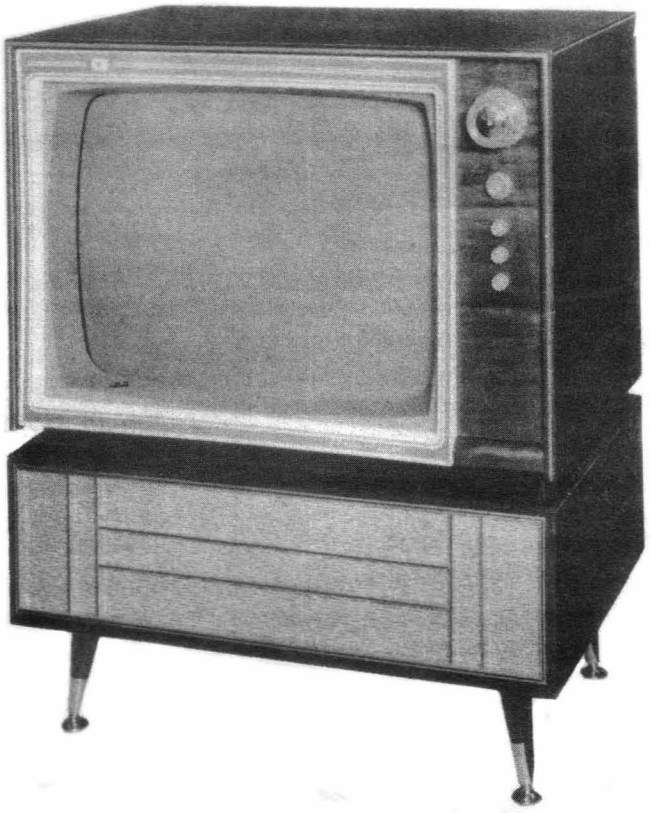
TELEVISION RECEIVER

SERVICE MANUAL



COVERING MODEL – T236

ISSUED BY THE SERVICE DEPARTMENT, CONSUMER PRODUCTS DIVISION
STANDARD TELEPHONES & CABLES PTY. LTD.

ISSUED FREE TO S.T.C. ACCREDITED RETAILERS

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ILLUSTRATIONS

INTRODUCTION

GENERAL INFORMATION

This manual has been published to assist you in obtaining the best possible installation, operation and service from the S.T.C. Model T236 Television Receiver.

It will be appreciated that the manual, although fairly comprehensive is nevertheless unable to cover every possible installation and service problem which will occur from time to time. We have therefore established a Technical Advice Service whereby a mechanic who is experiencing difficulty in the field may, by contacting the Service Department, obtain additional information or advice on any particular problem.

CHASSIS PRODUCTION CODING

To facilitate and co-ordinate the handling of production changes both in the factory and in the field, a production coding system has been established for these chassis.

The initial production will be indicated by means of a "Chassis Code Plate" marked T236 located on the rear apron of the chassis immediately above the serial number.

The number T236 indicates the model number, whilst any modifications which occur will be indicated as follows: – T236/1, T236/2 etc.

Where modifications occur a "Technical Flash" will be issued by the Service Department giving details of the modification and if necessary the reason for so doing.

SPARE PARTS

A replacement parts list is included in the manual to assist you in the correct identification and chassis location of defective parts.

When making an order or request for parts, please quote the following: –

1. The quantity required;
2. The circuit reference and/or the part number;
3. The part description;
4. The colour (where applicable);
5. The chassis Model Number;

Example: Please supply:
1 – SP40534R 50K ohm Taper A Potentiometer suitable for T236/? Television Receiver.

When returning defective parts, valves or cathode ray tubes for examination under the terms of the Television Receiver Warranty, please ensure that the parts are adequately packed against damage in transit.

Please quote the following: –

1. The Chassis Model Number;
2. The Chassis Serial Number;
3. The Receiver Owner's Name and Address;
4. The date of sale;
5. If the receiver was originally purchased from a company other than the service company, give details;
6. Reason for return of the defective part and where possible the electrical or mechanical defect.

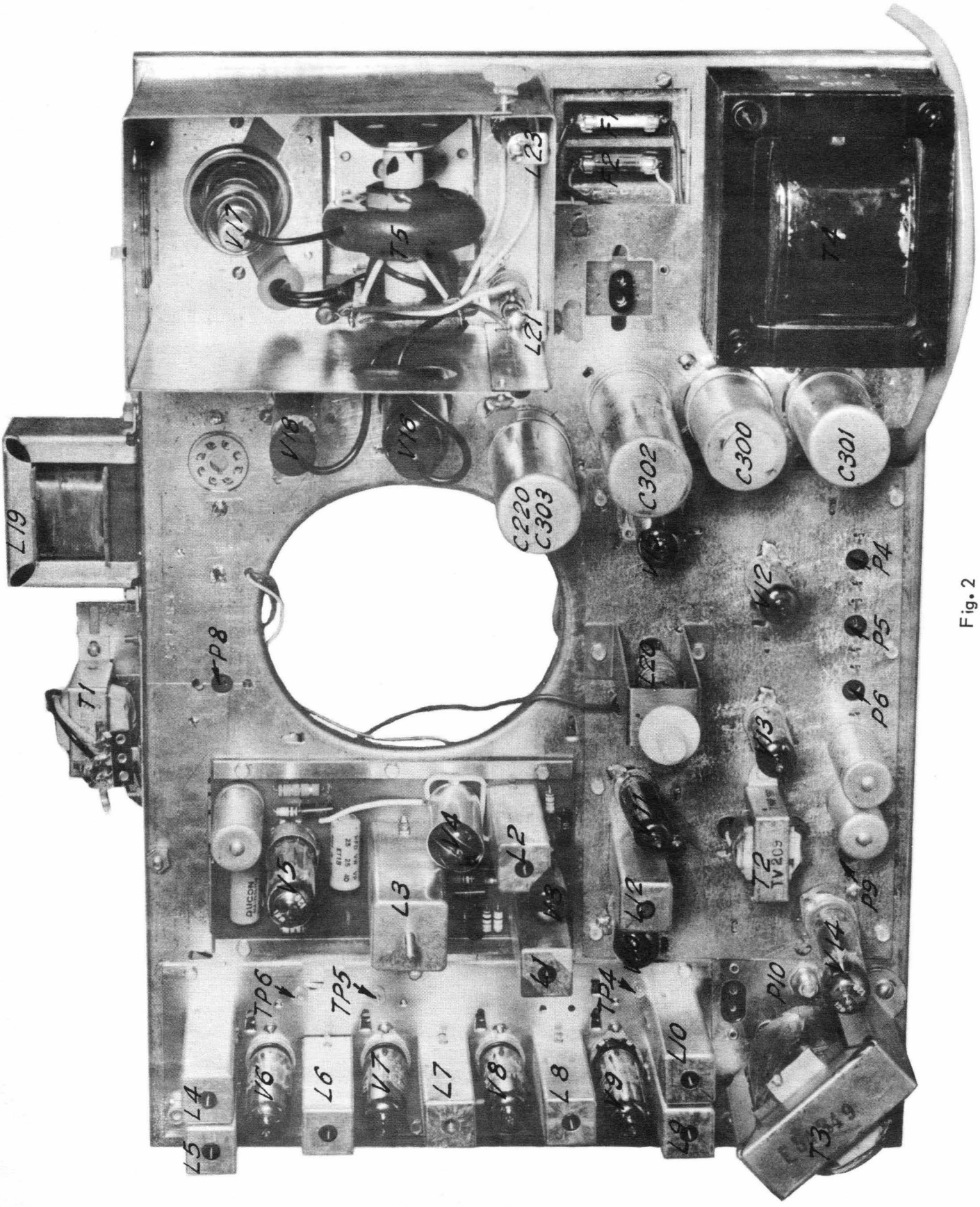

L19
T1
TP8
V16
V16
C220
C303
C302
C300
C301
V17
T5
L23
L21
T4
P4
P5
P6
P7
P8
P9
P10
P11
P12
T2
T3
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
L11
L12
L13
L14
TP4
TP5
TP6
V5
V6
V7
V8
V9
V10
V11
V12
V13
V14
T349

Fig. 2

SPECIFICATION

This Television Receiver is designed to operate on the Australian 625 line 50 field system.

The main features of the circuit are the use of automatic frequency control, keyed amplified automatic gain control, noise gating and a multi channel turret tuner. The receiver has high sensitivity and an electro statically focussed cathode ray tube is fitted.

There are 18 Valves in the receiver plus 6 germanium diodes, 2 silicon rectifiers, 1 selenium rectifier, and the cathode ray tube.

Circuit Reference	Type	Function
V1	6ES8	R.F. Amplifier
V2	6U8/ECF82	Frequency Converter and Local Oscillator
V3	6AU6	First sound I.F. Amplifier
V3	6AU6	Second sound I.F. Amplifier
V5	6BM8/ECL82	Audio Amplifier and Output
V11	6BY7/EF85	First I.F. Amplifier
V12	6BX6/EF80	Second I.F. Amplifier
V13	6BX6/EF80	Third I.F. Amplifier
V14	6BX6/EF80	Fourth I.F. Amplifier
V15	6U8/ECF82	Video Amplifier & Synchronising Amplifier
V16	6AQ5	Video Outlet Amplifier
V17	23WP4	Cathode Ray Tube
V21	6AU6	Keyed A.G.C. Amplifier and A.G.C. Clamp
V22	6CS6	Noise Gating and Synchronising Separator
V23	6BM8	Vertical Output & Vertical Blocking Oscillator
V31	6EA8	Horizontal Oscillator, Discharge & Control
V32	6CM5	Horizontal Output
V33	1B3GT	E.H.T. Rectifier
V34	6AL3/EY88	Damper Diode
D6 & D7	2 x FST 1/4	Mains Rectifiers
D4	GD10	D.C. Restorer Diode
D3	GD4	Video Detector
D1 & D2	20A79 or GD6	Ratio Detector
D8 & D9	2 x GD8	Horizontal A.F.C. Detector
D5	GD8	A.G.C. Clamp Diode

Aerial: The aerial input impedance is 300 ohms balanced.

Tuning Range: Channels 1 – 10 (Australian frequency allocations)

Intermediate Frequencies:			
	Picture	I.F. Carrier	36.0 Mc/s.
	Sound	I.F. Carrier	30.5 Mc/s.
	Intercarrier	Sound I.F.	5.5 Mc/s.
Bandwidth:	At the 3db points approx.		4.0 Mc/s.
	At the 6db points approx.		4.6 Mc/s.

Time Base Non-Linearity: Better than 10%

Power Supply: 200 - 280 volts A.C. 50 cycles

Power Consumption: 240 volts Amperes (Maximum)

Speaker: 23" Console Model 8" Circular Permagnetic plus 4" Circular Permagnetic.

Controls: The following controls are placed at the front of the cabinet:-

On/Off and Volume	Vertical Synchronising
Brightness	Tone Control
Channel Selector	Contrast
Fine Tuning	

The following preset controls are located at the rear of the receiver:-

Vertical Height	Automatic Gain Control Delay
Vertical Linearity	Automatic Gain Control Level
Vertical Linearity (Top)	Picture Width
Sync. Stability	Horizontal Linearity
Horizontal Drive	Picture Centering
Horizontal Frequency Control	Horizontal Hold

CIRCUIT DESCRIPTION

THE TUNER

The tuner unit comprises of a high frequency amplifier and a frequency converter. A separate set of coils is used for each channel, the coils being mounted in a twelve position turret. Electrical connections between the coils and associated circuits are made by silver contacts and wipers.

The R.F. Amplifier (V1) is an 6ES8 double triode valve connected as a cascode amplifier. A tuned secondary transformer (L1) is used to match the 300 ohm balanced aerial feeder to the input grid of the cascode circuit. A bridge network is used to achieve minimum feedback; reduce oscillator radiation and ensure that the input circuit is balanced.

A bandpass coupled circuit (L2) is used between the output of the cascode amplifier and the control grid of the pentode section of (V2) and the ECF82 frequency converter valve.

The triode section of the frequency converter valve is connected as a Colpitts Oscillator. The inductor (L6) of the oscillator circuit is wound on the same former as the bandpass coupling circuit and consequently the oscillator volts are mixed with the incoming high frequency signals. A high degree of oscillator stability is obtained by compensation using negative temperature coefficient capacitors.

The oscillator coil inductance (L6) is adjusted by means of a brass core. The other coils (L1 and L2) are adjusted by movement of the end turns.

The first tuned circuit of the intermediate amplifier (L7) is connected to the plate of the pentode section of the ECF82. Test points Nos. 1 and 2 are provided for use in aligning the tuner coils.

The following ten channels are provided :–

Channel	Video Carrier	Sound Carrier
1	50.25 Mc/s.	55.75 Mc/s.
2	64.25 Mc/s.	69.75 Mc/s.
3	86.25 Mc/s.	91.75 Mc/s.
4	133.25 Mc/s.	138.75 Mc/s.
5	140.25 Mc/s.	145.75 Mc/s.
6	175.25 Mc/s.	180.75 Mc/s.
7	182.25 Mc/s.	187.75 Mc/s.
8	189.25 Mc/s.	194.75 Mc/s.
9	196.25 Mc/s.	201.75 Mc/s.
10	210.25 Mc/s.	215.75 Mc/s.

THE COMPOSITE I.F. AMPLIFIER

The receiver utilises the intercarrier sound system and hence uses a common intermediate frequency amplifier for both vision and sound.

The amplifier uses one 6BY7 (V6) and three 6BX6 Valves (V7, V8, and V9) and four Tuned circuits (L6, L7, L8 and L9) arranged as a staggered quadruple. The coupling circuits L7 and L5 between the plate of the converter valve (V2) and the control grid of the first I.F. Amplifier (V6) form a bandpass circuit. The tuned circuits used in the amplifier are bifilar wound transformers.

A GD4 Germanium Diode is used as the video detector and is connected inside the screening can of the final tuned circuit (L9). This greatly reduces the feedback from the output to the input of the vision amplifiers.

THE VIDEO AMPLIFIER

Two stages of video amplification are used. The first amplifying stage employs the pentode section of V10 type 6U8 Valve and this is connected to the video detector. The output from the video detector is adjusted by means of the A.G.C. level control P4 to deliver 1.4 volts peak to peak signal at test point T.P.4. The output from video amplifier V10 is capacitance coupled via C133 to the control grid of V16 the video amplifier valve type 6AQ5 D.C. restoration is employed and this is accomplished by the GD10 diode (D4).

Compensation coils L13, L14, L15 and L16 are used to compensate for the effect of valve and wiring capacitances in order to maintain the necessary high frequency response.

An additional 5.5 Mc/s. trap (L12) is included in the circuit for the rejection of the sound carrier.

The overall gain of the video amplifier is varied by the contrast control (P3) which is connected in the cathode circuit of V11 and utilizes the principle of negative current feedback.

THE SOUND I.F. AMPLIFIER

The sound intermediate frequency amplifier is tuned to 5.5 Mc/s. the frequency difference between the sound and vision carriers. The input to the amplifier is connected to the video detector.

There are two stages of amplification using 6AU6 valves V3 and V4. This is followed by diodes 2 – OA79 connected in a ratio detector circuit.

THE AUDIO AMPLIFIER

The output from the ratio detector after passing through the volume control (P1A) is amplified by the two stages in the 6BM8 Valve (V5). This valve can deliver up to three watts of power to the loud-speaker.

THE SYNCHRONISING and NOISE GATING CIRCUIT

This circuit employs two valves, a type 6CS6 (V13) and the triode section of V10.

The 6CS6 valve (V22) receives the composite video signal with positive going synchronising pulses from the plate of the first video amplifier (V10) and these are applied to the control grid (pin No. 7). The operating voltages of this valve are adjusted to produce the most favourable amplification of the synchronising pulses relative to the video information.

To minimise the effect of positive going noise pulses that could be passed through the synchronising separator a noise gating circuit is used. A small amount of the video signal is coupled from the video detector output (test point TP4) via R211 to the grid No. 1 of the 6CS6 valve (V13). This signal is 180° out of phase with the signal which is applied to the control grid (pin No. 7). A positive bias is also applied to grid No. 1 which cancels the negative potential obtained from the video detector. The amount of the bias may be adjusted by means of the sync. stability control (P6) to a condition where any noise pulses which occur will exceed the positive bias and cut off the 6CS6 valve (V13). This results in the synchronising pulses at the plate of the valve having small portions missing and makes a readily observable improvement on the receiver in the presence of interference.

The synchronising information is coupled from the plate of the 6CS6 valve (V13) to the triode of V10. The vertical synchronising pulses are amplified and passed on to vertical integrating circuit.

The horizontal pulses are removed from the plate circuit of V13.

THE AUTOMATIC FREQUENCY and HORIZONTAL SCANNING CIRCUITS

Automatic frequency control of the horizontal oscillator is accomplished by the horizontal phase detector circuit which employs two germanium diodes type GD8. The horizontal synchronising pulses from V13 are applied to the two diodes together with a saw-tooth wave derived from the horizontal output transformer. By comparing the phase of the synchronising pulses and the saw-tooth wave the diodes produced a potential which is used to control the frequency of the horizontal control valve V15.

The horizontal oscillator employs the pentode section of V15 connected as a Hartley oscillator and and discharge section. The control voltage of the A.F.C. comparitor alters the grid voltage of the control triode V15 and so controls the frequency of oscillator (V15 pentrode section). The output at the plate of the horizontal output valve type 6CM5 (V16) is coupled to the deflection coils (L24) by means of an auto-transformer T5. The core material of the transformer is a ferrite known as Feramic and the windings are of the wave wound type. The E.H.T. winding is a separate winding, and the design of the unit is such that it has an adequately fast retrace time to meet the requirements of the 625 line system.

The 6AL3/EY88 (V18) rectifier is used to reclaim power from the deflection coils and thus improve the efficiency of operation.

The transformer produces a 17 Kv supply for the picture tube final anode. The E.H.T. rectifier (V17) is a type 1B3GT valve.

THE VERTICAL SCANNING CIRCUIT

A type 6MB8 valve (V14) is employed for vertical scanning. The triode section of V14 (6BM8) is used in a conventional blocking oscillator circuit whilst the pentode section is used in the vertical output stage, the output is transformer coupled to the deflection coils by means of the vertical output transformer (T3).

THE AUTOMATIC GAIN CONTROL CIRCUIT

A pentode valve type 6AU6 (V12) is used to provide the bias for the tuner and the first two intermediate frequency amplifier valves (V6 and V7).

The cathode of the 6AU6 Valve (V12) is connected to a variable positive potential controlled by the automatic gain control level potentiometer (P5). The grid is directly connected to the output of the first video amplifier (V10). The plate of the valve is fed by pulses taken from the horizontal output transformer (T5). By this method the current is determined during the synchronising pulse period only. The magnitude of the current is determined by the peak carrier level.

The circuit is so designed that the clamp diode (D5) will hold the R.F. bias to zero until the signal becomes strong enough to provide a snow free picture with maximum R.F. amplifier gain. The A.G.C. delay potentiometer (P4) may be used to vary the point at which the clamp diode loses its control and in this way enables the most favourable signal to noise ratio to be obtained at all levels of signal input.

The use of gated and amplified gain control ensures that the carrier level at the vision detector is constant for all signal input levels and is independent of picture content. The effects of interference are also kept to a minimum.

POWER SUPPLY

The mains transformer (T4) is designed for use with the appropriate supply voltage. Two FST 1/4 silicon diodes are used as mains rectifiers.

Filament windings on the transformer provides a 6.3 volt supply.

UNPACKING and SET-UP INSTRUCTIONS

These receivers are shipped complete in one corrugated cardboard carton with the picture tube fitted. To properly unpack receiver refer to the unpacking instructions attached to the exterior of the shipping carton.

After the receiver has been unpacked, the following inspection checks and adjustments should be made before placing the receiver into operation.

1. The general appearance and condition of the cabinet.
2. All valves in place and in their respective sockets, and the picture tube socket on tight.
3. Mechanical operation of controls.
4. Check that the speaker and yoke plugs are inserted in their respective sockets and that the high voltage anode lead is securely inserted in the socket on the exterior of the picture tube.

POWER SOURCE

These receivers are designed for operation from an alternating current power source of from 200 to 280 volts at a frequency of 50 cycles per second.

Before connecting the receiver to the power source a check should be made that the mains selector plug is in the correct position.

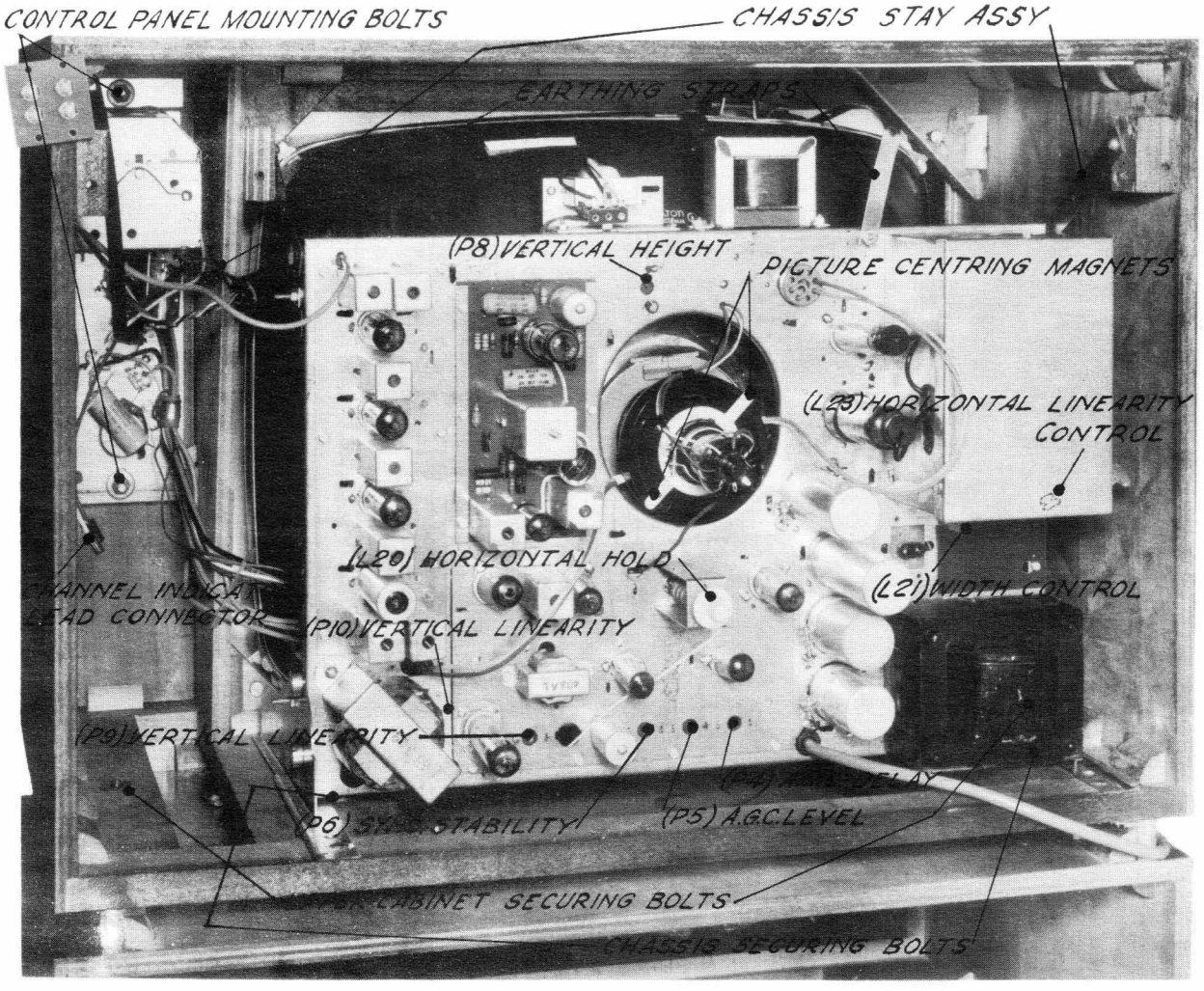


Fig. 3

OPERATING PROCEDURE

The following procedure should be adopted when tuning the receiver for the first time or if the various controls have been disturbed since the receiver was last operated.

(a) Refer to Fig. 3 which shows the location of the controls.

(b) Turn the receiver on by rotating the ON – OFF SOUND VOLUME CONTROL in a clockwise direction. Permit the receiver to establish an initial condition of stable operation by allowing two minutes to elapse then –

(c) Set the CHANNEL SELECTOR to the channel number of the desired transmitting station.

(d) Adjust the FINE TUNING CONTROL for the best (sharpest) detail in the picture (not necessarily the brightest picture), and good sound reproduction.
Do not endeavour to set the sound volume by rotating the FINE TUNING CONTROL for this purpose.

(e) Rotate the PICTURE BRIGHTNESS CONTROL from its extreme counter-clockwise position where the picture tube screen is sufficiently lighted. The CONTRAST CONTROL (P3) has been pre-set in the factory and should not be readjusted unless the receiver is operating in areas of low signal strength in which case it may be necessary to increase the contrast by rotating the CONTRAST CONTROL clockwise.

(f) If the picture is broken up by a series of diagonal bars, adjust the HORIZONTAL HOLD CONTROL at the rear of the receiver.

(g) If the picture moves up or down, adjust the VERTICAL HOLD CONTROL (P7).

(h) After sufficient time (approximately ten minutes) has been allowed for the components to reach their normal operating temperatures, it may be necessary to readjust the FINE TUNING CONTROL as outlined in Step D.

SIMPLIFIED OPERATING PROCEDURE

Use this procedure if controls have not been disturbed since the receiver was last operated.

(a) Turn the receiver on by rotating ON – OFF VOLUME CONTROL clockwise. Allow two minutes warm up period.

(b) Rotate the CHANNEL SELECTOR to the channel number of the desired transmitting station.

(c) Adjust the FINE TUNING CONTROL for the best picture and good sound re-production. Adjust the SOUND VOLUME CONTROL for desired sound level. DO NOT ROTATE TUNING TO ADJUST VOLUME.

(d) If the picture is broken up by diagonal bars, adjust the HORIZONTAL HOLD CONTROL (At rear)

(e) If the picture moves up or down, adjust the VERTICAL HOLD CONTROL (P7).

(f) After approximately ten minutes, readjust the FINE TUNING CONTROL as outlined in Step C.

PRESET ADJUSTMENTS (REAR)

The VERTICAL HEIGHT (P8) and VERTICAL LINEARITY CONTROLS (P9 and P10) have been preset at the factory for best operation and should not be reset unless absolutely necessary. If these controls are distrubed it will be necessary to reset them to obtain correct picture height and vertical linearity. As these control settings are not entirely independent of each other, then the adjustment is somewhat critical.

SYNC. STABILITY CONTROL (P6)

This control is adjusted at the factory and in good signal reception areas will require no further adjustment. In low and adverse signal areas an improvement may be effected by careful adjustment of this control.

NOTE: Care should be taken when adjusting this control otherwise sync. instability can result.

HORIZONTAL HOLD CONTROL

Adjusting Procedures :-

(1) Tune the receiver to a television transmission.

(2) Remove the cabinet back.

(3) Adjust the picture centring magnets to a position which will allow the right hand edge of the raster to be observed.

(4) Reduce the contrast control setting and advancing the brightness control observe the blanking bar at the right hand side of the raster (picture).

(5) The horizontal hold control should now be adjusted to a position that will allow approximately 3/16'' of blanking bar to be observed.

(6) On completion of the above, tune the receiver to all operational transmitting stations and observe that the picture falls into synchronisation.

(7) Finally recentre the picture by means of the centring magnets and refit the cabinet back.

A.G.C. DELAY CONTROL (P4)

This control is adjusted at the factory for maximum receiver performance over a wide range of signal input levels and in good signal strength areas will require no further adjustment. In areas where the signal strength is of low order, an improvement in picture quality may be obtained by increasing the A.G.C. Delay; i.e. reducing the R.F. A.G.C. line bias at test point TP5.

A.G.C. LEVEL CONTROL (P5)

This control is adjusted at the factory to deliver 1.4 volts peak to peak signal at the video detector output (test point TP4) and should require no further adjustment.

HORIZONTAL WIDTH CONTROL (L21)

After the horizontal drive has been correctly set the picture width can be adjusted by means of the slider adjustment at the rear of the chassis. The picture width should be set so that with correct mains voltage the raster overscans the tube face proper by at least one inch at each side.

HORIZONTAL LINEARITY CONTROL (L23)

This preset adjustment provides a small degree of control over the horizontal linearity of the raster. When setting this slider adjustment a position should be selected near minimum output valve V16 cathode current.

PICTURE CENTERING

The picture (raster) after correctly synchronising, is centered by means of the centering device on the yoke, the two sliding magnets being moved relative to each other to obtain the desired result.

Care must be taken not to produce picture distortion.

INSTALLATION INSTRUCTIONS

A built in aerial is not provided in the receiver and consequently either an indoor aerial or an outdoor aerial must be used depending on the site of the installation.

The input impedance of the receiver is 300 ohms and balanced and a suitable four terminal connector panel is arranged on the receiver to permit connection of the 300 ohms flat twin lead from the aerial. (See Service Notes)

An ettective aerial and transmission line system is a very important factor in obtaining good television reception in many areas where signal strength is not great and where interference conditions exist. If the installation is not properly made, satisfactory reception cannot be expected. The aerial used should be of a type and configuration chosen to suit the site conditions. A lightning arrester should be fitted in the lead in cable.

RECEIVER LOCATION

Selection of a suitable receiver location in the home or other place of installation should be decided upon only after the following factors have been taken into consideration.

1. The convenience of connecting the A/C power lead and the outdoor aerial lead in if required.
2. The location of the receiver should be such that no strong direct light from lamps or windows will fall on the picture or shine in the eyes of the viewers.
3. Sufficient space must be available in front of the receiver for the anticipated number of viewers. Normal viewing distance for a twenty-one inch picture tube is ten to twelve feet from the front of the receiver and eight to ten feet for a seventeen inch picture tube.
4. It is desirable that the receiver be placed away from sources of heat, such as hot air vents or radiators and that adequate clearance should be allowed at the back of the receiver to permit circulation of air through the rear of the cabinet.

CHECK OF OPERATION

At the time of installation a final operating check of the receiver should be made. The necessary final adjustments to the preset controls should be made at this time to provide proper operation of the receiver. The customer should be instructed in the proper operation of the receiver, and cautioned that the non-operating controls should be adjusted only by an experienced television service man.

1. Check control knobs for clearance between inner and outer concentric knobs so that the rotation of each knob is independent of its associated inner or outer knob.
2. Insert the power lead plug into the 50 cycle per second A.C. outlet point.
3. Switch the receiver on at the power outlet and receiver ON – OFF CONTROL. Rotate the CHANNEL SELECTOR CONTROL to a channel on which a television program is being transmitted (preferably a test pattern program).
4. Adjust the FINE TUNING CONTROL for best picture with the volume control set at minimum volume. Then set the volume control for the desired sound level.
5. If difficulty is experienced in obtaining a satisfactory picture, check the A.G.C. level control. (P5) and/or the A.G.C. delay control (P4). These controls have been preset at the factory to reproduce 1.4 volts peak to peak signal at the video detector output (test point TP4) and normally will not require any further adjustment.
6. Adjust the brightness, horizontal hold and vertical hold controls to obtain a picture. If necessary readjust the fine tuning control for the best picture detail.
7. The vertical height, vertical linearity, horizontal width and horizontal linearity controls may require adjusting to obtain the best picture geometry. The vertical height and vertical linearity adjustment are co-related, therefore these controls should be adjusted at the same time to provide

proper height and good vertical linearity.

8. In order to eliminate corner cutting, it is important that the deflection yoke be positioned as far along the neck of the tube as possible. If the picture is tilted the holding clip should be loosened and the yoke rotated to the desired position. If the picture is not centred on the screen it can be corrected by means of the centering magnets attached to the rear of the deflection yoke. The picture tube is electrostatically focussed and does not require any focus adjustments.

9. Readjust the width controls as required.

10. Recheck the horizontal hold control and determine that with the horizontal hold control adjusted to the centre of the hold range, the picture is centered horizontally.

11. Adjust the contrast control to 3/4 of its maximum rotation.

12. Turn the channel selector control to each channel on which reception is obtained. The picture should fall into sync. on all channels on which signals of normal strength are received.

13. Adjust the fine tuning control to obtain the best picture and check the quality of reception, picture and sound on all available television stations in the area.

MECHANICAL DETAILS

1. Servicing The Receiver

The design of the receiver permits the majority of service to be made without the need for complete chassis removal from the cabinet.

Before commencing service to the receiver reference should be made to the two photographs Figures 3 & 4, after which proceed as follows:

(a) Remove the cabinet back and detach the antenna terminal panel.

(b) Remove the Channel Selector Knob (Refer to paragraph 7).

(c) Remove the five remaining control knobs by affixing a suitable piece of cord behind the appropriate knob and pull off.

(d) Remove the four chassis securing bolts together with the two earthing straps and the two control panel mounting nuts.

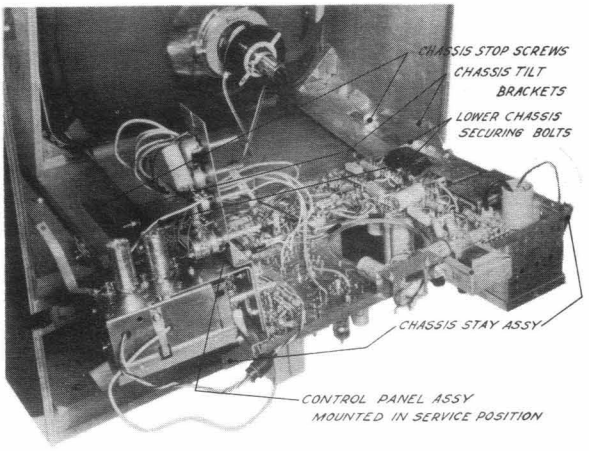


Fig. 4

(e) Pulling the chassis slightly back from the cathode ray tube disconnect as follows: The Yoke Plugs, E.H.T. Supply Lead, C.R.T. Tube base socket, Channel Indicator Lamp Supply and Speaker Leads.

(f) The chassis may now be pulled along the runner rails flush with the rear of the cabinet, after which slightly lifting the chassis tilt it over to the position as shown in Figure 5.

(g) The control panel assembly may now be mounted as shown in Figure 4, and by using suitable extension service leads the receiver may be operated in this position.

(h) To reassemble, the above procedure should be reversed.

2. Removing The Chassis

(a) Remove the two chassis stop screws and slide out the chassis complete with tilt brackets and control panel assembly from the rear of the cabinet.

(b) Refitting, reverse the procedure.

3. Cleaning the Safety Glass.

Before attempting removal of the safety glass refer to Figures 3, 5 & 6 showing the location of the various screws, after which proceed as follows:-

(a) Loosen the two bolts securing the upper cabinet. Access to these bolts may be gained from the rear of the lower speaker compartment.

(b) Slide the upper cabinet forward as shown in Figure 5.

(c) Remove the three frame retaining screws.

(d) Carefully pulling the frame in a downward and outward direction remove the frame.

(e) The three screws holding the glass retaining strip may now be removed.

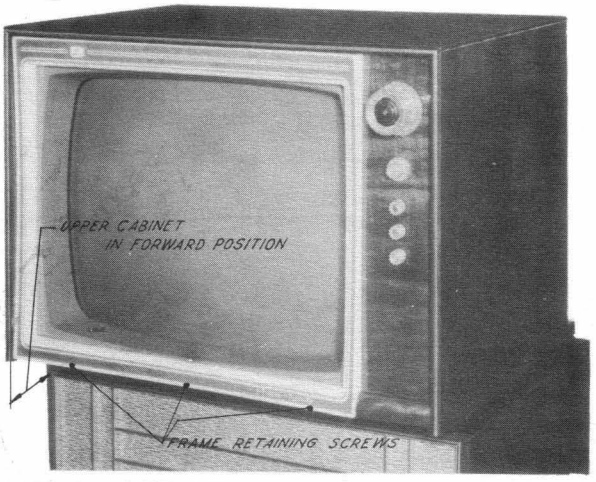


Fig. 5

(f) Pulling the top edge of the screen out as shown in Figure 6 remove the safety glass complete with mask.

(g) To detach the glass from the mask remove the two clips at the sides of the screen.

(h) Before reassembly it is suggested that the mask and picture tube face are also cleaned.

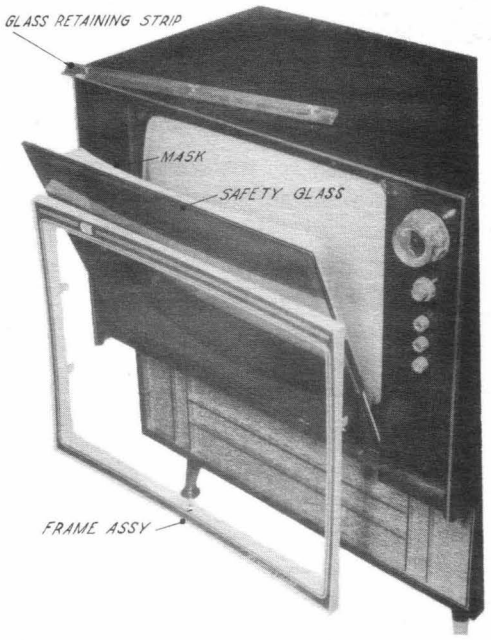


Fig. 6

4. Removing The Picture Tube

The following procedure should be used when removing the picture tube:-

(a) Remove the cabinet back.

(b) Disconnect the two deflection yoke plugs, picture tube base sockets and E.H.T. anode connector.

(c) Remove the c.r.t. earthing connector strip from the chassis.

(d) Remove the safety glass (refer to paragraph 3).

(e) Supporting the picture tube remove the four mounting nuts as shown in Figure 7.

(f) The picture tube complete with tube mounting strap assembly and deflection yoke may now be removed.

(g) Before removing the tube from the strap assembly, carefully measure and note the position of the strap and mounting clips, after which remove the strap assembly and refit in a similar position onto the new tube.

CAUTION: The picture tube is highly evacuated and extreme care should be exercised at all time. Protective goggles should be used.

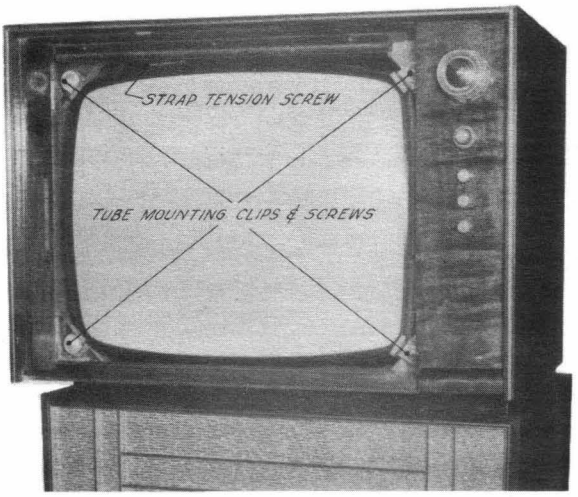


Fig. 7

5. Removing The Deflection Yoke

When removing the deflection yoke use the following procedure:-

(a) Remove the cabinet back.

(b) Remove the c.r.t. base socket together with the two yoke plugs.

(c) Remove the yoke holding clip shown in Figure 3.

(d) The deflection yoke may now be slipped off the neck of the picture tube.
(NOTE: On some models due to the chassis position in the cabinet it may be necessary to slide back the chassis.

6. Replacing The Turret Tuner

Before commencing removal of the turret tuner refer to Figures 3 & 8 showing the method of fixing, after which proceed as follows:-

(a) Remove the cabinet back and detach the serial panel.

(b) Remove the tuner supply and converter coupling plugs.

(c) Remove the front control knobs (for the channel selector knob details refer to paragraph 7).

(d) Remove the control panel mounting nuts as shown in Figure 3 and withdraw the control panel assembly pictures in Figure 8.

(e) The turret may now be detached from the panel assembly by removing the three turret mounting screws.

(f) To reassemble, reverse the procedure.

(g) After turret replacement, the receiver alignment should be checked (see under Alignment Instructions.

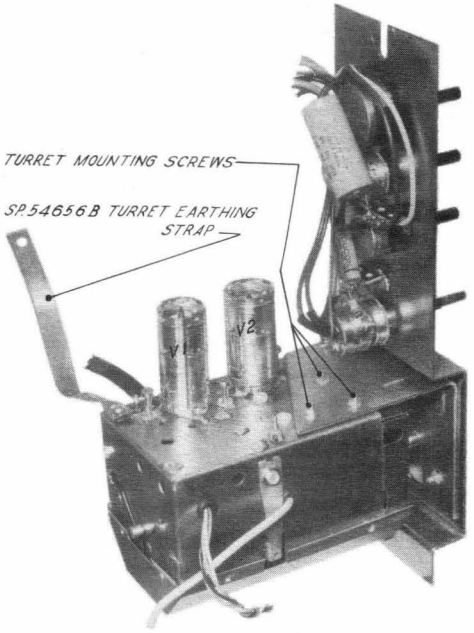


Fig. 8

7. Removing the Channel Selector Knob

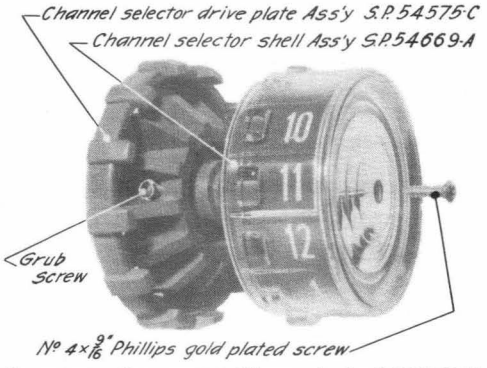
The channel selector knob comprises:- The Drive Plate Part Number SP54575C and the Outer Shell Part Number SP54669B.

To remove the knob refer to figure 9, after which proceed as follows:-

(a) Remove the Phillips gold plated screw securing the outer shell to the drive plate.

(b) Loosen the grub screw, permitting the drive plate to be pulled off the turret tuner spindle.

On reassembly care should be taken to ensure correct channel indexing, noting that Channel 1 is positioned over the grub screw.



CHANNEL SELECTOR KNOB ASS'Y S.P.54670-A

Fig. 9

8. Replacing The Channel Indicator Lamp

Refer to Figure 10, after which proceed as follows:-

(a) Remove the channel selector knob as outlined in paragraph 7.

(b) Using a piece of suitable cord remove the fine tuning knob.

(c) Remove the two screws securing the light mask.

(d) Ease out the dial lamp holder and replace lamp.

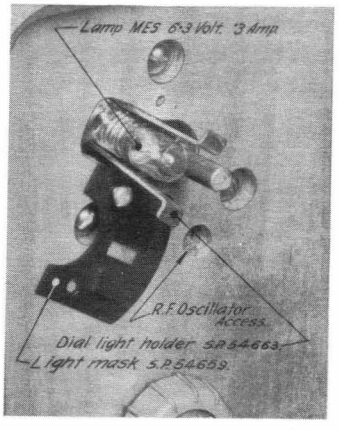


Fig. 10

EQUIPMENT REQUIRED

The following is a list of the Test Equipment that is required for proper alignment of this receiver.

The equipment should meet the specifications stated. The actual alignment of the video (composite) and sound intermediate frequency sections requires the use of a RF Signal Generator and Vacuum Tube Voltmeter. The RF Sweep Generator and Cathode Ray Oscilloscope are required to check the overall RF, IF and sound IF response curves.

1. RF SWEEP GENERATOR

(a) Centre frequency ranges:–

5 – 6 Mc/s.
29 – 39 Mc/s.
49 – 92 Mc/s.
132 – 146 Mc/s.
174 – 216 Mc/s.

(b) Sweep Width

Variable to 15 Mc/s. on all ranges except the 5 to 6 Mc/s. range for which the sweep width required is 500 Kc/s.

(c) Output

Variable with at least 0.1 volt (for maximum setting of attenuator). Constant output on all ranges with flat output at all attenuator positions.

2. RF SIGNAL (MARKER) GENERATOR

(a) Frequency range for sound IF adjustment.

5.5 Mc/s. crystal controlled oscillator with provision for at least two additional markers ± 100 Kc/s. about the 5.5 Mc/s. value.

(b) Frequency range for composite IF adjustment.

28.0 to 39.0 Mc/s. – with means for checking the frequency at fixed points against a crystal calibrator.

(c) Frequency range for RF adjustment.

Either crystal controller markers or markers capable of being set to an accuracy of (at least) 0.1% are required for the provision of the video and sound carrier markers for each channel listed below.

Channel Number.	Video Carrier	Sound Carrier
1	50.25 Mc/s.	55.75 Mc/s.
2	64.25 Mc/s.	69.75 Mc/s.
3	86.25 Mc/s.	91.75 Mc/s.
4	133.25 Mc/s.	138.75 Mc/s.
5	140.25 Mc/s.	145.75 Mc/s.
6	175.25 Mc/s.	180.75 Mc/s.
7	182.25 Mc/s.	187.75 Mc/s.
8	189.25 Mc/s.	194.75 Mc/s.
9	196.25 Mc/s.	201.75 Mc/s.
10	210.25 Mc/s.	215.75 Mc/s.

3. CATHODE RAY OSCILLOSCOPE

(a) Wideband vertical deflection
(b) Vertical Input Provided with a calibrated attenuator
(c) Low capacity probe
(d) High sensitivity (30 mV per inch deflection).

4. VACUUM TUBE VOLTMETER

(a) High input impedance
(b) Low voltage range (1.5 volts D.C.)
(c) A high voltage probe is required for measuring the EHT voltage for the picture tube. Those instruments are not usually very accurate and should be used as a guide only for this purpose.

GENERAL

During alignment of a television receiver, the test signal obtained from the signal generator and/or sweep generator should not be stronger than that required to produce the desired oscilloscope pattern/or voltmeter reading. When using the voltmeter for indication, the signal should be no stronger than that required to produce a reading of 1.0 to 1.5 volts at the video detector test point No. TP4. When using the oscilloscope for display purposes, it should be operated at high gain.

All chassis and connecting leads,must, in operation, be "cold", touching the leads with the hand should produce no change in the reproduced scope pattern or meter reading. If the hand does produce a change, evidently there is present an unstable condition which must be corrected by better grounding together of the chassis and all instruments in use.

Under normal conditions, complete alignment of a television receiver will not be necessary. The circuits employed are sufficiently stable that they will not require alignment unless the adjustments have been tampered with, or if components in these circuits become defective and are replaced. In the case where the receiver does not require a complete realignment, information is furnished in the following paragraphs which will enable the serviceman to perform the necessary adjustments in the proper manner.

To perform a complete realignment, the chassis may be removed from the cabinet. Using the two tilt brackets, the receiver chassis may be operated in the vertical position.

When performing a complete realignment, it is suggested that the following sequence of adjustment be observed.

1. Sound Ratio Detector
2. Sound IF Amplifiers
3. 5.5 Mc/s, Video Trap
4. Converter coupling circuits
5. Composite IF Trap Adjustments
6. Composite IF Transformers
7. RF Oscillator Adjustments
8. RF and Converter Adjustments

SOUND RATIO DETECTOR

1. Connect the high side of the signal generator to pin 1 of the 6AU6 (V4) limiter grid via a .01 mF capacitor and the low side of the generator to ground. Set the generator frequency to 5.5 Mc/s. This 5.5 Mc/s. signal should be accurately calibrated since the alignment of the sound channel at any improper frequency will cause distortion or even complete loss of the sound.

2. Connect the vacuum tube voltmeter to the junction of R28 and C41 in series with a 1 megohm resistor and set it to the 15 volt range. (Refer to Service Notes)

3. Adjust the primary of L31 (bottom) for maximum reading on the meter.

4. Connect the vacuum tube voltmeter to the junction of R26 and C40.

5. Adjust the secondary tuning L3 (top) for zero reading.

This adjustment will provide a positive or a negative reading on the meter. The proper setting is the point of zero output on the meter as the reading swings from positive to negative value.

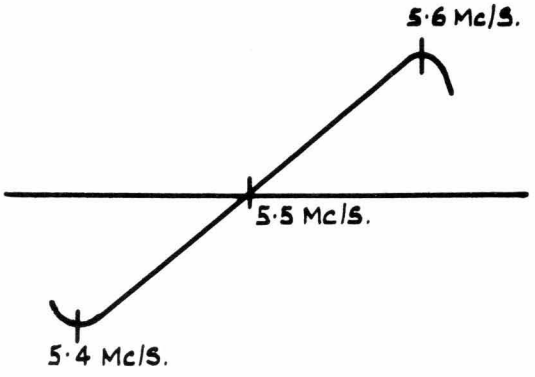


Fig. 11

As a final check of the ratio detector alignment, connect the sweep generator to the 6AU6 (V4) limiter grid (pin 1). Adjust the sweep generator output for approx. 500 Kc/s. sweep with a centre of 5.5 Mc/s. Connect the Oscilloscope to junction of R26 and C40 and chassis to observe the response curve. The ideal curve is shown in Fig. 11. If it is not symmetrical, adjust the secondary (top) of L31 to obtain symmetry.

Markers at 5.4 and 5.6 Mc/s. should be used to determine the peak to peak bandwidth of the ratio detector.

SOUND IF TRANSFORMERS

1. Connect the high side of the signal generator to the grid (pin 2) of the 4th IF Amplifier valve (V9).. Set the generator to 5.5 Mc/s.

2. Connect the vacuum tube voltmeter to the test point TP3.

3. Adjust L1 and L2 to give maximum indication on the vacuum tube voltmeter.

4. Connect the sweep generator to the grid (pin 2) of the 4th IF Amplifier tube (V9)1 and the oscilloscope to observe the response at test point TP3. With the generator set to give a sweep width of approx. 1 megacycle per second, the ideal response curve is shown in Fig. 12, and shows symmetry about the 5.5 Mc/s. marker.

5. Small departures from the initial settings may be made to obtain symmetry provided the gain is not permitted to deteriorate to any extent.

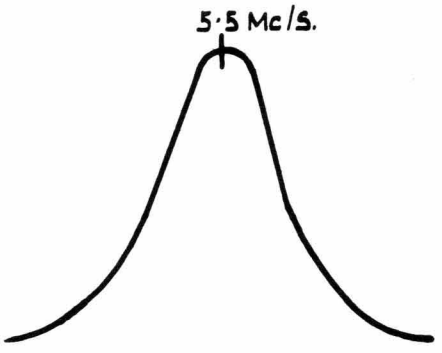


Fig. 12

5.5 Mc/s. VIDEO TRAP ADJUSTMENT

1. Connect a signal generator capable of providing a 5.5 Mc/s. accurately calibrated signal across the video detector load at test point TP4.

2. Connect the radio frequency A.C. probe of the vacuum tube voltmeter between the control grid (pin 7) and the chassis of V17.

3. Increase the output of the signal generator to obtain a convenient reading on the vacuum tube voltmeter.

4. Adjust the trap tuning core of L12 with an insulated screwdriver to obtain a minimum reading on the testmeter.

COMPOSITE IF TRAP ADJUSTMENT

1. Remove the keyed AGC amplifier valve (V12) from its socket.

2. Connect an external bias supply of approx. −6 volts between the test point TP6 and 4 volts between TP6A and the chassis. This bias potential can be obtained from a 9V bias battery and potentiometer network.

3. Connect the vacuum tube voltmeter across the video detector load resistor R121 (test point TP4).

4. Connect the signal generator to the grid of the ECF 82 (V2) converter (pin 2) through a .01 mF capacitor. Insert the .01 mfd condenser through the small round hole on ths eide of the tuner.

CAUTION: Do not move or reposition any components associated with the converter circuitry.

5. Set the channel selector to a position between channels, or to a spare channel position.

6. Adjust the signal generator to provide each of the following frequencies and adjust the corresponding trap coil to provide a minimum reading on the meter.

   (a) 37.5 Mc/s. L4 Adjacent channel sound trap

   (b) 37.5 Mc/s. L8 Adjacent channel sound trap

   (c) 29.0 Mc/s. L5 (top) Adjacent channel video trap

   (d) 29.0 Mc/s. L6 (top) Adjacent channel video trap

   (e) 30.7 Mc/s. L7 (top) sound carrier trap

In the foregoing adjustments, it may be possible to run the tuning cores through the coils and obtain two nulls. The correct null (minimum) will be the one which occurs when the cores are nearest the outer edge of the coils. If the cores are not correctly positioned, improper coupling will result, thus causing incorrect overall response.

CONVERTER COUPLING CIRCUIT

1. Connect a sweep generator to the converter grid through a .01 mf capacitor and adjust its centre frequency to approx. 33.5 Mc/s. with 10Mc/s. sweep width.

2. Connect the signal marker to the converter grid through a small capacitor. (Watch for loading of sweep input).

3. Connect an external bias supply of approx. −1.5 volts between the test point TP6 and the chassis. This bias can be obtained from a 9V bias battery and potentiometer network. The keyed AGC Amplifier valve V12 must be removed from its socket for this alignment.

4. Disconnect the lead from L6 to the plate (pin 7) of V6.

5. Connect a 220 ohm ½ watt carbon resistor between pins 7 and 8 of V6.

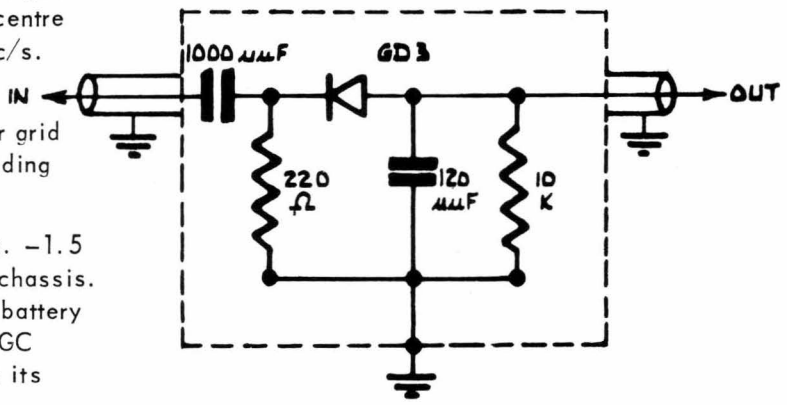


Fig. 13

6. Connect the oscilloscope, through the probe circuit shown in Fig. 13 between pin 7 of V6 and the chassis.

7. Adjust the signal (marker) generator to produce markers at 31.7 Mc/s. and 35.5 Mc/s.

8. Adjust the converter transformer L7 to peak at 35.5 Mc/s. and the inductance lL5 to peak at 31.7 Mc/s. to produce a curve similar to that shown in Fig. 14.

9. Remove test equipment and reconnect pin 7 (V6) to L6.

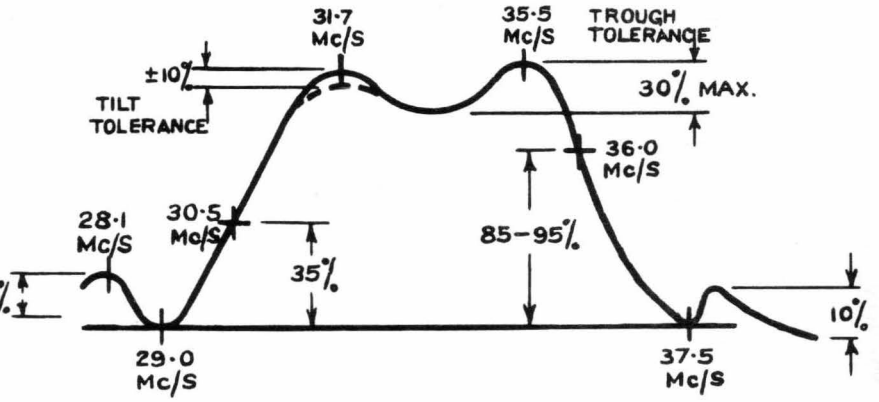


Fig. 14

VIDEO (COMPOSITE) IF TRANSFORMER ADJUSTMENTS

1. Remove the keyed AGC amplifier valve V12 from its socket.

2. Connect an external bias supply of approx. –6 volts between the test point TP6 and 4 volts between TP6A and the chassis. This bias potential can be obtained from a 9V bias battery and potentiometer.

3. Connect the vacuum tube voltmeter across the video detector load resistor R121 test point TP4

4. Connect the signal generator to a short tube shield placed over the converter tube and ground. Set the band selector to a free position.

5. Adjust the signal generator to provide each of the following frequencies in turn and adjust the corresponding coil tuning core to obtain minimum reading on the meter.

(a)	33.6 Mc/s	L6	bottom
(b)	31.5 Mc/s	L7	"
(c)	35.6 Mc/s	L8	"
(d)	32.4 Mc/s	L9	"

When tuning these circuits the tuning core should be moved from the full out position to the first position of tuning. Do not tune coils on the inner peak. If the tuning cores are moved through any great change in position then the trap adjustments should be checked or at least note made of the fact that the trap settings are to be checked on sweep operation.

6. Connect a sweep generator to the grid of the converter valve via a .01 mF capacitor and an oscilloscope across the video detector load resistor (TP4). The band selector must be set to a free position.

6a. Alternative method of sweep injection.

Connect the sweep generator to a short tube shield placed over the converter tube and ground. Set the selector to a free position. (The sweep generator output will have to be increased slightly when using this method of injection).

7. Adjust the sweep generator to display the overall IF response curve and set the signal generator to note the response at the desired frequencies as seen in Fig. 16.

8. Correct the response if necessary by retouching the composite IF tuning cores to obtain a response within the limits shown in Fig. 16.

9. Check that the trap coils are correctly set by noting that the trap frequency markers fall into the trough produced by trap attenuation and correct if necessary by returning the trap inductance concerned.

20. CAUTION Care must be taken to avoid overloading the receiver circuits under test due to excessive sweep or marker signals. When peaking the circuits the d.c. level at the detector load must not exceed 1.5 volts and the amplitude of the response curve must not exceed 3 volts peak.

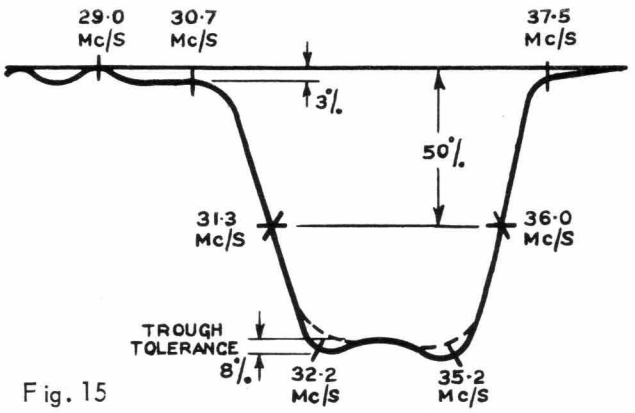


Fig. 15

RF AND CONVERTER ADJUSTMENT

1. Connect the sweep generator through a 300 ohm matching network or transformer to the aerial input terminals of the receiver.
2. Connect the oscilloscope to the plate test point of the turret unit via a low impedance crystal detector probe Fig. 13.
3. Connect a bias battery and potentiometer network to the test point TP5 and set the bias at this point to −0.5 volts.
4. Set the channel selector to Channel 9.
5. Adjust the sweep generator to sweep Channel 9 and adjust the signal generator to provide marker/signals at the picture and sound carrier frequencies for Channel 9.
6. Adjust the two RF trimmers C1 and C7 and the converter trimmer C12 (all located on the top of the RF tuner) for the curve as shown in Fig. 16 with maximum gain.

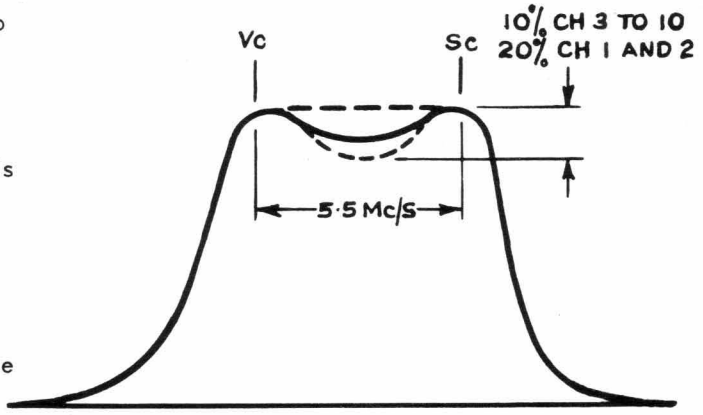


Fig. 16

7. Adjust the sweep and signal generators progressively for each of the remaining channels 10, 8, 7 etc. Observe the response and check the position of the markers. The curves for all channels should be within the limits shown by the curves in Fig. 16. If a particular channel does not fall within these limits, it is possible that a compromise can be made by adjusting the RF and converter trimmers as in steps 4, 5 and 6 to improve the channel that is out of limits. The response should then be checked on all other channels to determine the extent to which the other channels were affected by the compromise. (If this method proves unsatisfactory, the tuner should be returned to the factory for attention).

RF OSCILLATOR ADJUSTMENT

1. Connect the sweep generator to the aerial input terminals of the receiver.
2. Connect the marker generator to the receiver input terminals.
3. Connect the oscilloscope across the video detector load resistor R121 test point T4.
4. With the sweep generator set to sweep channel 9 and the signal generator set to the sound and video carrier frequencies for channel 9, observe the response curve when the tuner unit is set to this channel (Note: the bias conditions for this test are the same as for the composite IF transformer adjustments.)
5. With the fine tuning control fixed at its mid-position, check that the sound carrier frequency marker for all the remaining channels falls on the sound carrier plateau and make the necessary adjustments to ensure this is so. The adjustments are made by tuning the brass screwed core to a position in the coil which produces the desired results. A thin non-metallic screwdriver is required for this adjustment. The video carrier will fall at the −6 db point.

NOTE : The brass screw is accessible through the hole provided to the right of the turret spindle.

SERVICE NOTES

The Attenuator

A built in attenuator is provided in the receiver connected in series with the "Local" antenna terminals. In areas of good signal strength it is recommended these terminals be used.

The lower terminals marked "Distant" should be used in areas of low signal strength. It is also suggested that the links, used for connecting the "Local" attenuator to the "Distant" terminals, be disconnected to prevent unnecessary loss of signal.

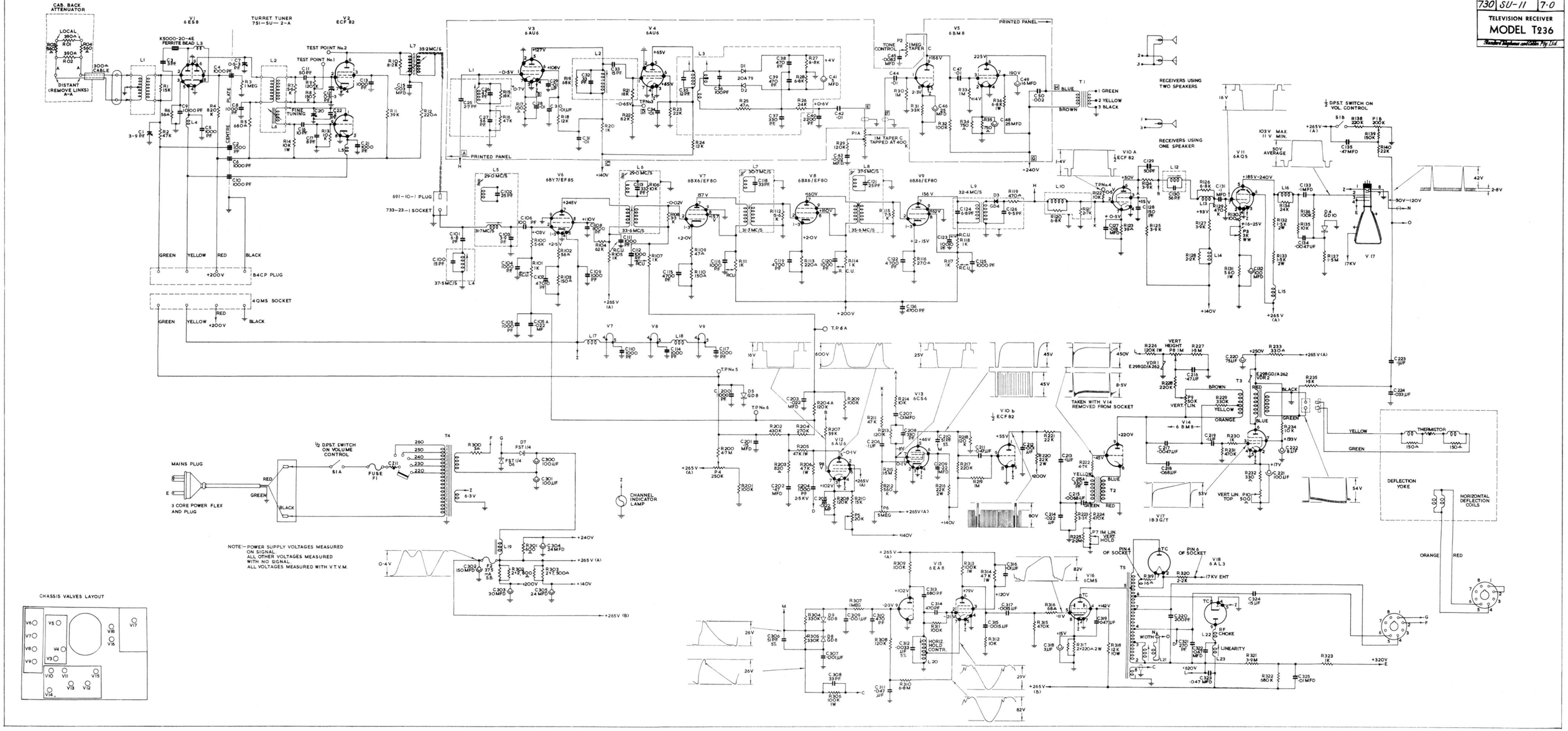
The Ratio Detector Transformer (L3)

The sound detector circuit is fully enclosed within the shielding can of L3.

To facilitate the connection of test instruments during the alignment of the sound section two small holes are provided in the side of the can.

The lower hole providing access to R26 whilst the upper hole provides access to the negative end of C41.

Where it becomes necessary to gain access to the components contained within the shield can this may be done simply be removing the two can retaining nuts located on the printed wiring side of the sound board and pulling off the can.


730 SU-11 7·0
TELEVISION RECEIVER
MODEL T236
Standard Telephones and Cables Pty Ltd.
CAB. BACK ATTENUATOR
LOCAL 390A R01 390A R02 DISTANT (REMOVE LINKS) A-A
300A CABLE
V1 6ES8
TURRET TUNER 751-SU-2-A
V2 ECF 82
K5000-2G-4E FERRITE BEAD L3
TEST POINT No.2
TEST POINT No.1
L7 35·2MC/S
V3 6AU6
V4 6AU6
V5 6BM8
PRINTED PANEL
TONE CONTROL
RECEIVERS USING TWO SPEAKERS
RECEIVERS USING ONE SPEAKER
½ D.P.S.T. SWITCH ON VOL. CONTROL
691-10-1 PLUG
733-23-1 SOCKET
V6 6BY7/EF85
V7 6BX6/EF80
V8 6BX6/EF80
V9 6BX6/EF80
V10 A ½ ECF 82
V11 6AQ5
V10 b ½ ECF 82
V12 6AU6
V13 6CS6
V14 6BM8
V15 6EA8
V16 6CM5
V17 1B3G/T
V18 6AL3
GREEN YELLOW RED BLACK +200V 8-4CP PLUG
4-QMS SOCKET
T.P No.5
T.P No.6
T.P 6A
MAINS PLUG
3 CORE POWER FLEX AND PLUG
½ D.P.S.T. SWITCH ON VOLUME CONTROL
FUSE F1
CHANNEL INDICATOR LAMP
NOTE:-POWER SUPPLY VOLTAGES MEASURED ON SIGNAL
ALL OTHER VOLTAGES MEASURED WITH NO SIGNAL
ALL VOLTAGES MEASURED WITH V.T.V.M.
CHASSIS VALVES LAYOUT
THERMISTOR 150A 150A
DEFLECTION YOKE
HORIZONTAL DEFLECTION COILS
VERT HEIGHT
VERT LIN
VERT LIN TOP
TAKEN WITH V14 REMOVED FROM SOCKET
PIN 4 OF SOCKET
PIN 6 OF SOCKET
17KV EHT
LINEARITY
T1
T2
T3
T4
T5

VALVES AND DIODES

CIRCUIT REF.	PART NO.	DESCRIPTION
V1	6ES8	R.F. Amplifier
V2	6U8A/ECF82	Frequency Converter and Local Oscillator
V3	6AU6	1st Sound I.F. Amplifier
V4	6AU6	2nd Sound I.F. Amplifier
V5	6BM8/ECL 82	Audio Amplifier & Output
V11	6BY7/EF85	1st I.F. Amplifier
V12	6BX6/EF80	2nd I.F. Amplifier
V13	6BX6/EF80	3rd I.F. Amplifier
V14	6BX6/EF80	4th I.F. Amplifier
V15	6U8A/ECF82	Video Amplifier & Vertical Synchronising Amplifier
V16	6AQ5	Video Output
V17	23WP4	Cathode Ray Tube
V21	6AU6	Keyed AGC Amplifier
V22	6CS6	Noise Gating & Synchronising Separator
V23	6BM8	Vertical Output & Blocking Oscillator
V31	6EA8	Horizontal Oscillator, Discharge & Control
V32	6CM5	Horizontal Output
V33	1B3GT	E.H.T. Rectifier
V34	6AL3/EY88	Damper Diode
D1	OA79	Ratio Detector
D2	OA79	Ratio Detector
D3	GD4	Video Detector
D4	GD10	D.C. Restorator Diode
D5	GD8	A.G.C. Clamp Diode
D6	FST 1/4	Power Rectifier
D7	FST 1/4	Power Rectifier
D8	GD8)	Horizontal A.F.C. Detector
D9	GD9)	" " "

COILS & TRANSFORMERS

CIRCUIT REF.	PART NO.	DESCRIPTION
L1	SP54384B	Sound Coupling Coil
L2	SP54381B	Limiter Coupling Coil
L3	SP54724	Ratio Detector Transformer
L4	SP54388A	37.5 Mc/s Trap Coil
L5	SP54373	Input IF Transformer
L6	SP54398A	IF Transformer
L7	SP54398B	IF Transformer
L8	SP54398C	IF Transformer
L9	SP54376B	Detector Transformer
L10	SP54396	Detector Series Peaking Choke
L11	SP54272A	Peaking Inductance
L12	SP54389A	5.5 Mc/s Trap Coil
L13	SP54003G	Series Compensating Coil
L14	SP54391A	Shunt Peaking Coil
L15	SP54391B	Shunt Peaking Coil
L16	SP54003H	Series Compensation Coil
L17	SP54001B	Heater Choke
L18	SP54001B	Heater Choke
L19	192-SU-3L	H.T. Filter Choke
L20	SP54726	Horizontal Hold Control
L21	SP54005F	Width Coil
L22	SP54487	Spook Suppressor
L23	SP54116C	Horizontal Linearity Coil
L24	Y110 D/10-42300	Deflection Yoke
T1	MSP54536A	Speaker Transformer
T2	RS507-40	Vertical Blocking Oscillator Transformer
T3	SP54349E	Vertical Output Transformer
T4	SP54486L	Power Transformer (Type PF1535)
T5	TH-97-41943	Horizontal Output Transformer

POTENTIOMETERS

CIRCUIT REF.	PART NO.	DESCRIPTION
P1A)		(1M Dual Concentric
P1B)	SP40534S	(200K Dual Concentric
P2	SP40534N	1M Taper "C"
P3	SP40534AD	3K 2W Wire Wound (1RC)
P4	ECTE	250K
P5	ECTE	20K
P6	ECTE	5M Taper "A"
P7	SP40534Q	1M Taper "A"
P8	ECTE	1M Taper "A"
P9	ECTE	50K Taper "A"
P10	SP30184AQ	500 ohm Wire Wound

MISCELLANEOUS (CHASSIS)

CIRCUIT REF.	PART NO.	DESCRIPTION
	751-SU-2A	Turret Tuner
	SP54645	Antenna Panel
	SP54673	Turret Mounting Bracket
	SM 22	Terminal Strip
	SM 23	" " "
	SM 24	" " "
	SM 25	" " "
	SM 26	" " "
	SM 27	" " "
	SM 28	" " "
	SM 29	" " "
	2M 210	" " "
	SP54196	Test Point Bush
	463	Miniature Valve Socket Contact
	SP54623	Fuse Cover Plate
	SP54350	Fuse Panel Assy.
F1		1 amp Slow Blow Fuse (Powder Filled)
F2		375 ma Spring Loaded Fuse
	SP54018	E.H.T. Anode Connector Shroud
	ST108	Octal Valve Socket (E.H.T.) complete with Anti Corona Ring.
	B7G187C	7 pin McMurdo Valve Socket c/w:-)
	19-B	Shield)
	SR7	Spring)
	PC22G/2	7 pin Valve Socket (V4)
	733-2-41	9 pin " " (V5)
	ST29G	9 pin " " (Must not have aluminium mtg ring (V6, 7, 8, 10, 15)
	BM9	9 pin Valve Socket complete with:-)
	A51	Shield)
	ST27G	7 pin Valve Socket (V11,12,13)
	ST29L	9 pin " " (Less centre shield)
	733-2-11	Octal Socket (V16)
	733-16-7	2 pin Socket
	733-2-24	Octal Socket
	4QMS	4 pin Socket
	733-22-4	Picture Tube Socket
	733-23-1	Coaxial Socket (I.F Input)
	SP54630M	Mains Tapping Sockets
	NEOSID 500 or CARBONYLE	Dust Core OBA x ½
	NEOSID 900	" " " "
	SP30076U	Dust Core
	SP30076S	" "
	SP30076R	" "
	SP54012	Manilla Bag
	SP54672A	Operating Instruction Book

MISCELLANEOUS (CABINET)

CIRCUIT REF.	PART NO.	DESCRIPTION
	SP54732FC	Cabinet ("Envoy")
	SP54544Q	Cabinet back
	CS 1052	Grille Material
	SP54553C	Loudspeaker 6" x 9"
	(M.S.P. (500054 MA/15	Loudspeaker 4"
	SP54674A	Frame Assy
	SP54698	23" Mask
	SP54096D	Safety Glass (Plain)
	SP54096DT	Safety Glass (Tinted)
	SP54096DP	Safety Glass (Polaroid)
	SP5454OAC	Knob (Fine Tuning)
	SP54521-B	Knob (Brightness)
	SP54525-B	Knob (Volume ON/OFF)
	SP54526-E	Knob (Vertical Hold)
	SP54526-F	Knob (Contrast)
	SP54526-G	Knob (Tune)
	SP54712	Knob (Horizontal Hold)
	SP54575C	Drive Plate (Channel Selector)
	SP54669B	Outer Shell (Channel Selector)
	SP54545	Grub Screw (Channel Selector)
	SCA0723/17/0	Knob Retaining Clip (Volume)
	SCB1609/17/2	Compression Ring (Brightness and Preset Knob Retaining)
	SCB1918/17/2	Compression Ring (Fine Tuning Knob Retaining)
	SP54109C	Medallion (S.T.C.)
	SP54283B	Monogram ("Vi-Fi")

CAPACITORS

CIRCUIT REF.	DESCRIPTION
C25	2.7 pf ± 5% N.P.O. Disc Ceramic
C26	47 pf ± 5% N.P.O. Disc Ceramic
C27	56 pf ± 10% N.P.O. Disc Ceramic
C28	.01 mfd 400V Type W99
C29	.01 mfd " " "
C30	.01 mfd " " "
C31	.01 mfd " " "
C32	33 pf ± 5% N.P.O. Disc Ceramic
C33	15 pf ± 10% N.P.O. Disc Ceramic
C34	.01 mfd 400V Type W99
C35	12 pf ± 5% N.P.O. Disc Ceramic
C36	100 pf ± 5% 600V Styroseal
C37	330 pf ± 10% 600V Styroseal
C38	470 pf ± 5% 600V Styroseal
C39	470 pf ± 5% 600V Styroseal
C40	.0022 mfd ± 10% Styroseal
C41	5 mfd 50V Electrolytic Type ES5003
C42	.01 mfd 200V Type W99
C43	.002 mfd 400V Type W99
C44	.01 mfd 200V Type W99
C45	,0082 mfd ± 10% 400V Type W99 T.P.B. or Styroseal
C46	25 mfd 25V Electrolytic Type ET1B
C47	.01 mfd 400V Type W99
C48	25 mfd 25V Electrolytic Type ET113
C49	16 mfd 450V Electrolytic Type EC5D
C50	.002 mfd 600V Type W99
C100	15 pf ± 2 pf N.P.O. Disc Ceramic
C101	6.8 pf ± ½ pf N.P.O. Disc Ceramic
C102	25 pf ± 2 pf N.P.O. Disc Ceramic
C103	3.9 pf ± ½ pf N.P.O. Disc Ceramic
C104	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf circuit type 5
C105	1000 pf HiK Style 'A' Disc Ceramic
C105A	.022 mfd ± 10% 200V Type T.P.B.
C106	100 pf ± 5% N750 Tubular Ceramic
C107	4700 pf HiK Style 'B' Disc Ceramic
C108	1000 ph HiK Style 'A' Disc Ceramic
C109	" " " " " " "
C110	" " " " " " "
C111	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
C112	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
C113	33 pf ± 2 pf N.P.O. Disc Ceramic
C114	1000 pf HiK Style 'A' Disc Ceramic
C115	4700 pf HiK Style 'B' Disc Ceramic
C116	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
C117	1000 pf HiK Style 'A' Disc Ceramic
C118	33 pf ± 2 pf N.P.O. Disc Ceramic
C119	4700 pf HiK Style 'B' Disc Ceramic
C120	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
C121	25 pf ± 2 pf N.P.O. Disc Ceramic
C122	4700 pf HiK Style 'B' Disc Ceramic
C123	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
C124	6.8 pf ±½ pf N.P.O. Disc Ceramic
C125	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
C126	9.5 pf + ½ pf N.P.O. Disc Ceramic
C127	.018 mfd ± 10% 200V Styroseal
C128	150 pf ± 5% N750 Tubular Ceramic
C129	50 pf ± 5% N.P.O. Tubular Ceramic
C130	56 pf ± 2½% N.P.O. Tubular Ceramic
C131	.1 mfd ± 10% 400V Phillips Polyester
C132	100 mfd 50V D.C.W. type ET4D
C133	.1 mfd ± 10% 400V Phillips Polyester
C134	.0047 mfd ± 10% 400V Styroseal
C135	.47 mfd ± 10% 400V Type T.P.B.
C136	4700 pf HiK Style 'B' Disc Ceramic
C200	1000 pf HiK Style 'A' Disc Ceramic
C201	.15 mfd ± 10% 200V type T.P.B.
C202	.47 mfd ± 10% 400V type T.P.B.
C203	.022 mfd ± 10% 200V type T.P.B.
C204	1000 pf ± 10% 2.5KV Tubular ceramic
C205	.022 mfd ± 10% 400V type T.P.B.
C206	.1 mfd ± 10% 400V type T.P.B.
C207	.01 mfd ± 10% 400V type W99
C208	330 pf ± 10% 400V Styroseal
C209	.22 mfd ± 10% 400V type T.P.B.
C210	51 pf ± 5% N.P.O. Style 'B' tubular ceramic
C211	.047 mfd ± 10% 200V type T.P.B.
C212	.001 mfd ± 10% 400V type T.P.B.
C213	.1 mfd ± 10% 400V type T.P.B.
C214	.022 mfd ± 10% 400V type T.P.B.
C215	.0068 mfd ± 10% 400V type T.P.B.
C216	.47 mfd ± 10% 600V type T.P.B.
C217	.0047 mfd ± 10% 400V type T.P.B.
C218	.068 mfd ± 10% 600V type T.P.B.
C219	.1 mfd ± 10% 600V type T.P.B.

CAPACITORS (Continued)

CIRCUIT REF.	DESCRIPTION
C220	30 mfd + 75 mfd 400V W type EMG 1569
C221	100 mfd 50V D.C.W. type EC5C
C222	8 mfd 450 D.C.W. type EC5C
C223	.1 mfd ± 10% 400V type T.P.B.
C224	.033 mfd ± 10% 400V type T.P.B.
C300	100 mfd 200V D.C.W. type EMG 1021
C301	100 mfd 200V D.C.W. type EMG 1020
C302	150 mfd 400V D.C.W. type ECS 468/9
C303	30 mfd + 75 mfd 400V.W. type EMG 1569
C304	24 mfd 400V. D.C.W. type ET-6D
C305	24 mfd 400V. D.C.W. type ET-6D
C306	51 pf ± 5% N.P.O. style 'B' tubular ceramic
C307	.001 mfd ± 10% 400V Styroseal
C308	33 pf ± 2pf N.P.O. 1000V.W. type C.D.H. disc ceramic
C309	.001 mfd ± 10% 400V Styroseal
C310	470 pf ± 10% 600V Styroseal
C311	.047 mfd ± 10% 400V type T.P.B.
C312	.0033 mfd ± 5% 600V Styroseal
C313	680 pf ± 10% 600V Styroseal
C314	470 pf ± 10% 600V Styroseal
C315	.0015 mfd ± 10% 600V Styroseal
C316	.01 mfd ± 10% 400V Styroseal
C317	.0015 mfd ± 10% 600V Styroseal
C318	3 mfd 100V.W. type ET1X
C319	.047 mfd ± 10% 400V type T.P.B.
C320	200 pf ± 5% N750 3KV Tubular ceramic
C321	270 pf ± 10% N750 2KV Tubular ceramic
C322	.047 mfd ± 10% 1000V type T.P.B.
C323	.047 mfd ± 10% 1000V type T.P.B.
C324	.15 mfd ± 10% 500V type T.P.B.566
C325	.01 mfd ± 10% 600V type T.P.B.

RESISTORS

CIRCUIT REF.	DESCRIPTION
R15	18K ± 10% ½W type AS or BTS
R16	47K ± 10% ½W type AS or BTS
R17	110 ohm ± 10% ½W type AS
R18	12K ± 10% ½W type AS or BTS
R19	68K ± 10% ½W type AS or BTS
R20	1K ± 10% ½W type AS or BTS
R21	18K ± 10% ½W type AS or BTS
R22	82K ± 10% ½W type AS or BTS
R23	22K ± 10% ½W type AS or BTS
R24	12K ± 10% ½W type AS or BTS
R25	47 ohm ± 10% ½W type AS or BTS
R26	24K ± 5% ½W type AS or BTS
R27	6.8K ± 5% ½W type AS or BTS
R28	6.8K ± 5% ½W type AS or BTS
R29	120K ± 10% ½W type AS or BTS
R30	1 meg ± 10% ½W type AS or BTS
R31	3.3K ± 10% ½W type AS or BTS
R32	100K ± 10% ½W type AS or BTS
R33	1 meg ± 10% ½W type AS or BTS
R34	750 ohm ± 5% ½W type AS
R35	750 ohm ± 5% ½W type AS
R36	6.8K ± 10% 1W type AY
R100	5.6K ± 5% ½W type AS
R101	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5.
R102	56 ohm ± 5% ½W type AS
R103	150 ohm ± 5% ½W type AS
R104	62K ± 5% ½W type AS
R105	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
R106	10K ± 5% ½W type AS
R107	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
R108	3.3K ± 5% ½W type AS
R109	47 ohm ± 5% ½W type AS
R110	150 ohm ± 5% ½W type AS
R111	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
R112	5.6 ± 5% ½W type AS
R113	220 ohm ± 10% ½W type AS
R114	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5

RESISTORS (Continued)

CIRCUIT REF.	DESCRIPTION
R115	7.5K ± 5% ½W type AS
R116	270 ohm ± 10% ½W type AS
R117	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
R118	Phillips R/C units ES54AA/36†36 1000 ohm + 1000 pf type 5
R119	470 ohm ± 10% ½W type BTS
R120	6.8K ± 10% ½W type BTS
R121	2.7K ± 5% ½W type AS
R122	10K ± 10% ½W type AS or BTS
R123	39 ohm ± 5% ½W type AS
R124	3.9K ± 5% ½W type AS
R125	3.9K ± 5% ½W type AS
R126	6.8K ± 10% ½W type BTS
R127	3.9K ± 5% ½W type AS
R128	2.2K ± 5% ½W type BTS
R129	470K ± 10% ½W type AS or BTS
R130	110 ohm ± 10% ½W type AS
R131	560 ohm ± 10% 1W type AY or BTA
R132	1.5K ± 5% 2W type BTB
R133	1.5K ± 5% 2W type BTB
R134	24K ± 5% ½W type BTS
R135	10K ± 10% ½W type AS or BTS
R136	1000K ± 10% ½W type AS or BTS
R137	1.5 meg ± 10% ½W type AS or BTS
R138	220K ± 10% ½W type AS
R139	150K ± 10% ½W type AS
R140	22K ± 10% ½W type AS
R200	1 meg ± 10% ½W type AS
R201	100K ± 10% ½W type AS or BTS
R202	430K ± 5% ½W type AS
R203	820 ohm ± 10% ½W type AS
R204A	120K ± 5% ½W type AS
R204	270K ± 5% ½W type AS
R205	47K ± 10% 1W type AY
R206	47K ± 10% 1W type AY
R207	39K ± 10% ½W type AS or BTS
R208	120K ± 10% ½W type AS or BTS
R209	100K ± 5% ½W type AS
R210	15K ± 10% ½W type AS or BTS
R211	47K ± 10% ½W type AS or BTS
R212	560K ± 10% ½W type AS or BTS
R213	120K ± 10% ½W type AS or BTS
R214	10K ± 10% ½W type AS or BTS
R215	1.5 meg ± 10% ½W type AS or BTS
R216	22K ± 10% 2W type BTB
R217	220K ± 10% ½W type AS or BTS
R218	120K ± 10% ½W type AS or BTS
R219	1 meg ± 10% ½W type AS or BTS
R220	22K ± 10% 2W type BTB
R221	22K ± 10% ½W type AS
R222	4.7K ± 10% ½W type AS or BTS
R223	3.3K ± 10% ½W type AS or BTS
R224	470K ± 10% ½W type AS or BTS
R225	2.2 meg ± 10% ½W type AS
R226	120K ± 10% type Y
R227	1.5 meg ± 10% type AS or BTS
R228	220K ± 10% ½W type AS or BTS
R229	330K ± 10% ½W type AS or BTS
R230	1K ± 10% ½W type AS or BTS
R231	470K ± 10% ½W type AS or BTS
R232	330 ohm ± 10% 1W type AY
R233	330 ohm ± 10F 1W type AY
R234	10K ± 10% 1W type AY
R235	1.5K ± 10% ½W type AS or BTS
R300	3 ohm ± 5% 10W type PW
R301	600 ohm ± 10% 5W type PW
R302	1.4K
R303	3.75K
R304	330K ± 5% ½W type AS
R305	330K ± 5% ½W type AS
R306	100K ± 10% 1W type AY or BTA
R307	1 meg ± 10% ½W type AS or BTS
R308	120K ± 10% ½W type AS or BTS
R309	100K ± 10% ½W type AS or BTS
R310	6.8 meg ± 10% ½W type AS or BTS
R311	100K ± 10% ½W type AS or BTS
R312	10K ± 10% ½W type AS or BTS
R313	10K ± 10% 1W type AY or BTA
R314	47K ± 10% 1W type AY
R315	470K ± 10% ½W type AS or BTS
R316	68 ohm ± 10% ½W type AS
R317	110 ohm ± 5% 4W
R318	12K ± 5% 10W type PW
R319	1.6 ohm ± 5% ½W type BW
R320	2.2K ± 10% ½W type AS
R321	3.9 meg ± 10% ½W type AS
R322	680K ± 10% ½W type AS
R323	1K ± 10% ½W type AS Voltage Dependent Resistor E298GD/A262 Thermistor CZ11