KS-20449 AMPLIFIER

TESTS AND ADJUSTMENTS

CONTENTS PAGE

1. GENERAL

1.01 This section outlines the tests to be performed on the KS-20449 L1 amplifier. The amplifier has an output of approximately 0.5 watt and is used in such applications as military conference arrangements, Call Distributor Systems, and No. 300 Switching Systems.

1.02 This section is reissued to add KS-19774 L2 100PF capacitor (or equivalent) on the printed circuit board, Fig. 3. This change eliminates high-frequency oscillations and reduces noise from the amplifier output signal.

This reissue does not affect the Equipment Test List.

1.03 The tests outlined in this section should be made to determine the performance of the amplifier when clearing troubles. These tests may also be used to locate equipment troubles. If the tests indicate trouble that cannot be cleared, the entire KS-20449 L1 amplifier should be returned to the repair center.

2. RECOMMENDED TEST EQUIPMENT

2.01 The following items of test equipment are required for tests on the KS-20449 L1 amplifier. If the specified equipment is not available, a substitute which is electrically equivalent may be used.

1—Hewlett-Packard Model 200 CD signal generator, or equivalent

1—5A attenuator, or equivalent

2—Hewlett-Packard Model 400 AC voltmeter, or equivalent

1—Tektronix* Model 515A oscilloscope, or equivalent

2—600-ohm resistor, ±1 percent, 1 watt noninductive

Test cords and clips as required.

*Registered trademark of Tektronix, Inc.

3. PREPARATION

3.01 All ac-operated test equipment should be allowed to warm up sufficiently before beginning any tests. This is important since it has a bearing on the stability of the equipment and accuracy of the tests. All test equipment should be calibrated before beginning the tests.

3.02 The amplifier should be removed from service before testing. The signal input and the amplifier output should be disconnected, or opened, at the most convenient point. Record amplifier options and connections for use in restoring amplifier to service.

Note: Unless absolutely necessary, wire-wrap terminations should ***not*** be disturbed.

3.03 A good ground should be connected to terminal 21 of TB1 to reduce the possibility of induced noise.

3.04 Refer to the manufacturer instructions and/or the appropriate BSPs for proper operation of test equipment.

3.05 Connect the ocilloscope to the signal generator output, and observe the sine wave to insure that no distortion exists in the oscillator output.

3.06 The amplifier may be tested using either 24- or 48-Vdc positive or negative grounded power supply. Fig. 1 and 2 show test circuits using 48-Vdc positive grounded power supply.

3.07 The BIAS ADJUST control (R23) is adjusted initially at the time of manufacture and should not be adjusted in the field.

3.08 The schematic diagram for the amplifier is shown in Fig. 3. The detailed circuit description is covered in CD-99531-01.

4. GAIN FREQUENCY TEST

4.01 The gain-frequency response of the KS-20449 L1 amplifier should be measured in accordance with Chart 1.

CHART 1

GAIN FREQUENCY TEST

STEP	PROCEDURE
1	Connect the equipment as shown in Fig. 1.
2	Turn GAIN control (R1) on the amplifier to maximum clockwise position.
3	Insert 65 dB loss in 5A attenuator.
4	Set the signal generator at 1000 Hz, and adjust its output voltage to deliver 2.45 volts (+10 dBm) to meter M1. Read meter M2 indication. ***Requirement:*** +10 dBm ±2 dB.
5	Repeat Step 4 with the signal generator set at 200 Hz and 6000 Hz. Read meter M2 indication. ***Requirement:*** The 200-Hz gain and the 6000-Hz gain shall not differ from the 1000-Hz gain, previously measured, by more than +0, −2 dB.

5. POWER OUTPUT TEST

5.01 The power output of the KS-20449 L1 amplifier should be measured in accordance with Chart 2.

CHART 2

POWER OUTPUT TEST

STEP	PROCEDURE
1	Connect the equipment as shown in Fig. 1.
2	Remove the strap from between terminals 18 and 20. This removes option W and disables the AGC circuit in the amplifier.
3	Turn GAIN control (R1) on the amplifier to maximum clockwise position.
4	Set the signal generator at 1000 Hz, and adjust its output voltage so that the amplifier delivers 14.8 volts (+25.5 dBm) indicated on the voltmeter (M2) connected across the 600-ohm load resistor.
5	Observe the oscilloscope. ***Requirement:*** There shall be no flattening of the peaks observed on the oscilloscope.
6	Rotate GAIN control R1 slowly counterclockwise. As the control is rotated, the amplifier output voltage should decrease smoothly. When the control is at its maximum counterclockwise position, the output shall have decreased by at least 50 dB.
7	Replace the strap between terminals 18 and 20.

6. AGC COMPRESSION RANGE TEST

6.01 The AGC compression range of the KS-20449 L1 amplifier should be measured in accordance with Chart 3.

CHART 3

AGC COMPRESSION RANGE

STEP	PROCEDURE
1	Connect the equipment as shown in Fig. 1.
2	Turn GAIN control (R1) and OUTPUT LEVEL control (R19) on the amplifier to maximum clockwise position.
3	Insert 30 dB loss in 5A attenuator.

CHART 3 (Cont)

STEP	PROCEDURE
4	Set the signal generator at 1000 Hz, and adjust its output voltage to deliver 2.45 volts (+10 dBm) to meter M1.
5	Observe voltmeter M2 and oscilloscope. ***Requirement:*** The reading of voltmeter M2 shall not exceed 15.5 volts (+26 dBm) nor be less than 11.0 volts (+23 dBm). There shall be no noticeable forms of distortion as observed on the oscilloscope.
6	Readjust 5A attenuator to insert 50 dB loss.
7	Connect B and remove A (Fig. 1). This is a test for potentiometer R19.
8	Observe voltmeter M2. ***Requirement:*** 0 dBm $\pm$2 dB.
9	Rotate OUTPUT LEVEL control (R19) slowly counterclockwise. As the control is rotated, the amplifier output voltage shall decrease smoothly. When the control is at its maximum counterclockwise position, the output shall have decreased by at least 35 dB.
10	Remove B and connect A (Fig. 1).

7. NOISE TEST

7.01 The noise of the KS-20449 L1 amplifier should be measured in accordance with Chart 4.

CHART 4

NOISE TEST

STEP	PROCEDURE
1	Connect the equipment as shown in Fig. 2. Test should be made with cover on.
2	Turn GAIN control (R1) on the amplifier to maximum clockwise position.
3	Observe the voltmeter.

CHART 4 (Cont)

STEP	PROCEDURE
	Requirement: The reading of the voltmeter shall not exceed 0.00435 volts (−45 dBm).
4	Remove the test equipment, and restore the amplifier to service if all requirements are met.

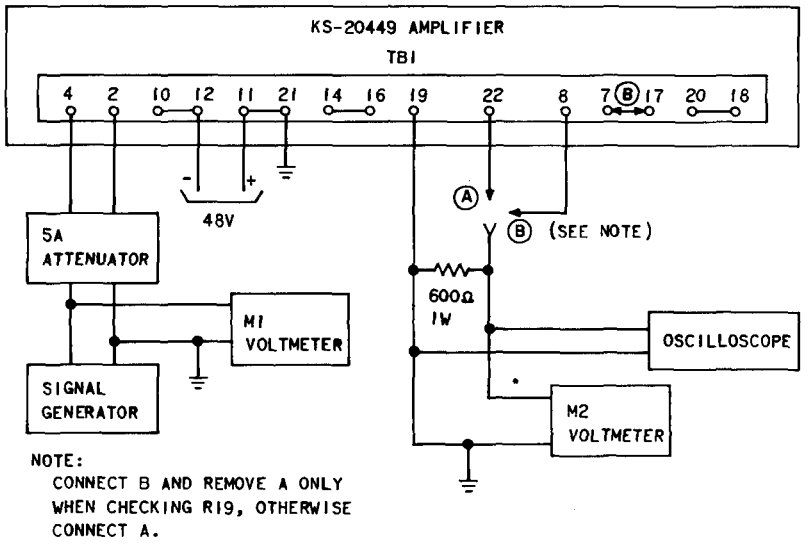


Fig. 1—Test Setup for Gain-Frequency, Power-Output, and AGC Compression Range Tests

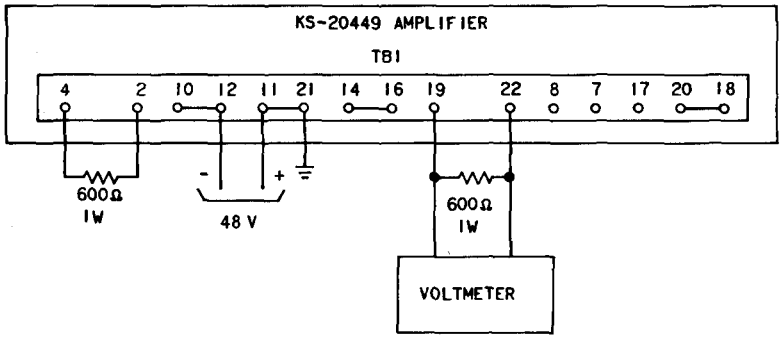
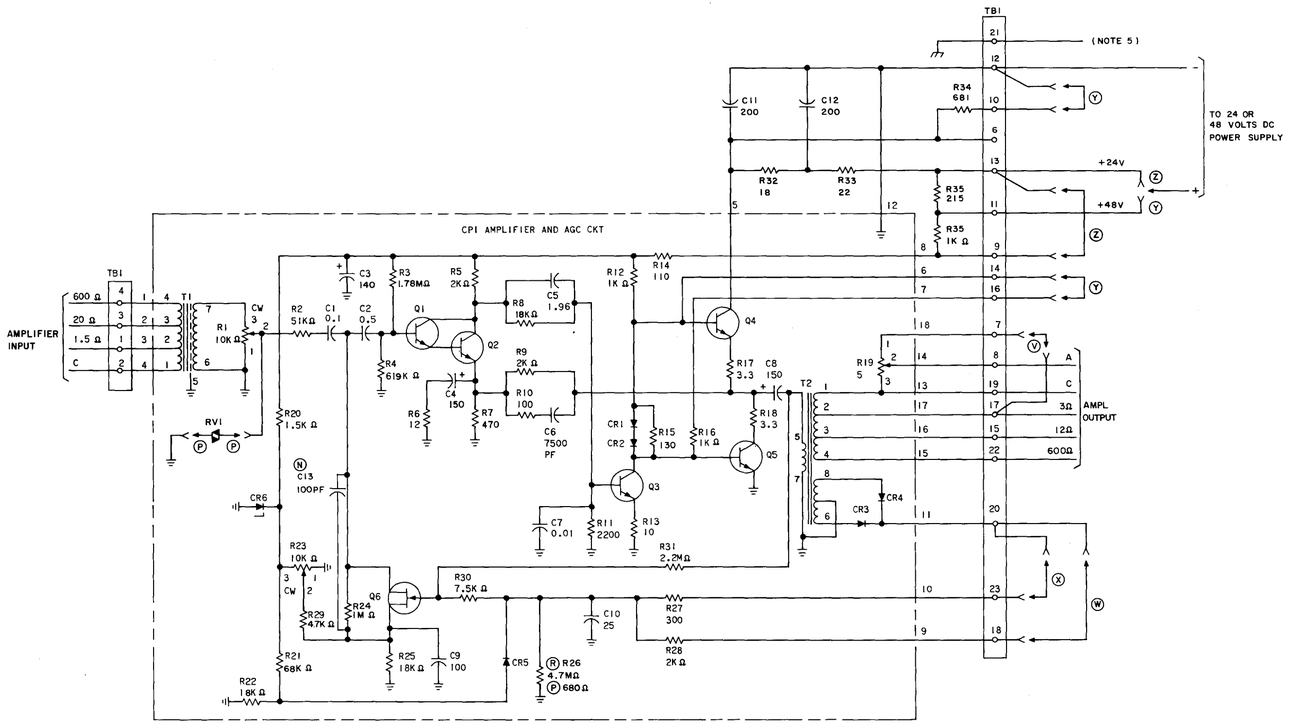


Fig. 2—Test Setup for Noise Test



NOTES:
1. UNLESS OTHERWISE SPECIFIED RESISTANCE VALUES ARE IN OHMS; CAPACITANCE VALUES ARE IN MICROFARADS, AND VALUES PRECEDED BY THE SYMBOL + (PLUS) OR - (MINUS) ARE IN VOLTS.
2. POTENTIOMETERS R1 AND R23 ARE FURNISHED WITH SCREWDRIVER ADJUSTABLE SHAFTS. A FLAT ON SIDE OF SHAFT INDICATES CONTACT POSITION.
3. FOR AMPLIFIER OPERATION WITHOUT AGC DO NOT CONNECT EITHER (W) OR (X) OPTION.

(S)	POSITIVE GROUND BATTERY (−24 VOLT)	(NOTE 5)
* (T)	POSITIVE GROUND BATTERY (−48 VOLT)	
(U)	NEGATIVE GROUND BATTERY (+24 OR +48 VOLT)	
(V)	OUTPUT LEVEL CONTROL	
* (W)	SLOW ATTACK TIME	
(X)	FAST ATTACK TIME	
* (Y)	48 VOLT OPERATION	
(Z)	24 VOLT OPERATION	
* OPTION FURNISHED WITH AMPL BY MANUFACTURE		

4. CIRCUIT BOARDS WILL BEAR THE SERIES NUMBER MARKING PER THE FOLLOWING TABLE:

SERIES NO.	OPTIONS
1	R (MD)
2	P
3	P, N

5. WHEN THE AMPLIFIER IS MOUNTED ON A NON-GROUNDED FRAME, ONE OF THE FOLLOWING CONNECTIONS MUST BE MADE:
   (A) OPTION (U), STRAP 21 TO 12
   (B) OPTION (T), STRAP 21 TO 11
   (C) OPTION (S), STRAP 21 TO 13
   WHEN THE AMPLIFIER IS MOUNTED ON A GROUNDED FRAME, CONNECTING TERMINAL 21 TO THE LEAD FROM THE GROUNDED SIDE OF THE POWER SUPPLY MAY, IN SOME INSTALLATIONS, CAUSE OBJECTIONABLE NOISE AT THE OUTPUT OF THE AMPLIFIER. IF THIS OCCURS, DO NOT MAKE ANY CONNECTION TO TERMINAL 21.

Fig. 3—KS-20449 L1 Amplifier—Schematic Diagram