MICROVITEC

SERVICE MANUAL

SERIES — 3
COLOUR DISPLAY MONITORS

GP0019AA2

MICROVITEC SERVICE MANUAL

INTRODUCTION

The contents of this manual are divided into several sections.

We will now look in some detail at the sections and explain how they are to be used to their best advantage.

Factory Pre-set Adjustments:

Some of these adjustments are very critical, not only from an operational point but also from a safety point. The manufacturer recommends that you read and understand the section fully before making any adjustments.

All pre-set adjustments are included in this section. You are given the prefix for example: Field Linearity VR312. If you are not sure of the location of any pre-set (or component) then you should refer to the section containing PCB or CRT base panel layouts. Once you have located the pre-set, you are then told what effect the adjustment will have on the display.

Removal/Installation (Mechanical Detail):

This section gives information (text and illustrated) on how to remove major service items such as: CRT, Main PCB and Tripler etc.

Description and Operation:

These sections will help you to understand the design concept of the Microvitec 'CUB' Monitor. They give very detailed descriptions of each part of the circuit. For example: Line Timebase. Field Timebase etc. It is very important that you read these sections before attempting any of the fault isolation and repair procedures.

Specification:

The first specification list (1431/1432) contains a full specification; subsequent lists contain only the areas that differ from the first list. For example: the supply is 180-265 volts, 48-64 Hz (excluding 110 volt models). This will only be given on the first specification list. Therefore, unless otherwise stated, refer to specification 1.

Circuit Diagram and Parts Listing:

There are many model variants in the Microvitec 'CUB' range and obviously it would not be practical to supply all the circuit diagrams. We have therefore devised one circuit diagram for the main P.C.B. assembly (including Standard/Medium Resolution Tube Base assembly) and a separate circuit diagram for the High Resolution Tube Base assembly. In addition there are no component values on the circuit diagrams: you should refer to the Parts Listing.

Component location is another problem that you may encounter. To assist you in this matter we have also included a full P.C.B. layout.

Fault Isolation and Repair Procedure:

Configured in a boxed flow chart format, it represents repetitive faults encountered by our own Service Technicians. Each fault is accompanied by a series of boxes which will ask you to check a particular part of the equipment. After you have carried out the check a question is asked (refer to Fig. 1).

INTERMITTENT -
LINE SYNC

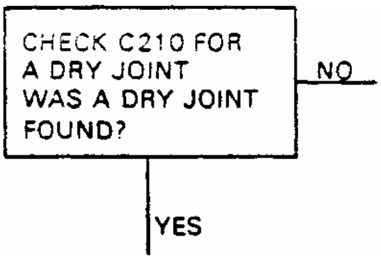


Fig. 1

From the result of the question you can then answer YES or NO.

If the answer is NO (as in this case) you must move onto the next box and carry out the next check.

If the answer is YES. the next box will be (refer to Fig. 2).

Fig. 2

Further into the Fault Isolation Procedure you may be asked to check a component: for example (refer to Fig. 3).

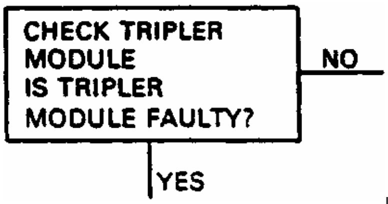


Fig. 3

In this case the best method of checking the Tripler Module would be substitution for a serviceable Tripler Module. This would establish very quickly the condition of the Tripler Module, in relation to the fault.

When all the known fault causes have been effected, the chart wil be terminated by a box reading: (refer to Fig. 4).

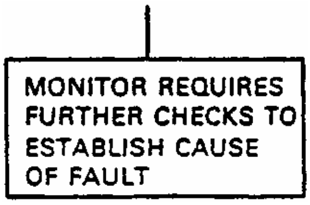


Fig. 4

If you have reached this stage you should use the circuit diagram and items of test equipment and adopt a logical method of fault isolation and repair.

Illustrated Parts Listing (I.P.L.)

This section contains ail current cabinet designs in the Microvitec 'CUB' monitor range. It is intended to show the service technician how to gain access to the equipment for repair purposes. In addition component part numbers accompany each illustration; this will assist you when ordering a component part.

TECHNICAL SPECIFICATIONS

1. **MODELS - 1431/1432**

SYSTEM	1 : 625 lines, 50 fields interlaced or 31 2/313 lines, 50 fields non interlaced 2 ; 525 lines, 60 fields interlaced or 262, 263 lines. 60 fields non-interlaced other non-standard systems may be suitable consult MICROVITEC PLC.
SUPPLY	Nominal 180 - 265V, 40 to 64Hz
TIMEBASE (LINE)	Pull-in range 15 to 16KHz
FRAME FREQUENCY	50Hz - Pull-in range 45 to 65Hz
POSITIONAL ERROR	+ or -3%
CONVERGENCE ERROR	0.6mm screen center 1.6mm screen edge
EHT	24KV approximately
EHT REGULATION	+ or -1KV
LINE FREQUENCY	15.625KHz
DEGAUSING	Automatic at switch ON
BANDWIDTH	18MHz
RESOLUTION	452(H)x585(V) elements
DOT PITCH	0.64mm
CRT	Rectangular 335.4mm (screen diagonal) 90 deg deflection. Precision in-line gun vertical stripe screen, high voltage focus
INPUTS MODEL 1431	TTL compatible; 1500 ohm R, G, B inputs link selectable, positive or negative video
MODEL 1432	Linear; 0 to 4V 1500 ohm R, G, B inputs. Positive video, composite or separate line and field synchronisation - each link selectable positive or negative
INPUT CONNECTOR	10 pin in-line 'SYSTEM 25' Pressac
OPERATING TEMP	0 to 55 deg C (max) open chassis -10 deg C to +40 deg C (max)
POWER CONSUMPTION	65 Watts approximately

2. **MODELS 1441 AND 1442 14" HIGH RESOLUTION**

NOTE: As models 1431 and 1432, with the following exceptions:

CONVERGENCE ERROR (MAX)	0.3mm screen center 0.8mm screen edge
EHT	Approximately 24KV
BANDWIDTH	18MHz
RESOLUTION	895(H)x585(V) elements, rectangular 333mm (screen diagonal) Automatic degausing at switch on. High focus voltage in-line gun. 90 deg. diagonal deflection, 0.31mm dot pitch black matrix screen with pigmented phosphors.
DOT PITCH	0.31mm
POSITIONAL ERROR	+ or -2%
CONVERGENCE ERROR	0.8mm screen edge

3. **MODEL 1451**

NOTE: As models 1431 and 1432, with the following exceptions:

RESOLUTION	652(H)x585(V)
DOT PITCH	0.43mm
CONVERGENCE ERROR	1.2mm screen edge

4. **MODEL 2030**

NOTE: As models 1431 and 1432, with the following exceptions:

CONVERGENCE ERROR (MAX)	0.4mm screen center 1.8mm screen edge
RESOLUTION	505(H)x585(V) elements, 80 characters on 6 dot, wide matrix
DOT PITCH	0.8mm
CRT	Rectangular 480mm (screen diagonal) 90 deg deflection precision in-line gun vertical stripe screen high voltage focus
POWER CONSUMPTION	80 Watts approximately

5. **MODEL 2040**

NOTE: As models 1431 and 1432. with the following exceptions:

RESOLUTION	940(H)x705(V)
DOT PITCH	0.47mm
POSITIONAL ERROR	+ or -4%
POWER CONSUMPTION	80 Watts approximately
CONVERGENCE ERROR	1.0mm screen edge

ELECTRICAL SUPPLY

Warning

THIS APPARATUS MUST BE EARTHED.

Important

The wires in the mains lead are coloured in accordance with the following code:

GREEN AND YELLOW	EARTH
BLUE	NEUTRAL
BROWN	LIVE

As the colours of the wires in the mains lead may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

1. Earth

The wire coloured GREEN and YELLOW must be connected to the terminal marked 'E' or by the safety earth symbol ⏚ or coloured GREEN, or GREEN and YELLOW.

2. Neutral

The wire coloured BLUE must be connected to the terminal marked 'N', or coloured BLACK.

3. Live

The wire coloured BROWN must be connected to the terminal marked ‘L’, or coloured RED.

X-Ray Radiation

X-rays constitute a health hazard on prolonged exposure at dose range unless adequate shielding is provided.

Precautions must be exercised during servicing of display equipment to ensure that the anode voltage and other tube voltages are adjusted to the recommended values.

Replace with a tube of the same type number or recommended replacement to assure continued safety.

Implosion Protection

This tube employs integral implosion protection and must be replaced with a tube of the same type or a recommended replacement to assure continued safety.

Shock Hazard

The high voltage at which the tube is operated may be very dangerous. Extreme care should be taken in the servicing or adjustment of any high voltage circuit Caution must be exercised during the replacement or servicing of the tube since a residual electrical charge may be contained on the high voltage capacitor formed by the external and internal conductive coating of the tube funnel. To remove any undesirable residual high voltage charges from the tube, "bleed off" the charge by shorting the anode contact button, located in the funnel of the tube, to the external conductive coating before handling the tube.

Tube Handling

Wear heavy protective clothing, including gloves and safety goggles with side shields. Handle the tube with extreme care. Do not strike, scratch or subject the tube to more than moderate pressure. Particular care should be taken to prevent damage to the seal area.

OPERATING SAFETY

We recommend — after effecting any Service and/or replacement of any part of the monitor, or after any repair work — that the SAFETY CHECKS listed following are carried out.

Note

Ensure on re-assembly that ALL earth connections are replaced SECURELY; in particular safety earths and the 'P' band and dag earth 'CRT' earth connections.

Important!

Failure to observe the points noted could affect your own safety, the product's safety and ultimately, that the user.

SAFETY CHECKS

Earth Continuity Check

a) Using a suitable multimeter:
Check between 'Dag' earth on the CRT and mains plug earth pin, (safety earth connection). The reading should be less than 470Kohm (with tube discharged).

b) Check mains earth continuity between mains plug earth pin and:

1) CRT 'P' Band

2) PCB 'Earth' pin on main chassis

c) The final assembly/housing should be checked for continuity between the mains plug earth pin and ALL exposed metalwork.

Note
Tests b) and c) should have a resistance of less than 0.5 ohm.

High Voltage Isolation/Insulation Checks

a) On the mains supply 3 pin plug, — check between 'live' and 'neutral' to 'earth' for leakage breakdown.

This test should be made with 1.5KV to 1.6KV AC or DC equivalent.

On Test

1) No breakdown should occur.

2) Earth leakage should be less than 6mA at 1.5KV.

b) Insulation resistance should be greater than 2Megohms at 500V DC.

CAUTION
A MONITOR FAILING ANY OF THE ABOVE CHECKS MUST BE RESTORED TO SAFE WORKING CONDITION BEFORE BEING RETURNED TO THE USER.

SAFETY STANDARDS

SAFETY AND ISOLATION

UNDER NO CIRCUMSTANCES SHOULD ANY FORM OF REPAIR OR MAINTENANCE BE ATTEMPTED BY ANY PERSON OTHER THAN A QUALIFIED ENGINEER.

Switched Mode Power Supply

Although the outputs from the power supply are isolated from the incoming mains supply, the bridge rectifier and the ontrol and regulation circuit ARE NOT isolated. Therefore, when servicing the power supply section of the chassis assembly, the SMPSU should be supplied by a MAINS ISOLATION TRANSFORMER OF AT LEAST 300VA RATING.

HANDLING PRECAUTIONS HT

Electrical Charges

The power supply section remains charged with respect to chassis for 30-60 seconds after switching off. Care should be taken when handling the chassis to avoid touching this area during this time.

EHT Charges — Horizontal (Line) Output Stage/CRT

Before handling or attempting adjustment or replacement on the horizontal (line) output stage or on CRT areas — always discharge the final anode of the CRT — by using a suitable EHT probe only. Do this by connecting first to CRT dag earth coating/earth braid assembly, and then to CRT final anode/anode button 'poppy' connector.

> **Please Note**
>
> **Very considerable electrical charges can be stored in these areas — even for lengthy periods of time after 'switch off'.**
>
> In the interests of your personal safety observe the precautions listed.

SAFETY CRITICAL COMPONENTS

Components marked on the parts list and circuit diagram are safety approved types and they should be replaced only with components supplied or approved by our Service Department It is also recommended that the components not marked with the safety symbol should be replaced by parts of the type originally fitted, and this applies particularly to those resistors which are stood off the printed circuit boards.

HANDLING PRECAUTIONS — STATIC ELECTRICAL CHARGES

Depending on equipment type and model, the equipment may contain device ich may be damaged by static electrical charges during handling. Generally, these devices are indicated by a symbol.

When replacing or handling these devices or PCBs containing such devices, care should be taken. Soldering irons should be earthed and personnel should use wrist straps earthed via a 1Mohm resistor. If the latter is not practicable they should discharge themselves of any static electricity by touching an earthed point

Static sensitive devices should be packed in suitable conductive containers. Note

> Electrostatic discharge does not necessarily 'kill' a component completely — more likely it will 'wound' it
>
> Many static wounded devices will pass normal test both on site and in Service Workshops. In this respect PCBs containing such 'wounded' devices are a major cause of 'no fault found' problems.
>
> It pays, therefore, to cultivate static safe ways when dealing with such static sensitive equipment

PRESET CONTROL ADJUSTMENT

GENERAL

Preset controls are initially set up at the factory and normally do not require adjustment unless a change is required in the input configuration — for example, typically to install a different graphics adaptor card in the associated host system. Details of the preset controls with their use and adjustment is described following:

PRESET ADJUSTMENTS

TO PROTECT AGAINST ELECTRICAL SHOCK HAZARD AND TO PROTECT THE MONITOR AGAINST SHORT CIRCUIT AND DAMAGE — USE ONLY AN INSULATED NON-METALLIC TRIMMING TOOL TO MAKE ADJUSTMENTS TO THE PRESET CONTROLS.

Care should be taken when adjusting presets. Adjust only one at a time and note carefully the effects of the adjustment before proceeding on to other adjustments. In some cases, it may be advisable to take note of the original setting position of the preset BEFORE adjustment in case the need arises to return to the original setting.

INTERCONNECTION COMPATIBILITY

On installation and prior to preset adjustments, ensure that video and sync connections from the host system are compatible with:

a) The monitor.

b) The interconnecting lead assembly in use.

Having determined these points are correct, proceed with the adjustments required according to the details given in the accompanying table and descriptions following.

PRESET CONTROL SETTINGS

1. **To set the preset controls, use a signal generating a display occupying as large a screen area as possible. For example a full page of upper case letter 'H' would be suitable, or alternatively a suitable test card as appropriate.**

2. **Preset controls in the table following marked with an asterisk * may be adjusted if required.**

   However, normally this should not be necessary, as these presets are set accurately at the factory during manufacture.

   NOTE: A circle is employed in the screen displays illustrated following, only to demonstrate more clearly the geometric effects of wrong settings.

PRESET LOCATIONS

The physical locations of most of the preset controls referred to in the descriptions following are shown in the illustration contained in the Section preceding.

Notable exceptions are preset controls contained on the TUBE BASE PCB assembly.

The positions of these presets are indicated on the individual PCB's by appropriate ident markings.

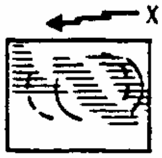
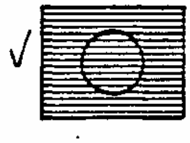
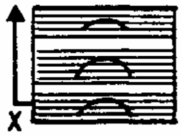
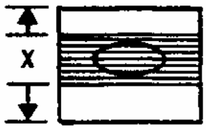
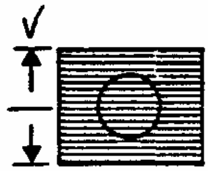
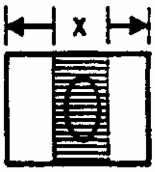
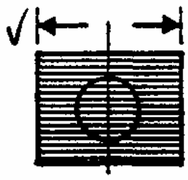
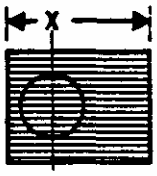
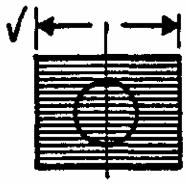
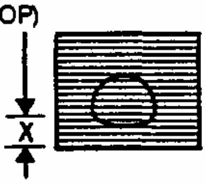
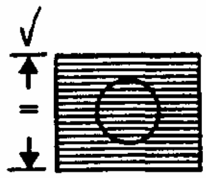
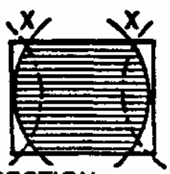
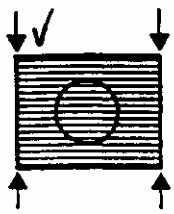
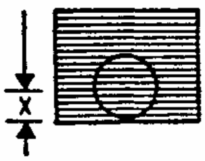
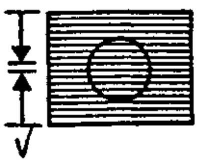
PRESET	WRONG X	RIGHT /
LINE FREQUENCY	PICTURE BREAKS UP ADJUST L.FREQ. 	 PICTURE LOCKED
FIELD FREQUENCY	PICTURE ROLLS ADJUST F.FREQ. 	 PICTURE LOCKED
HEIGHT	ADJUST HEIGHT 	 HEIGHT SET
WIDTH	ADJUST WIDTH 	 WIDTH SET
LINE PHASE*	PICTURE NOT CENTRAL ADJUST L. PHASE 	 PICTURE CENTRAL PHASE SET
FIELD LINEARITY* (VERTICAL LINEARITY)	BOTTOM (OR TOP) OF PICTURE COMPRESSED ADJUST F.LIN 	 VERTICAL SCAN LINEAR LIN.SET
EAST/WEST* CORRECTION	PICTURE 'BARREL SHAPED' OR 'PIN-CUSHION' SHAPED —  ADJUST E/W CORRECTION	 VERTICAL EDGES STRAIGHT E/W SET
FIELD SHIFT	PICTURE NOT CENTRAL ADJUST FIELD SHIFT 	 PICTURE CENTRAL FIELD SHIFT SET

TABLE OF PRESET ADJUSTMENTS

INPUT CONNECTIONS AND CUSTOMER CONTROLS 1. T.T.L.

Compatible/Linear input Selection

A. T.T.L. compatible or linear (0 to 4V, 1500 ohm) input level options can be selected by moving 3 links: (1) TL103 R,G,B located on main PCB:
position 1 corresponds with linear levels
position 2 with T.T.L. levels
NOTE: Contrast control VR111, inoperative when position 1 is selected.

2. Synchronisation - Input Options

A. Sync inputs must be T.T.L. compatible, the timing of sync pulses should approximately correspond with those used for broadcast purposes (refer to fig. 1 for available options.)

3. Inverse Video

A. To facilitate inversion of T.T.L. compatible video input signals by either moving link TL101 on main PCB to position 1, or removing TL101 and feeding a positive T.T.L. level in to pin 9 of PL101.

NOTE: Monitors are normally despatched wired in composite negative (going) syncs mode, with TL102 not fitted, and TL106 selected to position 1.

Signal input **pin connections**
Fig. 1

KEY
1 = +12V
2 = No connection
3 = Sync 3; -field sync
4 = Red video
5 = Sync 2; -field sync
6 = Green video
7 = Sync 1; composite sync or line sync
8 = Blue video
9 = Normal/inverse T.T.L. video
10 = Ground

4. Synchronisation Options

SYNC OPTIONS	INPUTS (PL101)	LINK POSITION
SYNC OPTIONS	INPUTS (PL101)	LINK POSITION
MIXED		
-ve going	pin 7	TL102 not fined
		TL106 in position 1
	pin 7	TL102 fitted
+ve going		TL106 in position 1
SEPARATE		
-ve line	pin 7	TL102 not fitted
-ve field	pin 5	TL106 in position 1
+ve line	pin 7	TL102 fitted
+ve field	pin 3	TL106 in position 2
-ve line	pin 7	TL102 not fitted
+ve field	pin 3	TL106 in position 1

5. Customer Controls

NOTE: On 'D' series monitors the controls listed below are located on the front of the monitor, concealed behind a downward hinging door.

A. ON/OFF Switch

(1) Mounted rear of the monitor, allows mains to be switched on and off without switching the mains supply off.

B. Contrast/Brilliance Adjustment (VR111)

(1) Mounted rear of main PCB, only active in T.T.L. mode, and allows video gain to be varied from maximum to minimum, at black level.

C. Brightness Adjustment (VR134 when fitted)

(1) Mounted rear of main PCB, next to VR111. Active in all modes of operation allowing brightness of display to be varied above or below cut off.

D. Volume/Audio Adjustment (when fitted)

(1) Mounted rear of the monitor, allows user to adjust volume/audio level of the monitor. Clockwise to increase, anti-clockwise to decrease.

E. Colour Saturation Control (when fitted)

(1) Mounted rear of the monitor, allows user to adjust the colour level of the monitor. Clockwise to increase, anti-clockwise to decrease.

FACTORY PRESET ADJUSTMENTS

NOTE: Certain preset adjustments can be from above or below main panel. Adjustments are best made on *a* static display, preferably a MICROVITEC test card, details of test equipment are available on application.

1. Set HT VR4

   A. Adjusted accurately at the factory to give 124V with a dark picture on, R138/137 (right hand side) 5, and should not be re-adjusted.

   WARNING: THIS IS A CRITICAL SAFETY ADJUSTMENT, FAILURE TO COMPLY WITH THE ABOVE WILL INVALIDATE THE WARRANTY.

2. Line Frequency VR218

   A. Set free running oscillator frequency to almost frequency of incoming line syncs.

   B. Adjust VR218, feed monitor with R,G,B video and interrupt the mixed sync information to line oscillator by removing sync information on PL101, (sync 1, 2 or 3 etc).

   C. Adjust VR218, until picture almost stabilizes then re-connect via PL101 as required. Resulting in a stable picture lock.

3. Field Frequency VR307

   A. Control of free running field oscillator frequency is achieved by VR307 being adjusted to give a stable picture lock. For effective lock VR307 should be set to centre of locked picture range.

4. Line Phase VR220

   A. VR220, controls positioning of video information relative to raster in line scan direction. B. Ensure

   the following operations have been effected:

   (1) The line frequency has been set (VR218)
   (2) The picture width has been set (L202)

   (3) The monitor is positioned in its place of use.

   NOTE: VR220 when adjusted will shift the picture, right or left.

5. Width L202

   CAUTION: CARE SHOULD BE TAKEN WHEN ADJUSTING THIS COMPONENT DUE TO ITS PROXIMITY TO EHT SECTION. IN PARTICULAR, TRIPLER AND LINE OUTPUT TRANSFORMER.

   A. Using a non-metalic trimming tool adjust L202, to effect picture width adjustment.

6. Height VR306

   A. VR306. when adjusted will provide for raster under scan and over scan.

7. Field Linearity VR312

   A. Adjust VR312, to give a linear picture in vertical direction.

   NOTE: Best results are obtained by using a cross hatch type grid or MICROVITEC test generator.

8. Field Shift VR321

A. VR321, controls positioning of raster in field scan direction.

9. East-West Correction VR328

NOTE: Some models will not require this adjustment, because east-west correction is integral on certain types of CRT.

A. Adjustment of VR328 will achieve straight verticals on left and right hand sides of pictures.

10. Focus

A. Located on end of tripler module, set brightness control to normal viewing level, then make focus adjustment.

11. Adjust Colour Background Controls (black level)

NOTE: These controls are factory preset. If adjustment is necessary, an AVO 8 multimeter and/or oscilloscope will be required. However, best results are obtained by using an oscilloscope.

A. Prepare to adjust colour background controls

(1) Set customer contrast (VR111), brightness (VR134) and A1 (VR932) fully anti-clockwise

(2) Disconnect R,G,B, sync inputs

B. Adjust red, green and blue

(1) Adjust VR9O6 for red cathode (black level) volts
(2) Adjust VR914 for green cathode (black level) volts
(3) Adjust VR921 for blue cathode (black level) volts
(4) The above voltages are:
(a) 150V-14" monitor (TTL or Linear)
(b) 155V-20" monitor (TTL or Linear)
(c) 140V-12"/14" high res monitor (TTL or Linear)

C. Adjust A1 voltage

(1) Adjust VR932 until a raster is just visible.
(2) Raster colour may be neutral. However, it is very likely shaded towards-red, green, blue or a combination of any two colours.
(3) Establish raster colour shading as follows:
(a) Red and Green • Yellow
(b) Red and Blue - Magenta
(c) Blue and Green - Cyan
(4) Reduce black level of remaining one or two guns using VR906, VR914, VR921 or combination until a neutral raster is achieved.
(5) Re-adjust VR932 to just extinguish raster
(6) Input - R,G,B and sync signals, then adjust VR111 clockwise
(7) If correct white balance has not been achieved, repeat operations C. (1) thru (6).

12. Adjust Colour Gain Controls

CAUTION: MAKE THE FOLLOWING ADJUSTMENTS USING A DC COUPLED OSCILLOSCOPE ONLY. A.

Prepare to adjust colour gain controls

(1) Disable beam current limit circuit, by removing TL901 in series with CRT heaters on tube base panel.
(2) Provide a test pattern with peak white and black level information on red, green and blue.
(3) Ensure VR111 is fully clockwise to provide maximum drive voltages to video output stages.

B. Adjust red, green and blue gain controls

(3) Adjust VR903, for red peak to peak drive volts at R926.
(2) Adjust VR910, for green peak to peak volts at R925.
(3) Adjust VR916, for blue peak to peak volts at R924.
(4) Above voltages are:
(a) 70V p-p on 14" monitor - TTL mode
(b) 70V p-p on 20" monitor - TTL mode
(c) 60V p-p on 14"/20" monitor - medium and high resolution

REMOVAL/INSTALLATION DETAILS

WARNING: ENSURE MONITOR IS DISCONNECTED FROM MAINS ELECTRICAL SUPPLY BEFORE EFFECTING THE FOLLOWING OPERATIONS.

1. Main PCB Removal/Installation (Fig. 1)

A. Disconnect EHT lead (1) from CRT, to ensure no charge remains on tnpler connect to chassis metalwork.

B. Discharge CRT, final anode by connecting it to CRT dag.

C. Disconnect PL201 (2), PL1 (3) and on cabinet versions PL2 (4) (if fitted) and mains plug PL3.

D. Remove tube base panel and CRT earthing braid tag.

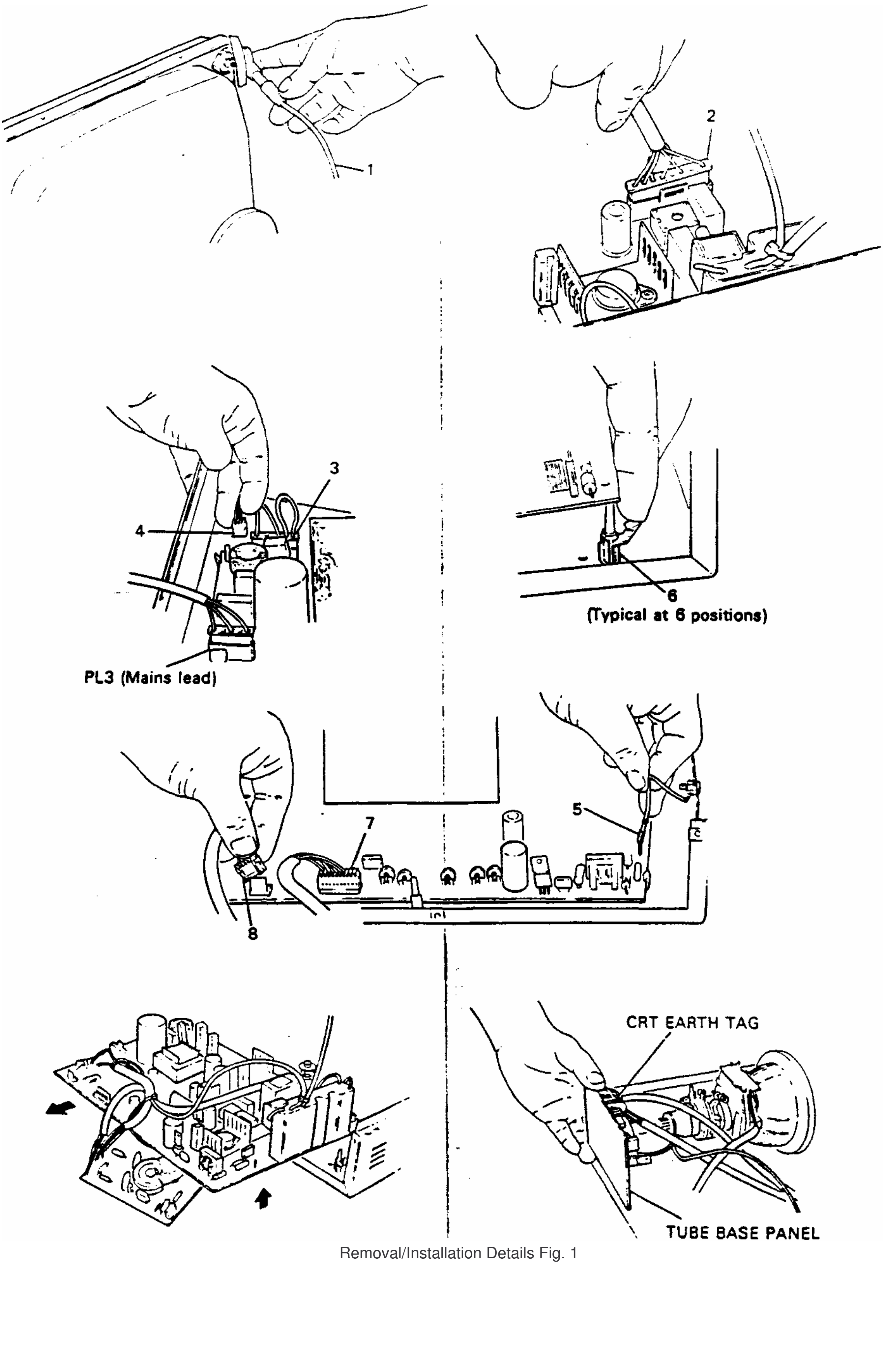
E. Remove 'P' band earthing tag (5) from main PCB, located next to tripler module.

F. Release in turn, each of the nylon self locking PCB support clips (6), lifting PCB slightly in each case.

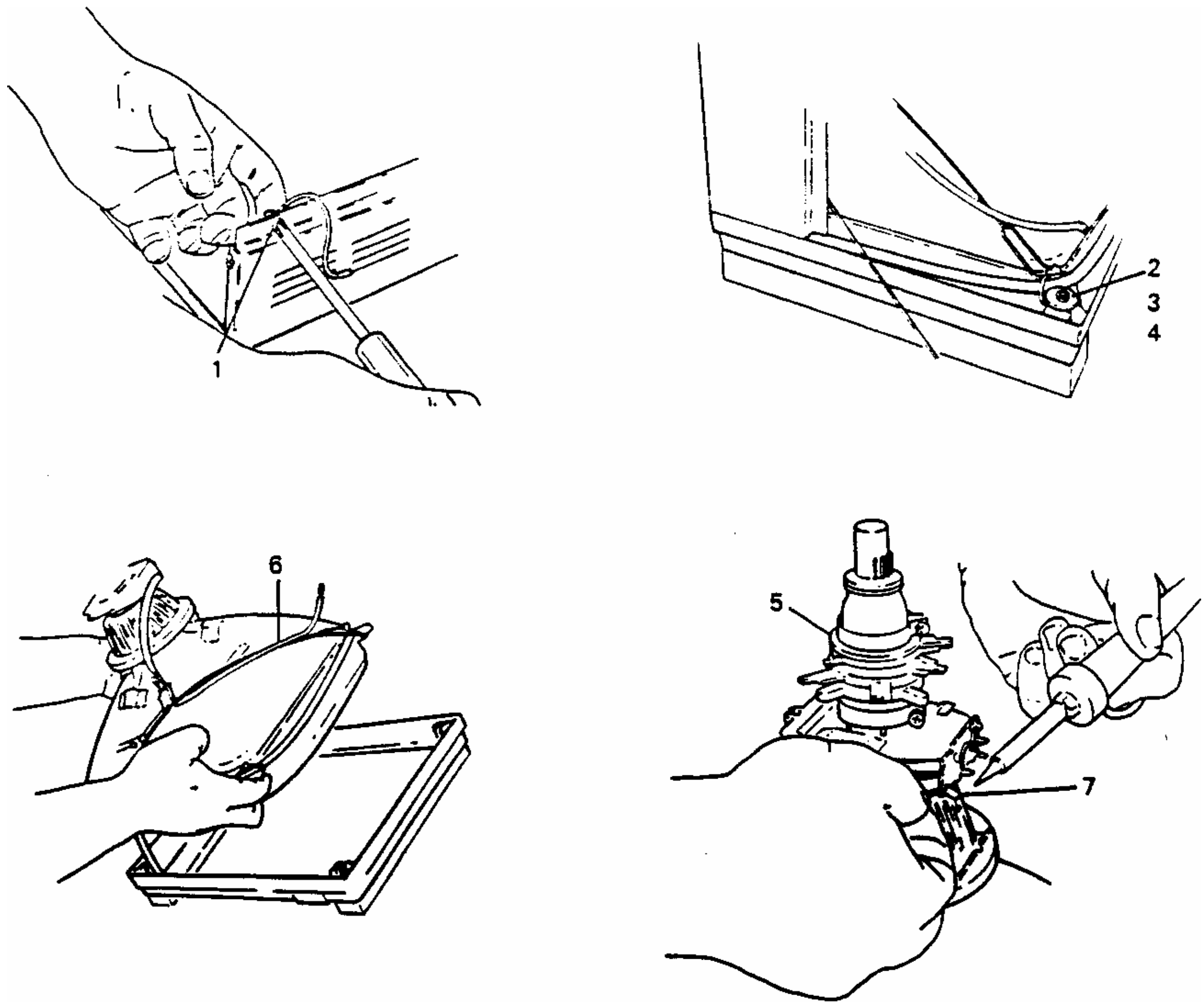
G. Disconnect PL101 (7), PL102 (8), then disconnect tube base from CRT.

H. The main PCB may now be removed by lifting upwards, and withdrawing from the rear.

J. For installation effect the above operations in reverse order.



Removal/Installation Details Fig. 1



CRT Removal/Installation
Fig. 2

2. CRT Removal/Installation (Fig. 2)

A. Effect operations 1.A. thru G., then position monitor so that the CRT is face down on two padded support blocks.

B. Remove two earthing screws (1), then refer to the illustrated mechanical parts section and remove the base of the monitor.

C. Remove the four nuts (2) and large washers (3) securing CRT to cabinet facia (4).

D. Carefully withdraw CRT vertically.

E. Transfer degauss coil (5) and earthing braid (6) and scan coil lead assembly (7) to new CRT.

F. Install main PCB assembly by effecting operations 1.A. thru G., in reverse order.

G. CRT installation safety checks.

(1) Check for correct fitting of CRT earthing braid (6).
(2) Ensure black lead from CRT earth braid to tube base panel is connected.
(3) Check 'P' band earth pin has been connected to main PCB.

3. **Line Output Transistor (TR202) and SMPSU Output Transistor (TR2) - Removal/Installation (Fig.** 3)

A. Remove Transistor

(1) Remove two M3 **screws** (1) securing transistor and heatsink to main PCB.

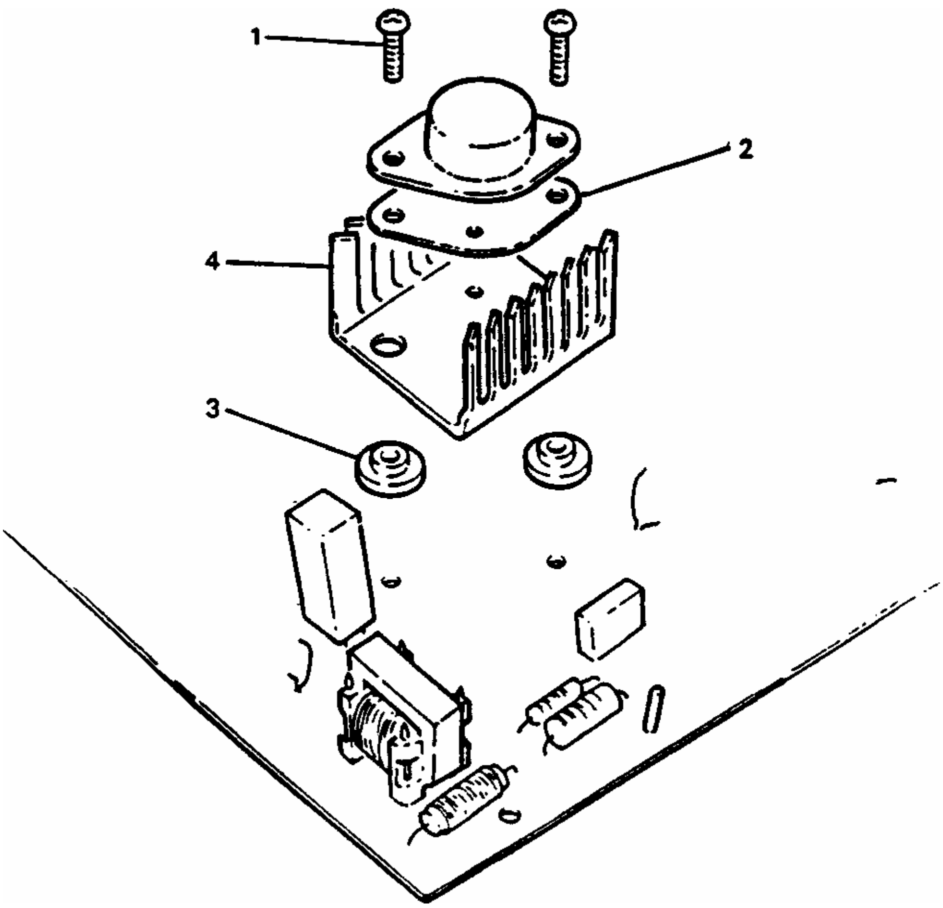
(2) Unsolder base and emitter connections on PC3, then withdraw transistor heatsink (4).

(3} Separate transistor from heatsink, retaining insulating bushes (3) and mica washer (2) for refitment.

B. Install Transistor

(1) Coat underside of transistor with thermally conductive heatsink compound.

(2) Effect operations 3.A.(1) thru (3), in reverse order.



Line Output Transistor (TR202) and SMPSU Output Transistor - Removal/Installation
Fig. 3

4. **Tripler - Removal/Installation** (Fig. 4)

A. Tripier Removal

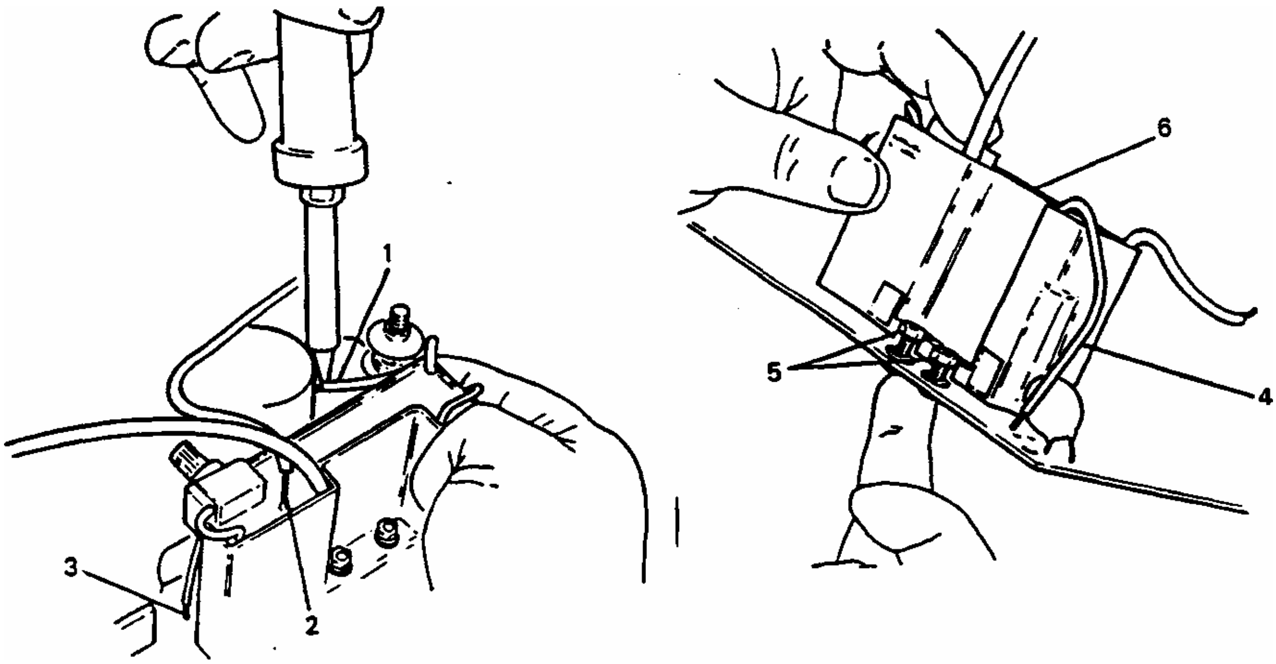
(1) Remove EHT lead from CRT and discharge CRT final anode to the earth braid.
(2) Unsolder the following: Lead from line output transformer overwind (1) focus lead (2) to tube base panel at the tripler end.
(3) Unsolder from main PCB: Earth return (3) from focus control, clamp diode earth return (4)
(4) Loosen, but do not remove tripler securing screws (5), then withdraw tripler module (6) from main PCB.

B. Tripler Module - Installation

(1) Position tripler module (6) on main PCB assembly and secure with screws (5).
(2) Solder on main PCB: Earth return (3) from focus control, clamp diode earth return (4).
(3) Solder : Lead from line output transformer overwind (1) focus lead (2) to tube base panel at the tripler end replace insulation sleeve on connection (2).

NOTE: Ensure all soldered connections are smooth and connecting wires kept as short as possible, to guarantee adequate voltage clearances.

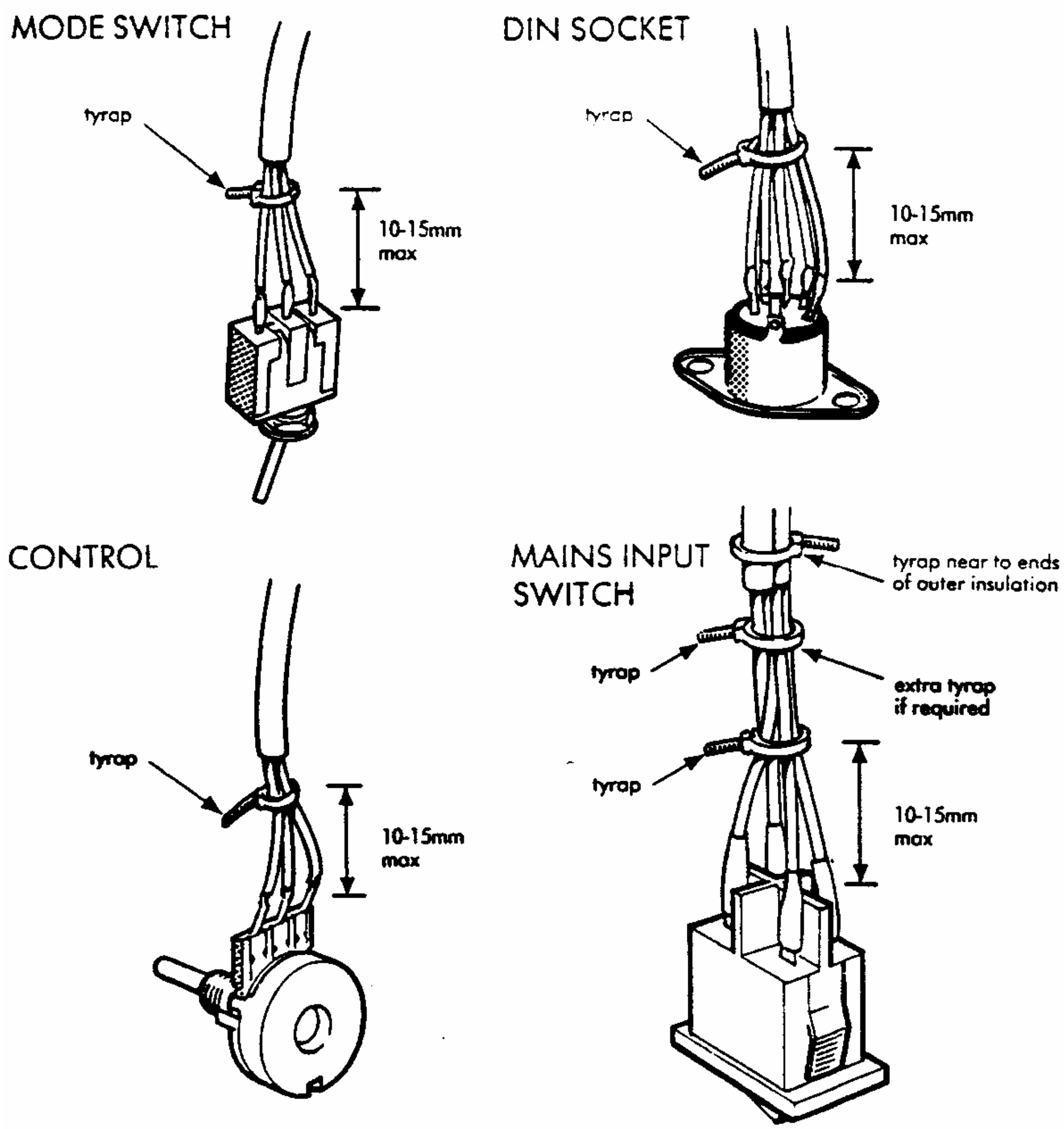
(4) Connect EHT lead to CRT final anode.



NOTE: Replace the insulation sleeve on connection (2)

Tripler Removal/Installation
Fig. 4

TYRAP POSITIONS ON CABINET BACK COMPONENTS



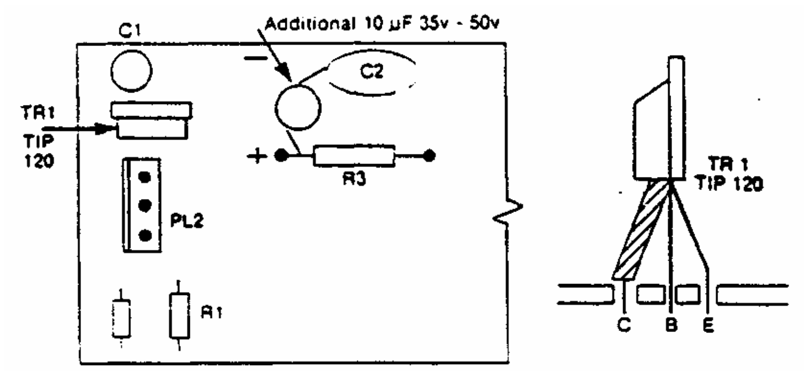
Note: All tyraps to be fully tight

MODIFICATION FOR IBM/APPLE INTERFACES

(1) Remove TR1 (BC337) and replace with TIP 120 as shown.

(2) Remove R1 (6 K8) and replace with 8K2 1/4 watt 5%.

(3) Race a 10 microfarad 35V electrolytic as follows: (i) negative side, to top of existing C4 position (ii) positive side, mechanically wrapped around and soldered to left side of R3.



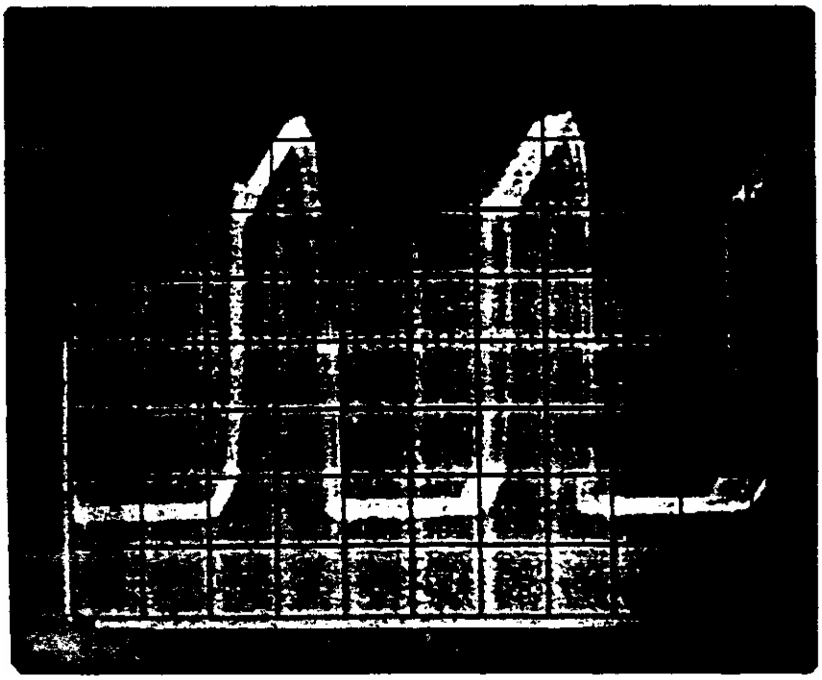
SWITCH MODE POWER SUPPLY - DESCRIPTION AND OPERATION

The power supply is a variable frequency, self oscillating, switching flyback convertor type, providing mains isolation and three stabilised voltages, of 18V, 124V and 200V.

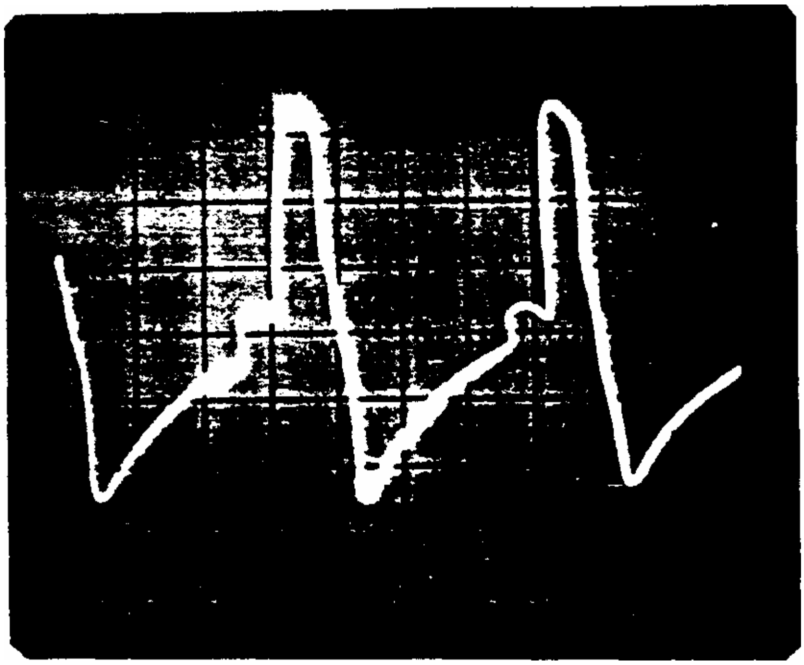
1. Control Circuit - Description

A. Operating Normally In A Ready State

(1) TR2 turns on a step voltage whose amplitude depends on the instantaneous value of rectified mams across T2 primary.
(2) Current in winding and TR2 collector increases in a linear fashion from zero, in which time energy is stored as flux in the transformer.
(3) During this time D22, D23 and D24 are reverse biased and any load energy is supplied by C27, C28. C31 and C26, from previous cycle.
(4) TR1 performs a control function, supplied from a reference winding on transformer (nominal +30V).
(5) During 'ON' time of TR2. the emitter of TR1 is held at a constant with regard to reference rail from D18.
(6) The base of TR1 is fed directly from the reference rail, via R3, VR4 and R5, any voltage change on the reference arising from a change of voltage at the main output will vary causing the constant current source, used to charge C16, to vary in sympathy.
(7) C16 charges on the current available from R10. The voltage across C16 increases until it reaches the gate trigger voltage of TY1. Then TY1 conducts and 'crow bars' base drive to TR2.
(8) TR2 ceases conduction and its collector voltage becomes positive. The dV/dT at TR2 collector, is limited by C17, R12 and D17. As this occurs D22. D23, D24 and D21 become forward biased and stored energy within the transformer is transferred into output capacitors, and their respective loads.
(9) Eventually voltages on D6, D21. D22. D23 and D24 anodes, collapses. TY1 is forced off prior to this stage by negative anode voltage, allowing TR2 to turn on. Full base drive is then sustained by R16.



TR2 BASE Fuse in



TR2 BASE START-UP Fuse out

(10) HT stabilisation

(a) HT stabilisation is achieved by controlling the duty cycle of the switching transistor.

(b) Increasing load = increased duty cycle and peak collector current.

(c) Increasing mains supply * increased operating frequency.

(d) HT adjustment is made by VR4.

(e) Extra damping for C14. R6 and D7. are required to limit Vce of TR2. 015 and D16 provide negative off drive and base current tracking, L2 optimises storage time of TR2 for minimum switching losses.

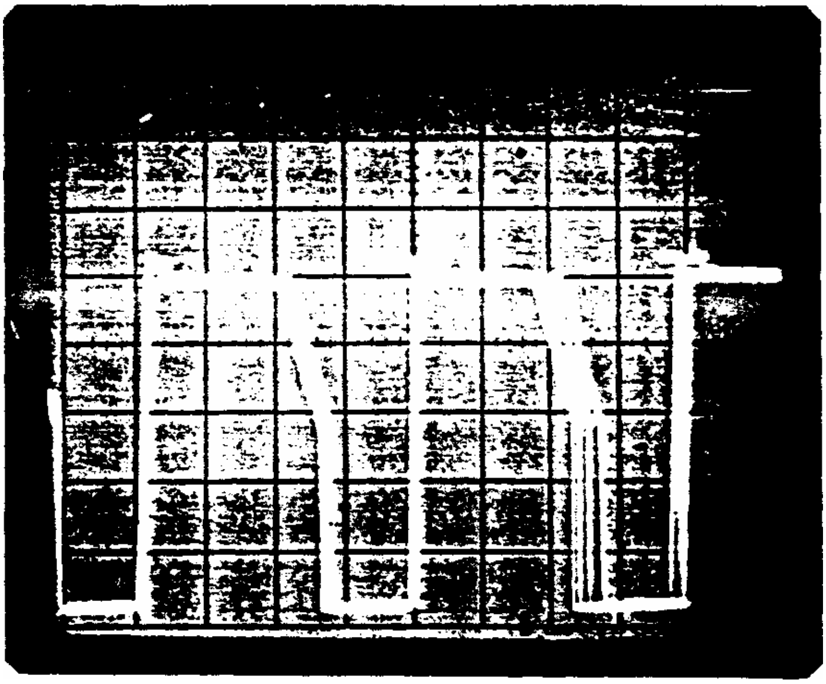
(11) Max available power is determined by measuring, peak collector current of TR2, and is sensed by R15. If voltage across R15 exceeds voltage across TY1 gate cathode, then TY1 conducts turning TR2 off.

NOTE: This sequence occurs during start-up, at low mains and under fault conditions. 2. Start-

Up Procedure

A. Current required at start-up is small compared with base drive current under normal operating conditions.

B. When turn on of TR2 occurs in this manner (once every 20ms) the oscillation becomes self sustaining. R8 continues to supply current, but is swamped by forward base drive from R16.



TR2 COLLECTOR Fuse in

3. **Over** Voltage Protection

A. Controlled by a second feedback loop attached to TY1, consisting of:

(1) A zener diode which senses the reference rail voltage and HT voltage proportionally.

(2) If this reference exceeds zener voltage. 020 conducts, fires TY1 and terminates drive to TR2. During which time enough volts are developed across TY2 gate-cathode to cause conduction, and latch on.

(3) Drive to TR2 is stopped until C23 is fully discharged (10ms).

(4) Power supply is off until the next mains start-up pulse.

4. Short Circuit Protection

A. Short circuit or over current on any output rail represents an increase in stored energy required from T2. therefore an increase in collector current through TR2. detected by R15. Thus TY1 is fired and TR2 turned off.

B. Now operating in 'Burst Mode', that is, the power supply is initiated under normal start-up conditions, but only operates for a few switching cycles when the over current protection comes into operation terminating drive to TR2.

VIDEO INPUT INTERFACE CIRCUIT - DESCRIPTION AND OPERATION

INPUT: Connections are made at PL101-red, green and blue video, sync options 1, 2, 3 and TTL video normal/invert. All inputs are flashover protected by, resistors and diodes. R,G,B drives are split in two ways:

1. Test selectable links TL103, R,G,B.

2. To IC101

Select Position 1: The input stage is in the linear mode, the video is buffered and level shifted by emitter output stages. These provide temperature tracking with TR103, 104 and 105 resulting in a stable black level.

NOTE: In the linear mode only brightness variations of the video information are possible using VR314.

Select Position 2: TR103, 104 and 105 bases are driven by IC101. This option is used when driving from TTL video sources offering primary/secondary colour and black and white drives.

NOTE: In the TTL mode, signal to noise immunity of system is very good. IC101 can be used with negative TTL level video drives (R,G,B), in order to invert video information.

Video inversion is achieved by toggling video polarity select line at. PL101 pin 2 or TL101:

Normal - 0V
Invert - + 5V

TTL Mode: Contrast of video information is tracked by varying available potential across open collector load resistors, R114, 115 and 116 which are supplied by TR101 from +12V, the base being driven from the contrast control slider VR111, R112. C101 form a low pass fitter and ensure smooth operation of contrast control.

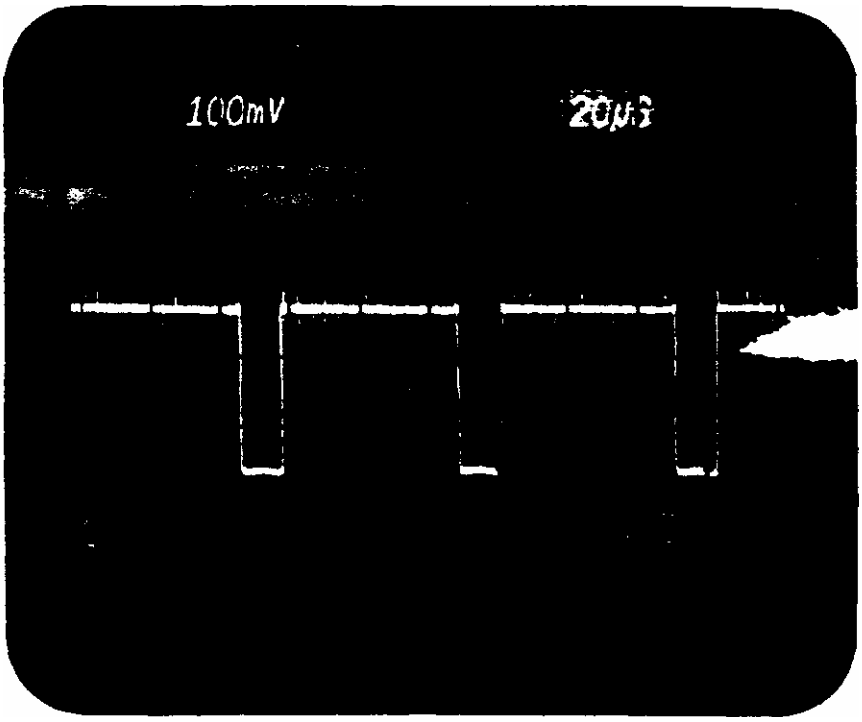
CRT Beam Current: Information is fed to D117, 118, from a constant current source derived from 124V main HT rail. As CRT beam current increases D117, 118 junctions become more negative thus; D117 conducts more heavily causing voltage to TR106 base to decrease. R136, C105 filter the signal, the derived voltage is emitter followed and supplies TR103, 104 and 105 emitters directly. Hence increases in CRT beam current, above a preset limit achieving an automatic reduction in picture brightness.

NOTE: CRT beam limiting is preset depending on monitor model.

Brightness of display in all modes is adjusted by. VR134 enabling parallel adjustment of R,G,B and black levels within a + or -20V range from nominal:

400uA - High and medium resolution 700uA - 14"
standard resolution TTL/Linear 900uA - 20" standard
resolution TTL/Linear

TR102: A fast switching transistor used to derive mixed blanking pulses for flyback blanking of video information. The base is driven from a potential divider/mixer network, from a line flyback pulse and a frame flyback pulse. Line flyback is advanced in phase with C225, to allow for transistor switching delays. D107, holds TR102 in a semi-saturation state.



TR102 COLLECTOR with 10 to 1 scope probe

IC101 is also used to provide the following sync options:

Composite negative sync: Fed in on PL101, pin 7, ensure TL102 in non-active position, allowing pin 2 of IC101, to be pulled high where upon IC101 performs a sync inversion and provides an attenuated positive sync waveform for driving sync separators of IC201, via R201 and TL106.

Composite positive sync: Fed in on PL101, pin 7 with TL102 in its grounded position. IC101, now provides an output in phase with input and of suitable amplitude for driving IC201 directly, via R201 and TL106.

Separate negative line and field syncs: Ensure TL102 in non-active position, line syncs are fed in on PL101, pin 5. IC101, performs an exclusive OR function, the output being an inverted composite sync waveform.

Separate positive line and field syncs: Fed in on PL101, pin 7 in its grounded position. TL106, is switched over to inverse field option. IC101, provides an attenuated and buffered line sync feed for IC201, via R201. Positive field sync information is fed directly PL101, pin 3 "sync3" input by, TL106(B) and R202.

LINE TIMEBASE - DESCRIPTION AND OPERATION

1. Line Timebase
   A. Line oscillator function is based on IC201, providing three outputs:

      (1) Horizontal drive pulses for control of line output stage.
      (2) Vertical sync pulses compatible with synchronisation of IC301 field output IC.
      (3) A sandcastle pulse providing burst gate and clamping information.
      NOTE: This facility is only used with IC TDA3301, currently required by '1 volt 75 ohm' linear/PAL input monitors.

2. Sync Separator

   A. IC (TDA1180P), incorporates separate noise gated sync separators for line/field syncs, which accepts positive going sync pulses (or negative going composite video) on pins 8 and 9.

   B. Output pulses from the line sync separator are used in conjunction with a sync gate to synchronise line oscillator in a phase locked loop circuit.

3. Line Oscillator - Phase Detectors

   A. The line oscillator is timed by a network of resistors and capacitors on pins 14 and 1 5 of IC201, used to derive a pulse of suitable mark space ratio for driving line output stages.

   B. IC201 contains two basic control loops, each containing a phase detector.

      (1) The first phase detector compares output of the line oscillator with the incoming line sync pulse. Phase detector output on pin 13, is filtered and fed to the voltage control input of the oscillator on pin 15.

      (2) The second phase detector, compensates for delays introduced by the line output stage and compares line flyback pulses at pin 6, with oscillator output. Phase detector output consists of a bi-directional current source used to charge/discharge C213 on pin 5. Voltage derived from C213 is used to control a phase shifter, which regulates the phase of the output pulse on pin 3. Pin 5 also provides a 'line shift' function, by offsetting voltage developed across C213. charged from VR220, R221 and R222 allowing phase shift of + or -1uS, between line scan and video information.

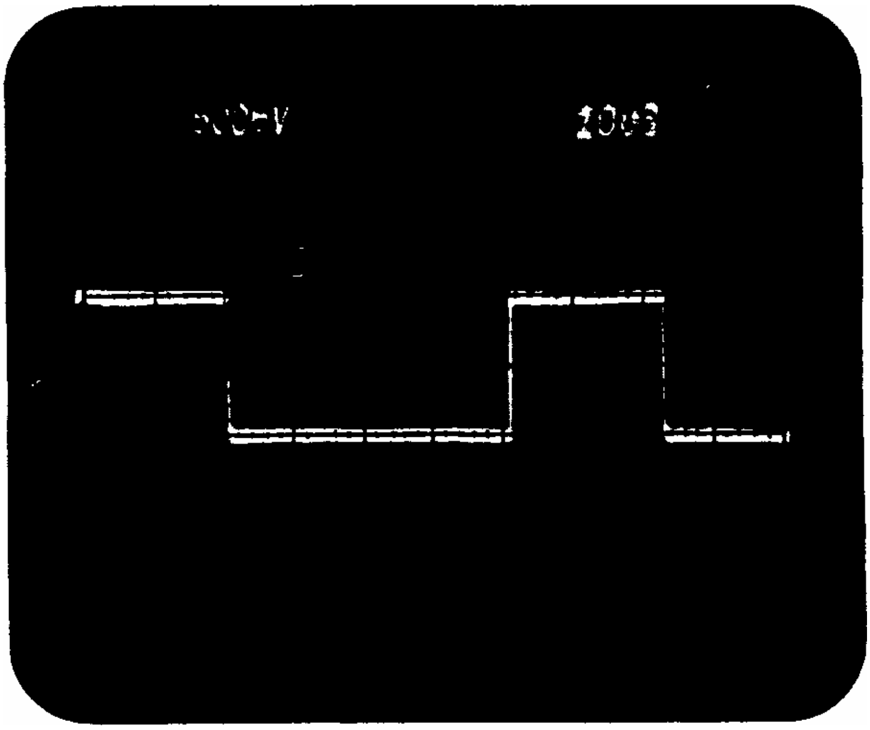
      (3) A 7uS gate pulse from the line oscillator, whose phase position is centred around the horizontal sync pulse. The gated pulse is used to control the arrival of sync pulses at the sync phase detector for a duration of 7uS, allowing latching and de-latching of line oscillator. Obtained by a coincidence detector which compares the phase gate pulse with that of incoming syncs.

      (4) When the two signals are not aligned, the coincidence detector is used to switch p.l.l. filter into a short time constant mode, giving a high input impedance at pin 12, thus increasing sensitivity and loop gain of oscillator. The phase locked loop now has a low noise immunity but has a very wide capture range. When aligned coincidence detector activates the time constant switch, causing low impedance on pin 12, achieving a lower sensitivity and loop gain, but providing a high degree of noise immunity. During the 'locked' condition the p.l.l. operates with a long time constant.

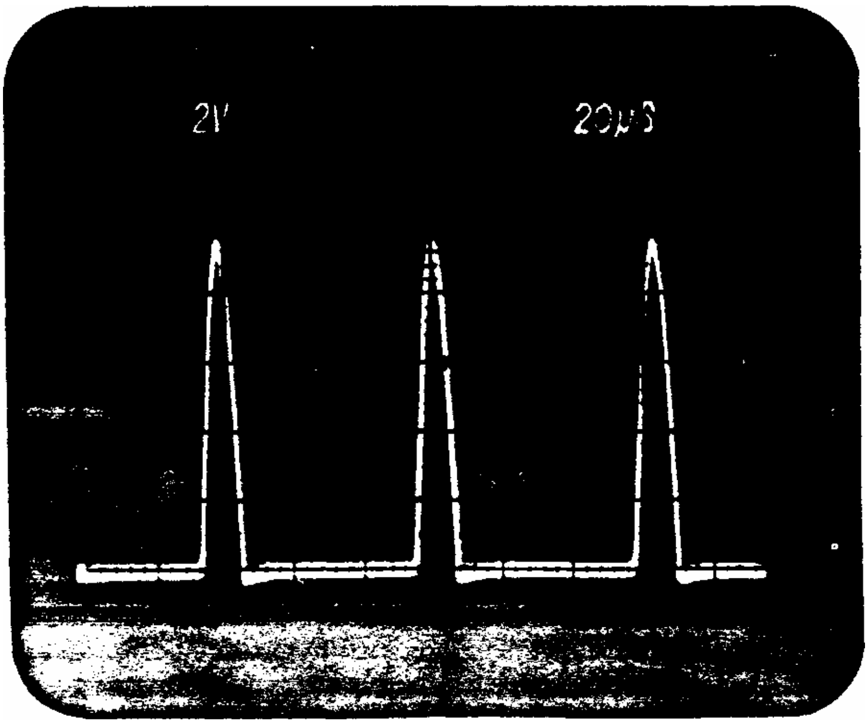
      NOTE: A short time constant mode, can be achieved manually by connecting the output of the coincidence detector on pin 11, to ground. Allowing the oscillator to follow rapid fluctuations in line period, which may occur on some non-standard signals.

4, Line Driver Stage

A. Horizontal drive pulses from pin 3 (IC201), are D.C. coupled to TR2Q1 and used to control driver transformer (T201), providing the impedance conversion necessary to provide 600mA forward base current, for saturation of line output transistor (TR202). Ringing is damped by R225 and C214 at TR201 turn off, thus limiting its Vce to a safe value. HT supply to the line driver comes from main HT supply rail, prior to R231 and HT scan interlock (PL201 pins 5/6; allowing its operation to be checked independently of the line output stage.



IC201 PIN 3 with 10 to 1 scope probe



TR202 COLLECTOR with 100 to 1 scope probe

5. Vertical Sync Output

A. Output of field sync separator is used to drive vertical sync output stage on pin 10 (IC201).

B. In addition, this pulse is used internally to inhibit the first phase detector during the field sync period, thus preventing 'top flutter' as a result of equalising pulses.

6. Sandcastle Pulse

A. Sandcastle pulse is on pin 7 (IC201), used on models with linear interface PCB assembly consisting of two sections.

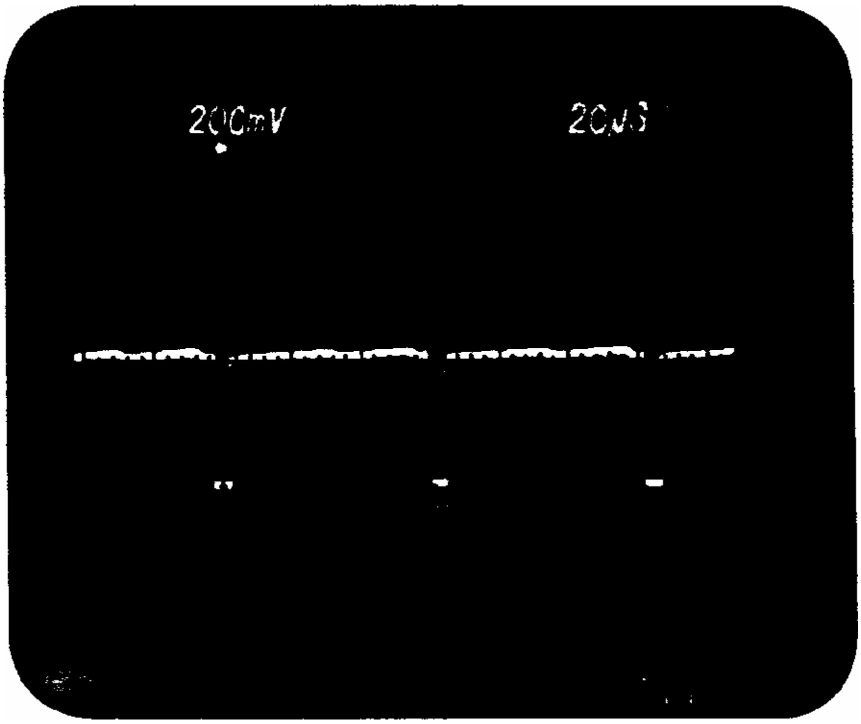
(1) Upper portion, suitable for burst gate and clamping operations from the horizontal oscillator, thus ensuring an accurate phase relationship with the video information.

(2) Lower portion, derived from a line flyback 'slice' for line blanking

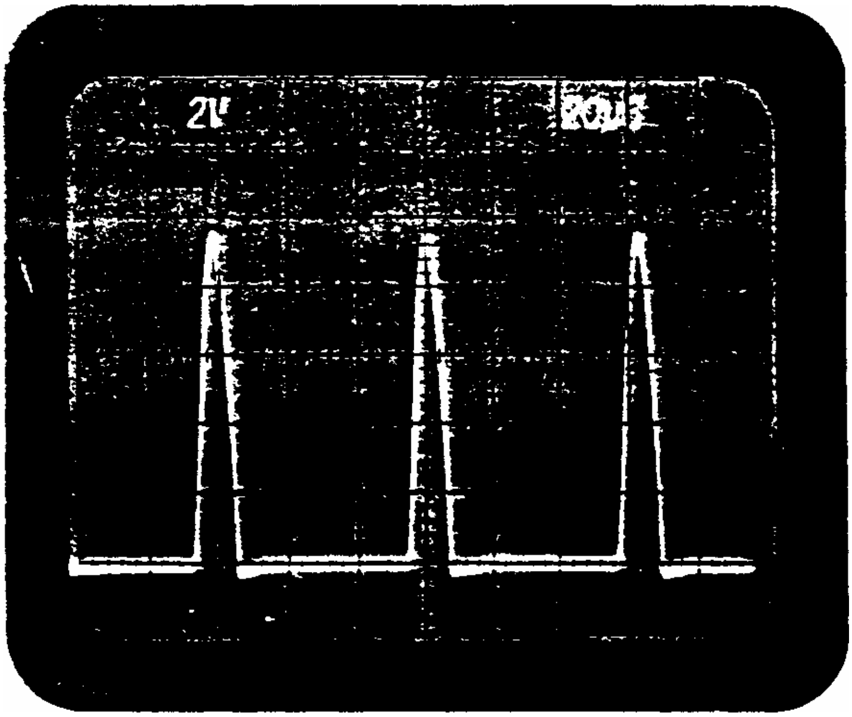
LINE OUTPUT - DESCRIPTION AND OPERATION A. Line

Output

1. L202. L203 and T202 primary, are tuned during the flyback period by C222. This lasts for 11.8/11. 1uS, on 14"/20" monitors.
2. Line output transistor TR2C2, is driven directly from the secondary winding of T201. 'ON' current is controlled by R227, turn off dissipation is minimised by L204.
3. Line linearity correction is provided by L203, which is damped by C217, R230 'S' correction is provided by C218.
4. Field timebase +25V (IC301), is achieved by rectifying a negative going flyback voltage from a secondary winding on line output transformer. A fusable resistor provides CRT protection under possible fault conditions.



LINE SYNC with 10 to 1 scope probe



TR202 COLLECTOR with 100 to 1 scope probe

B. EHT Supply

1. 23.5kV required for CRT is generated by a tripler module driven from a 7.5kV, overwind on T203. Inductance of the transformer (between primary and overwind), is tuned to the 7th harmonic of the flyback frequency by tripler input capacitance and self capacitance of the overwind.

2. The 'breathing' performance of the display is further improved by deriving a high focus potential from a resistive thick film/substrate potential divider from the EHT. giving rise to a constant bleed current from EHT, thus lowering output impedance of the EHT circuit.

3. An extra input diode within the tripler has its anode connected to the tube base ground and via a beam current sensing circuit to 0V. C223 and a network of resistors provide a load for the diode and effectively damp out ringing which may occur during scan. The resulting 1000V which occurs across C223 is used to generate A1 potential across CRT.

C. HT Supply

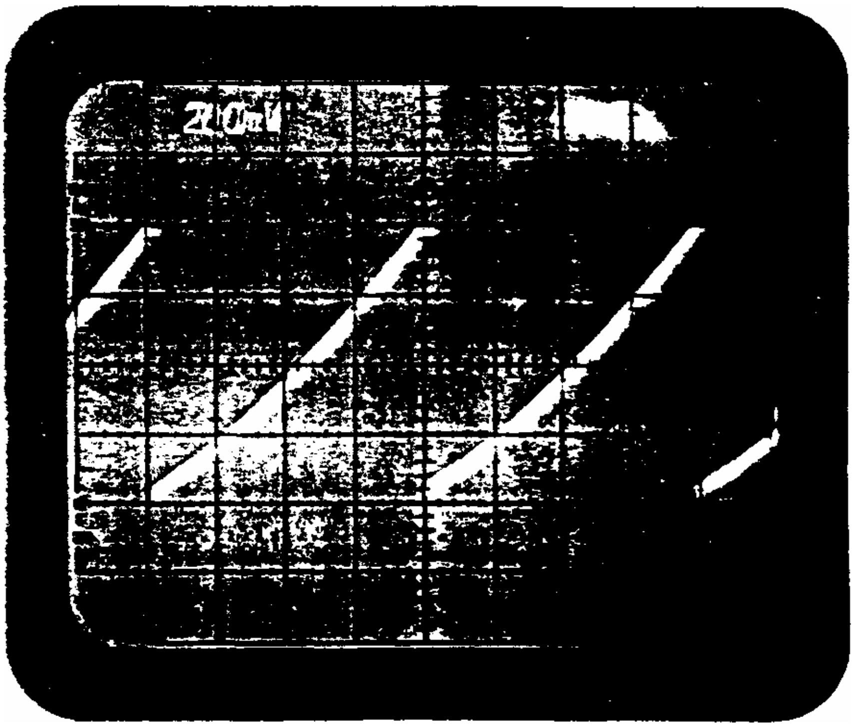
1. Derived from the main secondary winding of the switch mode power supply via R231. R231 is chosen to optimise picture breathing performance and offer protection to TR202, during CRT flashover.

FIELD TIMEBASE* - DESCRIPTION AND OPERATION

The field timebase -..":• ;^ s carried out by ;-.:2C* 2>: -.-: - --_ -. ^~~ :. s determined by VR307, R308 and C303. produ; ~: j '2C.S : .:c .: -'- 3": at pin 12 - •? - ; • .-.-;;:- s :?ʳved from potential across C305 and C306 as •--••. :- ange towards -25V*supp* . . -j - 11- R305 R306 and R301. When field scan is completed the ' COuS pulse discharges C305 *and C306* ready for charging cycle to be restarted.

1. **Field** Linearity

A. Sawtooth output on pin ? of IC301 via R?13 *and* ???? field linearity control.



IC301 PIN 1 with 10 to 1 scope probe

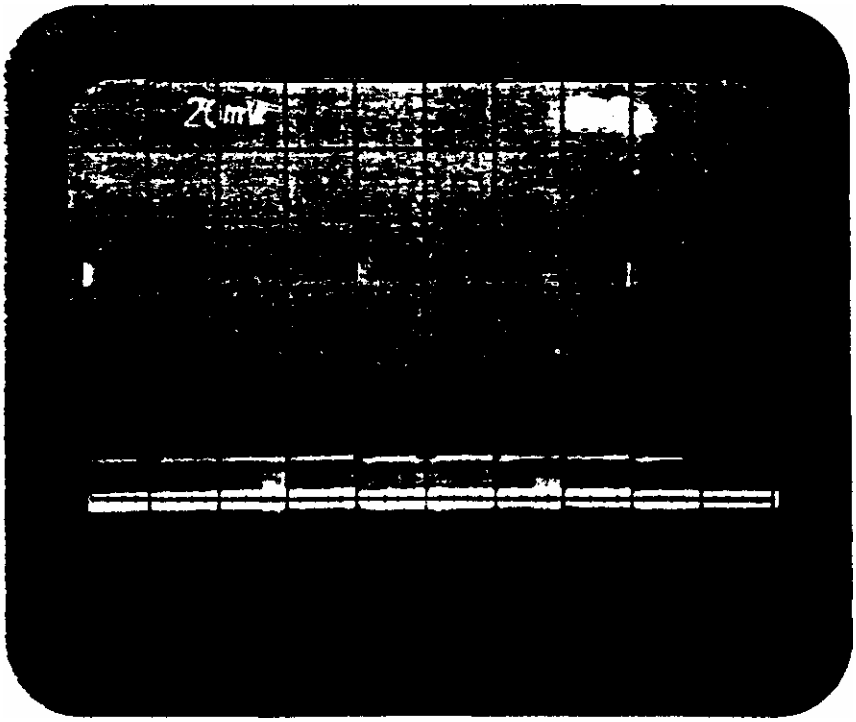
2. Field Flyback

A. In order to achieve a short fieid flyback time, a supply voltage larger than required during scan, must be applied to field deflection coils during flyback period. Made **possible** by using a separate field flyback generator, within IC301.

B. Main HT supply for IC301 is supplied to pin 5 via D302. During flyback the **generator doubles** the supply on pin 5, the potential on pin 3 *is switched* from 0V during scan to +25V during flyback The change in voltage occurs on pin 5 via C304 causing potential **to double during** flyback.

C. D302 isolates pin 5 from +25V supply. When deflection coil field has collapsed **and potential** across field scan coils has fallen below +25V pin 3 is switched back to **0V and scan cycle** resumed.

D. Synchronisation of IC301 is achieved by feeding a positive going) field sync pulse on pin 8 of IC301



!C301 PIN 8 with 10 to 1 scope probe

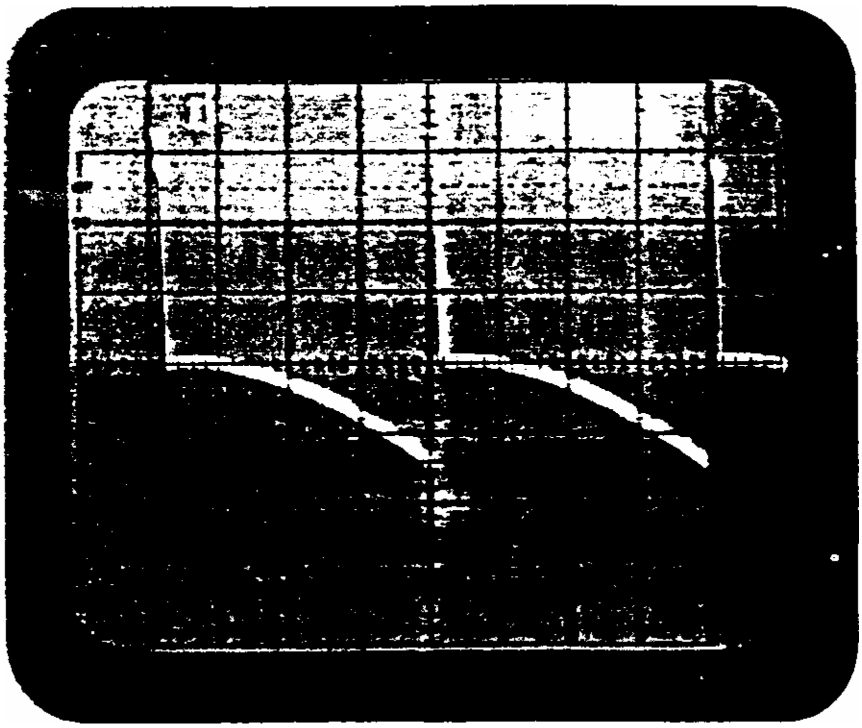
3. HT Supply for IC301

A. Derived from a scan rectified rail from the line output stage. C305, C306 are fed via VR306 (height control) from scan rectified supply and 12V rail. Proportions of current and associated time constants R303, C301 and D301 are used to minimise "picture bounce" thus maintaining accurate tracking of the field scan with line scan amplitude during CRT beam current variations, therefore reducing picture "breathing" effects.

4. Field Output

A. Sawtooth output on pin 1 is applied to output stage (within IC301) and scan output is available from pin 4 to field deflection coils. Current within coils is sampled by R323, then fed back via R31 7 to the virtual earth input pin 10 of IC301.

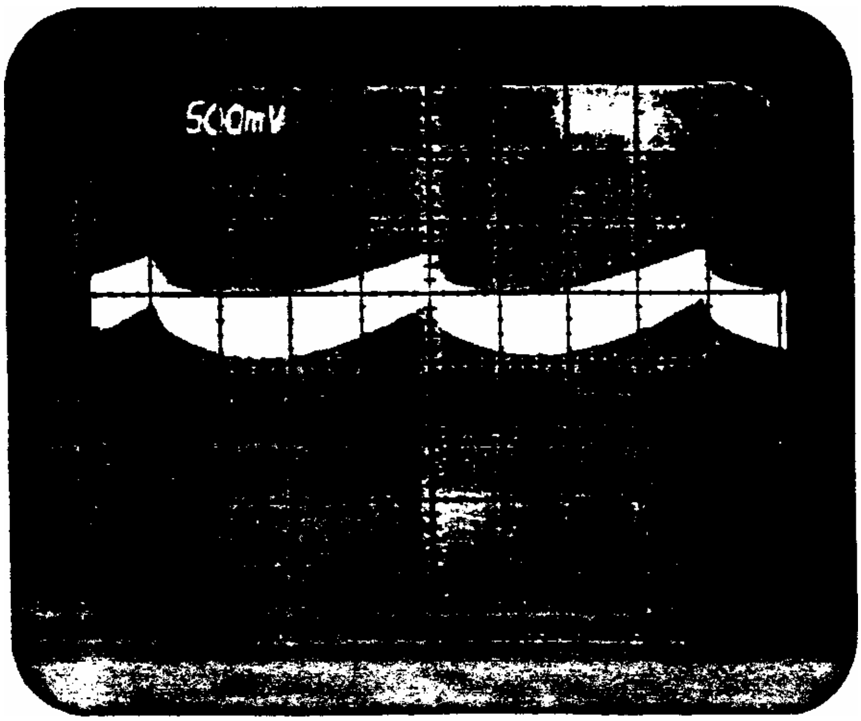
B. Gain of output amplifier is set by the ratio of R314 and R31 7. DC operating point by R318 and R316.



IC301 PIN 4 with 10 to 1 scope probe

5. Picture Geometry

A. CRT E-W pincushion distortion is corrected by modulation of line deflection current in transductor (T202) actively driven by TR301. which is then fed from the parabolic waveform at the top of the S correction capacitor C311. AC gam from the amplifying driver is used to control amount of correction applied to CRT.



TR301 COLLECTOR with 10 to 1 scope probe

CRT TUBE BASE PANEL - DESCRIPTION AND OPERATION

1. CRT Tube Base Panel (Refer to fig. 1)

2. Circuit Description

   A. All CRT electrodes are protected by a resistor, capacitor and spark gap.

      (1) Scark gaps on all electrodes (except focus) are formed by a 1 -2kV ring trap gap, positioned within CRT base socket assembly. High focus voltage has a separate 10kV spark gap contained within tube base socket.

      (2) CRT cathodes are stood off from video outputs by 220 ohm resistors, the grid 100k and A1's 820k.

      (3) Decoupling of grid and A1's is achieved by C910 and C911.

      (4) Focus voltage is provided by a potential divider located within tripler module, providing an adjustable voltage of 5-8KV.

      (5) A1 voltage is adjusted by VR932, offering a range of 350-820 volts.

      (6) CRT heaters may be disconnected by removing TL901, in order to make video adjustments.

      (7) CRT cathodes are directly driven from video output stages mounted on CRT panel.

   NOTE: The component values given in this section refer to a standard 14 inch model. For equivalent values, refer to the parts listing.

3. Video Output Stages - Circuit Description and Operation

NOTE: Red, Green and Blue video outputs are identical, the following text refers to the red output stage.

   A. TR902 forms a class 'A' amplifier, AC gain is derived from the ratio of R935 to R902. VR903 and DC gain by a DC offset current from R905 and VR906.

   B. R904 forms video output load and TR902 represents a low impedance drive source to CRT input capacitance during its conduction.

   C. During turn off of TR902. the source impedance of the load R904 is considerably reduced by TR901, ensuring a good 'pull-up' performance.

   D. Video compensation is achieved by split capacitances, C902, C903 to help maintain a constant amplifier response curve over the full range of VR903.

   E. The emitters of TR902. TR904 and TR906 are connected together with a DC reference of approximately 7.5V, used to set video black level voltage.

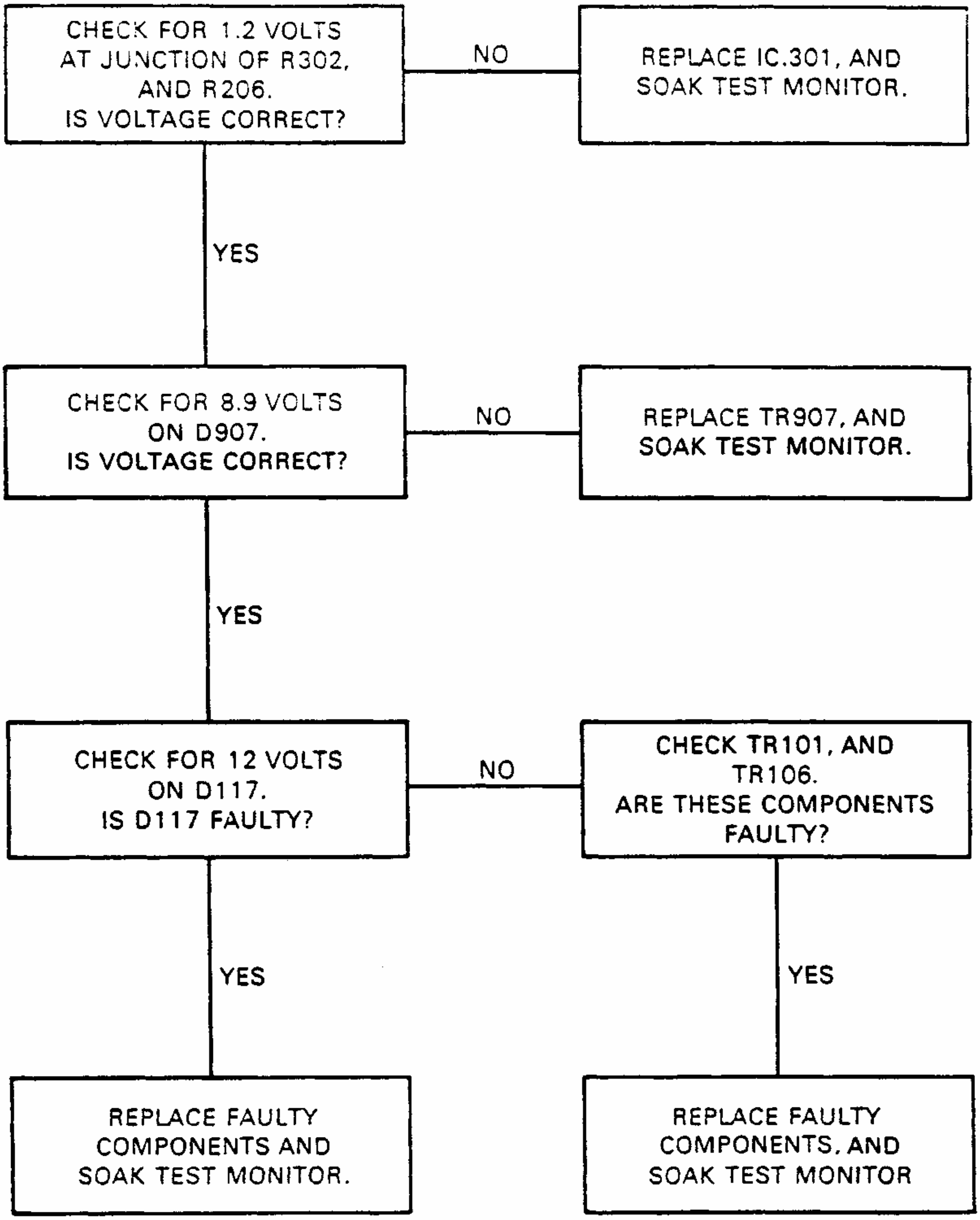
   F. TR907 performs line and field blanking of video information.

      (1) TR907 is driven by negative (going) mixed blanking pulses from TR102. TR907 conducts providing a 7.5V black level reference.

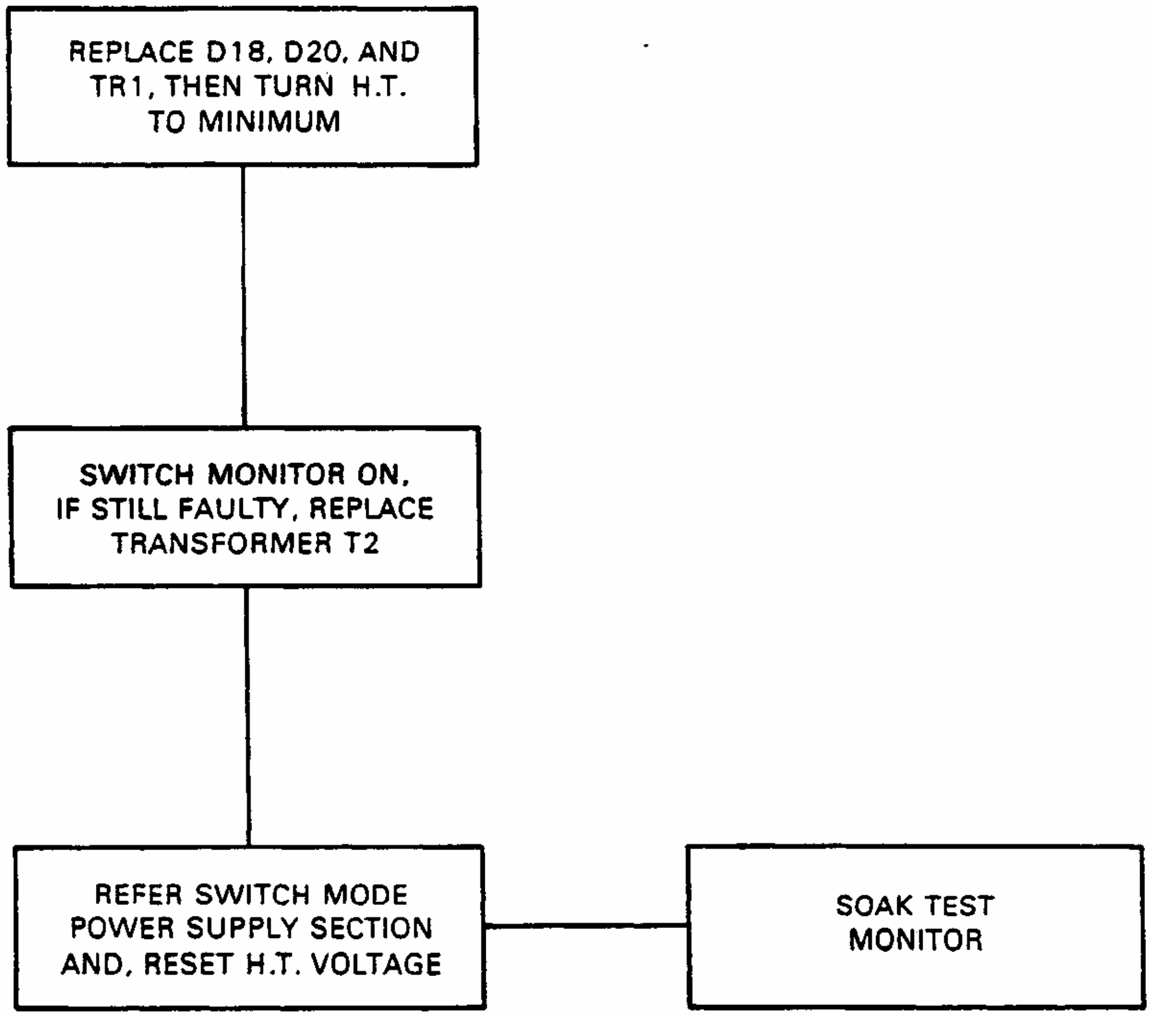
      (2) During line and field flyback TR907 is turned off, forcing video outputs off.

      (3) Beam current information is sensed on tube base panel resistively, across line output ground to 0V line by R937, D117, D118 on main PCB.

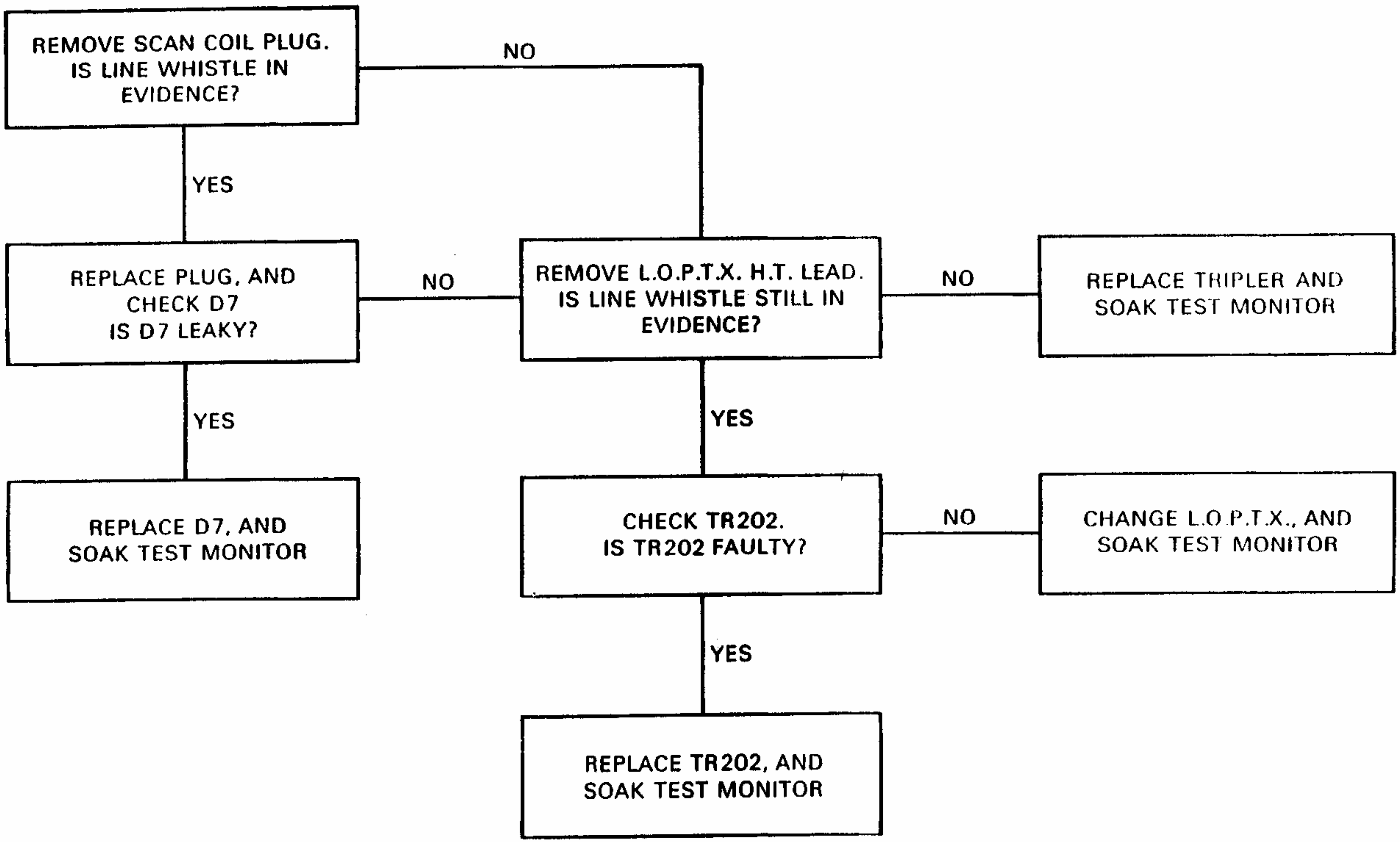
NO PICTURE –
LINE OSCILATING



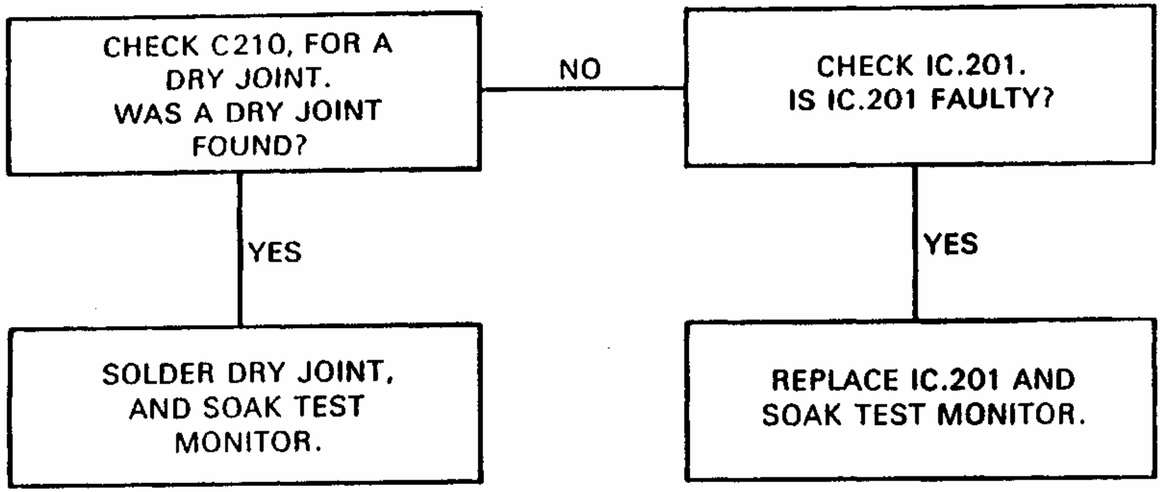
BURST MODE


REPLACE D18, D20, AND TR1, THEN TURN H.T. TO MINIMUM
SWITCH MONITOR ON, IF STILL FAULTY, REPLACE TRANSFORMER T2
REFER SWITCH MODE POWER SUPPLY SECTION AND, RESET H.T. VOLTAGE
SOAK TEST MONITOR

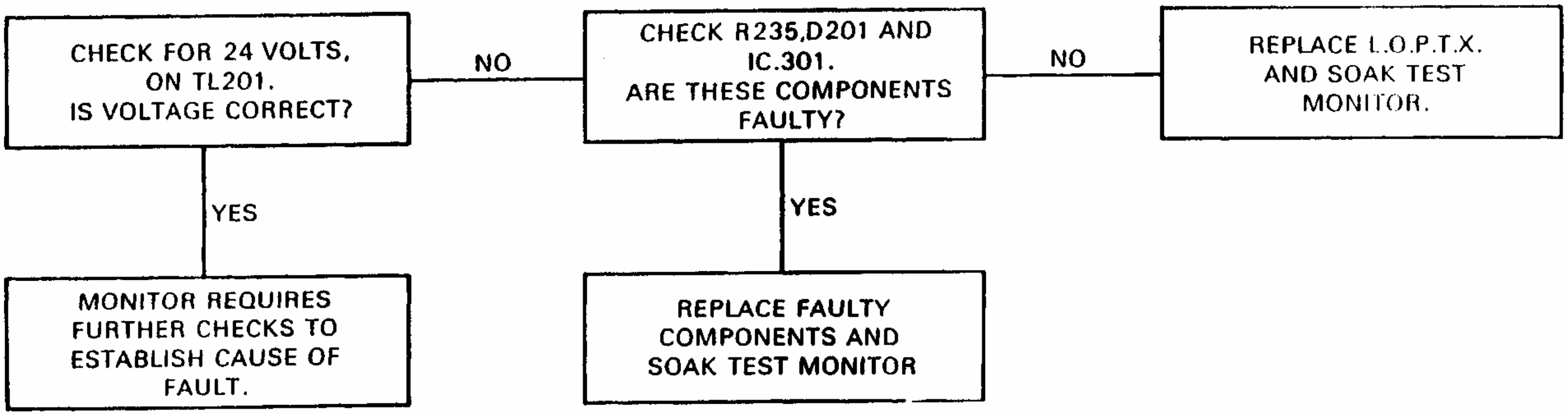
LINE WHISTLE

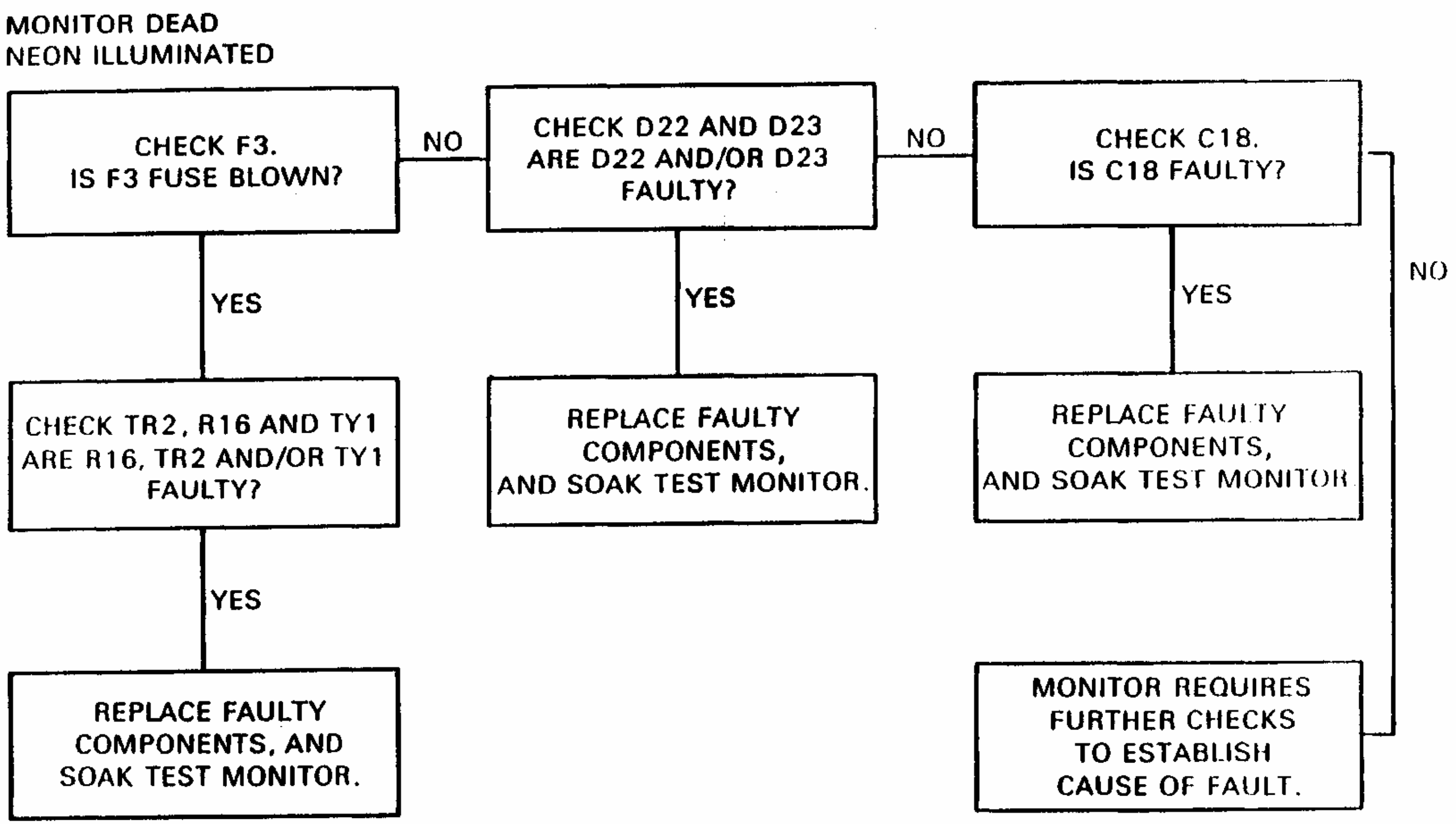


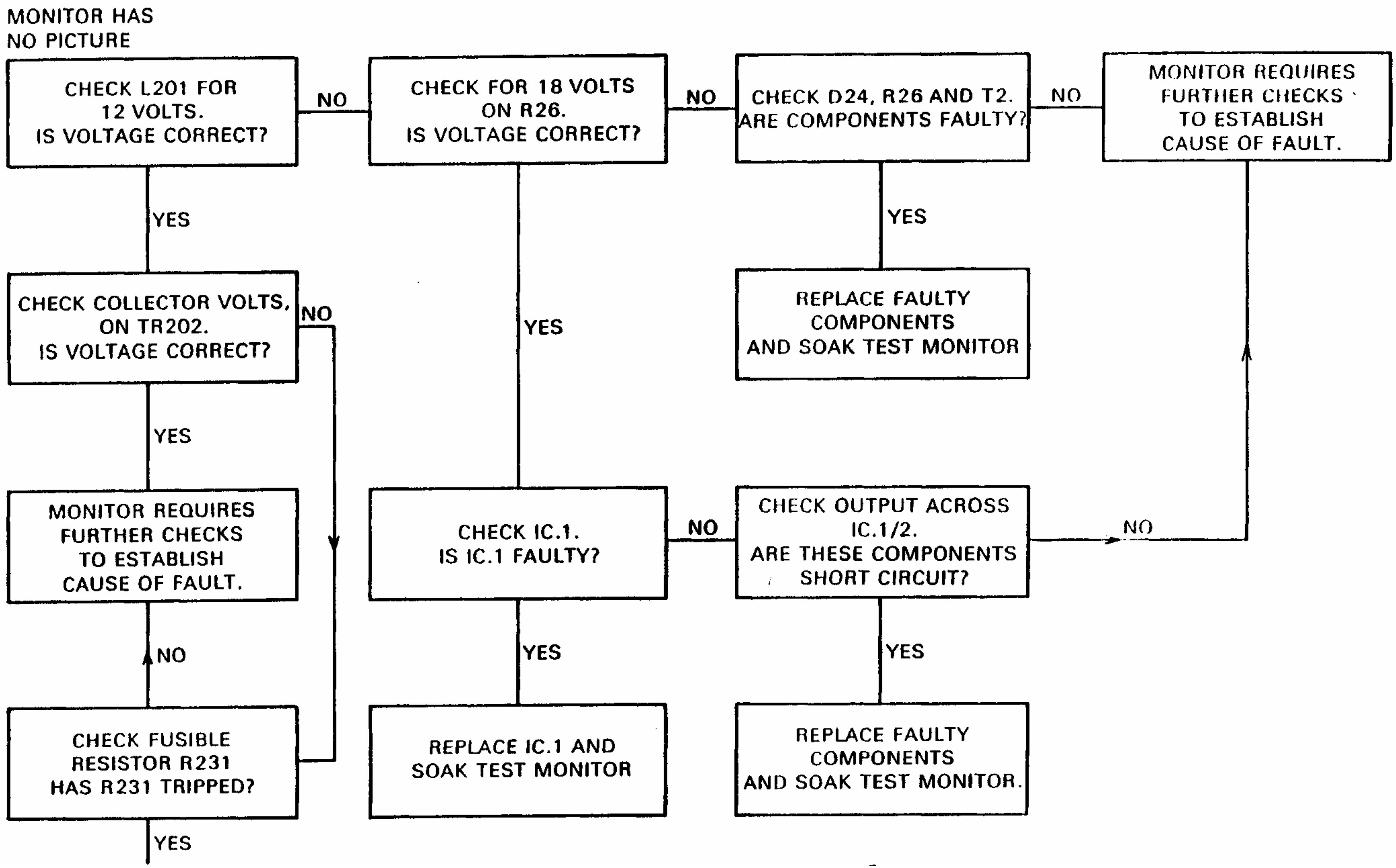
INTERMITTENT –
LINE SYNC

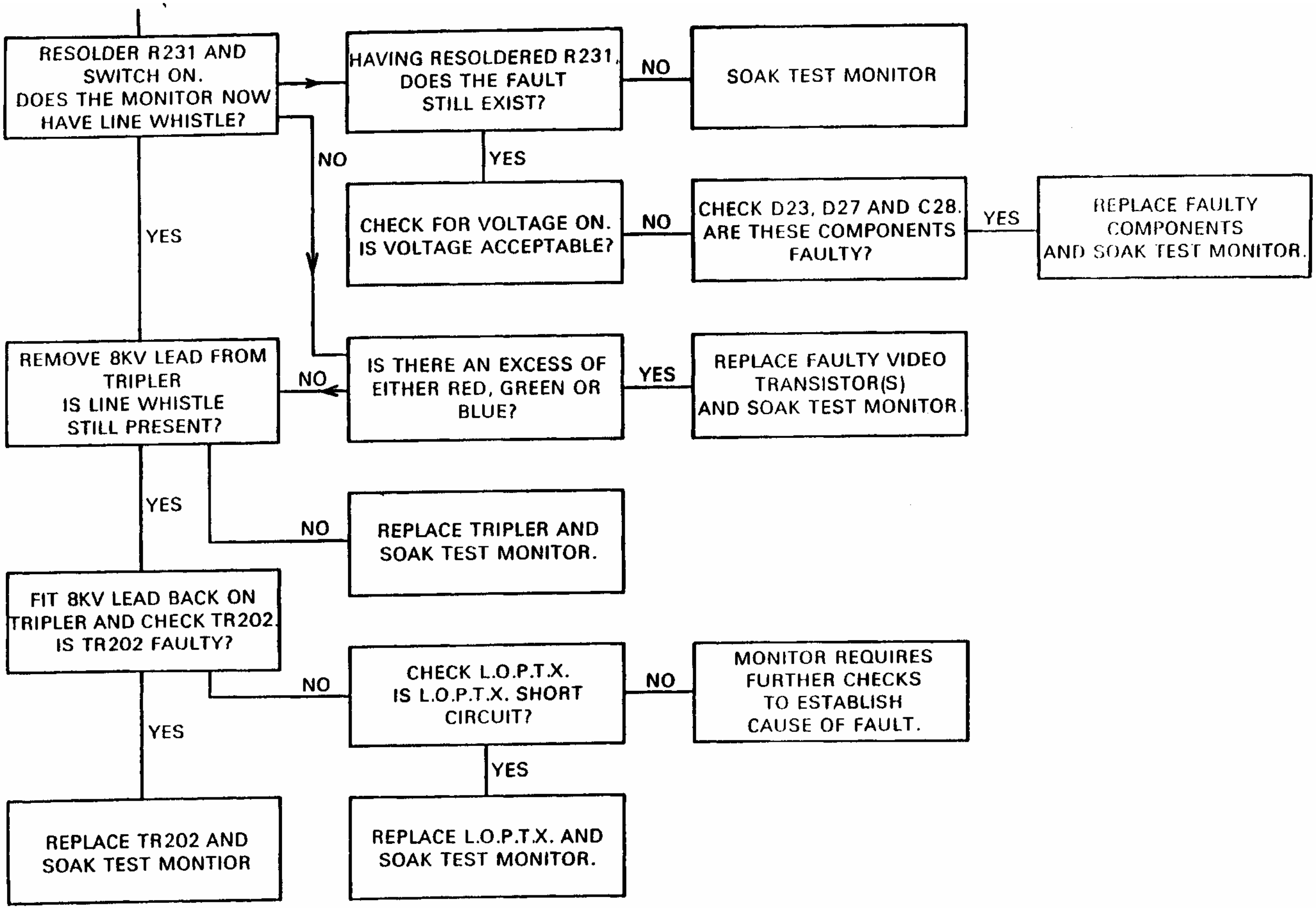


FRAME COLLAPSE

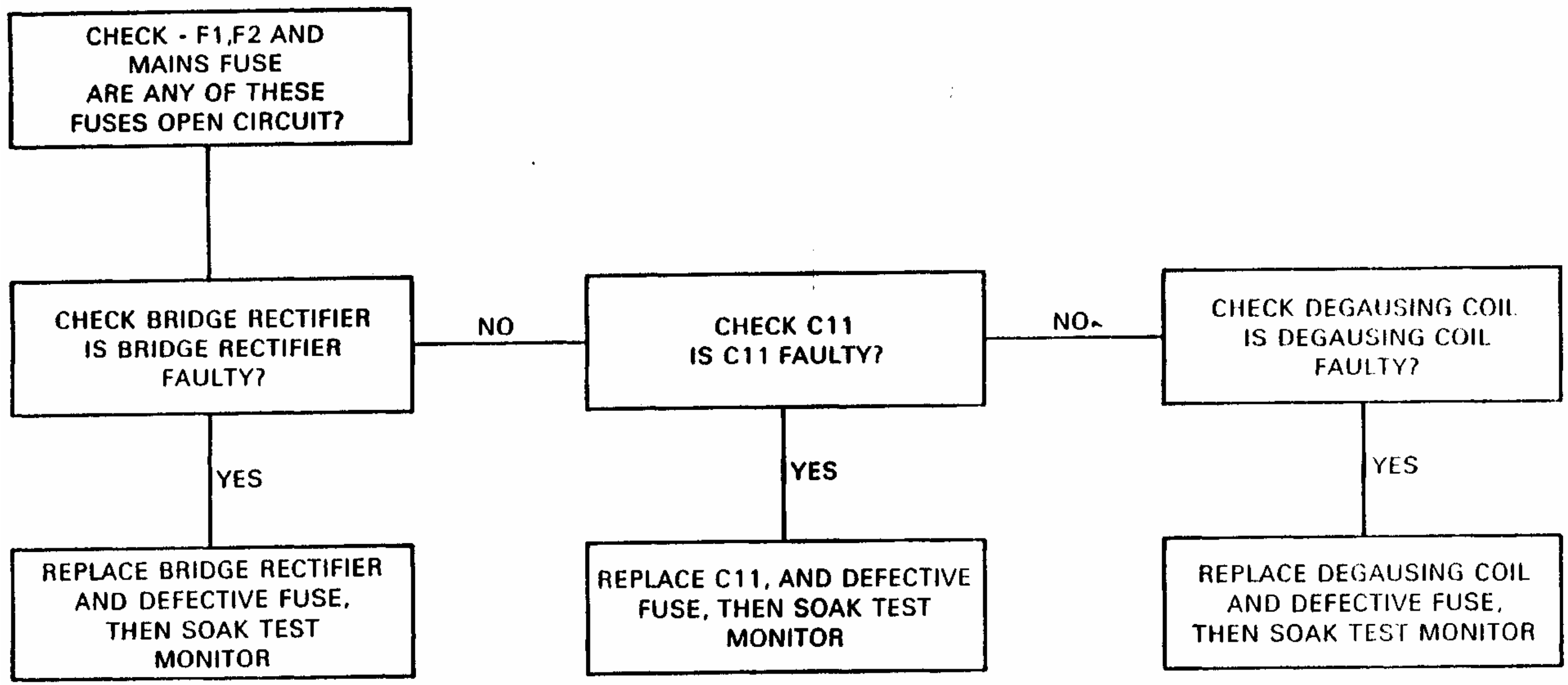



MONITOR DEAD
NEON ILLUMINATED
CHECK F3. IS F3 FUSE BLOWN?
NO
CHECK D22 AND D23 ARE D22 AND/OR D23 FAULTY?
NO
CHECK C18. IS C18 FAULTY?
NO
YES
CHECK TR2, R16 AND TY1 ARE R16, TR2 AND/OR TY1 FAULTY?
YES
REPLACE FAULTY COMPONENTS, AND SOAK TEST MONITOR.
YES
REPLACE FAULTY COMPONENTS, AND SOAK TEST MONITOR.
YES
REPLACE FAULTY COMPONENTS, AND SOAK TEST MONITOR
MONITOR REQUIRES FURTHER CHECKS TO ESTABLISH CAUSE OF FAULT.


MONITOR HAS
NO PICTURE
CHECK L201 FOR 12 VOLTS. IS VOLTAGE CORRECT?
NO
CHECK FOR 18 VOLTS ON R26. IS VOLTAGE CORRECT?
NO
CHECK D24, R26 AND T2. ARE COMPONENTS FAULTY?
NO
MONITOR REQUIRES FURTHER CHECKS TO ESTABLISH CAUSE OF FAULT.
YES
REPLACE FAULTY COMPONENTS AND SOAK TEST MONITOR
YES
CHECK COLLECTOR VOLTS, ON TR202. IS VOLTAGE CORRECT?
NO
YES
MONITOR REQUIRES FURTHER CHECKS TO ESTABLISH CAUSE OF FAULT.
NO
CHECK FUSIBLE RESISTOR R231 HAS R231 TRIPPED?
YES
YES
CHECK IC.1. IS IC.1 FAULTY?
NO
CHECK OUTPUT ACROSS IC.1/2. ARE THESE COMPONENTS SHORT CIRCUIT?
NO
YES
REPLACE IC.1 AND SOAK TEST MONITOR
YES
REPLACE FAULTY COMPONENTS AND SOAK TEST MONITOR.


RESOLDER R231 AND SWITCH ON. DOES THE MONITOR NOW HAVE LINE WHISTLE?
HAVING RESOLDERED R231, DOES THE FAULT STILL EXIST?
NO
SOAK TEST MONITOR
YES
CHECK FOR VOLTAGE ON. IS VOLTAGE ACCEPTABLE?
NO
CHECK D23, D27 AND C28. ARE THESE COMPONENTS FAULTY?
YES
REPLACE FAULTY COMPONENTS AND SOAK TEST MONITOR.
NO
YES
IS THERE AN EXCESS OF EITHER RED, GREEN OR BLUE?
YES
REPLACE FAULTY VIDEO TRANSISTOR(S) AND SOAK TEST MONITOR.
NO
REMOVE 8KV LEAD FROM TRIPLER IS LINE WHISTLE STILL PRESENT?
NO
REPLACE TRIPLER AND SOAK TEST MONITOR.
YES
FIT 8KV LEAD BACK ON TRIPLER AND CHECK TR202. IS TR202 FAULTY?
NO
CHECK L.O.P.T.X. IS L.O.P.T.X. SHORT CIRCUIT?
NO
MONITOR REQUIRES FURTHER CHECKS TO ESTABLISH CAUSE OF FAULT.
YES
REPLACE L.O.P.T.X. AND SOAK TEST MONITOR.
YES
REPLACE TR202 AND SOAK TEST MONTIOR

MONITOR DEAD –
NEON NOT ILLUMINATED



COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R1		RK105GKO	100K CARBON COMP. RESISTOR 10% 0.5W AXIAL
R2		RF185JJO	180K CARBON FILM RESISTOR 5% 1W AXIAL
R3		RF393DJO	3K9 CARBON FILM RESISTOR 5% 0.25W AXIAL
R3	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1449/AS)	RF273DJO	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R3	(1496/LI2U)		
	(1486/L12U)	RF363DJO	3K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R3	(1241 /AS)		
	(1446/L12)		
	(1451/MQ3)	RF473DJO	4K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R3	(1446/LF)	RF333DJO	3K3 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR4		RQ103AL2	1K PRESET POT CARB. MIN. H MTG 20% 0.1W AXIAL
R5		RF104DJO	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R5	(1441/AL)		
	(1441 /AS)		
	(1441/MS)		
	(1441/MS4)		
	(1449/AS)	RF683DJO	6K3 CARBON FILM RESISTOR 5% 0.25W AXIAL
R5	(1486/LI2U)	RF323DJO	8K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R6		RW154XJ 6	15K WW RESISTOR 5% 7W RADIAL
R7		RF471DJO	47R CARBON FILM RESISTOR 5% 0.25W AXIAL
R8		RF333JJO	3K3 CARBON FILM RESISTOR 5% 1W AXIAL
R8	(1496/L12U)		
	(1486/LI2U)	RF224GJO	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R8	(1451/AS)	RF564GJO	56K CARBON FILM RESISTOR 5% 0.5W AXIAL
R10		RF392DJO	390R CARBON FILM RESISTOR 5% 0.25W AXIAL
R11		RF221DJO	22R CARBON FILM RESISTOR 5% 0.25W AXIAL
R12		RW103XJ5	1K WW RESISTOR 5% 9W RADIAL
R12	(1451AP/DS)		
	(1451/DS)	RW103VJ5	1K WW RESISTOR 5% 7W RADIAL
R13		RF274DJO	27K CARBON FILM RESISTOR 5% 0.25W AXIAL
R14		RF102DJO	100R CARBON FILM RESISTOR 5% 0.25W AXIAL
R15		R0150LJO	1R5 METAL OXIDE RESISTOR 5% 2W AXIAL
R16		RW472ZJ5	470R RESISTOR 5% 1 1W RADIAL
R16	(1496/LI2U)		
	(1486/L12U)	RW103XJ5	1K WW RESISTOR 5% 9W RADIAL
R16	(1451/AS)	RW333RJO	3K3 WW RESISTOR 5% 5W RADIAL
R16	(1451AP/DS)		
	(1431/DS)		
	(1451/DS)	RW103VJ5	1K WW RESISTOR 5% 7W RADIAL
R17		RG336GJO	! 3M3 METAL GLAZE RESISTOR VDE/BS415 APPROVED 5% 0.5W AXIAL
R18/20		RF394GJO	39K CARBON FILM RESISTOR 5% 0.5 AXIAL
R21		RF392DJO	390R CARBON FILM RESISTOR 5% 0.25W AXIAL
R22		RF682DJO	680R CARBON FILM RESISTOR 5% 0.25W AXIAL
R23		RF104DJO	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R23	(1441/AL)	RF683DJO	6K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R24		RF224DJO	22K CARBON FILM RESISTOR 5% 0.25W AXIAL
R25		R0470UO	4R7 METAL OXIDE RESISTOR 5% 2W AXIAL
R26		RL470GJO	! 4R7 FUSIBLE METAL RESISTOR 5% 0.5W AXIAL
R27		RF125DJO	120K CARBON FILM RESISTOR 5% 0.25W AXIAL
R29		RF185DJO	180K CARBON FILM RESISTOR 5% 0.25W AXIAL
R29	(1486/LI2U)	RF684DJO	68K CARBON FILM RESISTOR 5% 0.25W AXIAL
R30		WL2214TU1	LINK 5mm x 14mm x 5mm

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R32	(1431AP/MS)		
	(1431AP/DS)		
	(1451AP/DS)		
	(2040/CS5)	RF392DJO	390R CARBON FILM RESISTOR 5% 0.25W AXIAL
R101		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R102-107		RF152DJO	150R CARBON FILM RESISTOR 5% 0.25VV AXIAL
R108		RF474DJO	47K CARSON FILM RESISTOR 5% 0.25W AXIAL
R110		RF474DJO	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR1 1 1		KP0025A05	PLUG 5-WAY 20/3445
VR11 1	(1451/AS)		
	(1441/AS)		
	(1241/AS)	RQ104CL1	10K PRESET POT CARB MIN 20% 0.15W V.MTG
VR111	(1439/AS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1435/MS)		
	(1439/MS)	KP0026A08	PLUG 8-WAY PRESSAC 2S/20/3448/BDFH
R112/113		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R114-116		RF472DJO	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R117		RF632DJO	53CR CARBON FILM RESISTOR 5% 0.25W AXIAL
R118		RF222DJO	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R120-123		RF153DJO	1K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R124		RF472DJO	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R125		RF153DJO	1K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R126		RF103DJO	IK CARBON FILM RESISTOR 5% 0.25W AXIAL
R127/128		RF222DJO	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R130		RF222DJO	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R131-133		RF102DJO	100R CARBON FILM RESISTOR 5% 0.25W AXIAL
VR134		RQ103AL2	1K PRESET POT CARBON MIN 20% 0.1W H.MTG
R135/R136		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R137		RF185DJO	180K CARBON FILM RESISTOR 5% 0.25W AXIAL
R138		RF105DJO	100K CARBON FILM RESISTOR 5% 0.25W AXIAL
R138	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1496/LI2U)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/MS)		
	(1451/DS)		
	(1451AP/MS4		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	RF1850JO	180K CARBON FILM RESISTOR 5% 0.25W AXIAL
R140		RF474DJO	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
R201		RF273DJO	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R202		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R203		RF686DJO	6M8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R204		RF156DJO	1M5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R205		RF226DJO	2M2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R206		RF394GJO	39K CARBON FILM RESISTOR 5% 0.25W AXIAL
R207		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R208		RF101DJO	10R CARBON FILM RESISTOR 5% 0.25W AXIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R210		RF825DJO	820K CARBON FILM RESISTOR 5% 0.25W AXIAL
R211		RF123DJO	1K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R212		RF363DJO	3K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R213		RF105DJO	100K CARBON FILM RESISTOR 5% 0.25W AXIAL
R214		RF225GJO	220K CARBON FILM RESISTOR 5% 0.5W AXIAL
R215		RF104DJO	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R215	(1441/AL)	RF913DJO	9K1 CARBON FILM RESISTOR 5% 0.25W AXIAL
R216		RF324DJO	82K CARBON FILM RESISTOR 5% 0.25W AXIAL
R217		RF224DJO	22K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR218		RQ224AL1	22K PRESET POT CARBON MIN 20% 0.1W V.MTG
VR220		RQ225AL1	220K PRESET POT CARBON MIN 20% 0.1W V.MTG
R221		RF225DJO	220K CARBON FILM RESISTOR 5% 0.25W AXIAL
R222		RF155DJO	150K CARBON FILM RESISTOR 5% 0.25W AXIAL
R223/224		RF222DJO	220R CARBON FILM RESISTOR 5% 0.25W AXIAL
R225		RW333LJ5	3K3 WW RESISTOR 5% 2W (PLUG)
R226		RX223PJO	! 2K2 FUSIBLE WW RESISTOR 5% 2W RADIAL
R227		RF100JJO	1RO CARBON FILM RESISTOR 5% 1W AXIAL
R227	(1496/L12U)		
	(1431/DS)		
	(1439/AS)		
	(1439/MS)		
	(2030/CS5)		
	(2031/CS5)		
	(203 VAX)		
	(2032/AM)		
	(1486/LI2U)		
	(1451/MS)		
	(1451/DS)		
	(1456/LI2)		
	(1241/AS)		
	(1241/AT)	R0100JJO	1R0 METAL OXIDE RESISTOR 5% 1W AXIAL
R228/230		RW682PJO	680R WW RESISTOR 5% 4W AXIAL
R231		RX1518J6	! 15R FUSIBLE WW RESISTOR 5% 2W8 RADIAL
R232		R0101LJO	10R METAL OXIDE RESISTOR 5% 2W AXIAL
R233/234		RF394GJO	39K CARBON FILM RESISTOR 5% 0.5W AXIAL
R235		RL101GJO	! 10R FUSIBLE METAL RESISTOR 5% 0.5W AXIAL
R236		RF155JJO	150K CARBON FILM RESISTOR 5% 1W AXIAL
R237	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	RW220PJO	2R2 WW RESISTOR 5% 4W AXIAL
R301		RF685DJO	680K CARBON FILM RESISTOR 5% 0.25W AXIAL
R302		RF124DJO	12K CARBON FILM RESISTOR 5% 0.25W AXIAL
R303/304		RF475DJO	470K CARBON FILM RESISTOR 5% 0.25W AXIAL
R305		RF685DJO	680K CARBON FILM RESISTOR 5% 0.25W AXIAL
VR306		RQ475AL1	470K PRESET POT CARBON MIN 20% 0.1W V.MTG
VR307		RQ105AL1	100K PRESET POT CARBON MIN 20% 0.1W V.MTG
R308		RF155DJO	150K CARBON FILM RESISTOR 5% 0.25W AXIAL
R310		RF183DJO	1K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
R311		RF563DJO	5K6 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR312		RQ105AL1	100K PRESET POT CARBON MIN 20% 0.1 W V.MTG
R313/314		RF474DJO	47K CARBON FILM RESISTOR 5% 0.25W AXIAL
R314	(1241/AS)	RF155DJO	150K CARBON FILM RESISTOR 5% 0.25W AXIAL
R314	(1441/AL)	RF3340JO	33K CARBON FILM RESISTOR 5% 0.25W AXIAL
R315		RF225DJO	220K CARBON FILM RESISTOR 5% 0.25W AXIAL
R316		RF184DJO	18K CARBON FILM RESISTOR 5% 0.25W AXIAL
R316	(1241/AS)	RF394DJO	39K CARBON FILM RESISTOR 5% 0.25W AXIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R317		RF563DJO	5K5 CARBON FILM RESISTOR 5% 0.25W AXIAL
R317	(1241/AS)	RF154DJO	15K CARBON FILM RESISTOR 5% 0.25W AXIAL
R318		RF184DJO	18K CARBON FILM RESISTOR 5% 0.25W AXIAL
R313	(1241/AS)	RF274DJO	27K CARBON FILM RESISTOR 5% 0.25W AXIAL
R320		RF330DJO	3R3 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR321		RS103PL2	1K PRESET POT CARB MIN WW H.VTG 20% 4W
R322		RF332JJO	330R CARBON FILM RESISTOR 5% 1W AXIAL
R323		RF100DJO	1R0 CARBON FILM RESISTOR 5% 0.25W AXIAL
R323	(1441/AL)	RF333DJO	3R3 CARBON FILM RESISTOR 5% 0.25W AXIAL
R324		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R325		RF182JJO	180R CARBON FILM RESISTOR 5% 1W AXIAL
R326		RF152GJO	150R CARBON FILM RESISTOR 5% 0.5W AXIAL
R327		RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
VR328		RQ222AL2	220R PRESET POT CARB MIN 20% 0.1W H.MTG
R801		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R802		RL102GJO	! 100R FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R803/804		RF224GJO	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R805		RF183DJO	1K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR806		RQ103AL2	1K PRESET POT CARS MIN H MTG 20% 0.1 W
R807		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR808		RQ473AL2	4K7 CARSON POT CARB MIN MTG 20% 0.1W
R309		RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
R810		RF103DJO	10K CARBON FILM RESISTOR 5% 0.25W AXIAL
R811		RF472DJO	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R811	(1441)		
	(1442)	RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
R812		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R813		RL102GJO	! 100R FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R			
814/815		RF224GJO	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R816		RF183DJO	1K8 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR817		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R818		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
R819		RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
VR820		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R821		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R822		RL103GJO	! 1K FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R822	(1441/AL)		
	(1441/AS)		
	(1441/MS		
	(1442 ALL MODELS)		
	(1241/AS)	RL102GJO	! 100R FUSIBLE METAL FILM RESISTOR 5% 0.25W AXIAL
R823/824		RF224GJO	22K CARBON FILM RESISTOR 5% 0.5W AXIAL
R825		RF183DJO	1K8 CARBON FILM RESISTOR 5% 0.5W AXIAL
VR826		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R827		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR828		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R829		RF331DJO	33R CARBON FILM RESISTOR 5% 0.25W AXIAL
R830/831/832			
833		RK222GKO	220R CARBON COMP RESISTOR 10% 0.5W AXIAL
R833	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1442 ALL MODELS)		
	(1486/LI2U)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)	RK105GKO	100K CARBON COMP RESISTOR 10% 0.5W AXIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
R824		RF273DJO	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
R835		RF475DJO	470K CAPBON FILM RESISTOR 5% 0.25W AXIAL
R836		RK825GKO	820K CARBON COMP RESISTOR 10% 0.5W AXIAL
VR837		RQ2260L2	2M2 PRESET POT CARB H MTG 20% 0.15W
R838		R??????0	180K CARBON FILM RESISTOR 5% 1W AXIAL
R840		???????	150K CARBON FILM RESISTOR 5% 1W AXIAL
VR901		RQ103AL1	1K PRESET POT CARB MIN - MTG 20% 0.1W AXIAL
R901		RF103DJO	1K CARBON FILM RESISTOR 5% 0.25W AXIAL
R902		RF223DJQO	2K2 PRESET POT CARB MIN H MTG 20% 0.1W AXIAL
VR902		RF222DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR903		RQ102AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R904		R0154LJO	1 5K METAL OXIDE RESISTOR 5% 2W AXIAL
R905		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR906		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R907		RL102GJO	! 100R FUSIBLE METAL FILM RESISTOR 5% 0.5W AXIAL
R908		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR910		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R911		RF474JJO	47K CARBON FILM RESISTOR 5% 1W AXIAL
R912		RG154LJO	1 5K METAL OXIDE RESISTOR 5% 2W AXIAL
R913		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR914		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R915		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR916		RQ103AL2	1K PRESET POT CARB MIN H MTG 20% 0.1W
R917		RF474JJO	47K CARBON FILM RESISTOR 5% 1W AXIAL
R918		R0154LJO	15K METAL OXIDE RESISTOR 5% 2W AXIAL
R920		RF223DJO	2K2 CARBON FILM RESISTOR 5% 0.25W AXIAL
VR921		RQ473AL2	4K7 PRESET POT CARB MIN H MTG 20% 0.1W
R922		RL102GJO	! 100R FUSIBLE METAL FILM RESISTOR 5% 0.5W AXIAL
R923		RF472DJO	470R CARBON FILM RESISTOR 5% 0.25W AXIAL
R924-926		RK222GKO	220R CARBON COMP RESISTOR 10% 0.5W AXIAL
R927		RK105GKO	100K CARBON COMP RESISTOR 10% 0.5W AXIAL
R928		RF475DJO	470K CARBON FILM RESISTOR 5% 0.25W AXIAL
R931		RK825GKO	820K CARBON COMP RESISTOR 10% 0.5W AXIAL
VR932		RQ226CL2	2M2 PRESET POT CARBON H MTG 20% 0.15W
R933		RF155JJO	150K CARBON FILM RESISTOR 5% 1W AXIAL
R933		RF185JJO	180K CARBON FILM RESISTOR 5% 1W AXIAL
R934		RF185JJO	180K CARBON FILM RESISTOR 5% 1W AXIAL
R934		RF225JJO	220K CARBON FILM RESISTOR 5% 1W AXIAL
R935		RF474JJO	47K CARBON FILM RESISTOR 5% 1W AXIAL
R936		RL102GJO	! 100R FUSIBLE METAL RESISTOR 5% 0.5W AXIAL
R937		RF273DJO	2K7 CARBON FILM RESISTOR 5% 0.25W AXIAL
C1		CX225NL6	! 220nF 250V AC MET POLY CLASS X CAP 20% RADIAL
C2/3		CY103NL6	! 1000pF 250V AC CERAMIC DISC CAPACITOR CLASS Y 20% RADIAL
C4			AS C1
C5		CD472YL6	470pF 2KV CERAMIC CAPACITOR 20% RADIAL
C6		CM104TL6	10nF 630V MET POLY CAPACITOR 20% RADIAL
C7		CD472YL6	470pF 2KV CERAMIC CAPACITOR 20% RADIAL
C8			AS C6
C10		CM554RK6	56nF 400V POLY CAPACITOR 20% RADIAL
C10	(1496/LI2U)		
	(1486/LI2U)	CM105NL6	100nF POLY CAPACITOR 20% RADIAL
C11		CA108RM7	100uF 385V ALUM ELECT CAPACITOR - 20+50% RADIAL
C11		CA288QM7	220uF 385V ALUM ELECT CAPACITOR - 20+50% RADIAL
C12		CA476HM6	4.7uF 35V ALUM ELECT CAPACITOR - 20+50% RADIAL
C13/14		CM105RL6	100nF 400V MET POLY CAPACITOR 20% RADIAL
C15		CD473KK6	4700pF 100V CERAMIC CAPACITOR 20% RADIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
C16		CR104MKO	10nF 160V POLYSTYRENE CAPACITOR 2.5% AXIAL
C17		CL223XJ6	! 2200pF 2000V POLYPROPYLENE CAPACITOR 5% RADIAL
C13		CA106JL0	1uF 50V ALUM ELECT CAPACITOR 20% AXIAL
C20		CY103NL6	! 1000pF 250V AC CERAMIC DISC CAPACITOR CLASS Y 20% RADIAL
C21		CM1C5RL6	100nF 400V POLY CAPACITOR 20% RADIAL
C22		CD223FL6	2200pF 25V CERAMIC CAPACITOR 20% RADIAL
C23		CA476HM6	4.7uF 35V ALUM ELECT CAPACITOR - 20+50% RADIAL
C24		CM105NL6	100nF 250V MET POLY CAPACITOR 20% RADIAL
C25		CD472RL6	470pF 400V CERAMIC CAPACITOR 20% RADIAL
C26-28		CA477NM6	47uF 250V ALUM ELECT CAPACITOR - 20+50% RADIAL
C30		CD472RL6	470pF 400V CERAMIC CAPACITOR 20% RADIAL
C31		CA478FM6	470uF 25V ALUM ELECT CAPACITOR - 20+50% RADIAL
C32,33		CM105ML6	100nF 160V POLY CAPACITOR 20% RADIAL
C34		CA228FM6	220uF 25V ALUM ELECT CAPACITOR - 20+50% RADIAL
C101, 102		CA107FM6	10uF ALUM ELECT CAPACITOR - 2+50% RADIAL
C103. 104		CM105ML6	100nF 160V POLY CAPACITOR 20% RADIAL
C105			AS C101
C106		CM225KL6	220nF 100V MET POLY CAPACITOR 20% RADIAL
C201/202		CD102FL6	100pF 25V CERAMIC CAPACITOR 20% RADIAL
C203		CM475KL6	470nF 100V MET POLY CAPACITOR 20% RADIAL
C204		CM225KL6	220nF 100V MET POLY CAPACITOR 20% RADIAL
C205		CM105ML6	100nF 160V MET POLY CAPACITOR 20% RADIAL
C206		CA685JLO	680nF 50V ALUM ELECT CAPACITOR 20% AXIAL
C207		CA476HM6	4.7uF 35V ALUM ELECT CAPACITOR - 20+50% RADIAL
C208		CM104TL6	10nF 630V MET POLY CAPACITOR 20% RADIAL
C210		CP473GGO	4700pF 30V POLYSTYRENE CAPACITOR 2.5% AXIAL
C211		CM105ML6	100nF 160V POLY CAPACITOR 20% RADIAL
C212		CA228FM6	220uF 25V ALUM ELECT CAPACITOR - 2O+50% RADIAL
C213		CM474NK6	47nF 250V MET POLY CAPACITOR 20% RADIAL
C214/215		CM105NL6	100nF 250V MET POLY CAPACITOR 20% RADIAL
C216/217		CD104YL6	10nF 2KV CERAMIC CAPACITOR 20% RADIAL
C218		CL335KN6	! 0.33uF 250V POLYPROPYLENE CAP 10% RADIAL
C220		CM104TL6	10uF 630V MET POLY CAPACITOR 20% RADIAL
C221		CM475RL6	470nF 400V MET POLY CAPACITOR 20% RADIAL
C222		CL753XJ6	! 7500pF 1500V POLYPROPYLENE CAP 5% RADIAL
C222	(ALL 1441, 1442 MODELS)		
	(1446/LF)		
	(1446/L12)		
	(1451/MQ3)	CL563YJ6	5600pF 2000V POLYPROPYLENE CAP 5% RADIAL
C222	(1241/AS)	CL333XJ6	3n3 2000V POLYPROPYLENE CAP 5% RADIAL
C222	(1241/AT)	CL473YJ6	4700pF 2000V POLYPROPYLENE CAP 5% RADIAL
C223		CM684XK6	68nF 1 500V POLY CAPACITOR 20% RADIAL
C224		CA109IN7	1000uF 40V ALUM ELECT CAPACITOR - 20+50% RADIAL
C225		CD561RL6	56pF 400V CERAMIC CAPACITOR 20% RADIAL
C301		CM225KL6	220nF 100V MET POLY CAPACITOR 20% RADIAL
C302		CM105NK6	100nF 250V POLY CAPACITOR 20% RADIAL
C			
303		CM155KK6	150nF 100V MET POLY CAPACITOR 20% RADIAL
C304		CA108HM6	100uF 35V ALUM ELECT CAPACITOR - 20+50% RADIAL
C305/306			AS C302
C306	(1241/AS)		
	(1241/AT)	CM225KL6	220nF 100V MET POLY CAPACITOR 20% RADIAL
C307		CD122RL6	120pF 400V CERAMIC CAPACITOR 20% RADIAL
C308		CA107FM6	10uF 25V ALUM ELECT CAP - 20+50% RADIAL
C310		CM105NK6	100nF 250V POLY CAPACITOR 20% RADIAL
C311		CA478HM6	470uF 35V ALUM ELECT CAP - 20+50% RADIAL
C312		CA228FM6	220uF 25V ALUM ELECT CAP - 20+50% RADIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
C801		CM105NL6	100nF 250V METAL POLYESTER CAPACITOR 20% RADIAL
C802/804/806		CP271GGO	27pF 30V POLYSTYRENE CAPACITOR 2.5% AXIAL
C803/805/807		CP561GG0	56pF 30V POLYSTYRENE CAPACITOR 2.5% AXIAL
C808		CD104YL6	10nF 2KV CERAMIC CAPACITOR 20% RADIAL
C810		CM105NL6	100nF 250V METAL POLYESTER CAPACITOR 20% RADIAL
C811	CD104YL6		10nF 1-2KV CERAMIC CAPACITOR 20% RADIAL
C901		CM105NL6	100nF 250V METAL POLYESTER CAPACITOR 20% RADIAL
C902,904,906		CP271GGO	27pF POLYSTYRENE CAPACITOR 2.5% AXIAL
C903,905,907		CP122GG1	120pF POLYSTYRENE CAPACITOR 2.5% AXIAL
C910.911		CD104YLS	10nF 2KV CERAMIC CAPACITOR 20% RADIAL
C913		CM105NL6	0.1uF 250V METAL POLYESTER CAPACITOR 20%
D1-4		DP4007UMO	POWER RECTIFIER DIODE IN4007 MOTOROLA AXIAL
D5		OP4005UMO	POWER RECTIFIER DIODE IN4005 MOTOROLA AXIAL
D6		DF0157UEO	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D7		DF0159UEO	FAST RECOVERY DIODE BA159 MOTOROLA AXIAL
D8, 10-14		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D11-13		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D15,16		DP4002UMO	POWER RECTIFIER DIODE 1N4002 MOTOROLA AXIAL
D17		DF0159UEO	FAST RECOVERY DIODE BA159 MOTOROLA AXIAL
D18		DZ3875CFCO	ZENER DIODE BZY88C7V5 400mW 5% AXIAL
D20		D279331FCO	ZENER DIODE BZX79C33V 400mW 5% AXIAL
D21		DP4002UMO	POWER RECTIFIER DIODE IN4002 MOTOROLA AXIAL
D22		DF0159UEO	FAST RECOVERY DIODE BA159 MOTOROLA AXIAL
D23		DF0818UMO	FAST RECOVERY DIODE MR818 MOTOROLA AXIAL
D24		DF0157UEO	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D25,116		DP4002UMO	POWER RECTIFIER DIODE IN4002 MOTOROLA AXIAL
D101-107		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D108,110,111		DZ79560FCO	ZENER DIODE BZX79C5V6 400mW 5% AXIAL
D108,110,111			
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/MS4)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MB4)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MR4)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(2030/CS5)		
	(1439/AS)		
	(1439/MS4)		
	(1439/MS)		
	(1451AP/DS)		
	(1449/AS)	DZ79430FCO	ZENER DIODE BZX79C4V3 400mW 5% AXIAL
D117		DZ79121FCO	ZENER DIODE BZX79C12V 400mW 5% AXIAL
D118			AS D108
D201		DF0157UEO	FAST RECOVERY DIODE BA157 MOTOROLA AXIAL
D301		DS4148UTO	SMALL SIGNAL DIODE 1N4148 THOMPSON AXIAL
D302		DP4005UMO	POWER RECTIFIER DIODE IN4005 MOTOROLA AXIAL
D801-803		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D804		DZ79750FC1	ZENER DIODE BZX79C75 400mW 5% AXIAL

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
D804	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1442)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	DZS8750FCO	DIODE BZY88C7V5
D805-808		DS4148UTO	SMALL SIGNAL DIODE 1N4148 THOMPSON AXIAL
D901-906		DS4148UTO	SMALL SIGNAL DIODE IN4148 THOMPSON AXIAL
D907		DZ79750FC1	ZENER DIODE BZX79C7V5 400mW 5% AXIAL
D907	(1496/LI2U)		
	(1439/AS)		
	(1439/MS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1436/LS1)		
	(1436/MS4)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1456/LI2)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1451/MS4)		
	(1451/MQ3)		
	(1451/AS)	DZ88750FCO	ZENER DIODE BZY88C7V5 400mW 5% AXIAL
D908 F1/F2		KA2001BAO	AS D805 ! FUSE 2AMP (20mm) TIME DELAY

TRIPLE STANDARD - PAL INTERFACE

GENERAL

The 'Triple Standard - PAL Interface Assembly' is designed to interface between the Series 3 main chassis PCB assembly and the host system. It is designed to accept RS170 video signals (0.7v p-p video + 0.3v p-p mixed - Ve Sync into 75R). In wire-frame chassis format, output connections from interface to main chassis PCB are made via hard-wired flexible leads and rnultiway plug-in connectors PL102 and PL103, located on the mam chassis.

On some models, an interface input wiring harness lead assembly is provided. This is supplied with one end only of the harness terminated in a 17-way connector, the opposite wire ends being unterminated. Circuit details and connections for this harness lead assembly are given in the accompanying diagram - ' 1 7-Wav Harness Connections' and Table of Options'.

DOUBLE STANDARD/TRIPLE STANDARD INPUTS

Depending on how the interface assembly is installed, input modes for either double or triple standards may be accommodated as follows:

1. **TTL and PAL Video Mode - Double Standard**
2. **TTL, 1 volt 75 ohm and PAL Video Mode - Triple Standard**

1. Double Standard Input

When wired as indicated in the diagram - TTL' and 'PAL Video' Modes are accommodated. Either one of these two modes may be selected by a 'single pole change-over' switch as shown in the diagram.

2. Triple Standard Input

Wiring details to accommodate Triple-Standard inputs and the various input options are given in the' 17-Way Harness Connections' Diagram and the accompanying Table of Options'. Suitable additional switching may be incorporated to accommodate the various options, depending on user require-ments.

OPERATIONAL NOTES

1. PAL/Sync Input

When this input (PL1-pin 16) is used as the separate sync input of a 1v/75R R.G.B. + sync video source, the amplitude of the sync MUST BE between 0.2v p-p and 0.7v p-p, nominally 0.3v peak to peak. If the amplitude exceeds these values, an 'In-Line' B.N.C. attenuator must be used.

2. Sync-On Green Option

Setting Plug Link TL1' on the PAL Interface PCB to 'Position 2', allows a 'sync-on-green' 1V/75R RGB Video Source to be used.

NB: Note that the 'Green' 1V/75R video input (PL1-pin 12) now also becomes the PAL input.

See wiring diagram and Table of Options'.

BRIGHTNESS CONTROL LIMIT

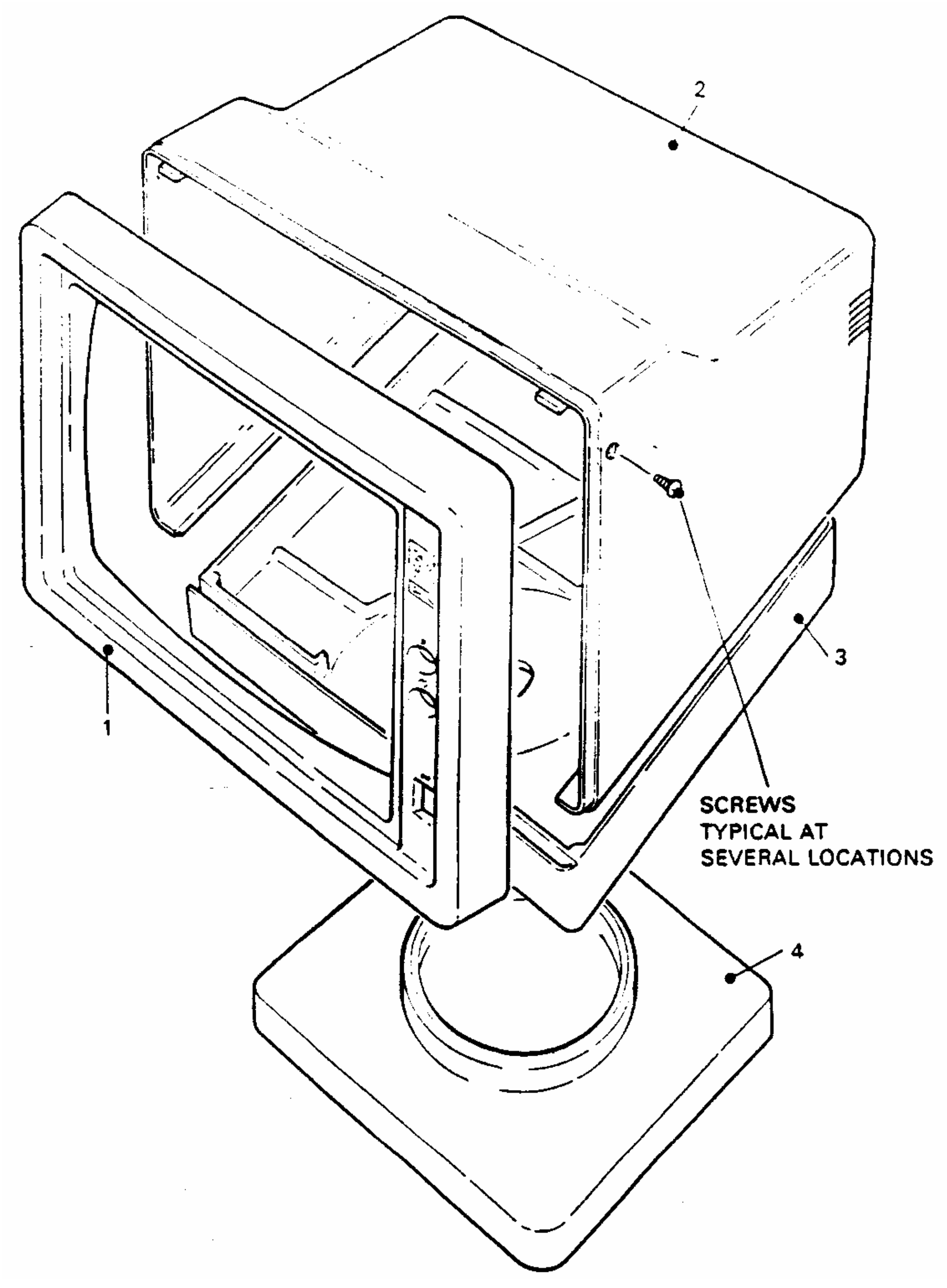
If required - a resistor of 5K6 ohms 0.25W - may be incorporated in series with the 'brightness' control to limit the control's range of 'brightness' variation - as shown in the diagram.

AUDIO STAGE

On some versions of the interface, either single channel or twin channel audio amplifier stages may be incorporated, depending on model and specification.

Inputs and outputs for the audio stage(s) are marked as left-hand channel (L) and right-hand channel (R) and are terminated in 2-pin connectors. Normally, only a single channel audio stage is provided in most applications.

Audio input to the stage may be fed across a 47k 'gain control' pot, with the slider taken to the audio stages input.

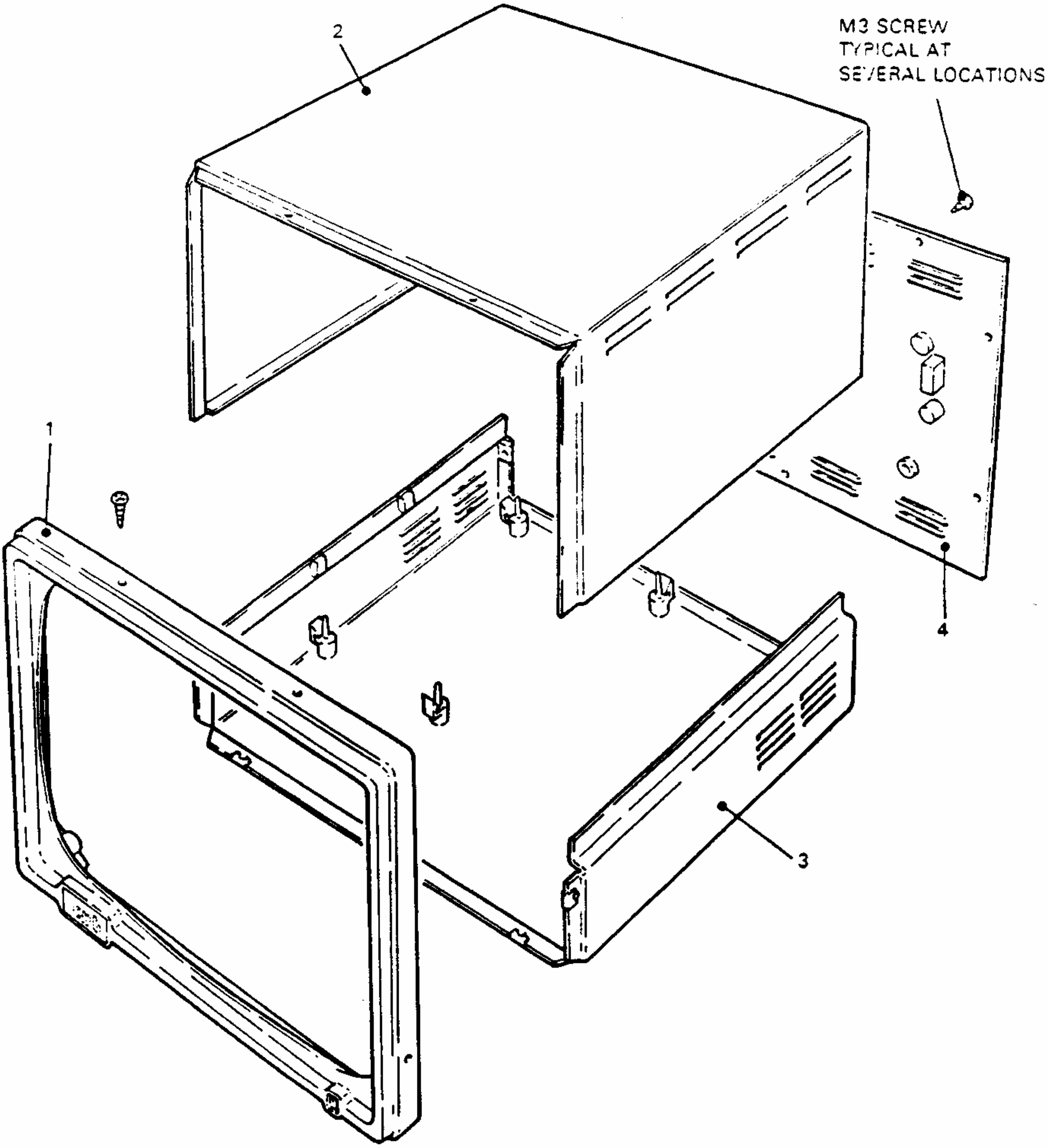


T SERIES CABINET - 14 INCH MODEL

A foam polyurethane moulded cabinet incorporating a swivel base assembly T SERIES

CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	PC5047I02	FACIA. CABINET BEZEL MOULDING
2	PC5046I01	CABINET COVER MOULDING
3	PC5045IO1	CABINET BASE MOULDING
4	PC5044I01	CABINET PLINTH MOULDING

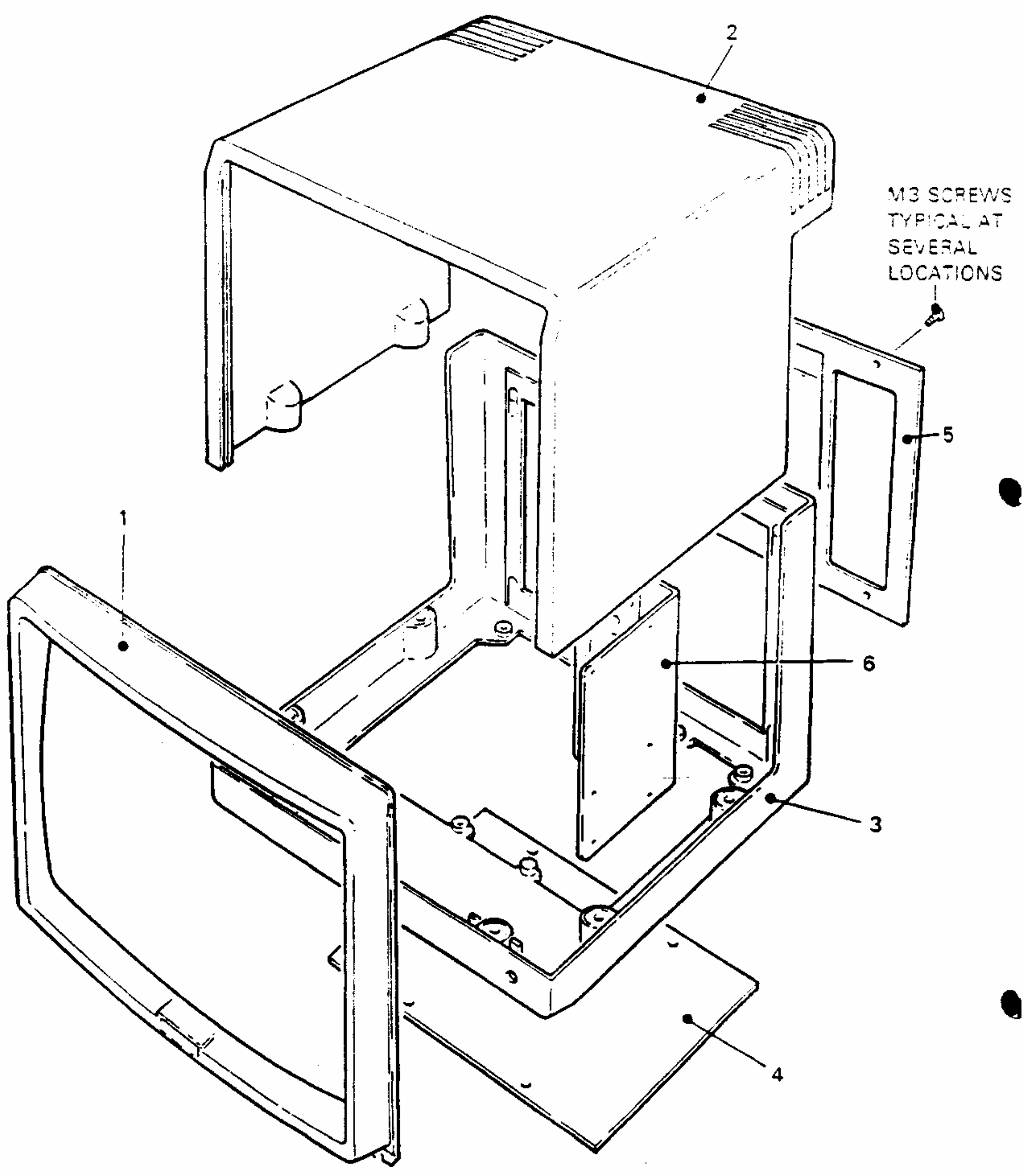


M SERIES CABINET - 14 AND 20 INCH MODELS

This cabinet is an all metal, rugged construction. The 20 inch model was deleted from production in December 1983.

M SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	MC0066I04	FACIA. CABINET BEZEL
2	MC0021I05	CABINET TOP/SIDE ASSEMBLY
3	MC0019I03	CABINET BASE ASSEMBLY
4	MC0094I03	CABINET BACK ASSEMBLY

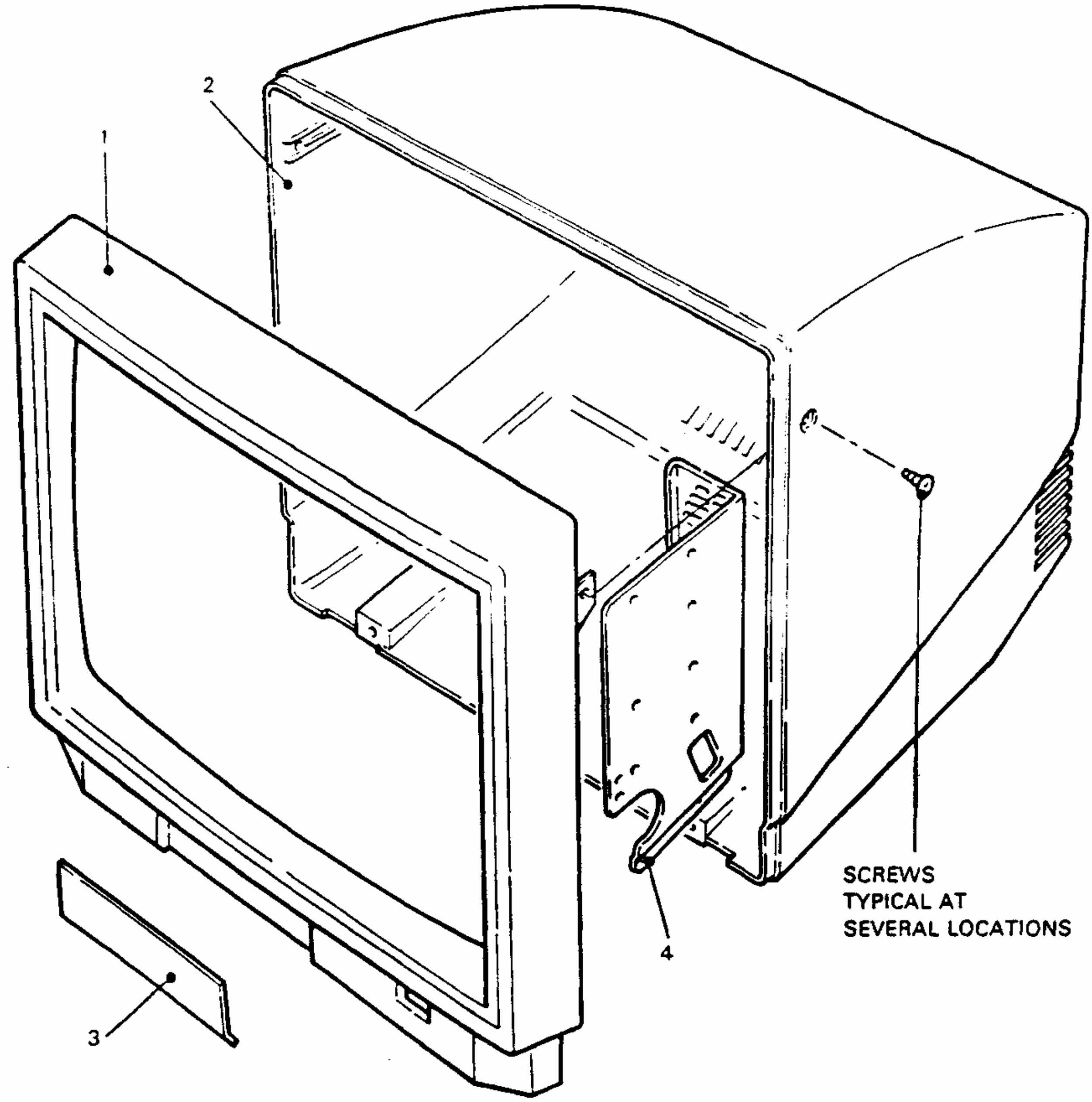


L SERIES CABINET - 14 INCH MODEL

This cabinet is constructed of high density structural foam. A modern compact design, available in different colours.

L SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	PC0103I05	FACIA. CABINET BEZEL
2	PC0104I02	CABINET TOP/SIDE ASSEMBLY
3	PC0107I02	CABINET BASE ASSEMBLY (MOULDED)
4	P00308I01	CABINET BASE PANEL (MOULDED)
5	PC0105I01	CABINET BACK ASSEMBLY
6	M00141I03	INPUT AND CONTROLS BRACKET ASSEMBLY (METAL)

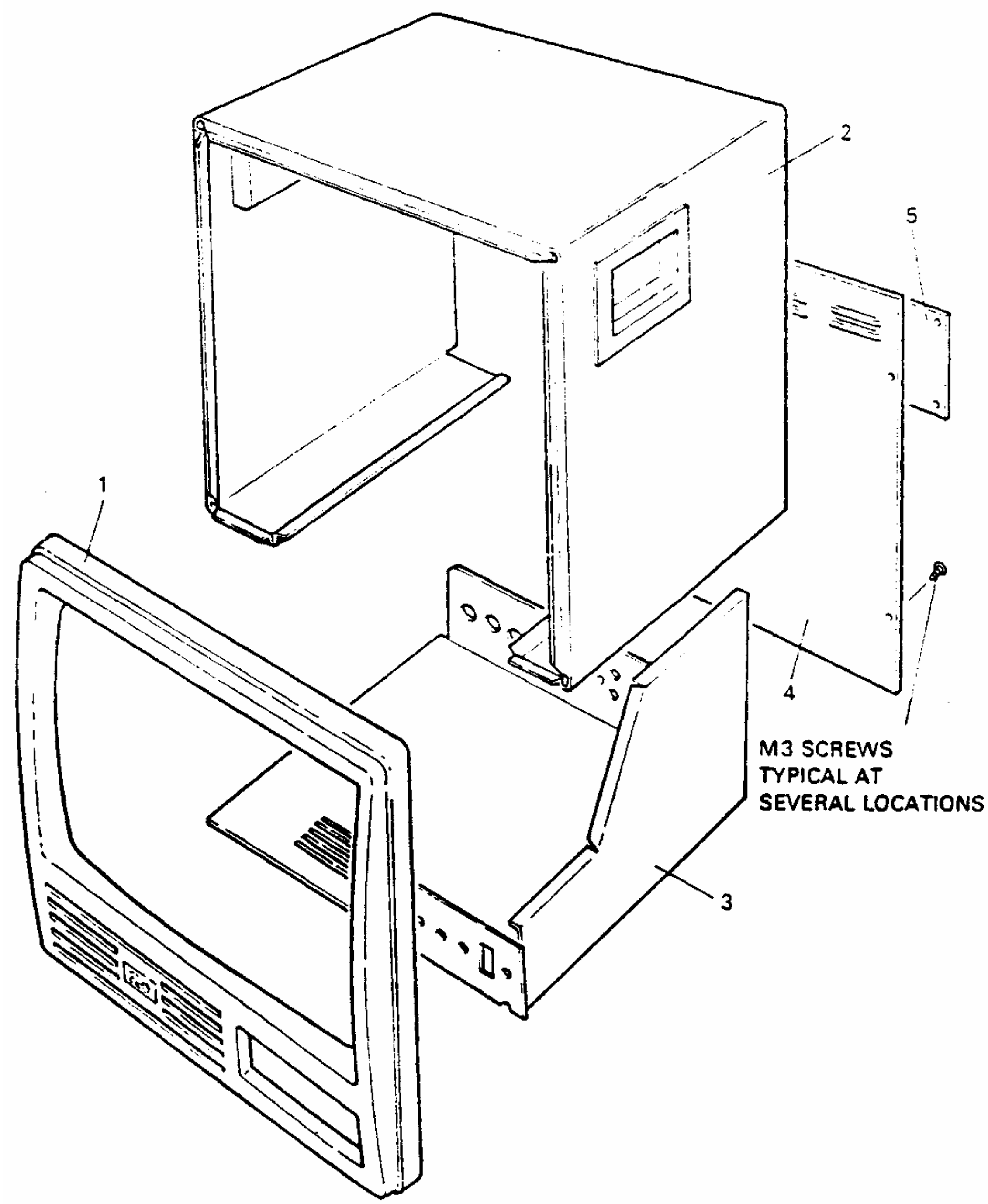


D SERIES CABINET - 14 INCH MODEL

This cabin is injection moulded, and is one of the latest designs offered in the MICROVITEC CUB monitor range and is available in different colours.

D SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	PC0124I01	FACIA, CABINET BEZEL
2	PC0125I01	CABINET
3	PC0126I01	HINGED DOOR
4	M00221I04	INPUT BRACKET ASSEMBLY (METAL)



C SERIES CABINET - 20 INCH MODEL

This cabinet is an all metal, rugged construction, incorporating carrying handles fitted on each side.

C SERIES CABINET COMPONENT PARTS

IDENT NO.	PART NO.	DESCRIPTION
1	PC0136I03	FACIA, CABINET BEZEL
2	MC0137I04	CABINET TOP/SIDE ASSEMBLY
2	MC0150I03	CABINET TOP/SIDE ASSEMBLY (INCL. SPEAKER)
3	M00235I02	CABINET BASE ASSEMBLY
4	MC0139I01	CABINET BACK ASSEMBLY
5	PC0140I01	BLISTER. FITTED TO CABINET BACK

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TR802,805,807 902,904,906		QS0787UM1	NPN SILICON TRANSISTOR BF787-5 MOTOROLA
TR802,805,807 902,904,906	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1436/LS1)		
	(1436/MS4)		
	(1486/LI2U)		
	(1435/MS)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1449/AS)		
	(1241/AS})		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	QS0869UAO	NPN SILICON TRANSISTOR BF869-5 MOTOROLA
TR802,805		QS0869UAO	TRANSISTOR BF869
TR803,907		QS4123UMO	NPN SILICON TRANSISTOR 2N4123 MOTOROLA
TR806		QS0393WT1	TRANSISTOR BF393 W1
TR807	(1441)		
	(1442)		
	(1241/AS)	QS0869UAO	TRANSISTOR BF869
TR902,904,906			
	(1431AP/MS4)		
	(1431AP/DS)		
	(1496/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS4)		
	(1451AP/MS4)		
	(1451/MQ3)		
	(1451AP/DS)		
	(1456/LI2)		
	(2031/CS5)		
	(2031/AX)	QS0869UAO	NPN SILICON TRANSISTOR BF869-5 MOTOROLA
	(2032/AM)		
TRIPLER		ET001QA1	TRIPLER BG1897
TY1,2		QY0103UMO	THYRISTOR BR 103 MOTOROLA AXIAL
PCB		BC0029106	MAIN PCB ASSEMBLY SERIES 3 (6)

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TR2		QT002AXO	NPN DARLINGTON TRANSISTOR TIPL 753A (R3213)
	(1496/LI2U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431 /LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS4)		
	(1451AP/MS4)		
	(1451/MQ3)		
	(1451AP/DS)		
	(1456/LI2)		
	(2032/AM)		
	(1486/LI2U)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	QP0753UXO	NPN TRANSISTOR TIPL753A (R321 3)
HEATSINK		A00007102	LCCD HEAT SINK (SMPSU) ASSEMBLY
TR2	HEATSINK	M00205I01	HEATSINK REDPOINT TV3 SPECIAL
TR16		QS0500UMO	NPN SILICON POWER TRANSISTOR MOTOROLA BU500
		OR	
		QS0500VXO	NPN SILICON POWER TRANSISTOR TEXAS BU500
TR16			
HEAT SINK		A00008102	LCCD HEAT SINK (LOPT) ASSEMBLY
TR101		QS0337UTO	NPN SILICON TRANSISTOR BC337-5 MOTOROLA
TR102		QS4123UMO	NPN SILICON TRANSISTOR 2N4123 MOTOROLA
TR103-105		QS4125UM5	PNP SILICON TRANSISTOR 2N4125 MOTOROLA
TR106		QS0337UTO	NPN SILICON TRANSISTOR BC337-5 MOTOROLA
TR201		QS0460UMO	NPN SILICON TRANSISTOR BF460-5 MOTOROLA
TR201			
HEATSINK		M00305I01	HEATSINK REDPOINT TV3 SPECIAL
TR202		QS0500UMO	NPN TRANSISTOR SIL BU500
TR202			
HEATSINK		M00205I01	HEATSINK REDPOINT TV3 SPECIAL
TR301			AS TR106
TR801,804,806 901,903,905		QS0392UMO	NPN SILICON TRANSISTOR BF392 MOTOROLA
TR801-804			
	(1441,1442)		
	(1449/AS)	QS0393WT1	TRANSISTOR BF393.W1

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TL201	(2031/CS5)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	KL4838Z02	LINK TEST 10/4838 PRESSAC
TL201A/B			
	(2031/CS5)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1436/LS1)		
	(1436/MS4)		
	(1441/MS4)		
	(1449/AS)	KM3070Y01	PIN TEST 10/3070 PRESSAC
TL202-2		WL2210TU1	WIRE LINK 5mm + 10mm + 5mm
TL901		KM3070Y01	PIN TEST 10/3070 PRESSAC
TL901		KL4838Z02	LINK TEST 10/4838 PRESSAC
TL901		KM0006Y01	PIN TURRET 10/006 PRESSAC
TL901A/B			
	(1435/MS)	KM3070Y01	PIN TEST 10/3070 PRESSAC
TL901A/B			
	(1435/MS)	KL4338Z02	LINK TEST 10/4838 PRESSAC
TR1		QS0307UM5	PNP SILICON TRANSISTOR BC307-5 MOTOROLA

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TL102A/B, 201A/B	(2030/CS5) (2031/AX) (2032/AM) (1431AP/MS4) (1431AP/DS) (1431/AS) (1432/AS) (1431/BS) (1431/LS1) (1431/MZ3) (1431/MZ4) (1431/MB4) (1431/MR4) (1431/MS4) (1431/DS) (1435/MS) (1436/LS1) (1436/MS4) (1439/AS) (1441/AL) (1441/AS) (1441/MS) (1441/MS4) (1451/AS) (1451/DS) (1451/MS) (1451AP/MS4) (1451AP/DS) (1449/AS) (1456/LI2) (1241/AS) (1446/LF) (1446/LI2) (1241/AT)	KM3070Y01	PIN TEST 10/3070 PRESSAC

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TL101.103-1C6			
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	KS7859I02	SOCKET-SHORTING 7859-02
TL102			
	(1486/LI2U)		
	(1435/MS)		
	(1446/LI2)	KL4838Z02	TEST LINK 10/4838 PRESSAC

COMP REF	MODEL NO.	PART DESCRIPTION	COMPONENT	NO.
TL101-106				
	(2030/CS5)			
	(2031/AX)			
	(2032/AM)			
	(1431AP/MS4)			
(1431,AS)				
	(1432/AS)			
	(1431/BS)			
	(1431/LS1)			
	(1431/MZ3)			
	(1431/MZ4)			
	(1431/MB4)			
	(1431/MR4)			
	(1431/MS4)			
	(1431/DS)			
	(1435/MS)			
	(1436/LS1)			
	(1436/MS4)			
	(1439/AS)			
	(1441/AL)			
	(1441/AS)			
	(1441/MS)			
	(1441/MS4)			
	(1486/LI2U)			
	(1451/AS)			
	(1451/DS)			
	(1451/MS)			
	(1451AP/MS4)			
	(1451AP/DS)			
	(1449/AS)			
	(1456/LI2)			
	(1241/AS)			
	(1446/LF)			
	(1446/LI2)			
	(1241/AT)	KP0024A03	3-WAY PLUG 20/3423	

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
TH2	(1496/LI2U)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1439/AS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	RT003NNO	THERMISTOR 15 OHMS 30% K231

COMP REF	MODEL MO.	PART NO.	C OMPONENT DESCRIPTION
T1			LINKS 2 x 14mm
T1A/1B		LM0001UA1	CHOKE (OREGA) 88545-00
T2		TI0004I06	TRANSFORMER SWITCH MODE ISOLATING PC5287 OR PC5307
T2	(1496/LI2U)		
	(1486/LI2U)	TL002SU0	TRANSFORMER SWITCH MODE ISOLATING PC3960
T201		TI0009I01	TRANSFORMER LINE DRIVER PC4163
T202		TI0003I01	! TRANSDUCTOR EAST-WEST PC3396
T203		TI0007I01	TRANSFORMER LINE OUTPUT 14" PC3755
T203	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	TI0016I01	TRANSFORMER LINE OUTPUT 20"
TH1	(1496/LI2U)		
	(1486/LI2U)	RT002QL0	THERMISTOR PTH45LC09-BG8ROH140
TH1	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	RT005QN0	THERMISTOR 263100P2332T333

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
PL3	(1496/LI2U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS 4)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1456/LI2)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	KP0300D05	5-2 PIN INLINE PLUG MTG SHROUDED LOCKABLE, PRESSAC 320/3765
PL101		KP0026A10	10 PIN INLINE PLUG PCB MTG SHROUDED PRESSAC 20/3450
PL102		KP0025A05	5-2 WAY INLINE PLUG PCB MTG 20/3345
PL103		KP0025A10	10 PIN INLINE PLUG PCB MTG UNSHROUDED PRESSAC 20/3430
PL103			
	(2030/CS5)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1435/MS)		
	(1439/AS)		
	(1451AP/MS4)		
	(1449/AS)	KP0026A10	10 PIN INLINE PLUG PCB MTG SHROUDED PRESSAC 20/3450
PL201		KP0222D08	8 PIN INLINE PLUG PCB MTG UNSHROUDED PRESSAC 220/1138
		OR	
		KP0300D08	8 PIN INLINE PLUG PCB MTG UNSHROUDED LOCKABLE, PRESSAC 320/3768

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
LK 1-5,7,8			
10-18,20-22		WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
LK23	(2031/AX)		
	(2032/AM)		
	(1451/AS)		
	(1451/DS)	WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
PL1		KP0220D06	PIN INLINE PLUG PCB MTG SHROUDED PRESSAC 20/1546
PL1	(1496/L12U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1439/AS)		
	(1439/MS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/MS)		
	(1451/DS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1456/LI2)		
	(1241/AS)		
	(1446/LF)		
	(1446/L12)		
	(1241/AT)	KP0300D06	6 PIN INLINE PLUG PCB MTG SHROUDED LOCKABLE, PRESSAC 320/3766
PL2		KP0025A03	PLUG 3 WAY 20/3443
PL3		KP0220D05	5-2 PIN INLINE PLUG MTG SHROUDED PRESSAC 220/2145-2,4

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
L925		LW154UA5	5uH (IN SERIES WITH R925)
	(1496/LI2U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431 /LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1441/MS4)		
	(1451AP/MS4)		
	(1451/MS4)		
	(1451/MQ3)		
	(1451AP/DS)		
	(1451/DS)		
	(1456/LI2)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	LW154SK2	CHOKE 15uH B78108-T1153-K
L926		LW154UA5	15uH (IN SERIES WITH R926)
L926	(1496/LI2U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1441/MS4)		
	(1451AP/MS4)		
	(1451/MS4)		
	(1451/MQ3)		
	(1451AP/DS)		
	(1451/DS)		
	(1456/LI2}		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	LW154SK2	CHOKE 15uH B78108-T1153-K

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OMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
L901	(1496/LI2U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1451/AS)		
	(1451/MS4)		
	(1451/MQ3)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1456/LI2)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	LW154SK2	CHOCK WIRE ENDED 15uH B78108-T1153-K
L924		LW154UA5	15uH (IN SERIES WITH R924)
	(1496/LI2U)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/M23)		
	(1431/M24)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1451/AS)		
	(1451/MS4)		
	(1451AP/MS4		
	(1451AP/DS)		
	(1451/DS)		
	(1451/MQ3)		
	(1456/LI2)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)	LW154SK2	CHOKE 15uH B78108-T1153-K

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
L2	(1496/LI2U)		
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1486/LI2U)		
	(1451/AS)		
	(1451/DS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1449/AS)		
	(1456/LI2)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	LW104UA7	CHOKE WIRE ENDED 10uH PC5640
L201		LW154SK2	CHOKE WIRE ENDED 15uH B78108-T1153-K
L202		LV001UA5	COIL WIDTH PC3398
L203		LN002UA5	COIL LINE LINEARITY PC5580
L204		LW104UA7	CHOKE WIRE ENDED 10uH PC5640
L801-804	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1442)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	LW154SK2	CHOKE 15uH B78108-T1153-K
L801		LW154VA5	CHOKE WIRE ENDED 15uH PC3391
L802		LW104VA4	CHOKE WIRE ENDED 10uH PC2677
L803/804		LW104VA4	CHOKE WIRE ENDED 10uH PC2677
L901		LW154UA5	CHOKE WIRE ENDED 15uH PC3391

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
FH3A/B	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1451/AS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1449/AS)		
	(1456/LI2)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	KS0001Y01	FUSE CLIP-PCB MTG (5mm)
HARNESS		A00584I01	TB -NO. 1 (4 LEADS) BR, OR, W, Y.
HARNESS		A00585I01	TB - NO. 2 (8 LEADS)
HARNESS	(2031/CS5)		
	(1449/AS)	A00815I01	TB - NO. 1 (4 LEADS) BR, OR, W, Y.
HARNESS	2031/CS5)	A00816I01	TB - NO. 2 (8 LEADS)
HARNESS	(1441/AL)	A00104I01	TB - NO. 1 (4 LEADS)
HARNESS	(1441/AL)	A00179I01	TB - NO. 2 (8 LEADS)
IC1		IV7812MX3	VOLTAGE REGULATOR 1C 78M12
IC1 (HEATSINK)		HH0003HAO	HEATSINK 1 STAVER TYPE V6-2L
IC101		IT74136MM2	OR/TTL LOGIC SN74LS136N
IC102		IV7805LXO	VOLTAGE REGULATOR IC "1" 78L05
IC201		IL1180PS2	LINEAR BI-POLAR IC TDA 1180P PLASTIC DIL S.G.S.
IC301		IL1170SS2	LINEAR BI-POLAR IC TDA 1170S PLASTIC DIL S.G.S.
IC301 (HEATSINK)		HHC001HCO	HEATSINK STAVER V8-800
L2		LW473UA6	CHOKE WIRE ENDED 10uH PC3774

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
FH1A/B,FH2A/B			
	(2030/CS5)		
	(2031/CS5)		
	(2031/AX)		
	(2032/AM)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1451/AS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1449/AS)		
	(1456/LI2)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1241/AT)	KS0003Y01	FUSEHOLDER L222/K
FH3A/B	(1496/LI2U)		
	(1486/LI2U)	KS0006Y01	FUSE CLIP-PCB MTG (6.3mm)

COMP REF	MODEL NO.	PART NO.	COMPONENT DESCRIPTION
F2	(2031/AX)		
	(2032/AM)		
	(1431/AS)		
	(1432/AS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1439/AS)		
	(1439/MS)		
	(1451/AS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451AP/DS)		
	(1451/DS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AT)	KA2001BAO	! FUSE 2AMP (20mm) TIME DELAY
F3	(2031/AX)		
	(1431/AS)		
	(1432/AS)		
	(1431AP/MS4)		
	(1431AP/DS)		
	(1431/AS)		
	(1432/AS)		
	(1431/BS)		
	(1431/LS1)		
	(1431/MZ3)		
	(1431/MZ4)		
	(1431/MB4)		
	(1431/MR4)		
	(1431/MS4)		
	(1431/DS)		
	(1435/MS)		
	(1436/LS1)		
	(1436/MS4)		
	(1439/AS)		
	(1439/MS)		
	(1441/AL)		
	(1441/AS)		
	(1441/MS)		
	(1441/MS4)		
	(1451/AS)		
	(1451/MS)		
	(1451AP/MS4)		
	(1451/DS)		
	(1446/LF)		
	(1449/AS)		
	(1241/AS)		
	(1446/LF)		
	(1446/LI2)		
	(1456/LI2)		
	(1241/AS)	KA1001BQO	
FH1 A/B	A/B	KS0001Y01	

TYPICAL AUDIO SPECIFICATIONS

Typical specifications for the audio amplifier **stage** are **as** follows:

Input impedance:	47 k nominal
Input sensitivity:	100 mV typical
Output:	*2* watts max @ 1kHz into 16 ohms

TABLE OF OPTIONS				
Connector		Available Standards		
Pin No.	Wire Colour Coding	TTL	1V/75R	PAL
10	Brown	O/C	0V (S/C)	0V (S/C)
15	Mauve	•	> 0.7V < 12V (O/C)	0V (S/C)
17	Pink	0V (S/C)	> 10.5V < 12V (O/C)	> 10.5V < 12V (O/C)

NOTES:

- Not Critical (May be 0V to 12V or O/C)

0/C = Open Circuit (No connection)

S/C = Short Circuit (< 10 R) to 0V (Ground)

PARTS LIST

Circuit Reference	Component Reference	Component Description
RESISTORS		
R5, 20, 21, 23, 25, 27, 28	RF104DJO	RESISTOR C/F 10K 1/4W 5%
R6, 8	RF562DJO	RESISTOR C/F 560R 1/4W 5%
R7, 30	RF473DJO	RESISTOR C/F 4K7 1/4W 5%
R9	RF156DJO	RESISTOR C/F 1M5 1/4W 5%
R10	RF183DJO	RESISTOR C/F 1K8 1/4W 5%
R11, 12	RF392DJO	RESISTOR C/F 390R 1/4W 5%
R13, 18	RF225DJO	RESISTOR C/F 220K 1/4W 5%
R14, 15	RF123DJO	RESISTOR C/F 1K2 1/4W 5%
R16	RF272DJO	RESISTOR C/F 270R 1/4W 5%
R17	RF273DJO	RESISTOR C/F 2K7 1/4W 5%
R19	RF184DJO	RESISTOR C/F 18K 1/4W 5%
R22, 24, 26	RF103DJO	RESISTOR C/F 1K0 1/4W 5%
R31	RL101DJO	RESISTOR M/FUS, 10R 1/4W 5%
R32	RF392DJO	RESISTOR C/F 390R 1/4W 5%
R33	RF152DJO	RESISTOR C/F 150R 1/4W 5%
R40	RF103DJO	RESISTOR C/F 1KO 1/4W 5%
R101, 201	RF104DJO	RESISTOR C/F 10K 1/4W 5%
R102, 202	RF222DJO	RESISTOR C/F 220R 1/4W 5%
R103, 203	RF100DJO	RESISTOR C/F 1R0 1/4W 5%
VR1	RQ102AL2	POT PRESET 100R 0.1W H7
CAPACITORS		
C1,2	CA337EN6	CAPACITOR ALUM/ELEC 33uF 16V
C3	CK331JJO	CAPACITOR CERAMIC/T 33pF 50V
C4	CK121JKO	CAPACITOR CERAMIC/T 12pF 50V
C5	CK681JJO	CAPACITOR CERAMIC/T 68pF 50V
C6, 8-15	CK104FLO	CAPACITOR CERAMIC/T 10nF 25V 20%
C7	CM225KK6	CAPACITOR MET/T 0.22uF 100V
C16, 17, 18, 19, 20, 27	CM105NL6	CAPACITOR MET/T 0.1uF 250V
C21	CK222JKO	CAPACITOR CERAMIC/T 220pF 50V
C22	CM105NL6	CAPACITOR MET/P 0.1uF 250V
C23	CK103JKO	CAPACITOR CERAMIC/T 1nF 50V
C24	CK151JKO	CAPACITOR CER/T 15pF 50V AXIAL
C25, 26	CM4758K6	CAPACITOR MET/P 470nF 63V
C30	CA107JL7	CAPACITOR A/ELEC 10uF 50V 20% RAD PR
C31	CA105NL6	CAPACITOR CERAMIC/T 100nF
C101, 102, 201, 202	CA2268M7	CAPACITOR A/ELEC 2.2uF 63V PREF
C103, 203	CA107JL7	CAPACITOR A/ELEC 10uF 50V 20% RAD PR
C104, 204	CM225KL6	CAPACITOR MET/P 0.22uF 100V
C105, 205	CA109HM6	CAPACITOR ALUM/ELEC 1000uF 35V
C106, 206	CM105NL6	CAPACITOR MET/P 0.1uF 250V
C107, 207	CA478FM7	CAPACITOR ALUM/ELEC 470uF 25V

Circuit Reference	Component Reference	Component Description
DIODES		
D1, 2, 3	DZ73560FRO	DIODE ZENER BZX79B5V6 2%
D4, 5	DS4143UTO	DIODE 1N 4148 THOMSON
INTEGRATED CIRCUITS		
IC1	IL3301UM3	CIRCUIT INT. TDA3301 SELECTED
IC2	IG4551UM2	CIRCUIT INT. 4551
IC101, IC201	IL19080S2	CIRCUIT INT. TDA 1908
CHOKES & DELAY LINES		
L1	LW474SK2	CHOKE 47uH
L2	LW105SK2	CHOKE 100uH
L3	LW104SK2	CHOKE 10uH
L4, 5	LV001TA3	CHOKE KAN K2819XM
L11	LW154SK2	CHOKE 15uH B78108-T1153-K
DL1	ED0001P01	DELAY LINE DL470
DL2	ED0002P01	DELAY LINE DL711
CONNECTORS		
PL1	KP0026A17	PLUG 17-WAY 20/3457
PL2	KP0026A16	PLUG 16-WAY 20/3456
PL102	KP0025A05	PLUG 5-WAY 20/3445
PL103	KP0025A03	PLUG 3-WAY 20/3443
PL104	KP0025A04	PLUG 4-WAY 20/3444
TL1	KP0024A03	PLUG 3-WAY 20/3423
MISCELLANEOUS		
FIT TL1	KL9005Z02	LINK TEST MOLEX 90059-0009 P/0
X1	XC0014UU6	CRYSTAL IQD TYPE 'P' A124D
2 TRACK CUTS	BC0111I02	PCB PAL INTERFACE
LK1, 2, 3	WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
LK6 7, 8	WL2212TU1	WIRE LINK 5mm x 12mm x 5mm
LK9, 10	WL2214TU1	WIRE LINK 5mm x 14mm x 5mm
LK12, 13	WL2212TU1	WIRE LINK 5mm x 12mm x 5mm
	A01647101	I/FACE ASSEMBLY TPL/STD - MC REV 3

SPECTRUM INTERFACE CARD - DESCRIPTION/OPERATION

1. LUMINANCE CHANNEL (Y)

A. The (-Y) signal contains:

(1) Video information
(2) line sync pulses
(3) frame sync pulse

3. The incoming Y signal is attenuated by the potential divider, R16, R17 the resultant signal is then amplified by TR6.

C. Transistors TR7, TR8 and TR9 have the following functions:-

(1) TR7 - Separates the sync pulses
(2) TR8 - Inverts the sync pulses
(3) TR9 - Buffers the sync pulses
R28 and R29 in the emitter of TR9, splits the voltage swing to produce a 'SYNC TTL' output.

D. The rising edge of the sync output signal is used by C6, R3Q and TR24 to produce a pulse which has the same duration and timing as the colour burst gating pulse on the +/- (R-Y) signal.

E. The luminance signal on the collector of TR6, is clamped to the black level by C10 and TR25.

F. The black level is set by resistor/diode potential divider formed by VR1, (R36. R37, R65 and 2 IN4148 diodes).

2. COLOUR DIFFERENCE CHANNELS

A. The -(B-Y) Channel

(1) The -(B-Y) signal is attenuated by a potential divider network R32 and R34. TR10 inverts and amplifies to produce + (B-Y). TR11 and C9 use the sync pulses to clamp the + (B-Y) signal to the black level.
(2) TR21 merges + (B-Y) clamped signal to +Y clamped signal to produce the BLUE output.
(3) TR22, is an electronic switch that has its threshold set by R56 and R57.
(4) The gain of TR22 is set by R58 and R59 to produce TTL levels. TR23 emitter follows the TTL signal which produces a buffered output.

B. The +/- (R-Y) Channel

This channel is a phase alternating line (PAL) signal, which requires alternate lines, inverted to produce + (R-Y).

(1) The incoming +/- (R-Y) signal is A.C. coupled by C17, C1 and TR1 thus forming a unity gain, phase splitter.
(2) The non inverted output of TR1 drives an electronic switch (TR3). The inverted output of TR1 is buffered by TR2.
(3) The (R-Y) switch is enabled during the colour burst, gating pulse.
(4) A set/re-set flip-flop switch formed by IC 1C and IC 1D works in the following :-
(a) SET - If next line of video is POSITIVE
(b) RESET - If next line of video is NEGATIVE
(5) The outputs of 1C1D enable bi-directional switches which will either:
(a) Connect +(R-Y) through C1
(b) Connect inverted -(R-Y) through C2.
Thus producing +(R-Y). TR4 and TR5 clamp the +(R-Y) to the black level.
(6) The + (R-Y) clamped signal is added to the +Y clamped signal by TR13 to produce +R signal.
(7) TR14 has its threshold set by R43 and R42. the gain is set by R44 and R45, in order to produce TTL levels.
(8) TR15 emitter follows the TTL signal thus producing a buffered signal output.

C. THE (G-Y) OUTPUT

(1) This signal is generated by mixing the following:-
  (a) The (B-Y) clamped signal. TR16 performs this mixing function
  (b) The (R-Y) clamped signal, TR16 performs this mixing function

(2) The proportions of (B-Y) and (R-Y) clamped signals which are added together are set by R54 and R40.

(3) G OUTPUTS
  (a) This signal is produced by the addition of the following signals:-(i) (G-Y) clamped signal. TR17 performs this function. (ii) +Y clamped signal, TR17 performs this signal function.

(4) TR18 *h*as its threshold set by R48 and R49. the gam is thus set by, R50 and R51 in order to produce suitable TTL levels. (5) TR19 emitter follows the TTL signal and produces a buffered output.

'PROM' INTERFACE PANEL

GENERAL

1. The 'Programmable-read-only-memory' (PROM) interface panel is used with certain models in the 'SERIES-3' range of colour monitors. Two different versions of the panel assembly may be used - depending on model and intended country of operation.

2. Basically, the two versions are very similar.

   (1) Versions incorporating R.F.I. filtering networks (L/C components L1 to L3 & C4 to C6), are employed with certain models intended for use in countries other than the UK.

   (2) Versions without R.F.I. filtering are currently used for models operating in the U.K.

3. Interface connections:

   (1) When installed, this panel assembly interfaces between input connector PL101, located on 'SERIES-3' main chassis PCB and the monitor's 'user' 7-pin Din input socket.

   NOTE: The 'customer' contrast control VR111, shown on the 'SERIES-3' main chassis circuit diagram, is not fitted as shown when the PROM interface is used. In this case, the 'customer' contrast control pot is connected to 'PL2', located on the PROM interface panel.

   (2) The 'PROM-INTERFACE CONNECTION DIAGRAM' provides wiring interconnection details.

CIRCUIT DIAGRAM

1. The circuit diagram for the 'PROM INTERFACE PANEL' provides circuit details of the panel assembly. Component values are given in the accompanying LIST of COMPONENTS.

CIRCUIT DESCRIPTION

1. The purpose of the 'PROM' interface panel is to convert 4-Bit digital video signals, normally referred to as 'R.G.B. & Intensity', into Linear R.G.B. signals.

2. **Colour Combinations**

   (1) There are 16 possible colours which can be displayed (2^4 combinations).

   (2) IC2, a fusible link PROM, provides sixteen 8-bit outputs corresponding to one of the 16 addresses selected by the R.G.B. and intensity signals.
   These outputs use 3-bits for RED and GREEN, and 2-bits for BLUE video, hence; there are 8 levels of Red and Green and 4 levels of Blue available.

   (3) Resistors R3 to R10 and resistors R11 to R18 form potential dividers respectively between base and collector resistors of TR101, TR102, TR103, located on the 'SERIES-3' main PCB. Resistors values are selected to 'weight' respective PROM outputs, to 'least significant' and 'most significant' bits.

   NOTE: When the 'PROM interface Panel' is installed, the moveable links PL103, shown in the 'SERIES-3' main circuit diagram, should be fitted into linked POSITION (1).

3. +5 Volt Supply

   (1) IC1, C2 and C3 provides a regulated + 5V supply for IC2.

4. **Protection & Termination**

   (1) Diodes D1 to D5 provide flash-over protection for IC2 and for computer signal 'in' sources.

   (2) Reistors R21 to R26 may be fitted on some models to terminate incoming digital signals.

5. Contrast Control

   (1) Transfer TR1, R1 and an external pot connected to PL2 provide for 'customer' control of contrast on some models.

   (2) TR1 forms an emitter follower, the voltage at the emitter determining the video output amplitude on 'contrast'.

LIST OF COMPONENTS - PROM INTERFACE PANEL

GENERAL

1. Components used in the Prom Interface Panel Assemblies, together with possible component variations are listed following;

2. Details of possible circuit variations, used with different versions of the panel, are shown in the accompanying Prom Interface Circuit Diagram.

RESISTORS

1. Most of the resistors employed in the construction are standard **carbon film types of 0.25 watt rating.** ±5% tolerance.

LIST OF COMPONENTS - PROM INTERFACE

Component Reference	Part No.	Component Description
RESISTORS		
R1	RF683DJO	RESISTOR C/F 6K8 0.25W 5%
R2	RF391GJO	RESISTOR C/F 39R 0.5W
R3,6,11,14,20,21,22,23,24,25,26 R4,7,10,12	RF222DJO RF472DJO	RESISTOR C/F 220R 0.25W 5% RESISTOR C/F 470R 0.25W 5%
R15,18	RF103DJO	RESISTOR C/F 470R 0.25W 5%
R5,8,13	RF103DJO	RESISTOR C/F 1K0 0.25W 5%
R16	RF683DJO	RESISTOR C/F 1K0 0.25W 5%
R9,17	RF102DJO	RESISTOR C/F 100R 0.25W 5%
R19		RESISTOR C/F 2K2 0.25W 5%
NOTE FOR APPLE MONITORS ONLY; - RESISTOR C/F R9,R17 BECOMES 220R 0.25W 5%		
CAPACITORS		
C1	CA2268M6	CAPACITOR ALUM/ELEC 2.2UF 63V
C2,3	CM105ML6	CAPACITOR MET/P 0.1 UF 160V
C4,5,6	CK151JKO	CAPACITOR CER/T 15PF 50V
DIODES, TRANSISTORS, INTEGRATED CIRCUITS		
TR1	QS0337UTO	TRANSISTOR BC337-5
IC1	IV7805LXO	CIRCUIT INT. 78L05
IC2	IR18030AX2	PROM TBP 18SA030N (PROGRAMMED INDIVIDUALLY FOR SPECIFIC MODEL)
D1,2-5	DS4148UTO	DIODE IN4148 THOMPSON
CONNECTORS		
PL1,3	KP0026A10	PLUG 10 PIN 20/3450 PRES
PL2	KP0025A05	PLUG 5 WAY 20/3445
INDUCTORS		
L1,2,3	LW104SK2	CHOKE 10 UH

6. Sync Signals

(1) Sync signals are not required by the PROM circuitry and are passed directly through the interface panel.

7. R.F.I. Filtering

(1) On models requiring R.F.I. filtering, L/C networks formed by L1/C4, L2/C5 and L3/C6 are fitted on R. G & B outputs.

AMENDMENTS

AFFECTS

All metal cabinet monitors.

DESCRIPTION

Modifications to bring cabinet back vvire routing, dressing and securing in line with current production practice.

IMPLEMENTATION

These modifications only apply whenever a monitor is returned for service.

MODIFICATIONS

With the cabinet top removed check the following:

Signal Wires On Cabinet Back Components

(DIN sockets. BNC sockets, mode switches, brightness/contrast controls etc).

a) It is now the practice to fit a 'tyrap' fastener onto the signal wires on each component. (See diagrams). A 'tyrap' should be fitted to any component which is found not to have one.

   Note: The signal wires are already mechanically twisted onto each pin and then soldered : this modification provides additional wire attachment.

b) If it is possible to move any of these signal wires away from its normal position to touch the small exposed section of the terminals on the main switch then sufficient 'tyraps' should be fitted to these wires to hold them in position.

   Note: This does not apply to wires which are already contained within a secondary sleeve. Single

Insulated Mains Wires On Mains Switch

This only applies to the short sections of mains cable from which the outer sheath has been removed to allow the individual wires to be attached and soldered to the mains switch.

If it is possible to move any of these short sections of wire away from its normal position to touch a pin on one of the cabinet back components then sufficient 'tyraps' should be fitted to the mains wires to hold them in position. (See diagram).