Chief, Office of Engineering

Chief, Office of Operations

Policy on Operational Requirements for Reliability of Main Power Source for Loran Stations

1. In the course of discussions from time to time between personnel of the EEE, ECV and OAN Divisions which concern generator installations for Loran stations where commercial power is used, the need has become evident for a statement of operational requirements as to reliability of the power supply.

2. The Air Coordinating Committee and ICAO have specified that in the case of long range electronic navigation systems the basic reliability should be in the order of 95%, or not to exceed a 1/2 hour outage in a 10 hour flight, or not in excess of 1 flight in 20 completely without the aid. The Coast Guard requires that notification be given the user of all outages of 1/2 hour or longer. This criteria may be translated into allowed outage time not to exceed 1/2 hour in 50 hours of operation to meet the Coast Guard goal of 99% reliability.

3. A recent statistical review of 44 weeks of operation of the East Coast Loran-C Chain shows that there were 205 power failures throughout the chain resulting in 1391 minutes of unusable time. Power failures accounted for 20.3% of the total unusable time. Each failure resulted in an average of 6.8 minutes of unusable time. The average period between power failures was 4.5 days. Our requirements allow 30 minutes total outage in 50 hours due to all factors, or allow 6.1 minutes in 50 hours (20.3%) due to power failures. The period sampled shows 6.8 minutes due to power failure in 4.5 days (108 hours) or about 50% of the allowable outage time. At the same time, recent reports from the East Coast Chain indicate that the new equipment, with its 5 minute time delay, requires approximately twice as long to return to stable operation and resynchronize after a power failure. Therefore, the experience period of 4.5 days between power failures will approximate our reliability requirements.

4. Our operational policy will be, therefore, that:

   a. At all Loran stations where commercial power is used, or will be used, local power company records for a two year period will be examined to determine the average period between power failures on the Loran station supply lines, or on supply lines similar to those which the Loran station will use.
b. At Loran stations where the average period between power failures is in excess of 4 days, generators must be capable of supplying the Loran load within 5 minutes after a power failure.

c. At Loran stations where the average period between power failures is less than 4 days, "no-break" power must be supplied.

d. Where a tripie pulsed Loran-A station, or a double pulsed Loran-C station, is concerned, the multiplicity of equipment which must be re-energized and resynchronized will cause excessive lost time and "no-break" power must be supplied.

e. At all Loran stations, instructions for operation of generators should require that, when a generator is started as a result of power failure caused by thunderstorm activity, the generator should be run until the thunderstorm has passed and atmospheric changes make it unlikely that another thunderstorm will cause a power failure within two hours.

5. At Loran stations which generate their own power, we consider that the availability of personnel, the ability to parallel generators and the reliability of generating equipment will provide a power source reliability exceeding the requirements outlined above.

W. D. SHIELDS

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