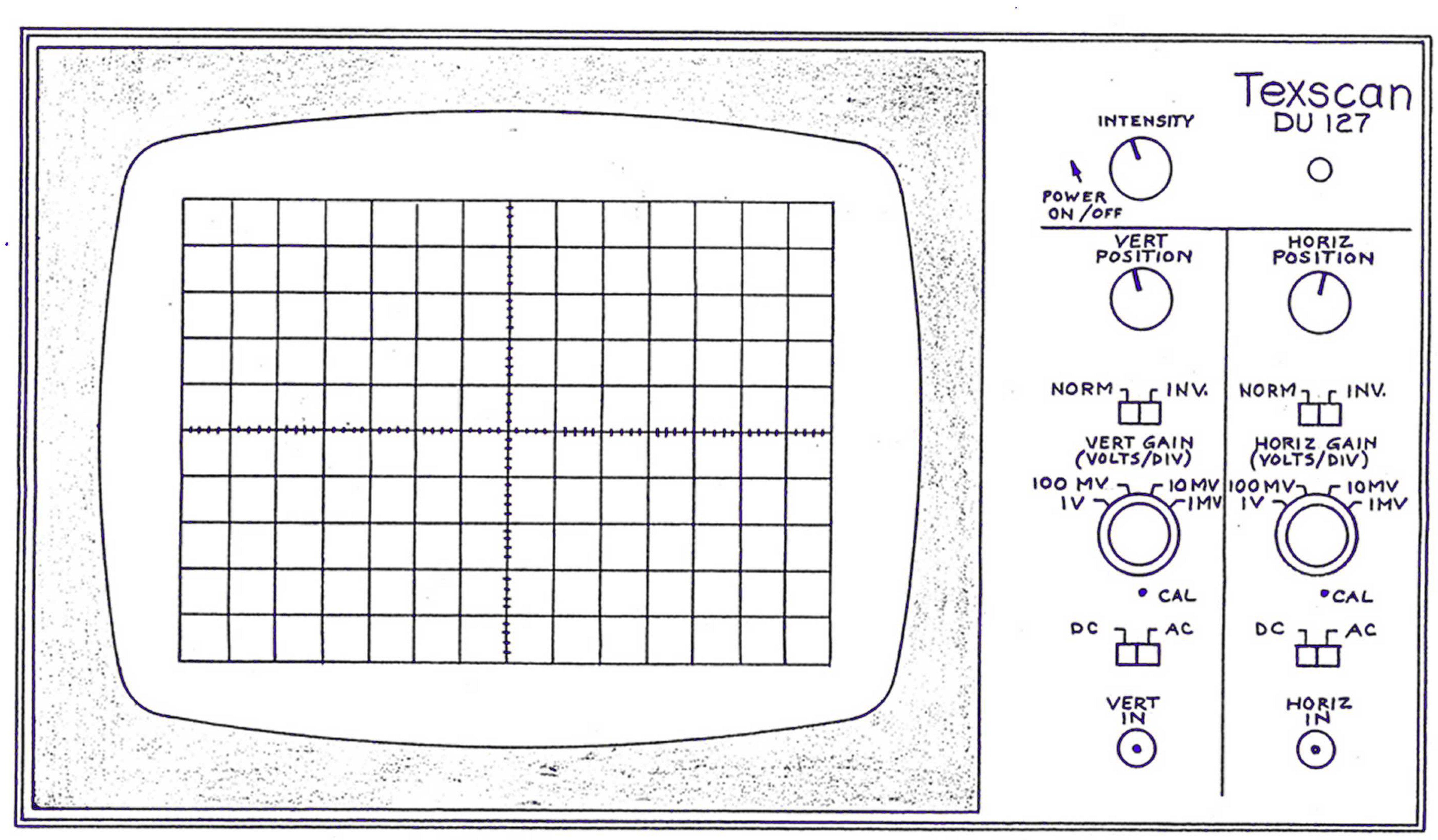
OPERATING AND MAINTENANCE MANUAL

DISPLAY OSCILLOSCOPE

DU-127

P/N 001-028



TEXSCAN CORPORATION
3169 N. Shadeland Avenue
Indianapolis, Indiana 46226

317/545-4196

rev 2/85

3/87

CAUTION:

Units shipped from the factory are identified for operation from the proper input power source. Note the following:

(1) 230-volt rms, 50/60 Hz, single-phase power source.

A RED label marked "230V" is wrapped around the power cord within six inches (15 cm) of the polarized power plug. A RED label marked "230V" is also attached to the rear panel of the unit above the line-cord grommet.

(2) 115 volt rms, 50/60 Hz, single-phase power source.

A YELLOW label marked "115V" is wrapped around the power cord within six inches (15 cm) of the polarized power plug. A YELLOW label marked "115V" is also attached to the rear panel of the unit above the line-cord grommet.

Dammage to any unit which is connected to a 230-volt power source, but which is wired internally for 115-volt operation constitutes "misuse", and is not covered by the TEXSCAN warranty. Consult the TEXSCAN instruction manual for the proper internal power-source connection if there is any question about the intended use. NOTE: The line fuse(s) must also be checked for the correct rating and type.

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SECTION 1
DU-127 SPECIFICATIONS

1.1 VERTICAL AMPLIFIER

1.1.1	Ranges	1 m//div., 10 mV/div., 100 mV/div. and 1V/div., (4 positions) (front panel).
1.1.2	Vernier	Continuously variable between all ranges, extends maximum deflection factor to at least 10V/div. (front panel).
1.1.3	Bandwidth	DC to 30 kHz (3 dB) @ 10 div.
1.1.4	Input Resistance	1 Mohms.
1.1.5	Input Connector	BNC female (front panel).
1.1.6	Linearity	5%.
1.1.7	Coupling	AC-DC.
1.1.8	Input	Unbalanced, 300V peak.

1.2 PULSE MARKER ADDER

1.2.1	Sensitivity	2V/div., continuously adjustable (rear panel, screw driver adjusts).
1.2.2	Input Resistance	50 Kohms.
1.2.3	Input Connector	BNC (rear panel).
1.2.4	Polarity	Positive or negative.

1.3 INTENSITY MODULATION

1.3.1	Sensitivity	+2V pulse will fully unblank CRT.
1.3.2	Input RC	4.7 KΩ shunted by 15 pf.
1.3.3	Risetime	less than 100 NS; CW bandwidth D.C. to approximately 4 MHz.

1.4 HORIZONTAL AMPLIFIER

1.4.1	Ranges	1 mV/div., 10 mV/div., 100 mV/div. and 1V/div., (4 positions) (front panel).
1.4.2	Vernier	Continuously variable between all ranges, extends maximum deflection factor to at least 10V/div., (front panel).
1.4.3	Bandwidth	DC to 24 kHz (3 dB) @ 14 division.
1.4.4	Input Resistance	1 Mohms.
1.4.5	Input Connector	BNC female (front panel).
1.4.6	Linearity	5%.
1.4.7	Coupling	AC-DC.
1.4.8	Input	Unbalanced, 300V peak.
1.4.9	Video Input	
1.4.9.1	Input Impedance	4.7 KΩ
1.4.9.2	Risetime	less than 100 NS; CW bandwidth D.C. to approximately 4 MHz.
1.4.9.3	Blanking Range	0 to +1V
1.4.9.4	Blanking Polarity	+1V into video input fully unblanks CRT.

1.5 CATHODE RAY TUBE

1.5.1	Size	30.48 cm (12 inches).
1.5.2	Graticule	10 div. X 14 div.
1.5.3	Deflection	Electromagnetic.
1.5.4	Phosphor	P7 standard.

1.6 GENERAL

1.6.1	Power	115 or 230V AC ±10%, 50/60 Hz.
1.6.2	Temperature	Operating 0 to 55°C.
1.6.3	Dimensions	9-9/16 inches (243 mm) high X 17 inches (432 mm) wide X 13-3/4 inches (349 mm) deep.
1.6.4	Weight	25 lbs. (11.34 kg).

SECTION 2
GENERAL DESCRIPTION

2.1 INTRODUCTION

The Texscan Model DU-127 Display Oscilloscope is a large-screen X-Y display unit that features modern integrated and discrete solid-state circuits, and a 12 inch (30.5 cm) cathode ray tube in a sensitive, stable design. The DU-127 is designed especially for display applications in production and laboratory sweep generator test systems, although it is suitable for a broad range of X-Y display applications. Detected sweep signal amplitude-versus-frequency characteristics of RF devices and circuits, with identifying frequency markers, are accurately displayed. The DU-127 can also be used with audio sweep generators to provide a display of rolloff characteristics of audio amplifiers, filters, and other low-frequency devices. Since the horizontal sweep signal is provided externally, no internal time-base circuits are required. A wide range of continuously adjustable vertical and horizontal input signals are accommodated by DU-127 feedback-stabilized amplifier circuits. These horizontal and vertical amplifier circuits are protected against overloads from off-screen deflections should the input circuits be overdriven for brief time periods. Prolonged off-screen deflections will, however, reduce operating amplifier life. The 12 inch diagonal CRT is electrostatically focused and magnetically deflected. A large 10 by 14 division graticule is applied to the external CRT display surface. The DU-127 has extensive marker capability. Pulse and intensity markers can be added to the display circuits via rear panel terminals. This feature provides simultaneous display of pulse and intensity markers used, for example, in tracking local oscillators to IF responses. Intensity markers are produced by modulating the CRT cathode with pulse or birdy markers. Pulse markers utilizing the DU-127 pulse amplifier input provide constant, but adjustable display amplitude regardless of the attenuator setting in the vertical input. Birdy and pulse markers added to the detected RF sweep signal in conventional marker-bypass (adder) circuits can also be displayed.

2.2 DETAILED DESCRIPTION

A block diagram of the DU-127 is shown in Figure 2-1. For component and circuit details refer to the schematic diagram in Section 6.

2.2.1 Horizontal & Vertical Amplfiers

The amplifiers are basically power amplifiers that drive the two deflection coils in the yoke assembly. At maximum deflection (10 div. P-P) the deflection coil voltage to ground is approximately 15 volts peak-to-peak at 30 kHz (sine wave input), and the driving current is approximately 5 amperes peak-to-peak (1.77 A rms).

Horizontal and vertical input signals may be AC or DC coupled. The HORIZ & VERT GAIN (FP) controls provide 60 dB of attenuation in four steps (1 mV/div. to 1 V/div.). The horizontal and vertical preamps, which accept positive and negative signal polarities consists of a JFET input op amp that functions as a differential amplifier. Internal preamp controls provide required gain balance and temperature compensation to insure circuit stability. Negative feedback is also provided in the preamp. The preamps are assembled on separate PC boards to reduce noise and extraneous pickup.

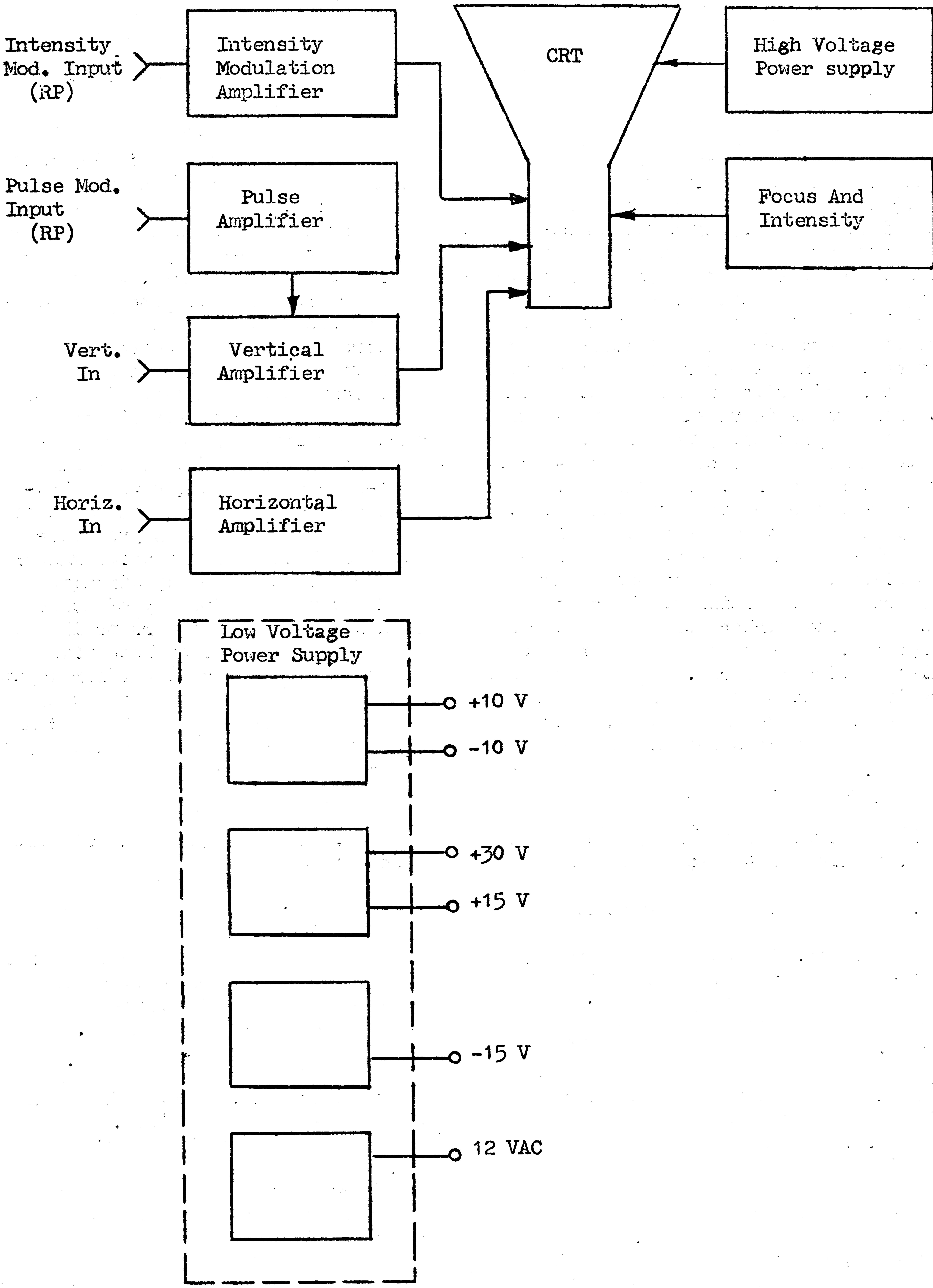


FIGURE 2-1: DU-127 BLOCK DIAGRAM

The preamps drive two cascaded op amp stages. The HORIZ & VERT GAIN verniers control the gain of the first op amp on the main PC board. The HORIZ & VERT POS (FP) controls provide an adjustable DC bias that is summed with the input signal at the inverting input of the second op amp. The output of the second op amp drives the complementary emitter-follower pair in the power stages. Compensating diodes in the base circuit of each emitter follower minimizes cross over distortion as the polarity of the output signal reverses. The two emitters of the complementary emitter-follower pair provide the required power to drive the deflection coils. A portion of the output signal is fed back to the inverting input of the second op amp to provide stable operation, and to limit amplifier overloading.

2.2.2 Pulse Amplifier

The pulse amplifier consists of a limiting op amp stage with adjustable size control. The input is a rear panel BNC connector. The PULSE SIZE control is also located on the rear panel. The output of the pulse amplifier is capacitance coupled to the non-inverting input of the final op amp in the vertical amplifier. Pulse markers of either positive or negative polarity are amplified. The pulse marker amplitude is unaffected by the VERT GAIN control.

2.2.3 Intensity-Modulation Amplifier

The intensity-modulation amplifier consists of a limiting op amp stage whose output controls the CRT cathode voltage. An input pulse or birdy marker applied to the rear panel BNC connector is limited by input diodes, and subsequently amplified. Either a positive or a negative pulse marker causes the CRT cathode voltage to become more negative with a consequent increase in spot brightness. A birdy marker produces two bright spots.

2.2.4 Video Input

The video input utilizes a high frequency/high slur rate op amp stage whose output controls the CRT cathode voltage. A video input signal of 0 to +1V applied to the rear panel BNC connector is linearily amplified, and subsequently, drives the CRT cathode more negative with a consequent linear increase in spot brightness.

2.2.5 Focus and Intensity Circuits

The CRT is electrostatically focused by applying the required voltage to grid #4 of the CRT. An internal focus control is set at the factory, or during alignment. The INTENSITY (FP) control applies the required voltage to grid #1 of the CRT.

2.2.6 Cathode Ray Tube

The Cathode Ray Tube (CRT) or electron-beam tube is a 12 inch (diagonal), electrostatically focused, and electromagnetically deflected (90 degree) display unit. The 10 by 14 division graticule is applied to the external display surface. The graticule is protected in the unit by a clear plastic shield. A P7 phosphor (medium persistance) is standard. The heater voltage is 12.6 volts, and the anode voltage is provided by the high voltage power supply.

2.2.7 Low Voltage Power Supply

The low voltage supply obtains AC power from transformer T1. 115 volt or 230 volt, 50 or 60 Hz, single-phase power is required.

The low voltage supply provides three regulated outputs +30V, +15V, & -15V. The supply also provides +10V and -10V unregulated, and 12.6V AC to the CRT heater. The positive and negative regulators are complementary duals. Each regulator is a series type regulator using a pass transistor, and an integrated circuit error amplifier. Current limiting and short circuit proof circuits are provided in each regulator.

2.2.8 High Voltage Power Supply

The high voltage power supply provides the CRT anode voltage (+6.5 kV) and +250V and -100V used in CRT focusing and grid supplies. The high voltage power supply is a DC-to-DC converter whose input voltage is obtained from the low voltage power supply, and converted to +6.5 kV, +250V, and -100V. The converter uses a relazation oscillator that drives a flyback transformer to produce high AC voltage. The high AC voltage is subsequently rectified and filtered. A sample of the high voltage DC output is fed back to an input regulator circuit that controls the relazation oscillator input voltage. An internal fuse is provided in the DC input line.

2.2.9 Beam Blanking

The horizontal sweep signal from U401 drives Q100 in the Beam Blanking ciruit. When Q100 is off, C101 and C102 charge from the -15 volts. When Q100 turns on, C101 discharges through the transistor and C102 must discharge through R104 and R105, controlling Q101. While Q101 is on, the beam is on; if Q101 is allowed to turn off, the beam is turned off. NOTE: the front panel switch must to OPEN to allow the beam blanking circuit to work; some schematics may show this backwards.

SECTION 3
OPERATING INSTRUCTIONS

3.1 INTRODUCTION

The DU-127 has two modes of operation. It provides vertical and horizontal gain to display X-Y information such as frequency-versus-gain characteristics of amplifiers, VSWR-versus-frequency, insertion loss-versus-frequency, and other similar X-Y variable pairs, or when used with intensity modulation can be used as a video monitor.

CAUTION: Before applying AC power to the DU-127 (unit) determine that the rear panel voltage switch is set for the correct line voltage. A slide switch is provided on the rear panel to select between 115V and 230V.

3.2 FRONT PANEL DESCRIPTION

The DU-127 front panel is shown in Figure 3-2.

1. ON/OFF switch, and INTENSITY control.

In fully CCW position the power to the unit is OFF. When rotated clockwise the unit is ON, if AC line power is applied to the DU-127. The INTENSITY control adjusts brightness of the trace.

CAUTION: Prevent phosphor burn in the CRT display screen by adjusting INTENSITY control CCW when a bright spot is displayed. Limiting spot brightness prolongs useful CRT screen life.

2. HORIZ GAIN and VERNIER controls.

Adjust VERNIER control fully clockwise (to switch position) to calibrate graticule horizontally at 1V/div., 100 mV/div., or 1 mV/div positions of HORIZ GAIN switch. VERNIER provides continuous horizontal gain adjustment between switch ranges.

3. HORIZ POS control.

Adjusts horizontal position of CRT trace.

4. VERT GAIN and VERNIER controls.

Adjust VERNIER control fully clockwise (to switch position) to calibrate graticule vertically at 1V/div., 100 mV/div., or 1 mV/div positions of VERT GAIN switch. VERNIER provides continuous vertical gain adjustment between switch ranges.

5. VERT POS control.

Adjusts vertical position of CRT trace.

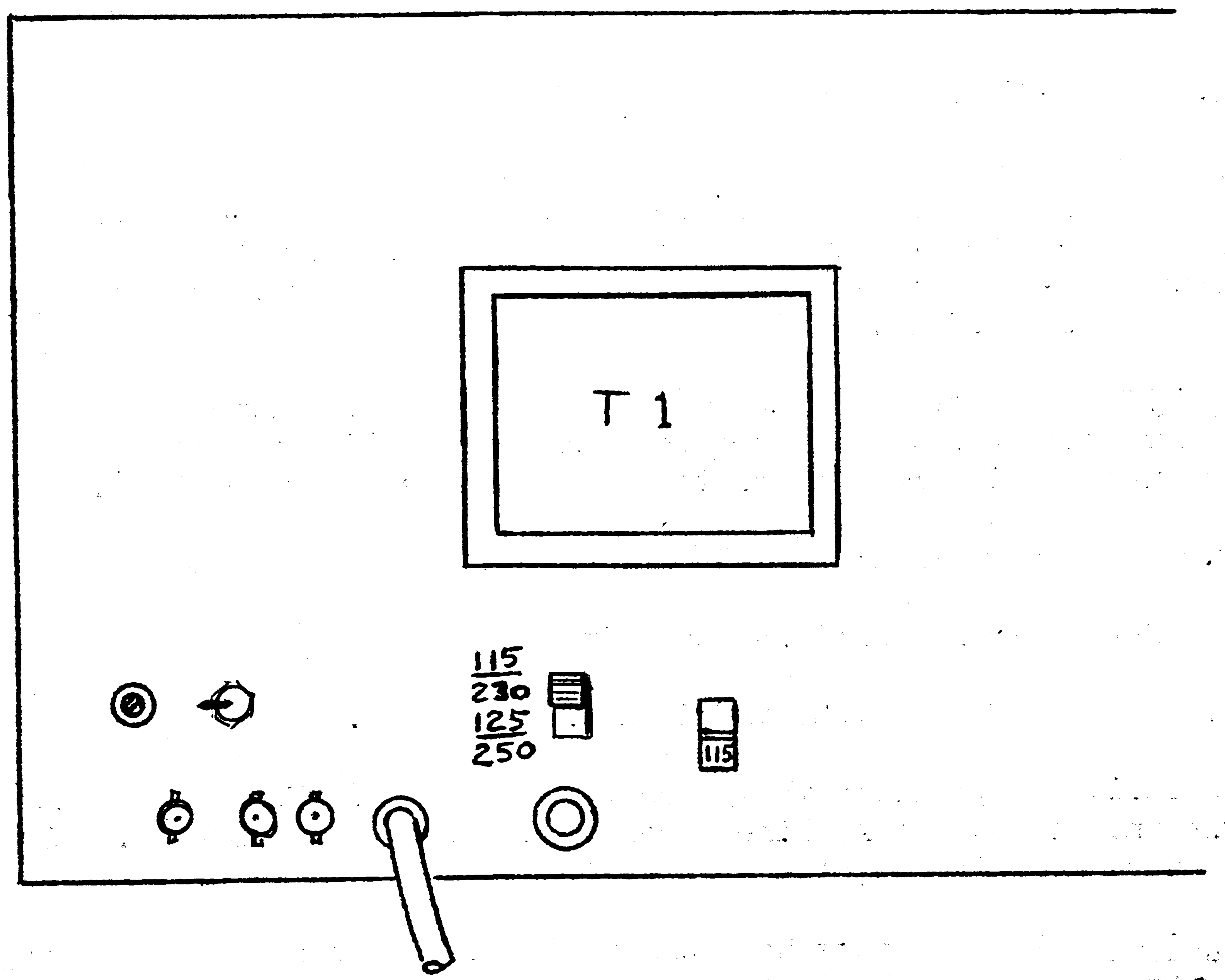


FIGURE 3-1: 115/230V POWER CONNECTION

CAUTION: Units shipped from the factory are identified for operation from the proper power source. The unit is equiped with a line voltage selector switch located on the rear panel (See Fig. 3-1). Proper line voltage selection may be obtained by setting the line voltage switch to the desired line voltage. Be certain that the fuse F1 is the proper value for line voltage selected. Also, provided is a high/low (110/220-115/230) line switch for use in areas where high/low line conditions may exist.

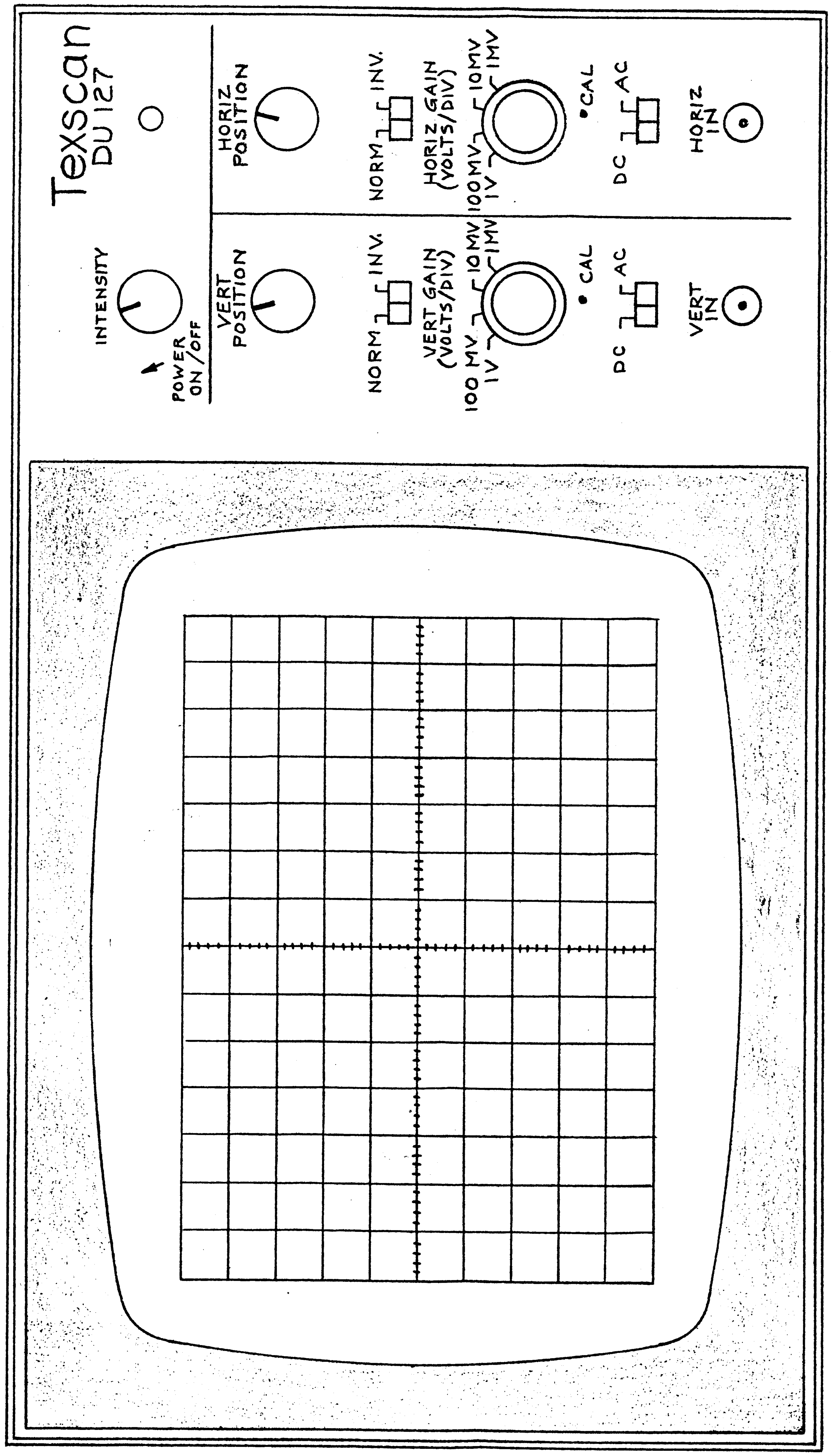


FIGURE 3-2: DU-127 FRONT PANEL

6. DC-AC (VERT IN) switch.

In DC position the vertical input is direct coupled. Vertical input DC signals are amplified depending on VERT GAIN setting. In AC position, DC signals are blocked, and only vertical input AC signals are amplified.

7. VERT IN connector.

The vertical input signal is coupled to this BNC connector.

8. DC-AC (HORIZ IN) switch.

In DC position the horizontal input is direct coupled. Horizontal input DC signals are amplified depending on HORIZ GAIN setting. In AC position, DC signals are blocked, and only horizontal input AC signals are amplified.

9. HORIZ IN connector.

The horizontal input signal is coupled to this BNC connector.

10. The 10 by 14 division graticule provides reference lines for calibrating voltage or other display levels.

NOTE: The graticule is bonded to the external CRT viewing screen surface. The graticule is protected by a clear plastic shield. If it is necessary to clean the graticule, after removing the plastic shield, use a soft cloth and a mild detergent solution or "Windex". Avoid scrubbing or scraping graticule lines. Calibration marks and numbers, or other reference information, can be applied or bonded to the CRT screen if precautions are taken to preserve graticule lines.

11. NORM/INVERT (HORIZ & VERT) switch.

In NORM position, signal polarity displayed is the same as that of the input signal. In INVERT position, signal polarity displayed is the opposite of that of the input signal.

3.3 REAR PANEL DESCRIPTION

A DU-127 rear panel is shown in Figure 3-3.

1. PULSE SIZE control (screwdriver adjust).

Adjusts amplitude of pulse markers coupled to PULSE MOD rear panel connector. Provides 2 V/div marker display amplitude at maximum sensitivity.

2. PULSE MARKER INPUT connector.

A pulse marker (±2 V/div minimum) from an external sweep generator is connected to the pulse marker input connector.

3. INTENSITY MARKER INPUT connector.

A pulse or birdy marker (±2 V minimum) from an external sweep generator is connected to the BNC input connector.

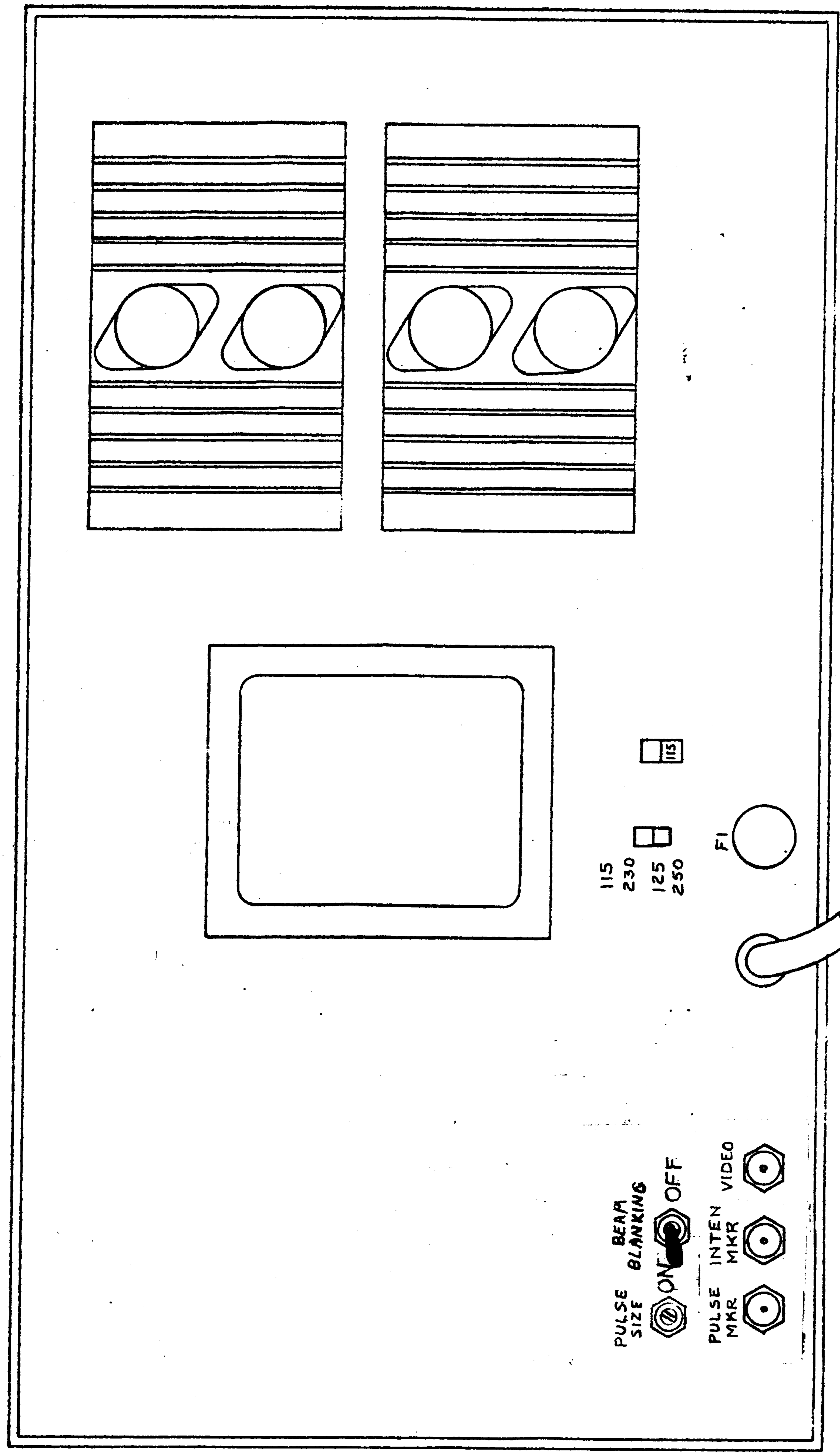


FIGURE 3-3: DU-127 REAR PANEL

SECTION 5
ALIGNMENT PROCEDURE

5.1 INTRODUCTION

Each Model DU-127 is completely aligned and tested at the factory prior to shipment. Due to aging or component replacement, alignment may be required in the field. Refer to Sections 1 and 2, and to the schematic diagram in Section 6 prior to performing the alignment procedure. Make adjustments only if measurements indicate out-of-tolerance performance. See Figure 5-1 for internal control locations. The following calibrated test equipment or equivalent is required.

A. Volt-ohmeter VOM)	Simpson 260
B. 25-k V Probe	Simpson
C. VC Function/Sweep Generator	Exact Model 126
D. Regulated DC Supply	Harrison 6101A
E. Variac with Ammeter	General Radio (0-130 VAC)
F. Oscilloscope	Model 547 with 1A1 plug-in
G. Pulse Generator	Crynetics Model P6

CAUTION: Avoid phosphor burns in CRT on splay screen by setting INTENSITY control fully CCW when a bright spot is displayed without turning off AC power.

5.2 TEST PROCEDURE

A. Low Voltage Power Supply

NOTE: Remove fuse F2 from +30 V input of high voltage circuit.

1. Use VOM to check for shorts in power supplies and transformer circuits.

2. Connect DU-127 to a variac, set to 0 volts.

3. Connect a multimeter to the +30 volt test point TP1.

4. Slowly increase the variac voltage, while observing the current meter on variac. The variac current should not exceed 2 amp. Simultaneously, observed the DC reading on multimeter attached to the +30 V TP1 and set voltage for +30 V DC using R21. Do not increase voltage further than necessary to allow adjustment of +30 V.

5. Connect VOM to +15 V DC test point E49. Should read +15 V ±.75V.

6. Connect VOM to -15 V DC test point E15. Should read -15 V ±.75V.

7. Adjust variac through the 115 V AC ± 10% range and observe +30 V, +15 V and -15 V.

B. H. V. Regulator

1. Remove F2 located inside against the rear panel.

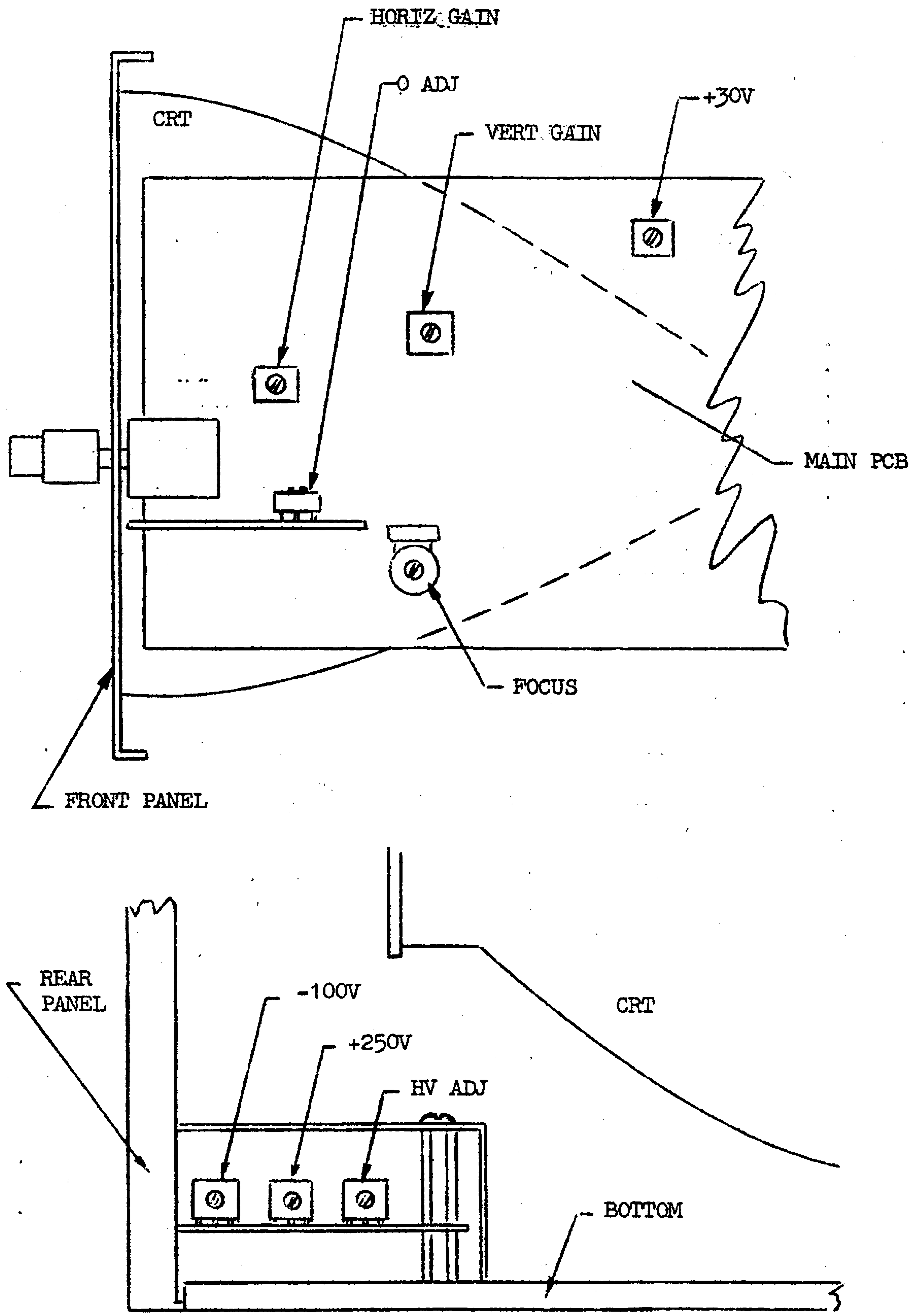


FIGURE 5-1: INTERNAL CONTROLS

2. Set scope vertical to 20V full scale. Set scope horiz to internal sweep and to 20 μs/cm.

3. Connect scope vertical to pin 3 of IC7.

4. Turn DU-127 on and observe response on scope. It should appear as in Figure 5-2.

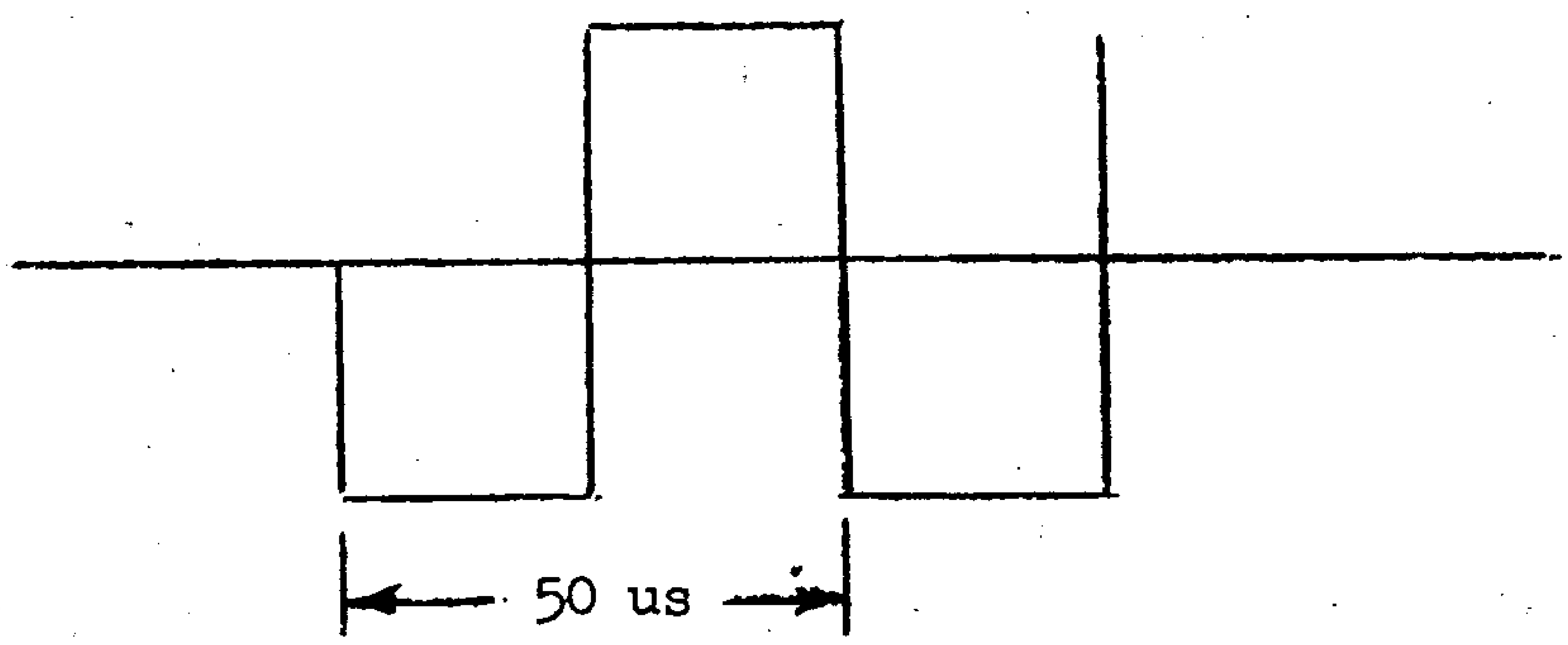


FIGURE 5-2: WAVESHAPE OF H-V OSCILLATOR

5. If 50 μ seconds is not obtained as in Figure 5-2, change value of starred resistor R52 until approximately 50 u seconds is obtained. Reducing value will reduce time interval thus increasing the frequency.

6. Turn DU-127 off. Connect High Voltage probe to High Voltage lead at R80 (270 Kohm Resistor). Replace F2 (fuse).

7. Insert a signal (sine or triangular wave) to either the HORIZ or VERT connector of the DU-127. This is to prevent phosphor burn of the CRT when there is a dot on the screen.

8. Turn the INTENSITY control fully CW.

9. Adjust H.V. control (R59) until H.V. reads approximately 6.5 kV.

10. Adjust the +250 volt control (R73) fully CW and then back off the adjustment until the trace on the CRT becomes sharp (minimum line width).

11. Turn the INTENSITY control (FP) fully CCW (without turning off DU-127) and adjust the -100V control (R71) until the trace barely disappears.

12. Due to interaction between R71 and R73 steps 10 and 11 may have to be repeated.

13. At maximum intensity the FOCUS control (R444) located on the main PCB should be adjusted for the sharpest line (minimum line width).

14. Adjust the INTENSITY control throughout the entire range. Any size change in the display indicates poor regulation. This can be caused by the 250V supply being set too high or a defective component in the feedback loop.

NOTE: Reducing the +250V supply requires a readjustment of the -100 volt control.

C. Vertical Preamp

1. Apply a signal to the horizontal input and terminate the vertical input with a short

2. Switch vertical gain to 1 mV/cm and vernier CCW.

3. Center the trace with the VERT POS control.

4. Turn gain vernier maximum CW. If the trace shifts position, adjust R708, located on the vertical preamp board, until complete rotation of the gain vernier will not change the trace position.

5. Resetting the VERT POS control is necessary to center the trace.

D. Horizontal Preamp

1. With the signal applied to the vertical connector, the same procedure used for the vertical preamp can be performed with the horizontal amplifier, correcting horizontal shift.

2. The balance control is R600 located on the HORIZ preamp board.

E. Vertical and Horizontal Amplifiers

1. Connect Model 126 to the DU-127 as follows:

    A. Range output of Model 126 to HORIZ IN of the DU-127.

    B. Connect the output of the Model 126 to the VERT IN of DU-127.

2. Set controls of Model 126 as follows:

    A. Range Hz to 10 K.

    B. Multiplier to 1.0.

    C. Main mode to sweep.

    D. Function to sine wave.

    E. Range mode to Run.

    F. Ramp amplitude to .9 X.

G. Ramp Time to 10 m sec. and variable to Cal.

H. Ramp Polarity to neg.

I. DC offset to off.

J. Attenuator to 20 dB and amplitude to max.

3. Turn DU-127 on and set HORIZ GAIN F.P. for a 10 cm trace.

4. Set VERT GAIN F.P. for a 10 div trace at low end of swept signal input.

5. Displayed signal is swept from 1 kHz to 10 kHz. Display must be flat over this range.

6. Set range switch Model 126 to 100 K. Displayed signal is now swept from 1 kHz to 100 kHz. (Swept signal is 10 kHz per div).

7. See Figure 5-3 for typical response over this range.

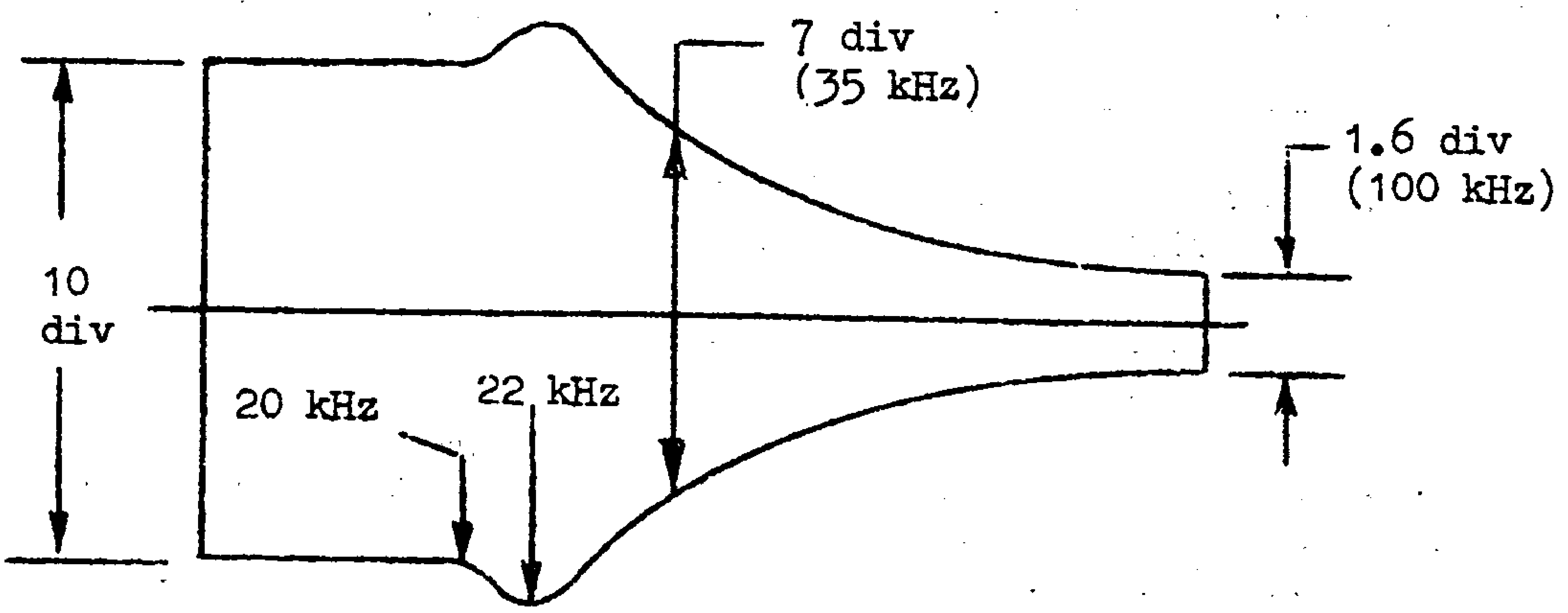


FIGURE 5-3: TYPICAL VERTICAL AMPLIFIER FREQUENCY RESPONSE

8. If a response similar to Figure 5-3 cannot be obtained, a problem exists in the vertical amplifier.

A. A similar test can be made for the HORIZ amp by reversing the connections to the VERT and HORIZ input.

F. Vertical and Horizontal Linearity Adjustment

NOTE: This adjustment is not normally required in the field.

1. Connect Model 126 to the DU-127 as follows:

A. Ramp output of Model 126 to Horizontal input of the DU-127.

B. Connect the output of the Model 126 to the vertical input of DU-127.

2. Set controls of Model 126 as follows:

A. Range Hz to 100.

B. Mult. to .15.

C. Main mode to Pulse.

D. Function to square.

E. Ramp mode to Run.

F. Ramp amplitude to .9 X.

G. Ramp time to 100 m sec and variable to calibrated.

H. Ramp polarity to neg.

I. Attenuator to 20 dB and amplitude to max.

J. DC offset to Off.

3. Turn DU-127 on and adjust HORIZ and VERT controls for a 10 X 14 division rectangular display.

4. Adjust ring magnets on back of yoke for best displayed rectangular pattern.

5. Add magnets to yoke to optimize display for rectangular pattern. Maximum variation from straight line on any side should not exceed .1 division. Hold magnets on with RTV adhesive.

H. Vertical and Horizontal Gain Calibration

1. Obtain a sine wave voltage source whose output is calibrated for 1 mV, 10 mV, 100 mV and 1 V P-P and frequency approximately 1 kHz or less.

2. Connect a 60 Hz signal to the HORIZ IN of DU-127.

3. Set calibrated voltage for 1 V and connect to the VERT IN of the DU-127.

4. Set VERT GAIN of DU-127 to 100 mV per div and vernier to full CW position.

5. Adjust interval vertical gain pot R419 for a 10 div deflection.

6. Set VERT GAIN vernier of DU-127 to fully CCW position. Vertical display should decrease to 1 div or less.

7. Set VERT GAIN of DU-127 to 1 V per div and vernier to full CW position.

8. Vertical display should be 1 div.

9. Set VERT GAIN of DU-127 to 10 mV per div and vernier to full CW position.

10. Set output of calibrator to 100 mV.

11. Vertical display should be 10 div ± .1 div.

12. Set VERT GAIN of DU-127 to 1 mV per div and vernier full CW position.

13. Set output of calibrator to 10 mV.

14. Vertical display should be 10 div ± .1 div.

15. Similar procedure may be used for the horizontal amplifier (adjust internal horizontal gain with R472).

I. Pulse Adder

1. Connect the Model 126 as follows:

   A. Ramp output to horizontal of DU-127.

   B. Output to vertical input of DU-127.

2. Set controls of Model 126 as follows:

   A. Range Hz to 10 K.

   B. Mult. to .5.

   C. Main mode to Pulse.

   D. Function to square.

   E. Ramp mode to run.

   F. Ramp amplitude to .9 X.

   G. Ramp time to 100 m sec and vernier to calibrate.

   H. Ramp polarity to neg.

   I. DC offset to off.

   J. Attenuator to 20 dB.

3. Turn DU-127 on and adjust HORIZ GAIN and POS controls for a 14 div trace.

4. Set VERT GAIN of DU-127 for 1V per division.

5. Adjust amplitude of output from Model 126 for a 2V indication on DU-127.

6. Disconnect the output from the Model 126 from VERT IN of DU-127 and reconnect to the pulse input connector (RP).

7. Set PULSE SIZE R.P. to full CW position.

8. Displayed pulse on DU-127 should be a minimum of one div in height.

9. Set function switch Model 126 to opposite square polarity and note pulse is equal and opposite in polarity.

10. Set PULSE SIZE R.P. to full CCW position.

11. Displayed pulse on DU-127 should decrease to near zero.

J. Intensity Modulation

1. Repeat pulse adder (I) steps 1 through 3.

2. Adjust amplitude of output from Model 126 for a 1.0V pulse.

3. Disconnect output from Model 126 vertical and reconnect to intensity mod output (RP).

4. Note intensity modulation occuring at pulse interval.

5. Set function switch Model 126 to opposite square wave polarity and note that intensity modulation occurs as in Step 4.

K. Video Input

1. Connect the Model 126 Ramp output to Horizontal Input DU-127.

2. Connect the Model P6-11A as follows:
   A. Output to input of 1A1 plug-in, TEXTRONICS 547 oscilloscope.
   B. Using "T" connector terminate input at model 547 with 50Ω load (detector).

3. Set controls of P6-11A as follows:
   A. Frequency maximum to 1 MHz/vernier fully C.W.
   B. Delay maximum to .1 µsec/vernier fully C.W./switch to normal.
   C. Width maximum to .1 µsec/vernier fully C.W.
   D. Output to (+) polarity/amplitude to +1 Volt.

4. Monitor 547 oscilloscope and note the display of +1 volt pulse with a pulse width of 100 NS and a rise time of less than 10 NS.

5. Remove input from model 547 oscilloscope and connect to VIDEO INPUT DU-127.

6. Monitor Pin #6 output IC 406 and note output pulse with rise time of less than 100 NS.

7. Note an input pulse amplitude change from 0-+1V varies scope intensity linearly from off to full on.

J. Beam Blanking

1. Supply a horizontal sweep signal to the DU-127.

2. Use the HORIZ GAIN control on the front panel to reduce the width of the sweep on the display (decrease INTENSITY if necessary, to avoid damage to screen phosphor).

3. When the width of the trace reaches 1.5 to 1.0 cm, the trace should disappear. If it does not, leave the width at 1.5 cm and adjust R100 until the trace blanks out. Check by adjusting HORIZ GAIN to vary the display width, and seeing when the trace blanks out.

CIRCUIT REF NO.	TEXSCAN STOCK NO.	CAPACITORS DESCRIPTION
C1	012-214	1500 uf/5C V
C2	012-231	400 uf/90 V
C3	012-444	3300 uf/25 V
C4	012-016	100 uf/25 V
C5	012-007	20 pf
C6	012-100	10 uf/50 V
C7	012-289	4600 uf/15 V
C8	012-289	4600 uf/15 V
C9	012-016	100 uf/25 V
C10	012-016	100 uf/25 V
C23	012-404	1000 uf/25 V
C24	012-053	.1 uf/600 V
C25	012-053	.1 uf/600 V
C26	012-016	100 uf/25 V
C27	012-069	.0015 uf MICA
C28	012-050	.01 uf/100 V
C29	012-066	.01 uf/100 V
C30	012-016	100 uf/50 V
C31	012-369	.1 uf
C32	012-276	10 uf/25 V
C33	012-310	.005 uf
C34	012-310	.005 uf
C35	012-310	.005 uf
C36	012-410	500 pf, 10 kV
C37	012-310	.005 uf
C38	012-404	1000 uf/25 V
C411	012-050	.01 uf
C412	012-100	10 uf/50 V
C413	012-050	.01 uf
C414	012-092	5 pf
C415	012-269	.1 uf
C416	012-143	220 pf
C417	012-012	50 pf
C418	012-269	.1 uf
C419	012-103	15 pf
C420	012-010	3 pf
C421	012-085	.005 uf
C422	012-085	.005 uf
C451	012-050	.01 uf
C452	012-100	10 uf/50 V
C453	012-050	.01 uf
C454	012-092	5 pf
C460	012-269	.1 uf
C461	012-269	.1 uf
C462	012-999	F.S.V.
C601	012-084	33 pf
C602	012-009	1000 pf
C603	012-010	3 pf
C604	012-095	330 pf

CIRCUIT REF. NO.	TEXSCAN STOCK NO.	CAPACITORS DESCRIPTION
C605	012-273	2.2 uf/35 V
C606	012-273	2.2 uf/35 V
C607	012-009	1000 pf
C608	012-144	.0022 uf
C701	012-084	33 pf
C702	012-009	1000 pf
C703	012-010	3 pf
C704	012-095	330 pf
C705	012-273	2.2 uf/35 V
C706	012-273	2.2 uf/35 V
C707	012-009	1000 pf
C708	012-144	.0022 uf
		DIODES
CR1	025-077	W06
CR2	025-077	W06
CR3	025-088	MR751
CR4	025-088	MR751
CR5	025-088	MR751
CR6	025-088	MR751
CR7	025-003	IN703
CR9	025-086	IN4446
CR10	025-086	IN4446
CR12	025-044	E8
CR13	025-044	E8
CR14	025-044	E8
CR15	025-044	E8
CR16	025-044	E8
CR18	025-044	E8
CR404	025-086	IN4446
CR405	025-086	IN4446
CR406	025-086	IN4446
CR407	025-086	IN4446
CR408	025-084	IN914
CR409	025-070	IN100
CR410	025-070	IN100
CR411	025-084	IN914
CR413	025-084	IN914
CR414	025-084	IN914
CR415	025-086	IN4446
CR416	025-086	IN4446
CR417	025-086	IN4446
CR418	025-086	IN4446
CR601	025-034	IN457
CR602	025-034	IN457
CR701	025-034	IN457
CR702	025-034	IN457
		FUSES
F1	034-003	2 Amp
F2	034-008	1 Amp

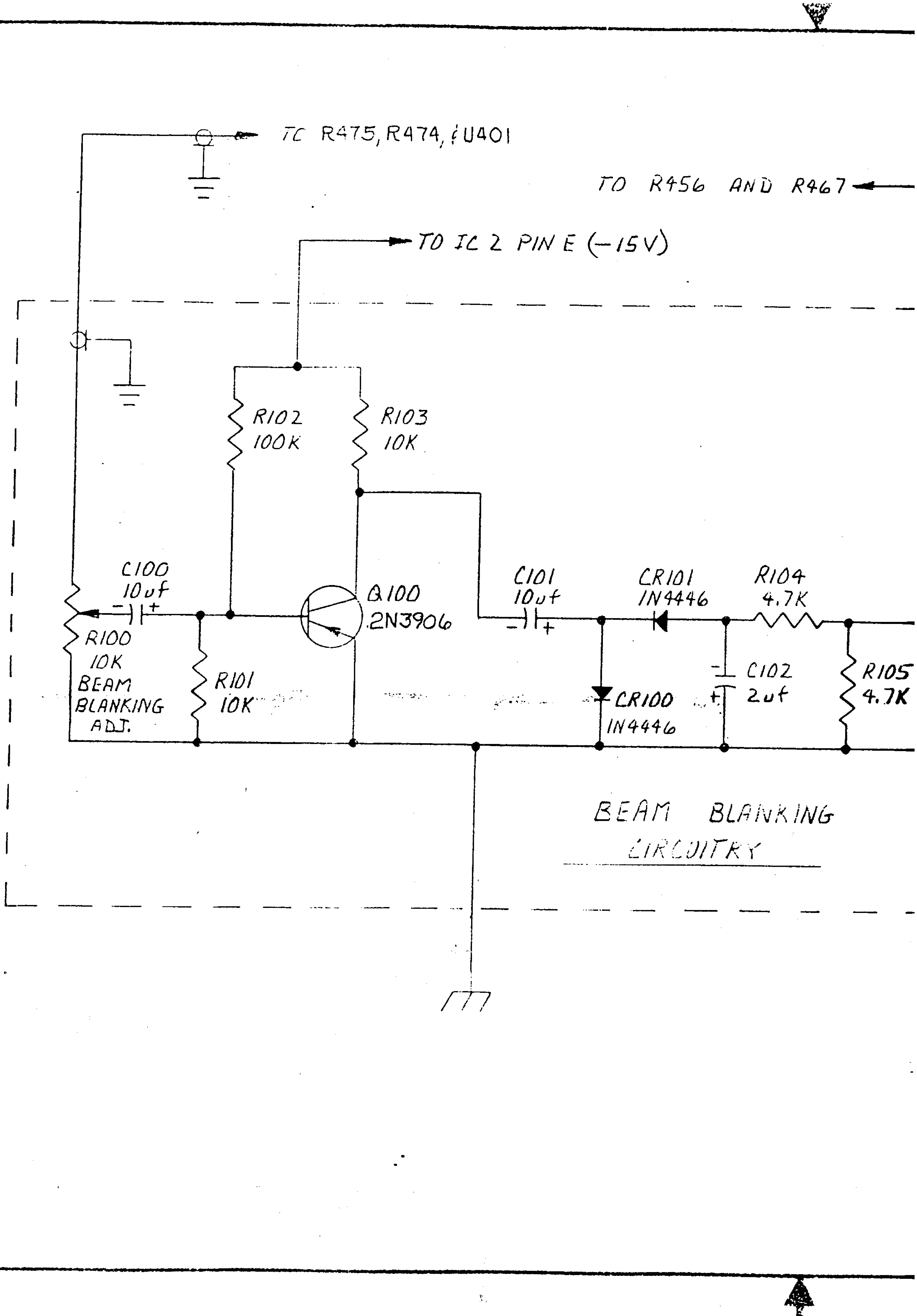
CIRCUIT REF. NO.	TEXSCAN STOCK NO.	INTEGRATED CIRCUIT DESCRIPTION
IC1	076-002	741C
IC2	076-087	7915
IC3	076-021	7815
IC7	076-042	MC1455
IC8	076-002	741C
IC401	076-012	741K
IC402	076-020	4531T
IC403	076-012	741K
IC404	076-020	4531T
IC405	076-002	741C
IC406	076-104	CA3100T
IC601	076-099	LF356H
IC602	076-012	741K
IC701	076-099	LF356H
IC702	076-012	741K
		CONNECTORS
J401	020-271	BNC, Insulated
J402	020-271	BNC, Insulated
J403	020-011	BNC
J404	020-017	BNC
J405	020-017	BNC
		INDUCTORS
L1	035-041	100 uh
L2	035-061	100 uh
L401/L402	A204-894-02	Yoke
		PILOT LAMP
LED1	025-140-00	5082/4403
		POWER CORD
P1	019-004	Power Cord
		TRANSISTORS
Q1	062-076	MJE1100
Q2	062-005	2N3053
Q3	062-010	2N3638
Q21	062-008	2N3440
Q22	062-080	2N3583
Q23	062-002	2N3565
Q24	062-002	2N3565
Q404	062-152	2N6577
Q405	062-134	2N6053
Q406	062-024	2N3644
Q407	062-003	2N3567
Q408	062-024	2N3644

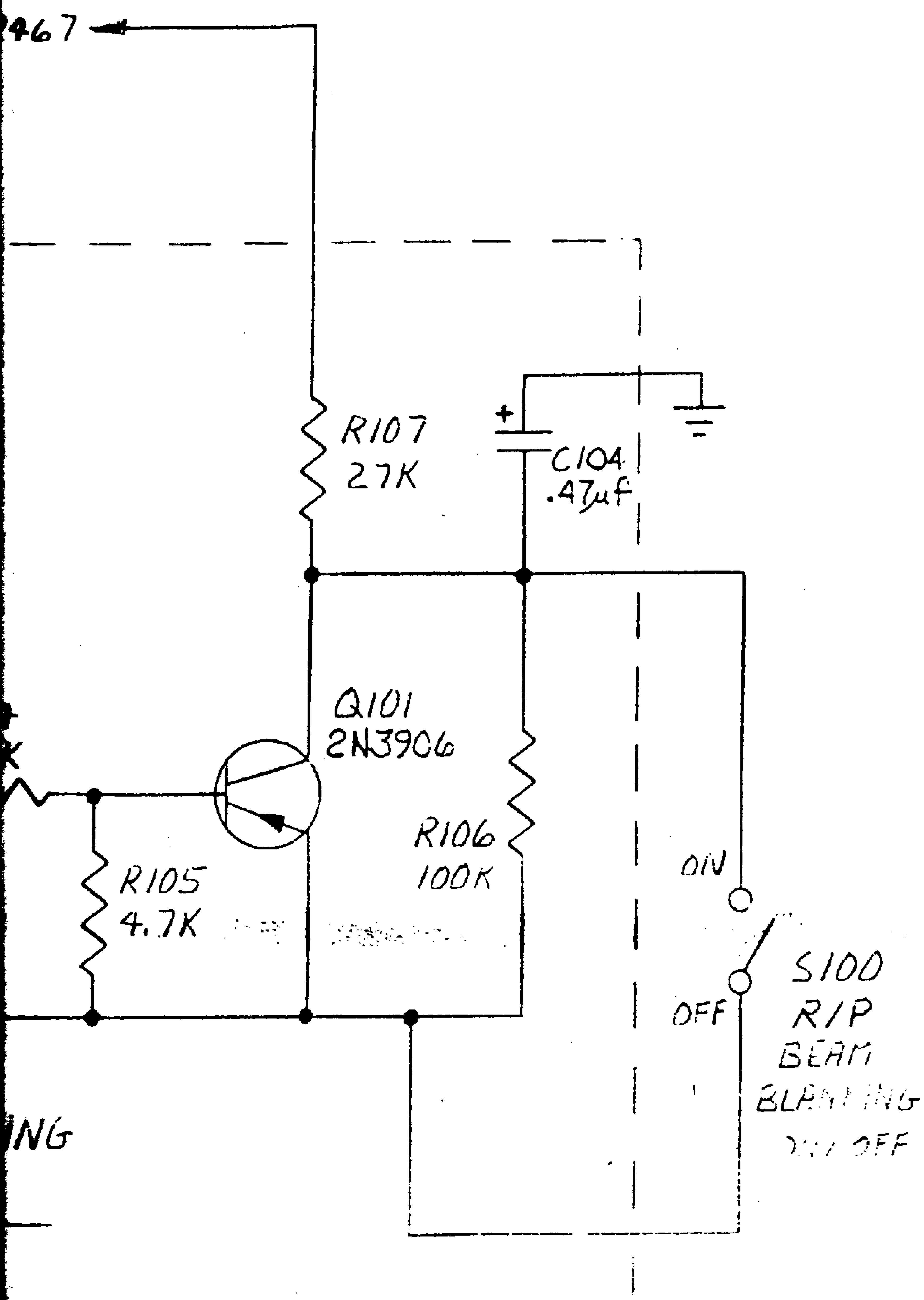
CIRCUIT REF. NO.	TEXSCAN STOCK NO.	TRANSISTOR DESCRIPTION
Q409	062-003	2N3567
Q410	062-152	2N6577
Q411	062-134	2N6053
		RESISTORS
R1	047-523	1.0 ohm, 2 W, 10%
R2	047-524	.39 ohm, 2 W, 1%
R3	045-710	1 Kohm, $\frac{1}{4}$ W, 10%
R4	045-723	2.2 Kohm, $\frac{1}{4}$ W, 10%
R5	046-110	1 Kohm, $\frac{1}{2}$ W, 10%
R6	045-710	1 Kohm, $\frac{1}{2}$ W, 10%
R7	046-142	5.6 Kohm, $\frac{1}{4}$ W, 10%
R8	047-495	3.57 Kohm, $\frac{1}{2}$ W, 1%
R9	048-243	1 Kohm, Variable
R10	047-462	1 Kohm, $\frac{1}{2}$ W, 1%
R11	046-672	120 ohm, 2 W, 10%
R12	047-523	1 ohm, 2 W, 1%
R36	046-105	750 ohm, $\frac{1}{2}$ W, 5%
R50	046-072	120 ohm, $\frac{1}{2}$ W, 10%
R51	047-462	1 Kohm, $\frac{1}{4}$ W, 10%
R52	047-675	24.3 Kohm, $\frac{1}{4}$ W, 1%
R53	045-710	1 Kohm, $\frac{1}{4}$ W, 10%
R54	045-794	10 ohm, 1 W, 10%
R55	047-462	1 Kohm, $\frac{1}{4}$ W, 1%
R56	045-682	220 ohm, $\frac{1}{4}$ W, 10%
R57	046-479	1 ohm, 2 W, 10%
R58	047-567	390 Mohm, 2 W, 1%
R59	048-246	1 Mohm, Variable
R70	045-808	220 Kohm, $\frac{1}{4}$ W, 10%
R71	048-246	Variable, 1 MEG
R72	045-836	1 Mohm, $\frac{1}{4}$ W, 10%
R73	048-246	Variable, 1 Mohm
R74	045-864	4.7 Mohm, $\frac{1}{4}$ W, 10%
R75	045-794	100 Kohm, $\frac{1}{4}$ W, 10%
R76	045-710	1 Kohm, $\frac{1}{4}$ W, 10%
R78	045-710	1 Kohm, $\frac{1}{4}$ W, 10%
R79	045-710	1 Kohm, $\frac{1}{4}$ W, 10%
R80	045-812	270 Kohm, $\frac{1}{4}$ W, 10%
R402	048-062	Variable, 100 Kohm
R419	048-243	Variable, 1 Kohm
R423	047-503	499 ohm, 1%
R424	045-794	100 Kohm, $\frac{1}{4}$ W, 10%
R425	047-419	7.425 Kohm, $\frac{1}{4}$ W, 1%
R426	047-516	2.74 Kohm, 1%
R427	047-452	15 Kohm, 1%
R428	045-738	4.7 Kohm, $\frac{1}{4}$ W, 10%
R429	046-054	47 ohm, $\frac{1}{2}$ W, 10%
R430	046-145	6.8 Kohm, $\frac{1}{2}$ W, 10%
R431	046-145	6.8 Kohm, $\frac{1}{2}$ W, 10%
R433	047-462	1 Kohm, $\frac{1}{2}$ W, 1%
R436	045-744	100 Kohm, $\frac{1}{4}$ W, 10%

CIRCUIT REF. NO.	TEXSCAN STOCK NO.	RESISTORS DESCRIPTION
R438	045-738	4.7 Kohm, $\frac{1}{4}$ W, 10%
R439	045-738	4.7 Kohm, $\frac{1}{4}$ W, 10%
R440	045-738	4.7 Kohm, $\frac{1}{4}$ W, 10%
R444	048-032	Variable, 1 MEG
R445	046-180	47 Kohm, $\frac{1}{2}$ W, 10%
R446	046-180	47 Kohm, $\frac{1}{2}$ W, 10%
R447	046-180	47 Kohm, $\frac{1}{2}$ W, 10%
R448	046-194	100 Kohm, $\frac{1}{2}$ W, 10%
R450	045-794	100 Kohm, $\frac{1}{4}$ W, 10%
R451	045-794	100 Kohm, $\frac{1}{4}$ W, 10%
R452	045-780	47 Kohm, $\frac{1}{4}$ W, 10%
R456/S1	048-216	Variable, 100 Kohm/Switch
R458	046-640	22 ohm, 2 W, 10%
R459	047-582	0.18 ohm, 2 W, 10%
R460	045-798	120 Kohm, $\frac{1}{4}$ W, 10%
R461	046-999	FSV
R464	048-057	Variable 100 Kohm
R465	045-626	10 ohm, $\frac{1}{4}$ W, 10%
R471	045-794	100 Kohm, $\frac{1}{4}$ W, 10%
R472	048-243	1 Kohm, Variable
R473	047-503	499 ohm, $\frac{1}{2}$ W, 1%
R474	047-419	7.925 Kohm, $\frac{1}{4}$ W, 1%
R475	047-516	2.74 Kohm, $\frac{1}{4}$ W, 1%
R476	048-452	15 Kohm, $\frac{1}{4}$ W, 1%
R477	048-057	Variable, 100 Kohm
R478	-45-738	4.7 Kohm, $\frac{1}{2}$ W, 1%
R479	045-626	10 ohm, $\frac{1}{4}$ W, 10%
R480	047-462	1 Kohm, $\frac{1}{2}$ W, 1%
R481	046-056	47 ohm, $\frac{1}{2}$ W
R482	047-718	15 ohm, 2 W, 1%
R483	046-145	6.8 Kohm, $\frac{1}{2}$ W, 10%
R484	046-145	6.8 Kohm, $\frac{1}{2}$ W, 10%
R485	046-640	22 ohm, 2 W, 10%
R490	045-738	4.7 K, $\frac{1}{4}$ W, 10%
R601	047-070	909 Kohm, $\frac{1}{2}$ W, 1%
R602	047-069	90.9 Kohm, $\frac{1}{2}$ W, 1%
R603	047-464	9.09 Kohm, $\frac{1}{4}$ W, 1%
R604	047-462	1 Kohm, $\frac{1}{4}$ W, 1%
R605	047-443	22.1 Kohm, $\frac{1}{4}$ W, 1%
R606	047.449	2 Kohm, $\frac{1}{4}$ W, 1%
R607	047-502	49.9 Kohm, $\frac{1}{4}$ W, 1%
R608	048-254	Variable, 100 Kohm
R609	048-220	10 Kohm/4P4POS
R610	047-658	5 K, 1%
R701	047-070	909 Kohm, $\frac{1}{2}$ W, 1%
R702	047-069	90.9 Kohm, $\frac{1}{2}$ W, 1%
R703	047-464	9.09 Kohm, $\frac{1}{4}$ W, 1%
R704	047-462	1 Kohm, $\frac{1}{4}$ W, 1%
R705	047-443	22.1 Kohm, $\frac{1}{4}$ W, 1%
R706	047-449	2 Kohm, $\frac{1}{4}$ W, 1%
R707	047-502	49.9 Kohm, $\frac{1}{4}$ W, 1%
R708	048-254	Variable, 100 Kohm
R709/S702	048-220	10 Kohm/4P4POS
R710	047-658	5 K, 1%

CIRCUIT REF. NO.	TEXSCAN STOCK NO.	SWITCH DESCRIPTION
S1/R456	048-216	Variable, 100 Kohm/Switch
S2	057-147	DPDT
S3	057-217	DPDT
S401	057-179	SPST
S402	057-179	DPDT
S403	057-179	DPDT
S404	057-179	DPDT
S602/R609	048-220	10 Kohm/4P4POS
S702/R709	048-220	10 Kohm/4P4POS
		TRANSFORMERS
T1	B061-063	Power
T3	204-721	Flyback

		BEAM BLANKING CIRCUIT
C100	012-276-00	10 uF capacitor
C101	012-276-00	10 uF capacitor
C102	012-273	2.2 uF/25V capacitor
C104	012-287	.47 uF capacitor
CR100	025-086	1N4446 diode
CR101	025-086	1N4446 diode
R100	048-157	10 k variable resistor
R101	045-751	10 k resistor
R102	045-793	100 k resistor
R103	045-751	10 k resistor
R104	045-737	4700 resistor
R105	045-737	4700 resistor
R106	045-793	100 k resistor
R107	045-769	27 k resistor
Q100	062-084	2N3906 transistor
Q101	062-084	2N3906 transistor


TO R475, R474, & U401
TO R456 AND R467
TO IC 2 PIN E (−15V)
R102
100K
R103
10K
C100
10uf
R100
10K
BEAM
BLANKING
ADJ.
R101
10K
Q100
2N3906
C101
10uf
CR101
1N4446
R104
4.7K
C102
2uf
R105
4.7K
CR100
1N4446
BEAM BLANKING
CIRCUITRY



HOLE SCHEDULE		
HOLE	DESCRIPTION	QTY.

REV.	ECN.	DESCRIPTION	DATE
P	8877		5/7/85
O	8441	SEE SHEET 1	9/11/84
N	8546	SEE SHEET 1	9-13-91
M	8060	SEE SHEET 1	6-7-84
	7394		

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

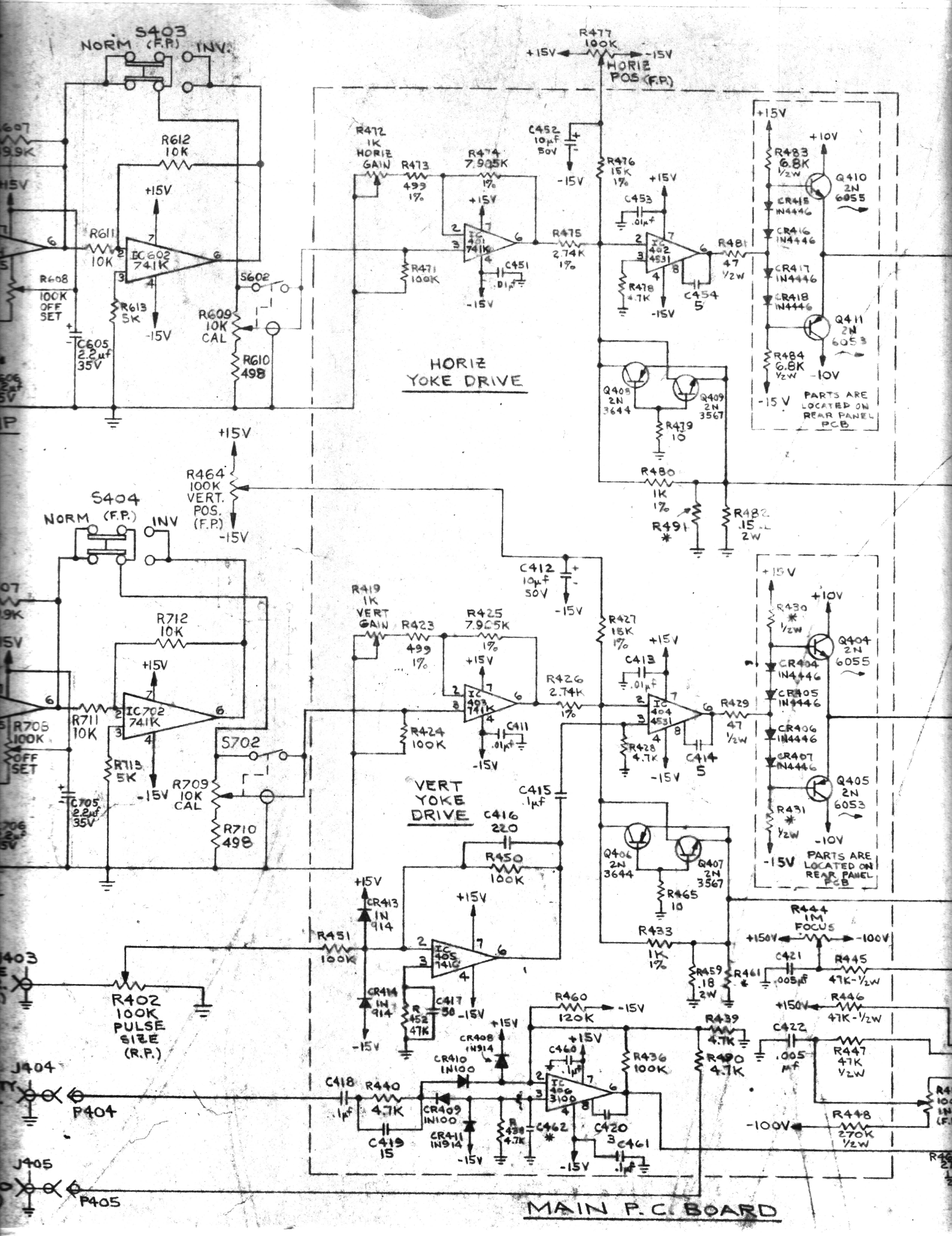
SCALE	DRAWN BY	APP'D BY
	DATE 8-3-82	DATE

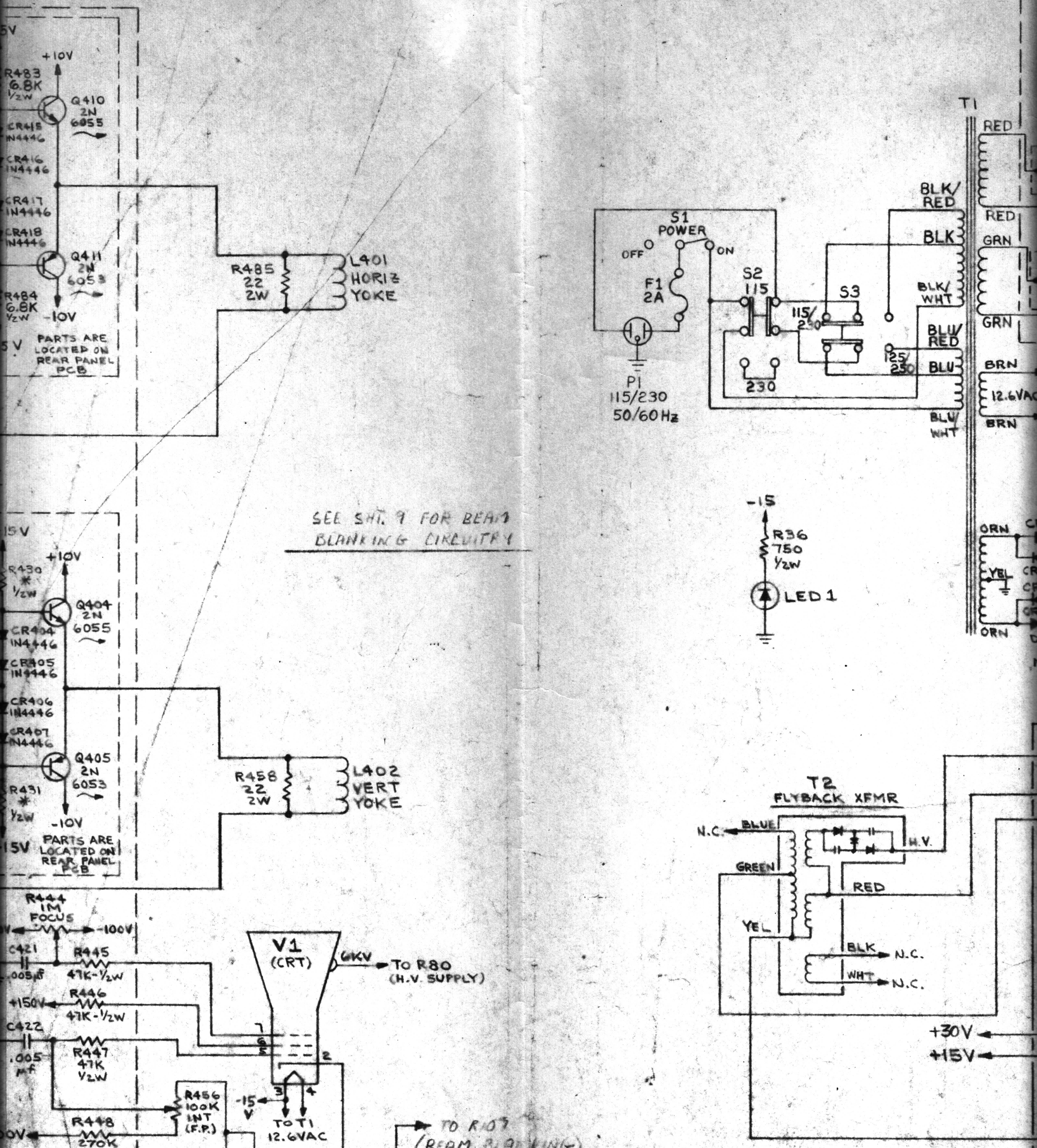
BEAM BLANKING
DU-177 SCHEMATIC

SHEET 9 OF 9 — B200-899-00

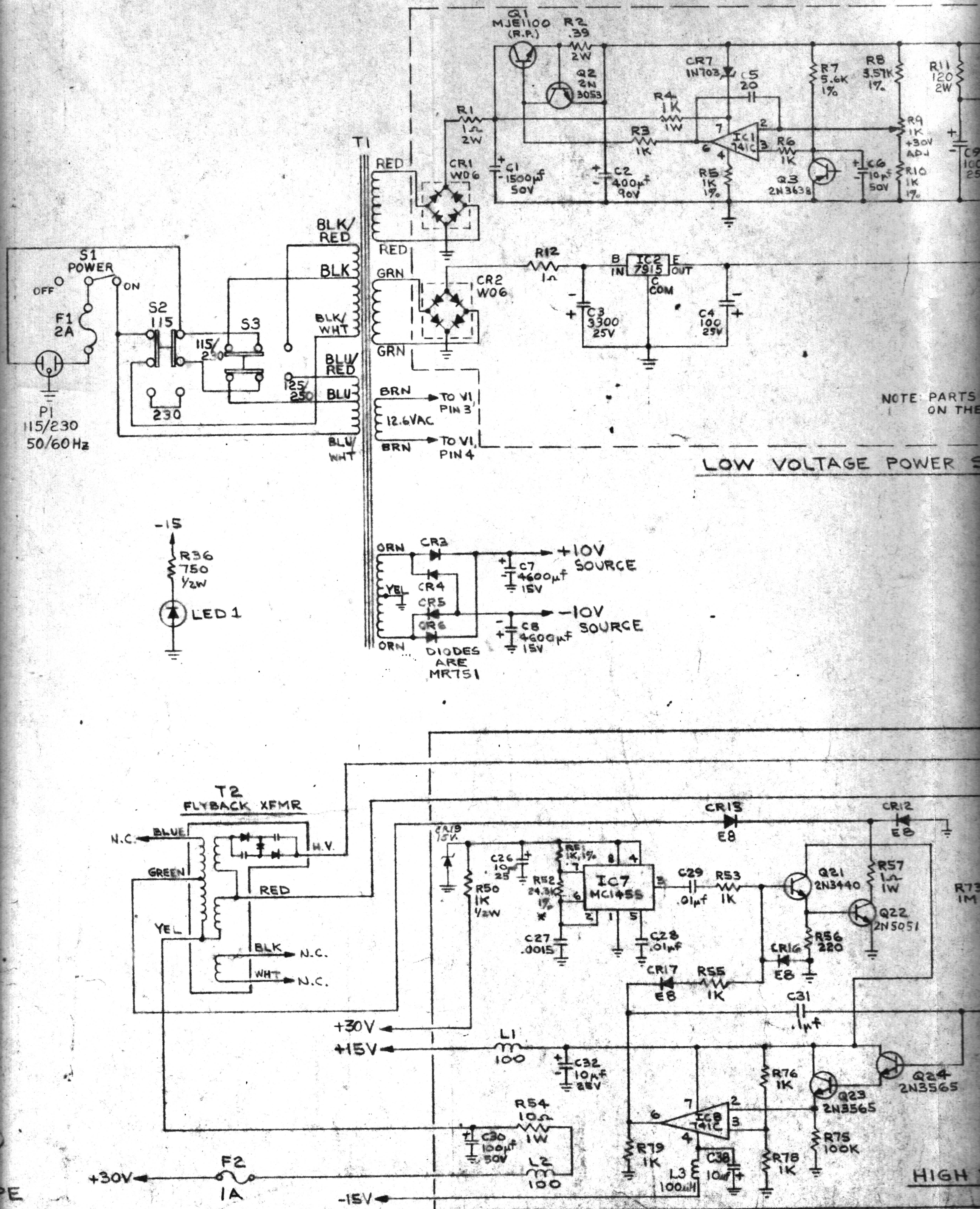
UNLESS OTHERWISE SPECIFIED: DECIMAL DIMENSIONS TO BE ± .015; FRACTIONAL DIMENSIONS TO BE ± 1/64; METRIC DIMENSIONS TO BE ± .40MM; DRILL, PUNCH AND COMMERCIAL STOCK ...

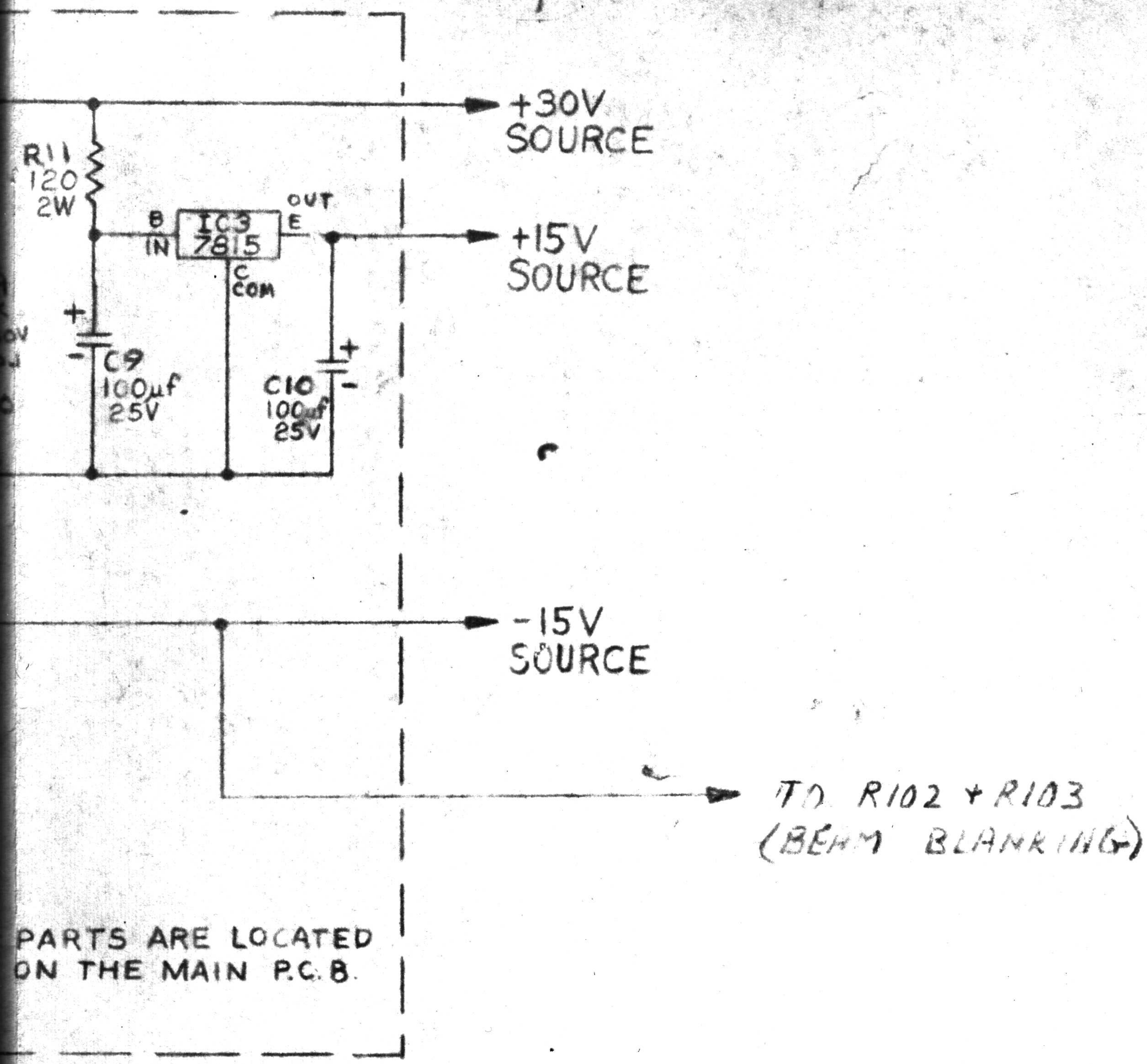
HORIZ PREAMP
VERT PREAMP
J401 HORIZ IN (F.P.)
S401 (F.P.) AC DC
C24 .1μf
S601 HORIZ GAIN (F.P.)
C602 1000
R605 22.1K
CR601 1N457
CR602 1N457
C603 3
R601 909K
R602 90.9K
C601 33
R603 9.09K
C604 330
R604 1K
C607 1000
C608 2200
R606 2K
TO R100 (BEAM BLANKING)
R607 49.9K
+15V
IC601 LF356H
C23 1000μf 25V
-15V
ALL RESISTORS ARE ±1%
C606 2.2μf 35V
R608 100K OFF SET
C605 2.2μf 35V
S403 (F.P.) NORM
R612 10K
R611 10K
IC602 741K
R613 5K
J402 VERT IN (F.P.)
S402 (F.P.) AC DC
C25 .1μf
S701 VERT GAIN (F.P.)
C702 1000
R705 22.1K
CR701 1N457
CR702 1N457
C703 3
R701 909K
R702 90.9K
C701 33
R703 9.09K
C704 330
R704 1K
C707 1000
C708 2200
R706 2K
R707 49.9K
IC701 LF356H
R708 100K OFF SET
C38 1000μf 25V
C706 2.2μf 35V
C705 2.2μf 35V
S404 (F.P.) NORM INV
R464 100K VERT. POS. (F.P.)
R712 10K
R711 10K
IC702 741K
R713 5K
R709 10K CAL
J403 PULSE MKR. (R.P.)
R402 100K PULSE SIZE (R.P.)
J404 INTENSITY MKR. (R.P.)
P404
J405 VIDEO (R.P.)
P405


S403
NORM (F.P.) INV.
R477
100K
+15V
-15V
HORIZ
POS (F.P.)
R612
10K
+15V
R611
10K
IC602
741K
R608
100K
OFF
SET
R613
5K
-15V
C605
2.2μf
35V
S602
R609
10K
CAL
R610
498
R472
1K
HORIZ
GAIN
R473
499
1%
R474
7.905K
1%
R471
100K
IC
401
741K
C451
.01μf
R475
2.74K
1%
C452
10μf
50V
R476
15K
1%
C453
.01μf
IC
402
4531
R478
4.7K
C454
5
R481
47
½W
HORIZ
YOKE DRIVE
Q408
2N
3644
Q409
2N
3567
R479
10
R480
1K
1%
R491
*
R482
.15Ω
2W
+15V
+10V
R483
6.8K
½W
Q410
2N
6055
CR415
1N4446
CR416
1N4446
CR417
1N4446
CR418
1N4446
Q411
2N
6053
R484
6.8K
½W
-10V
-15V
PARTS ARE
LOCATED ON
REAR PANEL
PCB
R464
100K
VERT.
POS.
(F.P.)
S404
NORM (F.P.) INV
R712
10K
R711
10K
IC702
741K
R706
100K
OFF
SET
R713
5K
C705
2.2μf
35V
S702
R709
10K
CAL
R710
498
R419
1K
VERT
GAIN
R423
499
1%
R425
7.905K
1%
IC
403
741K
R424
100K
C411
.01μf
C412
10μf
50V
R427
15K
1%
C413
.01μf
R426
2.74K
1%
IC
404
4531
R428
4.7K
C414
5
R429
47
½W
C415
.1μf
VERT
YOKE
DRIVE
C416
220
R450
100K
Q406
2N
3644
Q407
2N
3567
R465
10
R430
*
½W
Q404
2N
6055
CR404
1N4446
CR405
1N4446
CR406
1N4446
CR407
1N4446
Q405
2N
6053
R431
*
½W
PARTS ARE
LOCATED ON
REAR PANEL
PCB
CR413
1N
914
R451
100K
IC
405
741C
CR414
1N
914
R
452
47K
C417
50
R444
1M
FOCUS
+150V
-100V
R433
1K
1%
R459
.18
2W
R461
*
C421
.005μf
R445
47K-½W
R446
47K-½W
J403
R402
100K
PULSE
SIZE
(R.P.)
R460
120K
C460
1μf
CR408
1N914
CR410
1N100
CR409
1N100
CR411
1N914
IC
406
3100
R436
100K
R439
4.7K
R490
4.7K
C422
.005
μf
R447
47K
½W
J404
P404
C418
.1μf
R440
4.7K
C419
15
R
438
4.7K
C462
*
C420
3
C461
.1μf
R448
270K
½W
J405
P405
MAIN P.C. BOARD



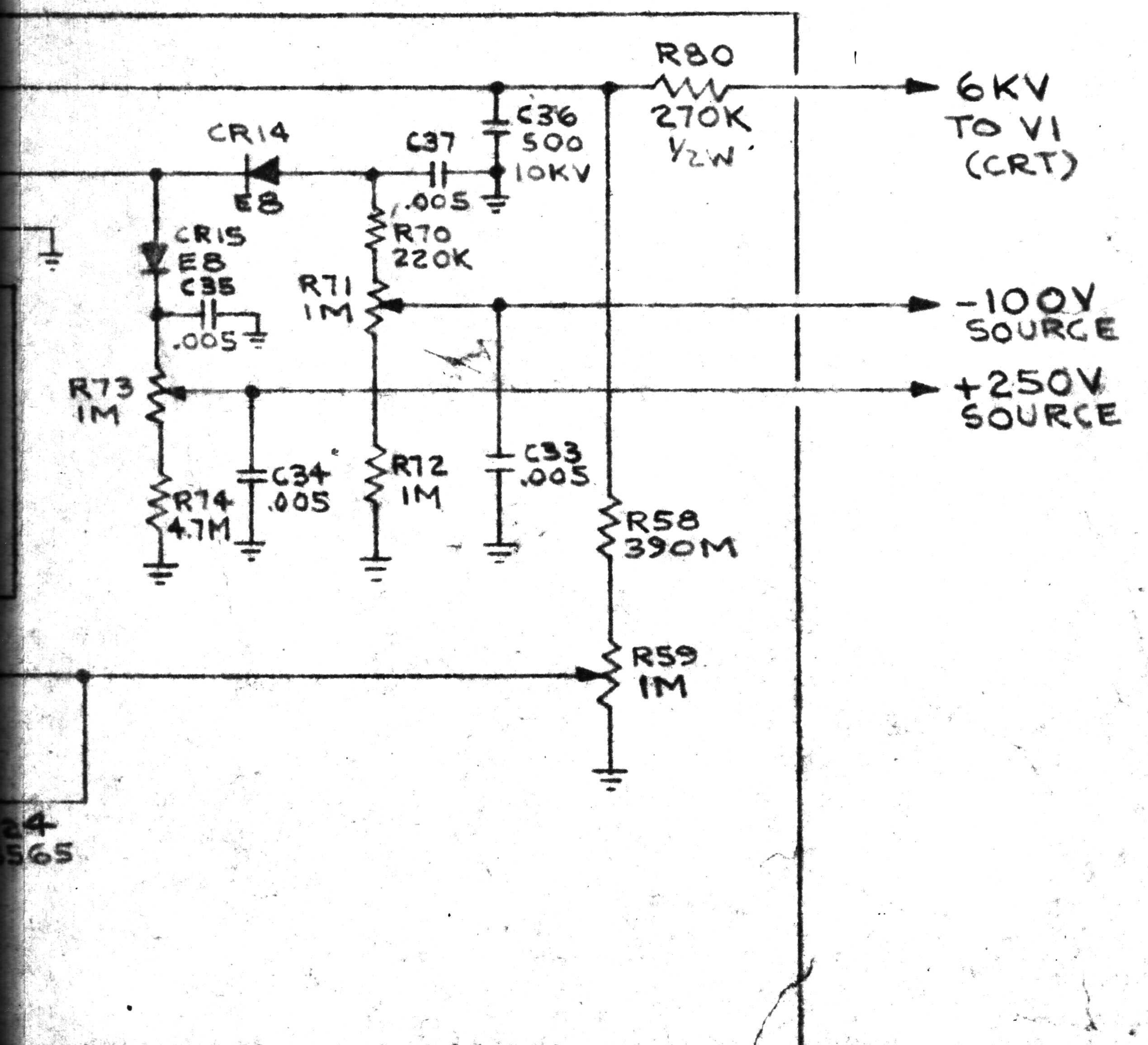
DU-127 OSCILLOSCOPE
200-899


Q1
MJE1100
(R.P.)
R2
.39
2W
Q2
2N
3053
CR7
1N703
C5
20
R7
5.6K
1%
R8
3.57K
1%
R11
120
2W
R1
1Ω
2W
R4
1K
1W
R3
1K
IC1
741C
R6
1K
R9
1K
+30V
ADJ
T1
RED
CR1
W06
C1
1500µf
50V
C2
400µf
90V
R5
1K
1%
Q3
2N3638
C6
10µf
50V
R10
1K
1%
BLK/
RED
BLK
S1
POWER
OFF
ON
F1
2A
S2
115
S3
115/
230
BLK/
WHT
GRN
R12
1Ω
CR2
W06
IC2
7915
IN
OUT
COM
C3
3300
25V
C4
100
25V
BLU/
RED
125/
250
BLU
230
P1
115/230
50/60 Hz
BRN
TO V1,
PIN 3
12.6VAC
TO V1,
PIN 4
BLU/
WHT
NOTE: PARTS
ON THE
LOW VOLTAGE POWER S
-15
R36
750
1/2W
LED 1
ORN
CR3
CR4
YEL
CR5
CR6
C7
4600µf
15V
+10V
SOURCE
C8
4600µf
15V
-10V
SOURCE
DIODES
ARE
MR751
T2
FLYBACK XFMR
N.C.
BLUE
GREEN
H.V.
RED
YEL
BLK
N.C.
WHT
N.C.
CR13
E8
CR12
E8
CR19
15V
C26
10
25
R51
1K, 1%
R52
24.3K
1%
IC7
MC1455
C29
.01µf
R53
1K
Q21
2N3440
R57
1Ω
1W
Q22
2N5051
R50
1K
1/2W
C27
.0015
C28
.01µf
R56
220
CR16
E8
CR17
E8
R55
1K
C31
.1µf
+30V
+15V
L1
100
C32
10µf
25V
R76
1K
Q23
2N3565
Q24
2N3565
R54
10Ω
1W
C30
100µf
50V
IC8
741C
R79
1K
R78
1K
R75
100K
L3
100µH
C38
10µf
L2
100
F2
1A
+30V
-15V
HIGH



ER SUPPLIES

ALL RESISTORS TO BE IN OHMS, 1/4 W, ±10%
ALL CAPACITORS TO BE IN PICOFARADS
ALL INDUCTORS TO BE IN MICROHENRIES UNLESS OTHERWISE SPECIFIED
* - VALUE IS ADJUSTED AT FACTORY



IGH VOLTAGE POWER SUPPLY

REV.	ECN.	DESCRIPTION	DATE
T	0479	SEE SHEET 1	1-21-80
S	0183	SEE SHEET 1	5-27-87
R	9978	SEE SHEET 1	2/18/87
Q	9756	SEE SHEET 1	10/27/86 DW
P	8?77		9/?/85
O	8444	SEE SHEET 1	9/11/84
N	8346	SEE SHEET 1	[illegible]
M	8099	SEE SHEET 1	6-?-84
L	7394	SEE SHEET 1	[illegible]
K	6472	SEE SHEET 1	[illegible]
J	6406	SEE SHEET 1	[illegible]

TEXSCAN CORPORATION
INDIANAPOLIS, INDIANA

SCALE	DRAWN BY PCN	APP'D. BY
	DATE 10/15/75	DATE 11/14/7?

DISPLAY OSCILLOSCOPE
DU-127 FINAL ASSY

SHEET 8 / 9 — F200-889