SERVICE MANUAL

TELEVISION MODELS
PX
VA

"HIS MASTER'S VOICE"

MANUFACTURED & DISTRIBUTED BY
E.M.I. (AUSTRALIA) LIMITED
(INCORPORATED IN N.S.W.)

6 PARRAMATTA ROAD
HOMEBUSH, N.S.W.

SPECIFICATIONS

POWER SUPPLY:
230-260 Volts, A.C., 50 Hz

CONSUMPTION:
130 Watts

AERIAL: INTERNAL:
Single Rod Telescopic

AERIAL: EXTERNAL
300 Ohms Balanced

INTERMEDIATE FREQUENCIES:
Vision Carrier: 36.875 MHz.
Sound Carrier: 31.375 MHz.
Sound Intercarrier: 5.5 MHz

FUSES:
H.T.: 1.5 amps.
Heater: 28 SWG. Tinned Copper Wire
(See Circuit Diagram)

VALVES AND SEMI-CONDUCTORS—I.F. BOARD—P.C.B.1

TR101	BF196	First IF Amplifier
TR102	BF196	Second IF Amplifier
TR103	BF194	Third IF Amplifier
TR104	BF173	Fourth IF Amplifier
TR105	BC147	Noise Gate (PX only)
TR106	BC147	Video Driver
TR107	BF336	Video Output
TR108	OC9464/ 2N3568	Voltage Regulator
TR109	BC147	Audio Driver
IC101	TAA570	Quadrature Demodulator Integrated Circuit
MR101	OA90	Signal Overload Diode
MR102	OA90	Sound Take-Off Diode
MR103	OA90	Video Detector Diode
MR104	BY126/ 400	Beam Current Limiter
MR105	BA216	Video Bias Diode
Z101	BZY88/ C11	Voltage Reference Diode
V101	6BQ5	Audio Output

SEMI-CONDUCTORS—A.G.C., SYNC., AND VERTICAL OSCILLATOR—P.C.B.2

TR201	SE1002/ BC147	A.G.C. Gate
TR202	BC208/ BC148	A.G.C. Amplifier
TR203	2N3569/ OC9671	Vertical Oscillator
TR204	2N3568/ OC9736	Vertical Oscillator
TR205	OC9631/ AX1255	Sync. Separator
TR206	OC9731/ AX1128	Vertical Feedback Amplifier
MR201	AB2031/ OA640	Vertical Sync. Clipper (PX only)
MR202	OA91	A.G.C. Stand-Off Diode
MR203	AB2031/ OA640	Vertical Sync. Gate
MR204	AB2040/ OA665	Vertical Drive Catcher
MR205	AB2040/ OA665	Vertical Feedback Catcher

SEMI-CONDUCTORS—FOCUS—P.C.B.3

MR301	OA202	Blanking Clamp
VDR301	E298ZZ/06	EHT Regulator

Part No. 684-1021

VALVES AND SEMI-CONDUCTORS—HORIZONTAL OSCILLATOR—P.C.B.4

V410	6JW8	Horizontal Oscillator and Reactance Valve	MR401	AB2040	Phase Discriminator
			MR402	AB2040	Phase Discriminator

SEMI-CONDUCTORS—TUNER BIAS—P.C.B.6

T601	BC148	Tuner Bias

VALVES AND SEMI-CONDUCTORS—MAIN CHASSIS

V701	6CW5	Vertical Output	MR701	BY126/400	Voltage Doubler Rectifier
V702	6CM5	Horizontal Output			
V703	6AL3	Damper Diode	MR702	BY126/400	Voltage Doubler Rectifier
			MR703	TV20	EHT Rectifier

SEMI-CONDUCTORS—TUNER

TR501	BF200	R.F. Amplifier	TR503	AS304	Oscillator
TR502	AS305	Mixer			

CAUTION

The normal B+ voltages in these receivers are dangerous. Use extreme caution when servicing. The high voltage at the picture tube anode (19,000 volts) will give an unpleasant shock but does not supply enough current to give a fatal shock. However, secondary human reactions to otherwise harmless shocks have been known to cause injury.

Always discharge the picture tube to the chassis, or to its aquadag coating, before handling the tube. The picture tube is highly evacuated and, if broken, it may violently expel glass fragments. When handling the picture tube, always wear goggles.

Damage to transistors can result from incorrect servicing technique. It is strongly recommended that all soldering be done with the set switched off and the soldering iron made electrically common with the chassis.

CIRCUIT DESCRIPTION

R.F. INPUT

The input signal is applied through a balun transformer matched for 300 ohm input impedance to the neutralised R.F. amplifier TR501. The gain of the amplifier is adjusted for a maximum on weak signals using RV601 and is reduced by increasing the collector current by a positive AGC voltage applied to its base. The amplified R.F. signal is coupled to the base of the frequency changer TR502. A direct connection to this base is brought out for I.F. alignment use. The output of the local oscillator TR503 is also coupled in, and mixing takes place in the base circuit. The I.F. component of the mixer collector current is selected by the collector transformer T502 and coupled to the I.F. amplifier TR101.

I.F. AMPLIFIER AND AGC AMPLIFIER

TR101 and TR102, the first two IF amplifiers are connected in parallel across the low voltage supply and their current is controlled by the output of the AGC Amplifier TR202 being applied to their bases. TR101 and TR102 transistors are so-called "forward AGC types." This means that as the current in the transistor increases, the amplification is reduced. This requires a positive potential on the base to reduce the gain.

The output from the last IF amplifier TR104 is detected by a diode MR103 and directly coupled to the phase splitter Video Driver Transistor TR106.

NOISE GATE (PX ONLY) AND VIDEO DRIVER

The noise gated transistor TR105 samples a narrow band of frequencies from the output of the last IF amplifier and conducts only when large noise pulses are present.

The noise gate transistor shares part of its collector load with the load of the video driver TR106 and prevents noise pulses from disturbing the AGC and Sync Separator Circuits.

A video output at low impedance is taken from the emitter of the driver transistor through a 5.5 MHz. null trap to the base of the video output transistor TR107.

VIDEO OUTPUT

The picture control varies the gain of the output transistor TR107 by varying the emitter resistance and therefore the amount of degeneration taking place in the emitter. The collector circuit has a peaking transformer to maintain a level frequency response over the video band. The signal applied to the base is proportioned, so that the black level of the picture is just at TR107 cut-off potential, and only the video information is amplified. As black level is at the cut-off potential, the gain control in the emitter does not affect the black information and gives a consistent black level picture control. The proportioning of the video signal to achieve this is controlled by the contrast range control in the AGC circuit.

GATED A.G.C.

The A.G.C. transistor TR201 has the output of the video driver transistor applied to its base and a potential on its emitter, which is varied with the contrast range control. The collector is supplied with positive gating pulses from the horizontal output transformer, and only passes collector current during the time of this pulse. The pulses of current build up a negative charge on C203 which, through the A.G.C. amplifier, is used to control the gain of both the tuner and I.F. stages. The value of collector current, and therefore A.G.C. voltage, is controlled by the base - emitter potential. The emitter potential is set by the contrast range control, the base potential being the sync. tip voltage at the video driver output. Variations in signal strength increase or reduce the sync. tip height, thus altering the A.G.C. produced, with a consequent change in gain to compensate for the varying signal strength. The action of this feedback loop maintains the base-emitter potential at an almost constant value.

Adjustment of the emitter potential with the contrast range control is matched by variation of receiver gain, so that the output sync. tip varies the same amount to maintain this base-emitter potential. This control therefore acts as an amplitude control of the video output from the video driver. White level approximately represents zero signal in, and therefore remains fixed, and adjustment of the signal amplitude is used as the means of setting the black level at the video output transistor cut-off.

The collector base junction of a transistor is a diode which is back-biased, and collector current is in fact the leakage across this back-biased diode. If the potential across this diode is reversed, it will cause a high current to flow. The A.G.C. potential would appear as just such a forward bias on the collector-base junction of the A.G.C. transistor and would rapidly discharge the A.G.C. voltage developed across C203. The diode MR202 prevents this, being biased off by the derived negative potential.

SYNC. SEPARATOR

The video output from the driver transistor TR106 is coupled through a capacitor C212 and resistor R222 to the base of sync. separator transistor TR205. The base emitter diode D.C. restores the sync. tips to a potential just greater than the emitter potential. The current drawn by the base during sync. tips is the current amplified in the collector to produce a train of sync. pulses. The sync. pulses are then differentiated by C218—R232 for application to the horizontal phase discriminator. The collector of the sync. separator is also connected to an integrator (R230, C213, R223, C210, R218, C208) to remove horizontal sync. pulses for vertical triggering.

VERTICAL OSCILLATOR AND OUTPUT

The vertical sync. pulse is coupled to the vertical oscillator through C202 and MR203.

Two transistors TR203 and TR204 form an oscillator to supply drive to the vertical output valve V701.

During the scan period TR203 is switched on and TR204 is off with the potential of its emitter falling towards earth as C207 charges. The base of TR204 is connected to the collector of TR203 and the potential is determined by the drop across R206 and RV702 the vertical hold control. As TR204 emitter potential falls to a value approximately half a volt less than its base, the transistor starts to conduct, and the potential on the emitter reverses direction and rises. The rise in potential is coupled through C207 to the emitter of TR203 and reduces the current in it. The collector potential therefore rises further, switching on TR204. The action is cumulative and reverses the state of the transistors so that TR204 is on, and TR203 is off. TR203 emitter then starts to run down as C207 reverses its charge until TR203 once more switches on and returns the system to the original condition.

MR203 isolates the oscillator from the sync. feed until the end of scan. When the voltage at the junction of R210 and R221 drops below the base potential on TR203, the sync. pulses are then allowed to turn TR203 off at the end of scan.

MR204 prevents TR204 collector from dropping below the "Knee" of the collector characteristic, thus isolating the timing components in the emitter from the collector circuit.

The collector circuit contains the capacitor C216 which is charged through the high value of collector resistor, and discharged by TR204

when it conducts during the flyback. The waveform across C216, corrected by a feedback waveform derived from the resistor (R709) in series with the yoke and amplified by TR206 is used to drive the vertical output valve V701.

The anode transformer T703 drives the yoke and provides the vertical blanking for the picture tube.

VOLTAGE REGULATOR AND ZENER DIODE

The 17.3V B+ voltage for the transistor circuitry is derived from V701 cathode which is connected to voltage regulator transistor TR108 via R710 current limiting resistor. TR108 acts as a series regulator using the Z101 zener diode as reference. Z101 also provides the 11 volts required by the tuner.

HORIZONTAL PHASE DISCRIMINATOR AND OSCILLATOR

The phase discriminator diodes MR401 and MR402 have anti-phase sine waves applied from a balanced winding on the oscillator coil, with picture phasing set by the integrators R407, C406 and R408, C407. Using the sine waves as the reference voltage, a negative going sync. pulse, differentiated by C218, R232 is applied to the junction of the diodes. When the oscillator and the sync. pulse are at the same frequency and in phase lock, there is zero output from the discriminator.

The triode section of the oscillator valve V401 has its anode connected to the oscillator transformer T401. The waveform at the anode is coupled to its grid through phase shift network C403, R404. The signal current in the anode is therefore leading the anode voltage, and the valve has the effect of a capacitor across the tuned circuit. Variation of bias on the valve varies the magnitude of the current and of the effective capacitor, thus controlling frequency.

When the oscillator tends to run at a different frequency to the incoming sync. pulses, a positive or negative output is obtained from the discriminator which is applied to the reactance valve as bias, and varies the effective tuning capacity, bringing the oscillator back to frequency.

The oscillator is the cathode, grid and screen of the pentode section of V401 operating as a triode, with an electron coupled output taken from the anode to drive the horizontal output stage.

HORIZONTAL DEFLECTION CIRCUITS

The horizontal deflection circuit is a conventional valve regulated E.H.T. circuit. However, the model VA differs from the model PX in that a different EHT transformer T704 is fitted to the VA model and the horizontal linearity coil L702 with its associated components has been deleted.

INTERCARRIER AMP. AND LIMITER

MR102 detects the video frequency band, and the signal is then coupled to IFT5 which is tuned to 5.5 MHz. The secondary of IFT5 is coupled into IC101 integrated circuit where the 5.5 MHz signal undergoes a quadrature demodulation process, giving good AM suppression for input signals greater than 1mV. L116 tuned by C156 is the detector parallel tuned circuit, the Q being chosen to give a good compromise between A.F. output and distortion at 5.5 MHz and a deviation of 50 KHz. C151 (.015) capacitor is chosen to provide a 50uS de-emphasis time constant. The audio output from pin 3 is then passed on to the volume control (RV709) and thence to the audio driver stage (TR109).

AUDIO AMPLIFIER AND OUTPUT

The required amount of audio from volume control RV709 is coupled to audio driver transistor TR109 which amplifies the signal to a level to drive the sound output valve V101. The audio output transformer T702 couples the V101 output to a 15 ohms speaker, a proportion of the signal appearing across T702 secondary is used as a negative feedback to the junction of R141 and R142 in TR109 emitter. The cathode voltage of V101 is also used to supply B+ voltage to the integrated circuit via resistor R147.

ADJUSTMENTS

HORIZONTAL OSCILLATOR

This is set at the factory and normally should not need further adjustment. However, after a change of components it may be necessary to readjust. The procedure is as follows:

PX:

1. Push in shaft of horizontal hold control RV708 and adjust control to mid-position.
2. With horizontal hold control shaft still depressed, adjust core of horizontal oscillator coil T401 until picture "floats" horizontally.
3. Release horizontal hold control shaft.

VA:

1. Set RV708 to mid-position.
2. Short sync. pulses to ground by shorting out R232.

3. Adjust core of horizontal oscillator transformer T401 until picture "floats" horizontally.
4. Remove short-circuit from R232.

CONTRAST RANGE

First adjust the Brightness control so that the picture information which is normally black, is turned up to grey. Using the Vertical Hold control, roll the picture until the vertical blanking bar is visible in the centre of the screen. Adjust RV701 so that the sync. pulse is seen to be a little darker than the surrounding grey blanking bar. Return the Brightness and Vertical Hold controls to the normal settings.

TUNER BIAS

Located on the P.C.B. mounted on tuner. Adjust tuner bias control RV601 for maximum snow on a vacant channel.

A.G.C.

The pre-set A.G.C. control RV703 should be set, when necessary, to the weakest signal, i.e., that displaying the most "snow" or grey to white flecks in the picture. Adjust the control to the position which just reduces the snow to a minimum.

FOCUS

The only time that focus adjustment may be necessary is after replacement of a picture tube.

PX: The focus potentiometer RV301 is located on the left-hand edge of the Focus and Boost P.C.B., and is accessible when the chassis has been swung down. Adjust for optimum overall focus across the picture tube face.

VA: Focus adjustment of flylead and two terminal pins is located on the left-hand edge of the Focus and Boost P.C.B. Solder flylead to pin which gives best overall focus.

BOOST VOLTAGE

The boost voltage may be adjusted, where necessary, by means of the pre-set control RV302 located at the centre of the Focus and Boost P.C.B., accessible when chassis is swung down. Reduce the beam current to zero, by means of the Brightness and Contrast controls RV707, RV706. The Boost voltage measured at Pin 2 on Focus and Boost P.C.B. should be adjusted to 670 volts which assures optimum picture width and EHT voltage. Reset the Brightness and Contrast controls.

NOTE: Do not use a meter protected with silicon diodes, as this gives a rectifying effect and results in an incorrect reading.

LINEARITY

Before adjusting either vertical or horizontal linearity, the picture shift magnets should be neutralised. To do this, the two magnets should be rotated with respect to each other. The neutralised setting is such that, when the complete assembly is rotated, it has little effect on the picture position. After adjustment has been made for best linearity, the picture may need to be recentred. The linearity should be retouched where necessary.

VERTICAL

Set 'S' correction control RV201 to mid-position. Adjust Vertical Linearity, using a pattern on the screen. If picture is cramped at both top and bottom, or expanded at both top and bottom, adjust 'S' correction control and readjust Vertical Linearity and Height controls.

HORIZONTAL

PX: The horizontal linearity coil L702 is situated midway beneath 6CM5 and 6AL3 valves and may be adjusted from rear of chassis.

The slug should be readjusted for best linearity, using a pattern on the screen. Two positions of the slug provide suitable conditions, but the position in which the slug is farthest out of the coil is the correct one.

VA: No horizontal linearity adjustment is provided on VA model.

PICTURE CENTRING

The picture may be centred by rotating the two shift magnets on the tube neck, behind the deflection yoke. Rotate the centring magnet assembly to shift the picture in the required direction, and move one of the magnets with respect to the other, to change the strength of the field, and so the amount of picture shift.

SOUND DETECTOR COIL L115

Should this coil become detuned it should be peaked for maximum volume. IFT5 should only be adjusted with correct alignment equipment.

INTERCARRIER IF ALIGNMENT

The following equipment is necessary:
(1) 5.5 MHz. sweep.
(2) Injection probe. (Fig. 1).
(3 Attenuator.
(4) Display Unit.
(5) Detector. (Fig. 2).

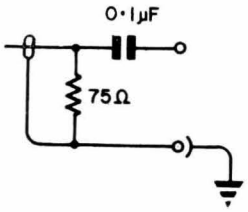


Fig. 1

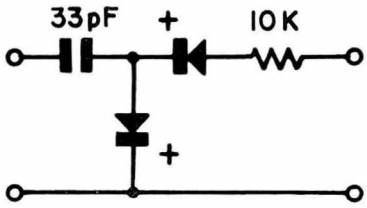


Fig. 2

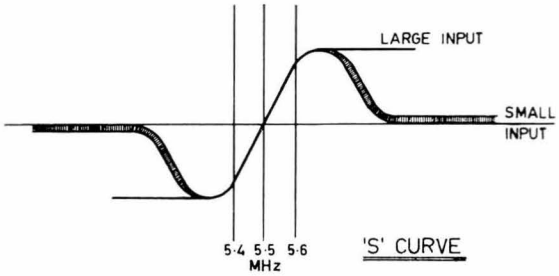


Fig. 3

STAGE 1.

5.5 MHz. Trap

(a) Inject 5.5 MHz. sweep through probe of Fig. 1 to junction of L111 and R124 (base of TR106). Connect detector (Fig. 2) to collector of video output (TR107) and connect display unit to output of detector.

(b) Adjust L113 for a minimum output at 5.5 MHz.

STAGE 2.

Intercarrier I.F.

(a) Connect probe to junction of C126 and R120.

(b) Connect detector to pin 8 (IC101) and adjust cores of IFT5 to produce a symmetrical response about 5.5 MHz., which should be approximately critically coupled, and with a bandwidth of 200 KHz.

Note: Each core is peaked on the response furthest out from the coil.

(c) Transfer display unit to junction of R135 and C154 and adjust L116 for a waveshape symmetrical about 5.5 MHz. (See Fig. 3).

VISION IF ALIGNMENT

The following equipment is required:
(1) IF sweep.
(2) IF injection probe. (Fig. 1).
(3) Attenuator.
(4) Display Unit.
(5) 4.0 Volt bias supply.

Before commencing alignment:

PX: Remove yoke plug (plug 8 on circuit diagram).

VA: Disconnect H.T. feed to line stage. (Red 23/0076 wire connected to C708).

Stage 1

(a) With the display unit adjusted to give full 'Y' deflection with 2 volts input, connect to emitter of TR106.

(b) Open link between C120 and R115, and using probe of Fig 1, connect the output of the sweep through the attenuator to the R115 side of the link. The earth connection should be made to the earth point of C128.

(c) Screw cores L108 and IFT4 halfway out at top of coil formers.

(d) Screw core L109 to centre of winding (PX only).

(e) Using the attenuator to maintain a display of half deflection, adjust L107 for a maximum response at 36 MHz. (Curve A, Stage 1).

(f) Adjust IFT4 for a symmetrical response, and the attenuator to maintain a display with full deflection (Curve B). This core being peaked on the response furthest out from the top of the coil former.

Where necessary, adjust the spacing between the winding of IFT4 to control the bandwidth. (Once set in the initial factory alignment, this adjustment should not require attention).

(g) Adjust L108 for minimum response at 31.375 MHz. (sound carrier), and readjust IFT4 for symmetrical response. (Curve C).

(h) If the spacing between IFT4 windings was adjusted, seal with adhesive, remove the input probe and reconnect the link between C120 and R115.

Stage 2

(a) Connect the 4.0 volts of bias to pin 2, plug 3 (3/2 on circuit diagram).

(b) Disconnect tuner input cable from I.F. Amplifier;

PX: Unplug Socket 2.

VA: Unsolder lead from IF P.C.B., then connect probe to socket 2, pin 2, and earth pin 1 (2/2 and 2/1 on circuit diagram).

(c) Using the attenuator to maintain full deflection on display, adjust L101 for minimum output at 29.875 MHz. when the core is furthest out from the bottom of the coil former (adjacent vision carrier).

(d) Adjust L102 for a minimum response at 38.375 MHz. when the core is furthest out from the top of the coil former (adjacent sound carrier).

(e) Adjust IFT3 for maximum response at 32.4 MHz.

(f) Adjust IFT2 for maximum response at 35.5 MHz.

(g) Adjust IFT1 for maximum response at 35 MHz.

(h) Readjust IFT1 and IFT3 to obtain the curve of Stage 2.

(i) Disconnect probe from plug 2 and reconnect tuner I.F. cable.

Stage 3

(a) Switch tuner to the blank position between channels 0 and 11, and connect probe to Test Point 2 on tuner. Set attenuator to give full deflection on display.

(b) Adjust tuner IF coil T502 for maximum response at 34 MHz.

(c) Readjust IFT3 and IFT2 to obtain the response shown for stage 3 (solid curve).

(d) PX only. Adjust L109 (Noise Gate) for a dip in response of —6db, at approximately 32.3 MHz. (Broken curve).

(e) Screw core of L101 one complete turn into the former (unless the receiver is known to be installed in an area with adjacent vision carrier interference).

Note: The presence of the adjacent vision trap set 1.5 MHz. away from the sound carrier can be objectionable for fringe operation, as peaking the video signal for best signal to noise ratio on picture can result in loss of sound as the sound carrier falls into the trap.

CIRCUIT MODIFICATIONS

VA

Due to decreased horizontal deflection sensitivity encountered with 17" CRT's, VA-E4 17" receivers equipped with 259-2301 deflection yoke and 908-0961 horizontal output transformer have a 33pF 4KV Ceramic disc capacitor 271-2031 connected between pins 4 and 6 of the horizontal output transformer, to allow correct scan width without excessive EHT.

As from Serial No. 5500 the following changes were made.

DELETE

C219	283-7041	2uF 10% 100V Capacitor
C722	271-2031	33pF 4KV Ceramic Disc
R241	742-0731	1.8M Ohm ± 10% 1 Watt Resistor
R242	740-2051	2.7M Ohm ± 10% ½ Watt Resistor
	259-2301	Yoke
	908-0961	Horizontal Output Transformer MSP Type 55462/001

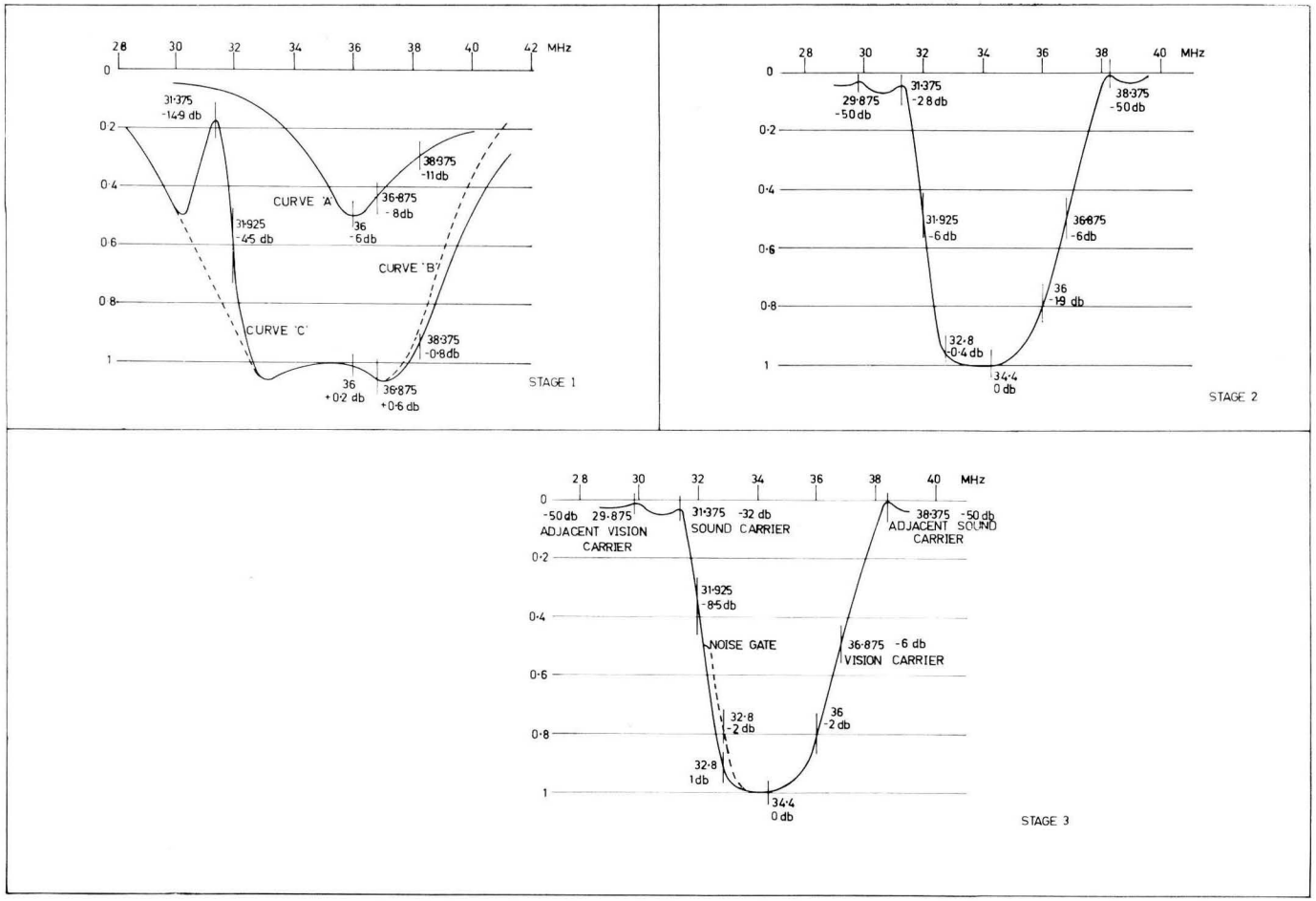
ADD

C219	283-7221	1.8uF ± 10% 100V Capacitor
R241	742-0892	2.2M Ohm ± 10% 1 Watt Resistor
R242	740-0721	1.5M Ohm ± 10% ½ Watt Resistor
	259-2431	Yoke, MSP Type
	908-0991	Horizontal Output Transformer MSP Type 55468
	271-2141	68pF 4KV Ceramic Disc. Capacitor—connected between pins 4 and 6 of horizontal output transformer—all chassis.

C712 56pF Part of 259-2301 Yoke

BECOMES

C712 82pF Part of 259-2431 Yoke, MSP Type 47810



I.F. ALIGNMENT CURVES

PARTS LIST

Ref.	Part No.	Description
P.C.B.1	(PX)132-2651 (VA)132-2661	I.F. P.C.B. complete, tested and aligned as follows:

CAPACITORS

Ref.	Part No.	Description
C101	271-1981	22pF ± 5% NPO Disc
C102	271-2061	8.2pF ± 5% NPO Disc
C103	271-0471	6.8pF ± ¼pF NPO Disc
C104	271-2061	8.2pF ± 5% NPO Disc
C105	271-0471	6.8pF ± ¼pF NPO Disc
C106	271-0731	.047uF +80% —20% 25V Red Cap
C107	271-0731	.047uF +80% —20% 25V Red Cap
C108	271-0731	.047uF +80% —20% 25V Red Cap
C109	271-2041	33pF ± 5% N150 Disc
C110	271-2041	33pF ± 5% N150 Disc
C111	271-1981	22pF ± 5% NPO Disc
C112	271-0731	.047uF +80% —20% 25V Red Cap
C113	271-0731	.047uF +80% —20% 25V Red Cap
C114	271-2011	30pF ± 5% N150 Disc
C115	271-0731	.047uF +80% —20% 25V Red Cap
C116	271-2021	47pF ± 2½% N330 Disc
C117	271-0731	.047uF +80% —20% 25V Red Cap
C118	271-0731	.047uF +80% —20% 25V Red Cap
C119	271-0731	.047uF +80% —20% 25V Red Cap
C120	271-1961	100pF ± 5% N330 Disc
C121	271-0731	.047uF +80% —20% 25V Red Cap
C122	271-1961	100pF ± 5% N330 Disc
C123	269-1741	47uF 25V Electrolytic
	or 269-1541	47uF 35V Electrolytic
C124	271-0731	.047uF +80% —20% 25V Red Cap
C125	271-1951	27pF ± 5% N330 Disc
C126	271-1751	15pF ± 5% NPO Disc
C127	271-1941	56pF ± 5% N330 Disc
C128	271-0731	.047uF +80% —20% 25V Red Cap
C129●	271-0701	1pF ± ¼pF. Not fitted to later PX models—Capacitance formed by copper pattern on PCB
C130●	271-1721	39pF ± 5% N330 Disc
C131●	269-1041	10uF 6V Electrolytic
C132●	271-0731	.047uF +80% —20% 25V Red Cap
C133	271-0731	.047uF +80% —20% 25V Red Cap

CAPACITORS (continued)

Ref.	Part No.	Description
C134	271-0681	12pF ± 5% NPO Disc
C135	271-0471	6.8pF ± ¼pF NPO Disc
C136	271-0731	.047uF +80% —20% 25V Red Cap
C137●	271-1891	68pF ± 5% N330 Disc
C138	271-0731	.047uF +80% —20% 25V Red Cap
C139	271-0731	.047uF +80% —20% 25V Red Cap
C140	271-0471	6.8 pF ± ¼pF NPO Disc
C141●	271-1891	68pF ± 5% N330 Disc
C142	271-0471	6.8pF ± ¼pF NPO Disc
C143	271-1601	220pF ± 20% AY 500V Disc
C144	280-3121	270pF ± 10% 100V Styroseal
C145	283-7021	.047uF ± 10% 250V Type PHE240/H647
C146	269-0871	125uF 16V Electrolytic
	or 269-1031	100uF 16V Electrolytic
C147	280-3641	390pF ± 10% 100V Styroseal
C148	271-0761	.1uF +80% —20% 25V Red Cap
C149	280-3641	390pF ± 10% 100V Styroseal
C150	271-0761	.1uF +80% —20% 25V Red Cap
C151	283-6641	.015uF ± 10% 100V Green Cap
C152	271-1201	.01uF +100% —0% 50V Disc
C153	271-0761	.1uF +80% —20% 25V Red Cap
C154	271-1201	.01uF +100% —0% 50V Disc
C155	271-1271	.001uF ±20% Disc
C155A	271-1481	.003uF ± 20% 500V Y Disc
C156	280-3391	100pF ± 10% 100V Styroseal
C157	269-0871	125uF 16V Electrolytic
	or 269-1031	100uF 16V Electrolytic
C158	271-0761	.1uF +80% —20% 25V Red Cap
C159	283-5741	1uF ± 10% 50V Polyester
C160	282-5081	.047uF ± 10% 160V Polyester
C161	271-2071	18pF ± 10% 500V N330 Disc
C162	269-1761	1000uF 25V Electrolytic
C163	269-1701	10uF 315V Electrolytic

● NOT USED ON VA

PARTS LIST

RESISTORS

10% ½w unless otherwise shown

Ref.	Part No.	Description
R101	740-0651	100 Ohm
R102	740-1081	18 Ohm ± 5% ½ Watt
R103	740-0041	2.7K Ohm
R104	740-0021	1K Ohm
R105	740-0291	270 Ohm
R106	740-0021	1K Ohm
R106A	740-0111	27K Ohm
R107	740-1141	5.6K Ohm
R108	740-0291	270 Ohm
R109	740-0921	330 Ohm
R110	740-0861	18K Ohm
R111	740-0041	2.7K Ohm
R112	740-0921	330 Ohm
R113	740-0681	680 Ohm
R113A	740-1141	5.6K Ohm
R114	740-0081	10K Ohm
R115	740-1811	2K Ohm ± 5% ½ Watt
R116	740-0281	220 Ohm
R117●	740-0111	27K Ohm
R118●	740-0681	680 Ohm
R119	740-0051	3.3K Ohm
R120	740-0041	2.7K Ohm
R121	740-0041	2.7K Ohm
R122●	740-0031	2.2K Ohm
R123	740-0641	1.5K Ohm ± 5% ½ Watt
R124	740-0221	180K Ohm
R125	740-0021	1K Ohm
R126	740-0681	680 Ohm
R127	740-0321	1.2K Ohm
R128	740-0321	1.2K Ohm
R129	740-0651	100 Ohm
R130	750-0782	6.8K Ohm ± 10% 4 Watt
R131	750-0632	8.2K Ohm ± 10% 4 Watt
R132	742-0092	47K Ohm ± 10% 1 Watt
R133	740-1811	2K Ohm ± 5% ½ Watt
R134	740-1311	2.2K Ohm ± 5% ½ Watt
R135	740-0071	4.7K Ohm
R136	740-0081	10K Ohm
R137	740-1141	5.6K Ohm
R138	740-0711	47 Ohm
R139	740-1491	6.8M Ohm
R140	740-0361	390K Ohm
R141	740-0021	1K Ohm
R142	740-0291	270 Ohm
R143	742-0722	560K Ohm ± 10% 1 Watt
R144	740-0221	180K Ohm
R145	740-0391	330K Ohm
R146	740-0791	8.2K Ohm
R147	740-0651	100 Ohm
R148	740-0311	1.2M Ohm
R149	740-0141	100K Ohm
R150	742-0022	4.7K Ohm ± 10% 1 Watt

TRANSISTORS, DIODES, I.C., VALVES

Ref.	Part No.	Description
TR101	932-3381	BF196—1st I.F. Amplifier
TR102	932-3381	BF196—2nd I.F. Amplifier
TR103	932-3221	BF194—3rd I.F. Amplifier
TR104	932-3761	BF173—4th I.F. Amplifier
TR105●	932-3401	BC147—Noise Gate (PX only)
TR106	932-3401	BC147—Video Driver
TR107	932-4091	BF336—Video Output
TR108	932-4021	OC9464—Voltage Regulator
	or 932-2971	2N3568
TR109	932-3401	BC147—Audio Driver
MR101	932-2031	OA91—Signal Overload Diode
	or 932-4461	BA217
MR102	932-0971	OA90—Sound Take-Off Diode
	or 932-4461	BA217
MR103	932-0971	OA90—Video Detector Diode
	or 932-4461	BA217
MR104	932-3631	BY126/400—Beam Current Limiter Diode
MR105	932-4371	BA126—Video Bias Diode
Z101	932-3541	BZY88/C11—Voltage Reference Diode
I.C.101	932-3741	TAA570—Quadrature Demodulator
V101	932-1051	6BQ5—Audio Output

COILS

Ref.	Part No.	Description
L101	259-2262	Coil—Adjacent Vision Trap
L102	259-2262	Coil—Adjacent Sound Trap
L103	259-1432	Coil—Filter
L104	259-1432	Coil—Filter
L105	259-1432	Coil—Filter
L106	259-2281	Coil—Filter
L107	259-2102	Coil—4th I.F. Collector
L108	259-2102	Coil—Sound Take-Off
L109●	259-2292	Coil—Noise Take-Off
L110	259-2151	Coil—Peaking
L111	259-1432	Coil—Filter
L111A	259-1432	Coil—Filter
L112●	259-1432	Coil—Filter
L113	259-1802	Coil—5.5 MHz Trap
L113A	259-1432	Coil—Filter
L114	259-2272	Coil—Shunt Video Peaking
L115	259-2272	Coil—Series Video Peaking
L116	259-2072	Coil—5.5 MHz Detection

TRANSFORMERS

Ref.	Part No.	Description
IFT1	906-1012	IF Transformer—Vision
IFT2	906-1012	IF Transformer—Vision

● NOT USED ON VA

PARTS LIST

TRANSFORMERS (continued)

Ref.	Part No	Description
IFT3	906-1111	IF Transformer—Vision
IFT4	906-1032	IF Transformer—Video Detector
IFT5	906-1042	IF Transformer—Intercarrier
P.C.B.2	(PX)132-2191 (VA)132-2421	Sync. Board complete as follows:

CAPACITORS

Ref.	Part No	Description
C201	269-0871	125uF 16V Electrolytic
C202	283-6581	.0047uF ± 10% 100V Polyester
C203	269-1671	47uF ± 20% 6.3V Tantalum
C204	269-0821	1uF 10V Electrolytic
C205	271-1481	.003uF ± 20% 500V Ceramic
C206	271-1201	.01uF +100% —0% 50V Disc
C207	283-7031 or 280-3591	1uF ± 10% 250V PHE280 1uF ± 10% 250V Metal Film
C208	271-1791	.001uF ± 10% Disc
C209	269-0871	125uF 16V Electrolytic
C210	271-1791	.001uF ± 10% Disc
C211	271-1261	.01uF ± 20% Disc
C212	283-5741	.1uF ± 10% 50V Polyester
C213	271-1781	470pF ± 10% Disc
C214	269-1131	10uF 16V Electrolytic
C215	269-1641	2.2uF ± 20% 35V Tantalum
C216	282-5261	.039uF ± 5% 160V Polyester
C217	283-5741	.1uF ± 10% 50V Polyester
C218	280-2041	220pF ± 20% 630V Styroseal
C219 (PX)	283-7041 or 280-3651	2uF ± 10% 100V PHE280 2uF ± 10% 200V Polyester
C219 (VA)	283-7221	1.8uF ± 10% 100V PHE280
C220	280-5201	.5uF ± 20% 50V Lacquer Film
C221	271-0911	.003uF 500V GMV Ceramic
C222	282-5081	.047uF ± 10% 160V Polyester
C223	269-1131	10uF 16V Electrolytic
C224	283-1241	.1uF ± 10% 160V Polyester
C225	271-0281	.022uF ± 20% 630V Styroseal

RESISTORS

All Resistors are ± 10% ½ watt unless otherwise specified

Ref.	Part No.	Description
R201	740-0001	390 Ohm
R202	740-0001	390 Ohm
R203	740-0221	180K Ohm
R204	740-0121	47K Ohm
R205●	740-0201	2.2M Ohm
R206	740-1291	680 Ohm ± 5% ½ Watt
R207	740-0111	27K Ohm
R208	740-0071	4.7K Ohm
R209	740-1351	33K Ohm ± 5% ½ Watt
R210	740-0071	4.7K Ohm
R211	740-0131	82K Ohm
R212	740-0681	680 Ohm
R213	740-0731	12K Ohm
R214	740-0661	82 Ohm
R215	740-0301	1.8K Ohm
R216	740-0711	47 Ohm
R217	740-1301	820 Ohm ± 5% ½ Watt
R218	740-0231	39K Ohm
R219	740-0221	180K Ohm
R220	740-0961	10K Ohm ± 5% ½ Watt
R221	740-0111	27K Ohm
R222	740-0301	1.8K Ohm
R223	740-0231	39K Ohm
R224	740-2111	2.4M Ohm ± 5% ½ Watt
R225	740-0141	100K Ohm
R226	740-1211	12K Ohm ± 5% ½ Watt
R227	740-1211	12K Ohm ± 5% ½ Watt
R228	750-0942	39K Ohm 4 Watt
R229	740-0731	12K Ohm
R230	740-0751	68K Ohm
R231	740-0051	3.3K Ohm
R232	740-0071	4.7K Ohm
R233	740-1331	150 Ohm ± 5% ½ Watt
R234	740-0651	100 Ohm
R235	750-1072	18K Ohm 4 Watt
R236	740-0941	6.8K Ohm
R237	740-0711	47 Ohm
R238	740-0961	10K Ohm ± 5% ½ Watt
R239	740-1281	3.3K Ohm ± 5% ½ Watt
R240	742-0102	82K Ohm ± 10% 1 Watt
R241 (PX)	742-0732	1.8M Ohm ± 10% 1 Watt
R241 (VA)	742-0892	2.2M Ohm ± 10% 1 Watt
R242 (PX)	740-2051	2.7M Ohm
R242 (VA)	740-0721	1.5M Ohm
R243	740-0651	100 Ohm
RV201	677-1851 or 677-2152	25K Ohm ± 30% Potentiometer
VDR201	750-0691	VDR E298 ED/A262 Violet Spot

● NOT USED ON VA

PARTS LIST

Ref.	Part No.	Description
		TRANSISTORS
TR201	932-3401	BC147—A.G.C. Gate
	or 932-2711	SE1002
TR202	932-3421	BC148—A.G.C. Amplifier
	or 932-3841	BC208
TR203	932-3961	OC9671—Vert. Oscillator
	or 932-3851	2N3569
TR204	932-4011	OC9736—Vert. Oscillator
	or 932-2971	2N3568
TR205	932-4121	OC9631—Sync. Separator
	or 932-3901	AX1255
TR206	932-4051	OC9731—Vert. Feedback Amplifier
	or 932-4131	AX1128
		DIODES
MR201●	932-2601	AB2031—Vertical Sync. Clipper
	or 932-4251	
MR202	932-2031	OA91—A.G.C. Stand-Off Diode
MR203	932-4251	OA665—Vert. Sync. Gate
	or 932-2961	AB2040
MR204	932-4251	OA665—Vert. Drive Catcher
	or 932-2961	AB2040
MR205	932-4251	OA665—Vertical Feedback Catcher
	or 932-2961	AB2040
P.C.B.3	(PX)132-2211	Focus and Boost complete
	(VA)132-2441	as follows:
		CAPACITORS
C301	283-1701	.047uF ± 10% 400V Polyester
C302	283-1661	.022uF ± 10% 400V Polyester
C303 (PX)	284-1281	.22uF ± 20% 1KV Dipol
C303 (VA)	283-7111	.1uF ± 20% 630V AEE Dipol
C304	271-2081	220pF ± 10% 2KV N750 Disc
C305	284-2711	.056uF ± 10% 1KV Dipol
		RESISTORS
		All Resistors are ± 10% ½ watt unless otherwise specified
R301	740-1082	470K Ohm
R302	750-1152	2K Ohm ± 5% 5 Watt
R303	742-0352	1M Ohm ± 20% 1 Watt
R304	742-0492	68K Ohm ± 10% 1 Watt

Ref.	Part No.	Description
		RESISTORS (continued)
		All Resistors are ± 10% ½ watt unless otherwise specified
R305	740-0101	22K Ohm
R306	742-0402	150K Ohm ± 20% 1Watt
R307 (PX)	742-1092	3.3M Ohm ± 20% 1 Watt
R307 (VA)	742-1131	6.8M Ohm ± 20% 1 Watt
R308	742-0562	470K Ohm ± 20% 1 Watt
R309	742-0562	470K Ohm ± 20% 1 Watt
R310	742-0352	1M Ohm ± 20% 1 Watt
R311	742-0352	1M Ohm ± 20% 1 Watt
R312	742-0102	82K Ohm ± 10% 1 Watt
R313	742-0142	270K Ohm ± 10% 1 Watt
RV301●	677-2121	2.2M Ohm—PCB Mount Potentiometer—Focus
RV302	677-2131	1M Ohm—PCB Mount Potentiometer—Boost
VDR301	750-0572	VDR E298—ZZ/06—Black Spot, Blue End
P.C.B.4	(PX)132-2201	Horizontal Oscillator Board
	(VA)132-2431	Assembly complete as follows:
		CAPACITORS
C401	271-1791	.001uF ± 10% AY Disc
C402	283-7031	1uF ± 10% 250V Polyester
C403	271-1971	82pF ± 5% NPO Disc
C404	271-1571	.0022uF ± 10% CY Disc
C405	271-1571	.0022uF ± 10% CY Disc
C406	280-1091	.0056uF ± 10% 400V Styroseal
C407	280-1091	.0056uF ± 10% 400V Styroseal
C408	283-7031	1uF ± 10% 250V Polyester
C409	280-1101	.0068uF ± 10% 400V Styroseal
C410	280-1091	.0056uF ± 10% 400V Styroseal
C411	271-1241	820pF ± 20% Tube or Disc
C412●	269-1571	16uF 350V Electrolytic
C413	269-1571	16uF 350V Electrolytic
C414	282-6001	.001uF ± 10% 400V Polyester
C415	282-0581	.0047uF ± 10% 400V Polyester
		RESISTORS
		All Resistors are ± 10% ½ watt unless otherwise specified
R401	740-0851	560K Ohm
R402	740-0851	560K Ohm

● NOT USED ON VA

PARTS LIST

RESISTORS (continued)

Ref.	Part No.	Description
R403	740-0141	100K Ohm
R404	740-0061	3.9K Ohm
R405	740-0241	33K Ohm
R406		
R407	742-1252	3.3K Ohm ± 5% 1 Watt
R408	742-1252	3.3K Ohm ± 5% 1 Watt
R409	740-0411	820 Ohm
R410	740-0321	1.2K Ohm
R411	742-0492	68K Ohm ± 10 %1 Watt
R412	742-0522	820K Ohm ± 10% 1 Watt
R413	742-0172	470K Ohm ± 10% 1 Watt
R414	740-0061	3.9K Ohm
R415	742-0742	3.9K Ohm ± 10% 1 Watt
R416	740-0101	22K Ohm
R417	742-0062	27K Ohm ± 10% 1 Watt

DIODES AND VALVES

Ref.	Part No.	Description
MR401	932-2961	AB2040 } Phase Discriminator
	or 932-4491	BA219 } Phase Discriminator
MR402	932-2961	AB2040 } Phase Discriminator
	or 932-4491	BA219 } Phase Discriminator
V401	932-2371	6JW8—Horiz. Oscillator and Reactance

COILS

Ref.	Part No.	Description
L401	259-2252	Coil—Horizontal Oscillator

PX
CHASSIS MOUNTED COMPONENTS

CAPACITORS

Ref.	Part No.	Description
C701	269-1131	10uF 16V Electrolytic
C702	269-1451	10uF 25V Electrolytic
C702A	271-0761	.1uF +80% —20% 25V Redcap
C703	269-0111	24uF 350V Electrolytic
C704	269-0471	47uF 350V Electrolytic
C705	269-0971	2000uF 25V Electrolytic
C706●	283-5221	.068uF ± 20% 50V Polyester
C707 } C708 }	269-1711	60uF 275V } 200uF 275V } DUCON
C707 } C708 }	or 269-1721	60uF 275V } 200uF 275V } ELNA
C709	269-0521	100uF 200V Electrolytic
C710	269-0521	100uF 200V Electrolytic
C711	271-0391	.0047uF 250V RMS Ceramic Disc
C712		56pF—Part of 259-2232—Yoke
C713	271-0911	.003uF 500V GMV Ceramic Disc
C714		
C715	271-2031	33pF ± 10% 4KV Ceramic Disc
C716●	284-2701	.047pF ± 10% 100V Dipol
C717	283-1691	.039uF ± 10% 400V Polyester
C718	271-0911	.003uF 500V GMV Ceramic Disc

CAPACITORS (continued)

Ref.	Part No.	Description
C719	271-0911	.003uF 500V GMV Ceramic Disc
C720	283-1701	.047uF ± 10% 400V Polyester
C721	271-0911	.003uF 500V GMV Ceramic Disc
C722	271-2031	33pF ± 10% 4KV Ceramic Disc

RESISTORS

All Resistors are ± 10% ½ watt unless otherwise specified

Ref.	Part No.	Description
R701	740-0012	470 Ohm
R702	740-0012	470 Ohm
R703	740-0302	1.8K Ohm
R704	740-0852	560K Ohm
R705	740-0722	1.5M Ohm
R706	740-0122	47K Ohm
R707	742-0022	4.7K Ohm ± 10% 1 Watt
R708	750-0442	270 Ohm ± 10% 5 Watt PW5
R709	746-0392	2.2 Ohm ± 5% BW ½
R710	740-1042	27 Ohm
R711●	740-0732	12K Ohm
R712	740-0022	1K Ohm
R713	750-1042	680 Ohm ± 10% 7 Watt
R714	742-0272	8.2K Ohm ± 10% 1 Watt

● NOT USED ON VA

PARTS LIST

Ref.	Part No.	Description
RESISTORS (continued)		
R715●	750-0602	22 Ohm ± 10% 4 Watt
R716	740-1042	27 Ohm
R717		150 Ohm } Part of Yoke
R718		150 Ohm } Part of Yoke
VDR701	750-0611	VDR E99 DE/P350
POTENTIOMETERS		
RV701	677-2561	1K Ohm—Contrast Range
RV702 (PX)	677-1492	500 Ohm—Vertical Hold
RV702 (VA)	677-2641	500 Ohm—Vertical Hold
RV703	677-2581	1.5K Ohm—A.G.C. Control
RV704	677-2511	2M Ohm—Height
RV705	677-2501	250 Ohm—Vert. Linearity
RV706	677-2551	1K Ohm—Contrast
RV707 (PX)	677-2531	500K Ohm—Brightness On-Off
RV707 (VA)	677-2631	500K Ohm—Brightness
RV708 (PX)	677-2521	100K Ohm—Horiz. Hold
RV708 (VA)	677-2621	100K Ohm—Horiz. Hold
RV709 (PX)	677-2571	250K Ohm—Tap 125K Ohm—Volume
RV709 (VA)	677-2651	250K Ohm—Volume
VALVES AND DIODES		
V701	932-1111	6CW5
V702	932-0531	6CM5
V703	932-1151	6AL3
MR701	932-3331	EM404—Diode
	or 932-3631	BY126/400—Diode
MR702	932-2261	EM404—Diode
	or 932-3631	BY126/400—Diode
MR703	932-4001	Rectifier Stick TV20

Ref.	Part No.	Description
MISCELLANEOUS		
	224-2821	Tuner
CH701	232-0352	Choke
L701	259-0045	Coil—Anti-Parasitic
L702●	259-1252	Coil—Linearity
L703	259-0045	Coil—Anti-Parasitic
F701	431-0081	Fuse—1.5 Amp.
T701	904-0781	Transformer—Mains
T702	905-0732	Transformer—Audio Output
T703	905-0761	Transformer—Frame Output
T704 (PX)	908-0941	Transformer—E.H.T.
T704 (VA)	908-0991	Transformer—E.H.T.

● NOT USED ON VA

S701 (PX)	Part of 677-2521	Horiz. Sync. Shorting Switch
S701a(VA) } S701b }	855-0961	Mains On-Off Switch Spot Suppression
S702a(PX) } S702b }	Part of 677-2531	Mains On-Off Switch
(PX)	259-2232	Yoke
(VA)	259-2431	Yoke

Early Model VA Chassis used 259-2301 Yoke and 908-096 EHT Transformers, in which case C219, R241 and R242 values on the Sync. P.C.B. were as indicated for PX.

NOTE: On some 17" Models using 259-2301 Yoke, a 33pF 4KV Capacitor was fitted to tage 4 and 6 of EHT. Transformer.

CABINET FITTINGS

PX-E4 NIPPER 17 17" PORTABLE

Dimensions		Weight	
Height ..	490mm (15¾")	Packed	21.75kg (48lb.)
Width ..	502mm (19¾")	Unpacked	19kg (42lb.)
Depth ..	318mm (12½")		

Part No.	Description
106-0111	Aerial—Telescopic
122-0101	Baseplate Assembly
191-0562	Cabinet—Wrap
244-0941	Clip—Knob, Channel Selector
259-2232	Yoke—Coil Deflection
294-1881	Cover—Cabinet Back
403-4991	Escutcheon—Mask
416-0131	Foot Rubber—Small
416-0141	Foot Rubber—Large
453-1702	Grille—Speaker
470-0371	Handle
517-3201	Knob—Channel Selector
517-3271	Knob—Minor Controls
517-3581	Knob—Skirt
561-2092	Medallion—Trade Mark
561-2731	Medallion—Handle
617-2071	Nut—Handle
661-0572	Plastic—Daylight Screen
661-0591	Plastic Strip
754-0411	Retainer—Aerial
754-0571	Retainer—Top Daylight Screen

● NOT USED ON VA

CABINET FITTINGS

Part No.	Description
754-0581	Retainer—Bottom Daylight Screen
754-0591	Retainer—Lead Wrapping
794-2642	Scale—Channel Indicator
794-2681	Scale—Control Indication
831-2601	Speaker—Earpiece
831-2511	Speaker—5" x 3" x 15 ohms
932-2791	C.R.T.—17"

PX-E5 NIPPER 20 20" PORTABLE

Dimensions		Weight	
Height ..	406mm (16")	Packed	25.1kg (56lb.)
Width ..	572mm (22½")	Unpacked	21.75kg (48lb.)
Depth ..	356mm (14")		

106-0111	Aerial—Telescopic
122-0081	Base Plate Assembly
191-0552	Cabinet—Wrap
238-1151	Clamp—Handle
244-0941	Clip—Knob Channel Selector
259-2232	Yoke—Coil Deflection
294-1852	Cover—Cabinet Back
403-4941	Escutcheon—Mask
416-0131	Foot Rubber—Small
416-0141	Foot Rubber—Large
453-1692	Grille—Speaker
470-0471	Handle
517-3201	Knob—Channel Selector
517-3271	Knob—Minor Control
517-3581	Knob—Skirt
561-2092	Medallion—Trade Mark
661-0581	Plastic—Strip
661-0542	Plastic Screen—Daylight
754-0411	Retainer—Aerial
754-0551	Retainer—Top Daylight Screen
754-0651	Retainer—Bottom Daylight Screen
754-0591	Retainer—Lead Wrapping
794-2642	Scale—Channel Indicator
794-2671	Scale—Control Indication
831-2601	Speaker—Earpiece
831-3001	Speaker—5" x 3" x 15 ohms
932-4211	CRT—20"

VA-E4 NIPPER 17 17" PORTABLE

Dimensions		Weight	
Height ..	490mm (15¾")	Packed	21.75kg (48lb.)
Width ..	502mm (19¾")	Unpacked	19kg (42lb.)
Depth ..	318mm (12½")		

106-0111	Aerial—Telescopic
122-0101	Baseplate Assembly
191-0562	Cabinet—Wrap
244-0941	Clip—Knob Channel Selector
244-1311	Clip—Fine Tuning Knob
294-1882	Cover—Cabinet Back
403-5131	Escutcheon—Mask
453-1702	Grille—Speaker
470-0371	Handle
517-3721	Knob—Channel Selector
517-3271	Knob—Minor Controls
517-3711	Knob—Fine Tune
517-3751	Knob—Fine Tune Drive
561-2092	Medallion—Trade Mark
561-2731	Medallion—Handle
617-2071	Nut—Handle
661-0591	Plastic—Strip
661-0572	Plastic—Daylight Screen
754-0411	Retainer—Aerial
754-0651	Retainer—Top Daylight Screen
754-0601	Retainer—Bottom Daylight Screen
794-2642	Scale—Channel Indicator
794-2761	Scale—Control Indication
831-2511	Speaker—5" x 3,, x 15 ohms
932-2791	C.R.T.—17"

VA-E5 NIPPER 20 20" PORTABLE

Dimensions		Weight	
Height ..	406mm (16")	Packed	25.1kg (56lb.)
Width ..	572mm (22½")	Unpacked	21.75kg (48lb.)
Depth ..	356mm (14")		

106-0111	Aerial—Telescopic
122-0082	Base Plate Assembly
191-0552	Cabinet—Wrap
238-1151	Clamp—Handle
244-0941	Clip—Knob Channel Selector
244-1311	Clip—Fine Tune Knob
294-1852	Cover—Cabinet Back
403-5121	Escutcheon—Mask
453-1692	Grille—Speaker
470-0471	Handle
517-3721	Knob—Channel Selector
517-3271	Knob—Minor Control
517-3711	Knob—Fine Tune
517-3751	Knob—Fine Tune Drive
561-2092	Medallion—Trade Mark
661-0581	Plastic—Strip
661-0542	Plastic—Daylight Screen
754-0411	Retainer—Aerial
754-0631	Retainer—Top Daylight Screen
754-0641	Retainer—Bottom Daylight Screen
794-2642	Scale—Channel Indicator
794-2751	Scale—Control Indication
831-3001	Speaker—5" x 3", 15 ohms.
932-4211	C.R.T. 20"

VA-EB BELLEVUE 20" CONSOLETTE

Dimensions		Weight	
Ht.	415mm (16 5/16")	Packed	28kg (61¾lb.)
Width ..	603mm (23¾")	Unpacked	25kg (55lb.)
Depth ..	356mm (14")		

CABINET FITTINGS

Part No.	Description
106-0111	Aerial—Telescopic
122-0082	Baseplate Assembly
191-0581	Cabinet—Wrap
192-5221	Cabinet—R.H. End Panel
192-5231	Cabinet—L.H. End Panel
244-0941	Clip—Knob Channel Selector
244-1311	Clip—Knob Fine Tune
294-1852	Cover—Cabinet Back
403-5121	Escutcheon—Mask
403-5171	Escutcheon—Perspex
517-3721	Knob—Channel Selector
517-3271	Knob—Minor Controls
517-3711	Knob—Fine Tune
517-3751	Knob—Fine Tune Drive
561-1961	Medallion—Trade Mark
831-3001	Speaker, 5" x 3" x 15 ohms
794-2642	Scale—Channel Selector
932-4211	C.R.T.—20"

VA-BR LINCOLN 24" LOWBOY

Dimensions		Weight	
Height with legs	696mm (27⅜")		
Width	910mm (35⅝")	Packed	38.1kg (84lb.)
Depth	420mm (16½")	Unpacked	33.1kg (73lb.)

Part No.	Description
192-5281	Cabinet—Teak
192-5291	Cabinet—Walnut
244-0941	Clip—Channel Selector Knob
244-1311	Clip—Fine Tuning Knob
294-1971	Cover—Cabinet Back
403-5211	Escutcheon—Mask
517-3271	Knob—Minor Controls
517-3711	Knob—Fine Tuning
517-3721	Knob—Channel Selector
517-3751	Knob—Fine Tune Drive
539-0211	Leg—Teak
539-0521	Leg—Walnut
561-2092	Medallion—Trade Mark
561-2761	Medallion—Inlay
794-2642	Scale—Channel Indicator
794-2781	Scale—Control Indication
831-1823	Speaker—7" x 4" x 15 ohms
932-3751	C.R.T.—24"

VA-BS GALAXY 25" LOWBOY

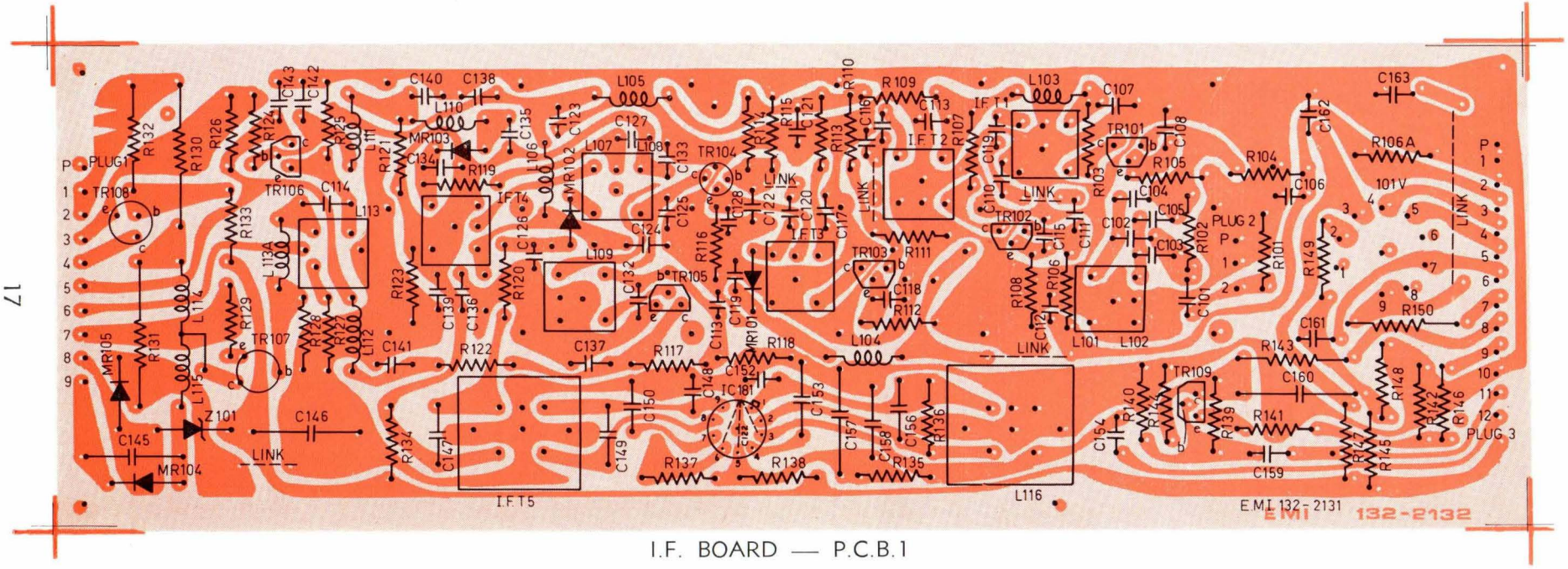
Dimensions		Weight	
Height with legs	683mm (27")		
Width	909mm (35¾")	Packed	42.5kg (94lb.)
Depth	432mm (17")	Unpacked	37.5kg (83lb.)

Part No.	Description
192-4911	Cabinet—Maple
192-4921	Cabinet—Walnut
192-4941	Cabinet—Teak
244-0941	Clip—Channel Selector Knob
244-1311	Clip—Fine Tuning Knob
294-1972	Cover—Cabinet Back
403-5221	Escutcheon—Mask
517-3271	Knob—Minor Controls
517-3711	Knob—Fine Tuning
517-3721	Knob—Channel Selector
517-3751	Knob—Fine Tune Drive
539-0531	Leg—Maple
539-0541	Leg—Walnut
539-0551	Leg—Teak
561-2092	Medallion—Trade Mark
794-2642	Scale—Channel Indicator
794-2711	Scale—Control Indication
831-1823	Speaker—7" x 4" x 15 ohms
932-2642	C.R.T.—25" Kimcode

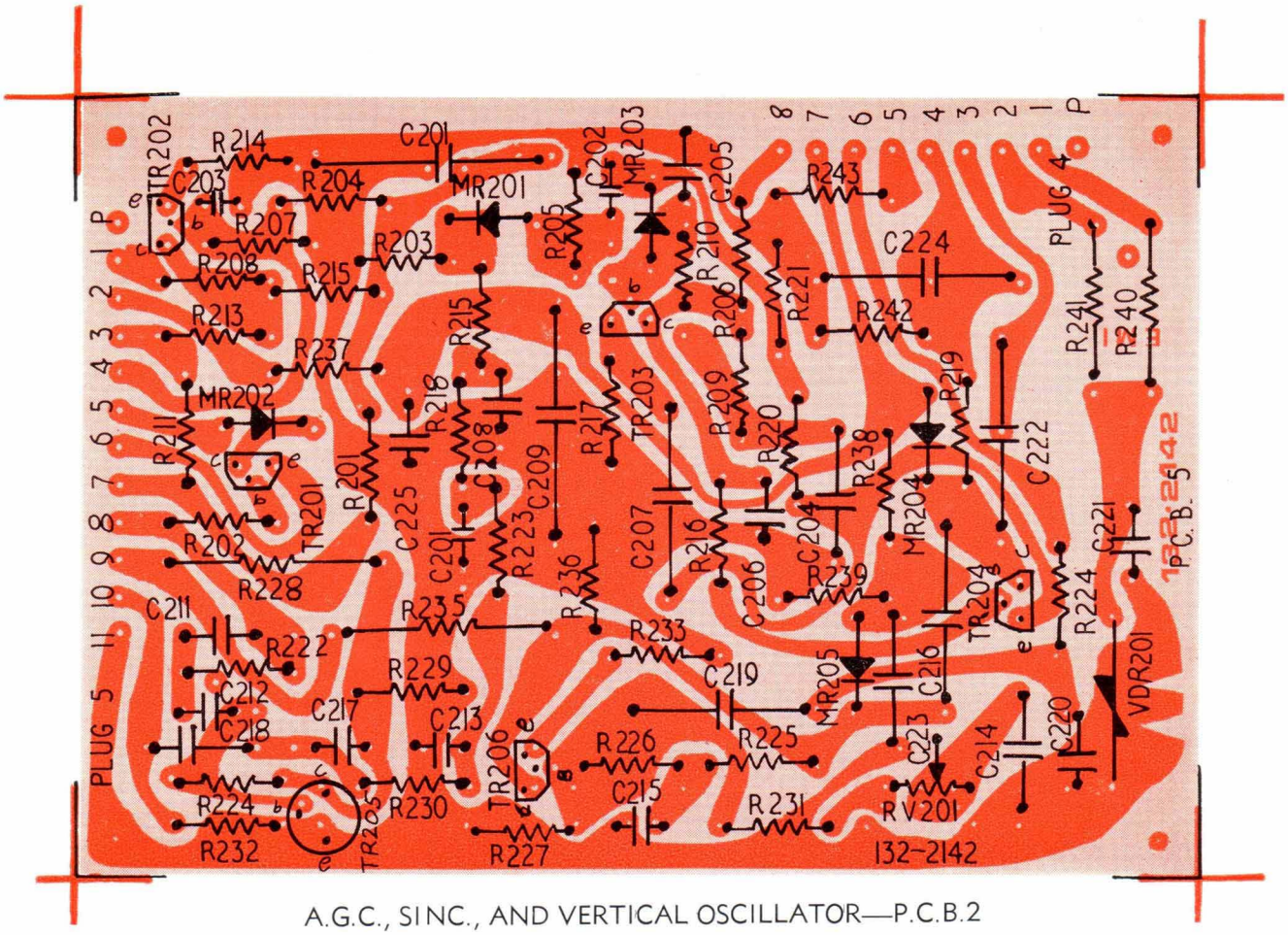
VA-9J CASINO 23" CONSOLETTE

Dimensions		Weight	
Height with legs	737mm (29")		
Height without legs	483mm (19")	Packed	37.5kg (83lb.)
Width	686mm (27")	Unpacked	28.5kg (63lb.)
Depth	419mm (16½")		

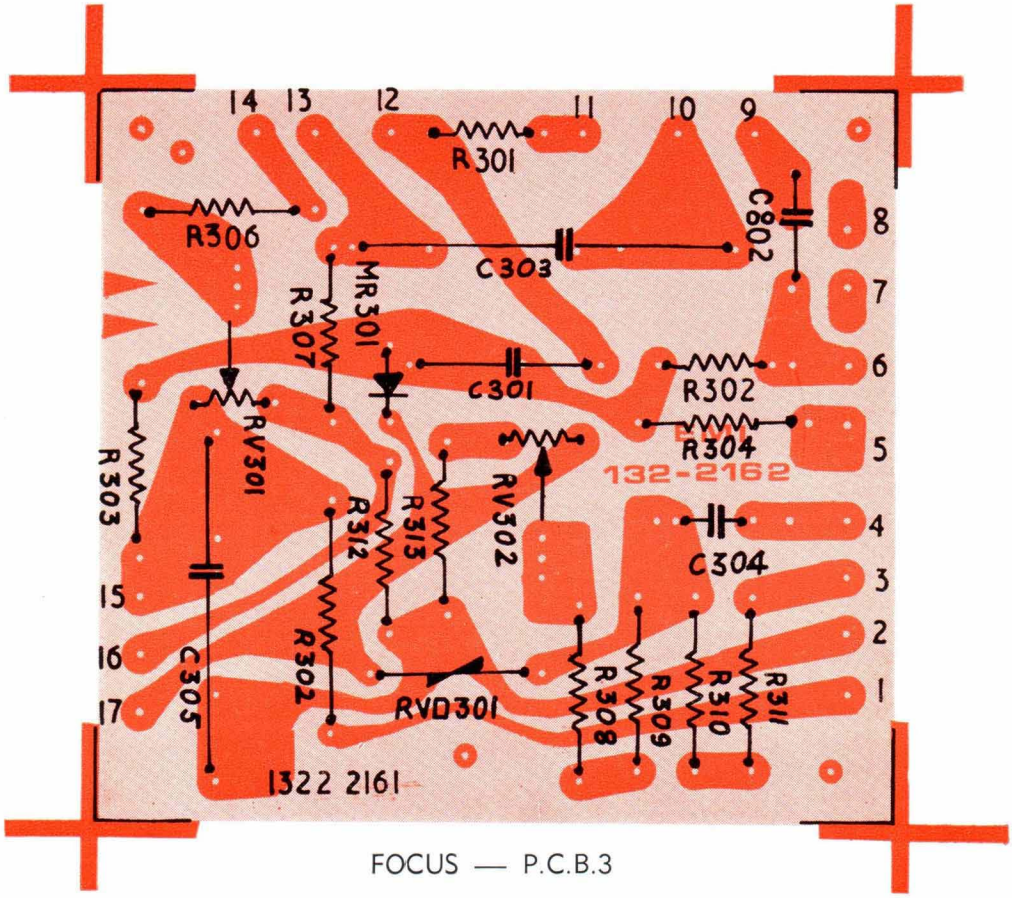
Part No.	Description
191-0494	Cabinet Wrap—Maple
191-0504	Cabinet Wrap—Walnut
244-0941	Clip—Channel Selector Knob
244-1311	Clip—Fine Tuning Knob
294-1972	Cover—Cabinet Back
403-5251	Escutcheon—Mask
416-0041	Foot—White Rubber
470-0491	Handle
517-3271	Knob—Front Controls
517-3711	Knob—Fine Tune
517-3721	Knob—Channel Selector
517-3751	Knob—Fine Tune Drive
539-0561	Leg
561-1961	Medallion—Trade Mark
661-0631	Plastic Trim—Top
661-0641	Plastic Trim—Sides
661-0651	Plastic Trim—Bottom
664-3762	Plate—Walnut
664-3772	Plate—Maple
794-2642	Scale—Channel Indicator
794-2791	Scale—Control Indication
831-1823	Speaker—7" x 4" x 15 ohms
932-2292	C.R.T.—23"



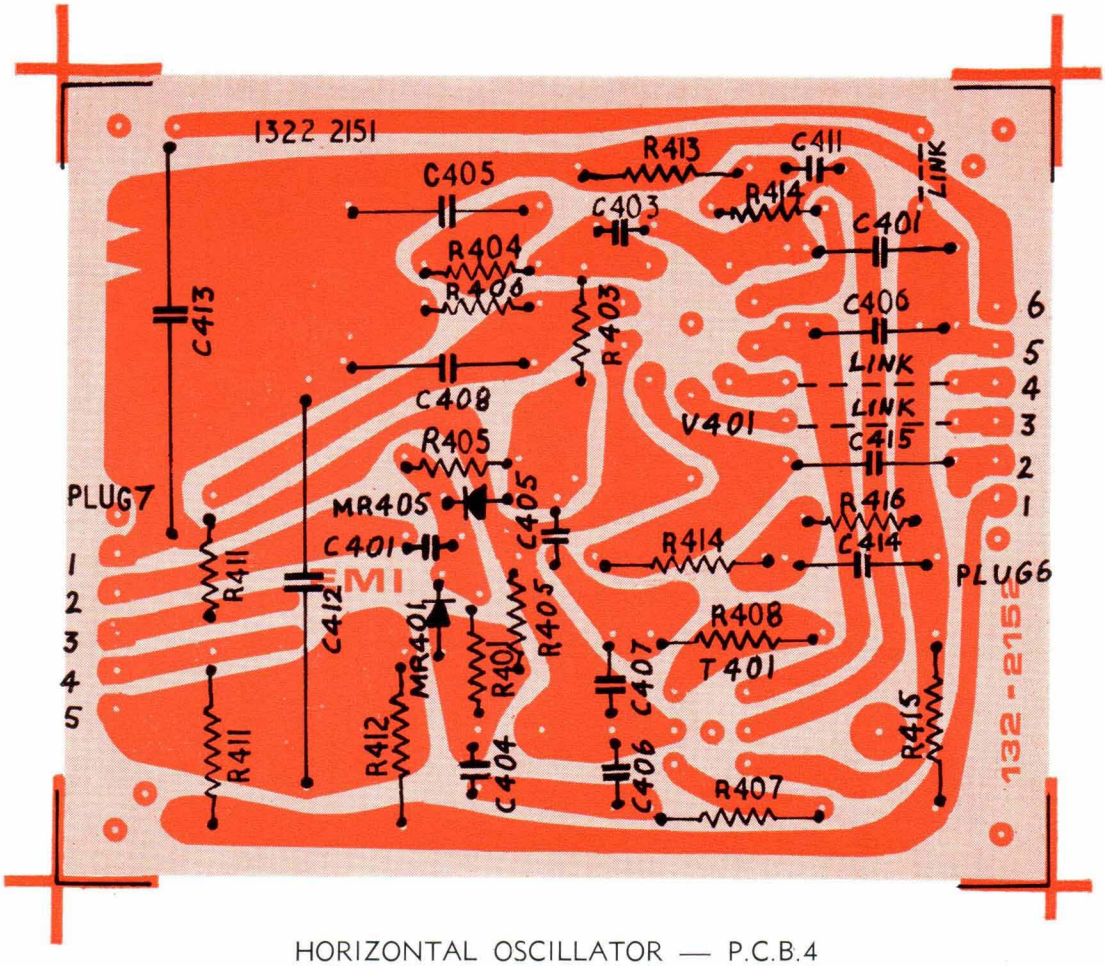
I.F. BOARD — P.C.B.1



A.G.C., SINC., AND VERTICAL OSCILLATOR—P.C.B.2



FOCUS — P.C.B.3



HORIZONTAL OSCILLATOR — P.C.B.4

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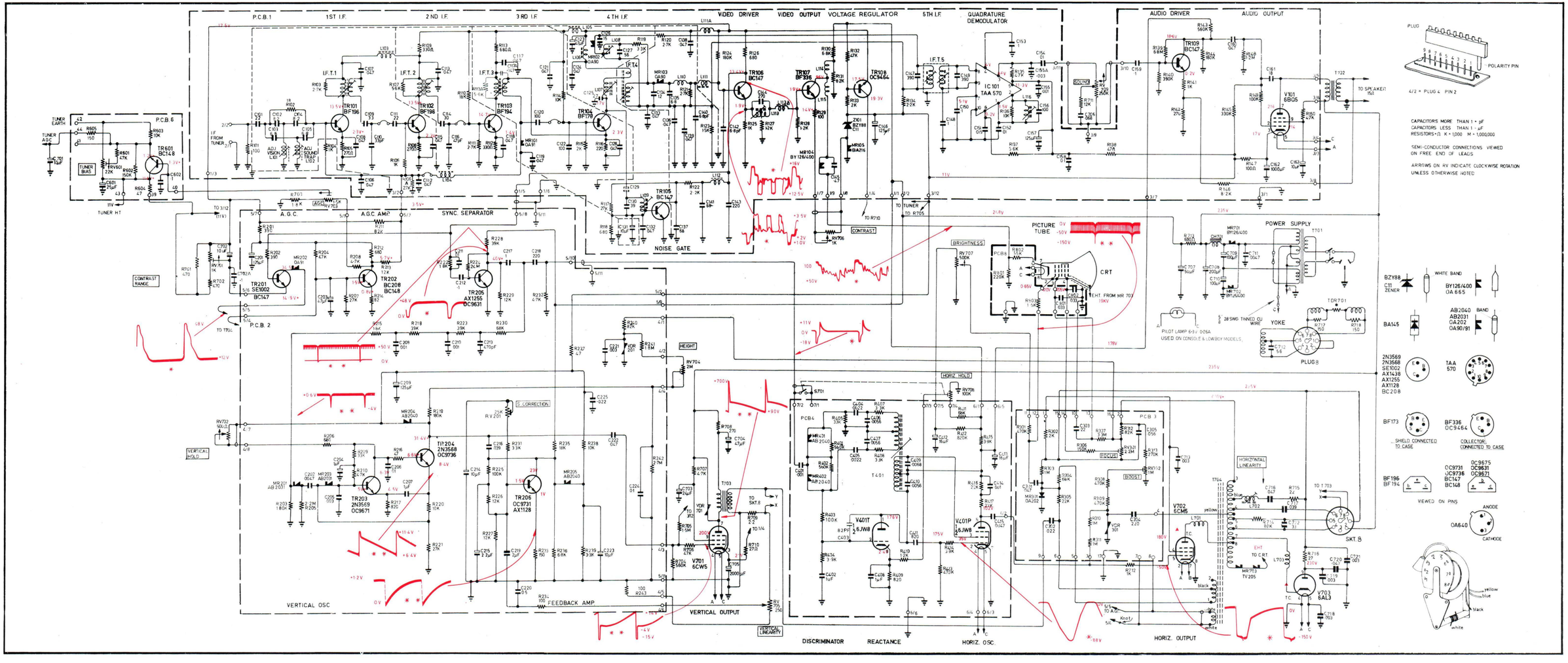
CIRCUIT DIAGRAM FOR PX



CIRCUIT DIAGRAM FOR VA