TELEVISION
J64081A (81A) MONITORING OSCILLOSCOPE AND PICTURE MONITOR PER SD-42012-01
TESTS AND ADJUSTMENTS

CONTENTS

1. GENERAL

1.01 This section describes the tests, adjustments and requirements associated with the 81A monitoring oscilloscope and picture monitor per SD-42012-01.

1.02 The tests and adjustments described in this section should be made if the performance of the equipment is not normal or in the event of trouble.

1.03 Information pertaining to the principles of operation of the 81A monitoring oscilloscope and rack mounted monitor can be found in the 103-740-100 section of the practices.

1.04 General instructions on the maintenance and handling of electronic equipment involving hazardous voltages and cathode ray tubes as contained in Sections 010-110-001 and 010-110-002 should be observed.

1.05 Test Equipment: The tests throughout this section require the use of the following test equipment.

- 1 - KS-14510-L1 Volt-Ohm-Milliammeter
- 1 - Set KS-14708-L1 Test Leads
- 1 - Ballantine Model 314 Vacuum Tube Voltmeter or equivalent
- 1 - 61B Signal Generator
- 1 - J44100M Test Probe
- 1 - 70A Power Meter
- 1 - 340C Plug (75 ohms)
- 1 - 341E Plug (110 ohms)
- 2 - P3AH (balanced) Cords, 3 feet long
- 1 - P2AW (unbalanced) Cord, 3 feet long
- 1 - Bridging Connector Assembly (Paragraph 2.02)

Note: The bridging connector assembly can be constructed using three 465C jacks on a 78C jack mounting. Refer to Fig. 1.

2. BRIDGING AMPLIFIER J44102B

2.01 The transmission characteristic of the bridging amplifier is critical to the input circuit loading. Therefore, it is necessary to duplicate the conditions which exist in actual practice in the following transmission tests.

2.02 The bridging connector assembly shown in Fig. 1 will simulate these conditions, and can be constructed locally by mounting three 465C jacks, two 27-ohm (Type 106A) resistors, two 510-ohm (Type 106A) resistors on a 78C jack mounting and wire as shown.

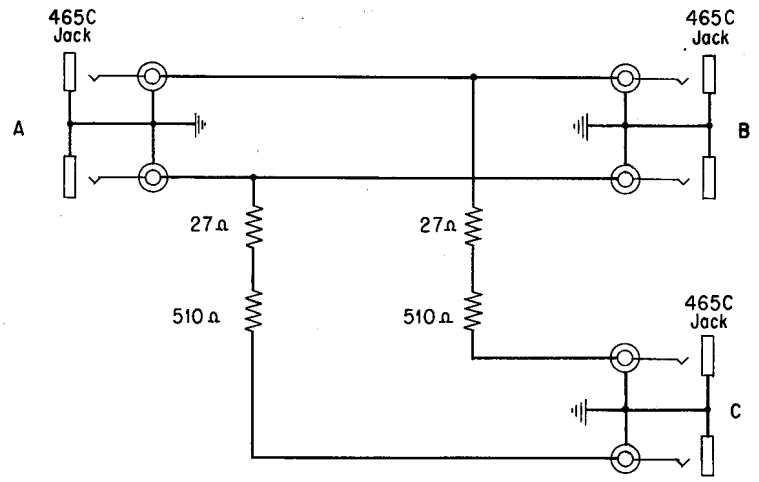

Fig. 1 - Bridging Connector Assembly

(A) Maximum Gain Measurement

2.03 With the GAIN control on the bridging amplifier set at maximum, the gain at 100 kilocycles from the 110-ohm balanced input to the 75-ohm unbalanced output should be 4 ± 3 db.

2.04 Apparatus:

1 - 61B Signal Generator
1 - Bridging Connector Assembly per Fig. 1
1 - 341E Plug (110 ohms)
1 - 70A Power Meter
2 - P3AH (balanced) Cords, 3 feet long
1 - P2AW (unbalanced) Cord, 3 feet long

2.05 Procedure:

(1) Set the 61B signal generator to 110-OHM BAL SINE WAVE OUTPUT, -7 db output level and 100-kilocycle frequency.

(2) Set the 70A power meter to 75-OHM UNBAL input and calibrate for 1V P/P.

(3) Connect the 61B signal generator, bridging connector assembly, bridging amplifier and 70A power meter as shown in Fig. 2.

(4) Set the GAIN potentiometer of the bridging amplifier to maximum (fully clockwise).

(5) Adjust the 61B signal generator output level to bring the reading on the 70A power meter as near to 0 db as possible. The voltage gain of the bridging amplifier is the difference between the 61B signal generator ATTENUATOR setting and the reading on the 70A power meter.

Requirement: The voltage gain should be 4 ± 3 db.

(6) Record the 70A power meter reading and the 61B signal generator ATTENUATOR setting.

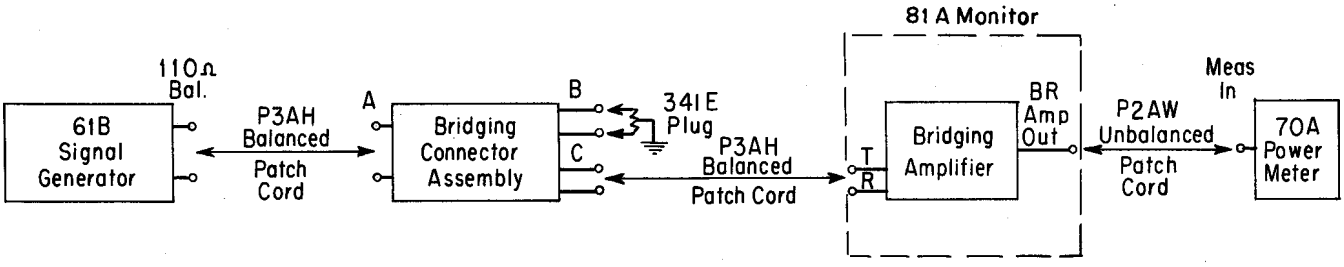

Fig. 2 - Testing Arrangement for Maximum Gain Measurement of Bridging Amplifier

(B) Transmission Frequency Measurement

2.06 With the equipment connected as in Fig. 2:

(1) Set the GAIN potentiometer of the bridging amplifier to minimum.

(2) Set the 61B signal generator output to a value 10 db greater than that recorded in Paragraph 2.05(6) at a frequency of 100 kilocycles.

(3) Adjust the GAIN potentiometer to obtain the same reading on the 70A power meter as in Paragraph 2.05(6). This is the reference GAIN setting and should not be changed.

(4) Adjust dial 2 of the 70A power meter to obtain a reading of exactly zero.

(5) Maintaining the same 61B signal generator output level make measurements at the following frequencies:

Frequency Mc	Limits
1	0 ± 0.15
2	0 ± 0.25
3	0 ± 0.25
4	0 ± 0.25
5	-.8 ± 0.8

Requirement: The value at any frequency should not deviate from the 100-kilocycle measurement by more than the limits.

(C) Alignment

2.07 If the requirement of Paragraph 2.06(5) is not met, adjustments of circuit elements in the bridging amplifier will have to be made as described below:

(1) The equipment should remain connected as in Fig. 2, except that the 510-ohm series resistors in the bridging connector assembly (Fig. 1) shall be strapped out. The setting of the 61B signal generator should be as in Paragraph 2.06(2).

(2) Adjust dial 2 of the 70A power meter to obtain a reading of exactly zero.

(3) With the power to the bridging amplifier OFF disconnect capacitors C7 and C8 from the cathode of V4 (pin 5). Restore power to the amplifier and allow a five-minute warmup period.

(4) Maintaining the same 61B signal generator output level as in Paragraph 2.07(1), adjust the L1 retard coil until the 4-megacycle transmission is the same as that at 100 kilocycles.

(5) Restore the 510-ohm series resistors in the bridging connector assembly.

(6) With the power to the bridging amplifier OFF reconnect C7 and C8 to the cathode of V4. Restore power to the amplifier and allow a five-minute warmup period.

(7) Maintaining the same 61B signal generator output level, adjust C7 until the 4-megacycle transmission is the same as that at 100 kilocycles.

(8) When this has been completed repeat items (4) and (5) in Paragraph 2.06.

(D) Reference Voltages

2.08 The reference voltages at the tube socket terminals are as follows for both maximum and minimum GAIN control settings.

	Socket Terminals							
	3		4		5		6	
Gain Setting	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
V1			68	63	67	68	163	180
V2	67	68	200	200	0	0	5.0	5.0
V3			78	65	84	68	180	163
V4			0	0	3.8	3.8	140	140

The above values are in volts d-c using a KS-14510-L1 volt-ohm-milliammeter between the socket terminal and ground.

Heater voltages should be 6.3 volts a-c measured between socket terminals 2 and 7 of each tube socket.

3. 1B CLAMPER-AMPLIFIER

3.01 Tests, adjustments and requirements for the 1B clamper-amplifier can be found in Section 318-103-500 of the practices.

4. RCA TM-5A MASTER MONITOR

4.01 Information as to trouble location, adjustments, maintenance routines and operation for the RCA TM-5A master monitor is contained in the instruction book No. 1B-36021-3 attached to Section 103-740-100.

4.02 Low voltage measurements (below 600 volts) in the TM-5A monitor should be made with the KS-14510-L1 volt-ohm-milliammeter. High voltage measurements (above 600 volts) should be made using the KS-14510-L1 meter with a set of KS-14708-L1 test leads. When making high voltage measurements extreme care should be taken to avoid electric shock.

4.03 Fig. 11 in the TM-5A instruction book gives the socket voltages necessary for maintenance.

(A) Kinescope Replacement

4.04 The kinescope 1816P4 should be replaced by a standard picture tube 10FP4A in the event of failure. The 10FP4A has an aluminum coated screen which results in greater picture contrast and is normally available through standard suppliers without order delay.

4.05 It is necessary to change the kinescope socket to accommodate the 10FP4A picture tube. The leads terminated in the 1816P4 kinescope socket can be cut at the socket, cleaned and terminated on a duodecal 12 prong socket such as a Cinch 3B12 or equivalent. The following pin numbers are for use as a guide in making the new socket connections.

	1816P4 Socket		10FP4A Socket
Pin No.	5	Wire to Pin No.	10
" "	6	" " " "	11
" "	7	" " " "	2
" "	8	" " " "	1
" "	9	" " " "	12

4.06 Installation instructions for the 1816P4 kinescope as given in the TM-5A monitor instruction book will apply to the 10FP4A picture tube without change.

(B) Kinescope Amplifier Frequency Response

4.07 The kinescope amplifier in the TM-5A monitor should have a frequency response flat ± 1 db to 6 megacycles.

4.08 After removing the TM-5A monitor chassis from the case, a frequency response test of the kinescope amplifier can be made by using the following procedure.

4.09 Apparatus:

1 - 61B Signal Generator
1 - Ballantine Model 314 Vacuum Tube Voltmeter or equivalent
1 - P2AW (unbalanced) Cord, 3 feet long
1 - 340C Plug (75 ohms)

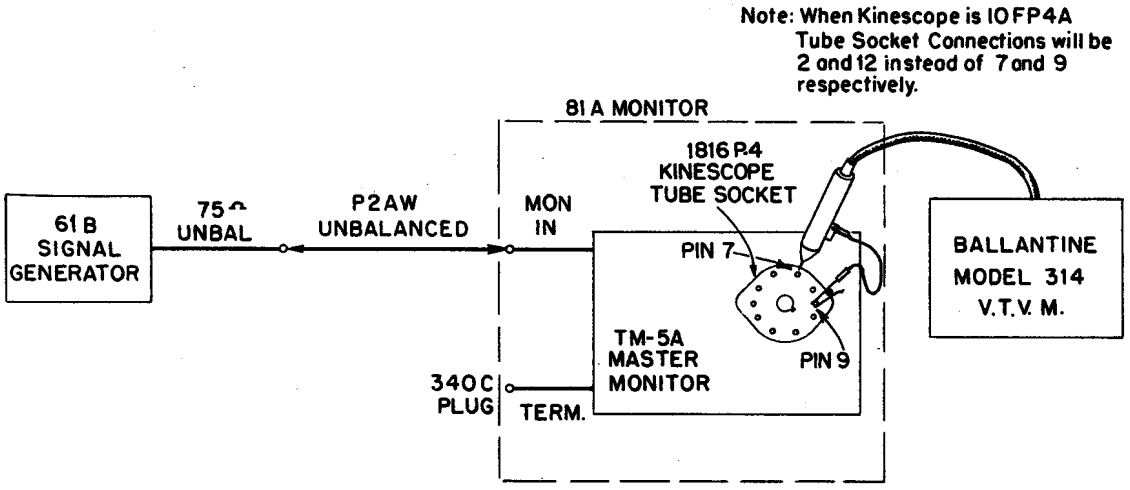

Fig. 3 - Equipment Arrangement for the Kinescope Frequency Response Test

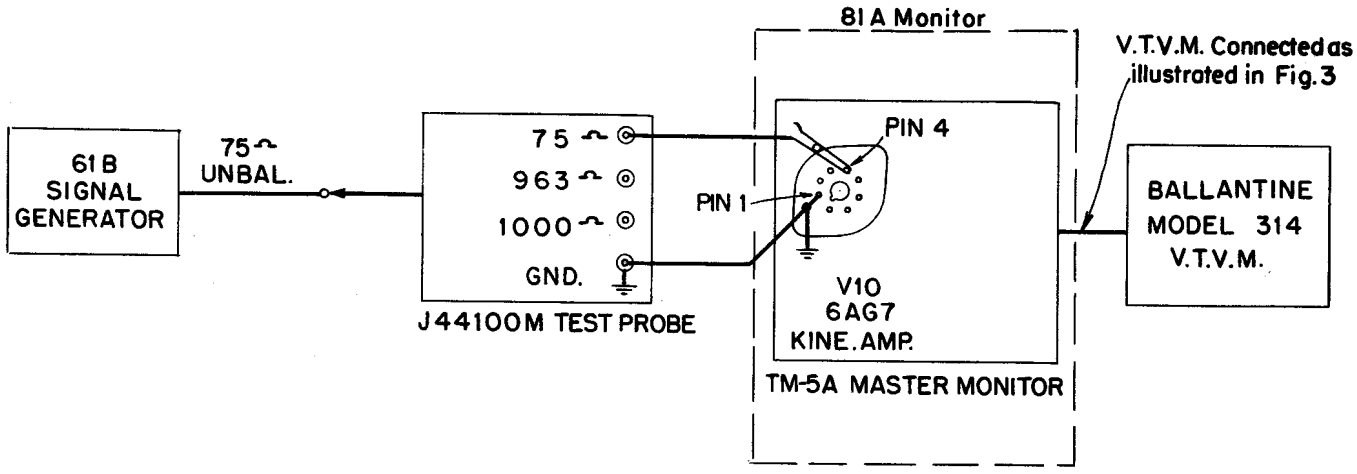

Fig. 4 - Equipment Arrangement for Stage Alignment of the Kinescope Amplifier

4.10 Procedure:

(1) Turn power OFF.

(2) Remove the kinescope socket and connect the vacuum tube voltmeter between the control grid socket pin No. 7 and ground socket pin No. 9 for the 1816P4 or socket pin No. 2 and ground socket pin No. 12 for the 10FP4A.

(3) Set the signal generator for 75-OHM UNBAL SINE WAVE OUTPUT, -6 db output level and 100-kilocycle frequency.

(4) Terminate the monitor input with the 340C plug (75 ohms).

(5) Connect the signal generator, TM-5A monitor, and vacuum tube voltmeter as shown in Fig. 3.

(6) Turn the power ON and allow a warmup period of 15 minutes.

(7) Adjust the CONTRAST CONTROL (R155) to cause a meter indication of exactly 7 volts.

(8) Maintaining the same signal generator output level make measurements at the following frequencies.

100 Kc	3 Mc
500 Kc	4 Mc
1 Mc	5 Mc
2 Mc	6 Mc

Requirement: The meter indication at all of the above frequencies should be within 7 volts ± .8 volt.

(C) Kinescope Amplifier Alignment

4.11 If the requirement given in Paragraph 4.10(8) for the kinescope amplifier frequency response is not met, adjustment of circuit elements in the amplifier will have to be made as described below.

4.12 Apparatus:

1 - 61B Signal Generator
1 - Ballantine Model 314 Vacuum Tube Voltmeter or equivalent
1 - P2AW (unbalanced) Cord, 3 feet long
1 - J44100M Test Probe

4.13 Procedure:

(1) Turn power OFF and connect the vacuum tube voltmeter as in Paragraph 4.10(2).

(2) Set the signal generator for 75-OHM UNBAL SINE WAVE OUTPUT, -3 db output level and 100-kilocycle frequency.

(3) Connect the signal generator via the J44100M tube probe (75-ohm position) to socket pin No. 4 of V10 and the socket chassis ground connection, in the kinescope amplifier. See Fig. 4.

(4) Turn the power ON and allow a warmup period of 15 minutes.

(5) Set the top and bottom slug adjustments of T104 and T105 for minimum inductance (full CCW).

(6) Adjust the output level of the signal generator for a convenient meter indication to be used as a reference. (-3 db normally results in a satisfactory value.)

Note: The bottom adjustments for T104 and T105 are those protruding from the terminal end of the unit.

(7) Maintaining the same signal generator output level as in step (6), set the frequency to 5 megacycles and adjust the bottom adjustment of T105 for a meter indication as close as possible to the reference value set in step (6).

(8) Change the signal generator frequency to 4 megacycles at the same output level and adjust the top adjustment of T105 for a meter indication as close as possible to the reference value.

(9) Change the signal generator frequency to 5 megacycles and readjust the bottom adjustment of T105 for a meter indication as close as possible to the reference value.

(10) Turn the power OFF, remove the test probe and proceed as in Paragraph 4.10(3), (4), (5), (6) and (7).

(11) Using the 7-volt reference adjust T104 bottom at 5 megacycles and T104 top at 4 megacycles as in steps (7), (8) and (9) of this paragraph.

(12) With the same arrangement as in step (11) and a 100-kilocycle 7-volt reference, make a frequency run as described in Paragraph 4.10(8).

(13) Turn power OFF, remove the vacuum tube voltmeter and replace the kinescope socket.

(D) Oscilloscope Amplifier Frequency Response

4.14 The following test information is for use with TM-5A monitor oscilloscope amplifiers which have been modified by the RCA factory to furnish the IRE roll-off video response characteristic. However, it is possible to use the test method described for unmodified amplifiers as a general indication of their response characteristics but the requirements of Paragraph 4.17, step (8) will not be applicable.

4.15 The frequency characteristic of the TM-5A monitor oscilloscope amplifier with the IRE-FLAT video characteristic switch in the FLAT position (push-push switch out) can be checked as follows.

4.16 Apparatus:

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

4.17 Procedure:

(1) Set the signal generator for 75-OHM UNBAL SINE WAVE OUTPUT, 0 db output level and 100-kilocycle frequency.

(2) Terminate the monitor input with a 340C plug (75 ohms).

(3) Connect the signal generator and TM-5A monitor as illustrated in Fig. 6.

Note: Do not change the CRO BRIGHTNESS or FOCUS controls during the test period.

(4) Set the VERTICAL-HORIZONTAL switch (S2) to VERTICAL.

(5) Adjust the CRO VERT GAIN control (R104) for a convenient vertical deflection greater than two inches peak to peak on the oscilloscope screen.

(6) Determine the exact peak-to-peak vertical deflection of the signal on the screen in inches by measurement with a non-magnetic scale.

(7) Maintaining the same signal generator output level, make similar measurements at the following frequencies.

100 Kc	2 Mc
300 Kc	3 Mc
500 Kc	4 Mc
1 Mc	

(8) The ratio $\frac{\text{Vd freq. kc}}{\text{Vd 100 kc}}$ may then be determined for each frequency.

Where: Vd freq. kc = measured vertical deflection at any frequency.

Vd 100 kc = measured vertical deflection at 100 kc.

Requirement: The ratios obtained by solving the above formula for each frequency should not be greater than 1.12 nor less than 0.89 (± 1 db).

4.18 If the requirement of Paragraph 4.17, step (8) is not met it will be necessary to align the amplifier as described in Paragraph 4.26.

4.19 A test of the IRE roll-off characteristic in the oscilloscope amplifier can be made using the same procedure (Paragraph 4.16) with the exception that the IRE-FLAT switch is in the IRE position (IN).

4.20 Make measurements at the following frequencies and compute the ratios as described in Paragraph 4.16, step (8).

Frequency	Limits Ratio	Limits db
100 kc	1.0	0
500 kc	1.0 to .944	0.0 to -0.5
1 mc	.944 to .813	-0.5 to -1.8
2 mc	.794 to .562	-2.0 to -5.0
3 mc	.631 to .355	-4.0 to -9.0
4 mc	.473 to .2	-6.5 to -14.0

Requirement: The ratio at any frequency should not exceed the limits.

4.21 If the FLAT frequency requirement (Paragraph 4.17, step (8)) is met and the IRE frequency requirement (Paragraph 4.20) is not met refer to Paragraph 4.26, step (21).

4.22 Fig. 5 illustrates a nominal frequency characteristic curve obtained by the method described above for an oscilloscope amplifier which has not been modified. If the measured amplifier characteristic deviates greatly from the general attitude of the illustrated curve after maintenance procedures have been performed, the peaking inductances T101, T102 and T103 top and bottom may be adjusted. The position of each adjustment should be noted at the beginning so that the original adjustment position can be duplicated.

4.23 In the event that any great deviation from the nominal objective (Fig. 5) persists after the above adjustments have been made, the case should be referred through the proper channels for consideration.

(E) Oscilloscope Amplifier Alignment

4.24 If the objective (Paragraph 4.17, step (8)) for the modified oscilloscope amplifier is not met, adjustments of circuit elements will have to be made as described below.

Note: This procedure does not apply to the unmodified oscilloscope.

4.25 Apparatus:

1 - 61B Signal Generator
1 - J44100M Test Probe
1 - P2AW (unbalanced) Cord, 3 feet long

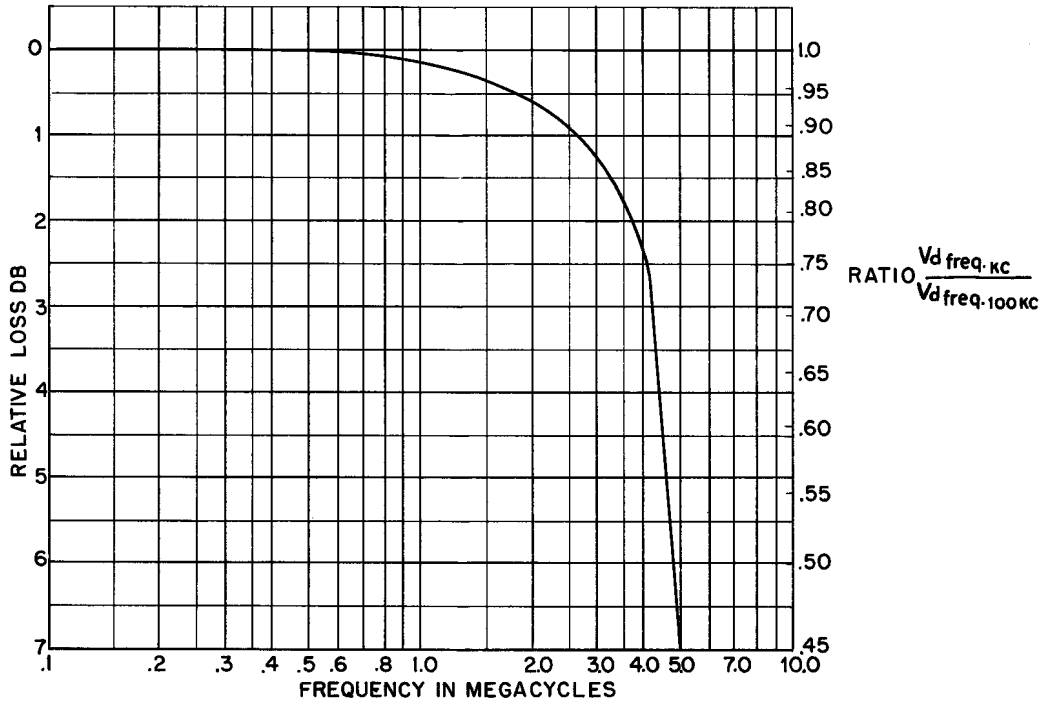

Fig. 5 - Nominal Frequency Response Curve for an Unmodified Oscilloscope Amplifier

4.26 Procedure:

(1) Turn power OFF.

(2) Set the TM-5A monitor VERTICAL-HORIZONTAL switch (S2) to VERTICAL, IRE-FLAT switch to FLAT, top and bottom slug adjustments of T101, T102 and T103 to midposition, disconnect the C107 lead from T103 and temporarily ground it to the chassis.

(3) Set the signal generator for 75-OHM UNBAL SINE WAVE OUTPUT, +10 db output level and 100-kilocycle frequency.

(4) Connect the signal generator via the J44100M test probe (75-ohm position) to socket pin No. 4 of V3 and the socket chassis ground connection in the oscilloscope amplifier.

(5) Turn the power ON and allow a warmup period of 15 minutes.

Note: Do not change the CRO BRIGHTNESS or FOCUS controls during the test period.

(6) Accurately measure the vertical deflection on the oscilloscope screen. (Approximately one-quarter inch.)

(7) Maintaining the same signal generator output level set the signal generator for 5 megacycles and adjust the top and bottom slug adjustments of T102 for a vertical deflection as close as possible to that measured in step (6).

(8) Turn the power OFF and replace the C107 lead to T103.

(9) Turn the power ON and allow a warmup period of 15 minutes.

(10) Set the signal generator to 100 kilocycles at +10 db output level.

(11) Accurately measure the vertical deflection on the oscilloscope screen. (Approximately one-half inch.)

(12) Maintaining the same signal generator output level set the signal generator for 4.5 megacycles and adjust the top and bottom adjustments of T103 for a vertical deflection as close as possible to that measured in step (11).

(13) Turn the power OFF and disconnect the J44100M test probe from V3.

(14) Set the signal generator output to 0 db at 100 kilocycles and connect it to the monitor input via the P2AW (unbalanced) cord. Terminate the monitor input with the 340C plug (75 ohms).

(15) Connect the signal generator and monitor as illustrated in Fig. 6.

(16) Turn the power ON and allow a 15-minute warmup period.

(17) Adjust the CRO VERT GAIN control (R104) for an accurate two-inch peak-to-peak vertical deflection on the screen.

(18) Maintaining the same signal generator output level set the signal generator for 1.5 megacycles and adjust the bottom of T101 for a vertical deflection as close as possible to that measured in step (17).

(19) Set the signal generator to 4 megacycles at 0 db and adjust the top of T101 for a vertical deflection as close as possible to that measured in step (17).

(20) Follow steps (7) and (8) of Paragraph 4.17 for a final frequency run.

(21) Check the IRE roll-off characteristic as described in Paragraphs 4.19 and 4.20.

Note: In the event that the FLAT frequency response meets the requirement and the IRE frequency response does not, it is possible to alter the roll-off by readjusting T102 and T103. However, this adjustment will change the FLAT frequency characteristic and step (20) should be repeated.

5. CALIBRATION VOLTAGE CIRCUIT ADJUSTMENT

5.01 The purpose of this adjustment is to set the voltage at the CAL VOLTS potentiometer to exactly 1.4 volts peak to peak.

5.02 Apparatus:

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

5.03 Procedure:

(1) Set the TM-5A monitor switch (S2) at VERTICAL, insert the 340B plug into the TERM jack and operate the CALIBRATE-OSCILLOSCOPE switch (S3) to OSCILLOSCOPE.

(2) Connect the 61B signal generator and TM-5A monitor as shown in Fig. 6.

(3) Set the 61B signal generator to 75-OHM UNBAL SINE WAVE OUTPUT, +3 db output level and 100-kilocycle frequency.

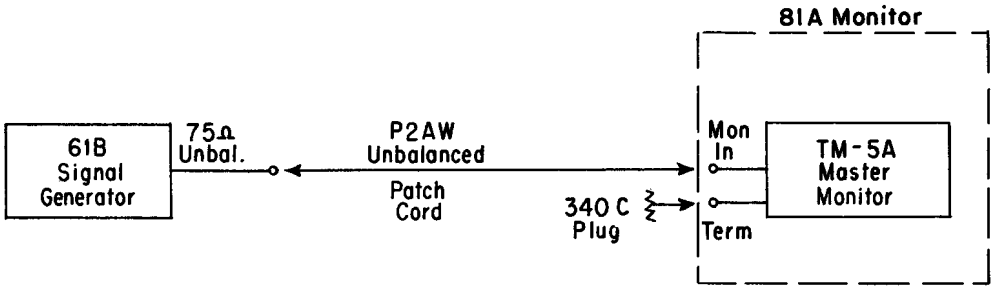

Fig. 6 - Equipment Arrangement for the Calibration Circuit Voltage Adjustment

(4) Adjust the CRO VERT GAIN control (R104) of the TM-5A monitor for a vertical deflection of 2 ± 0.25 inches as measured with a non-magnetic scale.

(5) Operate the CALIBRATE-OSCILLOSCOPE switch (S3) from OSCILLOSCOPE to CALIBRATE and compare the vertical deflections resulting from each position.

Requirement: The vertical deflections observed on the oscilloscope should be the same height on CALIBRATE as on OSCILLOSCOPE.

(6) If the above requirement is not met, it will be necessary to adjust the CALIBRATION ADJUST potentiometer (R111) in the TM-5A monitor until the vertical deflections are the same.

6. REGULATED POWER SUPPLY MEASUREMENTS

(A) Regulated Tube Rectifier J86226C

6.01 Voltage adjustments and noise tests for the regulated power supply are contained in Section 318-103-500.

(B) RCA WP-33A Regulated Power Supply

6.02 The RCA WP-33A regulated power supply instruction book No. 1B-36010-2 which is attached to Section 103-740-100 gives descriptive and maintenance information on the WP-33A supply.

6.03 The socket voltages given in Fig. 3 of the WP-33A regulated power supply instruction book can be measured with the KS-14510-L1 volt-ohm-milliammeter.

6.04 The methods for determining the proper operation of the regulated supply using the RCA MI-21200-C1 meter or the KS-14510-L1 volt-ohm-milliammeter are described below.

6.05 Apparatus:

1 - Meter, RCA Type MI-21200-C1
1 - Test Cord for RCA Meter

6.06 Procedure:

(1) Connect the RCA meter to the METER jack on the WP-33A power supply panel by means of the RCA test cord.

(2) The table below gives the WP-33A power supply SELECTOR switch position and meter readings which should be obtained.

Requirements:

Selector Switch Position	Meter Reading (Milliamperes)	Electron Tube
1A	85 ± 17	V1
1B	85 ± 17	V1
2A	85 ± 17	V2
2B	85 ± 17	V2
3A	85 ± 17	V3
3B	85 ± 17	V3
Io/5	110 ± 22	Total V1, V2 and V3
Eo/2	140* volts	

* Position Eo/2 on the SELECTOR switch is used to measure the output voltage of the power supply.

6.07 If the requirements are not met, adjust the OUTPUT VOLTAGE control on the power supply panel. If the OUTPUT VOLTAGE control range is not adequate it may be necessary to change the input connection on the power transformer (T1) to terminal 2.

6.08 If the requirements are not met on any SELECTOR switch setting replace electron tubes V1, V2 and V3 in the power supply and recheck all readings. All values under requirements should be met.

6.09 Apparatus:

1 - KS-14510-L1 Volt-Ohm-Milliammeter provided with a 1935-ohm shunt (Type 107A) resistor. Use 3-volt scale.

1 - Meter Cord provided with a 347A Plug or equivalent, polarized with the positive meter terminal connected to the tip of the plug.

Caution: The meter and terminals including any exposed sleeve connections on the 347A plug should be well insulated.

6.10 Procedure:

(1) Connect the KS-14510-L1 volt-ohm-milliammeter to the METER jack on the WP-33A power supply panel by means of the meter cord.

(2) The table below lists the SELECTOR switch positions and meter readings which should be obtained.

Requirements:

Selector Switch Position	Meter Reading (Volts)	Electron Tube
1A	0.85 ± .17	V1
1B	0.85 ± .17	V1
2A	0.85 ± .17	V2
2B	0.85 ± .17	V2
3A	0.85 ± .17	V3
3B	0.85 ± .17	V3
Io/5	1.1 ± .22	Total V1, V2 and V3
Eo/2	2.6*	

* Position Eo/2 on the SELECTOR switch is used to measure the output voltage of the power supply.

6.11 If the requirements are not met, adjust the OUTPUT VOLTAGE control on the power supply panel. If the OUTPUT VOLTAGE control range is not adequate it may be necessary to change the input connection on the power transformer (T1) to terminal 2.

6.12 If the requirements are not met with any SELECTOR switch setting replace electron tubes V1, V2 and V3 in the power supply and recheck all readings. All values under requirements should be met.

7. OVER-ALL ADJUSTMENT

7.01 The purpose of this adjustment is to insure that the correct operating level is provided at the input of the TM-5A monitor with the bridging amplifier GAIN potentiometer at the reference setting.

7.02 It is necessary that the transmission requirements for the 1B clamper-amplifier (Section 318-103-500) and the bridging amplifier (Paragraph 2.06(5)) be met before proceeding with the over-all adjustment.

7.03 Apparatus:

1 - 61B Signal Generator
1 - 70A Power Meter
1 - P3AB (balanced) Cord, 3 feet long
1 - P2AW (unbalanced) Cord, 3 feet long
1 - Bridging Connector Assembly per Fig. 1
1 - 341E Plug (110 ohms)
1 - 340C Plug (75 ohms)

7.04 Procedure:

(1) Set the 61B signal generator to 110-OHM BAL SINE WAVE OUTPUT, 0 db output level and 100-kilocycle frequency.

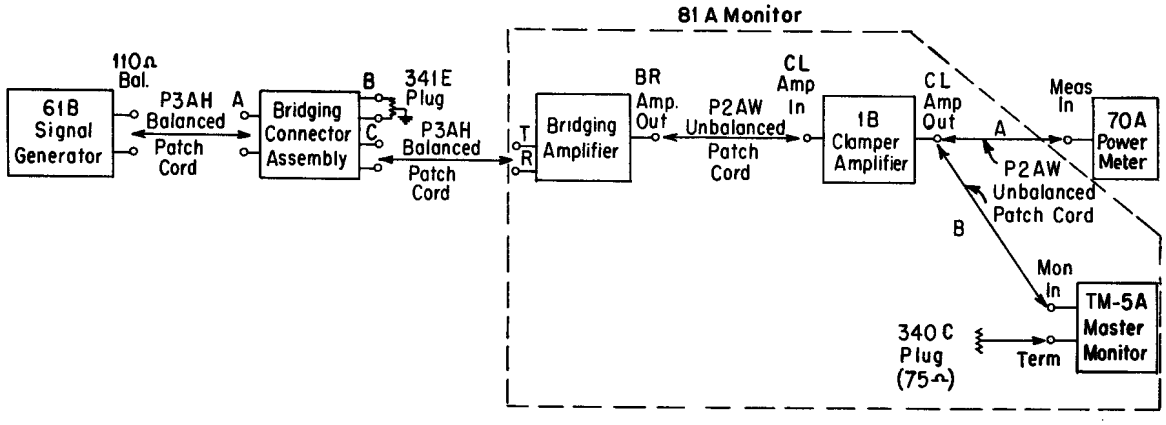

Fig. 7 - Equipment Arrangement for the Over-all Adjustment of the 81A Monitoring Oscilloscope and Picture Monitor

(2) The GAIN setting of the bridging amplifier should be as set in Paragraph 2.06(3).

(3) Set the 1B clamper amplifier LEVEL ADJ control to 10 db and the CLAMP switch to OUT.

(4) Set the 70A power meter to 75-OHM UNBAL input and calibrate for 1V P/P.

(5) Set up the circuit as shown in Fig. 7A.

(6) Adjust the LEVEL ADJ control and ATT switch on the 1B clamper-amplifier to obtain a reading as close as possible to 0 db on the 70A power meter.

(7) Disconnect the 70A power meter.

(8) Raise the gain of the 1B clamper-amplifier 3 db by means of the LEVEL ADJ control and ATT switch.

(9) Patch the CL AMP OUT to MON IN as shown in Fig. 7B.

(10) Set the TM-5A monitor OSCILLOSCOPE CALIBRATE switch to OSCILLOSCOPE and the VERTICAL-HORIZONTAL switch to HORIZONTAL.

(11) Adjust the HORIZONTAL, BRIGHTNESS and FOCUS controls on the TM-5A to obtain a pattern of normal clarity and brightness on the CRO screen.

(12) The peak-to-peak amplitude of the signal on the oscilloscope screen should be 2 ± 0.25 inches as measured with a non-magnetic scale.

Note: Operation of the OSCILLOSCOPE-CALIBRATE switch should result in equal deflections (± 0.25 inch) on the oscilloscope screen if the calibration circuit adjustment has been made.

8. FOCUS AND BRIGHTNESS CONTROLS

8.01 FOCUS and BRIGHTNESS controls are individually provided for the kinescope and oscilloscope in the TM-5A monitor.

8.02 With no input to the TM-5A monitor and with the MON IN jack terminated with a 340C plug (75 ohms), a horizontal sweep line should appear on the oscilloscope screen. The oscilloscope BRIGHTNESS control should be adjusted to give a trace of good intensity. The FOCUS control may then be set to the position where the trace is fine and sharp.

8.03 Adjust the kinescope BRIGHTNESS control to give a field of good intensity. Observe the line structure (horizontal lines on the screen) and adjust the FOCUS control to obtain fine sharp lines.

8.04 In the event that the foregoing focus and brightness control adjustments do not give the desired results, it will be necessary to refer to the TM-5A monitor instruction book for maintenance advice.

9. OVER-ALL FREQUENCY RESPONSE TEST

9.01 The over-all frequency characteristic of the 81A monitoring oscilloscope is the result of the transmission characteristics of the bridging amplifier, 1B clamper amplifier and the oscilloscope amplifier or kinescope amplifier in the TM-5A monitor.

(A) Oscilloscope

9.02 To check the frequency characteristic of the entire oscilloscope channel the following procedure can be used.

9.03 Apparatus:

1 - 61B Signal Generator
1 - P3AH (balanced) Cord, 3 feet long
1 - P2AW (unbalanced) Cord, 3 feet long
1 - Bridging Connector Assembly per Fig. 1
1 - 341E Plug (110 ohms)
1 - 340C Plug (75 ohms)

9.04 Procedure:

(1) Perform the over-all adjustment test as described in Paragraph 7.04.

(2) Connect the signal generator and 81A monitoring oscilloscope as shown in Fig. 7B.

(3) Set the TM-5A IRE-FLAT switch to FLAT and the CRO VERTICAL-HORIZONTAL switch (S2) to VERTICAL.

(4) Set the CLAMPER switch to OUT.

(5) Set the signal generator to 110-OHM BAL SINE WAVE OUTPUT, 0 dbv level and 100-kilocycle frequency.

(6) Perform steps (6), (7) and (8) of Paragraph 4.17.

Requirement: The ratios obtained by solving the above formula for each frequency should not be greater than 1.2 nor less than 0.84.

9.05 If the requirement given in Paragraph 9.04, step (6) is not met the test and alignment procedures given for the bridging amplifier, 1B clamper-amplifier and TM-5A oscilloscope vertical amplifier should be used to isolate the trouble.

(B) Kinescope

9.06 After the over-all 81A oscilloscope channel meets the requirement given, the kinescope channel can be tested visually as described below by using a 1-volt peak-to-peak test pattern.

9.07 Procedure:

(1) Set up the circuit as shown in Fig. 8.

(2) Set the CLAMPER switch to ON.

(3) Adjust the V and H controls on the TM-5A monitor until the pattern on the kinescope screen is locked in.

(4) Adjust the kinescope BRIGHTNESS and FOCUS controls to give a picture of normal contrast and clarity. Some distortion and lack of focus may be apparent at the corners of the pattern. The picture should fill the screen of the kinescope.

(5) The high frequency response of the kinescope channel can be generally determined by observing the horizontal resolution in the vertical wedge of the test pattern.

9.08 Use of the test pattern method to check the kinescope channel is limited. Therefore, it is advisable to completely test the channel as described in Paragraph 9.04 with a vacuum tube voltmeter connected to the kinescope socket as described in Paragraph 4.10(2). Also steps (7) and (8) of Paragraph 4.10 should be followed to establish a frequency characteristic limited at 4 megacycles.

Requirements: The meter indication should be 7 volts ± 1.2V.

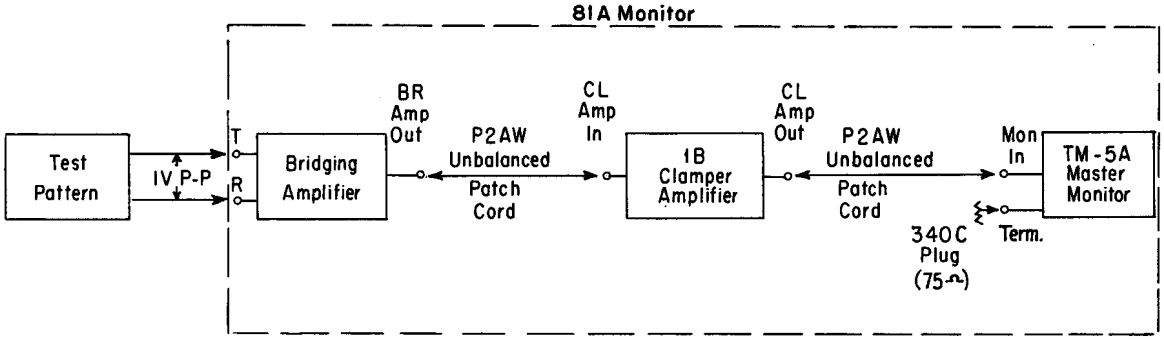

Fig. 8 - Equipment Arrangement for Kinescope Test