

KS-15512, LISTS 1, 2 AND 3
VIDEO FREQUENCY OSCILLOSCOPES
TESTS AND ADJUSTMENTS

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(A) Vertical Deflection Amplifier	2	1.01 This section is reissued to include information previously covered in Issue 1 of the addendum. It describes the tests, adjustments and requirements associated with the KS-15512, List 1, List 2, or List 3 oscilloscopes.	
Maximum Gain Measurement	2		
Gain Frequency Characteristic	2	1.02 The tests and adjustments described in this section should be made in accordance with Part 6. In addition to periodic tests certain tests may be required from time to time as a result of observation of trouble conditions in connection with routine monitoring tests. The particular tests required in such cases must be determined by the character of the trouble.	
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(A) Test Procedures	7		
(B) Alignment	7	1.06 Many of the following test procedures utilize the display of the oscilloscope under test as an indicating device. To maintain the necessary accuracy of measurement, the following steps should be taken:	
5. TROUBLE INVESTIGATION	8	(1) Adjust the oscilloscope trace for a sharp focus and medium intensity. (This adjustment must be maintained throughout any specific test.)	
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- (2) Remove the protective front window of the oscilloscope by loosening the four Cam-lock fasteners holding it to the oscilloscope.
- (3) Remove the scale from the face of the cathode ray tube.
- (4) Attach a piece of graph paper (20 divisions per inch) approximately 3 inches (60 divisions) long and 1/2 inch wide to the face of the cathode ray tube vertically or horizontally as illustrated in Fig. 1.

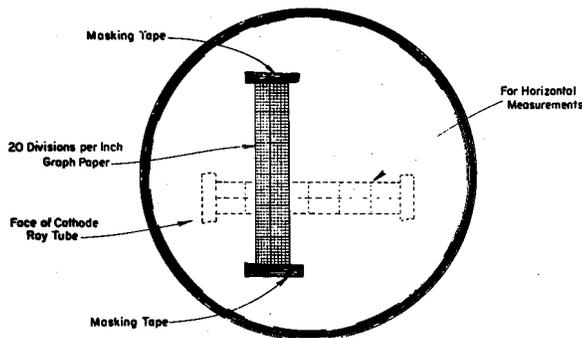


Fig. 1 - Method of Attaching Scale to Cathode Ray Tube

- (5) Make vertical or horizontal deflection measurements by visually comparing the signal to the number of divisions on the graph paper. Use the H. CENT and V. CENT controls to facilitate the measurements.

Caution: Do not subject the face of the cathode ray tube to any shock or strain. Make all measurements visually.

2. KS-15512, LIST 1, OSCILLOSCOPE

(A) Vertical Deflection Amplifier

2.01 The transmission characteristics of the vertical deflection amplifier must be maintained within prescribed limits in order to provide standard video signal level measurements and monitoring.

Maximum Gain Measurement

2.02 Apparatus:

- 1 - 61B Signal Generator
- 1 - 340C Plug (75 ohms)
- 1 - P2AW (unbalanced) Cord, 3 feet long

2.03 Procedure:

- (1) Prepare the oscilloscope as described in Paragraph 1.06.
- (2) Set the KS-15512, List 1 oscilloscope INPUT switch to NORMAL, V GAIN control to maximum, SYNC SELECTOR switch to (-), SWEEP FREQUENCY switch to HI, BLANKING switch to ON and the H GAIN control for a convenient horizontal deflection.
- (3) Set the 61B signal generator to 75-OHM UNBAL SINE WAVE OUTPUT, -20 dbv output level and 60-cycle frequency.
- (4) Terminate the oscilloscope with a 340C plug (75 ohms) and connect the 61B signal generator to the oscilloscope with a P2AW (unbalanced) cord as illustrated in Fig. 2.

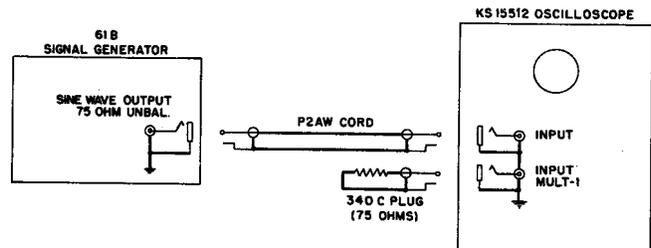


Fig. 2 - Equipment Arrangement for Maximum Gain Measurement

- (5) Measure the vertical deflection on the oscilloscope screen by visually comparing the deflection to the number of divisions on the graph paper.

Requirement: The vertical deflection should be greater than 8 divisions.

Gain Frequency Characteristic

2.04 The gain frequency characteristic of the vertical deflection amplifier can be checked in the following manner.

2.05 Procedure:

- (1) Prepare the oscilloscope as described in Paragraph 1.06.
- (2) Repeat Steps (2), (3), and (4) of Paragraph 2.03.

- (3) Set the 61B signal generator frequency at 100 kilocycles and adjust the output level to obtain a vertical deflection as close as possible, but not less than, 40 divisions as observed on the oscilloscope screen.
- (4) Adjust the V GAIN control of the oscilloscope for a vertical deflection of exactly 40 divisions measured on the oscilloscope screen.
- (5) Maintain the same signal generator output level and make similar measurements at the following frequencies:

Frequency	Limits	
	Divisions	Db
100 kc	40.0 (initial reference)	0
500 kc	40.0 to 38.6	0 to - 0.3
1 mc	39.1 to 37.8	-0.2 to - 0.5
2 mc	37.8 to 34.4	-0.5 to - 1.3
3 mc	34.4 to 30.0	-1.3 to - 2.5
4 mc	30.0 to 23.8	-2.5 to - 4.5
5 mc	23.8 to 17.9	-4.5 to - 7.0
6 mc	17.9 to 12.6	-7.0 to -10.0

Requirement: The number of divisions at any frequency should not exceed the limits.

Compression Test

2.06 For the proper interpretation of a video signal displayed on the oscilloscope screen, it is necessary that the vertical deflection amplifier cause a minimum amount of compression to the signal. The following test will determine the amount of compression of a given vertical deflection amplifier.

2.07 Apparatus:

- 1 - 61B Signal Generator
- 1 - 340C Plug (75 ohms)
- 1 - P2AW (unbalanced) Cord, 3 feet long

2.08 Procedure:

- (1) Prepare the oscilloscope as described in Paragraph 1.06.
- (2) Set the 61B signal generator to VIDEO SIGNAL OUTPUT, MOD-UNMOD switch to UNMOD and a 1-volt peak-to-peak video signal proportioned as illustrated in Fig. 3.
- (3) Set the oscilloscope as in Paragraph 2.03(2) but with reduced V GAIN control setting.
- (4) Connect the 61B signal generator and oscilloscope as illustrated in Fig. 4.
- (5) Synchronize the pattern and set the V GAIN control for a signal amplitude (E in Fig. 3) of 16 divisions as observed on

the oscilloscope screen and a sync amplitude (D in Fig. 3) of 4 divisions.

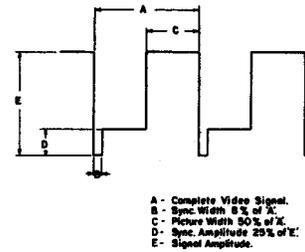


Fig. 3 - Video Test Signal

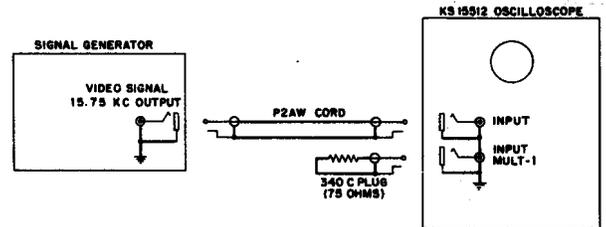


Fig. 4 - Equipment Arrangement for the Compression Test

- (6) Increase the V GAIN control to obtain a video signal amplitude of 50 divisions on the oscilloscope screen.
- (7) Observe the sync amplitude on the oscilloscope screen.

Requirement: The sync amplitude should be 12.5 ± 2.5 divisions.

Note: Failure to meet this requirement would indicate tubes of widely different transconductance in the V3 and V4 stages.

Vertical Output Resistor Change

2.09 The following change should be made on all KS-15512, List 1, oscilloscopes. Plate load resistors R33 and R34 in the vertical output stage (V5 and V6) are placed adjacent to plate load resistors R32 and R35 at the factory. Heat from R32 and R35 causes deterioration of R33 and R34. To remedy this condition, resistors R33 and R34 should be replaced and the new resistors mounted on the opposite side of the resistor card.

(B) Calibration Voltage Test

2.10 The calibration voltage circuit may be tested in the following manner:

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2.11 Apparatus:

- 1 - 61B Signal Generator
- 1 - P2AW (unbalanced) Cord, 3 feet long
- 1 - 340C Plug (75 ohms)

2.12 Procedure:

- (1) Prepare the oscilloscope as described in Paragraph 1.06.
- (2) Set the oscilloscope as in Paragraph 2.03(2).
- (3) Set the 61B signal generator to 75-OHM UNBAL SINE WAVE OUTPUT, 0 dbv output level and 60-cycle frequency.
- (4) Terminate the oscilloscope with a 340C plug (75 ohms) and connect the 61B signal generator to the oscilloscope with a P2AW (unbalanced) cord as illustrated in Fig. 2.
- (5) Set the oscilloscope V GAIN control for a vertical deflection of 40 divisions as observed on the oscilloscope screen.
- (6) Set the CAL VOLTS control for a reading of exactly 1 volt on the meter.
- (7) Set the INPUT switch to the CAL A position and note the resulting vertical deflection.

Requirement: The vertical deflection should be 40 ± 3 divisions.

- (8) Operate the INPUT switch to the CAL B position.

Requirement: The vertical deflection should be adjustable from 0 to at least 32 divisions, by means of the CAL B REF control.

(C) Horizontal Amplifier Gain Test

2.13 Apparatus:

- 1 - W2DC Cord, 5 feet 6 inches long

2.14 Procedure:

- (1) Prepare the oscilloscope as described in Paragraph 1.06.
- (2) Set the oscilloscope as in Paragraph 2.03(1) except the V GAIN control is set to minimum, SWEEP FREQUENCY switch to EXT and the H GAIN control to maximum.

- (3) Connect the CAL VOLT OUTPUT jack to the EXT SWEEP-GND binding posts with a W2DC cord.

- (4) Set the CAL VOLTS control for a meter indication of 1 volt.

- (5) Observe the horizontal deflection on the oscilloscope screen.

Requirement: The horizontal deflection should be at least 50 divisions.

(D) Astigmatism Adjustment

- 2.15 The ASTIGMATISM control is mounted on the oscilloscope chassis and should be adjusted as follows.

2.16 Procedure:

- (1) Prepare the oscilloscope as described in Paragraph 1.06.
- (2) Set the oscilloscope INPUT switch to CAL A, V GAIN control to minimum, SYNC SELECTOR switch to (-), SWEEP FREQUENCY switch to LO, BLANKING switch to ON and the H GAIN control for a horizontal deflection of about 40 divisions.
- (3) Set the CAL VOLTS control for a meter indication of 1 volt.
- (4) Adjust the V GAIN control for a vertical deflection of about 40 divisions and synchronize the signal using the FINE FREQUENCY and SYNC controls.
- (5) Set the FOCUS and INTENSITY controls for normal operation.
- (6) Adjust the ASTIGMATISM and FOCUS controls simultaneously until the trace is sharply focused in its entirety.

(E) Cathode Ray Tube Replacement

- 2.17 To remove the cathode ray tube from the oscilloscope chassis proceed as follows:

- (1) Remove the oscilloscope case, front window and the cathode ray tube scale and tube socket.
- (2) Remove electron tube V10.
- (3) Loosen the cathode ray tube base clamp and gently slide the cathode ray tube out of the front opening.

2.18 To install a new cathode ray tube, proceed as follows:

- (1) Gently slide the new cathode ray tube into the front opening and through the shield until the tube base is centered coincident with the base clamp and no pressure from the clamp will be applied to the glass part of the tube.
- (2) Rotate the cathode ray tube until the key of the tube base is pointed down.
- (3) Tighten the base clamp and install the tube socket.
- (4) Apply power to the oscilloscope and adjust it for a horizontal trace (V GAIN control at minimum) equal to the width of the cathode ray tube.
- (5) If the horizontal trace is tilted, loosen the cathode ray tube base clamp and gently rotate the tube until the trace is correctly orientated.
- (6) Tighten the base clamp and replace V10, and cathode ray tube scale, front window and oscilloscope case.

3. KS-15512, LIST 2, OSCILLOSCOPE

(A) General

3.01 Listed below are tests for the List 2 oscilloscope which involve procedures identical to those described under the same headings for the List 1 oscilloscope. These procedures as described in Part 2 of this section will apply to the List 2 oscilloscope with the exception that the List 2 oscilloscope INPUT switch is set to 1:1 and the BANDWIDTH switch is set at the 4 MC - NORMAL position.

<u>Test</u>	<u>Paragraph</u>
Vertical Deflection Amplifier Maximum Gain Measurement	2.03
Vertical Deflection Amplifier Compression Test	2.08
Calibration Voltage Test	2.12
Horizontal Amplifier Gain Test	2.14
Astigmatism Adjustment	2.16
Cathode Ray Tube Replacement	2.17

(B) Vertical Deflection Amplifier

3.02 Gain frequency characteristic tests for the List 2 oscilloscope vertical deflection amplifier should be made as described in Paragraphs 2.04 and 2.05 except that the List 2 oscilloscope BANDWIDTH switch is set to the desired characteristic position and the INPUT switch to 1:1. When the gain frequency characteristic tests are made, each position of the BANDWIDTH switch should be checked.

3.03 The frequencies to be measured and the requirements for the vertical deflection amplifier as determined by the BANDWIDTH switch position are listed below.

BANDWIDTH SWITCH 2 MC - IRE

<u>Frequency</u>	<u>Limits</u>	
	<u>Divisions</u>	<u>Db</u>
100 kc	40.0 (initial reference)	0
500 kc	40.8 to 37.8	0 to - 0.5
1 mc	37.8 to 32.5	-0.5 to - 1.8
2 mc	31.8 to 22.5	-2.0 to - 5.0
3 mc	25.2 to 14.2	-4.0 to - 9.0
4 mc	18.9 to 7.9	-6.5 to -14.0

BANDWIDTH SWITCH 4 MC - NORMAL

This requirement is the same as given in Paragraph 2.05(5) of this section.

BANDWIDTH SWITCH 6 MC - LINE TEST

(See Paragraph 4.01 for List 3 requirements.)

<u>Frequency</u>	<u>Limits</u>	
	<u>Divisions</u>	<u>Db</u>
100 kc	40.0 (initial reference)	0
500 kc	41.4 to 38.6	+0.3 to -0.3
1 mc	41.4 to 38.6	+0.3 to -0.3
2 mc	41.4 to 38.6	+0.3 to -0.3
3 mc	41.4 to 38.6	+0.3 to -0.3
4 mc	41.4 to 38.6	+0.3 to -0.3
4.5 mc	41.4 to 38.2	+0.3 to -0.4
6 mc	37.8 or less	-0.5 or lower

3.04 If the above requirements for the KS-15512, List 2, oscilloscope are not met, the following alignment procedure should be performed on those instruments having serial numbers above 201. List 2 oscilloscopes having a lower serial number will require maintenance as described in Part 5 of this section.

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Amplifier Alignment

3.05 Apparatus:

- 1 - 61B Signal Generator
- 1 - P2AW (unbalanced) Cord, 3 feet long
- 1 - 340C Plug (75 ohms)

3.06 Procedure:

- (1) Prepare the oscilloscope as described in Paragraph 1.06.
- (2) Set the oscilloscope INPUT switch to 1:1, V GAIN control to maximum, BANDWIDTH switch to 4 MC - NORMAL, SYNC SELECTOR switch to (-), SWEEP FREQUENCY switch to HI, BLANKING switch ON and H GAIN control for a convenient horizontal deflection.
- (3) Set the signal generator to 75-OHM UNBAL SINE WAVE OUTPUT, -6 dbv output level and 100-kilocycle frequency.
- (4) Terminate the oscilloscope with a 340C plug (75 ohms) and connect it to the signal generator as illustrated in Fig. 2.
- (5) Set the adjustable cores of inductors L8, L1, L2, and L3 to their approximate mid-positions.
- (6) With the signal generator frequency at 100 kilocycles adjust the output level to obtain a vertical deflection as close as possible, but not less than 40 divisions as observed on the oscilloscope screen.
- (7) Adjust the V GAIN control of the oscilloscope to obtain a vertical deflection of exactly 40 divisions.
- (8) Change the signal generator frequency to 3.0 megacycles and maintain the output level at -6 dbv.
- (9) Adjust inductors L2 and L3 to obtain a vertical deflection as close as possible, but not less than 34.4 divisions. If possible, the amount of adjustment should be evenly divided between inductors L2 and L3.
- (10) Change the signal generator frequency to 6 megacycles and maintain the output level at -6 dbv.
- (11) Adjust inductor L1 to obtain a vertical deflection as close as possible, but not less than 12.6 divisions.

- (12) Change the oscilloscope BANDWIDTH switch to the 6 MC - LINE TEST position.
- (13) Repeat Steps (6) and (7).
- (14) Change the signal generator frequency to 4.5 megacycles and maintain the output level at -6 dbv.
- (15) Adjust inductor L8 to obtain a vertical deflection as close as possible to 41 divisions.
- (16) Make the gain frequency characteristic tests described in Paragraphs 3.02 and 3.03.

Input Attenuator and Probe Adjustment

3.07 The following procedure may be used to adjust the input attenuator and oscilloscope probe after the vertical deflection amplifier has met the requirements of Paragraph 3.03.

3.08 Apparatus:

- 1 - 61B Signal Generator
- 1 - P2AW (unbalanced) Cord, 3 feet long

3.09 Procedure:

- (1) Set the 61B signal generator to VIDEO SIGNAL OUTPUT, MOD-UNMOD switch to UNMOD and a 1-volt peak-to-peak video signal as illustrated in Fig. 3.

Note: Do not terminate the 61B signal generator during this test.

- (2) Set the oscilloscope INPUT switch to 1:1, V GAIN control to minimum, BANDWIDTH switch to 4 MC - NORMAL, SYNC SELECTOR switch to (-), SWEEP FREQUENCY switch to HI, BLANKING switch ON and H GAIN control for a convenient horizontal deflection.
- (3) Connect the 61B signal generator and oscilloscope with a P2AW (unbalanced) cord as illustrated in Fig. 5.

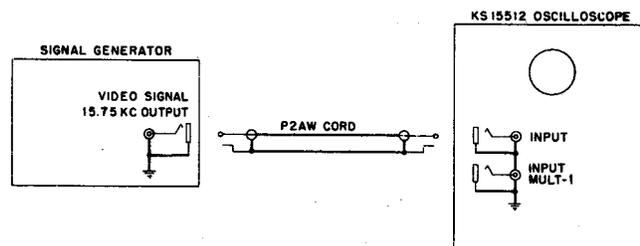


Fig. 5 - Equipment Arrangement for the Input Attenuator Adjustment

- (4) Set the V GAIN control for a convenient vertical deflection and synchronize the pattern using the SYNC and FINE FREQUENCY controls. The pattern should appear the same as that observed in Step (1).
- (5) Disconnect the signal generator from the oscilloscope and adjust it to give a video signal as in Step (1) but with a 4-volt peak-to-peak amplitude.
- (6) Set the oscilloscope INPUT switch to the 10:1 position and reconnect the signal generator.
- (7) Repeat Step (4).
- (8) Adjust capacitor C8 to obtain a symmetrical pattern as close as possible to that obtained in Step (4). (The effect of this adjustment can be observed as the rounding of the corners of the video test signal.)
- (9) Set the INPUT switch to the 100:1 position and adjust capacitor C5 to obtain results as in Step (8).
- (10) Connect the probe to the oscilloscope and set the INPUT switch to the 10:1 position.
- (11) Connect the signal generator (4-volt peak-to-peak video signal) to the oscilloscope probe.
- (12) Repeat Step (4).
- (13) Adjust capacitors C57 and C6 simultaneously to obtain results as in Step (8). (The effects of these adjustments can be observed as the slope of the top of the video test signal.)

Note: Capacitor C57 is adjusted with a small screwdriver through the end of the probe after the probe tip has been unscrewed.

Low-frequency Adjustment

- 3.10 The proper setting for the LOW-FREQ ADJ control is made as follows.
- 3.11 Apparatus:
 - 1 - 61B Signal Generator
 - 1 - P2AW (unbalanced) Cord, 3 feet long
- 3.12 Procedure:
 - (1) Set the 61B signal generator as in Paragraph 3.09(1) except the MOD-UNMOD switch should be on MOD.

- (2) Set the oscilloscope as in Paragraph 3.09(2) except the SWEEP FREQUENCY switch should be on 10.
- (3) Connect the signal generator and oscilloscope as illustrated in Fig. 5.
- (4) Set the V GAIN control for a convenient vertical deflection and synchronize the pattern with the SYNC and FINE FREQUENCY controls.
- (5) Adjust the LOW FREQ ADJ control for minimum "tilt" on the square wave display illustrated in Fig. 6.

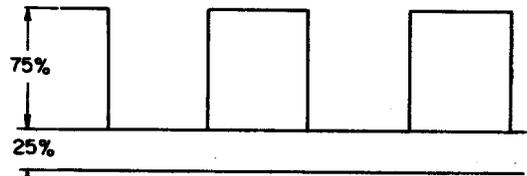


Fig. 6 - Modulated Video Test Signal

4. KS-15512, LIST 3, OSCILLOSCOPE

(A) Test Procedures

4.01 The testing procedures and requirements as given for the List 2 oscilloscope in Part 3 of this section will apply to the List 3 oscilloscope with the exception that the BLANKING switch setting is eliminated from the procedures and the following requirement changes are made for the vertical deflection amplifier when the BANDWIDTH switch is set on 6 MC - LINE TEST.

BANDWIDTH SWITCH 6 MC - LINE TEST

Frequency	Limits	
	Divisions	Db
100 kc	40.0 (initial reference)	0
500 kc	41.4 to 38.6	+0.3 to -0.3
1 mc	41.4 to 38.6	+0.3 to -0.3
2 mc	41.4 to 38.6	+0.3 to -0.3
3 mc	42.0 to 39.0	+0.4 to -0.2
4 mc	42.4 to 39.6	+0.5 to -0.1
4.5 mc	42.4 to 38.2	+0.5 to -0.4
6 mc	37.8 or less	-0.5 or lower

(B) Alignment

4.02 Alignment of the vertical deflection amplifier in the List 3 oscilloscope can be made using the procedure given for the List 2 oscilloscope in the following manner:

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- (1) Perform Steps (1), (2), (3), (4), (5) (eliminate adjustment of L2 and L3), (6), and (7) of the procedure given in Paragraph 3.06.
 - (2) Skip Steps (8) and (9).
 - (3) Perform Steps (10) and (11) but adjust L1 to obtain a vertical deflection as close as possible to 15.3 divisions (Paragraph 1.06).
 - (4) Perform Steps (12), (13), (14), and (15) but adjust I8 to obtain a vertical deflection as close as possible to 40.3 divisions.
 - (5) Make the gain frequency characteristic tests described in Paragraphs 3.02, 3.03, and 4.01.
- 4.03 The input attenuator and probe adjustments given for the List 2 oscilloscope in Paragraph 3.09 will apply to the List 3 oscilloscope.

5. TROUBLE INVESTIGATION

5.01 Trouble indications in the KS-15512 oscilloscope, either as a result of the above test procedures or as a result of improper operating performance, will ordinarily require similar investigation routines.

(A) Loss of Gain

5.02 Loss of over-all gain in either the vertical or horizontal deflection amplifiers can usually be attributed to a faulty electron tube or improper tube operating potentials.

5.03 To locate an unsatisfactory electron tube the KS-15560, List 1, tube tester can be used. In this case each satisfactory tube should be replaced in its respective socket after testing.

5.04 Although the tube tester is entirely satisfactory for general purpose testing, some tubes tested in this manner may not operate satisfactorily in the circuit and the tube substitution method of localizing trouble will be necessary.

5.05 In the event an electron tube is replaced in the vertical deflection amplifier, the gain frequency characteristic test should be made to insure that the circuit still meets the requirements.

5.06 If it is determined that the loss of gain is not due to a faulty electron tube, voltage measurements should be made with reference to the trouble location schematic, Fig. 7.

(B) Loss of Signal

5.07 Loss of signal in the oscilloscope is generally caused by a defective electron tube and the process of investigation described

above would apply. However, a visual examination of the electron tubes or by noting any cold tubes may expedite locating the trouble.

(C) Poor Gain Frequency Characteristic

5.08 If the vertical amplifier gain frequency characteristic requirements are not attainable by the alignment procedures given or as in the case of the List 1 oscilloscope, no alignment is possible, electron tubes should be first considered and any unsatisfactory ones replaced.

5.09 After the possibility of electron tube trouble has been eliminated, consideration should be given to the individual circuit elements with the aid of Fig. 7 and a schematic diagram.

5.10 The high-frequency response of the vertical deflection amplifier is determined by the plate peaking inductors and plate load resistors. The plate load resistor tolerance is ± 5 per cent and experience shows that in some cases these have changed value beyond the tolerance limits, thus causing a peak in the high-frequency response (a decrease in the load resistance) or high-frequency cutoff.

(D) Video Signal Tracing

5.11 The procedure of tracing a video signal through the various circuits of the oscilloscope is sometimes advantageous. For this purpose another KS-15512 oscilloscope (or equivalent) can be used. With Fig. 7 as a reference all circuits in the oscilloscope can be easily checked. After the trouble has been localized to a specific stage, the procedures described above can be employed to locate the defective part.

5.12 The signal tracing method of trouble isolation can be particularly useful in determining the operation of the sync separator circuit.

(E) Germanium Diode Test

5.13 If the trouble is traced to the sync separator stage (V8) and voltage measurements appear normal, a simple test of the germanium diode (CR1) can be made using the KS-14510, List 1, volt-ohm-milliammeter to measure the "front to back" ratio of the diode.

5.14 After the diode is disconnected from the circuit and the volt-ohm-milliammeter set and adjusted to the 10,000-ohm position, two measurements are made across the diode. One measurement is made and then the meter leads are reversed and the second measurement made. The ratio of the higher measurement to the lower measurement should be at least 20 to 1. If this is not the case the diode should be replaced.

6. PERIODIC TESTS AND TEST INTERVALS

6.01 Table 1 lists the tests to be made on the KS-15512, List 1, List 2 and List 3 Oscilloscope and gives suggested test intervals. Also for each test listed, corresponding reference paragraph numbers in this section are given

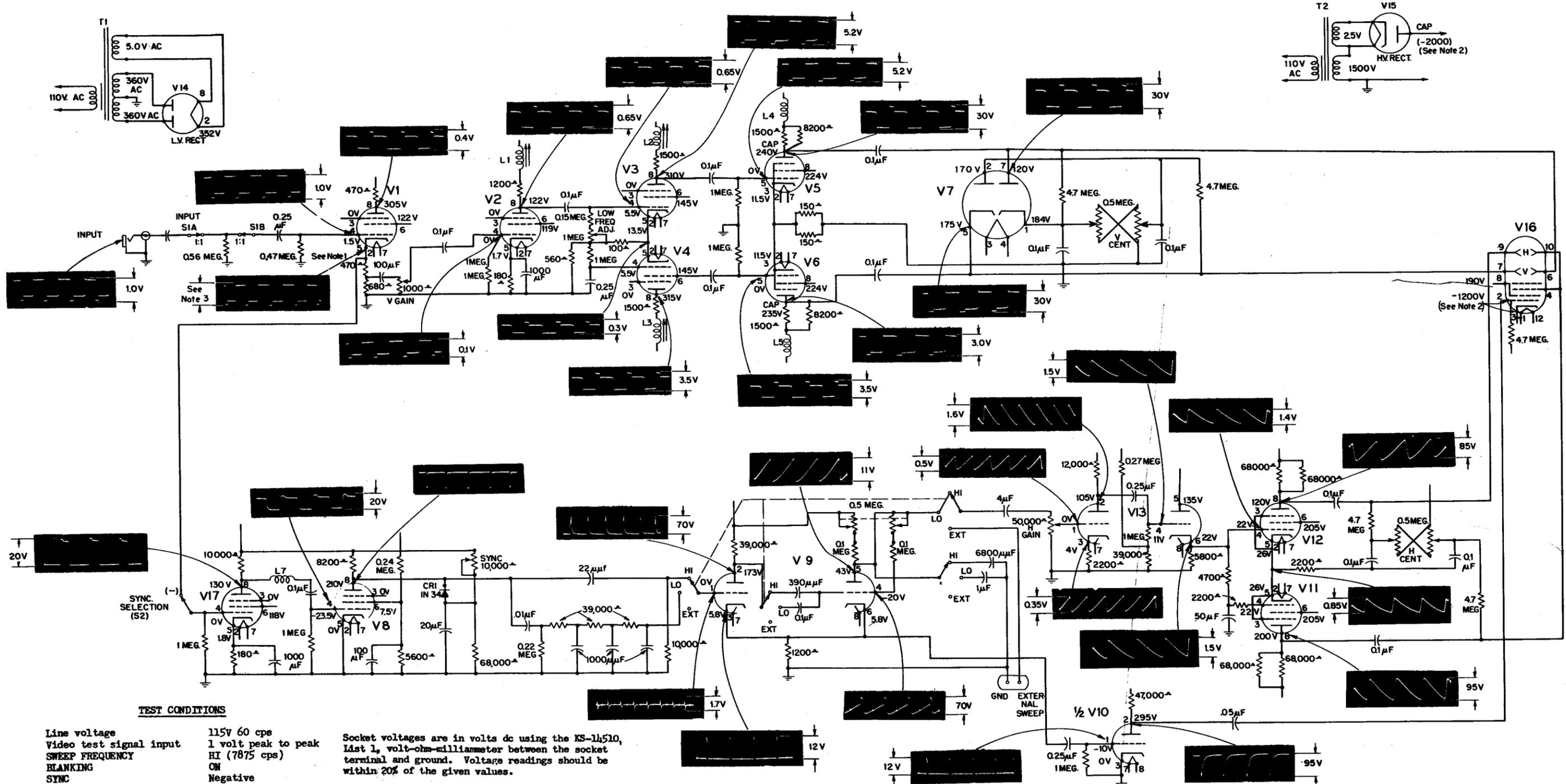
for the testing methods and requirements to be employed.

6.02 Oscilloscopes used at remote locations over extended periods should be returned to the serving test room for routine at least once every three months. All others should be routined at the suggested intervals.

TABLE 1
PERIODIC TESTS AND TEST INTERVALS

Test	List 1		List 2		List 3	
	Interval	Paragraph Reference	Interval	Paragraph Reference	Interval	Paragraph Reference
1. Vertical Deflection Amplifier						
(A) Max. Gain Measurement	(W)	2.02-2.03	(W)	3.01,2.03	(W)	4.01,2.03
(B) Gain-Frequency Characteristic	(W)	2.04-2.05	(W)	3.02-3.04 2.04-2.05	(W)	4.01 3.02-3.04 2.04-2.05
(C) Compression Test	(W)	2.06-2.08	(W)	2.06-2.08	(W)	2.06-2.08
(D) Vertical Output Resistor Change	(I)	2.09	—	—	—	—
(E) Vertical Amplifier Alignment	—	—	(AR)	3.05-3.06	(AR)	4.02,3.06
2. Calibration Voltage Test	(W)	2.10-2.12	(W)	2.12	(W)	2.12
3. Horizontal Amplifier Gain Test	(AR)	2.13-2.14	(AR)	2.13-2.14	(AR)	2.13-2.14
4. Astigmatism Adjustment	(AR)	2.15-2.16	(AR)	2.15-2.16	(AR)	2.15-2.16
5. Cathode Ray Tube Replacement	(AR)	2.17-2.18	(AR)	2.17-2.18	(AR)	2.17-2.18
6. Input Attenuator and Probe Adjustment	—	—	(AR)	3.07-3.09	(AR)	4.03 3.07-3.09
7. Low-Frequency Adjustment	—	—	(AR)	3.10-3.12	(AR)	3.10-3.12
8. Trouble Investigation	(AR)	5.01-5.14	(AR)	5.01-5.14	(AR)	5.01-5.14

Legend: (I), Initial; (W), Weekly; (AR), As Required.



TEST CONDITIONS

Line voltage 115V 60 cps
 Video test signal input 1 volt peak to peak
 SWEEP FREQUENCY HI (7875 cps)
 BLANKING ON
 SYNC Negative
 INTENSITY Normal
 FOCUS Normal
 BANDWIDTH 1 MC-NORMAL
 INPUT 1:1 or NORMAL
 V GAIN Normal
 H GAIN Normal

Wave form voltages are peak to peak.
 The wave form time base was not the same for all measurements.

Socket voltages are in volts dc using the KS-14510, List 1, volt-ohm-milliammeter between the socket terminal and ground. Voltage readings should be within 20% of the given values.

All heater voltages are 6.3 volts ac measured between the indicated socket terminals.

Note 1: The dc voltage at socket terminal 5 of V1 should be 5.25 for List 1 oscilloscopes, 2.0 for List 2 oscilloscopes under serial number 201X, 5.9 for List 2 oscilloscopes over 201X and 5.9 for List 3 oscilloscopes.

Note 2: These voltages are measured using the KS-14510, List 1, volt-ohm-milliammeter equipped with a set of KS-14708, List 1, test leads.

Note 3: Peak to peak voltage for wave form at pin 5 of V1 should be 0.7 for List 1 oscilloscopes, 0.7 for List 2 oscilloscopes under serial number 201X, 0.88V for List 2 oscilloscopes over 201X and 0.88V for List 3 oscilloscopes.

FIG. 7 - TROUBLE LOCATION SCHEMATIC