U.S. Department of Transportation
United States Coast Guard

Commanding Officer(R)
USCG Electronics
Engineering Center

P. O. Box 60
Wildwood, NJ 08260-0060
(609) 523-7312

DEC 15 1993

ELECTRONIC FIELD CHANGE BULLETIN

F.C. NO. 16 TYPE 1 TO AN/FPN-44A LORAN TRANSMITTER SET

PURPOSE:

This Field Change replaces the existing High-Voltage Cage channel and rollers with the new style channel and rollers.

DESCRIPTION:

This Field Change consists of installing a new High-Voltage Cage channel and rollers to allow for smoother operation of the high-voltage cage doors.

EQUIPMENT AFFECTED:

This Field Change is applicable to all AN/FPN-44A Loran Transmitters.

IDENTIFICATION OF ACCOMPLISHMENT:

The accomplishment of this Field Change can be identified by the presence of a new High-Voltage Cage channel and new tan rollers.

MATERIALS REQUIRED:

Field Change Bulletin No. 16 to the AN/FPN-44A with enclosure (2) parts kit, National Stock Number (NSN) CG 5825-01-GL7-5202, and standard hand tools are required to perform this Field Change.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.25, Chapter 2.

DISTRIBUTION - SDL No. 131

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
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Eh: EMDs(Alameda, Kodiak, and Seattle) (2)

Non-standard Distribution (Continued on page 2)

2. Follow the step-by-step installation instructions provided in enclosure (1).

ROUTINE INSTRUCTIONS:

1. Record completion of this Field Change by an entry on the Field Change Accomplished Plate, NSN I 0264-LP-085-0000 (available from the Naval Publications and Forms Center, Philadelphia, PA) and on any other required records. Record as Field Change No. 16 to the AN/FPN-44A.

2. Maintenance support facilities shall maintain a library copy of this and all other applicable field change bulletins. Additional and replacement copies can be obtained from the Coast Guard Supply Center, Baltimore, MD (Code 341). Order directly, using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1372 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the Field Change has been accomplished and that applicable technical manual annotations and reports have been made.

S. W. CLARK

Encl: (1) Step-by-step Installation Instructions
(2) Parts List for Field Change No. 16

Non-Standard Distribution **(Continued from page 1)**

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STEP-BY-STEP INSTALLATION INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS FIELD CHANGE.

1. Secure all power to the standby transmitter by following the instructions that are outlined in Chapter 3, Pages 3-2/3-3, Paragraphs 3.2.2.4/3.2.2.5 of the AN/FPN-44A/B Technical manual.

> **WARNING**
> Follow all safety instructions outlined in the COMDTINST M10550.25 Chapter 2 when working on electronic equipment.

2. Remove both sliding doors by loosening the door positioning adjustment nut (top nut) and removing the door securing nut (bottom nut) on the roller shafts.

3. Remove the nut and bolt that goes through both walls of the roller channel on the left side.

4. Remove the nut and bolt directly above the nut and bolt that was removed in step 3.

5. Gently push the left cage away from the roller channel and slide all of the rollers out of the roller channel.

6. Remove the nut and bolt that goes through both walls of the roller channel on the right side.

7. Remove the roller channel by removing the eight screws that secure the roller channel to the channel mounting angle.

8. Install the new roller channel by reinstalling the eight screws that secure the roller channel to the channel mounting angle.

9. Install the nut and bolt that goes through both walls of the roller channel on the right side.

10. Slide new rollers into roller channel and gently push the left cage onto the new roller channel.

11. Reinstall the nut and bolt that was removed in step #3.

12. Reinstall the nut and bolt that was removed in step #4.

13. Install both sliding doors by attaching them to the roller shafts and adjusting them to the proper height.

14. Ensure both sliding doors close and lock properly. Switch transmitters and perform steps 1 through 13 on your new standby transmitter.

ENCLOSURE (2)

PARTS LIST FOR FIELD CHANGE #16

ITEM	QTY	DESCRIPTION	NSN
1	2	Roller channel	-----
2	10	Roller Assy.	3930-01-358-4019
3	2	F.C. No. 16 Bulletin	7610-01-GE8-1372

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FEB 12 1991

ELECTRONIC FIELD CHANGE BULLETIN

F. C. NO. 13 TYPE 2 TO AN/FPN-44A LORAN-C TRANSMITTER SET

PURPOSE:

The purpose of this field change is to replace the EIMAC Y711 tube-type, used as the AN/FPN-44A 2nd IPA, with the ITT 8C25N tube-type.

DESCRIPTION:

This field change replaces the EIMAC Y711 and its associated hardware with the ITT 8C25N tube and its associated hardware. This field change constitutes a change of tube-type/manufacturer only and neither adds nor deletes any associated circuitry.

IDENTIFICATION OF ACCOMPLISHMENT:

The presence of the ITT 8C25N tube-type vice the EIMAC Y711 tube-type as the 1A4V9 and 1A4V10 identifies completion of this field change.

EQUIPMENT AFFECTED:

This field change is applicable to all AN/FPN-44A transmitters operated into Sectionalized Loran Transmitting (SLT) antenna systems.

MATERIALS REQUIRED:

Parts listed in this field change parts list and standard hand tools are all that is required to complete this field change.

PROCEDURE:

NOTE: DO NOT INSTALL THIS FIELD CHANGE UNTIL ALL EXISTING SUPPLIES OF EIMAC Y-711 TUBES HAS BEEN EXHAUSTED.

DISTRIBUTION - SDL No. 129

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
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Da: Tokyo only (2 copies)
Eh: EMD(Kodiak, Alameda, Seattle, Honolulu, Cleveland only) 2 copies

Non-Standard Distribution: (Continued on page 2)

PROCEDURE: (Continued)

1. Follow all safety instructions outlined in COMDTINST M10550.25 Chapter 2.

2. Install field change in accordance with the step-by-step instructions contained in enclosure (1).

3. Update the parts lists of the technical manual, ERPAL, and APL in accordance with instructions contained in enclosure (3).

4. Accomplishment of this field change will take two technicians approximately 8 hours per transmitter. Recommend this field change be installed by senior experienced technicians, and that a representative of the area EMD be present during the installation of the field change.

ROUTINE INSTRUCTIONS:

1. Record completion of this field change by making an entry on the Field Change Accomplished Plate, NSN I 0264-00-086-0000, available from the Naval Publications and Forms Center, Philadelphia, PA, and on any other required records. Record as Field Change No. 13 to the AN/FPN-44A Transmitter sets.

2. Maintenance support facilities shall maintain a library copy of this and all other applicable field change bulletins. Additional and replacement copies can be obtained from Coast Guard Supply Center, Brooklyn, NY (Code 341). Order directly, using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1367 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the Field Change has been accomplished, and that applicable reports have been made.

G. MARTINI
Acting

Encl: (1) Step-by-step installation instructions for 8C25N
(2) Step-by-step Initial Burn-in instructions for 8C25N
(3) Parts List for 8C25N
(4) Test instructions and Data Record for 8C25N

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ELECTRONICS FIELD CHANGE BULLETIN AUG 2 8 1990

F.C. NO. 12/35 TYPE 1 TO AN/FPN-44A/45( ) TRANSMITTER SETS

PURPOSE:

The purpose of this field change is to reduce the amount of GTU failures caused by noise voltages induced on the GTU control lines by providing a ground sink on the control lines.

DESCRIPTION:

This field change provides instructions and materials needed to install a ground wire on 1A53A3A1TB5 for the AN/FPN-44A transmitters and 1A53A24A1TB5, 1A53A24A3TB5 for the AN/FPN-45( ) transmitters.

EQUIPMENT AFFECTED:

This field change is applicable to all AN/FPN-44A and AN/FPN-45( ) Loran transmitters.

IDENTIFICATION OF ACCOMPLISHMENT:

Accomplishment of this field change can be identified by the presence of two black wires attached to a ground on 1A53A3A1TB5 for the AN/FPN-44A and 1A53A24A1TB5, 1A53A2A3TB5 for the AN/FPN-45( ).

MATERIALS REQUIRED:

1. A Field Change No. 12/35 Parts Kit, CG 5825-01-GL7-4980, and standard hand tools are all that is needed to accomplish this Field Change.

2. The items provided in the Field Change Parts Kit are listed in enclosure (5) to this Field Change Bulletin.

DISTRIBUTION - SDL No. 128

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
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3. Distribution of the parts kit will be made by Coast Guard Electronics Engineering Center, Wildwood, NJ.

PROCEDURE:

1. Follow all safety instructions outlined in COMDINST M10550.25 Chapter 2.

2. Install this Field Change in accordance with the step-by-step instructions provided in enclosure (1) for the AN/FPN-44A and enclosure (3) for the AN/FPN-45( ) to this field change bulletin.

3. Incorporate the Technical Manual changes in accordance with the instructions contained in enclosure (2) for the AN/FPN-44A and enclosure (4) for the AN/FPN-45( ).

ROUTING INSTRUCTIONS:

1. Record completion of this field change by making an entry on the Field Change Accomplished Plate, NSN I0264-00-085-0000, (available from the Naval Publications and Forms Center, Philadelphia, PA), and on any other required records. Record as Field Change No. 12/35 to the AN/FPN-44A/45( ) Transmitter Sets.

2. Maintenance support facilities shall maintain a library copy of this and all other applicable Field Change Bulletins. Additional and replacement copies can be obtained from Coast Guard Supply Center, Brooklyn, NY (Code 341). Order directly, using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1366 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the Field Change has been accomplished, and that applicable reports have been made.

C. A. TEANEY
Acting

Encl: (1) AN/FPN-44A Field Change No. 12 Step-by-Step Instructions
(2) AN/FPN-44A Technical Manual Corrections
(3) AN/FPN-45( ) Field Change No. 35 Step-by-Step Instructions
(4) AN/FPN-45( ) Technical Manual Corrections
(5) Field Change No. 12/35 Parts List

AN/FPN-44A
STEP-BY-STEP INSTALLATION INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS FIELD CHANGE.

1. This Field Change will require the Standby Transmitter to be unusable for approximately 1/2 hour.

2. Secure power to the Standby Transmitter.

WARNING

Follow all safety instructions outlined in COMDTINST M10550.25 Chapter 2 when working on electronics equipment.

3. Using the Black 18-AWG wire (#1 of the F.C. parts kit) cut two pieces of wire, one 7" and one 4". Attach lug (#2) to one end of each wire.

4. Locate 1A53A3A1TB5 (figure 5-63, pg. 5-97 in the AN/FPN-44A Technical Manual).

5. Slide head of bolt (#3) into terminal board mounting bracket. Using two flat washers (#4), one lock washer (#5), and nut (#6) attach lug end of both wires from step 1.

6. Attach the 4" wire to 1A53A3A1TB5-1 using lug (#7).

7. Attach the 7" wire to 1A53A3A1TB5-7 using lug (#7).

8. Energize the transmitter into the dummy load to ensure proper operation.

9. Switch transmitters and perform steps 1 through 8 on the new Standby Transmitter.

AN/FPN-44A (CG-273-136)
TECHNICAL MANUAL CHANGES

1. Make the following pen and ink corrections in the AN/FPN-44A Technical Manual. At the bottom of each page, where pen and ink corrections are made, enter the following below the existing effective page entry: "F.C. No. 12 to the AN/FPN-44A".

a. Page 6-101/102, Figure 6-52: Attach a chassis ground symbol to 1A53A3A1TB5-7.

2. Insert a copy of this Instruction Sheet behind the front cover of the Technical Manual.

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APR 25 1989

ELECTRONICS FIELD CHANGE BULLETIN

F.C. NO. 11/34/33 TYPE 2 TO AN/FPN-44A/44/45 TRANSMITTER SET

PURPOSE:

The purpose of this field change is to increase the reliability of 1A4A1A3 V3 through V8 in the Feedback Amplifier.

DESCRIPTION:

This field change replaces type 6146B tubes with type 6146W tubes. It will take approximately one technician-hour to accomplish.

EQUIPMENT AFFECTED:

This field change is applicable to all AN/FPN-44A/44/45 Loran Transmitters with Field Change No. 3/25/23 (Feedback Modification) installed.

IDENTIFICATION OF ACCOMPLISHMENT:

This field change may be identified by the presence of type 6146W tubes installed for 1A4A1A3 V3 through V8 in the Feedback Amplifier.

MATERIALS REQUIRED:

Six type 6146W tubes (9N 5960-00-060-6565) are required to accomplish this field change and shall be supplied by the unit.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13 chapter 2.

2. Replace 1A4A1A3 V3 through V8 type 6146B tubes with type 6146W tubes.

DISTRIBUTION - SDL No. 126

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
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Continued on pages 2 and 3

3. Incorporate the technical manual changes in accordance with the instructions contained in enclosure (1).

4. Incorporate the Allowance Parts List (APL) changes in accordance with the instructions contained in enclosure (2).

ROUTINE INSTRUCTIONS:

1. Record completion of this field change by an entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000, available from NPFC, Philadelphia, and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other applicable field change bulletins. Additional and replacement copies can be obtained from Coast Guard Supply Center, Brooklyn, NY (Code 341). Order directly, using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1364 applies.

3. Upon completion, a copy of this field change bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the field change has been accomplished and that applicable reports have been made. Coast Guard Supply Center, Brooklyn, NY, will update the APL to reflect this change.

R. V. CICIRELLI

Encl: (1) AN/FPN-44A/44/45 technical manual changes
(2) APL corrections for AN/FPN-44A/44/45 APLs

Distribution - SDL No. 126 (Continued from page 1):

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ENCLOSURE (1)

AN/FPN-44A/44/45 TECHNICAL MANUAL
PEN-AND-INK CORRECTIONS

1. Make the following pen-and-ink corrections to CG -273-136 and CG-273-103 "SUPPLEMENT FOR FEEDBACK OPERATION":

a. On page 6-11, figure 6-35A (sheet 3), marked F.C. 3; change the tube-type for V3 through V8 to read "6146W."

b. On page 7-14, table 7-2, marked F.C. 9/32/32; change the tube-type for V3 to read "6146W."

2. Make the following pen-and-ink corrections to CG-273-136-1, "AN/FPN-45( ) SERVICE AND REPAIR":

a. On page 6-69/6-70, figure 6-29, (sheet 3), marked original; change the tube-type for V3 through V8 to read "6146W."

b. On page 7-33, table 7-2, marked F.C. 32; change the tube-type for 1A4A1A3 V3 to read "6146W."

3. Annotate all pen-and-ink corrected pages in the bottom left-hand corner with the following phrase: "F.C. No. 11/34/33 to AN/FPN-44A/44/45".

7610-01-GE8-1363

U.S. Department of Transportation
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FTS 346-7312

ELECTRONIC FIELD CHANGE BULLETIN NOV 2 0 1987

F. C. NO. 10 TYPE 2 TO AN/FPN/44A LORAN TRANSMITTING SET
F. C. NO. 33 TYPE 2 TO AN/FPN-44 LORAN TRANSMITTING SET

PURPOSE:

The purpose of this field change is provide instructions for replacement of 1A53A3S1 knife switch sections in the OP-109 Solid State Power Supply, when switch replacement is required..

DESCRIPTION:

This field change contains instructions and the required drill bits for installing new type switch sections. Switch section S1B may be changed with out changing S1A, however, if S1A is changed, S1B must also be changed. Because the switch sections are not high failure items, units should order the kit when the switch sections are ordered. The switch sections must be ordered by the unit when replacement is required.

EQUIPMENT AFFECTED:

This field change is applicable to all AN/FPN-44 and AN/FPN-44A OP-109 Solid State Power Supplies that require replacement of 1A53A3 S1 switch sections.

DISTRIBUTION - SDL No. 125

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Ejde Loran Station
DK-3814-Faeroe Island
Via Denmark

Commander(TES)

Telecom Station Leader
Williams Lake Loran-C Station
P. O. Box 4568
Williams Lake, BC, Canada V2G 2V8

IDENTIFICATION OF ACCOMPLISHMENT:

This Field Change may be identified by the presence of S1A part number DA8035MOD revision 1 and S1B part number DA8032MOD revision 1 installed in the 1A53A3 S1 assembly.

MATERIALS REQUIRED:

1. Standard hand tools, a field change parts kit, CG 5999-01-[illegible]-4823, and the required switch sections are needed to accomplish this field change.

2. The items required to install this field change are listed in enclosure (3) to this field change bulletin.

3. When switch replacement is required, units should order the field change kit from Supply Center, Brooklyn.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2.

2. Install the field change in accordance with the step-by-step instructions in enclosures (1) or (2) as appropriate.

3. Incorporate the technical manual changes in the AN/FPN-44A Technical Manual in accordance with the instructions contained in enclosure (4).

4. Incorporate Allowance Parts List (APL) changes in all OP-109 APLs in accordance with the instructions contained in enclosure (5).

5. Accomplishment of this field change will take approximately six man-hours.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report completion of this Field Change as Field Change No. 10 to the AN/FPN-44A and Field Change No. 33 to the AN/FPN-44 in accordance with current directives. Record completion by an entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000 (available from the Naval Publications and Forms Center, Philadelphia, PA), and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this, and all other applicable Field Change Bulletins. Replacement copies can be obtained from Coast Guard Supply Center, Brooklyn, NY (Code 341). Order directly, using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1363 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the Field Change has been accomplished, and that applicable reports have been made. Coast Guard Supply Center, Brooklyn, NY, will update the Allowance Parts List to reflect this change.

H. G. FLETCHER, JR.

Encl: (1) Step-by-step installation instructions for changing 1A53A3 S1B only
(2) Step-by-step installation instructions for changing both 1A53A3 S1A and S1B
(3) Parts List for Field Change No. 10/33 Parts Kit
(4) AN/FPN-44A (CG-273-136) Technical Manual Changes
(5) Allowance Parts List (APL) Corrections

Enclosure(4)

AN/FPN-44A (CG-273-136)
TECHNICAL MANUAL CHANGES

1. Make the following pen and ink corrections in the AN/FPN-44A Technical Manual. At the bottom of each page where pen and ink corrections are made enter the following below the existing effective page entry: "F.C. No. 10 to the AN/FPN-44A".

a. Page 7-74, Table 7-2. Change 1A53A3S1A, to read:"SWITCH, KNIFE: 3pdt, 500vac, 400 amp; 58308 part no. DA8035MOD Revision 1".

b. Page 7-74, Table 7-2. Change 1A53A3S1B, to read:"SWITCH, KNIFE: 3 pdt, 500vac, 60 amp; 58308 part no. DA8032MOD Revision 1".

c. Page 7-115, Table 7-3. Add the following at the bottom of the page; "58308, Filnor Inc. Knife Switch Division" Alliance, OH 44601.

2. Insert a copy of this Instruction Sheet behind the front cover of the Technical Manual.

U.S. Department of Transportation
United States Coast Guard

Commanding Officer(ml)
USCG Electronics
Engineering Center

P. O. Box 60
Wildwood, NJ 08260-0060
(FTS) 346-7312

JAN 1 1 1989

ELECTRONICS FIELD CHANGE BULLETIN

F.C. NO. 9 TYPE 1 TO AN/FPN-44A LORAN TRANSMITTING SET
F.C. NO. 32 TYPE 1 TO AN/FPN-44 LORAN TRANSMITTING SET
F.C. NO. 32 TYPE 1 TO AN/FPN-45 LORAN TRANSMITTING SET

PURPOSE:

The purpose of this field change is to replace terminal boards with printed circuit boards in the Input Amplifier 1A4A1A3 chassis, relocate the Standby Gain Adjust, and disable the Quiescent Current Meter.

DESCRIPTION:

This field change consists of replacing the presently installed 1A4A1A3 TB-5, TB-7, and TB-8 component boards with two printed circuit boards (1A4A1A3A1 AND 1A4A1A3A2), relocating the Standby Gain Adjust potentiometer to the front panel of the 1A4A1 drawer (1A4A1R1), and disabling the Quiescent Current Meter by removing 1A4S2.

EQUIPMENT AFFECTED:

This field change is applicable to all AN/FPN-44A transmitters with Field Change No. 3 installed, AN/FPN-44 transmitters with Field Change No. 25 installed, and AN/FPN-45 transmitters with Field Change No. 23 installed.

IDENTIFICATION OF ACCOMPLISHMENT:

Accomplishment of this field change can be identified by the presence of 1A4A1A3A1 and 1A4A1A3A2 printed circuit boards installed in 1A4A1A3 Input Amplifier, the Standby Gain Control on the front panel of 1A4A1 drawer, and a label located under the Quiescent Current Meter 1A4M11.

DISTRIBUTION - SDL No. 126

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B	*	2	*				10		105								2		10							
C																						2				
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MATERIALS REQUIRED:

1. A Field Change No. 9/32/32 Parts Kit (CG 5825-01-GL7-4749) and standard hand tools are required to accomplish this field change.

2. The items provided in the field change kit are listed in enclosure (2) to this bulletin. Each parts kit contains the parts necessary for two transmitters, and an initial allowance of ERPAL spares.

3. Distribution of the field change kits will be made by Coast Guard Supply Center, Brooklyn, NY.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13, Chapter 2.

2. Install the field change in accordance with the step-by-step instructions contained in enclosure (1).

3. Incorporate appropriate field change changes in the AN/FPN-44/45, AN/FPN-44A, AN/FPN-45( ) Technical Manuals, and the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44 and AN/FPN-45 Loran-C Transmitting Sets (Modified for Feedback Operation) in accordance with instructions contained in enclosures (4), (5), (6), and (7).

4. Incorporate APL corrections in the appropriate APLs in accordance with instructions contained in enclosure (8).

5. Accomplishment of this field change will take approximately six technician-hours.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report the completion of this field change as Field Change No. 9 to the AN/FPN-44A, Field Change NO. 32 to the AN/FPN-44, or Field Change No. 32 to the AN/FPN-45, as appropriate, in accordance with current directives. Record completion by entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000, available from NPFC, Philadelphia, and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other field change bulletins applicable to them. Additional copies can be obtained from Coast Guard Supply Center, Brooklyn, NY. Order directly using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1362 applies.

3. Upon completion, a copy of this field change bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the field change has been accomplished and reports have been made. Coast Guard Supply Center, Brooklyn, NY, will update the Allowance Parts Lists to reflect this change.

R. V. CICIRELLI

Encl: (1) Step-by-step installation instructions
(2) Parts list for Field Change No. 9/32/32 Parts Kit
(3) Transmitter Bias Adjustment instructions
(4) AN/FPN-44/45 (CG-273-103) Technical Manual changes
(5) AN/FPN-44A (CG-273-136) Technical Manual changes
(6) AN/FPN-45( ) (CG-273-136-1) Technical Manual changes
(7) AN/FPN-44A, AN/FPN-44 and AN/FPN-45 (Modified for Feedback Operation) Technical Manual Supplement changes
(8) Allowance Parts List corrections

Distribution - SDL No. 126 (Continued from page 1):

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STEP-BY-STEP INSTALLATION INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS FIELD CHANGE.

1. This field change will require the standby transmitter to be unusable for approximately three hours.

2. Secure power to the standby transmitter.

WARNING

Follow all safety instructions outlined in COMDTINST M10550.13, Chapter 2 when working on electronic equipment.

3. Use parts locator drawings figure 1 and figure 2 for the following.

a. Using Table 1, determine what type of transmitter you have, and if necessary, remove R1 and R2 from printed circuit board (PCB) 1A4A1A3A1, (#1 of the F.C. parts kit).

b. Using Table 1 and the parts list [enclosure (2)], install the proper value resistor (items #4 or #5) for R73, and (items #6 or #7) for R76 on PCB 1A4A1A3A2 (item #2).

Table 1

	1A4A1A3A1		1A4A1A3A2	
TRANSMITTER	R1	R2	R73	R76
G001 AN/FPN-44/44A No Signal Conditioner	51ohm	51ohm	390ohm	120ohm
G002 AN/FPN-45 LORSTA George only	51ohm	51ohm	270ohm	220ohm
G003 AN/FPN-45 with Signal Conditioner	OPEN	OPEN	270ohm	220ohm
G004 AN/FPN-44/44A with Signal Conditioner	OPEN	OPEN	390ohm	120ohm
G005 AN/FPN-45 No Signal Conditioner	51ohm	51ohm	270ohm	220ohm

c. Ensure the selected resistor values correspond with the resistors presently installed on 1A4A1A3TB7 and 1A4A1A3TB8 in your transmitter.

4. Remove all cover plates from the 1A4A3 Input Amplifier chassis.

NOTE:

Prefix all reference designations with 1A4A1A3. Wire colors may be different at some installations.

5. Unsolder the blue/brown/white wire from TB8-E13. Label one wire marker (#8) E4, and slip it on the wire. Attach a terminal lug (#9) to the free end of the wire.

6. Unsolder the red/green/white wire from TB8-E16. Label one wire marker (#8) E5, and slip it on the wire. Attach a terminal lug (#9) to the free end of the wire.

7. Disconnect J1.

8. Unsolder the white wire between TB8-E2 and J1. Attach a terminal lug (#9) to the end of the wire removed from TB8-E2. Label one wire marker (#8) E6, and slip it on the wire. Resolder the other end of the wire to its original position on J1.

9. Unsolder the white wire between TB8-E1 and J1. Attach a terminal lug (#9) to the end of the wire removed from TB8-E1. Label one wire marker (#8) E7, and slip it on the wire. Resolder the other end of the wire to its original position on J1.

10. Reconnect J1.

11. Two red wires are connected to TB8-E37. Note: E21 used at some installations. Fabricate a new wire to replace the red wire between TB8-E37 and TB7-E69. With an 12" piece of red wire (#10), label one wire marker (#8) E8, and attach it to the end of the red wire closest to TB8. Label one wire marker (#8) E3, and attach it to the end of the red wire closest to TB7. Place, but do not connect, the new wire between TB8-E37 and TB7-E69. Attach terminal lugs (#9) to each end of red wire.

12. Unsolder the remaining red wire from TB8-E37. Label one wire marker (#8) E8, and slip it on the wire. Attach a terminal lug (#9) to the free end of the wire.

13. Unsolder the two purple wires from TB8-E34. Label two wire markers (#8) E9, and slip one on each of the purple wires. Attach one terminal lug (#9) to the free end of each purple wire. (One purple wire may have to be pulled through TB8 before attaching label and lug.)

14. Fabricate a new wire to replace the green wire between TB8-E44 and TB7-E61. With a 14" piece of green wire (#11), label one wire marker (#8) E10, and attach it to the end of the wire closest to TB8. Label one wire marker (#8) E1, and slip it on the side closest to TB7. Place, but do not connect, the new wire between TB8-E44 and TB7-E61. Attach a terminal lug (#9) to both ends of the new green wire.

15. Remove and discard the red/white wire between TB8-E14 and S1(2).

16. Remove TB8 from the Input Amplifier chassis by removing the four phillips screws holding TB8 to the metal standoffs (save these screws for later use).

NOTE:

Refer to figure 3 during steps 17 through 22.

17. As shown in figure 3, mark and drill a hole for 1A4A1R1 using drill bit (#12). (Place a wood block behind panel to protect transformer 1A4A1A3T2.)

18. Using figure 3 as a guide, mount new 1A4A1R1 (#3) in the hole drilled in step 17.

19. Attach decal (#13) on front panel over 1A4A1R1.

20. Cut a 24" piece of black wire (#14). Connect, but do not solder, one end of this wire to lug #3 of 1A4A1R1. Label one wire marker (#8) E3, and slip on the free end of the wire.

21. Cut a 24" piece of coaxial cable (#15). Solder the coaxial cable center conductor to terminal #1 of 1A4A1R1, and connect, but do not solder, the shield to terminal #3. Label one wire marker (#8) E1, and slip it on the free end of the cable.

22. Cut another 24" piece of coaxial cable (#15). Solder the center conductor to terminal #2 of 1A4A1R1. Solder the shields and the wire from step 20 to terminal #3. Label one wire marker (#8) E2, and slip it on the free end of the cable.

23. Using figure 4, drill a hole, as marked on the Feedback Control Drawer, using drill bit (#16).

24. Install a rubber grommet (#17) in the hole made in step 23.

25. Remove and discard the red wire between TB5-E55 and TB7-E69.

26. Unsolder the green wire from TB5-E54. Label one wire marker (#8) E9, and slip it on the wire. Attach a terminal lug (#9) to the free end of the wire.

27. Remove and discard the green/white wire between TB5-E60 and TB7-E80.

28. Remove TB5. Save the four mounting screws for later use.

29. Remove the excess metal standoffs indicated on figure 5. Relocate remaining standoffs, as necessary, for mounting A2.

30. Install PCB A1 (#1), so that Q13 and Q11 are at the top of the chassis, using screws removed in step 16.

31. Route the three cables connected to 1A4A1R1 along the bottom of the 1A4A1 chassis through the rubber grommet, installed in step 22, to the A1 enclosure.

32. Using station supplies, tie-wrap the three cables from 1A4A1R1 to the existing 300-ohm TV cable (Belden 8290).

33. Trim back the braided shield about one-inch from the free ends of the coaxial cables, fabricated in steps 21 and 22, and cover with heat shrink (#18). Install a terminal lug (#9) on the free end of each of the three cables from 1A4A1R1 (steps 20, 21, and 22).

34. Install a "U" terminal lug (#19) to E8 and E9 of A1.

35. Connect wires labeled in the preceding steps to their respective terminal lug tabs on A1. Use figure 1 for tab locations.

36. Cut a 7" piece of white wire (#20), and attach a terminal lug (#9) to one end. Label a wire marker (#8) E2, and attach to the end of the wire closest to the terminal lug. Replace the wire between TB7-E63 and E100 with this new wire. Solder the free end of the wire to E100.

37. Cut an 8" piece of white wire (#20), and attach a terminal lug (#9) to one end. Label a wire marker (#8) E6, and attach to the end of the wire closest to the terminal lug. Replace the wire between TB7-E79 and E102 with this new wire. Solder the free end of the wire to E102.

38. Cut an 8" piece of violet wire (#21), and attach a terminal lug (#9) to one end. Label a wire marker (#8) E5, and attach to the end of the wire closest to the terminal lug. Replace the wire between TB7-E88 and E103 with this new wire. Solder the free end of the wire to E103.

39. Unsolder the orange/yellow-white wire from TB7-E82. Label one wire marker (#8) E4, and slip it on the wire. Attach a terminal lug (#9) to the free end.

40. Unsolder the orange/yellow-white wire from TB7-E73. Label one wire marker (#8) E7, and slip it on the wire. Attach a terminal lug (#9) to the free end.

41. Unsolder the purple wire from TB7-E87. Label one wire marker (#8) E8, and slip it on the wire. Attach a terminal lug (#9) to the free end.

42. Unsolder the red wire from TB7-E69. Label one wire marker (#8) E3, and slip on the red wire attached to S1. Attach a terminal lug (#9) to the wire.

43. Remove TB7. Save the mounting hardware for later use.

44. Install new PCB A2 (#2) using mounting hardware removed in steps 34 and 42.

45. If desired, shrink the newly installed wire markers with a heat gun.

46. Install a "U" terminal lug (#19) to E3 on PCB A2.

47. Connect wires labeled in the preceding steps to their respective terminal lug tabs on A2. Use figure 2 for tab locations.

48. Remove wire between TB2-1 and S1-1.

49. Operate the transmitter into the dummy load to ensure proper operation.

50. After proper operation is obtained, proceed with the following steps.

51. Secure power to the standby transmitter.

52. Label 12 wire markers (#8) "F.C. 9/32/32".

53. Disconnect the following wires and place a label from step 52 on each end. Use approximately 1" of heat shrink (#18) to terminate each end.

From	To
1A4S2-1	1A4TB9-9
1A4S2-5	1A4TB9-10
1A4S2-9	1A4TB6-10
1A4S2-10/12	1A4TB4-7
1A4TB5-9	1A4M11 (Quiescent Current Meter)
1A4TB6-10	1A4P6-23

54. Remove the following wires:

From	To
1A4P6-23	1A4A1A3TB2-1
1A4S2-4/6	1A4M11 (Quiescent Current Meter)
1A4S2-2/3/7/8	1A4M11 (Quiescent Current Meter)

55. Remove 1A4S2 and insert rubber plug (#25) into the hole.

56. Using terminal lugs (#22) and black wire (#23), connect 1A4TB9-9 to 1A4TB9-10.

57. Using terminal lugs (#22) and black wire (#23) connect 1A4TB9-10 to 1A4TB5-9.

58. Place label (#24) below Quiescent Current Meter (1A4M11).

59. Energize transmitter into dummy load to ensure proper operation. Perform Bias Adjust following procedures as listed in enclosure (3).

60. Switch transmitters and perform steps 1 through 59 on the new standby transmitter.

61. Using the instructions in enclosures (4), (5), (6), and (7) complete the changes to the appropriate Technical Manuals.

62. Modify spare PCBs (1) and (2) by performing steps 3a through 3c.

63. Using the instructions in enclosure (8), complete the corrections to the appropriate APLs.

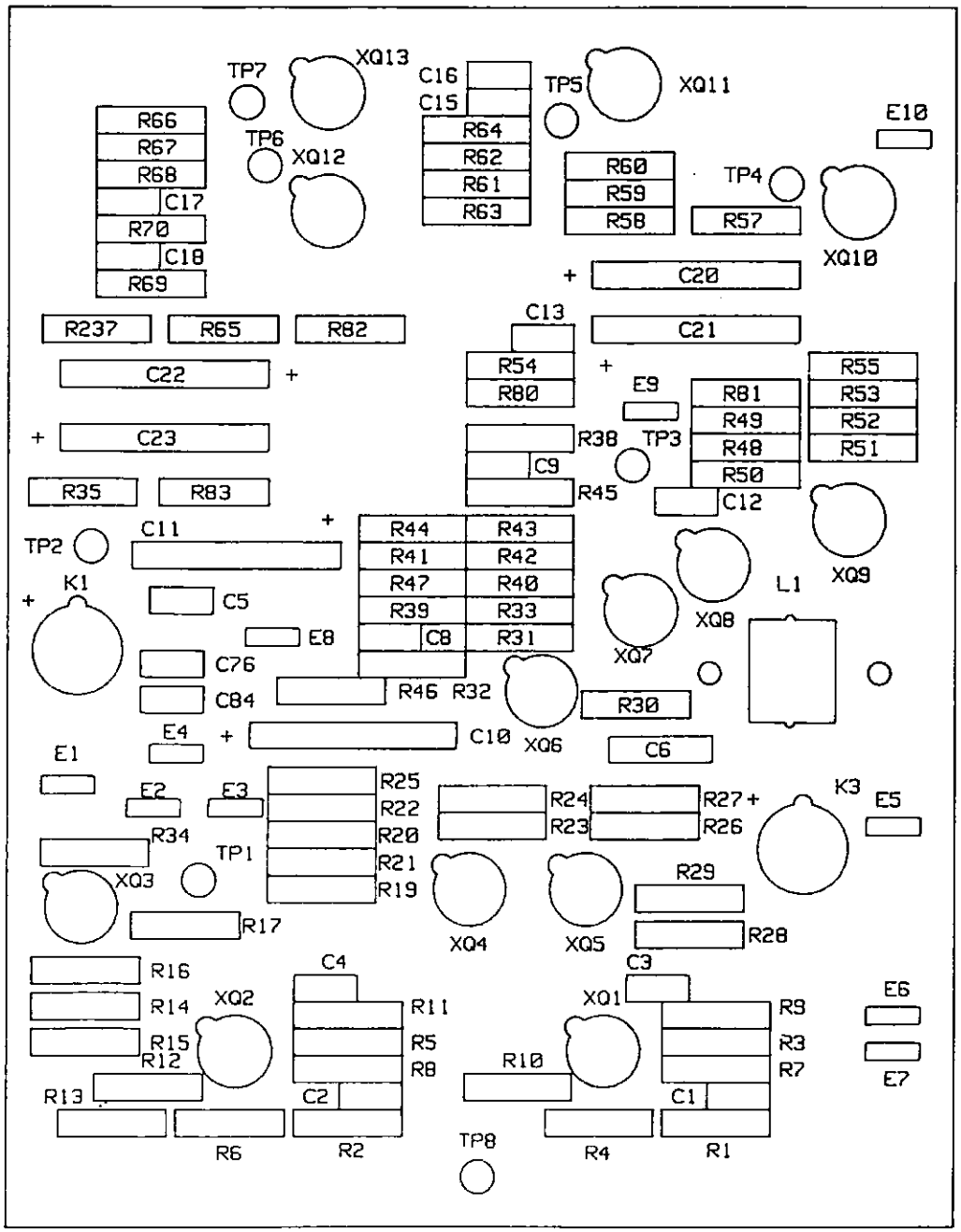


FIGURE 1.

PARTS LOCATION OF 1A4A1A3A1

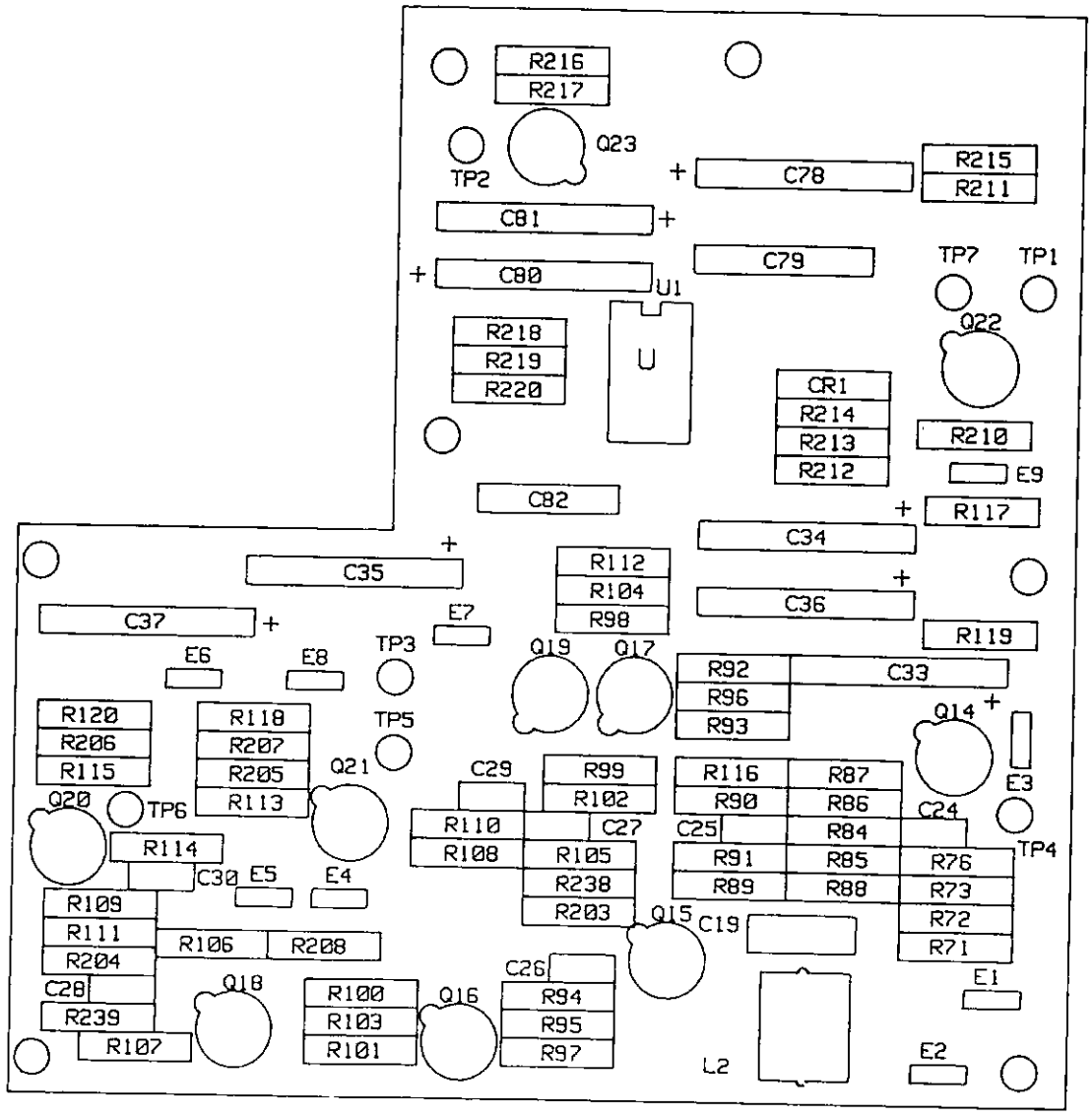


FIGURE 2

PARTS LOCATION OF 1A4A1A3A2

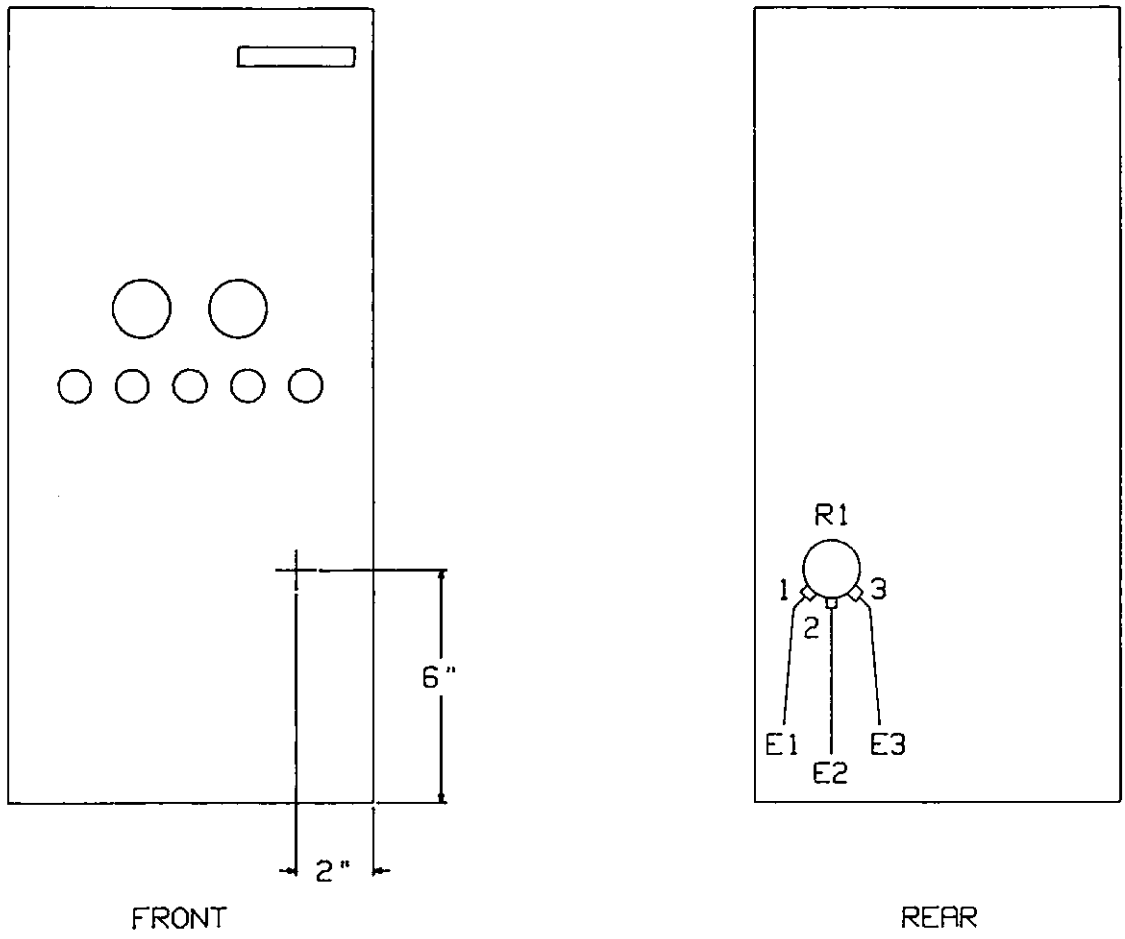
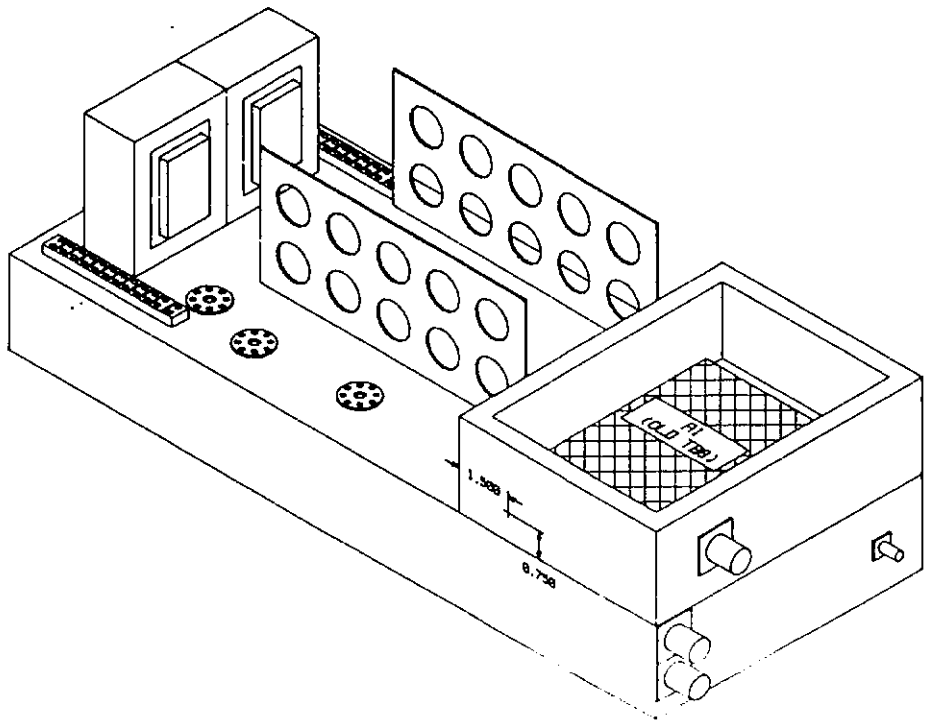
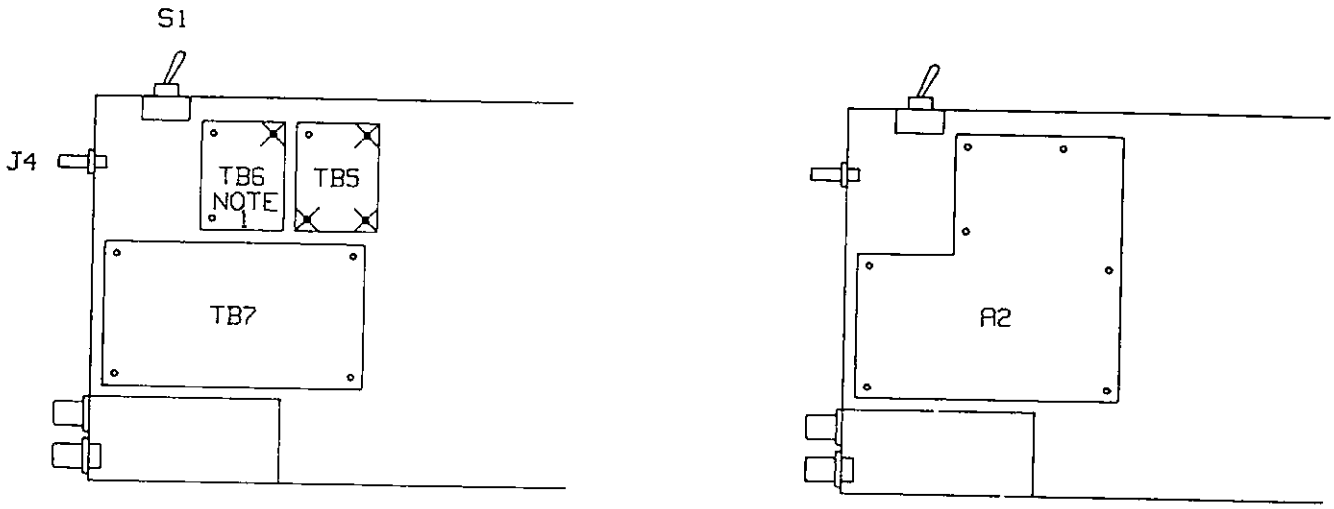


FIGURE 3. FEEDBACK CONTROL DRAWER (1A4A1) FRONT PANEL





X SIGNIFIES STAND-OFFS TO BE REMOVED

NOTE 1: TB6 WAS REMOVED BY A PREVIOUS FIELD CHANGE.

FIGURE 5. FEEDBACK CONTROL DRAWER (1A4A1) LEFT VIEW

AN/FPN-44A (CG-273-136)
TECHNICAL MANUAL CHANGES

1. Make the following pen and ink corrections to the AN/FPN-44A Technical Manual. At the bottom of each page where pen and ink corrections are made enter the following below the existing effective page entry: "F.C. No. 9 to the AN/FPN-44A".

a. Page iiA; add to end of List of Effective Pages, "NOTE: The following pages have been changed or corrected by Field Change No. 9/32/32 to the AN/FPN-44A/44-45/45( ): 1-2, 2-15, 3-3, 3-4, 4-10, 4-43, 4-57/58, 4-69, 5-9/10, 5-17/18, 5-53, 5-60, 5-61, 6-5, 6-33, 6-34, 6-35, 6-36, 6-36A/B, 6-61, 7-9, 7-18, 7-23."

b. Page 5-ii; add to the end of List of Effective Pages, "The following pages are changed or corrected for Field Change No. 9/32/32 to the AN/FPN-44A/44-45/45( ), 5-9/10, 5-17/18, 5-53, 5-60, 5-61."

c. Page 6-ii; add to the end of List of Effective Pages, "The following pages are changed or corrected by Field Change No. 9/32/32 to the AN/FPN-44A/44-45/45( ), 6-5, 6-33, 6-34, 6-35, 6-36, 6-36A/B, 6-61."

d. Page 1-2, paragraph 1-5.k; change "280 VAC" to "208 VAC."

e. Page 2-15/2-16, Table 2-4; delete step 14.

f. Page 3-3, Figure 3-1; delete "QUIESCENT CURRENT", "TURN TO READ" and "PA CATHODE".

g. Page 3-4, Table 3-1; delete all reference to PANEL MARKING "QUIESCENT CURRENT" and "QUIESCENT CURRENT PA CATHODE".

h. Page 4-10, paragraph 4-3b(1)(b); change 1A4R212 to 1A4A1R1. Delete the fifth sentence.

i. Page 4-43, paragraph 4-3r(1)(k); change "controlled by two relays." to "controlled by one relay." and "mode, one relay" to "mode, this relay". Delete the last sentence.

j. Page 4-57/4-58, Figure 4-15, Note 3; add "and F.C. 9".

k. Page 4-69, paragraph 4-3r(3)(e)1; delete last sentence.

l. Page 5-9/5-10, Figure 5-1; delete all reference to QUIESCENT CURRENT PA CATHODE meter.

m. Page 5-17/5-18, Figure 5-1, Note 2; add "and F.C. 9".

n. Page 5-53, Figure 5-19; delete S2.

o. Page 5-60, Figure 5-28; delete "A1R1 hidden", add "A1R2 hidden".

p. Page 5-61, Figure 5-29, at the location shown in Enclosure (1) Figure 3; add "R1 STANDBY DRIVE LEVEL ADJUST".

q. Page 6-5, Figure 6-3; delete "QUIESCENT CURRENT", "TURN TO READ" and "PA CATHODE".

r. Page 7-9, Table 7-2, 1A4M11 NOTE; add "No longer used".

s. Page 7-18, Table 7-2; delete all reference to 1A4S2.

t. Page 7-23, Table 7-2; change 1A4A1R1 to

"1A4A1R1	Resistor, variable, 1 kOhm, Type RV4LAYSA102A	STBY DRIVE LEVEL ADJUST, Figure 5-29"

u. Page 7-23, Table 7-2; delete 1A4A1R2.

v. Page 7-51, Table 7-2; delete all reference to 1A12R1.

2. Remove superseded pages, and insert revised pages as indicated.

Page	Remove	Insert
6-33/6-34	CHANGE 2/3	F.C. No. 9/32/32
6-35/6-36	CHANGE 2/3	F.C. No. 9/32/32
6-36A/6-36B	ORIGINAL	F.C. No. 9/32/32
6-61/6-62	CHANGE 3	F.C. No. 9/32/32

3. Insert a copy of this Instruction Sheet behind the front cover of the Technical Manual.

ENCLOSURE (7)

AN/FPN-44A, AN/FPN-44/45
SUPPLEMENT TECHNICAL MANUAL CHANGES

1. Make the following pen and ink corrections in the AN/FPN-44A, AN/FPN-44, and AN/FPN-45 Supplement to Technical Manual (Modified for Feedback Operation). At the bottom of each page where pen and ink corrections are made enter the following below the existing effective page entry: "F.C. No. 9/32/32".

a. Page iv; change description of Figure 5-2 to read, "PARTS LOCATION, REFERENCE AMPLIFIER (1A4A1A3A1) CIRCUIT BOARD".

b. Page iv; change description of Figure 5-4 to read, "PARTS LOCATION, PEDESTAL GENERATOR/DIFFERENCE PREAMPLIFIER (1A4A1A3A2) CIRCUIT BOARD".

c. Page 4-1; delete line 4-1c(7), "The Low Pass.....Network".

d. Page 4-4, Figure 4-1. In block above STANDBY DRIVE, delete K2 and SIGNAL DISABLE. Delete SIGNAL DISABLE input.

e. Page 6-12; change C16 from "470" to "525".

f. Page 6-12; TB3, Pin 9 connects to "11" vice "10".

g. Page 6-14, Figure 6-41, at D-14, D-15; change R45 and R46 "375W" to "150W".

2. Remove superseded pages, and insert revised pages in the AN/FPN-44A/44/45 Technical Manual Supplement as indicated.

Page	Remove	Insert
4-9/4-10	Original	F.C. No. 9/32/32-F.C. No. 9/32/32
5-1/5-2	Original	Original/F.C. No. 9/32/32
5-3/5-4	F.C. No. 6/29/28	F.C. No. 9/32/32-F.C. No. 9/32/32
5-5/5-6	Original	F.C. No. 9/32/32-F.C. No. 9/32/32
6-1/6-2	Original	F.C. No. 9/32/32-F.C. No. 9/32/32
6-7	F.C. No. 6/29/28	F.C. No. 9/32/32
6-9	Original	F.C. No. 9/32/32
6-10	Original	F.C. No. 9/32/32
7-5 through 7-21	Original	F.C. No. 9/32/32

U.S. Department of Transportation
United States Coast Guard

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FTS 346-7312

16 January 1987

ELECTRONIC FIELD CHANGE BULLETIN

F. C. NO. 31 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET
F. C. NO. 31 TYPE 1 TO AN/FPN-45 LORAN-C TRANSMITTING SET
F. C. NO. 8 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET

PURPOSE:

The purpose of this field change is to reduce failures to the 1A4P6-1A4A1J1 combinations in the Amplifier Group, OA-4483/FPN-44, OA-4479/FPN-45 or OG-159/FPN-44A.

DESCRIPTION:

This field change replaces the 1A4P6 - 1A4A1J1 connector combination with two twenty-terminal barrier strips.

EQUIPMENT AFFECTED:

This field change is applicable to all AN/FPN-44, AN/FPN-44A and AN/FPN-45 transmitters with the Feedback Modification installed. The Feedback Modification is Field Change No. 3 to AN/FPN-44A, Field Change No. 25 to AN/FPN-44, or Field Change No. 23 to AN/FPN-45.

IDENTIFICATION OF ACCOMPLISHMENT:

The presence of two barrier strips marked TB1A and TB1B on the rear of the 1A4A1 drawer will identify accomplishment of this field change.

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MATERIALS REQUIRED:

1. Standard hand tools and a field change parts kit, CG 5825-01-GL7-4716, are needed to accomplish this field change.

2. The items provided in the field change parts kit are listed in enclosure (2) to this field change bulletin.

3. Distribution of the field change parts kit will be made by Coast Guard Electronics Engineering Center, Wildwood, NJ.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2.

2. Install the field change in accordance with the step-by-step instructions in enclosure (1).

3. Incorporate appropriate technical manual changes in the AN/FPN-44/45, AN/FPN-44A, AN/FPN-45( ) Technical Manuals and the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44 and AN/FPN-45 LORAN-C TRANSMITTING SETS (Modified for Feedback Operation) in accordance with instructions contained in enclosures (3), (4), (5), and (6) as appropriate.

4. Incorporate Allowance Parts List (APL) changes in all AN/FPN-44/44A/45 APLs in accordance with the instructions contained in enclosure (7).

5. This field change will take approximately five technician-hours to accomplish.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report completion of this field change as Field Change No. 31 to the AN/FPN-44, Field Change No. 8 to the AN/FPN-44A or Field Change No. 31 to the AN/FPN-45, as appropriate, in accordance with current directives. Record completion by entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000 (available from the Naval Publications and Forms Center, Philadelphia, PA), and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other field change bulletins applicable to them. Additional or replacement copies can be obtained from Coast Guard Supply Center, Brooklyn, NY. Order directly using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1361 applies.

JAN 16 1987

3. Upon completion, a copy of this field change bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the field change has been accomplished and reports have been made. Coast Guard Supply Center, Brooklyn, NY, will update the Allowance Parts List to reflect this change.

H. G. FLETCHER, JR.

Encl: (1) Step-by-step installation instructions
(2) List of parts contained in field change kit
(3) AN/FPN-44/45 (CG-273-103) technical manual changes
(4) AN/FPN-44A (CG-273-136) technical manual changes
(5) AN/FPN-45( ) (CG-273-136-1) technical manual changes
(6) AN/FPN-44A/44/45 Feedback Modification Technical Manual Supplement Changes
(7) APL Change Instructions for AN/FPN-44A/44/45 APLs

STEP-BY-STEP INSTALLATION INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS FIELD CHANGE.

1. The installation of this field change will require that the standby transmitter be unusable for approximately five hours. Notify all concerned in accordance with local instructions.

2. Operate the Standby transmitter with plate voltage applied into the dummy load and ensure proper operation prior to commencing this field change.

3. Secure the standby transmitter and shut off the 460 VAC and 208 VAC wall breakers.

WARNING

Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2 during the installation of this Field Change.

4. Loosen the two holding screws and unplug 1A4P6 from 1A4A1J1. Un-wrap the spiral wrap on the cable bundle to P6 a sufficient length to allow re-dressing of the wires.

5. Remove J1 from the 1A4A1 chassis by removing the mounting hardware.

6. Using the wire markers (#1 of F.C. parts kit), mark the wires connected to 1A4P6 and 1A4A1J1 with their corresponding pin numbers. Cut all wires from 1A4P6 and 1A4A1J1, make cut approximately 1/2" from solder joint.

7. Using the No. 20 white/blue wire (#13), replace the existing No. 22 white/blue wire which was connected from 1A4A1J1-11 to 1A4A1TB1-4. Ty-wrap to existing cable run using ty-wraps (#17).

NOTE

For the following five steps refer to Figure (1) for approximate locations of the new barrier strips.

8. Place the bottom of the marker strip (#2) 8 1/4 inches from the bottom of the 1A4A1 chassis and the right edge of the marker strip 3/16 inch from the left edge of the oval cable entry hole in the chassis. Mark four mounting holes on the chassis where the holes in the marking strip are located.

9. Place the bottom of the marker strip (#3) 8 1/4 inches from the bottom of the 1A4A1 chassis and the left edge of the marking strip 3/4 inch from the right edge of the oval cable entry hole in the chassis. Mark four mounting holes on the chassis where the holes in the marking strip are located.

NOTE

Place rags over components below 1A4A1 chassis to catch drill shavings.

10. Center punch and drill, using the drill bit (#14), eight mounting holes at the marks made in the preceding steps.

NOTE

Care should be exercised when installing the thread inserts. If the inserts are not tightened enough they will spin in the chassis. If they are tightened excessively, the threads will be stripped. We highly recommend obtaining a piece of 3/32" thick aluminum to practice using the tool and inserts prior to inserting the threads in the chassis. Sufficient extra inserts are provided in the kit.

11. Mount the thread inserts (#15) in the holes drilled in step 9 with the tool provided (#16).

12. Using the barrier block jumpers (#8) make the following connections on the inside (toward oval cutout side) of the barrier strips, see figure (1) for a diagram of jumpers and connections to the barrier strips:

NOTE

Not all jumpers are required but they should all be installed.

(a) Right side of (TB1A): Terminals 1 to 2; 2 to 3; 6 to 7; 7 to 8; 17 to 18; and 18 to 19.

(b) Left side of (TB1B): Terminals 26 to 27; 27 to 28; 30 to 31; 32 to 33; and 34 to 35.

13. Connect the fanning strip (#6) to the outside terminals (opposite jumpers) of the barrier strip for (TB1A). Connect the fanning strip (#7) to the outside terminals of the barrier strip for (TB1B). Use needle nose pliers to bend appropriate tabs on fanning strips leaving sufficient space for wire to be inserted.

14. Mount the left (TB1A) barrier strip and the marker strip, number 1 - 20 (#2), in the holes to the left of the oval cable entry hole. Use hardware provided (#5). Using (#9), label this barrier strip TB1A.

15. Mount the right (TB1B) barrier strip and the marker strip, number 21 - 40 (#3), in the holes to the right of the oval cable entry hole. Use hardware provided (#5). Using (#9), label this barrier strip TB1B.

16. Place approximately 1/2 inch of shrink tubing (#10) on each wire removed from 1A4P6.

NOTE

Refer to NAVSHIPS 900,000.101 figure 23-16 for proper cable and wire routing.

Trim wires to correct length using the above note. Strip approximately 3/8 inch of insulation from the ends of the wires and tin the wire ends. Solder each wire to the fanning strip. Wires numbered 1 through 20 go to corresponding terminals 1 through 20 on the left barrier strip (TB1A). Wires numbered 21 through 34 go to corresponding terminals 21 through 34 on the right barrier strip (TB1B). After making all solder connections, move the heat shrink tubing over the connection and shrink using a heat gun or hair dryer.

17. Using the lugs (#11), connect the wires removed from 1A4A1J1 as marked in step 6 to the inside terminals of the barrier strips. Wires numbered 1 through 20 go to corresponding terminals 1 through 20 on the left barrier strip (TB1A). Wires numbered 21 through 34 go to corresponding terminals 21 through 34 on the right barrier strip (TB1B).

18. Using the existing spiral wrap and that provided (#12), dress wrap the cable bundles to the two fanning strips.

19. Record accomplishment of the field change on the Equipment Field Change Accomplished Plate located on the front of the Control Console.

20. Installation of this field change is now complete for one transmitter. When the transmitter has been checked and proper operation verified, notify all concerned in accordance with local instructions.

21. Repeat this procedure for the other transmitter.

22. Using appropriate enclosures (3), (4), (5) and (6), complete the Field Change Technical Manual Corrections to the AN/FPN-44/45, AN/FPN-44A, AN/FPN-45(), and/or the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44 and AN/FPN-45 (Modified for Feedback Operation).

23. Using enclosure (7), complete the APL corrections.

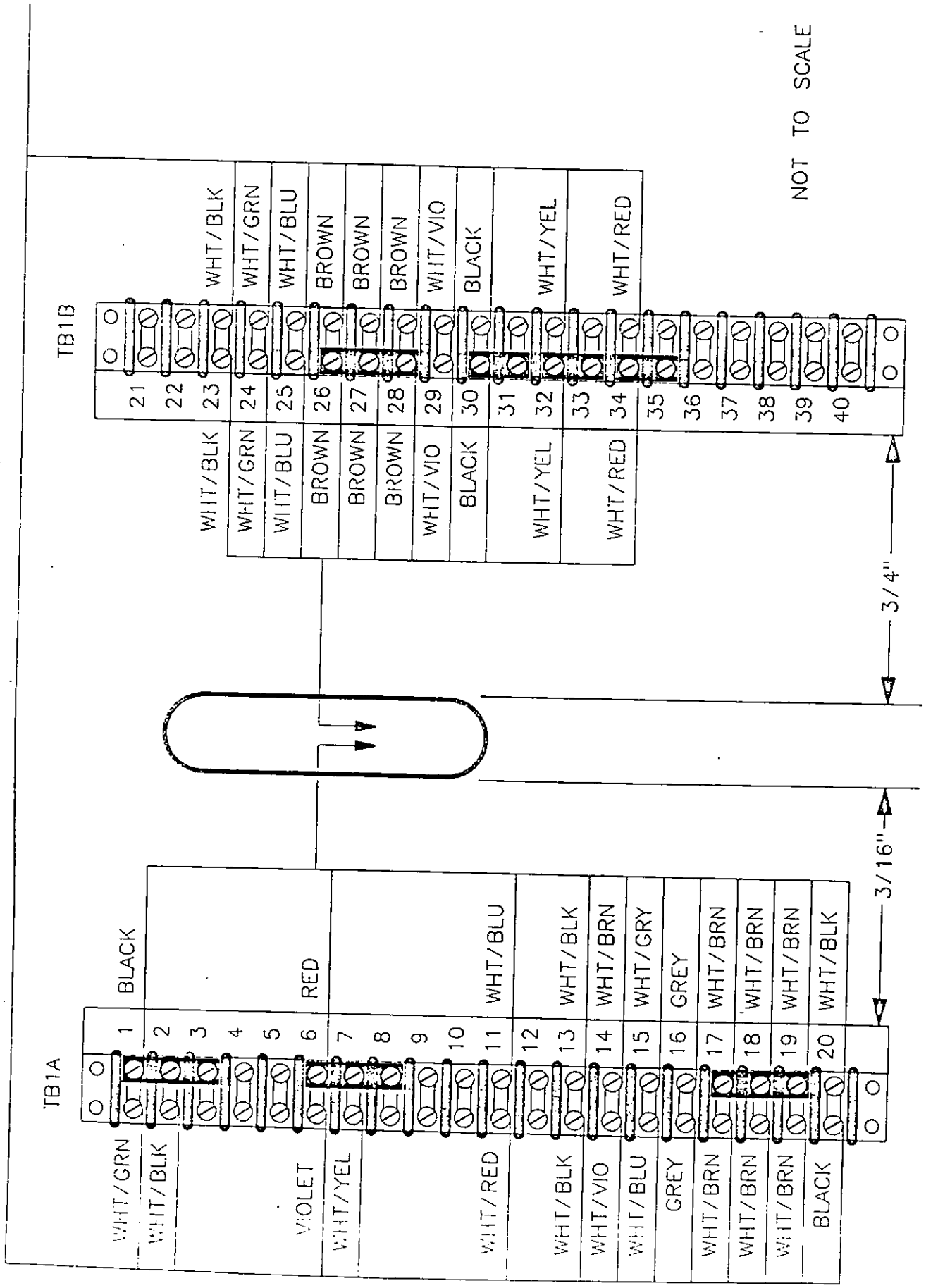

Figure 1

F. C. NO. 8/31/31 TYPE 1 TO THE AN/FPN-44A/44/45 LORAN-C TRANSMITTING SETS

Enclosure (4)

AN/FPN-44A (CG-273-136)
TECHNICAL MANUAL CHANGES

Make the following pen and ink corrections in the AN/FPN-44A Technical Manual. At the bottom of each page where pen and ink corrections are made replace, as appropriate, the ORIGINAL or CHANGE 2 or CHANGE 3 at the bottom of the page with: "F.C. No. 31/8 to the AN/FPN-44/44A".

1. Page ii, at the bottom of the page add the following: "NOTE: The following pages have been changed or corrected by F.C. No. 8 to the AN/FPN-44A or F.C. No. 31 to the AN/FPN-44: 6-61/6-62 and 6-63/6-64".

2. Page iiA/iiB, at the bottom of the page add the following: "NOTE: The following pages have been corrected by F.C. No. 8 to the AN/FPN-44A or F.C. No. 31 to the AN/FPN-44: 7-9 and 7-23".

3. Page 6-ii, at the bottom of the page add the following: "NOTE: The following pages have been corrected by F.C. No. 8 to the AN/FPN-44A or F.C. No. 31 to the AN/FPN-44: 6-61/6-62 and 6-63/6-64".

4. Page 6-61/6-62: Change P6(1A4A1J1) to "P6(1A4A1TB1) See Note 6", 3 places at the following locations: 6A, 16A, and 19C. In Zone 3B add: "6. P6A(1A4A1TB1A) contains terminals 1 - 20 and P6B(1A4A1TB1B) contains terminals 21 - 40."

5. Page 6-63/6-64: Change P6(1A4A1J1) To "P6(1A4A1TB1) See Note 3", in the upper left of the figure.

6. Page 6-63/6-64: Delete 120 VAC and pin 27 in the lower left of the figure.

7. Page 6-63/6-64: After Note 2 add: "3. P6A(1A4A1TB1A) contains terminals 1 - 20 and P6B(1A4A1TB1B) contains terminals 21 - 40".

8. Page 7-ii, at the bottom of the page add the following: "NOTE: The following pages have been corrected by F.C. No. 8 to the AN/FPN-44A or F.C. No. 31 to the AN/FPN-44: 7-9 and 7-23".

9. Page 7-9 replace REF. DESIG. 1A4P6, its NAME AND DESCRIPTION and its LOCATING FUNCTION with the following:

REF. DESIG.	NOTES	DESCRIPTION	LOCATING FUNCTION
1A4P6A		Fanning Strip 71785 part no. 20-160-L	Exciter Drawer Input Terminals 1 - 20.
1A4P6B		Fanning Strip 71785 part no. 20-160-R	Exciter Drawer Input Terminals 21 - 40

10. Page 7-23 replace REF. DESIG. 1A4A1J1, its NAME AND DESCRIPTION and its LOCATING FUNCTION with the following:

REF. DESIG.	NOTES	DESCRIPTION	LOCATING FUNCTION
1A4A1TB1A		Barrier Strip Cinch part no. 20-140	Drawer Rear Connector Terminals 1 - 20
1A4A1TB1B		Same as 1A4A1TB1A	Drawer Rear Connector Terminals 21 - 40

11. Record the accomplishment of these changes on the Record of Changes Page of the Technical Manual.

12. Insert a copy of this Instruction Sheet behind the front cover of the Technical Manual, Volume I.

Enclosure (6)

AN/FPN-44A/44/45 Feedback Modification
TECHNICAL MANUAL SUPPLEMENT CHANGES

Make the following pen and ink corrections in the SUPPLEMENT TO TECHNICAL MANUAL FOR LORAN TRANSMITTING SETS AN/FPN-44A AN/FPN-44 and AN/FPN-45 modified for Feedback Operation. At the bottom of each page where pen and ink corrections are made write: "F.C. No. 8/31/31 to the AN/FPN-44A/44/45".

1. Page 6-7: Change P6(1A4A1J1) to "P6(1A4A1TB1) See note 8", 4 places at the following locations: 5A, 16A, 17D and 19C. In Zone 2B add: "8. P6A(1A4A1TB1A) contains terminals 1 - 20 and P6B(1A4A1TB1B) contains terminals 21 - 40.

2. Page 6-8: Change P6(1A4A1J1) To "P6(1A4A1TB1) See Note 4", in the upper left of the figure.

3. Page 6-8: Delete 120 VAC and pin 27 in the lower left of the figure.

4. Page 6-8: After Note 3 add: "4. P6A(1A4A1TB1A) contains terminals 1 - 20 and P6B(1A4A1TB1B) contains terminals 21 - 40".

5. Insert a copy of this Instruction Sheet behind the front cover of the Technical Manual.

F. C. NO. 8/31/31 TYPE 1 TO THE AN/FPN-44A LORAN-C TRANSMITTING SETS

U.S. Department of Transportation
United States Coast Guard

Commanding Officer(sm)
USCG Electronics
Engineering Center

P.O. Box 60
Wildwood, NJ 08260-0060
FTS 346-7312

14 JAN 1986

ELECTRONIC FIELD CHANGE BULLETIN

F. C. NO. 7 TYPE 1 TO AN/FPN-44A LORAN TRANSMITTING SET
F. C. NO. 30 TYPE 1 TO AN/FPN-44 LORAN TRANSMITTING SET
F. C. NO. 29 TYPE 1 TO AN/FPN-45 LORAN TRANSMITTING SET

PURPOSE:

The purpose of this Field Change is to improve air circulation in the Input Amplifier 1A4A1A3 chassis.

DESCRIPTION:

This Field Change consists of replacing the presently installed cooling fan for the 1A4A1 Feedback Control drawer with a fan having a higher air flow capacity.

EQUIPMENT AFFECTED:

This Field Change is applicable to all AN/FPN-44A transmitters, AN/FPN-44 with Field Change 25 installed and AN/FPN-45 transmitters with Field Change 23 installed.

IDENTIFICATION OF ACCOMPLISHMENT:

Accomplishment of this Field Change can be identified by the presence of a fan having a 10 inch vice 7 inch diameter mounted below the 1A4A1 Feedback Control Drawer.

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MATERIALS REQUIRED:

1. A Field Change Parts Kit and standard hand tools are required to accomplish this field change.

2. The items provided in the Field Change Kit are listed in enclosure (2) to this Field Change Bulletin. Each parts kit contains the parts necessary for two transmitters and an initial allowance of ERPAL spares.

3. Distribution of the Field Change Kits will be made by Coast Guard Supply Center, Brooklyn, NY.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2.

2. Install the Field Change in accordance with the step-by-step instructions in enclosure (1).

3. Incorporate appropriate Field Change changes in the AN/FPN-45( ) Technical Manuals or the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44 and AN/FPN-45 LORAN-C TRANSMITTING SETS (Modified for Feedback Operation) in accordance with instructions contained in enclosure (3) or enclosure (4).

4. Accomplishment of this Field Change will take approximately two technician hours to accomplish.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report the completion of this Field Change as Field Change No. 7 to the AN/FPN-44A, Field Change No. 30 to the AN/FPN-44 or Field Change No. 29 to the AN/FPN-45, as appropriate, in accordance with current directives. Record completion by entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000 (available from the Naval Publications and Forms Center, Philadelphia, Pa.); and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other field change bulletins applicable to them. Additional or missing copies can be obtained from Coast Guard Supply Center, Brooklyn, NY. Order directly using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1360 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the Field Change has been accomplished and reports have been made. Coast Guard Supply Center, Brooklyn, NY, will update the Allowance Parts Lists (APLs) to reflect this change.

H. G. FLETCHER, Jr.

Encl: (1) Step by Step Installation Instructions
(2) Field Change parts list
(3) AN/FPN-45( ) (CG-273-136-1) Technical Manual Changes
(4) AN/FPN-44A, AN/FPN-44 and AN/FPN-45 (modified for feedback operation) Technical Manual Supplement Changes

STEP BY STEP INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS FIELD CHANGE.

1. Set the fan (#1 of the F.C. parts kit) on a flat surface with the airflow arrow pointing up and the AC connector facing you.

2. Set one of the finger guards (#2) on top of the fan with the four mounting points over four holes on the fan.

3. Set the fan plate (#3) on top of the finger guard with the countersunk mounting holes facing up and the two slotted mounting holes to your left.

4. Assemble the fan and fan plate using hardware as identified in Figure 1. Flat washers (#7) are to be used as spacers between the fan and the fan plate in the four holes that the finger guard does not attach to.

5. Turn the assembled fan and fan plate over and attach a finger guard to the bottom of the fan using hardware as identified in Figure 1.

6. The installation of this Field Change will require that the standby transmitter be unusable for approximately one hour. Notify all concerned in accordance with local instructions.

7. Secure power to the standby transmitter.

WARNING:

Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2 during the installation of this Field Change.

8. Slide the 1A4A1 Feedback Control drawer out to its fully extended position.

9. Open the doors on the rear of the Exciter Section (1A4).

10. Identify the brown wire between 1A4TB8-1 and 1A4B2-1. Disconnect this wire at 1A4B2-1. To locate 1A4TB8, see the Technical Manual for Loran Transmitting Sets AN/FPN-44 and AN/FPN-45, Figure 5-50, the Technical Manual for Loran Transmitting Set AN/FPN-44A, Figure 5-27, or the Technical Manual Supplement for Loran Transmitting Set AN/FPN-45 ( ), Figure 5-14.

11. Identify the black/white wire between 1A4TB7-9 and 1A4B2-2. Disconnect this wire at 1A4B2-2. To locate 1A4TB7, see the Technical Manual for Loran Transmitting Sets AN/FPN-44 and AN/FPN-45, Figure 5-50, the Technical Manual for Loran Transmitting Set AN/FPN-44A, Figure 5-27, or the Technical Manual Supplement for Loran Transmitting Set AN/FPN-45 ( ), Figure 5-14.

12. Remove the eight screws that mount the 1A4B2 fan plate to the fan supports. Retain hardware for use in the next step. Remove the fan plate, with the fan attached, from the transmitter.

13. Take the new fan and fan plate assembled in steps 1 through 5 and mount it to the fan supports from which you removed the old fan assembly. Re-use half of the hardware removed in step 12 to fasten the new fan plate to the fan supports. Position the fan so that the AC connector faces the rear of the transmitter.

NOTE:

In case the installed wires to be connected in steps 14 and 15 are too short, #9, #10, and #11 of the F.C. Parts Kit have been supplied.

14. Reconnect the brown wire removed in step 10 to the new 1A4B2-1.

15. Reconnect the black/white wire removed in step 11 to the new 1A4B2-2.

16. Operate the transmitter into the dummy load to ensure normal operation.

17. Switch transmitters and perform steps 1 through 16 on the new standby transmitter.

18. Using the instructions in enclosure (3), complete the changes to the Technical Manual.

19. All items removed by this Field Change may be disposed of locally.

AN/FPN-44A, AN/FPN-44 and AN/FPN-45
(MODIFIED FOR FEEDBACK OPERATION)
TECHNICAL MANUAL SUPPLEMENT CHANGES.

1. Make the following pen and ink corrections:

a. Page 7-6 Table 7-2: In the NAME and DESCRIPTION column, change the part number of 1A4B2 to "020189."

b. In the NAME and DESCRIPTION column, change the part number of 1A4B2E1 to "476323".

c. Page 7-6: At the bottom right side of the page, add the following:

(1) "F. C. No. 7/30/29 AN/FPN-44A/44/45."

U.S. Department of Transportation
United States Coast Guard

Commanding Officer(sm)
USCG Electronics
Engineering Center

P. O. Box 60
Wildwood, NJ 08260-0060
FTS 346-7312

ELECTRONIC FIELD CHANGE BULLETIN NOV 26 1985

F.C. NO. 6 TYPE 2 TO AN/FPN-44A LORAN TRANSMITTING SET
F.C. NO. 29 TYPE 2 TO AN/FPN-44 LORAN TRANSMITTING SET
F.C. NO. 28 TYPE 2 TO AN/FPN-45 LORAN TRANSMITTING SET

PURPOSE:

The purpose of this Field Change is to remove the Signal Disable Time Delay Circuitry in the Amplifier Oscillator (1A4) section of the transmitters.

DESCRIPTION:

This Field Change consists of removing the mounting bracket containing 1A4K11, 1A4K12, 1A4R218 and 1A4R219 and removing the Signal Disable Delay Terminal Board 1A4A1A3TB6 in the Amplifier Oscillator section of all AN/FPN-44A, and the AN/FPN-44 and AN/FPN-45 transmitters that have the Feedback Modification Field Change installed.

EQUIPMENT AFFECTED:

This Field Change is applicable to all AN/FPN-44A transmitters, AN/FPN-44 transmitters with Field Change No. 25 installed, and AN/FPN-45 transmitters with Field Change No. 23 installed.

IDENTIFICATION OF ACCOMPLISHMENT:

Accomplishment of this Field Change can be identified by the following two conditions:

a. The relay bracket, which contained K11, K12, R218, and R219 in the top rear of the Amplifier Oscillator (1A4) section of the AN/FPN-44A, AN/FPN-44,

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TOWER A, PLACE D VILLE
OTTAWA, ONTARIO CANADA K1A ON7

and AN/FPN-45 LORAN C TRANSMITTING SETS will be absent. See Figure 5-27 of the AN/FPN-44A Technical Manual, CG-273-136 or Figure 5-14 of the AN/FPN-45() Technical Manual, CG-273-136-1 for the location of this bracket.

b. The terminal board TB-6, which contained the Signal Disable Delay Circuit, in the Input Amplifier (1A4A1A3) section of the AN/FPN-44A, AN/FPN-44 and AN/FPN-45 will be absent. See Figure 5-3 of the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44 and AN/FPN-45 LORAN-C TRANSMITTING SETS (Modified for Feedback Operation) or Figure 5-13 of the AN/FPN-45() Technical Manual, CG-273-136-1 for the location of this terminal board.

MATERIALS REQUIRED:

1. The item listed in enclosure (2) and standard hand tools are needed to accomplish this Field Change.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2.

2. Install the Field Change in accordance with the step-by-step instructions in enclosure (1).

3. Incorporate appropriate Field Change changes in the AN/FPN-44A, AN/FPN-45( ) Technical Manuals or the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44 and AN/FPN-45 LORAN-C TRANSMITTING SETS (Modified for Feedback Operation) in accordance with instructions contained in enclosure (3), (4) or (5).

4. This Field Change will take approximately two technician hours to accomplish.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report the completion of this Field Change as Field Change No. 6 to the AN/FPN-44A, Field Change No. 29 to the AN/FPN-44 or Field Change No. 28 to the AN/FPN-45, as appropriate, in accordance with current directives. Record completion by entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000 (available from the Naval Publications and Forms Center, Philadelphia, PA), and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other field change bulletins applicable to them. Additional or missing copies can be obtained from Coast Guard Supply Center Brooklyn, NY. Order directly using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1359 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the Field Change has been accomplished and reports have been made. Coast Guard Supply Center Brooklyn, NY, will update the Allowance Parts Lists (APLs) to reflect this change.

H. G. FLETCHER, JR.

Encl: (1) Step-by-Step Installation Instructions
(2) Field Change Nos. 6/29/28 Parts Required but not Supplied
(3) Technical Manual Change Instructions for the AN/FPN-44A Technical Manual
(4) Technical Manual Change Instructions for the AN/FPN-45( ) Technical Manual
(5) Technical Manual Change Instructions for the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44 and AN/FPN-45 (Modified for Feedback Operation)

STEP-BY-STEP INSTALLATION INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS FIELD CHANGE.

1. The installation of this Field Change will require that the standby transmitter be unusable for approximately two hours. Notify all concerned in accordance with local instructions.

2. Secure power to the standby transmitter.

WARNING

Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2 during the installation of this Field Change.

3. Open the doors on the rear of the Exciter Section (1A4).

4. Identify and remove the wire between terminal 73 and terminal 91 (see Figures 1 and 2).

5. Identify and remove the wire between terminal 64 and 1A4R218-2.

6. Carefully remove 1A4R151 and retain it for use in step 9. One end of 1A4R151 is soldered to terminal 91 and the other end is soldered to terminal 92 (see Figures 1 and 2).

7. Identify the wire between terminal 92 and the coil of 1A4K3. Disconnect this wire from terminal 92 and reconnect it to terminal 64 (see Figures 1 and 2).

8. Identify the wire between terminal 91 and the coil of 1A4K3. Disconnect this wire from terminal 91 and reconnect it to terminal 73 (see Figures 1 and 2).

9. Solder 1A4R151, removed in step 6, across 1A4RV5, i.e., one end of 1A4R151 to terminal 64, and the other end to terminal 73.

10. Identify and remove the following wires (see Figures 1 and 2):

FROM	TO
1A4K11-3	1A4TB4-8
1A4K12-5	1A4TB4-7
1A4K12-7	1A4TB8-9
1A4K12-4	1A4TB9-8
1A4K12-8	1A4TB6-10

11. Remove the two bolts that secure the 1A4K11/K12 mounting bracket to the chassis and remove the bracket from the transmitter (see Figures 1 and 2).

12. Identify the wire between 1A4S2-10 (Quiescent Current Switch) and 1A4TB6-1, 2, or 3. Disconnect the wire from 1A4TB6-1, 2, or 3, and reconnect it to 1A4TB4-7.

13. Slide the 1A4A1 Feedback Control drawer out to its fully extended position.

14. Identify and remove the following wires (see Figures 3, 4, and 5).

FROM	TO	COLOR
1A4A1A3TB2-1	1A4A1A3TB6-E47	WHITE/ORANGE/GREEN
1A4A1A3S1-1	1A4A1A3TB6-E53	WHITE/BLUE
1A4A1A3TB5-E55	1A4A1A3TB6-E50	RED
1A4A1A3TB7-E87	1A4A1A3TB6-E49	PURPLE

15. Install a new wire, item 1 of enclosure (2), between 1A4A1A3TB2-1 and 1A4A1A3S1-1 (Feedback Switch).

16. Remove 1A4A1A3TB6 and its three mounting screws from the transmitter.

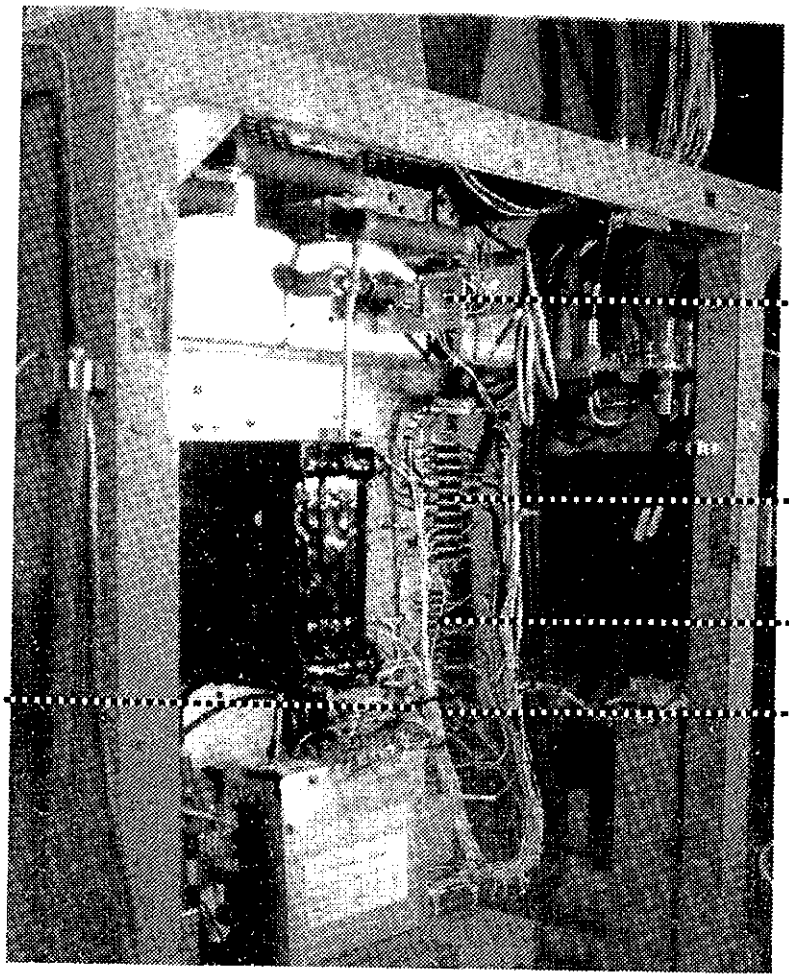
17. Operate the transmitter into the dummy load while observing the transmitter output RF (at the transmitter oscilloscope jack (1A4A1J4) with the oscilloscope drawer switch in the "XMTR OUTPUT" position). Output RF should now appear to increase as the high voltage increases indicating that drive is applied to the transmitter at all times.

18. Check to ensure that the Quiescent Current Switch (1A4S2) works correctly by observing that the transmitter output immediately disappears from the oscilloscope trace when the switch is placed in both the "left" and "right" positions, and that the RF immediately returns when the switch is allowed to spring back to the center position.

19. Using the instructions in enclosures (3), (4), or (5), complete the changes to the appropriate Technical Manuals.

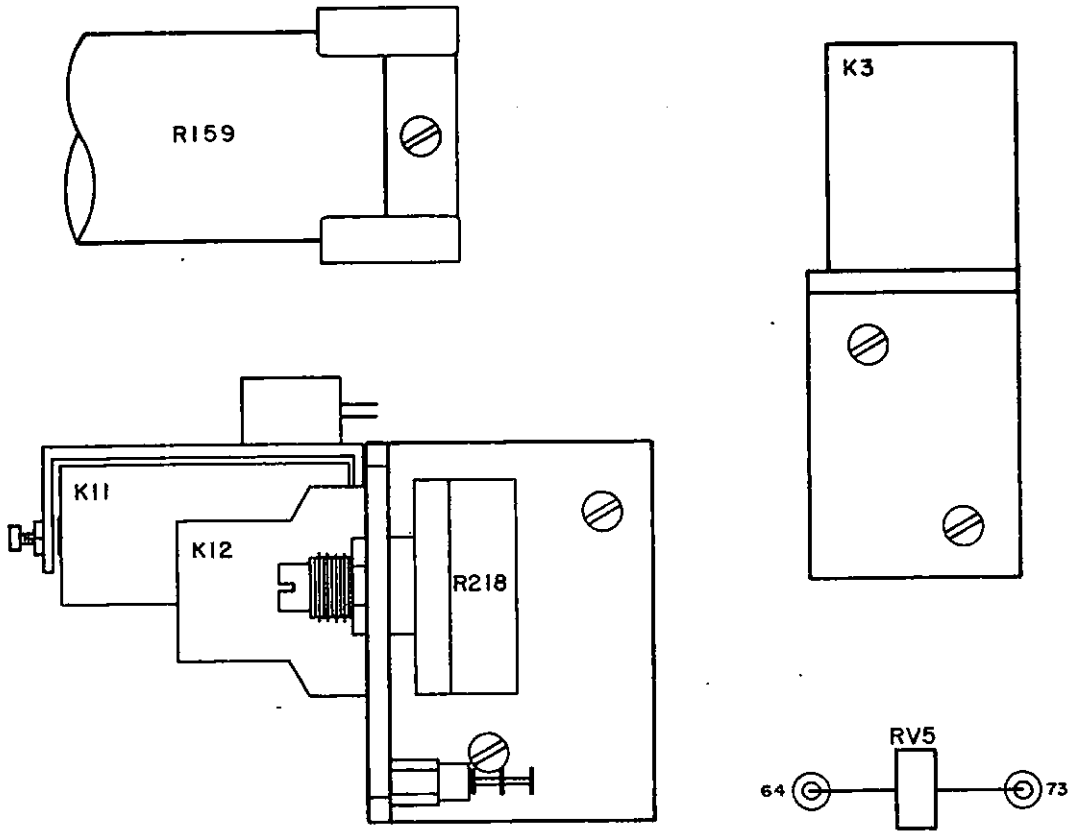
20. Switch transmitters and perform steps 1 thru 17 on the new standby transmitter.

21. All items removed by this Field Change may be disposed of locally.

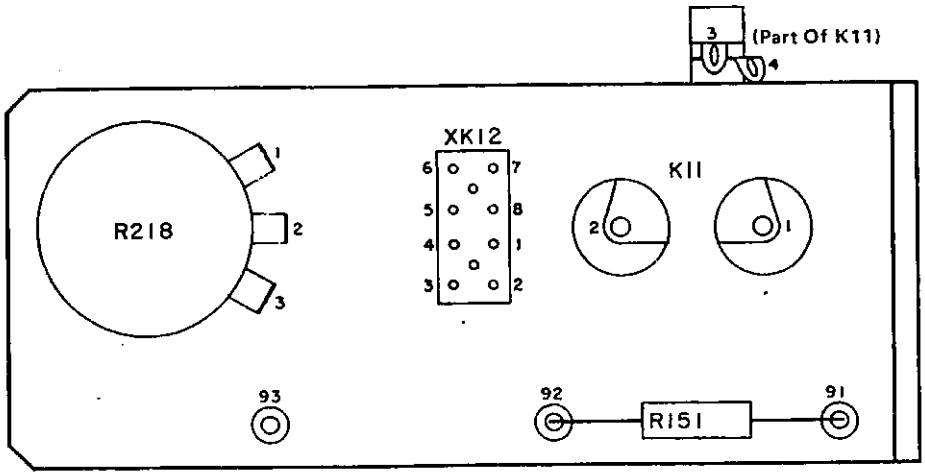


Prefix Reference Designation With 1A4

Figure 1. Amplifier Group OA-4482/FPN-44, OG-159/FPN-44A, OA-4480/FPN-45, Left Rear View, Partial Parts Location Diagram

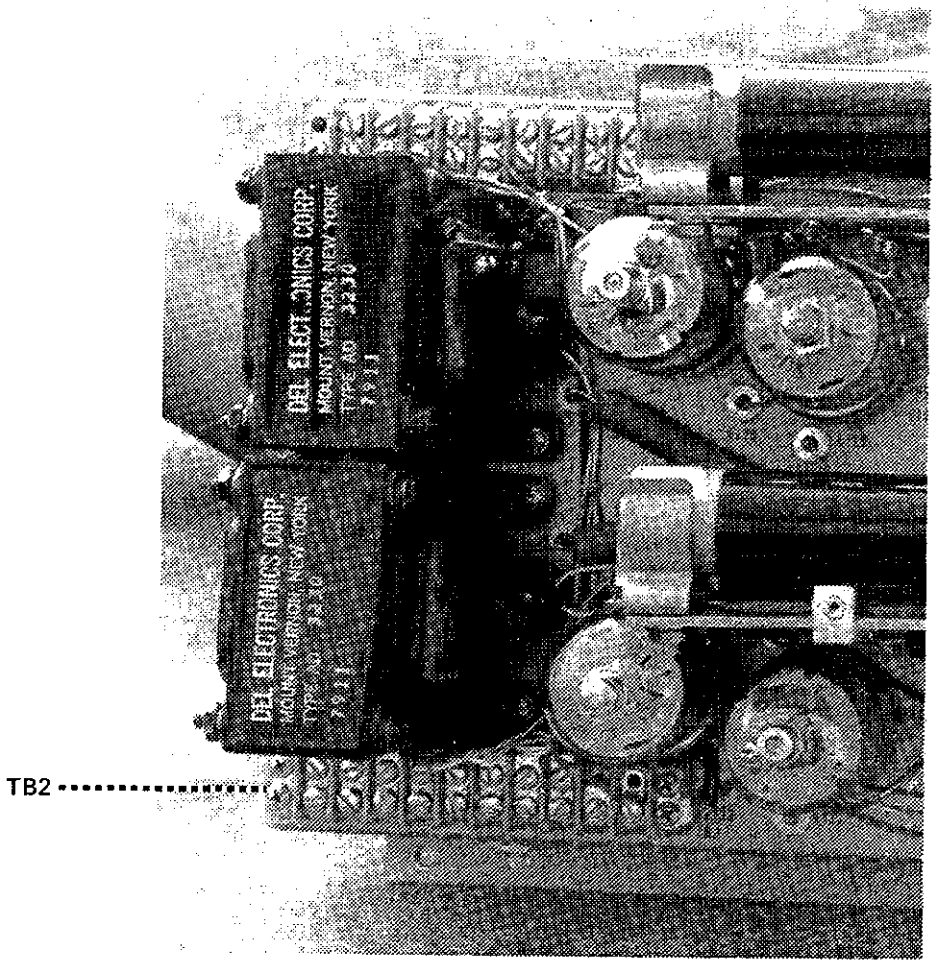


(a). Partial View, Top Left Rear



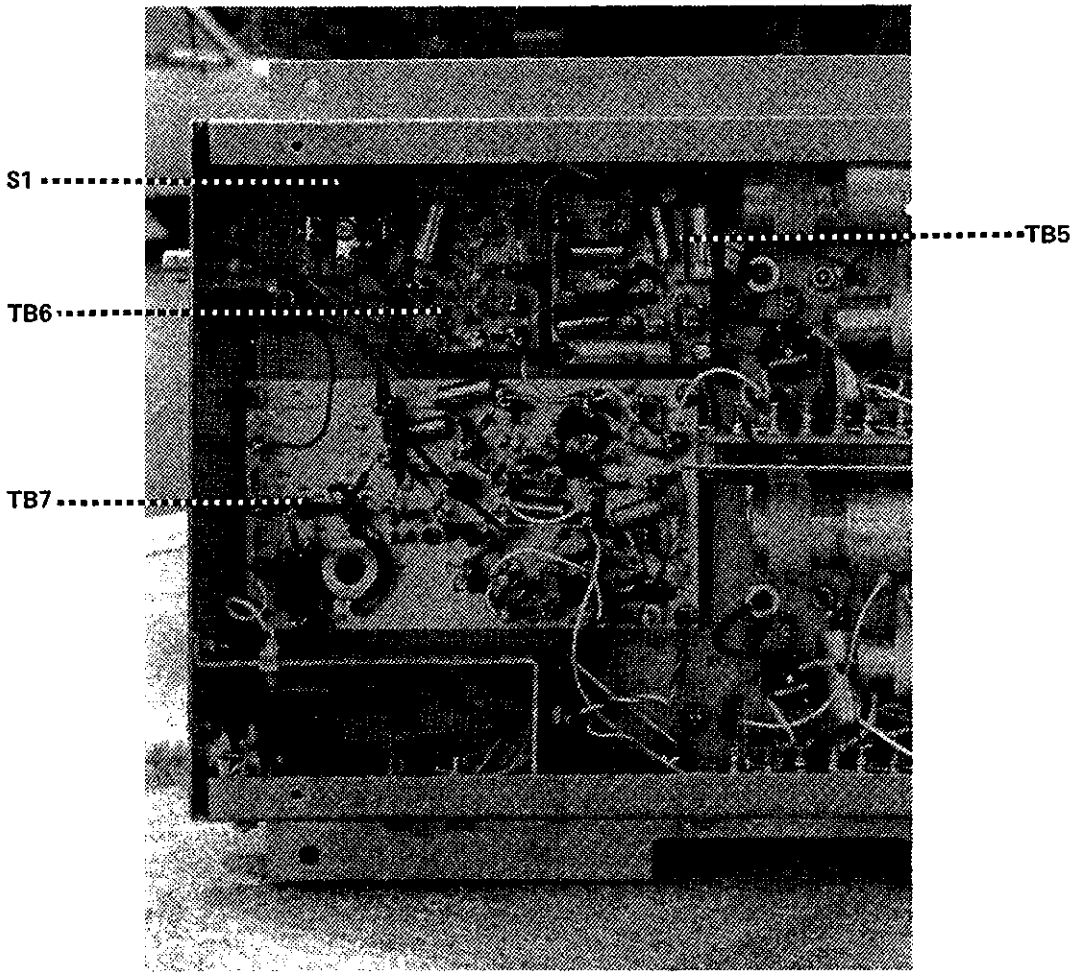
(b). 1A4K11/K12 Mounting Bracket

Figure 2. Amplifier Group OA-4482/FPN-44, OG-159/FPN-44A, OA-4480/FPN-45, Terminal Location Diagram.



Prefix Reference Designation With 1A4A1A3

Figure 3. Input Amplifier (1A4A1A3), Right Side, Partial Parts Location Diagram



Prefix Reference Designation With 1A4A1A3

Figure 4. Input Amplifier (1A4A1A3), Left Side, Partial Parts Location Diagram

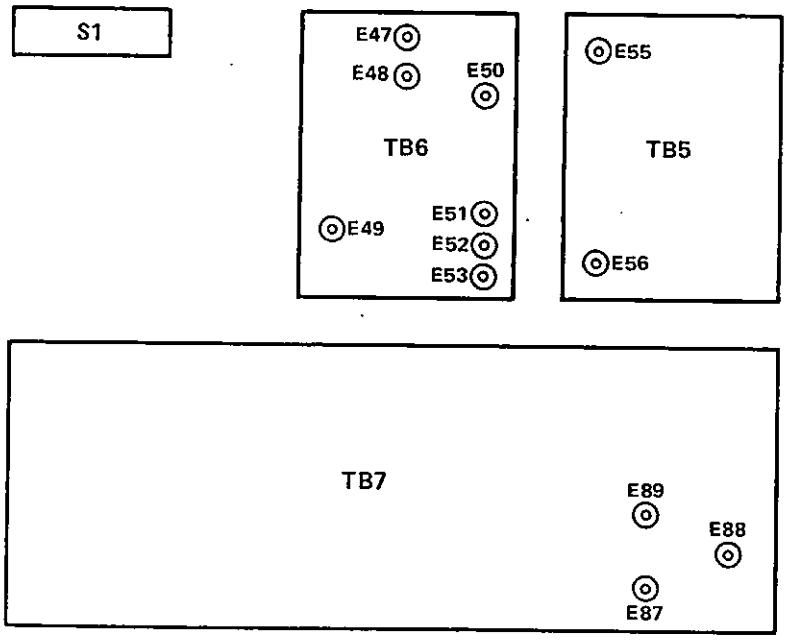


Figure 5. Input Amplifier (1A4A1A3), Left Side, Partial Terminal Location Diagram

AN/FPN-44A (CG-273-136)
TECHNICAL MANUAL CHANGES

1. Make the following pen and ink corrections in the AN/FPN-44A Technical Manual:

a. Page ii, at the bottom of the page add the following: "NOTE: Pages viii, 4-10, 4-43, 4-69, 5-59 and 6-42 have been changed by F.C. No. 6".

b. Page iiA, at the bottom of the page add the following: "NOTE: Pages 7-8, 7-18 and 7-22 have been changed by F.C. No. 6".

c. Page viii, delete reference to Paragraph 6-5p(2).

d. Page 4-10, Paragraph 4-3b(1)(b), delete the entire 4th sentence and the word "also" in the 6th sentence.

e. Page 4-43, Paragraph 4-3r(1)(k), delete the entire 3rd sentence and replace the first two words of the 4th (last) sentence to read "The other relay".

f. Page 4-69, Paragraph 4-3r(3)(e), delete "-Apply the drive signal to the voltage amplifiers in 1A4 when the high voltage is at the proper level."

g. Page 4-69, Paragraph 4-3r(3)(e)1, in the 4th paragraph delete ", and relay 1A4K11 enables relay 1A4K12" from the first sentence and delete the entire 2nd sentence.

h. Page 5-ii, at the bottom of the page add the following: "NOTE: Page 5-59 has been changed by F.C. No. 6".

i. Page 5-59, Figure 5-27, at the bottom of the page add the following: "NOTE: K11, K12, XK12, R218 and R219 removed by F.C. No. 6".

j. Page 6-ii, at the bottom of the page add the following: "NOTE: Pages 6-iii and 6-42 have been changed by F.C. No. 6".

k. Page 6-iii delete reference to Paragraph 6-5p(2).

l. Page 6-42, Paragraph 6-5p(2), delete entire paragraph.

m. Page 7-ii, at the bottom of the page add the following: "NOTE: Pages 7-8, 7-18 and 7-22 have been changed by F.C. No 6".

n. Page 7-8, Table 7-2, delete 1A4K11 and 1A4K12.

o. Page 7-18, Table 7-2, delete 1A4R218 and 1A4R219.

p. Page 7-22, Table 7-2, delete 1A4XK12.

q. Page 4-5/4-6, Page 4-57/4-58, Page 5-17/5-18, at the bottom of the pages add the following: "NOTE: NOT corrected to indicate changes made by Field Changes 3 and 6".

r. Pages 3-3, 3-4, 4-51/4-52, 5-15/5-16, 5-23/5-24, 5-45/5-46, 5-55, 5-56, 5-57, 5-72, 5-73, 5-76, and 6-34, at the bottom of the pages add the following: "NOTE: NOT corrected to indicate changes made by Field Change No. 3."

s. Pages 4-3, 6-61/6-62, 6-63/6-64, 6-75/6-76 and 6-77/6-78, at the bottom of the pages add the following: "NOTE: NOT corrected to indicate changes made by Field Change No. 3. See Supplement to Technical Manual for LORAN Transmitting Sets AN/FPN-44A, AN/FPN-44 and AN/FPN-45."

2. Record the accomplishment of these changes on the Record of Changes page of the Technical Manual.

3. Insert a copy of this Instruction Sheet behind the front cover of the Technical Manual, Volume I.

AN/FPN-44A/44/45 FEEDBACK MODIFICATION TECHNICAL MANUAL SUPPLEMENT CHANGES

1. Remove superseded pages and insert revised pages in the AN/FPN-44A/44/45 Technical Manual Supplement as indicated:

Page	Remove	Insert
5-3/5-4	Original/Original	Original/F.C.No. 6/29/28
6-7	Change No. 3	F.C. No. 6/29/28

2. Make the following pen and ink corrections in the AN/FPN-44A/44/45 Technical Manual Supplement:

a. Page ii, delete reference to Paragraph 4-3b(2)(c).

b. Page iii, delete reference to Paragraphs 6-2a and 6-2b.

c. Page 2-2, Paragraph 2-3a, delete steps 11, 12, and the note immediately following step 12.

d. Page 4-4, Figure 4-1, delete the "TIMING CKT & RELAY DRIVER" block. Draw a line from the point marked "Signal Disable" to the "K1 & K2 OPR/STBY GAIN & SIGNAL DISABLE" block.

e. Page 4-5, Paragraph 4-2b(3)f, delete the entire 4th sentence.

f. Page 4-9, Paragraph 4-3b(2)(c), delete the sentence: "-When the IPA Plate 10.75 kV supply is below approximately 7.5 kV."

g. Page 4-10, delete entire page.

h. Page 4-11, Paragraph 4-3b(2)(c), delete the first paragraph.

i. Page 5-5, Figure 5-4, delete TB6 parts location diagram.

j. Page 6-1, Paragraph 6-2a, delete entire paragraph (steps 1-6).

k. Page 6-1/6-2, paragraph 6-2b, delete entire paragraph (steps 1-4).

l. Page 6-9, Figure 6-35A, at the bottom of the page add the following: "NOTE: Signal Disable Delay TB6 has been removed by F.C. No. 6/29/28 to AN/FPN-44A/44/45. TB2-1 connects directly to S1-1.".

m. Page 7-12, Table 7-2, delete C83.

n. Page 7-13, Table 7-2, delete Q24, Q25, Q26 and Q27.

o. Page 7-25, Table 7-2, delete R221 through R235.

p. Page 7-26, Table 7-2, delete TB6.

q. Page 7-27, Table 7-2, change "LOCATING FUNCTION" for U1 from TB6 to TB5, and change reference designation for XQ2-XQ27 to XQ2-XQ23.

3. Insert a copy of this Instruction Sheet behind the front cover of the Technical Manual, Volume I.

U.S. Department of Transportation
United States Coast Guard

Commanding Officer(sm)
USCG Electronics
Engineering Center

P. O. Box 60
Wildwood, NJ 08260-0060
FTS 346-7312

26 February 1987

ERRATA SHEET

TO

F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

PURPOSE:

This Errata Sheet corrects printing and procedural errors in the original Field Change Bulletin dated 3 September 1985. In addition, items 65 and 66 are provided to Loran Stations.

PROCEDURE:

Discard all Field Change Bulletins dated 3 September 1985, including those provided as item #61 of the Field Change Kit. A new bulletin, dated January 28, 1987 is provided in enclosure (1). Pages in the bulletin changed by this Errata are identified by the words "ERRATA TO:" above the field change numbers.

ROUTINE INSTRUCTIONS:

Upon completion of the procedure, place a copy of this Errata Sheet and the Field Change Bulletin in front of the Technical Manual for the AN/FPN-44A Loran Transmitting Set. Additional copies of the Errata Sheet and the Field Change Bulletin may be obtained from Supply Center, Brooklyn, NY, using MILSTRIP procedures. NSN CG 7610-01-GE8-1358 applies.

H. G. FLETCHER, JR.

Encl: (1) Field Change Bulletin No. 5/28 to AN/FPN-44A/44 dtd 28 Jan 87
(2) Field Change Kit No. 5/28 items #65 and #66 (LORSTAs Fallon, Middletown, Narrow Cape, Searchlight, Shoal Cove and Williams Lake only)

DISTRIBUTION - SDL No. 123

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B	*	2	*				10		2								2		5							
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D																										
E																										
F																										
G																										
H																										

NON-STANDARD DISTRIBUTION: *B: a(G-TES), G-NRN) (1); c(2nd, 11th, 14th, 17th Only(2)
*C: v(DANA, FALLON, LAMPEDUSA, MIDDLETOWN, NARROW CAPE, SEARCHLIGHT, SHOAL COVE, AND TOK Only)(2)

Canadian Coast Guard (CGTG)
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Ottawa, Ontario, Canada K1A ON7

Station Leader
Ejde Loran Station
DK-3814-Faeroe Island
Via Denmark

Telecom Station Leader
Williams Lake Loran-C Station
P. O. Box 4568
Williams Lake, BC, Canada V2G 2V8

FIELD CHANGE BULLETIN NO. 5/28 TO
THE AN/FPN-44A/44 LORAN-C
TRANSMITTING SETS

Enclosure (1) to AN/FPN-44A/44
F.C. No. 5/28 Errata of 08 FEB 1987

U.S. Department of Transportation
United States Coast Guard

Commanding Officer(sm)
USCG Electronics
Engineering Center

P.O. Box 60
Wildwood, NJ 08260-0060
FTS 346-7312

ELECTRONIC FIELD CHANGE BULLETIN

• January 28, 1987

F. C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F. C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

PURPOSE:

The purpose of this field change is to permit automatic energizing and run-up of the standby AN/FPN-44A or AN/FPN-44 Transmitter upon selection as operate transmitter via the Transmitter Automatic Controller. This field change also adds a READY LIGHT lockout when 460 VAC primary power is not present.

DESCRIPTION:

This field change adds circuitry which enables the standby AN/FPN-44 or AN/FPN-44A Transmitter to remain substantially de-energized while in a ready status. Additionally, a relay, 1A53A2K3 is added which prevents the transmitter from displaying a ready condition when 460 volts are not present in the transmitter. This field change kit also contain the initial ERPAL spares. This field change, previously referred to as De-energized Standby Loran Transmitter (DESLOT), was field tested at LORSTA TOK and remains installed there.

IDENTIFICATION OF ACCOMPLISHMENT:

The presence of a rotary switch, marked DESLOT/NON-DESLOT, located to the left of the PLATE TRANSFORMER OVER TEMPERATURE indicator (1A53A2DS11) and centered below the POWER ON-OFF/RESET switch (1A53A2S17) will identify accomplishment of this field change.

EQUIPMENT AFFECTED:

This field change is applicable to all AN/FPN-44A Transmitters, and to all AN/FPN-44 Transmitters after the installation of the Solid-State Power Supply.

DISTRIBUTION - SDL No. 123

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B	*	2	*				10		2								2		5							
C																						*				
D																										
E																										
F																										
G																										
H																										

NON-STANDARD DISTRIBUTION: *B: a(G-TES, G-NRN) (1); C(2nd, 11th, 14th, 17th Only)(2)
*C: v(DANA, FALLON, LAMPEDUSA, MIDDLETOWN, NARROW CAPE, SEARCHLIGHT, SHOAL COVE, AND TOK Only)(2)

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Station Leader
Ejde Loran Station
DK-3814-Faeroe Island
Via Denmark

Telecom Station Manager
Williams Lake Loran-C Station
P.O. Box 4568
Williams Lake, BC, Canada V2G 2V8

MATERIALS REQUIRED:

1. A Field Change No. 5/28 parts kit and standard hand tools, including a 1/4" drill and a power supply capable of supplying 24 VDC, at 50 mA minimum, are required to accomplish this field change.

2. The items provided in the field change kit are listed in enclosure (2) to this field change. Each parts kit contains the parts necessary for two transmitters, and an initial allowance of ERPAL spares.

3. Distribution of the field change parts kits will be made by Coast Guard Supply Center, Brooklyn, NY.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2.

2. Install the field change in the AN/FPN-44A or AN/FPN-44 Transmitter power supply in accordance with the step-by-step instructions contained in enclosure (1). Approximately 20 technician-hours per transmitter should be required to complete this field change. The longest period that a transmitter should be required to remain unusable during installation of this field change is approximately 1.5 hours.

3. Applicable schematic diagrams of the circuits modified by this field change are included as enclosure (3). Instructions for operating in the DESLOT and NON-DESLOT modes are contained in enclosure (5).

4. Make temporary changes in the AN/FPN-44A Technical Manual, CG-273-136 in accordance with the instructions contained in enclosure (4). The DESLOT field change Theory of Operation is contained in enclosure (6).

5. Accomplishment of this field change will take two technicians approximately ten hours per transmitter. I recommend that this field change be installed by an ET1 and ET2, and that a representative of the responsible engineering support facility (Area or District Office) be present during the installation of this field change.

6. Completion of this field change does not authorize the station to operate in the DESLOT mode. Operation in this mode is dependent on environmental conditions and operational requirements. Authorization to operate in the DESLOT mode must be received from the appropriate operational commander.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report completion of this field change as Field Change No. 5 to the AN/FPN-44A or Field Change No. 28 to the AN/FPN-44, as appropriate, in accordance with current directives. Record completion by entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000 (available from the Naval Publications and Forms Center, Philadelphia, PA), and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other field change bulletins applicable to them. Additional or missing

copies can be obtained from Coast Guard Supply Center Brooklyn, NY. Order directly using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1357 applies.

3. Upon completion, a copy of this field change bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the field change has been accomplished and reports have been made. Coast Guard Supply Center Brooklyn, NY, will update the Allowance Parts List to reflect this change.

H. G. FLETCHER, JR.

Encl: (1) Step-by-step installation instructions
(2) Field change kit parts list
(3) Schematic diagrams for DESLOT field change
(4) Temporary technical manual corrections
(5) DESLOT and NON-DESLOT transmitter operating procedures
(6) DESLOT theory of operation for AN/FPN-44A transmitters

STEP-BY-STEP INSTALLATION INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS FIELD CHANGE

GENERAL COMMENTS AND NOTES:

The maximum length of time that a transmitter should remain inoperative during this installation has been estimated to be 1.5 hours or less. An asterisk (*) is shown at the end of each step where the transmitter is capable of normal on-air service, provided no wiring errors have been made by installation personnel. It is recommended that installation personnel review the steps to determine the extent of work involved to reach the next asterisk (*) before proceeding. This will allow the Field Change to be installed with minimal interruption to normal station routine. The transmitter will run-up only in the standby mode with the DESLOT/NON-DESLOT switch in the NON-DESLOT position, until the field change has been completed in both transmitters.

Wire lengths are specified for the maximum length with some excess to be trimmed during installation. Certain wires appear to be longer in one transmitter than the other. Since the transmitters are not a mirror image layout, the 1A53A3 terminal blocks are on opposite ends of the 1A53A3 panel with respect to the entrance to the transmitter. Wire lengths were measured for their longest length in either transmitter. All wiring shall be routed through existing cable harnesses and within the overhead ducts for steps 65 and 67 when run between the different sections of the transmitter.

When drilling holes, tape a large enough piece of paper to catch all metal filings/chips below the hole being drilled. A piece of scotch tape or masking tape should be used to hold the paper against the panel.

All circuit designations prefixed with an "A" (e.g., A3K18 are abbreviated designations for components within the 1A53 section of the transmitter. Full designation should be 1A53A3K18. Special attention must be paid to the reference designations used in the installation instructions so you don't confuse the terminal board connections between the 1A53A2 and 1A53A3 sections of the transmitter. There are no wire runs made between these two areas via the overhead cable troughs.

1. Operate the Standby transmitter with plate voltage applied into the dummy load to ensure proper operation.

2. Secure all power to the standby transmitter and turn off the 460 VAC and 208 VAC wall breakers. *

WARNING

Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2 during the installation of this Field Change.

3. Locate Warning labels (#48) and mount one on the clear plastic cover which is on the back of of 1A53A2. Center the label and mount at eye level but do not cover any existing warnings. Ensure that the mounting surface is clean before mounting the label.

4. Locate Warning label (#49) and mount it on the front cover of the 1A53A3S1 (460 VAC Main Power) knife switch assembly immediately to the left of the knife switch and centered on the panel.

5. Locate Warning label (#50) and mount it on the center portion of the uppermost clear plastic door cover of the 1A11 relay rack. Do not cover-up the existing warning label.

6. Use the template provided (#65) against the outside of the right hand side panel of the 1A53A2 Indicator Panel Assembly, as shown in figure 1 to center punch with #4, and drill the mounting holes with a No. 12 drill bit provided (#2). *

7. De-burr all holes drilled in step 3 using the 1/2 inch de-burring bit (#3). *

WARNING

Live Voltages (120 VAC) will be present on the terminals of the relay to be tested in step 8. Ensure that all personnel involved exercise caution while completing this step.*

8. Locate the Agastat 0-5 second time delay on drop-out relay (#5). Connect the spade lugs of the test cable (item 55) to terminals L1 and L2 of the relay. See detail plate on the relay for terminal layout. Set the relay timing head control knob to read 3 seconds. Using an ohmmeter, check for continuity across terminals 4 and 6 of the relay. While observing the ohmmeter, momentarily plug the test cable into a 115 VAC outlet, then unplug it. Using a stop watch or sweep second hand, measure the time required after the test cable is unplugged for the ohmmeter to read an open. Adjust the timing head control knob and repeat the above procedure, if necessary, to obtain a time delay of 3 seconds. *

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

9. Install the relay (#5) on the holes drilled in step 6, using 8-32 hardware from hardware kit (#54). See figure 1 for relay location. Using #58, label this relay as 1A53A2K2. *

10. Locate the gray Potter & Brumfield relay socket (#6) and mount on holes drilled in step 6 using 6-32 hardware from hardware kit (#54). See figure 1 for relay socket location. Mount the socket such that terminals 13 and 14 are facing towards you (i.e. away from the panel). Do not install the relay into the socket until instructed. Using #58, label this relay as 1A53A2K1. *

11. Locate the G.E. 4PST relay (#7), and mount on holes drilled in step 6, using 6-32 hardware from hardware kit (#54), see figure 1. Using #58, label this relay as 1A52A2K3. *

12. Locate, mark, center punch with #4, drill with (#66) and de-burr with #3, a 13/32 inch hole, centered directly below the POWER ON/OFF-RESET switch 1A53A2S17 and centered directly to the left of the POWER TRANSFORMER OVER TEMPERATURE indicator 1A53A2DS11, see figure 2 for hole location. *

13. Insert the 5PDT rotary switch (#8) in the hole drilled in the previous step. Mark the panel with a center punch at such a point that the locking key for the switch will be able to provide for the DESLOT position to be to the left and the NON-DESLOT position to the right when the switch is installed (refer to figure 2). Drill the hole with drill bit provided as #2 making sure that the hole does not penetrate the panel completely. Mount the switch in the hole using the hardware provided with the switch. Label this switch S20 on the backside of the panel. *

14. Locate the self adhesive "DESLOT/NOT-DESLOT" label (#9). Remove the backing and place evenly on the front panel, above the switch mounted in the previous step. Install the knob (#62) onto the shaft of the DESLOT/NON-DESLOT selector switch and tighten it. *

15. Refer to figures 3 through 6 or detail plates mounted on the relays for terminal locations when wiring to all components during the installation of this Field Change. *

16. Connect a 36" green wire (#56) from 1A12TB1-8 to 1A53A2XK1-14. Use crimp-on terminal lugs (#11, #12 and #53 as appropriate) for all terminal board connections. Solder-tin all leads to be connected to the Potter & Brumfield relay socket 1A53A2XK1 and connect without lugs. *

17. Connect a 40" green wire (#10) from 1A12TB3-1 to 1A53A2XK1-13.

18. Disconnect the two wires from 1A53A3K5-L1.

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

19. Disconnect the wire from A3TB24-5, the other end of which was disconnected in step 15. Insulate both ends with heat shrinkable tubing (#51).

20. Reroute and the connect the remaining wire disconnected in step 15 to A3TB24-5.

21. Connect an 18" green wire (#13) from A3K5-L1 to A3TB24-9.

22. Connect a 60" green wire (#14) from A2TB24-9 to A2XK1-5.

23. Connect a 16" green wire (#15) from A2K2-L1 to A2XK1-5.

24. Connect a 64" green wire (#16) from A2XK1-9 to A2TB24-5.

25. Connect a 76" green wire (#17) from A2K2-L2 to A2TB38-9.

CAUTION

The DESLOT switch must be left in the NON-DESLOT position throughout the installation, except when instructed otherwise.

26. Connect a 26" green wire (#18) from A2S20-A (wiper) to A2XK1-5.

27. Connect a 28" green wire (#19) from A2S20-A (open in DESLOT) to A2XK1-9.

28. Identify and disconnect the wire connecting 1A12TB4-5 to 1A12K17-8 or 1A12K17-9. Insulate both ends with heat shrink (#51).

29. Route and connect a 14" green wire (#57) from 1A12K17-8 (solder to socket pin) to 1A12TB3-6.

30. Connect a 32" green wire (#20) from 1A12TB3-6 to A2K2-6.

31. Connect a 30" green wire (#21) from 1A12TB4-5 to A2K2-4.

32. Connect a 28" green wire (#22) from A2S20-B(wiper) to A2K2-4.

33. Connect a 28" green wire (#23) from A2S20-B (open in DESLOT) to A2K2-6.*

34. To simplify any possible trouble-shooting necessary, the following four steps should be taken to ensure proper transmitter operation at this point.

35. With the DESLOT/NON-DESLOT selector switch in the NON-DESLOT position apply power to the transmitter and operate into the dummy load. If operation is normal proceed to the next step. If operation is not normal, commence checking the installation to this point using these instructions, the Transmitter Technical Manual and the Diagrams contained in enclosure (3) to the Field Change. Correct all problems until normal operation is obtained and proceed to the following step.

36. Secure the transmitter PLATE and BIAS switches. Place the DESLOT/NON-DESLOT selector switch in the NON-DESLOT position; the following should occur:

a. After approximately three seconds, transmitter filaments should turn off.

b. After approximately five minutes, transmitter pumps and blowers should turn off.

37. If the above sequence occurs, secure all power to the transmitter, place the DESLOT/NON-DESLOT switch in the NON-DESLOT position and proceed with step 39.

38. If the above sequence does not occur, commence checking the installation to this point using these instructions, the Transmitter Technical Manual and the Diagrams contained in enclosure (3) to the Field Change. Correct all problems until the conditions set forth in the preceding two steps are met, then proceed with the installation.

39. Locate the 5 section PLATE VOLTAGE SELECTOR replacement switch (#24). Remove the cover assemblies from A2S18 and the replacement switch. Using the rear 8 sections (sections 3-10) of the new switch, transfer all wiring and jumpers, wire for wire, from A2S18 to the replacement switch. The front sections (sections 1 and 2) will be wired later. The reference designation remains as A2S18. Note: If there is a jumper installed between section 2 and 4 or section 1 and 3 of the switch, remove the jumper.

40. Disconnect the wire from A2TB24-4 the other end of which is connected to A2S18-3 (top). Use ohmmeter to verify.

41. Reroute and connect the wire disconnected in the previous step to A2TB23-9.

42. Connect a 56" green wire (#25) from A2TB23-9 to A2XK1-12.

43. Connect a 54" green wire (#26) from A2XK1-8 to A2TB24-4.

44. Connect a 28" green wire (#27) from A2S20-C(wiper) to A2XK1-8.

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

45. Connect a 28" green wire (#28) from A2S20-C(open in DESLOT) to A2XK1-12. *

46. Connect a 32" green wire (#29) from A3K18-8 to A3K5-2. *

47. Connect a 26" orange wire (#30) from A3K5-2 to A3TB19-1.*

48. Connect a 26" orange wire (#31) from A3K5-6 to A3TB19-2. *

49. Connect a 36" orange wire (#32) from A2TB19-1 to A2XK1-11. *

50. Connect a 36" orange wire (#33) from A2TB19-2 to A2XK1-7. *

51. Connect a 62" orange wire (#34) from A2TB19-2 to A2S13-1. *

52. Connect a 18" orange wire (#35) from A2S13-2 to A2S7-1. *

53. Connect a 20" orange wire (#36) from A2S7-2 to A2S18-2 (bottom). * (Note: Ensure that the contact closes in the OPERATE position.)

54. Disconnect the wire from UD5TB1-2 (Xmtr #1) or UD5TB2-2 (Xmtr# 2) at 1A11TB3-10 and reconnect it to on of the terminals 1A53A3TB61-1 through 10.

55. Connect a 52" orange wire (#37) from A2S18-2 (top) to A2S20-D (closed in DESLOT). *

WARNING

Live Voltages (120 VAC) will be present on the terminals of 1A11TB8 even with the transmitter completely shut off. Ensure that all personnel involved exercise caution while completing the following two steps.

56. Disconnect the wire from A3TB69-2, the other end of which is connected to 1A11TB8-2.

57. Connect the wire disconnected in the previous step to A3TB69-3.

58. Connect a 40" orange wire (#38) from A2S20-D (wiper) to A2K3-8.

59. Connect a 64" orange wire (#39) from A2K3-4 to A2TB24-10.

60. Connect a 34" orange wire (#40) from A3TB24-10 to A3TB69-3.

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

61. Connect a 45" orange wire (#41) from A3TB69-2 to A3TB20-10.

62. Connect a 52" orange wire (#42) from A2TB20-10 to A2S20-D (open in DESLOT).

63. Connect a 52" orange wire (#43) from A2TB39-7 to A2K3-21 (coil).

64. Connect a 50" orange wire (#44) from A2K2L2 to A2K3-22 (coil).

65. Connect a 14'-0" orange wire (#45) from 1A11TB7-10 to A2S20-E (closed in DESLOT).

66. Connect a 36 inch orange wire (#60) A2S20-E (wiper) to A2XK1-2.

WARNING

Live Voltages (120 VAC) will be present on the terminals of 1A11TB8 even with the transmitter completely shut off. Ensure that all personnel involved exercise caution while completing the following step.

67. Connect a 14'-0" orange wire (#46) from A2XK1-10 to 1A11TB8-8.

68. Install the Potter & Brumfield relay, 1A53A2K1 (#47) into the relay socket 1A53A2XK1.

69. Adjust the Filament Warm-Up Delay Relay, 1A53A3K7, in accordance with the Technical Manual procedure given on Page 6-18, Para. 6-5b(3)(b), Steps 1 through 3 for 45 seconds vice 150 seconds.

70. The following checks will ensure proper operation of the control circuitry modification upon completion of the installation. They are set in a sequential order to observe operation of each functional circuit individually while reducing the possibility of transmitter damage, due to wiring errors or faulty components.

71. Steps 75 and 76 will confirm proper operation of the DESLOT/NON-DESLOT selector switch in the NON-DESLOT mode.

72. Steps 82 and 83 will check the operation of the TAC READY circuitry in the DESLOT mode.

73. Steps 87 through 92 will confirm proper operation of the automatic transmitter run-up by simulating selection by the Transmitter Automatic Controller with the use of a 24 VDC power supply energizing 1A53A2K1.

74. Steps 92 and 93 will confirm proper operation of the automatic transmitter run-down sequencing in the DESLOT mode. Special attention should be given to proper plate voltage turn off.

75. With the DESLOT/NON-DESLOT selector switch in the NON-DESLOT position, turn on the 208 VAC and 460 VAC wall breakers and operate the transmitter into the dummy load, using normal operating procedures. Ensure that the transmitter operates normally.

76. De-energize the transmitter following normal procedures. Ensure that the transmitter de-engerizes normally with a pump and blower time-delay of 5 minutes +/- 30 seconds.

77. Once the transmitter has completed the five minute cool down cycle, completely secure the 460 VAC and 208 VAC wall breakers (in that order). Leave the 1A53A3CB2 circuit breaker in the ON position.

78. Ensure that the POWER ON/OFF-RESET, FILAMENT, BIAS, and PLATE VOLTAGE SELECTOR switches are in their OFF position. Place the DESLOT/NON-DESLOT selector switch in the DESLOT position.

79. Turn on the 208 VAC wall breaker, observe that the following indicator lights are on:

208V Emergency Stop Power	1A11F4
DOOR INTERLOCKS	1A11F5
OVER TEMPERATURE PLATE TRANSFORMER	1A11F6
IPA OVERLOAD	1A11F7
PA OVERLOAD	1A11F8
AC OVERLOAD	1A11F9
3 STRIKE OVERLOAD	1A11F10
LEFT 1ST IPA CATHODE OVERLOAD	1A11F11
RIGHT 1ST IPA CATHODE OVERLOAD	1A11F12
RIGHT PA BIAS	LEFT PA BIAS
STANDBY	WATER LEVEL
PA 1A6 OUTLET	PA 1A6 INLET
1A6V2 CATHODE	1A6V1 CATHODE
1A6V4 CATHODE	1A6V3 CATHODE

80. Turn on the 460 VAC wall breaker, observe that the 460 VAC Emergency stop power indicator is lit. Ensure that all interlocks are closed.

81. Place the POWER ON/OFF-RESET switch in the ON position. The following indicators should be illuminated on the front panel:

208V Emergency Stop Power	1A11F4
460V Emergency Stop Power	1A11F5
DOOR INTERLOCK	1A11F6
OVER TEMPERATURE PLATE TRANSFORMER	1A11F7
IPA OVERLOAD	1A11F8
PA OVERLOAD	1A11F9
AC OVERLOAD	1A11F10
3 STRIKE	1A11F11
LEFT 1ST IPA CATHODE OVERLOAD	1A11F12
RIGHT 1ST IPA CATHODE OVERLOAD	
LEFT PA BIAS OVERLOAD	
RIGHT PA BIAS OVERLOAD	
WATER LEVEL	
STANDBY	
PA 1A6 INLET	
PA 1A6 OUTLET	
1A6V1 PA CATHODE	
1A6V2 PA CATHODE	
1A6V3 PA CATHODE	
1A6V4 PA CATHODE	

82. Place the FILAMENT and BIAS switches to the ON position. Place the PLATE VOLTAGE SELECTOR switch to the OPERATE position. Ensure that a READY FOR TRANSFER lamp on the UD5 (Local Control Panel) is illuminated. If not, refer to enclosure (3) figure 3 for trouble-shooting the circuit.

83. With the READY FOR TRANSFER lamp lit, place the following switches, one by one, to the OFF position then back to the ON position, observing each time that the READY FOR TRANSFER indicator goes off and back on again: PLATE VOLTAGE SELECTOR (to MAINTENANCE, OFF and back to OPERATE), BIAS, FILAMENT, 1A52A3S2 (KIRK KEY), and the 460 VAC WALL MOUNTED BREAKER.

84. Place the PLATE VOLTAGE SELECTOR, BIAS, and FILAMENT switches to the OFF position.

85. Turn off the 460 VAC and 208 VAC wall breakers.

86. Temporarily disconnect and fold back the wires from 1A53A2K1 terminals 13 and 14. Note the terminal where wire was connected.

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

87. Connect a 24 VDC power supply to 1A53A2K1; the positive lead to terminal 14 and the negative lead to terminal 13. DO NOT ENERGIZE THE POWER SUPPLY UNTIL INSTRUCTED.

CAUTION:

The following steps will cause the transmitter under test to energize with pumps, blowers, filaments, bias, and plate voltage. Therefore steps should be taken to notify station engineers or others concerned with power line surges.

88. With the DESLOT/NON-DESLOT selector switch in the DESLOT position, place the ON/OFF-RESET, FILAMENT, and BIAS switches to their ON positions. Place the PLATE VOLTAGE SELECTOR switch to its OPERATE position.

89. Turn on the 208 VAC and 460 VAC wall breakers.

90. Front panel indicators should appear as listed in step 81.

91. Notify those personnel concerned with power line surges and then energize the 24 VDC power supply connected to 1A53A2K1. The pumps and blowers, filaments, bias ,and high voltage should turn-on approximately according to the following sequence:

ACTION	TIME
ENERGIZE POWER SUPPLY	0:00
PUMPS AND BLOWERS	0:01
FILAMENTS	0:09
FILAMENT READY	0:54
BIAS & HV ON	0:54
FULL POWER	1:14

92. Make a cursory check of the transmitter to ensure that it is operating normally, then again notify the persons concerned with power surges and de-energize the 24 VDC power supply. The transmitter should run down automatically, sequenced as follows:

ACTION	TIME
DE-ENERGIZED POWER SUPPLY	0:00
HV (only) OFF	0:00
BIAS & FILAMENTS OFF	0:05
BLOWERS & PUMPS OFF	5:00
READY FOR TRANSFER LAMP ON	5:00

93. With the transmitter run down, secure the 460 VAC and 208 VAC WALL breakers.

94. Disconnect the 24 VDC power supply from 1A52A2K1 terminals 13 and 14. Reconnect the relay wires removed in step 86.

95. Turn on the 208 VAC and 460 VAC wall breakers.

NOTE:

Follow normal procedures for transmitter local control when performing steps 96 and 97.

96. With the DESLOT/NON-DESLOT selector switch in DESLOT, perform a transmitter switch utilizing the local control unit (UD5). Ensure that transmitter energizes and runs up upon selection as the operate transmitter in the same manner as in step 91. Ensure that the transmitter operates normally on-the-air.

CAUTION:

Do not attempt to do a DESLOT transmitter switch remotely via the TAC until both transmitters are fully modified. Such action will result in a double transmitter failure due to the TAC attempting to return to the standby transmitter while the newly selected transmitter is still awaiting the filament ready. This is not a problem while in local control.

97. When operationally convenient, perform another transmitter switch, again observing the transmitter run-down time delays for proper sequencing as shown in step 92.

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

98. With all power secured to the modified transmitter, wrap all new wiring to the cable harnesses, as appropriate, using ty-wraps (#59).

99. This completes the electronics portion of the field change installation and check-out for one AN/FPN-44 or AN/FPN-44A Loran Transmitter.

CAUTION:

It is imperative that the first transmitter modified and tested be left in the NON-DESLOT position until the opposite transmitter has also been completed. It becomes imperative that, whenever the transmitters are left in remote control, they are BOTH in the SAME MODE of operation. Operation otherwise can result in a double transmitter failure. Refer to enclosure (6) for operating instructions for DESLOT modified stations.

100. Perform steps 1 through 99 above to the other transmitter.

101. Utilize enclosure (4) to make temporary technical manual corrections.

102. Utilize enclosure (5) as routine operating instructions for the transmitters and their switching procedures, retain copies in transmitter building and timer room.

103. This completes the Field Change to both transmitters. Make all EICAM entries and records of Field Change accomplishment.

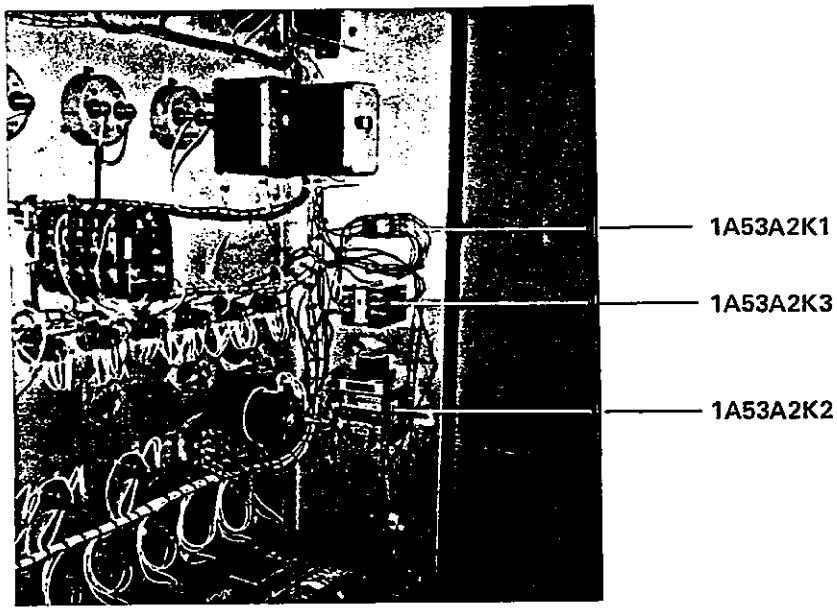
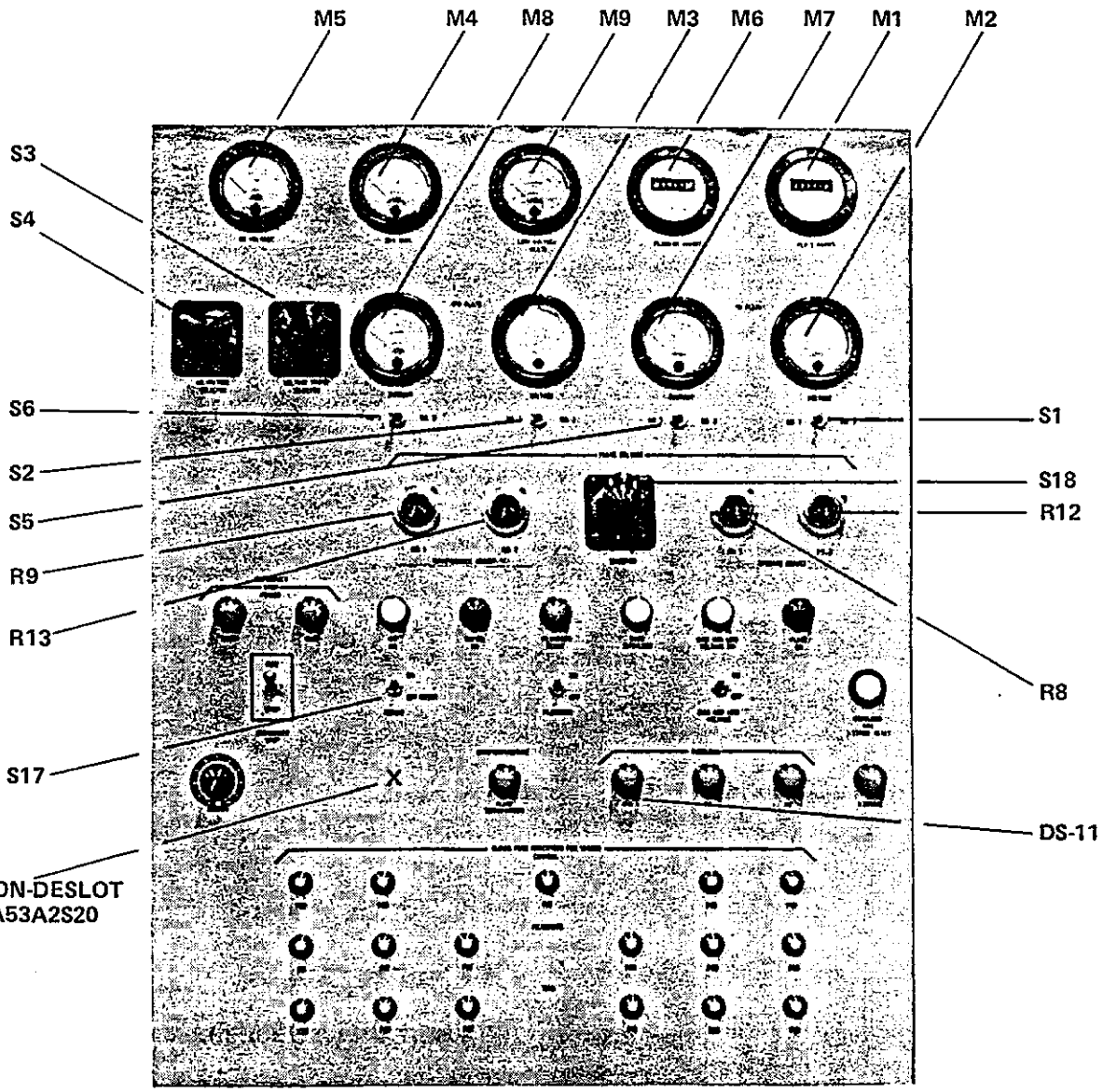


Figure 1. New Component Locations



PREFIX REFERENCE DESIGNATIONS WITH 1A53A2.

Figure 2. DESLOT/NON-DESLOT Selector Switch Mounting Location

GENERAL ELECTRIC

SPECIFICATION FORM—PART 1 TYPE SB-1, -9 AND -10 SWITCHES

Use GED-3934, Part 2 for special features
Refer to GEA-4746 and GET-6169 for descriptive information

ON SB-10 SWITCHES MARK LAT. STAGES WITH A DOT. (•)	CONTACT ARRANGEMENT MARK "X" FOR CLOSED CONTACT															
CONTACTS HANDLE END ODD EVEN	HANDLE POSITIONS (BACK VIEW)															
		3	2	1												
1				X												
2	X															
3				X												
4	X															
5				X												
6	X															
7				X												
8	X															
9				X												
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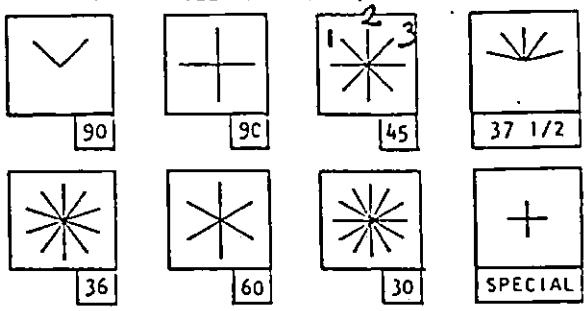
32																

BOTTOM TOP BOTTOM
TERMINAL LOCATION

MARK HANDLE POSITIONS (FRONT VIEW)



CIRCUIT PLATE ENGRAVING	
POS.	ESCUTCHEON ENGRAVING
1	MAINT
2	OFF
3	OPERATE

ROTATING ACTION
MAINTAINED ALL POSITIONS ☐

SPRING RETURN ACTION

S.R. FROM CCW POS.	S.R. FROM CW POS.
FROM POS ☐ TO ☐	FROM POS ☐ TO ☐

MAINT. POS. ☐☐☐☐

FULL TO LOCK IN POS. _____ ☐

HANDLES

KNURLED	☐
OVAL	☒
PISTOL GRIP	☐
LEVER	☐
ROUND	☐
RADIAL	☐
L. PISTOL GRIP	☐
NONE	☐

ESCUTCHEON

STANDARD OR ROUND	☐
TARGET	☐
KEYED FOR REMOV. HANDLE REMOV. IN POS. ___	☐
NONE	☐
SPECIAL _____	

STANDARD COVER (NEMA 1) ☒

PANEL THICKNESS 1/8"

FILL OUT BELOW FOR SB-10

LATERAL ACTION

NO ROTATION WHEN	IN	OUT
MAINTAINING (IN & OUT)		
SPRING RETURN TO	IN	OUT
PULL | PUSH | IN POS. _____		
TO CLOSE CONTACTS		
TO OPEN CONTACTS		

(CROSS OUT THE ACTION WHICH DOES NOT APPLY)

SPECIAL REMARKS Type SB-1

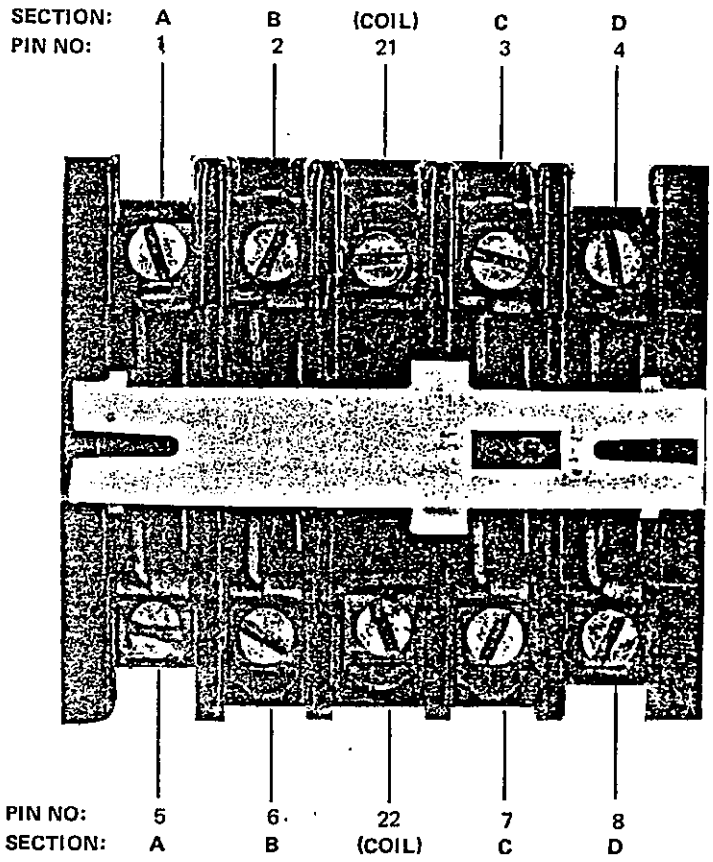
(SPECIAL FEATURE FORM GED-3934 PT2 MAY BE USED WITH THIS FORM)

GENERAL ELECTRIC CO. • POWER SYSTEMS MANAGEMENT BUSINESS DEPT. • PHILADELPHIA, PA. 19142

GED-3934B Part 1
12-78 (2M)

Figure 3. Specifications For 1A53A2S18

ERRATA TO:
F.C. NO. 5 TO AN/FPN-44A F.C. NO. 28 TO AN/FPN-44



NOTE: For 1A53A2K3 terminal locations for pins 1 through 8, sections a through d, are as shown. Coil terminals 21 and 22 are located on top of the relay.

Figure 4. Terminal Locations For 1A53A3K18 and 1A53A2K3

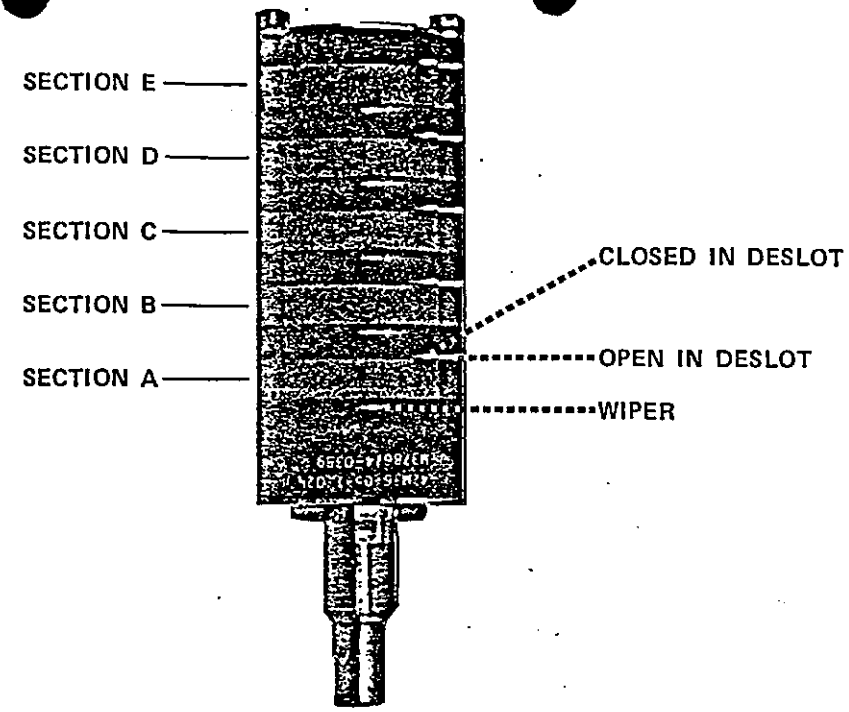


Figure 5A. Terminal Locations For 5 PDT DESLOT/NON-DESLOT Switch 1A53A2S20

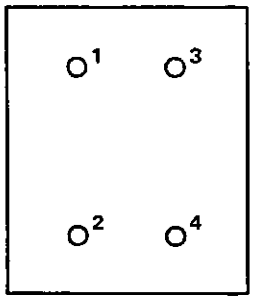


Figure 5B. Terminal Locations For Original 1A52A2S7 and S13

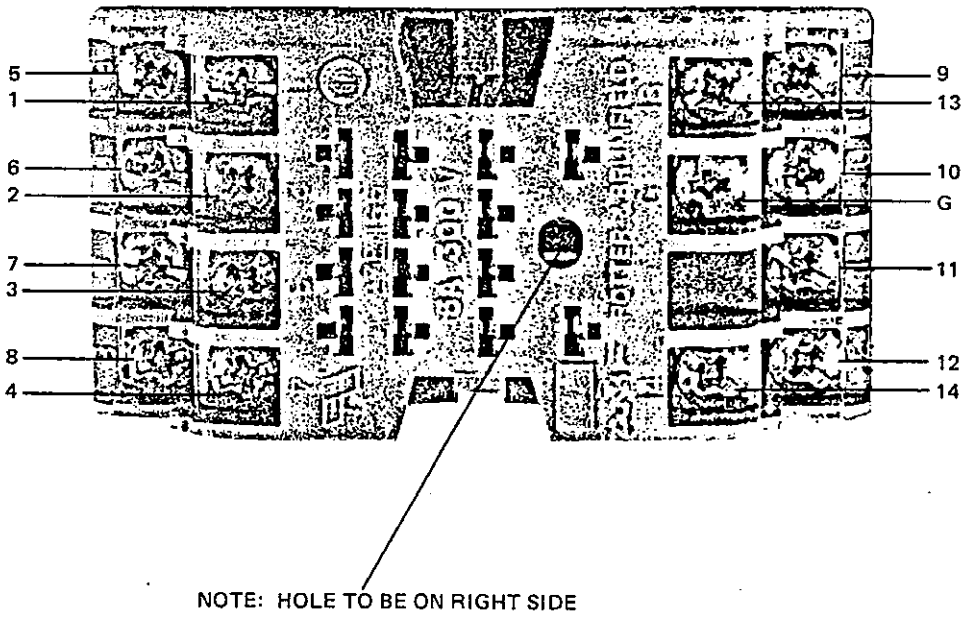
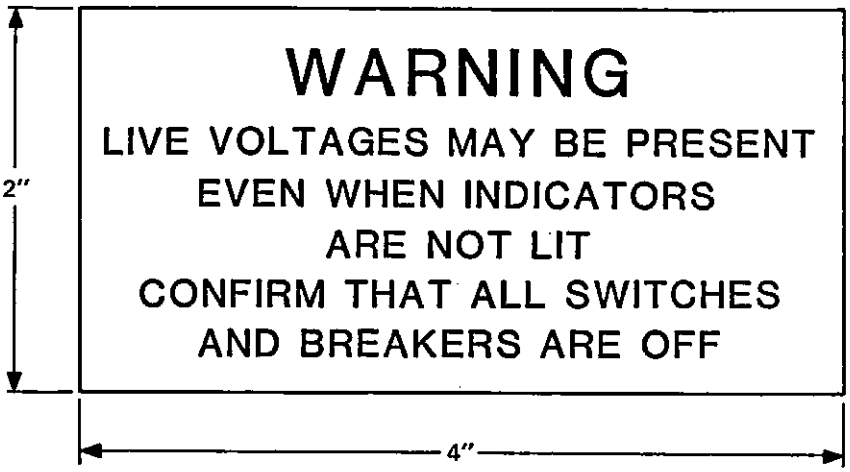
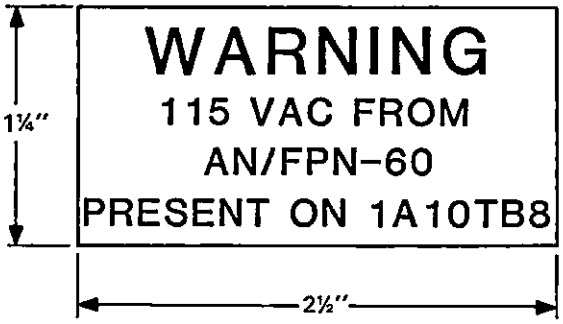


Figure 6. Terminal Locations For Potter & Brumfield Relay Socket (Model 27E166)



1/4" and 1/8" White Letters On Red Background

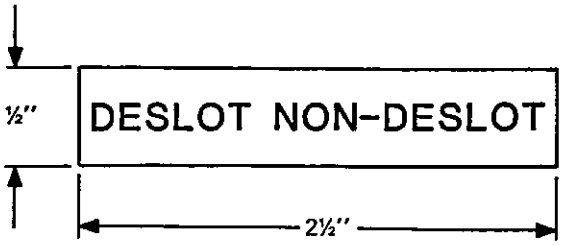
Plate 1



1/4" and 1/8" White Letters On Red Background

Plate 2

(AN/FPN-45 Only)



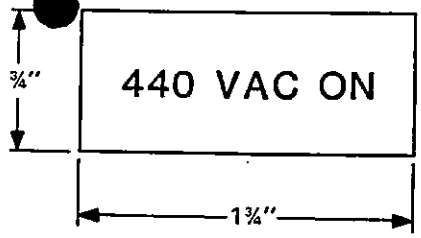
1/8" White Letters On Gray Background

Plate 3

Specifications:

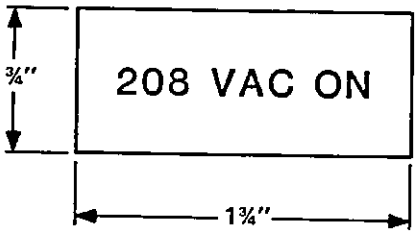
1. Material: Plastic (Plexiglas)
2. Beveled Edges Required
3. Self-Adhesive Backing Required (Full-Coverage)

Figure 7. Field Change Plates For AN/FPN-44/44A/45 Transmitters (Sheet 1 of 2)



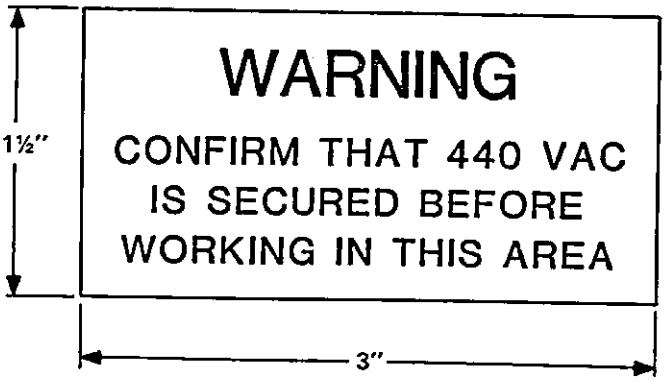
1/8" Black Letters On Gray Background

Plate 4



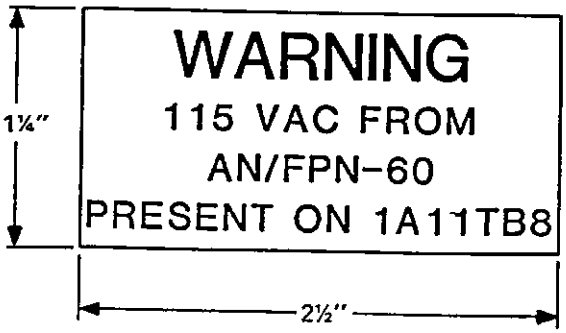
1/8" Black Letters On Gray Background

Plate 5



1/4" and 1/8" White Letters On Red Background

Plate 6



1/4" and 1/8" White Letters On Red Background

Specifications:

1. Material: Plastic (Plexiglas)
2. Beveled Edges Required
3. Self-Adhesive Backing Required (Full-Coverage)

Plate 7
(AN/FPN-44A Only)

Figure 7. Field Change Plates For AN/FPN-44/44A/45 Transmitters (Sheet 2 of 2)

Enclosure (2)

FIELD CHANGE KIT PARTS LIST

Item No.	Quan.	Description
1	2	Paper Template for use in drilling mounting holes for 1A53A2K1, 2, and 3.
2	2	No. 12 Drill Bit, NSN 5133-00-189-9257.
3	1	1/2 " De-burring tool/drill bit with 1/4" shank; Stanley No. 137, NSN 5133-00-752-9564.
4	1	Center Punch, Automatic Reset type, NSN 5120-00-595-9470. Maxon Mascot Model 79 or equivalent.
5	3	Agastat type 7022AB, 0-5 second delay on drop out relay, NSN 5945-00-813-9704, including 1 spare.
6	2	Potter & Brumfield relay socket, type 27E166, NSN 5935-00-443-9440, including 1 spare.
7	3	General Electric, 4PST relay type CR120A04002AAMFP, NSN 5945-00-014-1754, including 1 spare.
8	3	5PDT rotary switch NSN 9N 5930-00-576-5140, Grayhill type 42M36-05-1-2N, (with 1 spare)
9	2	Plastic, gray colored, self sticking label with engraved inscription, "DESLOT/NON-DESLOT" (refer to figure 3).
10	2	Wire, 36" green, Belden type 8521-5.
11	100	Thomas & Betts nylon insulated terminal lug type RA18-6F, for wire sizes 22-18 AWG, NSN 5940-00-176-7636.
12	100	Thomas & Betts nylon insulated terminal lug type RA18-8F, for wire sizes 22-18 AWG, NSN 5940-00-117-4424.
13	2	Wire, 18" green, Belden type 8521-5.
14	2	Wire, 60" green, Belden type 8521-5.
15	2	Wire, 16" green, Belden type 8521-5.

F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

16	2	Wire, 64" green, Belden type 8521-5.
17	2	Wire, 76" green, Belden type 8521-5.
18	2	Wire, 26" green, Belden type 8521-5.
19	2	Wire, 28" green, Belden type 8521-5.
20	2	Wire, 32" green, Belden type 8521-5.
21	2	Wire, 30" green, Belden type 8521-5.
22	2	Wire, 28" green, Belden type 8521-5.
23	2	Wire, 28" green, Belden type 8521-5.
24	3	General Electric control switch, part no. 16SB1EB3 B86SSM2V including 1 spare.
25	2	Wire, 56" green, Belden type 8521-5.
26	2	Wire, 54" green, Belden type 8521-5.
27	2	Wire, 28" green, Belden type 8521-5.
28	2	Wire, 28" green, Belden type 8521-5.
29	2	Wire, 32" green, Belden type 8521-5.
30	2	Wire, 26" orange, Belden type 8521-3.
31	2	Wire, 26" orange, Belden type 8521-3.
32	2	Wire, 36" orange, Belden type 8521-3.
33	2	Wire, 36" orange, Belden type 8521-3.
34	2	Wire, 62" orange, Belden type 8521-3.
35	2	Wire, 18" orange, Belden type 8521-3.
36	2	Wire, 20" orange, Belden type 8521-3.
37	2	Wire, 52" orange, Belden type 8521-3.
38	2	Wire, 40" orange, Belden type 8521-3.

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

39	2	Wire, 64" orange, Belden type 8521-3.
40	2	Wire, 34" orange, Belden type 8521-3.
41	2	Wire, 45" orange, Belden type 8521-3.
42	2	Wire, 52" orange, Belden type 8521-3.
43	2	Wire, 52" orange, Belden type 8521-3.
44	2	Wire, 50" orange, Belden type 8521-3.
45	2	Wire, 14'0" orange, Belden type 8521-3.
46	2	Wire, 14'0" orange, Belden type 8521-3.
47	3	Relay, Potter & Brumfield, 24 VDC, P/N KHS17D11-24, NSN 5945-00-903-7498, including 1 spare.
48	8	Label, Plastic, engraved self-sticking type with "WARNING-CONFIRM THAT 440 VAC IS SECURED BEFORE WORKING IN THIS AREA", including 4 spares.
49	2	Label, Plastic, engraved self-sticking type with "WARNING-LIVE VOLTAGES MAY BE PRESENT EVEN WHEN INDICATORS ARE NOT LIT. CONFIRM THAT ALL SWITCHES AND BREAKERS ARE OFF".
50	2	Label, Plastic, engraved self-sticking type with "WARNING-115 VAC FROM AN/FPN-60 PRESENT ON 1A11TB8".
51	10 ft	Heat shrink tubing, 1/4" dia., Alpha type FIT-105-1/4.
52	2	Drill bit 1/2" with 1/4" shank, NSN 5133-00-133-4216.
53	100	Thomas & Betts nylon insulated terminal lug type RB-14-8F, for wire sizes 14-18 AWG, NSN 5940-00-117-4424.
54	2	Hardware Kit, consisting of: a. 100 stainless steel #8-32 X 3/4" flat head screws, flat and lock washers, and hex nuts. b. 100 stainless steel #6-32 X 1/2" flat head screws, flat and lock washers, and hex nuts.

F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

55	1	Test cable, 2-conductor, Belden type 17308.
56	2	Wire, 40" green, Belden type 8521-5.
57	2	Wire, 14" green, Belden type 8521-5.
58	1	Pen, marking, black indelible, Thomas and Betts catalog no. WT163M-1
59	1 pk	Ty-wraps, assorted.
60	2	Wire, 36" orange, Belden type 8521-3.
61	4	Field Change Bulletin for Field Change No. 5/28 to the AN/FPN-44A/44.
62	2	Knob, switch selector, black NSN 5355-00-993-0760, MS-25169P2B, California Plastic Inc. type CPA3852P2B.
63	1	Wire, 25' green, Belden type 8521-5.
64	1	Wire, 25' orange, Belden type 8521-3.
65	2	Paper template, revised 10-28-85, for use in drilling mounting holes for 1A53A2K1,2 and 3
66	2	Drill bit 13/32", NSN 5133-00-227-9668

NOTE: Additional lengths of wire, items 63 and 64 are provided in case needed to replace existing wire or install missing wires in the transmitters.

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

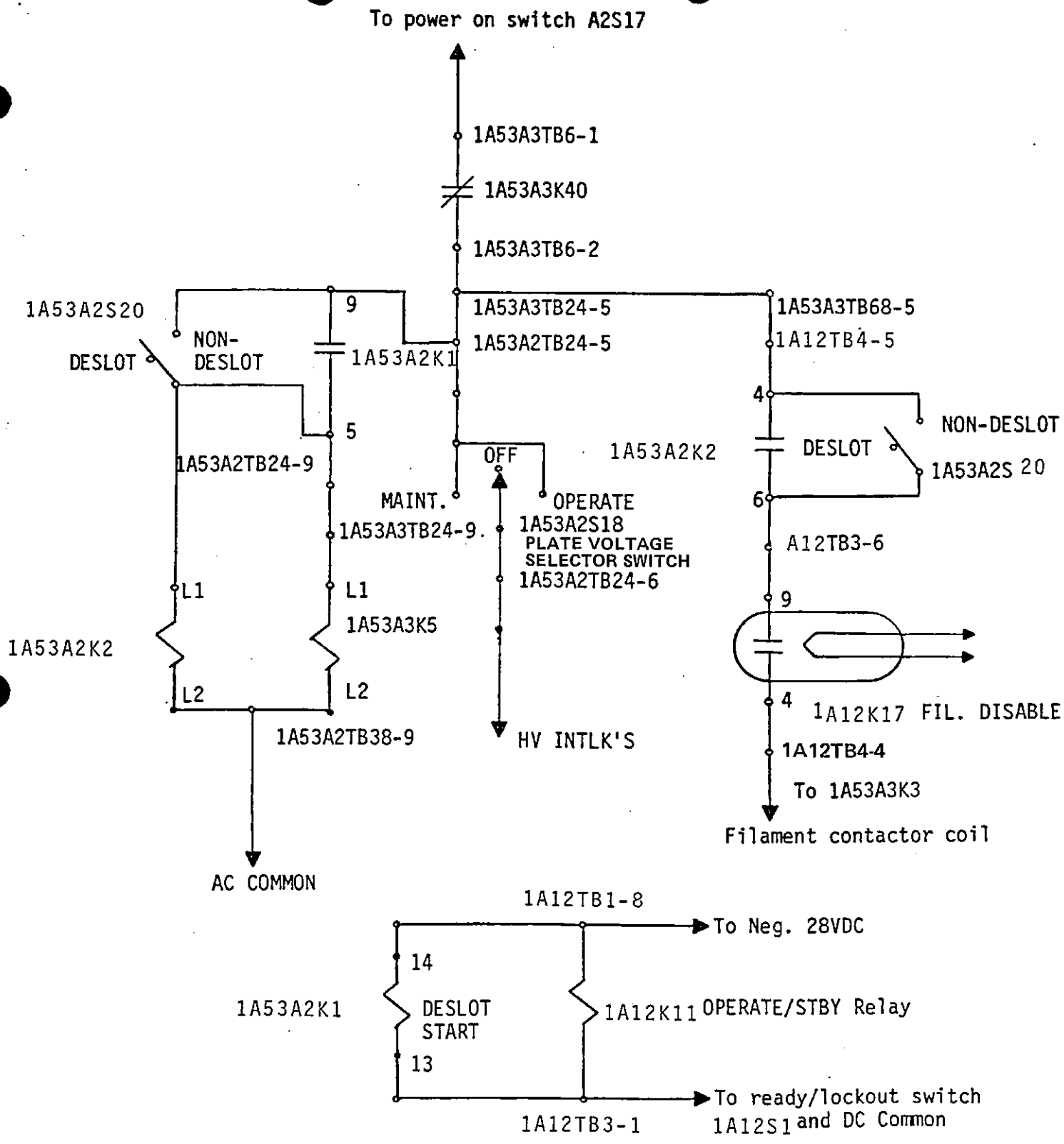


Figure 1. AN/FPN-44A DESLOT Modification
Pump, Blower, and Filament Control

ERRATA TO:
F.C. NO. 5 TO AN/FPN-44A
F.C. NO. 28 TO AN/FPN-44

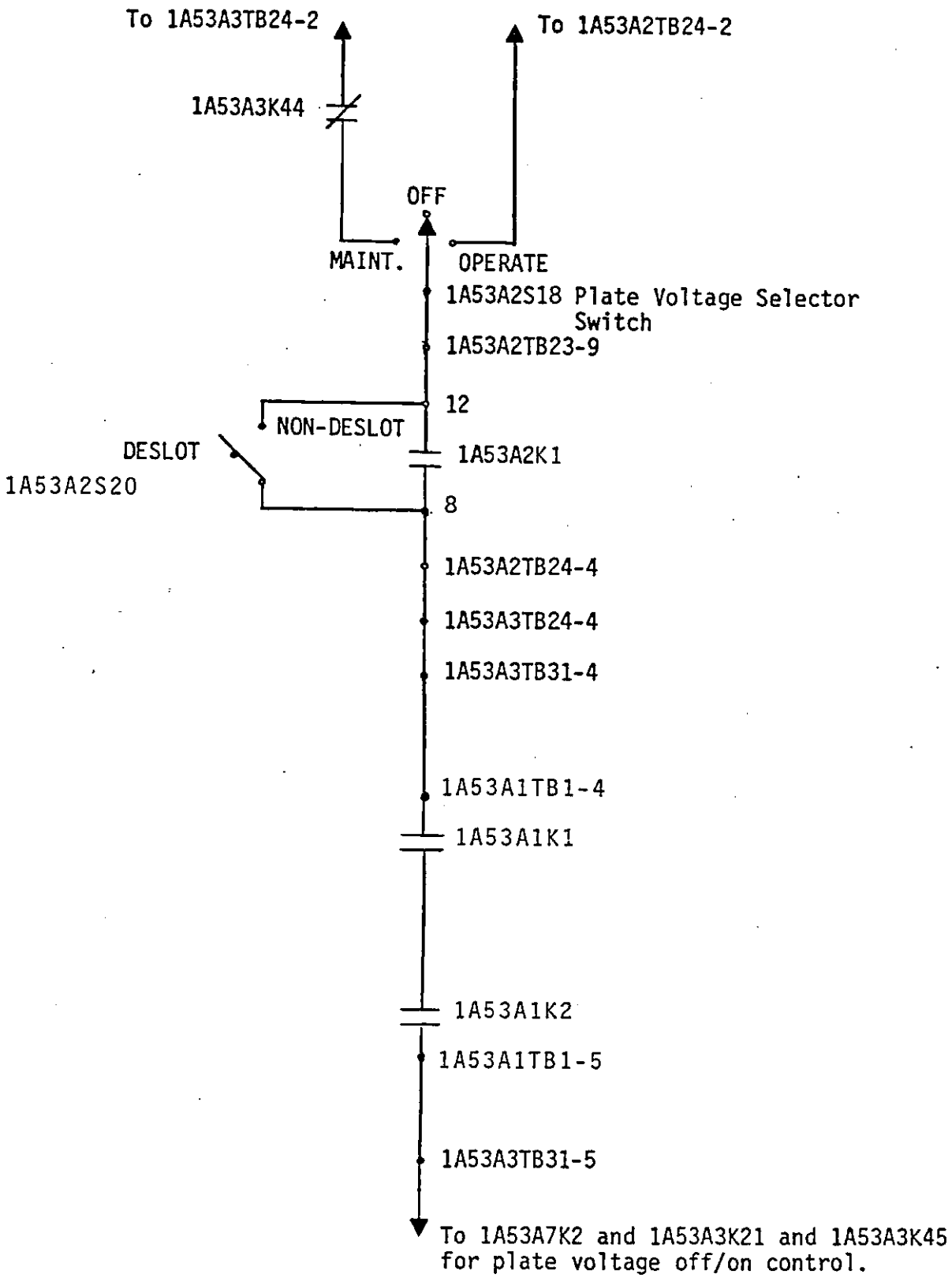


Figure 2. AN/FPN-44A DESLOT Modification For Plate Voltage Control

F.C. NO. 5 TO AN/FPN-44A
F.C. NO. 28 TO AN/FPN-44

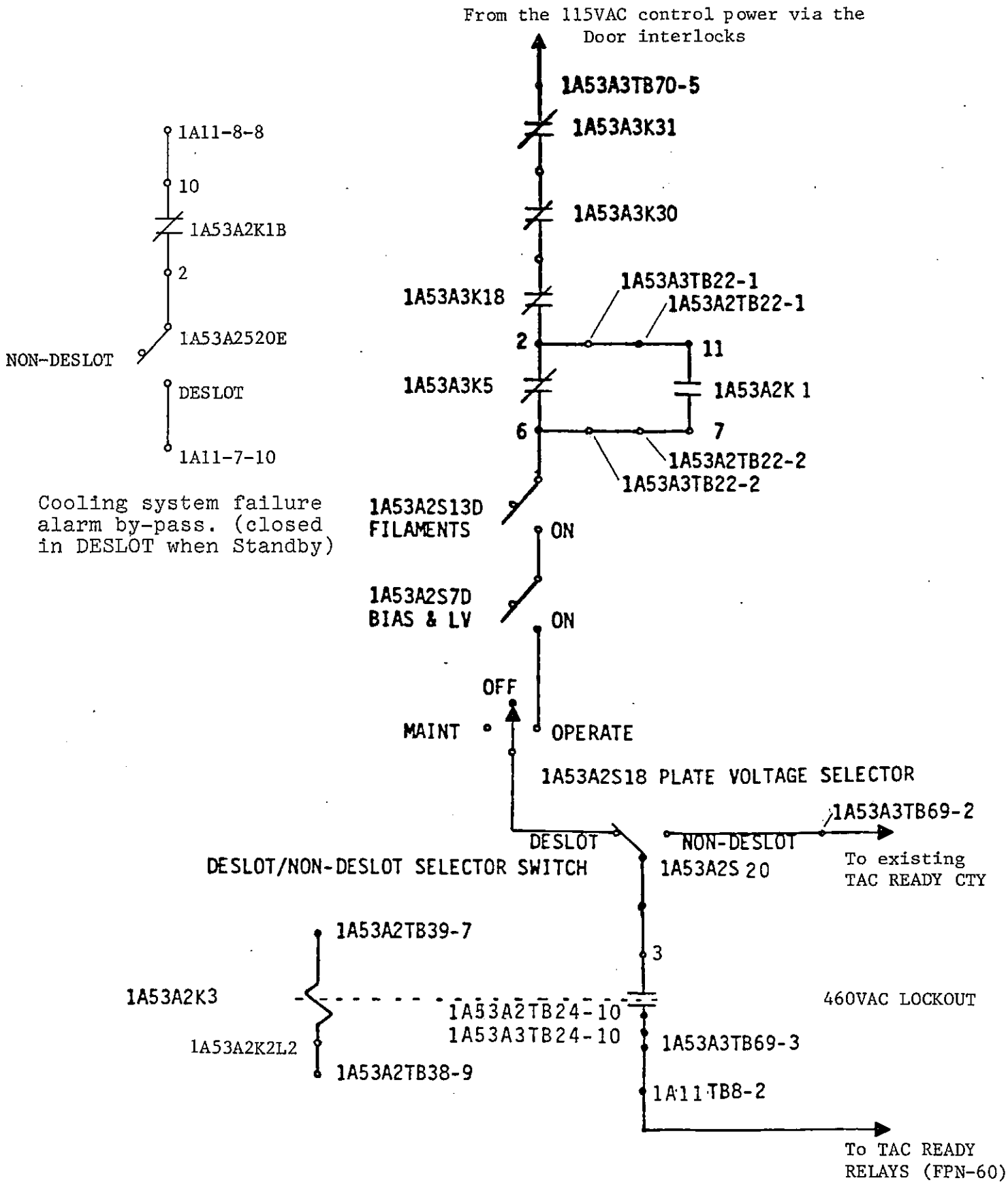


Figure 3. AN/FPN-44A DESLOT Modification For TAC READY Circuitry

ERRATA TO:

F.C. NO. 5 TO AN/FPN-44A
F.C. NO. 28 TO AN/FPN-44

10. Page 5-3, add to end of TABLE 5-2, under CONTROL "DESLOT/NON-DESLOT SELECTOR" under SETTING "NON-DESLOT".

11. Page 6-ii, at the bottom of the page add the following: "NOTE: The following page has been corrected by F.C. No. 5/28 to the AN/FPN-44/44A: 5-18.

12. Page 6-18, Para. 6-5b(3)(b), Step 1. Change 150 second mark to "45 second mark".

13. Page 6-18, Para. 6-5b(3)(b), Step 3. Change 150 ± 15 seconds to "45 ± 3 seconds."

14. Page 7-ii, at the bottom of the page add the following: "NOTE: The following pages have been corrected by F.C. No. 5/28 to the AN/FPN-44/44A: 7-59, 7-61 and 7-64.

15. Page 7-59, add the following at the bottom of the page:

REF. DESIG.	NOTES	DESCRIPTION	FUNCTION
1A53A2K1		Relay, 66342 Part No. KHS17D11-24	DESLOT/NON-DESLOT Control Relay.
1A53A2K2		Relay, Time Delay, 89020 Part No. 7012AB	Filament Off Delay
1A53A2K3		Relay, 24446 Part No. CR120A04002AAMFP	460 VAC Lockout Control Relay.

16. Page 7-61, for REF DESIGNATION for 1A52A2S18, under DESCRIPTION change 28527 part no. 2138352G2 to 24446 part no. 16B1EB3B86SSM2V.

17. Page 7-61, add the following at the bottom of the page:

REF. DESIG.	NOTES	DESCRIPTION	FUNCTION
1A53A2S20		Switch Rotary, 5PDT, 81083 part no. 42M36-05-1-2N	DESLOT/NON-DESLOT SWITCH

18. Page 7-64, add the following at the bottom of the page:

REF. DESIG.	NOTES	DESCRIPTION	FUNCTION
1A53A2XK1		Relay Socket, 77342 Part No. 270E166	K1 Mounting socket.

ERRATA TO:
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F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

Enclosure (4)

TEMPORARY TECHNICAL MANUAL CORRECTIONS

Make the following pen and ink corrections in the AN/FPN-44A Technical Manual. At the bottom of each page where pen and ink corrections are made replace, as appropriate, the ORIGINAL or CHANGE NO. at the bottom of the page with: "F.C. No. 5/28 to the AN/FPN-44/44A".

1. Page ii, at the bottom of the page add the following: "NOTE: The following pages have been corrected by F.C. No. 5/28 to the AN/FPN-44/44A: 2-6, 3-11, 3-13, 3-18, 3-19, 4-3, 5-ii, 5-3, 6-ii, 6-18, 7-ii 7-59, 7-61 and 7-64.

2. Page 2-6, add to TABLE 2-2, between EMERGENCY STOP and LOCKOUT-READY, under CONTROL, "DESLOT/NON-DESLOT"; under REF DES "1A52S20" under FIGURE, "3-5"; under POSITION, "NON-DESLOT".

3. Page 3-11, figure 3-5, correct to show 1A53A2S20, DESLOT/NON-DESLOT selector. See enclosure (1) figure 2 of Field Change Bulletin.

4. Page 3-13, add to TABLE 3-5, between DIMMER and OVER TEMPERATURE PLATE TRANSFORMER, under PANEL MARKING "DESLOT/NON-DESLOT", under REFERENCE SYMBOL "1A53A2S20", under TYPE "Switch", under FUNCTION "Selects DESLOT or NON-DESLOT mode."

5. Page 3-18, add to end of TABLE 3-9, under CONTROL "DESLOT/NON-DESLOT SELECTOR" under FIGURE "3-5" under SETTING "NON-DESLOT".

6. Page 3-19, TABLE 3-11, after DURING USE SEQUENCE OF OPERATION add "NON-DESLOT".

7. Between page 3-22 and 4-1, insert the "DESLOT and NON-DESLOT operating instructions", attachment (1).

8. Page 4-3, section 4-2a, right hand column, after the last paragraph add the following: "NOTE: the standby transmitter in the standby mode may have cooling, filament and bias power applied or be essentially de-energized depending on the position of the "DESLOT/NON-DESLOT" selector switch 1A53A2S20.

9. Page 5-ii, at the bottom of the page add the following: "NOTE: The following page has been corrected by F.C. No. 5/28 to the AN/FPN-44/44A: 5-3.

F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

DESLOT AND NON-DESLOT TRANSMITTER OPERATING PROCEDURES

1. When both transmitters are in the DESLOT mode of operation, the Local Control Unit will have its READY FOR TRANSFER indicator, the REMOTE indicator, and either the TRANSMITTER No. 1 ON ANTENNA or TRANSMITTER No. 2 ON ANTENNA indicator lit.

2. If DESLOT mode is the authorized normal operating mode, switch to NON-DESLOT mode on both transmitters when the standby transmitter is run-up into the dummy load for routine maintenance or for taking readings. Once the maintenance is completed, return the selector switches to the DESLOT mode.

3. When performing routine transmitter switches, place both transmitters into the NON-DESLOT mode. The purpose of this is to reduce the amount of time that the station will be off-air during the switch (approximately 15 seconds vs. 1-minute). After switching transmitters, return the mode selector to DESLOT, if this is the authorized normal operating mode. Once the previous operate transmitter has been switched to standby status, the transmitter will commence a 5-minute cool-down cycle, then secure itself. Once per month a DESLOT transmitter switch shall be performed utilizing the SWITCH TRANSMITTERS switch on the AN/FPN-60 (the purpose of this is to check-out the TAC and DESLOT circuitry for proper operation).

4. During an automatic transmitter switch, when the transmitters are in the DESLOT mode, the following indications will appear on the Status Alarm Unit (SAU): NO STBY XMTR, XMTR FAIL ON AIR, and XMTR FAIL OFF-AIR indications will appear for approximately five minutes, until the failed transmitter cools down and then secures itself. If the failure is due to a 3-Strike dropout, the XMTR FAIL ON AIR and NO STBY XMTR indications will remain. If an automatic switch occurs via operator intervention, the SAU will return to a HAPPY FACE condition only after the five minute cool-down period.

5. When changing from NON-DESLOT to DESLOT mode of operation, proceed as follows:

a. Ensure that the LOCAL CONTROL UNIT is in the LOCAL mode with the standby transmitter B+ switch OFF. On the standby transmitter, place the BIAS & LOW VOLTAGE, TRANS FIL and the POWER ON/OFF-RESET switches to the OFF position. Then place the DESLOT/NON-DESLOT switches on both transmitters in the DESLOT position. This will permit the normal 5 minute cooldown period.

F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

b. Place the POWER ON/OFF-RESET, FILAMENT, and BIAS/LOW VOLTAGE switches on the standby transmitter to their ON positions.

c. With the DOOR INTERLOCK lamp lit and the PLATE VOLTAGE selector switch in the OPERATE position, a READY FOR TRANSFER indication will be displayed on the Local Control Unit as soon as the pumps and blowers stop.

d. The Local Control Unit may be placed in the REMOTE position.

6. When changing from DESLOT to NON-DESLOT mode of operation, proceed as follows:

a. Ensure that the standby transmitter's B+ switch on the Local Control Unit is OFF and place the Local Control Unit in LOCAL Control.

b. Place the BIAS & LOW VOLTAGE, FILAMENTS, and POWER-ON/OFF-RESET switches into their OFF positions.

c. Place the DESLOT/NON-DESLOT selector switch in the NON-DESLOT position. (Both transmitters)

d. Run up or test the standby transmitter as desired by placing the POWER ON/OFF-RESET, FILAMENTS, BIAS & LOW VOLTAGE switches in their ON positions.

CAUTION

Do not attempt to operate the transmitters in opposite modes while in REMOTE (i.e., one transmitter in DESLOT and the other in NON-DESLOT). Such action will result in a dual transmitter failure should the operate transmitter fail.

7. The following indicators will be illuminated with the transmitter in DESLOT ready remote:

208V EMERGENCY STOP POWER	1A11F4
460V EMERGENCY STOP POWER	1A11F5
DOOR INTERLOCKS	1A11F6
OVER TEMPERATURE PLATE TRANSFORMER	1A11F7
IPA OVERLOAD	1A11F8
PA OVERLOAD	1A11F9
AC OVERLOAD	1A11F10
3-STRIKE	1A11F11
LEFT 1ST IPA CATHODE OVERLOAD	1A11F12

F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

RIGHT 1ST IPA CATHODE OVERLOAD
LEFT PA BIAS OVERLOAD
RIGHT PA BIAS OVERLOAD
WATER LEVEL
STANDBY
PA 1A6 INLET
PA 1A6 OUTLET
1A6V1 PA CATHODE
1A6V2 PA CATHODE
1A6V3 PA CATHODE
1A6V4 PA CATHODE

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

Enclosure (6)

DESLOT THEORY OF OPERATION FOR AN/FPN-44A TRANSMITTERS

1. A 24VDC Potter & Brumfield 4PDT relay designated as 1A53A2K1 is connected in parallel with the operate/standby relay 1A12K11. It is energized when the transmitter is selected as the operate transmitter. Its normally open contacts control all DESLOT circuit functions via Agastat time delay relays 1A53A3K5 (for pumps and blowers) and 1A53A2K2 (for filaments). One set of normally open contacts controls plate voltage turn on/off directly via existing high voltage interlock circuitry and 1A53A3K45. A set of normally closed contacts is used to bypass the 1A11 cooling system failure alarms when in the deslot mode.

2. The AN/FPN-44A DESLOT circuitry can be described as three functional circuits as follows:

   a. Pumps, Blowers, and Filament control (Figure 1 of schematic diagrams)

   b. Plate Voltage control (Figure 2 of schematic diagrams)

   c. TAC Ready circuitry (Figure 3 of schematic diagrams)

3. Pumps and Blowers are controlled directly via 1A53A3K5 in both the DESLOT and NON-DESLOT modes. A3K5 is energized by the Potter & Brumfield 1A53A2K1 upon selection as the operate transmitter when in the DESLOT mode. The new Agastat relay 1A53A2K2, used for filament control energizes in parallel with A3K5, by the same set of A2K1 contacts.

4. The 1A53A2K2 Agastat relay normally open contacts are placed in series with the Filament Disable relay 1A12K17 contacts for Filament control. Since the Agastat is a time delay on dropout type relay, it will delay the dropout of filaments for its delay setting after plate voltage is removed by the Potter & Brumfield 1A53A2K1. The purpose of this delay is to allow for the high voltage control circuits to be de-energized and stabilized prior to the removal of bias and filaments. This is to avoid possible damage to the high voltage bleeder resistors and power tubes.

5. Each of the normally open contacts used for DESLOT control are bypassed by the DESLOT/NON-DESLOT selector switch 1A53A2S20 to return all circuitry to the original configuration. Thus, the transmitter may be run up in the standby mode for maintenance or routine transmitter switching.

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F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

6. The DESLOT TAC Ready 115 VAC signal source is taken from the normally closed contacts of 1A53A3K18, the Three Strike Lockout relay. This provides assurance that door interlocks and Kirk key interlocks are secured, and that no Three Strike lockout condition exists while showing a READY transmitter. From this point the TAC Ready 115 VAC signal is gated through the 1A53A3K5 normally closed contacts wired in parallel with normally open contacts of the Potter & Brumfield relay 1A53A2K1. This parallel combination locks out the TAC Ready during transmitter cool down following a DESLOT transmitter switch. This is required because of the one minute required for the operate transmitter to warm up and go ON AIR. Without locking out the TAC Ready from standby transmitter during cool down, the TAC would try to switch back to the failed transmitter after waiting 30 seconds for the new operate. This of course causes a double transmitter failure. Extra contacts on 1A53A2S7, S13 and S18 are wired in series to ensure that these switches are placed in the "Ready to Go" positions prior to obtaining the TAC Ready and leaving the transmitter in the DESLOT Ready standby. The fourth section of the DESLOT/NON-DESLOT selector switch 1A53A2S20 places the TAC Ready circuitry back in the original configuration for NON-DESLOT operation.

7. The 460 VAC lockout is included with the DESLOT Field Change to prevent a READY indication with the 460 VAC wall breaker off. The GE 4PST relay 1A53A2K3 is wired in series with the wiper of the DESLOT/NON-DESLOT switch and the circuitry leading to the TAC Ready relays in the AN/FPN-60. Prior to this Field Change it was possible to leave the transmitter in a seemingly READY state without the 460 VAC wall breaker on.

U.S. Department of Transportation
United States Coast Guard

Commanding Officer(sm)
USCG Electronics
Engineering Center

P. O. Box 60
Wildwood, NJ 08260-0060
FTS 346-7312

3 SEP 1985

ELECTRONIC FIELD CHANGE BULLETIN

F. C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F. C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

PURPOSE:

The purpose of this field change is to permit automatic energizing and run-up of the standby AN/FPN-44A or AN/FPN-44 Transmitter upon selection as operate transmitter via the Transmitter Automatic Controller. This Field Change also adds a READY LIGHT lockout when 460 VAC primary power is not present.

DESCRIPTION:

This field change adds circuitry which enables the standby AN/FPN-44 or AN/FPN-44A Transmitter to remain substantially de-energized while in a ready status. Additionally, a relay, 1A53A2K3 is added which prevents the transmitter from displaying a ready condition when 460 volts are not present in the transmitter. This field change kit also contain the initial ERPAL spares. This field change, previously referred to as De-energized Standby Loran Transmitter (DESLOT), was field tested at LORSTA TOK and remains installed there.

IDENTIFICATION OF ACCOMPLISHMENT:

The presence of a rotary switch, marked DESLOT/NON-DESLOT, located to the left of the PLATE TRANSFORMER OVER TEMPERATURE indicator (1A53A2DS11) and centered below the POWER ON/OFF-RESET switch (1A53A2S17) will identify accomplishment of this Field Change.

EQUIPMENT AFFECTED:

This Field Change is applicable to all AN/FPN-44A Transmitters, and to all AN/FPN-44 Transmitters after the installation of the Solid State Power Supply.

DISTRIBUTION - SDL No. 121

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B	*	2	*		.		10		2								2		5							
C																						*				
D																										
E																										
F																										
G																										
H																										

NON-STANDARD DISTRIBUTION: *B: a(G-TES, G-NRN)(1); c(2nd, 11th, 14th, 17th Only)(2)
*C: v(DANA, FALLON, LAMPEDUSA, MIDDLETOWN, NARROW CAPE, SEARCHLIGHT, SHOAL COVE, and TOK Only)(2)

Canadian Coast Guard (CGTG)
Tower A, Place D Ville
Ottawa, Ontario, Canada K1A ON7

Station Leader
Ejde Station Leader
DK-3814-Faeroe Island
Via Denmark

Telecom Station Manager
Williams Lake Loran-C Station
P.O. Box 4568
Williams Lake, BC, Canada V2G 2V8

MATERIALS REQUIRED:

1. A Field Change No. 5/28 Parts Kit and standard hand tools, including a 1/4" drill and a power supply capable of supplying 24 VDC, at 50 mA minimum, are required to accomplish this Field Change.

2. The items provided in the Field Change kit are listed in enclosure (2) to this Field Change. Each parts kit contains the parts necessary for two transmitters, and an initial allowance of ERPAL spares.

3. Distribution of the Field Change Parts Kits will be made by Coast Guard Supply Center, Brooklyn, NY.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2.

2. Install the Field Change in the AN/FPN-44A or AN/FPN-44 Transmitter Power Supply in accordance with the step-by-step instructions contained in enclosure (1). Approximately 20 technician-hours per transmitter should be required to complete this Field Change. The longest period that a transmitter should be required to remain unusable during installation of this Field Change is approximately 1.5 hours.

3. Applicable schematic diagrams of the circuits modified by this Field Change are included as enclosure (3). Instructions for operating in the DESLOT and NON-DESLOT modes are contained in enclosure (5).

4. Make temporary changes in the AN/FPN-44A Technical Manual, CG-273-136 in accordance with the instructions contained in enclosure (4). The DESLOT Field Change Theory of Operation is contained in enclosure (6).

5. Accomplishment of this Field Change will take two technicians approximately ten hours per transmitter. I recommend that this Field Change be installed by an ET1 and ET2, and that a representative of the responsible engineering support facility (Area or District Office) be present during the installation of this Field Change.

6. Completion of this Field Change does not authorize the station to operate in the DESLOT mode. Operation in this mode is dependent on environmental conditions and operational requirements. Authorization to operate in the DESLOT mode must be received from the appropriate operational commander.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report completion of this Field Change as Field Change No. 5 to the AN/FPN-44A or Field Change No. 28 to the AN/FPN-44, as appropriate, in accordance with current directives. Record completion by entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000 (available from the Naval Publications and Forms Center, Philadelphia, PA); and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other field change bulletins applicable to them. Additional or missing

copies can be obtained from Coast Guard Supply Center Brooklyn, NY. Order directly using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1357 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the Field Change has been accomplished and reports have been made. Coast Guard Supply Center Brooklyn, NY, will update the Allowance Parts List to reflect this change.

H. G. FLETCHER, JR.

Encl: (1) Step-by-Step installation instructions
(2) Field change kit parts list
(3) Schematic diagrams for DESLOT field change
(4) Temporary technical manual corrections
(5) DESLOT and NON-DESLOT transmitter operating procedures
(6) DESLOT theory of operation for AN/FPN-44A transmitters

ENCLOSURE (4)

TEMPORARY TECHNICAL MANUAL CORRECTIONS

Make the following pen and ink corrections in the AN/FPN-44A Technical Manual. At the bottom of each page where pen and ink corrections are made replace, as appropriate, the ORIGINAL or CHANGE NO. at the bottom of the page with: "F.C. No. 5/28 to the AN/FPN-44/44A".

1. Page ii, at the bottom of the page add the following: "NOTE: The following pages have been corrected by F.C. No. 5/28 to the AN/FPN-44/44A: 2-6, 3-11, 3-13, 3-18, 3-19, 4-3, 5-ii, 5-3, 6-ii, 6-18, 7-ii 7-59, 7-61 and 7-64.

2. Page 2-6, add to TABLE 2-2, between EMERGENCY STOP and LOCKOUT-READY, under CONTROL, "DESLOT/NON-DESLOT"; under REF DES "1A52S20" under FIGURE, "3-5"; under POSITION, "NON-DESLOT".

3. Page 3-11, figure 3-5, correct to show 1A53A2S20, DESLOT/NON-DESLOT selector. See enclosure (1) figure 2 of Field Change Bulletin.

4. Page 3-13, add to TABLE 3-5, between DIMMER and OVER TEMPERATURE PLATE TRANSFORMER, under PANEL MARKING "DESLOT/NON-DESLOT", under REFERENCE SYMBOL "1A53A2S20", under TYPE "Switch", under FUNCTION "Selects DESLOT or NON-DESLOT mode."

5. Page 3-18, add to end of TABLE 3-9, under CONTROL "DESLOT/NON-DESLOT SELECTOR" under FIGURE "3-5" under SETTING "NON-DESLOT".

6. Page 3-19, TABLE 3-11, after DURING USE SEQUENCE OF OPERATION add "NON-DESLOT".

7. Between page 3-22 and 4-1, insert the "DESLOT and NON-DESLOT operating instructions", attachment (1).

8. Page 4-3, section 4-2a, right hand column, after the last paragraph add the following: "NOTE: the standby transmitter in the standby mode may have cooling, filament and bias power applied or be essentially de-energized depending on the position of the "DESLOT/NON-DESLOT" selector switch 1A53A2S20.

9. Page 5-ii, at the bottom of the page add the following: "NOTE: The following page has been corrected by F.C. No. 5/28 to the AN/FPN-44/44A: 5-3.

F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

10. page 5-3, add to end of TABLE 5-2, under CONTROL "DESLOT/NON-DESLOT SELECTOR" under SETTING "NON-DESLOT".

11. Page 6-ii, at the bottom of the page add the following: "NOTE: The following page has been corrected by F.C. No. 5/28 to the AN/FPN-44/44A: 5-18.

12. Page 6-18, Para. 6-5b(3)(b), Step 1. Change 150 second mark to "45 second mark".

13. Page 6-18, Para. 6-5b(3)(b), Step 3. Change 150 ± 15 seconds to "45 ± 3 seconds."

14. Page 7-ii, at the bottom of the page add the following: "NOTE: The following pages have been corrected by F.C. No. 5/28 to the AN/FPN-44/44A: 7-59, 7-61 and 7-64.

15. Page 7-59, add the following at the bottom of the page:

REF. DESIG.	NOTES	DESCRIPTION	FUNCTION
1A53A2K1		Relay, 66342 Part No. KHS17D11-24	DESLOT/NON-DESLOT Control Relay.
1A53A2K2		Relay, Time Delay, 89020 Part No. 7012AB	Filament Off Delay
1A53A2K3		Relay, 24446 Part No. CR120A04002AAMFP	460 VAC Lockout Control Relay.

16. Page 7-61, for REF DESIGNATION for 1A52A2S18, under DESCRIPTION delete 28527 part no. 2138352G2.

17. Page 7-61, add the following at the bottom of the page:

REF. DESIG.	NOTES	DESCRIPTION	FUNCTION
1A53A2S20		Switch Rotary, 5PDT, 81083 part no. 42M36-05-1-2N	DESLOT/NON-DESLOT SWITCH

18. Page 7-64, add the following at the bottom of the page:

REF. DESIG.	NOTES	DESCRIPTION	FUNCTION
1A53A2XK1		Relay Socket, 77342 Part No. 270E166	K1 Mounting socket.

F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

U.S. Department of Transportation
United States Coast Guard

Commanding Officer(sm)
USCG Electronics
Engineering Center

Wildwood, NJ 08260
FTS 346-7312

ELECTRONIC FIELD CHANGE BULLETIN

F. C. NO. 4 TYPE 1 TO AN/FPN-44A LORAN TRANSMITTING SET

PURPOSE:

The purpose of this Field Change is to replace deteriorating water hoses installed in the PA (1A6) section of the Transmitters.

DESCRIPTION:

This Field Change consists of removing the presently installed rubber hose assemblies located in the PA (1A6) section of the the AN/FPN-44A and certain AN/FPN-44 Transmitters and replacing them with assemblies which contain a more durable hose type.

EQUIPMENT AFFECTED:

This Field Change is applicable to all AN/FPN-44A Transmitters and to the AN/FPN-44 Transmitters at LORSTAs Dana and Lampedusa, EECEN Wildwood, NJ, and in ATLS storage.

IDENTIFICATION OF ACCOMPLISHMENT:

Accomplishment of this Field Change can be identified by the presence of orange vice green water hoses in the PA (1A6) section of the AN/FPN-44A or AN/FPN-44 LORAN-C TRANSMITTING SET.

MATERIALS REQUIRED:

1. A Field Change No. 4 parts kit, standard hand tools and the non-standard tools and items listed in enclosure (3) are needed to accomplish this Field Change.

2. The items provided in the Field Change parts kit are listed in enclosure (2). Each parts kit contains the parts necessary for one transmitter.

DISTRIBUTION - SDL No. 119

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B	*	2	*				10		2								2		5							
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NON-STANDARD DISTRIBUTION:

***B: a(G-TT, G-TES, G-NRN Only)(1); c(2nd, 11th, 12th, 17th Only)(2)**
C: v(DANA, FALLON, LAMPEDUSA, MIDDLETOWN, NARROW CAPE, SEARCHLIGHT, SHOAL COVE, TOK Only)(2)

TELECOM STATION MANAGER
WILLIAMS LAKE LORAN-C STATION
P.O. BOX 4568
WILLIAMS LAKE BC CANADA V2G 2V8

CANADIAN COAST GUARD (CGTG/CGTA)
TOWER A, PLACE D VILLE
OTTAWA, ONTARIO, CANADA K1A ON7

3. A list of non-standard hand tools and other items that are required to complete the Field Change, but not supplied with the Field Change kit, is contained in enclosure (3).

4. Initial distribution of the parts kit will be made by Coast Guard Supply Center, Brooklyn, NY.

5. Initial distribution of ERPAL spares will be made by Coast Guard Supply Center, Brooklyn, NY, at a later date.

PROCEDURE:

1. Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2.

2. Install the Field Change in accordance with the step-by-step instructions in enclosure (1).

3. Incorporate appropriate Field Change changes in the AN/FPN-44A or AN/FPN-44/45 Technical Manuals in accordance with instructions contained in enclosures (4) and (5).

NOTE:

After the installation of the Solid-State Power Supply Modification, the AN/FPN-44A, CG-273-136 Manual will be used to support the AN/FPN-44. If the AN/FPN-44A Technical Manual corrections are not used, retain these corrections for future use.

4. This Field Change will take two technicians approximately six hours to accomplish.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report the completion of this Field Change as Field Change No. 4 to the AN/FPN-44A or Field Change No. 26 to the AN/FPN-44, as appropriate, in accordance with current directives. Record completion by entry on the Field Change Accomplished Plate, NSN I 0264-00-085-0000 (available from the Naval Publications and Forms Center, Philadelphia, PA), and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other Field Change Bulletins applicable to them. Additional or missing copies can be obtained from Coast Guard Supply Center Brooklyn, NY. Order directly using MILSTRIP procedures; no cost is involved. NSN CG 7610-01-GE8-1355 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the Field Change has been accomplished and reports have been made. Coast Guard Supply Center Brooklyn, NY, will update the Allowance Parts Lists (APLs) to reflect this change.

W. H. HAYES, Jr.

Encl: (1) Step-by-Step Installation Instructions
(2) Field Change No. 4 Parts List
(3) Special Tools and Items Required but not Supplied
(4) Technical Manual Change Instructions for the AN/FPN-44A Technical Manual
(5) Technical Manual Change Instructions for the AN/FPN-44/45 Technical Manual

TECHNICAL MANUAL CHANGE INSTRUCTIONS FOR THE AN/FPN-44A TECHNICAL MANUAL

1. Remove superseded pages and insert revised pages as indicated:

Page	Remove	Insert
5-75/5-76	Original/Original	Original/F.C. No. 4
7-39/7-40	Original/Original	Original/F.C. No. 4
7-40A/7-40B	--------/--------	F.C. No. 4/Blank

2. Make the following pen and ink corrections in the AN/FPN-44A Technical Manual:

a. Page ii, at the bottom of the page add the following: "NOTE: Page 5-76 has been changed by F.C. No. 4".

b. Page iiA, at the bottom of the page add the following: "NOTE: Pages 7-40, 7-40A/7-40B, and 7-41 have been changed or added by F.C. No. 4".

c. Page 5-ii, at the bottom of the page add the following: "NOTE: Page 5-76 has been changed by F.C. No. 4".

d. Page 7-ii, at the bottom of the page add the following: "NOTE: Pages 7-40, 7-40A/7-40B, and 7-41 have been changed or added by F.C. No. 4".

e. Page 7-41, delete entire page and at the bottom of page delete "Original" and enter "Field Change No. 4".

3. Destroy superseded pages, but not until the complete Technical Manual has been checked against the "List of Effective Pages".

4. Record the accomplishment of these changes on the Record of Changes page of the Technical Manual.

5. Insert a copy of this Instruction Sheet behind the front cover of the Technical Manual, Volume I.

STEP BY STEP INSTALLATION INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS FIELD CHANGE.

1. The installation of this Field Change will require that the standby transmitter be unuseable for approximately eight hours. Notify all concerned in accordance with local instructions.

2. Secure power to the standby transmitter.

WARNING

Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2 during the installation of this Field Change.

3. The water coils will be replaced two at a time.

4. The first two water coils to be replaced will be those associated with 1A6V1 and 1A6V3. Close valves 1A6MP45, 1A6MP47, 1A6MP49 and 1A6MP51 (see Figure 5-42 Sheet 1 in the AN/FPN-44A Technical Manual or Figure 5-70 in the AN/FPN-44/45 Technical Manuals for tube and valve locations).

5. Remove the water coil associated with V1 first. Disconnect the top hoses of the water coil from the unions at the base of the tube water jacket. Have containers ready to catch the water that will run out. Disconnect the bottom hoses of the water coil just below the lateral fitting. Have containers ready to catch the water that will run out. Remove the old water coil including the top and bottom mounting brackets from the transmitter. Retain all hardware used to mount the water coil assembly as these items will be used to mount the new assemblies. Mark on the water coil assembly the position from which it was removed, i.e., 1A6V1. Remove all four adaptors from the water connections where the water hoses were removed.

6. Remove the top and bottom mounting brackets and associated hardware from the old hose assemblies. Retain these items as they will be used to install the new water coil assemblies.

7. Using one complete turn of the teflon pipe thread tape (Item No. 5 of the parts kit), install the new adaptors (Item No. 4 of the parts kit) in the connections from which the old adaptors were removed. To ease installation, tighten the adaptors closest to bulkheads, chassis, or other obstructions before installing the adjacent adaptor.

8. Repeat Steps 5 through 7 for the water coil associated with 1A6V3.

9. Obtain the hose assembly for 1A6V1 (Item No. 1 of the parts kit). Loosen the screws on the sides of the water coil forms just enough to allow the length of the hose ends and the diameter of the coils within the form to be adjusted. Be careful not to loosen the screws enough to permit the sides to separate from the coil form. Adjust the lengths of the top and bottom hoses on the new water coil form to approximately the same lengths as the old water

coil assembly. Using the brackets and hardware removed in Step 6, attach the top and bottom mounting brackets to the new water coil assembly.

10. Position the new hose assembly for 1A6V1 in the position vacated by the old hose assembly. Do not attach the mounting brackets to the transmitter chassis at this time. This will ease making the hose connections.

NOTE:

Two technicians, one working in the front of the transmitter, and one working in the back, are required to properly adjust the length of the hose ends and properly seat the hose connections.

11. Connect the two bottom hoses of the water coil to the adaptors that were installed into the lateral fittings. The upper hose goes to the right lateral fitting as viewed from inside the transmitter. The length of hose ends will have to be adjusted to insure proper seating of the connections and to prevent kinking of the hoses.

12. Connect the two top hoses of the water coil to the adaptors that were installed in the union at the base of the tube water jacket. The upper hose goes to the top connection in the water jacket. The length of hose ends will have to be adjusted to insure proper seating of the connections and to prevent kinking of the hoses.

13. Dress the hoses into a uniform circle with no twists or kinks, then tighten the water-hose-form side pieces securely.

14. Using the remaining hardware removed in step 6, secure the hose assembly to the transmitter chassis.

15. Repeat Steps 9 through 14, substituting Item No. 2 for Item No. 1, V3 for V1, and left for right wherever they appear.

16. Installation for V1 and V3 is now complete. Open valves 1A6MP45, 1A6MP47, 1A6MP49, and 1A6MP51. Check all connections for leaks, and tighten as necessary. Using rags, mop up any water present in the transmitter.

17. Fill primary water system to proper operating level with distilled water, and open air purge valves before starting the transmitter. Apply 208 VAC to the transmitter and start the transmitter. Fill primary water system and purge air from the system as required in accordance with local instructions or the instructions in the Installation and Field Assembly Manual (Volume III) of the appropriate Technical Manual. Observe 1A6S1 and 1A6S3 for proper water flow and check all water connections for leaks; tighten as necessary.

18. After the installation of replacement water coils for 1A6V1 and 1A6V3 is completed and no problems are noted, installation of the water coils for 1A6V2 and 1A6V4 may be started.

19. Secure power to the standby transmitter.

WARNING:

Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2 during the installation of this Field Change.

20. The installation of the water coils for 1A6V2 and 1A6V4 will be the same as it was for the 1A6V1 and 1A6V3 water coils. The 1A6V2 position will be replaced by Item No. 3 which has the leakage current pickup installed and the 1A6V4 position will use one each of Item No. 2.

21. Close valves 1A6MP46, 1A6MP48 1A6MP50 and 1A6MP52 (see Figure 5-42 Sheet 1 in the AN/FPN-44A Technical Manual or Figure 5-69 in the AN/FPN-44/45 Technical Manual for tube and valve locations).

22. Repeat Steps 5 through 7, substituting 1A6V2 for 1A6V1 wherever it appears. Be sure to disconnect the leakage current connection.

23. Repeat Steps 5 through 7, substituting 1A6V4 for 1A6V1 wherever it appears.

24. Repeat Steps 9 through 14, substituting Item No. 3 for Item No. 1 and 1A6V2 for 1A6V1 wherever they appear. Ensure that the hose connections to the leakage current pickup are tight prior to installing the new hose assembly, and be sure to connect the leakage current connection after installation of the new hose assembly.

25. Repeat Steps 9 through 14, substituting Item No. 2 for Item No. 1, 1A6V4 for 1A6V1, and left for right wherever they appear.

26. Installation for 1A6V2 and 1A6V4 is now complete. Open valves 1A6MP46, 1A6MP48, 1A6MP50, and 1A6MP52. Check all connections for leaks, and tighten as necessary. Using rags, mop up any water present in the transmitter.

27. Fill primary water system to proper operating level with distilled water, and open air purge valves before starting the transmitter. Apply 208 VAC to the transmitter and start the transmitter. Fill primary water system and purge air from the system, as required in accordance with local instructions or the instructions in the Installation and Field Assembly Manual (Volume III) of the appropriate Technical Manual. Observe 1A6S2 and 1A6S4 for proper water flow and check all water connections for leaks; tighten as necessary.

28. A rise in leakage current may occur because of impurities introduced into the primary water system by the new water coils. Allow the filtration system time to clear the impurities before placing the transmitter on-air. It may be necessary to run the primary water system for a few hours, and to change system filters (U40 and U41 prefix 1A52 in the AN/FPN-44A or 1A2 in the AN/FPN-44) to remove all impurities from the system.

29. Insure that the leakage current is within specifications prior to applying full plate voltage to the transmitter.

30. After the installation of replacement water coils for 1A6V2 and 1A6V4 is completed and no problems are noted, insure proper operation of the transmitter in accordance with local instructions.

31. Installation of this Field Change is now complete for one transmitter. When the transmitter has been checked and proper operation verified, notify all concerned in accordance with local instructions.

32. Record accomplishment of the Field Change on the Equipment Field Change Accomplished Plate located on the front of the Control Console.

33. Repeat this procedure for the other transmitter.

34. Using the instructions in enclosures (4) and (5), complete the changes to the AN/FPN-44A or AN/FPN-44/45 Technical Manuals. Record the accomplishment of these changes on the Record of Changes Page of the Technical Manual.

35. Remove the old rubber hoses from the hose assemblies and ship the forms, form sides, and all form hardware to Coast Guard Supply Center, 830 Third Avenue, Brooklyn, NY, 11232. Mark for Project B0333A3. The hoses, hose connectors, and adaptors may be disposed of locally.

FIELD CHANGE NO. 4 PARTS LIST

ITEM	QTY REQD	DESCRIPTION
1.	01 EA	HOSE ASSEMBLY, wound counter-clockwise on form, replacement for 1A6V1 hose assembly.
2.	02 EA	HOSE ASSEMBLY, wound clock-wise on form, replacements for 1A6V3 & 4 hose assemblies
3.	01 EA	HOSE ASSEMBLY, with leakage current pickup, wound counter-clockwise on form, replacement for 1A6V2 hose assembly.
4.	16 EA	Adaptor, stainless steel
5.	01 RO	TEFLON PIPE THREAD TAPE

SPECIAL TOOLS AND ITEMS REQUIRED BUT NOT SUPPLIED

ITEM	QTY REQD	DESCRIPTION
1.	AS REQD	RAGS
2.(Note 1)	04 EA	SMALL CONTAINERS, one gallon size
3.(Note 1)	01 EA	LARGE CONTAINERS, five gallon size
4.	20 GAL	DISTILLED WATER
5.	04 EA	REPLACEMENT FILTER CARTRIDGES for 1A52U40 & 41
6.	01 EA	SCREWDRIVER, SLOTTED OFFSET
7.	01 EA	OPEN END WRENCH, 7/16"
8.	01 EA	OPEN END WRENCH, 3/4"
9.	01 EA	OPEN END WRENCH, 1-1/4"
10.	01 EA	OPEN END WRENCH, 1-3/8"
11.	01 EA	OPEN END WRENCH, 1-5/8"
12. (Note 2)	01 EA	OPEN END WRENCH, 2-3/8"

NOTES: (1) Items two and three may be replaced by a wet vacuum cleaner with remote discharge, if available.

(2) A 24" adjustable wrench may be substituted for item 12.

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS
U.S. COAST GUARD (G-TEE-4
WASHINGTON, DC 20593
202-426-1193

ERRATA SHEET

8 OCT 1981

TO

F.C. NO. 3 TYPE 1 to AN/FPN-44A

PURPOSE:

Since the initial design of the AN/FPN-44A Feedback (FDBK) Modification Kit, the PA Tuning Capacitor Spark Gap Connector h s been modified. This Errata Sheet provides installation instructions for the new part and disposition instructions for the existing parts that have been replaced by this item.

PROCEDURE:

Refering to parts list PL1096561 (revision E) of enclosure (1), perform the following:

(1) Install item 64 in accordance with the "Pictorial Diagram of the Spark Gap Bracket" of enclosure (2).

(2) Remove and discard items 11, 21, 30, and 57 as currently furnished in the FDBK Modification Kit.

ROUTINE INSTRUCTIONS:

Upon completion, this Errata Sheet shall be attached in front of the indicated field change in the applicable technical publication. Copies of this Errata Sheet may be obtained from Supply Center, Brooklyn, using MILSTRIP procedures. NSN CG7610-01-GE8-1354 applies.

J. I. MALONEY, CAPT., USCG
CHIEF, ELECTRONICS ENGINEERING DIVISION

Encl: (1) Parts List PL109656 (Rev E)
(2) Pictorial Diagram of the Spark Gap Bracket

DISTRIBUTION - SDL No. 114

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
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C																						*				
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ITTAV 06213 REV. 1/68

PARTS LIST

ITT AVIONICS DIVISION — NUTLEY, NEW JERSEY

DWG SIZE	CODE IDENT NO.	DRAWING NUMBER	REV
A	28527	PL 1096561	E

SEE COVER SHEET FOR LIST TITLE, REVISION AND AUTHENTICATION

PARENTHETICAL IDENTITIES ARE FOR REFERENCE ONLY

PREPARED IN ACCORDANCE WITH MIL-STD-100

CATEGORY ____

SHT 2

QUANTITY PER GROUP G5	G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT	PART OR IDENTIFYING NO. ~~OTHER THAN ITTAV~~	SPECIFICATION NO. ~~ITTAV PART NO~~	NOMENCLATURE OR DESCRIPTION	SIZE	ITTAV SOURCE
		1	1	1	1	1		2138264G001		TRANSFORMER CURRENT (T5)	A	530
		1	1	1	1	2		1096555G001		TRANSFORMER BRACKET	B	120
		2	2	2	1	3		1087591G007		RESISTOR, FIXED 750Ω (R45, R46)	C	530
		—	—	X	20	4		1096572		TUBE RACK MOD INSTRUCTIONS	A	760
		1	1	1	1	5		1096556G001		RESISTOR BRACKET	B	120
		4	4	4	1	6		NL422W04-016	MIL-I-23264	INSULATOR PILLAR		530
		16	16	4	1	7		1087631G002		CLIP, FUSE	B	530
		1	1	1	1	8		UG-422/U	MIL-C-3655/2	RECEPTACLE (TWINAX), (J1)	B	530
		1	1	1	1	9		1096557G001		BOARD, MTG	B	120
		2	2	2	1	10		1096558G001		BRACKET, BOARD	B	520
		~~4~~	~~—~~	~~4~~	~~1~~	~~11~~		~~1088806G001~~		SPACER	~~B~~	~~530~~
		15	15	4	1	12	06383	ABMS-A		ADHESIVE CABLE PAD, PANDUIT		530
		4	4	4	1	13		1087865G003		CONNECTOR, PLATE	C	520
		6	6	6	1	14		NL422W04-024	MIL-I-23264	INSULATOR (1" x 3")		530
		6	6	6	1	15		383440A014		CLAMP, CABLE	C	530
		32	32	24	32	16		1089173G001		HIGH VOLTAGE CABLE, #14 AWG (WHT)	4	931
		14	14	14	1	17		1087662G001		WASHER, INSULATING	B	530/12
		34	34	30	1	18		M551957-81	FF-S-92	SCR, MACH. PAN HD. 1/4-20 x 3/4		530

U OF M CODE | 1 PIECE, 5 SET, 6 PAIR, 20 REF DOC, 32 FEET, 52 U.S. FLUID OZ., 54 U.S. LIQUID QT., 55 U.S. GAL., 68 VDP

* IN PART NO. COL. DENOTES VENDOR ITEM: SEE SOURCE OR SPECIFICATION CONTROL DWG.

ITTAV 04213 REV. 1-68

PARTS LIST

ITT AVIONICS DIVISION NUTLEY, NEW JERSEY

DWG SIZE	CODE IDENT NO	DRAWING NUMBER	REV
A	28527	PL 1096561	E

SEE COVER SHEET FOR LIST TITLE, REVISION AND AUTHENTICATION

PARENTHETICAL IDENTITIES ARE FOR REFERENCE ONLY

PREPARED IN ACCORDANCE WITH MIL-STD-100 | CATEGORY ___ | SHT 3

QUANTITY PER GROUP G5	G4	G3	G2	G1	U OF M	ITEM NO	CODE IDENT	PART OR IDENTIFYING NO ~~OTHER THAN ITTAV~~	SPECIFICATION NO ~~ITTAV PART NO~~	NOMENCLATURE OR DESCRIPTION	SIZE	ITTAV SOURCE
		8	8	8	32	19		1069153G001		CABLE (GROUND ROD)	A	931
		8	8	8	1	20		1088811G002		LUG	B	530
		~~8~~	~~=~~	~~8~~	~~1~~	~~21~~		~~1096559G001~~		~~SPARK GAP BRACKET~~	~~B~~	~~530~~
		4	4	4	1	22		1096560G001		SPARK GAP SUB-ASSY	B	180
		3	3	3	1	23		MS51958-65	FF-S-92	SCREW, MACH, PAN HD, #10-32 x 3/4		530
		8	8	8	32	24		1076161G001		SLEEVING	A	931
		2	2	2	1	25		2133698G002		LUG	A	530
		1	1	1	1	26		383440A016		CLAMP, CABLE	C	
		6	6	6	1	27		102309A020		SCREW, NYLON 1/4-20 x 5/8	B	
		6	6	6	1	28		200600A320		WASHER, FLAT, NYLON, 1/4	C	
		68	68	40	1	29		MS35338-139	FF-W-84	WASHER, LOCK, SPLIT, 1/4		
		~~4~~	~~=~~	~~4~~	~~1~~	~~30~~		~~MS51958-79~~	~~FF-S-92~~	~~SCREW, MACH, PAN HD, 1/4-28 x 1/2~~		
		38	38	22	1	31		MS35649-2254	FF-N-836	NUT, HEX, 1/4-20		
		4	4	4	1	32		MS51958-63	FF-S-92	SCREW, MACH, PAN HD, #10-32 x 1/2		
		7	7	7	1	33		MS35650-304	FF-N-836	NUT, HEX, #10-32		
		7	7	7	1	34		MS15795-842	FF-W-92	WASHER, FLAT, #10		
		7	7	7	1	35		MS35338-138	FF-W-84	WASHER, LOCK, SPLIT, #10		
		4	4	4	1	36		MS51957-17	FF-S-92	SCREW, MACH, PAN HD, #4-40 x 1/2		530

U OF M CODE: 1 PIECE, 5 SET, 6 PAIR, 20 REF DOC, 32 FEET, 52 U.S. FLUID OZ., 54 U.S. LIQUID QT., 55 U.S. GAL., 68 LB AVDP

* IN PART NO. COL. DENOTES VENDOR ITEM: SEE SOURCE OR SPECIFICATION CONTROL DWG.

PARTS LIST

ITT AVIONICS DIVISION — NUTLEY, NEW JERSEY

DWG SIZE	CODE IDENT NO.	DRAWING NUMBER	REV
A	28527	PL 1096561	E

SEE COVER SHEET FOR LIST TITLE, REVISION AND AUTHENTICATION

PARENTHETICAL IDENTITIES ARE FOR REFERENCE ONLY

PREPARED IN ACCORDANCE WITH MIL-STD-100

CATEGORY ____

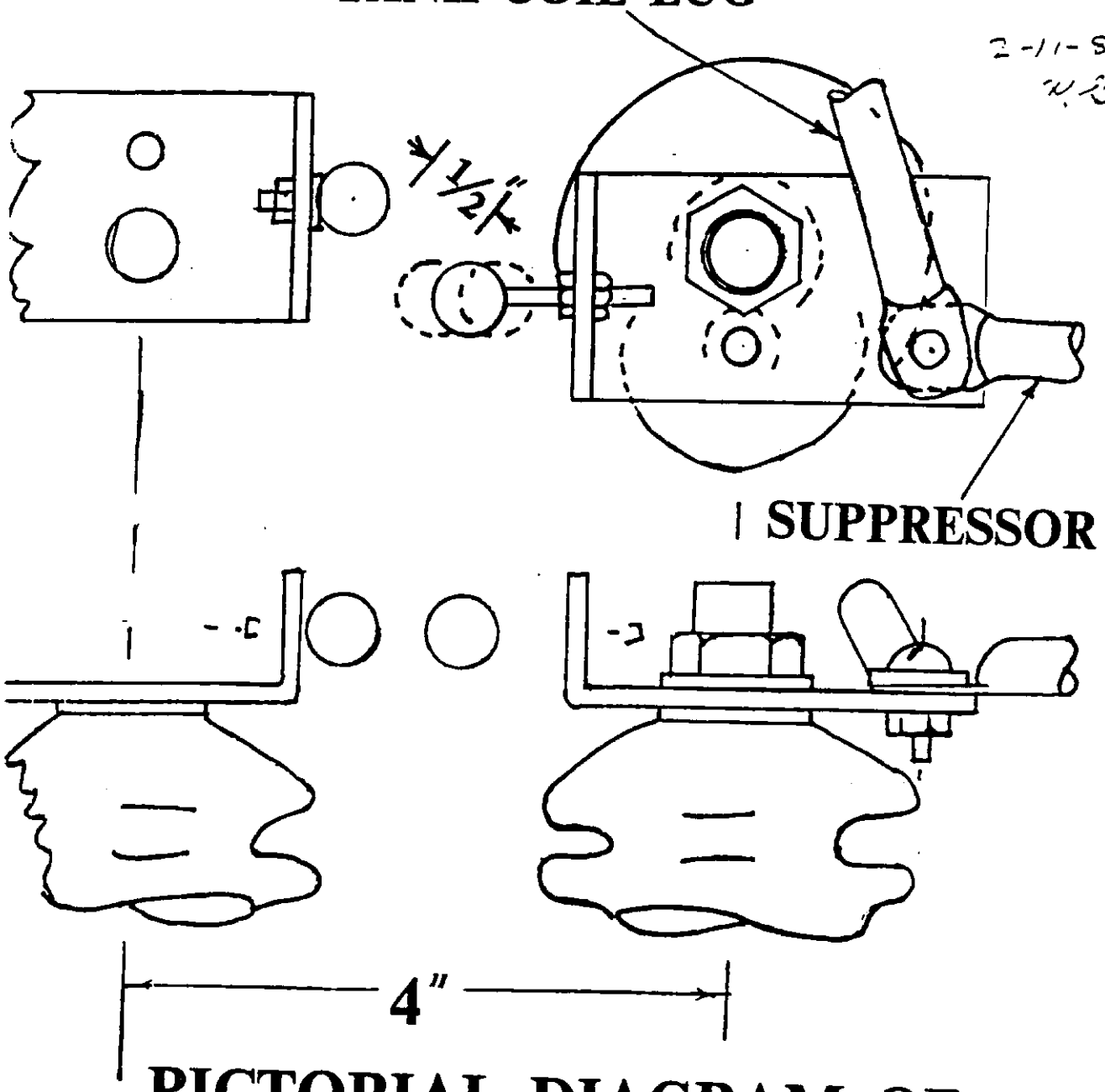
SHT 5

ITTAV D6213 REV. 1/68

QUANTITY PER GROUP G5	G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT	PART OR IDENTIFYING NO. ~~OTHER THAN ITTAV~~	SPECIFICATION NO. ~~ITTAV PART NO.~~	NOMENCLATURE OR DESCRIPTION	SIZE	ITTAV SOURCE
		10	10	10	1	55		MS51957-84	FF-S-92	SCREW, MACH, PAN HD, 1/4-20 x 1.250		530
		16	16	4	1	56		MS51957-79	FF-S-92	SCREW, MACH, PAN HD, 1/4-20 x 1/2		530
		~~16~~	~~16~~	~~4~~	~~1~~	~~57~~		~~MS51957-81~~	~~FF-S-92~~	~~SCREW, MACH PAN HD 1/4-20 x 3/4~~		~~530~~
		6	6	—	1	58		1087590G001		RESISTOR, FIXED	C	530
		—	12	—	1	59		1087669G001		SPEC-PLATE TUNING CAPACITOR	A	530
		—	12	—	1	60		1100033G001		BRACKET, SPARK GAP	B	520
		—	12	—	1	61		1100033G002		BRACKET, SPARK GAP	B	520
		X	—	—	20	62		1100096		TUBE RACK MOD INSTR (AN/FPN-45)	A	760
		1	1	1	1	63		1100115G001		SPACER	B	520
		8	—	8	1	64		2800500G001		BRACKET, SPARK GAP	B	

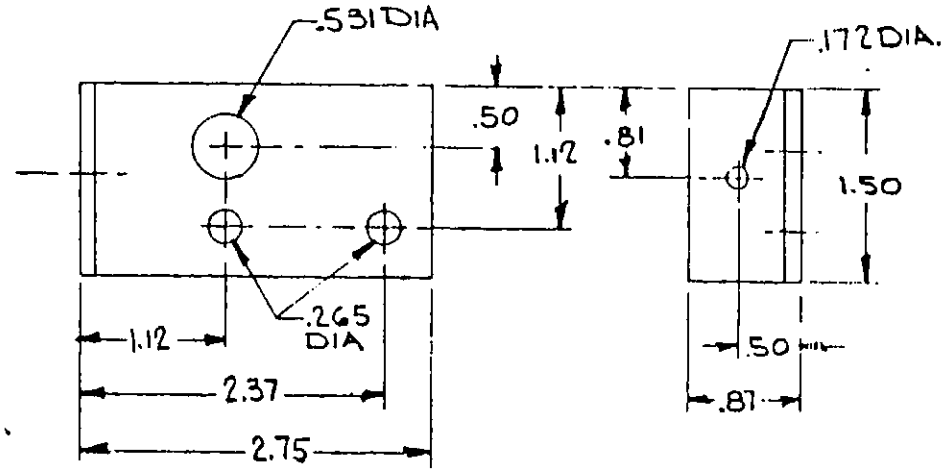
U OF M CODE: 1 PIECE, 5 SET, 6 PAIR, 20 REF DOC, 32 FEET, 52 U.S. FLUID OZ, 54 U.S. LIQUID QT, 55 U.S. [illegible], 68 LB AV

* IN PART NO. COL. DENOTES VENDOR ITEM: SEE SOURCE OR SPECIFICATION CONTROL DWG.



PICTORIAL DIAGRAM OF THE SPARK GAP BRACKET

REVISIONS			
ZONE	LTR	DESCRIPTION	DATE
		ERNG50R4	



NOTES:
1. BEND RADIUS .12 MAX.
2. ROUND EDGES AND CORNERS TO .03 MIN. RADIUS.

* IN PART NO. COL DENOTES VENDOR ITEM. SEE SOURCE CONTROL OR SPECIFICATION CONTROL DRAWING.	PARENTHETICAL IDENTITIES ARE FOR REFERENCE ONLY PREPARED IN ACCORDANCE WITH MIL STD-100	G5	G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT	PART OR IDENTIFYING NO.	SPECIFICATION NO.	NOMENCLATURE OR DESCRIPTION
		QUANTITY PER GROUP								PARTS LIST		
		G										
		G										
		G										

MATERIAL BRASS, .125 THK.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE CHEMICALLY APPLIED OR PLATED FINISHES
TOLERANCES

CONTR DOT CG-73035A
DWN [illegible] 3/10/61
CKD [illegible]

ITT ARNICS DIVISION NUTLEY, NEW JERSEY

U.S. Department of Transportation
United States Coast Guard

Commanding Officer
USCG Electronics
Engineering Center

Wildwood, NJ 08260
FTS 346-7312

JAN 28 1985

ERRATA SHEET NUMBER 3

TO

F.C. NO. 3 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET

W1087

PURPOSE:

Since the development of the parts kits for the AN/FPN-44A Feedback Modification, the installation drawings and parts list for the Bias Pedestal Generator (1A4A5) have been revised. This revision consists of replacing resistors R15 and R34, and adding resistor R46. This Errata Sheet provides the instructions to install these components. The components will be forwarded by EECEN to applicable units.

PROCEDURE:

WARNING

Follow all safety instructions outlined in COMDTINST M10550.13 Chapter 2 during the installation of this modification.

1. Install or replace the components, Items 3, 17, and 18 of enclosure (2), in accordance with steps 19, 20, and 21 of enclosure (1). Disregard the values given in enclosure (1) for the resistors to be replaced, as they may be in error.

2. Using enclosure (4), perform step 24 of enclosure (1).

3. Make pen and ink corrections to pages 6-12 and 7-28 of the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44, and AN/FPN-45 (Modified for Feedback Operation), provided with Field Change No. 3. The instructions are contained in enclosure (3).

DISTRIBUTION - SDL No. 120

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B	*	2	*				2		2								2		2							
C																						*				
D																										
E																										
F																										
G																										
H																										

NON-STANDARD DISTRIBUTION:

B: a(G-TT, G-TES, G-NRN)(1); b(2); c(2nd, 11th, 12th, 13th, 14th, and 17th only)(2)
C: v(DANA, FALLON, MIDDLETOWN, NARROW CAPE, SEARCHLIGHT, SHOAL COVE, TOK, only)(2)

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WILLIAMS LAKE LORAN-C STATION
P.O. BOX 4568
WILLIAMS LAKE BC CANADA V2G 2V8

ROUTINE INSTRUCTIONS:

Upon completion, this Errata Sheet shall be placed in front of Field Change No. 3 in the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44, and AN/FPN-45 (Modified for Feedback Operation). Copies of this Errata Sheet may be obtained from Supply Center Brooklyn, NY, using MILSTRIP procedures. NSN CG 7610-01-GE8-1356 applies.

W. H. HAYES, Jr.

Encl: (1) Bias Pedestal Generator Modification Instructions ITT Drawing 1096570 Revision E, Sheet 10 of 10
(2) Bias Pedestal Generator Mod Kit ITT Drawing PL1096564 Revision C, Sheet 2 of 3
(3) Corrections to the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44, and AN/FPN-45 (Modified for Feedback Operation)
(4) Dry Transfers, 12-point, Alternate Gothic No. 3, one sheet (LORSTAs only)

DRAWING NUMBER 1096570

Step 19

Replace R15 (220 ohms) with Item 17 (330 ohms).

Check _____

Step 20

Replace R34 (100K, with Item 3(39K) but do not solder to XC6-1 yet.

Check _____

Step 21

Install a new resistor R46, Item 18, (75K) from terminal XC6-1 to a ground tab on XC6. Solder R34 and R46 in place.

Check _____

Step 22

Remove "R35" marking.

Check _____

Step 23

Change marking C9 to C17.

Check _____

Step 24

Add marking for R46.

Check _____

NOTE

Do not install the modified bias pedestal generator in the exciter until directed to do so by Drawing 1096571, Exciter Modification Instructions.

ITT AVIONICS DIVISION
NUTLEY, NEW JERSEY

PREPARED BY	SIZE	CODE IDENT NO.		
	A	28527	1096570	E
CHECKED BY	SCALE	CATEGORY	SHEET 10	REV
WH 3-6-81				

PARTS LIST

ITT AVIONICS DIVISION — NUTLEY, NEW JERSEY

DWG SIZE	CODE IDENT NO.	DRAWING NUMBER	REV
A	28527	PL1096564	G

SEE COVER SHEET FOR LIST TITLE, REVISION AND AUTHENTICATION

PARENTHETICAL IDENTITIES ARE FOR REFERENCE ONLY

PREPARED IN ACCORDANCE WITH MIL-STD-100

CATEGORY ____

SHT 2

QUANTITY PER GROUP G5	G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT	PART OR IDENTIFYING NO. OTHER THAN ITTAV	SPECIFICATION NO. ~~ITTAV PART NO.~~	NOMENCLATURE OR DESCRIPTION	SIZE	ITTAV SOURCE
		1	1	1	1	1		CP72E1EH405K1		CAPACITOR (C17)		530
		4	5	4	1	2		RCR42G104JR	MIL-R-39008/5	RESISTOR (R24,36,40-42)		530
		1	—	1	1	3		RCR42G393JR	MIL-R-39008/5	RESISTOR (R34)		530
		2	2	2	32	4		910000H020		WIRE, SOLID, #20AWG		930
		2	2	2	32	5		945663H200		SLEEVING, #20		930
		6	2	6	32	6		902030H009		WIRE, #18 AWG, WHITE		930
		2	2	2	1	7		2131889G003		TERMINAL, LUG	A	530
		—	—	X	20	8		1096570G001		BIAS PED. GEN. MOD. INSTRU.	A	
		2	2	2	1	9		RCR42G512JR	MIL-R-39008/5	RESISTOR (R43 & R44)		530
		1	1	1	1	10		RCR42G272JR	MIL-R-39008/5	RESISTOR (R45)		530
		1	1	1	1	11		1096616G001		TRANSFORMER (T1)	A	530
		—	1	—	1	12		CP70B1EH105K1		CAPACITOR (C7)		530
		—	2	—	1	13		CP075A6		RETAINER, CAPACITOR		530
		—	1	—	1	14		2311207G001		ONE SHOT TE166 (A1)	A	530
		2	2	2	52	15				FLUX, LA-CO ROSIN "A"		
		2	2	2	1	16		CP075D4		RETAINER CAPACTIOR		530
		1	—	1	1	17		RW24V331		RESISTOR (R15)		530
		1	—	1	1	18		RCR32G753JR	MIL-R-39008/5	RESISTOR (R46)		530

U OF M CODE | 1 PIECE 5 SET 6 PAIR 20 REF DOC 32 FEET 52 U.S. FLUID OZ. 54 U.S. LIQUID QT. 55 U.S. GAL. 68 LB AVDP

* IN PART NO. COL. DENOTES VENDOR ITEM: SEE SOURCE OR SPECIFICATION CONTROL DWG.

Enclosure (2)

TECHNICAL MANUAL CORRECTIONS

1. Make the following pen and ink corrections in the Technical Manual Supplement to the AN/FPN-44A, AN/FPN-44, and AN/FPN-45 (Modified for Feedback Operation):

a. Page 6-12, change the value of R15 from "200, 50W" to "330, 91W".

b. Page 6-12, change the value of R34 from "10k" to "39k", 2W".

c. Page 6-12, add a resistor in parallel with C6. Label this resistor "R46, 75k, 1W".

d. Page 7-28, add the following to the PARTS LIST FOR THE EXCITER ADDENDUM:

REF DESIG	NAME AND DESCRIPTION
1A4A5R15	Resistor, Fixed, Wirewound; 330 Ohms, ±5%, 91 Watts; MIL-R-26 Type RW24V331
1A4A5R34	Resistor, Fixed, Composition; 39 kOhms, ±5%, 1 Watt; MIL-R-39008 Type RCR42G393JR
1A4A5R46	Resistor, Fixed, Composition; 75 kOhms, ±5%, 1 Watt; MIL-R-39008 Type RCR32G753JR

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (G-EEE-6)
WASHINGTON, DC 20593
202-426-4920

2 OCT 1980

ERRATA SHEET

TO

F.C. NO. 3 TYPE 1 to AN/FPN-44A
F.C. NO. 25 TYPE 1 to AN/FPN-44
F.C. NO. 23 TYPE 1 to AN/FPN-45

PURPOSE:

This Errata Sheet provides a technical booklet which was not included in these Field Changes. The booklet is presented as an appendix to the Supplement to Technical Manual for AN/FPN-44A, AN/FPN-44 and AN/FPN-45 (Modified for Feedback Operation) and provides the technical documentation for the organizational repair of the 1A4A6A1, A2, A3, A4 power supplies.

PROCEDURE:

Insert the booklet at the end of the supplement as Appendix I and remove page iii of the supplement and insert replacement page, enclosure (1) to this Errata Sheet.

ROUTINE INSTRUCTIONS:

Upon completion, attach this Errata Sheet in front of the indicated field change in the applicable technical publications. Copies of this Errata Sheet may be obtained from Supply Center, Brooklyn using MILSTRIP procedures. NSN CG7610-01-GE8-1353 applies.

J. I. MALONEY, CAPT., USCG
CHIEF, ELECTRONICS ENGINEERING DIVISION

Encl: (1) Replacement Pages and Technical Appendix

DISTRIBUTION - SDL No. 112

	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
A																										
B		2	*				2		2							2	2		2			*				
C																						*				
D	*																									
E																										
F																										
G																										
H																										

NON-STANDARD DISTRIBUTION: B: c(2nd, 11th, 12th, 13th, 17th Only)(1)
C: v(Searchlight, Fallon, Middletown, George, Tok, Narrow Cape, Shoal Cove, Dana, Only)(2); D: a(FESEC Only)(1)

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD
WASHINGTON, D.C. 20590
PHONE: 202 426-4920

ELECTRONIC FIELD CHANGE BULLETIN

G-EEE-6/63

13 JUL 1978

4X

F. C. NO. 3 TYPE 1 TO AN/FPN-44A

PURPOSE:

The purpose of this field change is to modify the AN/FPN-44A, LORAN-C Transmitting Set to improve linearity and stability of the amplifier circuits by providing negative feedback.

DESCRIPTION:

This field change adds a new unit, Input Amplifier (1A4A1A3), to incorporate negative feedback and provide requisite signal conditioning. Additionally, a Power Supply Assembly (1A4A6) is added to the Exciter to provide DC power for the Input Amplifier Unit. The Bias Pedestal Generator (1A4A5) is modified for improved controllability and to permit operation at dual rate. The PA Tube Rack (1A6) and PA Tank Coil (1A5) are modified to provide samples of output voltage and current for use as a feedback signal. Additionally, this field change kit contains the initial ERPAL spares. This field change was field tested at LorStas Tok, Shoal Cove and Searchlight with satisfactory results and remains operationally installed.

IDENTIFICATION OF ACCOMPLISHMENT:

The presence of Input Amplifier (1A4A1A3) and Power Supply assembly (1A4A6) will identify this change.

MATERIALS REQUIRED:

1. A Field Change Parts Kit and standard hand tools are necessary to perform this field change. A list of parts is contained in the parts kit.

2. Distribution of the Field Change Parts Kit will be directed by Commandant (G-EEE). Distribution is expected to commence in January 1979.

PROCEDURE:

1. Step-by-step installation instructions are provided as part of the Field Change Parts Kit.

2. A Supplementary Technical Manual to document this field change is attached as enclosure (1).

3. Initial ERPAL spares are provided with the Field Change Parts Kit. A listing of the spares provided is also contained in the Field Change Parts Kit.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report completion of this Field Change on Form CG-4334D using OG-159/FPN-44A for EQUIPMENT MODEL/TYPE. The serial number shall be reported as shown on the Electronic Installation Record (EIR). Record completion by entry on the Field Change Accomplishment Plate, NSN I0264-00-085-0000, available from NPFC, Philadelphia, and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this and all other field change bulletins applicable to them. Additional or missing copies can be obtained from Coast Guard Supply Center, Brooklyn, NY. Order directly using MILSTRIP procedures; no cost is involved. NSN CG7610-01-GE8-1352 applies.

3. Upon completion a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the field change has been accomplsihed and reports have been made. Coast Guard Supply Center, Brooklyn, NY, will update the Allowance Parts List to reflect any changes.

R. E. [illegible], CDR., USCG
ACTING CHIEF, ELECTRONICS
ENGINEERING DIVISION

Encl: (1) Supplemental Technical Manual (LOCATED WITH TECH MANUALS)

DIST: (SDL NO. 107) D4A2

A: NONE
B: b(PACAREA only): (11th, 12th, 17th only) (1); giqs(2); p(1)
C: v(Searchlight, Fallon, Middletown, Tok, Narrow Cape, Shoal Cove only) (2)
D: a(FESEC only) (1)
E: NONE
F: NONE

COMMANDING OFFICER
U. S. COAST GUARD LORAN C STATION
WILLIAMS LAKE
MINISTRY OF TRANSPORT
P. O. BOX 4568
WILLIAMS LAKE
BRITISH COLUMBIA V2G2V8 (2)

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G-EEE-7/63

ERRATA SHEET

TO

17 AUG 1977

F.C. No. 1 TYPE 4 TO AN/FPN-44A LORAN TRANSMITTING SET

PURPOSE:

This Errata Sheet corrects the model number of Gate Trigger unit (GTU) Test Set

PROCEDURE:

Enclosure (1) to Field Change No. 1 was inserted after page 6-ii of Volume V of the equipment technical manual. Make the following pen and ink correction to this enclosure:

Enclosure (1), page 3, paragraph 3, line 3, delete "179441" and add in its place "CEAT 300 427"

ROUTINE INSTRUCTIONS:

Upon completion, place this errata sheet in front of the indicated field change in the applicable technical publications.

D. Cattbertson

Engineering Division

DIST: (SDL 105)

A: None
B: b(PACAREA only), c(11th, 12th, 13th, 17th only), gis(2); p(1)
C: v(Fallon, Middletown, Narrow Cape, Searchlight, Shoal Cove, ToK only)(2)
D: None
E: None
F: None

	CO	XO	E	F	CX					FILE
ROUTE										
COPY										c-3
INITIAL										

7610 01 GE8 1350

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WASHINGTON, D.C. 20590
PHONE: 202-426-1223

ELECTRONIC FIELD CHANGE BULLETIN 10550
10 JAN 1977

F.C. NO. 1 TYPE 4 TO AN/FPN-44A LORAN TRANSMITTING SET

PURPOSE:

The purpose of this field change is to publish maintenance and support information for the AN/FPN-44A Loran Transmitting Set.

IDENTIFICATION OF ACCOMPLISHMENT:

Enclosure (1) to this field change, inserted between page 6-ii and 6-iii of Section 6 (Volume V) of the technical manual, identifies the accomplishment of this field change.

MATERIAL REQUIRED:

None

PROCEDURE:

Maintenance and support information for the AN/FPN-44A is contained in enclosure (1). Upon receipt of this field change, insert enclosure (1) after page 6-ii of Section 6 (Volume V) of the technical manual.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report completion of this field change on form CG-4334D using OT-96/FPN-44A as EQUIPMENT MODEL/TYPE. The serial number shall be reported as shown on the CGHQ-3134. Record completion by an entry on the Field Change Accomplished Plate, NSN I0264-00-085-0000, NPFC, Philadelphia; and on any other required records.

2. Maintenance support facilities shall maintain a library copy of this, and all other field change bulletins applicable to them. Additional or missing copies of this field change bulletin can be obtained from Coast Guard Supply Center, Brooklyn, N.Y. (Code 341). Order directly, using MILSTRIP procedures; no cost is involved. NSN CG7610-01-GE8-1350 applies.

3. Upon completion, a copy of this Field Change Bulletin shall be inserted after page iv of Section 1-4 (Volume I) of the technical manual. Cognizant commands shall ensure that this field change has been accomplished and applicable reports have been made.

J. F. CULBERTSON
By direction

Encl: (1) AN/FPN-44A Maintenance and Support Information dtd Dec 76

Dist: (SDL NO. 104)

A: NONE
B: g(15); i(5); a(4); bcs(2); p(1)
C: v(Fallon, Middletown, Narrow Cape, Searchlight, Shoal Cove, Tok only)(2)
D: NONE
E: NONE
F: NONE

CG-273-136 (Non-Registered)

VOLUME I

TECHNICAL MANUAL

for

LORAN TRANSMITTING SET

AN/FPN-44A

SECTIONS 1-4

ITT AVIONICS DIVISION
390 Washington Avenue
Nutley, New Jersey 07110

7610 01 GE8 1301

PRINTED: APR 90

U. S. COAST GUARD
DEPARTMENT OF TRANSPORTATION

Contract: DOT-CG-42535-A

15 AUGUST, 1976

LIST OF EFFECTIVE PAGES

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iiA - iiB	Change 3	4-63 - 4-65	Original	5-90	Change 2
iii - v	Original	4-66 - 4-69	Change 3	5-91 - 5-106	Original
vi - xiii	Change 3	4-70	Original	5-107	Change 2
1-0	Change 2	4-70A - 4-70B	Original	5-108	Original
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2-3 - 2-4	Change 2	Volume II		5-123	Change 3
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2-6	Change 3	ii - vi	Original	5-128A - 5-128B	Change 3
2-7 - 2-8	Original	1-54	Original		
2-9 - 2-10	Change 3			Volume V	
2-11	Change 2	Volume III		Title	Change 3
2-12	Change 3	Title	Original	6-ii	Change 3
2-13	Change 2	ii - vi	Original	6-iii	Change 3
2-14 - 2-16	Original	1 - 156	Original	6-iv	Original
3-1	Original			6-v - 6-vi	Change 3
3-2	Change 3	Volume IV		6-1 -	Change 2
3-3	Change 2	Title	Change 3	6-2 - 6-7	Original
3-4	Original	5-ii	Change 3	6-8 - 6-9	Change 2
3-5	Change 2	5-iii	Change 3	6-10	Original
3-6	Original	5-iv	Change 2	6-11	Change 3
3-7 - 3-9	Change 3	5-v - 5-vi	Original	6-12	Original
3-10	Change 2	5-1 - 5-2	Original	6-12A - 6-12B	Original
3-10A - 3-10B	Change 2	5-3	Change 3	6-13 - 6-14	Original
3-11 - 3-17	Original	5-4	Change 2	6-15 - 6-16	Change 3
3-18	Change 3	5-5 - 5-6	Original	6-17 - 6-22	Original
3-18A - 3-18B	Change 3	5-7 - 5-10	Change 3	6-23	Change 3
3-19	Original	5-11 - 5-12	Change 2	6-24 - 6-27	Original
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TECHNICAL MANUAL FOR LORAN TRANSMITTING SET AN/FPN-44A

CG-273-136

LETTER OF PROMULGATION

1. Purpose. CG-273-136 is the technical manual for the Loran Transmitting Set AN/FPN-44A and shall be considered a part of the equipment. The manual consists of six volumes.

2. Extracts. Extracts from this publication may be made to facilitate the preparation of other technical manuals and handbooks.

3. Procurement. Copies of this publication may be obtained by requisition to the Commanding Officer, U. S. Coast Guard Supply Center, Brooklyn, New York.

4. Corrections. Corrections to this publication will be made by serially numbered Field Changes. They shall be entered promptly by responsible personnel.

M. E. CLARK
Chief, Office of Engineering

RECORD OF CHANGES

Change No.	Date of Change	Date Entered	Signature
F.C. 1	17 AUG 1977	10 DEC 1991	SMITH
F. C. 2	23 JUL 1991	CANCELLED	
F.C. 3	13 JUL 1978	10 DEC 1991	SMITH
F. C. 4	01 JUN 1985	10 DEC 1991	SMITH
F. C. 5	03 SEP 1985	10 DEC 1991	SMITH
F.C.5 ER.	DELETES F.C. 5	26 FEB. 1987 11-DEC-1991	SMITH
F. C. 6	26 NOV 1986	12-DEC-1991	SMITH
F.C. 7	14 JAN 1986	12-DEC-1991	SMITH
F. C. 8	16 JAN 1987	12 DEC-1991	SMITH
F. C. 9	11 JAN 1989	12 DEEC 1991	SMITH
F. C. 10	20 NOV 1987	12 DEC 1991	SMITH
F. C. 11	25 APR 1989	13 DEC 1991	SMITH
F.C. 12	28 AUG 1990	13 DEC 1991	SMITH
F. C 13	12 FEB 1991	NO T. M. CHANGES	SMITH
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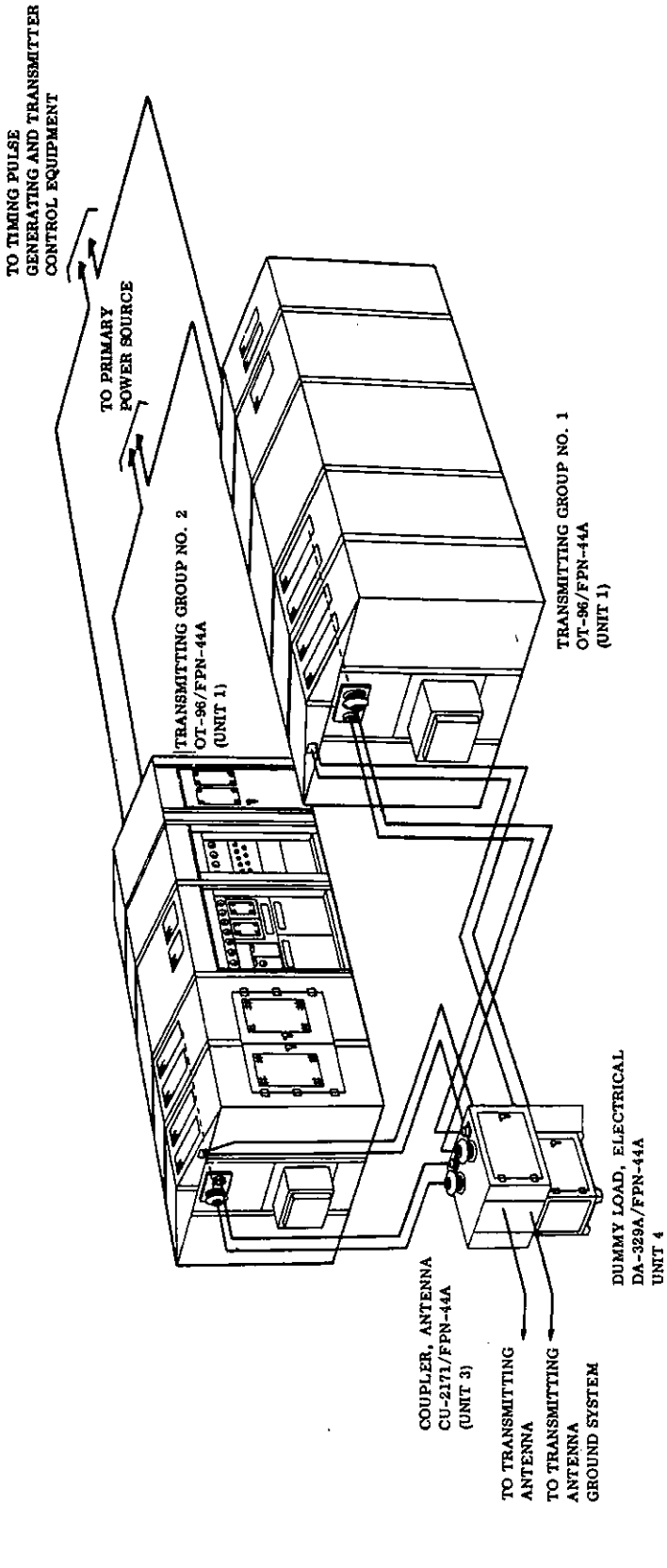

Figure 1-1. Loran Transmitting Set AN/FPN-44A, Relationship of Units

SECTION 1

GENERAL INFORMATION

1-1. INTRODUCTION.

This technical manual provides the general information, principles of operation, and instructions for the installation, operation, and maintenance of Loran Transmitting Set AN/FPN-44A (figure 1-1). This set is used in a Loran-C ground station to transmit pulsed signals which provide a means of determining geographical position.

1-2. FUNCTIONAL DESCRIPTION, LORAN GROUND STATION.

A Loran-C ground station consists of various configurations of equipment. A ground station that includes a Loran Transmitting Set AN/FPN-44A, is equipped with timing, pulse generating, and transmitter control equipment and an antenna. The function of the Loran-C ground station is to develop and transmit pulsed navigational signals at 100-kHz.

The station output power is 100 kilowatts at the standard sampling point. The standard sampling point occurs 25 microseconds after the start of each pulse. The peak power is approximately 400 kilowatts. The average power varies directly with the repetition rate of the pulses. Maximum output power averages 7.5 kilowatts; this occurs at a repetition rate of 180 pulses per second.

Loran-C ground stations are arranged in groups of three or more; one master station (M) and secondary stations (X, Y, Z). In each group (or chain) of stations, the transmissions are timed and coordinated so that the signals form a Loran-C cycle. This cycle consists of groups of eight (or nine) phase-coded pulses which are transmitted to convey position information.

At either a master or a secondary station, the Loran Transmitting Set may be group pulsed (or single pulsed) at two different specific repetition rates. This technique is utilized to add one Loran-C system to another, and is called double rating.

1-3. FUNCTIONAL DESCRIPTION, LORAN TRANSMITTING SET.

a. GENERAL. - The overall function of the Loran Transmitting Set AN/FPN-44A is to transmit Loran-C pulses. Principally, the Loran Transmitting Set performs the following basic functions:

(1) Amplifies Loran-C signal pulses, using triggers and 100-kHz excitation furnished by the associated timing, pulse generating, and transmitter control equipment.

(2) Monitors the developed signal.

(3) Transmits the signal pulses through an antenna.

(4) Incorporates features for switching its two integral transmitters between standby and operate status.

b. DESCRIPTION OF MAJOR UNITS.

(1) TRANSMITTING GROUP OT-96/FPN-44A. - Two transmitting groups (figure 1-1) are contained in the Loran Transmitting Set. Since the two groups are identical and each group is designated as unit 1, they are identified as Transmitting Group No. 1 and Transmitting Group No. 2. In practice, both transmitting groups are always in operation; one feeding the antenna, and the other on standby operation. In standby operation, only filament and bias voltages are applied to the standby group. Full operation into the dummy load is utilized only when necessary during maintenance or performance testing. If the operate transmitting group fails, the standby transmitting group can be switched to the antenna with no significant break in the transmission of the station signal.

The transmitting groups receive shaped drive pulses from the transmitter control and provide low level amplification to increase the signal level to sufficient amplitude to drive the final power amplifiers. The signal is then coupled to the antenna or dummy load. The transmitting groups also contain the power supplies and PA tube cooling facilities to provide proper operation of all amplifier circuits.

The transmitting group cooling system provides water at a rate of 75 gallons-per-minute delivered by an electron tube liquid cooler.

(2) ANTENNA COUPLER CU-2171/FPN-44A. - Tuned circuits in the antenna coupler (figure 1-1) match the output of the operate transmitting group to the antenna. The output of the standby transmitting group is switched to the dummy load by means of vacuum relays. This operation determines which transmitting group feeds the antenna and which feeds the dummy load and is controlled by a switch on the transmitter control equipment.

(3) ELECTRICAL DUMMY LOAD DA-329A/FPN-44. The dummy load (figure 1-1) provides an electrical load for the transmitting group that is in standby operation.

1-4. FACTORY OR FIELD CHANGES.

No factory or field changes have been made to the Loran Transmitting Set AN/FPN-44A.

1-5. QUICK REFERENCE DATA.

a. OPERATING FREQUENCY. - 100 kHz

b. FREQUENCY BANDWIDTH. - 90 to 110 kHz

c. FREQUENCY CONTROL. - 100 kHz shaped drive from transmitter control equipment.

d. TYPE OF EMISSION. - Pulse

e. POWER OUTPUT. -

(1) PEAK PULSE - 400 kw (approximate)
(2) SAMPLING POINT - 100 kw (minimum)
(3) AVERAGE - 7.5 kw (at 180 pps)

f. PULSE SHAPE. -

(1) AMPLITUDE. - 5 microseconds before pulse beginning; 60 db below sampling point

(2) PULSE BEGINNING. - First point at which amplitude reaches 0.5 per cent of peak amplitude

(3) SAMPLING POINT. - 25 microseconds after pulse beginning

(4) TRAILING EDGE. - Amplitude down 60 db from sampling point level 300 microseconds after pulse beginning

g. PULSE SPECTRUM. - At least 99.5 percent of radiated energy within band from 90 to 110 kHz

h. GROUP REPETITION INTERVALS (GRI). - GRI's available for use are 40,000 microseconds through 99,990 microseconds in ten microsecond increments. Thus, there are 5999 GRI's available. The actual GRI's used are selected to minimize mutual interference with other Loran-C chains and avoid synchronous interference from other signals in the low frequency band.

i. SPECIFIC LORAN-C RATES. - The specific Loran-C rate is identified by a four-digit number corresponding to the GRI in tens of microseconds. For example a GRI of 99,300 microseconds is called "rate 9930".

j. MULTIPULSE GROUPS. - One, two, eight, or nine pulses.

k. INPUT POWER REQUIREMENTS. - Each transmitting group requires the following maximum input power, however the required 460 volt power may be significantly less for certain modes of operation:

460 vac, 50 to 60 Hz, 3 phase, 335 kva
208 ~~230~~ vac, 50 to 60 Hz, 3 phase, 35 kva
120 vac, 50 to 60 Hz, 1 phase, 3 kva

1-6. EQUIPMENT LISTS.

a. EQUIPMENT SUPPLIED. - The complete equipment supplied by the manufacturer is listed in table 1-1.

b. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED. - Additional equipment required for operation but not supplied by the manufactorer under this contract is listed in table 1-2.

c. SHIPPING DATA. - The shipping data pertaining to the loran transmitting set is given in table 1-3.

d. ELECTRON TUBE COMPLEMENT. - The vacuum tubes and semiconductors contained in this equipment are listed in table 1-4.

TABLE 1-1. EQUIPMENT SUPPLIED

QUANT. PER EQUIP.	NOMENCLATURE		UNIT NO.	DIMENSIONS (INCHES)			VOLUME (CU. FT)	WEIGHT (LBS.)
	NAME	DESIGNATION		HEIGHT	WIDTH	DEPTH		
2	Transmitting Group (includes)	OT-96/FPN-44A	1					
1	Cabinet, Electrical Equipment	CY-3841/FPN-44	1A1	102	144	276	2,350	2,275
1	Electron Tube Liquid Cooler	HD-601/FPN	1A2	89	58	20	60	1,150
1	Amplifier Group (includes)	OG-159/FPN-44A	1A4	75	67	35	102	1,534
1	Power Supply	PP-7304/FPN-44A	1A4A1					
1	Oscilloscope Control	C-4558A/FPN-44	1A4A3					
1	Radio Frequency Amplifier (includes)	AM-3774/FPN-44						
1	Power Amplifier Tank		1A5	68	42	41	68	330
1	Power Amplifier Tube Rack		1A6	78	83	47	176	2,278
4	Resistor Rack		1A7-1A10	10	87	5	3	22 each
1	Electrical Equipment Rack	MT-2929/FPN-44	1A11	84	24	16	19	104
1	Indicator Panel	SB-1894A/FPN-44	1A12	15	30	14	4	17
1	Low Pass Filter	F-1428/FPN-44A	1A20	75	54	25	59	528
1	PA Overload Indicator Panel		1A21					
1	Power Supply Set (includes)	OP-109/FPN-44A	1A53					
1	Relay Assembly	RE-1112/FPN-44A	1A53A1	10	22	8	1	6
1	Control-Indicator	C-10034/FPN-44A	1A53A2	45	32	14	12	69
1	Relay Assembly (includes)	RE-1113/FPN-44A	1A53A3					
1	460 V Rack (less 1A53A3A1 and 1A53A3A2)			79	31	38	54	290
1	Voltage Regulator	CN-1473/FPN-44A	1A53A3A1 and 1A53A3A2	55 16	30 30	11 4	11 1	176 50
1	208 V Rack including			79	41	31	58	600
1	Voltage Regulator	CN-1472/FPN-44A	1A53A3A3 and 1A53A3A4					
1	Instrument Shunt	MX-9783/FPN-44A	1A53A4	8	22	13	1	13
1	Power Supply	PP-7305/FPN-44A	1A53A5 and 1A53A6	78	55	55	137	6,400
1	Voltage Divider	CN-1474/FPN-44A	1A53A7	11	35	11	2	26
1	Resistor Assembly		1A53A19 1A53A20 1A53A23	28 28 22	22 22 22	3 3 3	1 1 1	16 17 11
1	Antenna Coupler	CU-2171/FPN-44A	3	81	61	51	146	1,042
1	Electrical Dummy Load	DA-329A/FPN-44	4					

TABLE 1-2. EQUIPMENT AND PUBLICATIONS REQUIRED BUT NOT SUPPLIED

QUANT. PER EQUIP.	NOMENCLATURE		REQUIRED USE	REQUIRED CHARACTERISTICS
	NAME	DESIGNATION		
1	Variable Power Supply		Adjust overload relays	0 to 60 vdc, 0 to 3 amps
1	Timing, Pulse Generating, and Transmitter Control Equipment		Furnish required inputs	
1	Technical Manual for Timing, Pulse Generating, and Transmitter Control Equipment			
1	Phase Sequence Indicator	G.E. Type 5467032G5	Check input power phasing	107 to 625 vac, 60 Hz
1	Instruction Book for Phase Sequence Indicator			

NOTE

Also required, but not supplied are transmitting and receiving antennas, cables, wires and tubing for interconnections between the antenna, transmitter control equipment and various other installation items.

TABLE 1-3. SHIPPING DATA

BOX NO.	NOMENCLATURE		DIMENSIONS (INCHES)			VOLUME (CU. FT)	WEIGHT (LBS.)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
W1	Antenna Coupler, Dummy Load	CU-2171/FPN-44A DA-329A/FPN-44	96	72	68	272	1780
W3	Electrical Installation Material		21	105	46	60	400
W5	Cables		21	26	26	8	600
W5A	Cables		16	34	34	10	250
W6	Ducts		32	22	64	31	395
NOTE Transmitting Group No. 1 is shipped in series X boxes, and Transmitting Group No. 2 in series Y boxes. Refer to Volume III for detailed list of materials contained in each box.							
X1, Y1	Fan and Louver		49	33	57	70	370
X2, Y2	Electron Tube Liquid Cooler	HD-1000/FPN-44A	31	67	97	116	1340
X3, Y3	Ceramic Mounting		Packed in Boxes X21, Y21				
X4, Y4	Ceramic Mounting		Packed in Boxes X21, Y21				
X5, Y5	Capacitors		37	21	23	10	462
X6, Y6	Capacitors		37	21	23	10	462
X7, Y7	Water Jackets		Packed in Boxes X21, Y21				
X8, Y8	PA Tube Rack (P/O RF Amplifier)	P/O AM-3774/FPN-44	96	55	94	287	2605
X9, Y9	Resistor Rack	P/O AM-3774/FPN-44	23	24	49	15	170
X10, Y10	PA Tank	P/O AM-3774/FPN-44	79	48	52	114	700
X11, Y11	Air Exhaust Housing		28	26	43	18	98
X12, Y12	Meter Light Assembly, Cable Ducts		20	26	69	21	215
X13, Y13	Indicator Panel, and Miscellaneous Parts	SB-1894A/FPN-44	26	33	72	35	310
X14, Y14	Electrical Equipment Rack	MT-2929/FPN-44	22	28	92	33	250
X15, Y15	Enclosure Assembly, Partition		17	39	109	42	435
X16, Y16	Power Supply	PP-7305/FPN-44A	92	65	73	250	6222
X17, Y17	Control-Indicator	C-10034/FPN-44A	20	38	51	22	200
X18, Y18	Voltage Regulator	CN-1472/FPN-44A	89	45	40	105	960

TABLE 1-3. SHIPPING DATA (Cont)

BOX NO.	NOMENCLATURE		DIMENSIONS (INCHES)			VOLUME (CU. FT)	WEIGHT (LBS.)
	NAME	DESIGNATION	HEIGHT	WIDTH	DEPTH		
X19, Y19	Relay Assembly,	RE-1113/FPN-44A	89	35	45	93	640
X20, Y20	Voltage Regulator	CN-1473/FPN-44A	19	34	76	28	350
X21, Y21	Miscellaneous Parts	Includes Boxes X3, Y3, X4, Y4, X7, Y7	25	25	49	18	297
X22, Y22	Miscellaneous Parts		12	48	86	29	230
X23, Y23	Tubes		18	26	49	13	122
X24, Y24	Tubes		21	26	36	12	100
X25, Y25	Tube F1086		55	27	34	29	111
X26, Y26	Tube F1086		55	27	34	29	111
X27, Y27	Tube F1086		55	27	34	29	111
X28, Y28	Tube F1086		55	27	34	29	111
X29, Y29	Capacitor		27	17	21	6	180
X30, Y30	Amplifier Group	OG-159/FPN-44A	87	39	76	149	1950
X31, Y31	Tubes and Chimney		30	28	34	17	140
X32, Y32	Cables and Interconnections		14	38	52	16	330
X33, Y33	Floor Assembly		10	20	72	9	188
X34, Y34	Floor Assembly		15	50	94	44	430
X35, Y35	Enclosure Assembly		16	39	99	36	760
X36, Y36	Enclosure Assembly		26	51	96	74	820
X37, Y37	Enclosure Assembly		10	30	75	26	468
X38, Y38	Enclosure Assembly		8	28	77	10	330
X39, Y39	Low Pass Filter		30	59	59	60	760
X40, Y40	P/O Power Supply Set		9	14	126	9	120

TABLE 1-4. SEMICONDUCTOR AND TUBE COMPLEMENT

NUMBER OF SEMICONDUCTORS AND TUBES OF TYPES INDICATED

UNIT	C6A	F1086	F8C25N	JHV34H40	LM120K-15	LM340K-15	T720145504 DW	USS-15	OA2WA	1N1199A	1N1614	1N2976B	1N4003A	1N4007
TRANSMITTING GROUP OT-96/FPN-44A (2 PER SET)	7	4	2	12	2	2	6	6	2	2	4	1	87	22
TOTAL NUMBER OF EACH TYPE FOR LORAN TRANSMITTING SET AN/FPN-44A	14	8	4	24	4	4	12	12	4	4	8	2	174	44

UNIT	1N457	1N459	1N4733	1N4735	1N4737	1N4739	1N4744	1N5054	1N547	1087689	12AT7	2N2222A	2N2646	2N2905
TRANSMITTING GROUP OT-96/FPN-44A (2 PER SET)	6	1	2	3	4	12	2	3	14	8	1	8	2	1
TOTAL NUMBER OF EACH TYPE FOR LORAN TRANSMITTING SET AN/FPN-44A	12	2	4	6	8	24	4	6	28	16	2	16	4	2

UNIT	2N2907A	2N3417	2N4401	2N4403	3G6	741	4PR-1000A	5651WA	5751	5814A	6CL6	6336A	6922
TRANSMITTING GROUP OT-96/FPN-44A (2 PER SET)	4	2	17	10	19	3	2	1	1	1	5	4	2
TOTAL NUMBER OF EACH TYPE FOR LORAN TRANSMITTING SET AN/FPN-44A	8	4	34	20	38	6	4	2	2	2	10	8	4

SECTION 2

INSTALLATION

2-1. UNPACKING AND HANDLING.

Unpack and handle Loran Transmitting Set AN/FPN-44A with the care usually taken with precision electronic equipment. Immediately after unpacking, inspect the entire set for dents, damaged dials and indicators, etc. Check the equipment against table 1-3. Refer to Volume III for installation and assembly instructions.

The only special unpacking procedures are for boxes X25 through X28, and Y25 through Y28 containing electron tubes and are as follows (figure 2-1):

CAUTION

Keep package vertical at all times. Do not remove corrugated fiberboard container from wooden box.

Step 1. Carefully cut open top of corrugated container. Open top flaps of container, exposing top cushioning.

Step 2. Remove top cushioning from top of corrugated container, exposing spring-loaded frame which holds tube. Save cushioning to be used in step 4.

Step 3. Carefully lift loaded frame through the top opening of the container. Do not tilt or jar the tube.

Step 4. Gently set the spring-loaded frame containing the tube on the cushioning removed from the container in step 2. This is done keeping the tube in a vertical position.

Step 5. Remove the tube from the frame.

NOTE

Retain special packing materials after removal of equipment. They can be used for reshipment if needed.

2-2. SITE SELECTION.

The erection and installation of the enclosures housing the loran transmitting groups are described and illustrated in Volume II.

2-3. POWER REQUIREMENTS AND DISTRIBUTION.

Primary power distribution is shown in Section 4. Each transmitting group requires the following maximum input power; however the required 460-volt power may be significantly less for certain modes of operation.

a. 460 vac, 50/60 Hz ±10 percent, 3-phase, 3-wire, 335 kva.

b. 208 vac, 50/60 Hz ±10 percent, 3-phase, 4-wire, 35 kva.

c. 120 vac, 50/60 Hz ±10 percent, 1-phase, 2 wire, 3 kva.

2.4. INSTALLATION LAYOUT.

The layout and overall relationship between units of the loran transmitting set is shown in figure 2-2.

2-5. INSTALLATION REQUIREMENTS.

The installation and field assembly instructions for the AN/FPN-44A are described and illustrated in Volume III.

WARNING

This equipment uses voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

Interlocks are installed throughout the loran transmitting set to protect personnel from dangerous high voltages within the loran transmitting set. They are not to be tampered with or disabled in an unauthorized manner.

Before contacting any circuit shut down the equipment and then discharge all circuits in the working area with the grounding hooks.

2-6. INSPECTION AND ADJUSTMENTS.

WARNING

Be sure that station circuit breakers controlling 208-volt and 460-volt power to loran transmitting set are off until procedures of paragraphs 2-6a through 2-6k have been completed.

The instructions given in paragraph 2-6a should be performed immediately after unpacking. Procedures given in paragraphs 2-6b through 2-6ac, should be performed after the equipment is completely installed and ready for normal operation. See paragraph 6-5a for required test equipment. Inspection and adjustment procedures should be executed in the sequence given.

a. VISUAL INSPECTION. -

Step 1. Check for legibility of front panel markings.

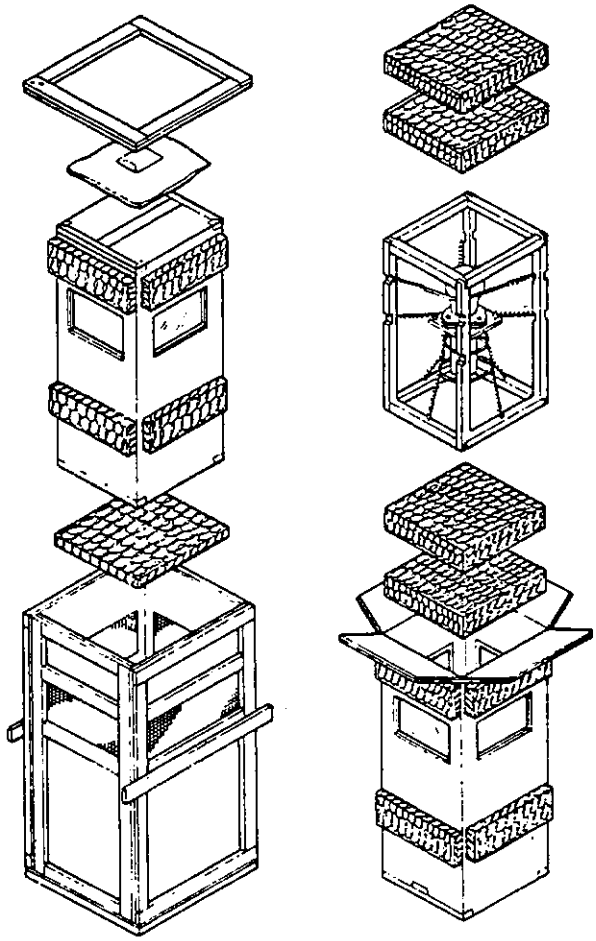

Figure 2-1. Unpacking Procedures for Electron Tubes

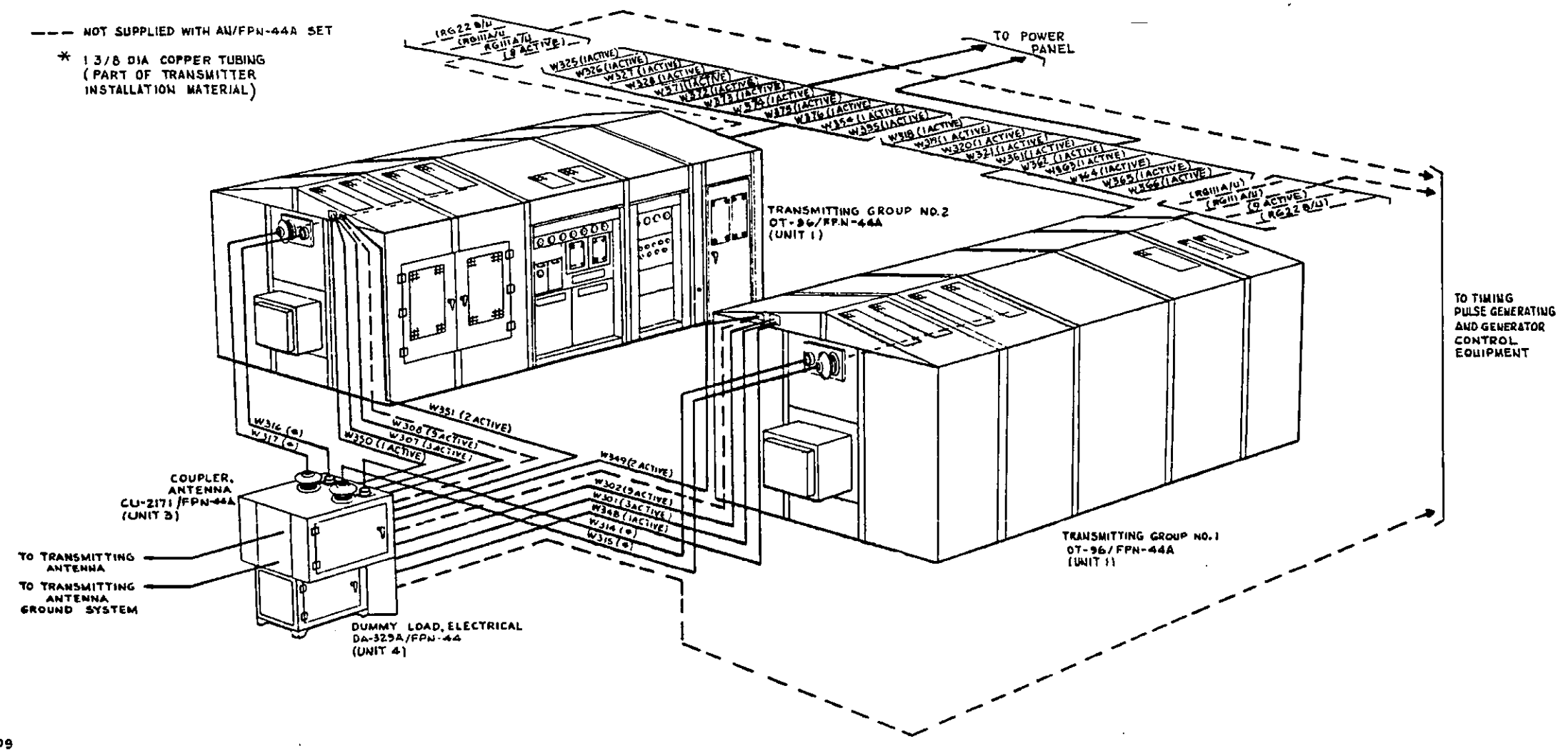

Figure 2-2. Loran Transmitting Set, AN/FPN-44A System Diagram

Step 2. Check finish of all units for damage.

Step 3. Operate front panel controls to check for freedom of movement. Check front panel controls for proper alignment with panel markings. Adjust, if necessary.

Step 4. Check all units internally for damage.

Step 5. Check that tubes and other plug in components are properly seated and have not incurred damage during transit.

Step 6. Check for loose or missing hardware.

Step 7. Check all units for broken or loose wire, and hardware.

Step 8. Check high voltage transformer 1A53A6T1 for oil leaks.

b. OPERATION ON 50 Hz POWER. - Follow the instructions listed below if the AN/FPN-44A Transmitting Set is to be used on 50 Hz power rather than 60 Hz power:

(1) Remove the jumpers that connect terminal 5 to terminal 6 on the gate trigger units, 1A53A3A1A1, 1A53A3A1A2, 1A53A3A1A3.

(2) Note that the elapsed time readings on the PLATE HOURS and FILAMENT HOURS meters must be multiplied by 1.2 because these meters have 60-Hz motors.

c. DISCHARGE CIRCUIT. - Check the function of the high-voltage discharge resistors and relays as follows:

Step 1. Connect an ohmmeter from the 21500 volt terminal of the rectifier assembly 1A53A5 to ground. The ohmmeter shall indicate 12,000 ohms (±2400 ohms).

Step 2. Open and close the contacts of the discharge relay 1A53A1K1 by hand. The ohmmeter shall indicate over one megohm when the relay is open and return to 12,000 ohms when the relay is closed.

Step 3. Connect the ohmmeter from the 10750 volt terminal of 1A53A5 to ground. The ohmmeter shall indicate 3000 ohms (±600 ohms).

Step 4. Open and close the contacts of the discharge relay 1A53A1K2 by hand. The ohmmeter shall indicate over one megohm when the relay is open and return to 3000 ohms when the relay is closed.

Step 5. Remove ohmmeter.

d. RELAY SHUNT ADJUSTMENTS. - Make relay adjustments according to paragraph 6-5b.

e. PROTECTIVE SPARK GAP SPACING. - Adjust spark gaps according to paragraph 6-5c.

f. GROUNDING HOOKS. - Check that all grounding hooks are furnished and that the lead is securely fastened to the hook and to cabinet ground. Secure the handle in the clips provided. There are two hooks each for the amplifier group 1A4 front and rear doors, two hooks on the protective partition inside the transmitter enclosure, and one hook at each door of the antenna coupler (CU-2171/FPN-44A) cabinet. There are also two hooks at the front doors and one hook at the rear of PA tube rack 1A6.

g. THERMOMETER SWITCH ADJUSTMENT. - Adjust thermometer switches according to paragraph 6-5d.

h. TEST POINT BLOCKING CAPACITOR ADJUSTMENT. - Adjust capacitors according to paragraph 6-5e.

i. FILAMENT TRANSFORMER VISUAL CHECK. - Check each filament transformer listed in table 2-1 to ensure that the proper primary taps are used. These transformers are located in amplifier group 1A4, and PA tube rack 1A6.

TABLE 2-1. FILAMENT TRANSFORMER PRIMARY TAPS

FILAMENT TRANSFORMER DESIGNATION	PRIMARY TAPS
1A4T1	1 and 2
1A4T2	1 and 2
1A4T3	1 and 2
1A4T4	1 and 2
1A6T1	1 and 4
1A6T2	1 and 4
1A6T3	1 and 4
1A6T4	1 and 4

j. UNDERVOLTAGE AND OVERVOLTAGE PROTECTION. Adjust meter 1A53A3M1 as specified in paragraph 6-5f.

k. EQUIPMENT SETUP. - Set up the equipment for electrical tests as follows:

Step 1. Place all controls as shown in table 2-2.

NOTE

When performing specified operation, the indicated result may be accompanied by other results not mentioned. The reason is that they do not pertain directly to the particular function being checked. Disregard results not specifically mentioned unless they are obviously a malfunction.

Step 2. Take readings of FILAMENT HOURS and PLATE HOURS meters (figure 3-5).

l. PHASE SEQUENCE OF 208-VOLT LINE. - Check phase sequence as follows:

Step 1. Turn off the 208 vac power at the station distribution panel.

TABLE 2-2. INITIAL EQUIPMENT SWITCH POSITIONS

CONTROL	REF DES	FIGURE	POSITION
208 vac circuit breaker	1A53A3CB2	3-6	OFF
460V INPUT CB1	1A53A3CB1	3-6	OFF
HIGH VOLTAGE RECTIFIER POWER	1A53A3S1	3-6	OFF
POWER	1A53A2S17	3-5	OFF/RESET
FILAMENTS	1A53A2S13	3-5	OFF
BIAS AND LOW VOLTAGE	1A53A2S7	3-5	OFF
PLATE VOLTAGE SELECTOR	1A53A2S18	3-5	OFF
EMERGENCY STOP DESLOT/NON-DESLOT LOCKOUT-READY	1A53A2S19 1A52S20 1A12S1	3-5 3-5 3-4	RUN NON/DESLOT LOCKOUT
All water flow valves in 1A6			open
All drawers and doors			closed
Transmitter control-equipment Transmitter Selector			To select transmitting group under test

Step 2. Set the 208-volt circuit breaker 1A53A3CB2 to OFF.

Step 3. Connect the phase sequence indicator to 208 vac regulator terminals 1A53A3TB1-1, 1A53A3TB1-2, and 1A53A3TB1-3.

Step 4. Turn on the 208 vac power at the station distribution panel.

Step 5. Check that phase sequence is as follows:

Terminal	Phase Sequence
1A53A3TB1-1	1
1A53A3TB1-2	2
1A53A3TB1-3	3

Step 6. Turn off the 208 vac power at the station distribution panel.

Step 7. Remove phase sequence indicator.

NOTE

Phase sequence check of 460-volt line is not required.

m. PRIMARY COOLING SYSTEM FILL PROCEDURE. - Fill the primary cooling system as specified in step 29 of table 2 in Volume III.

n. WATER FLOW SWITCHES. - Check water flow switches as follows:

Step 1. Set 208 vac circuit breaker 1A53A3CB2 to ON.

Step 2. Observe that WATER LEVEL lamp (figure 3-4) is lit.

Step 3. Set POWER switch (figure 3-5) to ON.

Step 4. Observe that water pump starts and then WATER ON lamp lights.

Step 5. Partially close the water control valve to each rf amplifier tube while observing that the WATER ON lamp goes out when the flow rate is 14 GPM or less. After each observation, reset the valve for a flow rate of 18 GPM. The reference designations of the water flow switches are: 1A6S1, 1A6S2, 1A6S3, and 1A6S4.

Step 6. Set 208 vac circuit breaker and POWER switch to OFF.

F.C. No 5/28

o. VOLTAGE REGULATOR CN-1472/FPN-44A ADJUSTMENT. - Adjust the 208-volt regulator according to paragraph 6-5g.

p. THERMOMETER SWITCHES. - Check thermometer switch circuits as follows:

Step 1. Set 208 vac circuit breaker 1A53A3CB2 (figure 3-6) to ON.

Step 2. Set POWER switch (figure 3-5) to ON.

Step 3. Check that each water thermometer switch operates by temporarily turning the temperature setting down until contact is made with the temperature indicator.

Step 4. Observe that the appropriate lamp on the indicator panel (figure 3-4) goes out and the transmitter control equipment alarm operates.

Step 5. Reset the temperature setting to normal and depress the OVERLOAD AND 3 STRIKE RESET pushbutton (figure 3-5) after each thermometer switch is checked. These switches are located in PA tube rack 1A6.

Switch Designation	Indicator Lamp Description	Normal Setting
1A6S5 1A6S6 1A6S7 1A6S8	PA 1A6 OUTLET	50
1A6S9	PA 1A6 INLET	70

Step 6. Turn off 208 vac circuit breaker and POWER switch.

q. AIR SWITCHES. - Check air switches as follows:

Step 1. Set 208 vac circuit breaker 1A53A3CB2 (figure 3-6) to ON.

Step 2. Set POWER and FILAMENTS switches (figure 3-5) to ON.

Step 3. Observe that the following indicator lamps are lit: AIR ON, AND FILAMENTS READY, (after a 2.5 minute delay) (figure 3-5).

Step 4. Block the air intake of the blower 1A4B1.

Step 5. Observe that AIR ON indicator lamps (goes out immediately) and the FILAMENTS READY indicator lamp goes out in 10 seconds maximum.

Step 6. Unblock the air intake and observe that the AIR ON indicator lamp is lit immediately and the filaments light after a delay of less than 10 seconds.

Step 7. Set 208 vac circuit breaker and POWER switch to OFF.

Step 8. Remove enclosure blower fuses 1A11F7, 1A11F8, and 1A11F9.

Step 9. Set 208 vac circuit breaker and POWER switch to ON.

Step 10. Observe that the AIR ON and FILAMENTS READY indicator lamps are off and the filaments are off.

Step 11. Set 208 vac circuit breaker and POWER switch to OFF. Replace fuses removed in step 8.

Step 12. Set 208 vac circuit breaker and POWER switch to ON.

Step 13. Observe that the following indicator lamps are lit: AIR ON, and FILAMENTS READY. There should be a 2.5 minute delay if the POWER switch was off more than 30 seconds.

Step 14. Set 208 vac circuit breaker (1A53A3CB2), POWER, FILAMENTS switches to OFF.

r. DOOR INTERLOCKS. - Check the door interlocks as follows:

Step 1. Close and secure all interlocked drawers and the access panels of amplifier group 1A4 (figure 3-1), antenna coupler unit 3 and dummy load unit 4.

Step 2. Lock all the key interlocks listed in table 2-3. Remove each key and place it in the appropriate lock position in the key block located on the bulkhead just inside the transmitter group access door.

TABLE 2-3. KEY INTERLOCKS

KEY	LOCATION
1	Right Fence
2	Left Fence
3	Amplifier Group 1A4 Front Door
4	Amplifier Group 1A4 Rear Door
5	PA Tube Rack 1A6 Front Door

Step 3. Ascertain that the master key in the key block cannot be turned and removed with any other key removed.

Step 4. Turn the master key in the key block and then remove the master key. Use this key to unlock the LOCKED OFF switch (figure 3-6).

Step 5. Place the HIGH VOLTAGE RECTIFIER POWER switch (figure 3-6) ON.

Step 6. Lock the LOCKED ON switch (figure 3-6). The DOOR INTERLOCK lamp (figure 3-5) shall light.

Step 7. Open each amplifier group 1A4 drawer and access panel, listed below in turn, and observe that the DOOR INTERLOCK lamp (figure 3-5) goes out. After opening each interlock, momentarily depress the INTERLOCK DISABLE pushbutton (figure 3-1) and then disable the interlock. Observe that the DOOR INTERLOCK lamp lights in each case, then close and secure the drawer or panel.

Drawer or Panel	Interlock Switch
Power Supply 1A4A1	1A4S5
Blank Panel	1A4S4
Oscilloscope Control 1A4A3	1A4S3
Access Panel	1A4S7

Step 8. Open each door and access panel of antenna coupler, unit 3, and each door of dummy load, unit 4, in turn, and observe that the DOOR INTERLOCK lamp, (figure 3-5) goes out. Then close and secure each door and panel. The interlock switches on the antenna coupler are: 3S1 through 3S8. The interlock switches on the dummy load are 4S3 through 4S6.

s. ANTENNA COUPLER-DUMMY LOAD SWITCHING TEST. - Check the antenna coupler and dummy load circuitry and switching functions before the application of rf power as follows:

Step 1. Set the following controls on both transmitting groups as indicated:

208 vac circuit breaker 1A53A3CB2 (figure 3-6) to OFF

460V INPUT circuit breaker 1A53A3CB1 (figure 3-6) to OFF

LOCKED ON 1A53A3S2 switch (figure 3-6) to open

HIGH VOLTAGE RECTIFIER POWER 1A53A3S1 switch (figure 3-6) to OFF and locked off

POWER switch (figure 3-5) to OFF/RESET

FILAMENTS switch (figure 3-5) to OFF

BIAS AND LOW VOLTAGE switch (figure 3-5) to OFF

PLATE VOLTAGE SELECTOR switch (figure 3-5) to OFF

EMERGENCY STOP switch (figure 3-5) to RUN

Step 2. On both transmitting groups set 208 vac circuit breaker 1A53A3CB2 (figure 3-6) and POWER switch (figure 3-5) to ON, and LOCAL-REMOTE switch (figure 3-4) to REMOTE.

Step 3. On transmitter control equipment, select transmitting group No. 1 as the operate group.

Step 4. On the antenna coupler observe that TRANSMITTER #1 OPERATE lamp (figure 3-8) is lit; OPERATE lamp (figure 3-4) is lit on transmitting group No. 1, and STANDBY lamp (figure 3-4) is lit on transmitting group No. 2.

Step 5. Open all the access doors on the antenna coupler and dummy load and disable their interlock switches. To disable an interlock switch, grasp the head of the interlock switch and pull forward until it clicks.

Step 6. Observe that the following circuits are closed by visually circuit tracing:

(1) Transmitting group No. 1 antenna terminal to high voltage contact of antenna transfer relay 3K1 to tap on antenna coupler coil 3L1.

(2) Transmitting group No. 1 ground terminal to high voltage contact of ground transfer 3K2 to ground terminal.

(3) Transmitting group No. 2 antenna terminal to high voltage contact of antenna transfer relay 3K11 to dummy load resistor bank.

(4) Transmitting group No. 2 ground terminal to high voltage contact of ground transfer relay 3K10 to ground side of dummy load resistor bank.

(5) Antenna coupler antenna terminal to antenna grounding relay 3K6 to antenna coupler ground terminal.

Step 7. On both transmitting groups set PLATE VOLTAGE SELECTOR switch (figure 3-5) to OPERATE.

Step 8. Observe that circuit from antenna terminal through relay 3K6 to ground is open.

Step 9. At transmitter control equipment, select transmitting group No. 2 as the operate group.

Step 10. On the antenna coupler, observe that the TRANSMITTER NO. 1 OPERATE lamp (figure 3-8) is not lit.

Step 11. On transmitting group No. 1, observe that OPERATE lamp is not lit and STANDBY lamp is lit (figure 3-4).

Step 12. Observe that dummy load blower is operating.

Step 13. Set PLATE VOLTAGE SELECTOR switch (figure 3-5) to OFF on both transmitting groups.

Step 14. On the antenna coupler, observe that TRANSMITTER #2 OPERATE lamp (figure 3-8) is lit; OPERATE lamp (figure 3-4) is lit on transmitting group No. 2; and STANDBY lamp (figure 3-4) is lit on transmitting group No. 1.

Step 15. Observe that the following circuits are closed by visual circuit tracing.

(1) Transmitting group No. 2 antenna terminal to high voltage contact of antenna transfer relay 3K11 to tap on antenna coupler coil 3L1.

(2) Transmitting group No. 2 ground terminal to high voltage contact of ground transfer relay 3K10 to ground terminal of antenna coupler.

(3) Transmitting group No. 1 antenna terminal to high voltage contact of antenna transfer relay 3K1 to dummy load resistor bank.

(4) Transmitting group No. 1 ground terminal to high voltage contact of ground transfer relay 3K2 to ground side of dummy load resistor bank.

Step 16. Set PLATE VOLTAGE SELECTOR switch to ON on both transmitting groups.

Step 17. Observe that circuit from antenna terminal through relay 3K6 to ground is open.

Step 18. Observe that dummy load blower is operating.

Step 19. Set PLATE VOLTAGE SELECTOR switch to OFF on both transmitting groups.

Step 20. Close all doors of the antenna coupler and dummy load.

Step 21. Set controls to positions listed in step 1.

t. TANK COIL ALIGNMENT. - Align the P.A. tank coil, 1A5, as specified in paragraph 6-5o.

u. TUNING PROCEDURES. - Tune the output circuits according to paragraph 6-5k.

v. BIAS AND PLATE VOLTAGE CIRCUITS. - Check the bias and plate voltage circuits, proceed as follows:

CAUTION

The transmitting group not being tested should be disconnected from the antenna coupler circuits by removing the copper tubing connectors that connect its vacuum switches to the large copper pipes. The output circuits of both transmitting groups are connected to the dummy load except when control power is applied to the transmitter group that is selected as the "operate" transmitter by the transmitter control equipment.

The secondary water system must be placed in operation while the following tests are being performed.

Step 1. Set BIAS PEDESTAL CCT CONTROL switch 1A4A4S8 (figure 3-1) to OFF.

Step 2. Set bias pedestal generator controls 1A4A5R14, 1A4A5R31 and 1A4A5R32 fully counterclockwise (figure 3-1).

Step 3. Set the following bias controls (figure 3-1) for maximum bias (extreme clockwise).

V7 BIAS ADJ	(1A4R149)
V8 BIAS ADJ	(1A4R150)
LEFT 2ND IPA BIAS ADJUST	(1A4R97)
RIGHT 2ND IPA BIAS ADJUST	(1A4R98)
LEFT PA BIAS ADJUST	(1A4T5)
RIGHT PA BIAS ADJUST	(1A4T6)

Step 4. Set the following controls to ON:

POWER switch (figure 3-5)

208 vac circuit breaker 1A53A3CB2 (figure 3-6)

HIGH VOLTAGE RECTIFIER POWER switch (figure 3-6)

Step 5. Turn the LOCKED ON key (figure 3-6) which locks 1A53A3S2.

Step 6. Observe that DOOR INTERLOCK indicator lamp (figure 3-5) is lit.

Step 7. Set 460V INPUT CB1 to ON. Set FILAMENTS switch to ON. Wait for FILAMENTS READY indicator lamp to light (approximately 150 seconds). Set BIAS AND LOW VOLTAGE switch (figure 3-5) to ON.

Step 8. Observe that the 5KV BIAS voltmeter indicates -5 kv ±500v and that the LOW VOLTAGE PLATE voltmeter indicates 500 ±50v (figure 3-5).

Step 9. Observe that the BIAS AND LOW VOLTAGE ON indicator lamp (figure 3-5), LEFT PA BIAS UNDERVOLTAGE, and RIGHT PA BIAS UNDERVOLTAGE indicator lamps (figure 3-4) are lit.

Step 10. Set LOCKOUT-READY switch (figure 3-4) to READY.

Step 11. Set 208 vac circuit breaker 1A53A3CB2 to OFF and then 20 seconds later set to ON.

Step 12. Observe that 5KV BIAS voltmeter indicates -5kv ±500v immediately after circuit breaker is set to ON.

Step 13. Set 208 vac circuit breaker to OFF and then 40 seconds later set to ON.

Step 14. Observe that 5KV BIAS voltmeter indicates -5kv ±500v in 150 ±15 seconds.

Step 15. On the transmitter control equipment, set the transmitting group under test in standby mode.

Step 16. Set the LOCKOUT-READY switch to LOCKOUT.

Step 17. Adjust MAINTENANCE ADJUST control (figure 3-5) fully counter-clockwise. Set PLATE VOLTAGE SELECTOR switch (figure 3-5) to MAINT. Adjust MAINTENANCE ADJUST control so PA PLATE VOLTAGE meter indicates less than 6.5 kv.

Step 18. Observe the following:

PLATE ON indicator lamp (figure 3-5) is lit.

IPA PLATE VOLTAGE meter (figure 3-5) indicates less than 3.3 kv.

Dummy load blower is running.

Step 19. Have one man observe IPA PLATE VOLTAGE meter and one man observe discharge switching relays on 1A53A1 when the BIAS AND LOW VOLTAGE switch is set to OFF. Observe that relays 1A53A1K1 and 1A53A1K2 close and IPA PLATE VOLTAGE and PA PLATE VOLTAGE meters indicate zero volts.

Step 20. Set BIAS AND LOW VOLTAGE switch to ON.

Step 21. Observe that PA PLATE VOLTAGE meter indicates less than 6.5 kv and IPA PLATE VOLTAGE meter indicates less than 3.3 kv.

Step 22. Set PLATE VOLTAGE SELECTOR switch (figure 3-5) to OFF.

Step 23. Disable dummy load blower 4B1 by blocking air intake. Set PLATE VOLTAGE SELECTOR switch to MAINT. Observe that PLATE ON indicator lamp (figure 3-5) is not lit.

Step 24. Enable dummy load blower by unblocking air intake and observe that PLATE ON indicator lamp is lit.

Step 25. Observe that the BIAS AND LOW VOLTAGE ON and PLATE ON indicator lamps go out as each of the following operations is performed:

(1) Unlock and lock LOCKED ON switch 1A53A3S2.

(2) Open and close each 1A4 interlock.

(3) Open and close dummy load side doors.

(4) Open and close antenna coupler side doors.

(5) Open and close antenna coupler front door.

(6) Open and close antenna coupler front panel.

Step 26. Set PLATE VOLTAGE SELECTOR switch to OPERATE. Set LOCKOUT-READY switch (figure 3-4) to READY. Observe that a transmitter ready indication is displayed on transmitter control equipment.

Step 27. On the transmitter control equipment, select the transmitting group under test as the operate transmitter.

Step 28. Set controls to initial positions as listed in table 2-2.

w. OVERLOAD CIRCUITS AND 3-STRIKE RELAY. - Check the overload and the 3-strike relay as follows:

Step 1. Set the following controls as indicated:

PLATE VOLTAGE SELECTOR switch to OFF

208-Volt circuit breaker 1A53A3CB2 to ON

HIGH VOLTAGE RECTIFIER POWER switch to ON

Turn LOCKED ON key

460V INPUT CB1 to ON

POWER switch to ON

FILAMENTS switch to ON

BIAS AND LOW VOLTAGE switch to ON

MAINTENANCE ADJUST control to 0

PLATE VOLTAGE SELECTOR switch to MAINT.

Step 2. After the PLATE ON lamp lights, use the MAINTENANCE ADJUST control to set the P.A. plate voltage to 3 KV as indicated on the PA PLATE VOLTAGE meter.

Step 3. Turn the LOCKED ON key, lower the HIGH VOLTAGE RECTIFIER POWER switch to OFF, turn the LOCKED OFF key, and move it to the key transfer block.

Step 4. Open enclosure partition gate with interlock key. Place a grounding hook on the 21.5 kv output bus. Close enclosure inner fence gate with interlock key.

Step 5. Set HIGH VOLTAGE RECTIFIER POWER switch to ON and lock LOCKED ON switch (figure 3-6). Set 460V INPUT circuit breaker (figure 3-6) to ON.

Step 6. Observe that the 3-strike relay cycles three times and locks out. Observe that the BIAS AND LOW VOLTAGE ON, and 3 STRIKE RESET indicator lamps are not lit.

Step 7. Set HIGH VOLTAGE RECTIFIER POWER switch to OFF. Open enclosure inner fence gate with interlock key. Place the grounding hook on the 10.75 kv bus.

Step 8. Repeat step 5.

Step 9. Depress OVERLOAD AND 3 STRIKE RESET pushbutton and repeat step 6.

Step 10. Depress OVERLOAD AND 3 STRIKE RESET pushbutton but only allow the 3-strike relay to cycle once by setting PLATE VOLTAGE SELECTOR switch to OFF after the first cycle.

Step 11. After at least 90 seconds, set the PLATE VOLTAGE SELECTOR switch to MAINT. Observe that the 3-strike relay cycles three times and locks out.

Step 12. Set PLATE VOLTAGE SELECTOR, BIAS AND LOW VOLTAGE and HIGH VOLTAGE RECTIFIER POWER switches to OFF. Open enclosure inner fence gate with interlock key. Remove grounding hook.

Step 13. Open the access doors of the PA tube rack. Slowly depress each PA cathode overload relay (see figure 5-42) listed below and observe that its associated indicator lamp (figure 3-4A) goes out and the 3-strike relay simultaneously cycles. After each relay operation is checked, depress the OVERLOAD AND 3 STRIKE RESET pushbutton (figure 3-5).

RELAY	INDICATOR
1A6K1	1A6V1 PA CATHODE OVERLOAD
1A6K2	1A6V2 PA CATHODE OVERLOAD
1A6K3	1A6V3 PA CATHODE OVERLOAD
1A6K4	1A6V4 PA CATHODE OVERLOAD

Step 14. Open the access doors on the rear of the exciter. Slowly depress each IPA cathode overload and PA bias overload relay listed below and observe that its associated indicator lamp (figure 3-4) goes out and the 3-strike relay simultaneously cycles. After each relay operation is checked, depress the OVERLOAD AND 3 STRIKE RESET pushbutton.

RELAY	INDICATOR
1A4K1	LEFT 1ST IPA CATHODE OVERLOAD
1A4K2	RIGHT 1ST IPA CATHODE OVERLOAD
1A4K5	LEFT PA BIAS OVERLOAD
1A4K4	RIGHT PA BIAS OVERLOAD

x. TRANSMITTER CONTROLS AND CONTROL CIRCUITS. - Check the transmitter controls and control circuits by performing the operations of table 2-4. Before performing these operations be sure that:

(1) Pulse input cable is disconnected from the transmitter input.

(2) Cooling system is connected and filled.

y. TUBE SEASONING. - Season tubes according to paragraph 6-5i.

z. BIAS ADJUSTMENT. - Adjust bias voltages as specified in paragraph 6-5j.

aa. NORMAL WAVESHAPES. - Check the normal waveshapes against table 6-4 step 7.

ab. NORMAL METER READINGS AND FUNCTIONS OF ALL METERS. - Check the normal meter readings and functions of all meters against table 6-4 steps 1 through 6.

ac. AC OVERLOAD ADJUSTMENT. - Readjust the OVER-CURRENT TRIP SETTING controls as specified in paragraph 6-5q as soon as the transmitting group is operating normally into the antenna.

TABLE 2-4. TRANSMITTER CONTROL SEQUENCE OF OPERATION

STEP	OPERATION	RESULT
1	Set the following controls to position indicated. CONTROL — POSITION All doors and drawers — Closed and locked EMERGENCY STOP (figure 3-5) — RUN 208 vac circuit breaker (figure 3-6) — ON POWER (figure 3-5) — OFF/RESET FILAMENTS (figure 3-5) — OFF HIGH VOLTAGE RECTIFIER POWER (figure 3-6) — ON LOCKED ON (figure 3-6) — Closed 460 V INPUT CB1 1A53A3CB1 (figure 3-6) — ON LOCKOUT-READY (figure 3-4) — READY BIAS AND LOW VOLTAGE (figure 3-5) — OFF PLATE VOLTAGE SELECTOR (figure 3-5) — OFF MAINTENANCE ADJUST (figure 3-5) — Full ccw (0.0) OPERATE ADJUST (figure 3-5) — Full ccw (0.0) All water flow valves — Open Transmitter control equipment, Transmitter group selector — See NOTE NOTE Test each transmitting group in the standby mode so that it operates into dummy load. On the transmitting control equipment, set the transmitting group selector to the "opposite" group; that is, if the transmitting group No. 1 is under test, transmitting group No. 2 should be selected as the operate transmitter.	
2	Set the AC VOLTAGE SELECTOR switch (figure 3-5) to 208 V LINE. Turn VOLTAGE PHASE SELECTOR switch through its three positions and observe AC VOLTAGE meter (figure 3-5).	208 ±21 vac for each phase
3	Set AC VOLTAGE SELECTOR switch to 208 V REG. Turn VOLTAGE PHASE SELECTOR through its three positions and observe AC VOLTAGE meter.	208 ±4 vac for each phase

TABLE 2-4. TRANSMITTER CONTROL SEQUENCE OF OPERATION (Cont)

STEP	OPERATION	RESULT
4	Set AC VOLTAGE SELECTOR switch to 460 V LINE. Turn VOLTAGE PHASE SELECTOR through its three positions and observe AC VOLTAGE meter.	460 ±46 vac for each phase
5	Observe the following indicator lamps (figures 3-5, 3-4 and 3-4A).	All indicator lamps are lit
	IPA OVERLOAD	
	PA OVERLOAD	
	AC OVERLOAD	
	3 STRIKE	
	DOOR INTERLOCK	
	208V EMERGENCY STOP POWER	
	460V EMERGENCY STOP POWER	
	PLATE TRANSFORMER OVERTEMPERATURE	
	LEFT 1ST IPA CATHODE OVERLOAD	
	RIGHT 1ST IPA CATHODE OVERLOAD	
	LEFT PA BIAS OVERLOAD	
	RIGHT PA BIAS OVERLOAD	
	1A6V1 PA CATHODE OVERLOAD	
	1A6V2 PA CATHODE OVERLOAD	
	1A6V3 PA CATHODE OVERLOAD	
	1A6V4 PA CATHODE OVERLOAD	
	WATER LEVEL	
	PA1A6 INLET OVER TEMPERATURE	
	PA1A6 OUTLET OVER TEMPERATURE	
	STANDBY	
6	Set METER SELECTOR switch (figure 3-3) to -28V and -12V positions and observe readings on voltmeter (figure 3-3).	
	-28V position	28 ±2.0v
	-12V position	12 ±0.6v
7	Set POWER switch to ON and observe AIR ON and WATER ON indicator lamps (figure 3-5).	Both indicator lamps are lit

TABLE 2-4. TRANSMITTER CONTROL SEQUENCE OF OPERATION (Cont)

STEP	OPERATION	RESULT
8	Set FILAMENTS switch to ON. Observe FILAMENTS READY indicator lamp and FILAMENT HOURS meter (figure 3-5).	
	FILAMENTS READY indicator lamp	Lit after a 150 ±15 second delay
	FILAMENT HOURS meter	Running
9	Set BIAS AND LOW VOLTAGE switch to ON. Observe following indicator lamps and meters:	
	BIAS AND LOW VOLTAGE ON indicator lamp (figure 3-5)	Lit
	LEFT PA BIAS UNDERVOLTAGE indicator lamp (figure 3-4)	Lit
	RIGHT PA BIAS UNDERVOLTAGE indicator lamp (figure 3-4)	Lit
	5 KV BIAS meter (figure 3-5)	-5 kv ±500v
	LOW VOLTAGE PLATE meter (figure 3-5)	500 ±50v
	LEFT PA BIAS meter (figure 3-1)	1.5 ±0.2 kv
	RIGHT PA BIAS meter (figure 3-1)	1.5 ±0.2 kv
	LEFT 2ND IPA BIAS meter (figure 3-1)	4 ±0.5 kv
	RIGHT 2ND IPA BIAS meter (figure 3-1)	4 ±0.5 kv
10	Set METER SELECTOR switch (figure 3-3) to +250 V position and observe voltmeter (figure 3-3).	250 ±12.5v
11	Set PLATE VOLTAGE SELECTOR switch to MAINT. Slowly turn MAINTENANCE ADJUST control clockwise until IPA PLATE VOLTAGE meter (figure 3-5) reads approximately 5 kv. Observe the following indicator lamps and meter:	
	PLATE ON indicator lamp (figure 3-5)	Lit
	PLATE HOURS meter (figure 3-5)	Running
	Transmitter control equipment high voltage on indicator.	Lit
12	Observe the following current indicating meters (figure 3-5):	
	IPA PLATE CURRENT meter	Reads zero
	PA PLATE CURRENT meter	Reads zero
13	Observe the following plate and cathode meters on units 1A4 (figure 3-1) and 1A6.	
	LEFT 1ST IPA CATHODE meter (1A4M1)	All meters read zero
	RIGHT 1ST IPA CATHODE meter (1A4M2)	

TABLE 2-4. TRANSMITTER CONTROL SEQUENCE OF OPERATION (Cont)

STEP	OPERATION	RESULT
	LEFT 2ND IPA PLATE CURRENT (1A4M3)	
	RIGHT 2ND IPA PLATE CURRENT (1A4M4)	
	V1 CATHODE CURRENT (1A6M1)	
	V2 CATHODE CURRENT (1A6M2)	
	V3 CATHODE CURRENT (1A6M3)	
	V4 CATHODE CURRENT (1A6M4)	
14	~~Set QUIESCENT CURRENT switch to left and right positions and observe PA CATHODE meter (figure 3-1).~~	Reads zero in both positions.
15	Set EMERGENCY STOP switch to STOP and observe that transmitter shuts down immediately.	460V INPUT CB1 and 208 vac circuit breakers open, all meters read zero, and all indicator lamps are off.
16	Set EMERGENCY STOP switch to RUN.	

2-7. INTERFERENCE REDUCTION.

Radio interference reduction has been designed into this equipment. The only area where installation may affect this interference is in the coupling of the transmitter to the antenna. The reduction of this radio interference to an absolute minimum, consistent with good engineering practice, must be accomplished by aligning the power amplifier tank according to paragraph 6-5o and tuning the output circuit according to paragraph 6-5k.

2-8. PREPARATION FOR RESHIPMENT.

The shipping and reassembly instruction for special equipment of the AN/FPN-44A is described in Volume III. For the rest of the equipment, reverse the order of procedure for unpacking. Determine whether shipment is domestic or overseas and pack accordingly. Mark the case containing the technical manuals TECHNICAL MANUALS INSIDE.

SECTION 3

OPERATOR'S SECTION

3-1. FUNCTIONAL OPERATION.

Loran Transmitting Set AN/FPN-44A is used to transmit uniform and accurately timed phase-coded pulses. The loran transmitting set is only one of several units essential to the transmission of these pulses. For this reason, operation of the loran transmitting set cannot be considered separately but must be incorporated into the operating routine for a complete station. The operation of the timing and some of the switching equipment which is not part of the loran transmitting set is covered in their respective instruction manuals.

Normal operation of the loran transmitting set includes a start-stop procedure, switching arrangements, operational adjustments, and monitoring procedures. Since a loran transmitting set is operational for extended periods of time, a time-sharing schedule for the two transmitter groups of a ground station is used. Starting and stopping procedures represent a small portion of the operating routine.

Controls located at the transmitter control equipment are used for switching transmitter groups. Indicators are provided for observing the operation of the set. Monitoring consists of observation of the transmitted pulse and observation of meter indications.

Before placing the equipment in normal operation, the transmitting set shall be completely tuned and adjusted as specified in Section 2. Only those controls listed in tables 3-1 through 3-8 should then be used by operating personnel.

3-2. OPERATING PROCEDURES.

The procedures used in operating the loran transmitting set consist of start-up, switching of transmitting groups, and monitoring.

WARNING

Interlocks are installed throughout the loran transmitting set to protect personnel from dangerous high voltages within the loran transmitting set. They are not to be tampered with or disabled in an unauthorized manner.

One of the two transmitting groups is placed in the operate status and the other transmitting group in standby. The controls and indicators associated with switching are located on the transmitter control equipment.

Since a loran transmitting set is operated constantly, monitoring is necessary to determine that the transmitted pulse is normal. Any deviation from prescribed timing, power, or pulse shape is detected immediately. In addition to display lamps and meters, oscilloscopes are used to monitor the transmitted pulse and the signal supplied to the antenna or dummy load.

a. DESCRIPTION OF CONTROLS. - The controls and indicators of the loran transmitting set with which the operator is concerned are located at the transmitting group and the antenna coupler. A description of these controls can be found in tables 3-1 through 3-8 and figures 3-1 through 3-8.

b. SEQUENCE OF OPERATION. -

NOTE

The sequence of operation is the same for both transmitter groups. Certain results (specified in tables 3-9 and 3-11) depend upon which status (operate or standby) has been selected by the transmitter control equipment.

(1) BEFORE USE. - Set the controls as shown in table 3-9 and perform the steps in table 3-10 before high voltage is applied to the transmitter groups.

(2) DURING USE. - Perform the sequence of operation in table 3-11 and observe that the specified results are obtained.

(3) TRANSFER. - The operate status may be transferred from one transmitter group to the other by the transmitter control equipment when both transmitter groups are turned on as specified in the two preceding paragraphs. This transfer will have the following effect:

(a) The IPA and PA plate voltages in the original operate transmitter group are cut off.

(b) The drive signal in the original operate transmitter group is cut off.

(c) The vacuum relays in the antenna coupler transfer the antenna from the original operate transmitter group to the new operate transmitter group.

(d) The IPA and PA plate voltages are applied in the new operate transmitter group.

(e) The drive signal is applied in the new operate transmitter group.

(4) AFTER USE. - To shut down either transmitting group set POWER switch (figure 3-5) to OFF/RESET. The same indicators which were

lit after setting 1A53A3CB2 (see table 3-9) will remain lit. In addition, the AIR ON and WATER ON (figure 3-5) indicators should remain lit for approximately five minutes. After this time, the pumps and blowers should go off and the AIR ON and WATER ON indicators should go out. After the AIR ON and WATER ON indicators go out, set 1A53A3CB1 and 1A53A3CB2 to OFF. All lamps should go off indicating that the equipment is shut down.

(5) OFF CONDITION. - When the AFTER USE procedures in step (4) above have been performed, the equipment is in the normal off condition. In this condition, however, there is power applied to 1A53A3CB1 and 1A53A3CB2. However, in situations where it is required to remove all power from the transmitting set completely (for repair, etc.), set the 208V and 460V circuit breakers on the station power distribution panel to OFF.

c. TUNING ADJUSTMENTS. - See Section 6 for all tuning adjustments for the loran transmitting sets.

3-3. SUMMARY OF OPERATING PROCEDURES.

The following summarizes the operating procedures described in detail in paragraph 3-2.

a. BEFORE USE. -

Step 1. Set the controls to their before-use positions (table 3-9).

Step 2. Monitor the 208 vac regulated and unregulated voltages, and the 28 vdc and -12 vdc regulated voltages.

Step 3. On control-indicator (1A53A2) check that all overload, 208V EMERGENCY STOP, POWER, DOOR INTERLOCKS, 3 STRIKE, and PLATE TRANSFORMER OVERTEMPERATURE indicator lamps are lit. On indicator panels (1A12 and 1A21), check that all overload, overtemperature and WATER LEVEL indicator lamps are lit.

b. DURING USE. -

Step 1. Set POWER switch (figure 3-5) to ON, and check that AIR ON and WATER ON indicator lamps are lit.

Step 2. Set FILAMENTS switch (figure 3-5) to ON and check that FILAMENTS READY lamp is lit after a time delay.

Step 3. Set BIAS AND LOW VOLTAGE switch (figure 3-5) to ON and check that BIAS AND LOW VOLTAGE ON indicator lamp and undervoltage indicators (figure 3-4) are lit. Check bias and low voltages for normal voltage.

Step 4. Set 460V INPUT CB1 circuit breaker (figure 3-6) to ON and observe that EMERGENCY STOP POWER 460V indicator lamp is lit.

Step 5. Set the PLATE VOLTAGE SELECTOR SWITCH (figure 3-5) to OPERATE. Observe that PLATE ON indicator lamp is lit. Check plate voltage and current meters for normal indications as specified by Calibration Chart at each station.

c. TRANSFER. - The operate status may be transferred by the transmitter control equipment when both transmitter groups are switched on.

d. AFTER USE. - This procedure is used when it is desired to place the loran transmitting set in the normal shutdown mode. In this mode, primary power is applied to the transmitting set's 1A53A3CB1 and 1A53A3CB2 but is not distributed.

e. OFF CONDITION. - This procedure is used to completely remove all power from the loran transmitting set for emergency or maintenance purposes. In this case, not even primary power is applied to the equipment.

3-4. EMERGENCY OPERATION.

The following instructions describe alternate methods of operation when certain failures occur within the loran transmitting set.

a. SWITCHING TRANSMITTING GROUPS. - Since uninterrupted transmission is required from a loran transmitting set, provision is made to switch the standby transmitting group to operate status in the event of failure of the transmitting group that is operating. Transmitting group switching is performed at the transmitter control equipment.

b. OPERATION WITH FAULTY POWER AMPLIFIER SECTION. - In the event that logistics prevent immediate repair of a fault in a Power Amplifier section, satisfactory reduced power operation may be possible if filament and plate power is removed from the faulty section. Additionally, to maintain a balanced output it will be necessary to remove filament power and plate voltage from one section of the opposite polarity side of the Power Amplifier, Unit 1A6. To remove filament power, take out the filament primary fuses corresponding to the defective tube section and to the selected tube of the opposite polarity. Filament fuses are F16 thru F23 on unit 1A11. To remove plate voltage, take out two plate charging resistors, R7 and R8 of each of the appropriate resistor assemblies; 1A7, 1A8, 1A9 or 1A10. When full plate voltage has been applied to the two operating tubes, pulse shape should be checked. If the pulse shape is incorrect, adjustment of the P-Gen settings will be required.

CAUTION

Removal of resistors from a resistor rack leaves plate storage capacitors without high-voltage discharge circuits. Use a grounding hook on the remaining resistors before replacing resistors.

3-5. OPERATOR'S MAINTENANCE.

a. OPERATING CHECKS AND ADJUSTMENTS. - Operator's routine maintenance is limited to front panel controls and indicators. The operator should not perform any interior preventive maintenance procedures.

b. ROUTINE CHECKS. - See Section 6 for all operator's preventive maintenance procedures.

c. EMERGENCY MAINTENANCE. - Operator's maintenance is limited to fuse and lamp replacement. Information pertinent to fuse replacement is given in table 3-12. Each fuse holder is connected to an indicator lamp that lights when its associated fuse is blown.

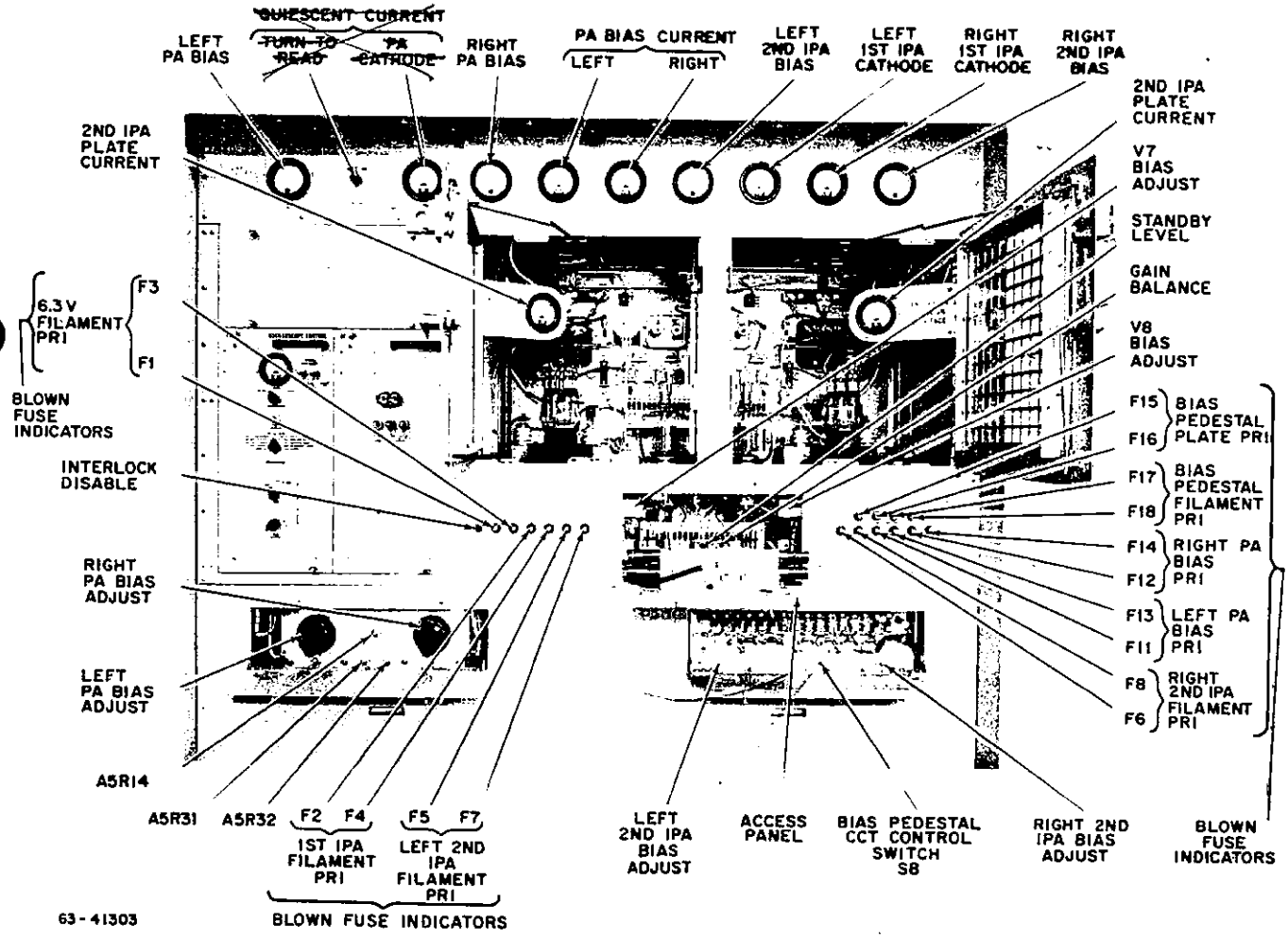

Figure 3-1. Amplifier Group OG-159/FPN-44A (1A4) Controls and Indicators

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TABLE 3-1. AMPLIFIER GROUP OG-159/FPN-44A (1A4) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-1)	REFERENCE SYMBOL	TYPE	FUNCTION
LEFT PA BIAS	M9	Meter	Measures left PA bias voltage.
~~QUIESCENT CURRENT~~	~~S2~~	~~Switch~~	~~Selects left or right PA quiescent current for monitoring on PA CATHODE QUIESCENT CURRENT meter.~~
~~QUIESCENT CURRENT PA CATHODE~~	~~M11~~	~~Meter~~	~~Measures PA cathode quiescent current.~~
RIGHT PA BIAS	M10	Meter	Measures right PA bias voltage.
LEFT PA BIAS CURRENT	M7	Meter	Measures left PA bias current.
RIGHT PA BIAS CURRENT	M8	Meter	Measures right PA bias current.
LEFT 2ND IPA BIAS	M5	Meter	Measures left 2nd IPA bias voltage.
LEFT 1ST IPA CATHODE	M1	Meter	Measures left 1st IPA cathode current.
RIGHT 1ST IPA CATHODE	M2	Meter	Measures right 1st IPA cathode current.
RIGHT 2ND IPA BIAS	M6	Meter	Measures right 2nd IPA bias voltage.
2ND IPA PLATE CURRENT	M3	Meter	Measures left 2nd IPA plate current.
V7 BIAS ADJUST	R149	Potentiometer	Adjusts left 1st IPA bias voltage. Clockwise rotation increases bias voltage.
STANDBY LEVEL	R212	Potentiometer	Adjusts gain to voltage amplifiers.
GAIN BALANCE	R144	Potentiometer	Balances input to voltage amplifiers.
V8 BIAS ADJUST	R150	Potentiometer	Adjusts right 1st IPA bias voltage. Clockwise rotation increases bias voltage.
BIAS PEDESTAL PLATE PRI F15 AND F16	DS13 and DS14	Lamps	Indicates bias pedestal plate primary power fuse blown.
BIAS PEDESTAL FILAMENT PRI F17 AND F18	DS15 and DS16	Lamps	Indicates bias pedestal filament primary power fuse blown.
RIGHT PA BIAS PRI F12 AND F14	DS12 and DS10	Lamps	Indicates right PA bias primary power fuse blown.
LEFT PA BIAS PRI F11 AND F13	DS9 and DS11	Lamps	Indicate left PA bias primary power fuse blown.
RIGHT 2ND IPA FILAMENT PRI F6 AND F8	DS6 and DS8	Lamps	Indicate right second IPA filament primary power fuse blown.
RIGHT 2ND IPA BIAS ADJUST	R98	Potentiometer	Adjusts right 2nd IPA bias voltage.
BIAS PEDESTAL CCT CONTROL SWITCH	S8	Switch	Controls power to bias pedestal power supply.

~~ORIGINAL~~

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TABLE 3-1. AMPLIFIER GROUP OG-159/FPN-44A (1A4) CONTROLS AND INDICATORS (Cont)

PANEL MARKING (Figure 3-1)	REFERENCE SYMBOL	TYPE	FUNCTION
LEFT 2ND IPA BIAS ADJUST	R97	Potentiometer	Adjusts left 2nd IPA bias voltage.
LEFT 2ND IPA FILAMENT PRI F5 AND F7	DS5 and DS7	Lamps	Indicate left second IPA filament primary power fuse blown.
1ST IPA FILAMENT PRI F2 AND F4	DS2 and DS4	Lamps	Indicate first IPA filament primary power fuse blown.
6.3V FILAMENT PRI F1 AND F3	DS1 and DS3	Lamps	Indicate 6.3 vac filament primary power fuse F1 blown.
R31	A5R31	Potentiometer	Adjusts bias pedestal generator positive clipping level.
R14	A5R14	Potentiometer	Adjusts bias pedestal level.
R32	A5R32	Potentiometer	Adjusts bias pedestal generator negative clipping level.
LEFT PA BIAS ADJUST	T5	Variac	Adjusts left PA bias voltage. Clockwise rotation increases bias voltage.
RIGHT PA BIAS ADJUST	T6	Variac	Adjusts right PA bias voltage. Clockwise rotation increases bias voltage.
INTERLOCK DISABLE	S6	Switch	Disables amplifier group 1A4 drawer interlock.
2ND IPA PLATE CURRENT	M4	Meter	Measures right 2nd IPA plate current.

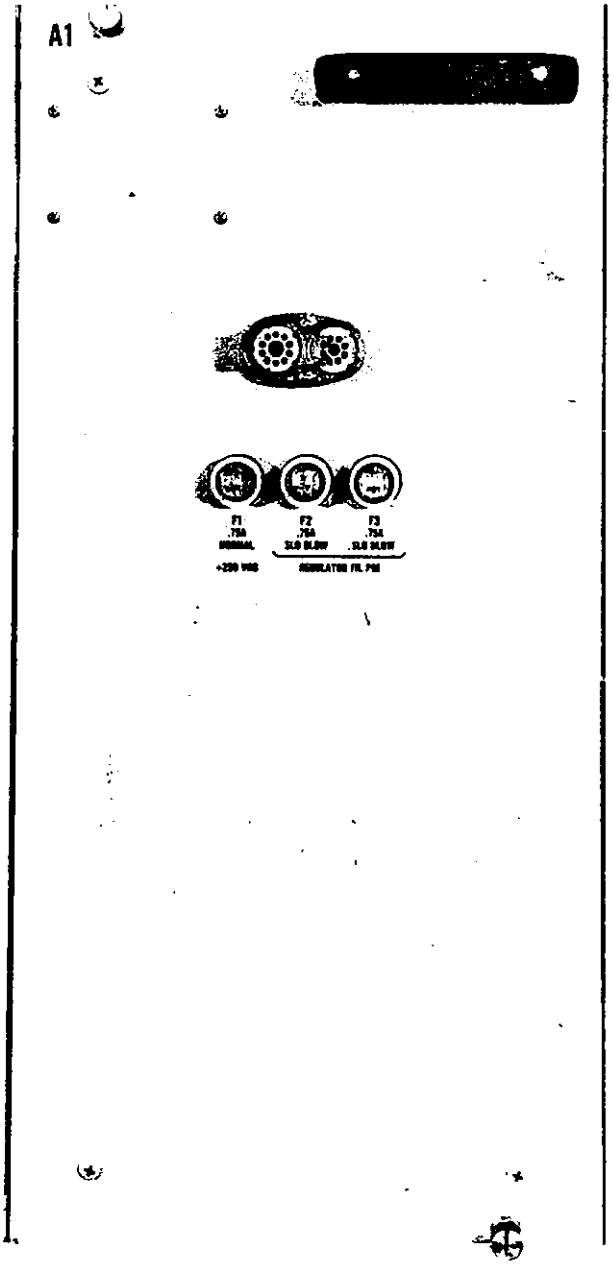

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Figure 3-2. Power Supply PP-3704/FPN-44A (1A4A1), Controls and Indicators

TABLE 3-2. POWER SUPPLY PP-7304/FPN-44A (1A4A1) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-2)	REFERENCE SYMBOL	TYPE	FUNCTION
+250VDC . 75A NORMAL F1	F1	Fuse/Lamp	Indicates 250 vdc fuse blown.
REGULATOR FIL PRI . 75A SLO BLOW F2 AND F3	F2 and F3	Fuse/Lamp	Indicate regulator filament primary power fuse blown.

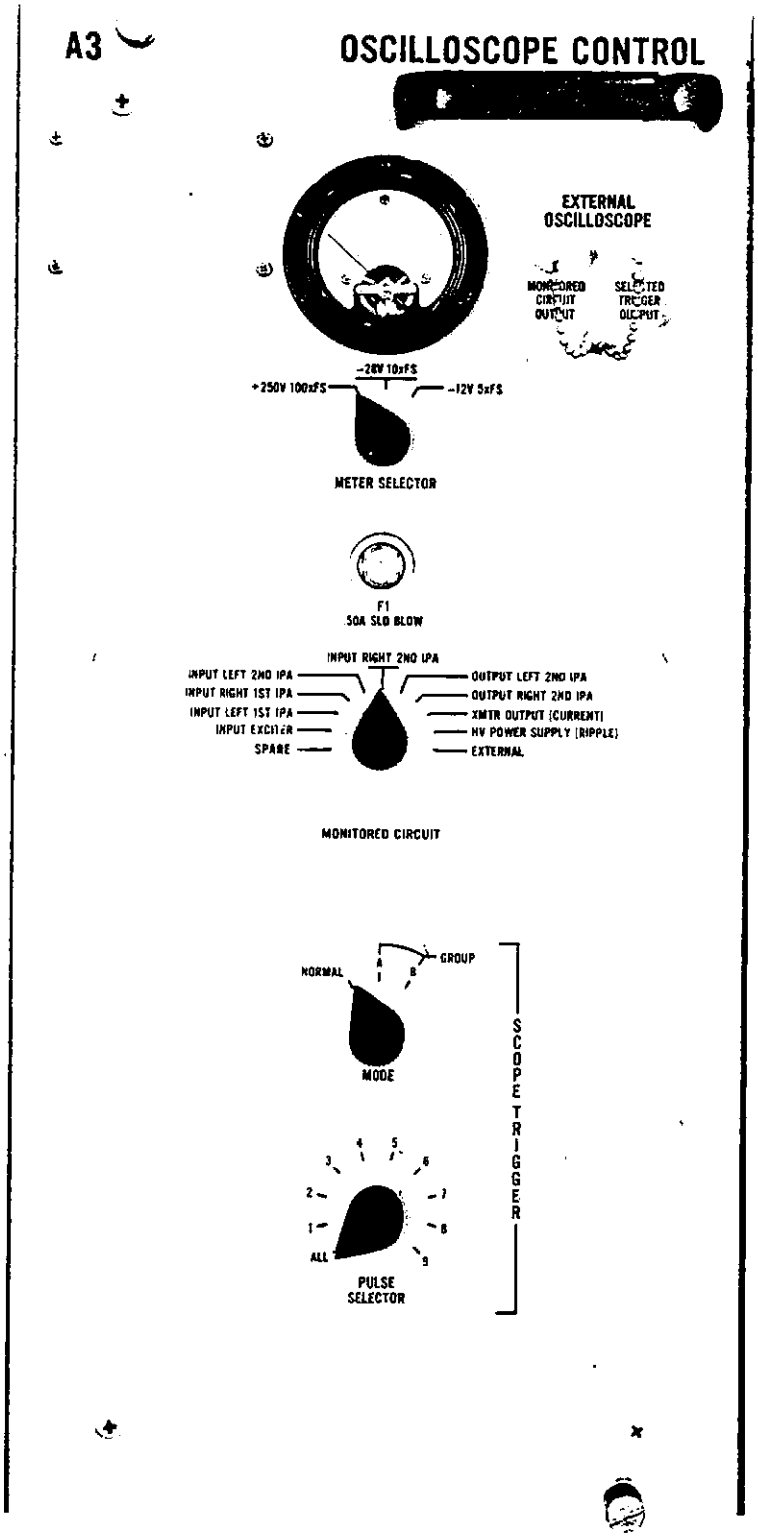

Figure 3-3. Oscilloscope Control C-4558A/FPN-44 (1A4A3) Controls and Indicators

TABLE 3-3. OSCILLOSCOPE CONTROL C-4558A/FPN-44 (1A4A3) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-3)	REFERENCE SYMBOL	TYPE	FUNCTION
VOLTMETER	M1	Meter	Measures +250, -28 and -12 vdc lines.
METER SELECTOR	S2	Switch	Selects voltage to be read on voltmeter M1.
F1 .50A SLO BLOW	F1	Fuse/Lamp	Indicates 28 vdc power supply 120 vac primary power fuse blown.
MONITORED CIRCUIT SPARE INPUT EXCITER INPUT LEFT 1ST IPA INPUT RIGHT 1ST IPA INPUT LEFT 2ND IPA INPUT RIGHT 2ND IPA OUTPUT LEFT 2ND IPA OUTPUT RIGHT 2ND IPA XMTR OUTPUT (CURRENT) HV POWER SUPPLY (RIPPLE) EXTERNAL	S1	Switch	Selects signal to be monitored on oscilloscope via MONITORED CIRCUIT OUTPUT connector J3.
SCOPE TRIGGER MODE	S4	Switch	Selects triggering mode for oscilloscope via SELECTED TRIGGER OUTPUT connector J4.
SCOPE TRIGGER PULSE SELECTOR	S3	Switch	Selects pulse for oscilloscope trigger. Allows individual pulses to be viewed via SELECTED TRIGGER OUTPUT connector J4.

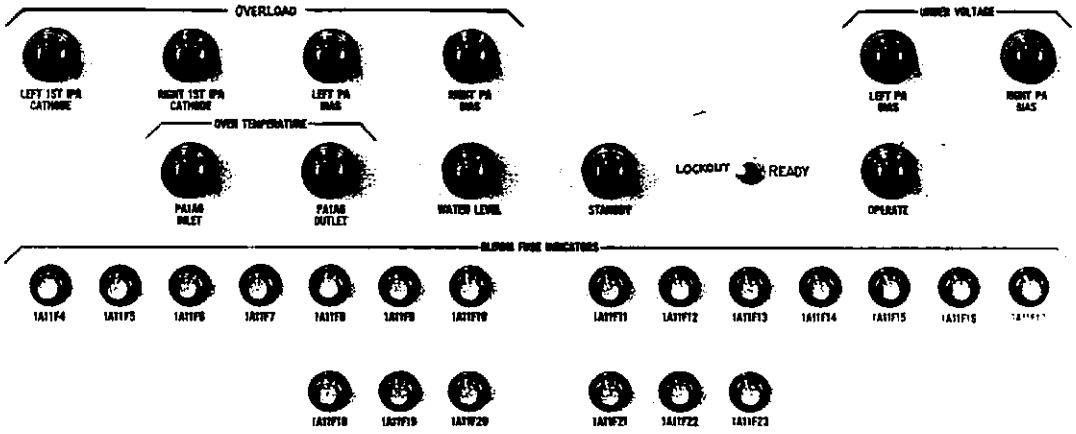

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Figure 3-4. Indicator Panel SB-1894/FPN-44 (1A12) Controls and Indicators

TABLE 3-4. INDICATOR PANEL SB-1894/FPN-44 (1A12) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-4)	REFERENCE SYMBOL	TYPE	FUNCTION
OVERLOAD:			
LEFT 1ST IPA CATHODE	DS1	Lamp	* Indicates overload in left 1st IPA cathode circuit.
RIGHT 1ST IPA CATHODE	DS2	Lamp	* Indicates overload in right 1st IPA circuit.
LEFT PA BIAS	DS3	Lamp	* Indicates overload in left PA bias circuit.
RIGHT PA BIAS	DS4	Lamp	* Indicates overload in right PA bias circuit.
OVER TEMPERATURE:			
PA1A6 INLET	DS7	Lamp	* Indicates overtemperature of PA1A6 inlet water.
PA1A6 OUTLET	DS8	Lamp	* Indicates overtemperature of PA1A6 outlet water.
WATER LEVEL	DS9	Lamp	* Indicates adequate water level of cooling system.
STANDBY	DS12	Lamp	Indicates that transmitter is switched to the dummy load.
OPERATE	DS13	Lamp	Indicates that transmitter is switched in to the antenna.
LOCKOUT-READY	S1	Switch	Allows transmitter to be maintained independently or made ready for normal operation.
UNDER VOLTAGE:			
LEFT PA BIAS	DS10	Lamp	* Indicates undervoltage in left PA bias circuit.
RIGHT PA BIAS	DS11	Lamp	* Indicates undervoltage in right PA bias circuit.
BLOWN FUSE INDICATORS:			
1A11F4	DS14	Lamp	Indicates 2nd IPA blower fuse blown.
1A11F5	DS15	Lamp	Indicates 2nd IPA blower fuse blown.
1A11F6	DS16	Lamp	Indicates 2nd IPA blower fuse blown.
1A11F7	DS17	Lamp	Indicates enclosure fan fuse blown.
			* Lamp not lit indicates malfunction.

TABLE 3-4. INDICATOR PANEL SB-1894/FPN-44 (1A12) CONTROLS AND INDICATORS (Cont)

PANEL MARKING (Figure 3-4)	REFERENCE SYMBOL	TYPE	FUNCTION
1A11F8	DS18	Lamp	Indicates enclosure fan fuse blown.
1A11F9	DS19	Lamp	Indicates enclosure fan fuse blown.
1A11F10	DS20	Lamp	Indicates water pump motor fuse blown.
1A11F11	DS21	Lamp	Indicates water pump motor fuse blown.
1A11F12	DS22	Lamp	Indicates water pump motor fuse blown.
1A11F13	DS23	Lamp	Indicates dummy load fan fuse blown.
1A11F14	DS24	Lamp	Indicates dummy load fan fuse blown.
1A11F15	DS25	Lamp	Indicates dummy load fan fuse blown.
1A11F16	DS26	Lamp	Indicates power amplifier 1A6V1 filament fuse blown.
1A11F17	DS27	Lamp	Indicates power amplifier 1A6V1 filament fuse blown.
1A11F18	DS28	Lamp	Indicates power amplifier 1A6V3 filament fuse blown.
1A11F19	DS29	Lamp	Indicates power amplifier 1A6V3 filament fuse blown.
1A11F20	DS30	Lamp	Indicates power amplifier 1A6V2 filament fuse blown.
1A11F21	DS31	Lamp	Indicates power amplifier 1A6V2 filament fuse blown.
1A11F22	DS32	Lamp	Indicates power amplifier 1A6V4 filament fuse blown.
1A11F23	DS33	Lamp	Indicates power amplifier 1A6V4 filament fuse blown.

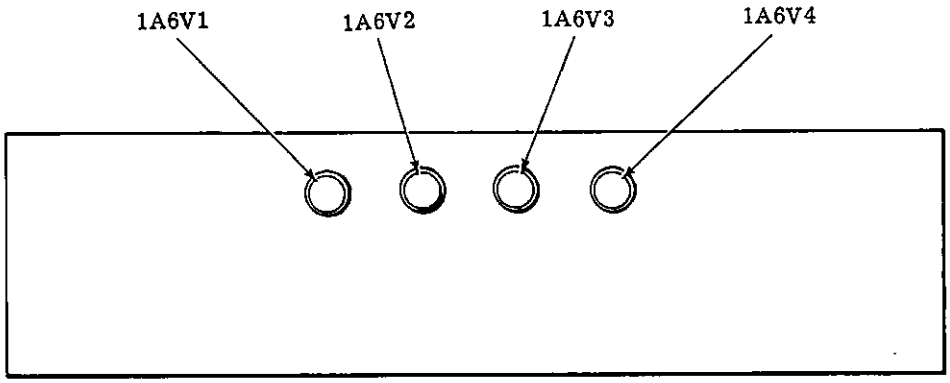

Figure 3-4A. PA Overload Indicator Panel (1A21) Controls and Indicators

TABLE 3-4A. PA OVERLOAD INDICATOR PANEL (1A21) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-4A)	REFERENCE SYMBOL	TYPE	FUNCTION
1A6V1	DS1	Lamp	*Indicates overload in 1A6V1 PA cathode circuit.
1A6V2	DS2	Lamp	*Indicates overload in 1A6V2 PA cathode circuit.
1A6V3	DS3	Lamp	*Indicates overload in 1A6V3 PA cathode circuit.
1A6V4	DS4	Lamp	*Indicates overload in 1A6V4 PA cathode circuit.
			*Lamp not lit indicates malfunction

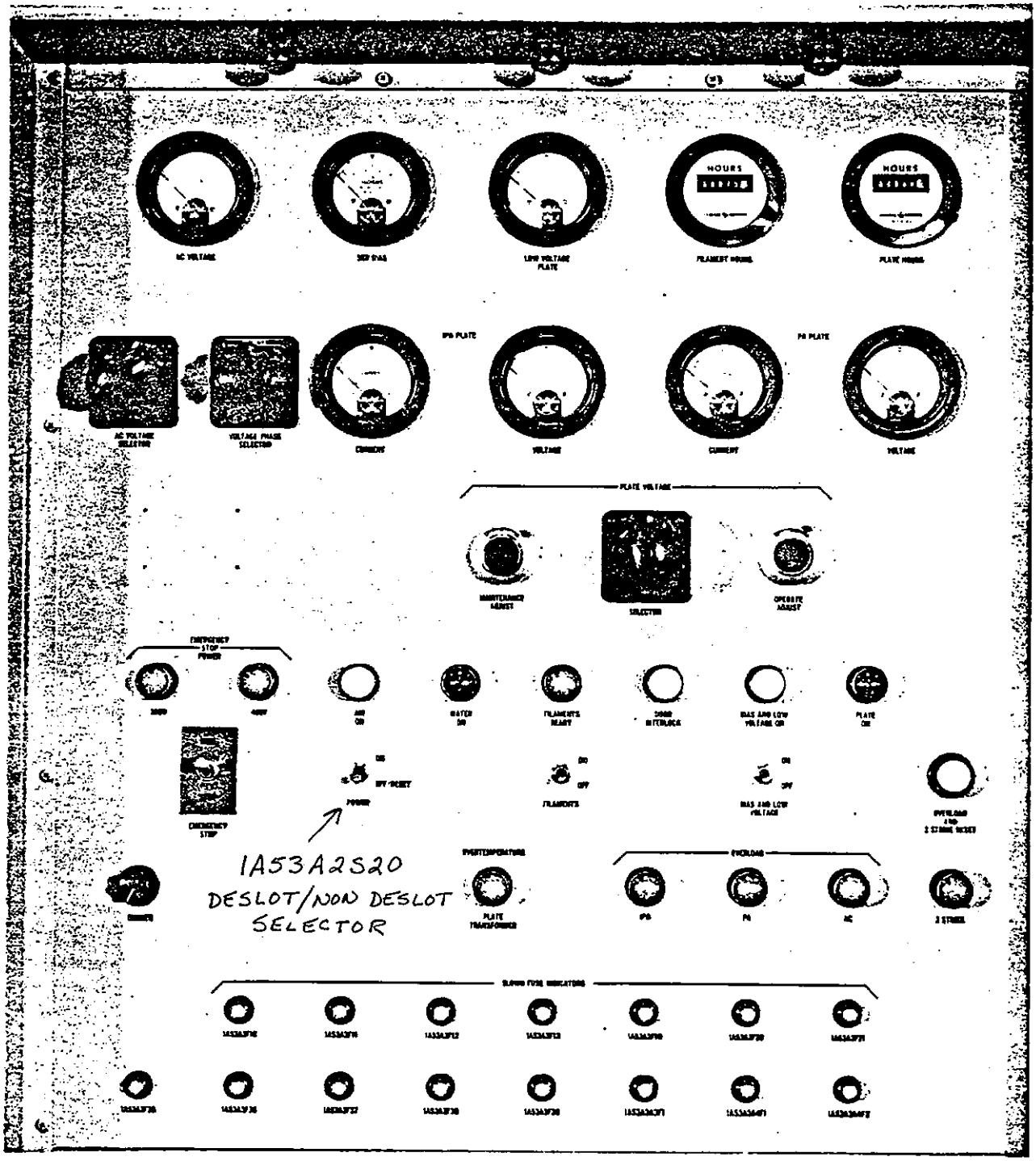

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Figure 3-5. Control-Indicator C-10034/FPN-44A (1A53A2) Controls and Indicators

TABLE 3-5. CONTROL-INDICATOR C-10034/FPN-44A (1A53A2) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-5)	REFERENCE SYMBOL	TYPE	FUNCTION
AC VOLTAGE	M5	Meter	Measures each phase of 460 vac and 208 vac, 3-phase input voltage and 208 vac regulated voltage.
5KV BIAS	M4	Meter	Measures -5 kvdc bias supply voltage.
LOW VOLTAGE PLATE	M9	Meter	Measures 500 vdc supply voltage.
FILAMENT HOURS	M6	Meter	Records length of time power is applied to transmitter group filaments.
PLATE HOURS	M1	Meter	Records length of time power is applied to transmitter group plates.
AC VOLTAGE SELECTOR	S4	Switch	Selects 460v input, 208v input, or 208v regulated as input to AC VOLTAGE meter M5.
VOLTAGE PHASE SELECTOR	S3	Switch	Selects phase of voltage selected by AC VOLTAGE SELECTOR S4 as input to AC VOLTAGE meter M5.
IPA PLATE:			
CURRENT	M8	Meter	Measures IPA plate current.
VOLTAGE	M3	Meter	Measure 10.75 kv IPA plate voltage.
PA PLATE:			
CURRENT	M7	Meter	Measures PA plate current.
VOLTAGE	M2	Meter	Measures 21.5 kv PA plate voltage.
PLATE VOLTAGE:			
MAINTENANCE ADJUST	R9	Potentiometer	Adjusts plate voltage over wide range in maintenance mode when selected by the PLATE VOLTAGE SELECTOR S18.
SELECTOR	S18	Switch	Turns plate voltage on in MAINT and OPERATE positions. Turns plate voltage off in OFF position. In OPERATE position enables OPERATE ADJUST (R8). In MAINT position enables OPERATE ADJUST or MAINTENANCE ADJUST (R9).
OPERATE ADJUST	R8	Potentiometer	Adjusts plate voltage to normal operating value when enabled by PLATE VOLTAGE SELECTOR S18.
EMERGENCY STOP POWER:			
208 V	DS44	Lamp	When lit, indicates 208v emergency stop power is present.
460 V	DS45	Lamp	When lit, indicates 460v emergency stop power is present.

TABLE 3-5. CONTROL-INDICATOR C-10034/FPN-44A (1A53A2) CONTROLS AND INDICATORS (Cont)

PANEL MARKING (Figure 3-5)	REFERENCE SYMBOL	TYPE	FUNCTION
AIR ON	DS8	Lamp	* Indicates all blowers are providing cooling air.
WATER ON	DS1	Lamp	* Indicates proper water flow to PA tubes.
FILAMENTS READY	DS7	Lamp	* Indicates that filaments have been heated up.
DOOR INTERLOCK	DS2	Lamp	* Indicates key interlock and all door and drawer interlock switches are closed.
BIAS AND LOW VOLTAGE ON	DS5	Lamp	* Indicates bias and low power supplies are at operating level.
PLATE ON	DS9	Lamp	* Indicates 460 vac voltage regulator has been enabled.
EMERGENCY STOP - RUN/STOP	S19	Switch	In STOP position, opens 460 vac and 208 vac circuit breakers.
POWER-ON/OFF - RESET	S17	Switch	Turns on blowers and pump. Resets control circuits following a power failure during LOCAL operation.
FILAMENTS - ON/OFF	S13	Switch	Turns transmitting group filaments on and off.
BIAS AND LOW VOLTAGE - ON/OFF	S7	Switch	Turns bias and low voltage power supplies on and off.
OVERLOAD AND 3 STRIKE RESET	S8	Push-button	When depressed, resets overload and three-strike circuit relays.
DIMMER	T1	Variable Autotrans-former	Adjusts brightness of edge lamps.
DESLOT/NON DESLOT	1A53A2S20	SWITCH	SELECTS DESLOT OR NON-DESLOT MODE
OVERTEMPERATURE PLATE TRANSFORMER	DS11	Lamp	* Indicates that temperature of 1A53A6T1 is over limit.
OVERLOAD:			
IPA	DS13	Lamp	* Indicates IPA overload.
PA	DS14	Lamp	* Indicates PA overload.
AC	DS10	Lamp	* Indicates overload in high voltage transformer input circuit.
3 STRIKE	DS12	Lamp	* Indicates three overloads in 90 seconds.
			* Lamp not lit indicates malfunction.

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TABLE 3-5. CONTROL-INDICATOR C-10034/FPN-44A (1A53A2) CONTROLS AND INDICATORS (Cont)

PANEL MARKING (Figure 3-5)	REFERENCE SYMBOL	TYPE	FUNCTION
BLOWN FUSE INDICATORS:			
1A53A3F10	DS30	Lamp	Indicates 120 vac control circuit fuse blown.
1A53A3F11	DS29	Lamp	Indicates filament power fuse blown.
1A53A3F12	DS28	Lamp	Indicates filament power fuse blown.
1A53A3F13	DS27	Lamp	Indicates filament power fuse blown.
1A53A3F19	DS39	Lamp	Indicates -5000v and +500v power supplies fuse blown.
1A53A3F20	DS38	Lamp	Indicates -5000v and +500v power supplies fuse blown.
1A53A3F21	DS37	Lamp	Indicates -5000v and +500v power supplies fuse blown.
1A53A3F35	DS40	Lamp	Indicates bias power supplies fuse blown.
1A53A3F36	DS41	Lamp	Indicates bias power supplies fuse blown.
1A53A3F37	DS42	Lamp	Indicates bias power supplies fuse blown.
1A53A3F38	DS43	Lamp	Indicates 460v voltage regulator control circuits fuse blown.
1A53A3F39	DS46	Lamp	Indicates 460v voltage regulator control circuits fuse blown.
1A53A3A3F1	DS47	Lamp	Indicates 208v voltage regulator motor circuit fuse blown.
1A53A3A4F1	DS48	Lamp	Indicates 208v voltage regulator control power fuse blown.
1A53A3A4F2	DS49	Lamp	Indicates 208v voltage regulator sensing power fuse blown.

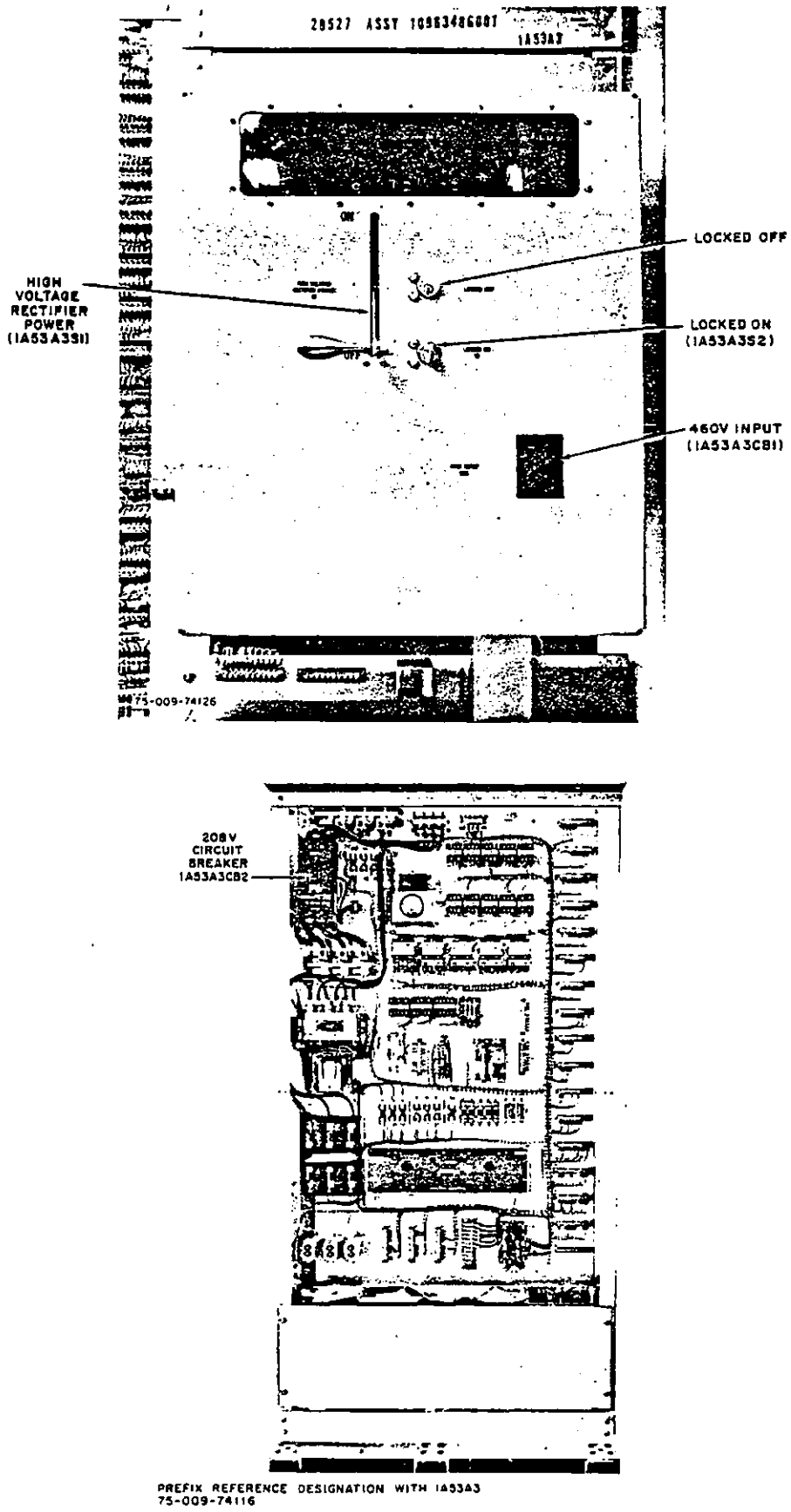

Figure 3-6. P/O Relay Assembly RE-1113/FPN-44A (1A53A3) Controls and Indicators

TABLE 3-6. P/O RELAY ASSEMBLY RE-1113/FPN-44A (1A53A3) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-6)	REFERENCE SYMBOL	TYPE	FUNCTION
HIGH VOLTAGE RECTIFIER POWER S1	S1	Switch	Applies 460 vac, 3-phase power.
LOCKED ON S2	S2	Key operated switch-lock	Provides safety interlocking for 460 vac application.
460V INPUT CB1	CB1	Circuit Breaker	Provides 460 vac, 3-phase application.
1A53A3CB2	CB2	Circuit Breaker	Provides 208 vac, 3-phase application.
LOCKED OFF	None	Key operated lock	Prevents bias and high voltage turn on until access doors on 1A4, 1A6, and right and left partition gates are key locked.

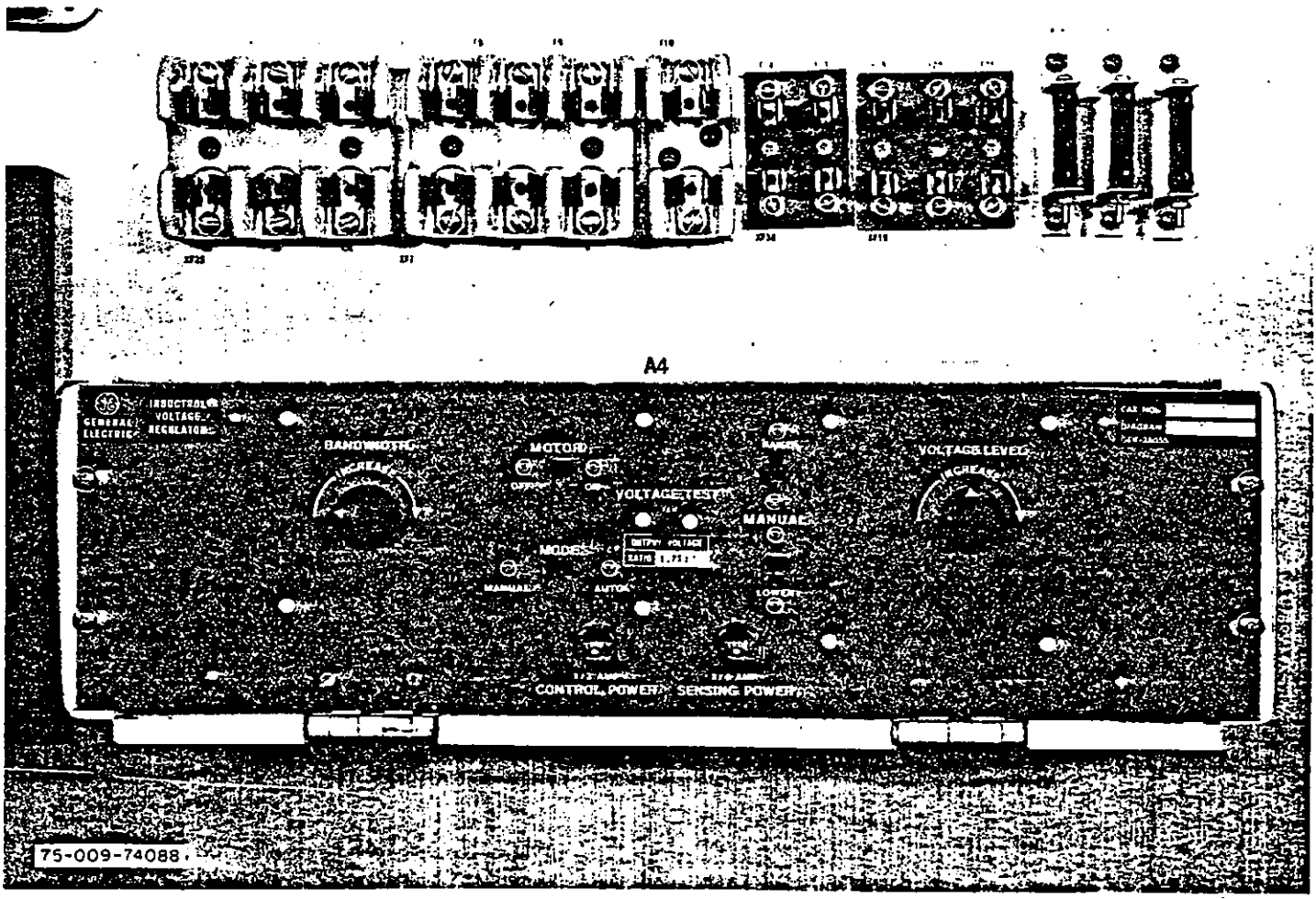

Figure 3-7. P/O Voltage Regulator CN-1472/FPN-44A (1A53A3A4), Controls and Indicators

TABLE 3-7. P/O VOLTAGE REGULATOR CN-1472/FPN-44A (1A53A3A4) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-7)	REFERENCE SYMBOLS	TYPE	FUNCTION
BANDWIDTH	R1	Potenti-ometer	Adjusts deadband range of regulator output.
MOTOR	S4	Switch	Controls power to regulator motor.
MODE	S1	Switch	In MANUAL position, enables manual control of regulator motor and disables automatic circuits. In AUTO position, enables automatic circuits.
VOLTAGE TEST	VTT	Tip Jacks	Provides access to sensing input voltage to automatic mode circuits.
MANUAL RAISE	S3	Switch	When MODE switch is in MANUAL position, enables regulator motor to increase voltage output.
MANUAL LOWER	S2	Switch	When MODE switch is in MANUAL position, enables regulator to decrease voltage output.
VOLTAGE LEVEL	R2	Potenti-ometer	Adjusts voltage level of regulator output.
CONTROL POWER 1/2 AMP	F1	Fuse	Protects reference circuit components.
SENSING POWER 1/4 AMP	F2	Fuse	Protects sense circuit components.

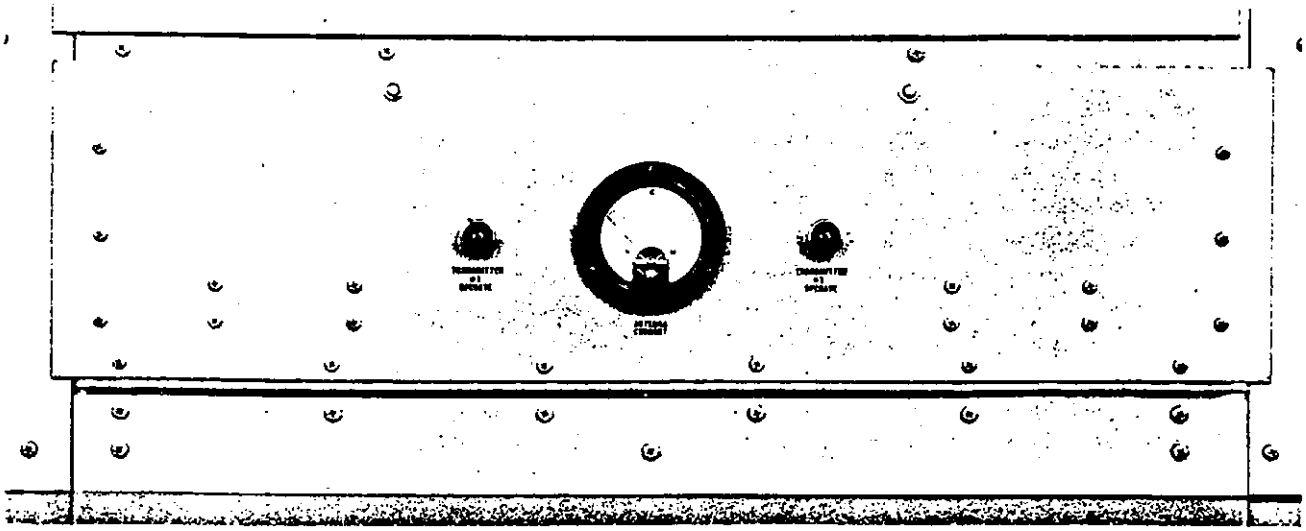

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Figure 3-8. Antenna Coupler CU-2171/FPN-44A (3) Controls and Indicators

TABLE 3-8. ANTENNA COUPLER CU-2171/FPN-44A (3) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-8)	REFERENCE SYMBOL	TYPE	FUNCTION
TRANSMITTER #1 OPERATE	DS1	Lamp	Indicates transmitting group No. 1 is operating into antenna.
ANTENNA CURRENT	M1	Meter	Measures antenna current for operate transmitter group.
TRANSMITTER #2 OPERATE	DS2	Lamp	Indicates transmitting group No. 2 is operating into antenna.

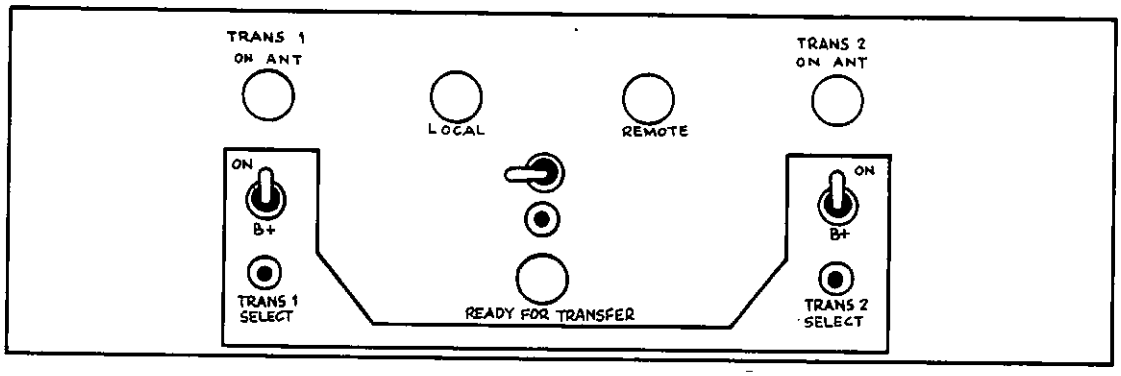

Figure 3-8A. Local Control Unit (5) Controls and Indicators

TABLE 3-8A. LOCAL CONTROL UNIT(5) CONTROLS AND INDICATORS

PANEL MARKING (Figure 3-8A)	REFERENCE SYMBOL	TYPE	FUNCTION
TRANS 1 ON ANT	DS1	Lamp	Indicates transmitter group no. 1 is operating into antenna.
LOCAL	DS2	Lamp	Indicates both transmitter groups are under control of Local Control Unit.
LOCAL-REMOTE	S2	Toggle switch	Selects control of transmitter groups from either Local Control Unit (LOCAL) or remote equipment (REMOTE).
REMOTE	DS3	Lamp	Indicates both transmitter groups are under control of remote equipment.
HOLD DOWN DURING TRANSFER	S5	Push-button switch	Enables continued operation of transmitter when operating LOCAL-REMOTE switch, S2.

TABLE 3-8A. LOCAL CONTROL UNIT(5) CONTROLS AND INDICATORS (Cont)

PANEL MARKING (Figure 3-8A)	REFERENCE SYMBOL	TYPE	FUNCTION
READY FOR TRANSFER	DS5	Lamp	Indicates both transmitter groups are ready for transfer by use of LOCAL-REMOTE switch.
TRANS 2 ON ANT	DS4	Lamp	Indicates transmitter group no. 2 is operating into antenna.
Transmitter 2 B+	S3	Toggle switch	Controls B+ power to transmitter group no. 2.
TRANS 2 SELECT	S6	Push-button switch	When operating in local control. enables switching transmitter group no. 2 to operate status.
TRANS 1 SELECT	S4	Push-button switch	When operating in local control. enables switching transmitter group no. 1 to operate status.
Transmitter 1 B+	S1	Toggle switch	Controls B+ power to transmitter group no. 1.

TABLE 3-9. BEFORE-USE SWITCH POSITIONS

CONTROL	FIGURE	SETTING
All drawers and doors		Closed
HIGH VOLTAGE RECTIFIER POWER S1	3-6	ON
LOCKED ON S2	3-6	LOCKED
1A53A3CB2	3-6	ON
LOCKOUT-READY	3-4	READY
POWER	3-5	OFF
FILAMENTS	3-5	OFF
BIAS AND LOW VOLTAGE	3-5	OFF
PLATE VOLTAGE SELECTOR	3-5	OFF
DESLOT/NON-DESLOT SEL.	3-5	NON-DESLOT

NOTE

On control-indicator (figure 3-5), the following indicators should be lit: IPA, PA and AC OVERLOAD, 208V EMERGENCY STOP POWER, DOOR INTERLOCK, 3 STRIKE, and PLATE TRANSFORMER OVERTEMPERATURE.

On indicator panel (figure 3-4), the WATER LEVEL, OVERLOAD and OVER TEMPERATURE indicators should be lit. On the transmitter group in the operate status, the OPERATE indicator should be lit; on the other transmitter group, the STANDBY indicator should be lit.

On the antenna coupler indicator panel (figure 3-8) the OPERATE indicator for the transmitter group in the operate status should be lit.

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TABLE 3-10. BEFORE-USE SEQUENCE OF OPERATION

STEP	OPERATION	RESULTS
1	Turn AC VOLTAGE SELECTOR switch (figure 3-5) to 208V LINE. In turn, set VOLTAGE PHASE SELECTOR switch to each position.	The 208 vac, 3-phase unregulated voltage is monitored by AC VOLTAGE meter (figure 3-5) for the correct indication.
2	Turn AC VOLTAGE SELECTOR switch (figure 3-5) to 208V REG. In turn, set VOLTAGE PHASE SELECTOR switch to each position.	The 208 vac, 3-phase regulated voltage is monitored by AC VOLTAGE meter (figure 3-5) for the correct indication.
3	Turn METER SELECTOR switch (figure 3-3) on the oscilloscope control to -28V and -12V, in turn.	The -28 vdc and -12 vdc regulated voltages should be monitored by voltmeter of oscilloscope control (figure 3-3).

TABLE 3-11. DURING-USE SEQUENCE OF OPERATION NON-DESLOT

STEP	OPERATION	RESULTS (Operate Status)	RESULTS (Standby Status)
1	Set POWER switch to ON (figure 3-5).	The water pump and blowers should become energized and the following lamps (figure 3-5) should light: AIR ON WATER ON	Same as operate status results
2	Place FILAMENTS switch (figure 3-5) to ON.	All tube filaments should light and FILAMENT HOURS meter (figure 3-5) should become energized. The FILAMENTS READY lamp (figure 3-5) should light after a time delay.	Same as operate status results.
3	Place the BIAS AND LOW VOLTAGE switch (figure 3-5) to ON and METER SELECTOR switch (figure 3-3) to +250V.	The -5KV BIAS and LOW VOLTAGE PLATE voltmeters (figure 3-5) should show an indication. The oscilloscope control voltmeter (figure 3-3) should indicate +250 vdc. The following meters (figure 3-1) should show an indication: LEFT PA BIAS RIGHT PA BIAS LEFT 2ND IPA BIAS RIGHT 2ND IPA BIAS The following lamps should light: BIAS AND LOW VOLTAGE ON (figure 3-5) LEFT PA BIAS UNDER VOLTAGE (figure 3-4) RIGHT PA BIAS UNDER VOLTAGE (figure 3-4)	Same as operate status results.

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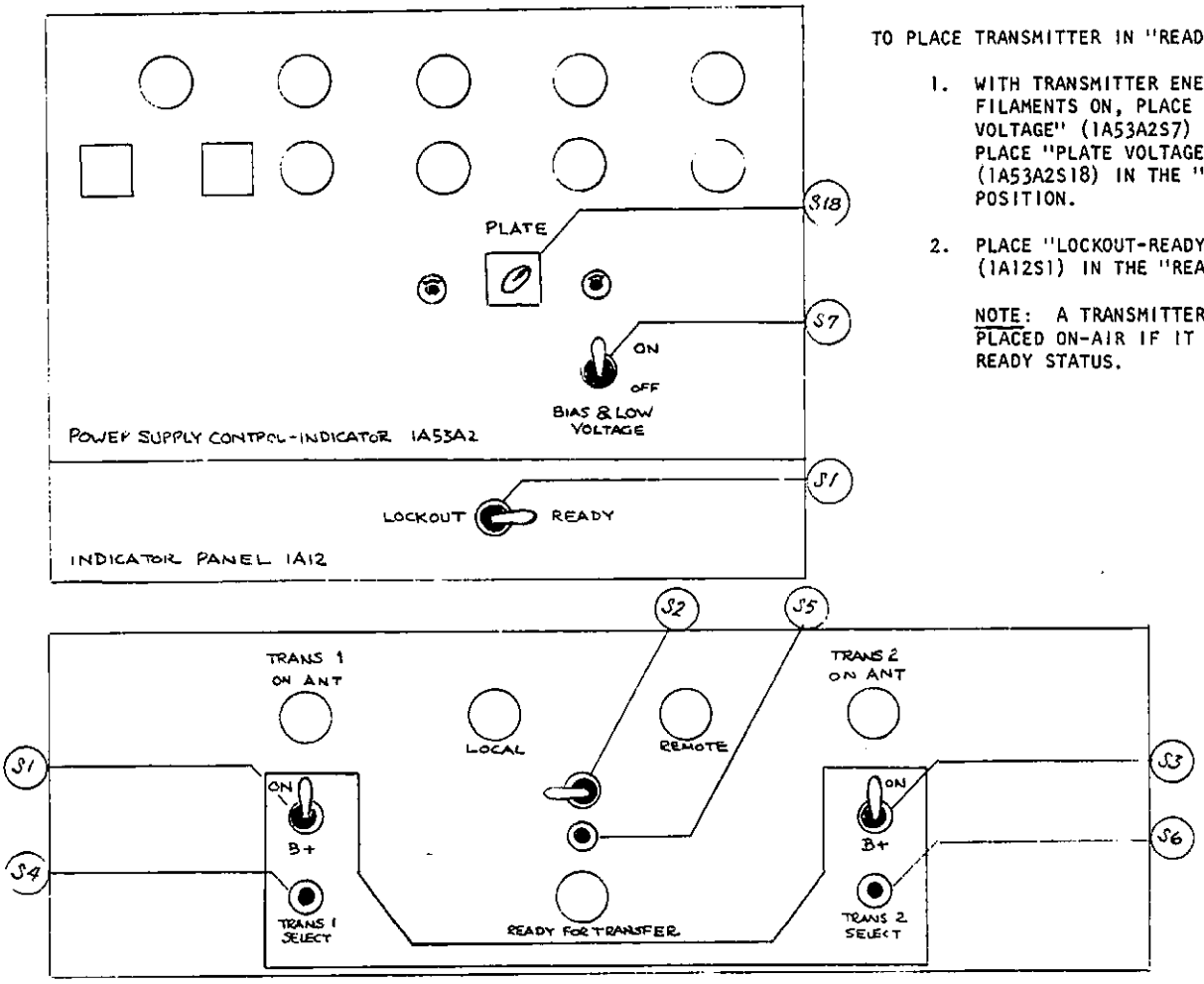
TABLE 3-11. DURING-USE SEQUENCE OF OPERATION (Cont)

STEP	OPERATION	RESULTS (Operate Status)	RESULTS (Standby Status)
4	Place the 460V INPUT CB1 circuit breaker (figure 3-6) to ON.	The 460V EMERGENCY STOP POWER lamp should light.	Same as operate status results.
5	Turn AC VOLTAGE SELECTOR switch (figure 3-5) to 460V LINE and, in turn, set the VOLTAGE PHASE SELECTOR switch (figure 3-5) to each position.	The AC VOLTAGE meter should provide the correct indication at each setting of the VOLTAGE PHASE SELECTOR switch.	The AC VOLTAGE meter should provide the correct indication at each setting of the VOLTAGE PHASE SELECTOR switch.
6	Turn the PLATE VOLTAGE SELECTOR (figure 3-5) to OPERATE	The PLATE ON lamp and the PLATE HOURS meter (figure 3-5) on the operate transmitter should become energized. After a few seconds delay the IPA PLATE VOLTAGE, PA PLATE VOLTAGE, IPA PLATE CURRENT, and PA PLATE CURRENT meters (figure 3-5) gradually increase to within ±15% of normal indication. The 10.75 kv supply voltage is monitored by the IPA PLATE VOLTAGE meter: the 21.5 kv supply voltage is monitored by the PA PLATE VOLTAGE meter. The 10.75 kv plate current is monitored by the IPA PLATE CURRENT meter: the 21.5 kv plate current is monitored by the PA PLATE CURRENT meter. All transmitting set meters should provide typical indications specified by the calibration chart at each station.	No additional voltages or indicator lamps on the transmitter group go on, however the ready circuit in the transmitter control equipment is energized. The IPA PLATE VOLTAGE, PA PLATE VOLTAGE, IPA PLATE CURRENT, and PA PLATE CURRENT meters should indicate zero.



TO PLACE TRANSMITTER IN "READY" STATUS:

1. WITH TRANSMITTER ENERGIZED AND FILAMENTS ON, PLACE "BIAS & LOW VOLTAGE" (1A53A2S7) "ON" AND PLACE "PLATE VOLTAGE" SWITCH (1A53A2S18) IN THE "OPERATE" POSITION.
2. PLACE "LOCKOUT-READY" SWITCH (1A12S1) IN THE "READY" POSITION.

NOTE: A TRANSMITTER CANNOT BE PLACED ON-AIR IF IT IS NOT IN READY STATUS.

TO SWITCH FROM LOCAL TO REMOTE CONTROL:

1. PLACE BOTH TRANSMITTERS IN "READY" STATUS.
2. THE "READY FOR TRANSFER" LAMP (5DS5) SHOULD NOW BE ILLUMINATED.
3. PUSH THE "HOLD DOWN DURING TRANSFER" SWITCH (5S5) AND PLACE THE "LOCAL/REMOTE" SWITCH (5S2) IN THE "REMOTE" POSITION. RELEASE THE "HOLD DOWN DURING TRANSFER" SWITCH.

TO SWITCH FROM REMOTE TO LOCAL CONTROL:

1. PLACE THE "B+" SWITCH (5S1) OR (5S3) FOR THE OPERATE TRANSMITTER IN THE "ON" POSITION.
2. THE "READY FOR TRANSFER" LAMP (5DS5) SHOULD NOW BE ILLUMINATED.
3. PUSH THE "HOLD DOWN DURING TRANSFER" SWITCH (5S5) AND PLACE THE "LOCAL/REMOTE" SWITCH (5S2) IN THE "LOCAL" POSITION. RELEASE THE "HOLD DOWN DURING TRANSFER" SWITCH.

TO SWITCH TRANSMITTERS WHEN OPERATING IN LOCAL CONTROL:

1. PLACE THE "B+" SWITCH (5S1) OR (5S3) FOR THE STANDBY TRANSMITTER IN THE "OFF" (i.e. down) POSITION.
2. PLACE THE "BIAS & LOW VOLTAGE" SWITCH (1A53A2S7) AND THE "PLATE" SWITCH (1A53A2S18) ON THE STANDBY TRANSMITTER IN THE "OPERATE" POSITION.
3. PLACE THE "LOCKOUT-READY" SWITCH (1A12S1) ON THE STANDBY TRANSMITTER IN THE "READY" POSITION.
4. PLACE THE "B+" SWITCH (5S1) OR (5S3) FOR THE OPERATE TRANSMITTER IN THE "OFF" (i.e. down) POSITION. PUSH THE LOCAL CONTROL "OPERATE SELECT" SWITCH (5S4) OR (5S6) FOR THE DESIRED TRANSMITTER. PLACE THE "B+" SWITCH (5S1) OR (5S3) FOR THE NEWLY SELECTED OPERATE TRANSMITTER IN THE "ON" POSITION.

Table 3-11A Local and Remote Operation

TABLE 3-12. FUSE REPLACEMENT DATA

FUSE SYMBOL	RATING AMPERES	RATING VOLTS
Amplifier Group 1A4		
F1	0.20	250 (Slo-Blo)
F2	2	250 (Slo-Blo)
F3	0.20	250 (Slo-Blo)
F4	2	250 (Slo-Blo)
F5	6	250 (Slo-Blo)
F6	6	250 (Slo-Blo)
F7	6	250 (Slo-Blo)
F8	6	250 (Slo-Blo)
F11	7	250 (Slo-Blo)
F12	7	250 (Slo-Blo)
F13	7	250 (Slo-Blo)
F14	7	250 (Slo-Blo)
F15	2	250 (Slo-Blo)
F16	2	250 (Slo-Blo)
F17	1	250 (Slo-Blo)
F18	1	250 (Slo-Blo)
Power Supply 1A4A1		
F1	0.75	250
F2	0.75	250 (Slo-Blo)
F3	0.75	250 (Slo-Blo)
Oscilloscope Control 1A4A3		
F1	0.5	250 (Slo-Blo)
Electrical Equipment Rack 1A11		
F4	15	500
F5	15	500
F6	15	500
F7	15	500 (Slo-Blo)
F8	15	500 (Slo-Blo)
F9	15	500 (Slo-Blo)
F10	80	250
F11	80	250
F12	80	250
F13	15	500 (Slo-Blo)
F14	15	500 (Slo-Blo)
F15	15	500 (Slo-Blo)
F16	25	250 (Slo-Blo)
F17	25	250 (Slo-Blo)
F18	25	250 (Slo-Blo)

FUSE SYMBOL	RATING AMPERES	RATING VOLTS
Electrical Equipment Rack 1A11 (Cont)		
F19	25	250 (Slo-Blo)
F20	25	250 (Slo-Blo)
F21	25	250 (Slo-Blo)
F22	25	250 (Slo-Blo)
F23	25	250 (Slo-Blo)
Relay Assembly 1A53A3		
F1	1.8	600 (Slo-Blo)
F2	1.8	600 (Slo-Blo)
F3	1.8	600 (Slo-Blo)
F4	1.8	600 (Slo-Blo)
F5	1.8	600 (Slo-Blo)
F6	1.8	600 (Slo-Blo)
F7	1.8	600 (Slo-Blo)
F8	1.8	600 (Slo-Blo)
F9	1.8	600 (Slo-Blo)
F10	30.0	250 (Slo-Blo)
F11	80.0	250 (Slo-Blo)
F12	80.0	250 (Slo-Blo)
F13	80.0	250 (Slo-Blo)
F19	8.0	250 (Slo-Blo)
F20	8.0	250 (Slo-Blo)
F21	8.0	250 (Slo-Blo)
F35	20.0	250 (Slo-Blo)
F36	20.0	250 (Slo-Blo)
F37	20.0	250 (Slo-Blo)
F38	2.0	250 (Slo-Blo)
F39	2.0	250 (Slo-Blo)
F40	8.0	250 (Slo-Blo)
F41	1.0	600 (Slo-Blo)
F42	1.0	600 (Slo-Blo)
Fuse Panel 1A53A3A2		
F1	800	500
F2	800	500
F3	800	500
208 V Voltage Regulator 1A53A3A3		
F1	3	250
Regulator Control Panel 1A53A3A4		
F1	.5	250
F2	.25	250

AN/FPN-44/44A LORAN-C TRANSMITTER
DESLOT AND NON-DESLOT OPERATING PROCEDURES

1. When both transmitters are in the DESLOT mode of operation, the Local Control Unit will have its READY FOR TRANSFER indicator, the REMOTE indicator, and either the TRANSMITTER No. 1 ON ANTENNA or TRANSMITTER No. 2 ON ANTENNA indicator lit.

2. If DESLOT mode is the authorized normal operating mode, switch to NON-DESLOT mode on both transmitters when the standby transmitter is run-up into the dummy load for routine maintenance or for taking readings. Once the maintenance is completed, return the selector switches to the DESLOT mode.

3. When performing routine transmitter switches, place both transmitters into the NON-DESLOT mode. The purpose of this is to reduce the amount of time that the station will be off-air during the switch (approximately 15 seconds vs. one-minute. After switching transmitters, return the mode selector to DESLOT, if this is the authorized normal operating mode. Once the previous operate transmitter has been switched to standby status, the transmitter will commence a five-minute cool-down cycle, then secure itself. Once per month a DESLOT transmitter switch shall be performed utilizing the SWITCH TRANSMITTERS switch on the AN/FPN-60 (the purpose of this is to check-out the TAC and DESLOT circuitry for proper operation).

4. During an automatic transmitter switch, when the transmitters are in the DESLOT mode, the following indications will apprear on the Status Alarm Unit (SAU): NO STBY XMTR, XMTR FAIL ON-AIR, and XMTR FAIL OFF-AIR indications will appear for approximately five minutes, until the failed transmitter cools down and then secures itself. If the failure is due to a 3-Strike dropout, the XMTR FAIL ON-AIR and NO STBY XMTR indications will remain. If an automatic switch occurs via operator intervention, the SAU will return to a HAPPY FACE condition only after the five minute cool-down period.

5. When changing from NON-DESLOT to DESLOT mode of operation, proceed as follows:

a. Ensure that the LOCAL CONTROL UNIT is in the LOCAL mode with the standby transmitter B+ switch OFF. Place the BIAS & LOW VOLTAGE, TRANS FIL and the POWER ON/OFF-RESET switches to the OFF position followed by placing the DESLOT/NON-DESLOT switches in the DESLOT position. (Both transmitters) This will permit the normal five minute cool down period.

b. Place the POWER ON/OFF-RESET, FILAMENT, and BIAS/LOW VOLTAGE switches to their ON positions.

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F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

c. With the DOOR INTERLOCK lamp lit and the PLATE VOLTAGE selector switch in the OPERATE position, a READY FOR TRANSFER indication will be displayed on the Local Control Unit as soon as the pumps and blowers stop.

d. The Local Control Unit may be placed in the REMOTE position.

6. When changing from DESLOT to NON-DESLOT mode of operation, proceed as follows:

a. Ensure that the standby transmitter's B+ switch on the Local Control Unit is OFF and place the Local Control Unit in LOCAL Control.

b. Place the BIAS & LOW VOLTAGE, FILAMENTS, and POWER ON/OFF-RESET switches into their OFF positions.

c. Place the DESLOT/NON-DESLOT selector switch in the NON-DESLOT position. (Both transmitters)

d. Run-up or test the transmitter as desired by placing the POWER ON/OFF-RESET, FILAMENTS, BIAS & LOW VOLTAGE switches in their ON positions.

CAUTION

Do not attempt to operate the transmitters in opposite modes while in REMOTE (i.e., one transmitter in DESLOT and the other in NON-DESLOT). Such action will result in a dual transmitter failure should the operate transmitter fail.

7. The following indicators will be illuminated with the transmitter in DESLOT ready remote:

208V EMERGENCY STOP POWER	1A11F4
460V EMERGENCY STOP POWER	1A11F5
DOOR INTERLOCKS	1A11F6
OVER TEMPERATURE PLATE TRANSFORMER	1A11F7
IPA OVERLOAD	1A11F8
PA OVERLOAD	1A11F9
AC OVERLOAD	1A11F10

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3-STRIKE	1A11F11
LEFT 1ST IPA CATHODE OVERLOAD	1A11F12
RIGHT 1ST IPA CATHODE OVERLOAD	
LEFT PA BIAS OVERLOAD	
RIGHT PA BIAS OVERLOAD	
WATER LEVEL	
STANDBY	
PA 1A6 INLET	
PA 1A6 OUTLET	
1A6V1 PA CATHODE	
1A6V2 PA CATHODE	
1A6V3 PA CATHODE	
1A6V4 PA CATHODE	

ERRATA TO:
F.C. NO. 5 TYPE 1 TO AN/FPN-44A LORAN-C TRANSMITTING SET
F.C. NO. 28 TYPE 1 TO AN/FPN-44 LORAN-C TRANSMITTING SET

SECTION 4

PRINCIPLES OF OPERATION

4-1. OVERALL FUNCTIONAL DESCRIPTION.

a. LIMITATIONS. - The functional and operational descriptions presented in this section are limited to the AN/FPN-44A equipment and the interface signals with other equipments of a Loran-C ground station. The overall functional description of Loran-C ground station equipment that includes a Loran Transmitting Set AN/FPN-44A and the fundamental concepts of the Loran system are beyond the scope of this manual.

b. LORAN-C GROUND STATION. - A typical equipment configuration at a Loran-C station, shown in figure 4-1, includes: timing, pulse generation, and transmitter control equipment, Loran Transmitting Set AN/FPN-44A, and an antenna. The Loran Transmitting Set consists of two functionally identical transmitting groups, an antenna coupler and a dummy load. Each transmitting group interfaces with a pulse generator, and both groups interface with a transmitter controller.

Each pulse generator develops a transmitter drive waveform (TDW) from timing signals received from the timer set. The transmitter drive waveform is shaped within the pulse generator to ensure that the radiated Loran-C pulse has proper phase code, balance, and shape characteristics. The operating transmitting group amplifies the TDW and applies the Loran-C pulse to an antenna via the antenna coupler, while the standby transmitting group, is connected to the dummy load.

The transmitter control equipment interface with the Loran Transmitting Set provides for the following functions:

- Selecting a transmitting group as the operating group.

- Monitoring the operational status of both transmitting groups.

- Monitoring the antenna current of the operating transmitting group.

- Shutting down a transmitting group in an emergency.

- Exercising the standby transmitting group into the dummy load.

c. DEFINITIONS. - This paragraph provides the definitions of terms which pertain to the Loran-C system.

(1) AMPLITUDE DROOP. - This is the decrease in the peak voltage over the first eight pulses in the pulse group.

(2) BASIC REPETITION RATE. - This is the approximate rate at which a transmitter is single pulsed or group pulsed.

(3) BLINKING. - This is the method by which the transmitting stations indicate an error in system timing accuracy to system users (vessels, aircraft) and other transmitting stations.

(4) DOUBLE RATING. - A transmitter may be group pulsed or single pulsed at two different repetition intervals simultaneously. Double rating is utilized when it is desired to operate one station in two chains.

(5) CROSS-OVER EFFECT. - This is the disturbance of loran equipment, or a loran pulse, caused by a pulse group of one repetition interval approaching and passing through coincidence with a pulse group of another rate.

(6) GROUP REPETITION INTERVAL (GRI). - This is the basic timing interval in the loran chain. Each signal (M, X, Y and Z) is transmitted once each interval from the corresponding transmitter. The timing relationships of transmitting equipments are such that the master (M) signal is transmitted first, and the slave signals follow at fixed intervals in the cycle in the order X, Y, and Z.

(7) LORAN-C CHAIN. - This is a group of three or more Loran-C transmitting stations having a common timing reference.

(8) LORAN-C PULSE GROUP. - This group consists of eight phase-coded pulses (nine for a master station) transmitted by a Loran-C station.

(9) LORAN PAIR. - The M-X, M-Y, and M-Z signal combinations each comprise a loran pair. Time-difference measurements are made between the signals of any pair or all three pairs.

(10) MASTER STATION (M). - This station is one of the group of Loran-C transmitting stations operating on a predetermined pulse repetition interval. It precisely maintains its assigned repetition interval and carrier frequency.

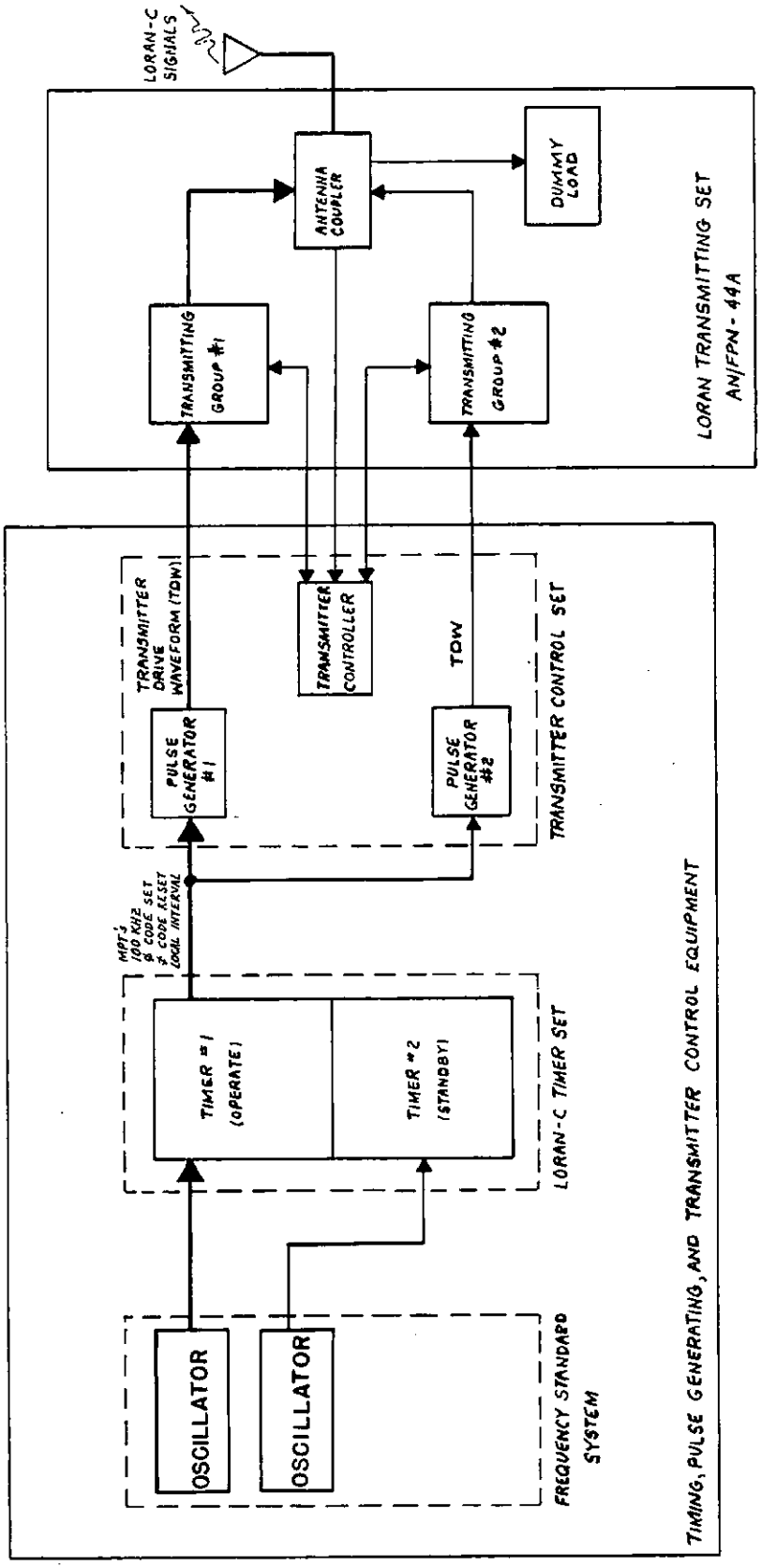


Figure 4-1. Loran C Transmitting Station Equipment Configuration

(11) SECONDARY STATIONS (X, Y, Z). - These stations are the Loran-C stations whose transmissions, when individually paired with the transmission of the master station, constitute a Loran-C pair. Each secondary station maintains an accurate fixed time delay between the master station transmissions and transmission of its own signal.

(12) PHASE COHERENCE. - A loran signal is phase-coherent when its rf cycles have a direct, fixed relationship to the pulsed envelope. Similarly, two 100 kHz cw signals are phase-coherent if they are maintanined at a desired phase relationship with respect to each other.

(13) PULSE BEGINNING. - The point at which the amplitude of the rf signal reaches one-half of one percent of the peak amplitude of the pulse is considered the pulse beginning.

(14) STANDARD SAMPLING POINT. - All measurements in the Loran-C system are referred to a standard sampling point. It is defined as being the point 25 microseconds after the beginning of the pulse.

(15) STANDBY TRANSMITTER. - Normally, two transmitter groups are provided at the master and each slave station. The transmitter group not operating is termed the standby transmitter.

4-2. FUNCTIONAL DESCRIPTION.

a. LORAN TRANSMITTING SET AN/FPN-44A. - The basic function of the Loran Transmitting Set (figure 4-2) is to amplify transmitter drive waveform (loran-C pulse) signals from the transmitter control equipment and couple the amplified signals to an antenna. The loran transmitting set consists of two functionally identical Transmitting Groups OT-96/FPN-44A, an Antenna Coupler CU-2171/FPN-44A, and an Electrical Dummy Load DA-329A/FPN-44. Since both transmitting groups are functionally identical, only one is shown in figure 4-2. Each transmitting group includes the following equipment: Amplifier Group OG-159/FPN-44A (1A4), Radio Frequency Amplifier AM-3774/FPN-44 (1A5 through 1A10), Electrical Equipment Rack MT-2929/FPN-44 (1A11), Indicator Panel SB-1894A/FPN-44 (1A12), Low Pass Filter F-1428/FPN-44A (1A20), Electron Tube Liquid Cooler HD-601/FPN(1A2), and Power Supply Set OP-109/FPN-44A (1A53).

The Loran Transmitting Set receives transmitter drive waveforms (loran-C pulses), trigger signals, and control signals from transmitter control equipment. The station provides 460 vac, three phase, 50/60 Hz and 208 vac, three phase, four wire, 50/60 Hz power to operate the Loran Transmitting Set. In addition, 120 vac, single phase, 50/60 Hz power is supplied for lighting and convenience outlets. The loran transmitting set supplies the transmitter control equipment with four equipment status indications and an antenna current indication. The transmitter control equipment control signals perform the following functions:

- Select one of the two transmitting groups as the operating group and the other as the standby group.

- Test the standby transmitting group using the dummy load.

- Shut down either transmitting group completely.

The four status signals sent to the transmitter control equipment from each transmitting group indicate the following conditions:

- The cooling system is operating properly; that is, the cooling equipment motors have been turned on, inlet and outlet water temperatures of PA cooling system are within limits, the water in cooling system tank is at proper level.

- The filaments are heated, bias and low voltages are normal, and transmitting group is under remote control.

- Filaments are heated, bias voltages are normal, and the 460-V voltage regulator has been turned on. The transmitting group is either under local or remote control.

- Plate voltages are at their proper operating levels.

In normal operation, a transmitting set operates with one transmitting group on the air and the other group in standby mode. The transmitting group selected as the operate group performs as follows: The Loran-C pulses are connected to two dual pentode voltage amplifier stages by the operation of a voltage sensing and signal control relays. The voltage sensing relay connects the input pulses to the amplifier only if the high voltages are near proper operating levels. The signal control relay selects a fixed level input. A gain balance control provides for balancing the input signal between the voltage amplifiers. The outputs of the voltage amplifiers are applied to the first intermediate power amplifier (IPA). The second IPA is a dc coupled cathode follower which drives the power amplifier (PA) grids. The PA employs water cooled type F1086 triodes. The PA plates connect to the PA tank (1A5) which provides transformer coupling to the antenna circuit. A low pass filter (1A20) in the circuit suppresses unwanted harmonics. Transfer relays in the antenna coupler switch the output of the operate transmitting group to the antenna and the output of the standby transmitting group to the dummy load. The antenna coupler houses the loading coil which resonates the antenna.

The standby transmitting group can operate in three modes: standby, standby test and local. The standby mode is the normal operating condition. In this mode, cooling, filament, and bias power is applied and the Loran-C pulse inputs are terminated. In the standby test mode all power is applied and the Loran-C pulse inputs are connected to the voltage amplifiers. However, unlike the operate mode, the PA output is connected to the dummy load. In the local mode, control is passed from the transmitter control equipment to the local controls.

~~CHANGE 2~~

F.C. NO 5/28 changes made by Field Change No. 3. "NOTE: NOT corrected to indicate See Supplement to Technical Manual for LORAN Transmitting Sets AN/FPN-44A, AN/FPN-44 and AN/FPN-45."

The PA output is also connected to the dummy load in the local mode.

Ancillary circuits in the loran transmitting set include the following:

- Regulated high voltage power supply.

- Standby transmitting group testing using the dummy load.

- Regulated filament and bias supplies.

- A water cooling system for the PA tubes.

- An oscilloscope control unit which can be switched to monitor waveforms in the transmitting group. Associated switching circuits can select individual pulses or an entire pulse-group for examination.

- A system of control circuits to ensure application and removal of voltages in proper sequence to prevent damage to the vacuum tubes.

- A system of control circuits to prevent component damage by removing power in the event of an overload.

- A system of interlocks to protect operating personnel from contact with high voltages.

b. POWER SUPPLY SET OP-109 FPN-44A (1A53). -

(1) PURPOSE. - Power supply set 1A53 (figure 4-3) provides the following voltages:

- Regulated 21.5 kvdc for power amplifier tubes.

- Regulated 10.75 kvdc for first and second intermediate power amplifiers.

- Regulated -5 kvdc for bias in second intermediate power amplifier.

- Regulated 500 volts dc for screen grid voltage in amplifier group 1A4 and for the 250-volt regulator (1A4A1A1).

- Regulated 208 vac for filaments and PA bias power supply.

(2) POWER SUPPLY ASSEMBLIES - The power supply set consists of assemblies and subassemblies. Table 4-1 identifies these assemblies and subassemblies and defines their functions.

(3) OVERALL DESCRIPTION. - The power supply set, controlled by internal and external signals, supplies regulated and unregulated power to operate a transmitting group. Figure 4-3 shows the functional relationship between the various assemblies of the power supply set as well as its interface with the other assemblies of a loran transmitting set and the remote transmitter control equipment.

External and internal control of the power supply set is determined by the status inputs from the cooling system, interlock, voltage and current sensing circuits; mode signals; emergency stop and switch settings. The sensing circuit inputs provide personnel and equipment protection. The mode signals select one of the transmitting groups as the operate group. The local-remote input determines the control point for the plate power supply (local control at the transmitter or remote from the transmitter control equipment). Control logic sequentially enables the distribution of power to the control circuits, cooling system motors, filaments, bias, and plates.

Power supply set sequential operation is as follows:

- Circuit breaker control applies 208 vac, 3 phase, 60 Hz station power to the 208 vac voltage regulator and to control circuits including antenna - dummy load switching.

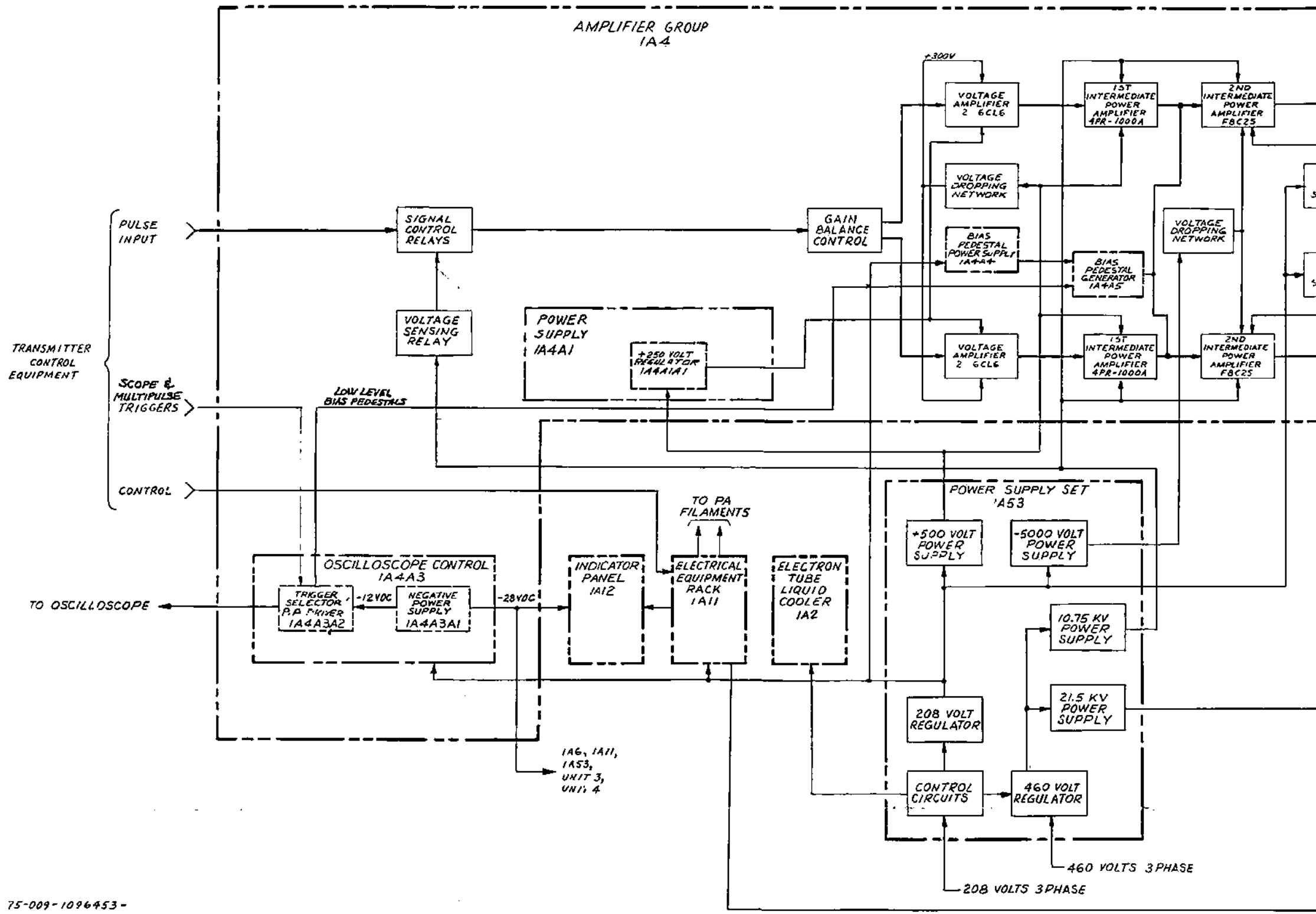
- Control logic to motor control circuits enables the distribution of unregulated 208 vac, 3-phase power to cooling system motors.

- Control logic enables regulated 208 vac, 3 phase power to filament transformers in radio frequency amplifier 1A6 and amplifier group 1A4.

- Control logic enables regulated 208 vac, 3-phase power to bias power supplies in 1A53A6 and amplifier group 1A4 when interlock switches are closed. The bias power supplies provide -5 kvdc and 500 vdc to amplifier group 1A4 circuits. The regulated 208 vac, 3 phase power to 1A4 supplies power to PA bias power supplies. A resistor assembly (1A53A23) acts as a bleeder for the -5 kvdc and 500 vdc supplies.

- When the 460 vac circuit breaker is closed, control logic enables the operation of 460 vac voltage regulator which supplies phase angle control of the ac voltage to the primary of the high voltage transformer (1A53A6T1). The high voltage power supplies provide 21.5 kv and 10.75 kv to the power amplifier tubes and IPA's. Resistor assemblies (1A53A19 and 1A53A20) discharge the high voltage circuits when bias voltages are off. Voltage divider (1A53A7) supplies a sample of the high voltage as a regulator control voltage.

4-2A NOTE THE STANDBY TRANSMITTER IN THE STANDBY MODE MAY HAVE COOLING, FILAMENT AND BIAS POWER APPLIED OR BE ESSENTIALLY DE-ENERGIZED DEPENDING ON THE POSITION OF THE "DESLOT/NON-DESLOT SELECTOR SWITCH 1A53A2S20



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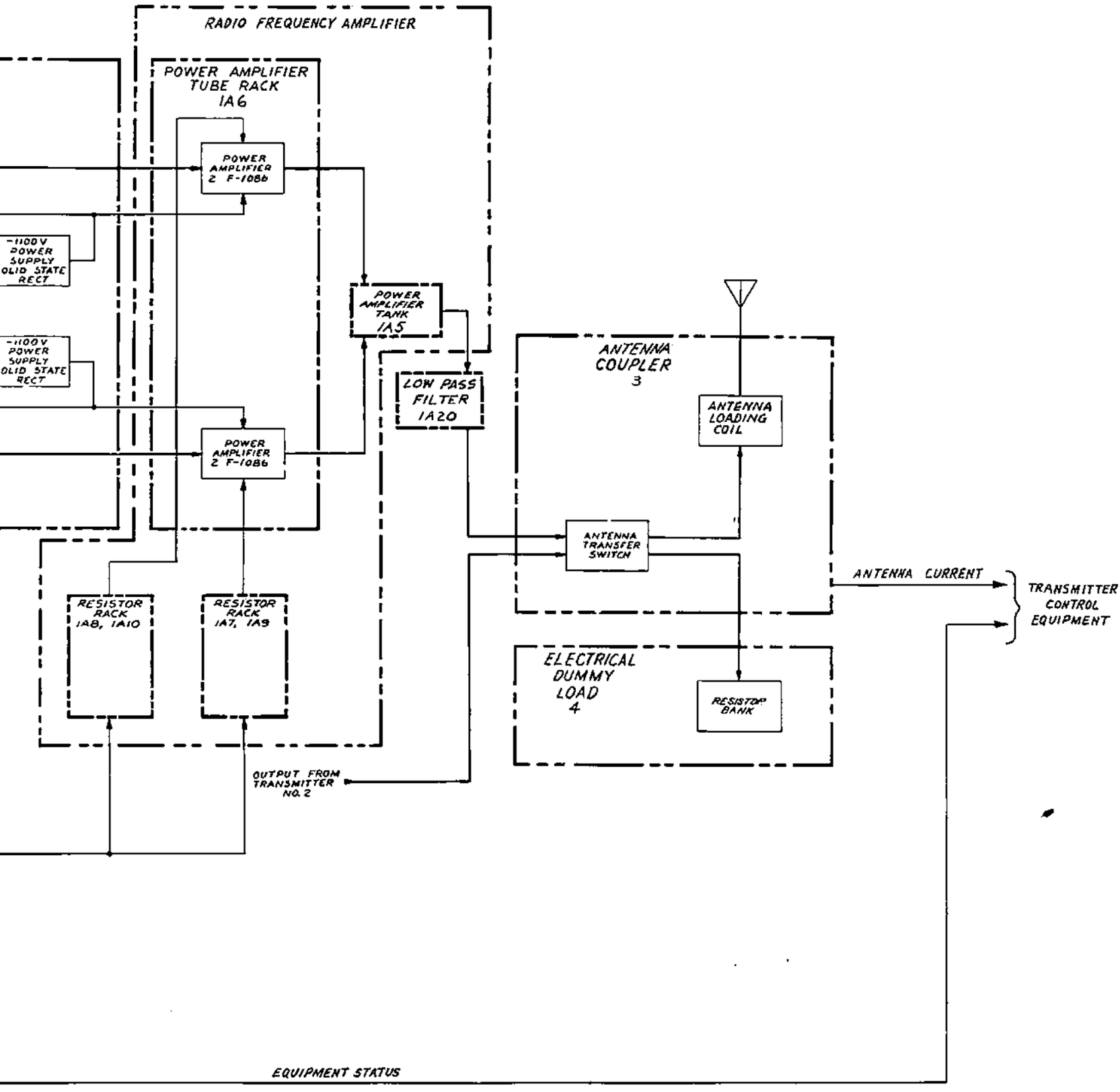

Figure 4-2. Loran Transmitting Set AN/FPN-44 Block Diagram

NOTE:
NOT CORRECTED TO INDICATE CHANGES MADE BY FIELD CHANGES 3 AND 4

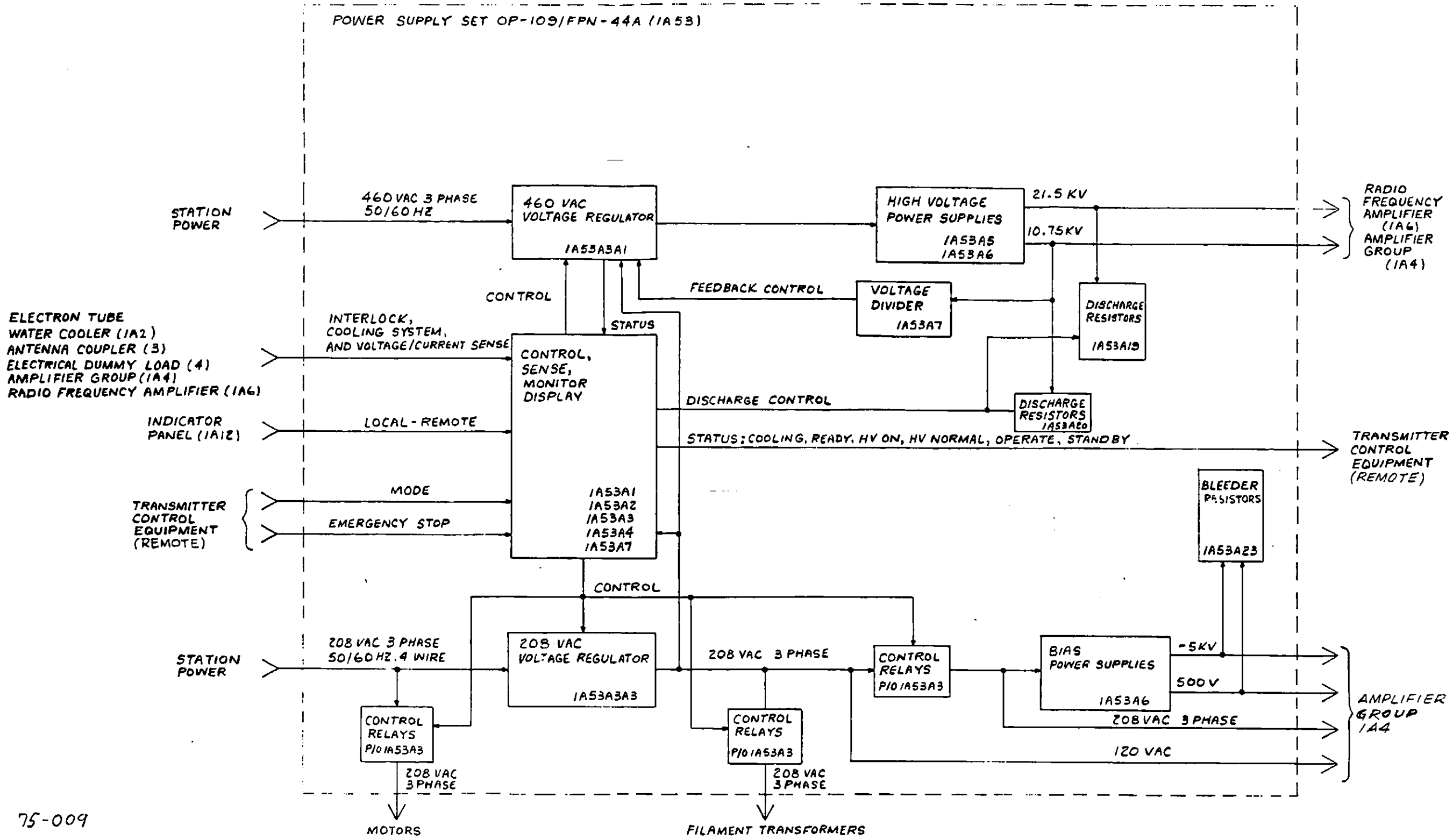

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Figure 4-3. Power Supply Set OP-109/FPN-44A(1A53) Simplified Functional Block Diagram

TABLE 4-1. POWER SUPPLY SET OP-109/FPN-44A (1A53) FUNCTIONS

REF. DES.	NOMENCLATURE	FUNCTION
1A53A1	Relay Assembly RE-1112/FPN-44A	Discharges 21.5 kv and 10.75 kv circuits when bias and low voltage voltages are off.
1A53A2	Control-Indicator C-10034/FPN-44A	Controls and monitors ac input, 21.5 kv, 10.75 kv, -5 kv, 500 v, emergency stop, three strike, overload, overtemperature, filament circuits. Provides fuse status indicators for power supply set units.
1A53A3	Relay Assembly RE-1113/FPN-44A	Controls 208 vac and 460 vac. Using relay logic, controls operation of loran transmitting set, with inputs from sensing circuits, manual controls, and remote transmitter control equipment circuits.
1A53A3A1	Voltage Regulator CN-1473/FPN-44A	Regulates 460 vac for 21.5 kv and 10.75 kv circuits.
1A53A3A2	Fuse Panel	Mounts fuses for 1A53A3A1
1A53A3A3 1A53A3A4	Voltage Regulator CN-1472/FPN-44A	Regulates 208 vac
1A53A4	Instrument Shunt MX-9783/FPN-44A	Senses 21.5 kv and 10.75 kv overloads. Samples 21.5 kv and 10.75 kv circuit currents for meters.
1A53A5 1A53A6 1A53A19 1A53A20 1A53A23	Power Supply PP-7305/FPN-44A	Supplies 21.5 kv, 10.75 kv, -5 kv, 500 v power. Provides discharge and bleeder resistors for power supplies.
1A53A7	Voltage Divider CN-1474/FPN-44A	Samples 21.5 kv and 10.75 kv voltages for meters. Senses 21.5 kv overvoltage. Senses -5 kv circuit voltage to enable high voltage turn on. Provides control voltage to 460 vac voltage regulator.

c. ANTENNA COUPLER CU-2171/FPN-44A(3) AND ELECTRICAL DUMMY LOAD DA-329A/FPN-44(4) - The antenna coupler receives the high level output of both transmitting groups, couples the operating transmitting group to the antenna, and the standby transmitting group to a tuned resistive load in the dummy load.

The following functions occur within the antenna coupler:

- Vacuum relays interchange the transmitter outputs between antenna and dummy load in accordance with the transmitting group selection command from the transmitter control equipment.

- An rf current transformer provides for monitoring antenna current.

- An rf current transformer provides for remote monitoring of the standby transmitting group.

- A front panel meter indicates the rms antenna current.

- Front panel indicator lamps denote which transmitting group is connected to the antenna.

- Interlock circuits prevent application of power in the event doors are opened.

The following functions occur within the dummy load:

- Forced-air-cooled resistors dissipate the rf power.

- A high power rf capacitor and inductor series-resonates the transmitter output reactance.

- Remote-controlled motor starters apply forced air when plate voltage is switched on for standby transmitting group.

- Interlock circuits prevent application of power in the event of air-failure or open doors.

4-3. CIRCUIT DESCRIPTION.

a. GENERAL. - This section describes the Loran Transmitting Set circuits. The descriptions reference functional block diagrams, timing diagrams, simplified schematics, and detailed schematics. The detailed schematic diagrams are contained in Section 6.

b. AMPLIFIER GROUP OG-159/FPN-44A AND RADIO FREQUENCY AMPLIFIER AM-3774/FPN-44. Amplifier group 1A4 (figure 6-33) provides voltage amplification of the input signal for excitation of the power amplifier tubes. Circuits are included for monitoring, coordination of the signal level with plate voltage control sequence and biasing provisions to prevent pulse ringing at the final output. The amplifier group, in addition to the components mounted on its frame, consists of power supply 1A4A1 (which includes a + 250 vdc regulator 1A4A1A1), oscilloscope control 1A4A3 (which includes trigger selector 1A4A3A2 and negative power supply 1A4A3A1), bias pedestal generator 1A4A5, and bias pedestal power supply 1A4A4.

The Radio Frequency Amplifier AM-3774/FPN-44 (figure 6-41) consists of the following units: power amplifier tank (1A5), power amplifier tube rack (1A6) and four resistor racks (1A7 through 1A10).

(1) MAIN FRAME CIRCUITS. -

(a) GENERAL. - The intermediate power amplifiers increase the signal level to provide excitation of the proper level for the power amplifiers. To obtain the voltage swing required by the power amplifiers, amplifier group 1A4 is connected as a two-stage push-pull voltage amplifier and an output cathode follower.

The input pulse signal from the transmitter control equipment, connected at connector CP1, is applied to an impedance-matching phase splitting transformer T12. The transformer output provides two signals equal in amplitude, but 180 degrees out-of-phase which drive the push-pull system.

The amplified outputs from the first IPA stages are then fed to the second IPA stages which provide power amplification to drive the transmission lines between amplifier-oscillator group 1A4 and the rf amplifier.

(b) PHASE SPLITTER CIRCUIT. - The phase splitter circuit and its associated controls include transformer 1A4T12, relays 1A4K9 through 1A4K12, STANDBY LEVEL control ~~1A4R212~~, and 1A4A1R1 GAIN BALANCE control 1A4R217. The input signal to the phase splitting transformer 1A4T12 is received from the transmitter control equipment. The equal in amplitude but 180-degrees out-of-phase transformer output is connected to the voltage amplifier circuits if relay 1A4K10 is not energized. ~~Relay 1A4K10 is not energized when the high voltage is at the proper operating level as sensed by relay 1A4K11 which enables relay 1A4K12 which disables relay 1A4K10. When relay 1A4K10 is energized, the input signal is terminated and the inputs to the voltage amplifiers are grounded.~~ Relay K10 is ~~also~~ energized when the QUIESCENT METER switch 1A4S2 is turned to either the RIGHT or LEFT position. Relay 1A4K9, which is energized in the local (maintenance) mode, provides for varying the input level by adjusting 1A4R212. GAIN BALANCE control 1A4R217 equalizes the inputs to the voltage amplifier stage.

(c) VOLTAGE AMPLIFIER CIRCUITS. - The voltage amplifier stage amplifies the outputs from the phase splitter to the level required by the first IPA. The tubes in each push-pull channel are connected in parallel pairs for lower output impedance and therefore, less loss of high-frequency response due to the input capacitance of the next stage shunting this output impedance.

(d) FIRST INTERMEDIATE POWER AMPLIFIER. - The first IPA is a tuned tetrode amplifier furnishing the principal signal voltage gain in the loran transmitting set. The plate circuit consists of transformer 1A4T11, tuned by the series combination of the output capacitors of 1A4V7 and 1A4V8, the input capacitors of 1A4V9 and 1A4V10, and the series combinations of capacitors 1A4C36 through 1A4C47. The bandwidth of the plate circuit is established by resistive loading consisting of resistors 1A4R34 through 1A4R63 in series.

The stage operates in push-pull Class B in which the plate current of both tubes in the absence of signals is biased near cut off. Negative signal swing at either grid cuts the tube completely off, while positive signal swing at the opposite grid causes an increase in plate current. This produces an increased voltage drop across the load, and thereby produces an output. A positive grid voltage swing, therefore, produces a negative half-cycle of plate voltage swing.

The first IPA is capacitively coupled to the second IPA, which also operates Class B. Therefore, the negative going plate swing of each first IPA is not directly amplified. It is, however, inverted in polarity by T11 which produces a positive swing at the opposite plate. This positive voltage is the effective signal applied to the grid of the following stage.

As the first IPA is a tetrode, protective facilities have been provided to prevent the screen grids from exceeding their rated dissipation. This condition can occur when the plate voltage is too low, as happens when power supply set 1A53 begins its slow start. Relay 1A4K3 delays the application of screen voltage until the plate voltage has increased to an adequate level. Resistor 1A4R66 serves as a screen grid leak to keep the screen at ground potential before voltage is applied. Resistor 1A4R105 and capacitor 1A4C35 perform the dual function of ripple filter and pulse-current energy source for the screen circuit.

(e) SECOND INTERMEDIATE POWER AMPLIFIER. - One stage of dc coupled current amplification is provided in the form of a dc coupled cathode follower to drive the next stage which is the final power amplifier.

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The signal applied to the second IPA grid does not exceed the bias, so no grid current flows in this stage. Class B biasing produces a half-wave rectified cathode-current waveform. This current flows in the grid-cathode resistor and develops a positive-going voltage on the cathode and on the succeeding grid. When the resistor voltage drop exceeds the PA bias, grid current flows, so that the second IPA cathode current thus divides between the resistor and the PA grid.

The peak signal currents represented by the arrows in figure 4-4 are far beyond the peak current capability of the dc power supplies. The second IPA plate bypass and PA grid bypass capacitors are the energy storage sources for the heavy grid cathode circuit currents. Between loran pulses, the plate bypass is recharged by the series combination of the 10.75 kv supply and the PA bias supply. The PA grid bypass recharges from the PA bias supply alone. As this recharge cannot fully take place between pulses, the droop in voltage at these capacitors during the pulse group may be overcome by increased drive from pulse-to-pulse which is produced by droop compensation in the driver equipment.

(f) BIAS PEDESTAL GENERATOR 1A4A5. - Bias pedestal generator 1A4A5 (figure 6-40) and its associated power supply (1A4A4) are located in amplifier group 1A4.

The purpose of the bias pedestal generator is to bias the 2nd IPA and PA tubes into Class B operation during the pulse and to shorten the rf output pulse of the transmitter by reducing "ringing" of the transmitter power amplifier output circuit.

Positive-going 350 microsecond pedestals from 1A4A3A2 are applied at the input of the Bias Pedestal Generator. The input signal is phase inverted by class A amplifier V1 and applied as a negative pulse to normally heavily conducting power amplifier V2. The output of V2 is a positive pulse that overcomes the blocking bias applied to power output amplifier V3, driving it into heavy conduction. The heavy V3 cathode current through the primary of output transformer T1 generates a high positive voltage pulse at the secondary of T1. Diodes CR1 through CR5, capicitor C7, resistors R23 and R24, and variable resistor 1A4A5R32 form a positive clipping network that maintains a constant output voltage level of pedestal pulses. Diodes CR6 through CR10, capacitors C8 and C9, and variable resistor 1A4A5R31 clip the negative output voltage that is developed across the secondary of transformer T1 when the positive driving pulse applied to power amplifier V3 ends. Variable resistors 1A4A5R31 and 1A4A5R32 permit adjustment of the clipping level, while variable resistor 1A4A5R14 provides adjustment for bias pedestal amplitude. The positive bias pedestal pulse is applied to the grids of second IPA tubes 1A4V9 and 1A4V10 via capacitors 1A4C51 and 1A4C54 and the series connected resistors 1A4R34 through 1A4R63; this reduces the second IPA tube fixed bias for the duration of the bias pedestal pulse. Cathode follower action of the second IPA tubes applies the bias pedestal voltage and superimposed rf pulse to the grids of power amplifier tubes 1A6V1 through 1A6V4. The bias pedestal causes the power amplifier tubes to draw additional dc plate current, thus lowering their plate resistance; this plate resistance is effectively across the power amplifier output tank circuit and the resultant damping action reduces "ringing" in the circuit. The bias pedestals also reduce the droop of the rf output pulse groups.

(g) BIAS PEDESTAL POWER SUPPLY 1A4A4 (See figure 6-39). - A single-phase bridge rectifier and a single-section choke input filter provide +350 volts dc for use as plate voltage on the output tube of bias pedestal generator 1A4A5. Step-up transformer T1 supplies the bridge rectifier CR1 through CR4. The filter, comprising L1, C6, and C7, reduces ripple to an acceptable level. Bleeder resistor R2 provides a fairly heavy constant load to maintain good regulation for wide ranges of pedestal loads. Filament voltage for the bias pedestal generator tubes is provided by step-down transformer T2.

(2) POWER SUPPLY PP-7304/FPN-44A. - Power connector 1A4A1J1, blown fuse indicators, coaxial connectors 1A4A1J3 and 1A4A1J4, and coaxial cable termination resistors 1A4A1R1 and 1A4A1R2 are mounted on power supply 1A4A1 (figure 6-34). The power connector connects 208 vac regulated and +500 vdc from the main chassis of the amplifier group to the +250 volt regulator 1A4A1A1, and +250 vdc from the regulator to amplifier group main chassis. The coaxial connectors connect the antenna current sample from rf current transformer 1T1 to the oscilloscope control 1A4A3 and to coaxial connector 1A4J14.

(a) +250 VOLT REGULATOR 1A4A1A1. - The +250 volt regulator (figure 6-35) supplies +250 vdc regulated to electron tube circuits in the low-level amplifiers in amplifier group 1A4.

The input to the regulator is +500 vdc from the primary power supply. The +250 vdc output is controlled such that any variation of input voltage or changes in load within the specified limits of these devices does not change the output value of +250 vdc. The regulator operates on the principle of an automatic variable voltage divider. Tubes V1, V2, and V3 function as controlled variable resistive impedances.

The circuit is initially adjusted to give +250 vdc across the specified load. If for any reason the voltage of +250 vdc should increase, the impedance of tubes V1, V2, and V3 also increases, causing the voltage drop across them to equal the increase in voltage. Thus, the voltage available for the load remains at +250 vdc.

If the output voltage should tend to decrease, the impedance across these tubes also decreases, maintaining the correct voltage across the external load. Tube V4 is the voltage sensing element in the regulator. Should the output fall below +250 vdc, the voltage across voltage divider R25, R26, and R27 decreases. A proportional voltage decrease is

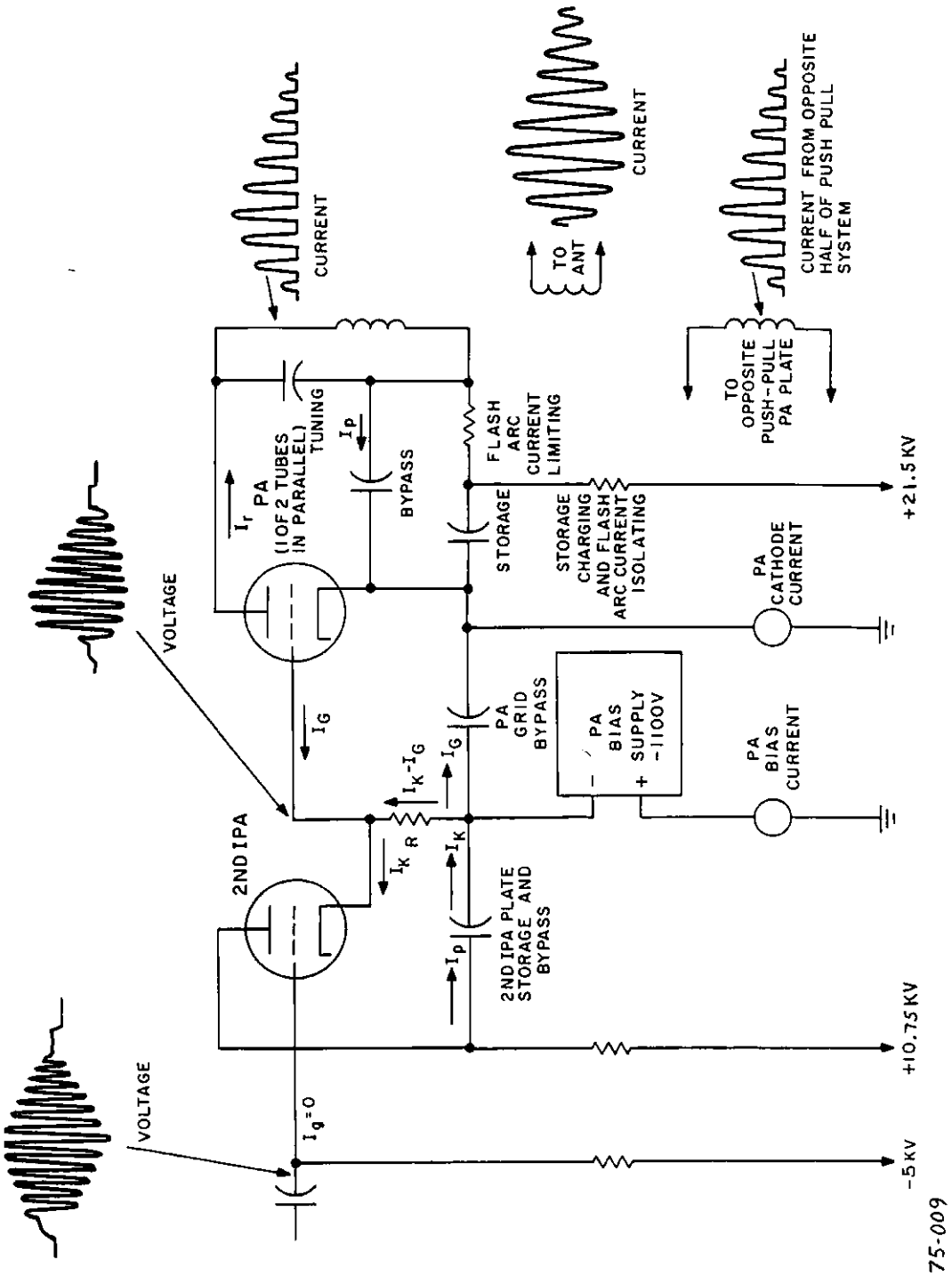


Figure 4-4. Amplifier Group, 2nd IPA and Radio Frequency Amplifier PA Stages, One-Half of Push-Pull Circuit, Simplified Schematic Diagram

obtained at the arm of potentiometer R26 which is connected to the cathode (pin 3) of V4.

Since the grid (pin 2) of V4 is held at a constant voltage by voltage reference tube V5, the grid-to-cathode voltage becomes less negative causing the current to increase and the plate voltage (pin 1) to fall. This voltage decrease is coupled to the grid (pin 7) of V4, causing the plate current to decrease and the plate voltage (pin 6) to rise. This rise is coupled to the grids of V1, V2, and V3 through grid resistors R6 and R11, R16 and R22, and R23 and R29, respectively. This increase of grid voltage lowers their cathode-to-plate impedance. Therefore, the voltage drop across these tubes decreases, raising the output voltage level to +250 vdc.

The reverse procedure occurs when the load voltage increases. Diode 1A4A1A1CR1 is a protective device limiting the positive grid bias that can be applied to tubes V1, V2, and V3. Should the voltage at the plate (pin 6) of V4 attempt to rise higher than the voltage at the bottom of R12, CR1 would conduct and clamp pin 6 to R12. This would limit the grid bias of tubes V1, V2, and V3 to the voltage drop across cathode resistor R12. Since voltage reference tubes are noisy devices, a noise suppression filter consisting of resistors R17, R19 and capacitor C3 is inserted between voltage reference tube V5 and the grid (pin 2) of V4. Resistor R19 and capacitor C3 act as an RC filter which attenuates frequencies at terminal 3. Resistor R17 serves as a parasitic suppressor. To ensure that the maximum filament-to-cathode voltage rating is not exceeded on V1 through V4, a bias voltage from the voltage divider consisting of resistors R2 and R3 is applied to the center tap of filament transformer T1.

(3) OSCILLOSCOPE CONTROL C-4558A/FPN-44. - Oscilloscope control 1A4A3 (figure 6-36) allows for selection of pulses in different parts of the transmitting set for examination on an external oscilloscope. The control circuits also contain the selector switch and voltmeter which permits measurements of the output voltage of the +250, -12, and -28 vdc power supplies. Also contained in the oscilloscope control are negative power supply 1A4A3A1 (figure 6-37), which supplies -12 and -28 vdc to control circuits in amplifier group 1A4, PA tube rack 1A6, indicator panel 1A12, electron tube liquid cooler 1A2, power supply set 1A53, antenna coupler (Unit 3) electrical dummy load (Unit 4), and local control unit (Unit 5).

METER SELECTOR switch 1A4A3S2 provides for connecting voltmeter 1A4A3M1 to the +250, -12, and -28 vdc power supplies. Since one meter movement is used to measure these three voltages, three external multiplier resistors are provided, the proper value for each scale selected.

MONITORED CIRCUIT switch 1A4A3S1 is an 11-position wafer switch and connects the oscilloscope to the desired circuit for observation. Resistor 1A4A3R4 provides the required termination impedance for the external oscilloscope.

(a) TRIGGER SELECTOR/BIAS PEDESTAL DRIVER 1A4A3A2. - Oscilloscope triggers that permit observation of any loran pulse are provided by this assembly. Oscilloscope triggers are selected by means of SCOPE TRIGGER MODE selector switch 1A4A3S4 and SCOPE TRIGGER PULSE SELECTOR switch 1A4A3S3. The mode selector switch permits individual examination of either the A phase code groups, the B groups, or both, superimposed. The pulse selector switch permits observation of any one of the nine pulses without a delayed oscilloscope.

The 1A4A3A2 printed circuit card also contains the circuitry which develops the rectangular drive pulse for the Bias Pedestal Generator (Unit 1A4A5). The Bias Pedestal Interval circuitry is not used in the AN/FPN-44A transmitter. Although the printed circuit card is not field repairable, the theory of operation is presented below.

The circuitry of 1A4A3A2 is divided into three main functions (Refer to figure 6-38). These functions are:

- trigger splitter
- bias pedestal driver
- trigger selector

The input signal to the TS/BPD board is the sum of Early Trigger (ET) and Multipulse Triggers (MPT) developed in the timing equipment. ETs and MPTs are multiplexed by applying inopposite phase to each other and appear at the transmitter on a balanced 95-ohm transmission line.

The trigger splitter separates the multiplexed input triggers and develops four output signals, each 5 microseconds wide. These outputs are shown on figure 6-38 as ET, MPT and their complements, $\overline{ET}$ and $\overline{MPT}$. A fifth output of the trigger splitter is a 300 microsecond MPT pulse to the unused Bias Pedestal Interval circuit.

The purpose of the Trigger Selector circuit is to develop a 70 microsecond oscilloscope trigger pulse for use in transmitter testing. Inputs to the C-SEL-1 circuit are ET, MPT and $\overline{ET}$. When the MODE switch, 1A4A3S4, is in the NORMAL position, every 70 microsecond pulse from the one-shot multivibrator, U14, will appear at the output. When in either A or B position, every other 70 microsecond trigger will appear due to the J-K Flip-Flop, U2 and gate, U7.

The one-shot is driven by the decoder-driver, U13. The decoder state is determined by the PULSE SELECTOR switch, 1A4A3S3, which is a Nines Complement Binary Coded Decimal switch. The following table shows the state of the four input lines from the switch for various positions.

1A4A3S3 position	"8" Pin 31	"4" Pin 35	"2" Pin 44	"1" Pin 61
0	HI	LO	LO	HI
1	HI	LO	LO	LO
2	LO	HI	HI	HI
3	LO	HI	HI	LO
4	LO	HI	LO	HI
5	LO	HI	LO	LO
6	LO	LO	HI	HI
7	LO	LO	HI	LO
8	LO	LO	LO	HI
9	LO	LO	LO	LO

HI = 0 VDC
LO = -12 VDC

The ET is applied at the input of a 50 microsecond one-shot, pin 6 of U14. The 50 microsecond gate is combined with the inputs from the PULSE SELECTOR switch and applied to the decoder-driver.

When 1A4A3S3 is in the "0" position, the ET is fed to the 70 microsecond one-shot. When in any other position, the appropriate MPT causes an output from the decoder-driver.

The "0" position is generally used for viewing the entire pulse group, while the other positions are for viewing specific pulses. At secondary stations, there is no oscilloscope trigger when 1A4A3S3 is in position "9".

Inputs to the Bias Pedestal Driver (BPD) circuit are MPT and $\overline{\text{MPT}}$. The $\overline{\text{MPT}}$ input sets flip-flop, U1, and resets flip-flop, U2. The $\overline{Q}$ output of U1 is applied to the input of a Schmidt trigger, U3, configured as an oscillator. When the oscillations start, the gate at the input of counter U4 is enabled. The counter is controlled by the position of S1, a hexidecimal (16 position) switch located on the 1A4A3A2 printed circuit card. MPT is applied to the counter through the switch to preset the count. When S1 is in the "0" position, the minimum delay of 20 microseconds will occur. Each step of the switch increases the delayed output of U4 by an increment of ten microseconds. The maximum delay is 170 microseconds = 20 microseconds + 10 X fifteen. Figure 5-5 shows the timing relationships.

The output of U4 is applied at the input of a one-shot multivibrator, U9, which develops a rectangular output pulse of 350 microseconds duration as determined by C8 and R14. The trailing edge resets the input flip-flop, U1, for the next input $\overline{\text{MPT}}$ pulse.

As shown in Figure 5-5. the delay switch S1, is adjusted to position the bias pedestal drive so that it precedes the drive signal.

(b) NEGATIVE POWER SUPPLY 1A4A3A1. - The 120-vac input (figure 6-37) is applied through step-down transformer T1 to a full-wave bridge rectifier consisting of diodes CR1 through CR4. The full-wave rectified output from this bridge is filtered by swinging choke L1 and capacitors C1, C2, C3, connected in parallel. The -28 vdc output from the filter is applied across a voltage divider consisting of resistor R1 and Zener diode CR5. Diode CR5 clamps its voltage drop at 12 volts. Therefore, the output voltage taken at the junction of R1 and CR1 is -12 vdc. This voltage is applied as element voltages for plug-in modules of trigger selector 1A4A3A2. The -28 vdc is distributed to relay circuits in 1A4, 1A12, 1A52, 1A53, Unit 3 and Unit 4.

(4) POWER AMPLIFIER. - The PA stage (figures 4-4 and 6-41) is a push-pull parallel triode amplifier operating Class B. The tubes are biased below cutoff until the bias pedestals occur. The amplitude of the bias pedestals is adjusted to raise the biasing level from below cutoff to the proper operating point. Positive-going grid voltage pulses produce plate-current pulses which flow to the plates through the tuned PA tank circuit. Tight coupling from each side of the push-pull plate circuit to the output, results in the two "half-wave rectified" currents, combining to form the desired symmetrical carrier.

The PA plate-bypass capacitor is the energy source for each individual half-wave pulse of 100-kHz plate current. It recharges from the storage capacitors on opposite half cycles through the flash-arc current limiter resistor. The storage capacitor recharges between pulse groups.

The PA tank circuit is divided into separate LC sections for each tube. The series-parallel combination of all the PA tuning capacitors, together with the series-parallel combination of all the PA primary coil sections resonates at 100 kHz. These sections and the associated bypass and storage capacitors are insulated from each other for the full dc plate voltage. By this technique, the flash-arc energy to be dissipated in a single tube is limited to that available from one pair of storage capacitors. The destructive power of the arc is thereby substantially limited.

(5) PROTECTIVE CIRCUITS IN THE POWER AMPLIFIERS. - Several stages in the AN/FPN-44 operate with plate potentials in the range of ten thousand to twenty thousand volts. At these voltages, a short-circuit in the form of an arc may be momentarily applied between the plate and all other electrodes. This arc maintains itself until the plate voltage is removed. This phenomenon requires the use of several equipment protective devices.

First of all, the tube itself must be protected from the burning damage of the arc. This is accomplished by limiting the short-circuit current into the tube, and providing a dissipation point for the short-circuit energy that would otherwise be dissipated at the tube electrodes. See figure 4-6, which illustrates a typical circuit configuration involved in the flash-arc

problem. Tracing the circuit from the arc back along the plate and filament leads, it is seen that the plate-bypass and storage capacitors are the original sources of energy to the arc. After these capacitors discharge, the plate power-supply furnishes energy up to its short-circuit capacity. The current-limiting resistor provides the necessary dissipation until the cathode overload relay can cause the removal of high voltage.

At the initial instant of the arc, the current inrush is limited to the plate voltage divided by the relatively low-value of current limiting resistance and wiring inductance. The current value can be several thousand amperes, with a very steep wavefront. Under these conditions, the small inductances of the circuit wiring can be subject to several thousand volts for a few microseconds, so that inadequate insulation can be punctured. The filament transformer leads can be particularly vulnerable to this type of damage. Varistors (thyrite discs) are provided, therefore, from each filament lead to ground. These devices decrease in resistance rapidly as the voltage across them is increased. The device selected for the PA filament circuits limits the surge to about 50 volts when the peak short-circuit current of the storage capacitor is flowing to ground.

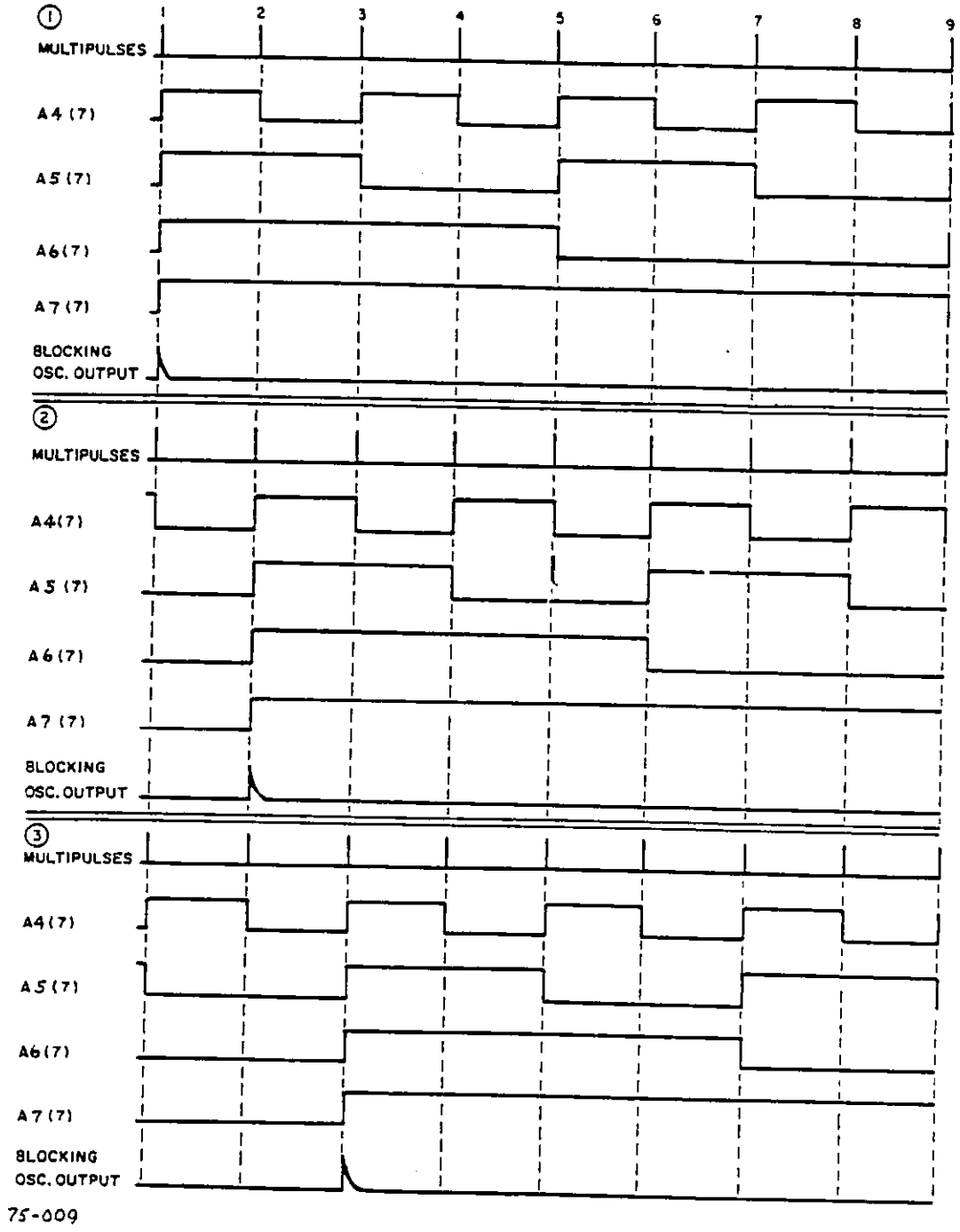


Figure 4-5. Trigger Selector Flip-Flop Counter Circuit Waveshape Timing Diagram (Sheet 1 of 3)

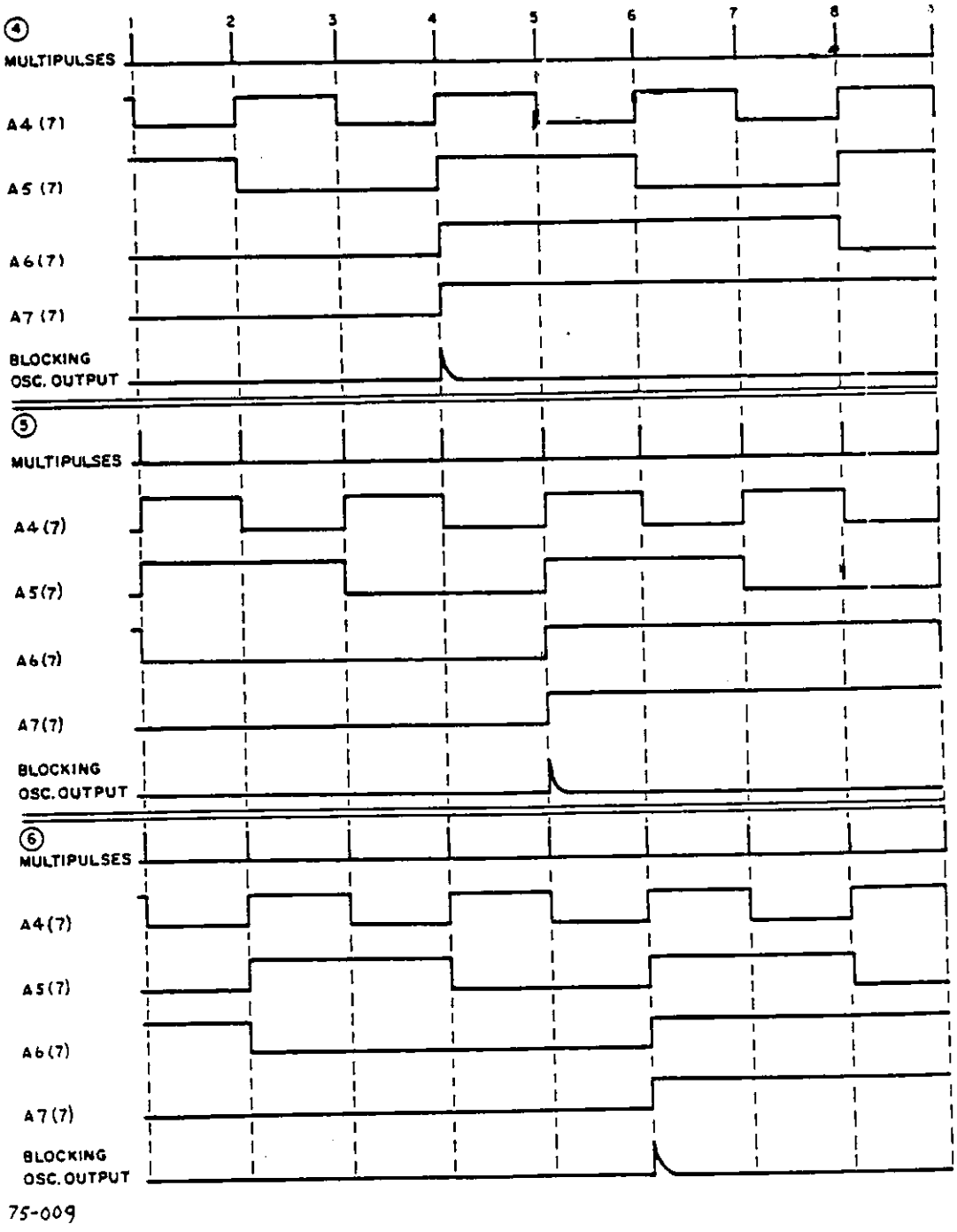


Figure 4-5. Trigger Selector Flip-Flop Counter Circuit Waveshape Timing Diagram (Sheet 2 of 3)

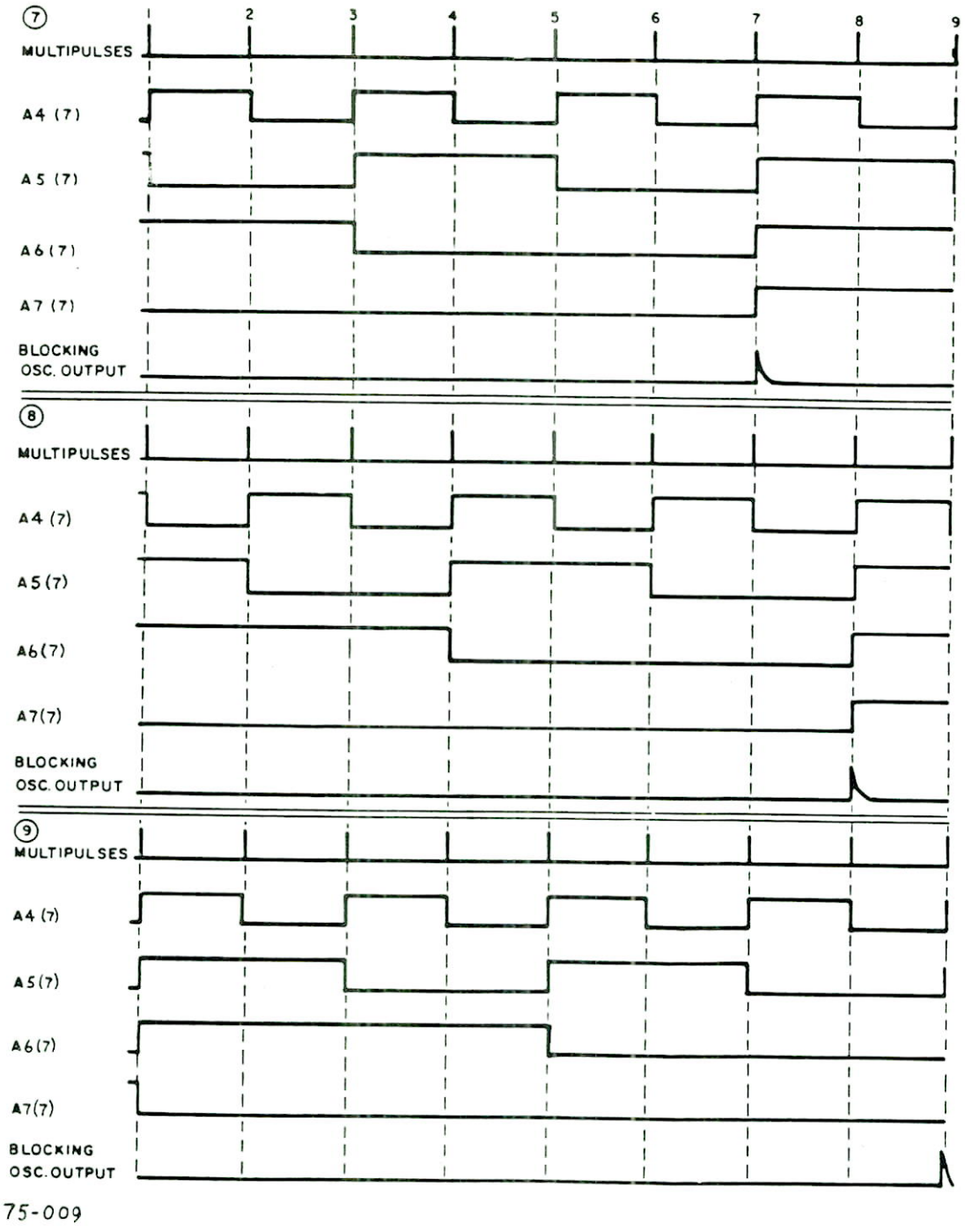


Figure 4-5. Trigger Selector Flip-Flop Counter Circuit Waveshape Timing Diagram (Sheet 3 of 3)

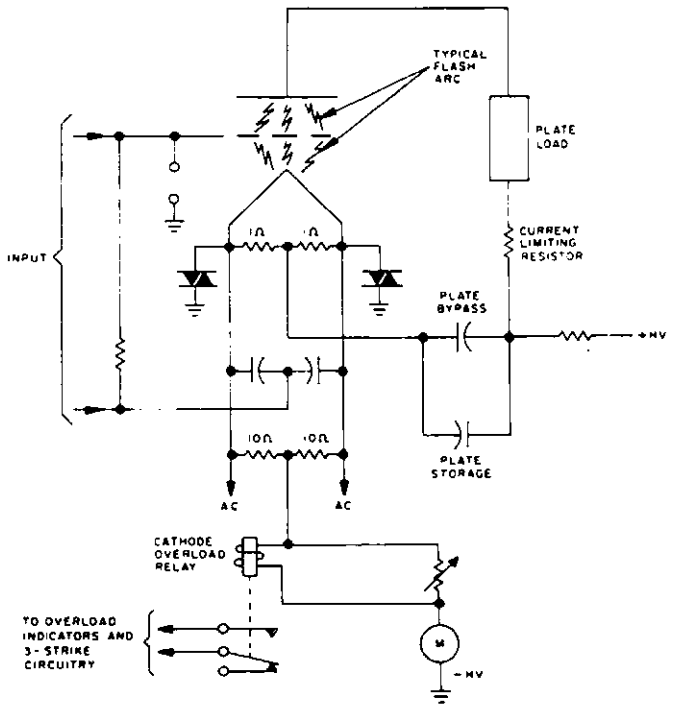


Figure 4-6. Power Amplifier Typical Grid-Cathode Protective Circuits, Simplified Schematic Diagram

The flash arc to the grid can cause this electrode to approach the plate voltage, so a ball gap is provided to limit this transient to slightly more than the grid-bias-plus-peak-signal voltage normally present. Varistors cannot be used in this application due to their inability to attain the relative change in resistance required in this high-voltage circuit. For this same reason the cathode circuits of the cathode follower stages must also be protected with ball gaps.

While ball gaps and varistors can short circuit the transient surges to the surrounding chassis structure, the fault currents still flow in these structures. A separate ground-lead is provided from each major frame in the transmitter. A single ground point is provided in the overall housing so that no fault currents flow in this enclosure to cause large voltage drops along the external surfaces. This phenomenon would otherwise be a serious personnel-safety hazard.

(6) BIAS POWER SUPPLIES. - PA bias is supplied from variable output power supplies in amplifier group 1A4. Separate supplies are provided for opposite sides of the push-pull circuit to facilitate balancing adjustments. Figure 4-7 is a simplified schematic diagram of a left PA bias supply which is identical with the right PA bias supply. Variable primary voltage to the rectifier transformer is provided by a buck-boost transformer operating from a variable autotransformer. A solid-state single-phase bridge rectifier is used, with a choke input filter. The filter capacitors serve the additional function of PA grid bypass (see figure 4-4) and are physically located in the PA tube rack. Relays are included to open the plate interlocks in the event of bias undervoltage and to trip the 3-strike overload system, removing all rectifier primary power in the event of bias overcurrent. Relay 1A4K8 shorts out overcurrent sensing relay 1A4K5 on initial high voltage turn on.

Flash arcs in the large amplifier tubes can apply high transient voltages to the bias supplies. Resistors in series with the diodes limit the current peaks. Varistors discs across the filter choke and overload relay protect these devices from overvoltage.

c. ELECTRICAL EQUIPMENT RACK MT-2929/FPN-44 (1A11). - This rack (figure 6-42) which consists of three relay contactors, fuses, terminal boards, and coaxial terminations, performs the following functions:

- Distributes fused unregulated 208 vac 3-phase power to the enclosure blower motor 1B1, amplifier group blower motor 1A4B1, and electron tube liquid cooler pump motor (1A52B1) when the three relay contactors are simultaneously energized by system control.

- Distributes fused unregulated 208 vac 3-phase power to the electrical dummy load motor relay-contactors (4K1 and 4K2).

- Distributes fused regulated 208 vac 3-phase power to the filament transformers of the PA (1A6).

- Distributes regulated 208 vac 3-phase power to the filament transformers of amplifier group (1A4).

- Provides interface connections between a transmitter group, the Local Control Unit, and remote transmitter control equipment. It receives from the control equipment: Operate/standby and B-Plus command, Emergency Stop command, and triggers. It transmits status information to remote equipment.

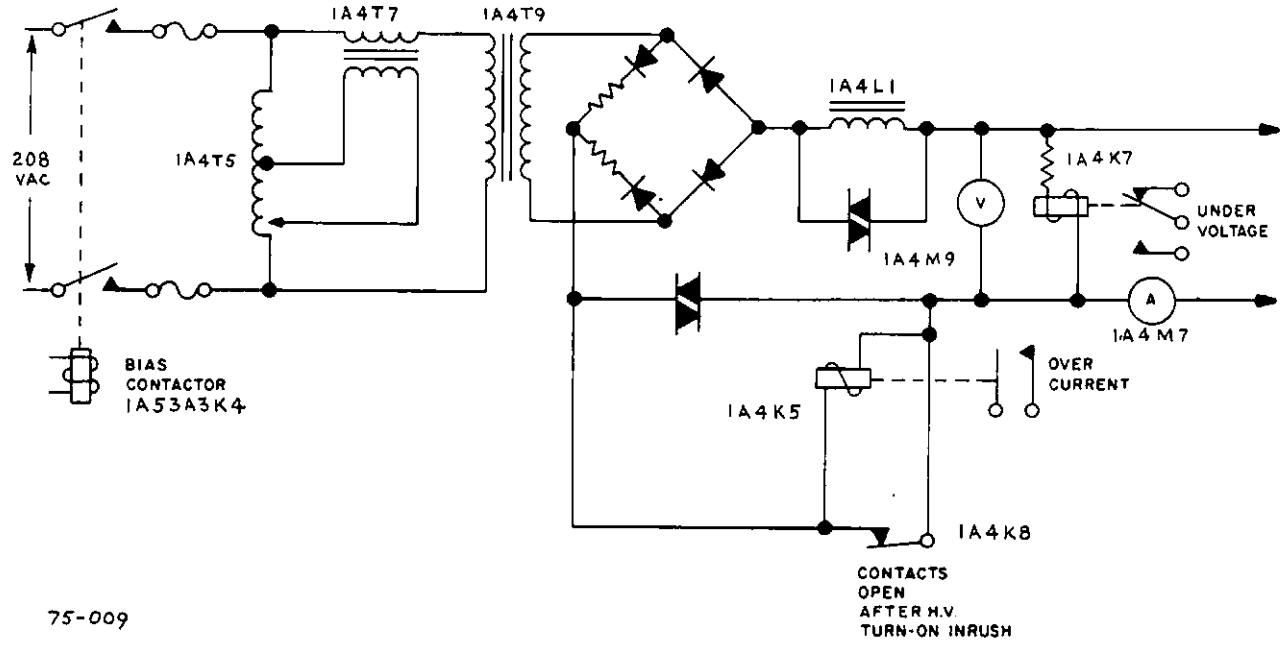


Figure 4-7. Left PA Bias Supply, Simplified Schematic Diagram

d. INDICATOR PANEL SB-1894A/FPN-44 (1A12). - This panel (figure 6-43) consists of a switch, indicator lamps, relays, and fuse indicator circuits. The functions of these circuits are as follows:

- The switch (LOCKOUT-READY) circuit selects the operating mode of the Transmitter Group. In normal operation, the switch is set to READY; for test or maintenance the switch may be placed in LOCKOUT which disables all controls external to the transmitter, and prevents operation on the antenna.

- The indicator lamps circuits include relays. These circuits are operated by relays and switches in the amplifier group (1A4), radio frequency amplifier (1A6) and electron tube water cooler (1A2).

- The fuse indicator circuits provide visual indications of blown fuses in the electrical equipment rack (1A11).

- The relay circuits (part of the system control logic) control filament turn-on, three strike, and emergency stop functions.

e. LOW PASS FILTER F-1428/FPN-44A (1A20). - The low pass filter (figure 6-44) tuned to 100 KHz suppresses all harmonics of this frequency. The input circuit consists of the secondary of the PA tank coil and 1A20L1, 1A20L2, 1A20C1, and 1A20C2. The output circuit consists of the antenna coupler coil 3L1, and the antenna. The low pass input and output circuits are tuned to 100-KHz and together comprise a band-pass filter which suppresses harmonics of 100 KHz.

f. ANTENNA COUPLER CU-2171/FPN-44A. - The antenna coupler (figure 6-60) switches the output of the operate transmitting group to the antenna and the output of the standby transmitting group to the dummy load. It also provides for tuning the antenna to each transmitting group.

The operational status of both transmitting groups is determined by the position of the transmitter control equipment. The TRANSMITTER #1 OPERATE lamp 3DS1 and TRANSMITTER #2 OPERATE lamp 3DS2 indicate the resultant status.

(1) TRANSMITTER OPERATE CONTROL. - Transmitter operate relay 3K5 or 3K7 is energized by the transmitter control equipment selector. When transmitting group No. 1 is selected, relay 3K5 is energized which, in turn, energizes relays 3K1 and 3K2. When these relays are energized, the following actions occur: The output signal from transmitting group No. 1 is connected to loading coil 3L1. The output signal from transmitting group No. 2 is connected to the dummy load. The ground circuit of transmitting group No. 1 is connected to the counterpoise, and the ground circuit from transmitting group No. 2 is connected to the dummy load. Also, TRANSMITTER #1 OPERATE lamp 3DS1 lights.

When transmitting group no. 2 is selected, relay 3K5 is de-energized and causes relays 3K1, 3K2, and 3K6 to de-energize. Relay 3K7 energizes which, in turn, energizes relays 3K10, and 3K11 and an opposite condition exists.

(2) ANTENNA SHORTING. - Antenna shorting relay 3K6, when not energized, connects the antenna to the grounded counterpoise. This relay is energized by closure of antenna coupler relays for the operate transmitting group; 3K5 and 3K1 for transmitting group No. 1 or 3K7 and 3K11 for transmitting group No. 2. Furthermore, the PLATE VOLTAGE SELECTOR must be set at MAINT or OPERATE for relay 3K6 to be energized. Auxiliary contacts on relay 3K6 prevent application of plate voltages in the operate transmitting group until the antenna ground has been opened by this relay.

(3) VACUUM RELAYS. - The large vacuum relays, 3K1, 3K2, 3K10, 3K11 and 3K6, are ac operated to the extent that the outputs of built-in semiconductor bridge rectifiers energize the solenoids. This feature provides reliable operation over a wide control-voltage frequency range. These rectifiers are physically located within the relay coil housings.

g. ELECTRICAL DUMMY LOAD DA-329A/FPN-44. - The dummy load (figure 6-61) provides the load for the standby transmitting group. The dummy load consists of non-inductive resistors, a coil and capacitor. The resistive load 2.5 ohms, consists of an assembly of thirty-six 2.5 ohm resistors connected in series parallel. A current transformer is provided in the ground return line for remote monitoring. Blower 4B1 is turned on when the plate voltage is on in the standby transmitting group to increase the power dissipation capability of the resistor bank.

h. POWER SUPPLY SET OP-109/FPN-44A (1A53). - The power supply set (1A53) consists of the following units identified by nomenclature and reference designation:

- Relay Assembly RE-1112/FPN-44A (1A53A1)
- Control-Indicator C-10034/FPN-44A (1A53A2)
- Relay Assembly RE-1113/FPN-44A (1A53A3)
- Voltage Regulator CN-1473/FPN-44A (1A53A3A1 and 1A53A3A2)
- Voltage Regulator CN-1472/FPN-44A (1A53A3A3 and 1A53A3A4)
- Instrument Shunt MX-9783/FPN-44A (1A53A4)
- Power Supply PP-7305/FPN-44A (1A53A5 and 1A53A6)
- Voltage Divider CN-1474/FPN-44A (1A53A7)
- Resistor Assembly (1A53A19)
- Resistor Assembly (1A53A20)
- Resistor Assembly (1A53A23)

These assemblies supply, control, and monitor:

- Unregulated 208 vac to blower and water pump motors 1B1, 1A4B1, 4B1, and 1A52B1.
- Regulated 208 vac to filament transformers in amplifier group 1A4 and radio frequency amplifier 1A6.
- Regulated 208 vac to -1100 vdc and bias pedestal power supplies in amplifier group 1A4.
- Regulated 21.5 ± 1 per cent kvdc to PA plate circuits.
- Regulated 10.75 ± 1 per cent kvdc to IPA plate circuits.
- Regulated -5 kvdc to second IPA bias circuits.
- Regulated 500 vdc to plate circuits of voltage amplifiers in amplifier group 1A4.
- Regulated 120 vac to transmitter control circuits.

Figure 4-8 shows the functional relationship between the various assemblies and components of the power supply set. The inputs include: 208 vac three phase 50/60 Hz 4 wire; 460 vac three phase 50/60 Hz and control signals from the remote transmitter control equipment and from other assemblies of the associated transmitting group. The outputs include not only the regulated and unregulated power listed previously but also transmitter control signals.

(1) 208 VAC CIRCUITS. - Primary 208 vac power is applied to the voltage regulator (1A53A3A3 and 1A53A3A4) via a circuit breaker. The LOCK-OUT-READY switch on indicator panel (1A12), water switches in electron tube water cooler (1A2) and radio frequency amplifier (1A6), door and interlock switches, and control-indicator (1A53A2) switches are inputs to the 208 vac transmitter control circuits that enable the sequential distribution of power to the motors, filament, and bias power supplies. Distribution of motor and filament power is controlled by contactors in the electrical equipment rack (1A11). The -5000 vdc and 500 vdc power supplies, part of the 1A53A6 assembly include a step up transformer, rectifier, and filters. Voltage divider networks in 1A53A7 supply sample voltages to meter circuits on 1A53A2. A -120 vdc power supply powers the three strike circuit, part of the transmitter control circuits.

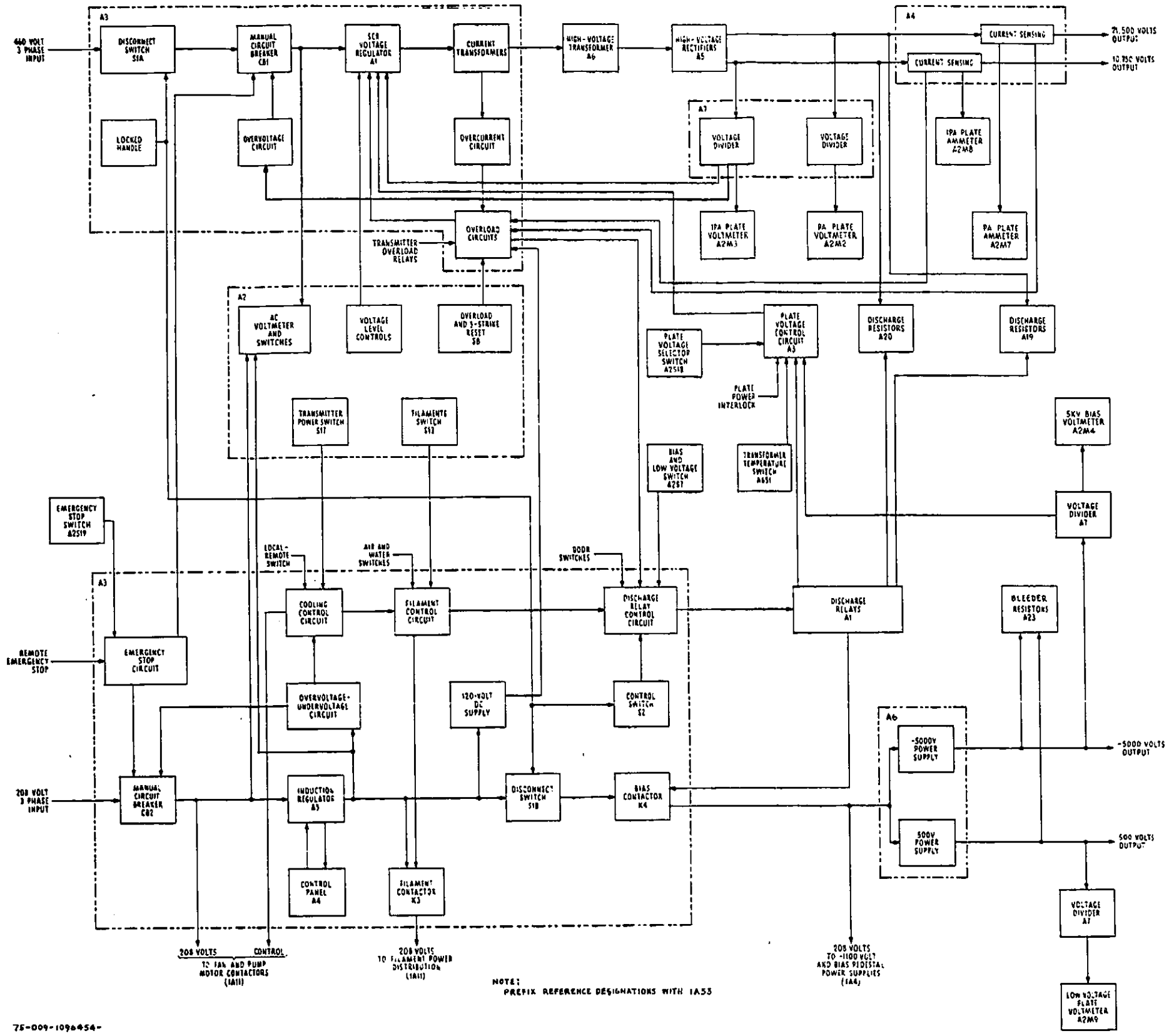


Figure 4-8. Power Supply Set OP-109/FPN-44A (1A53) Detailed Functional Block Diagram

(2) 460 VAC CIRCUITS. - Primary 460 vac power is applied to the voltage regulator (1A53A3A1) via a disconnect switch and a circuit breaker. The voltage regulator supplies regulated ac to the high voltage transformer (1A53A6T1) when enabled by the transmitter control circuits. Transformer 1A53A6T1 secondary voltages are rectified but not filtered by the 1A53A3A5 assembly. Voltage divider networks in 1A53A7 supply samples of the plate voltage output to meter circuits in 1A53A2 and to the voltage regulator voltage control circuit. Shunt resistors for the ammeter circuits of 1A53A2 are provided by the 1A53A4 assembly.

(3) TRANSMITTER CONTROL CIRCUITS. - Included on figure 4-8 are the following transmitter control circuits: 208 vac overvoltage/undervoltage, discharge relay control, emergency stop, and three strike overload. The 208 vac overvoltage circuit trips the 208 vac circuit breaker if an overvoltage is sensed for more than two seconds. In normal operation the 208 vac undervoltage circuit recycles the sequential turn-on of power if an undervoltage is sensed for more than two seconds. The discharge relay control circuit controls the discharge of plate voltages through discharge resistors of 1A53A19 and 1A53A20 when the bias voltages are turned off. The emergency stop circuit, which receives inputs from the transmitter control equipment and a control-indicator switch, trips both the 460 vac and 208 vac circuit breakers.

The three strike overload circuits receive inputs from various overload sensing circuits including 460 vac overcurrent, 208 vac undervoltage, plate overcurrents, the -120 vdc power supply and transformer temperature switch. When an overload is sensed, the circuit turns off the 460 vac voltage regulator and the bias supplies and then automatically turns them on again after a short interval. Three overloads in 90 seconds turns off these circuits until manually reset by a pushbutton switch on 1A53A2.

i. VOLTAGE REGULATOR CN-1472/FPN-44A (1A53A3A3 and 1A53A3A4). - The voltage regulator provides output voltages to ±1 per cent with input line variation of ±10 per cent. The regulated output voltage is adjustable to ±5 per cent of the 208 vac nominal input voltage.

The voltage regulator consists of two assemblies, a regulator (1A53A3A3) and a control panel (1A53A3A4) (see figure 4-9 and schematic diagrams 6-56 and 6-57). The 1A53A3A3 assembly consists of an induction regulator T1, isolation transformers T2 and T3, and motor B1. Motor B1, controlled by control panel circuits rotates the rotor winding of T1 to increase or decrease the output voltage. Isolation transformers T2 and T3 supply power to operate the motor B1 and the control panel circuits. The control panel assembly 1A53A3A4 consists of circuits that automatically or manually control the induction regulator.

(1) THEORY. - The operation is as follows (figure 4-10). Windings are provided on both the rotor and stator. The rotor windings are wye-connected to the input lines. The stator windings are each connected in series with an output line. As there is inductive coupling between rotor and stator windings, the output voltage at each line consists of the input voltage plus or minus the voltage induced in the associated stator by the rotor. This induced voltage is the vector sum of three voltages, each due to a corresponding rotor section. It should be noted that this resultant induced voltage is constant in magnitude, but at a phase which depends upon the angular position of the rotor. Each component of this induced resultant, however, is constant in phase and is the same as that of the line to which the corresponding rotor section is connected.

The amplitude and polarity of each induced component, on the other hand, are dependent upon the tightness of coupling and whether it is boosting or bucking the line voltage. The degree of coupling occurs symmetrically between all windings when the rotor is turned by motor 1A53A3A3B1. This coupling symmetry maintains a constant net amplitude in each stator. As the rotor is turned, coupling is reduced from one rotor to a particular stator section but is increased a compensating amount from another rotor section. Thus, the stator section receives a decreasing induced voltage of one phase and an increasing voltage of another phase. The phase of the resultant is then determined in accordance with the laws of vector addition. The induced resultant, in turn, adds vectorially to the line voltage at the input of the stator section. The output voltage therefore, is increased or decreased depending upon the phase of the induced resultant stator voltage, which similarly depends upon the angular position of the rotor.

The voltage regulator operates in two modes: automatic (normal) and manual (test or maintenance) In the following description reference designations are abbreviated. Unless otherwise indicated, prefix reference designations with 1A53A3.

(2) AUTOMATIC OPERATION. - When the voltage regulator is in the automatic mode, MODE switch A4S1 is set to AUTO and MOTOR switch A4S4 is set to ON. The regulated output voltage from the induction regulator A3T1 is applied to step down transformer A4A2T2 via isolation transformer A3T3. The transformer output is rectified, filtered, adjusted by BANDWIDTH control A4R1 and applied to operational amplifier comparators A4A1U1 and A4A1U2. The comparators compare this voltage with a reference voltage. The reference voltage is derived from the 208V unregulated input via isolation transformer A3T2, and stepdown transformer A4A2T1. The output of A4A2T1 is rectified, filtered and then stabilized to a fixed voltage by a two stage zener diode circuit A4A1CR9 and A4A1CR12. The reference voltage is adjusted by VOLTAGE LEVEL potentiometer A4R2 and fed to the comparators. Each comparator operates in the following manner: When the voltage at its (+) input is greater than at the (-) input the output is high (approximately +11V), otherwise it is low (approximately +1V).

When the output of regulator transformer A3T1 decreases, the sense voltage at the (-) input of comparator A4A1U1 decreases below the reference voltage at the (+) input. The high output of A4A1U1 turns on switching transistor A4A1Q1 which energizes the coil of raise relay A4A2K1, closing the raise winding circuit of motor A3B1 to raise the output voltage of A3T1. This raise circuit consists of isolation transformer A3T2, MOTOR switch A4S4, raise winding of A3B1, normally open contact of A4A2K1, normally closed contacts of A4A2K2, and MODE switch A4S1 contacts to ground. The raise winding of A3B1 remains energized until the reference and sense voltages are equal, which turns off A4A1U1. The sense voltage at the (+) input of comparator A4A1U2 increases above the reference input at the (-) input. When the output of regulator transformer A3T1 increases, the high output of A4A1U2 turns on switching transistor A4A1Q2 which energizes the coil of lower relay A4A2K2, closing the lower winding circuit of motor A3B1. The lower winding of A3B1 remains energized until the reference and sense voltages are equal, which turns off A4A1U2. When one motor winding is connected to A3T2, the other winding is also connected but with A3C1, and A3R1 in series. This provides the phase shift needed to make the motor run in the desired direction.

Transistor A4A1Q3 provides a positive bias voltage of 4 volts to the emitters of A4A1Q1 and A4A1Q2 to ensure that both turn off when the comparator outputs are low or when the control is balanced. Resistors A4A2R20 and A4A2R21 (see figure 6-57) are used to provide positive holding effects. Resistor A4A2R21 and capacitor A4A2C11 compensate for potential transformer regulation during motor start-up by momentarily feeding back sufficient positive voltage to the (+) terminal of comparator A4A1U2, so that A4A1U2 can be kept turned on without chattering. BANDWIDTH potentiometer A4R1 and potentiometer A4R6 provide for the adjustment of the dead band. The dead band is the voltage range around the selected voltage level set by the VOLTAGE LEVEL potentiometer A4R2 inside which the control is at rest and does not call for corrective action raise or lower. The output voltage has to be outside of the dead band range for the control to call for corrective action.

(3) MANUAL OPERATION. - When the voltage regulator is in the manual mode, switch S1 is set to MANUAL, and MOTOR switch S4 is set to ON. Setting the MODE switch to MANUAL disables the sense and reference circuits, thereby disabling voltage regulation capability. Control of motor A3B1 is either by the MANUAL RAISE switch A4S3 or MANUAL LOWER switch A4S2 which increases or decreases the output voltage.

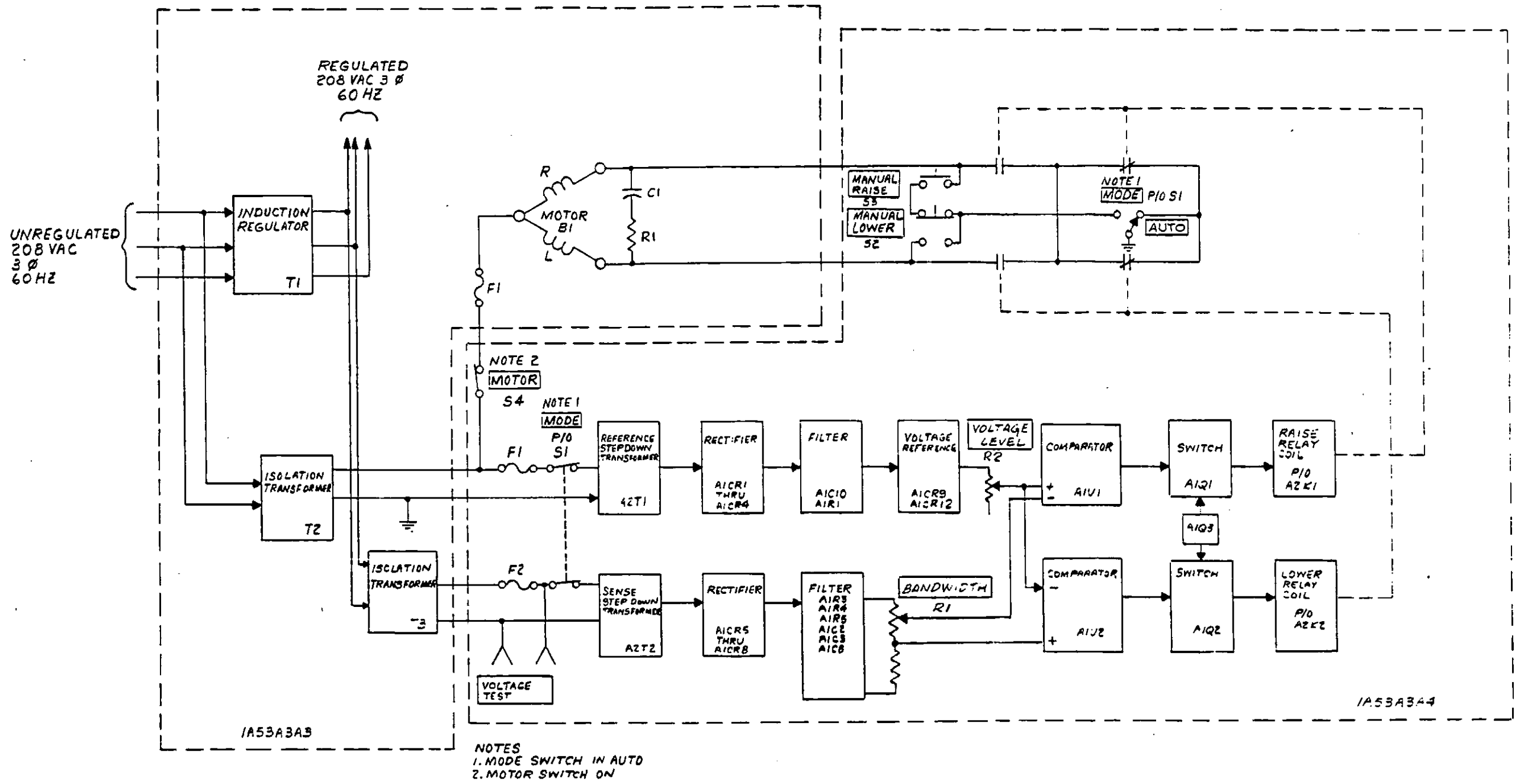
j. VOLTAGE REGULATOR CN-1473/FPN-44A (1A53A3A1 and 1A53A3A2). - The voltage regulator (figures 4-11 and 6-52) is a line voltage regulator which regulates the dc output voltage of power supply PP-7305/FPN-44A that supplies 21.5 kvdc and 10.75 kvdc to the power amplifier and amplifier group circuits. The high voltage is generated by the high voltage transformer whose primary windings are delta connected. The silicon controlled rectifiers (SCR's) are inserted in series with each delta leg. Regulation is accomplished by varying the firing angle of the SCR's. The voltage regulator operates with an input of 460 vac ± 10 per cent in an ambient temperature range of 0 to 60°C (32 to 140°F). The voltage regulator incorporates protective and control circuits.

(1) GENERAL THEORY. - The 460 vac voltage regulator employs the silicon controlled rectifiers (SCR) to control line voltage to high voltage transformer 1A53A6T1. The SCR is a solid-state, semiconductor NPNP four-layer device, shown schematically in figure 4-12a. When the anode is negative in polarity with respect to the cathode, the device does not conduct and is in the "blocking" state. The device blocks because junctions J1 and J3 are reverse biased P-N junctions. In order to fire an SCR, a voltage pulse is applied across gate-cathode. If the anode is more positive than the cathode, junctions J1 and J3 are forward biased. The application of positive pulse voltage at the gate causes increased hole velocity in the P2 region, accelerating electrons across the J3 junction and through the P2 region causing breakdown (or firing). Once the SCR is fired, the gate loses control, and the device can only be turned off by reducing the anode-to-cathode voltage to approximately zero. In summary, two conditions must be present for SCR firing.

- Anode must be positive with respect to cathode.

- A voltage pulse of sufficient magnitude must be fed to the SCR gate.

The circuit shown in figure 4-12b shows how these two conditions are utilized to fire SCR's. In this circuit, two SCR's are connected in reverse with respect to each other. When the polarity of the applied ac line voltage of the anode of SCR_1 is positive with respect to its cathode, it meets one of the conditions for conduction. Note also that SCR_2



NOTES
1. MODE SWITCH IN AUTO
2. MOTOR SWITCH ON

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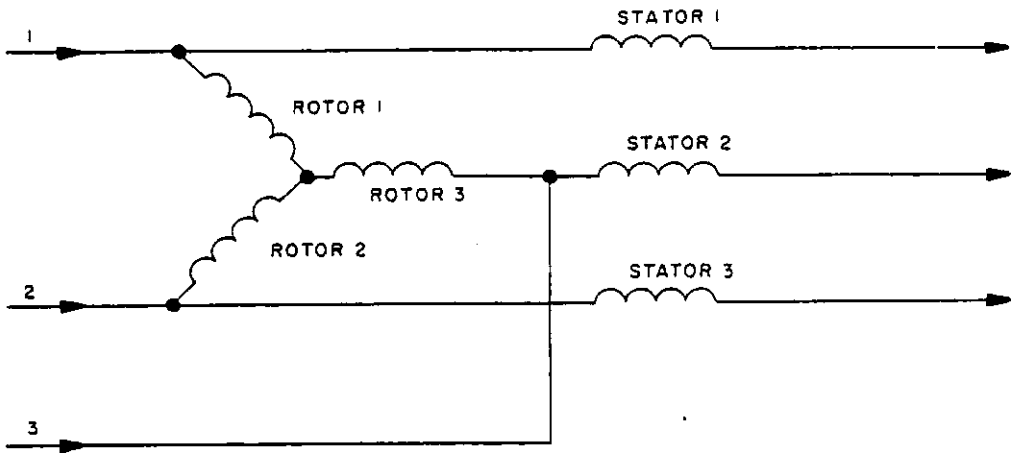
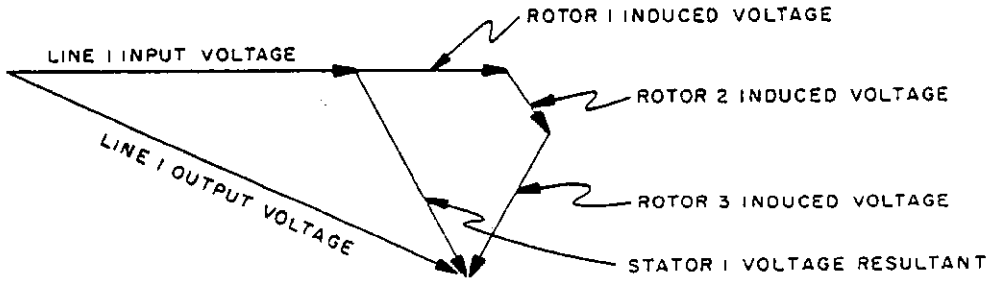
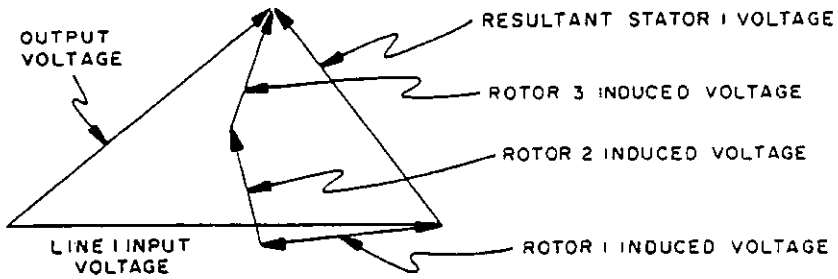
Figure 4-9. Voltage Regulator CN-1472/FPN-44A (1A53A3A3 and 1A53A3A4) Functional Block Diagram



A. INDUCTION VOLTAGE REGULATOR

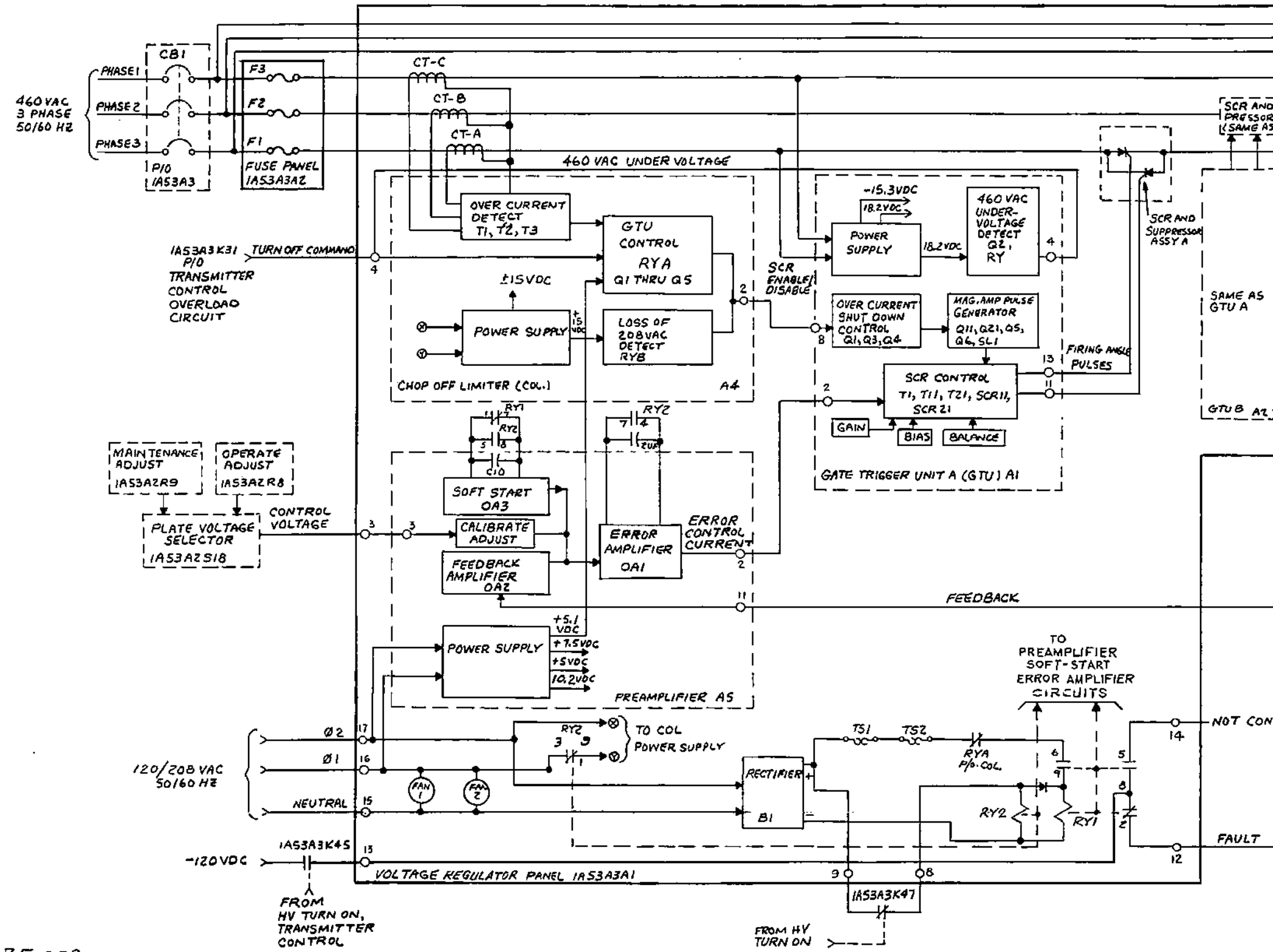


B. SUMMATION OF INDUCED VOLTAGES FROM THREE ROTOR SECTIONS IN A STATOR

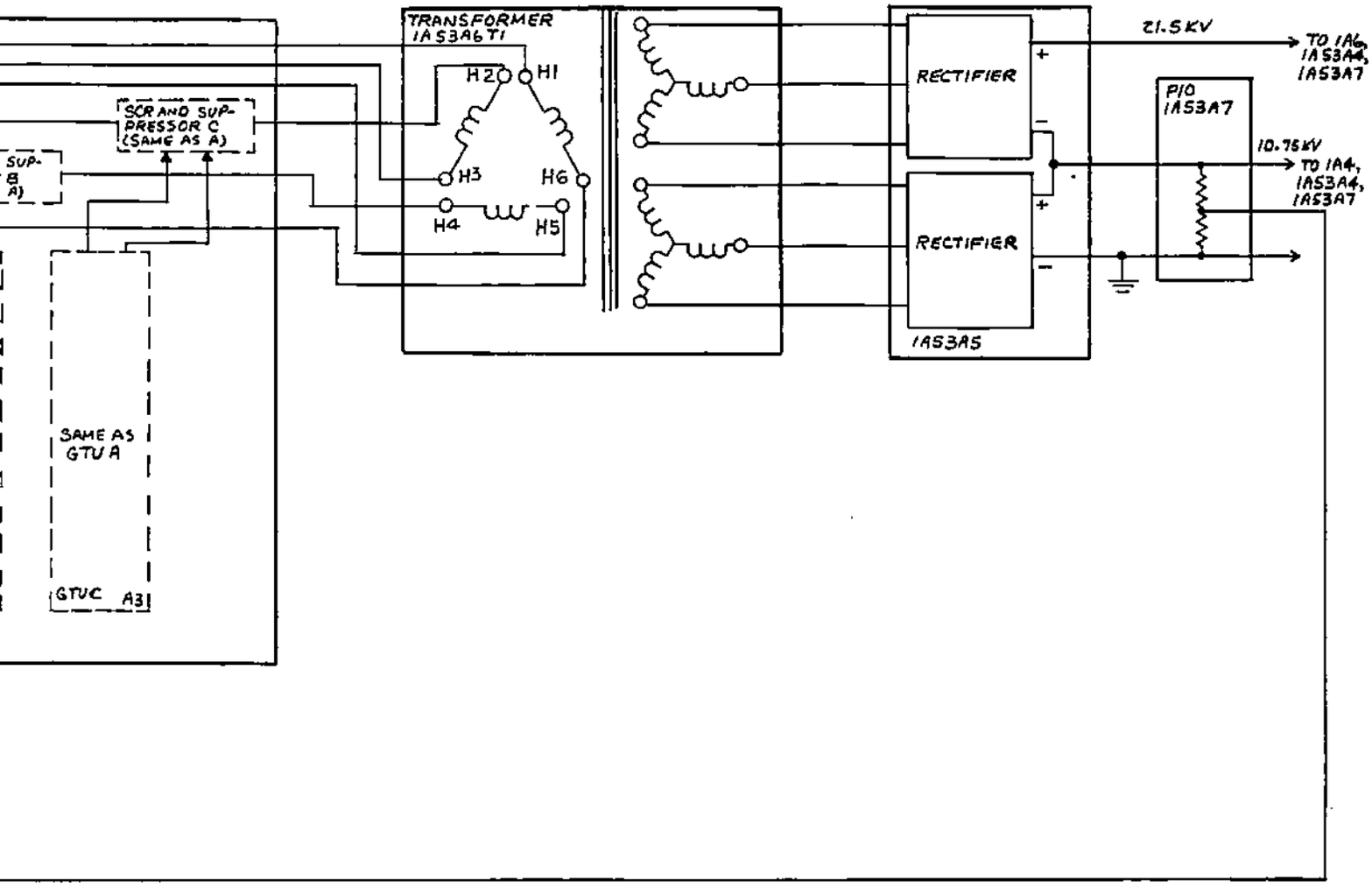


C. SUMMATION AS IN B BUT WITH ROTOR ASSEMBLY ROTATED 180 DEGREES

Figure 4-10. Voltage Regulator CN-1472/FPN-44A, Phase Relationships


460 VAC 3 PHASE 50/60 HZ
PHASE 1
PHASE 2
PHASE 3
CB1
P/O 1A53A3
F3
F2
F1
FUSE PANEL 1A53A3A2
CT-C
CT-B
CT-A
460 VAC UNDER VOLTAGE
1A53A3K31 TURN OFF COMMAND P/O TRANSMITTER CONTROL OVERLOAD CIRCUIT
OVER CURRENT DETECT T1, T2, T3
GTU CONTROL RYA Q1 THRU Q5
±15VDC
POWER SUPPLY
+15 VDC
LOSS OF 208VAC DETECT RYB
CHOP OFF LIMITER (COL.)
A4
SCR ENABLE/ DISABLE
-15.3VDC
18.2VDC
POWER SUPPLY
18.2VDC
460 VAC UNDER-VOLTAGE DETECT Q2, RY
OVER CURRENT SHUT DOWN CONTROL Q1, Q3, Q4
MAG. AMP PULSE GENERATOR Q11, Q21, Q5, Q6, SL1
FIRING ANGLE PULSES
SCR CONTROL T1, T11, T21, SCR11, SCR21
GAIN
BIAS
BALANCE
GATE TRIGGER UNIT A (GTU) A1
SCR AND SUPPRESSOR ASSY A
SAME AS GTU A
GTU B A2
MAINTENANCE ADJUST 1A53A2R9
OPERATE ADJUST 1A53A2R8
PLATE VOLTAGE SELECTOR 1A53A2S18
CONTROL VOLTAGE
SOFT START OA3
CALIBRATE ADJUST
FEEDBACK AMPLIFIER OA2
ERROR AMPLIFIER OA1
ERROR CONTROL CURRENT
FEEDBACK
+5.1 VDC
+7.5VDC
+5VDC
10.2VDC
POWER SUPPLY
PREAMPLIFIER A5
TO PREAMPLIFIER SOFT-START ERROR AMPLIFIER CIRCUITS
NOT CON
FAULT
120/208 VAC 50/60 HZ
Ø2
Ø1
NEUTRAL
FAN 1
FAN 2
TO COL POWER SUPPLY
RECTIFIER B1
TS1
TS2
RYA P/o COL.
RY2
RY1
-120VDC
1A53A3K45
FROM HV TURN ON, TRANSMITTER CONTROL
VOLTAGE REGULATOR PANEL 1A53A3A1
1A53A3K47
FROM HV TURN ON

75-009



NECTED

FAULT-TRIP RELAY
1A53A3K31,
→ TRANSMITTER
CONTROL

Figure 4-11. Voltage Regulator CN-1473/FPN-44A, (1A53A3A1 and 1A53A3A2) Functional Block Diagram

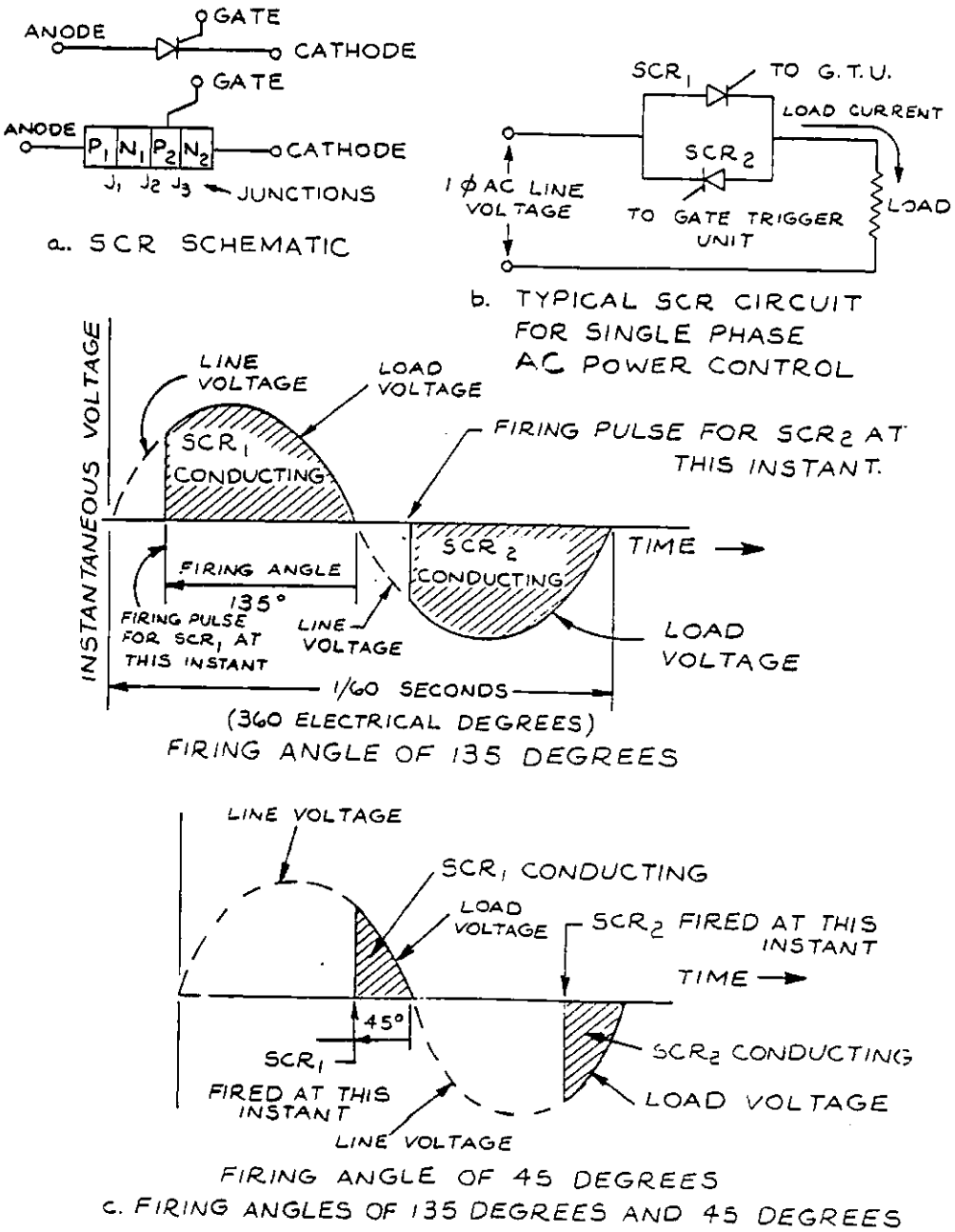


Figure 4-12. Silicon Controlled Rectifier Operation

is blocking during this half cycle of line voltage. The firing gate pulse for SCR_1 can be applied at any point in the half cycle with the result that the SCR_1 conducts for the remainder of the half cycle. When the polarity of the line voltage reverses, the anode of SCR_2 is positive with respect to its cathode and causes SCR_2 to conduct for any portion of this half cycle by applying its firing pulse at the proper moment.

Figure 4-12c shows load voltage for two different firing points. Since the voltage drop across an SCR is very slight (approximately one and one half volts), nearly all of the impressed line voltage appears across the load resistance during conduction of each SCR. Note that if the firing pulse is introduced relatively early in the half cycle, a greater RMS voltage is applied to the load than when the firing pulse is introduced relatively late in the half cycle. Thus by varying the firing pulse over any point in the half cycle, any desired power level within the limits of the voltage control unit can be achieved. The waveforms associated with three phase operation are a composite of those resulting from all three phases and are considerably more complex than those shown for the single phase example of figure 4-12.

The pulse firing circuit in the gate trigger unit of the 460 vac voltage regulator circuit is synchronized to line frequency. The pulse circuit produces symmetrical firing, that is, each SCR fires at the same point in its respective half cycle. This method of power control provides for output voltage control from minimum to maximum.

(2) FUNCTIONAL BLOCK DIAGRAM DESCRIPTION. - A functional block diagram of the 460 vac voltage regulator is shown in figure 4-11. The inputs are: 460 vac, 3-phase, 50/60 Hz; inductrol regulated 208 vac, 50/60 Hz; a control voltage signal; a feedback voltage signal and control signals from relays 1A53A3K47 and 1A53A3K31. The control voltage signal is supplied by two manual controls on the control-indicator (1A53A2): OPERATE ADJUST and MAINTENANCE ADJUST. The settings of these controls and the feedback voltage determine the regulated dc level at the output of the high voltage power supply. The relay 1A53A3K47 signal controls the turn on and turn off of the 460 vac voltage regulator. The 1A53A3K31 control signal turns off the regulator when an overload is sensed. The regulator supplies phase angle control of the 460 vac input to the primary of the high voltage transformer 1A53A6T1.

The voltage regulator consists of chassis mounted components and assemblies. The chassis mounted components include two fans, a rectifier (B1), three current transformers, relays RYA and RYB, and associated components. The assemblies consist of three gate trigger units, a chop-off limiter, a preamplifier, and three SCR assemblies and suppressor units.

(a) BEFORE HIGH VOLTAGE TURN ON. - The following functional description is presented in the sequence of power and control signal application: 208 vac, 460 vac, and turn-on (relay 1A53A3K47 energized). Before the 208vac is applied the contact configuration of relays RY1, RY2 and 1A53A3K47 are as shown in figure 4-11. When 208 vac is applied the following actions will occur:

- Fans 1 and 2 operate.

- 208 vac power is applied to operate the preamplifier.

- DC relays RY1 and RY2 are simultaneously energized via rectifier B1 and the closed contacts of relay 1A53A3K47.

- RY2 contact 3-9 open, thereby opening the 208 vac supply to the chop-off limiter.

- The loss of 208 vac detect relay RYB (in the chop-off limiter) contacts remain closed, inhibiting the three gate trigger units.

- Relay RY2 7-4 contacts short out the 2 uf capacitor of the error amplifier circuit in the Preamplifier.

- Relay RY2 5-8 contacts short out capacitor C10 of the soft start circuit in the preamplifier.

- Relay RY1 is latched via temperature switches TS1 and TS2, the closed contacts of relay RYA, and its own contacts 6-9.

- Relay RY1 contacts 8-2 oper..

- Relay RY1 contacts 1-7 oper. across capacitor C10 of the slow start circuit in the preamplifier, however, the capacitor is shorted by the RY2 contacts 5-8.

- A signal from the preamplifier to the chop-off limiter disables the gate trigger units.

(b) AFTER HIGH VOLTAGE TURN ON. - When 460 vac is applied shortly after the 208 vac the three gate trigger units are energized. However, since the gate trigger units are disabled by the loss of 208 vac detect relay RYB in the chop-off limiter (see fifth item above), the gate trigger units cannot supply firing pulses to the SCR assemblies. The voltage regulator circuits remain in this state until the blowers, filament and bias voltages are supplied. When these conditions are met, relay 1A53A3K47 is energized and the following actions occur:

- Relay 1A53A3K45 contacts close, however the open (8-2) contacts of RY1 prevent energizing the fault trip relay 1A53A3K31.

- Relay 1A53A3K47 contacts open.

- Relay RY2 drops out, but relay RY1 remains energized since it is latched by its contacts 6-9.

- When relay RY2 drops out, its 3-9 contacts close enabling the application of 208 vac power to the chop-off limiter. Since the chop-off limiter is now powered, the loss of 208 vac relay RYB contacts open enabling the three gate trigger units to supply firing pulses to the SCR assemblies.

- The contacts of relays RY1 and RY2 across the external capacitors of the preamplifier are opened.

The normal operation of the voltage regulator circuit is a loop consisting of a feedback signal from a voltage divider network (part of 1A53A7) that senses the 10.75 kv power supply; feedback amplifier OA2 and error amplifier OA1 in the preamplifier; SCR control circuits in gate trigger units; SCR assemblies associated with each gate trigger unit; the high voltage transformer 1A53A6T1 and its associated rectifiers and voltage divider networks.

Regulation operation begins with an initial error current signal from the preamplifier to the gate trigger units. The error current signal is a function of the difference between the control voltage manually selected by either the MAINTENANCE ADJUST control or the OPERATE ADJUST control located on the control-indicator 1A53A2 and the feedback signal from the voltage divider. Since the feedback signal from the voltage divider network of 1A53A7 is initially zero before the gate trigger units supply firing angle pulses, the error signal would be high. A high error signal would cause a high inrush of 460 vac power into the primary of 1A53A6T1. To prevent damage to circuit components due to these power surges, a soft start circuit in the preamplifier generates a ramp voltage on turn-on such that the error signal is initially small and gradually increases to the voltage level commanded by the manual controls. The error current signal is applied to the SCR control circuits of the gate trigger units. Each SCR control circuit generates firing angle pulses which are synchronized to the line and are applied to a pair of SCR's that are in the delta leg of the high voltage transformer 1A53A6T1. The firing angle pulses control the on time of each half cycle of line voltage.

(c) PROTECTION CIRCUITS. - In addition to the voltage regulation, the regulator includes circuits that provide protection against the following conditions:

- 460 vac voltage transients
- 460 vac overcurrents
- 460 vac undervoltage
- Loss of 208 vac in the chop-off limiter
- Overtemperature in the regulator
- Transmitter overloads

Each of these conditions, except 460 vac voltage transients, causes the shutdown of the gate trigger units. The bias and low voltage circuits are also shut down via energized relay 1A53A3K31 except for loss of 208 vac.

1. 460 VAC TRANSIENTS. - The pair of SCR's in each SCR assembly is protected against 460 vac transients by a suppressor network consisting of a selenium element and a resistor-capacitor network. When a transient occurs, the suppressor network bypasses the high voltage around the SCR's. In operation, the suppressor presents a high impedance up to a given voltage. Above this voltage its impedance falls off, providing a low impedance path for a voltage transient.

2. 460 VAC OVERCURRENT. - The 460 vac overcurrent circuit consists of three current transformers CTA, CTB, CTC; the overcurrent detect, and the gate trigger unit control circuits in the chop-off limiter. The outputs of the current transformers are sensed by overcurrent detect circuits in the chop-off limiter.

When the output of any current transformer is above a preset reference, a signal is generated which is applied to the gate trigger unit control circuits. These circuits, consisting of solid-state switches Q1 through Q5 and relay RYA, generate an SCR disable signal and energize relay RYA. The following actions result:

- The SCR disable signal, applied to each gate trigger unit, inhibits the generation of firing angle pulses, thereby shutting down the input to high voltage transformer 1A53A6T1.

- When relay RYA is energized, its contacts which are in the latching circuit of relay RY1, opens, de-energizing relay RY1. RY1 contacts 8-2 close, thereby supplying a fault signal to the fault trip relay 1A53A3K31. The subsequent opening of relay 1A53A3K45 permits 1A53A3K31 to drop out.

3. 460 VAC UNDERVOLTAGE. - The 460 vac undervoltage circuit consists of an undervoltage detect circuit in each gate trigger unit and the gate trigger unit control circuit in the chop-off limiter. When an undervoltage detect circuit in any one of the gate trigger units detects an undervoltage, a signal is sent to the gate trigger unit control circuit in the chop-off limiter which generates the same outputs as when it receives an input from the overcurrent detect circuits.

4. LOSS OF 208 VAC. - The loss of 208 vac detect relay, RYB, in the chop-off limiter keeps the gate trigger units off in the interval between the application of 208 vac and the energizing relay 1A53A3K47. Once the gate trigger units are enabled by the application of 208 vac to chop-off limiter, relay RYB monitors the +15 vdc chop-off limiter power supply. If the power supply voltage falls below RYB's drop-out voltage, the RYB closed contacts send an SCR disable signal to the gate trigger units.

5. OVERTEMPERATURE. - The overtemperature circuit consists of temperature switches TS1 and TS2, relay RY1 and the gate trigger unit control circuit in the chop-off limiter. When either switch opens because of an overtemperature condition in the regulator, the relay RY1 latching circuit opens,

which de-energizes relay RY1. Contacts 1-7 on relay RY1 close across the soft-start ramp capacitor A5C10 to shut down the voltage regulator. Contacts 8-2 on relay RY1 energize the fault trip relay 1A53A3K39.

6. TRANSMITTER OVERLOADS. - Any Overcurrents sensed by the transmitter overload relays operate relay 1A53A3K31 resulting in the generation of a turn-off command which is applied to the gate trigger unit control circuit of the chop-off limiter. Subsequent actions are the same as for a 460 vac overcurrent, described previously.

(3) GATE TRIGGER UNIT, DETAILED DESCRIPTION. - Each of the three identical gate trigger units (figures 6-53 and 4-11) provides phase shifted pulses for two SCR gates in response to the error current signal received from the preamplifier. The SCR firing angle is a function of the error current from the preamplifier. Each gate trigger unit contains the following functional circuits.

- Magnetic amplifier pulse generator and SCR control circuits.
- Overcurrent shutdown circuit.
- Undervoltage shutdown circuit.
- Zener regulated power supply.

The power supply consists of transformer, T1, rectifier diodes D7 through D10, resistors R1 and R2, capacitors C1 and C2, and zener diodes D1 through D4. The circuit provides regulated +18.2 ±10 per cent vdc and -15.3 ± 10 per cent vdc. An additional dc output is provided to the undervoltage detector from the cathodes of diode D7 and D9.

For 60 Hz operation, terminals 5 and 6 are jumpered so that factory selected resistors R3 and R100 are in parallel; for 50 Hz operation this jumper must be removed.

The magnetic amplifier and pulse generator and SCR control circuits, are composed of transistors Q5, Q6, Q11, and Q21, magnetic amplifier SL1, pulse transformers T11 and T21; silicon control rectifiers SCR11 and SCR21; and two windings (6-7, and 8-9) of power transformer T1. The error current signal from the preamplifier is series connected to the SCR control circuit via terminals 1 and 2 on all three gate trigger units.

Transistor Q6, which receives the error signal, is a common base amplifier and provides full control output for a nominal input current of 3 ma dc. Potentiometer P2 sets the bias point of Q6 to obtain three phase firing angle tracking when operating the near zero transmitter output voltage. Transistor Q6 drives the base of Q5. Potentiometer P3 provides a small variation of Q6 collector load resistance for gain adjustment for three phase tracking near full output. Collector current of Q5 flows through the common 600 turn control winding on magnetic amplifier cores SL1. R72 is a factory selected biasing resistor. Control winding current establishes the reset flux level for the magnetic amplifier cores and determines the firing delay and phase of the final gate pulses.

Q11 and Q21 drive the two gate windings of magnetic amplifier SL1. The bases of Q11 and Q21 clip the SINE wave from T1(pins 10, 12), via D14, R15, and D24, R25. The two windings receive gating voltage on opposite half cycles of the ac supply. Resistors R19, R14B, R24 and R24B are factory selected for optimum balance, tracking and freedom from spurious triggering.

During the gating half cycle, each core integrates flux (volt-seconds) until it saturates. The saturation point is determined by the amount of reset current (flux) set by the control current from Q5. The "phase forward" or lead of the saturation point from the end of the gating half cycle is roughly proportional to control current from the Preamplifier. When either core saturates, a current pulse flows through pulse transformer T11 or T21 primary. Resistance dividers R101/R102 and R103/R104 couple the pulse outputs to external test points at terminals 15 and 16.

Two isolated 20v secondaries on T1 provide voltage to the gating circuits. Resistor R11 is a current limiter for the voltage multiplier C11, D11, D12 and C12. This circuit functions to provide a continuing source of gating voltage near zero cross-over points in the line waveform. Capacitors C12 and C13 in combination provide a high initial current capability once a gate pulse is initiated.

Gating pulses are started by a gate signal to auxiliary SCR11 via T11 secondary when mag amp SL1 saturates. C15 and C12 provide noise immunity for SCR11. When SCR11 is fired, it delivers a high amplitude output pulse (20v, 2a) across + terminal 11 and - terminal 12; R13 provides noise immunity for the main SCR gated from terminals 11 and 12. At the end of the half cycle SCR11 drops out of conduction. The sequence just described occurs every other half cycle of supply voltage. SCR21 and associated components comprise an identical channel for the opposite half cycles and are used to gate the companion main SCR.

The 460 vac undervoltage detector circuit includes transistor Q2 and relay RY. Transistor Q2 is biased on by current through R69 and biased off by current through R66 and R67 from the voltage across zener diode D61. Resistor R67 is selected so that Q2 is biased on for line voltage above 65 per cent of nominal; consequently, relay RY is normally energized. When line voltage drops below 65 per cent of nominal, RY is de-energized, which shorts terminals 3 and 4. These terminals are connected to terminals 3 and 4 of the chop-off limiter, which causes the transmitter to shut down.

A fault signal generated by the chop-off limiter closes a circuit between terminals 1 and 8. Q4 is biased on which turns on transistor Q3, which shorts the base of transistor Q1 to common. This action reduced the clipped SINE wave drive to Q11 and Q21 to zero thereby disabling the SCR control circuit.

(4) CHOP-OFF LIMITER DETAILED DESCRIPTION. - The chop-off limiter (figure 6-54) consists of a power supply, an overcurrent detect circuit, a gate trigger unit control circuit, and a loss of 208 vac detect circuit. The power supply provides ±15 vdc operating voltage for chop off limiter circuits.

The overcurrent detect circuits sense overcurrents in the 460 vac input lines. The gate trigger unit control circuit enables and disables the gate trigger units. In addition, a signal is supplied to transmitter control circuits to turn off the bias power supplies. The loss of 208 vac detect circuit monitors the +15 vdc power supply output. When 208 vac is lost the +15 vdc drops to 0 vdc.

The power supply consists of a stepdown, center-tapped transformer T11, rectifier diodes D15 through D18, filter capacitors C2 and C3, resistors R4 and R5, and 15 volt Zener diodes Z1 and Z2. The circuit forms a pair of symmetrical positive and negative regulated power supplies. Each power supply has an output voltage of +15 ±10 per cent vdc.

The overcurrent detect circuit consists of current transformers T1, T2 and T3, rectifier diodes D1 through D13, resistor R1, and capacitor C1. The inputs to T1, T2 and T3 are from the 5 ampere secondaries of line current transformers CTA, CTB, CTC. Input currents are transformed to low current, high voltage signals by transformers T1, T2, T3 and diodes D1 through D12 connected as bridge rectifiers. Resistor R1 is the common load resistor for the three current detect circuits. Diode D13 and capacitor C1 form a filter that removes short duration line current transients.

The gate trigger unit control circuit consists of transistors Q1 through Q5 and their associated components, SCR1, and SPST relay RYA. The circuit receives signals from the overcurrent detect, the three gate trigger units, the external transmitter overload circuit, and the preamplifier.

Input current as represented by the drop across R1 is compared to adjustable reference voltage on potentiometer P1. Resistors R2 and R3 form a voltage divider to the base of Q1. When the input current signal exceeds the reference, the base of Q1 goes positive and Q1 conducts. Q1 turns on Q5 and Q5 then turns on Q2. As the collector of Q5 goes high, current through R11 and C4 maintains Q1 in conduction until the voltage at C4 rises to the conduction threshold of Q3. This action insures a continuing signal following a momentary overload. Reset of Q3 occurs after 50 ms.

As Q5 collector goes high, C5 charges and Q4 is also driven into conduction. C5 then discharges through Q4 and R20 to gate SCR1 on and pick up RYA. SCR1 continues to conduct until the 208 vac input is turned off. Contacts of RYA are used via terminals 5-6 to open the latching circuit of relay RY1 on the main voltage regulator chassis, thereby sending a fault signal to the transmitter overload circuit. When Q2 turns on and saturates, a short is placed across terminals 1-2 which is used to inhibit gating pulses to the power SCR's. A detected overcurrent thus results in immediate cessation of gating pulses.

The inputs from gate trigger units and the transmitter overload circuit appear as a short circuit across terminals 3 and 4. When this occurs, the current through diode D24 turns on transistor Q1. This results in circuit operation identical to an overcurrent input, except that the input circuit is independent of the setpoint of potentiometer P1. When 208 vac input power is first applied, an input from the preamplifier appears at terminal 13. Charging current of capacitor C12 activates Q1 and inhibits the gate trigger unit.

The loss of 208 vac detect circuit consists of SPST relay RYB and current limiting resistor R24. Relay RYB, in series with resistor R24, is across the +15 vdc supply. When the +15 vdc is lost, relay RYB is de-energized, and its contacts short terminals 1 and 2. These terminals, when shorted, disable the gate trigger units.

(5) PREAMPLIFIER DETAILED DESCRIPTION. - The preamplifier (figure 3-55) supplies an error signal that controls the firing angle pulses generated in the gate trigger units. The error signal is the difference between the feedback signal from the voltage divider 1A53A7 and the high voltage level selected by either the MAINTENANCE ADJUST or OPERATE ADJUST controls on the control-indicator 1A53A2. Preamplifier circuits consist of a power supply, a feedback amplifier, a reference circuit, soft start, and error amplifier.

The power supply consists of transformer T1, rectifier diodes D1 through D4, filter capacitors C1 and C2, resistors R1 and R2, and 7.5 v zener diodes D5 through D8. The circuit forms a pair of symmetrical positive and negative regulated power supplies. Each power supply has an output of 15 ±10 per cent vdc which are supplied to operational amplifiers 0A1, 0A2 and 0A3. Another power supply circuit, resistor R3 and 5.1 v zener diodes D9 and D10, provide a 10.2 ±5 per cent vdc regulated supply to the reference circuit. In addition, a 7.5 ±10 per cent vdc supply is provided for the timing circuit of the operational amplifier 0A3, and 5.1 vdc ±5 per cent output from D9 is supplied to the chop-off limiter to activiate it on initial turn-on.

The feedback amplifier circuit consists of operational amplifier 0A2 and its associated components. The amplifier's input at terminal 11, is amplified and inverted. The amplifier's gain is unity. Rf isolation is provided by rf choke RFC2 and capacitor C37. Capacitor C19, C20, and associated resistors reduce the feedback ripple.

The reference circuit, a voltage divider network, consists of calibration potentiometer P2 and the control voltage adjustment MAINTENANCE ADJUST or OPERATE ADJUST potentiometers. The input to terminal 3 is filtered by rf choke RFC1 and capacitor C33. Resistor R19 terminates the circuit if the input to terminal 3 is opened and forces a zero volt output. Potentiometer P2 (calibrate) provides a means of calibrating to compensate for zener diode and external potentiometer tolerances.

The control voltage at the junction of R17 and R18, selected by either the MAINTAIN ADJUST or OPERATE ADJUST potentiometers, is applied to error amplifier 0A1 after an interval determined by the soft start

circuit. The soft start circuit consists of inverting operational amplifier 0A3 and a timing circuit consisting of capacitor C10 and 3.0 megohm resistor 1A53A3A1R1 connected at terminals 12 and 13. The circuit generates a fast rising ramp voltage each time the high voltage is turned on, which occurs when relay RY1 is energized. When the high voltage is off, contacts of relay RY1 short capacitor C10, and the output of 0A3 at pin 6 is held to -1.4 vdc by the voltage drop across diodes D13 and D14. The anode of diode D12 is thus held to -0.7 vdc and the command voltage at the junction of R17 and R18 is thus clamped to this level. This generates a zero current error signal. When relay RY1 is energized, removing the short across C10, it charges from the 7.5 vdc power supply through the externally mounted 3 megohm resistor 1A53A3A1R1. As the capacitor charges, the output at terminal 6 of 0A3 rises to approximately +8.4 vdc. This back biases D12 and allows the input error signal to take command. The rise time in seconds to reach the set voltage output is approximately equal to 5 x R (3.0 megohms); that is, 15 seconds.

The error amplifier, operational amplifier 0A1, amplifies the voltage difference between the control voltage at the junction of resistors R17 and R18, and the amplified inverted feedback voltage at resistor R13 and produces a filtered error voltage. An external integrating 2.2 μf capacitor 1A53A3A1C1 is connected at terminals 14 and 16. This capacitor is initially shorted by relay RY2 contacts to reduce the gain of 0A1 during the soft start. This capacitor determines the bandwidth of the voltage regulator. The high frequency roll-off point (3 db down) is given as approximately f/Hz = $\frac{2}{c}$ microfarads up to the upper limit of 5 Hz. The error signal also appears on terminal 15 and is connected to an external test point. Maximum transmitter high voltage output is obtained when the voltage error signal at terminal 2 is -7.5 vdc.

k. POWER SUPPLY PP-7305/FPN-44A (1A53A5 and 1A53A6). - The power supply (1A53A5 and 1A53A6) (figure 6-46) supplies 21.5 kvdc, 10.75 kvdc, -5000 vdc, 500 vdc and ±26 vdc.

The +21.5 kvdc and +10.75 kvdc outputs are produced by rectifying the outputs of the 3-phase transformer 1A53A6T1 with silicon diode assemblies 1A53A5CR1 through 1A53A5CR12 each having a peak inverse voltage rating of 34000v. The high voltage transformer has two sets of secondary windings, each set being connected to diode assemblies arranged in a three phase, full-wave bridge configuration. 1A53A5CR1 through 1A53A5CR6 comprise one bridge and 1A53A5CR7 through 1A53A5CR12 comprise the second bridge. The two bridges are connected in series with each producing a nominal 10750 vdc.

Metal oxide varistors (MOV's) 1A53A5RV1 through 1A53A5RV18 and 1A53A5RV19 through 1A53A5RV36 are placed across the outputs of both rectifier bridges to absorb any excessive transient voltages that may be developed due to switching or shorting, of the power supply. Each MOV has a conduction point of approximately 1650 volts and is capable of absorbing 80 joules of energy. Each bridge is thus protected from transients that would exceed 29700 v (18 x 1650v).

The -5000 vdc, +500 vdc and ±24 vdc outputs are produced by a power supply module (1A53A6A1) which is mounted on the cover of the high voltage transformer. Both the -5000 vdc and +500 vdc supplies utilize three phase, full-wave bridge rectifiers followed by choke input filters in the conventional configuration. The ±24 vdc which is used by the 1A53A4 and 1A53A7 units is produced by 1A53A6A1A1CR19 through 1A53A6A1A1CR24 in conjunction with a wye connected secondary (terminals R10, R11, R12, and R13 of 1A53A6A1T2). The neutral of this three phase wye (terminal 13) is brought out and is the common side of both 24 vdc supplies. The positive voltage is then produced by 1A53A6A1A1CR19, CR21 and CR23, and the negative voltage produced by 1A53A6A1A1CR20, CR22, and CR24, both sets operating as a three phase, half-wave rectifier. Filtering of these 24 vdc supplies is accomplished by 1A53A6A1A1C1 and C2 acting as capacitor input filters, 1A53A6A1A1 R1 and R2 of this assembly function as bleeder resistors.

The output of the two high voltage supplies is governed by the 460 vac voltage regulator (1A53A3A1). These supplies have nominal outputs of 21.5 kvdc and 10.75 kvdc. When the three phase input voltage to the low voltage power supplies is 208 vac line-to line the output voltages are:

Terminal E2(-)	to TB1-4(+)	5150 vdc ±1% at 0.2 adc
Terminal E1(+)	to TB1-5(-)	505 vdc ±1% at 0.5 adc
Terminal TB1-6(+)	to TB1-7(-)	24 vdc ±5% at 0.1 adc
Terminal TB1-8(-)	to TB1-7(+)	24 vdc ±5% at 0.1 adc

A thermostat (1A53A6S1), attached to the high voltage tranformer (1A53A6T1), senses the temperature of the transformer. When the temperature is above a safe limit, the thermostat opens, which turns off the high voltages and OVERTEMPERATURE PLATE TRANSFORMER indicator lamp 1A53A2DS11.

l. RELAY ASSEMBLY RE-1112/FPN-44A (1A53A1). - Relay assembly (1A53A1) (figure 6-46) consists of two high voltage relays (1A53A1K1 and K2) which are normally closed when power is removed from the relay coils. These relays are energized during normal operation of the power supply. When the power supply is de-energized, power is removed allowing them to close and complete a relatively low resistance path across the 21.5 kvdc and 10.75 kvdc supplies. Auxiliary contacts are provided on the relays to enable high voltage turn on only after the relays have been energized. Power for the relay coils is 120 vrms, 45 to 66 Hz.

m. RESISTOR ASSEMBLY (1A53A19). - Resistor assembly (1A53A19) (figure 6-46) consists of eight (6000-ohm) non-inductive power resistors in a series parallel configuration to produce a total resistance of 12000 ohms. This resistor network is connected between the 21.5 kvdc output of the high-voltage supply and 1A53A1K1. In the normal operation of the power supply system, the relays contacts of 1A53A1K1 are open and no current flows through 1A53A19. When power is removed from the system, 1A53A19 is placed

1A53A7A4) are composed of frequency compensated precision resistors. In the +21500 vdc overvoltage level sensing and monitoring circuit a portion of the +21500 vdc is extracted at the slider of potentiometer 1A53A7R1, and applied to the input of a two stage amplifier consisting of 1A53A7A2Q1 and Q2. This amplifier which is powered by the +15 vdc output of the integrated circuit regulator assembly (1A53A7A1Q1) functions as a current amplifier that activates overvoltage sensing relay 1A53A7K1 when the signal level at the input is high enough to cause conduction of 1A53A7A2Q1. The function of diode 1A53A7A2CR1 is to absorb inverse transient voltages that are developed when K1 opens.

The -5000 vdc undervoltage sensing and monitoring circuit functions exactly the same as the +21500 vdc circuit except that the polarity of the 15 vdc supply, the transistors and the transient protection diode are reversed. In this -5000 vdc sensing circuit continuity must be established between terminals 1A53A7TB1-5 and 1A53A7TB1-6 before bias-up sensing relay 1A53A7K2 can be activated. Contacts on bias-up sensing relays in the amplifier group 1A4 are connected between these terminals, thus 1A53A7K2 is not activated until all bias voltages are adequate.

The monitor and sensing circuits are adjusted by potentiometers. The function of each potentiometer is as follows:

1A53A7R1	adjusts the trip point of K1 for overvoltage to the +21500 vdc supply.
1A53A7R3	adjusts the signal level at J1 that represents the +21500 vdc supply level to calibrate PA PLATE VOLTAGE meter 1A53A2M2.
1A53A7R4	adjusts the signal level at J3 that represents the +10750 vdc supply level to calibrate IPA PLATE VOLTAGE meter 1A53A2M3.
1A53A7R2	adjusts the trip point of K2 for -5000 vdc bias voltage.
1A53A7R5	adjusts the signal level at J7 that represents the -5000 vdc supply level to calibrate -5 KV BIAS meter 1A53A2M4.
1A53A7R6	adjusts the signal level at J5 that represents the -500 vdc supply level to calibrate LOW VOLTAGE PLATE meter 1A53A2M9.

Feedback connection to the 460 vac voltage regulator (1A53A3A1) is via 1A53A7J9 with pin B being the feedback signal, and pin A being the common side. Transient and overvoltage protection of all of the monitoring functions and the feedback signal is provided by capacitors 1A53A7A2C1 through 1A53A7A2C5 and neon lamps 1A53A7DS1 through 1A53A7DS5.

r. TRANSMITTER CONTROL. - This section describes the transmitter control circuits of a transmitting group.

(1) TRANSMITTER CONTROL FUNCTIONAL DESCRIPTION. - Transmitter control circuits (figure 4-13) consisting of relay-switch logic control the operation of each transmitting group. The relays and switches are located in the amplifier group (1A4), indicator panel (1A12), power supply set (1A53), antenna coupler unit 3 and electrical dummy load unit 4. The input control signals are from sensing circuits, remote and local switches, and potentiometers.

The sensing circuits are identified in table 4-2, as interlock, cooling system, and voltage, current, and temperature circuits. The table identifies the sensing component and the associated controlled circuit.

(a) SAFETY INTERLOCK SENSE. - The interlock signals provide for protecting personnel from dangerous voltages by inhibiting the turn on of bias and high voltages until areas of high potential are secured. In order to turn on these high voltages, interlocked switches on the amplifier group (1A4), antenna coupler (unit 3), and electrical dummy load (unit 4) must be closed. Furthermore, access doors to 1A4, 1A6 and the high voltage area in the enclosure must be locked and the key interlock system used to close the HIGH VOLTAGE RECTIFIER POWER switch 1A53A3S1 and the LOCKED ON switch 1A53A3S2.

NOTE

Only the high and bias voltages are inhibited by the interlock system. All cooling and control voltages remain on.

(b) COOLING SYSTEM SENSE. - The cooling system sense inputs are received from the electron tube water cooler (1A2, the radio frequency amplifier (1A6), the electronic dummy load (unit 4), the enclosure (unit 1), and the amplifier group (1A4). These inputs provide positive indications of the status of water cooling systems and blower operation. The water level signal indicates the relative (to preset standard) level of the distilled water (primary coolant) in the tank of the electron tube water cooler (1A2). The water temperature signals indicate the relative temperature of the distilled water at the input to PA tubes and at each of the outputs of the PA tubes. The water flow signals indicate the relative water flow rate at each of the PA tubes. The air flow signals indicate whether the blowers in the enclosure (unit 1), amplifier group (1A4) and dummy load (unit 4) are operating.

(c) VOLTAGE, CURRENT AND TEMPERATURE SENSE. - Voltage, current and temperature sensing circuits are located in amplifier group (1A4), radio frequency amplifier (1A6), and power supply set (1A53). A detected fault operates one of the

following circuits as indicated in table 4-2: overload, power turn on, high voltage turn on, 208 vac and 460 vac circuit breaker trip. The overload circuit turns off the bias, low and high voltages momentarily and automatically turns them back on again. If three faults are sensed in a less than 90 seconds bias, low and high voltages remain off. A fault which controls power turn-on disables the cooling system, filament, bias, low and high voltages. Other faults turn off or inhibit the turn-on of the high voltage only. Circuit breakers are tripped by certain over voltage conditions or by the emergency stop circuit.

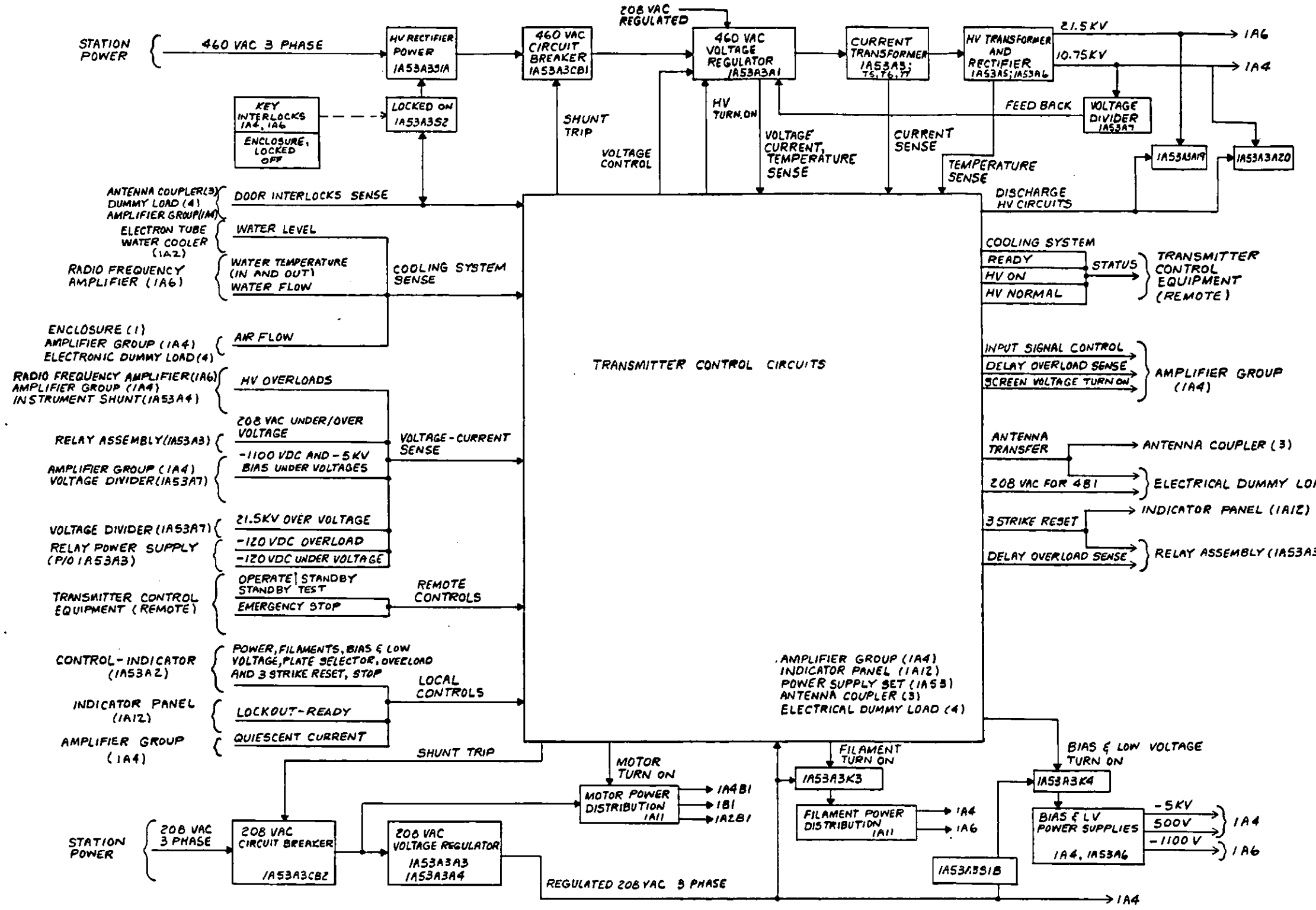


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Figure 4-13. Transmitter Control Functional Block Diagram

TABLE 4-2. SENSING INPUTS AND CONTROLLED CIRCUITS

CIRCUIT	SENSING COMPONENTS	CONTROLLED CIRCUIT
Safety Interlock	1A53A3S2 (LOCKED ON)	Bias, low and high voltage turn on
	1A4S3, 1A4S4, 1A4S5, 1A4S6	
	3S1, 3S2, 3S3, 3S4 (Transmitting Group No. 1)	
	3S5, 3S6, 3S7, 3S8 (Transmitting Group No. 2)	
	4S3, 4S6 (Transmitting Group No. 1)	
	4S4, 4S5 (Transmitting Group No. 2)	
Cooling System:		
Water Level	1A2S1	Cooling system status
Water Temperature Out	1A6S5, 1A6S6, 1A6S7 1A6S8	Cooling system status
Water Flow	1A6S1, 1A6S2, 1A6S3, 1A6S4	Filament turn on
Water Temperature In	1A6S9	Filament turn on
Air Flow	1S1, 1A4S1	Filament turn on
Air Flow (Dummy Load)	4S1, 4S2	High voltage turn on (Standby transmitter group)
Voltage, Current, Temperature:		
1st IPA cathode overloads	1A4K1, 1A4K2	Plate and Bias voltage turn off
PA bias overloads	1A4K4, 1A4K5	
PA cathode overloads	1A6K1, 1A6K2, 1A6K3, 1A6K4	
10.75 kvdc overload	1A53A4K1	
21.5 kvdc overload	1A53A4K2	
460 vac overload	1A53A3T5, 1A53A3T6, 1A53A3T7	
460 vac voltage regulator:	1A53A3A1:	
Overtemperature	TS1, TS2	
460 vac undervoltage	A1, A2, A3	
208 vac undervoltage	A4	
460 vac overload	CTA, CTB, CTC	
120/208 vac undervoltage	1A53A3M1	Power turn on
-120 vdc overload	1A53A3K36	Power turn on
-120 vdc undervoltage	1A53A3K37	Power turn on
-5000 vdc undervoltage	1A53A7K2	High voltage turn on
-1100 vdc undervoltages	1A4K6, 1A4K7	High voltage turn on

TABLE 4-2. SENSING INPUTS AND CONTROLLED CIRCUITS (Cont)

CIRCUIT	SENSING COMPONENTS	CONTROLLED CIRCUIT
High voltage transformer temperature	1A53A6S1	High voltage turn on
208 vac overvoltage	1A53A3M1	Trips 208 vac circuit breaker
21.5 kv overvoltage	1A53A7K1	Trips 460 vac circuit breakers

(d) REMOTE INPUTS. - The transmitter control equipment sends the mode input (operate, standby, or standby test) and the emergency stop signals to control circuits in the transmitting set. The operate signal is received by one of the transmitting groups while the other is the standby. The standby test signal is used only for test purposes. The emergency stop signal trips both the 208 vac and 460 vac circuit breakers.

(e) LOCAL INPUTS. - In normal operation the controls of control-indicator (1A53A2) relay assembly (1A53A3) and indicator panel (1A12) of both transmitting groups are set to the following positions:

- POWER (1A53A2S17) to ON
- FILAMENTS (1A53A2S13) to ON
- BIAS AND LOW VOLTAGE (1A53A2S7) to ON
- PLATE SELECTOR (1A53A2S18) to OPERATE
- HV RECTIFIER POWER (1A53A3S1) to ON
- LOCKED ON (1A53A3S2) locked
- 460 V INPUT (1A53A3CB1) to ON
- 208 vac circuit breaker (1A53A3CB2) to ON
- LOCKOUT-READY (1A12S1) to READY
- EMERGENCY STOP (1A53A2S19) to RUN

(f) OUTPUTS. - The relay-switch logic of 1A4, 1A12, 1A53, unit 3, and unit 4 processes the input signals to control the following operations:

- Sequentially turns on motors, filament, bias and low voltage, and high voltage power.
- Transfers signal output from dummy load to antenna.
- Turns on dummy load blower motor when high voltage is turned on in the standby transmitting group.
- Discharges high voltage circuits when bias and low voltage are turned off.
- Delays overload sense on bias and high voltage turn on.
- Selects input signal to 1A4 first stage.
- Transmits status indications to the transmitter control equipment.
- Resets three-strike circuit.

(g) SEQUENTIAL POWER TURN ON. - See figure 4-14. The power turn on circuits ensure that the cooling system, filaments, bias and low voltage, and high voltages are turned on in that order. The cooling system motors 1A2U39B1, 1A4B1, and 1B1 receive unregulated 208 vac, 3 phase when a motor turn on signal energizes relay-contactors in 1A11. Filament power is distributed from 1A11 when a filament turn on signal is received by relay 1A53A3K3 after the motors are running. After a delay to warm up the filaments, the bias and low voltages are supplied when a turn on signal energizes relay 1A53A3K4. Note that the HIGH VOLTAGE RECTIFIER POWER switch (1A53A3S1) must be closed and locked on with 1A53A3S2 to enable bias turn on. After the bias turn on the 460 vac voltage regulator (1A53A3A1) is turned on. The output of the regulator is stepped up, rectified, and supplied to the high voltage circuits of 1A6 and 1A4. A relay that senses the high voltage circuit, ensures that plate voltages are at the proper operating level before screen voltages are applied to the screens of the first IPA tubes 1A4V9 and 1A4V10.

(h) ANTENNA TRANSFER. - Antenna switching logic ensures that when a transmitting group is selected as the operate group, its output is connected to the antenna coupler and the standby group to the dummy load. The dummy load blower is turned on when the standby group receives the standby-test command from the transmitter control equipment or when it is under local control and high voltage is turned on.

(i) HIGH VOLTAGE DISCHARGE. - See figure 4-15, sheet 4. Normally closed contacts of relays in relay assembly (1A53A1) ground the high voltage busses through discharge resistor assemblies 1A53A19 and 1A53A20. These relays remain de-energized until the bias and low voltages are turned on, removing the ground. When the bias and low voltages are turned off the relays again ground the discharge resistor assemblies to discharge the high voltage capacitors.

(j) DELAY OVERLOAD SENSE. - On bias and high voltage turn on, transient overload inputs would be detected by sensing circuits causing turn off of bias, low voltage, and high voltage circuits. A time delay circuit is provided to inhibit these sensing circuits in 1A4 and 1A53A3 for a short interval after initial high voltage turn on.

(k) INPUT SIGNAL CONTROL. - The input circuit to the first amplifier stage of amplifier group (1A4) is controlled by ~~two~~ ONE relays. When the amplifier group is in the operate mode, ~~the~~ THIS relay selects a fixed level input; in the local mode or standby test mode a variable level input is enabled. ~~The other relay connects the input circuit of the first stage to the input transformer only after the high voltage has reached its proper operating level, otherwise it grounds the input circuit. It also grounds the input circuit when the QUIESCENT CURRENT switch (1A4S2) is operated to read PA cathode current.~~ THE OTHER RELAY →

(l) REMOTE STATUS INDICATIONS. - The remote control of the Loran Transmitting Set is governed by four status inputs sent from each transmitting group: cooling system, ready, high voltage on, and high voltage normal. These signals represent the status of the following circuits:

- Cooling system: Summation of all water and air cooling circuits.

- Ready: Cooling system operative, filament heated, bias and low voltages normal, and transmitting group is under remote control (LOCKOUT-READY switch set to READY).

- High voltage on: Cooling system operative, filament, bias, low and high voltage turned on.

- High voltage normal: Same as high voltage on, except high voltages are at normal operating level.

(m) RESET LATCHED RELAYS. - When three overloads have occurred in a preset interval, the bias, low and high voltage are turned off and latched relays prevent turn on until the OVERLOAD AND 3 STRIKE RESET switch is depressed. Operating this switch resets these relays as well as latched fault indicator relays and indicator lamps.

(2) PRIMARY POWER DISTRIBUTION. - Distribution of regulated and unregulated 208 vac three-phase 50/60 Hz 4 wire and 460 vac, three-phase 50/60 Hz primary power is shown in figure 4-14. As indicated in the figure, power is controlled by switches and transmitter control circuits. The following description of primary power distribution assumes that the following switches are set to positions indicated:

- EMERGENCY STOP switch 1A53A2S19 to RUN

- 208 vac circuit breaker 1A53A3CB2 to ON

- POWER switch 1A53A2S17 to ON

- FILAMENTS switch 1A53A2S13 to ON

- BIAS PEDESTAL CONTROL SWITCH 1A4S8 to ON

- BIAS AND LOW VOLTAGE switch 1A53A2S7 to ON

- HIGH VOLTAGE RECTIFIER POWER switch 1A53A3S1 to ON

- LOCKED ON switch 1A53A2S2 locked

- 460 V INPUT circuit breaker 1A53CB1 to ON

- PLATE VOLTAGE SELECTOR switch 1A53A2S18 to MAINT OR OPERATE.

(a) 208 VAC DISTRIBUTION. - When the EMERGENCY STOP switch is set to RUN and the 208 vac circuit breaker set to ON power is distributed as follows:

- Unregulated 120 vac is available for the 208 vac circuit breaker shunt trip circuit.

- Regulated 120 vac is supplied to the transmitter control circuits, the negative power supply 1A4A3A1, and the filament transformer of the bias pedestal power supply.

- Regulated 208 vac single-phase is supplied to operate the 460 vac voltage regulator 1A53A3A1.

- With the POWER switch set to ON and enabled by transmitter control, unregulated 208 vac three-phase power is supplied to the second IPA blower 1A4B1, enclosure blower 1B1, and water pump motor 1A52U39B1.

NOTE

Unregulated 208 vac three-phase power is distributed to the dummy load blower 4B1 only when 460 vac is applied to the high voltage transformer 1A53A6T1 in standby transmitting group.

- With FILAMENTS switch set to ON and enabled by transmitter control, regulated 208 vac three-phase power is supplied to the filament transformers of 1A4 and 1A6.

- With BIAS PEDESTAL CONTROL SWITCH, BIAS AND LOW VOLTAGE, and HIGH VOLTAGE RECTIFIER POWER switches set to ON; LOCKED ON switch locked, and enabled by transmitter control, distribution is as follows:

- Regulated 208 vac three-phase is supplied to the -5000 vdc and 500 vdc power supply 1A53A6A1.

- Regulated 208 vac single-phase is supplied to the left and right -1100 vdc PA bias power supplies in 1A4.

- Regulated 120 vac is supplied to the bias pedestal power supply 1A4A4.

(b) 460 VAC DISTRIBUTION. - When the 460 V INPUT circuit breaker is set to ON, one phase is stepped down to 120 vac to operate the 460 vac circuit breaker shunt trip circuit. The 120 vac is stepped down to 26.5 vac to operate transmitter control relays.

With the PLATE VOLTAGE SELECTOR switch set to either MAINT or OPERATE and enabled by transmitter control, 460 vac three phase is supplied to the high voltage transformer 1A53A6T1.

(3) TRANSMITTER CONTROL CIRCUIT DESCRIPTION. - The following paragraphs and associated figure 4-15, describe the operation of transmitter control circuits. Circuit descriptions are presented in the following sequence:

- Motor control (Sheet 1)
- Start transfer (Sheet 2)
- Filament turn-on (Sheet 3)
- Bias and low voltage turn-on (Sheet 4)
- High voltage turn-on (Sheet 5)
- Protection (Sheets 6 and 7)
- Shunt trip (Sheet 8)
- Lighting (Sheet 9)

NOTE

Control and indicator circuits identified on figure 4-15 (transmitter control) are only shown in simplified form for reference. These circuits are part of the transmitter control equipment, not supplied with Loran Transmitting Set AN/FPN-44. Refer to the Timing, Pulse Generating, and Transmitter Control Equipment Technical Manual for circuit details.

(a) MOTOR CONTROL. - This circuit (figure 4-15, sheet 1) performs the following functions:

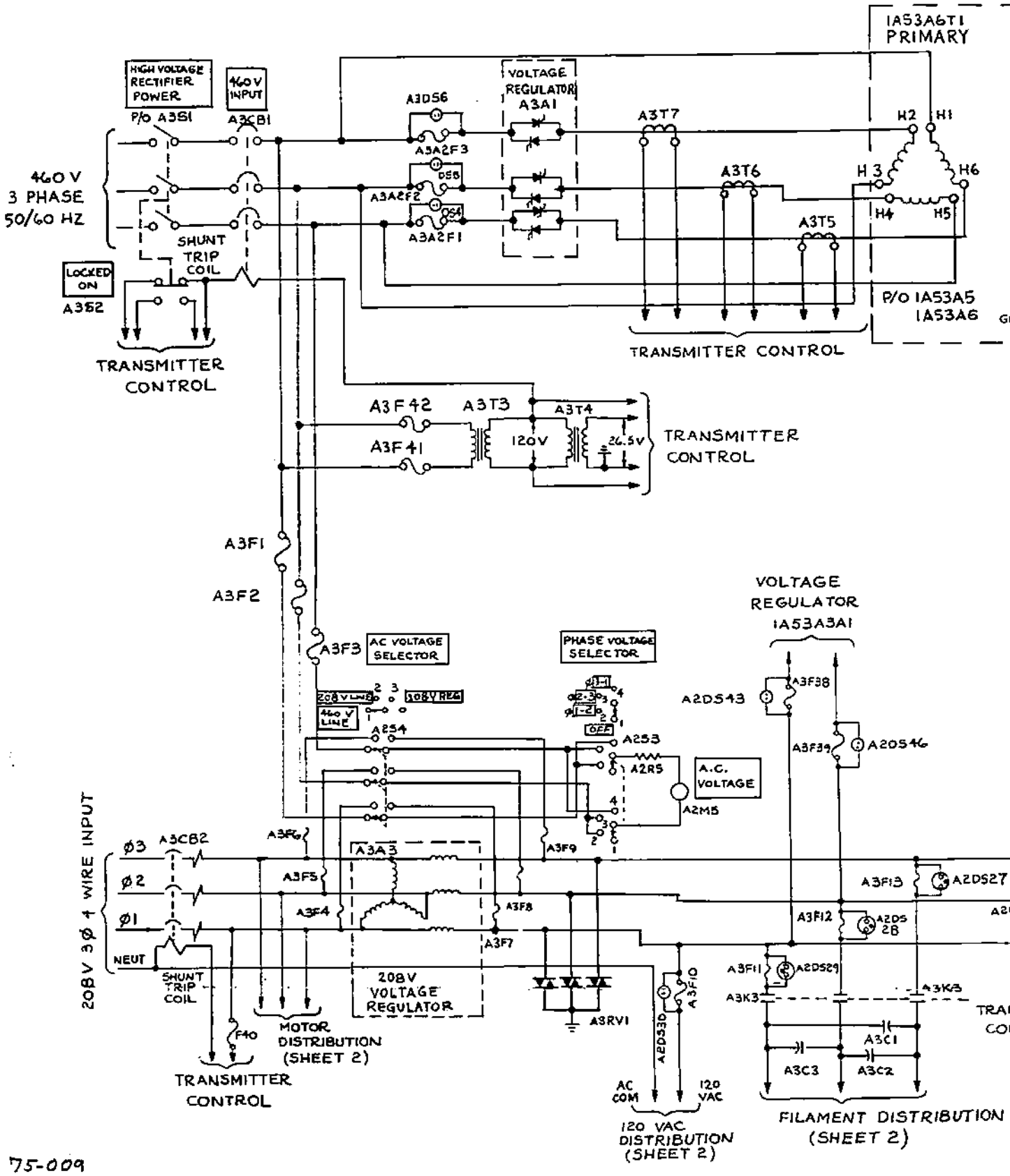
- Turns on motors.
- Enables antenna coupling switching to the operating transmitting group.
- Enables the sequential turn on of filament, bias and high voltage power.
- Provides for automatic restart if 208 vac power is momentarily interrupted in the remote mode.
- Disables automatic restart if 208 vac power is momentarily interrupted in the local mode.
- Provides for cooling after shut-down.
- Provides status indications of cooling systems.
- Provides optional remote power-on capability.

The second IPA blower motor 1A4B1, enclosure motor 1B1, and water pump motor 1A2U39B1 are simultaneously turned on by energizing 1A11K1, 1A11K2, and 1A11K3, respectively. The circuit consists of POWER switch 1A53A2S17, and relays 1A53A3K51, 1A53A3K40, and 1A53A3K5. When the POWER switch is in the OFF/RESET position relay 1A53A3K51 is latched on by its contacts, so that when the POWER switch is set to the ON position, it does not drop out. Relay contacts 1A53A3K40-4, -5 are normally closed and open only when meter-relay 1A53A3M1 or relays 1A53A3K36 or 1A53A3K37 have sensed malfunctions for more than two seconds. The sensed malfunctions are: 208 vac undervoltage or 120 vdc power supply overcurrent or undervoltage. Shut-down cooling relay 1A53A3K5 contacts remain closed (adjustable from 1 to 10 minutes) for 5.5 minutes after the coil is de-energized so that cooling can continue after a shutdown. An additional latching circuit is provided for relay 1A53A3K51 by the contacts of relay 1A53A3K44, when the LOCKOUT-READY switch 1A12S1 is in the READY position. This provides for automatic restart if there is an interruption of the 208 vac in remote operation mode only. To restart in the local mode, the POWER switch must be set to the OFF/RESET position and then to the ON position.

A status signal is provided to the remote control location to indicate the operation of water and air cooling. When relays 1A11K1, 1A11K2, and 1A11K3 are not energized or 1A12K14 is energized, a circuit is closed to the remote station to indicate a cooling fault. Relay 1A12K14 is energized when relay 1A12K7 or 1A12K8 is energized or 1A12K9 is de-energized. Relay 1A12K7 is energized when thermoswitch 1A6S9 is closed, indicating that the primary cooling inlet water temperature is above a preset level. Relay 1A12K8 is energized when any one of the primary cooling outlet water thermoswitches (1A6S5 through 1A6S8) is closed indicating that the outlet water temperature for a particular power amplifier tube is above a preset level. Relay 1A12K9 is de-energized when the water float switch is open indicating that the water level of the tank in 1A2 is low. The indicator lamps associated with relays 1A12K7, 1A12K8 and 1A12K9 are normally lit and go off when a fault is sensed. Relay 1A12K8, when energized by a fault, is latched, thereby keeping its associated indicator lamp off until reset by the OVERLOAD AND 3 STRIKE RESET pushbutton, shown in the protection circuits, figure 4-15, sheet 6.

An optional turn-on circuit is provided for the remote location, if a jumper is removed from 1A53A2TB37 terminals 1 and 2. The option provides for the remote control of the motor and filament turn on circuits.

(b) START TRANSFER. - The functions performed by these circuits (figure 4-15, sheet 2 and table 4-3) depends on the mode of operation and the selected transmitter group. Since the groups are functionally identical, to simplify presentation, the operation of transmitting group no. 1 is described in the various modes. The modes are: operate,


1A53A6T1
PRIMARY
HIGH VOLTAGE RECTIFIER POWER
P/O A3S1
460V INPUT
A3CB1
VOLTAGE REGULATOR A3A1
A3DS6
A3A2F3
A3A2F2
A3A2F1
DS5
DS4
A3T7
A3T6
A3T5
H2
H1
H3
H6
H4
H5
460 V
3 PHASE
50/60 HZ
SHUNT TRIP COIL
LOCKED ON
A3S2
TRANSMITTER CONTROL
P/O 1A53A5
1A53A6
TRANSMITTER CONTROL
A3F42
A3F41
A3T3
A3T4
120V
24.5V
TRANSMITTER CONTROL
A3F1
A3F2
A3F3
AC VOLTAGE SELECTOR
PHASE VOLTAGE SELECTOR
VOLTAGE REGULATOR
1A53A3A1
208 V LINE
460 V LINE
208V REG
OFF
A3S4
A3S3
A2R5
A.C. VOLTAGE
A2M5
A2DS43
A3F38
A3F39
A2DS46
208V 3Ø 4 WIRE INPUT
Ø3
Ø2
Ø1
NEUT
A3CB2
A3F6
A3F5
A3F4
A3A3
A3F9
A3F8
A3F7
A3F13
A2DS27
A3F12
A2DS 28
A3F11
A2DS29
A3K3
A3K3
A3RV1
A3F10
A2DS30
SHUNT TRIP COIL
F40
MOTOR DISTRIBUTION (SHEET 2)
208V VOLTAGE REGULATOR
TRANSMITTER CONTROL
A3C1
A3C3
A3C2
AC COM
120 VAC
120 VAC DISTRIBUTION (SHEET 2)
FILAMENT DISTRIBUTION (SHEET 2)

75-009

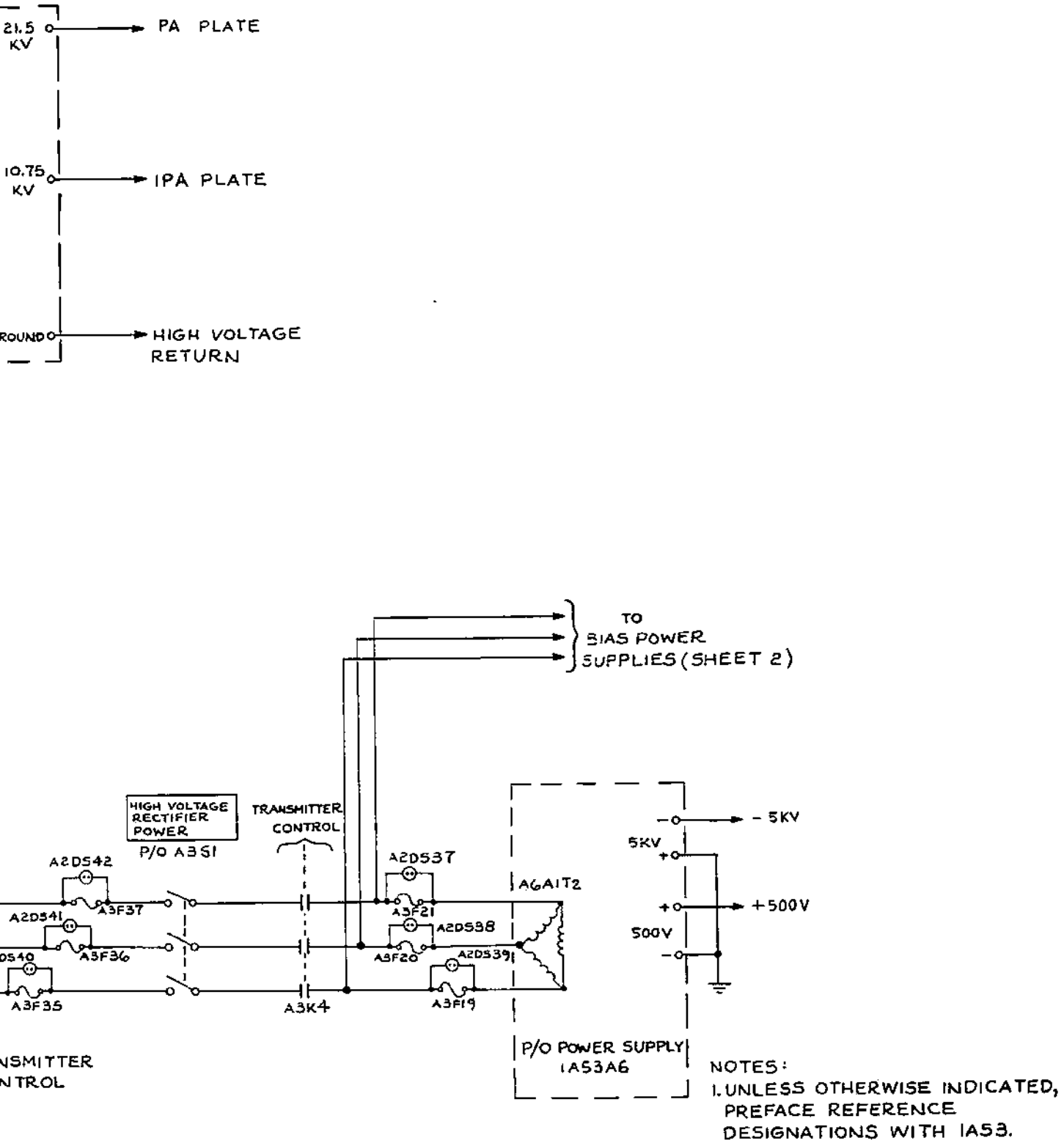
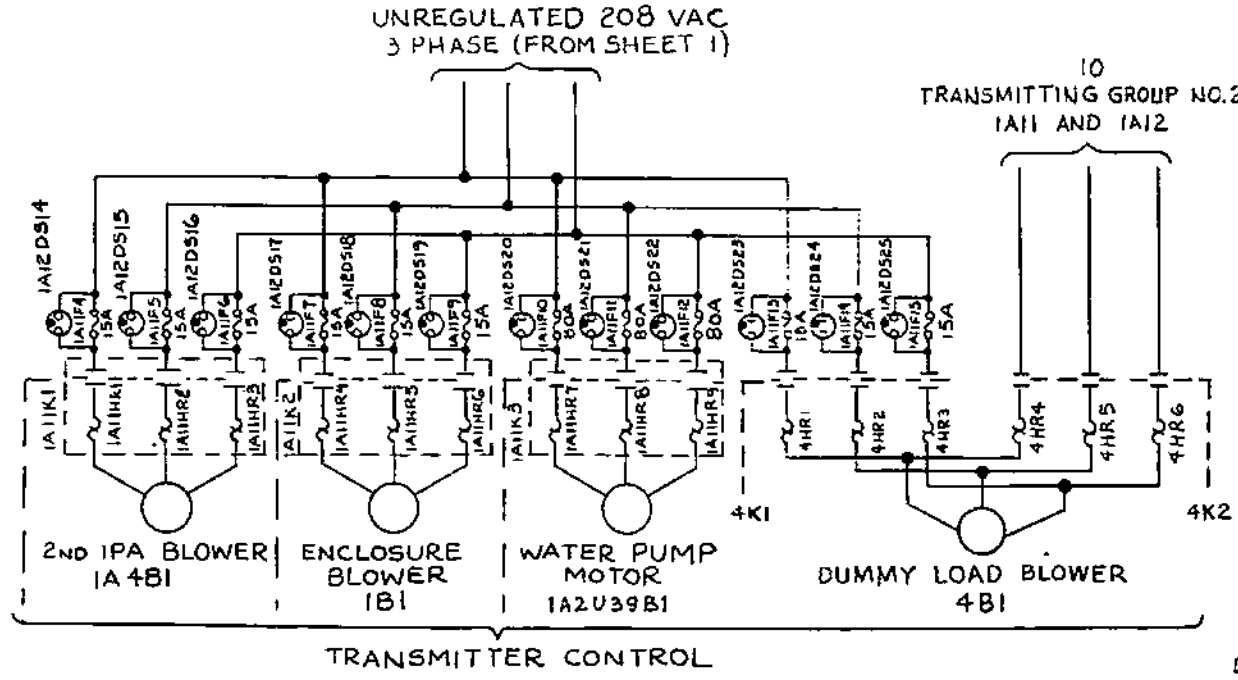
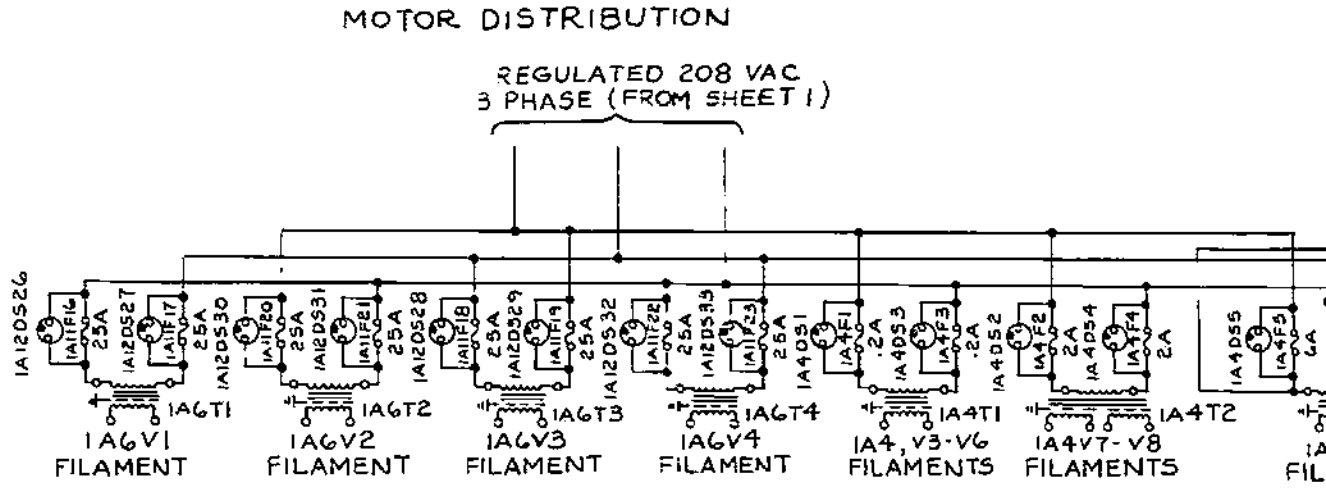


Figure 4-14. Primary Power Distribution
(Sheet 1 of 2)


UNREGULATED 208 VAC
3 PHASE (FROM SHEET 1)
10
TRANSMITTING GROUP NO.2
1A11 AND 1A12
REGULATED
208 VAC
3 PHASE
(FROM
SHEET 1)
1A12D514
1A12D515
1A12D516
1A12D517
1A12D518
1A12D519
1A12D520
1A12D521
1A12D522
1A12D523
1A12D524
1A12D525
1A11F4
1A11F5
1A11F6
1A11F7
1A11F8
1A11F9
1A11F10
1A11F11
1A11F12
1A11F13
15A
80A
1A11K1
1A11K2
1A11K3
1A11HR1
1A11HR2
1A11HR3
1A11HR4
1A11HR5
1A11HR6
1A11HR7
1A11HR8
1A11HR9
4HR1
4HR2
4HR3
4HR4
4HR5
4HR6
4K1
4K2
2ND 1PA BLOWER
1A 4B1
ENCLOSURE
BLOWER
1B1
WATER PUMP
MOTOR
1A2U39B1
DUMMY LOAD BLOWER
4B1
TRANSMITTER CONTROL
120 VAC
DISTRIBUTI
(FROM SHEE


MOTOR DISTRIBUTION
REGULATED 208 VAC
3 PHASE (FROM SHEET 1)
1A120526
1A120527
1A120528
1A120529
1A120530
1A120531
1A120532
1A120533
1A4D51
1A4D52
1A4D53
1A4D54
1A4D55
1A11F16
1A11F17
1A11F18
1A11F19
1A11F20
1A11F21
1A11F22
1A11F23
1A4F1
1A4F2
1A4F3
1A4F4
1A4F5
25A
2A
.2A
1A6T1
1A6T2
1A6T3
1A6T4
1A4T1
1A4T2
1A6V1
FILAMENT
1A6V2
FILAMENT
1A6V3
FILAMENT
1A6V4
FILAMENT
1A4, V3-V6
FILAMENTS
1A4V7-V8
FILAMENTS
FIL

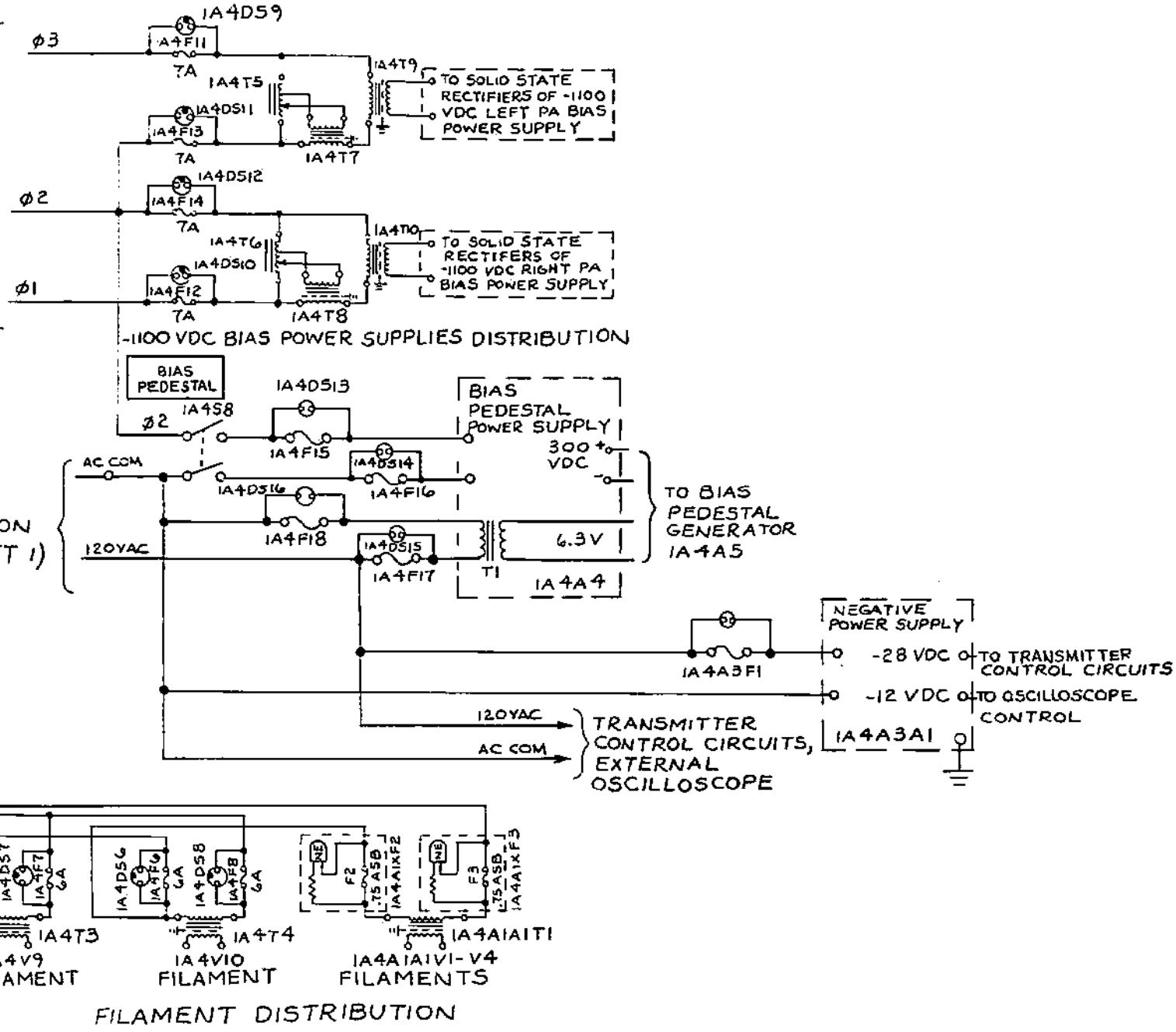
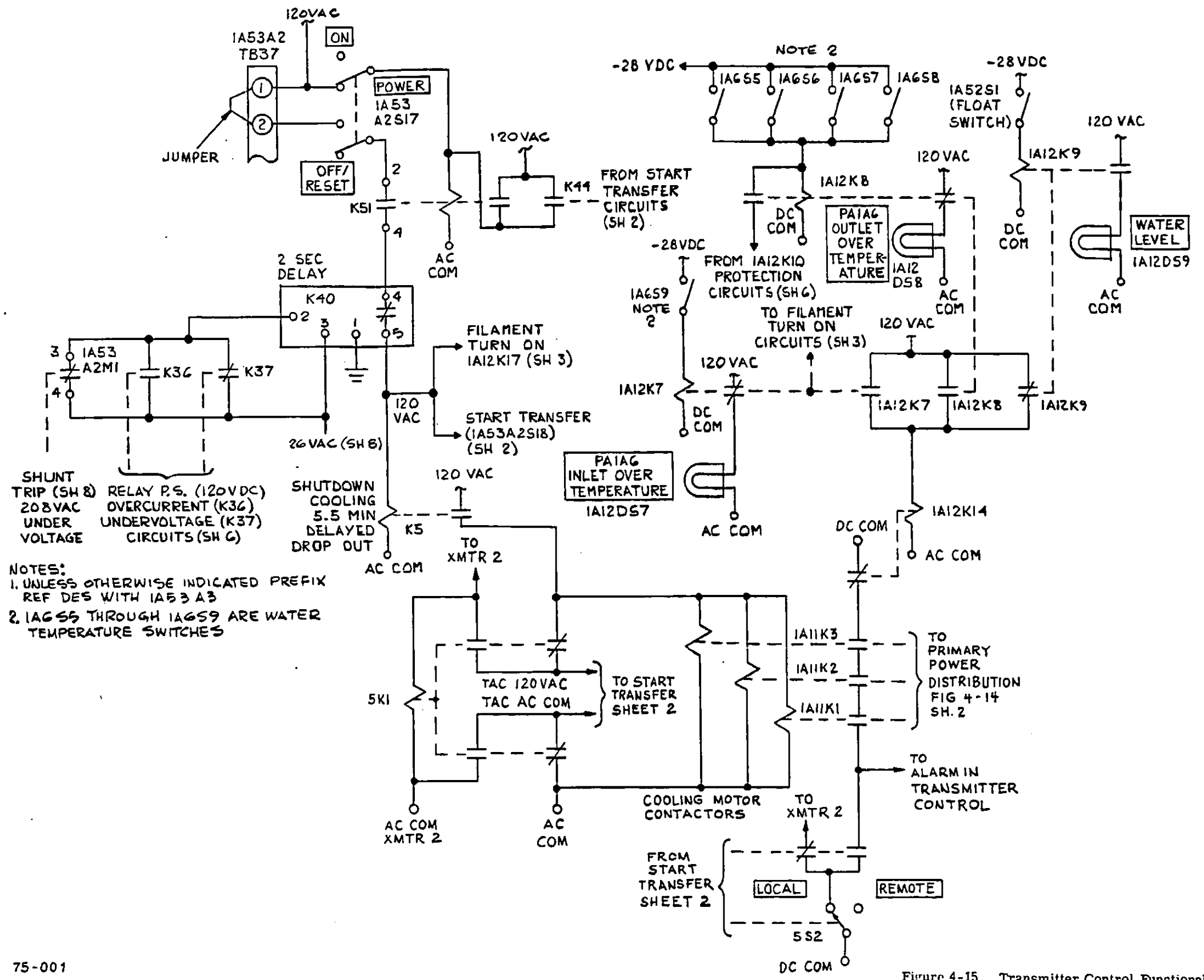


Figure 4-14. Primary Power Distribution
(Sheet 2 of 2)



75-001

Figure 4-15. Transmitter Control Functional Circuit Diagram (Sheet 1 of 9)

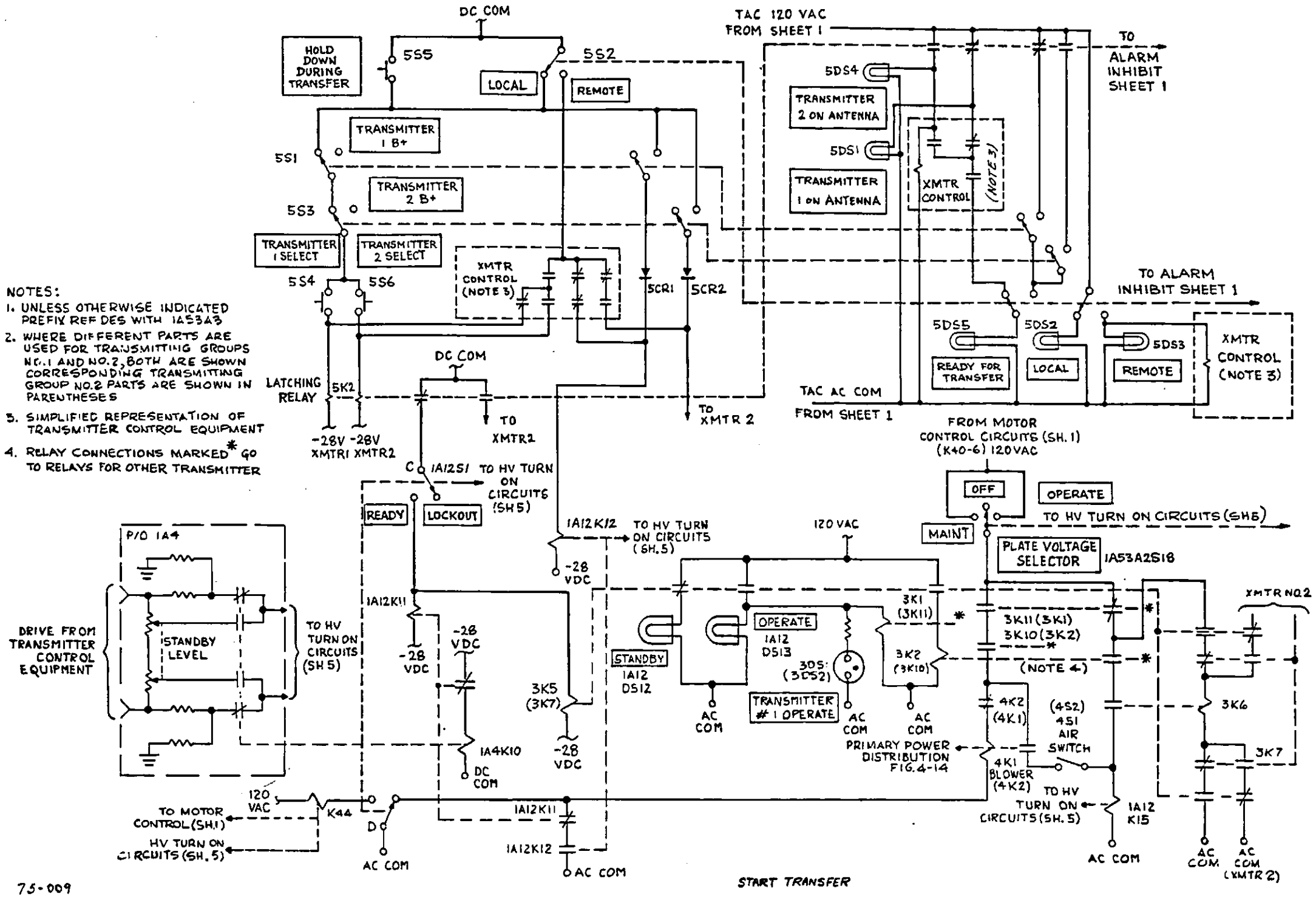
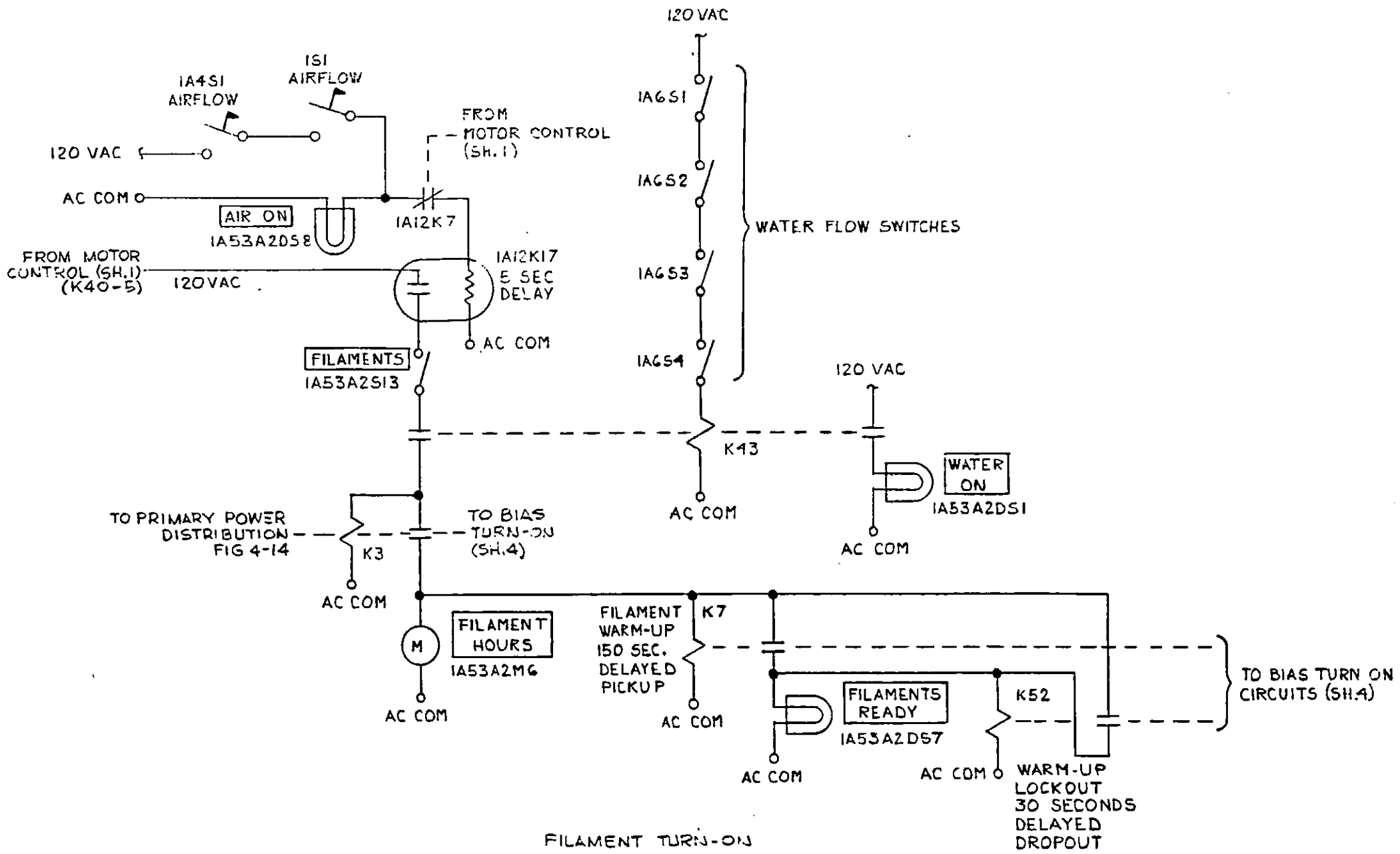


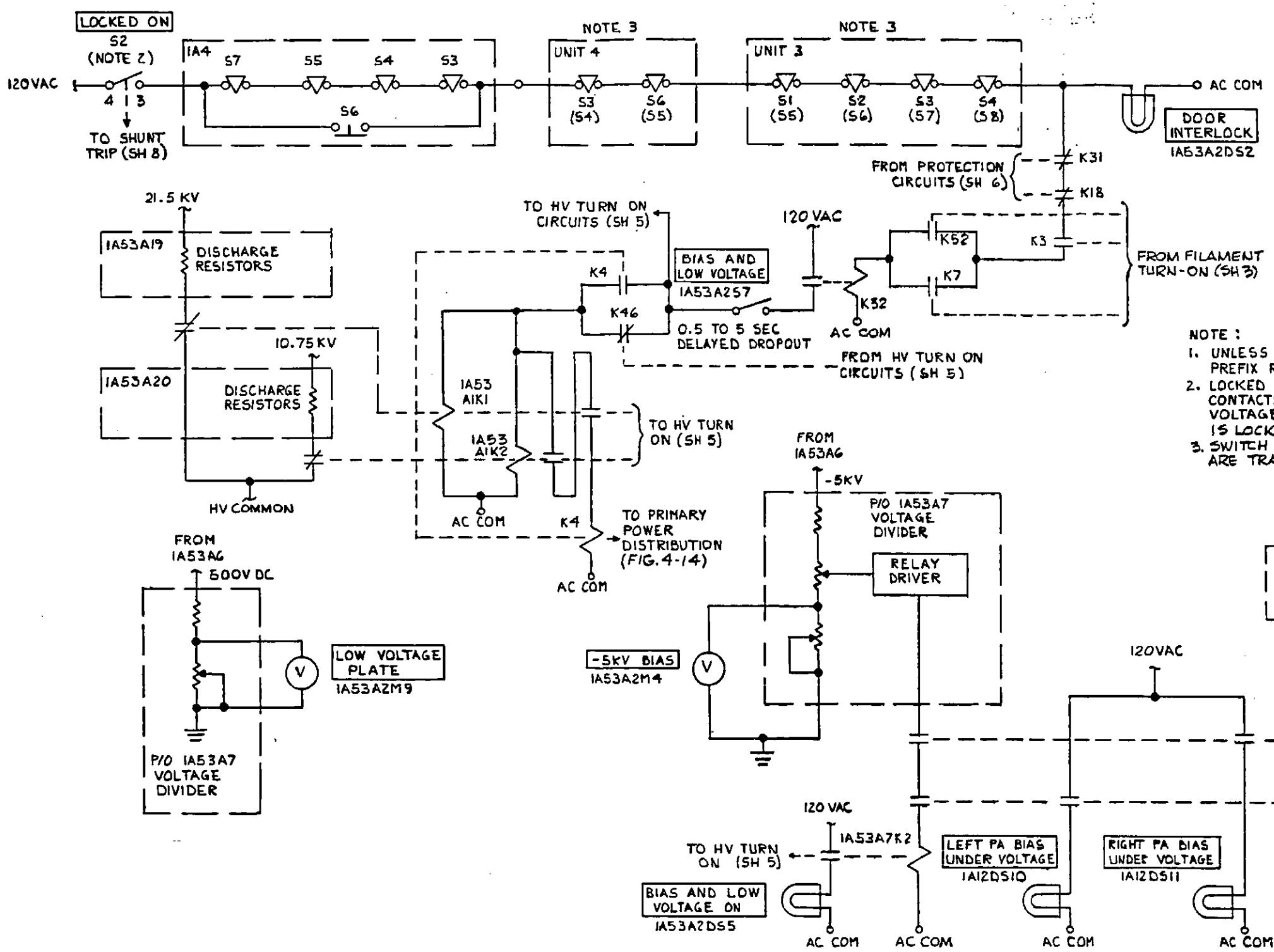
Figure 4-15. Transmitter Control Functional Circuit Diagram
(Sheet 2 of 9)



FILAMENT TURN-ON

75-007

Figure 4-15. Transmitter Control Functional Circuit Diagram (Sheet 3 of 9)

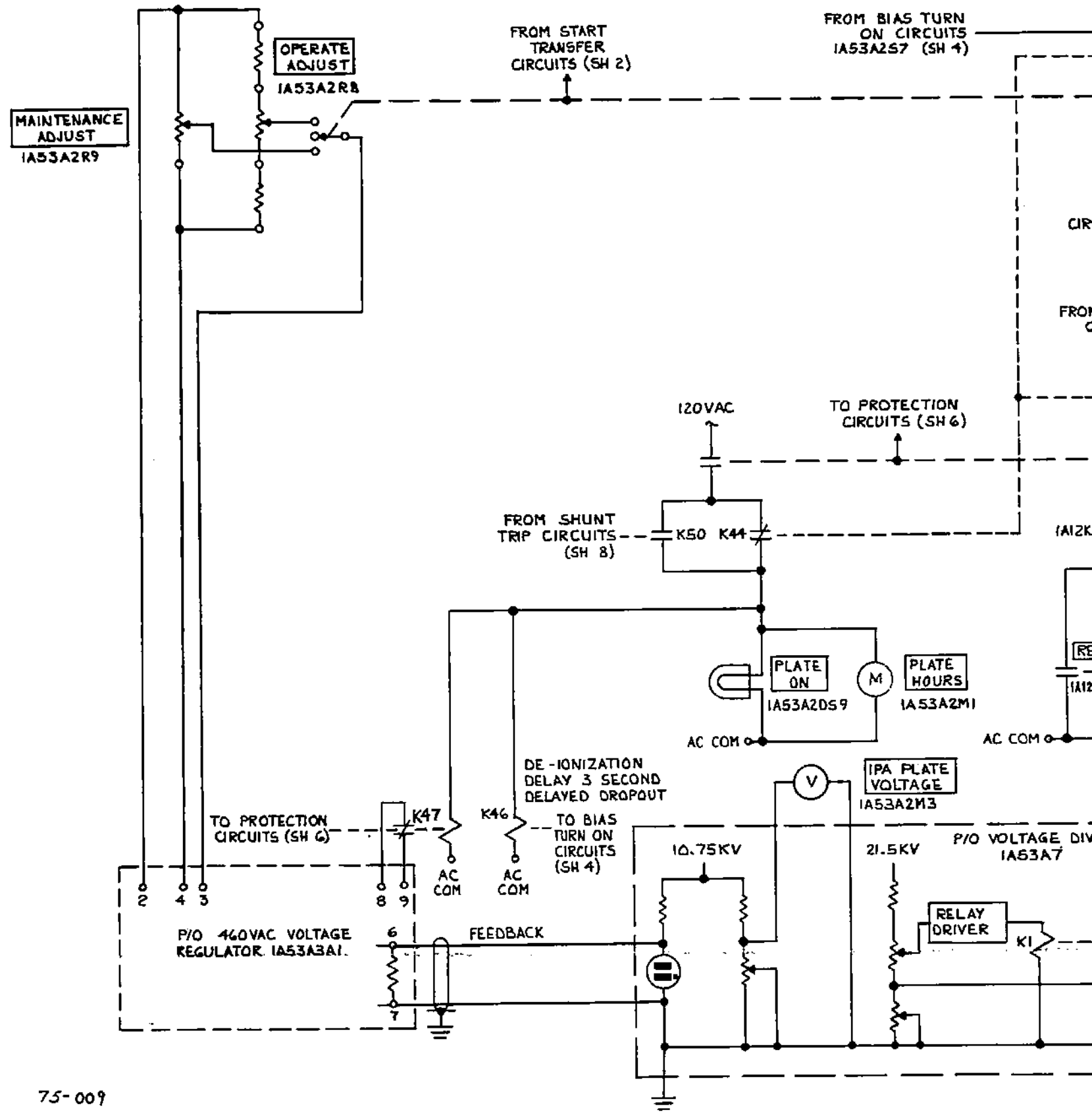


NOTE :
1. UNLESS OTHERWISE INDICATED PREFIX REF DES WITH 1A53A3.
2. LOCKED ON SWITCH S2B (KEY OPERATED) CONTACTS 3-4 CLOSED WHEN HIGH VOLTAGE RECTIFIER POWER SWITCH, S1, IS LOCKED.
3. SWITCH REF DES IN PARENTHESES ARE TRANSMITTER GROUP NO. 2

75-009

BIAS TURN ON CIRCUITS

Figure 4-15. Transmitter Control Functional Circuit Diagram (Sheet 4 of 9)


MAINTENANCE ADJUST
1A53A2R9
OPERATE ADJUST
1A53A2R8
FROM START TRANSFER CIRCUITS (SH 2)
FROM BIAS TURN ON CIRCUITS 1A53A2S7 (SH 4)
120VAC
TO PROTECTION CIRCUITS (SH 6)
FROM SHUNT TRIP CIRCUITS (SH 8)
K50
K44
PLATE ON
1A53A2DS9
M
PLATE HOURS
1A53A2M1
AC COM
AC COM
DE-IONIZATION DELAY 3 SECOND DELAYED DROPOUT
V
IPA PLATE VOLTAGE
1A53A2M3
TO PROTECTION CIRCUITS (SH 6)
K47
K46
TO BIAS TURN ON CIRCUITS (SH 4)
AC COM
AC COM
10.75KV
21.5KV
P/O VOLTAGE DIV 1A53A7
RELAY DRIVER
K1
2
4
3
8
9
6
7
P/O 460VAC VOLTAGE REGULATOR 1A53A3A1.
FEEDBACK

75-009

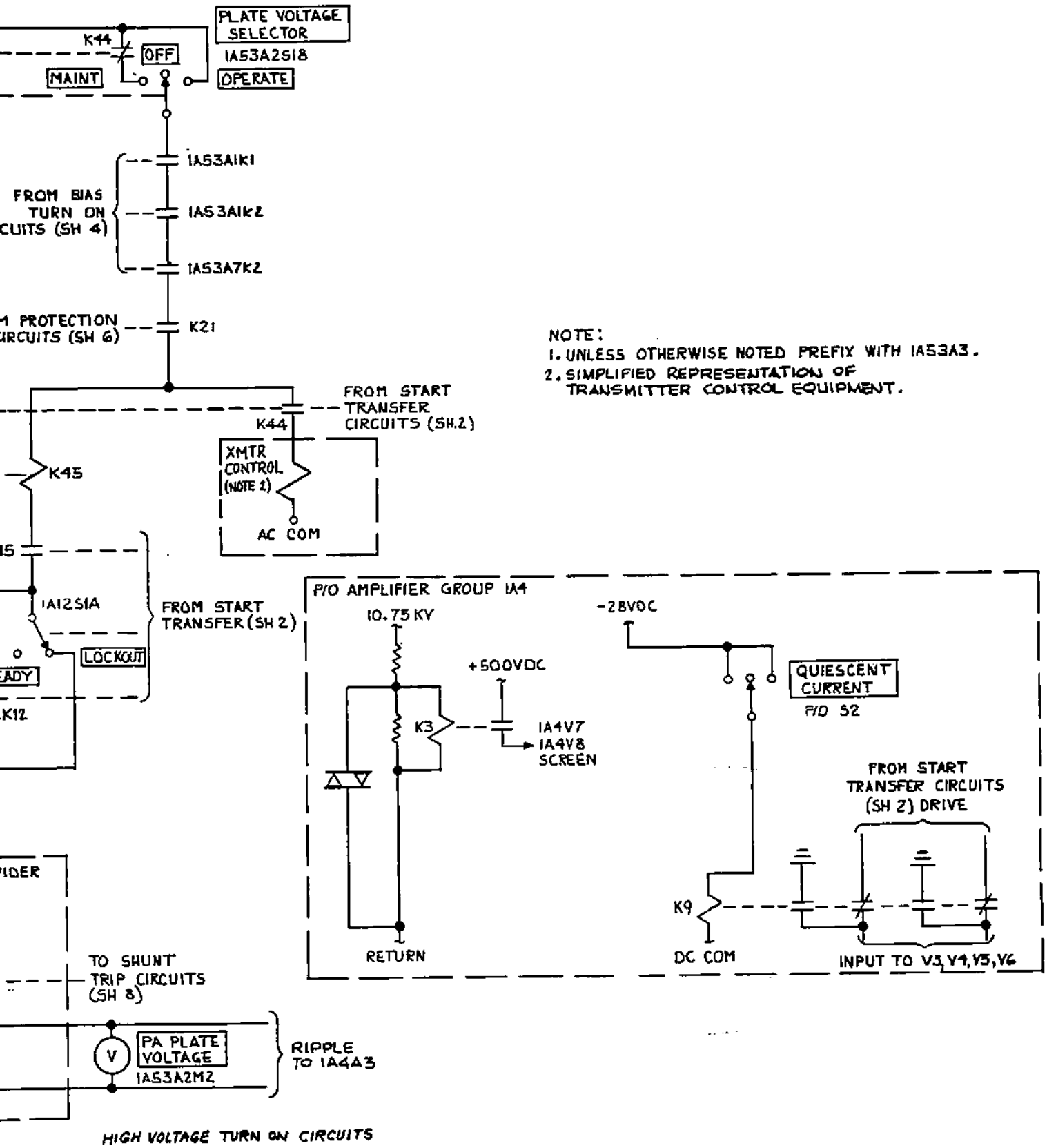
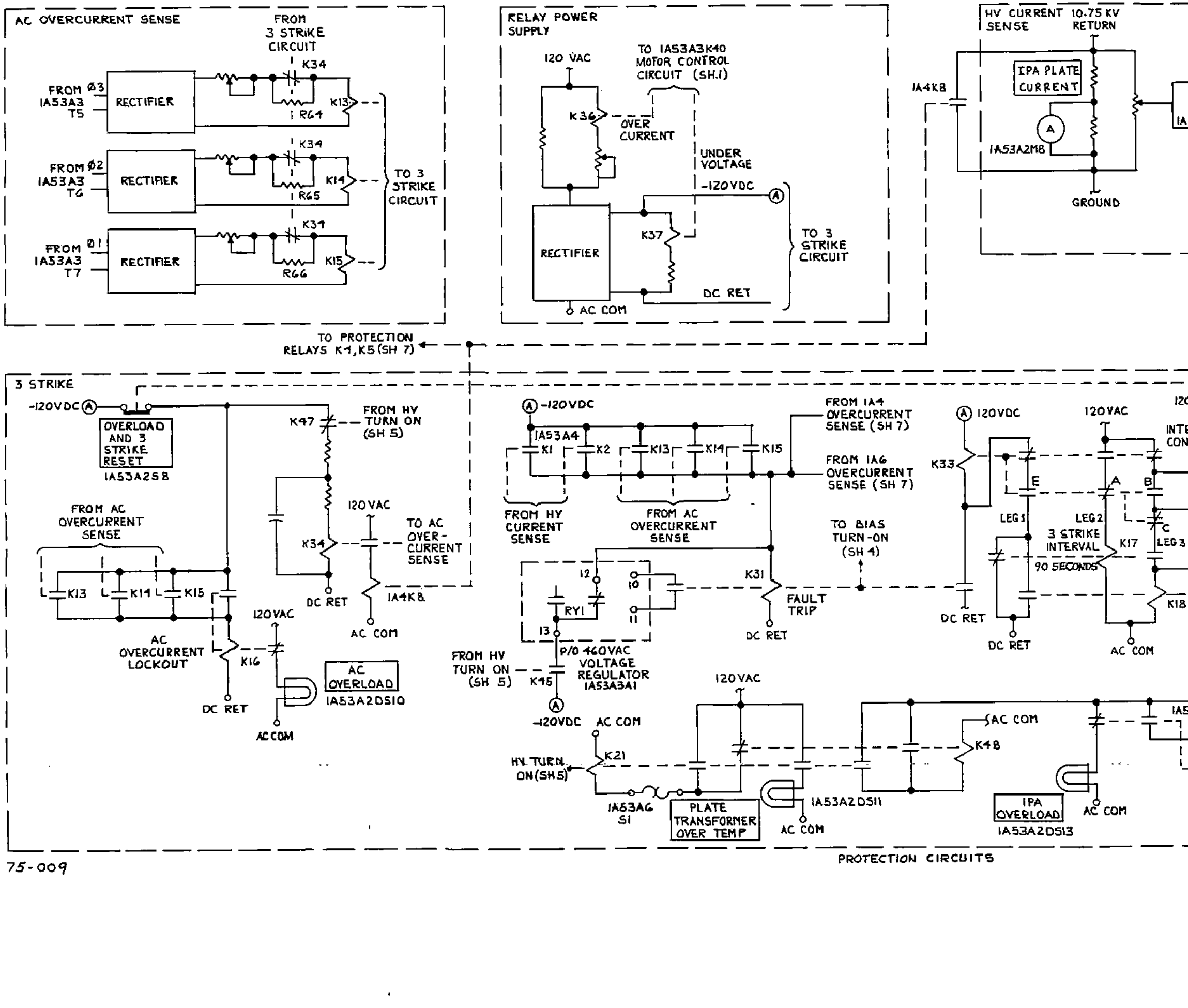


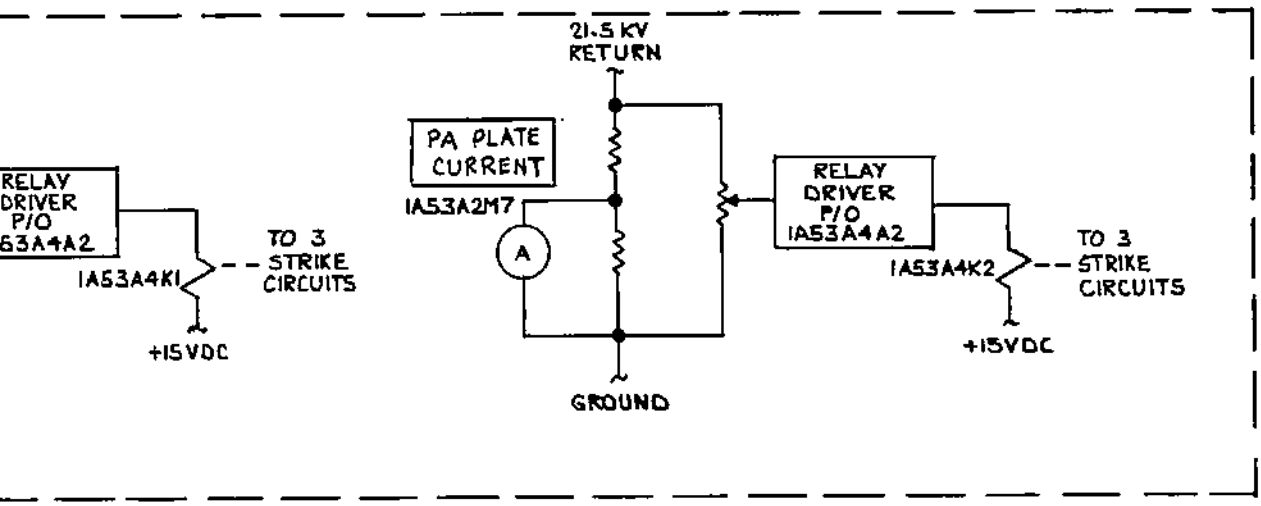
Figure 4-15. Transmitter Control Functional Circuit Diagram (Sheet 5 of 9)

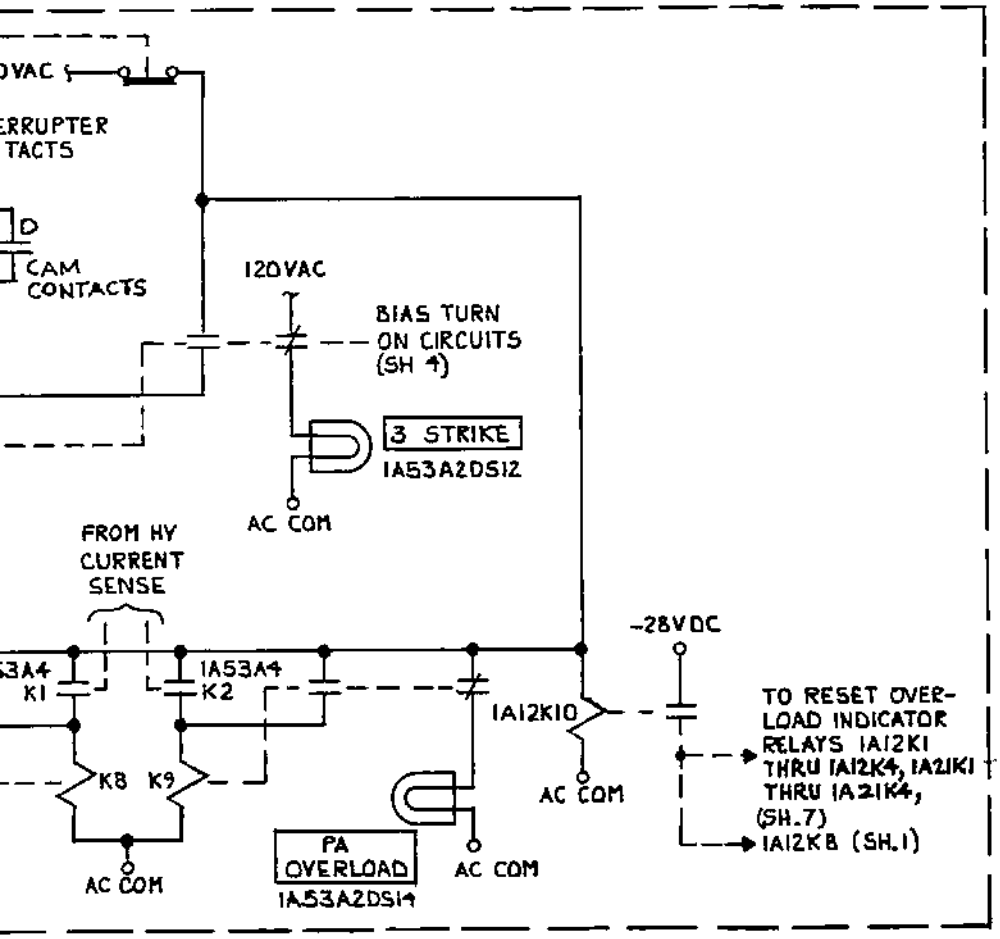
NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY FIELD CHANGES 3 AND 4 AND F.C. #9



75-009

PROTECTION CIRCUITS





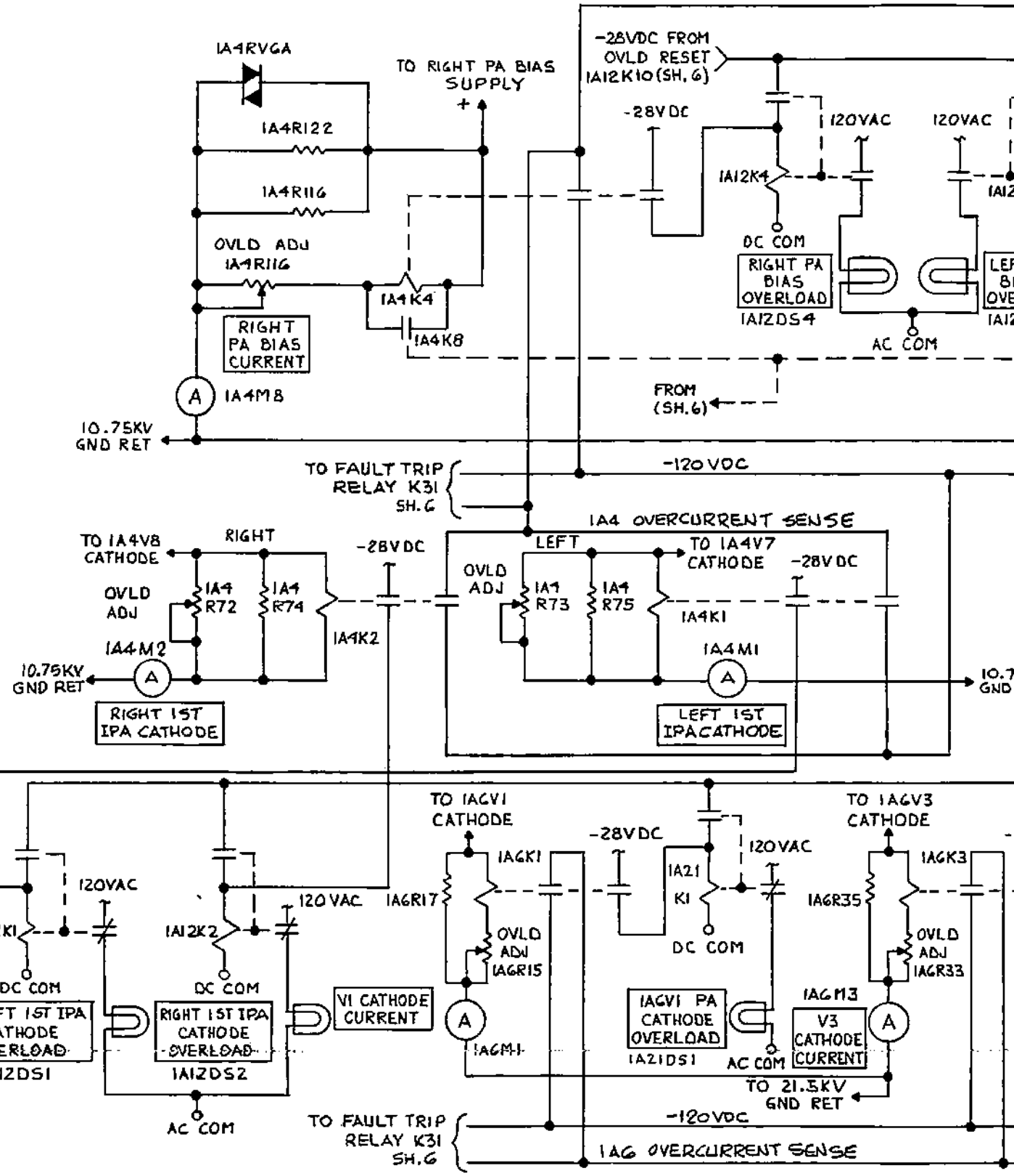
FAULT	CONTACT POSITION A	B	C	D	E
0	X	O	X	O	O
1	O	X	O	O	X
2	O	O	O	X	X
3	O	X	X	O	X

X = CLOSED
O = OPEN

NOTE:

1. UNLESS OTHERWISE NOTED PREFIX WITH 1A53A3

Figure 4-15. Transmitter Control Functional Circuit Diagram (Sheet 6 of 9)


1A4RVGA
TO RIGHT PA BIAS SUPPLY
+
-28VDC FROM OVLD RESET 1A12K10 (SH. 6)
-28VDC
120VAC
120VAC
1A4R122
1A4R116
1A12K4
OVLD ADJ 1A4R116
DC COM
RIGHT PA BIAS OVERLOAD
1A12DS4
1A4K4
1A4K8
AC COM
RIGHT PA BIAS CURRENT
A
1A4M8
FROM (SH. 6)
10.75KV GND RET
TO FAULT TRIP RELAY K31 SH. 6
-120VDC
1A4 OVERCURRENT SENSE
TO 1A4V8 CATHODE
RIGHT
-28VDC
LEFT
TO 1A4V7 CATHODE
-28VDC
OVLD ADJ
1A4 R72
1A4 R74
1A4K2
OVLD ADJ
1A4 R73
1A4 R75
1A4K1
1A4M2
1A4M1
10.75KV GND RET
RIGHT 1ST IPA CATHODE
LEFT 1ST IPACATHODE
TO 1AGV1 CATHODE
TO 1AGV3 CATHODE
-28VDC
120VAC
1AGK1
1AGR17
1A21 K1
1AGR35
1AGK3
120VAC
120VAC
1A12K1
1A12K2
OVLD ADJ 1AGR15
OVLD ADJ 1AGR33
DC COM
DC COM
DC COM
LEFT 1ST IPA CATHODE OVERLOAD
1A12DS1
RIGHT 1ST IPA CATHODE OVERLOAD
1A12DS2
V1 CATHODE CURRENT
1AGM1
1AGV1 PA CATHODE OVERLOAD
1A21DS1
AC COM
1AGM3
V3 CATHODE CURRENT
TO 21.5KV GND RET
AC COM
TO FAULT TRIP RELAY K31 SH.6
-120VDC
1AG OVERCURRENT SENSE

75-009

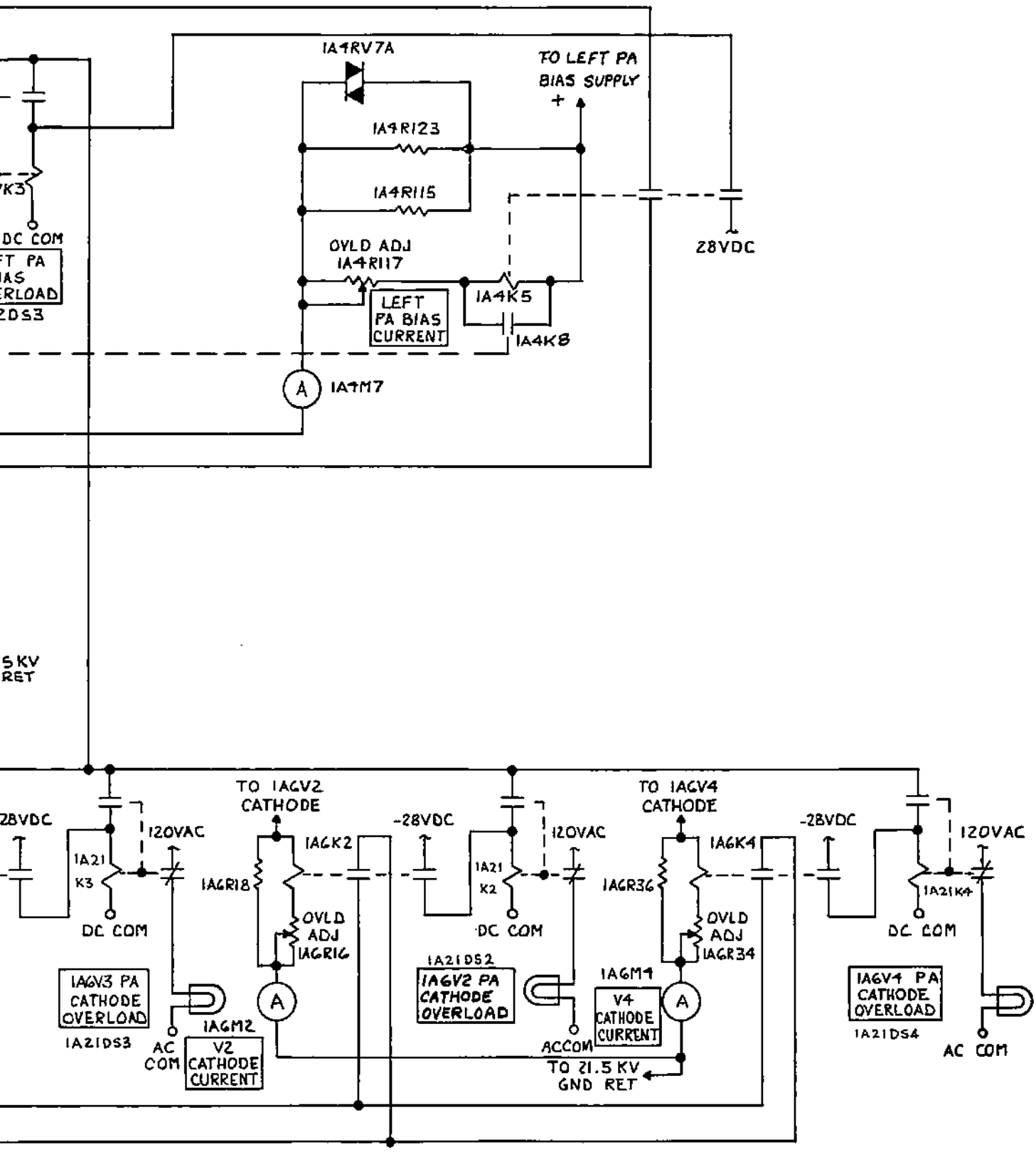
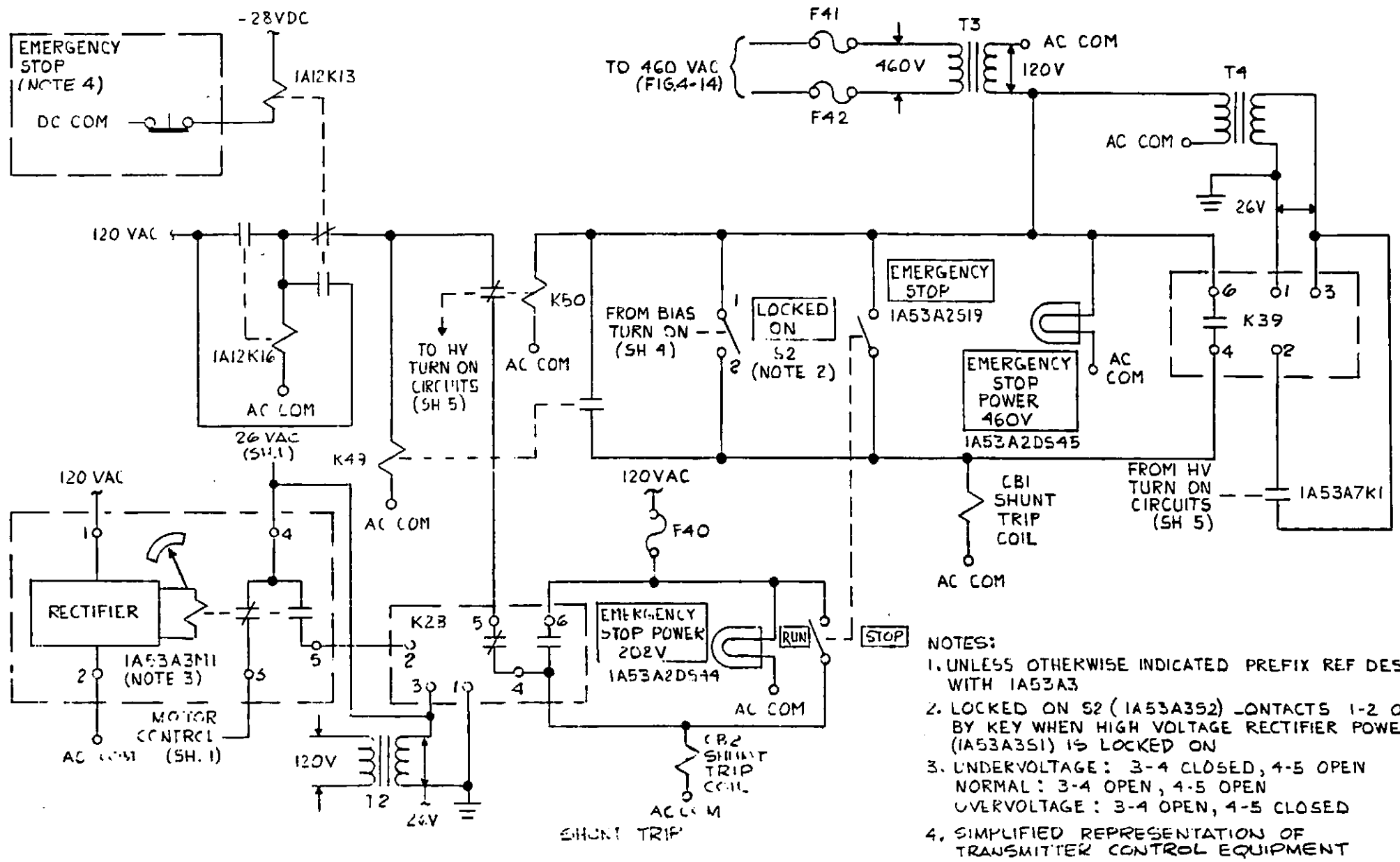


Figure 4-15. Transmitter Control Functional Circuit Diagram (Sheet 7 of 9)



NOTES:

1. UNLESS OTHERWISE INDICATED PREFIX REF DES WITH 1A53A3
2. LOCKED ON S2 (1A53A3S2) CONTACTS 1-2 OPENED BY KEY WHEN HIGH VOLTAGE RECTIFIER POWER S1 (1A53A3S1) IS LOCKED ON
3. UNDERVOLTAGE: 3-4 CLOSED, 4-5 OPEN
   NORMAL: 3-4 OPEN, 4-5 OPEN
   OVERVOLTAGE: 3-4 OPEN, 4-5 CLOSED
4. SIMPLIFIED REPRESENTATION OF TRANSMITTER CONTROL EQUIPMENT

75-CC-9

Figure 4-15. Transmitter Control Functional Circuit Diagram (Sheet 8 of 9)

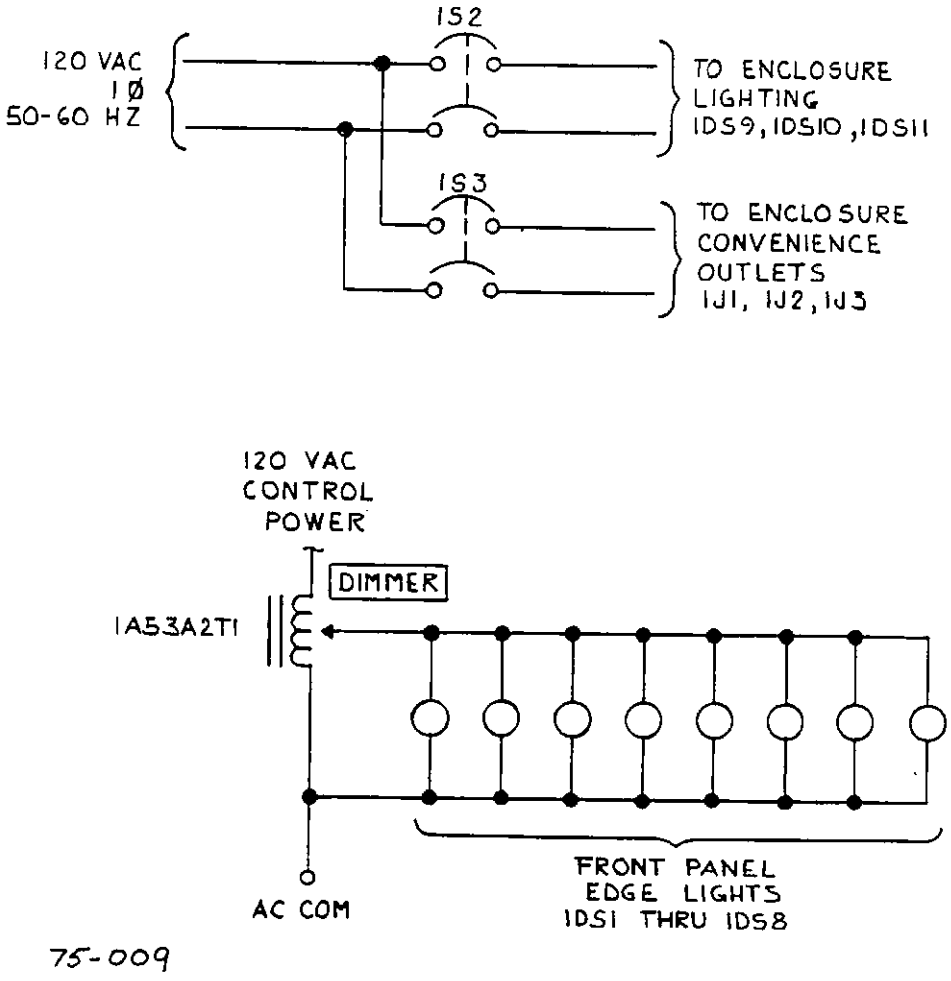


Figure 4-15. Transmitter Control Functional Circuit Diagram (Sheet 9 of 9)

TABLE 4-3. SUMMARY OF START TRANSFER FUNCTION IN VARIOUS MODES

XMTR NO. 1 MODE	SWITCH POSITIONS (NOTE 1)									RELAY STATUS (NOTE 2)						FUNCTIONS								LAMP STATUS (NOTE 2)		
	REMOTE				(1A12S1)		(1A53A2S18) PLATE VOLTAGE SELECTOR			1A12K11 3K1, 3K2 3K5, 3K6	1A12K12	1A12K15	4K1	1A4 K9	1A53-A3 K44	XMTR NO. 1 OUTPUT CONNECTED TO		HV TURN ON		DUMMY LOAD MOTOR		1A4 INPUT LEVEL		(1A12-DS13) OPER-ATE	(1A12-DS12) STAND-BY	(3DS1) TRANS-MITTER NO. 1 OPERATE
	XMTR SELECTOR		STANDBY TEST													ANT	D.L.	ON	OFF	ON	OFF	FIXED	ADJ			
	NO. 1	NO. 2	ON	OFF	READY	LOCKOUT	OP	MAINT	OFF																	
OPERATE	X			X	X		X			X	X	X			X	X		X			X	X		X		X
STANDBY		X		X	X		X							X	X		X		X		X		X		X	
STANDBY TEST		X	X		X		X				X	X	X	X	X		X	X		X		X		X		
LOCKOUT		X		X		X	X or X					X	X	X			X	X		X		X		X		

NOTES

1. SELECTED SWITCH POSITION INDICATED BY "X"
2. ENERGIZED RELAYS OR LAMPS INDICATED BY "X"

standby, standby test and lockout. Mode selection is controlled by the following switches: Xmtr Selector, Standby Test, and LOCKOUT-READY 1A12S1. A station is normally operated with one transmitting group in the operate mode and the other transmitting group in the standby mode. The standby test and local modes are used for test and maintenance.

1. OPERATE MODE. - In the operate mode, as indicated in table 4-3, Xmtr Selector is set to Xmtr No. 1, Standby Test is off, LOCKOUT-READY is set to READY, and the PLATE VOLTAGE SELECTOR switch is set to OPERATE. With this switch configuration the following relays are energized: 1A12K11, 3K1, 3K2, 3K5, 3K6, 1A12K12, 1A12K15, and 1A53A3K44. Relays 1A4K9, 3K7 and 4K1 are not energized. Relay 1A12K11, energized only when Xmtr No. 1 and READY are selected, enables the operation of 3K5 and disables 1A4K9. Relay 3K5 enables 3K1, 3K2, OPERATE indicator lamp 1A12DS13 and TRANSMITTER NO. 1 OPERATE lamp 3DS1 and disables STANDBY indicator lamp 1A12DS12. Relay 3K6 is energized via the closed contacts of relays 3K1, 3K2, and 3K7. Relay 1A12K15 is energized via the closed contact of relays 3K1, 3K2, and 3K6. Relay 1A53A3K44 is energized by selecting the READY position. Relay 1A12K12 is energized by selecting Xmtr No. 1. The functions performed by this relay configuration are:

- When relay 3K1 is energized, the output of transmitting group no. 1 is connected to the antenna.

- When relay 3K2 is energized, the ground circuit of transmitting group no. 1 is connected to the counterpoise.

- When relay 3K6 is energized, the ground is removed from the antenna.

- Relay 1A12K15 must be energized to enable the high voltage turn on.

- When relay 1A4K9 is not energized, the input to the amplifier group (1A4) is at a fixed drive level.

- Functions of relays 1A12K12, 1A12K15, and 1A53A3K44 are shown on figure 4-15, sheets 1 and 5.

- When relay 3K5 is energized, the OPERATE indicator lamp 1A12DS13 and TRANSMITTER NO. 1 OPERATE indicator lamp 3DS1 are lit.

2. STANDBY MODE. - In the standby mode, the Xmtr Selector is set to Xmtr No. 2, LOCKOUT-READY switch 1A12S1 is set to READY, and the PLATE VOLTAGE SELECTOR switch 1A53A2S18 is set to OPERATE. With this switch configuration only relays 1A4K9 and 1A53A3K44 are energized. The functions performed by operated and unoperated relays are as follows:

- When relay 3K1 is not energized, the output of transmitting group no. 1 is connected to the dummy load.

- When relay 3K2 is not energized, the transmitting group no. 1 ground is connected to the dummy load ground.

- When relay 4K1 is not energized dummy load blower is not turned on.

- When relay 1A12K15 is not energized, high voltage turn-on is not enabled.

- When relay 1A4K9 is energized, the input to the amplifier group (1A4) is an adjustable drive level.

- When relay 3K5 is not energized, the STANDBY indicator lamp 1A12DS12 is lit.

- Other functions of relays 1A12K12 and 1A53K44 are shown on figure 4-15, sheets 1 and 5.

3. STANDBY TEST MODE. - In the standby test mode, Xmtr Selector is set to Xmtr No. 2, Standby Test switch is closed, LOCKOUT-READY switch 1A12S1 is set to READY and PLATE VOLTAGE SELECTOR switch 1A53A2S18 is set to OPERATE. With this switch configuration the following relays are energized: 1A12K12, 1A4K9, 4K1, 1A12K15, and 1A53A3K44. Relay 1A12K12 is operated by common vdc via the Standby Xmtr B+ switch. Relay 4K1 is operated by 120 vac from the start motor circuit via 1A53A2S18, 3K1, 3K2, 4K2, 1A12K11, and 1A12K12 contacts. Relay 1A12K15 is operated by 120 vac from the start circuit via 1A53A2S18, 3K1, 3K2, 4K1, and 4S1. The function performed by operated and unoperated relays are as follows:

- When relay 3K1 is not energized, the output of transmitting group no. 1 is connected to the dummy load.

- When 3K2 is not energized, the transmitting group no. 1 ground is connected to the dummy load ground.

- When relay 4K1 is energized, the dummy load blower is turned on.

- Relay 1A12K15 must be energized to enable the high voltage turn on.

- When relay 1A4K9 is energized, the input to the amplifier-group (1A4) is at an adjustable drive level.

- When relay 3K5 is not energized, the STANDBY indicator lamp 1A12DS12 is lighted.

- Other functions of relays 1A12K12 and 1A53A3K44 are shown on figure 4-15, sheets 1 and 5.

4. LOCKOUT MODE. - In the lockout mode, the Xmtr Selector switch is set to Xmtr No. 2 and LOCKOUT-READY switch 1A12S1 is set to LOCKOUT. The PLATE VOLTAGE SELECTOR switch 1A53A2S18 may be set MAINT or OPERATE. With this switch configuration the following relays are energized: 1A4K9, 4K1 and 1A12K15. The functions performed

in the lockout mode are identical to the standby test mode, except for relay 1A12K12 and relay 1A53A3K44 functions.

5. SUMMARY OF START TRANSFER FUNCTIONS. - Table 4-3 summarizes the start transfer functions performed in the various modes. For each mode, the table lists the position of each switch in the switch position columns; the status of each relay in the relay status columns; the functions performed in the function columns, and the status of the associated indicators in the lamp columns.

(c) FILAMENT TURN ON. - The filament turn-on circuits (figure 4-15, sheet 3) turn on filament transformers and enable bias and low voltage power turn on after an adjustable 20 to 200 second delay. These functions are performed only if air and water cooling status signals indicate proper operation. If air flow is proper, indicating blower operation in 1A4 and the enclosure, switches 1A4S1 and 1S1 close. When this occurs, the AIR ON indicator lamp 1A53A2DS8 lights and 120 vac is applied to the heating element in relay 1A12K17 via the closed contacts of relay 1A12K7. Relay 1A12K7 contacts are closed if the primary cooling inlet water temperature is normal. If the water flow rate in the power amplifier (1A6) is proper water flow switches 1A6S1 through 1A6S4 close, energizing relay 1A53A3K43. Relay 1A53A3K43 contacts close and the WATER ON indicator lamp 1A53A2DS1 lights. Filament relay 1A53A3K3 closes when FILAMENTS switch 1A53A2S13 is closed.

When relay 1A53A3K3 is energized, filament power is turned on, FILAMENT HOURS 1A53A2M6 starts timing filament on time, and filament warm-up relay 1A53A3K7 is energized. This relay, which enables bias turn on, does not pick up until 150 seconds (adjustable from 20 to 200 seconds) have elapsed. The delay prevents bias and low voltage turn on before tube filaments have warmed up. When it picks up, its contacts close the FILAMENT READY indicator lamp 1A53A2DS7 and warm-up lockout relay 1A53A3K52 coil circuits. This relay, also latched by own contacts, has a 30 second delayed drop out. The delayed drop-out of relay 1A53A3K52 provides for turning on the bias supplies after a brief loss of power without waiting for the 150 second pickup delay of 1A53A3K7.

(d) BIAS TURN ON. - The bias turn on circuits (figure 4-15 sheet 4), which are initially enabled after filament ready, perform the following functions:

- Remove grounds from the high voltage discharge resistors.

- Turn on bias and low voltage power supplies.

- Enable high voltage turn on.

- Provide meter and indicator lamp indications of bias and low voltage power supplies.

- Disable bias and low voltage turn on when an interlock is opened.

- Disable bias turn on for a short interval after a fault is sensed in the high voltage circuits.

- Disable bias turn on when three faults are sensed in 90 seconds in the high voltage circuits until reset by the OVERLOAD AND 3 STRIKE RESET switch.

The ungrounding of high voltage discharge resistors, contained in subassemblies 1A53A19 and 1A53A20, occurs when relays 1A53A1K1 and 1A53A1K2 are energized by 120 vac. The circuit consists of the closed interlock switches; closed contacts of relays 1A53A3K31, 1A53A3K3, 1A53A3K18, 1A53A3K7 or 1A53A3K52 and 1A53A3K32; closed BIAS AND LOW VOLTAGE switch 1A53A2S7; the closed contacts of relay 1A53A3K46 and LOCKED ON switch 1A53A3S2. Relay 1A53A3K31 is normally de-energized, except when a fault is detected in the high voltage circuits by the protection circuits. Relay 1A53A3K18 is normally de-energized, unless three overloads have been detected in 90 seconds, and remains energized until manually reset. Relays 1A53A3K3, 1A53A1K1 and 1A53A1K2 are energized when the filament turn on conditions are satisfied. Relay 1A53A3K46 is de-energized until the high voltage regulator 1A53A3A1 is turned on. After relays 1A53A1K1 and 1A53A1K2 are energized, the bias and low voltage supplies are turned on by the energized relay 1A53A3K4. When relay 1A53A3K4 is energized, it is latched by its contacts, so that when relay 1A53A3K46 is energized by the turn on of the high voltage, relay 1A53A3K4 remains energized.

DOOR INTERLOCK indicator lamp 1A53A2DS2 lights when all interlocks are closed or bypassed. RIGHT PA BIAS UNDERVOLTAGE indicator lamp 1A12DS11 and LEFT PA BIAS UNDERVOLTAGE indicator lamp 1A12DS10 light when -1100 vdc PA bias power supply voltages, sensed by relays 1A4K7 and 1A4K6, are normal, BIAS AND LOW VOLTAGE ON indicator lamp 1A53A2DS5 lights when -5000 vdc power supply voltage and both -1100 vdc PA bias power supply voltages are normal. This circuit includes a voltage divider, a relay driver, and relays 1A53A7K2, 1A4K7, and 1A4K6. The relay driver circuit is adjusted so that when the -5000 vdc power supply is above a preset level it supplies current to operate relay 1A53A7K2 if relays 1A4K7 and 1A4K6 are energized. Relay 1A53A7K2 must be energized to enable high voltage turn-on.

(e) HIGH VOLTAGE TURN ON. - The high voltage turn on circuits (figure 4-15 sheet 5) consist of the following circuits: ready, high voltage turn on, high voltage sense, and signal drive control. Turn on occurs in the operate, standby test, and local modes. The mode of operation is determined by switches as described in the start transfer circuit. The circuits perform the following functions:

- Control the operation of 460 vac voltage regulator.

- Determine deionization time after a high voltage fault.

- Provide status signals to remote and local indicators.

- ~~Apply the drive signal to the voltage amplifiers in 1A4 when the high voltage is at the proper level.~~

- Apply screen grid voltages to 1A4V7 and 1A4V8 when the high voltage is at the proper level.

- Sense 21.5 kv overvoltage and supply signal to shunt trip circuit.

- Allow automatic recovery after a loss of 460 vac source power when control is from the remote location (operate and standby test modes).

1. OPERATE AND STANDBY TEST MODES OPERATION. - Circuit operation for these modes is identical, since the PLATE VOLTAGE SELECTOR switch is set to OPERATE and the LOCKOUT-READY switch is set to READY for both modes. For this switch configuration, relays 1A53A3K44, 1A12K12, and 1A12K15 are energized. Relays 1A53A1K1, 1A53A1K2 and 1A53A7K2 are energized by the bias turn on circuits. Relay 1A53A3K21 is energized if the temperature of the high voltage transformer 1A53A6T1 is below preset limit. With this configuration of energized relays the ready signal is sent to the remote location and relay 1A53A3K45 is energized. When relay 1A53A3K45 is energized, it enables energizing relays 1A53A3K47 and 1A53A3K46 if relay 1A53A3K50 is energized. Relay 1A53A3K50, part of the shunt trip circuit, is energized when 460 vac is present.

When relay 1A53A3K47 is energized, it opens the circuit between terminals 8 and 9 of the 460 vac voltage regulator, which turns on the regulator. When the regulator is turned on, its output rises to an adjustable preset level controlled by the OPERATE ADJUST control in approximately 15 seconds. The feedback voltage is obtained from a network of the 10.75 kv power supply in voltage divider 1A53A7. The 10.75 kv and 21.5 kv power supply voltages are monitored by IPA PLATE VOLTAGE and PA PLATE VOLTAGE meters from resistor networks in the voltage divider. A sample of the 21.5 kv voltage is also supplied to a connector so that the ripple can be observed on an external oscilloscope. Relay 1A53A7K1 senses 21.5 kv overvoltage. If the 21.5 kv supply is above a preset limit, a signal is sent to the shunt trip circuit, which trips the 460 vac circuit breaker.

When a high voltage fault is sensed, overload relay 1A53A3K31, turns off the bias and high voltage circuits. The function of deionization relay 1A53A3K46 is to disable bias turn on (and therefore disable high voltage turn on) for 3 seconds (adjustable from 0.5 to 5 seconds) to allow for deionization before the circuits are turned on again. When the 460 vac is lost, relay 1A53A3K50 inhibits high voltage turn on; otherwise the three-strike circuit would count three faults in 90 seconds and lockout the automatic recovery circuit.

When the 10.75 kv power supply rises to 65% of maximum (approximately 7 kv) relay 1A4K3 applies the screen grid voltage to 1A4V7 and 1A4V8. ~~and relay 1A4K11 enables relay 1A4K12. Relay 1A4K12 enables a high voltage normal indication signal to the remote location and de-energizes relay 1A4K10, which applies the fixed drive signal from the transmitter control equipment to voltage amplifiers 1A4V3, 1A4V4, 1A4V5, and 1A4V6. When QUIESCENT METER switch 1A4S2 is switched to either the LEFT or RIGHT position, the transmitter drive is removed.~~

2. LOCKOUT MODE OPERATION. - In the local mode, the LOCKOUT-READY switch is set to LOCKOUT. The PLATE VOLTAGE SELECTOR switch may be set to OPERATE or MAINT. For this switch configuration, relays 1A53A3K44, and 1A12K12 are not energized, while relay 1A12K15 is energized. Except for the following differences, circuit operation is identical to the operate and standby test mode.

- The MAINTENANCE ADJUST control may be used to set the high voltage level without disturbing the OPERATE ADJUST control setting.

(f) PROTECTION CIRCUITS. - The protection circuits (figure 4-15 sheets 6 and 7) consist of the relay power supply, ac overcurrent sense, high voltage current sense, and the three-strike circuits.

1. RELAY POWER SUPPLY. - The relay power supply includes a rectifier that converts 120 vac to -120 vdc, overcurrent sensing relay 1A53A3K36, and undervoltage sensing relay 1A53A3K37. The power supply supplies the operating voltage for relays 1A53A3K16, 1A53A3K34, 1A53A3K31, and 1A53A3K33 in the overload circuit. If 120 vdc overcurrent or undervoltage is sensed by relays 1A53A3K36 or 1A53A3K37 for more than 2 seconds, relay 1A53A3K40 in the start motor circuit disables the turn on the sequence.

2. AC OVERCURRENT SENSE. - The ac overcurrent sense circuits consists of three identical circuits which monitor each line of the 3-phase inputs to the high voltage power transformer. Each circuit consists of a current transformer, a load resistor, a rectifier, a relay, and associated components. The voltage resulting from the current transformer secondary current passing through the load resistor is rectified and applied to a relay (1A53A3K13, 1A53A3K14, or 1A53A3K15). When the input current in any line is above a preset level, the relay closes to energize relay 1A53A3K31 and 1A53A3K16. Relay 1A53A3K16, locked up through its own contacts, extinguishes the AC OVERLOAD indicator lamp 1A53A2DS10. Relay 1A53A3K31 is the fault trip relay in the three-strike overload circuit described subsequently.

3. HV CURRENT SENSE. - Relay 1A53A4K1 is energized when the sensed current in the 10.75 kv power supply return is above a preset level. Relay 1A53A4K2, is energized when the sensed current in the 21.5 kv power supply return is above a

preset level. When either relay is energized, it energizes relay 1A53A3K31. Relays 1A53A4K1 and 1A53A4K2 also energize relays 1A53A3K8 and 1A53A3K9 respectively. When relays 1A53A3K8 or 1A53A3K9 are energized, they are latched and extinguish IPA OVERLOAD indicator lamp 1A53A2DS13 and PA OVERLOAD indicator lamp, respectively.

4. THREE STRIKE OVERLOAD CIRCUIT. - The three strike overload circuit performs the following functions:

- Disables certain fault sensing circuits on initial high voltage turn on.

- Provides for the automatic turn off and reapplication of bias and high voltages due to a momentary fault.

- Locks out bias and high voltages if three faults are sensed in 90 seconds until manually reset.

- Inhibits the high voltage turn on if the high voltage transformer overheats until transformer returns to normal temperature and manually reset by the OVERLOAD AND 3-STRIKE RESET switch.

- Provides for the reset of latched relays.

Table 4-4 lists each fault that operates the automatic recovery circuit, and the associated sensing relay. The indicator relay latches when energized by a fault signal from the sensing relay, thereby keeping the indicator lamp off. In addition to the sensing relays, the overload circuits include: cam relay 1A53A3K33, 3-strike interval relay 1A53A3K17, 3-strike lockout relay 1A53A3K18, fault trip relay 1A53A3K31, and overload sense inhibit relay 1A53A3K34.

When any one of the faults listed in table 4-4 is sensed, fault trip relay 1A53A3K31 is energized. This locks out the 460-vac regulator by energizing relay RYA in the chop-off limiter unit. Relay 1A53A3K31 also de-energizes the discharge relays, 1A53A1K1 and 1A53A1K2, and the bias contactor, 1A53A3K4 by opening the bias turn-on circuit. Another set of relay 1A53A3K31 contacts control stepping relay 1A53A3K33.

Relay 1A53A3K33 is comprised of three sets of interrupter contacts and 5 sets of cam contacts. The interrupter contacts open and close with the energizing and de-energizing of the relay. The cam contacts open and close in the order shown on the table on figure 4-15, sheet 6. The cam is advanced whenever 1A53A3K33 is de-energized by a mechanical ratcheting action.

When the first fault energizes 1A53A3K31, it also energizes 1A53A3K33. This energizes relay 1A53A3K17 through leg 2. The contacts of 1A53A3K17 remain in this state for approximately 90 seconds after its coil is de-energized. The removal of bias and high voltage by 1A53A3K31 contacts prevents detection of another fault until bias and high voltage return. Therefore, relay 1A53A3K31 is de-energized, which causes 1A53A3K33 to be de-energized, which in turn advances its cam to fault position 1.

While in fault position 1, further cam advancement by leg 1 is inhibited by the open contacts of relays 1A53A3K17 and 1A53A3K18. Three conditions may now change the state of this circuit:

1. One more overload within 90 seconds advances the cam to fault position 2.

2. Two more overloads advances the cam to fault position 3. If this happens, 1A53A3K18 will be energized through leg 3.

3. If 90 seconds elapses before three overloads occur, the cam advances to the "home" (0) position and the circuit is back to its original condition.

In case 2, where the third overload is detected in less than 90 seconds, 1A53A3K18 is energized. One set of its contacts provide self-latching; another set inhibits bias and high voltage turn on. In addition, another set provides continuity in leg 1 and allows 1A53A3K33 to advance to home position, at which time contact E opens. Bias and high voltage can only be reapplied by manually pressing OVERLOAD AND 3 STRIKE RESET switch, which unlatches 1A53A3K18.

In case 3, where only one or two overloads have occurred and the 90 second time delay has expired, relay 1A53A3K17 contacts provide continuity in leg 1 to energize 1A53A3K33. Relay 1A53A3K33 is enabled until the home position is reached, where contact E opens breaking the circuit.

Transformer temperature sensing relay 1A53A3K21, is energized through the normally closed contacts of thermoswitch 1A53A6S1. When energized, the relay enables high voltage turn on, latches relay 1A53A3K48, and lights PLATE TRANSFORMER OVER TEMP indicator lamp 1A53A2DS11. When thermoswitch 1A53A6S1 opens, relay 1A53A3K21 is de-energized. When this occurs, high voltage is inhibited and the lamp is extinguished. When the switch 1A53A6S1 recloses, relay 1A53A3K21 remains de-energized because relay 1A53A3K48 is still energized through its latching contacts. The high voltage and the PLATE TRANSFORMER OVERTEMP lamp remain off until reset by pressing the OVERLOAD AND 3 STRIKE RESET switch to drop out 1A53A3K48.

When the OVERLOAD AND 3 STRIKE RESET switch 1A53A3S8 is depressed, it releases the following latched relays: 1A53A3K18, 1A53A3K16, 1A53A3K8, 1A53A3K9, 1A53A3K48, and 1A12K10. When relay 1A53A3K18 is released, bias and high voltage turn on are enabled and 3 STRIKE indicator lamp 1A53A2DS12 lights. When relay 1A53A3K16 is released, AC OVERLOAD indicator lamp 1A53A2DS10 lights. When relay 1A53A3K8 is released, IPA OVERLOAD indicator lamp

1A53A2DS13 lights. When relay 1A53A3K9 is released, PA OVERLOAD indicator lamp 1A53A2DS14 lights. When relay 1A53A3K48 is released, high voltage turn on is enabled and PLATE TRANSFORMER OVER TEMP indicator lamp 1A53A2DS11 lights. When relay 1A12K10 is de-energized, it releases relays 1A12K1 through 1A12K6, 1A12K18, and 1A12K19 which lights the associated lamps shown in table 4-4, and relay 1A12K12 which lights PA1A6 OUTLET OVERTEMPERATURE.

Fault sensing circuits are disabled on high voltage turn on by relays 1A53A3K47, 1A53A3K34 and 1A4K8. Before the high voltage is turned on, relay 1A53A3K34 is energized via the de-energized relay 1A53A3K47 closed contacts and relay 1A4K8 is energized via the energized relay 1A53A3K34 closed contacts. With relay 1A53A3K34 energized, the overcurrent sensing relays 1A53A3K13, 1A53A3K14, and 1A53A3K15 are in series with resistors 1A53A3R64, 1A53A3R65, and 1A53A3R66 respectively, thereby reducing their sensitivity. With 1A4K8 energized the current sensing relays 1A4K5, 1A4K4 and 1A53A4K1 are shorted. When relay 1A53A3K47 is energized for high voltage turn-on, a resistor-capacitor combination keeps relays 1A53A3K34 and 1A4K8 energized for approximately one tenth of a second. The turn off delay prevents initial surge currents on high voltage turn on from sending fault signals to the fault trip relay 1A53A3K31.

TABLE 4-4. FAULTS WHICH TURN OFF BIAS AND HIGH VOLTAGES

FAULT SENSE RELAY	FAULT/INDICATOR	INDICATOR RELAY
1A4K1	LEFT 1ST IPA CATHODE OVERLOAD (1A12DS1)	1A12K1
1A4K2	RIGHT 1ST IPA CATHODE OVERLOAD (1A12DS2)	1A12K2
1A4K5	LEFT PA BIAS OVERLOAD (1A12DS3)	1A12K3
1A4K4	RIGHT PA BIAS OVERLOAD (1A12DS4)	1A12K4
1A6K1	1A6V1 CATHODE OVERLOAD (1A12DS34)	1A12K18
1A6K3	1A6V3 CATHODE OVERLOAD (1A12DS5)	1A12K5
1A6K2	1A6V2 CATHODE OVERLOAD (1A12056)	1A12K6
1A6K4	1A6V4 CATHODE OVERLOAD (1A12DS35)	1A12K19
1A53A4K1	IPA OVERLOAD (1A53A2DS13)	1A53A3K8
1A53A4K2	PA OVERLOAD (1A53A2DS14)	1A53A3K9
1A53A3K13 1A53A3K14 1A53A3K15	AC OVERLOAD (1A53A2DS10)	1A53A3K16
	460 vac voltage regulator detected faults:	
NONE	Overtemperature	NONE
1A53A3A1A4RYA	AC overload	NONE
1A53A3A1A1RY 1A53A3A1A2RY 1A53A3A1A3RY	460 vac undervoltage	NONE

(g) SHUNT TRIP. - Both the 460 vac circuit breaker 1A53A3CB1 and the 208 vac circuit breaker 1A53A3CB2 incorporate shunt trip coils (see figure 4-15, sheet 8). Each coil when energized trips its circuit breaker. To restore power after a trip, the circuit breakers must be manually reset. A separate fused power circuit and indicator lamp is provided for each shunt trip circuit. The 460 vac shunt trip circuit fused by 1A53A3F41 and 1A53A3F42 receives its 120 vac operating voltage from the 460 vac lines via step down transformer 1A53A3T3. The 120 vac is stepped down to 26 vac by transformer 1A53A3T4 to supply time delay relay 1A53A3K39. The 208 vac shunt trip circuit receives its 120 vac via fuse 1A53A3F40. The 120 vac is stepped down to 26 vac by transformer 1A53A3T2 to operate time delay 1A53A3K28 and 1A53A3K40, shown as part of the motor turn-on circuits.

The following conditions trip the circuit breakers by energizing their shunt trip coils:

- Depress a remote emergency stop switch. (CB1 and CB2).

- Open the key operated LOCKED ON switch 1A53A3S2. (CB1 only)

- Set EMERGENCY STOP switch 1A53A2S19 to STOP. (CB1 and CB2)

- A plate overvoltage sustained for more than two seconds, sensed by relay 1A53A7K1 (CB1 only).

- A 208 vac overvoltage sustained for more than two seconds, sensed by meter-relay 1A53A3M1 (CB2 only).

1. REMOTE EMERGENCY TRIP. - This circuit provides the capability of tripping both the 460 vac circuit breaker 1A53A3CB1 and the 208 vac circuit breaker from a remote location. When activated, the 460 vac power is turned off before the 208 vac. Circuit operation is initiated by depressing a remote emergency stop pushbutton. . Note that in normal operation, relays 1A12K13, 1A12K16, and 1A53A3K50

are energized. When the pushbutton is depressed, relay 1A12K13 is de-energized, thereby providing a closed circuit to energize relay 1A53A3K49. When energized, its contacts close the 1A53A3CB1 shunt trip coil circuit, which results in the turning off of 460 vac power. Removing the 460 vac power causes relay 1A53A3K50 contacts to close, thereby applying 120 vac to the shunt trip coil of 1A53A3CB2 via the normally closed contacts of relay 1A53A3K28.

2. LOCKED ON SWITCH 1A53A3S2. - When the key in LOCKED ON S2 switch 1A53A3S2 is turned to the unlocked position, contacts 1 and 2 are closed. This action applies 120 vac across the shunt coil of the 460 vac circuit breaker 1A53A3CB1, tripping the breaker, thereby turning off the high voltage circuits. At the same time contacts 3 and 4 of 1A53A3S2 (shown on sheet 4 of figure 4-15 as part of the interlock circuit) are opened, turning off the bias and low voltage circuits.

3. EMERGENCY STOP SWITCH 1A53A2S19. - When this switch is set to STOP, it simultaneously applies 120 vac directly to each shunt trip coil, tripping both the 460V INPUT circuit breaker and the 208 volt circuit breaker.

4. HIGH VOLTAGE OVERVOLTAGE. - When relay 1A53A7K1 senses an overvoltage in the PA plate voltage supply, it applies 26 vac through its contacts to terminal 2 of time delay relay 1A53A3K39. If the overvoltage is sustained for more than two seconds, contacts 4-6 of relay 1A53A3K39 close, applying 120 vac to the shunt trip coil of 1A53A3CB1, thus disconnecting the 460 vac power.

5. 208 VAC OVERVOLTAGE. - When the 208 vac supply is within preset limits, contacts 3-4 and 4-5 of meter relay 1A53A2M1 are open. When the 208 vac supply is above the preset limit, contacts 4-5 close, supplying a signal to two-second time delay relay 1A53A3K28. If the overvoltage is sensed for more than two seconds, relay contacts 4-6 of 1A53A3K28 close the 120 vac circuit across the shunt trip coil of 1A53A3CB2.

(h) LIGHTING. - Power for lighting the enclosure and the panels (figure 4-15, sheet 9) is supplied from two sources. An independant 120 vac line supplies enclosure lighting and convenience outlet power, each controlled by a switch. Panel lighting power is supplied by the 120-vac control power. The brightness of the panel lights are controlled by the DIMMER control on the control indicator panel 1A53A2.

s. WATER COOLING SYSTEM. - The water cooling system is shown in figures 4-16 and 6-45. This system removes the heat generated by power amplifier tubes 1A6V1 through 1A6V4. The entire system is capable of delivering water at a rate of 75 gallons per minute to the power amplifiers and of dissipating 250 kilowatts of heat.

The water cooling system has two heat exchangers, a motor-driven pump and an expansion tank for the supply of primary coolant.

The water cooling system contains a primary and secondary circuit. The primary circuit is the path through which distilled water coolant is pumped from electron tube liquid cooler 1A2 through the power amplifier tube water jackets and back to the liquid cooler. Part of primary coolant is circulated through oxygen and mineral removal filters. The secondary circuit is the path in which the secondary coolant is pumped from an external source through the liquid cooler and back to its source. The secondary coolant is fresh undistilled water.

Four outlets leading from the main outlet distributes water to each power amplifier tube.

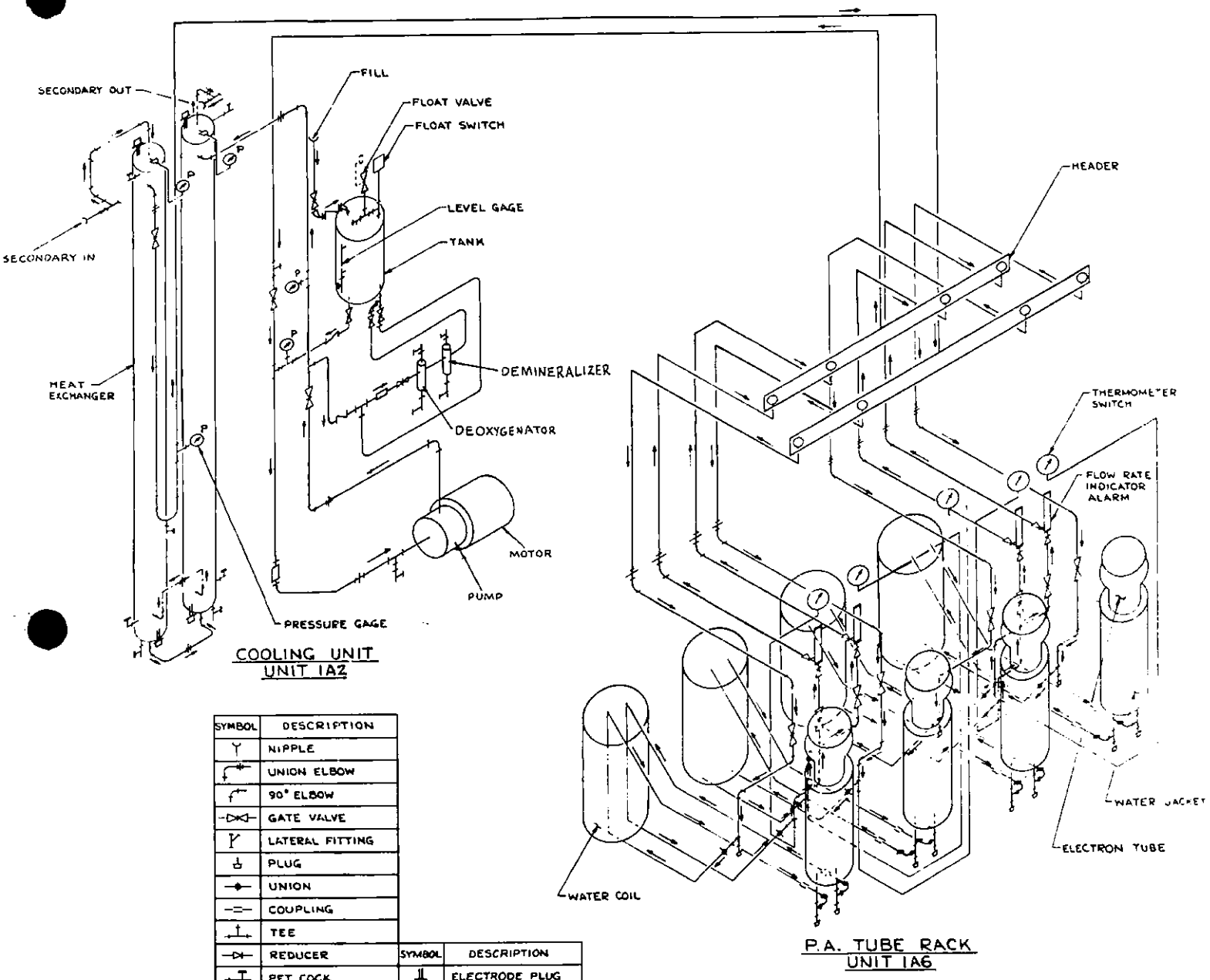
Safeguard alarms against insufficient cooling are provided to prevent damage due to excessive heating in the power amplifier tubes. These safeguard alarms are activated by automatic switches.

Flow rate alarm switches 1A6S1 through 1A6S4 are located in the cooling path of each power amplifier tube. These switches are electrically in series with one another. When the water flow through the system is normal, the switches close, energizing 1A53A3K43 which closes a set of contacts in the transmitter filament interlock circuits. In addition, another set of contacts close, lighting the WATER ON lamp 1A53A2DS1. The actual rate of flow can be measured directly from the flow meters.

The thermometers are directly associated with automatic thermo-electric switches 1A6S5 through 1A6S8. These thermometers are located in the cooling path of each tube, just before the coolant re-enters the main pipe to return to the liquid cooler.

The switches are connected in parallel. When the temperature of the primary coolant is too high-above 70°C (158°F) - in any of the paths, its associated switch closes and OVERTEMPERATURE PA1A6 OUTLET lamp 1A12DS8 on the indicator panel lights. The actual temperature can be read directly from the thermometer dial. These thermometers are located on the PA tube racks. A thermometer is associated with INLET TEMP. switch 1A6S9. This thermometer and switch are located in the main inlet where the coolant is about to enter the cooling path of each tube. When the temperatue of the primary coolant is above 50°C (122°F) switch 1A6S9 closes, the equipment shuts down automatically, and OVERTEMPERATURE PA1A6 INLET lamp 1A12DS7 on the indicator panel goes out.

In the water cooler itself, there is a low water level switch and gauge glass water level indicator.



SYMBOL	DESCRIPTION
	NIPPLE
	UNION ELBOW
	90° ELBOW
	GATE VALVE
	LATERAL FITTING
	PLUG
	UNION
	COUPLING
	TEE
	REDUCER
	PET COCK
	BUSHING
	CHECK VALVE
	PLATE STRAINER
	RETURN BEND
	REDUCING ELBOW
	DIRECTION OF FLOW
	PRIMARY SYSTEM
	SECONDARY SYSTEM

SYMBOL	DESCRIPTION
	ELECTRODE PLUG
P	FLOW SWITCH

75-009

Figure 4-16. Water Cooling System, Simplified Schematic Diagram

When the water falls below a preset level, the switch closes and WATER LEVEL indicator lamp 1A12DS9 on the indicator panel lights. If the low water level alarm, a flow meter, or an outlet thermometer indicates a malfunction, an alarm signal is sent to the transmitter control equipment.

Table 4-5 provides a summary of the water cooling system sense and indicator functions.

TABLE 4-5. WATER COOLING SYSTEM INDICATOR AND SENSOR FUNCTIONS

INDICATOR/SENSOR		FUNCTION
REF. DES.	DESCRIPTION	
1A6M5	Milliammeter	Provides visual indication of primary coolant conductivity.
1A6: S1, S2, S3, S4	Flow rate switches	Supplies transmitter control circuits with flow rate status for each PA tube. When rate is below limit, inhibits filament turn on and supplies alarm in remote indicator. Associated flow rate meter provides visual indication.
1A6: S5, S6, S7, S8	Thermostats	Provides transmitter control circuits with water temperature status of each PA tube. When temperature is above limit, sends alarm to remote station. Associated thermometers provide visual indications.
1A6S9	Thermostat	Provides transmitter control circuits with water temperature status to PA tubes. When temperature is above limit, inhibts filament turn on and supplies alarm to remote indicator. Associated thermometer provides visual indication.
1A2M1	Pressure gauge	Provides visual indication of secondary coolant pressure to heat exchanger.
1A2M2	Pressure gauge	Provides visual indication of secondary coolant pressure from heat exchanger.
1A2M3	Water level gauge	Provides visual indication of water level in tank.
1A2M4	Pressure gauge	Provides visual indication of primary coolant pressure from heat exchanger.
1A2M5	Pressure gauge	Provides visual indication of pressure of primary coolant return from PA tube rack.
1A52M6	Pressure gauge	Provides visual indication of primary coolant pressure at pump outlet.
1A52S1	Float switch	Provides transmitter control circuits with water level status of primary coolant in tank. When level is below limit, sends alarm to remote indicator.

t. COMMON CIRCUITS. - The following paragraph describes a circuit that is used in more than one assembly.

(1) TIME DELAY RELAY (1A53A3K28, 1A53A3K39 and 1A53A3K40). -This relay provides a two-second delay after closing the control circuit contacts. The control circuit requires only 1 milliampere at 26 volts ac.

The relay circuit is shown in figure 4-17. With a 26 volts ac signal applied at terminal 2, closing the contacts in the signal circuit energizes a relay A which applies power to heater A. After two seconds the thermal contacts close and energize relay B. This relay has a center-tapped coil with two halves supplied by two diodes. When relay B closes, it transfers the output contacts and closes a maintaining contact. It also disconnects heater A. A low-level heater B is connected to keep the thermal contacts closed. When the signal circuit (or the 26-volt supply) is opened for a few seconds, the thermal contacts open and the relay returns to its normal status.

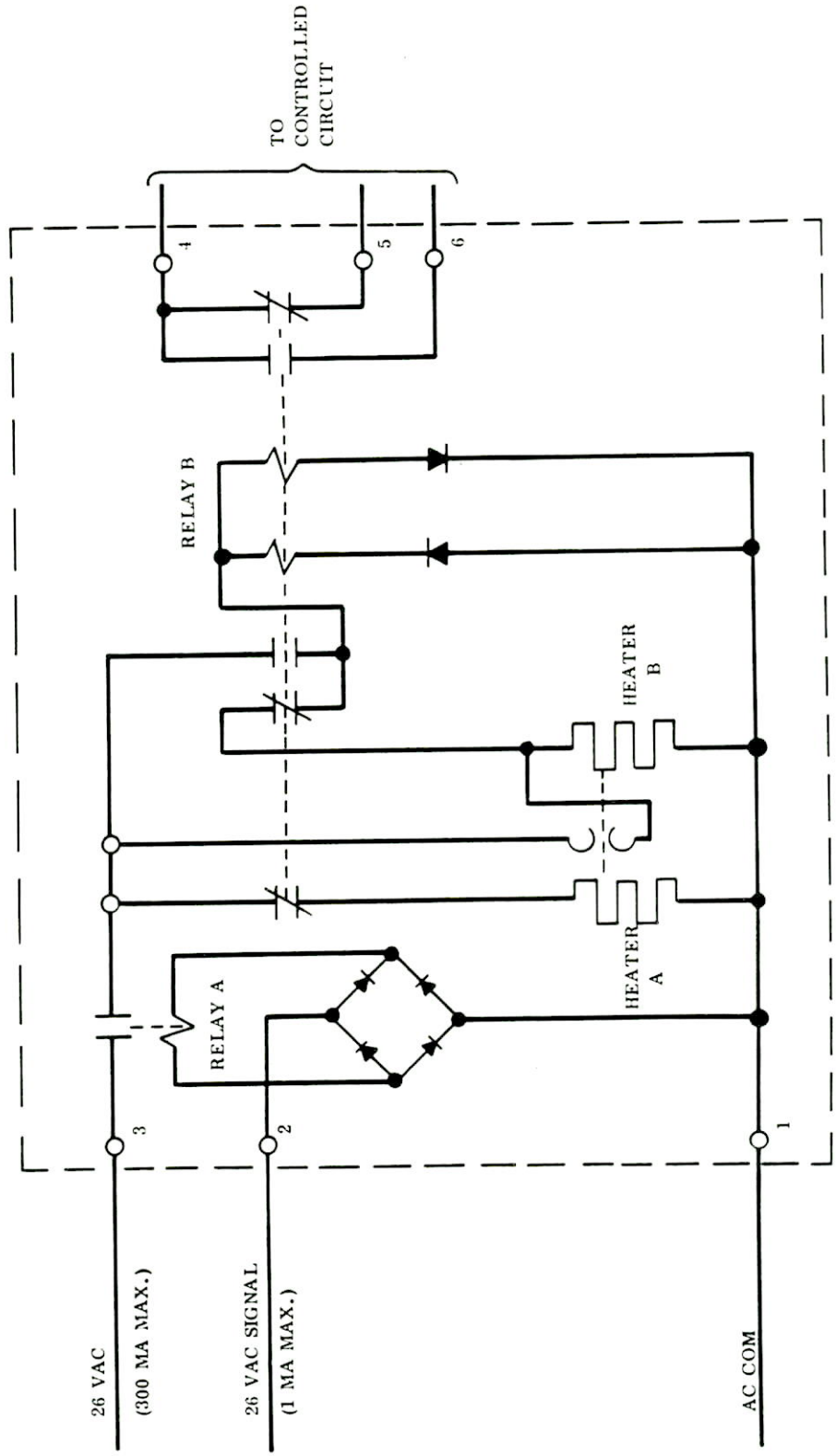


Figure 4-17. Time Delay Relay, Schematic Diagram

u. LOCAL CONTROL UNIT (5). - (Figure 6-62) The Local Control Unit (LCU), reference designation 5, is the interface between the Transmitting Set and the AN/FPN-60 Transmitter Control Set (TCS). In order to be controlled by either the LCU or the TCS, the OT-96/FPN-44A Transmitter Group must be in "Ready" status. "Ready" consists of 120 VAC when the following conditions are met:

- Transmitter a-c power ON.
- Bias and Low Voltage ON.
- PLATE VOLTAGE selector in OPERATE position.
- LOCKOUT-READY switch in READY position.

When in LOCAL mode, the LCU performs the following functions:

- Selects the OPERATE transmitter group.
- Controls transmitter plate voltage (HV interlock) of both transmitter groups.
- Provides control signal status information to the TCS.

When in the REMOTE mode, the controls of the LCU are ineffective.

(1) OPERATE TRANSMITTER SELECTION. Relay 5K2 is the operate transmitter selector relay having two independent coils. When a 28 volt impulse is impressed across coil terminals 1 and 19, the contacts go to the "latched" position. A voltage impulse impressed across coil terminals 2 and 18 place the contacts in the "reset" position. Relay 5K2 will remain mechanically locked in the last selected position until the opposite coil is actuated. In figure 6-62, relay 5K2 is shown in the "latched", or transmitter 1 position. Contacts of 5K2 apply d-c common to the Indicator Panel of the selected operate transmitter, which actuates 1A12K11 and the appropriate relay (3K5 or 3K7) in the Antenna Coupler.

In LOCAL mode, transmitter changes are made by manually depressing the appropriate selector switch, 5S4 or 5S6. The manual selector switches are interlocked through the plate switches of the LCU, 5S1 and 5S3, so that a transmitter change cannot be made unless both HV interlock circuits are open.

In REMOTE operation, the selector relay is actuated by the Transmitter Automatic Controller (TAC) of the TCS, by applying d-c common for a period of approximately eight seconds. When a transmitter change is made by the TAC, the HV interlock circuit is automatically opened prior to the change.

(2) PLATE VOLTAGE CONTROL. When 1A12S1 is in the READY position the high voltage interlock relay, 1A12K12, is energized by the appropriate B-Plus switch of the LCU in LOCAL mode, or by a contact closure in the TAC when in REMOTE mode. The coil of the HV interlock relay is wired to -28 VDC and energized by applying d-c common.

(3) OPERATE TRANSMITTER INDICATOR. Indicator lamps 5DS1 and 5DS4 show the position of the selector relay, i.e. Transmitter 1 or Transmitter 2, respectively. These lamps therefore indicate that the operate command has been given. The lighting of the OPERATE lamp, 1A12DS13, indicates that the Antenna Coupler has, in fact, made the proper transmitter selection.

(4) INHIBIT CIRCUITS IN LOCAL OPERATION. When 5S2 is placed in LOCAL, the alarm circuit for the standby transmitter is inhibited so that it may be serviced without causing the transmitter malfunction alarm to sound.

(5) STATUS SIGNALS TO THE TAC. In addition to performing transmitter selection and HV interlock by controlling d-c common, the TAC requires additional status information from the transmitters.

The status logic relays of the TAC require 120 VAC. Relay 5K1 determines the source of "TAC 120 V", which is Transmitter 2 when it has powered applied. If Transmitter 2 is secured, "TAC 120 V" is derived from Transmitter 1 through normally closed contacts of 5K1. A second set of contacts are used to provide the source for "TAC AC Common".

The "TAC 120 V"/"TAC AC COM" source is used for the following functions:

- lights 5DS1 or 5DS4, "Transmitter No ( ) On Antenna" indicator lamps, through contacts of transmitter selector relay.
- provides "No. 1 Ready for Remote" and "No. 2 Ready for Remote" status signals to the TAC through contacts of the selector relay. The "No. 2 Ready for Remote" signal is also used in the TAC as "No. 2 Operate" as the means of ensuring that the positions of the TAC transmitter selector relay and 5K2 are in agreement.
- lights 5DS2 or 5DS3 to indicate the control status of the LCU as "LOCAL" or "REMOTE", respectively.
- lights 5DS5 "READY FOR TRANSFER" lamp to indicate that conditions are correct for transfer of transmitter control point from LCU to TAC or vice versa, without interruption in the output signal.

(6) READY FOR REMOTE. Indicates capability of transfer of control without signal interruption. The "READY FOR TRANSFER" lamp, 5DS5, indicates that the system is properly aligned to permit a transfer of control of the transmitters without interrupting the transmitted signal. Indicator lamp 5DS5 is lighted under the following conditions:

- When in LOCAL control, READY FOR TRANSFER to the REMOTE, i.e. TAC control point is permissable (lamp is lighted) when the following conditions are satisfied.

- Both transmitters are in "READY" status.

- The B-Plus switch for the selected OPERATE transmitter (5S1 or 5S3) is ON for the OPERATE transmitter.

- 5S2 is in the LOCAL position.

- The transmitter selector relay in the TAC, K2, is in the same position as 5K2.

- When in REMOTE control, READY FOR TRANSFER to the LOCAL, i. e. LCU control point is permissable when the following conditions are satisfied.

- The B-Plus switch for the selected OPERATE transmitter is ON.

- 5S2 is in the REMOTE position.

The function of the HOLD DOWN DURING TRANSFER switch, 5S5, is to maintain continuity in the d-c common circuit when the LOCAL-REMOTE switch, 5S2, is operated. This normally open pushbutton switch completes the HV interlock circuit for the selected operate transmitter permitting transfer of control without turning the plate voltage off.

CG-273-136 (Non-Registered)

VOLUME II

TECHNICAL MANUAL

for

LORAN TRANSMITTING SET

AN/FPN-44A

SITE SELECTION

ITT AVIONICS DIVISION
390 Washington Avenue
Nutley, New Jersey 07110

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NOTE: THE FOLLOWING PAGE HAS BEEN CORRECTED BY F.C. NO 5/28

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SITE SELECTION

FOR

LORAN TRANSMITTING SET AN/FPN-44A

INTRODUCTION.

Included in this book are the assembly drawings, figures 1 and 6, necessary for the erection of the enclosure. The items referred to by number in the instructions that follow and appearing on figures 1 and 6 are given in the list of materials (LM), tables 1 and 2. All hardware and materials used are shown as circled numbers on figures 1 and 6. Referring to these item numbers in LM tables 1 and 2 will identify the proper materials and hardware for assembly of a given item as detailed below. All large items are stamped with their proper item numbers.

SHIPPING BOX NUMBERING SYSTEM.

The box numbering system used for the shipment of the Loran-C Ground Station equipment is somewhat different from that normally used and warrants a few words of explanation. The system was set up on the premise that the equipment may have to be stored on a beach or similar unprotected area prior to installation and so it is imperative that only boxes containing equipment required for immediate installation be opened.

The box identification, a letter-number combination, indicating the box in which each item is shipped is indicated on the LM's. The letter portion of the letter-number box identification is a reference designation indicating that the equipment in that box belongs to a particular major area of the installation and the number indicates the box number. Thus when the equipment is being stored, boxes having a common reference letter should be stored together. The box reference letters are:

Transmitter Groups #1 and #2	X and Y, respectively
Antenna Coupler, Dummy Load, Installation Material, Cables, and Ducts	W

PRE-ASSEMBLY.

ROOF TRUSS. - The overhead trusses should be assembled before actual installation begins. The internal overhead trusses are items 51 and 52. There are 11 sets of internal trusses in the enclosure. The end trusses, items 54 and 94, constitute one set and items 53 and 93, the other set. The outside of these end trusses are painted gray and trim strip 10 covers the outside point of each external truss set. The enclosure assembly of the trusses is shown in detail 1 on sheet 5 of figure 1 and on figure 2.

UPRIGHT CHANNEL AND CORNER ANGLE SUPPORTS. - The channel supports, item 26, should have truss supports 23 (one each) and 24 (two each) attached before installation begins. There are 16 such units in the enclosure. See detail 2 sheet 3 of figure 1 and figure 3 for installation. The corner angle support that is designated 25 should have a truss support (gusset 22) and gusset 60 attached before installation. See detail 3 sheet 4 of figure 1 and figures 4 and 5 for installation.

INSTALLATION.

FLOOR. - Floor channels are installed first according to figure 6. See the typical station floor layout on this drawing. Each channel is marked with an A followed by its item number on the list of material (table 2).

First connect straight channel runs together, using shims as required between channels to maintain dimensions given on figure 6. Add #13 angles per detail B-B of figure 6 at end of long runs. Lay channel runs in location on transmitter building floor and connect together with flat head screws. Channels along wall should be approximately 3/8 inches from walls. See figures 7 and 8.

The enclosure shown in sheets 1 through 6 of figure 1 is hereafter called transmitter No. 2. The floor plan layouts for this enclosure is shown on the typical station floor layout of figure 6. Sheet 7 of figure 1 and figure 6 show the floor plan assembly of transmitter No. 1. The transmitter No.1 enclosure assembly is a mirror image of the enclosures shown in sheets 1 through 6 of figure 1 except as noted on sheet 7. It is suggested that the enclosure for transmitter No. 2 is assembled first.

WALL PANELS. - The enclosure rear wall and the rf output end wall are assembled from the inside; the other end and front walls can be assembled from either side.

After floor channels are installed, starting at corners A1 and A10, stand corner trim strip 39 in corner. Place end wall panel 95 into side corner and place one screw connecting bottom flange of 95 to floor channel. Also place corner angle 25 in place and insert one screw through corner channel, panel 95, and into corner trim strip 39.

CAUTION

Do not secure tightly.

Next place rear wall panel 3 between corner angle 25 and corner trim strip 39. Secure panels 95 and 3, corner trim strip 39 and corner angle 25 with proper hardware. Hand tighten.

Place trim strip 9 on the outside of the left edge of panel 95 and upright channel support 26 on the inside of panel 95. Hold loosely in place with screws through right holes in 26 through holes in 95, and into right holes in 9. Then slide panel 96 between support channel 26 and trim strip 9 to butt against panel 95. Secure with screws through left holes in channel support 26, through holes in 96, and into left holes in 9. (Keep all screws loose). Place trim strip 9 on outside of left edge of panel 96 and place channel support 26, on inside of left edge of panel 96 and fasten as above. Remember, all assembly so far must be done from inside. Secure loosely with screws. Slide panel 7 between trim strip 9 and upright channel support 26 to butt against panel 96. Secure loosely with screws.

Connect corner angle support 25 to floor channel and slide corner trim 37 behind left edge of panel 7. Place screws through corner angle support 25, through panel 7, and into tapped holes in trim 37. Slide panel 42 between front edge of angle support 25 and trim 37. Secure with screws and secure panel 42 to channel at floor. This can be done from outside of enclosure if necessary.

At this point make sure that all screws and lock washers have been inserted in the proper places to secure the panels, support channels, corner angles and trim strip. Also make certain that all screws holding panels to the floor channels have been inserted. None of these screws need to be tightened yet.

ROOF TRUSSES. - Pre-assembled overhead end trusses 54 and 94 are placed into position on top of end wall 95, 96, and 7. The trusses are secured through the angle brackets mounted on the channel supports and corner angle supports and the top angle of the panels.

Put pre-assembled trusses 51 and 52 in place and secure loosely to overhead angle of panels 42 and 3. Mounting holes for this truss section are near the center of the top angles of panels 42 and 3. Roof truss assemblies 51 and 52 are always installed with their smooth side nearest to the rf output end of the enclosure.

Corner trim strip 11, covering joint made by truss 54 and perforated roofing panel 67, is loosely secured to truss 54. Then perforated roofing panel 67 is slid between truss 54 and corner trim strip 11, and rests on top of truss 52. This roofing panel is then secured through trim strip 11 with screws to truss 54. Next trim strip 31, covering joint made by roofing panel 67 and panel 3, is secured by screws through panel 3 and through the flange of truss 52.

Position trim strip 12 on left side of enclosure in same manner as trim strip 11. Secure loosely.

Place roofing panel 14 and corner trim strip 30 on right side of enclosure in same manner as roofing panel 67 and corner trim strip 31, respectively.

Roof trip strip 18, covering joint made by roofing panels 14 and 67, is put in place and secured, and roof trim strips 13, covering the gap between roof panels 14 and 67, and the adjacent roof panels, are mounted by screws through the holes nearest the end of the enclosure, the holes in roof panels 14 and 67, and the holes in the trusses which are also nearest the end of the enclosures.

Make sure that bolts are loosely secured in order to have all holes line up.

Place trim strip 9 and upright channel supports 26 at the end of rear panel 3 and fasten together with screws through the left row of holes. Fasten trim strips 72 and 71 and upright channel support 26 at the end of front panel 42. Secure these supports to the floor channels. Then put truss assemblies 51 and 52 on top of these channels and secure with screws through channel bracket 23.

Place roofing panel 68 underneath trim strips 13 and 31 and butt against roofing panel 67. Also place roofing panel 15 underneath trim strips 13 and 30 and butt against roofing panel 14. Secure both panels tightly enough so that final tightening may be done from inside.

Position and secure trim strip 19 to cover joint between roofing panels 15 and 68.

The second rear panel 3 and front panel 41 can now be slid between the appropriate trim strips and channel supports and fastened in place and secured to the floor channels.

A fourth set of trusses 51 and 52 is now positioned on top of the overhead flanges of panels 3 and 41. Trim strips 31 and 30 are secured loosely on panels 3 and 42, respectively. Then another set of roofing panels 15 and 68 are positioned and butted against the previous roofing panels designated 15 and 68. Roofing panel 15 is on the left side and roofing panel 68 is on the right side. The panels must be placed underneath their respective trim strips 30 and 31. Then the roofing panels are secured to the set of trusses. Next, center roof trim strip 19 and two trim strips 13 are positioned and secured loosely on the outside edges of the roofing panels.

This same assembly procedure is then followed for the remaining enclosure panels, supports, roof sections, and trim strips using sheets 1 through 6 of figure 1 to indicate the proper locating of the parts.

It will be noted that where large cutouts in the front panels are required for the exciter, control panel, and access door, channel supports are omitted and the space between existing supports is bridged by top panels 47, 2, and 45.

After the complete enclosure for transmitter No. 2 has been assembled, all screws should be tightened and the door hardware and doors can be assembled. It may be noted that if the floor on which the enclosure is erected is not perfectly flat, the tightening of the screws holding the panels to the floor channels may cause the floor channels to pull up from the floor in the low spots. This is normal.

Next the floor pans as shown on figure 6 can be placed in the positions noted on the drawing. The flanges between adjacent pans should be connected together with the hardware specified.

The screws, lockwashers and large flat washers used to hold the floor pans to the edge of the floor channels should be assembled hand tight all around the edge of the channels. Then with one man standing on the pan with one foot on each side of a screw forcing the pan down on the floor, a second man should tighten the screw. This procedure should be repeated for each of the screws tying the pan to the floor channel. It ensures the good tight fit required between the floor pans and the floor when the special concrete transmitter base is poured on the floor pans.

After the enclosure for transmitter No. 2 has been assembled the second enclosure for transmitter No. 1 should be assembled as shown in sheet 7 of figure 1. This second enclosure is assembled from the same parts as the first one except that it is for the most part assembled as a mirror image of the first. Those parts which are not mirror imaged are indicated by item numbers in sheet 7 of figure 1.

Figures 9 through 26 show the progressive assembly of the enclosure shown on sheet 7 of figure 1 for transmitter No. 1.

CONCRETE FLOOR. - Use a mixture of Portland cement, 10 percent by volume; aggregate, 72 percent by volume; and water, 18 percent by volume. These items are not part of installation materials.

1. Portland cement shall comply with "Specifications for Portland Cement" (ASTM C150).

   (A) For normal cure, use Type I, which achieves 4000 psi strength after seven days. Keep concrete moist for five days.

   (B) For fast cure, use Type III, which achieves 4000 psi strength after three days. Keep concrete moist for two days.

2. Concrete aggregates shall conform to "Specification for Concrete Aggregates" (ASTM C33). Aggregates shall consist of clean, hard, strong and durable particles free of chemicals or coatings of clay or other fine material that may affect bonding of the cement paste.

   (A) The aggregate shall consist of 45 percent fine aggregate (sand).

   (B) The aggregate shall consist of 55 percent coarse aggregate having a maximum size of 3/8 inch.

3. The water used for mixing concrete shall be suitable for drinking and free of acids, alkalines and oil.

   Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing or near-freezing weather.

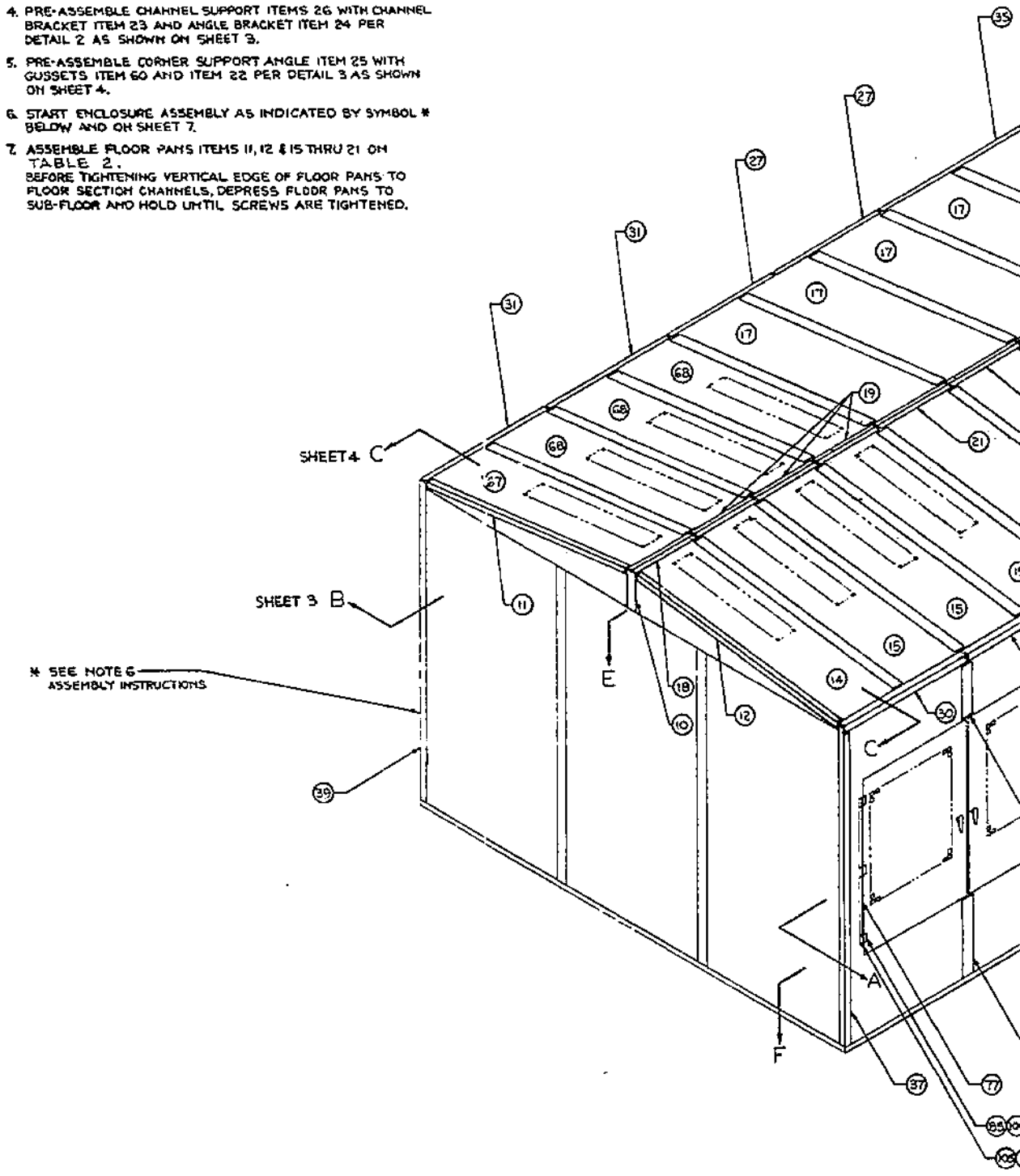
4. Whenever the temperature of the surrounding air is below 40°F, all concrete placed in the forms shall have a temperature of between 70°F and 80°F, and adequate means shall be provided for maintaining a temperature of not less than 70°F for three days or 50°F for five days, except when high-early-strength concrete is used - the temperature shall be maintained at not less than 70°F for two days or 50°F for three days. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

The concrete shall be screeded to a true and even surface at the established elevation. It should be compacted by power floating as soon as the concrete can support the weight of the operator and machine. If a power float cannot be used, the concrete can be carefully hand floated.

Floating shall be followed by steel troweling when the concrete has reached a firm set. The finish shall be troweled to a smooth surface free from defects, blemishes and floating marks.

ASSEMBLY INSTRUCTIONS

1. FIRST ASSEMBLE ENCLOSURE SHOWN IN THIS VIEW AND SHEETS 2 THRU 6 COMPLETELY, THEN PROCEED TO ASSEMBLE ENCLOSURE SHOWN ON SHEET 7, WITH FRONTS OPPOSITE EACH OTHER.
2. ASSEMBLE FLOOR SECTION CHANNELS ITEMS 1 THRU 10 ON TABLE 2 IN LOCATION DESIGNATED. (DO NOT ASSEMBLE FLOOR PANS AT THIS STAGE.)
3. PRE-ASSEMBLE ALL TRUSSES ITEMS 51, 52, 53, 54, 93 & 94 PER DETAIL 1 AS SHOWN ON SHEET 5.
4. PRE-ASSEMBLE CHANNEL SUPPORT ITEMS 26 WITH CHANNEL BRACKET ITEM 23 AND ANGLE BRACKET ITEM 24 PER DETAIL 2 AS SHOWN ON SHEET 3.
5. PRE-ASSEMBLE CORNER SUPPORT ANGLE ITEM 25 WITH GUSSETS ITEM 60 AND ITEM 22 PER DETAIL 3 AS SHOWN ON SHEET 4.
6. START ENCLOSURE ASSEMBLY AS INDICATED BY SYMBOL * BELOW AND ON SHEET 7.
7. ASSEMBLE FLOOR PANS ITEMS 11, 12 & 15 THRU 21 ON TABLE 2. BEFORE TIGHTENING VERTICAL EDGE OF FLOOR PANS TO FLOOR SECTION CHANNELS, DEPRESS FLOOR PANS TO SUB-FLOOR AND HOLD UNTIL SCREWS ARE TIGHTENED.



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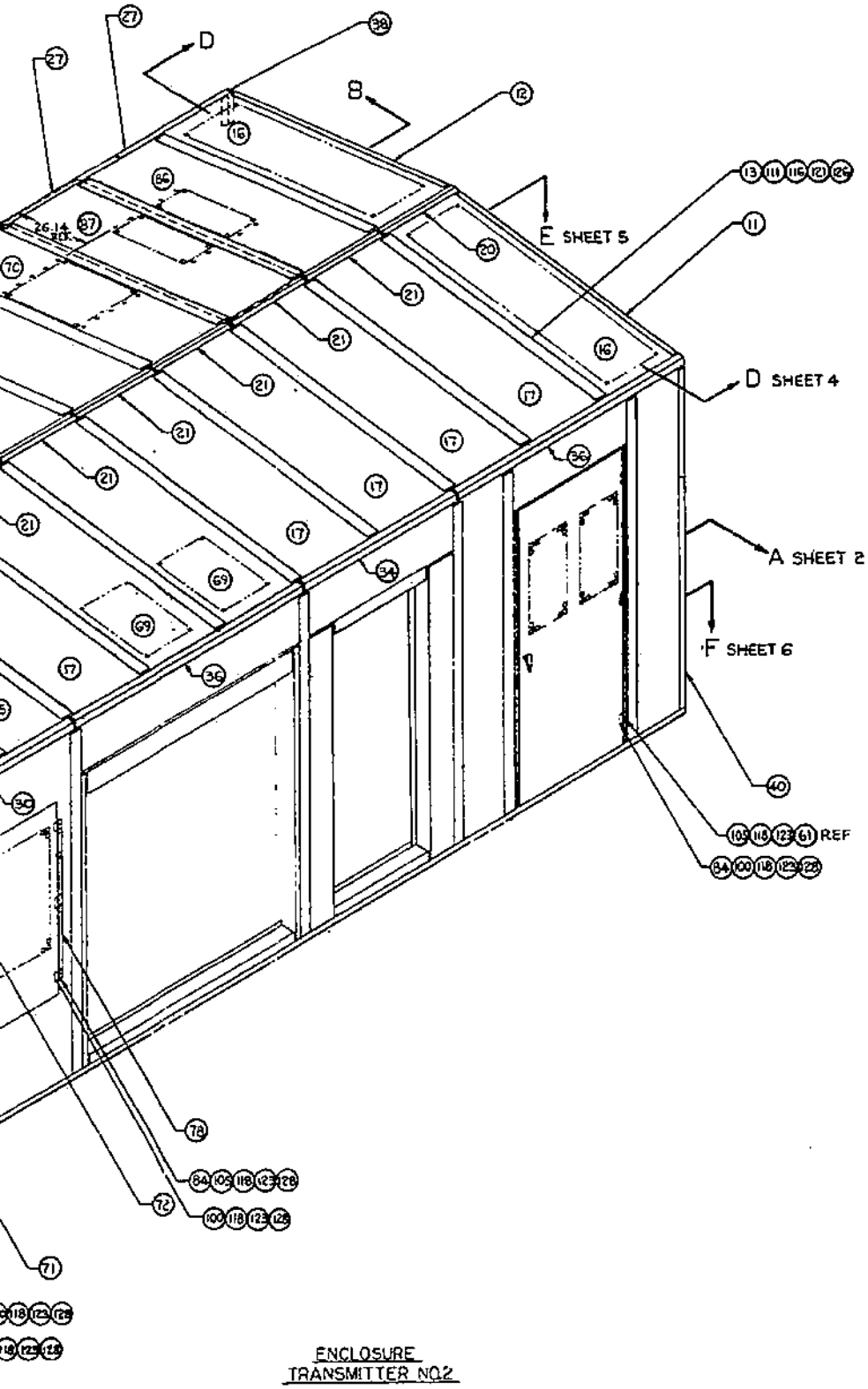
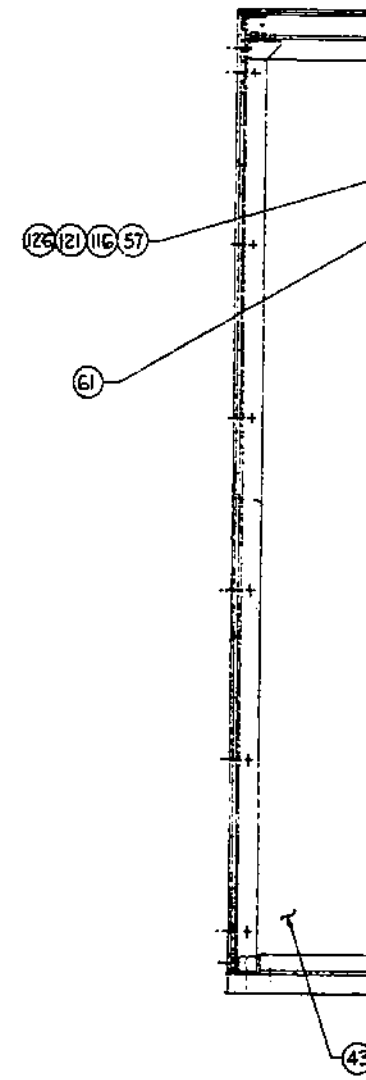


Figure 1. Enclosure Assembly
(Sheet 1 of 7)



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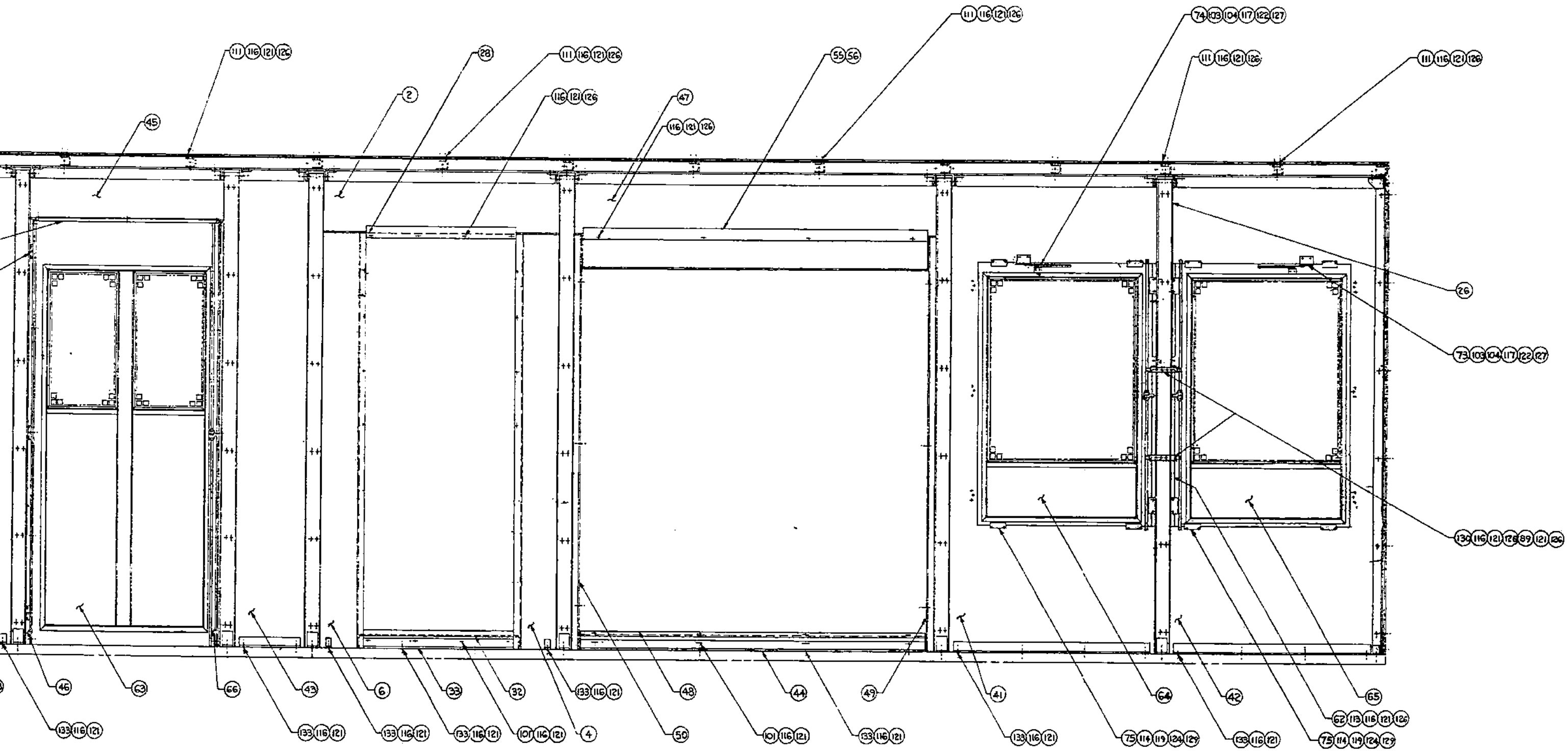

SECTION A-A

Figure 1. Enclosure Assembly
(Sheet 2 of 7)

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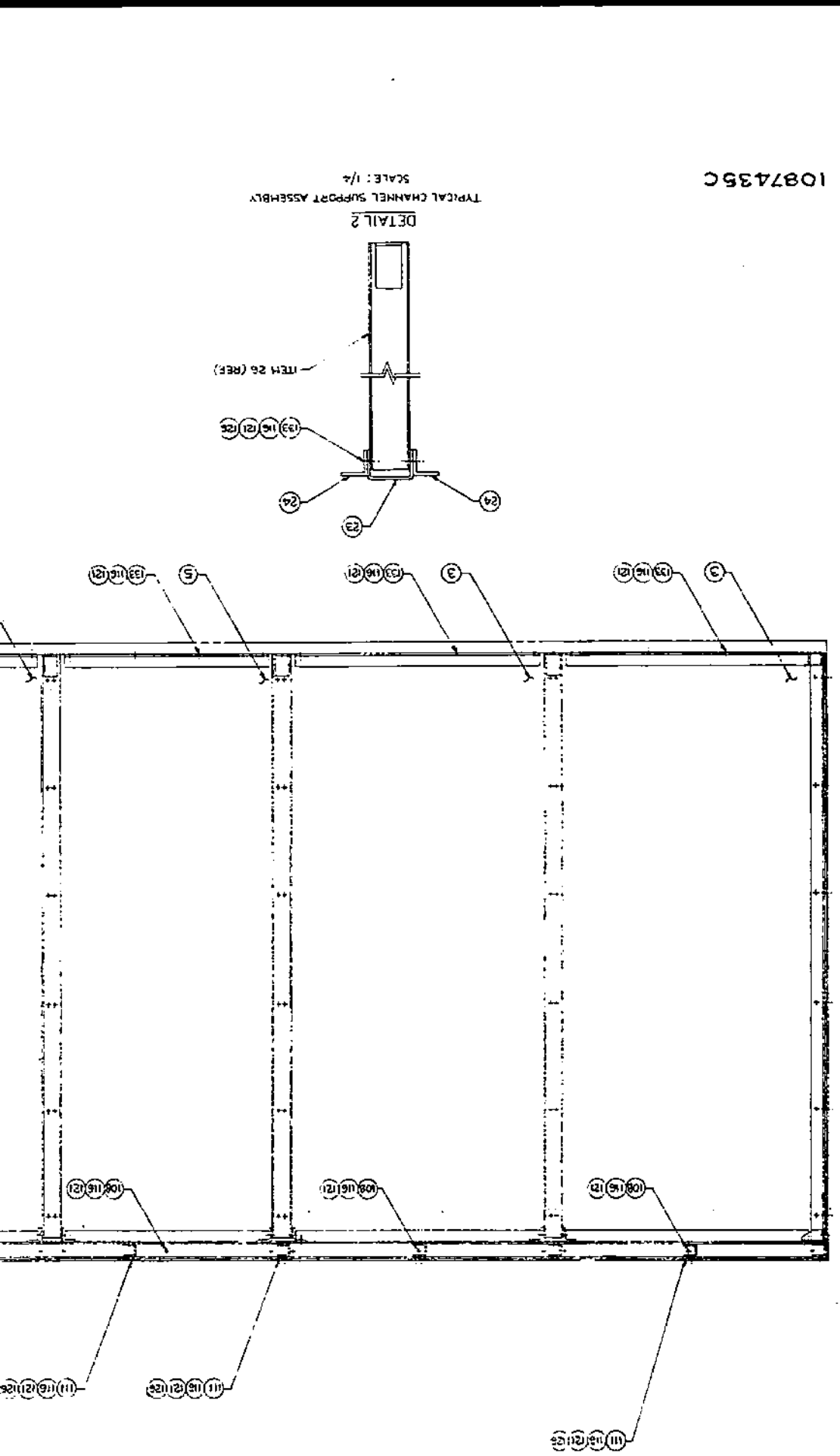
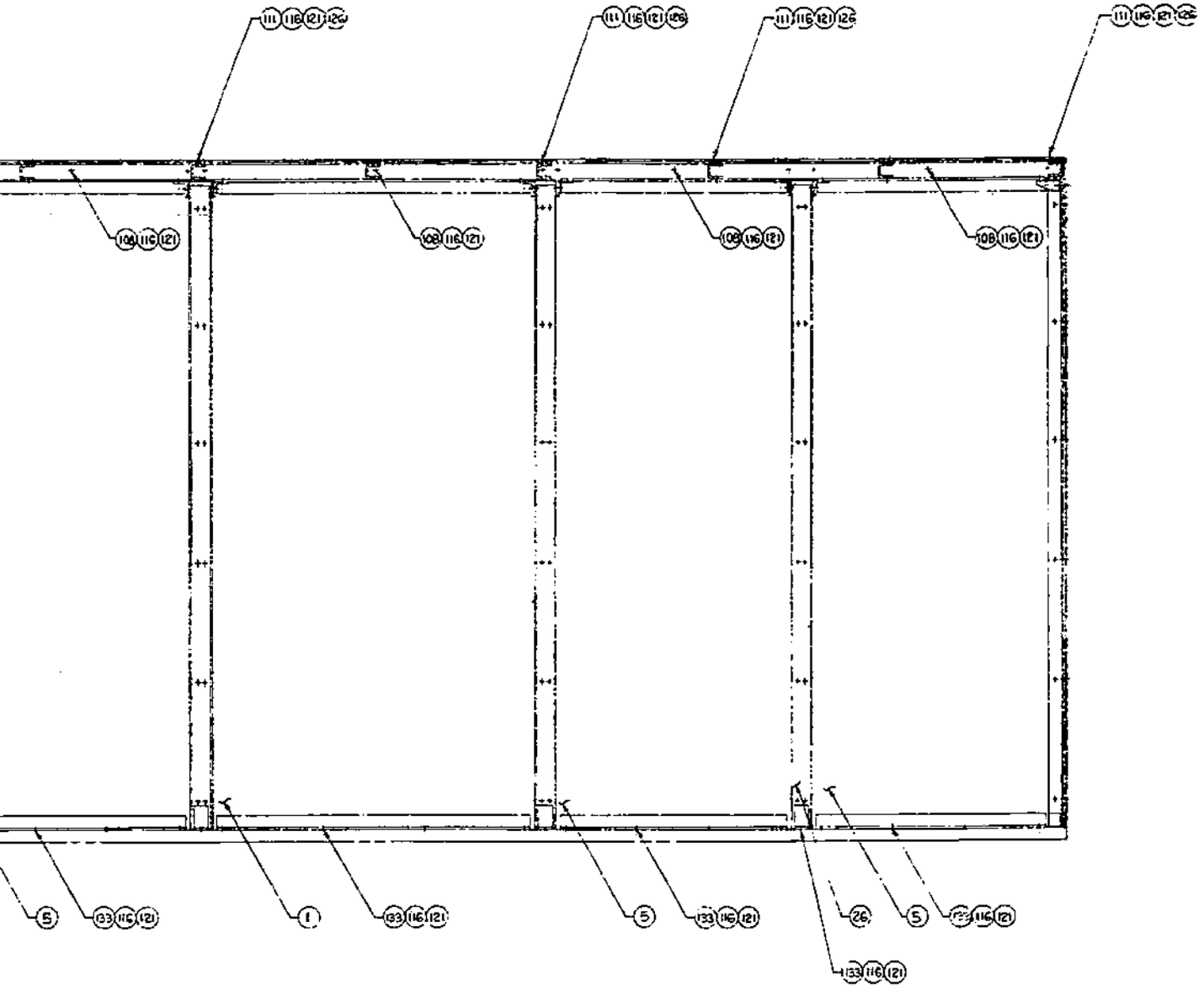
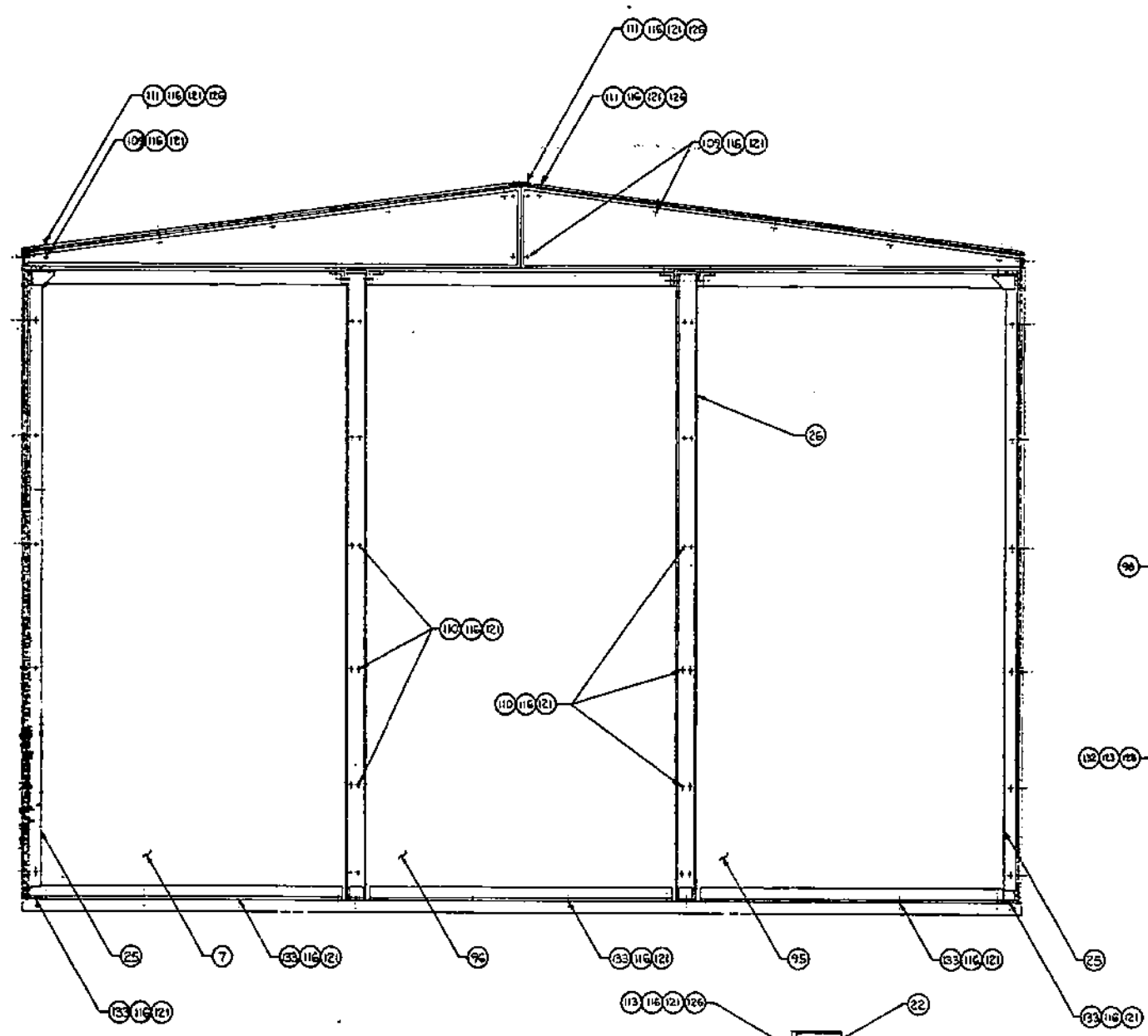

DETAIL 2
TYPICAL CHANNEL SUPPORT ASSEMBLY
SCALE: 1/4
ITEM 26 (REF.)
(26)(21)(16)(33)
(24)
(24)
(23)
(5)
(3)
(3)
(12)(9)(8)
(12)(9)(8)
(12)(9)(8)
(12)(9)(11)
(12)(9)(11)
(12)(9)(11)

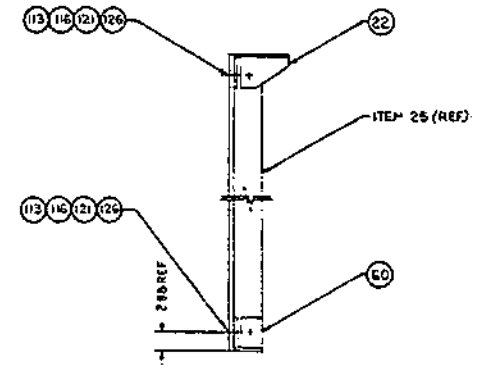


SECTION B-B

Figure 1. Enclosure Assembly
(Sheet 3 of 7)



SECTION C-C



DETAIL 3

TYPICAL CORNER ANGLE SUPPORT ASSEMBLY

SCALE: 1/4

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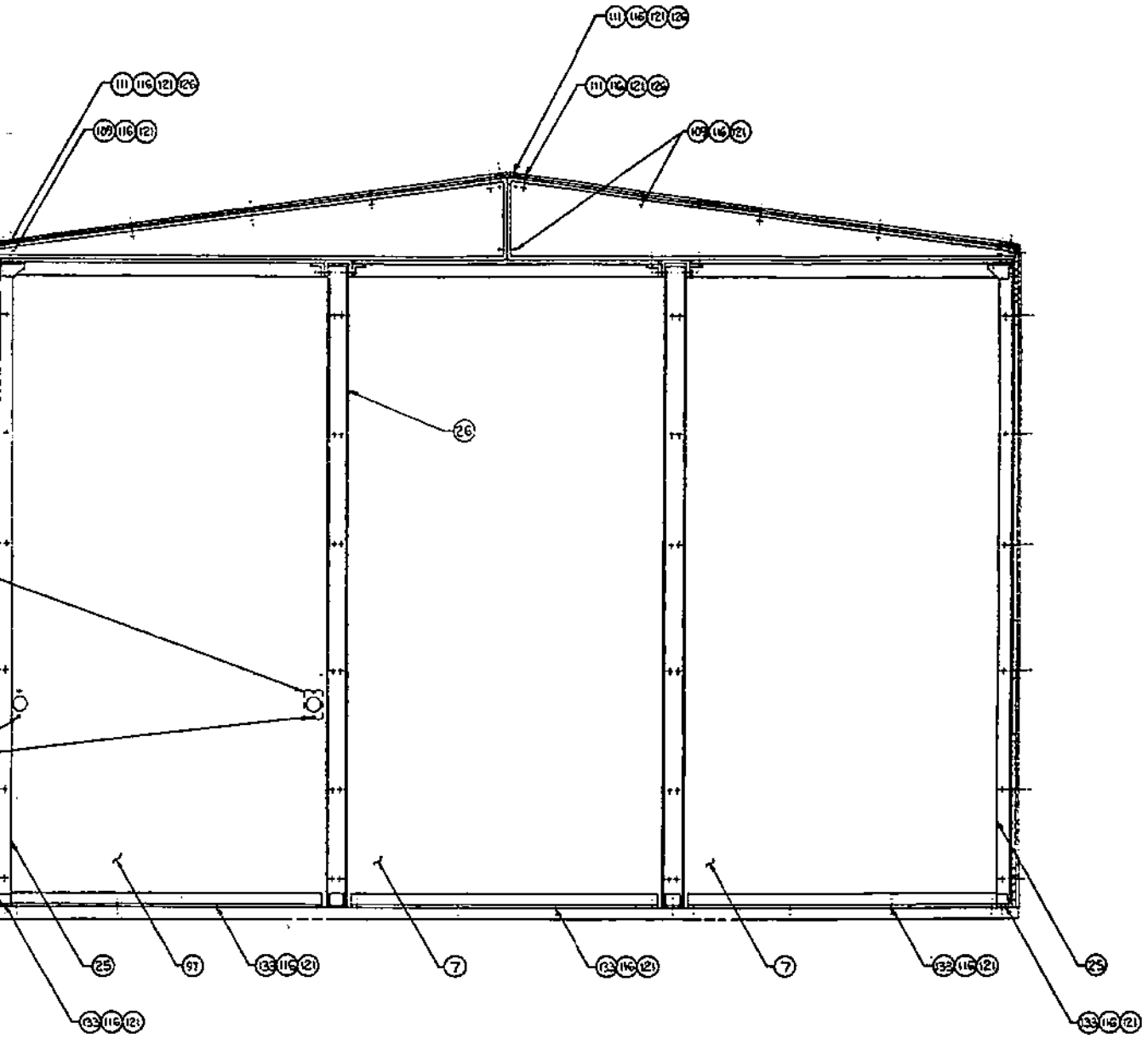
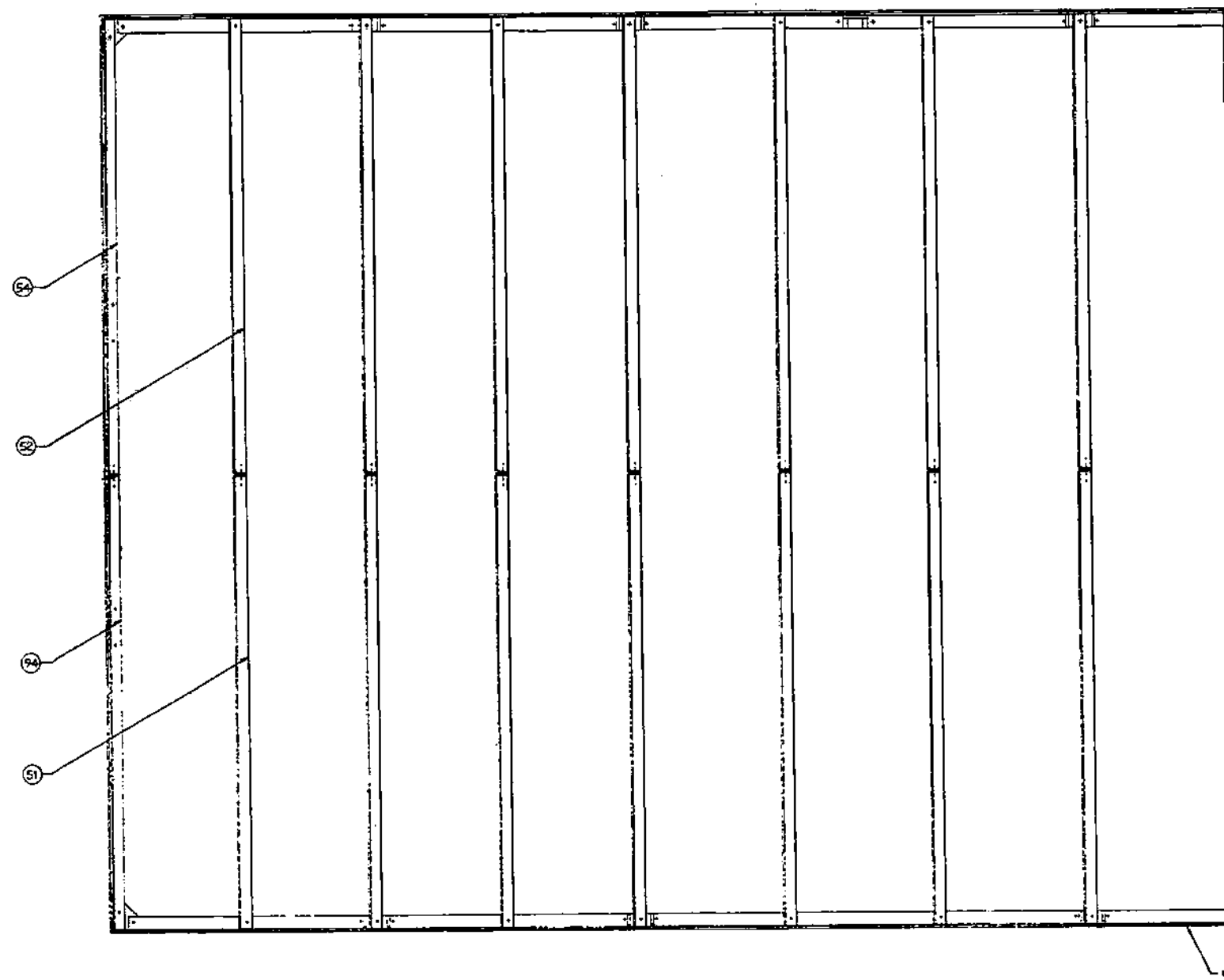


Figure 1. Enclosure Assembly
(Sheet 4 of 7)



SECTION E-E

DETAIL I
TYPICAL TRUSS ASSEMBLY
SCALE: NONE

1087435C

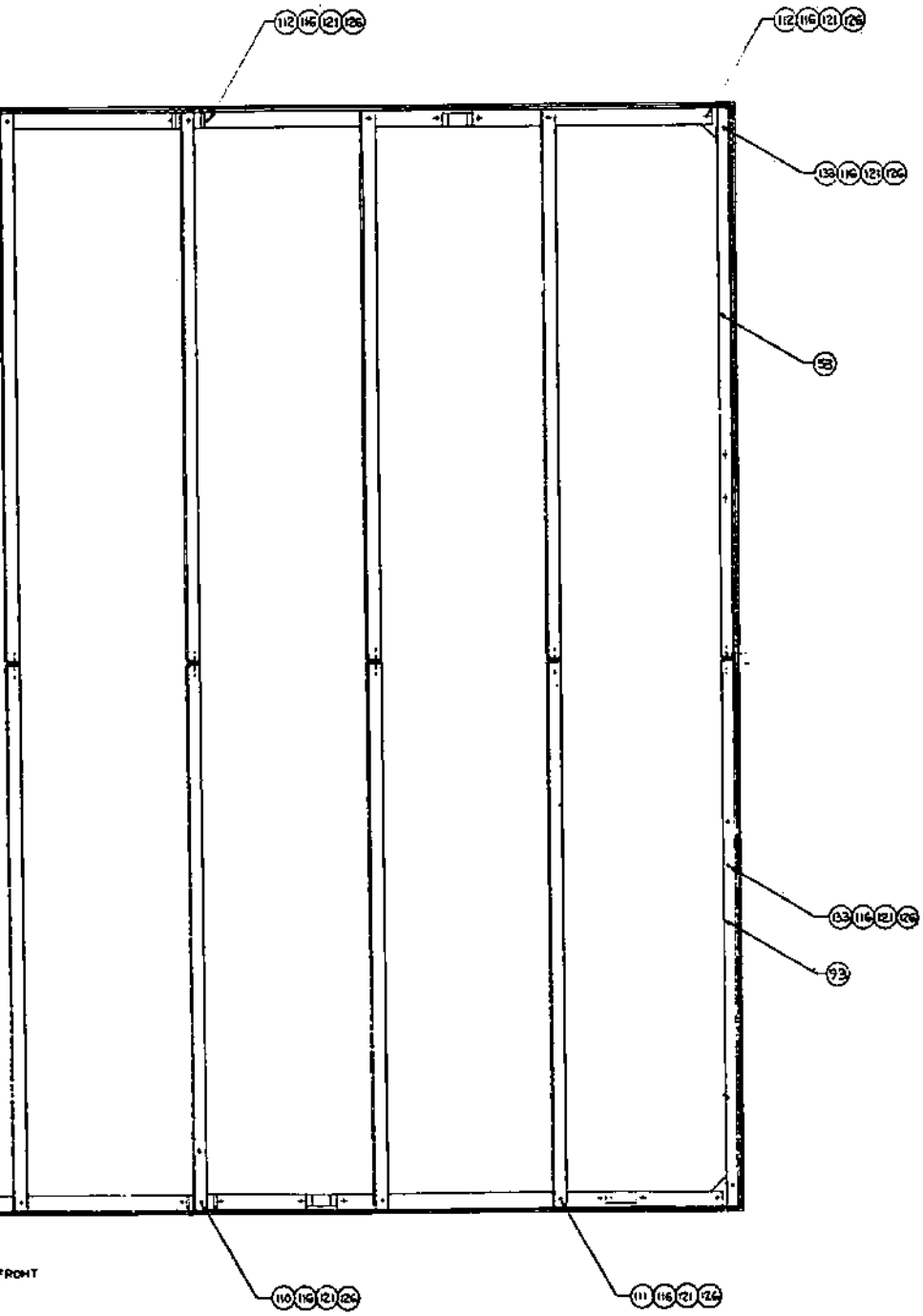
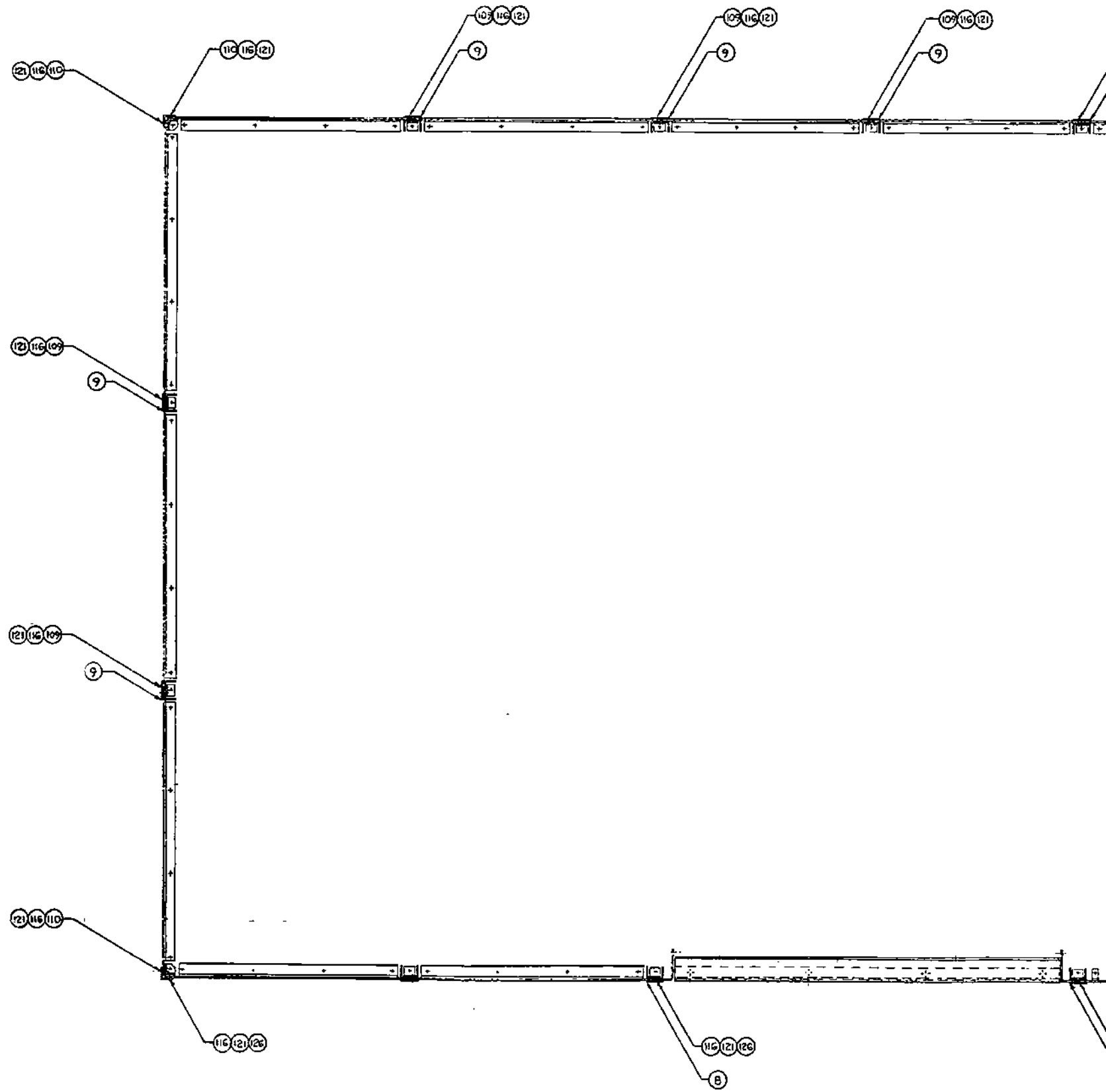


Figure 1. Enclosure Assembly
(Sheet 5 of 7)



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SECTION F-F

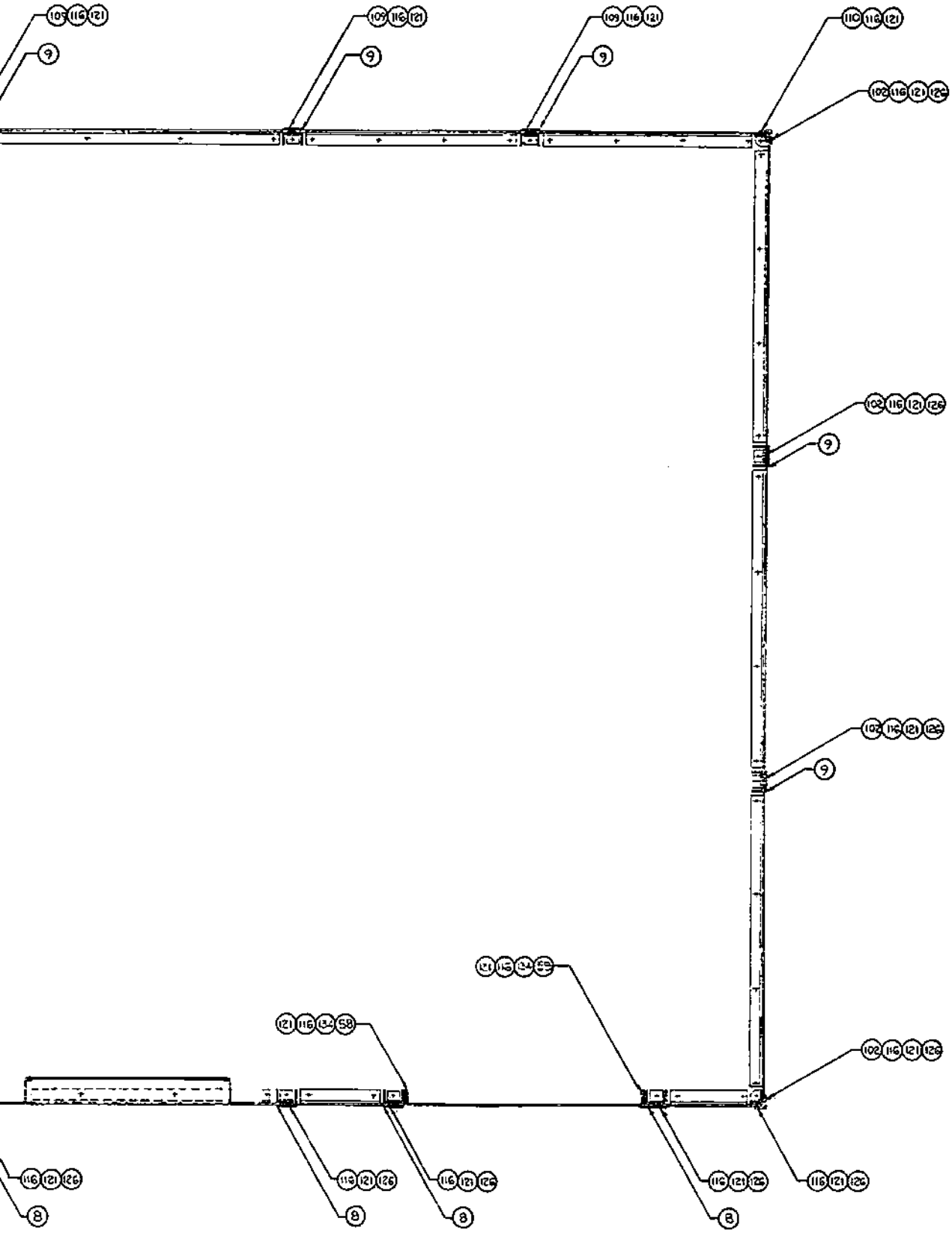
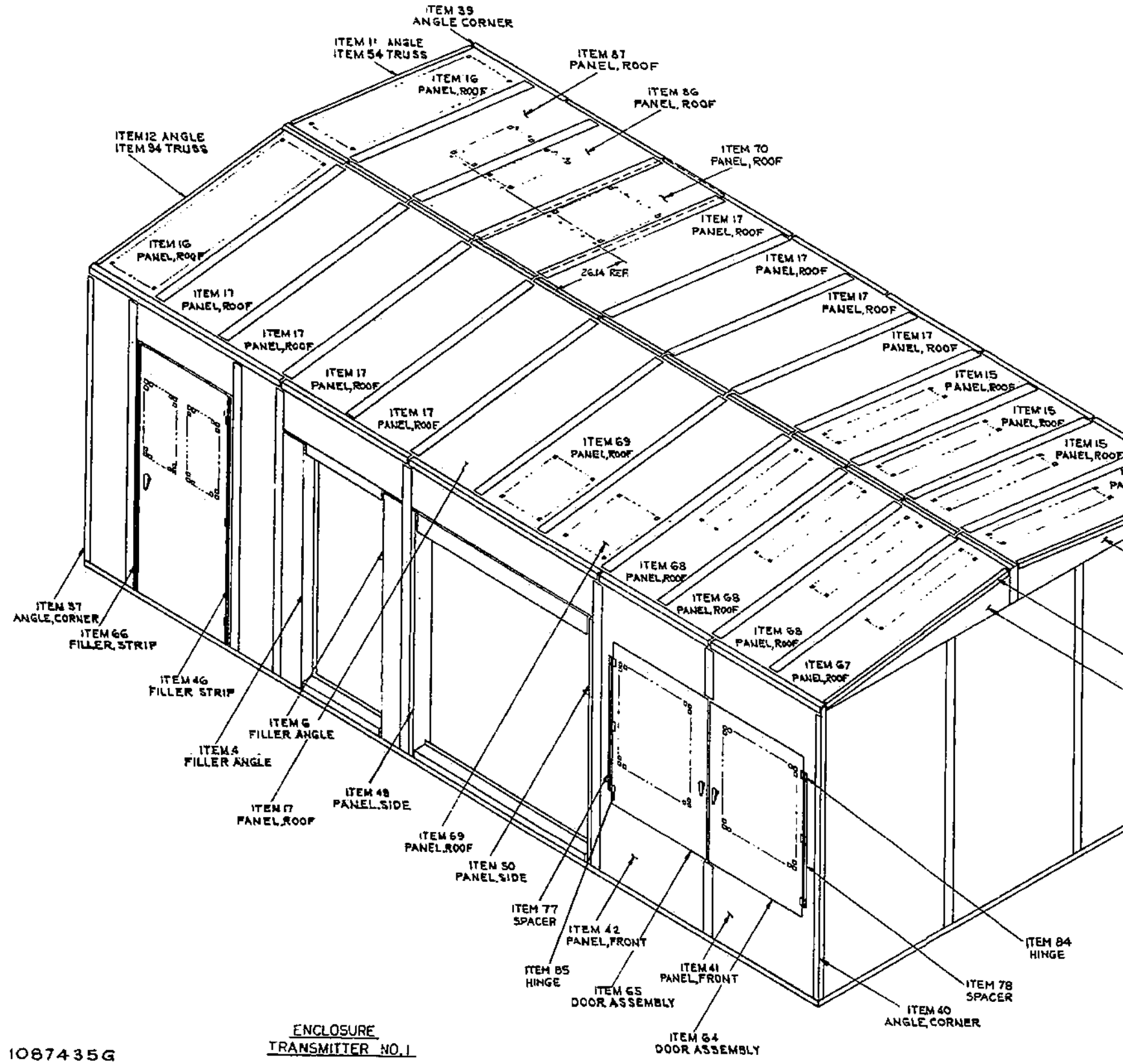


Figure 1. Enclosure Assembly
(Sheet 6 of 7)



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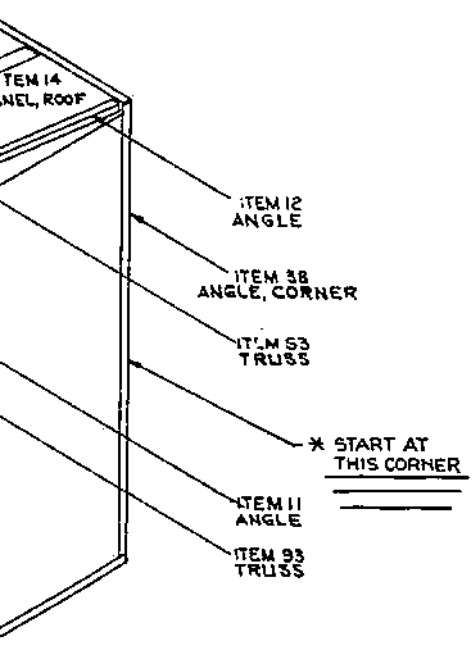
ENCLOSURE
TRANSMITTER NO. 1

Figur

NOTE
THIS SHEET SHOWS AN OPPOSITE HAND ENCLOSURE INSTALLATION. ITEMS THAT ARE NOT MIRROR IMAGE ARE INDICATED ONLY. FOR OTHER ITEMS SEE SHEETS 1 THRU 6



e 1. Enclosure Assembly
(Sheet 7 of 7)

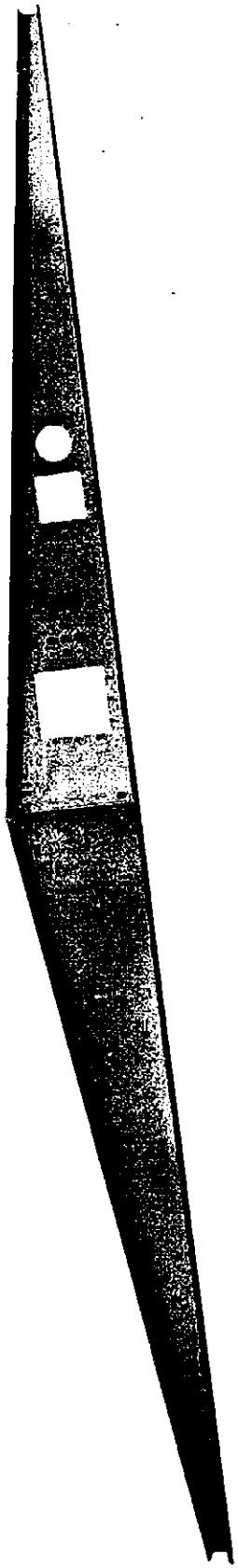


Figure 2. Roof Truss Assembly

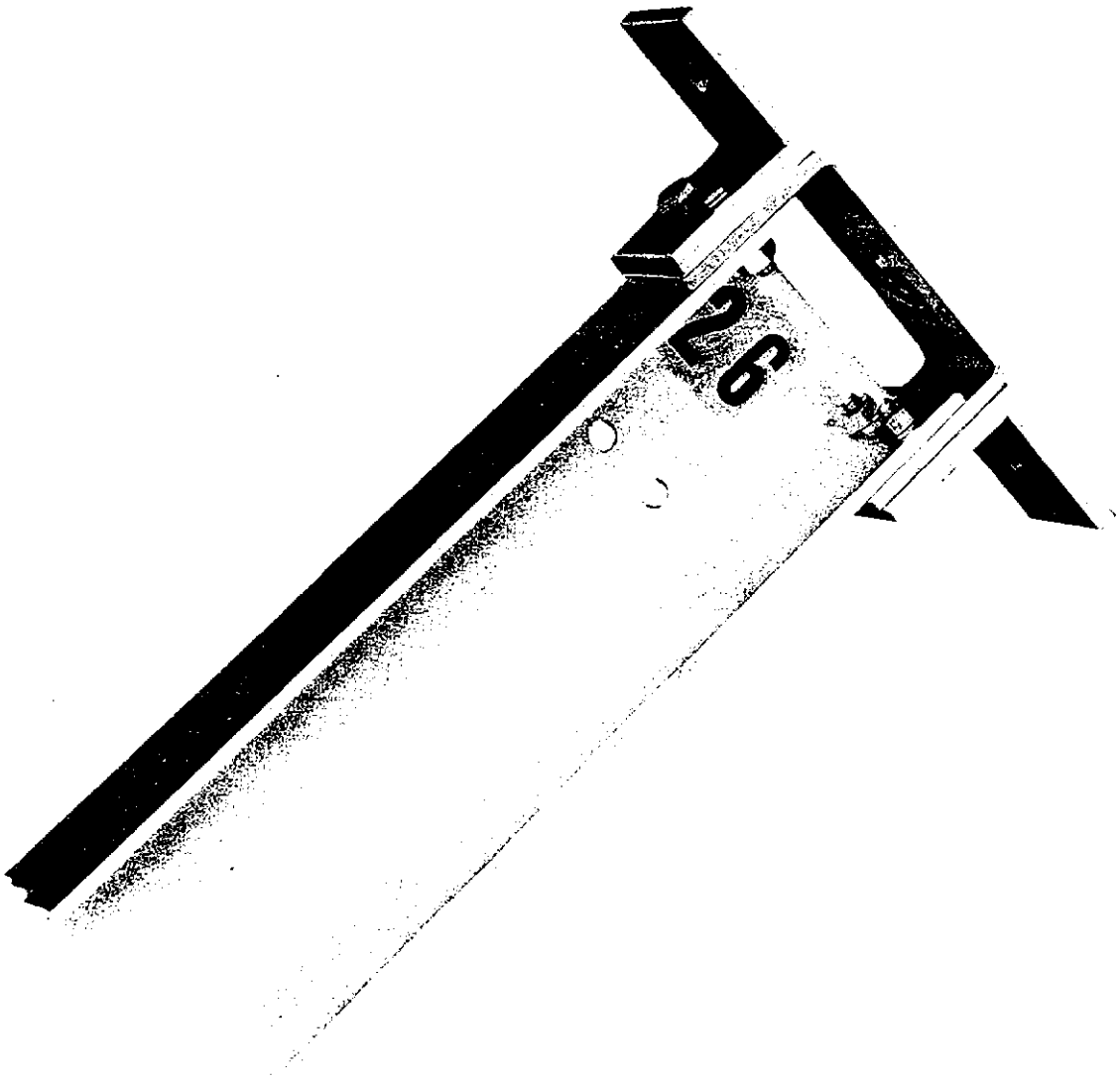


Figure 3. Channel Support Top Assembly

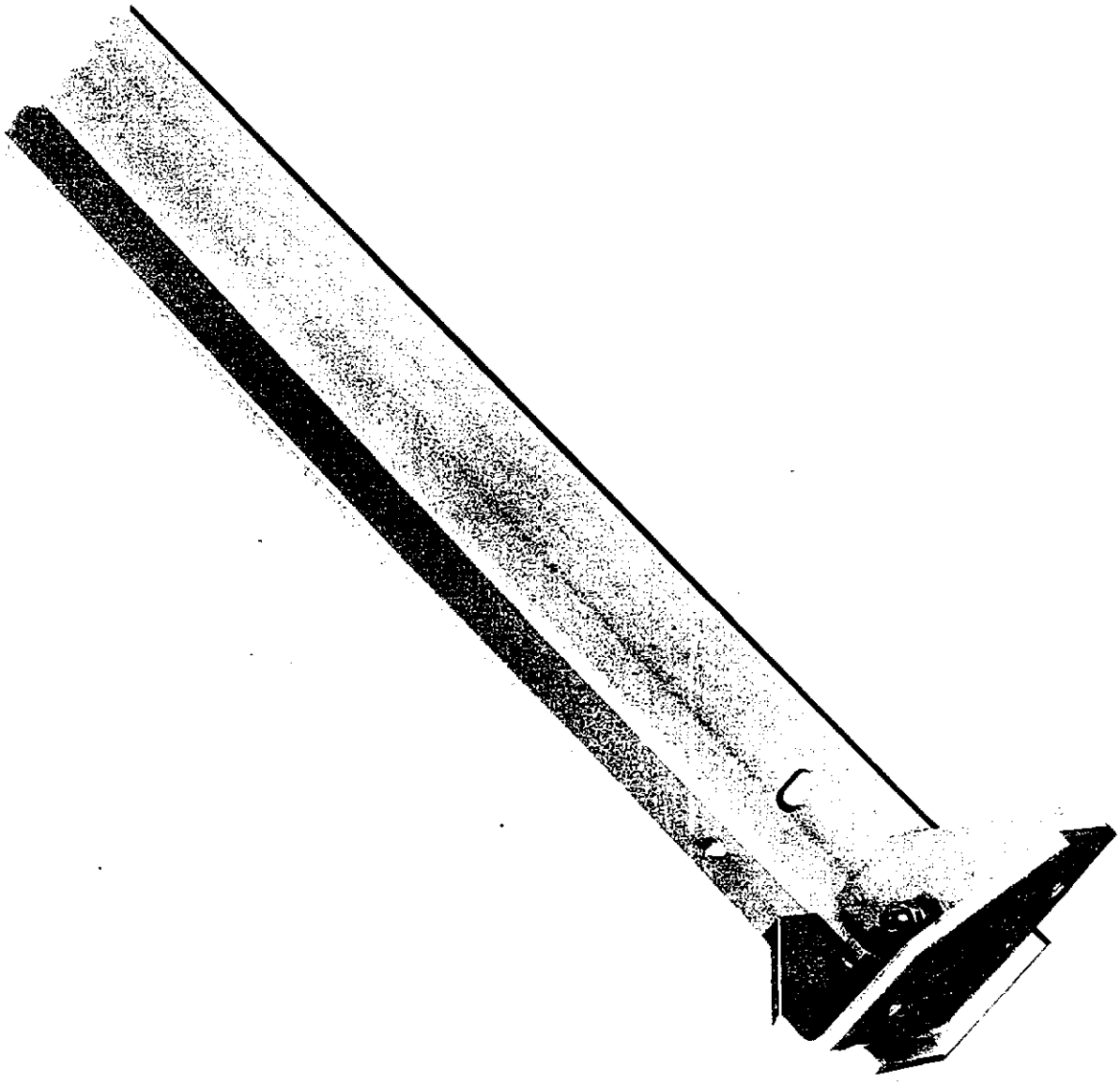


Figure 4. Corner Post Top Assembly

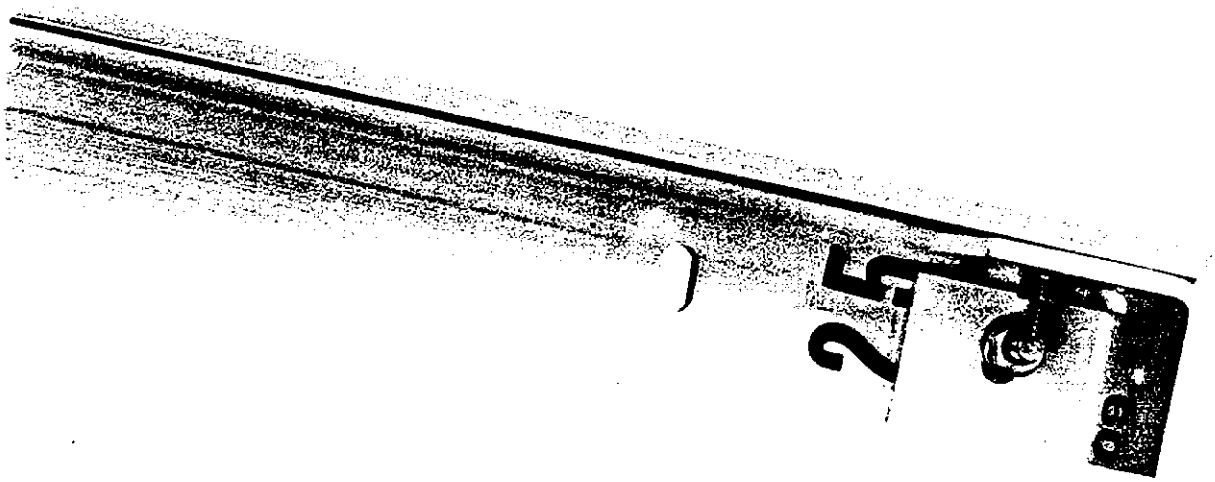


Figure 5. Corner Post Bottom Assembly

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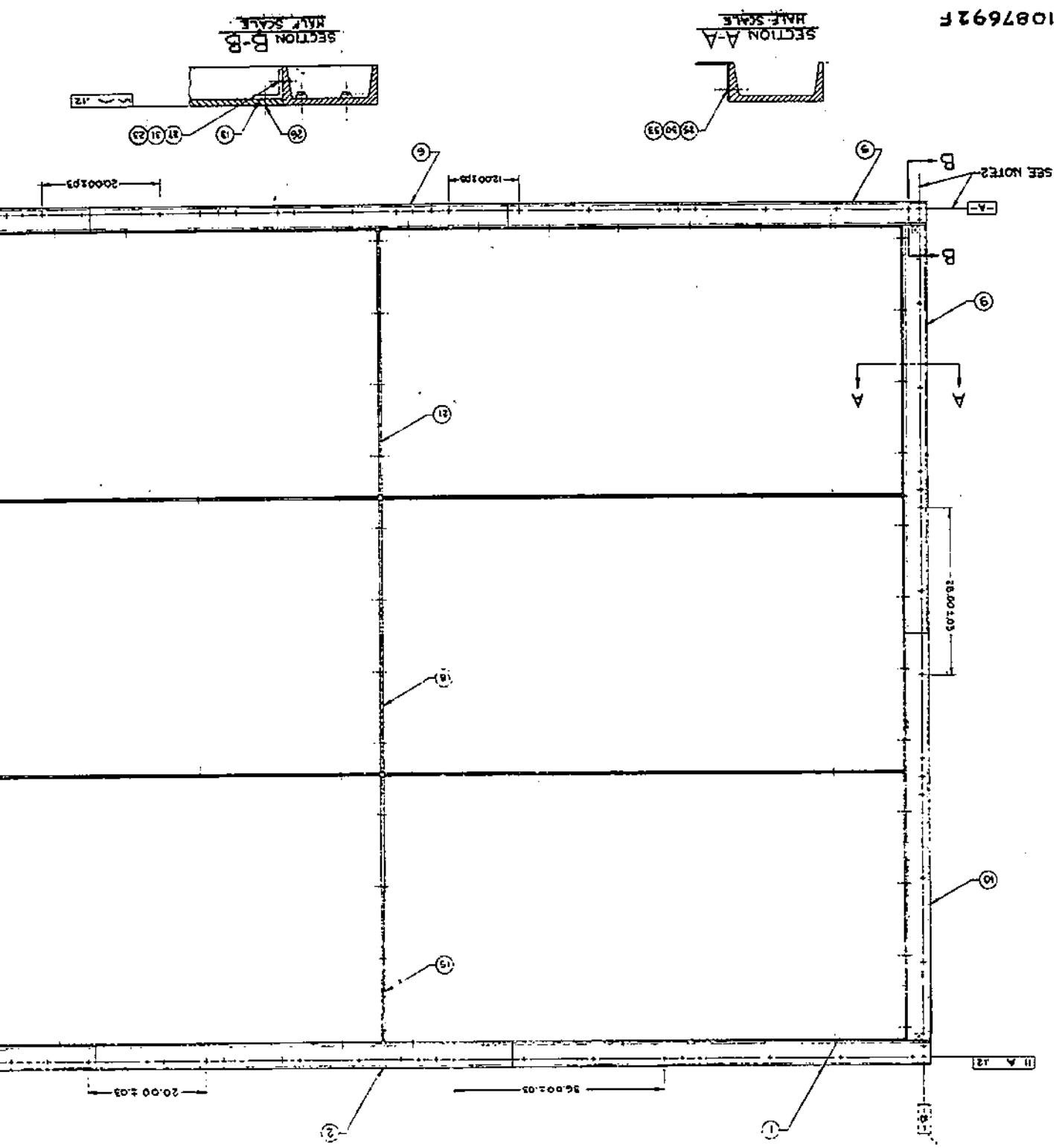
SECTION A-A
MALE SCALE
SECTION B-B
MALE SCALE
SEE NOTE2
A
B
20.00±03
36.00±.03
20.00±03

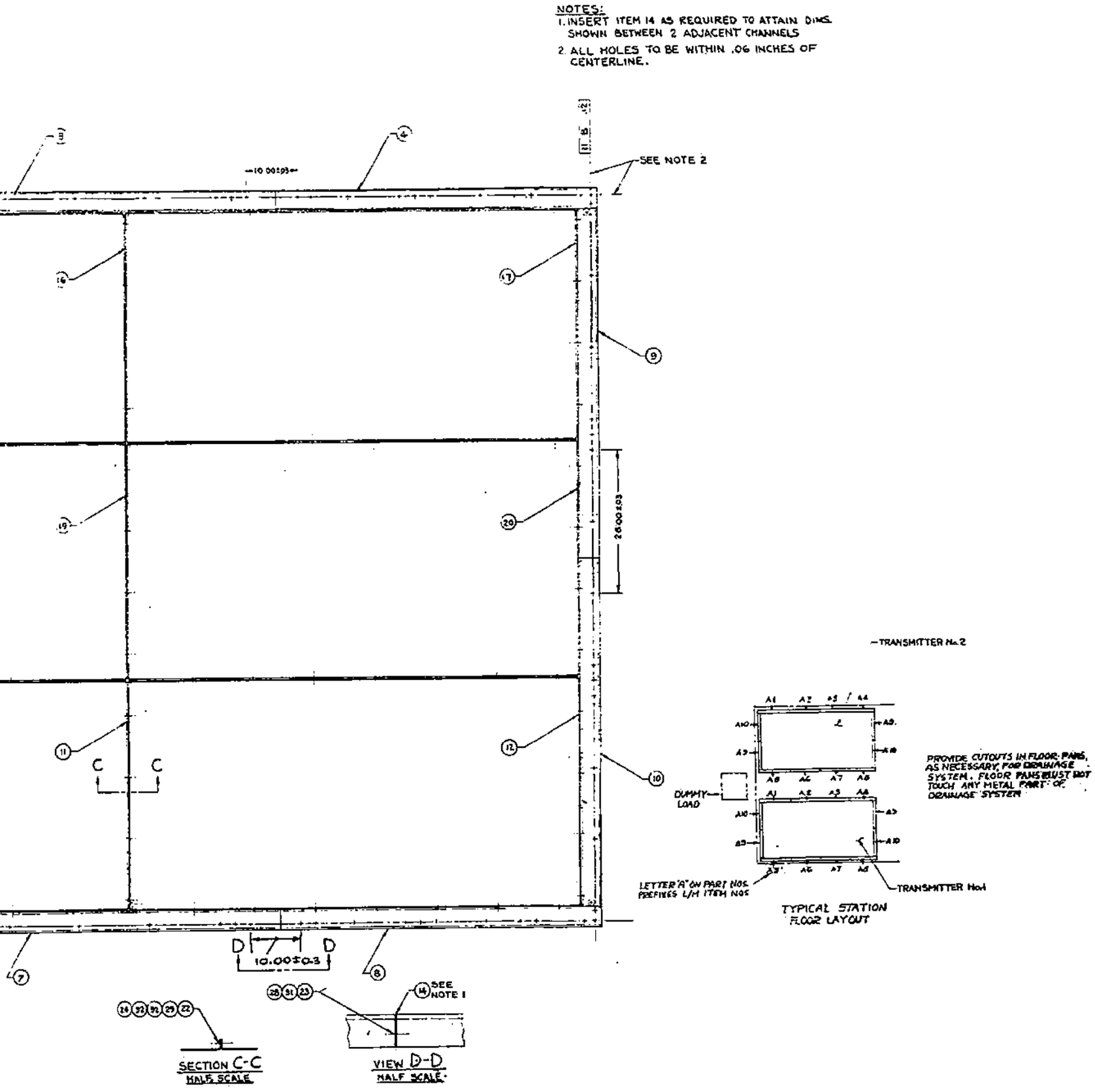

Figure 6. Floor Assembly

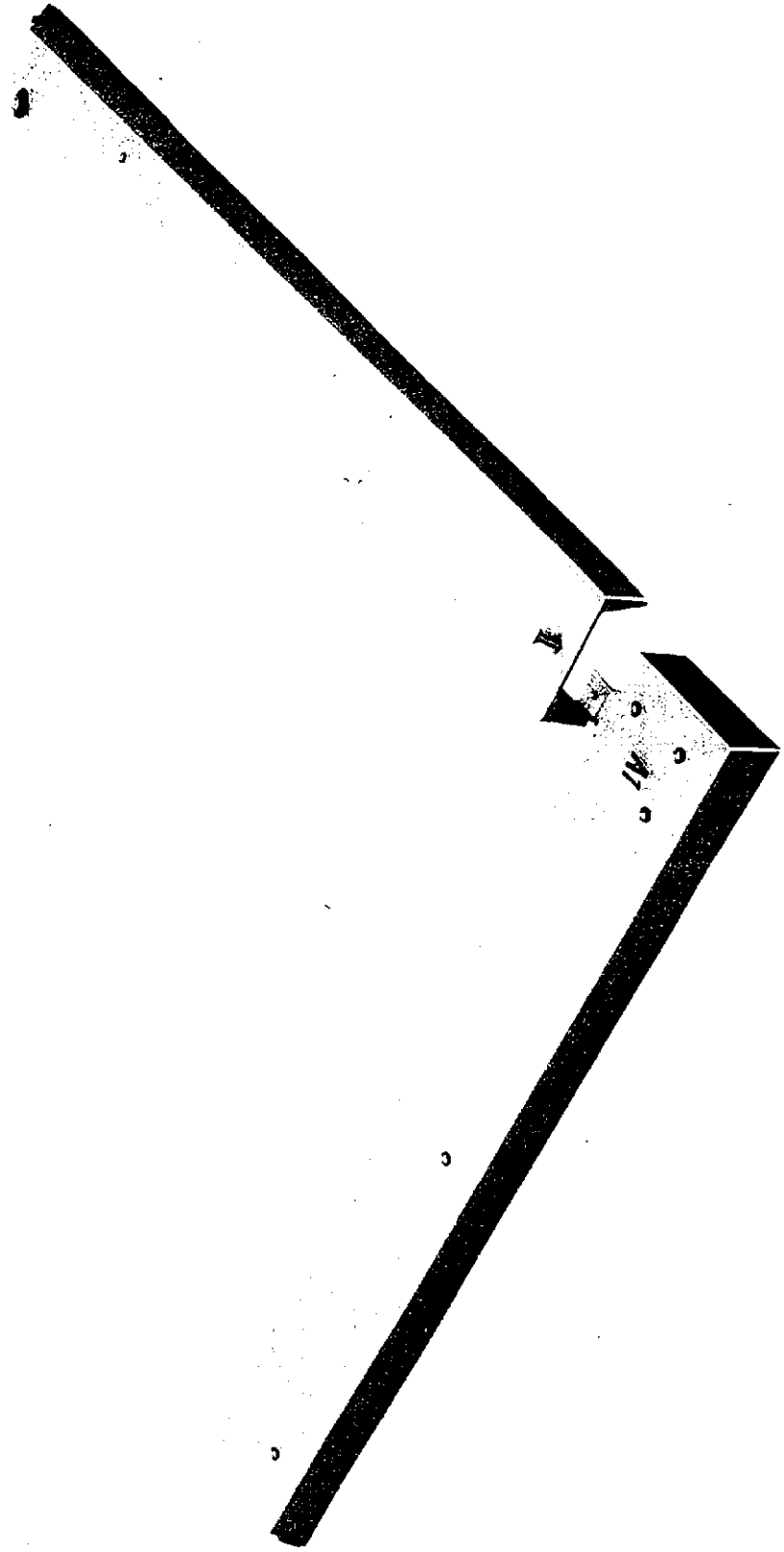

Figure 7. Floor Channel, Method of Connection

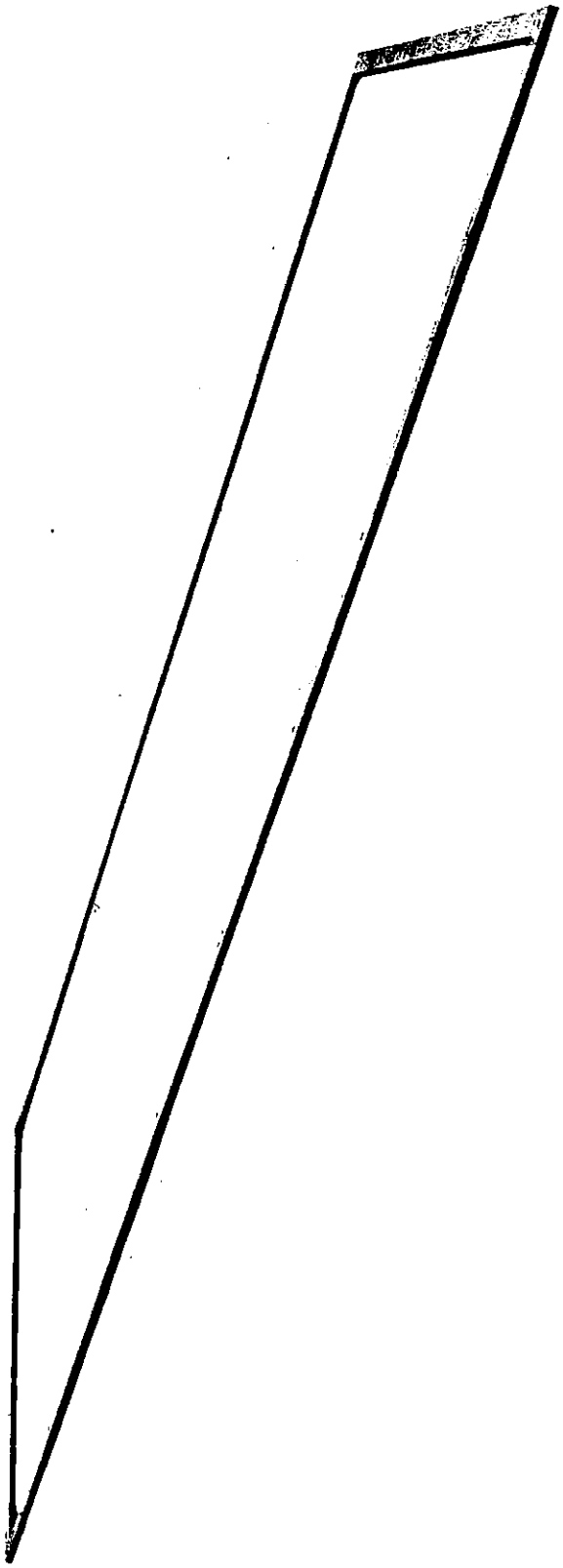

Figure 8. Floor Channel Assembly

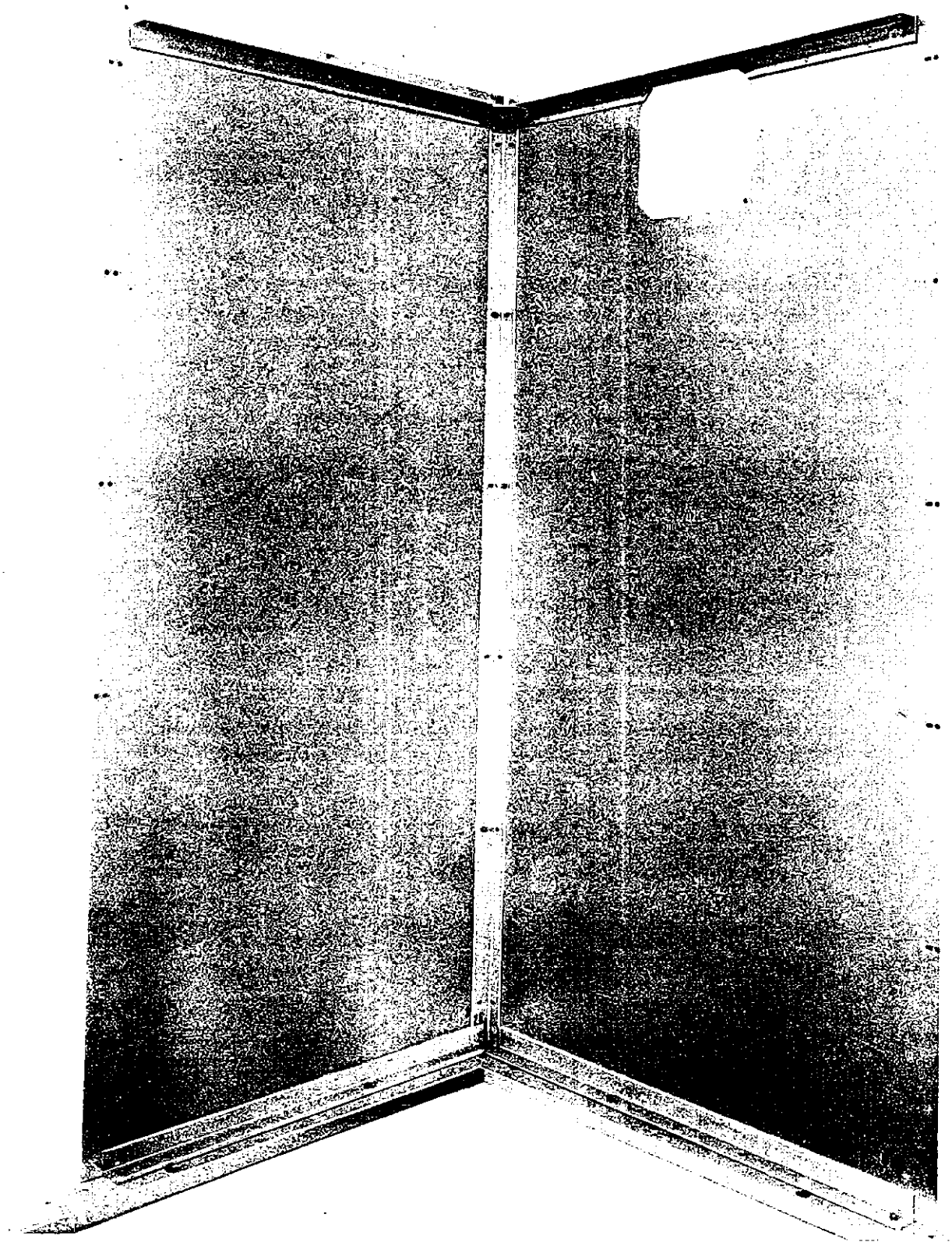

Figure 9. Enclosure, Starting Corner Assembly

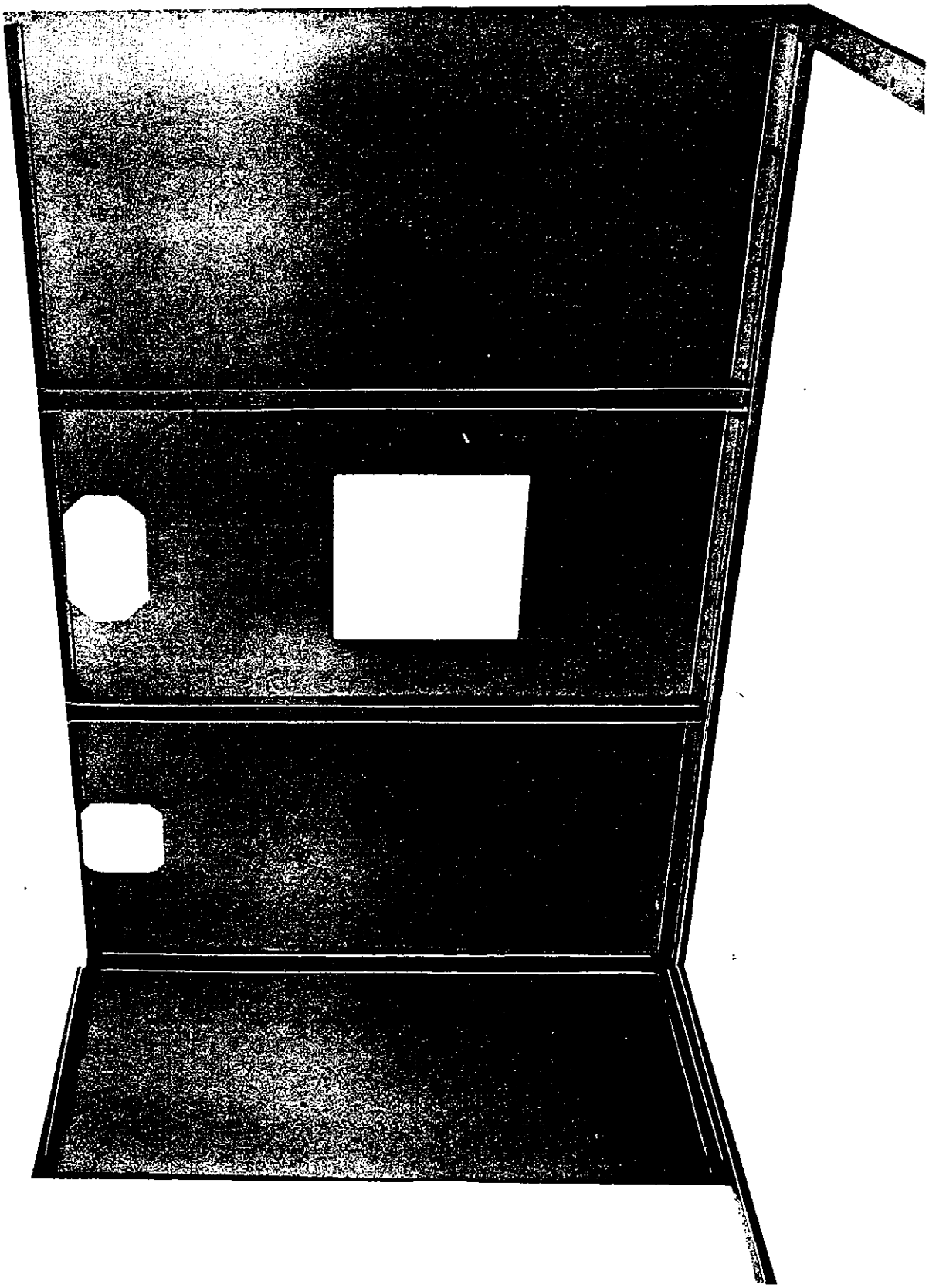

Figure 10. Enclosure, Starting End Assembly

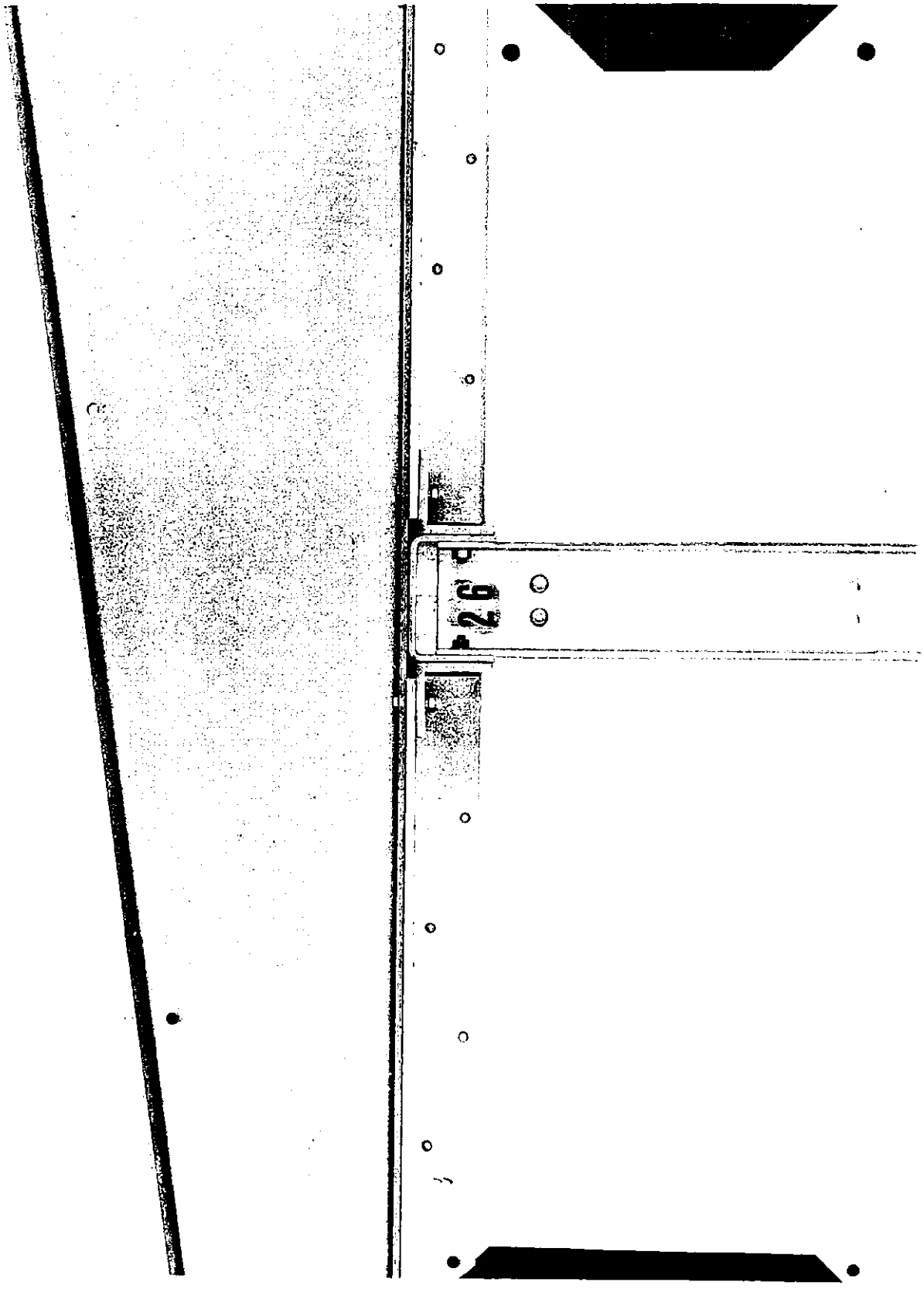

Figure 11. Truss Panel Support Assembly Detail

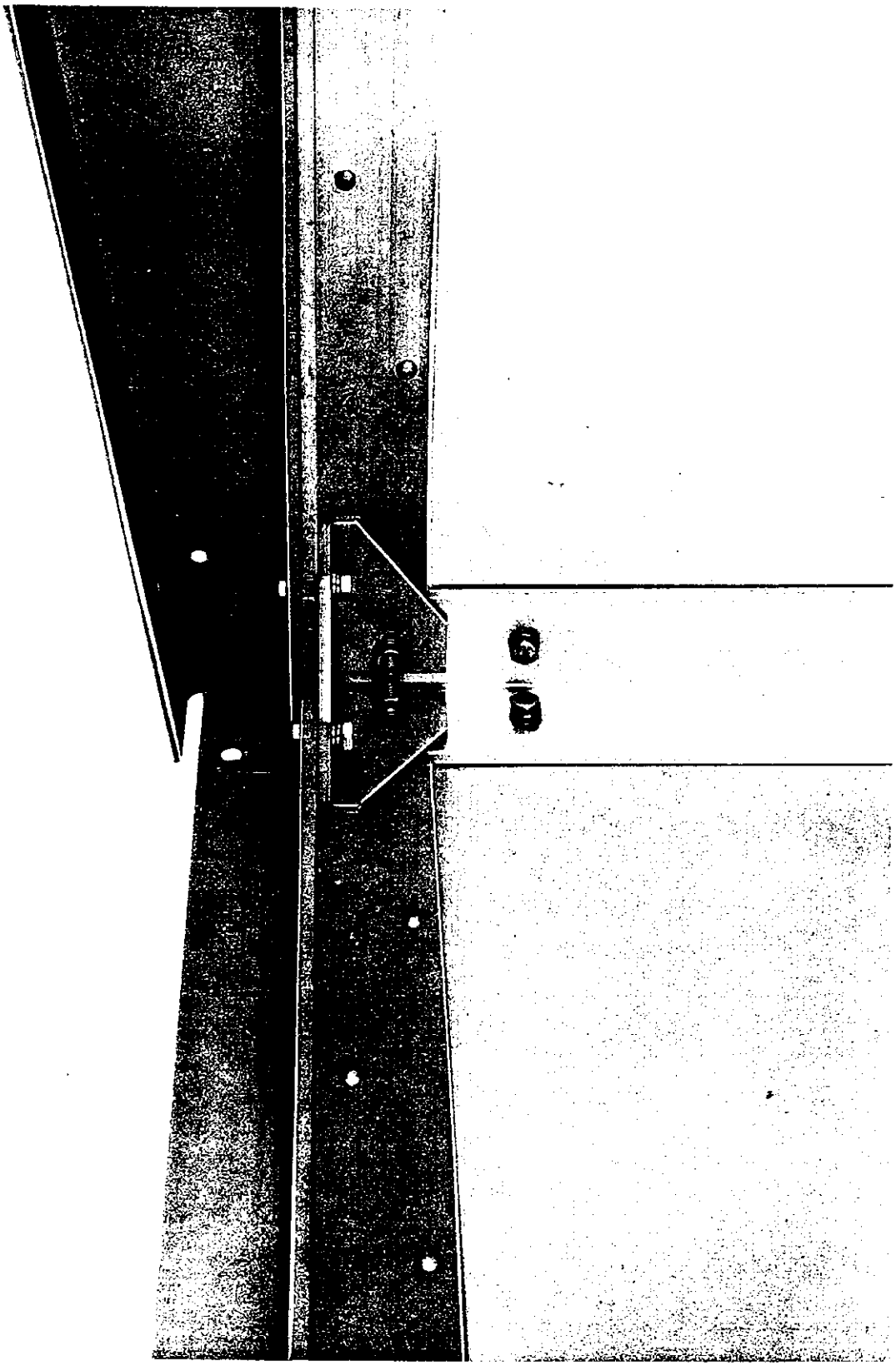

Figure 12. Enclosure, Truss Panel Corner Post Assembly Detail

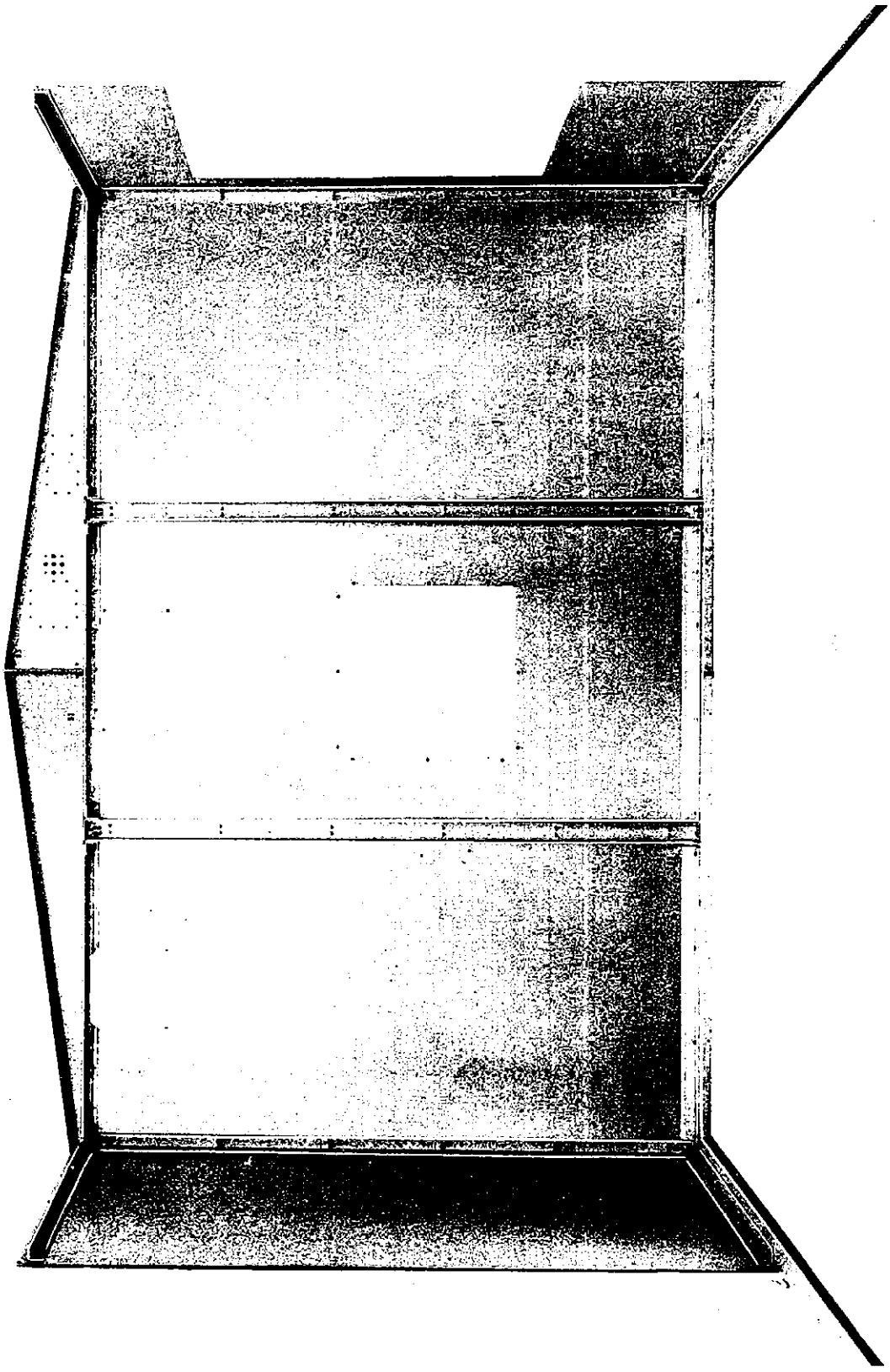

Figure 13. Enclosure, Starting End Assembly with Roof Truss

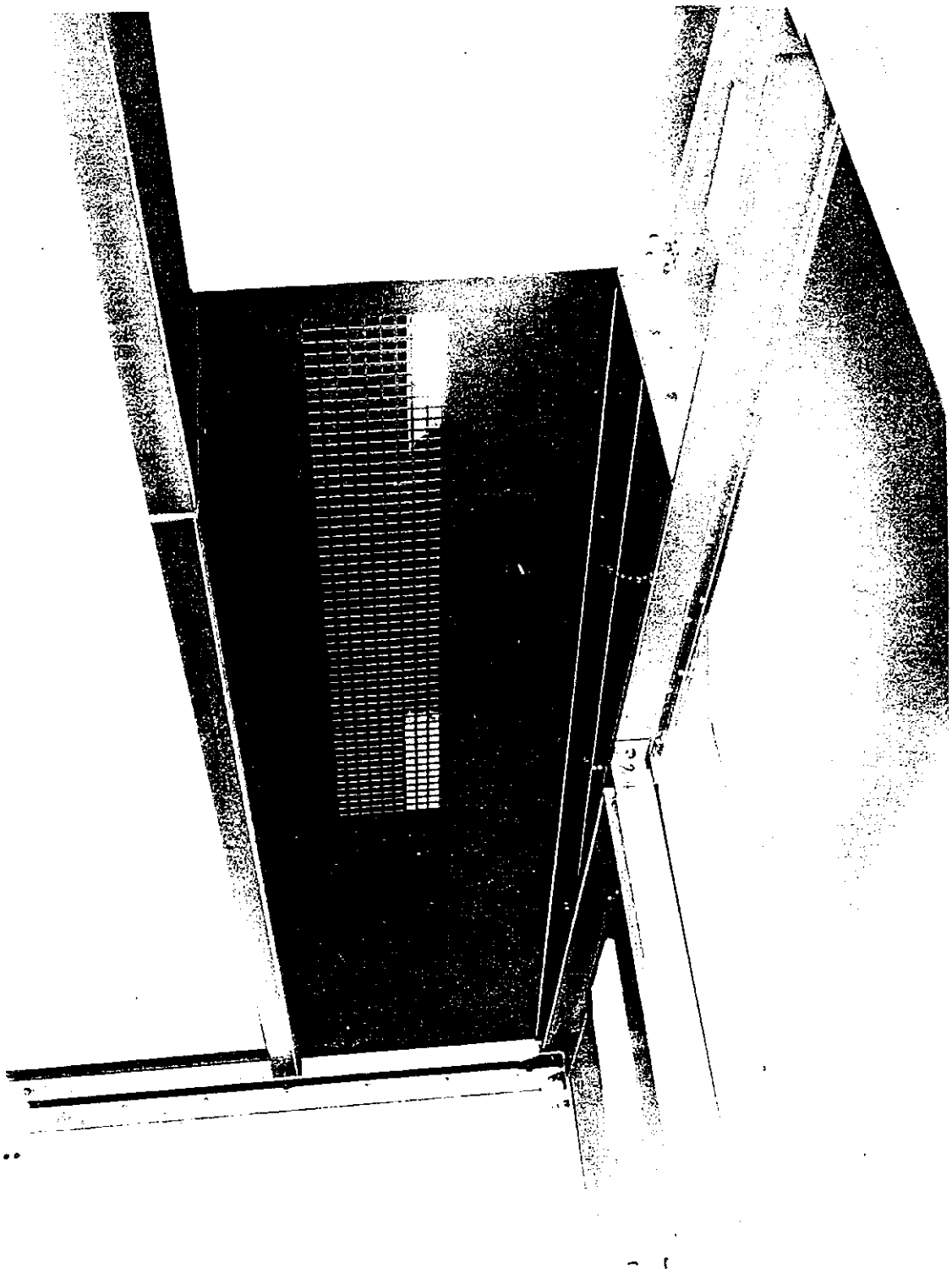

Figure 14. Enclosure, Roof Panel Assembly Detail

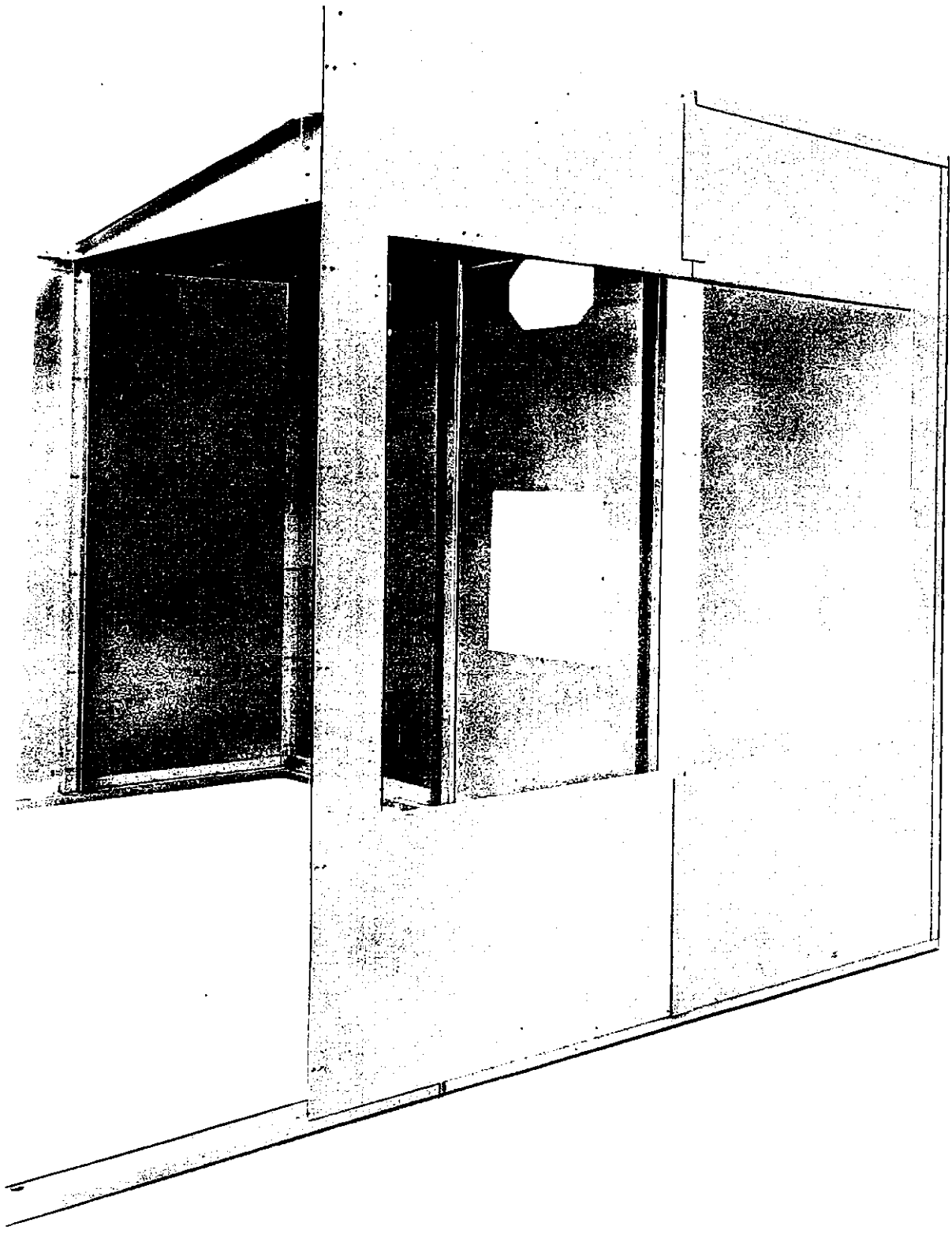

Figure 15. Enclosure, Partial Assembly, Front View

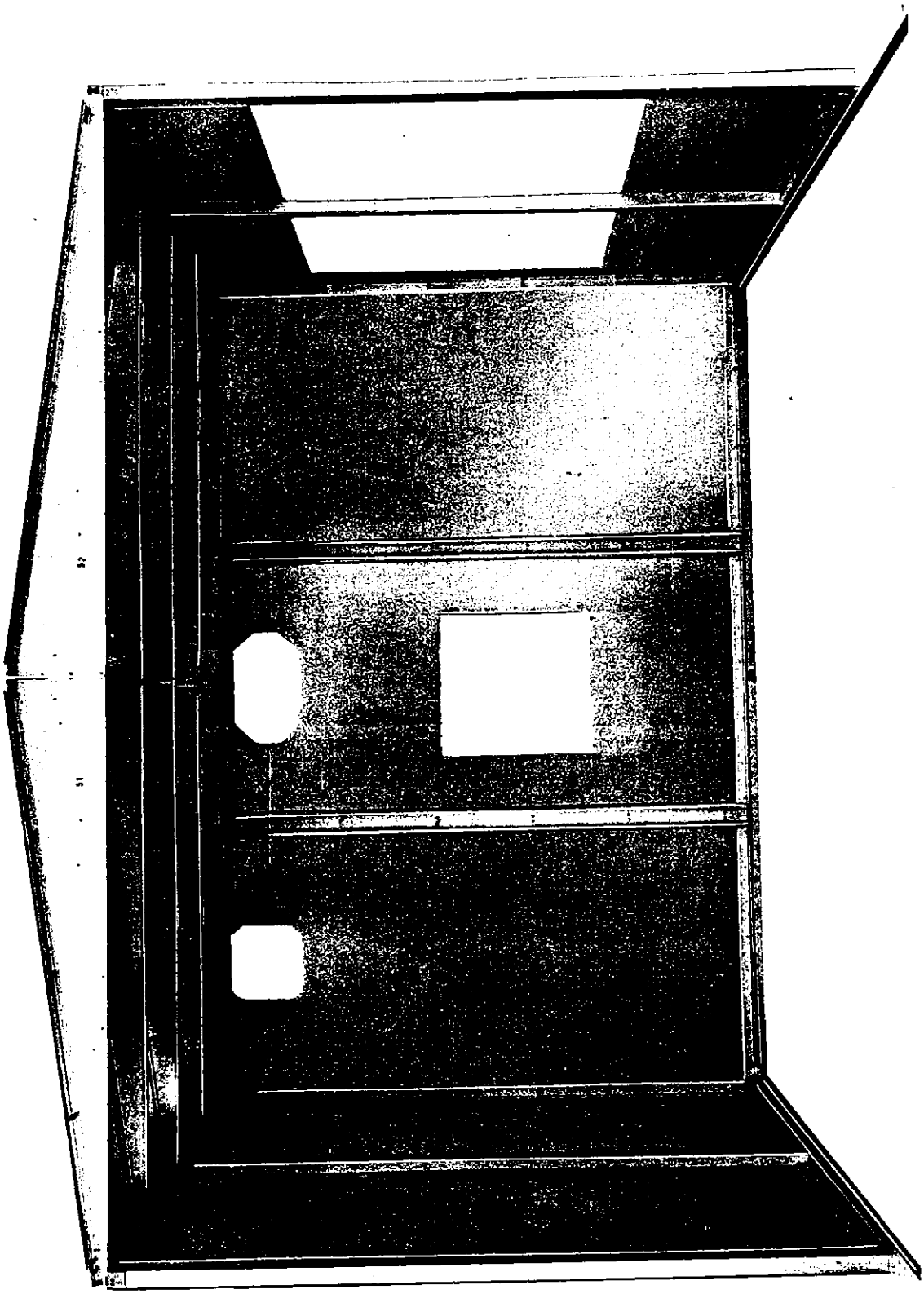

Figure 16. Enclosure, Partial Assembly, Inside View

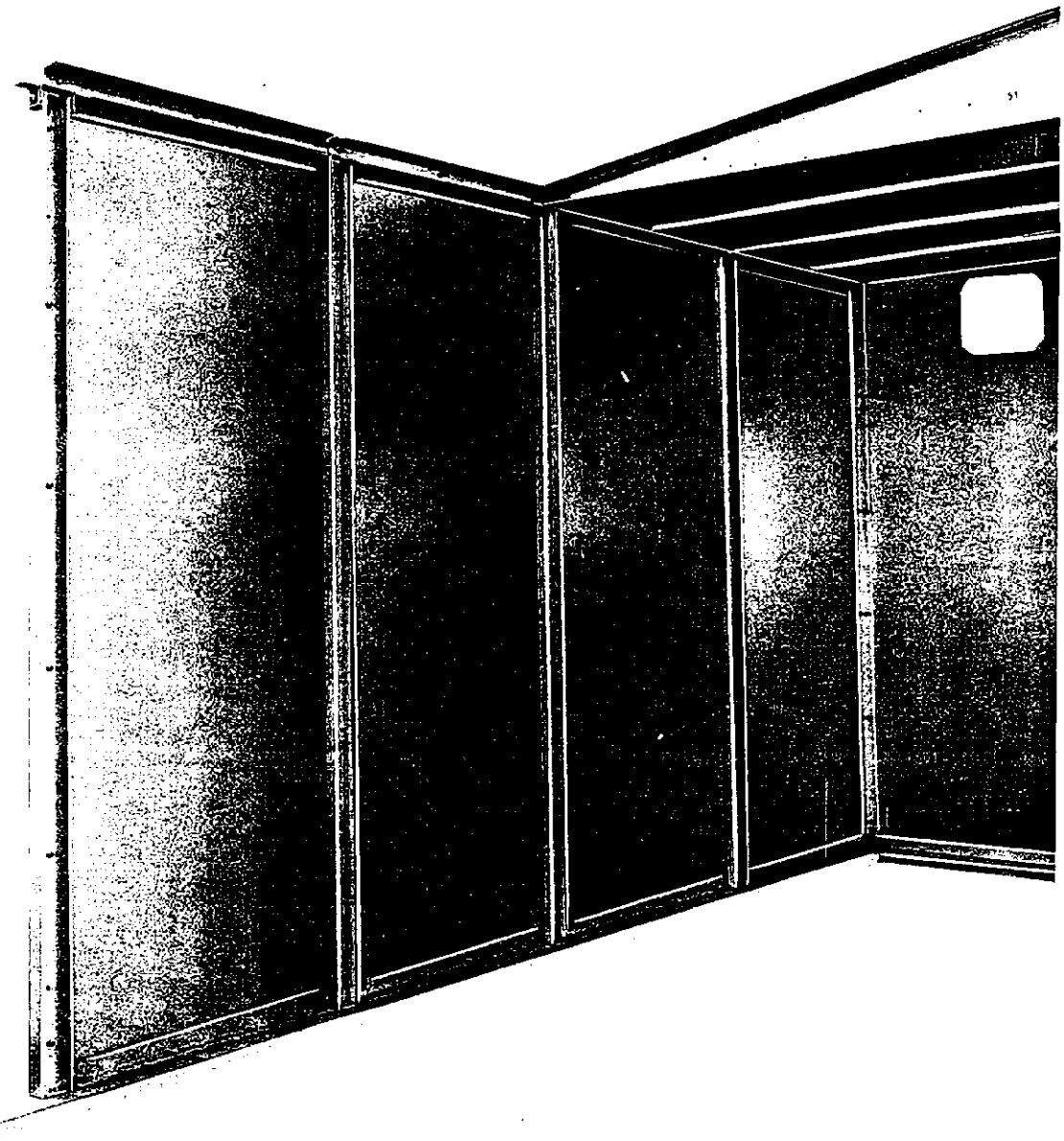

Figure 17. Enclosure, Partial Assembly, Rear Wall Detail

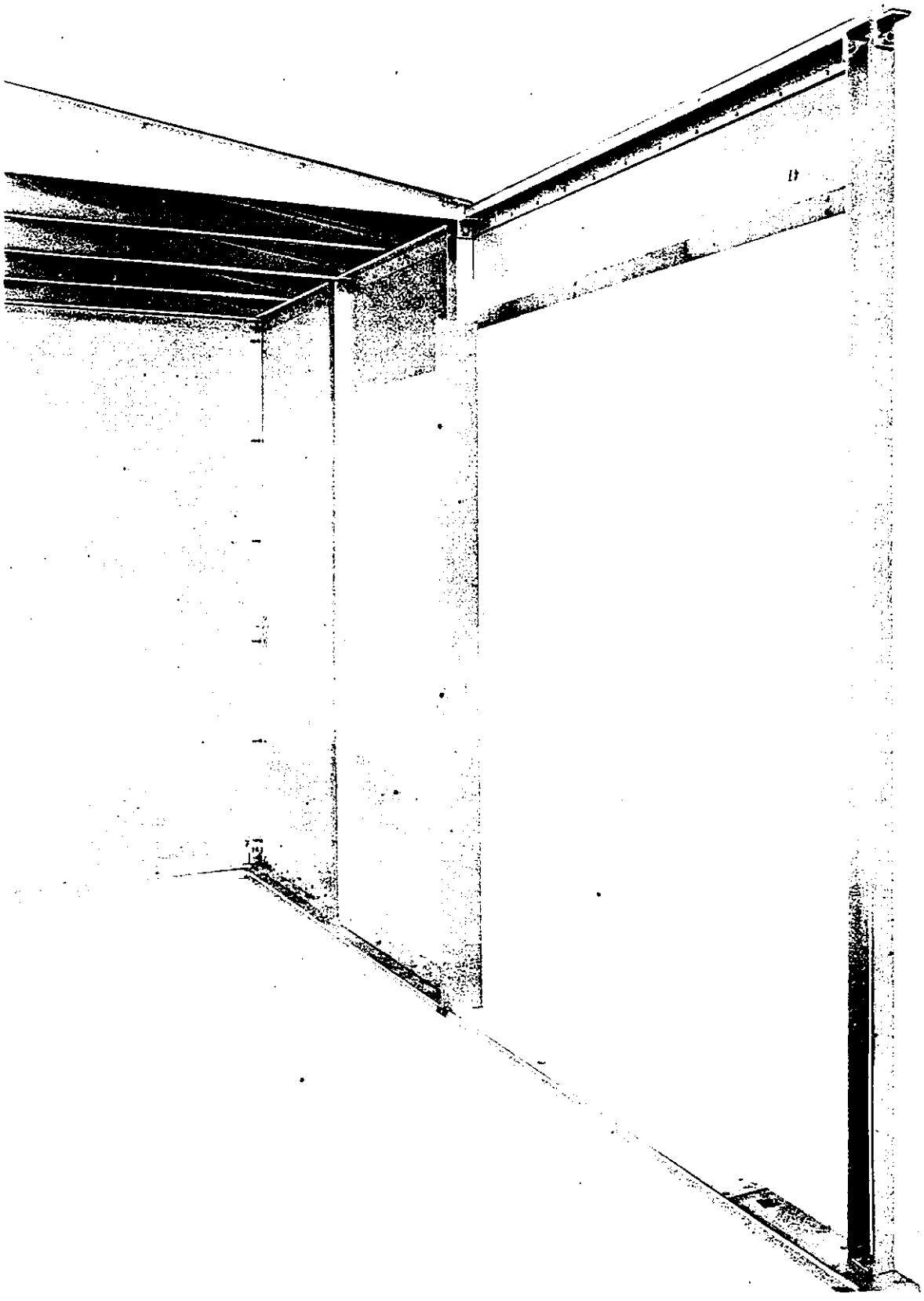

Figure 18. Enclosure, Partial Assembly, Inside Front Panel Detail

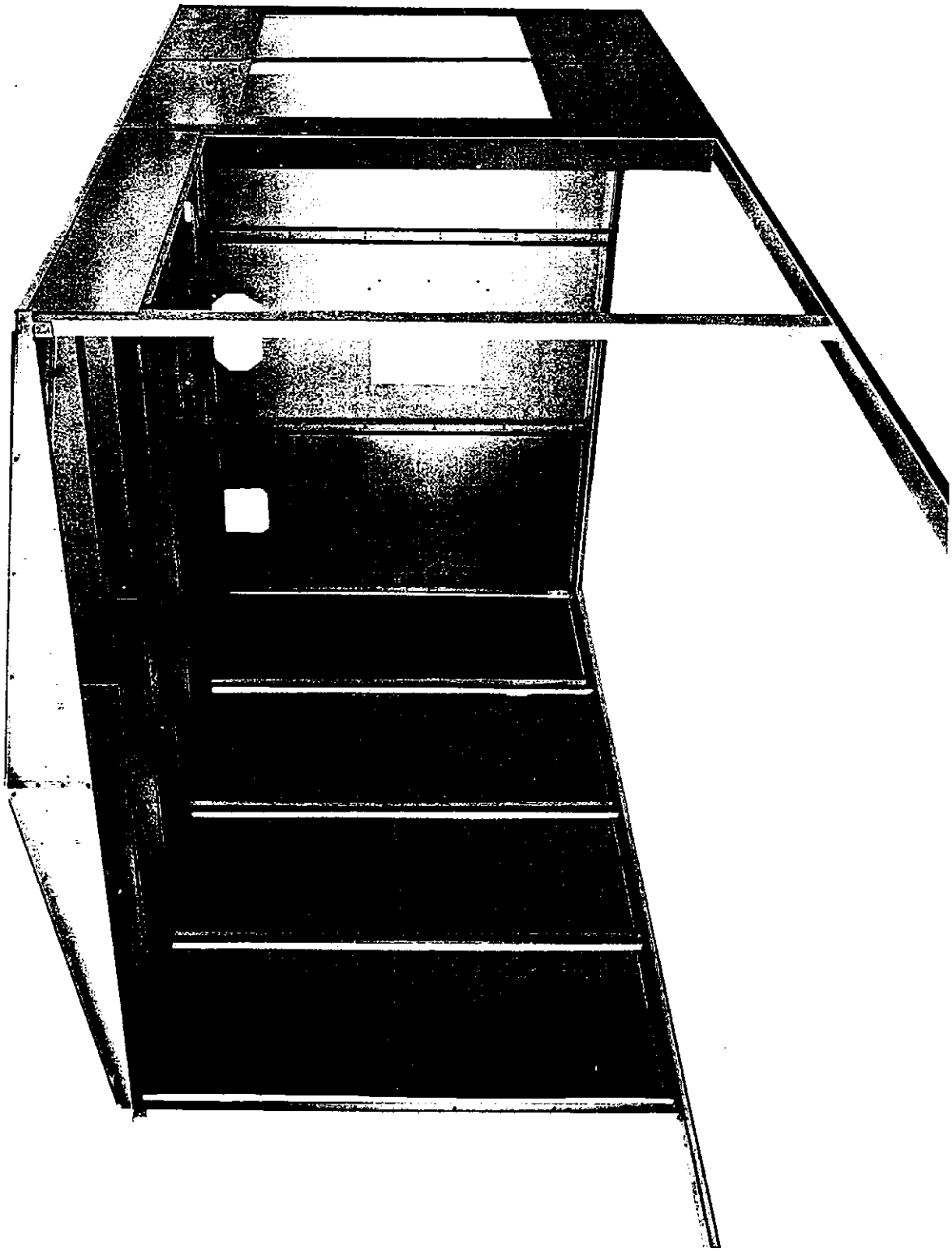

Figure 19. Enclosure, Partial Assembly, Outside Front Panel Detail

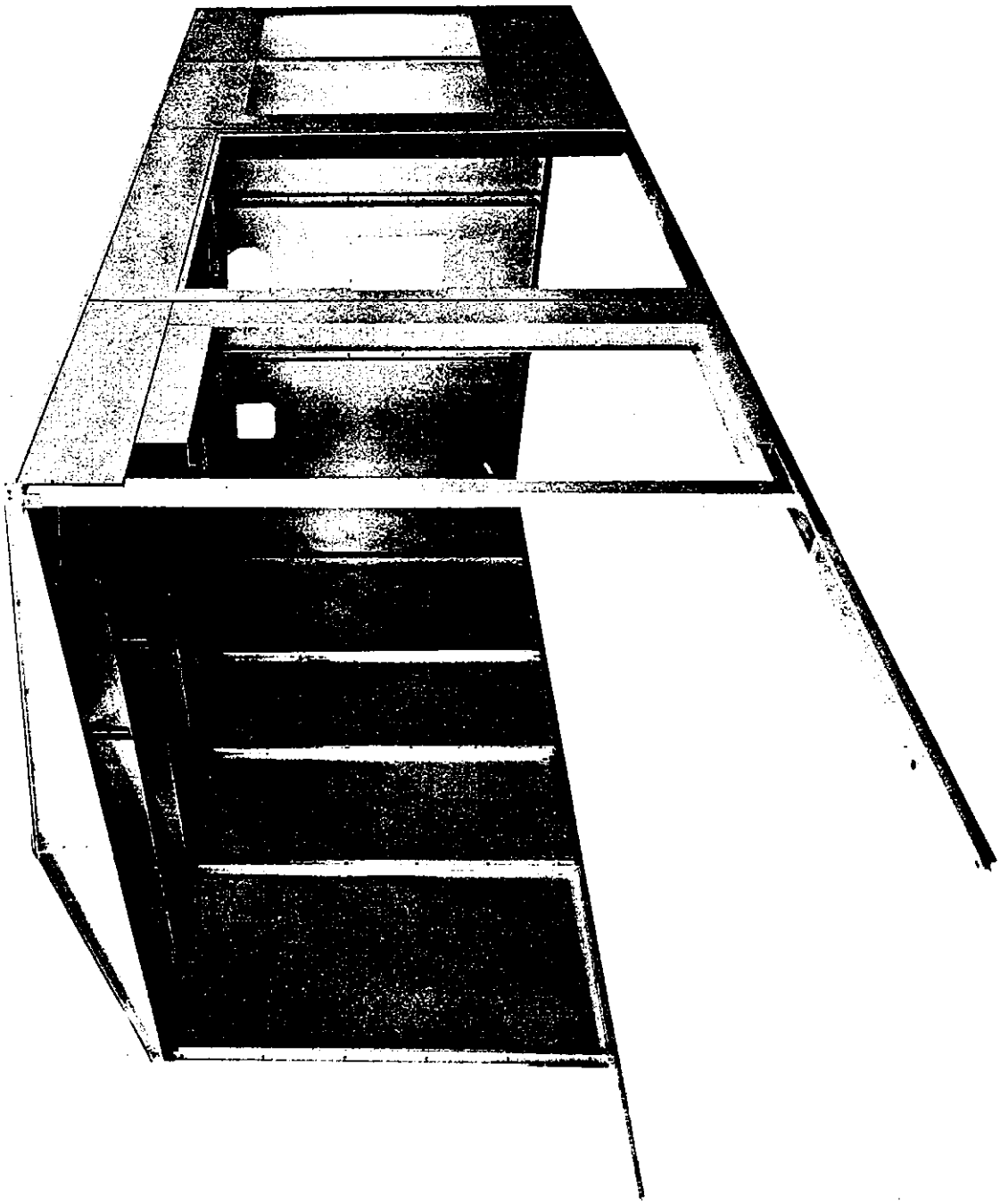

Figure 20. Enclosure, Partial Assembly, Control Panel, Front View

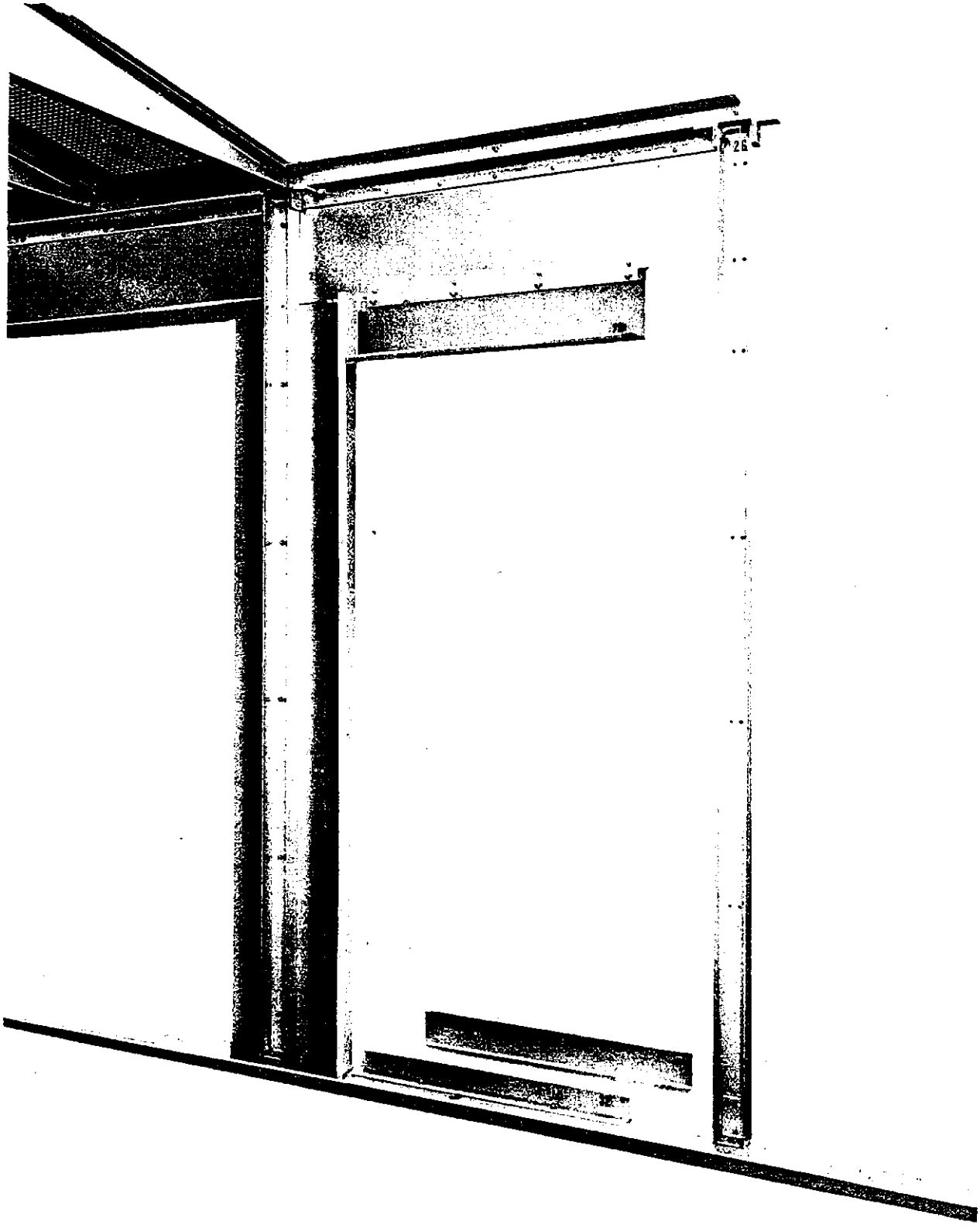

Figure 21. Enclosure, Partial Assembly, Control Panel, Inside View

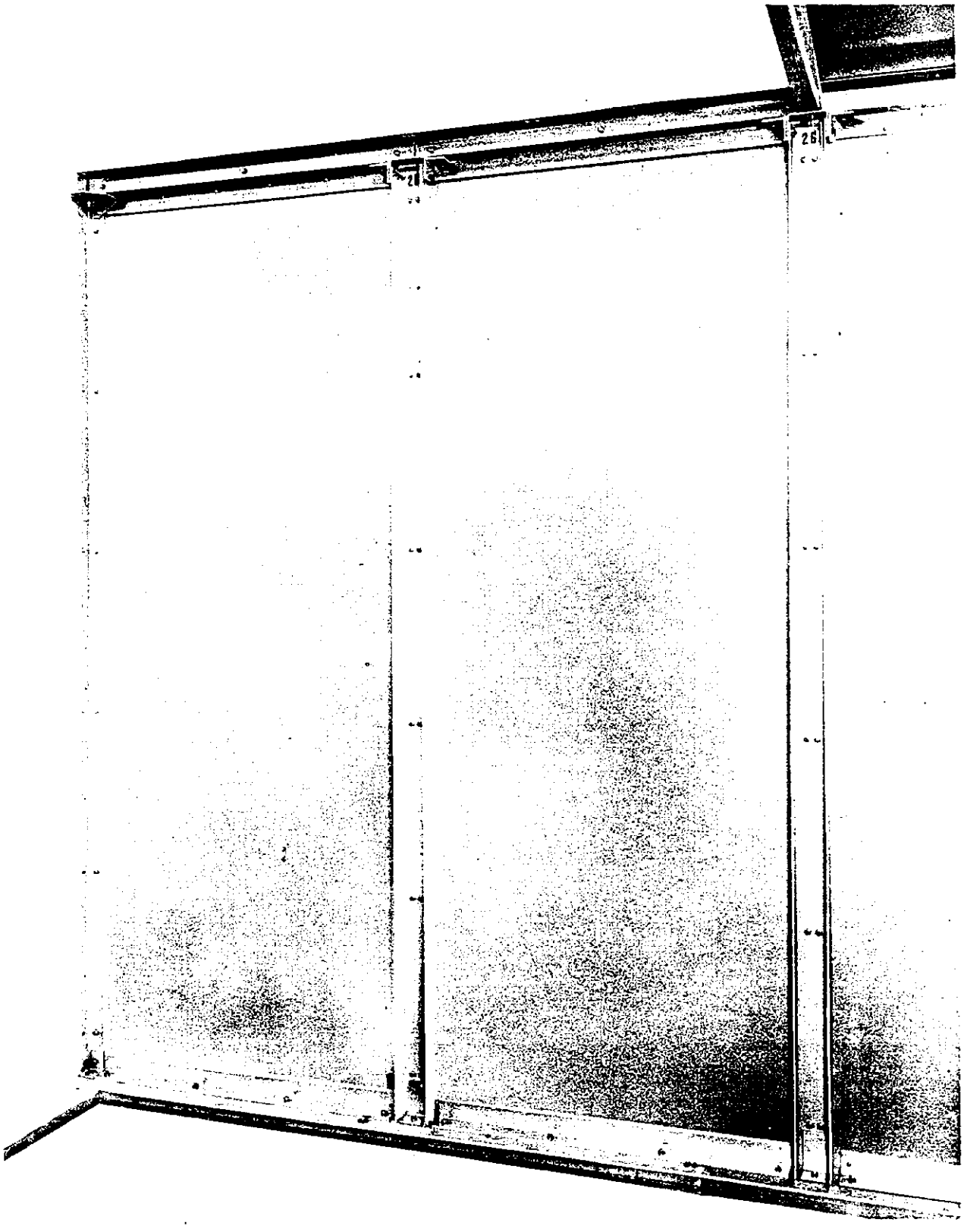

Figure 22. Enclosure, Partial Assembly, Finishing End, Rear Corner Detail

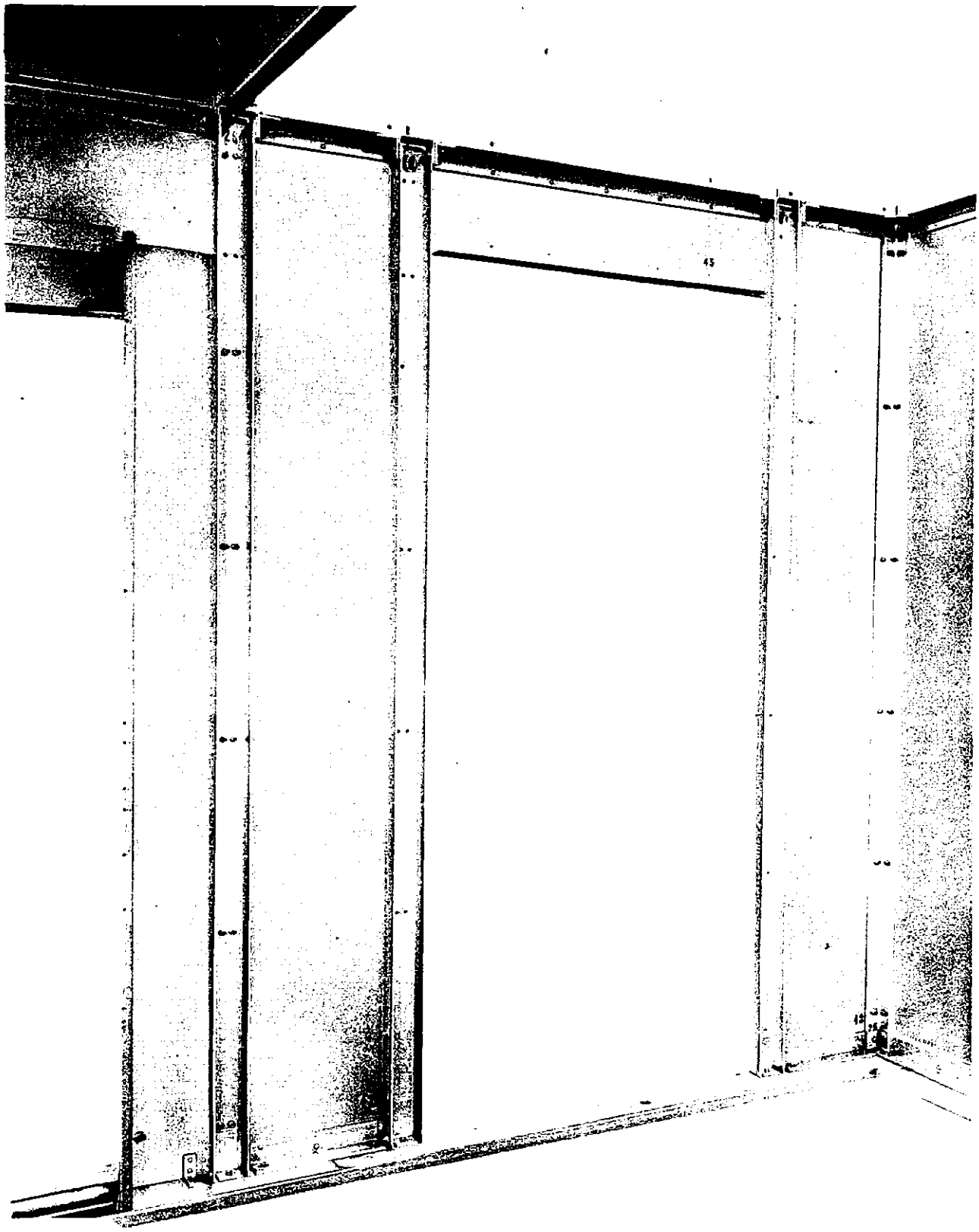

Figure 23. Enclosure, Entrance Door Detail, Inside View

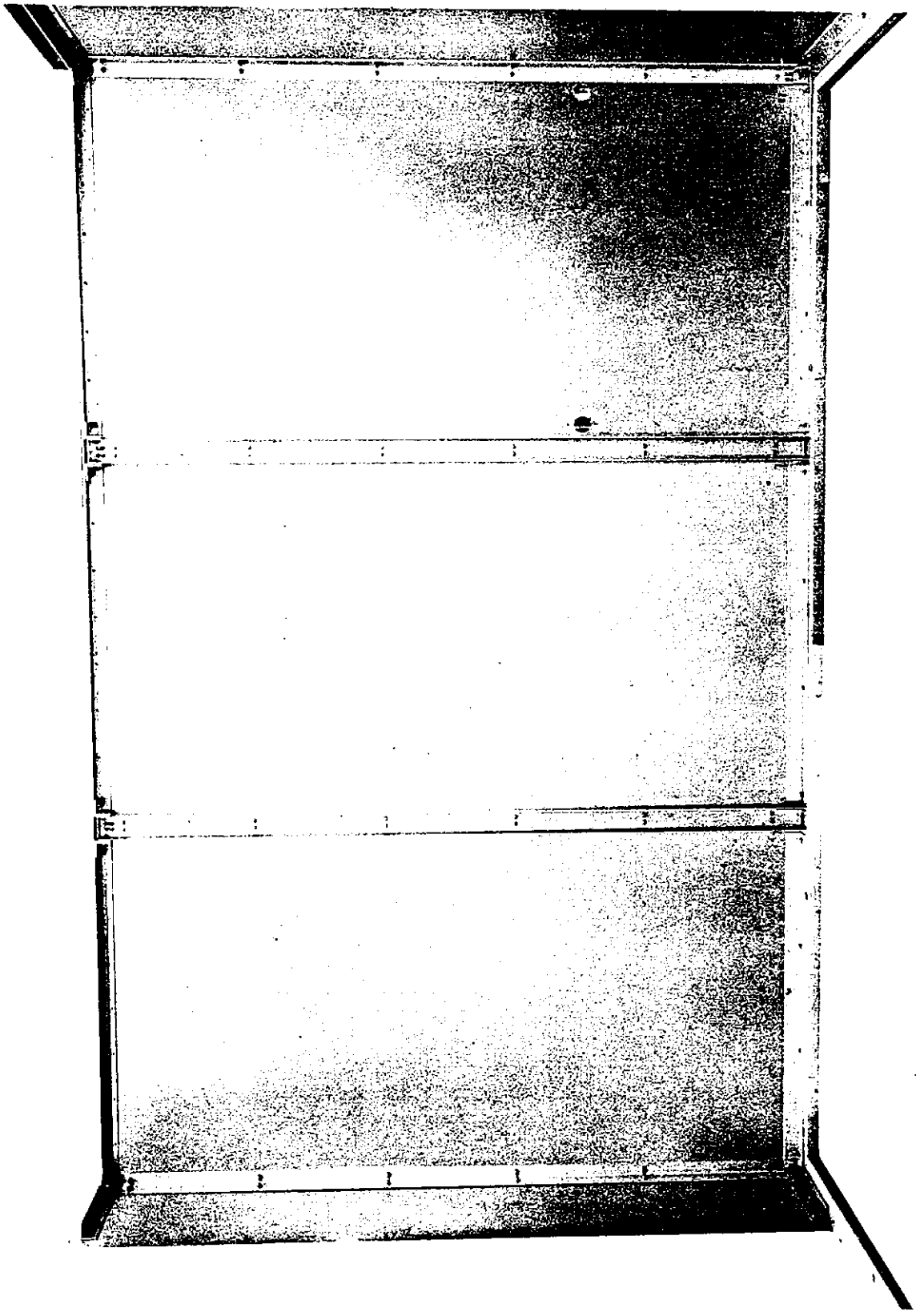

Figure 24. Enclosure, Partial Assembly, Finishing End Detail

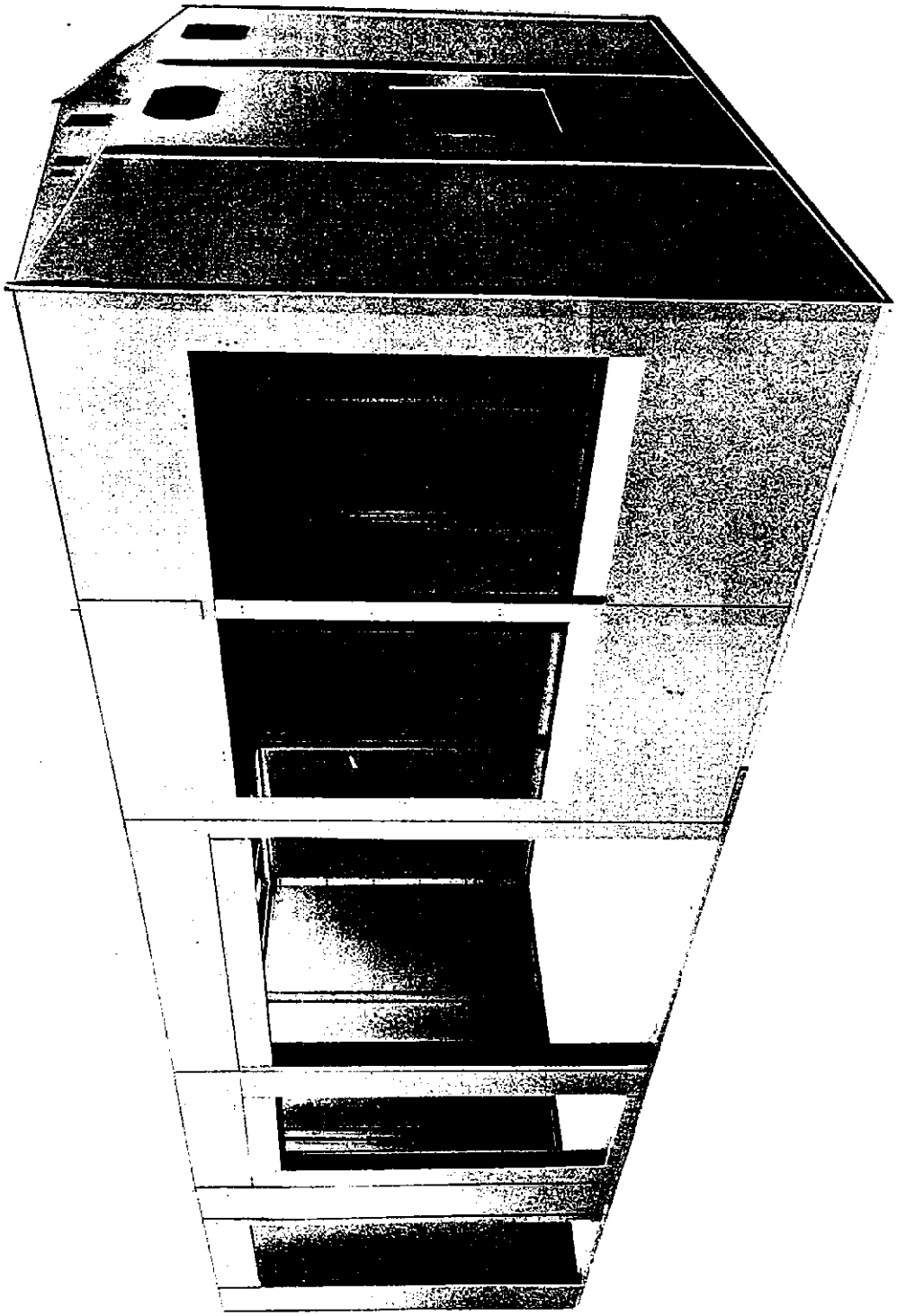

Figure 25. Enclosure, Completed Wall and Roof Assembly

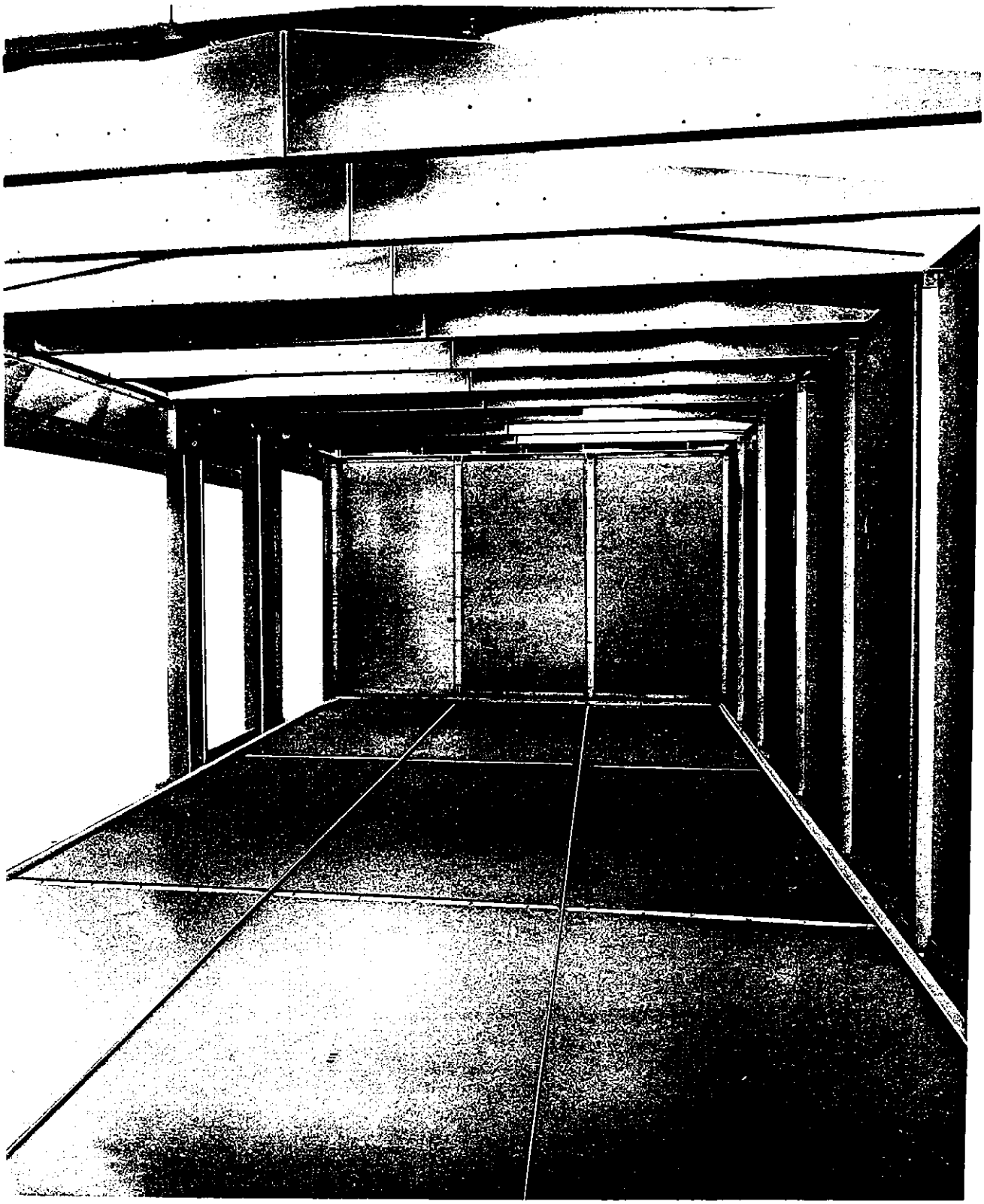

Figure 26. Enclosure, Inside View Including Floor Pan Assembly

ORIGINAL

TABLE 1. ENCLOSURE LIST OF MATERIALS

QUAN. PER GROUP				LIST OF MATERIALS						ITEM SHOWN ON H10874354 SHEET (1-7) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
													Q	BOX	Q	BOX	Q	BOX	Q	BOX						
			1	1	1		F	1087501G1	PANEL, RIVETED	120	3								1	X36 Y36		9, 26, 76, 133, 36				
			1	1	2		F	1087793G1	FILLER, PANEL, TOP	120	2								1	X35 Y35		8, 26, 28, 84				
			2	1	3		F	1087502G1	PANEL, RIVETED	120	3								2	X36 Y36		9, 25, 26, 31, 39, 76, 133				
			1	1	4		D	1087777G1	FILLER ANGLE SIDE	120	2								1	X35 Y35		8, 26, 76, 133				
			4	1	5		F	1087503G1	PANEL, RIVETED	120	3								4	X36 Y36		9, 25, 26, 27, 38, 76, 133				
			1	1	6		D	1087777G2	FILLER ANGLE, SIDE	120	2								1	X35 Y35		8, 26, 76, 133				
			3	1	7		F	1087504G1	PANEL, RIVETED	120	4								3	X36 Y36		9, 25, 26, 87, 40, 76, 133				
			5	1	8		C	1087505G1	TRIM STRIP	120	6								5	X35 Y35		2, 4, 6, 44-45, 46-47, 49, 80, 66, 116, 121, 126				
			10	1	9		C	1087505G2	TRIM STRIP	120	6								10	X35 Y35		1, 3, 5, 7, 95-97, 102, 109				
			2	1	10		B	1087506G1	TRIM STRIP	120	1								2	X35 Y35		53, 54, 93, 94, 101, 109				
			2	1	11		C	1087507G1	ANGLE (TRIM SIDE)	120	1								2	X35 Y35		16, 54, 67, 93, 101, 109, 111				
			2	1	12		C	1087508G1	ANGLE (TRIM SIDE)	120	1								2	X35 Y35		14, 16, 53, 94, 101, 109, 111				
			22	1	13		B	1087509G1	TRIM STRIP (ROOF)	520	1								22	X35 Y35		14-17, 67-70, 86, 87, 111				
			1	1	14		D	1087844G1	PANEL, ROOF, PERFORATED	120	1								1	X38 Y38		12, 13, 18, 30, 81, 94				
			3	1	15		D	1087845G1	PANEL, ROOF, PERFORATED	120	1								3	X38 Y38		13, 19, 30, 81				
			2	1	16		D	1087843G1	PANEL, ROOF, PERFORATED	120	1								2	X38 Y38		11-13, 20, 27, 36 51, 83, 93				
			9	1	17		C	1087510G4	PANEL, ROOF	520	1								9	X38 Y38		13, 21, 27, 34-36 81, 82				
			1	1	18		B	1087511G1	TRIM STRIP (ROOF, PEAK)	520	1								1	X35 Y35		14, 67, 111				

1087435C

TABLE 1. ENCLOSURE LIST OF MATERIALS (CONT)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON H108743561 SHEET (1-7) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			3	1	19		B	1087511G2	TRIM STRIP (ROOF, PEAK)	520	1								3	X35 Y35		16,68,111				
			1	1	20		B	1087511G3	TRIM STRIP (ROOF, PEAK)	520	1								1	X35 Y35		16,111				
			7	1	21		B	1087511G4	TRIM STRIP (ROOF, PEAK)	520	1								7	X35 Y35		17,69,70,86, 87,111				
			4	1	22		C	1087512G1	GUSSET	520	4								4	X35 Y35		25,113				
			16	1	23		B	1087513G1	BRACKET, CHANNEL	520	3								16	X35 Y35		24,26,133				
			32	1	24		B	1087514G1	BRACKET, ANGLE	520	3								32	X35 Y35		23,26,133				
			4	1	25		C	1087515G1	SUPPORT, CORNER ANGLE	520	4								4	X35 Y35		3,5,7,42,45 76,95,97,133	22,113 60			
			16	1	26		D	1087516G1	SUPPORT, CHANNEL	120	2,3, 4								16	X35 Y35		1-7,41-48,48-51 44,80,82,86,96 89,95-97,117,133	23 24			
			4	1	27		C	1087517G1	TRIM STRIP (TOP & REAR)	120	1								4	X35 Y35		5,16,17,86,87 108				
			1	1	28		B	1087778G1	SPACER (CONTROL)	120	2								1	X35 Y35		2,116,121,126				
					29																					
			2	1	30		C	1087518G1	TRIM STRIP (TOP, & REAR)	120	1								2	X35 Y35		14,15,41,42				
			2	1	31		C	1087518G2	TRIP STRIP (TOP, & REAR)	120	1								2	X35 Y35		5,42,68,108				
			1	1	32		C	1087791G1	ANGLE CONTROL	120	2								1	X35 Y35		76,133				
			1	1	33		C	1087792G1	PANEL, BOTTOM (CONTROL)	120	2								1	X35 Y35		32,101				
			1	1	34		C	1087519G1	TRIM STRIP (TOP, & REAR)	120	1								1	X35 Y35		2,17,97				
			1	1	35		C	1087519G2	TRIM STRIP (TOP, & REAR)	120	1								1	X35 Y35		1,17,70,108				
			2	1	36		C	1087520G1	TRIM STRIP (TOP, FRONT)	120	1								2	X35 Y35		16,17,48,45 47,69				

1087435E

TABLE 1. ENCLOSURE LIST OF MATERIALS (CONT)

QUAN. PER GROUP				LIST OF MATERIALS						ITEM SHOWN ON H10814356I SHEET (1-7) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (•)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
													Q	BOX	Q	BOX	Q	BOX	Q	BOX						
			1	1	37		C	1087521G1	ANGLE, CORNER	120	1								1	X35 Y35		7,42,110,116 121,126				
			1	1	38		C	1087521G2	ANGLE, CORNER	120	1								1	X35 Y35		5,97,102,110				
			1	1	39		C	1087522G1	ANGLE, CORNER	120	1								1	X35 Y35		3,95,110				
			1	1	40		C	1087522G2	ANGLE, CORNER	120	1								1	X35 Y35		7,43,102,116, 121,126				
			1	1	41		F	1087523G1	PANEL, FRONT (TUBE RACK)	120	2								1	X36 Y36		8,26,30,64, 71,72,74-76,78, 84,133				
			1	1	42		F	1087523G2	PANEL, FRONT (TUBE RACK)	120	2								1	X36 Y36		8,26,29,30,31, 63,71-73,75-77, 83,133				
			2	1	43		F	1087524G1	PANEL, FRONT(ENTRANCE DOOR	120	2								2	X36 Y36		8,28,29,34,40, 76,133				
			1	1	44		C	1087757G1	ANGLE (EXCITER)	120	2								1	X35 Y35		48,76,133				
			1	1	45		D	1087525G1	PANEL, FRONT (ENTR. DOOR)	120	2								1	X35 Y35		5,76,36 97				
			1	1	46		D	1087819G1	FILLER, STRIP (ENTR DOOR)	120	2								1	X35 Y35		8,26,61,63, 84,58				
			1	1	47		F	1087527G1	PANEL, TOP (EXCITER)	120	2								1	X35 Y35		8,26,36,55 86				
			1	1	48		D	1087528G1	PANEL, BOTTOM (EXCITER)	120	2								1	X35 Y35		44,101				
			1	1	49		D	1087529G1	PANEL, SIDE (EXCITER)	120	2								1	X35 Y35		5,26				
			1	1	50		D	1087529G2	PANEL, SIDE (EXCITER)	120	2								1	X35 Y35		8,26				
			11	1	51		D	1087530G1	TRUSS	520	5								11	X37 Y37		14-17,52,69, 110				
			11	1	52		D	1087530G2	TRUSS	520	5								11	X37 Y37		17,51,67,68,70, 86,87,110				
			1	1	53		D	1087559G1	TRUSS	520	5								1	X37 Y37		10,12,16,93 110				
			1	1	54		D	1087559G2	TRUSS	520	5								1	X37 Y37		10,11,67,94 110				

1087435A

TABLE 1. ENCLOSURE LIST OF MATERIALS (CONT)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON H1087435G1 SHEET (1-7) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*) ITTFL SOURCE		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION	EQUIP. SERIAL NO.
			1	1	55		D	1087536G1	FILLER ANGLE (EXCITER)	120	2								1	X35 Y35		47,116,121,126	
			1	1	56		B	1087537G1	SPACER	520	2								1	X35 Y35		47	
			1	1	57		C	1087538G1	DOOR, STOP, TOP	120	2								1	X35 Y35		45,116,121 126	
			2	1	58		B	1087817G1	DOOR, STOP, SIDE	120	6								2	X35 Y35		46,66,134	
					59																		
			4	1	60		C	1087560G1	GUSSET	120	4								4	X35 Y35		25,113	
			3	1	61		B	1087823G1	PLATE, NUT	120	2								3	X35 Y35		46,63,84	
			1	1	62		D	1087890G1	DOOR STOP SIDE (TUBE RACK)	120	2								1	X35 Y35		26,113	
			1	1	63		H	1087562G1	DOOR ASSEMBLY (ENTRANCE)	110	2								1	X15 Y15		46,61,84	
			1	1	64		H	1087563G1	DOOR ASSEMBLY (TUBE RACK)	110	2								1	X15 Y15		41,74,78,84	
			1	1	65		H	1087563G2	DOOR ASSEMBLY (TUBE RACK)	110	2								1	X15 Y15		42,73,77, 85	
			1	1	66		D	1087822G1	FILLER, STRIP (ENTR DOOR)	520	2								1	X35 Y35		8,26,58	
			1	1	67		D	1087844G2	PANEL, ROOF, PERFORATED	120	1								1	X38 Y38		11,13,18,31, 52,54	
			3	1	68		D	1087845G2	PANEL, ROOF, PERFORATED	120	1								3	X38 Y38		13,19,31,52	
			2	1	69		D	1087831G1	PANEL, ROOF, PERFORATED	120	1								2	X38 Y38		13,21,36,51	
			1	1	70		D	1087846G1	PANEL, ROOF, PERFORATED	120	1								1	X35 Y35		13,21,35,52	
			1	1	71		B	1087891G1	TRIM STRIP (TUBE RACK)	120	1								1	X35 Y35		41,42,116, 121,126	
			1	1	72		B	1087892G1	TRIM STRIP (TUBE RACK)	120	1								1	X35 Y35		41,42,116, 121,126	

1087435 E

TABLE 1. ENCLOSURE LIST OF MATERIALS (CONT)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON H1081435G1 SHEET (1-7) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*) ITTFL SOURCE		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			1	1	73		C	1087636G1	DOOR STOP ASSEMBLY	120/110	2								1	X35 Y35		42,65,103, 104				
			1	1	74		C	1087636G2	DOOR STOP ASSEMBLY	120/110	2								1	X35 Y35		41,64,103, 104				
			12	1	75		B	1087663G1	SPRING, GROUNDING	110	2								12	X35 Y35		41,42,114				
			X	20	76		H	1081692G1	FLOOR, ASSEMBLY	760												1,3-7,23,24,32, 41-44,95-97				
			1	1	77		C	1087745G1	SPACER (TUBE RACK DOOR)	120	1								1	X35 Y35		42,65,86				
			1	1	78		C	1087745G2	SPACER (TUBE RACK DOOR)	120	1								1	X35 Y35		41,64,84				
					79																					
					80																					
					81																					
					82																					
					83																					
			6	1	84		D	1087556G3	HINGE, MODIFIED	531/120	1								6	X35 Y35		41,46,61,63,64, 76,105				
			3	1	85		D	1087556G4	HINGE, MODIFIED	531/120	1								3	X35 Y35		42,65,77, 105				
			1	1	86		D	1088294G1	PANEL, ROOF, PERFORATED	120	1								1	X38 Y38		13,21,27, 52				
			1	1	87		D	1088294G2	PANEL, ROOF, PERFORATED	120	1								1	X38 Y38		13,21,27, 52				
					88																					
			2	1	89		B	1088289G1	BRACKET (GROUNDING ROD)	120	2								2	X35 Y35		26,130				
					90																					

1087435C

TABLE 1. ENCLOSURE LIST OF MATERIALS (CONT)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON H10874356 SHEET (1-7) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*) ITTFL SOURCE		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
					91																					
					92																					
			1	1	93		D	1088229G1	TRUSS	120	5								1	X37 Y37		10,11,16,53 110				
			1	1	94		D	1088229G2	TRUSS	120	5								1	X37 Y37		10,12,14,54, 110				
			1	1	95		F	1088326G1	PANEL, RIVETED, SIDE	120	4								1	X36 Y36		9,25,26,39, 76,133				
			1	1	96		F	1088276G1	PANEL, RIVETED, SIDE	120	4								1	X36 Y36		9,26,76,133				
			1	1	97		F	1087504G2	PANEL, RIVETED, SIDE	120	4								1	X36 Y36		9,25,26,38, 76,98,133				
			1	1	98		B	1088347G1	PLATE, COVER	120	4								1	X35 Y35		97,132				
					99																					
			33	1	100		B	1087671G5	SCREW, PTD HD #8-32x1/2	532/120	1								33	X35 Y35		41,42,45,84, 85				
			27	1	101		B	1087671G7	SCREW, PTD, HD, 1/4-20X3/4	532/120	2,4								27	X35 Y35		10-12,38,48				
			44	1	102		B	1087671G8	SCREW, PTD, HD, 1/4-20X7/8	532/120	6								44	X35 Y35		9,38,40				
			5	1	103		B	1087671G12	SCREW, PTD, HD, #10-32X5/8	532/120	2								5	X35 Y35		73,74				
			5	1	104		B	1087671G4	SCREW, PTD, HD, #10-32X5/8	532/120	2								5	X35 Y35		73,74				
			33	1	105		B	1087671G11	SCREW, PTD, HD, #8-32X3/4	532/120	1								33	X35 Y35		84,86				
					106																					
					107																					
			26	1	108			136009A116	SCREW, HEX HD, 1/4-20X1/2	530	3								26	X35 Y35		27,31,35				

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TABLE 1. ENCLOSURE LIST OF MATERIALS (CONT)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON H1087435G1 SHEET (1-7) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*) ITTFL SOURCE		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			132	1	109			136009A120	SCREW, HEX HD, 1/4-20X5/8	530	4,6								132	X35 Y35		9-12				
			108	1	110			136009A124	SCREW, HEX HD, 1/4-20X3/4	530	4,5 6								108	X35 Y35		37-39,51-54, 93,94				
			440	1	111			136009A128	SCREW, HEX HD, 1/4-20X7/8	530	1,2,3 4,5								440	X35 Y35		11-18,18-21				
			72	1	112			136009A132	SCREW, HEX HD, 1/4-20X1"	530	5								72	X35 Y35		26				
			21	1	113			100709A132	SCREW, F.H. 100° 1/4-20X1"	530	24								21	X35 Y35		62,22,25 60				
			29	1	114			100703A116	SCREW, F.H. 100° #4-40X1/2	530	2								29	X35 Y35		75				
					115																					
			1194	1	116			200609H018	WASHER, FLAT L.P. (1/4)	530	1,2,3, 4,5,6								1194	X35 Y35		8,28,30,34,36(2) 40,55,101 102,108 109-111,130,133,135	45,57 134			
			10	1	117			200609H014	WASHER, FLAT, L.P. (#10)	530	2								10	X35 Y35		103,104				
			66	1	118			200609H012	WASHER, FLAT L.P. (#8)	530	1								33	X35 Y35		100,105				
			29	1	119			200609H008	WASHER, FLAT L.P. (#4)	530	2								29	X35 Y35		114				
					120																					
			1200	1	121			107268	WASHER, LOCK, SPLIT (1/4)	530	1,2,3 4,5,6								1200	X35 Y35		8,28,30,34,36 37,40,55,101,102, 108,111,113,130,133	45,57 134			
			10	1	122			107224	WASHER, LOCK, SPLIT (#10)	530	2								10	X35 Y35		103,104				
			71	1	123			107202	WASHER, LOCK, SPLIT (#8)	530	1,4								38	X35 Y35		100,105,132,				
			29	1	124			107136	WASHER, LOCK, SPLIT (#4)	530	2								29	X35 Y35		114				
					125																					
			905	1	126			107752	NUT, HEX (1/4-20)	530	1,2,3 4,5								905	X35 Y35		8,28,30,34,36,37 40,55,101,110, 111,113,130,133	45 57			

1087435 E

TABLE 1. ENCLOSURE LIST OF MATERIALS (CONT)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON HI087435G SHEET (1-7) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			10	1	127			107686	NUT, HEX (#10-32)	530	2								10	X35 Y35		103,104				
			78	1	128			107917	NUT, HEX, (#8-32)	530	1.4								78	X35 Y35		100,105,132				
			29	1	129			107741	NUT, HEX (#4-40)	530	2								29	X35 Y35		114				
			5	1	130		B	1088328G1	SCR.F.H.100°(1/4-20X2 3/4)	530	2								5	X35 Y35		89				
					131																					
			5	1	132		B	1087671G15	MACH.PAN HD. SCR.PTD.HD.#8-32 X 3/8	532/120	4								5	X35 Y35		98				
			157	1	133			136009A136	SCR. HEX HD. 1/4-20X1 1/4	530	2,3, 4,5								157	X35 Y35		1,3-7,23-24, 32,41-44,95-97 114,121,126				
			10	1	134		B	1087671G20	SCR. PTD. HD.1/4-20 X 5/8	532/120	6								10	X36 Y36		58				
					135																					
					136																					
					137																					
					138																					
					139																					
					140																					

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TABLE 2. FLOOR ASSEMBLY LIST OF MATERIALS

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON H1087692G1 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			1	1	1		F	1087677G1	CHANNEL, FLOOR SECTION	120	1								1	X33 Y33		2,10,13-15				
			1	1	2		F	1087676G1	CHANNEL, FLOOR SECTION	120	1								1	X33 Y33		1, 3, 14-16				
			1	1	3		F	1087678G1	CHANNEL, FLOOR SECTION	120	1								1	X33 Y33		2,4,14,16,17				
			1	1	4		D	1087679G1	CHANNEL, FLOOR SECTION	120	1								1	X33 Y33		3,9,13,14,17				
			1	1	5		F	1087680G1	CHANNEL, FLOOR SECTION	120	1								1	X33 Y33		6,9,13,14,21				
			1	1	6		D	1087681G1	CHANNEL, FLOOR SECTION	120	1								1	X33 Y33		5,7,11,14,21				
			1	1	7		F	1087683G1	CHANNEL, FLOOR SECTION	120	1								1	X33 Y33		6,8,11,12,14				
			1	1	8		D	1087682G1	CHANNEL, FLOOR SECTION	120	1								1	X33 Y33		7,10,12,13,14				
			2	1	9		F	1087675G1	CHANNEL, FLOOR SECTION	120	1								2	X33 Y33		4,5,10,13,14, 17,18,20,21				
			2	1	10		D	1087674G1	CHANNEL, FLOOR SECTION	120	1								2	X33 Y33		1,8,9,12-15, 18,20				
			1	1	11		D	1087702G1	FLOOR PAN	120	1								1	X34 Y34		6,7,12,19,21, 24,25				
			1	1	12		D	1087703G1	FLOOR PAN	120	1								1	X34 Y34		7,8,10,11 20,24,25				
			4	1	13		B	1087684	ANGLE	520	1								4	X34 Y34		1,4,5,8,9,10 26,27				
			24	1	14		B	1087687	SHIM	520	1								24	X34 Y34		1,2,3,4,5,6 7,8,9,10				
			1	1	15		D	1087695G1	FLOOR PAN	120	1								1	X34 Y34		1,2,10,16,18, 24,25				
			1	1	16		D	1087696G1	FLOOR PAN	120	1								1	X34 Y34		2,3,15,17,19, 24,25				
			1	1	17		D	1087697G1	FLOOR PAN	120	1								1	X34 Y34		3,4,9,16,20 24,25				
			1	1	18		D	1087698G1	FLOOR PAN	120	1								1	X34 Y34		9,10,15,19,21 24,25				

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TABLE 2. FLOOR ASSEMBLY LIST OF MATERIALS (CONT)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON H1067692G1 SHEET (1) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITTFL SOURCE		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			1	1	19		D	1087699G1	FLOOR PAN	120	1									1	X34 Y34		11,16,18,20 24				
			1	1	20		D	1087700G1	FLOOR PAN	120	1									1	X34 Y34		9,10,12,17,19 24,25				
			1	1	21		D	1087701G1	FLOOR PAN	120	1									1	X34 Y34		5,6,9,11,18 24,25				
			82	1	22			107939	NUT, HEX, SM. PAT (#8-32)	530	1									82	X34 Y34		24				
			16	1	23			107752	NUT, HEX (1/4-20)	530	1									16	X34 Y34		27,28				
			82	1	24			100306A116	SCR. FIL HD. (#8-32X1/2)	530	1									82	X34 Y34		11,12,15-21				
			82	1	25			100348A116	SCR. FIL HD. (#10-32X1/2)	530	1									82	X34 Y34		1-12,18-18, 20,21				
			6	1	26			100709A120	SCR. 100° F.H.(1/4-20X5/8)	530	1									6	X34 Y34		9,10,13				
			6	1	27			136009A124	SCR. HEX HEAD (1/4-20X3/4)	530	1									6	X34 Y34		1,4,5,8,9, 10,13				
			10	1	28			136009A128	SCR. HEX HEAD (1/4-20X7/8)	530	1									10	X34 Y34		1-10,14				
			82	1	29			107191	WASHER, LOCK, SPLIT, L.P.#8	530	1									82	X34 Y34		24				
			82	1	30			107213	WASHER, LOCK, SPLIT, L.P.#10	530	1									82	X34 Y34		25				
			16	1	31			107257	WASHER, LOCK, SPLIT, L.P.1/4	530	1									16	X34 Y34		27,28				
			164	1	32			200505	WASHER, FLAT, L.P. (#8)	530	1									164	X34 Y34		24				
			82	1	33		B	1087885	WASHER, FLAT	520	1									82	X34 Y34		25				

1087692B

CG-273-136 *(Non-Registered)*

VOLUME III

TECHNICAL MANUAL

for

LORAN TRANSMITTING SET

AN/FPN-44A

INSTALLATION and FIELD ASSEMBLY INSTRUCTIONS

ITT AVIONICS DIVISION
390 Washington Avenue
Nutley, New Jersey 07110

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DEPARTMENT OF TRANSPORTATION

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INSTALLATION AND FIELD ASSEMBLY INSTRUCTIONS

FOR

AN/FPN-44A TRANSMITTING SET

INTRODUCTION.

The instructions contained in this book cover the installation and field assembly of the Loran Transmitting Set AN/FPN-44A. Detailed assembly drawings of the equipment have been prepared and are included in the book so that the tables and figures contained herein act as a guide and checklist for the operations to be followed during transmitter installation.

This book contains the complete set of the list of material (LM) (tables 5X thru 12E and table 14Q) required for the transmitting set. The LM format was developed so that one list could be used for all aspects of the job, parts procurement, assembly, packing, shipping at ITT Avionics and installation in the field by the customer. This eliminates the usual problems of keeping a number of lists up to date as changes and/or additions are made to the equipment.

As an assist in the understanding of the LM form, a blank copy annotated with the usage for the various columns is included as figure 1.

SHIPPING BOX NUMBERING SYSTEM.

The box numbering system used for the shipment of the Loran-C Ground Station equipment is somewhat different from that normally used and warrants a few words of explanation. The system was set up on the premise that the equipment may have to be stored on a beach or similar unprotected area prior to installation and so it is imperative that only boxes containing equipment required for immediate installation be opened.

The box identification, a letter-number combination, indicating the box in which each item is shipped is indicated on the LM's. The letter portion of the letter-number box identification is a reference designation indicating that the equipment in that box belongs to a particular major area of the installation and the number indicates the box number. Thus when the equipment is being stored, boxes having a common reference letter should be stored together.

The LM for the equipment set table 11W (LM coded W) lists the total number of boxes used for the shipping of each major portion of the set by reference letters and box numbers.

The box reference letters are:

Transmitting Set	W
Transmitting Group #1	X
Transmitting Group #2	Y

TRANSMITTER INSTALLATION.

The installation instructions are given in the form of the step-by-step procedure on the following pages. The major items required for each step are referenced to the applicable LM and assembly drawing. Supplemental items, hardware etc., required to complete each step of the installation are given on assembly drawing and the LM. Lists of material and drawings are identified by letter codes which can be interpreted by referring to the List of Tables and List of Illustrations respectively.

It is assumed that the transmitter enclosures have been erected and the concrete floor installed and cured for at least 10 days. If the enclosure doors have not been hung, they should be stored until the equipment has been completely installed in the enclosure. The equipment can be moved into the enclosure either through the front opening where the exciter will be located or through the power supply end of the enclosure. The exciter bottom and top trim strips will have to be removed and if the main access is to be through the end of the enclosure, the end panels and support channels should also be removed.

INTRODUCTION

The installation of the equipment into the transmitter enclosures will be described first and then the installation procedures for the remaining components of the transmitting set will be given.

The procedure to be followed with each step of the installation will be as follows:

1. Read the operation instructions for the particular step under consideration.

2. Check LM for major item to be installed. LM code and item number on LM are given in the installation instructions.

3. Locate the item on its appropriate assembly drawing. The drawing is referenced on the instruction sheet and the sheet of the assembly drawing on which the item is shown is listed on the LM.

4. List auxiliary items, hardware etc., needed to install the item. The LM item numbers for these items are shown on the assembly drawing as circled numbers associated to the circled number indicating the LM item number of the major item.

5. Note the box numbers in which the required items were shipped on the LM. Locate all parts required to accomplish the particular step of the installation procedure under consideration before starting assembly.

TABLE 1. TRANSMITTING GROUP INSTALLATION INSTRUCTIONS

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
1	Assemble WATER SUPPLY PLATE to RF end of enclosure (table 5X, figure 2X).	X	231	X		
2	Assemble BLANK PLATE to RF end of enclosure.	X	6	X		
3	Assemble ANTENNA TERM. ASSEMBLY and ADAPTOR to RF end of enclosure. ADAPTOR is mounted with same hardware as ANTENNA TERM. ASSEMBLY and extends through the wall on the outside of the transmitter enclosure.	X X X	224 204 223	X X X	--	--
4	Assemble 2 MOUNTING PLATES and 1 TUBE CONNECTOR to power end of enclosure. Center cut out of MOUNTING PLATE to fit into slot at center of TUBE CONNECTOR.	X X	8 9	X X		
5	Assemble BLANK PLATE to RF end of enclosure.	X	222	X		
6	Assemble GRD. PLATE ASSEMBLY to power end of enclosure	X	10	X		
7	Assemble CABLE DUCT ADAPTOR and INSULATOR to power end of enclosure.	X X	208 11	X X		
8	Assemble FAN HOUSING to RF end of enclosure. The FAN HOUSING, item 12, AIR FILTER FRAME, item 15, and SPACER, item 14, are assembled together for shipment. Disassemble items 12, 14 and 15. Insert AIR FILTER FRAME, item 15, through wall on outside of enclosure and secure to enclosure by SPACERS, item 14. SPACERS are located on inside of enclosure. The FAN HOUSING is supported by studs through enclosure vertical channels. Note location of holes in FAN HOUSING and remove corresponding nuts and lock washers from studs extending into enclosure. Mount FAN HOUSING on studs and replace nuts and lock washers.	X	12	X		
9	Assemble LOUVER to FAN HOUSING. Bolts holding LOUVER into FAN HOUSING thread into the inserts in the FAN HOUSING or through the FAN HOUSING into the SPACERS.	X	19	X		
10	Mark enclosure floor as shown in figure 3Y with chalk or other temporary marking to indicate the approximate equipment location.			Y		
11	Assemble 4 RES. RACK ASSEMBLIES to enclosure roof trusses. Each RES. RACK ASSEMBLY is shipped with the resistors removed and the rack in two parts. Mount the rack to the roof trusses but do not tighten hardware until the resistors have been inserted in the clips and all resistors are making good contact in the clips. Tighten hardware.	X X	26 65	X X	--	--
12	Move P.A. TUBE RACK 1A6, frame only, into place. The INSULATOR is to be placed under the end of the P.A. TUBE RACK nearest to the RF end of the enclosure. This insulator is to insulate the P.A. TUBE RACK from the floor channel.	X X X	25 199 53	X X X	--	--

TABLE 1. TRANSMITTING GROUP INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
13	Reassemble P.A. TUBE RACK per instructions given in Shipping-Reassembly section of this volume.					
14	Move LOW PASS FILTER (1A20) capacitor assembly frame into place. Reassemble per Shipping-Reassembly section of this volume.	X	91 233	X	-	-
15	Assemble LOW PASS FILTER ASSEMBLY 1A20L1, L2 to roof truss. Connect lead from 1A20L2 to 1A20C2 (ribbed insulator terminal).	X	P/O 91 or P/O 233	X	-	-
16	Move the P.A. TANK 1A5, into the area near the P.A. TUBE RACK. This unit will be electrically connected later and need not be put in exact location at this time.	X	27	X		
17	Move the RELAY RACK 1A11 into position. NOTE If equipment is being moved into the enclosure through power end of the enclosure, do steps 18, 19 and 20 in order given. If equipment is being moved into the enclosure through the exciter opening in the front of the equipment, do these steps in the reverse order (i.e. 20, 19, 18).	X	39	X		
18	Move the POWER SUPPLY TRANSFORMER/RECTIFIER ASSEMBLY 1A53A5/A6 into position.	P	6.7	P		
19	Move the 208 VOLT RACK ASSEMBLY (P/O RELAY ASSEMBLY 1A53A3) into position. (The 208 VOLT RACK ASSEMBLY contains the INDUCTROL REGULATOR UNIT 1A53A3A3 and REGULATOR CONTROL PANEL 1A53A3A4.)	P P	14 15	P P	-	-
20	Reassemble the REGULATOR ASSEMBLY (1A53A3A1) and FUSE PANEL (1A53A3A2) to the 460 VOLT RACK. Then move the 460 VOLT RACK ASSEMBLY (P/O RELAY ASSEMBLY 1A53A3) into position and bolt to the 208 VOLT RACK ASSEMBLY. Remove panel from 460 VOLT RACK ASSEMBLY by removing HIGH VOLTAGE RECTIFIER POWER S1 switch handle, attaching panel bolts, and LOCKED ON S2 switch nuts. Note to gain access to LOCKED ON S2 switch nuts it is necessary to partially remove the panel from the rack using care not to break attaching wires.	P P	14 15	P P	-	-
21	Connect Cables W91 through W94. These cables run from the 208-VOLT RACK ASSEMBLY through the 3 inch holes in the channels, to the 460 VOLT RACK ASSEMBLY. Terminal information is given on cable marker bands.					
22	Assemble FILLER STRIP to rack.	P	16	P		

TABLE 1. TRANSMITTING GROUP INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
23	Move the EXCITER 1A4 into position in the enclosure. The EXCITER should be moved into the enclosure through the opening in the front panel. Then the enclosure trim strips around the EXCITER front panel that were removed prior to moving the equipment into the enclosure should be replaced. The trim should be secured to the EXCITER as indicated on the assembly drawing (figure 2X). Reassemble per Shipping-Reassembly section of this volume.	X	22	X		
24	Assemble METER LIGHT ASSEMBLY to the EXCITER and the enclosure.	X	36	X		
25	Assemble the two AIR EXHAUST HOUSINGS to the top of the EXCITER.	X	35	X		
26	Assemble the CABLE DUCTS to the transmitter enclosure. The cable duct parts are listed on table 8B and are shown on figure 6B. Each part of the duct assembly except hardware is stamped with its item number given on table 8B (LM coded B). This duct should be completely assembled as shown on figure 6B except that all item 9's located on the inside of the duct system should not be assembled until after all the cables have been installed in the ducts.	B		B		
27	Assemble METER LIGHT ASSEMBLY to enclosure.	X	37	X		
28	Assemble BLANK PANEL to enclosure.	X	205	X		
29	Assemble INDICATOR PANEL ASSEMBLY 1A12 to enclosure.	X	86	X		
30	Assemble CONTROL PANEL 1A53A2 to enclosure.	P	4	P		
31	Assemble PANEL MOUNTING RAILS TO roof trusses.	P P P	20 21 22	P P P		
32	Assemble RESISTOR PANELS 1A53A19, A20, A23, with INSULATED STANDOFFS to PANEL MOUNTING RAILS. Exercise caution with standoffs; do not apply excessive stress during assembly.	P P P P	9 10 11 25	P P P P		
33	Assemble SWITCHING RELAY (Grounding Switch) ASSEMBLY 1A53A1 to PANEL MOUNTING RAILS.	P	12	P		
34	Assemble SHUNT ASSEMBLY 1A53A4 to PANEL MOUNTING RAILS.	P	13	P		
35	Install CABLE CLAMPS per sheets 6 and 7 of figure 2X.	X	274	X		

TABLE 1. TRANSMITTING GROUP INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
36	Install MODIFIED CABLE CLAMPS per view F-F on sheet 3 of figure 2X.	X	269	X		
37	Assemble VOLTAGE DIVIDER 1A53A7 to roof trusses.	P P P P	8 20 23 24	P P P P		
38	Assemble POWER SUPPLY CABLE SUPPORTS and BRACKETS.	P P P P	17 18 19 26, 27	P P P P		
39	Install POWER SUPPLY cables. The POWER SUPPLY cables are listed on the interconnecting cable table 3JJ, W1 through W59.			JJ		
	Each end of each wire is marked with the wire number, the terminal board or connector to which that end connects and in the case of multi-wire cables, each wire is marked with the number of the terminal on the terminal board to which it connects. This information is given on the interconnecting cable table 3JJ and it is suggested that this table be used as a check list as the cables are installed.					
	Install cables W31 through W36 in supports and strap in place.	P	28	P		
	The terminal board or connector number marked on the end of the wire will locate the termination of each end of the wire. It will be noted on the cable duct drawing figure 6B that each opening in the duct has been assigned a letter. These cable duct opening letters are referenced in the "via" column in the interconnecting cable table 3JJ.					
	Install cables W31 through W36 first, then the remainder of the power supply cables per the following steps: 1. Find the terminal board or connector to which one end of the cable is to connect. 2. Connect cable. 3. Run cable in a neat manner to the nearest cable duct opening listed in table 3JJ "via" column. Where several cables are going into a common duct opening they should follow a common path from the terminal board or connector to the opening insofar as possible. Dress cables as shown on sheets 6 and 7 of figure 2X.			X		
	4. Run the cable in the cable duct via the shortest route to the cable duct opening indicated by the second letter given in table 3JJ "via" column. 5. Locate the terminal board or connector to which this end of the cable is to be connected. 6. Run the cable in a neat manner to the terminal board or connector and connect cable. 7. If the cable should be longer than necessary, pull the slack cable up into the cable duct and double cable back on itself as required. Do not cut cables.					

TABLE 1. TRANSMITTING GROUP INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
40	Install TRANSMITTER GROUP cables W101 through W174 and W187 through W191. These cables are listed on the interconnecting cable table 3JJ. The installation procedure is the same as that listed in step 39.			JJ		
41	After all of the cables have been installed and the vertical runs from each duct opening to the terminal board and connector areas beneath it have been bundled together, the vertical runs should be wrapped with the nylon spiral wrap (table 12E). This wrap should start up in the ducts and extend as far down the cable bundle as is practical.	E	45			
42	The item 9's on the CABLE DUCT LM table 8B and figure 6B that were left off during step 26 of these instructions can be assembled to the rest of the ducts.	B	9	B		
43	Attach TUBING HANGERS to roof trusses.	C C	45 46	C C		
44	Assemble the RF input shield to the enclosure and the EXCITER. This tubing is to be insulated from ground throughout its entire run.	C C C C	19 20 21 37	C C C C	- -	- -
45	Assemble TUBING ASSEMBLIES to the enclosure.	C C	30 31	C C		
46	Assemble tubing connectors to LOW PASS FILTER capacitor assembly, to items C30 and C31 and to tubing of items X223 and X224.	C C C C C C	10 11 12 13 14 15	C C C C C C	- - -	- -
47	Assemble HOSE between WATER SUPPLY PLATE and headers of P.A. TUBE RACK, using two CLAMPS at each connection. Hoses are furnished cut to correct length. Mount hose to roof trusses with HANGERS and CLAMPS per views C-C, D-D, and E-E of figure 4C. Adjust supports to avoid kinking and sagging.	C C C	3-5 48, 50 22-26	C C C		
48	Move the COOLING SYSTEM 1A52, to the area adjacent to the WATER SUPPLY PLATE outside the transmitter enclosure. See sheet 2 of figure 3Y for recommended location.	X	21	Y		
49	Assemble HOSE between WATER SUPPLY PLATE and COOLING SYSTEM, using two CLAMPS at each connection. Hoses are furnished long to permit flexibility in layout and may need to be cut to desired length.	C C	1, 2 5	C C		

TABLE 1. TRANSMITTING GROUP INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
50	Check the direction of the water flow through all hoses to make certain that the water flow in the P.A. TUBE RACK will be correct.					
51	Remove mesh strainer (U24) from the COOLING SYSTEM and ensure that it is clean. Replace strainer. Remove 2 cartridge holders and insert OXYGEN and MIXED BED cartridge. NOTE Observe cartridge color coding and marking; ensure proper cartridge is inserted into the appropriate holder. Replace cartridge holders with cartridge in assembly. Observe decals to ensure correct cartridge location.					
52	Assemble CONNECTOR HANGERS, item 59, on table 9D in the approximate location shown on figure 7D. The final position for these items may shift slightly as the CONNECTORS are installed.	D	59	D		
53	Assemble appropriate CONNECTORS from table 9D and figure 7D. It is suggested that this table be used for a check list as these items are assembled.	D		D		
54	After all CONNECTORS have been installed, check that there is clearance around all the high voltage connectors and that the water hose is not drooping onto the bus work. The connector installation should also be checked circuit-wise against the schematic diagrams. Be especially sure that the proper connections have been installed between all B + leads and grounding relays.					
55	Install INSULATOR ASSEMBLY, item 28. Move the P.A. TANK into position and connect the leads of the primary windings to the plate tuning capacitors on the P.A. TUBE RACK. Marker bands on the ends of the leads indicate lead terminating points. Be sure that the transformer leads do not droop onto any part of the P.A. TUBE RACK. Clamp P.A. TANK primary leads with clamps at bottom of item 28. Connect one end of the secondary winding of the P.A. TANK COIL (end nearest Power end of enclosure) to the end of item 30 with 1/4-20 hardware. Connect the other end of the secondary winding to LOW PASS FILTER coil 1A20L1 (item 91 or 233, figure 2X). Ensure that lead from 1A20L2 is connected to 1A20C2 (ribbed insulator terminal).	X X	28 27	X X		

TABLE 1. TRANSMITTING GROUP INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
56	Move all parts of the PARTITION into the enclosure and assembly as shown on table 10S and figure 8S. When PARTITION is assembled, move it into position between the EXCITER 1A4 and the RELAY RACK 1A53A3. Secure the PARTITION to the EXCITER, the roof trusses and the RELAY RACK with items 80 and 232 and associated hardware shown on figure 2X.	S X X X X	 42 80 232 58	S X X X X		
57	Assemble all enclosure doors as illustrated in the Enclosure Installation Instructions of Volume II. Reassemble balance of enclosure.					
58	Assemble the key block portion of the INTERLOCK ASSEMBLY to the enclosure vertical channel located immediately inside the enclosure entrance door. Then install each of the individual opening key blocks to the PARTITION gates, EXCITER front and rear doors and P.A. doors. See details on sheet 3 of figure 2X and sheet 1 of figure 15Q.	X X	227 228	X X	-	-
59	Collect one set of INTERLOCK ASSEMBLY keys and store in a safe place. ONLY ONE SET OF OPERATING KEYS SHOULD BE KEPT AT THE TRANSMITTER.					
60	Assemble the TRANSMITTER LIGHT FIXTURES to the enclosure as shown on figure 15Q. The parts required are listed on table 14Q.	Q Q	2,3 8	Q Q		
61	Install ground cable W186.			JJ		
62	Assemble 2 GROUNDING RODS, item 45, inside the P.A. doors. The end of the ground lead for each of these rods is to be secured to the bracket inside the door on which the rod mounting clips are located. Assemble 2 GROUNDING RODS, item 183, to center of the stationary section of the protective screen inside the transmitter enclosure as shown in view G-G of figure 2X. The end of the ground lead for each of these rods is to be secured to the overhead truss members using the existing holes as shown on figure 2X.	X X	45 183	X X		
63	Ensure that Lucite GUARD ASSEMBLIES and SHIELDS are properly secured to the RELAY RACK 1A53A3. Check that metal shield over Inductrol unit (rear of 1A53A3) is secure.					
64	Attach the Lucite GUARD ASSEMBLY to the rear of the CONTROL INDICATOR PANEL 1A53A2.	P	5	Q		
65	Mount the SPARE FUSE AND TOOL PANEL, item 229, per sheet 1 of figure 15Q.	X	229	X		

TABLE 1. TRANSMITTING GROUP INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
66	Attach IDENTIFICATION PLATES to front of enclosure per section C-C, and view E-E on sheet 3 of figure 2X.	X X X X X X	31 32 34 214 215 216	X X X X X X	-	-
67	MAKE A CAREFUL INSPECTION OF THE COMPLETE INSTALLATION TO MAKE SURE THAT ALL HIGH VOLTAGE PORTIONS OF THE EQUIPMENT ARE CLEAR OF ANY POSSIBLE GROUNDS. Care should be exercised to make sure that all controls, wires, etc., are dressed well away from the high voltage DC circuits. Possible trouble spots in this area may come from such items as: 1. The ground leads of the ground rods. 2. Control wires and metal Bourdon tubes from the thermometers on the P.A. TUBE RACKS. 3. Water hoses. 4. Control wires to grounding switch relays. 5. Control wires to high voltage power supply voltage dividers. 6. P.A. tube parasitic suppressor assemblies. 7. P.A. TANK primary leads near LOW PASS FILTER capacitor cases.					

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
1	Move the ANTENNA MATCHING NETWORK - DUMMY LOAD (table 11W) in position in the air chamber. Reassemble the assembly per instructions given in Shipping-Reassembly section of this volume. Locate tubing which protrudes through antenna lead bowl insulator mounted on transmitter building rear wall directly behind Antenna Matching Network. Assemble Cap, item 30, and Wire Assemblies, items 28 and 36, as shown on view D-D of figure 9E. NOTE The dimensions of the transmitter building may be such that the design dimensions between the transmitter output and the ANTENNA MATCHING NETWORK - DUMMY LOAD ASSEMBLY cannot be maintained. If this is so, it will be necessary to modify the fixed connections between the equipments (i.e., copper tubing and fiberglass shields) to fit the new conditions. This may be done without harmful effects to the operation of the equipment as long as no major changes in the design intent are introduced. (Design intent is shown on figure 9E.) Ground the frame of the dummy load to the station ground (not the counterpoise) using cable or copper strap equivalent to No. 6 AWG or larger.	W W E E E	4 5 30 28 36	 E E E		- - - - -
2	Assemble SHIELDS, items 6 and 7, to the fiberglass shield box around the ANTENNA MATCHING NETWORK RF input terminals.	E E	6 7	E E	 -	-
3	Assemble low voltage side of the RF transmission line from transmitter #1 to the ANTENNA MATCHING NETWORK. Clamp hardware on item 32 should face away from the other copper line.	E E E	25 19 32	E E E		- - -
4	Assemble low voltage side of the RF transmission line from transmitter #2 to the ANTENNA MATCHING NETWORK. Clamp hardware on item 32 should face away from the other copper line.	E E E	25 19 32	E E E	- - -	
5	Insert TUBING, item 24, through the bowl insulator on transmitter #1.	E	24	E		-
6	Assemble TUBING, item 18, to the stub extending out of the bowl insulator on the left side of the ANTENNA MATCHING NETWORK and item 24 installed in step 5. Tighten gland nut on both bowl insulators and solder both couplings of item 18 to mating tubing.	E	18	E		-
7	Insert TUBING, item 24, through the bowl insulator on transmitter #2.	E	24	E	-	

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
8	Assemble TUBING, item 18, to the stub extending out of the bowl insulator on the right side of the ANTENNA MATCHING NETWORK and item 24 installed in step 7. Tighten gland nut on both bowl insulators and solder both couplings of item 18 to mating tubing.	E	18	E	-	
9	Assemble TUBING ASSEMBLY to the end of item 24 on the inside of transmitter #1 as shown in figure 4C.	C	31	C		-
10	Assemble TUBING ASSEMBLY to the end of item 24 on the inside of transmitter #2 as shown in figure 4C.	C	31	C	-	
11	Assemble the remaining sections of the fiberglass shields around the RF transmission line.	E E E E E E	8 9 10 11 12 31	E E E E E E	 - -	- -
12	Assemble the DUCT ASSEMBLY, BRACKET and BLOCK to the RF end of the enclosure for transmitters 1 and 2.	E E E	2 3 5	E E E		
13	Assemble the CABLE DUCT BOTTOM to item 2 installed in step 12 above for transmitters 1 and 2.	E	1	E		
14	Connect the ground plate on the power end of each transmitter enclosure to the station ground using cable or copper strap equivalent to 700 MCM.					
15	Assemble the power duct items as shown on figure 9E for G4, which shows two possible configurations. The ducts, item 48, between the transmitter enclosure ends and the wall are to be cut to length so that the completed duct work will reach from the end of the enclosure over to the wall. A support will have to be provided on the wall at installation for the duct. The ducts, item 48, running along the wall can again be cut to length at installation and if necessary, a hole can be cut in the bottom of the ducts for the cables to be run to the station primary power distribution panel.	E E E E E E	47 48 49 50 52 53	E E E E E E		

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
16	Check TUBING, item 22, to see that it is the proper shape to couple the stub coming up from the floor trench at the power end of the transmitter #1 to the connector on the end roof truss (which connects to the tubing on the inside of the enclosure). Reshape tubing if necessary. When the RF transmitter input cable (to be supplied by installing activity) has been run from the transmitter control unit in the signal power building and comes out of the stub in the floor trench, it should be fed through the CONNECTOR, item 32, and the TUBING, item 22. Then it should be pushed into the connector on the roof truss and through the tubing in the enclosure into the EXCITER 1A4. After the wire has been installed, the TUBING and CONNECTOR can be permanently assembled to the connector on the enclosure and to the stub from the floor trench.	E E	22 32	E E		- -
17	Repeat step 16 using the cable from the transmitter control unit to transmitter #2 (Cable to be supplied by installing activity).	E E	22 32	E E	- -	
18	The cables W301, W302, W348 and W349 should be placed in the floor trench between transmitter #1 and the DUMMY LOAD. The DUMMY LOAD end of these cables should be connected to the indicated terminal boards. At the transmitter end, the cables should run vertically up the wall on the CABLE DUCT BOTTOM and thence into the transmitter enclosure through the DUCT ASSEMBLY. Inside the transmitter, the cables should follow the transmitter cable ducts to their terminating terminal boards on the RELAY RACK 1A11 and INDICATOR PANEL ASSEMBLY 1A12 and EXCITER 1A4 where they should be connected. See table 4MM.	E E E E	55 56 70 71	MM		- - - -
19	The cables W307, W308, W350 and W351 should be connected in a manner similar to that described in step 18 between transmitter #2 and the DUMMY LOAD.	E E E E	61 62 88 89	MM	- - - -	
20	Assemble the COVER CABLE over the cables installed in steps 18 and 19, as shown on figure 9E. Do this on both transmitters #1 and #2.	E	4	E		
21	(a) When the installation cables W714, W716 and W718 are installed from the transmitter control unit in the signal power building to transmitter #1, they should be formed along the floor trench and up the power end of the enclosure into the opening in the roof truss which connects to the internal duct system and connected to their terminating points. This cable should then be covered with COVER CABLE, item 4. (W714, W716, W718 provided by installing activity.)	E	4	E		-

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
21 (Cont.)	(b) When installation cable W713 is installed from the transmitter control unit in the signal power building to DUMMY LOAD in the transmitter building, it should be placed along the floor trench up to the break out and into the DUMMY LOAD and connected to its terminating point. (W713 provided by installing activity.)					
22	Similarly, cables W715, W717 and W719 should be connected into transmitter #2 and covered as in step 21. (W715, W717, W719 provided by installing activity.)	E	4	E	-	
23	Install the 460 volt power input wires as follows:					
	(a) Disconnect cables and remove the fuse panel 1A53A3A2 from the RELAY RACK 1A53A3 in both transmitters #1 and #2.					
	(b) Set up the reel of wire, item 83, in the area between the transmitters on a pair of boxes using a pipe as an axle for the reel.	E	83			
	(c) Open the covers on all the power wiring ducts, and install cables W361 through W366 described in steps (d) through (h).			MM		
	(d) Unreel a length of wire from the cable reel, pass it over the edge of the power duct through the power input opening in the roof truss on transmitter #1. Continue wire through the opening in the top of the RELAY RACK 1A53A3. Make up end of wire into the connector provided on 1A53A3S1-3 (the right terminal of the switch when looking at the rear of the RELAY RACK). Dress wire neatly from the RELAY RACK through the cable entrance in the roof truss. This is W363.					
	(e) Lay wire in power duct and continue it along duct to station power distribution panel. Determine wire termination point and cut wire to length. Make up end of wire in LUG, item 77. Connect lug to termination point on phase 3 of the 460 volt line. Repeat steps (d) and (e) to install W366 parallel to W363.	E	77			
	(f) Repeat steps (d) and (e) between 1A53A3S2-2 (the middle terminal of the switch when looking at the rear of the RELAY RACK) and phase 2 of the 460 volt line. This installs W362 and W365.					
	(g) Repeat steps (d) and (e) between 1A53A3S2-1 (the left terminal of the switch when looking at the rear of the RELAY RACK) and phase 1 of the 460 volt line. This installs W361 and W364.					
	(h) Replace the fuse panel and cables on the RELAY RACK and bundle the 6 wires into a neat cable and tie together using strap, item 46.	E	46			
	(i) Repeat steps (d) through (h) for the 460 volt power connections to transmitter #2. This installs cables W371 through W376.				-	

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
24	Install the 208 V 4 wire power input cables, W318 through W321 and W325 through W328, as follows:			MM		
	(a) Feed the lugged end of an ELECTRICAL WIRE, item 80, from outside the enclosure, over the edge of the power duct, through the power input opening in the roof truss of transmitter #1, along the path of the 460 V wire installed in step 23, and connect to the terminal 1A53A3TB1-1 on the RELAY RACK 1A53A3.	E	80			-
	(b) Lay the wire in the power duct and continue it back to the station power distribution panel. This wire is to be connected to the NEUTRAL bus. Determine the termination point for this wire and cut to length. Make up end of wire into lug, item 78. Connect lug to NEUTRAL bus.	E	78			
	(c) Repeat steps (a) and (b) except connect wire to terminal 1A53A3TB1-2 on the RELAY RACK 1A53A3 and to PHASE 1 bus in the station power distribution board.					
	(d) Repeat steps (a) and (b) except connect wire to terminal 1A53A3TB1-3 on the RELAY RACK 1A53A3 and to PHASE 2 bus in the station power distribution board.					
	(e) Repeat steps (a) and (b) except connect wire to terminal 1A53A3TB1-4 on the RELAY RACK 1A53A3 and to PHASE 3 bus in the station power distribution board.					
	(f) Bundle wires neatly in a cable and tie together using strap, item 46.	E	46			
	(g) Repeat steps (a) through (f) for transmitter #2.	E E	79 78	MM	-	
	(h) Replace 460 VOLT RACK ASSEMBLY panel following the instructions given in table 1 step 21 in reverse order.					
25	Install the 120 Volt lighting input wires W346, W347, W354, W355 as follows:					
	(a) Feed the end of ELECTRICAL WIRE, item 82, from the outside of the enclosure, over the edge of the power duct, through the power input opening in the roof truss of transmitter #1, through the transmitter cable ducts and switch box conduit and connect to the silver input terminal of 1S2, 1S3, switch box.	E	82	MM		
	(b) Lay the wire in the power duct and continue it back to the station power distribution panel. This wire is to be connected to the neutral side of the 120 V supply designated for 120 V enclosure lighting and power. Determine the termination point and cut to length.					

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
25 (Cont.)	(c) Repeat step (a) except connect this wire to the gold input terminal of 1S2. 1S3, switch box. (d) Repeat step (b) except connect this end of wire to the active side of the 120 V supply. (e) Repeat steps (a) through (d) for transmitter #2. (f) Close tops on all power ducts.					
26	Install the 4PR-1000A tubes in the EXCITER 1A4. Place chimneys over tubes and connect plate cap.	X	22			
27	Install the F8C25A tubes in the EXCITER 1A4. Connect B+ band to tube.	X	22			
28	Install F1086 tubes in the P.A. TUBE RACK as follows: (a) Inspect the tube and the tube jacket and note method in which tube is held into place before attempting to install the tube. The tube is placed in the jacket sitting on a rubber 0 ring on the ledge near the top of the jacket. There is a split tapered ring between the top of the fixed portion of the jacket and the screwed on retainer ring on the top of the jacket. As the retainer ring is screwed down onto the jacket, the tapered ring slides down the tapered side of the jacket and pushes on the top of the tube flange thus compressing the 0 ring to provide a tight water seal. If the retainer ring is unscrewed, the tapered ring will be seen to expand and follow the retainer ring up the inclined plane and if the retainer ring is unscrewed far enough, the tapered ring will spring under the retainer ring and prevent its being screwed back down on the tube. When this happens, the tapered ring must be compressed and the retainer ring screwed down until the tapered ring is again riding on the tapered surface of the jacket. (b) Remove the tapered ring and the rubber 0 ring from the jacket. (c) Screw the retainer ring approximately 1/2 way down the jacket threads. (d) Lubricate the 0 ring and tapered ring grooves in the jacket and the retainer ring threads with silicon grease (Stop - Cock Grease manufactured by Dow Corning or equivalent). (e) Slide the tapered ring over the tube anode and up over the tube retaining flange at the top of the anode. (f) Slide the 0 ring up on the tube anode until it is just below the tube retaining flange.	X	25 199		-	-

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
28 (Cont.)	(g) Insert the tube in the jacket. (h) Adjust the height of the retainer ring until the tapered ring can be sprung into the space between the bottom of the retainer ring and the top of the tube retaining flange. CAUTION If the tube retainer ring is unscrewed too far, the tapered ring will spring out under the retainer ring and the top of the jacket as described in the last part of step (a). If this happens, remove the tube and the tapered ring from the jacket and start over. (i) Gently tighten the retainer ring down and note that the tapered ring is pushing down on the top of the tube retaining ring. Screw the retainer ring down hand tight. DO NOT EXERT AN EXCESSIVE ROTARY STRESS ON THE TUBE JACKET WHEN TIGHTENING OR LOOSENING THE TUBE RETAINING RING. TO DO SO WILL CAUSE AN EXCESSIVE STRAIN ON THE CERAMIC INSULATORS USED TO MOUNT THE JACKET AND THEY MAY BREAK.					
29	A TUBE REMOVER (INSTALLER) has been provided to tighten the tube down in the socket if the tube leaks after the water has been turned on or if it is impossible to unscrew the jacket retainer ring without undue strain when the tube is to be removed from service. This tool is used as follows: (a) Look at the crescent shaped portion of the tool and note that it is marked INSTALL on one side and REMOVE on the other. Screw the thumb screw and associated stainless steel strap section into the side of the crescent part of the tool indicating whether the tube is to be INSTALLED or REMOVED. Run the nut on the T-Bar portion of the stainless steel strap to the end of its threaded section (the end away from the top of the T). (b) Note the notch on the one end of the crescent shaped part of the tool and hook this notch over the block on the back of the jacket where the suppressor connects to the jacket. (DON'T HIT HEAD ON GRID RESISTORS WHEN LOOKING FOR BLOCK.) Crescent shaped section of tool will then lay around top of jacket just under the flange on top of fixed portion of jacket. (c) Wrap the other portion of the tool, also a stainless steel strap, around the retainer ring portion of the jacket. This strap has attached to it a small block with a pin protruding from it and also a hinged mating section for the T-BAR on the crescent shaped section of the tool. Move the block containing the pin on the strap until it engages one of the holes in the jacket retainer ring and so that the hinged section will be in the proper location so that it can be coupled with the T-BAR.	W	16			

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
29 (Cont.)	(d) Screw the nut on the T-BAR hand tight and then using a small open end wrench continue to tighten nut until retainer ring moves in the required direction. If end of threaded section of the T-BAR is reached and retainer ring is still not sufficiently tightened or loosened, run T-BAR nut back to the other end of the thread again and repeat step (c). Continue steps (c) and (d) until the jacket retainer ring is loose or tight as the case may be. The action of this tool is to provide the required rotary motion between the two parts of the tube jacket without placing any rotary strain on the jacket mounting insulators. CAUTION Tighten just enough to stop leaks.					
30	The procedure given below should be used to fill the transmitter water cooling systems after inspection and adjustment procedures are followed as specified in paragraph 2-6 of Volume I. Refer to schematic diagram, figure 6-45 in Volume V. NOTE System should be low-pressure air tested for leaks prior to filling. Do not exceed 50 pounds per square inch. TO FILL SYSTEM: (a) With pump shut down. (1) Open vent valves U4, U7, and U32. (2) Open main line valves U23 and U16. (3) Open tank valves U8, U17, and U18. (4) Open bypass valve U26. (b) Fill tank with distilled water through fitting U3 until water shows in gauge glass M3 to the arrow. (c) Start pump by setting 208 vac circuit breaker 1A53A3CB2 and POWER switch 1A53A2S17 to ON. (1) Watch water level in gauge M3 on tank. Level should drop slowly. Keep tank level near arrow by addition of more water as level slowly drops.					

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
30 (Cont.)	(c) (2) When water appears at each vent value U4 or U7, close them, but keep vent valve U32 on fill tank open. Close U16 to help pull water from U17 and tank.					
	(3) As soon as the pump primes, there will be a build up of pressure on discharge gauge M6 (approximately 35 lbs). When gauge reads a steady pressure without violent fluctuations of the needle, this is an indication that most of the air pockets in the system have been eliminated.					
	(4) Open U16 and close bypass valve U26.					
	(5) Fill tank to level indicated by arrow.					
	(6) Close tank vent valve U32.					
	(7) Close fill valve U8.					
	(d) Stop pump by setting POWER switch to OFF/RESET.					
	(1) There will be pressure evident in the lines as shown by discharge gauge M6 and suction gauge M5. If not, check for leaks.					
	(2) Wait until pressure drop to 10 psig or open any drain valve (such as U27, U29, or U31) just long enough to release pressure to 0 psig.					
	(3) Start pump. Pump should immediately prime as evidenced by pressure build up on discharge gauge M6.					
	(4) If pump immediately primes, the system is satisfactory.					
	(5) If pump does not prime, the system is still not completely filled or there is some connection in the system that is leaking air into the suction line to the pump. Check all hose connections or drain valves.					
	(6) Restart pump and repeat operations (a) through (d). System should now be fully charged and self priming.					
	(e) Adding water.					
	(1) To add water to the system, keep pump running.					
	(2) Open tank vent valve U32 and fill valve U8.					

TABLE 2. TRANSMITTING SET INSTALLATION INSTRUCTIONS (Cont)

STEP NO.	OPERATION	L M CODE	L M ITEM	DWG. CODE	CHECK TRAN. 1	CHECK TRAN. 2
30 (Cont.)	(e) (3) Add distilled water to tank through connection U3 to level indicated by arrow. (4) Close tank vent valve U32 and fill valve U8. CAUTION (1) After pump primes, keep bypass valve U26 closed. Open it after any shut down only long enough to repeat procedures (a), (b), and (c) where necessary. (2) Keep tank vent valve U32 closed. (3) Keep fill valve U8 closed.					

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES

W-	FROM 1A53-	VIA PATH OR DUCT/ OUTLET-	TO 1A53-	PART NO.
1	A2TB1	M	A4A3	C1096494G001
2	A3TB12	D-A	A6TB1	C1096491G001
3	A2TB23	M	A3A1	C1096492G001
4	A2TB38	M	A3TB71	C1096476G001
5	A2TB19	M	A3TB19	C1096477G001
6	A2TB20	M	A3TB20	C1096478G001
7	A2TB21	M	A3TB21	C1096479G001
8	A2TB22	M	A3TB22	C1096480G001
9	A2TB39	M	A3TB23	C1096481G001
10	A2TB24	M	A3TB24	C1096483G001
11	A2TB25	M	A3TB25	C1095484G001
12	A1TB1		A3TB31	C1096485G001
13	A2TB36	M	A3TB36	C1096486G001
14				NOT USED
15				NOT USED
16	A3TB33	-	A4TB1	C1096488G001
17	A3TB35	D-A	A7TB1	C1096489G001
18	A3A1	D-A	A7J9	C1096493G001
19				NOT USED
20				NOT USED
21				NOT USED
22	A2J3	M-A	A7J3	C1096482G001
23	A2J1	M-A	A7J1	C1096482G002
24	A2J7	M-A	A7J7	C1096482G003
25	A2J5	M-A	A7J5	C1096482G004
26	A4E6	-	A6TB1	C1096505G001
27	A6TB1	-	A23	C1096506G001
28				NOT USED
29				NOT USED
30				NOT USED
31	A3TB77-1	-	A6T1H1	C1096474G001
32	A3A1T3	-	A6T1H2	C1096475G001

75-009-1096504B

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

W-	FROM 1A53-	VIA PATH OR DUCT/ OUTLET-	TO 1A53-	PART NO.
33	A3TB77-2	–	A6T1H3	C1096474G002
34	A3A1T2	–	A6T1H4	C1096475G002
35	A3TB77-3	–	A6T1H5	C1096474G003
36	A3A1T1	–	A6T1H6	C1096475G003
37				NOT USED
38				NOT USED
39				NOT USED
40				NOT USED
41				NOT USED
42	A5-10750	–	A20E1	NOTE 1 (C1096530G002)
43	A5-10750	–	A7E3	NOTE 1 G003
44	A1E1	–	A19E2	NOTE 1 G004
45	A1E3	–	A20E2	NOTE 1 G005
46	A1E2	–	A1E4	NOTE 1 G006
47	A1E4	–	A4E4	NOTE 1 G007
48	A6E2	–	A7E5	NOTE 1 G008
49	A6E1	–	A7E7	NOTE 1 G009
50	A7E5	–	A23E1	NOTE 1 G0010
51	A7E7	–	A23E3	NOTE 1 (C1096530G011)
52				NOT USED
53				NOT USED
54				NOT USED
55	A4TB1	–	A6TB1	NOTE 1 (C1096530G001)
56	A6TB1	–	A7TB2	NOTE 1 (C1096531G002)
57				NOT USED
58	A4E3	–	A7E12	NOTE 1 (C1096530G016)
59	A4E5	–	A5-GROUND	NOTE 1 (C1096530G017)

NOTE:

1. PART OF HIGH VOLTAGE POWER SUPPLY, A2484642G001

75-009-1096504A

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

WIRE SIZE	WIRE TYPE LM FIND NO.	WIRE LENGTH IN.	WIRE AWG	WIRE ♦ COLOR	REF. NO.	FROM LOCATION	FROM ✱ NOTES	VIA ▬	TO LOCATION	TO ✱ NOTES	CIRCUIT FUNCTION
	(D1088609G1) CABLE					W101		F-G			
	417		18	91	1	1A12TB1-1	181		1A4TB4-1	181	
	418		18	92	2	-2	182		-2	182	
	419		18	93	3	-3	183		-3	183	
	420		18	94	4	-4	184		-4	184	
	421		18	95	5	-5	185		-5	185	
	422		18	96	6	-6	186		-6	186	
	423		18	97	7	-7	187		-7	187	
	424		18	98	8	-8	188		-8	188	
	415		18	9	9	-9	189		-9	189	
	416		18	90	10	-10	190		-10	190	
	(D1088609G2) CABLE					W102		F-H			
	417		18	91	11	1A12TB2-1	181		1A6TB1-1	181	
	418		18	92	12	-2	182		-2	182	
	419		18	93	13	-3	183		-3	183	
	420		18	94	14	-4	184		-4	184	
					15						
	422		18	96	16	-6	186		-6	186	
	423		18	97	17	-7	187		-7	187	
	424		18	98	18	-8	188		-8	188	
	415		18	9	19	-9	189		-9	189	
					20						
	(D1088609G16) CABLE					W103		F-E			
	417		18		21	1A12TB3-1	181		1A11TB8-1	181	▲
					22						
	419		18	93	23	-3	183		-3	183	▲
	420		18	94	24	-4	184		-4	184	▲
	421		18	95	25	-5	185		-5	185	▲
	422		18	96	26	-6	186		-6	186	▲
					27						
					28						
					29						
					30						
	(D1088609G4) CABLE					W104		F-E			
	417		18	91	31	1A12TB6-1	181	▲	1A11TB1-1	181	
	418		18	92	32	-2	182	▲	-2	182	
	419		18	93	33	-3	183	▲	-3	183	
	420		18	94	34	-4	184	▲	-4	184	
	421		18	95	35	-5	185	▲	-5	185	
	422		18	96	36	-6	186	▲	-6	186	
	423		18	97	37	-7	187	▲	-7	187	
	424		18	98	38	-8	188	▲	-8	188	
	415		18	9	39	-9	189	▲	-9	189	
	416		18	90	40	-10	190	▲	-10	190	
	▬, ▲, ✱, SEE NOTES ON SHEET 9										

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM A1088728G2

♦ COLOR CODE: 0 BLACK BK; 1 BROWN BN; 2 RED R; 3 ORANGE O; 4 YELLOW Y; 5 GREEN GN; 6 BLUE BL; 7 VIOLET V; 8 GRAY GY; 9 WHITE W

§ SH -SHIELD PGT-PIGTAIL

JJ

1096487-

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

SYMBOL §	WIRE TYPE LM FIND NO.	WIRE LENGTH IN.	WIRE AWG	WIRE ◆ COLOR	REF. NO.	FROM LOCATION	FROM ✱ NOTES	VIA ■	TO LOCATION	TO ✱ NOTES	CIRCUIT FUNCTION
	(D1088209G5) CABLE					W105		F-E			
	417		18	91	41	1A12TB7-1	181		1A11TB2-1	181	▲
	418		18	92	42	-2	182		-2	182	▲
	419		18	93	43	-3	183		-3	183	▲
	420		18	94	44	-4	184		-4	184	▲
	421		18	95	45	-5	185		-5	185	▲
	422		18	96	46	-6	186		-6	186	▲
	423		18	97	47	-7	187		-7	187	▲
	424		18	98	48	-8	188		-8	188	▲
	415		18	9	49	-9	189		-9	189	▲
	416		18	90	50	-10	190		-10	190	▲
	(D1088209G6) CABLE					W106		F-E			
	417		18	91	51	1A12TB8-1	181	▲	1A11TB4-1	181	▲
	418		18	92	52	-2	182	▲	-2	182	▲
	419		18	93	53	-3	183	▲	-3	183	▲
	420		18	94	54	-4	184	▲	-4	184	▲
	421		18	95	55	-5	185	▲	-5	185	▲
	422		18	96	56	-6	186	▲	-6	186	▲
	423		18	97	57	-7	187	▲	-7	187	▲
	424		18	98	58	-8	188	▲	-8	188	▲
	415		18	9	59	-9	189	▲	-9	189	▲
	416		18	90	60	-10	190	▲	-10	190	▲
	(J1088611G1) CABLE					W107			(J1088705G1)		
	445		6	0	61	1A11TB10-1			1AGT1-1		
	445		6	0	62	-9		E-J	-4		
	445		6	0	63	-4			1AGT3-1		
	445		6	0	64	-11			-4		
	445		6	0	65	-16			1AGT4-1		
	445		6	0	66	-24		E-H	-4		
	445		6	0	67	-19			1AGT2-1		
	445		6	0	68	-26			-4		
					69						
	(D1088614G11) CABLE					W108		E-D			
	446		2	0	70	1A11TB10-2	246		1A53A3TB2-3	247	
	446		2	0	71	-3	247		-1	245	
	446		2	0	72	-10	251		-2	246	
					73						
	(D1088614G12) CABLE					W109		E-G			
	446		2	0	74	1A11TB10-2	246	▲	1A4TB10-2	246	
	446		2	0	75	-3	247	▲	-1	245	
	446		2	0	76	-10	251	▲	-3	247	
					77						
						W110		NOT USED			
	■, ▲, ✱ SEE NOTES					ON SHEET 9					

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM A1088728G2

◆ COLOR CODE: 0 BLACK BK; 1 BROWN BN; 2 RED R; 3 ORANGE O; 4 YELLOW Y; 5 GREEN GN; 6 BLUE BL; 7 VIOLET V; 8 GRAY GY; 9 WHITE W

§ SH - SHIELD
PGT - PIGTAIL

JJ

1096487-

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

FIGURE	W I K E TYPE LM FIND NO.	LENGTH IN.	AWG	◆ COLOR §	REF. NO.	FROM LOCATION	FROM NOTES *	VIA ▬	TO LOCATION	TO NOTES *	CIRCUIT FUNCTION
	(D 1088614G12) CABLE					W111		E-D			
	446	2	0		82	1A11TB10-32	252		1A53A3TB74-1	245	
	446	2	0		83	-39	253		-2	246	
	446	2	0		84	-46	254		-3	247	
					85						
	(D 1088614G5) CABLE					W112		E-G			
	436	14	91		86	1A11K1-T1	220	▲	1A4TB8-1	223	▲
	437	14	92		87	-T2	221	▲	-2	224	▲
	438	14	93		88	-T3	222	▲	-3	225	▲
					89						
	(D 1088614G13) CABLE					W113		D-G			
	444	10	0		90	1A53A3TB73-1	499		1A4TB8-4	255	▲
	444	10	0		91	-2	500		-5	256	▲
	444	10	0		92	-3	501		-6	261	▲
					93						
	(D 1088609G23) CABLE					W114		H-D			
	436	14	91		94	1A6TB2-1	223	▲	1A53A3TB34-1	223	
	437	14	92		95	-2	224	▲	-2	224	
	431	16	95		96	-5	214	▲	-5	214	
	432	16	96		97	-6	215	▲	-6	215	
	433	16	97		98	-7	216		-7	216	
	(D 1088609G17) CABLE					W115		G-D			
	441	14	98		99	1A4TB5-8	229		1A53A3TB70-3	225	
	435	14	90		100	-10	231		-4	226	
					101						
					102						
					103						
	(D 1088609G22) CABLE					W116		E-D			
	434	14	98		104	1A11TB3-8	229		1A53A3TB69-8	229	
	442	14	9		105	-9	230		-9	230	
	435	14	90		106	-10	231		-10	231	
					107						
	(D 1088609G7) CABLE					W117		G-H			
	425	16	9		108	1A4TB5-9	218	▲	1A6TB2-9	218	▲
	426	16	90		109	-10	219	▲	-10	219	▲
					110						
	(D 1088609G18) CABLE					W118		G-D			
	427	16	91		111	1A4TB7-1	210		1A53A3TB70-1	210	
	428	16	92		112	-2	211		-2	211	
					113						
					114						
	(C 1088617G51) CABLE					W119		A-G			
	436	14	91		115	1A53A6E1			1A4TB5-1	223	▲
					116						

▬, ▲, ● * SEE NOTES ON SHEET 9

JJ

FOR CUMULATIVE LIST, & SPECIFICATIONS SEE LM A108872862

◆ COLOR CODE | § MIL = ASA = 0 BLK BK 1 BRN BR 2 RED R 3 ORN O 4 YEL Y 5 GRN G 6 BLU BL 7 VIO V 8 GY GY 9 WHT W

PGT—PIGTAIL § MIL ASA SHLD SHIELD

1096487E

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

WIRE LM FIND NO.	LENGTH IN.	AWG	♦ COLOR §	REF. NO.	FROM LOCATION	* NOTES	VIA	TO LOCATION	* NOTES	CIRCUIT FUNCTION
(D1088609G11) CABLE				W120			D-K			
439	14	94		117	1A53A3TB69-4	226		1TB1-7	506	
504	14	95		118	-5	523		-8	229	
● CABLE				W121						
	16	96		119	1A53A2TB37-6			1XDS5-1		
	16	97		120	-7			1XDS5-2		
				121						
(D1088614G14) CABLE				W122			A-E			
445	6	0		122	1A52TB1-1	232	▲	1A11K3-T1	242	
445	6	0		123	-2	233	▲	-T2	243	
445	6	0		124	-3	234	▲	-T3	244	
				125						
(D1088614G8) CABLE				W123			E-K			
436	14	91		126	1A11K2-T1	220	▲	1TB1-1	223	▲
437	14	92		127	-T2	221	▲	-2	224	▲
438	14	93		128	-T3	222	▲	-3	225	▲
				129						
CABLE				W124			NOT USED			
				130						
				131						
D1088609G19) CABLE				W125			G-D			
504	14	95		132	1A4TB9-5	214		1A53A3TB70-5	214	
440	14	96		133	-6	215		-6	215	
505	14	97		134	-7	506		-7	506	
436	14	91		135	-1	223		-8	229	
(D1088609G14) CABLE				W126			G-D			
442	14	9		136	1A4TB8-9	230		1A53A3TB70-9	230	
441	14	98		137	-8	229		-10	231	
CABLE				W127			NOT USED			
				138						
				139						
				140						
				141						
CABLE				W128			NOT USED			
				142						
				143						
CABLE				W129			NOT USED			
				144						
				145						
				146						
(C108BG17G6) CABLE				W130			G-K			
426	16	90		147	1A4TB8-10	219	▲	1TB1-10		
				148						
CABLE				W131			NOT USED			
				149						
(D1088812G1 OR D1088812G3) CABLE				W132				(D1088812G3)		
447	RG 213/U		0	150A	1AG-1 (FRONT)			1A4-C21		
443	14		9	150B	1AG-3 (FRONT)			SHIELD		
443	14		9	150C				1A4-C17 CASE		
▬, ▲, ●, *	SEE NOTES ON			SHEET 9						J J

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM A1088728G2

♦ COLOR CODE | # MIL = ASA = 0 BLK BK 1 BRN BN 2 RED R 3 ORN O 4 YEL Y 5 GRN G 6 BLU BL 7 VIO V 8 GY GY 9 WHT W

§ PGT=PIGTAIL | MIL ASA SHLD SH | SHIELD

1096487G

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

CHANGE	W TYPE LM FIND NO.	I LENGTH IN.	K AWG	E ◆ COLOR §	REF. NO.	FROM LOCATION	* TP	VIA ▬	TO LOCATION	* NOTE	CIRCUIT FUNCTION
	(D1088812G2 OR D1088812G4				CABLE	W133			(D1088812G4)		
	447	RG 213/U		0	151A	1A6-2 (FRONT)			1A4-C22		
	443	14		9	151B	1A6-4 (FRONT)			SHIELD		
	443	14		2	151C	SHIELD			1A4-C18 CASE		
	C1088617G15)				CABLE	W134		A-G			
	443	14		9	164	1A53A6E2			1A4-65		
					165						
	(D1088609G20)				CABLE	W135		F-A			
	431	16		95	166	1A12TB2-5	214		1A52TB1-5	214	▲
	426	16		90	167	-10	219		-10	219	▲
	(C1088617G16)				CABLE	W136		B-G			
	443	14		9	168	1A53A5-10750			1A4-22		
					169						
					CABLE	W137		NOT USED			
					170						
					171						
	(D1088614G15)				CABLE	W138		G-D			
	438	14		93	172	1A4TB5-3	225		1A53A4-E1	514	
	442	14		9	173	-9	230		E2	515	
					174						
					175						
	(C1088617G39)				CABLE	W139		D-G			
	444	10		0	176	1A53A3TB73-4	255		1A4TB10-4	255	▲
					177						
					CABLE	W140		NOT USED			
					178						
					179						
					180						
					CABLE	W141		NOT USED			
					181						
					182						
					183						
	C1088617G41)				CABLE	W142		G-E			
					184						
	434	16		98	185	1A4TB9-8	217	▲	1A11TB8-10	219	▲
					186						
					CABLE	W143		NOT USED			
					187						
					188						
					CABLE	W144		NOT USED			
					189						
					190						
					CABLE	W145		NOT USED			
					191						
					CABLE	W146		NOT USED			
					192						J J
	▬, ▲, * SEE NOTES ON SHEET 9										

FOR CUMULATIVE LIST OF SPECIFICATIONS SEE LM A1088728G2

◆ COLOR CODE | # MIL / ASA: 0 BLK BK, 1 BRN BN, 2 RED R, 3 ORN O, 4 YEL Y, 5 GRN G, 6 BLU BL, 7 VIO V, 8 GY GY, 9 WHT W

§ MIL / ASA SHLD LM | PGT–PIGTAIL | SHIELD

1096487C

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

WIRE	WIRE TYPE LM FIND NO.	WIRE LENGTH IN.	WIRE AWG	WIRE ◆ COLOR §	REF. NO.	FROM LOCATION	FROM * NOTES	VIA ▬	TO LOCATION	TO * NOTES	CIRCUIT FUNCTION
				CABLE		W147		NOT	USED		
					193						
					194						
					195						
					196						
				CABLE		W148		NOT	USED		
					197						
					198						
				CABLE		W149		NOT	USED		
					199						
					200						
				CABLE		W150		NOT	USED		
					201						
					202						
				CABLE		W151		NOT	USED		
					203						
					204						
				CABLE		W152		NOT	USED		
					205						
					206						
				CABLE		W153		NOT	USED		
					207						
					208						
				CABLE		W154		NOT	USED		
					209						
					210						
				CABLE		W155		NOT	USED		
					211						
					212						
				CABLE		W156		NOT	USED		
					213						
					214						
					215						
					216						
					217						
				CABLE		W157		NOT	USED		
					218						
					219						
				CABLE		W158		NOT	USED		
					220						
					221						
	(C1096482G005)			CABLE		W159		G-F			
			RG-		222	1A4J4			1A53A2J2		
			58U								
	(C2311725G9)			CABLE		W160		G-E			
			RG-		223	1A4J9			1A11J1		
			58U								
	▬, *	SEE NOTES ON SHEET 9									JJ

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM A1088728G2

◆ COLOR CODE | # MIL / ASA | 0 BLK BK | 1 BRN BN | 2 RED R | 3 ORN O | 4 YEL Y | 5 GRN G | 6 BLU BL | 7 VIO V | 8 GY GY | 9 WHT W

§ MIL / ASA SHLD SH | SHIELD

PGT-PIGTAIL

1096487-

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

W TYPE LM FIND NO.	K LENGTH IN.	E AWG	♦ COLOR §	REF. NO.	FROM LOCATION	* NOTE	VIA	TO LOCATION	* NOTE	POINT-TO-POINT FUNCTION
(C2311725G10)			CABLE	W161			G-E			
		RG-58U		224	1A4J10			1A11J2		
●			CABLE	W162						
		16	96	225	1A53A2TB37-6			1XDS8-1		
		16	97	226	-7			1XDS8-2		
				227						
(C1088617G42)			CABLE	W163			G-D			
439		14	94	228	1A4TB5-4	226		1A53A4E3		
				229						
(C1088617G43)			CABLE	W164			D-L			
446		2	0	230	1A53A3-GND (208-Y RACK)			1-GND STUD		
(C1088617G44)			CABLE	W165			B-L			
446		2	0	231	1A53A6TI-GND			1-GND STUD		
(C1088617G45)			CABLE	W166			A-L			
444		10	0	232	1A53A7E11			1-GND STUD		
			CABLE	W167			NOT	USED		
				233						
			CABLE	W168			NOT	USED		
				234						
(C1088617G33)			CABLE	W169			G-L			
444		10	0	235	1A4-GND			1-GND STUD		
(C1088617G34)			CABLE	W170			H-L			
444		10	0	236	1A6-GND			1-GND STUD		
(C1088617G35)			CABLE	W171			E-L			
444		10	0	237	1A11-GND			1-GND STUD		
(C1088617G46)			CABLE	W172			A-L			
444		10	0	238	1A52-GND			1-GND STUD		
(C1088617G47)			CABLE	W173			D-L			
445		6	0	239	1A53A4E7			1-GND STUD		
(C1088617G48)			CABLE	W174			D-L			
446		2	0	240	1A53A3-GND (460-Y RACK)			1-GND STUD		
			CABLE	W175			NOT	USED		
				241						
			CABLE	W176			NOT	USED		
				242						JJ
*, ●	SEE NOTES ON SHEET 9									

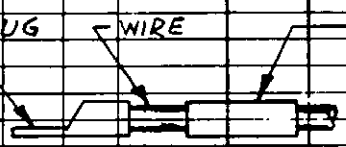
FOR CUMULATIVE LIST 5 SPECIFICATIONS SEE LM A1088728G2

♦ COLOR CODE | # MIL / ASA: 0 BLK BK, 1 BRN BN, 2 RED R, 3 ORN O, 4 YEL Y, 5 GRN G, 6 BLU BL, 7 VIO V, 8 GY GY, 9 WHT W | § MIL / ASA: SHLD, SHIELD | PGT-PIGTAIL

1096487F

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

SYMBOL	WIRE § TYPE LM FIND NO.	LENGTH IN.	AWG	♦ COLOR	REF. NO.	FROM LOCATION	FROM NOTES	VIA	TO LOCATION	TO NOTES	CIRCUIT FUNCTION
				CABLE		W177	⌀				
			12	TW [0	243	1J1 (GOLD)			1S3 (GOLD)		
			12	P [9	244	1J1 (SILVER)			1S3 (SILVER)		
				CABLE		W178	⊙				
			12	TW [0	245	1DS10(GOLD)			1S2 (GOLD)		
			12	P [9	246	1DS10(SILVER)			1S2 (SILVER)		
				CABLE		W179	⊙				
			12	TW [0	247	1J2 (GOLD)			1S3 (GOLD)		
			12	P [9	248	1J2 (SILVER)			1S3 (SILVER)		
				CABLE		W180	✉				
			12	TW [0	249	1DS11 (GOLD)			1S2 (GOLD)		
			12	P [9	250	1DS11 (SILVER)			1S2 (SILVER)		
				CABLE		W181	✉				
			12	TW [0	251	1J3 (GOLD)			1S3 (GOLD)		
			12	P [9	252	1J3 (SILVER)			1S3 (SILVER)		
				CABLE		W182	⌀				
			12	5	253	1J1 GND			1S2,1S3 GND		
				CABLE		W183	⊙				
			12	5	254	1J2 GND			1S2,1S3 GND		



MARKER BAND MUST BE POSITIONED ON WIRE SO THAT MARKING APPEARS ON TOP WITH RELATION TO LUG AS SHOWN HERE.

SKETCH

NOTES:

✱ NOS IN "NOTES" COLUMNS INDICATE MARKER BAND ITEMS ON LIM A1088728

● CABLES ARE PART OF SUB-ASSY C1088631 AND C1088632, AND ARE LISTED HERE FOR WIRING PURPOSE ONLY.

▲ THE SYMBOL ADJACENT TO THE MARKER BAND ITEM NOS. INDICATES THAT THE MARKER BAND SHALL BE INSTALLED OPPOSITE TO THE DIRECTION SHOWN ON THE DRAWING SO THAT THE MARKER BAND IS READ CORRECTLY AT INSTALLATION. FOR PROPER POSITION SEE SKETCH ABOVE.

■ CHARACTERS IN "VIA" COLUMN REFER TO WIRE DUCT STATION BREAKOUT POINTS IN CABLE DUCT ASSEMBLY H1088061

⌀, ⊙, ✉, ⊠ SEE NOTES ON SHEET 10

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM A108872 BG2

♦ COLOR CODE: 0 BLACK BK; 1 BROWN BN; 2 RED R; 3 ORANGE O; 4 YELLOW Y; 5 GREEN GN; 6 BLUE BL; 7 VIOLET V; 8 GRAY GY; 9 WHITE W

§ SH-SHIELD PGT-PIGTAIL

JJ

1096487-

TABLE 3JJ. TRANSMITTING GROUP INTERCONNECTING CABLES (Cont)

SYMBOL	W TYPE LM FIND NO.	I LENGTH IN.	N AWG	E ◆ COLOR §	REF. NO.	FROM LOCATION	FROM NOTES	VIA	TO LOCATION	TO NOTES	CIRCUIT FUNCTION
				CABLE		W184	⊠				
			12	5	255	1J3 GND			IS2/S3 GND		
				CABLE		W185	⌀				
			12	TW (0	256	1DS9(GOLD)			IS2 (GOLD)		
			12	P (9	257	1DS9(SILVER)			IS2 (SILVER)		
	(C1088617G53)			CABLE		W186	≠				
			10	0	258	IS2,IS? GND			1-GND STUD		
	(C2314330G015)			CABLE		W187					
			RG22B/U		259	1A4J15 (1P7)			1T1 (1P8)		
	(C1088609G21)			CABLE		W188		M			
	436		14	91	260	1A12TB4-1	223		1A53A3TB68-1	223	
	437		14	92	261	-2	224		-2	224	
	438		14	93	262	-3	225		-3	225	
	439		14	94	263	-4	226		-4	226	
	504		14	95	264	-5	523		-5	523	
	440		14	96	265	-6	228		-6	228	
	505		14	97	266	-7	506		-7	506	
	441		14	98	267	-8	229		-8	229	
	443		14	9	268	-9	230		-9	230	
	435		14	90	269	-10	231		-10	231	
	(C1088617G49)			CABLE		W189		M			
	435		14	90	270	1A12TB3-10	231		1A53A3TB69-1	223	
	(C1088617G50)			CABLE		W190					
	437		14	92	271	1A11TB8-2	224	E-D	1A53A3TB69-2	224	
	(C1088617G52)			CABLE		W191					
	443		14	9	272	1A53A7E1			1E12		

NOTES:-

⌀ CABLES ARE PART OF SUB-ASSEMBLY C1089092G1 AND ARE LISTED HERE FOR WIRING PURPOSES ONLY

⊙ CABLES ARE PART OF SUB-ASSEMBLY C1089096G1 AND ARE LISTED HERE FOR WIRING PURPOSES ONLY

⊠ CABLES ARE PART OF SUB-ASSEMBLY C1089229G1 AND ARE LISTED HERE FOR WIRING PURPOSES ONLY

~~≠ CABLE IS PART OF C1089096G1 AND IS LISTED HERE FOR WIRING PURPOSES ONLY~~

~~▽ CABLE IS PART OF SUB-ASSEMBLY C2314330G15 AND IS LISTED HERE FOR WIRING PURPOSES ONLY~~

JJ

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LMA1088728G2

◆ COLOR CODE | # MIL / ASA | 0 BLK BK | 1 BRN BN | 2 RED R | 3 ORN O | 4 YEL Y | 5 GRN G | 6 BLU BL | 7 VIO V | 8 GY GY | 9 WHT W | § MIL ASA SHLD SH | SHIELD

PGT—PIGTAIL

1096487H

TABLE 4MM. TRANSMITTING SET INTERCONNECTING CABLES

SYMBOL	WIRE TYPE LM FIND NO.	LENGTH IN.	AWG	♦ COLOR	REF. NO.	FROM LOCATION	NOTES	VIA	TO LOCATION	NOTES	CIRCUIT FUNCTION
						TRANSMITTER #1					
	(D1088758G1)					CABLE W301					
	59		14	91	1	4TB1-1	13		1A1TB10-33	1	
	60		14	92	2	-2	14		-40	2	
	61		14	93	3	-3	15		-47	3	
					4						
					5						
	(D1088738G1)					CABLE W302					
	51		16	91	6	4TB2-1	4		1A12TB5-1	4	
	52		16	92	7	-2	5		-2	5	
	53		16	93	8	-3	6		-3	6	
	54		16	94	9	-4	7		-4	7	
	55		16	95	10	-5	8		-5	8	
	56		16	96	11	-6	9		-6	9	
	57		16	97	12	-7	10		-7	10	
	58		16	98	13	-8	11		-8	11	
	50		16	9	14	-9	12		-9	12	
					15						
	(D1088738G2)					CABLE W303					
	51		16	91	16	4TB3-1	4		3TB1-1	4	
	52		16	92	17	-2	5		-2	5	
	53		16	93	18	-3	6		-3	6	
	54		16	94	19	-4	7		-4	7	
	55		16	95	20	-5	8		-5	8	
					21						
	(D1088738G3)					CABLE W304					
	51		16	91	22	4TB4-1	4		3TB2-1	4	▲
	52		16	92	23	-2	5		-2	5	▲
	53		16	93	24	-3	6		-3	6	▲
	54		16	94	25	-4	7		-4	7	▲
	55		16	95	26	-5	8		-5	8	▲
	56		16	96	27	-6	9		-6	9	▲
	57		16	97	28	-7	10		-7	10	▲
	58		16	98	29	-8	11		-8	11	▲
	50		16	9	30	-9	12		-9	12	▲
					31						
		▲, *, SEE NOTES ON SHEET					4				

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM A1088721G1

♦ COLOR CODE: 0 BLACK BK; 1 BROWN BN; 2 RED R; 3 ORANGE O; 4 YELLOW Y; 5 GREEN GN; 6 BLUE BL; 7 VIOLET V; 8 GRAY GY; 9 WHITE W

§ SH -SHIELD
PGT-PIGTAIL

1096501-

TABLE 4MM. TRANSMITTING SET INTERCONNECTING CABLES (Cont)

SYMBOL	WIRE § TYPE LM FIND NO.	WIRE LENGTH IN.	WIRE AWG	WIRE ♦ COLOR	REF. NO.	FROM LOCATION	FROM *NOTES	VIA	TO LOCATION	TO *NOTES	CIRCUIT FUNCTION
			TRANSMITTER #2								
	(D1088758G2)					CABLE W307					
	59		14	91	34	4TB5-1	13	▲	1A11TB10-33	1	
	60		14	92	35	-2	14	▲	-40	2	
	61		14	93	36	-3	15	▲	-47	3	
					37						
					38						
	(D1088738G4)					CABLE W308					
	51		16	91	39	4TB6-1	4	▲	1A12TB5-1	4	
	52		16	92	40	-2	5	▲	-2	5	
	53		16	93	41	-3	6	▲	-3	6	
	54		16	94	42	-4	7	▲	-4	7	
	55		16	95	43	-5	8	▲	-5	8	
	56		16	96	44	-6	9	▲	-6	9	
	57		16	97	45	-7	10	▲	-7	10	
	58		16	98	46	-8	11	▲	-8	11	
	50		16	9	47	-9	12	▲	-9	12	
					48						
	(D1088738G5)					CABLE W309					
	51		16	91	49	4TB7-1	4	▲	3TB3-1	4	
	52		16	92	50	-2	5	▲	-2	5	
	53		16	93	51	-3	6	▲	-3	6	
	54		16	94	52	-4	7	▲	-4	7	
	55		16	95	53	-5	8	▲	-5	8	
					54						
	(D1088738G6)					CABLE W310					
	51		16	91	55	4TB8-1	4	▲	3TB4-1	4	▲
	52		16	92	56	-2	5	▲	-2	5	▲
	53		16	93	57	-3	6	▲	-3	6	▲
	54		16	94	58	-4	7	▲	-4	7	▲
	55		16	95	59	-5	8	▲	-5	8	▲
	56		16	96	60	-6	9	▲	-6	9	▲
	57		16	97	61	-7	10	▲	-7	10	▲
	58		16	98	62	-8	11	▲	-8	11	▲
	50		16	9	63	-9	12	▲	-9	12	▲
					64						
	(C1088725G5)					CABLE W313					
			RG 22U	0	67	4J1			3J2		
	▲, *, SEE NOTES ON SHEET 4										

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM A1088721G1

♦ COLOR CODE: 0 BLACK BK; 1 BROWN BN; 2 RED R; 3 ORANGE O; 4 YELLOW Y; 5 GREEN GN; 6 BLUE BL; 7 VIOLET V; 8 GRAY GY; 9 WHITE W

§ SH -SHIELD PGT-PIGTAIL

1096501-

TABLE 4MM. TRANSMITTING SET INTERCONNECTING CABLES (Cont)

WIRE TYPE OR LM FIND NO.	WIRE LENGTH IN.	WIRE AWG	WIRE ◆ COLOR	REF. NO.	FROM LOCATION	FROM NOTES	VIA	TO LOCATION	TO NOTES	CIRCUIT FUNCTION
					TRANSMITTER #1					
(D10887386 13)					CABLE W348					
62		16	90	68	4TB2-10	83		1A12TB5-10	83	
(D10887386 14)					CABLE W349					
54		16	94	69	4TB1-4	7		1A4TB9-4	7	
55		16	95	70	4TB1-5	8		1A4TB9-5	8	
(D10887386 17)					CABLE W352					
62		16	90	71	4TB4-10	83		3TB2-10	83	
				72						
				73						
					TRANSMITTER #2					
(D10887386 15)					CABLE W350					
62		16	90	74	4TB6-10	83		1A12TB5-10	83	
(D10887386 16)					CABLE W351					
54		16	94	75	4TB5-4	7		1A4TB9-4	7	
55		16	95	76	4TB5-5	8		1A4TB9-5	8	
(D10887386 18)					CABLE W353					
62		16	90	77	4TB8-10	83		3TB4-10	83	

NOTES:

* NOS IN NOTES COLUMN INDICATE MARKER BAND ITEMS ON L/M A10887216 1.

▲ THE SYMBOL ADJACENT TO THE MARKER BAND NOS INDICATES THAT THE MARKER BAND SHALL BE INSTALLED OPPOSITE TO THE DIRECTION SHOWN ON THE DWG SO THAT THE MARKER BAND IS READ CORRECTLY AT INSTALLATION.

● THIS SYMBOL INDICATES ITEM NUMBERS ON BLM 1088723.

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM A10887216 1

◆ COLOR CODE: 0 BLACK BK; 1 BROWN BR; 2 RED R; 3 ORANGE O; 4 YELLOW Y; 5 GREEN GN; 6 BLUE BL; 7 VIOLET V; 8 GRAY GY; 9 WHITE W

$ SH -SHIELD PGT-PIGTAIL

1096501A

TABLE 4MM. TRANSMITTING SET INTERCONNECTING CABLES (Cont)

SYMBOL	W I R E TYPE LM FIND NO.	LENGTH IN.	AWG	◆ COLOR §	REF. NO.	FROM LOCATION	FROM NOTES	VIA	TO LOCATION	TO NOTE	CIRCUIT FUNCTION
				INPUT	POWER CABLES, TRANSMITTER NO. 1						
						CABLE W318					
	● 80		2/0	0	81	1A53A3TB1-1			208VAC NEUTRAL		
						CABLE W319					
	● 80		2/0	0	82	1A53A3TB1-2			208VAC PHASE A		
						CABLE W320					
	● 80		2/0	0	83	1A53A3TB1-3			208VAC PHASE B		
						CABLE W321					
	● 80		2/0	0	84	1A53A3TB1-4			208VAC PHASE C		
						CABLE W361					
	● 83		350MCM	0	85	1A53A3S1A-1			460VAC PHASE A		
						CABLE W362					
	● 83		350MCM	0	86	1A53A3S1A-2			460VAC PHASE B		
						CABLE W363					
	● 83		350MCM	0	87	1A53A3S1A-3			460VAC PHASE C		
						CABLE W364					
	● 83		350MCM	0	88	1A53A3S1A-1			460VAC PHASE A		
						CABLE W365					
	● 83		350MCM	0	89	1A53A3S1A-2			460VAC PHASE B		
						CABLE W366					
	● 83		350MCM	0	90	1A53A3S1A-3			460VAC PHASE C		
						CABLE W346					
	● 82		0	0	91	1S2, 1S3 (SILVER)			120VAC NEUTRAL		
						CABLE W347					
	● 82		6	0	92	1S2, 1S3 (GOLD)			120VAC		
	● SEE NOTES ON SHEET 4										

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM

◆ COLOR CODE | § MIL / ASA — 0 BLK BK, 1 BRN BN, 2 RED R, 3 ORN O, 4 YEL Y, 5 GRN G, 6 BLU BL, 7 VIC V, 8 GY GY, 9 WHT W

PGT—PIGTAIL § MIL / ASA SHLD — SHIELD

1096501A

TABLE 4MM. TRANSMITTING SET INTERCONNECTING CABLES (Cont)

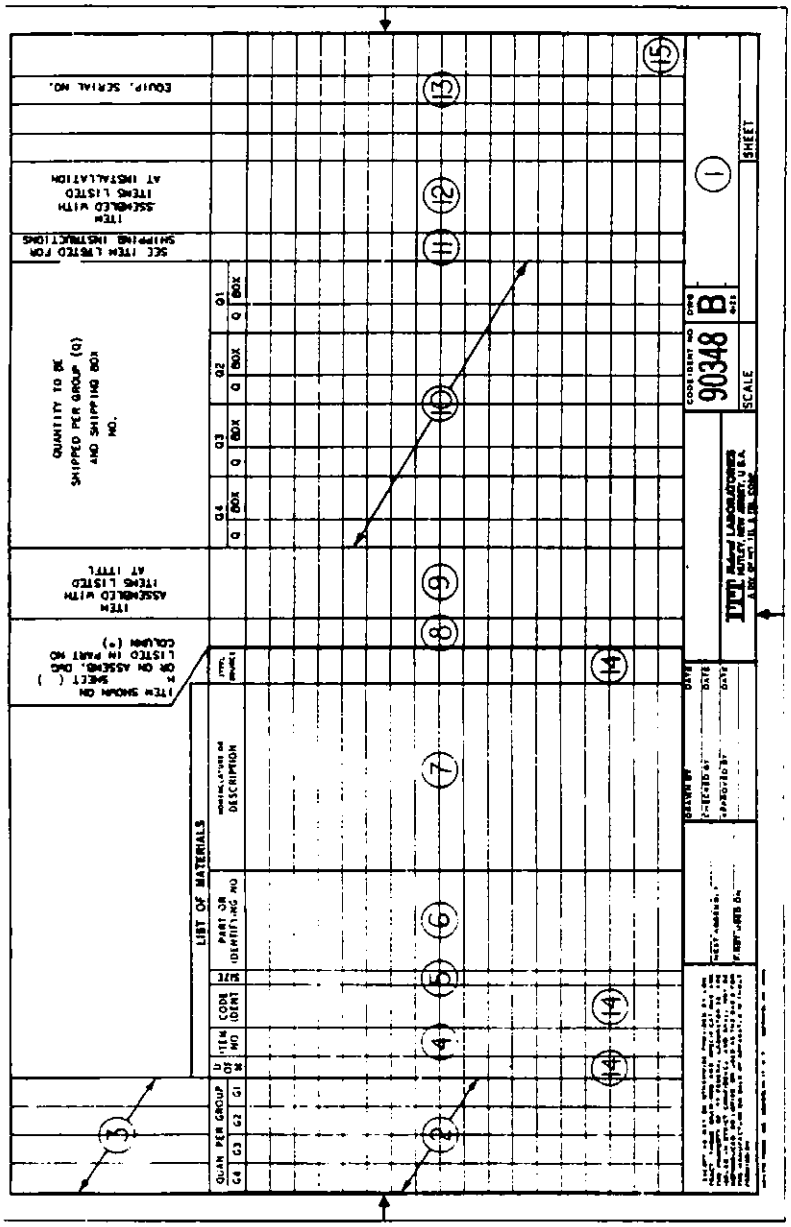
FIGURE	W TYPE LM FIND NO.	L LENGTH IN.	K AWG	E ◆ COLOR §	REF. NO.	FROM LOCATION	FROM NOTES	VIA	TO LOCATION	TO NOTES	CIRCUIT FUNCTION
				INPUT POWER CABLES, TRANSMITTER NO. 2							
						CABLE W325					
	● 79		2/0	0	101	1A53A3TB1-1			208VAC NEUTRAL		
						CABLE W326					
	● 79		2/0	0	102	1A53A3TB1-2			208VAC PHASE A		
						CABLE W327					
	● 79		2/0	0	103	1A53A3TB1-3			208VAC PHASE B		
						CABLE W328					
	● 79		2/0	0	104	1A53A3TB1-4			208VAC PHASE C		
						CABLE W371					
	● 83		350MCM	0	105	1A53A3S1A-1			460VAC PHASE A		
						CABLE W372					
	● 83		350MCM	0	106	1A53A3S1A-2			460VAC PHASE B		
						CABLE W373					
	● 83		350MCM	0	107	1A53A3S1A-3			460VAC PHASE C		
						CABLE W374					
	● 83		350MCM	0	108	1A53A3S1A-1			460VAC PHASE A		
						CABLE W375					
	● 83		350MCM	0	109	1A53A3S1A-2			460VAC PHASE B		
						CABLE W376					
	● 83		350MCM	0	110	1A53A3S1A-3			460VAC PHASE C		
						CABLE W354					
	● 82		6	0	111	1S2, 1S3 (SILVER)			120VAC NEUTRAL		
						CABLE W355					
	● 82		6	0	112	1S2, 1S3 (GOLD)			120VAC		
	● SEE NOTES ON SHEET 4										

FOR CUMULATIVE LIST & SPECIFICATIONS SEE LM

◆ COLOR CODE | § MIL / ASA = 0 BLK BK, 1 BRN BN, 2 RED R, 3 ORN O, 4 YEL Y, 5 GRN G, 6 BLU BL, 7 VIO V, 8 GY GY, 9 WHT W

PGT—PIGTAIL | § MIL / ASA SHLD = SHIELD

1096501A



1) THE LIST OF MATERIAL (LM) IDENTIFICATION NUMBER APPEARS IN THIS BLOCK.

2) ONE LM MAY BE USED FOR UP TO 4 SIMILAR EQUIPMENTS WHICH HAVE COMMON PARTS. EACH OF THESE EQUIPMENTS WILL BE ASSIGNED A GROUP NUMBER G1, G2, G3 OR G4. THE NUMBERS APPEARING IN THE COLUMNS BELOW EACH OF THE G NUMBERS IS THE QUANTITY OF THE PART GIVEN ON THE LM HORIZONTAL LINE USED IN THE EQUIPMENT REPRESENTED BY THAT GROUP. WHEN THIS LM IS REFERENCED THE NUMBER GIVEN MUST BE THE LM NUMBER APPEARING IN BLOCK (1) SUFFIXED BY G1, G2, G3 OR G4.

3) A BRIEF DESCRIPTION OF THE EQUIPMENT REPRESENTED BY EACH GROUP WILL APPEAR IN THIS AREA.

4) THE NUMBER APPEARING IN THIS COLUMN IS THE ITEM NUMBER OF THE HORIZONTALLY LISTED PART ON THIS LM. IF THERE IS AN ASSEMBLY DRAWING ASSOCIATED WITH THIS LM, (I.E. AN ASSEMBLY DRAWING HAVING THE SAME NUMBER AS THE LM) THIS ITEM AS SHOWN PICTORIALLY ON THE ASSEMBLY DRAWING WILL BE IDENTIFIED BY THE ITEM NUMBER IN A CIRCLE.

5 THE LETTER APPEARING IN THIS COLUMN INDICATES THE SIZE OF THE DRAWING LISTED IN THE "PART OR IDENTIFYING NO." COLUMN.

6 THE NUMBER IN THIS COLUMN PRECEDED BY THE LETTER APPEARING IN THE "SIZE" COLUMN IS THE DRAWING NUMBER OF THE HORIZONTALLY LISTED PART.

7 A BRIEF DESCRIPTION OF THE PART APPEARS IN THIS COLUMN.

8 THE NUMBER APPEARING IN THIS COLUMN INDICATES ON WHICH SHEET OF THE ASSEMBLY DRAWING THE PART IS SHOWN PICTORIALLY. AN ASTERISK APPEARING IN THIS COLUMN INDICATES THAT THE PART LISTED IS A MAJOR EQUIPMENT SUBASSEMBLY AND HAS ITS OWN LM AND ASSEMBLY DRAWING.

9) THE NUMBERS APPEARING IN THIS COLUMN INDICATE ITEM NUMBERS OF OTHER PARTS LISTED ON THIS LM WHICH ARE ASSEMBLED WITH THE HORIZONTALLY LISTED PART PRIOR TO SHIPMENT FROM ITT/FL.

10) THIS AREA OF THE LM GIVES THE SHIPPING INFORMATION FOR THE EQUIPMENT. A SEPARATE PAIR OF COLUMNS IS PROVIDED FOR EACH OF THE GROUPS (G1, G2, G3, AND G4). THESE GROUPS, OF COURSE, BEING THE SAME AS THE GROUPS APPEARING IN THE LEFT HAND COLUMN OF THE LM. THE NUMBER IN THE "Q" COLUMN UNDER EACH G NO. COLUMN INDICATES THE QUANTITY OF THE HORIZONTALLY LISTED PART IS TO BE SHIPPED. THE NUMBER IN THE "BOX" COLUMN INDICATES THE NUMBER OF THE BOX IN WHICH THE FULL QUANTITY OF THE HORIZONTALLY LISTED PART IS TO BE SHIPPED. THE QUANTITY OF A PARTICULAR PART AS GIVEN IN THE "QUAN PER GROUP" COLUMN MAY BE DIFFERENT FROM THE QUANTITY AS LISTED IN THE "QUANTITY TO BE SHIPPED" COLUMN BECAUSE SOME OF THE PARTS GIVEN WITH THE QUANTITY LISTED IN THE "QUAN PER GROUP" COLUMN MAY BE ASSEMBLED TOGETHER AT ITT/FL PRIOR TO SHIPMENT. WHERE SEVERAL ITEMS ARE ASSEMBLED TOGETHER AT ITT/FL PRIOR TO SHIPMENT, THE SHIPPING INFORMATION FOR THE SUBASSEMBLY WILL BE GIVEN IN THE SHIPPING COLUMNS FOR THE MAJOR ITEM OF THE SUBASSEMBLY.

11) THE NUMBER IN THIS COLUMN WILL REFER TO ANOTHER ITEM ON THIS LM. THE DRAWING NUMBER GIVEN IN THIS REFERENCED ITEM WILL INCLUDE SPECIAL SHIPPING AND FIELD PREPARATION FOR USE INFORMATION FOR THE HORIZONTALLY LISTED PART.

12 THE NUMBERS APPEARING IN THIS COLUMN INDICATE THE ITEM NUMBERS OF OTHER PARTS LISTED ON THIS LM WHICH ARE ASSEMBLED WITH THE HORIZONTALLY LISTED PART DURING ASSEMBLY OF THE EQUIPMENT IN THE FIELD.

13 THIS COLUMN FOR FIELD REFERENCE USE ONLY.

14. FOR ITT/FL MANUFACTURING USE ONLY.

15 FOR EASE OF REFERENCE A CODE LETTER MAY BE ASSIGNED TO THE LM. IF SUCH A LETTER IS ASSIGNED, IT WILL APPEAR IN THIS CORNER

Figure 1. List of Material Form

TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON H1087428 SHEET (1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
TRANSMITTER 2	TRANSMITTER 1	TRANSMITTER #1 SINGLE PULSE	TRANSMITTER #2 SINGLE PULSE					LIST OF MATERIALS																			
1	1	1	1	1	1		H	1087692G1	FLOOR ASSEMBLY	110	3			1	Y33,Y34	1	X33,X34	1	X33,X34	1	Y33,Y34						
1	1	1	1	1	2		H	1087435G1	ENCLOSURE (NUS5907)	110	1,2,4,5		31,32,34	1	Y15 Y35-Y38	1	X15 X35-X38	1	X15 X35-X38	1	Y15 Y35-Y38						
—	—	X	X	20	3		H	1088682	FLOOR PLAN (L.P.)	760																	
1	1	1	1	1	4		C	1088064G1	PLATE, WATER SUPPLY	120	3							1	X13	1	Y13		2,15,76				
1	1	1	1	1	5		D	1088501G1	ANTENNA TERM. ASSEMBLY	110	3							1	X13				2,77,204				
1	1	1	1	1	6		C	1088214	PLATE, BLANK	520	3			1	X13	1	X13	1	X13	1	Y13		2,74				
—	—	X	X	20	7		J	1087436	XMTR GROUP WIRING SCHEM	760																	
2	2	2	2	1	8		B	1088217	PLATE, MOUNTING	530	3			2	Y13	2	X13	2	X13	2	Y13		2,75				
1	1	1	1	1	9		C	1088133G1	CONNECTOR, TUBE	120	3			1	Y13	1	X13	1	X13	1	Y13		8,78				
1	1	1	1	1	10		B	1088119G1	GRD. PL. ASSEMBLY	110	3			1	Y13	1	X13	1	X13	1	Y13		2,15				
1	1	1	1	1	11		C	1088218	ADAPTER, CABLE DUCT	530	3			1	Y13	1	X13	1	X13	1	Y13		2,208,209				
1	1	1	1	1	12		H	1088283G1	HOUSING, FAN	120	1,2,4,5		13,14,15 200,201	1	Y1	1	X1	1	X1	1	Y1		2,19				
1	1	1	1	1	13		D	1087896G1	BLOWER	130	1,2,4,5		12,84,202 67														
6	6	6	6	1	14		B	1088232	SPACER	520	1,2,4,5		12,15														
1	1	1	1	1	15		H	1088330G1	FRAME, AIR FILTER	120	1,2,4,5		12,16,17,18 81										2,14				
5	5	5	5	1	16		C	1088231	FILTER, AIR	530	3		15														
1	1	1	1	1	17		F	1088389G1	COVER, AIR FILTER	120	3		15,73														X
1	1	1	1	1	18		C	1088394	RETAINER, AIR FILTER	520	3		15,72														

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO.1 SINGLE PULSE	TRANSMITTER NO.2 SINGLE PULSE	LIST OF MATERIALS							ITEM SHOWN ON H-[illegible] SHEET (1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1								
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX							
-	-	-	1	1	19		D	10883516 1	LOUVER	110	1,2 485	272,273	1	Y1	1	Y1	1	X1	1	Y1		[illegible]				
1	1	1	1	1	20		H	1087435G2	ENCLOSURE	110	*		1	[illegible]	1	[illegible]						1					
-	1	-	-	1	21		E	1096267G1	COOLING SYSTEM		485	47,63	1	X3	1	X2										
-	1	-	-	1	22		H	1087463G3	EXCITER	110	485		1	Y13-Y18 [illegible]	1	X29,X30 X31					191	2,39,71,78				
-	-	-	-	1	23		A	1087438G1	COOL.SYS.MOD. (NUS5908)	110	1	47							1	Y2						
-	-	-	-	1	24		A	1087438G2	COOL.SYS.MOD. (NUS5908)	110	2	47					1	X2								
-	-	-	-	1	25		H	1087441G1	TUBE RACK, P.A. (NUS5909)	110	185	43	1	Y3-Y8 Y25-Y28					1	Y3-Y8 Y25-Y28	279					
-	4	4	-	1	26		H	1087447G1	RES. RACK ASS'Y (NUS5922)	110	284	48,50,51,52			4	X9	4	X9				2,79				
-	-	-	-	1	27		H	1087450G1	P.A. TANK (NUS5912)	110	1,2 485		1	Y10	1	X10	1	X10	1	Y10						
2	2	2	2	1	28		C	1096262	INSULATOR ASSY		1,2 485		2	Y13	2	X13	2	X13	2	Y13						
-	-	-	-	1	29		H	1088482G1	P.S., INST., S.P. TRANSM #2	110	*								1	[illegible]						
-	-	-	-	1	30		H	1088482G2	P.S., INST., S.P. TRANSM #1	110	*						1	[illegible]								
-	-	-	-	1	31		B	1088821G1	PLATE IDENTIFICATION	[illegible]	3				1	X13	1	X13				[illegible]				
-	-	-	-	1	32		B	1088823G1	PLATE, IDENTIFICATION	[illegible]	3		1	Y13					1	Y13		[illegible] 210				
-	-	-	-	1	33		H	1087453G1	EXCITER, S.P. (NUS5913)	110	1,2,3						1	[illegible]	1	[illegible]	191	2,35,73,78				
1	1	1	1	1	34		E	1095825G1	PLATE, IDENTIFICATION	[illegible]	3		1	Y13	1	X13	1	X13	1	Y13		[illegible] 210				
2	2	2	2	1	35		D	1087647G1	HOUSING, AIR EXHAUST	120	1,2,3 485		2	Y11	2	X11	2	X11	2	Y11		33				X
-		1	1	1	36		C	1088631G1	METER LIGHT ASSEMBLY (5)	110	3		1	Y13	1	X13	1	X13	1	Y13		2,10,12				

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO 2	TRANSMITTER NO 1	TRANSMITTER NO 1 SINGLE PULSE	TRANSMITTER NO 2 SINGLE PULSE	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON H-03743 SHEET (1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP					LIST OF MATERIALS								QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.													
G4	G3	G2	G1																							
1	1		1	1	37		C	1088632G1	METER LIGHT ASSEMBLY	110	1,2 4,5		1	Y 3	1	X 3	1	X13		Y 3		3 33 36				
—	—	1	—	1	38		F	1088013G1	IND. PNL ASS'Y (NUS6181)	110	1,2						1	X13	1	Y13		2, 31				
1	1	1	1	1	39		H	1088019G1	RELAY RACK (NUS6179)	110	1,2 4,5	40	1	Y 4	1	X 4	1	X14	1	Y14						
1	1	1	1	1	40		B	1088658	SPACER	520	1,2 4,5	39, 79														
1	1	1	1	1	41		H	1088061G1	CABLE DUCTS	110	4,5		1	Y12	1	X 12	1	X12	1	Y12		2				
1	1	1	1	1	42		H	1088449G1	PARTITION	110	1,2 4,5		1	Y15	1	X15	1	X15	1	Y15		2 33 232,55, 56,58, 80				
—	—	1	1	1	43		F B	1088892G1 ASSEMBLY ~~1087555~~	INTERLOCK ~~GROUP~~	110	1,2,3						1	X13	1	Y 3		2.33, 83, 85				
		1	1	1	~~44~~		D	~~1088162G1~~	~~PANEL, SPARE FUSE & TOOL~~	~~110~~	1,2						1	X12	1	Y12		2				
2	2	2	2	1	45		C	1087644G1	GROUNDING ROD	110	1,2 4,5		2	Y 3	2	X 3	2	X13	2	Y13		2				
—	—	1	—	1	46		H	1088995G1	LIGHT FIXTURES, TRANSM.	110	*						1	X13				2				
1	1	1	1	1	47		B	1088827G1	PLATE, IDENTIFICATION	110	4,5	21,210														
2	2	2	2	1	48		B	1088833G1	PLATE, IDENTIFICATION		4,5	210														
1	1	1	1	1	49		B	1088837G1	PLATE, IDENTIFICATION		4,5	211														
1	1	1	1	1	50		B	1088838G1	PLATE IDENTIFICATION		4,5	211														
1	1	1	1	1	51		B	1088834G1	PLATE IDENTIFICATION		4,5	211														
1	1	1	1	1	52		B	1088843G1	PLATE, IDENTIFICATION	110	4,5	211														
1	1	1	1	1	53		B	1088951	INSULATOR	110	1,2 4,5		1	X 13		X 13	1	X13	1	Y13		25, 199				X
—	1	—	—	1	54		H	1088995G2	LIGHT FIXTURES, TRANSM	110	4				1	X13						2				

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

Quan. per Group G4 (Transmitter No. 2)	G3 (Transmitter No. 1)	G2 (Transmitter No. 1 Single Pulse)	G1 (Transmitter No. 2 Single Pulse)	U of M	Item No	Code Ident	Size	Part or Identifying No	Nomenclature or Description	Item Source	Item shown on 1-087428 sheet (1,2,3,4,5) or on assembl. dwg listed in part no column (*)	Item assembled with items listed at ITTFL	G4 Q	G4 Box	G3 Q	G3 Box	G2 Q	G2 Box	G1 Q	G1 Box	See item listed for shipping instructions	Item assembled with items listed at installation	Equip. Serial No.	
—	—	4	4	1	55		C	1088529	**BRACKET, PARTITION MTG.**	120	1,2						4	X13	4	Y13		12,55		
—	—	4	4	1	56		B	1088530	**NUT "UNISTRUT," 1/4-20**	530	1,2						4	X13	4	Y13		4,55		
1	1	1	1	1	57		C	1089113G1	PLATE IDENTIFICATION	[illegible]	3	37,69												
4	4	4	4	1	58		D	108784164	**CLAMP**	120	1,2 4,5		4	Y13	4	X13	4	X13	4	Y13		42		
—	—	—	1	1	59		H	1088732G1	**HOSES, FITTINGS & TUBING**	110	*								1	Y22				
—	—	1	—	1	60		H	1088732G2	**HOSES, FITTINGS & TUBING**	110	*						1	X22						
—	—	—	—	20	61		H	1089157	DC DISTR. CP SIMPLIFIED SCHEM	[illegible]														
—	—			20	62		F	1089160	SCHEM DIAGRAM, COOLING SYSTEM	760														
1	1	1	1	1	63		B	1088543G1	PLATE IDENTIFICATION	[illegible]	4,5	21												
					64																			
4	—	—	4	1	65		H	[illegible]	[illegible]	110	1,5	4,50,51,52	4	Y13					4	Y7		[illegible]		
—			1		66		H	[illegible]	LIGHT FIXTURES, TRANSM.	[illegible]	*								1	Y13				
1	1	1		1	67		C	1089155G1	INTERCONNECTING DIAGRAM	110	1	15												
1	—	—	—	1	68		H	1088995G4	LIGHT FIXTURES, TRANSM	110	5		1	Y13								[illegible]		
4	4	4	4	1	69			MS24622-16	SCW. TAPPING, TYPE B #8-20 x [illegible]	[illegible]	3	57,57												
8	8	8	8	1	70		B	108767162	**SCW.PTD. HD. #10-32 X 1/2**	[illegible]	3		8	X22	8	X22	8	X22	8	Y22		[illegible]		
19	19	19	19	1	71		B	108767164	**SCW.PTD. HD. #10-32 X 5/8**	[illegible]	3		19	Y22	19	X22	19	X22	19	Y22		[illegible]		
12	12	12	12	1	72		B	108767G16	**SCW.PTD. HD. #1/4-20 X 1/2**	[illegible]	3		12	Y22	12	X22	12	X22	12	Y22		[illegible]		X

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO1 SINGLE PULSE	TRANSMITTER NO.2 SINGLE PULSE	LIST OF MATERIALS							ITEM SHOWN ON H.O.S. 1428 SHEET (1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE				G4		G3		G2		G1							
G4	G3	G2	G1											Q	BOX	Q	BOX	Q	BOX	Q	BOX						
5	5	5	5	1	73		B	1087671G20	SCW. PTD. HD. 1/4-20 X 5/8	532/120	3			5	Y22	5	X22	5	X22	5	Y22						
8	8	8	8	1	74		B	1087671G21	SCW. PTD. HD. 1/4-20 X 5/8	532/120	3			8	↑	8	↑	8	X22	8	Y22		6.30				
17	17	17	17	1	75		B	108767168	SCW. PTD. HD. 1/4-20 X 7/8	532/120	3			17		17		17	X22	17	Y22		4.8.10				
3	3	3	3	1	76		B	1087671G22	SCW. PTD. HD. 1/4-20X11/4	532/120	3			3		3		3	X22	3	Y22		4				
5	5	5	5	1	77		B	1087671G23	SCW. PTD. HD.7/16-14X1.00	532/120	3			5		5		5	X22	5	Y22		5				
11	11	11	11	1	78			100348A120	SCW. FIL. HD. #10-32 X 5/8	530	1,2 3,4,5			11		11		11	X22	11	Y22		9,33,183				
50	50	50	50	1	79			100309A124	SCW. FIL. HD. 1/4-20 X 3/4	530	1,2 4,5	40		50	↓	50	↓	50	X22	50	Y22		26.33				
11	11	17	17	1	80			136009A124	SCW. HEX HD. 1/4-20 X 3/4	530	1,2 4,5	272		11	Y22	11	X22	17	X22	17	Y22		19.42				
6	6	6	6	1	81			139190	SCW. HEX HD. 3/8-16 X 5/8	530	1,2 4,5	15															
8	8	8	8	1	82			136011A124	SCW. HEX HD. 3/8-16 X 3/4	530	1,2 4,5			5	Y22	8	X22	8	X22	8	Y22		19				
12	12	12	12	1	83		B	1088704G1	SCW. FIL HD. 3/8-16 X13/4	530	3			12	Y22	12	X22	12	X22	12	Y22		43,227,228				
4	4	4	4	1	84			136011A132	SCW. HEX HD. 3/8-16 X 1.00 ~~1.00~~	530	1,2 4,5	13															
12	12	12	12	1	85		B	1088703G1	SCW. 100° F.H.1/2-13 x 3/4	530	3			12	Y13	12	X13	12	X13	12	Y13		43,227,228				
1	1	-	-	1	86		F	10330136G3	INDICATOR PANEL	110	3			.	Y13	1	X13						71.20				
45	45	43	43	1	87			107224	WASHER, LOCK, SPLIT #10	530	1,2,3 4,5	273		45	Y22	45	X22	43	X22	43	Y22		70,71,78,206				
100	100	101	101	1	88			107268	WASHER, LOCK, SPLIT 1/4	530	1,2,3 4,5	272		100	↑	100	↑	101	X22	101	Y22		37,72,74,75, 78,79,80				
30	30	30	30	1	89			107312	WASHER, LOCK, SPLIT 3/8	530	1,2,3 4,5	81		30	↓	30	↓	30	X22	30	Y22		82,83,84				X
5	5	5	5	1	90			107334	WASHER, LOCK, SPLIT 7/16	530	3			5	Y22	5	X22	5	X22	5	Y22		77				

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO.1 SINGLE PULSE	TRANSMITTER NO.2 SINGLE PULSE	U OF M	ITEM NO.	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON HOOKUP SHEET (1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION	EQUIP. SERIAL NO.
1	1	1	-	1	91		B	1293222361	LOW PASS FILTER	110	4,5	234,210			1	X39						2	
23	23	21	21	1	92			200609H014	WASHER, FLAT #10	520	1,2,3 4,5	208	23	Y22	23	X22	21	X22	21	Y22		70.11.13	
13	13	15	15	1	93			200609H018	WASHER, FLAT 1/4	520	3		13	↑	13	↑	13	X22	15	Y22		72 75.80	
16	16	12	12	1	94			200609H026	WASHER, FLAT 3/8	520	1,2,3 4,5		16		16		12	X22	12	Y22		73.84	
26	26	24	24	1	95			107686	NUT, HEX #10-32	530	1,2,3 4,5	273	26	-	26		24	X22	24	Y22		71.78,206	
89	89	89	39	1	96			107752	NUT, HEX 1/4-20	530	1,2,3 4,5		89		89		89	X22	89	Y22		31 72,74,75, 76,79,85	
5	5	5	5	1	97			107840	NUT, HEX 3/8-16	530	1,2 4,5		5	↓	5	↓	5	X22	5	Y22		73.84	
5	5	5	5	1	98			MS51971-4	NUT, HEX 7/16-14	130	3		5	Y22	5	X22	5	X22	5	Y22		77	
-	-	-	-		99		A	1043728G2	CABLING MATERIAL	110	4,5												
				20	100		D	1088609G1	CABLING DIAGRAM (W101)	760			1	Y32	1	X32	1	X32	1	Y32			
				20	101		D	1088609G2	CABLING DIAGRAM (W102)	↑			1	Y32	1	X32	1	X32	1	Y32			
1	1			20	102		D	1088609G3	CABLING DIAGRAM (W103)								1	X32	1	Y32			
				20	103		D	1088609G4	CABLING DIAGRAM (W104)				1	Y32	1	X32	1	X32	1	Y32			
				20	104		D	1088609G5	CABLING DIAGRAM (W105)				1	Y32	1	X32	1	X32	1	Y32			
				20	105		D	1088609G6	CABLING DIAGRAM (W106)				1	Y32	1	X32	1	X32	1	Y32			
	1	1		20	106		J	1088611G1	CABLING DIAGRAM (W107)				1	Y32					1	Y32			
1	1			20	107		D	1088614G1	CABLING DIAGRAM (W108)	↓							1	X32	1	Y32			
				20	108		D	1088614G2	CABLING DIAGRAM (W109)	760				Y32	1	X32	1	X32	1	Y32			X

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO 1 SINGLE PULSE	TRANSMITTER NO 2 SINGLE PULSE	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON HI053-23 SHEET (1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.							SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
													G4		G3		G2		G1						
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX					
X	X		X	~~20~~	~~109~~		~~C~~	~~1088609G14~~	~~CABLING DIAGRAM (W110)~~	~~760~~																
—	—		X	20	110		D	1088614G4	CABLING DIAGRAM (W111)	760							1	X32	1	Y32					
X	X		X	20	111		D	1088614G5	CABLING DIAGRAM (W112)	↓			1	Y32	1	X32	1	X32	1	Y32					
—	—		X	20	112		D	1088614G6	CABLING DIAGRAM (W113)								1	X32	1	Y32					
—	—		X	20	113		F	1088616G1	CABLING DIAGRAM (W114)								1	X32	1	Y32					
—	—		X	20	114		D	1088609G12	CABLING DIAGRAM (W115)								1	X32	1	Y32					
—	—		X	20	115		F	1088616G3	CABLING DIAGRAM (W116)								1	X32	1	Y32					
X	X		X	20	116		D	1088609G7	CABLING DIAGRAM (W117)				1	Y32	1	X32	1	X32	1	Y32					
—	—		X	20	117		D	1088609G8	CABLING DIAGRAM (W118)								1	X32	1	Y32					
—	—		X	20	118		C	1088617G1	CABLING DIAGRAM (W119)								1	X32	1	Y32					
—	—		X	20	119		C	1088617G2	CABLING DIAGRAM (W120)								1	X32	1	Y32					
—	X	X	—	20	120		J	1088705G1	CABLING DIAGRAM (W107)						1	X32	1	X32								
—	—		X	20	121		D	1088614G7	CABLING DIAGRAM (W122)								1	X32	1	Y32					
X	X		X	20	122		D	1088614G8	CABLING DIAGRAM (W123)				1	Y32	1	X32	1	X32	1	Y32					
—	—		X	20	123		C	1088617G3	CABLING DIAGRAM (W124)								1	X32	1	Y32					
—	—		X	20	124		D	1088609G9	CABLING DIAGRAM (W125)								1	X32	1	Y32					
—	—		X	20	125		C	1088617G4	CABLING DIAGRAM (W126)	↑							1	X32	1	Y32					
—	—		X	20	126		F	1088616G4	CABLING DIAGRAM (W127)	760							1	X32	1	Y32					X

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO.1 SINGLE PULSE	TRANSMITTER NO.2 SINGLE PULSE	U OF M	ITEM NO.	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON H-1087425 SHEET(1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP													QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.													
G4	G3	G2	G1						LIST OF MATERIALS																	
-	-		X	20	127		C	1088617G5	CABLING DIAGRAM (W128)	760							1	X32	1	Y32						
1	-			20	128		F	1088616G5	CABLING DIAGRAM (W129)	"							1	X32	1	Y32						
X	-			20	129		C	1088617G6	CABLING DIAGRAM (W130)				1	Y32	1	X32	1	X32	1	Y32						
-	-			20	130		C	1088617G7	CABLING DIAGRAM (W131)								1	X32	1	Y32						
-	-			20	131		D	1088812G1	CABLING DIAGRAM (W132)				1	Y32					1	Y32						
-	-			20	132		D	1088812G2	CABLING DIAGRAM (W133)				1	Y32					1	Y32						
1	-			20	133		C	1088617G8	CABLING DIAGRAM (W134)								1	X32	1	Y32						
-	-			20	134		D	1088609G10	CABLING DIAGRAM (W135)								1	X32	1	Y32						
1	-			20	135		C	1088617G9	CABLING DIAGRAM (W136)								1	X32	1	Y32						
1	-			20	136		D	1088614G9	CABLING DIAGRAM (W137)								1	X32	1	Y32						
1	-			20	137		D	1088614G10	CABLING DIAGRAM (W138)								1	X32	1	Y32						
1	-			20	138		C	1088617G10	CABLING DIAGRAM (W139)								1	X32	1	Y32						
1	-			20	139		C	1088609G13	CABLING DIAGRAM (W140)								1	X32	1	Y32						
1	-			20	140		C	1088617G11	CABLING DIAGRAM (W141)								1	X32	1	Y32						
X	-			20	141		C	~~1088609G11~~ 1088617G41	CABLING DIAGRAM (W142)				1	Y32	1	X32	1	X32	1	Y32						
-	-			20	142		C	1088617G12	CABLING DIAGRAM (W143)	"							1	X32	1	Y32						
-	-			20	143		C	1088617G13	CABLING DIAGRAM (W144)	760							1	X32	1	Y32						X
				20	144		C	1088617G14	CABLING DIAGRAM (W145)	760																

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO.1 SINGLE PULSE	TRANSMITTER NO.2 SINGLE PULSE	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON HIGHER SHEET(1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
								LIST OF MATERIALS				G4		G3		G2		G1							
QUAN. PER GROUP												Q	BOX	Q	BOX	Q	BOX	Q	BOX						
G4	G3	G2	G1																						
				EA	~~145~~		C	~~1088617G15~~	~~CABLING DIAGRAM (W146)~~	~~760~~															
				EA	~~146~~		C	~~1088617G16~~	~~CABLING DIAGRAM (W147)~~	~~760~~															
1	1			EA	147		C	1088617G17	CABLING DIAGRAM (W148)	760						1	X32	1	Y32						
1	1			EA	148		C	1088617G18	CABLING DIAGRAM (W149)	"						1	X32	1	Y32						
1	1			EA	149		C	1088617G19	CABLING DIAGRAM (W150)	"						1	X32	1	Y32						
1	1			EA	150		C	1088617G20	CABLING DIAGRAM (W151)	"						1	X32	1	Y32						
1	1			EA	151		C	1088617G21	CABLING DIAGRAM (W152)	"						1	X32	1	Y32						
1	1			EA	152		C	1088617G22	CABLING DIAGRAM (W153)	"						1	X32	1	Y32						
1	1			EA	153		C	1088617G23	CABLING DIAGRAM (W154)	"						1	X32	1	Y32						
1	1			EA	154		C	1088617G24	CABLING DIAGRAM (W155)	"						1	X32	1	Y32						
1	1			EA	155		D	1088623G1	CABLING DIAGRAM (W156)	"						1	X32	1	Y32						
1	1			EA	156		C	1088617G25	CABLING DIAGRAM (W157)	"						1	X32	1	Y32						
1	1			EA	157		C	1088617G26	CABLING DIAGRAM (W158)	760						1	X32	1	Y32						
1	1	1	1	1	158		C	2311725G8	CABLE ASSEMBLY (W159)	110						1	X32	1	Y32						
1	1	1	1	1	159		C	2311725G9	CABLE ASSEMBLY (W160)	110		1	Y32	1	X32	1	X32	1	Y32						
1	1	1	1	1	160		C	2311725G10	CABLE ASSEMBLY (W161)	110		1	Y32	1	X32	1	X32	1	Y32						
1	1			EA	161		C	1088617G27	CABLING DIAGRAM (W163)	760						1	X32	1	Y32						X
1	1			EA	162		C	1088617G28	CABLING DIAGRAM (W164)	760						1	X32	1	Y32						

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO.1 SINGLE PULSE	TRANSMITTER NO. 2 SINGLE PULSE	QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON H105-443 SHEET(1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITTFL SOURCE	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
LIST OF MATERIALS																												
				1	1			EA	163		C	1088617G29	CABLING DIAGRAM (W165)								1	X32	1	Y32					
				1	1			EA	164		C	1088617G30	CABLING DIAGRAM (W166)								1	X32	1	Y32					
				1	1			EA	165		C	1088617G31	CABLING DIAGRAM (W167)								1	X32	1	Y32					
				1	1			EA	166		C	1088617G32	CABLING DIAGRAM (W168)								1	X32	1	Y32					
				1	1			EA	167		C	1088617G33	CABLING DIAGRAM (W169)				1	X32	1	X32	1	X32	1	Y32					
				1	1			EA	168		C	1088617G34	CABLING DIAGRAM (W170)				1	X32	1	X32	1	X32	1	Y32					
				1	1			EA	169		C	1088617G35	CABLING DIAGRAM (W171)				1	X32	1	X32	1	X32	1	Y32					
				1	1			EA	170		C	1088617G36	CABLING DIAGRAM (W172)								1	X32	1	Y32					
				1	1			EA	171		C	1088617G37	CABLING DIAGRAM (W173)								1	X32	1	Y32					
				1	1			EA	172		C	1088617G38	CABLING DIAGRAM (W174)								1	X32	1	Y32					
				1	1			EA	173		C	1088617G40	CABLING DIAGRAM (W175)								1	X32	1	Y32					
				1	1			EA	174		D	1088812G3	CABLING DIAGRAM (W132)								1	X32							
				1	1			EA	175		D	1088812G4	CABLING DIAGRAM (W133)								1	X32							
				1	1			EA	176		D	1088609G15	CABLING DIAGRAM (W176)								1	X32	1	Y32					
				1	1			EA	177		B	[illegible]	[illegible]			4			1	X32									
				1	1			EA	178		B	[illegible]	[illegible]			5	1	Y32											
				1	1			EA	179		B	[illegible]	[illegible]			4				X32									
				1	1			EA	180		B	[illegible]	[illegible]			5	1	Y32											X

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO.1 SINGLE PULSE	TRANSMITTER NO.2 SINGLE PULSE	Ø NOTE:- DIFFERENT WIRING WAS SUPPLIED FOR CONTRACT NO. Teq-41848, SEE SUPPLEMENT WIRE LIST A1092027 (ITEM 195 OF THIS LIST)

QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON H1087428 SHEET(1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.							SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
G4	G3	G2	G1						LIST OF MATERIALS				G4		G3		G2		G1						
													Q	BOX	Q	BOX	Q	BOX	Q	BOX					
-	-	-	1	1	181		H	1088066G1	CONNECTORS	110	*								1	Y22					
1	1	1	1	1	182		H	1088066G2	CONNECTORS	110	*						1	X22							
2	2	2	2	1	183		C	1087644G4	GROUNDING ROD	110	3		2	Y13	2	X13	2	X13	2	Y13		194			
8	8	8	8	1	184		B	1089184G1	WASHER	530	3		8	Y13	8	X 3	8	X13	8	Y13		186			
-	-	X	X	20	185		A	1088577G1 Ø	INTERCONNECTING CABLE	760															
4	4	4	4	1	186			100348A124	SCREW, MACH (FIL HD 10-32 x 3/4)	530	3		4	Y13	4	X13	4	X13	4	Y13		42,87,184, 193,194			
1	1	1	1	1	187		A	1088728G1	CABLING MATERIAL	110															
1	1	1	1	1	188		C	1087599G1	SWITCH, AIRFLOW (S1)	430	2,4,5	19,206													
1	1	X	X	20	189		A	1088989	SHIPPING-REASSEMBLY INSTR.	110															
					~~190~~				TUBE RACK R.A.	1															
X	X	X	X	20	191		A	1088993	SHIPPING-REASSEMBLY INSTR.	110															
					~~192~~				EXCITER	1															
4	4	4	4	1	193			150482A051	NUT, CAP	530	3		4	Y 3	4	X 3	4	X13	4	Y13		186			
4	4	4	4	1	194			746104	CLIP, E-EC	530	3		4	Y 3	4	X 3	4	X13	4	Y13		186			
-	-	X	X	20	195		A	1C92027	SUPPLEMENT WIRE LIST	760															
2	2	-	-	1	196		B	1096510	SPACER		3	227,228													
4	4	-	-	1	197			MS35307-368	SCREW, CAP, HEX HD 3/8-16 x 2.50		3	227,228													X
4	4			1	198			MS16228-6C	NUT, LOCK 3/8-16		3	227,228													

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TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO.1 SINGLE PULSE	TRANSMITTER NO.2 SINGLE PULSE	LIST OF MATERIALS							ITEM SHOWN ON H1087428 SHEET (1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT 1TTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	1TTFL SOURCE			G4		G3		G2		G1							
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX						
—	1	1	—	1	199		H	10874463	TUBE RACK (NUS5911)	110	2,4	-8			1	X3-X8 X25-X28	1	X3-X8 X25-X28			279					
1	1	1	1	1	200		C	1088018G1	TERM. BD. (TYPE 17TB)	530	1,2,3,4,5	12, 203														
1	1	1	1	1	201			330103H416	GROMMET (MS5489-43)	530	1,2,3,4,5	12														
1	1	1	1	1	202			330103H216	GROMMET (MS35489-14)	530	1,2,3,4,5	13														
2	2	2	2	1	203			100348A132	SCW. FIL.HD. #10-32 X 1.00	530	1,2,3,4,5	200														
1	1	1	1	1	204		D	1088645	ADAPTOR	530	3		1	Y13	1	X13	1	X13	1	Y13		5, 2, 77				
1	1	1	1	1	205		C	1088145G2	PANEL, BLANK	530	3		1	Y13	1	X13	1	X13	1	Y13		71, 2				
4	4	2	2	1	206			100348A116	SCW FIL HD #10-32 X 1 2	530	1,2,3,4,5	273	2	Y22	2	X22	2	X22	2	X22		183				
5	5	5	5	1	207		B	1088468G1	WASHER FLAT 7/16	130	3		5	Y22	5	X22	5	X22	5	Y22		77				
1	1	1	1	1	208		B	1088962	INSULATOR	530	3		1	Y22	1	X22	1	X22	1	Y22		11, 209				
15	15	15	15	1	209			102348A024	SCW NYLON, #10-32 X 3/4		3		15	Y22	15	X22	15	X22	15	Y22		11, 208				
30	30	30	30	1	210			100603A108	SCW, PAN HD #4-40 X 1/4		1,2,3,4,5	47, 48, 63, 234	14	Y13	14	X13	22	X13	22	Y13		31, 32, 34, 214, 215				
16	16	16	16	1	211			100603A104	SCW, PAN HD #4-40 X 1/8		1,2,3,4,5	49 50, 51, 52														
30	30	30	30	1	212			171304A048	NUT, NYLON #10-32	V	3		30	Y22	30	X22	30	X22	30	Y22		209				
15	15	15	15	1	213			200631A112	WASHER, FLAT, NYLON #10	530	3		15	Y22	15	X22	15	X22	15	Y22		209				
1	1	1	1	1	214		B	1088539G1	PLATE, IDENTIFICATION	130	3		1	Y13	1	X13	1	X13	1	Y13		2, 210				
1	1	1	1	1	215		B	1088542G1	PLATE, IDENTIFICATION	130	3		1	Y13	1	X13	1	X13	1	Y13		2, 210				
1	1	1	1	1	216		B	1088544G1	PLATE, IDENTIFICATION	130	3		1	Y13	1	X13	1	X13	1	Y13		2				X

BLM1087428BH

TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO.2	TRANSMITTER NO.1	TRANSMITTER NO.1 SINGLE PULSE	TRANSMITTER NO.2 SINGLE PULSE	LIST OF MATERIALS							ITEM SHOWN ON H1087428 SHEET(1,2,3,4,5) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX						
–	–	–	1	1	217		D	1088501G2	ANTENNA TERM. ASSEMBLY	110	3								1	Y13		2.77.204				
–	–	1	1	1	218		C	2314330G13	CABLE ASSEMBLY (W187)	110	3						1	X32	1	Y32						
–	–	1	1	1	219		F	1096241G001	CAPACITOR ASSY	110	1,2						1		1						
–	–	1	1	1	220		C	1096249G001	BRACKET CLAMP ASSY	110	1,2						1		1						
–	–	1	1	1	221		D	1096272G001	COIL ASSY	110	1,2,3						1		1						
1	1	1	1	1	222		B	1092539G001	PLATE, BLANK	120	3		1	Y13	1	X13	1	X13	1	Y13		2,75				
–	1	–	–	1	223		D	1088501G5	ANTENNA TERM ASSY	110	3				1	X13						2,77,204				
1	–	–	–	1	224		D	1088501G6	ANTENNA TERM ASSY	110	3		1	Y13								2,77,204				
–	1	–	–	1	225		B	1096281G001	POWER SUPPLY SET NO1	110	4				1	X16-X21 X23, X24										
1	–	–	–	1	226		B	1096281G002	POWER SUPPLY SET NO2	110	5		1	Y16-Y21 Y23, Y24												
–	1	–	–	1	227		F	1088692G2	INTERLOCK ASSY L.P.	110	3	196,197,198			1	X13						2,22,32,35				
1	–	–	–	1	228		F	1088692G3	INTERLOCK ASSY L.P	110	3	196,197,198	1	Y13								2,22,32,85				
1	1	–	–	1	229		D	1039162G3	PANEL, SPARE FUSE & TOOL	110	4,5		1	Y12	1	X12						2				
X	X	–	–	20	230		H	1096444G1	FLOOR PLAN (L P)	110																
1	1	–	–	1	231		C	1096446G1	PLATE, WATER SUPPLY	110	3		1	Y13	1	X13						2,75,76				
5	5	–	–	1	232		–	MS35307-308	SCREW, CAP, HEX HD 1/4-20X1.00	5J0	3,4,5	21,88,96	4	Y22	4	X22						42,225,226				
1	–	–	1	1	233		B	1096268G2	LOW PASS FILTER	110	4,5	234,210	1	Y39								2				
1	1	–	–	1	234		B	1096526G1	PLATE, IDENTIFICATION	130	4,5	91,233														X

BLM1087428BD

TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO 2	TRANSMITTER NO 1	TRANSM NO 1 SINGLE PULSE	TRANSM NO 2 SINGLE PULSE	LIST OF MATERIALS						ITEM SHOWN ON H SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE		G4		G3		G2		G1							
G4	G3	G2	G1									Q	BOX	Q	BOX	Q	BOX	Q	BOX						
		1	1	20	235		D	1088602G16	CABLE DIAG (W103)	760		1	Y32	1	X32										
		1	1	20	236		D	1088614G11	(W108)	↑		1	Y32	1	X32										
		1	1		237		D	1088614G12	(W111)																
		1	1		238		D	1088614G13	(W113)																
		1	1		239		D	1088603G23	(W114)																
		1	1		240		D	1088603G17	(W115)																
		1	1		241		D	1088603G22	(W116)																
		1	1		242		D	1088614G14	(W122)																
		1	1		243		D	1088603G18	(W118)																
		1	1		244		C	1088617G51	(W119)																
		1	1		245		D	1088603G11	(W120)																
		1	1		246		D	1088614G16	(W121)																
		1	1		247		D	1088603G19	(W125)																
		1	1		248		D	1088603G14	(W126)																
		1	1		249		C	1088617G15	(W134)																
		1	1		250		D	1088603G22	(W135)																
		1	1		251		C	1088617G16	(W136)	V															
		1	1	20	252		D	1088614G15	CABLE DIAG (W139)	760		1	Y32	1	X32										X

BLM1087428BB

TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO 2	TRANSMITTER NO 1	TRANSM NO 1 SINGLE PULSE	TRANSM NO 2 SINGLE PULSE	LIST OF MATERIALS							ITEM SHOWN ON H105742BSHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX						
		–	–	20	253		C	1088617653	CABLE DIAG (W 252)	740			1	Y32	1	X32										
1	1	–	–	1	254		C	09.451.6115	CABLE ASSY (W133)	110																
		–	–	20	255		C	1088617642	CABLE WIRING (W 163)	740																
		–	–		256		C	1088617643	(W164)																		
		–	–		257		C	1088617644	(W165)																		
		–	–		258		C	1088617645	(W166)																		
		–	–		259		C	1088617646	(W172)																		
		–	–		260		C	1088617647	(W173)																		
		–	–		261		C	1088617648	(W176)																		
		–	–		262		C	1089460 001	(W 9)																		
		–	–		263		C	1088617649	(W183)																		
		–	–	20	264		A	1088617650	(W193)				1	Y32	1	X32										
		–	–	20	265		A	1036437 0001	TRANSM GROUP INTER-UNIT CABLE																		
		–	–	20	266		J	1096502	WIRING DIAGRAM																		
0.5	0.5	–	–	32	267			330673	GROMMET PLASTIC		3	227,228															
					268																						
2	2	–	–	1	269		B	1096533G001	CLAMP, CABLE MODIFIED		3	242,250, 259	1	Y32	1	X32										X

BLM1087428BF

TABLE 5X. TRANSMITTING GROUP LIST OF MATERIALS (Cont)

TRANSMITTER NO. 2	TRANSMITTER NO. 1	TRANSMITTER NO. 1 SINGLE PULSE	TRANSMITTER NO. 2 SINGLE PULSE	LIST OF MATERIALS						ITEM SHOWN ON H1087428 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX						
1	1	-	-	1	270			MS35489-123	GROMMET RUBBER	530	4,5	13														
1	1	-	-	1	271		C	23143306015	CABLE ASSY (W187)	110			1	Y32	1	X32										
1	1	-	-	1	272		B	1096536G001	BRACKET AIR FLOW SW.	520	4,5	19,80,88, 273														
1	1	-	-	1	273		C	108759945	SWITCH, AIR FLOW (S1)	530	4,5	87,95,206, 272														
9	9	-	-	1	274		C	383440A024	CLAMP, CABLE (HP-12N)	530	6,7		9	Y22	9	X22						2,225,226				
9	9	-	-	1	275			MS51957-47	SCR, PAN HD. #8-32 x .75	↓	6,7		9	Y22	9	X22						274				
9	9	-	-	1	276			MS15795-841	FLAT WASHER #8		6,7		9	Y22	9	X22						274				
9	9	-	-	1	277			MS35338-137	LOCK WASHER #8	↓	6,7		9	Y22	9	X22						274				
9	9	-	-	1	278			MS35649-284	NUT, HEX #8-32	530	6,7		9	Y22	9	X22						274				
X	X	-	-	20	279		A	1096543G1	SHPNG-REASSY INSTR, TUBE	110																
									RACK, P.H. AN/FPN-44A																	
X	X	-	-	20	280		C	1088617G52	CABLE DIAG (W191)	760			1	Y32	1	X32										
X	X	-	-	20	281		C	1088617G53	CABLE DIAG (W196)	760			1	Y32	1	X32										
																									X	

BLM1087428BK

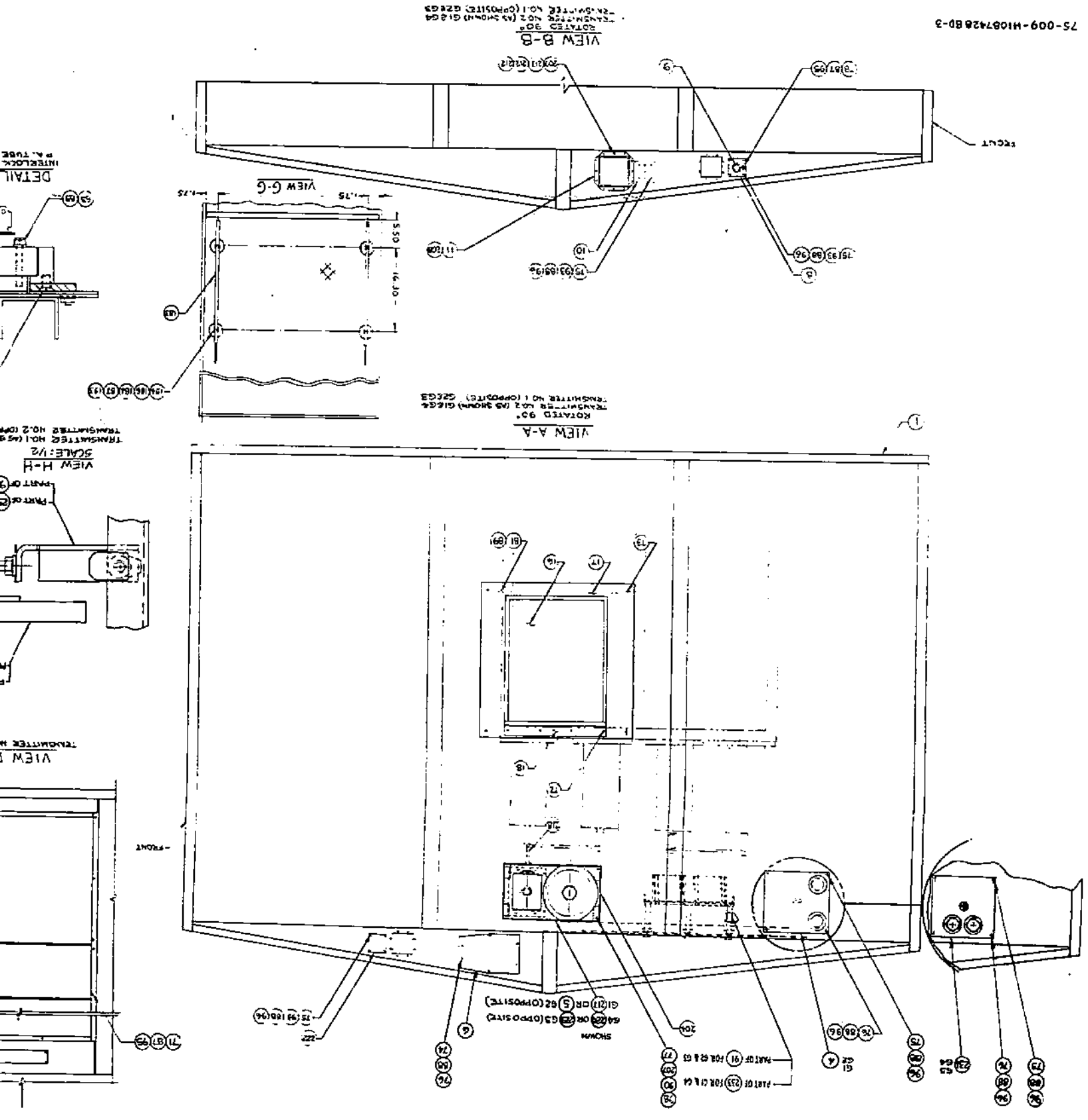
This sheet has been intentionally left blank as it contains data not applicable to the AN/FPN-44A. The sheet is provided only to maintain continuity in referencing from the associated LM Table 5X.

Figure 2X. Transmitting Group Assembly Drawing (Sheet 1 of 7)

This sheet has been intentionally left blank as it contains data not applicable to the AN/FPN-44A. The sheet is provided only to maintain continuity in referencing from the associated LM Table 5X.

Figure 2X. Transmitting Group Assembly Drawing (Sheet 2 of 7)

75-009-H1087428 BD-3



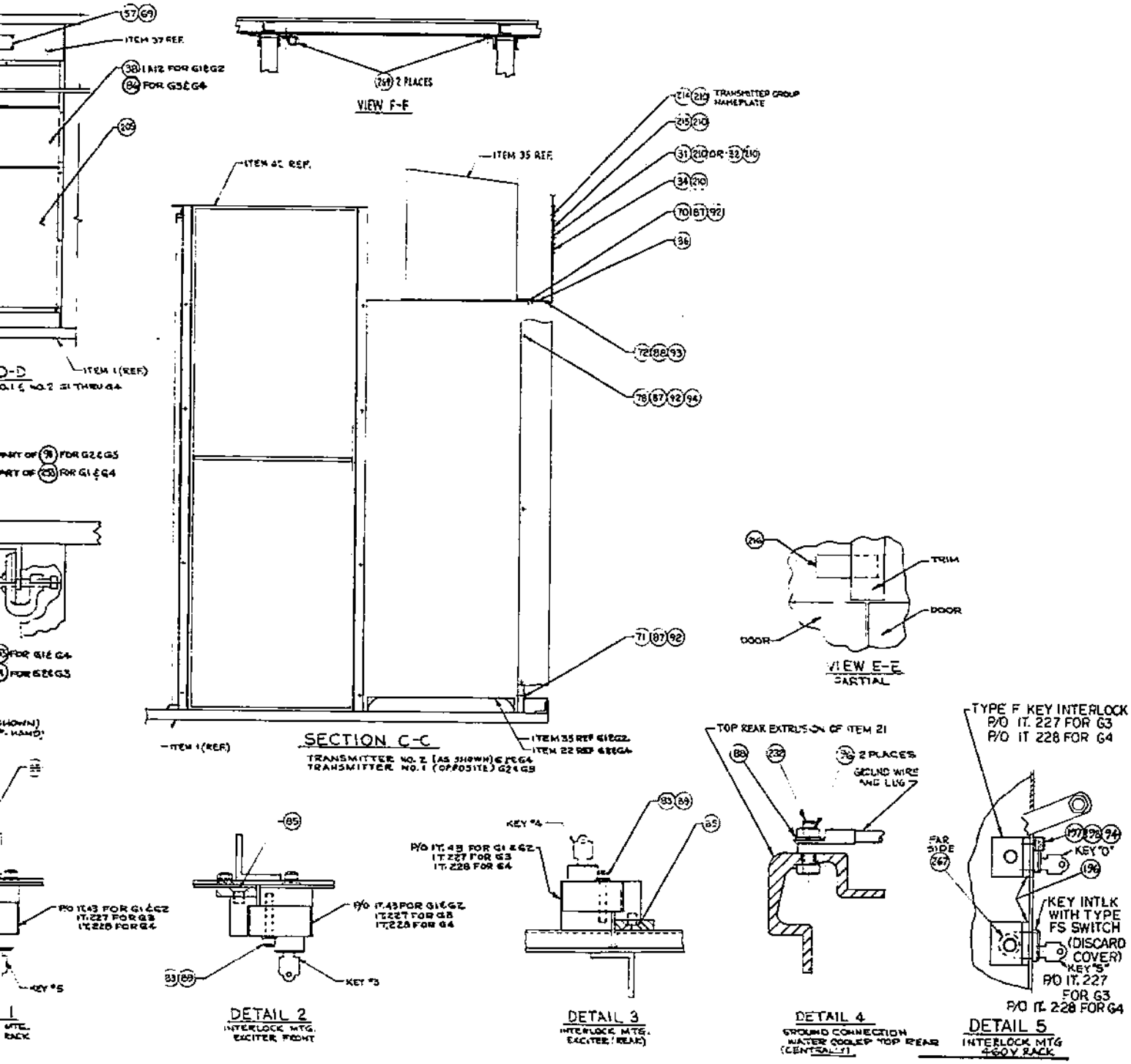


Figure 2X. Transmitting Group Assembly Drawing
(Sheet 3 of 7)

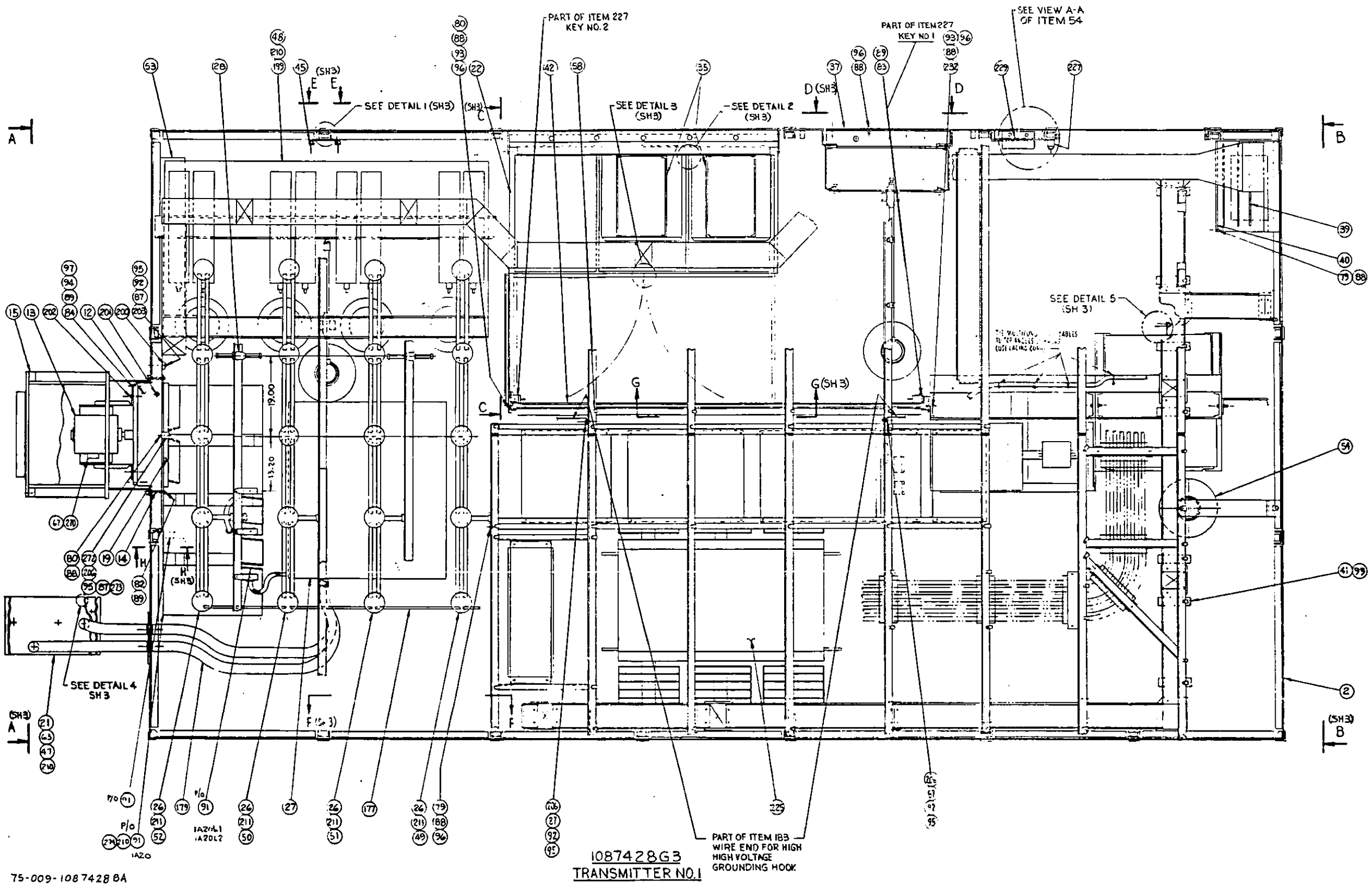
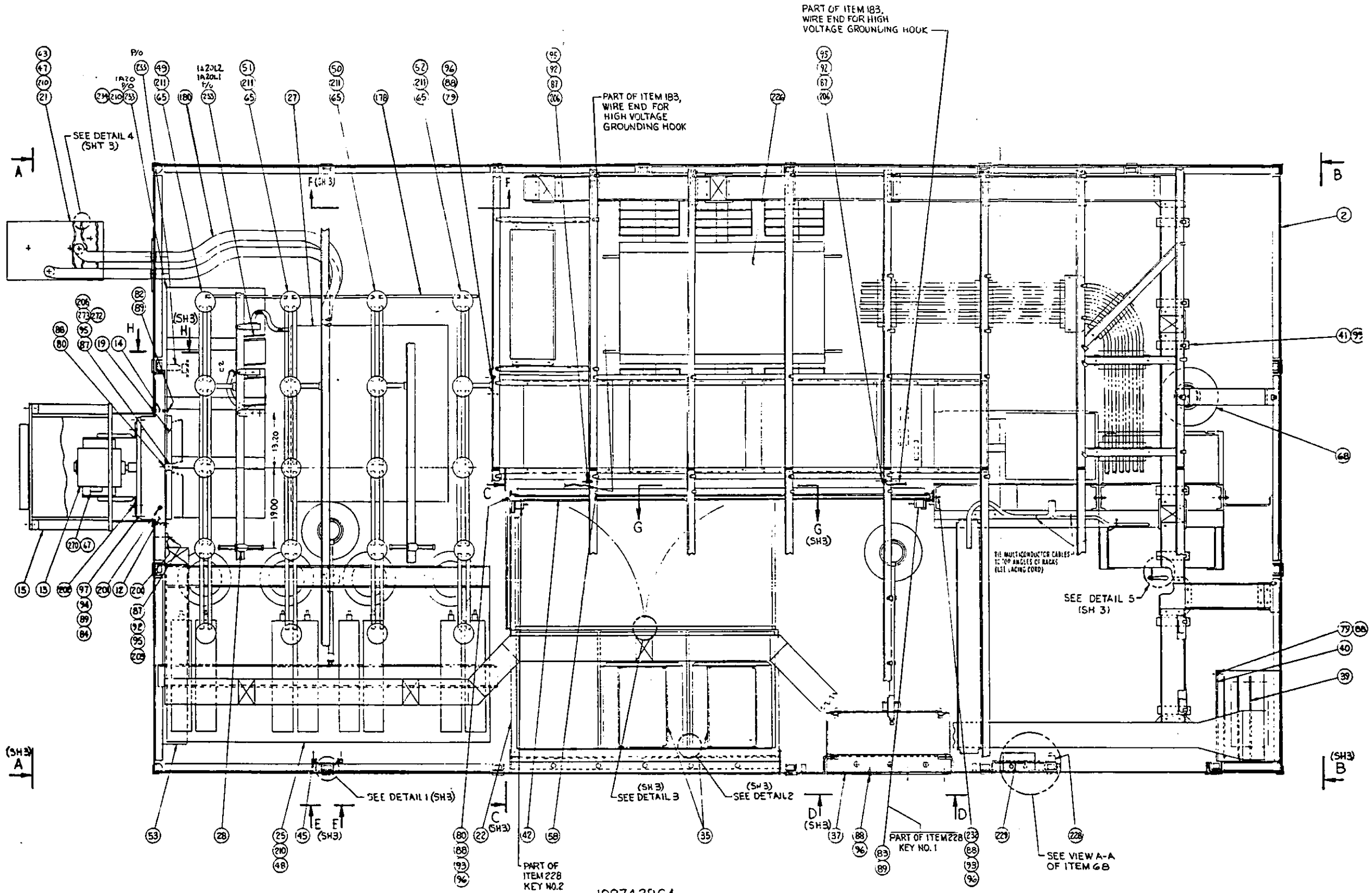
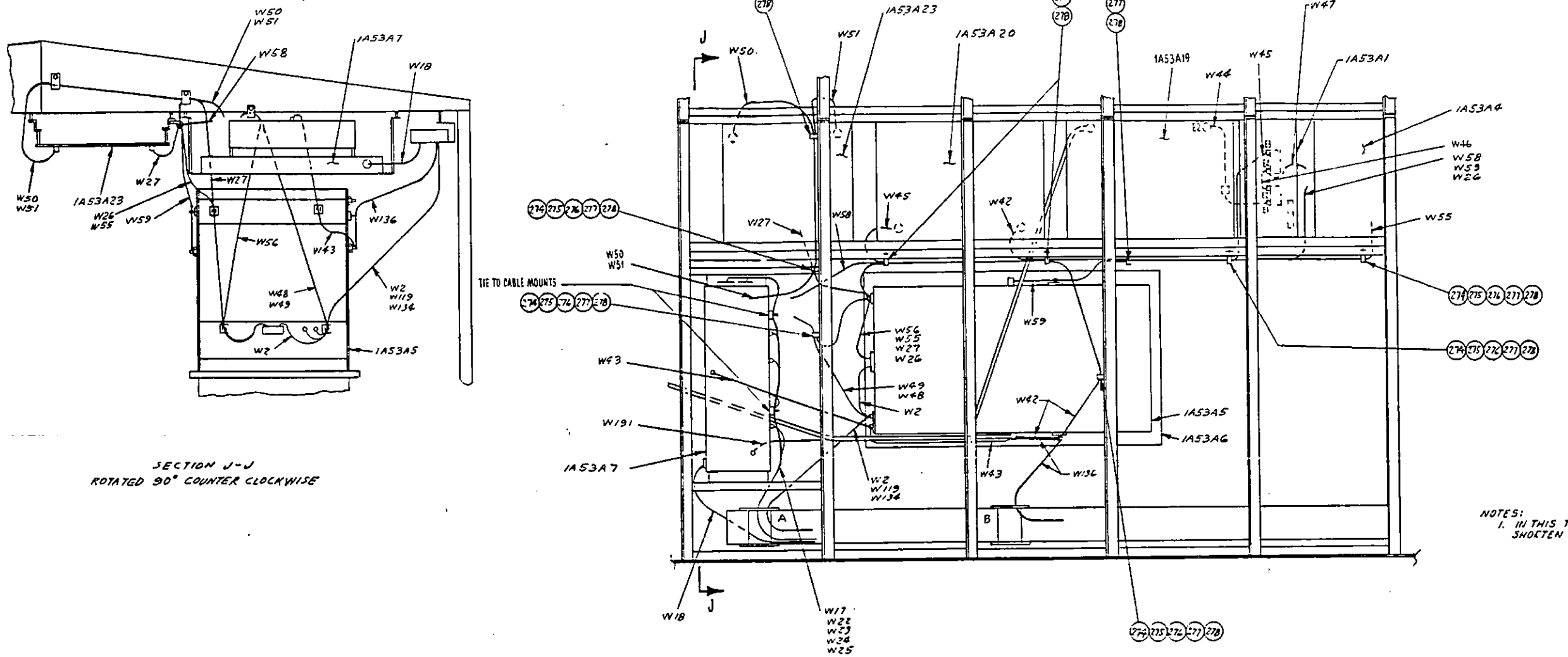


Figure 2X. Transmitting Group Assembly Drawing
(Sheet 4 of 7)



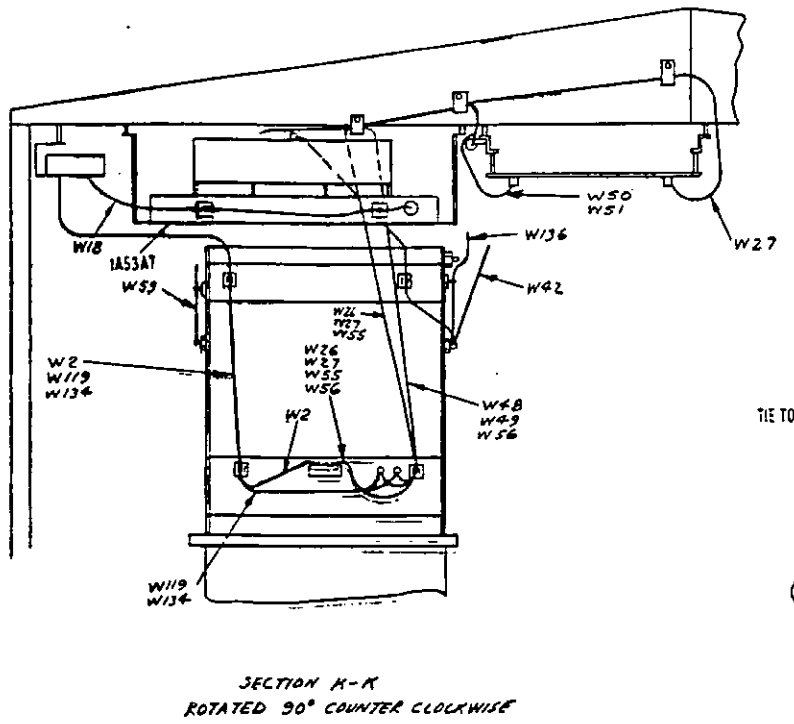
75-009-10874-28BA

Figure 2X. Transmitting Group Assembly Drawing (Sheet 5 of 7)

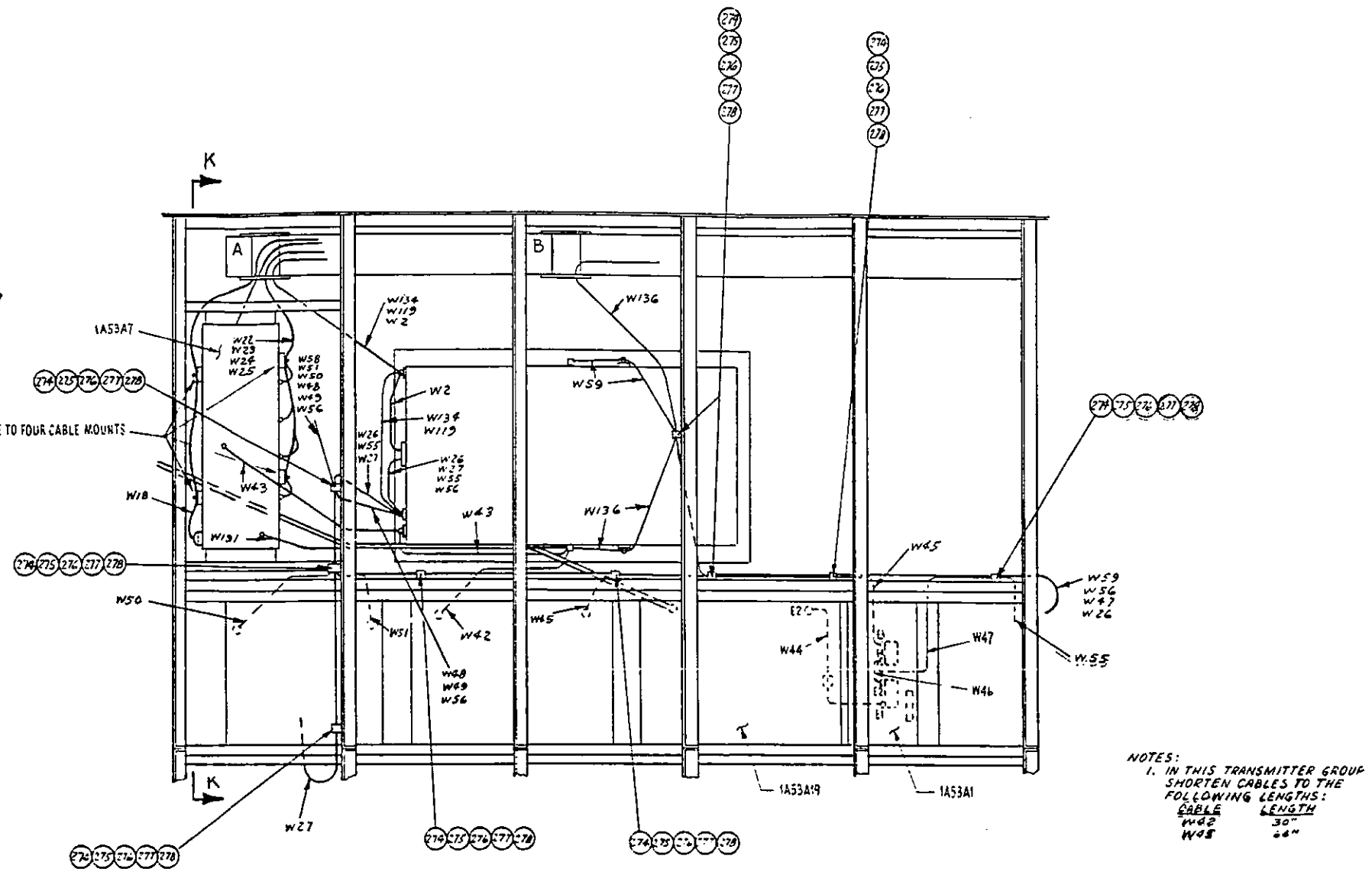


10874-2863
TRANSMITTER NO. 1

Figure 2X. Transmitting Group Assembly Drawing
(Sheet 6 of 7)



SECTION K-K
ROTATED 90° COUNTER CLOCKWISE



NOTES:
1. IN THIS TRANSMITTER GROUP SHORTEN CABLES TO THE FOLLOWING LENGTHS:

CABLE	LENGTH
W42	30"
W45	44"

10874286G4
TRANSMITTER NO. 2

Figure 2X. Transmitting Group Assembly Drawing
(Sheet 7 of 7)

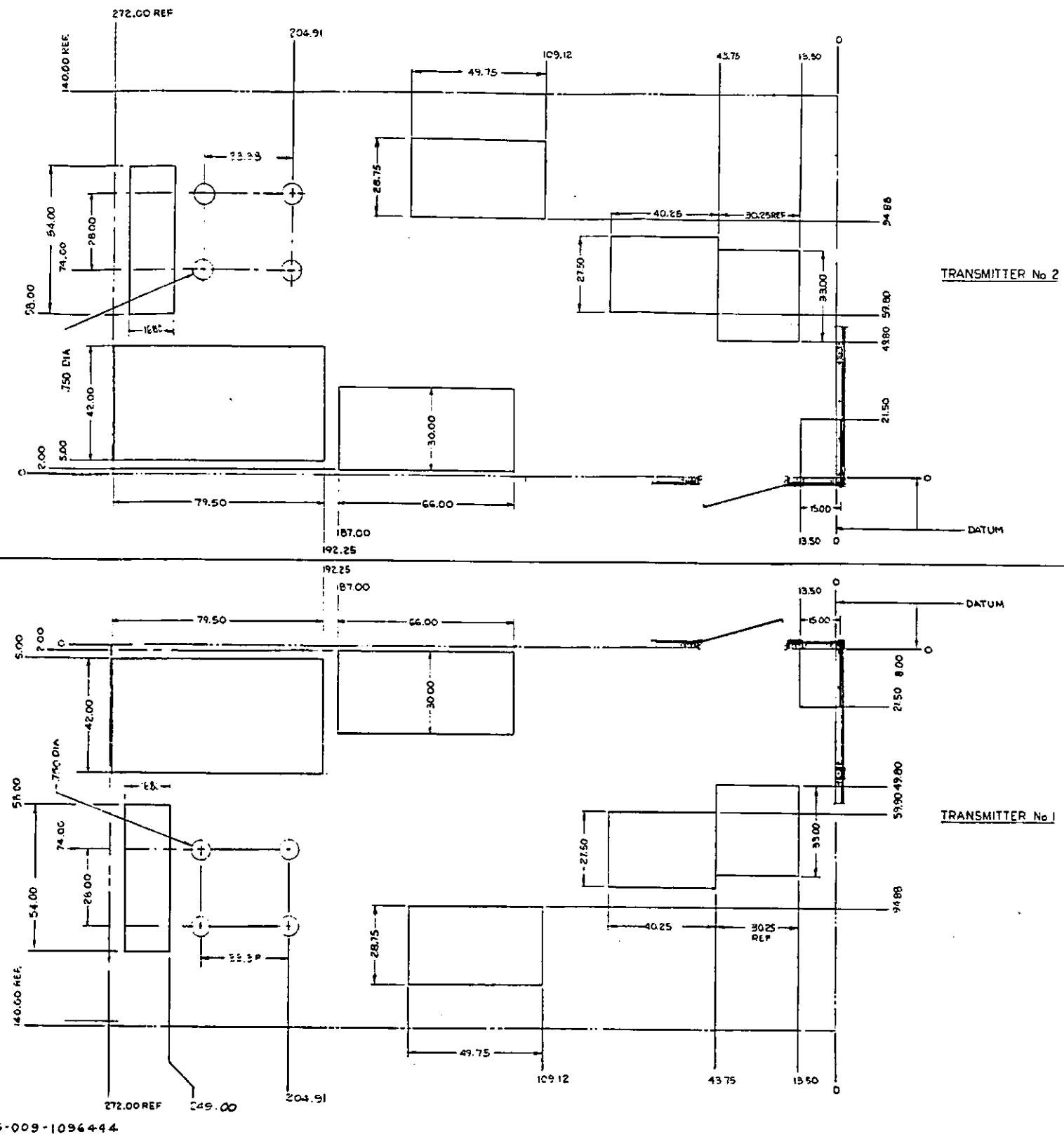
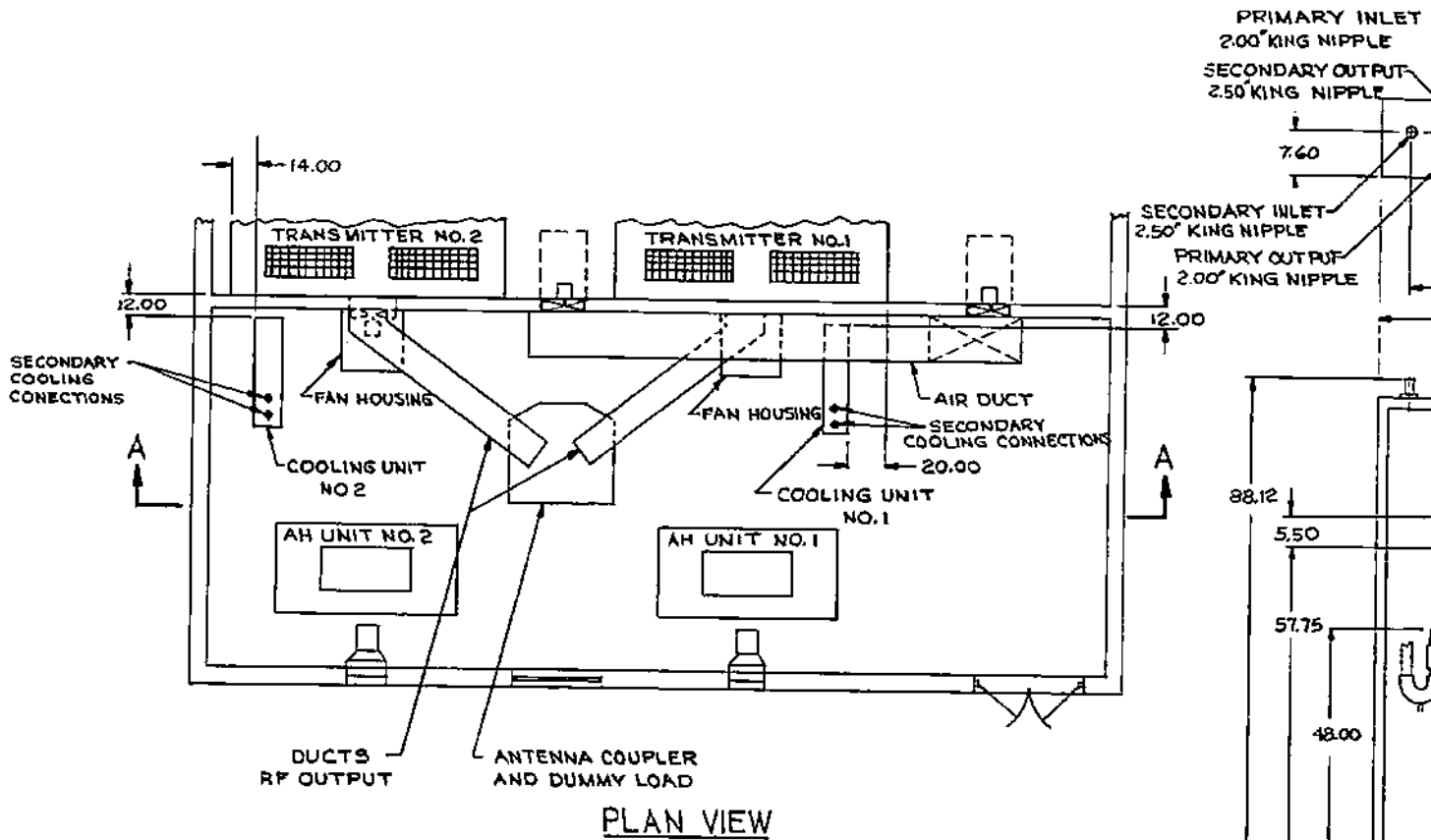
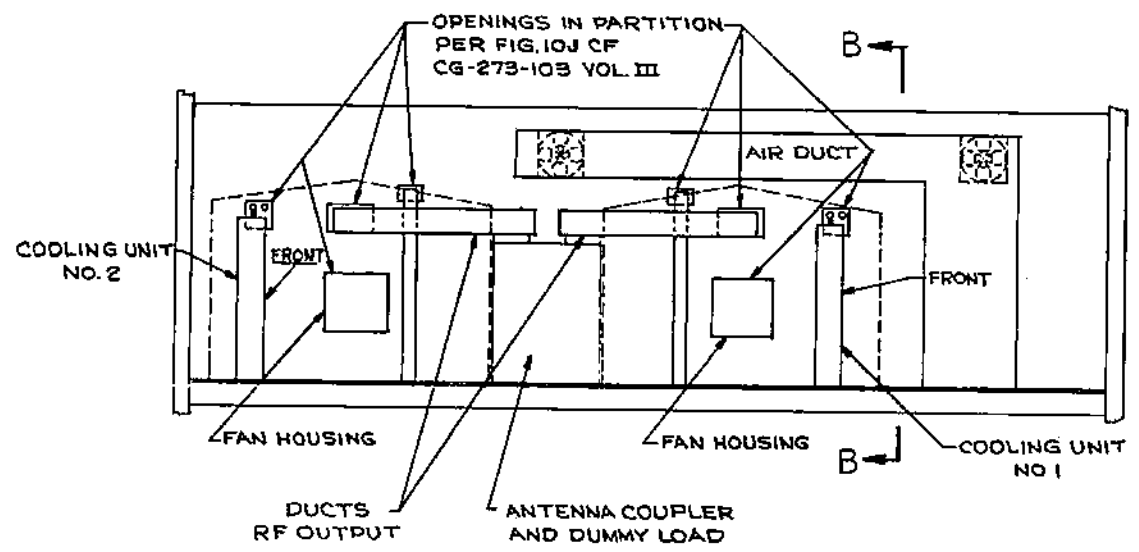


Figure 3Y. Transmitting Group Floor Plan
(Sheet 1 of 2)

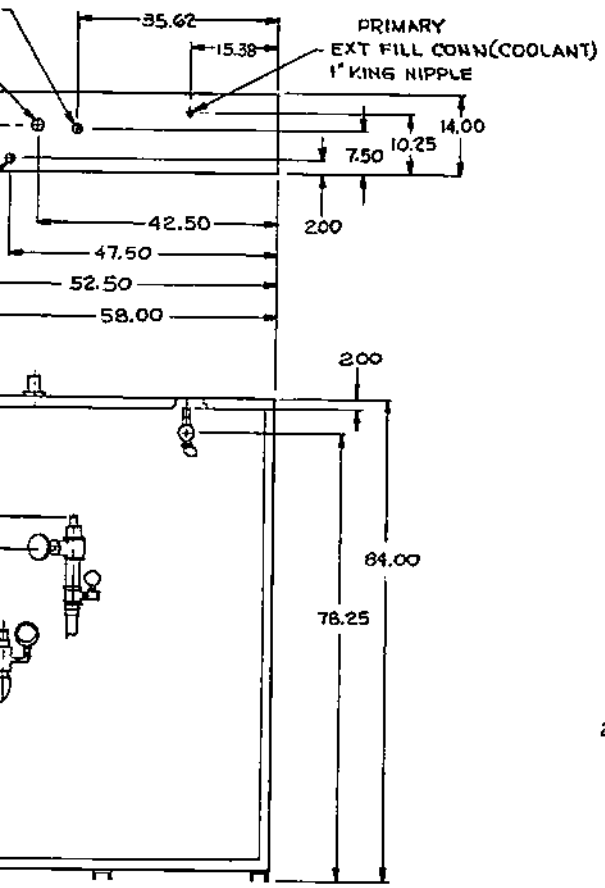


PLAN VIEW



SECTION A-A

75-009-01096362A

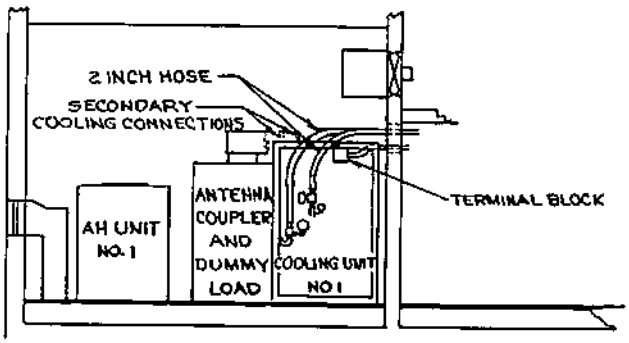


OOLING UNIT

NOTES:

1. THE ILLUSTRATED LAYOUT IS RECOMMENDED FOR THE FOLLOWING REASONS:
   A. IT IS COMPATIBLE WITH COAST GUARD DRAWING NO. 112635.
   B. ADEQUATE ACCESS IS PROVIDED TO THE FRONT OF BOTH COOLING UNITS
   C. THE SECONDARY COOLING CONNECTIONS ARE IN LINE AND FACILITATE RUNNING INTERCONNECTING PIPING OVER THE RF DUCTS WITHOUT GOING UNDER THE RETURN AIR DUCT.

2. THE MATERIAL BEING FURNISHED WITH THE LORAN TRANSMITTER SET WILL PERMIT THE FOLLOWING FLEXIBILITY WITH THE COOLING UNIT LAYOUT:
   A. THE RECOMMENDED 12 INCH DIMENSION TO THE END WALL OF THE TRANSMITTER ENCLOSURES MAY HAVE ANY VALUE BETWEEN 2 INCHES AND 36 INCHES.
   B. THE RECOMMENDED 14 INCH AND 20 INCH DEMENSIONS TO THE REAR WALLS OF THE TRANSMITTER ENCLOSURES MAY HAVE ANY VALUE BETWEEN ZERO AND 34 INCHES.
   C. EITHER COOLING UNIT MAY BE TURNED 180° TO FACE THE OPPOSITE DIRECTION.
   D. EITHER COOLING UNIT MAY BE TURNED 90° TO FACE AWAY FROM THE TRANSMITTER ENCLOSURE.



SECTION B-B

Figure 3Y. Transmitting Group Floor Plan
(Sheet 2 of 2)

TABLE 6C. HOSES, FITTINGS, AND TUBINGS LIST OF MATERIALS

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	LITIL SOURCE	ITEM SHOWN ON SHEET ( ) H OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (•)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITEM	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION	EQUIP. SERIAL NO.
		1	1	1	1		C	10384554A	HOSE	110							1	X22	1	Y22		5	
		1	1	1	2		C	10884554G7	HOSE	110							1		1	Y22		5	
		1	1	1	3		C	10834559G8	HOSE	110							1	X22	1			5,22,23, 48,50	
		1	1	1	4		C	10884559G9	HOSE	110							1		1			5,22,23, 48,50	
		16	16	1	5		B	10884616Z	CLAMP	530							16		16			12,3,4	
		4	4	1	6			100307A124	SCR FIL HD 10-24 x 3/4	530							4		4			37	
		4	4	1	7			107983	NUT 10-24	530							4		4			37	
		4	4	1	8			107224	WASHER Lock SPLIT #10	530							4		4			37	
		5	5	1	9			136093A132	SCR 1/4-20 x 1	530							5	X22	5			30,31	
		1	1	1	10		B	10962525G1	CONNECTOR										1	Y22		9	
		1	-	1	11		B	10962525G2	CONNECTOR								1	X22				9	
		-	1	1	12		B	10962535G1	CONNECTOR										1	Y22		31	
		1	-	1	13		B	10962539G2	CONNECTOR								1	X22				31	
		-	1	1	14		B	10962554G1	CONNECTOR										1	Y22		30	
		1	-	1	15		B	10962544G2	CONNECTOR								1	X22				30	
					16																		
					17																		
					18																		

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C

TABLE 6C. HOSES, FITTINGS, AND TUBINGS LIST OF MATERIALS (Cont)

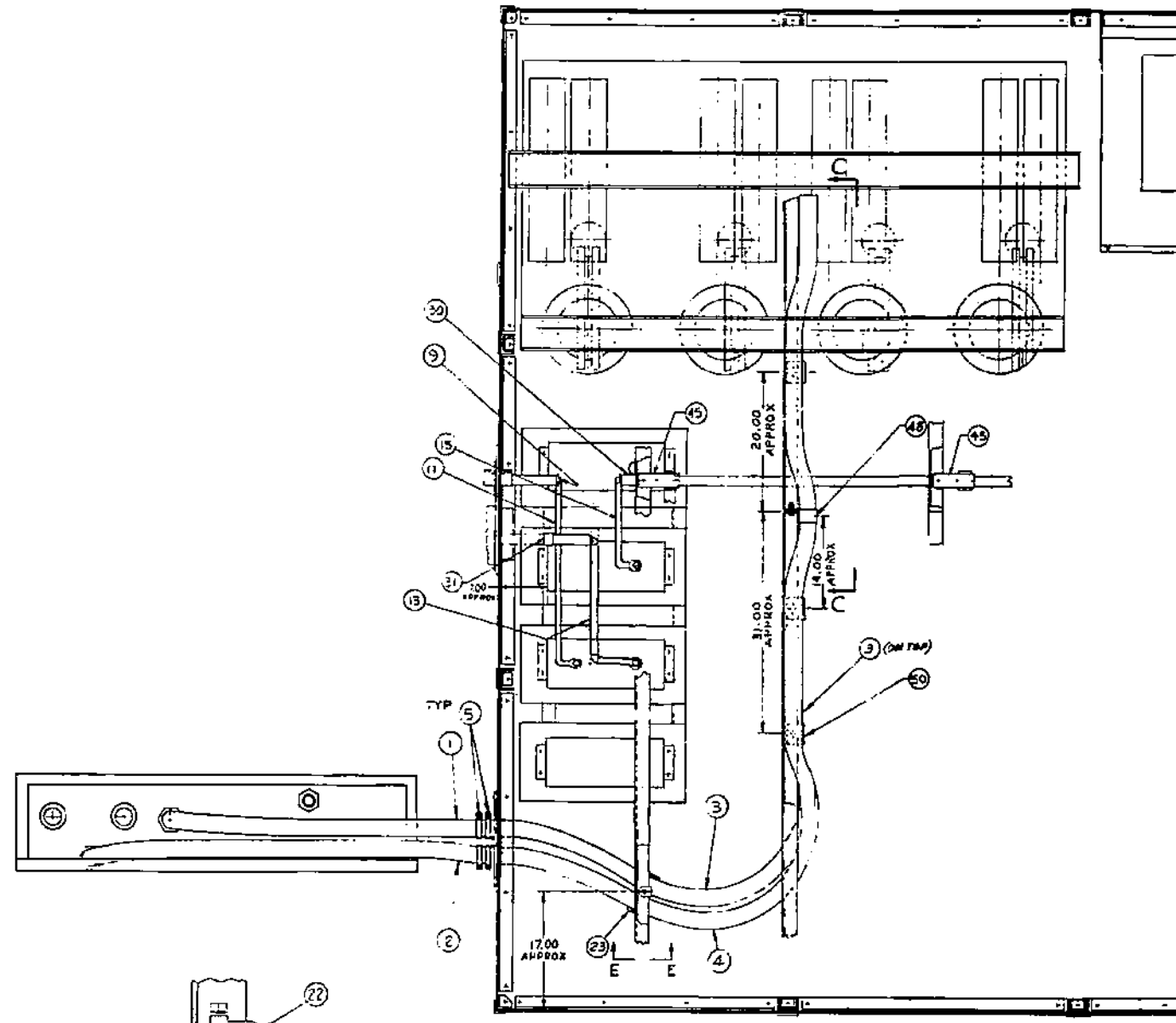
TRANSMITTER GROUP NO. 1	TRANSMITTER GROUP NO.	LIST OF MATERIALS						ITEM SHOWN ON SHEET ( ) H OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP		U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITEM SOURCE		G4		G3		G2		G1								
G4	G3	G2	G1											Q	BOX	Q	BOX	Q	BOX	Q	BOX				
		1	1	1	19		F	10887-3G1	TUBING RF SHIELDG	110						1	X22	1	Y22		37, 45				
		1	-	1	20		F	108876 3G2	TUBING RF SHIELDG	110						1	X22				37				
		-	1	1	21		F	10887G1G4	TUBING RF SHIELDG	110								1	Y22		37				
		1	1	1	22		D	10878 41G3	CLAMP	120						1	X22	1	Y22		23				
		1	1	1	23		B	1088899 J2	HANGER	[illegible]						1	X22	1	Y22		3,4,22,24, 25,26				
		2	2	1	24		B	10884 99G1	NUT, HEX, 7/16-14	530						2	X22	2	Y22						
		2	2	1	25			MS 35338-142	WASHER, SPLIT LOCK #7/16	530						2	X22	2	Y22						
		1	1	1	26			MS 35307-345	SCREW, CAP, #7/16-14 x 3.00LG	530						1	X22	1	Y22						
		2	2	1	27			MS 15795-8.0	WASHER, FLAT, NO 1/4	530						2	X22	2	Y22						
					28																				
					29																				
		1	1	1	30		B	1096251G2	TUBING ASSY	120						1	X22	1	Y22		45				
		1	1	1	31		B	1088754G3	TUBING ASSY	120						1	X22	1	Y22		12 OR 13				
					32																				
					33																				
					34																				
					35																				
					36																				C

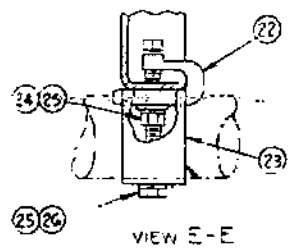
BIM1096276B

TABLE 6C. HOSES, FITTINGS, AND TUBINGS LIST OF MATERIALS (Cont)

TRANSMITTER GROUP NO 1		TRANSMITTER GROUP NO 2			LIST OF MATERIALS					ITEM SHOWN ON H SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE		G4		G3		G2		G1							
G4	G3	G2	G1									Q	BOX	Q	BOX	Q	BOX	Q	BOX						
		1	1	1	37		C	108813363	CONNECTOR	110						1	X22	1	Y22		15, 20				
					38																				
					39																				
					40																				
					41																				
					42																				
					43																				
					44																				
		2	2	1	45		C	108867661	HANGER, TUBING	110						2	X22	2	Y22		30				
		1	1	1	46		C	108867662	HANGER, TUBING	110						1	X22	1	Y22		19				
					47																				
		1	1	1	48		B	108890162	BRACKET, HOSE SUPPORT	110						1	X22	1	Y22		3,4,9,27				
					49																				
		3	3	1	50		B	108917661	SUPPORT HOSE	110						3	X22	3	Y22						
					51																				
					52																				
					53																				
					54																				C

BLM1096276C





VIEW E-E
(1/2 SCALE)

1096276C

1096276 G2
TRANSMITTER NO. 1

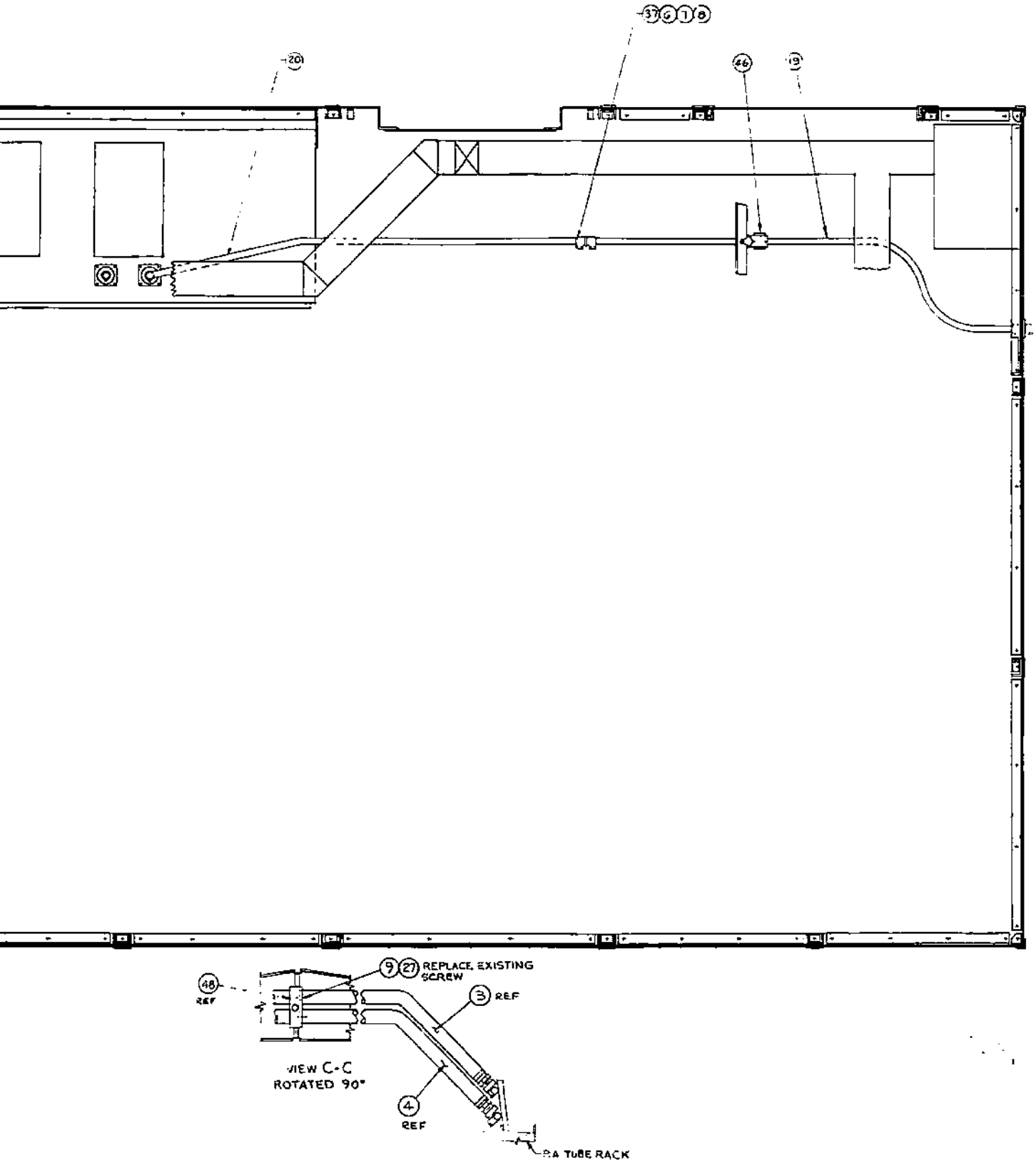
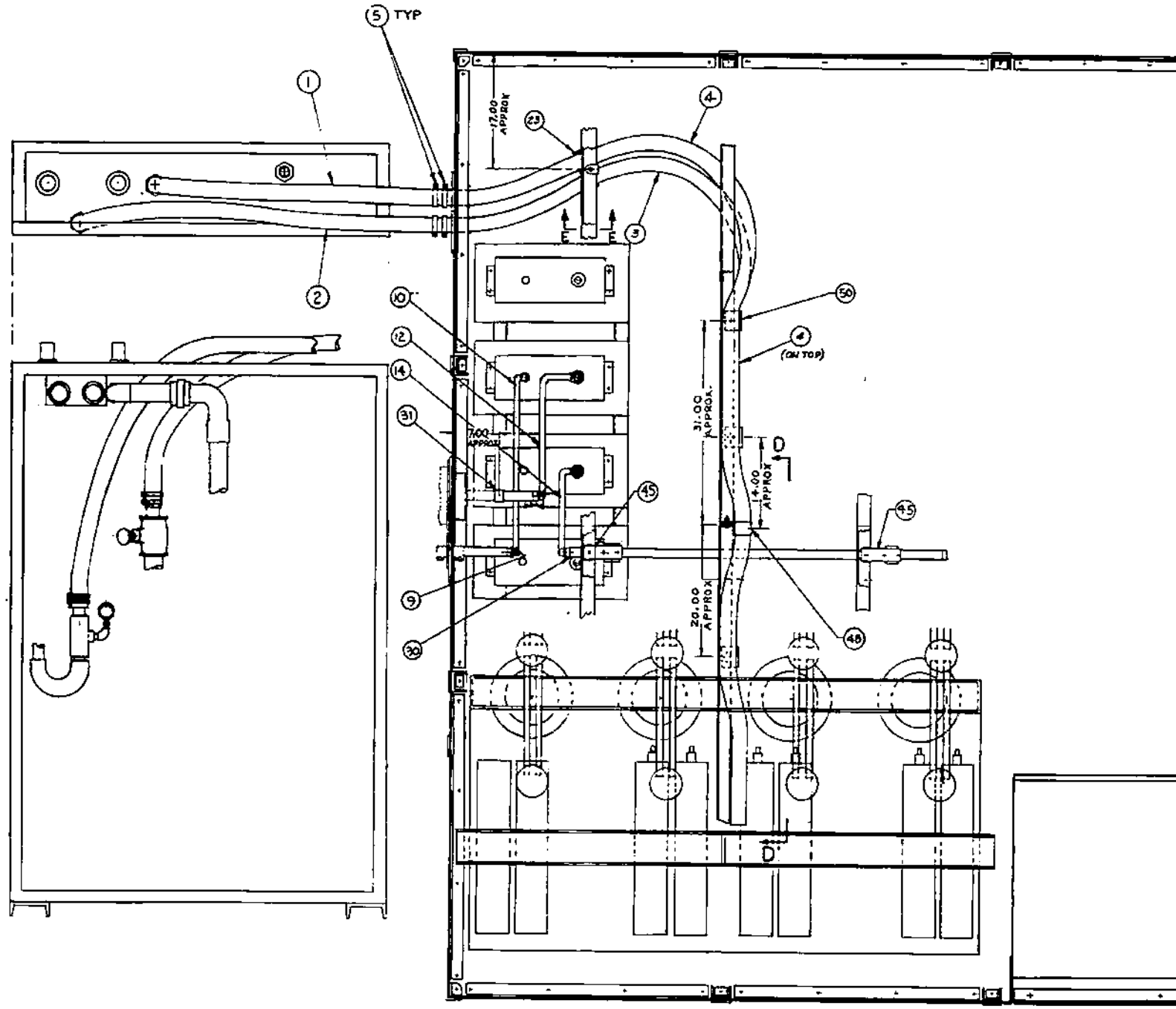
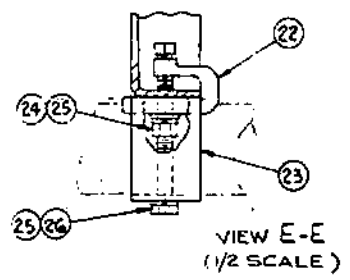
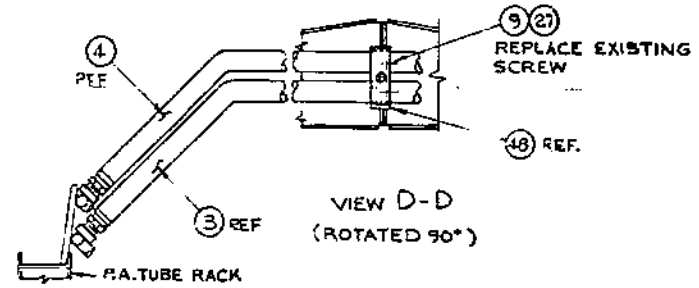


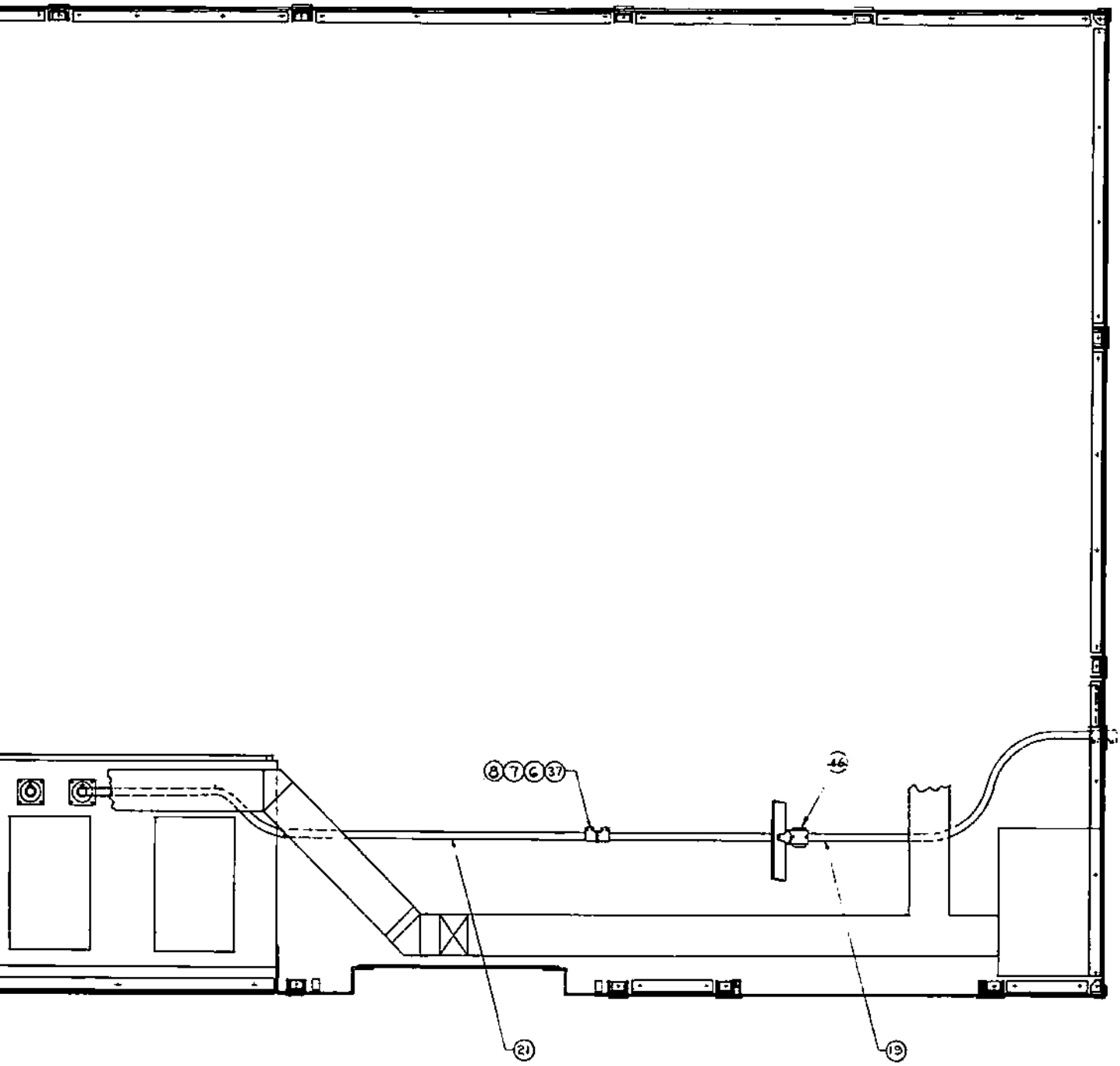
Figure 4C. Hoses, Tubes and Fittings
(Sheet 1 of 2)


5 TYP
1
2
4
23
3
10
12
14
31
9
30
45
50
4 (ON TOP)
48
17.00 APPROX
31.00 APPROX
14.00 APPROX
20.00 APPROX
D
D


22
24 25
23
25 24
VIEW E-E
(1/2 SCALE)


9 27
REPLACE EXISTING SCREW
4 REF
48 REF.
3 REF
VIEW D-D
(ROTATED 90°)
P.A. TUBE RACK

1096276C



1096276 G1
TRANSMITTER NO. 2

Figure 4C. Hoses, Tubes and Fittings
(Sheet 2 of 2)

TABLE 7P. POWER SUPPLY LIST OF MATERIALS

QUAN. PER GROUP G4	G3	POWER SUPPLY SET NO 2 G2	POWER SUPPLY SET NO. 1 G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON E1096281 SHEET ( ) OR ON ASSEMBL. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
		1	1	1	1		A	2484642G001	HIGH VOLTAGE POWER SUPPLY	330																
									(SPECIFICATION)																	
		~~1~~	~~1~~	~~1~~	~~2~~		~~A~~	~~1096283G001~~	~~SPEC, VOLTAGE REG~~																	
		~~1~~	~~1~~	~~1~~	~~3~~		~~A~~	~~1096285G001~~	~~SPEC, VOLTAGE REG~~																	
									~~INDUCTROL~~																	
		1	1	1	4		A	PL1096286G001	CONT. IND. PANEL	110	1,2	87, 82							1	Y17	1	X17		45 46 47 48, 5				
		1	1	1	5		D	1088935G001	GUARD ASSY	110	1 2								1	Y17	1	X17		4				
		X	X	20	6			1096300G001	TRANSFORMER, (AG)	760	1, 2, 3, 4	7							1	Y16	1	X16						
		X	X	20	7			1096301G001	POWER SUPPLY, RECT (A5)	↑	1, 2, 3, 4	6, 83, 91-94							1	Y16	1	X16						
		X	X	20	8			1096302G001	VOLTAGE DIVIDER (A7)		1,2,5	90, 82							1	Y23	1	X23		20, 23, 24 29				
		X	X	20	9			1096303G001	RESISTOR PANEL (A23)		1,2,5								1	Y24	1	X24		20, 21, 22, 25, 30, 31, 32, 33, 34				
		X	X	20	10			1096304G001	RESISTOR PANEL (A20)		1,2,5								1	Y24	1	X24		20, 21, 22, 25 30, 31, 32, 33, 34				
		X	X	20	11			1096304G002	RESISTOR PANEL (A19)		1,2,5								1	Y24	1	X24		20, 21, 22, 25 30, 31, 32, 33, 34				
		X	X	20	12			1096306G001	SWITCHING RELAY ASSY (A1)	↓	1,2,5	89, 82							1	Y23	1	X23		20, 21, 22 29				
		X	X	20	13			1096307G001	SHUNT, DC, LOW PWR (A4)	760	1,2,5	88, 82							1	Y23	1	X23		20, 21, 22 29				
		—	1	1	14		A	LM1096289G001	RELAY RACK ASSY (A3)	110	1	81, 84, 85, 86, 82									1	X18, X19 X20		16, 38, 39 42 44				
		1	—	1	15		A	LM1096289G002	RELAY RACK ASSY (A3)	110	2	81 84, 85, 86, 82							1	Y18, Y19 Y20				16, 38, 39 42, 44				
		1	1	1	16		D	1096431G001	FILLER STRIP	520	1,2								1	Y19	1	X19		14, 15				

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TABLE 7P. POWER SUPPLY LIST OF MATERIALS (Cont)

POWER SUPPLY SET NO.2 QUAN. PER GROUP G4	POWER SUPPLY SET NO.2 QUAN. PER GROUP G3	POWER SUPPLY SET NO.2 QUAN. PER GROUP G2	POWER SUPPLY SET NO.1 QUAN. PER GROUP G1	LIST OF MATERIALS U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON E1096281 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION	EQUIP. SERIAL NO.
		6	6	1	17		F	1096439G001	CABLE SUPPORT	520	1,2						6	Y40	6	X40		26, 37, 40, 41, 43	
		1	1	1	18		D	1096440G001	BRACKET	520	1,2						1	Y40	1	X40		26	
		2	2		19		D	1096443G001	BRACKET	520	1,2						2	Y40	2	X40		26	
		16	16	1	20		D	1087841G001	CLAMP	120	5						16	Y40	16	X40		21, 22, 24, 36	
		1	1	1	21		D	1096308G001	RAIL, PANEL MTG (LH)	120	5						1	Y40	1	X40		20, 25	
		1	1	1	22		D	1096308G002	RAIL, PANEL MTG (RH)	120	5						1	Y40	1	X40		20, 25	
		1	1	1	23		D	1088518G001	MTG, VOLTAGE DIVIDER	120	5						1	Y40	1	X40		20	
		1	1	1	24		D	1088519G001	MTG, VOLTAGE DIVIDER	120	5						1	Y40	1	X40		20	
		12	12	1	25			800329	INS. JAN I-8 N55W0416	520	5						12	Y40	12	X40		21, 22, 30	
		12	12	1	26		D	1087841G003	CLAMP	120	1,2						12	Y40	12	X40		17, 18, 19, 27	
		1	1	1	27		C	1096442G001	MTG BRACKET	520	1,2						1	Y40	1	X40		26	
		36	36	1	28		B	2311158G001	STRAP	520	5						36	Y40	36	X40		17	
					-																		
		12	12	1	29			136009A120	SCR, HEX HD 1/4-20x5/8	520	5						12	Y40	12	X40		21, 22, 23, 24	
		12	12	1	30			136009A124	SCR, HEX HD 1/4-20x3/4	520	5						12	Y40	12	X40		25, 32	
		18	18	1	31			136009A128	SCR, HEX HD 1/4-20x7/8	520	5						18	Y40	18	X40		25	
		12	12	1	32		B	1087662G001	WSHR, FLAT, INSUL	520	5						12	Y40	12	X40		30	
		18	18	1	33			200609H018	WSHR, FLAT 1/4	520	5						18	Y40	18	X40		31	

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TABLE 7P. POWER SUPPLY LIST OF MATERIALS (Cont)

QUAN. PER GROUP G4	G3	POWER SUPPLY SET NO.2 G2	POWER SUPPLY SET NO.1 G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITEM SOURCE	ITEM SHOWN ON 81096281 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (•)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITEM
		42	42	1	34			107268	WSHR, LOCK SPLIT 1/4		5	
		18	18	1	35			107752	NUT, HEX 1/4-20		5	
		40	40	1	36			MS15795-816	WSHR, FLAT 1/4		5	
		6	6	1	37			MS35307-333	SCR, HEX HD 5/16-18 x 3/8		1,2	
		3	3	1	38			MS35307-362	SCR, HEX HD 3/8-16 x 1/4		1,2	
		6	6	1	39			MS15795-814	WSHR, FLAT .406 ID		1,2	
		12	12	1	40			MS15795-811	WSHR, FLAT .344 ID		1,2	
		6	6	1	41			MS35338-140	WSHR, LOCK 5/16		1,2	
		3	3	1	42			MS35338-141	WSHR, LOCK 3/8		1,2	
		6	6	1	43			MS35649-2314	NUT, HEX, 5/16-18		1,2	
		3	3	1	44			MS35649-2384	NUT, HEX, 3/8-16		1,2	
		11	11	1	45			10BT6TIG.01T	SCR, PAN HD 10-32 x 3/4		1,2	
		21	21	1	46			MS15795-808	WSHR, FLAT #10		1,2	
		11	11	1	47			MS35333-138	WSHR, LOCK #10		1,2	
		11	11	1	49			MS35650-304	NUT, HEX 10-32		1,2	
		~~42~~	~~42~~	~~1~~	~~43~~			~~8-2316-250000~~	~~WIRE, ELECT~~			
		3	3	1	50		A	2138411-6001	TERMINAL, LUG			
		3	3	1	51		A	2138411-6005	TERMINAL, LUG			

QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
G4		G3		G2		G1							
Q	BOX	Q	BOX	Q	BOX	Q	BOX						
				42	Y40	42	X40		29 30 31				
				18	Y40	18	X40		29				
				40	Y40	40	X40		20				
				6	Y40	6	X40		17				
				3	Y40	3	X40		14, 15, 16				
				6	Y40	6	X40		38				
				12	Y40	12	X40		37				
				6	Y40	6	X40		37				
				3	Y40	3	X40		38				
				6	Y40	6	X40		37				
				3	Y40	3	X40		38				
				11	Y40	11	X40		4				
				21	Y40	21	X40		4				
				11	Y40	11	X40		4				
				11	Y40	11	X40		4				

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TABLE 7P. POWER SUPPLY LIST OF MATERIALS (Cont)

LIST OF MATERIALS																													
QUAN. PER GROUP				U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON E1096281 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
G4	G3	G2	G1									G4		G3		G2		G1									
												Q	BOX	Q	BOX	Q	BOX	Q	BOX								
		1	1	1	52		C	1096475G001	CABLE ASSY (W32)		1,2,5					1	Y32	1	X32		6,14,15,17						
		1	1	1	53		C	1096475G002	CABLE ASSY (W34)		1,2,5					1	Y32	1	X32		6,14,15,17						
		1	1	1	54		C	1096475G003	CABLE ASSY (W36)		1,2,5					1	Y32	1	X32		6,14,15,17						
		1	1	1	55		C	1096474G001	CABLE ASSY (W31)		1,2,5					1	Y32	1	X32		6,14,15,17						
		1	1	1	56		C	1096474G002	CABLE ASSY (W33)		1,2,5					1	Y32	1	X32		6,14,15,17						
		1	1	1	57		C	1096474G003	CABLE ASSY (W35)		1,2,5					1	Y32	1	X32		6,14,15,17						
		1	1	1	58		C	1096494G001	CABLE W1							1	Y32	1	X32								
		1	1	1	59		C	1096491G001	CABLE W2							1	Y32	1	X32								
		1	1	1	60		C	1096492G001	CABLE W3							1	Y32	1	X32								
		1	1	1	61		C	1096476G001	CABLE W4							1	Y32	1	X32								
		1	1	1	62		C	1096477G001	CABLE W5							1	Y32	1	X32								
		1	1	1	63		C	1096478G001	CABLE W6							1	Y32	1	X32								
		1	1	1	64		C	1096479G001	CABLE W7							1	Y32	1	X32								
		1	1	1	65		C	1096480G001	CABLE W8							1	Y32	1	X32								
		1	1	1	66		C	1096481G001	CABLE W9							1	Y32	1	X32								
		1	1	1	67		C	1096483G001	CABLE W10							1	Y32	1	X32								
		1	1	1	68		C	1096484G001	CABLE W11							1	Y32	1	X32								
		1	1	1	69		C	1096485G001	CABLE W12	110						1	Y32	1	X32								

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TABLE 7P. POWER SUPPLY LIST OF MATERIALS (Cont)

POWER SUPPLY SET NO.2	POWER SUPPLY SET NO.1	LIST OF MATERIALS						ITEM SHOWN ON E1096281 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (•)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.						SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP		U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1						
G4	G3	G2	G1									Q	BOX	Q	BOX	Q	BOX	Q	BOX					
		1	1	1	70		C	1096486G001	CABLE W13	110						1	Y32	1	X32					
		1	1	1	71		C	1096488G001	CABLE W16							1	Y32	1	X32					
		1	1	1	72		C	1096489G001	CABLE W17							1	Y32	1	X32					
		1	1	1	73		C	1096493G001	CABLE W18							1	Y32	1	X32					
		1	1	1	74		C	1096482G001	CABLE W22							1	Y32	1	X32					
		1	1	1	75		C	1096482G002	CABLE W23							1	Y32	1	X32					
		1	1	1	76		C	1096482G003	CABLE W24							1	Y32	1	X32					
		1	1	1	77		C	1096482G004	CABLE W25	110						1	Y32	1	X32					
		1	1	1	78		C	1096505G001	CABLE W26	110						1	Y32	1	X32					
		1	1	1	79		C	1096506G001	CABLE W27	110						1	Y32	1	X32					
				20	80		A	1096504G001	CABLE LIST	760														
		1	1	1	81		B	1096524G1	PLATE, IDENT	130	1,2	14, 15, 82												
		32	32	1	82			MS51957-12	SCR, MACH, PANHD 4-40 x 3/16	530	1,2,5	81, 84-90												
		1	1	1	83		B	1089059G1	PLATE, IDENT	130	3,4	7, 91, 92, 93 94												
		1	1	1	84		B	1089060G1	PLATE, IDENT	130	1,2	14, 15, 82												
		1	1	1	85		B	1089061G1	PLATE, IDENT	130	5	14, 15, 82												
		1	1	1	86		B	1089051G1	PLATE, IDENT	130	1,2	14, 15, 82												
		1	1	1	87		B	1096527G1	PLATE, IDENT	130	1,2	4, 82												

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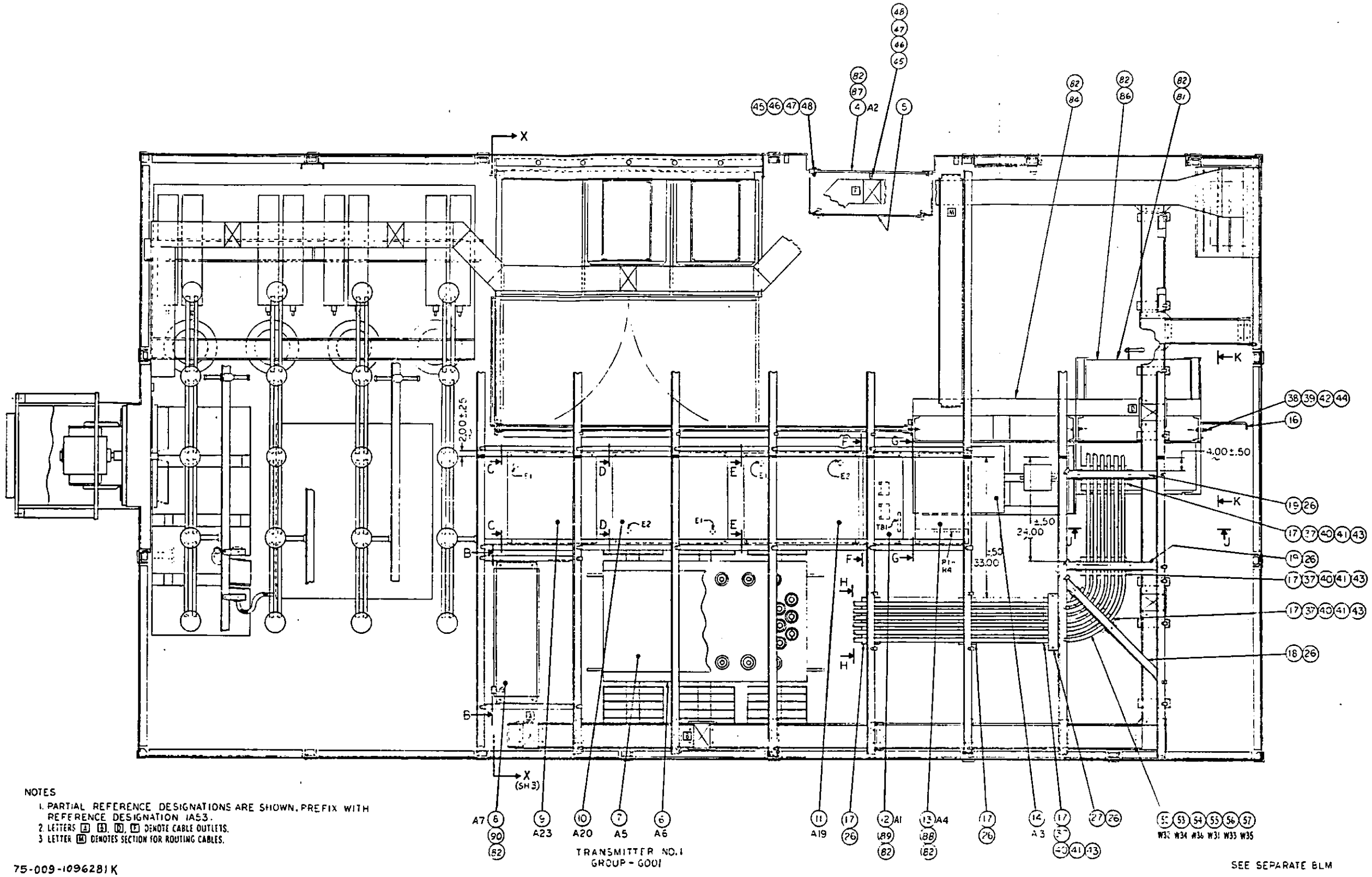


NOTES

1. PARTIAL REFERENCE DESIGNATIONS ARE SHOWN. PREFIX WITH REFERENCE DESIGNATION 1A53.
2. LETTERS [A] [B], [D], [F] DENOTE CABLE OUTLETS.
3. LETTER [M] DENOTES SECTION FOR ROUTING CABLES.

75-009-1096281 K

Figure 5P. Power Supply, Installation Drawing (Sheet 1 of 5)

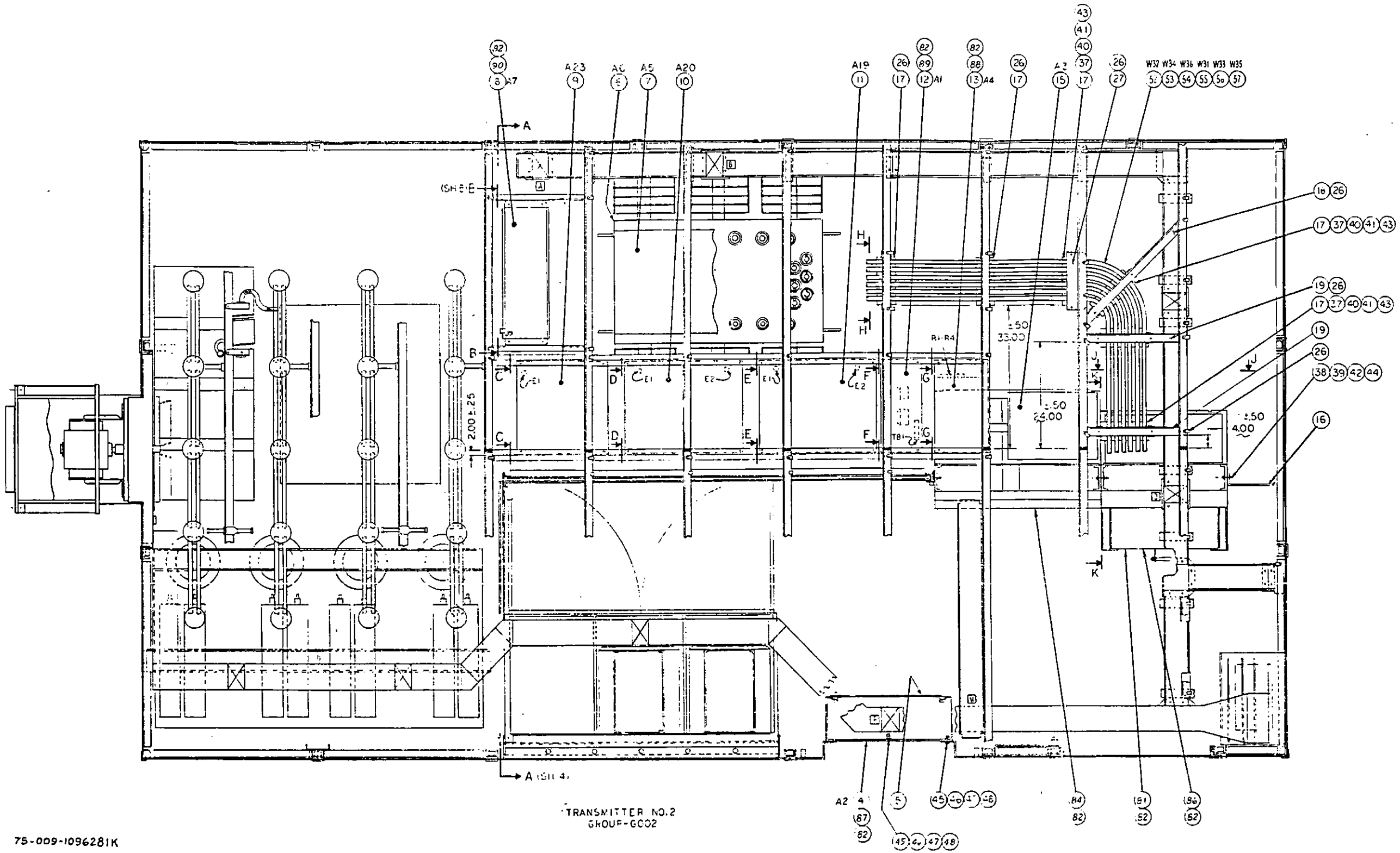


Figure 5P. Power Supply Installation Drawing
(Sheet 2 of 5)

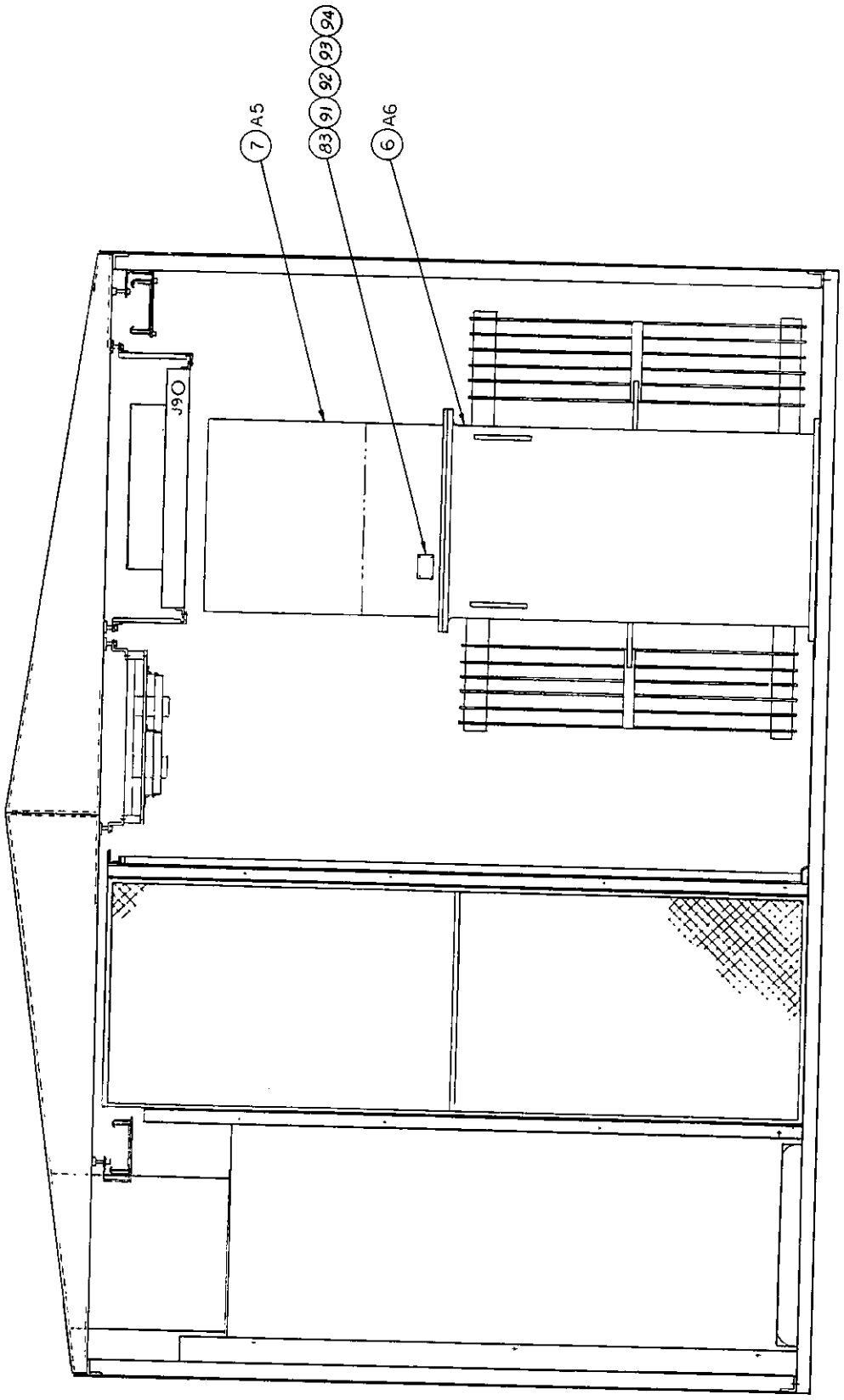


Figure 5P. Power Supply Installation Drawing (Sheet 3 of 5)

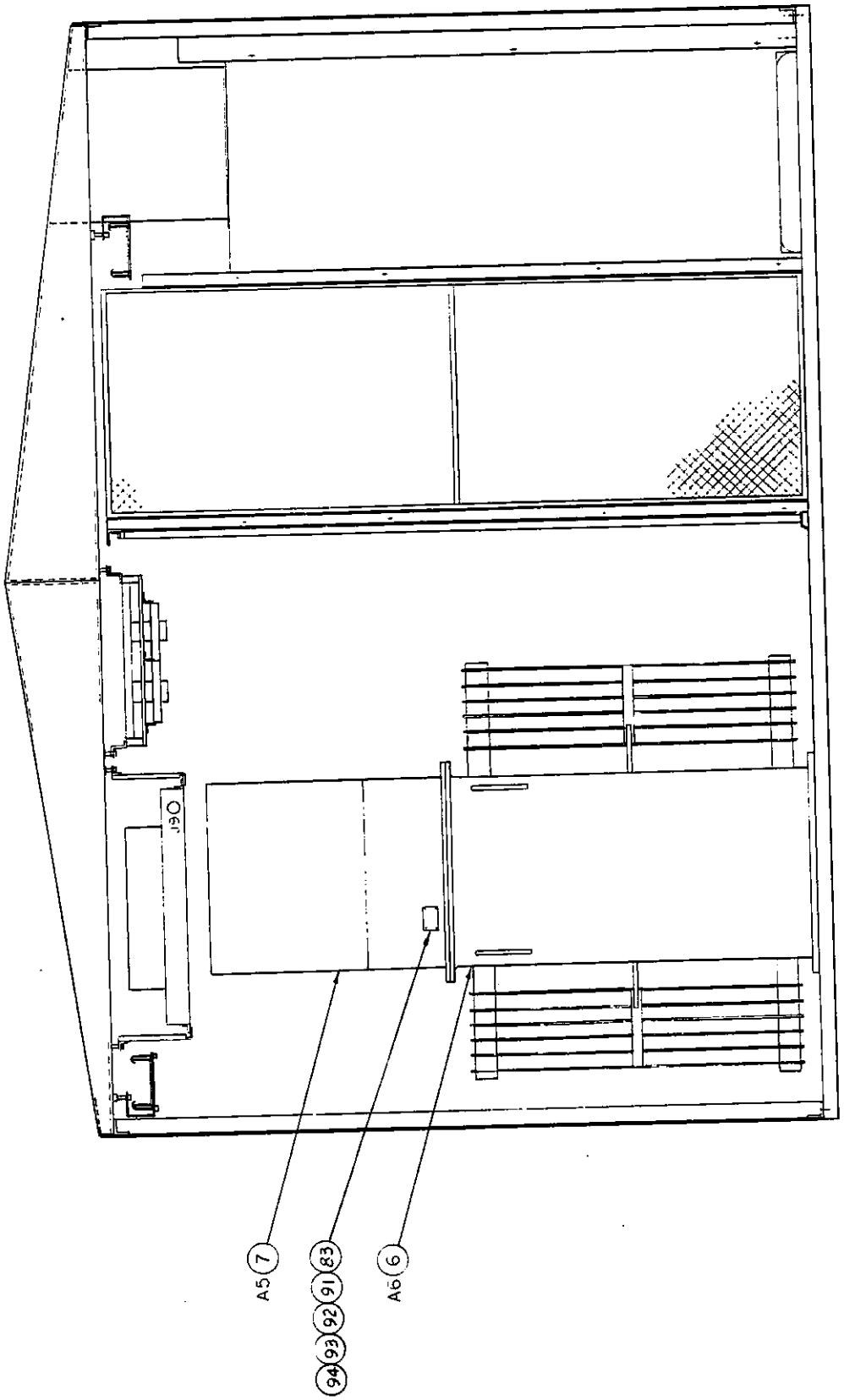
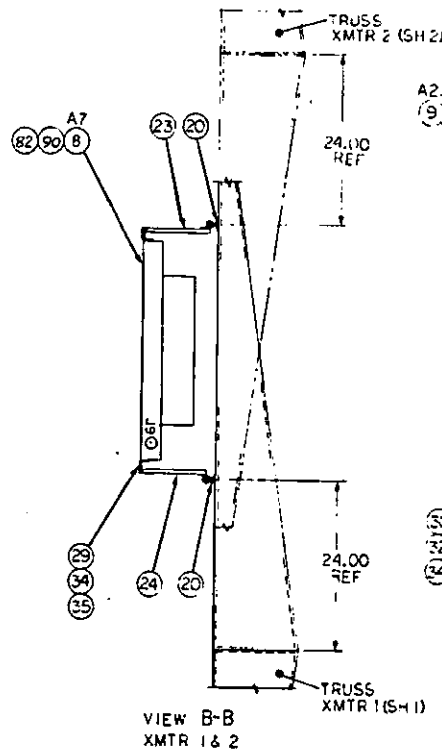
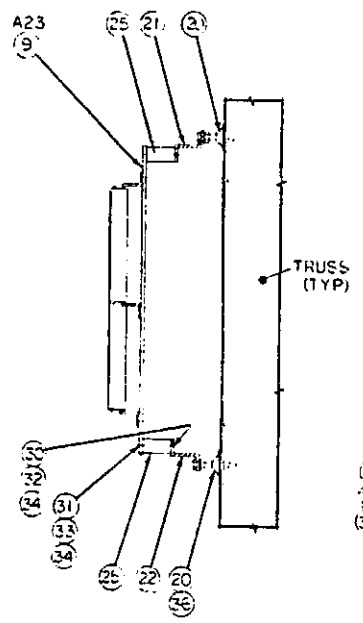


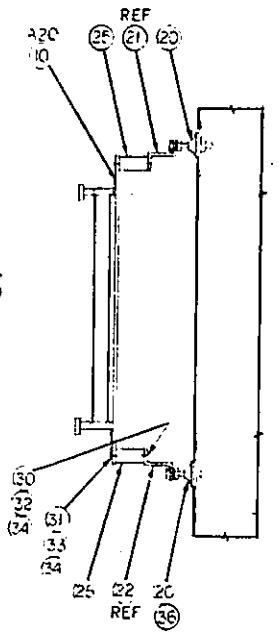
Figure 5P. Power Supply Installation Drawing (Sheet 4 of 5)



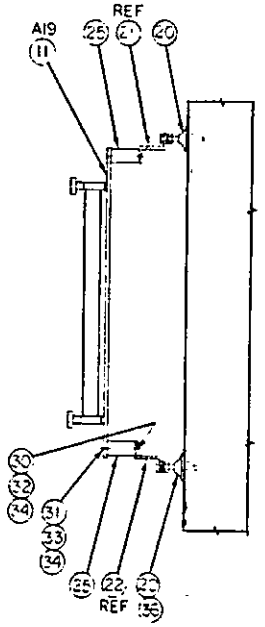
VIEW B-B
XMTR 1 & 2



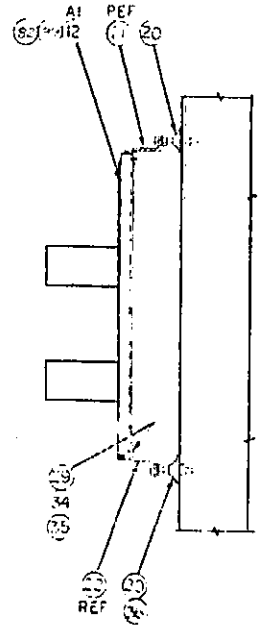
VIEW C-C
XMTR 1 & 2



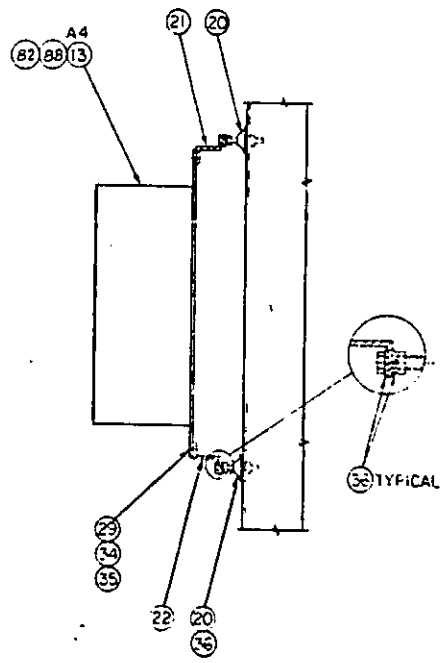
VIEW D-D
XMTR 1 & 2



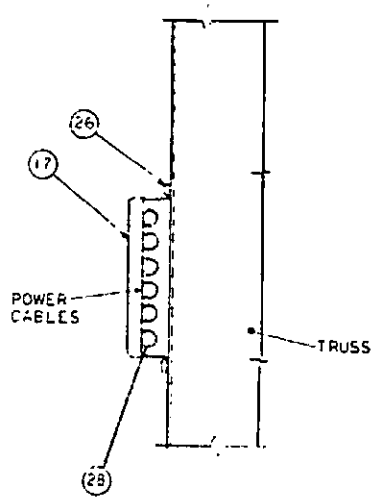
VIEW E-E
XMTR 1 & 2



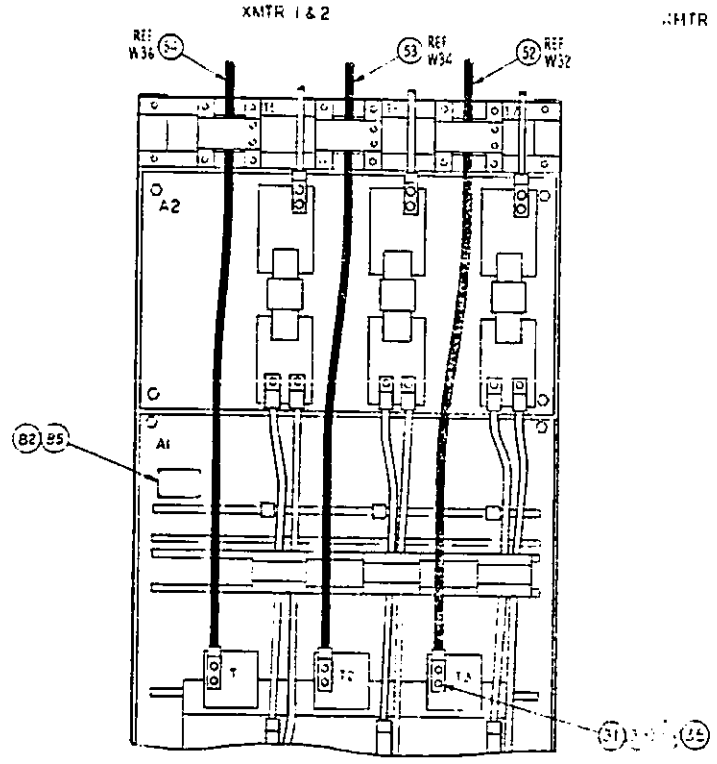
VIEW F-F
XMTR 1 & 2



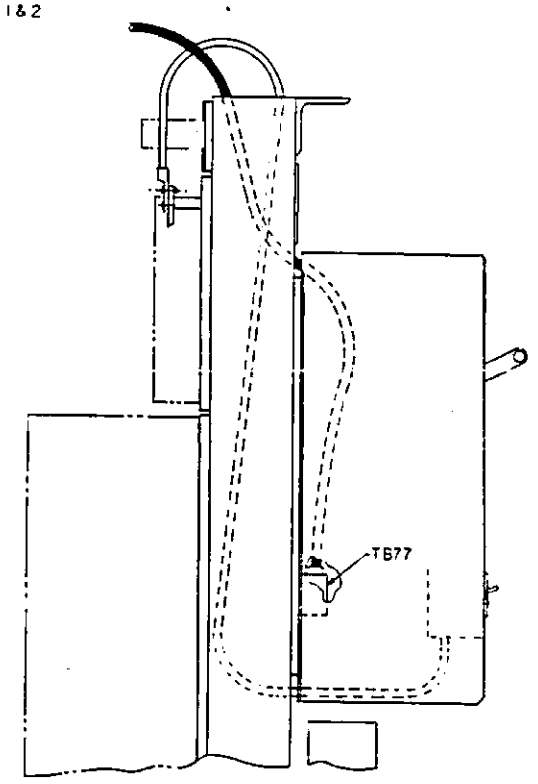
VIEW G-G
XMTR 1 & 2



VIEW H-H
XMTR 1 & 2



VIEW J-J
XMTR 1 & 2



VIEW K-K
ROTATED 90°
XMTR 1 & 2

75-009-1096281H

SEE SEPARATE ELM

Figure 5P. Power Supply Installation Drawing
(Sheet 5 of 5)

TABLE 8B. TRANSMITTER CABLE DUCTS LIST OF MATERIALS

TRANSMITTER 1 & 2 (SINGLE PULSE) QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON HIO88061 SHEET (1&2) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*) ITTFL SOURCE		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			22	1	1		D	1087841G1	CLAMP	120	1,2	6,8										33				
			2	1	2		C	1087833G1	PLATE, 90° TURN	120	1,2								2	X12 Y12		11,12,16,32				
			4	1	3		C	1087834G1	PLATE, 45° TURN	120	1,2								4	X12 Y12		11,12,14,15, 32				
			2	1	4		C	1087835G1	PLATE, TEE CONNECTION	120	1,2								2	X12 Y12		11,16,17,18, 22, 32				
			3	1	5		C	1087836G1	END CAP	120	1,2								3	X12 Y12		7,8,9,10				
			19	1	6		C	1087839G1	STRAP, CABLE DUCT	120	1,2	1							19	X12 Y12		10,11,12,13, 14,16,18-21				
			2	1	7		C	1087840G1	STRAP, JOINT	120	1,2								2	X12 Y12		5,16,17,20				
			3	1	8		C	1087842G1	STRAP, CABLE DUCT	120	1,2	1							3	X12 Y12		5,10,11				
			18	1	9		D	1087837G1	OUTLET, CABLE	120	1,2								18	X12 Y12		5,10,11,12,13,14,15 16,18,19,20,21,32				
			44	1	10		B	1087899	HOOK, CABLE DUCT	520	1,2								44	X12 Y12		5,6,8,11,12,13,14,15 16,18,19,20,21,29,30				
			4	1	11		D	1087832G1	DUCT, CABLE	120	1,2								4	X12 Y12		2,3,4,6,8,9, 10				
			3	1	12		D	1087832G2	DUCT, CABLE	120	1,2								3	X12 Y12		2,3,6,9,10				
			1	1	13		D	1087832G3	DUCT, CABLE	120	1,2								1	X12 Y12		6,9,10				
			2	1	14		D	1087832G4	DUCT, CABLE	120	1,2								2	X12 Y12		3,6,9,10				
			1	1	15		D	1087832G5	DUCT, CABLE	120	1,2								1	X12 Y12		3,9				
			2	1	16		D	1087832G6	DUCT, CABLE	120	1,2								2	X12 Y12		2,4,6,7,9,10				
			1	1	17		D	1087832G7	DUCT, CABLE	120	1,2								1	X12 Y12		4 7				B
			1	1	18		D	1087832G8	DUCT, CABLE	120	1,2								1	X12 Y12		4,6,9,10				

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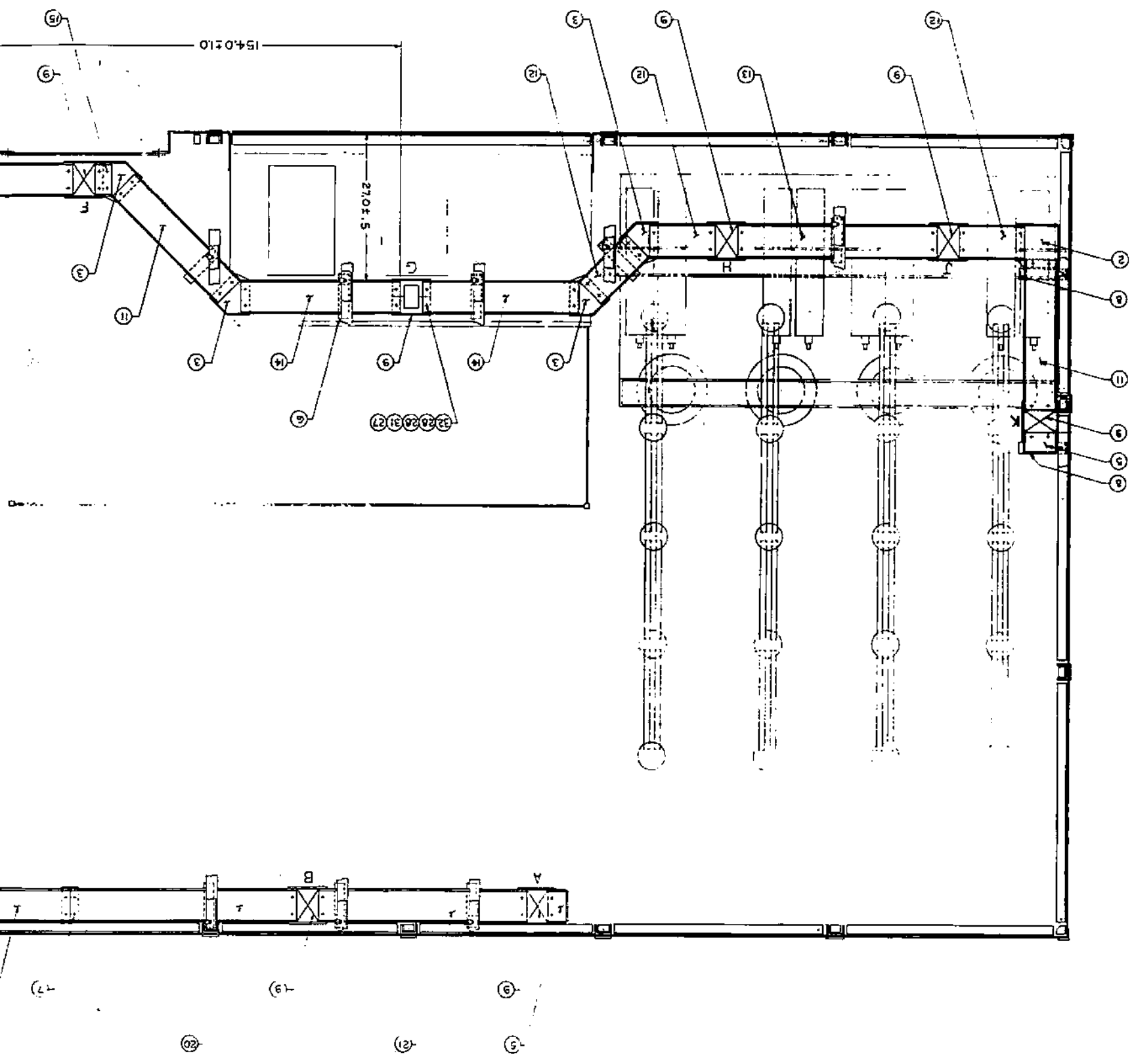
TABLE 8B. TRANSMITTER CABLE DUCTS LIST OF MATERIALS (Cont)

QUAN. PER GROUP G4	G3	G2	G1	TRANSMITTER 1&2 (SINGLE PULSE)	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON HIO 88061 SHEET (1&2) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*) ITTFL SOURCE		ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			1		1	19		D	1087832G9	DUCT, CABLE	120	1,2								1	X12 Y12		6,9,10				
			1		1	20		D	1087832G10	DUCT, CABLE	120	1,2								1	X12 Y12		6,7,9,10				
			1		1	21		D	1087832G11	DUCT, CABLE	120	1,2								1	X12 Y12		6,9,10				
			1		1	22		D	1088603G1	DUCT, CABLE	120	1,2								1	X12 Y12		4,26,34				
						23																					
						24																					
						25																					
			2		1	26			136009A116	SCW,HEX,HD., 1/4-20X.50	530	1,2								2	X12 Y12		22				
			140		1	27			107752	NUT, HEX, 1/4-20	530	1,2								128	X12 Y12		32				
			282		1	28			20609H018	WASHER, FLAT, 1/4	530	1,2								258	X12 Y12		26,32				
			44		1	29			180184	NUT,HEX,,SELF LOCK, 10-24	530	1,2								48	X12 Y12		10				
			44		1	30			200609H014	WASHER, FLAT, #10	530	1,2								48	X12 Y12		10				
			142		1	31			107268	WASHER, LOCK, SPLIT 1/4	530	1,2								130	X12 Y12		26,32				
			140		1	32			136009A124	SCW,HEX HD., 1/4-20X.75LG	530	1,2								128	X12 Y12		2,3,4,9 35				
			X		20	33		H	1087435G1	ENCLOSURE (L.P.)	760	1,2											1,35				
			X		20	34		H	1088019G1	RELAY RACK	760	1,2											22				
			1		1	35		D	108888SG1	DUCT, CABLE	120	1,2								1	X12 Y12		32,33				B

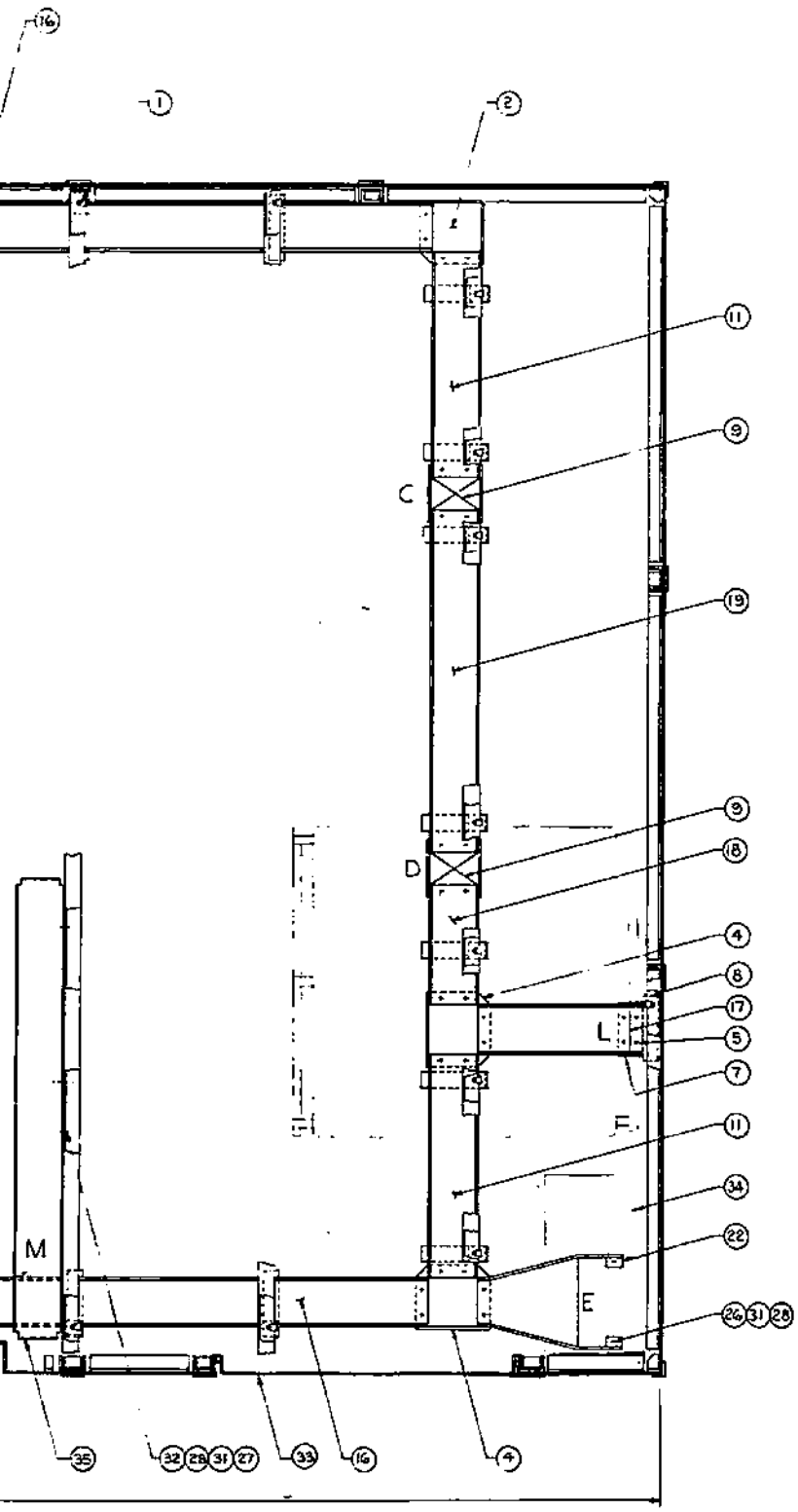
75-009-BLM10880616

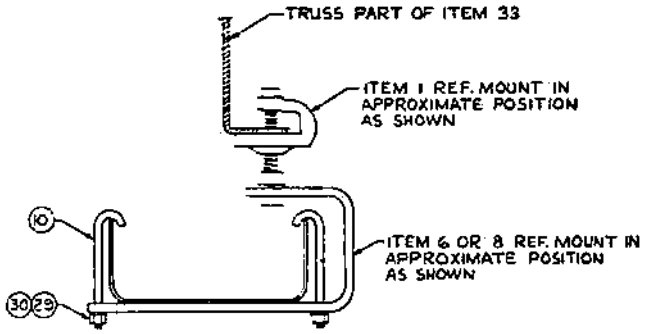
1088061C

TRANSMITTER NO. 2



NOTES
1. LETTERS 'A' THRU 'K' DENOTE CABLE OUTLETS.
2. LETTERS 'L & M' DENOTE SECTIONS FOR ROUTING CABLES





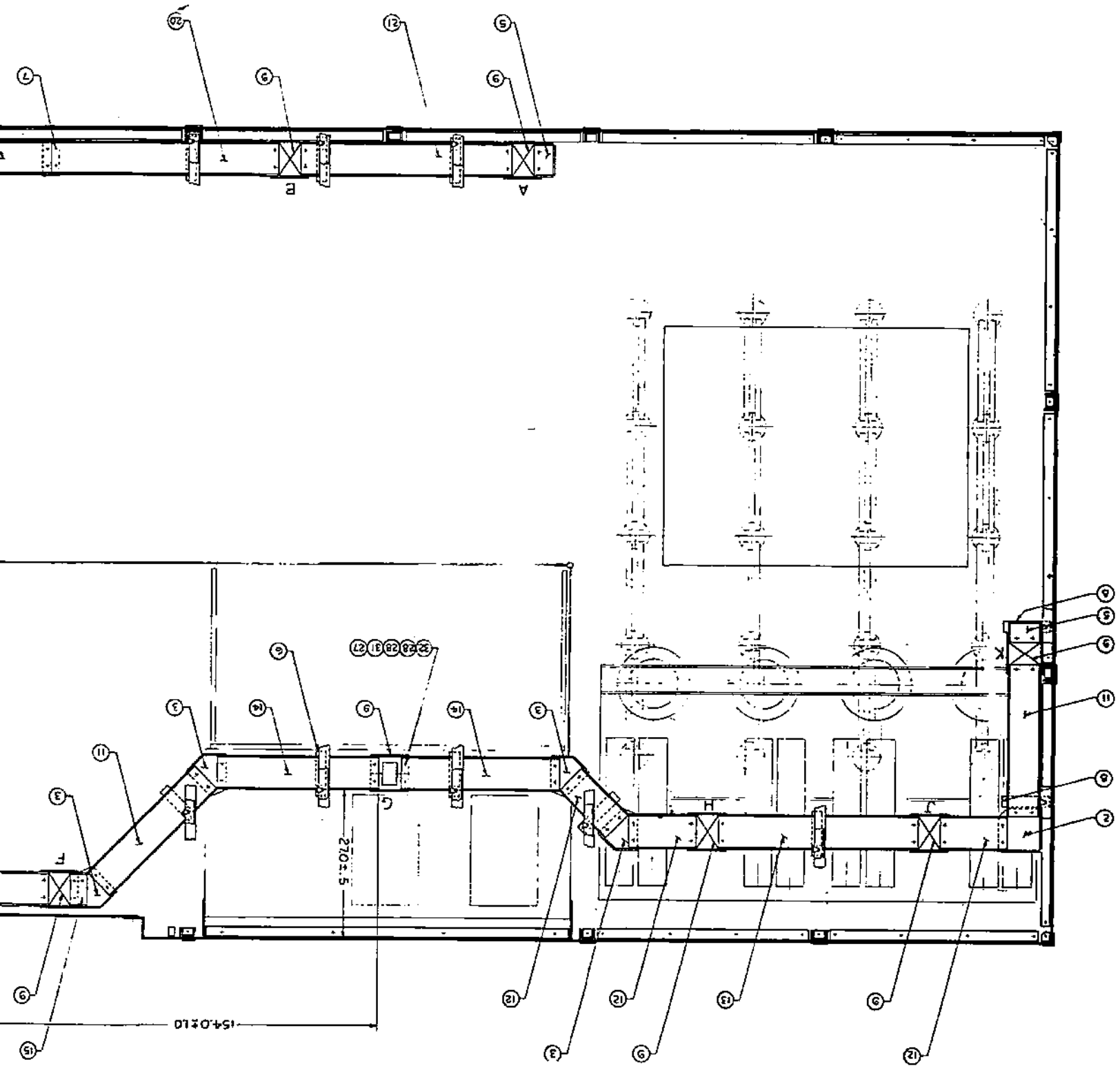
INSTALLATION DETAIL
FOR
CLAMP(IT 1) & STRAPS(ITS 6 & 8)

SCALE 1/2

Figure 6B. Transmitter Cable Ducts
(Sheet 1 of 2)

TRANSMITTER NO. 1

1088613



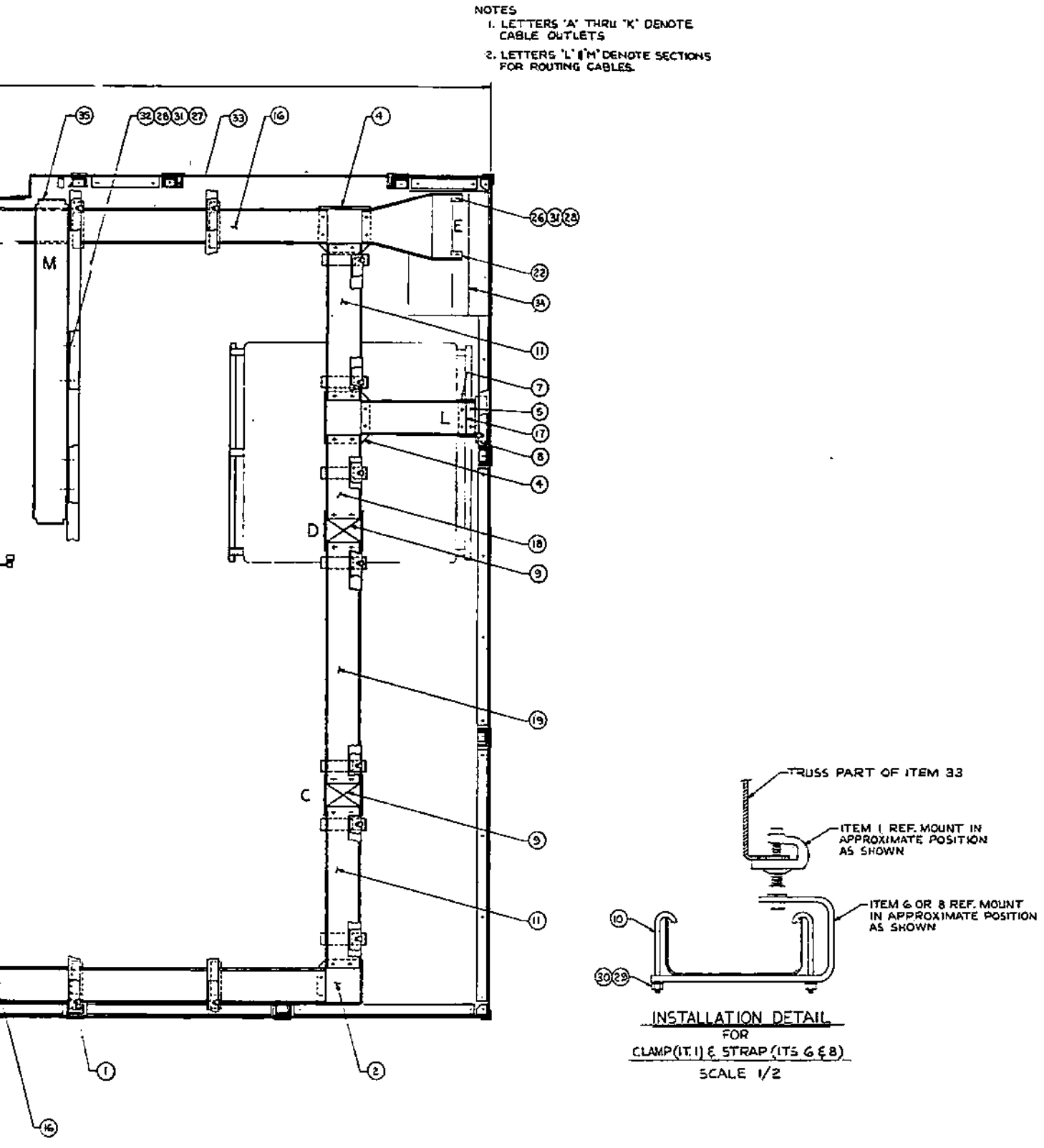


Figure 6B. Transmitter Cable Ducts
(Sheet 2 of 2)

TABLE 9D. TRANSMITTING GROUP CONNECTORS LIST OF MATERIALS

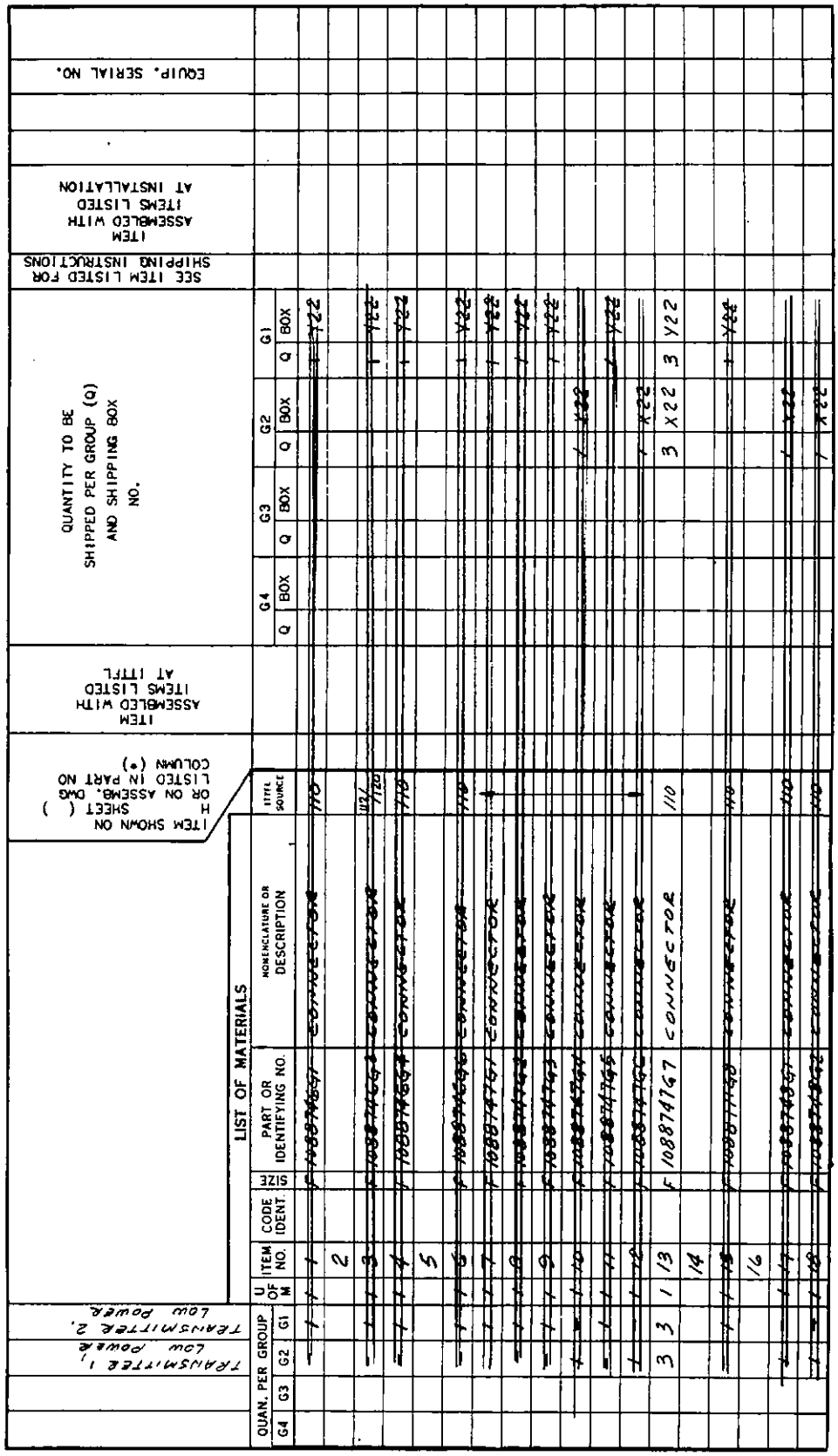


TABLE 9D. TRANSMITTING GROUP CONNECTORS LIST OF MATERIALS (Cont)

QUAN. PER GROUP G4	G3	TRANSMITTER 1 LOW POWER G2	TRANSMITTER 2 LOW POWER G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON SHEET ( ) H OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (•)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
		1	-	1	19			10887483	CONNECTOR	110							1	X22									
		1	-	1	20			10887484	CONNECTOR	110							1	X22									
		1	-	1	21			10887485	CONNECTOR	110							1	X22									
		1	-	1	22			10887486	CONNECTOR	110							1	X22									
		1	-	1	23			10887487	CONNECTOR	110							1	X22									
					24																						
		1	-	1	25			10887489	CONNECTOR	112/110							1	X22									
					26																						
					27																						
					28																						
					29																						
					30																						
					31																						
					32																						
					33																						
					34																						
					35																						
					36																						

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TABLE 9D. TRANSMITTING GROUP CONNECTORS LIST OF MATERIALS (Cont)

TRANSMITTER 1 LOW POWER	TRANSMITTER 2 LOW POWER	LIST OF MATERIALS							ITEM SHOWN ON H SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP		U OF M	ITEM NO.	CODE IDENT	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
G4	G3	G2	G1												Q	BOX	Q	BOX	Q	BOX	Q	BOX						
					37																					
					38																					
					39																					
		1	1	1	40		F	108874711	CONNECTOR	110							1	X22	1	Y22						
		~~1~~	~~—~~		~~41~~		~~F~~	~~10888154S~~	~~CONNECTOR~~	~~110~~							~~1~~	~~X22~~								
					42																					
		1	—		43		D	1096455G001	CONNECTOR								1	X22								
		—	1		44		D	1096455G002	CONNECTOR										1	Y22						
		1	1		45		D	1096455G005	CONNECTOR								1	X22	1	Y22						
					46																					
		1	—		47		D	1096455G003	CONNECTOR								1	X22								
		—	1		48		D	1096455G004	CONNECTOR										1	Y22						
		2	2	1	49		F	10888154G1	CONNECTOR	110							2	X22	2	Y22						
		2	2	1	50		F	10887716G9	CONNECTOR	112/120							2	X22	2	Y22						
					51																					
					52																					
					53																					
					54																					

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TABLE 9D. TRANSMITTING GROUP CONNECTORS LIST OF MATERIALS (Cont)

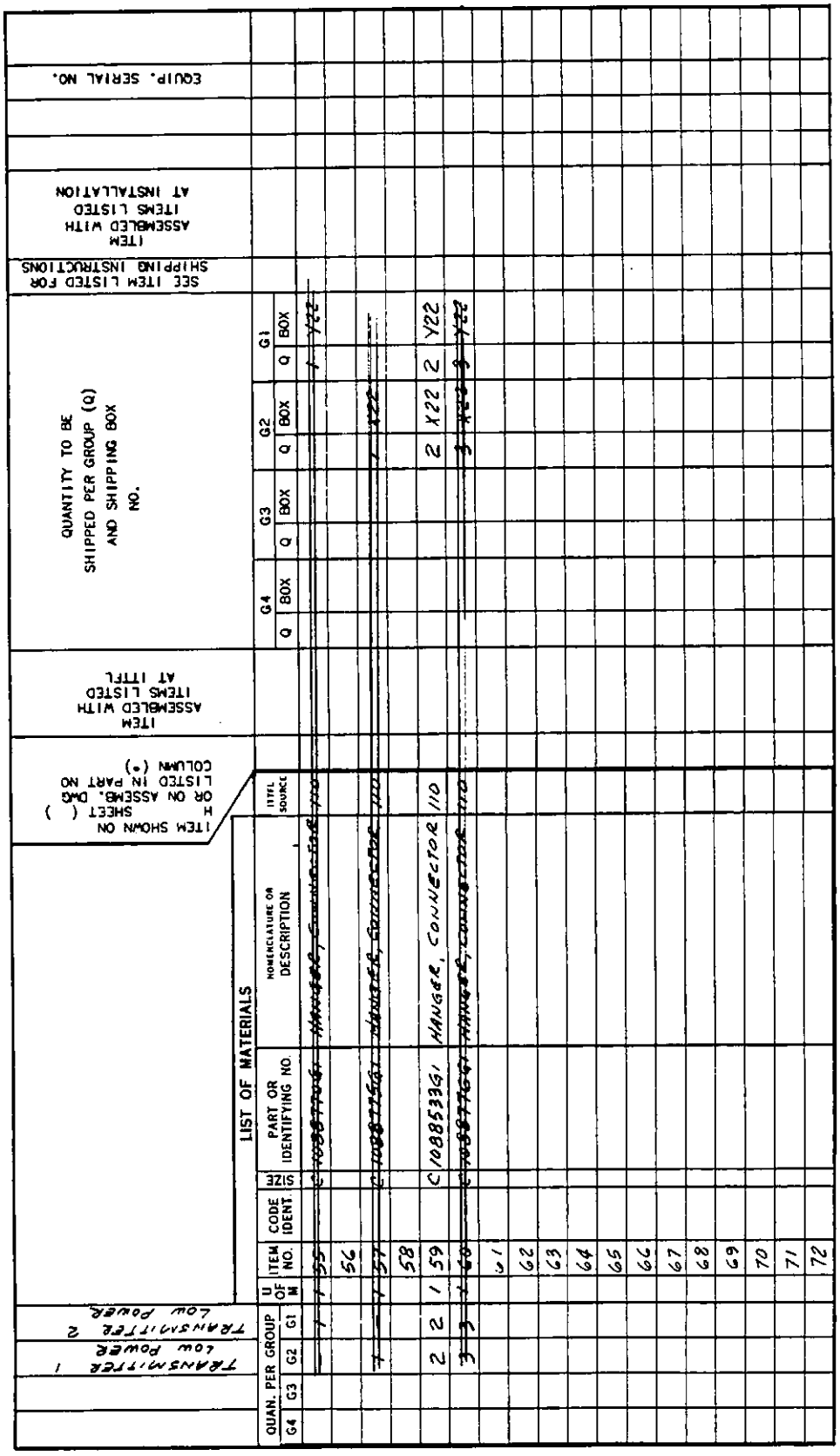


TABLE 9D. TRANSMITTING GROUP CONNECTORS LIST OF MATERIALS (Cont)

QUAN. PER GROUP G4	G3	TRANSMITTER 1 LOW POWER G2	TRANSMITTER 2 LOW POWER G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON H SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*) ITTFL SOURCE	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
		16	16	1	73			101609A316	SCR PAN HD 1/4-20 x 1/2L	530						16	X22	16	Y22						
		3	3	1	74			107749	NUT HEX 1/4-20	↕						3	↕	3	↕						
		17	17	1	75			107268	WASHER, LOCK SPLIT 1/4							17		17							
		17	17	1	76			200404	WASHER FLAT # 1/4	530						17		17							
~~1~~	~~1~~	~~1~~	~~77~~					~~107840~~	~~NUT HEX 3/8-16~~							~~1~~		~~1~~							
~~1~~	~~1~~	~~1~~	~~78~~					~~107376~~	~~WASHER LOCK 3/8~~							~~1~~		~~1~~							
~~4~~	~~4~~	~~1~~	~~79~~					~~15007EA05A~~	~~NUT CAP~~							~~4~~		~~4~~							
1	1	1	80					107224	WASHER LOCK SPLIT #10	530						1	X22	1	Y22						
1	1	1	81					200609H014	WASHER FLAT #10	530						1	X22	1	Y22						
1	1	1	82					MS35650-304	NUT, HEX, PLAIN #10-32	530						1	X22	1	Y22						

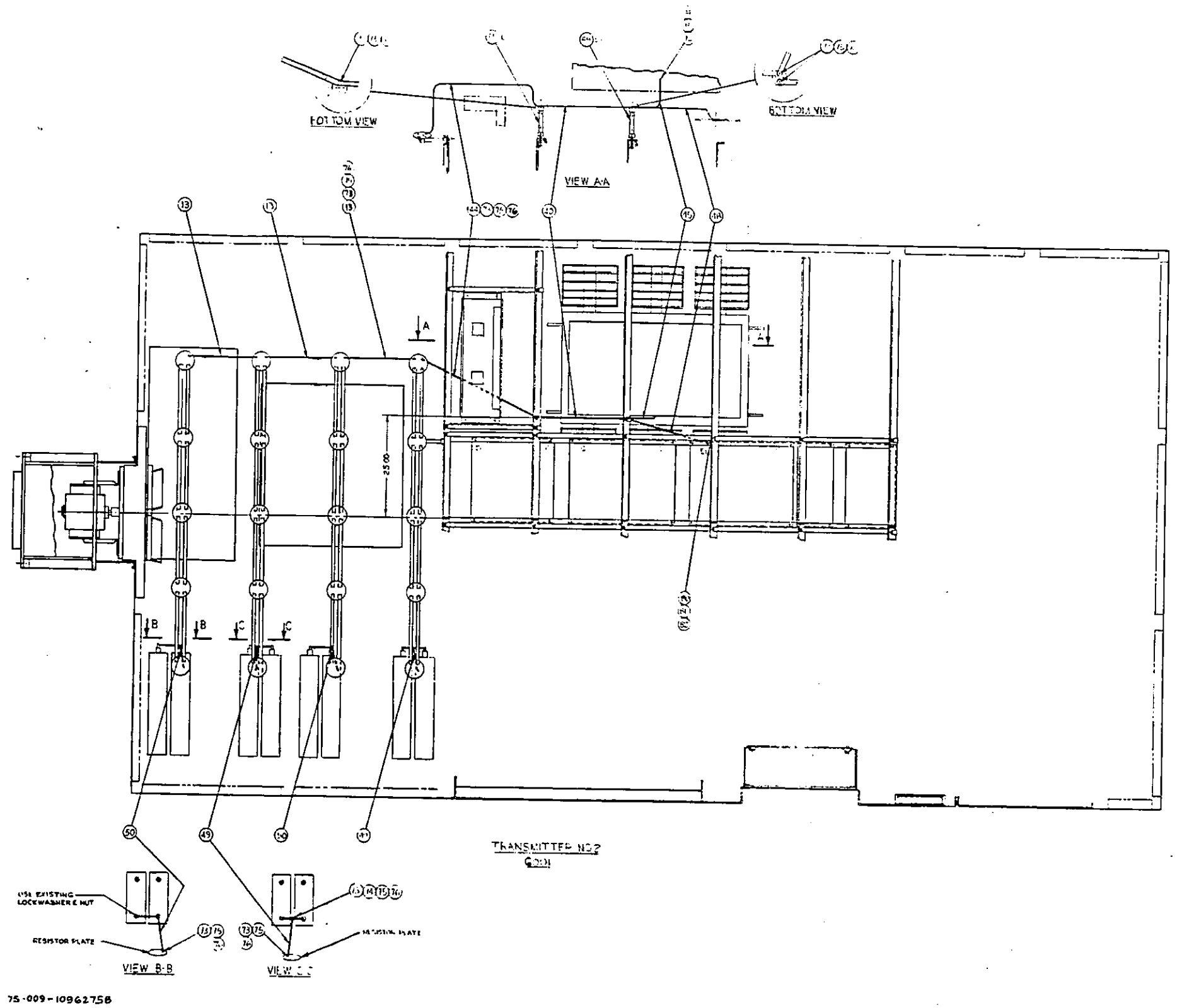
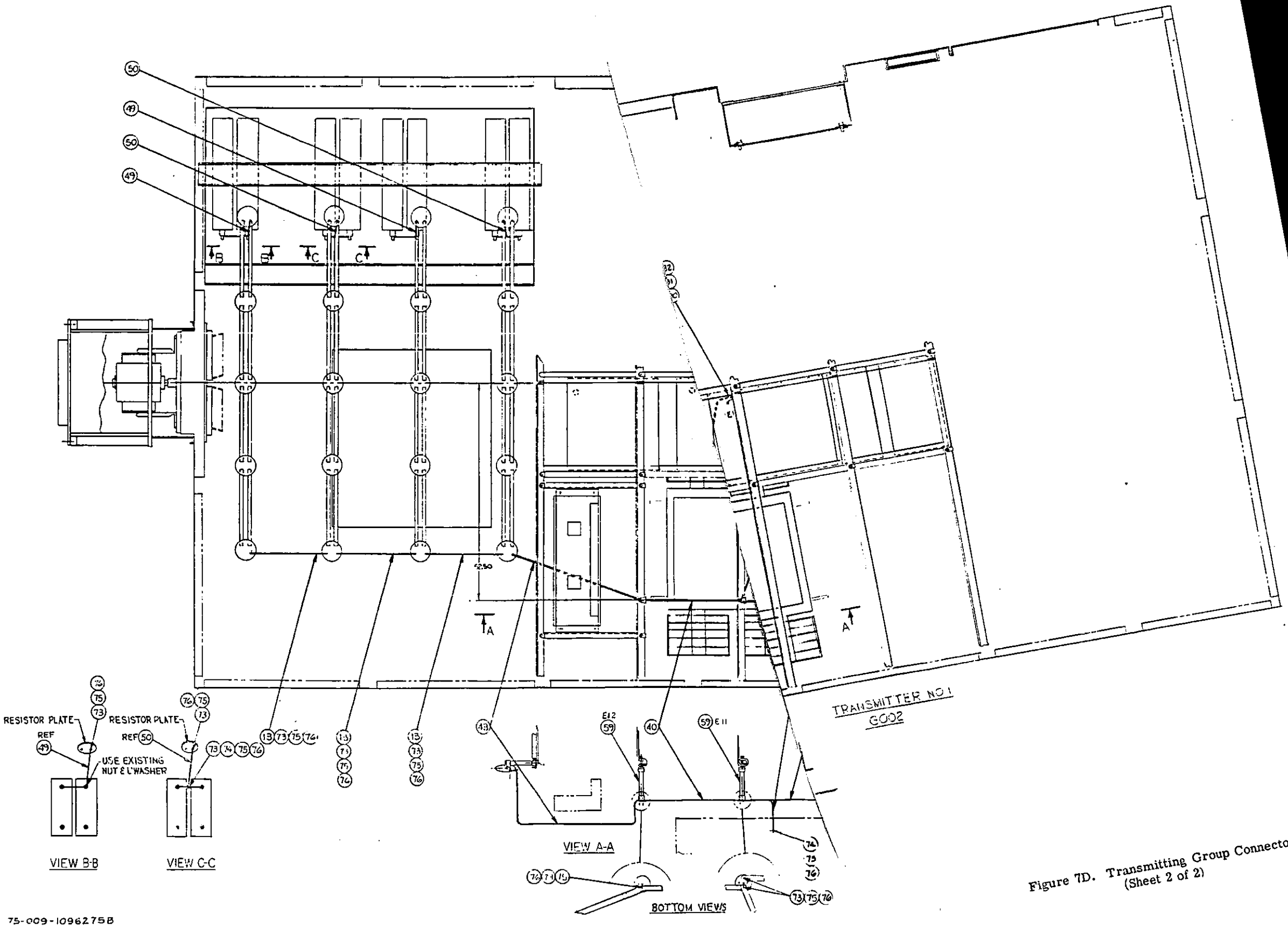


Figure 7D. Transmitting Group Connectors
(Sheet 1 of 2)

CG-273-136



75-009-1096275B

Figure 7D. Transmitting Group Connectors
(Sheet 2 of 2)

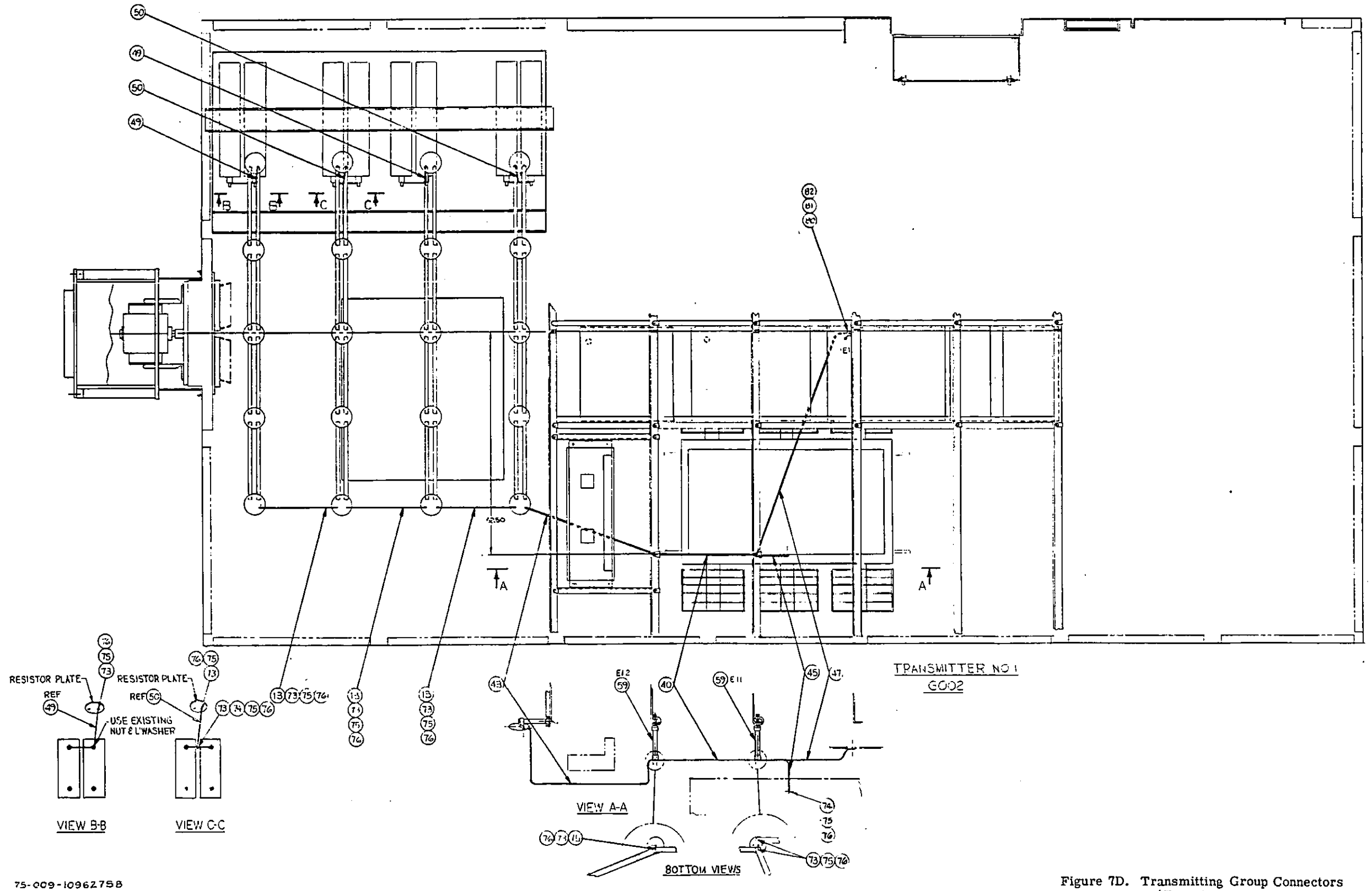


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Figure 7D. Transmitting Group Connectors
(Sheet 2 of 2)

TABLE 10S. TRANSMITTING GROUP ENCLOSURE PARTITION LIST OF MATERIALS

TRANSMITTER No.1 & No.2 HIGH & LOW POWER				LIST OF MATERIALS							ITEM SHOWN ON H10B5449 SHEET (1&2) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX						
					1																					
			1	1	2		H	1088449G2	SADDLE	533/123	1	11, 24							1	X15, Y15 L31, M31		7, 27, 9, 17, 26,				
			1	1	3		H	1088449G3	SUPPORT, TOP		1	4, 5, 28														
			1	1	4		H	1088449G4	ANGLE, CHANNEL MTG.		1	6, 23, 3, 28														
			1	1	5		H	1088449G5	ANGLE, FIXED PANEL MTG.		1	3, 28														
			1	1	6		H	1088449G6	CHANNEL, (ROLLER)		1	4, 23,							1	X15, Y15 L31, M31		9, 17				
			1	1	7		H	1088449G7	PANEL, FIXED		1	8, 29							1	X15 Y15 L31, M31		5, 2, 28, 27				
			2	1	8		H	1088449G8	STIFFENER, FIXED PANEL		1	7, 29														
			1	1	9		H	1088449G9	UPRIGHT, RIGHT HAND		1	10, 24,							1	X15, Y15 L31, M31		2, 6, 26, 27, 30				
			1	1	10		H	1088449G10	ANGLE, UPRIGHT (R.H.)		1	9, 24														
			2	1	11		H	1088449G11	GUIDE, DOOR		1	2, 24														
			1	1	12		H	1088449G12	DOOR, RIGHT HAND		1	13, 14, ~~15~~, 25							1	X15, Y15 L31, M31		6, 15				
			2	1	13		H	1088449G13	CHANNEL, TOP, DOOR		1	12, 16,														
			2	1	14		H	1088449G14	CHANNEL, BOTTOM, DOOR		1	12, 16,														
			4	1	15		H	1088449G15	~~HANGER ASSY~~ HANGER ASSY		1	~~12, 33, 16~~							4	X15 Y15		12, 16, 33				
			1	1	16		H	1088449G16	DOOR, LEFT HAND		1	13, 14, ~~15~~, 25,							1	X15, Y15 L31, M31		6, 15				
			1	1	17		H	1088449G17	UPRIGHT LEFT HAND		1	18, 24,							1	X15, Y15 L31, M31		2, 6, 26, 27, 30				
			1	1	18		H	1088449G18	ANGLE, UPRIGHT (L.H.)	533/120	1	17, 24,														S

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TABLE 10S. TRANSMITTING GROUP ENCLOSURE PARTITION LIST OF MATERIALS (Cont)

TRANSMITTER No.1 & No.2 HIGH & LOW POWER				LIST OF MATERIALS						ITEM SHOWN ON H10884-49 SHEET (1&2) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1						
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX					
			1	1	19		H	1088449G19	PANEL, SIDE	532/123	1	21, 22, 28,							1	X15, Y15 L31, M31					
			2	1	20		H	1088449G20	STIFFENER, SIDE PANEL		1	19, 29													
			1	1	21		H	1088449G21	ANGLE, SIDE PANEL (L.H.)		1	19, 28													
			1	1	22		H	1088449G22	ANGLE, SIDE PANEL (R.H.)	532/120	1	19, 28													
			8	1	23		H	100648A116	SCREW, RD. HD. #10-32X1/2	530	1	4.6													
			20	1	24		H	1088449G24	SCREW, FLAT HD. 1/4-20X5/8		1	11, 2, 9, 10, 17, 18													
			12	1	25		H	1088449G25	SCREW, FLAT HD. 1/4-20X1 3/8		1	12, 13, 14, 16,													
			5	1	26		H	1088449G26	SCREW, RD. HD. 1/4-20X1/2		1								5	X15, Y15 L31, M31		2, 9, 17,			
			8	1	27		H	1088449G27	SCREW, RD. HD. 1/4-20X3/4		1								8	X15, Y15 L31, M31		2, 7, 9, 6, 17,			
			27	1	28		H	1088449G28	SCREW, RD. HD. 1/4-20X1"		1	3, 4, 5, 19, 21, 22							5	X15, Y15 L31, M31		5, 7			
			7	1	29		H	1088449G29	SCREW, RD. HD. 1/4-20X1 1/4		1	7, 8, 19, 20													
			3	1	30		H	1088449G30	SCREW, RD. HD. 1/4-20X2"		1								3	X15, Y15 L31, M31		9, 6, 17			
					~~31~~		~~H~~	~~1088449G31~~	~~WASHER, FLAT, 1/4~~																
			8	1	32		H	1088449G32	WASHER, LOCK, SPLIT #10		1	23													
			86	1	33		H	1088449G33	WASHER, LOCK, SPLIT, 1/4		1	12, 28, 29, 24, 25							21	X15, Y15 L31, M31		26, 27, 28, 30,			
			8	1	34		H	1088449G34	NUT, HEX. #10-32		1	23													
			68	1	35		H	1088449G35	NUT, HEX. 1/4-20	530	1	28, 29, 24, 25							11	X15, Y15 L31, M31		27, 28, 30,			S

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TABLE 10S. TRANSMITTING GROUP ENCLOSURE PARTITION LIST OF MATERIALS (Cont)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON M1088449 SHEET (162) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*) ITEM SOURCE	ITEM ASSEMBLED WITH ITEMS LISTED AT ITEM	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION	EQUIP. SERIAL NO.
			4	1	36			4108449436	SCREW SPECIAL	[illegible] 2	15											
			4	1	37			MS35649-284	NUT HEX 8-32	[illegible] 2	15											
			4	1	38			MS51957-53	SCR PAN HD 8-32 x 2.00	[illegible] 2	15											
			4	1	39			MS35338-137	WASHER, LOCK, SPLIT #8	[illegible] 2	15											
			4	1	40			MS15795-841	WASHER, FLAT #8	[illegible] 2	15											

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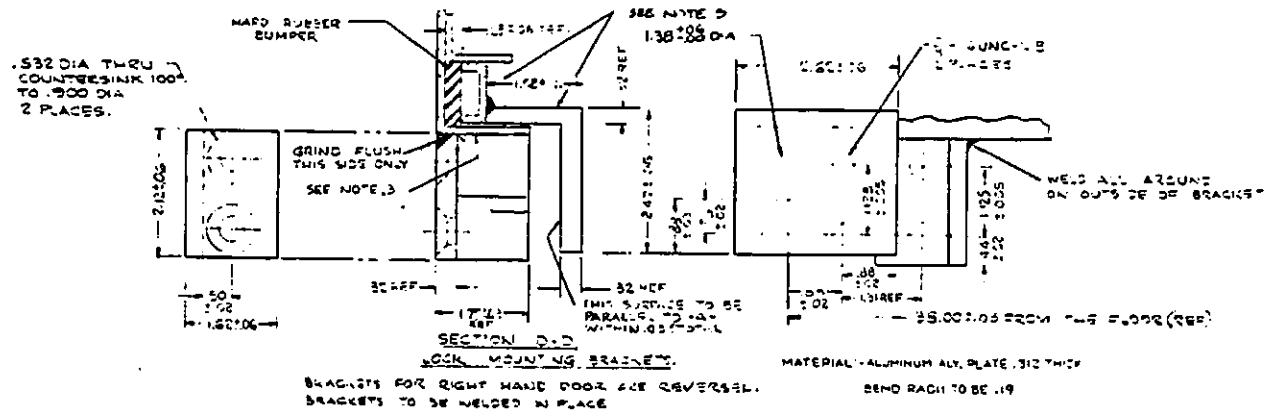

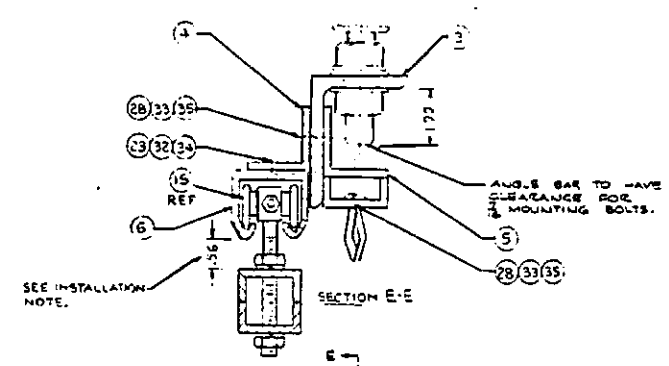

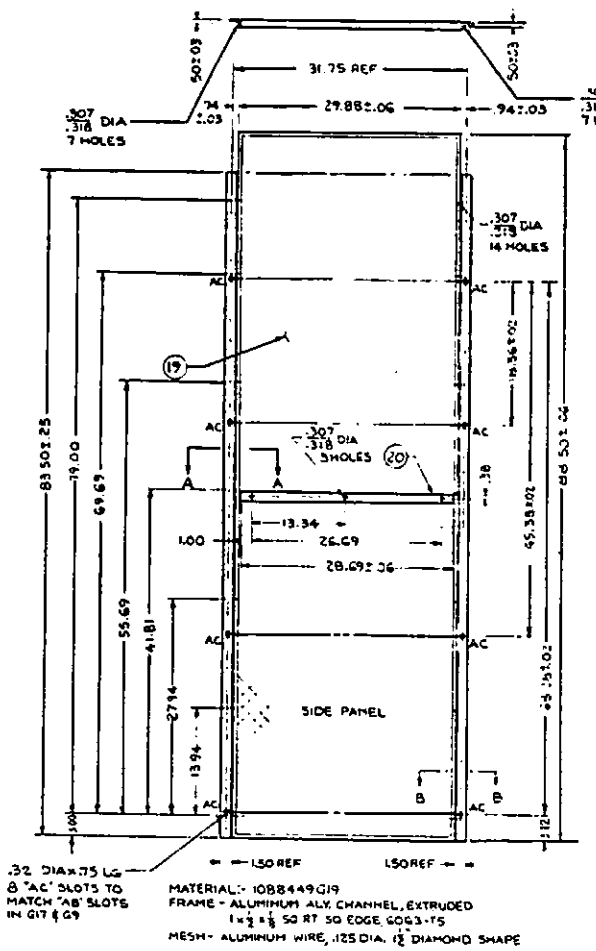

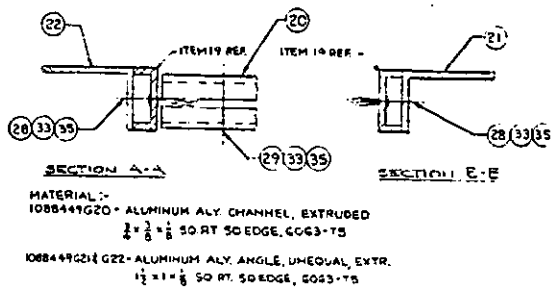

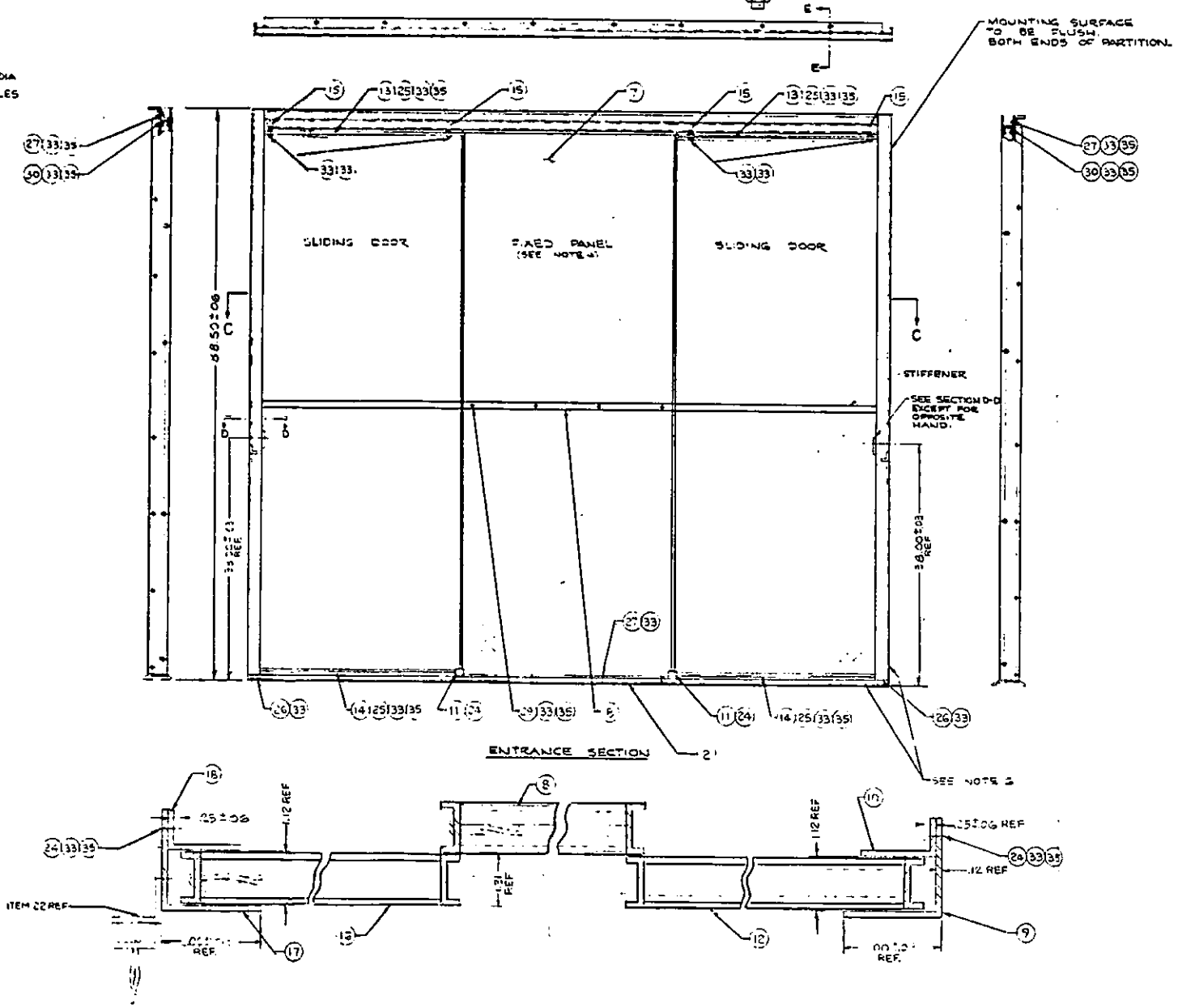

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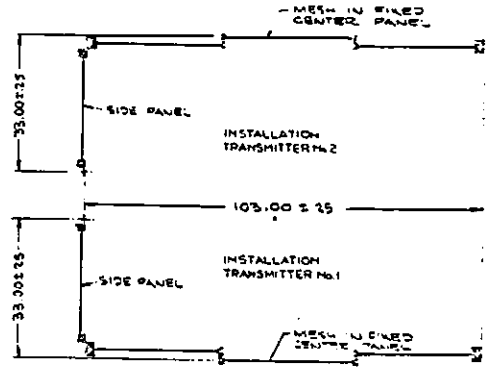
FABRICATION NOTES -

1. RIVETS TO BE ALUMINUM SCREWS WASHERS & NUTS TO BE AUSTENITIC CORROSION RESISTANT STEEL.
2. FINISH: CHROMATE CONVERSION COATING PER MIL-C-5541 YELLOW IRIDESCENT USING IRIDITE #14-2. TO BE A FUNCTION OF LTT.F.L.
3. SCRATCHES ON INSIDE OF THIS BRACKET MUST BE CLEAN AND FREE OF WELD.
4. CENTER PANEL MUST BE MOUNTED SO THAT IT CAN BE REMOVED FROM INSTALLED PARTITION WITHOUT DISTURBING THE WHOLE SECTION
5. THIS END OF BRACKET MAY BE FORMED AND WELDED TO FRAME ACCORDING TO MANUFACTURING CONDITIONS
6. DOOR SADDLE TO BE ATTACHED TO FIXED PORT (CHANNEL 12) SO THAT IT CAN BE EASILY REMOVED FROM INSTALLED PARTITION.
7. SUPPLIER TO SHIP PARTITION UNASSEMBLED AS LISTED ON LIST OF MATERIAL.

SOURCE:- 130/120/110
ALL PARTS ON THE L/M SHALL BE PURCHASED FROM THE SAME SUPPLIER. THOSE PARTS SOURCED 532/120 ON THE L/M SHALL BE ROUTED TO ITT F.L. FABRICATION FOR FINISHING BEFORE BEING ROUTED TO ASSEMBLY THOSE PARTS SOURCED 530 ON THE L/M SHALL BE ROUTED DIRECTLY TO ASSEMBLY



ALTERNATE INSTALLATIONS OF PARTITION.
NOTE POSITION OF FIXED CENTER PANEL IN RESPECT TO SIDE PANEL.

INSTALLATION NOTE -
ASSEMBLE SLIDING DOORS ITEMS 12 & 15 APPROX TO .56 DIM AND ADJUST AS REQUIRED TO PERMIT ENGAGEMENT OF KIRK LOCKS.

RECOMMENDED SUPPLIER -
WIRE & IRON PRODUCTS INC.
DETROIT MICH.
COUF IDENT NO. [illegible]
SUPPLIERS No. W9455

Figure 8S. Transmitting Group Enclosure Partition

TABLE 11W. TRANSMITTING SET LIST OF MATERIALS

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON H SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
			1	1	1		H	1087428G4	TRANSMITTER GROUP NO. 2	110									1	Y1-Y40						
			1	1	2		H	1087428G3	TRANSMITTER GROUP NO. 1	110									1	X1-X40						
					3																					
			1	1	4		H	1087429G4	ANTENNA MATCH NET.	110		5,10,13							1	W1						
			1	1	5		F	087432G3	DUMMY LOAD	110		4,10,13														
					6																					
			1	1	7		B	1088723G4	INSTALLATION MATL	110									1	W3, W5, W6						
					8																					
					9																					
			4	1	10			138772	SCREW, HEX HD, 5/8-11X1 3/4	530		4,5														
			6	1	11			215203	WASHER, LOCK, SPLIT 5/8	530		10,13														
					12																					
			2	1	13		B	1089083G1	SCREW, HEX SOC, 5/8-11X2	53J		4,5														
					14																					
			X	20	15		A	2138275	CROSS REF LIST	7W3																
			1	1	16		C	1088969G1	TUBE INSTALLER	110									1	W5						
			X	20	17		A	2138265-4	COMPONENT CROSS REFERENCE LIST	7W2																W

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TABLE 11W. TRANSMITTING SET LIST OF MATERIALS (Cont)

QUAN. PER GROUP G4	G3	G2	G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON SHEET ( ) H OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION	EQUIP. SERIAL NO.	
			X	20	18		E	1096453G001	FUNCTIONAL DIAGRAM, LORAN XMTG SET AN/FPN-44A	760														
			X	20	19		E	1096454G001	FUNCTIONAL DIAGRAM, POWER SUPPLY SET 1A53	760														
			X	20	20		F	1096500G001	WIRING DIAGRAM	760														
			X	20	21		A	1096541G001	SHIPPING-REASSEMBLY INSTRUCTIONS FOR ANTENNA MATCHING NETWORK DUMMY LOAD	760														
				4	1	22			TECHNICAL MANUAL (FINAL)									4	W1					

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TABLE 12E. INSTALLATION MATERIAL LIST OF MATERIALS

AN/FPN-44A
TRAINING, GROTON NUS 6551
DEVELOP. MODEL, WILDWOOD. NUS 5867
PROD. MODEL, SINGLE PULSE NUS 6552

QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE	ITEM SHOWN ON H108872 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
G4	G3	G2	G1						LIST OF MATERIALS				G4		G3		G2		G1						
													Q	BOX	Q	BOX	Q	BOX	Q	BOX					
2	1	1	2	1	1		D	1088118G1	BOTTOM, CABLE DUCT	120			2	W3	1	W3	1	W3	2	W3		2, 4, 37, 42, 44			
2	1	1	2	1	2		C	1088511G1	DUCT ASSEMBLY	110			2	W3	1	W3	1	W3	2	W3		1, 3, 4			
4	2	2	4	1	3		C	1088068	BRACKET	520			4	W3	2	W3	2	W3	4	W3		2, 5, 41			
4	2	2	4	1	4		D	1088135G1	COVER, CABLE DUCT	120			4	W3	2	W3	2	W3	4	W3		1, 41, 2			
4	2	2	4	1	5		B	1088516	BLOCK	520			4	W3	2	W3	2	W3	4	W3		3, 41			
1	–	–	1	1	6		D	1088638	SHIELD, ANTENNA LEADS	530			1	W3					1	W3		9, 10, 33			
1	1	1	1	1	7		D	1088639	SHIELD	530			1	W3	1	W3	1	W3	1	W3		9, 10, 33			
1	–	1	1	1	8		D	1088640	SHIELD	530			1	W3					1	W3		10, 11, 33			
2	1	1	2	1	9		D	1088641	SHIELD	530			2	W3	1	W3	1	W3	2	W3		6, 7, 33			
2	1	1	2	1	10		D	1088642	SHIELD	530			2	W3	1	W3	1	W3	2	W3		6, 7, 8, 31, 33			
1	–	–	1	1	11		D	1088643G1	SHIELD	530			1	W3					1	W3		8, 33			
1	1	1	1	1	12		D	1088644G1	SHIELD	530			1	W3	1	W3	1	W3	1	W3		31, 33			
–	–	–	–		13			NOT USED																	
–	–	–	–		14			NOT USED																	
–	–	–	–		15			NOT USED																	
–	–	–	–		16			NOT USED																	
–	–	–	–		17			NOT USED																	E
2	1	1	2	1	18		B	1088759G1	TUBING ASSY	110			2	W3	1	W3	1	W3	2	W3		24			

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TABLE 12E. INSTALLATION MATERIAL LIST OF MATERIALS (Cont)

TRAINING, GROTON HUS 6551	DEVELOP. MODEL, WILDWOOD NUS 5867	PROD. MODEL, SINGLE PULSE HUS 6552	LIST OF MATERIALS							ITEM SHOWN ON 1088723 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP												G4		G3		G2		G1							
G4	G3	G2	G1	U OF M	ITEM NO	CODE IDENT	SIZE	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE		Q	BOX	Q	BOX	Q	BOX	Q	BOX						
2	1	1	2	1	19		F	1088763G5	TUBING	110		2	W3	1	W3	1	W3	2	W3		25,32				
~~1~~	~~1~~	~~1~~	~~2~~	~~1~~	~~20~~		~~F~~	~~1088763G6~~	~~TUBING~~					~~1~~	~~W3~~	~~1~~		~~2~~	~~W3~~		~~21,32~~				
~~1~~	~~1~~	~~1~~	~~2~~	~~1~~	~~21~~		~~F~~	~~1088763G7~~	~~TUBING~~					1		1		2	W3		23,32,20				
2	1	1	2	1	22		F	1088762G3	TUBING			2	W3	1	W3	1	W3	2	W3		32				
~~1~~	~~1~~	~~1~~	~~2~~	~~1~~	~~23~~		~~F~~	~~1088761G3~~	~~TUBING~~					~~1~~		~~1~~		~~2~~	~~W3~~		~~21,32~~				
2	1	1	2	1	24		F	1088762G4	TUBING			2	W3	1	W3	1	W3	2	W3		18,				
2	1	1	2	1	25		F	1088762G5	TUBING	110		2	W3	1		1	W3	2	W3		19,32				
					26																				
					27																				
1	-	1	1	1	28		B	1089007G8	WIRE ASSEMBLY (W356)	110		1	W5	-		1	W5	1	W5		30,41				
					29																				
1	-	1	1	1	30		B	1088249G2	CAP	520		1	W3	-		1	W3	1	W3		28,36,41				
1	1	1	1	1	31		D	1088679	SHIELD	530		1	W3	1	W3	1	W3	1	W3		12,33				
4	2	2	4	1	32		C	1088133G4	CONNECTOR	120		4	W3	2	W3	2	W3	4	W3		~~1,20,21~~ 22,~~33~~,25,37				
84	42	42	84	1	33			102309A032	SCR FIL HD, NYLON 1/4-20 X ~~3/4~~ 1" LG.	530		84	W3	42	W3	42	W3	84	W3		6,7,8,9,10,11 12,13,31,34,35				
168	84	84	168	1	34			171304A009	NUT, HEX, NYLON 1/4-20	530		168	W3	84	W3	84	W3	168	W3		33				
168	84	84	168	1	35			200631A116	WASHER, NYLON, 1/4	530		168	W3	84	W3	84	W3	168	W3		33				E
1	-	1	1	1	36		B	1089007G7	WIRE ASSEMBLY (W357)	110		1	W5	-		1	W5	1	W5		30,41				

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TABLE 12E. INSTALLATION MATERIAL LIST OF MATERIALS (Cont)

TRAINING, GROTON NUS 6551	DEVELOP. MODEL, WILDWOOD NUS 5867	PROD. MODEL, SINGLE PULSE NUS 6552	LIST OF MATERIALS						ITEM SHOWN ON H 1088723 SHEET (1) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1						
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX					
32	16	16	32	1	37			100307A124	SCREW, FIL. HD. 10-24 x 3/4 LG.	530			32	W3	16	W3	16	W3	32	W3		1, 32, 38, 40				
32	16	16	32	1	38			107983	NUT, HEX, 10-24				32	W3	16	W3	16	W3	32	W3		37				
~~20~~	~~20~~	~~20~~	~~40~~	~~1~~	~~39~~			~~200609H014~~	~~WASHER, FLAT, #10~~						~~20~~		~~20~~		~~40~~	~~W3~~		~~37~~				
32	16	16	32	1	40			107224	WASHER, LOCK, SPLIT, #10				32	W3	16	W3	16	W3	32	W3		37				
33	16	17	33	1	41			136009A120	SCR, HEX HD 1/4-20X5/8LG				33	W3	16		17		33	W3		2, 3, 4, 5, 42, 43, 44, 28, 30, 36				
20	10	10	20	1	42			107752	NUT, HEX, 1/4-20				20	W3	10		10		20	W3		41				
30	15	15	30	1	43			200609H018	WASHER, FLAT # 1/4	↓			30	W3	15		15		30	W3		41				
39	19	20	39	1	44			107268	WASHER, LOCK, SPLIT 1/4	530			39	W3	19		20		39	W3		41				
100	50	50	100	32	45		A	213354003	SLEEVING (SPIRAP) 1/2"	931			100'	W3	50'		50'		100'	W3						
100	50	50	100	1	46		B	~~2911188~~ 1088736	STRAP	530			100	W3	50	↓	50	↓	100	W3						
3	-	-	2	1	47		B	1088946G1	DUCT, HINGE COVER (LDG2)				3	W6					2	W6						
8	3	3	7	1	48		B	1088946G2	DUCT, HINGE COVER (LDG5)				8	W6	3	W6	3	W6	7	W6						
3	1	1	3	1	49		B	1088947	DUCT, TELESCOPE (LDGTF)				3	W6	1	↓	1	↓	3	W6						
2	1	1	1	1	50		B	1088948	90° ELBOW (LDG90L)				2	W6	1	↓	1	↓	1	W6						
—	-	-	1	1	51		B	1088949	TEE (LDGT)	↓									1	W6						
2	1	1	1	1	52		B	1088950	CLOSING PLATE (LDGCP)	530			2	W6	1	W6	1	W6	1	W6						
X	X	X	X	20	53			PART OF ITS 47, 48, 50 & 51	CONNECTOR (LDGC)	760			13	W6	4	W6	4	W6	12	W6						E
					54																					

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TABLE 12E. INSTALLATION MATERIAL LIST OF MATERIALS (Cont)

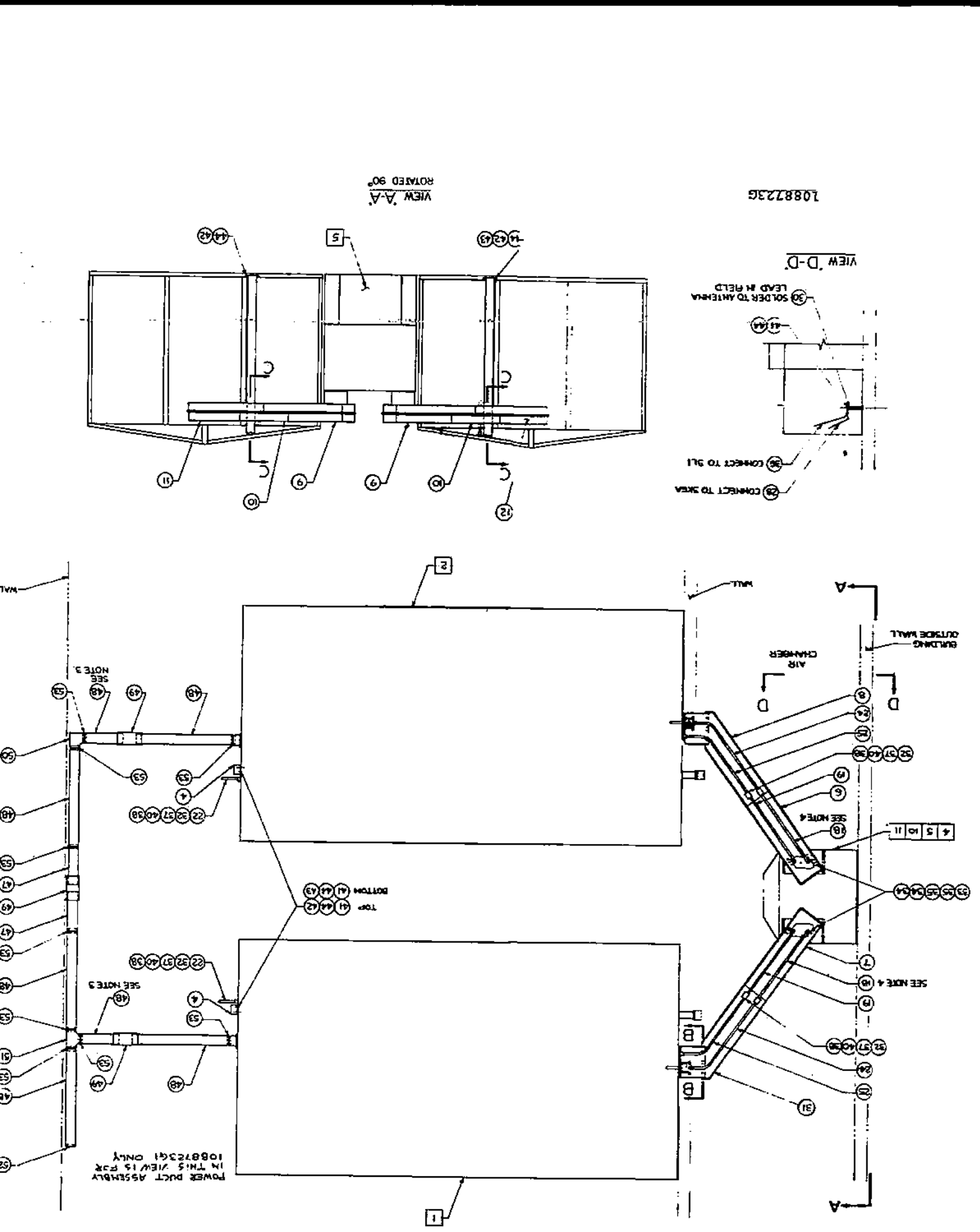
QUAN. PER GROUP G4	QUAN. PER GROUP G3 (TRAINING, GROTON NUS6551)	QUAN. PER GROUP G2 (DEVELOP. MODEL, WILDWOOD NUS5867)	QUAN. PER GROUP G1 (PROD. MODEL, SINGLE PULSE NUS6552)	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON SHEET ( ) H OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITTFL SOURCE	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION	EQUIP. SERIAL NO.	
X	—	—	X	20	55		D	1088758G1	CABLING DIAGRAM (W301)		760		1	W5					1	W5				
X	—	—	X	20	56		D	1088738G1	CABLING DIAGRAM (W302)		760		1	W5					1	W5				
X	—	—	X	20	57		D	1088738G2	CABLING DIAGRAM (W303)		760	ITEM 4 OF TRANS. SET												
X	—	—	X	20	58		D	1088738G3	CABLING DIAGRAM (W304)		760	ITEM 4 OF TRANS. SET												
—	—	—	—	1	59		C	~~1088725G1~~	~~CABLING ASSEMBLY (W305)~~		110								1	W5				
—	—	—	—	1	60		C	~~1088725G2~~	~~CABLE ASSEMBLY (W306)~~		110	ITEM 4 OF BLM1088723G3												
X	X	X	X	20	61		D	1088758G2	CABLING DIAGRAM (W307)		760		1	W5	1	W5	1	W5	1	W5				
X	X	X	X	20	62		D	1088738G4	CABLING DIAGRAM(W308)		760		1	W5	1	W5	1	W5	1	W5				
X	—	X	X	20	63		D	1088738G5	CABLING DIAGRAM (W309)		760	ITEM 4 OF TRANS. SET												
X	—	X	X	20	64		D	1088738G6	CABLING DIAGRM (W310)		760	ITEM 4 OF TRANS. SET												
—	1	1	1	1	65		C	~~1088725G3~~	~~CABLE ASSEMBLY (W311)~~		110				1	W5	1	W5	1	W5				
—	—	—	1	1	66		C	~~1088725G4~~	~~CABLE ASSEMBLY (W312)~~		110	ITEM 4 OF BLM1088723G3												
1	—	—	1	1	67		C	1088725G5	CABLE ASSEMBLY(W313)		110	ITEM 4 OF TRANS. SET												
1	1	1	1	1	68		A	1088721G1	CABLING MATERIAL		110													
—	X	X	X	20	69		A	1088627	INTERCONNECTING CABLE		760													
X	—	—	X	20	70		D	1088738 G13	CABLING DIAGRAM (W348)		760		1	W5					1	W5				
X	—	—	X	20	71		D	1088738 G 14	CABLING DIAGRAM(W349)		760		1	W5					1	W5				E
X	—	—	X	20	72		D	1088738 G 17	CABLING DIAGRAM(W352)		760	ITEM 4 OF TRANS. SET												

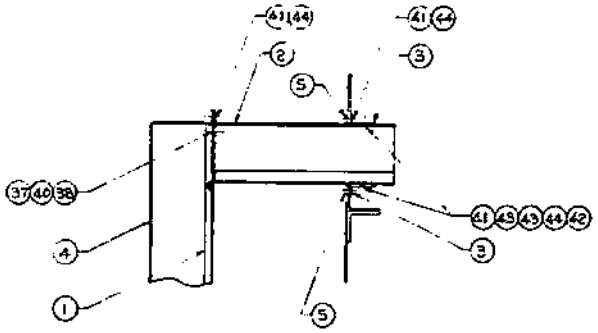
BLM1088723S

TABLE 12E. INSTALLATION MATERIAL LIST OF MATERIALS (Cont)

TRAINING, GROTON NUS 6551	DEVELOP. MODEL, WILDWOOD NUS 5867	PROD. MODEL, SINGLE PULSE NUS 6552	LIST OF MATERIALS						ITEM SHOWN ON SHEET ( ) H OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP			U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE		G4		G3		G2		G1							
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX						
X	–	–	–	20	73		A	10965016001	INTERCONNECTING CABLE LIST																	
					74																					
					75																					
1	6	6	6	1	76		C	1088902G1	LUG	530									6	W5		81				
6	1	–	–	1	77		A	2138411G002	TERMINAL, LUG			6	W5													
8	8	8	8	1	78		C	1088902G3	LUG	530		8	W5						8	W5		79, 80				
4	4	4	4	1	79		B	1088952G1	WIRE ELECT. VULKENE INSUL.	110		4	W5						4	W5		78				
4	4	4	4	1	80		B	1088952G2	WIRE ELECT. VULKENE INSUL.	110		4	W5						4	W5		78				
--	219 FT.	219 FT.	219 FT.	32	81		B	2312625G6	WIRE ELECT. VULKENE INSUL.	931									219 FT.	W5		76.				
172 FT	172 FT	172 FT	172 FT	32	82		B	2312625G2	WIRE ELECT. VULKENE INSUL	931		172 FT	W5						172 FT	W5						
450 FT	–	–	–	32	83		B	2312625G8	WIRE ELECT. VULKENE INSUL	931		450 FT	W5													
					84																					
					85																					
					86																					
					87																					
X	X	X	X	20	88		D	1088738 G15	CABLING DIAGRAM (W350)	760		1	W5	1	W5	1	W5	1	W5							
X	X	X	X	20	89		D	1088738 G16	CABLING DIAGRAM (W351)	760		1	W5	1	W5	1	W5	1	W5							E
X	X	X	X	20	90		D	1088738 G18	CABLING DIAGRAM (W353)	760	ITEM 4 OF TRANS. SET															

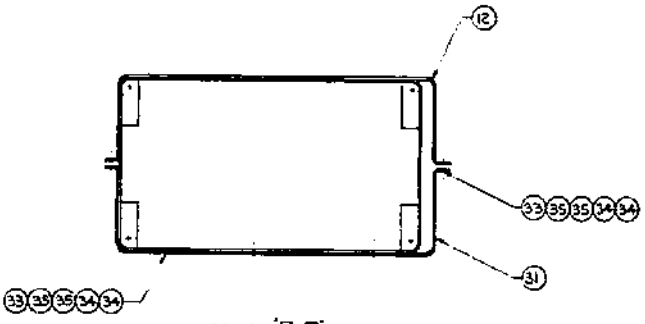
BLM1088723S


VIEW A-A
ROTATED 90°
VIEW D-D
1088723G
POWER DUCT ASSEMBLY
IN THIS VIEW IS FOR
1088723G1 ONLY
SEE NOTE 3
SEE NOTE 4
TOP
BOTTOM
AIR
CHAMBER
BUILDING
OUTSIDE WALL
SOLDER TO ANTENNA
LEAD IN FIELD
CONNECT TO SKEA
CONNECT TO SLI

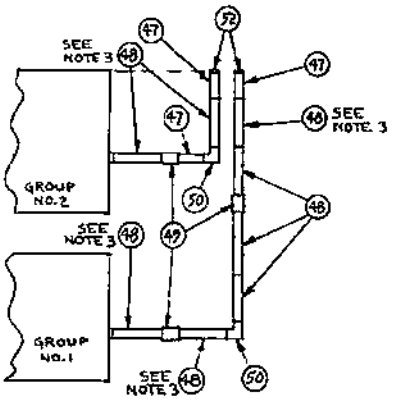


SECTION "C-C"
SCALE :- 1/4

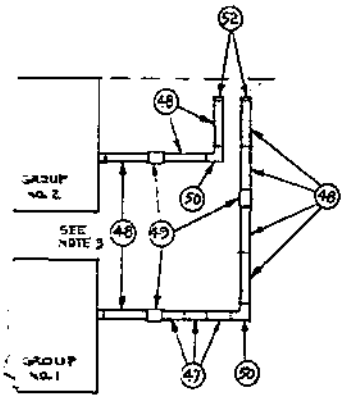
NOTES:-
1. NUMBERS IN CIRCLE ◯ INDICATE ITEM NUMBERS OF L/M BLM1088723.
2. NUMBERS IN SQUARE ☐ INDICATE ITEM NUMBERS OF L/M BLM1087426.
3. MODIFY ITEM 48 AS REQUIRED IN FIELD.
4. SOLDER TUBING CONNECTOR AS REQUIRED IN FIELD.



SECTION "B-B"
ROTATED 90°
SCALE :- 1/4

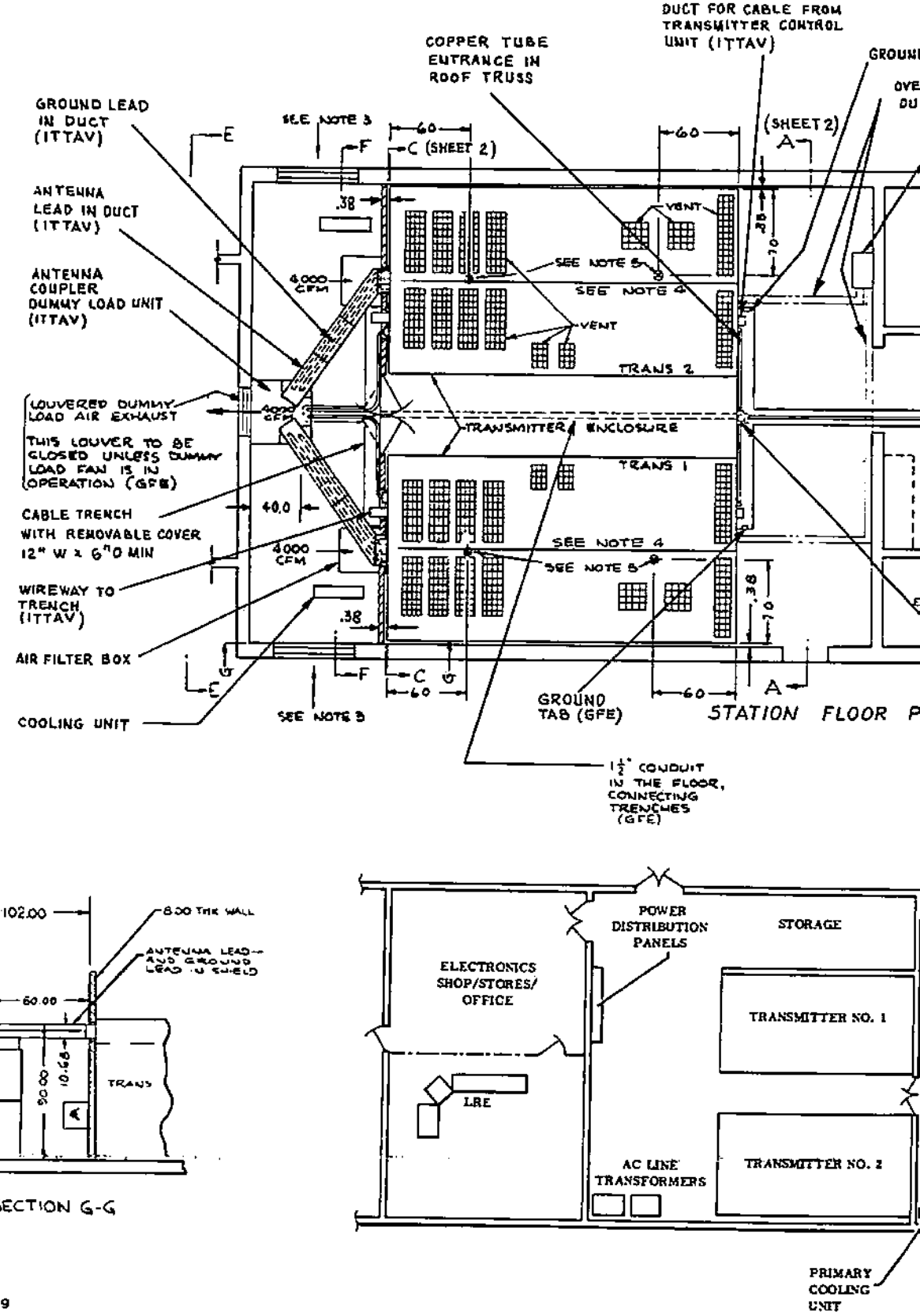


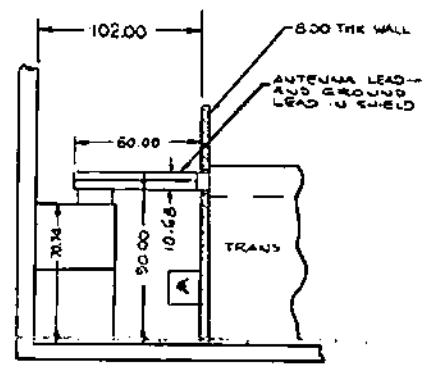
POWER DUCT ASSEMBLY
10887236-4
NO SCALE



ALTERNATE POWER DUCT ASSEMBLY
10887236-4
NO SCALE

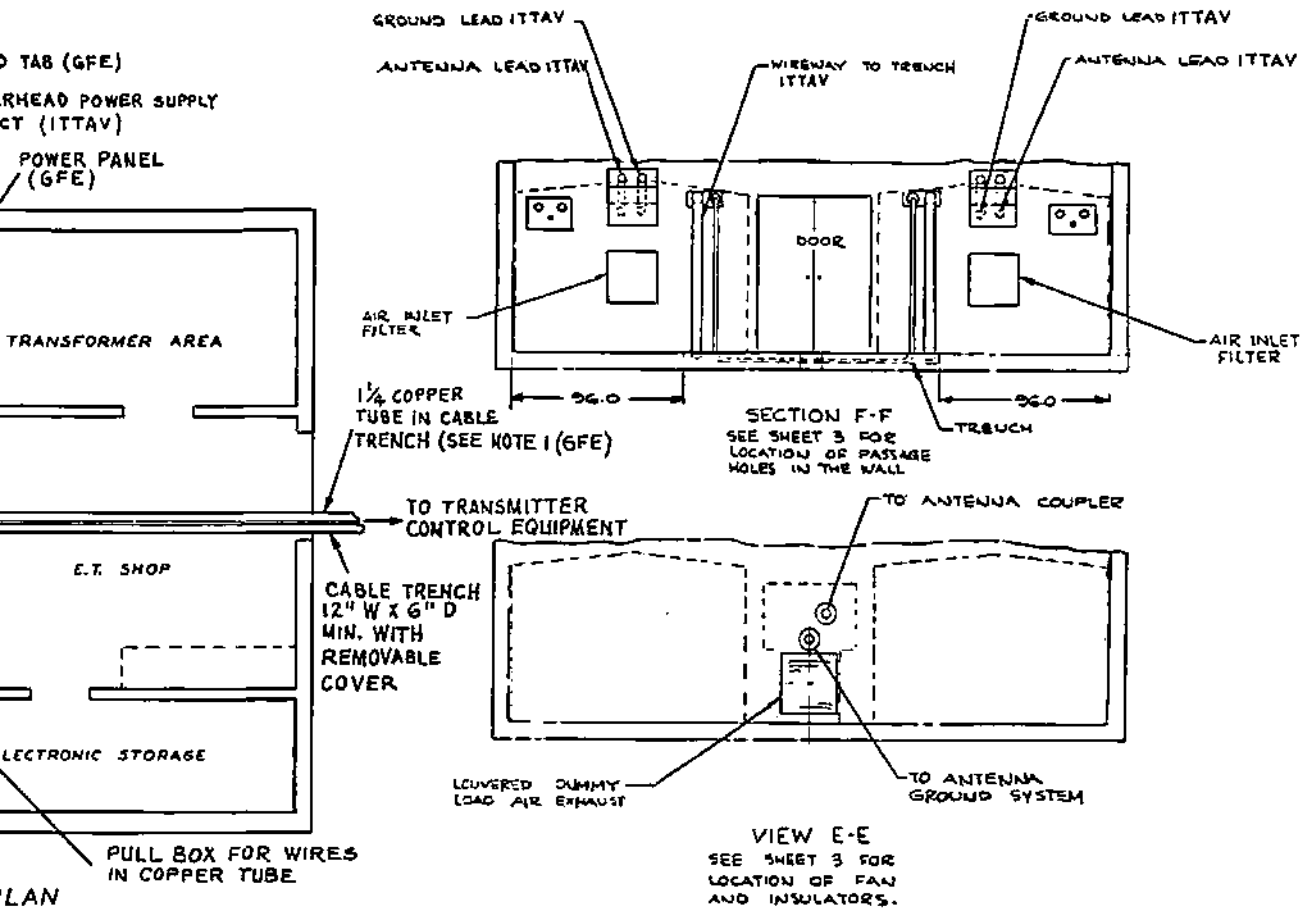
Figure 9E. Installation Materials

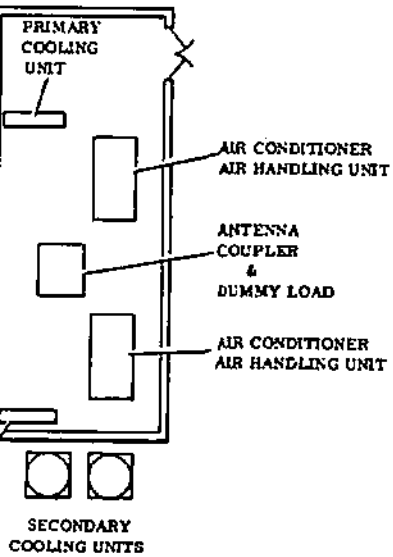




SECTION G-G

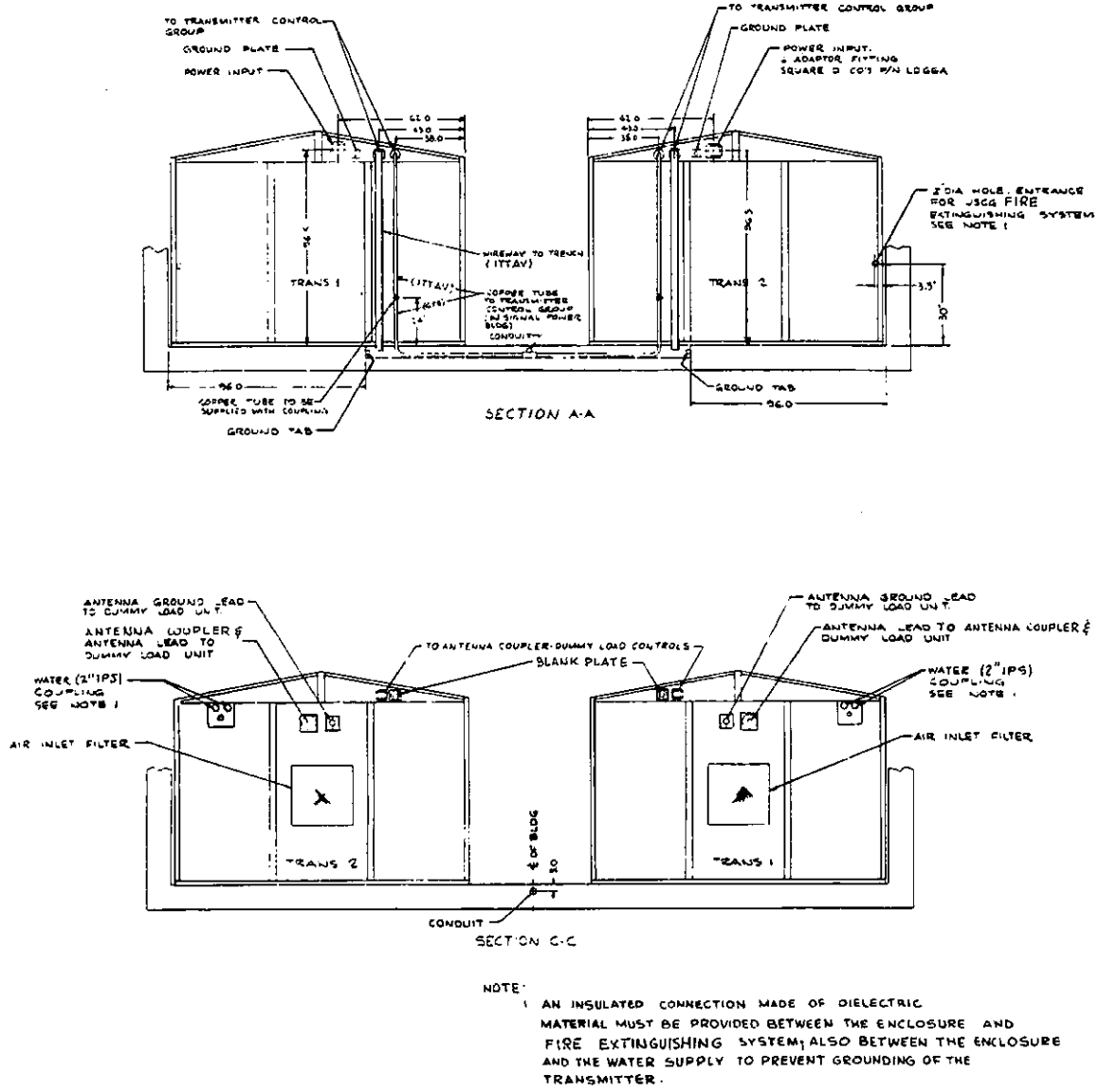
75-009





NOTES:
1. SUGGESTED COPPER TUBE: 1¼" STREAMLINE (MUELLER BRASS CO) TYPE L COPPER TUBE (1.375 O.D.), USING LONG RADIUS 90° STREET ELBOWS (P/N A3115) AND COUPLINGS (P/N W-1055)
2. TRANSMITTER ENCLOSURE IS TO BE FLOATING WITH RESPECT TO BUILDING GROUND SYSTEM. ENCLOSURE WILL BE CONNECTED TO STATION GROUND AT INSTALLATION.
3. LOUVERED, FILTERED AIR INLET (GFE) PRESSURE DROP ACROSS AIR FILTERS IN THIS OPENING NOT TO EXCEED 0.2 IN. WATER.
4. FLOOR UNDER TRANSMITTER ENCLOSURE TO BE SMOOTH (EXCEPT FOR FLOOR DRAINS).
5. ⊗ INDICATES APPROX. LOCATION OF FLOOR DRAINS.

Figure 10. Loran C Transmitting Station Layout (Sheet 1 of 5)



NOTE:
1. AN INSULATED CONNECTION MADE OF DIELECTRIC MATERIAL MUST BE PROVIDED BETWEEN THE ENCLOSURE AND FIRE EXTINGUISHING SYSTEM; ALSO BETWEEN THE ENCLOSURE AND THE WATER SUPPLY TO PREVENT GROUNDING OF THE TRANSMITTER.

Figure 10. Loran C Transmitting Station Layout (Sheet 2 of 5)

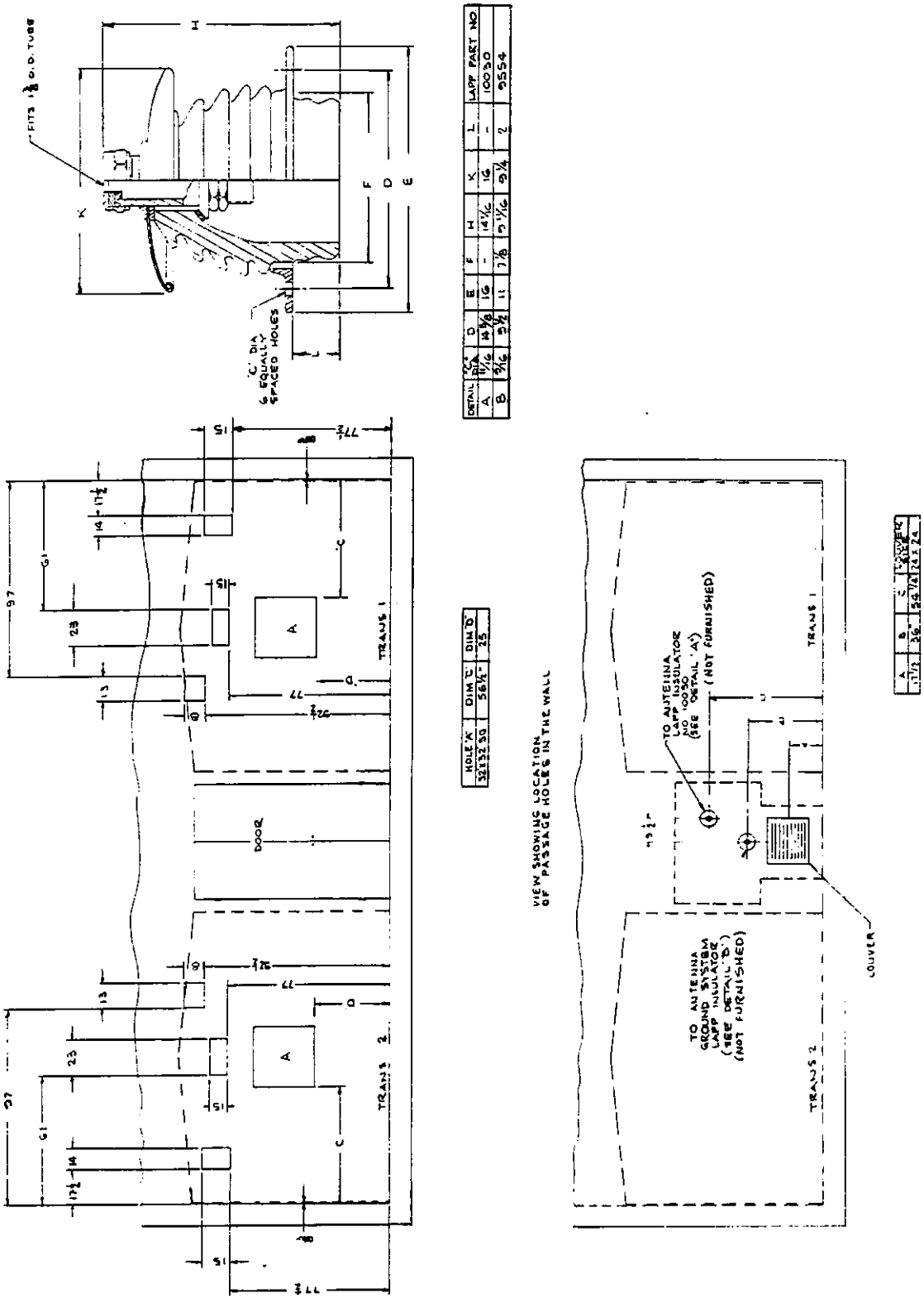


Figure 10. Loran C Transmitting Station Layout (Sheet 3 of 5)

NOTES
1. ARROWS INDICATE DIRECTION OF AIR FLOW.
2. AIR INLETS TO TRANSMITTER BUILDING TO BE PROVIDED WITH FILTERS & LOUVERS. FILTER DROP-LOADED NOT TO EXCEED 0.2 IN. WATER. FILTER OPENING ON EACH SIDE OF BUILDING SHOULD BE SIZED TO HANDLE COMPLETE AIR REQUIREMENTS. THUS LOUVERS CAN BE USED TO TAKE ADVANTAGE OF PREVAILING WINDS OR PROTECT AGAINST STORM CONDITIONS.
3. THE DUMMY LOAD AIR EXHAUST TO BE PROVIDED WITH LOUVERS. THESE LOUVERS TO BE CLOSED UNLESS DUMMY LOAD FAN IS IN OPERATION.
4. LOUVERED OPENINGS FOR USE IN RECIRCULATING WARM AIR FROM TRANSMITTER, AS REQUIRED TO RAISE AMBIENT TEMP. OF AIR ENTERING TRANSMITTER ENCLOSURE.
5. EXHAUST FANS TO BE LOCATED SO THAT EXHAUST AIR WILL NOT BE RECIRCULATED INTO BUILDING VIA BUILDING AIR INLETS, OR SEE SH.1.
6. AREA ABOVE TRANSMITTER ENCLOSURES TO BE COMPLETELY ENCLOSED AND EXHAUSTED ONLY VIA EXHAUST FANS OR END LOUVERS.
7. ADDITIONAL LOUVERED OPENINGS CAN BE PLACED IN THIS SECTION OF THE WALL IF IT IS DESIRED TO USE A PORTION OF THE WARM AIR FROM THE TRANSMITTER TO HELP HEAT REMAINDER OF BUILDING.
8. FOR AIR EXHAUST & VENTILATION, ALSO SEE ALTERNATE FLOOR PLAN, SH. 1.

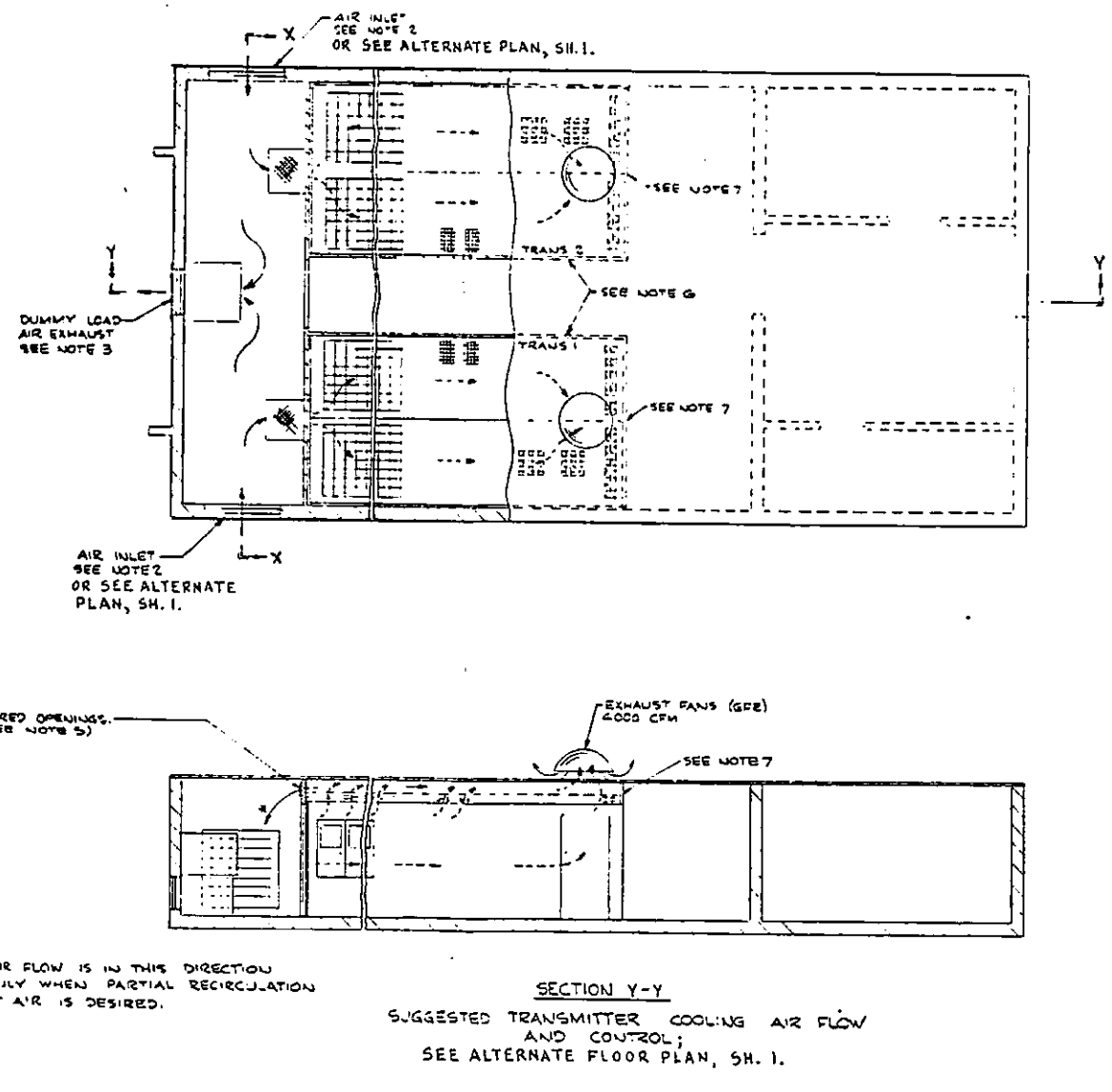


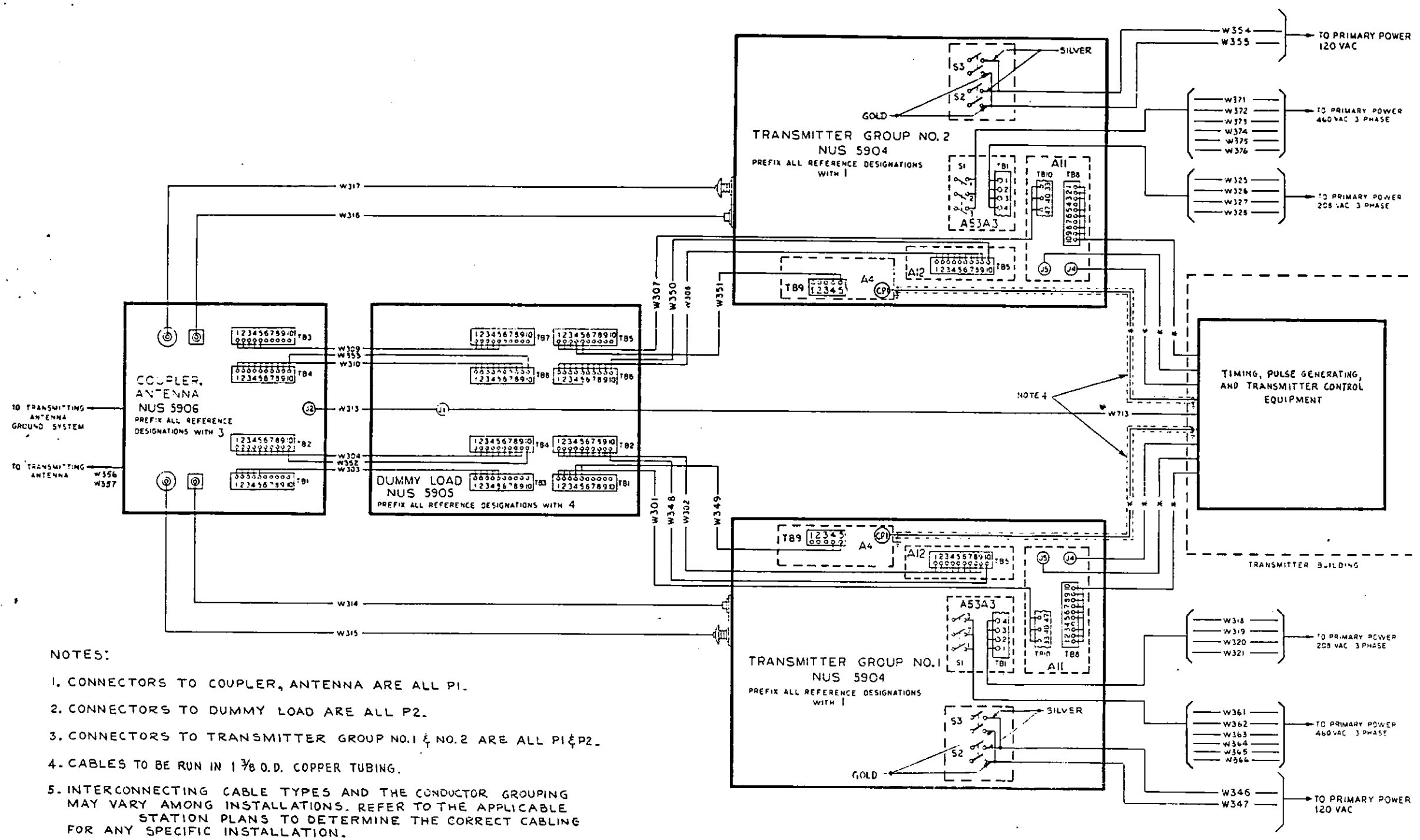
Figure 10. Loran C Transmitting Station Layout (Sheet 4 of 5)

POWER REQUIREMENTS, LOW POWER TRANSMITTER. - SINGLE RATE													
POWER IN	VOLT 3φ	PULSE RATE 180 PPS			150 PPS			113 PPS			90 PPS		
		KVA IN	KW WATER	KW - AIR	KVA IN	KW WATER	KW - AIR	KVA IN	KW-WATER	KW - AIR	KVA IN	KW-WATER	KW-AIR
STAND BY	208	35	22	9	35	22	9	35	22	9	35	22	9
FIXED OPERATE	460	13	0	8	13	0	8	13	0	8	13	0	8
PULSED OPERATE	460												
TOTAL													
POWER OUT ANTENNA OR DUMMY LOAD													

SECONDARY COOLING SYSTEM		
TRANSMITTER COOLING WATER REQUIREMENT GPM = KW - WATER / X		
COOLING WATER		
MAX. INLET TEMPERATURE	OUTLET TEMP.	X
50°C	60°C	2.5
40°C	55°C	3.75
30°C	55°C	6.25
25°C	55°C	7.50

AIR REQUIREMENTS		
	EACH TRANSMITTER	DUMMY LOAD
	4000 CFM	4000 CFM

Figure 10. Loran C Transmitting Station Layout (Sheet 5 of 5)



NOTES:

1. CONNECTORS TO COUPLER, ANTENNA ARE ALL P1.
2. CONNECTORS TO DUMMY LOAD ARE ALL P2.
3. CONNECTORS TO TRANSMITTER GROUP NO.1 & NO.2 ARE ALL P1 & P2.
4. CABLES TO BE RUN IN 1 3/8 O.D. COPPER TUBING.
5. INTERCONNECTING CABLE TYPES AND THE CONDUCTOR GROUPING MAY VARY AMONG INSTALLATIONS. REFER TO THE APPLICABLE STATION PLANS TO DETERMINE THE CORRECT CABLING FOR ANY SPECIFIC INSTALLATION.

* NOT SUPPLIED WITH LORAN TRANSMITTING SET AN/FPN-44A

75-009-D10889178

Figure 11. Transmitting Set Interconnecting and Cabling Diagram (Sheet 1 of 3)

SYMBOL	ITT AV DWG. NO.	NAVY STANDARD	NUMBER COND	ACTIVE COND	NAVY TYPE NO.	FROM	TO	CONNECTOR XMTR CONTROL	CONNECTOR XMTR NO. 1	CONNECTOR XMTR NO.2	CONNECTOR COUPLER ANTENNA	CONNECTOR DUMMY LOAD	CONNECTOR 208VAC 3PH POWER	CONNECTOR 460VAC 3PH POWER	CONNECTOR 120VAC POWER	SEE NOTE
W301	D10887586		3	3		4TB1	1A11TB10		SOLDER LUG			SOLDER LUG				
W302	D10887361		9	9		4TB2	1A12TB5		SOLDER LUG			SOLDER LUG				
W303	D10887362		5	3		4TB3	3TB1				SOLDER LUG	SOLDER LUG				2
W304	D10887363		9	9		4TB4	3TB2				SOLDER LUG	SOLDER LUG				2
W305	NOT USED															
W306	NOT USED															
W307	D10887586		3	3		4TB5	1A11TB10			SOLDER LUG		SOLDER LUG				
W308	D10887364		9	9		4TB6	1A12TB5			SOLDER LUG		SOLDER LUG				
W309	D10887365		5	3		4TB7	3TB3				SOLDER LUG	SOLDER LUG				2
W310	D10887366		9	9		4TB8	3TB4				SOLDER LUG	SOLDER LUG				2
W311	NOT USED															
W312	NOT USED															
W313	C10887565		TWINAX	2	RG22 B/U	431	3J2				UG421B/U	UG421B/U				2
W314				1		1A20C3, C4	3K2A		TH'D CAP		TH'D CAP					1
W315			1	1		1A20L2	3K1A		TH'D CAP		TH'D CAP					1
W316			1	1		1A20C3,C4	3K10A			TH'D CAP	TH'D CAP					1
W317			1	1		1A20L2	3K11A			TH'D CAP	TH'D CAP					1
W318	B10889526		1	1		1A53A3TB1	POWER PANEL		SOLDER LUG				PRESSURE LUG			
W319	B10889525		1	1		TB1										
W320	B10889526		1	1		TB1										
W321	B10889526		1	1		1A53A3TB1			SOLDER LUG				PRESSURE LUG			
W322	NOT USED		1	1												
W323	NOT USED		1	1												
W324			1	1												
W325	B10889526		1	1		1A53A3TB1				SOLDER LUG			PRESSURE LUG			
W326	B10889526		1	1		TB1										
W327	B10889526		1	1		TB1										
W328	B10889526		1	1		1A53A3TB1	POWER PANEL			SOLDER LUG			PRESSURE LUG			
W329	NOT USED		1	1												
W330	NOT USED		1	1												
W331	NOT USED		1	1			POWER PANEL									

NOTES
1. 1 3/8 DIA COPPER TUBING, PART OF TRANSMITTING INSTALLATION MATERIAL
2 CABLES W303, W304, W309, W310, AND W313 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT.

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Figure 11. Transmitting Set Interconnecting and Cabling Diagram (Sheet 2 of 3)

SYMBOL	IT TAV DWG. NO.	NAVY STANDARD	NUMBER COND	ACTIVE COND	NAVY TYPE NO.	FROM	TO	CONNECTOR XMTR CONTROL	CONNECTOR XMTR NO. 1	CONNECTOR XMTR NO.2	CONNECTOR COUPLER ANTENNA	CONNECTOR DUMMY LOAD	CONNECTOR 208VAC 3PH POWER	CONNECTOR 460VAC 3PH POWER	CONNECTOR 120VAC POWER	SEE NOTE
W346	B231262SG2		1	1		152/153(SILVER)	POWER PANEL		SOLDER LUG						PRESSURE LUG	
W347	B231262SG2		1	1		152/153(GOLD)	POWER PANEL		SOLDER LUG						PRESSURE LUG	
W348	D10B873BG13		1	1		4TB2	1A12TB5		SOLDER LUG			SOLDER LUG				
W349	D10B873BG14		2	2		4TB1	1A4TB9		SOLDER LUG			SOLDER LUG				
W350	D10B873BG15		1	1		4TB6	1A12TB5			SOLDER LUG		SOLDER LUG				
W351	D10B873BG16		2	2		4TB5	1A4TB9			SOLDER LUG		SOLDER LUG				
W352	D10B873BG17		1	1		4TB4	3TB2				SOLDER LUG	SOLDER LUG				1
W353	D10B873BG18		1	1		4TB8	3TB4				SOLDER LUG	SOLDER LUG				1
W354	B231262SG2		1	1		152/153(SILVER)	POWER PANEL			SOLDER LUG					PRESSURE LUG	
W355	B231262SG2		1	1		152/153(GOLD)	POWER PANEL			SOLDER LUG					PRESSURE LUG	
W361	B251262568		1	1		1A53A35IA	POWER PANEL		PRESSURE LUG					PRESSURE LUG		
W362	↑		↑	↑		↑	↑		↑					↑		
W363																
W364																
W365									↓							
W366									PRESSURE LUG							
W371										PRESSURE LUG						
W372										↑						
W373																
W374																
W375	↓		↓	↓		↓	↓			↓				↓		
W376	B251262568		1	1		1A53A35IA	POWER PANEL			PRESSURE LUG				PRESSURE LUG		
W711			TWINAX	2	RG22B/U	2A7J8	1A4CP1	UG421B/U		UG421B/U						3
W712			↑	↑	RG22B/U	↑ J13	1A4CP1	↑	UG421B/U							3
W713					RGIIIA/U	J14	4J1					UG421B/U				3
W714					RGIIIA/U	J9	1A11J4		UG421B/U							3
W715					RGIIIA/U	J10	1A11J4			UG421B/U						3
W716				↓	RGIIIA/U	J11	1A11J5		UG421B/U							3
W717			TWINAX	2	RGIIIA/U	J12	1A11J5	UG421B/U		UG421B/U						3
W718			12	9		↓ TB1	1A11TB8	SOLDER LUG	SOLDER LUG							3
W719			12	8		247TB2	1A11TB8	SOLDER LUG		SOLDER LUG						3
W720		NOT	USED				NOT	USED								

NOTES: 1. CABLES W352 & W353 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT.

3. SUPPLIED BY INSTALLING AGENCY

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Figure 11. Transmitting Set Interconnecting and Cabling Diagram (Sheet 3 of 3)

TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W301			#14 AWG STRANDED 600 VAC	3	WH-BRN	DUMMY LOAD	4TB1	1	XMTR NO 1	1A11TB10	33	208VAC 3 PHASES BLOWER START	5.8	ITTAV		
					WH-RED			2			40		5.8			
					WH ORN			3			47		5.8			
W302			#16 AWG STRANDED 600 VAC	9	WH-BRN	DUMMY LOAD	4TB2	1	XMTR NO. 1	1A12TB5	1	H.V. INTERLOCK	< .1	ITTAV		
					WH RED			2			2	OPERATE-STANDBY	< .1			
					WH-ORN			3			3	STANDBY	< .1			
					WH-YEL			4			4	DC COMMON	< .1			
					WH-GRN			5			5	OPERATE	< .1			
					WH-BLU			6			6	-28VDC	< .1			
					WH-VIO			7			7	AC INTLK	< .1			
					WH-GRY			8			8	120VAC	< .1			
					WH			9			9	AC COMMON	< .1			
W303			#16 AWG STRANDED 600VAC	3	WH BRN	DUMMY LOAD	4TB3	1	COUPLER, ANTENNA	3TB1	1	DOORS INTLK	< .1	ITTAV	1	
					WH RED			2			2	AC INTLK	< .1			
					WH ORN			3			3	H.V. INTERLOCK	< .1			
					WH YEL			4			4	SPARE	< .1			
					WH GRN			5			5	DOOR INTLK	< .1			
W304			#16 AWG STRANDED 600VAC	9	WH-BRN	DUMMY LOAD	4TB4	1	COUPLER, ANTENNA	3TB2	1	120VAC	< .1	ITTAV	1	
					WH RED			2			2	AC COMMON	< .1			
					WH-ORN			3			3	H.V. INTERLOCK	< .1			
					WH-YEL			4			4	OPERATE-STANDBY	< .1			
					WH-GRN			5			5	STANDBY	< .1			
					WH-BLU			6			6	DC COMMON	< .1			
					WH-VIO			7			7	OPERATE	< .1			
					WH-GRY			8			8	-28VDC	< .1			
					WH			9			9	AC INTLK	< .1			
W305	NOT	USED														
W306	NOT	USED														
W307			#14 AWG STRANDED 600VAC	3	WH-BRN	DUMMY LOAD	4TB5	1	XMTR NO. 2	1A11TB10	33	208VAC 3 PHASES BLOWER START	5.8	ITTAV		
					WH-RED			2			40		5.8			
					WH-ORN			3			47		5.8			

NOTES:

1. CABLES W303, AND W304 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT, THEREFORE ARE NOT SHOWN ON TRANSMITTING SET SYSTEM DIAGRAM DWG D10880I6, USCG DWG AND ARE LISTED HERE FOR REFERENCE PURPOSE.

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TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W308			#16 AWG STRANDED 600VAC	9	WH-BRN	DUMMY LOAD	4TB6	1	XMTR NO 2	1A12TB5	1	H.V INTERLOCK	< .1	ITTAV		
					WH RED			2			2	OPERATE-STANDBY	< .1			
					WH-ORN			3			3	STANDBY	< .1			
					WH-YEL			4			4	DC COMMON	< .1			
					WH-GRN			5			5	OPERATE	< .1			
					WH BLU			6			6	-28VDC	< .1			
					WH-VIO			7			7	AC INTLK	< .1			
					WH-GRY			8			8	120VAC	< .1			
					WH			9			9	AC COMMON	< .1			
W309			#16 AWG STRANDED 600VAC	3	WH-BRN	DUMMY LOAD	4TB7	1	COUPLER, ANTENNA	3TB3	1	DOOR INTLK	< .1	ITTAV	1	
					WH-RED			2			2	AC INTLK	< .1			
					WH-ORN			3			3	H.V. INTERLOCK	< .1			
					WH-YEL			4			4	SPARE	< .1			
					WH-GRN			5			5	DOOR INTLK	< .1			
W310			#16 AWG STRANDED 600VAC	9	WH-BRN	DUMMY LOAD	4TB8	1	COUPLER, ANTENNA	3TB4	1	120VAC	< .1	ITTAV	1	
					WH-RED			2			2	AC COMMON	< .1			
					WH-ORN			3			3	H.V. INTERLOCK	< .1			
					WH-YEL			4			4	OPERATE-STANDBY	< .1			
					WH-GRN			5			5	STANDBY	< .1			
					WH-BLU			6			6	DC COMMON	< .1			
					WH-VIO			7			7	OPERATE	< .1			
					WH-GRY			8			8	-28VDC	< .1			
					WH			9			9	AC INTLK	< .1			
W311	NOT	USED														
W312	NOT	USED														
W313		RG22B/U	TWINAX	2		DUMMY LOAD	4J1 P2		COUPLER, ANTENNA	3J2 P1		MONITOR	—	ITTAV	1	
W314						XMTR NO. 1			COUPLER, ANTENNA			COUNTERPOISE		ITTAV	2	
W315						XMTR NO.1			COUPLER, ANTENNA			ANTENNA		ITTAV	2	

NOTES:

1. CABLES W309, W310, AND W313 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT.
2. 1 3/8 DIA. COPPER TUBING, PART OF TRANSMITTING INSTALLATION MATERIAL.

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TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W316						XMTR NO. 2			COUPLER, ANTENNA			COUNTERPOISE		ITTAV	1	
W317						XMTR NO. 2			COUPLER, ANTENNA			ANTENNA		ITTAV	1	
W318			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.1	1A53A3TB1	1	208VAC POWER PANEL			208 VAC NEUTRAL	.5	ITTAV		
W319			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.1	1A53A3TB1	2	208VAC POWER PANEL			208VAC PHASE A	TBD	ITTAV		
W320			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO. 1	1A53A3TB1	3	208VAC POWER PANEL			208VAC PHASE B	TBD	ITTAV		
W321			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.1	1A53A3TB1	4	208VAC POWER PANEL			208VAC PHASE C	TBD	ITTAV		
W322	NOT	USED														
W323	NOT	USED														
W324	NOT	USED														
W325			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.2	1A53A3TB1	1	208VAC POWER PANEL			208VAC NEUTRAL	.5	ITTAV		
W326			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.2	1A53A3TB1	2	208VAC POWER PANEL			208VAC PHASE A	TBD	ITTAV		
W327			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.2	1A53A3TB1	3	208 VAC POWER PANEL			208VAC PHASE B	TBD	ITTAV		
W328			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.2	1A53A3TB1	4	208VAC POWER PANEL			208VAC PHASE C	TBD	ITTAV		
W329	NOT	USED														
W330	NOT	USED														
W331	NOT	USED														

NOTES:
1. 1 3/8 DIA COPPER TUBING, PART OF TRANSMITTING INSTALLATION MATERIAL.

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TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE
W346			#6 AWG STRANDED 600 VAC	1	BLK	XMTR NO.1	1S2 & 1S3 (SILVER)		120 VAC POWER PANEL			120 VAC NEUTRAL		ITTAV	
W347			#6 AWG STRANDED 600 VAC	1	BLK	XMTR NO 1	1S2 & 1S3 (GOLD)		120 VAC POWER PANEL			120 VAC		ITTAV	
W348			#16 AWG STRANDED 600 VAC	1	WHT-BLK	DUMMY LOAD	4TB2	10	XMTR NO.1	1A12TB5	10	FAN CONTROL	< .1	ITTAV	
W349			#16 AWG STRANDED 600 VAC	2	WHT-YEL WHT-GRN	DUMMY LOAD	4TB1	4 5	XMTR NO. 1	1A4TB9	4 5	DOOR INTERLOCK	< .1	ITTAV	
W350			#16 AWG STRANDED 600 VAC	1	WHT-BLK	DUMMY LOAD	4TB6	10	XMTR NO.2	1A12TB5	10	FAN CONTROL	< .1	ITTAV	
W351			#16 AWG STRANDED 600 VAC	2	WHT-YEL WHT-GRN	DUMMY LOAD	4TB5	4 5	XMTR NO.2	1A4TB9	4 5	DOOR INTERLOCK	< .1	ITTAV	
W352			#16 AWG STRANDED 600 VAC	1	WHT-BLK	DUMMY LOAD	4TB4	10	ANTENNA MATCHING NETWORK	3TB2	10	FAN CONTROL	< .1	ITTAV	1
W353			#16 AWG STRANDED 600 VAC	1	WHT-BLK	DUMMY LOAD	4TB8	10	ANTENNA MATCHING NETWORK	3TB4	10	FAN CONTROL	< .1	ITTAV	1
W354			#6 AWG STRANDED 600 VAC	1	BLK	XMTR NO.2	1S2 & 1S3 (SILVER)		120 VAC POWER PANEL			120 VAC NEUTRAL		ITTAV	
W355			#6 AWG STRANDED 600 VAC	1	BLK	XMTR NO 2	1S2 & 1S3 (GOLD)		120 VAC POWER PANEL			120 VAC		ITTAV	
W361			350 MCM STRANDED 600 VAC	1	BLK	XMTR NO. 1	1A53A3 S1A	1	460 VAC POWER PANEL			460 VAC PHASE A	TBD	ITTAV	
W362			↑	↑	↑	↑	↑	2	↑			460 VAC PHASE B	TBD	↑	
W363			↑	↑	↑	↑	↑	3	↑			460 VAC PHASE C	TBD	↑	
W364			↑	↑	↑	↑	↑	1	↑			460 VAC PHASE A	TBD	↑	
W365			↑	↑	↑	↑	↑	2	↑			460 VAC PHASE B	TBD	↑	
W366			350 MCM STRANDED 600 VAC	1	BLK	XMTR NO. 1	1A53A3 S1A	3	460 VAC POWER PANEL			460 VAC PHASE C	TBD	ITTAV	

NOTES:
1 CABLES W352 & W353 ARE PRE INSTALLED ON UNIT BEFORE SHIPMENT, THEREFORE ARE NOT SHOWN ON TRANSMITTING SET SYSTEM DIAGRAM DWG D1088916, USCG DWG AND ARE LISTED HERE FOR REFERENCE PURPOSE.

TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W371			350 MCM STRANDED 600 VAC	1	BLK	XMTR NO. 2	1A53A3 S1A	1	460 VAC POWER PANEL			460 VAC PHASE A	TBD	ITTAV		
W372			↑	↑	↑	↑	↑	2	↑			460 VAC PHASE B	TBD	↑		
W373								3				460 VAC PHASE C	TBD			
W374								1				460 VAC PHASE A	TBD			
W375			↓	↓	↓	↓	↓	2	↓			460 VAC PHASE B	TBD	↓		
W376			350 MCM STRANDED 600 VAC	1	BLK	XMTR NO. 2	1A53A3 S1A	3	460 VAC POWER PANEL			460 VAC PHASE C	TBD	ITTAV		
W711		RG22B/U	TWINAX	2		XMTR CONTROL	2A7J8 P1		XMTR NO. 2	1A4CP1 P2		XMTR NO. 2 PULSE	.005	INSTL AGENCY		
W712		RG22B/U	TWINAX	2		XMTR CONTROL	2A7J13 P1		XMTR NO. 1	1A4CP1 P2		XMTR NO. 1 PULSE	.005	INSTL AGENCY		
W713		RG11A/U (WITH OUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J14 P1		DUMMY LOAD	4J1 P2		ANT CURRENT PULSE	—	INSTL AGENCY		
W714		RG11A/U (WITHOUT OUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J9 P1		XMTR NO 1	1A11J4 P2		XMTR NO. 1 SCOPE GATE TRIGGERS	—	INSTL AGENCY		
W715		RG11A/U (WITHOUT OUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J10 P1		XMTR NO. 2	1A11J4 P2		XMTR NO. 2 SCOPE GATE TRIGGERS	—	INSTL AGENCY		
W716		RG11A/U (WITH OUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J11 P1		XMTR NO 1	1A11J5 P2		XMTR NO. 1 SCOPE MULTITRIGGER	—	INSTL AGENCY		
W717		RG11A/U (WITH OUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J12 P1		XMTR NO. 2	1A11J5 P2		XMTR NO. 2 SCOPE MULTITRIGGER	—	INSTL AGENCY		

TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W718			#14 AWG STRANDED 600VAC	9	BLK	XMTR CONTROL	2A7TB1	1	XMTR NO. 1	1A11TB8	7	DC COMMON	.4	INSTL AGENCY	1	
					RED			2			1	OPERATE-STANDBY	.1			
					WHT			3			5	STOP	.1			
					GRN			4			3	H.V INTERLOCK	.1			
					BLK-WHT			5			9	AC COMMON	.03			
					GRN-BLK			6			10	PLATE VOLTAGE UP	.01			
					ORN-BLK			7			2	READY	.01			
					RED-BLK			8			6	HIGH VOLTAGE ON	.01			
					BLU			9			8	ALARM	.1			
W719			#14 AWG STRANDED 600VAC	8	BLK	XMTR CONTROL	2A7TB2	1	XMTR NO. 2	1A11TB8	7	DC COMMON	.4	INSTL AGENCY	2	
					RED			2			1	OPERATE-STANDBY	.1			
					WHT			3			5	STOP	.1			
					GRN			4			3	H.V INTERLOCK	.1			
					BLK-WHT			5			9	AC COMMON	.03			
					GRN-BLK			6			10	PLATE VOLTAGE UP	.01			
					ORN-BLK			7			2	READY	.01			
					RED-BLK			8			6	HIGH VOLTAGE ON	.01			
					BLU			9			8	ALARM	.1			
W720			NOT	USED												

NOTES
1. IN CABLE W718 WIRES COLORED ORN, WH BLK & WH BLU ARE SPARE WIRES AND ARE TO BE DOUBLED BACK INTO WIRE DUCT ON XMTR CONTROL & XMTR NO.1.
2. IN CABLE W719 WIRES COLORED BLK, ORN, WH BLK & WH-BLU ARE SPARE WIRES AND ARE TO BE DOUBLED BACK INTO WIRE DUCT ON XMTR CONTROL & XMTR NO.2.

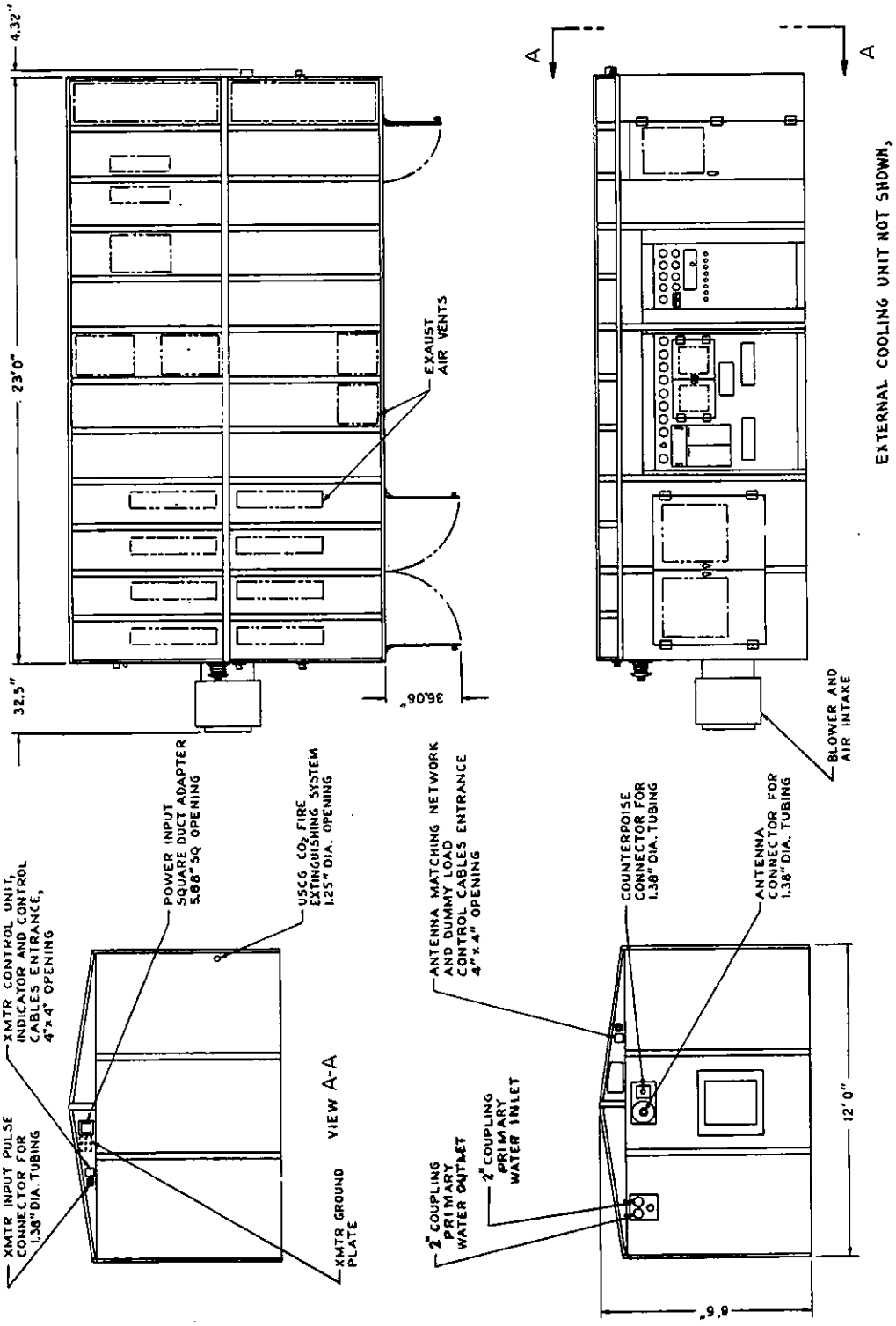
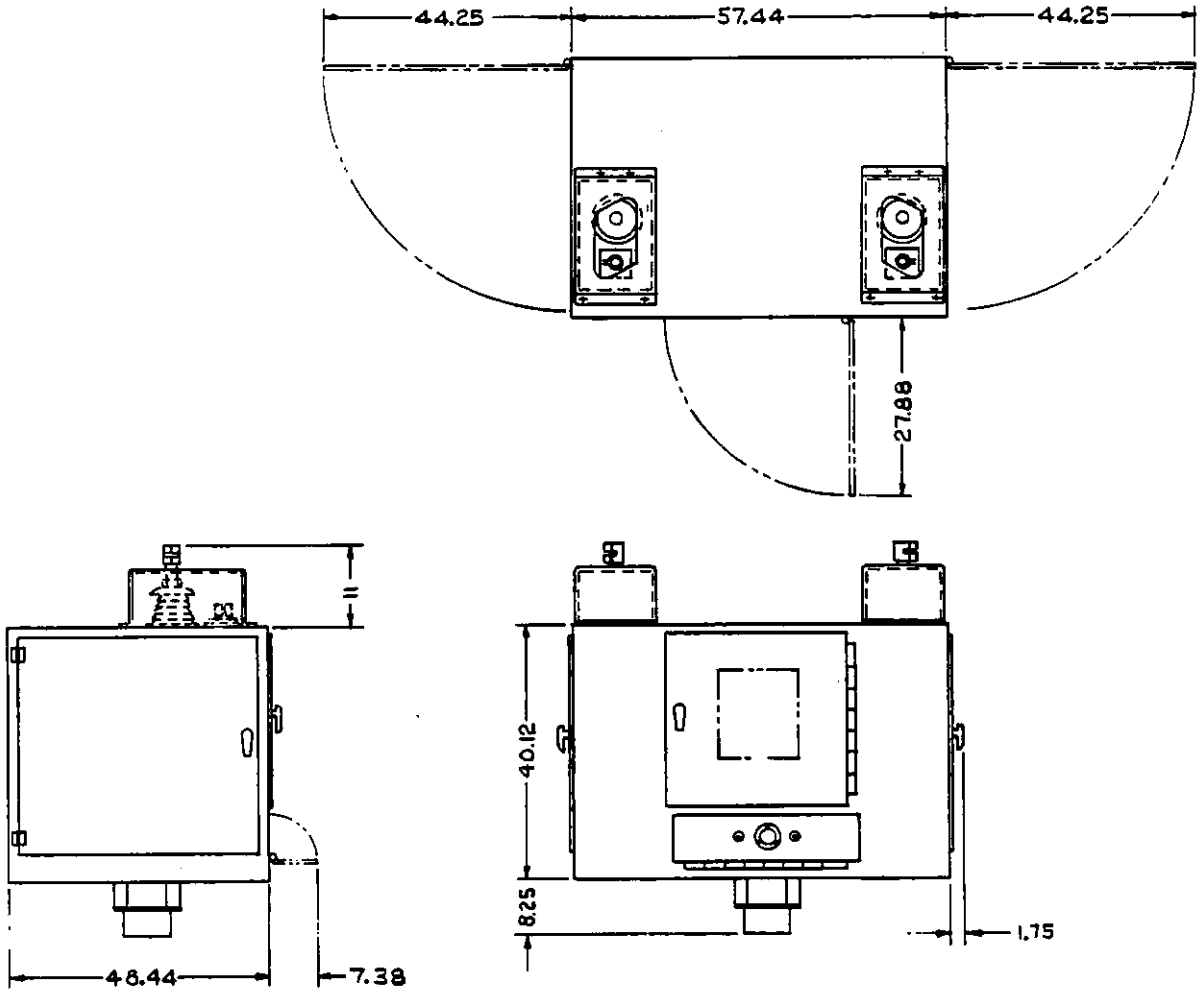


Figure 12. Transmitting Group Outline Drawing

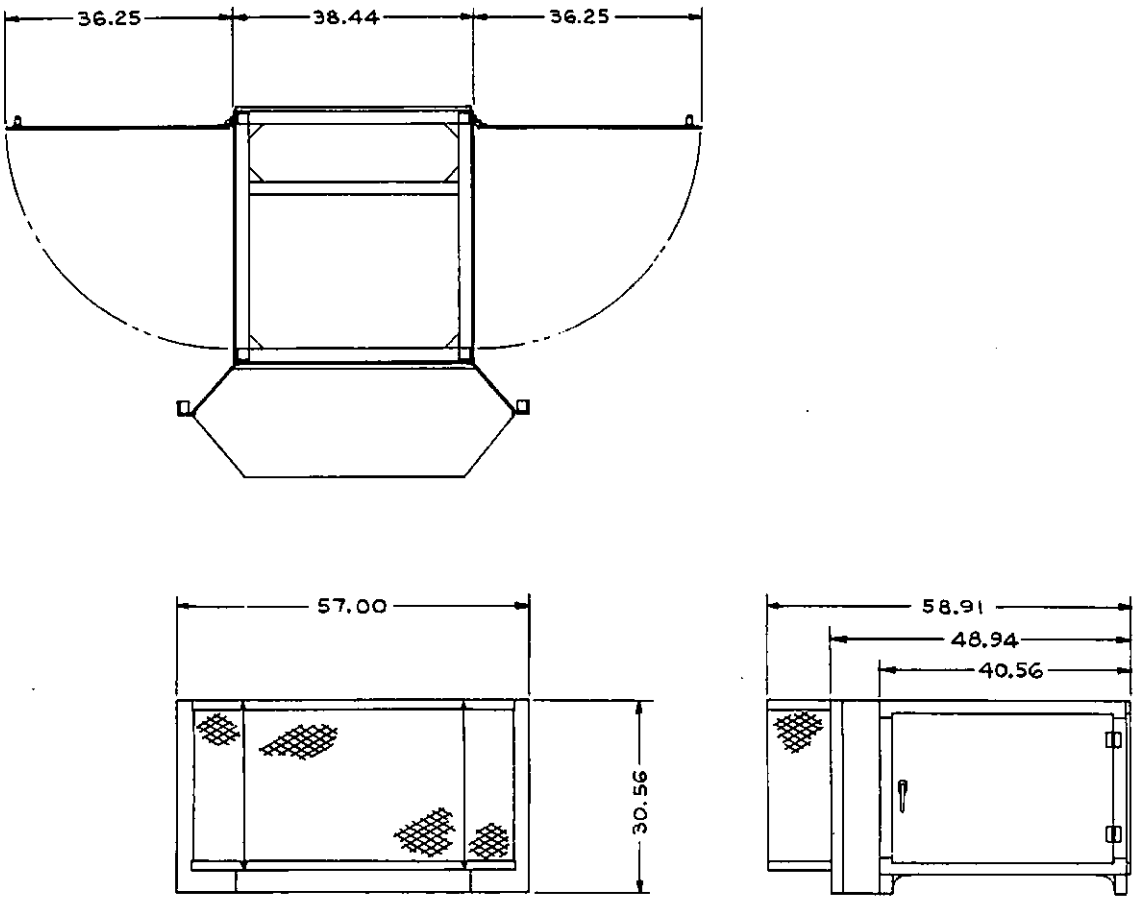


ESTIMATED WEIGHT UNCRATED ——— 482 LBS
ESTIMATED WEIGHT CRATED ——— *
ESTIMATED VOLUME CRATED ——— *

AMBIENT TEMPERATURE RANGE:
OPERATING ——— 0°C TO +50C
STORAGE ——— -62°C TO +75°C

* SHIPPED WITH DUMMY LOAD IN BOX WI

Figure 13. Antenna Coupler CU-2171/FPN-44A Outline Drawing



ESTIMATED WEIGHT UNCRATED ——— 430 LBS
ESTIMATED WEIGHT CRATED ——— *
ESTIMATED VOLUME CRATED ——— *
ESTIMATED POWER REQUIRED ——— 1120 WATTS
ESTIMATED HEAT DISSIPATION ——— 1120 WATTS
ESTIMATED POWER FACTOR ——— .89
208 VOLTS ±10%, 3Φ 50/60 CPS ±10%
AMBIENT TEMPERATURE RANGE:
OPERATING ——— 0°C TO +50°C
STORAGE ——— -62°C TO +75°C

* SHIPPED WITH ANTENNA COUPLER IN BOX W1.

Figure 14. Dummy Load Outline Drawing

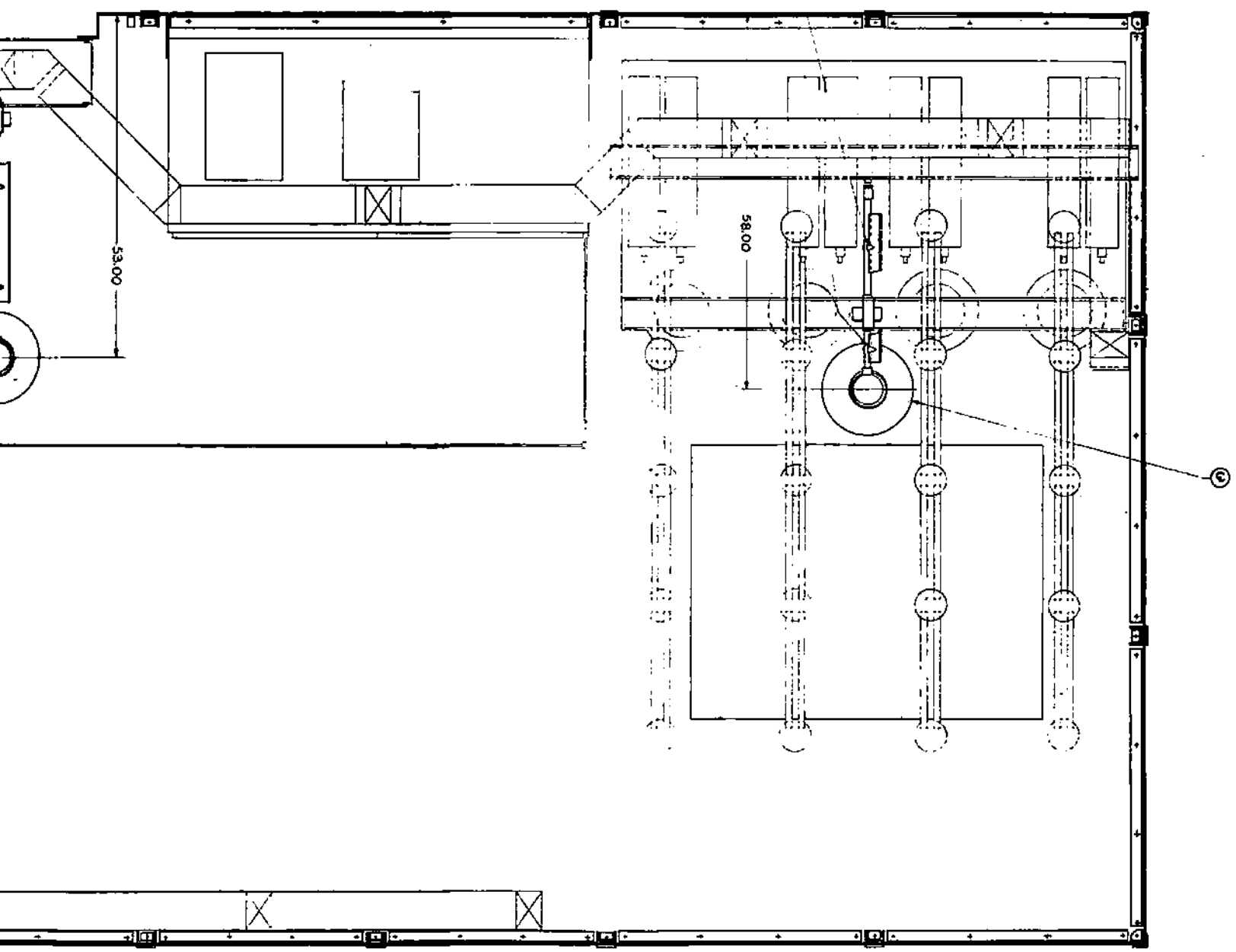
TABLE 14Q. TRANSMITTING LIGHT FIXTURES LIST OF MATERIALS

TRANSMITTER #2 (AN/FPN-44A) QUAN. PER GROUP G4	TRANSMITTER #1 (AN/FPN-44A) QUAN. PER GROUP G3	TRANSMITTER #2 QUAN. PER GROUP G2	TRANSMITTER #1 QUAN. PER GROUP G1	U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITEM SHOWN ON H10B8995 SHEET (1,2) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITTFL SOURCE	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO. G4 Q	G4 BOX	G3 Q	G3 BOX	G2 Q	G2 BOX	G1 Q	G1 BOX	SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
1	1	1	1	1	1		C	10891066G1	CIRCUIT BREAKER ASS'Y	110	1,2						1	Y13	1	X13					
1	1	1	1	1	2		C	1089092G1	FIXTURE ASSEMBLY	110	1,2		1	Y13	1	X13	1	Y13	1	X13		4			
1	1	1	1	1	3		C	1089096G1	FIXTURE ASSEMBLY	110	1,2		1	Y13	1	X13	1	Y13	1	X13		4			
4	4	4	4	1	4		D	1087841GG	CLAMP	120	1,2		4	Y13	4	X13	4	Y13	4	X13		2,3			
1	1	—	—		5		D	10964496001	CIRCUIT BREAKER ASSY	110	2		1	Y13	1	X13									
					6																					
		1	1	1	7		C	10891066G2	CIRCUIT BREAKER ASS'Y	110	1						1								
1	1	1	1	1	8		C	1089229G1	FIXTURE ASSEMBLY	110	1,2		1	Y13	1	X13	1	Y13	1	X13					
15	15	15	15	1	9		A	2138550B015	TERMINAL, LUG		2		15	Y13	15	X13	15	Y13	15	X13					
																										Q

BLM1088995E

TRANSMITTER No.2
10889952 ∉ 94

10889952



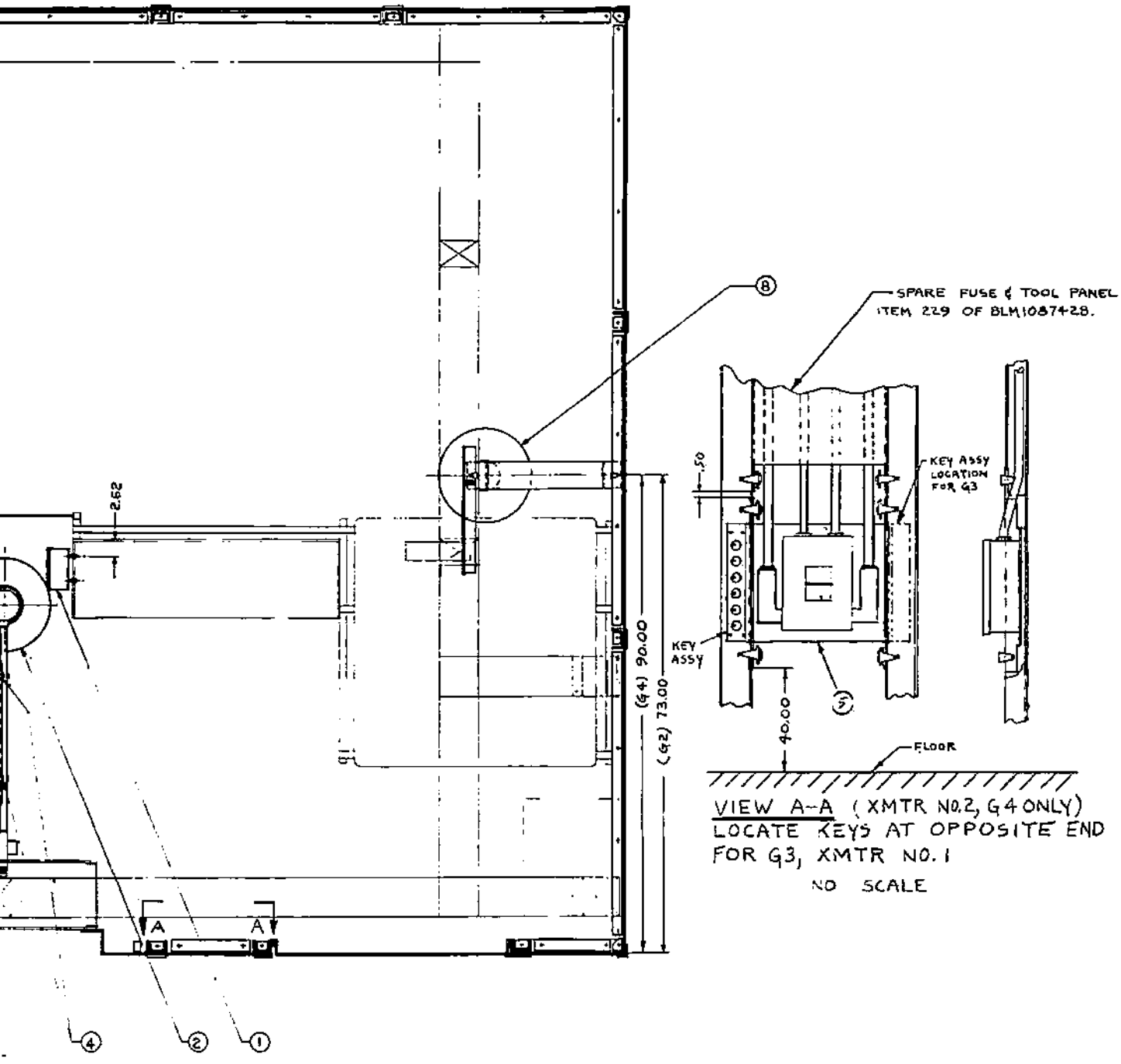
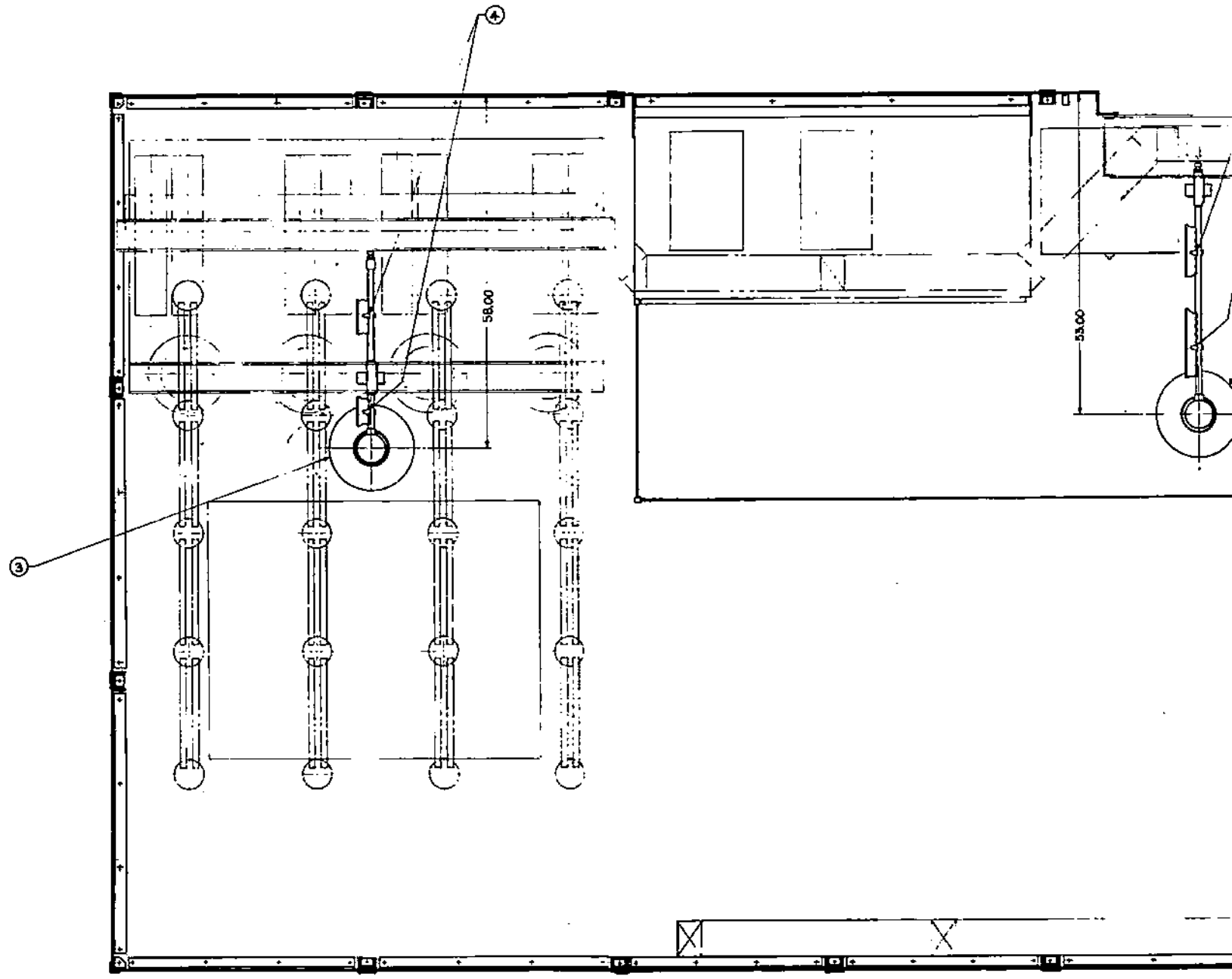
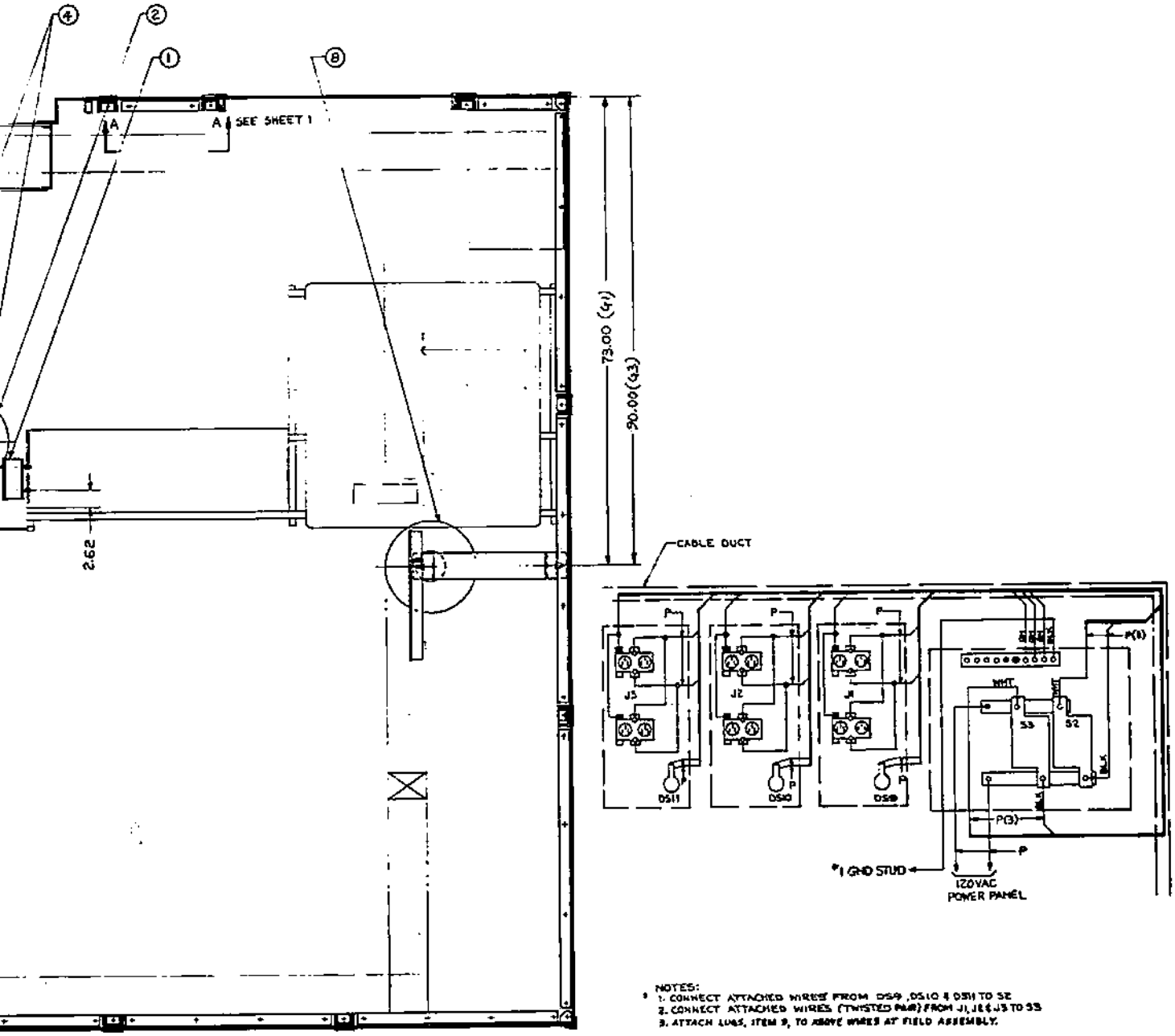


Figure 15Q. Transmitter Light Fixtures Assembly Drawing (Sheet 1 of 2)



TRANSMITTER No. 1
1088995G1 & G3

1088995E



NOTES:
1. CONNECT ATTACHED WIRES FROM DS9, DS10 & DS11 TO S2.
2. CONNECT ATTACHED WIRES (TWISTED PAIR) FROM J1, J2 & J3 TO S3.
3. ATTACH LUGS, ITEM 9, TO ABOVE WIRES AT FIELD ASSEMBLY.

Figure 15Q. Transmitter Light Fixtures Assembly Drawing (Sheet 2 of 2)

SYMBOL	ITTAV DWG. NO.	NAVY STANDARD	NUMBER COND	ACTIVE COND	NAVY TYPE NO.	FROM	TO	CONNECTOR XMTR CONTROL	CONNECTOR XMTR NO. 1	CONNECTOR XMTR NO. 2	CONNECTOR COUPLER ANTENNA	CONNECTOR DUMMY LOAD	CONNECTOR 208 VAC 3 PH POWER	CONNECTOR 460 VAC 3 PH POWER	CONNECTOR 120 VAC POWER	SEE NOTE
W301	D10887386		3	3		4TB1	1A11TB10		SOLDER LUG			SOLDER LUG				
W302	D10887386		9	9		4TB2	1A12TB5		SOLDER LUG			SOLDER LUG				
W303	D10887386		5	3		4TB3	3TB1				SOLDER LUG	SOLDER LUG				2
W304	D10887386		9	9		4TB4	3TB2				SOLDER LUG	SOLDER LUG				2
W305	NOT USED															
W306	NOT USED															
W307	D10887386		3	3		4TB5	1A11TB10			SOLDER LUG		SOLDER LUG				
W308	D10887386		9	9		4TB6	1A12TB5			SOLDER LUG		SOLDER LUG				
W309	D10887386		5	3		4TB7	3TB3				SOLDER LUG	SOLDER LUG				2
W310	D10887386		9	9		4TB8	3TB4				SOLDER LUG	SOLDER LUG				2
W311	NOT USED															
W312	NOT USED															
W313	C10887256		TWINAX	2	RG22 B/U	4J1	3J2				UG421B/U	UG421B/U				2
W314				1		1A20C3, C4	3K2A		TH'D CAP		TH'D CAP					1
W315			1	1		1A20L2	3K1A		TH'D CAP		TH'D CAP					1
W316			1	1		1A20C3,C4	3K10A			TH'D CAP	TH'D CAP					1
W317			1	1		1A20L2	3K11A			TH'D CAP	TH'D CAP					1
W318	B10889526		1	1		1A53A3TB1	POWER PANEL		SOLDER LUG				PRESSURE LUG			
W319	B10889526		1	1		TB1										
W320	B10889526		1	1		TB1										
W321	B10889526		1	1		1A53A3TB1			SOLDER LUG				PRESSURE LUG			
W322	NOT USED		1	1												
W323	NOT USED		1	1												
W324			1	1												
W325	B10889526		1	1		1A55A3TB1				SOLDER LUG			PRESSURE LUG			
W326	B10889526		1	1		TB1										
W327	B10889526		1	1		TB1										
W328	B10889526		1	1		1A53A3TB1	POWER PANEL			SOLDER LUG			PRESSURE LUG			
W329	NOT USED		1	1												
W330	NOT USED		1	1												
W331	NOT USED		1	1			POWER PANEL									

NOTES
1. 1⅜ DIA COPPER TUBING, PART OF TRANSMITTING INSTALLATION MATERIAL
2 CABLES W303, W304, W309, W310, AND W313 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT.

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Figure 11. Transmitting Set Interconnecting and Cabling Diagram (Sheet 2 of 3)

SYMBOL	ITT AV DWG. NO.	NAVY STANDARD	NUMBER COND	ACTIVE COND	NAVY TYPE NO.	FROM	TO	CONNECTOR XMTR CONTROL	CONNECTOR XMTR NO. 1	CONNECTOR XMTR NO. 2	CONNECTOR COUPLER ANTENNA	CONNECTOR DUMMY LOAD	CONNECTOR 208 VAC 3 PH POWER	CONNECTOR 460 VAC 3 PH POWER	CONNECTOR 120 VAC POWER	SEE NOTE
W346	B231262SG2		1	1		1S1,153(SILVER)	POWER PANEL		SOLDER LUG						PRESSURE LUG	
W347	B231262SG2		1	1		1S2,153(GOLD)	POWER PANEL		SOLDER LUG						PRESSURE LUG	
W348	DIO8873BG13		1	1		4TB2	1A12TB5		SOLDER LUG			SOLDER LUG				
W349	DIO8873BG14		2	2		4TB1	1A4TB9		SOLDER LUG			SOLDER LUG				
W350	DIO8873BG15		1	1		4TB6	1A12TB5			SOLDER LUG		SOLDER LUG				
W351	DIO8873BG16		2	2		4TB5	1A4TB9			SOLDER LUG		SOLDER LUG				
W352	DIO8873BG17		1	1		4TB4	3TB2				SOLDER LUG	SOLDER LUG				1
W353	DIO8873BG18		1	1		4TB8	3TB4				SOLDER LUG	SOLDER LUG				1
W354	B231262SG2		1	1		1S2,153(SILVER)	POWER PANEL			SOLDER LUG					PRESSURE LUG	
W355	B231262SG2		1	1		1S2,153(GOLD)	POWER PANEL			SOLDER LUG					PRESSURE LUG	
W361	B231262568		1	1		1A53A351A	POWER PANEL		PRESSURE LUG					PRESSURE LUG		
W362	↑		↑	↑		↑	↑		↑					↑		
W363																
W364																
W365									↓							
W366									PRESSURE LUG							
W371										PRESSURE LUG						
W372										↑						
W373																
W374																
W375	↓		↓	↓		↓	↓			↓				↓		
W376	B231262568		1	1		1A53A351A	POWER PANEL			PRESSURE LUG				PRESSURE LUG		
W711			TWINAX	2	RG22B/U	2A7J8	1A4CP1	UG421B/U		UG421B/U						3
W712			↑	↑	RG22B/U	↑ J13	1A4CP1	↑	UG421B/U							3
W713					RGIIIA/U	J14	4J1					UG421B/U				3
W714					RGIIIA/U	J9	1A11J4		UG421B/U							3
W715					RGIIIA/U	J10	1A11J4			UG421B/U						3
W716			↓	↓	RGIIIA/U	J11	1A11J5		UG421B/U							3
W717			TWINAX	2	RGIIIA/U	J12	1A11J5	UG421B/U		UG421B/U						3
W718			12	9		↓ TB1	1A11TB8	SOLDER LUG	SOLDER LUG							3
W719			12	8		2A7TB2	1A11TB8	SOLDER LUG		SOLDER LUG						3
W720		NOT	USED				NOT	USED								

NOTES - 1. CABLES W352 & W353 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT.

3. SUPPLIED BY INSTALLING AGENCY

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Figure 11. Transmitting Set Interconnecting and Cabling Diagram (Sheet 3 of 3)

TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W301			#14 AWG STRANDED 600 VAC	3	WH-BRN	DUMMY LOAD	4TB1	1	XMTR NO 1	1A11TB10	33	208VAC 3 PHASES BLOWER START	5.8	ITTAV		
					WH-RED			2			40		5.8			
					WH ORN			3			47		5.8			
W302			#16 AWG STRANDED 600 VAC	9	WH-BRN	DUMMY LOAD	4TB2	1	XMTR NO. 1	1A12TB5	1	H.V. INTERLOCK	< .1	ITTAV		
					WH RED			2			2	OPERATE-STANDBY	< .1			
					WH-ORN			3			3	STANDBY	< .1			
					WH-YEL			4			4	DC COMMON	< .1			
					WH-GRN			5			5	OPERATE	< .1			
					WH-BLU			6			6	-28VDC	< .1			
					WH-VIO			7			7	AC INTLK	< .1			
					WH-GRY			8			8	120VAC	< .1			
					WH			9			9	AC COMMON	< .1			
W303			#16 AWG STRANDED 600VAC	3	WH BRN	DUMMY LOAD	4TB3	1	COUPLER, ANTENNA	3TB1	1	DOORS INTLK	< .1	ITTAV	1	
					WH RED			2			2	AC INTLK	< .1			
					WH ORN			3			3	H.V. INTERLOCK	< .1			
					WH YEL			4			4	SPARE	< .1			
					WH GRN			5			5	DOOR INTLK	< .1			
W304			#16 AWG STRANDED 600VAC	9	WH-BRN	DUMMY LOAD	4TB4	1	COUPLER, ANTENNA	3TB2	1	120VAC	< .1	ITTAV	1	
					WH RED			2			2	AC COMMON	< .1			
					WH-ORN			3			3	H.V. INTERLOCK	< .1			
					WH-YEL			4			4	OPERATE-STANDBY	< .1			
					WH-GRN			5			5	STANDBY	< .1			
					WH-BLU			6			6	DC COMMON	< .1			
					WH-VIO			7			7	OPERATE	< .1			
					WH-GRY			8			8	-28VDC	< .1			
					WH			9			9	AC INTLK	< .1			
W305	NOT	USED														
W306	NOT	USED														
W307			#14 AWG STRANDED 600VAC	3	WH-BRN	DUMMY LOAD	4TB5	1	XMTR NO. 2	1A11TB10	33	208VAC 3 PHASES BLOWER START	5.8	ITTAV		
					WH RED			2			40		5.8			
					WH-ORN			3			47		5.8			

NOTES:

1. CABLES W303, AND W304 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT, THEREFORE ARE NOT SHOWN ON TRANSMITTING SET SYSTEM DIAGRAM DWG D10880I6, USCG DWG AND ARE LISTED HERE FOR REFERENCE PURPOSE.

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TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W308			#16 AWG STRANDED 600VAC	9	WH-BRN	DUMMY LOAD	4TB6	1	XMTR NO 2	1A12TB5	1	H.V INTERLOCK	< .1	ITTAV		
					WH-RED			2			2	OPERATE-STANDBY	< .1			
					WH-ORN			3			3	STANDBY	< .1			
					WH-YEL			4			4	DC COMMON	< .1			
					WH-GRN			5			5	OPERATE	< .1			
					WH-BLU			6			6	-28VDC	< .1			
					WH-VIO			7			7	AC INTLK	< .1			
					WH-GRY			8			8	120VAC	< .1			
					WH			9			9	AC COMMON	< .1			
W309			#16 AWG STRANDED 600VAC	5	WH-BRN	DUMMY LOAD	4TB7	1	COUPLER, ANTENNA	3TB3	1	DOOR INTLK	< .1	ITTAV	1	
					WH-RED			2			2	AC INTLK	< .1			
					WH-ORN			3			3	H.V. INTERLOCK	< .1			
					WH-YEL			4			4	SPARE	< .1			
					WH-GRN			5			5	DOOR INTLK	< .1			
W310			#16 AWG STRANDED 600VAC	9	WH-BRN	DUMMY LOAD	4TB8	1	COUPLER, ANTENNA	3TB4	1	120VAC	< .1	ITTAV	1	
					WH-RED			2			2	AC COMMON	< .1			
					WH-ORN			3			3	H.V. INTERLOCK	< .1			
					WH-YEL			4			4	OPERATE-STANDBY	< .1			
					WH-GRN			5			5	STANDBY	< .1			
					WH-BLU			6			6	DC COMMON	< .1			
					WH-VIO			7			7	OPERATE	< .1			
					WH-GRY			8			8	-28VDC	< .1			
					WH			9			9	AC INTLK	< .1			
W311	NOT	USED														
W312	NOT	USED														
W313		RG22B/U	TWINAX	2		DUMMY LOAD	4J1 P2		COUPLER, ANTENNA	3J2 P1		MONITOR	——	ITTAV	1	
W314						XMTR NO. 1			COUPLER, ANTENNA			COUNTERPOISE		ITTAV	2	
W315						XMTR NO.1			COUPLER, ANTENNA			ANTENNA		ITTAV	2	

NOTES:

1. CABLES W309, W310, AND W313 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT.
2. 1 3/8 DIA. COPPER TUBING, PART OF TRANSMITTING INSTALLATION MATERIAL.

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TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W316						XMTR NO. 2			COUPLER, ANTENNA			COUNTERPOISE		ITTAV	1	
W317						XMTR NO. 2			COUPLER, ANTENNA			ANTENNA		ITTAV	1	
W318			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.1	1A53A3TB1	1	208VAC POWER PANEL			208 VAC NEUTRAL	.5	ITTAV		
W319			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.1	1A53A3TB1	2	208VAC POWER PANEL			208VAC PHASE A	TBD	ITTAV		
W320			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO. 1	1A53A3TB1	3	208VAC POWER PANEL			208VAC PHASE B	TBD	ITTAV		
W321			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.1	1A53A3TB1	4	208 VAC POWER PANEL			208VAC PHASE C	TBD	ITTAV		
W322	NOT	USED														
W323	NOT	USED														
W324	NOT	USED														
W325			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.2	1A53A3TB1	1	208VAC POWER PANEL			208VAC NEUTRAL	.5	ITTAV		
W326			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.2	1A53A3TB1	2	208VAC POWER PANEL			208VAC PHASE A	TBD	ITTAV		
W327			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO.2	1A53A3TB1	3	208 VAC POWER PANEL			208 VAC PHASE B	TBD	ITTAV		
W328			#2/0 AWG STRANDED 600VAC	1	BLK	XMTR NO. 2	1A53A3TB1	4	208VAC POWER PANEL			208VAC PHASE C	TBD	ITTAV		
W329	NOT	USED														
W330	NOT	USED														
W331	NOT	USED														

NOTES:
1. 1 3/8 DIA COPPER TUBING, PART OF TRANSMITTING INSTALLATION MATERIAL.

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TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W346			#6 AWG STRANDED 600 VAC	1	BLK	XMTR NO.1	1S2 & 1S3 (SILVER)		120 VAC POWER PANEL			120 VAC NEUTRAL		ITTAV		
W347			#6 AWG STRANDED 600 VAC	1	BLK	XMTR NO 1	1S2 & 1S3 (GOLD)		120 VAC POWER PANEL			120 VAC		ITTAV		
W348			#16 AWG STRANDED 600 VAC	1	WHT-BLK	DUMMY LOAD	4TB2	10	XMTR NO.1	1A12TB5	10	FAN CONTROL	< .1	ITTAV		
W349			#16 AWG STRANDED 600 VAC	2	WHT-YEL WHT-GRN	DUMMY LOAD	4TB1	4 5	XMTR NO.1	1A4TB9	4 5	DOOR INTERLOCK	< .1	ITTAV		
W350			#16 AWG STRANDED 600 VAC	1	WHT-BLK	DUMMY LOAD	4TB6	10	XMTR NO.2	1A12TB5	10	FAN CONTROL	< .1	ITTAV		
W351			#16 AWG STRANDED 600 VAC	2	WHT-YEL WHT-GRN	DUMMY LOAD	4TB5	4 5	XMTR NO.2	1A4TB9	4 5	DOOR INTERLOCK	< .1	ITTAV		
W352			#16 AWG STRANDED 600 VAC	1	WHT-BLK	DUMMY LOAD	4TB4	10	ANTENNA MATCHING NETWORK	3TB2	10	FAN CONTROL	< .1	ITTAV	1	
W353			#16 AWG STRANDED 600 VAC	1	WHT-BLK	DUMMY LOAD	4TB8	10	ANTENNA MATCHING NETWORK	3TB4	10	FAN CONTROL	< .1	ITTAV	1	
W354			#6 AWG STRANDED 600 VAC	1	BLK	XMTR NO.2	1S2 & 1S3 (SILVER)		120 VAC POWER PANEL			120 VAC NEUTRAL		ITTAV		
W355			#6 AWG STRANDED 600 VAC	1	BLK	XMTR NO.2	1S2 & 1S3 (GOLD)		120 VAC POWER PANEL			120 VAC		ITTAV		
W361			350 MCM STRANDED 600 VAC	1	BLK	XMTR. NO. 1	1A53A3 S1A	1	460 VAC POWER PANEL			460 VAC PHASE A	TBD	ITTAV		
W362			↕	↕	↕	↕	↕	2	↕			460 VAC PHASE B	TBD	↕		
W363			↕	↕	↕	↕	↕	3	↕			460 VAC PHASE C	TBD	↕		
W364			↕	↕	↕	↕	↕	1	↕			460 VAC PHASE A	TBD	↕		
W365			↕	↕	↕	↕	↕	2	↕			460 VAC PHASE B	TBD	↕		
W366			350 MCM STRANDED 600 VAC	1	BLK	XMTR NO. 1	1A53A3 S1A	3	460 VAC POWER PANEL			460 VAC PHASE C	TBD	ITTAV		

NOTES:
1 CABLES W352 & W353 ARE PRE-INSTALLED ON UNIT BEFORE SHIPMENT, THEREFORE ARE NOT SHOWN ON TRANSMITTING SET SYSTEM DIAGRAM DWG D108891G, USCG DWG AND ARE LISTED HERE FOR REFERENCE PURPOSE.

TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W371			350 MCM STRANDED 600 VAC	1	BLK	XMTR NO. 2	1A53A3 S1A	1	460 VAC POWER PANEL			460 VAC PHASE A	TBD	ITTAV		
W372			↑	↑	↑	↑	↑	2	↑			460 VAC PHASE B	TBD	↑		
W373			↕	↕	↕	↕	↕	3	↕			460 VAC PHASE C	TBD	↕		
W374			↕	↕	↕	↕	↕	1	↕			460 VAC PHASE A	TBD	↕		
W375			↕	↕	↕	↕	↕	2	↕			460 VAC PHASE B	TBD	↕		
W376			350 MCM STRANDED 600 VAC	1	BLK	XMTR NO. 2	1A53A3 S1A	3	460 VAC POWER PANEL			460 VAC PHASE C	TBD	ITTAV		
W711		RG22B/U	TWINAX	2		XMTR CONTROL	2A7J8 P1		XMTR NO. 2	1A4CP1 P2		XMTR NO.2 PULSE	.005	INSTL AGENCY		
W712		RG22B/U	TWINAX	2		XMTR CONTROL	2A7J13 P1		XMTR NO.1	1A4CP1 P2		XMTR NO.1 PULSE	.005	INSTL AGENCY		
W713		RG111A/U (WITH OUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J14 P1		DUMMY LOAD	4J1 P2		ANT CURRENT PULSE	—	INSTL AGENCY		
W714		RG111A/U (WITHOUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J9 P1		XMTR NO 1	1A11J4 P2		XMTR NO.1 SCOPE GATE TRIGGERS	—	INSTL AGENCY		
W715		RG111A/U (WITHOUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J10 P1		XMTR NO.2	1A11J4 P2		XMTR NO.2 SCOPE GATE TRIGGERS	—	INSTL AGENCY		
W716		RG111A/U (WITHOUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J11 P1		XMTR NO 1	1A11J5 P2		XMTR NO.1 SCOPE MULTITRIGGER	—	INSTL AGENCY		
W717		RG111A/U (WITHOUTER VINYL JACKET)	TWINAX (ARMORED)	2		XMTR CONTROL	2A7J12 P1		XMTR NO.2	1A11J5 P2		XMTR NO.2 SCOPE MULTITRIGGER	—	INSTL AGENCY		

TABLE 13. TRANSMITTING SET RUNNING LIST FOR INTERCONNECTING CABLES (Cont)

SYMBOL	NAVY SYMBOL	NAVY TYPE NO.	WIRE TYPE	NO. ACTIVE COND.	COLOR	FROM	CONN. & MATING PLUG	PIN NO	TO	CONN. & MATING PLUG	PIN NO.	FUNCTION	CONDUCTOR AMPERES	SUPPLIED BY	SEE NOTE	
W718			#14 AWG STRANDED 600VAC	9	BLK	XMTR CONTROL	2A7TB1	1	XMTR NO. 1	1A11P8	7	DC COMMON	.4	INSTL. AGENCY	1	
					RED			2			1	OPERATE-STANDBY	.1			
					WHT			3			5	STOP	.1			
					GRN			4			3	H.V. INTERLOCK	.1			
					BLK-WHT			5			9	AC COMMON	.03			
					GRN-BLK			6			10	PLATE VOLTAGE UP	.01			
					ORN-BLK			7			2	READY	.01			
					RED-BLK			8			6	HIGH VOLTAGE ON	.01			
					BLU			9			8	ALARM	.1			
W719			#14 AWG STRANDED 600VAC	8	BLK	XMTR CONTROL	2A7TB2	1	XMTR NO. 2	1A11T88	7	DC COMMON	.4	INSTL AGENCY	2	
					RED			2			1	OPERATE-STANDBY	.1			
					WHT			3			5	STOP	.1			
					GRN			4			3	H.V. INTERLOCK	.1			
					BLK-WHT			5			9	AC COMMON	.03			
					GRN-BLK			6			10	PLATE VOLTAGE UP	.01			
					ORN-BLK			7			2	READY	.01			
					RED-BLK			8			6	HIGH VOLTAGE ON	.01			
					BLU			9			8	ALARM	.1			
W720			NOT	USED												

NOTES
1. IN CABLE W718 WIRES COLORED ORN, WH-BLK & WH-BLU ARE SPARE WIRES AND ARE TO BE DOUBLED BACK INTO WIRE DUCT ON XMTR CONTROL & XMTR NO.1.
2. IN CABLE W719 WIRES COLORED BLK, ORN, WH-BLK & WH-BLU ARE SPARE WIRES AND ARE TO BE DOUBLED BACK INTO WIRE DUCT ON XMTR CONTROL & XMTR NO.2.

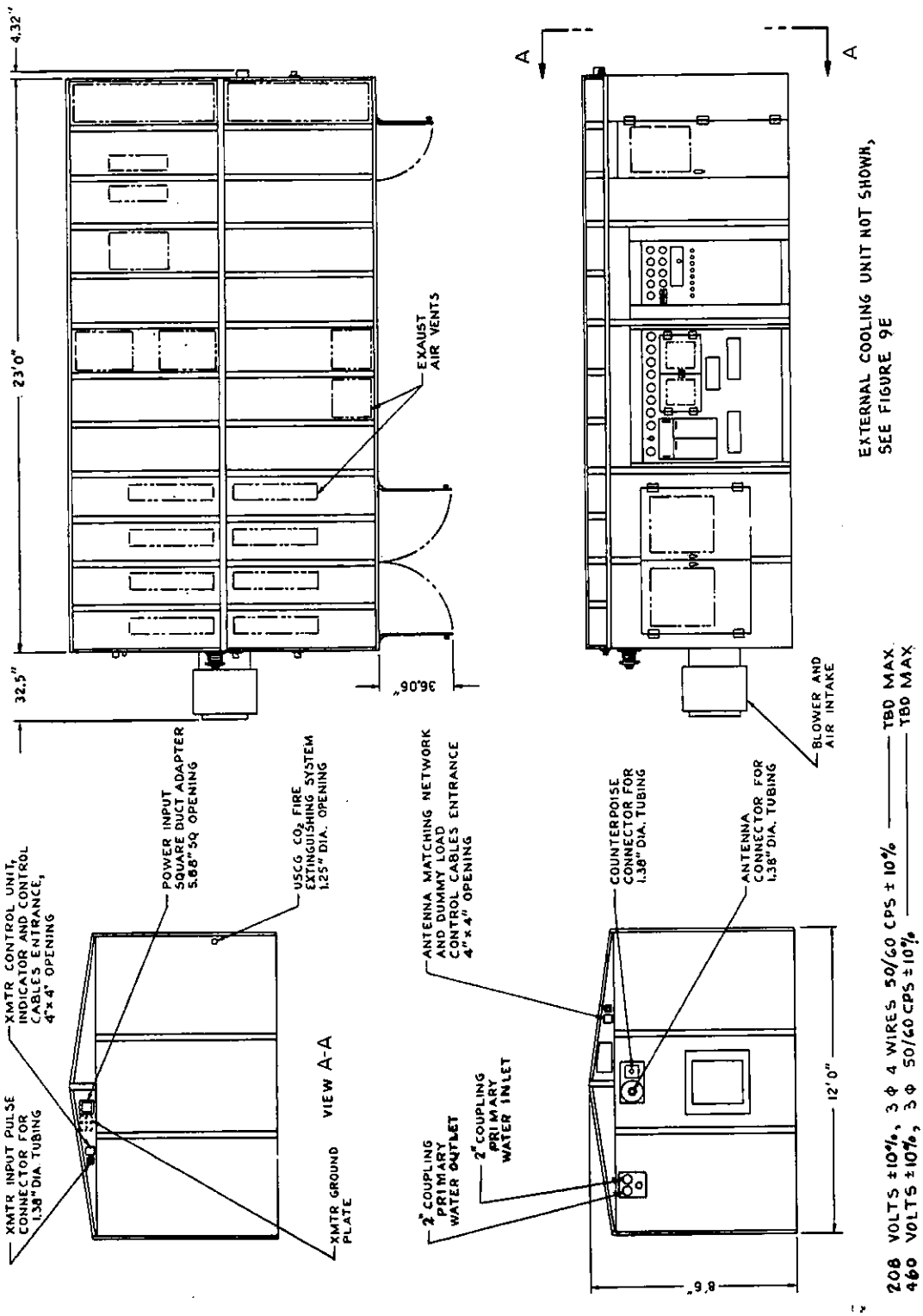
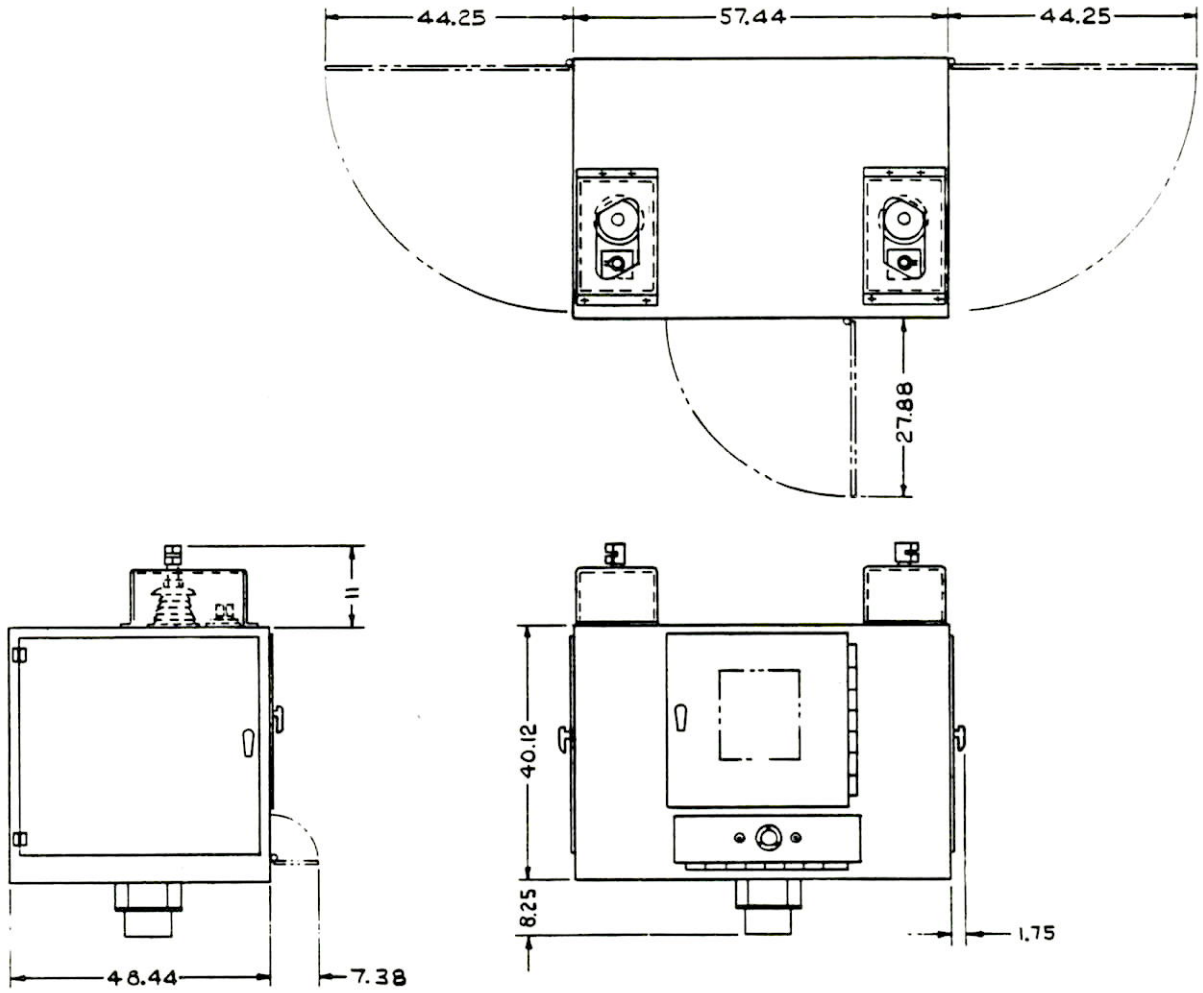


Figure 12. Transmitting Group Outline Drawing

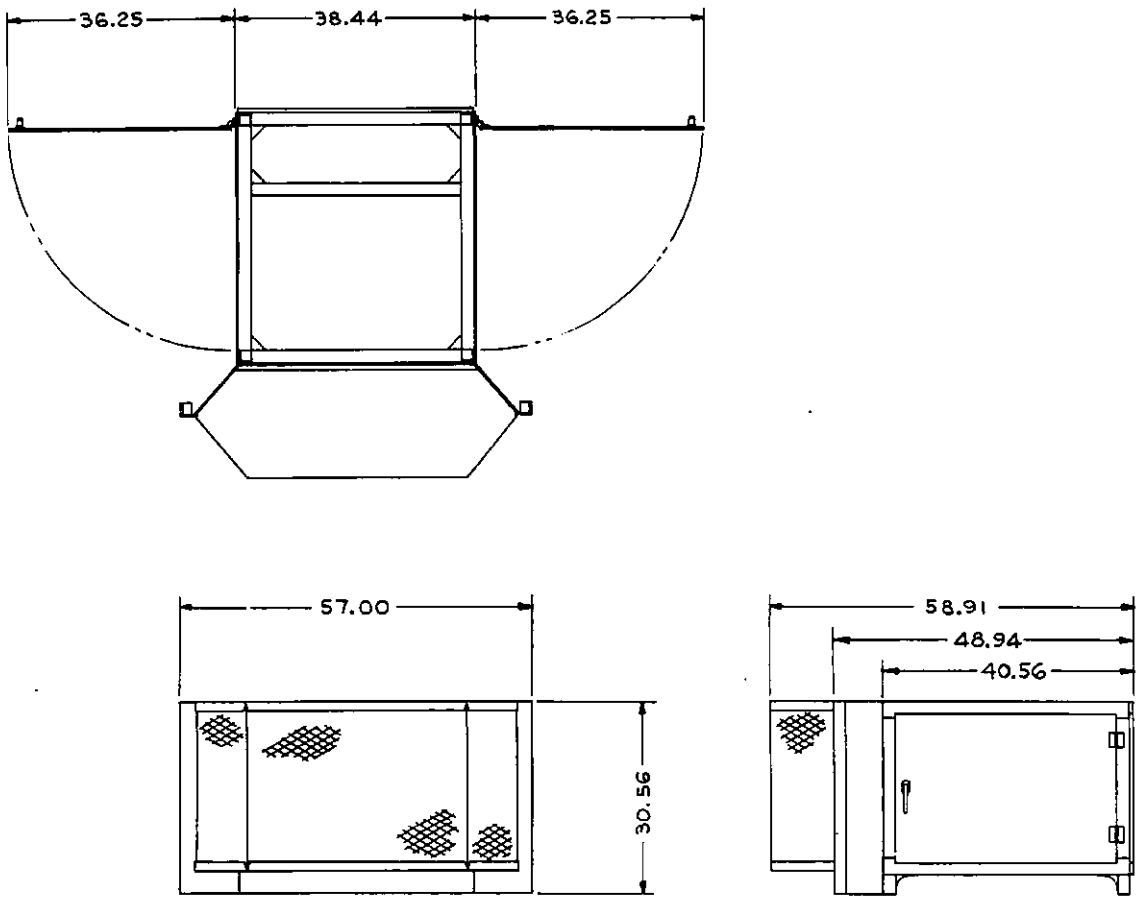


ESTIMATED WEIGHT UNCRATED ——— 482 LBS
ESTIMATED WEIGHT CRATED ——— *
ESTIMATED VOLUME CRATED ——— *

AMBIENT TEMPERATURE RANGE:
OPERATING ——— 0°C TO +50C
STORAGE ——— -62°C TO +75°C

* SHIPPED WITH DUMMY LOAD IN BOX WI

Figure 13. Antenna Coupler CU-2171/FPN-44A Outline Drawing



ESTIMATED WEIGHT UNCRATED ——— 430 LBS
ESTIMATED WEIGHT CRATED ——— *
ESTIMATED VOLUME CRATED ——— *
ESTIMATED POWER REQUIRED ——— 1120 WATTS
ESTIMATED HEAT DISSIPATION ——— 1120 WATTS
ESTIMATED POWER FACTOR ——— .89
208 VOLTS ±10%, 3 Φ 50/60 CPS ±10%
AMBIENT TEMPERATURE RANGE:
OPERATING ——— 0°C TO +50°C
STORAGE ——— -62°C TO +75°C

* SHIPPED WITH ANTENNA COUPLER IN BOX W1.

Figure 14. Dummy Load Outline Drawing

TABLE 14Q. TRANSMITTING LIGHT FIXTURES LIST OF MATERIALS

TRANSMITTER #2 (AN/FPN-44A)	TRANSMITTER #1 (AN/FPN-44A)	TRANSMITTER #2	TRANSMITTER #1	LIST OF MATERIALS						ITEM SHOWN ON H1088995 SHEET (1,2) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX						
1	1	1	1	1	1		C	10891069G1	CIRCUIT BREAKER ASS'Y	110	1,2						1	Y13	1	X13						
1	1	1	1	1	2		C	1089092G1	FIXTURE ASSEMBLY	110	1,2		1	Y13	1	X13	1	Y13	1	X13		4				
1	1	1	1	1	3		C	1089096G1	FIXTURE ASSEMBLY	110	1,2		1	Y13	1	X13	1	Y13	1	X13		4				
4	4	4	4	1	4		D	1087841G6	CLAMP	120	1,2		4	Y13	4	X13	4	Y13	4	X13		2,3				
1	1	1	1		5		D	10964496001	CIRCUIT BREAKER ASSY	110	2		1	Y13	1	X13										
					6																					
		1	1	1	7		C	10891066G2	CIRCUIT BREAKER ASS'Y	110	1						1									
1	1	1	1	1	8		C	1089229G1	FIXTURE ASSEMBLY	110	1,2		1	Y13	1	X13	1	Y13	1	X13						
15	15	15	15	1	9		A	2138550B015	TERMINAL, LUG		2		15	Y13	15	X13	15	Y13	15	X13						

BLM1088995E

Q

TABLE 15F. HARMONIC FILTER LIST OF MATERIALS

		TRANSMITTER No 2	TRANSMITTER NO. 1	LIST OF MATERIALS						ITEM SHOWN ON E1087428 SHEET ( ) OR ON ASSEMB. DWG LISTED IN PART NO COLUMN (*)	ITEM ASSEMBLED WITH ITEMS LISTED AT ITTFL	QUANTITY TO BE SHIPPED PER GROUP (Q) AND SHIPPING BOX NO.								SEE ITEM LISTED FOR SHIPPING INSTRUCTIONS	ITEM ASSEMBLED WITH ITEMS LISTED AT INSTALLATION			EQUIP. SERIAL NO.	
QUAN. PER GROUP				U OF M	ITEM NO.	CODE IDENT.	SIZE	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	ITTFL SOURCE			G4		G3		G2		G1							
G4	G3	G2	G1										Q	BOX	Q	BOX	Q	BOX	Q	BOX						
		1	1	1	1		F	109G241G1	CAPACITOR ASST.	110	*								1	X39						
		1	1	1	2		G	109G249G1	BRACKET CLAMP ASST.	110							1	Y39	1	X39		1,4				
		1	1	1	3		D	109G258G1	COIL ASST.	110	4								1	X39						
		1	—	1	4		F	109G241G2	CAPACITOR ASSY	110	*						1	Y39								
		1	—	1	5		D	109G258G2	COIL ASSY.	110	5						1	Y39								
																										F

BLM1096268

Table 16. Harmonic Filter Capacitor Assembly (Sheet 1 of 3)

ITTAV D6213 REV. 1/68

PARTS LIST	ITT AVIONICS DIVISION NUTLEY, NEW JERSEY	DWG SIZE: A	CODE IDENT NO.: 28527	DRAWING NUMBER: PL 1096241	REV: -
SEE COVER SHEET FOR LIST TITLE, REVISION AND AUTHENTICATION	PARENTHETICAL IDENTITIES ARE FOR REFERENCE ONLY	PREPARED IN ACCORDANCE WITH MIL-STD-100	CATEGORY ___		SHT 2

QUANTITY PER GROUP G5	G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT	PART OR IDENTIFYING NO.	SPECIFICATION NO.	NOMENCLATURE OR DESCRIPTION	SIZE	ITTAV SOURCE
						1						
						2						
						3						
			9	9	1	4		1096232G001		ANGLE, SUPPORT	B	520
			3	3	1	5		1096233G001		ANGLE SUPPORT	C	530
										(VERTICAL)		
			3	3	1	6		1096233G002		ANGLE SUPPORT	C	530
										(VERTICAL)		
			1	1	1	7		1096234G001		ANGLE, SUPPORT	C	530
			1	1	1	8		1096234G002		ANGLE, SUPPORT	C	530
			4	4	1	9		1096235G001		PLATE, CAPACITOR MTG	C	530
			1	1	1	10		1096237G001		ANGLE, SUPPORT (TOP)	D	120
			4	4	1	11		1096242G001		CAPACITOR (C1 THRU C4)	C	530
			-	1	1	12		1096237G002		ANGLE, SUPPORT (TOP)	D	120
			60	60	1	13		MS51957-84	FF-S-92	SCREW, MACH. 1/4-20		530
										PAN HD. 1.25 LG		
			16	16	1	14		MS51957-87	FF-S-92	SCREW MACH. 1/4-20		530
										PAN HD 2.00 LG		

U OF M CODE | 1 PIECE 5 SET | 6 PAIR 20 REF DOC | 32 FEET | 52 U.S. FLUID OZ. 54 U.S. LIQUID QT. | 55 U.S. GAL. 68 LB AVDP

* IN PART NO. COL. DENOTES VENDOR ITEM: SEE SOURCE OR SPECIFICATION CONTROL DWG.

Table 16. Harmonic Filter Capacitor Assembly (sheet 2 of 3)

ITTAV D6213 REV. 1/68

PARTS LIST	ITT AVIONICS DIVISION NUTLEY, NEW JERSEY	DWG SIZE: A	CODE IDENT NO.: 28527	DRAWING NUMBER: PL 1096241	REV: A
SEE COVER SHEET FOR LIST TITLE, REVISION AND AUTHENTICATION	PARENTHETICAL IDENTITIES ARE FOR REFERENCE ONLY	PREPARED IN ACCORDANCE WITH MIL-STD-100	CATEGORY ___		SHT 3

QUANTITY PER GROUP G5	G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT	PART OR IDENTIFYING NO.	SPECIFICATION NO.	NOMENCLATURE OR DESCRIPTION	SIZE	ITTAV SOURCE
			16	16	1	15		MS51957-114	FF-S-92	SCREW, MACH. 3/8-16		530
										PAN HD 1.75 LG		
			152	152	1	16		MS15795-810	FF-W-92	WASHER, FLAT, 1/4		530
			76	76	1	17		MS35338-139	FF-W-84	WASHER, LK SPLIT 1/4		530
			76	76	1	18		MS35649-2254	FF-N-836	NUT, HEX 1/4-20		530
			32	32	1	19		MS15795-814	FF-W-92	WASHER, FLAT 3/8		530
			16	16	1	20		MS35338-141	FF-W-84	WASHER, LK SPLIT 3/8		530
			16	16	1	21		MS35649-2384	FF-N-836	NUT, HEX 3/8-16		530
			4	4	1	22		1096236G001		SPARK-GAP SUB. ASSY	B	120
			8	8	1	23		MS35649-264	FF-N-836	NUT, HEX NO. 8-32		530
			8	8	1	24		MS15795-841	FF-W-92	WASHER, FLAT NO. 8		530
			8	8	1	25		MS35338-137	FF-W-84	WASHER LK SPLIT #8		530
			2	2	1	26		1096245G001		BRACKET, SPK GP. MTG	B	520
			2	2	1	27		1096245G002		BRACKET, SPK GP. MTG.	B	520
			5	5	1	28		1096243G001		CONNECTOR	B	520
			1	1	1	29		1096535G001		ADAPTER, IDENT PLATE	B	520
			1	—	1	30		1096237G003		ANGLE, SUPPORT TOP	D	120

U OF M CODE | 1 PIECE 6 PAIR 32 FEET 52 U.S. FLUID OZ. 55 U.S. GAL. | 5 SET 20 REF DOC 54 U.S. LIQUID QT. 68 LB AVDP

* IN PART NO. COL. DENOTES VENDOR ITEM: SEE SOURCE OR SPECIFICATION CONTROL DWG.

Table 16. Harmonic Filter Capacitor Assembly (Sheet 3 of 3)

ITTAV D6213 REV. 1/66

PARTS LIST	ITT AVIONICS DIVISION NUTLEY, NEW JERSEY	DWG SIZE: A	CODE IDENT NO.: 28527	DRAWING NUMBER: PL 1096241	REV: —
SEE COVER SHEET FOR LIST TITLE, REVISION AND AUTHENTICATION	PARENTHETICAL IDENTITIES ARE FOR REFERENCE ONLY	PREPARED IN ACCORDANCE WITH MIL-STD-100	CATEGORY —		SHT 4

QUANTITY PER GROUP G5	G4	G3	G2	G1	U OF M	ITEM NO.	CODE IDENT	PART OR IDENTIFYING NO.	SPECIFICATION NO.	NOMENCLATURE OR DESCRIPTION	SIZE	ITTAV SOURCE
			8	8	1	31		MS51971-4	FF-N-836	NUT, HEX NO. 7/16-14		530
			8	8	1	32		MS35338-142	FF-W-84	WASHER, LK SPLIT NO. 7/16		530
			8	8	1	33		MS15795-816	FF-W-92	WASHER, FLAT NO. 7/16		530

U OF M CODE | 1 PIECE 6 PAIR 32 FEET 52 U.S. FLUID OZ. 55 U.S. GAL. | 5 SET 20 REF DOC 54 U.S. LIQUID QT. 68 LB AVDP

* IN PART NO. COL. DENOTES VENDOR ITEM: SEE SOURCE OR SPECIFICATION CONTROL DWG.

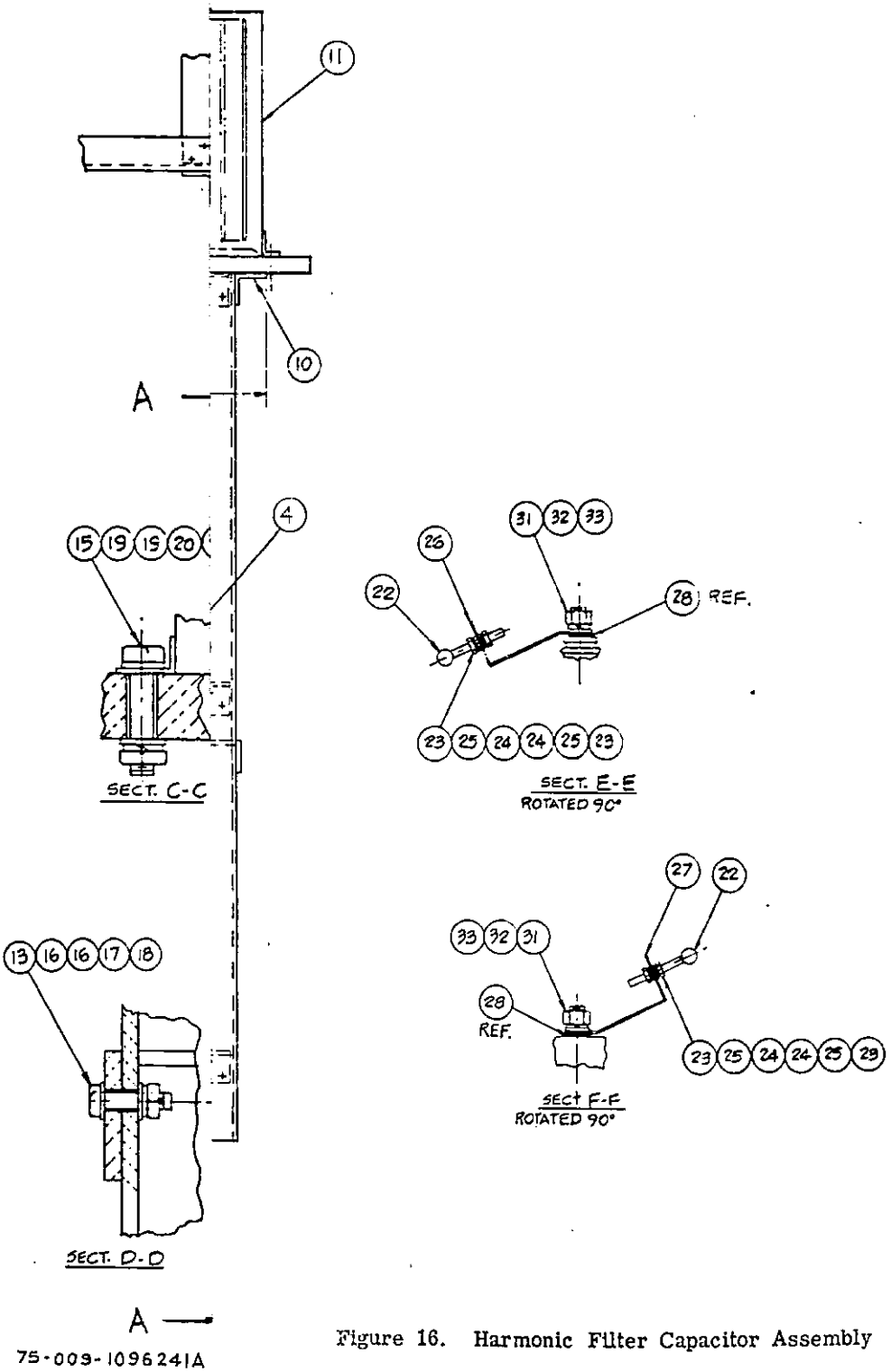


Figure 16. Harmonic Filter Capacitor Assembly

SHIPPING - REASSEMBLY INSTRUCTIONS -

TUBE RACK, P. A.

(1096543A)

SHIPPING INSTRUCTIONS.

When the TUBE RACK, P. A. is shipped, the following items are to be removed from the rack and shipped in the boxes listed:

QUANTITY	ITEM DESCRIPTION	BOX NO.
4	Type F-1086 Tubes	X/Y 25-28
8	Standoff	X/Y 3&4
8	Clamp (Casting)	X/Y 3&4
8	7MF Capacitors (21000 V.)	X/Y 5&6
4	Tube Water Jackets	X/Y 7
1	Frame	X/Y 8
2	Connector F190	X/Y 8
6	Connector F191	X/Y 8
2	Connector F199	X/Y 8
2	Connector F200	X/Y 8
8	Connector F220	X/Y 8
4	Suppressor Assembly	X/Y 8
4	Resistor Connector Assemblies	X/Y 8

The chrome plated hex cap nut on the top of each water flow meter is to be removed and a short wooden dowel rod put in the open end of the tube thus exposed. The dowel should extend from the tube approximately 1/8 inch so that when the hex cap is replaced it will press the dowel pin against the water flow meter float and keep it from moving during shipment.

The water inlet and outlet headers are secured to two short channels which in turn are bolted to the top channel member of the rack. These short channels should be unbolted from the rack and the header assembly tied down on the capacitor mounting angles for shipment. Do not disconnect the hoses.

When any item is removed from the unit for shipping, the mounting hardware is to be replaced in the holes to facilitate the reassembling of the equipment in the field.

REASSEMBLY INSTRUCTIONS.

After the TUBE RACK, P. A. has been placed in its final position during Transmitter assembly in the field it should be reassembled as follows: (Note boxes in which items were shipped as listed in the shipping instructions above)

1. Remove hex cap nuts on top of each water flow meter and remove wooden dowel pin from tube. Replace the hex cap nuts.

2. Remove the water header mounting from the holes in the center portion of the top channel of the tube rack. Untie the water header assembly which was secured to the capacitor mounting angles for shipment. Place the assembly header in its normal position so that the face of the two short vertical mounting channels of the assembly header are on the inside surface of the rear leg of the channel on top of the tube rack. Bolt the header assembly to the tube rack channel.

3. Remove the nylon mounting hardware for the high voltage capacitors from the mounting holes in the top frame members of the tube rack.

4. Install the capacitors in the tube rack by lifting them up to and sliding on the capacitor mounting angles located on the upper support channels of the tube rack. The capacitor terminals should be facing the rear of the tube rack and positioned so that the flange on the capacitor with the 10-32 stud mounted on it is on the bottom. When the capacitor mounting flanges meet the tube rack support members, the nylon bolts for capacitor mounting should be placed through the capacitor mounting holes and the nylon spacers placed between the capacitor mounting bracket and the tube rack support channels. Secure with the nylon nuts.

5. Mount the eight vertical and horizontal tube support insulators to the rack. Then mount the clamps (castings) to the insulated supports; mount clamp 1087766G1 to the vertical supports and 1087766G2 to the horizontal supports.

Next, the tube water jackets should be remounted as their insulated supports. Care must be exercised throughout this phase of the installation so that the tube support insulators are not broken either by bumping or by exerting undue stresses due to misalignment of the jackets. The jackets should be mounted so that the inlet/outlet fittings of each pair are adjacent to each other (i.e., away from the tube rack vertical support members).

The tapped jackets should be placed on the top support casting so that the top flange of jacket rests on the casting. The boss on the jacket into which the hex bolt is tapped should face the rear. The stainless steel band should then be wrapped around the jacket and the stud on the band inserted in the hole in the top support casting and secured loosely with the nut and lockwasher. The band on the bottom tube support should be placed around the jacket in a similar manner. If the tube jacket fits snugly into both tube jacket support castings, then the nuts may be tightened to pull up the stainless steel bands to secure the jacket to the mounting castings. If the jacket does not fit into both castings, it may be necessary to loosen the insulator mounting bolts and readjust the position of the insulator until a good fit between the jacket and the mounting castings is obtained. The tube jackets should be checked with a level to determine that they are mounted vertically. If a vertical mounting is not obtained again the insulator should be adjusted until the tube jacket is vertical.

6. The flexible, coiled water columns were left in place (assembled to the rack) when shipped. The couplings on the ends of the flexible hoses should be connected to their mating parts on the tube water jackets.

7. Connect the eight CONNECTORS marked F220 between the lower (#2) terminal of each of the high voltage capacitors and its case. Secure these connectors on the case end only.

8. Connect the CONNECTORS marked F199 between the lower (#2) terminals of the capacitors C3 and C4 and the cathode buss bar directly below. Connect at the cathode buss far end only.

9. Connect the CONNECTORS marked F200 between the lower terminals of the capacitors C15 and C16 and the cathode buss bar directly below. Connect at the cathode buss bar end only.

10. Connect the lower (#2) terminals of each pair of capacitors with a CONNECTOR marked F191. Using capacitor hardware secure CONNECTORS on all bottom terminals of the capacitors.

11. Place a CONNECTOR marked F191 between the top (#1) terminals of the capacitor pairs C13, C15 and C14, C16.

12. Place a CONNECTOR marked F190 between the top terminals of the capacitor pairs C3, C5 and C4, C6.

13. Connect the four resistor-connector assemblies between the top (#1) terminals of C3, C15, C4 or C16 and the insulated standoffs that are adjacent to C21, C23, C22 or C24 respectively. (The insulated standoffs are mounted on capacitor assemblies C1, C11, C2 or C12 respectively.) Tighten all hardware on standoffs and high voltage capacitors.

14. Connect a SUPPRESSOR ASSEMBLY from the rear of each tube water jacket to the front terminal of the tuning capacitor, (C21, C22, C23, or C24) located directly behind each water jacket. Position the top ends of the suppressor assemblies to provide adequate clearance to capacitors, with at least 2 1/4 inches clearance between the suppressor clip knobs and filament by-pass capacitors.

CAUTION

Loosen clamps during installation to avoid cracking resistors.

15. Tubes should be installed after complete transmitter installation has been completed.

SHIPPING - REASSEMBLY INSTRUCTIONS -

CAPACITOR ASSEMBLY

P/O HARMONIC (LOW PASS) FILTER

SHIPPING INSTRUCTIONS.

The CAPACITOR ASSEMBLY consists of a fiber-glass frame and capacitor mounting plates which support four 0.07 MF. (10.8 KV) capacitors, plus interconnecting copper tubing.

Remove the tubing connectors from the capacitors. Remove the capacitors (with spark gap assemblies left in place) from the frame and pack separately. Attach shorting wires across capacitor terminals. Replace the mounting hardware into the capacitor mounting plates. Ship in boxes X39 and Y39.

REASSEMBLY INSTRUCTIONS.

1. Refer to figures 3Y, 4C and 16. Place CAPACITOR ASSEMBLY frame in enclosure adjacent to enclosure blower with "C4" marking adjacent to P.A. Tube Rack and the ends of the capacitor mounting plates over the louvres.

2. Mount the four 0.07 MF capacitors on mounting plates; capacitors with ball gaps are to be located at each end of the frame; ribbed insulators are to be oriented away from the enclosure wall.

3. Remove ball gap assemblies and install five connectors (P/N 1096243G001) per figure 16.

4. Replace ball gap assemblies on C1, C4 with gaps approximately 0.13 inch.

5. Tighten hardware. Replace shorting wires across capacitor terminals until ready for tuning and electrical operation.

SHIPPING - REASSEMBLY INSTRUCTIONS -

EXCITER

(A1088993C)

SHIPPING INSTRUCTIONS.

When the EXCITER is shipped, the following items are to be removed from the unit when shipped in the boxes listed:

QUAN.	ITEM	BOX NO.
2	F8C25A Tubes	X or Y 31
2	4PR-1000A Tubes	X or Y 31
2	4PR-1000A Chimney	X or Y 31
2	Capacitor (C32, C50)	X or Y 29
1	Frame	X or Y 30
1	6336 Tubes	X or Y 31
1	6336 Tube Retainer	X or Y 31

When the parts are removed for shipment, all hardware shall be replaced in the mounting holes. Place shorting wires across terminals of capacitors C32, C50. Secure bracketry (for C32, C50) in the bottom of the EXCITER unit.

REASSEMBLY INSTRUCTIONS.

The mounting plate, angles, and brackets for capacitors C32, C50 will be found taped together and secured in the bottom of the EXCITER unit. Remove these pieces. Remove the panel from the front lower left portion of the EXCITER and place capacitors C32 and C50 in position. Reassemble the mounting plate and brackets to the capacitors and EXCITER frame.

P/N 1092072 and 1092074 are to be assembled at rear of capacitors; P/N 1092073 (two brackets) are to be assembled to front of capacitors. Reconnect leads to capacitors and remove shorting wires. Replace EXCITER front panel.

Tubes should be installed after the complete transmitter installation has been performed. Store the 6336 tubes and retainers (from box 31) as spares.

SHIPPING - REASSEMBLY INSTRUCTIONS -

ANTENNA MATCHING NETWORK, DUMMY LOAD

(A1096541-)

SHIPPING INSTRUCTIONS.

When the antenna matching network and dummy load units are shipped, they are assembled together and the following items are removed for shipment:

All vacuum relays

Tubing connectors to capacitors

Shields

After individual packing, these items are packed inside the unit cabinets.

When parts are removed for shipping, all hardware is replaced in the mounting holes.

ASSEMBLY INSTRUCTIONS.

1. Install vacuum relays 3K1, 3K2, 3K6, 3K10, and 3K11. Make certain that relays are correctly oriented, per tag instructions, before securing with hardware. Handle with extreme care during installation, and guard against accidental striking of glass envelopes.

2. Tubing and wire connectors for capacitors and vacuum relays will be found taped to an interior surface of the antenna matching network. Remove and install these connectors which were tagged at disassembly to facilitate reassembly.

SHIPPING - REASSEMBLY INSTRUCTIONS -

460 VOLT RACK ASSEMBLY

(PART OF POWER SUPPLY 1A53)

SHIPPING INSTRUCTIONS.

When the 460 volt rack assembly is shipped, the following items are to be removed and shipped on a common skid:

REGULATOR ASSEMBLY	1A53A3A1 (P/N 1096342)
FUSE PANEL	1A53A3A2 (P/N 1096343)

REASSEMBLY INSTRUCTIONS.

Remove Regulator Assembly 1A53A3A1 from skid. Using hardware supplied (from skid), bolt Regulator Assembly to lower portion of 460 volt rack.

Assemble Fuse Panel 1A53A3A2 to rack above the Regulator Assembly.

CG-273-136 *(Non-Registered)*

VOLUME IV

TECHNICAL MANUAL

for

LORAN TRANSMITTING SET

AN/FPN-44A

SECTION 5

NOTE

Change 3 to be used only with Loran Transmitting Set AN/FPN-44 modified to include solid-state power supply.

ITT AVIONICS DIVISION
390 Washington Avenue
Nutley, New Jersey 07110

7610 01 GE8 1301

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U. S. COAST GUARD

DEPARTMENT OF TRANSPORTATION

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15 AUGUST, 1976
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LIST OF EFFECTIVE PAGES

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Title	Change 3	5-23	Original	5-51	Change 3
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5-v	Change 3	5-26 Blank	Original	5-52B Blank	Change 2
5-vi Blank	Change 3	5-27	Change 3	5-53 - 5-54	Change 2
5-1 - 5-2	Original	5-28 Blank	Change 3	5-55 - 5-63	Original
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5-16A	Change 3	5-40 Blank	Change 2	5-107	Change 2
5-16B Blank	Change 3	5-41	Original	5-108	Original
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5-18 Blank	Change 3	5-43	Change 3	5-113 - 5-116	Original
5-19	Original	5-44 Blank	Change 3	5-117	Change 2
5-20 Blank	Original	5-45	Original	5-118 - 5-122	Original
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5-22 Blank	Change 3	5-47	Original	5-124 - 5-128	Original
5-22A	Change 3	5-48 Blank	Original	5-128A - 5-128B	Change 3
5-22B Blank	Change 3	5-49 - 5-50	Original		
5-22C - 5-22D	Change 3				

b. Page 5-ii; add to the end of List of Effective Pages, "The following pages are changed or corrected for Field Change No. 9/32/32 to the AN/FPN-44A/44-45/45( ). 5-9/10, 5-17/18, 5-53, 5-60, 5-61."

NOTE: PAGE 5-76 HAS BEEN CHANGED BY F.C. NO. 4
THE FOLLOWING PAGE HAS BEEN CORRECTED BY F.C. NO 5/28

PAGE 5-59 HAS BEEN CHANGED BY F.C. NO 6

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SECTION 5 - TROUBLE SHOOTING (Cont)

SECTION 5 - TROUBLE SHOOTING (Cont)

SECTION 5 - TROUBLE SHOOTING (Cont)

LIST OF TABLES

SECTION 5

TROUBLE SHOOTING

5-1. GENERAL.

To locate troubles quickly and efficiently, the technician should become thoroughly familiar with the Loran-C ground station equipments, giving special attention to monitoring devices and alarm and status indicators of the loran transmitting set.

When a trouble is encountered, the cause of it may be localized to the exact assembly or component item by a systematic procedure. First the defective group must be determined and then the defective unit within the group. Next, the defective circuit must be determined. Finally the trouble must be isolated to the defective assembly or part.

a. SYMPTOM RECOGNITION. - This is the first step in the trouble shooting procedure and is based on a complete knowledge and understanding of equipment operating characteristics. All equipment troubles are not the direct result of component failure. Therefore, a trouble in an equipment is not always easy to recognize, since all conditions of less than peak performance are not always apparent. This type of equipment trouble is usually discovered while accomplishing preventive maintenance procedures. It is important that the "not so apparent" troubles, as well as the apparent troubles, be recognized.

b. SYMPTOM ELABORATION. - After an equipment trouble has been "recognized", all the available aids designed into the equipment should be used to further elaborate on the original trouble symptom. Use of front panel controls and other built-in indicating and testing aids should provide better identification of the original trouble symptom. Also, checking or otherwise manipulating the operating controls may eliminate the trouble.

c. LISTING PROBABLE FAULTY FUNCTION. - The next step in logical trouble shooting is to formulate a number of "logical choices" as to the cause and likely location (functional section) of the trouble. The "logical choices" are mental decisions which are based on knowledge of the equipment operation, a full identification of the trouble symptom, and information contained in this manual. The overall functional description and its associated block diagram should be referred to when selecting possible faulty functional sections.

d. LOCALIZING THE FAULTY FUNCTION. - For the greatest efficiency in localizing trouble, the functional sections which have been selected by the "logical choice" method should be tested in an order that requires the least time. This requires a mental selection to determine which section to test first. The selection should be based on the validity of the "logical choice" and the difficulties in making the necessary tests. If the tests do not prove that functional section to be at fault, the next selection should be tested, and so on until the faulty functional section is located. As aids in this process, the manual contains a functional description and a servicing schematic or block diagram for each functional section. Waveforms (or other pertinent indications) are included as significant check points on servicing block diagrams to aid in isolating the faulty section.

e. LOCALIZING TROUBLE TO THE CIRCUIT. - After the faulty functional section has been isolated, it is often necessary to make additional "logical choices" as to which group of circuits or circuit (within the functional section) is at fault. Servicing schematics or block diagrams for each functional section provide the signal flow and test location information needed to bracket and then isolate the faulty circuit.

f. FAILURE ANALYSIS. - After the trouble (faulty component, misalignment, etc.) has been located, but prior to performing corrective action, the procedures followed up to this point should be reviewed to determine exactly why the fault affected the equipment in the manner it did. This review is usually necessary to make certain that the fault discovered is actually the cause of the malfunction, and not just result of the malfunction.

g. TROUBLE SHOOTING AIDS. - The trouble shooting information in this section is arranged to make the procedure outlined above possible. System trouble shooting procedures are provided, which when followed, help to determine which one of the equipment groups and major components within the group contains the trouble. After the trouble is isolated to a specific unit within a group, the functional section breakdown table references a corresponding service block or schematic diagram. This diagram contains all the waveshape and voltage information necessary to completely isolate the trouble to a particular stage within the unit. Continuity checks may then be performed to localize the trouble to a defective part. To aid the technician in performing these procedures, part and test point location diagrams and voltage and resistance diagrams are provided in addition to the service block and schematic diagrams.

The service diagrams and part and test point location diagrams include tests points which are indicated by stars ⬠ and circles ◯ . The starred test points (major test points) are for checking the overall functions of, and localizing troubles to, a unit or rack.

The circled test points (secondary and minor test points) are for isolating causes of abnormal performance within a unit and stage.

5-2. TEST EQUIPMENT AND SPECIAL TOOLS.

The test equipment required to trouble shoot the loran transmitting set is listed in table 5-1. No special tools are required.

5-3. OVERALL TROUBLE SHOOTING.

a. PRELIMINARY CHECK. - Check the equipment visually before performing trouble shooting procedures. Note the state of front panel alarms, as these may give a clue to the cause of equipment malfunction.

b. CONTROL SETTINGS. - The initial control settings for commencement of overall trouble shooting procedures are given in table 5-2. Deviations from these control settings are listed in appropriate portions of the trouble shooting procedures. Once a change in control settings has been effected in the trouble shooting procedures, the controls remain in the changed position until a note in the procedure directs that the control be placed in a new position or returned to the initial position.

c. SYSTEM TROUBLE SHOOTING. - The purpose of system trouble shooting is isolation of a malfunction to a specific unit of the equipment. This is accomplished by a minimum performance type procedure which provides instructions to obtain indications of critical points within the equipment. From the indications obtained in these tests, trouble isolation to a specific unit may be surmised. Trouble isolation procedures, on a system basis, are given in table 5-3. The procedures given in this table is arranged in sequential steps, each of which has a normal indication. The last column gives the action required in the event a normal indication is not obtained. This column normally contains a reference to the applicable service diagram.

5-4. FUNCTIONAL SECTION TROUBLE SHOOTING.

If a functional section or unit is suspected of being faulty, trouble shoot in accordance with the information provided in the applicable service diagram.

a. TEST EQUIPMENT. - The test equipment required for functional section trouble shooting is the same as that for system trouble shooting (see table 5-1).

b. CONTROL SETTINGS. - The initial control settings required for functional section trouble shooting are identical to those required for system trouble shooting (table 5-2). After any functional section trouble shooting is completed, return all controls to the positions indicated in table 3-9.

c. SERVICE BLOCK AND SCHEMATIC DIAGRAMS. - Figures 5-1 through 5-16 are the service block and schematic diagrams.

d. VOLTAGE AND RESISTANCE DIAGRAMS. - After it has been determined that a malfunction exists in a particular section or unit (see table 5-4), the trouble is then isolated to a stage and then a component. To aid the technician in isolating a trouble to a part within a stage, voltage and resistance diagrams are provided which indicate the voltage and resistance at each terminal to ground (or some other designated point).

e. TEST POINT AND PARTS LOCATION DIAGRAMS. - Figures 5-17 through 5-94 show the test points and the parts that might require replacement during service life of the equipment. Table 5-4 lists the applicable diagram by functional section.

f. SCHEMATIC DIAGRAMS. - The schematic diagrams are contained in section 6 of this manual. These schematics should be referred to when isolating a malfunction to a particular component within a unit or stage.

TABLE 5-1. TEST EQUIPMENT

NAME	DESIGNATION	QUANTITY
Oscilloscope	AN/USM-281 (or equal)	1
Dual-trace plug-in unit	Plug-in units for AN/USM-281 (or equal)	1
Oscilloscope	AN/USM-11 (or equal)	1
HV probe for 25 KV		1
Multimeter		1
Digital Multimeter		1

TABLE 5-2. TRANSMITTING GROUP INITIAL CONTROL SETTINGS

CONTROL	SETTING
NOTE Set transmitting control equipment to put transmitting group under test in standby.	
208 vac and 460 vac circuit breakers on power distribution panel	ON
Emergency STOP 1A53A3S19 (figure 3-5)	RUN
1A53A3CB2 (figure 3-6)	ON
All interlocked doors and drawers (including antenna coupler and electrical dummy load)	Closed
LOCKOUT-READY 1A12S1 (figure 3-4)	READY
POWER 1A53A2S17 (figure 3-5)	OFF/RESET
FILAMENTS 1A53A2S13 (figure 3-5)	OFF
BIAS AND LOW VOLTAGE 1A53A2S7 (figure 3-5)	OFF
PLATE VOLTAGE SELECTOR 1A53A2S18 (figure 3-5)	OFF
MOTOR 1A53A3A4S4 (figure 3-7)	ON
MODE 1A53A3A4S1 (figure 3-7)	AUTO
HIGH VOLTAGE RECTIFIER POWER 1A53A3S1 (figure 3-6)	ON
LOCKED ON 1A53A3S2 (figure 3-6)	Locked
460V INPUT 1A53A3CB1 (figure 3-6)	ON
DESLOT/NON-DESLOT SELECTOR	NON-DESLOT

TABLE 5-3. CONTROL AND POWER CIRCUITS, SYSTEM TROUBLE SHOOTING PROCEDURES

STEP	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP
1	Set controls as indicated in table 5-2.	The following lamps shall be lit: 208 V EMERGENCY STOP POWER 1A53A2DS44 460 V EMERGENCY STOP POWER 1A53A2DS45 DOOR INTERLOCK 1A53A2DS2 PLATE TRANSFORMER OVER TEMPERATURE 1A53A2DS11 IPA OVERLOAD 1A53A2DS13 PA OVERLOAD 1A53A2DS14 AC OVERLOAD 1A53A2DS10 3 STRIKE 1A53A2DS12	If one or more of the indicator lamps do not light, check the lamps. If the malfunction is not isolated, trouble shoot the energizing circuit corresponding to the name of the indicator lamp using figure 5-1.

TABLE 5-3. CONTROL AND POWER CIRCUITS, SYSTEM TROUBLE SHOOTING PROCEDURES (Cont)

STEP	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP
1 (Cont)		LEFT 1ST IPA CATHODE OVERLOAD 1A12DS1 RIGHT 1ST IPA CATHODE OVERLOAD 1A12DS2 LEFT PA BIAS OVERLOAD 1A12DS3 RIGHT PA BIAS OVERLOAD 1A12DS4 1A6V1 PA CATHODE OVERLOAD 1A21DS1 1A6V3 PA CATHODE OVERLOAD 1A21DS3 1A6V2 PA CATHODE OVERLOAD 1A21DS2 1A6V4 PA CATHODE OVERLOAD 1A21DS4 OVER TEMPERATURE PA 1A6 INLET 1A12DS7 OVER TEMPERATURE PA 1A6 OUTLET 1A12DS8 WATER LEVEL 1A12DS9 STANDBY 1A12DS12 No blown fuse indicators are lit	Check associated fuse. If fuse blows again, check circuit using figure 5-1.
2	Turn AC VOLTAGE SELECTOR switch 1A53A2S4 to 208 V LINE. Turn VOLTAGE PHASE SELECTOR switch 1A53A2S3 through its three positions.	The 208 vac 3-phase unregulated voltage is monitored by AC VOLTAGE meter 1A53A2M5 for the correct indication.	If indications are abnormal, trouble shoot using figure 5-1.
3	Turn AC VOLTAGE SELECTOR switch to REG 208 V. Turn VOLTAGE PHASE SELECTOR switch 1A53A2S3 through its three positions.	The 208 vac 3-phase regulated voltage is monitored by AC VOLTAGE meter for 208 ± 5 vac.	If indications are abnormal, trouble shoot using figure 5-1.
4	Turn AC VOLTAGE SELECTOR switch 1A53A2S4 to 460 V LINE and VOLTAGE PHASE SELECTOR 1A53A2S3 switch through its three positions.	The 460 vac line voltage is monitored by AC VOLTAGE meter 1A53A2M5 for the correct indication.	If indications are abnormal, trouble shoot using figure 5-1.

TABLE 5-3. CONTROL AND POWER CIRCUITS, SYSTEM TROUBLE SHOOTING PROCEDURES (Cont)

STEP	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP
5	Turn METER SELECTOR 1A4A3S2 on oscilloscope control 1A4A3 to -28V and -12V.	The voltmeter 1A4A3M1 indicates 28 vdc and 12 vdc.	If indications are abnormal, trouble shoot using figure 5-4. If still incorrect, check using figure 6-37.
6	Set POWER switch 1A53A2S17 to ON.	The water pump and blowers shall start.	If the pump or blowers do not function, check primary power circuits using figure 5-1.
		The following lamps shall light: AIR ON 1A53A2DS8 WATER ON 1A53A2DS1	If any of the indicators fail to light, check the lamp. If the trouble is not isolated, check the corresponding energizing control circuit using figure 5-1.
7	Place FILAMENTS switch 1A53A2S13 to ON	All tube filaments light.	If filaments do not light, check filament primary power circuits using figures 5-1 and 4-14.
		The TRANSMITTER FILAMENT HOURS meter 1A53A2M6 is energized.	If meter is not energized, trouble shoot the energizing circuit using figure 5-1. If fault is not found, replace the meter.
		The FILAMENTS READY lamp 1A53A2DS7 shall light after a 90 second time delay.	If lamp does not light, check lamp. If fault is not isolated, trouble shoot the corresponding energizing control circuit using figure 5-1.
8	Place the BIAS AND LOW VOLTAGE switch 1A53A2S7 to ON and METER SELECTOR switch 1A4A3S2 to +250V.	The -5KV BIAS voltmeter 1A53A2M4 indicates -5KV ± 10%. The LOW VOLTAGE PLATE voltmeter 1A53A2M9 indicates 0.5 kv ± 10%.	If any of the indicators fail to light, first check the lamps. If the fault is not isolated, trouble shoot the energizing circuits indicated by the title of the lamp using figure 5-1. If both meters 1A53A2M4 and 1A53A2M9 indicate no voltage, check the 500 vdc and -5 kv primary power supplies figures 5-1 and 6-46.
		The voltmeter 1A4A3M1 indicates +250 vdc.	If meter 1A4A3M1 does not indicate properly trouble shoot using figures 5-3 and 5-4.
		The following meters shall show an indication: LEFT PA BIAS 1A4M9 RIGHT PA BIAS 1A4M10	If the meters do not show an indication, check their respective bias supply circuits using figure 6-33.

TABLE 5-3. CONTROL AND POWER CIRCUITS, SYSTEM TROUBLE SHOOTING PROCEDURES (Cont)

STEP	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP
8 (Cont)		LEFT 2ND IPA BIAS 1A4M5 RIGHT 2ND IPA BIAS 1A4M6 The following lamps shall light: BIAS & LOW VOLTAGE ON 1A53A2DS5 LEFT PA BIAS UNDER VOLTAGE 1A12DS10 RIGHT PA BIAS UNDER VOLTAGE 1A12DS11	If any of the indicators fail to light, check the lamp. If lamp is normal, check the corresponding energizing circuit indicated by the name of the lamp using figure 5-1.
9	Observe the INPUT EXCITER waveform as selected by MONITORED CIRCUIT switch 1A4A3S1 table 6-4 step 7A.	Waveform as shown in table 6-4 step 7A.	If the waveform is incorrect, trouble shoot using figure 5-2 or 5-4.
10	Turn PLATE VOLTAGE SELECTOR to OPERATE	The PLATE ON lamp 1A53A2DS9, should light.	If indication is abnormal, check lamp and associated energizing circuit using figures 5-1 and 5-6.
		The PLATE HOURS meter 1A53A2M1 shall start.	If meter is not energized, check meter control circuit using figure 5-1.
		PA PLATE VOLTAGE meter 1A53A2M2 shall indicate 21.5 kv ± 5% within 15 seconds and IPA PLATE VOLTAGE meter 1A53A2M3 shall indicate 10.75 kv.	If meter readings are abnormal, trouble shoot using figure 6-46.
		The IPA PLATE CURRENT meter 1A53A2M8 and PA PLATE CURRENT meter 1A53A2M7 shall show an indication.	If meters are not energized, check meter control circuits using figures 5-1, 6-46, and 6-58.
		The appropriate HIGH VOLTAGE NORMAL lamp at remote location shall light.	If indicator does not light, refer to figure 5-1.
		The following plate and cathode current meters shall provide typical indications specified by the calibration chart at each station: LEFT 1ST IPA CATHODE 1A4M1 RIGHT 1ST IPA CATHODE 1A4M2 LEFT PA BIAS CURRENT 1A4M7	If meters are not energized, check meter control circuits using figure 6-33.

TABLE 5-3. CONTROL AND POWER CIRCUITS, SYSTEM TROUBLE SHOOTING PROCEDURES (Cont)

STEP	PRELIMINARY ACTION	NORMAL INDICATION	NEXT STEP
10 (Cont)		RIGHT PA BIAS CURRENT 1A4M8 LEFT 2ND IPA PLATE CURRENT 1A4M3 RIGHT 2ND IPA PLATE CURRENT 1A4M4 The following cathode current meters located in PA tube rack 1A6, shall provide typical indications specified by the calibration chart at each station: PA 1A6-V1 CATHODE CURRENT 1A6M1 PA 1A6-V2 CATHODE CURRENT 1A6M2 PA 1A6-V3 CATHODE CURRENT 1A6M3 PA 1A6-V4 CATHODE CURRENT 1A6M4	If any of the cathode current meters indicate abnormal current, proceed to step 7 of table 6-4.

TABLE 5-4. FUNCTIONAL SECTION DIAGRAMS

FUNCTIONAL SECTION	VOLTAGE AND RESISTANCE	SERVICE DIAGRAMS	SCHEMATIC DIAGRAMS	TEST POINT AND PARTS LOCATION
Transmitter Control		5-1, 5-1A	6-43, 6-46 thru 6-51	
Amplifier Group 1A4	5-13, 5-15	5-2	6-33	5-19 thru 5-28
Power Supply 1A4A1			6-34	5-29
+250V Regulator 1A4A1A1	5-14	5-3	6-35	5-30, 5-31
Oscilloscope Control 1A4A3		5-4	6-36	5-32, 5-33
Negative Power Supply 1A4A3A1			6-37	5-34
Trigger Selector/Bias Pedestal Driver 1A4A3A2		5-5	6-38	5-35, 5-36
Bias Pedestal Power Supply 1A4A4			6-39	5-37, 5-38
Bias Pedestal Generator 1A4A5			6-40	5-39, 5-40
Radio Frequency Amplifier 1A5-1A10	5-16		6-41	5-41 thru 5-45
Electrical Equipment Rack 1A11			6-42	5-46
Indicator Panel 1A12			6-43	5-47, 5-48
Low Pass Filter 1A20			6-44	5-49

TABLE 5-4. FUNCTIONAL SECTION DIAGRAMS (Cont)

FUNCTIONAL SECTION	VOLTAGE AND RESISTANCE	SERVICE DIAGRAMS	SCHEMATIC DIAGRAMS	TEST POINT AND PARTS LOCATION
Water Cooling Unit 1A2			6-45	5-50, 5-51
Relay Assembly 1A53A1				5-52, 5-53
Power Supply 1A53A5, 1A53A6			6-46	5-79, 5-80, 5-81
Resistor Rack 1A53A19, 1A53A20, 1A53A23				5-84, 5-86, 5-87
Control-Indicator 1A53A2			6-47	5-54, 5-55
Relay Assembly 1A53A3			6-48 thru 6-51	5-56 thru 5-62
Voltage Regulator 1A53A3A1, 1A53A3A2		5-6	6-52	5-63, 5-72
Gate Trigger Unit 1A53A3A1A1, 1A53A3A1A2, 1A53A3A1A3			6-53	5-64 thru 5-68
Chop-Off Limiter 1A53A3A1A4	5-7	5-7	6-54	5-69
Pre-Amplifier 1A53A3A1A5	5-8	5-8	6-55	5-70, 5-71
Voltage Regulator 1A53A3A3			6-56	5-73
Voltage Regulator Control Panel 1A53A3A4	5-9	5-9	6-57	5-74
Instrument Shunt 1A53A4	5-10	5-10	6-58	5-75 thru 5-78
Voltage Divider 1A53A7		5-11	6-59	5-76, 5-82, 5-83, 5-85
Antenna Coupler 3		5-12	6-60	5-88 thru 5-91
Electrical Dummy Load 4		5-12	6-61	5-92 thru 5-94
Local Control Unit 5			6-62	5-95

INDICATOR CROSS-REFERENCE INDEX

INDICATOR	REF DESIGN	SHEET NUMBER
LEFT PA BIAS CURRENT meter	1A4M7	7
RIGHT PA BIAS CURRENT meter	1A4M8	7
~~QUIESCENT CURRENT PA CATHODE meter~~	~~1A4M11~~	~~5~~
VOLT meter	1A4A3M1	8
1A6V1 CATHODE CURRENT meter	1A6M1	7
1A6V2 CATHODE CURRENT meter	1A6M2	7
1A6V3 CATHODE CURRENT meter	1A6M3	7
1A6V4 CATHODE CURRENT meter	1A6M4	7
LEFT 1st IPA CATHODE OVERLOAD	1A12DS1	7
RIGHT 1st IPA CATHODE OVERLOAD	1A12DS2	7
LEFT PA BIAS OVERLOAD	1A12DS3	7
RIGHT PA BIAS OVERLOAD	1A12DS4	7
1A6V3 PA CATHODE OVERLOAD	1A12DS5	7
1A6V2 PA CATHODE OVERLOAD	1A12DS6	7
PA 1A6 INLET OVERTEMPERATURE	1A12DS7	7
PA 1A6 OUTLET OVERTEMPERATURE	1A12DS8	7
WATER LEVEL	1A12DS9	7
LEFT PA BIAS UNDERVOLTAGE	1A12DS10	7
RIGHT PA BIAS UNDERVOLTAGE	1A12DS11	7
STANDBY	1A12DS12	4
OPERATE	1A12DS13	4
1A6V1 PA CATHODE OVERLOAD	1A12DS34	7
1A6V4 PA CATHODE OVERLOAD	1A12DS35	7
WATER ON	1A53A2DS1	3
DOOR INTERLOCK	1A53A2DS2	3
BIAS AND LOW VOLTAGE ON	1A53A2DS5	4
FILAMENTS READY	1A53A2DS7	3
AIR ON	1A53A2DS8	3
PLATE ON	1A53A2DS9	4
AC OVERLOAD	1A53A2DS10	6
PLATE TRANSFORMER OVER TEMPERATURE	1A53A2DS11	6
3 STRIKE	1A53A2DS12	6
IPA OVERLOAD	1A53A2DS13	6
PA OVERLOAD	1A53A2DS14	6
208 V EMERGENCY STOP POWER	1A53A2DS44	2
460 V EMERGENCY STOP POWER	1A53A2DS45	2
PLATE HOURS meter	1A53A2M1	4
PA PLATE VOLTAGE meter	1A53A2M2	5
IPA PLATE VOLTAGE meter	1A53A2M3	5
5KV BIAS meter	1A53A2M4	4
AC VOLTAGE meter	1A53A2M5	5
FILAMENT HOURS meter	1A53A2M6	3
PA PLATE CURRENT meter	1A53A2M7	5
IPA PLATE CURRENT meter	1A53A2M8	5
LOW VOLTAGE PLATE meter	1A53A2M9	4
AC VOLTAGE meter	1A53A3M1	2
TRANSMITTER #1 OPERATE	3DS1	4
TRANSMITTER #2 OPERATE	3DS2	4

NOTES:

1. TERMINAL BOARD CONNECTIONS ARE INDICATED USING AN ABBREVIATED CODE CONSISTING OF THE ASSEMBLY REF DESIGNATION, TERMINAL BOARD NUMBER AND PIN NUMBER. FOR EXAMPLE, 1A4-1-7 MEANS CONNECTION IS MADE TO PIN 7 OF TERMINAL BOARD TB1 ON ASSEMBLY 1A4.

2. RELAYS, INDICATORS AND TERMINAL BOARDS ON ALL ASSEMBLIES EXCEPT 1A53 ARE PREFIXED WITH COMPLETE ASSEMBLY REFERENCE DESIGNATION. ON POWER SUPPLY 1A53, RELAYS, INDICATORS AND TERMINAL BOARDS ARE PREFIXED WITH SUBASSEMBLY REFERENCE DESIGNATION (I.E., A3-1-4 MEANS CONNECTION IS MADE TO PIN 4 OF TERMINAL BOARD TB1 ON ASSEMBLY 1A53A3.

Figure 5-1. AN/FPN-44A Control Circuitry (Sheet 1 of 8)

NOTES

1. SEE SHEET 1 NOTES 1 AND 2 FOR KEY TO REFERENCES

FRONT PANEL EDGE LIGHTING

120 VAC 1Ø 50-60 HZ

TO ENCLOSURE LIGHTING LDS9, LDS10 AND LDS11

TO ENCLOSURE CONVENIENCE OUTLETS LU1, LU2 AND LU3

208V 3Ø 50-60 HZ

NEUT

Ø3

Ø2

Ø1

AC COMMON DISTRIBUTION SHEET 8 D-1

DIMMER

A2T1

A2-37-6

A2-37-7

LDS1 LDS2 LDS3 LDS4 LDS5 LDS6 LDS7 LDS8

AC

COM

120 VAC

DC

COM

-28VDC

P/O REMOTE EMERG. STOP

1A11-8-7

1A11-2-7

1A12-7-7

1A11-8-5

1A12-3-5

1A12K13

1A12K16

A3K50

A3-68-1

A3-67

A3-67-7

A3-67-8

TO 460V REG AC COM UV TRIP SHEET 5 F-1

TO SHEET 4 F-26

460V POWER

208V POWER

A2DS44

A2DS45

A2S19 RUN STOP EMERGENCY STOP

A3-39-8

A2-39-8

A3-23-8

A2-39-7

A3-23-7

A2-39-5

A3-23-5

A3-23-6

A2-39-6

A3-6-1

A3-6-2

TO POWER INTLK

SHEET 3 B-2

A3K40

A3-6-5

A3K28

A3-6-7

A3-6-6

A3E40 8A

T3-1-3

T3-1-2

T3-1-1

P/O 208V 3Ø INDUCTION REGUL A3A3T1

208V LINE G-1

TO AC VOLTAGE SELECTOR SWITCH SHEET 5

A2-19-6

A2-19-5

A2-19

A3-19-6

A3-19-5

A3-19-4

A3-19

A3F6

A3F5

A3F4

1.8A

A3-74-3

A3-74-2

A3-74

A3-74-1

1A11-10-46

1A11-10-39

1A11-10-32

TO 1A11 PUMP AND BLOWER CONTACTORS SHEET 3 F-5

A3CB2

A3-1-2

A3-1-3

A3-1-4

A3-1-1

A3-64-1

A3-64-2

A3-64-9

A3-60-5

A3-60-6

1A4-10-4

A3-73-4

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

A B C D E F G H I J

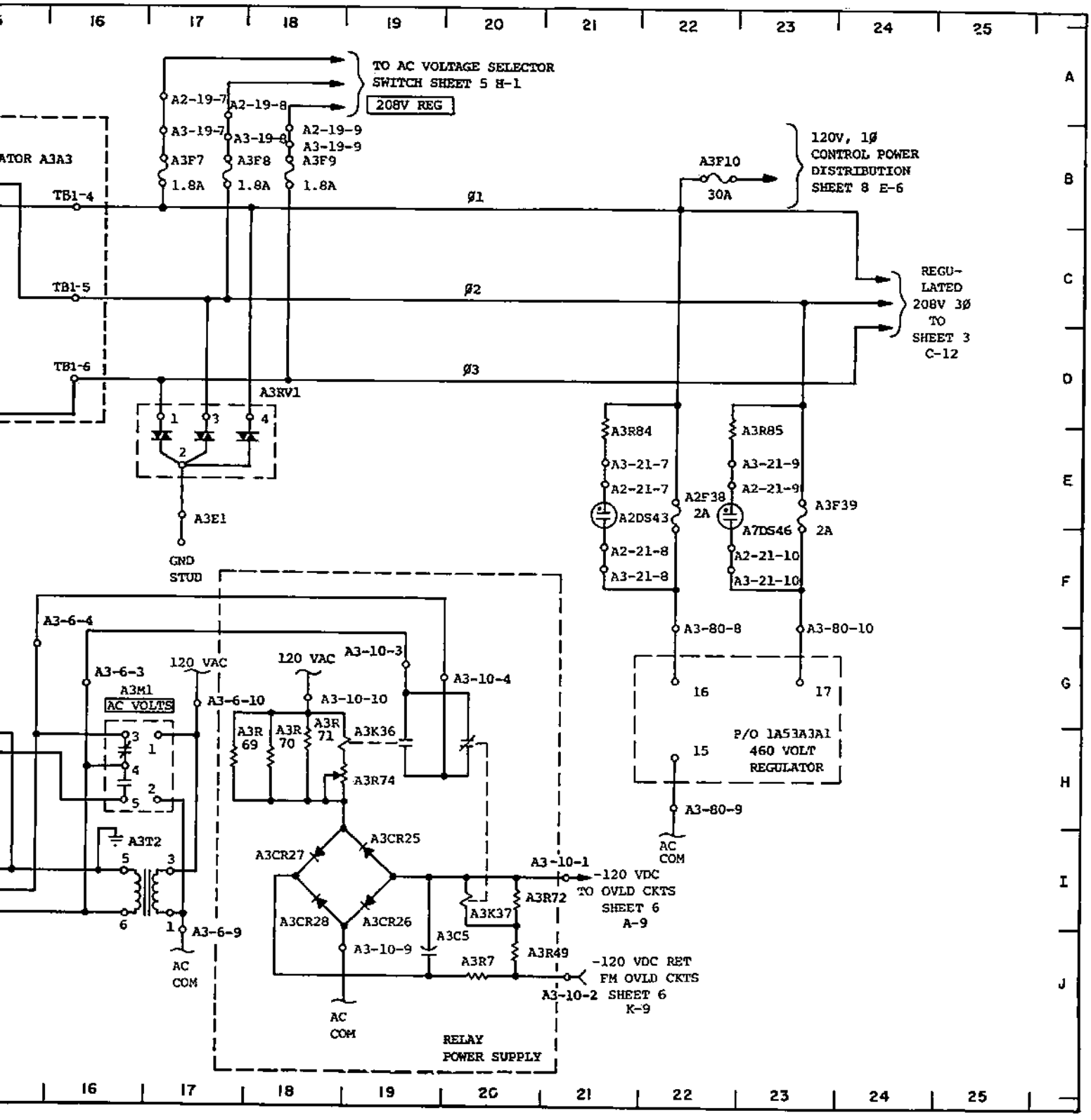
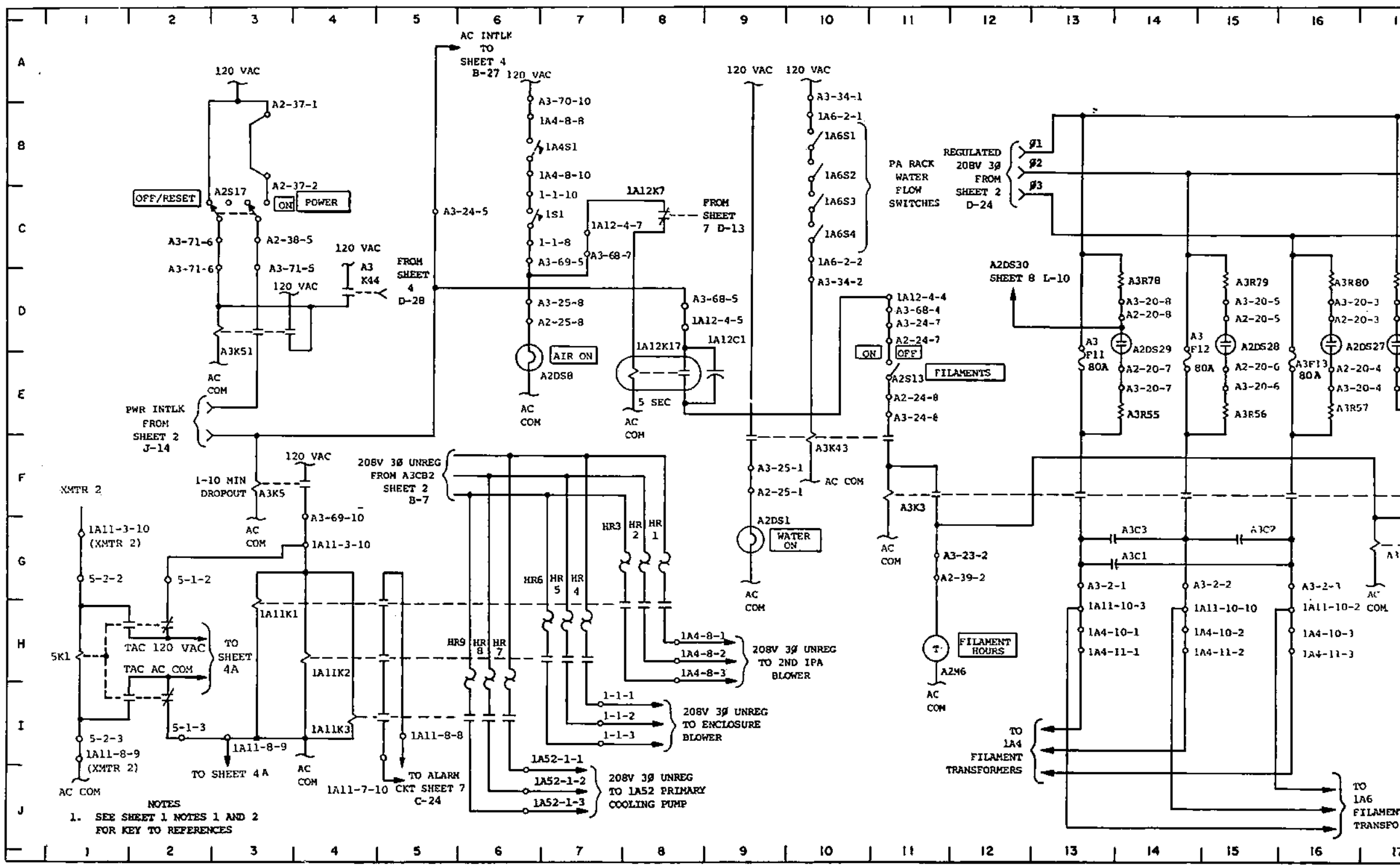


Figure 5-1. AN/FPN-44A Control Circuitry
(Sheet 2 of 8)


120 VAC
A2-37-1
A2-37-2
OFF/RESET
A2S17
ON
POWER
A3-71-6
A2-38-5
A3-71-6
A3-71-5
120 VAC
A3 K44
120 VAC
A3K51
AC COM
PWR INTLK FROM SHEET 2 J-14
AC INTLK TO SHEET 4 B-27
120 VAC
A3-24-5
FROM SHEET 4 D-28
A3-70-10
1A4-8-8
1A4S1
1A4-8-10
1-1-10
1S1
1-1-8
A3-69-5
1A12K7
1A12-4-7
A3-68-7
FROM SHEET 7 D-13
A3-25-8
A2-25-8
AIR ON
A2DS8
AC COM
A3-68-5
1A12-4-5
1A12C1
1A12K17
5 SEC
AC COM
120 VAC
120 VAC
A3-34-1
1A6-2-1
1A6S1
1A6S2
1A6S3
1A6S4
1A6-2-2
A3-34-2
PA RACK WATER FLOW SWITCHES
REGULATED 208V 3Ø FROM SHEET 2 D-24
Ø1
Ø2
Ø3
A2DS30 SHEET 8 L-10
A3R78
A3-20-8
A2-20-8
A3 F11 80A
A2DS29
A2-20-7
A3-20-7
A3R55
A3R79
A3-20-5
A2-20-5
A3 F12 80A
A2DS28
A2-20-6
A3-20-6
A3R56
A3R80
A3-20-3
A2-20-3
A3F13 80A
A2DS27
A2-20-4
A3-20-4
A1R57
1A12-4-4
A3-68-4
A3-24-7
A2-24-7
ON
OFF
A2S13
FILAMENTS
A2-24-8
A3-24-8
A3K43
A3-25-1
A2-25-1
AC COM
A2DS1
WATER ON
AC COM
A3K3
A3-23-2
A2-39-2
FILAMENT HOURS
A2M6
AC COM
A3C3
A3C1
A3C2
A3-2-1
1A11-10-3
1A4-10-1
1A4-11-1
A3-2-2
1A11-10-10
1A4-10-2
1A4-11-2
A3-2-3
1A11-10-2
1A4-10-3
1A4-11-3
AC COM
TO 1A4 FILAMENT TRANSFORMERS
TO 1A6 FILAMENT TRANSFO
XMTR 2
1A11-3-10 (XMTR 2)
5-2-2
5-1-2
5K1
TAC 120 VAC
TAC AC COM
TO SHEET 4A
5-2-3
1A11-8-9 (XMTR 2)
AC COM
1A11K1
1A11K2
1A11K3
5-1-3
1A11-8-9
TO SHEET 4A
AC COM
120 VAC
1-10 MIN DROPOUT
A3K5
AC COM
A3-69-10
1A11-3-10
1A11-8-8
TO ALARM CKT SHEET 7 C-24
1A11-7-10
208V 3Ø UNREG FROM A3CB2 SHEET 2 B-7
HR6 HR 5 HR 4
HR3 HR 2 HR 1
HR9 HR 8 HR 7
1A4-8-1
1A4-8-2
1A4-8-3
208V 3Ø UNREG TO 2ND IPA BLOWER
1-1-1
1-1-2
1-1-3
208V 3Ø UNREG TO ENCLOSURE BLOWER
1A52-1-1
1A52-1-2
1A52-1-3
208V 3Ø UNREG TO 1A52 PRIMARY COOLING PUMP
NOTES
1. SEE SHEET 1 NOTES 1 AND 2 FOR KEY TO REFERENCES

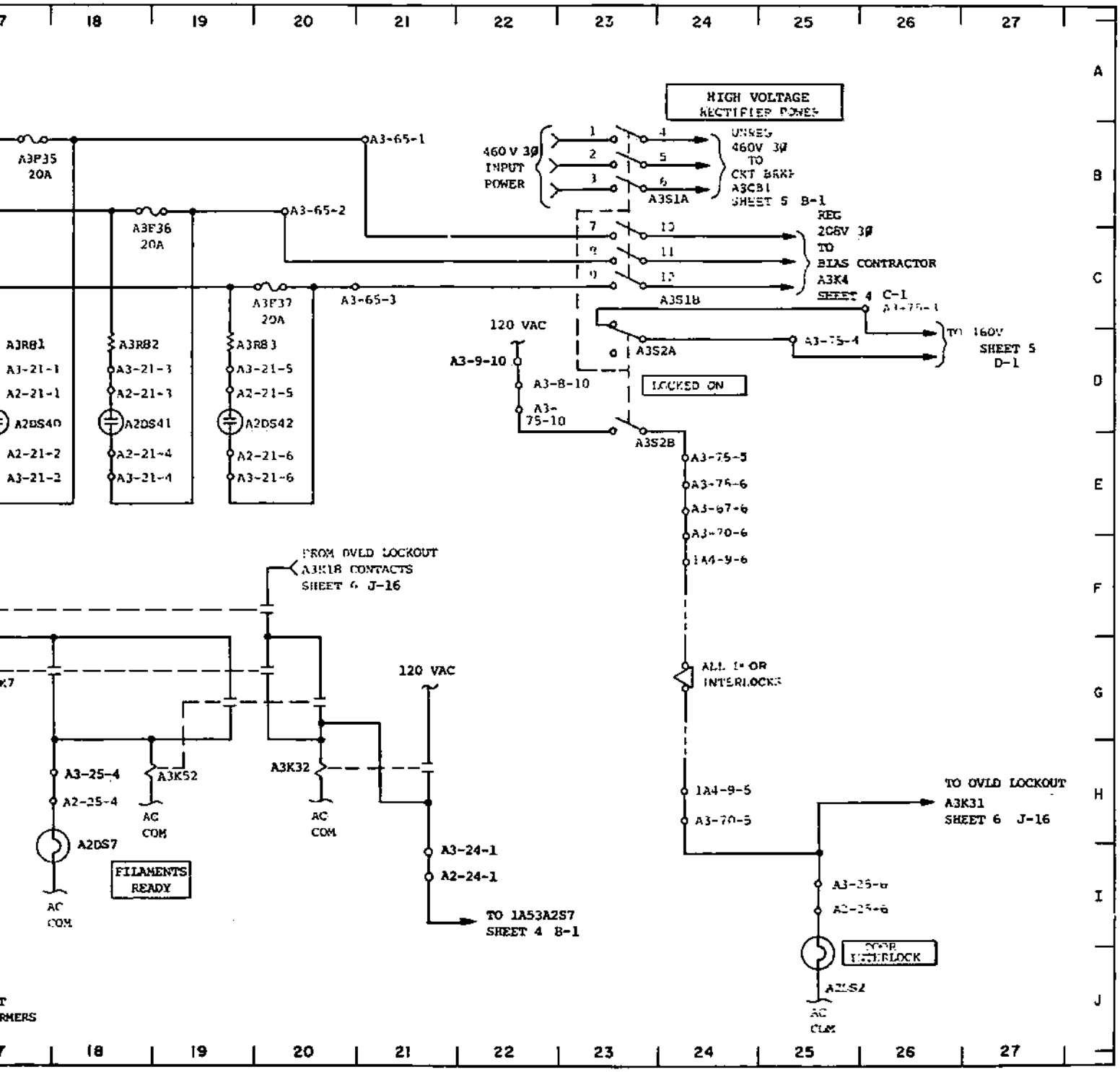
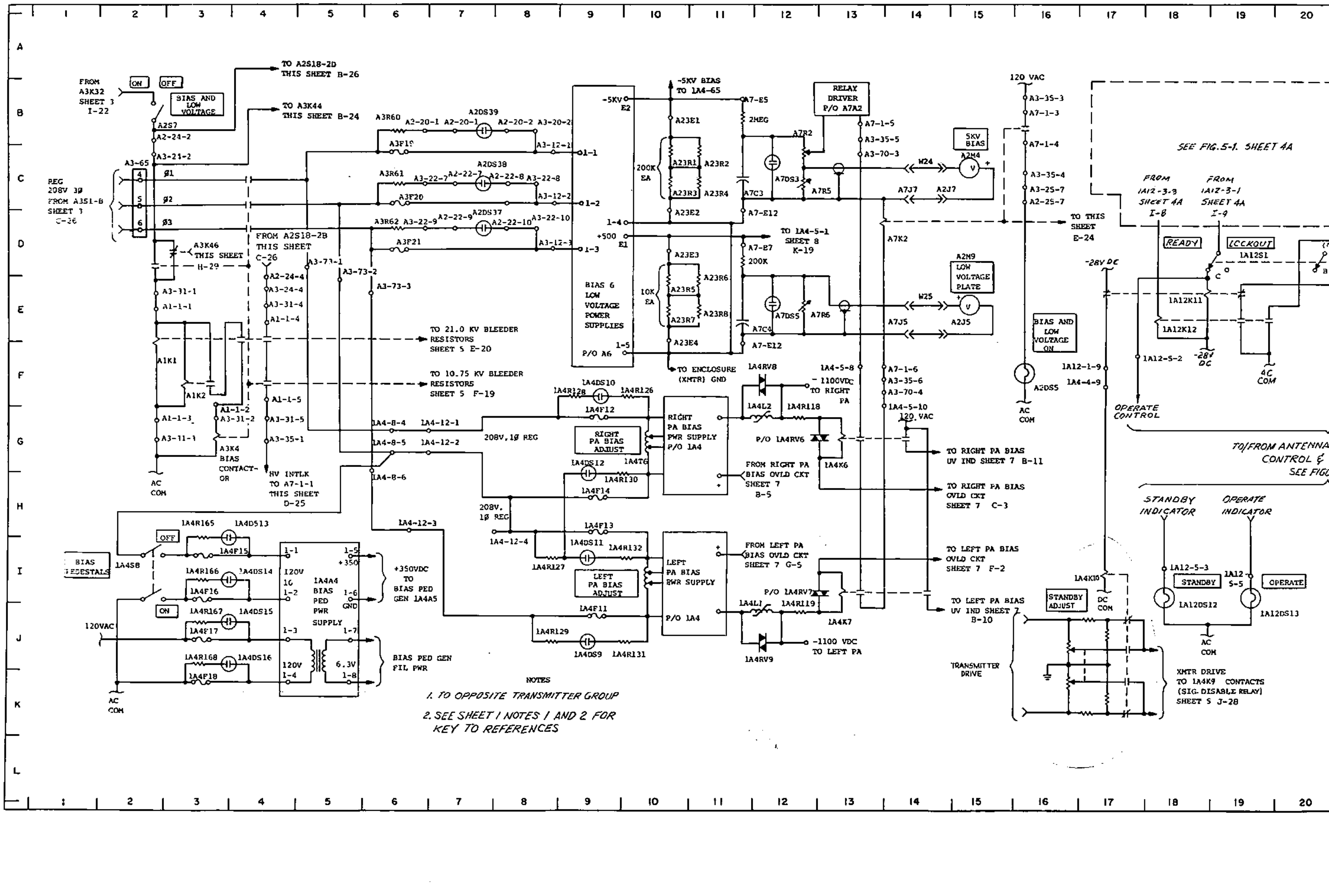


Figure 5-1. AN/FPN-44 Control Circuitry
(Sheet 3 of 8)


FROM A3K32 SHEET 3 I-22
ON
OFF
BIAS AND LOW VOLTAGE
TO A2S18-2D THIS SHEET B-26
TO A3K44 THIS SHEET B-24
A2S7
A2-24-2
A3-21-2
A3-65
REG 208V 3Ø FROM A3S1-B SHEET 3 C-26
Ø1
Ø2
Ø3
A3K46 THIS SHEET H-29
A3-11-1
A1-1-1
A1K1
A1K2
A1-1-3
A3-11-3
A1-1-2
A3-31-2
A3K4 BIAS CONTACT-OR
AC COM
A1-1-5
A3-31-5
A3-35-1
HV INTLK TO A7-1-1 THIS SHEET D-25
FROM A2S18-2B THIS SHEET C-26
A2-24-4
A3-24-4
A3-31-4
A1-1-4
A3-73-1
A3-73-2
A3-73-3
A3R60
A2-20-1
A2DS39
A2-20-2
A3-20-2
A3F19
A3-12-1
1-1
A3R61
A3-22-7
A2DS38
A2-22-8
A3-22-8
A3F20
A3-12-2
1-2
A3R62
A3-22-9
A2DS37
A2-22-10
A3-22-10
A3F21
A3-12-3
1-3
BIAS 6 LOW VOLTAGE POWER SUPPLIES
P/O A6
-5KV E2
+500 E1
1-4
1-5
TO 21.0 KV BLEEDER RESISTORS SHEET 5 E-20
TO 10.75 KV BLEEDER RESISTORS SHEET 5 F-19
1A4-8-4
1A4-12-1
1A4-8-5
1A4-12-2
1A4-8-6
208V,1Ø REG
1A4DS10
1A4R128
1A4R126
1A4F12
RIGHT PA BIAS ADJUST
1A4DS12
1A4T6
1A4R130
1A4F14
RIGHT PA BIAS PWR SUPPLY P/O 1A4
208V, 1Ø REG
1A4-12-4
1A4-12-3
1A4F13
1A4DS11
1A4R132
1A4R127
LEFT PA BIAS ADJUST
LEFT PA BIAS PWR SUPPLY
1A4F11
1A4R129
1A4DS9
1A4R131
P/O 1A4
-5KV BIAS TO 1A4-65
A7-E5
2MEG
A23E1
200K EA
A23R1
A23R2
A23R3
A23R4
A23E2
A7C3
A7-E12
A7R2
A7DS3
A7R5
RELAY DRIVER P/O A7A2
A7-1-5
A3-35-5
A3-70-3
W24
A2M4
SKV BIAS
A7J7
A2J7
A23E3
10K EA
A23R6
A23R5
A23R7
A23R8
A23E4
A7C4
A7-E12
A7DS5
A7R6
A7-E7
200K
TO 1A4-5-1 SHEET 8 K-19
W25
A2M9
LOW VOLTAGE PLATE
A7J5
A2J5
A7K2
TO ENCLOSURE (XMTR) GND
1A4RV8
1A4L2
1A4R118
P/O 1A4RV6
1A4K6
1A4-5-8
-1100VDC TO RIGHT PA
A7-1-6
A3-35-6
A3-70-4
1A4-5-10
120 VAC
FROM RIGHT PA BIAS OVLD CKT SHEET 7 B-5
TO RIGHT PA BIAS UV IND SHEET 7 B-11
TO RIGHT PA BIAS OVLD CKT SHEET 7 C-3
FROM LEFT PA BIAS OVLD CKT SHEET 7 G-5
TO LEFT PA BIAS OVLD CKT SHEET 7 F-2
TO LEFT PA BIAS UV IND SHEET 7 B-10
P/O 1A4RV7
1A4L1
1A4R119
1A4K7
1A4RV9
-1100 VDC TO LEFT PA
120 VAC
A3-35-3
A7-1-3
A7-1-4
A3-35-4
A3-25-7
A2-25-7
TO THIS SHEET E-24
BIAS AND LOW VOLTAGE ON
A2DS5
AC COM
SEE FIG. 5-1. SHEET 4A
FROM 1A12-3-3 SHEET 4A I-8
FROM 1A12-3-1 SHEET 4A I-9
READY
LOCKOUT
1A12S1
-28V DC
1A12K11
1A12K12
1A12-5-2
-28V DC
4C COM
1A12-1-9
1A4-4-9
OPERATE CONTROL
TO/FROM ANTENNA CONTROL & SEE FIG
STANDBY INDICATOR
OPERATE INDICATOR
1A12-5-3
STANDBY
1A12 S-5
OPERATE
1A12DS12
1A12DS13
AC COM
1A4K10
STANDBY ADJUST
DC COM
TRANSMITTER DRIVE
XMTR DRIVE TO 1A4K9 CONTACTS (SIG. DISABLE RELAY) SHEET 5 J-28
BIAS PEDESTALS
1A4S8
OFF
ON
120VAC
1A4R165
1A4DS13
1A4F15
1A4R166
1A4DS14
1A4F16
1A4R167
1A4DS15
1A4F17
1A4R168
1A4DS16
1A4F18
1A4A4 BIAS PED PWR SUPPLY
120V 1Ø
120V
6.3V
1-1
1-2
1-3
1-4
1-5 +350
1-6 GND
1-7
1-8
+350VDC TO BIAS PED GEN 1A4A5
BIAS PED GEN FIL PWR
AC COM
NOTES
1. TO OPPOSITE TRANSMITTER GROUP
2. SEE SHEET 1 NOTES 1 AND 2 FOR KEY TO REFERENCES

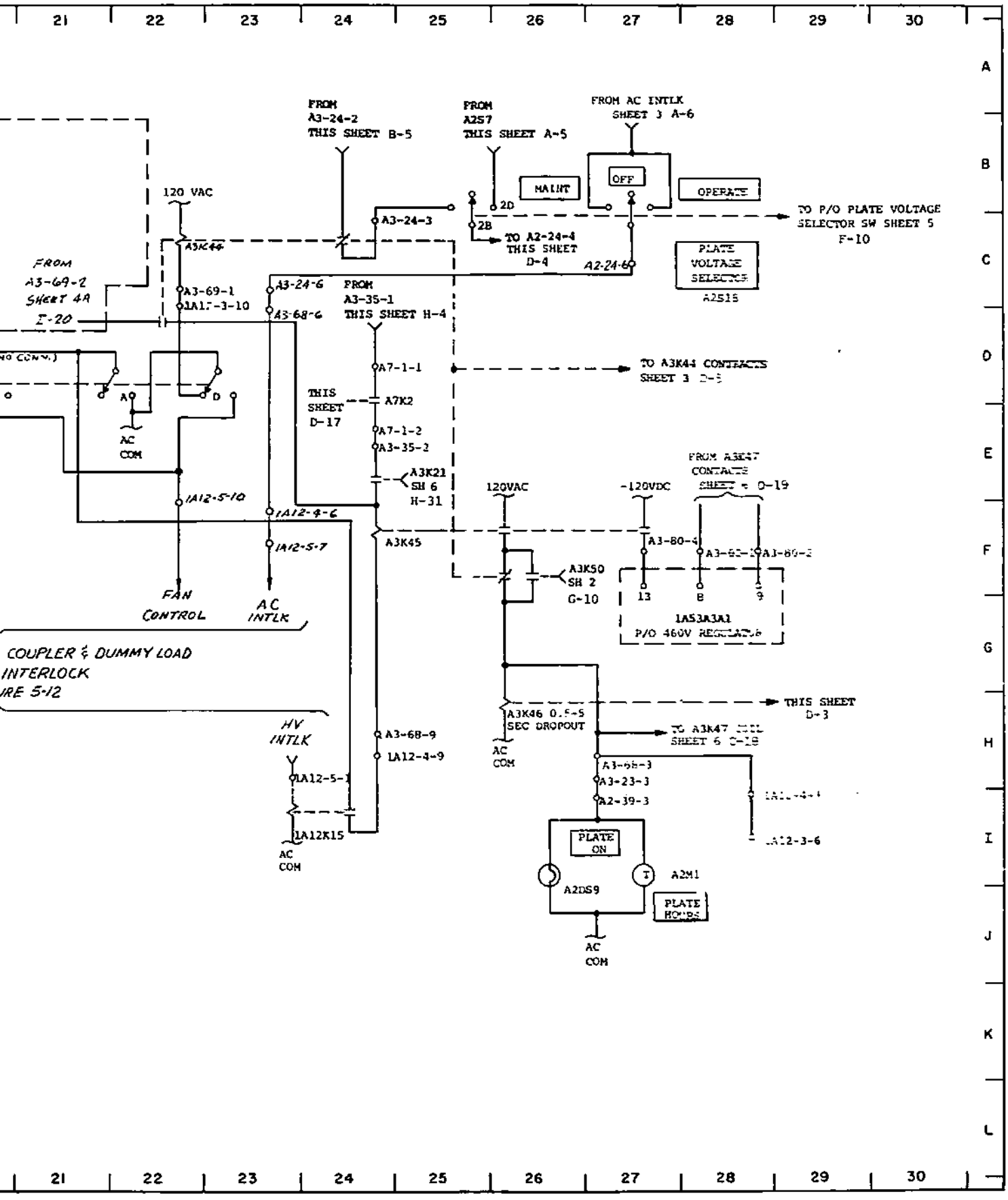
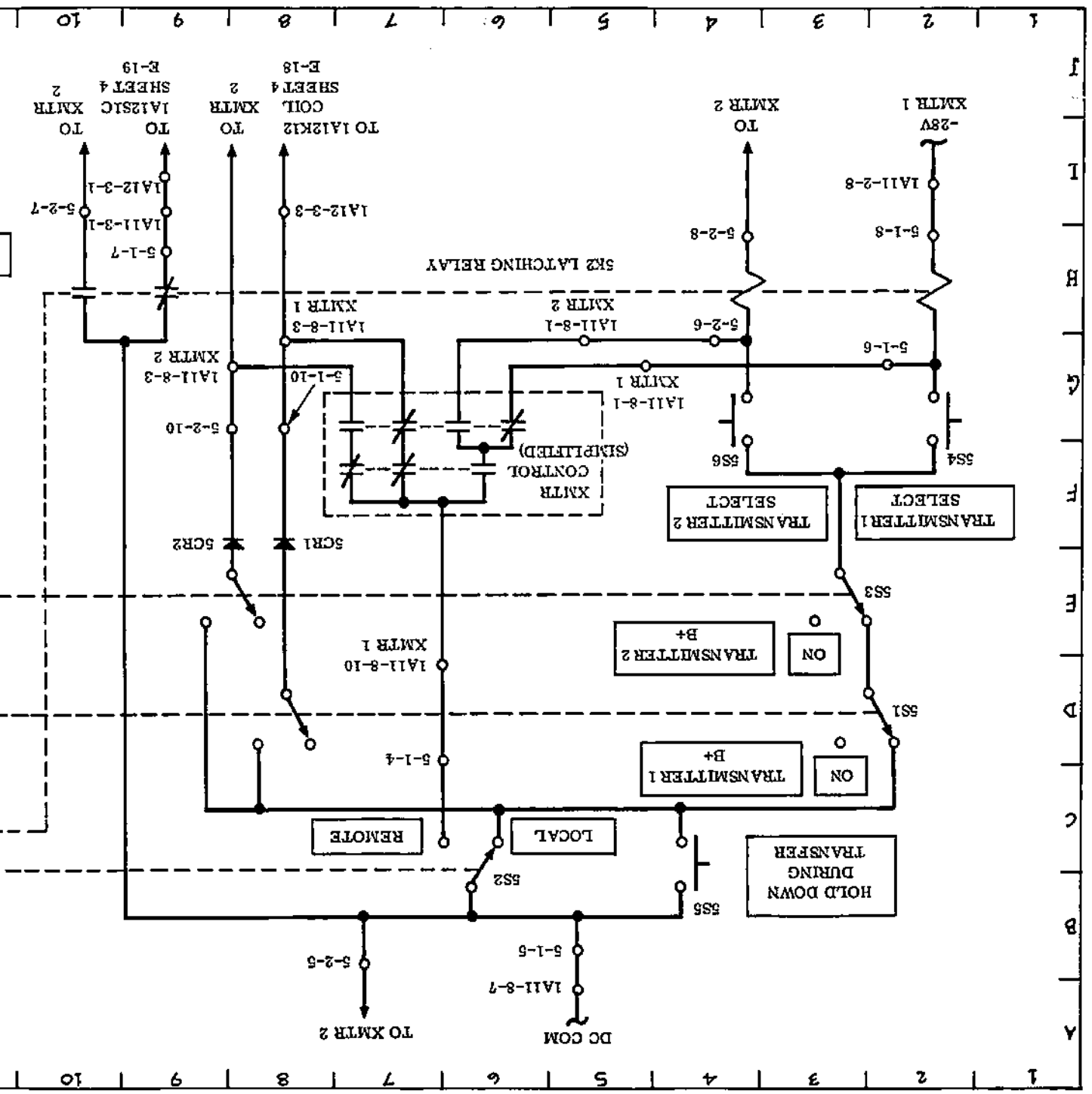


Figure 5-1. AN/FPN-44 Control Circuitry (Sheet 4 of 8)

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY FIELD CHANGE NO. 3


1 2 3 4 5 6 7 8 9 10
A B C D E F G H I J
-28V
XMTR 1
TO
XMTR 2
1A11-2-8
5-1-8
5-2-8
1A12-3-3
TO 1A12K12
COIL
SHEET 4
E-18
TO
XMTR
2
1A12-3-1
1A11-3-1
5-2-7
5-1-7
TO
1A12SIC
SHEET 4
E-19
TO
XMTR
2
5K2 LATCHING RELAY
1A11-8-3
XMTR 1
1A11-8-1
XMTR 2
5-2-6
5-1-6
1A11-8-3
XMTR 2
5-1-10
1A11-8-1
XMTR 1
XMTR
CONTROL
(SKIPLIFTED)
5-2-10
5S6
5S4
TRANSMITTER 1
SELECT
TRANSMITTER 2
SELECT
5CR1
5CR2
5S3
ON
TRANSMITTER 2
B+
1A11-8-10
XMTR 1
5S1
ON
TRANSMITTER 1
B+
5-1-4
REMOTE
LOCAL
5S2
HOLD DOWN
DURING
TRANSFER
5S5
5-1-5
1A11-8-7
5-2-5
DC COM
TO XMTR 2

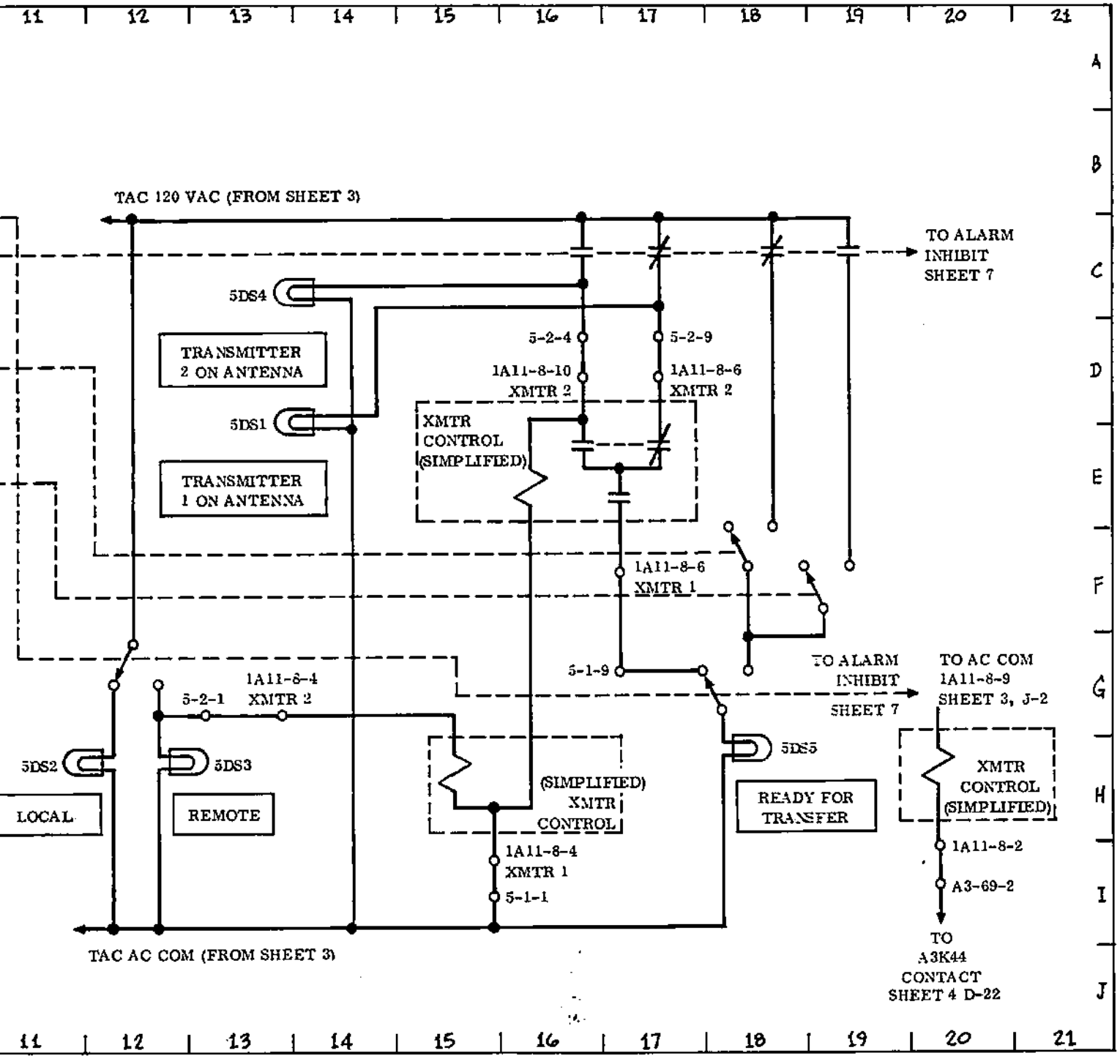
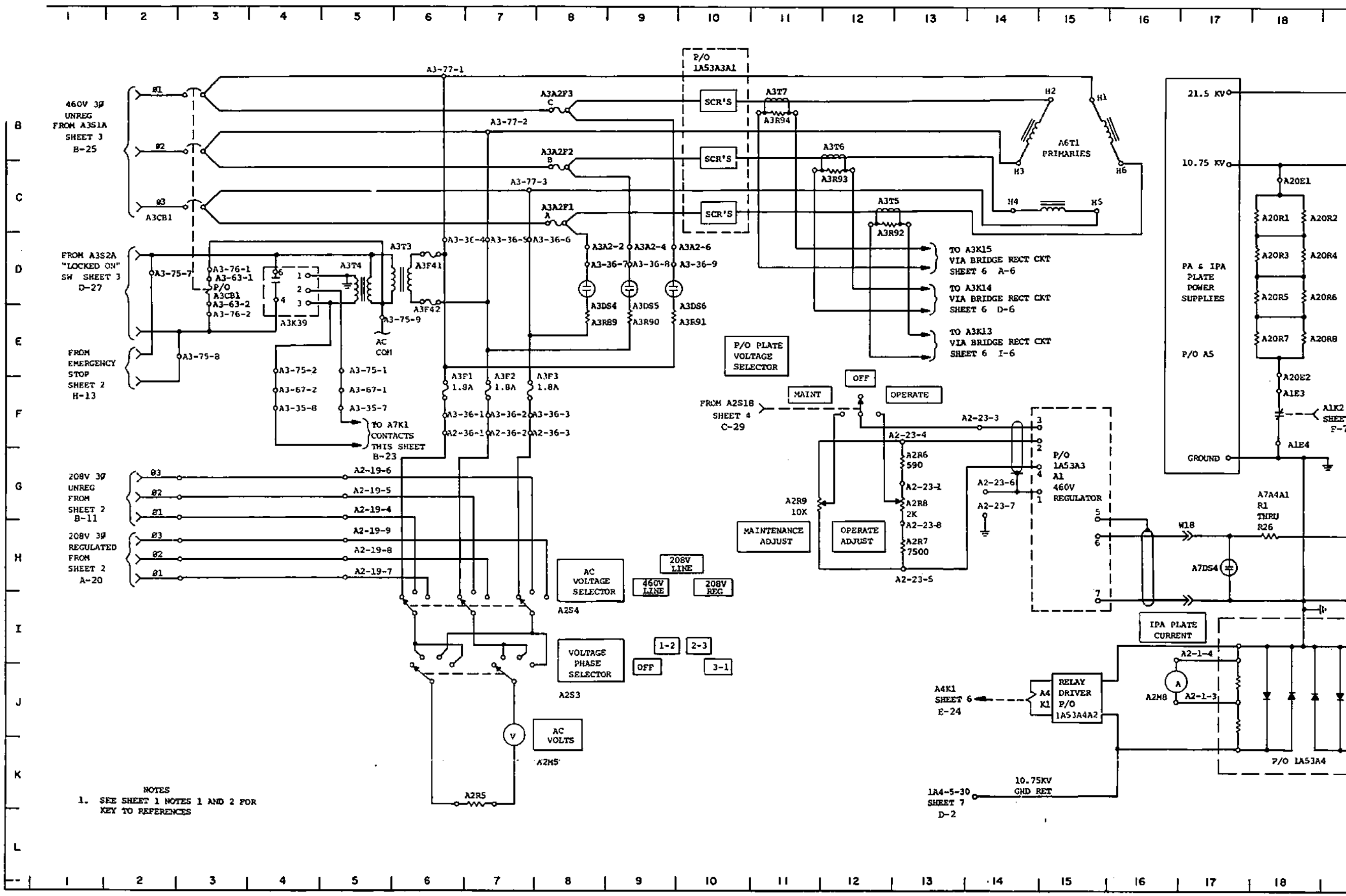


Figure 5-1. AN/FPN-44 Control Circuitry
(Sheet 4A of 8)


460V 3Ø UNREG FROM A3S1A SHEET 3 B-25
Ø1
Ø2
Ø3
A3CB1
A3-77-1
A3-77-2
A3-77-3
A3A2P3 C
A3A2P2 B
A3A2P1 A
SCR'S
P/O 1A53A3A1
A3T7
A3R94
A3T6
A3R93
A3T5
A3R92
H1
H2
H3
H4
H5
H6
A6T1 PRIMARIES
TO A3K15 VIA BRIDGE RECT CKT SHEET 6 A-6
TO A3K14 VIA BRIDGE RECT CKT SHEET 6 D-6
TO A3K13 VIA BRIDGE RECT CKT SHEET 6 I-6
FROM A3S2A "LOCKED ON" SW SHEET 3 D-27
A3-75-7
A3-76-1
A3-63-1
P/O A3CB1
A3-63-2
A3-76-2
A3K39
A3T4
A3T3
A3F41
A3F42
A3-75-9
AC COM
A3-36-5
A3-36-6
A3A2-2
A3A2-4
A3A2-6
A3-36-7
A3-36-8
A3-36-9
A3DS4
A3DS5
A3DS6
A3R89
A3R90
A3R91
FROM EMERGENCY STOP SHEET 2 H-13
A3-75-8
A3-75-2
A3-75-1
A3-67-2
A3-67-1
A3-35-8
A3-35-7
TO A7K1 CONTACTS THIS SHEET B-23
A3F1 1.8A
A3F2 1.8A
A3F3 1.8A
A3-36-1
A3-36-2
A3-36-3
A2-36-1
A2-36-2
A2-36-3
P/O PLATE VOLTAGE SELECTOR
FROM A2S1B SHEET 4 C-29
MAINT
OFF
OPERATE
A2-23-3
A2-23-4
A2-23-6
A2-23-7
A2-23-1
A2-23-8
A2-23-5
A2R6 590
A2R8 2K
A2R7 7500
A2R9 10K
MAINTENANCE ADJUST
OPERATE ADJUST
P/O 1A53A3 A1 460V REGULATOR
208V 3Ø UNREG FROM SHEET 2 B-11
208V 3Ø REGULATED FROM SHEET 2 A-20
A2-19-6
A2-19-5
A2-19-4
A2-19-9
A2-19-8
A2-19-7
AC VOLTAGE SELECTOR
A2S4
208V LINE
460V LINE
208V REG
VOLTAGE PHASE SELECTOR
A2S3
1-2
2-3
3-1
OFF
AC VOLTS
A2M5
A2R5
21.5 KV
10.75 KV
PA & IPA PLATE POWER SUPPLIES
P/O A5
A20E1
A20R1
A20R2
A20R3
A20R4
A20R5
A20R6
A20R7
A20R8
A20E2
A1E3
A1E4
GROUND
A1K2
SHEET F-7
W18
A7A4A1 R1 THRU R26
A7DS4
IPA PLATE CURRENT
A2-1-4
A2-1-3
A2M8
A4K1 SHEET 6 E-24
A4 K1 RELAY DRIVER P/O 1A53A4A2
1A4-5-30 SHEET 7 D-2
10.75KV GND RET
P/O 1A53A4
NOTES
1. SEE SHEET 1 NOTES 1 AND 2 FOR KEY TO REFERENCES

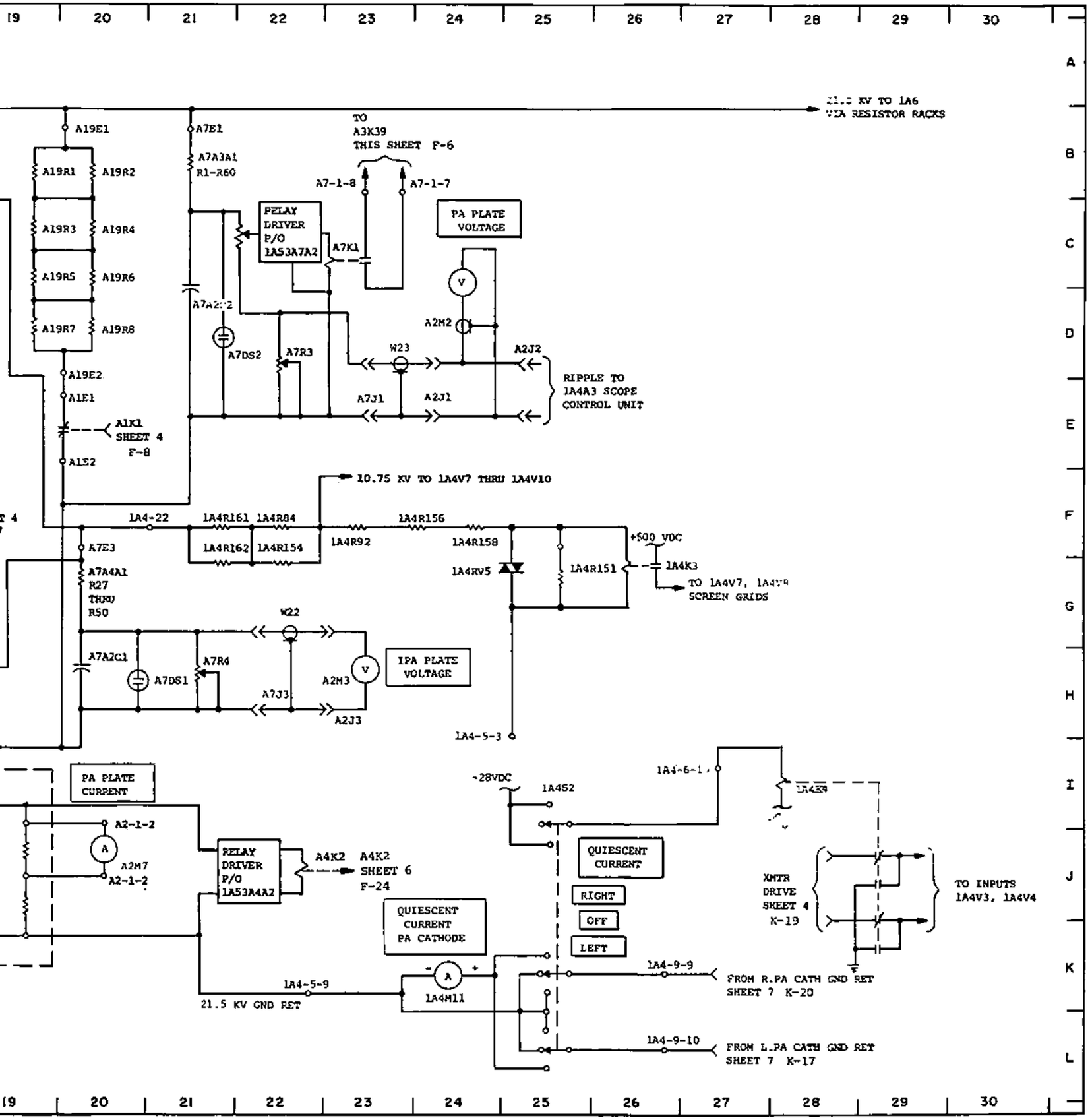
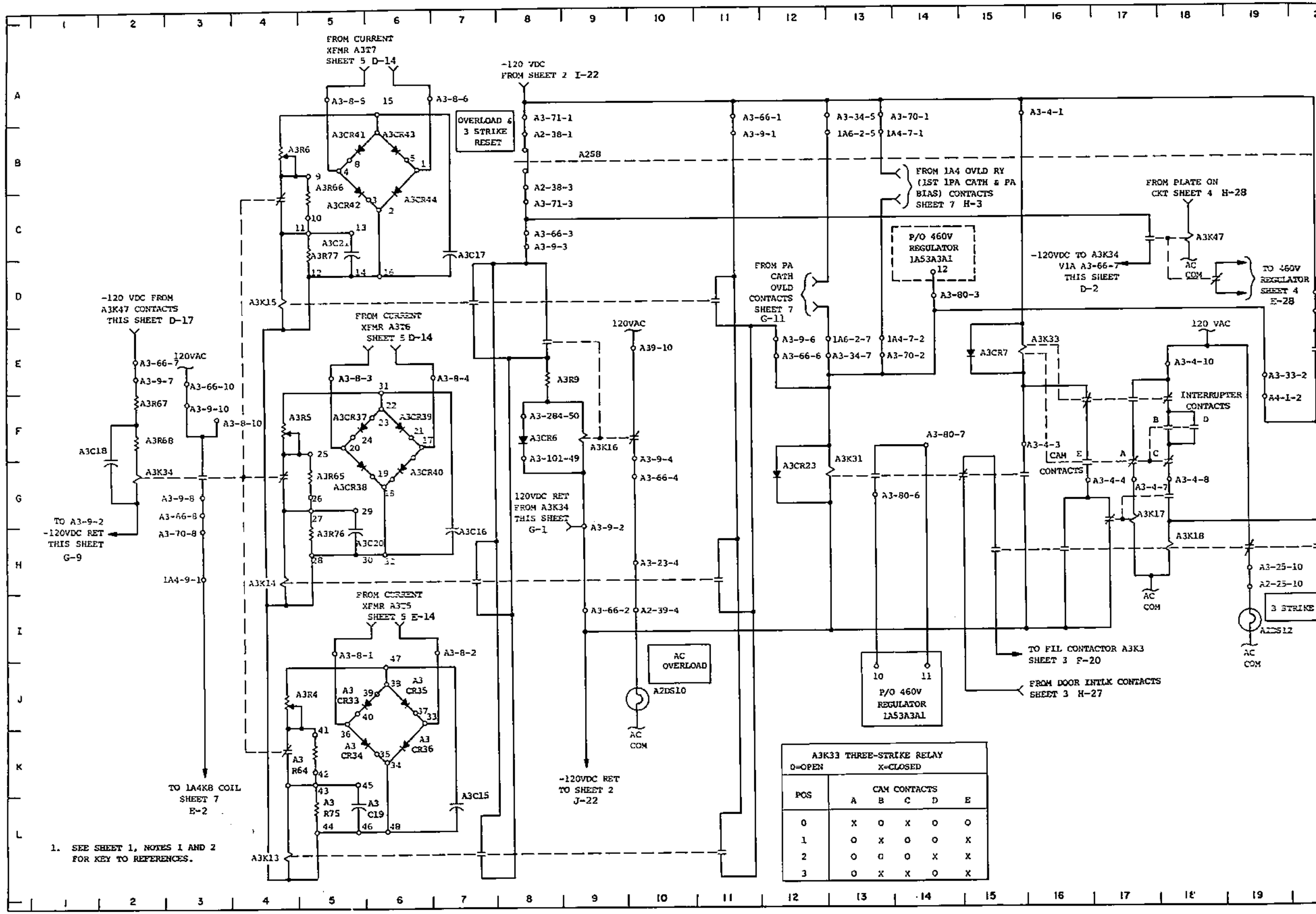


Figure 5-1. AN/FPN-44 Control Circuitry
(Sheet 5 of 8)

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY FIELD CHANGES 3 AND 4 AND E.C. NO. 9



A3K33 THREE-STRIKE RELAY 0=OPEN X=CLOSED					
POS	CAM CONTACTS A	B	C	D	E
0	X	O	X	O	O
1	O	X	O	O	X
2	O	O	O	X	X
3	O	X	X	O	X

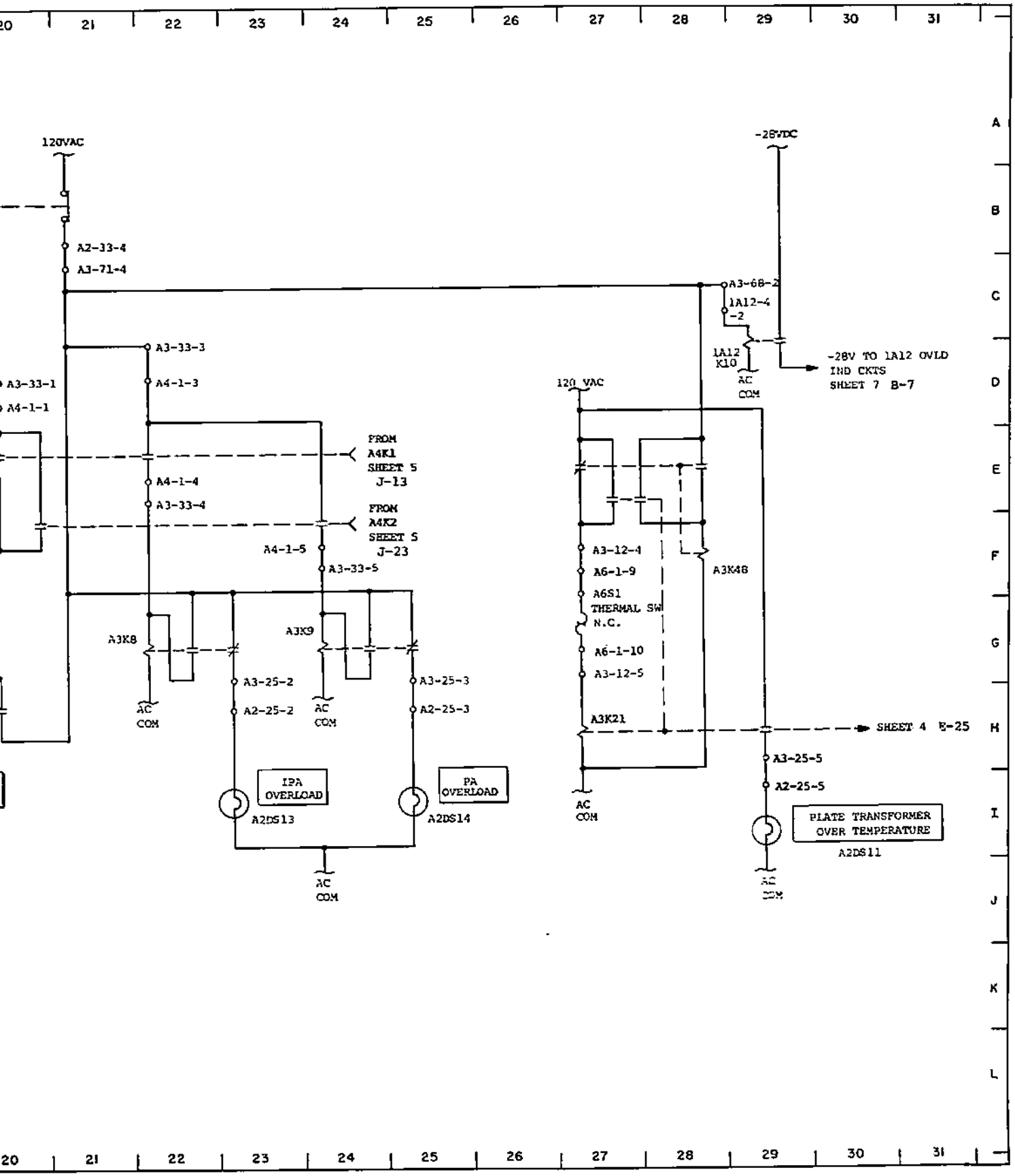
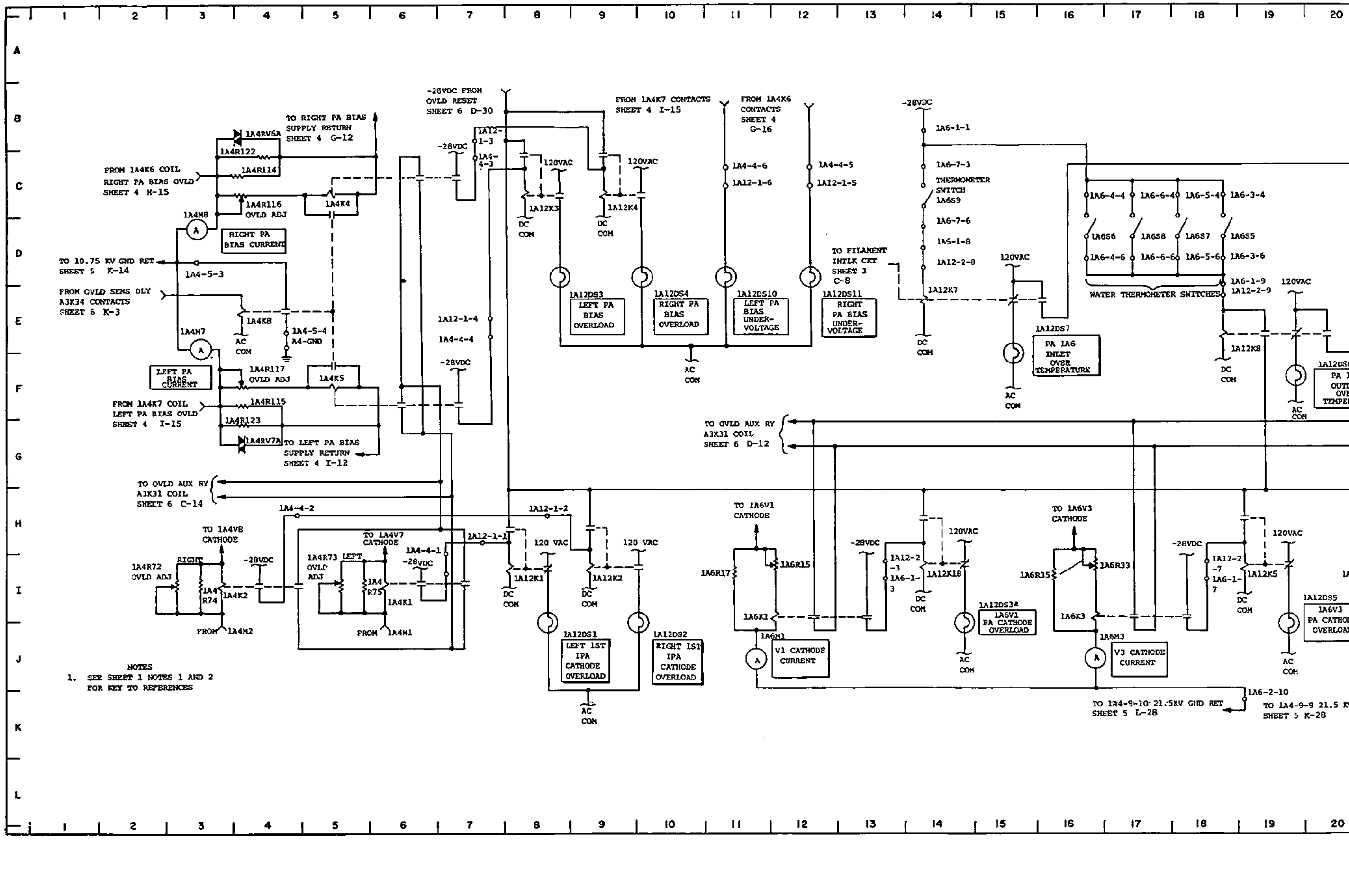


Figure 5-1. AN/FPN-44A Control Circuitry
(Sheet 6 of 8)


-28VDC FROM OVLD RESET SHEET 6 D-30
FROM 1A4K7 CONTACTS SHEET 4 I-15
FROM 1A4K6 CONTACTS SHEET 4 G-16
TO RIGHT PA BIAS SUPPLY RETURN SHEET 4 G-12
FROM 1A4K6 COIL RIGHT PA BIAS OVLD SHEET 4 H-15
1A4RV6A
1A4R122
1A4R114
1A4R116 OVLD ADJ
1A4K4
1A4M8
RIGHT PA BIAS CURRENT
TO 10.75 KV GND RET SHEET 5 K-14
1A4-5-3
FROM OVLD SENS OLY A3K34 CONTACTS SHEET 6 K-3
1A4K8
1A4-5-4 A4-GND
AC COM
1A4M7
LEFT PA BIAS CURRENT
1A4R117 OVLD ADJ
1A4K5
FROM 1A4K7 COIL LEFT PA BIAS OVLD SHEET 4 I-15
1A4R115
1A4R123
1A4RV7A
TO LEFT PA BIAS SUPPLY RETURN SHEET 4 I-12
1A12-1-4
1A4-4-4
-28VDC
1A12-1-3
1A4-4-3
120VAC
1A12K3
1A12K4
DC COM
1A12DS3 LEFT PA BIAS OVERLOAD
1A12DS4 RIGHT PA BIAS OVERLOAD
1A12DS10 LEFT PA BIAS UNDER-VOLTAGE
1A12DS11 RIGHT PA BIAS UNDER-VOLTAGE
1A4-4-6
1A12-1-6
1A4-4-5
1A12-1-5
TO FILAMENT INTLK CKT SHEET 3 C-8
-28VDC
1A6-1-1
1A6-7-3
THERMOMETER SWITCH 1A6S9
1A6-7-6
1A6-1-8
1A12-2-8
1A12K7
120VAC
1A12DS7 PA 1A6 INLET OVER TEMPERATURE
1A6-4-4
1A6-6-4
1A6-5-4
1A6-3-4
1A6S6
1A6S8
1A6S7
1A6S5
1A6-4-6
1A6-6-6
1A6-5-6
1A6-3-6
WATER THERMOMETER SWITCHES
1A6-1-9
1A12-2-9
1A12K8
120VAC
TO OVLD AUX RY A3K31 COIL SHEET 6 D-12
TO OVLD AUX RY A3K31 COIL SHEET 6 C-14
1A4-4-2
1A12-1-2
TO 1A4V8 CATHODE
TO 1A4V7 CATHODE
1A12-1-1
1A4R72 RIGHT OVLD ADJ
-28VDC
1A4R74
1A4K2
FROM 1A4M2
1A4R73 LEFT OVLD ADJ
1A4R75
1A4K1
FROM 1A4M1
1A4-4-1
-28VDC
120 VAC
1A12K1
1A12K2
1A12DS1 LEFT 1ST IPA CATHODE OVERLOAD
1A12DS2 RIGHT 1ST IPA CATHODE OVERLOAD
AC COM
TO 1A6V1 CATHODE
1A6R17
1A6R15
1A6K1
1A6M1
V1 CATHODE CURRENT
-28VDC
1A12-2-3
1A6-1-3
1A12K18
120VAC
1A12DS34 1A6V1 PA CATHODE OVERLOAD
TO 1A6V3 CATHODE
1A6R35
1A6R33
1A6K3
1A6M3
V3 CATHODE CURRENT
-28VDC
1A12-2-7
1A6-1-7
1A12K5
120VAC
1A12DS5 1A6V3 PA CATHOD OVERLOAD
1A6-2-10
TO 1A4-9-10 21.5KV GND RET SHEET 5 L-28
TO 1A4-9-9 21.5 K SHEET 5 K-28
NOTES
1. SEE SHEET 1 NOTES 1 AND 2 FOR KEY TO REFERENCES

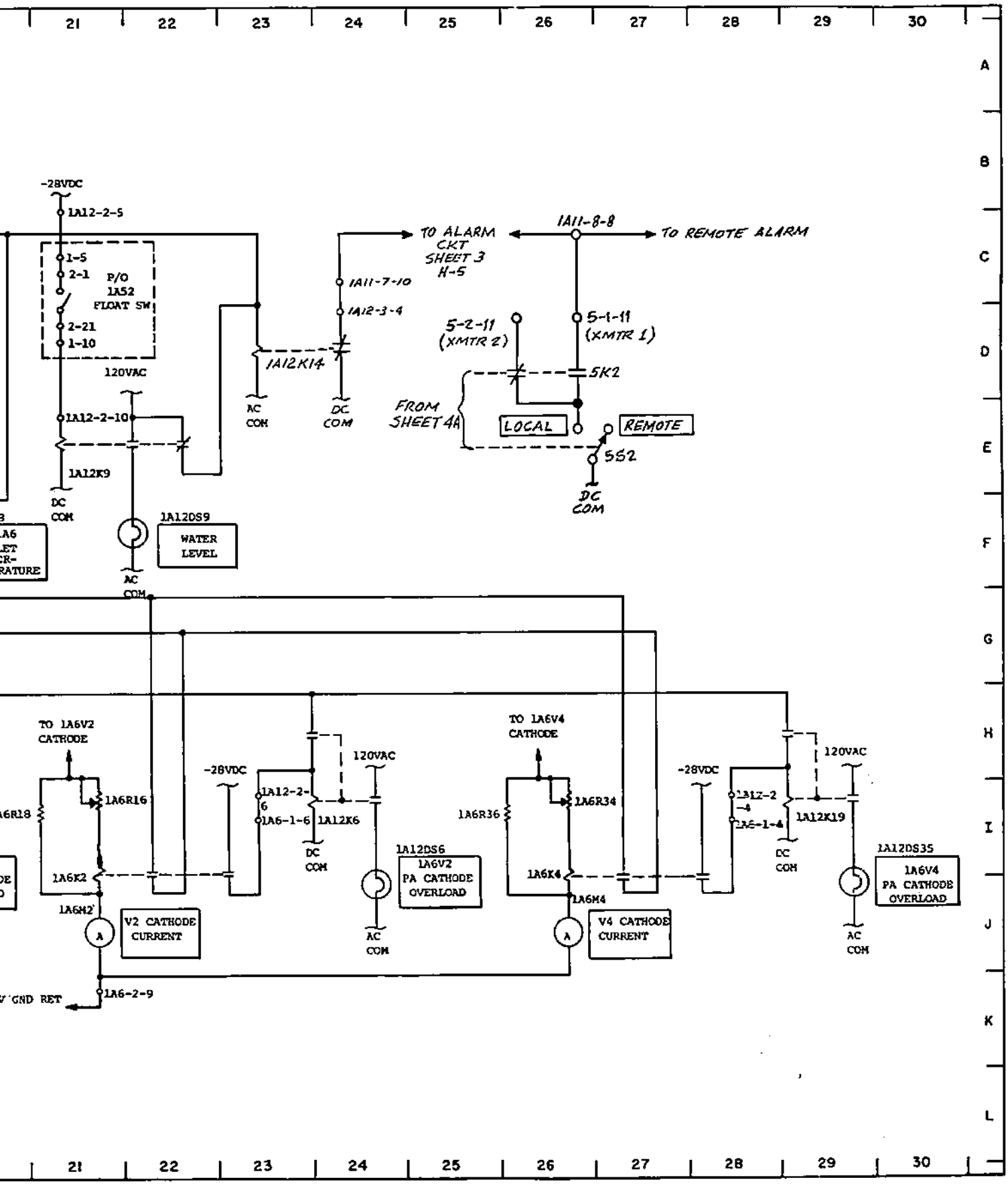


Figure 5-1. AN/FPN-44 Control Circuitry
(Sheet 7 of 8)

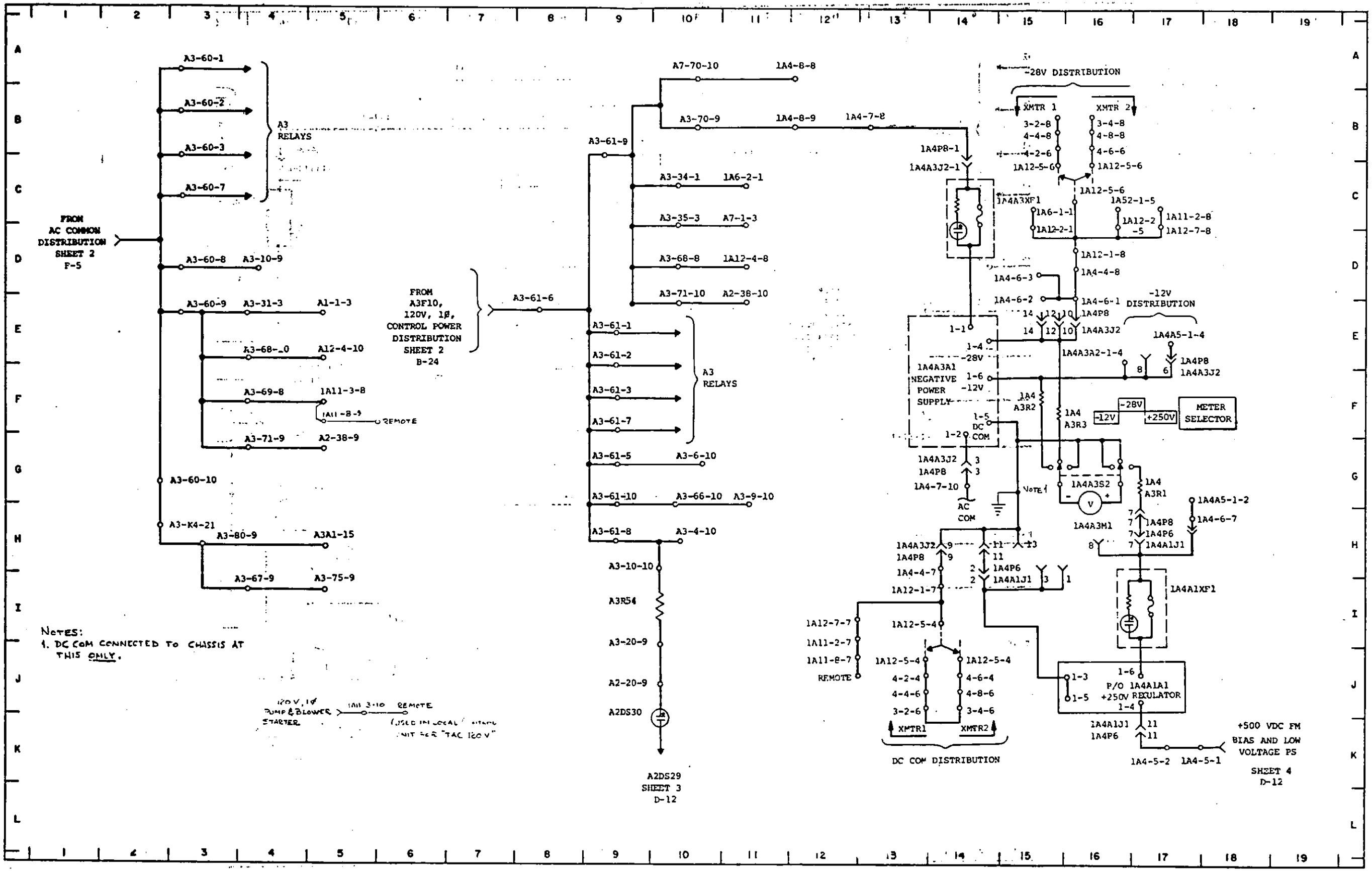
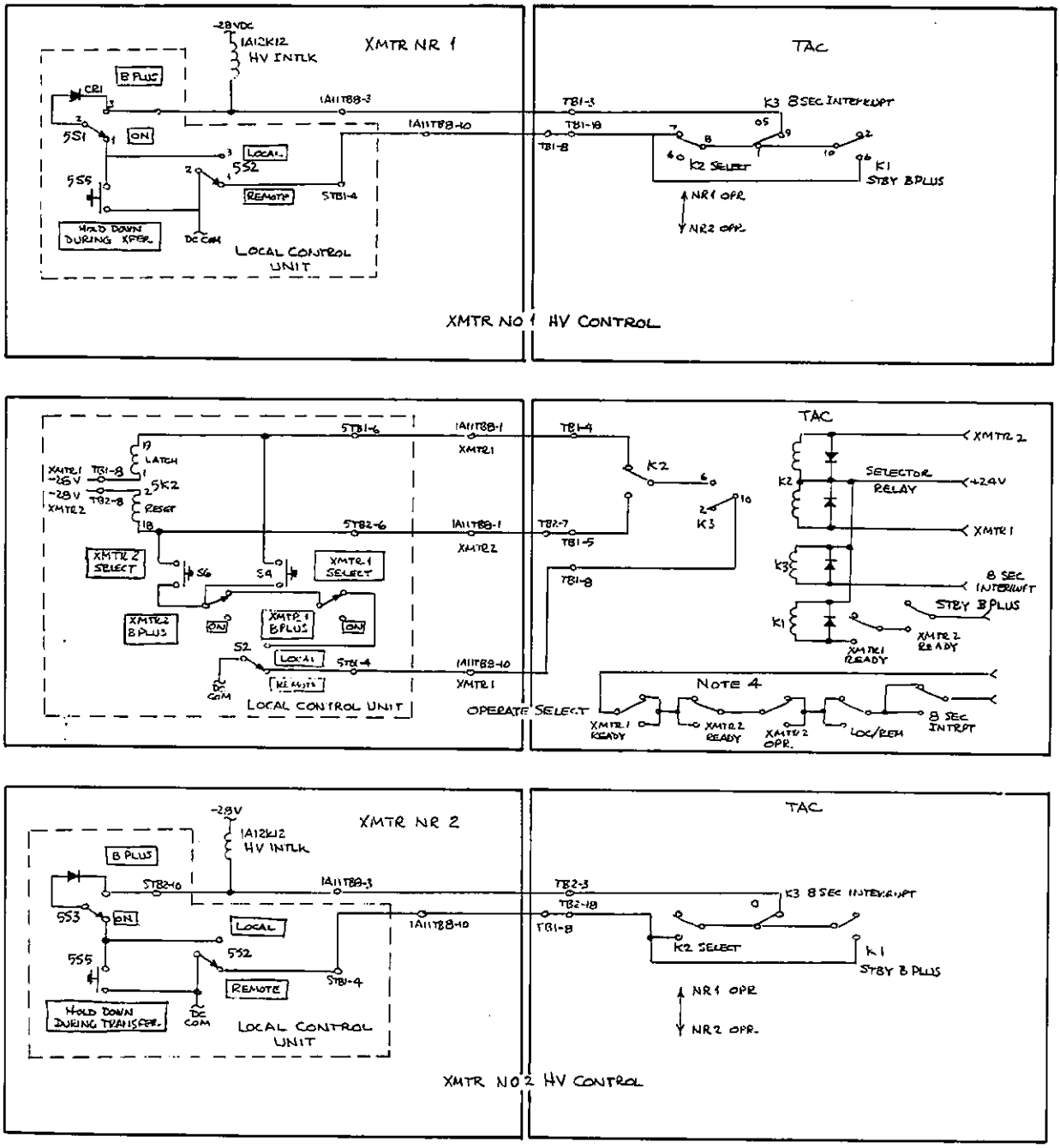


Figure 5-1. AN/FPN-44 Control Circuitry
(Sheet 8 of 8)



NOTES:

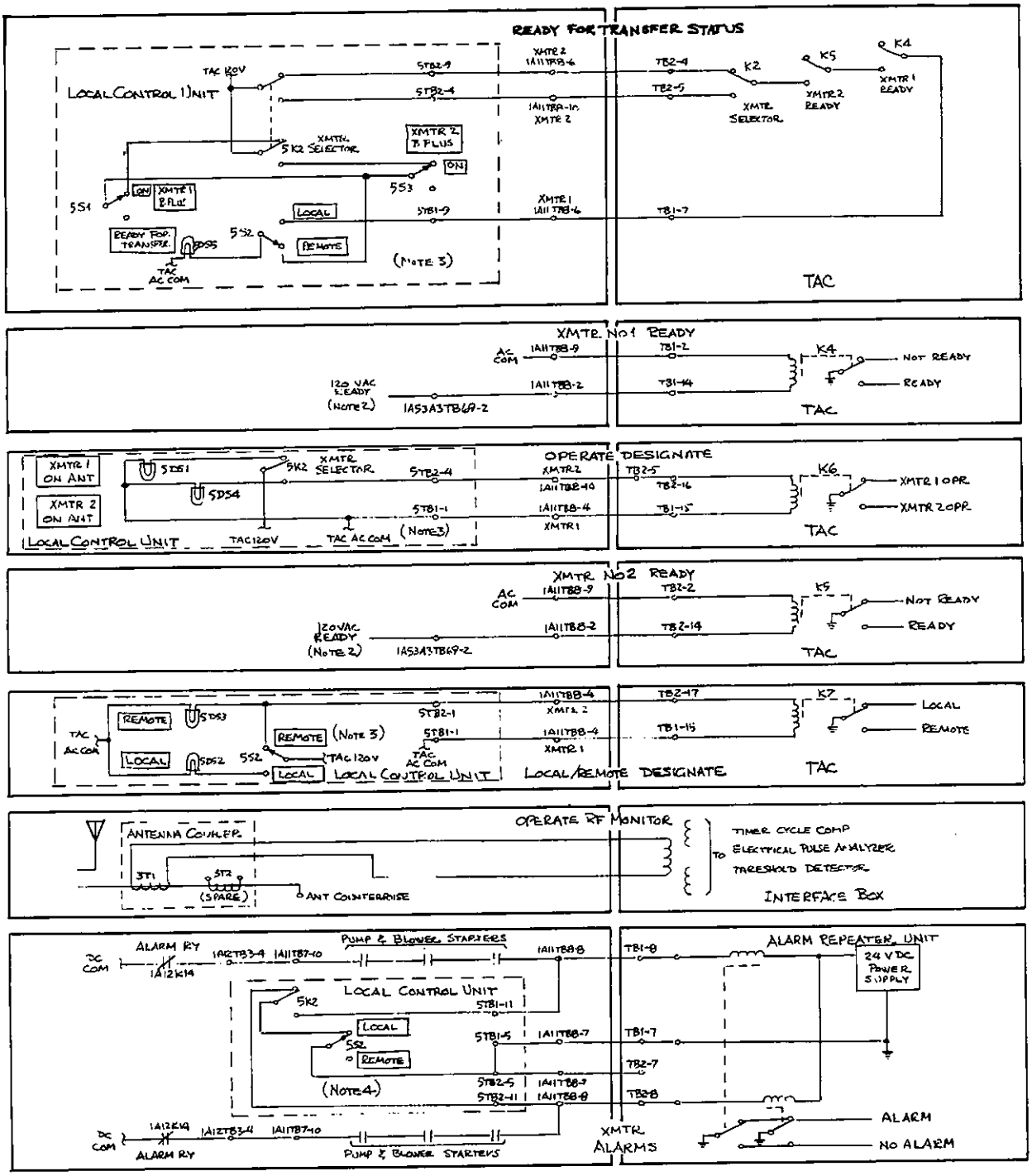
1. Latching relays 5K2 & (TAC)K2 are shown in "XMTR NO. 1" position. All other relays are shown de-energized.

2. Relay (TAC)K3 is energized for 8 seconds upon TAC command for transmitter change.

3. Logic circuitry in TAC causes relay (TAC)K2 to follow position of 5K2, called "re-initialize".

4. Change in state of any of these relays causes the TAC to re-initialize.

Figure 5-1A. AN/FPN-44/TAC Interface Diagrams (Sheet 1 of 2)



NOTES:

1. Latching relays 5K2 & (TAC)K2 are shown in "XMTR NO. 1" position. All other relays are shown de-energized.

2. Transmitter "READY" is 120 VAC when:
   - "BIAS & LOW VOLTAGE" 1A53A2S7 is ON.
   - Discharge contactors 1A53A1K1 & K2 are energized.
   - Bias On relay 1A53A7K2 is energized.
   - HVPS transformer termperature is normal.
   - "PLATE VOLTAGE" 1A53A2S18 in OPERATE position.
   - "LOCKOUT-READY" switch 1A12S1 in READY position.

3. "TAC AC HOT" (120 VAC) and "TAC AC COM" normally from XMTR NO 2; if XMTR No 2 is OFF, TAC AC is from XMTR NO 1.

4. When 5S2 is in LOCAL, the ALARM circuit for the STANDBY transmitter is inhibited.

Figure 5-1A. AN/FPN-44/TAC Interface Diagrams (Sheet 2 of 2)

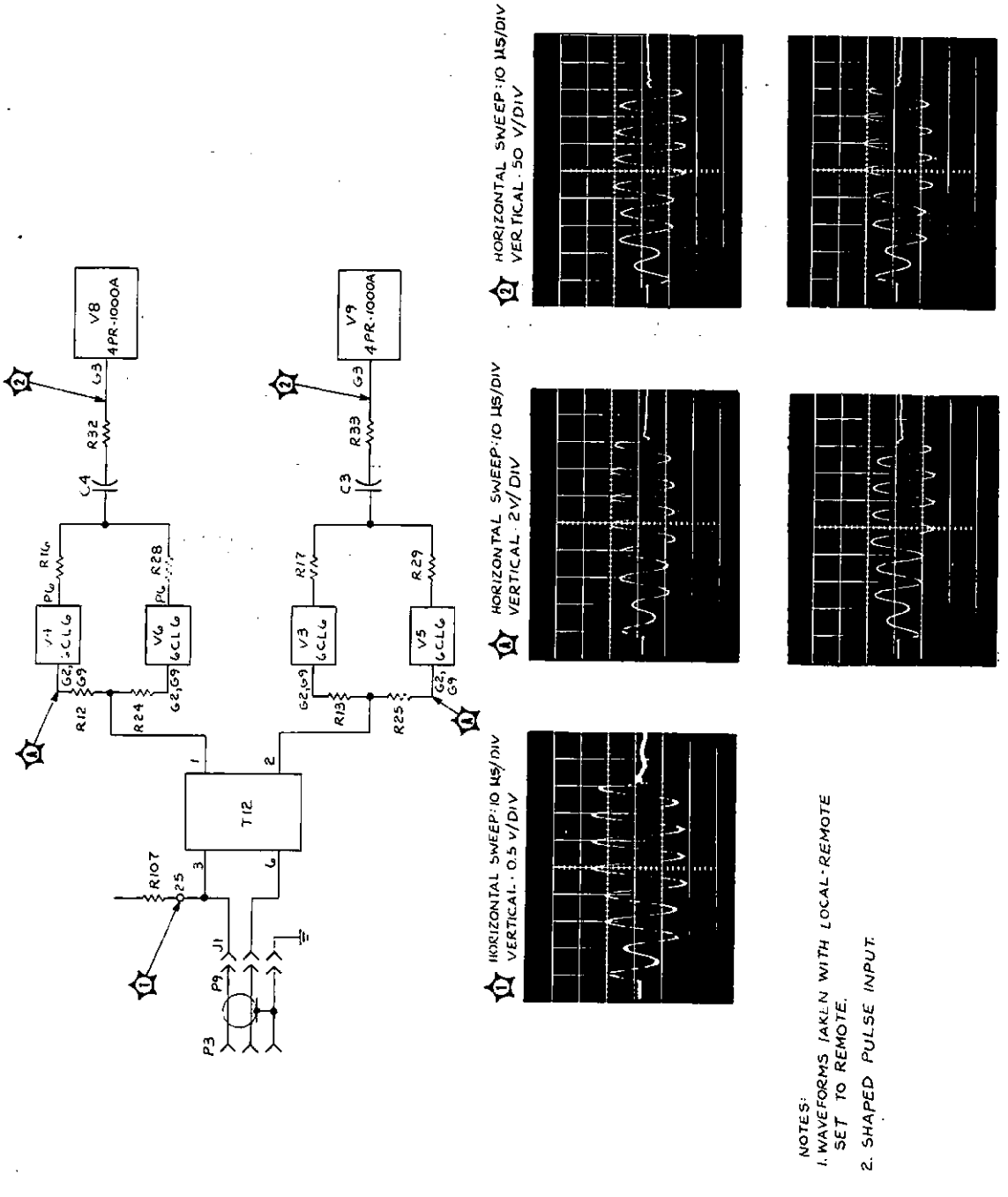


Figure 5-2. Input Stages Amplifier Group OG-159/FPN-44A, Servicing Block Diagram

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY FIELD CHANGE NO. 3

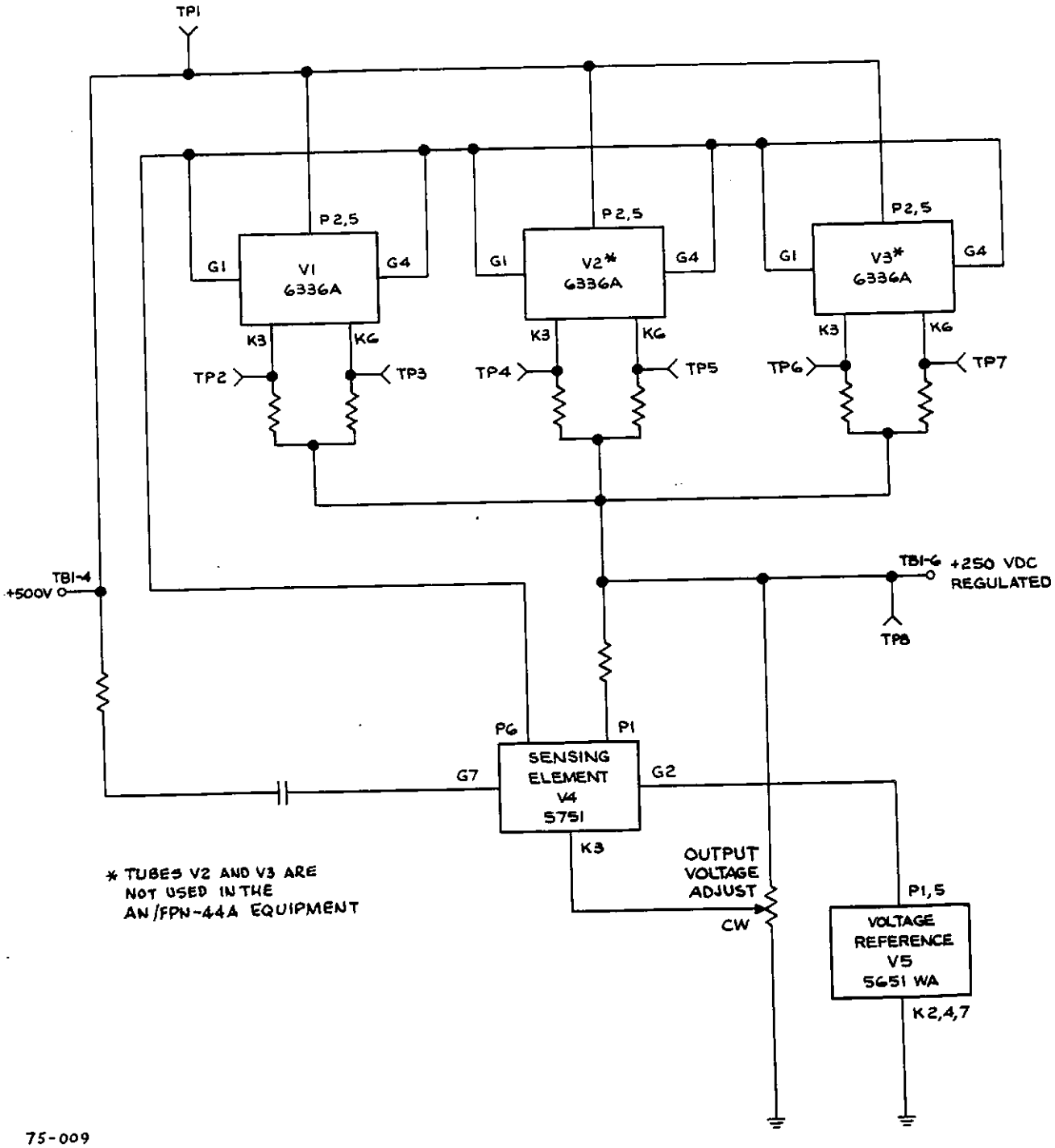
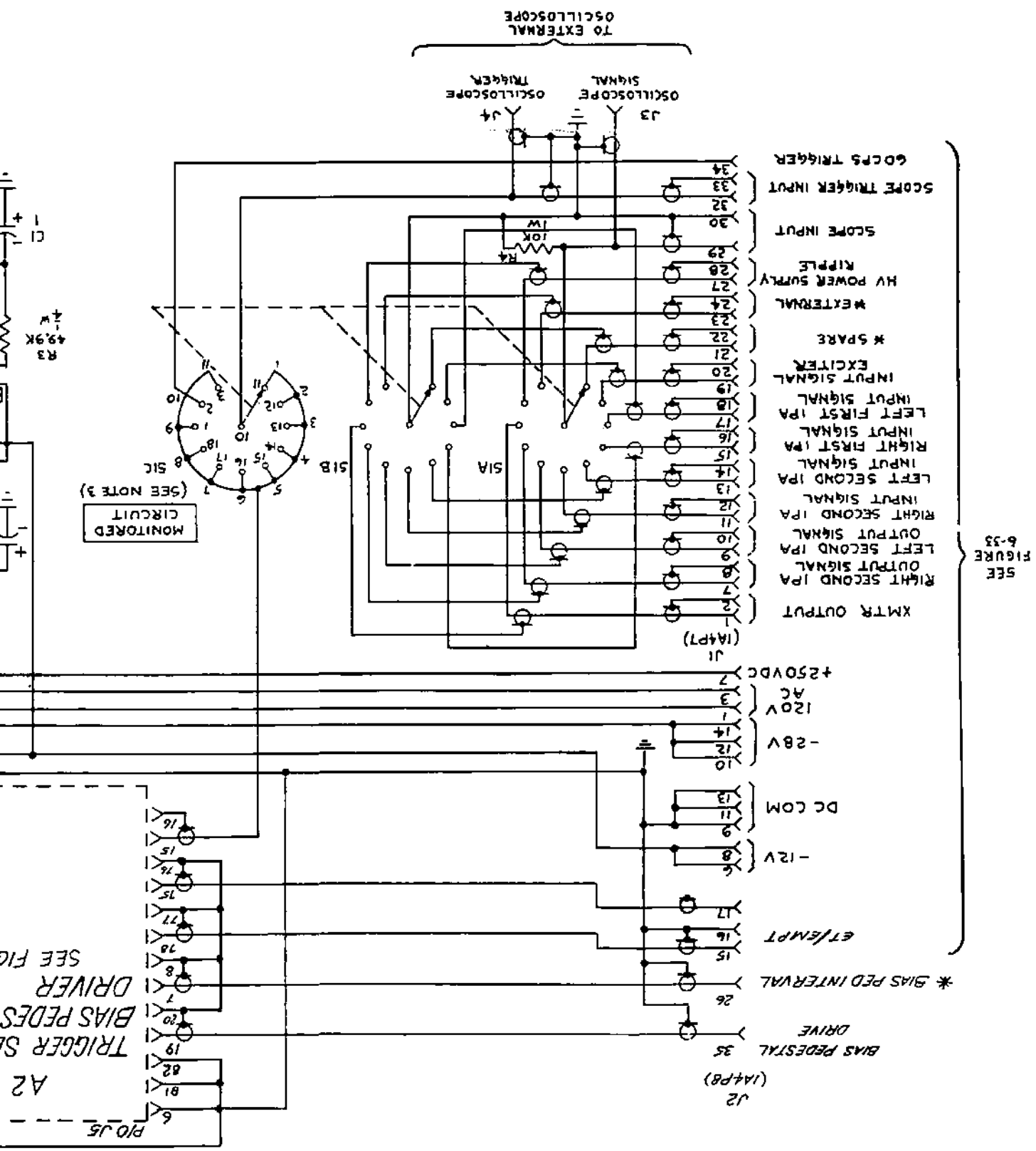
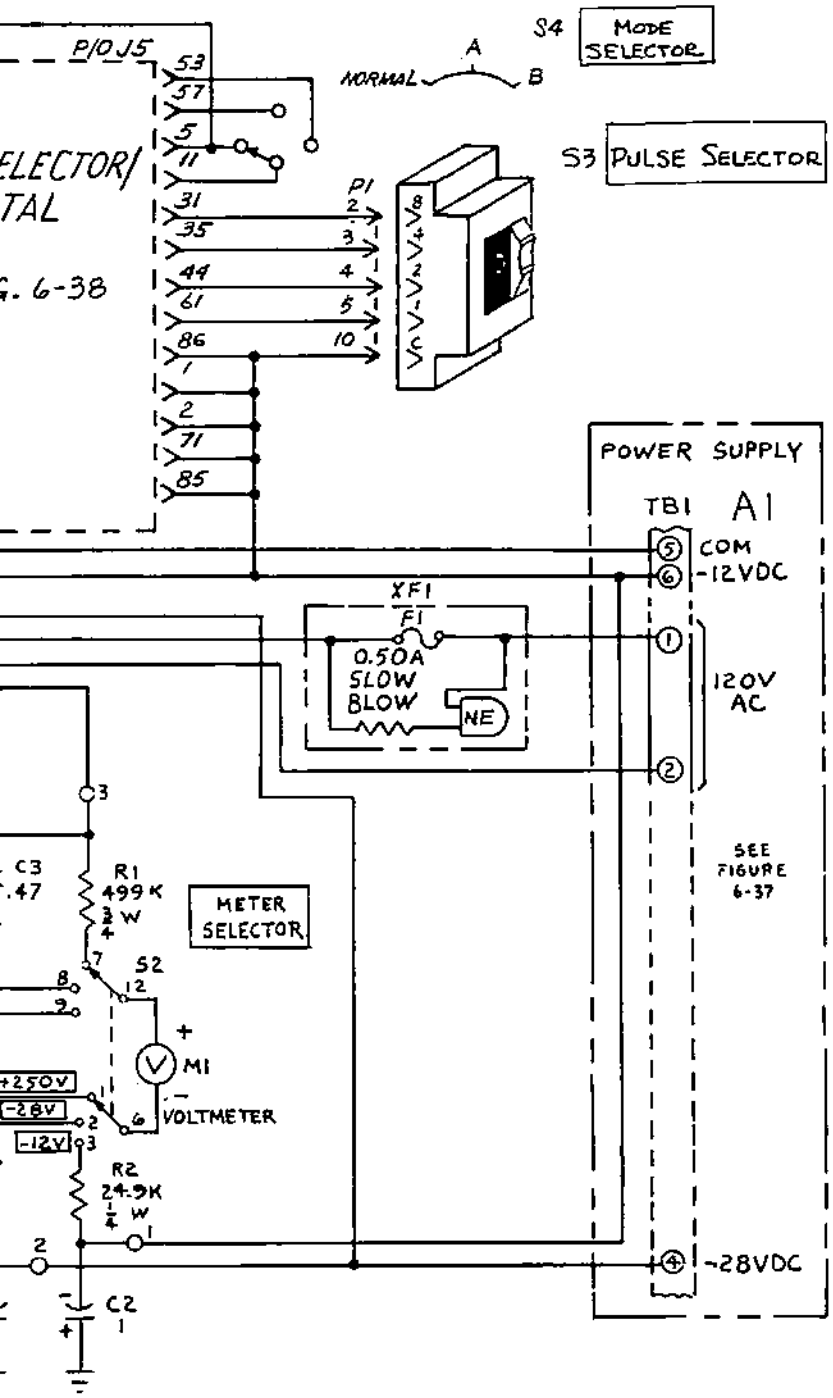


Figure 5-3. +250-Volt Regulator 1A4A1A1 Servicing Block Diagram


TO EXTERNAL OSCILLOSCOPE
OSCILLOSCOPE SIGNAL
OSCILLOSCOPE TRIGGER
J3
J4
60CPS TRIGGER
SCOPE TRIGGER INPUT
SCOPE INPUT
HV POWER SUPPLY RIPPLE
*EXTERNAL
* SPARE
INPUT SIGNAL EXCITER
LEFT FIRST IPA INPUT SIGNAL
RIGHT FIRST IPA INPUT SIGNAL
LEFT SECOND IPA INPUT SIGNAL
RIGHT SECOND IPA INPUT SIGNAL
LEFT SECOND IPA OUTPUT SIGNAL
RIGHT SECOND IPA OUTPUT SIGNAL
XMTR OUTPUT
J1 (IA4P7)
+250VDC
120V AC
-28V
DC COM
-12V
ET/EMPT
* BIAS PED INTERVAL
BIAS PEDESTAL DRIVE
J2 (IA4P8)
SEE FIGURE 6-33
R4 10K 1W
R3 49.9K ±¼W
C1 1
MONITORED CIRCUIT
(SEE NOTE 3)
S1A
S1B
S1C
P10 J5
A2
TRIGGER SI
BIAS PEDES
DRIVER
SEE FIG



S1

POS	FUNCTION
1	SPARE
2	INPUT EXCITER
3	INPUT LEFT FIRST IPA
4	INPUT RIGHT FIRST IPA
5	INPUT LEFT SECOND IPA
6	INPUT RIGHT SECOND IPA
7	OUTPUT LEFT SECOND IPA
8	OUTPUT RIGHT SECOND IPA
9	XMTR OUTPUT (CURRENT)
10	HV POWER SUPPLY (RIPPLE)
11	EXTERNAL
12	

S3

POS	CONTACT CLOSURES X = CLOSED O = OPEN			
	B-C	4-C	2-C	1-C
0	X	O	O	X
1	X	O	O	O
2	O	X	X	X
3	O	X	X	O
4	O	X	O	X
5	O	X	O	O
6	O	O	X	X
7	O	O	X	O
8	O	O	O	X
9	O	O	O	O

NOTES:
1. O INDICATES INSULATED STANDOFF
2. UNLESS OTHERWISE SPECIFIED RESISTANCE VALUES ARE IN OHMS. CAPACITANCE VALUES ARE IN MICROFARADS.
3. NUMBERS ON THE OUTSIDE ARE SWITCH POSITION NUMBERS. NUMBERS ON THE INSIDE ARE SWITCH TERMINAL NUMBERS.
4. PREFIX REF DESIG WITH 1A4A3.

* NOT USED

Figure 5-4. Oscilloscope Control C-4558A/FPN-44A, Servicing Schematic Diagram

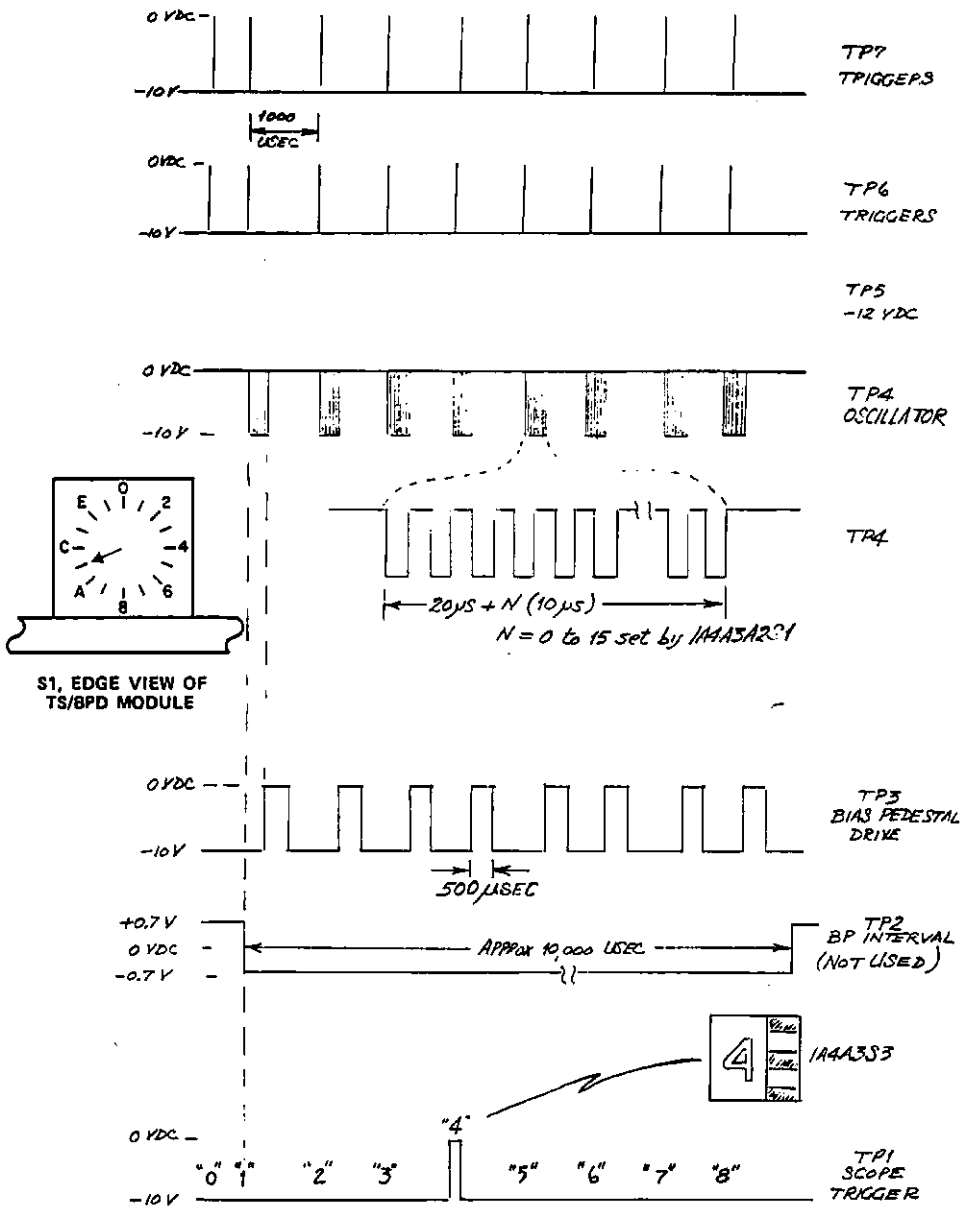
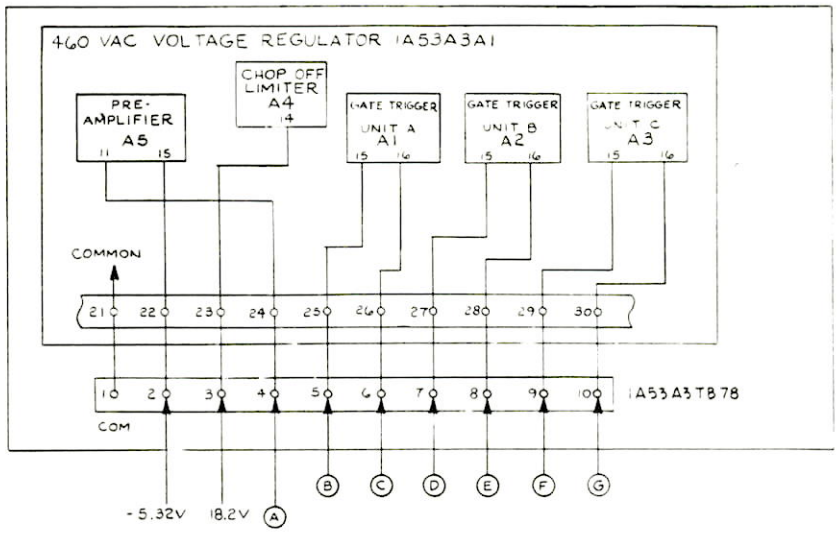
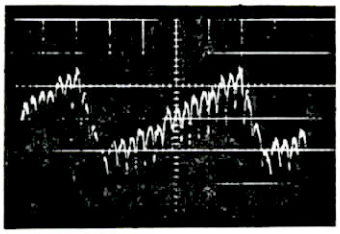
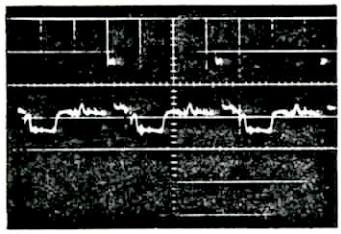


Figure 5-5. Trigger Selector/Bias Pedestal Driver 1A4A3A2, Waveforms and Adjustments

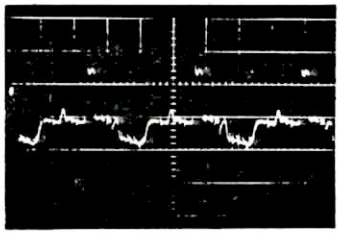




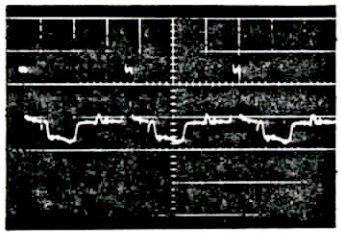
(A) TB78-4
HORIZONTAL SWEEP: 10MS/DIV
VERTICAL SENSITIVITY: 0.2V/DIV
TRIGGER: LINE



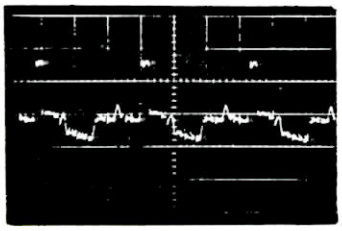
(E) TB78-8
HORIZONTAL SWEEP: 5MS/DIV
VERTICAL SENSITIVITY: 50MV/DIV
TRIGGER: LINE



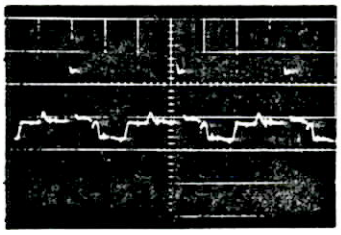
(B) TB78-5
HORIZONTAL SWEEP: 5MS/DIV
VERTICAL SENSITIVITY: 50MV/DIV
TRIGGER: LINE



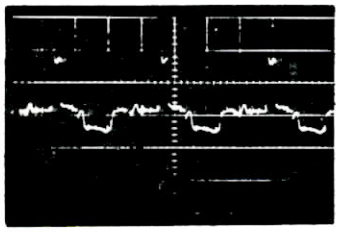
(F) TB78-9
HORIZONTAL SWEEP: 5MS/DIV
VERTICAL SENSITIVITY: 50MS/DIV
TRIGGER: LINE



(C) TB78-6
HORIZONTAL SWEEP: 5MS/DIV
VERTICAL SENSITIVITY: 50MV/DIV
TRIGGER: LINE



(G) TB78-10
HORIZONTAL SWEEP: 5MS/DIV
VERTICAL SENSITIVITY: 50 MS/DIV
TRIGGER: LINE



(D) TB78-7
HORIZONTAL SWEEP: 5MS/DIV
VERTICAL SENSITIVITY: 50 MV/DIV
TRIGGER: LINE

NOTE:
1. CONDITIONS
   A. MEASUREMENTS REFERENCED TO TB78-1.
   B. PLATE VOLTAGE SELECTOR SET TO OPERATE.
   C. DRIVE PULSE INPUT.

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Figure 5-6. Voltage Regulator CN-1473/FPN-44A, Servicing Diagram

CHOP-OFF LIMITER TEST PROCEDURE

Step 1. Remove chop-off limiter 1A53A3A1A4 from voltage regulator 1A53A3A1 and place on test bench.

Step 2. Connect test setup in accordance with figure.

Step 3. Set SPST switch across terminals 3 and 4 to closed position. The digital voltmeter should indicate less than +5 vdc and the ohmeter across terminals 5 and 6 should indicate infinity.

Step 4. Connect oscilloscope to junction of emitter of Q4, resistor R17 and capacitor C5.

Step 5. Momentarily set switch across 3 and 4 to open position and then close. Observe waveform displayed on oscilloscope.

Step 6. Connect oscilloscope to junction of emitter of Q3, resistor R11, and capacitor C4.

Step 7. Repeat step 5.

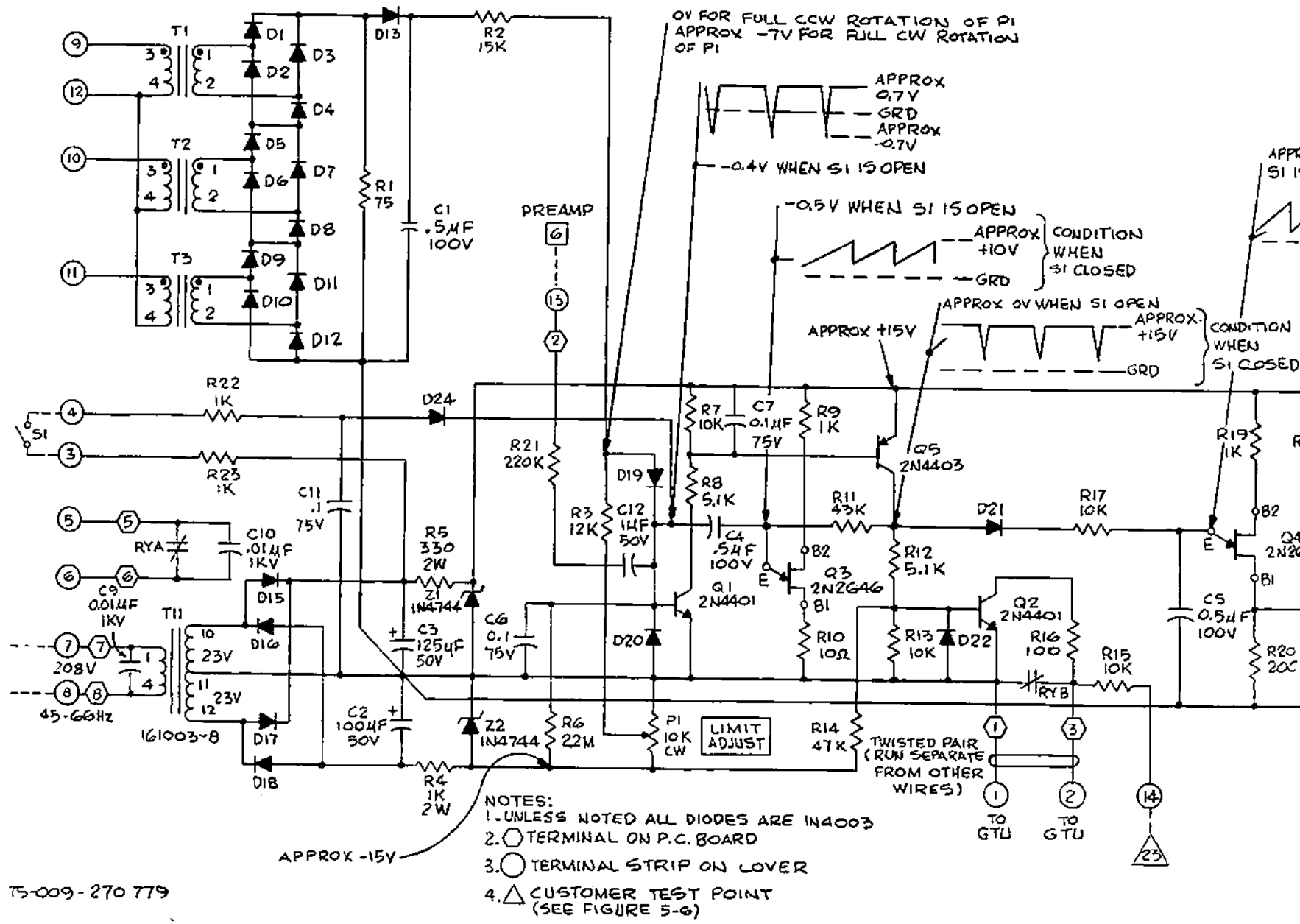
Step 8. Open switch across terminals 3 and 4 and observe that digital voltmeter indicates 15 vdc.

Step 9. Using DPDT switch disconnect terminals 7 and 8 from the 208 vac source and connect to a 120 vac source. Observe that the digital voltmeter reads 0 vdc.

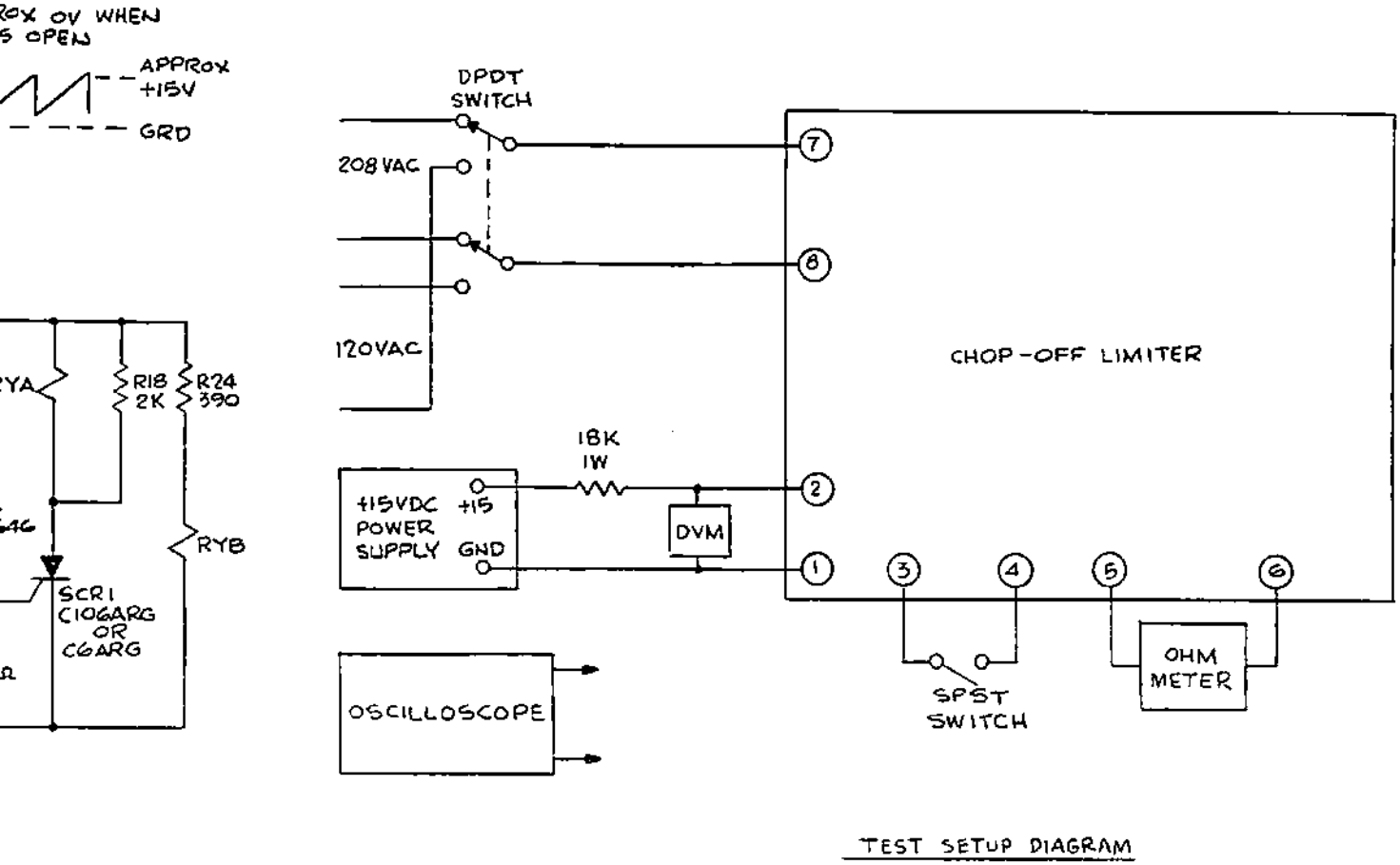
Step 10. Disconnect all test equipment from chop-off limiter.

Step 11. With chop-off limiter on test bench, use extender cable to connect system inputs.

Step 12. Measure voltages at junction of R2 and R3 with digital voltmeter. It should be -7 vdc with P1 fully clockwise and 0 vdc with P1 fully counterclockwise.



T5-009-270 779



TEST SETUP DIAGRAM

Figure 5-7. Chop-Off Limiter 1A53A3A1A4 (P/O Voltage Regulator CN-1473/FPN-44A) Servicing Schematic Diagram

PREAMPLIFIER TEST PROCEDURE

Step 1. Remove preamplifier 1A53A3A1A5 from voltage regulator 1A53A3A1 and place on test bench.

Step 2. Connect test setup in accordance with figure.

Step 3. Set SPST switch across terminals 7 and 8 to closed position.

Step 4. Adjust 1K potentiometer across power supply output for a 1 vdc indication on digital voltmeter.

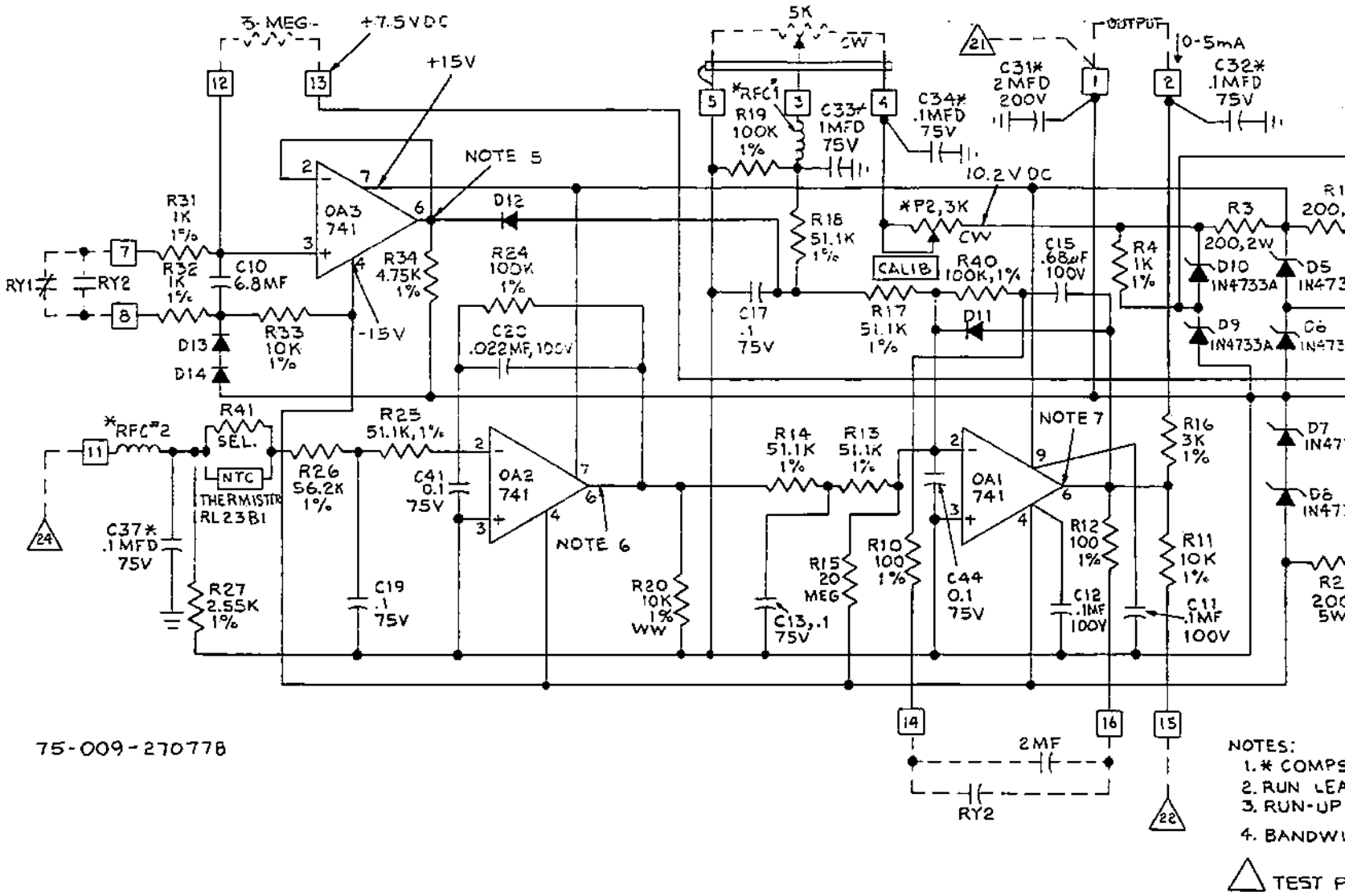
Step 5. Turn 5K potentiometer across terminals 3, 4, 5 fully clockwise and observe milliameter for a 5 ma indication.

Step 6. Turn 5K potentiometer fully counterclockwise. The milliameter should read 0 ma.

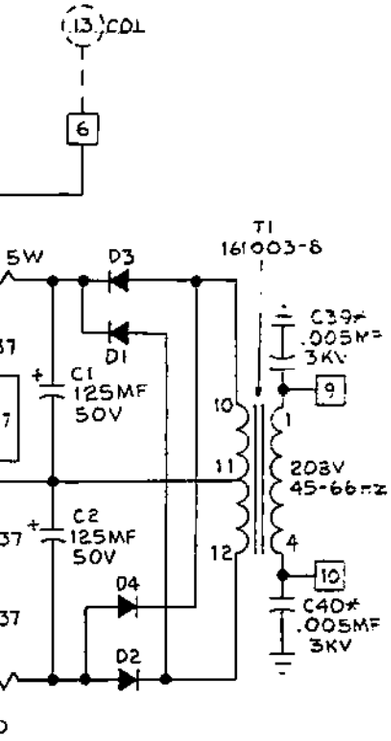
Step 7. Adjust 1K potentiometer for 0 vdc on digital voltmeter.

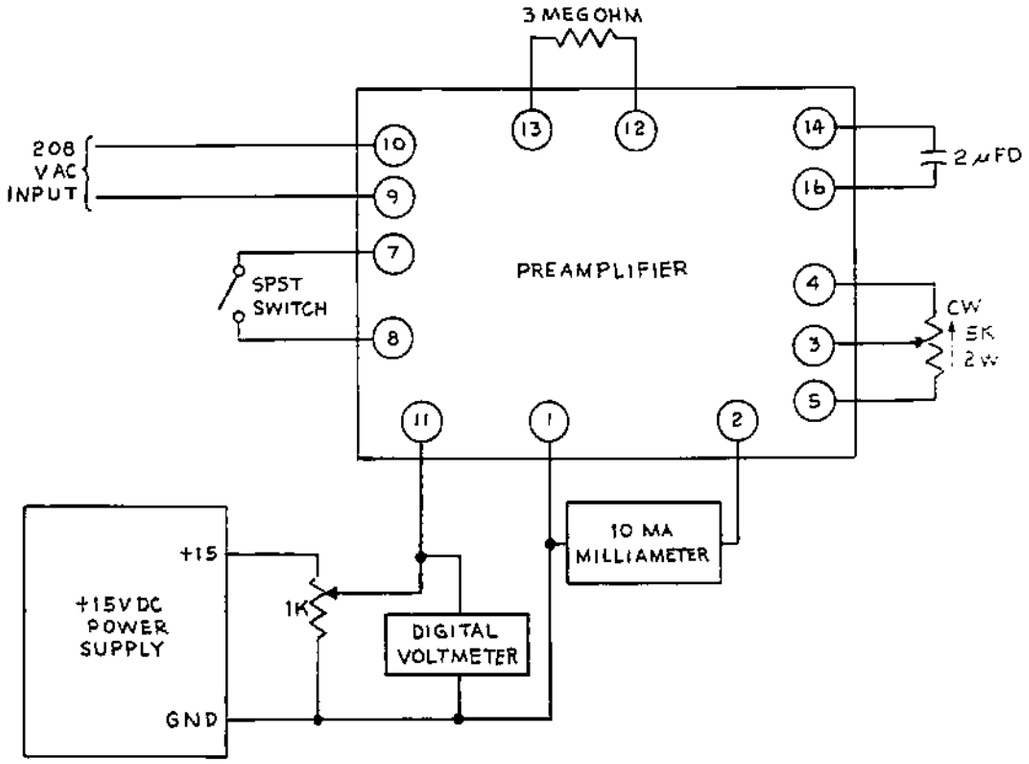
Step 8. Connect digital voltmeter to pin 6 of 0A3 and terminal 1 (common).

Step 9. Set SPST switch across terminals 7 and 8 to open position while observing digital voltmeter. The voltage at 0A3, terminal 6 should rise from -0.7 vdc to approximately 8.4 vdc.



75-009-270778



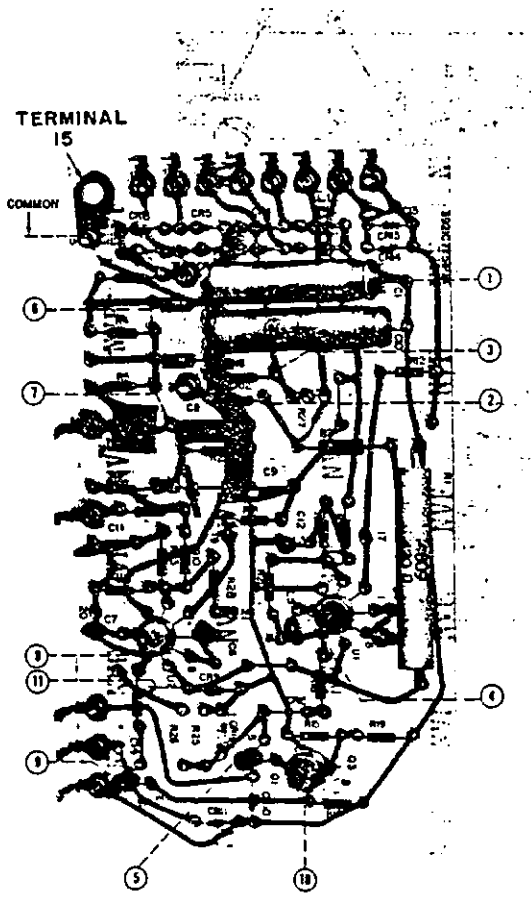


TEST SETUP DIAGRAM

. ARE LOCATED ON COVER (FIGURE 5-71)
ADS 9 & 10 SEPARATE FROM OTHER BUNDLE (LEADS 1-8)
TIME ≅ 4.5 X $R_{(MEG)}$ SECONDS (0-100%).
DTH ≅ $\frac{2}{C_{(MF)}}$ Hz UP TO 5Hz.
POINTS (SEE FIGURE 5-6)

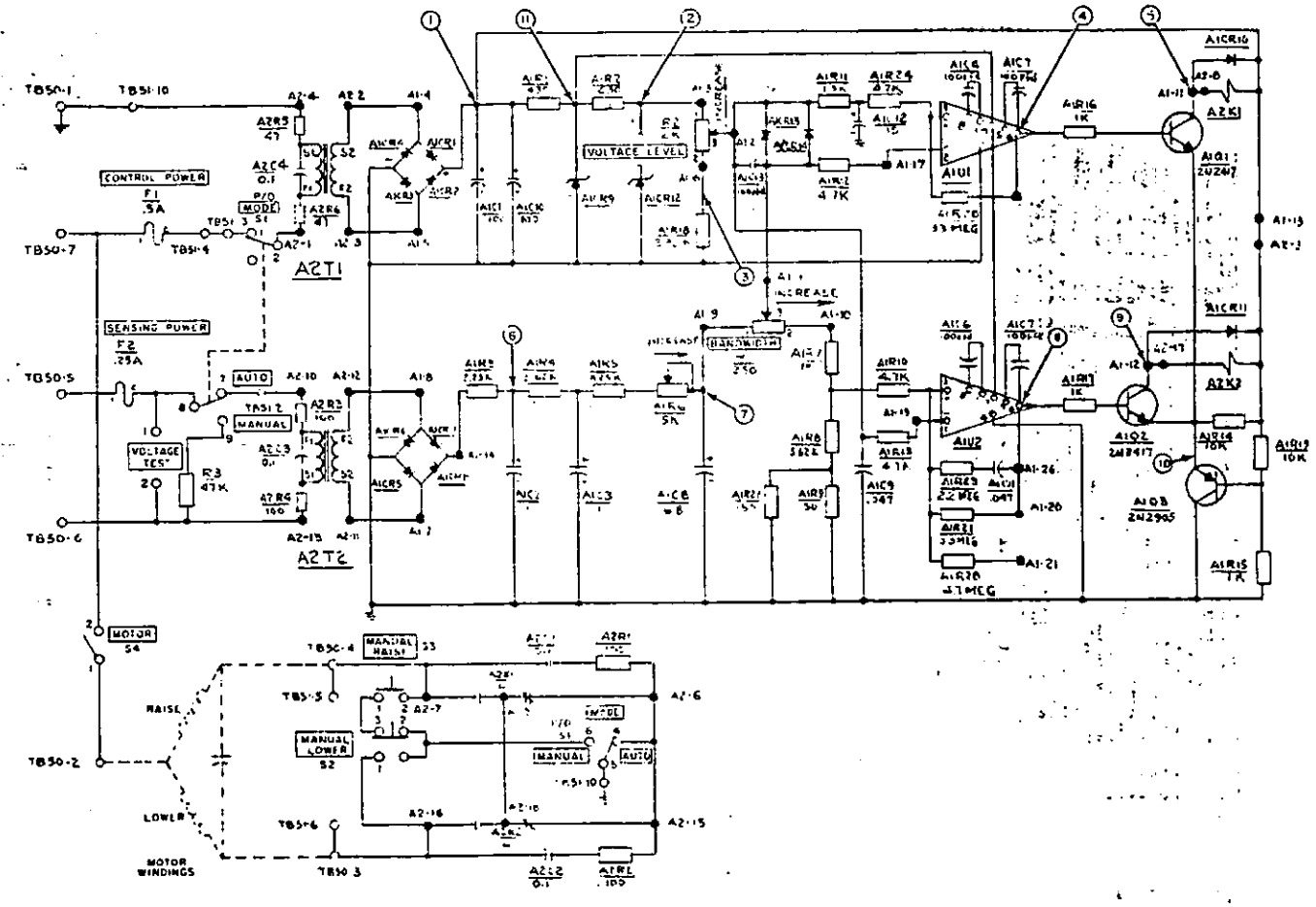
5. TERMINALS 7 & 8 SHORTED APPROX. -1.4V
TERMINALS 7 & 8 OPEN, RAMP UP TO +15V
6. A NEGATIVE VOLTAGE APPROX. EQUAL IN MAGNITUDE TO ANY D.C. VOLTAGE (UP TO APPROX. 12V) PLACED ON TERMINAL 11 WITH RESPECT TO TERMINAL 1.
7. AN OUTPUT VOLTAGE RAMPING DOWN TO -15V. SPEED OF RAMP DEPENDENT UPON SETTING OF 5K POT ON TERMINALS 3,4 AND 5.

Figure 5-8. Preamplifier 1A53A3A1A5 (P/O Voltage Regulator CN-1473/FPN-44A) Servicing Schematic Diagram



SENSING COMPONENT
BOARD A1
TEST POINT LOCATIONS

75-009



VOLTAGE TABLE

TEST POINT NO.	COMPONENT	DC ± 10%	
1	C1	28	
2	CR12	6	
3	R18	4	
4	U1-6	0.8	*10.7
5	Q1-C	28	*3
6	C2	19	
7	C8	5	
8	U2-6	0.8	*10.7
9	Q2-C	28	*3
10	Q3-E	3	
11	CR9	12	

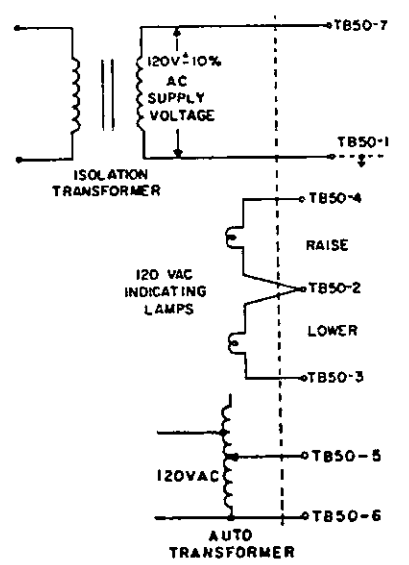
*The voltage readings when raise or lower relay is energized.

VOLTAGE MEASUREMENT PROCEDURE

1. GAIN ACCESS TO SENSING CIRCUIT COMPONENT BOARD A1.
2. ADJUST VOLTAGE LEVEL CONTROL SO THAT RAISE AND LOWER RELAYS ARE NOT ENERGIZED.
3. MEASURE VOLTAGES WITH 10,000 OHMS/VOLT METER, METER COMMON LEAD AT NEGATIVE TERMINAL OF A1C1 (TERMINAL 15) AND POSITIVE LEAD AT POINTS LISTED IN VOLTAGE TABLE.

OPTIONAL BENCH TEST PROCEDURE

1. REMOVE PANEL FROM CASE AS FOLLOWS:
   A. REMOVE SCREWS FASTENING PANEL TO CASE.
   B. DISCONNECT EXTERNAL LEADS AT TERMINAL BOARDS TB50 AND TB51.
2. CONNECT AS SHOWN IN OPTIONAL BENCH TEST SET-UP.
3. ADJUST AUTO TRANSFORMER SO THAT RAISE AND LOWER LAMPS ARE NOT LIT.

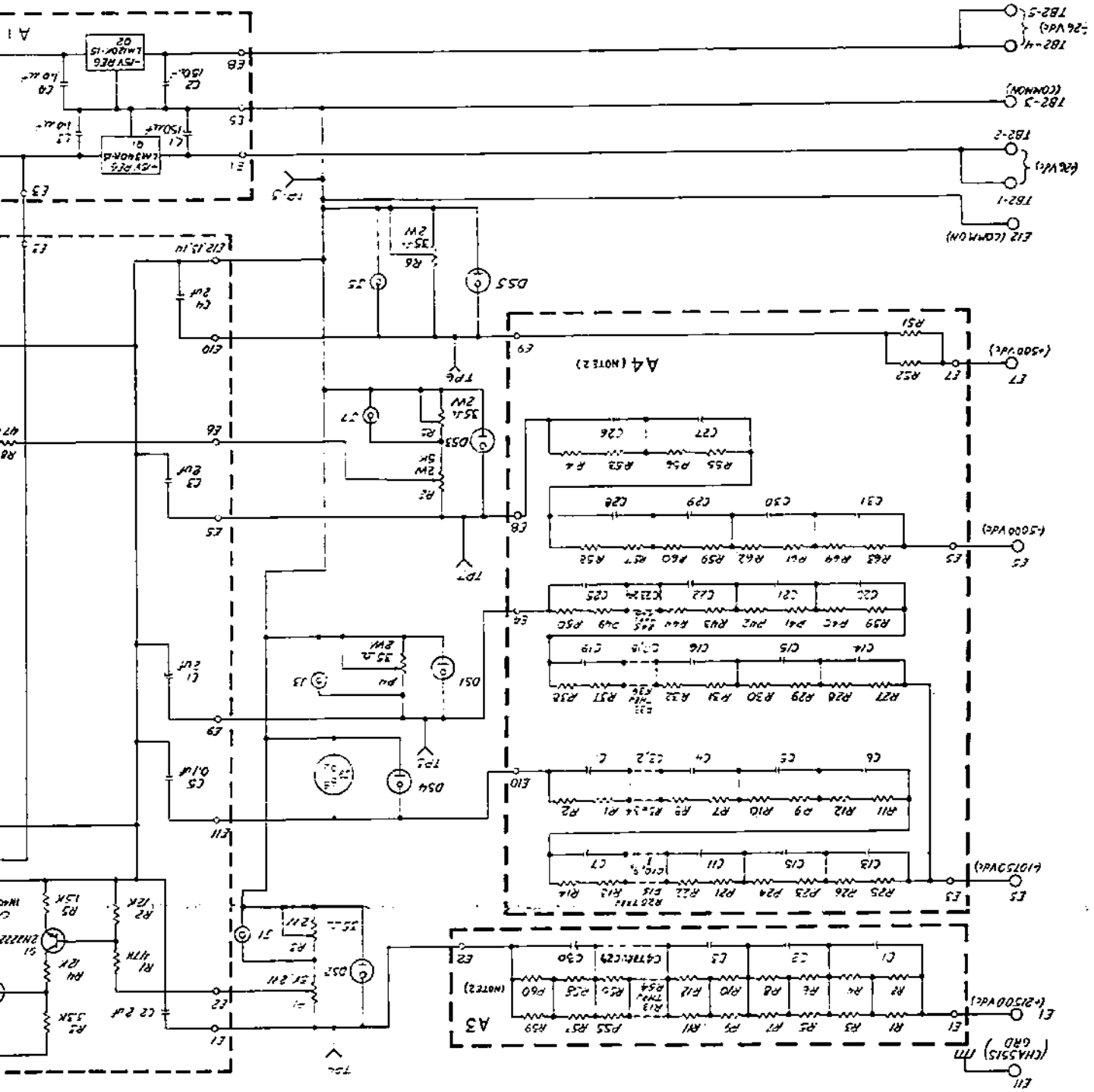


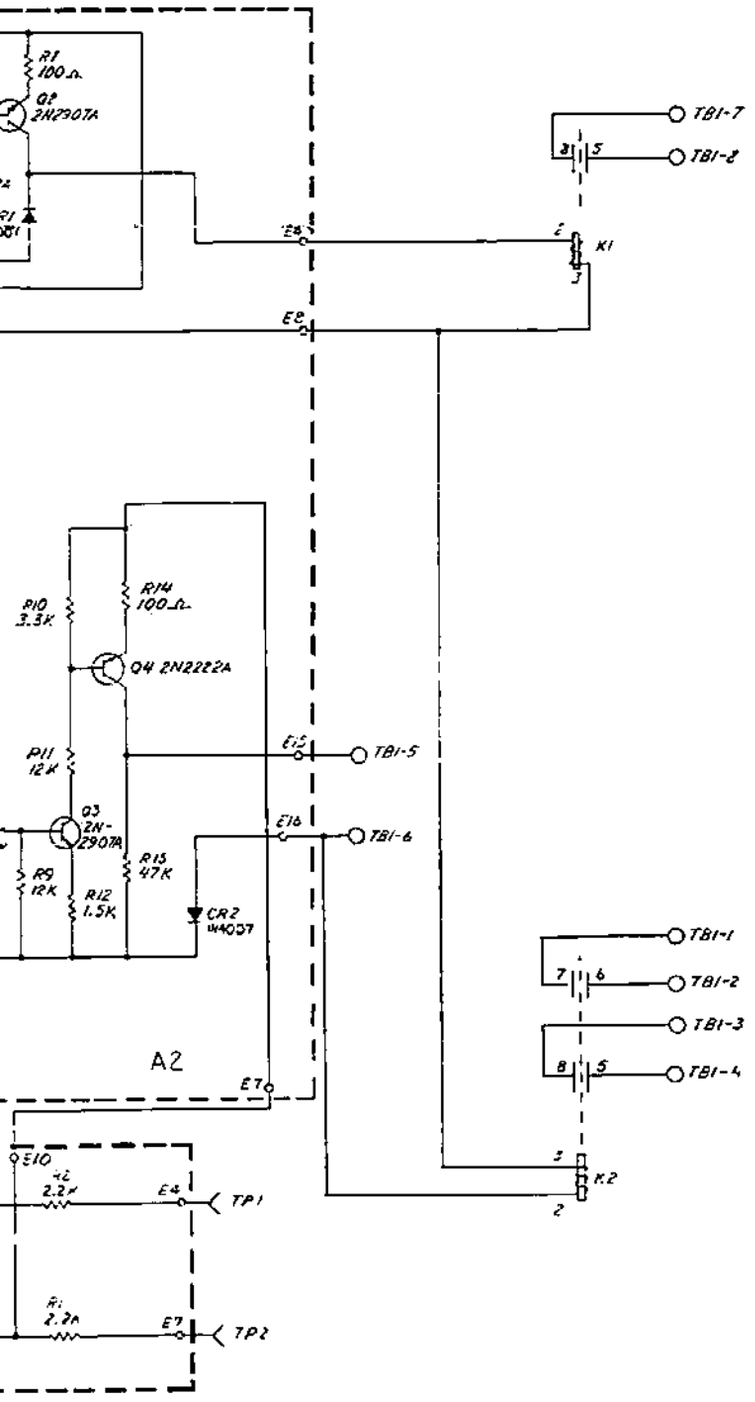
OPTIONAL BENCH TEST SET-UP

Figure 5-9. Regulator CN-1472/FPN-44A Servicing Schematic Diagram

Figure 5-10. Deleted

75-009-E10-177950



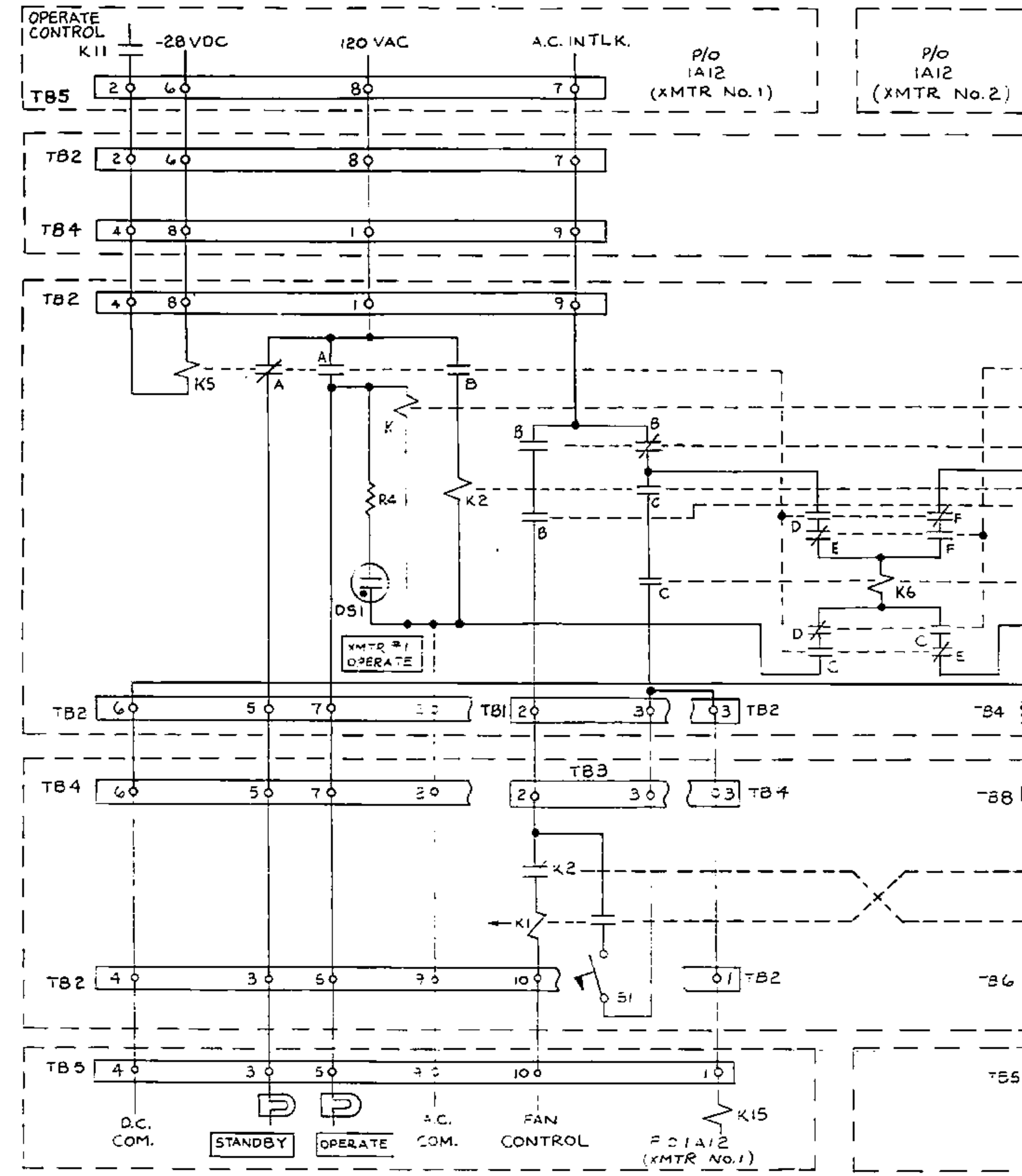


TP1	+15.0 Vdc ±0.5 Vdc
TP2	−15.0 Vdc ±0.5 Vdc
Q1 E	0 (0V at 1A53A7E1), +0.70 Vdc ±0.15 Vdc (K1 closed)
Q1 B	0 (0V at 1A53A7E1, +1.30 Vdc ±0.2 Vdc (K1 closed)
Q1 C	+15.0 Vdc ±0.5 Vdc (0V at 1A53A7E1), +5.0 Vdc ±3.0 Vdc (K1 closed)
Q2 E	+15.0 Vdc ±0.5 Vdc (0V at 1A53A7E1), +14.0 Vdc ±1.0 Vdc (K1 closed)
Q2 B	+15.0 Vdc ±0.5 Vdc (0V at 1A53A7E1), +13.2 Vdc ±1.0 Vdc (K1 closed)
Q2 C	0 (0V at 1A53A7E1), +10.0 Vdc ±3 Vdc (K1 closed)
Q3 E	0 (0V at 1A53A7E5), −0.70 Vdc ±0.15 Vdc (K2 closed)
Q3 B	0 (0V at 1A53A7E5), −1.30 Vdc ±0.2 Vdc (K2 closed)
Q3 C	−15.0 Vdc ±0.5 Vdc (0V at 1A53A7E5), −5.0 Vdc ±3.0 Vdc (K2 closed)
Q4 E	−15.0 Vdc ±0.5 Vdc (0V at 1A53A7E5), −14.0 Vdc ±1.0 Vdc (K2 closed)
Q4 B	−15.0 Vdc ±0.5 Vdc (0V at 1A53A7E5), −13.2 Vdc ±1.0 Vdc (K2 closed)
Q4 C	0 (0V at 1A53A7E5) −10.0 Vdc ±3 Vdc (K2 closed)

NOTES: UNLESS OTHERWISE SPECIFIED

1. IN UNITS A1 AND A2, ALL RESISTORS ARE IN OHMS, ±5% 1/2 W.
2. IN UNITS A3 AND A 4, ALL RESISTORS ARE ±1%, 10W; A3R1 THRU A3R60 ARE 400K OHM, A4R1 THRU R4R26 ARE 137.8K OHM, A4R50 AND A4R53 THRU A4R64 ARE 167K OHM, A4R51 AND A4R52 ARE 400K OHM.
3. VOLTAGE MEASUREMENTS MADE FROM 1A53A7TP3 TO INDICATED TEST POINT USING 20,000 OHM/VOLT VOLTMETER.
4. SEE FIGURE 6-59 FOR INTERFACE.

Figure 5-11. Voltage Divider CN-1474/FPN-44A (1A53A7), Servicing Schematic Diagram


OPERATE CONTROL
K11
-28 VDC
120 VAC
A.C. INTLK.
P/O 1A12 (XMTR No. 1)
P/O 1A12 (XMTR No. 2)
TB5
TB2
TB4
TB2
K5
K2
R4
DS1
XMTR #1 OPERATE
K6
TB1
TB3
K1
S1
K15
D.C. COM.
STANDBY
OPERATE
A.C. COM.
FAN CONTROL

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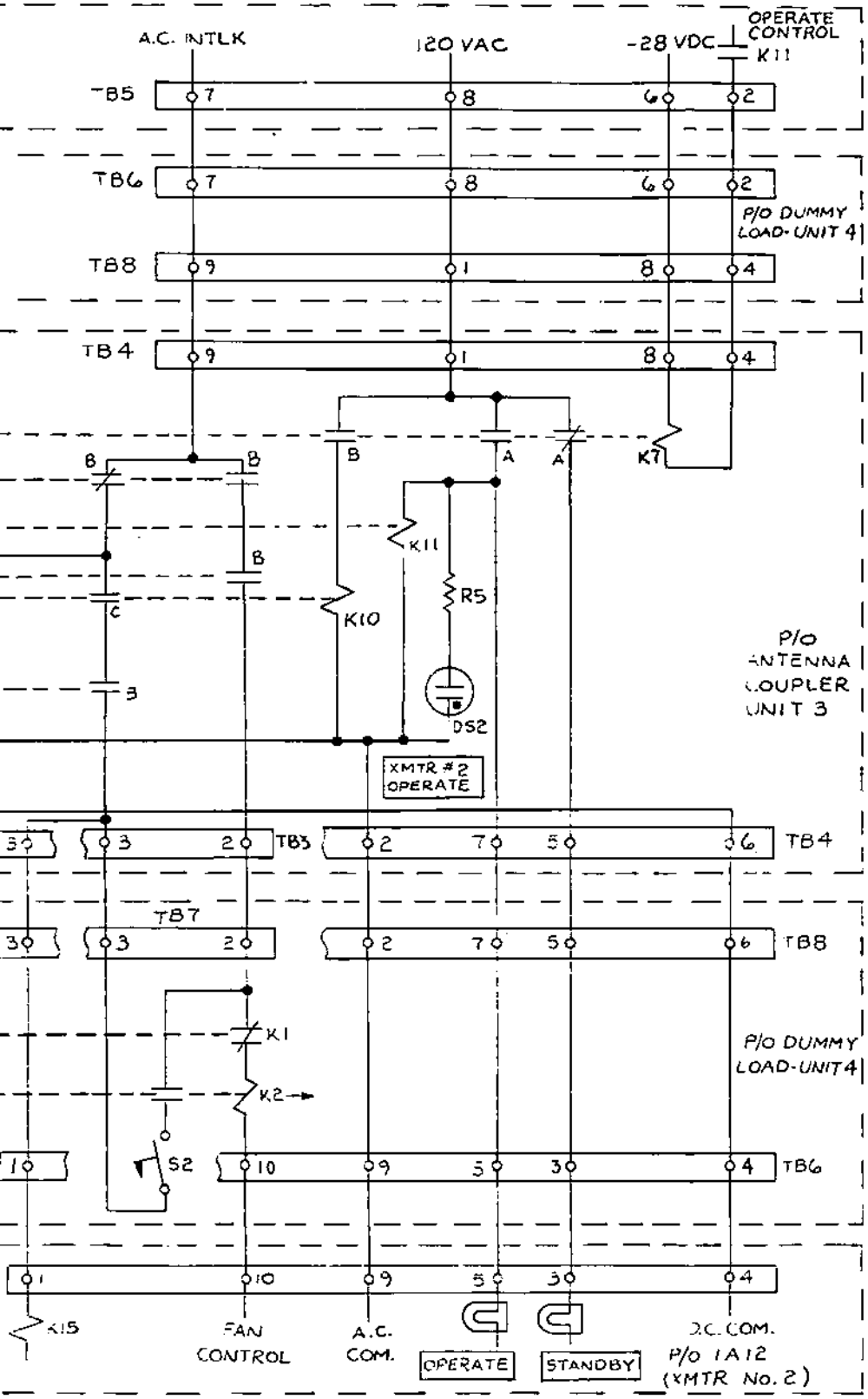


RELAY	FUNCTION
3K1	XMTR #1 ANTENNA TRANSFER
3K2	XMTR #1 GROUND TRANSFER
3K3	NOT USED
3K4	NOT USED
3K5	XMTR #1 OPERATE CONTROL
3K6	ANTENNA GROUNDING
3K7	XMTR #2 OPERATE CONTROL
3K8	NOT USED
3K9	NOT USED
3K10	XMTR #2 GROUND TRANSFER
3K11	XMTR #2 ANTENNA TRANSFER
4K1	XMTR #1 DUMMY LOAD FAN
4K2	XMTR #2 DUMMY LOAD FAN

Figure 5-12. Antenna Coupler and Dummy Load, Control Circuits, Servicing Schematic Diagram

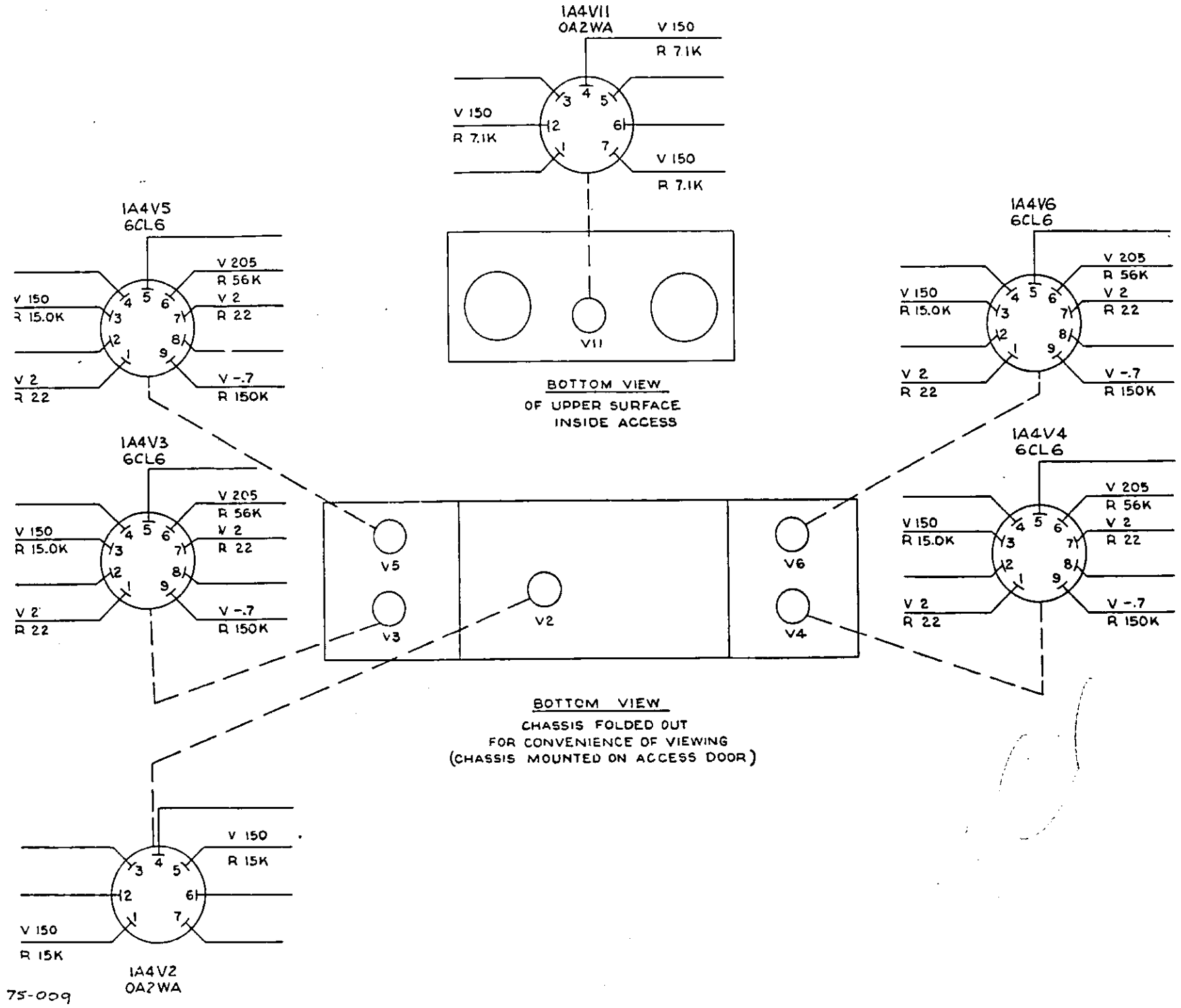


Figure 5-13. Input Stages in Amplifier Group OG-159/FPN-44A, Voltage and Resistance Measurements

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY FIELD CHANGE NO. 3

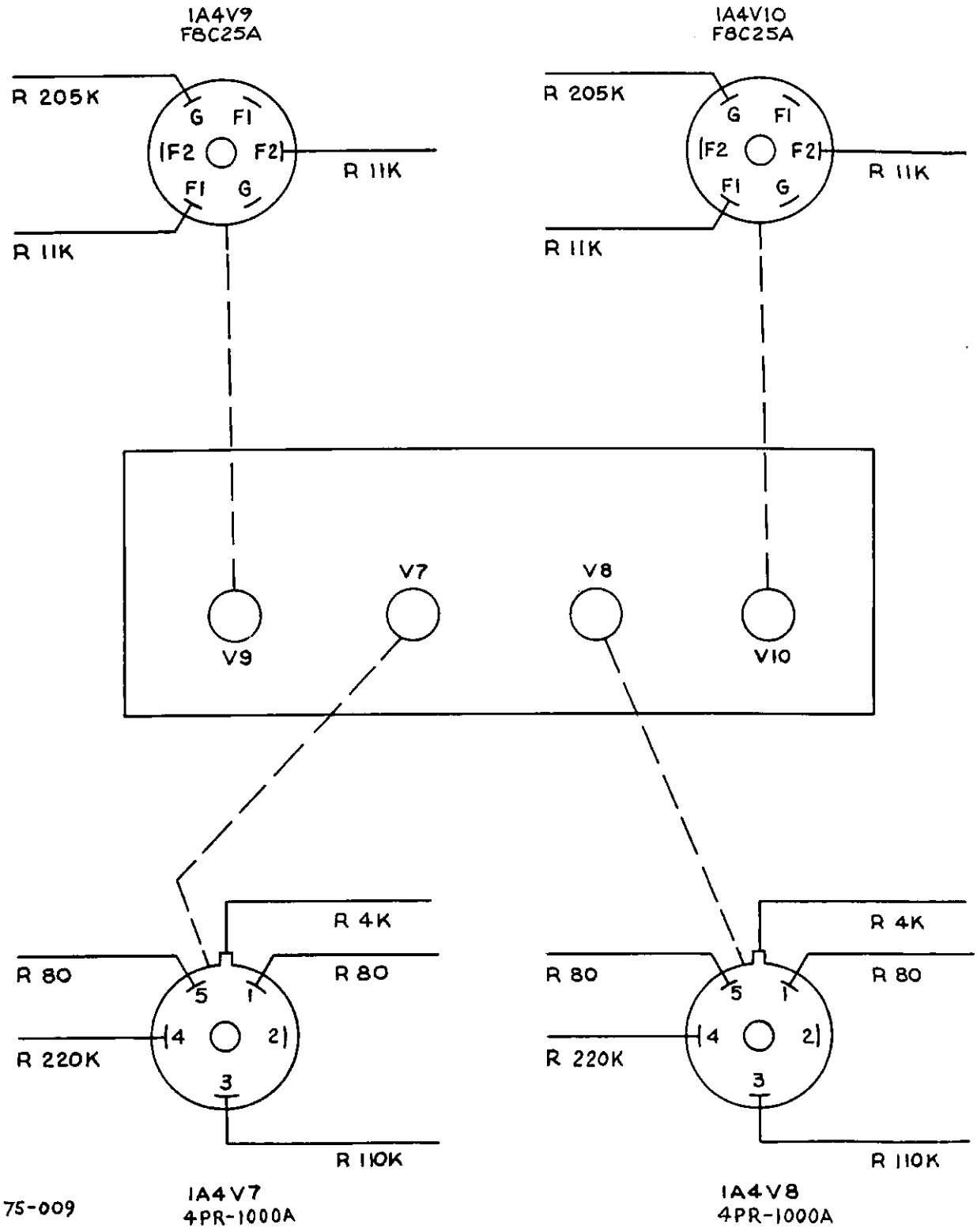


Figure 5-15. Output Stages in Amplifier Group OG-159/FPN-44A, Resistance Measurements

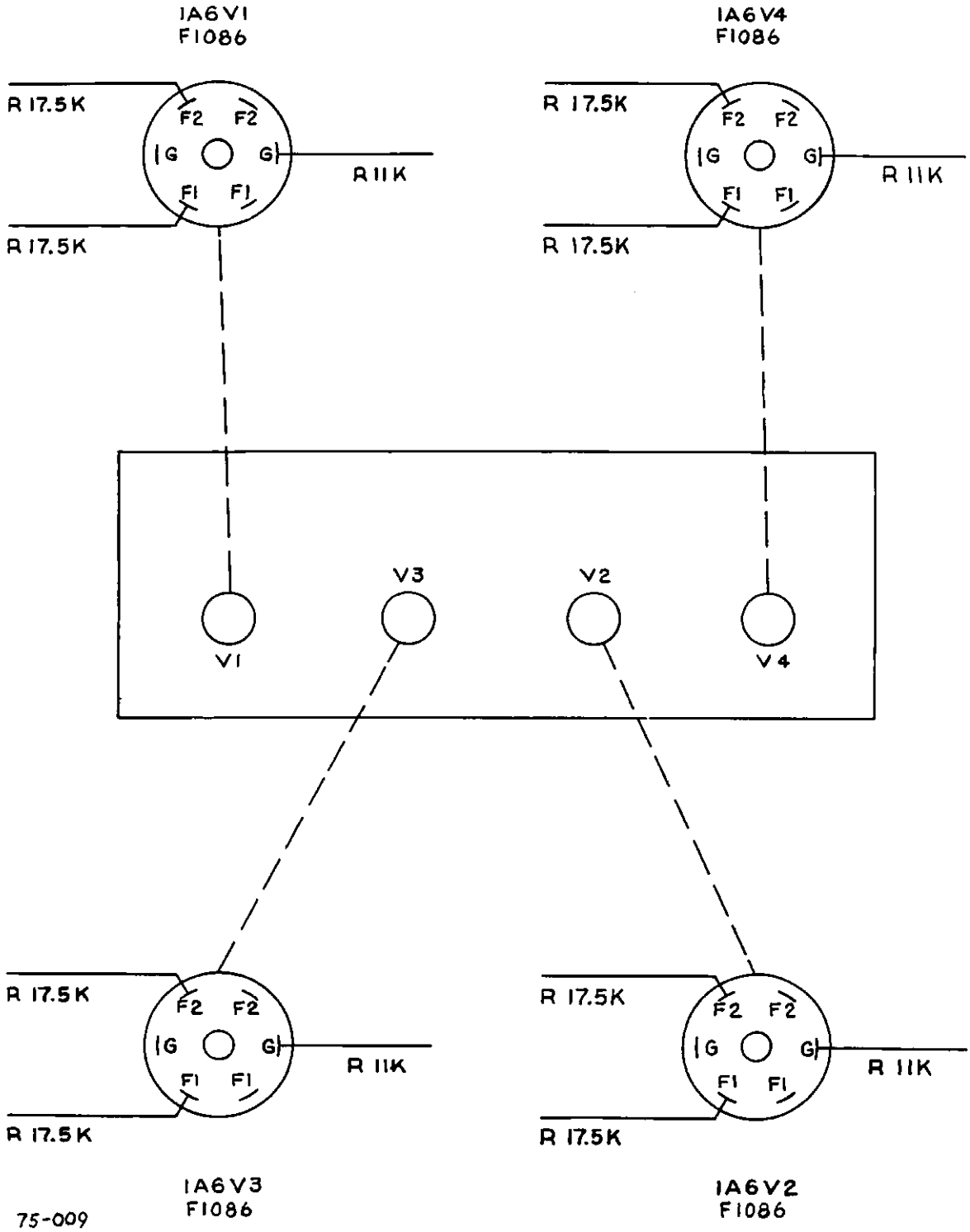


Figure 5-16. PA Tube Rack 1A6, Resistance Measurements

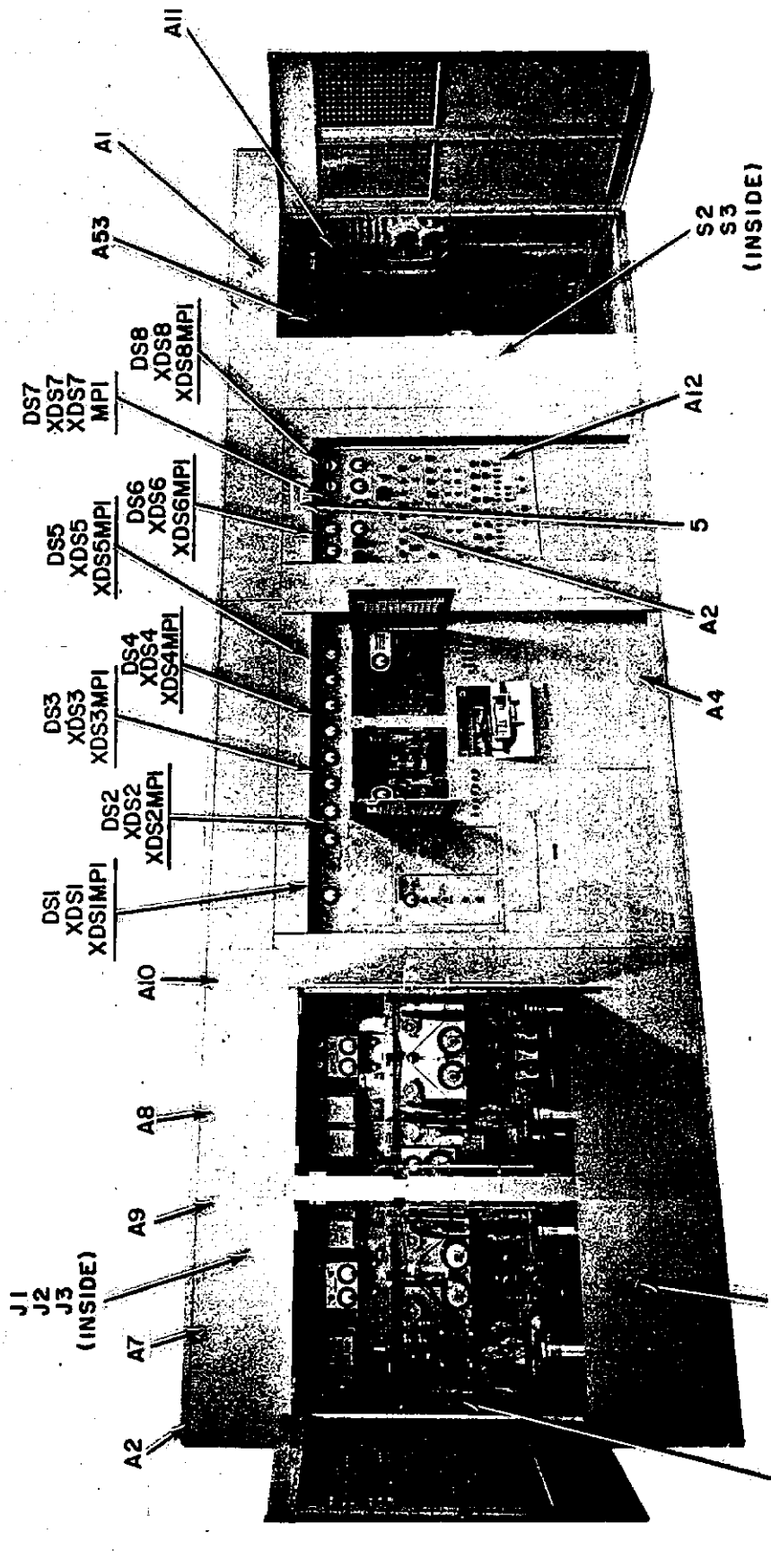
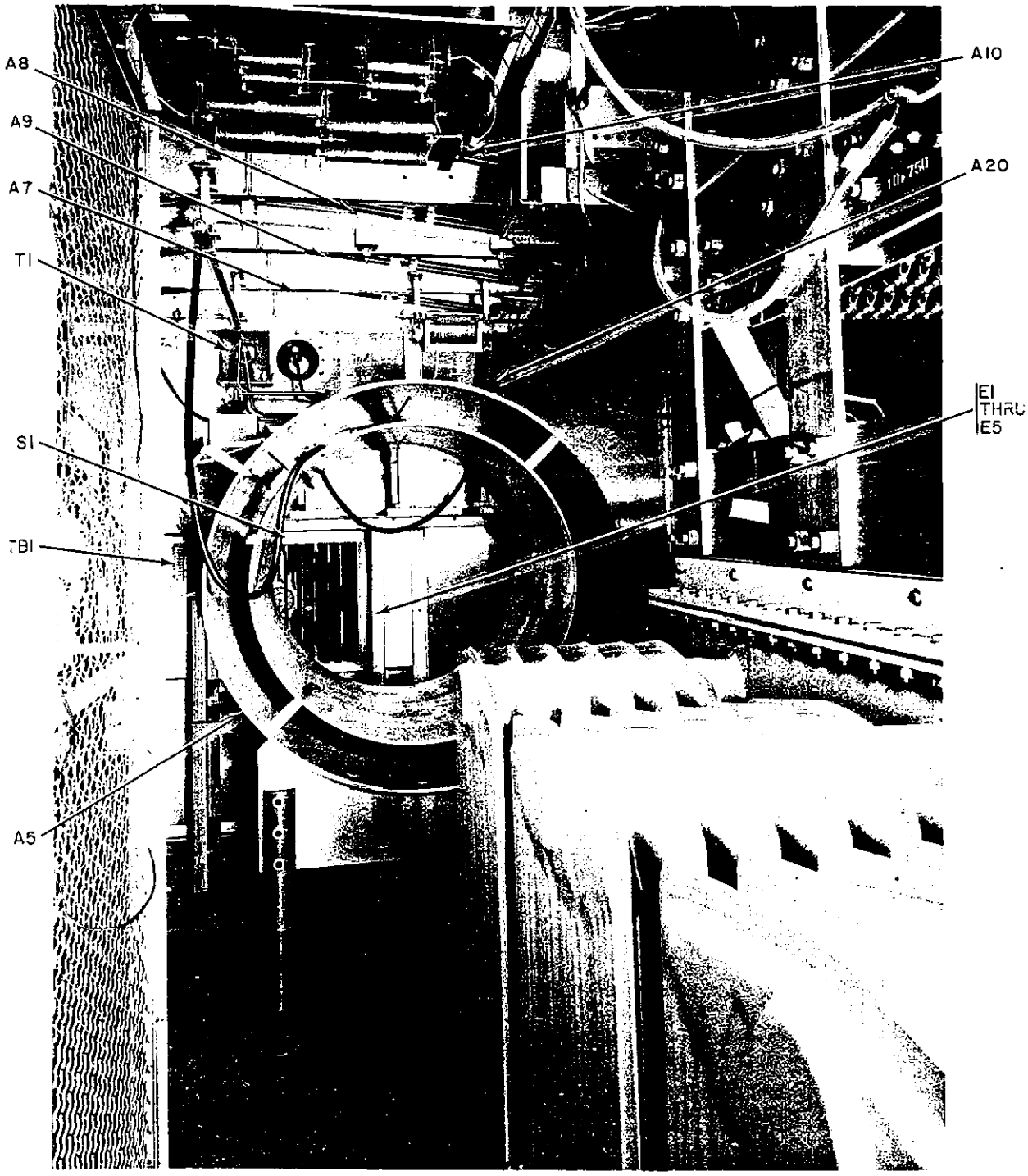


Figure 5-17. Transmitting Group OT-96/FPN-44A, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1
75-009-74150

Figure 5-18. Transmitting Group OT-96/FPN-44A, Inside Rear View, Parts Location Diagram

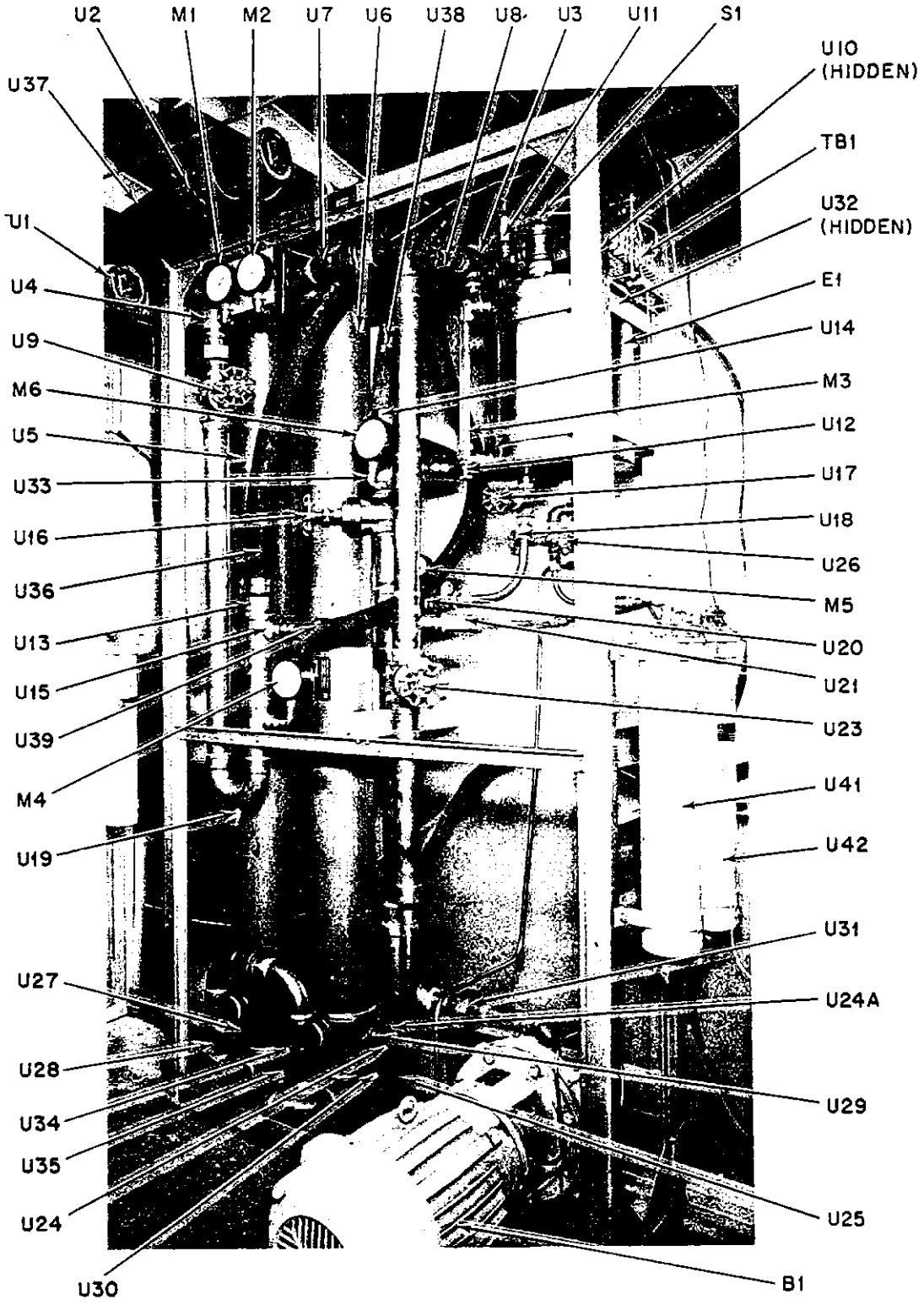


Figure 5-18A. Cooler Liquid Electron Tube HD-601/FPN, Parts Location Diagram

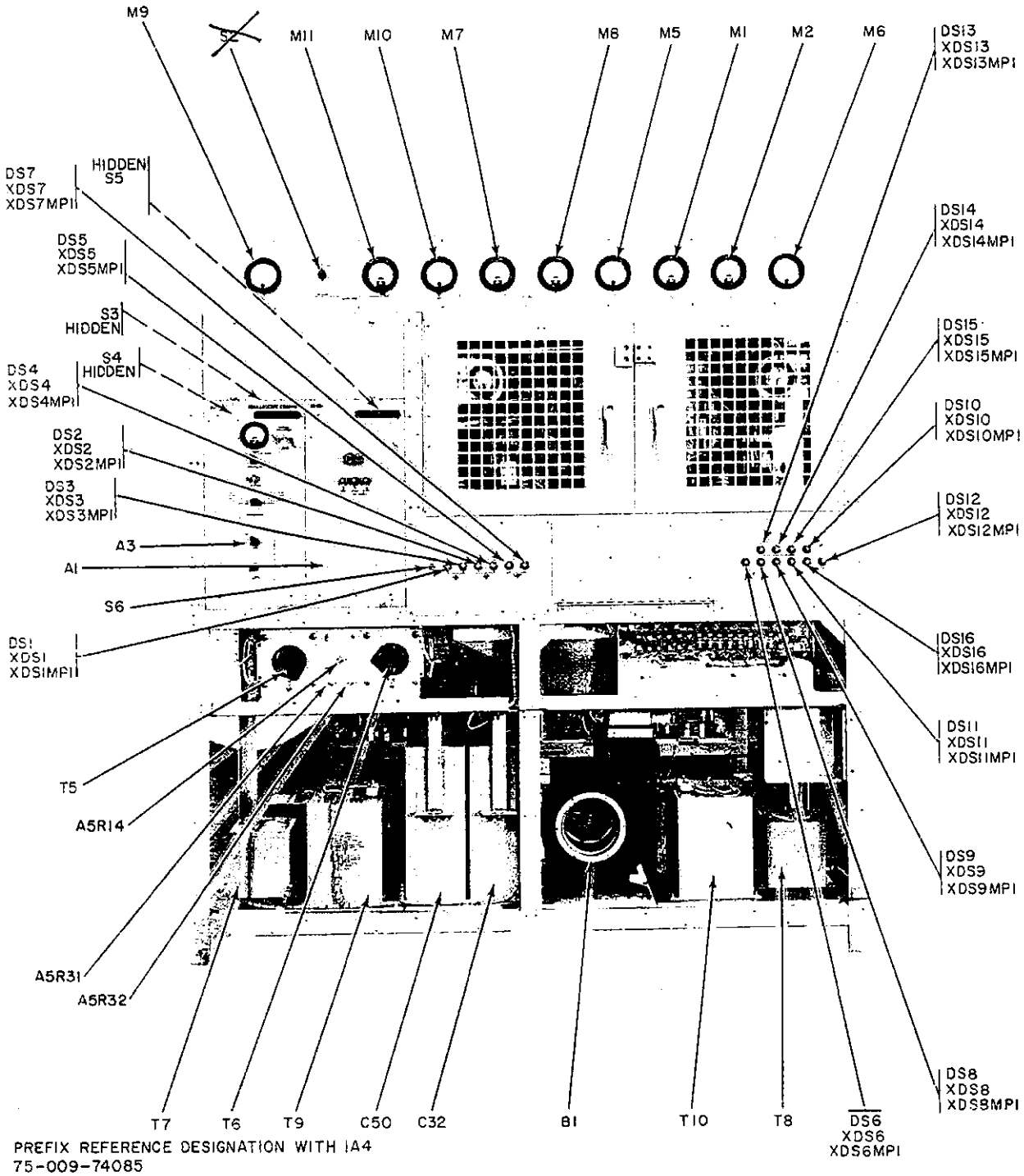


Figure 5-19. Amplifier Group OG-159/FPN-44A, Front View, Parts Location Diagram

F.C. NO. 9

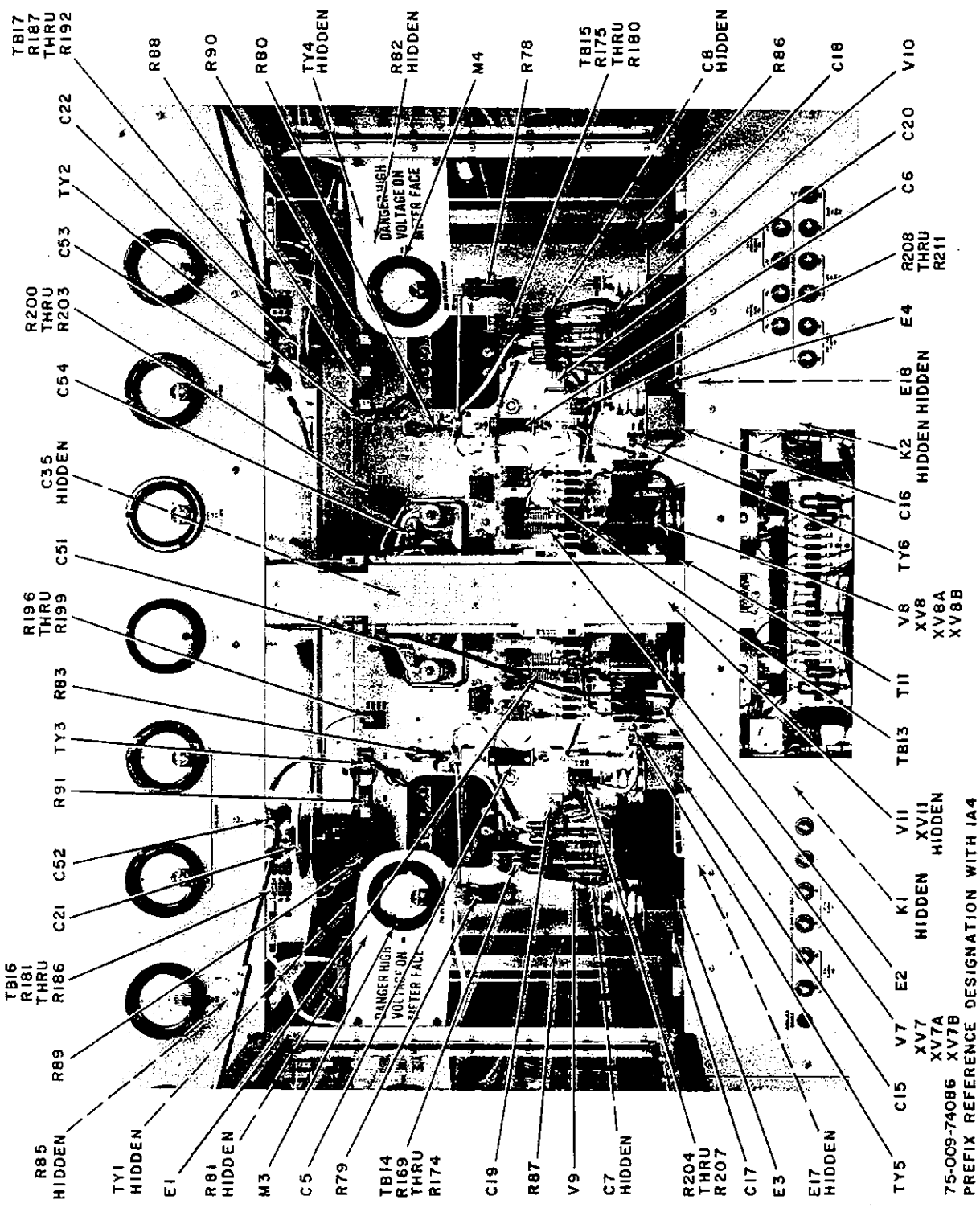


Figure 5-20. Amplifier Group OG-159/FPN-44A, Front View With Doors Open, Parts Location Diagram

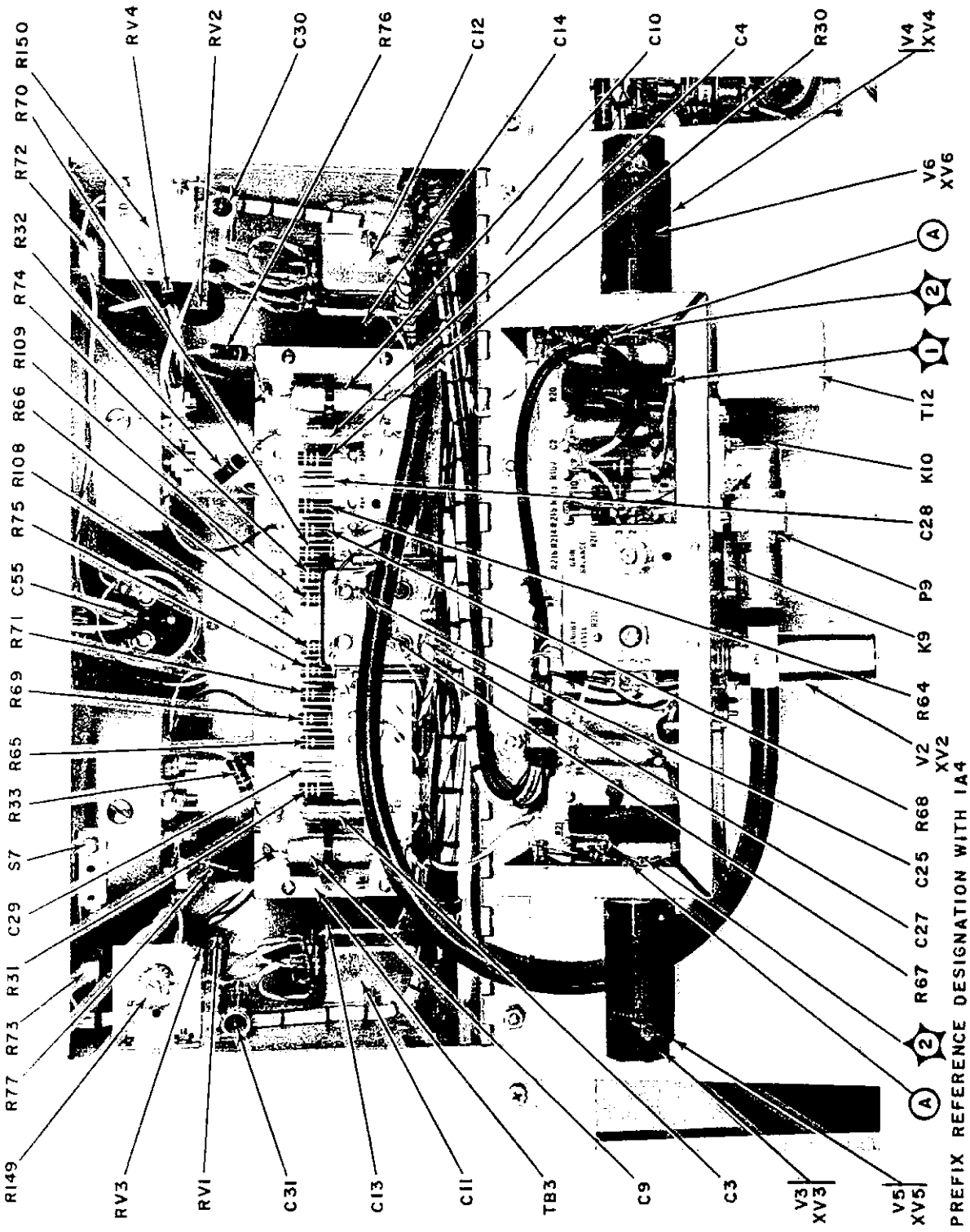


Figure 5-21. Amplifier Group OG-159/FPN-44A, Front Panel Open, Parts Location Diagram

NOTE NOT CORRECTED TO INDICATE CHANGES MADE BY F. C. NO. 3

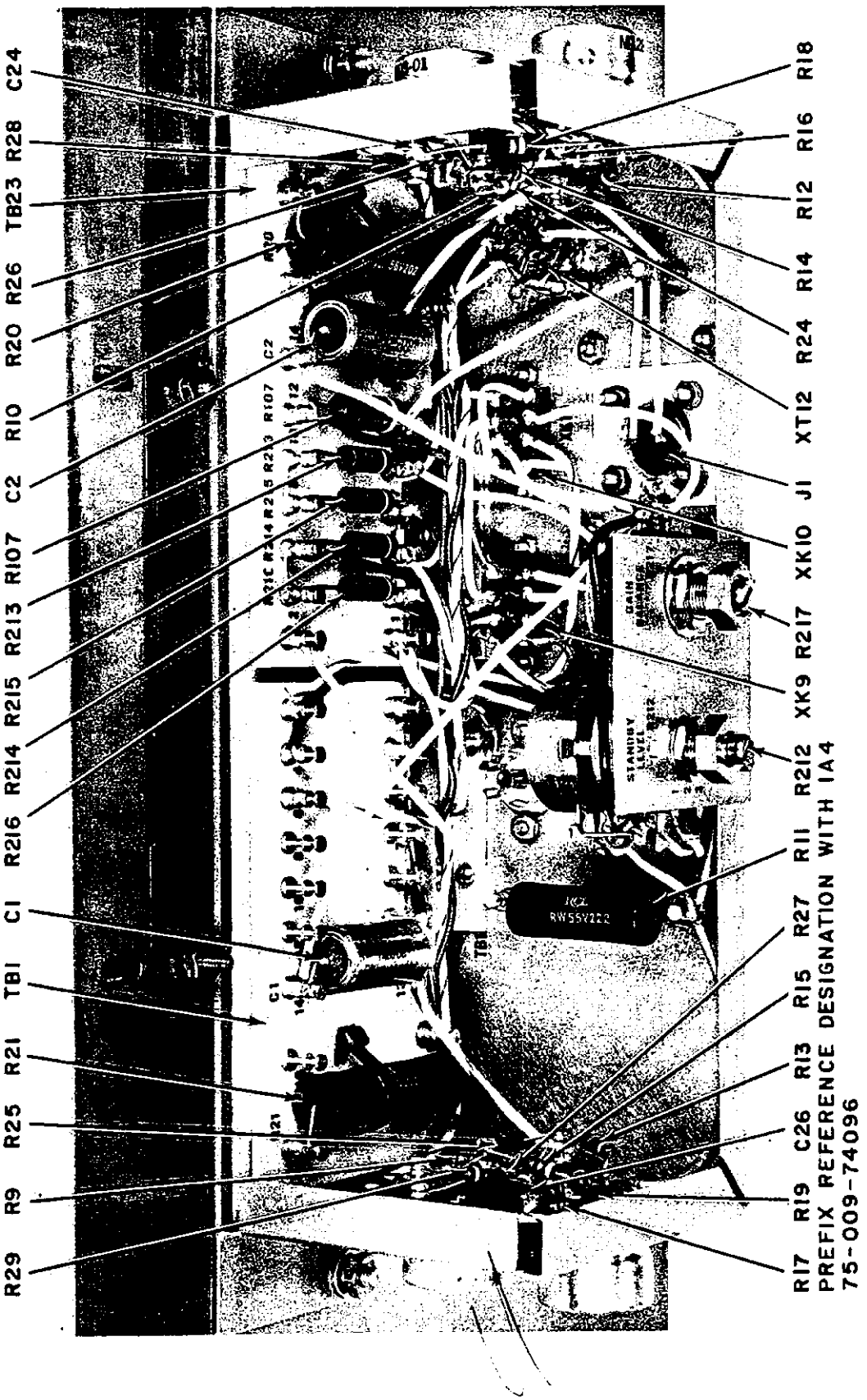


Figure 5-22. Amplifier Group OG-159/FPN-44A, Top View Panel Open, Parts Location Diagram

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY F.C. NO.3

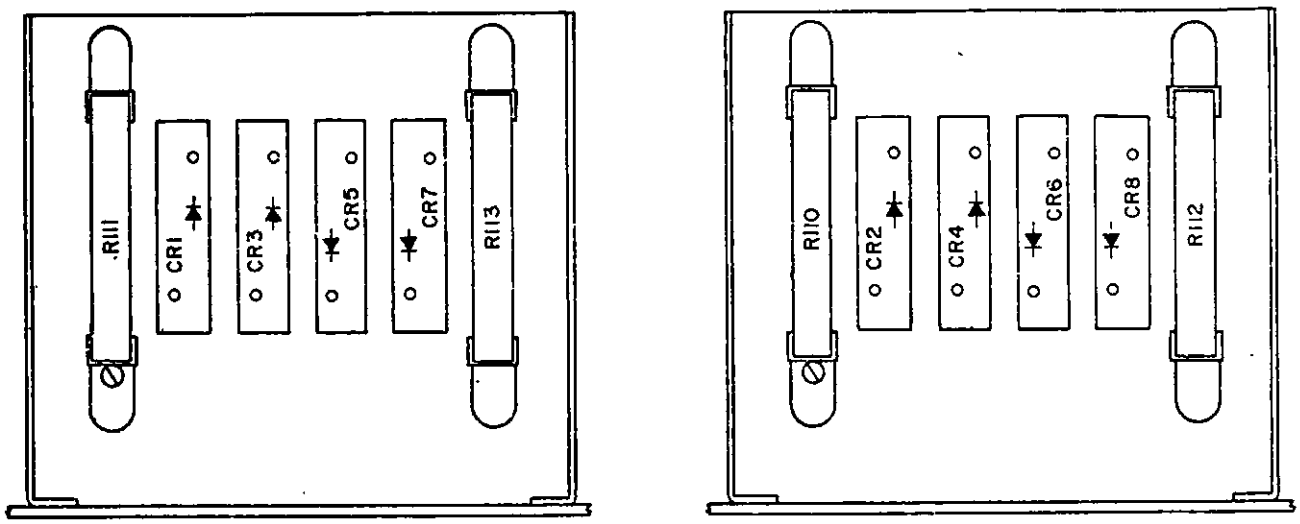


Figure 5-23. Amplifier Group OG-159/FPN-44A, Part of Lower Shelf, Parts Location Diagram

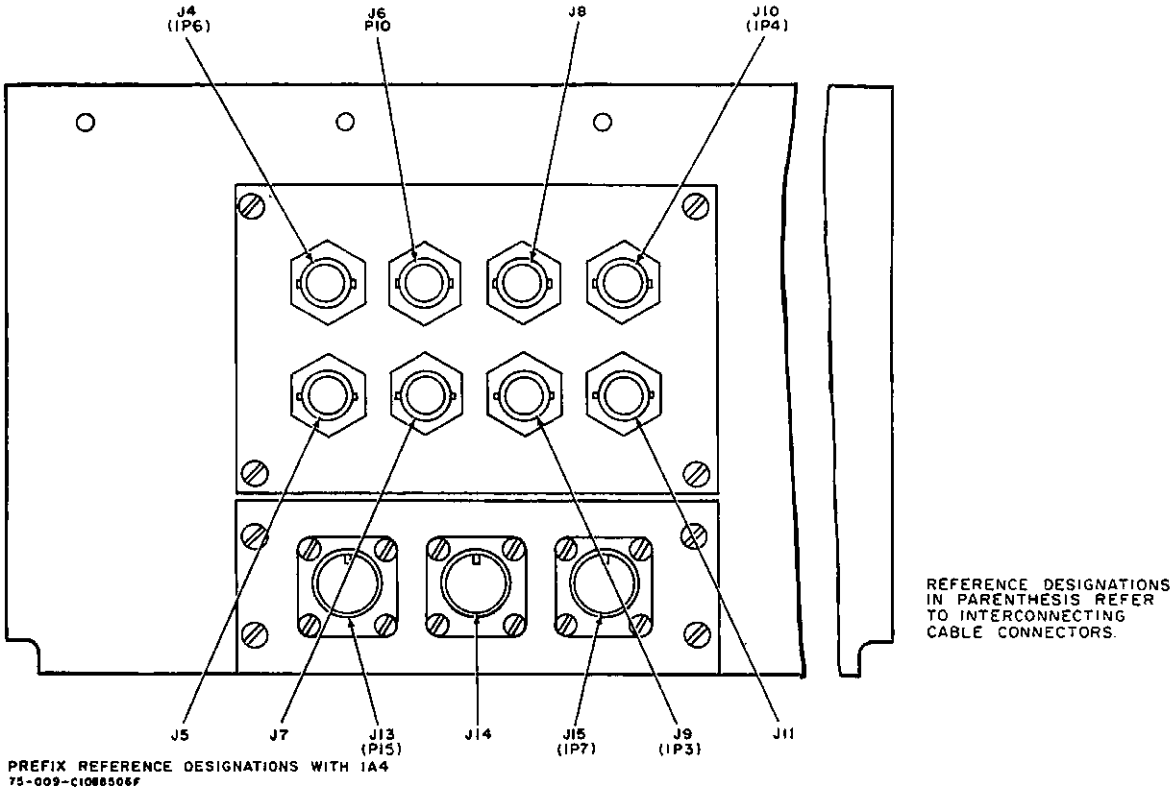
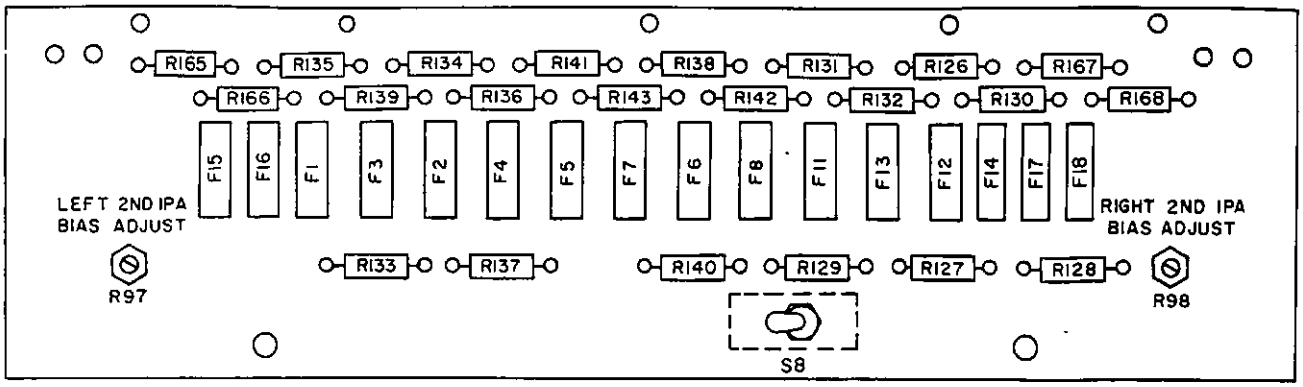


Figure 5-24. Amplifier Group OG-159/FPN-44A, Connector and Jack Assembly, Parts Location Diagram

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY F. C. NO. 3



NOTE:
REFERENCE DESIGNATIONS ARE ABBREVIATED.
PREFIX REFERENCE DESIGNATIONS WITH 1A4.

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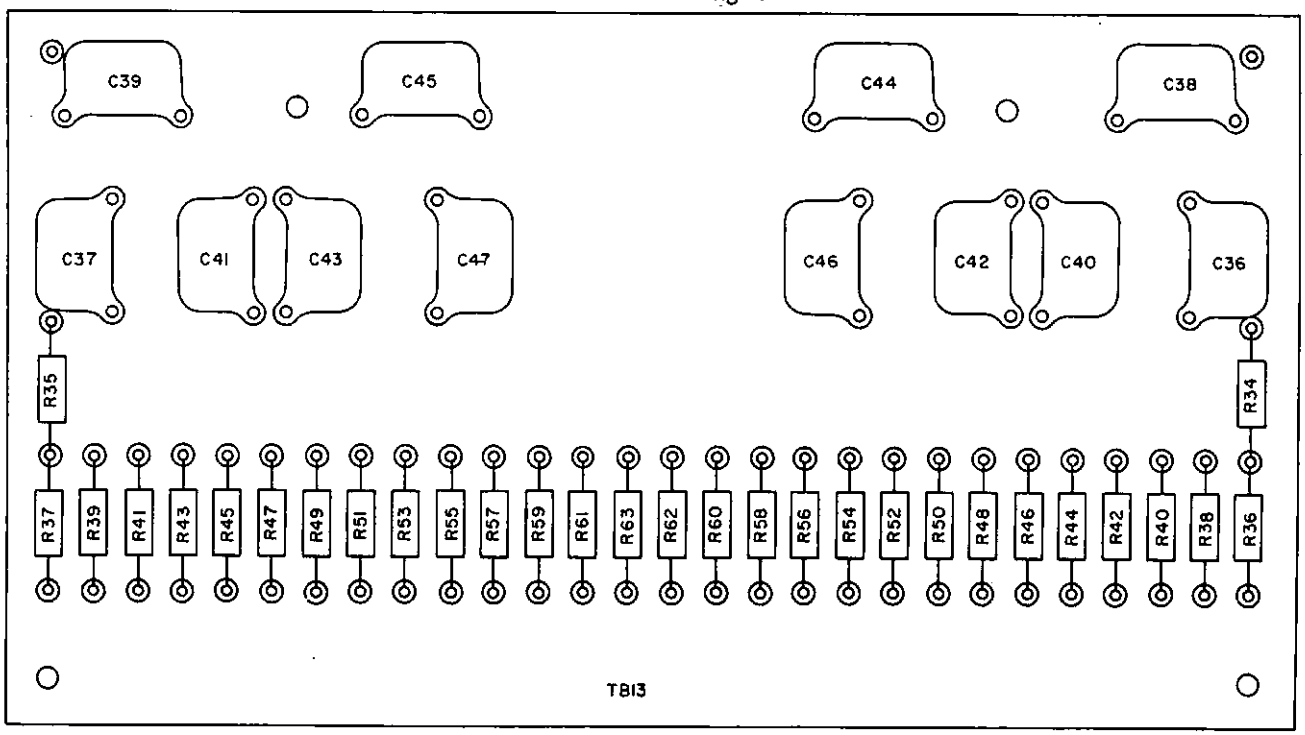
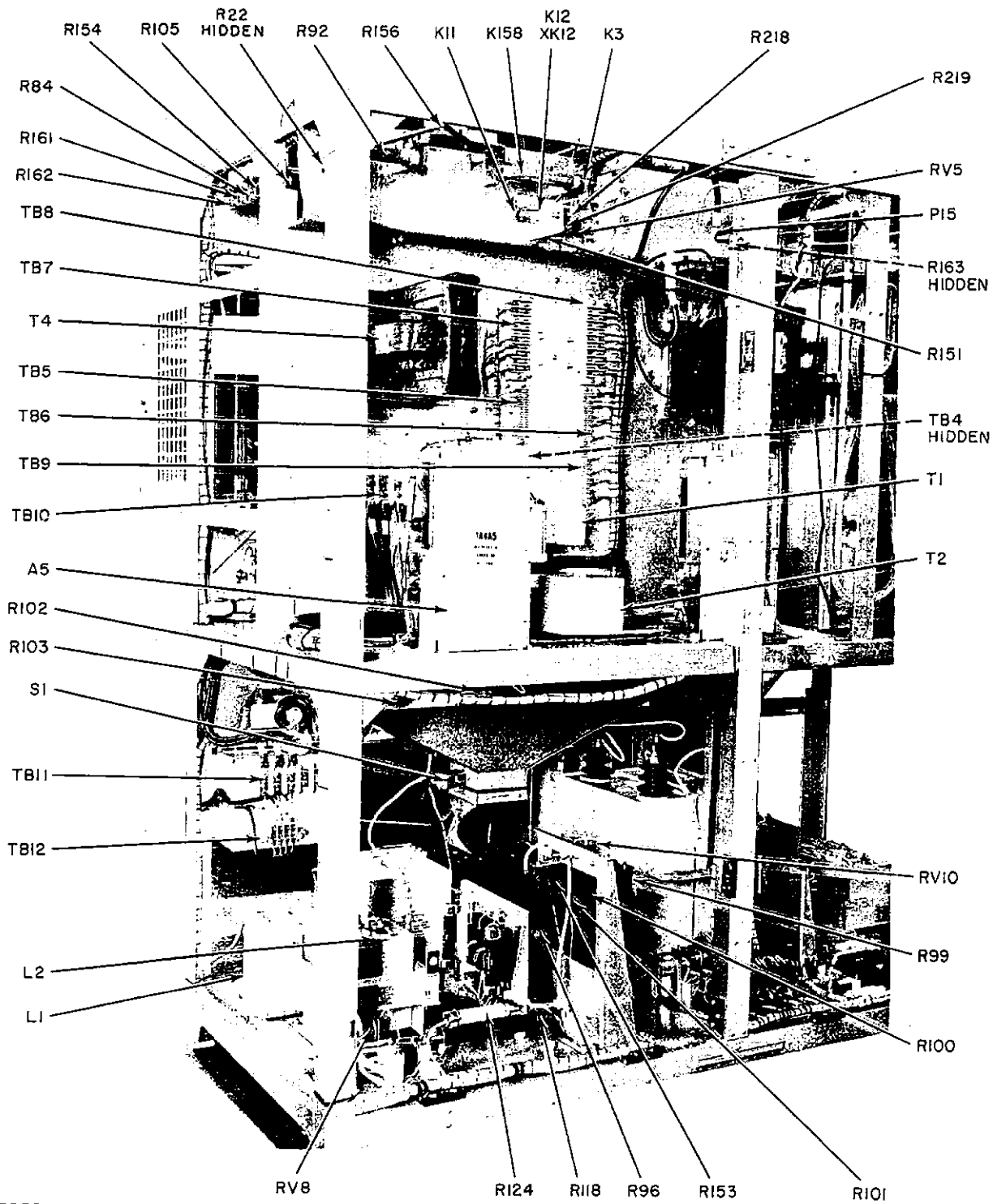
Figure 5-25. Amplifier Group OG-159/FPN-44A, Front Panel, Parts Location Diagram



NOTE:
REFERENCE DESIGNATIONS ARE ABBREVIATED.
PREFIX REFERENCE DESIGNATIONS WITH 1A4

75-009

Figure 5-26. Amplifier Group OG-159/FPN-44A, Terminal Board, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A4
75-009-74075

Figure 5-27. Amplifier Group OG-159/FPN-44A, Left Rear View, Parts Location Diagram

F.C. NO 6 NOTE: K-11, K-12, XK-12, R218, & R219 REMOVED BY F.C. NO 6

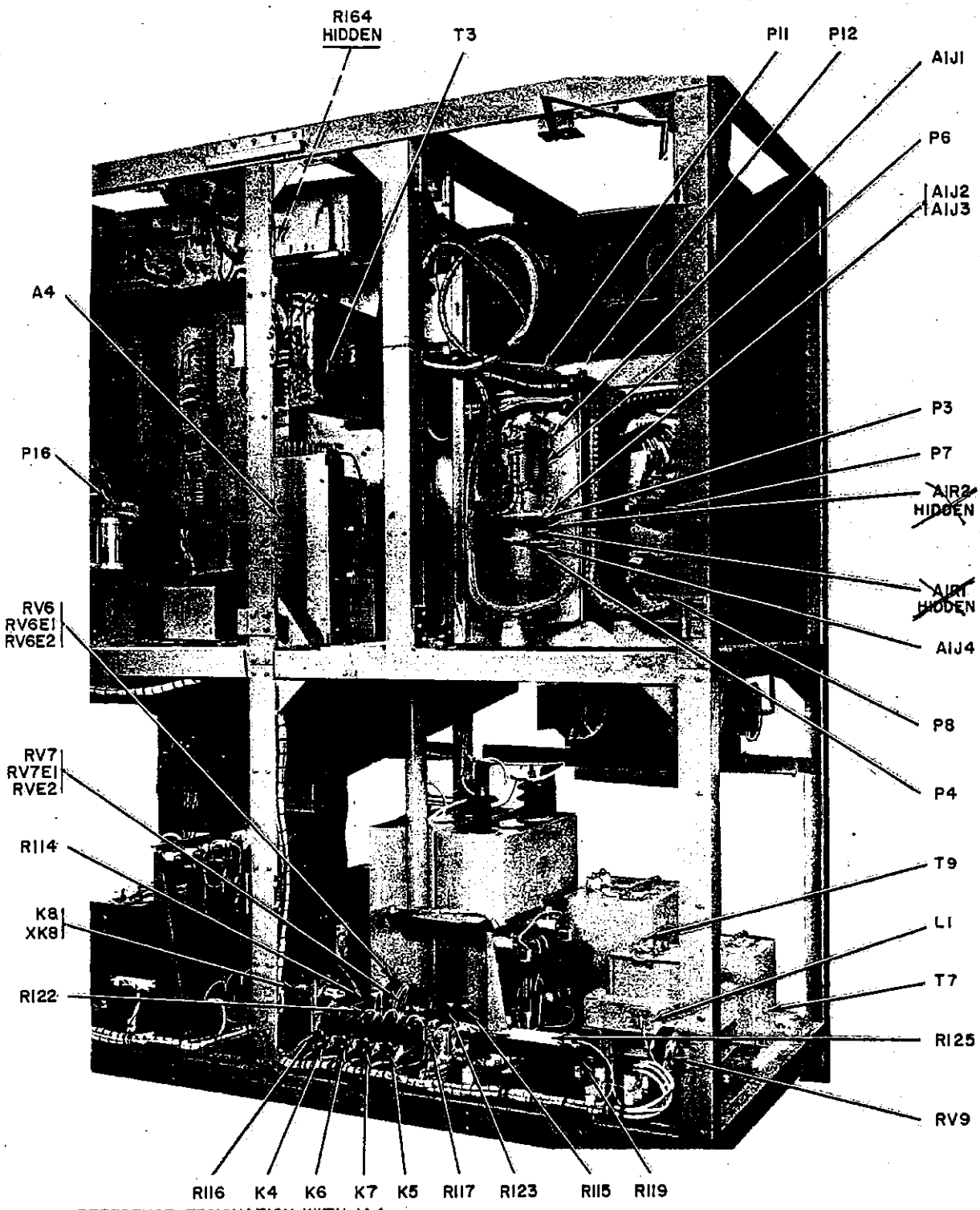


Figure 5-28. Amplifier Group OG-159/FPN-44A, Right Rear View, Parts Location Diagram

~~ORIGINAL~~
F.C. No. 9

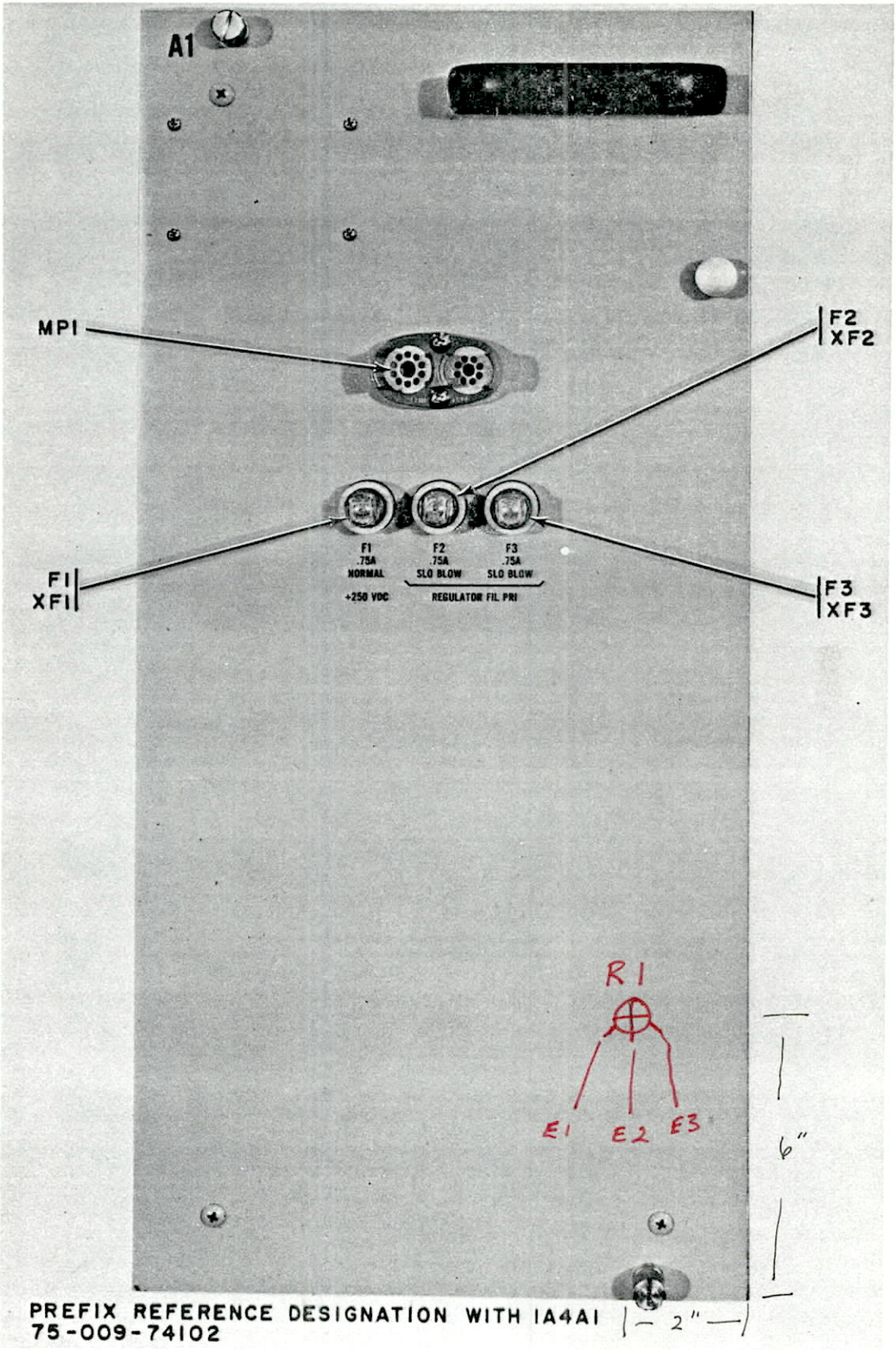


Figure 5-29. Power Supply PP-7304/FPN-44A, Front View, Parts Location Diagram

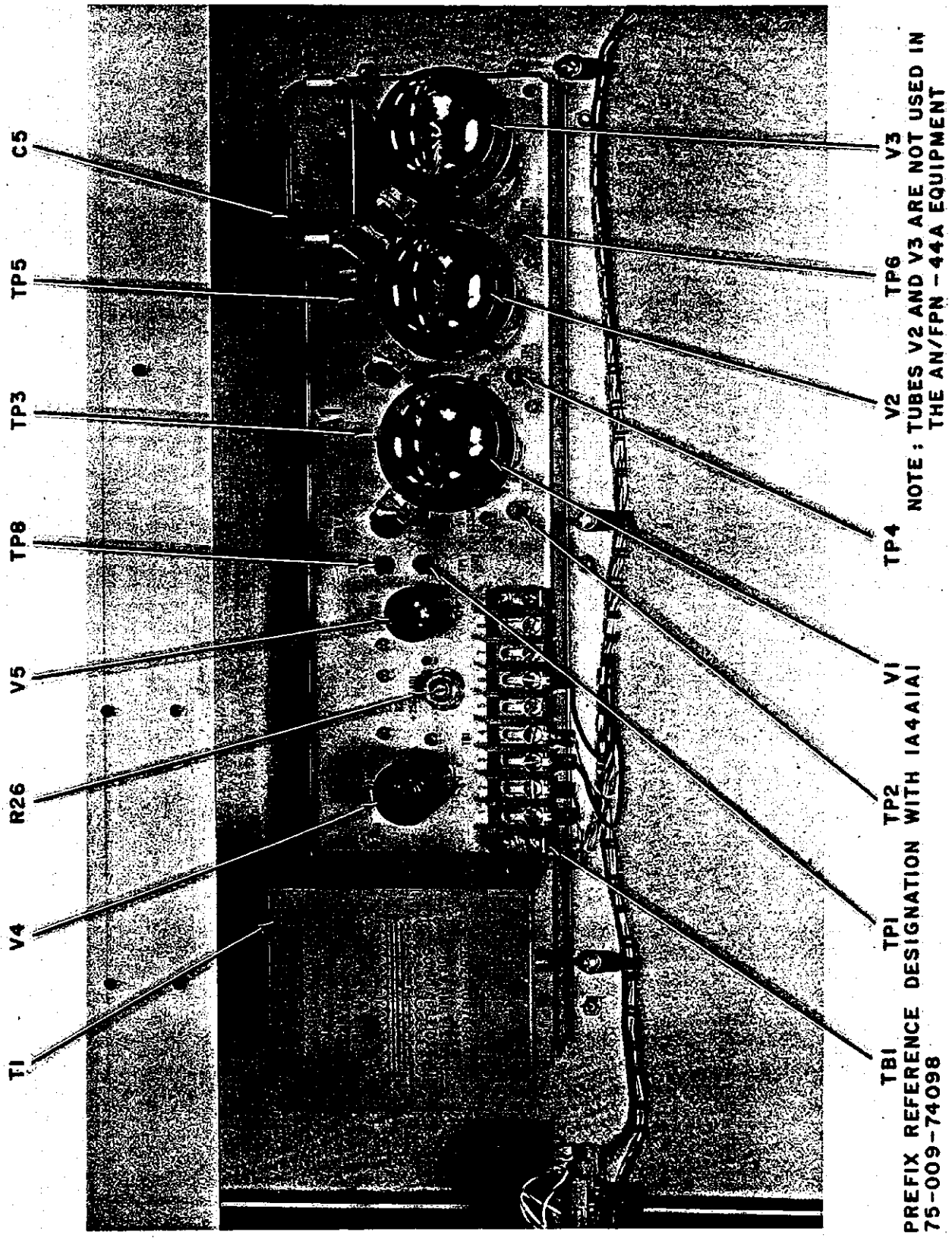


Figure 5-30. +250V Regulator Voltage, Top View, Parts Location Diagram

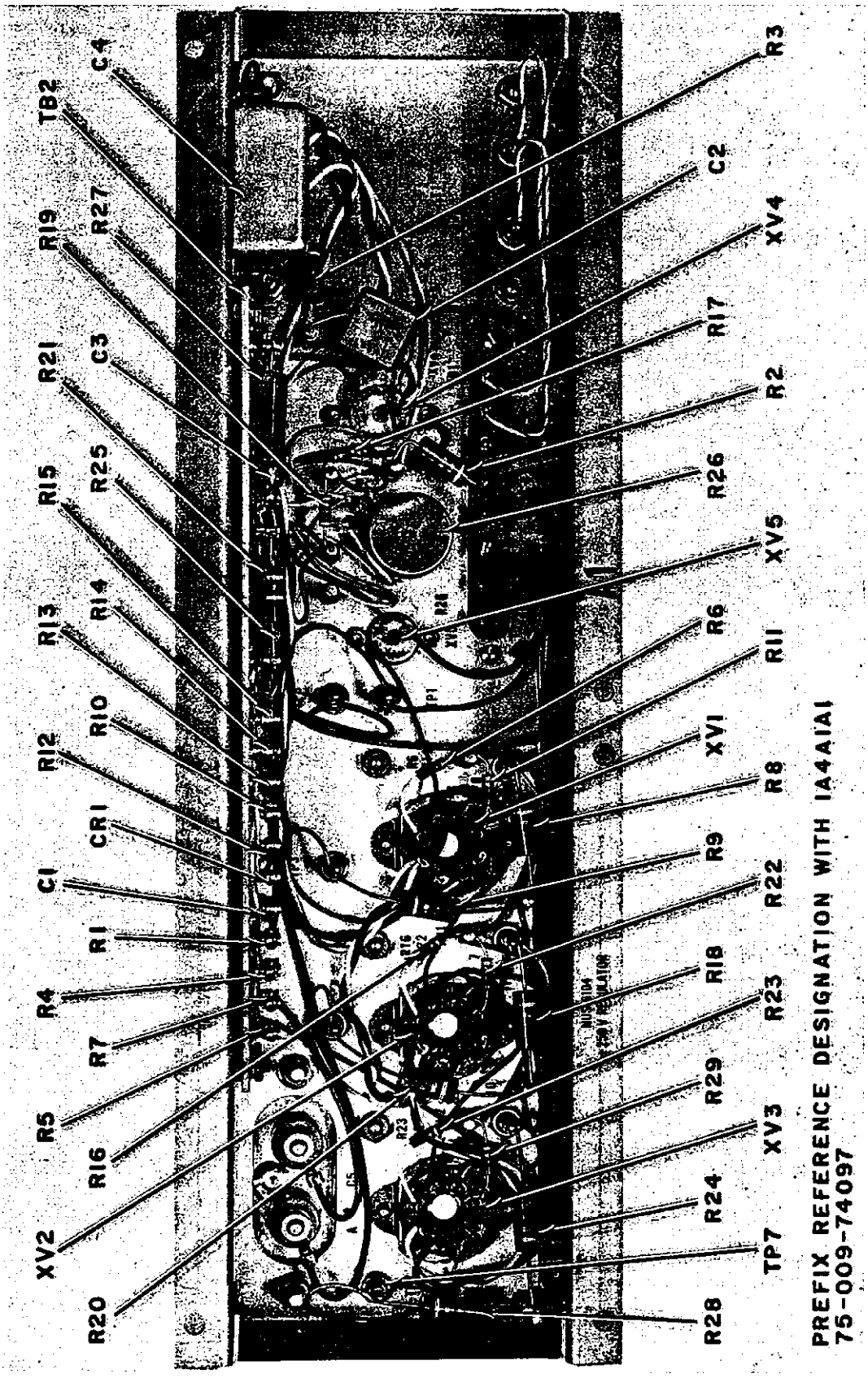


Figure 5-31. +250V Regulator Voltage, Bottom View, Parts Location Diagram

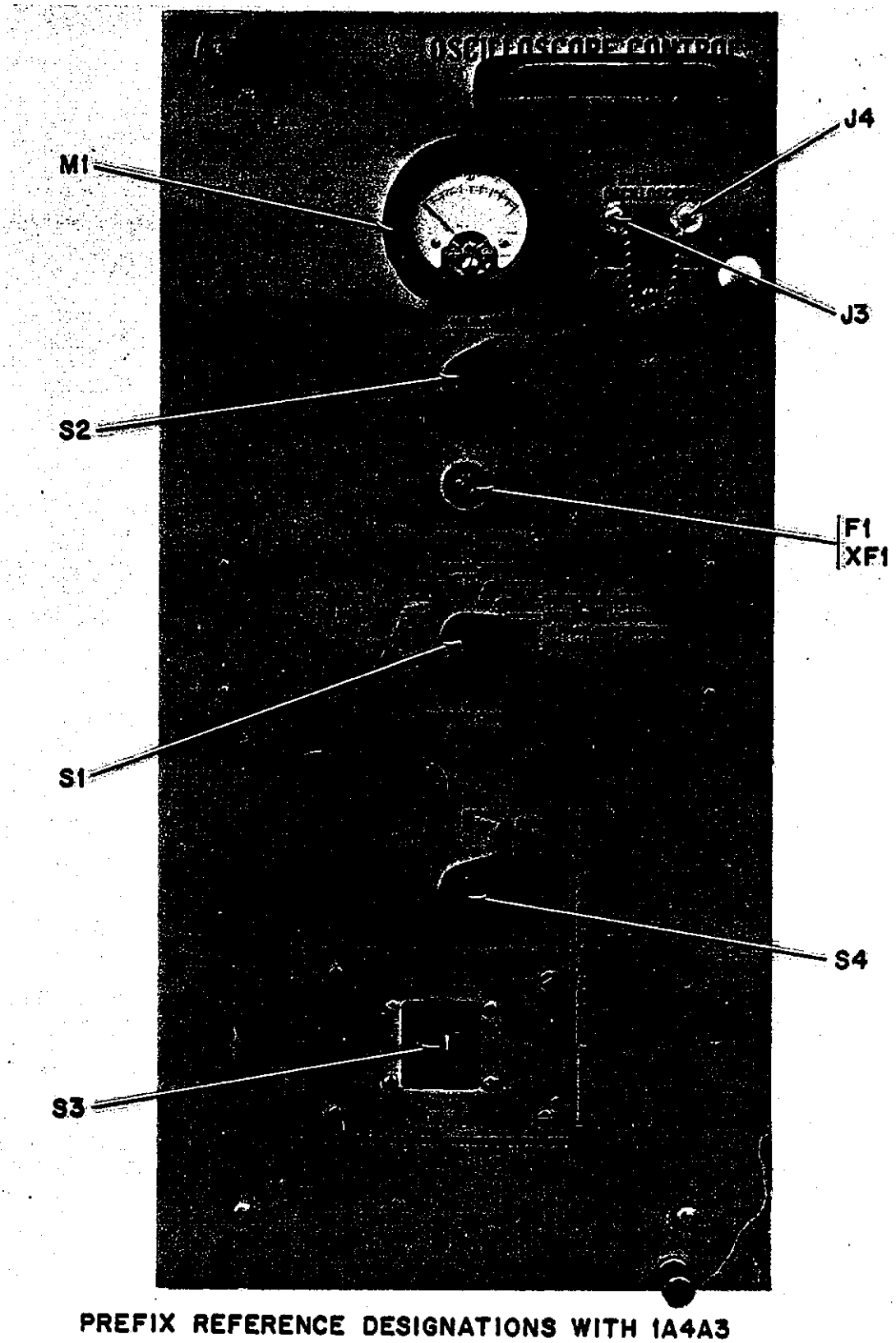


Figure 5-32. Control Oscilloscope C-4558A/FPN-44A, Front View, Parts Location Diagram

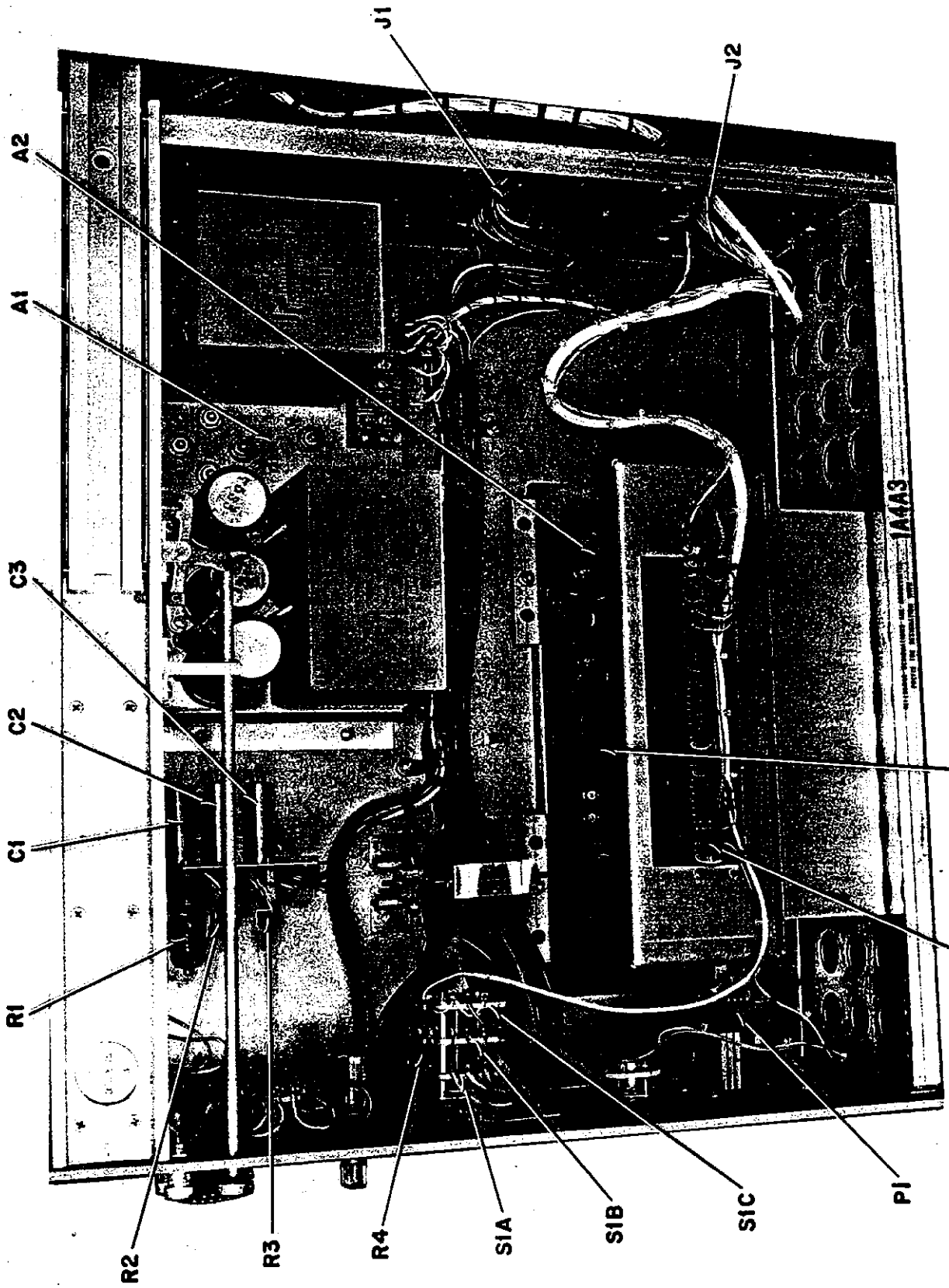


Figure 5-33. Control Oscilloscope C-4558A/FPN-44A, Right Side View, Parts Location Diagram

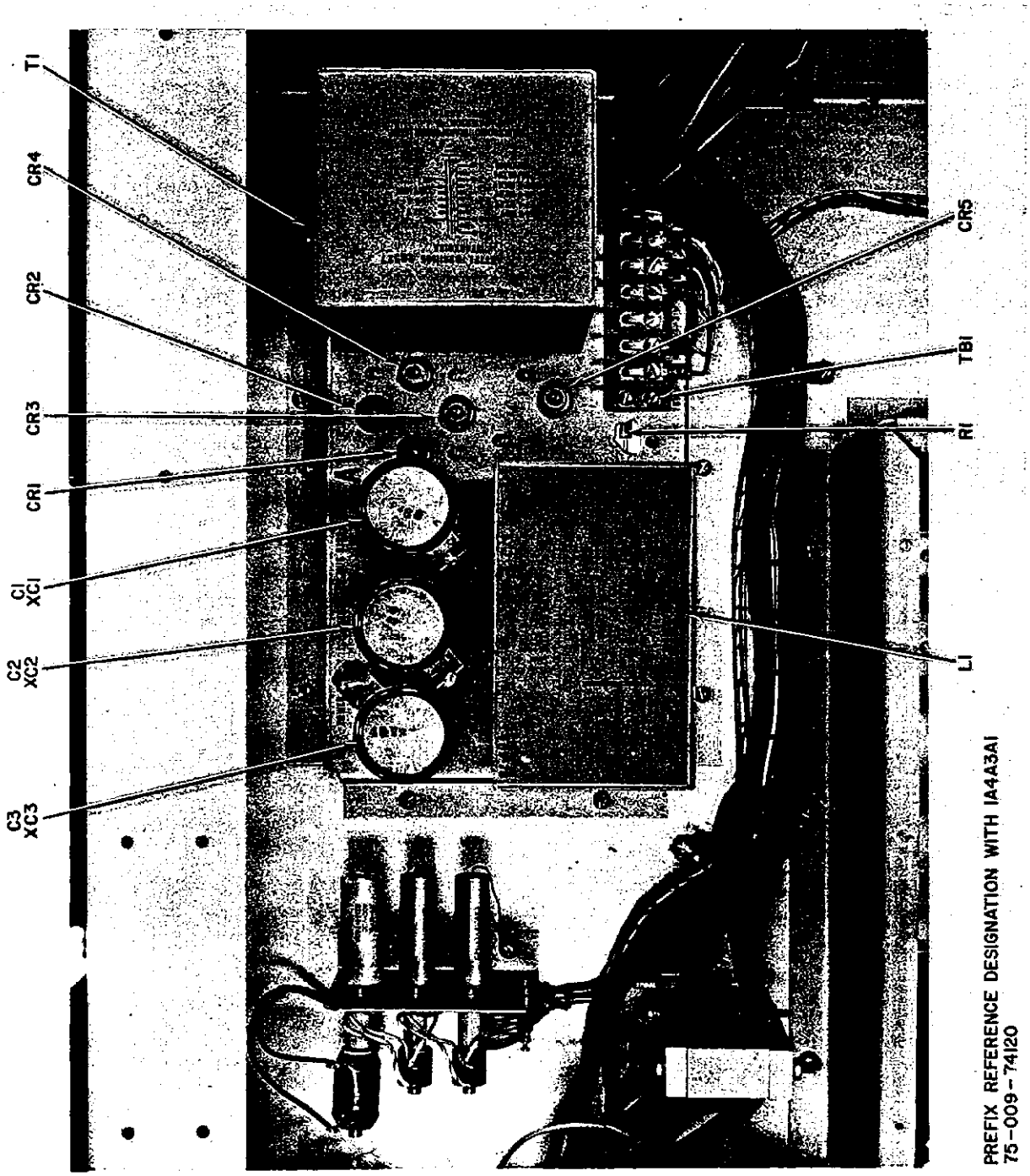
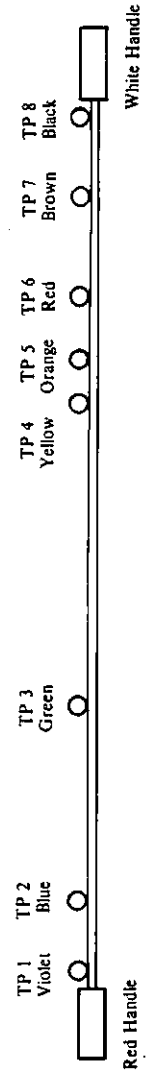


Figure 5-34. Power Supply, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A4A3A2

Figure 5-35. Trigger Selector, Edge View, Test Point Location Diagram

All data on page 5-68 deleted.

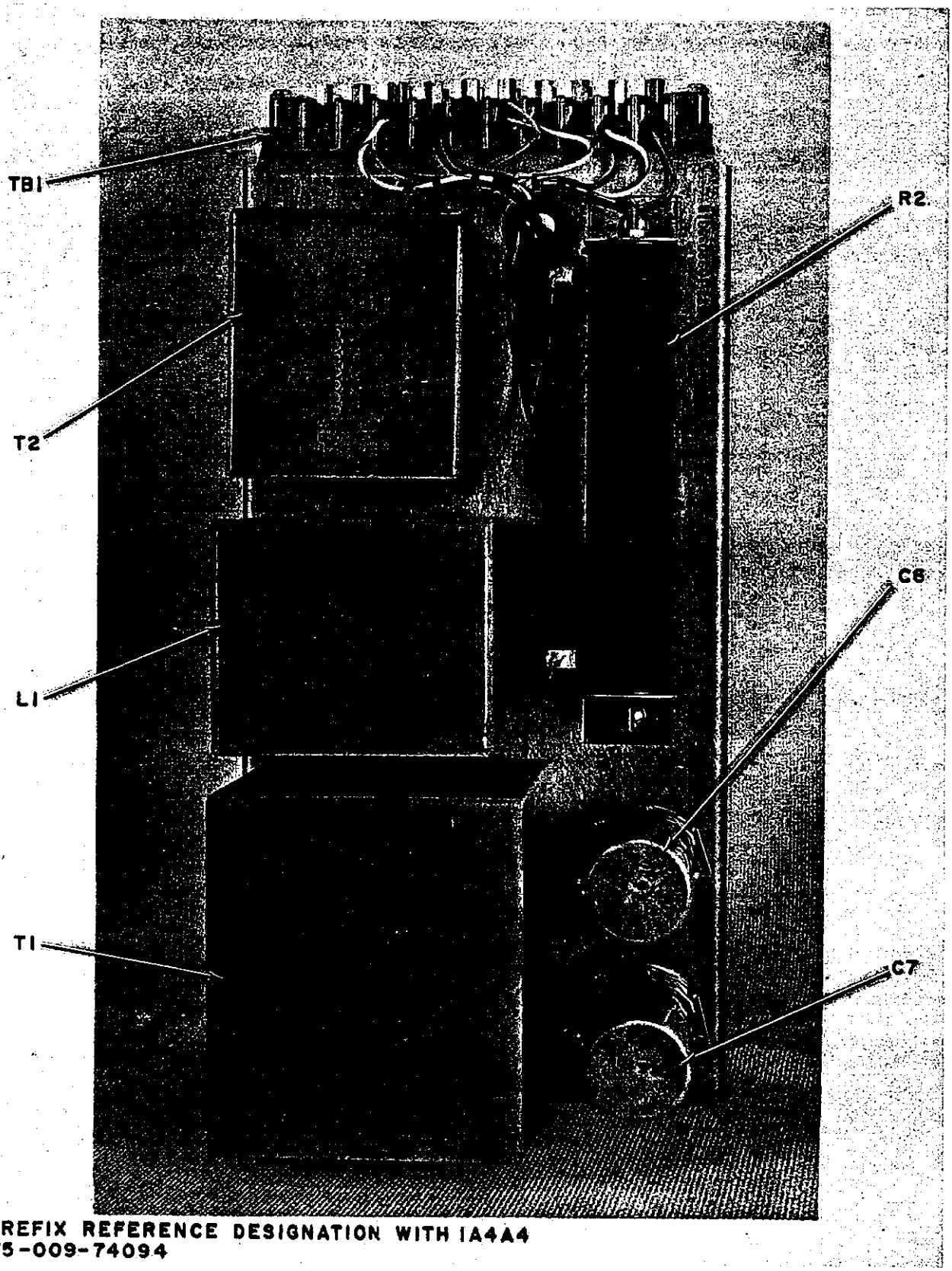
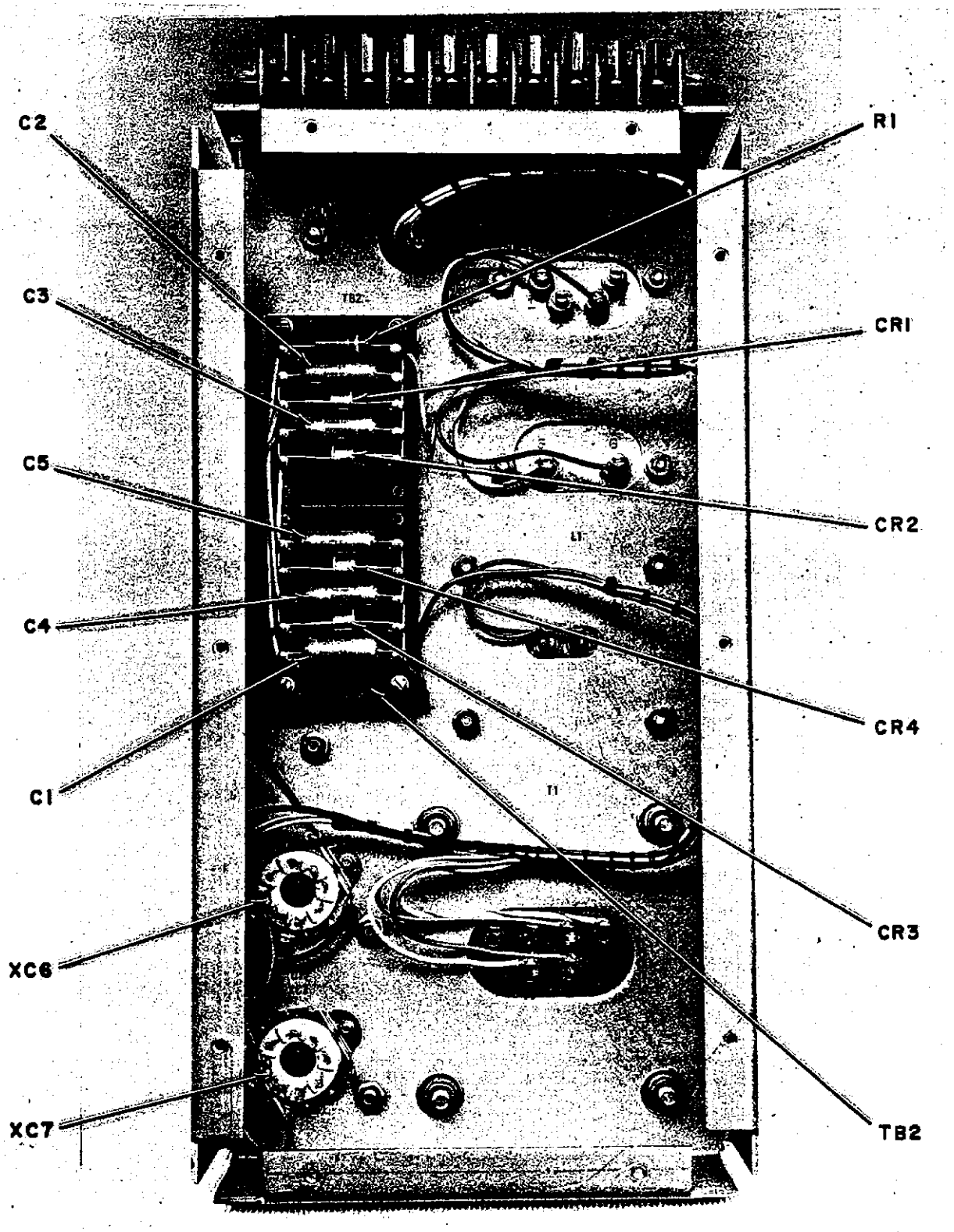


Figure 5-37. Bias Pedestal Power Supply, Top View, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A4A4
75-009-74095

Figure 5-38. Bias Pedestal Power Supply, Bottom View, Parts Location Diagram

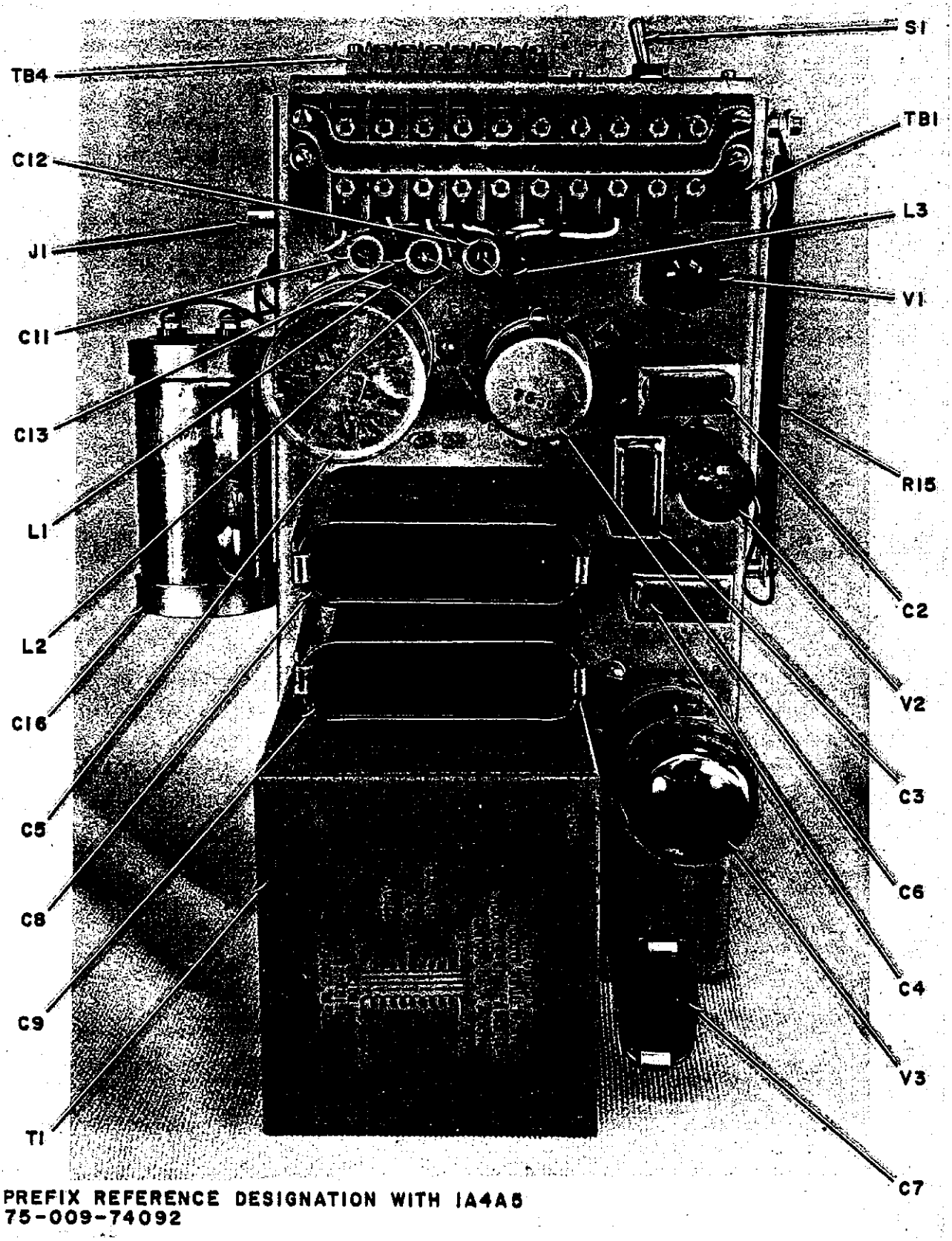


Figure 5-39. Generator Bias Pedestal, Top View, Parts Location Diagram

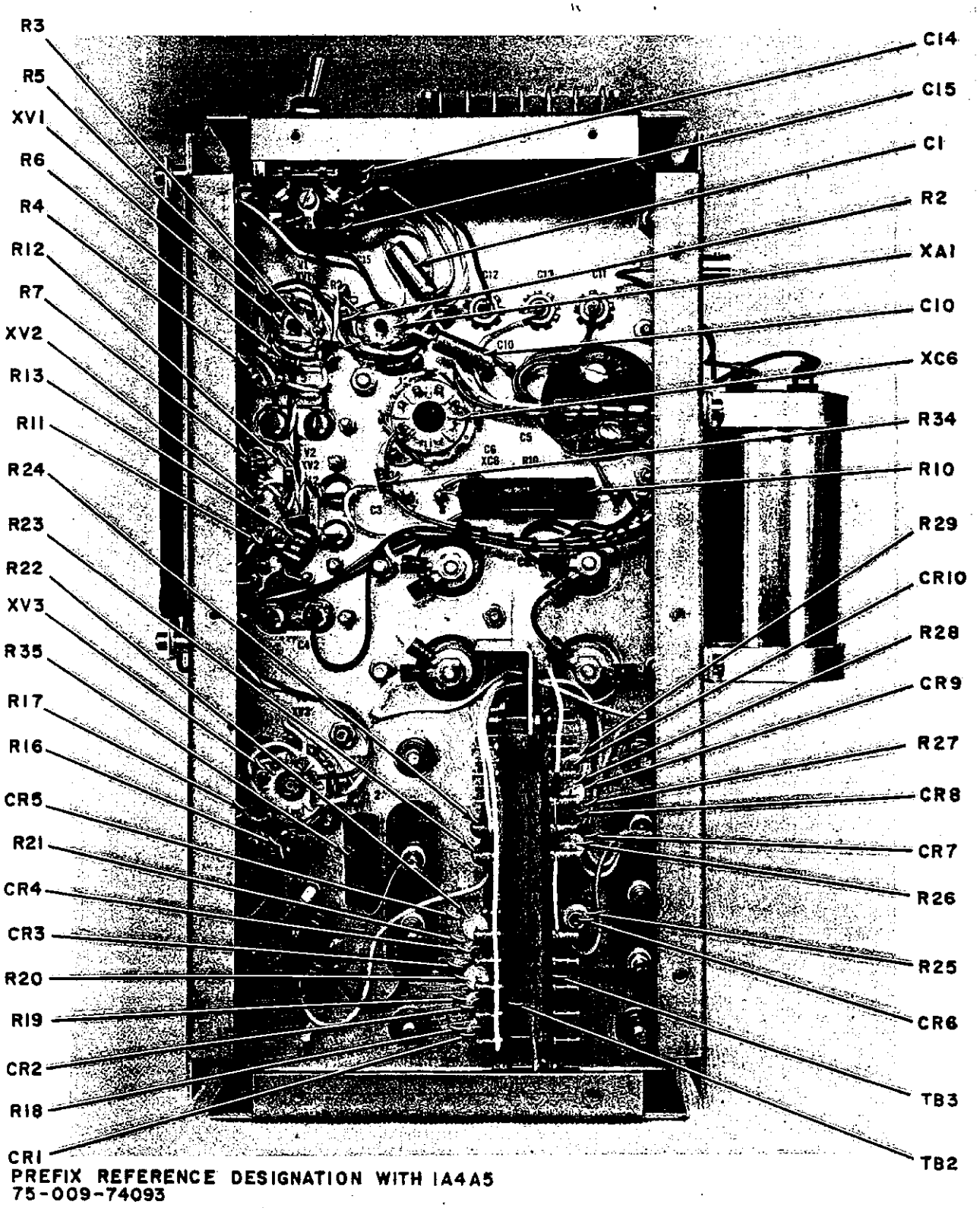
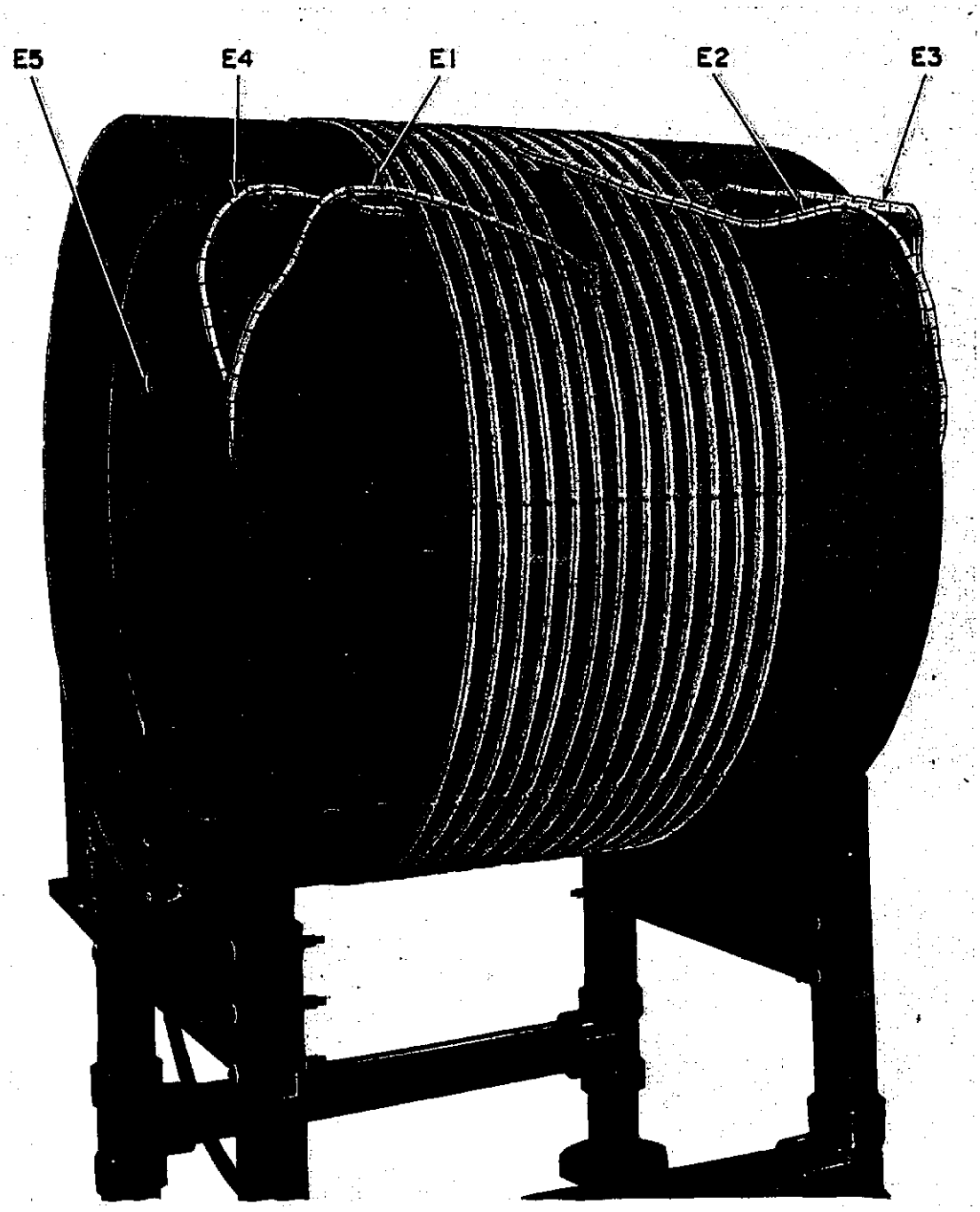


Figure 5-40. Generator Bias Pedestal, Bottom View, Parts Location Diagram

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY F.C. NO. 3



PREFIX REFERENCE DESIGNATION WITH 1A5
75-009-74585

Figure 5-41. Power Amplifier Tank Coil, Parts Location Diagram

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY F. C. NO 3

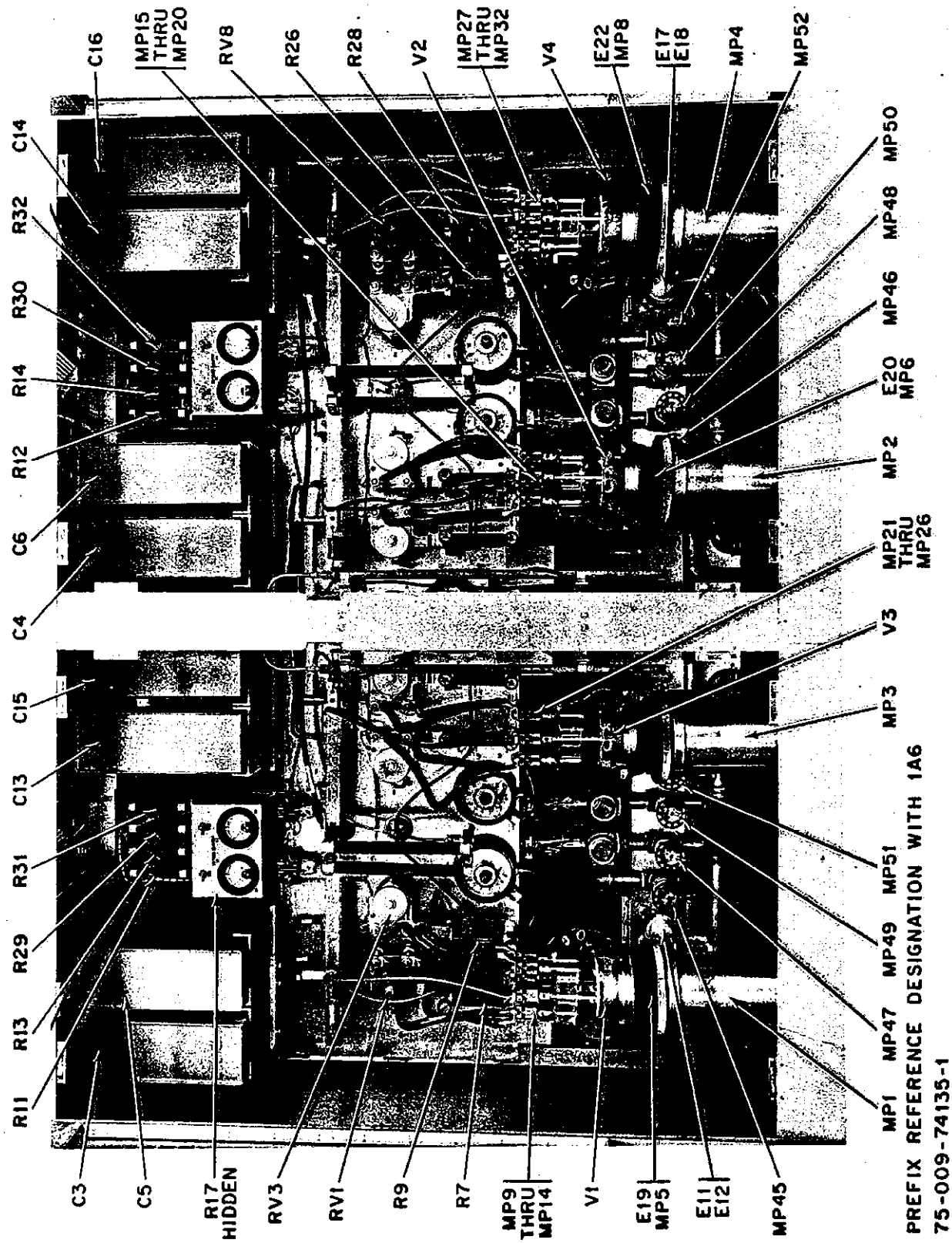


Figure 5-42. Amplifier Radio Frequency AM-3774 FPN-44, Front View Doors Open, Parts Location Diagram (Sheet 1 of 2)

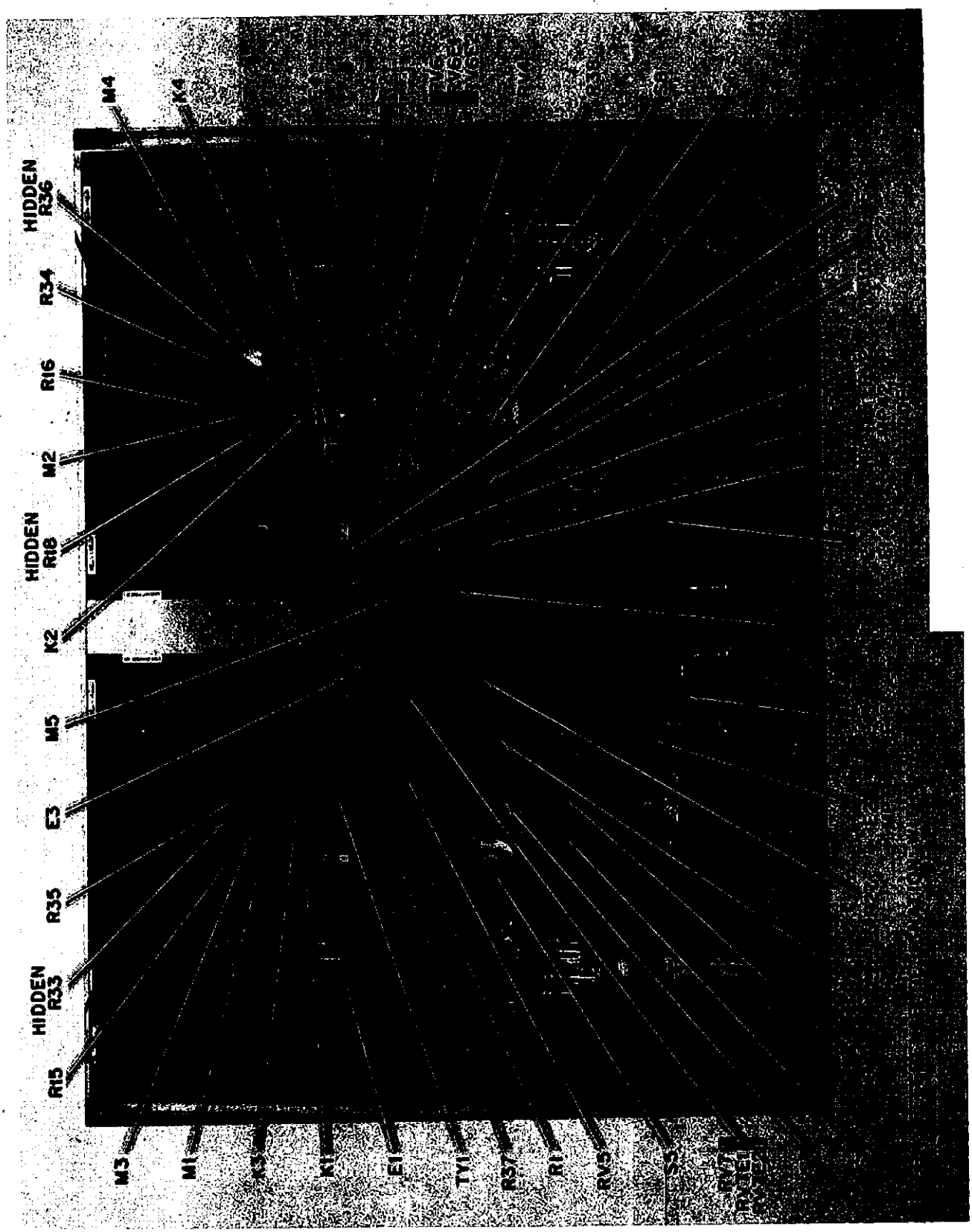
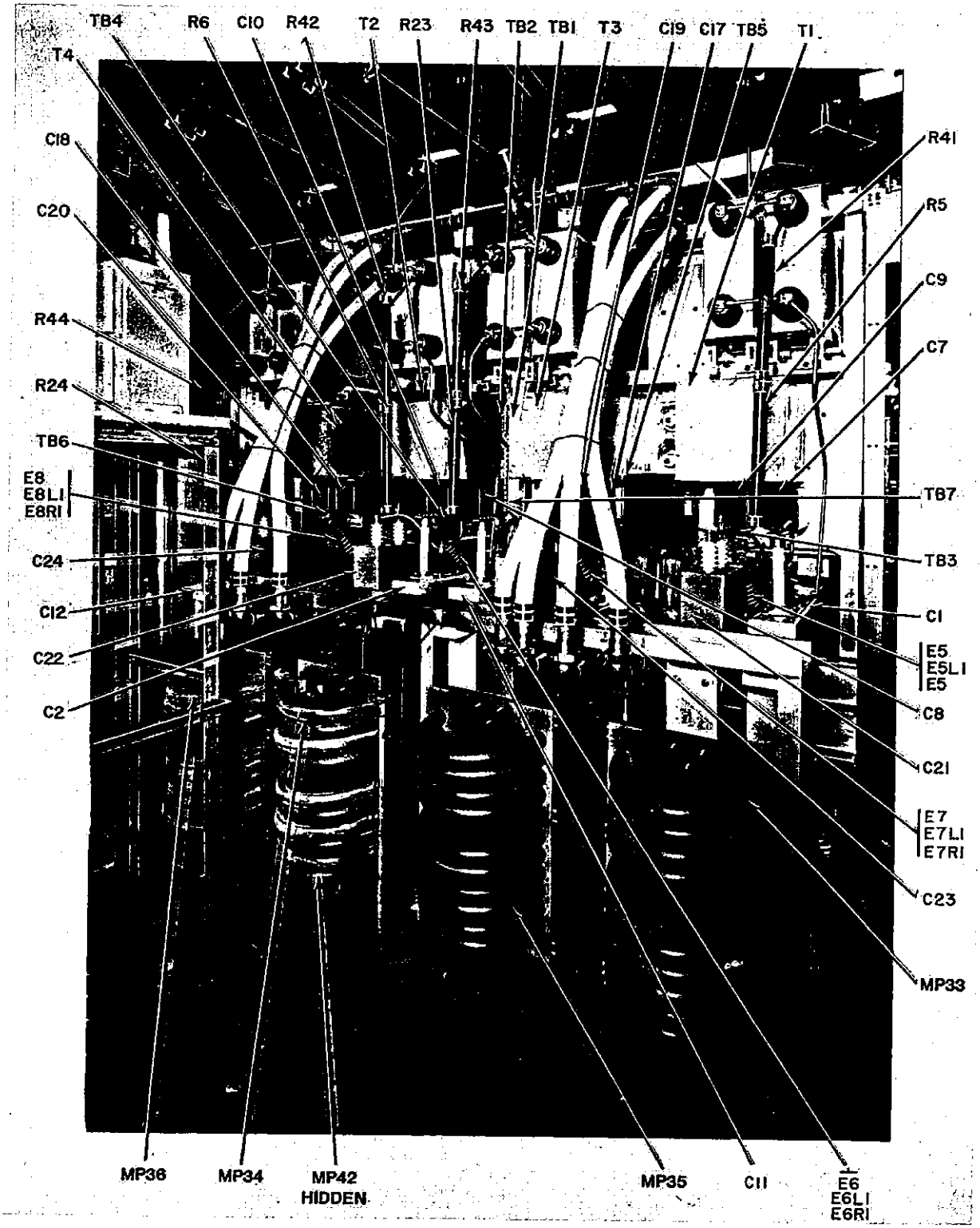


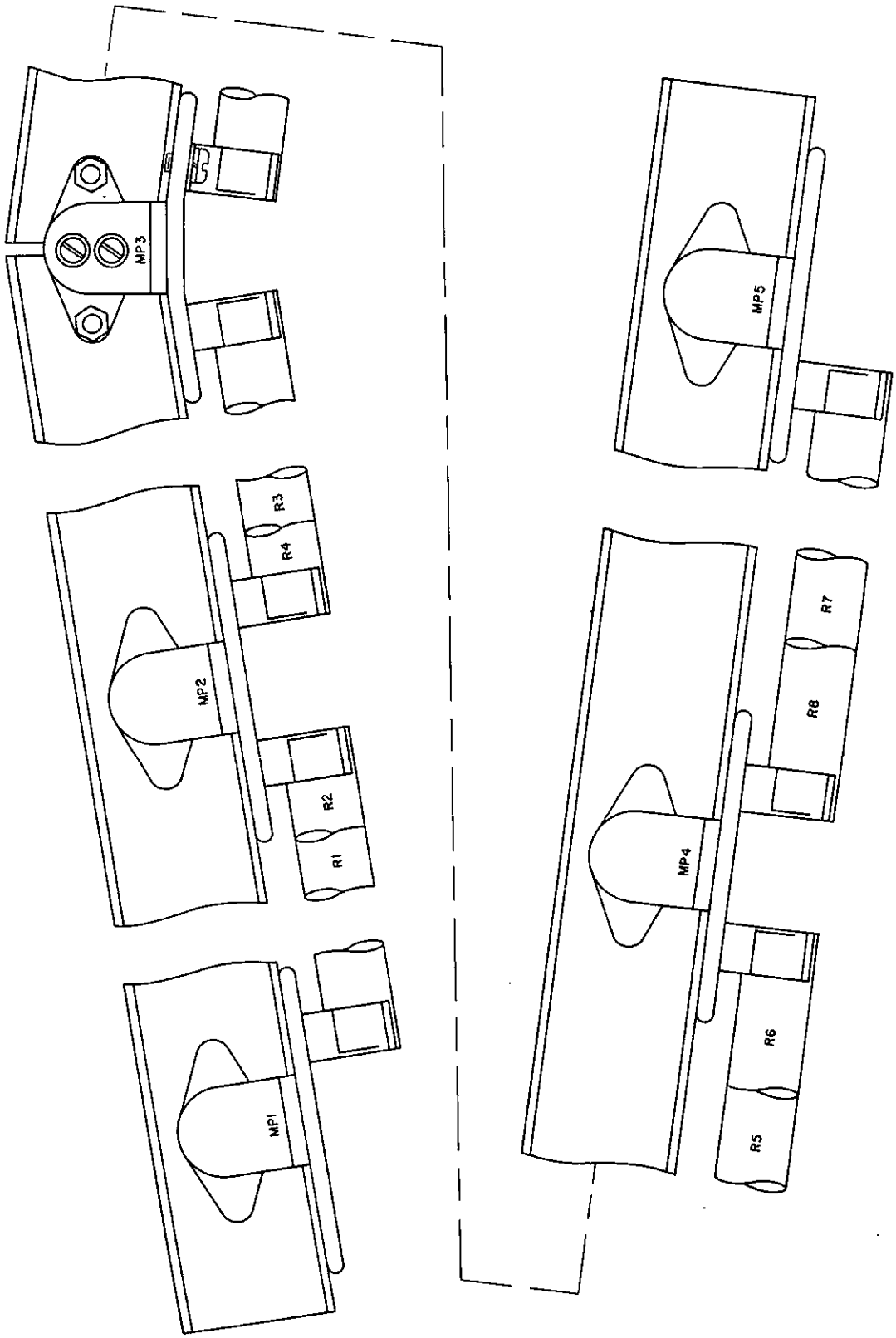
Figure 5-42. Amplifier Radio Frequency AM-3774/FPN-44, Front View Doors Open, Parts Location Diagram (Sheet 2 of 2)



PREFIX REFERENCE DESIGNATION WITH 1A6
75-009-74159

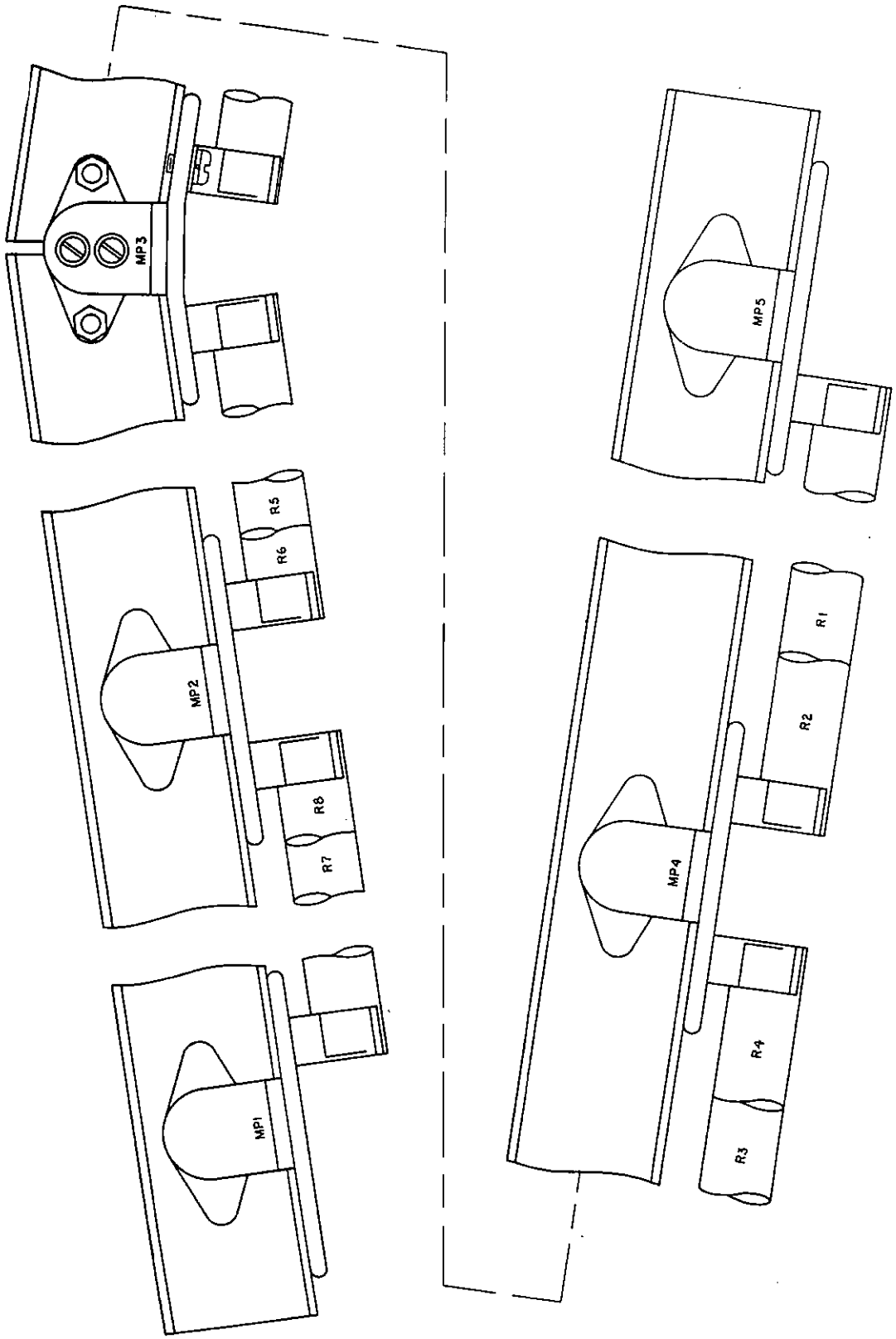
Figure 5-43. Amplifier Radio Frequency AM-3774/FPN-44, Rear View, Parts Location Diagram

NOTE: NOT CORRECTED TO INDICATE CHANGES MADE BY F. C. NO. 3



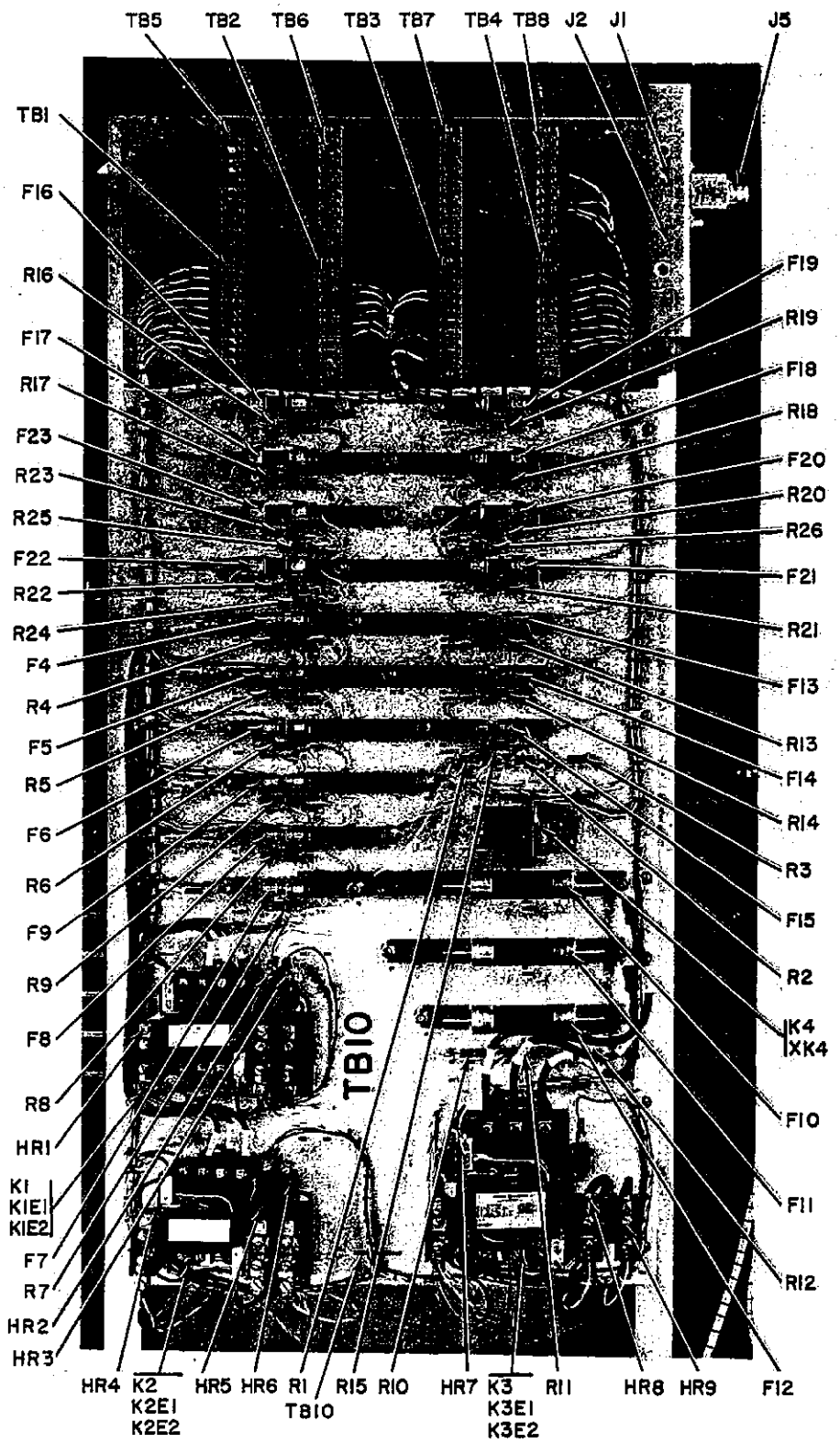
NOTE:
REFERENCE DESIGNATIONS ARE ABBREVIATED. PREFIX REFERENCE DESIGNATIONS IA7 THROUGH IA10. FOR TRANSMITTER GROUP NO. 1.

Figure 5-44. Resistor Rack Transmitter No. 1, Parts Location Diagram



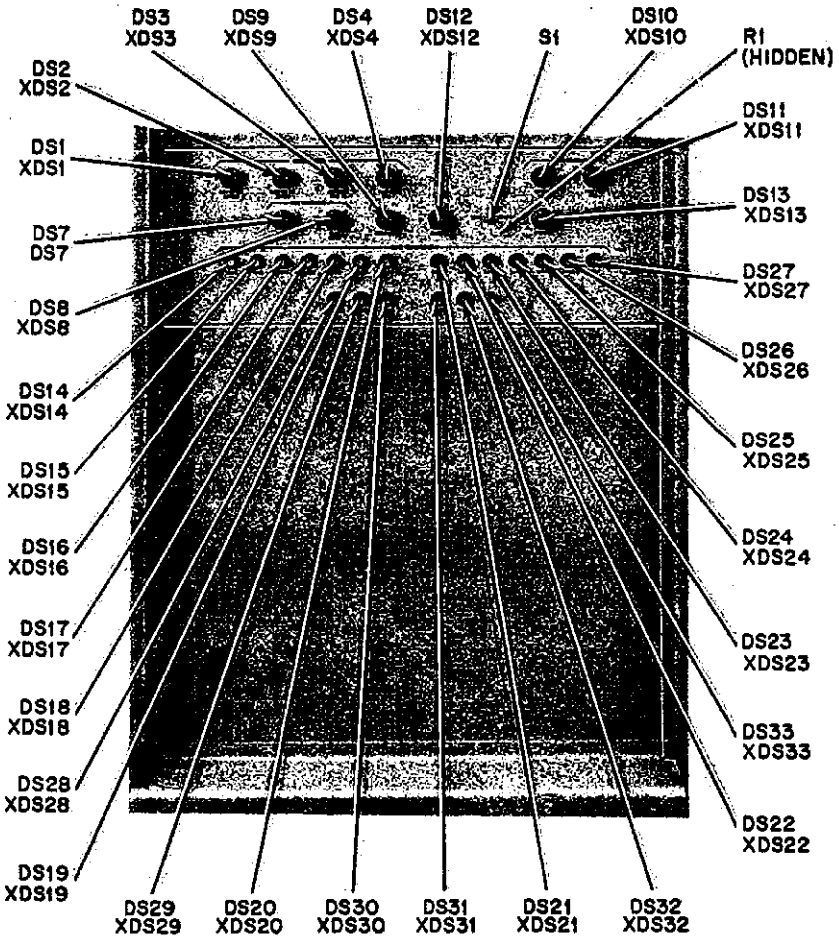
NOTE
REFERENCE DESIGNATIONS ARE ABBREVIATED PREFIX REFERENCE DESIGNATIONS 1A7 THROUGH 1A10. FOR TRANSMITTER GROUP NO. 2

Figure 5-45. Resistor Rack Transmitter No. 2, Parts Location Diagram



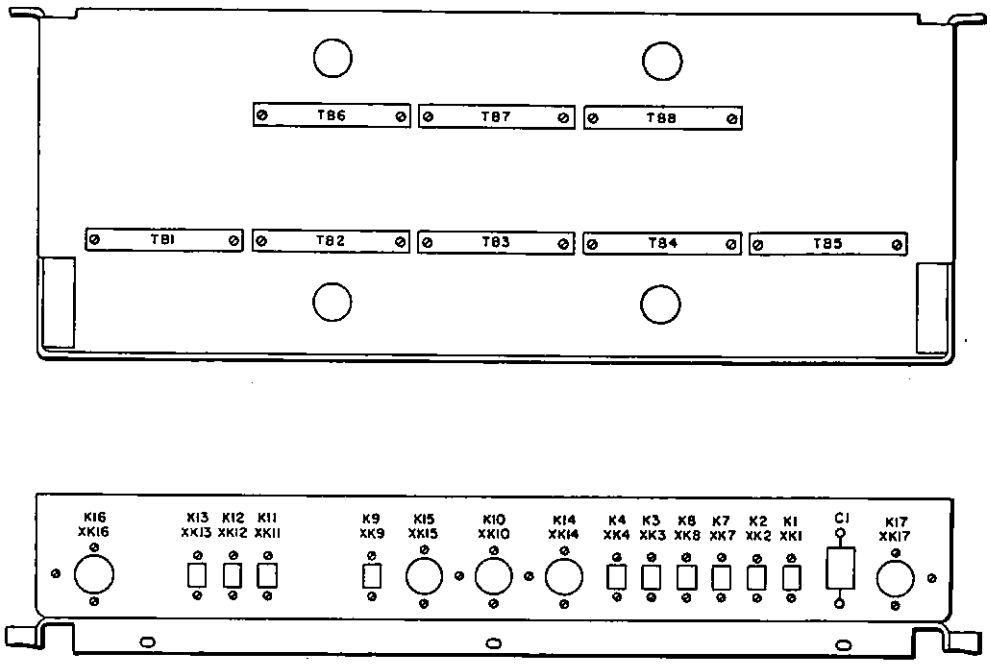
PREFIX REFERENCE DESIGNATION WITH IA11
75-009-74109

Figure 5-46. Rack, Electrical Equipment MT-2929/FPN-44A, Parts Location Diagram



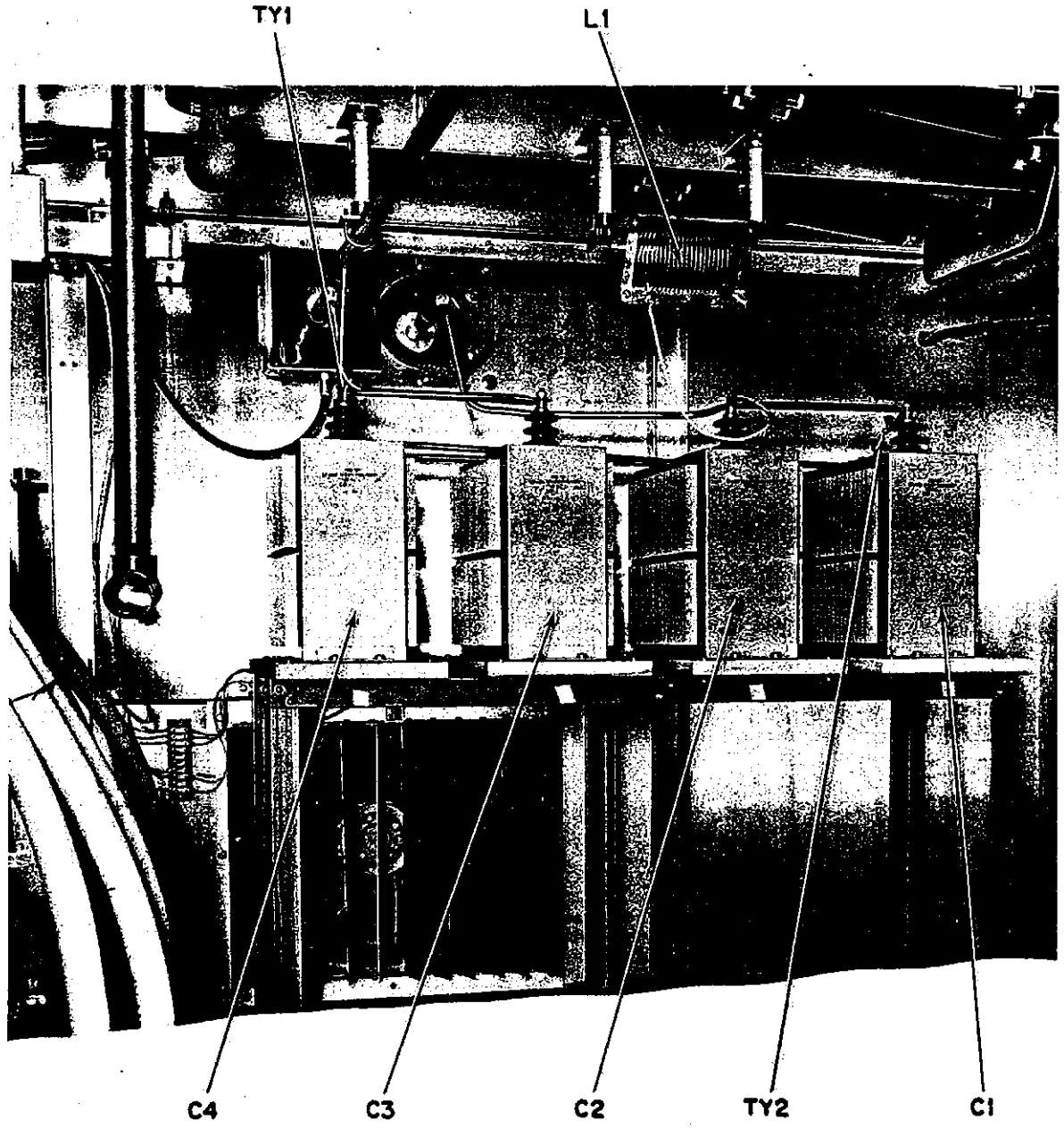
NOTE:
REFERENCE DESIGNATIONS ARE ABBREVIATED.
PREFIX REFERENCE DESIGNATIONS WITH 1A12.

Figure 5-47. Panel Indicator SB-1894/FPN-44, Front View, Parts Location Diagram



NOTE:
REFERENCE DESIGNATIONS ARE ABBREVIATED.
PREFIX REFERENCE DESIGNATIONS WITH 1A12.

Figure 5-48. Indicator Panel SB-1894/FPN-44, Chassis, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A20

75-009-74168

Figure 5-49. Filter, Low Pass F-1428/FPN-44A, Parts Location Diagram

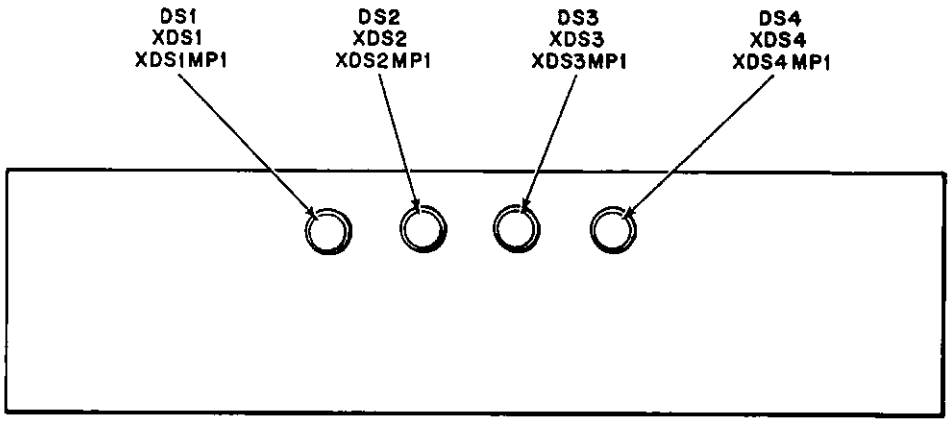


Figure 5-50. Indicator Panel, PA Overload, Front View, Parts Location Diagram

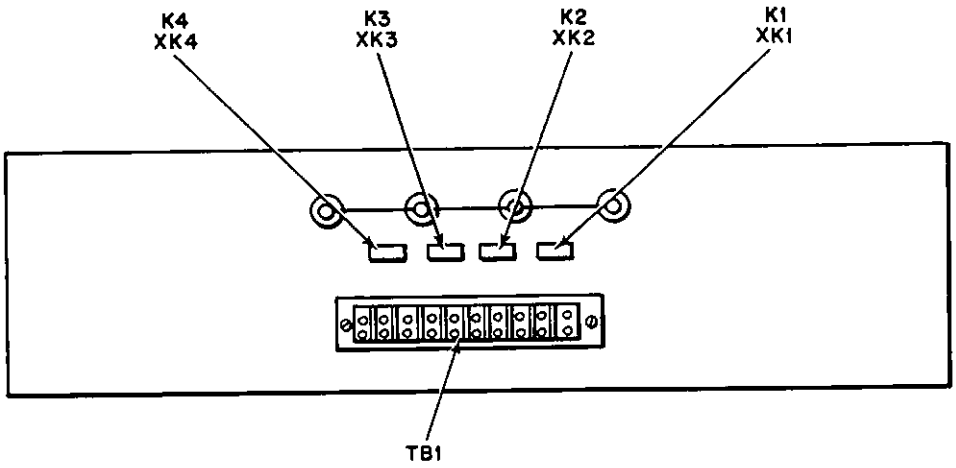


Figure 5-51. Indicator Panel
PA Overload, Rear View,
Parts Location Diagram

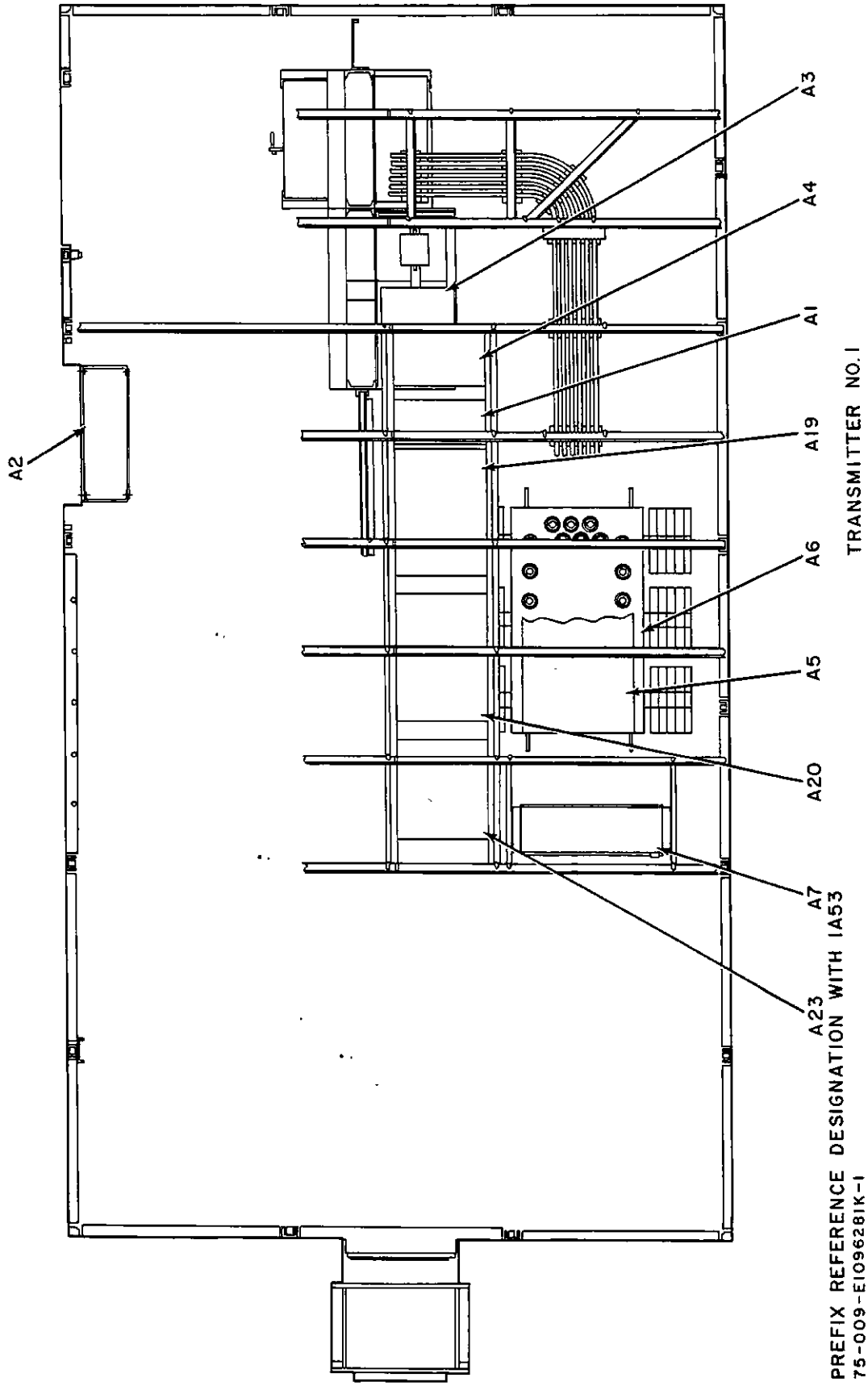


Figure 5-52. Power Supply Set OP-109/FPN-44A, Parts Location Diagram (Sheet 1 of 2)

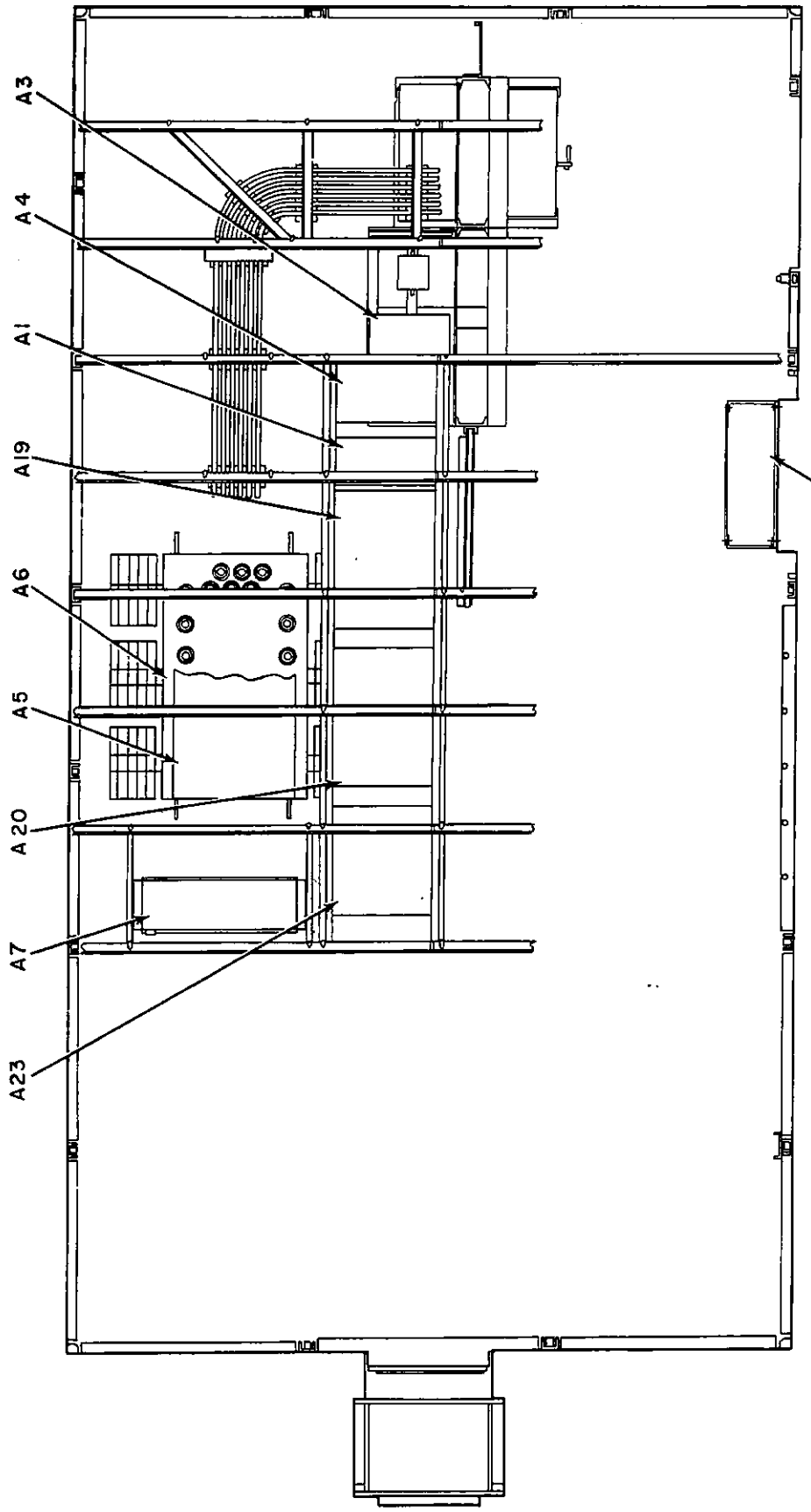


Figure 5-52. Power Supply Set OP-109/FPN-44A, Parts Location Diagram (Sheet 2 of 2)

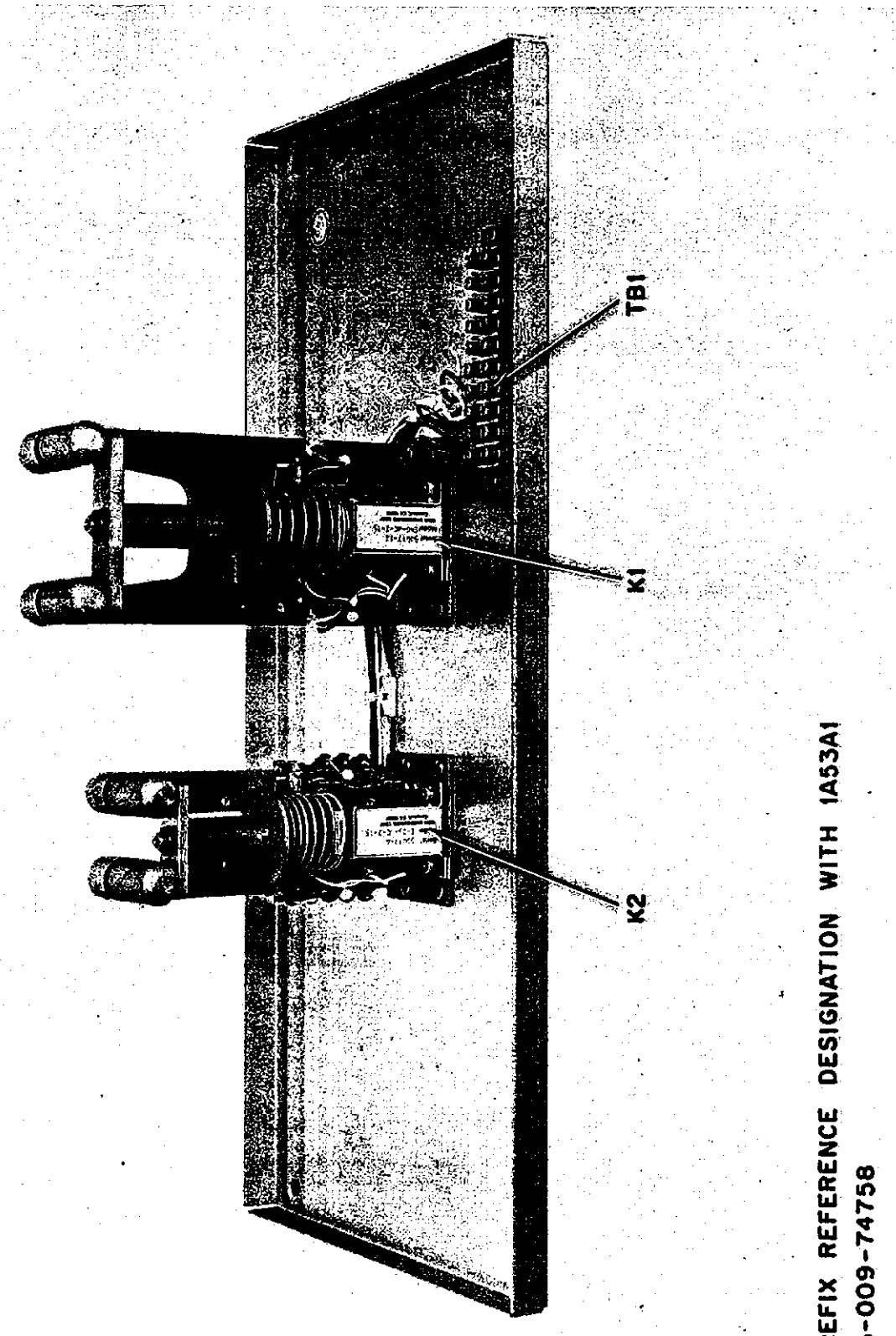


Figure 5-53. Relay Assembly RE-1112/FPN-44A, Parts Location Diagram

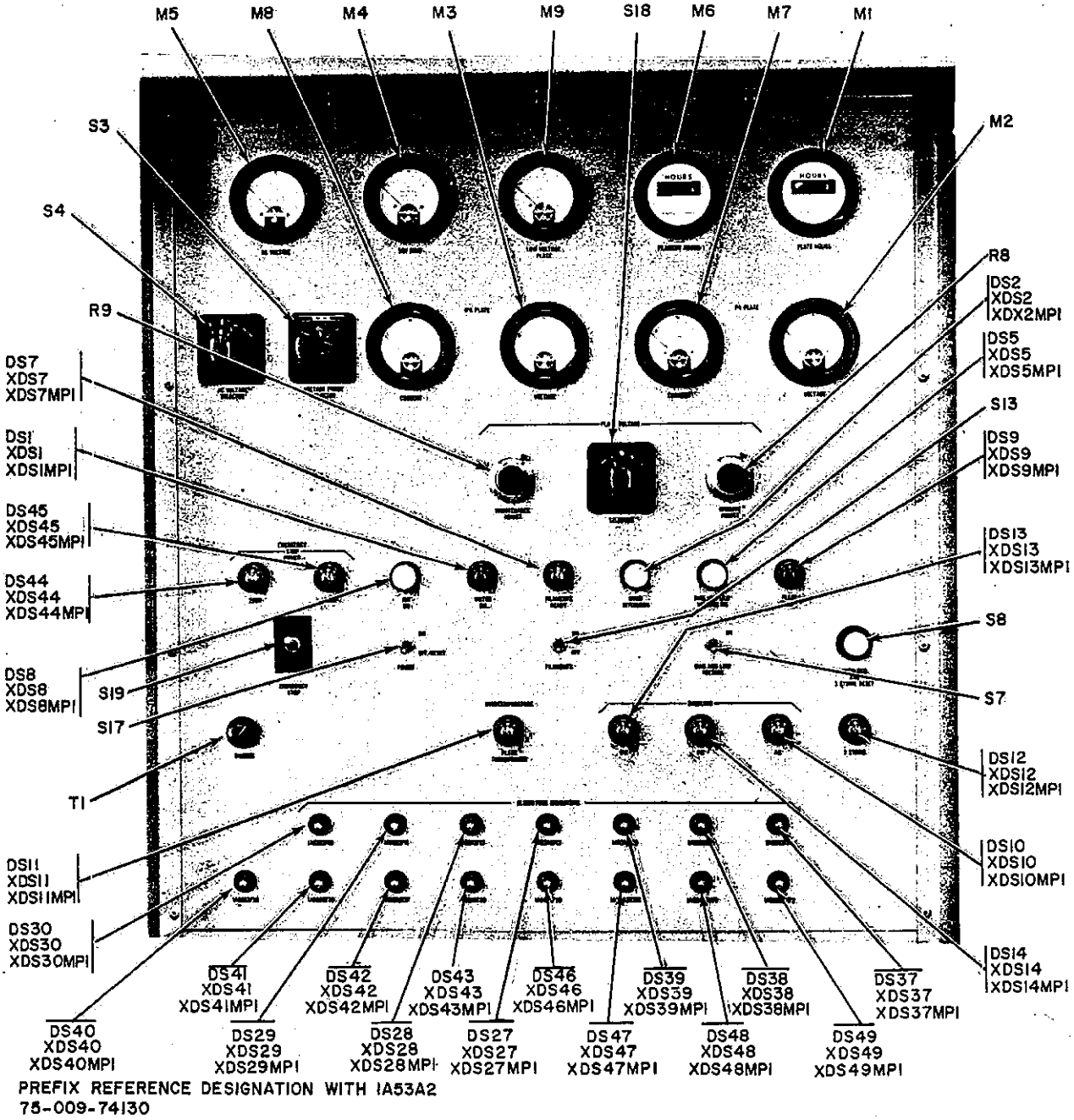


Figure 5-54. Control-Indicator C-10034/FPN-44A, Front View, Parts Location Diagram

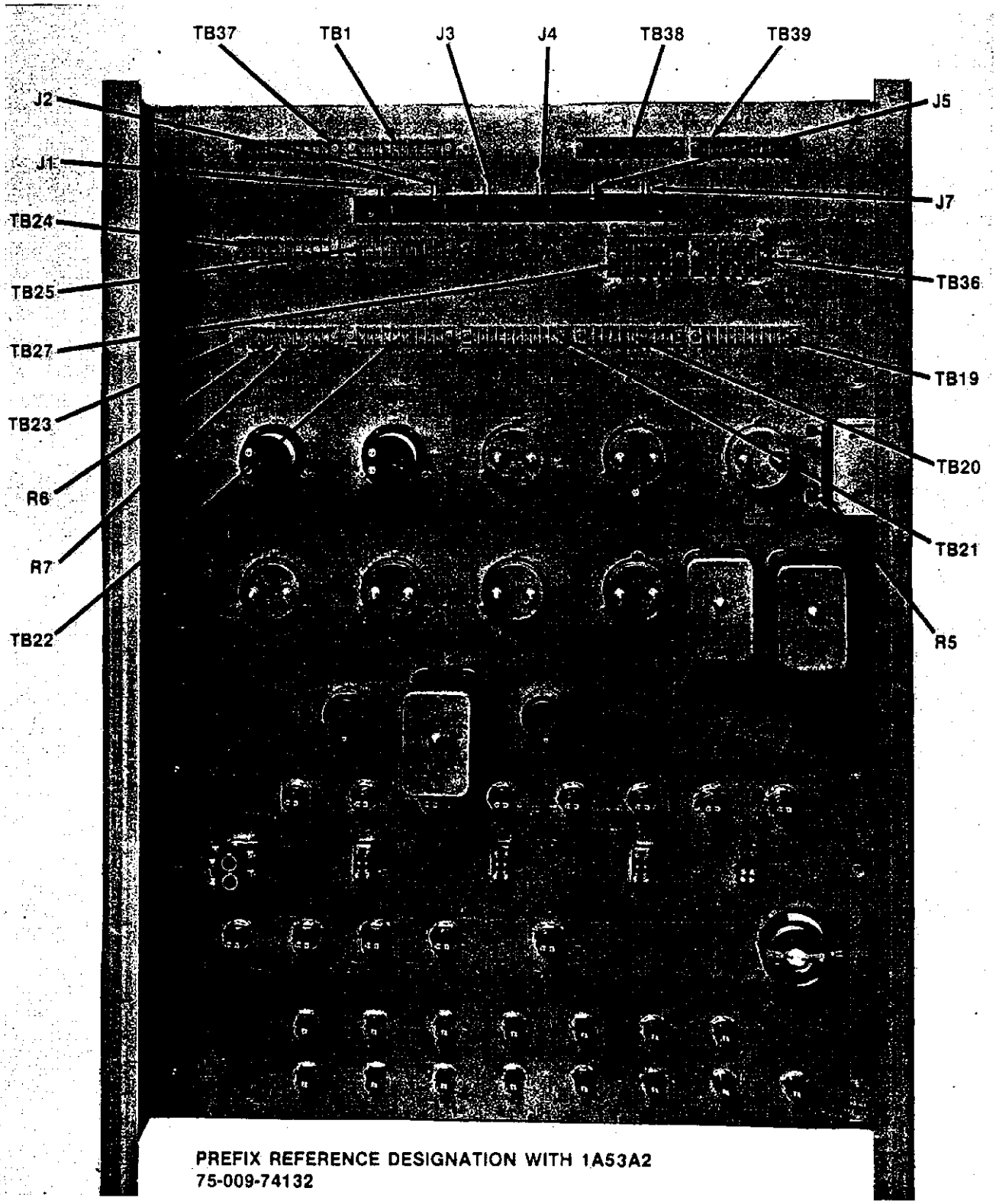
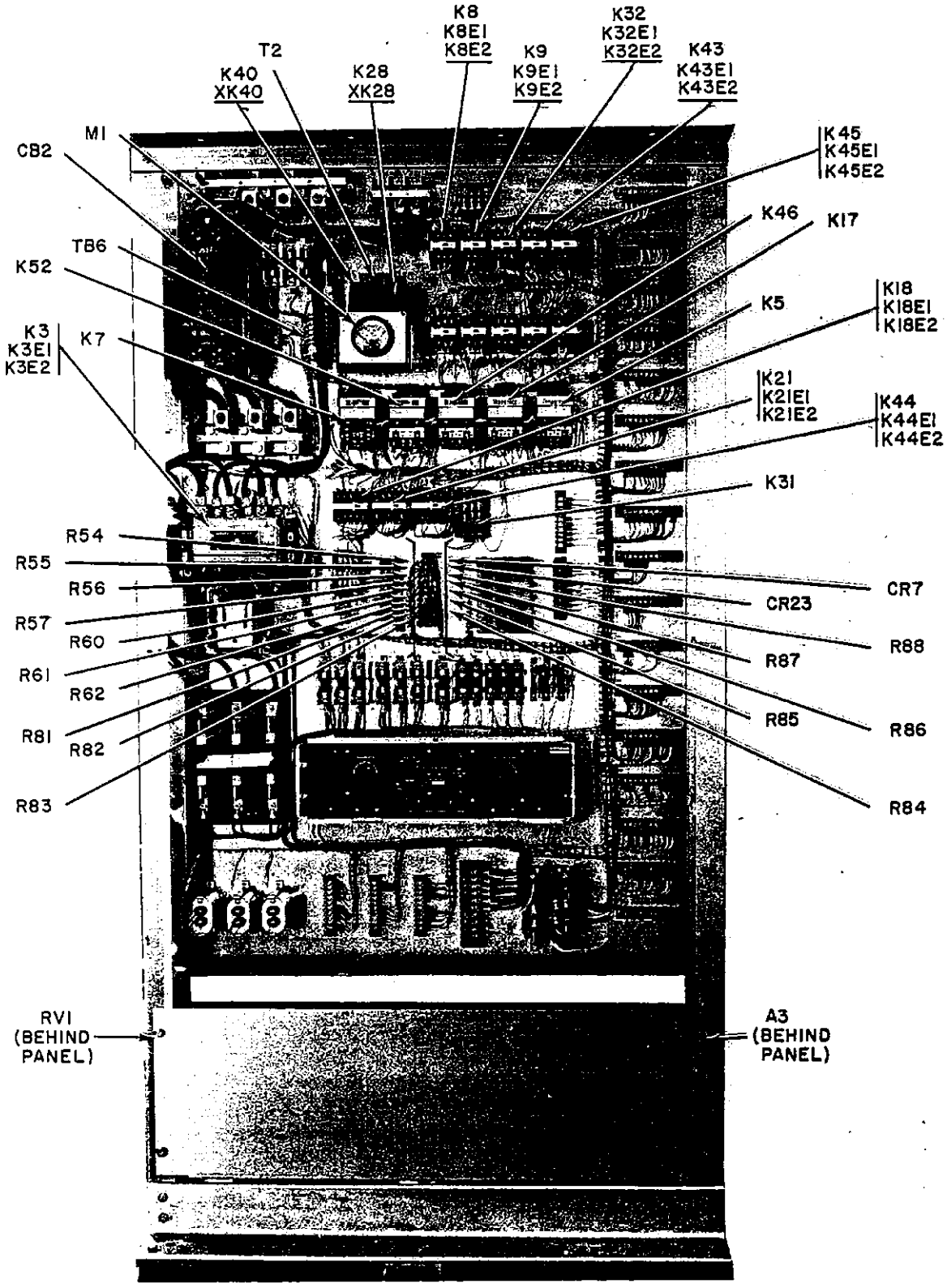
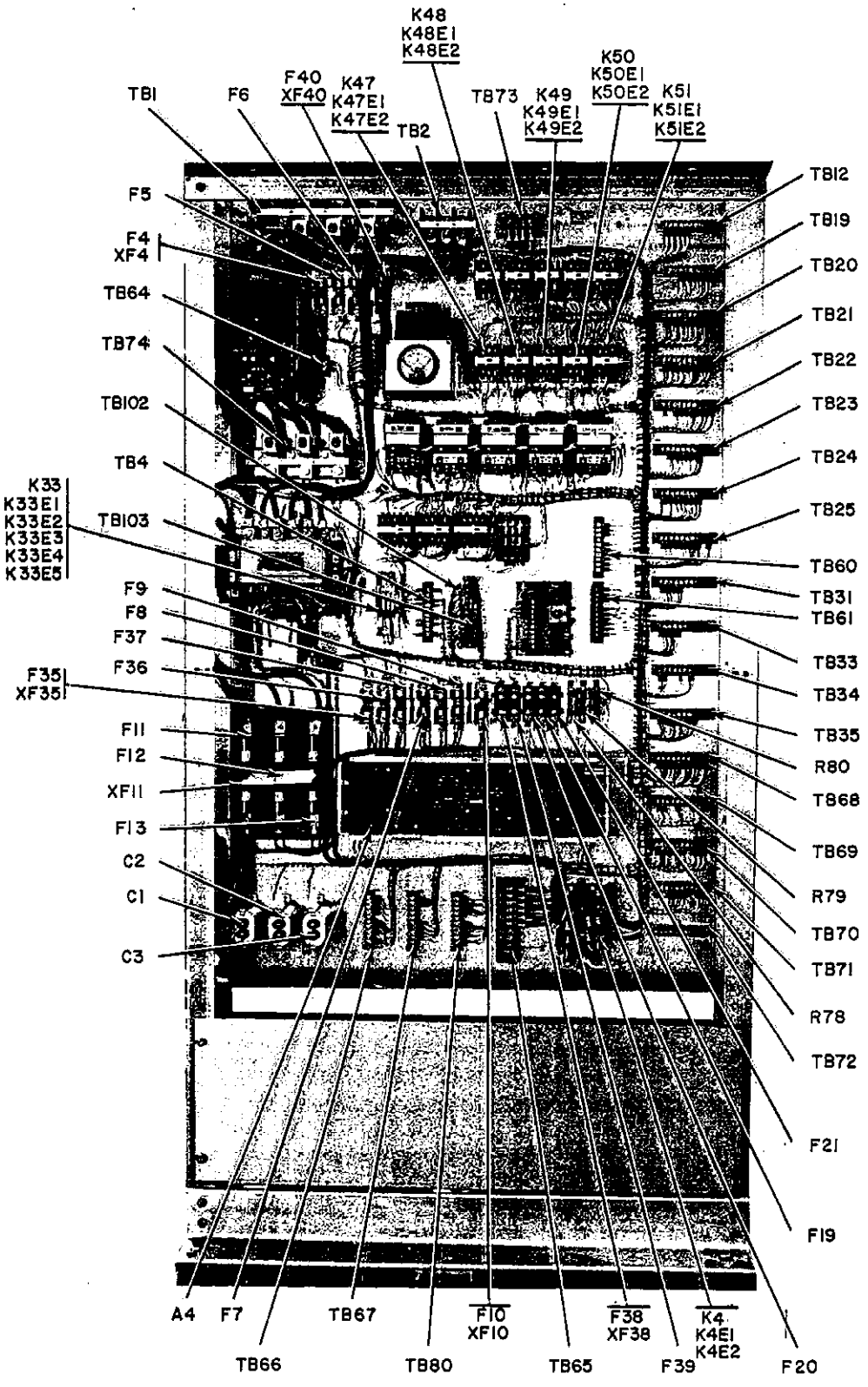


Figure 5-55. Control-Indicator C-10034/FPN-44A, Rear View, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A53A3
75-009-74116

Figure 5-56. Relay Assembly RE-1113/FPN-44A, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A53A3
75-009-74116

Figure 5-57. Relay Assembly RE-1113/FPN-44A, Parts Location Diagram

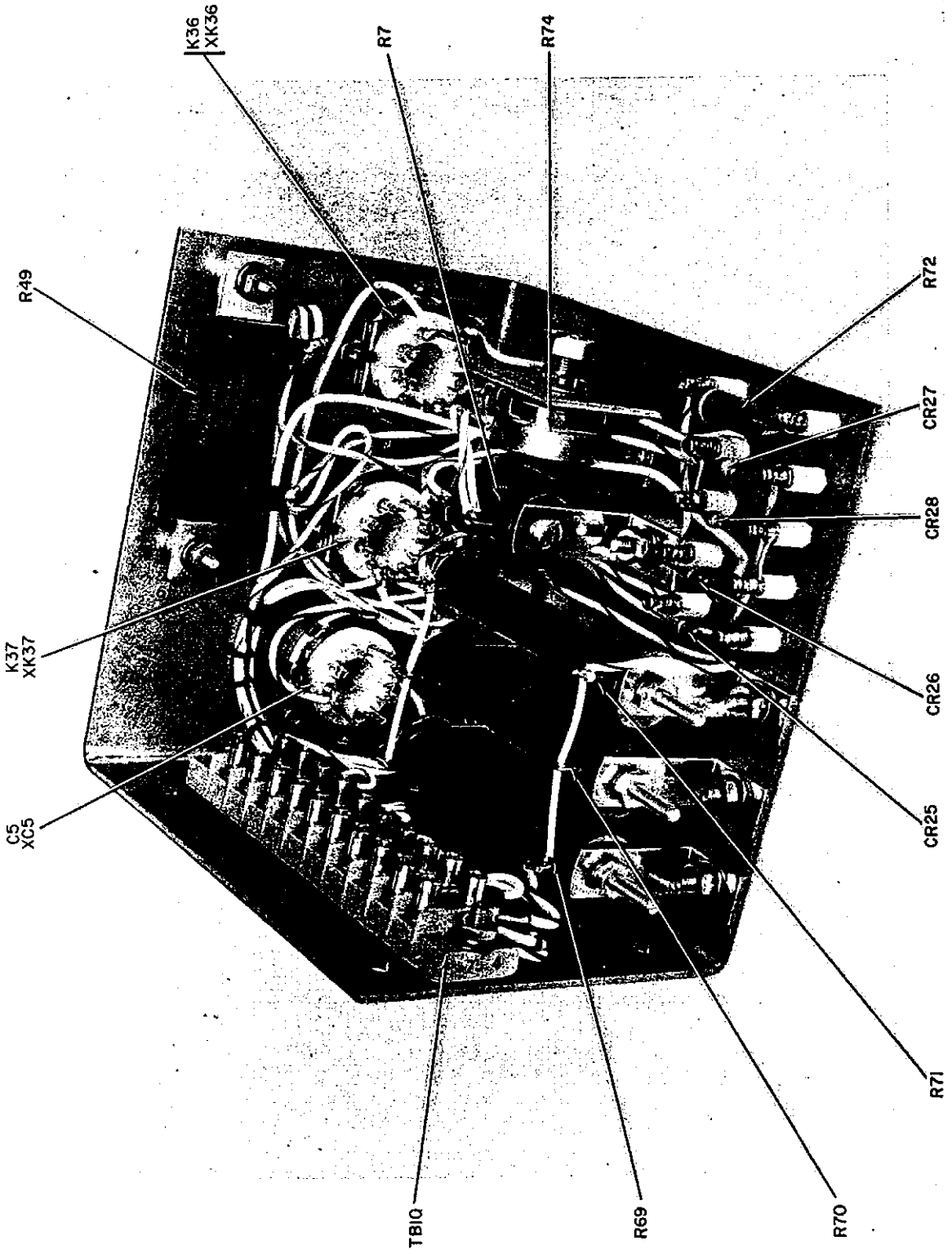


Figure 5-58. Relay Assembly P/O RE-1113/FPN-44A, Parts Location Diagram

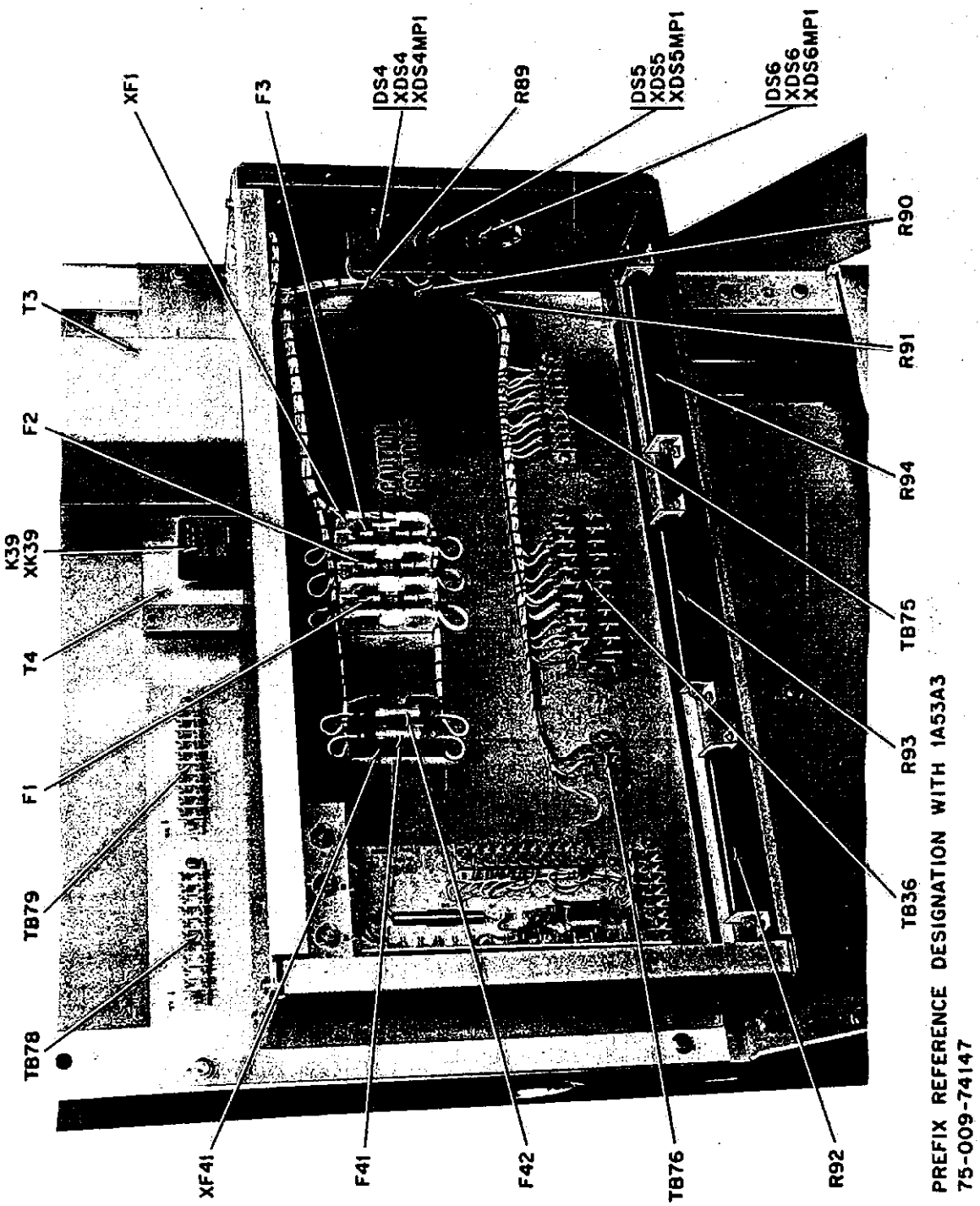


Figure 5-59. Relay Assembly P/O RE-1113/FPN-44A, Parts Location Diagram

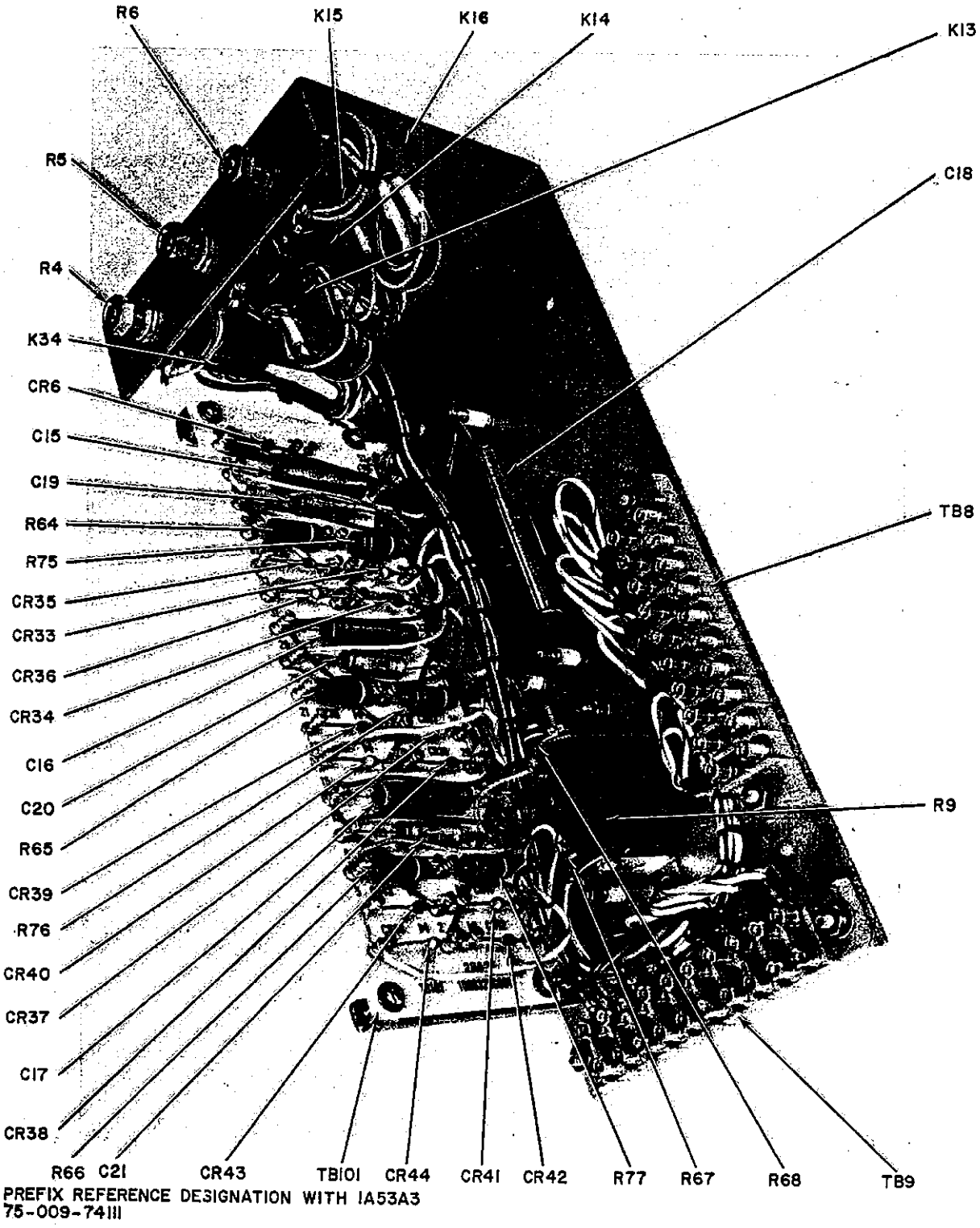
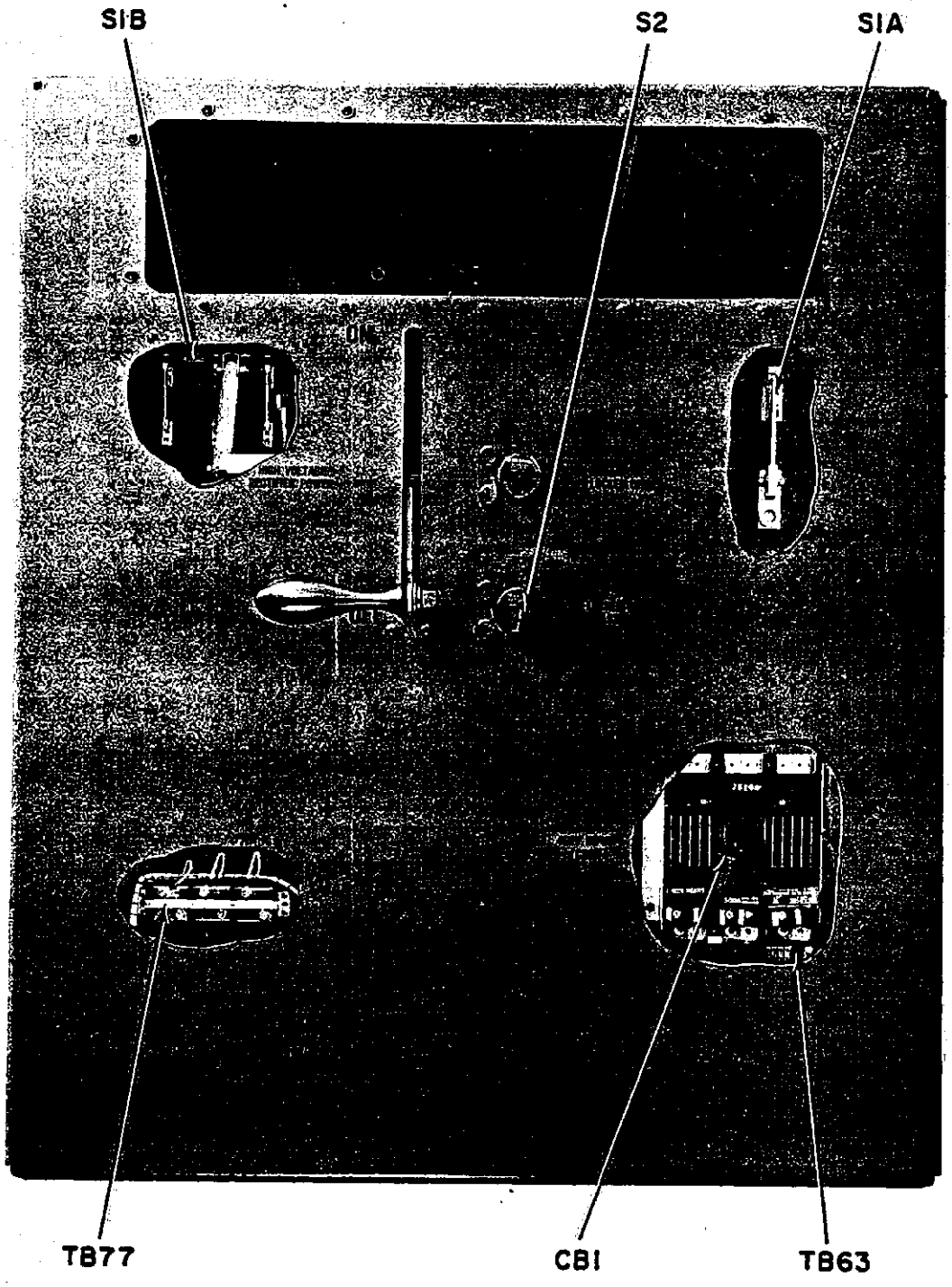


Figure 5-60. Relay Assembly P/O RE-1113/FPN-44A, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A53A3
75-009-74126

Figure 5-61. Relay Assembly P/O RE-1113/FPN-44A, Parts Location Diagram

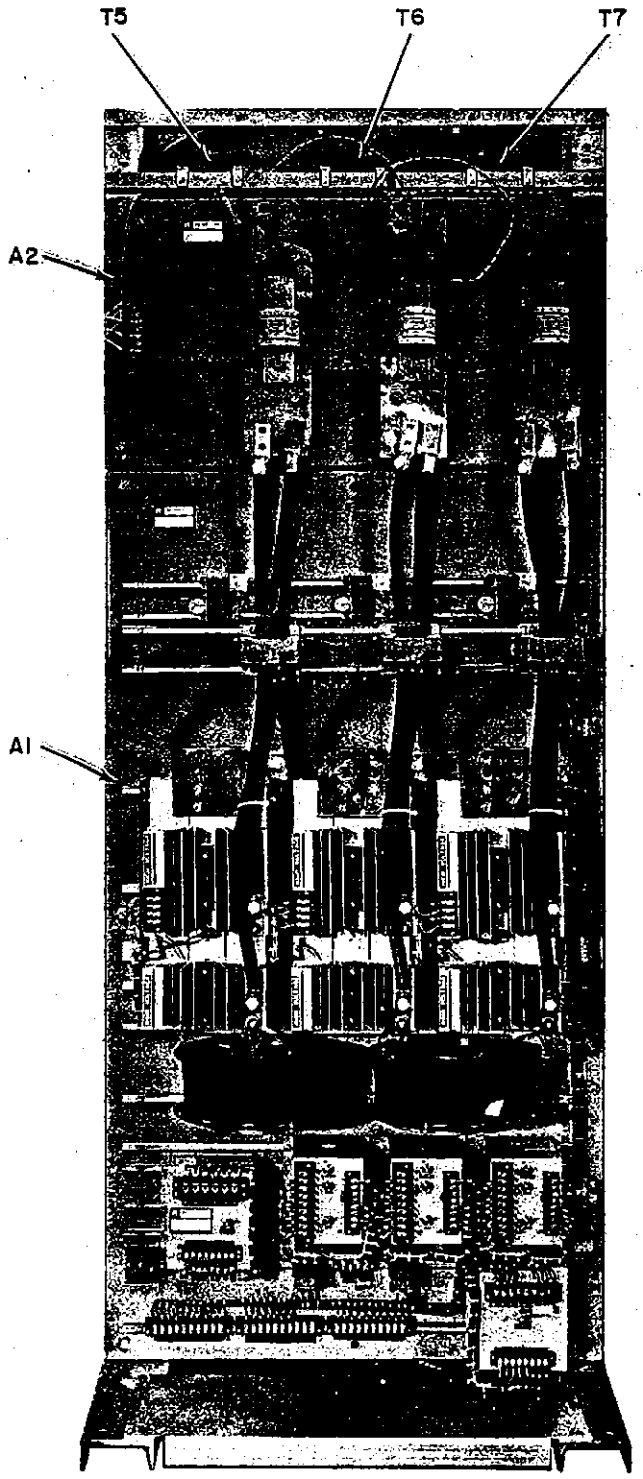


Figure 5-62. Relay Assembly P/O RE-1113/FPN-44A, Parts Location Diagram

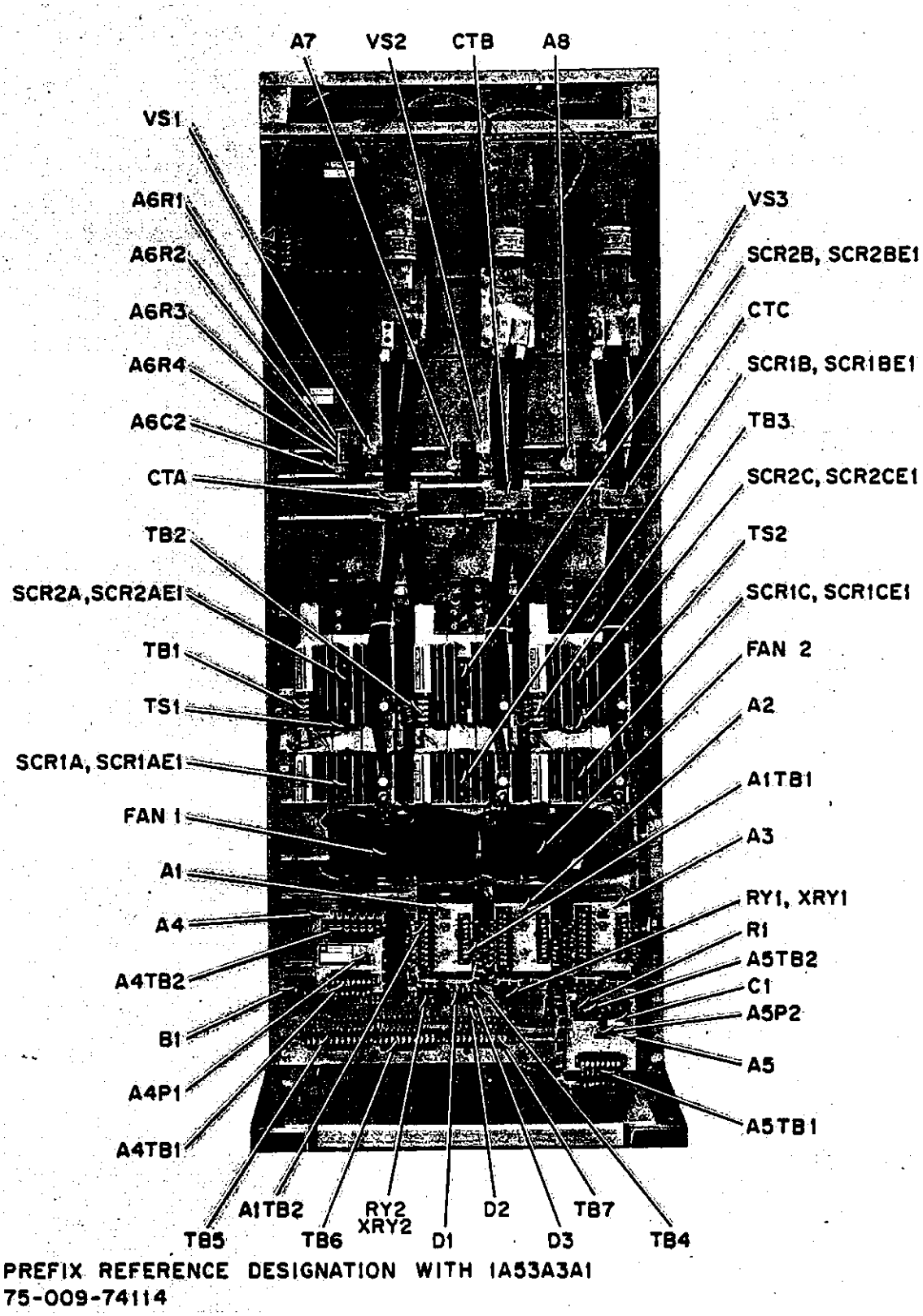


Figure 5-63. Regulator Voltage CN-1473/FPN-44A, Parts Location Diagram

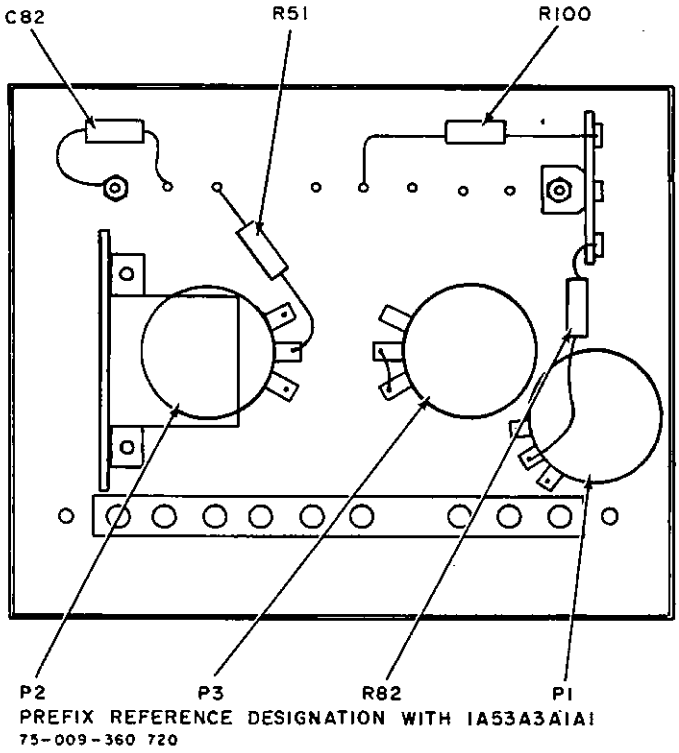


Figure 5-64. Gate Trigger Unit, Underside of Cover, Parts Location Diagram

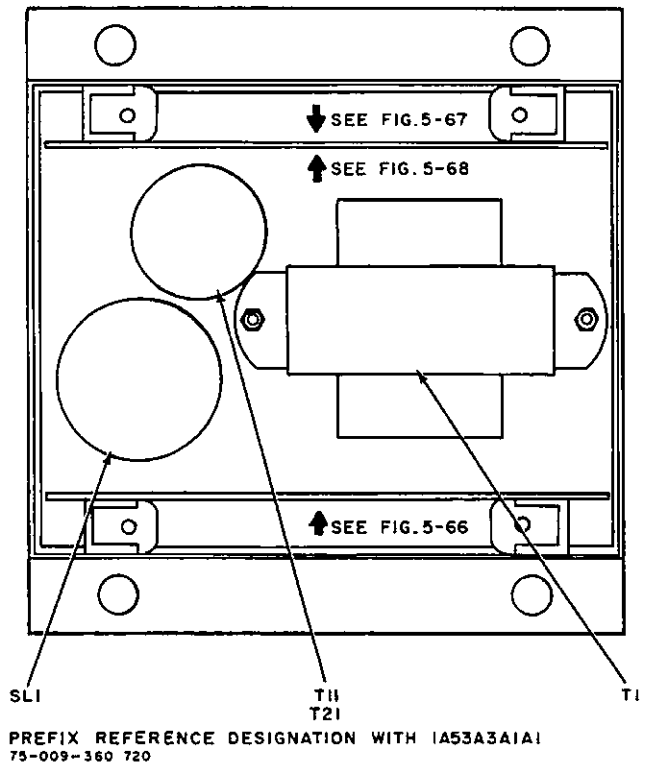
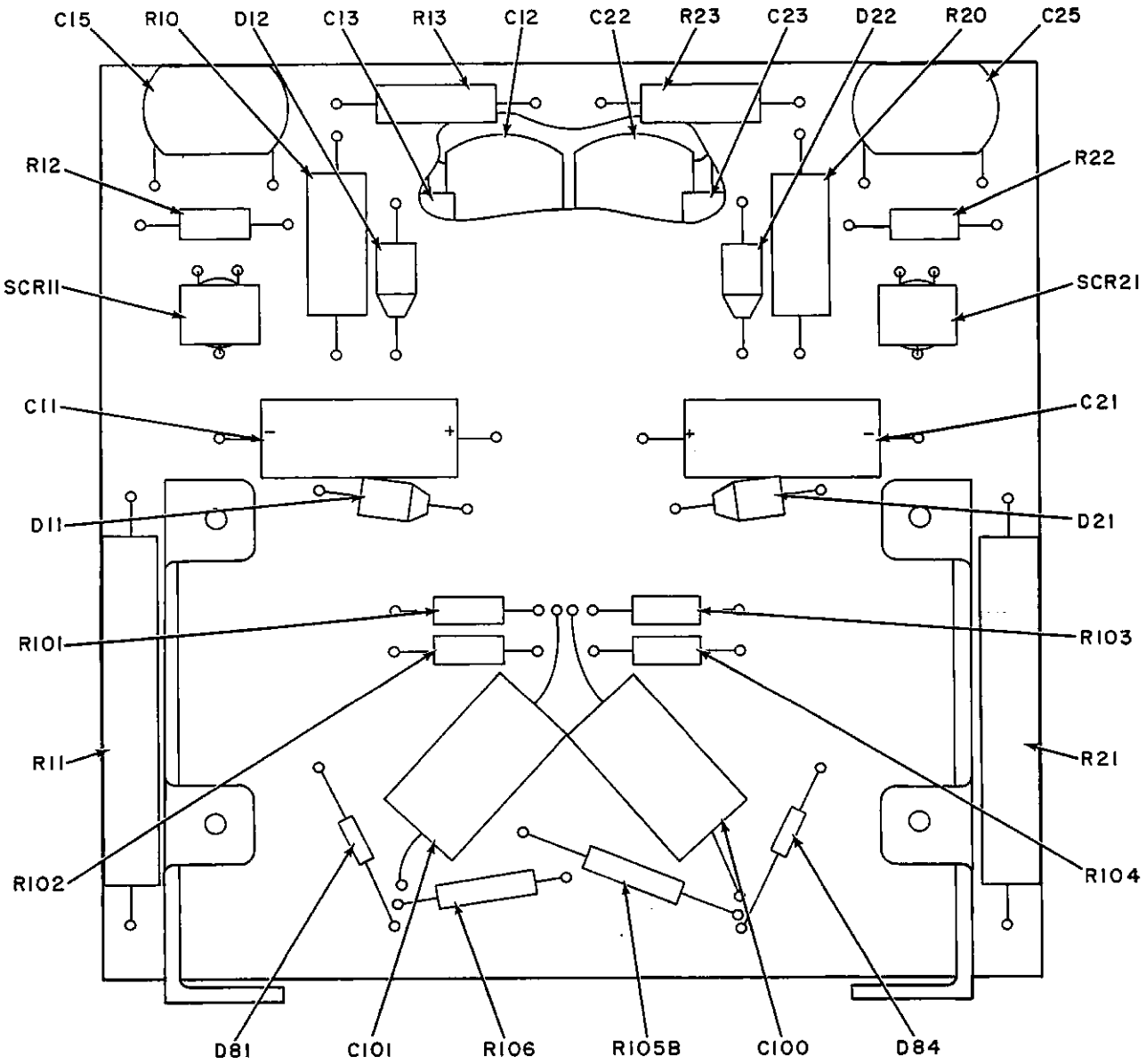


Figure 5-65. Gate Trigger Unit, Inside Can, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A53A3A1A1
75-009-360 729

Figure 5-66. Gate Trigger Unit, Underside of Board, Parts Location Diagram

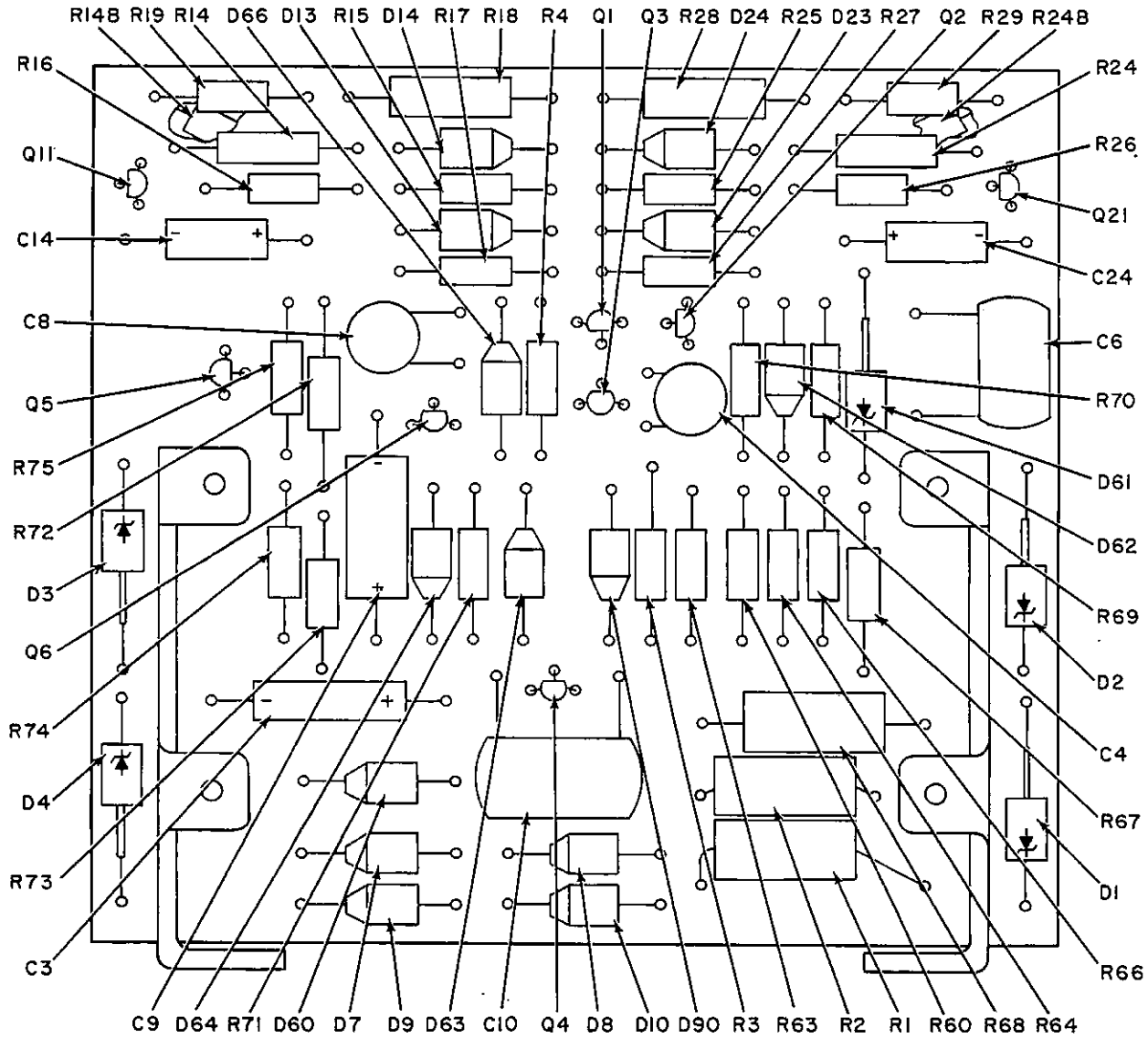


Figure 5-67. Gate Trigger Unit, Underside of Board, Parts Location Diagram

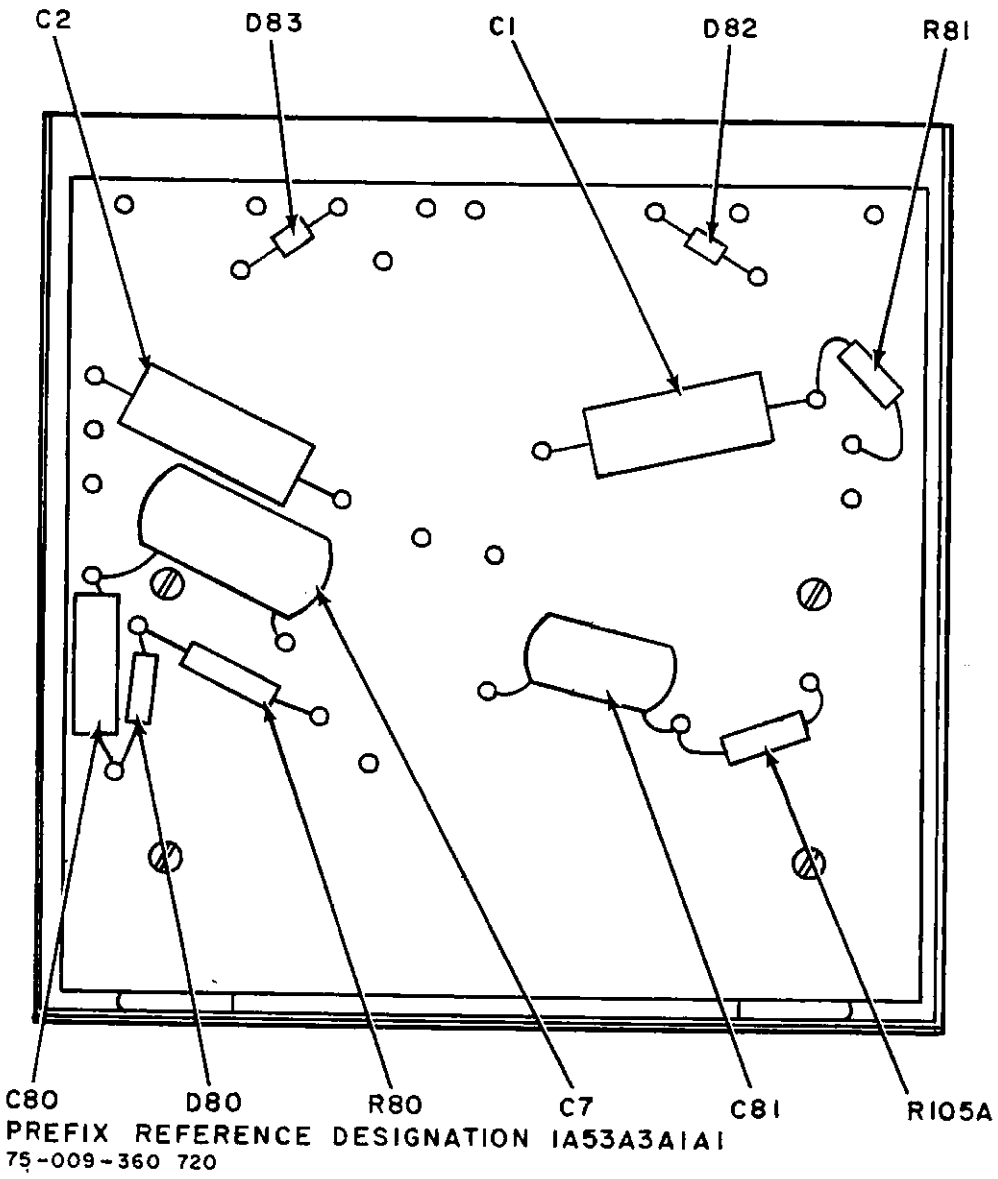


Figure 5-68. Gate Trigger Unit, Topside of Board, Parts Location Diagram

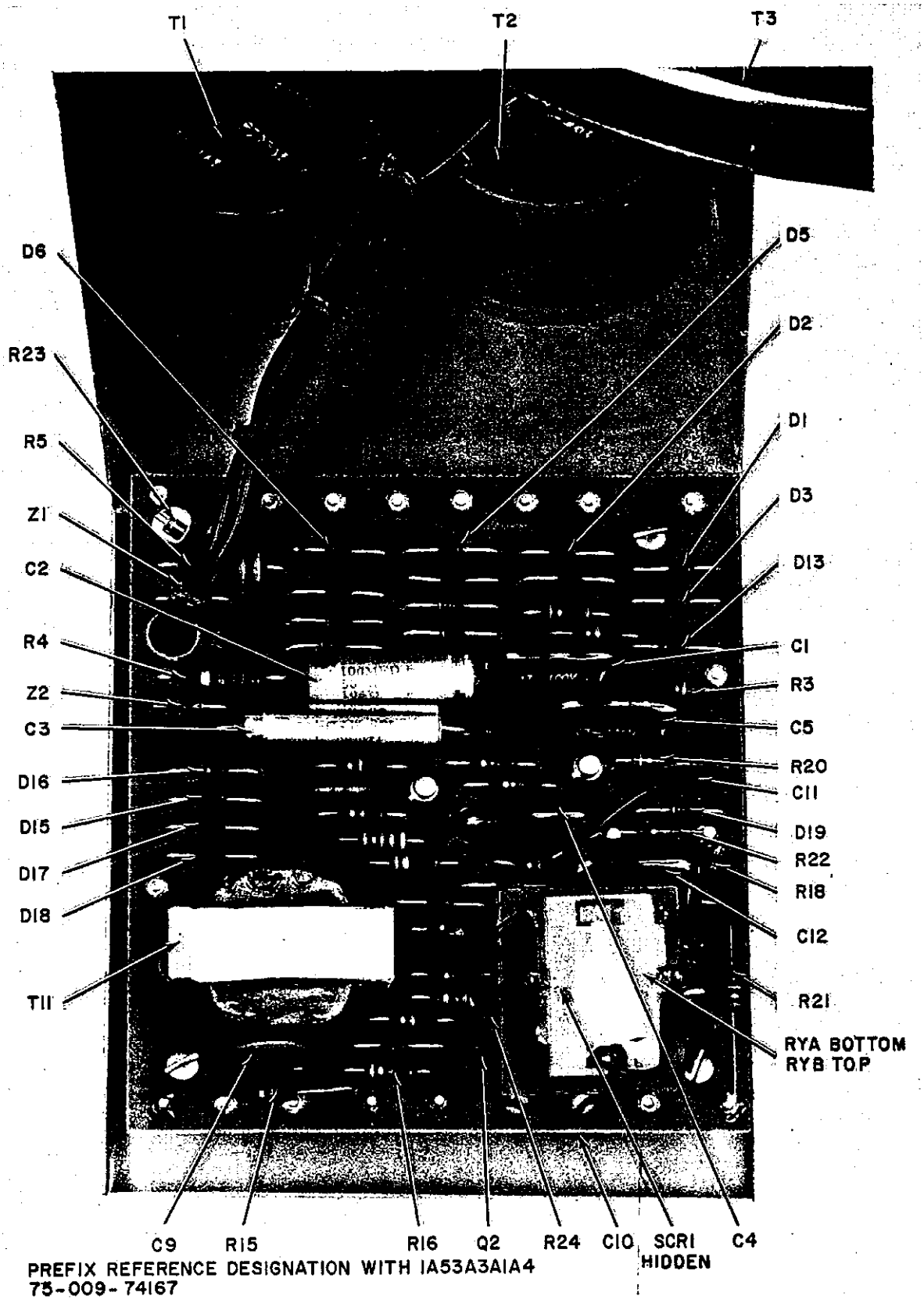


Figure 5-69. Chop-Off Limiter, Parts Location Diagram (Sheet 1 of 2)

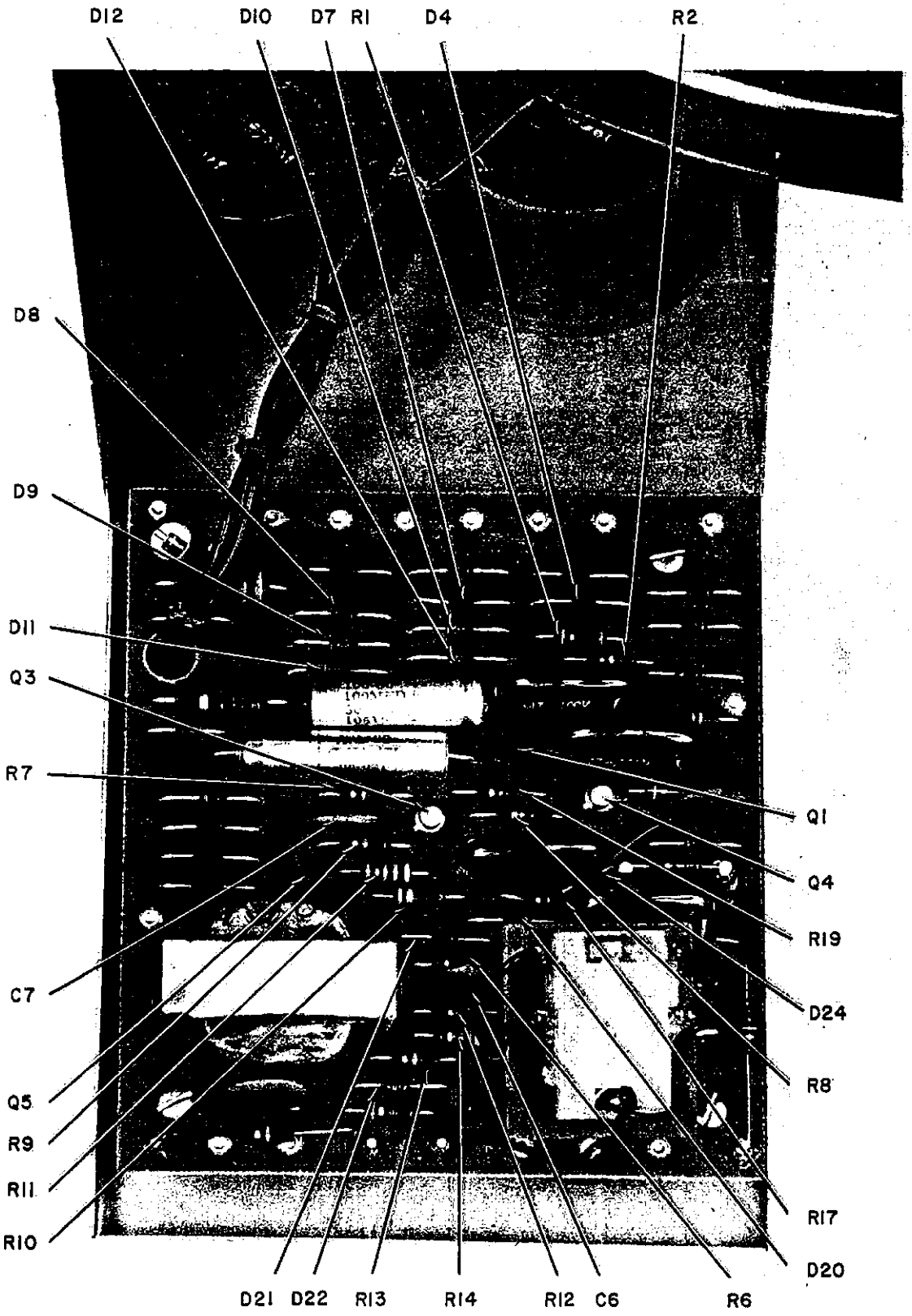
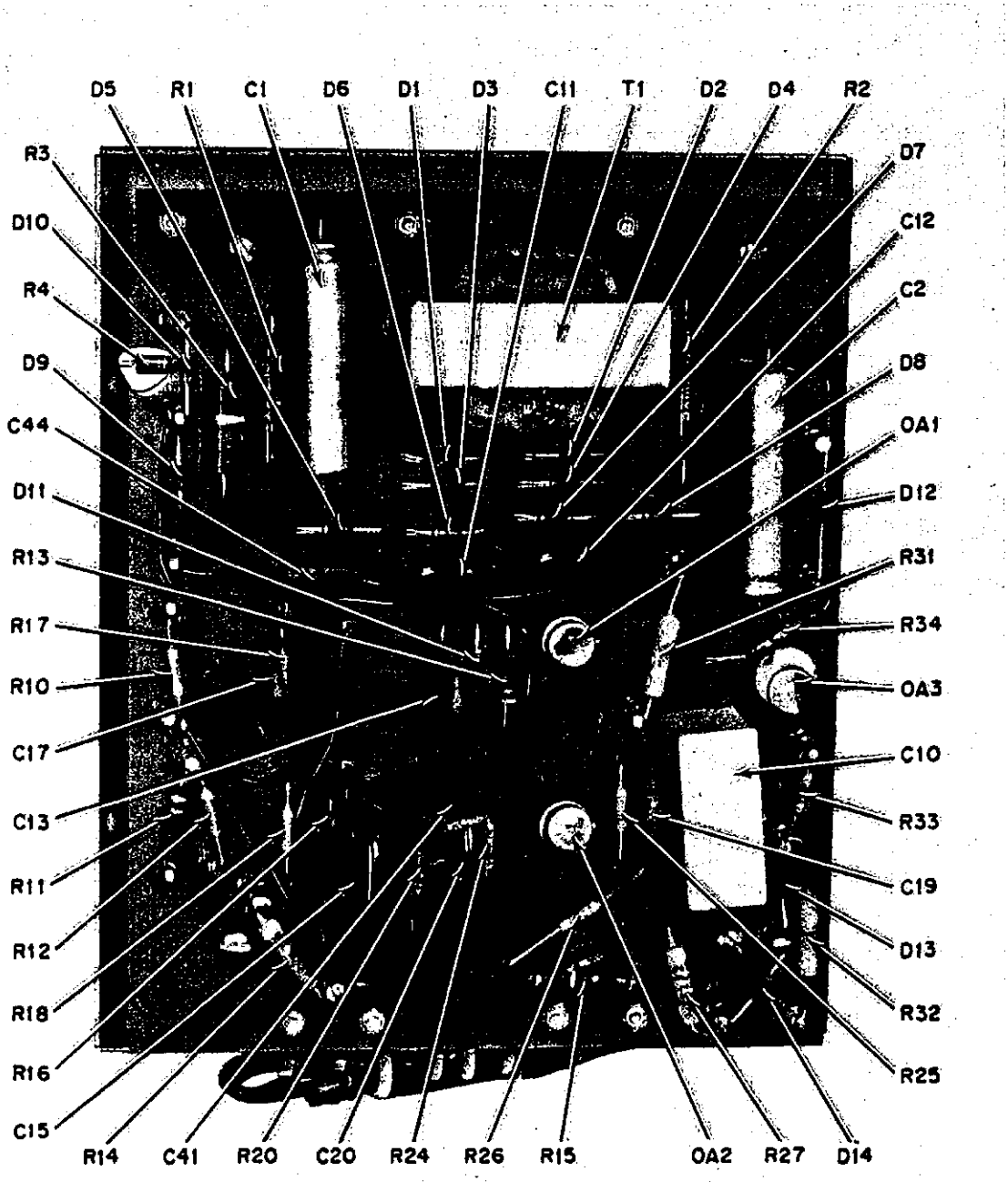


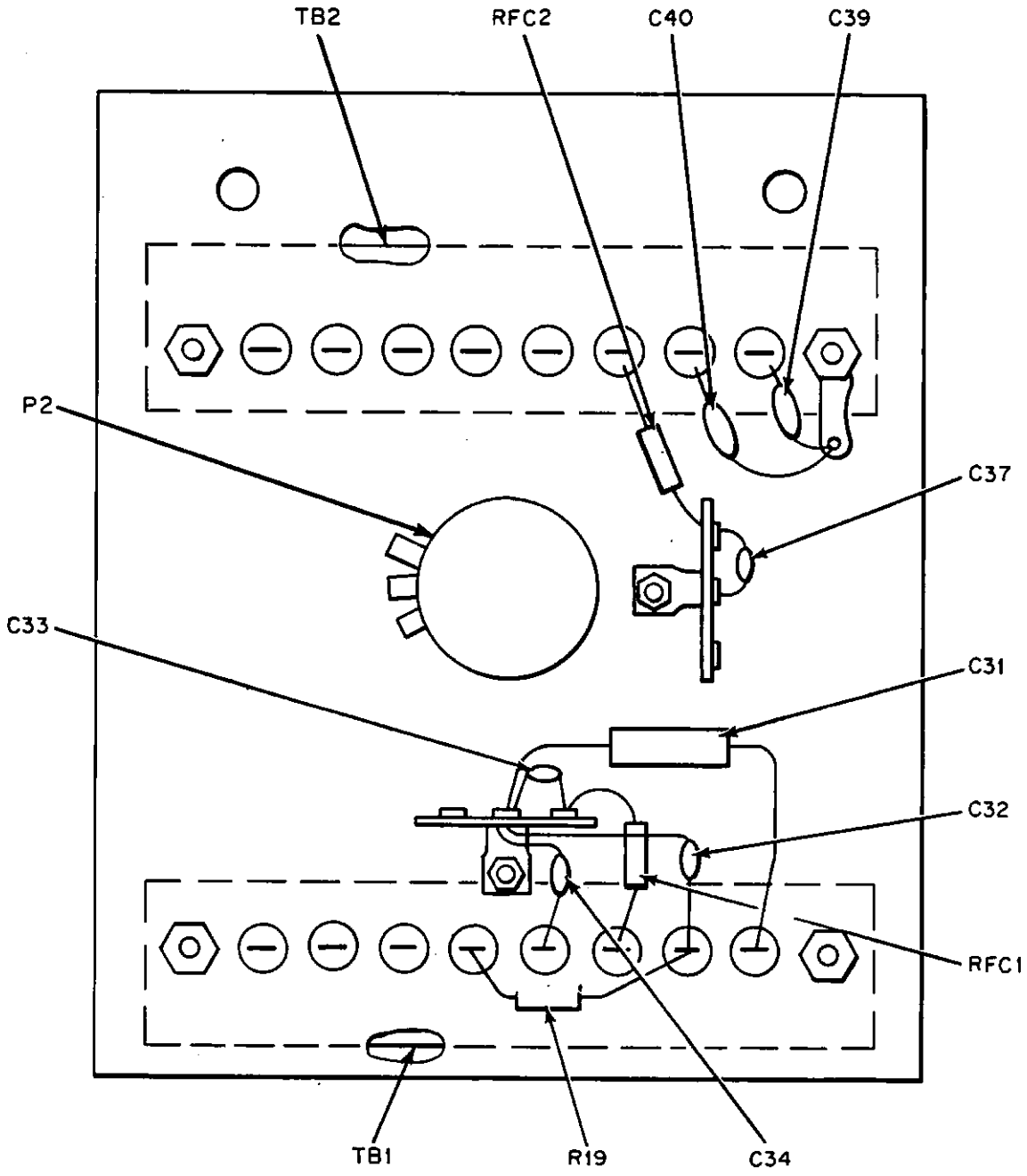
Figure 5-69. Chop-Off Limiter, Parts Location Diagram (Sheet 2 of 2)



PREFIX REFERENCE DESIGNATION WITH 1A53A3A1A5

75-009-74146

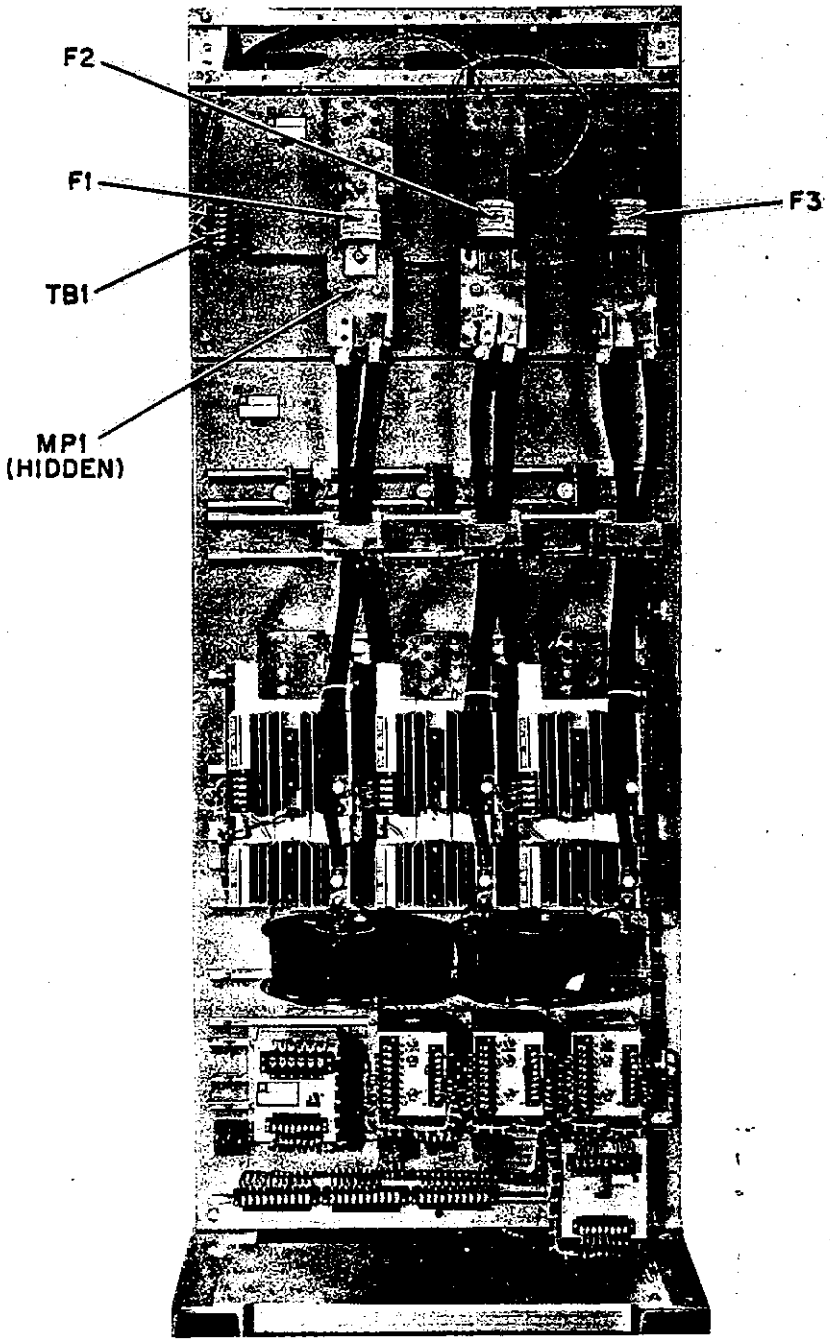
Figure 5-70. Amplifier Voltage Regulator, Cover Dropped, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A53A3A1A5

75-009-260259

Figure 5-71. Preamplifier Voltage Regulator, Underside of Cover, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A53A3A2
75-009-74114

Figure 5-72. Fuse Panel, Parts Location Diagram

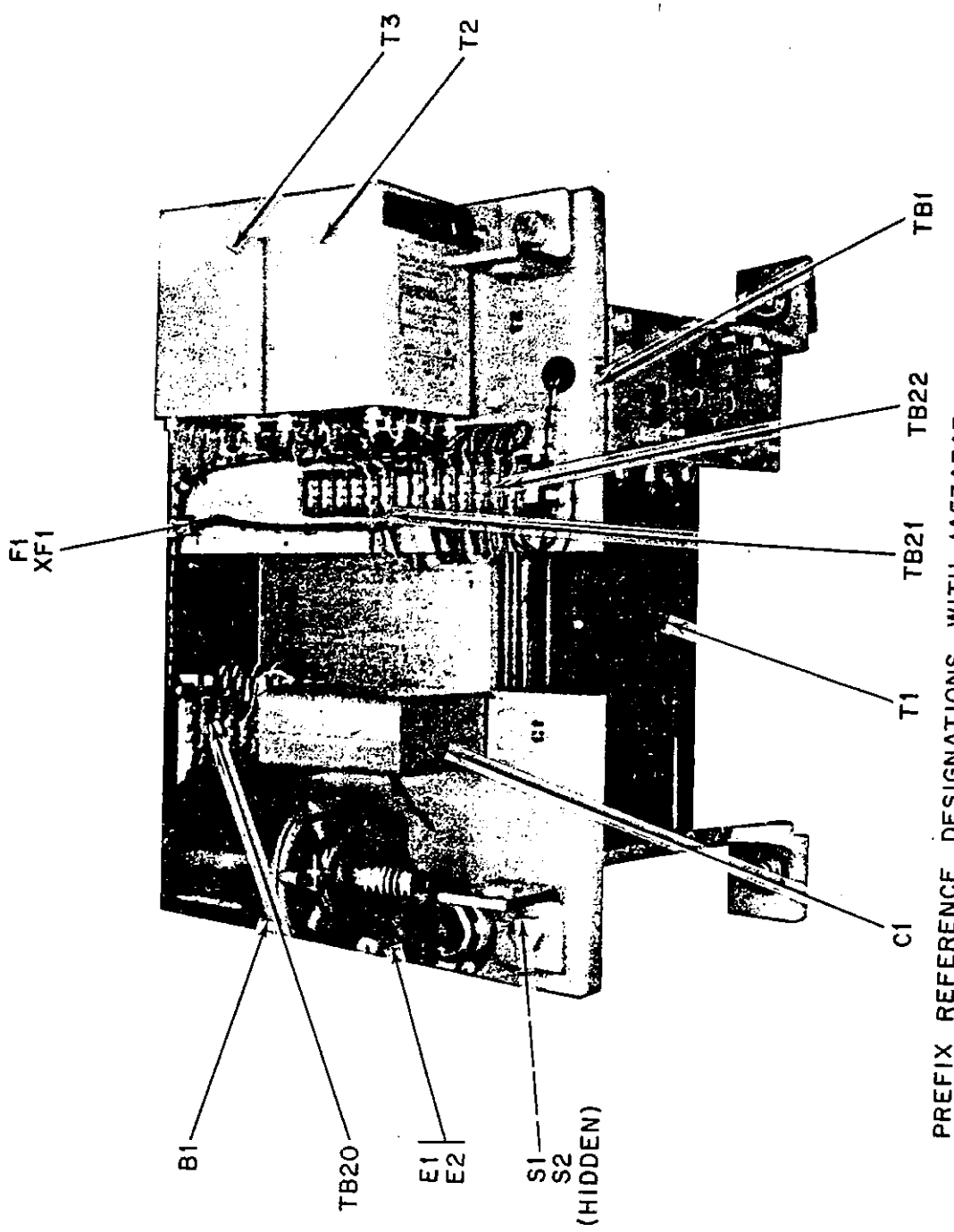


Figure 5-73. Voltage Regulator, Interior View, Parts Location Diagram

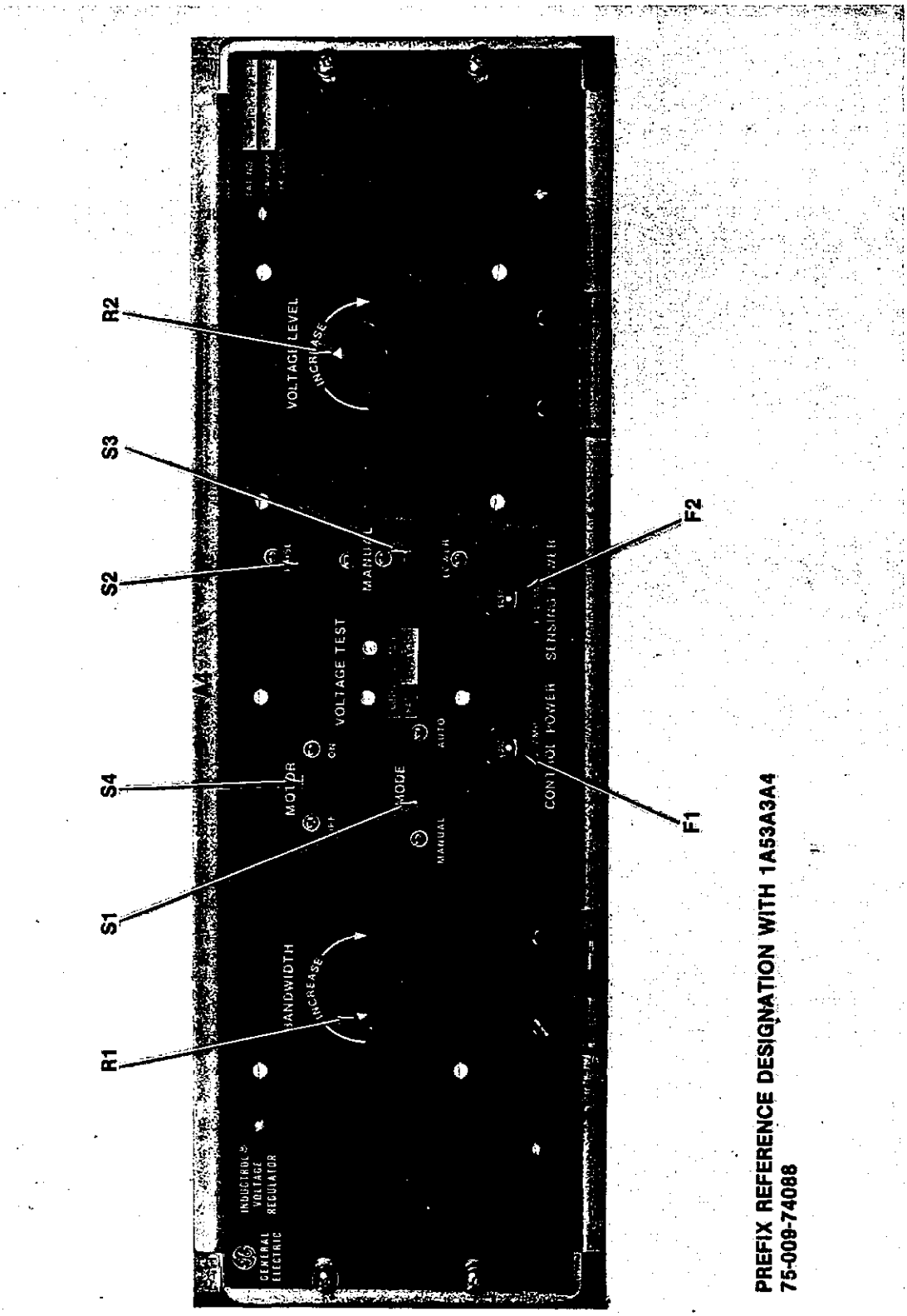


Figure 5-74. Panel Control P/O CN-1472/FPN-44A, Parts Location Diagram

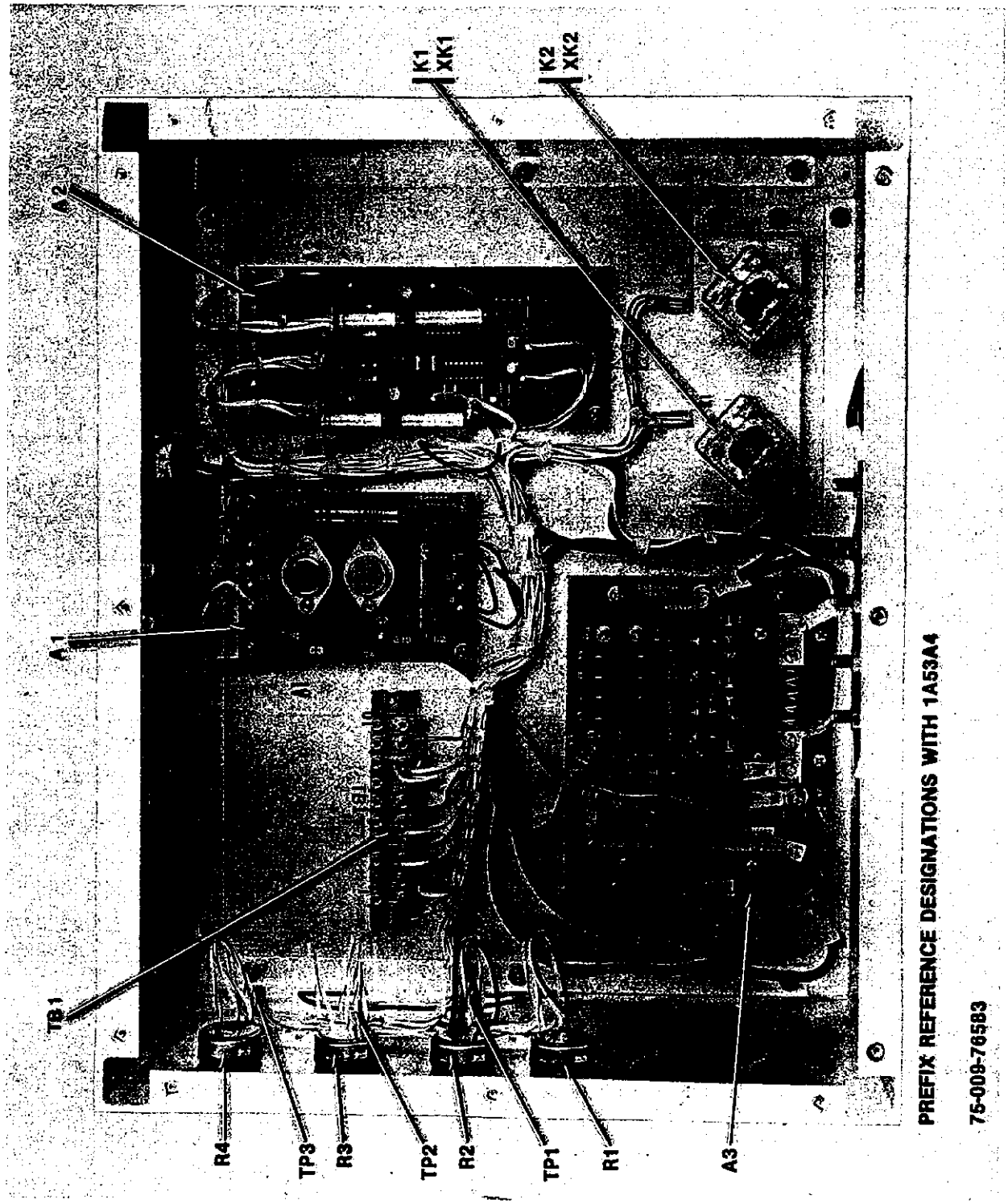
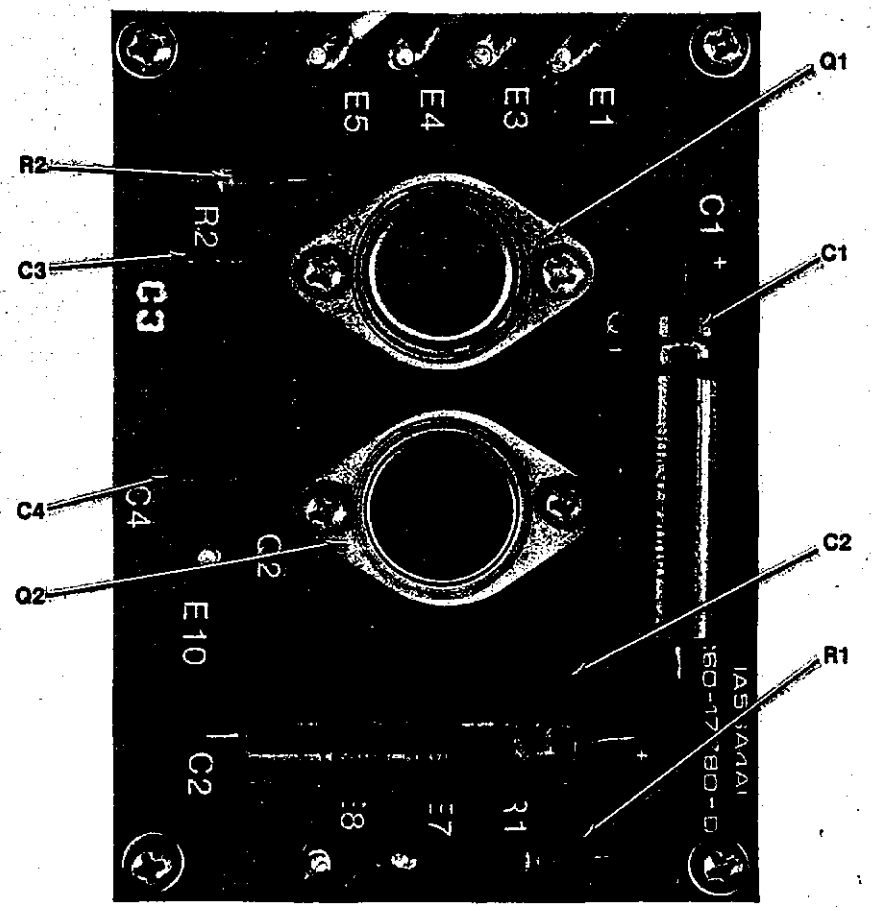


Figure 5-75. Shunt, Instrument, Parts Location Diagram



PREFIX REFERENCE DESIGNATIONS WITH 1A53A4A1, 1A53A7A1

75-009-76585

Figure 5-76. Component Board Assembly, Parts Location Diagram

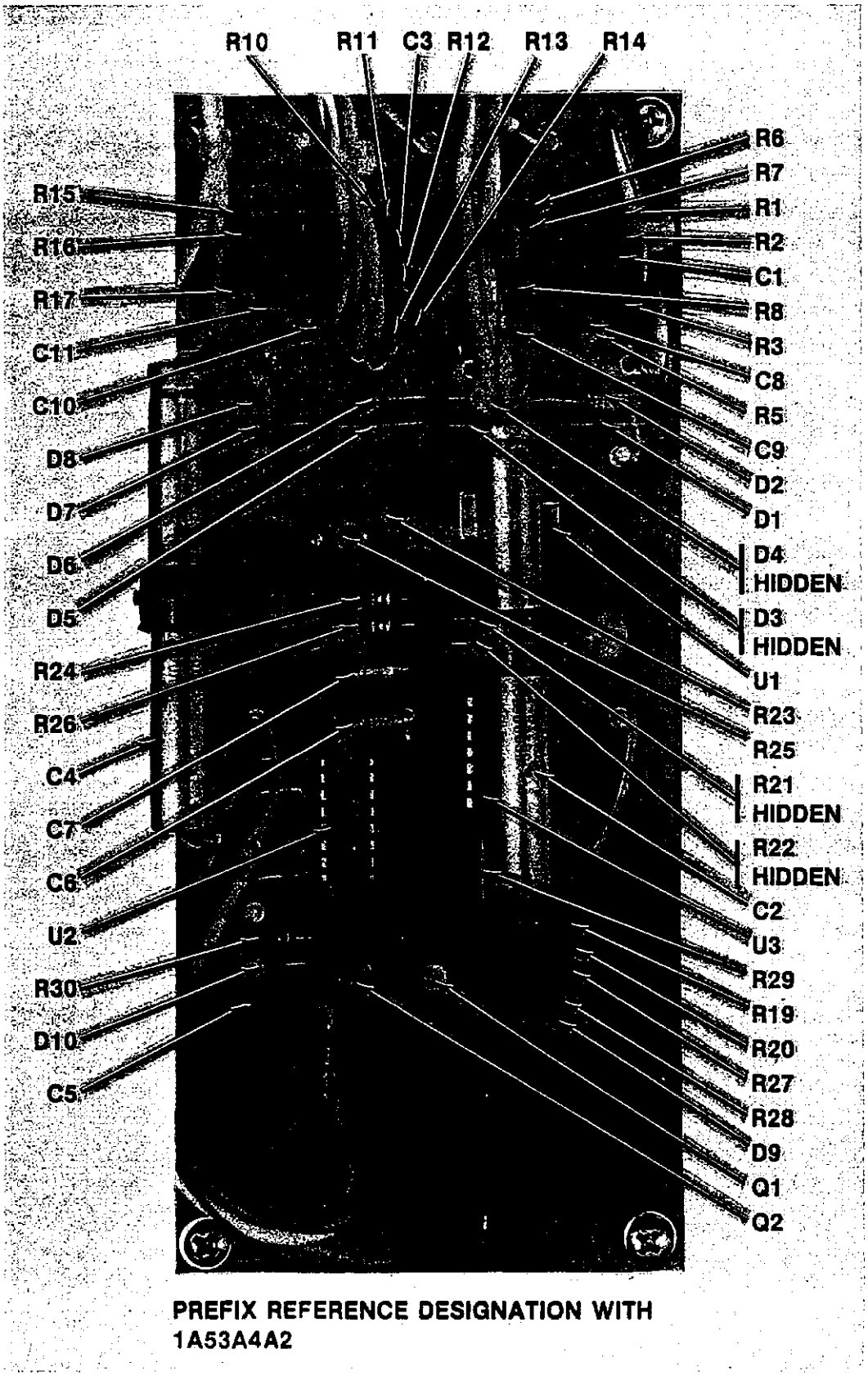


Figure 5-77. Component Board Assembly, Parts Location Diagram

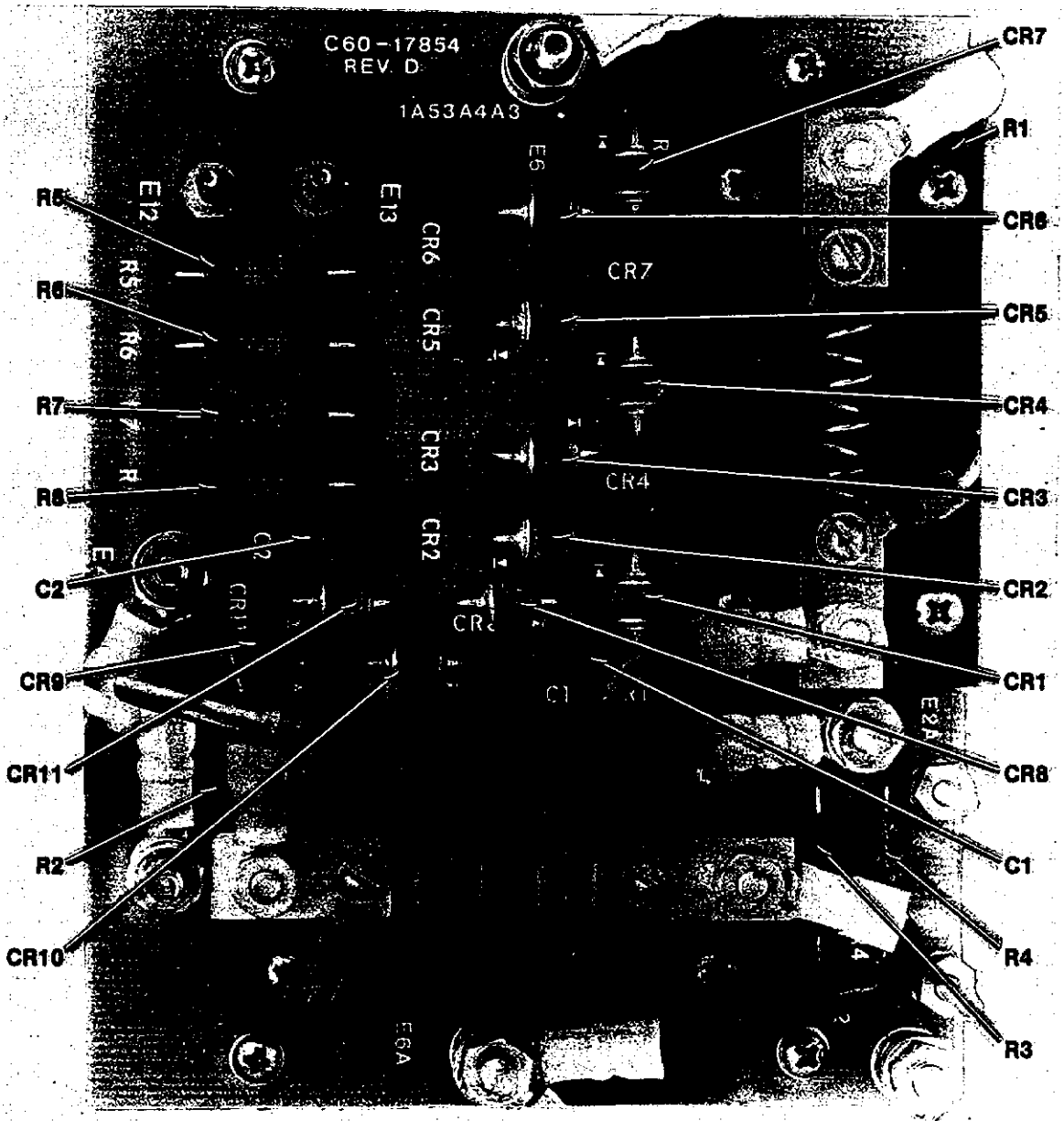


Figure 5-78. Component Board Assembly Parts Location Diagram

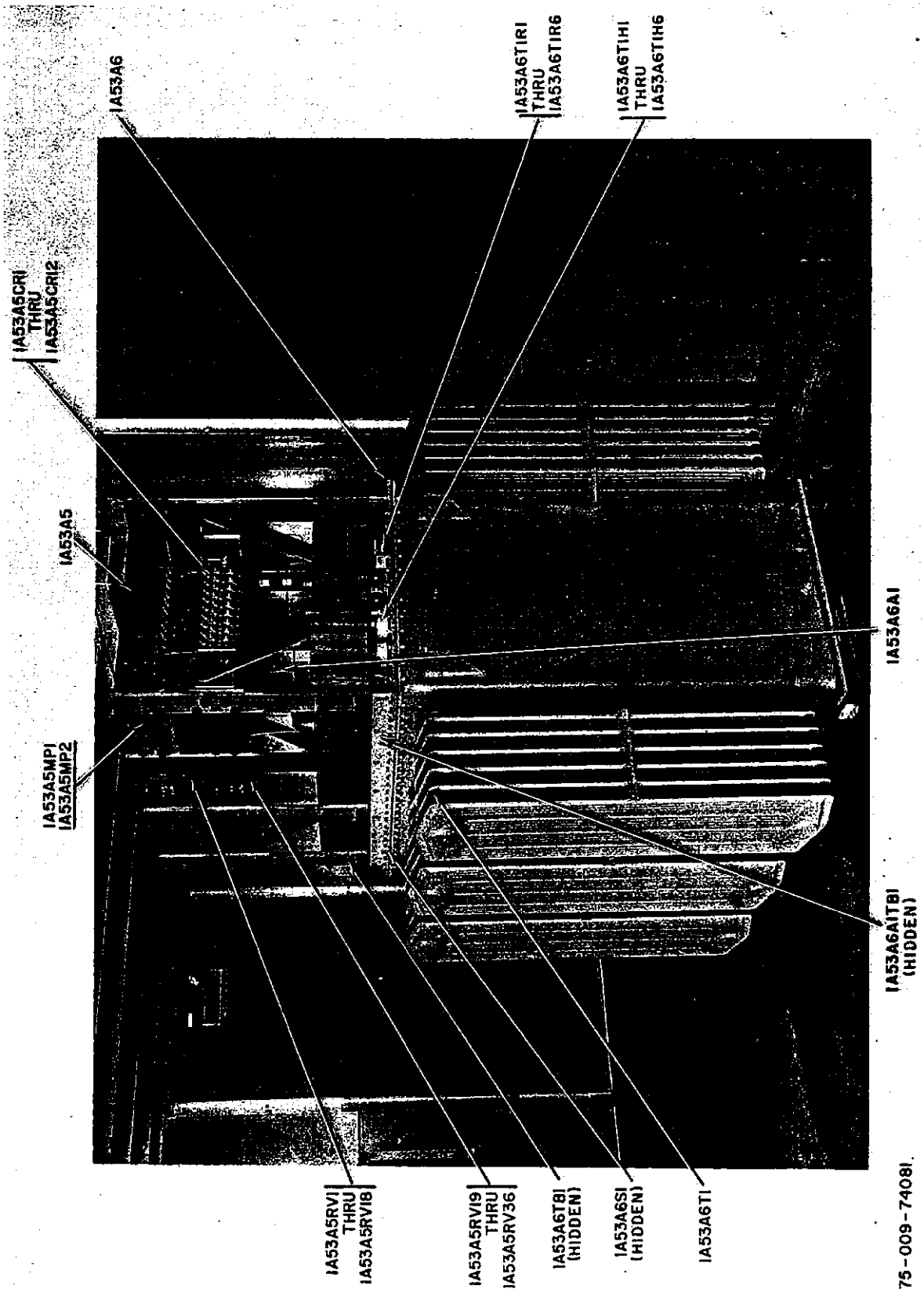


Figure 5-79. Power Supply PP-7305/FPN-44A, Parts Location Diagram

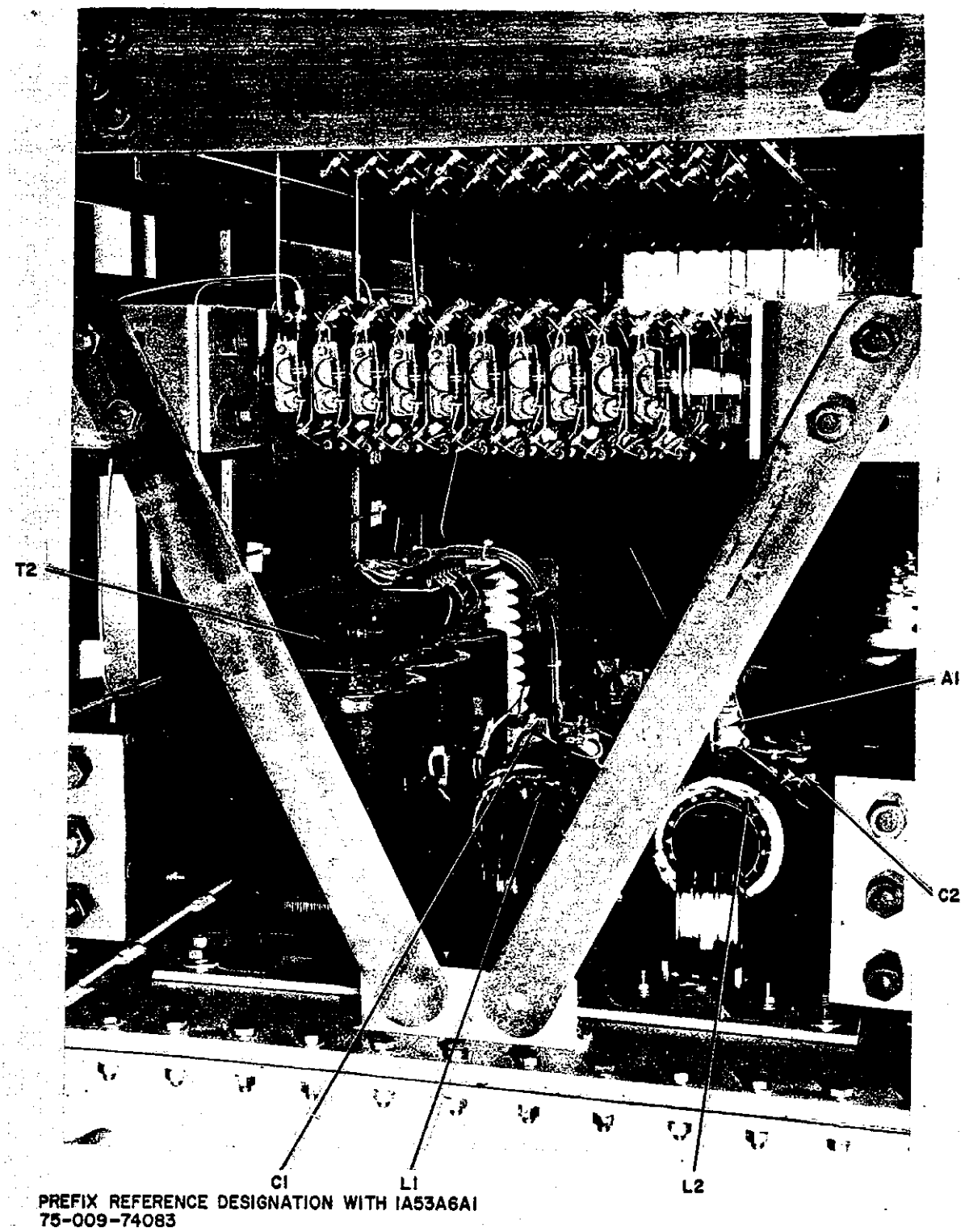


Figure 5-80. Power Supply, Parts Location Diagram

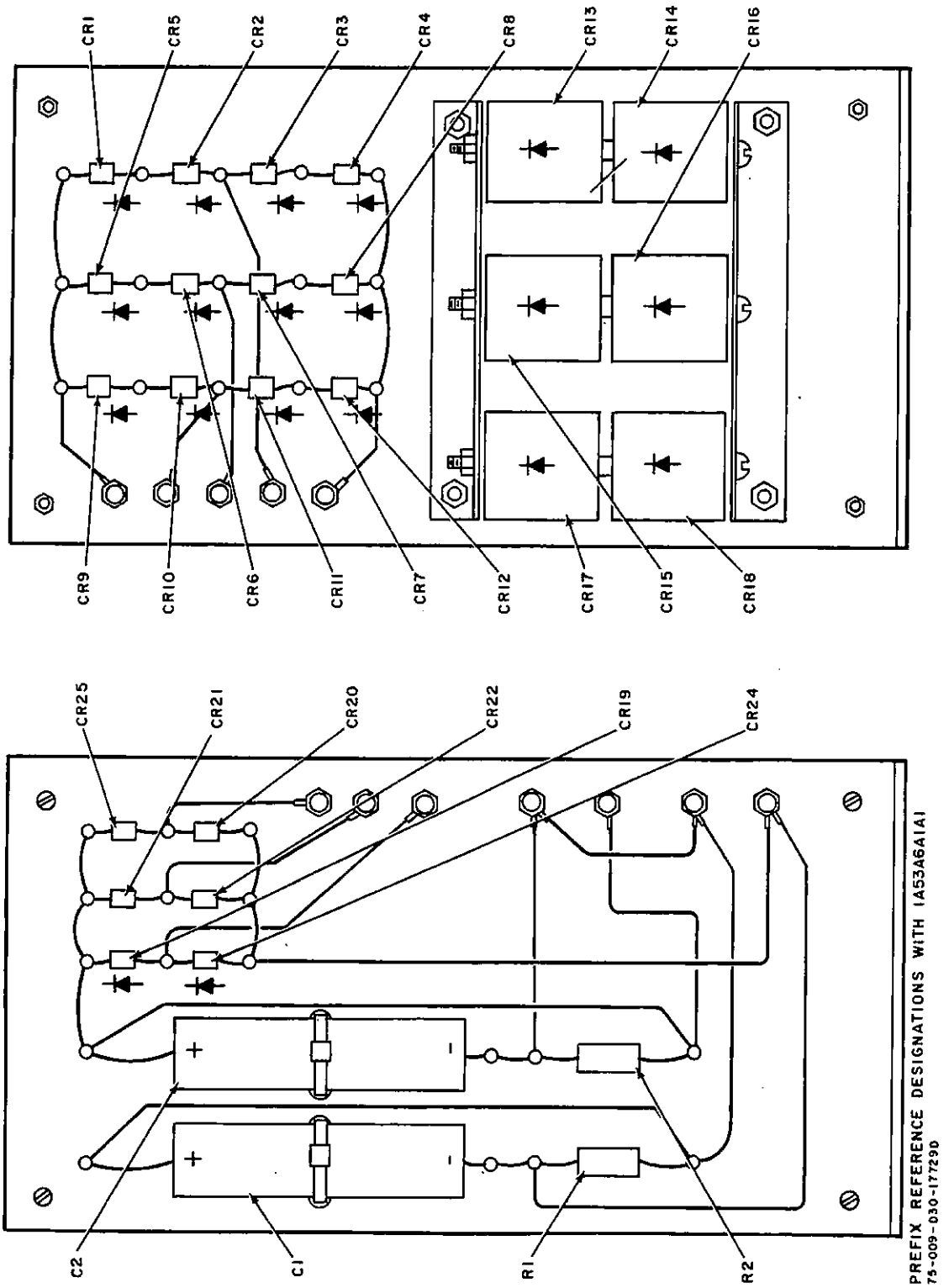


Figure 5-81. Power Supply, Parts Location Diagram

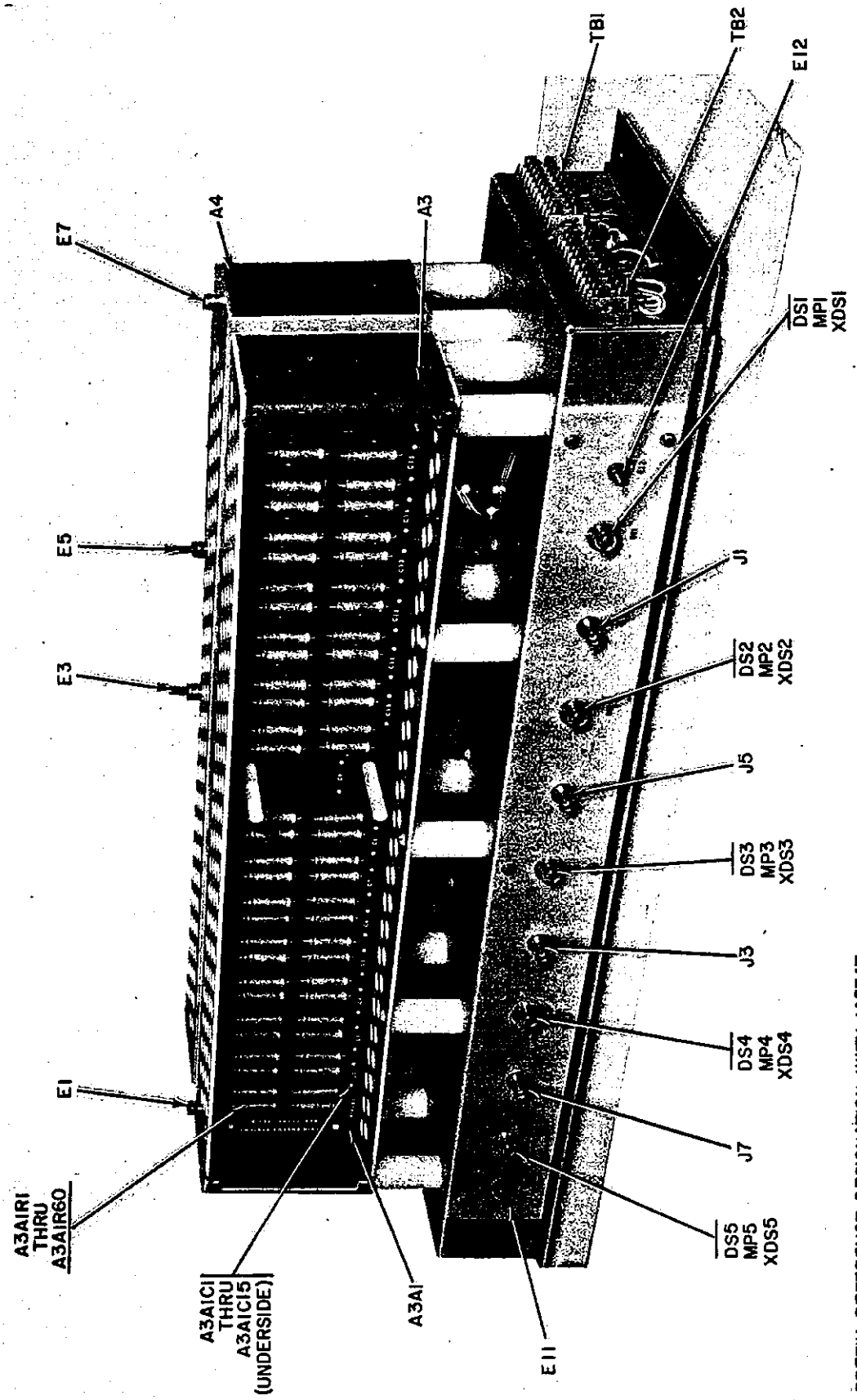


Figure 5-82. Voltage Divider CN-1474/FPN-44A, Right View, Parts Location Diagram

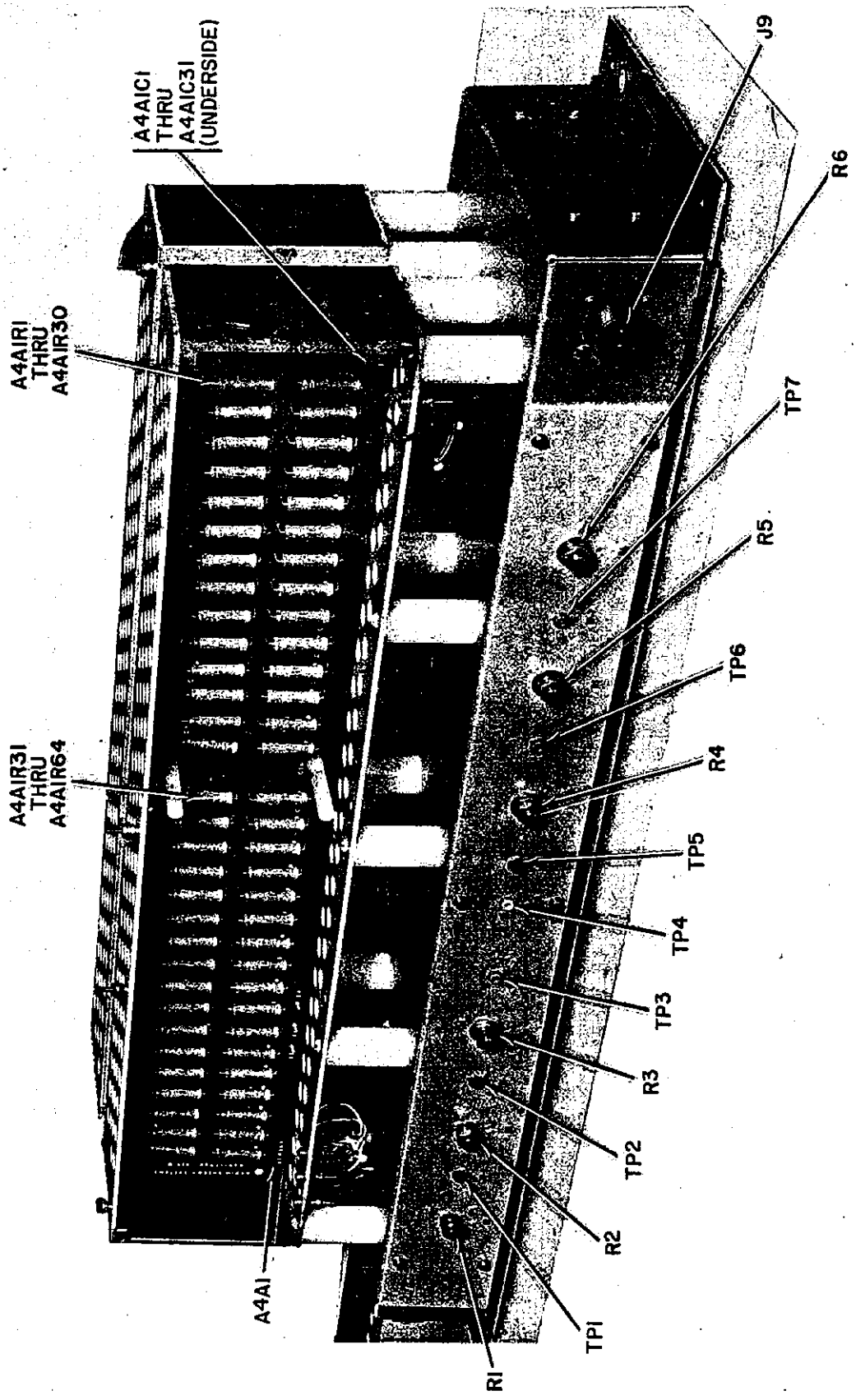


Figure 5-83. Voltage Divider CN-1474/FPN-44A, Left View, Parts Location Diagram

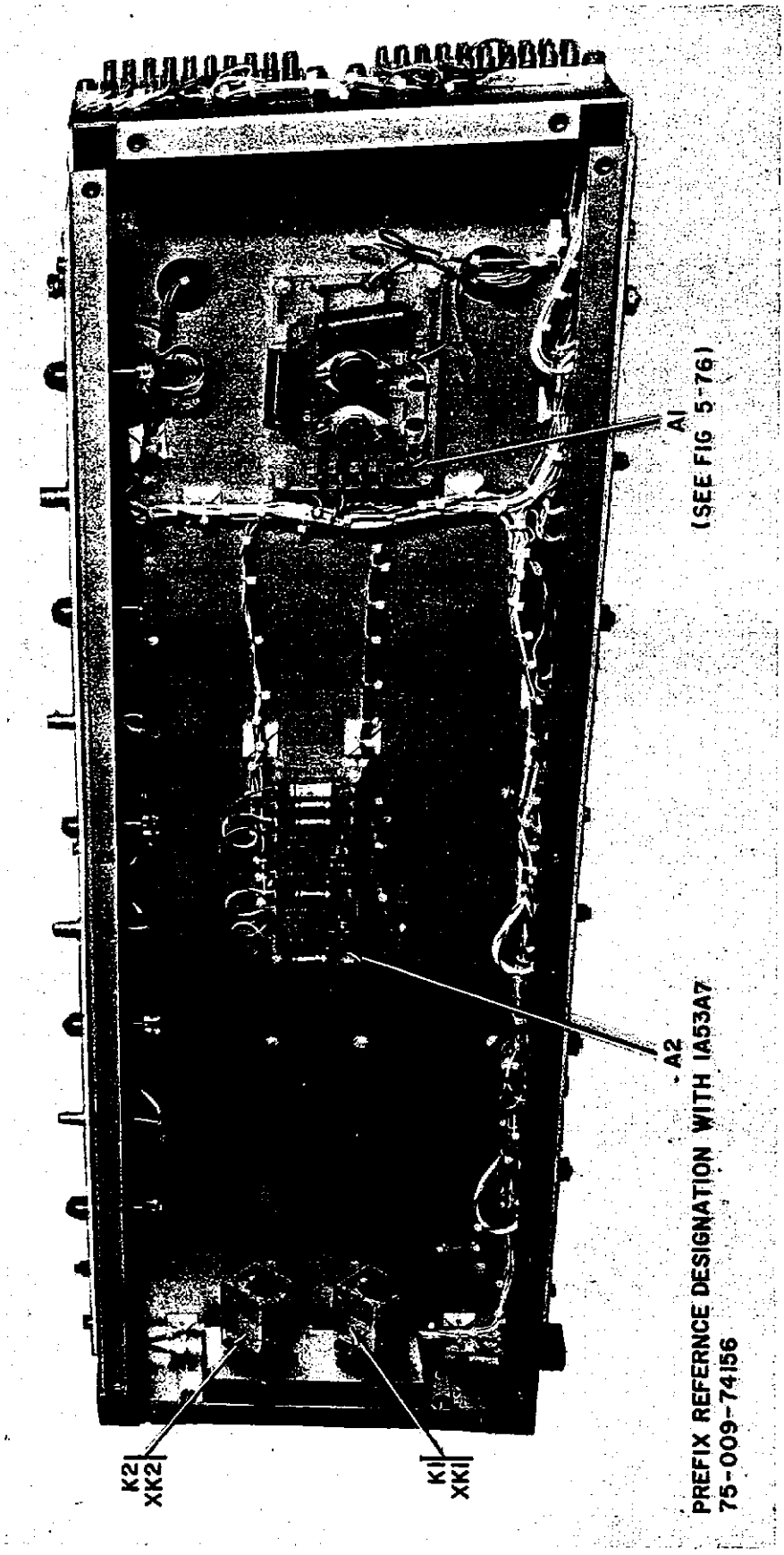


Figure 5-84. Voltage Divider CN-1474/FPN-44A, Bottom View, Parts Location Diagram

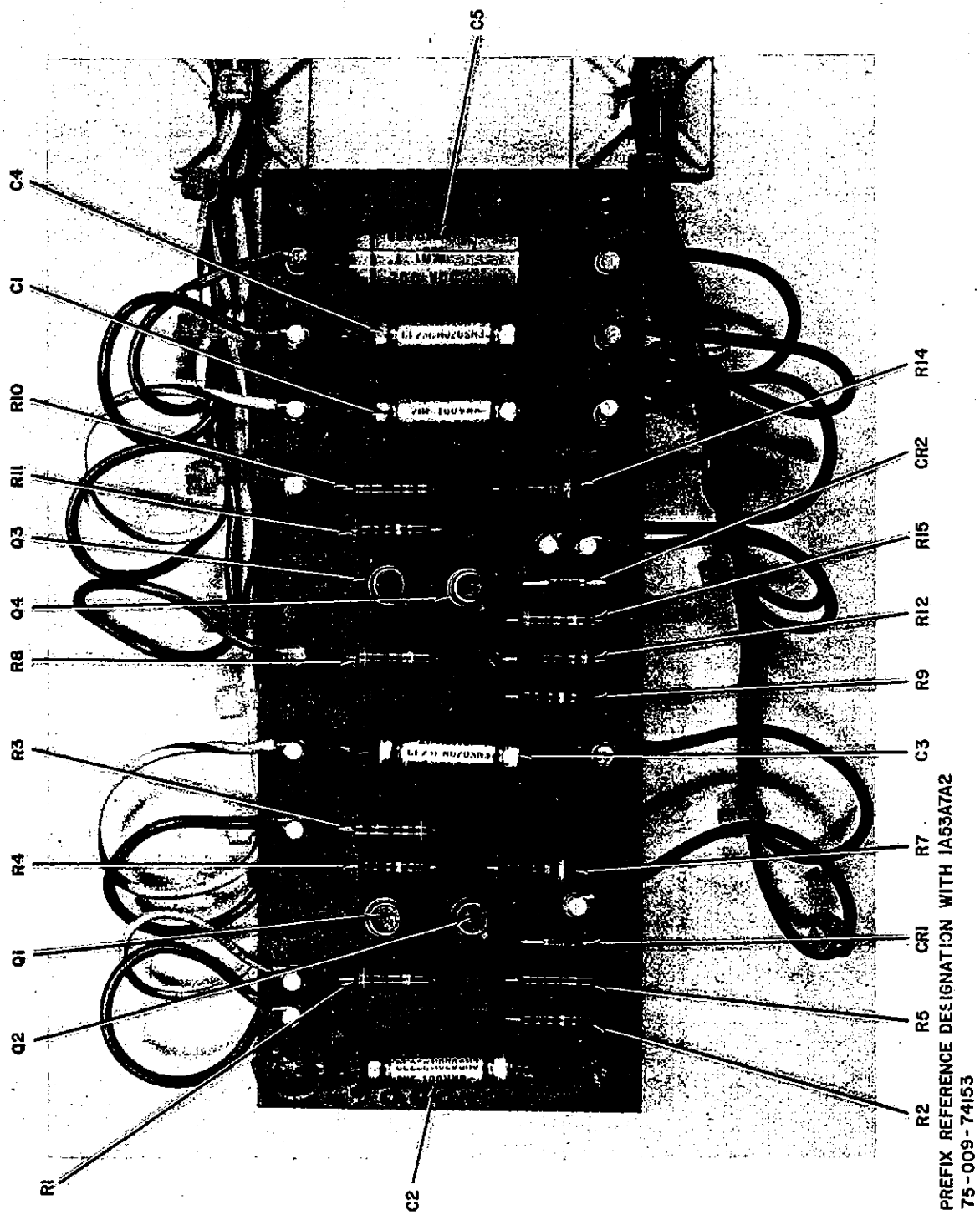


Figure 5-85. Relay Driver, Parts Location Diagram

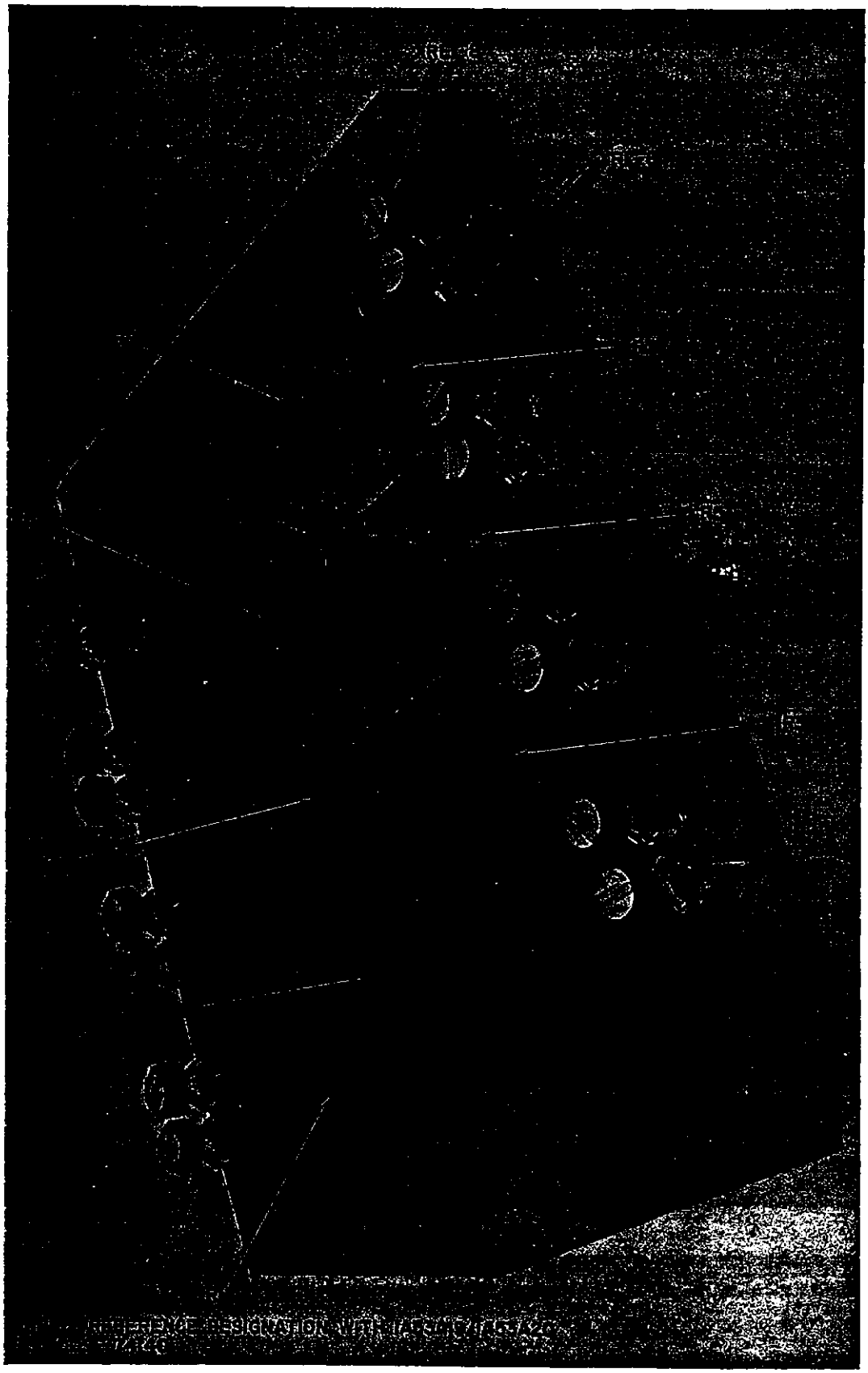
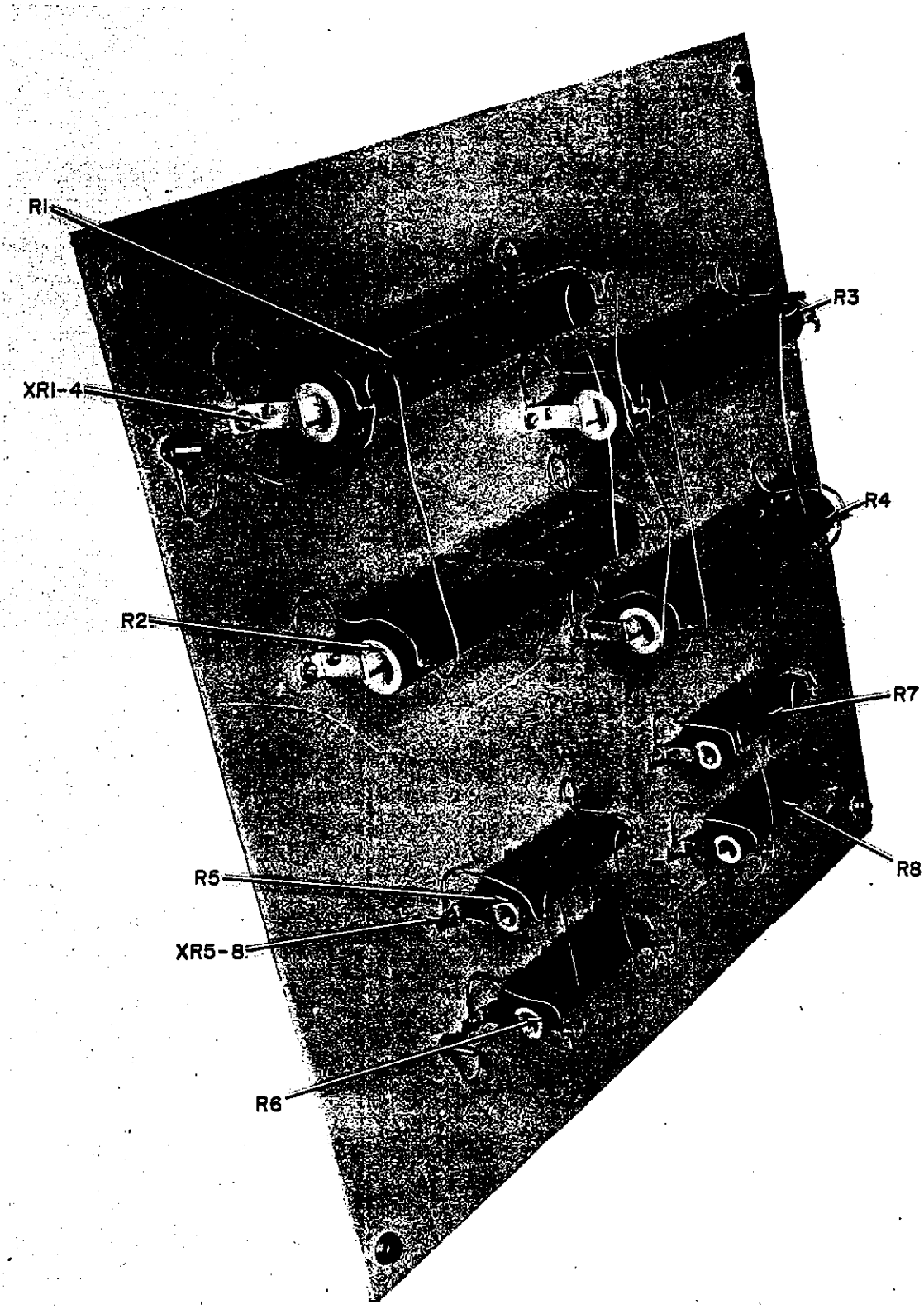


Figure 5-86. Resistor Assembly, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 1A53A23
75-009-74144

Figure 5-87. Resistor Assembly, Parts Location Diagram

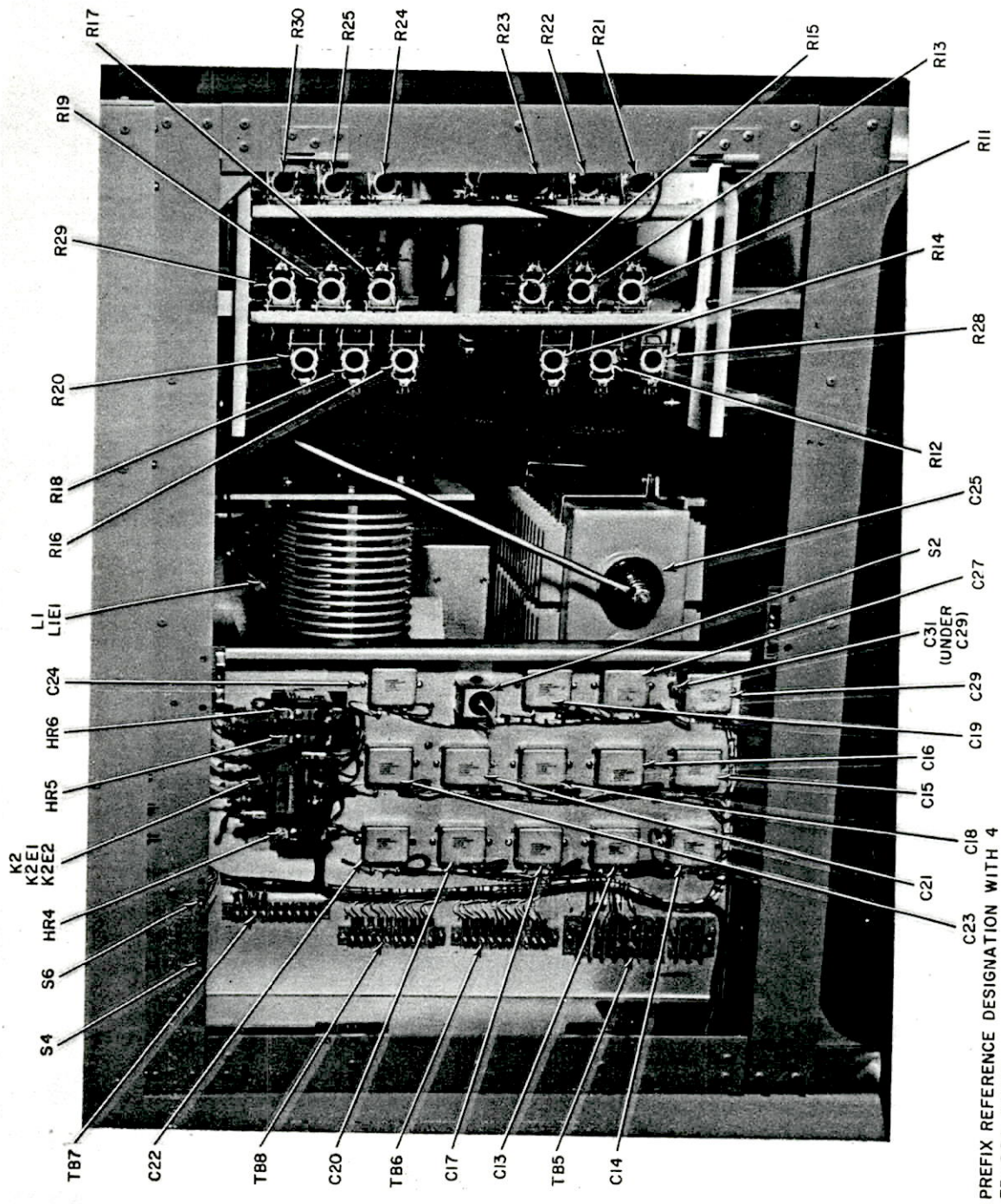
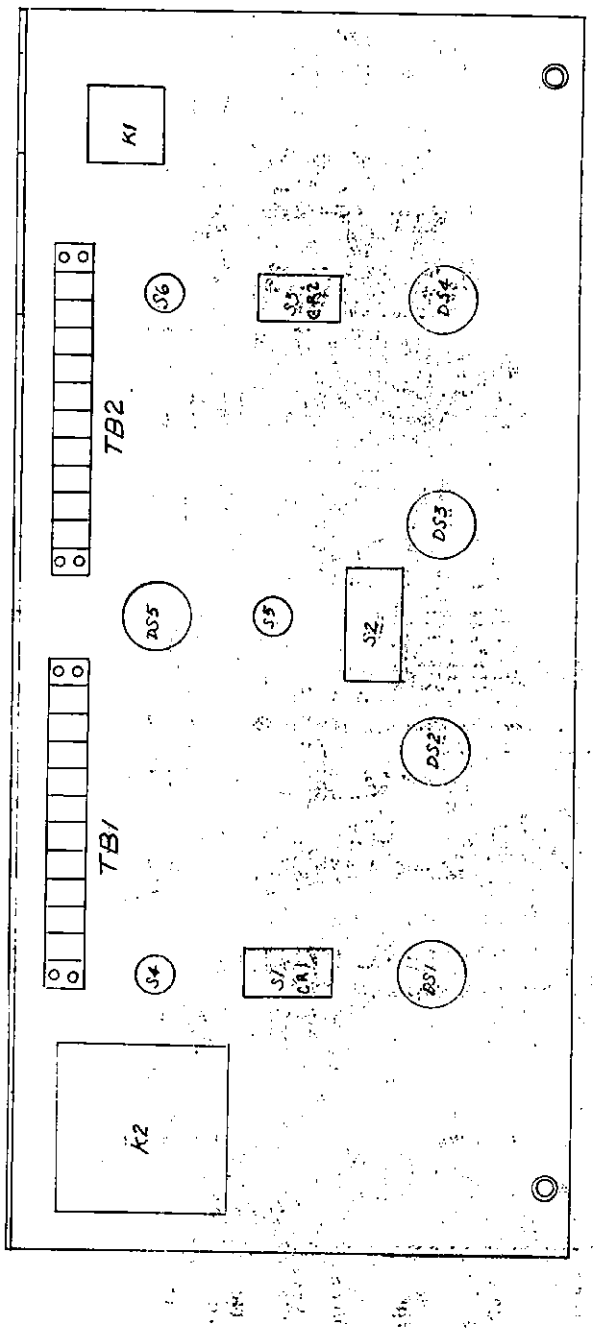


Figure 5-94. Dummy Load Electrical DA-329A/FPN-44, Right Side View, Parts Location Diagram



PREFIX REFERENCE DESIGNATION WITH 5

Figure 5-95. Local Control Unit, Inside View Parts Location Diagram