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

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<b><u>1. GENERAL</u></b>		
1.01 This section describes the 81A monitoring oscilloscope and the picture monitor per SD-42012-01 (both of which are based on the RCA TM-5A Master Monitor), their use and operation.		
1.02 The 81A monitoring oscilloscope (also the picture monitor) is provided with a high impedance input circuit designed for monitoring on balanced or unbalanced video circuits without disturbing the through circuit.		
1.03 A kinescope is provided for reproducing the picture and an oscilloscope for reproducing in wave form, the video signal under observation.		
1.04 A calibration voltage is also provided for measuring, by comparison, the peak-to-peak voltage of the video signal.		
1.05 The 81A monitoring oscilloscope is supplied mounted in a mobile console. The picture monitor per SD-42012-01 is equivalent electrically but is relay rack mounted at the control position of a television operating center.		

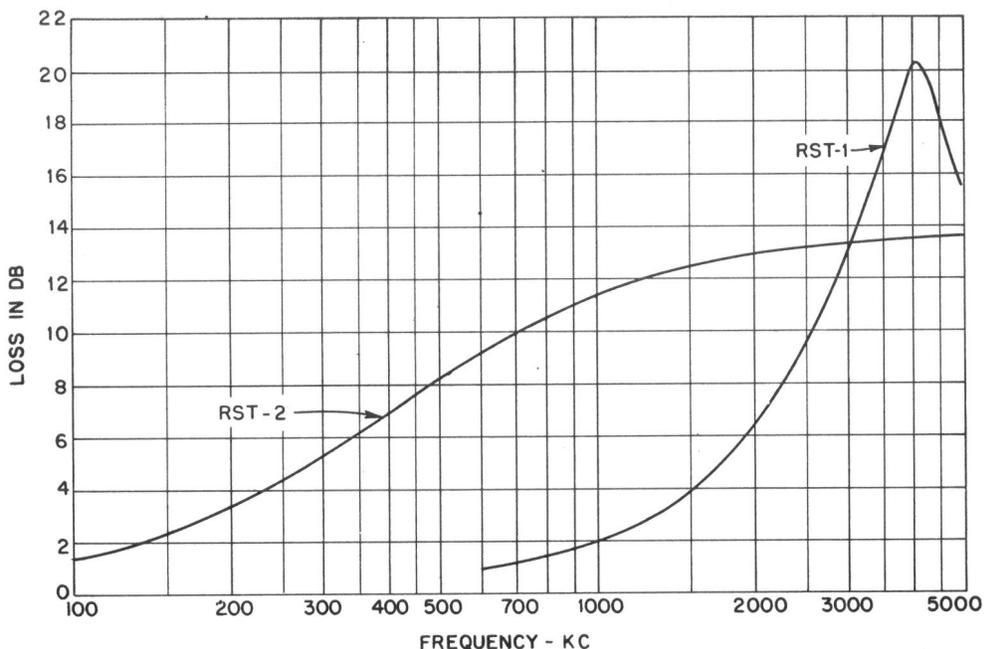


Fig. 1 - Transmission Characteristics of the RST-1 and RST-2 Restorers

2.07 In the event that the video circuit to be monitored has both types of predistortion, both RST-1 and RST-2 can be patched in to provide a flat transmission characteristic. Fig. 1 shows the transmission characteristics of the RST-1 and RST-2 restorers.

2.08 Accurate voltage measurements are possible on the oscilloscope by using the calibration voltage circuit. Voltage measurements can be made in a range from 0.25 volt to 1.4 volts peak to peak. Complete accuracy necessitates the use of an external signal source for comparison.

2.09 Additional information contained in the attached manufacturer's instruction book for the TM-5A master monitor (No. 1B-36021-3) will also apply as general performance data for the 81A monitoring oscilloscope and the rack mounted picture monitor.

### 3. DESCRIPTION

#### (A) 81A Monitoring Oscilloscope

3.01 The components of the 81A monitoring oscilloscope are mounted in a mobile console approximately 60 inches high, 30 inches deep and 23 inches wide. The sloping front accommodates the kinescope and oscilloscope assembly (TM-5A monitor).

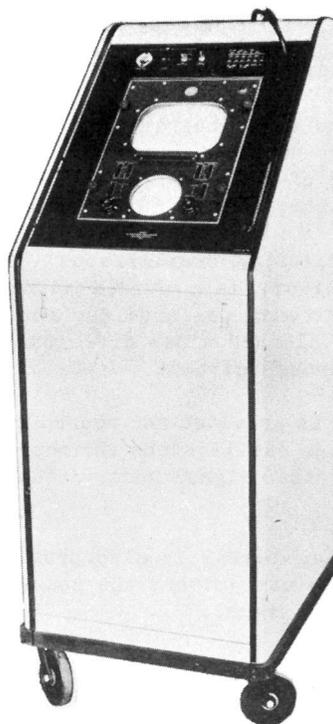


Fig. 2 - 81A Monitoring Oscilloscope

3.02 External power is supplied from the 115-volt 60-cycle power lines to either the top or bottom of the console. The power consumption is about 750 watts.

3.03 The total weight of the console is approximately 300 pounds and the general appearance is shown in Fig. 2.

3.04 In the mobile monitor there are two 115-volt 60-cycle outlets into which plug connection to the 115-volt 60-cycle power source can be made. One outlet is on the rear panel at the top and the other is in the rear of the base.

3.05 The 115-volt 60-cycle power switch on the front panel has three positions which energize the console from either of the two plugs. The center position of the switch is OFF. There are three safety switches associated with the sides and back of the cabinet. On the TM-5A monitor, the interlock switch (S5) is strapped out. A cooling fan is provided at the bottom of the console.

#### (B) Relay Rack Mounted Picture Monitor

3.06 The components of the relay rack mounted picture monitor are mounted on a duct-type framework at the control position of the television operating center.

3.07 External power is supplied from the 115-volt 60-cycle power line to a convenient outlet or fuse panel. The power consumption of all components is approximately 750 watts.

3.08 The nominal video voltage to be measured at the control position of the television operating center is 1 volt peak to peak. The monitor is normally adjusted so that a 1 volt peak to peak input signal results in a 1.4 volt peak to peak signal at the input of the TM-5A monitor.

3.09 The balanced input arrangement is usually used at the control position. The gain of the monitor is the same for balanced or unbalanced input. The relay rack mounting arrangement is shown in Fig. 3.

3.10 A simplified block schematic of the relay rack mounted picture monitor is shown in Fig. 4. The input and output connections of the component units (except power supplies) are brought out to a jack field so that the various circuits may be patched conveniently. However, the input of the 81A monitoring oscilloscope consists of about 6 feet of low capacity coaxial cable for both the tip (T) and ring (R) connections and connects directly to the grids of the bridging amplifier tubes V1 and V3.

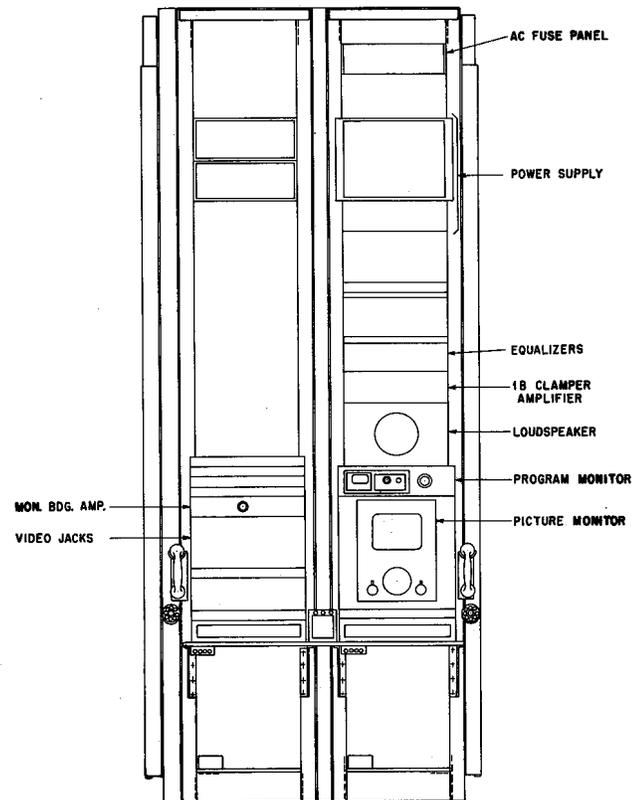


Fig. 3 - Equipment Arrangement for the Relay Rack Mounted Picture Monitor

3.11 The input to the picture monitor is the high impedance balanced or unbalanced input of the bridging amplifier. When an unbalanced input is required, it is necessary to use either the tip (T) or ring (R) input connection. If the polarity of the video signal to be observed is black negative (synchronizing pulses negative) the tip (T) input is used. The ring (R) connection is used for the reverse polarity signal. In either case, the unused input must be terminated in 75 ohms for the proper amplifier operation. For balanced input operation both the tip (T) and ring (R) connections are used.

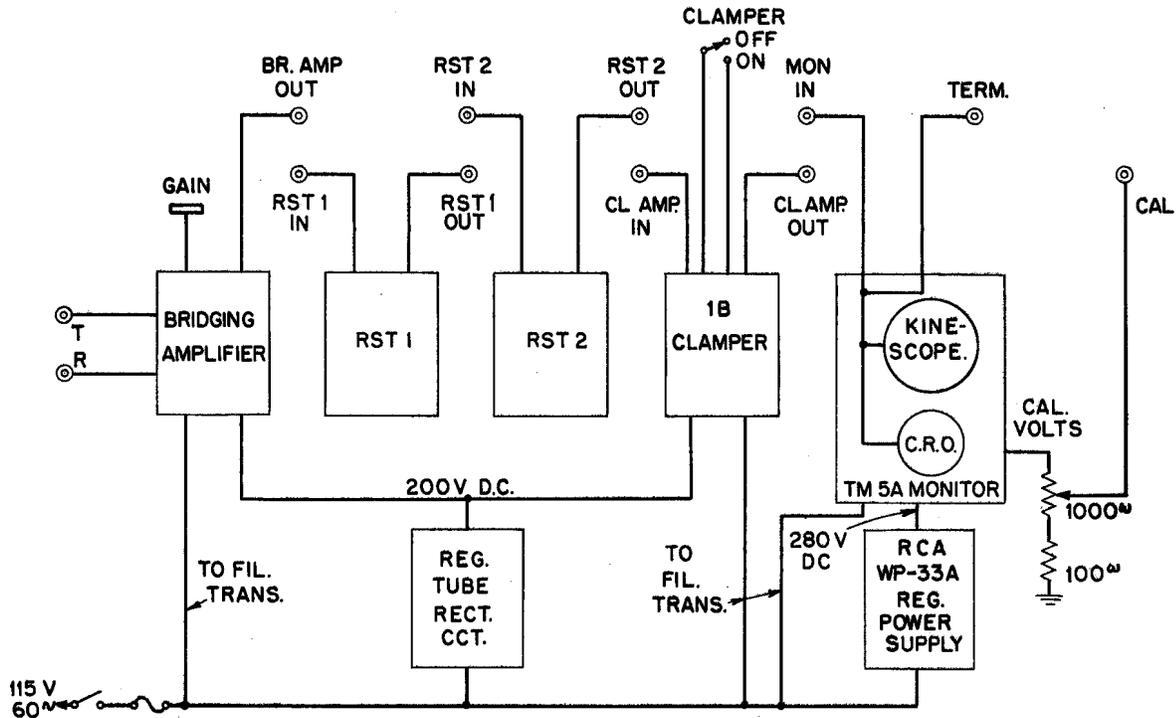


Fig. 4 - Block Schematic of the Picture Monitor

3.12 The 81A oscilloscope and the picture monitor are designed to operate only at test points where an isolating resistor of 510 ohms is wired in series with each input connection. If the isolating resistor is omitted, some distortion of the signal will result.

3.13 The GAIN control of the bridging amplifier is one means of over-all gain adjustment. However, due to distortion created by shunt capacity at the control, the GAIN setting is normally not varied.

3.14 The 1-B clamping amplifier is employed to clamp the signal, if necessary, and further amplify it to provide an adequate input voltage for the TM-5A monitor.

3.15 The RCA TM-5A master monitor provides both a kinescope and oscilloscope for simultaneous picture and wave form presentation.

3.16 Controls for the kinescope and oscilloscope are self-contained in the TM-5A monitor which is mounted for convenient viewing and adjustment.

3.17 In addition to the RCA WP-33-A regulated power supply which furnishes 280 volts d-c to the TM-5A monitor, there is a J68226-C regulated

tube rectifier which supplies 200 volts d-c to the 1B clamping amplifier and the bridging amplifier.

3.18 The two amplifiers and the TM-5A monitor also receive 115-volts 60-cycles for filament supply.

#### (C) Bridging Amplifier (J44102-B)

3.19 The bridging amplifier is basically an electronic circuit which will convert from a high-impedance input, balanced or unbalanced, to a low impedance (75 ohms) unbalanced output.

3.20 The circuit has two main parts, an input amplifier and an output amplifier. Fig. 5 is a schematic of the bridging amplifier.

3.21 The input circuit of the bridging amplifier is made up of low capacity coaxial cable for both the ring (R) and tip (T) connections and connects to the grids of each of the input tubes V1 and V3

3.22 The shunting capacitance of the input cables, together with the required 510-ohm series isolating resistors creates a resistance capacitance voltage divider to ground which affects the high-frequency transmission from the line to the grids of V1 and V3. This signal distortion is equalized in the output amplifier circuit.

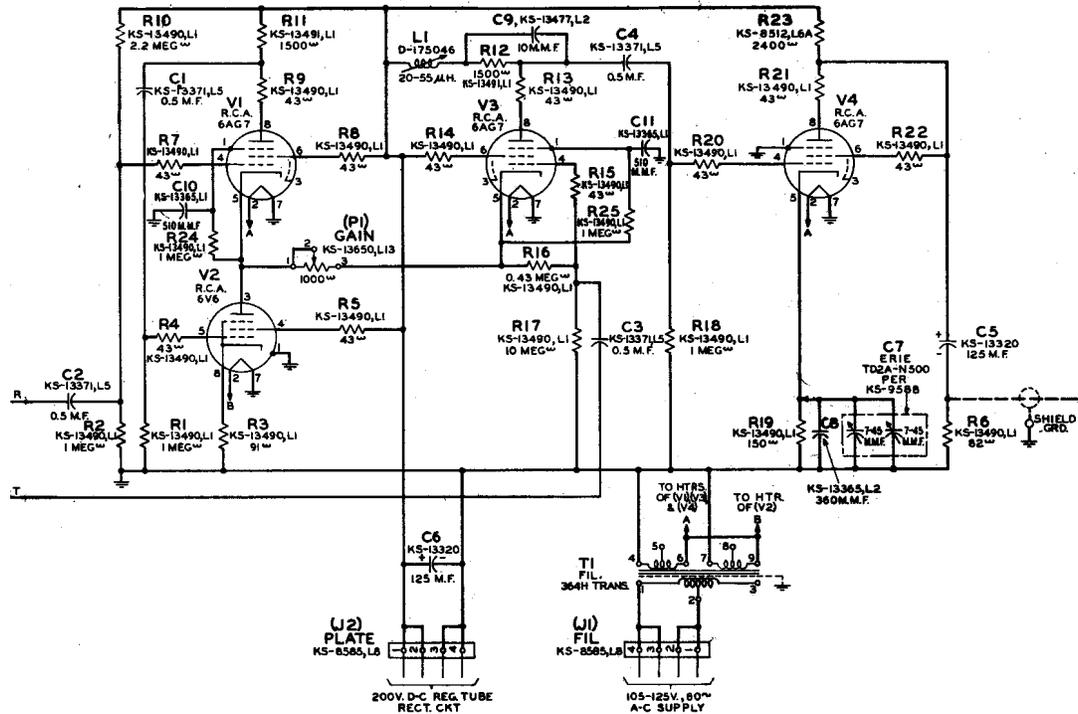


Fig. 5 - Bridging Amplifier Schematic

3.23 In the 81A oscilloscope the input distortion can be equalized for either the balanced or unbalanced condition as the transmission is essentially the same for either. However, the relay rack mounted monitor input cable capacitance varies slightly due to differences in the capacities of balanced and unbalanced patch cords and the transmission should be equalized for the balanced condition.

3.24 Longitudinal signal suppression is accomplished in the input amplifier. The electron tube V2 constitutes the cathode circuit impedance which is common to the input tubes V1 and V3. The cathode circuit impedance is very high due to the pentode characteristic of V2. This creates a great deal of degeneration for longitudinal signals that may appear as grid-ground voltages of the same sign on the grids of V1 and V3. However, when balanced voltages, i.e., equal and opposite, are applied to the grids of V1 and V3 the impedance of V2 does not introduce degeneration and these signals are amplified. Thus, when an input signal contains both balanced and longitudinal components the input amplifier will tend to amplify the balanced signal and suppress the longitudinal.

3.25 The feedback connection from the plate of V1 to the control grid of V2 reduces the signal currents in V1 to relatively low values and at

the same time effectively doubles the signal current in V3. Since the output of the input amplifier is taken from the plate of V3 this represents a gain of about 6 db for the input amplifier as a whole. There is no decrease in the suppression of longitudinal input signals by this feedback connection.

3.26 Circuit arrangements are also such that application of unbalanced input voltages to (R) results in practically no potential difference between the cathode and grid of V1 and a large potential difference across the cathode and grid of V3 which also results in an increase of 6 db as explained above.

3.27 The over-all gain is, therefore, essentially the same for a balanced input, unbalanced input at (T) or unbalanced input at (R).

3.28 It is necessary to terminate the unused input when the unbalanced condition is used to eliminate instability of the amplifier.

3.29 P1 is the GAIN control for the bridging amplifier. It is the variable resistor which is between the cathodes of V1 and V3. P1 adjusts the amount of degeneration to the balanced component of the input signal, therefore, controlling the gain. The GAIN adjustment range is about 20 db.

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3.30 Due to the stray capacity across the variable resistor (P1) the gain change is not quite flat with frequency and a GAIN setting of approximately mid-range has been selected as the working GAIN setting. Changing this setting is not usually necessary unless signals of lower than normal levels are being monitored. In this case the transmission characteristic distortion should be acknowledged.

3.31 The plate of V3 is coupled to the grid of the output tube V4 by an adjustable inter-stage network. The adjustable feature is the inductor L1 which is set to make the gain of the input amplifier flat with frequency. This does not include the distortion introduced by the 510-ohm isolating resistors in the input circuit which is taken care of by the C7 capacitor (Paragraph 3.22).

3.32 The output stage, V4, primarily couples the voltage output of the input stage to a low-impedance load. This means that V4 must operate at a relatively high current output and is, therefore, operated as a triode. The normal output is 0.25 volt peak to peak across a 75-ohm load although 1.0 volt peak to peak is tolerable. The output at this point is polarized black negative.

3.33 The distortion introduced in the input circuit by the isolating resistor and input capacity (Paragraph 3.22) can be equalized in the cathode circuit of V4 by means of the adjustable capacitor C7. This capacitor reduces the local feedback on V4 at the higher frequencies which increases the gain to balance out the loss in the input circuit.

3.34 Adjustments to produce a flat frequency transmission characteristic are made by varying the values of the L-1 inductor and the C7 capacitor with the GAIN setting at approximately mid-range. Any reference gain point should be satisfactory if adjustments of L1 and C7 result in a flat frequency transmission characteristic. The characteristic should be flat to 4.5 megacycles  $\pm 0.1$  db.

### (D) 1B Clamper Amplifier

3.35 The 1B Clamper Amplifier used in the monitor is both a clamper and an amplifier. Descriptive information and operational theory of the clamper-amplifier is covered in Section 318-103-100 and maintenance information is covered in Section 318-103-500.

3.36 Clamping action is switched IN or OUT of the circuit by the CLAMP switch. This switch has been brought out from the clamper-amplifier chassis to a readily available location at the

control point of the television operating center or on the control panel of the mobile monitor. This switch is marked CLAMPER-ON-OFF and controls the heater current to the clamp tubes. Due to the electron tube warm-up or cooling off period, the circuit is slow in reacting. During this period the circuit behavior is not normal and the indications on the oscilloscope should not be used.

3.37 The output of the clamper-amplifier is brought out to the CL AMP jack which is normally patched to the MON IN jack. The MON IN and TERM jacks are strapped at the TM-5A monitor and connect to the CRO amplifier input and the kinescope amplifier input, thus forming a bridging connection to the TM-5A monitor. A 340B (75-ohm) plug is inserted in the TERM jack to provide the proper termination for the clamper amplifier.

3.38 The clamper amplifier provides the necessary gain to step up the bridging amplifier output to 1.4 volts peak to peak, which is a satisfactory operating voltage for the TM-5A monitor. An output of 1.4 volts peak to peak is also a satisfactory operating level for the clamper amplifier.

3.39 If the bridging amplifier has high gain tubes a situation may arise where the working GAIN setting results in more than 1.4 volts peak to peak at the terminated output of the clamper amplifier. This output may be reduced by means of the LEVEL ADJ switch on the clamper amplifier.

### (E) RCA TM-5A Master Monitor

3.40 The RCA TM-5A Master Monitor includes both a kinescope, an oscilloscope and with a 1.4-volt peak-to-peak input signal gives adequate picture and wave form presentation.

3.41 The oscilloscope gives confirming data on the picture and is also used for analyzing the wave form and determining the peak-to-peak voltage of the signal.

3.42 The external kinescope controls are FOCUS, BRIGHTNESS, horizontal hold (H) and vertical hold (V), while the external oscilloscope controls are FOCUS and BRIGHTNESS, with switches for selection of CALIBRATE or OSCILLOSCOPE and HORIZONTAL line or VERTICAL frame presentation. The horizontal and vertical hold controls adjust the synchronization for both the kinescope and oscilloscope.

3.43 A complete description of the TM-5A monitor circuits, operation and use is included in the attached RCA TM-5A Master Monitor instruction book No. 1B-36201-3.

3.44 Certain wiring changes and equipment modifications in the TM-5A monitor have been made necessary for maintenance reasons and to facilitate its use in the monitor.

3.45 Interlock switch (S5) on the TM-5A monitor chassis has been strapped out.

3.46 The 1000-ohm cathode resistor (R295) for V2 has been removed and a connection made from the cathode (Pin 5) of V2 to J2 to provide for an external CAL VOLT circuit.

3.47 The PICTURE INPUT and CRO INPUT have been strapped together to provide a bridging input to the TM-5A monitor.

3.48 A 0.25 ampere fuse has been added to protect the primary of the horizontal output transformer (T109) against excessive current as a result of a shorted 6BG6G tube.

3.49 The spacing between the socket terminals of the high voltage rectifier and chassis ground has been increased to minimize the chance of arcing.

3.50 Extruded plastic sleeving has been added over the filament supply leads which connect to windings (7) and (8) of the horizontal output transformer (T109). These leads are also isolated from adjacent leads and terminals.

3.51 Arrangements have been made with the RCA factory for modification of the vertical amplifier in the oscilloscope of the TM-5A, to incorporate the IRE roll-off and also provide a flat 4 megacycle response. Either of the circuits is made available by operating a switch on the front panel.

3.52 The modification also includes additional low frequency compensation in the vertical amplifier to meet the allowable limit of low-frequency distortion as specified by the IRE standard.

3.53 A new oscilloscope scale has been added which will facilitate the measurement of video signal levels in keeping with IRE Standard 50 IRE 23.S1 and the recommendations of the Joint Committee of TV Broadcasters and Manufacturers for Coordination of Video Levels.

3.54 The installation of the new scale necessitates relocation of the vertical centering control on the monitor. The old centering control (R141) is disconnected but not removed from the inside panel.

3.55 The new oscilloscope scale is shown in Fig. 6 and has linear markings with arbitrary numbers for reading the various levels. The oscilloscopes along a system are to be calibrated in terms of the normal signal levels at each of the

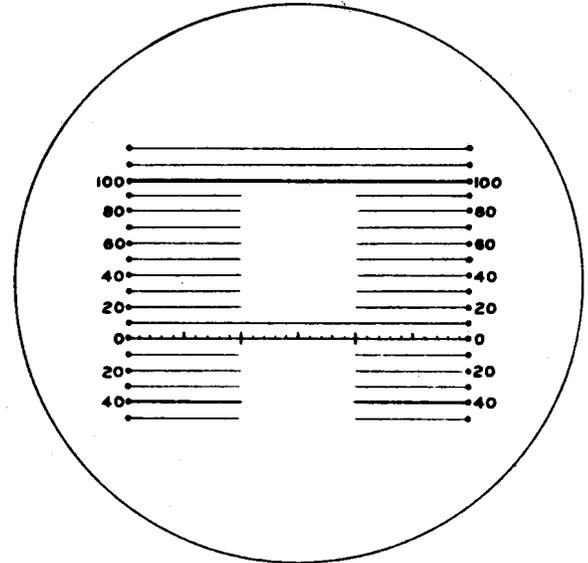


Fig. 6 - Oscilloscope Scale

measuring points and then similar scale readings should be obtained on oscilloscopes at all points regardless of differences in the absolute voltage levels at the measuring points. These readings may, if desired, be readily converted to volts.

3.56 Circuit rearrangements and parts list changes are illustrated in Appendix A of this section for ready reference use with the TM-5A instruction book.

3.57 Fig. 7 illustrates the significant levels as measured on the new scale. The blanking level of the signal is set to the 0 line by means of the vertical centering control of the oscilloscope. The upper portion of the scale marked from 0 to 100 covers the range of the picture signal proper and on it are read the black and white peaks. Two additional points are marked beyond 100 to permit reading of abnormally high white peaks. An extra line is marked at the 10 step where the reference black level is usually established by the broadcasters to provide a setup region.

3.58 The synchronizing level is read on the lower part of the scale which is marked downward from 0 to 50. This indicates the synchronizing level as a percentage of the reference picture signal amplitude. The 40 step is shown more promi-

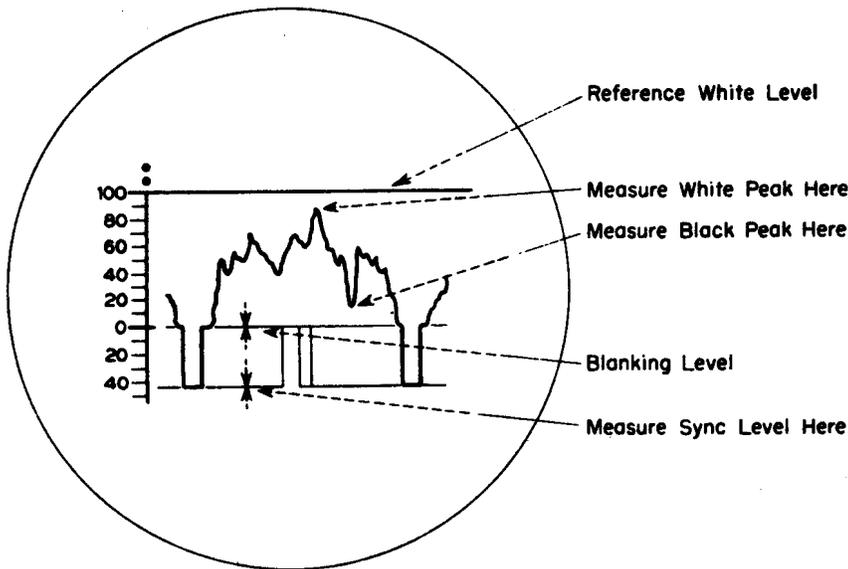


Fig. 7 - Use of Scale

nently as this is the value of synchronizing level commonly provided by the broadcasters for inter-city transmission.

3.59 To further insure uniformity in interpreting the oscilloscope indication for level measurements, the oscilloscope should normally be synchronized at either the line rate or at one-half the line rate. The vertical synchronizing signal will then produce light horizontal lines at the blanking and synchronizing levels, permitting measurements as shown in Fig. 7 which should more closely correspond to steady state values than measurements made during the short duration of the horizontal synchronizing signal. The oscilloscope intensity and focus should be adjusted to make these portions of the display visible and well defined.

(F) Calibration Voltage Circuit

3.60 The calibration voltage circuit of the TM-5A monitor has been modified to make the calibration voltage available at the input to the bridging amplifier. The calibration voltage is brought out via the PICTURE INPUT jack to the CAL VOLTS potentiometer circuit and thence via the slider connection to the CAL jack in the jack field. The CAL VOLTS potentiometer will allow the calibration voltage appearing at the CAL jack to be set anywhere in the range from 0.2 to 2.0 volts peak to peak.

3.61 The calibration voltage is generated in the TM-5A monitor and is basically an interrupted d-c voltage. This voltage is developed across the CAL VOLTS potentiometer and its associated resistance which are in the cathode circuit of one of the diodes of V2. This diode is cut off during the flyback of the horizontal sweep by part of the flyback voltage developed across the horizontal sweep coil, so that the resulting pulse is one having a long duty cycle and a repetition of 15,750 cycles per second.

3.62 The calibration pulse is shown on the oscilloscope by throwing the OSCILLOSCOPE CALIBRATE switch on the TM-5A monitor to CALIBRATE and the VERTICAL HORIZONTAL switch to HORIZONTAL.

3.63 The original calibrating voltage circuit relied on an accurate 1000-ohm resistor in the diode cathode circuit which has not been replaced by a nominal 1100 ohms in the CAL VOLTS circuit. Therefore, the adjustment routine outlined in the TM-5A monitor instruction manual will not apply. The method which should be followed is described in Section 103-740-500.

3.64 It should be stressed that operation of the OSCILLOSCOPE CALIBRATE switch to CALIBRATE is a measure of the maximum calibration voltage as applied at the input of the TM-5A monitor. It does not measure, or serve as a comparison for a video signal as applied to the input of the monitor since

this would include the gain of both the bridging amplifier and the clamper amplifier.

3.65 To measure a video voltage by comparison the calibration voltage as it appears at the CAL jack is used. This voltage can be set to a reference value in the range from 0.2 to 1.4 volts peak to peak and is readily available for checking purposes. The voltage is normally set by comparison with an external sine wave signal of 100 KC with good wave form and having the desired peak to peak value.

#### (G) Regulated Power Supplies

3.66 Two regulated power supplies are used in the 81A oscilloscope. They are the J86226-C rectifier and the RCA WP-33A regulated power supply.

3.67 The J86226-C rectifier supplies approximately 230 milliamperes at 200 volts d-c to the bridging amplifier and 1B clamper amplifier combined.

3.68 Descriptive and maintenance information for this rectifier is included in Sections 318-103-100 and 318-103-500 of the practices.

3.69 The RCA WP-33A regulated power supply furnishes approximately 500 milliamperes at 280 volts d-c and a centering voltage of -7 volts d-c to the TM-5A monitor.

3.70 The WP-33A power supply instruction book (No. 1B-36010-2) which is attached to this practice includes both descriptive and maintenance information. Further information will be found in Section 103-740-500 of the practices.

3.71 The WP-33A instruction book suggests the use of the RCA M1-21200-C1 meter for measuring voltage and current distribution in the rectifier. However, the 103-740-500 section of the practices provides data for using the KS-14510 volt-ohm-milliammeter in making the same measurements.

3.72 In practice, it is important to check the operation of the three regulating tubes V1, V2 and V3. Each section should carry one-fifth of the total output current and a deviation greater than 10% is not desirable.

3.73 It should be noted that there is a line voltage adjustment on the power transformer T1 in the WP-33A rectifier. A low line voltage may be limiting in which case the input connection should be made to terminal 2 of T1, Fig. 6 of the WP-33A instruction book. The effect of this may be checked roughly by watching the output voltage

as the OUTPUT VOLTAGE control is turned up. The voltage should go up to at least 300 volts before it limits.

#### 4. OPERATION

4.01 It is necessary that the following switch settings be made prior to operation of the 81A oscilloscope or picture monitor.

(a) The 1B clamper amplifier shall have the CLAMP switch thrown to OUT and the output selector switch (S3) set on 75-ohm UNBAL.

(b) The TM-5A monitor shall have the (S6) switch thrown to the up position, the MONITOR switch thrown to SYNC and the CRO SYNC switch thrown to INT.

4.02 The following examples are given as a guide to the performance as well as to operational methods. Further operational details can be found included in the preceding circuit descriptions and in the TM-5A monitor instruction book. The frequency characteristic of the vertical amplifier is of the original design.

4.03 Fig. 8 illustrates the oscilloscope pattern when the calibrating voltage is applied at the input to the TM-5A monitor on a half-line frequency basis, or 7875 cycles per second. For this condition the VERTICAL HORIZONTAL switch (S2) is thrown to HORIZONTAL and the OSCILLOSCOPE CALIBRATE switch (S3) to CALIBRATE. Since the HORIZONTAL sweep is at half-line frequency the time base of the sweep is equivalent to that of two lines. Therefore, under ideal conditions, two pulses would be shown. However, one pulse is lost in fly-back time. The edges of the "lost" pulse are seen at either end of the trace.

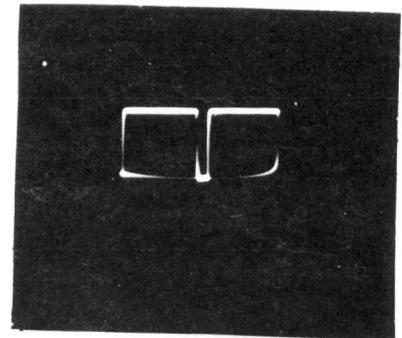


Fig. 8

4.04 The same pulses are shown on a frame frequency basis in Fig. 9 where the VERTICAL HORIZONTAL switch (S2) is thrown to VERTICAL and the OSCILLOSCOPE CALIBRATE switch (S3) is left on CALIBRATE. Since the line frequency is 525 times

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that of the frame frequency, this wave form would show 525 pulses under ideal conditions. However, these lines cannot be resolved, though if the sweep linear length were multiplied about 250 times, the part showing on the oscilloscope would be approximately that shown in Fig. 8.

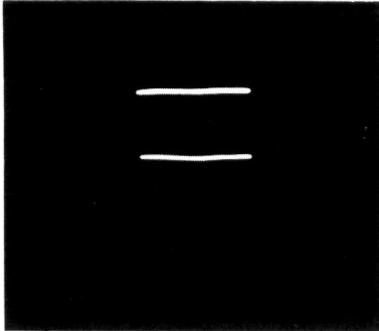


Fig. 9

4.05 Fig. 10 shows the wave form of a test pattern when the signal is applied at the input to the 81A oscilloscope. The BR AMP OUT is patched to the CL AMP IN, CL AMP OUT patched to MON IN and a 75-ohm termination in TERM. The CLAMPER switch is thrown to ON, the VERTICAL-HORIZONTAL switch (S2) to HORIZONTAL and the OSCILLOSCOPE-CALIBRATE switch (S3) to OSCILLOSCOPE. As in Paragraph 4.03, above, this picture shows two lines with one horizontal sync pulse in the middle and the other lost in the flyback. However, one edge can be seen rather faintly since there is no blanking on the retrace or flyback. The picture video signal does not show much detail since all of the lines, in pairs, are "laid down" one on top of the other and it is the horizontal sync pulse which is of major interest. As shown, this pulse is somewhat degraded by "overshoot" most of which is due to the short cutoff of the video amplifier in the TM-5A monitor. However, the corners of the pulse are sharp indicating no particular limitation in bandwidth. In general rounded corners indicate limiting high-frequency bandwidth and excessive overshoot points to non-linear phase shift usually associated with too sharp a high-frequency cutoff.

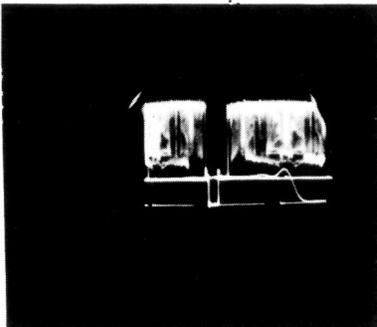


Fig. 10

4.06 Fig. 11 shows the same signal as Fig. 10 on a frame or vertical basis with the VERTICAL-HORIZONTAL switch (S2) thrown to VERTICAL. This presentation is normally used for analyzing low-frequencies. The vertical sync region is shown in the middle, though the horizontal scale is too compressed to show any detail of the pulses. For good transmission the base line and the black line should be straight and parallel including the vertical sync region. In this case a small amount of non-uniformity can be observed due to power line frequency pickup in the oscilloscope. This can be checked by removing the signal and observing the sweep line across the oscilloscope. Interference shows up as a small amount of curvature in this line and there is usually some present.

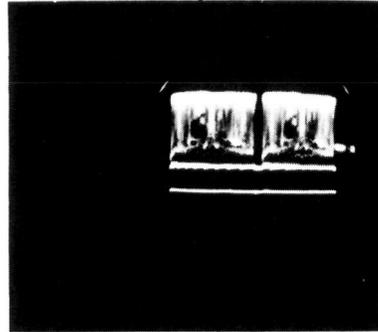


Fig. 11

4.07 In Paragraph 4.06 the CLAMPER switch is ON so that even if the original signal had some low-frequency distortion or interference it would tend to be corrected. Fig. 12 shows the same signal with the CLAMPER switch OFF, which is the condition for analyzing low-frequency distortion. Under these conditions a small amount of low-frequency distortion can be observed as the slight discontinuities in the base and black lines, particularly in the vertical sync region. This effect is shown in somewhat greater proportions in Fig. 13, which is the low-frequency distortion introduced by a 197A repeat coil.

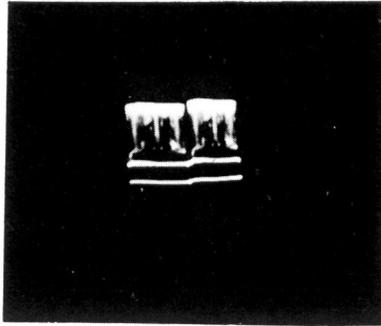


Fig. 12

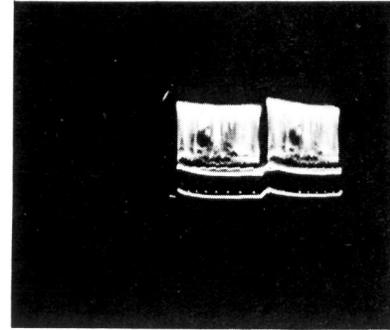


Fig. 13

Attached:

Appendix A.

Instruction Books—1B-36021-3 and 1B-36010-2

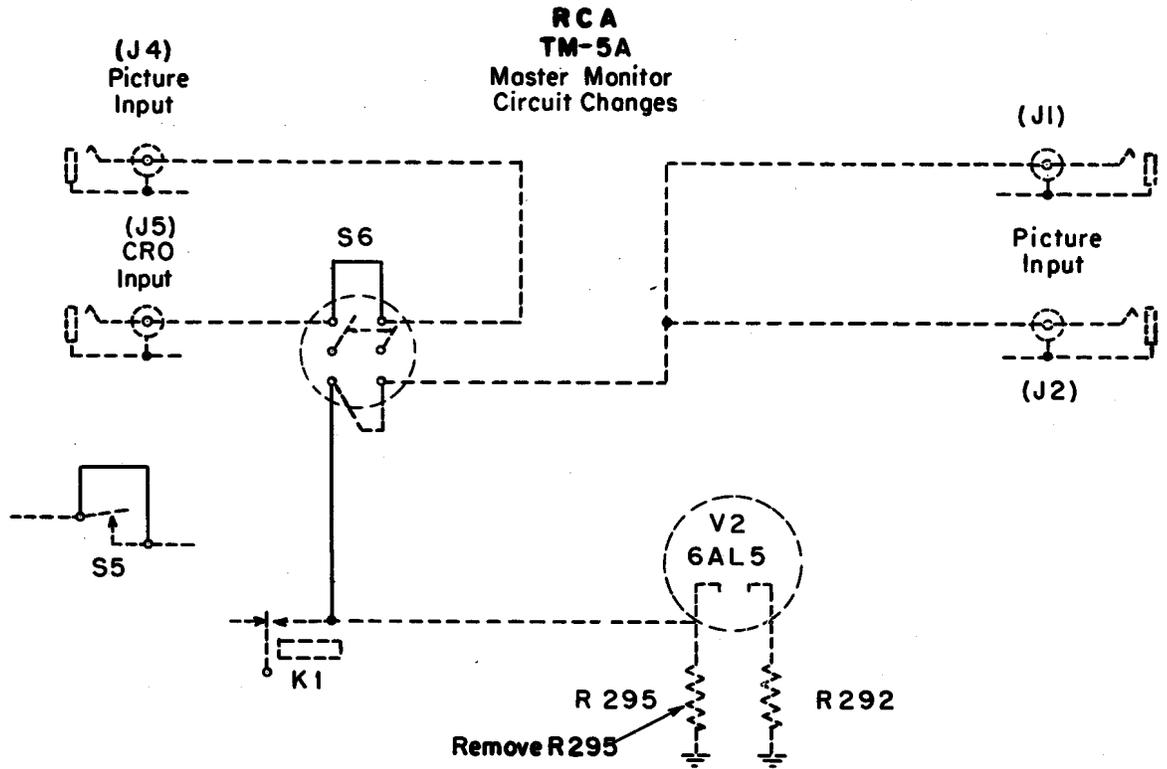


Fig. 1 - Wiring Changes Necessary Prior to Using the TM-5A as a Unit of the 81A Monitoring Oscilloscope and Picture Monitor

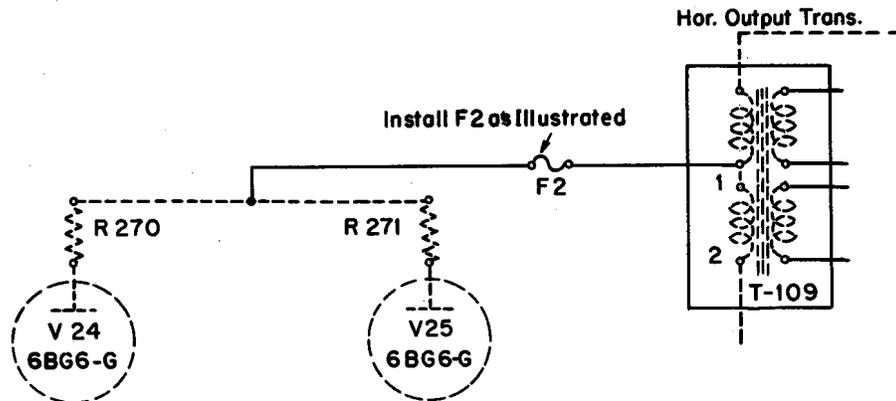


Fig. 2 - Protective Fuse Installation in High Voltage Circuit

SECTION 103-740-100  
APPENDIX A

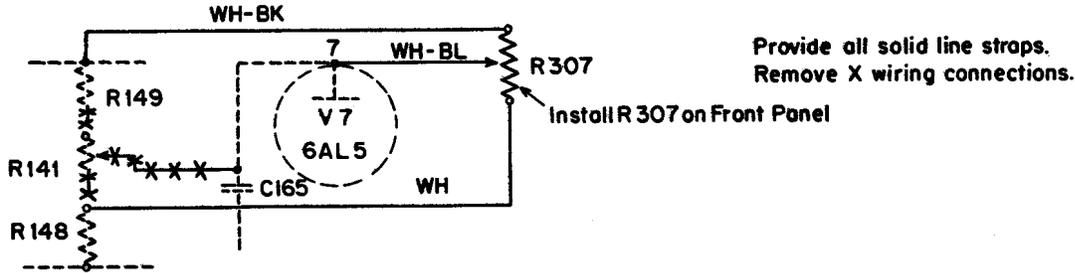


Fig. 3 - Oscilloscope Vertical Centering Control Change to Accommodate Use of New Scale

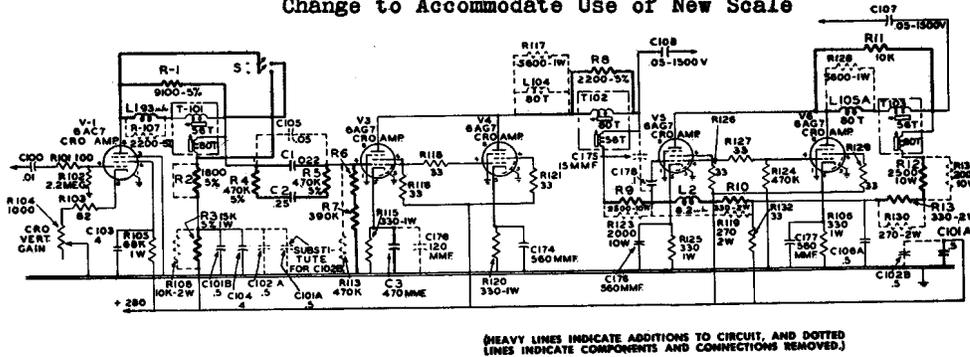


Fig. 4 - Schematic Diagram of Oscilloscope Amplifier Including Modifications for IRE Roll-off and Low Frequency Compensation

The following changes should be made in the parts list for the TM-5A Master Monitor (IB-36021-1).

Remove:

- R107, 2200 ohms  $\pm$  5%, 1/2 watt
- R108, 10,000 ohms, 2 watts
- C105, 0.05 mfd, 400 volts
- C102, 2 x 0.05 mfd, 400 volts (oil filled)
- R113, 470,000 ohms, 1/2 watt
- C173, 120 mmf
- L104, 80T; and R117, 5600 ohms, 1 watt
- C175, 15 mmf
- R123, 2000 ohms, 10 watts
- R119, 270 ohms, 2 watts
- L105, 80T; and R128, 5600 ohms, 1 watt
- R130, 270 ohms, 2 watts
- R131, 2000 ohms, 10 watts
- R295, Resistor, Fixed, Wire wound, 1000 ohms  $\pm$  10%, 4 Watt, R.C.A. Stock No. 55128
- F2 Fuse, 3/10 Ampere, 250 Volt, R.C.A. Stock No. 58465

Add:

- C1 Capacitor, moulded tubular, 0.022 mfd  $\pm$  10%, 400 volts, Sprague Cat. No. 67P22394

- C2 Capacitor, oil impregnated, rectangular metal container, 0.25 mfd, 400 volts; Sprague Cat. No. PAB12
- C3 Capacitor, fixed, mica, 470 mmf  $\pm$  10%, 500 volts
- L1 Choke, fixed (on 1 megohm, 1/2 watt resistor), 93 muh (red dot); RCA Dwg. No. 940144-4, Type No. 203L4
- L2 Choke, insulated, 8.2 muh  $\pm$  10%; IRC Type CL1
- R1 Resistor, fixed, composition, 9100 ohms  $\pm$  5%, 1/2 watt
- R2 Resistor, fixed, composition, 1800 ohms  $\pm$  5%, 1/2 watt
- R3 Resistor, fixed, composition, 15,000 ohms  $\pm$  5%, 1 watt
- R4 Resistor, fixed, composition, 470,000 ohms  $\pm$  5%, 1/2 watt
- R5 and Resistor, fixed, composition, initially 100,000 ohms  $\pm$  10% (larger or smaller value may be required finally as explained in the text), 1/2 watt
- R6 Resistor, fixed, composition, initially 100,000 ohms  $\pm$  10% (larger or smaller value may be required finally as explained in the text), 1/2 watt
- R7 Resistor, fixed, composition, 390,000 ohms  $\pm$  10%, 1/2 watt

R8	Resistor, fixed, composition, 2200 ohms ± 5%, 1/2 watt	L105A)	± 10%, 1 watt
R9	Resistor, fixed, wire wound, 2500 ohms	S	Switch, push-push, d.p.d.t.; RCA Dwg. No. 8830276-2, Stock No. 93544; Oak Manufac- turing Company Type 170, Pt. 44569
R12 <sup>and</sup>	± 5%, 10 watts; Sprague Kool-ohm 10 NIT	F2	Fuse, 0.25 Ampere, R.C.A. Stock No. 73600
R10	Resistor, fixed, composition, 330 ohms	R307	Potentiometer, M-61-S, Clarostat Mfg. Co. 1 Megohm
R13 <sup>and</sup>	± 10%, 2 watts	Scale	Polarad Electronics Corp. BT-TS-8019-1
R11	Resistor, fixed, composition, 10,000 ohms ± 10%, 1/2 watt		
(for	Resistor, fixed, composition, 1 meg-ohm		