PRIVATE LINE TELEPHONE SERVICE
SAC PRIMARY ALERTING SYSTEM
TESTS AND ADJUSTMENTS

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1. GENERAL

1.01 This section discusses the testing and maintenance of the Strategic Air Command (SAC) Primary Alerting System (PAS). A schematic diagram of the system is shown in Fig. 11.

1.02 This section is reissued to include requirements for operation and maintenance of the PAS Fast Klaxon equipment and to make various corrections. A general discussion of the system and its operating features is covered in Section 310-500-100. Unless specifically covered in this section, testing and maintenance procedures should follow the standard procedures for similar 4-wire voice circuits, as covered in Section 310-405-500. Since this section is a general revision, arrows ordinarily used to indicate changes have been omitted.

1.03 Special attention must be given to maintaining line continuity on all circuits. An interruption of approximately 10 seconds or more will result in a visual and audible alarm at SAC or at a Numbered Air Force (NAF) Headquarters location. Standard procedures for office responsibility, protection of special circuits, and other operating routines should be followed, except as supplemented by this section.

1.04 Special precautionary measures must be observed during testing and maintenance activities to insure these activities are not responsible for false Klaxon Horn operation. Any false

Klaxon Horn operation is subject to extensive investigation by Telephone Company forces and SAC Communication personnel. SAC is extremely sensitive to false horn operation, and unexplainable horn operations cast doubt on the integrity of the PAS Fast Klaxon System.

1.05 Where customer-provided facilities are used to make up a portion of a circuit, loopback relays may provide a convenient means of sectionalizing trouble. Requests for the addition of these devices to a circuit should be passed through normal lines of organization.

2. CIRCUIT LINEUP REQUIREMENTS

2.01 Circuit order test instructions and transmission tests contained in the standard sections for Two-point Private Line Systems (310-300-500) and Multistation Private Line Systems (310-405-500) should be followed in the lineup of all PAS circuits, except as supplemented in this section.

2.02 On all circuits between SAC, NAF Headquarters, Base, or Missile Complex locations, the net loss at 2700 Hz should not exceed the 1000-Hz net loss by more than 10 dB in either circuit direction. In addition, on circuits between a Missile Complex and an NAF Headquarters, the net loss at 2850 Hz should not exceed the 1000-Hz net loss by more than 10 dB in the direction toward NAF Headquarters.

2.03 A Northeast Electronics TTS-26B, if available, may be used in place of the SD-96362-01 pulse checking test set. The TTS-26B should be connected to the test circuits with a 2P30-type cord or a single conductor cord equipped with 310- and 347-type plugs to provide tip continuity. Calibration and test setups for E lead, ground and open (E = G & O) are not included in this section and must be determined locally.

3. SAC AND NAF HEADQUARTERS TESTING AND MAINTENANCE

3.01 At SAC and all NAF Headquarters locations, an overall operations test can be made by the customer to check operation of all associated line checking circuits, including the line failure lamps, at one time. A separate test will check all acknowledgment lamps at one time.

3.02 On local channels between a serving testroom and SAC or an NAF Headquarters location, the 1000-Hz net loss should be within ± 1.0 dB of that specified on the circuit layout record (CLR). The net loss at 2700 and 2850 Hz should not exceed the 1000-Hz net loss by more than 5 dB.

A. Transmission Tests (SD-1G116-01, Fig. 1, 2, 3, 7, 8, 11, 18, 19, 20, 21, and 28; and SD-1G117-01, Fig. 1)

3.03 Tests on the alert transmission path should be made only if the circuit is ***out-of-service.*** Local procedures should be developed for routine tests and alignment on an ***"in service—with customer approval"*** basis. Section 310-405-500 should be used where applicable.

STEP	PROCEDURE
1	Obtain and set up required test apparatus, as shown in Fig. 1.
2	Block the T relay in the operated position in both SD-1G116-01, Fig. 2 equipments, which will disconnect the output of each slow pulse generator from the associated 43A1 telegraph carrier channel.
	Note: All PAS circuits will alarm.
3	Block the SW relay of SD-1G116-01, Fig. 1 in the released position, which will place the first SD-1G116-01, Fig. 2 under test.

STEP	PROCEDURE
4	All bridge outlets, SD-1G116-01, Fig. 20, not under test should be terminated in normally assigned 600-ohm equipment or a 600-ohm resistor.
5	Verify that each 89-type resistor in pad sockets A1, A2, and B is as specified on the CLR (SD-1G116-01, Fig. 1).
6	Adjust the gain control of the KS-16754, L1 or L3 amplifiers in the first SD-1G116-01, Fig. 2 to minimum.
7	At the location of the red telephone set, per SD-1G116-01, Fig. 3, set up the test arrangement shown on Fig. 1. Adjust the oscillator to send 1000-Hz tone at +6.7 dBm.
8	Adjust the gain of the KS-16754, L1 or L3 amplifier under test to provide a reading within ±0.1 dB of the specified value on the CLR. ***When adjusting the KS-16754 amplifier, start at minimum gain and slowly raise the gain to the specified level. If the correct level is exceeded, readjust the setting by starting from minimum gain. The final setting must not be at maximum gain.*** Measure levels at all other bridge outlets and at the red handset receiver, as indicated in Fig. 1. ***Requirement:*** The measured loss of each remaining SD-1G116-01, Fig. 20 outlet should not deviate more than ±0.3 dB from the value obtained at the first outlet.
9	Raise and lower the oscillator output by 10 dB in 2-dB steps. Record the readings obtained at an SD-1G116-01, Fig. 20 outlet. ***Requirement 1:*** Any input higher than normal level should produce an output at the SD-1G116-01, Fig. 20 outlet not more than 2 dB higher than that obtained in Step 8. ***Requirement 2:*** An input lower than normal level should produce a correspondingly lower output level at the SD-1G116-01, Fig. 20 outlet within 2 dB. For example, an input 5 dB lower than normal (+1.7 dBm at red phone) should produce an output at the SD-1G116-01, Fig. 20 outlet of −21 dBm ±2.0 dB for a normal −16 dBm point. If these requirements cannot be met, replace the amplifier and repeat the tests in Steps 8 and 9.
10	At NAF Headquarters locations only, send 1000-Hz tone at the level specified on the CLR into the SD-1G116-01, Fig. 11 equipment. Read the output at an SD-1G116-01, Fig. 20 outlet. ***Requirement:*** The output obtained should be within ±0.2 dB of that obtained in Step 8. If necessary, change the value of the C pad in SD-1G116-01, Fig. 11 to meet this requirement. Lower the oscillator send level by 10 dB in 2-dB steps; the output should indicate a correspondingly lower level within 2 dB. If this requirement cannot be met, regain the amplifier and check the C pad for the proper value.
11	At NAF Headquarters locations only, block the SWA relay operated in SD-1G116-01, Fig. 28. Send 1000-Hz tone at the proper level into the SD-1G117-01, Fig. 1 equipment associated

STEP	PROCEDURE
	with the alternate circuit to SAC. Connect as shown in Fig. 1. The output measured at an SD-1G116-01, Fig. 20 outlet should be within ±1.5 dB of that level obtained in Step 8. Lower the oscillator send value by 10 dB in 2-dB steps; the output should indicate a correspondingly lower level. Remove the block from the SWA relay.
12	In Step 3, the SW relay was blocked in the released position. Block it in the operated position. This will interchange with KS-16754, L1 or L3 amplifier and associated equipment. Repeat Steps 6 through 10.
13	At the red telephone set location, move the test equipment at the subscriber terminal from the SD-1G116-01, Fig. 3 spare equipment to the SD-1G116-01, Fig. 21 regular equipment and repeat the test procedures in Steps 8 through 12. ***Requirement:*** The measured loss to the bridge outlet should be within ±0.3 dB of the value obtained in Step 8.
14	Remove the block from both T relays and the SW relay.

Loudspeaker Amplifier Adjustment

3.04 The loudspeakers at NAF Headquarters locations are equipped with an adjustable minimum output level control. This is an internal control and is not accessible to the customer. This control should be adjusted with the external gain control in the maximum counterclockwise position to provide a loudspeaker output that may be heard over the normal room noise at the customer location. Adjustments should be made after end-to-end circuit tests have been completed.

3.05 The following transmission tests on the blocking filters (SD-1G116-01, Fig. 1, 2, 11, and 18) are to be made on an ***out-of-service basis.*** Test each blocking filter on a bridging basis, using 600-ohm impedance testing equipment.

STEP	PROCEDURE
1	Adjust the test oscillator for a zero level output at the frequency given in Table A and connect it to terminals 1 and 2 of the blocking filter under test.
2	Connect the TMS to terminals 3 and 4 (see Fig. 2).
3	Vary the frequency of the oscillator ±35 Hz to obtain a minimum reading. The reading obtained should be lower than −40 dBm.

STEP	PROCEDURE
	TABLE A

SD FIG. NO.	QUANTITY		FILTER		FREQUENCY HZ
	SAC	HQ	DESIG	CODE	
1	1	1	A	202E	2635
2	2	2	A	202E	2635
11	—	1	A	202E	2635
11	—	1	B	202F	2465
18	*	*	A	202E	2635
18	*	*	B	202F	2465
			**—	616A	2805

*One Fig. 18 is provided for each operator position.

**Only at Headquarters locations.

3.06 The following tests are made on the nonalert transmission path (SD-1G116-01, Fig. 7, 8, 11, 13, 18, 19, 20, 23, 24, 25, 26, and 27; and SD-1G117-01, Fig. 1).

STEP	PROCEDURE
1	Prepare the test arrangement at the gray handset to be tested, as indicated in Fig. 3. Connect a second TMS to an assigned SD-1G116-01, Fig. 7 (contacts 10 and 11 of the H relay or a suitable test point on the transmit line at the output of the talk connector circuit). Adjust the oscillator to send 1000-Hz tone at +6.7 dBm.
2	Operate the nonlocking TEL key associated with the bridge outlet that is connected to the second TMS. The reading obtained should be within ±1.5 dB of the −13 or −16 dBm level specified on the CLR.
3	Send 1000-Hz tone at +4 or −7 dBm, as specified on the CLR, into the corresponding receive jack on the circuit selected for test in Step 4. The reading on the TMS at the gray handset should be within ±1.5 dB of the level specified on the CLR.
4	Repeat tests per Steps 1 through 3 at all gray handsets equipped with an SD-1G116-01, Fig. 18.

3.07 The following tests are to be made at NAF Headquarters locations on the nonalert portions of the regular and alternate lines to SAC. The test arrangements shown in Fig. 4A and 4B, respectively, are to be used.

STEP	PROCEDURE
1	At the serving testroom, transmit 1000-Hz tone at the specified level toward NAF Headquarters on the regular line from SAC. The value obtained at the customer location should be within ±1.0 dB of that specified on the CLR. If the requirement is not met, determine the cause of the variation before making pad adjustments.
2	Transmit 1000 Hz at +6.7 dBm at the subscriber's terminal on the regular circuit to SAC. At the serving testroom, connect a transmission measuring set (TMS) to the first jack-equipped test point on the circuit. The value obtained should be within ±1.0 dB of that specified on the CLR. If the requirement is not met, determine the cause of the variation before making pad adjustments.
3	Repeat tests per Steps 1 and 2 at each customer appearance of the regular line to SAC.
4	At the NAF serving testroom, transmit 1000-Hz tone at the specified level toward NAF Headquarters on the alternate line from SAC. The value obtained at the customer location should be within ±1.0 dB of that specified on the CLR. If the requirement is not met, determine the cause of the variation before making pad adjustments.
5	Transmit 1000-Hz tone at +6.7 dBm at the NAF subscriber terminal on the alternate circuit to SAC. At the serving testroom, connect a TMS to the first jack-equipped test point on the circuit. The value obtained should be within ±1.0 dB of that specified on the CLR. If the requirement is not met, determine the cause of the variation before making pad adjustments.
6	Repeat the test per Steps 5 and 6 at each customer appearance of the alternate line to SAC.

B. 43A1 Carrier Telegraph Channel Tests

3.08 The following adjustment of the SEND LEV controls of the 43A1 send circuits and the REC GAIN controls of the slow pulse 43A1 monitor receiving circuits is to be made on an ***out-of-service basis.*** The 1000-Hz transmission requirements should have been met as covered in 3.03, Steps 1 through 13.

STEP	PROCEDURE
1	With reference to SD-1G116-01, each 43A1 telegraph carrier channel unit should be arranged as shown in Table B. The LP CUR control should be adjusted fully clockwise.
2	Connect a 72A frequency meter or equivalent to a bridge outlet at the first jack appearance at the specified −13 or −16 test level point (see Fig. 5).

STEP	PROCEDURE

TABLE B

SD-1G116-01 FIG.	NETWORK		SWITCH POS		*EQPT TUBE SOCKETS
	SEND	REC	SEND	REC	
1	—	454M	—	L+	V3, V4, V5
2	453M	—	HM	—	V1, V2
6	—	454L	—	H+	V3, V4, V5
	—	**454AB	—	H+	V3, V4, V5
11	453L	454M	LM	L+	V1, V1, V3, V4, V5

*Tubes should be removed from sockets not listed.

**Used only at Headquarters locations.

Apparatus required is:

1 — Transmission Measuring Set
1 — KS-14510 or equivalent Volt-ohmmeter

3 Block the SW relay in the released position.

4 In the first SD-1G116-01, Fig. 2, block the U and S relays in the operated position. This will result in the transmission of a steady 2670-Hz mark signal. Verify with the 72A frequency meter that the proper frequency is being received. Remove the 72A and connect a TMS to the bridge outlet.

5 Adjust the SEND LEV control on the associated SEND TRSG unit to give a reading on the TMS that is 25 dB lower than the specified 1000-Hz level on the CLR.

6 Adjust the BRDG REC 43A1 receiving unit with the voltmeter set to read 150 Vdc. Connect the negative terminal to the ground pin jack G and the positive terminal to the LP pin jack of the BRDG REC 43A1 receiving unit (see Fig. 5).

7 Adjust the REC GAIN control to the maximum counterclockwise position. Observe the minimum reading of the voltmeter. It should be approximately 10 volts.

8 While observing the voltmeter, slowly adjust the REC GAIN control in the clockwise direction to the point where the voltage suddenly increases to approximately 120 volts or more. This is the final REC GAIN adjustment for this unit.

9 In Step 3, the SW relay was blocked in the released position. Change this by blocking the SW relay in the operated position.

10 Repeat Steps 6 through 8 with respect to the SP GEN REC 43A1 receiving unit.

11 Make final SEND LEV control adjustments as follows:

(a) Block the SW relay in the released position.

STEP	PROCEDURE
	(b) Verify that the TMS reading is the same value as obtained in Step 5. Then adjust the SEND LEV control on the SEND TRSG 43A1 unit of the first SD-1G116-01, Fig. 2 to obtain a reading on the TMS that is -20 ± 0.1 dB of the 1000-Hz level specified on the CLR. This will produce a fail margin of 5 dB for the bridge receiver.
12	Remove the relay blocking tools from the U and S relays in the first SD-1G116-01, Fig. 2 (Step 4) and block the U and S relays in the operated position in the second SD-1G116-01, Fig. 2.
13	Reverse the condition of Step 11(a) and block the SW relay in the operated position.
14	Verify the frequency and adjust the SEND LEV control on the 43A1 SEND TRSG unit, associated with the second SD-1G116-01, Fig. 2 to give a reading on the TMS equal to that obtained in Step 11(b). Remove the blocking tools from U, S, and SW relays, which were placed in Steps 12 and 13.
15	With relays MB and MS operated and relays SW and SZ released, short leads T2 and R2 of the first SD-1G116-01, Fig. 2 at terminals 21 and 22 of the unit terminal strip C associated with the SW relay. ***Requirement 1:*** Relay MB should release within approximately 5 seconds and give an alarm. ***Requirement 2:*** Relay SW will then operate. ***Requirement 3:*** Within the next 3 seconds, relay MB should operate, followed by the operation of relay SZ. ***Requirement 4:*** Relay MS should release within approximately 5 seconds after the MB relay has reoperated. The alarm indication will remain and the No. 1 GEN FAIL lamp will be on.
16	Remove the short from leads T2 and R2 that was placed in Step 15. The MS relay should then operate within approximately 3 seconds. This will remove the alarm indication. Relays SW and SZ will remain operated. Short terminals 11 and 12 on unit terminal strip C; short leads T2 and R2 to the second SD-1G116-01, Fig. 2. ***Requirement 1:*** Relay MB should release within approximately 5 seconds and give an alarm. ***Requirement 2:*** Relay SW will then release. ***Requirement 3:*** Within the next 3 seconds, relay MB should operate, followed by the release of relay SZ. ***Requirement 4:*** Relay MS should release within approximately 5 seconds after the MB relay has reoperated. The alarm indication will remain and the No. 2 GEN FAIL lamp will be on.
17	Remove the short placed in Step 16. The MS relay should then operate within approximately 3 seconds and remove the alarm indication.

3.09 The 43A1 receiving unit of the slow pulse receive circuits (SD-1G116-01, Fig. 6 and 11) is not to be operated at maximum gain. The following steps to adjust the REC GAIN control are to be made on an ***out-of-service basis.*** This test is to be made on circuit order, routine, or trouble basis, as required. It is assumed that transmission levels of the associated line facilities in both directions of transmission are within the required transmission limits and that pulses of the proper level are being received. Figure 6 shows the test arrangement to be used.

STEP	PROCEDURE
1	Adjust the REC GAIN control of the unit under test to maximum clockwise. Arrange the voltmeter to read 60 Vdc. Connect the negative terminal to pin jack G and the positive terminal to pin jack LP of the unit under test. Slow pulses should be indicated at the rate of one every 3 seconds. The meter should indicate approximately 25 to 35 volts. When a slow pulse is received, the meter will indicate its presence, but due to the short duration, will not indicate the maximum voltage of the pulse.
2	At the control office connect an attenuator in series with the transmit line ahead of the 43A1 unit under test. Adjust the attenuator loss to 12 dB, corrected for any deviation in the facility levels from the specified value.
3	Observe the slow pulse indications on the voltmeter, which are at the rate of one every 3 seconds, while turning the REC GAIN control of the 43A1 unit under test in the counterclockwise direction in small increments. Determine the control position at which the slow pulses just drop out (no voltmeter indication). Then adjust the REC GAIN control in small increments in the clockwise direction until slow pulses are again observed on the voltmeter. This is the final REC GAIN control setting. Remove the attenuator from the circuit under test.
4	At NAF Headquarters locations, block the AD relay in SD-1G116-01, Fig. 11 in the operated position. This will transmit a steady 2430-Hz mark signal from the equipment.
5	Connect a TMS to the first jack-equipped test point on the circuit (see Fig. 6). Adjust the SEND LEV control to produce a reading on the TMS that is 20 $\pm$0.1 dB lower than the 1000-Hz level specified on the CLR.

3.10 The 43A1 unit associated with the SD-1G117-01 equipment of the alternate line to SAC should be adjusted as described in Part 4B of this section.

C. Fast Pulse Generator Tests (SD-1G116-01, Fig. 2 and SD-1G120-01, Fig. 1)

3.11 The pulse speed, or frequency, and the percent break adjustments are made by strapping resistors in associated resistor networks.

3.12 Tests are made during nonalert periods ***with customer permission.*** Test apparatus required is:

1—SD-96362-01 Pulse Checking Test Set (TTS 26B or equivalent may be substituted)

1—1W3A Cord or equivalent.

3.13 Percent break is adjusted as follows.

STEP	PROCEDURE
1	Connect −48 volt battery and ground to the test set.
2	Set the lever-type key in the normal position and adjust the CAL rheostat to obtain zero on the percent break meter scale.
3	Connect the spade-type tip of the 1W3A cord to binding post P. Connect the 347A plug to the fast pulse generator TST jack.
4	Operate the lever-type key to the PCB position and observe the percent break meter reading. The reading should be between 49 and 51 percent. To meet the requirement, strap resistors R and S as described on the drawing.

3.14 Pulse speed is adjusted as follows:

STEP	PROCEDURE
1	Set the lever-type key in the normal position and adjust the CAL rheostat to obtain zero on the percent break scale.
2	Operate the SCALE key to the 20 position.
3	Operate the lever-type key to the PPS position and observe the 0 to 20 pulses per second scale. The reading should be between 4.8 and 5.2 pulses per second. Strap resistors L, M, and N, as described on the drawing, to obtain the proper reading.
4	Recheck 3.13, Steps 1 through 4, if changes are made in Steps 1 through 3 of this paragraph.

D. Alert Tone Tests

3.15 Output frequency and amplitude tests of the alerting tone circuit (SD-1G129-01) should be made per CD-1G129-01. Adjust the 1C pad value to provide −13 TLP (13 dB below the nominal 1000-Hz test levels).

E. Fast Pulse Receiver Tests (SD-1G116-01, Fig. 6 and 11)

3.16 This test uses SD-1G120-01, Fig. 1, 2, and 5 test circuit, which is part of the initial installation at SAC and NAF Headquarters. The Fig. 2 and 5 test jacks are mounted in bays containing fast pulse receivers. Test apparatus required is:

1—SD-25707-01 Timing Test Set

3—3P15A Patch Cords.

This test must be made during a nonalert, ***after obtaining customer permission.***

STEP	PROCEDURE
1	Adjust the MIL SEC switch on the test set to the 0—5000 position and the REC switch to the fifth clockwise position.
2	Make the following patches with 3P15A patch cords: (a) 48 V BAT jack to 48 V jack on test set (b) FP MEAS jack to TST 1 jack on test set (c) FP TST jack to FP TST jack on the fast pulse receiver to be tested.
3	Operate the test set BAT key to the ON position. After approximately 15 seconds, adjust the ADJ-0 control to obtain a zero meter reading.
4	Operate TST key to CAL and adjust the CAL control to obtain full-scale deflection on the meter. Recheck the calibration preceding each test.
5	Operate the TST key to the OPR position. This will start the fast pulse generator. The meter pointer will advance until the fast pulse receiver operates. This should occur between 800 and 900 milliseconds. This will indicate that the receiver operated on the fifth pulse. Adjust the AC (Fig. 6) or V (Fig. 11) control as required to obtain the reading.
6	If the required reading cannot be obtained by adjusting the AC (Fig. 6) or V (Fig. 11) control, try replacing the cold cathode 313CC tube V4 (Fig. 6) or V5 (Fig. 11).

F. Long Pulse Receiver Tests (SD-1G116-01, Fig. 6)

3.17 This test uses SD-1G120-01, Fig. 3, 4, and 5 test circuit, which is a part of the initial installation at SAC and NAF Headquarters. The Fig. 4 and 5 test jacks are mounted in bays containing long pulse receivers. Tests are made during nonalert periods, ***with customer permission.*** Test apparatus required is:

1—SD-25701-01 Timing Test Set

3—3P15A Patch Cords.

STEP	PROCEDURE
1	Adjust the MIL SEC switch on the test set to the 0—5000 position. Adjust the REC switch to the fifth clockwise position.
2	Make the following patches with 3P15A patch cords: (a) 48 V BAT jack to 48 V jack on test set (b) LP MEAS jack to TST 1 jack on test set (c) LP TST jack to LP TST jack on the long pulse receiver to be tested.

STEP	PROCEDURE
3	Operate the test set BAT key to the ON position. After approximately 15 seconds, adjust the ADJ-0 control to obtain a zero meter reading.
4	Operate TST key to CAL and adjust the CAL control to obtain full-scale deflection on the meter. Recheck the calibration preceding each test.
5	Operate the TST key to the OPR position. This will start the transmission of a marking pulse. The meter pointer will advance until the long pulse receiver operates. This should occur between 500 and 1000 milliseconds. Failure to meet this requirement may be due to a defective 313CC cold cathode tube V5.

G. Slow Pulse Receiver Tests (SD-1G116-01, Fig. 6)

3.18 The following tests are to be made on an in-service basis. The purpose is to determine whether or not pulses are being received via the 43A1 carrier telegraph channel and whether or not false pulses will give an alarm. Normally, false pulses would be the result of line noise, crosstalk, etc, at the receiving frequency of the 43A1 channel. Test apparatus required is:

1—KS-14510 or equivalent Volt-ohmmeter.

STEP	PROCEDURE
1	Set the test meter to read 150 Vdc and connect the negative terminal to ground.
2	Connect the positive terminal to SP IN pin jack on the panel under test. The meter will normally indicate approximately 7 volts for a period of approximately 3 seconds. Then, when a slow pulse is received, the voltage increases to approximately 120 volts. The voltmeter is too slow to measure this peak voltage. However, it will indicate when a slow pulse is received.
3	After determining that slow pulses are being received, connect the positive terminal of the voltmeter to pin jack SP OUT. Observe that slow pulses are being received.
4	Momentarily operate the nonlocking SP TST key just before the next slow pulse is due. The pulse should be blocked, as indicated by the absence of a meter deflection. This tests the blocking circuit, consisting of tubes V2B and V3. If three legitimate slow pulses are missed, the A relay will release and give a CONT ALM at the customer location.

THINK ***If the SP TST KEY is held operated for approximately 1/2 second, the associated long pulse receiver will operate and signal the operator. If it remains operated 10 seconds or longer, it will give a line failure alarm.***

H. Tube Failure Alarm Tests (SD-1G116-01, Fig. 1, 6, and 15)

3.19 Normally, each 429A tube in SD-1G116-01, Fig. 1 and 6, is conducting approximately 2.8 seconds out of each 3-second slow pulse cycle. During the 0.2-second interval, the tube is nonconducting, due to reception of a slow pulse. At this time, the plate voltage rises to a maximum. These voltage spurts keep the associated alarm relay operated. If a tube fails or becomes nonconducting, the alarm relay will not release. For this reason the SD-1G116-01, Fig. 15 tube alarm is provided. Test apparatus required is:

1—Tube Extractor, KS-14428 or equivalent.

STEP	PROCEDURE
1	Remove the 429A tube from the socket on the receiving panel to be tested. The tubes are designated as follows:

SD FIG.	ASSOC WITH	DESIG
1	BRDG MONITOR	V2
1	SP GEN MONITOR	V4
6	—	V1

Requirement: Approximately 1 second after a tube is removed, the red neon ALM lamp on the receiving panel should start flashing, and a visual and audible equipment room alarm will result.

2	Replace the tube in the socket. In a few seconds, after the heater has reached operating temperature, the tube will start operating and remove the alarm indications.

4. BASE AND MISSILE SITE TESTING AND MAINTENANCE

4.01 The general operating features on the base and missile complex in the PAS are covered in Section 310-500-100. In addition, certain operating and testing features are provided at these locations.

Caution: A dc continuity check circuit monitors the receive pair of all 4-wire stations at each base and missile complex for open, short-circuit, or ground conditions on the line (SD-69358-01, Fig. 2). If a continuity failure occurs, it will interrupt the output of the slow pulse repeater at the associated base or missile complex resulting in an alarm at SAC or the associated NAF Headquarters location.

4.02 If more than one location is at a base, all locations must operate an ACK key before a base acknowledgment signal is transmitted. When an ACK key is operated, it will then operate an associated lamp at all other locations. When the last ACK key has been operated at a base, all ACK lamps at all wing locations will be extinguished. This will indicate that the base acknowledgment signal has been transmitted.

A. Transmission Tests (SD-1G117-01 and SD-69358-01, Fig. 1, 2, 6, 7, 12, and 13)

4.03 The following tests are in addition to the normal circuit order and routine tests for circuits of this type. They may also be used for trouble testing. All tests in this part are to be made on an ***out-of-service basis.***

Before any routine maintenance, trouble shooting, or circuit order tests are performed, request that the KLX RCO key be operated. Verify that the KLX RCO lamp is lit and that

the RCZ and RCW relays are operated. Insert open plug in the LP Test 2A jack, SD-1G117-01, Fig. 8 of the circuit under test. Upon completion of the tests, remove the open plug and verify that all but the RCZ and RCW relays are in the nonoperated position. Advise the customer that he can return to normal operation.

4.04 Tests shall be made on each 4-wire line from each telephone set to the first jack-equipped test point in the serving central office. In addition, tests shall be made from the serving central office to other receiving-only points or to the demarcation strip serving other receiving-only points, as applicable. Reference is made to Section 310-405-500, where applicable. Testing apparatus required is:

1—Variable Frequency Oscillator

1—Transmission Measuring Set

1—Induction Coil

(Other items listed, as required).

STEP	PROCEDURE
1	Set up the test arrangement per Fig. 7 at a telephone location on a 4-wire line. Adjust the oscillator to send 1000-Hz tone at +6.7 dBm.
2	At the serving central office, measure at the first jack-equipped test point from the base. The measured value should be within ±1.0 dB of the value specified on the CLR.
3	Transmit 1000-Hz tone from the serving testroom toward the base or missile site at the specified level. The measured value at the handset location should be within ±1.0 dB of the value specified on the CLR.
4	Repeat Steps 1 through 3 at all other locations at the same base.
5	Using the test arrangements shown in Fig. 8, transmit 1000-Hz tone at the level specified on the CLR. Record the measurement obtained at the serving testroom. Next, send 2850-Hz tone at the same level used above. The measurement obtained at the serving testroom should be within 5 dB of the 1000-Hz tone level.
6	At the serving testroom, transmit 1000-Hz tone toward the base or missile site at the level specified for the test jack to be used. Record the value obtained at the base or missile site. Next, transmit 2850 Hz at the same level used above. The above, obtained at the base or missile site, should be within 5 dB of the 1000-Hz tone level.
7	The tests listed in Steps 8 and 9 require that both circuits to a base be out of service. The tests are written assuming both circuits to a base go through the same serving testroom. Where this is not the case, the other testroom must assist in making the tests. Use the test arrangement shown in Fig. 7.
8	At the base location, transmit 1000-Hz tone +6.7 dBm. Momentarily depress the LINE GRP key associated with the handset and circuit under test. A 1000-Hz tone should be present on both circuits at the serving testroom. The measured value of the tone on each circuit should be approximately 3.5 dB lower than the level specified on the CLR.
9	At the serving testroom, transmit a 1000-Hz tone at the specified level toward the base. The value obtained at the handset should be approximately 3.5 dB lower than the value obtained in Step 6. Next, transmit a 1000-Hz tone at the specified level on the other PAS circuit. The value obtained at the handset should be approximately the same as that obtained on the first circuit.

4.05 The loudspeaker at base and missile site locations are equipped with an adjustable minimum output level control. This is an internal control and is not accessible to the customer. This control should be adjusted, with the external gain control in the maximum counterclockwise position, to provide a loudspeaker output that may be heard over the normal room noise at the customer location. Adjustments should be made after the end-to-end tests have been completed.

4.06 At locations where amplifiers per SD-69358-01, Fig. 17 are provided, the gain should be checked as follows, using the test arrangement in Fig. 9:

STEP	PROCEDURE
1	Where KS-16754, L2 or L4 amplifiers are used, transmit 1000-Hz tone at circuit level (0 TLP) into the amplifier. Adjust the gain of the amplifier to a level within $\pm$1.0 dB of the level measured at the handset in 4.04.
2	Where KS-16754, L1 or L3 amplifiers or KS-20449 amplifiers are used, adjust the gain control to the maximum counterclockwise position. Transmit 1000-Hz tone at circuit level (0 TLP) into the amplifier. Adjust the gain control clockwise to a level within $\pm$1.0 dB of the level measured at the handset in 4.04. ***If the correct level is exceeded, readjust the setting by starting from minimum gain. The final setting must not be at maximum gain.*** To verify that the amplifier is working as specified, raise and lower the 1000-Hz tone input level 10 dB in 1-dB steps. For any input higher than normal, the amplifier output should not rise more than 2 dB. For any input lower than normal, the amplifier output should be correspondingly lower within 2 dB.

4.07 Transmission tests of the blocking filters (SD-1G117-01, Fig. 1 and 6) are to be made on an ***out-of-service basis.*** Test each blocking filter on a bridging basis, using 600-ohm impedance testing equipment.

STEP	PROCEDURE
1	Adjust the test oscillator for a zero level output at the frequency given in Table C and connect it to terminals 1 and 2 of the filter under test.
2	Connect the TMS to terminals 3 and 4 (see Fig. 2).
3	Vary the oscillator frequency $\pm$35 Hz to obtain the minimum reading. The reading obtained should be lower than $-$40 dBm.

STEP	PROCEDURE

TABLE C

SD FIG. NO.	FILTER		FREQUENCY HZ	NOTES
	DESIG	CODE		
1	A	202E	2635	
1	B	202F	2465	
6	C	202E	2635	
6	D	616A	2805	
6	E	202F	2465	At missile sites only
6	E	616A	2805	At bases with associated missile sites

Note: SD Fig. 6 is used only on circuits from a base and missile site to a Headquarters location.

B. 43A1 Carrier Telegraph Channel Tests (SD-1G117-01, Fig. 1)

4.08 When performing the following tests and adjustments on the 43A1 carrier telegraph channel unit, the requirements of the existing instruction must be met. The voltages are critical with the remote Klaxon Horn operation requirement.

STEP	PROCEDURE
1	Arrange each 43A1 carrier telegraph channel unit, depending on its location, as shown in the table below.
2	Measure the station voltages and adjust the proper 48- and 130-Vdc voltages.
3	Adjust the dc voltage across terminals 5 and 8 on the 43A1 unit to 20 volts $\pm$0.5 volt, with normal supply voltage, by strapping resistors R34, R35, and R36 as required. Adjust the LP CUR control fully clockwise.

LOCATION	NETWORK		SWITCH POS		*EQUIP TUBE SOCKETS
	SEND	REC	SEND	REC	
Base	453L	454M	LM	L+	V1, V2, V3, V4, V5
Missile Site	453AB	454M	LM	L+	V1, V2, V3, V4, V5

*Verify that socket V6 is not equipped.

Test apparatus required:

1 — KS-14510 or equivalent Volt-ohmmeter

4.09 All other tests and adjustments, with the exception of the SEND LEV, REC GAIN, and REC BIAS controls, that are covered in the following steps should be in accordance with the sections covering 43A1 carrier telegraph terminals (312-7XX-YYY). Adjustment of the 43A1 transmitting level assumes that the transmission tests have been made and the requirements met. The following test is to be made on an ***out-of-service basis.***

STEP	PROCEDURE
1	At the base of missile site location of the circuit under test, block the LP relay in the operated position. This will result in the transmission of a steady mark signal.
2	At the serving testroom, connect a 72A frequency meter or equivalent at the same test point used in 4.04, Step 2. Verify that the steady mark frequency is correct. Remove the 72A frequency meter and connect a TMS to the test point. The measured value should be 20 $\pm$0.2 dB below the 1000 Hz specified in the CLR. To meet this requirement, adjust the SEND LEV control on the 43A1 panel at the base or missile site (see Fig. 10).
3	Remove the block from the LP relay, which was placed in Step 1.

4.10 The 43A1 receiving unit receive bias must be balanced. The test to adjust the REC BIAS control is to be made on an ***out-of-service basis.*** This test is to be made on circuit order, routine, or trouble basis, as required. The receiving transmission levels should be within the required limits.

STEP	PROCEDURE
1	In the control office, patch the output of the Klaxon test set to the transmit MON jack of the circuit under test and terminate the transmit test jack. Block the A relay of the Klaxon test set operated.
2	At the base location, set the KS-14510 volt-ohmmeter to read 60 Vdc. Connect the negative terminal to pin jack D and the positive terminal to pin jack C of the 43A1 unit under test. ***Requirement:*** 25 volts or greater.
3	At the base location remove the volt-ohmmeter connections from the pin jacks. Operate the REC SWITCH to H+. Connect the negative terminal of the volt-ohmmeter to pin jack C and the positive terminal to pin jack D. Record the voltage measured. ***Requirement:*** 25 volts or greater.

STEP	PROCEDURE
4	The voltage measurements should be equal. If not, adjust the REC BIAS control on the 43A1 unit under test and repeat tests in Step 3 until the voltage measurements are balanced. If this requirement cannot be met or if the voltage is less than 25 volts, the probable cause is a weak V4 tube (408A), a defective 454M receive network in the 43A1 unit or a maladjusted REC GAIN control. ***Caution 1: The REC SWITCH should be left in the L+ position.*** ***Caution 2: If the REC BIAS control is adjusted, the receive gain must be reset.***
5	Remove the patch and termination from the circuit at the control office and unblock the A relay of the Klaxon test set.

4.11 The 43A1 receiving unit is not to be operated at maximum gain. The following tests to adjust the REC GAIN control are to be made on an ***out-of-service basis.*** These tests are to be made on circuit order, routine, or trouble basis, as required. It is assumed that the receiving transmission levels are within the required transmission limits and that slow pulses are being received.

STEP	PROCEDURE
1	Set the KS-14510 volt-ohmmeter to read 150 Vdc. Connect the negative terminal to pin jack G and the positive terminal to pin jack LP on the 43A1 unit under test.
2	Adjust the REC GAIN control maximum clockwise. Verify that the voltmeter indicates that slow pulses are being received at the rate of one every 3 seconds. Between pulses, the meter will indicate approximately 10 volts. When a 170-ms slow pulse is received, the meter will indicate its presence but will not indicate the maximum voltage of the pulse, due to its short duration.
3	In the serving testroom, adjust an attenuator for 12-dB loss, corrected for any deviation in the facility levels from the specified value (see Fig. 10). After adjusting the attenuator, connect it in series with the receive line of the circuit under test at a convenient jack appearance.
4	While observing the slow pulse indications on the voltmeter, turn the REC GAIN control of the 43A1 unit under test in the counterclockwise direction by a small increment at a time. Determine the REC GAIN control position at which the slow pulses just drop out (no voltmeter indication); the continuity failure alarm should operate at SAC or NAF Headquarters.

STEP	PROCEDURE
5	Adjust the REC GAIN control slowly by a small increment at a time in the clockwise direction until slow pulses are again observed on the voltmeter. This is the final REC GAIN control setting.

C. Fast Pulse Generator Tests (SD-1G117-01, Fig. 1)

4.12 Adjust the percent break and pulse speed as follows:

STEP	PROCEDURE
	Note: Test apparatus required is: 1—J94723A Pulse Checking Test Set 1—1W3A Cord or equivalent.
1	Connect −48 volt battery and ground to the test set.
2	With the lever-type key in the normal position, adjust the CAL rheostat to obtain a zero reading on the percent break meter scale.
3	Connect the spade-type tip of the 1W3A cord to binding post P on the test set. Connect the 347A plug to the fast pulse generator A TST jack. The reading should be between 49 and 51 percent. Strap resistors R6 and R7, as required, to meet the percent break requirement.
4	Adjust the CAL rheostat per Step 2.
5	Operate the SCALE key to the 20 position.
6	Operate the lever-type key to the PPS position and observe the 0—20 pulses per second scale. The reading should be between 4.8 and 5.2 per second. Strap resistors R2, R3, and R4, as described on the drawing, to obtain the required pulse speed reading.
7	Recheck Steps 1 through 3 if a change of resistor strapping is made in Step 6.

D. Fast Pulse Receiver Tests (SD-1G117-01, Fig. 1)

4.13 The fast pulse receiver is adjusted to operate on the fifth fast pulse received. A test circuit is provided as a part of the base equipment. Test apparatus required is:

1—Test Cord equipped with a 347D Plug, or one 165C Open Plug.

STEP	PROCEDURE
1	Hold the nonlocking B TST key operated and insert the open plug into the fast pulse generator A TST jack. Observe the A relay and determine the number of pulses required to operate it. This can be determined by listening to the operation of the pulsing P2 relay and by counting the pulses.
2	Remove the open plug from the TST jack to stop the test cycle.
3	Adjust the P control as required to obtain operation of relay A on the fifth pulse. Failure to meet this requirement may be due to a defective cold cathode tube V3.
4	Repeat a test cycle per Steps 1 through 3 except that the open plug should be removed from the generator TST jack immediately after the A relay operates. The relay should remain operated for a minimum of 5 seconds. Failure to do so may be due to a defective cold cathode tube V4.

E. Tests of Transmission of Fast and Long Pulse Signals

4.14 The following tests must be made on an ***out-of-service basis*** with the base 4-wire line terminated at the serving testroom:

STEP	PROCEDURE
1	Momentarily connect a ground to the H relay, released contact 4. The H relay should operate in approximately 2 seconds to end the transmission of a fast pulse acknowledgment signal. The H relay should remain operated for approximately 1.5 seconds.
2	Momentarily connect a ground to the H relay, released contact 6. The H relay should operate in approximately 1.5 seconds to end the transmission of the long pulse line signal.
3	If the H relay fails to operate within the approximate time intervals specified in Steps 1 and 2, try replacing the cold cathode tube V5.

F. Slow Pulse Repeater Tests (SD-1G117-01, Fig. 1)

4.15 Make tube tests and replacements on the same basis as specified for the associated 43A1 carrier telegraph terminal.

5. KLAXON HORN TESTS (SD-1G117-01, FIG. 1, 8, AND 9, AND SD-69358-01)

5.01 The tests and adjustments in 4.04, Steps 1 through 6, 4.07 through 4.10, and 4.12 should meet requirements before proceeding with this test.

The precautionary measures required in 4.03 of this section should be observed. These tests involve sending actual Klaxon Alert signals, and the Klaxon Horns will be sounded if the proper safeguards are not taken.

STEP	PROCEDURE
1	Have the control office of the circuit under test place open plugs in receive and transmit TEST jacks at the testboard.
2	Patch from the Klaxon test set output jack to the transmit MON jack of the circuit under test. Set the function of the Klaxon test set to long pulse and verify test set send level and frequency.
3	At the base location, set the KS-14510 volt-ohmmeter to read 150 Vdc. Connect the negative terminal to pin jack G and the positive terminal to pin jack LP of the 43A1 unit associated with the circuit under test.
4	Request the control office to send a long pulse while the meter is being observed. A fluctuating voltage will be observed, followed by a long pulse of 6 seconds. The voltage during the long pulse should measure approximately +112 volts. A voltage lower than 100 volts is an indication of 43A1 channel unit trouble.
5	Remove the volt-ohmmeter leads from the pin jacks of the 43A1 unit.
6	Verify that all relays are in a nonoperated position with the exception of the RCZ and RCW relays. If so, remove the open plug from the LP test 2A jack of the circuit under test.
7	At the control office, set the function switch of the Klaxon test set to short pulse while the A, M, FL, and LR relays are being observed at the base location. The M relay can be observed for operation by placing a finger on the M relay cover. The M relay is located on the CP 1 circuit board. The A relay should operate and release in approximately 5 seconds. The M, LR, and FL relays should not operate.
8	Send a long pulse from the Klaxon test set while observing the A, M, LR, and FL relays at the base location. The A relay should operate as in Step 7. The M relay should operate approximately 3 seconds after the A relay and release after the A releases. No other relay should operate.
9	Send a normal pulse from the Klaxon test set while observing the A, M, LR, and FL relays. The A and M relays should function as in Step 8. The LR relay should operate and hold operated, and the FL relay should begin operating and releasing. This condition should provide a flashing KLX lamp at the console indicating proper operation. ***Caution: Operation of the KLX RCO key when the KLX lamp is flashing will operate the Klaxon Horns. Operation of either ACK key will operate the H and FP relays and release the LR and FL relays. The only relays operated should then be the RCZ and RCW, and the only lamp lighted on the console should be the KLX RCO key.***
10	Each of the operations in Steps 7 through 9 should be repeated to test for marginal conditions (allow 30 seconds for stabilization before repeating tests).
11	At the control office, insert an attenuator between the Klaxon test set output and the transmit MON jack of the circuit under test. Set the function switch to short pulse. Transmit short pulse while the A relay is being observed at the base. Adjust the attenuator loss until the A relay fails to operate.

STEP	PROCEDURE
	Requirement: Minimum fail point should not exceed 8 dB.
12	After completing tests, verify that all relays are in a nonoperated condition, with the exception of the RCZ and RCW relays. ***Caution: It is important to insure that the M relay has released to prevent false Klaxon Horn operation. If the M relay is left operated, a normal alert signal will operate the Klaxon Horns. To verify that the M relay is released, transmit short pulse test with the Klaxon test set; if the M relay is held operated, the LR relay will operate.***
13	Upon verifying that the M relay is released, the control office will remove the Klaxon test set and terminations from the circuit and advise the customer that he can return to normal operation.

6. ROUTINE TESTS

6.01 The tests listed in Table D are to be made on a routine basis to supplement those specified in Section 310-405-500. Unless otherwise specified, the listed references are a part of this section.

7. IN-SERVICE TESTS

7.01 In-service tests are designed to uncover any circuit impairments that, if not corrected before the next scheduled routine, may cause a circuit failure. They should be made on a weekly basis. All level measurements are to be made on a high-impedance bridging basis in order not to interrupt circuit continuity or transmission levels.

7.02 Table E lists the in-service tests to be made, location of tests to be made, and test requirements.

7.03 Test equipment required is:

1—Brush Recorder or equivalent
1—High-impedance TMS.

7.04 Pulse length measurements may be made by connecting the input of the recorder to the LP pin jack of the 43A1 carrier telegraph channel in the SD-1G116-01, Fig. 6 of the circuit under test. Set the recorder drive for maximum speed. Start the recorder and record several pulses. Read the pulse length from the recorder chart. Requirements are shown in Table E.

TABLE D

TEST	REFERENCES		INTERVAL
	PAR.	STEP	
43A1 Send Level			
for SD-1G116-01, Fig. 2	3.08	1—11	A
for SD-1G116-01, Fig. 11	3.09	4,5	Q
for SD-1G117-01, Fig. 1	4.08	1—3	Q
43A1 REC GAIN			
for SD-1G116-01, Fig. 1	3.08	1—11	A
for SD-1G116-01, Fig. 6 and 11	3.09	1—3	Q
for SD-1G117-01, Fig. 1	4.11	1—5	Q
1000-Hz Net Loss			
Serving testroom to base or missile site	4.04	1—4	Q
Serving testroom to SAC or Headquarters location	3.02	—	Q
Frequency Response			
Serving testroom to base or missile site	4.04	5—7	A
Serving testroom to SAC or Headquarters location	3.02	—	A
Net Loss of Alert Transmission Path at SAC and Headquarters	3.03	1—13	A
Alert Tone Tests	3.15	—	Q
Gain of SD-69358-01, Fig. 17 Amplifier	4.06	1—2	Q
Klaxon Horn Test	5.02	1—10	Q
Fast Pulse Receiver	4.13	1—4	Q

A — Annual Q — Quarterly

TABLE E

LOCATION TO MAKE TEST	TEST TO BE MADE	REQUIREMENT
Testroom serving base or missile site	Measure 43A1 carrier pulse level from SAC or Headquarters	−20 ±3.0 dB of 1000-Hz level specified on circuit layout record
Testroom serving SAC or Headquarters location	Measure 43A1 carrier pulse level from base, missile site, or Headquarters	−20 ±3.0 dB of 1000-Hz level specified on circuit layout record
SAC or Headquarters location	Measure received slow pulse length	Minimum of 170 ms
SAC or Headquarters location	Check slow pulse fail level	12 dB ±3.0 dB

7.05 Bridge the high-impedance TMS across the line and read the 43A1 carrier telegraph tone level. Requirements are shown in Table E.

7.06 The received pulse length may be affected by any of the following conditions:

(a) Transmission levels to the distant location

(b) Improper adjustment of the 43A1 telegraph carrier channel units at either end of the circuit

(c) Aging tubes in the 43A1 telegraph carrier channels, slow pulse repeater, or slow pulse receiver

(d) Low power supply voltages to the equipment.

7.07 To make in-service slow pulse fail test, insert an attenuator between the transmit MON and TEST jacks. Adjust the attenuator while monitoring at the receive MON jack until the return pulse fails. A fail point of 9 dB or less indicates a possible PAS Fast Klaxon impairment and warrants investigation.

8. TROUBLE TESTS FOR KLAXON OPERATION

8.01 The same precautions specified in 4.03 and 5.01, Step 6 must be observed when conducting trouble tests. Every precaution must be taken to insure the Klaxon Horns are not inadvertently operated.

8.02 Table F lists a step-by-step sequence of tests to be performed and possible reasons for malfunctions. These tests require use of the Klaxon test set at the control office.

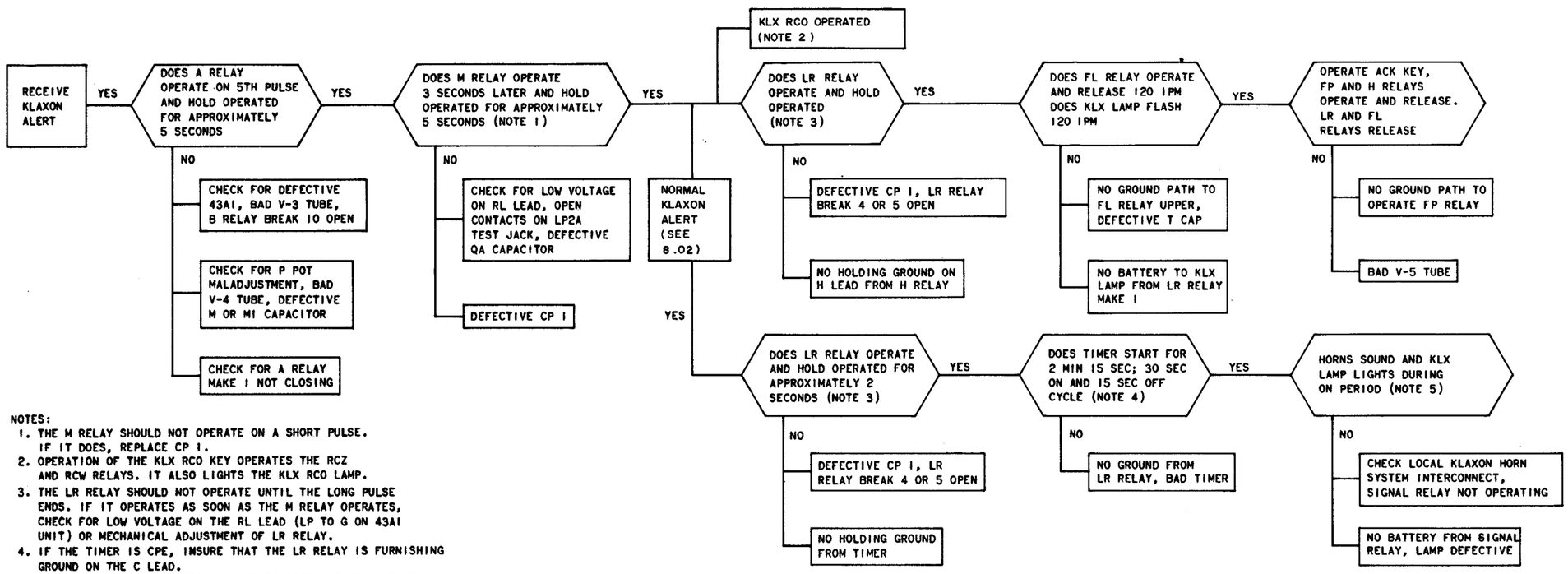
Tests in Parts 6, 7, and 8 can be performed only with customer concurrence. They are listed only as an aid should the horns be inoperative on a remote activation and all other requirements are met.

8.03 Part 5 describes how to connect the test set and send the Klaxon Alert signals.

TABLE F

TROUBLE TEST FLOW CHART

FOR KLAXON OPERATION



NOTES:

1. THE M RELAY SHOULD NOT OPERATE ON A SHORT PULSE. IF IT DOES, REPLACE CP I.
2. OPERATION OF THE KLX RCO KEY OPERATES THE RCZ AND RCW RELAYS. IT ALSO LIGHTS THE KLX RCO LAMP.
3. THE LR RELAY SHOULD NOT OPERATE UNTIL THE LONG PULSE ENDS. IF IT OPERATES AS SOON AS THE M RELAY OPERATES, CHECK FOR LOW VOLTAGE ON THE RL LEAD (LP TO G ON 43AI UNIT) OR MECHANICAL ADJUSTMENT OF LR RELAY.
4. IF THE TIMER IS CPE, INSURE THAT THE LR RELAY IS FURNISHING GROUND ON THE C LEAD.
5. IF CPE KLAXON HORN SYSTEM AND TELCO SIGNAL RELAY, VERIFY THAT IT IS FURNISHING OPERATING VOLTAGE OR GROUND TO HORNS. IF KLX LAMP DOES NOT LIGHT AND CPE SIGNAL RELAY IS BEING USED, VERIFY LAMP BATTERY IS BEING FURNISHED ON L LEAD.

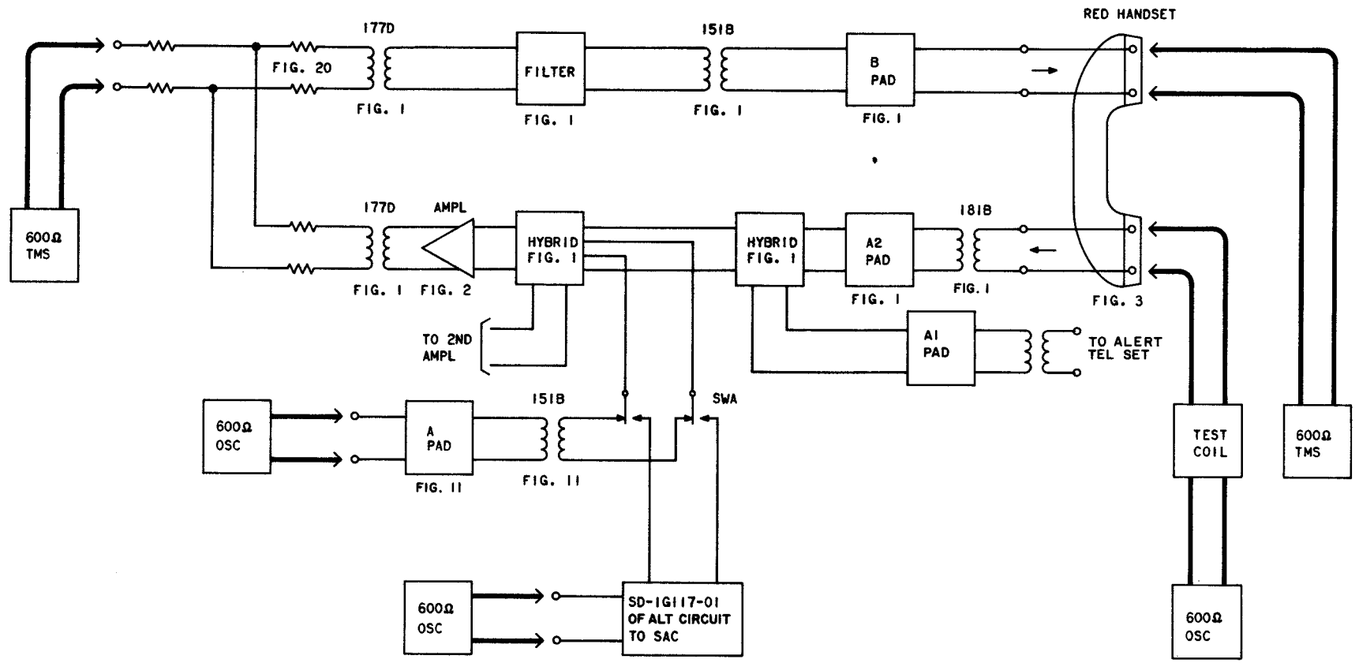


Fig. 1—Transmission Tests—Red Telephone Positions per SD-1G116-01

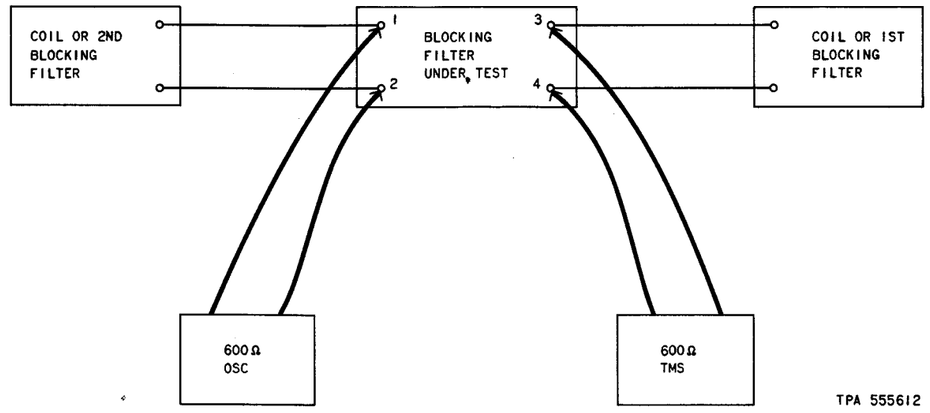


Fig. 2—Transmission Tests—Blocking Filters per SD-1G116-01

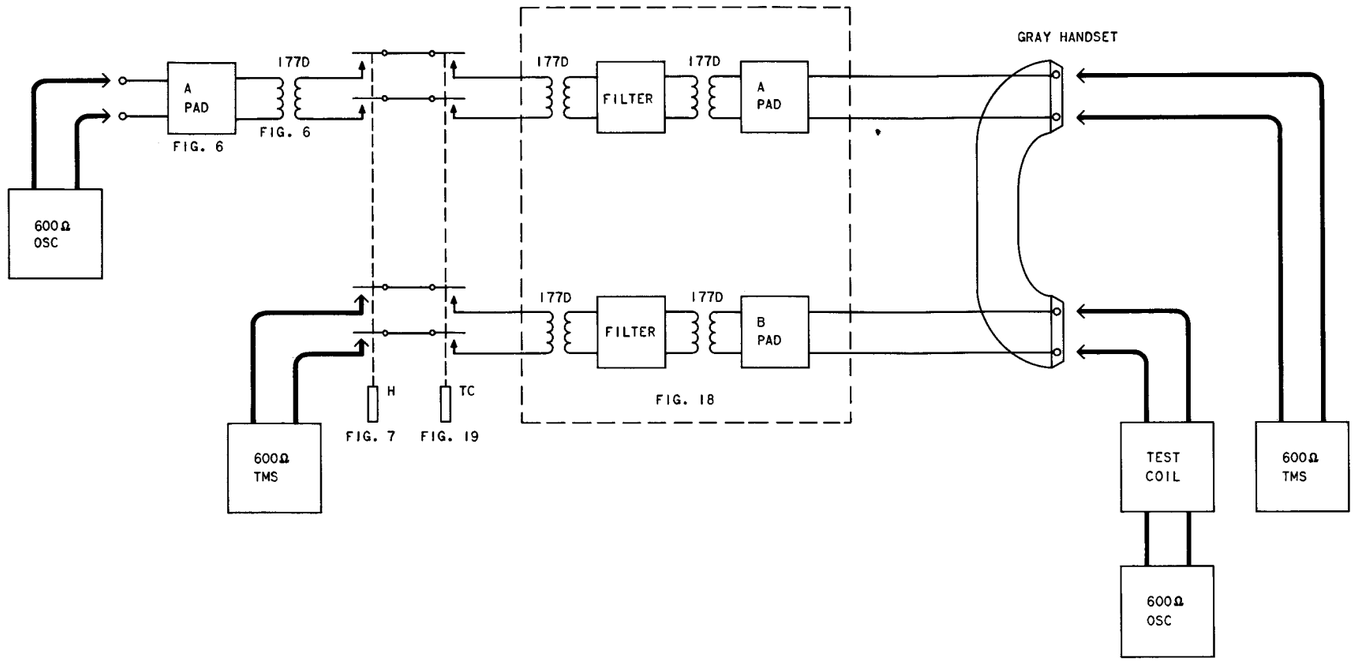


Fig. 3—Transmission Tests—Gray Telephone Positions per SD-1G116-01

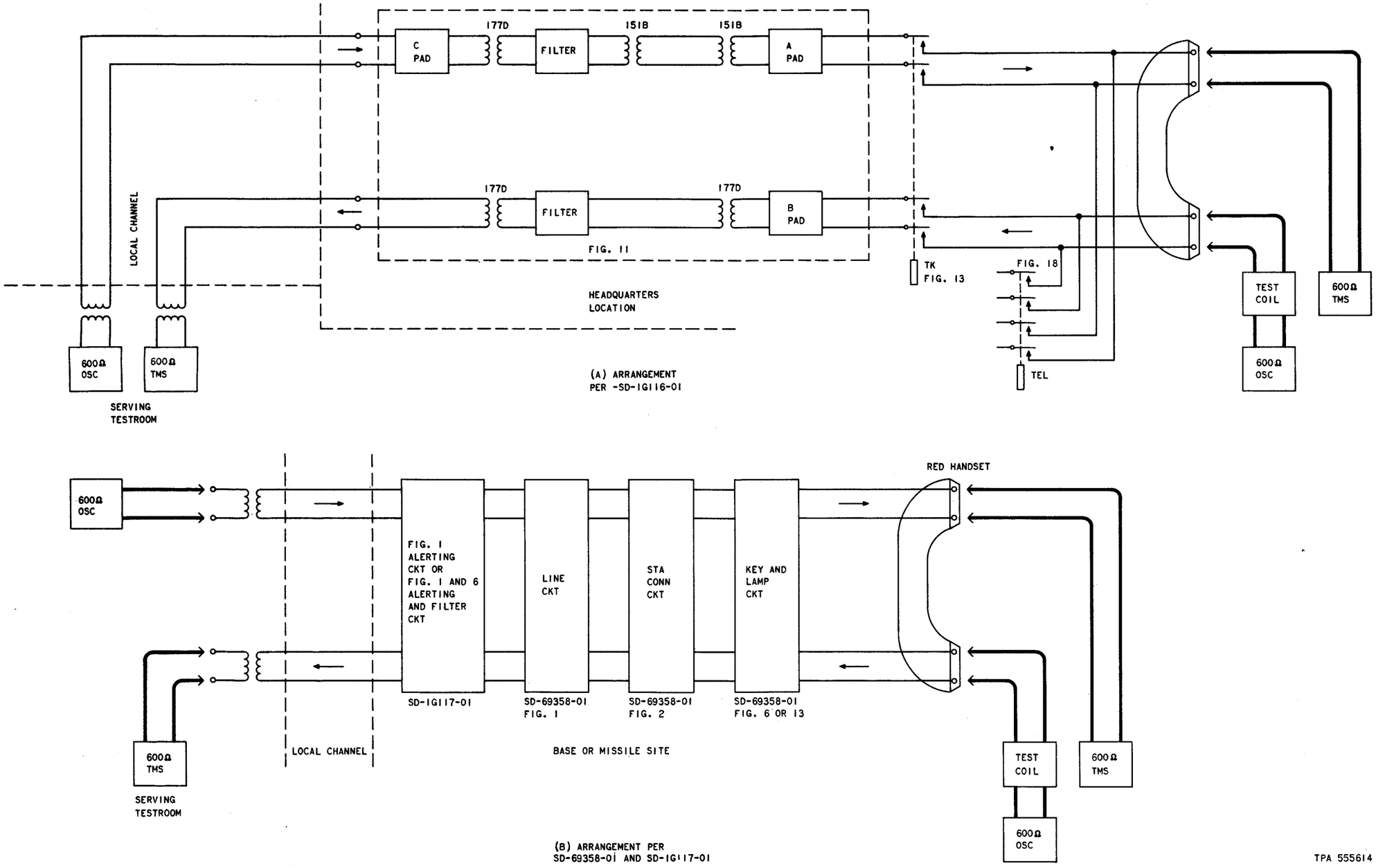
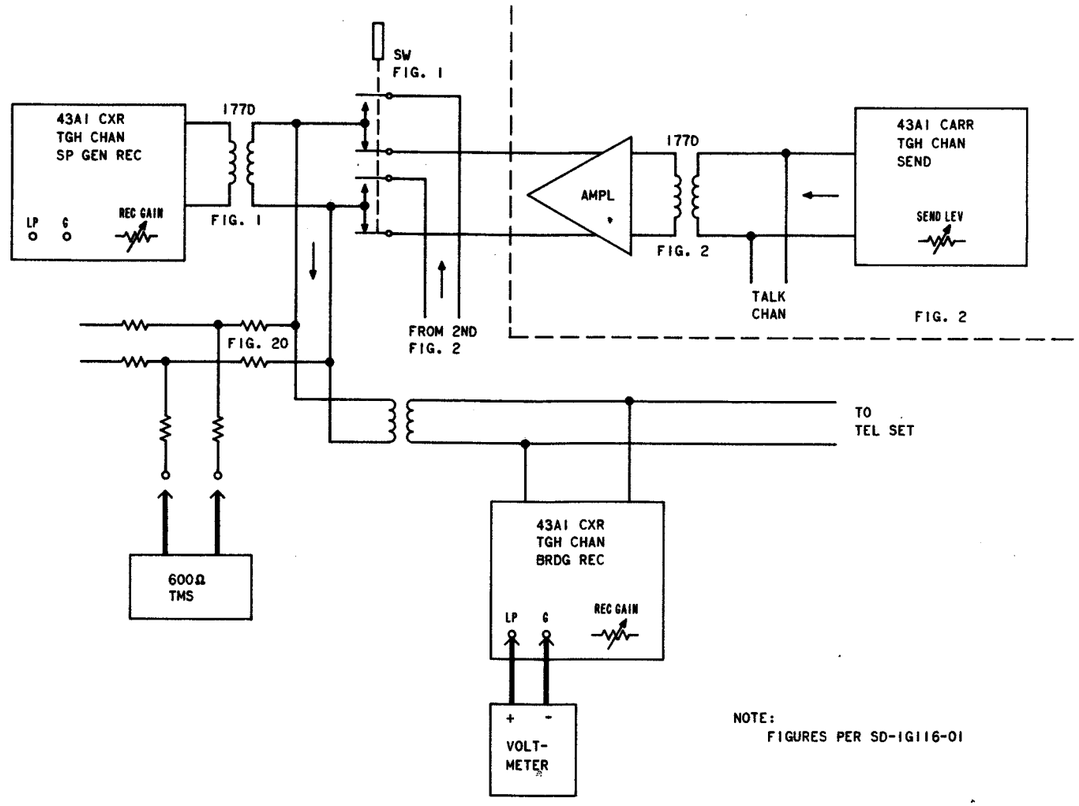


Fig. 4—Transmission Tests—Headquarters Locations



NOTE:
FIGURES PER SD-IG116-01

Fig. 5—Transmission Tests—43A1 Carrier Telegraph Channels—SAC and Headquarters Locations

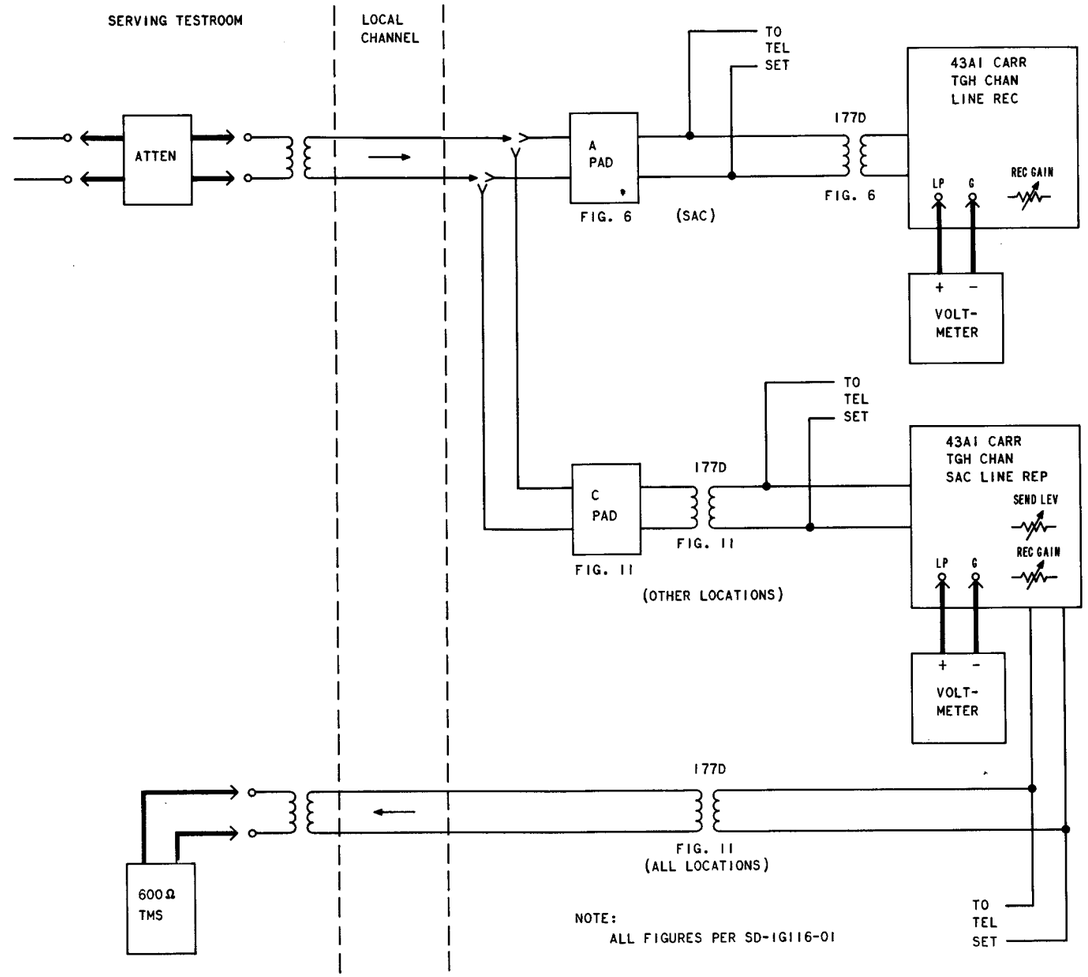


Fig. 6—Transmission Tests—43A1 Carrier Telegraph Channels—SAC and Headquarters

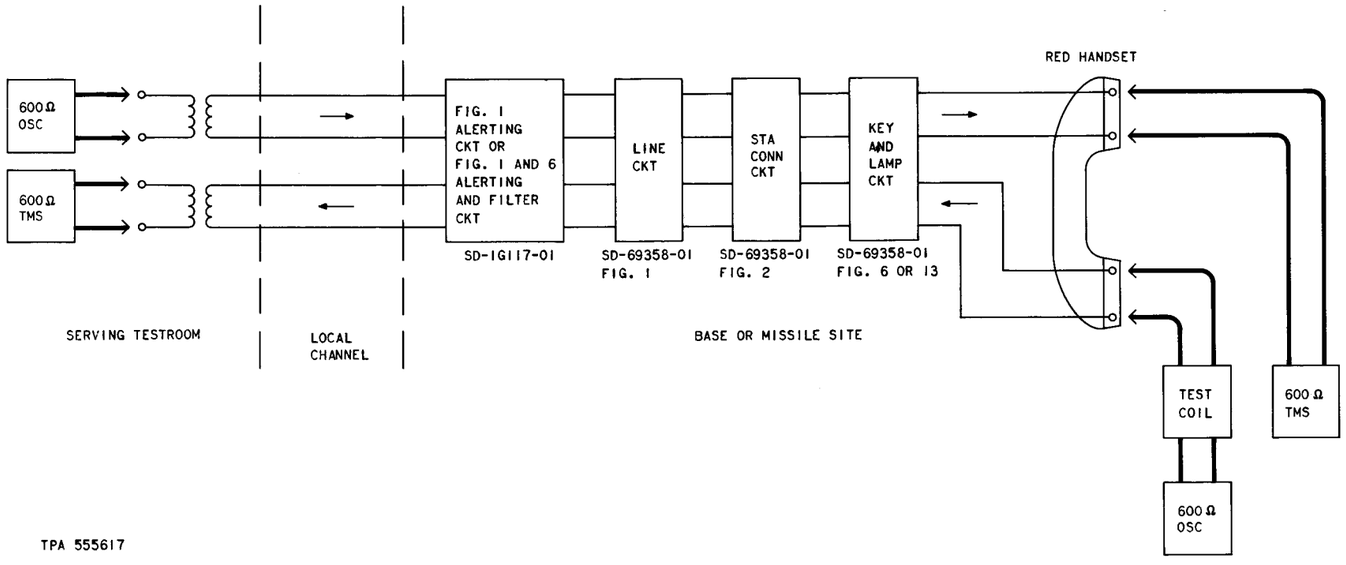


Fig. 7—Transmission Tests—Telephone Positions—Base or Missile Location

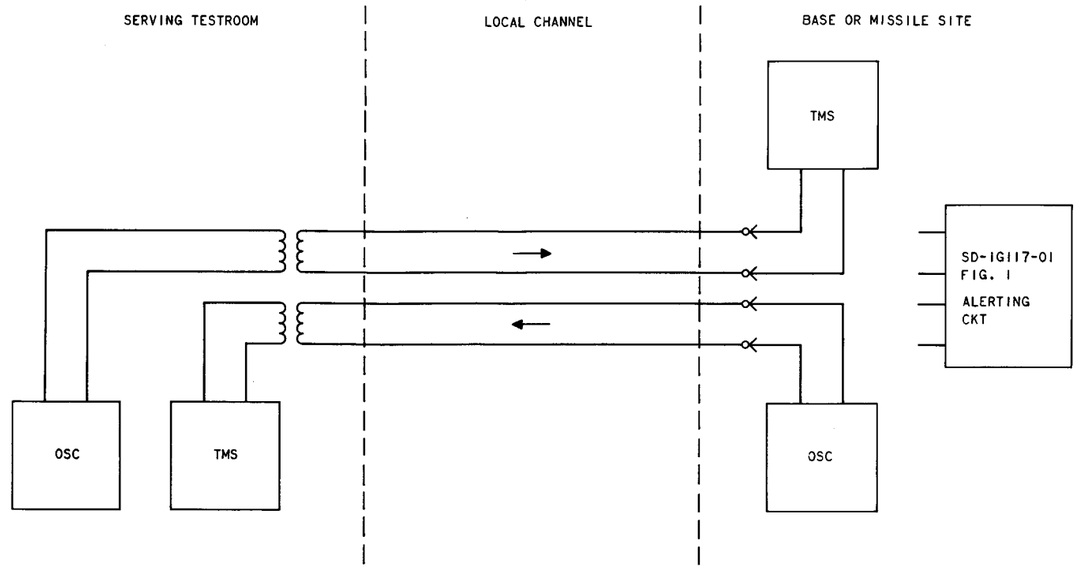


Fig. 8—Transmission Tests—Local Channels

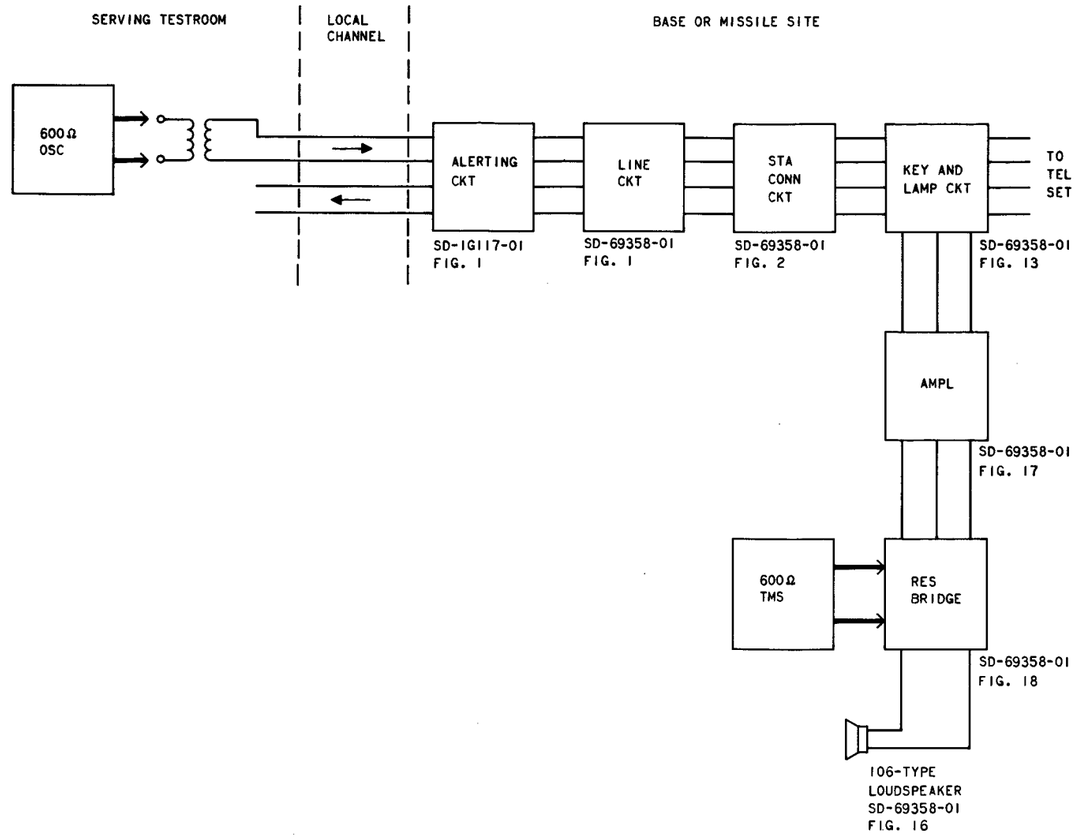


Fig. 9—Transmission Tests—Distribution Amplifiers—Base and Missile Locations

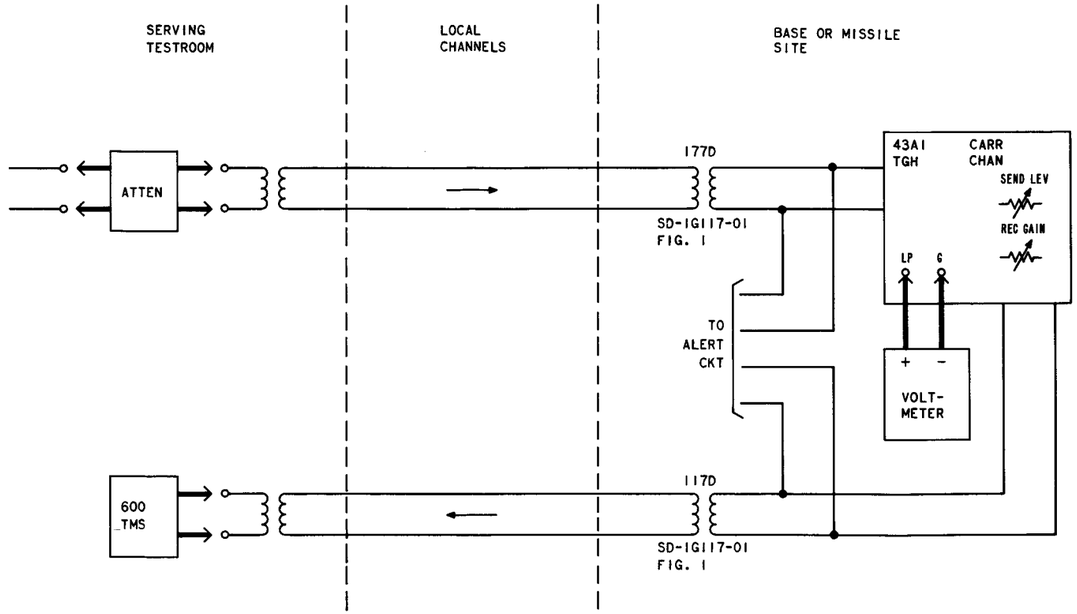


Fig. 10—Transmission Tests—43A1 Carrier Telegraph Channels—Base or Missile Locations

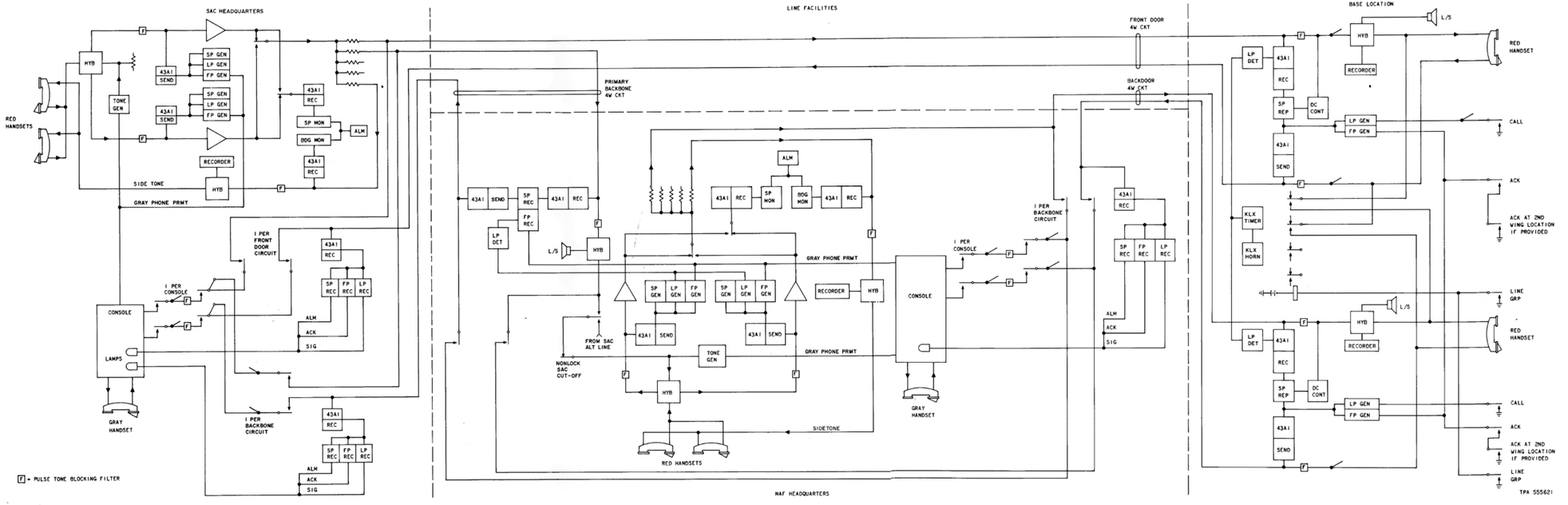


Fig. 11—Schematic Diagram of Primary Alerting System