TX-1C COLORPLEXER

RADIO CORPORATION OF AMERICA
ENGINEERING PRODUCTS DIVISION CAMDEN, N. J.

IB-36252-1

TX-1C COLORPLEXER

MI-40209-B

INSTRUCTIONS

Manufactured by
RADIO CORPORATION OF AMERICA
ENGINEERING PRODUCTS DIVISION
Camden 2, New Jersey, U.S.A.

Printed in U.S.A.

IB-36252-1

FIRST AID

WARNING!

Operation of electronic equipment involves the use of high voltages which are dangerous to life. Operating personnel must at all times observe all safety regulations. Do not change tubes or make adjustments inside the equipment with voltage supply on. Under certain conditions dangerous potentials may exist in circuits with power controls in the off position due to charges retained by capacitors, etc. To avoid casualties, ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

ABOUT FIRST AID

Personnel engaged in the installation, operation and maintenance of this equipment or similar equipment are urged to become familiar with the following rules both in theory and in the practical application thereof. It is the duty of every radioman to be prepared to give adequate First Aid and thereby prevent avoidable loss of life.

FIRST DEGREE BURN

SKIN REDDENED. Temporary treatment—Apply baking soda or Unguentine.

SECOND DEGREE BURN

SKIN BLISTERED. Temporary treatment—Apply baking soda, wet compress, white petroleum jelly, foille jelly, olive oil, or tea.

THIRD DEGREE BURN

FLESH CHARRED. Temporary treatment—Apply baking soda, wet compress, white petroleum jelly, or foille spray. Treat for severe shock.

BACK PRESSURE—ARM LIFT METHOD OF ARTIFICIAL RESPIRATION

(Courtesy of the American Red Cross)

1. Position of the subject (See Fig. 1)

Place the subject in the face down, prone position. Bend his elbows and place the hands one upon the other. Turn his fact to one side, placing the cheek upon his hands.

FIGURE 1

2. Position of the operator (See Fig. 2)

Kneel on either the right or left knee at the head of the subject facing him. Place the knee at the side of the subject's head close to the forearm. Place the opposite foot near the elbow. If it is more comfortable, kneel on both knees, one on either side of the subject's head. Place your hands upon the flat of the subject's back in such a way that the heels lie just below a line running between the armpits. With the tips of the thumbs just touching, spread the fingers downward and outward.

FIGURE 2

3. Compression phase (See Fig. 3)

Rock forward until the arms are approximately vertical and allow the weight of the upper part of your body to exert slow, steady, even pressure downward upon the hands. This forces air out of the lungs. Your elbows should be kept straight and the pressure exerted almost directly downward on the back.

4. Position for expansion phase (See Fig. 4)

Release the pressure, avoiding a final thrust, and commence to rock slowly backward. Place your hands upon the subject's arms just above his elbows.

FIGURE 3

5. Expansion phase (See Fig. 5)

Draw his arms upward and toward you. Apply just enough lift to feel resistance and tension at the subject's shoulders. Do not bend your elbows, and as you rock backward the subject's arms will be drawn toward you. Then lower the arms to the ground. This completes the full cycle. The arm lift expands the chest by pulling on the chest muscles, arching the back, and relieving the weight on the chest.

THE CYCLE SHOULD BE REPEATED 12 TIMES PER MINUTE AT A STEADY, UNIFORM RATE. THE COMPRESSION AND EXPANSION PHASES SHOULD OCCUPY ABOUT EQUAL TIME; THE RELEASE PERIODS BEING OF MINIMUM DURATION.

FIGURE 4

Additional related directions:

It is all important that artificial respiration, when needed, be started quickly. There should be a slight inclination of the body in such a way that fluid drains better from the respiratory passage. The head of the subject should be extended, not flexed forward, and the chin should not sag lest obstruction of the respiratory passages occur. A check should be made to ascertain that the tongue or foreign objects are not obstructing the passages. These aspects can be cared for when placing the subject into position or shortly thereafter, between cycles. A smooth rhythm in performing artificial respiration is desirable, but split-second timing is not essential. Shock should receive adequate attention, and the subject should remain recumbent after resuscitation until seen by a physician or until recovery seem assured.

FIGURE 5

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TECHNICAL SUMMARY

ELECTRICAL SPECIFICATIONS

INPUT POWER

From A-C Line for Tube Heater:
- Line Rating ..... 105-125 volts, 90 watts
- Line Frequency ..... 50 to 60 cycles

From Regulated Power Supply:
- Plate Voltage ..... 280 volts dc
- Plate Current: TX-1C Colorplexer ..... 280 ma
  - Automatic Carrier Balance Control ..... 20 ma
  - Aperture Compensator ..... 33 ma

SIGNAL INPUTS

Monochrome from Aperture Compensator ..... 0.5 volt peak-to-peak
Red, Green, and Blue from Camera or other signal source ..... 1 or 0.71 volt
Red, Green, Blue, I_S, and Q_S from Color Bar Generator ..... 1 or 0.71 volt
Subcarrier (Bridging) ..... 2 volts peak-to-peak ±10%
Burst Flag Keying (Bridging) ..... -4 volts peak
Sync ..... -4 volts peak*
Horizontal Drive (Bridging) ..... -4 volts peak
I and Q Correction Voltages from Automatic Carrier Balance ..... Variable

SIGNAL OUTPUT

Monochrome to Aperture Compensator ..... 0.5 volt peak-to-peak
Composite Color Signal ..... 1.0 volt peak (sync to white) **

NOTE

Additional signal input and output connections are made between the Automatic Carrier Balance Control, MI-40416, and the Colorplexer chassis as shown in Figure 14. Refer to the instruction book for the Automatic Carrier Balance Control.

MECHANICAL SPECIFICATIONS

Width ..... 19 inches
Height ..... 21 inches
Depth (overall) 14-1/4 inches

* Applied to Aperture Compensator. See Text.

** 0.71 volt video and 0.29 volt sync. The IRE reticle used with the RCA Types TM-6B or TM-6C Master Monitors provide a convenient means for adjusting these levels.

TUBE COMPLEMENT

Symbol	RCA Type	Function
V1	6BX7	Video Amplifier
V2	6BC4	Video Amplifier
V3	6BK7A	Video Amplifier
V4	6BK7A	Cathode Follower
V5	6BX7	Video Amplifier
V6	6BK7A	Differential Amplifier
V7	0A2	Voltage Regulator
V8	6X4	Rectifier
V9	0A2	Voltage Regulator
V10	5726	Output Clamp
V11	6AU6	Monochrome Adder
V12	12AU7	Clamp Driver
V13	6AU6	Burst Adder
V14	6AU6	Chroma Adder
V15	12AU7	Horizontal Delay Amplifier
V16	6AU6	Sync and Monochrome Adder
V17	6AU6	I Amplifier
V18	12AU7	I Phase Splitter; Q Phase Splitter
V19	*	I Modulator
V20	*	I Modulator
V21	*	Q Modulator
V22	*	Q Modulator
V23	6AH6	I Amplifier
V24	6AU6	Q Amplifier
V25	6AU6	0^{o} Subcarrier Amplifier
V26	6AU6	90^{o} Subcarrier Amplifier
V27	6AH6	Q Amplifier
V28	*	Burst Keyer
V29	6AU6	Burst Flag Inverter
V30	6AU6	Subcarrier Output Amplifier
V31	6AU6	Subcarrier Amplifier

* Type 6AS6 (for replacement order RCA Stock No. 204603)

EQUIPMENT LIST

The RCA Type TX-1C Colorplexer equipment is listed on Equipment Schedule ES-40951 and includes the following items:

Description	RCA Reference
Colorplexer chassis (including all tubes in place)	MI-40209-B
Delay line DL-1 (MONO) approx. 29 ft. long	
Delay line DL-2 (I) approx. 27 ft. long	
Aperture Compensator	MI-40414
Automatic Carrier Balance Control	MI-40416
*Power Supply, Type 580-D	MI-21523-C

* Supplied only if specified by sales order.

RECOMMENDED TEST EQUIPMENT

The following test equipment is recommended to facilitate adjustment and maintenance of the RCA Colorplexer.

Vacuum Tube Voltmeter	RCA VoltOhmyst, Type WV-97A
Oscilloscope	RCA Type TO-524
Color Bar Generator	RCA Type WA-1D
Color Signal Analyzer	RCA Type WA-6A
Cross-Over Filter	RCA MI-34021 (Part of RCA Type WA-7D Linearity Checker)
Sweep Generator	RCA Type WA-21B
Dummy Type 5726 or 6AL5 tube (pins 3 or 4 removed)	
Diode Detector	See Figure 2

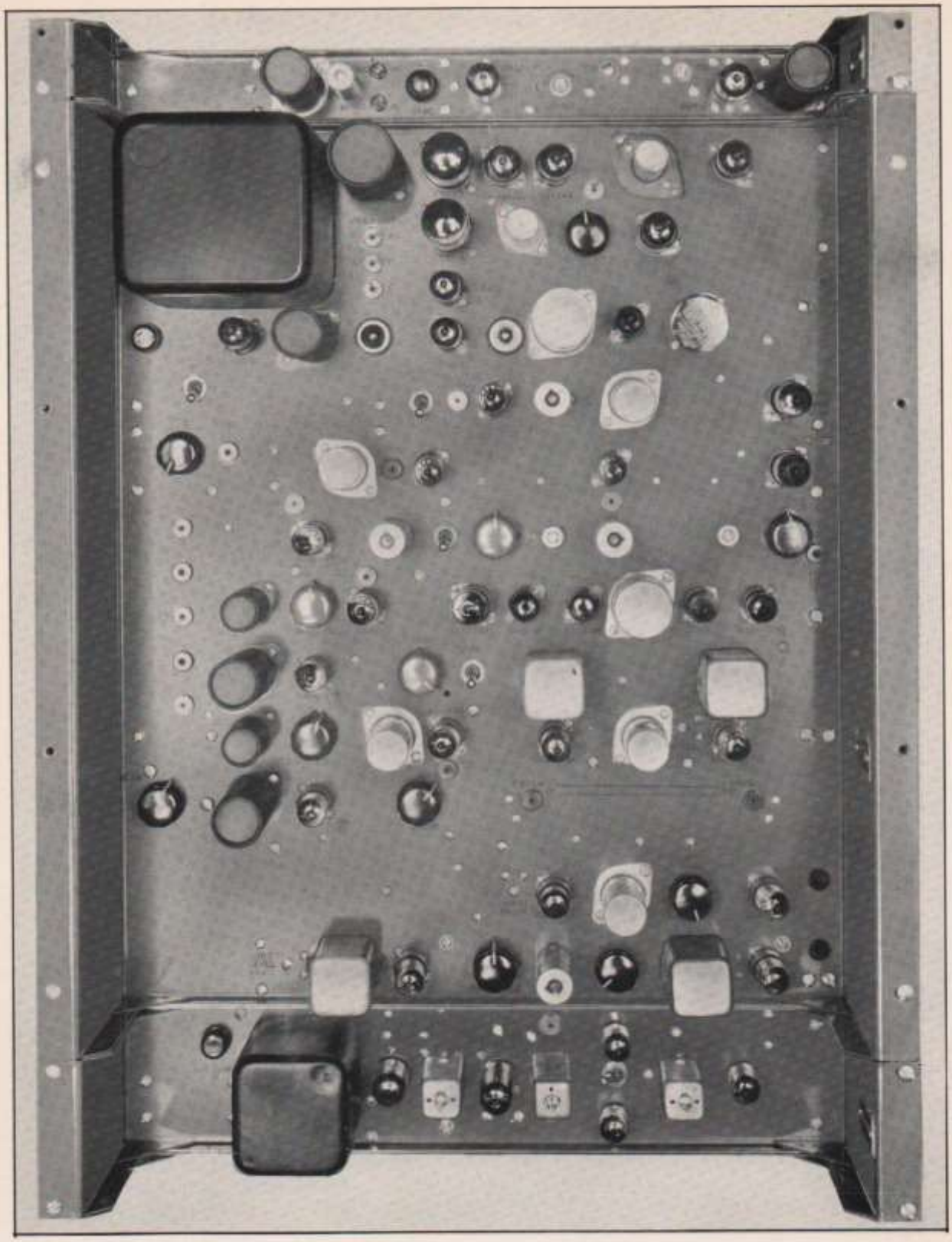


Figure 1. TX-1C Colorplexer

DESCRIPTION

GENERAL

The RCA Type TX-1C Colorplexer, MI-40209-B, is a rack-mounted unit which combines, on one chassis, the circuits required to produce a composite color television signal from the various individual signals originating in a color television signal-generating system. Its functions, as shown in the Block Diagram, Figure 8, are as follows:

1. Cross-mixing, or matrixing, red, blue, and green video signals from a color television camera chain (either live or film) or from a color bar generator, in proper proportion to produce a luminance signal (which is equivalent to a monochrome video signal) and to produce two color-difference or chrominance signals.

2. Amplitude and phase modulation of the subcarrier by the two chrominance signals.

3. Adding standard sync signals to the video and color information. (See Step 9.)

4. Inserting a color synchronizing burst of suitable amplitude and duration into the composite color television signal.

5. Filtering the chrominance signals to maintain their required bandwidth.

6. Compensation for delays in the signals introduced by band limiting of the chrominance signals.

7. Shifting phase of incoming 3.579545 megacycle subcarrier through 360° to allow matching of several Colorplexer outputs with respect to subcarrier phase.

8. Operating controls for the various functions are mounted on the front of the chassis, as are the test jacks which are connected to key points in the circuitry for observation of waveforms.

   A selector switch at the Colorplexer's input enables selection of either camera signals or color bar test signals for transmission through the unit. When the selector switch is in the BARS position, two additional inputs are included which are for special test pulses supplied by an RCA Color Bar Generator.

9. Provision has been made for adding aperture compensation in the monochrome channel of the Colorplexer. The compensator unit corrects for variations in frequency response due to the finite size of the electron scanning beam in a signal pickup device such as an image orthicon color camera, a flying spot film scanner, or a vidicon color film camera. Sync is added in this unit instead of in the Colorplexer chassis.

10. An Automatic Carrier Balance Control unit is used with the Colorplexer to balance out unwanted subcarrier components (3.579545 mc) present at the outputs of the I and Q modulators in the Colorplexer due to modulator unbalance. This eliminates the necessity of frequent manual adjustment of the I and Q carrier balance controls on the Colorplexer during operation.

CIRCUITS

During the following brief description of the functioning of the Colorplexer circuits, reference should be made to the Schematic Diagram, Figure 15 and the Interconnection Diagram, Figure 14.

The 3.579545 megacycle subcarrier signal from the Frequency Standard is applied through jack J7 to the control grid (pin 1) of the subcarrier amplifier, V31. The signal then passes through a phase adjusting network and an output amplifier, V30, to a phase shifting network that provides subcarrier signals of the correct phase for the 0^{o} and 90^{o} amplifier tubes and the burst keyer tube, V25, V26, and V28 respectively.

A keying signal from the Burst Flag Generator is applied through jack J44 and the burst flag inverter tube, V29, to the suppressor grid (pin 7) of the burst keyer tube, V28. The subcarrier burst from the plate (pin 5) of V28 is then fed to the burst adder tube, V13.

Blue, red, and green signals from the color camera, or other sources, are fed into jacks J1, J3, and J5 respectively. These color signals are applied through the matrix network, R4, R5, and R6, to the control grid (pin 1) of V16 to form the monochrome signal. This monochrome signal then passes from jack J39 on the Colorplexer through a short (14 inch) length of RG-59/U cable to a differential amplifier tube, V1, in the Aperture Compensator. The differential amplifier drives an open ended transmission line which is connected to the grid of the output amplifier tube, V2.

Sync signals are fed through jack J1 and a gain control on the Aperture Compensator to the grid (pin 9) of the triode section of V2. The combined sync and monochrome signals at J4 then pass through a delay line, DL-1 to jack J40 on the Colorplexer and thence to the monochrome adder tube, V11.

The I signal is developed in amplifier stage V23 which has a red signal applied to its control grid (pin 1) and blue and green signals to the cathode (pin 2). Similarly, the Q signal is obtained by applying a green signal to the control grid (pin 1) of amplifier V27, and red and blue signals to its cathode.

Output from the plate (pin 5) of I amplifier V23 passes through a delay line, DL-2, amplifier V17, a band limiting filter, and phase splitter V18A, to the I modulator tubes, V19 and V20.

The signal from the plate (pin 5) of the Q amplifier, V27, passes through a band limiting filter, amplifier V24, and phase splitter V18B, to the Q modulator tubes, V21 and V22.

The plates of the I and Q modulator tubes are connected in parallel to the control grid (pin 1) of the chroma adder tube V14. The plate of this tube is connected in parallel with that of the monochrome adder tube, V11, and the burst adder tube, V13. Output from these three tubes is combined to form the composite color signal which is applied to the control grid (pin 2) of amplifier V6.

Horizontal drive is applied through J9, delay amplifier V15, and the delay keyer tube, V12B, to the output clamp tube V10. Output from this tube clamps the composite color signal at the required level in V6. The composite signal then passes through the output amplifier stages, V4A, V3, V2, V1, and V5, to the three output jacks, J31, J32, and J36. The output amplifier is of the feedback type, providing three 75 ohm outputs which are isolated from each other.

An external 280-volt power supply is required to provide plate voltage for the Colorplexer. This voltage is dropped to +150 volts and regulated by V9 for certain circuits. Additionally, a -150 volt regulated bias supply using tubes V7 and V8 is included in the Colorplexer circuits.

INSTALLATION

Mount the TX-1C Colorplexer in a standard 19 inch equipment rack with the Aperture Compensator unit directly above, and the Automatic Carrier Balance Control unit directly below the Colorplexer chassis. See Figure 14. Refer to the respective instruction books for installation details and power connections for the Aperture Compensator and the Automatic Carrier Balance Control units.

LINE VOLTAGE SETTING

Using an accurate voltmeter, measure the voltage of the a-c line to which the Colorplexer will be connected. Adjust the input taps on the power transformer, T6, by connecting the tap lead to the proper primary terminal, either 2, 3, or 4 for line voltages of 109, 117, or 125 respectively.

AUTOMATIC CARRIER BALANCE CONTROL CONNECTIONS

After the Automatic Carrier Balance Control unit has been installed beneath the TX-1C Colorplexer as described previously, these two units must be interconnected. Note that a color-coded four wire cable and two coaxial cables extend upward from the Automatic Carrier Balance Control chassis. These cables must be connected to the Colorplexer in accordance with the following procedure. Refer also to Figure 14, and the Schematic Diagram, Figure 15.

1. Connect the center conductor of the shorter coaxial cable to terminal D of transformer T2. (Identified as point B on the Colorplexer Schematic Diagram.) Ground the cable shield to the chassis ground lug on the mounting screw for capacitor C58.

   Using the cable clamp and mounting post located just below the Q PHASE adjusting capacitor, C67, secure the cable in position.

2. Connect the center conductor of the longer coaxial cable to pin 1 of coil L12. (Point A on the Schematic Diagram.) Ground the cable shield to the ground lug adjacent to tube socket XV12.

   Secure the cable by using one clamp on the post just above the Q GAIN control, R83, and a second clamp on the post just above the I ON-OFF switch, S3.

3. Note the color coding on the four wire cable connected to switch S1 on the Automatic Carrier Balance Control chassis. Connect the wire from the lower left hand terminal of S1 to the center terminal of the Q CARRIER BALANCE control, R176, on the Colorplexer. (Point D on the Schematic Diagram.)

4. Connect the wire from the upper left hand terminal of switch S1 to the center terminal of the I CARRIER BALANCE control, R170, on the Colorplexer. (Point F.)

5. Connect the wire from the lower center terminal of switch S1 to the right hand terminal of the strip on which resistor R189 is mounted. (Point C.) This terminal strip is located just above the bracket on which the Q VID BAL 2 control is mounted.

6. Connect the wire from the upper center terminal of switch S1 to the upper terminal of the strip on which resistor R187 is mounted. (Point E.) This terminal strip is located above and slightly to the right of the I CARRIER BALANCE control, R170.

7. Clamp this cable in place using the clamp mounted on the post attached to coil L10.

POWER CONNECTIONS

Connect the a-c line to terminals 7 and 8 of connector plug P14 on the Colorplexer. Connect the positive side of a well-regulated source of 280 volts dc, such as the RCA Type WP-15 power supply, to terminal 10 of P14. Connect the negative side to terminal 12. The power supply must be capable of supplying 280 ma for the Colorplexer, and 55 ma for the Aperture Compensator and Automatic Carrier Balance Control units. Power connections for the latter two units are described in their respective instruction books.

SIGNAL CONNECTIONS

Two long lengths of coaxial cable with connectors mounted at each end are supplied as part of the equipment (MI-40209-B items 2 and 3). These cables are tagged "MONO" and "I" respectively and are used as delay lines in conjunction with the Aperture Compensator. Connect these cables between the Aperture Compensator and the Colorplexer as shown in Figure 14. Excess cable may be coiled for convenience and hung at the top of the rack. Additionally, connect the 14 inch cable (MI-40414 item 2) which is supplied with the Aperture Compensator as shown in Figure 14.

Connect horizontal drive signals from the station's pulse distribution system to the HORIZ. DRIVE jack, J9, on the Colorplexer. Connect the bridging HORIZ. DRIVE jack, J24, on the Colorplexer to the HOR. DRIVE jack, J1, on the Automatic Carrier Balance Control. The bridging HOR. DRIVE jack, J2, may either be terminated with a 75 ohm coaxial termination, or bridged to other equipment which then must be properly terminated.

Connect sync signals to the SYNC IN jack, J1, on the Aperture Compensator. Note that with this system, the sync and monochrome signals are combined in the Aperture Compensator and, therefore, the SYNC IN jack, J10, and the SYNC GAIN control, R2, are not used. The bridging jack, J2, may be terminated in 75 ohms or bridged to other equipment.

Connect the subcarrier output from the RCA Color Frequency Standard to the SUBCARRIER INPUT jack, J7, on the Colorplexer.

Connect the KEYING PULSE OUTPUT jack on the RCA Burst Flag Generator to the BURST FLAG INPUT jack, J44.

Bridging jacks J8 and J45, which are connected in parallel with jacks J7 and J44 respectively, may either be terminated in 75 ohms or bridged to other equipment with correct termination.

Facing the chassis from the rear, there is a panel at the right, on which are mounted eight jacks in two vertical rows. Connect the left row of five jacks to the proper output jacks of the RCA Color Bar Generator. From top to bottom respectively they are BLUE, SPECIAL I, RED, SPECIAL Q, and GREEN. The right hand row of three jacks (from top to bottom respectively) are for blue, red, and green video signals from the color camera chain and slide scanner, if used. Where these jacks are to be connected will depend upon the manner in which the individual station's equipment is arranged and the type of video switching used.

Three output jacks, J31, J32, and J36, where the complete composite color television signal appears, will enable flexibility in output connections. Individual station requirements will dictate how the jacks are to be used, such as for video line, monitoring distribution to viewing rooms, or similar applications. Terminate all unused output jacks in 75 ohms.

ADJUSTMENTS

INITIAL ADJUSTMENTS

Check the electrical connections and set all control switches to OFF. Operate the POWER ON-OFF switch, S6, to ON and turn on the external 280 volt-power supply. Allow several minutes for the equipment to reach normal operating temperature, then check for the correct amplitude of all input signals as follows:

1. Rotate the CAM-BARS switch, S8, to BARS. Set the PATTERN SWITCH on the Color Bar Generator to Position 3. Using the oscilloscope listed under "Recommended Test Equipment", measure the amplitude of the signals between each of the five test jacks provided for this purpose and ground. These jacks are located on the front of the Colorplexer, mounted in a vertical row near the left edge, and are labeled from top to bottom, B IN, I_S IN, R IN, Q_S IN, G IN. The amplitude of the signal at each test jack should be one volt.

2. Check for a -4 volt peak signal at the HOR DR IN test jack, J25.

3. Check for a -4 volt peak signal at the BURST FLAG IN test jack, J46, at the extreme lower right of the chassis.

4. Check for a subcarrier amplitude of two volts peak-to-peak ±10%, using a low capacity probe, at test jack J19. IT IS IMPORTANT THAT THE SUBCARRIER AMPLITUDE BE WITHIN THE ±10% TOLERANCE.

5. Check for a -4 volt signal at the SYNC IN test jack, J6, on the Aperture Compensator.

PHASE SHIFTER SECTION ADJUSTMENTS

1. Using a low capacity probe, connect the vertical input of the oscilloscope between pin 1 of V30 and ground. Set the oscilloscope's horizontal deflection for an internally triggered sawtooth sweep.

2. Set the ROUGH PHASE control, S7, to the 0^o position. Adjust C46 (on transformer T1) for maximum amplitude of the signal on the oscilloscope.

3. Connect the oscilloscope through the low-capacity probe to J23 on the front of the chassis (marked 3.579-0^o). Adjust the SUB C LEVEL ADJ capacitor, C126, to obtain maximum amplitude of the subcarrier signal being displayed by the oscilloscope.

4. Adjust the core of L3 so that the rotation of the FINE PHASE control, R14, throughout its range results in a decrease of no more than 5% in the amplitude of the signal on the oscilloscope. The subcarrier amplitude should remain constant when each position of the ROUGH PHASE control, S7, is checked.

5. Using a low capacity probe, readjust the SUB C LEVEL ADJ to set the amplitude of the subcarrier signal at two volts ±10%, peak-to-peak. IT IS IMPORTANT TO MAINTAIN THE 10% TOLERANCE.

This completes adjustment of the 360^o phase shifter section. For the steps which follow, trigger the oscilloscope's horizontal deflection with horizontal driving signals. These signals may be conveniently obtained by connecting a wire between the oscilloscope's trigger input and the HOR DR IN test jack, J25, on the front of the Colorplexer near the right edge.

COLORPLEXER ADJUSTMENTS

Two methods of adjustment are described in the following text. The first does not make use of the special I and Q test pulses generated by the RCA Color Bar Generator. The second method does.

Both of these adjustment methods are based on the use of an RCA Color Signal Analyzer which will provide an adjustment accuracy within ± one degree.

If a Color Signal Analyzer is not available, an alternative adjustment procedure may be used as described in the "Maintenance" section under "Colorplexer Phase Adjustments Without a Color Signal Analyzer". This technique will enable quadrature phase adjustment within ±2 degrees, and burst phase adjustment within ±5 degrees.

Method I

Connect one of the Colorplexer Output jacks (J31, J32 or J36) through a coaxial line to the VIDEO INPUT jack on an RCA Color Signal Analyzer. Make certain the remaining two Colorplexer OUTPUT jacks are terminated with 75 ohms each or bridged to other equipment. Connect an oscilloscope to the SCOPE jack on the Color Signal Analyzer and set the VIDEO OUTPUT switch to DIRECT. Set the PATTERN SWITCH on the RCA Color Bar Generator to Position 1. After the preceding connections and adjustments have been completed, proceed as follows:

1. Set the MONO ON-OFF, S5; I ON-OFF, S3; and Q ON-OFF, S4, switches on the Colorplexer to their OFF position. Set the IN-OUT switch, S1, on the Automatic Carrier Balance control to the OUT position. Turn the SYNC GAIN control, R1, on the Aperture Compensator to its extreme counterclockwise position. Set the VIDEO GAIN control, R196, on the Colorplexer to its mid-position.

2. While observing the oscilloscope pattern, adjust the I CARRIER BALANCE, R170, and Q CARRIER BALANCE, R176, controls which are located approximately along the horizontal center line of the chassis, to the positions at which any signals appearing on the base line of the oscilloscope are cancelled. A smooth, clean base line indicates carrier balance.

3. Set the I ON-OFF switch to the ON position. Rotate the I GAIN control, R39, located in the lower left center portion of the chassis, to approximately two-thirds of its extreme clockwise position.

4. Rotate the I PHASE control, C61, to the position at which maximum amplitude of the oscilloscope pattern is obtained. The I PHASE control (C61) is a trimmer adjustment and is located on transformer T4 at the rear of the chassis.

5. Set the VIDEO OUTPUT switch on the Color Signal Analyzer to the LP position; an external RCA cross-over filter may be used to replace the internal Color Signal Analyzer Low Pass Filter (LP). While observing the oscilloscope pattern, carefully adjust the I VID BAL-1 control, R51, and the I VID BAL 2 control, R53, to the positions at which complete cancellation of the video signal is possible. The I VID BAL-1 control is a screwdriver adjustment located in the approximate center of the front of the chassis; the I VID BAL-2 control is a similar control located in the approximate center of the rear of the chassis.

6. Place the VIDEO OUTPUT switch on the Color Signal Analyzer in its DIRECT position. Recheck the setting of the I CARRIER BALANCE control, R170, to obtain optimum cancellation of the carrier signal.

   Repeat steps 5 and 6 alternately until there is a complete cancellation of the video and carrier signals.

7. Place the I ON-OFF switch in the OFF position and the VIDEO OUTPUT switch on the Color Signal Analyzer in the DIRECT position.

8. Place the Q ON-OFF switch in the ON position. Set the Q GAIN control, R83, to approximately two thirds of its extreme clockwise position. The Q GAIN control is located in the lower left-central portion of the front of the chassis.

9. Adjust the Q PHASE control, C67, to the position at which maximum amplitude is obtained on the oscilloscope pattern. The Q PHASE control (C67) is a trimmer adjustment located in the lower right hand portion of the front of the chassis.

10. Place the VIDEO OUTPUT switch on the Color Signal Analyzer in the LP position; an RCA cross-over filter may be used to replace the internal Color Signal Analyzer Low Pass Filter. While observing the oscilloscope pattern, carefully adjust the Q VID BAL-1 control, R96, and the Q VID BAL-2 control, R100, to the position at which complete cancellation of the video signal is possible. The Q VID BAL-1 and -2 controls will be found along the same horizontal line as the I VID BAL-1 and -2 controls which were located physically in step 5.

11. Place the VIDEO OUTPUT switch on the Color Signal Analyzer in its DIRECT position. Recheck the setting of the Q CARRIER BALANCE control, R176, for optimum cancellation of the carrier signal.

    Repeat steps 10 and 11 alternately until there is complete cancellation of the video and carrier signals.

12. Place the IN-OUT switch on the Automatic Carrier Balance Control in the IN position.

13. Rotate the Q WHITE BAL control, R68, to the position at which the first (white) bar in the oscilloscope pattern is cancelled out. The Q WHITE BAL control is the blue knob located in the lower left-central portion of the chassis.

14. Place the Q ON-OFF control in the OFF position and the I ON-OFF control in the ON position.

15. Rotate the I WHITE BAL control, R25, to the position at which the first (white) bar in the oscilloscope pattern is cancelled out. The I WHITE BAL control is the red knob located in the left-central portion of the chassis.

16. Place the MONO ON-OFF switch in the ON position and observe the monochrome signal now present in the pattern on the oscilloscope screen. Rotate the VIDEO GAIN control, R196, to the position at which the amplitude of the first (white) bar of the composite signal is 0.7 volt, peak-to-peak, on the oscilloscope screen. The VIDEO GAIN control is located in the upper right portion of the chassis.

17. Rotate the SYNC GAIN control, R1, on the Aperture Compensator to the position at which the amplitude of the sync signal is equal to 0.286 volt, peak-to-peak, on the oscilloscope screen.

18. Place the MONO ON-OFF switch in the OFF position.

19. Rotate the I GAIN control, R39, to the position at which the peak-to-peak amplitude of the red and cyan bars (the two bars with the highest amplitude) is equal to 0.85 volt on the oscilloscope screen.

20. Place the I ON-OFF switch in the OFF position and the Q ON-OFF switch in the ON position.

COLORPLEXER ADJUSTMENTS

Two methods of adjustment are described in the following text. The first does not make use of the special I and Q test pulses generated by the RCA Color Bar Generator. The second method does.

Both of these adjustment methods are based on the use of an RCA Color Signal Analyzer which will provide an adjustment accuracy within ± one degree.

If a Color Signal Analyzer is not available, an alternative adjustment procedure may be used as described in the "Maintenance" section under "Colorplexer Phase Adjustments Without a Color Signal Analyzer". This technique will enable quadrature phase adjustment within ±2 degrees, and burst phase adjustment within ±5 degrees.

Method I

Connect one of the Colorplexer Output jacks (J31, J32 or J36) through a coaxial line to the VIDEO INPUT jack on an RCA Color Signal Analyzer. Make certain the remaining two Colorplexer OUTPUT jacks are terminated with 75 ohms each or bridged to other equipment. Connect an oscilloscope to the SCOPE jack on the Color Signal Analyzer and set the VIDEO OUTPUT switch to DIRECT. Set the PATTERN SWITCH on the RCA Color Bar Generator to Position 1. After the preceding connections and adjustments have been completed, proceed as follows:

1. Set the MONO ON-OFF, S5; I ON-OFF, S3; and Q ON-OFF, S4, switches on the Colorplexer to their OFF position. Set the IN-OUT switch, S1, on the Automatic Carrier Balance control to the OUT position. Turn the SYNC GAIN control, R1, on the Aperture Compensator to its extreme counterclockwise position. Set the VIDEO GAIN control, R196, on the Colorplexer to its mid-position.

2. While observing the oscilloscope pattern, adjust the I CARRIER BALANCE, R170, and Q CARRIER BALANCE, R176, controls which are located approximately along the horizontal center line of the chassis, to the positions at which any signals appearing on the base line of the oscilloscope are cancelled. A smooth, clean base line indicates carrier balance.

3. Set the I ON-OFF switch to the ON position. Rotate the I GAIN control, R39, located in the lower left center portion of the chassis, to approximately two-thirds of its extreme clockwise position.

4. Rotate the I PHASE control, C61, to the position at which maximum amplitude of the oscilloscope pattern is obtained. The I PHASE control (C61) is a trimmer adjustment and is located on transformer T4 at the rear of the chassis.

5. Set the VIDEO OUTPUT switch on the Color Signal Analyzer to the LP position; an external RCA cross-over filter may be used to replace the internal Color Signal Analyzer Low Pass Filter (LP). While observing the oscilloscope pattern, carefully adjust the I VID BAL-1 control, R51, and the I VID BAL 2 control, R53, to the positions at which complete cancellation of the video signal is possible. The I VID BAL-1 control is a screwdriver adjustment located in the approximate center of the front of the chassis; the I VID BAL-2 control is a similar control located in the approximate center of the rear of the chassis.

6. Place the VIDEO OUTPUT switch on the Color Signal Analyzer in its DIRECT position. Recheck the setting of the I CARRIER BALANCE control, R170, to obtain optimum cancellation of the carrier signal.

   Repeat steps 5 and 6 alternately until there is a complete cancellation of the video and carrier signals.

7. Place the I ON-OFF switch in the OFF position and the VIDEO OUTPUT switch on the Color Signal Analyzer in the DIRECT position.

8. Place the Q ON-OFF switch in the ON position. Set the Q GAIN control, R83, to approximately two thirds of its extreme clockwise position. The Q GAIN control is located in the lower left-central portion of the front of the chassis.

9. Adjust the Q PHASE control, C67, to the position at which maximum amplitude is obtained on the oscilloscope pattern. The Q PHASE control (C67) is a trimmer adjustment located in the lower right hand portion of the front of the chassis.

10. Place the VIDEO OUTPUT switch on the Color Signal Analyzer in the LP position; an RCA cross-over filter may be used to replace the internal Color Signal Analyzer Low Pass Filter. While observing the oscilloscope pattern, carefully adjust the Q VID BAL-1 control, R96, and the Q VID BAL-2 control, R100, to the position at which complete cancellation of the video signal is possible. The Q VID BAL-1 and -2 controls will be found along the same horizontal line as the I VID BAL-1 and -2 controls which were located physically in step 5.

11. Place the VIDEO OUTPUT switch on the Color Signal Analyzer in its DIRECT position. Recheck the setting of the Q CARRIER BALANCE control, R176, for optimum cancellation of the carrier signal.

    Repeat steps 10 and 11 alternately until there is complete cancellation of the video and carrier signals.

12. Place the IN-OUT switch on the Automatic Carrier Balance Control in the IN position.

13. Rotate the Q WHITE BAL control, R68, to the position at which the first (white) bar in the oscilloscope pattern is cancelled out. The Q WHITE BAL control is the blue knob located in the lower left-central portion of the chassis.

14. Place the Q ON-OFF control in the OFF position and the I ON-OFF control in the ON position.

15. Rotate the I WHITE BAL control, R25, to the position at which the first (white) bar in the oscilloscope pattern is cancelled out. The I WHITE BAL control is the red knob located in the left-central portion of the chassis.

16. Place the MONO ON-OFF switch in the ON position and observe the monochrome signal now present in the pattern on the oscilloscope screen. Rotate the VIDEO GAIN control, R196, to the position at which the amplitude of the first (white) bar of the composite signal is 0.7 volt, peak-to-peak, on the oscilloscope screen. The VIDEO GAIN control is located in the upper right portion of the chassis.

17. Rotate the SYNC GAIN control, R1, on the Aperture Compensator to the position at which the amplitude of the sync signal is equal to 0.286 volt, peak-to-peak, on the oscilloscope screen.

18. Place the MONO ON-OFF switch in the OFF position.

19. Rotate the I GAIN control, R39, to the position at which the peak-to-peak amplitude of the red and cyan bars (the two bars with the highest amplitude) is equal to 0.85 volt on the oscilloscope screen.

20. Place the I ON-OFF switch in the OFF position and the Q ON-OFF switch in the ON position.

21. Rotate the Q GAIN control, R83, to the position at which the peak-to-peak amplitude of the green and purple bars (the two bars with the highest amplitude) is equal to 0.746 volt on the oscilloscope screen.

22. Rotate the BURST GAIN control, R134, to the position at which the peak-to-peak amplitude of the burst signal is equal to 0.286 volt on the oscilloscope screen.

23. Place the Q ON-OFF switch in the OFF position and the I ON-OFF switch in the ON position. Set the Color Signal Analyzer switch to the DEMOD position.

24. Add 90 degrees, in increments of 57 degrees and 33 degrees, from the calibrated phase shifter of the Color Signal Analyzer. Adjust the SUBCARRIER PHASE DELAY controls on the Color Signal Analyzer for base line cancellation of all signals on the oscilloscope except the burst signal.

25. Remove 57 degrees of calibrated delay. Adjust BURST PHASE, C75, for cancellation of only the burst signal on the base line.

26. Remove 33 degrees of calibrated delay. Turn the I ON-OFF switch to OFF, and the Q ON-OFF switch to ON. Adjust Q PHASE, C67, for cancellation of all signals on the base line except the burst signal.

27. Switch the VIDEO OUTPUT control on the Color Signal Analyzer to DIRECT. Recheck the settings of the video output and gain controls in accordance with Steps 3, 17, and 18. Be sure that only one switch is ON at a time; MONO ON for adjustment of the VIDEO GAIN control, I ON for I GAIN, and Q ON for Q GAIN.

28. Turn all three switches, I, Q, and MONO (S3, S4, and S5) to ON and a composite color signal should appear on the oscilloscope. Turn the CAM-BARS switch to CAM and the Colorplexer is ready for use.

Method II

Connect one of the Colorplexer OUTPUT jacks (J31, J32 or J36) through a coaxial line to the VIDEO INPUT jack on an RCA Color Signal Analyzer. Make certain the remaining two Colorplexer OUTPUT jacks are terminated with 75 ohms each or bridged to other equipment. Connect an oscilloscope to the SCOPE jack on the Color Signal Analyzer and set the VIDEO OUTPUT switch to DIRECT. Set the PATTERN SWITCH on the RCA Color Bar Generator to Position 3. Check all input signals as described under "Initial Adjustments". After the preceding connections and adjustments have been completed, proceed as follows:

Perform steps one to twenty-two inclusive of Method I.

23. Place the I ON-OFF switch in the ON position and leave the Q ON-OFF switch in the ON position. Set the Color Signal Analyzer switch to the DEMOD position.

24. Add 90 degrees of calibrated delay in increments of 57 degrees and 33 degrees.

25. Adjust the uncalibrated phase shifter for cancellation, on the base line, of the I_S portion of the demodulated signal.

26. Remove the 57-degree step of calibrated delay. Adjust the BURST PHASE capacitor, C75, for cancellation of only the burst signal on the oscilloscope's base line.

27. Remove the 33-degree step of calibrated delay. Adjust the Q PHASE capacitor, C67, for cancellation, on the base line, of the Q_S portion of the demodulated signal.

28. Set the VIDEO OUTPUT switch of the Color Signal Analyzer to DIRECT. Recheck the settings of the VIDEO GAIN, Q GAIN, and I GAIN controls as described in Steps 3, 17, and 18. This should be done with only the appropriate switch ON for each control.

29. Turn ON all three switches I, Q, and MONO (S3, S4, and S5) and a composite color signal would be presented by the oscilloscope.

30. Disconnect and remove the Color Signal Analyzer. The disconnected leads should be terminated or connected to appropriate circuits.

31. Turn the CAM-BARS switch to CAM. The Colorplexer is now ready for operation.

OPERATION

GENERAL

It is recommended that, at the beginning of each operating day, the settings of the various controls of the RCA Colorplexer be checked. Once operating personnel have become familiar with the equipment, such checking is a relatively simple matter. Using the methods of oscilloscope observation outlined under INITIAL ADJUSTMENTS, turning the I, Q, and MONO toggle switches ON, one at a time, will disclose immediately whether the various GAIN and BALANCE controls require adjustment.

Figures 5D and 9 show the complete signal from the Color Bar Generator after colorplexing, together with a chart of the amplitudes of the various portions of the signal.

Because of aging of the tubes, a time may come when carrier balancing will not be possible by adjustment of the balancing controls with the Automatic Carrier Balance Control unit switched out. Proper modulator performance requires two tubes in each stage whose mutual conductances are as nearly alike as possible. It may be necessary to exchange tubes within the unit or to try other tubes until this condition is satisfied.

PHASE SHIFTER SECTION

Operating adjustments to the 360^{o} phase shifter section are required only when two or more Colorplexers are to be phased together. In this case, select one Colorplexer as a standard and adjust the phasing of the other(s) to match it in the following manner:

1. Connect the RCA Color Signal Analyzer to a point where a common line is carrying signals from all Colorplexers; at the master control position, for example. Connect the oscilloscope, triggered by horizontal driving pulses, to the Color Signal Analyzer.

2. On the Colorplexer selected as a standard, set the ROUGH PHASE control, S7, to 0^{o} position; rotate the FINE PHASE control, R114, fully counterclockwise. Make no further adjustments to these controls on this Colorplexer.

3. Switch in the Colorplexer chosen as a standard; its output will be displayed on the oscilloscope. Adjust the Color Signal Analyzer's uncalibrated phase shifter until the color burst signal is cancelled on the base line of the oscilloscope.

21. Rotate the Q GAIN control, R83, to the position at which the peak-to-peak amplitude of the green and purple bars (the two bars with the highest amplitude) is equal to 0.746 volt on the oscilloscope screen.

22. Rotate the BURST GAIN control, R134, to the position at which the peak-to-peak amplitude of the burst signal is equal to 0.286 volt on the oscilloscope screen.

23. Place the Q ON-OFF switch in the OFF position and the I ON-OFF switch in the ON position. Set the Color Signal Analyzer switch to the DEMOD position.

24. Add 90 degrees, in increments of 57 degrees and 33 degrees, from the calibrated phase shifter of the Color Signal Analyzer. Adjust the SUBCARRIER PHASE DELAY controls on the Color Signal Analyzer for base line cancellation of all signals on the oscilloscope except the burst signal.

25. Remove 57 degrees of calibrated delay. Adjust BURST PHASE, C75, for cancellation of only the burst signal on the base line.

26. Remove 33 degrees of calibrated delay. Turn the I ON-OFF switch to OFF, and the Q ON-OFF switch to ON. Adjust Q PHASE, C67, for cancellation of all signals on the base line except the burst signal.

27. Switch the VIDEO OUTPUT control on the Color Signal Analyzer to DIRECT. Recheck the settings of the video output and gain controls in accordance with Steps 3, 17, and 18. Be sure that only one switch is ON at a time; MONO ON for adjustment of the VIDEO GAIN control, I ON for I GAIN, and Q ON for Q GAIN.

28. Turn all three switches, I, Q, and MONO (S3, S4, and S5) to ON and a composite color signal should appear on the oscilloscope. Turn the CAM-BARS switch to CAM and the Colorplexer is ready for use.

Method II

Connect one of the Colorplexer OUTPUT jacks (J31, J32 or J36) through a coaxial line to the VIDEO INPUT jack on an RCA Color Signal Analyzer. Make certain the remaining two Colorplexer OUTPUT jacks are terminated with 75 ohms each or bridged to other equipment. Connect an oscilloscope to the SCOPE jack on the Color Signal Analyzer and set the VIDEO OUTPUT switch to DIRECT. Set the PATTERN SWITCH on the RCA Color Bar Generator to Position 3. Check all input signals as described under "Initial Adjustments". After the preceding connections and adjustments have been completed, proceed as follows:

Perform steps one to twenty-two inclusive of Method I.

23. Place the I ON-OFF switch in the ON position and leave the Q ON-OFF switch in the ON position. Set the Color Signal Analyzer switch to the DEMOD position.

24. Add 90 degrees of calibrated delay in increments of 57 degrees and 33 degrees.

25. Adjust the uncalibrated phase shifter for cancellation, on the base line, of the I_S portion of the demodulated signal.

26. Remove the 57-degree step of calibrated delay. Adjust the BURST PHASE capacitor, C75, for cancellation of only the burst signal on the oscilloscope's base line.

27. Remove the 33-degree step of calibrated delay. Adjust the Q PHASE capacitor, C67, for cancellation, on the base line, of the Q_S portion of the demodulated signal.

28. Set the VIDEO OUTPUT switch of the Color Signal Analyzer to DIRECT. Recheck the settings of the VIDEO GAIN, Q GAIN, and I GAIN controls as described in Steps 3, 17, and 18. This should be done with only the appropriate switch ON for each control.

29. Turn ON all three switches I, Q, and MONO (S3, S4, and S5) and a composite color signal would be presented by the oscilloscope.

30. Disconnect and remove the Color Signal Analyzer. The disconnected leads should be terminated or connected to appropriate circuits.

31. Turn the CAM-BARS switch to CAM. The Colorplexer is now ready for operation.

OPERATION

GENERAL

It is recommended that, at the beginning of each operating day, the settings of the various controls of the RCA Colorplexer be checked. Once operating personnel have become familiar with the equipment, such checking is a relatively simple matter. Using the methods of oscilloscope observation outlined under INITIAL ADJUSTMENTS, turning the I, Q, and MONO toggle switches ON, one at a time, will disclose immediately whether the various GAIN and BALANCE controls require adjustment.

Figures 5D and 9 show the complete signal from the Color Bar Generator after colorplexing, together with a chart of the amplitudes of the various portions of the signal.

Because of aging of the tubes, a time may come when carrier balancing will not be possible by adjustment of the balancing controls with the Automatic Carrier Balance Control unit switched out. Proper modulator performance requires two tubes in each stage whose mutual conductances are as nearly alike as possible. It may be necessary to exchange tubes within the unit or to try other tubes until this condition is satisfied.

PHASE SHIFTER SECTION

Operating adjustments to the 360^{o} phase shifter section are required only when two or more Colorplexers are to be phased together. In this case, select one Colorplexer as a standard and adjust the phasing of the other(s) to match it in the following manner:

1. Connect the RCA Color Signal Analyzer to a point where a common line is carrying signals from all Colorplexers; at the master control position, for example. Connect the oscilloscope, triggered by horizontal driving pulses, to the Color Signal Analyzer.

2. On the Colorplexer selected as a standard, set the ROUGH PHASE control, S7, to 0^{o} position; rotate the FINE PHASE control, R114, fully counterclockwise. Make no further adjustments to these controls on this Colorplexer.

3. Switch in the Colorplexer chosen as a standard; its output will be displayed on the oscilloscope. Adjust the Color Signal Analyzer's uncalibrated phase shifter until the color burst signal is cancelled on the base line of the oscilloscope.

4. Switch to the output of the second Colorplexer. Adjust its **ROUGH PHASE** and **FINE PHASE** controls for cancellation of the color burst signal on the base line of the oscilloscope.

5. Although the outputs of the two Colorplexers are now apparently in phase, it is possible that a 180° phase difference exists. To check for this condition, switch in the standard Colorplexer. Rotate the Color Signal Analyzer's uncalibrated phase shifter to uncancel slightly the burst signal previously cancelled, noting the direction of rotation required. Cancel the burst signal again with the uncalibrated phase shifter.

6. Switch in the second Colorplexer; rotate the uncalibrated phase shifter for a slight uncancellation of the burst signal now appearing on the oscilloscope, again noting the direction of rotation required to obtain the same direction of unbalance. If the direction is the same as that used in uncancelling the standard Colorplexers' burst, the two are in phase; if it is opposite, the second is 180° out of phase. For the latter condition, perform the phasing procedure again, setting the **ROUGH PHASE** control on the second Colorplexer to a point 180° from its former position; readjust the **FINE PHASE** control, if necessary, for complete cancellation of the color burst signal.

7. Where more than two Colorplexers are used, phase the remainder in the same manner, adjusting their **ROUGH PHASE** and **FINE PHASE** controls to match the standard, then checking for a 180° ambiguity. If adjustment of the relative phase of the burst, I, and Q signals is required and a Color Signal Analyzer is not available, refer to the "Maintenance" section of this book for an alternative procedure.

MAINTENANCE

GENERAL

During routine maintenance periods, dust the equipment and inspect all components for discoloration caused by overheating. Inspect all cable connectors for cleanliness and tightness. Check the tubes in a mutual conductance tube checker, replacing those which are below normal or are otherwise defective. Anticipate tube failure by keeping a log of all tube readings, comparing them with previous readings each time they are checked. Be sure to replace each tube in the same socket since a complete readjustment may be necessary if tubes become interchanged. Whenever a tube is replaced, check the entire operation of the unit as described under "Initial Adjustments" and "Colorplexer Adjustments".

In cases of abnormal operation, check for the presence and correct amplitude of all input signals as described in "Initial Adjustments". Be sure all adjustments have been made correctly; misadjustment is the most frequent source of trouble.

Use of the Schematic Diagram, Figure 15, the Typical Operating Voltages Chart and the charts of Typical Waveforms and Operating Voltages, Figure 3, 4, 5, and 6, will assist in the location of defective components.

COLORPLEXER PHASE ADJUSTMENTS WITHOUT A COLOR SIGNAL ANALYZER

Adjustments of the relative phase of the burst, I, and Q signal components at the output of the Colorplexer can be made accurately and conveniently with a phase-measuring device such as the RCA Color Signal Analyzer. However, if a Color Signal Analyzer is not available, it is possible to make these adjustments with an oscilloscope which has a vertical amplifier flat to at least four megacycles, such as the RCA Type TO-524 or equivalent. The RCA Type TM-6C Master Monitor also may be used for this purpose.

The 90-degree relationship between I and Q can be set by making use of the fact that the resultants formed by adding a 90-degree component to two signals differing in phase by 180 degrees are equal in amplitude. If the added component is not 90 degrees apart from the two signals, the resultants are not equal. The two vector diagrams shown on Figure 10 illustrate both conditions.

I and Q Phasing

To adjust the 90-degree relationship between the I and Q signals, proceed as follows:

1. Set all controls on the Colorplexer for normal operation; switch OUT the Automatic Carrier Balance Control. Connect the oscilloscope's vertical input to one of the Colorplexer's **OUTPUT** test jacks. Set the **PATTERN SWITCH** on the RCA Color Bar Generator to Position 1. Trigger the oscilloscope with horizontal drive signal. This signal may be conveniently obtained from the **HOR DR IN** test jack, J25. Adjust the oscilloscope so as to display two or three horizontal lines.

2. Adjust the I **CARRIER BAL** and the Q **CARRIER BAL** controls, R170 and R176, to obtain minimum thickness of the black reference line on the oscilloscope display.

3. Apply the color bar signals, then adjust the I **WHITE BAL** and Q **WHITE BAL** controls, R25 and R68, so that there is no carrier during the white pulse interval. (It is assumed that the I and Q video balance controls, R51, R53, R96, and R100, have previously been properly adjusted.)

4. Switch off the **MONO** and Q channels, leaving only the I channel functioning. In the center of this pattern, where the green and purple bar intervals are adjacent to each other, there are two signal envelopes that should be equal in amplitude but opposite in phase. See Figure 11.

   With only the I signal **ON**, deliberately unbalance the Q modulator (in either direction) until the carrier amplitude during the white bar interval is approximately equal to the original amplitude for the green bar. Then adjust the relative phase between I and Q using the Q **PHASE** control, C67, until the green and purple bar intervals are again equal in amplitude.

5. Switch **ON** the **MONO** and Q channels and readjust I and Q **CARRIER BAL** for a thin black reference line.

Burst Phasing

When two equal-amplitude vectors 120 degrees apart are added together, the vector sum has the same amplitude as either of the two components. See Figure 12. Therefore, the burst phase may be adjusted by making use of the fact that in a properly adjusted system, the phase of a pure purple bar interval should be approximately 120 degrees behind the phase of the burst (the exact value is 119.4 degrees, but 120 degrees is close enough).

4. Switch to the output of the second Colorplexer. Adjust its **ROUGH PHASE** and **FINE PHASE** controls for cancellation of the color burst signal on the base line of the oscilloscope.

5. Although the outputs of the two Colorplexers are now apparently in phase, it is possible that a 180° phase difference exists. To check for this condition, switch in the standard Colorplexer. Rotate the Color Signal Analyzer's uncalibrated phase shifter to uncancel slightly the burst signal previously cancelled, noting the direction of rotation required. Cancel the burst signal again with the uncalibrated phase shifter.

6. Switch in the second Colorplexer; rotate the uncalibrated phase shifter for a slight uncancellation of the burst signal now appearing on the oscilloscope, again noting the direction of rotation required to obtain the same direction of unbalance. If the direction is the same as that used in uncancelling the standard Colorplexers' burst, the two are in phase; if it is opposite, the second is 180° out of phase. For the latter condition, perform the phasing procedure again, setting the **ROUGH PHASE** control on the second Colorplexer to a point 180° from its former position; readjust the **FINE PHASE** control, if necessary, for complete cancellation of the color burst signal.

7. Where more than two Colorplexers are used, phase the remainder in the same manner, adjusting their **ROUGH PHASE** and **FINE PHASE** controls to match the standard, then checking for a 180° ambiguity. If adjustment of the relative phase of the burst, I, and Q signals is required and a Color Signal Analyzer is not available, refer to the "Maintenance" section of this book for an alternative procedure.

MAINTENANCE

GENERAL

During routine maintenance periods, dust the equipment and inspect all components for discoloration caused by overheating. Inspect all cable connectors for cleanliness and tightness. Check the tubes in a mutual conductance tube checker, replacing those which are below normal or are otherwise defective. Anticipate tube failure by keeping a log of all tube readings, comparing them with previous readings each time they are checked. Be sure to replace each tube in the same socket since a complete readjustment may be necessary if tubes become interchanged. Whenever a tube is replaced, check the entire operation of the unit as described under "Initial Adjustments" and "Colorplexer Adjustments".

In cases of abnormal operation, check for the presence and correct amplitude of all input signals as described in "Initial Adjustments". Be sure all adjustments have been made correctly; misadjustment is the most frequent source of trouble.

Use of the Schematic Diagram, Figure 15, the Typical Operating Voltages Chart and the charts of Typical Waveforms and Operating Voltages, Figure 3, 4, 5, and 6, will assist in the location of defective components.

COLORPLEXER PHASE ADJUSTMENTS WITHOUT A COLOR SIGNAL ANALYZER

Adjustments of the relative phase of the burst, I, and Q signal components at the output of the Colorplexer can be made accurately and conveniently with a phase-measuring device such as the RCA Color Signal Analyzer. However, if a Color Signal Analyzer is not available, it is possible to make these adjustments with an oscilloscope which has a vertical amplifier flat to at least four megacycles, such as the RCA Type TO-524 or equivalent. The RCA Type TM-6C Master Monitor also may be used for this purpose.

The 90-degree relationship between I and Q can be set by making use of the fact that the resultants formed by adding a 90-degree component to two signals differing in phase by 180 degrees are equal in amplitude. If the added component is not 90 degrees apart from the two signals, the resultants are not equal. The two vector diagrams shown on Figure 10 illustrate both conditions.

I and Q Phasing

To adjust the 90-degree relationship between the I and Q signals, proceed as follows:

1. Set all controls on the Colorplexer for normal operation; switch OUT the Automatic Carrier Balance Control. Connect the oscilloscope's vertical input to one of the Colorplexer's **OUTPUT** test jacks. Set the **PATTERN SWITCH** on the RCA Color Bar Generator to Position 1. Trigger the oscilloscope with horizontal drive signal. This signal may be conveniently obtained from the **HOR DR IN** test jack, J25. Adjust the oscilloscope so as to display two or three horizontal lines.

2. Adjust the I **CARRIER BAL** and the Q **CARRIER BAL** controls, R170 and R176, to obtain minimum thickness of the black reference line on the oscilloscope display.

3. Apply the color bar signals, then adjust the I **WHITE BAL** and Q **WHITE BAL** controls, R25 and R68, so that there is no carrier during the white pulse interval. (It is assumed that the I and Q video balance controls, R51, R53, R96, and R100, have previously been properly adjusted.)

4. Switch off the **MONO** and Q channels, leaving only the I channel functioning. In the center of this pattern, where the green and purple bar intervals are adjacent to each other, there are two signal envelopes that should be equal in amplitude but opposite in phase. See Figure 11.

   With only the I signal **ON**, deliberately unbalance the Q modulator (in either direction) until the carrier amplitude during the white bar interval is approximately equal to the original amplitude for the green bar. Then adjust the relative phase between I and Q using the Q **PHASE** control, C67, until the green and purple bar intervals are again equal in amplitude.

5. Switch **ON** the **MONO** and Q channels and readjust I and Q **CARRIER BAL** for a thin black reference line.

Burst Phasing

When two equal-amplitude vectors 120 degrees apart are added together, the vector sum has the same amplitude as either of the two components. See Figure 12. Therefore, the burst phase may be adjusted by making use of the fact that in a properly adjusted system, the phase of a pure purple bar interval should be approximately 120 degrees behind the phase of the burst (the exact value is 119.4 degrees, but 120 degrees is close enough).

To adjust the burst phase, proceed as follows:

1. Prior to burst phase adjustment, the Colorplexer should first be adjusted for carrier balance, white balance, I and Q relative phase, and I and Q amplitudes. Switch ON the Automatic Carrier Balance Control.

   After the Colorplexer has been properly adjusted, switch OFF the MONO channel and disconnect the cable at J6 which supplies the green bar signal. In order that the color bar generator operates properly, either terminate the disconnected green bar cable with 75 ohms or short-circuit it to ground. Removing the green signal turns the first color bar interval from white (its normal color) to purple. Therefore, in the signal output the color synchronizing burst is adjacent to a purple bar interval.

2. Adjust the BURST GAIN control R134 so that the amplitude of the burst signal is equal to the amplitude of the purple signal. See Figure 13A. Then, with the BURST DELAY control on the Burst Flag Generator, move the burst into the center area of the purple bar. See Figures 13B and 13C.

3. Adjust the BURST PHASE capacitor, C75, until the amplitude during the "purple-plus-burst" interval is the same as during the rest of the purple interval. See Figure 13D.

4. Readjust the BURST DELAY control on the Burst Flag Generator to properly position the burst, then adjust the BURST GAIN control on the Colorplexer to obtain normal burst amplitude. Reconnect the green video cable from the bar generator and switch ON the MONO signal in the Colorplexer.

COLORPLEXER ALIGNMENT

The TX-1C Colorplexer has been properly adjusted at the factory, however, after servicing or repair, circuit characteristics should be checked and readjusted if necessary. Suitable test equipment is listed under "Recommended Test Equipment" at the front of this book.

Preparation for Alignment

Before commencing Colorplexer adjustment, be sure that the tap has been properly connected to the primary of transformer T6 for the existing a-c line voltage. Connect the power input jack, J14, to suitable power sources as described in the "Installation" section of this book. Adjust the +B voltage supplied to the Colorplexer to 280 volts.

By bridging to other equipment or using 75 ohm coaxial terminations, terminate all OUTPUT jacks (J31, J32, and J36), SUBCARRIER INPUT J8, BURST FLAG INPUT J45, and HORIZONTAL DRIVE INPUT J24 on the Colorplexer. Similarly terminate the HORIZONTAL DRIVE INPUT J2 on the Automatic Carrier Balance Control. Do not, however, connect any signal lines to the input or output jacks at this time. Signal connections will be made as adjustment progresses.

SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT

1. Set all GAIN controls to maximum, and place the BALANCE controls at mid-position except the I VID BAL 2 and Q VID BAL 2 controls which should be set at minimum resistance (I control extreme CCW; Q control extreme CW). Set I, Q, and MONO switches (S3, S4, and S5) to ON.

2. Remove tube V10 from its socket and replace it with a dummy type 5726 or 6AL5 tube. (See "Recommended Test Equipment.")

COLORPLEXER PHASE ADJUSTMENTS WITHOUT A COLOR SIGNAL ANALYZER

Adjustments of the relative phase of the burst, I, and Q signal components at the output of the Colorplexer can be made accurately and conveniently with a phase-measuring device such as the RCA Color Signal Analyzer. However, if a Color Signal Analyzer is not available, it is possible to make these adjustments with an oscilloscope which has a vertical amplifier flat to at least four megacycles, such as the RCA Type TO-524 or equivalent. The RCA Type TM-6C Master Monitor also may be used for this purpose.

The 90-degree relationship between I and Q can be set by making use of the fact that the resultants formed by adding a 90-degree component to two signals differing in phase by 180 degrees are equal in amplitude. If the added component is not 90 degrees apart from the two signals, the resultants are not equal. The two vector diagrams shown on Figure 10 illustrate both conditions.

I and Q Phasing

To adjust the 90-degree relationship between the I and Q signals, proceed as follows:

1. Set all controls on the Colorplexer for normal operation; switch OUT the Automatic Carrier Balance Control. Connect the oscilloscope's vertical input to one of the Colorplexer's **OUTPUT** test jacks. Set the **PATTERN SWITCH** on the RCA Color Bar Generator to Position 1. Trigger the oscilloscope with horizontal drive signal. This signal may be conveniently obtained from the **HOR DR IN** test jack, J25. Adjust the oscilloscope so as to display two or three horizontal lines.

2. Adjust the I **CARRIER BAL** and the Q **CARRIER BAL** controls, R170 and R176, to obtain minimum thickness of the black reference line on the oscilloscope display.

3. Apply the color bar signals, then adjust the I **WHITE BAL** and Q **WHITE BAL** controls, R25 and R68, so that there is no carrier during the white pulse interval. (It is assumed that the I and Q video balance controls, R51, R53, R96, and R100, have previously been properly adjusted.)

4. Switch off the **MONO** and Q channels, leaving only the I channel functioning. In the center of this pattern, where the green and purple bar intervals are adjacent to each other, there are two signal envelopes that should be equal in amplitude but opposite in phase. See Figure 11.

   With only the I signal **ON**, deliberately unbalance the Q modulator (in either direction) until the carrier amplitude during the white bar interval is approximately equal to the original amplitude for the green bar. Then adjust the relative phase between I and Q using the Q **PHASE** control, C67, until the green and purple bar intervals are again equal in amplitude.

5. Switch **ON** the **MONO** and Q channels and readjust I and Q **CARRIER BAL** for a thin black reference line.

Burst Phasing

When two equal-amplitude vectors 120 degrees apart are added together, the vector sum has the same amplitude as either of the two components. See Figure 12. Therefore, the burst phase may be adjusted by making use of the fact that in a properly adjusted system, the phase of a pure purple bar interval should be approximately 120 degrees behind the phase of the burst (the exact value is 119.4 degrees, but 120 degrees is close enough).

To adjust the burst phase, proceed as follows:

1. Prior to burst phase adjustment, the Colorplexer should first be adjusted for carrier balance, white balance, I and Q relative phase, and I and Q amplitudes. Switch ON the Automatic Carrier Balance Control.

   After the Colorplexer has been properly adjusted, switch OFF the MONO channel and disconnect the cable at J6 which supplies the green bar signal. In order that the color bar generator operates properly, either terminate the disconnected green bar cable with 75 ohms or short-circuit it to ground. Removing the green signal turns the first color bar interval from white (its normal color) to purple. Therefore, in the signal output the color synchronizing burst is adjacent to a purple bar interval.

2. Adjust the BURST GAIN control R134 so that the amplitude of the burst signal is equal to the amplitude of the purple signal. See Figure 13A. Then, with the BURST DELAY control on the Burst Flag Generator, move the burst into the center area of the purple bar. See Figures 13B and 13C.

3. Adjust the BURST PHASE capacitor, C75, until the amplitude during the "purple-plus-burst" interval is the same as during the rest of the purple interval. See Figure 13D.

4. Readjust the BURST DELAY control on the Burst Flag Generator to properly position the burst, then adjust the BURST GAIN control on the Colorplexer to obtain normal burst amplitude. Reconnect the green video cable from the bar generator and switch ON the MONO signal in the Colorplexer.

COLORPLEXER ALIGNMENT

The TX-1C Colorplexer has been properly adjusted at the factory, however, after servicing or repair, circuit characteristics should be checked and readjusted if necessary. Suitable test equipment is listed under "Recommended Test Equipment" at the front of this book.

Preparation for Alignment

Before commencing Colorplexer adjustment, be sure that the tap has been properly connected to the primary of transformer T6 for the existing a-c line voltage. Connect the power input jack, J14, to suitable power sources as described in the "Installation" section of this book. Adjust the +B voltage supplied to the Colorplexer to 280 volts.

By bridging to other equipment or using 75 ohm coaxial terminations, terminate all OUTPUT jacks (J31, J32, and J36), SUBCARRIER INPUT J8, BURST FLAG INPUT J45, and HORIZONTAL DRIVE INPUT J24 on the Colorplexer. Similarly terminate the HORIZONTAL DRIVE INPUT J2 on the Automatic Carrier Balance Control. Do not, however, connect any signal lines to the input or output jacks at this time. Signal connections will be made as adjustment progresses.

SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT

1. Set all GAIN controls to maximum, and place the BALANCE controls at mid-position except the I VID BAL 2 and Q VID BAL 2 controls which should be set at minimum resistance (I control extreme CCW; Q control extreme CW). Set I, Q, and MONO switches (S3, S4, and S5) to ON.

2. Remove tube V10 from its socket and replace it with a dummy type 5726 or 6AL5 tube. (See "Recommended Test Equipment.")

3. Disconnect the cathode compensating capacitors. C8 and C9, from tube socket XV11 and capacitor C16 from socket XV17.

4. Connect a 1.0 megohm resistor from either pin 1 or 2 of socket XV10 to ground.

5. Temporarily ground the control grids, pin 1, of the burst and adder tube sockets, XV13 and XV14.

6. Connect 0.1 mf capacitors to the control grids, pin 1, of each of the I and Q modulator tube sockets, XV19, XV20, XV21, and XV22. Make certain that the unattached end of each capacitor is clear of the chassis or other components.

7. Apply power to the equipment and allow the unit to warm up thoroughly before beginning alignment. It is assumed that all operating voltages in the Colorplexer are correct. Typical voltages are listed in Table I.

Monochrome and Output Circuits

1. Terminate the output of the sweep generator with 50 ohms and adjust the r-f level to 0.5 volt at 1.0 megacycle. Connect the sweep output to pin 2 of XV6.

2. Connect the diode detector (see Figure 2) and oscilloscope to OUTPUT test jack J48 or J31. Adjust the VIDEO GAIN control, R196, to obtain 0.7 volt output from the Colorplexer.

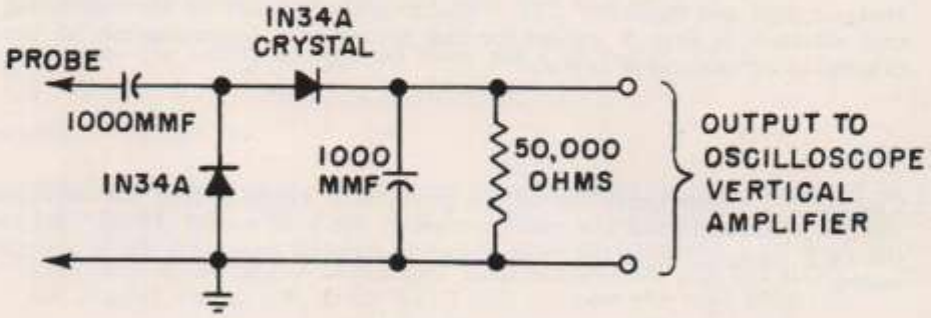


Figure 2. Schematic Diagram, Video Dectector (8867213 Sub 0)

3. Adjust the high frequency compensating capacitors, C120 and C136, to obtain response to 8.0 megacycles flat within ±3 percent. The response beyond 8.0 megacycles should not exceed +3 percent and should drop off smoothly.

4. The response at test jacks J49 and J50 should conform to the limits specified in Step 3.

5. Set the SYNC GAIN control (R1 on the Aperture Compensator) to minimum position, and the MONO ON-OFF switch, S5, to ON.

6. Adjust L12 for flat response ±5 percent to 8.0 megacycles.

7. Reconnect capacitors C8 and C9, then connect the sweep generator across resistor R9. Check the overall response at jack J31 which should conform to that in Step 3. Note, however, that some ringing (approximately ±3 percent) may be observed along the curve traces due to slight mismatch of delay line DL-1.

8. Check the response at output jacks J32 and J36 which should be identical with that in Step 7.

I Video Circuits

1. Connect the sweep generator to pin 1 of socket XV17, and the diode detector and oscilloscope to pin 8 of socket XV18.

2. Set the I ON-OFF switch, S3, to ON, and decrease the I GAIN control, R39, to reduce ringing from the preceding delay line, DL-2.

3. Adjust L15 to obtain the following response:

Frequency	Response
1.3 mc	Down not more than 20%
2.0 mc	Down not more than 50%
3.6 mc	Down at least 90%

4. Reconnect capacitor C16. Connect the sweep generator to the junction of resistor R30 and capacitor C11. The response should be the equivalent of that obtained in Step 3 except for the presence of approximately ±3 percent ringing along the curve trace.

Q Video Circuits

1. Connect the sweep generator to the junction of resistor R66 and capacitor C29, and the diode detector and oscilloscope to pin 3 of socket XV18. Set the Q ON-OFF switch, S4, to ON, and adjust the sweep generator for a narrow band sweep.

   The response should be as follows:

Frequency	Response
400 kc	Down not more than 20%
500 kc	Down not more than 50%
600 kc	Down at least 50%

I Modulator

1. Connect together the free ends of the 0.1 mf capacitors attached to pin 1 of XV19 and pin 1 of XV20 (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6). Remove the temporary ground from pin 1 of socket XV14.

3. Disconnect the cathode compensating capacitors. C8 and C9, from tube socket XV11 and capacitor C16 from socket XV17.

4. Connect a 1.0 megohm resistor from either pin 1 or 2 of socket XV10 to ground.

5. Temporarily ground the control grids, pin 1, of the burst and adder tube sockets, XV13 and XV14.

6. Connect 0.1 mf capacitors to the control grids, pin 1, of each of the I and Q modulator tube sockets, XV19, XV20, XV21, and XV22. Make certain that the unattached end of each capacitor is clear of the chassis or other components.

7. Apply power to the equipment and allow the unit to warm up thoroughly before beginning alignment. It is assumed that all operating voltages in the Colorplexer are correct. Typical voltages are listed in Table I.

Monochrome and Output Circuits

1. Terminate the output of the sweep generator with 50 ohms and adjust the r-f level to 0.5 volt at 1.0 megacycle. Connect the sweep output to pin 2 of XV6.

2. Connect the diode detector (see Figure 2) and oscilloscope to OUTPUT test jack J48 or J31. Adjust the VIDEO GAIN control, R196, to obtain 0.7 volt output from the Colorplexer.

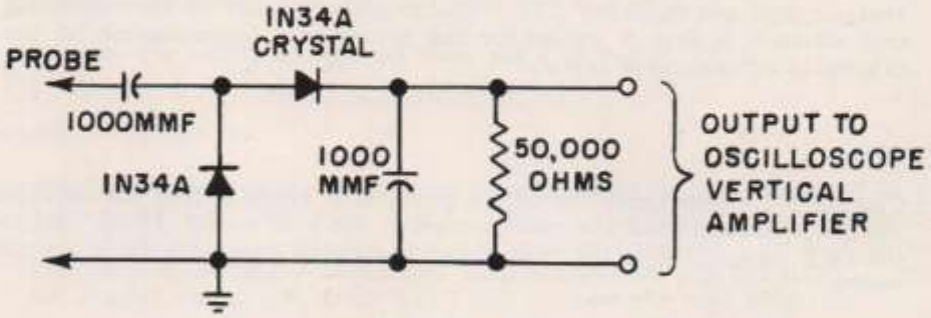


Figure 2. Schematic Diagram, Video Dectector (8867213 Sub 0)

3. Adjust the high frequency compensating capacitors, C120 and C136, to obtain response to 8.0 megacycles flat within ±3 percent. The response beyond 8.0 megacycles should not exceed +3 percent and should drop off smoothly.

4. The response at test jacks J49 and J50 should conform to the limits specified in Step 3.

5. Set the SYNC GAIN control (R1 on the Aperture Compensator) to minimum position, and the MONO ON-OFF switch, S5, to ON.

6. Adjust L12 for flat response ±5 percent to 8.0 megacycles.

7. Reconnect capacitors C8 and C9, then connect the sweep generator across resistor R9. Check the overall response at jack J31 which should conform to that in Step 3. Note, however, that some ringing (approximately ±3 percent) may be observed along the curve traces due to slight mismatch of delay line DL-1.

8. Check the response at output jacks J32 and J36 which should be identical with that in Step 7.

I Video Circuits

1. Connect the sweep generator to pin 1 of socket XV17, and the diode detector and oscilloscope to pin 8 of socket XV18.

2. Set the I ON-OFF switch, S3, to ON, and decrease the I GAIN control, R39, to reduce ringing from the preceding delay line, DL-2.

3. Adjust L15 to obtain the following response:

Frequency	Response
1.3 mc	Down not more than 20%
2.0 mc	Down not more than 50%
3.6 mc	Down at least 90%

4. Reconnect capacitor C16. Connect the sweep generator to the junction of resistor R30 and capacitor C11. The response should be the equivalent of that obtained in Step 3 except for the presence of approximately ±3 percent ringing along the curve trace.

Q Video Circuits

1. Connect the sweep generator to the junction of resistor R66 and capacitor C29, and the diode detector and oscilloscope to pin 3 of socket XV18. Set the Q ON-OFF switch, S4, to ON, and adjust the sweep generator for a narrow band sweep.

   The response should be as follows:

Frequency	Response
400 kc	Down not more than 20%
500 kc	Down not more than 50%
600 kc	Down at least 50%

I Modulator

1. Connect together the free ends of the 0.1 mf capacitors attached to pin 1 of XV19 and pin 1 of XV20 (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6). Remove the temporary ground from pin 1 of socket XV14.

2. Set the I VID BAL-1, R51, and the Q VID BAL-1, R96, to their mid-position. Set the I VID BAL-2, R53, and the Q VID B-2, R100, to their respective minimum positions.

3. Connect the sweep generator to the junction of the two 0.1 mf capacitors (Step 2), and the diode detector and oscilloscope jack J18 or to pin 7 of socket XV14. Set the sweep generator for normal band width sweep.

4. Adjust L10 to obtain the following characteristics:

Frequency	Response
0.5 to 4.0 mc	Flat within ±5%
4.5 mc	Down not more than 10%
7.2 mc	Down at least 90%

Q Modulator

1. Connect together the free ends of the 0.1 mf capacitors attached to pin 1 of XV21 and pin 1 of XV22 (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6). Be sure the CARRIER BALANCE and VID. BAL. controls are set as in Step 3, I Modulator.

2. Connect the sweep generator to the junction of the two 0.1 mf capacitors (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6), and the diode detector and oscilloscope to test jack J18 or to pin 7 of XV14.

   The response should be identical with that in Step 1.

3. Remove the temporary ground from pin 1 of socket XV13.

Clamp Operation

1. Disconnect and remove the 0.1 mf capacitors which were installed on pin 1 of sockets XV19 to XV22 (see Step 6, SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT), and the 1.0 megohm resistor from pin 1 or 2 of socket XV10 (see Step 4, SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT). Remove the dummy clamp tube from XV10 and reinsert the type 5726 tube.

2. Connect cables carrying horizontal drive and sync signals to jacks J9 and J10 respectively.

3. Place the Colorplexer SYNC GAIN control, R2, at maximum; connect the oscilloscope (without the diode detector) to OUTPUT jack J31. Adjust the oscilloscope sweep to a vertical rate so that the vertical sync equalizing pulses may be observed.

4. Adjust the HOR. DRIVE DELAY capacitor, C82, until the vertical sync pulses are clamped during the first half of the sync pulse. The clamp position will be visible as a small pulse on the tip of sync. After adjustment, C82 should not be at either its extreme minimum or maximum position.

5. Using the oscilloscope, observe the clamp pulses at socket XV10 between pin 5 and the chassis, and pin 7 and the chassis. In each case, the amplitude of the keying portion of the pulse should be at least 2.0 volts. See Figures 5F and 5G.

7. Reconnect capacitors C8 and C9, then connect the sweep generator across resistor R9. Check the overall response at jack J31 which should conform to that in Step 3. Note, however, that some ringing (approximately ±3 percent) may be observed along the curve traces due to slight mismatch of delay line DL-1.

8. Check the response at output jacks J32 and J36 which should be identical with that in Step 7.

I Video Circuits

1. Connect the sweep generator to pin 1 of socket XV17, and the diode detector and oscilloscope to pin 8 of socket XV18.

2. Set the I ON-OFF switch, S3, to ON, and decrease the I GAIN control, R39, to reduce ringing from the preceding delay line, DL-2.

3. Adjust L15 to obtain the following response:

Frequency	Response
1.3 mc	Down not more than 20%
2.0 mc	Down not more than 50%
3.6 mc	Down at least 90%

4. Reconnect capacitor C16. Connect the sweep generator to the junction of resistor R30 and capacitor C11. The response should be the equivalent of that obtained in Step 3 except for the presence of approximately ±3 percent ringing along the curve trace.

Q Video Circuits

1. Connect the sweep generator to the junction of resistor R66 and capacitor C29, and the diode detector and oscilloscope to pin 3 of socket XV18. Set the Q ON-OFF switch, S4, to ON, and adjust the sweep generator for a narrow band sweep.

   The response should be as follows:

Frequency	Response
400 kc	Down not more than 20%
500 kc	Down not more than 50%
600 kc	Down at least 50%

I Modulator

1. Connect together the free ends of the 0.1 mf capacitors attached to pin 1 of XV19 and pin 1 of XV20 (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6). Remove the temporary ground from pin 1 of socket XV14.

2. Set the I VID BAL-1, R51, and the Q VID BAL-1, R96, to their mid-position. Set the I VID BAL-2, R53, and the Q VID B-2, R100, to their respective minimum positions.

3. Connect the sweep generator to the junction of the two 0.1 mf capacitors (Step 2), and the diode detector and oscilloscope jack J18 or to pin 7 of socket XV14. Set the sweep generator for normal band width sweep.

4. Adjust L10 to obtain the following characteristics:

Frequency	Response
0.5 to 4.0 mc	Flat within ±5%
4.5 mc	Down not more than 10%
7.2 mc	Down at least 90%

Q Modulator

1. Connect together the free ends of the 0.1 mf capacitors attached to pin 1 of XV21 and pin 1 of XV22 (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6). Be sure the CARRIER BALANCE and VID. BAL. controls are set as in Step 3, I Modulator.

2. Connect the sweep generator to the junction of the two 0.1 mf capacitors (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6), and the diode detector and oscilloscope to test jack J18 or to pin 7 of XV14.

   The response should be identical with that in Step 1.

3. Remove the temporary ground from pin 1 of socket XV13.

Clamp Operation

1. Disconnect and remove the 0.1 mf capacitors which were installed on pin 1 of sockets XV19 to XV22 (see Step 6, SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT), and the 1.0 megohm resistor from pin 1 or 2 of socket XV10 (see Step 4, SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT). Remove the dummy clamp tube from XV10 and reinsert the type 5726 tube.

2. Connect cables carrying horizontal drive and sync signals to jacks J9 and J10 respectively.

3. Place the Colorplexer SYNC GAIN control, R2, at maximum; connect the oscilloscope (without the diode detector) to OUTPUT jack J31. Adjust the oscilloscope sweep to a vertical rate so that the vertical sync equalizing pulses may be observed.

4. Adjust the HOR. DRIVE DELAY capacitor, C82, until the vertical sync pulses are clamped during the first half of the sync pulse. The clamp position will be visible as a small pulse on the tip of sync. After adjustment, C82 should not be at either its extreme minimum or maximum position.

5. Using the oscilloscope, observe the clamp pulses at socket XV10 between pin 5 and the chassis, and pin 7 and the chassis. In each case, the amplitude of the keying portion of the pulse should be at least 2.0 volts. See Figures 5F and 5G.

360° Phase Shifter

1. Connect the subcarrier input from the Frequency Standard to jack J7, and set the ROUGH PHASE control S7, to 0 degrees.

2. Connect the oscilloscope, using a low capacitor probe, to pin 1 of XV30. Adjust capacitor C46 (associated with transformer T1) for maximum output.

3. Connect the oscilloscope, using low capacity probe, to the 3.579 mc test jack, J23, or to terminal C of transformer T3. Adjust capacitor C46 and the SUB C LEVEL ADJ capacitor, C126, for maximum output.

   Adjust coil L3 for a minimum variation in output as the FINE PHASE control, R114, is varied over its entire range. The maximum output at terminal C of T3 should be between 1.1 and 1.5 times the subcarrier input to jack J7.

4. Readjust the SUB C LEVEL ADJ control for an output at the 3.579 mc test jack, J23, that is equal to that at the SUB C test jack, J19. The output amplitude at J23 should not change more than ±5 percent when the ROUGH PHASE control is varied to all positions.

2. Set the I VID BAL-1, R51, and the Q VID BAL-1, R96, to their mid-position. Set the I VID BAL-2, R53, and the Q VID B-2, R100, to their respective minimum positions.

3. Connect the sweep generator to the junction of the two 0.1 mf capacitors (Step 2), and the diode detector and oscilloscope jack J18 or to pin 7 of socket XV14. Set the sweep generator for normal band width sweep.

4. Adjust L10 to obtain the following characteristics:

Frequency	Response
0.5 to 4.0 mc	Flat within ±5%
4.5 mc	Down not more than 10%
7.2 mc	Down at least 90%

Q Modulator

1. Connect together the free ends of the 0.1 mf capacitors attached to pin 1 of XV21 and pin 1 of XV22 (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6). Be sure the CARRIER BALANCE and VID. BAL. controls are set as in Step 3, I Modulator.

2. Connect the sweep generator to the junction of the two 0.1 mf capacitors (see SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT, Step 6), and the diode detector and oscilloscope to test jack J18 or to pin 7 of XV14.

   The response should be identical with that in Step 1.

3. Remove the temporary ground from pin 1 of socket XV13.

Clamp Operation

1. Disconnect and remove the 0.1 mf capacitors which were installed on pin 1 of sockets XV19 to XV22 (see Step 6, SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT), and the 1.0 megohm resistor from pin 1 or 2 of socket XV10 (see Step 4, SWEEP ALIGNMENT AND RESPONSE ADJUSTMENT). Remove the dummy clamp tube from XV10 and reinsert the type 5726 tube.

2. Connect cables carrying horizontal drive and sync signals to jacks J9 and J10 respectively.

3. Place the Colorplexer SYNC GAIN control, R2, at maximum; connect the oscilloscope (without the diode detector) to OUTPUT jack J31. Adjust the oscilloscope sweep to a vertical rate so that the vertical sync equalizing pulses may be observed.

4. Adjust the HOR. DRIVE DELAY capacitor, C82, until the vertical sync pulses are clamped during the first half of the sync pulse. The clamp position will be visible as a small pulse on the tip of sync. After adjustment, C82 should not be at either its extreme minimum or maximum position.

5. Using the oscilloscope, observe the clamp pulses at socket XV10 between pin 5 and the chassis, and pin 7 and the chassis. In each case, the amplitude of the keying portion of the pulse should be at least 2.0 volts. See Figures 5F and 5G.

360° Phase Shifter

1. Connect the subcarrier input from the Frequency Standard to jack J7, and set the ROUGH PHASE control S7, to 0 degrees.

2. Connect the oscilloscope, using a low capacitor probe, to pin 1 of XV30. Adjust capacitor C46 (associated with transformer T1) for maximum output.

3. Connect the oscilloscope, using low capacity probe, to the 3.579 mc test jack, J23, or to terminal C of transformer T3. Adjust capacitor C46 and the SUB C LEVEL ADJ capacitor, C126, for maximum output.

   Adjust coil L3 for a minimum variation in output as the FINE PHASE control, R114, is varied over its entire range. The maximum output at terminal C of T3 should be between 1.1 and 1.5 times the subcarrier input to jack J7.

4. Readjust the SUB C LEVEL ADJ control for an output at the 3.579 mc test jack, J23, that is equal to that at the SUB C test jack, J19. The output amplitude at J23 should not change more than ±5 percent when the ROUGH PHASE control is varied to all positions.

TABLE I. VOLTAGE CHART FOR TYPE TX-1C COLORPLEXER, MI-40209-B

TUBE			PIN NUMBERS								
SYMBOL	TYPE	FUNCTION	1	2	3	4	5	6	7	8	9
V1	6BX7	Video Amplifier	-7.0	137.5	--	137.5	280	144	--	*6.3	--
V2	6BC4	Video Amplifier	280	160	160	--	*6.3	160	160	160	280
V3	6BK7A	Video Amplifier	158	--	1.2	--	*6.3	280	158	158	--
V4	6BK7A	Cathode Follower	--	--	2.2	--	*6.3	280	138	140	--
V5	6BX7	Video Amplifier	-7.0	137.5	--	137.5	280	144	*6.3	*6.3	--
V6	6BK7A	Differential Amplifier	144	0.3	2.2	--	*6.3	138	--	2.2	--
V7	0A2	Voltage Regulator	--	--	--	--	--	--	145	X	X
V8	6X4	Rectifier	260 rms	--	--	*6.3	--	260 rms	92	X	X
V9	0A2	Voltage Regulator	--	--	--	--	--	--	145	--	--
V10	5726	Output Clamp	0.3	0.3	--	*6.3	1.3	--	-1.2	X	X
V11	6AU6	Monochrome Adder	0.5	1.6	--	*6.3	262	128	-1.6	X	X
V12	12AU7	Clamp Driver	17.5	-1.1	--	*6.3	*6.3	275	-0.7	9.0	*6.3
V13	6AU6	Burst Adder	0.5	1.6	--	*6.3	262	128	1.6	X	X
V14	6AU6	Chroma Adder	--	1.05	--	*6.3	262	131	1.05	X	X
V15	12AU7	Horizontal Delay Amplifier	120	27	62	--	*6.3	27	-0.8	--	*6.3
V16	6AU6	Sync and Monochrome Adder	0.6	1.6	--	*6.3	207	128	1.6	X	X
V17	6AU6	I Amplifier	2.2	3.4	--	*6.3	262	152	3.4	X	X
V18	12AU7	I Phase Splitter; Q Phase Splitter	266	--	9.0	--	*6.3	266	--	9.0	*6.3
V19	**	I Modulator	2.1	4.7	--	*6.3	182	118	--	X	X
V20	**	I Modulator	1.9	4.6	--	*6.3	182	118	--	X	X
V21	**	Q Modulator	1.9	4.9	--	*6.3	182	118	--	X	X
V22	**	Q Modulator	2.2	5.0	--	*6.3	182	118	--	X	X
V23	6AH6	I Amplifier	4.8	--	--	*6.3	148	118	6.0	X	X
V24	6AU6	Q Amplifier	2.4	3.8	--	*6.3	264	139	3.8	X	X
V25	6AU6	0^{o} Subcarrier Amplifier	145	147	--	*6.3	276	234	147	X	X
V26	6AU6	90^{o} Subcarrier Amplifier	145	147	--	*6.3	276	236	147	X	X
V27	6AH6	Q Amplifier	4.8	--	--	*6.3	153	114	6.0	X	X
V28	**	Burst Keyer	15.5	18.2	--	*6.3	275	110	--	X	X
V29	6AU6	Burst Flag Inverter	-0.7	93	--	*6.3	93	93	--	X	X
V30	6AU6	Subcarrier Output Amplifier	137	147	--	*6.3	275	218	147	X	X
V31	6AU6	Subcarrier Amplifier	137	147	--	*6.3	275	266	147	X	X

* Heater voltage (A.C.), measured to ground.

** Type 6AS6, for replacement order RCA Stock No. 204603.

All D.C. voltages measured to ground with Type WV-97A, RCA VoltOhmyst.

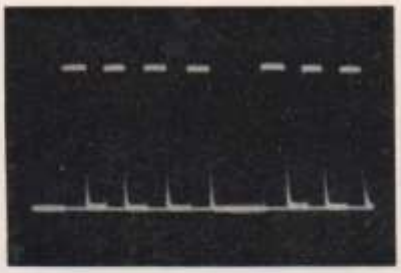
TABLE I. VOLTAGE CHART FOR TYPE TX-1C COLORPLEXER, MI-40209-B

TUBE			PIN NUMBERS								
SYMBOL	TYPE	FUNCTION	1	2	3	4	5	6	7	8	9
V1	6BX7	Video Amplifier	-7.0	137.5	--	137.5	280	144	--	*6.3	--
V2	6BC4	Video Amplifier	280	160	160	--	*6.3	160	160	160	280
V3	6BK7A	Video Amplifier	158	--	1.2	--	*6.3	280	158	158	--
V4	6BK7A	Cathode Follower	--	--	2.2	--	*6.3	280	138	140	--
V5	6BX7	Video Amplifier	-7.0	137.5	--	137.5	280	144	*6.3	*6.3	--
V6	6BK7A	Differential Amplifier	144	0.3	2.2	--	*6.3	138	--	2.2	--
V7	0A2	Voltage Regulator	--	--	--	--	--	--	145	X	X
V8	6X4	Rectifier	260 rms	--	--	*6.3	--	260 rms	92	X	X
V9	0A2	Voltage Regulator	--	--	--	--	--	--	145	--	--
V10	5726	Output Clamp	0.3	0.3	--	*6.3	1.3	--	-1.2	X	X
V11	6AU6	Monochrome Adder	0.5	1.6	--	*6.3	262	128	-1.6	X	X
V12	12AU7	Clamp Driver	17.5	-1.1	--	*6.3	*6.3	275	-0.7	9.0	*6.3
V13	6AU6	Burst Adder	0.5	1.6	--	*6.3	262	128	1.6	X	X
V14	6AU6	Chroma Adder	--	1.05	--	*6.3	262	131	1.05	X	X
V15	12AU7	Horizontal Delay Amplifier	120	27	62	--	*6.3	27	-0.8	--	*6.3
V16	6AU6	Sync and Monochrome Adder	0.6	1.6	--	*6.3	207	128	1.6	X	X
V17	6AU6	I Amplifier	2.2	3.4	--	*6.3	262	152	3.4	X	X
V18	12AU7	I Phase Splitter; Q Phase Splitter	266	--	9.0	--	*6.3	266	--	9.0	*6.3
V19	**	I Modulator	2.1	4.7	--	*6.3	182	118	--	X	X
V20	**	I Modulator	1.9	4.6	--	*6.3	182	118	--	X	X
V21	**	Q Modulator	1.9	4.9	--	*6.3	182	118	--	X	X
V22	**	Q Modulator	2.2	5.0	--	*6.3	182	118	--	X	X
V23	6AH6	I Amplifier	4.8	--	--	*6.3	148	118	6.0	X	X
V24	6AU6	Q Amplifier	2.4	3.8	--	*6.3	264	139	3.8	X	X
V25	6AU6	0^{o} Subcarrier Amplifier	145	147	--	*6.3	276	234	147	X	X
V26	6AU6	90^{o} Subcarrier Amplifier	145	147	--	*6.3	276	236	147	X	X
V27	6AH6	Q Amplifier	4.8	--	--	*6.3	153	114	6.0	X	X
V28	**	Burst Keyer	15.5	18.2	--	*6.3	275	110	--	X	X
V29	6AU6	Burst Flag Inverter	-0.7	93	--	*6.3	93	93	--	X	X
V30	6AU6	Subcarrier Output Amplifier	137	147	--	*6.3	275	218	147	X	X
V31	6AU6	Subcarrier Amplifier	137	147	--	*6.3	275	266	147	X	X

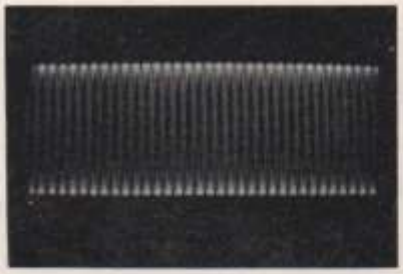
* Heater voltage (A.C.), measured to ground.

** Type 6AS6, for replacement order RCA Stock No. 204603.

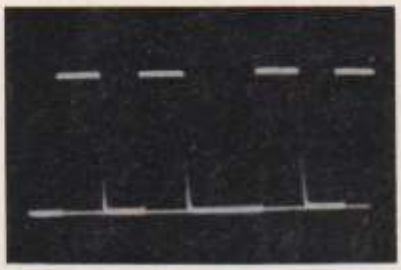
All D.C. voltages measured to ground with Type WV-97A, RCA VoltOhmyst.



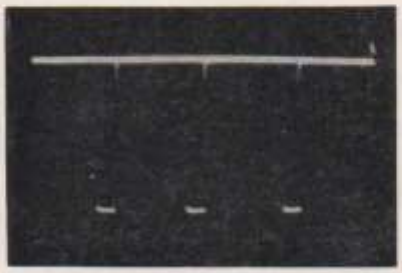
A – B IN AMP AT J17;
1.0 VOLT (PEAK-TO-PEAK);
SWITCH S8 IN BAR POSITION



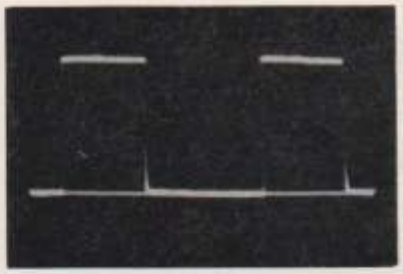
E – SUBCARRIER INPUT AT J19;
2 VOLTS (PEAK-TO-PEAK)



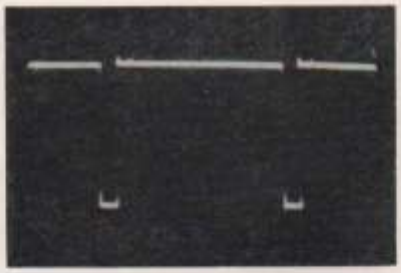
B – R IN AMP AT J41;
1.0 VOLT (PEAK-TO-PEAK);
SWITCH S8 IN BAR POSITION



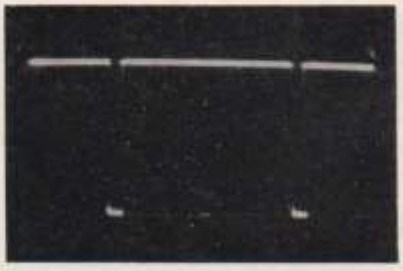
F – BURST FLAG IN AT J46;
4.0 VOLTS (PEAK-TO-PEAK)



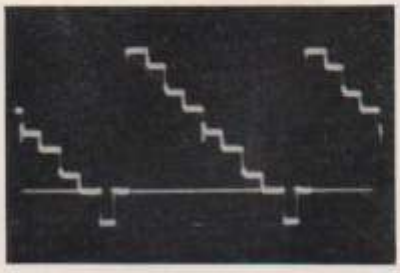
C – G IN AMP AT J35;
1.0 VOLT (PEAK-TO-PEAK)
SWITCH S8 IN BAR POSITION



G – HOR DRIVE IN AT J25;
4 VOLTS (PEAK-TO-PEAK)

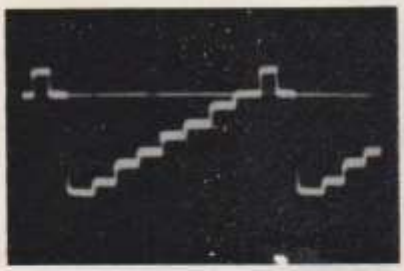


D – SYNC IN AT J21;
4.0 VOLTS (PEAK-TO-PEAK)

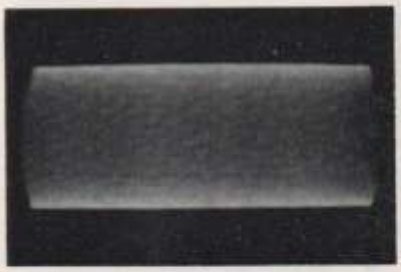


H – MONO AT J30;
0.14 VOLT (PEAK-TO-PEAK)

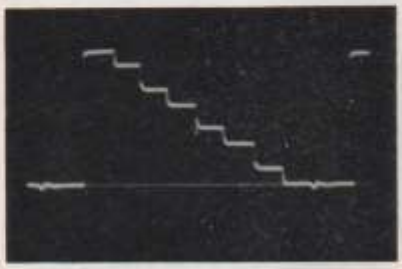
Figure 3. Typical Waveforms and Operating Voltages



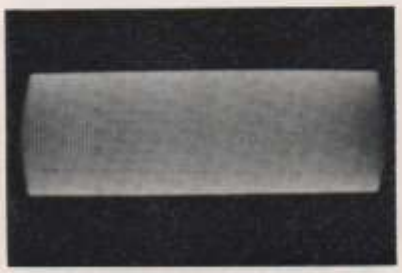
A – DELAYED MONO AT J29;
0.11 VOLT (PEAK-TO-PEAK)



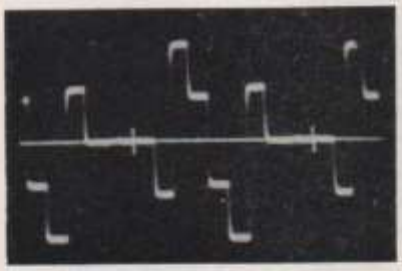
E – 3.579 MC, 0° PHASE SHIFT
AT J23;
2.0 VOLTS (PEAK-TO-PEAK)



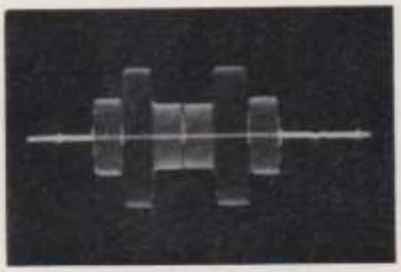
B – MONO ONLY AT J48;
0.7 VOLT (PEAK-TO-PEAK);
SWITCH S5 AT ON POSITION



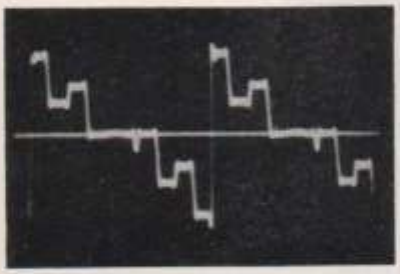
F – 3.579 MC, 90° PHASE SHIFT
AT J22;
2.0 VOLTS (PEAK-TO-PEAK)



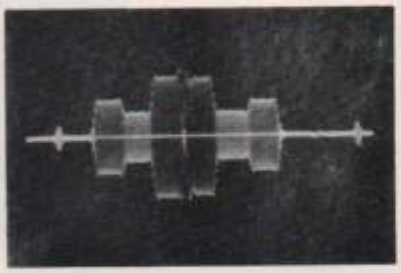
C – I VIDEO AT J15;
0.10 VOLT (PEAK-TO-PEAK)



G – I ONLY AT J48;
1.4 VOLT (PEAK-TO-PEAK)

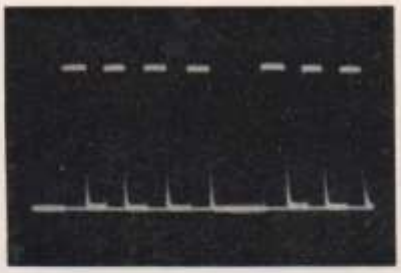


D – Q VIDEO AT J16;
0.08 VOLT (PEAK-TO-PEAK)

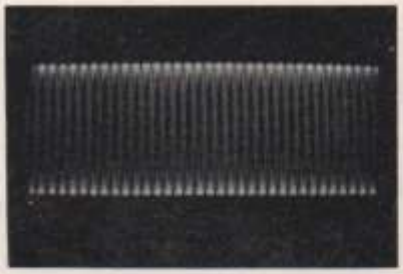


H – Q ONLY AT J48;
1.4 VOLT (PEAK-TO-PEAK)

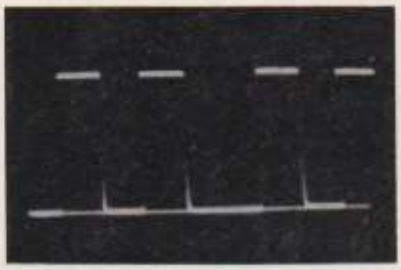
Figure 4. Typical Waveforms and Operating Voltages



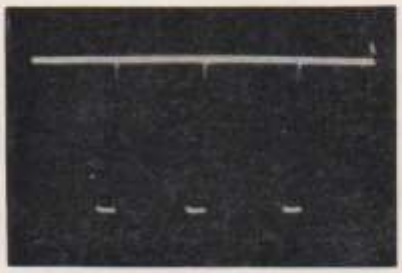
A – B IN AMP AT J17;
1.0 VOLT (PEAK-TO-PEAK);
SWITCH S8 IN BAR POSITION



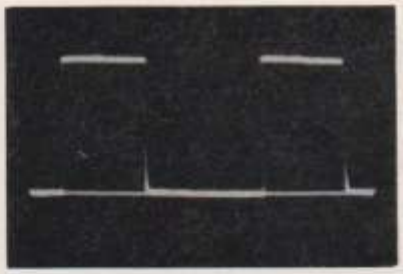
E – SUBCARRIER INPUT AT J19;
2 VOLTS (PEAK-TO-PEAK)



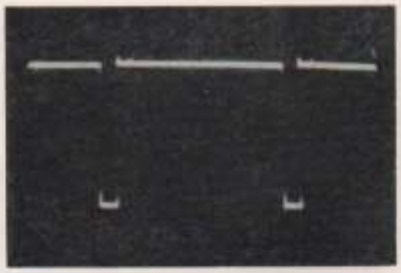
B – R IN AMP AT J41;
1.0 VOLT (PEAK-TO-PEAK);
SWITCH S8 IN BAR POSITION



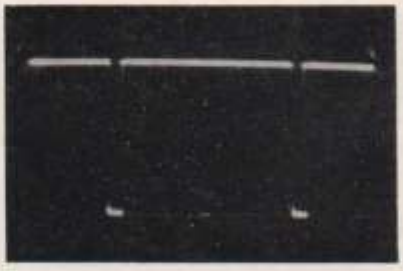
F – BURST FLAG IN AT J46;
4.0 VOLTS (PEAK-TO-PEAK)



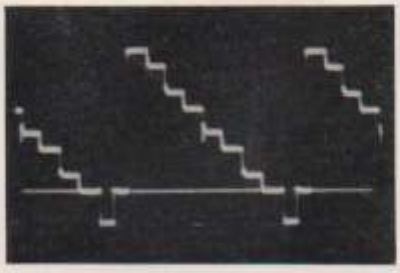
C – G IN AMP AT J35;
1.0 VOLT (PEAK-TO-PEAK)
SWITCH S8 IN BAR POSITION



G – HOR DRIVE IN AT J25;
4 VOLTS (PEAK-TO-PEAK)

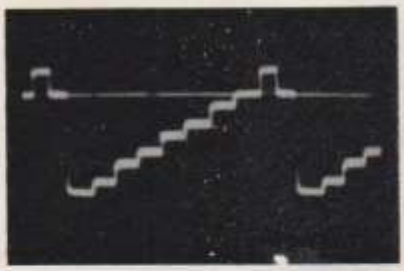


D – SYNC IN AT J21;
4.0 VOLTS (PEAK-TO-PEAK)

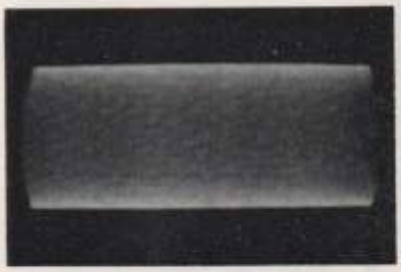


H – MONO AT J30;
0.14 VOLT (PEAK-TO-PEAK)

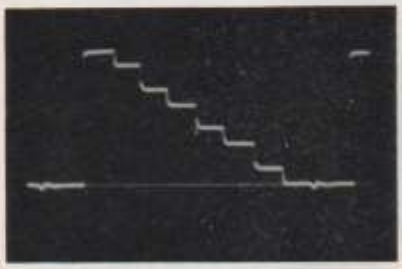
Figure 3. Typical Waveforms and Operating Voltages



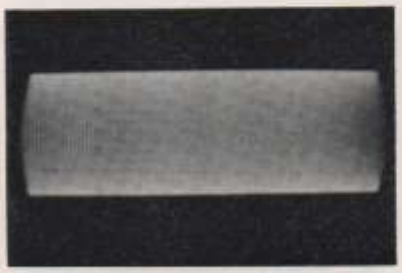
A – DELAYED MONO AT J29;
0.11 VOLT (PEAK-TO-PEAK)



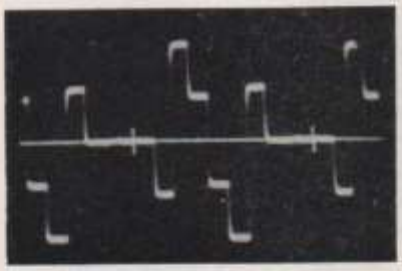
E – 3.579 MC, 0° PHASE SHIFT
AT J23;
2.0 VOLTS (PEAK-TO-PEAK)



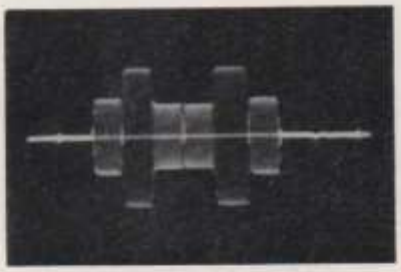
B – MONO ONLY AT J48;
0.7 VOLT (PEAK-TO-PEAK);
SWITCH S5 AT ON POSITION



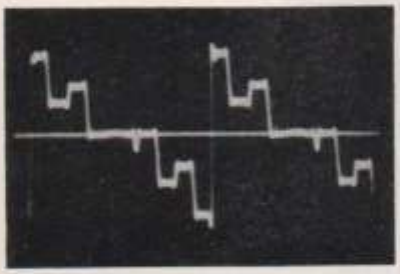
F – 3.579 MC, 90° PHASE SHIFT
AT J22;
2.0 VOLTS (PEAK-TO-PEAK)



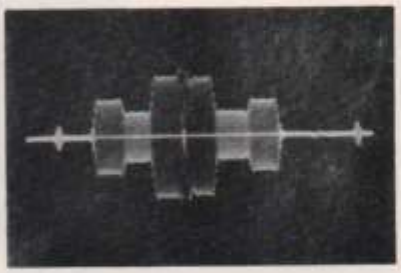
C – I VIDEO AT J15;
0.10 VOLT (PEAK-TO-PEAK)



G – I ONLY AT J48;
1.4 VOLT (PEAK-TO-PEAK)

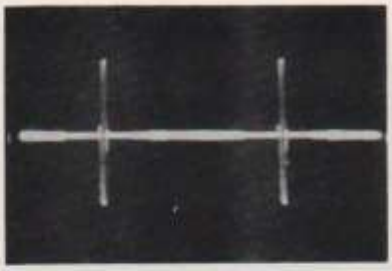


D – Q VIDEO AT J16;
0.08 VOLT (PEAK-TO-PEAK)

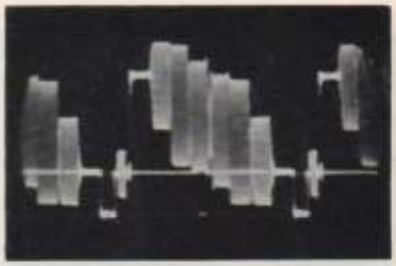


H – Q ONLY AT J48;
1.4 VOLT (PEAK-TO-PEAK)

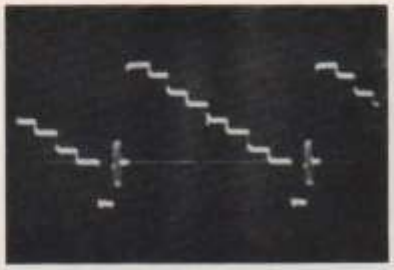
Figure 4. Typical Waveforms and Operating Voltages



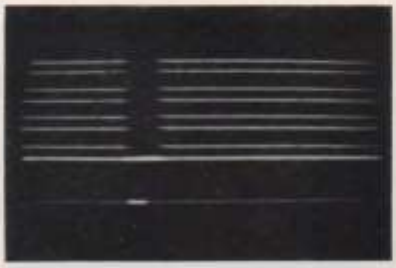
A – BURST; AT J47;
0.30 VOLT (PEAK-TO-PEAK)



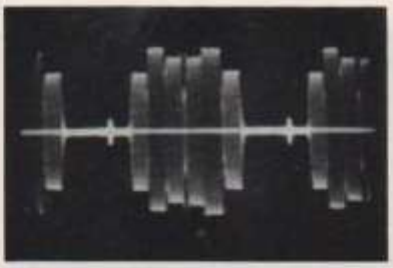
D – VIDEO OUT AT J54;
1.60 VOLTS (SYNC-TO-WHITE)



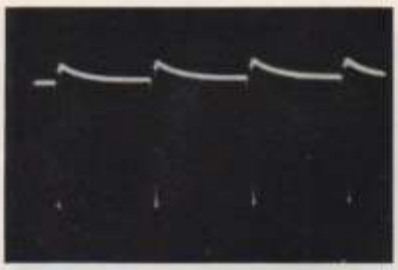
B – MONO PLUS MAX BURST AT
J48;
0.30 VOLT (PEAK-TO-PEAK)



E – MONO ONLY (NO TILT) AT
J31;
1.0 VOLT (PEAK-TO-PEAK)



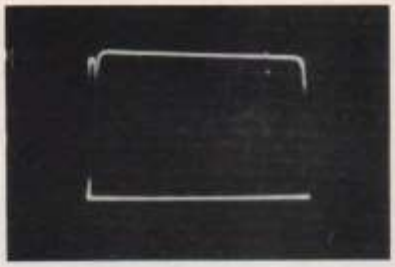
C – CHROMA AT J18;
0.14 VOLT (PEAK-TO-PEAK)



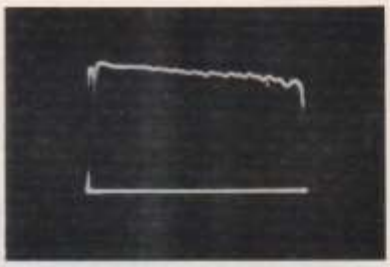
F – NEG CLAMP PULSE AT PIN
5 OF V10;
2.0 VOLTS (PEAK-TO-PEAK)

G – POS CLAMP PULSE AT PIN
7 OF V10;
2.0 VOLTS (PEAK-TO-PEAK)

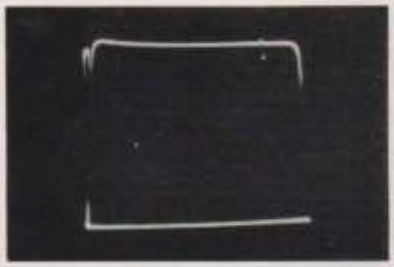
Figure 5. Typical Waveforms and Operating Voltages



A – SWEEP OUTPUT
(MARKER AT 8 MC)
AT PIN 2 OF V6; 0.50 VOLT

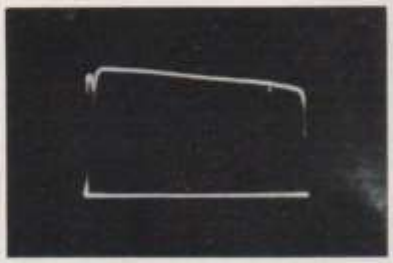


D – MONO ONLY OUTPUT
(MARKER AT 8 MC) AT J31;
0.80 VOLT, 3.0% DOWN AT 8 MC

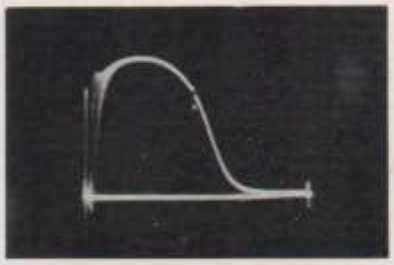


B – OUTPUT AMP RESPONSE
(MARKER AT 8 MC) AT J31;
0.70 VOLT, 0.80% DOWN AT 8 MC

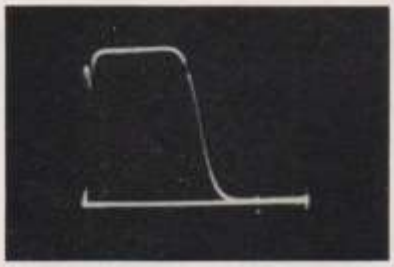
E – "I" VIDEO OUTPUT
(MARKER AT 2 MC) AT PIN 8
OF V18; 0.70 VOLT



C – MONOCHROME ADDER OUTPUT
(MARKER AT 8 MC) AT J31;
0.90 VOLT, 3.0% DOWN AT 8 MC

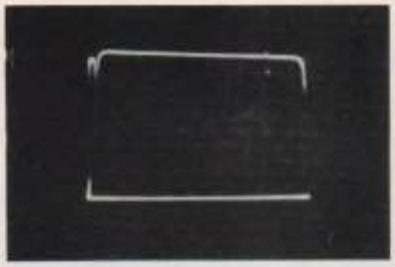


F – Q VIDEO OUTPUT
(MARKER AT 500 KC) AT PIN 3
OF V18: 0.09 VOLT

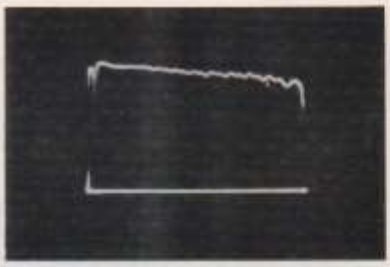


G – MODULATOR RESPONSE
(MARKERS AT 4.5 AND 7.2 MC)
AT PIN 7 OF V14; 0.29 VOLT

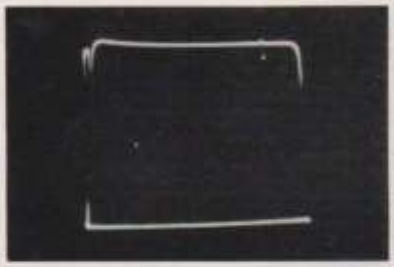
Figure 6. Typical Waveforms and Operating Voltages



A – SWEEP OUTPUT
(MARKER AT 8 MC)
AT PIN 2 OF V6; 0.50 VOLT

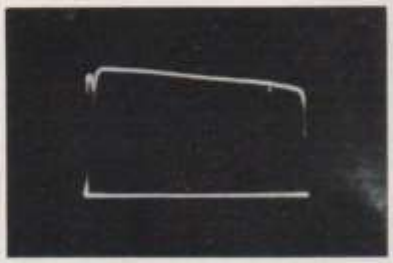


D – MONO ONLY OUTPUT
(MARKER AT 8 MC) AT J31;
0.80 VOLT, 3.0% DOWN AT 8 MC

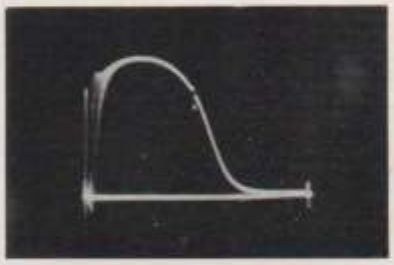


B – OUTPUT AMP RESPONSE
(MARKER AT 8 MC) AT J31;
0.70 VOLT, 0.80% DOWN AT 8 MC

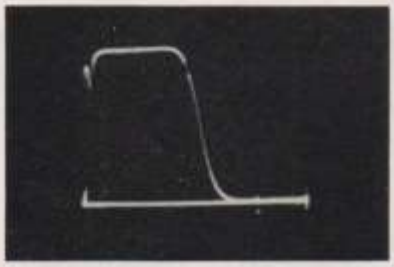
E – "I" VIDEO OUTPUT
(MARKER AT 2 MC) AT PIN 8
OF V18; 0.70 VOLT



C – MONOCHROME ADDER OUTPUT
(MARKER AT 8 MC) AT J31;
0.90 VOLT, 3.0% DOWN AT 8 MC

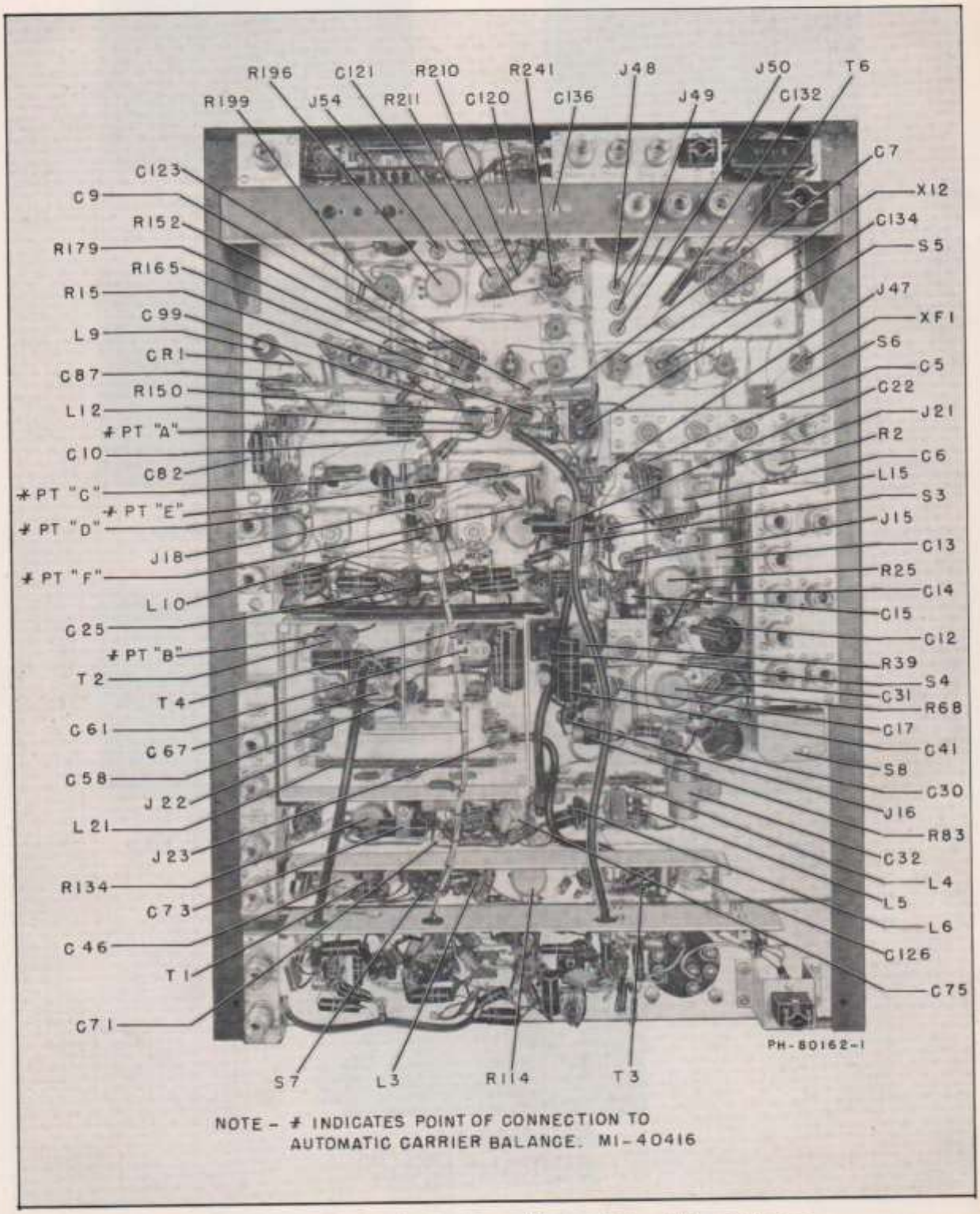


F – Q VIDEO OUTPUT
(MARKER AT 500 KC) AT PIN 3
OF V18: 0.09 VOLT



G – MODULATOR RESPONSE
(MARKERS AT 4.5 AND 7.2 MC)
AT PIN 7 OF V14; 0.29 VOLT

Figure 6. Typical Waveforms and Operating Voltages



NOTE - # INDICATES POINT OF CONNECTION TO AUTOMATIC CARRIER BALANCE. MI-40416

Figure 7. TX-1C Colorplexer, Rear View, Wiring Side of Chassis

REPLACEMENT PARTS AND ENGINEERING SERVICE

When ordering replacement parts, please give symbol, description, and stock number of each item ordered.

The part which will be supplied against an order for a replacement item may not be an exact duplicate of the original part. However, it will be a satisfactory replacement differing only in minor mechanical or electrical characteristics. Such differences will in no way impair the operation of the equipment.

The following tabulations list service parts, electron tube, and field engineering service ordering instructions according to the geographical location of the station.

SERVICE PARTS

STATION LOCATION	OBTAIN SERVICE PARTS FROM
Continental United States or Alaska	Local Broadcast Equipment Sales Representative, his office, or directly from the Service Parts Order Service, Bldg.60, 19th and Federal Streets, Camden 5, N. J. Emergency orders may be telephoned, telegraphed, or teletyped to RCA Emergency Service, Bldg.60, Camden, N.J. (Telephone: Woodlawn 3-8000).
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Local Broadcast Equipment Sales Representative, or Service Parts Order Service, RCA International Division, Gloucester, New Jersey. U.S.A.

ELECTRON TUBES

STATION LOCATION	OBTAIN ELECTRON TUBES FROM
Continental United States or Alaska	Local Distributor or nearest of the following warehouses: 34 Exchange Place Jersey City 2, New Jersey 589 E. Illinois Street Chicago 11, Illinois 420 S. San Pedro Street Los Angeles 13, California
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Local Distributor or from: Tube Department RCA International Division 30 Rockefeller Plaza New York 20, New York. U.S.A.

If for any reason, it is desired to return tubes, please return them to the place of purchase. If this is not convenient, please notify your RCA serving warehouse so that Return Authorization may be forwarded to you.

PLEASE DO NOT RETURN TUBES DIRECTLY TO RCA WITHOUT AUTHORIZATION AND SHIPPING INSTRUCTIONS.

It is important that complete information regarding each tube (including type, serial number, hours of service and reason for its return) be given.

When tubes are returned, they should be shipped to the address specified on the Return Authorization form. A copy of the Return Authorization and also a Service Report for each tube should be packed with the tubes.

FIELD ENGINEERING SERVICE*

STATION LOCATION	REQUEST FIELD ENGINEERING SERVICE FROM
Continental United States or Alaska	Local Broadcast Equipment Sales Representative or the RCA Service Company, Inc., Broadcast Communications Service Division, Camden, N.J. Telephone: Woodlawn 3-8000.
Dominion of Canada	Local Broadcast Equipment Sales Representative, his office, or directly from RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec.
Outside of Continental United States, Alaska, and the Dominion of Canada	Chief Engineer RCA International Division 30 Rockefeller Plaza New York 20, New York, U.S.A.

Charges for field engineering service will be made at current rates.

For ordering information see page 31

TX-1C COLORPLEXER, MI-40209-B

SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
C1	Capacitor: fixed, ceramic, 12 mmf ±5%, 500 v	90575-211	70595
C2	Capacitor: fixed, ceramic, 4.7 mmf ±1.0 mmf, 500 v	90575-301	71086
C3	Capacitor: fixed, paper, 0.22 mf ±10%, 200 v	737818-55	97444
C4	Capacitor: fixed, mica, 56 mmf ±5%, 500 v	727853-217	95254
C5A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v	459614-1	99134
C6	Capacitor: electrolytic, 24 mf -10 +50%, 350 v	449633-16	99695
C7	Capacitor: fixed, paper, 0.22 mf, 400 v	737818-95	94904
C8	Capacitor: fixed, mica, 82 mmf ±5%, 500 v	727853-221	203411
C9	Capacitor: fixed, mica, 180 mmf ±5%, 500 v	727853-229	98951
C10A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v. Same as C5	459614-1	99134
C11	Capacitor: fixed, paper, 0.22 mf ±10%, 200 v. Same as C3	737818-55	97444
C12	Capacitor: electrolytic, 1000 mf -10 +40%, 15 v	458557-6	204403
C13	Capacitor: electrolytic, 16 mf -10 +50%, 450 v	449633-15	99694
C14	Capacitor: electrolytic, 10 mf -10 +50%, 450 v	86028-9	95907
C15	Capacitor: fixed, paper, 0.22 mf ±10%, 400 v	737818-95	94904
C16	Capacitor: fixed, mica, 150 mmf ±5%, 500 v	727856-227	39632
C17A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v. Same as C5	459614-1	99134
C18	Capacitor: fixed, ceramic, 10 mmf ±5%, 500 v	90575-209	53511
C19	Capacitor: fixed, ceramic, 8.2 mmf ±5%, 500 v	8817564-304	98231
C20	Capacitor: fixed, ceramic, 18 mmf ±5%, 500 v	90575-215	57517
C21	Capacitor: fixed, mica, 47 mmf ±5%, 500 v	727856-215	39620
C22	Capacitor: fixed, paper, 0.22 mf ±20%, 400 v	735715-129	73794
C23, C24	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v	737816-413	211508
C25A/B/C/D	Capacitor: electrolytic, 10/10/10/10 mf -10 +50%, 450 v	458558-10	98986
C26	Capacitor: fixed, ceramic, 6.8 mmf ±0.25 mmf, 500 v	90575-412	205183
C27	Capacitor: fixed, ceramic, 8.2 mmf ±5%, 500 v. Same as C19	8817564-304	98231
C28	Capacitor: fixed, mica, 23 mmf ±5%, 500 v	748252-315	96998
C29	Capacitor: fixed, paper, 0.22 mf ±10%, 200 v. Same as C3	737818-55	97444
C30	Capacitor: electrolytic, 1000 mf -10 +40%, 15 v. Same as C12	458557-6	204403
C31	Capacitor: electrolytic, 10 mf -10 +50%, 450 v. Same as C14	86028-9	95907
C32	Capacitor: electrolytic, 16 mf -10 +50%, 450 v. Same as C13	449633-15	99694
C33	Capacitor: fixed, mica, 6 mmf ±5%, 500 v	748252-306	204767
C34	Capacitor: fixed, mica, 150 mmf ±5%, 500 v	727853-227	99652
C35	Capacitor: fixed, mica, 62 mmf ±5%, 500 v	727853-218	204766
C36	Capacitor: fixed, mica, 820 mmf ±2%, 500 v	727863-345	52795
C37	Capacitor: fixed, mica, 6 mmf ±5%, 500 v. Same as C33	748252-306	204767
C38	Capacitor: fixed, mica, 150 mmf ±5%, 500 v. Same as C34	727853-227	99652
C39	Capacitor: fixed, paper, 0.22 mf ±10%, 400 v. Same as C15	737818-95	94904
C40	Capacitor: fixed, mica, 47 mmf ±5%, 500 v. Same as C21	727856-215	39620
C41	Capacitor: fixed, paper, 0.22 mf ±20%, 400 v. Same as C22	735715-129	73794
C42, C43	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v. Same as C23	737816-413	211508
C44	Not Used		
C45	Capacitor: fixed, mica, 100 mmf ±10%, 500 v	727851-123	98422
C46	Capacitor: variable, 7-45 mmf	984003-5	54221
C47	Capacitor: fixed, mica, 22 mmf ±10%, 500 v	727851-107	96998
C48	Capacitor: fixed, mica, 180 mmf ±10%, 500 v	727851-129	56745
C49	Capacitor: fixed, mica, 390 mmf ±10%, 500 v	727851-137	79988
C50	Capacitor: fixed, mica, 180 mmf ±10%, 500 v. Same as C48	727851-129	56745
C51	Capacitor: fixed, mica, 27 mmf ±10%, 500 v	727851-109	39614
C52	Capacitor: fixed, mica, 100 mmf ±10%, 500 v. Same as C45	727851-123	98422
C53	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v	737818-93	94915
C54	Capacitor: fixed, paper, 0.047 mf ±10%, 400 v	737818-91	99125
C55	Capacitor: fixed, mica, 82 mmf ±5%, 500 v	727856-221	39626
C56	Capacitor: fixed, mica, 39 mmf ±5%, 500 v	727856-213	39618
C57	Capacitor: fixed, mica, 100 mmf ±10%, 500 v	727856-123	39628
C58A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v. Same as C5	459614-1	99134
C59	Capacitor: fixed, paper, 0.01 mf ±10%, 400 v	735715-163	73561
C60	Capacitor: fixed, paper, 0.22 mf ±20%, 400 v. Same as C22	735715-129	73794

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For ordering information see page 31

TX-1C COLORPLEXER, MI-40209-B

SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
C1	Capacitor: fixed, ceramic, 12 mmf ±5%, 500 v	90575-211	70595
C2	Capacitor: fixed, ceramic, 4.7 mmf ±1.0 mmf, 500 v	90575-301	71086
C3	Capacitor: fixed, paper, 0.22 mf ±10%, 200 v	737818-55	97444
C4	Capacitor: fixed, mica, 56 mmf ±5%, 500 v	727853-217	95254
C5A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v	459614-1	99134
C6	Capacitor: electrolytic, 24 mf -10 +50%, 350 v	449633-16	99695
C7	Capacitor: fixed, paper, 0.22 mf, 400 v	737818-95	94904
C8	Capacitor: fixed, mica, 82 mmf ±5%, 500 v	727853-221	203411
C9	Capacitor: fixed, mica, 180 mmf ±5%, 500 v	727853-229	98951
C10A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v. Same as C5	459614-1	99134
C11	Capacitor: fixed, paper, 0.22 mf ±10%, 200 v. Same as C3	737818-55	97444
C12	Capacitor: electrolytic, 1000 mf -10 +40%, 15 v	458557-6	204403
C13	Capacitor: electrolytic, 16 mf -10 +50%, 450 v	449633-15	99694
C14	Capacitor: electrolytic, 10 mf -10 +50%, 450 v	86028-9	95907
C15	Capacitor: fixed, paper, 0.22 mf ±10%, 400 v	737818-95	94904
C16	Capacitor: fixed, mica, 150 mmf ±5%, 500 v	727856-227	39632
C17A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v. Same as C5	459614-1	99134
C18	Capacitor: fixed, ceramic, 10 mmf ±5%, 500 v	90575-209	53511
C19	Capacitor: fixed, ceramic, 8.2 mmf ±5%, 500 v	8817564-304	98231
C20	Capacitor: fixed, ceramic, 18 mmf ±5%, 500 v	90575-215	57517
C21	Capacitor: fixed, mica, 47 mmf ±5%, 500 v	727856-215	39620
C22	Capacitor: fixed, paper, 0.22 mf ±20%, 400 v	735715-129	73794
C23, C24	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v	737816-413	211508
C25A/B/C/D	Capacitor: electrolytic, 10/10/10/10 mf -10 +50%, 450 v	458558-10	98986
C26	Capacitor: fixed, ceramic, 6.8 mmf ±0.25 mmf, 500 v	90575-412	205183
C27	Capacitor: fixed, ceramic, 8.2 mmf ±5%, 500 v. Same as C19	8817564-304	98231
C28	Capacitor: fixed, mica, 23 mmf ±5%, 500 v	748252-315	96998
C29	Capacitor: fixed, paper, 0.22 mf ±10%, 200 v. Same as C3	737818-55	97444
C30	Capacitor: electrolytic, 1000 mf -10 +40%, 15 v. Same as C12	458557-6	204403
C31	Capacitor: electrolytic, 10 mf -10 +50%, 450 v. Same as C14	86028-9	95907
C32	Capacitor: electrolytic, 16 mf -10 +50%, 450 v. Same as C13	449633-15	99694
C33	Capacitor: fixed, mica, 6 mmf ±5%, 500 v	748252-306	204767
C34	Capacitor: fixed, mica, 150 mmf ±5%, 500 v	727853-227	99652
C35	Capacitor: fixed, mica, 62 mmf ±5%, 500 v	727853-218	204766
C36	Capacitor: fixed, mica, 820 mmf ±2%, 500 v	727863-345	52795
C37	Capacitor: fixed, mica, 6 mmf ±5%, 500 v. Same as C33	748252-306	204767
C38	Capacitor: fixed, mica, 150 mmf ±5%, 500 v. Same as C34	727853-227	99652
C39	Capacitor: fixed, paper, 0.22 mf ±10%, 400 v. Same as C15	737818-95	94904
C40	Capacitor: fixed, mica, 47 mmf ±5%, 500 v. Same as C21	727856-215	39620
C41	Capacitor: fixed, paper, 0.22 mf ±20%, 400 v. Same as C22	735715-129	73794
C42, C43	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v. Same as C23	737816-413	211508
C44	Not Used		
C45	Capacitor: fixed, mica, 100 mmf ±10%, 500 v	727851-123	98422
C46	Capacitor: variable, 7-45 mmf	984003-5	54221
C47	Capacitor: fixed, mica, 22 mmf ±10%, 500 v	727851-107	96998
C48	Capacitor: fixed, mica, 180 mmf ±10%, 500 v	727851-129	56745
C49	Capacitor: fixed, mica, 390 mmf ±10%, 500 v	727851-137	79988
C50	Capacitor: fixed, mica, 180 mmf ±10%, 500 v. Same as C48	727851-129	56745
C51	Capacitor: fixed, mica, 27 mmf ±10%, 500 v	727851-109	39614
C52	Capacitor: fixed, mica, 100 mmf ±10%, 500 v. Same as C45	727851-123	98422
C53	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v	737818-93	94915
C54	Capacitor: fixed, paper, 0.047 mf ±10%, 400 v	737818-91	99125
C55	Capacitor: fixed, mica, 82 mmf ±5%, 500 v	727856-221	39626
C56	Capacitor: fixed, mica, 39 mmf ±5%, 500 v	727856-213	39618
C57	Capacitor: fixed, mica, 100 mmf ±10%, 500 v	727856-123	39628
C58A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v. Same as C5	459614-1	99134
C59	Capacitor: fixed, paper, 0.01 mf ±10%, 400 v	735715-163	73561
C60	Capacitor: fixed, paper, 0.22 mf ±20%, 400 v. Same as C22	735715-129	73794

For ordering information see page 31

SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
C61	Capacitor: variable, 5-20 mmf	8824243-2	55301
C62	Capacitor: fixed, ceramic, 33 mmf ±5%, 500 v	90575-221	90015
C63	Capacitor: fixed, mica, 68 mmf ±5%, 500 v	727856-219	98947
C64	Capacitor: fixed, mica, 100 mmf ±10%, 500 v. Same as C57	727856-123	39628
C65	Capacitor: fixed, paper, 0.01 mf ±10%, 400 v. Same as C59	735715-163	73561
C66	Capacitor: fixed, paper, 0.22 mf ±20%, 400 v. Same as C22	735715-129	73794
C67	Capacitor: variable, 4.5-25 mmf	8817584-1	57602
C68	Capacitor: fixed, ceramic, 33 mmf ±5%, 500 v. Same as C62	90575-221	90015
C69	Capacitor: fixed, paper, 0.1 mf ±10%, 200 v	735715-75	73784
C70	Capacitor: fixed, ceramic, 12 mmf ±5%, 500 v. Same as C1	90575-211	70595
C71A/B/C	Capacitor: electrolytic, 10/10/10 mf -10 +50%, 450 v. Same as C5	459614-1	99134
C72	Capacitor: fixed, mica, 100 mmf ±10%, 500 v. Same as C57	727856-123	39628
C73	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v	735715-175	73551
C74	Capacitor: fixed, paper, 0.22 mf ±10%, 200 v. Same as C3	737818-55	97444
C75	Capacitor: variable, 7-45 mmf. Same as C46	984003-5	54221
C76	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v. Same as C73	735715-175	73551
C77	Capacitor: fixed, mica, 100 mmf ±10%, 500 v. Same as C57	727856-123	39628
C78A/B	Not Used		
C79	Capacitor: fixed, paper, 0.01 mf ±10%, 400 v. Same as C59	735715-163	73561
C80	Capacitor: fixed, mica, 150 mmf ±5%, 500 v. Same as C16	727856-227	39632
C81	Capacitor: fixed, paper, 0.047 mf ±10%, 200 v	735715-21	73558
C82	Capacitor: variable, 7-45 mmf. Same as C46	984003-5	54221
C83 to C86	Not Used		
C87	Capacitor: fixed, mica, 33 mmf ±5%, 500 v	727853-211	98146
C88	Capacitor: fixed, paper, 0.01 mf ±10%, 400 v. Same as C59	735715-163	73561
C89 to C97	Not Used		
C98	Capacitor: fixed, paper, 0.1 mf ±10%, 200 v. Same as C69	735715-75	73784
C99	Capacitor: fixed, paper, 6800 mmf ±10%, 400 v	737816-86	212287
C100, C101	Capacitor: fixed, paper, 0.1 mf ±10%, 200 v	737818-53	205184
C102 to C117	Not Used		
C118	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v. Same as C73	735715-175	73551
C119	Capacitor: fixed, paper, 1.0 mf ±10%, 400 v	8814169-3	210342
C120	Capacitor: variable, 8-50 mmf	258851-5	99446
C121	Capacitor: fixed, paper, 1.0 mf ±10%, 400 v. Same as C119	8814169-3	210342
C122	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v. Same as C73	735715-175	73551
C123A/B/C	Capacitor: electrolytic, 160/60/20 mf -10 +50%, 300 v	458558-8	98407
C124	Capacitor: fixed, ceramic, 3.3 mmf ±0.5 mmf, 500 v	8817564-401	205186
C125	Capacitor: fixed, mica, 220 mmf ±5%, 500 v	727858-231	39636
C126	Capacitor: variable, 7-45 mmf. Same as C46	984003-5	54221
C127	Capacitor: fixed, mica, 180 mmf ±5%, 500 v	727856-229	51416
C128	Capacitor: fixed, mica, 120 mmf ±5%, 500 v	727856-225	39630
C129	Not Used		
C130, C131	Capacitor: fixed, paper, 0.01 mf ±10%, 400 v. Same as C59	735715-163	73561
C132	Capacitor: fixed, paper, 0.001 mf ±10%, 600 v	735715-251	75643
C133	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v. Same as C73	735715-175	73551
C134	Capacitor: electrolytic, 20/20 mf -10 +50%, 450 v	459614-2	99295
C135	Capacitor: electrolytic, 250 mf -10 +50%, 300 v	458558-7	99340
C136	Capacitor: variable, 8-50 mmf. Same as C120	258851-5	99446
C137	Capacitor: fixed, paper, 0.01 mf ±10%, 400 v. Same as C59	735715-163	73561
C138	Capacitor: fixed, paper, 0.1 mf ±10%, 400 v. Same as C53	737818-93	94915
C139, C140	Capacitor: fixed, paper, 0.22 mf ±10%, 100 v	737818-15	98048
CR1	Rectifier: crystal, 1N34A		59395
DL1	Delay Line, 29" long	470661-501	
	Connector: male, coaxial, (for DL1)	252868-1	66344
DL2	Delay Line, 27" long	470661-502	
	Connector: male, coaxial, (for DL2)	252868-1	66344
F1	Fuse: 2 amp, 3 AG, slo-blo	8851771-10	93939
I1	Lamp: neon	872291-9	91749
I2	Lamp: pilot, 6.3 v	61114-22	31480
J1 to J10	Connector: coaxial	255223-1	51800
J11 to J13	Not Used		
J14	Connector: male, 6 contact	427017-6	99449
J15	Jack: tip, red	845648-2	54409
J16, J17	Jack: tip, blue	845648-4	99215
J18	Jack: tip, red. Same as J15	845648-2	54409
J19	Jack: tip, black	845648-1	18348
J20	Not Used		
J21	Jack: tip, black. Same as J19	845648-1	18348

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SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
J22, J23	Jack: tip, blue. Same as J16	845648-4	99215
J24	Connector: coaxial. Same as J1	255223-1	51800
J25	Jack: tip, black. Same as J19	845648-1	18348
J26 to J28	Not Used		
J29, J30	Jack: tip, ivory	845648-6	99217
J31 to J34	Connector: coaxial. Same as J1	255223-1	51800
J35	Jack: tip, black. Same as J19	845648-1	18348
J36 to J40	Connector: coaxial. Same as J1	255223-1	51800
J41	Jack: tip, red. Same as J15	845648-2	54409
J42	Jack: tip, black. Same as J19	845648-1	18348
J43	Jack: tip, green	845648-3	99214
J44, J45	Connector: coaxial. Same as J1	255223-1	51800
J46, J47	Jack: tip, black. Same as J19	845648-1	18348
J48 to J50	Jack: tip, red. Same as J15	845648-2	54409
J51 to J53	Not Used		
J54	Jack: tip, green. Same as J43	845648-3	99214
L1, L2	Coil: R. F. choke, 2.38 microhenry	8861360-1	204476
L3	Coil: peaking, adjustable, iron core	739772-501	52453
L4A/B	Coil: iron core, 918 microhenry	8866338-1	204768
L5, L6	Coil: R. F. choke, 279 microhenry	8817508-1	99300
L7A/B/C/D	Coil: non-metallic core Two windings 1.19 microhenry each Two windings 3.39 microhenry each	8818809-1	99303
L8	Coil: peaking, 36 microhenry	940144-5	71793
L9	Coil: air core, 15 millihenry	8831776-501	95173
L10	Coil: peaking, adjustable, iron core. Same as L3	739772-501	52453
L11	Coil: R. F. choke, 13 microhenry	8816186-1	99299
L12A/B	Coil: peaking, adjustable, iron core	739772-507	52454
L13, L14	Coil: R. F. choke, 13 microhenry. Same as L11	8816186-1	99299
L15A/B	Coil: peaking, adjustable, iron core	739772-515	99410
L16	Coil: R. F. choke, 13 microhenry. Same as L11	8816186-1	99299
L17	Coil: peaking, 6 microhenry	8825473-503	210343
P1 to P6	Connector: coaxial	252868-1	66344
P7	Connector: coaxial termination	8909771-501	210715
P8	Connector: coaxial. Same as P1	252868-1	66344
P9	Connector: coaxial termination. Same as P7	8909771-501	210715
P10	Connector: coaxial. Same as P1	252868-1	66344
P11 to P13	Not Used		
P14	Connector: female, 6 contact	727969-4	51607
P15 to P23	Not Used		
P24	Connector: coaxial. Same as P1	252868-1	66344
P25 to P30	Not Used		
P31 to P34	Connector: coaxial. Same as P1	252868-1	66344
P35	Not Used		
P36 to P40	Connector: coaxial. Same as P1	252868-1	66344
P41 to P43	Not Used		
P44	Connector: coaxial termination. Same as P7	8909771-501	210715
P45	Connector: coaxial. Same as P1	252868-1	66344
R1	Resistor: fixed, composition, 120 ohm ±5%, 1/2 w	82283-137	502112
R2	Resistor: variable, 200 ohm ±10%, 2 w	433196-9	52598
R3	Resistor: fixed, composition, 10,000 ohm ±5%, 1 w	90496-183	512310
R4	Resistor: fixed, composition, 2960 ohm ±1%, 1 w	8898693-298	99081
R5	Resistor: fixed, composition, 5840 ohm ±1%, 1 w	8898693-303	99076
R6	Resistor: fixed, composition, 15,900 ohm ±1%, 1 w	8898693-304	99075
R7	Resistor: fixed, composition, 75 ohm ±5%, 1/2 w	82283-132	502075
R8	Resistor: fixed, composition, 82 ohm ±5%, 1/2 w	82283-133	502082
R9	Resistor: fixed, composition, 1800 ohm ±1%, 1 w	984081-165	94888
R10	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w	82283-98	502510
R11, R12	Resistor: fixed, composition, 100 ohm ±5%, 1 w	90496-135	512110
R13	Resistor: fixed, composition, 56,000 ohm ±10%, 2 w	99126-83	28741
R14	Resistor: fixed, composition, 10,000 ohm ±10%, 2 w	99126-74	522310
R15	Resistor: fixed, composition, 1000 ohm ±1%, 1 w	990187-301	57241
R16	Resistor: fixed, composition, 953 ohm ±1%, 1 w	990187-295	99083
R17	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R18	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w	82283-50	502110
R19	Resistor: fixed, composition, 240 ohm ±5%, 1/2 w	82283-144	30619
R20	Resistor: fixed, composition, 100 ohm ±10%, 1 w	90496-50	512110
R21	Resistor: fixed, composition, 68 ohm ±5%, 1 w	90496-131	512068

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SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
R22	Resistor: fixed, composition, 75 ohm ±5%, 1/2 w. Same as R7	82283-132	502075
R23	Resistor: fixed, composition, 82 ohm ±5%, 1/2 w. Same as R8	82283-133	502082
R24	Resistor: fixed, composition, 750 ohm ±1%, 1 w	990187-285	205106
R25	Resistor: variable, 10,000 ohm ±10%, 2 w	433196-6	68833
R26	Resistor: fixed, composition, 1000 ohm ±5%, 1 w	90496-159	512210
R27	Resistor: fixed, composition, 3160 ohm ±1%, 1 w	990187-349	205107
R28	Resistor: fixed, composition, 2740 ohm ±1%, 1 w	990187-343	205108
R29	Resistor: fixed, composition, 4420 ohm ±1%, 1 w	990187-363	205109
R30	Resistor: fixed, composition, 301 ohm ±1%, 1 w	990187-247	205105
R31	Resistor: fixed, composition, 5100 ohm ±5%, 1 w	90496-176	512251
R32	Resistor: fixed, composition, 560,000 ohm ±10%, 1 w	90496-95	512456
R33	Resistor: fixed, composition, 270,000 ohm ±5%, 1 w	90496-217	512427
R34	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R35	Resistor: fixed, composition, 604 ohm ±1%, 1 w	990187-276	205163
R36	Resistor: fixed, composition, 15,000 ohm ±10%, 2 w	99126-76	522315
R37	Resistor: fixed, composition, 82,000 ohm ±5%, 1 w	90496-205	512382
R38	Resistor: fixed, composition, 1020 ohm ±1%, 1 w	990187-302	205164
R39	Resistor: variable, 1000 ohm ±10%, 2 w	433196-8	206913
R40	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R41	Resistor: fixed, composition, 100 ohm ±5%, 1 w. Same as R11	90496-135	512110
R42	Resistor: fixed, composition, 270 ohm ±5%, 1 w	90496-145	512127
R43	Resistor: fixed, composition, 47,000 ohm ±5%, 2 w	99126-199	522347
R44	Resistor: fixed, composition, 1600 ohm ±5%, 1 w	90496-164	512216
R45	Resistor: fixed, composition, 5100 ohm ±5%, 1/2 w	82283-176	3413
R46	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R47	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R48, R49	Resistor: fixed, composition, 1000 ohm ±5%, 2 w	99126-159	522210
R50	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R51	Resistor: variable, 250 ohm ±10%, 2 w	433196-49	99084
R52	Resistor: fixed, composition, 620 ohm ±5%, 1 w	90496-154	59488
R53	Resistor: variable, 1000 ohm ±10%, 2 w	427471-31	98956
R54 to R57	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R58	Resistor: fixed, composition, 1500 ohm ±5%, 1 w	90496-163	512215
R59	Resistor: fixed, composition, 100,000 ohm ±5%, 1/2 w	82283-207	502410
R60	Resistor: fixed, composition, 100 ohm ±5%, 1 w. Same as R11	90496-135	512110
R61	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R62 to R64	Resistor: fixed, composition, 75 ohm ±5%, 1/2 w. Same as R7	82283-132	502075
R65	Not Used		
R66	Resistor: fixed, composition, 301 ohm ±1%, 1 w. Same as R30	990187-247	205105
R67	Resistor: fixed, composition, 1000 ohm ±5%, 1 w. Same as R26	90496-159	512210
R68	Resistor: variable, 10,000 ohm ±10%, 2 w. Same as R25	433196-6	68833
R69	Resistor: fixed, composition, 750 ohm ±1%, 1 w. Same as R24	990187-285	205106
R70	Resistor: fixed, composition, 560,000 ohm ±10%, 1/2 w	82283-95	502456
R71	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R72	Resistor: fixed, composition, 15,000 ohm ±10%, 2 w. Same as R36	99126-76	522315
R73	Resistor: fixed, composition, 82,000 ohm ±5%, 1 w. Same as R37	90496-205	512382
R74	Resistor: fixed, composition, 2610 ohm ±1%, 1 w	990187-341	205110
R75	Resistor: fixed, composition, 3830 ohm ±1%, 1 w	990187-357	205111
R76, R77	Resistor: fixed, composition, 75 ohm ±5%, 1/2 w. Same as R7	82283-132	502075
R78	Resistor: fixed, composition, 4020 ohm ±1%, 1 w	990187-359	205112
R79	Resistor: fixed, composition, 604 ohm ±1%, 1 w. Same as R35	990187-276	205163
R80	Resistor: fixed, composition, 1070 ohm ±1%, 1 w	990187-304	99082
R81, R82	Resistor: fixed, composition, 2200 ohm ±5%, 1/2 w	82283-167	502222
R83	Resistor: variable, 1000 ohm ±10%, 2 w. Same as R39	433196-8	206913
R84	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R85	Resistor: fixed, composition, 100 ohm ±5%, 1 w. Same as R11	90496-135	512110
R86	Resistor: fixed, composition, 270 ohm ±5%, 1 w. Same as R42	90496-145	512127
R87	Resistor: fixed, composition, 1600 ohm ±5%, 1 w. Same as R44	90496-164	512216
R88	Resistor: fixed, composition, 100 ohm ±10%, 1 w. Same as R20	90496-50	512110

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SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
R89	Resistor: fixed, composition, 47,000 ohm ±5%, 2 w. Same as R43	99126-199	522347
R90	Resistor: fixed, composition, 100 ohm ±10%, 1 w. Same as R20	90496-50	512110
R91	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R92	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R93, R94	Resistor: fixed, composition, 1000 ohm ±5%, 2 w. Same as R48	99126-159	522210
R95	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R96	Resistor: variable, 250 ohm ±10%, 2 w	433196-49	99084
R97	Resistor: fixed, composition, 620 ohm ±5%, 1 w. Same as R52	90496-154	59488
R98, R99	Resistor: fixed, composition, 27,000 ohm ±5%, 2 w	99126-193	522327
R100	Resistor: variable, 1000 ohm ±10%, 2 w. Same as R53	427471-31	98956
R101	Resistor: fixed, composition, 33,000 ohm ±5%, 1 w	90496-195	512333
R102 to R105	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R106, R107	Not Used		
R108	Resistor: fixed, composition, 56,000 ohm ±10%, 2 w. Same as R13	99126-83	28741
R109	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R110	Resistor: fixed, composition, 100 ohm ±5%, 1 w. Same as R11	90496-135	512110
R111	Resistor: fixed, composition, 6800 ohm ±5%, 1 w	90496-179	512268
R112	Resistor: fixed, composition, 68,000 ohm ±5%, 1 w	90496-203	512368
R113	Resistor: fixed, composition, 75 ohm ±5%, 1 w	90496-132	512075
R114	Resistor: variable, 5000 ohm ±10%, 2 w	433196-7	68844
R115	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R116	Resistor: fixed, composition, 1000 ohm ±10%, 1 w	90496-62	512210
R117	Resistor: fixed, composition, 36,000 ohm ±5%, 1 w	90496-196	512336
R118	Resistor: fixed, composition, 180 ohm ±5%, 1/2 w	82283-141	502118
R119	Resistor: fixed, composition, 150 ohm ±5%, 1 w	90496-139	512115
R120	Resistor: fixed, composition, 100,000 ohm ±10%, 1/2 w	82283-86	502410
R121, R122	Resistor: fixed, composition, 100 ohm ±5%, 1 w. Same as R11	90496-135	512110
R123	Resistor: fixed, composition, 22,000 ohm ±5%, 1 w	90496-191	512322
R124	Resistor: fixed, composition, 8200 ohm ±5%, 1/2 w	82283-181	502282
R125	Resistor: fixed, composition, 100 ohm ±10%, 1 w. Same as R20	90496-50	512110
R126	Resistor: fixed, composition, 150 ohm ±5%, 1 w. Same as R119	90496-139	512115
R127	Resistor: fixed, composition, 100,000 ohm ±10%, 1/2 w. Same as R120	82283-86	502410
R128, R129	Resistor: fixed, composition, 100 ohm ±5%, 1 w. Same as R11	90496-135	512110
R130	Resistor: fixed, composition, 22,000 ohm ±5%, 1 w. Same as R123	90496-191	512322
R131	Resistor: fixed, composition, 8200 ohm ±5%, 1/2 w. Same as R124	82283-181	502282
R132	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R133	Resistor: fixed, composition, 2200 ohm ±10%, 1 w	90496-66	512222
R134	Resistor: variable, 5000 ohm ±10%, 2 w. Same as R114	433196-7	68844
R135	Resistor: fixed, composition, 27,000 ohm ±10%, 1 w	90496-79	512327
R136, R137	Resistor: fixed, composition, 100,000 ohm ±10%, 1/2 w. Same as R120	82283-86	502410
R138	Resistor: fixed, composition, 220 ohm ±5%, 1 w	90496-143	512122
R139	Resistor: fixed, composition, 2200 ohm ±10%, 1 w. Same as R133	90496-66	512222
R140	Resistor: fixed, composition, 47,000 ohm ±5%, 1 w	90496-199	512347
R141	Resistor: fixed, composition, 22,000 ohm ±5%, 1 w. Same as R123	90496-191	512322
R142	Resistor: fixed, composition, 1000 ohm ±5%, 1/2 w	82283-159	502210
R143	Resistor: fixed, composition, 330 ohm ±10%, 1 w	90496-56	512133
R144	Resistor: fixed, composition, 100,000 ohm ±10%, 1/2 w. Same as R120	82283-86	502410
R145	Not Used		
R146	Resistor: fixed, composition, 100 ohm ±5%, 1 w. Same as R11	90496-135	512110
R147	Resistor: fixed, composition, 330 ohm ±10%, 1 w. Same as R143	90496-56	512133
R148	Resistor: fixed, composition, 27,000 ohm ±10%, 2 w	99126-79	522327
R149	Resistor: fixed, composition, 680 ohm ±5%, 2 w	99126-155	522168

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SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
R150	Resistor: fixed, composition, 3000 ohm ±5%, 1 w	90496-170	47234
R151	Not Used		
R152, R153	Resistor: fixed, composition, 100,000 ohm ±1%, 1 w	990187-501	207032
R154	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R155	Resistor: fixed, composition, 330,000 ohm ±10%, 1 w	90496-92	512433
R156	Resistor: fixed, composition, 470,000 ohm ±10%, 1/2 w	82283-94	502447
R157	Resistor: fixed, composition, 330,000 ohm ±10%, 1 w. Same as R155	90496-92	512433
R158 to R161	Not Used		
R162	Resistor: fixed, composition, 4700 ohm ±5%, 1/2 w	82283-175	502247
R163, R164	Not Used		
R165	Resistor: fixed, composition, 68,000 ohm ±5%, 1 w. Same as R112	90496-203	512368
R166, R167	Not Used		
R168	Resistor: fixed, composition, 68,000 ohm ±5%, 2 w	99126-203	522368
R169	Resistor: fixed, composition, 510 ohm ±5%, 1 w	90496-152	512151
R170	Resistor: variable, 1000 ohm ±10%, 2 w. Same as R39	433196-8	206913
R171	Resistor: fixed, composition, 510 ohm ±5%, 1 w. Same as R169	90496-152	512151
R172 to R175	Not Used		
R176	Resistor: variable, 1000 ohm ±10%, 2 w. Same as R39	433196-8	206913
R177, R178	Not Used		
R179	Resistor: fixed, composition, 470 ohm ±10%, 1 w	90496-58	512147
R180 to R182	Not Used		
R183	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R184	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R185	Resistor: fixed, composition, 1000 ohm ±5%, 1 w. Same as R26	90496-159	512210
R186	Not Used		
R187 to R190	Resistor: fixed, composition, 100,000 ohm ±1%, 1 w. Same as R152	990187-501	207032
R191, R192	Resistor: fixed, composition, 100 ohm ±5%, 1/2 w	82283-135	502110
R193	Resistor: fixed, composition, 220,000 ohm ±5%, 1 w	90496-215	512422
R194	Resistor: fixed, composition, 68,000 ohm ±5%, 1 w. Same as R112	90496-203	512368
R195	Resistor: fixed, composition, 15,000 ohm ±5%, 2 w	99126-187	522315
R196	Resistor: variable, carbon, 500 ohm ±10%, 2 w	433196-36	205063
R197	Resistor: fixed, composition, 1200 ohm ±5%, 1 w	90496-161	512212
R198	Resistor: fixed, composition, 15,000 ohm ±5%, 2 w. Same as R195	99126-187	522315
R199	Resistor: fixed, composition, 47 ohm ±5%, 1/2 w	82283-127	502047
R200, R201	Resistor: fixed, composition, 27,000 ohm ±10%, 2 w. Same as R148	99126-79	522327
R202	Resistor: fixed, composition, 1.0 megohm ±5%, 1/2 w	82283-231	502510
R203	Resistor: fixed, composition, 82 ohm ±5%, 1/2 w. Same as R8	82283-133	502082
R204	Resistor: fixed, composition, 160 ohm ±5%, 1/2 w	82283-140	502116
R205	Resistor: fixed, composition, 12,000 ohm ±10%, 2 w	99126-75	522312
R206	Resistor: fixed, composition, 150 ohm ±5%, 1/2 w	82283-139	502115
R207	Resistor: fixed, composition, 47 ohm ±5%, 1/2 w. Same as R199	82283-127	502047
R208	Resistor: fixed, composition, 10 ohm ±10%, 1 w	90496-38	512010
R209	Resistor: fixed, composition, 220 ohm ±5%, 1 w. Same as R138	90496-143	512122
R210, R211	Resistor: fixed, composition, 22 ohm ±10%, 1/2 w	82283-42	502022
R212	Resistor: fixed, composition, 1.0 megohm ±10%, 1/2 w. Same as R10	82283-98	502510
R213	Resistor: fixed, composition, 27,000 ohm ±5%, 1 w	90496-193	512327
R214	Resistor: fixed, composition, 150,000 ohm ±5%, 1 w	90496-211	512415
R215	Resistor: fixed, composition, 9100 ohm ±5%, 1 w	90496-182	3155
R216	Resistor: fixed, composition, 220 ohm ±5%, 1/2 w	82283-143	502122
R217 to R219	Resistor: fixed, composition, 110 ohm ±5%, 1/2 w	82283-136	37968
R220, R221	Resistor: fixed, composition, 220 ohm ±5%, 1/2 w. Same as R216	82283-143	502122
R222	Resistor: fixed, composition, 15,000 ohm ±5%, 2 w. Same as R195	99126-187	522315
R223	Resistor: fixed, composition, 750,000 ohm, part of XII		
R224 to R230	Not Used		

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SYMBOL NO.	DESCRIPTION	DRAWING NO.	STOCK NO.
R231, R232	Resistor: fixed, wire wound, 2500 ohm ±5%, 5 w	458572-60	52743
R233	Resistor: fixed, composition, 100 ohm ±10%, 1 w. Same as R20	90496-50	512110
R234	Not Used		
R235	Resistor: fixed, composition, 15,000 ohm ±5%, 2 w. Same as R195	99126-187	522315
R236	Not Used		
R237	Resistor: fixed, composition, 330 ohm ±5%, 1 w	90496-147	512133
R238	Resistor: fixed, composition, 43 ohm ±5%, 1/2 w	82283-126	502043
R239	Resistor: fixed, composition, 39 ohm ±5%, 1/2 w	82283-125	502039
R240	Resistor: fixed, composition, 220 ohm ±5%, 1/2 w. Same as R216	82283-143	502122
R241	Resistor: fixed, composition, 220 ohm ±5%, 1 w. Same as R138	90496-143	512122
R242, R243	Resistor: fixed, composition, 100 ohm ±10%, 1/2 w. Same as R18	82283-50	502110
R244	Resistor: fixed, composition, 10 ohm ±10%, 1/2 w	82283-38	502010
R245	Resistor: fixed, composition, 150 ohm ±5%, 1/2 w. Same as R206	82283-139	502115
R246	Resistor: fixed, composition, 43 ohm ±5%, 1/2 w. Same as R238	82283-126	502043
S1, S2	Not Used		
S3 to S6	Switch: DPDT	95559-5	93263
S7	Switch: selector	8865160-1	30155
S8	Switch: rotary	465069-1	99208
T1	Transformer: coupling	8861357-501	204475
T2	Transformer: phase splitting, subcarrier	462299-502	98985
T3	Transformer: output	8818888-501	99693
T4	Transformer: phase splitting, subcarrier. Same as T2	462299-502	98985
T5	Transformer: pulse	949425-1	94634
T6	Transformer: bias and filament supply	949718-1	205125
XF1	Holder: fuse	99088-2	48894
XI1	Socket: indicator light	8856946-7	
	Socket - (for XI1)		56610
	Jewel - red (for XI1)		56612
XI2	Socket: pilot lamp	8876203-7	
	Socket - (for XI2)		56100
	Jewel - clear (for XI2)		208080
XT5	Socket: transformer, 8 pin	99100-4	68590
XV1	Socket: tube	99100-4	68590
XV2 to XV4	Socket: tube	737870-18	94880
XV5	Socket: tube. Same as XV1	99100-4	68590
XV6	Socket: tube. Same as XV2	737870-18	94880
XV7 to XV11	Socket: tube	737867-18	94879
XV12	Socket: tube. Same as XV2	737870-18	94880
XV13, XV14	Socket: tube. Same as XV7	737867-18	94879
XV15	Socket: tube. Same as XV2	737870-18	94880
XV16, XV17	Socket: tube. Same as XV7	737867-18	94879
XV18	Socket: tube. Same as XV2	737870-18	94880
XV19 to XV31	Socket: tube. Same as XV7	737867-18	94879
	MISCELLANEOUS		
	Knob: red (for R25, R29)	8849946-1	99244
	Knob: blue (for R68, R83, R176)	8849946-3	99246
	Knob: black (for S8, R2, R114, R134, R195)	721336-507	30075
	Plate: capacitor mounting, phenolic (for C12, C30)	85558-2	28452
	Plate: capacitor mounting, phenolic (for C14, C31)	85558-1	19820
	Plate: capacitor mounting, steel (for C5, C17, C71, C58, C10)	85559-2	18468
	Plate: capacitor mounting, phenolic (for C106, C114)	85558-3	18469
	Plate: capacitor mounting, steel (for C25)	85559-3	19984
	Plate: capacitor mounting, phenolic (for C108)	8829890-1	99451
	Shield: tube (for V30, V31)	99369-2	54521

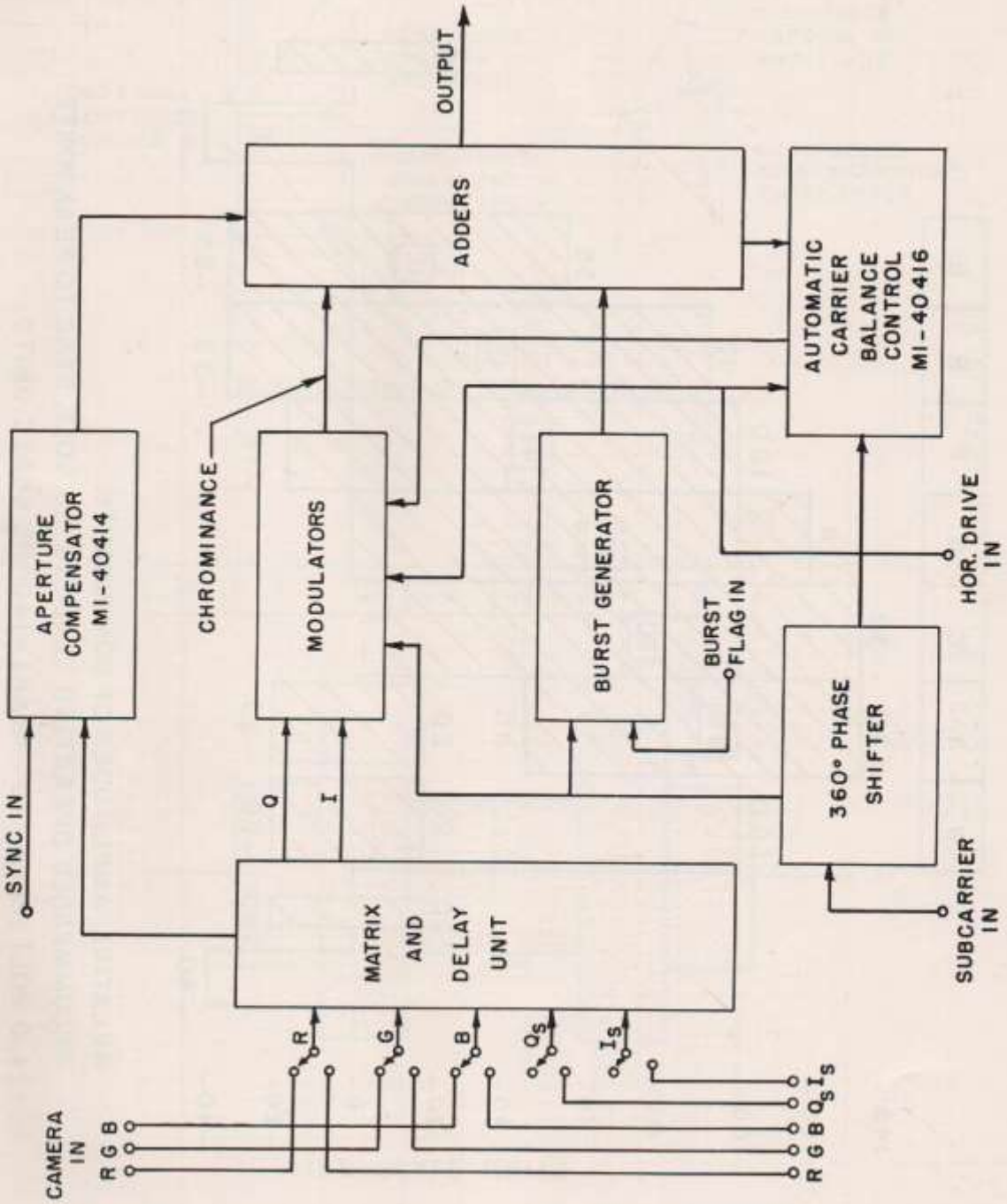

Figure 8. Simplified Block Diagram, TX-1C Colorplexer (477658 Sub 0)

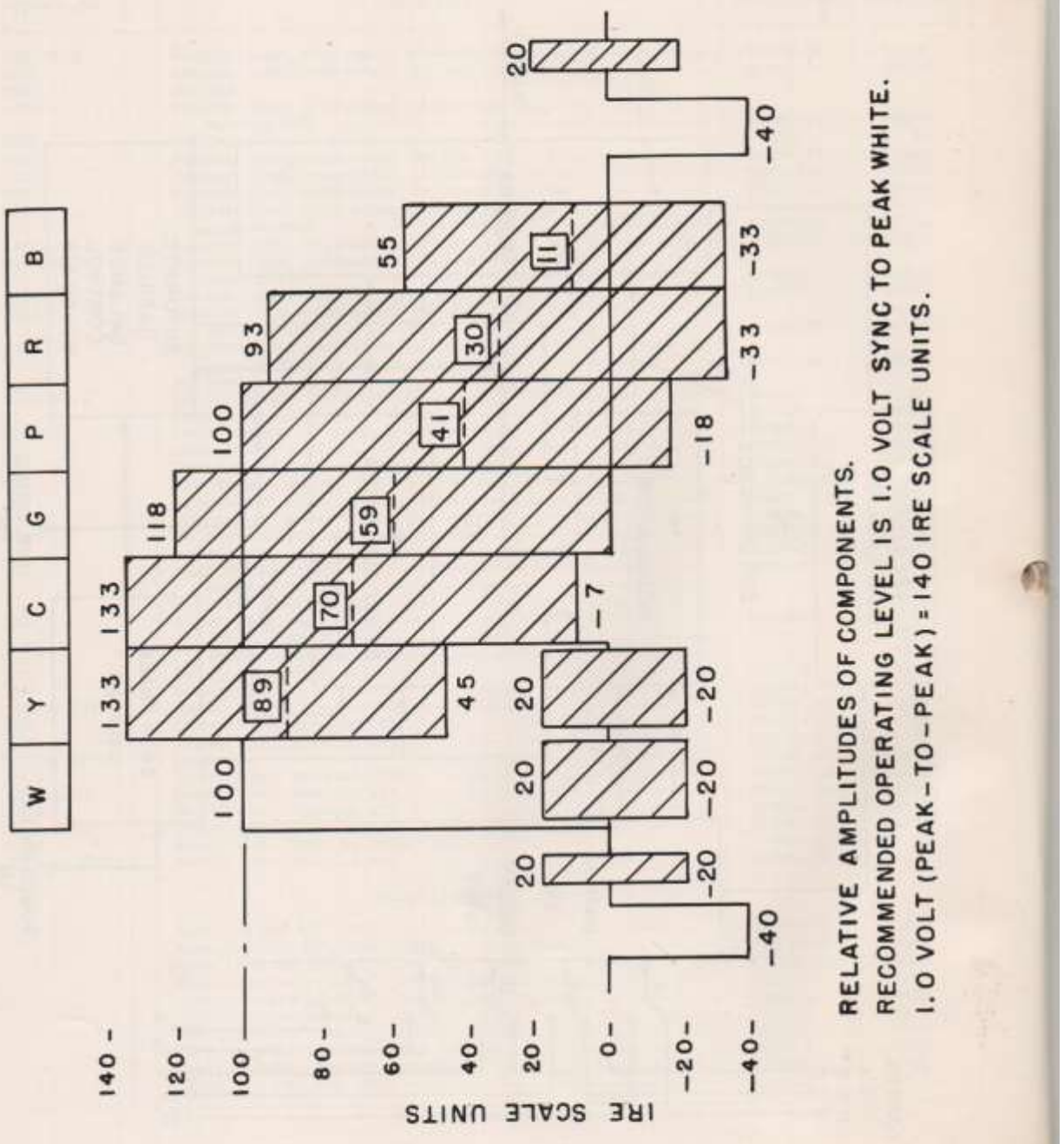

Figure 9. Waveform of Colorplexer Color Bar Video (477657 Sub 0)

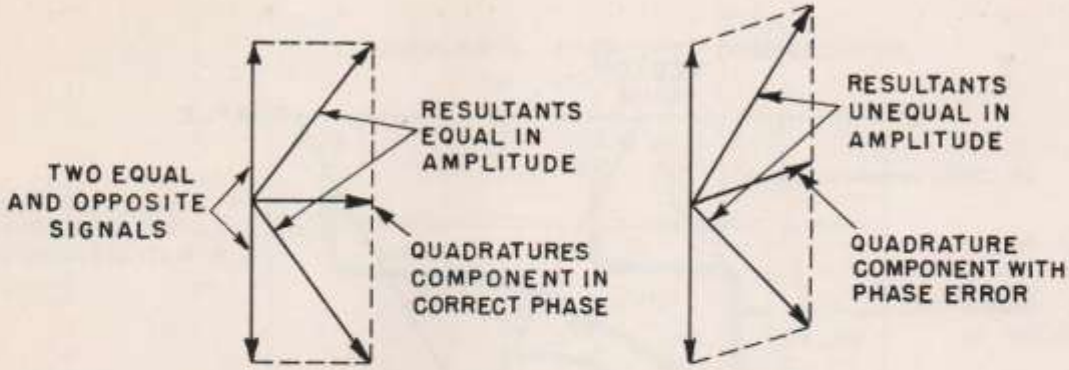

Figure 10. I and Q Phasing (473179 Sub 0)

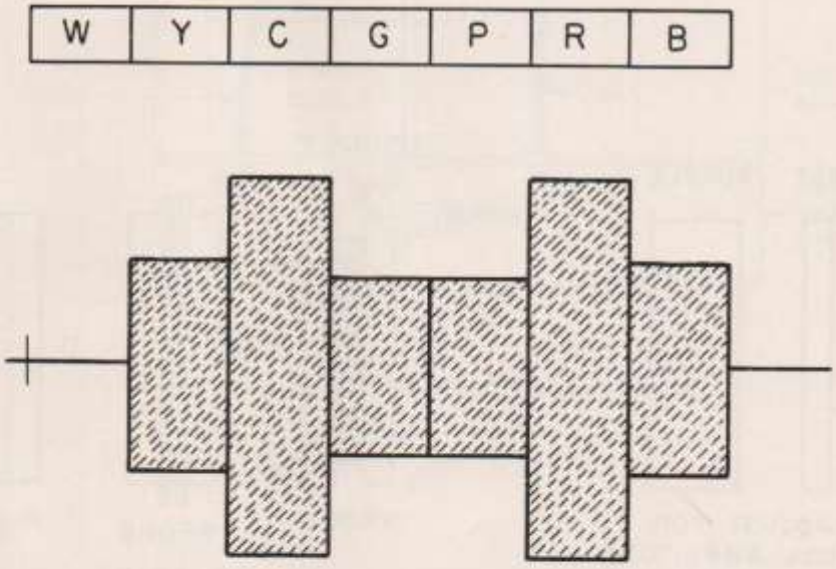

Figure 11. I Modulated Signal Correctly Phased (473179 Sub 0)

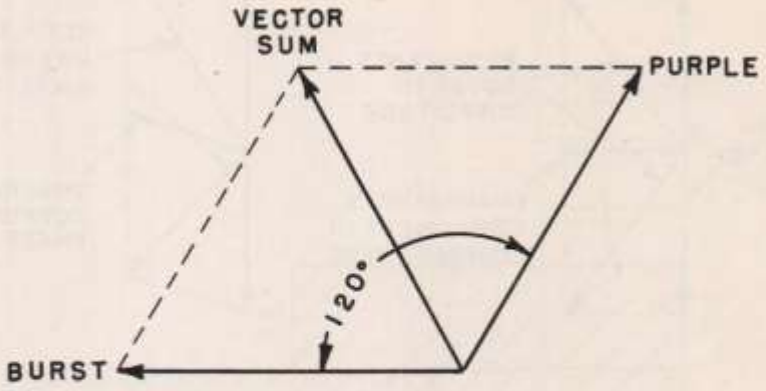

Figure 12. Burst Phasing (473180 Sub 0)

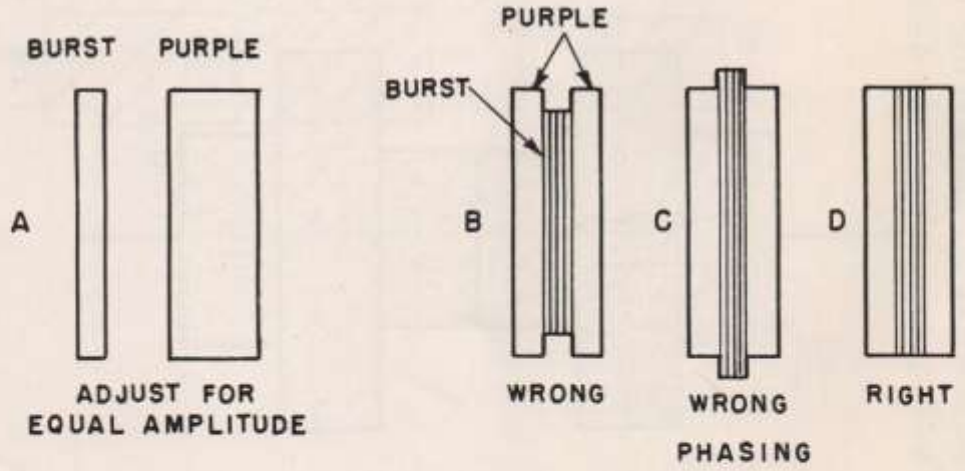

Figure 13. Burst Phasing Adjustment (473180 Sub 0)

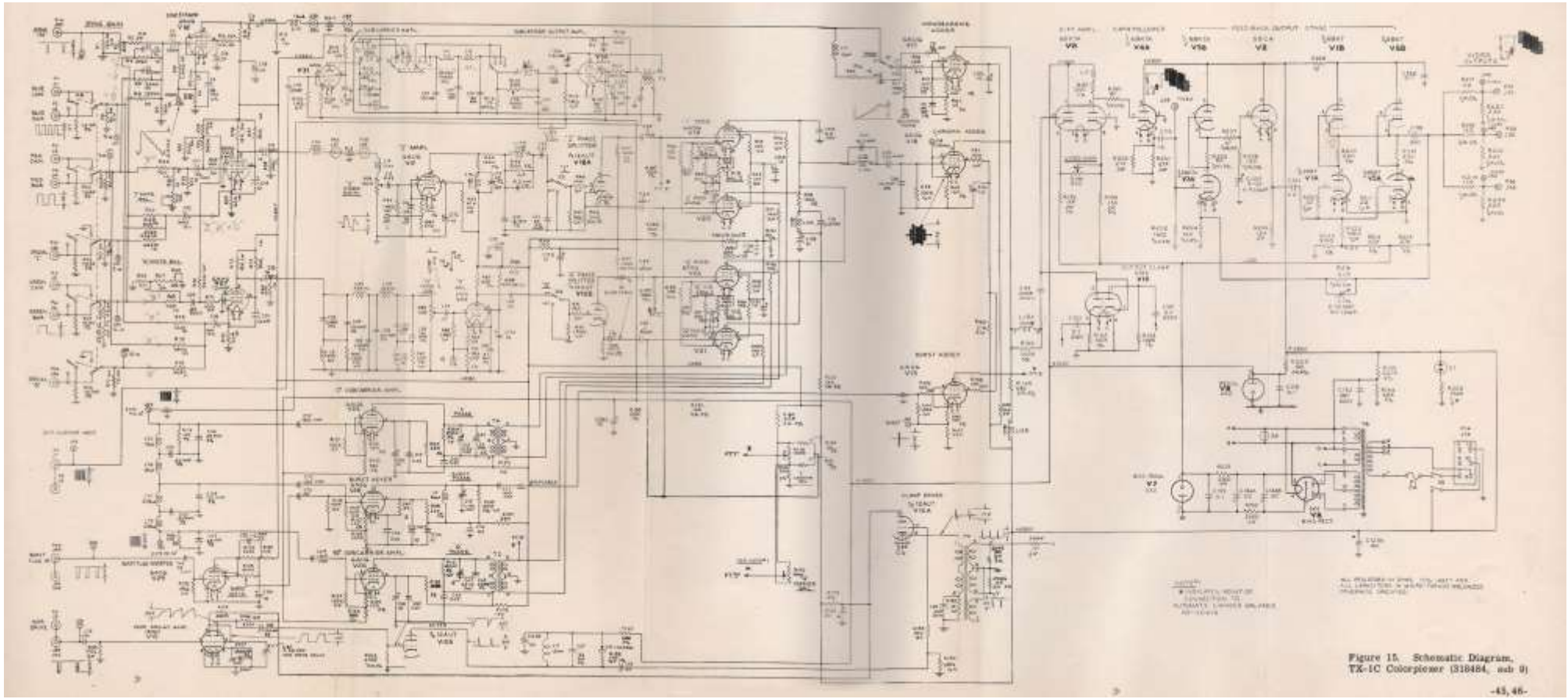

Figure 15. Schematic Diagram, TX-1C Colorplexer (318484, sub 9)

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