2400- OR 2600-CYCLE SINGLE-FREQUENCY SIGNALING SYSTEM

SUPPLY CIRCUITS

TESTS

1. GENERAL

1.01 This section describes a method of testing the 2400- or 2600-cycle single-frequency signaling system supply circuits.

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 and the features tested are:

A. Output Power (When a Transfer Circuit is Provided)

This test checks the output level of the oscillators when a transfer circuit is provided.

B. Output Power (When Load Transfer Jacks are Provided)

This test checks the output level of the oscillators when load transfer jacks are provided.

C. Output Power (When a Transfer Circuit or Load Transfer Jacks are not Provided)

This test checks the oscillator output level in single oscillator installations.

D. Filament Activity (When a Transfer Circuit is Provided)

This test checks the condition of the electronic tube filament when a transfer circuit is provided.

E. Filament Activity (When a Transfer Circuit is not Provided)

This test checks the condition of the electronic tube filament when a transfer circuit is not provided.

F. Output Frequency Using No. 72A Frequency Meter (When a Transfer Circuit is Provided)

This test checks the frequency of the oscillators when a transfer circuit is provided.

G. Output Frequency Using No. 72A Frequency Meter (When Load Transfer Jacks are Provided)

This test checks the frequency of the oscillators when load transfer jacks are provided.

H. Output Frequency Using No. 72A Frequency Meter (When a Transfer Circuit or Load Transfer Jacks are not Provided)

This test checks the oscillator frequency in single oscillator installations.

I. Output Frequency Using Beat Frequency Method

This test checks the frequency of an oscillator by beating it against that of a previously calibrated oscillator.

J. Manual Load Transfer

This test checks the control of the transfer relays and associated lamps and minor alarm by the transfer keys or the OSC OUT jacks.

K. Automatic Load Transfer

This test checks the control of the transfer relays and associated lamps and minor alarm by the S relays.

L. Double Failure

This test checks the operation of the major alarm and LOAD lamp.

M. Load Alarm

This test checks the control of the major alarm and LOAD lamp by the LOAD jacks.

1.04 Output frequency tests are normally made per tests F, G, or H, using the No. 72A frequency meter. The best frequency method per test I can be used instead of the No. 72A meter if another oscillator of the same frequency is available which has just been checked.

1.05 Since calls in progress may be affected by momentary interruption of the supply during transfer, tests A, D, F, J, K, and L involving the transfer circuit should be made only during periods of light traffic.

Caution: Tests involving the transfer circuit should not be made if any of the red, green, or white panel lamps associated with the transfer circuit are lighted.

1.06 When readjustments are required in tests B and G, they should be made during period of light traffic.

1.07 The No. 13A transmission measuring set and the 40B transmission measuring system are referred to in this section as TMS.

1.08 Lettered Steps: The letters a, b, etc., are added to a step number to designate steps that may or may not be required depending on local conditions. The conditions under which a lettered step or series of steps should be made are given in the ACTION column, and all steps in the same test governed by the same condition are designated by the same letter. Where a condition does not apply, the associated steps should be omitted.

2. APPARATUS

2.01 The apparatus required for each test is shown in the following list. The details for each item are covered in the indicated paragraph.

Apparatus	No. Reqd. for Tests											
	A	B	C	D	E	F	G	H	I	J	K	L	M
TMS (2.02)	1	1	1	-	-	-	-	-	-	-	-	-	-
No. 72A frequency meter	-	-	-	-	-	1	1	1	-	-	-	-	-
Meter (2.03)	-	-	-	1	1	-	-	-	-	-	-	-	-
Operator telephone set	-	-	-	-	-	-	-	-	1	-	-	-	-
KS-3008 stop watch or equivalent	-	-	-	-	-	-	-	-	1	-	-	-	-
Testing cord(2.04)	1	1	1	-	-	-	-	-	-	-	-	-	-
Testing cord(2.05)	-	-	-	1	1	-	-	-	-	-	-	-	-
Testing cord(2.06)	-	-	-	-	-	-	-	-	-	-	1	-	-
Patching cord (2.07)	2	3	2	-	-	1	2	1	2	-	-	-	-
No. 241C plug	-	-	-	-	-	-	-	-	-	-	-	-	1
No. 327A plug	-	-	-	-	-	-	-	-	1	-	-	-	-

2.02 No. 13A transmission measuring set or 40B transmission measuring system J64040B(SD-64355-01).

2.03 KS-14510 meter, or M9B meter.

2.04 W2CA cord 5 feet 6 inches long, equipped with a No. 327A plug (2W36A cord) (to connect OSC TST jack to No. 13A TMS).

2.05 W2DY or W2DS cord 4 feet long (to connect oscillator test points to KS-14510 or to M9B meter respectively).

2.06 W2W cord 6 feet long equipped with a No. 310 plug and two No. 360 tools, and a No. 364 or a KS-6278 tool for insertion in the No. 360C white tool (to open the ring contact of the ODD or EVEN TS jacks and ground the tip).

2.07 P4H cord 6 feet long, equipped with two No. 327A plugs (4P18D cord) (to patch OSC TST jack to 40B TMS or to No. 72A frequency meter, or for transfer patch).

3. METHOD

STEP	ACTION	VERIFICATION
	A. Output Power (When a Transfer Circuit is Provided)	
1a	When using No. 13 TMS - Calibrate in accordance with appropriate practice (103-213-100)	
2	To test ODD oscillator - Operate ODD TR key	ODD OSC (red) lamp lights Minor alarm sounds
3	Operate ALM CO (red) key momentarily	Minor alarm is silenced GD lamp (white) lights

STEP	ACTION	VERIFICATION
4	Connect OSC TST jack (of oscillator under test) to REC jack of 40B TMS, or to IN terminals of No. 13A TMS	The TMS reads (in dbm ± 0.2)

Ambient Temperature Degrees F	Supply Circuit "X" wiring Option	Supply Circuit "W" wiring Option
61 - 64	-6.4	- 9.4
65 - 71	-6.5	- 9.5
72 - 78	-6.6	- 9.6
79 - 85	-6.7	- 9.7
86 - 92	-6.8	- 9.8
93 - 99	-6.9	- 9.9
100 - 106	-7.0	-10.0
107 - 110	-7.1	-10.1

5b	If requirement in step 4 is not met - Adjust VOL potentiometer to give value in step 4 to ± 0.1, and lock potentiometer	
6c	If requirement in step 5b is not met - Transfer lead Z, at retard coil A, to another terminal	
7c	Adjust VOL potentiometer to give value in step 4 to ± 0.1, and lock potentiometer	
8d	If VOL potentiometer was adjusted - Check output frequency per test F steps 4 to 8c or test I steps 1 to 4a	
9	Remove plug from OSC TST jack	
10	Restore ODD TR key to normal	ODD OSC, GD lamps are extinguished
11	To test EVEN oscillator - Operate EVEN TR key	EVEN OSC (red) lamp lights Minor alarm sounds
12	Repeat steps 3 to 9	
13	Restore EVEN TR key to normal	EVEN OSC, GD lamps are extinguished

B. Output Power (When Load Transfer Jacks are Provided)

1a	When using No. 13 TMS - Calibrate in accordance with appropriate practice (103-213-100)	
2	Proceed as in test A step 4	
3b	If requirement of test A step 4 is not met - Insert patching cord into OSC TST jack (of oscillator not under test)	
4b	Insert other end of patching cord in LOAD TRANSFER jack (of oscillator under test)	
5b	Adjust VOL potentiometer to give value in test A step 4 to ± 0.1, and lock potentiometer	
6c	If requirement in step 5b is not met - Transfer lead Z, at retard coil A, to another terminal	
7c	Adjust VOL potentiometer to give value in test A step 4 to ± 0.1, and lock potentiometer	

STEP	ACTION	VERIFICATION
8d	If VOL potentiometer was adjusted - Check output frequency per test G steps 2 to 8c or test I steps 1 to 4a	
9b	Remove patching cord from LOAD TRANSFER jack (of oscillator under test).	
10b	Remove other end of patching cord from OSC TST jack (of oscillator not under test)	
11	Repeat steps 2 to 10b for oscillator not tested	

C. Output Power (When a Transfer Circuit or Load Transfer Jacks are not Provided)

1a	When using No. 13 TMS - Calibrate in accordance with appropriate practice (103-213-100)	
2	Proceed as in test A step 4	
3b	If requirement in test A step 4 is not met - Have associated signaling circuits made busy at test board	
4b	Adjust VOL potentiometer to give value in test A step 4 to ± 0.1, and lock potentiometer	
5c	If requirement in step 4b is not met - Transfer lead Z, at retard coil A, to another terminal	
6c	Adjust VOL potentiometer to give value in test A step 4 to ± 0.1, and lock potentiometer	
7d	If VOL potentiometer was adjusted - Check output frequency per test H steps 2 to 7c or test I steps 1 to 4a	

D. Filament Activity (When a Transfer Circuit is Provided)

1	To test ODD oscillator - Operate ODD TR key	ODD OSC (red) lamp lights Minor alarm sounds
2	Operate ALM CO (red) key momentarily	Minor alarm is silenced GD lamp (white) lights
3a	When using KS-14510 meter - Patch F and GRD test points of oscillator to - and + pin jacks of meter. Set scale selecting switch to 60 VOLTS DC	
4b	When using M9B meter - Patch F and GRD test points of oscillator to -V and 30V pin jacks of meter	
5	Adjust FIL potentiometer to obtain reading of 20 ± 0.2 volts	
6a	When using KS-14510 meter - Patch CA2 and CA1 test points to - and + test jacks of meter. Set scale selecting switch to 3 VOLTS DC	Meter reads 1.12 to 2.4 volts Record reading

STEP	ACTION	VERIFICATION
7b	When using M9B meter - Patch CA2 and CA1 test points to -V and 3V pin jacks of meter	Meter reads 1.2 to 2.4 volts Record reading
8a	When using KS-14510 meter - Repeat step 3a	
9b	When using M9B meter - Repeat step 4b	
10	Adjust FIL potentiometer to obtain reading of 18 ± 0.2 volts	
11a	When using KS-14510 meter - Repeat step 6a	Meter reads not less than value obtained in step 6a minus 10%
12b	When using M9B meter - Repeat step 7b	Meter reads not less than value obtained in step 7b minus 10%
13a	When using KS-14510 meter - Repeat step 3a	
14b	When using M9B meter - Repeat step 4b	
15	Adjust FIL potentiometer to obtain reading of 20 + 0.4D ± 0.2 volts, where D is the deviation (positive or negative) of the office battery voltage at the time of adjustment, from its average value	
16	Remove patch from F and GRD test points	
17	Restore ODD TR key	ODD OSC, GD lamps are extinguished
18	To test EVEN oscillator - Operate EVEN TR key	EVEN OSC (red) lamp lights Minor alarm sounds
19	Repeat steps 2 to 16	
20	Restore even TR key	EVEN OSC, GD lamps are extinguished

E. Filament Activity (When a Transfer Circuit is not Provided)

1	Proceed as in test D steps 3a to 16	
2a	When load transfer jacks are provided - Repeat test D steps 3a to 16 for oscillator not tested	

F. Output Frequency Using No. 72A Frequency Meter (When a Transfer Circuit is Provided)

1	Calibrate the No. 72A frequency meter in accordance with appropriate practice (103-425-100)	
2	To test ODD oscillator - Operate ODD TR key	ODD OSC (red) lamp lights Minor alarm sounds
3	Operate ALM CO (red) key momentarily	Minor alarm is silenced GD (white) lamp lights
	Patch OSC TST jack (of oscillator under test) to 600 OHM IN jack of No. 72A frequency meter	The frequency meter reads the nominal frequency value ± 2 cycles

STEP	ACTION	VERIFICATION
5a	If requirement in step 4 is not met - Adjust F2 condenser to obtain nominal frequency ± 1/2 cycle	
6b	If requirement in step 5a is not met - Change strapping condensers F3 to F8	
7b	Adjust F2 condenser to obtain nominal frequency ± 1/2 cycle	
8c	If F2 condenser was adjusted - Check output power per test A steps 4 to 8d	
9	Remove patching cord from OSC TST jack	
10	Restore ODD TR key to normal	ODD OSC, GD lamps are extinguished
11	To test EVEN oscillator - Operate EVEN TR key	EVEN OSC (red) lamp lights Minor alarm sounds
12	Repeat steps 3 to 9	
13	Restore EVEN TR key to normal	EVEN OSC, GD lamps are extinguished

G. Output Frequency Using No. 72A Frequency Meter (When Load Transfer Jacks are Provided)

1	Calibrate the No. 72A frequency meter in accordance with appropriate practice (103-425-100)	
2	Patch OSC TST jack (of oscillator under test) to 600 OHM IN jack of No. 72A frequency meter	The frequency meter reads the nominal frequency ± 2 cycles
3a	If requirement in step 2 is not met - Insert patching cord into OSC TST jack (of oscillator not under test)	
4a	Insert other end of patching cord in LOAD TRANSFER jack (of oscillator under test)	
5a	Adjust F2 condenser to obtain nominal frequency ± 1/2 cycle	
6b	If requirement of step 5a is not met - Change strapping of condensers F3 to F8	
7b	Adjust F2 condenser to obtain nominal frequency ± 1/2 cycle	
8d	If F2 condenser was adjusted - Check output power per test B steps 2 to 8d	
9a	Remove patching cord from LOAD TRANSFER jacks (of oscillator under test)	
10a	Remove other end of patching cord from OSC TST jack (of oscillator not under test)	
11	Repeat steps 2 to 10a for oscillator not tested	

STEP	ACTION	VERIFICATION
	H. Output Frequency Using No. 72A Frequency Meter (When a Transfer Circuit or Load Transfer Jacks are not Provided)	
1	Calibrate the No. 72A frequency meter in accordance with appropriate practice (103-425-100)	
2	Patch OSC TST jack to 600 OHM IN jack of No. 72A frequency meter	The frequency meter reads the nominal frequency ± 2 cycles
3a	If requirement of step 2 is not met - Have associated signaling circuits made busy at test board	
4a	Adjust F2 condenser to obtain nominal frequency ± 1/2 cycle	
5b	If requirement of step 4a is not met - Change strapping of condensers F3 to F8	
6b	Adjust F2 condenser to obtain nominal frequency ± 1/2 cycle	
7c	If F2 condenser was adjusted - Check output power per test C steps 2 to 7d	
	I. Output Frequency Using Beat Frequency Method	
1	Patch OSC TST jack of previously calibrated oscillator to MIX A jack of Beat Frequency checking circuit	
2	Patch OSC TST jack of oscillator under test to MIX B jack	
3	Plug operator telephone set in REC jack of Beat Frequency checking circuit	Audible beats are not heard oftener than 2 per second
4a	If requirement of step 3 is not met - Proceed as in test F steps 2 to 13, or G steps 2 to 10a, or H steps 2 to 7c	
5b	When a Transfer Circuit or LOAD TRANSFER jacks are provided - Repeat steps 1 to 4 for oscillator not tested	
	J. Manual Load Transfer	
1	To test ODD side - Operate ODD TR key	ODD OSC (red) lamp lights Minor alarm sounds
2	Operate ALM CO (red) key momentarily	Minor alarm is silenced GD (white) lamp lights
3	Insert No. 327A plug into ODD OSC OUT jack	
4	Restore ODD TR key to normal	ODD OSC lamp is extinguished
5	Remove No. 327A plug	GD lamp is extinguished
6	To test EVEN side - Operate EVEN TR key	EVEN OSC (red) lamp lights Minor alarm sounds

STEP	ACTION	VERIFICATION
7	Operate ALM CO (red) key momentarily	Minor alarm is silenced GD (white) lamp lights
8	Insert No. 327A plug into EVEN OSC OUT jack	
9	Restore EVEN TR key to normal	EVEN OSC lamp is extinguished
10	Remove No. 327A plug	GD lamp is extinguished
	K. Automatic Load Transfer	
1	To test ODD side - Operate ODD TR key	ODD OSC (red) lamp lights Minor alarm sounds
2	Operate ALM CO (red) key momentarily	Minor alarm is silenced GD (white) lamp lights
3	Connect No. 364 or KS-6278 tool of testing cord to ground	
4	Insert plug of testing cord into ODD TS jack	
5	Restore ODD TR key to normal	ODD OSC, GD lamps remain lighted
6	Remove plug from ODD TS jack	ODD OSC, GD lamps are extinguished
7a	If verification not obtained in step 6 - Operate ODD RS key momentarily	Same as step 6
8	To test EVEN side - Operate EVEN TR key	EVEN OSC (red) lamp lights Minor alarm sounds
9	Operate ALM CO (red) key momentarily	Minor alarm is silenced GD (white) lamp lights
10	Insert plug of testing cord with grounded tip into EVEN TS jack	
11	Restore EVEN TR key to normal	EVEN OSC, GD lamps remain lighted
12	Remove plug from EVEN TS jack	EVEN OSC, GD lamps are extinguished
13b	If verification not obtained in step 12 - Operate EVEN RS key momentarily	Same as step 12
	L. Double Failure	
1	Operate ODD TR key	ODD OSC (red) lamp lights Minor alarm sounds
2	Operate EVEN TR key	EVEN OSC (red) lamp lights Minor alarm is silenced LOAD (green) lamp lights Major alarm sounds Note: Although this test causes the Major alarm to sound there is no adverse effect on service
3	Restore first ODD TR key, and then EVEN TR key	Major alarm is silenced ODD OSC, EVEN OSC, LOAD lamps are extinguished

STEP	ACTION	VERIFICATION
	M. Load Alarm	
	Caution: The test plug should be inserted in a vertical position only, with the grooved edge upward.	
1	To test ODD side - Insert No. 241C plug into the tip ODD OSC OUT and tip ODD LOAD jacks.	Major alarm sounds. LOAD (green) lamp lights.
2	Remove plug.	Major alarm is silenced. LOAD lamp is extinguished.
3	To test EVEN side - Insert No. 241C plug into the tip EVEN OSC OUT and tip EVEN LOAD jacks.	Major alarm sounds. LOAD (green) lamp lights.
4	Remove plug.	Major alarm is silenced. LOAD lamp is extinguished.