KS-16508 — L1 AMPLIFIER
TRANSMISSION TESTS

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1. GENERAL

1.01 This practice outlines the transmission tests to be performed on the KS-16508, L1 Amplifier. This amplifier is used in the 5A, 6A, 8A and 9A Announcement Systems.

1.02 The transmission tests outlined in this practice should be performed on the service order. Routine or scheduled transmission tests are not required on the amplifier. However, when the announcement system in which the amplifier is used is tested, the amplifier performance should also be checked by measuring the audio output power and frequency response in accordance with the procedures outlined in this practice.

1.03 For the purpose of these tests, the input and output external connections to the amplifier should be removed. The power connections should remain on terminal board TB3.

2. RECOMMENDED TEST EQUIPMENT

2.01 The following testing equipment is satisfactory for use in making these amplifier tests. If equipment is available which is electrically equivalent to an item in this list, it will be satisfactory for use.

200CD Oscillator (Hewlett-Packard)	RCA Voltohmyst — Model Junior or Senior
201C Oscillator (Hewlett-Packard)	304H DuMont Oscilloscope
21A TMS	400-Type VTVM (Hewlett-Packard)
AC Voltmeter	KS-15560 or KS-15750 Tube Tester

2.02 There are two points to keep in mind when making transmission tests. The first is that ***GOOD*** equipment should be used and second, it should be ***CALIBRATED PROPERLY.*** If these two things are observed, you are on your way toward making some good tests. Remember, ***POOR TESTS ARE A WASTE OF TIME, EFFORT, AND MONEY.***

2.03 All ac operated test equipment should be allowed to warm up sufficiently. This is important since it has a bearing on the stability of the equipment and accuracy of the test.

2.04 The dc socket voltages should be measured with an RCA Voltohmyst so as not to load the circuit down. The grid and plate circuits, in many instances, are high impedance. Hence, if a volt-ohm-milliammeter is used, erroneous readings will be obtained. This is true even with a 20,000 ohms per volt meter.

2.05 The frequency response of the 21A TMS should be checked over the range of frequencies it is to be used. The response should meet the requirements set forth in the practice for the test set. This will insure better results when making the gain-frequency test.

3. AC LINE VOLTAGE

3.01 The ac line voltage should be measured with a suitable ac voltmeter at the terminals of the amplifier. If possible, the voltage should be measured during the heavy and light power load periods so as to determine the magnitude of the voltage fluctuations. ***REQUIREMENTS:*** The voltage should measure 120 ± 10 volts. The ac voltage should be measured at terminal board TB3 as shown in Table I.

TABLE I

TERMINAL NO.	CONNECTION
21	Ungrounded side of ac line
22	Grounded side of ac (110-120 volts)
23	Grounded side of ac (120-130 volts)

4. ELECTRON TUBE TEST

4.01 All electron tubes should be tested using a standard KS tube tester. The tubes should meet all their requirements.

5. REPRODUCE CHANNEL

(A) Gain-Frequency Test

5.01 The test setup for measuring the reproduce channel of the amplifier is shown in Fig. 1. Chart I outlines the step procedure to be followed when making this test. The oscillator output in Step 7 of the procedure, for instance, is measured to insure that the amplifier will deliver the proper output with the minimum input voltage requirement. The procedure for the test will vary somewhat depending on the testing equipment used.

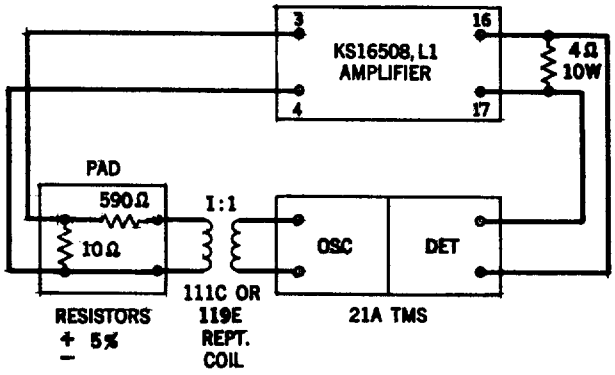

Fig. 1 – Gain-Frequency Test Setup for Reproducing Channel

CHART I

STEP	PROCEDURE	REMARKS
1	Connect 21A and amplifier to ac power.	
2	Set OSC to 1 kc.	
3	Connect circuit as shown in Fig. 1. The pad should be made up locally.	Make sure the pad is connected as shown.
4	Remove connections to terminals 1 and 5 of TB6.	
5	Turn REPRODUCE GAIN control of amplifier to maximum.	
6	Adjust OSC output until DET (TMS) reads +8 db.	
7	With OSC setting same as in Step 6 above, patch OSC OUT jacks to DET IN jacks.	***Requirement:*** DET (TMS) shall read −35 ± 3 dbm.
8	Reconnect circuit as shown in Fig. 1.	Don't change OSC output.

CHART I (Cont)

STEP	PROCEDURE	REMARKS
9	Adjust OSC for 100 and 5,000 cycles. Record DET (TMS) readings.	*Requirements:* See Table II(a).
10	Restore connections to terminals 1 and 5 of TB6.	Don't change OSC output.
11	Adjust OSC for 100, 1,000 and 5,000 cycles. Record DET (TMS) readings.	*Requirements:* See Table II(b).

TABLE II

(a) ***Without Low Frequency Equalizer***

FREQUENCY	AMPLIFIER OUTPUT
100 cycles	$+8^{+0}_{-2.5}$ db
1,000 "	$+8 \pm 0$ db
5,000 "	$+8^{+0}_{-2.5}$ db

(b) ***With Low Frequency Equalizer***

FREQUENCY	AMPLIFIER OUTPUT*
100 cycles	-1 ± 1.0 db
1,000 "	-1 ± 1.5 db
5,000 "	-11 ± 2.0 db

*The readings recorded in Step 11 of Chart I should not change by more than the limits shown. If, for instance, the 100-cycle reading in Step 9 is +6.0 db, an acceptable reading at 100 cycles with the low frequency equalizer in the circuit is $+5.0 \pm 1$ $(+6 -1 \pm 1.0)$ db.

(B) Distortion Test

5.02 The distortion test should be made using the test setup shown in Fig. 2. Chart II outlines the step procedure to be followed when making this test. The procedure will vary slightly depending on the testing equipment used.

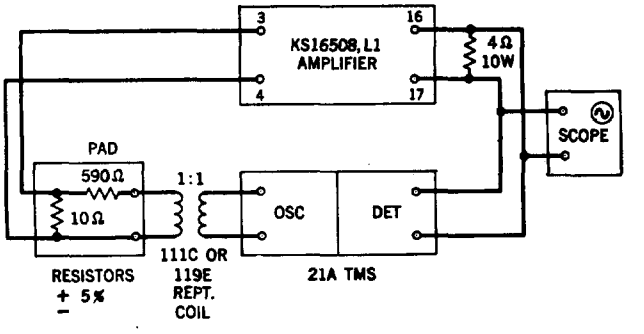

Fig. 2 – Test Setup for Observing Distortion of Reproducing Channel

CHART II

STEP	PROCEDURE	REMARKS
1	Connect equipment to ac power.	
2	Connect circuit as shown in Fig. 2.	
3	Adjust OSC for 1 kc.	
4	Turn REPRODUCE GAIN control of amplifier to maximum.	
5	Adjust OSC output until DET (TMS) reads +14 db.	
6	Adjust vertical gain, sync and frequency controls of oscilloscope to show a stable pattern.	The output waveshape should be the same as the input wave except for amplitude. See Fig. 3.

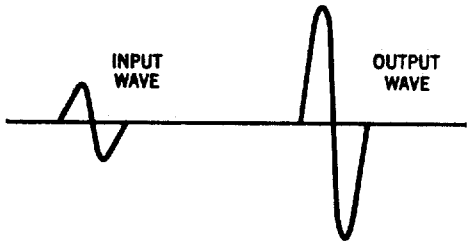

Fig. 3 – Comparison of Input and Output Waveshapes (Distortion)

(C) Noise Test

5.03 The noise test on the reproduce channel should be made using the test setup shown in Figs. 1 and 4. Chart III outlines the step procedure to be followed when making this test. This method is recommended so as to measure the noise under approximate operating conditions. A DET (TMS) is used to measure the unweighted noise instead of the 2B or 3A Noise Measuring Set for the sake of convenience. The readings obtained are arbitrary readings and are not true noise levels since a DET (TMS) is not a direct replacement for a noise measuring set. The procedure will vary somewhat depending on the testing equipment used.

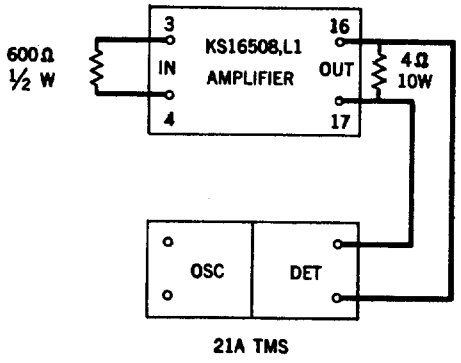

Fig. 4 – Test Setup for Measuring Noise

CHART III

STEP	PROCEDURE	REMARKS
1	Connect 21A and amplifier to ac power.	
2	Patch OSC OUT jacks to DET IN jacks.	
3	Set OSC to 1 kc.	
4	Adjust OSC output to −22 dbm.	
5	Connect circuit as shown in Fig. 1. The pad should be made up locally.	Make sure the pad is connected as shown.
6	Turn REPRODUCE GAIN control of amplifier for an output of +8 db on DET (TMS).	
7	Remove test connections to terminals 3 and 4 of amplifier.	These are connected to PAD.
8	Connect circuit as shown in Fig. 4.	Don't change REPRODUCE GAIN control setting.
9	Read noise on DET (TMS).	*Requirement:* −35 db max.*

*The true noise level is 22 db higher or −13 dbm unweighted.

6. RECORD CHANNEL

(A) Gain-Frequency Test

6.01 The test setup for measuring the record channel of the amplifier is shown in Fig. 5. Chart IV outlines the step procedure to be followed when making this test. The oscillator output in Step 7 of the procedure, for instance, is measured to insure that the amplifier will provide proper output with minimum input requirement. The procedure will vary somewhat depending on the testing equipment used.

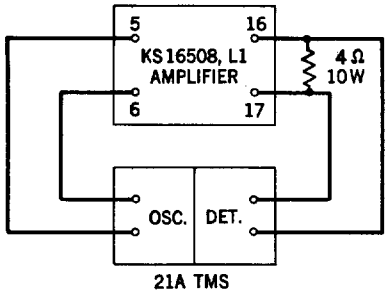

Fig. 5 – Gain-Frequency Test Setup for Record Channel

TABLE III

FREQUENCY	AMPLIFIER OUTPUT
200 cycles	$+8^{0}_{-2}$ db
1,000 "	+8 db
4,000 "	$+8^{0}_{-2}$ db

6.02 It should not be necessary to measure the distortion or noise of the record channel by itself. If the requirements for the reproducing channel are met, the record channel should be satisfactory since it is included in the former test.

7. ADJUSTMENT OF VOICE-OPERATED ALARM CIRCUIT

7.01 The voice-operated alarm circuit is adjusted by means of the OPERATE and RELEASE controls on the apparatus side of the chassis. These controls should be adjusted in accordance with the practice covering the application of the amplifier in a system.

CHART IV

STEP	PROCEDURE	REMARKS
1	Connect 21A and amplifier to ac power.	
2	Connect circuit as shown in Fig. 5.	
3	Operate K1 relay of amplifier.	
4	Turn RECORD GAIN control of amplifier to maximum.	
5	Adjust OSC to 1 kc.	
6	Increase OSC output until DET (TMS) reads +8 db.	
7	With OSC setting same as in Step 6 above, patch OSC OUT jacks to DET IN jacks. Read DET (TMS).	***Requirement:*** −38 ± 2 dbm.
8	Reconnect circuit as shown in Fig. 5.	Don't change OSC output.
9	Adjust OSC for 200 and 4,000 cycles. Record DET (TMS) readings.	***Requirements:*** See Table III.
10	Release K1 relay of amplifier.	