MULTIFREQUENCY PULSING SUPPLY SD-95086-01 (J-98608)

TESTS

1. GENERAL

1.01 This section describes a method of testing the multifrequency pulsing supply circuit J98608 (SD-95086-01).

1.02 This section is reissued to incorporate material from the addendum in its proper location. In this process marginal arrows have been omitted.

1.03 The tests covered are:

(A) Switching Battery Alarm
(B) Transfer Feature
(C) Frequency Test Using the Oscillators Under Test
(D) Frequency Test Using a Variable Frequency Oscillator
(E) Oscillator Output - Voltage
(F) Oscillator Output - db
(G) Plate Battery Alarm
(H) Alarm Test for Ground on Output Leads
(I) Voltage Alarm - Using A-c Voltmeter
(J) Voltage Alarm - Using Transmission Measuring Set
(K) Current Alarm
(L) Frequency Test Using the No. 72A Frequency Meter

1.04 An assistant at the location of the 6010B oscillator or the transmission measuring system may be required for tests (D), (F) and (J).

1.05 The limits specified for frequency tests in Test (D) are for testing purposes only and are based upon tolerance inherent in testing equipment listed herein.

1.06 Test (C) is a means of making a rough check of frequency by comparing two like frequencies. It is expected that this test will normally be used. When the results of this test are not within limits specified or when measurement of frequency is required, Test (D) or (L) should be made.

1.07 Only one test of output and of the voltage alarm is required. Either test (E) or test (F) and either test (I) or test (J) should be made depending upon the test equipment available.

1.08 Test (B) and Tests (D) to (K) should be made at periods of light load and preferably when test circuits using multifrequency pulsing are not being used in order to minimize signal multilation when the transfer feature operates.

1.09 (~) is used in the methods to indicate the oscillator output jacks designated (700~), (900~), (1100~), (1300~), (1500~) or (1700~).

2. APPARATUS

Test (A)

2.01 No. W3M cord 6 feet long, equipped with 1 No. 310 plug and 3 No. 360 tools (3W4A cord) with 3 No. 365 tools.

Test (C)

2.02 Two P2AA cords, 6 feet long, equipped with No. 241A plugs, (2P13B cord).

2.03 L2K cord 4 feet long equipped with a No. 289A plug (2W2A cord).

2.04 No. 716E or No. 528 receiver.

Test (D)

2.05 No. 6010B oscillator.

2.06 P2AA cord, 6 feet long, equipped with No. 241A plugs (2P13B cord).

2.07 Two wire patching trunk from the multifrequency supply bay to the variable frequency oscillator bay.

2.08 Test circuit for beat method of checking frequencies consisting of the following apparatus and connected as shown in Fig. 1.

No. 5A attenuator or equivalent
Two W2S cords, 2 feet 6 inches long, equipped with No. 241A plugs (2W14A cord)
R2BT cord
No. 12E connecting block
No. 716E or No. 528 receiver

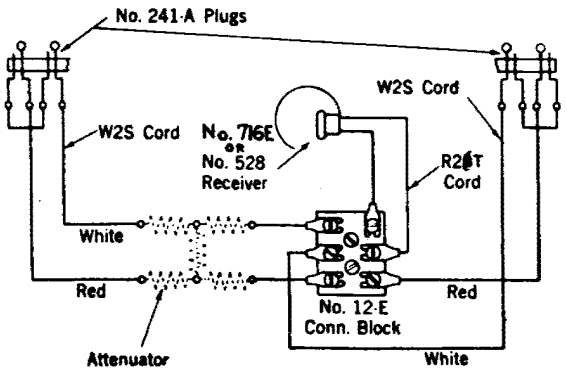

Fig. 1

Test (E)

2.09 One W2W cord, 6 feet long, equipped with a No. 310 plug (2W17A cord) and one W2S cord, 2 feet 6 inches long, equipped with a No. 241A plug (2W14A cord) modified as follows: Solder the No. 131 cord tip connected to the white conductor of the W2S cord and the 360C (white) tool of the W2W cord to opposite ends of a No. 106A resistance (8000 ohms) and solder the remaining No. 131 cord tip of the W2S cord to the 360B (black) tool. Cover all exposed cord tips and conductors with tape.

2.10 A-C voltmeter test set J68602AH (SD-64125-01) or J68602AJ (SD-63674-01) calibrated as follows: Using the cord covered in 2.09 connect the voltmeter in parallel with the transmission measuring set, which is in the level measuring condition, to an a-c source having a frequency between 700 and 1700 cycles. Adjust the output of the a-c source to +17.8 dbm as read on the transmission measuring set. Turn the zero adjusting screw of the voltmeter as required until the pointer indicates 3 volts on the 4 volt scale. The voltmeter indicates one half the actual voltage of the a-c source due to the 8000 ohm series resistance in the modified cord.

Test (F)

2.11 Two P2AA cords, equipped with No. 241A plugs (2P13B cord).

2.12 No. 40B transmission measuring system or the electrical equivalent.

2.13 Two wire patching trunk from the multifrequency supply bay to the measuring bay.

Test (G)

2.14 Two W2W cords, 6 feet long, equipped with a No. 310 plug and 2 No. 360 tools (2W17A cord) with 2 No. 365 tools and 2 No. 364 tools.

2.15 No. 35 type test set.

Test (H)

2.16 No. 893 cord, 3 feet long, equipped with No. 360A tools (1W13A cord) with 2 No. 365 tools.

Test (I)

2.17 P2AM cord, 8 feet long, equipped with a No. 309 plug and a No. 327A plug (2P22A cord).

2.18 Special cord as covered in 2.09.

2.19 A-C voltmeter test set (J68602AH or J68602AJ) calibrated as covered in 2.10.

2.20 35 Type test set.

Test (J)

2.21 P3P cord, 4 feet long, equipped with No. 305A plugs (3P20A cord).

2.22 W2W cord, 6 feet long, equipped with a No. 310 plug and No. 360 tools (2W17A cord).

2.23 P2AA cord, 6 feet long, equipped with No. 241A plugs (2P13B cord).

2.24 Two wire patching trunk from the supply bay to the measuring bay.

2.25 No. 40B transmission measuring system or the electrical equivalent.

2.26 35 Type test set.

Test (K)

2.27 P2AA cord, 6 feet long, equipped with No. 241A plugs (2P13B cord).

Test (L)

2.28 No. 72A frequency meter.

2.29 P2AA cord, 6 feet long, equipped with No. 241A plugs (2P13B).

3. METHOD

(A) Switching Battery Alarm

3.01 Insert the plug of the W3M cord into the BA jack associated with the odd numbered circuit of a pair of oscillator circuits. Observe that the B OFF lamp lights and that the office alarm operates.

3.02 Operate B ALM (battery alarm) key. Observe that B ALM lamp lights and office alarm restores to normal.

3.03 Connect the sleeve conductor (red tool) of the W3M cord to 48 volt battery. Observe that the B OFF lamp is extinguished.

3.04 With the sleeve connected to battery, connect the tip conductor (white tool) of the W3M cord to 48 volt battery. Observe that the B OFF lamp lights.

3.05 Remove the tip conductor of the W3M cord from battery. Observe that the B OFF lamp is extinguished.

3.06 With the sleeve connected to battery, connect the ring conductor (black tool) of the W3M cord to 48 volt battery. Observe that the B OFF lamp lights.

3.07 Remove the ring conductor of the W3M cord from battery. Observe that the B OFF lamp is extinguished.

3.08 Remove the sleeve conductor of the W3M cord from battery and remove the plug from the BA jack. Disregard lighting of the B OFF lamp while removing connections.

3.09 Repeat 3.01 to 3.08 inclusive on the even circuit of the pair of oscillators. Restore the B ALM key to normal.

Note: When 3.01 is applied to the even circuit, the office alarm will not operate as the B ALM key is operated.

(B) Transfer Feature

3.10 Block non-operated the PL relay in the odd oscillator circuit. When the frequencies are supplied to senders, observe that the associated G1 relay operates and then releases. Observe that the VOLT lamp lights and that the associated B1 to B5 relays operate and the office alarm operates.

3.11 Operate the SW (switch) key associated with the odd oscillator circuit. Observe that the SW lamp of the odd circuit lights and the alarm is silenced.

3.12 Remove the blocking tool from the PL relay. Observe that the VOLT lamp is extinguished but relays B1 to B5 remain operated.

3.13 Restore the SW key to normal. When the frequencies are supplied to senders, observe that the associated G1 relay operates and then releases. Observe that the SW lamp is extinguished and the B1 to B5 relays release. Disregard a momentary operation of the office alarm.

3.14 Repeat 3.10 to 3.13 inclusive on the even oscillator circuit.

(C) Frequency Test Using the Oscillators Under Test

3.15 Using P2AA cords, plug into the OSC1 and OSC2 jacks of the frequency test circuit and then plug into the (-~) jacks of the two oscillators producing like frequencies. Using the L2K cord, connect the 528 receiver to the REC jacks of the frequency test circuit.

3.16 Listen in the receiver. Observe the frequency beats and if the beats can be counted (generally 5 per second or less), the oscillators may be considered satisfactory. The beats heard are the difference in frequencies of the two oscillators being compared. If the rate is more than can be counted, check each oscillator of the pair against other oscillators producing like frequencies, in order to determine the one causing the excessive beats. Check this oscillator in accordance with test (D).

3.17 Remove the plugs from the oscillator test jacks.

3.18 Repeat 3.15 to 3.17 inclusive for each frequency until each oscillator has been checked with another oscillator, producing a like frequency.

(D) Frequency Test Using a Variable Frequency Oscillator

3.19 Operate the SW key associated with the oscillator circuit to be checked. The SW lamp will light.

3.20 At the variable frequency oscillator bay, connect the oscillator output jacks to the two wire patching trunk terminated at the multifrequency supply bay, using the test circuit made up locally as covered in 2.08 so that the beat method of comparing frequencies can be used. The plug of the test cord connected to the attenuator, should be inserted into the jack of the patching trunk. The attenuator provides means of adjusting the level of the multifrequency oscillator output to facilitate the detection of beats.

3.21 At the multifrequency oscillator bay, plug into the two wire patching trunk from the variable frequency oscillator bay and then plug into the (-~) jacks of the oscillator under test, using a P2AA cord.

3.22 Adjust the variable frequency oscillator until the frequency beats are less than 1 beat per second and from its calibration data determine the frequency of the oscillator under test to within 0.5 per cent accuracy. Observe that this frequency is within the limits shown in the following table for the frequencies being checked.

Frequencies Cycles per Second	Limits Cycles per Second
700	± 11
900	± 14
1100	± 17
1300	± 20
1500	± 23
1700	± 26

Note: The 6010B oscillator is calibrated in 20 cycle steps at these frequencies. In order to determine the frequency within 0.5 per cent accuracy, it will be necessary to interpolate between the calibrated points. This can be done by plotting frequency against condenser dial settings for the necessary points on the

calibration chart and drawing a curve connecting these points. For the purpose of this curve use the air condenser dial reading, which is a multiple of 10 and nearest the recorded value as the fourth digit of the total condenser value. Therefore, if a calibration chart indicates a fixed condenser dial reading of .062 and an air condenser dial reading of 77 for 440 cycles, the condenser value to be plotted for this frequency is .0628. If the air condenser reading is 73, then the condenser value to be plotted is .0627.

3.23 Remove the plug from the (~) jacks.

3.24 Repeat 3.20 to 3.23 inclusive on all oscillators of the oscillator circuit under test.

3.25 At the completion of frequency tests on the oscillator circuit, restore the SW key to normal. The SW lamp will be extinguished.

3.26 Repeat 3.19 to 3.25 inclusive on all oscillator circuits.

(E) Oscillator Output - Voltage

3.27 Operate the SW key associated with the oscillator circuit to be checked. The SW lamp will light.

3.28 Using the cord covered in 2.09, plug into the L jack of the a-c voltmeter test set and then plug into the (~) jacks of an oscillator.

3.29 Operate the voltmeter scale key to the 4 position. Observe that the voltmeter reads 3.0 ± 0.15 volts. Record the voltmeter reading for use in Test (I).

Note: It may be necessary to change the connection of the X lead to the terminals of the L coil of the oscillator. Readjust until a meter reading of 3.0 ± 0.1 volts is obtained.

3.30 Remove the plug from the (⊢) jack of the oscillator.

3.31 Repeat 3.28 to 3.30 inclusive on each oscillator of the oscillator circuit.

3.32 At the completion of output tests on the oscillator circuit, restore the SW key to normal. The SW lamp will be extinguished.

3.33 Repeat 3.27 to 3.32 inclusive on all oscillator circuits.

(F) Oscillator Output - db

3.34 Operate the SW key associated with the oscillator circuit to be checked. The SW lamp will light.

3.35 Using a P2AA cord plug into the two wire patching trunk, which has been patched to the transmission measuring set, and then plug into the (~) jacks of an oscillator.

3.36 Observe that the transmission measuring set, arranged for measuring level, reads an output of +17.8 dbm ± 0.4 db. Record the reading of the transmission measuring set, for use in Test (J).

Note: It may be necessary to change the connection of the X lead to the terminals of the L coil of the oscillator. Readjust until the transmission measuring set reads +17.8 dbm ± 0.35 db is obtained.

3.37 Remove the plug from the (~) jacks of the oscillator.

3.38 Repeat 3.35 to 3.37 inclusive on each oscillator.

3.39 At the completion of output tests on the oscillator circuit, restore the SW key to normal. The SW lamp will be extinguished.

3.40 Repeat 3.34 to 3.39 inclusive on all oscillator circuits.

(G) Plate Battery Alarm

3.41 Operate the SW key associated with the oscillator circuit to be checked. The SW lamp will light.

3.42 Move all sliders of the No. 35 type test set to the extreme right so that the resistance will be a maximum. Connect battery and ground to the TEST BAT & GRD jack, using a W2W cord equipped with No. 365 tools. Connect the ring conductor (black tool) to 48V battery and the tip conductor (white tool) to ground. Operate the BAT & GRD CO (battery and ground cut-off) key and close the GRD (ground) switch of the test set.

3.43 Using a W2W cord equipped with No. 364 tools, connect the tip conductor (white tool) to the BAT screw terminal of the test set and connect the ring conductor (black tool) to the R screw terminal of the test set. Insert the plug of the W2W cord into the PL jack of the circuit under test. Observe that the VOLT lamp lights.

3.44 Close the locking lever of key 1, of the test set, and adjust the 1 sliders until the milliammeter reads 20 milliamperes. Observe that the VOLT lamp is extinguished.

3.45 Adjust the 1 sliders until the milliammeter reads 50 milliamperes. Observe that the VOLT lamp remains extinguished.

3.46 Adjust the 1 sliders until the milliammeter reads 70 milliamperes. Observe that the VOLT lamp lights.

3.47 Adjust the 1 sliders until the milliammeter reads 4 milliamperes. Observe that the VOLT lamp is extinguished and then relights.

3.48 Remove the plug from the PL jack and open the locking lever of key 1 of the test set. Observe that the VOLT lamp is extinguished.

3.49 Restore the SW key to normal. The SW lamp will be extinguished.

3.50 Repeat 3.41 to 3.49 inclusive on each oscillator circuit.

3.51 Remove the cords from the test set.

(H) Alarm Test for Ground on Output Leads

3.52 Operate the SW key associated with the odd oscillator circuit. The associated SW lamp will light.

3.53 Connect ground to any one TR terminal on the connecting strip associated with the KP, 0 to 9 and ST output transformers, associated with the oscillator circuit under test, using the No. 893 cord. Observe that the GRD lamp lights and that the office alarm operates.

3.54 Operate the G ALM (ground alarm) key. Observe that the G ALM lamp lights, the office alarm restores to normal and the buzzer operates.

3.55 Operate the BUZ (buzzer) key. Observe that the buzzer is silenced.

3.56 Remove the ground from the connecting strip. Observe that the GRD lamp is extinguished.

3.57 Restore the G ALM key to normal. Observe that the G ALM lamp is extinguished.

3.58 Restore the BUZ key to normal and then restore the SW key to normal. The SW lamp will be extinguished.

3.59 Operate the SW key associated with the even oscillator circuit. The associated SW lamp will light.

3.60 Repeat 3.53 to 3.58 inclusive.

(I) Voltage Alarm - Using A-C Voltmeter

3.61 Operate the SW key associated with the oscillator circuit to be checked. The SW lamp will light.

3.62 Insert the No. 241A plug of the cord covered in 2.09 to the T and R or the T1 and R1 jacks of the a-c voltmeter test set. Connect the No. 310 plug of the cord covered in 2.09 to the TEST T & R jack of the 35 type test set.

3.63 Move all sliders of the 35 type test set to the extreme right so that the resistance will be a maximum. Connect the No. 309 plug of the P2AM cord to the multiple TEST T & R jack of the 35 type test set and connect the 327A plug of the P2AM cord to the (-~) jacks of one oscillator of a pair. The oscillators are connected to the voltmeter relays in pairs as follows: 700~-900~, 1100~-1300~, 1500~-1700~

3.64 Record the setting of the voltmeter relay contacts, before proceeding with the test. Operate the BAT & GRD CO key and close the locking lever of key 1 of the 35 type test set. Set the voltmeter relay contact indices at the end scale position and adjust the 1 sliders of the test set until the a-c voltmeter reads .35 volt (on the 0-4 volt scale) less than the voltage recorded in test (E) for the other oscillator of the pair. This difference is approximately 1 db. Observe that the associated voltmeter relay does not operate.

Note: For example, if the test equipment is connected to the 700~ oscillator of the 700~-900~ pair, the test set should be adjusted until the voltmeter indicates .35 volt less than the voltage read for the 900~ oscillator during test (E).

3.65 Adjust the 1 sliders of the 35 type test set until the a-c voltmeter reads .7 volt (on the 0-4 volt scale) less than the voltage recorded in test (E) for the other oscillator of the pair. This difference is approximately 2 db. Observe that the associated voltmeter relay operates and the VOLT lamp lights.

3.66 Move the 1 sliders of the test set to the extreme right and remove the plug from the (-~) jack. Reset the voltmeter relay pointer and set the contacts to the positions noted in 3.64, by means of the manual reset feature. Observe that the VOLT lamp is extinguished.

3.67 Repeat 3.62 to 3.66 inclusive on each oscillator of the circuit under test.

3.68 Restore the SW key to normal. Observe that the SW lamp is extinguished.

3.69 Repeat 3.61 to 3.68 inclusive for each oscillator circuit.

(J) Voltage Alarm - Using Transmission Measuring Set

3.70 Operate the SW key associated with the oscillator circuit to be checked. The SW lamp will light.

3.71 Connect the two wire patching trunk to the transmission measuring set, using a P2AA cord.

3.72 Using the P3P cord, plug into the two wire patching trunk terminated at the transmission measuring bay and then plug into the (-~) jacks of one oscillator of a pair. The oscillators are connected to the voltmeter relays in pairs as follows: 700~-900~, 1100~-1300~, 1500~-1700~.

3.73 Move all sliders of the 35 type test set to the extreme right, so that the resistance will be a maximum. Connect the No. 310 plug of the W2W cord to the TEST T & R jack of the test set and then connect the No. 360 tools to the terminals on the back of the No. 305A plug associated with the (-~) jacks.

3.74 Record the setting of the voltmeter relay contacts before proceeding with the test. Operate the BAT & GRD CO key and close the locking lever of key 1 of the 35 type test set. Set the voltmeter relay contact indices at the end scale position and adjust the 1 sliders of the test set until the transmission measuring set reads 1.0 db less than the measurement recorded in test (F) for the other oscillator of the pair. Observe that the associated voltmeter relay does not operate.

Note: For example, if the test equipment is connected to the 700~ oscillator of the 700~-900~ pair, the test set should be adjusted until the transmission measuring set indicates 1.0 db less than the reading recorded in test (F) for the 900~ oscillator.

3.75 Adjust the 1 sliders of the 35 type test set until the transmission measuring set reads 2 db less than the reading recorded in test (F) for the other oscillator of the pair. Observe that the associated voltmeter relay operates and that the VOLT lamp lights.

3.76 Move the 1 sliders of the test set to the extreme right and remove the plug from the (-~) jack. Reset the voltmeter relay pointer and set the contacts to the positions noted in 3.74 by means of the manual reset feature. Observe that the VOLT lamp is extinguished.

3.77 Repeat 3.72 to 3.76 inclusive on each oscillator of the circuit under test.

3.78 Restore the SW key to normal. Observe that the SW lamp is extinguished.

3.79 Repeat 3.70 to 3.78 inclusive for each oscillator circuit.

(K) Current Alarm

3.80 Operate the SW key associated with the oscillator circuit to be checked. The associated SW lamp will light.

3.81 Using a P2AA cord connect to the TEST jacks and then to the KP jacks.

3.82 Operate and hold the TEST key. Observe that the SHORT lamp lights steadily, that the KP lamp flashes and that the office alarm operates.

3.83 Operate the SH ALM (short alarm) key. Observe that the SH ALM lamp lights, that the office alarm is released and the buzzer operates.

3.84 Release the TEST key. Observe that the SHORT and KP lamps are extinguished and that the buzzer is released.

3.85 Remove the plug from the KP jacks and repeat 3.82 and 3.84 with the plug inserted into each of the 0 to 9 and ST jacks, in turn.

3.86 If the SHORT and the KP, 0 to 9 or ST lamps light before the TEST key is operated or fail to light after the TEST key is operated a readjustment should be made as covered in the following paragraphs.

3.87 Operate the ADJ (adjust) key. The ADJ lamp will light.

3.88 Set the associated multipoint switch KP, 0 to 9 or ST at a point where the tubes do not fire and then rotate the arm in a clockwise direction until a point is reached at which the SHORT lamp lights and the KP, 0 to 9 or ST lamp flashes.

3.89 Release the ADJ key. The ADJ, SHORT and KP, 0 to 9 or ST lamps will be extinguished.

3.90 If the VOLT lamp is lighted, reset the voltmeter relay pointer by means of the manual reset feature.

3.91 Restore the SH ALM key to normal. The SH ALM lamp will be extinguished.

3.92 Remove all test connection and restore the SW key to normal. The SW lamp will be extinguished.

3.93 Repeat 3.80 to 3.92 as required on each oscillator circuit.

(L) Frequency Test Using No. 72A Frequency Meter

3.94 Using the P2AA cord connect the (BRDG IN) jacks of the No. 72A frequency meter to the (~) jacks of the oscillator under test. Measure the frequency.

Caution: To avoid shorting the supply, connect the cord to the oscillator last and, when disconnecting, remove the cord from the oscillator first.

3.95 Observe that this frequency is within the limits shown in the following table for the frequency being checked.

Frequencies Cycles per Second	Limits Cycles per Second
700	± 11
900	± 14
1100	± 17
1300	± 20
1500	± 23
1700	± 26

3.96 Remove the plug from the (~) jacks.

3.97 Repeat 3.94 to 3.96 on all oscillators to be tested.

4. REPORTS

4.01 The required record of these tests should be entered on the proper form.