

1600- OR 2000-CYCLE SINGLE FREQUENCY SIGNALING SYSTEM

SUPPLY CIRCUIT SD-55962-01

TESTS

1. GENERAL

- 1.01** This section describes a method of testing the 1600- or 2000-cycle single frequency signaling system supply circuit SD-55962-01. ←
- 1.02** This section is reissued for the following reasons:
- (a) To add a verification of filament current in Test E.
 - (b) To include the use of the No. 72A frequency meter in Test F.
 - (c) To remove the procedure for obtaining 4 kc reference frequency from the carrier supply unit directly.
 - (d) To correct some cord and jack designations.
- 1.03** The tests covered are:
- A. Manual Transfer of Load: This test ↗ checks the control of the transfer relays from the OSC OUT jacks.
 - B. Automatic Transfer of Load: This test checks the control of the transfer relays from the ALM relays.
 - C. Double Failure: This test checks the operation of the major alarm and associated lamps.
 - D. Load Trouble Alarm: This test checks the control of the major alarm and LOAD lamp from the LOAD jacks.
 - E. Output Amplitude and Regulation. This test checks the oscillator output level and ↘
- regulation. It includes a verification of the filament current when tube or wiring changes are made to meet output limit.
- F. Output Frequency: This test checks the frequency of the oscillators using, a No. 72A frequency meter, a 4 kc reference frequency, or a similar oscillator known to be in accurate frequency adjustment.
- 1.04** Of the three calibration methods covered in Test F, calibration with the No. 72A frequency meter is the most practical. Calibration with a 4 kc reference frequency may result in excessive wiring changes, as it will be difficult to observe and count the loops of the oscilloscope pattern, if the oscillator is near the tolerance limit. Readjustment to a closer tolerance will usually be required, to enable the loops to be counted accurately. ↘
- 1.05** Since calls in progress may be affected by momentary interruption of the supply that occurs during transfer, tests involving transfer should be made during periods of light traffic.
- 1.06** The No. 13A, 21A, or 40B transmission ↗ measuring sets are referred to in this section as TMS. ↘
- 1.07** In general, only the lamps, tones, etc, necessary for verification, are mentioned in the VERIFICATION column.
- 1.08** Lettered Steps: A letter a, b, c, etc, added to a step number in Part 3 of this section indicates an action which may or may not be required depending on local conditions. The condition under which a lettered step or a series of lettered steps should be made is given in the ACTION column, and all steps governed by the

STEP	ACTION	VERIFICATION
2	Using right-hand knurled knob on front face of sensitrol relay, move upper limit contact toward meter pointer. As red pointer associated with limit contact passes under meter pointer, meter pointer should quickly swing over and strike limit contact.	Minor alarm sounds. ODD OSC (red) lamp lights.
3	Momentarily operate ALM CO key.	Minor alarm silenced. GD (white) lamp lights.
4	Insert No. 241C (shorted) plug vertically into right-hand jacks of ODD OSC OUT and LOAD jacks. Using right-hand knurled knob on front face of sensitrol relay associated with ODD oscillator, move upper limit contact away from pointer until pointer leaves limit contact and returns to its normal position as observed in Step 1.	ODD OSC (red) lamp extinguished. GD (white) lamp remains lighted.
5	Using associated knurled knob, reset limit contact so that associated red pointer is on its red scale mark. Remove No. 241C plug from ODD OSC OUT and LOAD jacks.	GD (white) lamp extinguished.
6	Insert No. 241C (shorted) plug vertically into right-hand jacks of ODD OSC OUT and LOAD jacks.	GD (white) lamp lights.
7	Insert No. 241C (shorted) plug into ODD OSC TST jack.	Sensitrol relay pointer swings toward left, striking lower limit contact. Minor alarm sounds. ODD OSC (red) lamp lights. GD lamp extinguished.
8	Momentarily operate ALM CO key.	GD (white) lamp lights. Minor alarm silenced.
9	Remove No. 241C plug from ODD OSC TST jack. Release meter pointer of sensitrol relay by turning left-hand knurled knob, so as to move contact away from pointer.	ODD OSC (red) lamp extinguished.
10	Reset left-hand (lower limit) contact so that associated red pointer is on its red scale mark. Remove No. 241C plug from ODD OSC OUT and LOAD jacks.	GD (white) lamp extinguished.

STEP	ACTION	VERIFICATION
11	Repeat Steps 1 to 10 using, or observing, sensitrol relay controls associated with EVEN oscillator, EVEN OSC OUT and LOAD jacks, and EVEN OSC (red) lamp.	
C. Double Failure		
<i>Caution: Do not make the test if any of the red, green, or white lamps associated with the supply circuit are lighted.</i>		
<i>Note: Although this test causes major alarm to sound, it does not affect service to any greater degree than does manual transfer test.</i>		
1	Using knurled knob provided on front face of sensitrol relay associated with ODD oscillator, move upper or lower limit contact (whichever is nearer meter pointer) toward meter pointer until meter pointer strikes limit contact.	ODD OSC (red) lamp lights. Minor alarm sounds.
2	Momentarily operate ALM CO key.	GD (white) lamp lights. Minor alarm silenced.
3	Using knurled knob provided on front face of sensitrol relay associated with EVEN oscillator, move upper or lower limit contact (whichever is nearer meter pointer) toward meter pointer until meter pointer strikes limit contact.	EVEN OSC (red) lamp lights. GD (white) lamp extinguished. LOAD (green) lamp lights. Major alarm sounds.
4	Release meter pointer of EVEN sensitrol relay by turning knob associated with limit contact against which meter pointer is resting so as to separate pointer and contact. Reset contact so that associated red pointer is on its red scale mark.	LOAD (green) lamp and EVEN OSC (red) lamp extinguished. Major alarm silenced. Minor alarm sounds.
5	Momentarily operate ALM CO key.	GD (white) lamp lights. Minor alarm silenced.
6	Release meter pointer of ODD sensitrol relay by turning knob associated with limit contact against which meter pointer is resting so as to separate pointer and contact. Reset contact so that associated red pointer is on its red scale mark.	ODD OSC (red) lamp and GD (white) lamp extinguished.

STEP	ACTION	VERIFICATION
D. Load Trouble Alarm		
1	Momentarily insert No. 241C (shorted) plug vertically into left-hand jacks of ODD LOAD and OSC OUT jacks.	LOAD (green) lamp lights. Major alarm sounds.
2	Remove plug.	LOAD (green) lamp extinguished. Major alarm silenced.
3	Repeat Steps 1 and 2 using EVEN LOAD and OSC OUT jacks.	
E. Output Amplitude and Regulation		
→ 1	Using 2P13A or 2W36A cord as appropriate, patch ODD OSC TST jack of supply circuit to TMS. <i>Note:</i> If using 21A Transmission Measuring Set patch to DET IN 600 Ω jack.	TMS reads -6.5 ± 0.4 db if leads T and R (see SD-55962-01) connect to terminals 1 and 5, respectively, of 518A output transformer OUT. TMS reads -9.6 ± 0.4 db if leads T and R connect to terminals 2 and 4 of 518A output transformer OUT. Record reading.
2	Transfer load of ODD oscillator to EVEN oscillator by turning left-hand knurled knob on face of ODD sensitrol relay to bring left-hand contact to touch meter pointer.	
→ 3	Using 2P13A cord, patch ODD OSC OUT jack to 10 Ω RES jack.	Reading indicated on TMS should not drop more than 0.5 db from value recorded in Step 1. <i>Note:</i> Before making any tube or wiring changes to meet requirements of Step 1 or 3, verify that filament current meets requirement in information note of SD-55962-01.
4	Remove cord connecting ODD OSC OUT jack and 10 Ω RES jack.	
5	Reset sensitrol relay left-hand contact.	
6	Remove plug from ODD OSC TST jack and insert in EVEN OSC TST jack.	Same as Step 1.
7	Transfer load of EVEN oscillator to ODD oscillator by turning left-hand knurled knob on face of EVEN sensitrol relay to bring left-hand contact to touch meter pointer.	

STEP	ACTION	VERIFICATION
→ 8	Using 2P13A cord, patch EVEN OSC OUT jack to 10 Ω RES jack.	Reading indicated on TMS should not drop more than 0.5 db from value recorded in Step 1.
		<i>Note:</i> See note in Step 3.
9	Remove cords connecting EVEN OSC OUT jack and 10 Ω RES jack, and EVEN OSC TST jack and SEND jack. Release TMS.	
10	Reset sensitrol relay contact.	

F. Output Frequency

↳ Using No. 72A Frequency Meter

1	Calibrate No. 72A frequency meter in accordance with Section 103-425-100.	
2	Operate CAL-MEAS-SEARCH switch to MEAS.	
3	Operate FREQUENCY CPS control to 1600 or 2000 cycles, as required.	
4	To test ODD oscillator — Using 2P13A cord, patch ODD OSC OUT jack of supply circuit to 600 Ω IN jack of No. 72A frequency meter.	GD (white) lamp lights.
5	Adjust frequency control of meter to give stationary 1/1 pattern. (Fig. 11 Section 103-425-100.)	Frequency is within ± 3 cycles of 1600 or 2000 cycles.
6a	If requirement is not met — Adjust frequency in accordance with note on SD-55962-01.	Obtain 1600- or 2000-cycle frequency $\pm 1/2$ cycle. <i>Note:</i> Use Table 1 of Section 103-425-100 with method described in section for obtaining increased accuracy at specific frequencies.
7a	If frequency adjustment was made — Check output power per Test E.	
8	To test EVEN oscillator — Repeat Steps 1 to 7a, substituting EVEN OSC OUT jack.	
L	Remove patch cords.	

STEP	ACTION	VERIFICATION
Using 4 Kc Reference Frequency		
9	<p>In preparation for frequency calibration using 4 kc, place DuMont 208B oscilloscope at miscellaneous jack circuit associated with supply circuit being tested.</p> <p>Patch up testing trunks as necessary to reach location of 4 kc source via REC jack of miscellaneous jack circuit.</p>	
→ 10	<p>At miscellaneous jack circuit of single frequency signaling bay, using 2W36A cord, connect REC jack of miscellaneous jack circuit to X axis SIGNAL INPUT and GROUND terminals of 208B oscilloscope. Using 2W36A cord, connect ODD or EVEN OSC OUT jack of supply circuit to Y axis SIGNAL INPUT and GROUND terminals of 208B oscilloscope.</p>	GD (white) lamp lights.
11	<p>On 208B oscilloscope, set controls as follows:</p> <p>BEAM ON to up (on) position</p> <p>INTENSITY to 0</p> <p>POWER ON to down (off) position</p> <p>SYNC SIGNAL SELECTOR to LINE</p> <p>FREQ</p> <p>SYNC SIGNAL AMPLITUDE to 0</p> <p>Y AXIS AMPLIFIER to SIGNAL UNDER 250 VOLTS</p> <p>COARSE FREQUENCY to OFF</p> <p>X-GAIN to 20</p> <p>Y-GAIN to 20</p>	
12	<p>Plug power cord of oscilloscope into source of 110-volt, 60-cycle power.</p> <p>Operate POWER ON switch to the up (on) position.</p> <p>Allow oscilloscope to warm up for at least one minute.</p> <p>Slowly advance INTENSITY control of oscilloscope while moving FOCUS control repeatedly back and forth between 0 and 100 on its scale.</p>	

SECTION 179-205-501

STEP

ACTION

VERIFICATION

As INTENSITY control is advanced, a glow will appear on face of cathode-ray tube.

This glow should be focused to form a sharp trace by means of FOCUS control. FOCUS control may require occasional minor readjustment, but otherwise need not be moved again.

Caution: Do not advance INTENSITY control farther than is necessary to give an easily visible trace in ordinary room light or cathode-ray tube may be damaged. If direct light makes trace hard to see, shield face of tube from this light.

- 13 If trace is not centered upon screen, or if no trace can be seen, adjust Y-POSITION and X-POSITION controls of oscilloscope to center trace upon screen.
Adjust X-GAIN control, if necessary, to make trace occupy about three-fourths of width of cathode-ray screen.
Adjust Y-GAIN control, if necessary, to make trace occupy about three-fourths of height of screen.

If measuring 1600 cycles see Fig. 1.
Requirement: Less than 7-1/2 loops shall pass a given point in one second.

If measuring 2000 cycles see Fig. 2.
Requirement: Less than 6 loops shall pass a given point in one second.

Note: These requirements correspond to a tolerance of ± 3 cycles per second. Loops should be counted for a minimum timing period of 20 seconds.
See 1.04.

- + 14a If requirement is not met —
Adjust frequency in accordance with note on SD-55962-01.

The correct oscilloscope pattern remains as stationary on screen as possible.
Maximum number of loops that pass a given point is as follows:
1600-cycle oscillator — 5 loops in 2 seconds
2000-cycle oscillator — 2 loops in 1 second
Count loops for at least 20 seconds.

- 15a If frequency adjustment was made —
Check output per Test E.

- 16 To test other oscillator —
Repeat Steps 10 to 15a.

- 17 Remove all patch cords and restore all keys to normal.

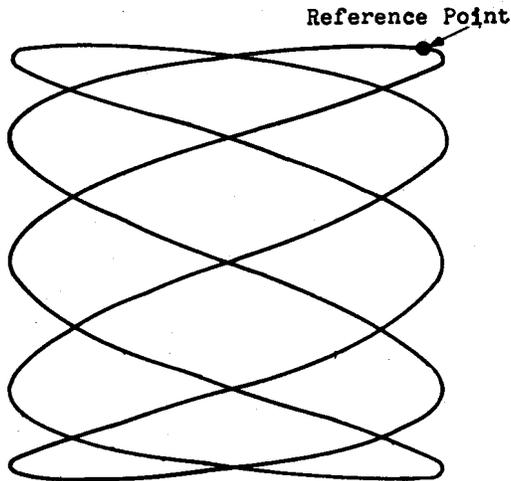


Fig. 1 – Pattern Obtained When Comparing a Frequency of 1600 CPS to a Frequency of 4 Kc.

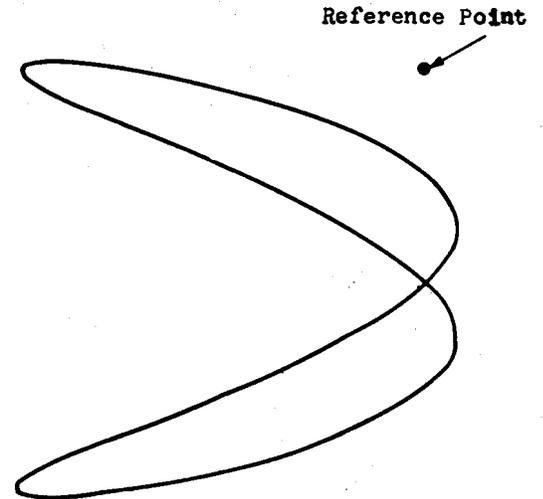


Fig. 2 – Pattern Obtained When Comparing a Frequency of 2000 CPS to a Frequency of 4 Kc.

Note: Choosing the reference point similar to that shown in Fig. 1 or 2 will help in counting the loops as the pattern rotates.

STEP	ACTION	VERIFICATION
Using a 1600- or 2000-Cycle Oscillator Known to be in Accurate Frequency Adjustment		
18	Using patch cords as necessary, connect OSC TST jack of a 1600- or 2000-cycle (depending upon frequency of oscillator being tested) supply circuit which is known to be in accurate frequency adjustment, to EVEN OSC jack of beat-frequency checking circuit.	
19	Using 2P13A cord, connect OSC TST jack of oscillator to be tested to ODD OSC jack of beat-frequency checking circuit.	
20	Connect head telephone set to REC jack of beat-frequency checking circuit.	Tone beats heard in telephone set should not occur oftener than one per second.
→ 21a	If requirement is not met — Adjust frequency in accordance with notes on SD-55962-01.	Tone beats heard in telephone set should occur less than one per second.
→ 22a	If frequency adjustment was made — Check output per Test E.	
23	To test other oscillator — Repeat Steps 19 to 22a.	
24	Remove all patch cords.	