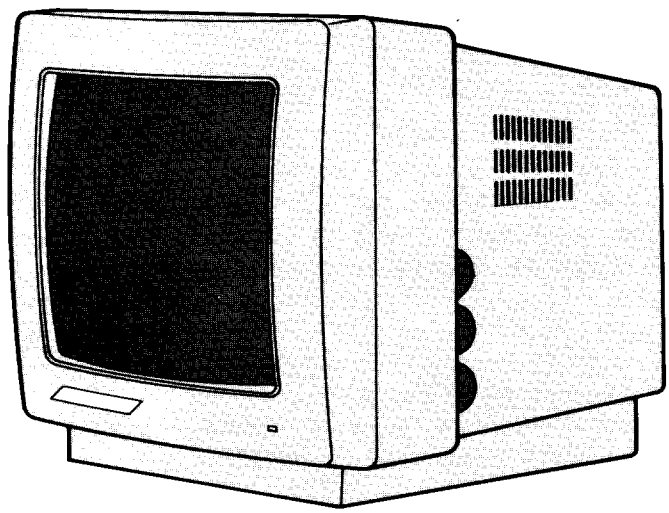
ATARI®

Chassis No.: CA-3

SC1224™
RGB COLOR MONITOR



CONTENTS

THEORY OF OPERATION

POWER SUPPLY

The power supply is a SMPS (switching mode power supply) that consists of switching IC950 (STR41090), SMPS transformer (T950), and the associated components. The basic theory of the SMPS is the circuit of self oscillation. The primary winding of the SMPS transformer is applied the pulse by operating Q931. Therefore, rectified DC 115V and DC 12V, 14V is obtained by D960, D961, D962 in the secondary winding of SMPS transformer T950.

START UP CIRCUIT

An initial start-up circuit drives the horizontal output stage when the set is initially turned on.
This circuit consists of transistor Q701 and its associated components. Provides a drive pulse to the horizontal drive transistor Q702. Once the FBT-driven voltages operate, diode D706 is forwardbiased and diode D701 is reverse-biased, providing DC 24V to IC601 and Q702. Switching the voltage supply circuit in the above manner, result in saving power consumption.

HORIZONTAL AND VERTICAL DEFLECTION SYNCHRONIZATION

The IC701 performs the horizontal synchronization (oscillator). A horizontal rate output pulse is coupled from IC701 pin 12 to the horizontal driver Q702. The driver stage drives the horizontal output Q703.
The horizontal sync signal coupling IC701 pin 1 is derived from dividing between R704 and R709.
The vertical sync signal is injected to IC701 pin 19 through C602.

HORIZONTAL AFC AND OSCILLATION LIMITTER

The AFC circuit consists of phase detection circuit of IC701 and the associated component. The oscillation limit circuit is necessary to prevent the pulse from excessive high voltage. This circuit is located in IC701 and cotrols the oscillator to maintain the control signal in its correct frequency and in phase with the horizontal sync signal.

X-RAY PROTECTION CIRCUIT

The X-ray protection circuit consists of D704, R725 (hold down), R724, R726 and the associated component that connected to pin 12 of IC701. A pulse from the FBT pin 2 is rectified by D705. Under normal operating conditions, the resultant voltage maintains the specified value.
If a malfunction cause excessive high voltage, the amplitude of the pulse from the FBT increases, causing a corresponding increase in D704 which results in a voltage increase at pin 13 of IC601. A voltage increase at IC701 pin 13 makes the X-ray protection circuit conduct, and the horizontal oscillation operation no longer functional.
The circuit latches as above, and itis necessary for the circuit to turn the power off for at least 30 seconds to function again.

VERTICAL OSCILLATION DRIVE CIRCUIT

The time constant circuit that determines the vertical oscillation frequency consists of IC701, C602, R603 and C603 connected at IC701 pin 18. Vertical size control function is performed by R615, causing the negative feed back to change.

VERTICAL OUTPUT

Vertical out circuit consists of IC601 and associated component.

HORIZONTAL DRIVE CIRCUIT

To obtain horizontal drive pulses from IC701 pin 12, the horizontal oscillator must be working.
Horizontal drive pulses from IC701 pin 12 are applied to horizontal driver Q702. The B^+ for Q702 is supplied from the 50V line through D706. During initial receiver turn-on before the FBT (drive supply voltages are developed), an initial B^+ is supplied to Q702 from the regulated 115 volt line through R704.

HORIZONTAL OUTPUT

Horizontal drive pulses from Q702 are coupled through T701 to the base of horizontal output Q703. Transistor Q703 is biased on when the beam is at about mid-screen.
The charge stored on C732 and C733 causes current to flow through the horizontal yoke winding and Q703 to ground. When the beam reaches the right side of the screen, Q703 is turned off, and the current in the yoke is directed into C715 and C716. At the same time current flows into C715 and C716 from the regulated B^+ via the FBT primary winding.
Due to resonance, the current then reverses and flows back through the horizontal yoke winding into C732 and C733. This action defects the electron beam back to the +115V regulated B^+.

PINCUSHION CORRECTION

The pincushion correction circuit consists of T703, Q602 and its associated components.
The horizontal yoke current is increased or decreased in response to vertical parabola pulses.

POWER SUPPLY DESCRIPTIONS

This SMPS (switching mode power supply) using STR41090 obtains rectified DC115V, 12V, 14V from AC240V.
Power is supplied in the following procedure:

1) AC240V supplied from the AC socket is rectified by BD901.
2) Rectified voltage is supplied to the T950. As to STR41090 Voltage which is primarily rectified by D951, is supplied to pin 2 of IC951 through R952, R953, R954.
3) At this moment, a pulse is generated at pin 3 of the IC950, which switches Q3 by internal oscillation of IC951.
4) This oscillation causes IC950 to switched, and at the secondary terminal of T950, a voltage proportional to the turn ratio is generated.
5) The generated voltage supplies DC 115V, 12V, 14V to the output terminal after the rectified by D960, D961, D962 and filtered by C961, C963, C965 and L961.
6) Between Pins 5 and 6 of T950, a voltage is generated proportional to turn the ratio from voltage generated between Pins 11 and 12.
7) Detecting voltage (pin 1 of IC950) is obtained through D950 by generated voltage pin 6 in T950) is 90V.
8) Over current protection circuit (Q950, R951) is existed in order to protect Q3 in IC950 from surge current which may be caused at power switch on or off and output short-circuit.

ADJUSTMENT AND MAINTENANCE

GENERAL INFORMATION

All adjustments are thoroughly checked and corrected when the monitor leaves the factory. Therefore the monitor should operate normally and produce proper color and pictures upon installation. However, serveral minor adjustments may be required depending on the particular location in which the monitor is to operate. This monitor is shipped completely in cardboard carton. Carefully draw out the monitor from the carton and remove all packing materials. Plug the power cord into a convenient 240 volts 50 Hz AC power outlet. Never connect to direct current or any other power outlet or frequency. Check and adjust all the customer controls such as BRIGHTNESS, and CONTRAST to obtain a normal picture.

AUTOMATIC DEGAUSSING.

A degaussing coil is mounted around the picture tube so that external degaussing is normally unnecessary after moving the monitor. The monitor should be properly degaussed upon installation. The degaussing coil operates for about 1 second after the power to the monitor is switched ON. If the set is moved or faced in a different direction, the power switch must be switched off for at least 10 minutes in order that the automatic degaussing circuit operates properly.
Should the chassis or parts of the cabinet become magnetized to cause poor color purity, use an external degaussing coil. Slowly move the degaussing coil around the faceplate of the picture tube, the sides and front of the monitor, and slowly withdraw the coil to a distance of about 2 meters before disconnecting it from the AC source. If color shading still persists, perform the CONVERGENCE ADJUSTMENT procedures, as mentioned later.

HIGH VOLTAGE CHECK

WARNING: There is no HIGH VOLTAGE ADJUSTMENT on this chassis. The +115 volt power supply must be properly adjusted to insure the correct high voltage.

1. Connect an accurate high voltage meter to the second anode of the display tube.
2. Turn on the monitor. Set the BRIGHTNESS and CONTRAST controls to monimum (zero beam current).
3. High voltage will be measured below 24.0 KV.
4. Rotate the BRIGHTNESS control to both extremes to be sure that the high voltage does not exceed the limit of 24.5 KV under any conditions.

FS CIRCUIT CHECK (Hold Down)

The FS (fail safe) circuit check is indispensable for the final check. Checking should be done following steps:

1. Turn the power switch ON and adjust customer controls for normal operation.
2. Connect a VTVM between (the cathode of D704) and the chassis ground.
3. Adjust brightness, and contrast, for mechanical minimum.
4. Adjust the Hold-down VR (R725) on the main board for the voltage of (the cathode voltage of D704) in DC10.25V.
5. After adjusting the voltage, fix the hold down VR (R725) with EPOXY or same kind of bond.
6. Check the set in the hold down when the voltage of TP5 (the cathode voltage of D704) is 13.2V +0.5, −0V.
7. If this monitor is not the FS (fail safe), repeat steps 1 through 5.

HORIZONTAL OSCILLATOR ADJUSTMENT

If there is an indication of unstable horizontal sync., adjust the HORIZONTAL HOLD control (R716) until screen image is stable.

VERTICAL OSCILLATOR ADJUSTMENT

If the picture moves up or down on the screen, adjust the VERTICAL HOLD control (R603) at the back of the monitor until there is a single image without vertical movement.

VERTICAL SIZE ADJUSTMENT

The vertical size control (R616) on the main board changes the size of the picture or pattern, having an equal effect on the top and bottom. The final adjustment for the V-size of picture is 150 mm for 12".

FOCUS ADJUSTMENT

Adjust the FOCUS control on the focus pack for well defined scanning lines in the 1/4 and 3/4 points of the screen.

HORIZONTAL WIDTH ADJUSTMENT

Adjust the horizontal width control coil (L702) by turning it with a hexagonal adjusting tool so that the width of the picture (data display area) is 210 mm for 12".

H-POSITION ADJUSTMENT

Adjust the H-position control (R710), so that the center of picture is the same as the mechanical center of the screen.

V-LINEARITY ADJUSTMENT

1. Display the cross hatch with the character generator.
2. Adjust R635 (V-LIN.) to the best condition.
3. Non-Linearity should be within ±7%.
4. If V-size is changed after adjusting R635 (V-LIN.), readjust R616 (V-SIZE). At the time, signal is reverse pattern.

SUB-BRIGHTNESS ADJUSTMENT

1. Supply white color with a computer to the video input terminal.
2. Turn the contrast to the maximum with the contrast volume (fully clockwise) and BRIGHTNESS to the minimum with the bright volume (fully counterclockwise).
3. Adjust the sub-bright volume (R742) to cut-off the picture slightly.

VERTICAL CENTER ADJUSTMENT

Adjust the V-center control (R626), so that the center of the picture is the same as the mechanical center of the screen.

SIDE PCC ADJUSTMENT

1. Display the reverse pattern with the character generator.
2. Adjust to minimum by rotating R621 (side PCC).
3. At this time, the pincushion or barrel distortion should be within 1.5% (max.)

WHITE BALANCE ADJUSTMENT

1. EQUIPMENT
   - Video Signal generator: LVG-1600 (Analog input)
     R: 1Vp-p G: 1Vp-p B: 1Vp-p
   - Oscillascope
   - W/B meter
   - Color analyzer

2. Adjustment 1
   - Input the 16 step wave 4 Pattern) to the set.
   - Set the BRIGHTNESS, CONTRAST VOL to the maximum.
   - Set the Video output level (R511 rear part) 45Vp-p with adjusting the G.DRIVE (R303).
   - Set the Video output level (R510 rear part) 45Vp-p with adjusting the R.DRIVE (R323.)

- Adjust R.LEVEL (R369) in order to agree with R and G. output level when CONTRAST is minimum position.
- Adjust the R.DRIVE again in order to agree with R and G. output level when CONTRAST is maximum.
- When CONTRAST is maximum or minimum, As above (4) (5) (6) adjust the B.DRIVE (R343) in order to agree with B and G. OUTPUT Level.

3. Adjustment 2
   - Set the SCREEN, CONTROL BRIGHTNESS, CONTRAST VOL.
   - Set the SUB BRIGHT (R742) to the maximum.
   - Set the R.CUT OFF (R317). G. CUT OFF (R337) B. CUT OFF (R357) to the center position.
   - Input the reverse pattern.
   - Set the reverse pattern 3FL in the COLOR ANALYZER with rotating the SCREEN CONTROL.
   - In the case, adjust R.G.B CUT OFF (R317, R337, R357) As below X.Y with W/B METER.
     X: 0.28 ± 0.002 = 0.279−0.283
     Y: 0.311 ± 0.002 = 0.309-0.313

4. Adjustment 3
   Set the CONTRAST AND BRIGHTNESS VOL to the maximum. Set the reverse pattern 28FL in the COLOR ANALYZER with rotating the SUB-BRIGHT (R742).

CONVERGENCE ADJUSTMENT

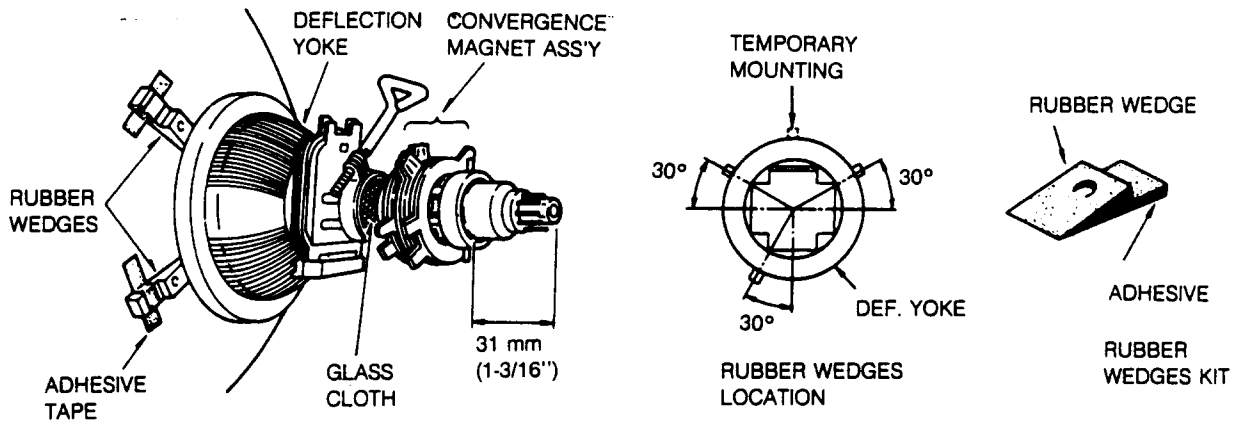
NOTE: Before attempting any convergence adjustments, the monitor should be operated for at least fifteen minutes.

• Center Convergence Adjustment

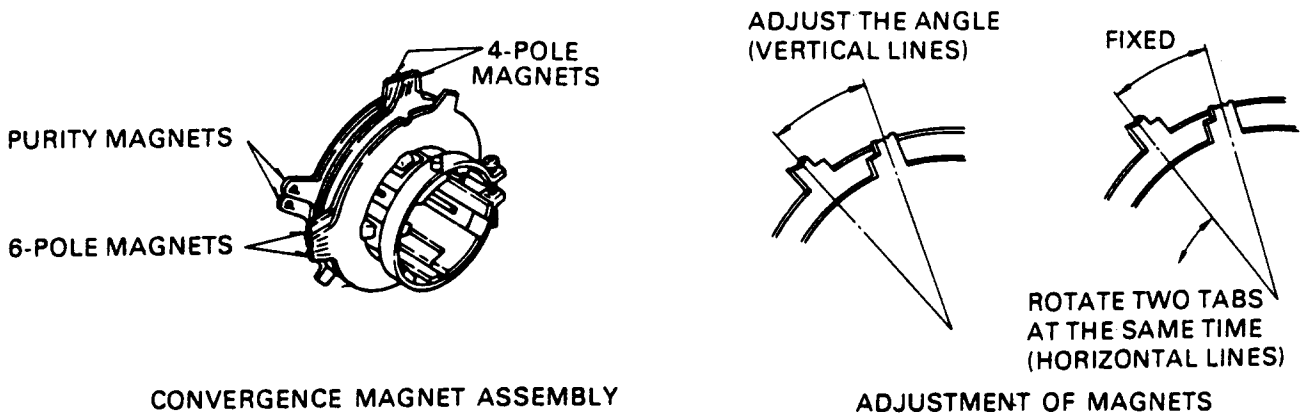
1. Supply a crosshatch pattern with a color character generator. to the video input.
2. Adjust the brightness and contrast controls for a well defined pattern.
3. Adjust the two tabs of the 4-pole magnets to change the angle between them (See Figure 3) and superimpose red and blue vertical lines in the center area of the picture screen. (See Figure 4).
4. Turn both the tabs at the same keeping the angle constant to superimpose red and blue horizontal lines at the center of the screen. (See Figure 4)
5. Adjust the two tabs of the 6-pole magnets to superimpose red/blue line and a green one. Adjusting the angle affects the vertical lines, and rotating both magnets affects the horizontal lines.
6. Repeat adjustment steps 3,4,5 describing red, green and blue movements. The 4-pole magnets and the 6-pole magnets have mutual affection making dots movement complex.

• Circumference Convergence Adjustment

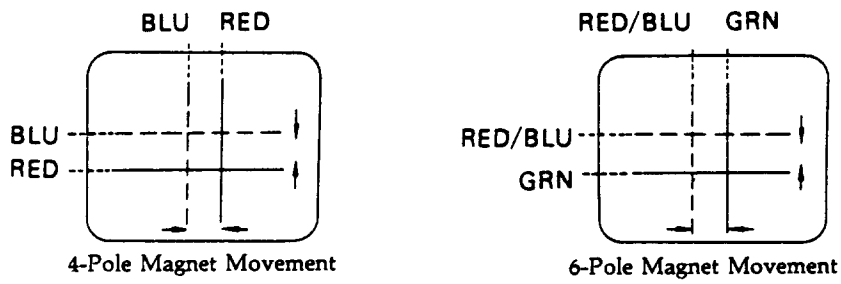
1. Loosen the clamping screw of deflection yoke to allow the yoke to tilt.
2. Put a wedge temporarily, as shown in Figure 2. (Do not remove the cover paper on the adhesive part of the wedge.)
3. Tilt front of the deflection yoke up or down to obtain better convergence in circumference. (See Figure 2) push the mounted wedge into the space between display tube and the yoke to fix the yoke temporarily).
4. Put the other wedge into the bottom space and remove the cover paper.
5. Tilt the front of the yoke right or left to obtain better convergence in circumference. (See Figure 2).
6. Keep the yoke position and put another wedge in eighter upper space. Remove the cover paper and stick the wedge on the display tube to fix the yoke.
7. Detach the temporarily mounted wedge and put it in another upper space. Stick it on the display tube to fix the yoke.
8. After attaching three wedges, recheck overall convergence. Tighten the screw firmly to fix the yoke and check the yoke is firm.
9. Stick 3 adhesive tapes on the wedges as shown in Figure 2.



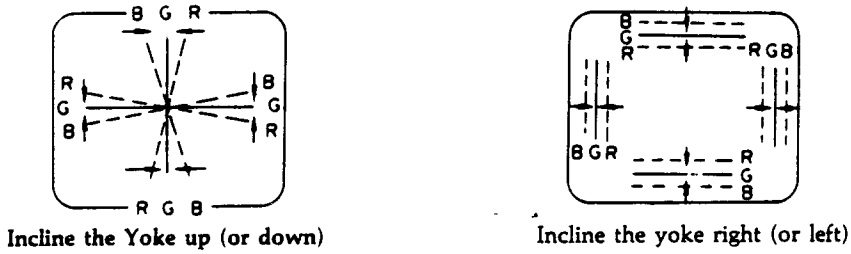
[Figure 2] Circumference Convengent Adjustment



[Figure 3] Center Convergent Adjustment



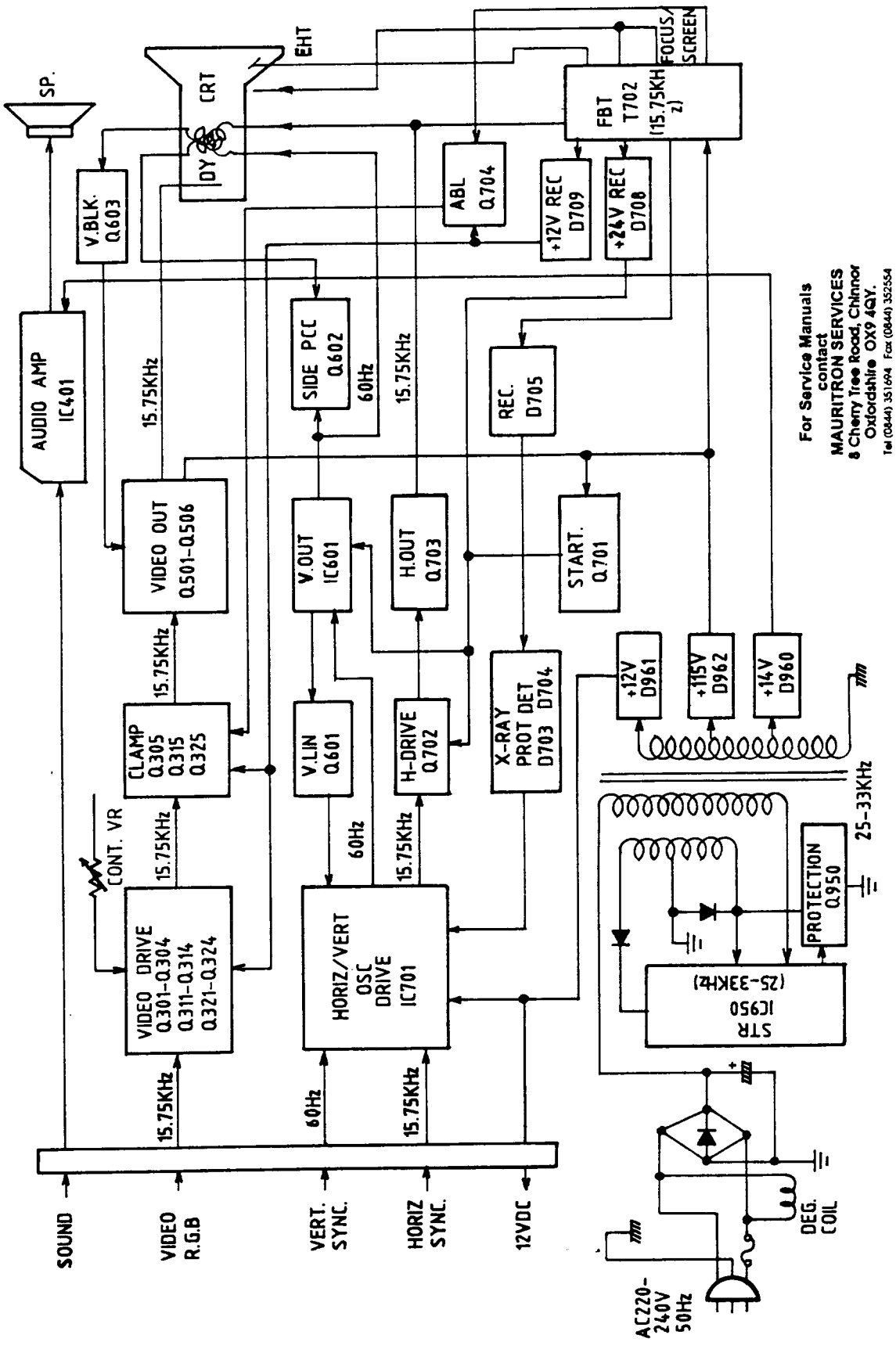
Center Convergence by Convergence Magnets



Circumference by DEF Yoke

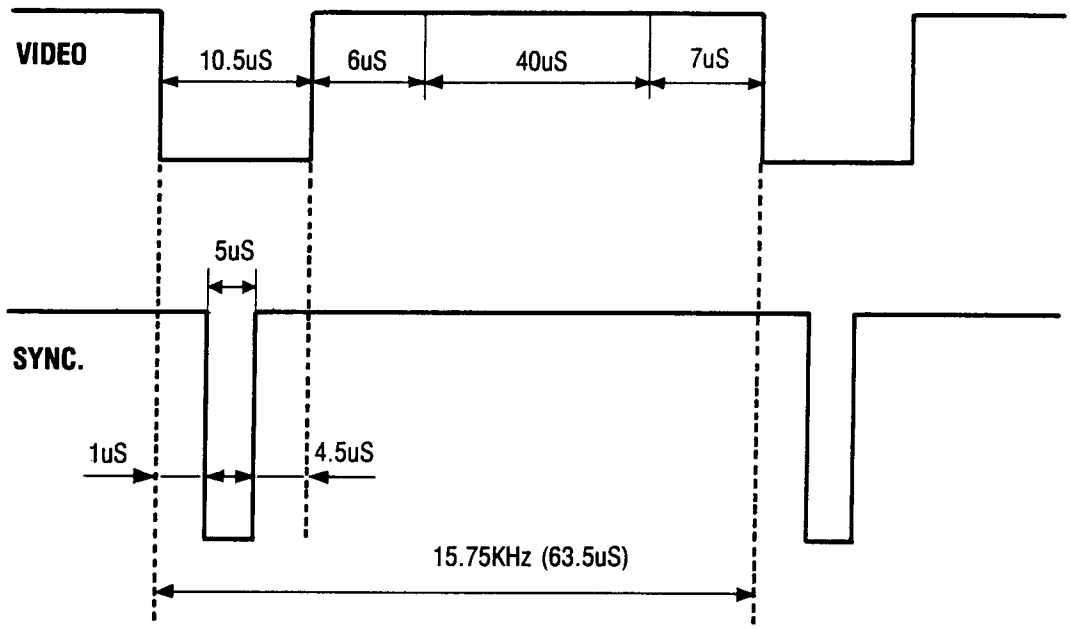
[Figure 4] Dot Movement Pattern

BLOCK DIAGRAM

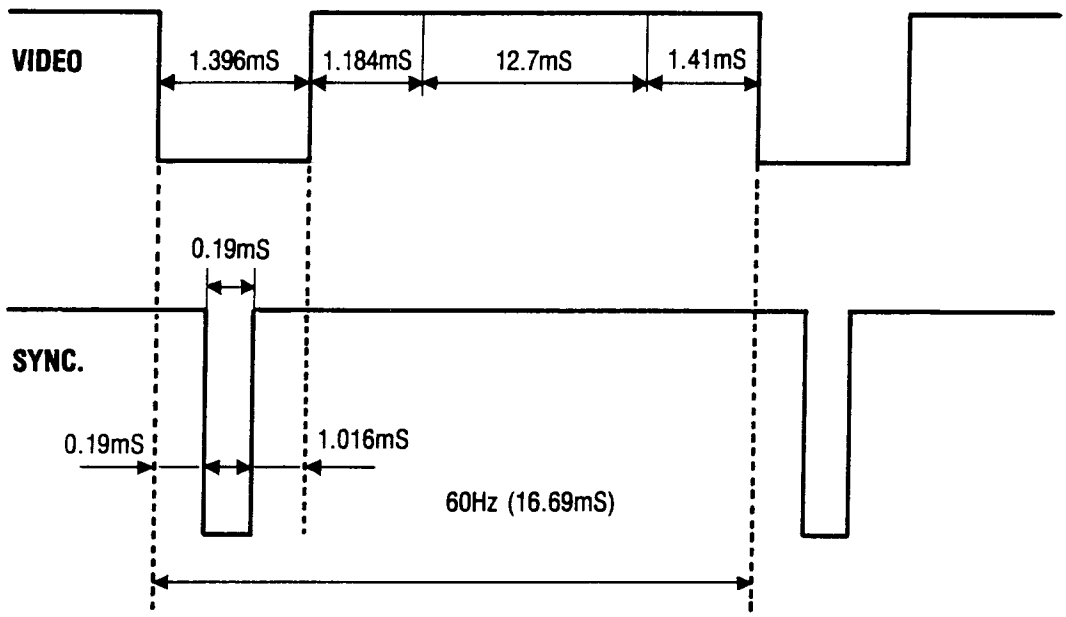


TIMING CHART

HORIZONTAL TIMING



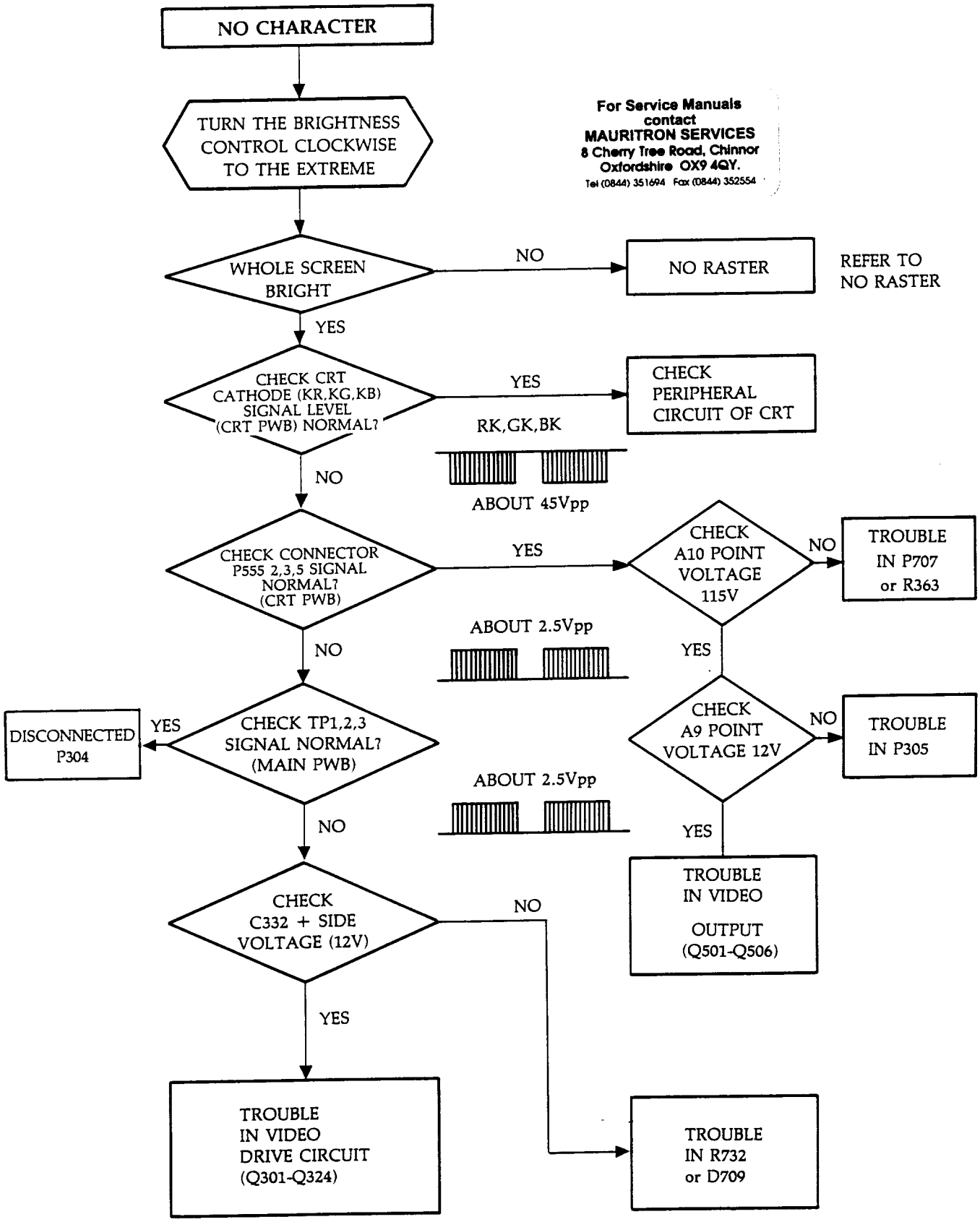
VERTICAL TIMING



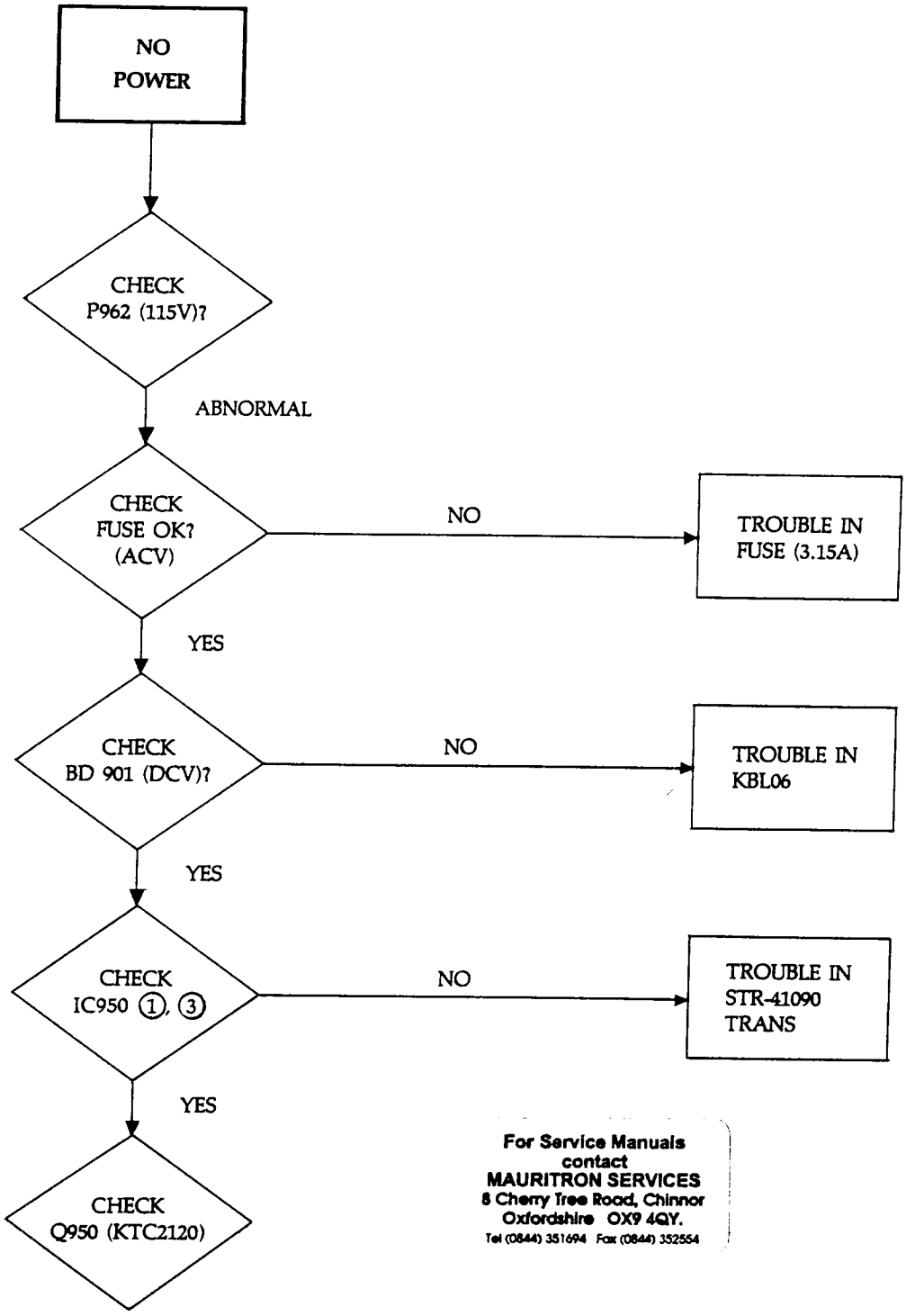
* NOTES
1. SIGNAL INPUT LEVEL: 1Vp-p
2. TIME TOLERANCE: ±0.1%
3. THE MONITOR IS ADJUSTED ACCORDING TO THE ABOVE TIMINGS AND FREQUENCY.

TROUBLE SHOOTING CHART

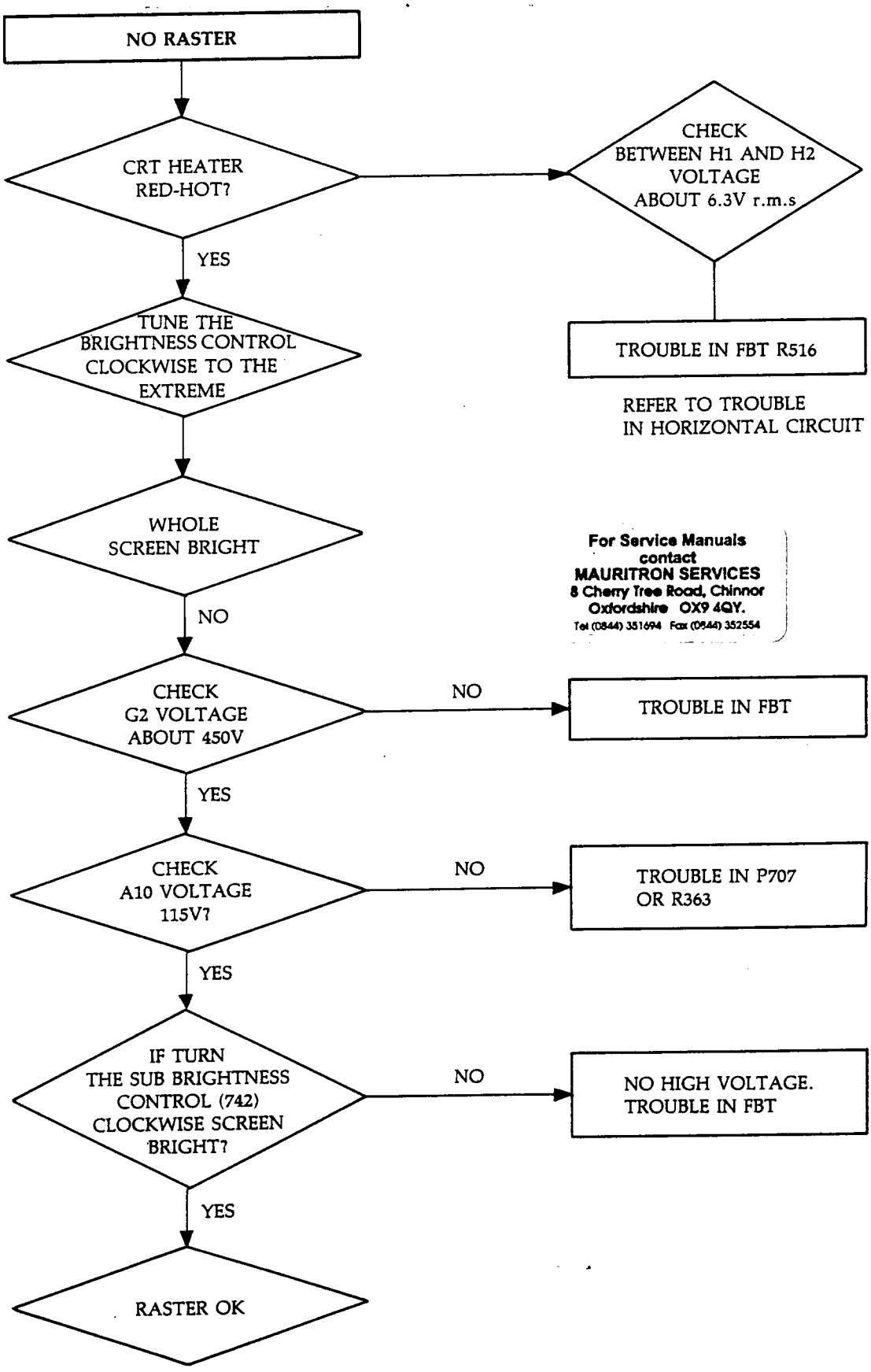
A. NO CHARACTER



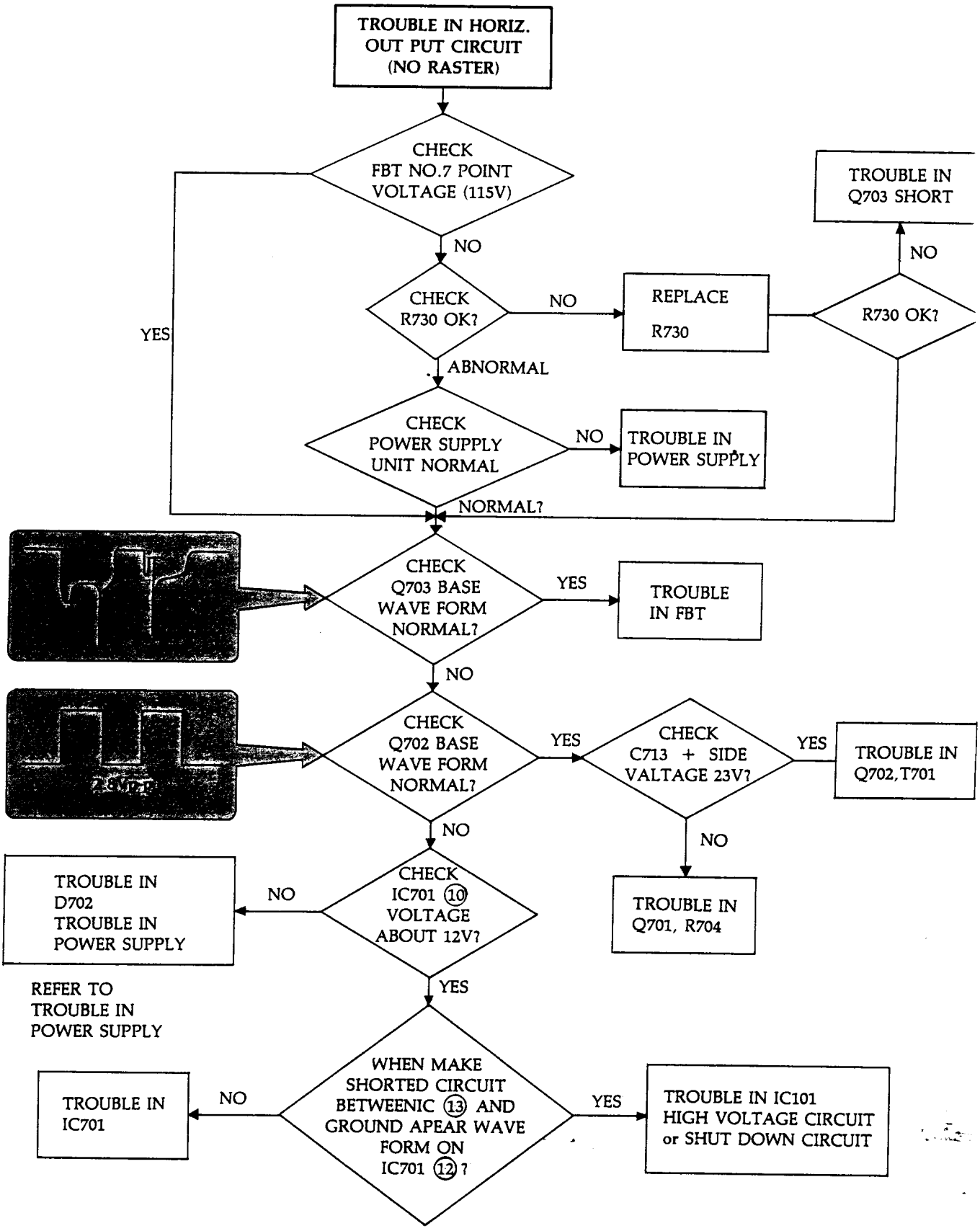
B. NO POWER



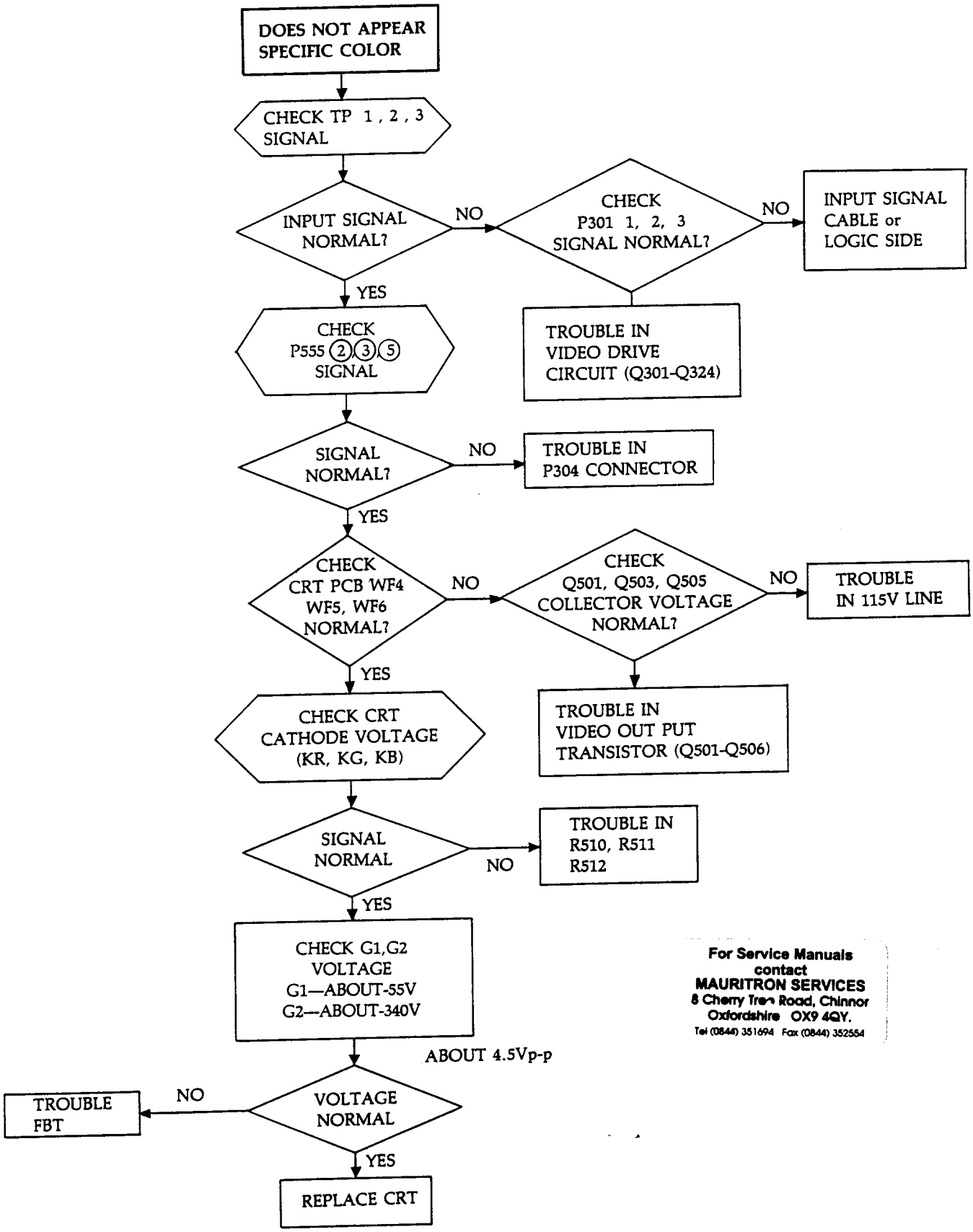
C. NO RASTER



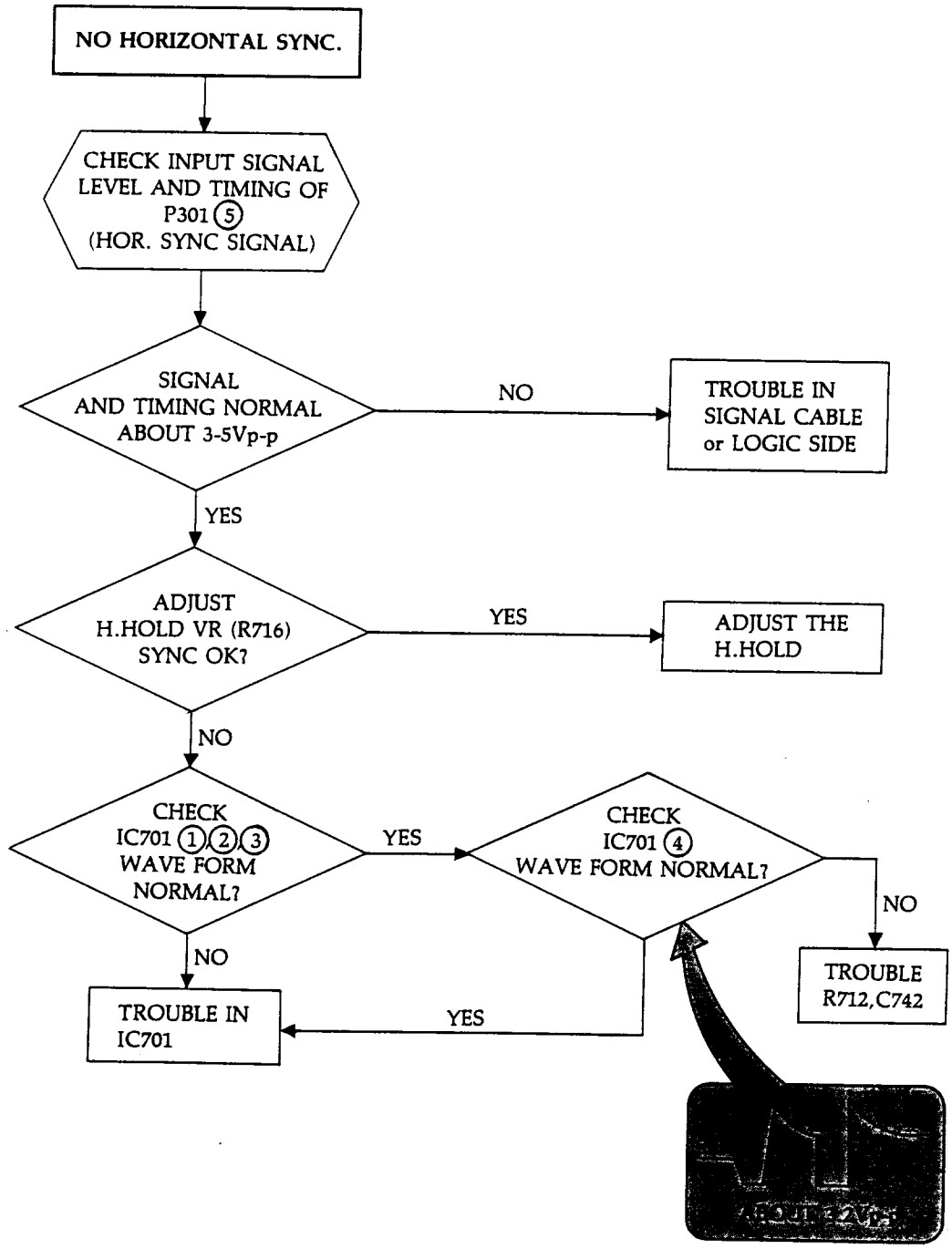
C-1. TROUBLE IN HORIZ OUT CIRCUIT



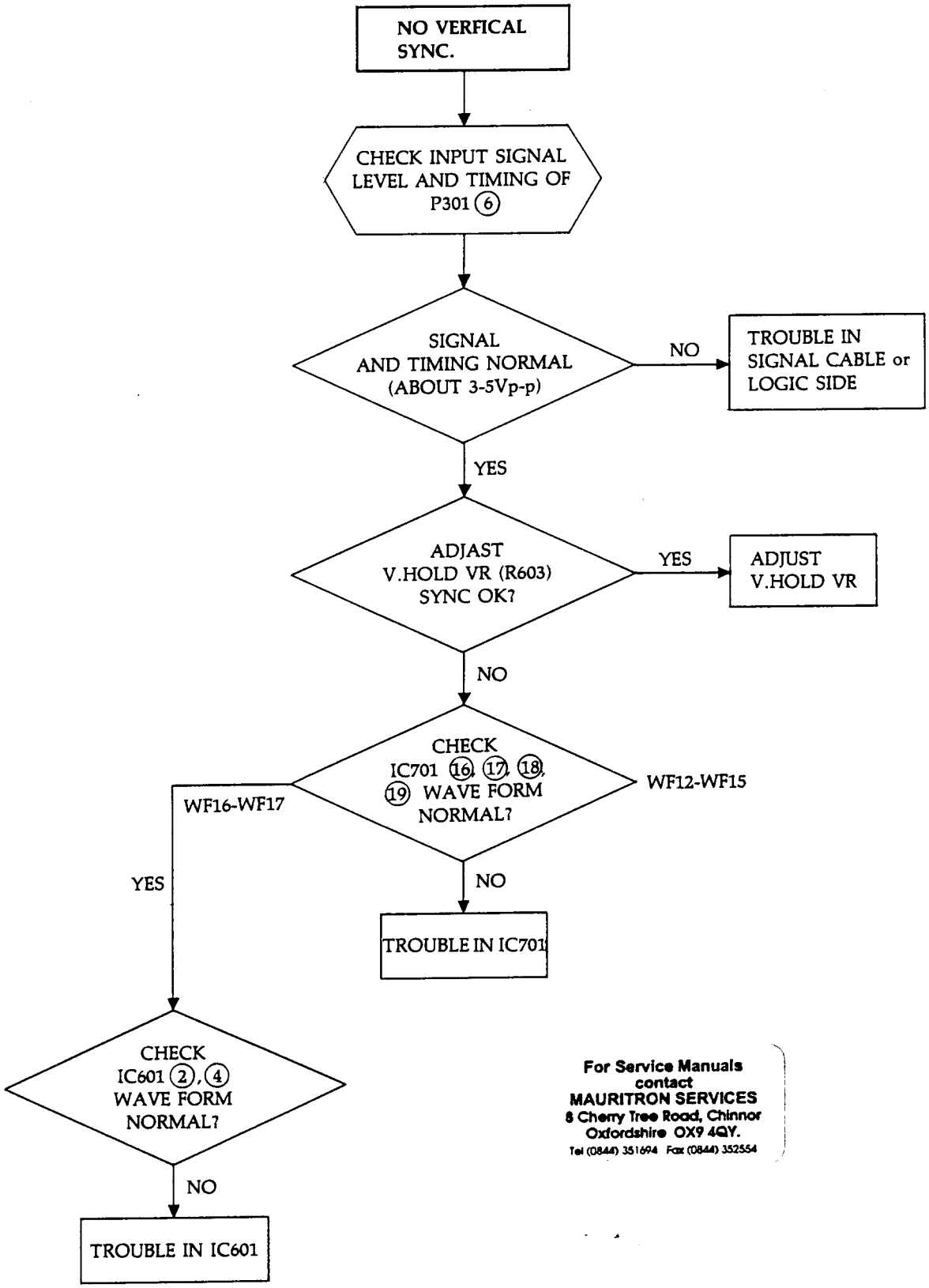
D.



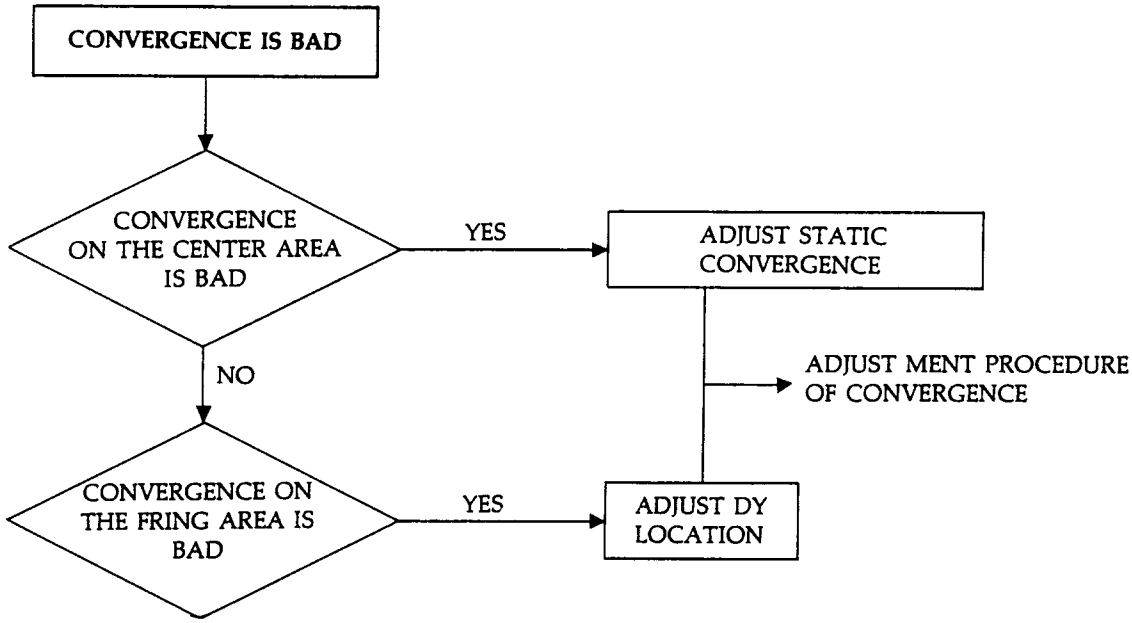
E: NO HORIZONTAL SYNC.



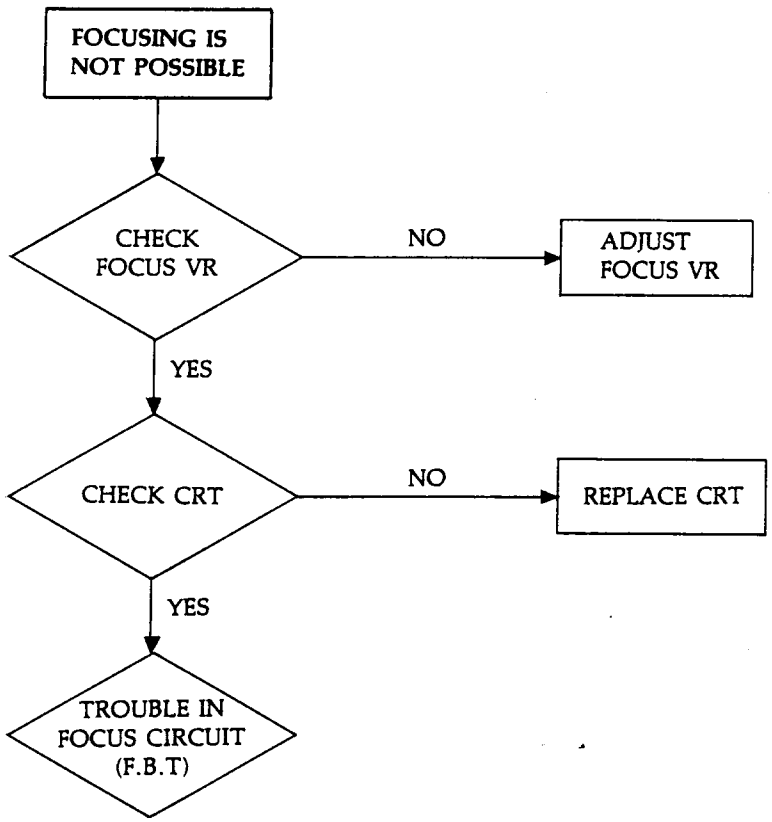
F. NO VERTICAL SYNC.



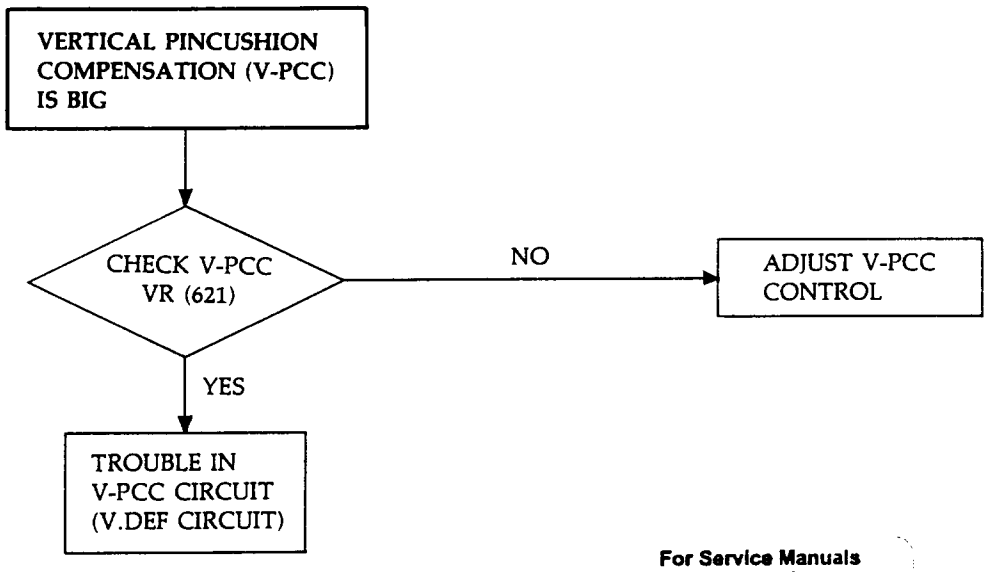
G. CONVERGENCE IS BAD



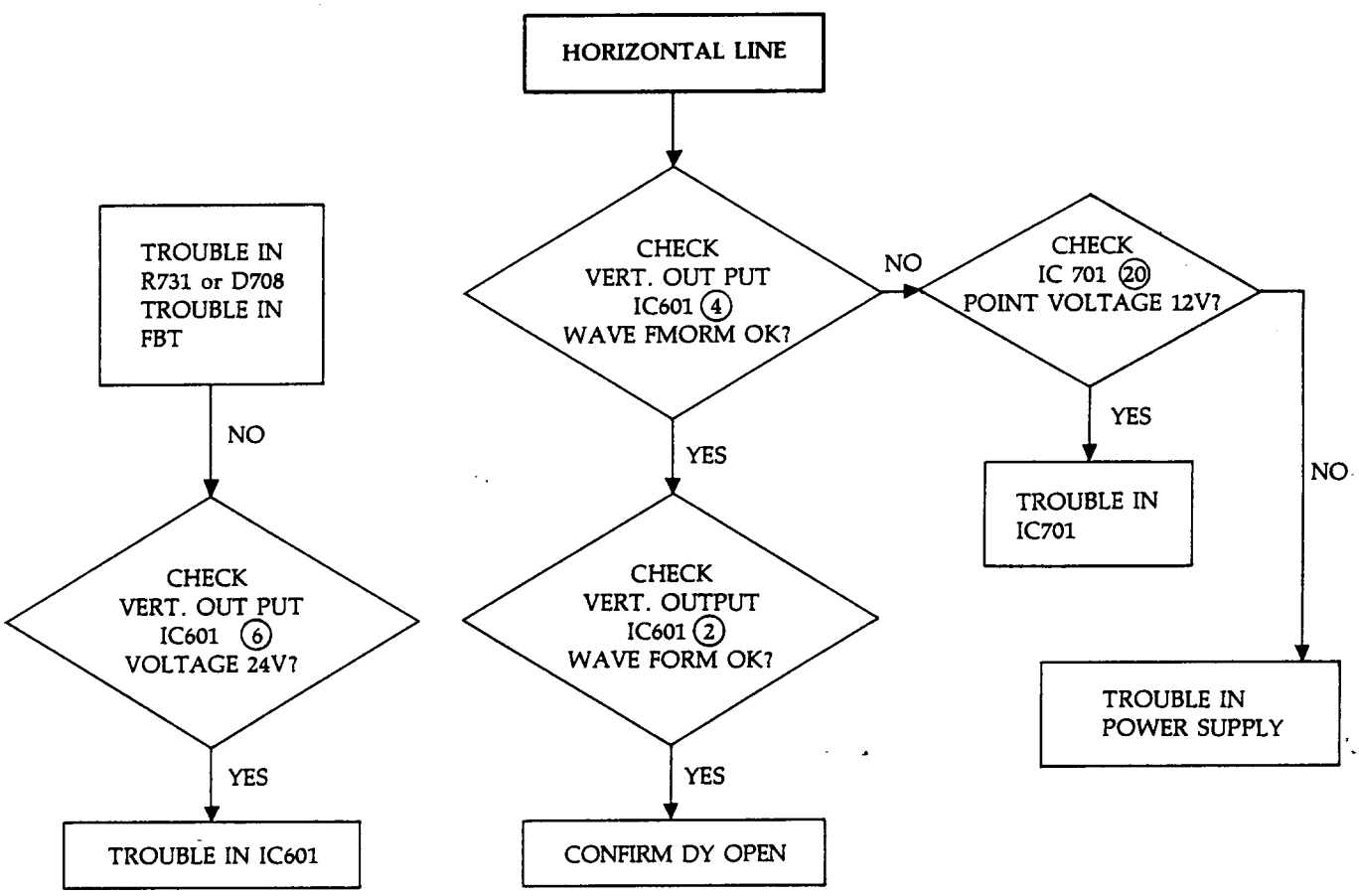
H. FOCUSING PROBLEM



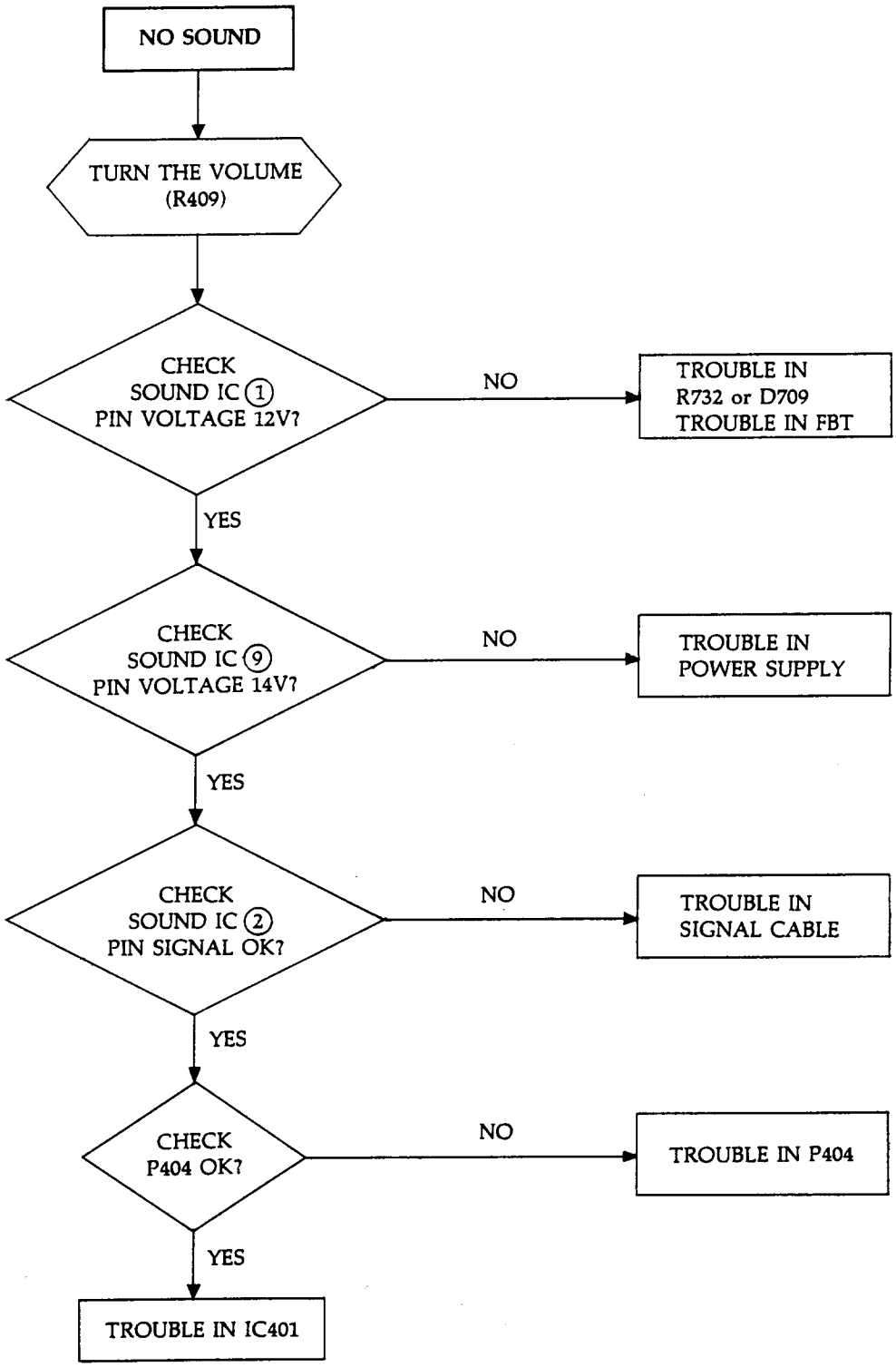
I. VERTICAL PIN COMPENSATION (V.PCC) IS BIG



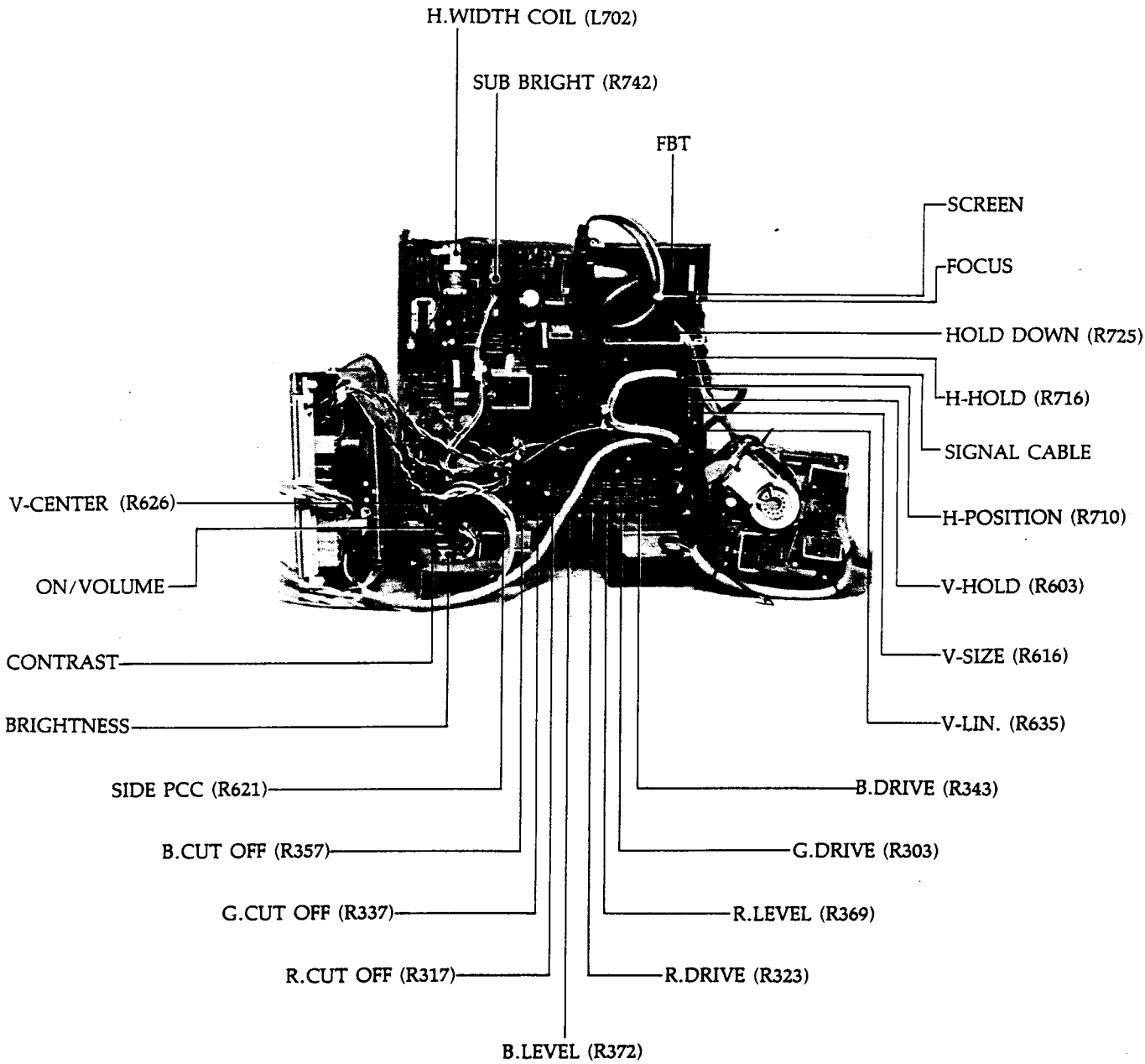
J. HORIZONTAL LINE



K: NO SOUND

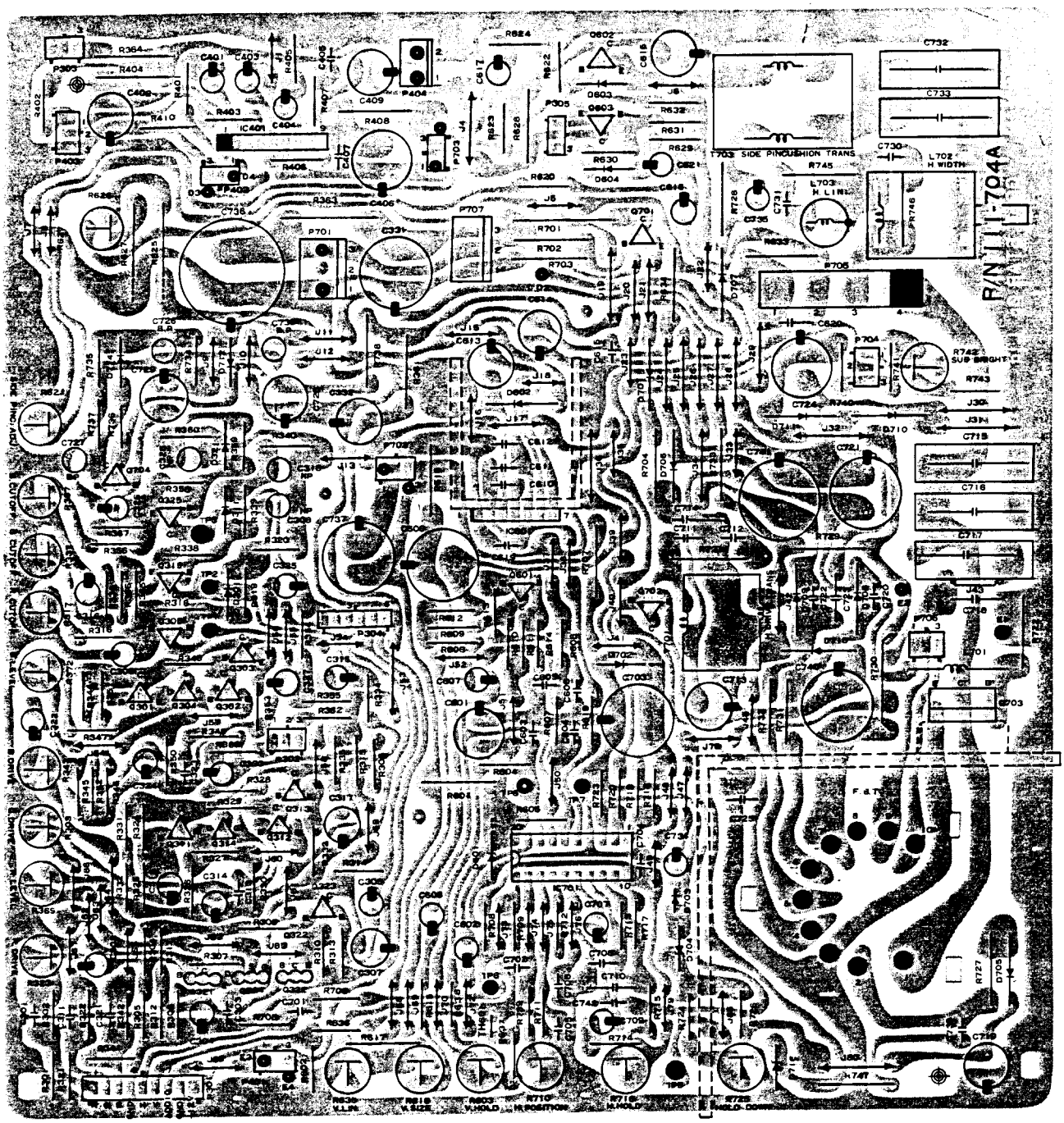

NO SOUND
TURN THE VOLUME (R409)
CHECK SOUND IC ① PIN VOLTAGE 12V?
NO
TROUBLE IN R732 or D709 TROUBLE IN FBT
YES
CHECK SOUND IC ⑨ PIN VOLTAGE 14V?
NO
TROUBLE IN POWER SUPPLY
YES
CHECK SOUND IC ② PIN SIGNAL OK?
NO
TROUBLE IN SIGNAL CABLE
YES
CHECK P404 OK?
NO
TROUBLE IN P404
YES
TROUBLE IN IC401

CHASSIS IMPORTANT PARTS

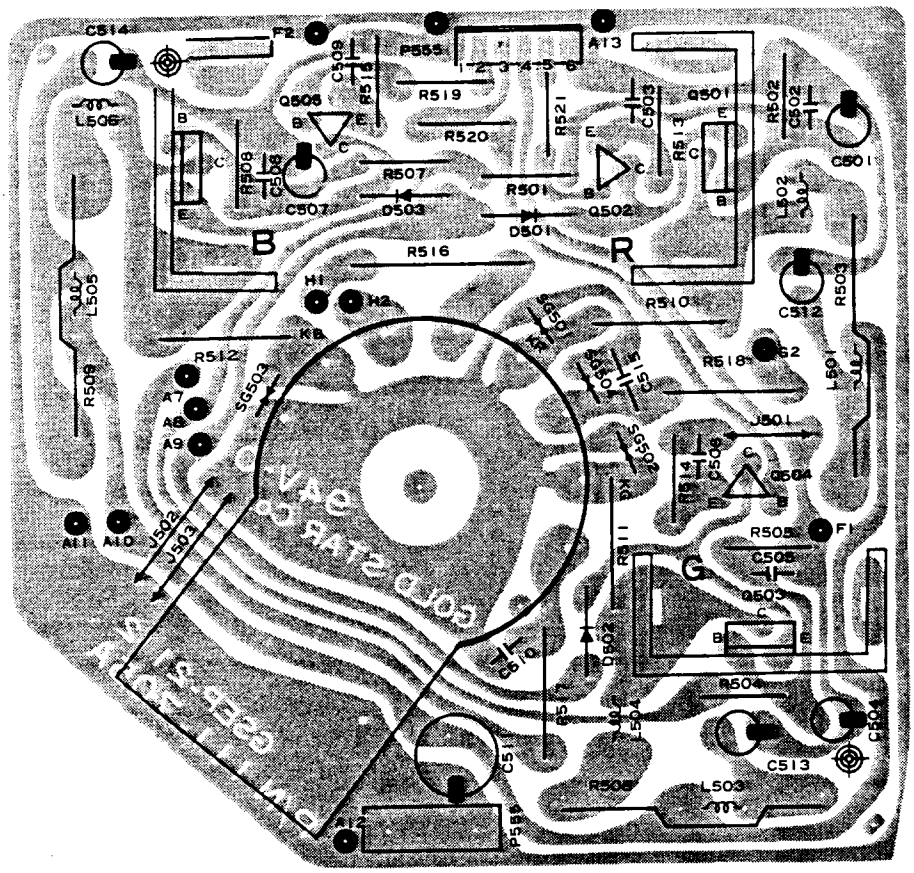


COMPOINENT OF P.C.B

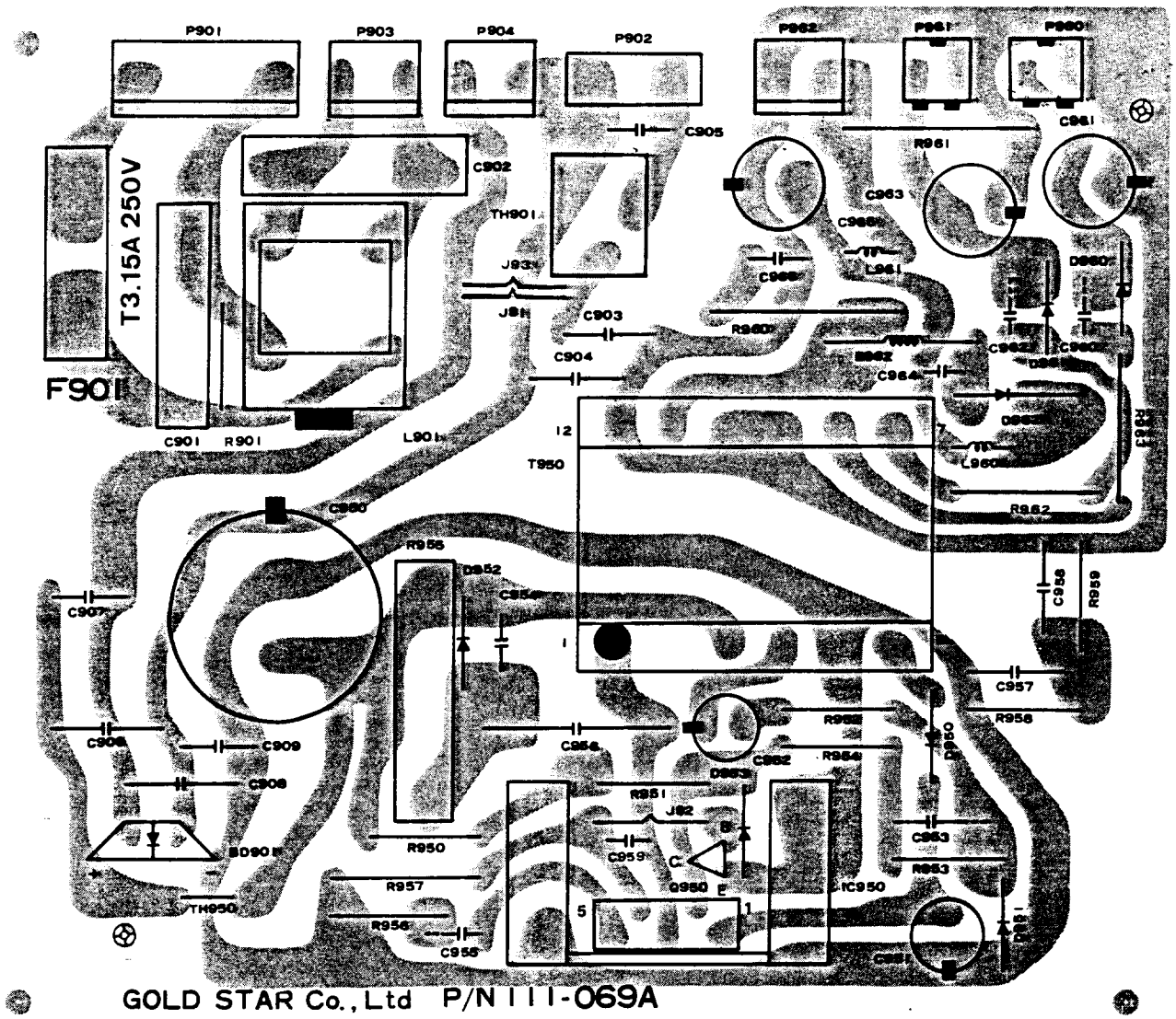
1. MAIN P.C.B LAYOUT



2. C.P.T. P.C.B LAYOUT



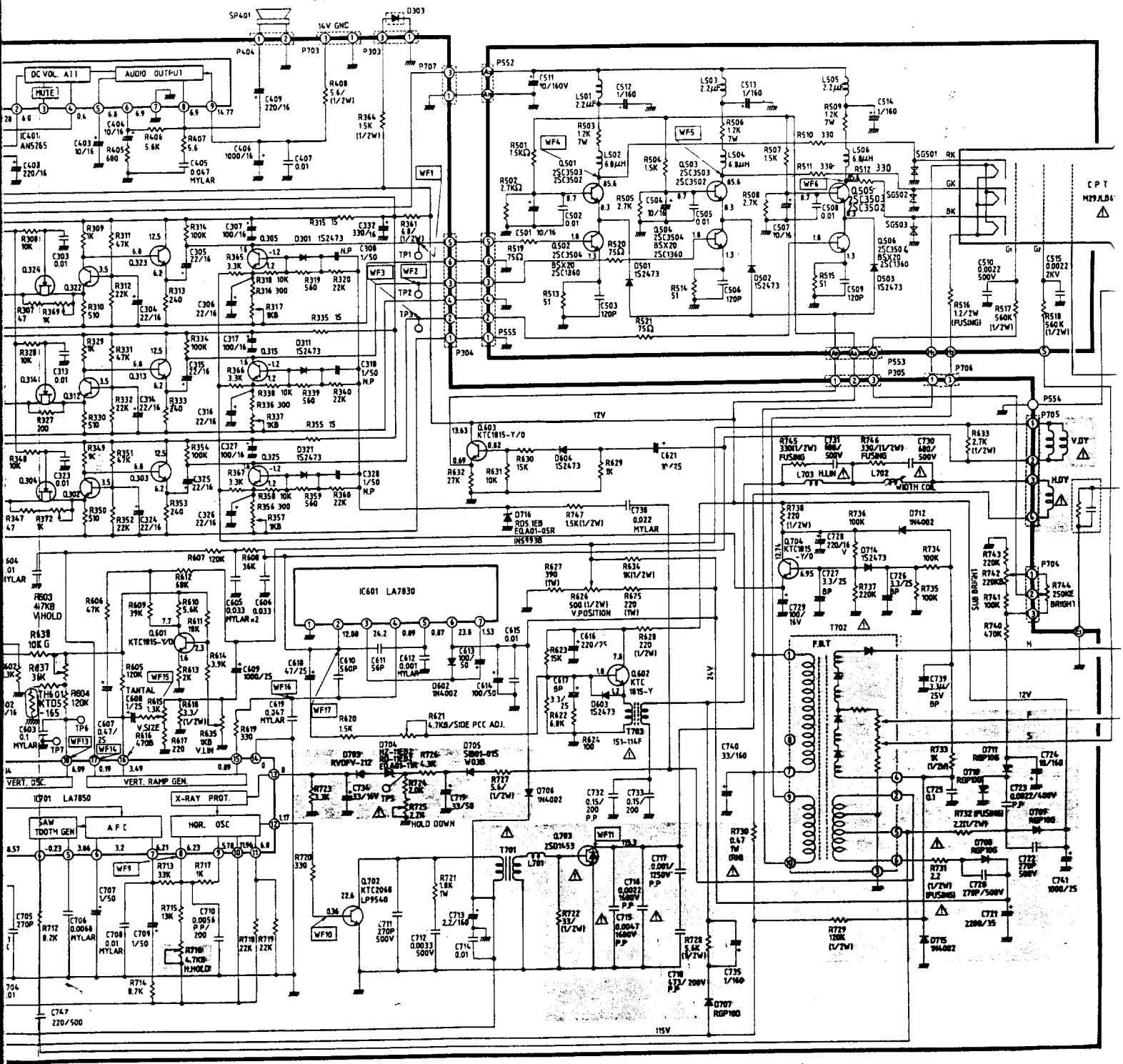
3. POWER P.C.B LAYOUT

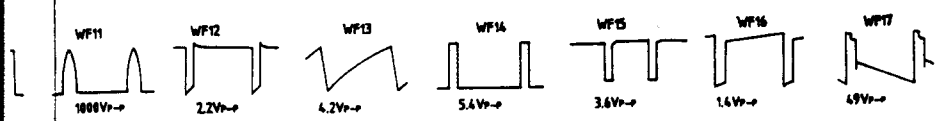


GOLD STAR Co., Ltd P/N 111-069A

ATIC DIAGRAM

CA-3 CHASSIS SCHEMATIC DIAGRAM

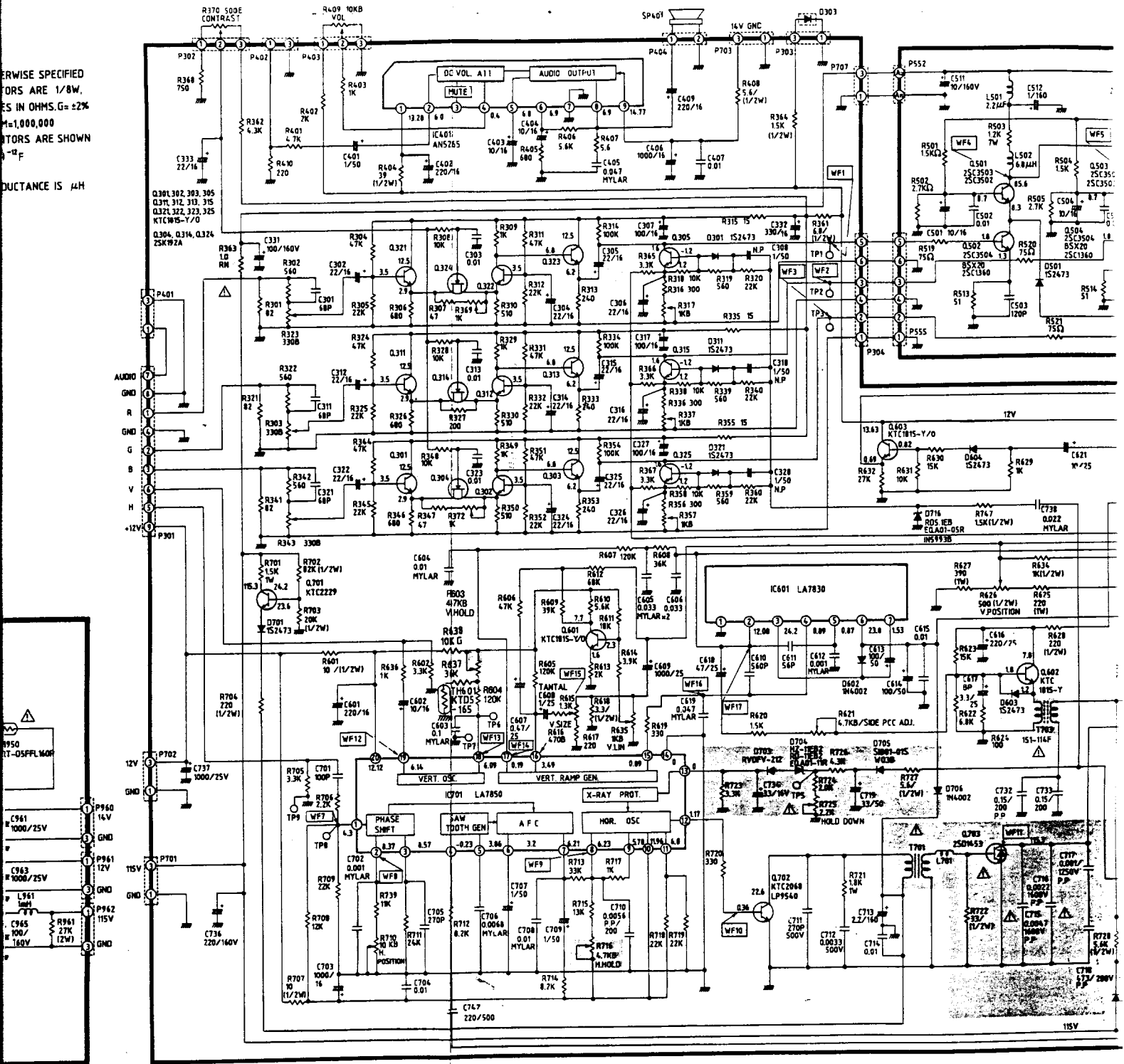




P/N 484-257A

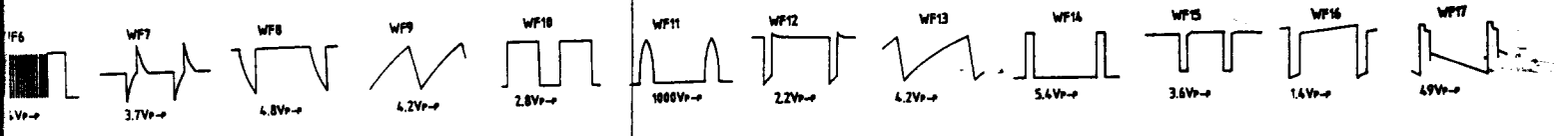
SCHEMATIC DIAGRAM

CA-3 CHASSIS SCHEMATIC DIAGRAM



ERWISE SPECIFIED
TORS ARE 1/8W.
ES IN OHMS. G= ±2%
M=1,000,000
TORS ARE SHOWN
$^{-12}$F

DUCTANCE IS μH



IMPORTANT SAFETY NOTICE

THE COMPONENT IDENTIFIED BY SHADING OR THE INTERNATIONAL SYMBOL ⚠ ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURER'S SPECIFIED PARTS BE USED FOR THOSE CRITICAL COMPONENTS.

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL RESISTORS ARE 1/8W, ±5 % VALUES IN OHMS. G= ±2% K=1,000 M=1,000,000
2. ALL CAPACITORS ARE SHOWN IN μF P=10^{-12}F
3. COIL UNIT OF INDUCTANCE IS μH