1600- OR 2000-CYCLE SINGLE FREQUENCY SIGNALING SYSTEM

SUPPLY CIRCUIT SD-55962-01

ALARM ROUTINE, MANUAL TRANSFER

AND TROUBLE CLEARING PROCEDURES

1. GENERAL

1.01 This section outlines the procedure to be followed when responding to an alarm at the 1600 or 2000 cycle supply circuit (J68602CC).

1.02 Revised to cover test load connections for testing regulation of oscillators.

1.03 The alarms covered are, (A) Major Alarm and (B) Minor Alarm.

1.04 Because of the importance of the equipment affected and the possibility of causing delays on single frequency signaling circuits, these alarms should receive prompt attention and any trouble which causes the alarms should be cleared immediately.

2. CIRCUIT FEATURES

2.01 The supply consists of two oscillators of the same frequency, either 1600 or 2000 cycles, and an associated alarm and transfer arrangement.

2.02 Each oscillator is equipped with means for automatically regulating the output voltage under load and temperature conditions normally encountered in service.

2.03 Taps on the output transformer of each oscillator permit the use of either of two output voltages.

2.04 In case of failure of one oscillator to provide the proper output level, a minor alarm is sounded and the output leads normally connected to the failing oscillator are automatically switched to the other oscillator.

2.05 In the case of failure of both oscillators, a major alarm is sounded.

2.06 Jacks are provided to test each oscillator without transferring its load.

2.07 Jacks are provided to permit connecting to the output of each oscillator. Auxiliary contacts on these jacks disconnect the oscillator's load, cause this load to be transferred to the mate oscillator, and cause a guard lamp to be lighted.

2.08 Jacks are provided to permit connecting to the load of each oscillator. Auxiliary contacts on these jacks disconnect the oscillator, cause the major alarm to sound, and cause a load lamp to be lighted.

2.09 A key is provided for silencing the minor alarm and lighting a guard lamp. This circuit restores automatically when trouble is cleared.

2.10 Padding out resistances are provided in the distribution circuit. (Figs.3 and 4 of SD-55962-01)

2.11 A network equipped with jacks is provided for making beat frequency comparisons. Jacks are provided for connecting a head receiver. (Fig. 5 of SD-55962-01).

2.12 Jacks are provided for the patching of tone of the proper power for test purposes.

2.13 A jack is provided to permit connecting a test load to the oscillators in order to test their regulation.

3. METHOD

(A) Major Alarm

3.01 Patch a 600 ohm transmission measuring set to the ODD OSC TST jack and then to the EVEN OSC TST jack, noting the value of output indicated in each case. (The limits are -6.5 ± 0.4 dbm if leads T and R (see SD-55962-01) connect to terminals 1 and 5, respectively, of the 518A output transformer OUT; the limits are -9.6 ± 0.4 if leads T and R connect to terminals 2 and 4 of the 518A output transformer OUT)

(a) If both output levels are out of limits, proceed as described in 3.02.

(b) If either, but not both, output levels are out of limits, proceed as described in 3.03.

(c) If both output levels are within the limits, proceed as described in 3.04.

3.02(1) If another supply circuit of the correct frequency is located nearby, patch the ODD OSC TST jack of the good circuit to the ODD LOAD jack of the defective circuit and patch the EVEN OSC TST jack of the good circuit to the EVEN LOAD jack of the defective circuit. Service has now been restored on the signaling circuits normally supplied by the defective oscillator.

Note: The major alarm will continue to sound even though service is restored. This alarm will be silenced when the trouble is corrected and patch cords are removed from the LOAD jacks of the repaired supply circuit.

(2) When both oscillators are out of limits the trouble may be due to partial or total failure of the battery supply to these oscillators. Inspect for blown fuses, shorts or opens in battery wiring common to both oscillators. When the trouble is located and cleared, reset the sensitrol relays associated with each oscillator and remove any patch cords which may be connected to the oscillator output or load jacks.

Note: The minor alarm may sound momentarily as this procedure is followed. This alarm and the major alarm should cease when both oscillators are restored to service.

3.03 When only one of the outputs is found to be out of limits, proceed as follows:

(1) With the transmission measuring set patched to the OSC TST jack of the oscillator whose output is out of limits, place a 327A plug or equivalent in the LOAD jack of the oscillator whose output voltage is out of limits and observe whether the output returns to normal. If it does, proceed as described in (2) below. If it does not proceed as described in (3) below.

(2) If the output returns to normal when a 327A plug is placed in the LOAD jack, there may be a short or a ground in the wiring between the LOAD jack and the V.F. tone supply resistances. This trouble should be located and cleared. Check that the trouble is actually cleared by removing the 327A plug from the LOAD jack and noting that the oscillator's output voltage remains normal. Reset the sensitrol relays of both oscillators.

(3) If the output does not return to normal when a 327A plug is placed in the LOAD jack, there may be a trouble in the oscillator whose output is out of limits. Ordinarily, this should cause this oscillator's load to be transferred to the mate oscillator and cause the minor alarm to sound. However if the output of the mate oscillator were near its lower limit, or if this oscillator had poor regulation for any reason, addition of the extra load might cause its output to drop enough to trip its sensitrol relay. This might also occur as a result of transfer relay troubles which allow both oscillators to be placed momentarily in parallel during transfer.

(a) Attempt to restore service to the load normally supplied by the defective oscillator by the following method: Remove the cord connecting to the transmission measuring set from the OSC TST jack of the defective oscillator and place it in the OSC TST jack of the mate oscillator. Turn the lower-limit contact reset knob of the sensitrol relay associated with the mate oscillator to separate the pointer and the lower-limit contact. The OSC (red) lamp associated with the good oscillator should be extinguished. Observing the reading of the transmission measuring set, remove the plug from the LOAD jack of the defective oscillator. If the reading of the transmission measuring set drops to a value more than 3 db out of limits, immediately replace the plug in the LOAD jack of the defective oscillator. This indicates a short or ground on the load. This should be located and cleared. Otherwise, momentarily operate the ALM CO key to silence the minor alarm and note that the GD (white) lamp is lighted.

(b) If it was necessary to replace the plug in the LOAD jack of the defective oscillator, signaling tone is not being supplied to the circuits normally connected to the defective oscillator. If it was not necessary to replace this plug, the mate oscillator is now supplying tone to both EVEN and ODD signaling circuits, and, although the output voltage may be out of limits, service is restored on an emergency basis.

(4) Follow the minor alarm procedures which begin with paragraph 3.05 in order to locate the trouble in the defective oscillator. When the trouble has been cleared, transfer both loads to their respective oscillators as

described in the minor alarm methods and reset the lower limit contact of the sensitrol relay mentioned in 3.03 (3a).

(5) After normal service is restored, test the oscillator which presumably could not handle both loads with normal output voltage, using methods described in 179-205-501.

3.04 When both outputs are found to be within limits, it is possible that the alarm was brought in due to momentary battery fluctuations. Restore normal operation by resetting the sensitrol relays associated with each oscillator.

Note: After one sensitrol relay has been reset, the major alarm will cease and the minor alarm will sound. The minor alarm will cease as soon as the remaining sensitrol relay is reset.

After both sensitrol relays have been reset, check that all indicator lamps associated with the supply circuit are extinguished, showing that normal operation has been restored.

(B) Minor Alarm

3.05 At the jack strip associated with the supply circuit whose OSC (red) lamp is lighted, momentarily operate the ALM CO key to silence the alarm. Operation of the ALM CO key lights the GD (white) lamp. This lamp will automatically remain lighted until the trouble is cleared and normal operation restored, after which it will be extinguished.

3.06 Patch a 600 ohm transmission measuring set to the OSC TST jack of the oscillator whose OSC (red) lamp is lighted. Record the value of output indicated. Using a4P18A cord, patch the OSC OUT jack to the RES TST jack and note whether the output voltage when the circuit is thus "loaded" remains within 0.5 dbm of the "no load" value recorded above. (The limits are -6.5 ± 0.4 dbm if leads T and R (see SD-55962-01) connect to terminals 1 and 5, respectively, of the 518A output transformer OUT; the limits are -9.6 ± 0.4 dbm if leads T and R connect to terminals 2 and 4 of the 518A output transformer OUT.)

(a) If no output is indicated in either case, proceed as described in 3.07.

(b) If the "no load" and "load" voltages are both low, proceed as described in 3.08.

(c) If there is a difference of more than 0.5 db between the "no load" and "load" voltages, proceed as described in 3.09.

(d) If the "no load" and "load" voltages are both correct, proceed as described in 3.10.

3.07 The following troubles may cause the circuit to have no output. The accompanying procedure for locating and clearing each should be followed. As soon as an output signal is obtained, proceed as described in 3.06.

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

(2) defective vacuum tube - Remove the vacuum tube and replace it with one known to be good. If no output level is indicated after the replacement tube warms up, remove the replacement tube and replace the original tube in its socket.

(3) defective wiring or apparatus - Measure d.c. voltage on the vacuum tube socket terminals, using an M9B meter. Approximate correct values are given below. These voltages are measured to ground.

Terminal	D.C. Voltage	M9B Scale
3	-24V	30V
4	- 4V	15V
2	-22	30V
5	+119	150V
6	+ 96	150V

(4) Remove power and make resistance measurements necessary to check remaining apparatus not involved in voltage tests. Inspect wiring for shorts or opens.

3.08 The following troubles may cause the circuit to have low output level under both "no load" and "load" conditions. The procedure for locating and clearing each should be followed. As soon as a normal output signal is obtained, proceed as described in 3.06.

(1) wrong strapping on E, F, and G resistors - Strap out additional resistance as required to raise the output level to meet the requirements.

(2) weak vacuum tube - Replace the vacuum tube with one known to be good. If the output level is still low after the replacement tube has warmed up, remove the replacement tube and replace the original tube in its socket.

(3) incorrect operating voltages applied to vacuum tube - Measure dc voltages on vacuum tube socket terminals, using an M9B meter. See 3.07(3) for typical voltages.

(4) tuning circuit trouble - Troubles affecting 167M retard coil A, condensers F1 to F9, or associated strapping affect frequency as well as amplitude of output signal. Using beat frequency checking circuit check frequency of oscillator against that of its mate by patching ODD OSC TST jack to ODD OSC jack, patching EVEN OSC TST jack to EVEN OSC jack, and patching an operator telephone set to REC jack. A small difference in frequency will be heard as "beats", while a large difference in frequency will cause two distinct tones to be heard. In trouble clearing, beats may be disregarded; however, before oscillator is returned to service, limits of Section 179-205-501 should be met.

3.09 The following troubles may cause the circuit to have a greater than normal difference between its "no load" and "load" output voltage. The procedure for locating and clearing each should be followed. As soon as normal output is obtained, proceed as described in 3.06.

(1) defective 310B varistor A - Replace this varistor with one known to be good.

(2) weak vacuum tube - Replace the vacuum tube with one known to be good. If the trouble is not cleared after the replacement tube has warmed up, remove the replacement tube and replace the original tube in its socket.

(3) incorrect operating voltage applied to vacuum tube - Measure dc voltages on vacuum tube socket terminals, using an M9B meter. See 3.07(3) for typical voltages.

(4) defective output transformer OUT - make continuity tests or replace the output transformer with one known to be good.

3.10 The following troubles may cause the minor alarm to sound but will enable correct output to be measured thereafter: These procedures also provide a final test of the alarm circuit before an oscillator is returned to service.

(1) intermittent troubles - Since there is no way to determine whether an intermittent trouble occurred in the circuit itself or in some other circuit and momentarily affected supply voltages, etc., the oscillator should be returned to service after the alarm circuit is checked as described in 3.10(b). If intermittent troubles recur frequently, the oscillator should be thoroughly checked with particular attention paid to the condensers of the circuit.

(2) defective alarm circuit - With a 4P18A cord connecting the OSC OUT jack to the RES TST jack, reset the sensitrol relay and observe whether the pointer returns to a position near the center (black) scale mark. If it does, remove the cord connecting the OSC OUT jack to the RES TST jack. If there is a plug in the LOAD jack, remove that plug also. Observe that the GD (white) lamp is extinguished indicating that the circuit has been returned to service. If the pointer of the sensitrol relay does not return to a position near the center black scale mark, the alarm circuit may be in trouble. This may be due to; a defective rectifier associated with the sensitrol relay, a defective sensitrol relay or, in circuits wherein the T and R leads (output) connect to terminals 2 and 4 of the 518A output transformer OUT, to a defective output transformer. These should be replaced one at a time in the order named and an attempt made to reset the sensitrol relay after each is replaced. When the pointer takes up a position near the central black scale mark, indicating the trouble is cleared, remove the cord connecting the OSC OUT jack to the TST RES jack. If there is a plug in the LOAD jack, remove that plug also. The GD (white) lamp should be extinguished, indicating that the circuit has been returned to service.

4. MANUAL TRANSFER

4.01 To transfer the load of an oscillator to the mate oscillator, insert a 327A, or similar plug in the oscillator's OSC OUT jack. The GD (white) lamp should light.

4.02 To restore the load to its normally-associated oscillator, remove the plug from the oscillator's OSC OUT jack. The GD (white) lamp should be extinguished.

5. REPORTS

5.01 The required reports of these alarms should be entered on the proper form.