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BROADCAST AND TELEVISION EQUIPMENT

RCA

Instructions

RADIO CORPORATION OF AMERICA, Industrial Electronic Products

TM-27

COLOR MONITORS

Tmk's ®

IB-31677

EQUIPMENT LOST OR DAMAGED IN TRANSIT

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign it until you have (a) inspected the containers for visible signs of damage and (b) counted the containers and compared with the amount shown on the shipping papers. If a shortage or if evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt.

Report all shortages and damages to RCA, Broadcast and Television Department, Camden 2, N. J.

Radio Corporation of America will file all claims for loss and damage on this equipment so long as the inspection report is obtained. Disposition of the damaged item will be furnished by RCA.

REPLACEMENT PARTS AND ENGINEERING SERVICE

RCA field engineering service is available at current rates. Requests for field engineering service may be addressed to your RCA Broadcast Field Representative or the RCA Service Company, Inc., Broadcast Service Division, Camden, N. J. Telephone: WOodlawn 3-8000.

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 and electron tube ordering instructions according to your geographical location.

SERVICE PARTS

LOCATION	ORDER SERVICE PARTS FROM:
Continental United States, including Alaska and Hawaii	RCA Electron Tube Division, Parts and Equipment, P.O. Box 654, Camden, New Jersey or through your nearest RCA Regional Office. Emergency orders may be telephoned, telegraphed, or teletyped to RCA Emergency Service, Bldg. 60, Camden, N. J. (Telephone: WO 3-8000).
Dominion of Canada	RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec or through your local Sales Representative or his office.
Outside of Continental United States, Alaska, Hawaii and the Dominion of Canada	RCA International Division, Clark, N. J., U.S.A. or through your local Sales Representative.

ELECTRON TUBES

LOCATION	ORDER ELECTRON TUBES FROM:
Continental United States, including Alaska and Hawaii	Local RCA Tube Distributor.
Dominion of Canada	RCA Victor Company Limited, 1001 Lenoir Street, Montreal, Quebec or through your local Sales Representative or his office.
Outside of Continental United States, Alaska, Hawaii and the Dominion of Canada	Local RCA Tube Distributor or from: Tube Department RCA International Division 30 Rockefeller Plaza New York 20, New York, U.S.A.

RETURN OF ELECTRON TUBES

If for any reason, it is desired to return tubes, please return them through your local RCA tube distributor, RCA Victor Co. Ltd., or RCA International Div., depending on your location.

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.

LIST OF RCA REGIONAL OFFICES

Atlanta 3, Georgia
1121 Rhodes-Haverty Bldg.
134 Peachtree St. N.W.
JAckson 4-7703

Boston 16, Mass.
Room 2301, John Hancock Bldg.
200 Berkley St.
HUbbard 2-1700

Chicago 54, Ill.
1186 Merchandise Mart Plaza
DElaware 7-0700

Cleveland 15, Ohio
1600 Keith Bldg.
CHerry 1-3450

Dallas 35, Texas
7901 Empire Freeway
FLeetwood 2-3911

Hollywood 28, Calif.
RCA Bldg., 1560 N. Vine St.
HOllywood 9-2154

Kansas City 6, Missouri
340 Home Savings Bldg.
HArrison 1-6480

New York 20, New York
36 W. 49th St.
JUdson 6-3800

Branch—San Francisco 2, Calif.
420 Taylor St.
ORdway 3-8027

Seattle, Washington
2250 First Ave., S.
MAin 2-8350

INSTRUCTIONS

Color Monitors

TM-27C	**TM-27AC**
MI-40232	**MI-40232-A**
TM-27R	**TM-27AR**
MI-40231	**MI-40231-A**

RADIO CORPORATION OF AMERICA
INDUSTRIAL ELECTRONIC PRODUCTS, CAMDEN, N. J.

Printed in U.S.A.

IB-31677

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

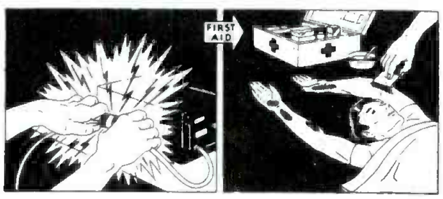
Personnel engaged in the installation, operation and maintenance of this equipment or similar equipment are urged to become familiar with the following rules both in theory and in the practical application thereof. It is the duty of every radioman to be prepared to give adequate First Aid and thereby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

FIGURE 3

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 4

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.

FIGURE 5

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.

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 seems assured.

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LIST OF ILLUSTRATIONS

17″ Cabineted Color Monitor, Front View

EQUIPMENT

TM-27C, 17" Cabinet Monitor, includes the chassis, kinescope and all tubes in place, mounted in the cabinet. The front is finished in deep umber gray textured vinyl. The sides and top are finished in light gray textured vinyl. The monitor is equipped with carrying handles.

TM-27AC, 17" Cabinet Monitor, includes the chassis, kinescope and all tubes in place, mounted in the cabinet. The front, top and sides are finished in midnite blue textured vinyl. The monitor is equipped with carrying handles.

TM-27R, 17" Rack Monitor, includes the chassis, kinescope and all tubes in place, and is equipped with slides and hardware for mounting in a standard 19" relay rack. A set of mounting angles and hardware, MI-30527-G29, is included. Sides, top and carrying handles are not furnished. The front is finished in deep umber gray textured vinyl.

TM-27AR, 17" Rack Monitor, includes the chassis, kinescope and all tubes in place, and is equipped with slides and hardware for mounting in a standard 19" relay rack. A set of mounting angles and hardware, MI-30527-G29, is included. Sides, top and carrying handles are not furnished. The front is finished in aluminum vinyl.

The rack mounting installation drawing on page 56 describes the manner in which the rack mounted units may be installed in a standard relay rack.

TECHNICAL SUMMARY

ELECTRICAL SPECIFICATIONS

Input Power:	105-130 volts, 50/60 cycles, 350 watts, 3-wire line cord, 6 feet long with twist lock disconnect furnished. Primary Fuse: 4 amperes, 3AG slo-blo Power Connector: Hubbell #7486
Input Signals:	Composite Video: 0.25 volts peak-to-peak minimum Non-Composite: 0.20 volts peak-to-peak minimum Sync: 3 - 8 volts peak-to-peak
Input Impedance:	Video: High impedance bridging. Can be terminated by an internal 75 ohm load through a switch located on rear apron, parallel co-ax input connectors Sync: High impedance, 3 - 8 volts peak-to-peak, sync negative, parallel co-ax input connectors
Video Frequency Response:	Flat to 5 mc in black-and-white position. A 3.58 mc trap is automatically switched-in during color operation while frequencies above 3.58 mc are rolled off. Variable aperture correction from front panel control.
Linearity:	Within 2% of picture height

MECHANICAL SPECIFICATIONS

MODEL	WIDTH	HEIGHT	LENGTH	NET WEIGHT	SHIPPING WEIGHT
17" Cabinet Monitor	19"	21"	$22\frac{1}{2}$"	101 Lbs.	120 Lbs.
17" Rack-Mounted Monitor	19"	21"	$22\frac{1}{2}$"	94 Lbs.	115 Lbs.

TUBE COMPLEMENT

SYMBOL	TYPE	FUNCTION
4V1	6EB8	Red Video Output
4V2	5751/12AX7	Clamp
4V3	6DJ8	Clamp Pulse Generator
4V21	6EB8	Green Video Output
4V22	5751/12AX7	Clamp
4V41	6EB8	Blue Video Output
4V42	5751/12AX7	Clamp
5V1	6EM7	Vertical Discharge and Output
5V2	6BV8	Horizontal AFC
5V3	6FQ7	Horizontal Oscillator
5V4	6DQ5	Horizontal Output
5V5	3A3	High Voltage Rectifier
5V6	1V2	Focus Rectifier
5V7	6DW4	Damper
5V8	6BK4	High Voltage Regulator
7V1	6080	Power Supply Regulator
7V2	6080	Power Supply Regulator
7V3	6AU6	Power Supply Regulator Amplifier
7V4	6BL8	Power Supply Regulator Amplifier
7V5	5651A	Voltage Reference
8V1	12AU7	Blanking Mixer
8V2	17EJP22	Color Kinescope

DIODES

SYMBOL	TYPE
2D1 to 2D4	1N916
2D5 to 2D6	V939
2D7	1N456
2D8 to 2D10	1N67A
3D1 to 3D3	1N67A
4D1	1N1763
6D1 to 6D3	ED0041B
7D1 to 7D2	1N3196
7D3 to 7D14	1N1763
7D50	1N756
7D51	1N456
7D52	1N751
7D53	1N3253
7D54	1N756
7D55	1N456
7D56	1N751
7D57	1N2982A
8D1	1N1763

TRANSISTOR COMPLEMENT

SYMBOL	TYPE
1Q1	SM1036A
1Q2	2N2189
1Q3	2N706
1Q4 to 1Q6	2N2189
1Q7	2N706
1Q8	SM1036A
1Q9	2N706
1Q10 to 1Q11	2N1303
1Q12	2N706
1Q13	2N2189
1Q14 to 1Q15	2N706
1Q16 to 1Q17	2N2189
1Q18	2N706
1Q19 to 1Q20	2N1303
2Q1	2N2189
2Q2 to 2Q4	2N3053
2Q5 to 2Q6	2N706
2Q7	2N1302
2Q8	2N1303
2Q9	2N706
2Q10 to 2Q11	2N1303
2Q12	2N1302
2Q13	2N3053
2Q14 to 2Q15	2N1302
2Q16 to 2Q17	2N1303
2Q18	2N3053
2Q19	2N1303
2Q20	2N706
2Q21	2N2189
2Q22 to 2Q23	2N1302
2Q24	2N706
2Q25	2N2189
2Q26 to 2Q27	2N1302
2Q28	2N706
2Q29	2N2189

SYMBOL	TYPE
2Q30	2N706
2Q31	2N2189
2Q32	2N3053
2Q33	2N706
2Q34	2N2189
2Q35	2N3053
2Q36	2N706
2Q37	2N2189
2Q38	2N3053
2Q39	2N1303
2Q40	2N2189
2Q41	2N1303
2Q42 to 2Q44	2N3053
3Q1	SM0082
3Q2 to 3Q6	2N1303
3Q7	2N711A
3Q8	TI 485
3Q9 to 3Q13	2N1303
3Q14	2N1302
3Q15	2N1303
3Q16	2N1302
3Q17 to 3Q22	2N1303
3Q23	2N711A
3Q24	2N1303
5Q1 to 5Q2	SM0082
5Q3	2N1303
7Q50	2N456A
7Q51	2N1372
7Q52 to 7Q54	2N1303
7Q55	2N456A
7Q56	2N1372
7Q57 to 7Q59	2N1303

COLOR MONITOR

CIRCUIT DESCRIPTION

VIDEO INPUT

The composite color signal from 1J1 or 1J2 is fed to a feedback-pair amplifier, 1Q1 and 1Q2. The coil assembly, 1L1, together with the input and stray capacitances, behaves as an m derived filter, which virtually eliminates reflections on the video cable due to insertion of the monitor. The amplifier provides a high input and a low output impedance to couple the signal through a cable to the CONTRAST control, 1P1, without significant high frequency attenuation.

VIDEO PROCESSING

After the CONTRAST control, point AZ, the composite signal is amplified by another feedback pair, 1Q3 and 1Q4, and the signal for the chroma section is taken off at point AJ. A double emitter follower isolates this point from the following backporch clamp so that the subcarrier reference burst will not be affected. The network, 1R18 and 1C8, produces a deliberate roll-off of high frequency video components (3.6 mc), in order to prevent the possibility that the absolute black level clipper might clip-off portions of high chrominance subcarrier signals which extend beyond black level. (The desired flat frequency response is restored after the clipper and clamp circuits by the high peaker capacitor, 1C16.) The backporch clamp, 1Q8, 1Q9, 1Q11 and 1Q12, clamps the collector of 1Q9 to ground during backporch time. The emitter of 1Q9 contains a 3.58mc trap which attenuates the video response at 3.58 mc during color transmissions, which prevents "set up" on burst and also removes 3.58mc from the "Y" channel. During monochrome transmissions, there will be no color-kill voltage (point AY = zero volts), and transistor 1Q10 shorts-out the trap, making the video response flat to 5.5 mc. Note that this circuit strips-off sync and any components which are beyond black level, thus leaving a reference black level "shelf" during horizontal blanking time.

A locally generated "brightness pulse", occurring during horizontal blanking time, is added to the video signal in the differential amplifier, 1Q14 and 1Q15. The amplitude and polarity of this "brightness pulse" is controlled by 1P3, the front panel control marked BRIGHTNESS. Under normal conditions, the BRIGHTNESS control will be set near the center of its range, and the amplitude of the "brightness pulse" will be near zero.

A feedback pair, 1Q7 and 1Q13, drives the video delay line, where the video signal is delayed by approximately .82 microsecond to match the delay in the chroma circuits, due to their limited bandwidth. Following the "brightness pulse" addition is the aperture corrector, which makes the picture more "crisp" by adding a small amount of pre-shoot and overshoot to transitions in the signal. The aperture corrector differs from ordinary "high peakers" in that it boosts high frequencies without affecting phase. A feedback pair, 1Q17 and 1Q18, with low output impedance couples the processed luminance signal to the matrix.

CHROMINANCE SECTION

The composite video signal from point AJ is fed to the CHROMA control, 2P2, on the front panel. The chroma level is adjustable with 2P2, or can be switched to the UNITY CHROMA (pre-set) position by turning 2P2 completely counterclockwise until the switch on 2P2 operates. The pre-set chroma level is adjusted at the factory for unity chroma with locking potentiometer 2P3. The signal is fed to an amplifier, 2Q1, and bandpass filter, 2T3, having a passband of approximately 1.8 mc, centered about the color subcarrier frequency. This chrominance signal is applied to a terminated precision delay line having a time delay equivalent to 90° at the subcarrier frequency; thus, no quadrature adjustments are needed. The signal from the input of this line is fed to the

R-Y demodulator, and the signal from the output end of the line is fed to the B-Y demodulator. Reference subcarrier signal at high level (25 volts) is fed to both demodulators, 180° out of phase by balanced bifilar transformer 2T1. Matched high-speed diodes and balanced structure insure accurate decoding. Low-pass filters remove the subcarrier in the demodulated R-Y and B-Y signals before they are further amplified. The R-Y amplifier is a feedback pair, 2Q20 and 2Q21. Its gain is determined by the 1% resistors, 2R75 and 2R76. The B-Y amplifier, 2Q24 and 2Q25, is similar, except for a higher gain. Following the amplifiers are the R-Y and B-Y gates, 2Q22 and 2Q26. The gates function as the color killers, being turned on and off by the color-kill voltage at point K (plus 14 V for color, zero for monochrome). Emitter followers, 2Q23 and 2Q27, after the gates, provide low impedance sources for driving the matrix. The R-Y and B-Y signals are matrixed directly with the processed Y signal to produce the RED and BLUE video signals. They are also matrixed by 2R93 and 2R94 to produce a G-Y signal, which after amplification and inversion is matrixed with the Y signal to produce the GREEN video information. There are no adjustments in the matrix section. Due to large amounts of negative feedback, the matrix accuracy is independent of transistor characteristics and is determined by the 1% precision resistors. The level of the RED video signal is fixed, while the level of the BLUE and GREEN signals may be changed with 2P4 and 2P5, respectively, to adjust the color temperature of the displayed picture. The matrix is followed by two stages of amplification in each video channel. The -15 V supply voltage to the first stage is removed when the SET-UP-OPERATE switch, 8SW4, is placed in the SET-UP position. This removes video and collapses vertical scan to permit accurate setting of the three screen adjustments for gun cut-off matching. The final video amplifiers and clamps are vacuum tubes because transistors cannot easily be protected from high voltage arc-back in the kinescope.

SUBCARRIER OSCILLATOR

2Q5 is the crystal controlled 3.58mc subcarrier oscillator. Its frequency is varied with two varactor diodes, 2D5 and 2D6, in the crystal circuit. The varactor diodes change their capacity with the DC voltage applied at point AS. A push-pull amplifier, 2Q3 and 2Q4, increases the subcarrier to a higher voltage for the diode chroma demodulators. The two demodulators load the amplified subcarrier on opposite peaks, 180° out of phase, for greater demodulation accuracy.

COLOR SYNCHRONIZATION

The method used in this monitor to phase-lock the local subcarrier oscillator to the reference burst on the video signal is rather unusual. It consists of sampling the demodulated R-Y signal during burst time and developing an oscillator control voltage from this information. Since the transmitted reference burst is at -B-Y, or 180°, it is in quadrature with R-Y at 90°, and the burst pulse in the demodulated R-Y signal will be at a null point. If the local subcarrier oscillator leads or lags the reference burst, a negative or positive signal will be developed which can be used to correct the oscillator.

This system has several advantages over the conventional circuitry using separate channels for chrominance and burst-color sync: (1) Since chrominance and burst signals pass through the same amplifiers and demodulator, the troublesome phase-drift problem is avoided; (2) The AFPC system handles only pulses instead of 3.58mc subcarrier signals, again avoiding phase-shift problems; (3) The system is well adapted to transistorization, which improves reliability.

The R-Y signal at point T is amplified by a feedback pair, 2Q6 and 2Q8. 2Q7 is a shunt gate, which is heavily saturated and shunts all signals to ground. During burst time, 2Q7 is turned off by the burst key pulse and lets burst information pass to the next amplifier. There, after amplification by 2Q9 and 2Q11, it is clamped during burst time by 2Q10. This increases the average DC value of any information and makes it easier to filter. 2Q13 and 2Q41 are a high-input-impedance DC amplifier. The COLOR HOLD control, 2P1, adds a DC voltage to the signal, setting the free-running frequency of the subcarrier oscillator in the absence of any signal. It should be set about +13v (measured with VTVM)

to give the same DC voltage at the collector of 2Q41, with no signal, as there is when the oscillator is locked to a signal. After the DC amplifier, the signal is filtered by 2C28, 2C31 and 2R158, which determine the AFC loop cut-off frequency and damping. When the oscillator is not locked to a color signal, 2Q12 is off, and 2R159 is in series with the filter, increasing the pull-in range and speed of the AFC loop. After pull-in occurs, the color-kill voltage appears at point K and saturates 2Q12, shorting-out 2R159.

The hue of the decoded signal should automatically be correct. It is possible to change the hue, however, by matrixing-in a positive or negative amount of B-Y into the R-Y signal to be sampled, causing the local oscillator to lock-in a different phase relative to the reference burst. This is done with the HUE control. In its mid-position, nothing is added to the R-Y signal, but as the HUE control is turned away from center, positive or negative B-Y is added to the R-Y signal at point T, changing the phase of the subcarrier oscillator. 2Q40 produces B-Y and -B-Y across the HUE control.

SYNCHRONISM DETECTOR ("S" DETECTOR)

The "S" or synchronism detector produces a color-kill voltage only after a color signal has locked-in the local subcarrier oscillator, which is a reliable indication of the presence of a color program. It does this by sensing the presence of a demodulated reference burst in the B-Y signal during burst time.

The circuits are similar to those in the subcarrier AFPC. 2Q15 is a shunt transistor which is opened by the burst key pulse during burst time. 2Q16 and 2Q39 amplify any signals, which are then clamped at 2Q17 with a burst key pulse. 2R63 and 2C38 filter any DC from the clamp and remove noise during monochrome transmissions. A two-stage DC amplifier amplifies any small DC voltage from the clamp. 2R162 gives the DC amplifier a latching feature, causing the output voltage to be either fully on or off. For monochrome signals, the output will be zero volts; for color signals, when a demodulated burst is present, the output will go to plus 14 volts.

The color-kill voltage is used to open the R-Y and B-Y gates, change the two-mode filter in the subcarrier AFPC circuit, and to switch-in the 3.58 mc filter in the video processing circuit.

SYNC AND PULSE CIRCUITS

The monitor can use either internal or external sync, and switching for this may be done locally or remotely by grounding point M, which is also connected to 3J3. The sync switcher consists of 3Q4 and 3Q5, a differential amplifier, and 3Q2 and 3Q3, two series gates. The gates are controlled by the collector voltages of the differential amplifier so that only one can be ON at a time. Depending on whether or not point M is grounded, either video or external sync is fed to the sync stripper. A high impedance input for external sync at 3J1 and 3J2 is provided by emitter follower 3Q1 on the video input board. The output of the sync switcher is coupled to the sync stripper through an emitter follower. The sync stripper consists of 3Q7 and 3Q23 operating in parallel, one responding to fast variations and one to slower variations in the signal for increased immunity against hum, noise and transients. The combined output of 3Q7 and 3Q23 is again clipped by 3Q8.

The sync chain effectively regenerates "horizontal drive" and "vertical drive" pulses in order to eliminate the "sync hook", or bending of vertical lines in the picture, which is inherent in conventional horizontal AFC systems, and to insure correct interlace.

Horizontal drive is regenerated by: (1) Differentiating all pulses so that regular horizontal pulses and equalizing pulses are of the same duration, (2) Gating-out the unwanted odd equalizing pulses, and (3) Stretching and shaping the pulses to provide a steady stream of identical "horizontal drive" signals.

Vertical drive is regenerated by applying a locally generated 31.5 KC signal to one input of an "AND" gate, and the composite sync signal to the other input. Coincidence occurs only during the six broad vertical sync pulses; thus a definite, accurately-timed, vertical trigger pulse is obtained which insures accurate interlace.

The circuit functions as follows: Differentiated sync from point AH is amplified by 3Q10. 3Q11 is a gate in the emitter circuit of 3Q10; 3Q12 clips the pulse from 3Q10 after stretching by the shunt capacitor, 3C10. 3Q13 is an emitter follower which couples-out the horizontal drive pulses to the rest of the circuits. 3Q14 excites a 15.750 KC tuned circuit, 3L1 and 3C12, with the horizontal drive pulses so that a 15.750 KC sine wave appears across it. The positive halves of the sine wave occur during equalizer time and turn-off gate 3Q11 to prevent equalizing pulses from passing through 3Q10. Negative sync and full-wave rectified sine wave from the tuned circuit are applied to 3Q15, which then conducts only in the middle of the six vertical sync pulses. Its output is clipped by 3Q16 and fed to the vertical oscillator.

The brightness pulse is generated in 3Q17 by lengthening the horizontal drive pulse and clipping in 3Q18. 3P2 adjusts its length.

The burst keying pulse, which occurs during backporch time, is produced by gating horizontal drive and the brightness pulse in 3Q21 so that only the difference appears as an output. 3Q24 provides noise immunity by shorting all signals and noise to ground, except during flyback time. 3Q22 provides a pulse of opposite polarity.

The vertical oscillator is a multivibrator, consisting of 5Q1 and 5Q2. Its free-running rate is controlled by 5P8, the VERTICAL HOLD control. The oscillator is triggered by vertical drive from the gating circuit.

RGB VIDEO AMPLIFIERS

The final three-video amplifier for RED, GREEN and BLUE signals are identical and employ pentode vacuum tubes. A "backporch" type keyed clamp is used, each channel using a 12AX7 dual-triode tube as error detector and rectifier. During backporch time, a positive pulse, having a peak voltage adjustable (4P1) from 160 to 180 volts, is applied to the grid of one-half of the 12AX7. The cathode is tied to the output of the final video amplifier. Error pulses from the plate of this tube are passed through the rectifier to the grid of the pentode amplifier. The circuit acts to maintain the black level of the output amplifiers at a level determined by the setting of 4P1.

The backporch keying pulses are derived from the flyback system, in order to prevent abnormal operation of the picture tube in the absence of input sync signals. Failure protection is provided by the large cathode resistors in the pentode amplifiers.

KINESCOPE BLANKING AND FAILURE PROTECTION

Horizontal and vertical retrace blanking is included to prevent visible vertical striations due to colorburst signal and vertical retrace lines. Horizontal and vertical blanking pulses are generated in the two halves of 8V1, a dual-triode tube. Each grid is fed with large amplitude positive retrace pulses and is grid-leak biased. Negative blanking pulses are produced in the plate circuit and DC coupled to the kinescope grids. The kinescope grid voltage is clamped to a fixed voltage during trace time by diode 8D1 to eliminate picture shading and stray signals.

In event of failure of either scanning system, 8V1 will conduct and reduce the beam current of the kinescope to a safe value.

LOW VOLTAGE POWER SUPPLIES

The plus 15 V and minus 15 V supplies are identical; therefore, only the circuit of one will be described. In the -15 V supply, the pass transistor, 7Q50, is connected to the chassis as a heat sink; the rest of the regulator circuitry is on a board. 7Q51 is an emitter follower current amplifier, 7Q52 a common emitter amplifier, and 7Q53 and 7Q54 a differential amplifier which compares the output voltage with the voltage of reference diode 7D52. Any change in the output voltage causes a current change through the amplifier transistors to the pass transistor so that the voltage-drop across it changes in such a way to keep the output voltage constant.

The low voltage supplies are protected against momentary short-circuits by current limiting. Diodes 7D53 and 7D57 protect the plus 15 V and minus 15 V regulators from being shorted into each other. 7D57, an 18 V Zener diode, also protects the transistor circuits from having high voltage accidentally shorted into them.

TUBE POWER SUPPLY

Power for the vacuum tube portion of the monitor is furnished by two regulated power supplies. One delivers 200 volts DC at about 150 ma. for the video amplifier, and the other delivers 395 volts DC at 300 ma.

The master reference voltage is obtained from a type 5651A high-stability glow tube. A portion of the output from the 200 volt supply is compared with this reference voltage in differential amplifier 7V4 and controls the voltage-drop across 7V2B. The voltage is adjusted to exactly 200 volts by 7P1, a locking potentiometer. The output of the 200 volt supply is used as the reference voltage for the 395 volt supply. Consequently, adjustment of the 200 volt system determines the output voltage of the 395 volt supply, and no separate adjustment is needed.

CRT FILAMENT REGULATOR

The picture tube heater voltage is regulated by an "Amperite" barretter tube. This is essentially a slow-acting constant current device which acts to maintain a constant heater temperature and reduces long-term drift of color temperature and convergence, and incidentally increases life expectancy of the picture tube.

INSTALLATION

The monitor is shipped with all tubes and kinescope in place and should operate when power and input signals are applied. CAUTION: Note that the monitor will NOT operate unless a video input signal is supplied. Frequently, parts of the monitor become magnetized during shipment, producing an impure field and/or poor convergence. Before attempting to adjust and set up the monitor, it should be degaussed.

DEGAUSSING

The RCA Type #205W1, or similar degaussing coil, is recommended. Connect the degaussing coil to 117 volt AC line and hold the coil in front of the picture tube about one inch away. Move the coil slowly in a circular motion in a plane parallel to the front of the monitor for a few seconds. Then slowly back away from the monitor several feet. Turn off the degaussing coil. This will usually clear up any purity problems. Feed the monitor with a grating "crosshatch" pattern and observe center convergence. If convergence is not correct, adjust the permanent magnets on the picture tube neck assemblies, as described in paragraph 4.6.11. Normally, this is all the adjustment that will be required. In the event that the placement of components on the picture tube neck has been disturbed due to rough handling, it is best to go through the entire setup procedure, as described in the Maintenance section under Kinescope Replacement.

OPERATION

OPERATING CONTROLS

Operating controls on the front panel are: (1) POWER ON/OFF switch, (2) BRIGHTNESS, (3) CONTRAST, and (4) CHROMA. When the CHROMA control is rotated fully counterclockwise, a snap switch operates, switching the monitor to a PRE-SET "unity chroma" position.

SECONDARY CONTROLS

Behind the trap door below the picture tube are located the usual television controls for Horizontal and Vertical HOLD, HEIGHT, LINearity, CENTering, FOCUS, etc. The color setup adjustments are also conveniently located here. The COLOR HOLD and "Unity Chroma" calibration adjustments are locking screwdriver-type potentiometers to prevent accidental operation.

The convergence adjustments are located behind the small trap door above the picture tube.

ADJUSTMENTS

In addition to the controls accessible from the front panel, certain adjustments, such as peaking coils, tuned circuits and power supply voltage adjustments, are located inside the monitor. Since these do not normally require adjustment and since their adjustment does require test equipment, such as meters, sweep generators, etc., the procedures for making these adjustments are described in the maintenance and repair section of this book.

Feed the monitor with video signal and allow to "warm up" thoroughly. Make the usual monochrome television adjustments of brightness, contrast, horizontal and vertical hold, linearity and focus. Feed the monitor with a grating pattern and observe purity and convergence. If unsatisfactory, correct, following procedure described in the Maintenance section.

KINESCOPE GUN CUT-OFF ADJUSTMENT

Apply bar test pattern or other video signal. Turn COLOR-MONOCHROME switch to MONOCHROME position and OPERATE-SET UP switch to SET UP position. This causes vertical scanning to collapse and feeds "black level" signal to the kinescope.

Turn off BLUE and GREEN screens and set RED screen adjustment, 8P3, at the point where the red line is just barely visible.

Turn off RED screen and turn on BLUE screen. Adjust BLUE screen, 8P1, until the blue line is just barely visible.

Turn off BLUE screen and turn on GREEN screen. Adjust GREEN screen, 8P2, until the green line is just barely visible.

Turn on all three screens and restore OPERATE-SET UP switch to OPERATE position.

COLOR TEMPERATURE ADJUSTMENT

Advance CONTRAST control to produce a normal brightness, black-and-white picture. Adjust GREEN GAIN, 2P4, and BLUE GAIN, 2P5, controls to produce the desired color temperature white. Satisfactory adjustment can be obtained by subjective judgment. For greater accuracy, a large-area lighted screen of about 50-foot lamberts at the desired color temperature (usually 9300° K) should be used as a reference for visual comparisons.

Note that it is usually more important to "match" all the monitors in a particular control room, so that they "look alike", than it is to observe any particular color temperature.

If gun cut-off adjustments were made accurately, grey scale will track automatically.

COLOR HOLD ADJUSTMENT, 2P1

Adjust the COLOR HOLD control, 2P1, until the subcarrier oscillator locks to the signal. Measure the DC voltage at the collector of 2Q41, or point AS, and carefully note the exact voltage reading. Turn CHROMA control to minimum chroma (counterclockwise just before switch operates) in order to cause the oscillator to drop out of sync. Readjust 2P1 to give the same reading as obtained above. Lock down 2P1.

BURST GATE PULSE ADJUSTMENT

The leading edge timing of the burst gate pulse is adjusted by 3P1 and the trailing edge of 3P2. Both are locking potentiometers, located on circuit board 162037 on the righthand chassis.

Connect one probe of a dual trace scope to terminal AJ to view the burst, and the other probe to terminal AG to view the gate pulse. A negative external trigger pulse for the scope is available at terminal BL or Z.

Adjust 3P1 to place the leading edge of the burst gate ahead of the burst approximately at the trailing edge of sync.

Adjust 3P2 to place the trailing edge of the burst gate pulse near the end of burst where it effectively cuts off the last cycle of burst.

Alternatively, the trailing edge of the pulse may be adjusted to fall behind the end of burst and before the end of blanking. In this case, the monitor may display a small hue shift, if a faulty encoder is introducing spurious burst keying transients into the signal.

CONVERGENCE CHECK

Apply composite sync and crosshatch, or grating signal. Set BRIGHTNESS and CONTRAST controls so that brightness of crosshatch lines is low enough to prevent spot blooming. Set size switch to WIDE position.

Starting at the upper lefthand corner, adjust each convergence control in order, working from left to right. Refer to convergence chart and procedure.

(NOTE: It is not necessary to go through the entire procedure to make minor adjustments. Simply refer to the convergence diagram and "touch up" the indicated adjustments as needed.)

MAINTENANCE

THE VOLTAGES EMPLOYED IN THIS EQUIPMENT ARE SUFFICIENTLY HIGH TO ENDANGER LIFE. MAKE CERTAIN POWER IS OFF AND CAPACITORS ARE DISCHARGED BEFORE TOUCHING ANY COMPONENT.

1. LOW VOLTAGE POWER SUPPLY ADJUSTMENTS

   The low voltage power supplies will not normally require adjustment. These adjustments must not be disturbed unless proper equipment is available with which to test them. The performance of the monitor is critically dependent on these voltages. If these voltages are readjusted, the entire monitor must be readjusted.

   If the power supplies must be readjusted, due to replacement of critical components or other reasons, use meters of 1% accuracy.

   Connect the meter between chassis ground and plus 15 volt terminal. Adjust 7P3 for 15 volts. Connect the meter between chassis ground and minus 15 volts. Adjust 7P2 for 15 volts. Connect the meter between chassis ground and test point 7J3, and adjust for 395 volts.

2. KINESCOPE REPLACEMENT

   Remove old picture tube as follows:

   2.1 Remove dress-front panel by taking out screws accessible from the rear of the front panel.

   2.2 Remove the 1/4-20 screws from the tube strap, disconnect the socket and H.V. cap, and remove the yoke and magnet assemblies. Withdraw the kinescope from the front.

   2.3 Install the new kinescope in reverse order. Note that the new kinescope must first be wrapped with two turns of 2" wide adhesive tape, like the original tube. Take care to insure that the "screen" is positioned to fit the mask and that the kinescope neck is level and parallel with the sides of the chassis. Make sure that the ground spring which grounds the outside aquadag coating of the picture tube is in place.

   2.4 Place the deflection yoke about 1/4 inch back from the maximum possible forward position. Place the convergence yoke over the pole pieces. Place the blue lateral magnet assembly over the pole pieces and then rotate it about 75° clockwise as viewed from the neck of the kinescope.

   Turn on the monitor and allow it to warm up.

3. RED FIELD PURITY

3.1 Turn off BLUE and GREEN screens, and advance the BRIGHTNESS control to produce a raster of medium brightness.

3.2 Slide the deflection yoke back on the kinescope neck until the rear of the yoke cover almost touches the convergence assembly.

3.3 Rotate the purity magnet assembly and/or spread tabs as needed to produce purest red field in the center area of the screen.

3.4 Slide the deflection yoke forward to produce best edge purity.

3.5 Be sure that the yoke is rotated so that scanning lines are "level". Tighten the yoke clamp.

4. COMPLETE CONVERGENCE PROCEDURE

4.1 Apply composite sync and crosshatch, or grating signal. Set BRIGHTNESS and CONTRAST controls so that brightness of crosshatch lines is low enough to prevent spot blooming. Set size switch to WIDE position.

4.2 Starting at the upper lefthand corner, adjust each convergence control in order, working from left to right. Refer to convergence chart and procedure.

(NOTE: It is not necessary to go through the entire procedure to make minor adjustments. Simply refer to the convergence diagram and "touch up" the indicated adjustments as needed.)

4.3 Pre-set the "R, G and B" DC position controls, 6P11, 6P8 and 6P13, at the center of their ranges.

4.4 Converge the center of the screen by adjusting the four permanent magnets on the neck of the picture tube. NOTE: In case that it is found necessary to fully withdraw any magnet to approach convergence, the holder can be rotated 180° (not end-for-end) and reinserted for additional range.

4.5 <u>Vertical Convergence</u>

4.5.1 Turn off BLUE beam, 8SW3.

Adjust Vertical R/G Amplitude, 6P9, to converge vertical center lines at the bottom of the screen.

4.5.2 Adjust Vertical R/G Tilt control, 6P5, to converge vertical center lines at the top of the screen.

4.5.3 Adjust Vertical R/G Differential Amplitude control, 6P2, to converge horizontal lines at the bottom of the screen.

4.5.4 Adjust Vertical R/G Differential Tilt control, 6P1, to converge horizontal lines at the top center of the screen.

4.5.5 Turn on BLUE beam.

Adjust Vertical BLUE Tilt control, 6P6, to produce equal displacement (convergence error) of top and bottom grating lines.

4.5.6 Adjust Vertical BLUE Amplitude control, 6P10, to converge top and bottom horizontal lines. Readjust BLUE centering magnet, if necessary, to converge the center of the screen. Repeat steps 4.5.5 and 4.5.6. Repeat step 4.4 and steps 4.5.1 through 4.5.6 of Vertical Convergence, if needed, until best convergence is obtained along the center vertical axis of the screen.

4.6 Horizontal Convergence

4.6.1 Turn off BLUE beam.

Adjust Horizontal R/G Amplitude, 6L2, to converge vertical lines at the right side of the screen.

4.6.2 Adjust Horizontal R/G Differential, 6L3, to converge horizontal lines at the right side of the screen.

4.6.3 Turn on BLUE beam.

Adjust Horizontal BLUE Right, 6T1, to converge horizontal center lines at the right side of the screen.

4.6.4 Turn off BLUE beam.

Adjust Horizontal R/G Tilt, 6P4, to converge vertical lines at the left side of the screen.

4.6.5 Adjust Horizontal R/G Differential Tilt, 6P3, to converge horizontal lines at the left side of the screen. Repeat steps 4.6.4 and 4.6.5, if needed.

4.6.6 Turn on BLUE beam.

Adjust Horizontal BLUE Left, 6P7, to converge center horizontal lines at the left side of the screen.

4.6.7 Adjust BLUE DC Position control, 6P13, and RED/GREEN Differential DC Position control, 6P8, for best convergence of horizontal lines at the center of the screen.

4.6.8 Adjust RED/GREEN DC Position control, 6P11, for best convergence of vertical lines at the center of the screen.

4.6.9 Turn size switch, 5SW1, to UNDERSCAN position.

Converge the center of the screen with R/G UNDERSCAN Position control, 6P12, and BLUE UNDERSCAN Position control, 6P14.

4.6.10 Adjust Horizontal UNDERSCAN control, 6L1, for best over-all convergence along the horizontal axis of the tube.

4.6.11 If at any point during the convergence procedure a control does not seem to have the proper effect or has insufficient range of adjustment, the trouble is probably due to incorrect placement of the components on the kinescope neck. Try sliding the convergence yoke fore-and-aft and/or rotating it slightly. Similarly, reposition the blue lateral magnet assembly. After moving components, readjust purity and repeat convergence procedure.

5. ADJUSTMENT OF HORIZONTAL AND HIGH VOLTAGE SYSTEM

5.1 Horizontal Oscillator Adjustment

Temporarily short-circuit the sync signal by placing a jumper between pin 3 of 5V2/6BV8 and chassis ground. Also short-circuit the "sine wave coil" by placing a jumper from pin 8 of 5V3/6FQ7 to chassis ground. Adjust Horizontal HOLD control, 5P7, for correct horizontal oscillator frequency as evidenced by the picture being near synchronism. If this condition is not obtained with the Horizontal HOLD control, adjust core 5T2A to obtain correct frequency.

Remove the temporary jumper from pin 8 of 5V3/6FQ7 and adjust core 5T2B to produce correct frequency. Remove the jumper from pin 3 of 5V2/6BV8.

5.2 This monitor is designed to operate with an ultor voltage of 23KV design center. This voltage is arbitrary. It will operate satisfactorily at any voltage from approximately 20 to 25KV. The technician may accept any voltage between 20 and 25KV which gives satisfactory operation.

5.3 Remove the high voltage cage cover. Set the UNDERSCAN switch to WIDE position. Hold the scope probe near (3 or 4 inches away) the flyback transformer and adjust the scope to display one or two of the horizontal pulses. Observe the sine wave ringing between retrace pulses. Adjust the width coil, 5L1 on rear, to produce minimum amplitude ringing.

5.4 Measure the high voltage. An electrostatic voltmeter, such as Sensitive Research Model ERSH, is preferred. Set the high voltage to 23KV by means of 5P6.

5.5 Observe the picture at low or medium brightness. The picture width should be nearly correct, i.e., slightly overscanned. If the width is not near normal, check the adjustment of the B+, 395 volt power supply, and the deflection tubes, 5V4/6DQ5, 5V3/6FQ7 and 5V7/6DW4.

If necessary, adjust the width coil to produce the desired width.

5.6 Check the efficiency and high voltage system performance by measuring currents as follows:

5.6.1 To measure I_k of 5V4/6DQ5, use Simpson Model 260, Series III, meter (or other meter having 50 microampere full-scale and 5000 ohm total resistance). Set the meter to read 50 microampere full-scale, and connect to J501A and J501B. When thus connected, full-scale deflection of the meter represents 500 milliamperes of cathode current in the type 6DQ5 tube.

5.6.2 Adjust the horizontal linearity/efficiency coil, 5L2, for minimum current reading, which should be about 215 ma. Now advance this screw clockwise slightly until adequate high voltage performance is obtained. In no case allow this current to exceed 250 ma.

5.6.3 The available picture tube beam current is measured indirectly by turning the picture tube beam current off (with BRIGHTNESS and CONTRAST controls) and measuring the cathode current of the shunt regulator tube, 5V8/6BK4.

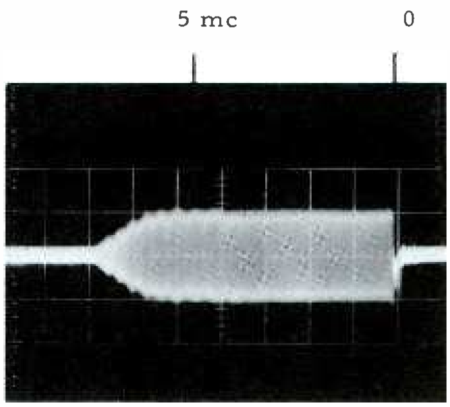
5.6.4 To measure this current, use a Simpson Model 260, Series III, meter or equal. Set the meter to read 50 microampere full-scale, and connect to J502A and J502B. Full-scale deflection of the meter indicates 2.5 ma. For 23KV of ultor voltage, the meter should read at least 800 microamperes. With new vacuum tubes and with the set at normal temperature, the reading will typically be about 1.2 milliamperes.

5.7 Throw the size switch to UNDERSCAN position. Adjust coil 5L3 (on front of H.V. cage) for desired width. The underscan width should be as large as possible while still showing corners. Picture quality will deteriorate if the raster is smaller than necessary.

6. VIDEO RESPONSE ADJUSTMENTS

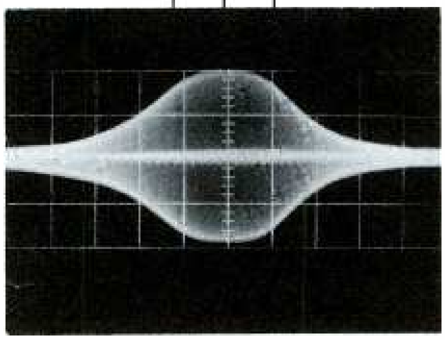
6.1 Feed the monitor with square-wave signal with repetition rate from 15KC to 100KC. Connect the scope to point BK (top end of CONTRAST control). Adjust 1C1 for best square-wave response.

6.2 Unsolder the co-ax cable from terminal U on circuit board 162039 (matrix). Connect a video sweep generator between terminal U and ground. Connect low capacitance scope probe to the red kinescope cathode lead, pin 8 of 4V2. Set up the scope and sweep generator to display a bandwidth of about 8 or 10 mc. Adjust 4L1 and 4L2 for flattest response curve. See figure below. Move the scope probe to the green kinescope cathode lead, pin 8 of 4V22, and similarly adjust 4L21 and 4L22. Move the scope probe to the blue kinescope cathode lead, pin 8 of 4V42, and similarly adjust 4L41 and 4L42. Restore the co-ax connection to terminal U.



Sweep Response, Red Channel

6.3 Unsolder the input lead to terminal AN on circuit board 162042. Feed the sweep generator into terminal AN and ground. Connect the scope probe to delay line 2DL1 (junction of 2C5 and 2R9). Adjust both tuning cores of 2T3 to produce a flat bandpass response symmetrical about 3.6 mc, as shown in the following figure. Note that a "birdie" beat marker is visible at 3.6 mc due to the local subcarrier signal. Restore the connection to terminal AN.



Response of Bandpass Filter, 2T3 3

6.4 Feed the monitor with a color bar signal. Connect the scope probe to terminal U and adjust the scope to display one horizontal line. Observe the residual 3.6 mc "fuzz" on saturated bar signals. Adjust the 3.6 mc trap, 1L2, to minimize this subcarrier signal. The 3.6 mc signal component can be exaggerated to facilitate this adjustment by advancing the aperture corrector control.

7. SUBCARRIER GENERATOR ADJUSTMENT

7.1 Oscillator

Connect the scope probe to terminal BG or BH, and adjust 2T2 for maximum amplitude of 3.6 mc subcarrier; then turn, one turn, counterclockwise. (NOTE: Oscillator must be locked to incoming color signal during this adjustment.)

7.2 Amplifier

Couple the scope probe loosely by clipping an insulated part of the lead wire to terminal BG or BH. Adjust 2T1 for maximum amplitude of 3.6 mc subcarrier.

8. ADJUSTMENT OF SYNC PROCESSING AND PULSE GENERATION CIRCUITS

8.1 Interlace

Connect the scope probe to one end of 3L1. Adjust 3L1 for maximum amplitude of 15.75KC sine wave. Connect the scope to terminal BL and check to be sure that equalizing pulses are absent during vertical interval. Move the scope probe to point Q, and check to be sure that only the six vertical sync pulses are present. Observe the picture for interlace. If the interlace is imperfect, slightly retune 3L1 (not over one-eighth turn) to produce perfect interlace.

8.2 Burst Gate

Connect the EXTERNAL trigger input of the scope to terminal Z. Set the scope to NEGATIVE EXT TRIGGER, and adjust the sweep for about 2 microseconds per centimeter. Connect the probe to terminal AJ, and observe the position of the colorburst signal. Move the probe to terminal AG (burst key pulse). Adjust 3P1 to place the leading edge of the burst key pulse between the trailing edge of sync and start of burst. Adjust 3P2 to place the trailing edge of the burst keying pulse at the end of colorburst.

If a dual-trace scope is available, the adjustment is simplified by placing one probe on terminal AJ, and the other probe on terminal AG, permitting simultaneous display of both signals.

If "hue" or "phase" errors are noted, recheck adjustment of 3P2. Hue errors, caused by faulty encoders or keying transients, can be minimized by cutting off the last cycle of burst. With a perfect encoded signal, 3P2 has little affect on phase.

9. UNITY CHROMA CALIBRATION

Do not attempt this adjustment unless an accurately-encoded standard color-bar signal is available.

Feed the monitor with a known accurately-encoded standard color-bar signal. Connect the scope probe to terminal J (BLUE signal). At this point, all of the color bars which do not contain BLUE should be at "black" level, and all of the bars which contain BLUE should be at "white" level, i.e., all the same amplitude. Therefore, the procedure is to simultaneously adjust the HUE or PHASE control, 2P7, and the CHROMA control knob until this condition is obtained, i.e., the waveform should look like the figure on page 27, Blue Signal at Point J.

When best adjustment is obtained, turn the manual CHROMA control counterclockwise until the switch operates. Then adjust the locking calibrate potentiometer, 2P3, until this condition is duplicated. Lock down 2P3.

To check on correct operation, move the scope probe to terminal F to observe the RED signal. All color bars which contain RED should be equal at "white" level, and all bars which do not contain RED should be at "black" level.

Similarly, check the GREEN signal at point H. All bars containing GREEN should be at "white" level, and all bars which do not contain GREEN should be at "black" level.

In the event that all three channels do not check out perfectly, the best procedure is to make a compromise adjustment which rather favors the accuracy of the RED channel.

TM-27 COLOR MONITORS - TYPICAL SOCKET VOLTAGES

Tube Symbol	TUBE FUNCTION	TUBE TYPE	Plate Pin No.	Plate Volts DC	Cathode Pin No.	Cathode Volts DC	Grid Pin No.	Grid Volts DC	Screen Pin No.	Screen Volts DC	Suppressor Pin No.	Suppressor Volts DC	Filament Pin No.	Filament Volts AC
4V1B	Red Video Output	6EB8	9	155	6	3.4	7	-.46	8	173	-	-	4-5	6.3
4V2	Clamp	5751/12AX7	1	-3.7	3	11	2	-3.7	-	-	-	-	4-5-9	6.3
			6	200	8	140[g]	7	30	-	-	-	-		
4V3	Clamp Pulse Generator	6DJ8	1	30	3	G	2	-1.5	-	-	-	-	4-5	6.3
			6	200	8	5.6	7	-39						
4V21B	Green Video Output	6EB8	9	155	6	3.3	7	-2	-	-	-	-	4-5	6.3
4V22	Clamp	5751/12AX7	1	-1.7	3	11	2	-1.7	-	-	-	-	4-5-9	6.3
			6	200	8	145[g]	7	30						
4V41B	Blue Video Output	6EB8	9	155	6	3.3	7	-1.5	8	173	-	-	4-5	6.3
4V42	Clamp	5751/12AX7	1	-2.2	3	11	2	-2.2	-	-	-	-	4-5-9	6.3
			6	200	8	143[g]	7	30						
5V1	V. Discharge & Output	6EM7	5	101	6	G	4	-9.8	-	-	-	-	7-8	6.3
			2	390	3	104	1	54						
5V2	Horizontal AFC	6BV8	3	52	1	-.56	2	-11	-	-	-	-	4-5	6.3
			9	G	7	13	-	-						
			6	-.44	8	13	-	-						
5V3	Horizontal Oscillator	6FQ7	1	21-29[a]	3	.2	2	.04	-	-	-	-	4-5	6.3
			6	270	8	.13	7	-100						
5V4	Horizontal Output	6DQ5	-	-	3-6	.22	1-5	-57	4-8	149	-	-	2-7	6.3
5V5	High Voltage Rectifier	3A3	-	-	-	-	-	-	-	-	-	-	2-7	24KV
5V6	Focus Rectifier	1V2	PULSES PRESENT - DO NOT MEASURE											
5V7	Damper	6DW4	2-7	380	9	730	-	-	-	-	-	-	4-5	6.3
5V8	High Voltage Regulator	6BK4	-	-	1	380	5	370[b]	-	-	-	-	2-7	6.3
7V1	Power Supply Regulator	6080	5	510	6	395	4	325	-	-	-	-	7-8	6.3
			2	510	3	395	1	325						
7V2	Power Supply Regulator	6080	5	510	6	395	4	325	-	-	-	-	7-8	6.3
			2	285	3	200	1	175						
7V3	P.S. Reg. Amplifier	6AU6	5	325	7	200	1	195	6	370	2	200	3-4	6.3
7V4	P.S. Reg. Amplifier	6BL8	6	175	7	86	2	83.5	3	150			4-5	6.3
			1	200	8	86	9	82						
7V5	Voltage Reference	5651	1-5	82	7	G	-	-	-	-	-	-	-	-
8V1	Blanking Mixer	12AU7	6	127	8	0	7	-185	-	-	-	-	4-5-9	6.3
			1	127	3	G	2	-10						
8V2	Color Kinescope Red	17EJP22	-	-	4	140[g]	2	42	3	540[d]	Focus		1-14	6.3
	Green		-	-	5	145[g]	6	42	7	475[e]	9	4.4 to 4.7KV[c]		
	Blue		-	-	13	143[g]	12	42	11	520[f]				

CONDITIONS: All controls are adjusted to display a normal monochrome picture; then contrast is turned to minimum and brightness to mid-position; B+ 395 V; measured with Hewlett-Packard 410B VTVM.

a-Varies with Hold Setting
b-Varies with Ultor Adj.
c-Varies with Focus Setting
d-Varies with Red Screen Setting
e-Varies with Green Screen Setting
f-Varies with Blue Screen Setting
g-Varies with Kine-Bias Setting

ADDENDUM TO CYB INSTRUCTION MANUAL TO COVER

MODIFICATION D

Dispostion: To be included and to become a part of the CYB instruction manual.

Make the following changes:

Delete all references to 21" units.

Page 8: DIODES (Additions)

Symbol	Type	Function
D1001	CL6	Pincushion Correction
		Filament Regulator Board 162290-1
16D1 to 16D4	SCE6	Silicon Rectifiers
16D5	4M5.1ZS	Zener
16D6 to 16D8	SCE6	Silicon Rectifiers

TUBE COMPLEMENT

Deletions		
V554	1V2	Focus Rectifier
V900	21GVP22	21" Color Kinescope

Change		
V900	17303P22 or 1835P22	17" Color Kinescope

Page 9: TRANSISTOR COMPLEMENT (Addition)

Q4	DTG-110	Filament Regulator

Page 16: CRT FILAMENT REGULATOR - Replace with the following:

PICTURE TUBE FILAMENT REGULATOR BOARD 162290-1

A bridge-rectifier system develops approximately 12 volts DC across C4 which is dropped to 6.3 volts by Q4, pass transistor. This voltage is stabilized by Zener diode 16D5 and two silicon diodes, 16D6 and 16D7. Diode 16D8 and capacitor 16C1 are provided to protect the regulator from high voltage transients in case of picture tube flashover.

ARC SUPPRESSION BOARD 162321-1

This board is added to ensure circuit protection under CRT arcing conditions. It has three capacitors with arc-gaps to suppress any arcing developed in the picture tube.

Page 19: 3. CONVERGENCE - RED PURITY AND STATIC CENTER

Change this section to read as follows:

3.1 Center R/G DC CENTER ↕, R ↔ G DC CENTER, and BLUE DC CENTER ↕ convergence potentiometers on the upper control panel; and on the lower front control panel, center HORIZontal CENTering and VERTical CENTering potentiometers before proceeding.

3.2 Check the purity ring and blue lateral magnet assembly for correct positioning. The BLUE gun is at the bottom, and the blue lateral magnet should be placed accordingly. (Refer to arrows on the assembly illustration.) Note that the BLUE gun on this picture tube is at the bottom, the RED gun on the top left, and the GREEN gun on the top right, viewing the unit from the back (socket side).

3.3 Release the three wing nuts and slide the deflection yoke all the way toward the convergence pole exciters.

3.4 Degauss the unit according to instructions on page 16 of the manual. Turn off the BLUE and GREEN screens, and advance the BRIGHTNESS control to produce a raster of medium brightness. If a crosshatch signal is available, turn the CONTRAST control to produce a subdued crosshatch on the kinescope.

3.5 Rotate the purity magnet assembly and/or spread the tabs to center the patch of red.

3.6 CENTER SCREEN CONVERGENCE

NOTE: This portion of the procedure is made considerably easier if some sort of video signal, having an exact center-of-raster reference, is used; an "Indian" and most crosshatches (grating patterns) provide exact center-of-raster points or crossings.

The preferred technique is to display the video signal discussed in the above note over a brighter-than-black background. Turn the BLUE screen ON and align the blue pattern with the red pattern, using the blue lateral and blue static convergence magnets. Turn the blue gun OFF and turn the green gun ON. Align the green pattern with the red pattern, using both the red and green static convergence magnets. It will probably be necessary to repeat this procedure at least twice before all three guns can be turned ON and give patterns that are exactly coincident. Repeat step 3.5 if necessary.

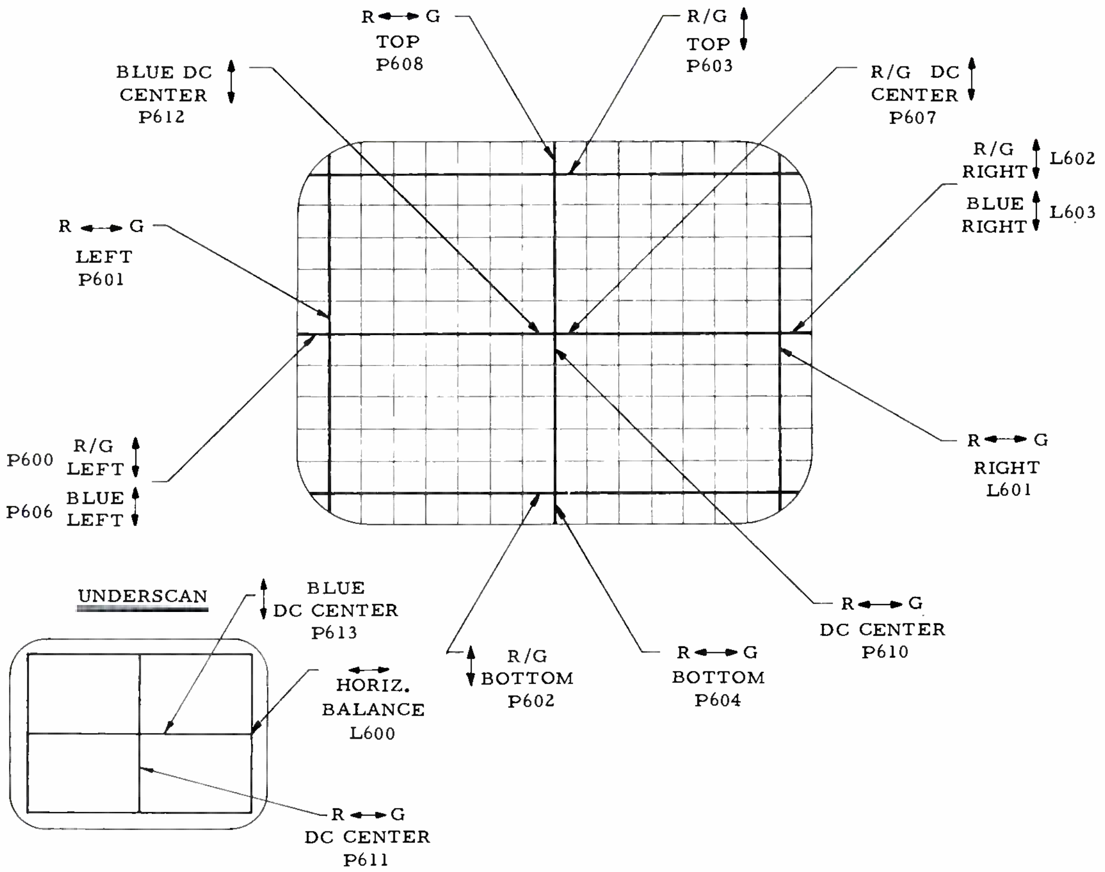
When using the alternate technique (without crosshatch generator) locate and mark the center of the screen with a grease pencil or a piece of tape; the red patch of step 3.5 should be centered about this point. Turn the RED screen OFF and the BLUE screen ON. Center the blue patch, using both the blue lateral and blue static magnets. Turn the blue gun OFF, and turn the green gun ON. Center the green patch, using both the red and green static magnets. Turn the green gun OFF, and again turn the RED screen ON. Recenter the red patch, using the purity magnets employed in step 3.5, as it may have become decentered with the foregoing adjustments. It will probably be necessary to repeat this procedure at least twice. Ultimately, some monochrome video must be displayed and shows no center-screen color fringing.

3.7 When the red field is centered and all three guns converged in the center area, slide the deflection yoke forward to produce the best over-all red purity. Tighten the wing nuts.

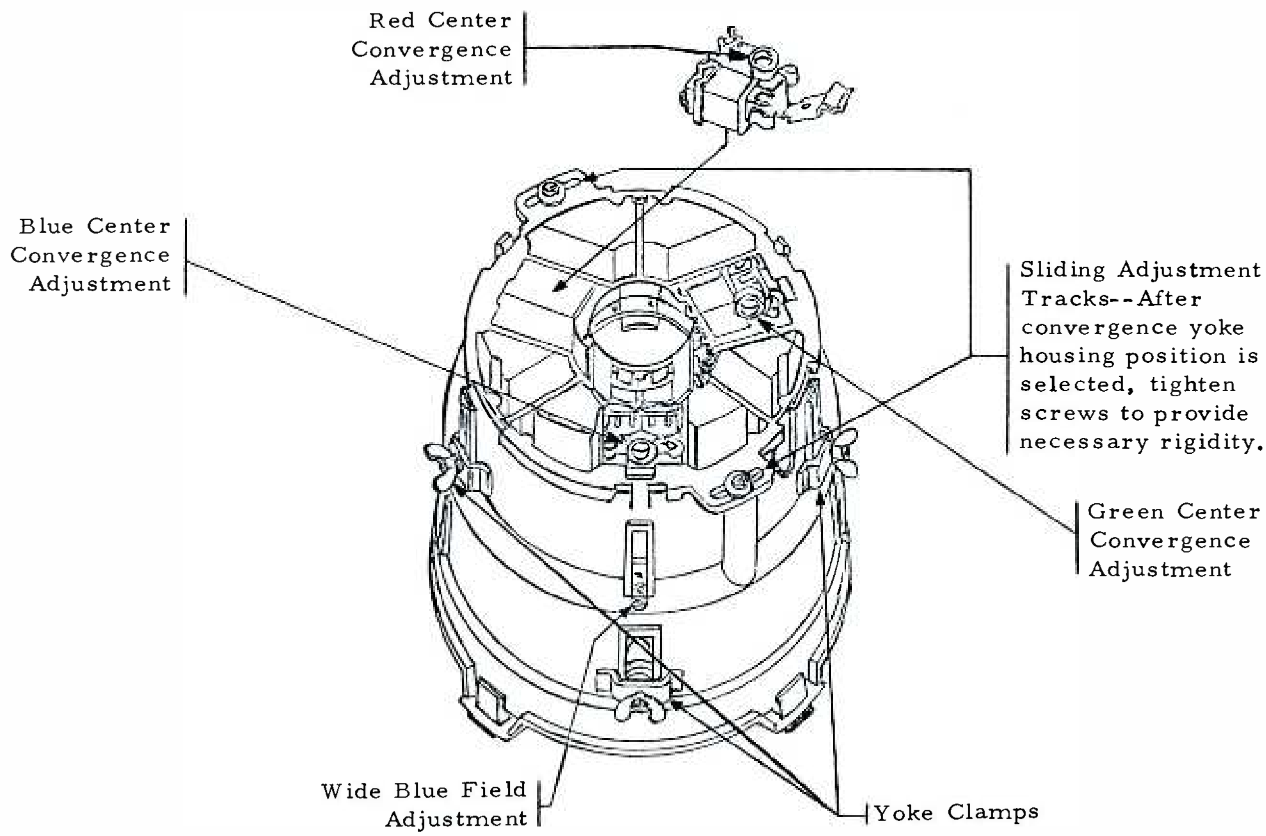
3.8 Be sure that the yoke is rotated so that scanning lines are "level". Tighten the three yoke screws. Turn BLUE and GREEN screens ON.

3.9 WIDE BLUE FIELD CORRECTION

The wide blue field adjustment is set at the factory. When adjustment is necessary due to the blue field overscanning the red and green, loosen the yoke thumbscrews; then tighten the "wide blue field" screw to reduce the width of the blue field. This positions the yoke vertically for proper blue beam scan.



CONVERGENCE CHART



CONVERGENCE AND DEFLECTION YOKE ASSEMBLY

Page 20: 4. CONVERGENCE - DYNAMIC

Change this section to read as follows:

GENERAL COMMENTS

Apply composite sync and a crosshatch or grating signal. Set BRIGHTNESS and CONTRAST controls so that brightness of crosshatch lines is low enough to prevent spot blooming. Set the size switch to WIDE position. Advance APERTURE control until vertical lines have the same brightness as horizontal lines.

Starting at the upper lefthand corner, adjust each convergence control in order, working from left to right. Refer to convergence chart and procedure. (NOTE: It is not necessary to go through the entire procedure to make minor adjustments. Simply refer to the convergence diagram and "touch up" the indicated adjustments as needed.)

RED AND GREEN CONVERGENCE

4.1 Turn off BLUE SCREEN, SW801. Adjust R ↔ G TOP, P608, to converge vertical center lines at the top of the screen. NOTE: Throughout the entire convergence procedure, it may be necessary to make minor adjustments to previously set controls due to the interaction of components.

4.2 Adjust R ↔ G BOTTOM, P604, to converge vertical center lines at the bottom of the screen.

4.3 Adjust R ↕ G TOP, P603, to converge horizontal lines at the top of the screen.

4.4 Adjust R ↕ G BOTTOM, P602, to converge horizontal lines at the bottom center of the screen.

4.5 Adjust R ↔ G RIGHT, L601, to converge vertical lines at the right side of the screen.

4.6 Adjust R/G ↕ RIGHT, L602, to converge horizontal lines at the right side of the screen.

4.7 Adjust R ↔ G LEFT, P601, to converge vertical lines at the left side of the screen.

4.8 Adjust R/G ↕ LEFT, P600, to converge horizontal lines at the left side of the screen.

RED AND BLUE CONVERGENCE

4.9 Turn on BLUE SCREEN, SW801, and turn off GREEN SCREEN, SW802. With the blue and red converged at the center of the screen, adjust the BLUE TILT control, P605, to produce equal displacement (convergence error) of top and bottom grating lines.

4.10 Adjust BLUE AMPlitude control, P609, to converge top and bottom horizontal lines. Readjust the BLUE centering magnet (convergence yoke), if necessary, to converge the center of the screen. Repeat steps 4.5 and 4.6 until best convergence is obtained.

4.11 Adjust BLUE RIGHT ↕ , L603, to converge horizontal center lines at the right side of the screen.

4.12 Adjust BLUE LEFT ↕ , P606, to converge center horizontal lines at the left side of the screen.

4.13 Turn on GREEN SCREEN, SW802, and make any minor adjustments needed to correct the RED and GREEN convergence.

UNDERSCAN CONVERGENCE

4.14 Turn the size switch, SW551, to UNDERSCAN position. Converge the center of the screen with UNDERSCAN-R ↔ G DC CENTER, P611, and UNDERSCAN-BLUE DC CENTER ↕ control, P613.

Page 21: 4.15 Adjust UNDERSCAN - HORIZONTAL BALANCE ↔, L600, for best over-all convergence along the horizontal axis of the tube.

4.16 TOP AND BOTTOM PINCUSHION ADJUSTMENT AND YOKE COMPENSATING (RINGING) ADJUSTMENT

The top and bottom pincushion adjustment is factory-preset and normally needs no further adjustment.

Top and bottom pincushion adjustments may be made, if necessary, by adjusting for straight horizontal lines at the top and bottom of the raster.

With a crosshatch pattern on the screen, turn TOP/BOTTOM AMPlitude P1001 fully clockwise. Adjust top/bottom pin phase L1001 to move the curvature to the center of the screen. Then adjust P1001 for straight horizontal lines. L1001 changes the phase of the horizontal correction waveform, and P1001 affects its amplitude. Both controls are located on a sub-chassis at the rear of the convergence assembly. One of the yoke compensating coils, L1002, is also located on the pincushion correction sub-assembly. It is factory-adjusted for minimum ringing on the left side of the raster. The second yoke compensating coil, L553, is located on the back apron. (Refer to paragraph 5.7.)

5. ADJUSTMENT OF HORIZONTAL AND HIGH VOLTAGE SYSTEM

Change this section to read as follows:

5.1 HORIZONTAL OSCILLATOR ADJUSTMENT

Adjust Horizontal HOLD control P902 to the center of its range. Temporarily short-circuit the sync signal by placing a jumper between pin 3 of V550/6BV8 and chassis ground. Also short-circuit the "sine wave coil" by placing a jumper from pin 8 of V551/6FQ7 to chassis ground. Adjust the Horizontal HOLD control, P902, for correct horizontal oscillator frequency as evidenced by the picture being near synchronism. If this condition is not obtained with the Horizontal HOLD control, adjust core T550A (bottom slug) to obtain correct frequency.

Remove the temporary jumper from pin 8 of V551/6FQ7, and adjust core T550B (top slug) to produce correct frequency. Remove the jumper from pin 3 of V550/6BV8.

5.2 Remove the top high voltage cage cover. Set the UNDERSCAN switch to WIDE position. Hold the scope probe near (3 or 4 inches away) the flyback transformer and adjust the scope to display one or two of the horizontal pulses. Observe the sine wave ringing between retrace pulses. Adjust the width coil, L550 on the rear, to produce minimum amplitude ringing.

5.3 Measure the high voltage. An electrostatic voltmeter, such as Sensitive Research Model ERSH, is preferred. Set the high voltage by means of P551, ULTOR VOLTAGE. Adjust the high voltage to the 20 to 22KV range. DO NOT EXCEED 22KV.

5.4 Observe the picture at low or medium brightness. The picture width should be nearly correct i.e., slightly overscanned. If the width is not near normal, check the adjustment of the B+, 395-volt power supply, and the deflection tubes, V552/6JE6A/6LQ6, V551/6FQ7 and V555/6DW4 (6CL3).

If necessary, adjust the width coil to produce the desired width.

5.5 Check the efficiency and high voltage system performance by measuring currents as follows:

5.5.1 To measure I_k of V552/6JE6A/6LQ6, use Simpson Model 260, Series III, meter (or other meter having 50 microampere full-scale and 5000 ohm total resistance). Set the meter to read 50 microampere full-scale, and connect to J550 and J551. When thus connected, full-scale deflection of the meter represents 500 milliamperes of cathode current in the 6JE6A/6LQ6 tube.

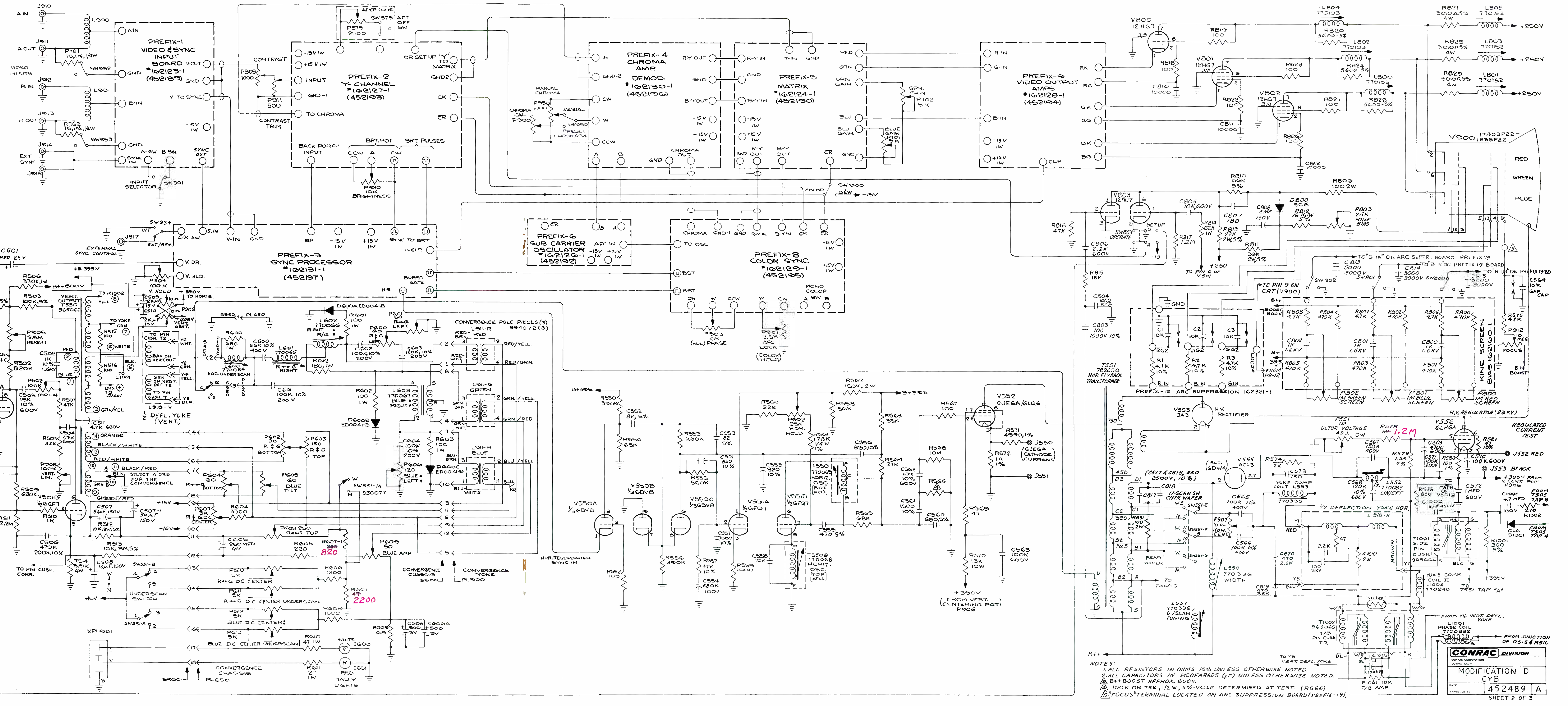
5.5.2 Adjust the horizontal linearity/efficiency coil, L552, for minimum current reading, which should be about 215 mA. Now advance this screw clockwise slightly until adequate high voltage performance is obtained. (See paragraph 5.3.) In no case allow this current to exceed 250 mA.

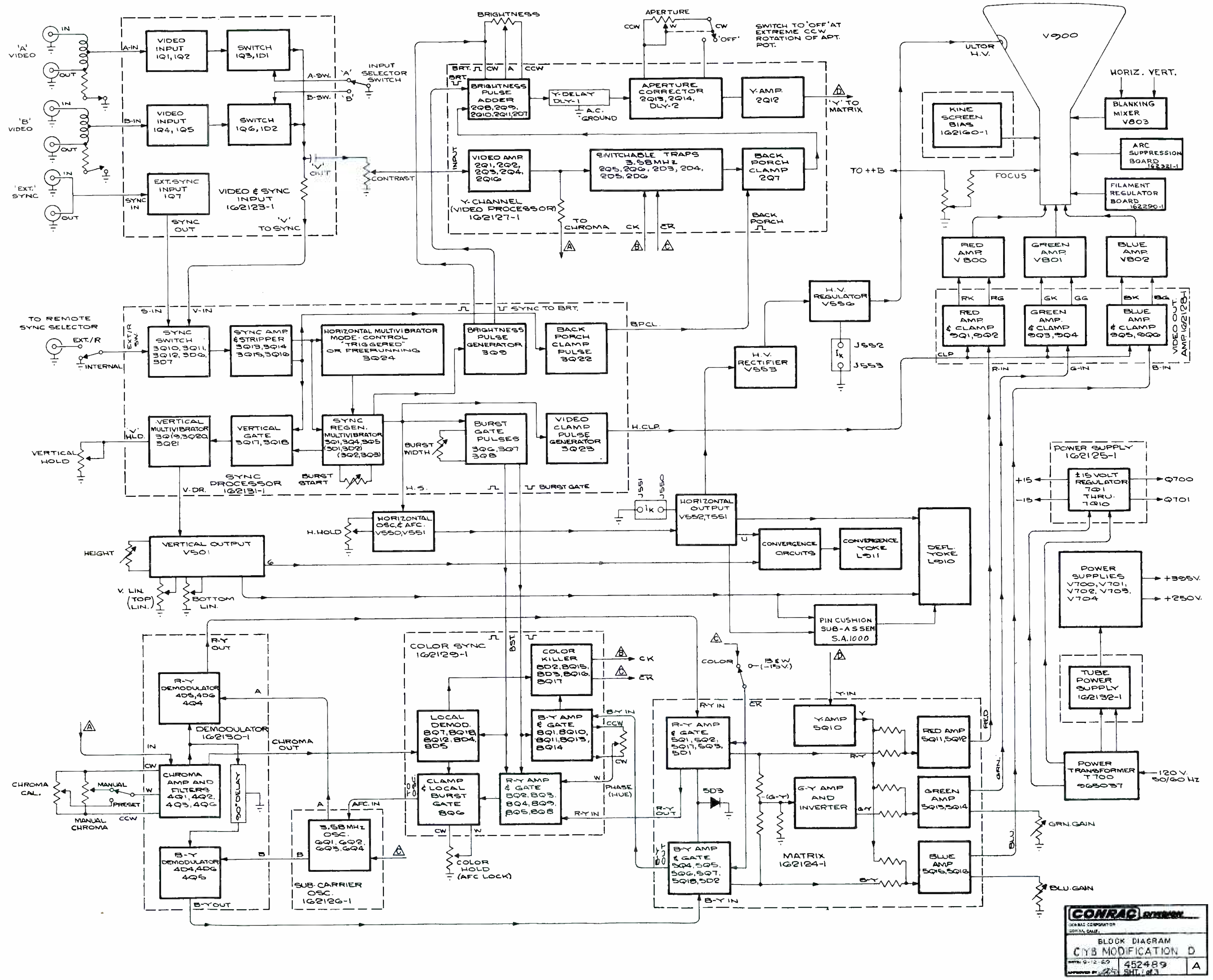
Page 22: 5.5.3 The available picture tube beam current is measured indirectly by turning the picture tube beam current off (with BRIGHTNESS and CONTRAST controls) and measuring the cathode current of the shunt regulator tube, V556/6LH6A.

5.5.4 To measure this current, use a Simpson Model 260, Series III, meter or equal. Set the meter to read 50 microampere full-scale, and connect to J552 and J553. Full-scale deflection of the meter indicates 2.5 mA. For 22KV of ultor voltage, the meter should read at least 0.8 mA. With new vacuum tubes and with the set at normal temperature, the reading will typically be about 1.5 milliamperes.

5.6 Throw the size switch to the UNDERSCAN position. Adjust underscan tuning coil L551 (on side of H.V. cage) for desired width. The underscan width should be as large as possible while still showing corners. Picture quality will deteriorate if the raster is smaller than necessary.

5.7 The second yoke compensating (ringing) coil, L553, is located on the back apron next to the linearity coil. It is the adjustment for minimum ringing on the left side of the raster.


PREFIX-1 VIDEO & SYNC INPUT BOARD *162123-1 (452185)
PREFIX-2 Y-CHANNEL *162127-1 (452193)
PREFIX-4 CHROMA AMP. DEMOD. *162130-1 (452196)
PREFIX-5 MATRIX *162124-1 (452190)
PREFIX-9 VIDEO OUTPUT AMPS *162128-1 (452194)
PREFIX-3 SYNC PROCESSOR *162131-1 (452197)
PREFIX-6 SUB CARRIER OSCILLATOR *162126-1 (452192)
PREFIX-8 COLOR SYNC *162129-1 (452195)
PREFIX-19 ARC SUPPRESSION 162321-1
KINE SCREEN BIAS (162160-1)
T551 782050 HOR. FLYBACK TRANSFORMER
H.V. REGULATOR (23 KV)
REGULATED CURRENT TEST
V900 17303P22 - 1835P22
CONVERGENCE POLE PIECES (3) 994072 (3)
1/2 DEFL. YOKE (VERT.)
1/2 DEFLECTION YOKE HOR.
CONVERGENCE CHASSIS S600
CONVERGENCE YOKE PL500
NOTES:
1. ALL RESISTORS IN OHMS 10% UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS IN PICOFARADS (pF) UNLESS OTHERWISE NOTED.
3. B++ BOOST APPROX. 800V.
4. 100K OR 75K, 1/2 W, 5%-VALUE DETERMINED AT TEST. (R566)
5. "FOCUS" TERMINAL LOCATED ON ARC SUPPRESSION BOARD (PREFIX-19).
CONRAC DIVISION
CONRAC CORPORATION
COVINA, CALIF
MODIFICATION D
CYB
452489 A
SHEET 2 OF 3



Page 23: 9. KINESCOPE REPLACEMENT - Change to read:

Remove old picture tube as follows:

9.1 Remove BRIGHTNESS, CONTRAST, CHROMA and OFF/ON knobs. Remove the sides and top.

9.2 Unplug the deflection yoke.

9.3 Unplug the convergence pole piece assembly from the upper convergence chassis.

9.4 Remove the kinescope socket.

9.5 Unplug the anode lead from the top of the kinescope.

Remove an 8-32 screw from each corner of the rear surface of the front panel. Remove two aluminum handles from the front panel, thus releasing the front assembly from the monitor. Remove the screws from the tube strap at either side of the kinescope. Remove the kinescope and set it face downward on a soft pad. Remove the blue lateral magnet-purity ring assembly and complete deflection yoke and convergence pole piece assembly.

Install the new kinescope in reverse order. Take care to ensure that the "screen" is positioned to fit the mask and that the kinescope neck is level and parallel with the sides of the chassis. Make sure that the ground spring which grounds the outside aquadag coating of the picture tube is in position. Place the deflection yoke complete housing assembly in position. Place the blue lateral magnet assembly over the pole pieces. Connect the CRT socket, deflection yoke socket, and convergence socket. Turn on the monitor and allow to warm. Make complete purity and convergence adjustments, as outlined in section 3, page 1 of this addendum.

Page 24: 10. CRT FILAMENT REGULATOR

Delete this section.

Page 25: TYPICAL SOCKET VOLTAGES

Delete V554/1V2, Focus Rectifier.

Change V900 to 17303P22 or 1835P22, with pins and voltages as follows:

Cathode	Grid	Screen	Focus
Pin 2 - 140_g	Pin 3 - 42	Pin 4 - 540_d	Pin 9 - 0V to 800V
Pin 6 - 145_g	Pin 7 - 42	Pin 5 - 475_e	
Pin 11 - 143_g	Pin 12 - 42	Pin 13 - 520_f	

Add Q4, Filament Regulator, DTG-110:

V_E - 0V

V_B - -0.25V

V_C - -7V

Page 23: 9. KINESCOPE REPLACEMENT - Change to read:

Remove old picture tube as follows:

9.1 Remove BRIGHTNESS, CONTRAST, CHROMA and OFF/ON knobs. Remove the sides and top.

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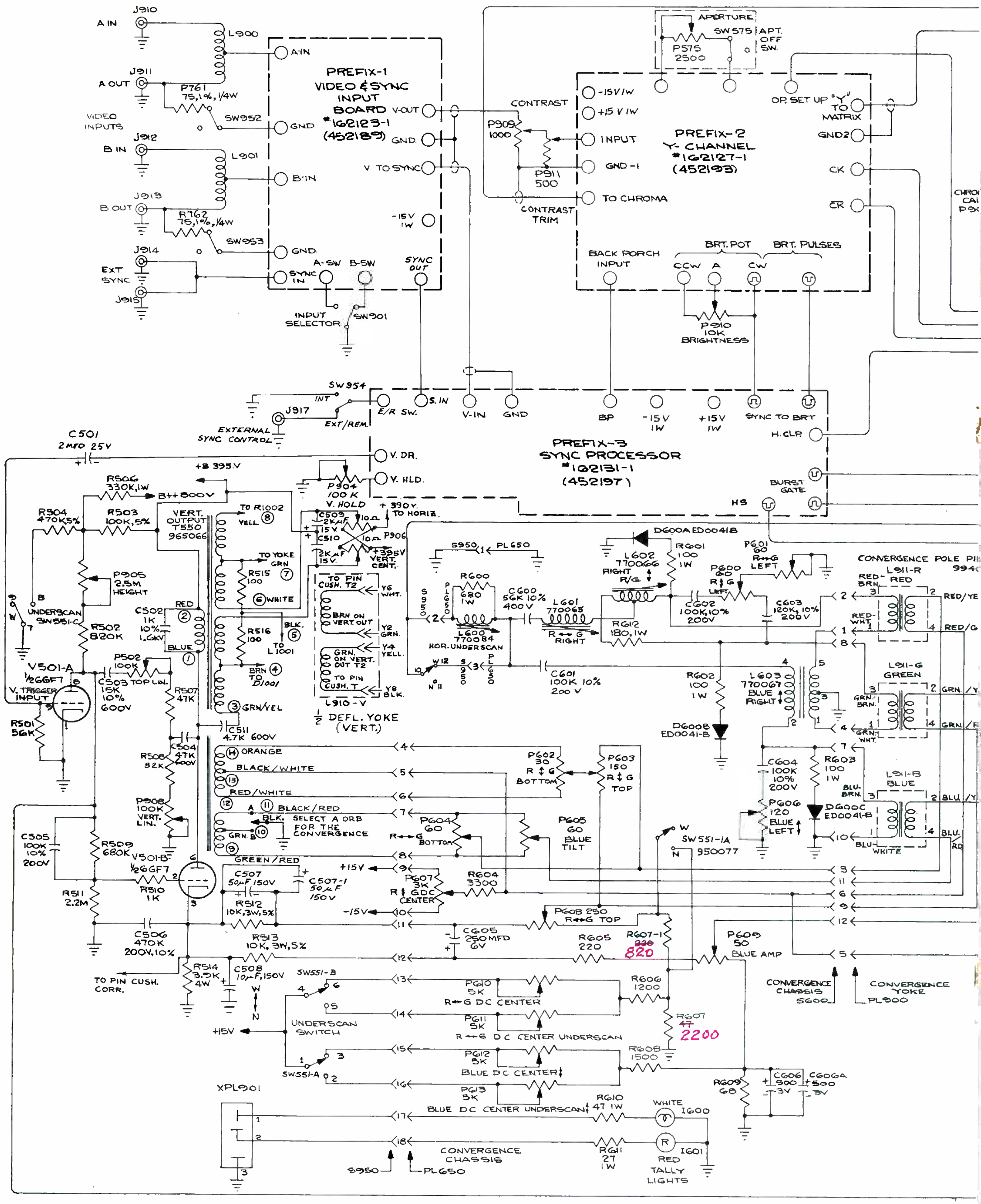
Add Q4, Filament Regulator, DTG-110:

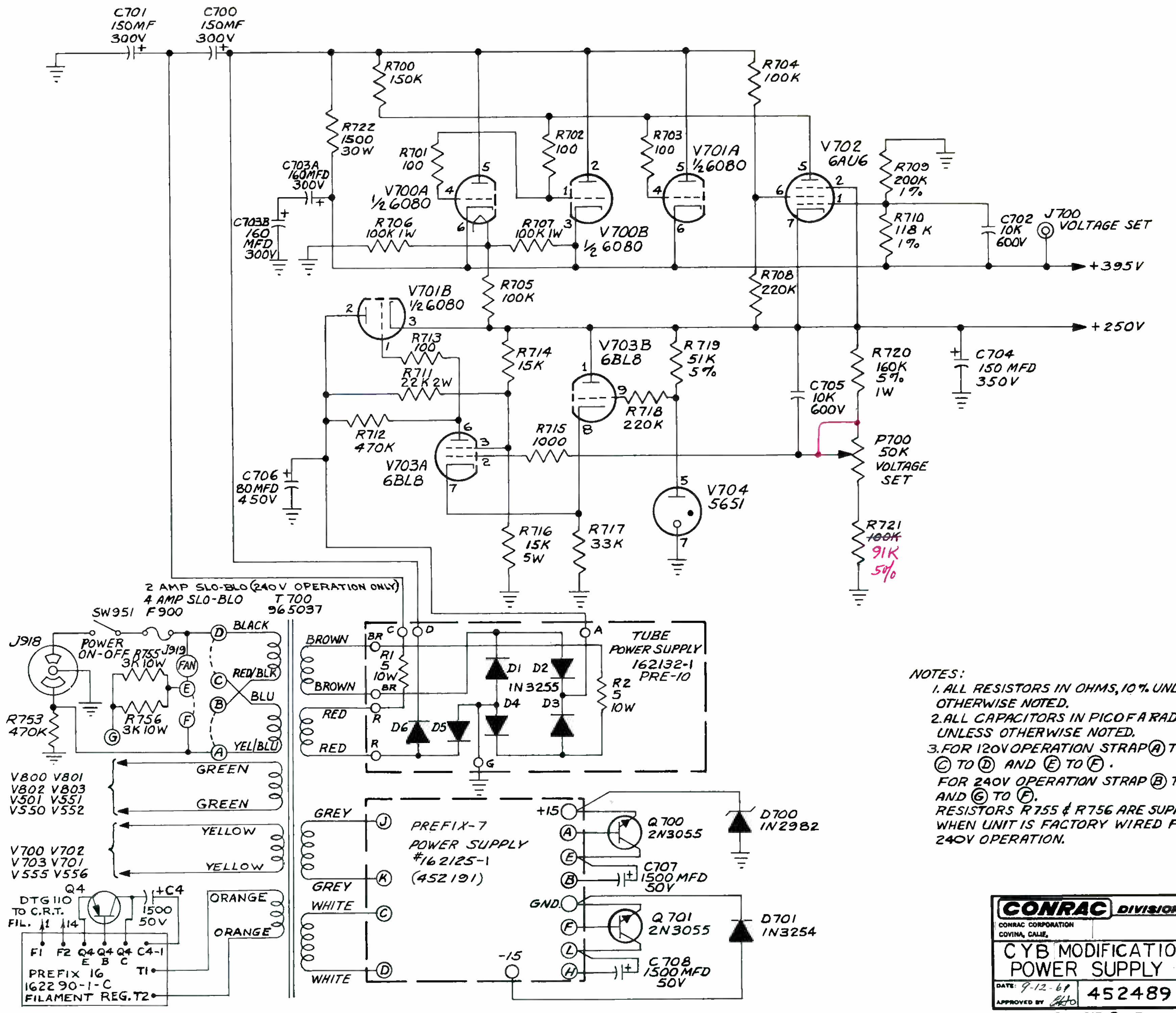
V_E - 0 V

V_B - -0.25V

V_C - -7V



J910
A IN
L900
J911
A OUT
P761
75,1%,1/4W
SW952
VIDEO INPUTS
J912
B IN
L901
J913
B OUT
R762
75,1%,1/4W
SW953
J914
EXT SYNC
J915
A-IN
GND
B-IN
GND
SYNC IN
PREFIX-1
VIDEO & SYNC INPUT BOARD
#162123-1
(452189)
V-OUT
GND
V TO SYNC
-15V 1W
SYNC OUT
A-SW
B-SW
INPUT SELECTOR
SW901
APERTURE
SW575
APT. OFF SW.
P575
2500
CONTRAST
P909
1000
P911
500
CONTRAST TRIM
-15V/W
+15 V IW
INPUT
GND-1
TO CHROMA
PREFIX-2
Y- CHANNEL
#162127-1
(452193)
OP. SET UP "Y" TO MATRIX
GND2
CK
CK
BACK PORCH INPUT
BRT. POT
BRT. PULSES
CCW
A
CW
P910
10K
BRIGHTNESS
SW954
INT
J917
EXT/REM.
EXTERNAL SYNC CONTROL
E/R SW.
S. IN
V-IN
GND
BP
-15 V 1W
+15V 1W
SYNC TO BRT
H. CLP.
PREFIX-3
SYNC PROCESSOR
#162131-1
(452197)
V. DR.
V. HLD.
BURST GATE
HS
C501
2MFD 25V
+B 395V
R506
330K,1W
B++800V
R504
470K5%
R503
100K,5%
VERT. OUTPUT T550
965066
P904
100 K
V. HOLD
+390V
TO HORIZ.
TO R1002
YELL.
C509
2KμF
15V
C510
2KμF
15V
P906
+395V
VERT. CENT.
TO YOKE GRN
R515
100
WHITE
P905
2.5M
HEIGHT
UNDERSCAN
SW551-C
R502
820K
C502
1K
10%
1.6KV
RED
BLUE
R516
100
BLK.
TO L1001
BRN TO D1001
GRN/YEL
TO PIN CUSH. T2
Y6 WHT.
BRN ON VERT. OUT
Y2 GRN.
GRN. ON VERT. OUT T2
Y4 YELL.
TO PIN CUSH. T
Y8 BLK.
L910-V
1/2 DEFL. YOKE (VERT.)
V501-A
1/2 6GF7
P502
100K
C503 TOP LIN.
15K
10%
600V
R507
47K
V. TRIGGER INPUT
R501
56K
C511
4.7K 600V
R508
82K
C504
47K
600V
P908
100K
VERT. LIN.
C505
100K
10%
200V
R509
680K
V501-B
1/2 6GF7
R510
1K
R511
2.2M
C506
470K
200V,10%
ORANGE
BLACK/WHITE
RED/WHITE
BLACK/RED
BLK.
SELECT A OR B FOR THE CONVERGENCE
GRN.
GREEN/RED
C507
50μF 150V
C507-1
50μF
150V
+15V
R512
10K,3W,5%
-15V
R513
10K, 3W,5%
R514
3.9K
4W
C508
10μF,150V
TO PIN CUSH. CORR.
SW551-B
W
N
UNDERSCAN SWITCH
+15V
SW551-A
XPL901
S950
PL650
S950
PL650
R600
680
1W
C600
56K 10%
400V
L601
770065
L600
770084
HOR. UNDERSCAN
W12
N11
C601
100K 10%
200 V
D600A ED0041B
R601
100
1W
L602
770066
RIGHT
R/G
P601
50
R↔G LEFT
P600
50
R↕G
LEFT
C602
100K,10%
200V
C603
120K, 10%
200V
R612
180, 1W
R↔G RIGHT
R602
100
1W
L603
770067
BLUE RIGHT
D600B
ED0041-B
CONVERGENCE POLE PIECE
L911-R
RED
RED-BRN.
RED-WHT.
RED/YE
RED/G
L911-G
GREEN
GRN.-BRN.
GRN.-WHT.
GRN./Y
GRN./
L911-B
BLUE
BLU.-BRN.
BLU.-WHITE
BLU./Y
BLU.
C604
100K
10%
200V
R603
100
1W
P606
120
BLUE LEFT
D600C
ED0041-B
P602
30
R↕G
BOTTOM
P603
150
R↕G
TOP
P604
50
R↔G
BOTTOM
P605
50
BLUE TILT
SW551-1A
950077
P607
3K
R↕G DC CENTER
R604
3300
P608 250
R↔G TOP
C605
250MFD
6V
R605
220
R607-1
~~330~~
820
P609
50
BLUE AMP
P610
5K
R↔G DC CENTER
R606
1200
P611
5K
R↔G DC CENTER UNDERSCAN
R607
~~47~~
2200
P612
5K
BLUE DC CENTER
R608
1500
P613
5K
BLUE DC CENTER UNDERSCAN
R610
47 1W
WHITE
I600
R611
27
1W
R
I601
RED
TALLY LIGHTS
R609
68
C606
500
3V
C606A
500
3V
CONVERGENCE CHASSIS
S600
CONVERGENCE YOKE
PL900
CONVERGENCE CHASSIS
S950
PL650



NOTES:

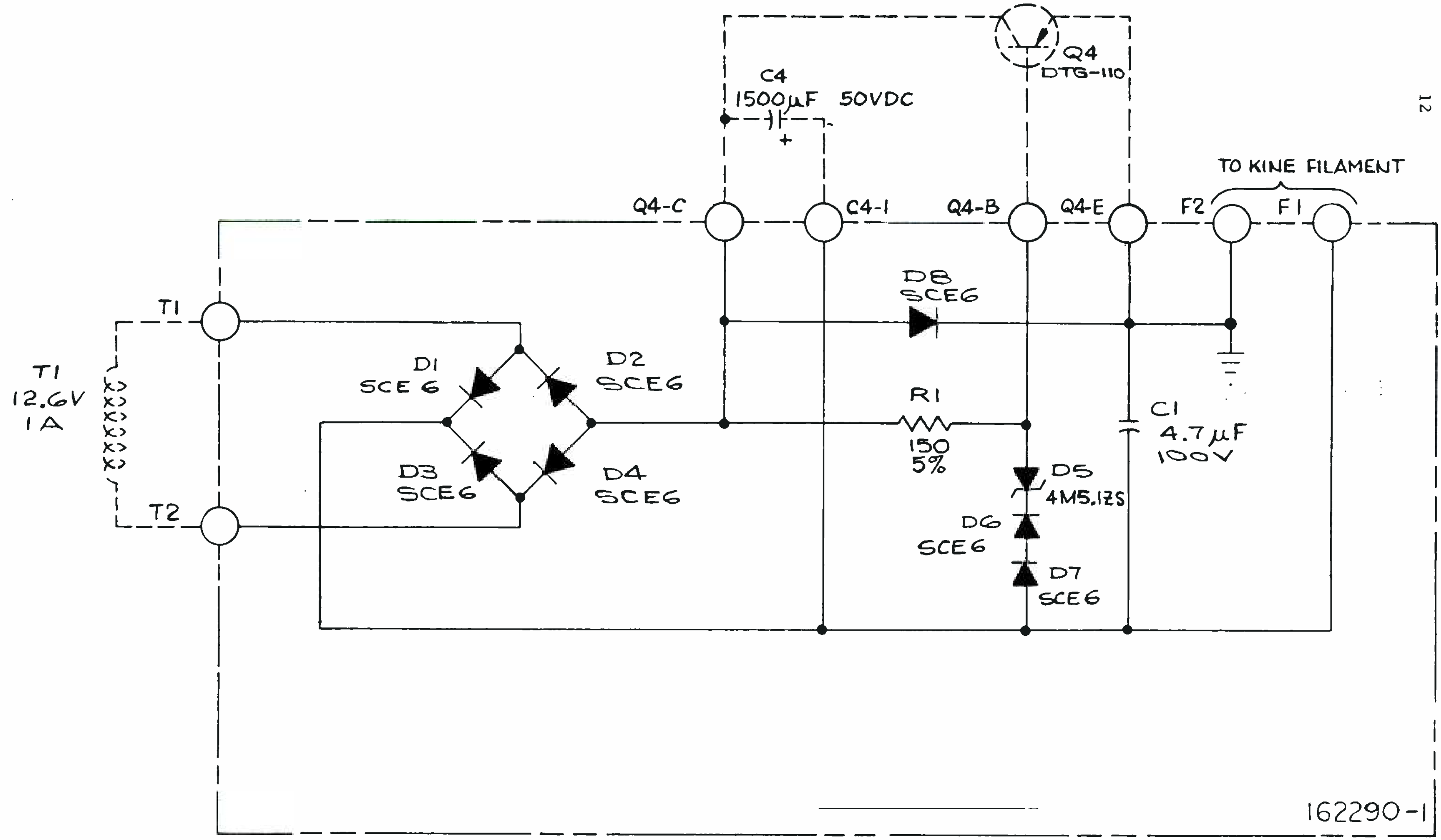
1. ALL RESISTORS IN OHMS, 10% UNLESS OTHERWISE NOTED.
2. ALL CAPACITORS IN PICOFARADS (pF) UNLESS OTHERWISE NOTED.
3. FOR 120V OPERATION STRAP A TO B, C TO D AND E TO F.
   FOR 240V OPERATION STRAP B TO C AND G TO F.
   RESISTORS R755 & R756 ARE SUPPLIED WHEN UNIT IS FACTORY WIRED FOR 240V OPERATION.

CONRAC DIVISION
CONRAC CORPORATION
COVINA, CALIF.

CYB MODIFICATION D
POWER SUPPLY

DATE: 9-12-69
APPROVED BY
452489 A

SHEET 3 OF 3



NOTES:

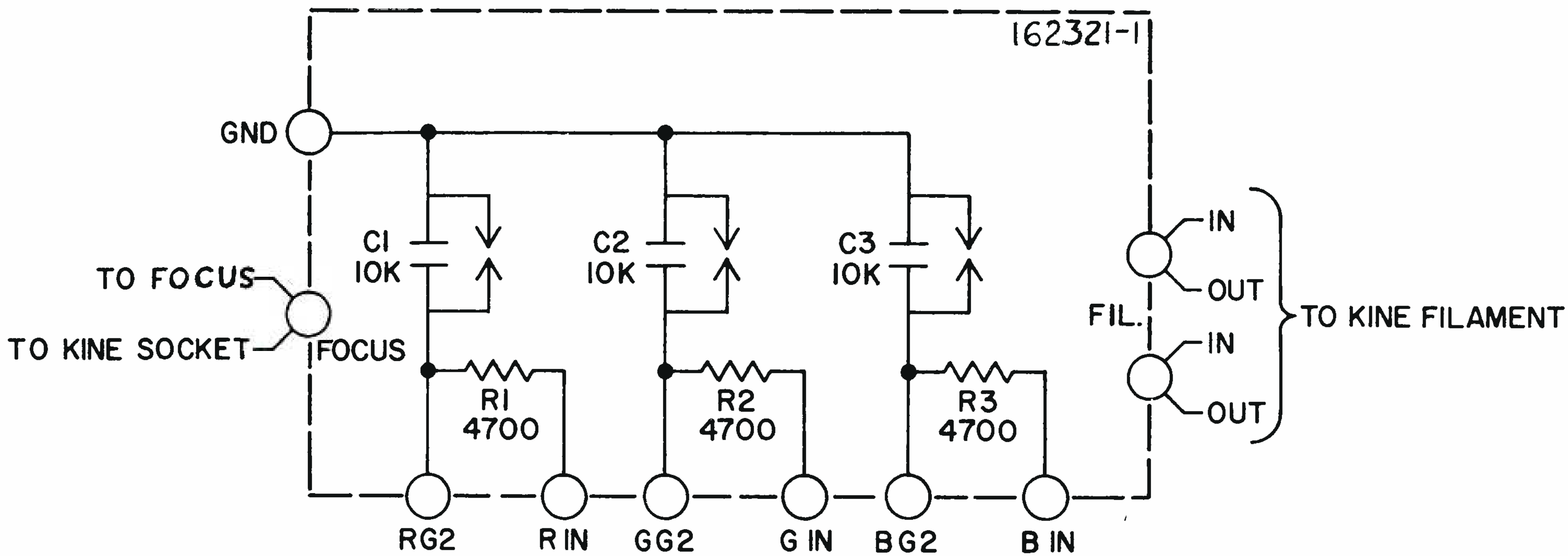
1. ALL RESISTORS IN OHMS ±10%, 1/2 WATT UNLESS OTHERWISE SPECIFIED.
2. ALL CAPACITORS IN PICOFARADS UNLESS OTHERWISE SPECIFIED.
3. COMPONENTS SHOWN DOTTED NOT ON CIRCUIT BOARD.
4. COMPONENT DESIGNATIONS ON THIS SCHEMATIC ARE PREFIXED BY THE NUMBER 16.

CONRAC DIVISION
CONRAC CORPORATION
COVINA, CALIFORNIA

SCHEMATIC
FILAMENT REGULATOR

DATE: 9-24-68
APPROVED BY: H.J.

452375A



NOTES:(UNLESS OTHERWISE SPECIFIED)
1. ALL RESISTOR VALUES ARE IN OHMS, 10%, $\frac{1}{2}$ WATT.
2. ALL CAPACITOR VALUES ARE IN PICOFARADS.
3. ALL COMPONENT DESIGNATIONS ON THIS SCHEMATIC ARE PREFIXED BY THE NUMBER 19.

CONRAC DIVISION
CONRAC CORPORATION
COVINA, CALIFORNIA

SCHEMATIC
ARC SUPPRESSION BOARD

DATE: 9-25-68
APPROVED BY: H.J.

452411 A

Pages 31 through 49: REPLACEABLE PARTS

SYMBOL	DESCRIPTION	PART NO.	MFR.*
	Add the following:		
	CAPACITORS		
C4	Electrolytic, 1500 µF, 50 V	WP-068	MAL
C421-1	Mica, 10 pF, 5%, 500 V	DM15-100J	ELM
C507-1	Electrolytic, 50 µF, 150 V	TC49A	MAL
C508	Electrolytic, 10 µF, 150 V	BBR10-150	CD
C509, C510	Electrolytic, 2000 µF, 15 V	BR2000-15	CD
C511	Paper Tubular, 4700 pF, 10%, 600 V	PKM-6D47	CD
C573	Mica, 150 pF, 5%, 500 V	DM15-151J	ELM
C819, C820	Mica, 470 pF, 5%, 2500 V	VCM35B471J	ELM
C1001	Polycarbonate, 4.7 µF, 10%, 100 V	C281CH/A4M7	AMP
C1002	Electrolytic, 8 µF, 450 V	TC71A	MAL
C1003	Polycarbonate, 100,000 pF, 10%, 200 V, MF575		PAK
C1003-1	Polycarbonate, 100,000 pF, 10%, 200 V, MF575		PAK
D1001	Diode: Silicon Rectifier, 600 V, 1A	CL-6	PC
L553	Coil: Yoke Compensating	770335	CONRAC
L1001	Coil: Pin Phase	770332	CONRAC
L1002	Coil: Yoke Compensating	770240	CONRAC
	POTENTIOMETERS		
P912	Composition, 10 megohms (Focus)	928335	CONRAC
P1001	Composition, 10,000 ohms (Top/Bottom Amplitude)	928077	CONRAC
Q4	Transistor: Germanium Power	DTG-110	DEL
	RESISTORS		
R515, R516	Composition, 100 ohms, 10%, $\frac{1}{2}$ w		AB
R607-1	Composition, 820 ~~220~~ ohms, 10%, $\frac{1}{2}$ w		AB
R1001	Composition, 300 ohms, 5%, $\frac{1}{2}$ w		AB
R1002	Composition, 270 ohms, 10%, $\frac{1}{2}$ w		AB
VR1001	Varistor, 1 mA, 175 V	334BNR-10	CAR
T1001	Transformer: Side Pincushion	965064	CONRAC
T1002	Transformer: Top Pincushion	965065	CONRAC
	MISCELLANEOUS		
	Cap Assembly: Anode	117109	CONRAC
	Connector: Female, 3 Contact	886074	CONRAC
	Connector: Female, Nylon, Single Contact	886088	CONRAC
	Connector: Female, Mate-N-Lock Contact	886102-2	CONRAC
	Connector: Male, Mate-N-Lock Contact	886102-1	CONRAC
	Connector: Pincushion Housing	886099-1	CONRAC
	Connector: Socket Housing	886099-2	CONRAC
	Knob: Secondary Control, Black	361024-1	CONRAC
	Socket: Transistor (DTG-110)	935046-4	CONRAC
SW551-1	Switch: Rotary (U/Scan Deck #3)	950077	CONRAC
	Terminal Strip: 4 Point	384004-4	CONRAC
	Terminal Strip: 7 Point	384004-7	CONRAC
	Terminal Strip: 12 Point	384004-12	CONRAC

SYMBOL	DESCRIPTION	PART NO.	MFR.*
	Filament Regulator Board 162290-1		
16C1	Capacitor: Polycarbonate, 4.7 μF, 10%, 100 V	C281CH/A4M7	AMP
16D1 to 16D4	Diode: Silicon Rectifier	SCE6	SEM
16D5	Diode: Zener, 5.1 V, 2%, 400 mw	4M5.1ZS	MOT
16D6 to 16D8	Diode: Silicon Rectifier	SCE6	SEM
16R1	Resistor: Composition, 150 ohms, 5%, ½ w		AB
	Arc Suppression Board 162321-1		
19C1 to 19C3	Capacitor: Gap, 10,000 pF, 1000 WV (2 - 3KV Arc)	GAP103	CRL
19R1 to 19R3	Resistor: Composition, 4700 ohms, 10%, ½ w		AB

Change the following to read:

SYMBOL	DESCRIPTION	PART NO.	MFR.*
	CAPACITORS		
C503	Isofarad Plastic, 15,000 pF, 10%, 500 V	279P15395X	SP
C564	Gap, 10,000 pF, 1000 WV (2 - 3KV Arc)	GAP103	CRL
C572	Electrolytic, 1 μF, 20%, 600 V	BA2G105	IMB
C602	Paper, 100,000 pF, 10%, 600 V	160P10492	SP
	COILS		
L550	High Z	770336	CONRAC
L551	Width	770336	CONRAC
L910	Deflection Yoke	994070	CONRAC
L911	Pole Exciter	994072	CONRAC
P906	Potentiometer: Composition, 10/10 ohms (Vert. Centering)	928355	CONRAC
	RESISTORS		
R504	Composition, 470,000 ohms, 5%, ½ w		AB
R508	Composition, 82,000 ohms, 10%, ½ w		AB
R509	Composition, 680,000 ohms, 10%, ½ w		AB
R561	Film, 178,000 ohms, 1%, 1/4 w, N60/N65		COR
R562	Composition, 150,000 ohms, 10%, 2 w		AB
R574	Composition, 2000 ohms, 5%, 1 w		AB
R575	Composition, 47,000 ohms, 10%, ½ w		AB
R576	Composition, 680 ohms, 10%, ½ w		AB
R815	Composition, 18,000 ohms, 10%, ½ w		AB
R817	Composition, 1.2 megohms, 10%, ½ w		AB
R607	Composition, 2200 ohms, 10%, 1/2 W		AB
T550	Transformer: Vertical Output	965066	CONRAC
T551	Transformer: Horizontal Flyback	782050	CONRAC
	MISCELLANEOUS		
	Mask: 17"	390045	CONRAC
	Ring: Blue Lateral and Purity Magnet Assembly	844072	CONRAC
	Shield: 17" Kinescope	394290	CONRAC

SYMBOL	DESCRIPTION	PART NO.	MFR.*
Delete the following:			
C816	Capacitor: Mica, 820 pF, 10%, 500 V	CM20B821K	ELM
	RESISTORS		
R577	Composition, 100,000 ohms, 10%, $\frac{1}{2}$ w		AB
R751	Composition, 100,000 ohms, 10%, $\frac{1}{2}$ w		AB
R752	Regulator - CRT Filament	22-4	AMP
R754	Wirewound, 18 ohms, 10%, 5 w, X60		TO
R757	Composition, 33 ohms, 5%, 2 w		AB
R760	Composition, 100,000 ohms, 10%, $\frac{1}{2}$ w		AB
R830	Composition, 100 ohms, 10%, $\frac{1}{2}$ w		AB
T552	Transformer: Focus	770088	CONRAC
XV554	Socket: High Voltage (1V2)	935002	CONRAC

Page 50: CONVERGENCE CHART - Replace with revised chart on page 3 of this addendum.

Page 51: Schematic Block Diagram 452201Q, Sheet 2, replace with 452489A, Sheet 2.

Page 53: Schematic Diagram 452201B, Sheet 1, replace with 452489A, Sheet 1.

Page 55: Schematic Diagram, Power Supply, 452201J, Sheet 3, replace with 452489A, Sheet 3.

Add Schematic Diagram 452375A, Filament Regulator Board 162290-1.
Add Schematic Diagram 452411A, Arc Suppression Board 162321-1.

Page 80: MANUFACTURERS OF REPLACEABLE PARTS

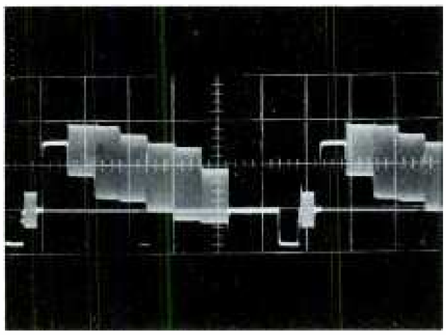
Add the following:

*CODE	MANUFACTURER	LOCATION
AMP	Amperex Electronic Corporation	Hicksville, L. I., New York 11802
CAR	Carborundum Company	Niagara Falls, New York 14302
DEL	Delco Radio Division, General Motors Corp.	Kokomo, Indiana 46901
IMB	IMB Electronic Products, Inc.	Santa Fe Springs, California 90670
PAK	Paktron Division, Illinois Tool Works, Inc.	Alexandria, Virginia 22300
PC	Power Components, Inc.	Scottsdale, Pennsylvania 15683

Typical Waveforms

CONDITIONS FOR WAVEFORM PHOTOGRAPHS

Input Signal:	Standard composite color bar signal, 1.4 volts peak-to-peak.
Monitor Adjustment:	Monitor adjusted and set up to produce a typical "normal" picture (wide scan).
Time Base:	All photographs taken with horizontal sweep speed of 10 microseconds per cm, except where otherwise stated.
Equipment Used:	Tektronix 531A scope with 10:1 attenuator probe and Polaroid camera.

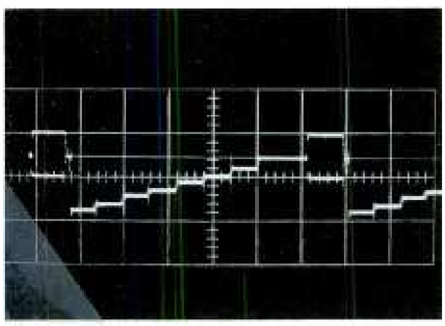


Video Input at Terminal V
.5 Volts/CM

Same Wave Appears at Terminal AZ -.2 V P-P
Same Wave Appears at Terminal AJ -1.3 V P-P

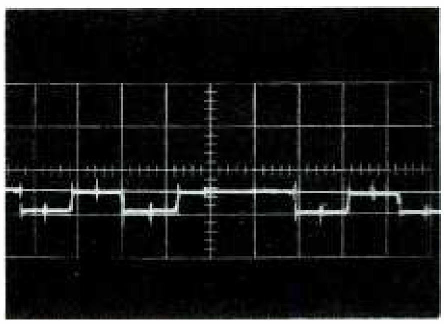
Delay Line Input at Junction of 1R29 and 1R31
1 Volt/CM

Same Wave Appears at Collector of 1Q15
2.8 Volts P-P



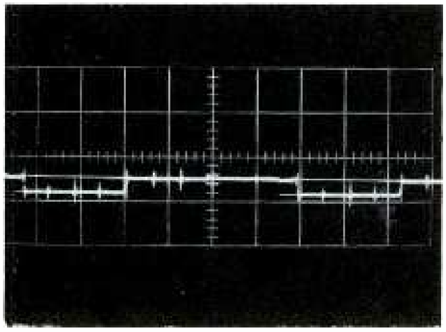
Processed Luminance Signal at Point U
1 Volt/ CM

This is a double exposure, showing the added "Brightness Pulse" at both extremes of the brightness control range.

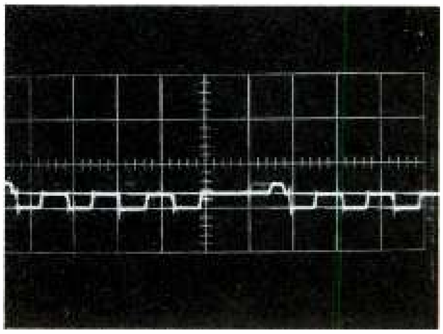


Red Signal at Kinescope Pin #4
100 Volts/CM
Zero Volts DC at Bottom Line of Graticle

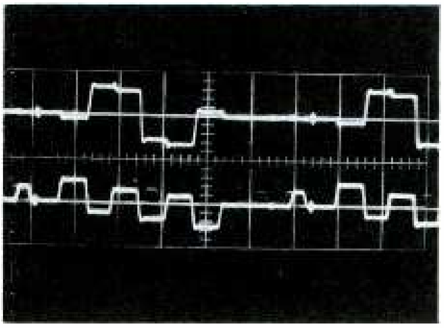
Typical Waveforms



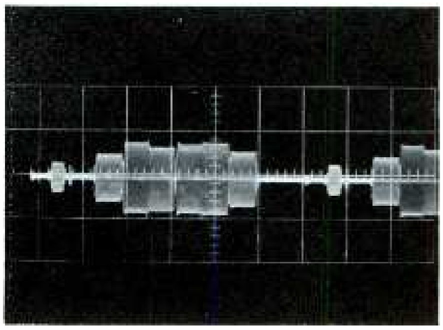
Green Signal at Kinescope Pin #5
100 Volts/CM
Zero Volts DC at Bottom Line of Graticle



Blue Signal at Kinescope Pin #13
100 Volts/CM
Zero Volts Reference at Bottom Line of Graticle

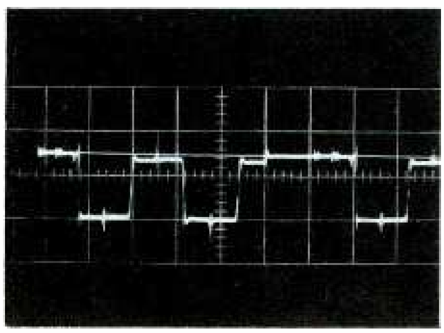


Top Trace: R-Y Signal at Point R
Bottom Trace: B-Y Signal at Point S
.5 Volt/CM



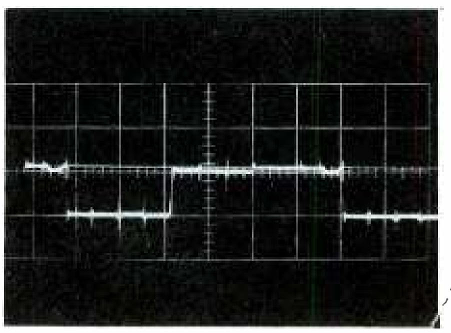
Chroma Signal at Emitter of 2Q2
1 Volt/CM

This wave also appears at collector of 2Q1 and junction of 2R14 and 2C12 at .8 V P-P.



Red Signal at Point F
.5 Volt/CM

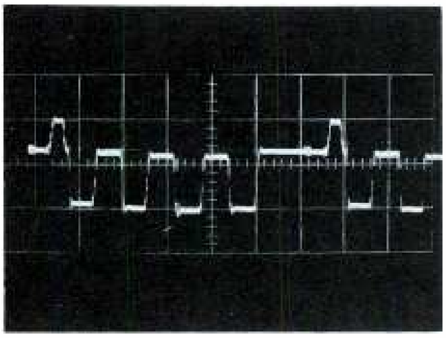
Same Wave Appears at Point AK at 5 V P-P



Green Signal at Point H
.5 Volt/CM

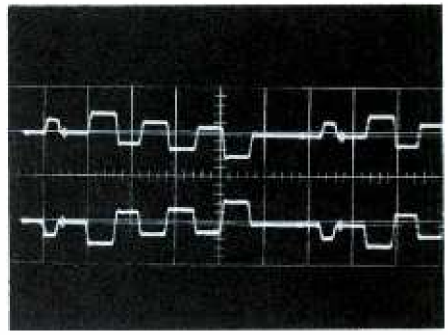
This wave also appears at point AL at 3.6 V P-P.

Typical Waveforms

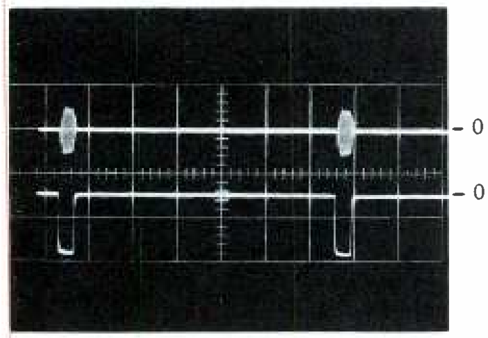


Blue Signal at Point J
.5 Volt/CM

This wave also appears at Point AM at 4.3 V P-P



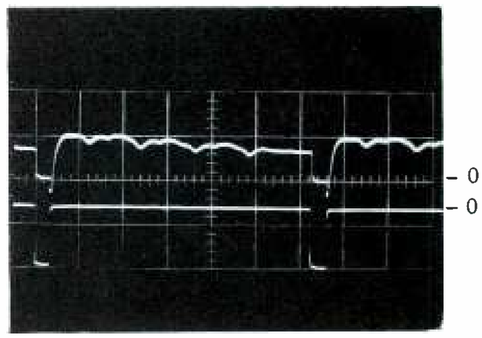
Hue Control Pulses
Top Trace Point BM (B-Y)
Bottom Trace Point BO (Y-B)
1 Volt/CM



Top Trace: Demodulated Burst at Emitter of 2Q7
2 Volts/CM

The demodulated burst (R-Y axis) normally goes through a null at this point. To illustrate circuit action, photograph was made with color sub-carrier oscillator thrown out of synchronization by grounding point AS.

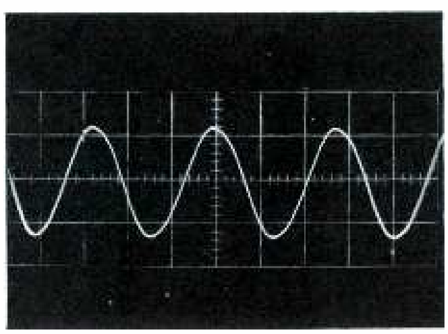
Bottom Trace: Burst Key Pulse at Point AG
10 Volts/CM



Color Kill Signal - Collector of 2Q17
5 Volts/CM

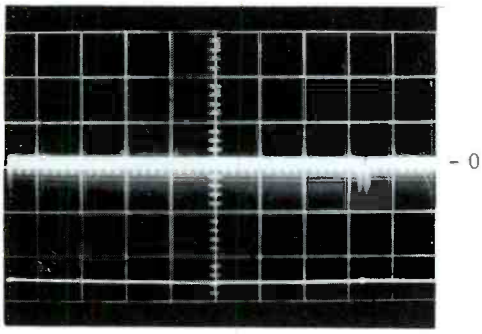
(Bottom trace is burst key pulse at Point AG, 10 Volts/CM, shown for reference.)

The demodulated burst (B-Y axis) is clamped to ground by the burst key pulse. The resulting wave is filtered to obtain the "DC" color killer voltage.

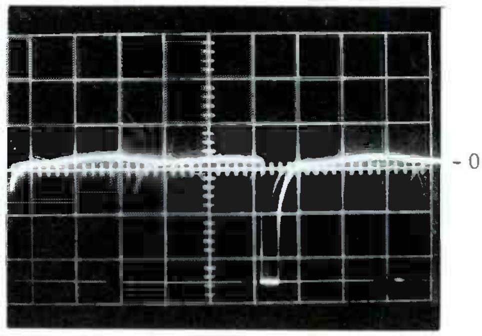


Subcarrier Signal at Point BG or BH
10 Volts/CM
Sweep Speed = 1/10 Microsecond/CM

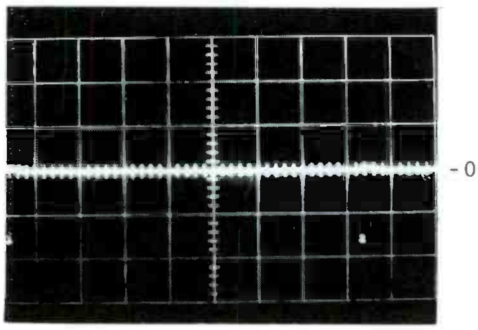
Typical Waveforms
Sync and Pulse Waves



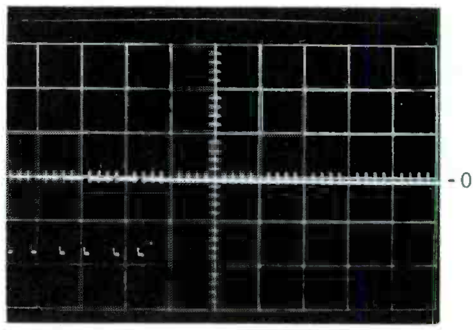
Composite Sync, Terminal N
5 Volts/cm
Sweep: 2 msec/cm



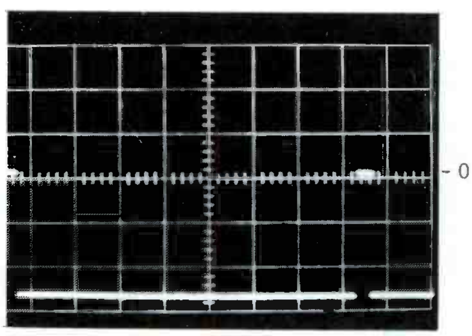
Composite Sync, Terminal N
5 Volts/cm
Sweep: 10 microsec/cm



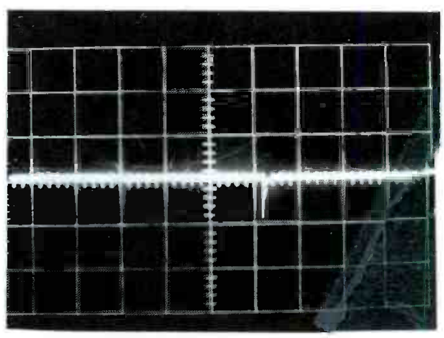
Vertical Trigger, Terminal Q
5 Volts/cm
Sweep: 2 msec/cm



Vertical Trigger, Terminal Q
5 Volts/cm
Sweep: 50 microsec/cm

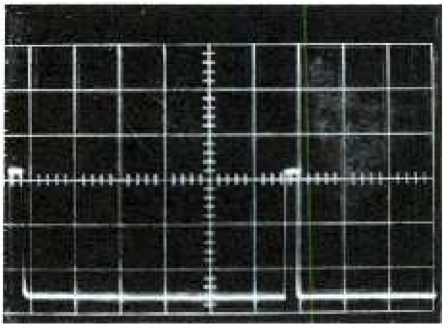


Vertical Drive at Terminal L
5 Volts/cm
Sweep: 2 msec/cm

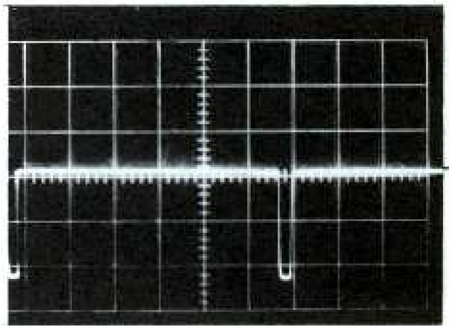


Differentiated Sync at Terminal AH
5 Volts/cm
Sweep: 10 microsec/cm

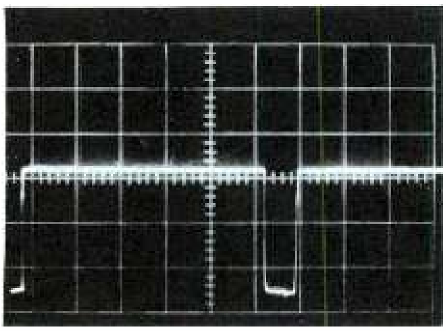
Typical Waveforms
Sync and Pulse Waves



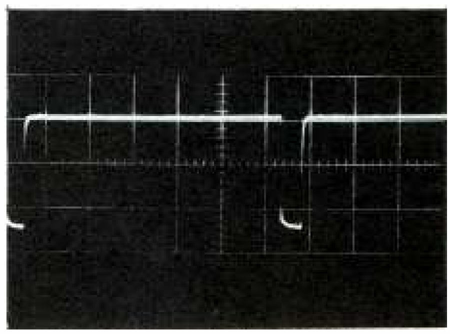
Burst Key Pulse at Terminal AF
5 Volts/cm



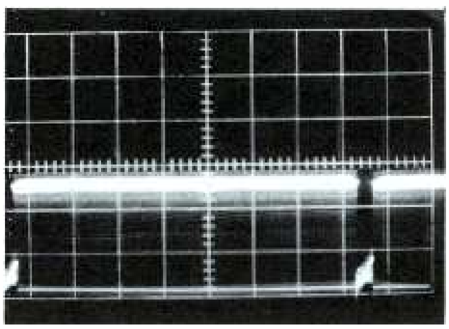
Burst Key Pulse at Terminal AG
5 Volts/cm



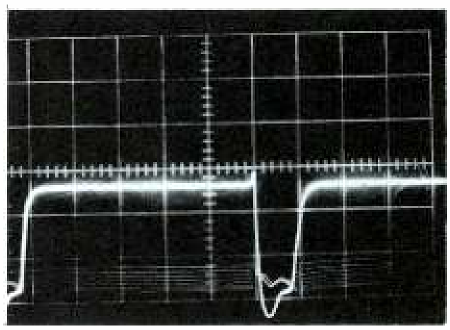
Brightness Pulse at Terminal Z



Horizontal Drive Pulse at Terminal BL

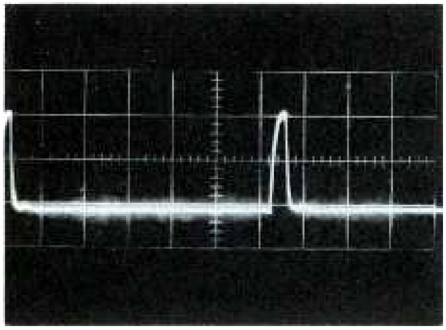


Blanking at Kinescope Grid #1
20 Volts/cm
Sweep: 2 msec/sec

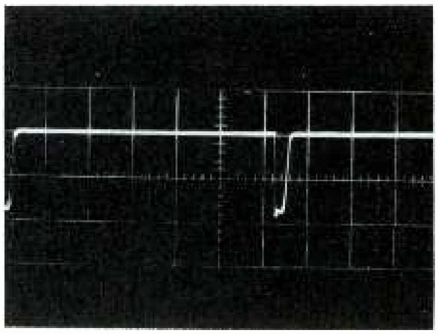


Blanking at Kinescope Grid #1
20 Volts/cm
Sweep: 10 microsec/cm

Typical Waveforms
Sync and Pulse Waves

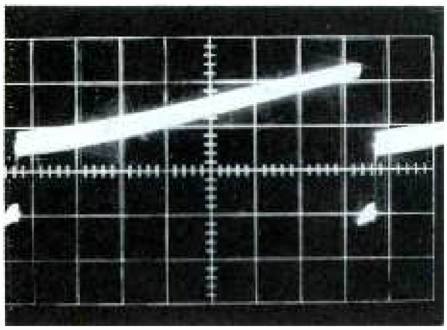


Clamp Pulse at Pin 6 of 4V3
20 Volts/cm
Sweep: 10 microsec/cm

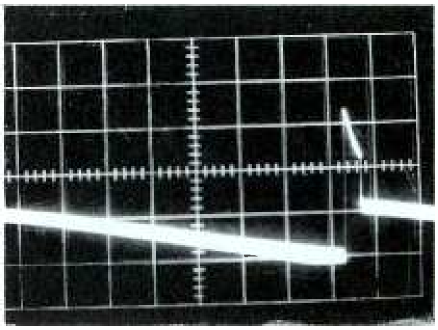


Clamp Pulse at Pin 1 of 4V3
50 Volts/cm
Sweep: 10 microsec/cm

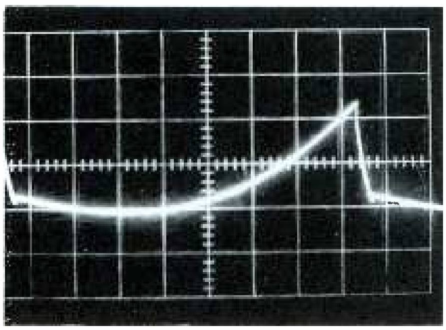
Vertical Deflection Waves



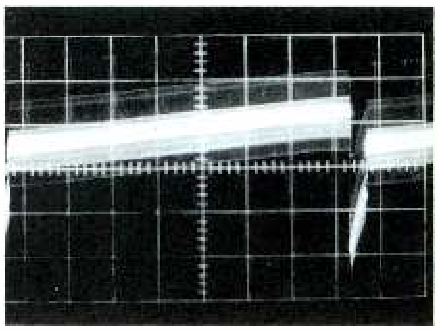
Vertical Sawtooth at Pin 1 of 5V1
50 Volts/cm; Zero Center
Sweep: 2 msec/cm



Vertical Output at Pin 2 of 5V1
200 Volts/cm
Sweep: 2 msec/cm

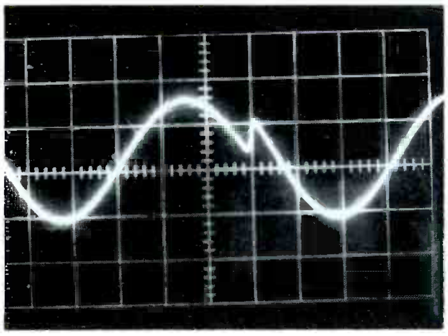


Vertical Convergence at Pin 3 of 5V1
5 Volts/cm; Zero at Bottom of Graticle
Sweep: 2 msec/cm

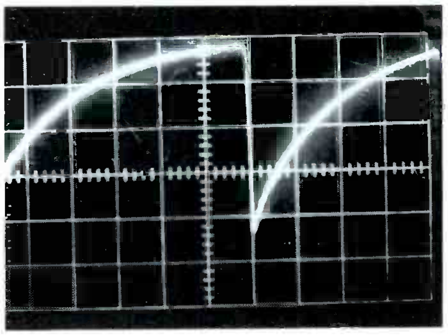


Yoke Voltage at Yellow Lead of 5T1
20 Volts/cm
Sweep: 2 msec/cm

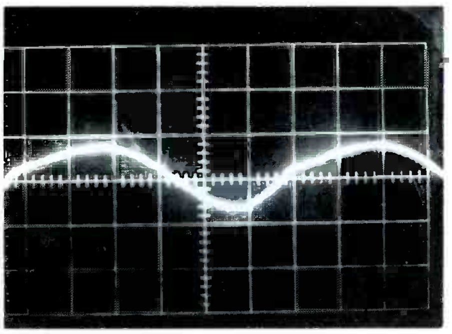
Typical Waveforms
Horizontal Deflection Waves



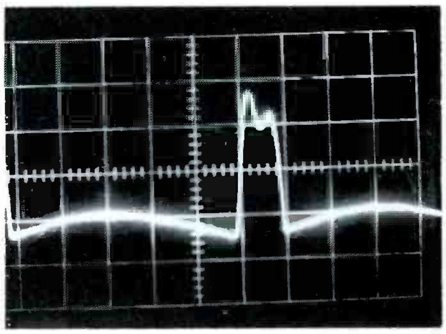
Ringing Coil Voltage at Pin 8 of 5V3
20 Volts/cm
Sweep: 10 microsec/cm



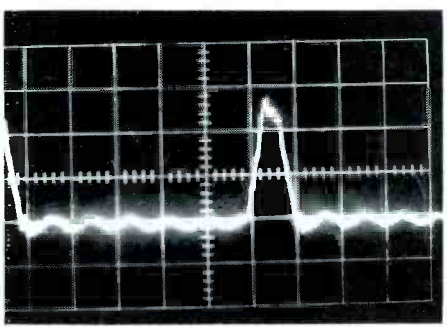
Grid Drive at Pin 5 of 5V4
50 Volts/cm
Sweep: 10 microsec/cm



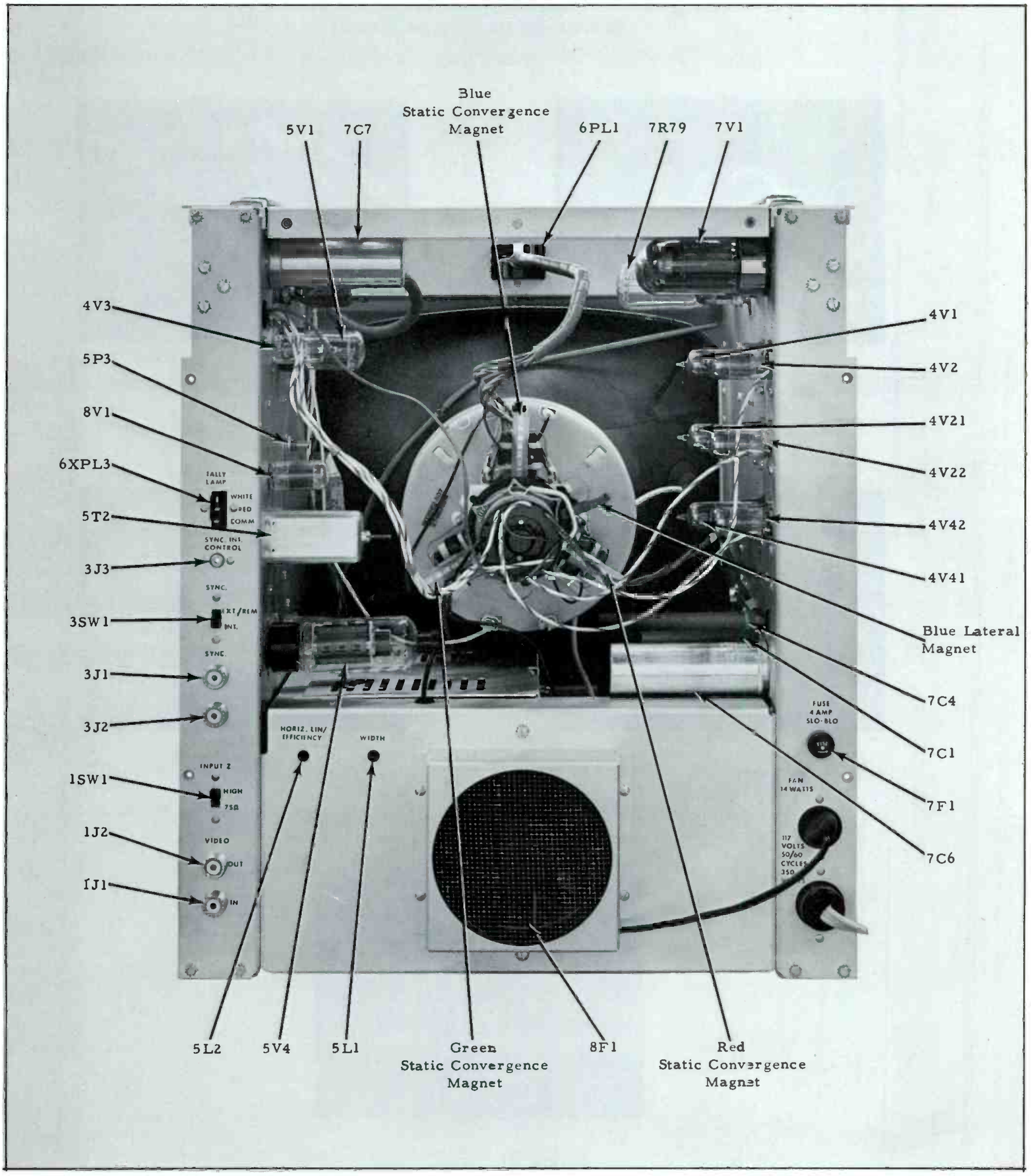
Damper Plate, Pin 2 of 5V7
50 Volts/cm
Sweep: 10 microsec/cm



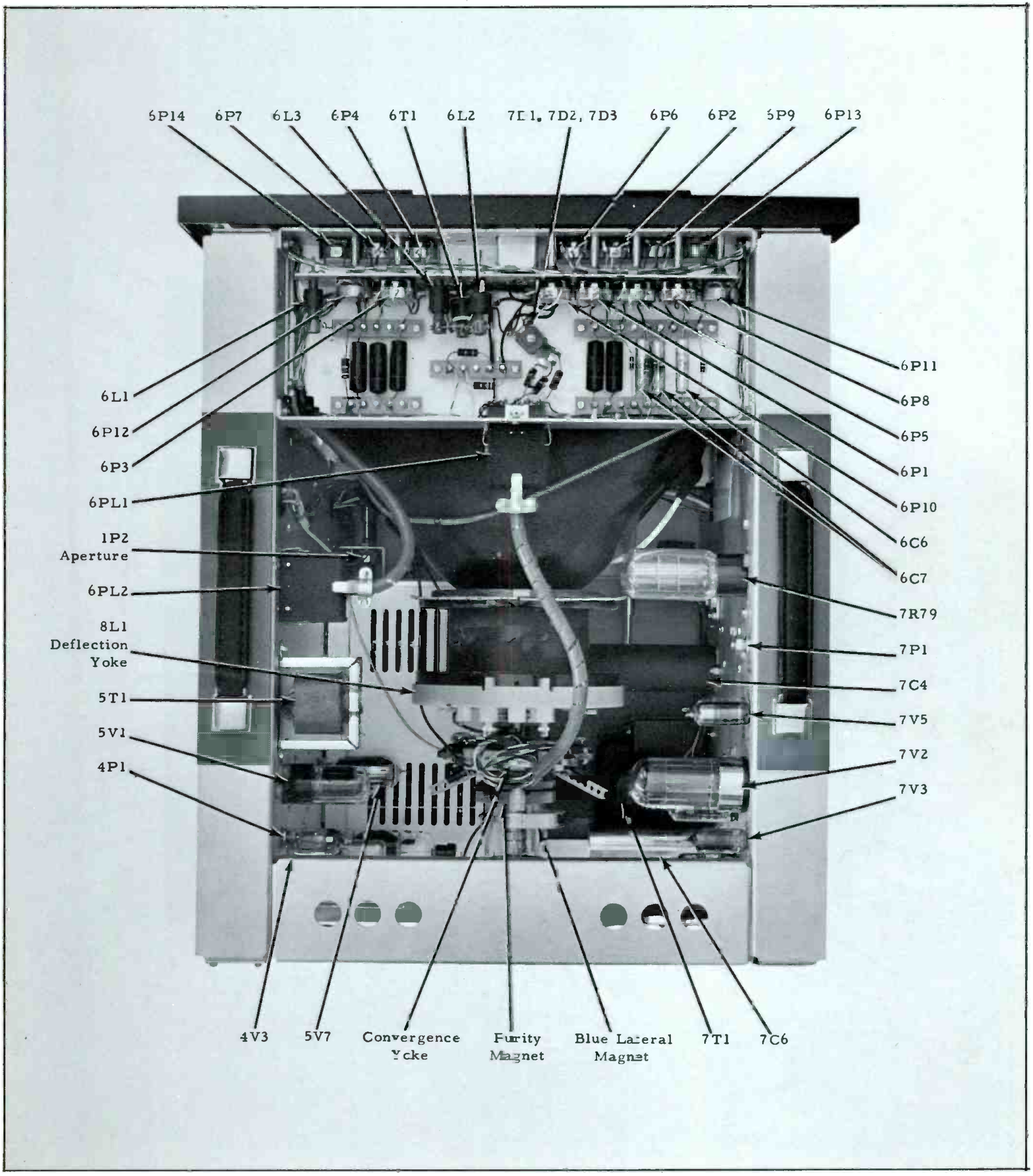
Terminal "A" of Flyback, 5T3
200 Volts/cm
Sweep: 10 microsec/cm



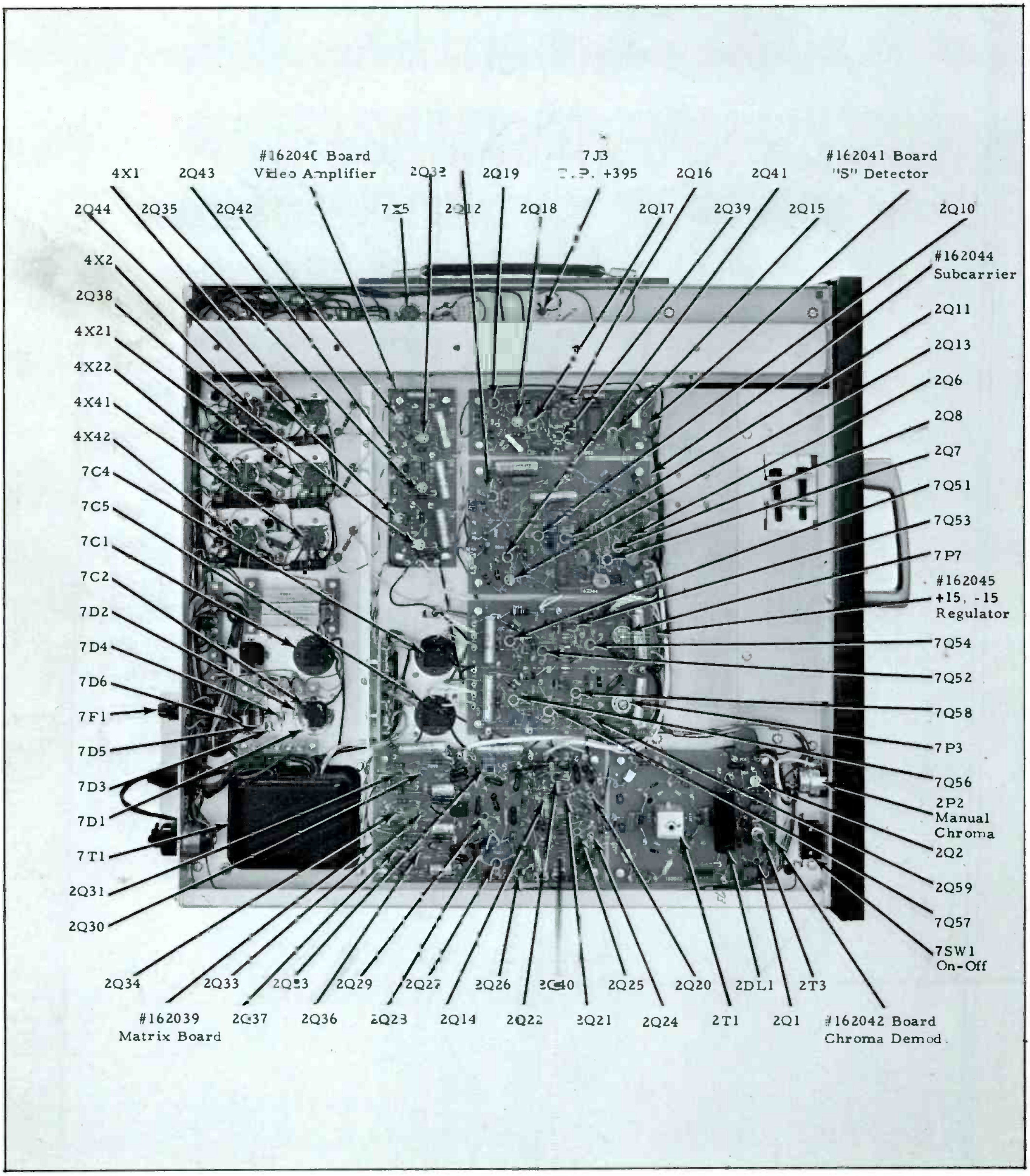
Terminal U of Flyback
100 Volts/cm
Sweep: 10 microsec/cm



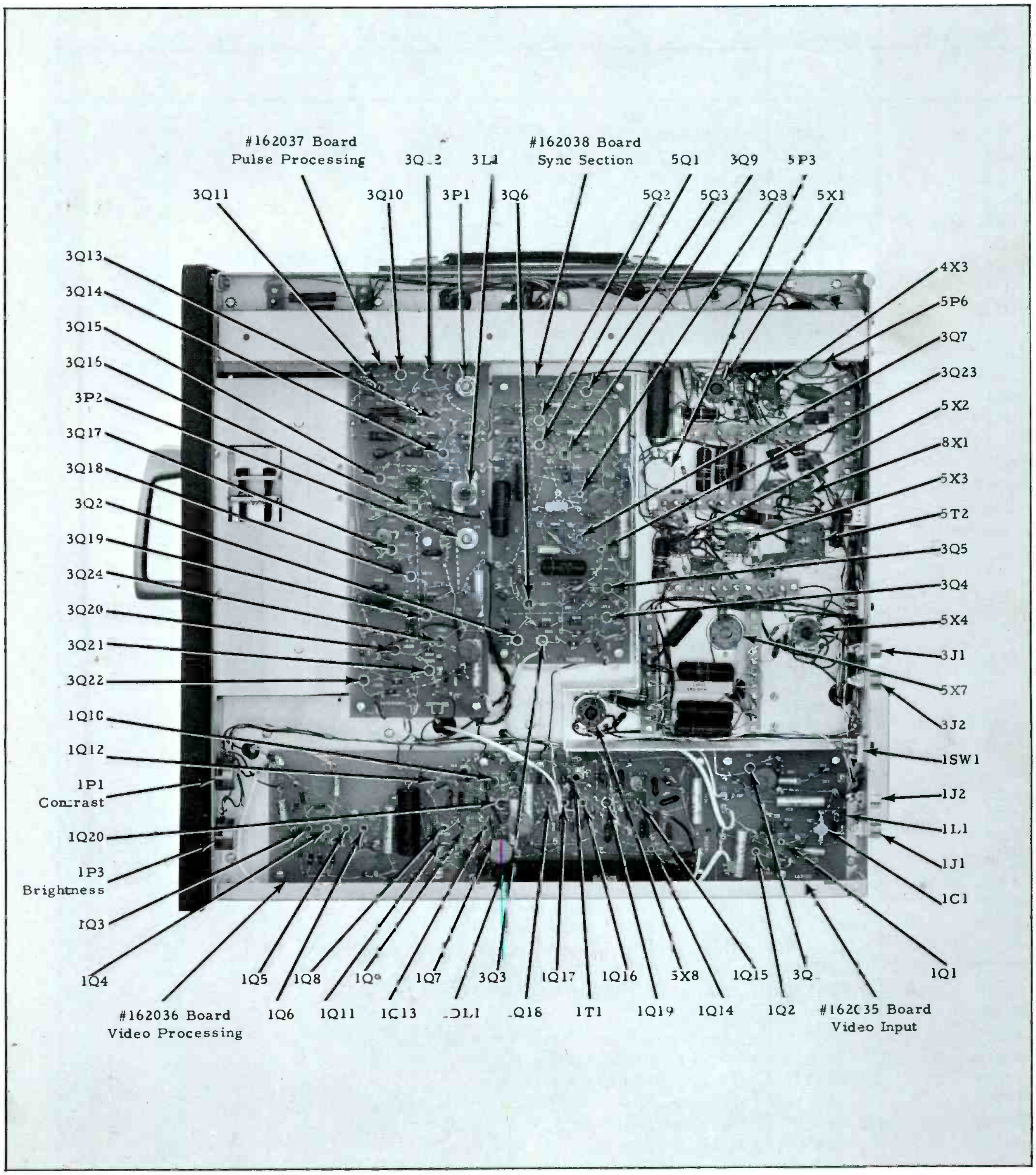
Color Monitor, Rear View



Color Monitor, Top View



Color Monitor, Left Side View



Color Monitor, Right Side View

LIST OF PARTS

Symbol	RCA Stock No.	Description
		CAPACITORS:
1C1	230248	Trimmer, 5.5 - 18 mmf
1C2	230237	Mica, 43 mmf, 5%, 500 v
1C3	228960	Electrolytic, 5 mfd, 25 v
1C4	218097	Ceramic, 100,000 mmf, 500 v
1C5, 1C6	230232	Electrolytic, 150 mfd, 15 v
1C7	230221	Electrolytic, 25 mfd, 15 v
1C8	230238	Mica, 130 mmf, 5%, 500 v
1C9	230232	Electrolytic, 150 mfd, 15 v
1C10	218097	Ceramic, 100,000 mmf, 500 v
1C11	300603	Paper, 470,000 mmf, 10%, 200 v
1C12	227692	Mica, 360 mmf, 5%, 500 v
1C13	230239	Mica, 100 mmf, 5%, 500 v
1C14	218097	Ceramic, 100,000 mmf, 500 v
1C15	230232	Electrolytic, 150 mfd, 15 v
1C16	230240	Mica, 56 mmf, 5%, 500 v
1C17	230222	Electrolytic, 2 mfd, 25 v
1C18	230240	Mica, 56 mmf, 5%, 500 v
1C19	218097	Ceramic, 100,000 mmf, 500 v
1C20	230232	Electrolytic, 150 mfd, 15 v
1C21	218097	Ceramic, 100,000 mmf, 500 v
1C22	230232	Electrolytic, 150 mfd, 15 v
1C23	230239	Mica, 100 mmf, 5%, 500 v
1C24	230223	Electrolytic, 10 mfd, -10% +100%, 15 v
1C25	230241	Mica, 20 mmf, 5%, 500 v
1C26	230240	Mica, 56 mmf, 5%, 500 v
2C1	300590	Paper, 47,000 mmf, 20%, 200 v
2C2	230242	Mica, 47 mmf, 5%, 500 v
2C3	75643	Paper, 1000 mmf, 20%, 600 v
2C4	106547	Ceramic Disc, 4700 mmf, 20%, 500 v
2C5	230243	Mica, 120 mmf, 5%, 500 v
2C6	230235	Electrolytic, 3.3 mfd, 20%, 35 v, Tantalum
2C7	230245	Mica, 150 mmf, 5%, 500 v
2C8		Paper, 10,000 mmf, 20%, 200 v
2C9, 2C10	300590	Paper, 47,000 mmf, 20%, 200 v
2C11		Paper, 10,000 mmf, 20%, 200 v
2C12	230243	Mica, 120 mmf, 5%, 500 v
2C13	230235	Electrolytic, 3.3 mfd, 20%, 35 v, Tantalum
2C14	230245	Mica, 150 mmf, 5%, 500 v
2C15	300590	Paper, 47,000 mmf, 20%, 200 v
2C16		Not Used
2C17	73960	Ceramic Disc, 10,000 mmf, 500 v, GMV
2C18	218249	Mica, 1200 mmf, 5%, 500 v
2C19	230244	Mica, 220 mmf, 5%, 500 v
2C20	112660	Ceramic Disc, 1000 mmf, 10%, 500 v
2C21, 2C22	73960	Ceramic Disc, 10,000 mmf, 500 v, GMV
2C23	219195	Mica, 1000 mmf, 5%, 100 v
2C24 to 2C26	73960	Ceramic Disc, 10,000 mmf, 500 v, GMV
2C27	106547	Ceramic Disc, 4700 mmf, 20%, 500 v

Symbol	RCA Stock No.	Description
2C28		Paper, 10,000 mmf, 20%, 200 v
2C29, 2C30		Not Used
2C31	258080	Metallized Paper, 2 mfd, 10%, 100 v
2C32		Not Used
2C33		Paper, 10,000 mmf, 20%, 200 v
2C34	921651	Paper, 100,000 mmf, 20%, 200 v
2C35	230224	Electrolytic, 2 mfd, -10% +100%, 15 v
2C36		Paper, 10,000 mmf, 20%, 200 v
2C37	230240	Mica, 56 mmf, 5%, 500 v
2C38	230225	Electrolytic, 10 mfd, -10% +100%, 3 v
2C39, 2C40	230244	Mica, 220 mmf, 5%, 500 v
2C41	230235	Electrolytic, 3.3 mfd, 20%, 35 v, Tantalum
2C42	228721	Electrolytic, 10 mfd, 25 v
2C43	230226	Electrolytic, 100 mfd, -10%+100%, 15 v
2C44	230243	Mica, 120 mmf, 5%, 500 v
2C45	228721	Electrolytic, 10 mfd, 25 v
2C46	230226	Electrolytic, 100 mfd, -10%+100%, 15 v
2C47	230243	Mica, 120 mmf, 5%, 500 v
2C48	228721	Electrolytic, 10 mfd, 25 v
2C49	230226	Electrolytic, 100 mfd, -10%+100%, 15 v
2C50	230243	Mica, 120 mmf, 5%, 500 v
2C51, 2C52	218097	Ceramic, 100,000 mmf, 500 v
2C53, 2C54	224358	Electrolytic, 75 mfd, 25 v
2C55	230227	Electrolytic, 25 mfd, 25 v
2C56		Not Used
2C57	228721	Electrolytic, 10 mfd, 25 v
2C58		Not Used
2C59	230226	Electrolytic, 75 mfd, 25 v
2C60		Not Used
2C61	218097	Ceramic, 100,000 mmf, 500 v
2C62		Not Used
2C63	300590	Paper, 47,000 mmf, 20%, 200 v
2C64	230242	Mica, 47 mmf, 5%, 500 v
2C65	230224	Electrolytic, 2 mfd, -10%+100%, 15 v
2C66	—	MICA, 39 MMF, 5%, 500V (ELMENCO #DM10-390J)
3C1	107594	Ceramic Disc, 8.2 mmf, ±10%, 500 v
3C2	228960	Electrolytic, 5 mfd, 25 v
3C3, 3C4	228721	Electrolytic, 10 mfd, 25 v
3C5	218097	Ceramic, 100,000 mmf, 500 v
3C6	230232	Electrolytic, 150 mfd, 15 v
3C7	230236	Mica, 390 mmf, 5%, 100 v
3C8	219195	Mica, 1000 mmf, 5%, 100 v
3C9		Paper, 10,000 mmf, 10%, 200 v
3C10	106943	Mica, 470 mmf, 5%, 500 v
3C11		Paper, 10,000 mmf, 10%, 200 v
3C12	921796	Mica, 3900 mmf, 5%, 500 v
3C13	106943	Mica, 470 mmf, 5%, 500 v
3C14	219195	Mica, 1000 mmf, 5%, 100 v
3C15	230239	Mica, 100 mmf, 5%, 500 v
3C16	230048	Mica, 910 mmf, 5%, 300 v
3C17		Paper, 10,000 mmf, 10%, 200 v
3C18, 3C19	230239	Mica, 100 mmf, 5%, 500 v

Symbol	RCA Stock No.	Description
3C20	218097	Ceramic, 100,000 mmf, 500 v
3C21	224358	Electrolytic, 75 mfd, 25 v
3C22	218097	Ceramic, 100,000 mmf, 500 v
3C23	224358	Electrolytic, 75 mfd, 25 v
3C24	921651	Paper, 100,000 mmf, 10%, 200 v
3C25	73960	Ceramic Disc, 10,000 mmf, 500 v, GMV
3C26 to 3C29		Not Used
3C30	73960	Ceramic Disc, 10,000 mmf, 500 v, GMV
3C31, 3C32	112660	Ceramic Disc, 1000 mmf, 10%, 500 v
4C1	73594	Paper, 10,000 mmf, 20%, 600 v
4C2	227530	Paper, 100,000 mmf, 20%, 400 v
4C3	300186	Mica, 180 mmf, 5%, 500 v
4C4		Not Used
4C5	227530	Paper, 100,000 mmf, 20%, 400 v
4C6	921651	Paper, 100,000 mmf, 20%, 200 v
4C7	230247	Ceramic Disc, 56 mmf, 1000 v
4C8 to 4C20		Not Used
4C21	73594	Paper, 10,000 mmf, 20%, 600 v
4C22	227530	Paper, 100,000 mmf, 20%, 400 v
4C23	300186	Mica, 180 mmf, 5%, 500 v
4C24 to 4C40		Not Used
4C41	73594	Paper, 10,000 mmf, 20%, 600 v
4C42	227530	Paper, 100,000 mmf, 20%, 400 v
4C43	300186	Mica, 180 mmf, 5%, 500 v
5C1	228434	Paper, 220,000 mmf, 10%, 200 v
5C2		Paper, 18,000 mmf, 10%, 200 v
5C3	230232	Electrolytic, 150 mfd, 15 v
5C4	230223	Electrolytic, 10 mfd, -10%+100%, 15 v
5C5	230222	Electrolytic, 2 mds, 25 v
5C6 to 5C9		Not Used
5C10	921651	Paper, 100,000 mmf, 10%, 200 v
5C11	230222	Electrolytic, 2 mfd, 25 v
5C12	300603	Paper, 470,000 mmf, 10%, 200 v
5C13		Not Used
5C14	204821	Paper, 15,000 mmf, 10%, 600 v
5C15		Paper, 47,000 mmf, 10%, 600 v
5C16	227694	Paper, 1000 mmf, 10%, 1600 v
5C17	109227	Electrolytic, 50 mfd, 150 v
5C18, 5C19		Not Used
5C20	227530	Paper, 100,000 mmf, 10%, 400 v
5C21, 5C22	230242	Mica, 47 mmf, 5%, 500 v
5C23, 5C24	219743	Mica, 820 mmf, 10%, 500 v
5C25	230250	Film, 10,000 mmf, 5%, 500 V
5C26	73594	Paper, 10,000 mmf, 10%, 600 v
5C27	109806	Ceramic, 390 mmf, 5%, N1500
5C28	218777	Mica, 1500 mmf, 10%, 500 v
5C29	218468	Mica, 680 mmf, 5%, 500 v
5C30	228573	Paper, 100,000 mmf, 20%, 600 v
5C31	230246	Ceramic, 120 mmf, 20%, 5000 v
5C32, 5C33	227530	Paper, 100,000 mmf, 10%, 400 v
5C34	229933	Paper, 150,000 mmf, 20%, 400 v

Symbol	RCA Stock No.	Description
5C35		Paper, 120,000 mmf, 10%, 600 v
5C36	73920	Paper, 4700 mmf, 20%, 600 v
5C37		Not Used
5C38	210965	Paper, 150,000 mmf, 20%, 200 v
5C39	227530	Ceramic Disc, 1000 mmf, 10%, 500 v
5C40	230249	Ceramic Disc, 100 mmf, 5%, 3000 v
5C41, 5C42	230234	Ceramic Disc, 390 mmf, 20%, 3000 v
5C43		Not Used
5C44	106547	Ceramic Disc, 4700 mmf, 20%, 500 v
5C45		Not Used
5C46	221678	Mica, 47 mmf, 10%, 500 v
5C47	—	CERAMIC DISC 10,000 MMF, 5%, 500V (DILECTRON)
6C1	230452	Paper, 82,000 mmf, 10%, 200 v
6C2	230453	Paper, 120,000 mmf, 10%, 200 v
6C3	230451	Paper, 56,000 mmf, 10%, 400 v
6C4, 6C5	230449	Paper, 100,000 mmf, 10%, 200 v
6C6	230228	Electrolytic, 250 mfd, 6 v
6C7, 6C7A	217937	Electrolytic, 500 mfd, 3 v
7C1, 7C2	230229	Electrolytic, 150 mfd, 300 v
7C3	230230	Electrolytic, 80 mfd, 350 v
7C4, 7C5	98180	Electrolytic, 1500 mfd, 50 v
7C6	230251	Electrolytic, 150 x 150 mfd, 250 v
7C7A, 7C7B	230233	Electrolytic, 160 mfd, 300 v
7C8, 7C9	73594	Paper, 10,000 mmf, 20%, 600 v
7C10 to 7C49		Not Used
7C50	230231	Electrolytic, 200 mfd, 12 v
7C51	224358	Electrolytic, 75 mfd, 25 v
7C52	230231	Electrolytic, 200 mfd, 12 v
7C53	224358	Electrolytic, 75 mfd, 25 v
8C1	73595	Paper, 2200 mmf, 20%, 600 v
8C2	73594	Paper, 10,000 mmf, 10%, 600 v
8C3	300186	Mica, 180 mmf, 5%, 500 v
8C4 to 8C6	227694	Paper, 1000 mmf, 10%, 1600 v
8C7	76578	Mica, 100 mmf, 10%, 1000 v
8C8	300196	Mica, 1000 mmf, 10%, 500 v
8C9	214466	Electrolytic, 5 mfd, 150 v
		COILS:
1L1	230310	Input Compensating
1L2	230317	6 uh Nom. Adj. (3.58 mc Trap)
2L1		Not Used
2L2, 2L3	230318	420 uh Self-Resonant at 3.58 mc
2L4	230309	1.3 mh RF Choke
2L5, 2L6	230318	420 uh Self-Resonant at 3.58 mc
2L7 to 2L9		Not Used
2L10	230318	420 uh Self-Resonant at 3.58 mc
3L1	230316	Interlace
4L1, 4L2	230311	Peaking

Symbol	RCA Stock No.	Description
4L3 to 4L20		Not Used
4L21, 4L22	230311	Peaking
4L23 to 4L40		Not Used
4L41, 4L42	230311	Peaking
5L1	230315	Width
5L2	230314	Linearity/Efficiency
5L3	230312	Underscan Tuning
6L1	230313	Underscan Convergence
6L2	230320	R/G Convergence #1
6L3	230319	R/G Convergence #2
8L1	109457	Deflection Yoke Assembly
		DIODES:
2D1 to 2D4	230260	Silicon Diode, Switching
2D5, 2D6	230261	Varactor Diode
2D7	221128	Silicon Diode
2D8 to 2D10	219283	Germanium Diode
3D1 to 3D3	219283	Germanium Diode
4D1	300315	Silicon Rectifier
6D1 to 6D3	230262	Rectifier Assembly
7D1, 7D2	223357	Silicon Rectifier
7D3 to 7D14	300315	Silicon Rectifier
7D15 to 7D49		Not Used
7D50	285485	Zener Diode
7D51	221128	Silicon Diode
7D52	224881	Zener Diode
7D53	225592	Silicon Rectifier, Insulated Version of 1N3193
7D54	285485	Zener Diode
7D55	221128	Silicon Diode
7D56	224881	Zener Diode
7D57	230263	Zener Diode, 10 w, 18 v, 10%
8D1	300315	Silicon Rectifier
		POTENTIOMETERS:
1P1	206913	Composition, 1000 ohms (Contrast)
1P2	206913	Composition, 1000 ohms (Aperture)
1P3	208677	Composition, 5000 ohms (Brightness)
2P1	230330	Composition, 500 ohms (Color Hold)
2P2	230321	Composition, 1000 ohms, $\frac{1}{2}$ w (Manual Chroma)
2P3	230333	Comp., 1000 ohms (Unity Chroma Pre-Set)
2P4, 2P5	208677	Composition, 5000 ohms (Green and Blue Gain)
2P6		Not Used
2P7	208677	Composition, 5000 ohms (Hue)

Symbol	RCA Stock No.	Description
3P1, 3P2	230334	Comp., 10,000 ohms (Lead. & Trail. Edge Pos.)
4P1	230335	Composition, 100,000 ohms (Kine Bias)
5P1	213201	Composition, 2.5 megohms (Height)
5P2, 5P3	95243	Composition, 100,000 ohms (Bottom & Top Linearity)
5P4, 5P5	205940	Wire Wound, 10 ohms (Vertical & Horizontal Centering)
5P6	92231	Composition, 1 megohm (Ultor Voltage Adj.)
5P7	68837	Composition, 25,000 ohms (Horizontal Hold)
5P8	95243	Composition, 100,000 ohms (Vertical Hold)
6P1	230322	Wire Wound, 30 ohms (R-G Diff. Tilt)
6P2	230325	Wire Wound, 150 ohms (R-G Diff. Amp.)
6P3	230327	Wire Wound, 60 ohms (Right Horizontal Convergence)
6P4	230327	Wire Wound, 60 ohms (Left Horizontal R-G)
6P5	230327	Wire Wound, 60 ohms (R-G Tilt)
6P6	230327	Wire Wound, 60 ohms (Blue Tilt)
6P7	230324	Wire Wound, 120 ohms (Left Blue Horiz.)
6P8	230326	Wire Wound, 3000 ohms (R-G Diff. Position)
6P9	95245	Composition, 250 ohms (R-G Amp.)
6P10	230323	Wire Wound, 50 ohms (Blue Amp.)
6P11, 6P12	208677	Composition, 5000 ohms (R-G Pos. and R-G Pos. Underscan)
6P13, 6P14	208677	Composition, 5000 ohms (Blue Pos. and Blue Pos. Underscan)
7P1	230332	Composition, 50,000 ohms (200 Volt Adj.)
7P2, 7P3	230331	Wire Wound, 100 ohms (-15 Volt Adj. & +15 Volt Adj.)
8P1 to 8P3	95242	Composition, 1 megohm (Blue, Green, and Red Screen)
		RESISTORS:
		Fixed, Composition - Unless Otherwise Specified
1R1	212767	75 ohms, 1%, $\frac{1}{2}$ w
1R2	502322	22,000 ohms, 10%, $\frac{1}{2}$ w
1R3	502427	270,000 ohms, 5%, $\frac{1}{2}$ w
1R4	502418	180,000 ohms, 10%, $\frac{1}{2}$ w
1R5	502168	680 ohms, 5%, $\frac{1}{2}$ w
1R6	502147	470 ohms, 5%, $\frac{1}{2}$ w
1R7	502110	100 ohms, 10%, $\frac{1}{2}$ w
1R8		Not Used
1R9	502127	270 ohms, 5%, $\frac{1}{2}$ w
1R10	502327	27,000 ohms, 5%, $\frac{1}{2}$ w
1R11	502247	4700 ohms, 5%, $\frac{1}{2}$ w
1R12	502210	1000 ohms, 10%, $\frac{1}{2}$ w
1R13	502110	100 ohms, 5%, $\frac{1}{2}$ w
1R14	502156	560 ohms, 5%, $\frac{1}{2}$ w
1R15	502047	47 ohms, 10%, $\frac{1}{2}$ w
1R16	502222	2200 ohms, 5%, $\frac{1}{2}$ w
1R17	502210	1000 ohms, 5%, $\frac{1}{2}$ w
1R18	502147	470 ohms, 5%, $\frac{1}{2}$ w
1R19	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
1R20	502233	3300 ohms, 10%, $\frac{1}{2}$ w
1R21	502439	390,000 ohms, 5%, $\frac{1}{2}$ w

Symbol	RCA Stock No.	Description
1R22	502127	270 ohms, 5%, ½ w
1R23	255839	3320 ohms, 1%, 1/4 w
1R24	258744	1000 ohms, 1%, 1/4 w
1R25	224154	182 ohms, 1%, 1/4 w
1R26	502156	560 ohms, 5%, ½ w
1R27	502227	2700 ohms, 10%, ½ w
1R28	502210	1000 ohms, 10%, ½ w
1R29	502210	1000 ohms, 5%, ½ w
1R30	502147	470 ohms, 5%, ½ w
1R31	230265	475 ohms, 1%, 1/4 w
1R32, 1R33	230274	249 ohms, 1%, 1/4 w
1R34	213694	150 ohms, 1%, 1/4 w
1R35	230266	332 ohms, 1%, 1/4 w
1R36	257841	1820 ohms, 1%, 1/4 w
1R37	258744	1000 ohms, 1%, 1/4 w
1R38	213694	150 ohms, 1%, 1/4 w
1R39	255839	3320 ohms, 1%, 1/4 w
1R40	502147	470 ohms, 5%, ½ w
1R41		Not Used
1R42	502133	330 ohms, 5%, ½ w
1R43	502210	1000 ohms, 5%, ½ w
1R44	502118	180 ohms, 5%, ½ w
1R45	502122	220 ohms, 5%, ½ w
1R46	502010	10 ohms, 10%, ½ w
1R47	502239	3900 ohms, 10%, ½ w
1R48	502322	22,000 ohms, 10%, ½ w
1R49	258744	1000 ohms, 1%, 1/4 w
1R50		Not Used
1R51	258744	1000 ohms, 1%, 1/4 w
1R52	502222	2200 ohms, 10%, ½ w
1R53		Not Used
1R54	502215	1500 ohms, 10%, ½ w
1R55	502047	47 ohms, 10%, ½ w
1R56	502168	680 ohms, 5%, ½ w
1R57	502210	1000 ohms, 10%, ½ w
2R1		Not Used
2R2	502327	27,000 ohms, 10%, ½ w
2R3	502310	10,000 ohms, 10%, ½ w
2R4	502247	4700 ohms, 10%, ½ w
2R5	502091	91 ohms, 5%, ½ w
2R6	502212	1200 ohms, 10%, ½ w
2R7, 2R8	502233	3300 ohms, 10%, ½ w
2R9	230276	90.6 ohms, 1%, 1/4 w
2R10		Not Used
2R11	502322	22,000 ohms, 10%, ½ w
2R12		Not Used
2R13	502322	22,000 ohms, 10%, ½ w
2R14	255837	100 ohms, 1%, 1/4 w
2R15, 2R16	502133	330 ohms, 10%, ½ w
2R17	502156	560 ohms, 5%, ½ w
2R18	502333	33,000 ohms, 10%, ½ w

Symbol	RCA Stock No.	Description
2R19	502239	3900 ohms, 10%, $\frac{1}{2}$ w
2R20	502339	39,000 ohms, 5%, $\frac{1}{2}$ w
2R21	502233	3300 ohms, 10%, $\frac{1}{2}$ w
2R22	502282	8200 ohms, 5%, $\frac{1}{2}$ w
2R23	502522	2.2 megohms, 10%, $\frac{1}{2}$ w
2R24 to 2R26		Not Used
2R27	502375	75,000 ohms, 5%, $\frac{1}{2}$ w
2R28	502218	1800 ohms, 5%, $\frac{1}{2}$ w
2R29	502118	180 ohms, 5%, $\frac{1}{2}$ w
2R30	502310	10,000 ohms, 5%, $\frac{1}{2}$ w
2R31	502218	1800 ohms, 5%, $\frac{1}{2}$ w
2R32	502127	270 ohms, 5%, $\frac{1}{2}$ w
2R33	502268	6800 ohms, 10%, $\frac{1}{2}$ w
2R34	502368	68,000 ohms, 5%, $\frac{1}{2}$ w
2R35	502256	5600 ohms, 5%, $\frac{1}{2}$ w
2R36	502282	8200 ohms, 5%, $\frac{1}{2}$ w
2R37	502327	27,000 ohms, 10%, $\frac{1}{2}$ w
2R38	502227	2700 ohms, 5%, $\frac{1}{2}$ w
2R39, 2R40	502410	100,000 ohms, 10%, $\frac{1}{2}$ w
2R41	502147	470 ohms, 10%, $\frac{1}{2}$ w
2R42	502127	270 ohms, 5%, $\frac{1}{2}$ w
2R43	502347	47,000 ohms, 10%, $\frac{1}{2}$ w
2R44	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
2R45	502322	22,000 ohms, 10%, $\frac{1}{2}$ w
2R46	502227	2700 ohms, 10%, $\frac{1}{2}$ w
2R47	502127	270 ohms, 10%, $\frac{1}{2}$ w
2R48	502322	22,000 ohms, 10%, $\frac{1}{2}$ w
2R49	502215	1500 ohms, 10%, $\frac{1}{2}$ w
2R50	502115	150 ohms, 10%, $\frac{1}{2}$ w
2R51	502127	270 ohms, 10%, $\frac{1}{2}$ w
2R52		Not Used
2R53	502227	2700 ohms, 10%, $\frac{1}{2}$ w
2R54	502268	6800 ohms, 10%, $\frac{1}{2}$ w
2R55	502156	560 ohms, 5%, $\frac{1}{2}$ w
2R56	502412	120,000 ohms, 5%, $\frac{1}{2}$ w
2R57	502256	5600 ohms, 10%, $\frac{1}{2}$ w
2R58	502268	6800 ohms, 5%, $\frac{1}{2}$ w
2R59	502118	180 ohms, 5%, $\frac{1}{2}$ w
2R60	502175	750 ohms, 5%, $\frac{1}{2}$ w
2R61, 2R62	502410	100,000 ohms, 10%, $\frac{1}{2}$ w
2R63	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
2R64		Not Used
2R65	502233	3300 ohms, 10%, $\frac{1}{2}$ w
2R66	502247	4700 ohms, 10%, $\frac{1}{2}$ w
2R67	502233	3300 ohms, 10%, $\frac{1}{2}$ w
2R68	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
2R69		Not Used
2R70	502439	390,000 ohms, 5%, $\frac{1}{2}$ w
2R71	502239	3900 ohms, 5%, $\frac{1}{2}$ w
2R72	502139	390 ohms, 10%, $\frac{1}{2}$ w
2R73	502268	6800 ohms, 5%, $\frac{1}{2}$ w
2R74	502418	180,000 ohms, 5%, $\frac{1}{2}$ w
2R75	230265	475 ohms, 1%, 1/4 w

Symbol	RCA Stock No.	Description
2R76	230273	751 ohms, 1%, 1/4 w
2R77	502247	4700 ohms, 5%, ½ w
2R78, 2R79	502327	27,000 ohms, 5%, ½ w
2R80	502218	1800 ohms, 5%, ½ w
2R81	502468	680,000 ohms, 5%, ½ w
2R82	502268	6800 ohms, 10%, ½ w
2R83	502110	100 ohms, 5%, ½ w
2R84	502422	220,000 ohms, 5%, ½ w
2R85	229833	825 ohms, 1%, 1/4 w
2R86	230268	2740 ohms, 1%, 1/4 w
2R87	502310	10,000 ohms, 5%, ½ w
2R88		Not Used
2R89	502247	4700 ohms, 5%, ½ w
2R90, 2R91	502327	27,000 ohms, 5%, ½ w
2R92	502227	2700 ohms, 10%, ½ w
2R93	230269	3740 ohms, 1%, 1/4 w
2R94	260040	10,000 ohms, 1%, 1/4 w
2R95	256028	22,100 ohms, 1%, 1/4 w
2R96	502411	110,000 ohms, 5%, ½ w
2R97	224870	47,500 ohms, 1%, 1/4 w
2R98	229833	825 ohms, 1%, 1/4 w
2R99	213701	8250 ohms, 1%, 1/4 w
2R100	229833	825 ohms, 1%, 1/4 w
2R101, 2R102	260040	10,000 ohms, 1%, 1/4 w
2R103	502222	2200 ohms, 5%, ½ w
2R104, 2R105	260040	10,000 ohms, 1%, 1/4 w
2R106		Not Used
2R107, 2R108	260040	10,000 ohms, 1%, 1/4 w
2R109		Not Used
2R110	502339	39,000 ohms, 5%, ½ w
2R111	502310	10,000 ohms, 5%, ½ w
2R112	502118	180 ohms, 5%, ½ w
2R113	502156	560 ohms, 5%, ½ w
2R114	502039	39 ohms, 5%, ½ w
2R115	502168	680 ohms, 5%, ½ w
2R116	502315	15,000 ohms, 5%, ½ w
2R117, 2R118	502212	1200 ohms, 5%, ½ w
2R119		Not Used
2R120	502115	150 ohms, 5%, ½ w
2R121	502339	39,000 ohms, 5%, ½ w
2R122	502310	10,000 ohms, 5%, ½ w
2R123	502118	180 ohms, 5%, ½ w
2R124	502156	560 ohms, 5%, ½ w
2R125	502039	39 ohms, 5%, ½ w
2R126	502168	680 ohms, 5%, ½ w
2R127	502315	15,000 ohms, 5%, ½ w
2R128, 2R129	502212	1200 ohms, 5%, ½ w
2R130		Not Used
2R131	502115	150 ohms, 5%, ½ w
2R132	502339	39,000 ohms, 5%, ½ w
2R133	502310	10,000 ohms, 5%, ½ w
2R134	502118	180 ohms, 5%, ½ w
2R135	502156	560 ohms, 5%, ½ w

Symbol	RCA Stock No.	Description
2R136	502039	39 ohms, 5%, $\frac{1}{2}$ w
2R137	502168	680 ohms, 5%, $\frac{1}{2}$ w
2R138	502315	15,000 ohms, 5%, $\frac{1}{2}$ w
2R139, 2R140	502212	1200 ohms, 5%, $\frac{1}{2}$ w
2R141		Not Used
2R142	502115	150 ohms, 5%, $\frac{1}{2}$ w
2R143		Not Used
2R144, 2R145	502212	1200 ohms, 10%, $\frac{1}{2}$ w
2R146, 2R147	502210	1000 ohms, 5%, $\frac{1}{2}$ w
2R148	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
2R149, 2R150		Not Used
2R151	502227	2700 ohms, 10%, $\frac{1}{2}$ w
2R152	502210	1000 ohms, 10%, $\frac{1}{2}$ w
2R153, 2R154	502256	5600 ohms, 5%, $\frac{1}{2}$ w
2R155, 2R156	502210	1000 ohms, 5%, $\frac{1}{2}$ w
2R157	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
2R158	502239	3900 ohms, 10%, $\frac{1}{2}$ w
2R159	502410	100,000 ohms, 10%, $\frac{1}{2}$ w
2R160	502318	18,000 ohms, 10%, $\frac{1}{2}$ w
2R161	502412	120,000 ohms, 10%, $\frac{1}{2}$ w
2R162	502447	470,000 ohms, 10%, $\frac{1}{2}$ w
2R163	502110	100 ohms, 10%, $\frac{1}{2}$ w
3R1		Not Used
3R2	502368	68,000 ohms, 10%, $\frac{1}{2}$ w
3R3	502410	100,000 ohms, 10%, $\frac{1}{2}$ w
3R4	502347	47,000 ohms, 10%, $\frac{1}{2}$ w
3R5	502222	2200 ohms, 10%, $\frac{1}{2}$ w
3R6, 3R7	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
3R8	502247	4700 ohms, 10%, $\frac{1}{2}$ w
3R9	502415	150,000 ohms, 10%, $\frac{1}{2}$ w
3R10	502310	10,000 ohms, 5%, $\frac{1}{2}$ w
3R11	502215	1500 ohms, 5%, $\frac{1}{2}$ w
3R12	502315	15,000 ohms, 5%, $\frac{1}{2}$ w
3R13	502415	150,000 ohms, 5%, $\frac{1}{2}$ w
3R14	502322	22,000 ohms, 5%, $\frac{1}{2}$ w
3R15	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
3R16	502222	2200 ohms, 10%, $\frac{1}{2}$ w
3R17	502110	100 ohms, 5%, $\frac{1}{2}$ w
3R18	502439	390,000 ohms, 5%, $\frac{1}{2}$ w
3R19	502239	3900 ohms, 5%, $\frac{1}{2}$ w
3R20	502210	1000 ohms, 5%, $\frac{1}{2}$ w
3R21	502356	56,000 ohms, 5%, $\frac{1}{2}$ w
3R22	502222	2200 ohms, 10%, $\frac{1}{2}$ w
3R23, 3R24	502247	4700 ohms, 10%, $\frac{1}{2}$ w
3R25	502210	1000 ohms, 10%, $\frac{1}{2}$ w
3R26	502110	100 ohms, 10%, $\frac{1}{2}$ w
3R27	502210	1000 ohms, 10%, $\frac{1}{2}$ w
3R28	502339	39,000 ohms, 5%, $\frac{1}{2}$ w
3R29		Not Used
3R30	230270	15,000 ohms, 1%, 1/4 w
3R31	502110	100 ohms, 10%, $\frac{1}{2}$ w
3R32	502233	3300 ohms, 10%, $\frac{1}{2}$ w

Symbol	RCA Stock No.	Description
3R33	255839	3320 ohms, 1%, 1/4 w
3R34	258744	1000 ohms, 1%, 1/4 w
3R35	502139	390 ohms, 10%, $\frac{1}{2}$ w
3R36	502210	1000 ohms, 5%, $\frac{1}{2}$ w
3R37		Not Used
3R38	502047	47 ohms, 10%, $\frac{1}{2}$ w
3R39	502115	150 ohms, 10%, $\frac{1}{2}$ w
3R40	502110	100 ohms, 10%, $\frac{1}{2}$ w
3R41	502322	22,000 ohms, 5%, $\frac{1}{2}$ w
3R42	502310	10,000 ohms, 5%, $\frac{1}{2}$ w
3R43	502327	27,000 ohms, 10%, $\frac{1}{2}$ w
3R44	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
3R45	502115	150 ohms, 10%, $\frac{1}{2}$ w
3R46	502147	470 ohms, 10%, $\frac{1}{2}$ w
3R47	502212	1200 ohms, 10%, $\frac{1}{2}$ w
3R48	502210	1000 ohms, 10%, $\frac{1}{2}$ w
3R49	230270	15,000 ohms, 1%, 1/4 w
3R50		Not Used
3R51	502233	3300 ohms, 10%, $\frac{1}{2}$ w
3R52	255839	3320 ohms, 1%, 1/4 w
3R53	258744	1000 ohms, 1%, 1/4 w
3R54	502210	1000 ohms, 5%, $\frac{1}{2}$ w
3R55		Not Used
3R56	502110	100 ohms, 10%, $\frac{1}{2}$ w
3R57	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
3R58	502333	33,000 ohms, 10%, $\frac{1}{2}$ w
3R59	502233	3300 ohms, 10%, $\frac{1}{2}$ w
3R60	502210	1000 ohms, 10%, $\frac{1}{2}$ w
3R61	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
3R62	502333	33,000 ohms, 10%, $\frac{1}{2}$ w
3R63, 3R64	502210	1000 ohms, 10%, $\frac{1}{2}$ w
3R65	502456	560,000 ohms, 5%, $\frac{1}{2}$ w
3R66	502110	100 ohms, 5%, $\frac{1}{2}$ w
4R1		Not Used
4R2	502218	1800 ohms, 10%, $\frac{1}{2}$ w
4R3	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
4R4	502610	10 megohms, 10%, $\frac{1}{2}$ w
4R5	502422	220,000 ohms, 10%, $\frac{1}{2}$ w
4R6	502539	3.9 megohms, 10%, $\frac{1}{2}$ w
4R7	230271	3000 ohms, 5%, 4 w
4R8	502110	100 ohms, 10%, $\frac{1}{2}$ w
4R9	502118	180 ohms, 5%, $\frac{1}{2}$ w
4R10	502322	22,000 ohms, 10%, $\frac{1}{2}$ w
4R11	522318	18,000 ohms, 5%, 2 w
4R12	53366	Wire Wound, 2000 ohms, 10%, 10 w
4R13		Not Used
4R14	502510	1 megohm, 10%, $\frac{1}{2}$ w
4R15	512233	3300 ohms, 10%, 1 w
4R16	512375	75,000 ohms, 5%, 1 w
4R17	502122	220 ohms, 10%, $\frac{1}{2}$ w
4R18	522310	10,000 ohms, 10%, 2 w
4R19	502447	470,000 ohms, 10%, $\frac{1}{2}$ w

Symbol	RCA Stock No.	Description
4R20	502333	33,000 ohms, 10%, ½ w
4R21		Not Used
4R22	502218	1800 ohms, 10%, ½ w
4R23	502310	10,000 ohms, 10%, ½ w
4R24	502610	10 megohms, 10%, ½ w
4R25	502422	220,000 ohms, 10%, ½ w
4R26	502539	3.9 megohms, 10%, ½ w
4R27	230271	3000 ohms, 5%, 4 w
4R28	502110	100 ohms, 10%, ½ w
4R29	502118	180 ohms, 5%, ½ w
4R30	502322	22,000 ohms, 10%, ½ w
4R31	502310	10,000 ohms, 5%, ½ w
4R32 to 4R41		Not Used
4R42	502218	1800 ohms, 10%, ½ w
4R43	502310	10,000 ohms, 10%, ½ w
4R44	502610	10 megohms, 10%, ½ w
4R45	502422	220,000 ohms, 10%, ½ w
4R46	502539	3.9 megohms, 10%, ½ w
4R47	230271	3000 ohms, 5%, 4 w
4R48	502110	100 ohms, 10%, ½ w
4R49	502118	180 ohms, 5%, ½ w
4R50	502322	22,000 ohms, 10%, ½ w
4R51	502310	10,000 ohms, 5%, ½ w
4R52 to 4R70		Not Used
4R71	502310	10,000 ohms, 5%, ½ w
5R1	502368	68,000 ohms, 5%, ½ w
5R2	502210	1000 ohms, 10%, ½ w
5R3	502215	1500 ohms, 10%, ½ w
5R4		Not Used
5R5	502368	68,000 ohms, 5%, ½ w
5R6	502210	1000 ohms, 10%, ½ w
5R7	502051	51 ohms, 5%, ½ w
5R8	502156	560 ohms, 5%, ½ w
5R9	502310	10,000 ohms, 10%, ½ w
5R10	502210	1000 ohms, 10%, ½ w
5R11		Not Used
5R12	502522	2.2 megohms, 10%, ½ w
5R13	502482	820,000 ohms, 10%, ½ w
5R14	502518	1.8 megohms, 10%, ½ w
5R15	502436	360,000 ohms, 5%, ½ w
5R16	502410	100,000 ohms, 5%, ½ w
5R17	502412	120,000 ohms, 10%, ½ w
5R18	502347	47,000 ohms, 10%, ½ w
5R19	502210	1000 ohms, 10%, ½ w
5R20, 5R21	213756	10,000 ohms, 10%, 3 w
5R22	112980	3900 ohms, 10%, 4 w
5R23	502356	56,000 ohms, 10%, ½ w
5R24	512433	330,000 ohms, 10%, 1 w
5R25	502310	10,000 ohms, 10%, ½ w
5R26	502439	390,000 ohms, 10%, ½ w
5R27	502368	68,000 ohms, 10%, ½ w
5R28	502410	100,000 ohms, 10%, ½ w

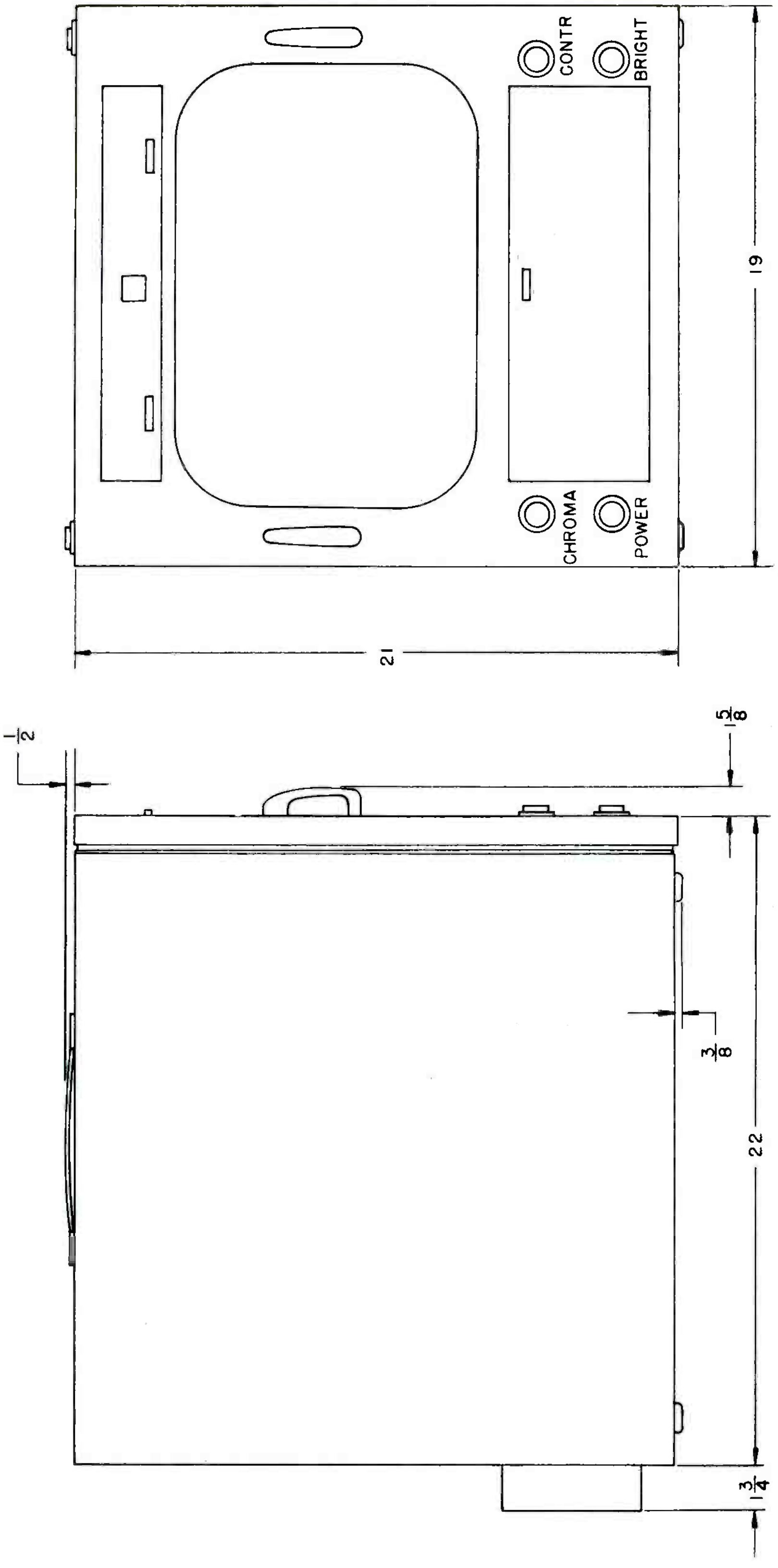
Symbol	RCA Stock No.	Description
5R29	502356	56,000 ohms, 10%, $\frac{1}{2}$ w
5R30, 5R31	502439	390,000 ohms, 10%, $\frac{1}{2}$ w
5R32	502456	560,000 ohms, 10%, $\frac{1}{2}$ w
5R33	502210	1000 ohms, 10%, $\frac{1}{2}$ w
5R34	502322	22,000 ohms, 10%, $\frac{1}{2}$ w
5R35	512415	150,000 ohms, 10%, 1 w
5R36	502418	180,000 ohms, 10%, $\frac{1}{2}$ w
5R37	502368	68,000 ohms, 10%, $\frac{1}{2}$ w
5R38	502333	33,000 ohms, 10%, $\frac{1}{2}$ w
5R39	502327	27,000 ohms, 10%, $\frac{1}{2}$ w
5R40	502411	110,000 ohms, 5%, $\frac{1}{2}$ w
5R41	502610	10 megohms, 10%, $\frac{1}{2}$ w
5R42	502110	100 ohms, 10%, $\frac{1}{2}$ w
5R43	502047	47 ohms, 10%, $\frac{1}{2}$ w
5R44	254104	1 ohm, 1%, $\frac{1}{2}$ w
5R45	213160	Wire Wound, 13,000 ohms, 10%, 10 w
5R46	230264	3.9 ohms, 10%, $\frac{1}{2}$ w
5R47	522547	4.7 megohms, 10%, 2 w
5R48	512515	1.5 megohms, 5%, $\frac{1}{2}$ w
5R49	502510	1 megohm, 10%, $\frac{1}{2}$ w
5R50	522247	4700 ohms, 10%, 2 w
5R51	255837	100 ohms, 1%, 1/4 w
5R52	230521	4990 ohms, 1%, 1/4 w
5R53	230347	Film, 47 megohms, 20%
5R54	502312	12,000 ohms, 10%, $\frac{1}{2}$ w
5R55	522268	6800 ohms, 10%, 2 w
5R56	502410	100,000 OHMS, 10%, 1/2 W
6R1	5121~~39~~ 68	~~390~~ 680 ohms, 10%, 1 w
6R2 to 6R4	512110	100 ohms, 10%, 1 w
6R5	512118	180 ohms, 10%, 1 w
6R6	502233	3300 ohms, 10%, $\frac{1}{2}$ w
6R7	502047	47 ohms, 10%, $\frac{1}{2}$ w
6R8	502122	220 ohms, 10%, $\frac{1}{2}$ w
6R9	502068	68 ohms, 10%, $\frac{1}{2}$ w
6R10	502212	1200 ohms, 10%, $\frac{1}{2}$ w
6R11	502215	1500 ohms, 10%, $\frac{1}{2}$ w
6R12	512047	47 ohms, 10%, 1 w
6R13	512027	27 ohms, 10%, 1 w
7R1, 7R2	921227	Wire Wound, 5 ohms, 10%, 10 w
7R3, 7R4	230272	Wire Wound, 5 ohms, 10%, 7 w
7R5	300548	Wire Wound, 1000 ohms, 10%, 30 w
7R6		Not Used
7R7	502415	150,000 ohms, 10%, $\frac{1}{2}$ w
7R8	502410	100,000 ohms, 10%, $\frac{1}{2}$ w
7R9 to 7R11	502110	100 ohms, 10%, $\frac{1}{2}$ w
7R12	502422	220,000 ohms, 10%, $\frac{1}{2}$ w
7R13, 7R14	230267	200,000 ohms, 1%, $\frac{1}{2}$ w
7R15		Not Used
7R16	502447	470,000 ohms, 10%, $\frac{1}{2}$ w
7R17	502110	100 ohms, 10%, $\frac{1}{2}$ w
7R18	502210	1000 ohms, 10%, $\frac{1}{2}$ w
7R19	512247	4700 ohms, 10%, 1 w

Symbol	RCA Stock No.	Description
7R20	522315	15,000 ohms, 10%, 2 w
7R21	502362	62,000 ohms, 5%, $\frac{1}{2}$ w
7R22	502422	220,000 ohms, 10%, $\frac{1}{2}$ w
7R23	502351	51,000 ohms, 5%, $\frac{1}{2}$ w
7R24	512416	160,000 ohms, 5%, 1 w
7R25	502410	100,000 ohms, 10%, $\frac{1}{2}$ w
7R26 to 7R49		Not Used
7R50	502212	1200 ohms, 10%, $\frac{1}{2}$ w
7R51	502215	1500 ohms, 10%, $\frac{1}{2}$ w
7R52	502233	3300 ohms, 10%, $\frac{1}{2}$ w
7R53	502110	100 ohms, 10%, $\frac{1}{2}$ w
7R54	113152	.47 ohm, 5%, $\frac{1}{2}$ w
7R55	502215	1500 ohms, 10%, $\frac{1}{2}$ w
7R56	502122	220 ohms, 10%, $\frac{1}{2}$ w
7R57	502168	680 ohms, 5%, $\frac{1}{2}$ w
7R58	502227	2700 ohms, 10%, $\frac{1}{2}$ w
7R59, 7R60	502212	1200 ohms, 10%, $\frac{1}{2}$ w
7R61	230265	475 ohms, 1%, 1/4 w
7R62		Not Used
7R63	230275	221 ohms, 1%, 1/4 w
7R64	502212	1200 ohms, 10%, $\frac{1}{2}$ w
7R65	502215	1500 ohms, 10%, $\frac{1}{2}$ w
7R66	502233	3300 ohms, 10%, $\frac{1}{2}$ w
7R67	502110	100 ohms, 10%, $\frac{1}{2}$ w
7R68	113152	.47 ohm, 5%, $\frac{1}{2}$ w
7R69	502215	1500 ohms, 10%, $\frac{1}{2}$ w
7R70	502122	220 ohms, 10%, $\frac{1}{2}$ w
7R71	502168	680 ohms, 5%, $\frac{1}{2}$ w
7R72	502227	2700 ohms, 10%, $\frac{1}{2}$ w
7R73, 7R74	502212	1200 ohms, 10%, $\frac{1}{2}$ w
7R75	230265	475 ohms, 1%, 1/4 w
7R76		Not Used
7R77	230275	221 ohms, 1%, 1/4 w
7R78	502410	100,000 ohms, 10%, $\frac{1}{2}$ w
7R79	230277	Regulator - CRT Filaments
7R80	512410	100,000 ohms, 10%, 1 w
7R81	104390	Wire Wound, 18 ohms, 10%, 5 w
8R1	502310	10,000 ohms, 10%, $\frac{1}{2}$ w
8R2	522322	22,000 ohms, 5%, 2 w
8R3	502347	47,000 ohms, 10%, $\frac{1}{2}$ w
8R4	502522	2.2 megohms, 10%, $\frac{1}{2}$ w
8R5	502356	56,000 ohms, 5%, $\frac{1}{2}$ w
8R6	502339	39,000 ohms, 5%, $\frac{1}{2}$ w
8R7 to 8R12	502447	470,000 ohms, 10%, $\frac{1}{2}$ w
8R13 to 8R15	502247	4700 ohms, 10%, $\frac{1}{2}$ w
8R16	502410	100,000 ohms, 5%, $\frac{1}{2}$ w
8R17	502333	33,000 ohms, 5%, $\frac{1}{2}$ w
8R18	512382	82,000 ohms, 10%, 1 w
8R19	502247	4700 ohms, 10%, $\frac{1}{2}$ w

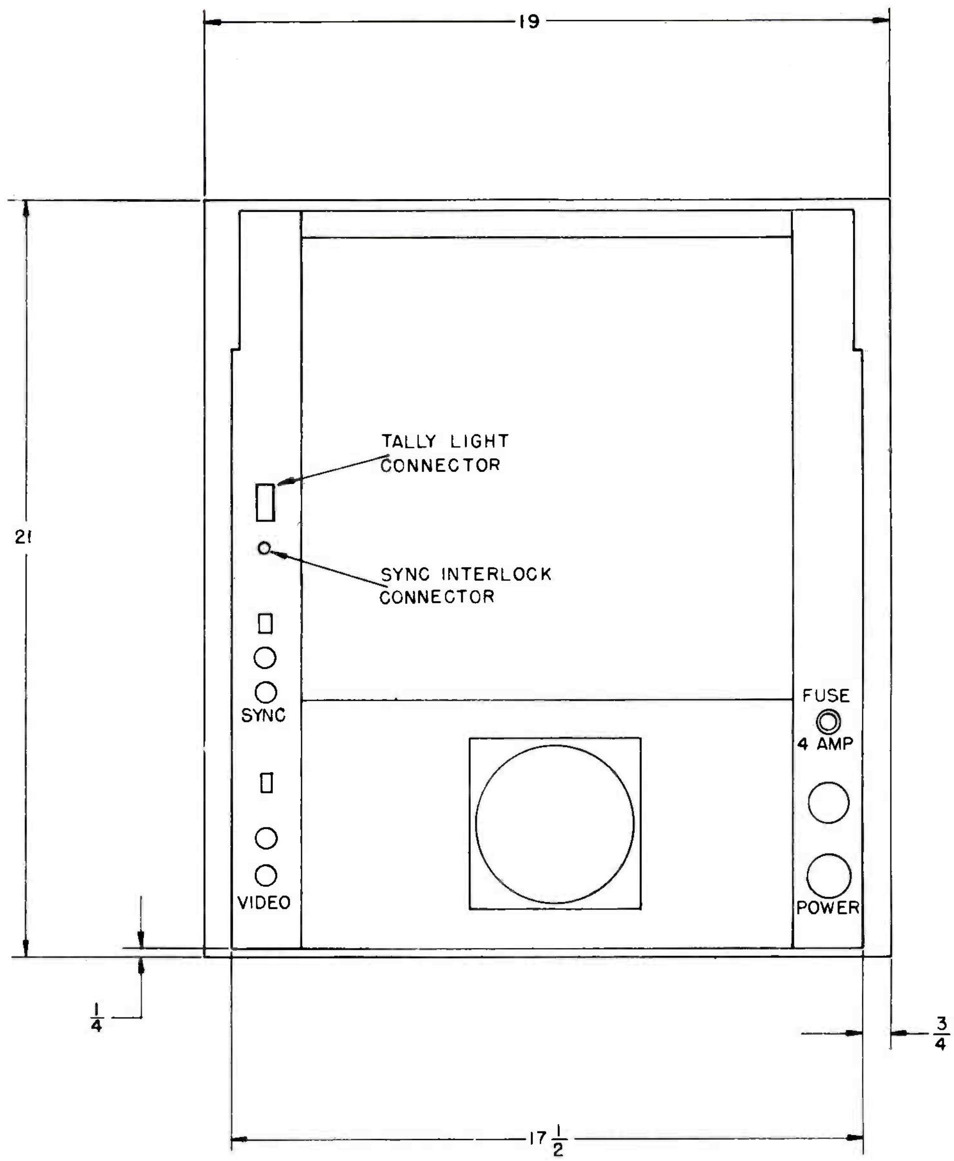
Symbol	RCA Stock No.	Description
		TRANSFORMERS:
1T1	230299	Aperture
2T1	230297	Demodulator
2T2	230301	3.58 mc
2T3	230296	Chroma Bandpass
5T1	112821	Vertical Output
5T2	230298	Horizontal Oscillator
5T3	230294	Flyback
5T4	230304	Focus
6T1	230303	Blue Convergence
7T1	230300	Main Power
7T2	230295	Filament - Isolation
		TRANSISTORS:
1Q1	230252	Silicon Mesa
1Q2	229133	Germanium High Frequency
1Q3	227196	Silicon Switching
1Q4 to 1Q6	229133	Germanium High Frequency
1Q7	227196	Silicon Switching
1Q8	230252	Silicon Mesa
1Q9	227196	Silicon Switching
1Q10, 1Q11	230253	Germanium Switching
1Q12	227196	Silicon Switching
1Q13	229133	Germanium High Frequency
1Q14, 1Q15	227196	Silicon Switching
1Q16, 1Q17	229133	Germanium High Frequency
1Q18	227196	Silicon Switching
1Q19, 1Q20	230253	Germanium Switching
2Q1	229133	Germanium High Frequency
2Q2 to 2Q4	230254	Silicon Planar
2Q5, 2Q6	227196	Silicon Switching
2Q7	230256	Germanium Switching
2Q8	230253	Germanium Switching
2Q9	227196	Silicon Switching
2Q10, 2Q11	230253	Germanium Switching
2Q12	230256	Germanium Switching
2Q13	230254	Silicon Planar
2Q14, 2Q15	230256	Germanium Switching
2Q16, 2Q17	230253	Germanium Switching
2Q18	230254	Silicon Planar
2Q19	230253	Germanium Switching
2Q20	227196	Silicon Switching
2Q21	229133	Germanium High Frequency
2Q22, 2Q23	230256	Germanium Switching
2Q24	227196	Silicon Switching
2Q25	229133	Germanium High Frequency
2Q26, 2Q27	230256	Germanium Switching
2Q28	227196	Silicon Switching
2Q29	229133	Germanium High Frequency
2Q30	227196	Silicon Switching
2Q31	229133	Germanium High

Symbol	RCA Stock No.	Description
2Q32	230254	Silicon Planar
2Q33	227196	Silicon Switching
2Q34	229133	Germanium High Frequency
2Q35	230254	Silicon Planar
2Q36	227196	Silicon Switching
2Q37	229133	Germanium High Frequency
2Q38	230254	Silicon Planar
2Q39	230253	Germanium Switching
2Q40	229133	Germanium High Frequency
2Q41	230253	Germanium Switching
2Q42 to 2Q44	230254	Silicon Planar
3Q1	230257	Silicon Mesa
3Q2 to 3Q6	230253	Germanium Switching
3Q7	230255	Germanium Switching
3Q8	230258	Silicon Industrial
3Q9 to 3Q13	230253	Germanium Switching
3Q14	230256	Germanium Switching
3Q15	230253	Germanium Switching
3Q16	230256	Germanium Switching
3Q17 to 3Q22	230253	Germanium Switching
3Q23	230255	Germanium Switching
3Q24	230253	Germanium Switching
5Q1, 5Q2	230257	Silicon Mesa
5Q3	230253	Germanium Switching
7Q50	225595	Germanium Power
7Q51	230259	Germanium General Purpose
7Q52 to 7Q54	230253	Germanium Switching
7Q55	225595	Germanium Power
7Q56	230259	Germanium General Purpose
7Q57 to 7Q59	230253	Germanium Switching
		MISCELLANEOUS:
	230308	Cap: Plate (6BK4)
	219162	Cable: 3 Wire, Line Cord with Right Angle Plug
	230291	Connector: 30 Inch Lead for Yoke (1 Set of Red, Blue, Yellow & Black)
8X3	230285	Connector: Anode (Neoprene Cap and Button)
	210267	Connector: Male, 3 Contact
	210467	Connector: Female, 3 Contact
6PL3	48255	Connector: Male, 3 Contact
6PL1	205127	Connector: Male, 15 Contact
6PL2	205871	Connector: Male, 18 Contact
6XPL3	222618	Connector: Female, 3 Contact
	300069	Connector: Female, 2 Contact (AC)
7J3	213010	Connector: Nylon Test Jack, Red
3J3	230284	Connector: Phono
J501B, J502B	225222	Connector: Test Jack, Black
J501A, J502A	230283	Connector: Test Jack, Red
1J1, 1J2	223761	Connector: UHF
3J1, 3J2	223761	Connector: UHF

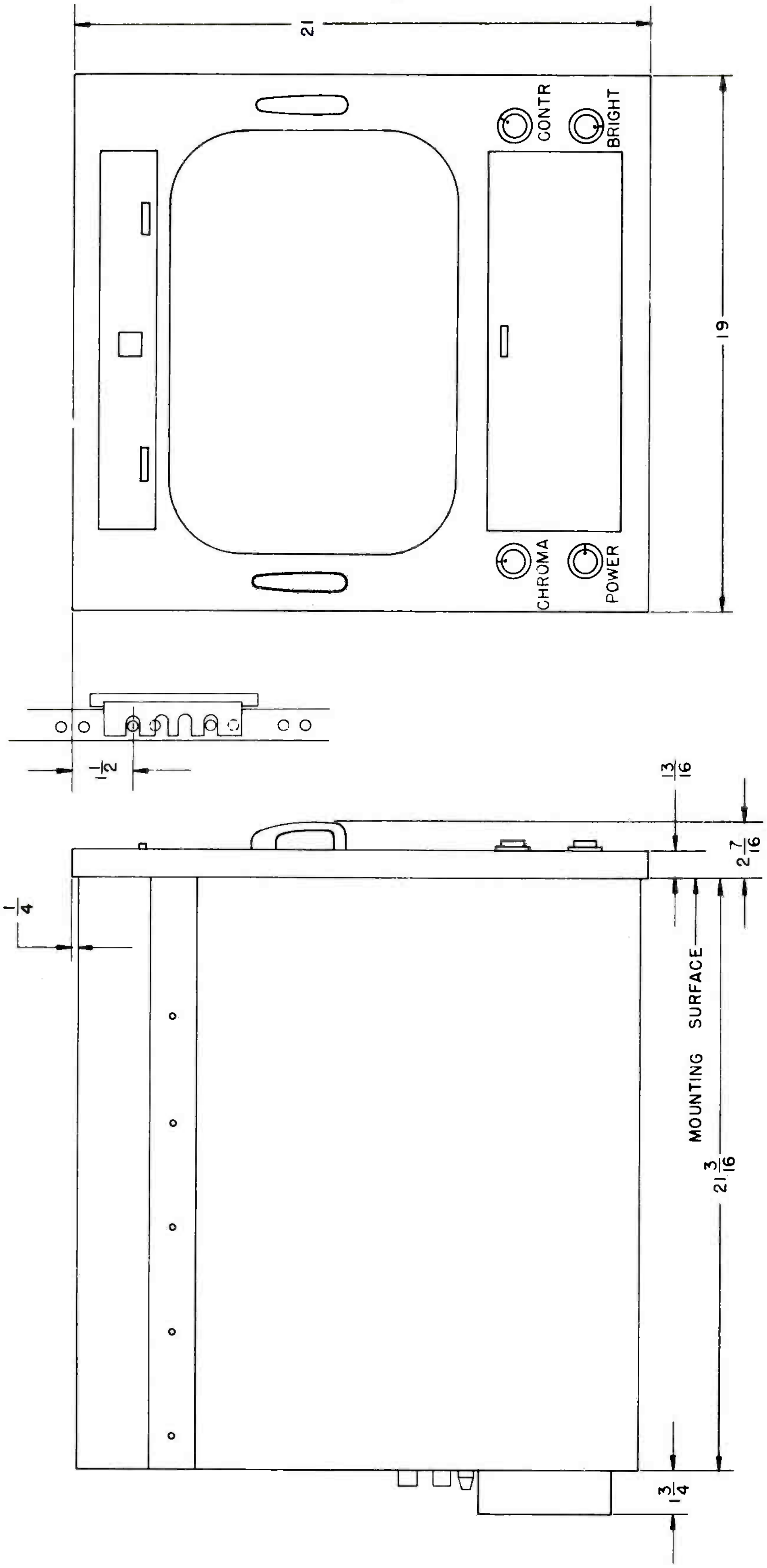
Symbol	RCA Stock No.	Description
6CV1		Convergence Coil and Magnet Assembly
	230349	Coil - Pole Piece Exciter Assembly
2Y1	230278	Crystal Quartz, 3.579545 mc
2DL1	230302	Delay Line Assembly, 3.58 mc, 90 degrees
1DL1	230328	Delay Line Assembly, 500 ohm
8F1	227687	Fan: Venturi Whisper
	230455	Foot: Nylon, for Cabinet
7F1	212231	Fuse: 4 Amperes, Slo-Blo
	230454	Handle: Cabinet
	230456	Handle: Monitor Front Panel
	48894	Holder: Fuse
	230307	Knob: Black, Primary Controls
	57711	Knob: Red, Blue, Green, Black
	217218	Lamp: Clear, 28 V, 0.10 Ampere
	230290	Lamp: Red, 28 V, 0.17 Ampere
8M1	230348	Magnet Assembly, Blue Lateral
8M2	112783	Magnet Assembly, Purity
5X5		Socket Assembly, H.V. (3A3)
	78215	Cap - Plastic Cap
	68590	Socket - Octal
2X1	209378	Socket: Crystal
6S1	95561	Socket: Female, 15 contact
6S2	56079	Socket: Female, 18 contact
7X3, 7X5	230287	Socket: 7 Pin Miniature
4X1 to 4X3	230286	Socket: 9 Pin Miniature
4X21, 4X22	230286	Socket: 9 Pin Miniature
4X41, 4X42	230286	Socket: 9 Pin Miniature
5X2, 5X3	230286	Socket: 9 Pin Miniature
7X4, 8X1	230286	Socket: 9 Pin Miniature
5X6	230305	Socket: 9 Pin (1V2)
5X7	230289	Socket: Novar (6DW4)
5X1, 5X4, 5X8	230288	Socket: Octal
7X1 to 7X3	230288	Socket: Octal
8X2	230306	Socket: Picture Tube, Neodiheptal
	225186	Socket: Transistor
7SW1	230279	Switch: Power On-Off
1SW1, 3SW1	230282	Switch: Slide, D.P.D.T.
2SW1	230280	Switch: Toggle, S.P.D.T.
8SW1 to 8SW3	230280	Switch: Toggle, S.P.D.T.
8SW4	230281	Switch: Toggle, D.P.D.T.
5SW1	230329	Switch: Underscan
	230293	Tally Light Numeral Plate, (1)
	230292	Tally Light Numeral Plate, (2 through 8)



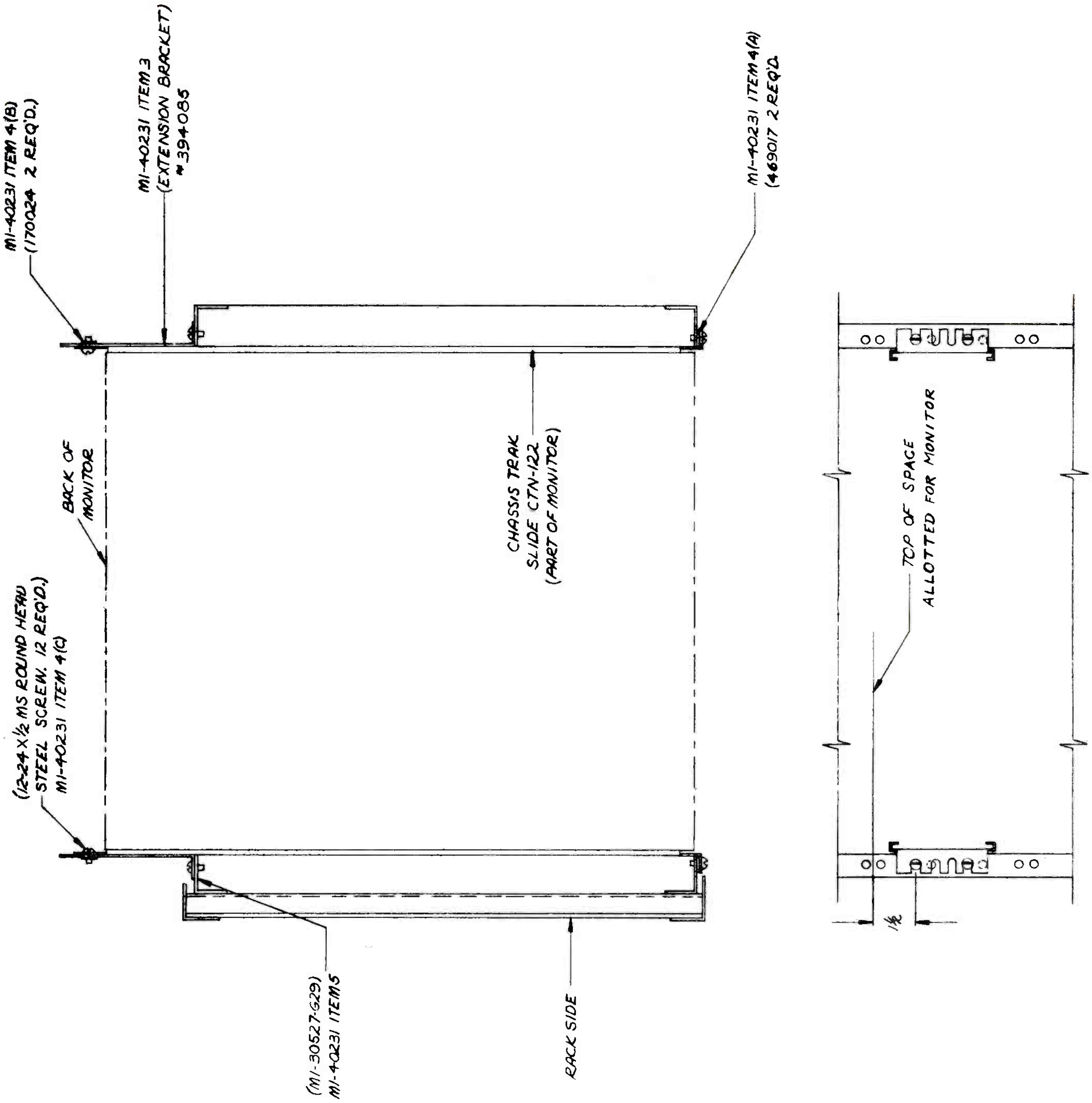
OUTLINE DIMENSIONS
17″ CABINET MONITOR
(286215A)



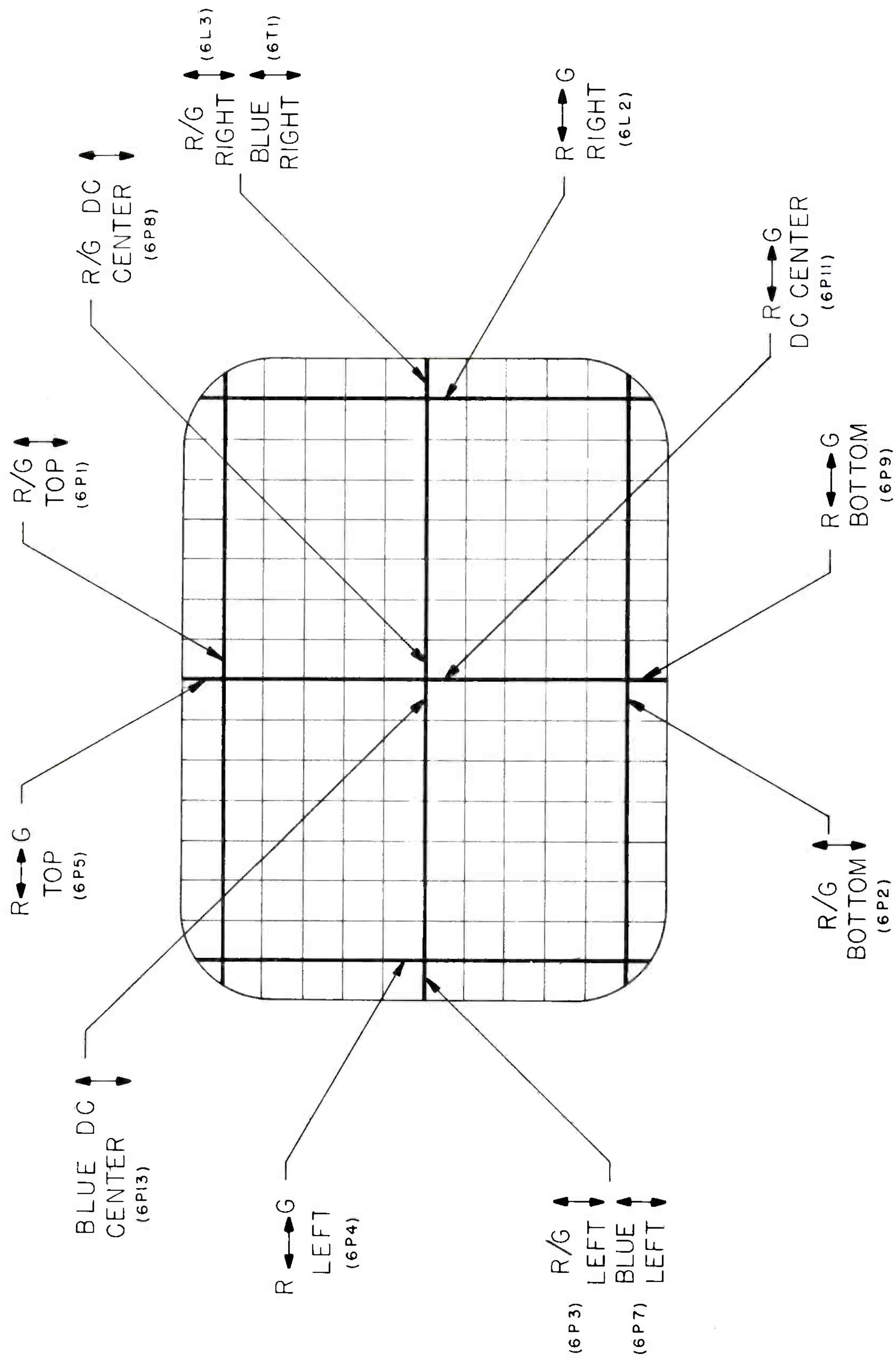
OUTLINE DIMENSIONS
17″ MONITOR - REAR VIEW
(286219A)



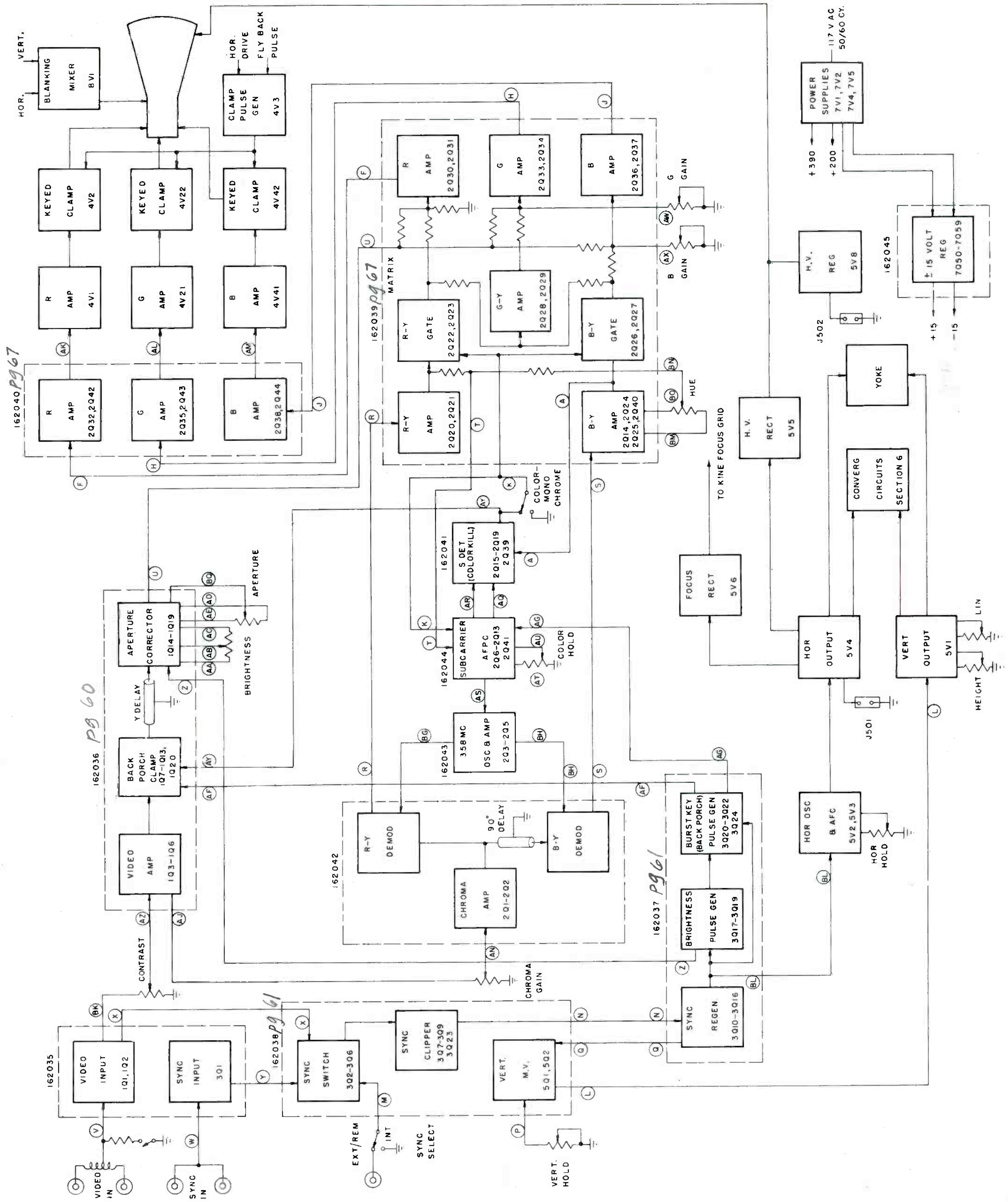
OUTLINE DIMENSIONS
17" RACK-MOUNTED MONITOR
(386216A)



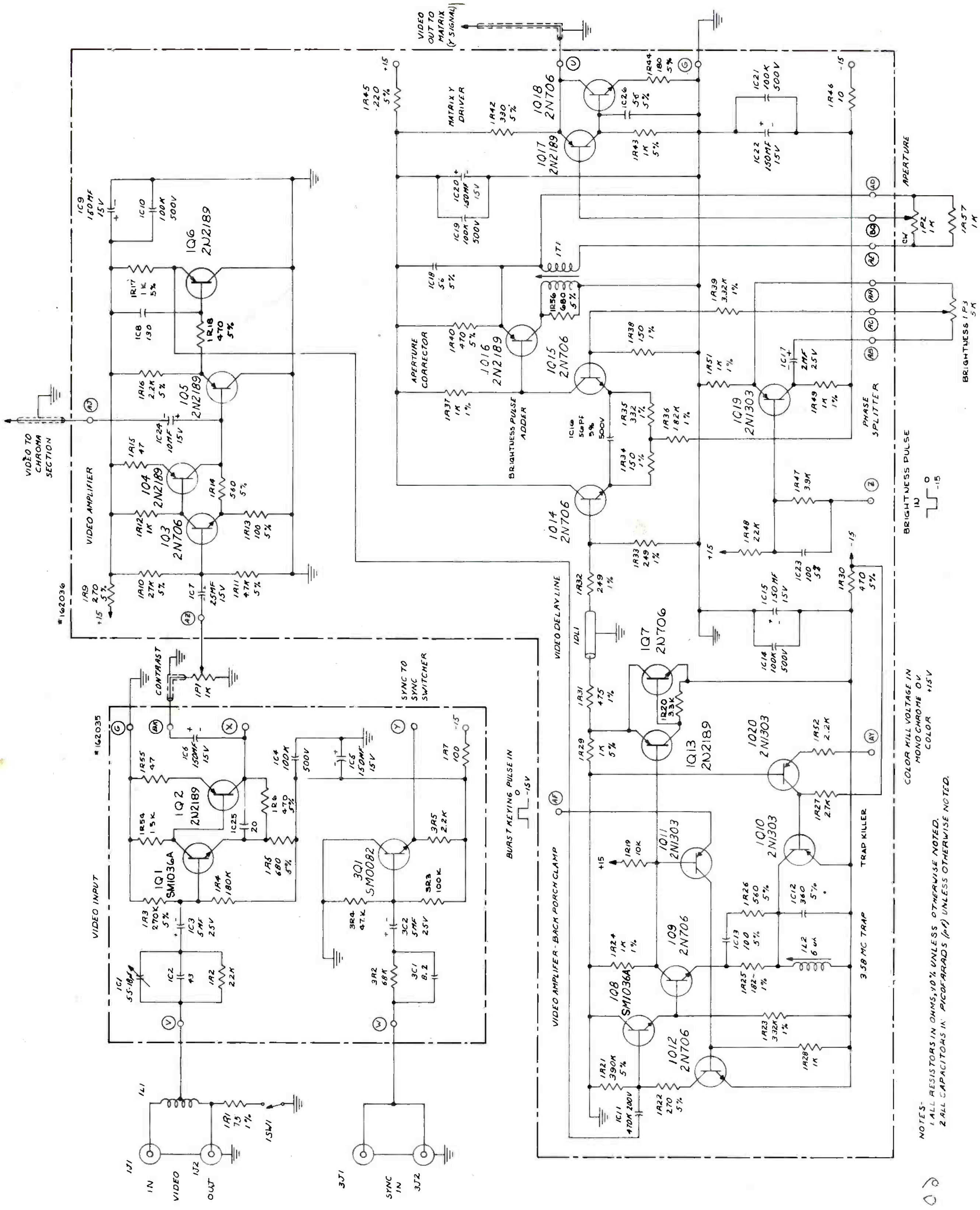
RACK MOUNTING INSTALLATION
(286232)



CONVERGENCE DIAGRAM
(286204B)

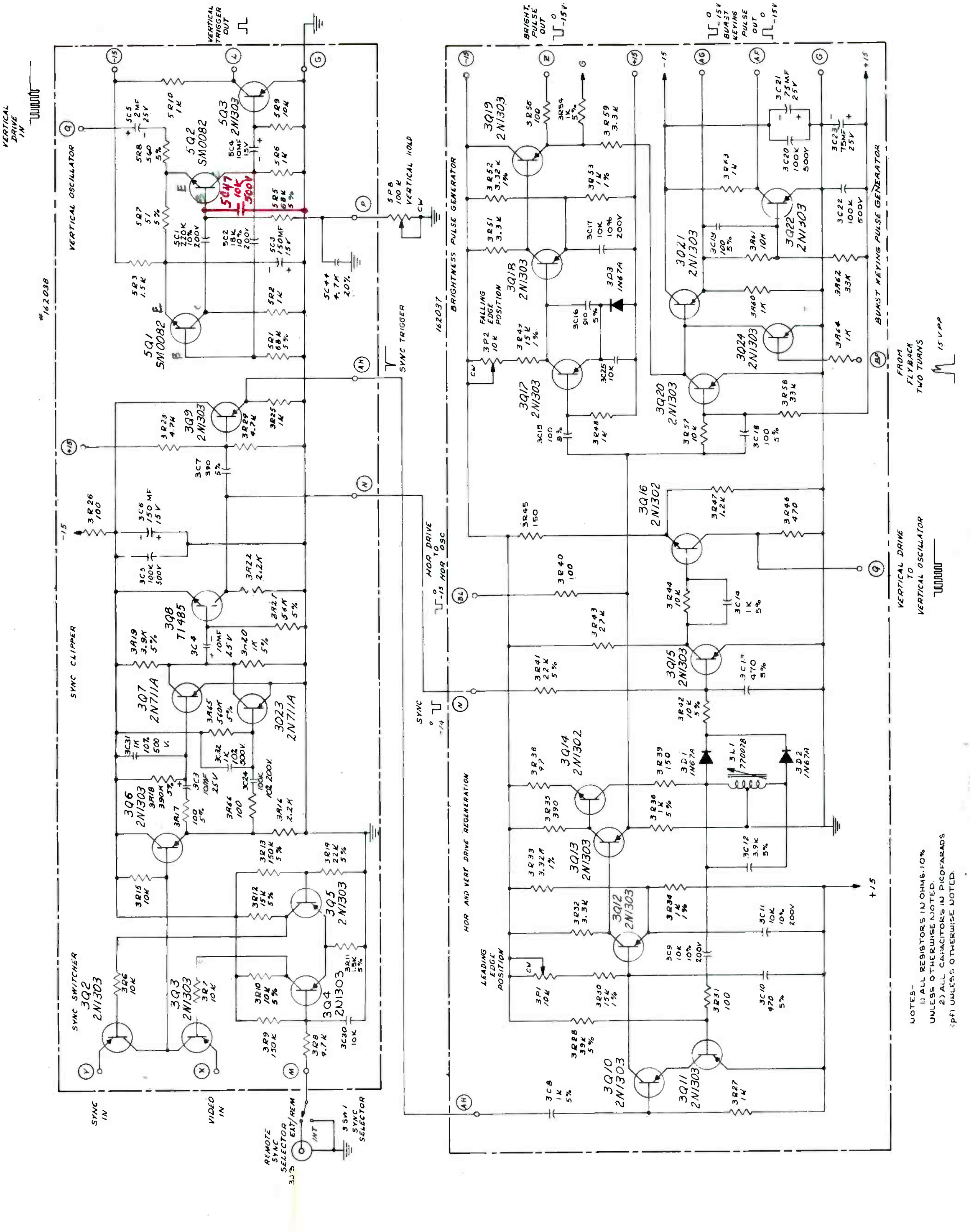


BLOCK DIAGRAM
(452068B, Sheet 1 of 10)

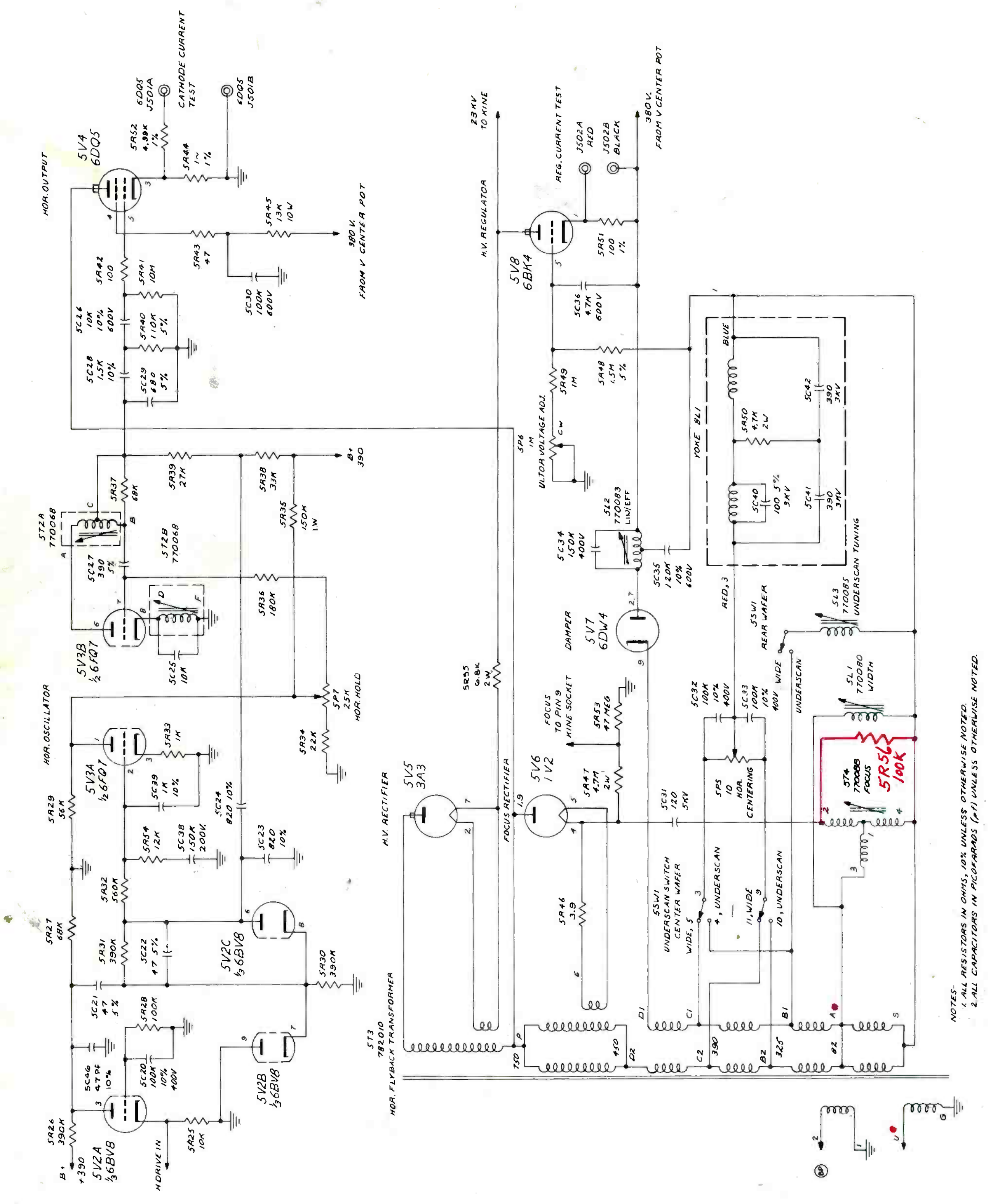


VIDEO PROCESSING
(452068C, Sheet 2 of 10)

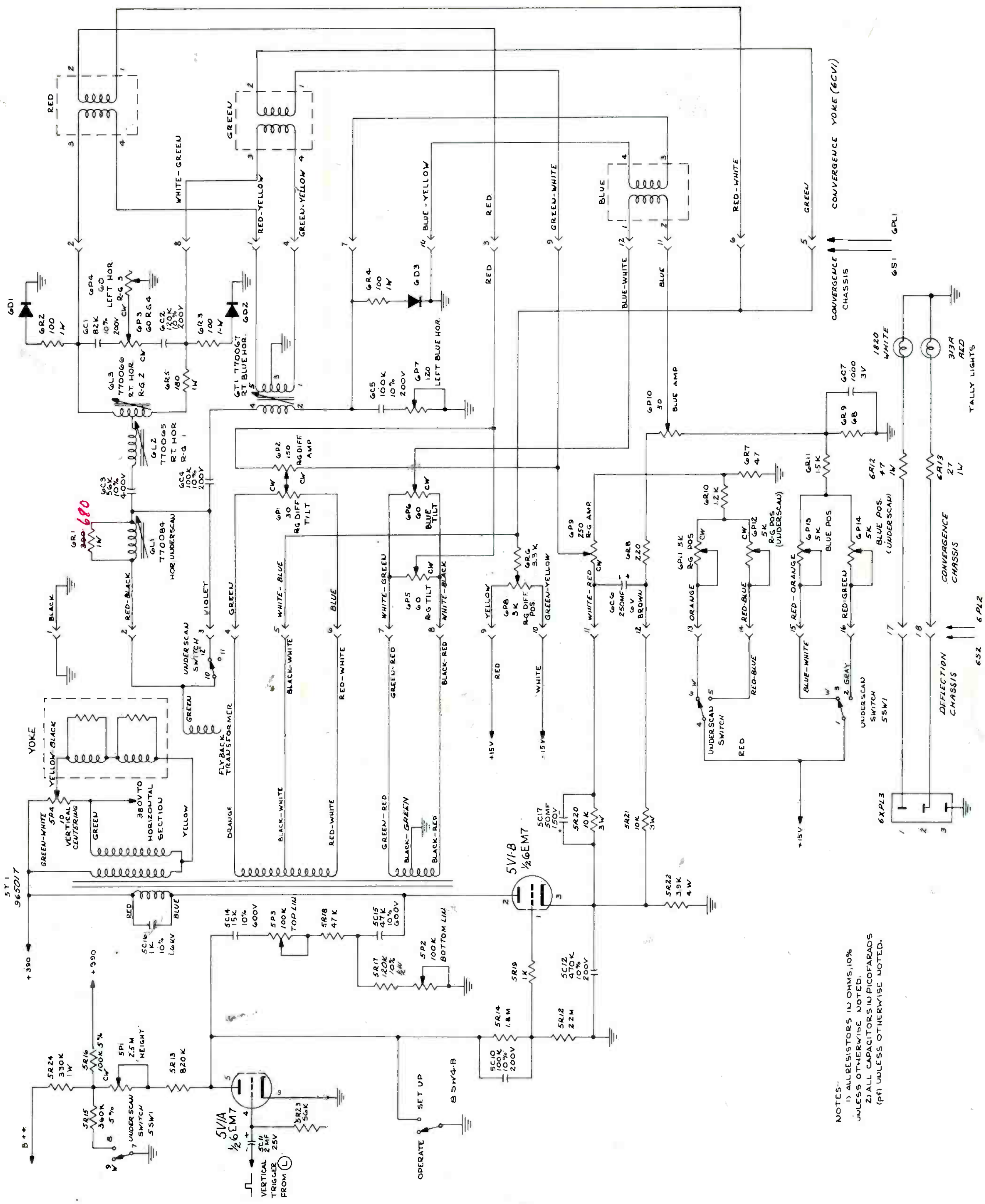
162036



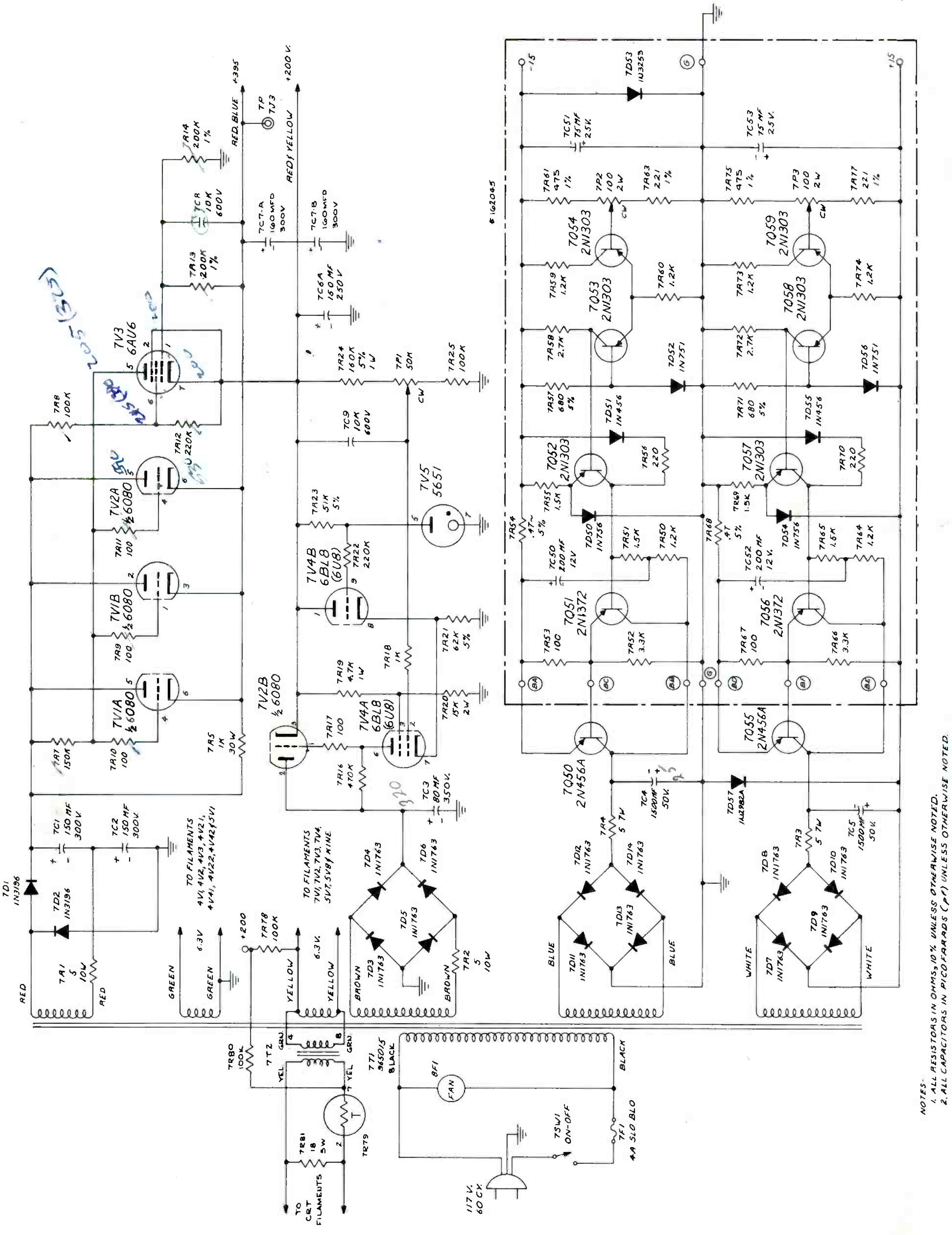
SYNC AND PULSE PROCESSING
(420068C, Sheet 3 of 10)
162037 & 162038



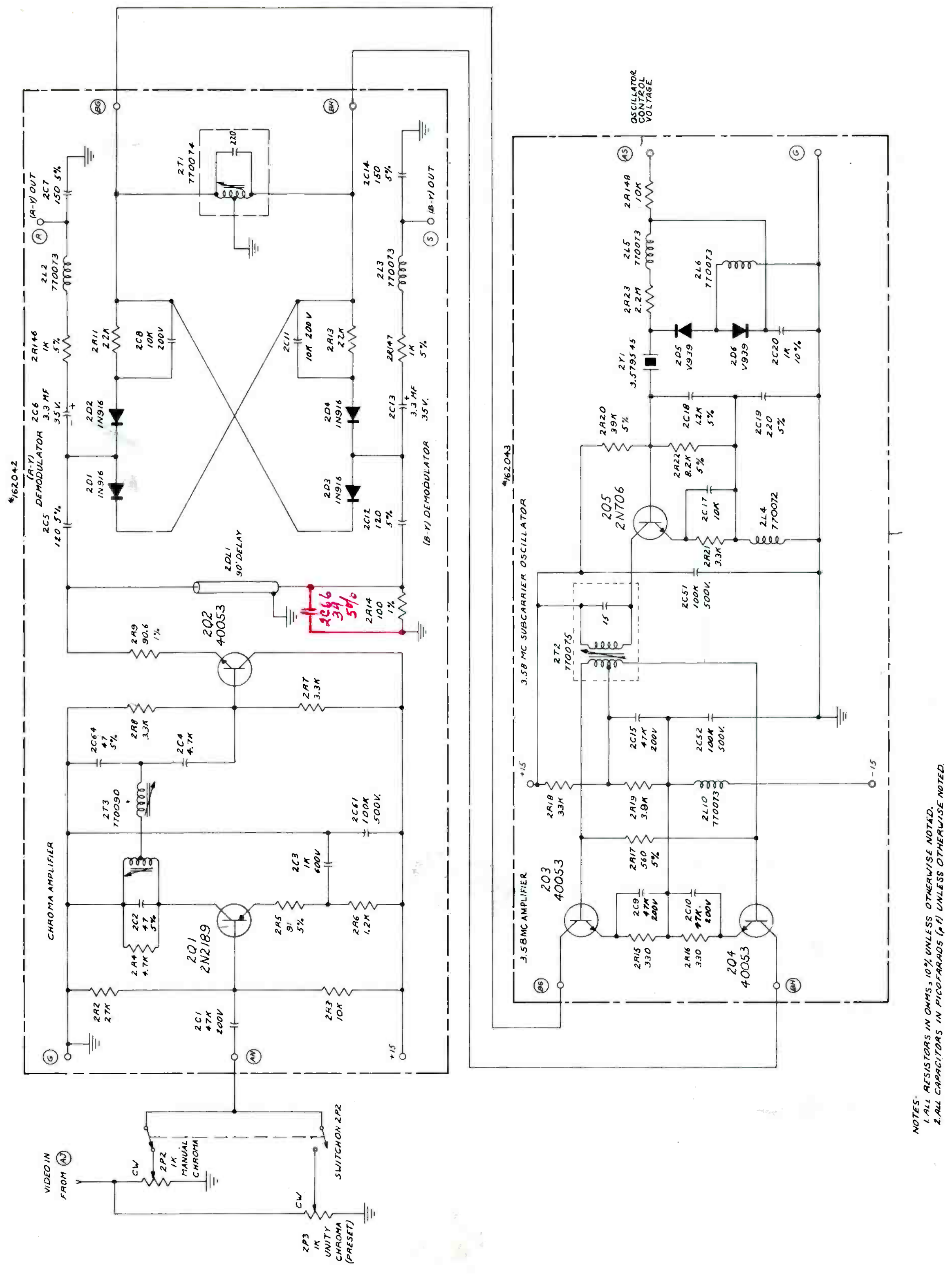
HORIZONTAL DEFLECTION AND HIGH VOLTAGE (452068D, Sheet 4 of 10)



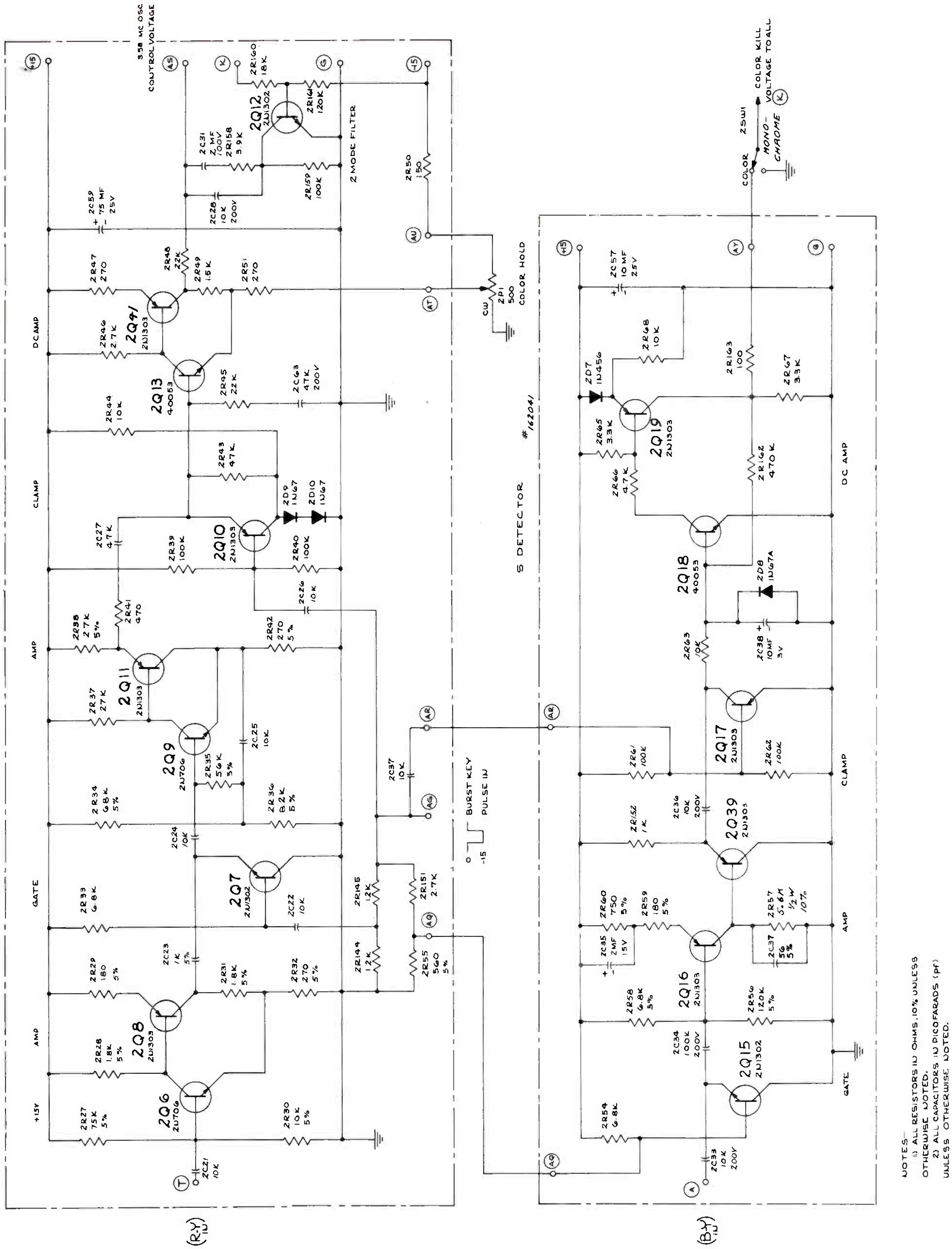
VERTICAL OUTPUT
CONVERGENCE ASSEMBLY
(452068C, Sheet 5 of 10)



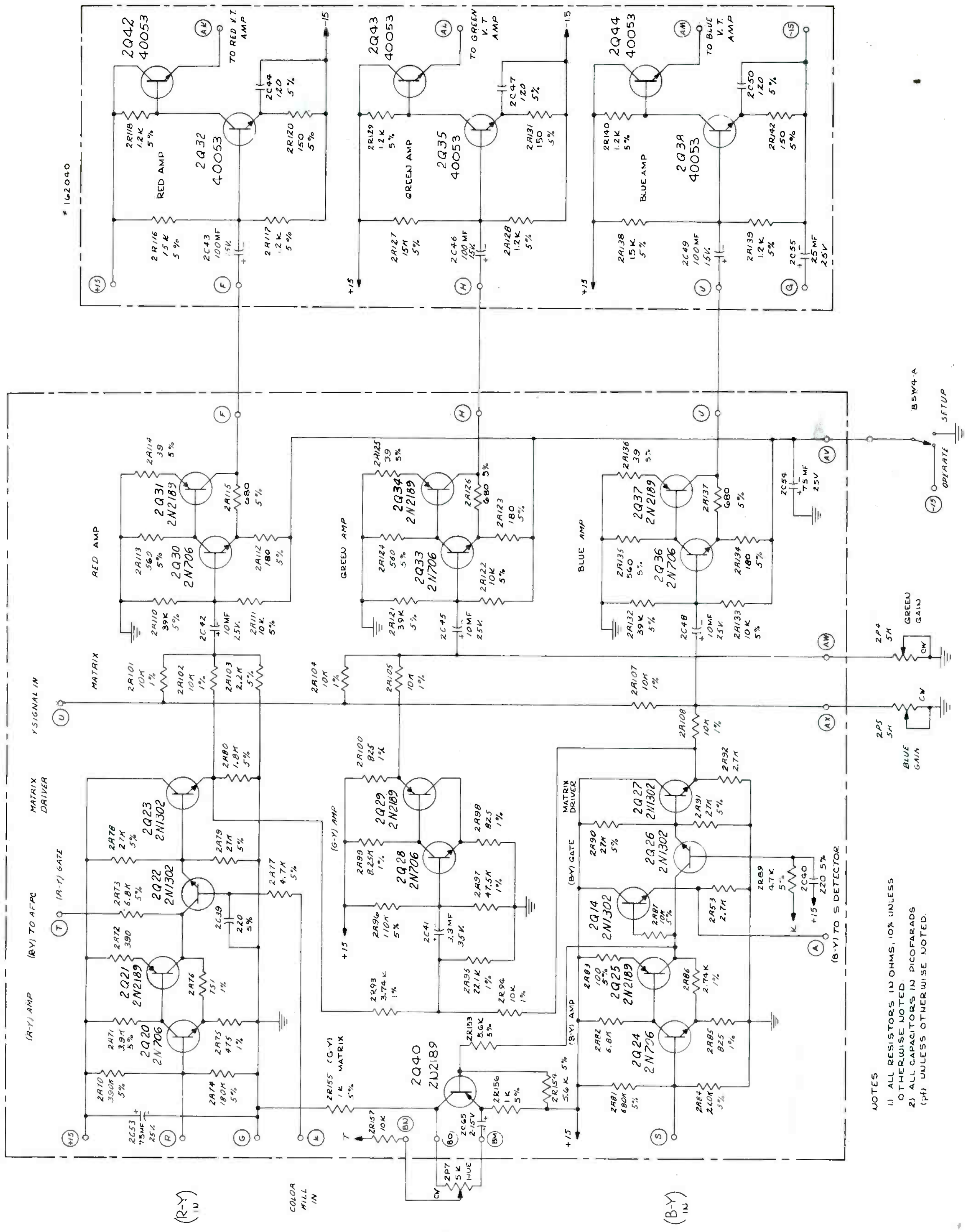
POWER SUPPLY
(452068D, Sheet 6 of 10)



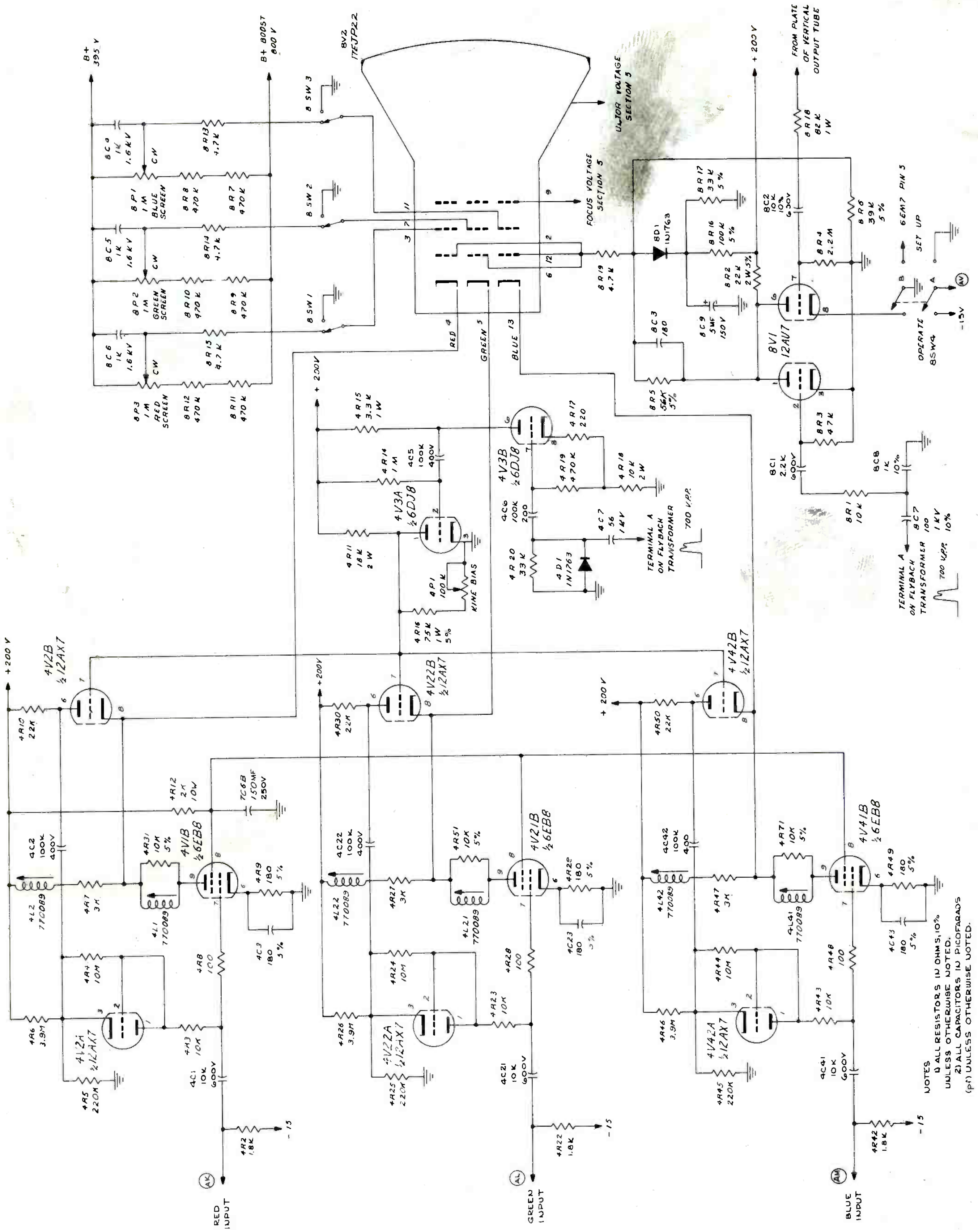
DEMODULATORS AND SUBCARRIER OSCILLATOR
(452068A, Sheet 7 of 10)



SUBCARRIER AFPC AND S DETECTOR
(452068C, Sheet 8 of 10)



MATRIX AND COLOR AMPLIFIERS (452068A, Sheet 9 of 10)



VIDEO AMPLIFIERS AND KINESCOPE CIRCUITRY
(452068C, Sheet 10 of 10)

RADIO CORPORATION OF AMERICA

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