

For Service Manuals
contact
MAURITRON SERVICES
8 Cherry Tree Road, Chinnor
Oxfordshire, OX9 4QY.
Tel (01844) 351694
Fax (01844) 352554

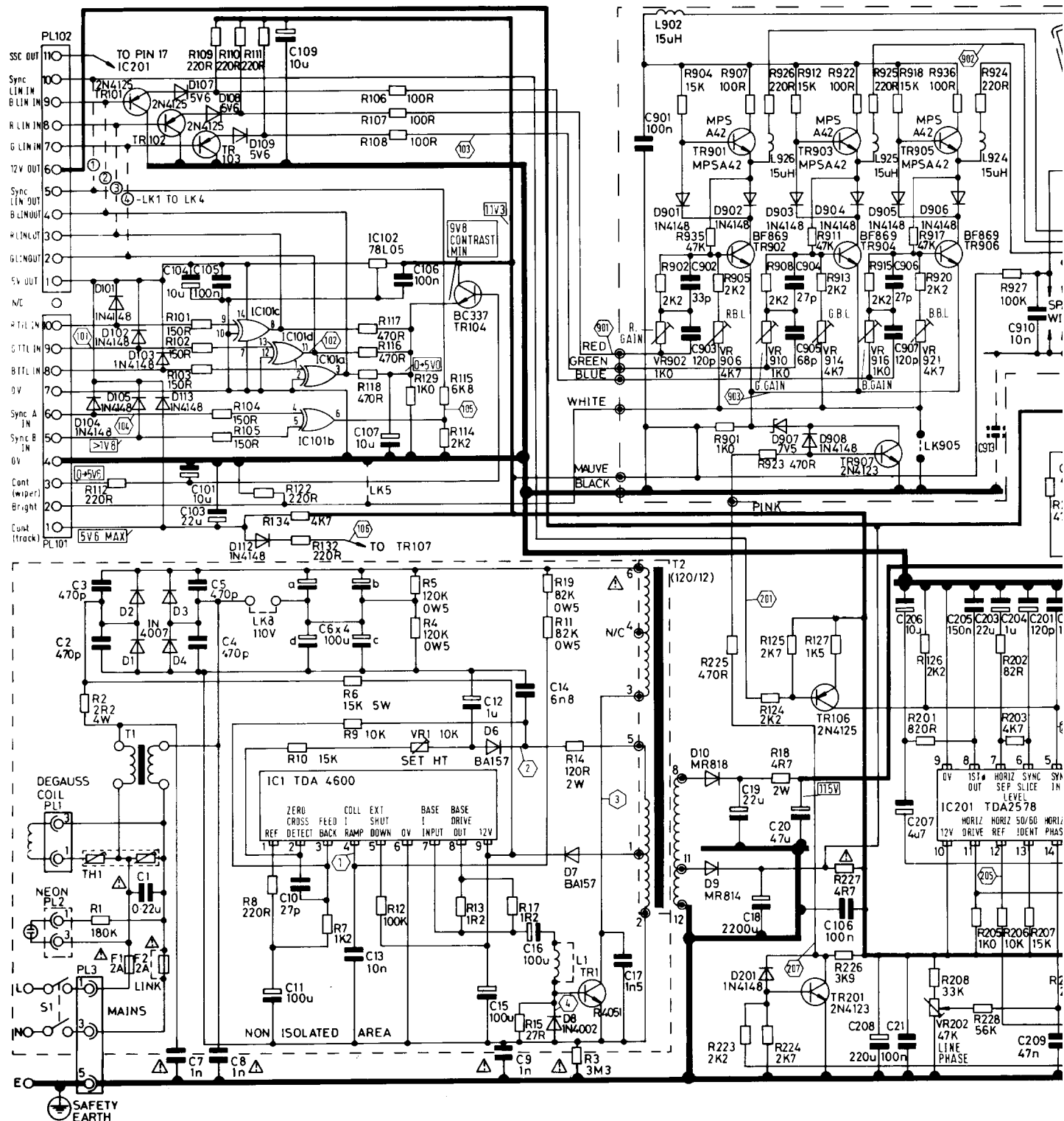
MICROVITEC



SERVICE MANUAL

FOR
COLOUR MONITORS
WITH
SERIES-4 CHASSIS
AND
SERIES-5 CHASSIS

MODELS
CM 120M V
1431 DS4F
121+529NS3
1431 MS4F



VIDEO INPUTS
USED
ON
SOME
MODELS
ONLY



PL102

VIDEO INPUTS
AND
CUSTOMER
CONTROLS



PL101

ISOLATION

BARRIER



PL1
DEGAUSS
COIL



PL2
(NEON INDICATOR)

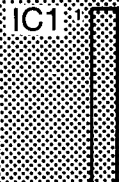


T1

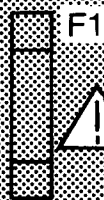
**SMPSU
NON-ISOLATED
AREA**

VR1
SET HT

**DO NOT ADJUST
SEE NOTE -
PRESET ADJUSTMENTS**



TR1



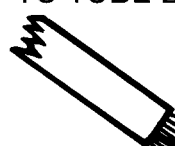
F1

F2



PL3 MAINS INPUT

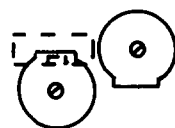
TO TUBE-BASE PCB



- blue
- red
- green
- black
- pink
- mauve
- white
- brown

(grey lead) →

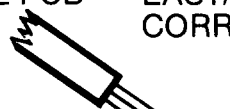
VR201
LINE FREQUE



VR202
LINE PHASE

IC20

TO TUBE-BASE PCB



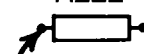
VR402
EAST/
CORR

C6

C20

C215

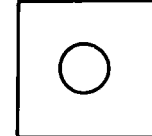
R222



HT MEASUREMENT
POINT



T2



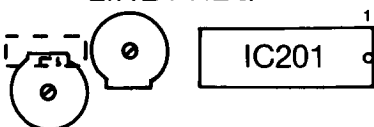
T201

NOTE: Do not adjust presets VR1 'SET HT' and VR301 'Frame Frequency', BEFORE reading 'Preset Adjustment' instructions.

PCB

- blue
- red
- green
- black
- pink
- mauve
- white
- brown

VR201
LINE FREQUENCY



VR202
LINE PHASE

DO NOT ADJUST
SEE NOTE —
PRESET ADJUSTMENTS

VR301
FRAME FREQUENCY

VR302
HEIGHT

VR303
FRAME
LINEARITY

IC401

VR401
WIDTH

VR402
EAST/WEST
CORRECTION

TO TUBE-BASE PCB

C20

C215

R222

HT MEASUREMENT
POINT

T201

PL301
FIELD SHIFT

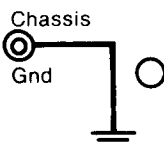
T202

PL201
SCAN COIL
CONNECTIONS
PINS 1 & 2 = LINE
PINS 4 & 5 = FRAME

TR203

FOCUS

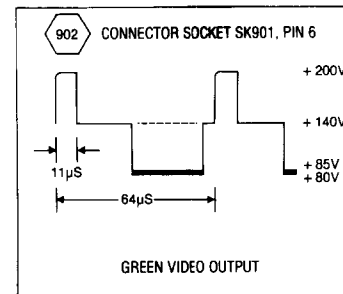
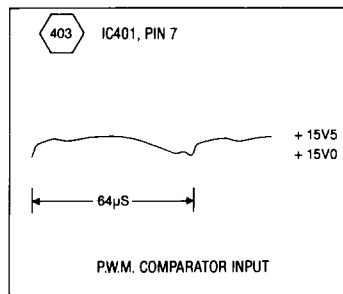
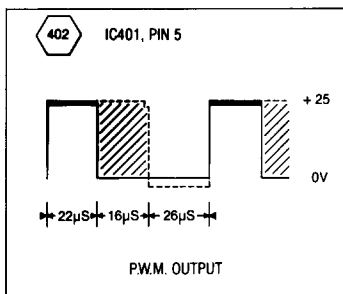
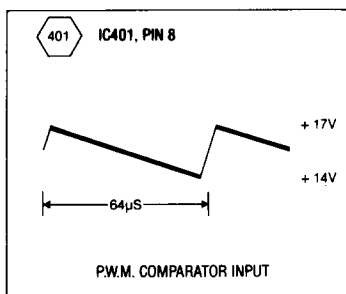
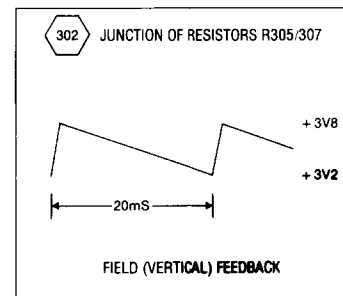
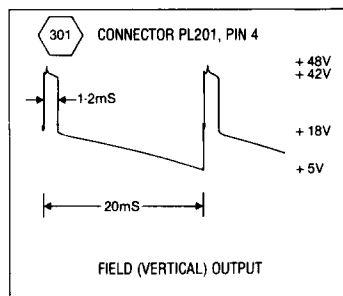
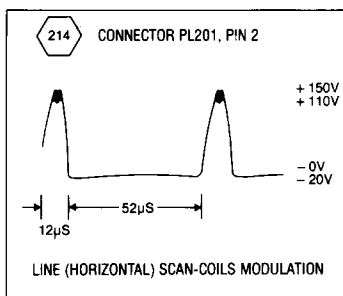
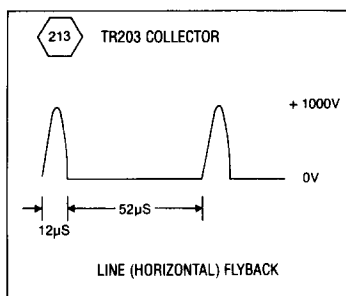
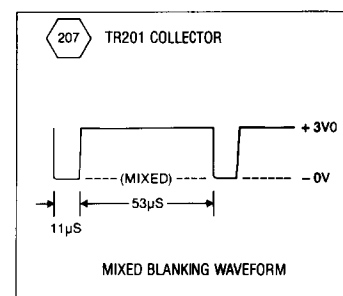
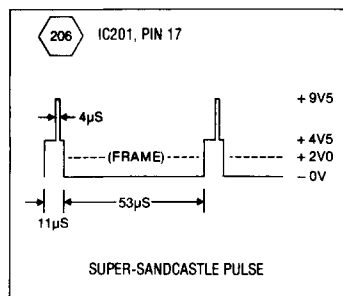
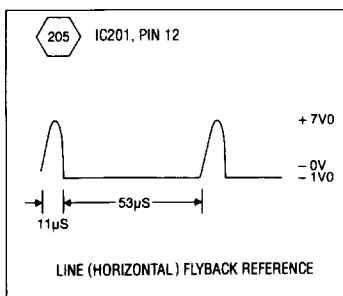
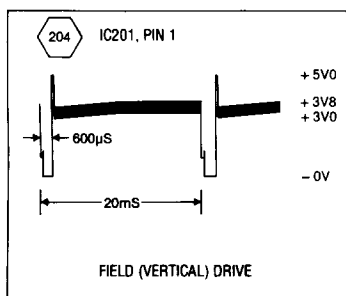
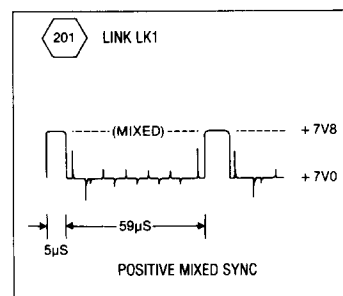
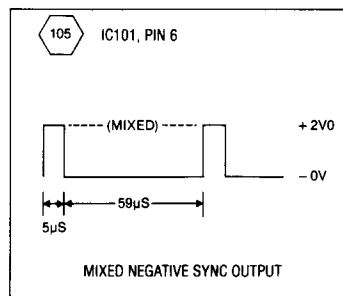
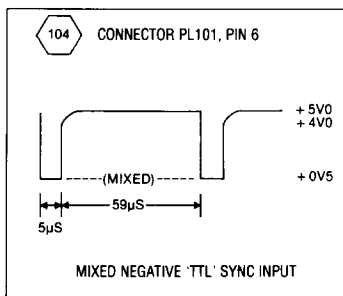
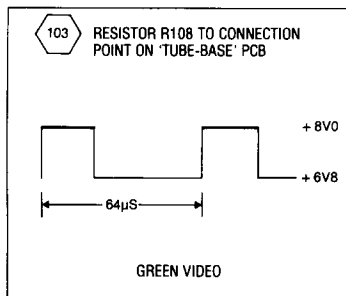
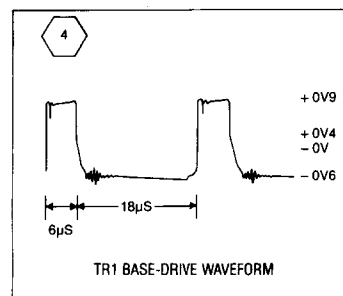
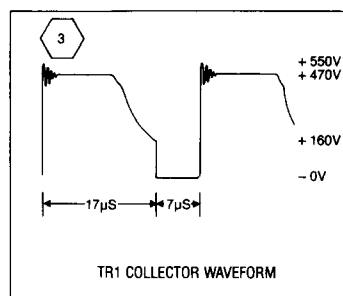
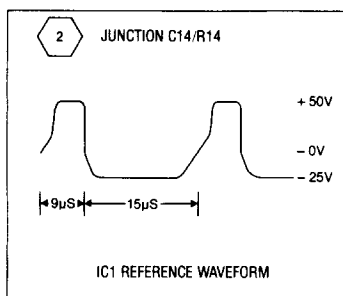
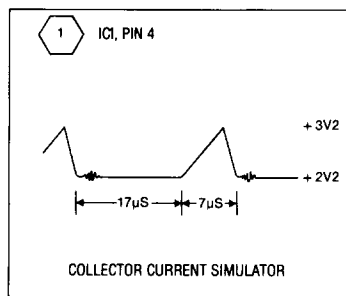
SCREEN
(A1)

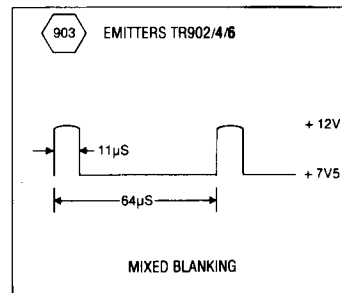
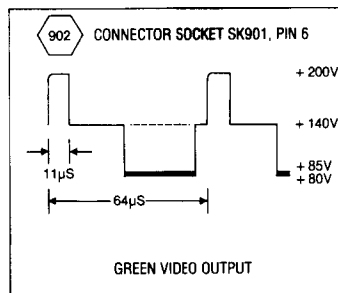
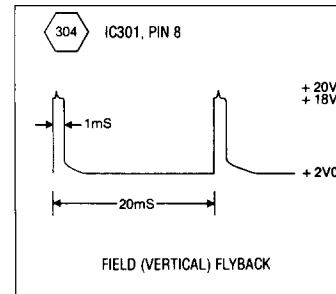
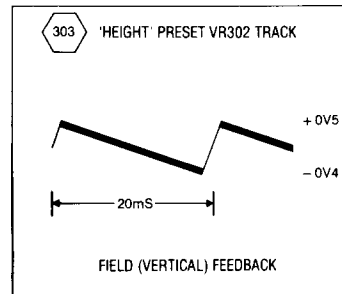
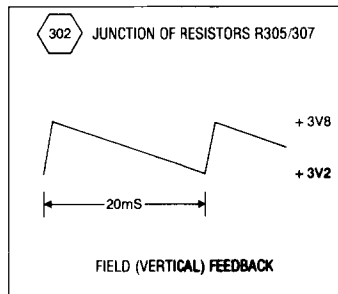
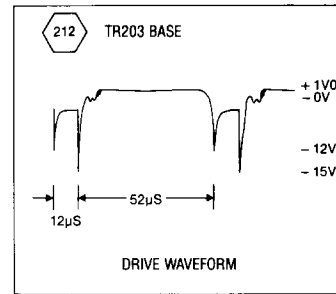
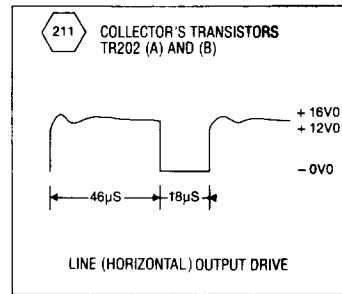
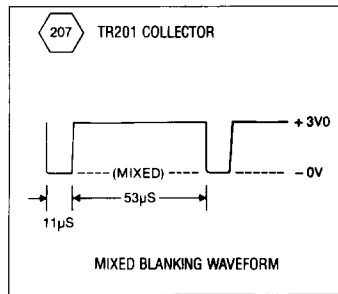
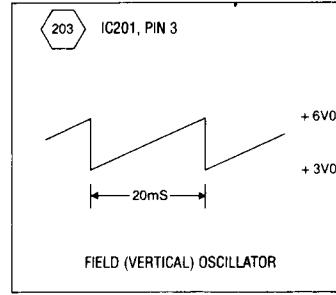
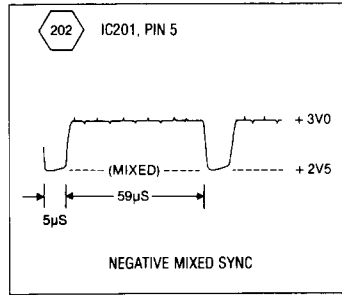
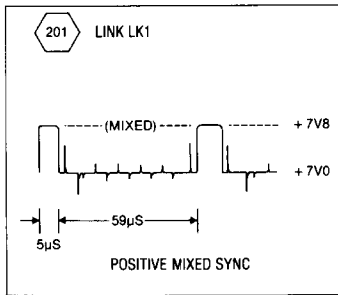
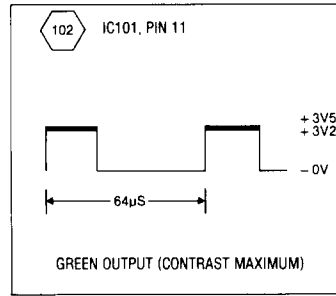
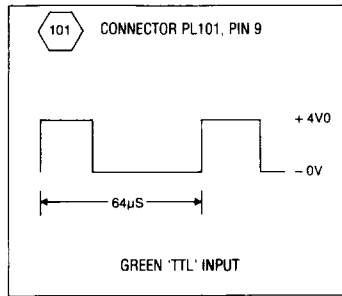
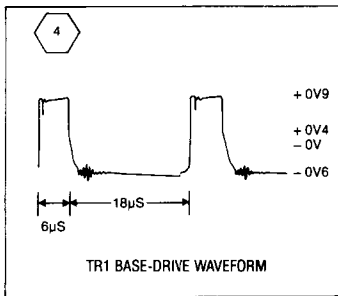


BEFORE reading 'Preset Adjustment' instructions.

CAUTION — HIGH VOLTS AREA

SERIES-4 — MAIN CHASSIS PCB PRESET CONTROLS






SAFETY AND ISOLATION!

The power supply is always live regardless of the mains supply polarity. Therefore for servicing, the monitor should be supplied through a mains Isolation Transformer of at least 300VA rating.
(See 'SAFETY NOTES' in SERIES 4/5 SERVICE MANUAL).


SAFETY CRITICAL COMPONENTS




Components marked  on the circuit diagram and parts list are safety approved types and should only be replaced with components supplied or approved by our Service Department. It is recommended that other replaced parts should be of the type originally fitted, particularly resistors stood off the printed circuit boards.
FAILURE TO OBSERVE THE ABOVE MAY RENDER THE CHASSIS AND EXTERNAL ACCESSIBLE PARTS LIVE, OR CAUSE OTHER HAZARDS!

INITIAL TEST CONDITIONS


Mains Input: 240 V A.C. ~ 50 Hz.
Contrast Control: Set to Maximum.
Brightness Control (if fitted): Set to Mid-Range.
3 BIT TTL Input: Standard 8 vertical colour bars.
Sync: Mixed Negative TTL levels;
C.C.I.R. Timing.

WAVEFORM MEASUREMENT POINTS

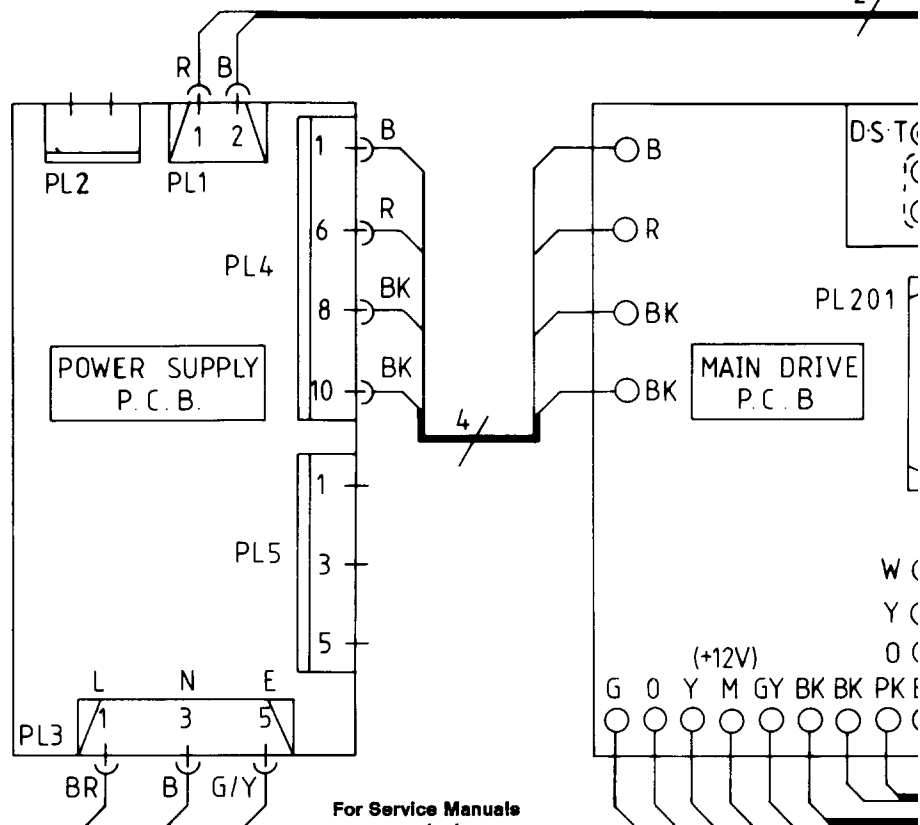
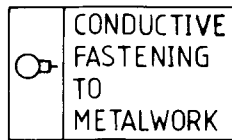
Waveform points are denoted thus 

- 1) The numerical reference point on the circuit diagram relates to the corresponding numbered display on the accompanying table.
- 2) Waveform measurements were made using an oscilloscope of 20MHz minimum bandwidth and a ± 10 or ± 100 passive probe.
- 3) **NOTE DANGER!** For reasons of safety, waveforms , , and  **MUST** be measured **ONLY** when using a mains Isolation Transformer.

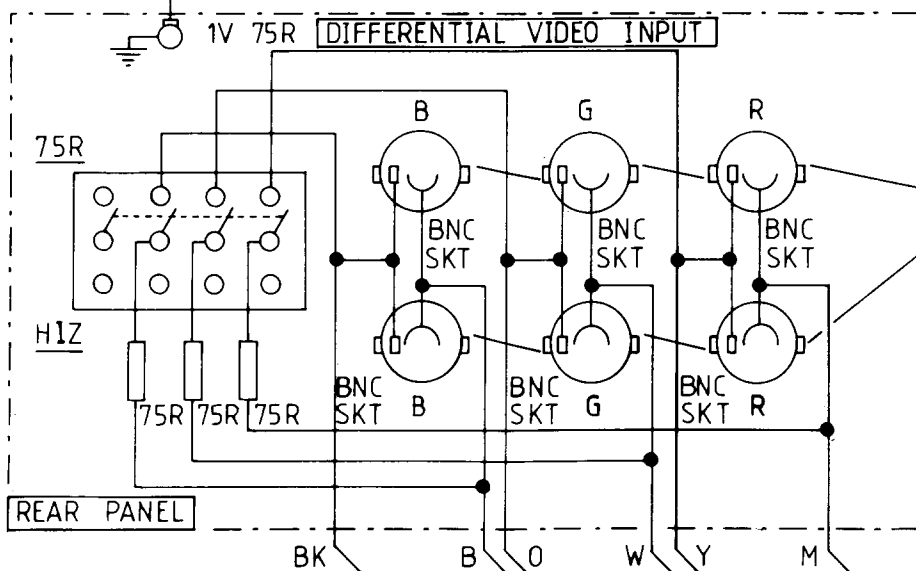
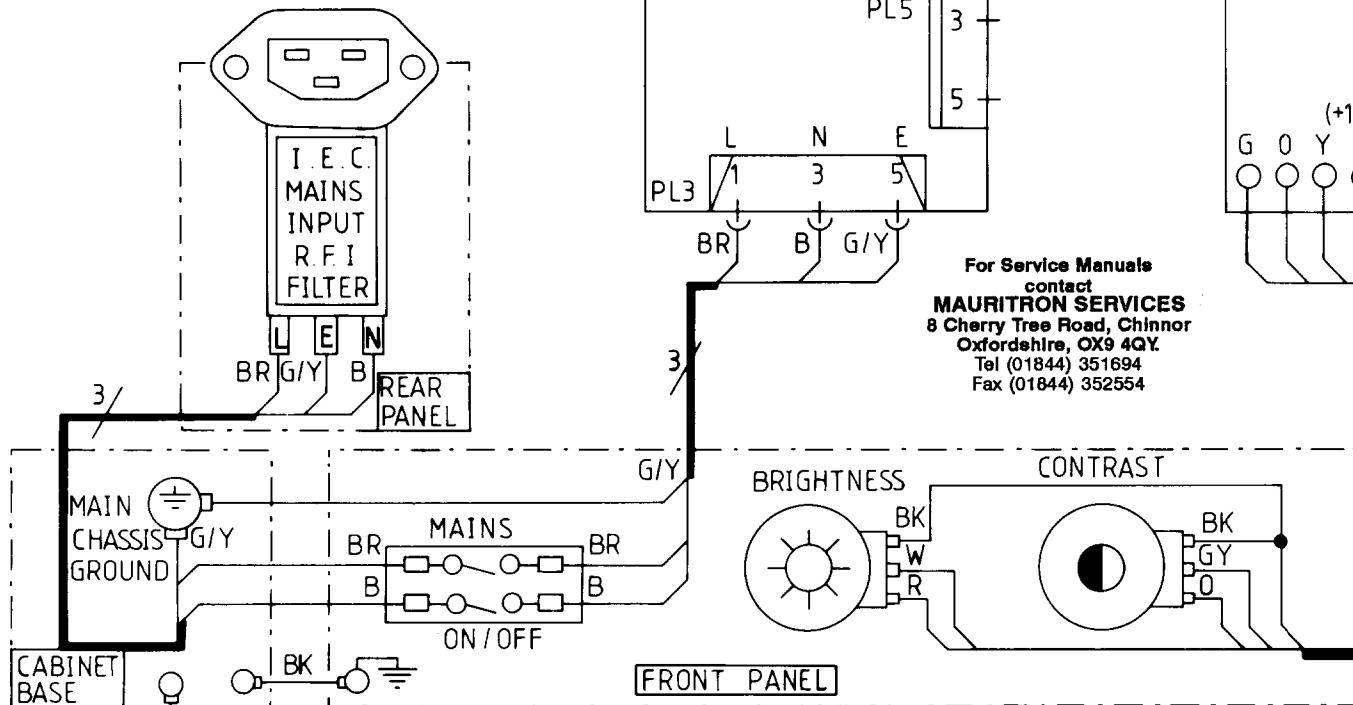
TYPICAL VOLTAGES - MEASUREMENT POINTS

- 1) Voltages denoted thus  on the circuit diagram, are typical voltages only, and were measured using a high input impedance D.V.M.
- 2) Alternatively, Analogue meters of 20 Kn/Volt minimum can be used.

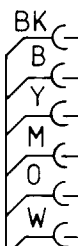
WIRING CODE	
6/	6 LEADS IN SLEEVED HARNESS
CODE	COLOUR
BK	BLACK
BR	BROWN
R	RED
O	ORANGE
Y	YELLOW
G	GREEN
B	BLUE
M	MAUVE
GY	GREY
W	WHITE
PK	PINK

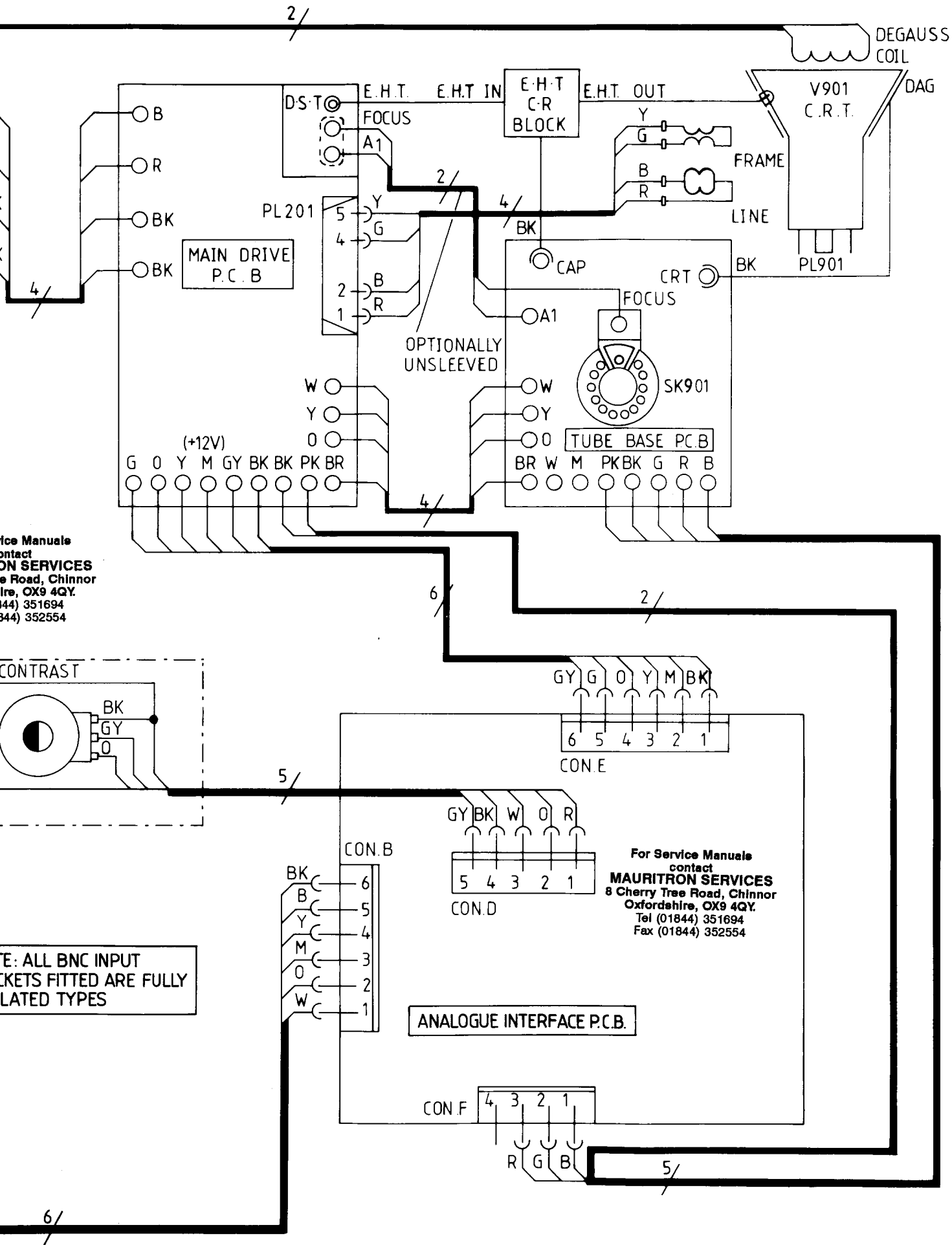


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NOTE: ALL BNC INPUT SOCKETS FITTED ARE FULLY ISOLATED TYPES





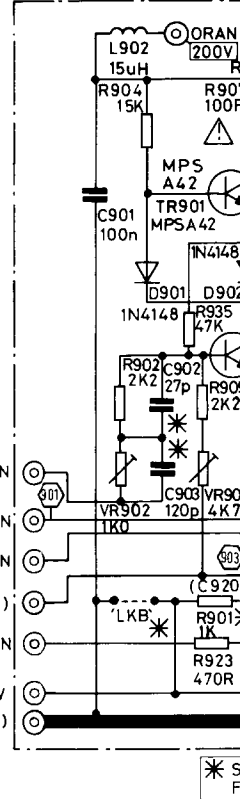
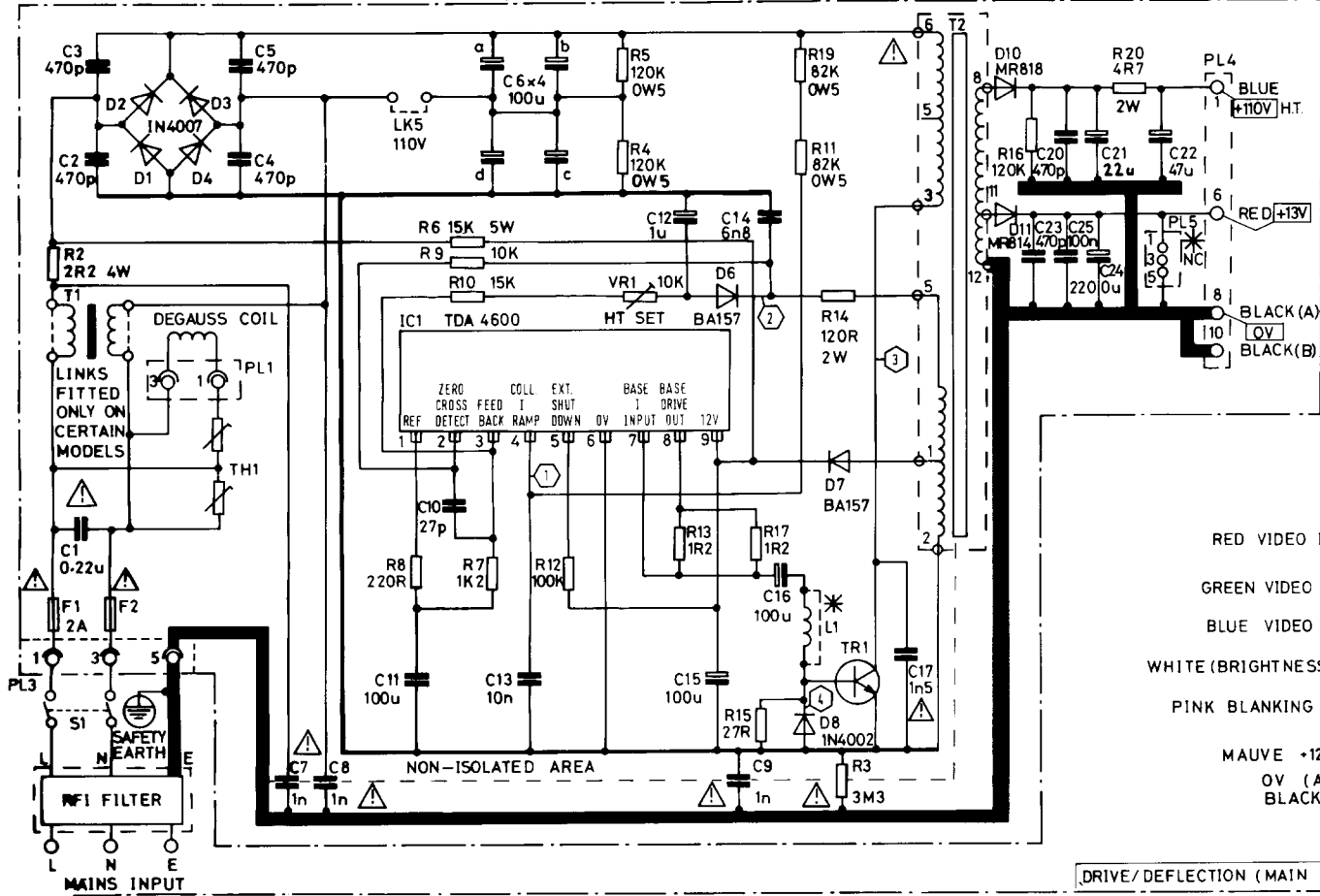
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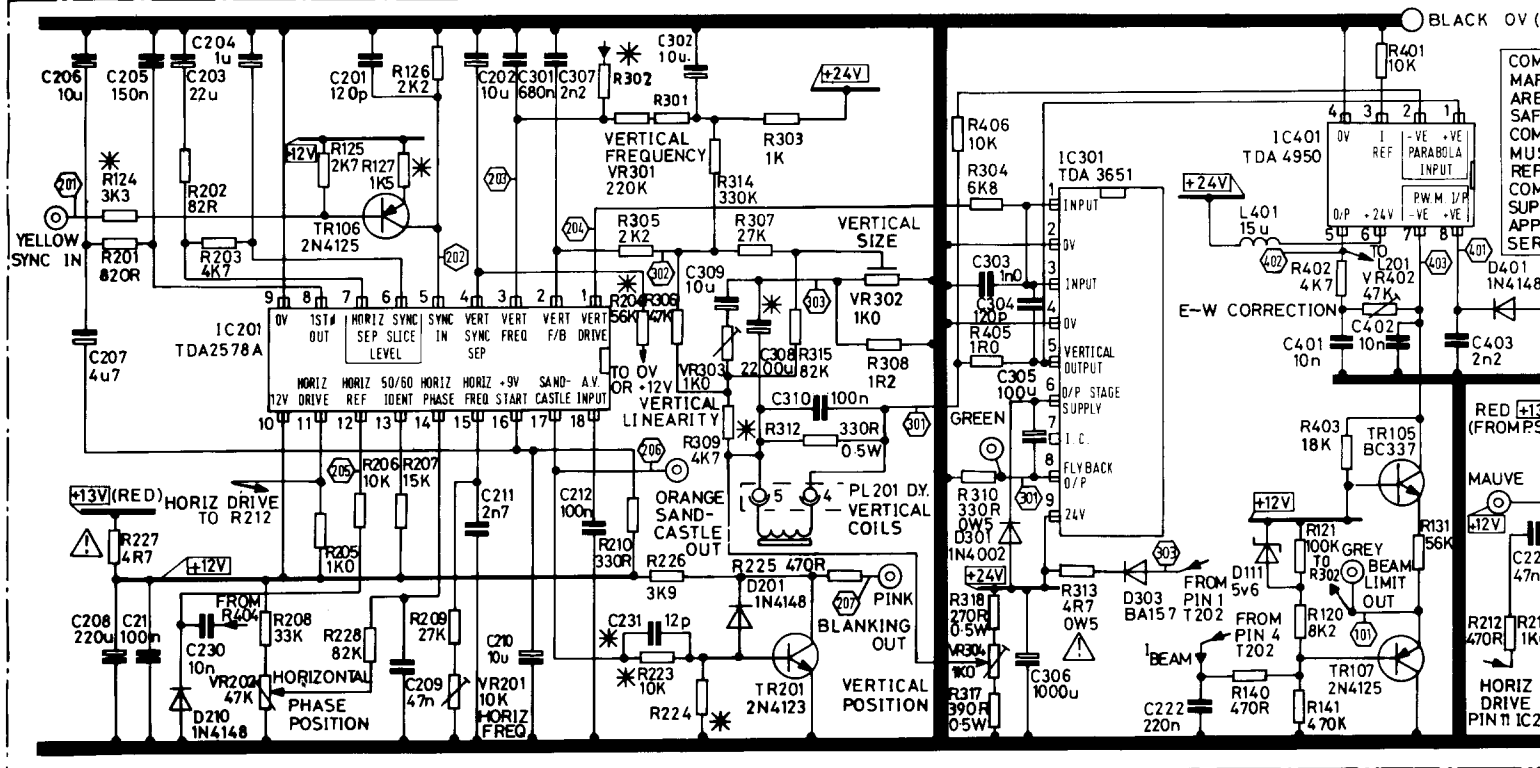
NOTE: ALL BNC INPUT
SOCKETS FITTED ARE FULLY
SHIELDED TYPES

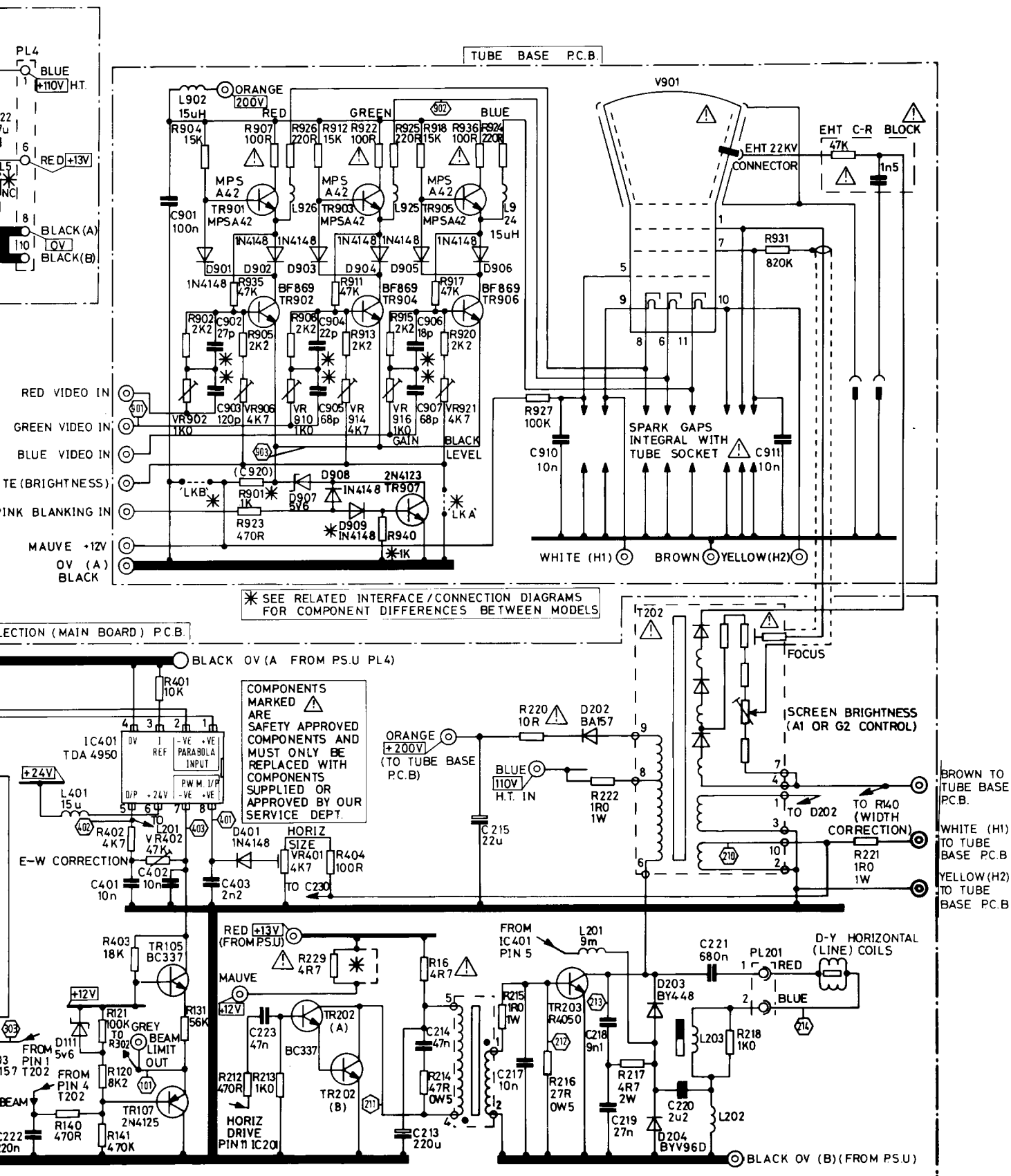
SERIES 5 INTERCONNECTION DIAGRAM (ANALOGUE MONITOR)

POWER SUPPLY P.C.B



DRIVE/DEFLECTION (MAIN BOARD) P.C.B

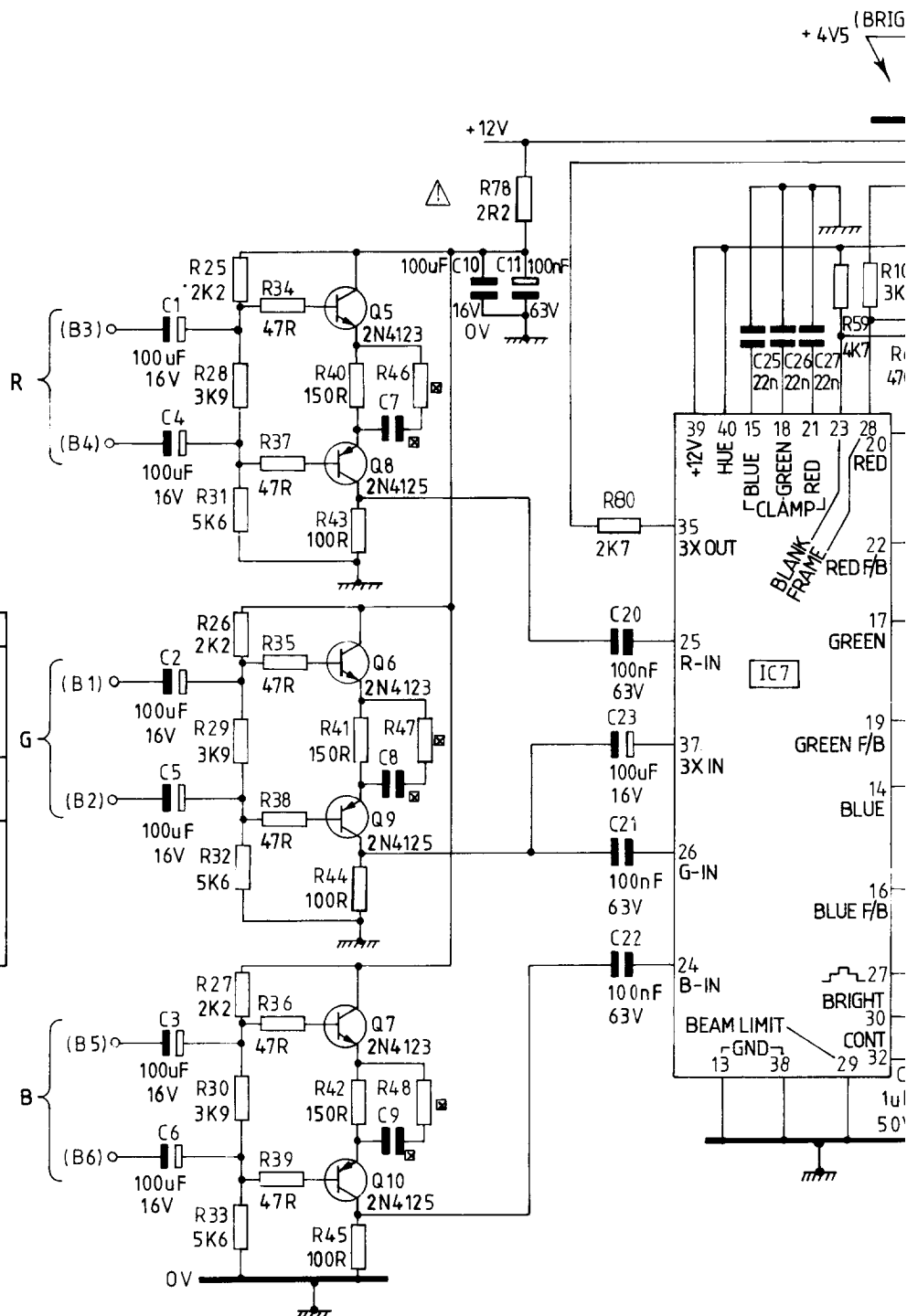


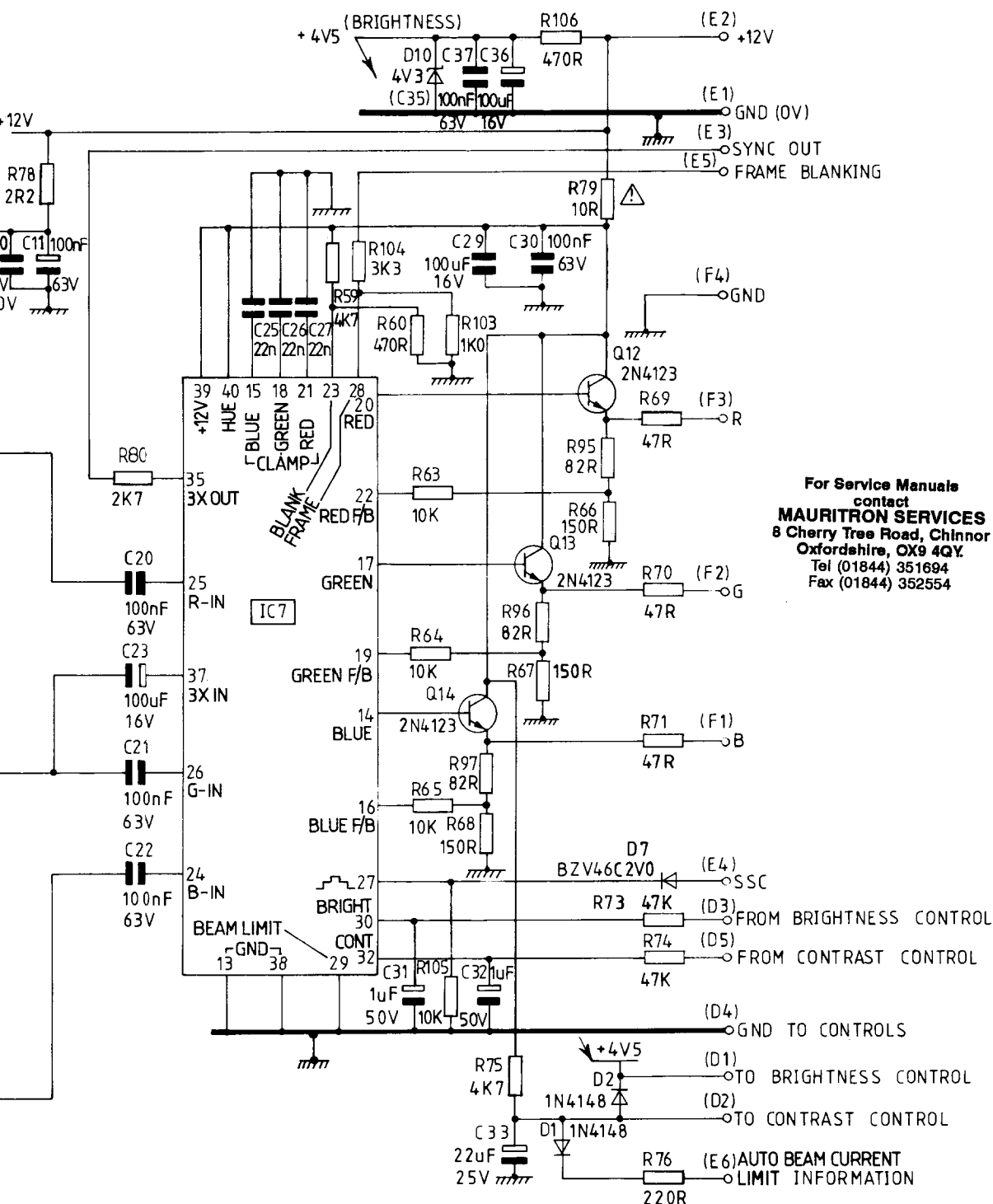


SERIES 5 MAIN CIRCUIT DIAGRAM

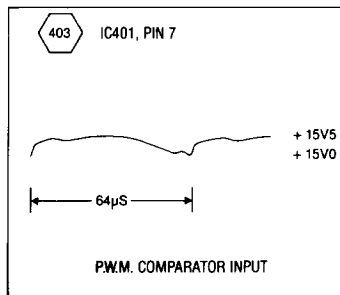
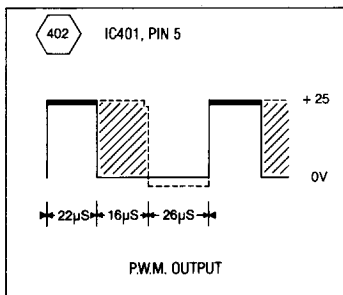
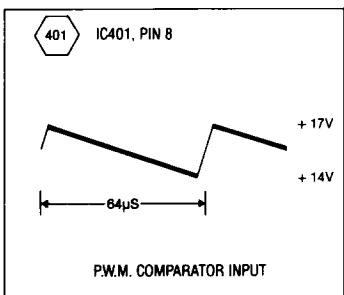
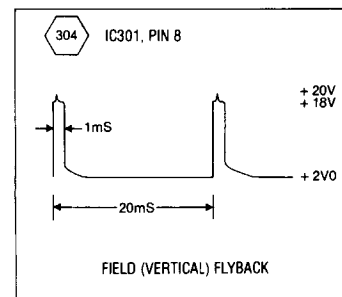
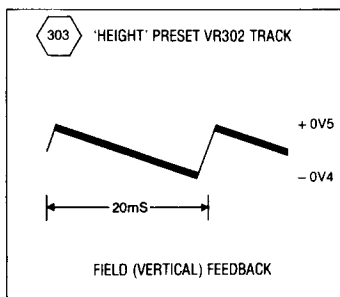
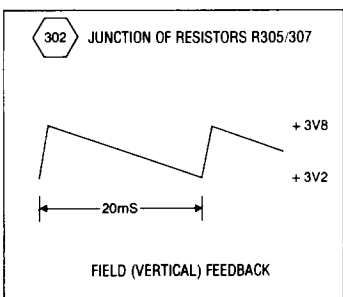
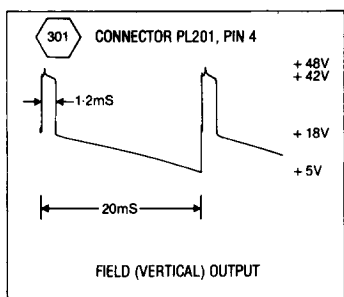
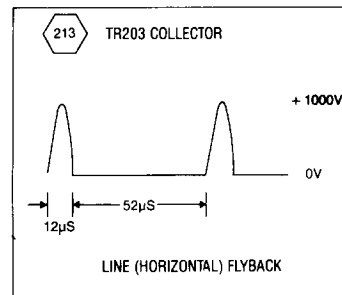
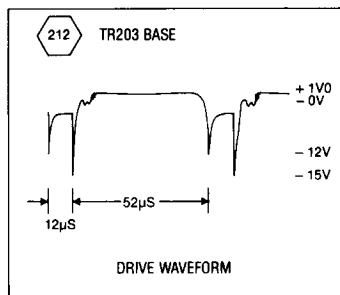
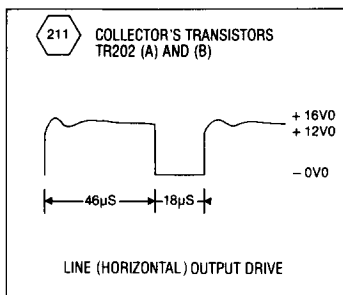
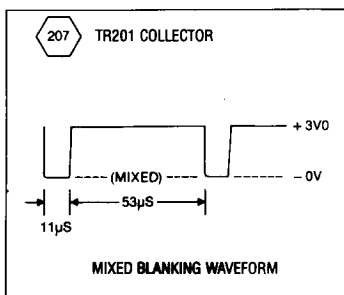
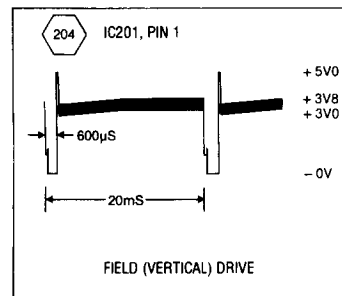
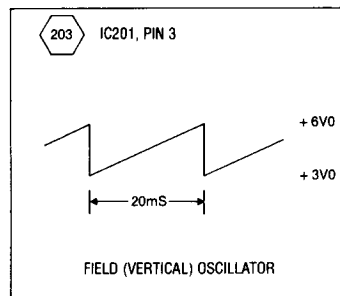
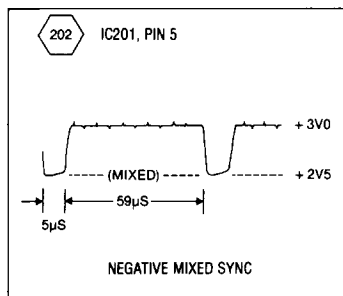
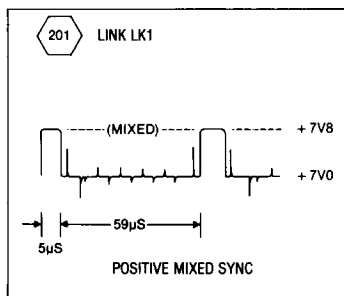
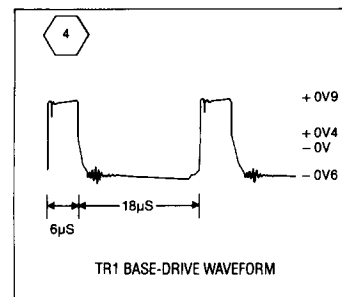
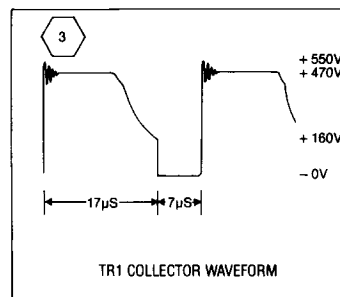
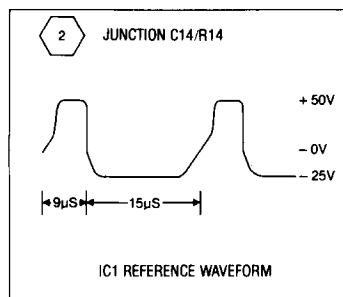
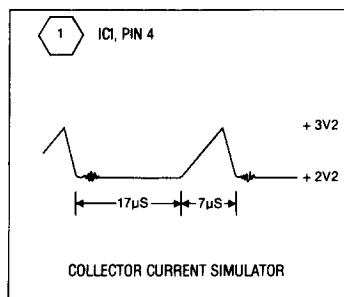
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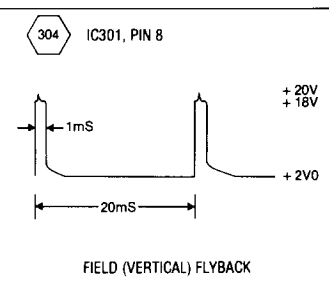
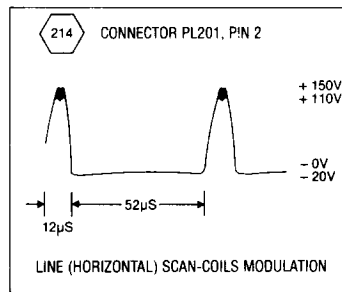
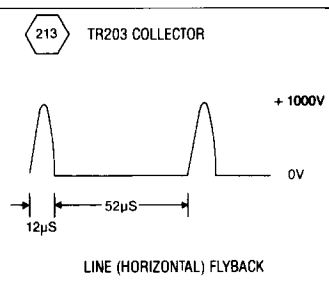
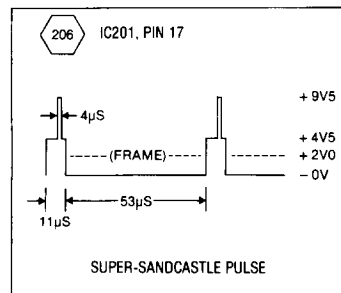
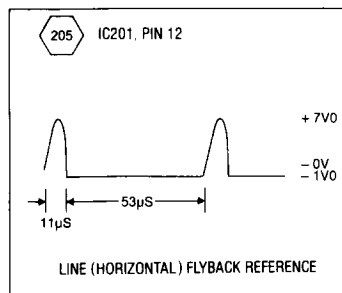
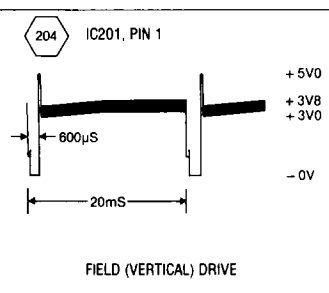
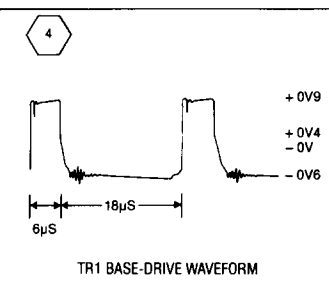
SYMBOL	NOTES
(B1)	DENOTES TYPICAL MARKING AND PIN NUMBER OF P.C.B. CONNECTOR. I.E. (B1 TO B6) REPRESENTS 6-WAY CONNECTOR.
☒	DENOTES OPTIONAL COMPONENTS (DEPENDS ON MODEL).
⚠	COMPONENTS MARKED THUS ARE SAFETY APPROVED AND MUST ONLY BE REPLACED WITH COMPONENTS SUPPLIED OR APPROVED BY OUR SERVICE DEPARTMENT.



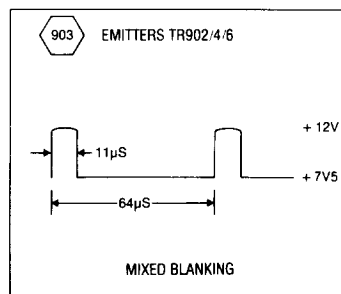
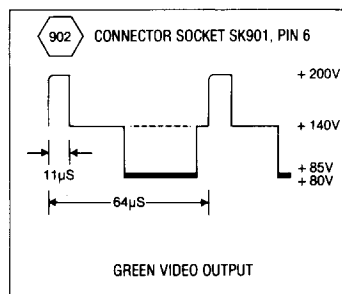


SERIES 5 ANALOGUE INTERFACE CIRCUIT DIAGRAM





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SAFETY AND ISOLATION!

The power supply is always live regardless of the mains supply polarity. Therefore for servicing, the monitor should be supplied through a mains Isolation Transformer of at least 300VA rating. (See 'SAFETY NOTES' in SERIES 4/5 SERVICE MANUAL).

SAFETY CRITICAL COMPONENTS

Components marked ⚠ on the circuit diagram and parts list are safety approved types and should only be replaced with components supplied or approved by our Service Department. It is recommended that other replaced parts should be of the type originally fitted, particularly resistors stood off the printed circuit boards. **FAILURE TO OBSERVE THE ABOVE MAY RENDER THE CHASSIS AND EXTERNAL ACCESSIBLE PARTS LIVE, OR CAUSE OTHER HAZARDS!**

INITIAL TEST CONDITIONS

Mains Input: 240 V A.C. ~ 50 Hz.
Contrast Control: Set to Maximum.
Brightness Control (if fitted): Set to Mid-Range.

WAVEFORM MEASUREMENT POINTS

Waveform points are denoted thus ③

- 1) The numerical reference point on the circuit diagram relates to the corresponding numbered display on the accompanying table.
- 2) Waveform measurements were made using an oscilloscope of 20MHz minimum bandwidth and a +10 or ÷100 passive probe.
- 3) **NOTE DANGER!** For reasons of safety, waveforms ①, ② and ③ **MUST** be measured **ONLY** when using a mains Isolation Transformer.

TYPICAL VOLTAGES - MEASUREMENT POINTS

- 1) Voltages denoted thus 3.0 V on the circuit diagram, are typical voltages only, and were measured using a high input impedance D.V.M.
- 2) Alternatively, Analogue meters of 20 K Ω /Volt minimum can be used.

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 the preset controls referred to in the descriptions following are shown in the illustrations contained in this Section.

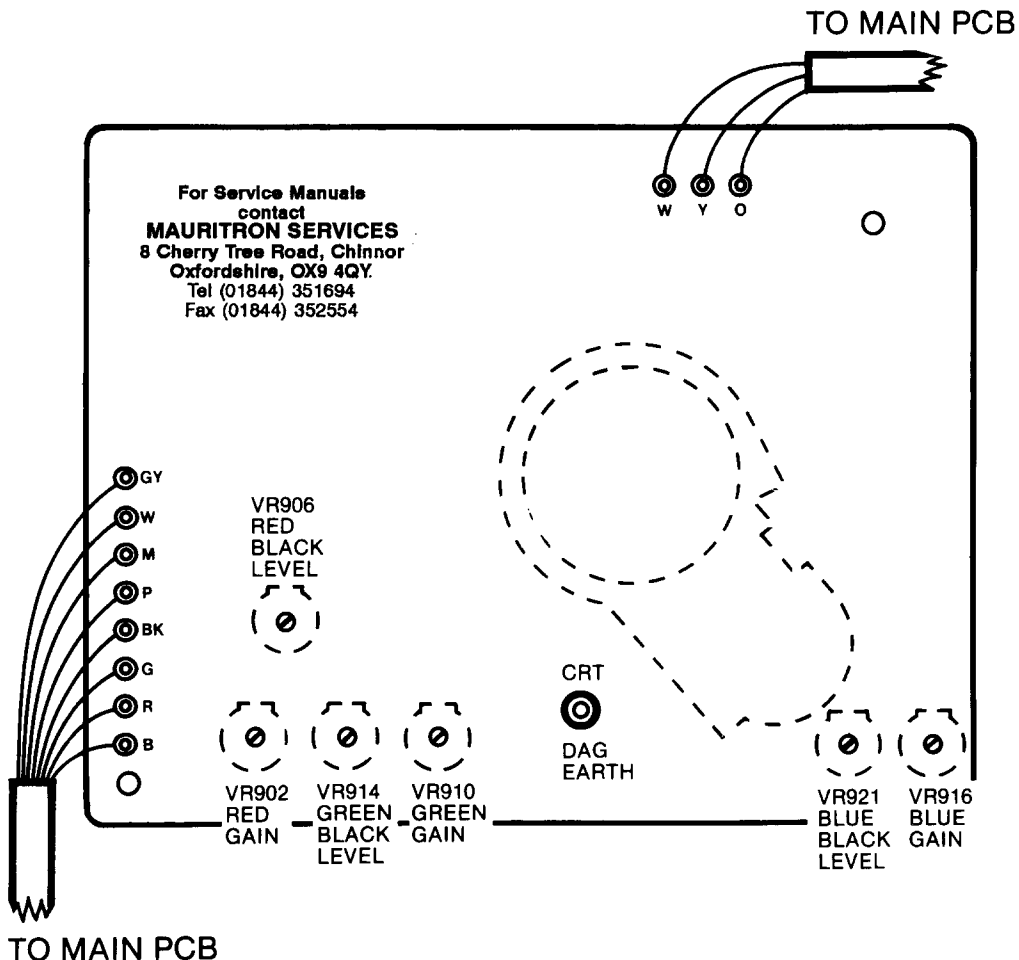
Noteable exceptions are:- 'SET HT' preset on the SMPSU (which should NOT normally be re-adjusted) and, the 'R, G, B GAIN' presets on the ANALOGUE only interface.

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

PICTURE TUBE – COLOUR CONVERGENCE/DEFLECTION ASSEMBLY SETTINGS

IMPORTANT NOTE: The deflection/coil assembly and colour convergence magnet assembly are an Integral part of the colour picture tube. These components are very precisely adjusted and set at the time of the tube's manufacture.

Under no circumstances should these components be removed from the tube or their settings be disturbed or seals broken, as otherwise - the tube's warranty will be rendered void.



**TUBE - BASE PCB - PRESET CONTROLS - SERIES-4 AND SERIES-5
(VIEWED FROM 'TRACK-SIDE' OF PCB)**

FACTORY PRESET ADJUSTMENTS

NOTE: Adjustments of picture display presets are described following.

Adjustments are best made using a static display/test card, or similar.

Graphic representation of correct and incorrect settings of some of the presets most likely to be used are shown in the accompanying Table of Preset Adjustments.

1. SET HT VR1

Located on the Switched-Mode Power Supply.

IMPORTANT: This is adjusted accurately at the factory, to give + 110V (Series-5) or + 115V (Series-4) –with a dark picture on screen 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, VR201 (Horizontal Hold)

- a) To adjust VR201; feed the monitor with RGB video information and interrupt the mixed sync information to the line oscillator by removing the sync information on input connection PL101, (Series-4) or the input socket (Series-4/5).
- b) Adjust VR201 until picture almost stabilizes, then reconnect sync – this should result in a stable picture lock.

3. FIELD FREQUENCY, VR301 (Vertical Hold)

Control of free running field oscillator frequency is achieved by VR301 being adjusted to give a stable picture lock.

This may be achieved by using either of the alternative methods described following:-

3.1 Using a Digital Frequency Meter (DFM)

- a) Attach the test probe to either Pin 8 of IC301, or to the 'live-end' of the field-scan coils (Pin 4, PL201).
- b) With no input signal applied to the monitor – adjust preset VR301 until the free-running field oscillator frequency registers $46\text{Hz} \pm 1\text{Hz}$. This completes the adjustment.

3.2 Adjustment without DFM and with 50Hz/ 60Hz Pattern Generator/Microcomputer

50Hz PATTERN GENERATED

- a) Display a 50Hz graticule, cross-hatch pattern, test card or similar.
- b) Rotate preset VR301 fully anti-clockwise:-

Then turn VR301, SLOWLY clockwise until the picture display locks.

Continue turning slowly, noticing that the picture height decreases to a point where the picture abruptly expands to a setting of MAXIMUM height.

Stop turning at this point.

NOTE: 'Rocking' the setting of the preset very slightly may help in determining the maximum setting.

- c) Attach approximately 75mm (3") of masking tape or similar temporarily to the top centre of the tube face, running the tape vertically downward. On this tape, mark the position of the topmost horizontal line of the display pattern – this marks the MAXIMUM height setting.

NOTE: This horizontal line on the display becomes the reference point for ALL setting/markings of VR301 referred to following.

- d) Turn VR301, now anti-clockwise slowly, to a point where the display height abruptly collapses. 'Rock' the preset gently to determine the MINIMUM height setting. Again, mark the position of the horizontal reference line, to mark the minimum reference point on the tape.

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- e) Measure carefully the 'mid-point' between the maximum and minimum markings and mark this central MID-POINT reference on the tape.
- f) Adjust preset VR301 slowly anti-clockwise until the 'horizontal line reference' on the display matches the central mid-point reference marked on the tape – as in e) above.

60Hz PATTERN GENERATED

Repeat operations a) through to e) but with 60Hz pattern displayed.

With NEW minimum, maximum and mid-point markings on the tape (coinciding with the 60Hz 'horizontal reference line'), align VR301 by turning slowly clockwise. Continue to rotate slowly clockwise to a point where the display increases abruptly in height. Rotate the preset further, until the 'first horizontal reference line' on the display starts to lower, and rotating further – adjust the horizontal reference line to align with the mid-point marking on the tape.

Adjustment is now complete.

Remove tape from CRT. Removal of sync will allow the display to lose picture lock. Restoring sync should lock the display.

4. LINE PHASE VR202 (Horizontal Phase)

- a) VR202 controls positioning of video information relative to the raster in a line-scan direction.
- b) Ensure the following operations have been effected:
 - 1) The line frequency has been set (VR201)
 - 2) The picture width has been set (VR401)
 - 3) If possible, the monitor is positioned in its place of use.

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NOTE: VR202, when adjusted, will shift the picture right or left.

5. WIDTH, VR401 *

CAUTION: CARE SHOULD BE TAKEN WHEN ADJUSTING THIS COMPONENT DUE TO ITS PROXIMITY TO EHT SECTION, IN PARTICULAR THE AREA OF THE DIODE-SPLIT TRANSFORMER AND CIRCUITRY.

Using a non-metallic trimming tool adjust VR401 to effect picture width adjustment.

6. EAST-WEST CORRECTION, VR402 *

NOTE: Some models will not require this adjustment because 'East-West Correction' is integral with certain types of CRT.

Correct adjustment of VR402 (when fitted) will achieve straight verticals on left and right hand sides of pictures.

* NOTE: Preset Controls – 'Width', VR401 and 'East-West Correction', VR402 are interactive. It is important that 'Width' and 'East-West' controls are set in conjunction to obtain correct results.

7. HEIGHT, VR302

VR302, when adjusted, will provide for raster under scan and over scan.

8. FIELD LINEARITY, VR303 (Vertical Linearity)

Adjust VR303 to give a linear picture in a vertical direction.

NOTE: Best results are obtained by using a cross-hatch type grid or static test pattern.

9. FIELD SHIFT, PL301/VR304 (Vertical Shift)

On the 'Series-4 main chassis' PCB assembly, the position of 'Moveable Link – PL301', determines positioning of the raster in a vertical scan direction. This link may be fitted in one of two positions on PL301 depending on Tube characteristics, or not fitted at all. On the 'Series-5 main-drive board' PCB assembly, preset VR304, 'Field Shift' determines the positioning of the raster in a vertical scan direction.

10. FOCUS

Focus is located on the end of the diode-split transformer (T202)

- To adjust - Set 'CONTRAST' control to max, then make focus adjustments to obtain a 'sharp', clear image over the whole picture area.

11. COLOUR GAIN CONTROLS AND COLOUR BACKGROUND (BLACK LEVEL) CONTROLS

MAKE THE FOLLOWING ADJUSTMENTS USING A DC COUPLED OSCILLOSCOPE

a) To adjust colour gain controls:-

- (1) Reduce beam current to minimum by turning A1 'Screen' preset fully anti-clockwise.
- (2) Provide a test pattern with peak white and black level information.
- (3) Ensure Customer Contrast Control is fully clockwise to provide maximum drive voltages to video output stages.

b) To adjust Red, Green and Blue gain controls:-

- (1) Adjust VR902 for *Red peak-to-peak drive volts at R926, CRT - red cathode feed resistor.
- (2) Adjust VR910 for *Green peak-to-peak volts at R925, CRT - Green cathode feed resistor.
- (3) Adjust VR916 for *Blue peak-to-peak volts at R924, CRT - Blue cathode feed resistor.
- (4) The above voltages should measure typically as follows:-

a)	* 70V p-p on 14" monitor - TTL mode - Standard Resolution
b)	* 60V p-p on 14" monitor - Medium Resolution

c) To adjust colour background controls (black level settings):-

Adjust Red, Green and Blue presets on the Tube Base panel as follows:-

- (1) Adjust VR906 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 voltages for the above levels should be as follows:-

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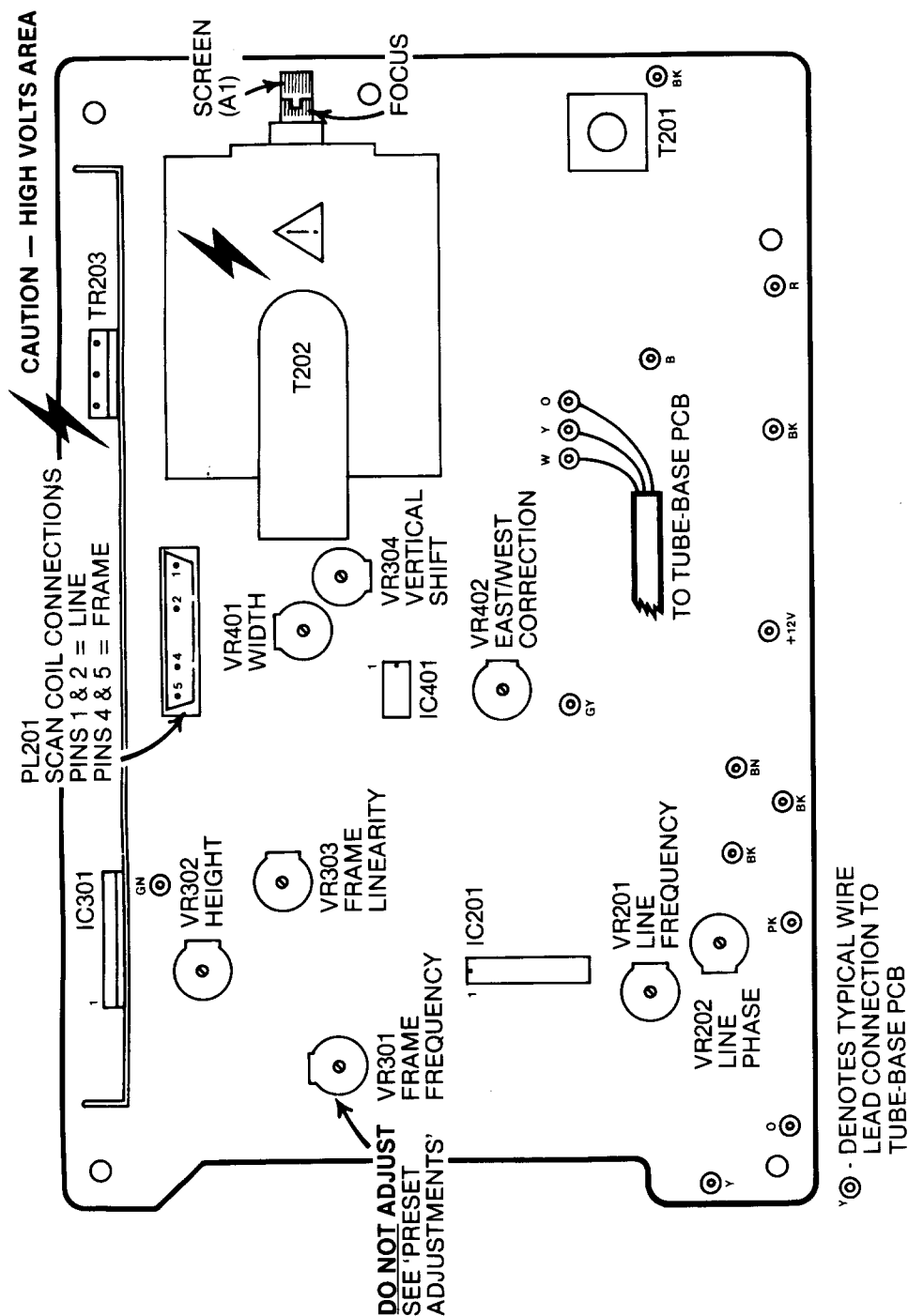
150V black level, for Standard Resolution 14" Monitor (TTL or Linear)
140V black level, for Medium Resolution 14" Monitor (TTL or Linear)

d) Disconnect the Input Signal (RGB sync)

- (1) Adjust A1 'Screen' 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 A1 'Screen' to just extinguish raster.
- (6) Input - R, G, B and sync signals (full white screen) then adjust the Customer Contrast Control throughout its full travel.
- (7) If correct greyscale has not been achieved, repeat operations d) (1) through to (6).



SERIES-5 DRIVE/DEFLECTION BOARD PCB - PRESET CONTROLS

WARNING: If making adjustments to the preset controls located on this board through the metal cabinet base – an insulated trimming tool must be used to prevent shorts.

NOTE: Do not adjust presets VR1 'SET HT' and VR301 'Frame Frequency', BEFORE reading 'Preset Adjustment' instructions.

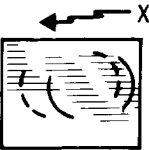
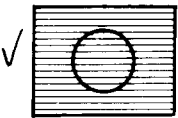


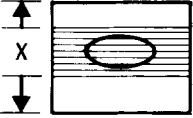

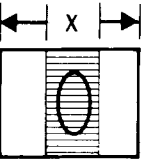
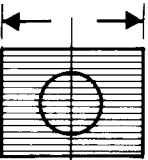
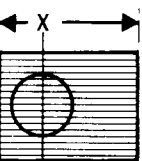
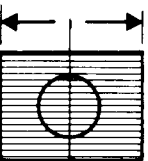
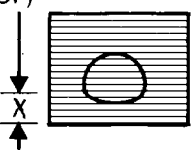
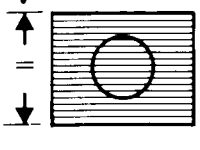
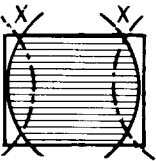
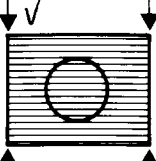
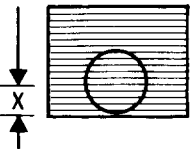
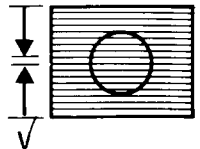
PRESET	WRONG X	RIGHT ✓
LINE FREQUENCY	PICTURE BREAKS UP ADJUST L.FREQ. 	 PICTURE LOCKED
FIELD FREQUENCY	PICTURE ROLLS ADJUST F.FREQ. 	 PICTURE LOCKED
HEIGHT	ADJUST HEIGHT 	 HEIGHT SET
WIDTH	ADJUST WIDTH 	 WIDTH SET
LINE PHASE*	PICTURE NOT CENTRAL ADJUST L. PHASE 	 PICTURE CENTRAL PHASE SET
FIELD LINEARITY* (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