

2400- OR 2600-CYCLE SINGLE FREQUENCY SIGNALING SYSTEM

SUPPLY CIRCUITS

TROUBLE CLEARING PROCEDURES

1. GENERAL

1.01 This section describes a method of clearing troubles which may be encountered in the 2400 or 2600 cycle single frequency signaling system supply circuits.

1.02 Indication of troubles will usually be obtained from alarms provided by the supply circuit itself. In some cases failure of the supply circuit may not produce an alarm. Also in small installations which are not supplied with a transfer circuit, no alarms are provided. Failure in these cases will be indicated by the receipt of trouble reports on the signaling circuits connected to the common supply circuit.

1.03 The troubles are classified as follows:

- (A) Trouble Causing a Minor Alarm.
- (B) Trouble Causing a Major Alarm.
- (C) Trouble not Causing an Alarm.
- (D) Trouble in Small Installations.

2. METHOD

(A) Trouble Causing a Minor Alarm

2.01 When a minor alarm sounds and an ODD OSC or EVEN OSC (red) lamp lights, operate the ALM CO (red) key momentarily to silence the alarm. Observe that the GD (white) lamp lights.

2.02 Operate the TRO or TRE key for the oscillator in trouble to guard against possible retransfer of the load while inspecting or testing.

2.03 Measure the output of the oscillator per Section 179-301-501 covering testing of the supply circuit. Proceed as in 2.04 if no output is present. If an output outside limits is obtained follow with procedure of 2.05. When the output is within limits proceed as in 2.06.

2.04 The following troubles may cause the circuit to have no output. Follow the accompanying procedure for locating and

clearing the trouble. When the correct output is obtained return the oscillator to service as outlined in 2.07.

(1) Blown Fuses: Inspect the fuses associated with the circuit and, if any are found blown, clear the cause and replace the blown fuse.

(2) Incorrect Voltages or Defective Vacuum Tube: Measure the d-c voltage between test points, using an M9B meter or equivalent. Approximate correct values are as follows:

Test Points	M9B Pin Jacks	D.C. Volts
F and GRD	-V and 30V	20
CA2 and CA1	-V and 3V	1.2 to 2.4

If the voltage between F and GRD has the correct value or greater and the voltage between CA2 and CA1 is low, remove the tube and replace it with one known to be good. If no output is indicated after the replacement tube warms up, remove the replacement tube and replace original tube in its socket.

(3) Defective Wiring or Apparatus: Remove power from the oscillator under investigation and make the resistance measurements necessary to check the remaining apparatus not involved in the voltage tests of (2) above, inspecting the wiring for shorts or opens.

2.05 The following troubles may result in the oscillator not meeting the output requirements. Follow the accompanying procedure for locating and clearing the trouble. When the output is back within limits return the oscillator to service as outlined in 2.07.

(1) Incorrect Voltages or Defective Vacuum Tube: Measure the d.c. voltage as described in 2.04 (2). If the voltage between test points CA2 and CA1 is low, replace the tube.

(2) Tuning Circuit Trouble: Troubles affecting retard coil A, Varistor A, the tuning condensers F1 to F8, or

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associated strapping will affect not only the frequency but the amplitude of the output. Check the frequency, and readjust if necessary, per Section 179-301-501. When using the beat frequency method a small difference of frequency will be heard as "beats", while a large difference will cause two different tones to be heard. For purpose of clearing trouble, small differences heard as beats, or small deviations from the required frequency reading may be disregarded. However, before the oscillator is returned to service make sure that the requirements of Section 179-301-501 are met.

2.06 If the measured output is within limits the following troubles may have caused the minor alarm to sound:

- (1) Defective Vacuum Tube: Measure the voltage between test points CA2 and CA1 as described in 2.04 (2). Replace the vacuum tube if this voltage is low.
- (2) Intermittent Troubles: Since there is no way to determine whether an intermittent trouble occurred in the circuit itself or in some other circuit, first check the alarm circuit, if possible, as outlined in (3) below, and then return the oscillator to service as outlined in 2.07.
- (3) Defective Alarm Circuit: When another supply circuit of the correct frequency is available proceed as follows: Patch the ODD OSC TST jack of this other supply circuit to the ODD LOAD jack of the circuit being investigated and the EVEN OSC TST jack of the replacing circuit to the EVEN LOAD jack of the defective supply. Then test the alarm circuit as outlined in Section 179-301-501.

Caution: In order to prevent service interference make the patch to the LOAD jack last.

2.07 When the trouble has been cleared and the output is back within limits, return the oscillator to service as follows:

- (1) If patches have been made to another supply, remove the patches first from the LOAD jacks and then from the OSC TST jacks.
- (2) Restore the TRO or TRE key, and operate the RSO or RSE momentarily. Observe that the GD (white) lamp and the ODD OSC and EVEN OSC (red) lamps are extinguished.

(B) Trouble Causing a Major Alarm

2.08 When a major alarm sounds, and the LOAD (green) lamp and both the ODD OSC and EVEN OSC (red) lamps light,

attempt first to restore service to the load normally supplied by the defective supply circuit as outlined in 2.09. Then follow the trouble tracing and clearing procedure of 2.10.

2.09 If another supply circuit of the correct frequency is available, patch the ODD OSC TST jack of the good circuit to the ODD LOAD jack of the defective circuit, and the EVEN OSC TST jack of the good circuit to the EVEN LOAD jacks of the defective supply. Service is now restored on the signaling circuits originally supplied by the defective oscillators, although the major alarm will continue to sound until the trouble has been corrected.

2.10 Measure the output of both oscillators per Section 179-301-501 covering testing of the supply circuit, and proceed as follows:

- (a) If no output is obtained from both oscillators the trouble probably results from battery supply failure. Proceed as described in 2.04.
- (b) If both outputs are found to be within limits, the alarm resulted either from an intermittent trouble or from a defective transfer circuit. Check the latter in accordance with Section 179-301-501.
- (c) If one only of the oscillator outputs is outside limits, investigate the defective oscillator as outlined in 2.04 in the case of no output, or 2.05. Check also the transfer circuit in accordance with Section 179-301-501.

2.11 When the output is back within limits on both ODD and EVEN oscillators, restore the supply circuit to service as follows:

- (1) Restore the TRO and TRE keys if operated.
- (2) Operate the RSO and RSE keys momentarily.
- (3) If patches have been made to another supply circuit, remove the patches, first from the LOAD jacks, and then from the OSC TST jacks.

2.12 If after clearing the trouble on either the ODD or EVEN oscillator, it appears that it may take some time to find the trouble on the other, proceed as follows:

- (1) Operate the TRE or TRO key of the oscillator still in trouble.
- (2) Operate the RSO or RSE key of the cleared oscillator.

(3) Remove the patches from the LOAD jacks of both oscillators (the cleared oscillator and the one still in trouble) and then remove the other end of the patches from the OSC TST jacks of the substituted oscillators. The supply circuit is now in a minor alarm condition. Trace and clear the trouble as outlined in 2.05 and 2.06. Then return the oscillator to service as outlined in 2.07 (2).

(C) Trouble not Causing an Alarm

2.13 In the cases of trouble which do not result in an alarm, failure of the supply is known from the receipt of trouble reports on the connected signaling circuits. Determine from these reports which of the ODD or EVEN oscillators is in trouble.

2.14 Measure the output of the defective oscillator per Section 179-301-501 covering testing of the supply circuit. Proceed as in 2.15 if the output is within limits. When the output is outside limits proceed as in 2.16 and 2.17.

2.15 If the output is within limits, there may be an open between the output of the oscillator and the tone supply resistances. Locate and clear the trouble thus restoring service to the affected signaling circuits.

2.16 If the output is outside limits, insert a No. 327A plug in the LOAD jack associated with the oscillator. If this brings back the output within limits, there may be a short or a ground in the wiring between the LOAD jack and the tone supply resistances. Locate and clear the trouble. Check that the trouble is actually cleared by removing the plug and observing that the output now remains unchanged and between limits. Removing the plug also places the oscillator back in service.

2.17 If despite the insertion of the plug in the LOAD jack the output remains unchanged and outside limits, this may

indicate failure of both the oscillator proper and the transfer and alarm circuit. Proceed as follows:

(1) Operate the TRO or TRE key corresponding to the oscillator in trouble, to restore service to the affected signaling circuit. Operate the AIM CO key momentarily to silence the resulting alarm.

(2) Proceed as outlined in 2.04 in the case of no output, or in 2.05.

(3) If another supply circuit of the same frequency is available, follow the procedure outlined in 2.06 (3) to test the transfer circuit.

(4) When the trouble has been cleared restore to service as outlined in 2.07.

(D) Trouble in Small Installations

2.18 In installations where no transfer jacks are provided (1 or 2 signaling circuits supplied from one oscillator) proceed as in 2.03, and 2.04, or 2.05 or 2.06 (1) and (2).

2.19 In installations provided with load transfer jacks (3 or 4 signaling circuits supplied from two oscillators), determine from the trouble reports whether the signaling circuits affected are supplied by the ODD or EVEN oscillator, then proceed as follows:

(1) Patch the odd or even LOAD TRANSFER jack of the oscillator in trouble to the even or odd OSC TST jack of the other oscillator thus restoring service to the affected signaling circuits.

(2) Proceed as in 2.03 and 2.04 or 2.05, or 2.06 (1) and (2). When the trouble is cleared, and the output is back within limits, restore to service, removing the patch first from the LOAD TRANSFER jack of the oscillator previously in trouble, and then from the OSC TST jack of the second oscillator.