DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

Address reply to:

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19 March 1971

From: Commanding Officer, USCG Loran Station, Attu
To: Commander, Seventeenth Coast Guard District (o)

Subj: LORAN-C off air 130249Z to 140137Z Mar 71

1. At 121910Z a broken wire in the on line generator voltage regulator caused primary station power to jump from 208V to 245V. B+ was immediately secured on both LORAN-C timers, but timer S/N 8 began smoking before B+ was secured. Timer S/N 7 was not damaged. Maintenance was begun on timer S/N 8 and continued until 122315Z. At the time of the power surge the LORAN-C maintenance technician went to the transmitter building to check the transmitters. Transmitter S/N 8 was on air; transmitter S/N 7 was in standby. Transmitter S/N 8 was secured because of the timer failure. At 121922Z timer S/N 7 was operational and transmitter S/N 8 was placed on air. Transmitter S/N 7 was checked but plate voltage was not applied. There were no overload indications on number 7. In addition to the LORAN-C failures the AN/TRC-24 communications equipment was damaged by the power surge. Maintenance on that equipment continued until 130200Z. Voltage regulators associated with the LORAN-A system prevented damage to that equipment.

2. At 130249Z transmitter S/N 7 overloaded three times. The LORAN-C watchstander switched back and forth between transmitters several times but neither would come up. Maintenance was begun on both transmitters. The EMO lead the troubleshooting on transmitter S/N 8 and the ETC took number 7. The Commanding Officer was present in the transmitter building.

a. Transmitter S/N 7: Plate voltage would not come up. 1AK7 was replaced with negative results. 1AK8 and 1AK9 were checked and appeared to be operating normally. Troubleshooting was begun on 1AZ1. After determining that 1AZ1 was good K8 and K9 were again checked and found to be inoperative. Both were adjusted with negative results and then replaced at about 130800Z. Plate voltage was applied and came up to minimum. At minimum plate voltage all rectifiers were conducting heavily and 3AV9 and 3AV10 cathode current was pegged. Troubleshooting was begun on the bias circuits. 3AT4 was found leaking and replaced. 3AR76 and 3AR123 were found burned up and troubleshooting continued but no more faulty components could be found using a meter. The bias circuit was then checked out with a megger and at approximately 131730Z 3AC81 was found to be shorted. C81 was replaced but plate voltage would not come up. Control circuits were checked out and at approximately 131900Z it was determined that the problem was due to antenna coupler damage. (Earlier, severe

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arcing had occurred in the coupler during a snow shower.) 4AS3 was replaced. Differences between the installed S3 and the replacement S3 made fabrication of a section of the transmission line necessary. At about 132330Z repairs to the antenna coupler were completed. The transmitter came up in dummy load but total cathode current was only 1.5 amps. V9 and V10 were replaced and cross neutralized. While replacing V9 and V10 transmitter filament voltages were checked and filament contacts burnished. Transmitter S/N 7 came on air at 140137Z with 1.68 amps total cathode current and 26.5 amps antenna current at 15.0 KV plate voltage.

b. Transmitter S/N 8: When troubleshooting began the plate voltage on transmitter S/N 8 would not come up. The three strike relay, thermal contacts and overload relays were reset with no results. At about 130445Z the 1AZ1 overload was reset and plate voltage came up. Total cathode current was 1.7 amps. Total cathode current was fluctuating and gradually dropping off. Filament and bias voltages in the pulse driver and 1st and 2nd IPA's were checked and found good. Plate voltage was again applied. Total cathode current was fluctuating around 1.5 amps and still gradually dropping off. 3A1V3 and 3A1V4, 3AB11 and 3AB12, 3A1V1 and 3A1V2 were changed in pairs. After replacing each pair plate voltage was run up. Each time plate voltage was applied after changing tubes total cathode current would be lower than before and still fluctuating, until after changing 3A1V1 and 3A1V2 there was no total cathode current. Filament voltages were checked and signal tracing was begun. Arcing in the transmitter was noted. 3AR123 and the solid copper conductor to terminal 3 of 3AT4 were found burned up. R123 was replaced and a new conductor for T4 was fabricated and installed. Arcing persisted and the new conductor had to be removed and filed down again and insulated high voltage leads had to be rearranged to prevent arcing. The signal was then traced to the grids of 3A1V3 and 3A1V4 from which there was no output. Troubleshooting was begun in the pulse driver chassis. Filament and plate voltages were checked and R23 was found burned up. 3A1C4, 3A1C6 and 3A1C7 were replaced. At about 1500Z the EMO and ET3 MILAKOVICH went to bed. ET2 EYESTONE and ET3 DURANTE continued work on transmitter S/N 8. At about 1900Z the EMO and ET3 MILAKOVICH returned. ET2 EYESTONE and ET3 DURANTE went to bed. The ETC went to bed about 132100Z. Work was stopped on transmitter S/N 8 to concentrate on the antenna coupler so that transmitter S/N 7 could be placed on air. Work resumed on transmitter S/N 8 after the antenna coupler had been repaired at about 142330Z. After troubleshooting resumed on S/N 8 3A1R11 and 3A1R14 were found to be defective. Both had loose wiper arms which resulted in intermittent contact. Repairs were completed to transmitter S/N 8 at 140230Z and it was placed on air operating normally at 140535Z.

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The above account is based on the best recollections of those involved in troubleshooting the equipment. Most of the times mentioned are rough estimates. In addition to the technicians mentioned above, other persons were utilized as watch schedules permitted.

3. To attribute one or both transmitter failures to the "strain" placed on equipment components by the power surge is pure speculation. However, if the power surge was the cause of the failure of transmitter S/N 7 it would have been discovered immediately had number 7 been run up after the generator failure. In any case, transmitter S/N 7 should have been completely checked out immediately after the power surge. It is pointed out that there were no bias overload indications on transmitter S/N 7 at the time of the power surge or at the time of the failure. It would seem that failure of C81 should cause such an overload. Short of inducing a casualty there is no known way of checking operation of the bias overload relay.

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