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"HIS MASTER'S VOICE"

SERVICE MANUAL

for

CHASSIS TYPES PL - PN

(SERIES 2)

■

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■

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INTRODUCTION

This service manual is intended to provide all relevant information for servicing the present series of "H.M.V" 110° television receivers, type PL and PN (Series 2).

Series 2 chassis (PL and PN) differ in the following respects from Series 1. The differences are noted in greater detail in the appropriate sections:

(1) A standing bias has been supplied to the RF valves to provide better operating conditions in fringe areas where cross modulation problems may arise.

(2) Dual detection is employed for video and intercarrier sound after the video IF channel to provide better signal to noise characteristics in the sound section under fringe conditions.

(3) HT supplied to line oscillator, driver and other valves has been re-routed from HT1 line, preventing loss of line output drive on failure of 250 mA fuse.

(4) Filtering capacitors in the main power supply have been rearranged to provide better filtering.

(5) The relays in the remote control section have been modified and certain wiring changes made to provide better DC filtering to eliminate the buzz in the hearing-aid output when the mute button was operated.

(6) Filter capacitors in the vertical output stage have been increased to reduce hum in the sound system.

(7) Wiring changes in the audio output result in better filtering in the screen circuit of the sound output valve.

(8) Modified brightness control circuitry to provide better spot elimination when the receiver is switched off.

The one basic chassis, employing either automatic or manual operation, is used in console and lowboy type cabinet.

The two chassis comprise a 17-valve high performance chassis and a 17-valve high performance chassis with transistorized remote control.

Aerial selection switching is standard on remote control models, and is available as an optional addition to manually-operated models.

The models covered in this manual are:

Chassis Type	*No. of Valves*	*Picture Tube*	*Styling*	*Remote Control*
PL	17	23" bonded face	Console (AC)	No.
PL	17	23" bonded face	Lowboy (BC)	No.
PN	17	23" bonded face	Console (AC)	Yes.
PN	17	23" bonded face	Console with doors (AD)	Yes.

CAUTION

The normal B+ voltages in these receivers are dangerous. Use extreme caution when servicing. The high voltage at the picture tube anode (17,000 volts) will give an unpleasant shock but does not supply enough current to give a fatal burn or shock. However, secondary human reactions to otherwise harmless shocks have been known to cause injury.

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

SPECIFICATIONS

POWER SUPPLY
230, 240, 250 volts A.C., 50 c.p.s.

CONSUMPTION:
200 watts.

AERIAL INPUT:
300 ohms balanced.

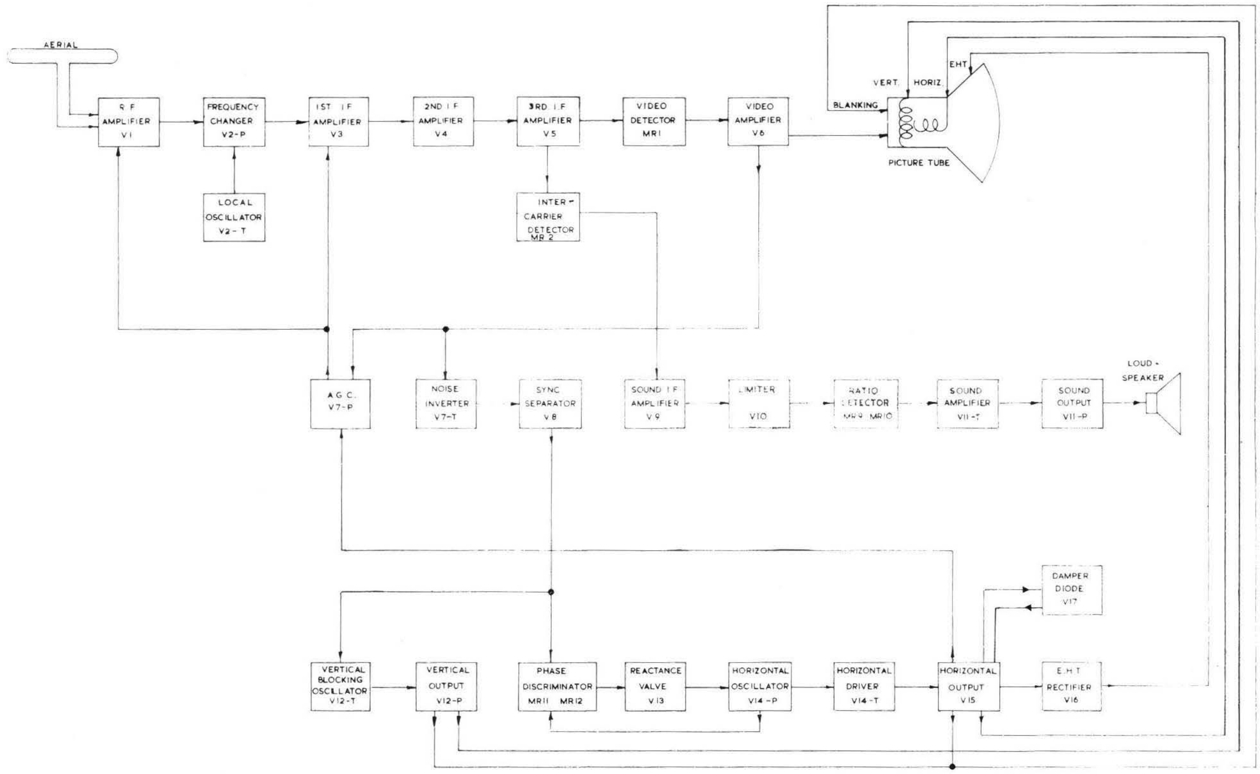
INTERMEDIATE FREQUENCIES:
Vision carrier — 36.875 Mc/s.
Sound carrier — 31.375 Mc/s.

FUSES:
Mains (2) — 2.0A. (Black and White).
H.T.1 — 2.0A. (Yellow).
H.T.2 — 250 mA.

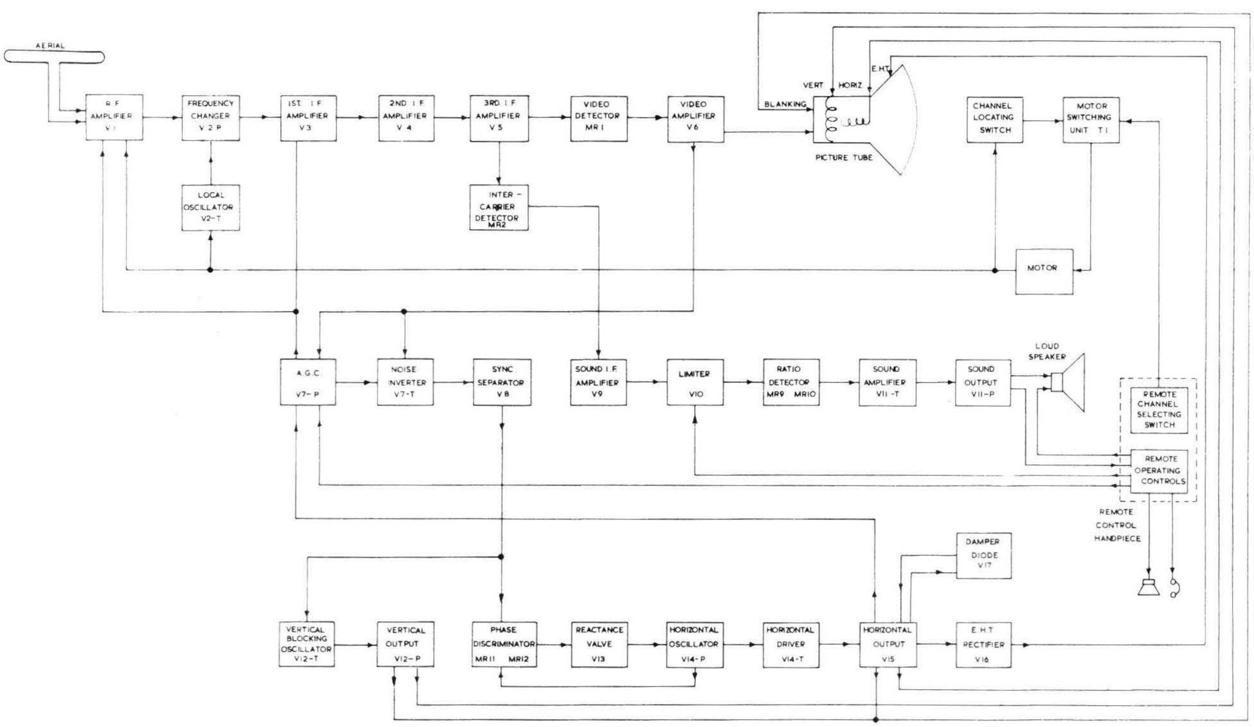
VALVE COMPLEMENTS

17 VALVE RECEIVERS — PL - PN

V1	6ES8	R.F. Amplifier.
V2	6HG8	Frequency Changer.
V3	6BY7	1st I.F. Amplifier.
V4	6EJ7	2nd I.F. Amplifier.
V5	6EJ7	3rd I.F. Amplifier.
V6	6CK6	Video Amplifier.
V7	6DX8	Noise Inverter and AGC.
V8	6BA8	Sync. Separator.
V9	6BX6	Sound I.F. Amplifier.
V10	6BX6	Sound Limiter.
V11	6GW8	Audio driver and output.
V12	6GV8	Vertical output and blocking oscillator.
V13	12AT7	Reactance valve.
V14	6DX8	Horizontal oscillator and driver
V15	6CM5	Horizontal output.
V16	1S2	E.H.T. Rectifier.
V17	6AL3	Damper diode.
MR1	0A90	Vision Detector
MR2	0A90	Intercarrier Detector.
MR3	0A91	Beam Current Limiter
MR4) MR5)	0A210) 0A210)	Mains Rectifier
MR6	M3	A.G.C. Clamping Diode
MR6A	M3	Clamping Diode
MR7	0A605	Sync. Level Detector
MR8	0A91	Noise Clipper
MR9) MR10)	2/AA119	Ratio Detector (Matched Pair)
MR11) MR12)	M3) M3)	Phase Discriminator
MR13	0A91	Pulse Clipper
MR14	BS1/1 or OA610 or IN2859	Horizontal Blanking Clamp
MR15		Remote Control HT Supply Rectifier
MR16		Remote Control HT Supply Rectifier
MR17	OA91	Clipper
TRANSISTOR	AC128	Remote Control Motor Relay Operating Switch.



BLOCK DIAGRAM — 17-VALVE CIRCUIT — PL (Series II)



BLOCK DIAGRAM — 17-VALVE CIRCUITS — PN (Series II)
with Remote Control.

SUMMARY OF FEATURES

These features are common to both types of receivers, unless otherwise stated.

1. The turret tuner has a preset fine tuning facility, which individually adjusts the oscillator tuning on each channel.

2. Linear phase treatment of the IF response ensures the best possible definition with freedom from overshoot or smearing, allowing non-critical fine tuning control.

3. The overall frequency response of the system is within 6 db from D.C. up to 4.7 Mc/s.

4. A separate high performance video amplifier valve having high output voltage capability with good amplitude linearity ensures accurate reproduction of all shades in the picture. Full D.C. coupling under normal operating conditions ensures that true scene black is retained and all shades retain their true relationship to black irrespective of scene content. This prevents fading to grey and gives accurate portrayal of night-time scenes.

Current limiting in the cathode of the picture tube prevents excessive beam current being drawn outside the normal range of the E.H.T. regulation system.

5. CRT beam spot elimination under all control settings when the receiver is switched off, preventing electron burn on the CRT face.

6. Separate diode detectors for video and intercarrier are employed after IFT3. The use of a separate detector for the sound section enables better signal to noise characteristics to be obtained, ensuring good quality sound under fringe conditions.

6. Time-gated AGC is employed, giving immunity from the effects of impulse noise and has a fast action to cope with rapid fading from "aircraft flutter." A variable delay on the tuner is provided to maintain full RF gain on weak to moderate signals, thus minimising frequency converter noise. This delay can be adjusted for best results when the receiver is first installed. A delay voltage of approximately 0.5 volts is fed to the earth end of MR6 rectifier to provide a standing negative bias to the tuner RF valves under no signal or very weak signal conditions, thus improving cross modulation characteristics.

8. A noise inverter is used, before the sync. separator, giving protection to the input circuit and preventing paralysis of the sync. separator action following large bursts of impulse noise.

9. The audio amplifier with feedback gives excellent quality sound with ample power. A compensated volume control maintains tonal balance at all volume settings.

A variable tone control is fitted and frequency response can be adjusted from full and normal to attenuated high and low frequencies simultaneously. This system is used rather than accentuated or attenuated bass or treble, so that the intelligibility of the signal in "fringe" conditions will be retained.

10. The horizontal oscillator circuit uses a sine wave oscillator employing a balanced discriminator and reactance valve control of the oscillator providing very high stability. This stability, together with an adequate pull in range, renders a front horizontal hold control unnecessary. A pre-set control is provided at the rear of the receiver.

11. A linearity control is fitted to ensure correct horizontal linearity and can be readily adjusted using a pattern on the picture tube.

12. Vertical and horizontal blanking is incorporated.

13. The picture tube is of the bonded face type, and does not readily attract dust. Furthermore, it may be very easily cleaned when finger marked. The reduction in the number of reflecting surfaces improves the rendition of picture black, i.e., scattered light, which otherwise illuminates black areas of the picture and reduces contrast.

14. E.H.T. voltage regulation is achieved by feedback and automatic drive adjustment in the line output stage, preventing varying width of the picture under varying picture content and mains voltage variations.

15. The user controls are reduced to a minimum necessary to ensure correct operation, which is made as simple as possible. There are no interacting controls and, since the receiver is completely DC coupled, then the Brightness control will vary the light output of the picture tube and the Contrast control will vary the depth of shades without any interaction between them.

16. Silicon Junction Diodes are used in a voltage doubler full-wave power supply. These diodes are noted for their robustness, economy of power and high surge rating. Since they have no heated cathode they cannot be damaged by operation on low mains voltage as is the case with valve rectifiers.

17. Accessibility for service is excellent. The chassis is hinged and can be swung down to give ready access for servicing in the home. If it is necessary to remove the chassis for workshop servicing, the chassis may be lifted straight out of its hinged supports.

If desired, the complete chassis and picture tube assembly may be removed as a complete working unit.

18. Two separate sync. separators are used to give the best synchronisation obtainable, necessary for receivers operating under "Fringe" conditions.

19. To keep impulse interference to a minimum in the audio output and when operating under adverse conditions, a sound I.F. amplifier is included before the sound limiter. This gives a substantial increase in gain and gives virtually noise-free sound, even under extreme "fringe" conditions.

20. Current feedback is used to keep a constant amplitude of deflection current in the vertical coils. This feature maintains constant height of picture as the deflection coils warm up. A volt-

age dependent resistor across the vertical output transformer primary suppresses the frame flyback pulse.

21. Transformer - coupled dynamic focusing is employed to ensure good overall edge-to-edge focus. Degradation of definition due to change in spot shape across the tube is thus obviated.

22. Full remote control facility using a transistor circuit is provided in the remote control version.

The receiver may be switched "on" or "off" from a remote location; channel selection and adjustment of picture and sound can also be made. The sound output may be transferred from the receiver cabinet to the remote control unit and volume adjusted at either location.

Facilities are also provided in the remote control unit for connection of hearing aids with and without local or remote speaker operating. Volume in the hearing-aid may be controlled separately.

Muting of the sound and picture is carried out whenever channels are changed.

No warm-up time is required before channel changing may be effected because of the use of a transistor.

With the remote control unit connected to the receiver, normal functioning of the manual controls on the receiver still exist.

23. In the remote control receivers, facilities have been provided for the automatic switching of up to 3 different aerials, depending on frequency and transmission polarisation to the aerial terminals on the tuner, by means of the multi-aerial connecter block and the wafer switches on the channel changing mechanism.

24. A trap circuit is provided for adjustment on installation to eliminate severe adjacent channel interference.

CIRCUIT DESCRIPTION

R.F. INPUT

The input to the turret tuner is to a centre tapped transformer which presents an impedance of 300 ohms (Balanced).

R.F. amplification is achieved with a type 6ES8, double triode (V1), in a cascode circuit. The two sections of this stage are connected in series for DC. The grounded cathode input section is neutralised and is also controllable by A.G.C. from the main chassis. Because of the series DC connection of the two portions, A.G.C. voltage to one section also effects control on the other section.

Coupling between the two sections of the cascode is direct and the coil between the two maintains amplification on the high frequency channels.

Inductive coupling is used between the cascode and mixer. V2, a type 6HG8, combined triode-pentode, is used as oscillator and mixer. The oscillator is a Colpitts circuit operating above signal frequency. Injection to the mixer input is by capacitive coupling. The fine tuning variable capacitor is connected directly across the oscillator inductance. The capacitor is spring loaded at one end and adjustment of range is determined by a range-determining screw located on the front end of the tuner.

Adjustment on each channel is provided by means of an adjustable screw operating a cam to vary the fine tuning capacitor. The adjustable screw is varied by depressing the fine tuning knob, located within the channel selector knob, and rotating it in either direction. The extent of rotation is approx. 3 to 4 complete turns.

The intermediate frequency output of the tuner (vision 36.875 Mc/s., sound 31.375 Mc/s.) is coupled to the IF channel of the main chassis through a capacitor C10, .001 uF.

The heater circuit is filtered by a Ferrite bead through which a heater wire is passed. The bead concentrates the field around the wire, increasing its self-inductance so that it acts as a choke.

I.F. AMPLIFIER

The tuner IF output is coupled to the grid of the first IF Amplifier V3 via the bottom end of the coil L21. There are three IF amplifying stages and AGC voltage is applied to V3.

V5 is coupled to the video detector MR1 and the intercarrier detector MR2 by inductive coupling via IFT3.

Trap circuits L22, with L24 (coupled to L23), L26 (coupled to L25) and L31 (coupled to L27) attenuate the carriers of adjacent vision (L31), the adjacent sound (L24) and sound carrier (L26).

The adjacent vision trap (L22) is set in the factory to approximately 28.375 Mc/s which is further removed from the main response than the nominal adjacent vision carrier frequency 29.875). This allows for the fact that, in fringe areas, receivers are seldom tuned to the correct nominal frequencies and are usually tuned for maximum contrast by shifting intermediate frequencies lower than nominal. The slug of this trap is accessible at the rear of the chassis and may be adjusted on site to minimise an interfering carrier on the low frequency side of I.F. (High frequency side at R.F.).

V3 has a small unbypassed cathode resistor R23, to minimise detuning of the grid circuit with varying input levels.

VIDEO AMPLIFIER

The detected video output of the germanium diode MR1 is amplified by the pentode V6.

R39, R40, L29, L34, L35 and L36 compensate for the stray capacities and sync. seperator loading to maintain a constant gain in the video stage for all signals from DC up to 5.5 Mc/s. The 5.5 Mc/s. component is removed by the combined transformer and trap, IFT4.

INTERCARRIER SOUND

L31 is coupled to the IF coil L27 inductively and also directly to the output of IFT3 via R35.

Sound and Vision IF carriers are mixed in the rectifier MR2, the resulting 5.5 Mc/s. frequency being fed via L32 to the grid of V9 intercarrier amplifier.

L33, C41 combination is tuned to 5.5 Mc/s. across which is derived an intercarrier signal for V9, intercarrier amplifier.

The intercarrier amplifier output is fed to the sound I.F. Limiter valve V10 which, in turn, feeds its output to the ratio detector, IFT6 and diodes, where it is demodulated to provide the audio signal which passes through the volume control to be amplified by the driver triode and output pentode sections of the audio output valve. Feedback is applied in both audio circuits.

A full margin of sound gain is provided so that 1.9 watts undistorted output is obtained from sound signals which do not fully modulate the carrier. Moreover, the sound output stage has a controlled overload characteristic which does not "paralyse" but merely clips the peaks and so remains comparatively free from audible distortion.

NOISE INVERTER

Video signal is fed from the output of the video amplifier to the grid and anode of the triode section of the 6DX8 noise inverter valve (V7).

This valve is biased to a condition where it will not conduct on positive sync. tips. Noise pulses appearing more positive at the grid will drive the tube into conduction causing a negative pulse of voltage at the anode. This will cancel the corresponding positive pulse and no signal will be fed to the sync. separator.

Video signals, with positive going sync. pulses are applied to the two sync. separators (V8 pentode and triode sections) through time constants adjusted for the particular requirements of each separator.

Adjustment for the noise inverter bias or control is made by means of the pre-set variable control RV13. The correct position of adjustment is just prior to the position which allows the picture to pull on a fairly strong signal.

SYNC. SEPARATOR

The video signals from the noise inverter are both DC-restored by grid current in the sync. separators flowing during sync. tips so that the picture information is beyond the cut-off potentials of both sections, and anode current occurs only during sync. pulses. The output from the pentode section is differentiated in the sync. transformer, T2, and applied to the horizontal phase discriminator.

The output from the triode section is fed to the vertical blocking oscillator through a three-stage integrator (R80, R113, R114, C100, C102 and C103).

GATED A.G.C.

Video signals, with positive going sync pulses, are applied to the detector circuit MR7, R65, C65. The load time constant charges up during sync. tips, and discharges during the scan period to a level only just beyond the cut-off of V7 pentode. Positive going pulses generated during flyback are applied to the anode through C132 and R153 from T9. As this is the only time that the anode is positive, and it normally occurs coincident with the sync. pulse, the current flowing in V7 pentode anode is proportional to the height of the sync. pulses. The flow of current charges C132 to a negative potential which is used to control the receiver gain and maintains a constant sync.-pulse height. The height required is set by adjustment of the picture control RV4, which adds a positive potential to the signal supplied to the grid, raising the negative AGC voltage produced, thus reducing receiver gain, and, therefore, contrast.

MR8 is a clipper to prevent large noise pulses from producing an AGC voltage which would reduce contrast, causing a lightening of the picture.

The ratio of I.F. A.G.C. voltage to Tuner A.G.C. voltage is important and the ratio can be adjusted by means of RV2. If the ratio is too small then, on medium strength signals, the tuner will be biased back and the I.F. amplifier will be operating at an unnecessarily large gain and converter noise will be evident in the picture. If the ratio is too large, then no controlling bias will be applied to the tuner, and it will be held at the clamping voltage and all control will be made in the I.F. amplifiers. This can cause severe overloading of the I.F. amplifier.

A standing bias of approximately —0.5 volt is applied to the earth end of MR6, AGC clamping diode to provide a minimum negative bias for for the RF valves.

VERTICAL DEFLECTION CIRCUITS

Vertical sync. pulses from the sync. separator are used to synchronise the blocking oscillator, T4, and the triode portion of V12. "Height" is adjusted by varying the DC potential fed to the blocking oscillator, and "Vertical Hold" is adjusted by varying the time constant of the blocking oscillator grid circuit. The sawtooth waveform from the blocking oscillator is applied to the grid of the output amplifier and a sawtooth current waveform appears in the vertical output transformer. A feedback voltage is developed across R124-R125, from the current in the deflection coils. This voltage is stepped up to the input grid of the vertical output valve. A potentiometer, RV9, is provided for adjustment of linearity.

HORIZONTAL OSCILLATOR AND AUTOMATIC PHASE CONTROL

Automatic frequency and phase control is obtained by means of a sine wave oscillator circircuit, a balanced phase discriminator, and a reactance valve.

The purpose of the reactance valve is to correct frequency/phase differences between the line oscillator and incoming sync. pulses.

Incoming sync. pulses via the sync. separator and secondary winding of T2 are fed to the balanced discriminator.

Line oscillator voltage is fed to the two grids of V13, the reactance valve, in phase. In a normal "in lock" condition, the balanced discriminator will provide no correcting voltage to the reactance valve and in these conditions the reactance valve may be removed. In fact, this is a condition of setting the phase discriminator transformer. If any change in frequency/phase relationship occurs between the line oscillator and the incoming sync. pulses, an unbalance occurs in the discriminator and a voltage appears at the grid of the reactance valve.

The same control voltage is applied, with polarity reversed, to the second triode via the cathode coupling. Relatively equal and opposite voltages will appear at the anodes of both triodes. This change in voltage appears to the tuned oscillator circuit as a change in capacitive reactance, in the first triode as a positive change and in the second, as a negative. Then, the cumulative effect is a tuning action of large capacity change for a small voltage variation.

The capacity change occurs in such a way that frequency/phase correction takes place in the oscillator circuit and the "in lock" condition continues.

HORIZONTAL DEFLECTION CIRCUITS

The frequency controlled output of the horizontal oscillator, V14 pentode, has the negative peak of the output waveform clipped by the diode MR13. After the driver valve, V14 triode, the waveform is suitably shaped with an RC network and applied to the line output valve grid.

At the end of a line scan the negative excursion of the drive waveform cuts off the line output valve sharply and the magnetic field in the line output transformer, which has been established by the forward scan, collapses rapidly. The inductance and self-capacitance of the system "rings" and, after one half-cycle of "ring" the magnetic field has reversed its direction, causing the beam to return to the left-hand side of the tube ready for the next scan.

During this first half-cycle the pulse of voltage at the damper diode (V17) cathode is positive with respect to the damper diode anode (H.T.) and keeps the damper cut off.

The next half-cycle tends to make the voltage at the damper cathode negative, but since this causes the damper diode to conduct and effectively clamp this tap of the transformer to H.T., it thereby damps out any further ringing and allows the energy stored in the magnetic field after flyback to decay linearly and provide the first part of the forward scan.

As this decays toward zero (approximately 1/3 of the forward scan) the line output valve V15 starts to conduct and provides a constantly increasing current to complete the forward scan. At the end of the line period another negative pulse at the grid cuts off V15 and the cycle is repeated.

The positive pulse during the first half-cycle of "ring," referred to above, appears, by transformer action, as a very high voltage pulse at the anode of V16, where it is peak rectified and then smoothed by the capacitance between inner and outer bulb coatings of the C.R.T., to supply E.H.T. of approximately 17,000 volts for the C.R.T. anode.

Energy recovered by the damping diode produces a boost voltage of approximately 740 volts, which is used for the DC focus voltage and is also divided down to 500 volts for the G2 electrode of the picture tube.

The horizontal output stage is stabilised so that changes, in mains voltage and setting of the brightness control, have relatively little effect on picture size, or EHT voltage.

This is achieved by biasing the control grid of the 6CM5 from a negative voltage which is proportional to the peak amplitude of the transformer flyback pulse.

This bias is derived by the rectifying action of a VDR to which a pulse is applied (1200V. P.P.) via a 220 pF capacitor from a tap on the output transformer. The bias level and, therefore, the operating conditions of the valve, may be set by adjusting the value of a positive 'backing off' potential derived from the boost voltage.

The control grid of the 6CM5 should not pass grid current as is normal with unstabilised circuits, and at the end of the line period, the voltage as measured on an oscilloscope (with DC input) should be approximately —4 volts to ground.

The sawtooth scanning current in the primary winding of the focus transformer, T7, produces in the secondary a large parabolic voltage waveform which is fed direct to the focus electrode of the CRT. The cold end of the secondary is connected to a variable DC source to give good overall focus as the AC source modulates the DC supply in accordance with the spot positioning on the face of the CRT.

REMOTE CONTROL

The remote control unit is connected to the receiver by fitting a small 9-pin plug (PL3) into the socket (SKT3) at the rear of the chassis on the L.H. end of the mains and fuse panel and accessible through the hole in the back. With mains power connected and the receiver mains switched "on," the receiver may be switched "on" or "off" by the slide switch on the side of the remote handpiece, which completes the circuit from the full wave rectifier MR15, MR16, through the relay winding RLB back to earth. Power is supplied to RLB winding which closes and makes contact B1, completing the primary circuit for the receiver mains transformer T1; B2, which supplies an AC voltage from the secondary of the remote operation mains transformer T8 to the index transformers T9 and T10, and the pilot lamp in the handset; B3, which earths the resistor network in the picture tube grid; B4, which adds filter capacity to the supply voltage for the transistor and RLB.

A condition now exists when channel changing may take place.

In this condition of "rest" or normal," the base of the transistor is held at a very low potential, and there is little or no potential difference between the emitter and the base.

OPERATING SEQUENCE

After selection of the appropriate channel by the remote control channel switch, if the "mute-start" push-button in the handpiece is operated, the following steps take place:

PSA-1 makes and shorts the limiter HT to earth, via R90, muting the sound.

PSA-2 makes and shorts the emitter of the transistor to earth, causing heavy current to flow through the transistor and the coil of RLA.

When RLA operates:

Contacts A1 close and supply AC mains power to the channel changing motor.

Contacts A2 close and short-circuit PSA2, earthing the emitter of the transistor.

Contacts A3 close and short PSA-1 contacts holding the muting on the sound while channel changing.

Contacts A4 close and short the picture tube grid to earth via R155 resistor, muting the picture.

All actions occur simultaneously.

Since an unequal voltage will appear at the base and emitter of the transistor when a change of tapping has been made on the indexing transformers, current will flow in the collector circuit and the relay RLA will be held closed until the voltages are equalised.

Simultaneously, with the closing of A1 contacts when relay RLA is operated, the tuning motor commences to operate and the cam-operated contacts MSB close. This shorts the RLA relay to earth by-passing the transistor. This is a sensing device and stops the channel switching motor at a precise position when it opens at the selected channel. At such time there will be no unequal voltages applied to the base and emitter of the transistor, no current will flow through the relay RLA and it will cease to operate, opening the "A" contacts. The contacts of MSB open at each channel position, but if heavy current is flowing through the transistor due to unequal voltage applied to the base and emitter, this holds RLA closed, and the motor will continue to operate until the selected position has been reached.

When the relay RLA ceases to operate:

Contacts A4 open and remove short and picture appears.

Contacts A3 open and remove short and sound is restored.

Contacts A2 open and remove short on PSA-2, Mute-Start switch.

Contacts A1 open and remove mains supply from motor.

All actions occur simultaneously.

When the "On-Off" switch (SD) in the handpiece is switched "off," relay RLB operates and opens contacts:

B4, to remove the additional filter across the relay and transistor supply voltage.

B3, to remove the earth from the CRT grid voltage divider, immediately placing a positive bias on the grid to allow beam current to flow and discharge the EHT, preventing a bright spot appearing on the screen.

B2, to remove AC voltage from the indexing transformers in the remote control unit.

B1, to remove power from the receiver mains transformer.

A pin in the centre of the plug PL3, when inserted into the socket SKT3, open-circuits three leaf spring contacts which are used for the following purposes:

MSA1 contacts are in parallel with the mains "on-off" switch (SD) on the remote control unit.

MSA2 completes the speaker transformer secondary.

MSA3 earths the contrast control voltage divider network.

When the plug PL3 is inserted:

MSA1 contacts open and remothe control "on-off" switch (S) becomes operative.

MSA2 removes the earth on the contrast control circuit and substitutes the remote control contrast potentiometer.

MSA3 transfers the sound output for the speaker circuit into the remote control unit where selection of speakers and/or hearing-aid outlet is made, together with control of volume.

Channel selection may be effected immediately the receiver is switched on, unlike previous models when a delay was entailed while the valves reached operating temperatures.

Volume of the receiver may be adjusted at the remote handpiece for both local and remote speakers by variation of the sound limiter HT using the remote volume control.

Two sockets are available on the side of the remote handpiece for hearing-aid plugs. Insertion of the hearing-aid plug into SKT4 with the "local-remote" speaker switch in the remote position, removes sound from the speaker and supplies sound to the hearing-aid only. If SKT5 is used, sound is supplied to the hearing-aid and the remote speaker. A separate volume control is provided for hearing-aid adjustment; however, no hearing-aid sound will be available if the main or remote speaker volume control is turned to minimum position.

Hearing-aid sound, operating with separate control of volume, is available either with remote control or local speakers.

For the remote controls to be fully effective, the receiver sound and picture controls should be well-advanced. If these controls are so set, removal of the remote control plug PL3 will not disturb the contrast or sound when the receiver

INSTALLATION

The receivers are shipped from the factory with all pre-set controls adjusted for normal operation. For chassis type PL it should only be necessary to ensure that the mains tapping is correctly adjusted for the mains voltage existing in the particular area and a suitable aerial connected to the aerial terminals.

For chassis type PN it will be necessary to unpack the remote control unit and fit the plug into the socket at the rear of the cabinet. All adjustments can then be made from the remote control unit after the various controls have been set on the receiver front and rear where necessary.

In the case where more than one aerial is installed for reception from diverse directions or from differently polarised transmissions, it will be necessary to connect 300-ohm ribbon leads from the multi-connector block at the rear of the set, to the lugs on the rotary switch for the appropriate channel.

In very strong signal areas it may be necessary to use an attenuator in the aerial lead to avoid overloading the receiver.

The various operating controls should be checked for proper operation, and their use demonstrated to the purchaser as described in the installation manual. It is necessary to remove the back of the cabinet to gain access to the mains adjustment plug or aerial connections to the switch.

PICTURE SHIFT

Small shifts in position of picture may occur due to the effect of the earth's magnetic field in different locations. The picture may be re-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 hence the amount of picture shift.

PICTURE TILT

If the picture is not square with the edges of the mask, the deflection coils should be rotated until the picture is squared up. It may be necessary after this operation to centre the picture by means of the shift magnets.

A.G.C.

The A.G.C. control is normally pre-set in the factory but if it is necessary to adjust it at any time the procedure is to turn the control to the maximum anti-clockwise position then, observing the picture, advance the control until the noise or "snow" in the picture is no longer reduced. The receiver should then be checked on all channels to ensure that no overloading is evident, which may be due to the control being adjusted too far in a clockwise position, and that the minimum noise condition has been achieved for all signals. This control may need adjustment in strong signal areas to remove "herringbone" pattern.

FUSES

Four fuses are provided, two in the mains circuit and two in the HT circuits. Ensure that they are replaced with similiar types in their respectively colour-coded holders.

NOISE INVERTER

The cathode bias of the noise inverter can be adjusted on installation (if necessary) by means of a pre-set control on the rear panel of the receiver. Tune to the strongest signal and turn contrast control to maximum. Turn the Noise Inverter control in an anti-clockwise direction until the picture tends to go out of lock. Turn control slightly clockwise so that picture returns to lock. Check that receiver locks quickly on all channels when changing channels.

ADJACENT CHANNEL TRAP CIRCUIT

If interference in the form of herring-bone pattern, due to a strong adjacent vision carrier, is visible on picture, it may respond to manipulation of the trap circuit L22, adjusted in the top R.H. corner of the chassis, and adjusted with the back removed.

Normally the trap is adjusted in the factory to approximately 28.375 Mc/s.

SERVICING

The vertical chassis of this receiver has been specially designed to make servicing as easy as possible.

All valves, test points and components are accessible for service with the back removed and the chassis in either its normal or swing-down position. This includes the tuner and associated controls.

To prepare the chassis for service, remove the front channel selector and fine tuner knobs. Press down on aerial terminal block with thumb. The aerial block will then spring out, allowing removal of back without disconnecting leads. Remove two screws securing the metal back to the cabinet. Remove back by lifting out, first at base. Remove the PK screw securing the L.H. side of the tuner to the cabinet front (viewed from rear).

Loosen the wing-nut on the L.H. side of the chassis and withdraw the tuner and bracket assembly.

(*Note 1.* This assembly is secured to the picture tube clamping framework by means of a shaped plate fitting into shaped clamps. The tuner and panel may be withdrawn to the rear but must be lifted to clear the safety catch at the front end of the shaped plate for complete removal).

(*Note 2.* To facilitate servicing of the chassis in these Series 2 receivers, the bracket for the tuner which is clamped to the side of the chassis has been modified so that, if required, the tuner may be left in place and, by loosening the wing-nut at the side of the chassis, the chassis may be swung down for inspection. The tuner connecting leads to the chassis have been lengthened and re-routed to suit).

Having withdrawn the tuner, it may be dropped to be parallel to the chassis and with a special safety catch lug fitted into the chassis hole and clamped to it by tightening the thumbscrew.

Loosen the two thumbscrews on the top corners of the chassis and swing the clamp rods away from the chassis. The chassis, complete with tuner, may then be swung down on the pivots at the chassis rear lower corners and held secure by the stops in the pivotal quadrants.

If desired, the chassis complete with tuner may be removed by first disconnecting EHT, yoke and speaker leads, then tilting the chassis to an angle of approx. 45° and lifting the unit out of the pivots.

The yoke and EHT leads are long enough to prevent strain in the chassis lowered position and the chassis will operate satisfactorily in this position for service if necessary.

To reassemble, complete the above operations in reverse, ensuring that the yoke and EHT leads are positioned correctly and are not clamped under any components when the chassis is returned to its original position and that the earthing braid bonding the chassis to cabinet back is in place on the R.H. chassis clamp.

DISMANTLING

CHASSIS TYPE PL AND PN IN CABINETS TYPE AC—AD—BC.

Remove the remote control plug where necessary.

Remove the aerial leads and terminal block.

Remove the two back-securing screws and then remove the back.

Proceed as described under the heading of "Servicing" to swing the chassis "down." In this position access is gained to the two 5/16-inch bolts securing the chassis mounting board to the cabinet base. Unscrew these two bolts and replace and clamp the chassis in its normal position.

Remove the two machine screws at the top of the picture tube holding the CRT clamp to the top front of the cabinet.

Remove the speaker leads from the chassis.

Remove the entire assembly by sliding from the rear of the cabinet.

SPEAKERS IN CABINETS TYPE AC AND AD

To remove the speakers for test or replacement in cabinets type AC and AD, the speaker baffle grille silk must first be removed.

Two wood screws are accessible under the front centre rail to remove the grille silk. The backing for the grille silk is slightly bowed over a strain block on the speaker baffle board and when the two wood screws are removed, they may be used as grips to ease the top of the grille silk forward when it may be lifted out of the groove at the bottom of the cabinet.

The speakers are secured to the baffle board by wood screws accessible from the front.

A cement block contained in a plastic bag is bolted to the bottom of the cabinet for balance when the chassis is removed. This block is accessible from the front of the cabinet through the speaker holes in the baffle board of the vented enclosure.

DEFLECTION YOKE

First remove the picture tube socket. Loosen the clamp-fixing screw on the rear of the yoke assembly, remove the yoke plug from the socket on the rear of the EHT assembly and slide yoke over neck of tube. When replacing yoke, do not use force and do not tighten clamping screw until set has been operated and picture is squared up.

REMOVAL OF PICTURE TUBE

Having removed the chassis and picture tube assembly, remove chassis from baseboard and remove yoke from C.R.T. Take care that C.R.T. does not fall forward on its face when chassis is lifted from baseboard. Remove the spring which rests against the aquadag coating on the rear of the picture tube. Slacken the nut at the side of the tube securing the retaining strap and ease the tube out carefully, meanwhile supporting it around the mounting ring. The rubber mounts may be eased over the ears at the tube face corners and then the tube may be carefully withdrawn from the strap.

Note: The tubes are heavy and particular care in handling is necessary. It is recommended that protective goggles, apron and gloves be worn by personnel handling picture tubes to prevent personal injury should an implosion occur due to mishandling. The picture tube should be carefully handled and never placed face-down on a bench. Always ensure that it is placed on a soft, clean surface, such as felt, so that the face does not become scratched. Whenever possible, keep tubes in the original manufacturer's carton.

ADJUSTMENTS

NOTE:

The receivers type PL, PN have a number of regulating devices incorporated such as voltage dependent resistors and diodes which are designed to correct departures from mean operating conditions.

In making corrections, a certain amount of masking "the true cause" occurs and defective parts or incorrect operation of the circuitry may be difficult to isolate under certain circumstances.

Servicemen are therefore requested to consider carefully any substitution of components or observation of unfamiliar symptoms of a fault before making adjustments to the receiver and so avoid any unnecessary complications in repair.

On the Series 1 chassis, HT for the Horizontal Oscillator driver and other valves was derived from the HT2 line being dependent on the tertiary fuse FS4. The loss of HT on these valves deprived the line output valves of drive and dissipation limits were exceeded. This has now been rectified and HT for these valve is now taken from HT1.

An improvement in filtering has been effected by reversing the position of C55 and C56, main HT filter capacitor, together with a modified method of supplying HT to the sound output valve screen from the HT1 line. By-passing capacitor C93 has been increased.

HORIZONTAL HOLD

Remove the 12AT7 reactance valve V13 and short-circuit the sync. pulses at the test point. Adjust the discriminator transformer slug until the picture floats weakly in lock.

Replace the 12AT7 and adjust the horizontal hold control until the picture again locks weakly.

Remove the sync. pulse short and the picture should lock immediately. Check that immediate locking occurs when the channel switch is operated. A slight readjustment of the hold control may be necessary. Normally it should be about mid-position.

CONTRAST RANGE

Turn the Contrast Control to its maximum position and adjust the contrast range control to give sync. tips of 190 volts at the video anode, read on a DC-coupled oscilloscope.

HORIZONTAL LINEARITY

The slug in the horizontal linearity coil may be adjusted from the R.H. side inside the chassis and should be adjusted for best linearity using a pattern on the CRT.

Two positions of the slug provide suitable conditions but the position in which the slug is furthest out of the coil is the correct one. Re-adjustment of the width control and interlocking adjustments may be necessary if the other position of the slug is used.

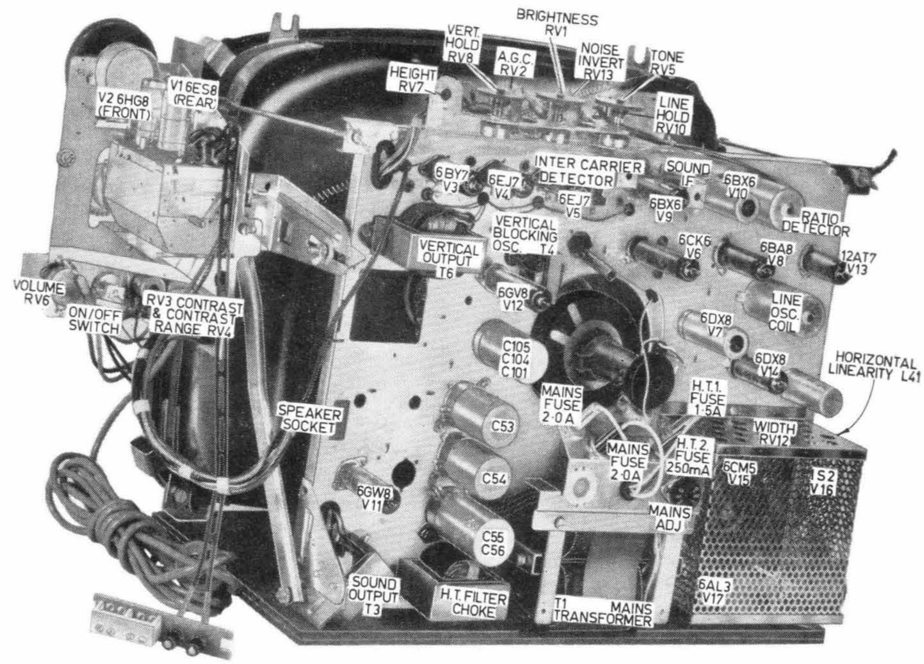
During the course of production of these receivers, the Company reserves the right, without notice, to make any modifications or improvements in design which may be necessary to meet prevailing conditions.

Information concerning changes, which are likely to be of benefit to retailers and servicemen, will be notified as far as possible by issuing a Technical Data Sheet.

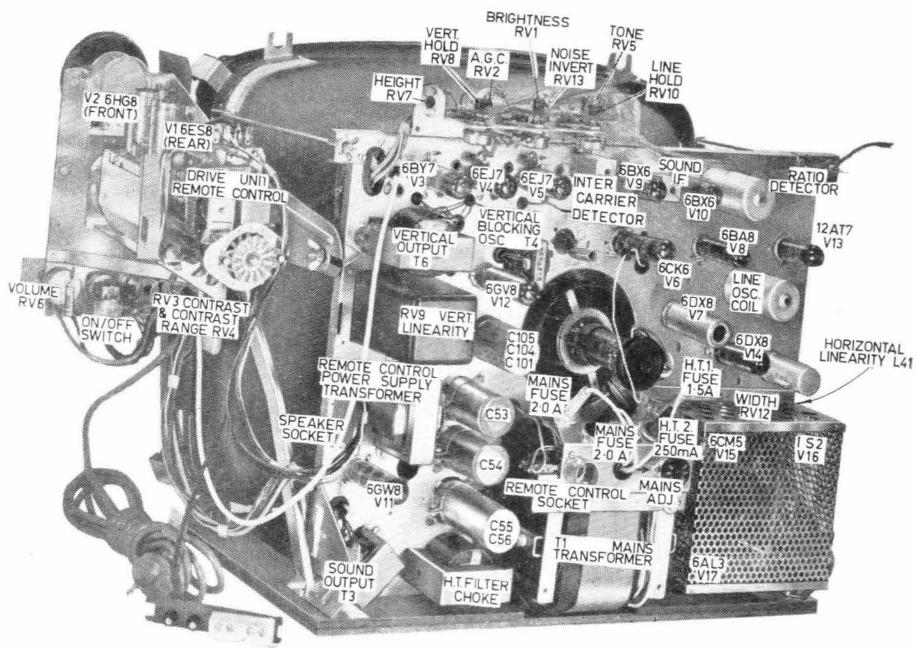
Any further service information may be obtained by addressing an inquiry to "The Service Division," E.M.I. (Australia) Limited, 575-577 Parramatta Road, Leichhardt (Telephone 560-8444).
or Interstate Branches as below:

E.M.I. (Australia) Limited

109 Burwood Road, Hawthorn, Victoria.
Emitron House, 105 Port Road, Hindmarsh, South Australia.
457 Beaufort Street, Highgate, Western Australia.
252 Argyle Street, Hobart, Tasmania.
17 The Quadrant, Launceston, Tasmania.
Bramble's Building, National Park Street, Newcastle West, N.S.W.
83 Robertson Street, Fortitude Valley, Brisbane, Queensland.
C/- A. Leenders, 13-17 Murray Street, Rockhampton, Queensland.



REAR VIEW — 17-VALVE CHASSIS — PL (Series II)



REAR VIEW — 17-VALVE CHASSIS — PN (Series II)
(WITH REMOTE CONTROL)

ALIGNMENT

VISION I.F.

To align the vision IF amp., a sweep generator and a marker generator, both covering the range 28 to 38.5 Mc/s are required, together with a display unit. The marker generator may be a signal generator and the display unit a C.R.O. These instruments should be interconnected as described in the instructions supplied with the sweep generator. The sweep generator should be terminated with a resistor equal to its output impedance and connected to the receiver as shown in Figure 1.

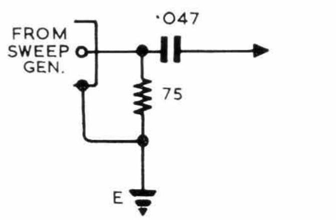


Fig. 1.

Because of the high gain of the receivers, care should be taken to ensure that all components replaced are on short leads and are placed in exactly the same position as the original part.

Care must also be taken to prevent feedback in interconnecting leads of the alignment equipment.

OPERATION 1.

(a) Connect a bias supply of 18 volts across IF AGC smoothing capacitor C.

(b) Connect display unit between L29 and R38 junction and earth.

(c) Remove cores from L24, L26, L26A and L31.

NOTE (1) Throughout the alignment, the display should be adjusted so that the response is accurately set between the reference level and the base line from a signal of about 2 volts peak-to-peak. The output of the IF strip should be maintained at that level by varying the output from the sweep generator and not the gain of the display unit.

NOTE (2) Coupling between stages will not require adjusting, unless either IFT1, IFT2 or IFT3 has been replaced .

NOTE (3) Cores in L21, L24, L26, L26A, IFT3 and L31 are set in the position furthest from the chassis.

Cores in L22, L23, IFT1, L25, and L26 are set in position nearest the chassis.

OPERATION 2.

(a) Using the terminating network as shown in Fig. 1, connect sweep output between pin of V5 and earth.

(b) Adjust the cores of L27 and IFT3 to obtain the response of Fig. 3A (Stage 1).

(c) If IFT3 has been replaced it will be necessary to adjust the coupling by closing the spacing of the two windings of IFT3 until desired bandwidth is achieved.

(d) If a dip appears in the response, remove it by screwing the core in L25 away from the chassis.

OPERATION 3.

(a) Remove the sweep from V5 and connect it as shown by Figure 1 to pin 2 of V4.

(b) Maintaining the level of the display unit constant by varying the sweep output, adjust the cores of L25 and IFT2 to obtain the response of Figure 3B (Stage 2).

(c) If a dip appears in the response, remove it by screwing the core in L23 away from the chassis.

(d) If IFT2 has been replaced, it will be necessary to adjust the coupling by closing the spacing between the two windings of IFT2 until the desired bandwidth is achieved.

OPERATION 4.

(a) Remove the sweep from V4 and connect it to pin 2 of V3.

(b) Adjust the cores of L23 and IFT1 to obtain the response of Figure 3C (Stage 3).

(c) If a dip appears in this response, remove it by shorting out the coaxial lead from the tuner.

(d) If IFT1 has been replaced, it will be necessary to adjust the coupling by closing the spacing of the windings of IFT1 until the desired band width is achieved.

OPERATION 5.

(a) Remove sweep from V3 and connect it to the IF test point on tuner, located adjacent to the converter valve. Switch tuner to the position between Channel 11 and Channel 0.

(b) Adjust the cores in L11 (IF output coil located adjacent to V2 on the tuner, and L21 to obtain the response of Figure 3D (Stage 4).

OPERATION 6.

(a) Insert a core into L24 and adjust to a minimum at 38.375 Mc/s by varying the spacing between L23 and L24. Ensure that the response at 38.375 Mc/s is at least 60 dB below peak response. To do this, increase the sweep generator output by 40 dB, reset the base line with the vertical shift control if necessary, and the 20 dB will represent the —60 dB point required below the reference level.

(b) Adjust the core in L22 to read a minimum at 28.375 Mc/s.

(c) Insert a core in L26 and adjust together with the spacing of L25 and L26 to ensure that the responses at 31.375 Mc/s is between 25 and 28 dB below the peak response. Use method in (a) but increase output by only 20 dB.

(d) Insert a core in L31 and adjust by varying the coupling between L31 and L27 so that the response at 29.875 Mc/s is 35 dB below the peak response. (It may be found necessary to readjust L27 to maintain the response shape as shown in 3E (Stage 5).

(e) Adjust L26A on former of IFT2, such that it widens the response of L24, but at the same time, care must be taken to ensure that it leaves the main response shape substantially unchanged.

(f) Remove bias battery, and check that the response curve remains substantially unchanged.

(g) Replace bias and connect display unit to test point on L33. Check to see that the response to the sound IF detector is similar to response of 3F (Stage 6).

(h) Seal the coils of L24, L26, L26A, L31 and also IFT1, IFT2, and IFT3 with a light application of A1 adhesive.

SOUND I.F. ALIGNMENT

The following equipment is necessary to carry out this procedure:

(i) A C.W. Oscillator accurately tuned to 5.5 Mc/s. by a crystal controlled reference.

(ii) A 20,000 ohm/volt meter (Model 8, AVO or similar type).

(iii) A DC V.T.V.M.

(iv) A peak-to-peak detector as shown in Fig. 2.

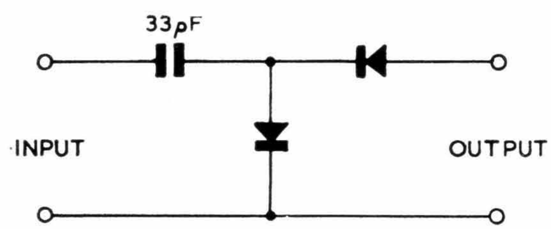


Fig 2: Peak-to-Peak Detector.

5.5 Mc/s. NULL TRAP (IFT4)

IFT4 is a combined null trap and transformer, working at 5.5 Mc/s. When tuned in the factory, both primary and secondary cores are tuned together to give a zero output at 5.5 Mc/s at the video grid, and a maximum transfer to the intercarrier amplifier. This can only be done accurately with a sweep oscillator and a suitable display unit having a high gain at 5.5 Mc/s. Once set ,however, it should not need re-tuning unless quite large circuit alterations have been made.

Should it be necessary to re-tune IFT4, the following procedure should be adopted:

(1) Inject 5.5 Mc/s. at approximately 100 mV between the junction L28 and MR1 diode and earth (disconnecting the diode).

(2) Connect the input of the peak-to-peak detector illustrated (Fig. 2) to CRT cathode, pin 7. Connect the output of the peak-to-peak detector to a 20,000 ohm/volt meter on the 50 micro-amp. range.

(3) Adjust primary core of IFT4 (nearest chassis)to give zero reading on meter. If the IFT is replaced, it is necessary to adjust both cores to give a zero reading at 5.5 Mc/s.

(4) Withdraw both cores from former. Screw in primary core (nearest chassis) to give a minimum reading.

(5) Screw in secondary core until meter reading rises slightly and then adjust primary core until a new minimum is obtained.

(6) Repeat adjustment of primary and secondary cores until meter reads zero.

PEAKING COIL ADJUSTMENT

Disconnect the sweep oscillator as in (1) above and reconnect between junction of L31 and diode MR2 (0A90). Connect a VTVM across R89 and adjust the slug in L33 for maximum response.

SOUND IF AMPLIFIER IFT3

With the sweep oscillator connected for "Peaking coil adjustment" and the VTVM connected across R89, adjust both primary and secondary cores in IFT5 for maximum response. This adjustment and the preceding one may be carried out using an air signal substituting for the oscillator.

RATIO DETECTOR TRANSFORMER (IFT6)

With the oscillator connected as above, adjust the secondary core (nearest chassis) so that a positive or negative reading is obtained on a DC VTVM connected between the junction of the diode load resistors and earth. Adjust the primary (top of coil) so that this reading shows a maximum. Then adjust the secondary core so that this reading is zero volts. This adjustment may also be carried out using an "air" signal as previously.

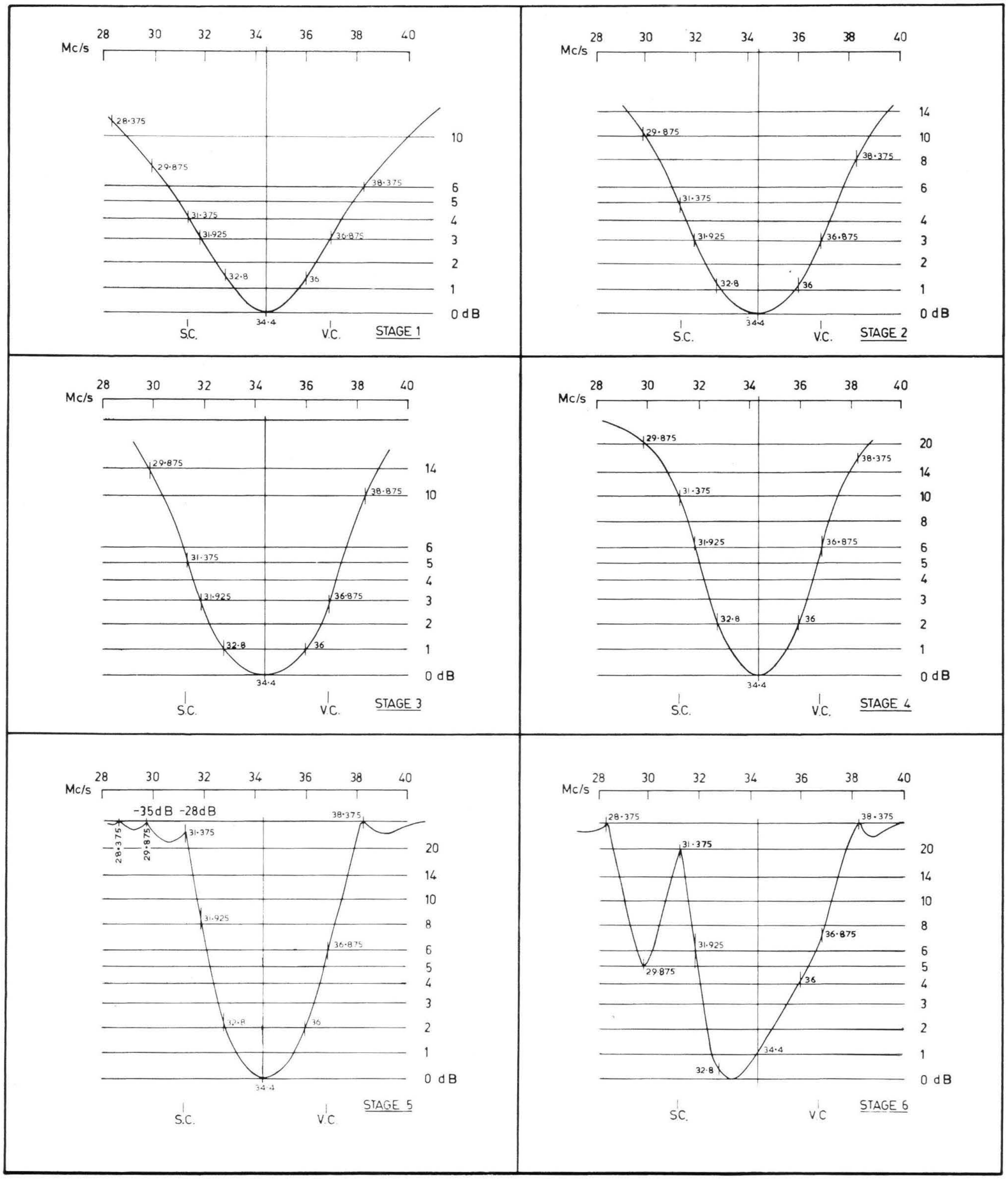
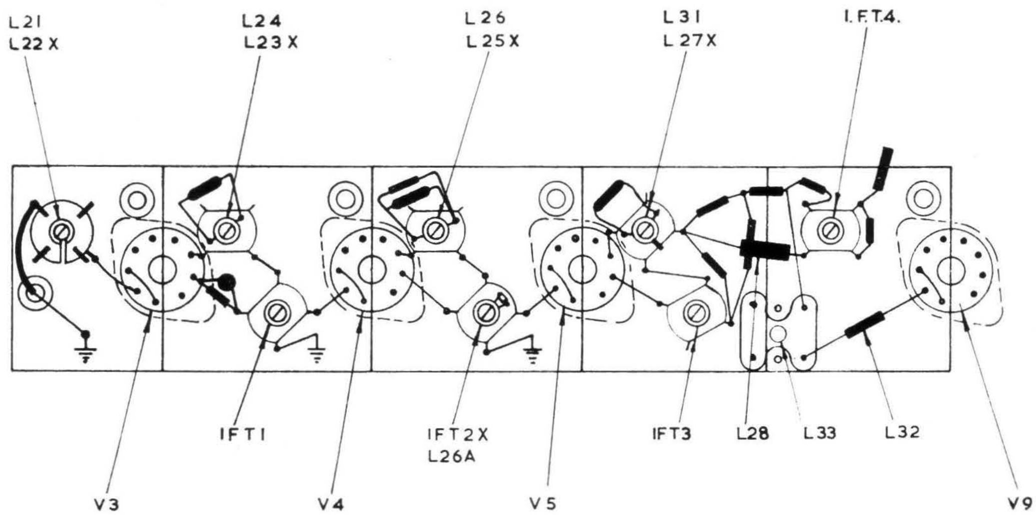


Fig. 3

VISION I.F. RESPONSE CURVES

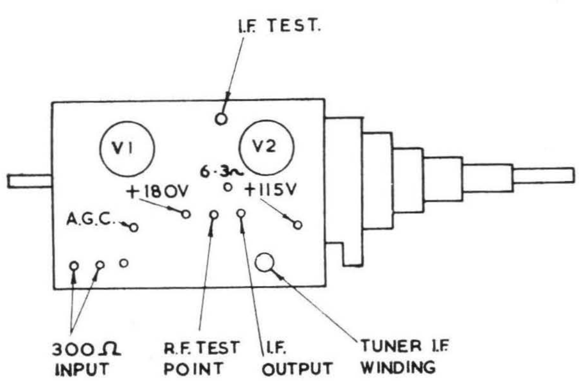
PICTURE TUBE REPLACEMENT

Manufacturer	*ReplacementTube Type*
AWA	23CP4—23HP4.
Philips	23-CRP4.
Thomas	23HP4



LOCATION OF COILS FROM UNDERSIDE OF CHASSIS

X INDICATES COIL NEAREST CHASSIS



TUNER TYPE NT3011

PARTS LIST — CHASSIS PL/2

(Parts List for Chassis Type PN the same except for differences in additional Parts List on Sheet 22).

RESISTORS

REF.	PART No.	DESCRIPTION
R21	740-0412	820 ohms ± 10% ½W.
R22	740-0032	2.2K ohms ± 10% ½W.
R23	740-0483	56 ohms ± 10% ½W. Morganite
R24		
R25	742-0512	2.2K ohms ± 10% 1W.
R26	740-0702	56K ohms ± 10% ½W.
R27		
R28	740-0412	820 ohms ± 10% ½W.
R29	740-0273	150 ohms ± 10% ½W. Morganite
R30	742-0512	2.2K ohms ± 10% 1W.
R31	740-0412	820 ohms ± 10% ½W.
R31a	740-0062	3.9K ohms ± 10% ½W.
R32	740-0273	150 ohms ± 10% ½W. Morganite
R33	749-0342	1.5K ohms ± 10% 2W.
R34		
R35	740-0322	1.2K ohms ± 10% ½W.
R35a	742-0992	300K ohms ± 5% 1W.
R35b	740-0043	2.7K ohms ± 10% ½W.
R36	740-0732	12K ohms ± 10% ½W.
R37	740-0043	2.7K ohms ± 10% ½W.
R38	740-0022	1K ohm ± 10% ½W.
R39	Part of 259-1261	2.7K ohms ± 10% 1W. Former for Equalising Coil.
R40	740-0922	330 ohms ± 10% ½W.
R41	750-0582	2.7K ohms ± 5% 8W. Metox.
R42	740-0483	56 ohms ± 10% ½W. Morganite
R43	740-0182	470K ohms ± 10% ½W.
R44	740-0182	470K ohms ± 10% ½W.
R45	740-0862	18K ohms ± 10% ½W.
R46	740-0082	10K ohms ± 10% ½W.
R47	740-0072	4.7K ohms ± 10% ½W.
R48	740-0242	33K ohms ± 10% ½W.
R49	742-0162	390K ohms ± 10% 1W.
R50	740-0122	47K ohms ± 10% ½W.
R51	750-0622	250 ohms ± 5% 10W. Cemcoat
R52	749-0142	1 Kohm ± 20% 2W.
R53		
R54	750-0632	8.2K ohms ± 5% 4W. Metox
R54a	742-0872	5.6M ohms ± 10% 1W.
R55	742-0602	470K ohms ± 10% 1W.
R56	742-0192	1M ohm ± 10% 1W.
R57	742-0772	3.9M ohms ± 10% 1W.
R58	742-0772	3.9M ohms ± 10% 1W.
R59	742-0892	2.2M ohms ± 10% 1W.
R60	749-0232	27K ohms ± 10% 2W.
R61	740-0122	47K ohms ± 10% ½W.
R61a	749-0372	3.9K ohms ± 10% 2W.
R62	740-0252	1.5K ohms ± 10% ½W.
R63	740-0252	1.5K ohms ± 10% ½W.
R64	740-0082	10K ohms ± 10% ½W.
R65	740-0212	3.3M ohms ± 10% ½W.
R66	740-0242	33K ohms ± 10% ½W.
R67	740-0132	82K ohms ± 10% ½W.
R68	740-0232	39K ohms ± 10% ½W.
R69	740-0782	120K ohms ± 10% ½W
R70	740-0862	18K ohms ± 10% ½W.
R71	740-0082	10K ohms ± 10% ½W.
R72	740-0082	10K ohms ± 10% ½W.
R73	742-1052	56K ohms ± 10% 1W.
R74	740-0092	15K ohms ± 10% ½W.
R75	742-0092	47K ohms ± 10% 1W.
R76	740-0092	15K ohms ± 10% ½W.
R77	740-0202	2.2M ohms ± 10% ½W.
R78	740-0242	33K ohms ± 10% ½W.
R79	740-0202	2.2M ohms ± 10% ½W.
R80	740-0082	10K ohms ± 10% ½W.
R81	742-0132	220K ohms ± 10% 1W.
R82	740-0152	150K ohms ± 10% ½W.
R83		
R84		
R85	740-0292	270 ohms ± 10% ½W.
R86	740-0022	1K ohm ± 10% ½W.
R87	740-0142	100K ohms ± 10% ½W.
R88	740-0242	33K ohms ± 10% ½W.
R89	740-0082	10K ohms ± 10% ½W.
R90	742-0092	47K ohms ± 10% 1W.
R91		
R92	740-0112	27K ohms ± 10% ½W.
R93	740-0112	27K ohms ± 10% ½W.
R94	740-0122	47K ohms ± 10% ½W.
R95	740-0082	10K ohms ± 10% ½W.
R96	740-0082	10K ohms ± 10% ½W.
R97	740-0152	150K ohms ± 10% ½W.
R98	740-0152	150K ohms ± 10% ½W.
R99	740-0702	56K ohms ± 10% ½W.
R100	740-0532	1M ohm ± 20% ½W.
R101	742-0022	4.7K ohms ± 10% 1W.
R102	742-0132	220 ohms ± 10% 1W.
R103	740-0052	3.3K ohms ± 10% ½W.
R104	740-0292	270 ohms ± 10% ½W.
R105	740-1062	680K ohms ± 20% ½W.
R106	740-0392	330K ohms ± 10% ½W.
R107		
R108		
R109	740-0663	82 ohms ± 10% ½W. Morganite
R110	740-0072	4.7K ohms ± 10% ½W.
R111	742-0112	100K ohms ± 10% 1W.
R112	740-0232	39K ohms ± 10% ½W.
R112a	740-0142	100K ohms ± 10% ½W.
R112b	740-0082	10K ohms ± 10% ½W.
R113	740-0082	10K ohms ± 10% ½W.
R114	740-0082	10K ohms ± 10% ½W.
R115	740-0082	10K ohms ± 10% ½W.
R116	742-0172	470K ohms ± 10% 1W.
R117	742-0022	4.7K ohms ± 10% 1W.
R117a	742-0823	270 ohms ± 10% 1W. Morganite
R118	740-0082	10K ohms ± 10% ½W.
R119	740-0232	39K ohms ± 10% ½W.
R120	740-0202	2.2M ohms ± 10% ½W.
R121	740-0122	47K ohms ± 10% ½W.
R122	740-0302	1.8K ohms ± 10% ½W.
R123	742-0823	270 ohms ± 10% 1W. Morganite
R124	740-1043	27 ohms ± 10% ½W. Morganite
R125	740-1043	27 ohms ± 10% ½W. Morganite
R126	740-0072	4.7K ohms ± 10% ½W.
R127	742-0602	470 ohms ± 10% 1W.
R128	740-0082	10K ohms ± 10% ½W.
R128a	740-0852	560K ohms ± 10% ½W.
R129	740-0362	390K ohms ± 10% ½W.
R130	740-0362	390K ohms ± 10% ½W.
R131	740-0092	15K ohms ± 10% ½W.
R132	740-0142	100K ohms ± 10% ½W.
R133	740-0182	470K ohms ± 10% ½W.
R134	742-0052	22K ohms ± 10% 1W.
R135	740-0082	10K ohms ± 10% ½W.
R136	740-0122	47K ohms ± 10% ½W.
R136a	740-0062	3.9K ohms ± 10% ½W.
R137	742-0492	68K ohms ± 10% 1W.
R138	740-0232	39K ohms ± 10% ½W.
R139	742-0892	2.2M ohms ± 10% 1W.
R140	742-0192	1M ohm ± 10% 1W.
R141	740-0022	1K ohm ± 10% ½W.
R142	750-0362	2.7K ohms ± 10% 5W. PW5.
R143	742-0192	1M ohm ± 10% 1W.
R144	749-0162	100K ohms ± 10% 2W.
R145	742-0172	470K ohms ± 10% 1W.
R146	742-0492	68K ohms ± 10% 1W.
R147	742-0492	68K ohms ± 10% 1W.
R148	Part of 908-0591	470 ohms ± 10% 2W.
R149	Part of 908-0591	1 ohm Resistance Wire
R150	740-0122	47K ohms ± 10% ½W.
R151	742-0772	3.9M ohms ± 10% 1W.
R152	750-0602	22 ohms ± 10% 5W. PW5
R153	740-0092	15K ohms ± 10% ½W.

CAPACITORS

REF.	PART No.	DESCRIPTION
C20	271-0941	8.2 pF ± ½ pF NPO
C21	271-0911	.003 uF 500V Ceramic
C22	271-0911	.003 uF 500V Ceramic
C23	271-0621	.001 uF lead thru Ducon CAC100.
C24	273-0591	68 pF ± 2½% M.S. Mica
C25	271-0911	.003 uF 500V Ceramic
C26		
C27	271-0281	.022 uF 100V Ceramic Disc
C28	271-0591	.0027 uF ± 20% K2000 Ceramic Disc
C29	273-0591	68 pF ± 2½% M.S. Mica
C30	271-0911	.003 uF 500V Ceramic
C31	271-0731	.047 uF + 30% — 20% 25V Red Cap
C32	271-0591	.0027 uF ± 20% K2000 Ceramic Disc
C33	273-0591	68 pF ± 2½% M.S. Mica
C34	271-0911	.003 uF 500V Ceramic
C35	271-1021	.001 uF + 100% — 20% Type AZ Ceramic Disc
C36	271-0911	.003 uF 500V Ceramic
C37	271-0591	.0027 uF ± 20% K2000 Ceramic Disc
C38	273-0591	68 pF ± 2½% M.S. Mica
C39	271-1091	12 pF ± 20% N330 Ceramic
C40	271-0121	5.6 pF NPO Ceramic
C41	271-0311	27 pF ± 5% NPO Ceramic
C42	271-0941	8.2 pF ± ½ pF NPO Disc
C43	271-0621	.001 uF lead thru Ducon CAC 100
C44	271-0351	33 pF ± 5% NPO Tube
C45		

PARTS LIST — CHASSIS PL/2

(Parts List for Chassis Type PN the same except for differences in additional Parts List on Sheet 22).

CAPACITORS — *continued*

REF.	PART No.	DESCRIPTION
C46		
C47	271-1061	15 pF ± 10% N330 Tube
C47a	283-1621	.1 uF ± 10% N330 Tube
C48	283-0201	.47 uF ± 10% 125V Polyester
C49	283-1701	.047 uF ± 10% 400V Polyester
C49a	283-1581	.0047 uF ± 10% 400V Polyester
C50	283-1581	.0047 uF ± 10% 400V Polyester
C51	283-1721	.068 uF ± 10% 400V Polyester
C52	269-0211	8 uF 300V. Electro
C52a	283-1581	0047 uF ± 10% 400. Polyester
C53	269-0521	100 uF 150V Insulated Electro
C54	269-0521	100 uF 150V Insulated Electro
C55)		(200 uF
)	269-0901	(+ 275 V.W. Electro Type EMG8275
C56)		(60 uF
C57	271-0911	.003 uF 500V Ceramic
C58	271-0911	.003 uF 500V Ceramic
C58a	283-1781	0.22 uF ± 10% 400V. Polyester
C59	283-0121	0.1 uF ± 10% 125V Polyester
C60	283-1361	1.0 uF ± 20% 125V Polyester
C61)		(8 uF 100V. Electro
)	269-1081	(+
C62)		(16 uF 300V. Electro
C63	283-1701	.047 uF ± 10% 400V Polyester
C64	283-1281	.22 uF ± 10% 125V Polyester
C65	271-1031	82 pF ± 20% N330 Ceramic Tube
C66	271-1041	4.7 pF ± 1 pF NPO Disc
C67	271-1031	82 pF ± 20% N330 Ceramic Tube
C68	269-0941	8 uF 100V. Electro
C69	283-1621	.01 uF ± 10% 400V Polyester
C70	283-1281	0.22 uF ± 10% 125V. Polyester
C71	283-1201	.047 uF ± 10% 125V Polyester
C72	283-1701	.047 uF ± 10% 400V Polyester
C73		
C74		
C75		
C76	271-0731	.047 uF + 30% — 20% 25V. Red Cap
C77	271-0591	.0027 uF ± 20% K2000 Ceramic Disc
C78	271-0681	12 pF ± 5% NPO Ceramic Disc
C79	271-0681	12 pF ± 5% NPO Ceramic Disc
C80	271-0471	6.8 pF ± ¼ pF NPO Disc
C81	271-0591	.0027 uF ± 20% K2000 Ceramic Disc
C82	271-0621	.001 uF Lead thru CAC100
C83	271-0801	10 pF ± 5% NPO Ceramic Disc
C84	271-0771	100 pF ± 5% NPO Ceramic Disc
C85	280-1501	100 pF ± 5% 600V Styroseal
C86	280-1501	100 pF ± 5% 600V Styroseal
C87	283-1501	.001 uF ± 10% 400V Polyester
C88	269-0781	4 uF 25VW Electro
C89	283-1581	.0047 uF 400V Polyester

REF.	PART No.	DESCRIPTION
C90	271-0961	560 pF + 100% — 10% K2000 Ceramic
C91	283-1121	.01 uF ± 10% 125V Polyester
C92	283-1121	.01 uF ± 10% 125V Polyester
C93	269-1001	60 uF 300 V.W. Electro Type ET5F
C94	269-0701	10 uF 12V Electro
C95	271-0181	15 pF ± 10% NPO Tube
C96	283-1641	.015 uF ± 10% 400V Polyester
C97	269-0061	16 uF 300V Electro
C98	269-0221	25 uF 25V Electro
C99	283-1661	.022 uF ± 10% 400V Polyester
C100	283-1541	.0022 uF ± 10% 400V Polyester
C101	269-0981	50 uF 300V Electro with C104 and C105
C102	283-1541	.0022 uF ± 10% 400V Polyester
C103	283-1541	.0022 uF ± 10% 400V Polyester
C104	269-0981	24 uF 300V Electro with C101 and C105
C105	269-0981	100 uF 25V Electro with C101 and C104
C106	283-1621	.01 uF ± 10% 400V Polyester
C107	283-1781	.22 uF ± 10% 400V Polyester
C108	283-1361	1 uF ± 20% 125V Polyester
C109	283-1721	.068 uF ± 10% 400V Polyester
C110	271-0951	47 pF ± 10% Ceramic Tube
C111	283-0201	.47 uF ± 10% 125V Polyester
C112	271-0951	47 pF ± 10% Ceramic Tube
C113	283-1581	.0047 uF ± 10% 400V Polyester
C114	283-1581	.0047 uF ± 10% 400V Polyester
C115	283-1621	.01 uF ± 10% 400V Polyester
C116	283-1621	.01 uF ± 10% 400V Polyester
C117	280-1851	680 pF ± 10% 600V. Styroseal
C118	271-0961	560 pF + 100% — 10% K2000 Ceramic
C119	271-0911	.003 uF 500V Ceramic
C119a	271-0591	0.047 uF + 30% — 20% 25V. Redcap
C120	271-0961	560 pF + 100% — 10% K2000 Ceramic
C121	283-1581	.0047 uF ± 10% 400V Polyester
C122	271-0911	.003 uF 500V Ceramic
C123	271-0991	220 pF ± 10% 2KV Ceramic Tube
C124	271-1001	220 pF ± 20% K2000 Ceramic
C125	284-0661	.022 uF ± 20% 600V Polyester
C126	Part of 908-0591	330 pF ± 10% 5K VW Ceramic
C127	284-1281	.22 uF ± 20% 1000V Polyester
C128	271-0901	68 pF ± 20% 3K VW Ceramic Disc
C129	284-2701	.047 uF ± 10% 1000V Polyester
C130	284-1211	.056 uF ± 10% 1000V Polyester
C131	283-1781	.22 uF ± 10% 400V Polyester
C132	271-1051	18 pF ± 10% 3K VW Ceramic Disc

COILS

REF.	PART No.	DESCRIPTION
L21 } L22 }	259-1321	{ 1st I.F. Grid Coil { 28.375 Mc/s Trap
L23 } L24 }	259-1391	{ 1st I.F. Anode Coil { 38.375 Mc/s Trap
L25 } L26 }	259-1401	{ 2nd I.F. Anode Coil { 31.375 Mc/s Trap
L26a	Part of 906-0631	38.375 Mc/s Trap
L27	Part of 259-1411	3rd I.F. Anode Coil
L28	259-0955	Grid Peaking Choke
L29	259-1431	Choke
L30	259-1431	Choke

REF.	PART No.	DESCRIPTION
L31	Part of 259-1411	29.875 Mc/s Trap
L32	259-1431	Choke
L33	259-1421	Intercarrier Detector Coil
L34 } L35 }	259-1261	Equalising Coil
L36	908-0621	Video Peaking Transformer
L37	259-0045	Antiparasitic Coil
L38	259-0045	Antiparasitic Coil
L39	259-0045	Antiparasitic Coil
L40	259-0045	Antiparasitic Coil
L41	259-1251	Linearity Coil

POTENTIOMETERS

REF.	PART No.	DESCRIPTION
RV1	677-1102	500K ohms Curve 'A'—Brightness—I.R.C.
RV2	677-0911	1M ohms Curve 'A' Type EC. A.G.C.
RV3 } RV4 }	677-1151	{ 50K ohms Curve 'A'—Contrast Range { 25K ohms Curve 'A'—Picture Contrast
RV5	677-1112	1M ohms 'Reverse C' Curve—Tone
RV6	677-1091	1M ohms Curve 'A' tapped 500K ohms—Volume

REF.	PART No.	DESCRIPTION
RV7	677-0921	50K ohms Curve 'A' type E.C.—Height
RV8	677-1102	500K ohms Curve 'A'—Vertical Hold. I.R.C.
RV9	677-0511	10K ohms Curve 'A' type E.C.—Vertical Linearity
RV10	677-1121	15K ohms Curve 'A' type E.C.—Horizontal Hold
RV11	677-0891	2M ohms ± 25%—Focus
RV12	677-0911	1M ohms Curve 'A' type E.C.—Width
RV13	677-1121	15K ohms Curve 'A' type E.C.—Noise Inverter

PARTS LIST — CHASSIS PN/2

(Parts List for Chassis Type PN the same except for differences in additional Parts List on Sheet 22).

TRANSFORMERS

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
T1	904-0392	Mains Transformer	T9	908-0591	Line Output Transformer (M.S.P.)
T2	908-0642	Sync. Coupling Transformer	IFT1	906-0621	Vision IFT
T3	905-0541	Audio Output Transformer	IFT2	906-0631	Vision IFT
T4	908-0662	Blocking Osc. Transformer	IFT3	906-0641	Vision IFT
T5	908-0671	Vertical Feedback Transformer	IFT4	906-0651	5.5 Mc/s Trap
T6	905-0511	Vertical Output Transformer	IFT5	906-0382	Sound IFT
T7	908-0612	Focus Transformer	IFT6	906-0324	Ratio Detector
T8	259-1311	Horizontal Oscillator Coil			

VALVES

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
V1	932-1161	6ES8 — R.F. Amplifier	V11	932-1771	6GW8 — Audio Driver and Output
V2	932-1921	6HG8 — Frequency Changer	V12	932-2001	6GV8 — Vertical Blocking Osc. and Vertical Output
V3	932-0881	6BY7 — 1st I.F. Amplifier			
V4	932-1221	6EJ7 — 2nd I.F. Amplifier	V13	932-2091	12AT7 — Reactance Valve
V5	932-1221	6EJ7 — 3rd I.F. Amplifier	V14	932-1081	6DX8 — Horizontal Osc. and Horizontal Driver
V6	932-0661	6CK6 — Video Amplifier			
V7	932-1081	6DX8 — A.G.C. and Noise Inverter	V15	932-0531	6CM5 — Horizontal Output
V8	932-2171	6BA8 — Sync. Separator	V16	932-0771	1S2 — E.H.T. Rectifier
V9	932-0521	6BX6 — Sound I.F. Amplifier	V17	932-1151	6AL3 — Damper Diode
V10	932-0521	6BX6 — Limiter			

DIODES

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
MR1	932-0971	0A90 — Video Detector	MR8	932-2031	0A91 — Noise Clipper
MR2	932-0971	0A90 — Intercarrier Detector	MR9 } MR10 }	932-2081	2-AA119 — Ratio Detector (Matched Pair)
MR3	932-2031	0A91 — Beam Current Limiter	MR11 } MR12 }	932-0991	M3 — Phase Discriminator
MR4 } MR5 }	932-1071	0A210 — Voltage Doubler	MR13	932-2031	0A91 — Pulse Clipper
MR6	932-0991	M3 — A.G.C. Clamp	MR14	932-2191	BS1/1 or OA610 or IN2859—Blanking Clamp
MR6a	932-0991	M3—AGC Bias Control Diode			
MR7	932-2181	0A605 — 40 P.I.V.—Sync. Level Detector			

MISCELLANEOUS

REF.	PART No.	DESCRIPTION	REF.	PART No.	DESCRIPTION
CH1	232-0311	H.T. Choke		824-1021	Lamp Socket, 733-3-7
VDR1	750-0611	Voltage Dependent Resistor, type E299 DE/P350		160-0151	Tuner, Mounting Bush
				220-0001	Pointer, Drive Chain
VDR2	750-0571	Voltage Dependent Resistor, Type E298 ZZ/06 Red Spot		224-0881	Chain Sprocket Retaining Clips
				517-2081	Knob — rear presets — brightness, tone, vertical hold
VDR3	750-0281	Voltage Dependent Resistor, type E298 GO/A260 Blue spot.		518-5051	Chain Sprocket Kit
FS1	431-0051	Fuse 2.0 amp. } Mains		617-0191	3/16in. Wing-nut—top chassis fixing
FS2	431-0051	Fuse 2.0 amp. } Mains			
FS3	431-0081	Fuse, 1.5 amp.—H.T. Secondary		617-0211	¼in. Wing-nut—tuner bracket fixing
FS4	431-0031	Fuse, 250 mA—H.T. Secondary			
Tuner	224-1512	Tuner—Philips NT3011		671-0641	Pointer
Swith(SA)	855-0601	D.P. Push-Push On/Off Switch Mains		840-0851	Chain Tensioning Spring
			Yoke	259-1351	M.S.P.
Lamp	932-1171	6.3V .32A Bayonet Cap Lamp	C.R.T.	932-1591	23CP4, 23CRP4 and 23HP4.

PARTS LIST — CHASSIS PN/2

DELETE

(from PL List)

RESISTORS

REF.	PART No.	DESCRIPTION
R35a	742-0992	300K ohms ± 5% 1W.
R35b	740-0043	2.7K ohms ± 10% ½W.
R49	742-0162	390K ohms ± 10% 1W.
R50	740-0122	47K ohms ± 10% ½W.
R54a	742-0872	5.6M ohms ± 10% 1W.
R50	742-0092	47K ohms ± 10% 1W.

CAPACITORS

REF.	PART No.	DESCRIPTION
C52	269-0211	8 uF 300V. Electro
C52a	283-1581	.0047 uF ± 10% 400V. Polyester
C58a	273-1781	.22 uF ± 10% 400V. Polyester

DIODES

REF.	PART No.	DESCRIPTION
MR6a	932-0991	M3—A.G.C. Bias Control Diode

ADD

RESISTORS

REF.	PART No.	DESCRIPTION
R45	742-0192	1M ohm ± 10% 1W.
R45a	740-0862	18K ohms ± 10% ½W.
R49a	742-0642	180K ohms ± 10% 1W.
R49b	742-0172	470K ohms ± 10% 1W.
R50a	740-0382	6.8K ohms ± 10% ½W.
R50b	742-0172	470K ohms ± 10% 1W.
R82a	742-0162	390K ohms ± 10% 1W.
R90	749-0052	47K ohms ± 20% 2W.
R90a	740-0032	2.2K ohms ± 10% ½W.
R154	740-0653	100 ohms ± 10% ½W.
R155	742-0512	2.2K ohms ± 10% 1W.
R156	740-0092	15K ohms ± 10% ½W.
R157	742-0112	100K ohms ± 10% 1W.
R158	740-0262	560 ohms ± 10% ½W.
R159	740-0412	820 ohms ± 10% ½W.
R160	749-0362	150 ohms ± 10% 2W.

CAPACITORS

REF.	PART No.	DESCRIPTION
C52a	269-0611	4 uF 300V. Electro
C61	269-0921	8 uF 300V. Electro with C62
C83a	271-0911	.003 uF 500V. Ceramic
C133	271-0781	.035 uF 2KVW Double Disc Ceramic
C134	271-0781	.035 uF 2KVW Double Disc Ceramic
C135	269-0761	25 uF 50VW Electro
C136	269-1091	10 uF 50 V.W. Electro Type EU Ducon

POTENTIOMETERS

REF.	PART No.	DESCRIPTION
R14	677-0971	1.5K ohms Curve 'F' Hearing Aid Volume
R15	677-1191	250K ohms Curve 'F' Remote Control "Picture"
R16	677-1011	250K ohms Curve 'G' Remote Control "Volume"

TRANSFORMERS

REF.	PART No.	DESCRIPTION
T10	904-0381	Remote Control Power Transformer
T11	908-0571	Indexing Transformer
T12	908-0571	Indexing Transformer

DIODES

REF.	PART No.	DESCRIPTION
MR15	932-2191	BS1/10
MR16	932-2191	BS1/10
MR17	932-2031	0A81/0A91

TRANSISTOR

REF.	PART No.	DESCRIPTION
	932-2211	AC128

MISCELLANEOUS

REF.	PART No.	DESCRIPTION
RLA	735-0041	Relay, 300 ohms coil, 4-pole. Normally open
RLB	735-0051	Relay, 600 ohms coil, 4-pole. Normally open
MSA-1) MSA-2) MSA-3)	855-0651	(On/Off Control) Leaf switch op- (Speaker Control) erated by remote (Contrast ,,) control plug

MISCELLANEOUS—*continued*

REF.	PART No.	DESCRIPTION
MSB	855-0481	Muting Switch (Cam operated)
SB	855-0531	Switch Wafer—1-pole, 14-position
SC	855-0441	Switch Local/Remote Speaker MSP77
SD	855-0441	Switch—On/Off MSP77
SE	855-0451	Switch—Channel Selector, OAK CK 14
	855-0541	Switch Wafer—1-pole, 14-position Aerial Selector
	577-0111	Motor 240V.
	577-0121	Motor + Driving dog.
	306-0111	Clutch — Driving dog
	306-0101	Clutch — Driven dog
	837-0531	Spindle — Driven dog and pinion mounting
	447-0051	Pinion
	664-1731	Rear bearing plate assembly Plate with bearings, driven dog, pinion and spindle.
	447-0061	Idler gear
	447-0071	Crank driving gear
	654-0623	Crank with pin
	263-0051	Crank pin collar
	244-0811	Circlip, SCO1916, crank pin collar retaining
	954-0271	Geneva wheel assembly
	244-0771	Circlip, SCO1960/17/0 Geneva wheel assembly retaining
	664-1801	Front bearing plate assembly
	306-0131	Tuner Coupling — Driving
	306-0121	Tuner Coupling — Driven
	263-0061	Collar — driven tuner coupling
SKT3	824-1091	Socket—Remote Control. Mc-Murdo Type 782A.

ON REMOTE CONTROL HANDPIECE

REF.	PART No.	DESCRIPTION
	190-2501	Cabinet Back.
	244-0491	Circlip, ASCO/8169/17/0
	814-0961	Captive 4BA Screw held by 244-0491
	190-2491	Cabinet Front
	794-1301	Scale—Channel Indicator
	664-1701	Plate—Scale Backing
	372-0181	Disc—Channel Indicator
	517-1631	Knob—Pre-selector Knob
	840-0731	Spring—Pre-selector Knob
	517-1641	Knob—Channel Selector
	517-1891	Knob
	794-1261	Scale—Hearing-Aid Volume
	794-1271	Scale—Picture
	794-1281	Scale—Volume
	453-1291	Speaker Grille
	661-0231	Grille Backing Strip
	831-1391	Speaker, 2-inch MSP, Type 2HB, 15 ohms
	757-0181	Speaker Mounting Rubber Ring
	824-0841	Hearing-Aid Socket
	831-1331	Hearing-Aid Earpiece, 15 ohms, with lead and plug
	852-0221	Handset Support
	770-0361	Anti-Skid Rubber Balls
	961-0761	25ft. 9-core Beige Cable
	826-0001	Sleeve
	668-0581	Plug—9-pin, XLM9/UTP1
	234-0971	Cover—9-pin plug, 10B
PLP	932-1791	12-volt 2-watt Lamp, Philips 12829

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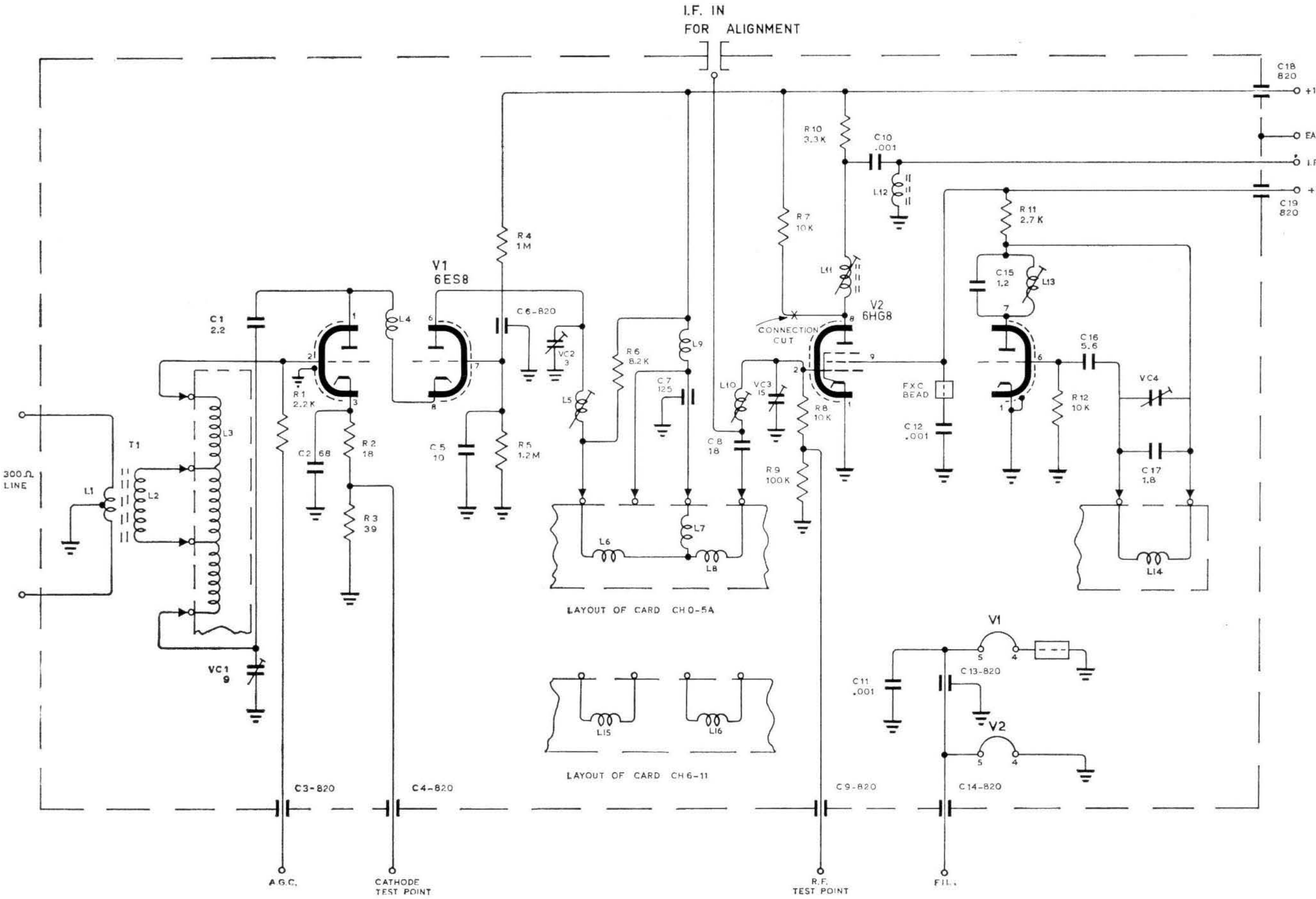
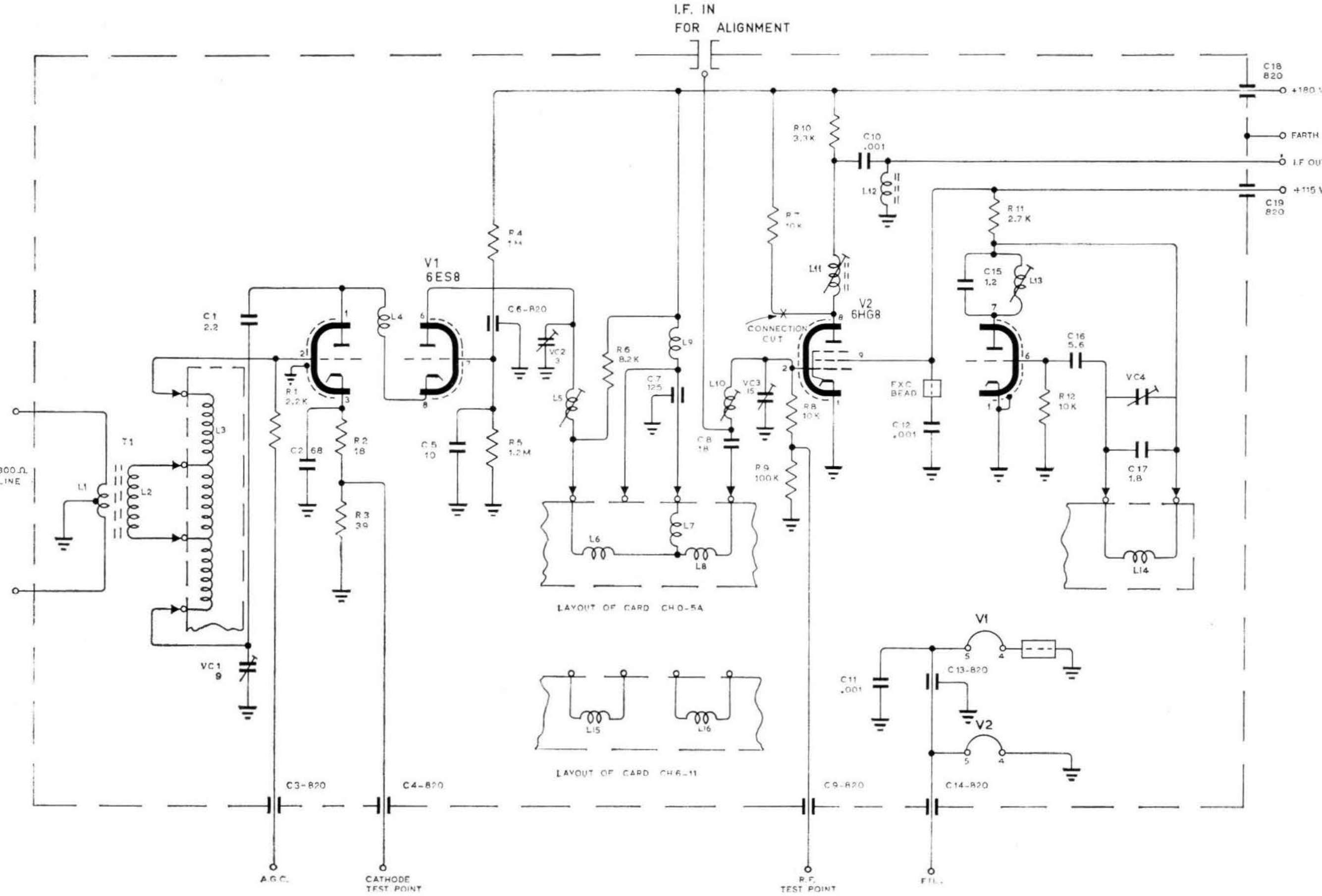


TUNER TYPE NT3011

"H.M.V" CHASSIS TYPE PL

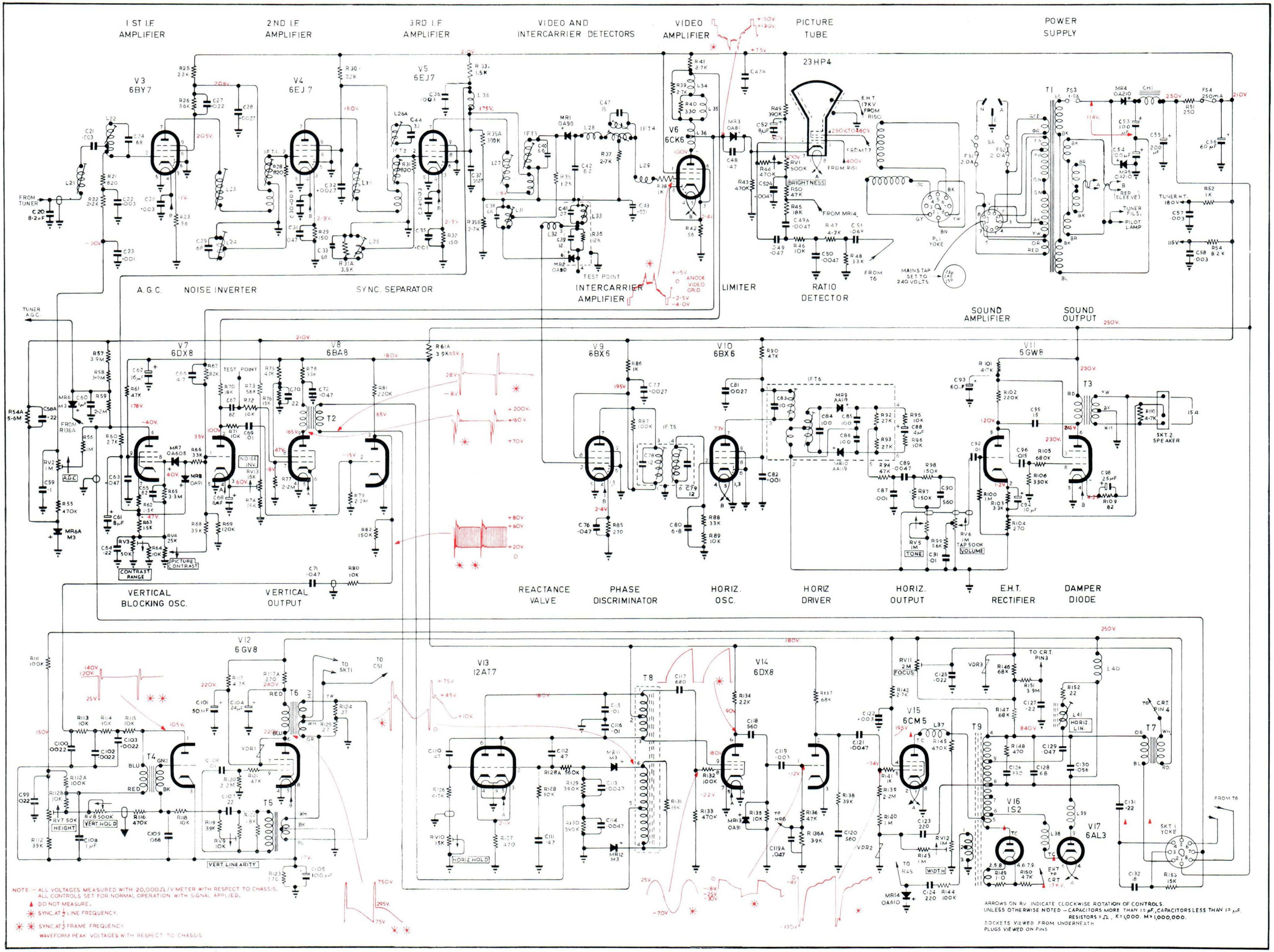
(SERIES 2)



TUNER TYPE NT3011

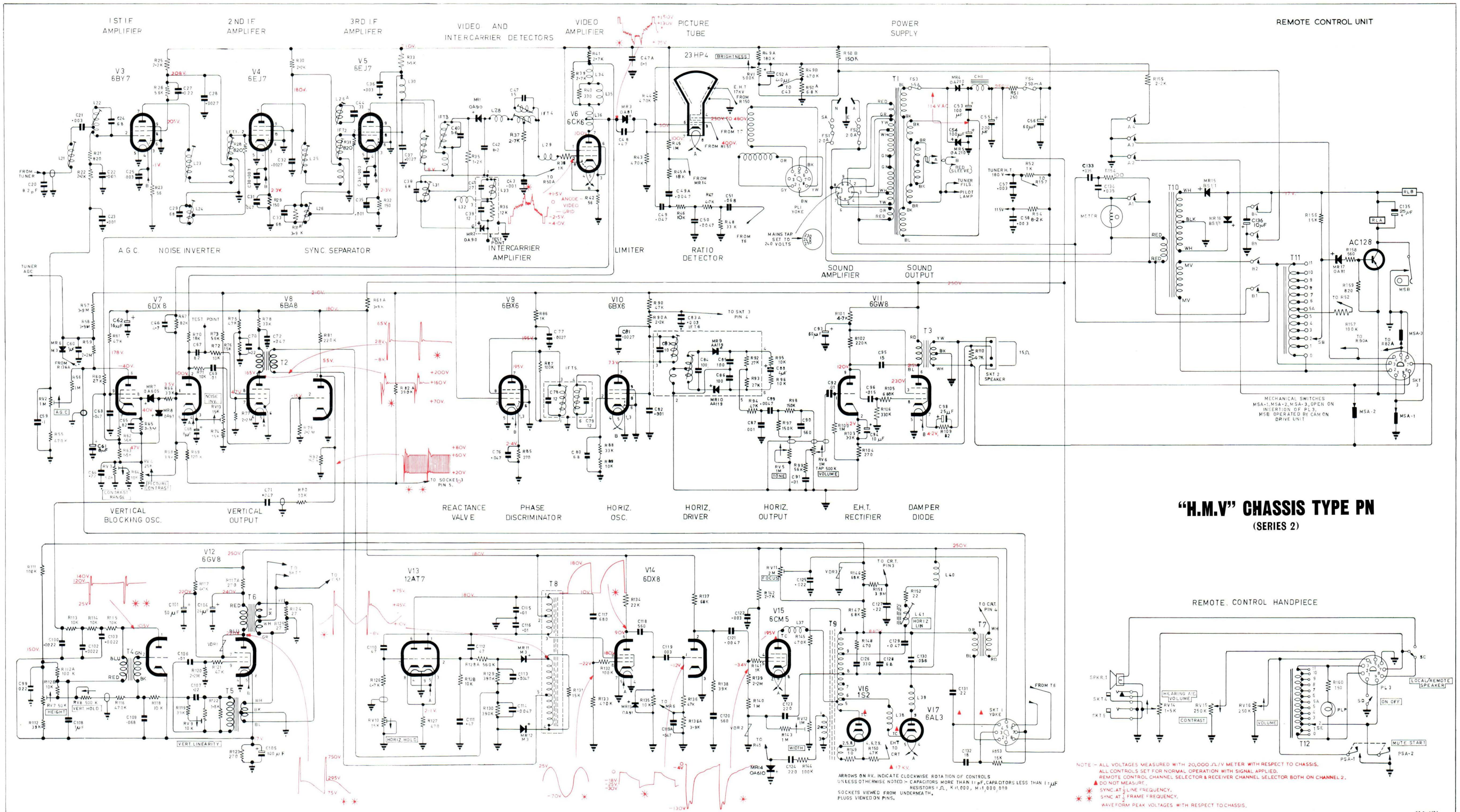
"H.M.V" CHASSIS TYPE PN

(SERIES 2)



"H.M.V" CHASSIS TYPE PL

(SERIES 2)



1ST I.F. AMPLIFIER
2ND I.F. AMPLIFIER
3RD I.F. AMPLIFIER
VIDEO AND INTERCARRIER DETECTORS
VIDEO AMPLIFIER
PICTURE TUBE
POWER SUPPLY
REMOTE CONTROL UNIT
A.G.C.
NOISE INVERTER
SYNC SEPARATOR
INTERCARRIER AMPLIFIER
LIMITER
RATIO DETECTOR
SOUND AMPLIFIER
SOUND OUTPUT
VERTICAL BLOCKING OSC.
VERTICAL OUTPUT
REACTANCE VALVE
PHASE DISCRIMINATOR
HORIZ. OSC.
HORIZ. DRIVER
HORIZ. OUTPUT
E.H.T. RECTIFIER
DAMPER DIODE
“H.M.V” CHASSIS TYPE PN
(SERIES 2)
REMOTE CONTROL HANDPIECE
MECHANICAL SWITCHES MSA-1, MSA-2, MSA-3, OPEN ON INSERTION OF PL3. MSB OPERATED BY CAM ON DRIVE UNIT
ARROWS ON RV... INDICATE CLOCKWISE ROTATION OF CONTROLS
UNLESS OTHERWISE NOTED :- CAPACITORS MORE THAN 1 = pF, CAPACITORS LESS THAN 1 = μF
RESISTORS = Ω, K = 1,000, M = 1,000,000
SOCKETS VIEWED FROM UNDERNEATH.
PLUGS VIEWED ON PINS.
NOTE :- ALL VOLTAGES MEASURED WITH 20,000 Ω/V METER WITH RESPECT TO CHASSIS.
ALL CONTROLS SET FOR NORMAL OPERATION WITH SIGNAL APPLIED.
REMOTE CONTROL CHANNEL SELECTOR & RECEIVER CHANNEL SELECTOR BOTH ON CHANNEL 2.
▲ DO NOT MEASURE.
✳ SYNC. AT 1/2 LINE FREQUENCY.
✳✳ SYNC AT 1/2 FRAME FREQUENCY.
WAVEFORM PEAK VOLTAGES WITH RESPECT TO CHASSIS.
683-4101