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INSTRUCTION AND SERVICE MANUAL

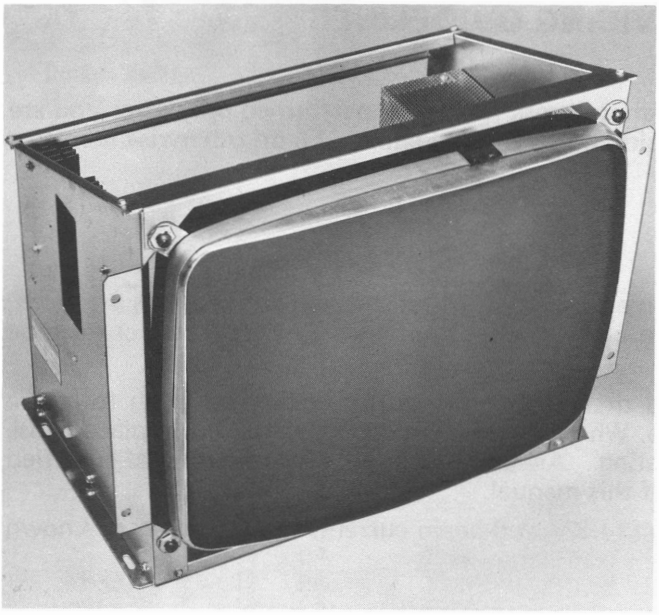
G05 MONOCHROME X-Y MONITOR "QUADRASCAN"

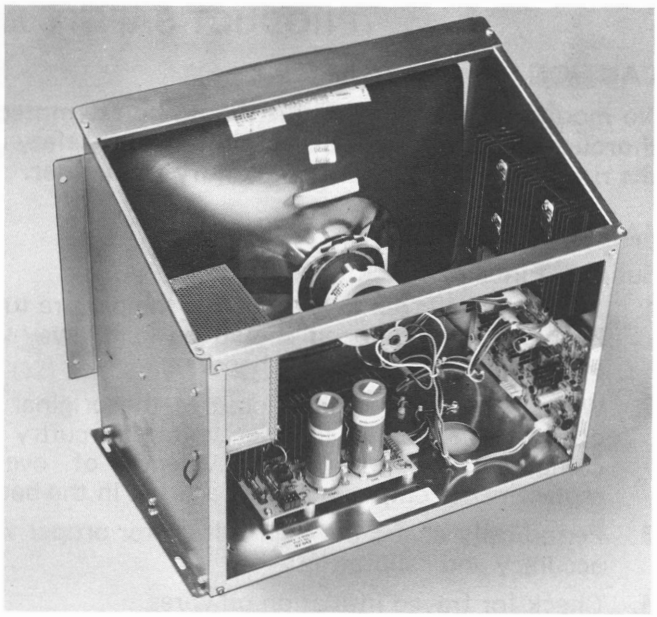
ELECTROHOME ELECTRONICS
A DIVISION OF CENTRAL ONTARIO TELEVISION LIMITED
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TM-146

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SERVICE DATA REFERENCE

For individual model information, see model data sheets.

When writing for Service Information, please quote chassis type number and model code. See chassis type number and model code located on the rear edge of bottom panel.

This information is correct as of August 1979.

WARNINGS

1. POWER DOWN WARNING

CAUTION: REMOVE INPUT SIGNALS TO DEFLECTION AMPLIFIER BOARD (P-703) IN MONITOR BEFORE REMOVING POWER TO REGULATOR BOARD (P-100) IN MONITOR.

2. X-Radiation

This chassis has been designed for minimal x-radiation hazard. However, to avoid possible exposure to soft x-radiation it is IMPERATIVE that the EHT circuitry **IS NOT** modified.

3. HIGH VOLTAGE

This X-Y monitor contains HIGH VOLTAGES derived from power supplies capable of delivering LETHAL quantities of energy. To avoid DANGER TO LIFE, do not attempt to service the chassis until all precautions necessary for working on HIGH VOLTAGE equipment have been observed. In order to prevent damage to solid state devices, do not arc pix tube anode lead to chassis or earth ground.

4. CRT Handling

The picture tube encloses a high vacuum and due to the large surface area is subject to extreme force. Care must be taken not to bump or scratch the picture tube as this may cause the tube to implode resulting in personal injury and property damage. Shatter-proof goggles must always be worn by individuals while handling the CRT or installing it in the monitor. Do not handle the CRT by the neck.

5. To prevent fire or shock hazard DO NOT EXPOSE THIS MONITOR TO RAIN OR MOISTURE.

6. FILE SUPPLEMENTARY MODEL DATA WITH THIS G05 X-Y MANUAL

PRODUCT SAFETY SERVICING GUIDELINES

CAUTION

No modification of any circuit should be attempted. Service work should be performed only after you are thoroughly familiar with all of the following safety checks and service guidelines. To do otherwise increases the risk of potential hazards and injury to the user.

SAFETY CHECKS

Subject: Fire and Shock Hazard

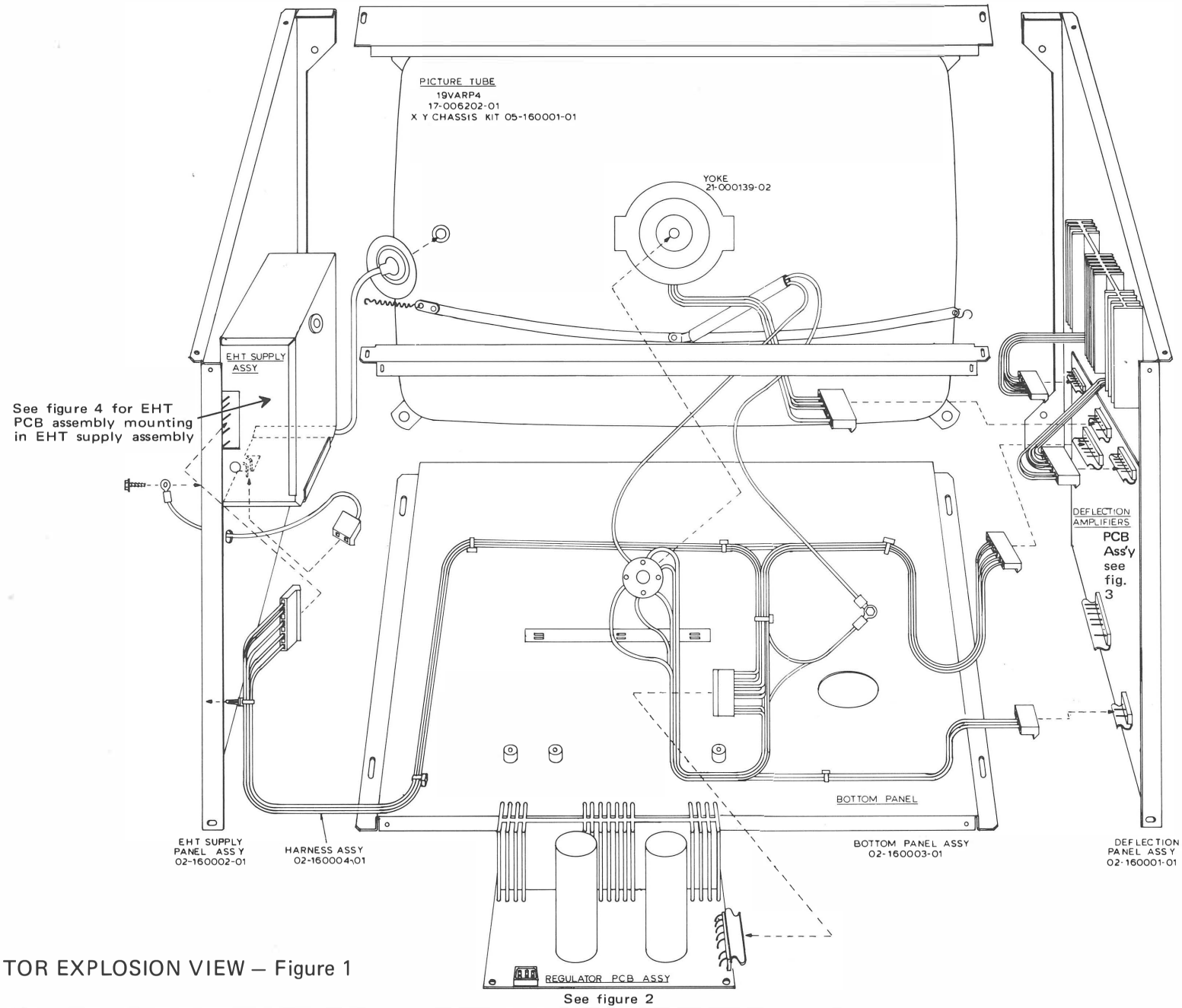
1. Do not install, remove, or handle the picture tube in any manner unless shatter-proof goggles are worn. People no so equipped should be kept away while picture tubes are handled. Keep the picture tube away from the body while handling.
2. When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuitry area. Where a short circuit has occurred, replace those components that indicate evidence of overheating. Always use the manufacturer's specified replacement component. See parts list in the back of this manual.
3. Periodically check the high voltage for proper value (14 KV at 0 beam current) using a meter of known accuracy and calibration.
4. Check for frayed insulation on wires.
5. If service is performed on the EHT Module, the EHT overvoltage protective circuit MUST BE VERIFIED AS OPERATING AT 21 KV MAXIMUM.

OPERATING INSTRUCTIONS

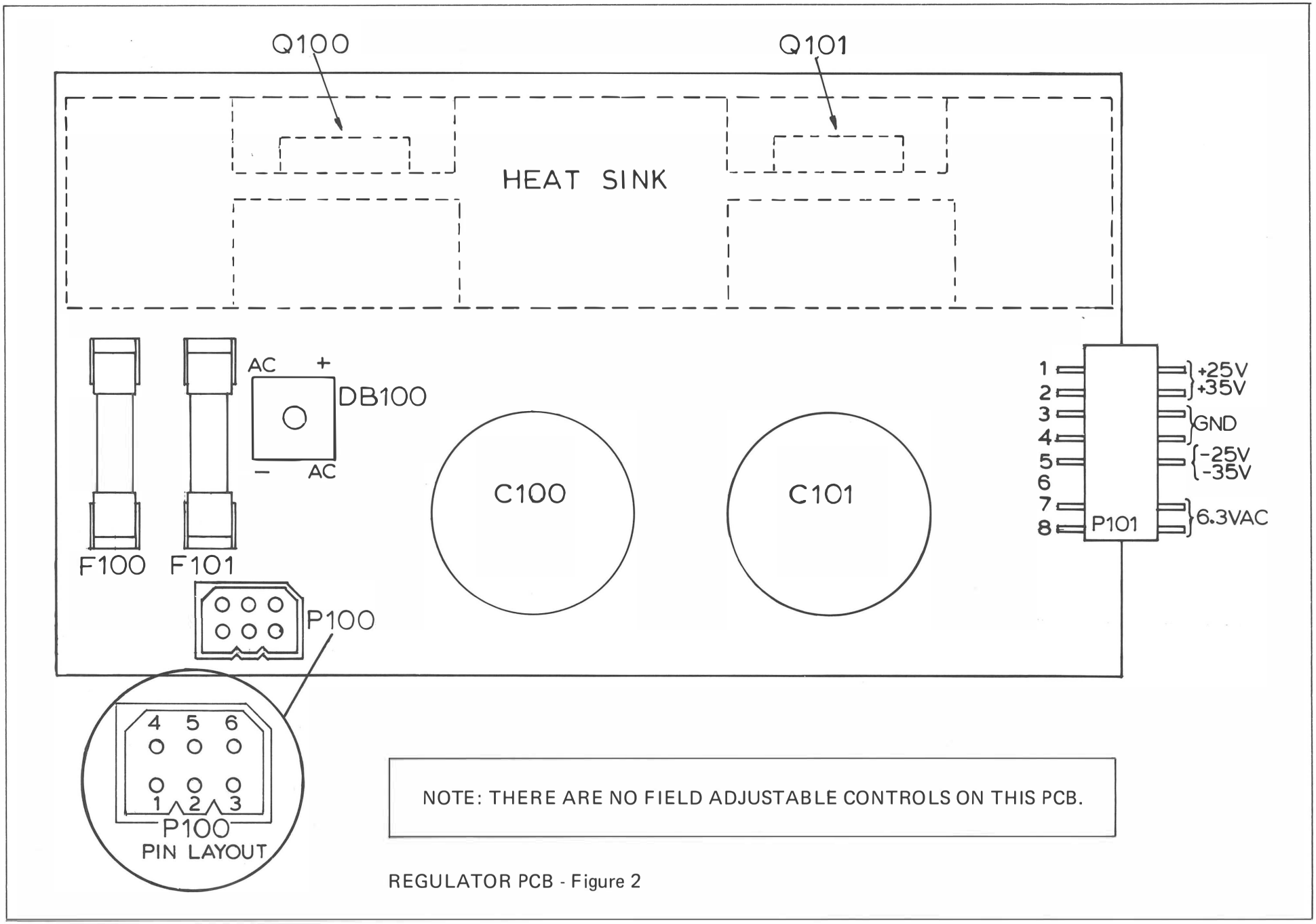
1. Apply a suitable power source to the monitor regulator PCB by means of P100.
2. Apply a suitable signal source to the monitor deflection PCB by means of P703.
3. **Brightness and Contrast**
   These controls are preset at the factory, but may be adjusted to suit program material. They are located on the right hand edge of the deflection amplifier PCB. R519 is the brightness control and R526 is the contrast control. Both are finger adjustment controls.

Caution must be exercised when adjusting the brightness control. This control has more than 100% brightness range on most tubes. This control should be maintained below the point where a center spot appears on the CRT under a no input signal condition. Adjusting the control above this point may result in a phosphor burn.

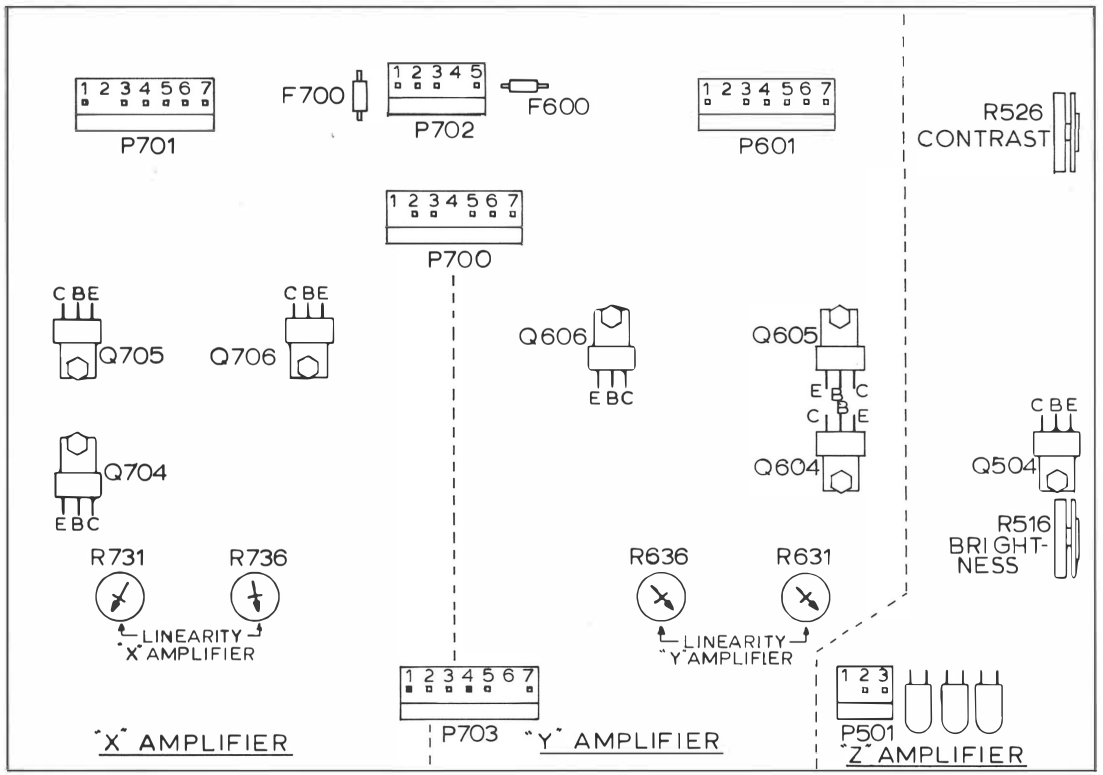
4. **Spot Killer Indicator**
   A spot killer circuit is used to blank the CRT under a no signal condition. When the spot killer is active, the CRT will be extinguished and LED D507 will light indicating spot killer operation.
5. **Power Down**
   The signals that drive the X-Y monitor must be removed before the monitor is powered down. This sequence must be followed or a phosphor burn may result. This damage is permanent and cannot be repaired.



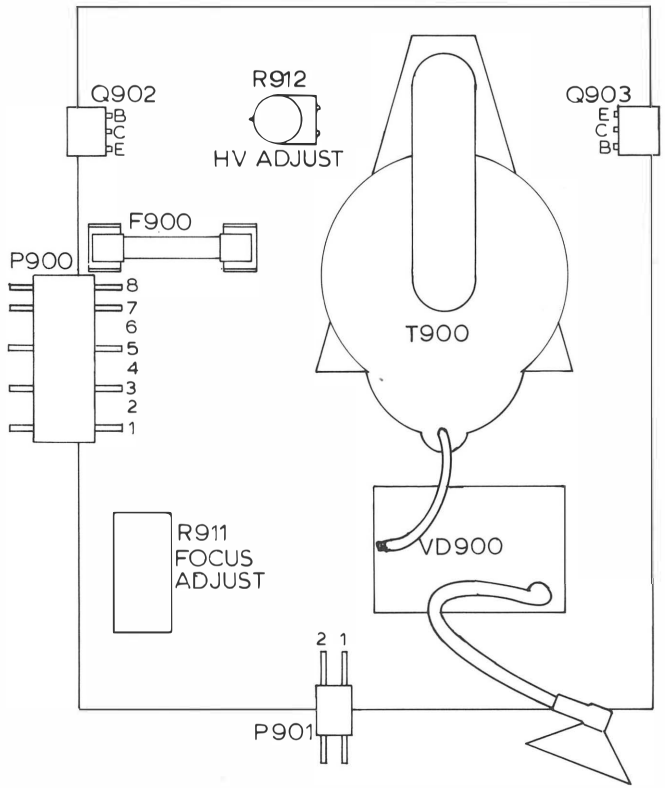
MONITOR EXPLOSION VIEW – Figure 1



REGULATOR PCB - Figure 2



DEFLECTION AMPLIFIER PCB – Figure 3



EHT SUPPLY PCB – Figure 4

NOTE: ONLY THE BRIGHTNESS CONTROL (R516) AND THE CONTRAST CONTROL (R526) ON THE DEFLECTION AMPLIFIER PCB ARE "FIELD ADJUSTABLE". ALL OTHER CONTROLS, INCLUDING X AND Y LINEARITY, FOCUS, AND HIGH-VOLTAGE, HAVE BEEN FACTORY ADJUSTED AND SHOULD **NOT** BE TAMPERED WITH.

PERFORMANCE DATA

INPUT AND ADJUSTMENT DATA

A. Supply Voltage

A.C. power must be applied to the monitor through plug P100 from the isolated secondary winding of a power transformer, capable of supplying the following voltages at line frequencies from 47 to 63 Hz.

A1. Model G05-801 25 Volt Operation

Main Winding: 28-0-28 VAC RMS ± 15% capable of supplying a DC load current of 0 to 2 amps.
Filament Winding: 6.3 VAC ± 10% at .45 amps nominal current.
Pin Assignment of P100:

Pin No.	Description
1	28 VAC RMS ± 15%
2	Ground – Center Tap of 28-0-28 VAC RMS main winding
3	Filament Ground
4	28 VAC RMS ± 15%
5	Ground – center tap of 28-0-28 VAC RMS main winding
6	Filament 6.3 VAC ± 10%

A2. Model G05-802 35 Volt Operation

Main Winding: 37-0-37 VAC RMS ± 15% capable of supplying a DC load current of 0 to 2 amps.
Filament Winding: 6.3 VAC ± 10% at .45 amps nominal current
Pin Assignment of P100:

Pin No.	Description
1	37 VAC RMS ± 15%
2	Ground – center tap of 37-0-37 VAC RMS main winding
3	Filament grounding
4	37 VAC RMS ± 15%
5	Ground – center tap of 37-0-37 VAC RMS main winding
6	Filament 6.3 VAC ± 10%

B. High Voltage (EHT)

14 KV at zero (0) beam current.

C. Input Signal and Pin Assignments for P703

Pin No.	Description	Impedance	Voltage
1	X	1K ohms	± 10V (0V center)
2	GND	– –	– –
3	Y	1 K ohms	± 7.5V (0V center)
4	GND	– –	– –
5	Z	220 ohms min.	0.5V blanking 1.0V off 4.0V full on
6	Key	– –	– –
7	GND	– –	– –

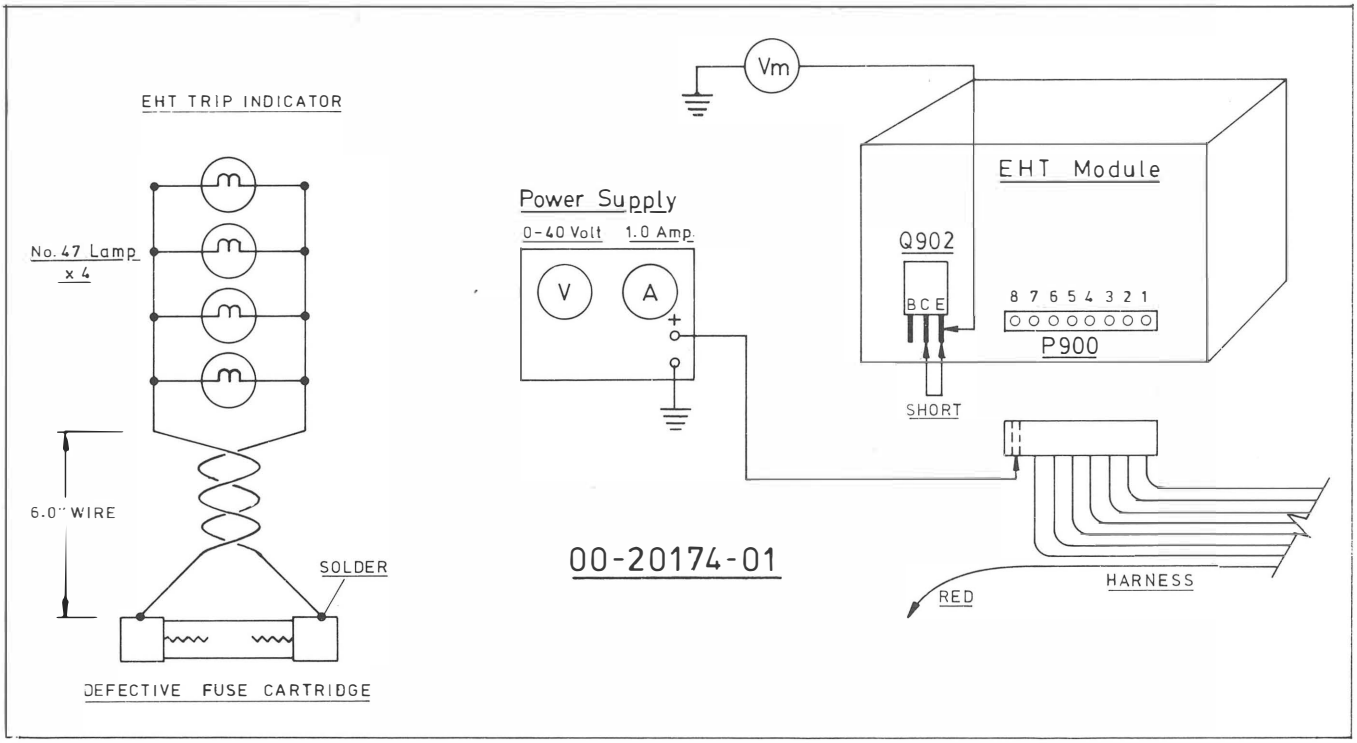
D. Customer Controls

a) Brightness Control: Located on deflection amp printed circuit board. Control is finger adjustable.
b) Contrast Control: Located on deflection amp printed circuit board. Control is finger adjustable.

E. Service Controls – These are factory adjusted and should not be tampered with.

a) High Voltage Adjust: Located in EHT supply module. Hole in screen cover provides access to this control. **Caution – use insulated tool to adjust.**
b) Linearity Controls: R731 and R736 are linearity controls for "X" channel. R631 and R636 are linearity controls for "Y" channel. These controls are located on the deflection amplifier printed circuit board.
c) Focus Control: Located in EHT supply module. Hole in supply heat sink/wrap provides access to this control.

EHT TRIP VERIFICATION PROCEDURE



Set up equipment as per above diagram. Remove Red wire from harness going to P900-8 and let hang free. Attach a separate 0 to 40 volt 1 amp power supply, ground to case of monitor and positive lead to P900-8. Remove cover of EHT supply and install EHT trip indicator in place of F900, as per above diagram. Short collector to emitter of Q902 with a jumper, attach a high voltage meter (25KV FSD @ 1% accuracy) to the CRT annode and slowly advance the input voltage to the EHT module. Measure input voltage to module at shorted C-E terminals of Q902. Do not apply more than 27.5 volts input. Note the maximum EHT obtained before actuation of hold down circuit as evidenced by the sudden increase in brightness of the No. 47 lamps. This would normally open the 1 amp fuse, F900, and interrupt power to the module ending the test. Measured EHT voltage must be no more than 21 KV.

If 21 KV is exceeded it indicates that the tolerances of several components in the hold down circuitry are adding to produce an out of spec module. This condition must be corrected. Suspect components to check would be those marked with the safety symbol on the EHT module schematic.

WARNING

Caution must be exercised once the EHT trip circuitry has been activated. The input voltage must be disconnected immediately or damage to several internal components will result. After testing, the EHT module should be visually inspected for damaged components. Any damaged components must be replaced. The EHT module should then be restored to normal operation.

CIRCUIT DESCRIPTION

The following circuit description will give a full understanding of how each individual section of the X-Y monitor functions.

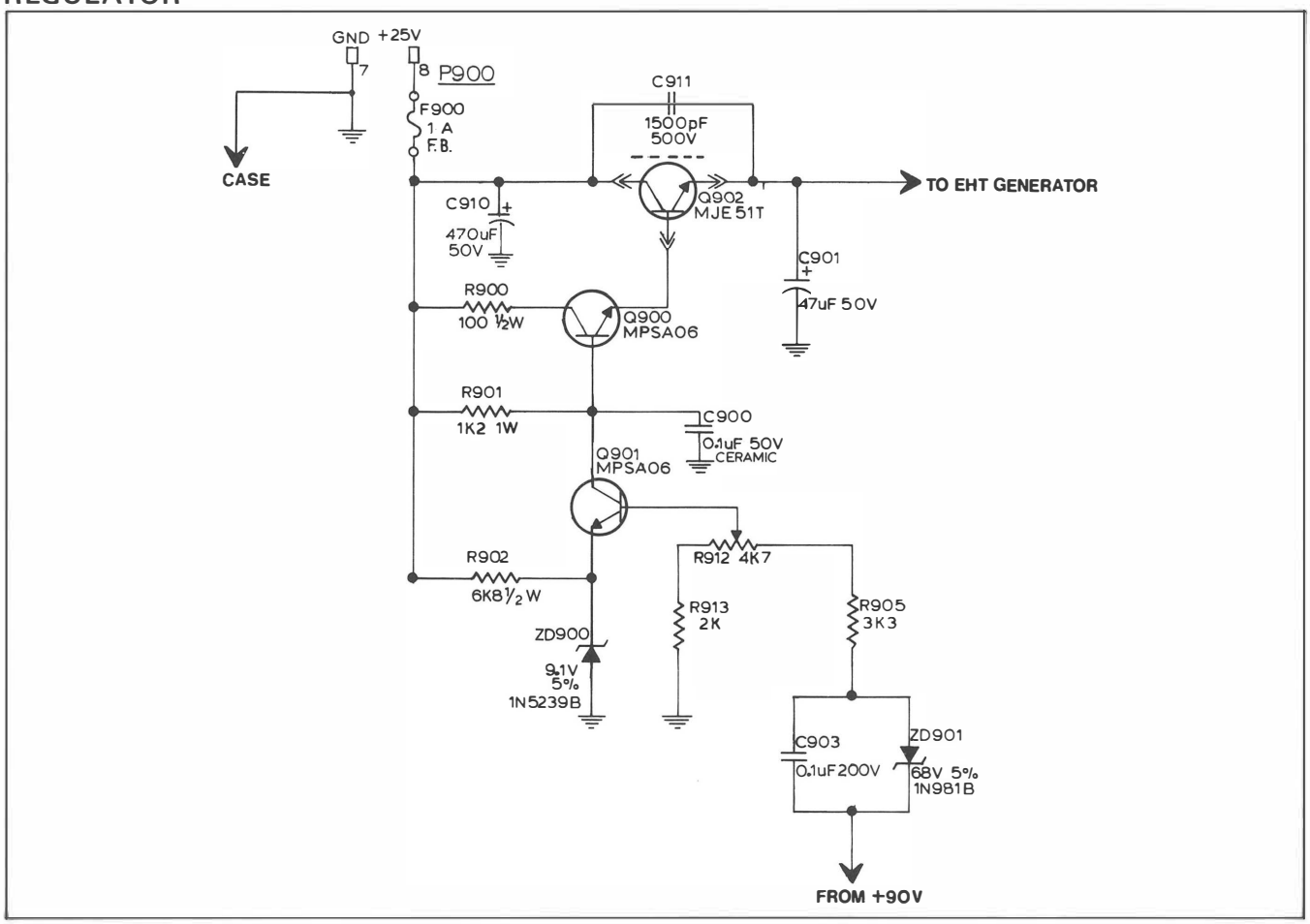
EHT SUPPLY

The EHT module has been designed to operate over an input supply voltage range of +23 to +38 volts, and an ambient temperature range of 0 to +55°C. The module produces nominal voltages of:

+14 kv @ 200 μa CRT anode
+400V G2 voltage
−140 to + 400V focus
+ 90V for Z amplifier

The circuit can be broken down into 3 basic sub-systems: regulator, high voltage generator and EHT hold down.

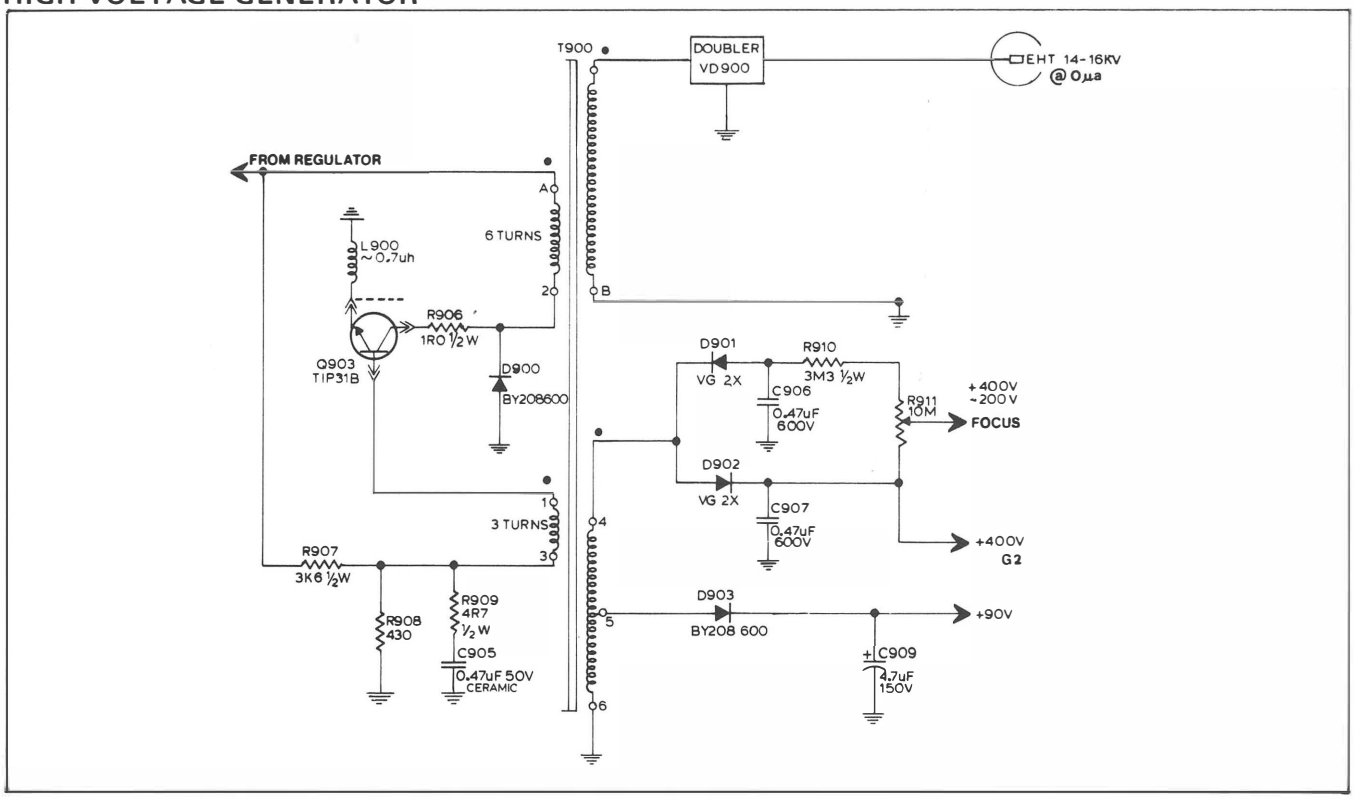
REGULATOR



This is a series regulator with Q902 being the control element, Q900 a driver, and Q901 an error amp. ZD900 forms the emitter reference voltage source. Since the generated EHT and other voltages are linked by means of the magnetic field of T900, any change in EHT will be reflected back to all of the other voltages. This EHT fluctuation is sensed on the 90V line and is used to control Q901. R905 and R913 are used to limit the range of EHT adjustment by R912, to roughly 12 to 17 KV at 0 beam current. ZD901 and C903 provide a means of dropping a large DC component without also attenuating the error voltage that is needed to stabilize the EHT line. R902 provides a means of biasing ZD900 to insure a stable reference voltage for the error amp to work against. R901 is the collector load resistor for Q901 and biases on Q900 and Q902 in the absence of an error signal. The error amp, Q901, can only divert some of the base current from Q900 and shut the regulator down. It can not increase the conduction of the regulator above a level determined primarily by R901 and the current gain of Q900 and Q902. R900 is a buffer resistor to protect Q902 by limiting the maximum current flow into its base in case of C-E short of Q900.

C900 and C911 are used to suppress any tendency for high frequency oscillation that could generate radio frequency interference. C901 and C910 are filtering capacitors to decouple 25 KHz pulses that are impressed onto the +25V line by a normally operating EHT generator and prevent interference with other circuitry.

HIGH VOLTAGE GENERATOR

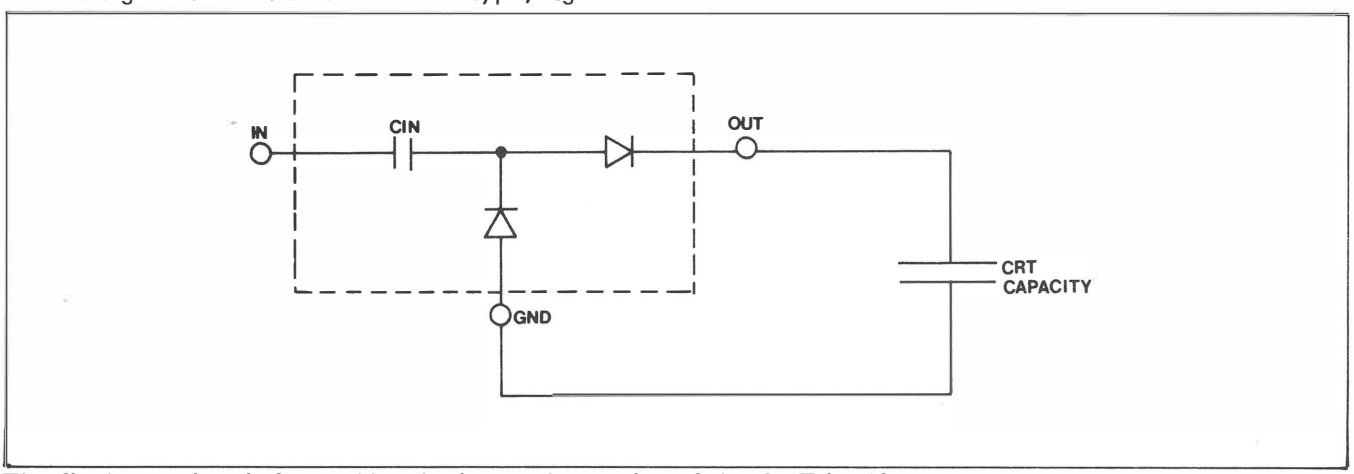


Q903, R907, R908, R909, C905 and T900 form a free running Hartley oscillator circuit that operates at approximately 25 KHz. The operating frequency is primarily determined by transformer and transistor characteristics. Feedback is established by the proper phasing of primary to feedback winding. AC feedback is determined by the turns ratio of primary to feedback winding as well as R909 and C905. The transistor must also be forward biased sufficiently to where oscillation can start when power is applied. This is controlled by R907 and R908. L900 is not essential to circuit operation but helps smooth out the AC waveform generated into a reasonable approximation of a sine wave; This in turn minimizes any tendency for radio frequency interferance.

R906 is a safety resistor that will burn out, and prevent damage to Q903, should the output circuitry come under excessive current drain. D900 is a damper diode.

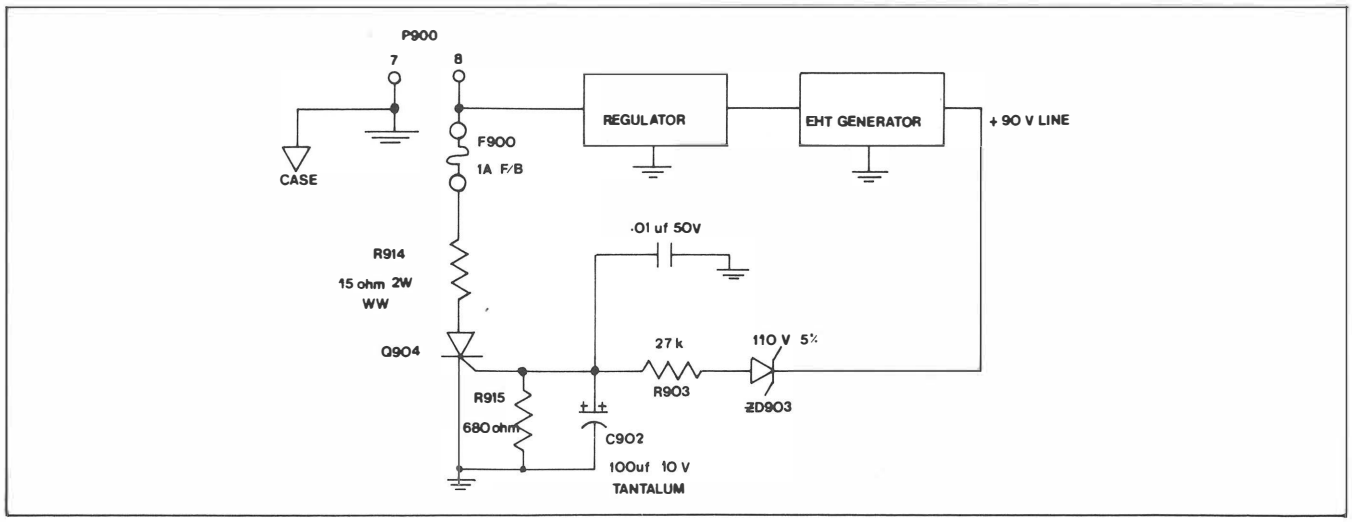
There are two secondary windings. The EHT winding delivers sufficient AC to the doubler to generate 14 KV anode voltage at a maximum current of 400 μa, and a tapped lower voltage winding that is used to generate focus voltage of +400 to −140 VDC, and G2 voltage of +400V, and +90 volts for operation of the Z amp circuitry. It is possible to obtain a negative and positive DC voltage from the same winding because of the generated sinusoidal voltage. R911 is a high voltage control in a conventional package that can withstand 750 VDC which is used for focus adjustment. Because the operating frequency is 25 KHz, fast recovery diodes must be used. The efficiency of a normal diode would be very low, resulting in low output voltage and excessive heating in the diode itself. Similarly C906, C907, C909 must be capacitors of low ESR so as not to overheat at this operating frequency.

The voltage doubler is of the ½ wave type; e.g.



The final capacitor is formed by the internal capacity of the CRT itself.

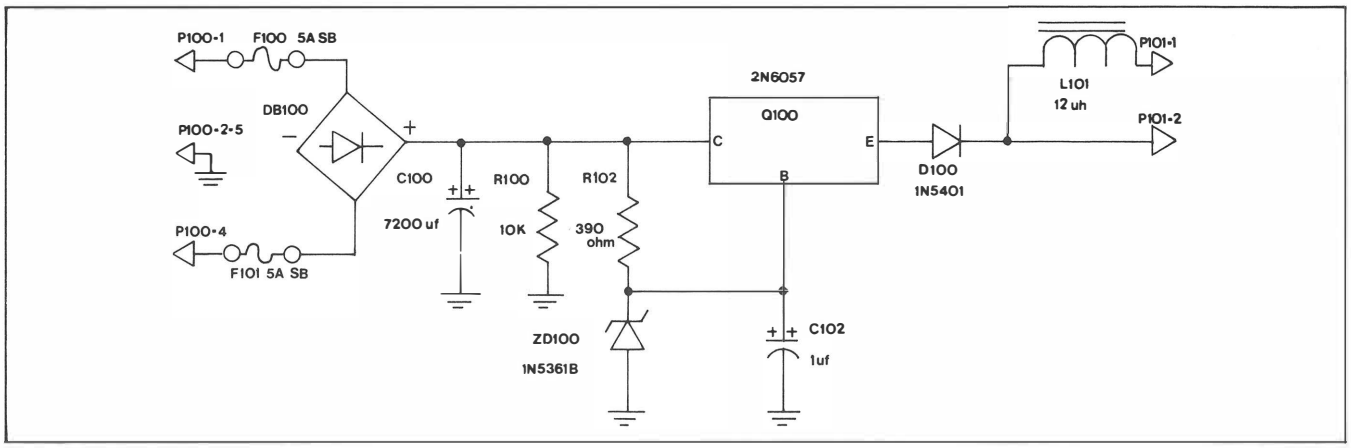
EHT HOLD DOWN



To comply with DHEW regulations it is necessary to insure that the EHT may not rise to the point where soft x-rays are generated by the CRT. This would occur at 22.5 KV when sufficient beam current is present. The hold down circuitry has a maximum trip range of 18 to 21 KV EHT. This circuitry is normally not active and should only function under a fault condition.

Both EHT and 90V lines are linked by the flux of the transformer. If the EHT rises so will the 90V line. When the EHT hits a nominal 19KV, the 90V line will be sufficiently increased to turn on ZD903 and allow voltage divider R903 and R915 to produce 0.6 VDC to fire the SCR. Upon firing, the SCR will latch and tie the 15 ohm anode resistor to ground; this in turn will cause sufficient current drain through F900 to open the fuse and disable the EHT supply. The normal operating current of the regulator and the additional current through R914 will usually open the fuse within 2 seconds. C902 and R903 form a slight RC time delay before tripping the SCR and offer a degree of immunity from false triggering due to internal arcing in the CRT. R915 also serves to improve the arc immunity of Q904. The leads of R915 and C902 must be short for good immunity from false tripping. Additionally C902 is a tantalum capacitor for low high frequency impedance, and low leakage.

DC POWER REGULATOR



For ± 25 volt operation the normal input voltage is 28-0-28 volt AC RMS. This voltage is rectified by diode bridge DB100 and the raw ± DC is filtered by C100 and C101. R100 and R101 are bleeder resistors.

Sufficient current is supplied by R102 and R103 to maintain a constant voltage of ± 27 volts (5%) across ZD100, ZD101 and supply sufficient base current to the darlington pass regulator Q100, Q101 for 2 amps peak output current. There is typically 1.5 volts base emitter junction voltage on Q100, Q101, so the nominal emitter voltage will be ± 27-1.5 = ± 25.5 volts. If a current demand in excess of 2 amps is required, there will be insufficient base current and output regulation will deteriorate. If the input trough voltage on C100, C101 falls below approximately 29 volts, deterioration of output regulation will also occur.

When the supply is switched on or off, it is possible for one supply to come on first or hang on longer and drive current into the other supply. This will destroy the pass transistors. D101 and D100 are blocking diodes that carry full supply current and drop an extra .6 volts each so the nominal output is now ± 24.9 volts. They prevent the above condition from occurring. L101 is a small high frequency filter choke to decouple the EHT generator from the positive supply rail and minimize line conducted radiation.

There is no short circuit protection for Q100, Q101 so even a momentary short could prove disastrous. The

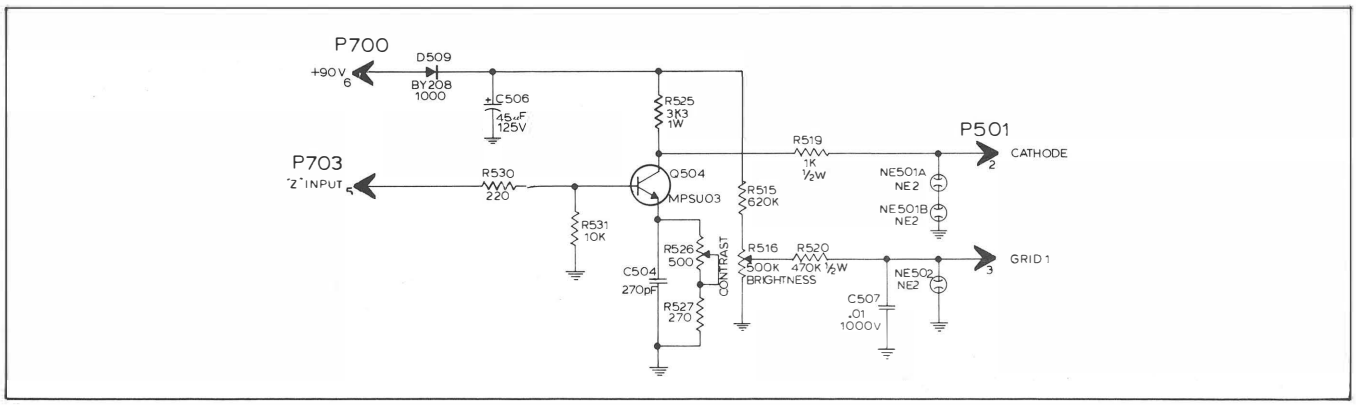
input legs of the bridge rectifier are fused with 5A fuses, however, these will operate only in case of catastrophic failure of bridge or filters. They are much too slow to protect Q100, Q101; they will however protect the power transformer.

Because of the high HFE of Q100 and Q101, two small capacitors C102 and C103 are tied from base to ground to eliminate any tendency toward H.F. oscillation.

The basic X-Y monitor is capable of ± 25 to ± 35 volt operation. There are two power supply assemblies available and except for component ratings the supplies operate identically.

The regulator board also loops through 6.3 volts for the CRT heater. This voltage is slightly reduced from nominal (-10%) to eliminate any possibility of secondary emission in the CRT under high line conditions. There is also a beneficial effect in expected tube life.

Z AMPLIFIER



The Z amplifier provides intensity modulation of the electron beam. A minimum of 8 gray scale steps are discernable. The driving generator must be capable of the following outputs into a 200 ohm load:

0.5 volts blanking
1.0 volts black level
4.0 volts full beam intensity

Q504 is a single stage common emitter amplifier with a 3 dB point of 1 MHz, capable of sufficient amplification to control the electron beam. Typically 30V p-p of signal may be found on the cathode of the CRT. R526 is a contrast control and varies the AC gain over a range of 3:1. R531 is a pull down resistor to insure that Q504 is cut off under a no signal input condition. C504 is a peaking capacitor – selected for good high frequency response with minimum overshoot.

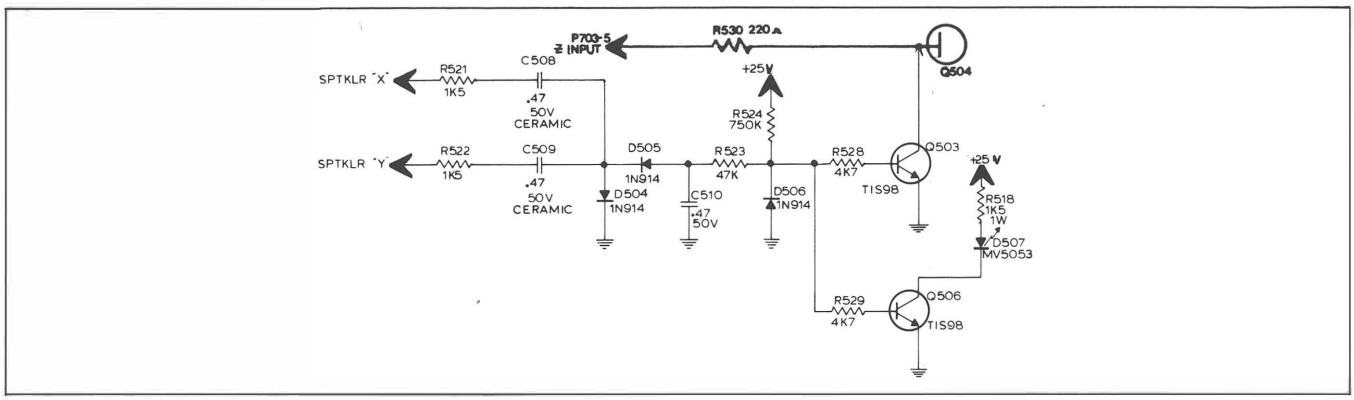
Brightness is controlled by the DC bias voltage between cathode and G1, with G1 being the most negative. It is set by a divider network comprised of R515 and the location of the wiper arm of R516. In order to accomodate the large differences in turn on characteristics of the 19VARP4 CRT, it is necessary to give this control an over range of 25%.

This means that on most tubes it is now possible to turn this control up to the point where an undeflected beam may be seen on the screen. Care must be used when adjusting this control because should this occur, the probability is high that phosphor burn and irreversable CRT damage will result in short order.

R520, C507 and NE502 are a spark supression network to keep any transient voltage spikes that may be generated inside the CRT due to internal arcing from damaging the Z amp by routing them to ground. R519 and NE501A and NE501B are also arc supression components. The two neons have a combined firing voltage of approximately 130 volts. Any voltage spike greater than 130 volts will trigger the neons and provide a very low impedance path to ground.

R515 and R516 in addition to forming the brightness divider chain are also part of a power down spot supression network comprised additionally of D509 and C506. On power down, the discharge path of C506 is through R515 and R516, and must be of sufficient time lag to allow the CRT heater to cool down before the cathode to G1 bias voltage becomes small enough to turn on the electron beam and produce an undeflected bright spot on the CRT. This spot over a period of time would burn the CRT phosphor. A typical cathode to G1 voltage for a just visable display is 60 volts. D509 is an isolation diode to prevent discharge of C506 through any resistance path in the EHT supply and to provide a repeatable time delay by steering the discharge current only through R515 and R516. The time constant of this circuit is approximately 50 seconds.

SPOT KILLER



Both X and Y channels are sampled for presence of sufficient amplitude and rate of change by means of R521, C508, R522 and C509. Any alternating voltage present is summed, rectified by D504, D505 and held as a negative voltage across C510. This negative voltage is limited in amplitude by D506 to prevent possible zenering of base emitter junction of Q503 and Q506.

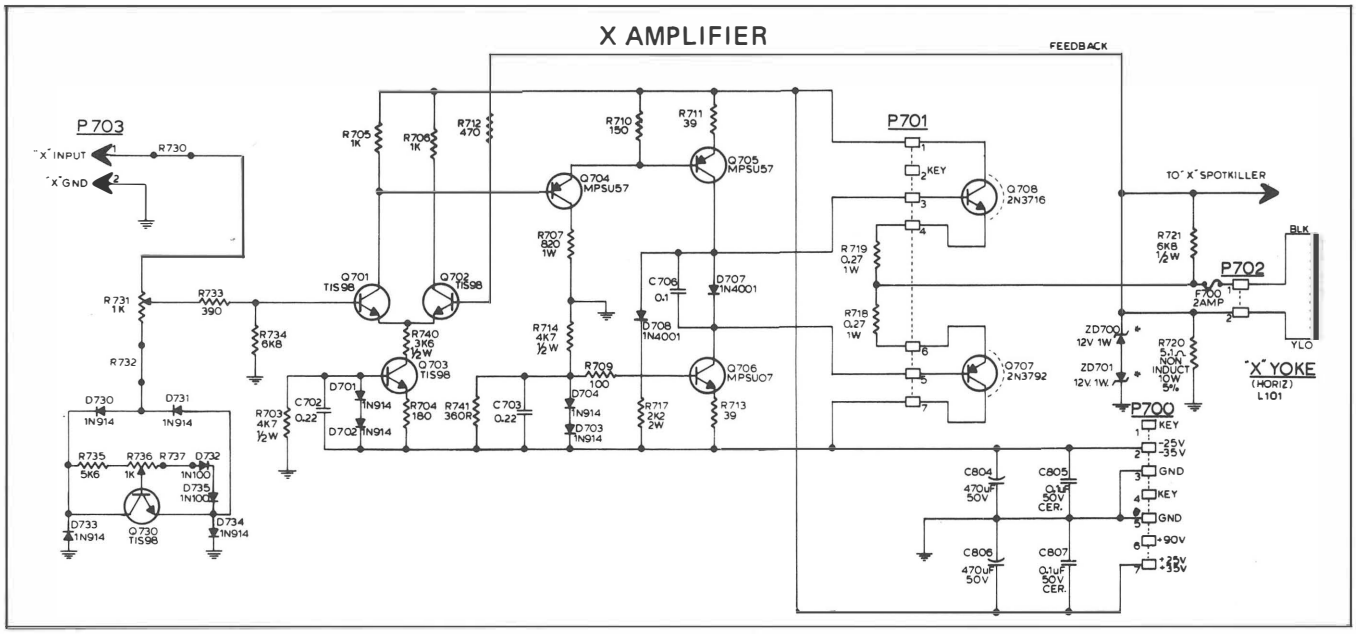
A positive voltage is introduced by R524 that would be sufficient under no signal conditions to turn on Q503 and Q506. The negative sample voltage is sufficient to buck this positive voltage and under normal operation prevents Q503 and Q506 from conducting. R528 and R529 provide current limiting protection for the bases of Q503 and Q506.

When the X and Y sampled signals are of sufficient low amplitude due to:
a) lack of drive
b) removal of input signal plug
c) repetition rate too low
the positive voltage introduced by R524 will forward bias Q503 and Q506 causing the input Z amplifier signal to be shorted to ground via Q503 and series resistor R530. This will cause the collector voltage of Q504 to rise to full supply and the cathode to G1 voltage will be sufficient to blank the CRT. At this time, Q506 will also be turned on causing LED D507 to illuminate and indicate spot killer operation.

On power down, the transistor Q503 shorting out the Z signal, draws its operating power from a decaying +25 volt line and consequently after a short time loses its ability to short out the Z signal. If the Z signal is still present, it will turn on Q504 and greatly decrease the discharge time constant of C506, which maintains the cathode to G1 bias voltage. If this voltage falls below a critical value, the CRT will turn on and if the heater is still warm enough and EHT is present on the CRT, an undeflected spot containing very high energy per unit area of display will burn the phosphor.

It is imperative that the Z signal be removed before Q503 loses its ability to short out this signal. If the signal plug is disconnected, before the monitor is powered down, this condition will be automatically met. In a fully integrated system where generator and monitor are switched off at the same time, the power supply of the generator must decay before the power supply of the monitor.

X-Y DEFLECTION AMPLIFIER



Both X and Y channels are practically identical with only minor differences in some component values to accommodate the differences in input signal levels of ± 10V and ± 7.5V respectively, and to accommodate the 4:3 aspect ratio of the CRT. Because of this we will investigate only the X channel.

The amplifier is a direct coupled voltage to current converter. It is current through the yoke that will produce the magnetic field to deflect the electronic beam. The small signal response of the amplifier is DC to approximately 1 MHz with the large signal being limited mainly by yoke inductance and available supply voltage to a maximum slew rate of 2300 Hz at ± 25V supply. The voltage gain is slightly less than unity as measured across the sense resistor R620, R720.

The input signal of ± 10V is applied to P703-1 by a generator that is capable of delivering this voltage into a 1K ohm load. The signal is gain corrected to compensate for inherent CRT non-linearity in deflection by R731, R733, R734 and the components located within a bridge rectifier formed by D730, D731, D733 and D734. Q730 is the active gain correction element whose break point can be controlled by R736. Germanium diodes D732 and D735 are used to soften the turn on point and produce a closer 1st order approximate to the desired pre-distortion necessary to correct for the CRT deflection characteristics. Due to the bridge configuration, the same control element is used for positive and negative break points resulting in a very symetrical correction factor which is highly desirable without having to precisely match the gain correction components as would otherwise be necessary.

The gain corrected signal is applied to the input transistor of a differential amplifier comprised of Q701, Q702 and constant current source Q703. The current supplied by Q703 will ideally split equally between Q701 and Q702 resulting in identical no signal collector voltage. In practise it should be matched within 5% of the supply level. Very heavy negative feedback is applied to the base of Q702 from across R720, a non inductive current sensing resistor, the voltage across which supplies an accurate representation of yoke current and forces the amplifier to correct any distortion present as well as holding a 0 DC condition at the emitter commons of output transistors Q707 and Q708 under 0 input signal condition.

The signal present at the collector of Q701 is current amplified by emitter follower Q704 and this in turn is used to drive Q705 which then drives the output transistors Q708 and Q707 forcing current through the X winding of the yoke and producing beam deflection.

The output transistors are current driven with the actual driver transistor being Q705 and its constant current source being Q706, D708 and R717 are a network to suppress possible high frequency oscillation if the driving signal exceeds the maximum writing speed capabilities of the monitor. D707 is used to hold the bases of Q707 and Q708 separate by 0.6 of a volt. This results in output transistors that are biased Class B. Under no signal conditions no current is flowing through R719 and R718. Any small amount of crossover distortion that may result from Class B operation is removed by means of the very heavy negative feedback present. C706 is used to maintain a low impedance path across D707.

Both Q703 and Q706 are constant current sources and except for the amount of sourced current and protection in case of failure, are identical. For simplicity, we will only look at Q706 operation.

R714 allows a current to flow through D704 and D703 from the negative rail to ground. D704 and D703 drop approximately 1.4 volts in the forward biased state. This voltage remains relatively constant. A small current will flow into the base of Q706. The base emitter junction voltage is typically 0.6V. This would leave .8V across R713, a 39 ohm resistor. This corresponds to an emitter current of 20 ma. This effectively represents the constant current available from Q706. R709 is a suppressing resistor to prevent spontaneous oscillation of Q706. In case of a failure of D704 or D703, the 360 ohm resistor across them forms a voltage divider with R717 and limits the current available to the constant current transistor Q706 and prevents its sudden destruction along with a handful of other components. C703 is an HF bypass.

A 3K6 ohm safety resistor in the collector of Q703, the other constant current source prevents destruction of a large number of components should this current source fail.

R721 is a resistor critically selected to damp the yoke and minimize any tendancy for ringing. ZD700 and ZD701 are transient suppressor diodes and their sole function is to clamp any voltage spike that may be induced in the yoke due to an arc in the CRT. They serve no active part in beam deflection.

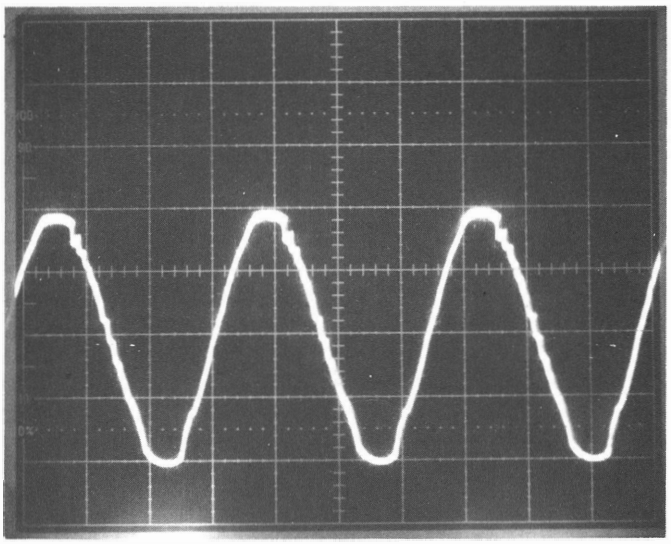
In case of a failure of an output device or an extreme excursion of the electron beam, F700 will open and prevent damage to the yoke or sense resistor as well as remove all loading from Q707 and Q708, thus protecting those from potential failure also.

ZD700 and ZD701 are transient suppressor diodes and their sole function is to clamp any voltage spike that may be induced in the yoke due to an arc in the CRT. They serve no active part in beam deflection.

In case of a failure of an output device or an extreme excursion of the electron beam, F700 will open and prevent damage to the yoke or sense resistor as well as remove all loading from Q707 and Q708, thus protecting those from potential failure also.

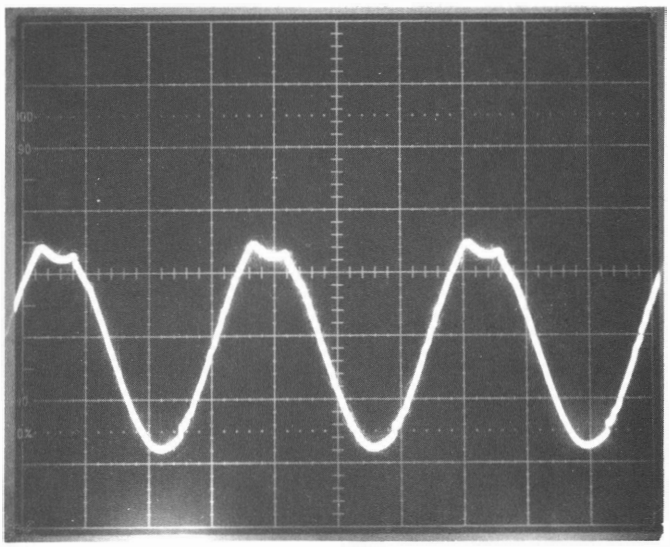
R719 and R718 supply a small voltage drop to help control any tendency for thermal runaway in Q708 and Q707 under heavy loading and high ambient temperature condition.

WAVEFORMS



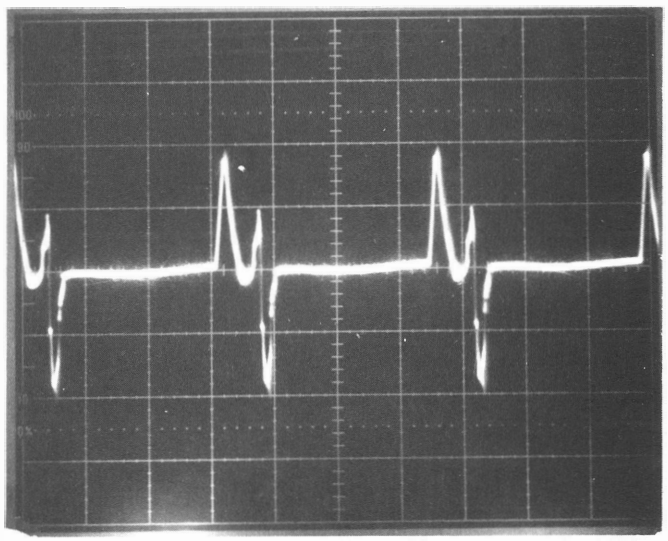
EHT Supply
Waveform at collector of Q903
Vout = 14kv @ 0μa
10 v/cm V
10 μsec/cm H

0 DC



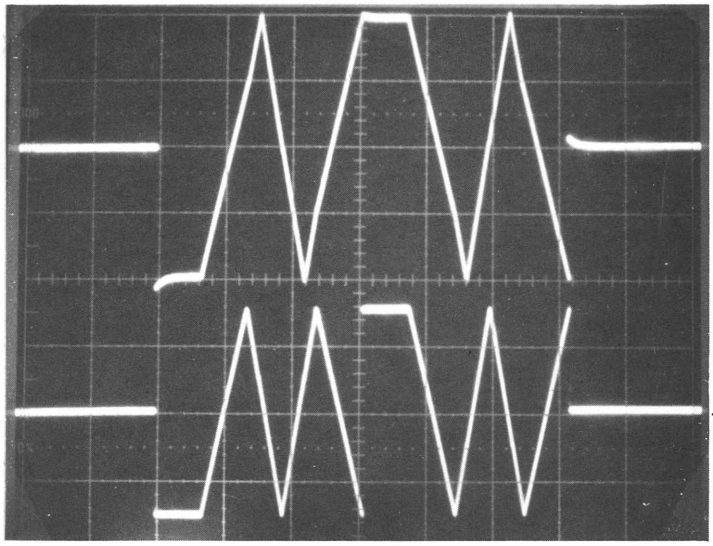
EHT Supply
Waveform at base of Q903
Vout = 14kv @ 0μa
5v/cm V
10 μsec/cm H

0 DC



EHT Supply
Waveform at emitter Q903
Vout = 14kv @ 0μa
0.5 v/cm V
10 μsec/cm H

0 DC CENTER

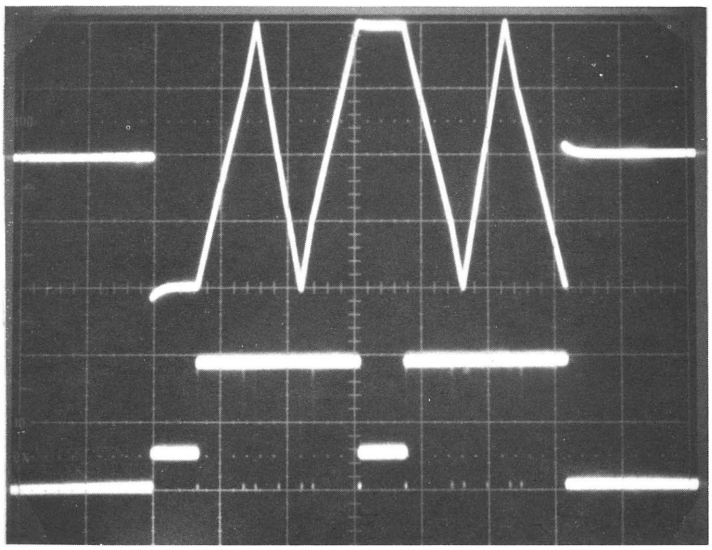


Input Signals
Diagonal Crosshatch Pattern

0 DC CENTER
X INPUT

5 v/cm V
5 ms/cm H

0 DC CENTER
Y INPUT



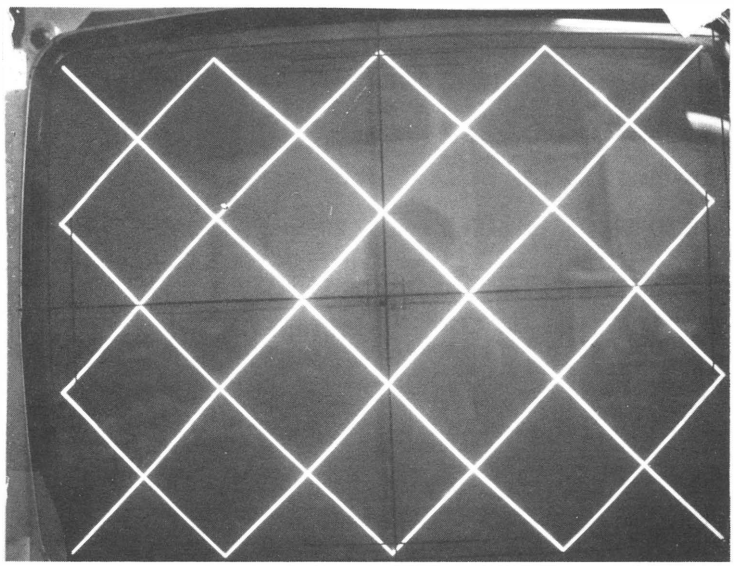
Input Signals
Diagonal Crosshatch Pattern

0 DC CENTER
X-INPUT

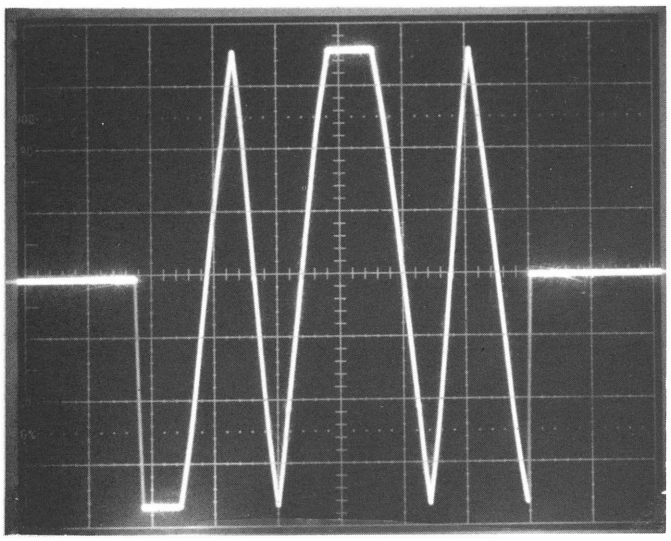
5 v/cm V
5 ms/cm H

2 v/cm V
5 ms/cm H

0 DC CENTER
Z INPUT



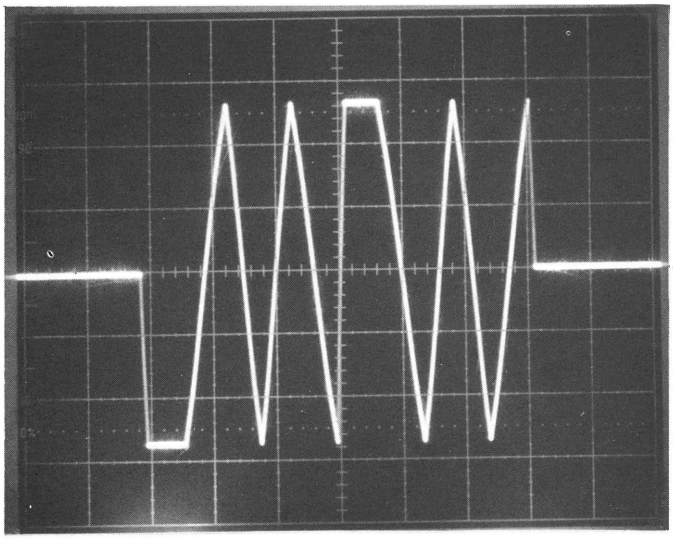
CRT Display
Diagonal Crosshatch Pattern
11¼" x 15" Display



X Channel Output measured across R720
Diagonal Crosshatch Pattern

2 v/cm V
5 ms/cm H

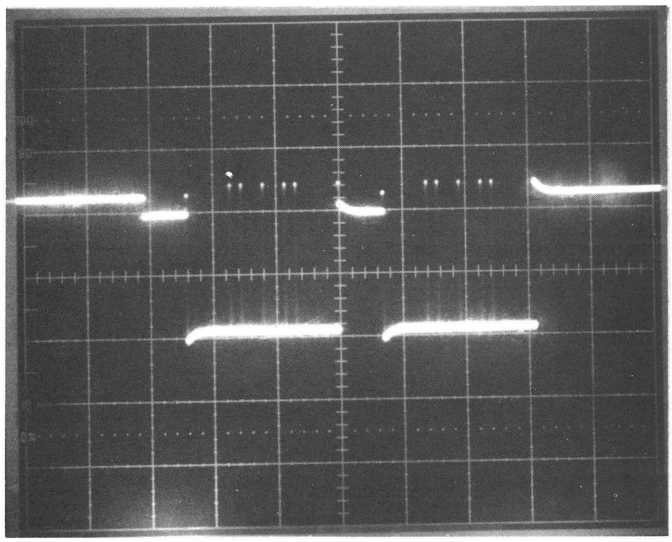
0 DC CENTER



Y Channel Output measured across R620
Diagonal Crosshatch Pattern

2 v/cm V
5 ms/cm H

0 DC CENTER



Z Channel Output measured at collector Q504
Diagonal Crosshatch Pattern

10 V/cm V
5 ms/cm H

+100 VDC

SERVICE INFORMATION

DEFLECTION AMPLIFIER

This board is held in place by 3 mounting screws and a retaining bracket. There is sufficient slack in the harness so that service may be performed with the set operating and this board removed from its mounting position. All of the plugs are keyed so improper termination would be difficult. P601 and P701 are interchangeable for troubleshooting purposes.

The linearity controls R731, R736, X channel, and R636, R631 Y channel are factory sealed and do not normally require adjustment. If adjustment is necessary the seals must be broken and a generator capable of displaying a diagonal crosshatch pattern on the monitor must be used. Adjustment, while not impossible, would be difficult on a conventional crosshatch pattern. The nominal input of ± 10 and ± 7.5 volts must be used. Both linearity controls interact. They must be adjusted for best overall linearity with a displayed pattern size of 11¼x15 inches. Before adjustment is undertaken, EHT should be verified at 14 KV 0 beam. Should the sense resistors R720, R620 need replacement, they must be replaced only with non-inductive resistors of the same value or monitor performance will be degraded.

Both output channels are fused. These must be replaced with similar fuses for continued protection. When replacing F700, F600, they should be protected from excessive heating by using needle nosed pliers to hold the leads and act as a heat sink.

Caution: Removal of any plug on the deflection board other than input plug P703 on an operating monitor could result in phosphor burn.

EHT MODULE

The CRT anode voltage is adjustable by means of R912. This control is accessible through the top perforated shield of the module. A small flat blade screwdriver of non metallic composition should be used for this adjustment. The EHT is adjustable from approximately 12 KV to 16 KV at 0 beam current. Nominal EHT is 14.0 KV at 0 beam current.

Focusing may be set by means of R911. This control is accessible through the side shield of the module. It is a flat blade screwdriver adjustment. The focus voltage is adjustable over the range of -140 to +400 volts. Focus should be set for best overall definition.

Inside the module is a 1 amp fast blow fuse. This must be replaced only with a fast blow device. To replace this fuse, the screened cover must be removed and the fuse holder will be clearly revealed.

When replacing the EHT module, make certain that the CRT anode is safely discharged to ground before removing the anode cap. Make certain the ground wire coming from the rear of the module is re-attached before operating EHT module in the monitor. This ground wire prevents damage to the oscillator transistor in the event of internal arcing in the CRT.

Typical input current from the 25V line for a normally operating unloaded EHT module is .35 amps. Input current will increase with loading and higher than nominal 14 KV EHT.

Under a load of 300 μa the EHT should not change by more than 300 volts from 14 kV.

A suitable load can be made from 5, 10 M ohm 1W resistors in series. Caution must be used when doing this check.

The 90V line should be capable of supplying 25 ma output current with good regulation. A suitable load would be a 3k9 ohm 2W resistor momentarily held on to the 90V terminal. The output voltage should not drop by more than several volts.

The focus and G2 voltages are capable of only very low current drain; they are potential voltages only.

REGULATOR ASSEMBLY

Caution must be exercised when servicing this module. The regulator has no current limiting and even a momentary short of output voltage could cause destruction of the pass transistors.

The two fuses on the PCB are intended to protect the power transformer only, and offer little protection to any of the components on the assembly. Replace only with identical rated devices.

The assembly may be removed from the chassis by removing the two corner mounting screws, unplugging the harnesses and sliding the board out from its mounting bracket.

When installing the board, make certain it is properly seated in its mounting bracket. If the filters are replaced, care must be used in their mounting so as not to deform the PC board.

The no load regulator voltage should be ± 25V ± 5%. The heater line is simply looped through this board with a small series dropping resistor. Under a load of 500ma this resistor will reduce the nominal 6.3 heater voltage to the CRT by approximately 10%.

The supply should be capable of delivering 2 amps output current from either the positive or negative lines at nominal voltage. Ripple content should be less than .5V p-p under this static load.

A suitable load would be a 12.5 ohm 25W resistor momentarily held on to positive or negative rail while this measurement is taken.

Typical ripple content on C100, C101 with a diagonal crosshatch pattern display is 1.5 volt p-p.

CRT REPLACEMENT

Caution: CRT anode should be discharged to aquadag ground strap before attempting replacement. All precautions regarding CRT handling should be observed.

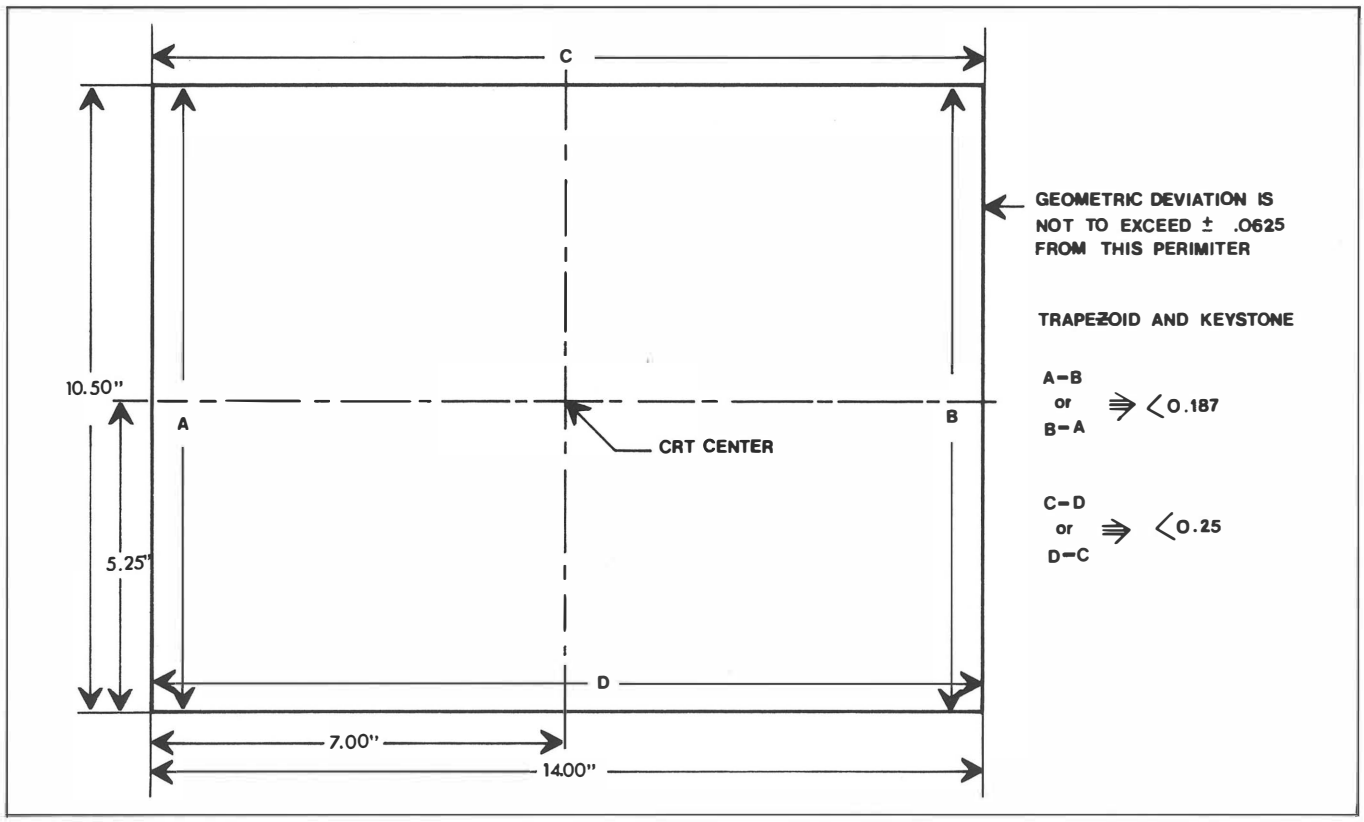
Remove CRT socket, yoke and anode lead. The CRT may then be removed by loosening the four front panel mounting screws. It will be necessary to verify centering, geometry and linearity. Adjustment may be necessary.

CENTERING ADJUSTMENT

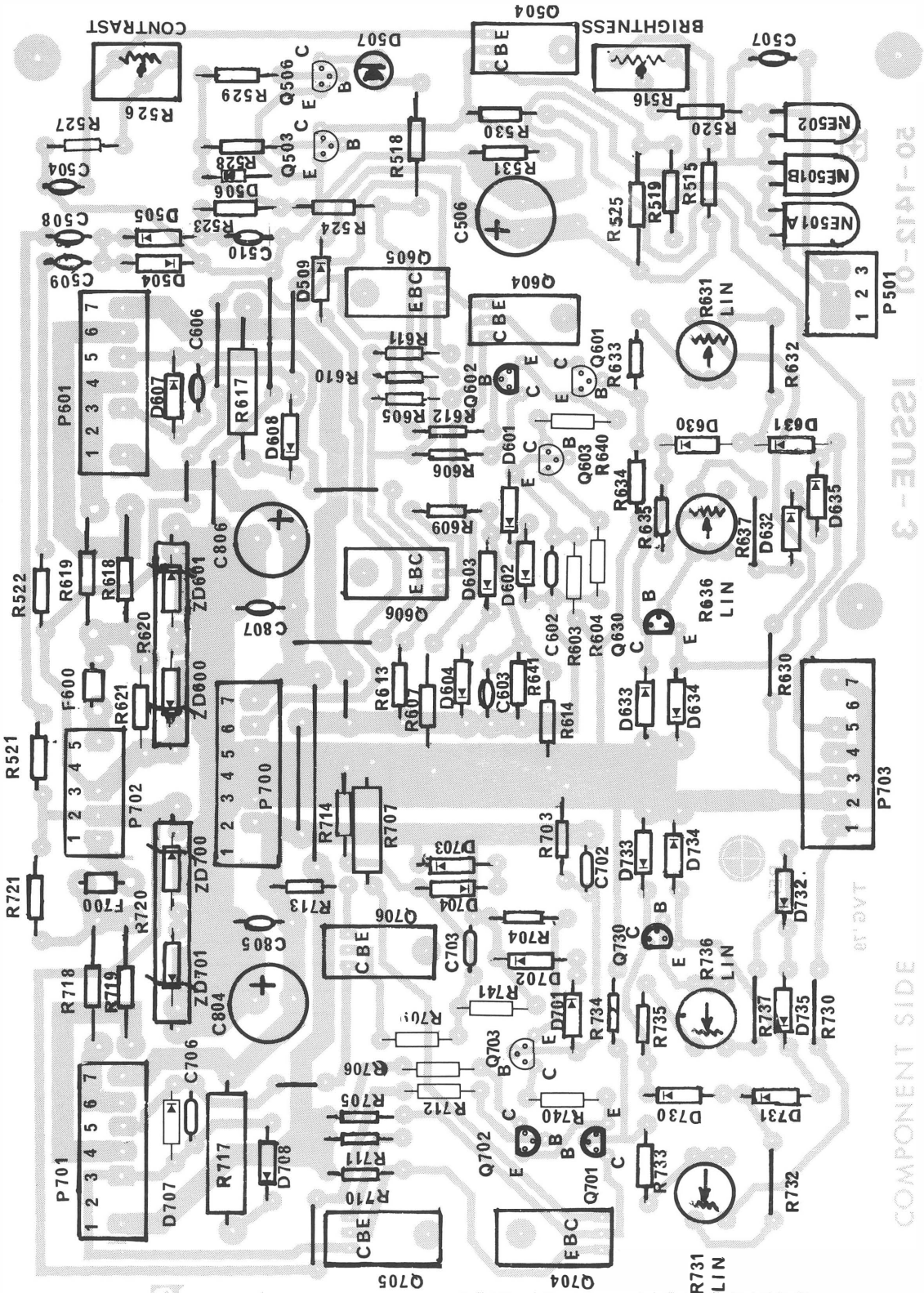
In a semi-dark area with no signal input, brightness control at minimum (maximum CCW rotation), and the yoke unplugged, apply power to the set and after thirty seconds warm up time carefully advance the brightness control until a just visable spot appears on the CRT. Adjust this spot to the geometric center of the CRT by means of the centering rings. Reduce the brightness control to minimum and switch off the set. Plug in the yoke (P702).

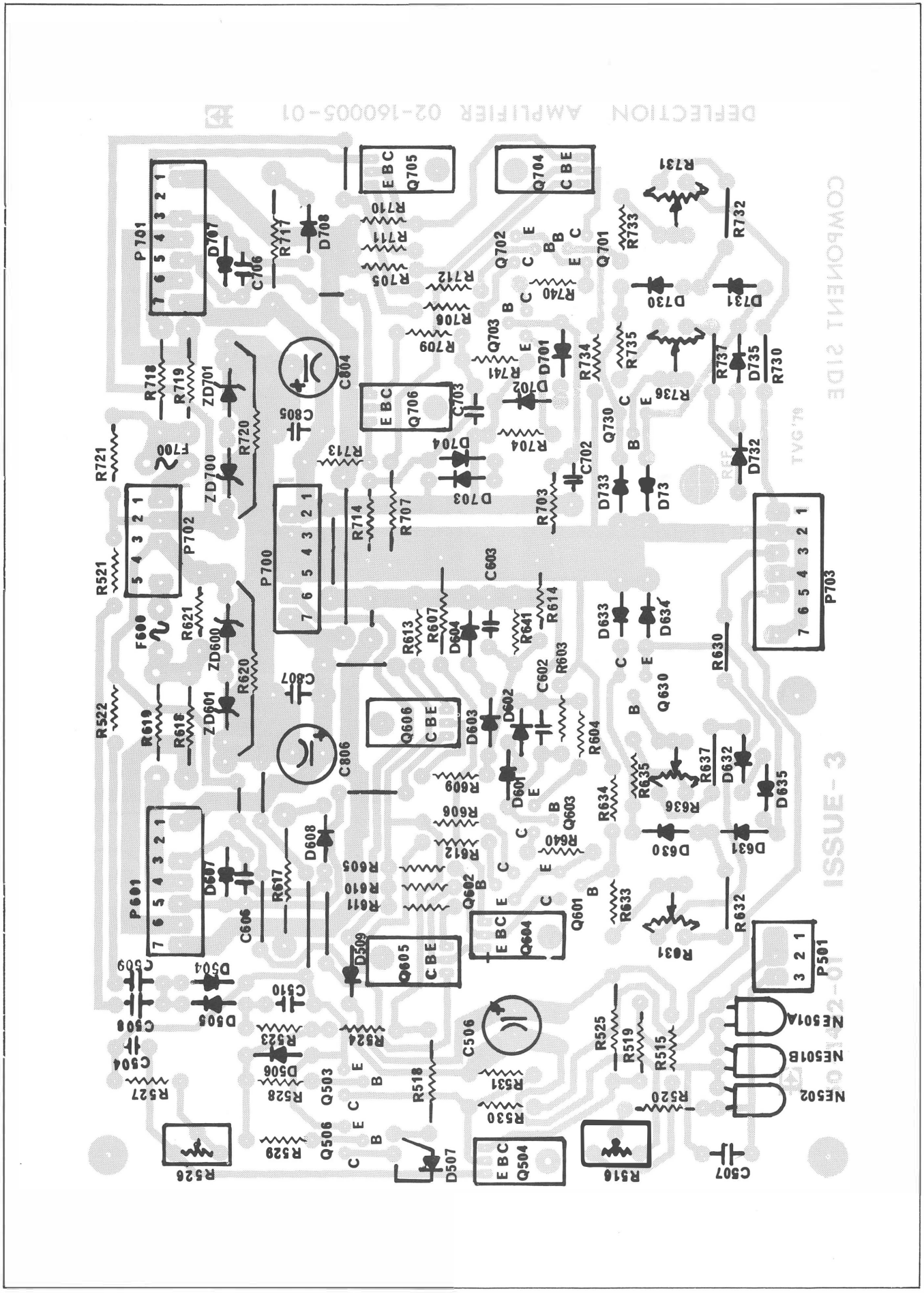
GEOMETRY ADJUSTMENT

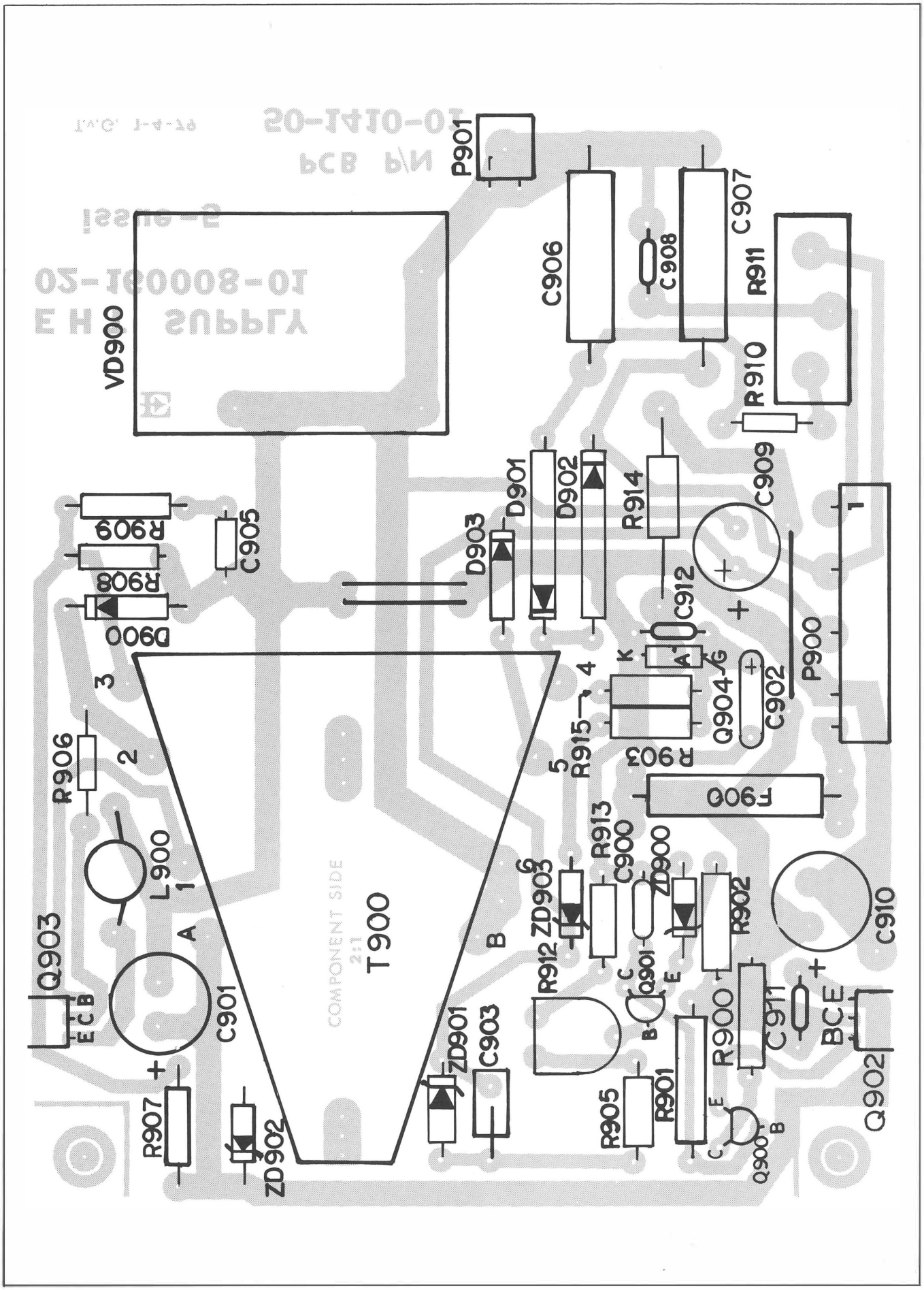
Before adjusting the geometry verify that the EHT is 14KV. Set the signal generator to display a rectangle of 10½" x 14" on the monitor. Adjust the brightness control for comfortable viewing of the display, keeping below the point where a no signal center spot appears on the CRT. Correct any yoke tilt and tighten the yoke clamp. Check that maximum geometry distortion falls within the guidelines as described in the following diagram. Geometry distortion is corrected by proper positioning of magnets on the yoke housing.

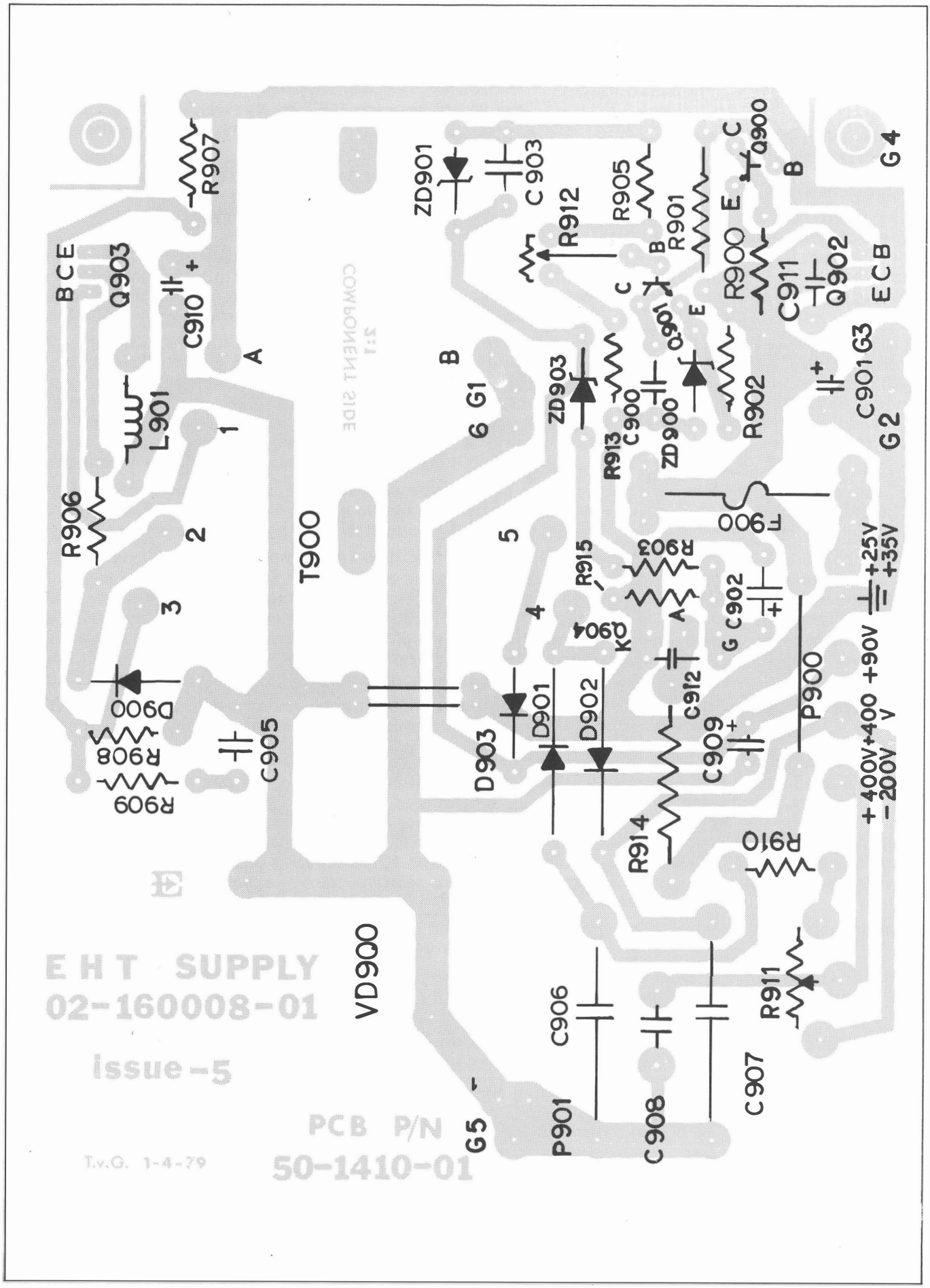


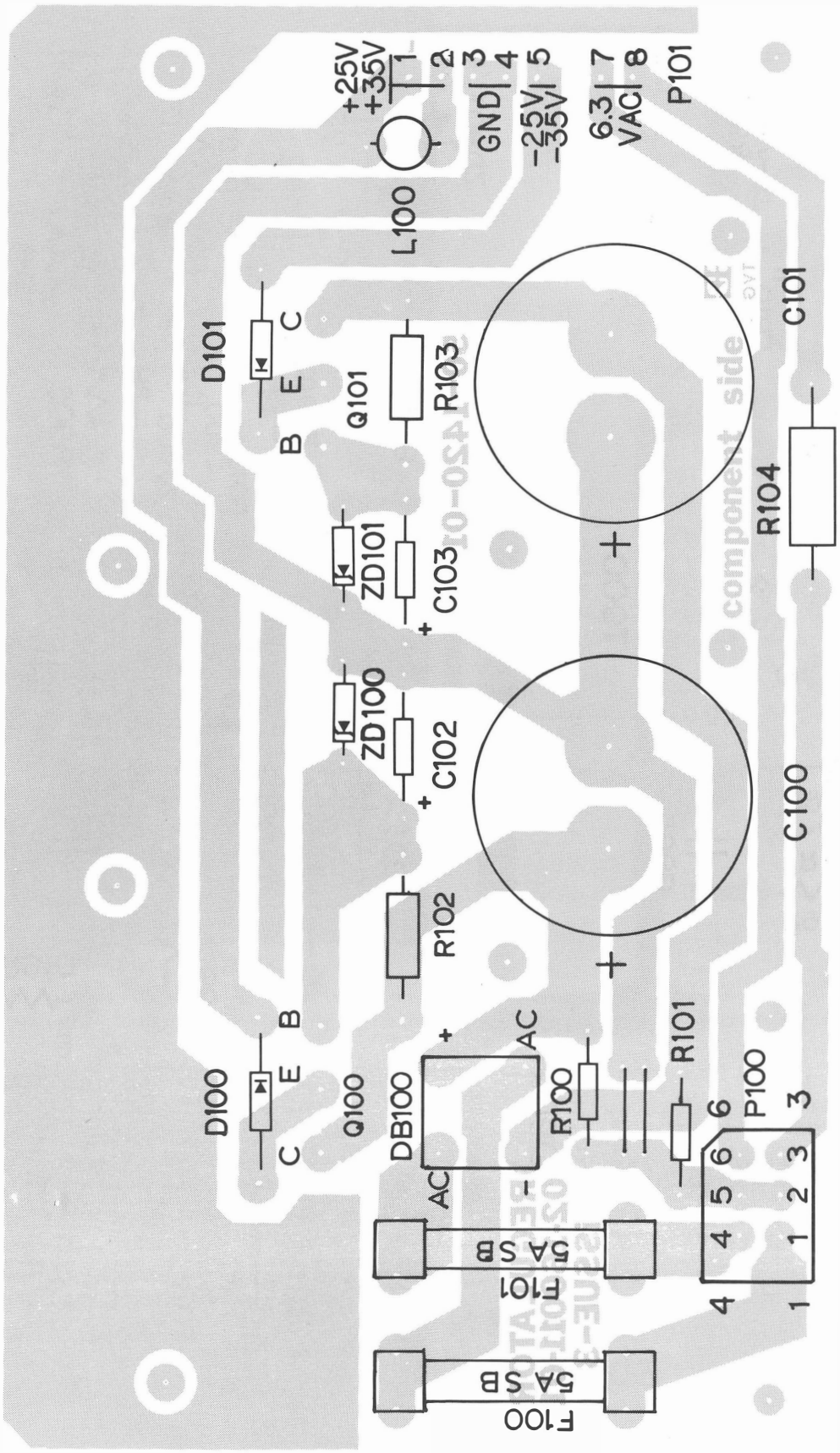
MEMO

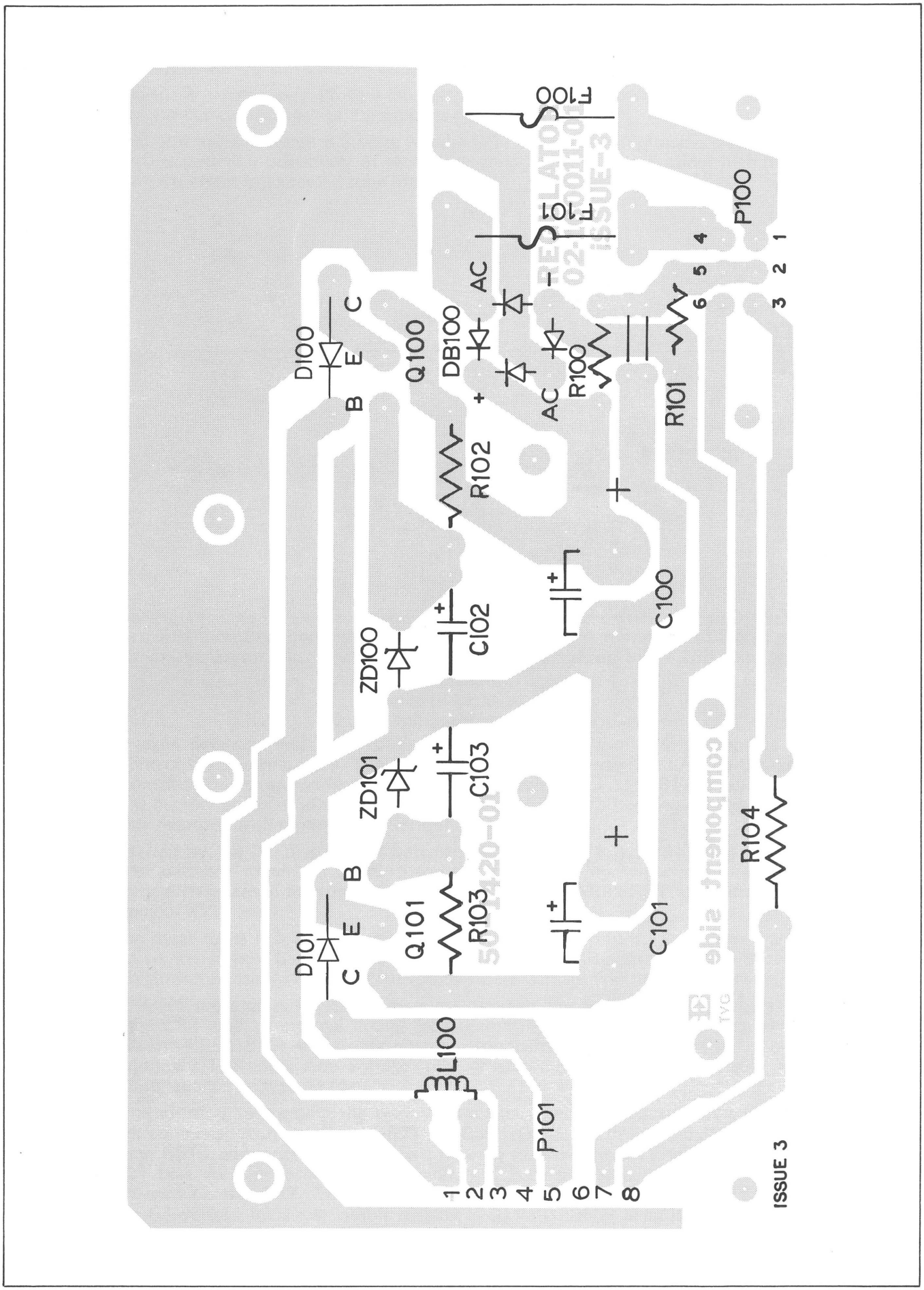

CONTRAST
BRIGHTNESS
Q504
D507
C507
R526
R529
Q506
R516
R527
R528
Q503
R518
R530
R520
NE502
C504
D506
R531
NE501B
C508
D505
R523
R524
C506
R525
R519
R515
NE501A
C510
C509
D504
Q605
D509
Q604
P501
P601
C606
R631 LIN
R611
R610
R632
D607
R617
Q602
Q601
R633
R612
R605
D608
D601
D630
D631
R606
Q603
R640
R634
R609
R635
R637
D632
D635
C806
D603
D602
C602
R603
R604
Q630
R636 LIN
R522
R619
R618
ZD601
Q606
C807
R620
R613
D604
C603
R641
R614
D633
D634
R630
F600
R621
ZD600
R607
P703
R521
P702
P700
R714
R707
D703
R703
C702
D733
D734
R721
ZD700
R713
D704
R704
D732
F700
R720
Q706
C805
C703
Q730
R736 LIN
R718
R719
ZD701
C804
D702
R741
D701
R734
R735
R737
D735
R730
R705
Q703
R706
R712
C706
R740
D730
D731
P701
D707
R717
D708
R710
R711
Q702
Q701
R733
R732
R731 LIN
Q705
Q704
ISSUE - 3
50-1412-10
COMPONENT SIDE
DEFLECTION AMPLIFIER 02-160005-01


DEFLECTION AMPLIFIER 02-16000S-01
COMPONENT SIDE
ISSUE-3
P601
P700
P701
P702
P703
P501
Q503
Q504
Q506
Q601
Q602
Q603
Q604
Q605
Q606
Q630
Q701
Q702
Q703
Q704
Q705
Q706
D507
D509
D601
D602
D603
D604
D607
D608
D630
D631
D632
D633
D634
D635
D701
D702
D703
D704
D707
D708
D730
D731
D732
D73
D504
D505
D506
ZD600
ZD601
ZD700
ZD701
F600
F700
NE501A
NE501B
NE502
C504
C506
C507
C509
C510
C602
C603
C606
C702
C703
C706
C708
C709
C805
C806
C807
R516
R518
R519
R520
R521
R522
R523
R524
R525
R526
R527
R528
R529
R530
R531
R603
R604
R606
R607
R609
R610
R611
R612
R613
R614
R617
R618
R619
R620
R621
R630
R631
R632
R633
R634
R635
R636
R637
R640
R641
R703
R704
R705
R706
R707
R709
R710
R711
R712
R713
R714
R717
R718
R719
R720
R721
R731
R732
R733
R734
R735
R736
R737
R740
R741
R730
R735
D733
D735
TVG'78


VD900
P901
C906
C908
C907
R911
R910
R909
R908
D900
C905
D903
D901
D902
R914
C909
C912
K
A
G
Q904
C902
P900
R906
3
2
1
L900
A
Q903
E C B
C901
R907
ZD902
ZD901
C903
T900
COMPONENT SIDE
2:1
B
4
R915
5
R903
F900
R913
C900
6
ZD903
R912
ZD900
C
Q901
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R902
C910
R900
R901
R905
C911
B C E
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C
E
B
Q900

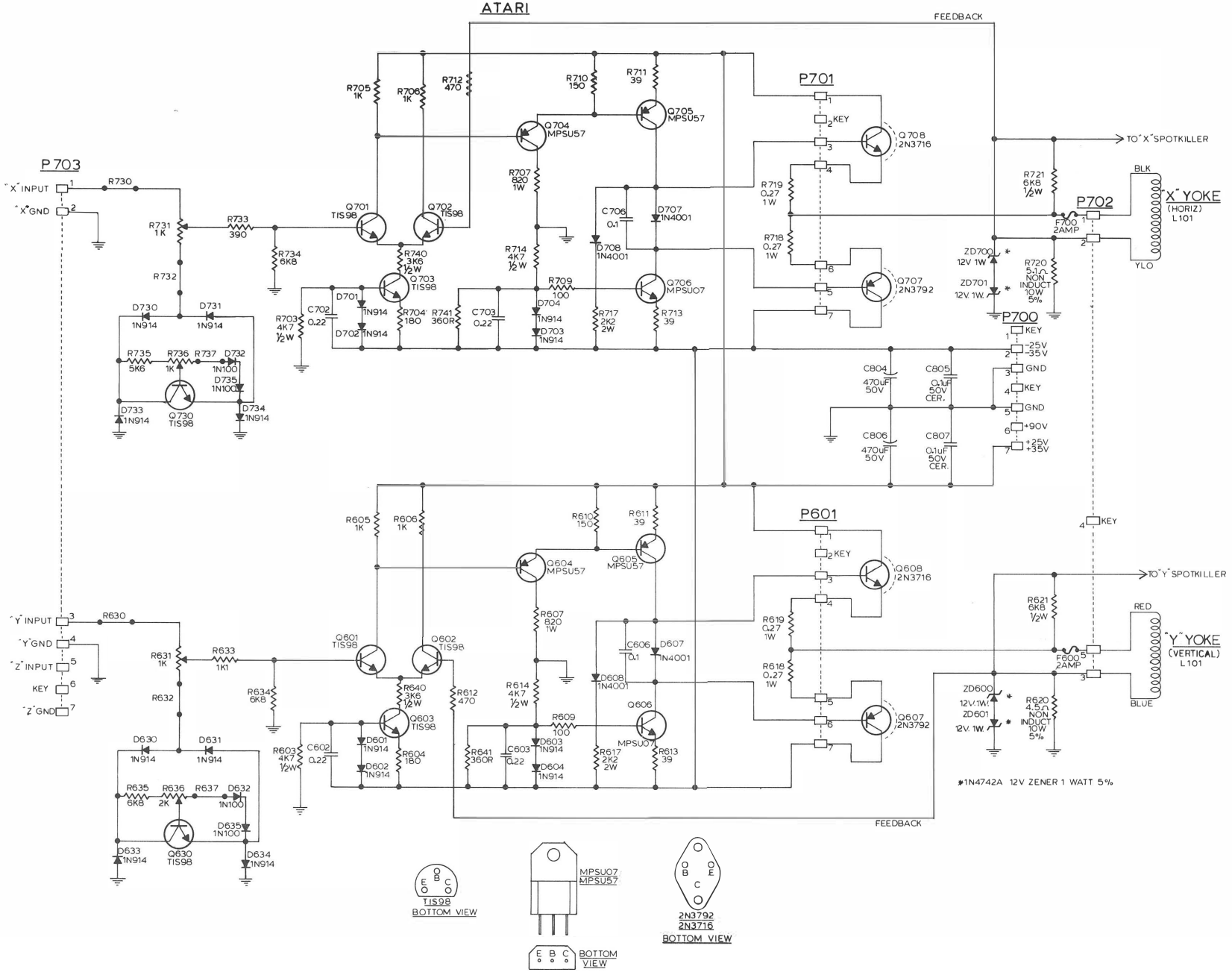

EHT SUPPLY
02-160008-01
Issue-5
PCB P/N
50-1410-01
T.v.G. 1-4-79
VD900
T900
L901
Q903
Q902
Q900
Q901
D900
D901
D902
D903
ZD901
ZD903
ZD900
R906
R907
R908
R909
R910
R911
R912
R913
R914
R915
R901
R902
R903
R904
R905
C900
C901
C902
C903
C905
C906
C907
C908
C909
C910
C911
C912
P900
P901
+400V +400 +90V +25V
-200V V +35V
G1
G2
G3
G4
G5
G6


+25V
+35V
1
2
GND
3
4
-25V
-35V
5
6.3
VAC
7
8
P101
L100
D101
C
E
B
Q101
R103
ZD101
C103
ZD100
C102
C101
R104
C100
component side
D100
B
E
C
Q100
R102
DB100
+
AC
AC
-
R100
R101
P100
6
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6
5
2
4
1
4
1
F101
5A SB
F100
5A SB

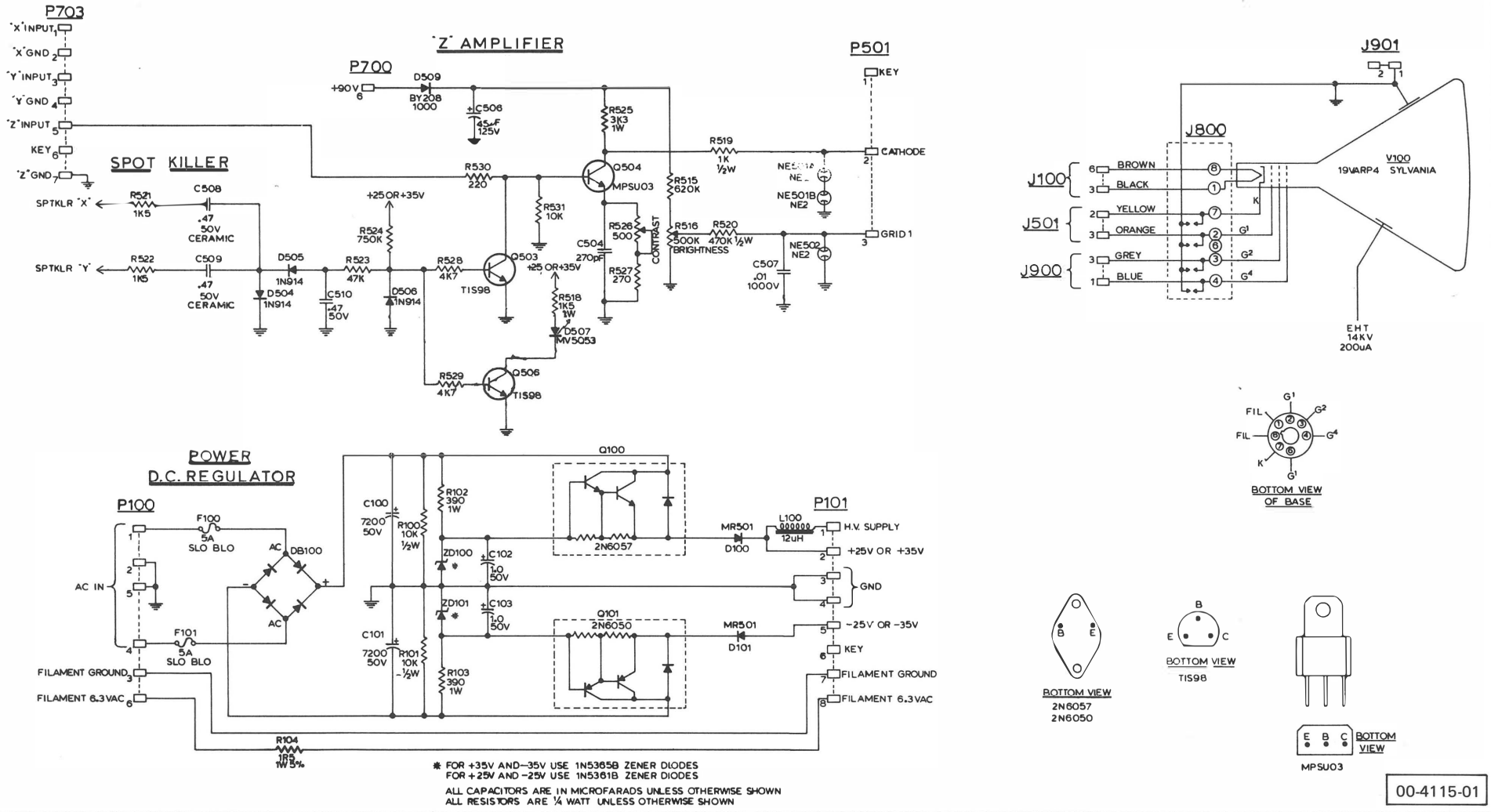

D101
C
E
B
Q101
R103
L100
ZD101
C103
D100
E
C
B
ZD100
C102
Q100
DB100
AC
R102
+
AC
R100
F101
F100
C101
C100
R101
R104
P101
P100
1 2 3 4 5 6 7 8
3 2 1
4 5 6
ISSUE 3

MEMO

X-Y AMPLIFIER
ATARI



00-4117-01



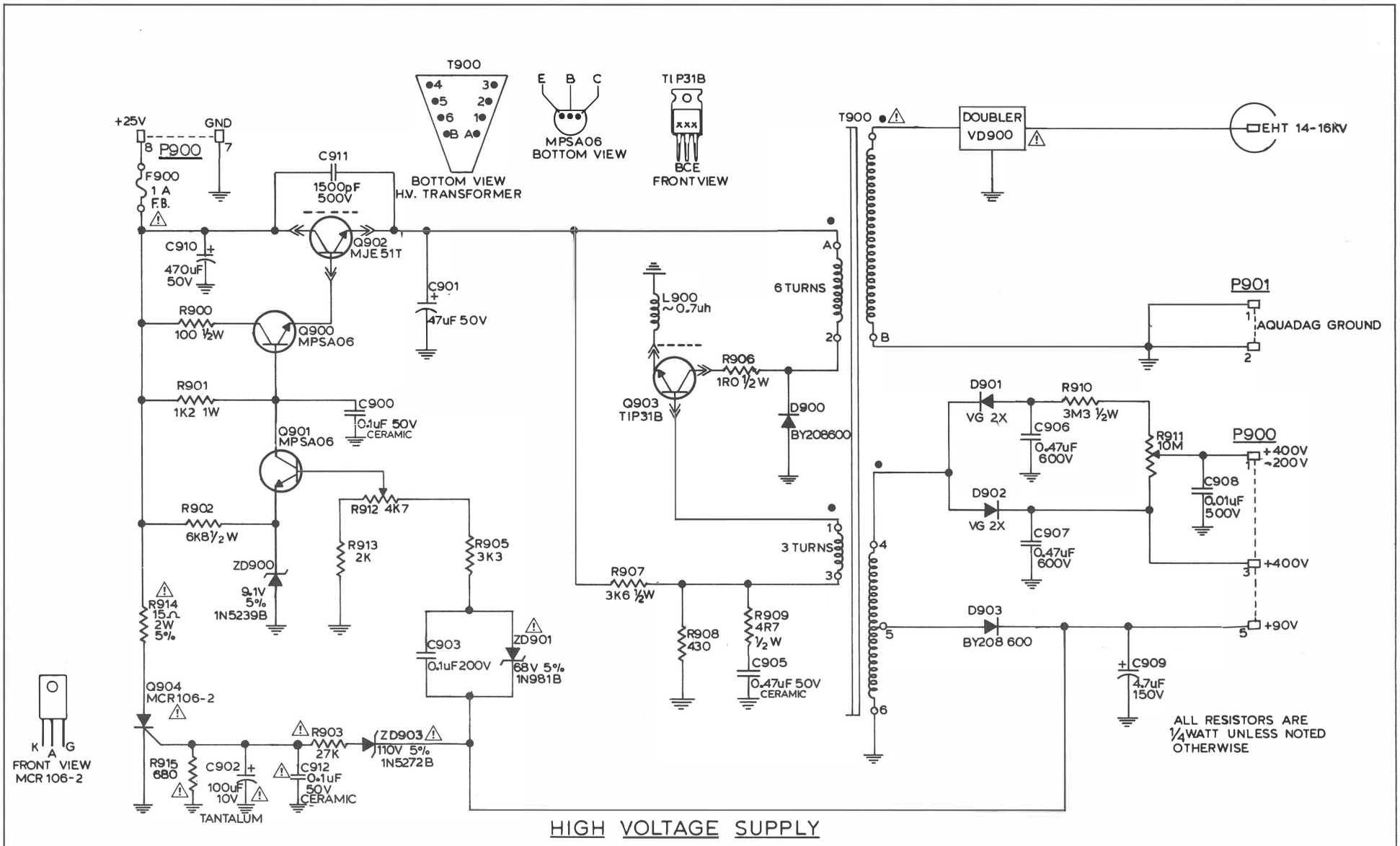
LEGEND

RESISTORS – RESISTANCE IN OHMS, K (KILO-OHMS) OR M (MEGOHMS, ¼ WATT, 5% TOLERANCE UNLESS OTHERWISE NOTED.
CAPACITORS – CAPACITY IN p (PICOFARADS), n (NANOFARADS) OR µ (MICROFARADS), DCWV AND TOLERANCE NOTED WHERE CRITICAL.
INDUCTORS – INDUCTANCE IN µH (MICRO HENRIES).
ZENER DIODES – ZENER VOLTAGE IN VOLTS.
ELECTROLYTICS OR TANTALUMS ±|I– CAPACITY IN µF DCWV IN VOLTS.

MULTIPLIER NOTATION

MULTIPLIER OR SUB-MULTIPLE	PREFIX	SYMBOL
10^{6}	MEGA	M
10^{3}	KILO	k
10^{-3}	MILLI	m
10^{-6}	MICRO	µ
10^{-9}	NANO	n
10^{-12}	PICO	p

EXAMPLE FOR CAPACITORS	NEW NOTATION	OLD NOTATION
1n = 1nF	µ = µF	MFD
= 10^{9} FARAD	n = nF	k
= .001 µF	p = pF	mmf
= 1000pF		



HIGH VOLTAGE SUPPLY

CAUTION – FOR CONTINUED SAFETY, REPLACE THOSE COMPONENTS INDICATED BY ⚠ WITH EXACT REPLACEMENT PARTS ONLY. CONSULT SERVICE MANUAL PARTS LIST **"SAFETY COMPONENTS"**.

00-4118-01

INDEX FOR SERVICE REPLACEMENT PARTS LIST

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C. Miscellaneous Hardware for Deflection Panel Assembly 02-160001-01	36
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A2. EHT Supply Assembly Kit 05-160002-01	37
B. Miscellaneous Hardware for EHT Supply Panel Assembly 02-160002-01	37
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Harness Assembly 02-160004-01	38

SERVICE REPLACEMENT PARTS LIST

IMPORTANT SAFETY NOTICE

Components identified by the ⚠ symbol on the schematic have special characteristics for safety. These critical safety components are designed to "fail safe" under abnormal conditions. The failure of any one component often causes stress in other components which could lead to smoke or fire or other hazards. Because of this, components are selected and tested under actual fault conditions to ensure safe operation. Replacement with anything other than the identical Electrohome part may present a hazard.

DEFLECTION PANEL ASSEMBLY 02-160001-01

A. Deflection Amp PCB Assembly 02-160005-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Capacitors	1	C504	270pF Z5P 10% 500V	46-327113-51		
	2	C506	45uF 125V Low ESR Elect.	44-000205-01		
	3	C507	10nF 1000V	46-510371-75		
	4	C508	.47uF 50V Cer.	49-000032-02		
	5	C509	.47uF 50V Cer.	49-000032-02		
	6	C510	.47uF 50V Cer.	49-000032-02		
	7	C602	.22uF 50V Cer.	49-000032-01		
	8	C603	.22uF 50V Cer.	49-000032-01		
	9	C606	.1uF 50V Cer.	46-310468-65		
	10	C702	.22uF 50V Cer.	49-000032-01		
	11	C703	.22uF 50V Cer.	49-000032-01		
	12	C706	.1uF 50V Cer.	46-310468-65		
	13	C804	470uF 50V Elect.	44-347106-10		
	14	C805	.1uF 50V Cer.	46-310468-65		
	15	C806	470uF 50V Elect.	44-347106-10		
	16	C807	.1uF 50V Cer.	46-310468-65		
Resistors	17	R515	620K ¼W 5%	40-126245-11		
	18	R516	500K trim pot	41-000299-22		
	19	R518	1.5K 1W 5%	40-421525-11		
	20	R519	1K ½W 5%	40-221025-11		
	21	R520	470K ½W 5%	40-224745-11		
	22	R521	1.5K ¼W 5%	40-121525-11		
	23	R522	1.5K ¼W 5%	40-121525-11		
	24	R523	47K ¼W 5%	40-124735-11		
	25	R524	750K ¼W 5%	40-127545-11		
	26	R525	3.3K 1W 5%	40-423325-01		
	27	R526	500 ohm trim pot	41-000299-17		
	28	R527	270 ohm ¼W 5%	40-122715-11		
	29	R528	4.7K ¼W 5%	40-124725-11		
	30	R529	4.7K ¼W 5%	40-124725-11		
	31	R530	220 ohm ¼W 5%	40-122215-11		
	32	R531	10K ¼W 5%	40-121035-11		
	33	R603	4.7K ½W 5%	40-224725-11		
	34	R604	180 ohm ¼W 5%	40-121815-11		
	35	R605	1K ¼W 5%	40-121025-11		
	36	R606	1K ¼W 5%	40-121025-11		
	37	R607	820 ohm 1W 10%	40-428211-01		
	38	R609	100 ohm ¼W 5%	40-121015-11		
	39	R610	150 ohm ¼W 5%	40-121515-11		
	40	R611	39 ohm ¼W 5%	40-123905-11		
	41	R612	470 ohm ¼W 5%	40-124715-11		
	42	R613	39 ohm ¼W 5%	40-123905-11		
	43	R614	4.7K ½W 5%	40-224725-11		
	44	R617	2.2K 2W 5%	40-622225-07		
	45	R618	0.27 ohm 1W 5% w.w.	42-000075-01		
	46	R619	0.27 ohm 1W 5% w.w.	42-000075-01		
	47	R620	4.5 ohm 10W 5%	42-000076-03		
	48	R621	6.8K ½W 5%	40-226825-11		

A. Deflection Amp PCB Assembly 02-160005-01 (continued)

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Resistors	49	R631	1K control	41-000331-02		
	50	R633	1.1K ¼W 5%	40-121125-11		
	51	R634	6.8K ¼W 5%	40-126825-11		
	52	R635	6.8K ¼W 5%	40-126825-11		
	53	R636	2K control	41-000331-03		
	54	R640	3.6K ½W 5%	40-223625-11		
	55	R641	360 ohm ¼W 5%	40-123615-11		
	56	R703	4.7K ½W 5%	40-224725-11		
	57	R704	180 ohm ¼W 5%	40-121815-11		
	58	R705	1K ¼W 5%	40-121025-11		
	59	R706	1K ¼W 5%	40-121025-11		
	60	R707	820 ohm 1W 10%	40-428211-01		
	61	R709	100 ohm ¼W 5%	40-121015-11		
	62	R710	150 ohm ¼W 5%	40-121515-11		
	63	R711	39 ohm ¼W 5%	40-123905-11		
	64	R712	470 ohm ¼W 5%	40-124715-11		
	65	R713	39 ohm ¼W 5%	40-123905-11		
	66	R714	4.7K ½W 5%	40-224725-11		
	67	R717	2.2K 2W 5%	40-622225-07		
	68	R718	0.27 ohm 1W 5% w.w.	42-000075-01		
	69	R719	0.27 ohm 1W 5% w.w.	42-000075-01		
	70	R720	5.1 ohm 10W 5%	42-000076-04		
	71	R721	6.8K ½W 5%	40-226825-11		
	72	R731	1K control	41-000331-02		
	73	R733	390 ohm ¼W 5%	40-123915-11		
	74	R734	6.8K ¼W 5%	40-126825-11		
	75	R735	5.6K ¼W 5%	40-125625-11		
	76	R736	1K control	41-000331-02		
	77	R740	3.6K ½W 5%	40-223625-11		
	78	R741	360 ohm ¼W 5%	40-123615-11		
Semiconductors	79	D504	Diode	14-000514-36	TI 1N914	
	80	D505	Diode	14-000514-36	TI 1N914	
	81	D506	Diode	14-000514-36	TI 1N914	
	82	D507	Light emitting diode	14-000521-03		
	83	D509	Fast recovery diode	28-000044-01	BY-208-1000	Philips
	84	D601	Diode	14-000514-36	TI 1N914	
	85	D602	Diode	14-000514-36	TI 1N914	
	86	D603	Diode	14-000514-36	TI 1N914	
	87	D604	Diode	14-000514-36	TI 1N914	
	88	D607	Diode	14-000525-01	TI 1N4001	
	89	D608	Diode	14-000525-01	TI 1N4001	
	90	D630	Diode	14-000514-36	TI 1N914	
	91	D631	Diode	14-000514-36	TI 1N914	
	92	D632	Germanium diode	14-000514-37	1N 100	
	93	D633	Diode	14-000514-36	TI 1N914	
	94	D634	Diode	14-000514-36	TI 1N914	
	95	D635	Germanium diode	14-000514-37	1N 100	
	96	D701	Diode	14-000514-36	TI 1N914	
	97	D702	Diode	14-000514-36	TI 1N914	
	98	D703	Diode	14-000514-36	TI 1N914	
	99	D704	Diode	14-000514-36	TI 1N914	
	100	D707	Diode	14-000525-01	TI 1N4001	
	101	D708	Diode	14-000525-01	TI 1N4001	
	102	D730	Diode	14-000514-36	TI 1N914	
	103	D731	Diode	14-000514-36	TI 1N914	
	104	D732	Germanium diode	14-000514-37	1N 100	
	105	D733	Diode	14-000514-36	TI 1N914	
	106	D734	Diode	14-000514-36	TI 1N914	
	107	D735	Germanium diode	14-000514-37	1N 100	
	108	ZD600	12V 1W zener diode 5%	14-000515-75	1N4742A	
	109	ZD601	12V 1W zener diode 5%	14-000515-75	1N4742A	

A. Deflection Amp PCB Assembly 02-160005-02 (continued)

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
	110	ZD700	12V 1W zener diode 5%	14-000515-75	1N4742A	
	111	ZD701	12V 1W zener diode 5%	14-000515-75	1N4742A	
	112	Q503	Transistor	14-000943-12	TIS98	
	113	Q504	Transistor	14-000944-12	MPSU03	
	114	Q506	Transistor	14-000943-12	TIS98	
	115	Q601	Transistor	14-000943-12	TIS98	
	116	Q602	Transistor	14-000943-12	TIS98	
	117	Q603	Transistor	14-000943-12	TIS98	
	118	Q604	Transistor	14-000934-12	MPSU57	
	119	Q605	Transistor	14-000934-12	MPSU57	
	120	Q606	Transistor	14-000935-12	MPSU07	
	121	Q630	Transistor	14-000943-12	TIS98	
	122	Q701	Transistor	14-000943-12	TIS98	
	123	Q702	Transistor	14-000943-12	TIS98	
	124	Q703	Transistor	14-000943-12	TIS98	
	125	Q704	Transistor	14-000934-12	MPSU57	
	126	Q705	Transistor	14-000934-12	MPSU57	
	127	Q706	Transistor	14-000935-12	MPSU07	
	128	Q730	Transistor	14-000943-12	TIS98	
Fuses	129	F600	2 amp pico fuse	27-000034-01		
	130	F700	2 amp pico fuse	27-000034-01		
Lamps	131	NE501A	Lamp (neon)	27-000011-05	NE2	
	132	NE501B	Lamp (neon)	27-000011-05	NE2	
	133	NE502	Lamp (neon)	27-000011-10	NE2H	
Hardware	134	P501	Wafer assembly	34-000621-03		
	135	P601	Wafer assembly	34-000621-07		
	136	P700	Wafer assembly	34-000621-07		
	137	P701	Wafer assembly	34-000621-07		
	138	P702	Wafer assembly	34-000621-05		
	139	P703	Wafer assembly	34-000621-07		
	140	RV	Eyelet (8)	32-000007-15		
	141	X	Radio pin (4)	34-000490-01		
	142	X	Cement	99-000002-28		
	143	X	Silicone compound	99-000030-05		
	144	W	Wire (18)	33-000679-01		
	145	BR	Heat sink (4)	35-003702-01		
	146	SC	PCB studs (7)	33-000634-01		
	147	NU	PAL nut (7)	33-000030-07		
	148	PB	Deflection amp PCB	50-001412-01		
	149	W	Fibre washer (3)	33-000041-16		
	150	RV	Eyelet (8)	32-000007-12		

B. Deflection Heat Sink Assembly 02-160006-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Semiconductors	1	Q607	Transistor	14-000940-01	TI2N3792	
	2	Q608	Transistor	14-000941-01	TI2N3716	
	3	Q707	Transistor	14-000940-01	TI2N3792	
	4	Q708	Transistor	14-000941-01	TI2N3716	
Hardware	5	J601	Nylon connector	34-000655-07		
	6	J701	Nylon connector	34-000655-07		
	7	X	Crimp type terminal (12)	34-000550-01		
	8	QS	Trans. socket (4)	34-000515-04		
	9	X	Cable tie (4)	33-000523-01		
	10	SC	No. 6x½" TFAB HWH SC (8)	31-620618-08		
	11	EX	Heat sink extru.	30-100120-03		
	12	W	Wire No. 20 TR-64 white	20-311999-12		
	13	SH	Insulator (4)	39-000068-13		
	14	X	Silicone compound	99-000030-05		
	15	X	Polarizing key (2)	34-000552-01		

C. Miscellaneous Hardware for Deflection Panel Assembly 02-160001-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Hardware	1	SC	10-24x3/8" HWH SC (4)	31-601018-06		
	2	SC	No. 8x3/8" TFB HWH SC (4)	31-610818-06		
	3	SC	No. 8x5/8" TFB HWH SC	31-610818-10		
	4	RV	Rivet 3/16 (4)	32-000002-06		
	5	RV	Plastic grommet	32-000061-06		
	6	RV	PCB support	33-000626-01		
	7	BR	PCB support bracket	35-003565-02		
	8	BR	Side panel LH	35-003668-01		
	9	BR	Stand-off bracket (2)	35-003680-01		

EHT SUPPLY PANEL ASSEMBLY 02-160002-01
A. EHT Supply Assembly 02-160007-01
A1. EHT Supply PCB Assembly 02-160008-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Capacitors	1	C900	.1uF 50V Cer.	46-310468-65		
	2	C901	47uF 50V Elect.	44-347006-05		
	⚠3	C902	100uF 10V tantalum	44-210239-03		
	4	C903	0.1uF 200 Volt	49-000033-01		
	5	C905	0.47uF 50V Ceramic	49-000032-02		
	6	C906	.47uF 600V mylar	48-174746-62		
	7	C907	.47uF 600V mylar	48-174746-62		
	8	C908	10nF 1000V	46-510371-75		
	9	C909	4.7uF 150V Elect.	44-347509-05		
	10	C910	470uF 50V Elect.	44-347106-10		
	11	C911	1500pF cer.	46-315217-07		
	12	C912	.1uF 50V Cer.	46-310468-65		
Resistors	13	R900	100 ohm ½W 5%	40-221015-11		
	14	R901	1.2K 1W 5%	40-421225-01		
	15	R902	6.8K ½W 5%	40-226825-11		
	⚠16	R903	27K ¼W 5%	40-122735-11		
	17	R905	3.3K ¼W 5%	40-123325-11		
	18	R906	1 ohm ½W 5%	40-221095-01		
	19	R907	3.6K ½W 5%	40-223625-11		
	20	R908	430 ohm ¼W 5%	40-124315-11		
	21	R909	4.7 ohm ½W 5%	40-224795-11		
	22	R910	3.3M ½W 5%	40-223355-11		
	23	R911	10M ohm focus control	41-000227-72		
	24	R912	4.7K trim pot	41-000265-12		
	25	R913	2K ¼W 5%	40-122025-11		
	⚠26	R914	15 ohm 2W 5% w.w.	40-621505-04		
	⚠27	R915	680 ohm ¼W 5%	40-126815-11		
Semiconductors	28	D900	Fast recovery diode	28-000044-01	BY208-1000	Philips
	29	D901	Rectifier	28-000022-29	VG2X	Varo
	30	D902	Rectifier	28-000022-29	VG2X	Varo
	31	D903	Fast recovery diode	28-000044-01	BY208-1000	Philips
	32	ZD900	9.1V 5% zener diode	14-000515-67	1N5239B	
	⚠33	ZD901	68V 5% zener diode	14-000515-73	1N981B	
	⚠34	ZD903	110V 5% zener diode	14-000515-77	1N5272B	
	35	Q900	Transistor	14-000936-32	MPSA06	
	36	Q901	Transistor	14-000936-32	MPSA06	
	⚠37	Q904	SCR transistor	14-000516-04	MCR106-2	
Special Parts	⚠38	VD900	HV doubler	28-000043-01		
	⚠39	T900	HV transformer	24-180001-01		
Fuse	⚠40	F901	1 amp fuse (fast blow)	27-000014-09		
Hardware	41	P900	Wafer assembly	34-000557-08		
	42	P901	Wafer assembly	34-000557-02		
	43	QS900	Trans. socket	34-000594-02		
	44	QS901	Trans. socket	34-000594-02		
	45	CL	Fuse mtg. clip (2)	33-000446-03		
	46	RV	Eyelet (4)	32-000007-15		
	47	WA	Lockwasher (2)	33-000024-05		
	48	NU	Hex nut (2)	33-000009-01		
	49	PB	EHT PCB	50-001410-01		
	50	X	Silicon	99-000002-28		
	51	W	Wire	33-000679-01		
	52	X	Ring terminal	34-000699-01		

A1. EHT Supply PCB Assembly 02-160008-01 (continued)

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Hardware	53	X	Sleeving	20-300013-04		
	54	W	Wire (green)	20-311999-21		
Coil	55	L900	0.7uH coil	21-001126-01		

A2. EHT Supply Assembly Kit 05-160002-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Semiconductors	1	Q902	Transistor	14-000942-23	MJE 51T	Motorola
	2	Q903	Transistor	14-000937-23	TIP 31B	Motorola
Hardware	3	SC	No.4x3/8" TFB HWH SC (2)	31-610418-06		
	4	SC	No.8x3/8" TFB HWH SC (12)	31-610818-06		
	5	RV	Rubber Grommet	32-000044-04		
	6	RV	Nyliner	33-000429-01		
	7	X	Heat sink	35-003678-01		
	8	BR	Cover	35-003679-01		
	9	SH	Insulator (2)	39-000068-15		
	10	WA	Shoulder washer (2)	39-001189-01		
	11	LA	Fuse caution label	54-008399-01		
	12	LA	Focus adjust label	54-008490-01		
	13	LA	EHT adjust label	54-008491-01		
	14	X	Silicone compound	99-000030-05		
	15	J901	connector	34-000655-02		
	16	X	Crimp type terminal	34-000550-01		
	17	X	Rint terminal	34-000699-01		
	18	W	No.18 wire (black)	20-311999-21		

B. Miscellaneous Hardware for EHT Supply Panel Assembly 02-160002-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Hardware	1	SC	No.8x3/8" TFB HWH SC (4)	31-610818-06		
	2	X	Cable tie	33-000523-04		
	3	BR	Side panel RH	35-003667-01		
	4	LA	Warning label	54-008198-02		
	5	WA	Lockwasher	33-000025-01		

BOTTOM PANEL ASSEMBLY 02-160003-01
A. Regulator P.C.B. Assembly 02-160011-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Capacitors	1	C100	7200uF 50V Elect.	44-000188-04		
	2	C101	7200uF 50V Elect.	44-000188-04		
	3	C102	1uF 50V Elect.	44-110509-02		
	4	C103	1uF 50V Elect.	44-110509-02		
Resistors	5	R100	10K ½W 5%	40-221035-11		
	6	R101	10K ½W 5%	40-221035-11		
	7	R102	390 ohm 1W 5%	42-000078-01		Fire Retardant
	8	R103	390 ohm 1W 5%	42-000078-01		Fire Retardant
	9	R104	1.5 ohm 1W 5% w.w.	40-521595-04		
Semiconductors	10	D100	3 amp diode	14-000514-38	MR 501	Motorola
	11	D101	3 amp diode	14-000514-38	MR 501	Motorola
	12	DB100	Bridge rectifier	28-000046-02	KBPC 602	G.I.
	13	ZD100	27V 5W 5% zener diode	14-000515-74	1N5361B	
	14	ZD101	27V 5W 5% zener diode	14-000515-74	1N5361B	
	15	Q100	Regulator	14-002075-01	2N6057	
	16	Q101	Regulator	14-002076-01	2N6050	
Fuses	17	F100	Fuse 5 amp slow blow	27-000005-07		
	18	F101	Fuse 5 amp slow blow	27-000005-07		
Coil	19	L100	12uH choke	21-001410-02		
Hardware	20	P100	Wafer housing	34-000711-01		
	21	P101	Pin terminal	34-000557-18		
	22	EX	Heat sink extrusion	30-100120-04		
	23	QS	Trans. socket (2)	34-000515-04		
	24	SH	Insulator	39-000068-13		
	25	X	Silicone compound	99-000030-05		
	26	SC	No.6x½" TFAB HWH SC (4)	31-620618-08		
	27	SC	No.8x3/8" TFB HWH SC (4)	31-610818-06		
	28	BR	Cap. mounting clamp	33-000479-02		
	29	SC	No.6x5/8" HWH SC (2)	31-600618-10		
	30	NU	6-32 nut and star washer (4)	33-000440-01		

A. Regulator PCB Assembly 02-160011-01 (continued)

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
	31	SC	6-32 P.C.B. studs (4)	33-000634-09		
	32	CL	Fuse mounting clip (4)	33-000446-03		
	33	RV	Radio pin (6)	34-000490-01		
	34	RV	Eyelet (6)	32-000007-15		
	35	PB	Regulator PCB	50-001420-01		
	36	W	Wire No. 20 TR 64	20-311999-12		
	37	W	Wire	33-000679-01		
	38	NU	Speed Nut (2)	33-000465-22		
	39	RV	Eyelet (4)	32-000007-12		
	40	X	Cement	99-000002-28		
	41	SC	Screw for 44-188-04 (2)	33-000539-01		
	42	WA	Lockwasher for 44-188-04 (2)	33-000539-02		

B. Miscellaneous Hardware for Bottom Panel Assembly 02-160003-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Hardware	1	BR	PCB support bracket	35-003565-02		
	2	BR	Bottom Panel	35-003666-01		
	3	SC	No.8x3/8" TFB HWH SC (3)	31-610818-06		
	4	SC	No.8x5/8" TFB HWH SC	31-610818-10		
	5	RV	Plastic grommet	32-000061-06		
	6	X	Cable tie (6)	33-000523-04		
	7	WA	Lockwasher	33-000025-01		
	8	LA	Label	54-008546-01		

X-Y CHASSIS KIT 05-160001-01 AND CRT

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Yoke	1	L101	Deflection yoke	21-000139-02		
Hardware	2	SC	No.8x3/8" TFB HWH SC (16)	31-610818-06		
	3	RV	Rivet	32-000002-05		
	4	WA	Pyramidal lock washer (4)	33-000255-01		
	5	SC	¼-20x¾ mach. screw (4)	33-000485-01		
	6	W	Ground strap assembly	34-000697-01		
	7	SS	Ground strap spring	35-003560-01		
	8	BR	Rear brace	35-003681-01		
	9	BR	Front brace	35-003682-01		
	10	X	Hook (ground strap)	35-003690-01		
	11	SH	Ground strap isolator	39-001190-01		
	12	TA	Masking tape	36-000008-02		
	13	LA	Control identification label	54-008557-01		
C.R.T.	14	V100	20" pix tube	17-006202-01	19VARP4	Sylvania

HARNESS ASSEMBLY 02-160004-01

Comp. Name	Item	Symbol	Description	Elect. P/N	House or JEDEC P/N	Remarks
Hardware	1	J101	Nylon connector	34-000655-08		
	2	J501	Nylon connector	34-000655-03		
	3	J700	Nylon connector	34-000655-07		
	4	J800	Socket (CRT)	34-000213-12		
	5	J900	Nylon connector	34-000655-08		
	6	X	Crimp type term. (18)	34-000550-01		
	7	X	Polarizing key (10)	34-000552-01		
	8	X	Ring terminal (3)	34-000699-01		
	9	X	Cable tie (20)	33-000523-01		
	10	W	Wire No.18 TR64	20-311999-21		
	11	W	Wire No.20 TR64	20-311999-12		

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