SERVICE MANUAL

TELEVISION CHASSIS TYPE **ZI**

"HIS MASTER'S VOICE"

"HIS MASTER'S VOICE"

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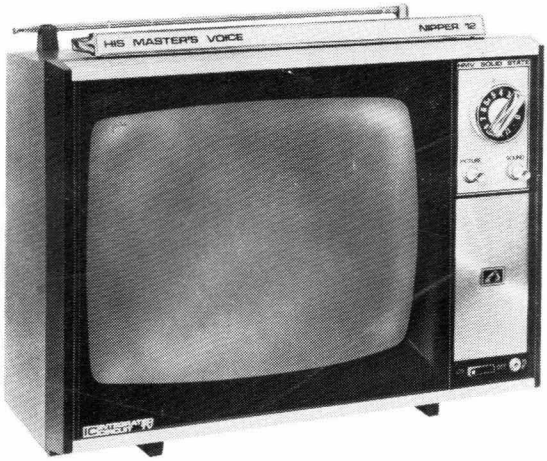
6 PARRAMATTA ROAD
HOMEBUSH, N.S.W.



SPECIFICATIONS

Note: The first figure of the 3-figure reference numbers indicates the printed circuit board on which a part is located. Locations are as follows:

0- 99—Chassis, e.g., MR7, R16
100-199—Small Signals Board, e.g., R115
200-299—Audio Assembly
300-399—Timebase Board
400-499—Rectifier Assembly
500-599—Tuner
600-699—Tuner AGC Bias

POWER SUPPLY:
Mains 230-260 volts A.C., 50 Hz.
Battery: 12 volts, 2 amps car-type battery.

CONSUMPTION:
Mains: 30 watts.
Battery: 24 watts.

AERIAL INPUT:
External Aerial—300 ohms balanced.
Internal Aerial—Adjustable rod, unbalanced.

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

FUSES:
AC—{FS1—1 amp. / FS2—1 amp.}
DC—FS3—5 amps.

TRANSISTORS — TUNER:

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

CHASSIS AND BOARD TRANSISTORS:

TR1	AD149 or AT1138 or AS57—Regulator
TR2	BD124—Vertical Output
TR3	AU104 or 40440 or MP3731—Horizontal Output
TR101	SE5002 or BF196 or AT343—1st Vision I.F.
TR102	SE5002 or BF196 or AT343—2nd Vision I.F.

January, 1970 **Part No. 683-9511**

CHASSIS AND BOARD TRANSISTORS (continued):

TR103	BF184—3rd Vision I.F.
TR104	BC108 or SE1002 or AT324—Video Driver and Intercarrier Amplifier
TR105	BC178 or SE7010 or AT330—Video Amplifier
TR106	BC147 or SE1002 or AT341—A.G.C.
TR107	BC108 or SE1002 or AT324—A.G.C. Amplifier
TR108	OC962 or SE1002 or AT341—Sync. Separator
TR109	BC148 or SE1002 or AT324—Sync. Amplifier
TR110	BC148 or SE1002 or AT324—Noise Gate
TR111	BC148 or SE1002 or AT324—Intercarrier Amplifier
TR112	BC148 or SE1002 or AT324—Intercarrier Limited
TR301	BC148—Vertical Oscillator
TR302	OC963—Blanking
TR303	BC148—Vertical Driver
TR304	BC148—Reactance
TR305	(BC158B) OC969—Horizontal Oscillator
TR306	OC946—Horizontal Driver
TR307	BC108—11 Volts Adjust
TR601	SE1002 or BC148 or AT324

DIODES:

MR1	BY126/50—Audio Board Reverse Polarity Protector
MR2	IS689—Series Efficiency Diode
MR3	MA102 or IS689—Shunt Efficiency Diode
MR4	BY126/50—CRT Filament Supply Diode
MR5	BY126/400 or AD4004—140 Volt Line Rectifier
MR6	BA148—250 Volt Line Rectifier
MR7	TV11—E.H.T. Rectifier
MR101	OA90 or IN295A—Video Detector
MR102	OA91 or IN297A—A.G.C. Isolating Diode
MR104	OA640 or IN914 or AB1101 or AB1122 or TD1101—Video Clamp
MR105	OA640 or IN914 or AB1101 or AB1122 or TD1101—Discriminator
MR106	OA640 or IN914 or AB1101 or AB1122 or TD1101—Discriminator
MR107	AA119 or IN293A—Limiting Diode
MR108	AA119 or IN293A—Ratio Detector
MR109	AA119 or IN295A—Ratio Detector
MR301	OA91—Overshoot Clipper
MR302	BA100—Sync. Clipper
MR303	BA100—Vertical Clamp
MR304	BA100—Blanking Clamp
MR305	OA91—Horizontal Clamp
Z301	BZY94/C11—11 Volt Stabilised Line
Z302	BZY88/C5V6—5.6 Volt Supply Reference Diode
MR401	BY126/50 } Power Supply Bridge Rectifier
MR402	BY126/50 } Power Supply Bridge Rectifier
MR403	BY126/50 } Power Supply Bridge Rectifier
	BY126/50 } Power Supply Bridge Rectifier

CAUTION

The normal B+ voltages in these receivers are not dangerous, but exercise extreme caution when servicing. The high voltage at the picture tube anode (11,000 volts) will give an unpleasant shock but does not supply enough current to give a fatal shock. However, secondary human reactions to otherwise harmless shocks have been known to cause injury.

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

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

CIRCUIT DESCRIPTION

NOTE: The first figure on the 3-figure reference numbers indicates the printed circuit board on which a part is located. Locations are as follows:

0- 99—Chassis, e.g., MR7, R16
100-199—Small Signals Board, e.g., R115
200-299—Audio Assembly
300-399—Timebase Board
400-499—Rectifier Assembly
500-599—Tuner Board
600-699—Tuner AGC Bias

R.F. INPUT

The input signal is applied through a Balun transformer matched for 300 Ohm input impedance to the neutralised R.F. amplifier BF200 (TR501). The gain of the amplifier is adjusted for a maximum on weak signals using RV601 and is reduced by increasing the collector current by a positive AGC voltage applied to its base. The amplified R.F. signal is coupled to the base of the frequency changer AS305 (TR502). A direct connection to this base is brought out for I.F. alignment use. The output of the local oscillator AS304 (TR503) is also coupled in, and mixing takes place in the base circuit. The I.F. component of the mixer collector current is selected by

the collector transformer T502 and coupled to the I.F. amplifier TR101.

I.F. AMPLIFIER AND A.G.C. AMPLIFIER

TR101 and TR102, the first two I.F. amplifiers, are connected in series across the low voltage rail, and their current is controlled by the output from the A.G.C. amplifier, TR107, being applied to the base of TR101. TR101 and TR102 transistors are so-called "forward A.G.C. types," as when the current in the transistor increases, the amplification is reduced. This requires a positive going potential on the base to reduce the gain.

The output from the last I.F. amplifier, a BF184 (TR103) is detected by an 0A90 (MR101) and a narrow band of frequencies from the output is also applied to the noise gate transistor, TR110. The band of frequencies selected normally contains very small amounts of signal power, and sufficient signal is obtained to switch on TR110 only when impulse noise occurs, or when the receiver fine tuning is set too far from the normal position.

VIDEO DRIVER AND NOISE GATE

The detected video signal is applied to the video amplifier/driver transistor, TR104. In the collector, an amplified video signal is developed across R117. This amplified video is used to drive sync. separator and A.G.C. stages, and is gated by the noise gate transistor TR110. This video signal has positive sync. pulses. Without gating, impulse noise would appear as positive pulses, producing spurious sync. pulses and A.G.C. voltage. When impulse noise switches on TR110, the collector falls, introducing a negative pulse to the video signal, which prevents generation of the spurious information. If the negative pulse is too great, it efficiently removes the supply voltage to the driver, and interrupts the 5.5 MHz signal selected by I.F.T.2, thereby introducing noise pulses in the audio section. This is prevented by the diode MR106, which limits the low voltage excursion of TR110 collector to approximately 14V.

A video output at low impedance is taken from the emitter of the video driver through a 5.5 MHz null trap to the base of the video output transistor TR105.

VIDEO OUTPUT

The picture control varies the gain of the output transistor, TR105, by varying the emitter resistance, and therefore the amount of degeneration taking place in the emitter. The collector circuit has a peaking transformer, to maintain a level frequency response over the video band. The signal applied to the base is proportioned, so that the black level of the picture is just at TR105 cut-off potential, and only the video information is amplified. As black level is at the cut-off potential, the gain control in the emitter does not affect the black information and gives a constant black level picture control. The proportioning of the video signal to achieve this is controlled by the contrast range control in the A.G.C. circuit.

GATED A.G.C.

The A.G.C. transistor, TR106, has the output of the video driver transistor applied to its base and a potential on its emitter, which is varied with the contrast range control. The collector is supplied with positive gating pulses from the horizontal output transformer, and only passes collector current during the time of this pulse. The pulses of current build up a negative charge on C130 which, through the A.G.C. amplifier, is used to control the gain of both the tuner and I.F. stages. The value of collector current, and therefore A.G.C. voltage, is controlled by the base - emitter potential. The emitter potential is set by the contrast range control, the base potential being the sync. tip voltage at the video driver output. Variatons in signal strength increase or reduce the sync. tip height, thus altering the A.G.C. produced, with a consequent change in gain to compensate for the varying signal strength. The action of this feedback loop maintains the base-emitter potential at an almost constant value. Adjustment of the emitter potential with the contrast range control is matched by variation of receiver gain, so that the output sync. tip varies the same amount to maintain this base-emitter potential. This control therefore acts as an amplitude control of the video out from the video driver. White level approximately represents zero signal in, and therefore remains fixed, and adjustment of signal amplitude is used as the means of setting the black level at the video output transistor cut-off.

The collector base junction of a transistor is a diode which is back-biased, and collector current is in fact the leakage across this back-biased diode. If the potential across this diode is reversed, it will cause a high current to flow. The A.G.C. potential would appear at just such a forward bias on the collector-base junction of the A.G.C. transistor and would rapidly discharge the A.G.C. voltage developed across C130. The diode MR102 prevents this, being biased off by the derived negative potential.

SYNC. SEPARATOR

The video output from the driver transistor is coupled through a capacitor to the base of the sync. separator transistor, TR108. The base emitter diode D.C. restores the sync. tips to a potential just greater than the emitter potential. The current drawn by the base during sync. tips is the current amplified in the collector to produce a train of sync. pulses. The sync. pulses are then differentiated by C134A-R144 for application to the horizontal

phase discriminator, via sync. amplifier TR109. The collector of the sync. separator TR108 is also connected to an integrator to remove the horizontal sync. pulses for vertical triggering.

VERTICAL BLOCKING OSCILLATOR AND OUTPUT

The diode MR302 is normally conducting and shorting the vertical sync. line to earth. When incoming vertical sync. pulse is large enough to overcome the current in R302, the sync. pulse then appears across MR302. This negative going sync. pulse is directly connected to the emitter of TR301 and initiates the start of flyback by turning on the blocking oscillator stage TR301. The collector current of TR301 is made up from the current through the blocking oscillator transformer T301 and MR303. Normally, TR301 is off and its collector voltage is at 11V. The sawtooth voltage being developed across C306 and C307 from a 20V boost rail has only had time to reach some 3V positive, therefore MR303 is biased off by approximately 8V. The instant TR301 is made to conduct, all its collector current is obtained through the primary of T301. By transformer action the base of TR301 is turned hard on, thereby increasing its collector current. As the collector voltage falls, MR303 becomes conductive and through TR301 discharges C306 and C307. In this way, large changes in the height control have little effect on the speed of the time base.

The sawtooth voltage which is developed across C306 and C307 is coupled to the output transistor TR2 via an emitter follower, T303.

HORIZONTAL PHASE DISCRIMINATOR AND OSCILLATOR

The phase discriminator diodes, MR104 and MR105, have a sawtooth wave applied to them from a winding on the line output transformer T2. Using a sawtooth wave as a reference voltage, sync. pulses are applied to the diodes from the sync. amplifier, TR109. When the oscillator and the sync. pulses are at the same frequency and in lock, there is zero output from the discriminator. The transistor TR304 has its collector connected to one side of the oscillator transformer T302 and its base through phase shift network C313, R316, R151.

The signal current in the collector is therefore leading the anode voltage, and the transistor behaves as if it were a capacitor across the tuned circuit. Variation of bias to the transistor alters the magnitude of the current and the effective capacitor, and thus controls the frequency.

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

The collector of the oscillator TR305 is directly connected to the horizontal driver transistor, TR305. Positive going line pulses from the oscillator drive TR306 into saturation for approximately 22 micro-seconds each line.

A step-down transformer T303 delivers to the base of the line output transistor, TR3, a a large current waveform to ensure its rapid cut-off.

HORIZONTAL DEFLECTION CIRCUITS

The horizontal driver transistor produces an output which is timed to cut off the horizontal output transistor at the end of the scan.

When cut off sharply, the magnetic field that has been established in the horizontal output transformer during the scan collapses and the oscillatory current comprised of the transformer inductance and stray capacitances tends to "ring." However, after one-half cycle of oscillation the damping diode starts to conduct. During the "flyback" time the magnetic energy has established itself in the reverse direction, and the picture tube spot has returned to the left-hand side of the screen.

When the damping diode conducts, it permits current to flow at a controlled rate through part of the transformer. This current, passed by the auto-transformer into the deflection coils, forms the initial part of the horizontal scan. As the damper ceases to conduct, the line output transistor takes over and supplies the necessary current to complete the scan, at which point a further negative pulse on the base starts the cycle over again.

During the flyback, a high voltage pulse is produced at the anode of the E.H.T. rectifier, which is peak-rectified and then smoothed by the capacitance between inner and outer bulb coatings of the picture tube, and supplied E.H.T. of approximately 11,000 volts.

Energy recovered by the damping diodes produces a boosted H.T. voltage of 20 volts, which is used to supply the time base oscillators, I.F. and tuner stages.

Tappings on the horizontal output transformer are used to provide suitable voltages for the tube and video output stage. MR5 has two functions to perform. The first is to rectify the high positive pulse across the deflection coils to provide 100V H.T. to the video and sync. stages; and the second is to provide a degree of protection against breakdown of the horizontal output transistor through E.H.T. flash-over.

MR6 is connected to a tapping to provide focus potential, and by a potential divides R15-R16, the junction of which supplies 150V to the G2 of the picture tube.

A winding on the transformer provides 1.6 volts via MR4, added to the 11V supply rail to make 12.6 volts needed for the CRT heater.

INTERCARRIER AMP. AND LIMITER

The output from I.F.T.2 is inductively coupled to the base of the intercarrier amplifier TR111. The collector load of TR111 is the base circuit of the limiter transistor, TR112, which limits the positive excursion of the base signal by driving the collector below the knee, and the negative excursion by cut-off and the action of the AA119 diode, MR107. The bias for TR111 is derived from the emitter voltage of TR112, which stabilises the bias point for large variations in transistor characteristics. The collector load of TR111 is a ratio detector employing two transformers, I.F.T.4 and I.F.T.5, and the AA119 diodes MR108 and MR109.

SOUND AMPLIFIER AND OUTPUT

The audio from the ratio detector is applied to the volume control RV5, and the required amount is amplifier by the integrated circuit type PA237 to produce an output into an 8 ohm speaker of not less than 600 milliwatts when the television set is being run from a 12V battery source.

Advantage is taken of the higher voltage available when the set is being used from AC mains to obtain more power output by feeding the H.T. supply to the PA237 from the unregulated side of the regulator transistor TR1 via MR1. This diode protects the integrated circuit from reversed polarity connection.

DISMANTLING

TO REMOVE BACK

1. Disconnect aerial.
2. Lie set face down.
3. Undo four back-fixing screws and pull off side knobs for "Set Black," "Vertical Hold" and "Horizontal Hold."
4. Lift back and slide mains plug through lower aperture.
5. Loosen top and bottom screws securing the hinged plates of the Small Signals and Time Base Board.
6. Undo five screws holding the Small Signals Board and the two screws holding the Time Base Board, and then swing out.

TO REMOVE CHASSIS

1. Looking from the back of the receiver, undo two screws holding the front chassis (heat sink) to the cabinet front, and two holding the left side chassis plate to the top of the cabinet front.
2. Undo two screws holding the right side chassis plate to bracket, but **do not** remove bracket from cabinet front, as this is part of the picture tube attachment.
3. Remove "Fine Tuning" and "Channel Indicator" knobs.
4. Lift chassis from right side and unplug E.H.T. lead from picture tube socket.
5. Remove picture tube socket and slacken yoke clamping screw.
6. Lift yoke and chassis clear of neck, and swing chassis to stand on tuner side, beside cabinet.

ADJUSTMENTS

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

Set RV7 Horizontal Hold to approximately mid-range.

Adjust horizontal oscillator coil, T302, till picture locks.

Adjust RV7 to both extremes and note equal range of pull-in.

Readjust T302 until equal pull-in is achieved from both extremes of rotation of the Horizontal Hold control, RV7.

Check that there is no delay in picture locking when changing channel.

CONTRAST RANGE. First adjust the Set-Black control so that the picture information which is normally black is turned up to grey. Using the Vertical Hold control, roll the picture until the vertical blanking bar is visible in the centre of the screen. Adjust RV1 so that the sync. pulse is seen to be a little darker than the surrounding grey blanking bar. Return the Set-Black and Vertical Hold controls to their normal settings.

TUNER BIAS. This is behind the Small Signals Board. With the Small Signals Board swung open, adjust the Tuner Bias Board for maximum snow on a vacant channel.

A.G.C.

Note: The A.G.C. may be adjusted without removing the back of the cabinet, through the hole above the Variable Side Controls, "Horizontal Hold," "Vertical Hold" and "Set-Black."

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

FOCUS. The only time that focus adjustment may be necessary is after replacement of the picture tube. Three alternative connection points are shown on the circuit. Reconnect focus lead for optimum setting.

LINEARITY. Before adjusting either Vertical (Overall) Linearity, RV302, or Top Linearity, RV303, the picture shift magnets should be neutralised. To do this, the two magnets should be rotated with respect to each other. The neutralised setting is such that, when the complete assembly is rotated, it has little effect on the picture position.

After adjustment has been made for best linearity, the picture may need to be re-centred. The linearity should be retouched where necessary .

VERTICAL LINEARITY. The vertical linearity pre-set potentiometers, RV302 and RV303, are located on the R.H. printed board (viewed from the back). For best linearity, RV302 and RV303 should be adjusted in conjunction with the HEIGHT control, using a pattern on the screen.

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

INTERCARRIER I.F. ALIGNMENT

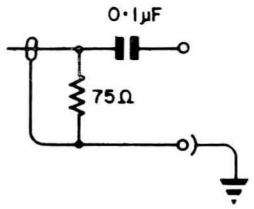


Fig. 1.

The following equipment is necessary:

(1) 5.5 MHz sweep.
(2) Injection probe (Fig. 1).
(3) Attenuator.
(4) Display unit.
(5) Detector (Fig. 2).

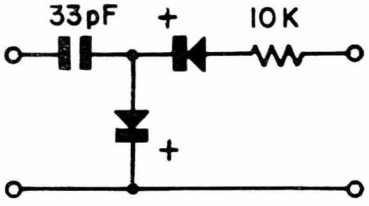


Fig. 2.

STAGE 1
5.5 MHz Trap

(a) Inject 5.5 MHz Sweep through probe of Fig. 1 to junction of L9 and R115 (base of TR104). Connect detector (Fig. 2) to collector of video output, TR105, and connect the display unit to the output of the detector.

(b) Adjust the slug in L10 for a minimum of output at 5.5 MHz.

STAGE 2
Intercarrier I.F.

(a) Remove the detector from collector of video output transistor and reconnect it to collector of TR111.

(b) Adjust the level of input such that the detected output is below limiting in the amplifier. Then adjust the slugs of IFT2 and IFT3 to produce a symmetrical response about 5.5 MHz, which should be slightly overcoupled and with a bandwidth of 200 KHz.

(c) Remove detector from collector of TR111 and connect it to collector of TR112. With the input adjusted so that the intercarrier amp. does not limit, tune the slug of IFT4 for a maximum output at 5.5 MHz.

STAGE 3
Ratio Detector

(a) Remove detector from TR112 and connect the display unit only to junction of R161 and C156. Increase input so that the amplifier limits.

(b) Tune slug in IFT5 to produce an S response that is symmetrical and zero at 5.5 MHz.

VISION I.F. ALIGNMENT

The following equipment and settings are necessary:

(1) I.F. sweep.
(2) I.F. injection probe (Fig. 1).
(3) Attenuator.
(4) Display unit.
(5) 0-5 volt bias supply.
(6) Set volume controls and Set-Black to minimum.
(7) Rotate Contrast Range to fully anti-clockwise position.

STAGE 1

(a) Connect the display unit to junction of L9 and R115 and set Y amp. to give full deflection with 1 volt input.
(b) Open cut link connected to C118.
(c) Using probe of Fig. 1 and attenuator, inject I.F. sweep into last stage by connecting between C118 and earth strip.

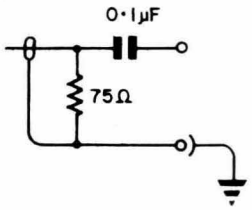


Fig. 1

(d) Connect +2.5 volts of bias to junction of R102 and R129.
(e) Set attenuator to give full deflection on display and tune L7 to a maximum at 34.625 MHz. Tune I.F.T.1 to produce a symmetrical response about 34.325 MHz. If a hole appears in the response it can be removed by detuning L12.
(f) Adjust L8 to give the desired bandwidth, and L7 and I.F.T.1 to produce the I.F. response shape of Stage 1 curve.

STAGE 2

(a) Remove probe from C118 and reconnect link.
(b) Cut open link connected to C106.
(c) Connect probe to junction of base TR101 and R102. Set attenuator to give full deflection on display.
(d) Tune L5 and L6 to 34.625 MHz and then adjust for response shape of Stage 2 curve.
(e) Remove probe from R102 and reconnect link.

STAGE 3

(a) Switch tuner to blank channel.
(b) Connect probe to I.F. input on tuner and earth, set attenuator to give full deflection on display.
(c) Tune L1 to 38.375 MHz.
(d) Tune L4 to 31.375 MHz.
(e) Tune L12 to 32.8 MHz.
(f) Tune L3 to 28.875 MHz to ensure lining of this trap and then return to 28.00 MHz.
(g) Tune tuner I.F. coils L1 and L2 to 34.625 MHz. Adjust L1A to give the desired bandwidth and tune coil L1 and L2 to produce the I.F. response shape of Stage 3 curve.

STAGE 4

Check that maximum gain occurs at +1.7 volts and that the response shape remains substantially unchanged between +1.7 volts and 4 volts.

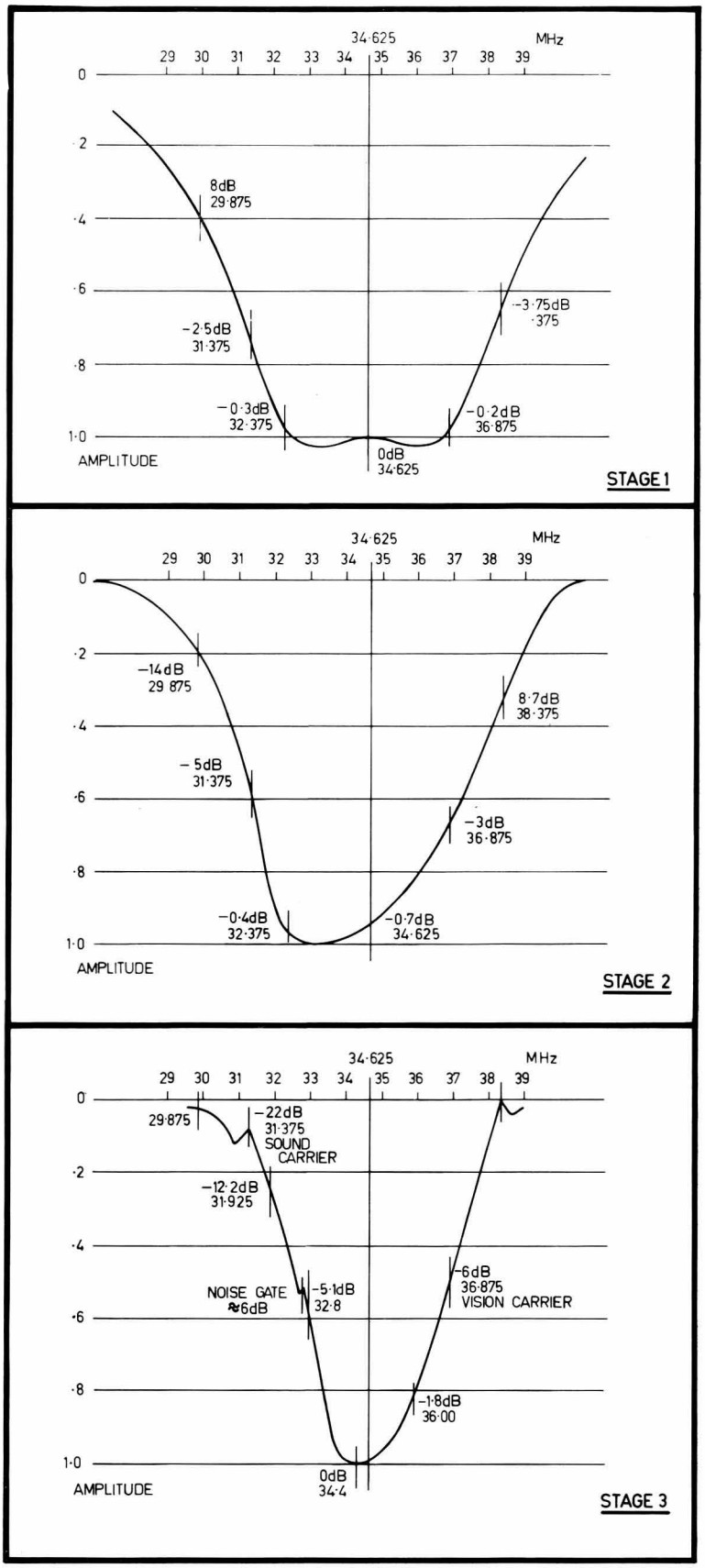
RESISTANCE TABLE

T1—Main Transformer	Primary Secondary	62 ohms 0.45 ohm
T301—Vertical Blocking Transformer	Primary Secondary	6.2 ohms 24.5 ohms
T302—Horizontal Oscillator Transformer	Primary Secondary	93 ohms 8.8 ohms
T303—Horizontal Drive Transformer	Primary Secondary	0.45 ohm 0.1 ohm
T2—Horizontal Output Transformer Primary EHT winding CRT heater winding AGC winding AFC response winding	**Measure Between** pins 1- 5 5 to top cap 7- 8 10-11 12-13	 2.9 ohms 475 ohms 0.14 ohm 0.21 ohm 0.53 ohm
CH1—Vertical Output Choke		4.2 ohms
Yoke	Vertical Horizontal	14 ohms 0.3 ohm

SOUND IC VOLTS PA237

Pins	Volts
3	11.4 volts
5	18 volts
7	10.6 volts
12	4 volts
14	3.7 volts

Set operating from 240V AC main. Volume control set to minimum. Measured with 20,000 ohm voltmeter.



I.F. ALIGNMENT CURVES

MODEL Z1-E2 — PRODUCTION CHANGES

The circuit diagram and service information within this manual include amendments which have been affected since early production. The amendments referred to include:

(a) **To Increase Video Drive (Contrast)**

R111	740-0082	10K has been changed to
	740-1921	7.5K ½W 5%.

(b) **To Stabilise Horizontal Drive**

R319	740-0172	270K ½W 10% has been changed to
	740-0162	220K ½W 10%.
TR305	932-3441	BC158 has been changed to
	932-3711	OC969.

(c) **To Improve Tuner Sensitivity**

In some early receivers,
R517 10K mounted on the tuner was reduced to 8.2K.

This resistor appeared on a separate tuner circuit diagram which was printed in the Service Manual, but not on the Field Service Sheet 683-920.

In later receivers, this resistor was removed and Printed Circuit Board 132-162, Tuner AGC Bias, has been added to the circuit diagram 683-918. This appears in the Service Manual and on issue 3 of the Z1-E2 Field Service Sheet 683-9203.

The addition of the Tuner AGC Bias Board involved the following changes:

Tuner Printed Circuit Board

R517 10K ± 10% ½W
R518 100K ± 10% ½W } Deleted.

Small Signals Board

Deleted			Added		
R102a	740-0382	6.8K	R102b	740-0361	390K ± 10%
R105	740-0382	6.8K	R105	740-1971	5.1K ± 5%
R106	740-0082	10K	R106	740-0071	4.7K ± 10%
R110	740-0272	150 ohms	R110	740-0411	820 ohms ± 10%
R129	740-0062	3.9K	R129	740-0701	56K ± 10%
R130	740-0302	1.8K	R130	740-0041	2.7K ± 10%
R131	740-0292	270 ohms	R131	740-0041	2.7K ± 10%
MR103	932-2451	BA100 AGC Delay Diode	Shorting Link		

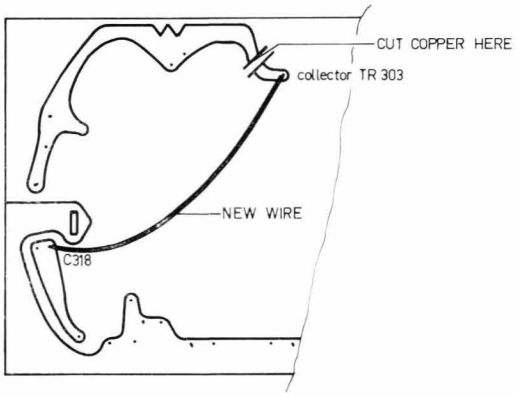
Tuner AGC Bias Board

R601	740-0141	100K
R602	740-0081	10K
R603	740-1391	470 ohms ± 20%
R604	740-0151	150K
RV601	677-2151	22K (linear) Max. Tuner Gain Adjustment.
TR601	932-3421	BC148 — R.F. AGC Output Transistor

(d) **To prevent failure of TR303 (Vertical Drive Transistor) as a result of CRT Flashover**

The collector of TR303 is now connected to the junction of R326, R327 and C318.

Modification may be carried out by cutting the copper on the Timebase Board close to the collector lead of TR303 and adding a 4-inch connecting wire between the collector lead of TR303 and the junction of R326, R327 and C18 as shown in the diagram.



(e) **To Reduce the Effects of CRT Flashover**

740-178 1.5K ½W 10% resistor added in series with Pin 1 of CRT.
740-178 1.5K ½W 10% resistor added in series with Pin 2 of CRT.

Note that factory modified receivers for changes (d) and (e) commence with Serial Number 2430, approximately.

PARTS LIST — MODEL Z1-E2

Note: The first figure of the 3-figure reference numbers indicates the printed circuit board on which a part is located. Locations are as follows:

0- 99—Chassis, e.g., MR7, R16
100-199—Small Signals Board, e.g., R115
200-299—Audio Assembly
300-399—Timebase Board
400-499—Rectifier Assembly
500-599—Tuner Board
600-699—Tuner AGC Bias

RESISTORS

All resistors are ½ watt, ± 10% except where stated

Ref.	Part No.	Description
Chassis		
R1	740-0142	100K
R2	740-0082	10K
R3	740-0232	39K
R4	740-0182	470K
R5	742-1232	68 ohms 1W
R7	740-1222	12 ohms 1W
R7a	740-0102	22K
RB	Part of Yoke 259-1991	1K
R9	740-0292	270 ohms
R10	748-0202	0.75 ohms ± 5% 1W
R11	742-0742	3.9K 1W
R12	740-0282	220 ohms
R13	742-0402	150K ± 20% 1W
R14	740-0262	560 ohms
R15	742-0892	2.2M
R16	742-1182	2.7M
Small Signals Board		
R100	740-0052	3.3K
R101	740-0682	680 ohms
R102	740-0022	1K
R102b	740-0361	390K
R103	740-1161	180 ohms
R105	740-1971	5.1K ± 5%
R106	740-0071	4.7K
R107	740-0272	150 ohms
R108	740-0292	270 ohms
R109	740-0652	100 ohms
R110	740-0411	820 ohms
R111	740-1921	7.5K ± 5%
R112	740-0652	100 ohms
R113	740-0071	4.7K
R114	740-0002	390 ohms
R115	740-0052	3.3K
R116	740-0222	180K
R117	740-0012	470 ohms
R118	740-0002	390 ohms
R119	740-0322	1.2K
R120	740-0322	1.2K
R121	750-0782	6.8K ± 10% 4W Metox
R122	742-0042	15K 1W
R123	740-0051	3.3K
R124	740-0442	120 ohms
R125	740-0002	390 ohms
R126	740-0512	100K ± 20%
R128	740-0112	27K
R129	740-0701	56K

RESISTORS (continued)

Ref.	Part No.	Description
Small Signals Board (continued)		
R130	740-0041	2.7K
R131	740-0041	2.7K
R132	740-0292	270 ohms
R134	740-0302	1.8K
R135	740-0022	1K
R136	740-0532	1M ± 20%
R137	740-0782	120K
R138	740-0082	10K
R139	740-0082	10K
R140	740-0082	10K
R141	742-0102	22K 1W
R142	740-0792	8.2K
R144	740-0222	180K
R145	740-0922	330 ohms
R146	740-0922	330 ohms
R147	742-0292	3.3K 1W
R148	740-0112	27K
R149	740-0112	27K
R150	740-0172	270K
R151	740-0062	3.9K
R152	740-0092	15K
R153	740-0012	470 ohms
R154	740-0022	1K
R155	740-0252	1.5K
R156	740-0922	330 ohms
R157	740-0262	560 ohms
R158	740-0662	82 ohms
R158a	738-0102	3.9K ¼W
R159	740-0382	6.8K
R160	740-0382	6.8K
R161	740-0102	22K
Audio Assembly		
R201	740-0752	68K
R202	740-0162	220K
R203	740-0072	4.7K
R204	740-0182	390K
R205	740-0032	2.2K
R206	740-0672	680K
Timebase Board		
R301	740-0232	39K
R302	740-0122	47K
R303	740-1242	6.8 ohms
R304	740-0302	1.8K
R305	740-0291	270 ohms
R306	740-0922	330 ohms
R307	740-0102	22K
R308	740-0232	39K
R309	740-0072	4.7K
R310	740-0281	220 ohms

Ref.	Part No.	Description
RESISTORS (continued)		
Timebase Board (continued)		
R311	740-0651	100 ohms
R312	740-1161	180 ohms
R313	740-0012	470 ohms
R314	750-0772	1.5 ohms ± 5% 1W
R315	740-0072	4.7K
R316	740-0252	1.5K
R317	740-0651	100 ohms
R318	740-0242	33K
R319	740-0162	220K
R320	740-0382	6.8K
R321	740-0272	150 ohms
R322	740-0712	47 ohms
R323	740-0442	120 ohms
R324	740-0712	47 ohms
R325	740-1242	6.8 ohms
R326	740-1032	10 ohms
R327	740-1242	6.8 ohms
R328	740-0022	1K
R329	746-0352	0.47 ohms BW½
R330	740-0142	270K 1W
R331	740-0281	220 ohms
R332	740-0651	100 ohms
R333	740-0412	820 ohms
R334	740-0682	680 ohms
R335	740-0982	22 ohms
R336	740-0651	100 ohms
Tuner AGC Bias		
R601	740-0141	100K
R602	740-0081	10K
R603	740-1391	470 ohms ± 20%
R604	740-0151	150K
CAPACITORS		
Chassis		
C1	280-5241	1uF ± 20% 50V Philips
C2	283-1201	0.047uF ± 10% 160V Polyester
C3	269-1521	2000uF 50V Electro
C4	269-1551	1uF +50% —10% 40V Electro
C5	269-1301	400uF 25V Electro
C6	269-0971	2000uF 25V Electro
C6a	269-0971	2000uF 25V Electro
C7	269-1301	400uF 25V Electro
C8	269-1501	2000uF 16V Electro
C9	269-1171	25uF 6.4V Electro
	Part of	
C10	259-1991	3.3uF
C11	283-5751	6.8uF ± 10% 50V Polyester
C12	271-1571	0.0022uF ± 10% CY Ceramic Disc
C12a	271-0761	0.1uF ± 80% 25V Redcap
C13	282-6181	0.033uF ± 10% 400V Polyester

Ref.	Part No.	Description
CAPACITORS (continued)		
Chassis (continued)		
C14	269-1131	10uF 16V Electro
C15	283-1741	0.1uF ± 10% 400V Polyester
C16	269-1511	10uF 300V Electro
C17	283-1741	0.1uF ± 10% 400V Polyester
C18	271-0911	0.003uF Ceramic Disc
Small Signals Board		
C101	271-1301	22pF ± 10% NPO Disc
C102	271-1341	68pF ± 10% Ceramic
C103	271-0941	8.2pF ± ½pF NPO Disc
C104	271-0771	100pF ± 5% NPO Disc
C105	271-1301	22pF ± 10% NPO Disc
C106	271-0681	12pF ± 5% NPO Disc
C107	271-0691	3.9pF ± ¼pF NPO Disc
C108	271-0731	0.047uF +80% —20% 25V Redcap
C109	271-1201	0.01uF +100% —0% 50V Ceramic
C110	271-0681	12pF ± 5% NPO Disc
C111	269-1251	50uF 25V Electro
C112	271-1271	0.001uF +80% —20% Ceramic
C113	271-1201	0.01uF +100% —0% Ceramic
C114	271-1201	0.01uF +100% —0% Ceramic
C115	271-1891	68pF ± 5% N330 Disc
C116	271-1201	0.01uF +100% —0% 50V Ceramic
C117	269-1211	12.5uF 25V Electro
C118	271-1271	0.001uF +80% —20% Ceramic
C119	271-1201	0.01uF +100% —0% 50V Ceramic
C120	271-1201	0.01uF +100% —0% 50V Ceramic
C121	271-1881	56pF ± 5% NPO Style A
C122	271-1201	0.01uF +100% —0% 50V Ceramic
C123	271-0941	8.2pF ± ½pF NPO Disc
C124	271-1201	0.01uF +100% —0% 50V Ceramic
C125	271-1751	15pF ± 5% NPO Disc
C126	271-0681	12pF ± 5% NPO Disc
C127	280-3401	470pF ± 10% 100V Styroseal
C128	280-3121	270pF ± 10% 125V Styroseal
C129	269-0871	125uF 16V Electro
C130	269-1171	25uF 6.4V Electro
C131	283-5741	0.1uF 50V Polyester
C132	271-1571	.0022uF ± 10% Type CY Ceramic Disc
C133	271-1571	.0022uF ± 10% Type CY Ceramic Disc

CAPACITORS (continued)

Ref.	Part No.	Descripion
Small Signals Board (continued)		
C134	283-5741	.1uF ± 10% 50V Polyester
C134a	271-1811	56pF ± 10% N330 Disc
C135	283-1121	0.01uF ± 10% 160V Polyester
C136	283-1121	0.01uF ± 10% 160V Polyester
C137	283-1201	0.047uF ± 10% 160V Polyester
C138	280-5241	1uF ± 20% 50V Metalised Lacquer
C139	271-1691	2.2pF ± ¼pF NPO Disc or Bead Ceramic
C140	271-1681	39pF ± 10% NPO Tube Ceramic
C141	271-1201	0.01uF +100% —0% 50V Ceramic
C142	269-1051	10uF 6V Electro
C143	280-3401	470pF ± 10% 100V Styroseal
C144	271-1341	68pF ± 10% N750 Ceramic Tube
C145	271-1341	68pF ± 10% N750 Ceramic Tube
C146	269-1211	12.5uF 25VW Electro
C147	280-3401	470pF ± 10% 100V Styroseal
C148	271-0731	0.047uF +80% —20% 25V Redcap
C149	271-0731	0.047uF +80% —20% 25V Redcap
C150	280-3401	470pF ± 10% 100V Styroseal
C151	271-0731	0.047uF +80% —20% 25V Redcap
C151a	271-1561	0.1uF ± 20% 25V Ceramic
C152	280-3131	100pF ± 5% 100V Styroseal
C153	280-3401	470pF ± 10% 100V Styroseal
C154	280-3401	470pF ± 10% 100V Styroseal
C155	269-1211	12.5uF 25VW Electro
C156	271-1571	0.0022uF ± 10% Type CY Ceramic Disc
Audio Assembly		
C201	280-5201	0.47uF 50V ± 20%
C202	271-0801	0.0047uF ± 20% 25V Redcap
C203	269-1191	400uF 16V Electro
C204	269-1321	6.4uF 25V Electro
Timebase Board		
C301	271-1571	0.0022uF ± 10% Ceramic Disc

CAPACITORS (continued)

Ref.	Part No.	Descripion
Timebase Board (continued)		
C302	280-3591	1uF 200-250V Metalised Film
C303	280-5201	.05uF ± 20% 50V Lacquer Film
C304	271-1151	0.047uF ± 20% 25V Redcap
C305	271-1071	0.22uF ±20% 25V Redcap
C306	269-1321	6.4uF 25V Electro
C307	269-1321	6.4uF 25V Electro
C308	271-1561	0.1uF ± 20% 25V Redcap
C309	269-0871	125uF 16V Electro
C310	271-1481	0.003uF ± 20% CY Ceramic Disc
C311	269-0871	125uF 16V Electro
C312	280-5201	0.5uF ± 20% 50V Lacquer Film
C313	271-0311	27pF ± 5% Ceramic Tube
C314	280-3601	680pF ± 10% 100V Styroseal
C315	280-3311	0.0047uF ± 10% 50V Styroseal
C316	269-0871	125uF 16V Electro
C317	269-0871	125uF 16V Electro
C318	269-0871	125uF 16V Electro
C319	271-0891	15pF ± 10% Ceramic Disc
C320	269-1131	10uF 16V Electro
C321	271-1611	100pF Ceramic Disc N750
Rectifier Assembly		
C401	271-1271	0.001uF ± 20% Type AY Ceramic Disc
C402	271-1271	0.001uF ± 20% Type AY Ceramic Disc

POTENTIOMETERS

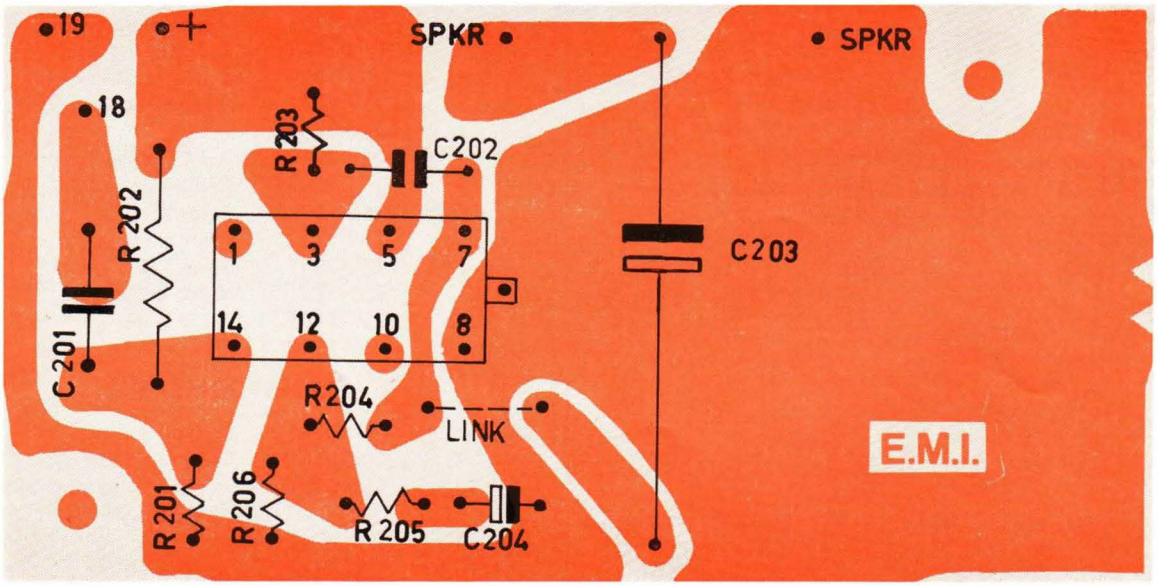
Chassis		
RV1	677-1541	500 ohms, CTS Curve 'D' (linear)—Contrast Range
RV2	677-1631	1.5K CTS Curve 'D' (linear)—A.G.C.
RV3	677-1911	25K (linear)—Set Black
RV4	677-1901	1K (linear)—Picture
RV5	677-1891	1M (inverse log)—Sound
RV6	677-1931	10K (linear)—Vertical Hold
RV7	677-1921	1.5K (linear)—Horizontal Hold
Timebase Board		
RV301	677-1951	50K (linear)—Height
RV302	677-1541	500 ohms (linear)—Overall Linearity
RV303	677-1951	50K (linear)—Top Linearity
RV304	677-1941	1K (linear)—11 volts adjust

Ref.	Part No.	Descripion
TRANSISTORS (continued)		
Tuner AGC Bias		
RV601	677-2151	22K (linear)Max. Tuner Gain Adjustment
TRANSISTORS		
Chassis		
TR1	932-3501	AD149
TR2	932-3481	BD124
TR3	932-3491	AU104
Small Signals Board		
TR101	932-2831	SE5002—1st Vision I.F.
TR102	932-2831	SE5002—2nd Vision I.F.
TR103	932-2921	BF184—3rd Vision I.F.
TR104	932-3021	BC108—Video Driver and Intercarrier Amplifier
TR105	932-3391	BF178—Video Amplifier
TR106	932-3401	BC147—A.G.C.
TR107	932-3021	BC108—A.G.C. Amplifier
TR108	932-3411	OC962—Sync. Separator
TR109	932-3421	BC148—Sync. Amplifier
TR110	932-3421	BC148—Noise Gate
TR111	932-3421	BC148—Intercarrier Amplifier
TR112	932-3421	BC148—Intercarrier Amplifier Limiter
Timebase Board		
TR301	932-3421	BC148—Vertical Oscillator
TR302	932-3531	OC963—Blanking
TR303	932-3421	BC148—Vertical Driver
TR304	932-3421	BC148—Reactance
TR305	932-3711	OC969 / BC158B } Horizontal Oscillator
TR306	932-3431	OC946—Horizontal Driver
TR307	932-3021	BC108—11 Volts Adjust
Tuner		
TR501		BF200—R.F. Amplifier
TR502		AS305—Mixer
TR503		AS304—Oscillator
Tuner AGC Bias		
TR601	932-3421	BC148—RF AGC Output Transistor
DIODES		
Chassis		
MR1	932-3041	BY126/50—Reverse Audio Board Polarity Switch
MR2	932-3641	IS689—Series Efficiency Diode
MR3	932-3511	MA102—Shunt Efficiency Diode
MR4	932-3041	BY126/50—CRT Filament Supply Diode
MR5	932-3631	BY126/400—140 Volt Line Rectifier
MR6	932-3521	BA148—250 Volt Line Rectifier
MR7	932-3471	TV11—E.H.T. Rectifier
Small Signals Board		
MR101	932-0971	OA90—Video Detector
MR102	932-2031	OA91—AGC Isolating Diode
MR104	932-2961	OA640—Video Clamp
MR105	932-2961	OA640—Discriminator
MR106	932-2961	OA640—Discriminator
MR107	932-2271	AA119—Limiting Diode
MR108	932-2271	AA119—Ratio Detector
MR109	932-2271	AA119—Ratio Detector
Timebase Board		
MR301	932-2031	OA91—Overshoot Clipper
MR302	932-2451	BA100—Sync. Clipper
MR303	932-2451	BA100—Vertical Clamp
MR304	932-2451	BA100—Blanking Clamp
MR305	932-2031	OA91—Horizontal Clamp
Z301	932-3541	BZY 94/C11—11 Volt Stabilized Line
Z302	932-3461	BZY 88/C5V6—5.6 Volt Supply Reference Diode
MR401 MR402 MR403 MR404	932-3041	BY126/50—Power Supply Bridge Rectifier
COILS		
All these coils are located on the Small Signals Board		
L1	259-1792	Adjacent sound carrier trap
L1a	259-2021	Coil, tuner coupling
L2	259-1711	I.F. Input coil
L3	259-1771	Adjacent vision trap
L4	259-1761	Sound carrier trap
L5	259-1721	1st I.F. collector coil
L6	259-1731	2nd I.F. collector coil
L6a	259-1432	Filter choke
L7	259-2011	3rd I.F. collector coil
L8	259-2001	Coil collector
L9	259-1872	Filter coil
L9a	259-1432	Filter choke
L10	259-1801	Trap 5 (5.5 MHz)
L11	259-1821	Video collector coil
L12	259-1781	Noise gate
L13	259-1812	Filter coil
TRANSFORMERS		
Chassis		
T1	904-0591	Transformer, mains
T2	908-0901	Horizontal output transformer, E.H.T.
Timebase Board		
T301	908-0911	Vertical blocking oscillator transformer

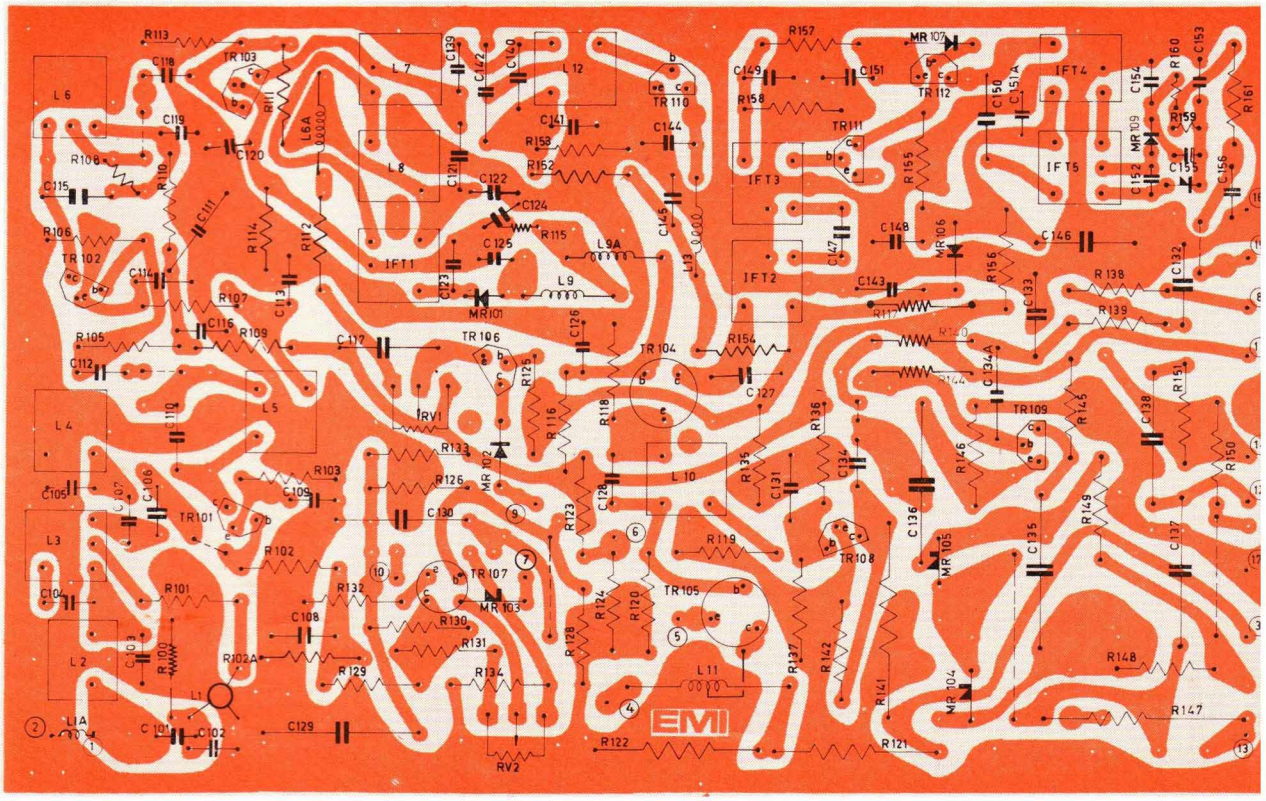
PARTS LIST — MODEL Z1-E2

Ref.	Part No.	Descripion
TRANSFORMERS (continued)		
T302	259-1981	Horizontal oscillator transformer
T303	908-0921	Horizontal drive transformer
Small Signals Board		
IFT1	906-1001	IF Transformer, Vision
IFT2	906-0881	IF Transformers, Intercarrier
IFT3	906-0891	IF Transformer, Intercarrier
IFT4	906-0901	IF Transformer, Ratio Detector
IFT5	906-0911	IF Transformer, Ratio Detector
MISCELLANEOUS		
SW1a } SW1b }	855-0871	Switch, 250V, 2A, 2-pole, 1-way
SW2 and SKT1	288-0121	Connector Jack 2P
FS1	431-0111	Fuse, 5 amps
FS2	431-0071	Fuse, 1 amp
FS3	431-0071	Fuse, 1 amp
CH1	232-0441	Choke, vertical output
VDR301	750-1011	Voltage Dependent Resistor
	106-0911	Aerial, telescopic
	148-6751	Bracket, aerial terminal
	148-6831	Bracket, tuner support

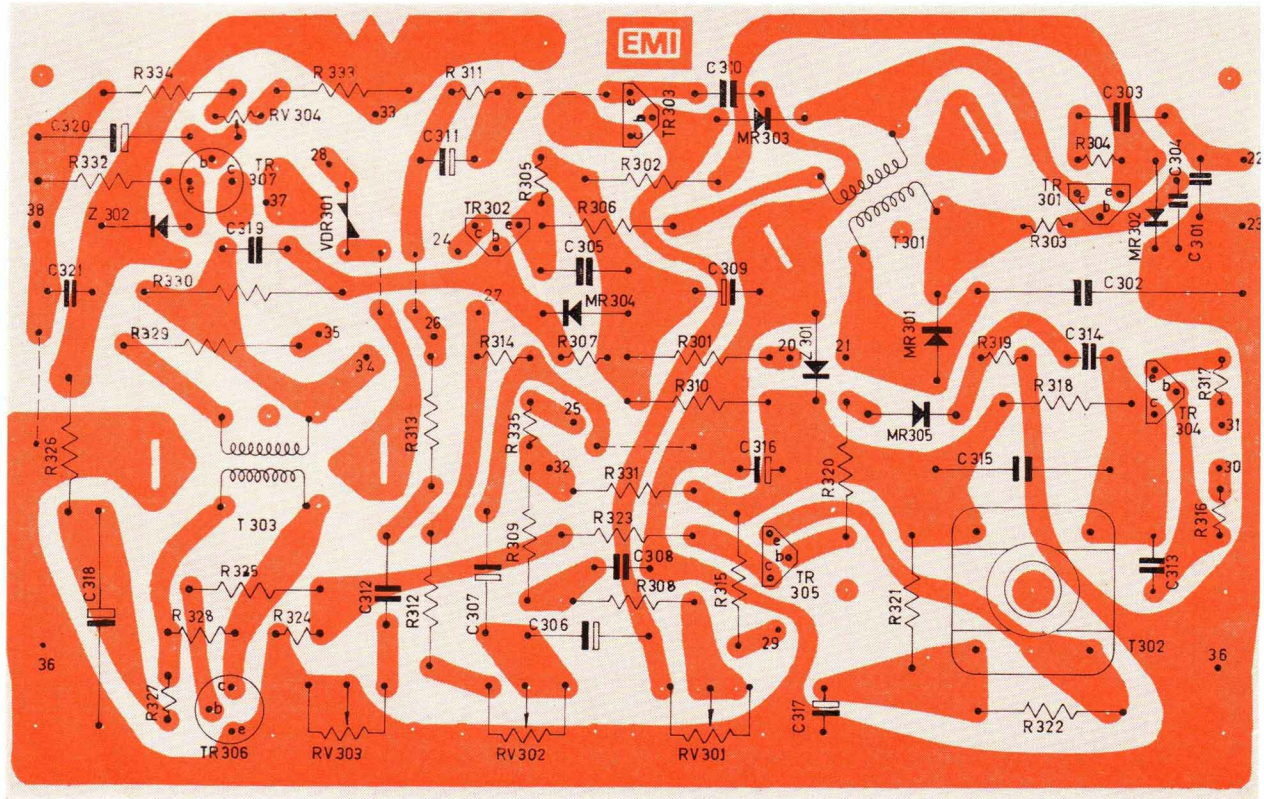
Ref.	Part No.	Descripion
MISCELLANEOUS (continued)		
	190-3261	Cabinet, back
	224-2471	Chassis, assembled and wired
	224-2481	Tuner assembly MSP TC20
	259-1991	Yoke, deflection coil, 14 ohms MSP 44980
	403-4051	Escutcheon, cabinet front
	453-1601	Grille, speaker
	470-0371	Handle assembly
	517-3161	Knob, front controls
	517-3171	Knob, side controls
	517-3201	Knob, channel selector
	517-3211	Knob, fine tuning
	526-7171	Lead assembly, 12V D.C.
	561-2191	Medallion, handle
	561-2231	Medallion, model identification
	561-2271	Medallion, trade mark
	664-3361	Nameplate, front control
	754-0421	Retainer, decorative top
	754-0431	Retainer, decorative bottom
	794-2241	Scale, channel indicator
	824-1311	Socket, earpiece
	831-2601	Earpiece and jack assembly
	831-2941	Speaker, 5" x 3" MSP
	895-0011	Terminal Spring
	932-3351	Picture Tube, 12" 110° Aluminised Type
	932-3371	PA237—Integrated Circuit



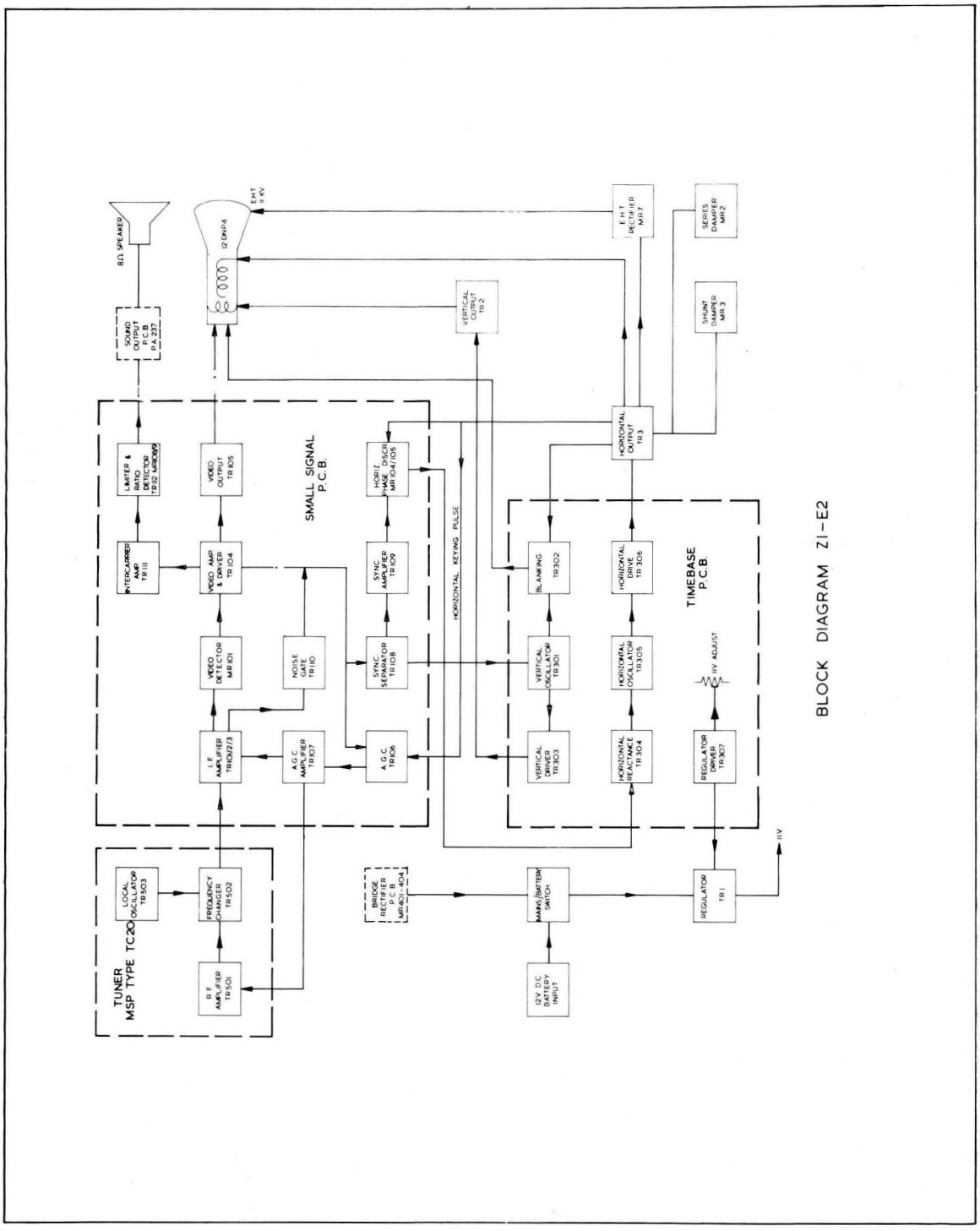
AUDIO ASSEMBLY (VIEWED FROM COPPER SIDE)



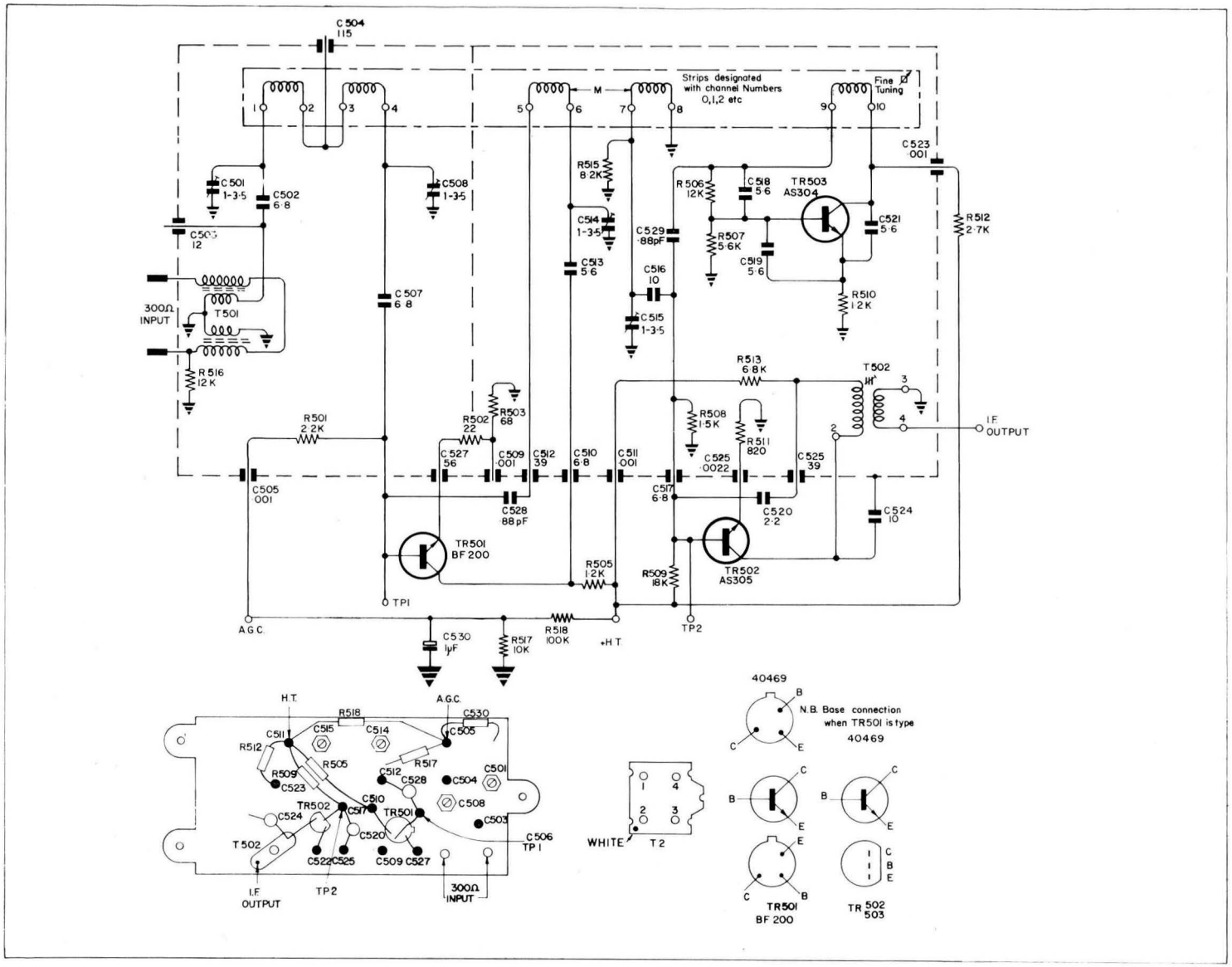
SMALL SIGNALS BOARD (VIEWED FROM COPPER SIDE)



TIMEBASE BOARD (VIEW FROM COPPER SIDE)



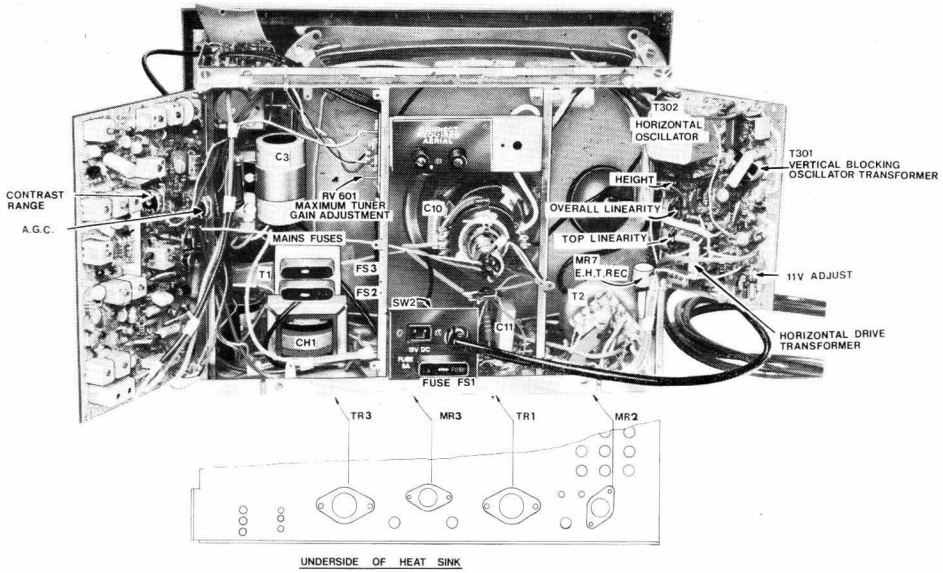
BLOCK DIAGRAM Z1-E2



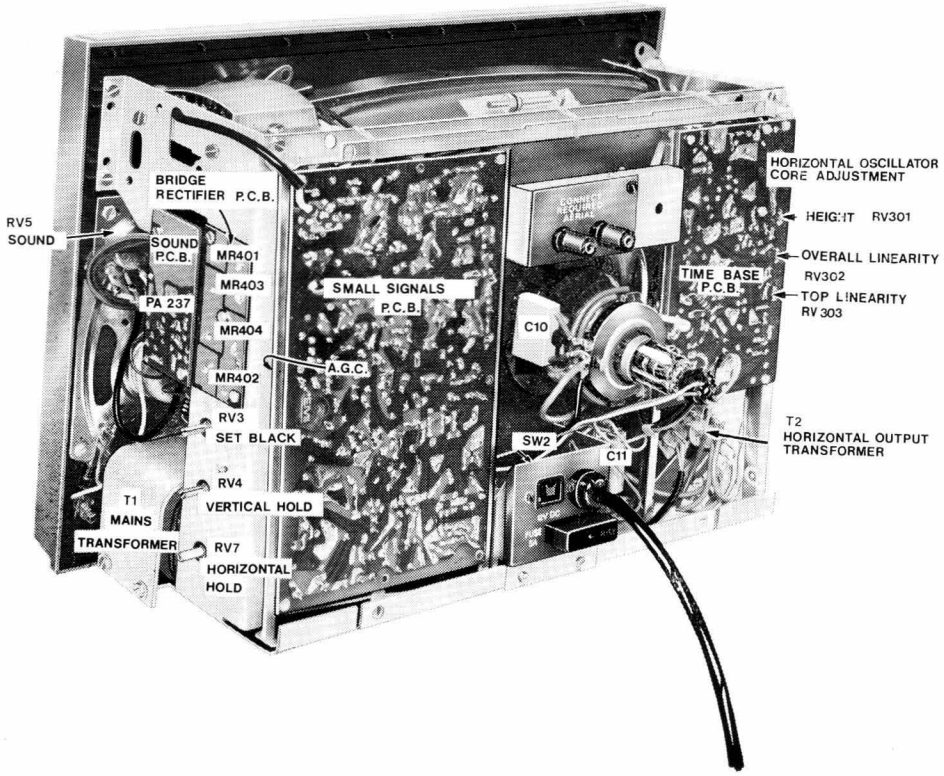
Note: Resistors R517 (10K) and R518 (100K) have now been deleted.

TUNER TYPE TC20

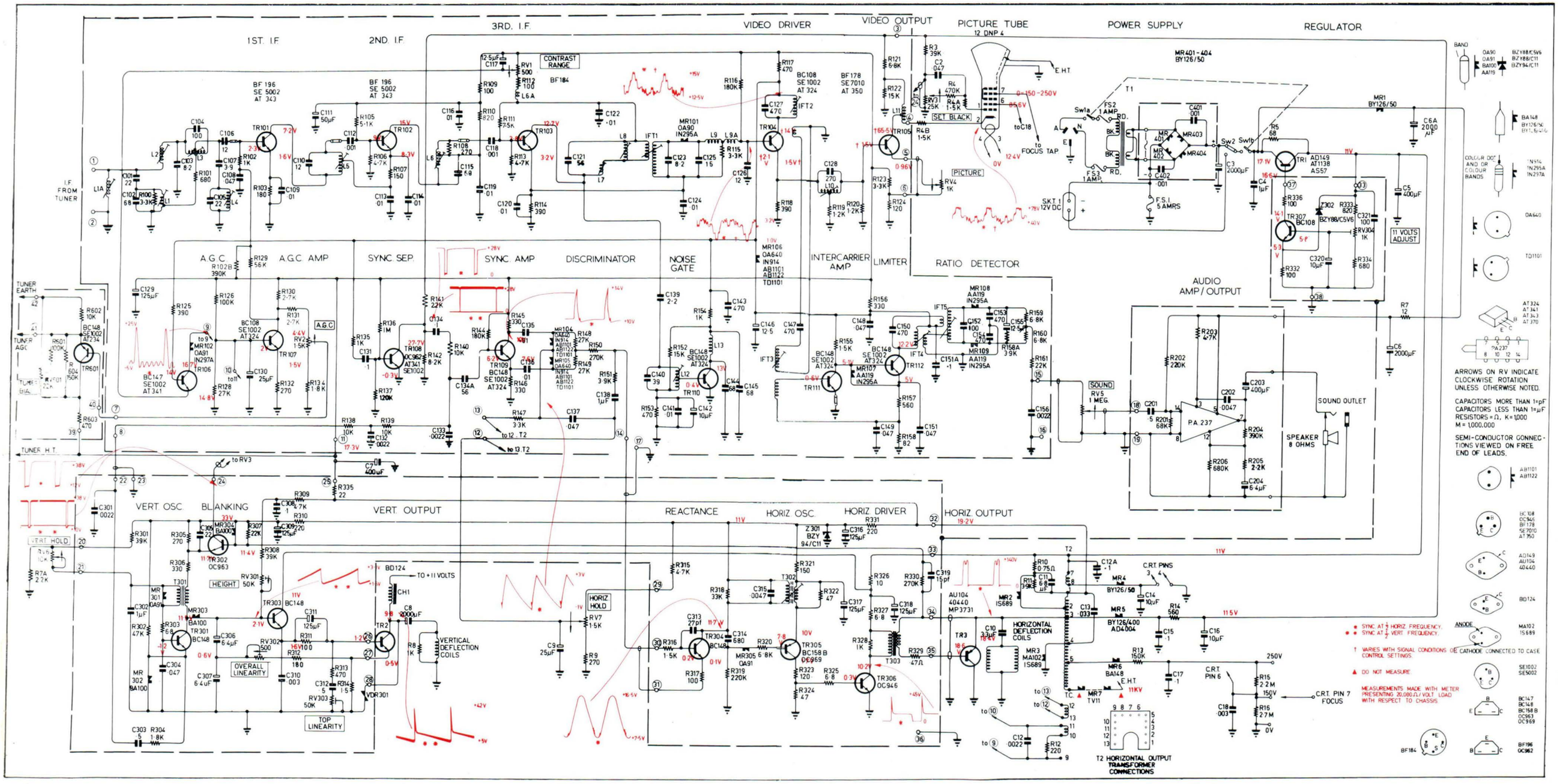
H. CLARK PTY. LTD.
Printers
MARRICKVILLE, N.S.W.



REAR VIEW DOORS OPEN



REAR VIEW DOORS CLOSED


1ST. I.F.
2ND. I.F.
3RD. I.F.
VIDEO DRIVER
VIDEO OUTPUT
PICTURE TUBE
12 DNP 4
POWER SUPPLY
REGULATOR
MR401 - 404
BY126/50
CONTRAST RANGE
SET BLACK
PICTURE
E.H.T.
0-150-250V
to FOCUS TAP
to C18
SKT 1 12V DC
F.S.1 5 AMPS
F.S.2 1 AMP
F.S.3 1 AMP
11 VOLTS ADJUST
I.F. FROM TUNER
A.G.C.
A.G.C. AMP
SYNC. SEP.
SYNC. AMP
DISCRIMINATOR
NOISE GATE
INTERCARRIER AMP
LIMITER
RATIO DETECTOR
AUDIO AMP/OUTPUT
SOUND OUTLET
SPEAKER 8 OHMS
TUNER EARTH
TUNER AGC
TUNER BIAS
TUNER H.T.
VERT. OSC.
BLANKING
VERT. OUTPUT
REACTANCE
HORIZ. OSC.
HORIZ. DRIVER
HORIZ. OUTPUT
HEIGHT
OVERALL LINEARITY
TOP LINEARITY
VERT. HOLD
HORIZ. HOLD
VERTICAL DEFLECTION COILS
HORIZONTAL DEFLECTION COILS
TO +11 VOLTS
C.R.T. PINS
C.R.T. PIN 6
C.R.T. PIN 7 FOCUS
T2 HORIZONTAL OUTPUT TRANSFORMER CONNECTIONS
BF 196 SE 5002 AT 343
BF 196 SE 5002 AT 343
BF184
BC108 SE 1002 AT 324
BF 178 SE 7010 AT 350
BC148 SE1002 AT324
BC147 SE1002 AT341
BC108 SE1002 AT324
BC148 SE1002 AT324
BC148 SE1002 AT324
BC148 SE1002 AT324
BC148 SE1002 AT324
OC962 AT341 SE1002
BC148
BA100
BC148
BC148
BC158B OC969
OC946
MP3731
AU104 40440
MA102 IS689
IS689
BY126/50
AD4004
BY126/400
BAI48
TV11
PA 237
BZY88/C5V6
BZY88/C5V6
AD149 AT1138 AS57
MR101 OA90 IN295A
MR102 OA91 IN297A
MR103 OA91 IN297A
MR104 OA640 IN914 AB1101 AB1122 TD1101
MR105 OA640 IN914 AB1101 AB1122 TD1101
MR106 OA640 IN914 AB1101 AB1122 TD1101
MR107 AA119 IN295A
MR108 AA119 IN295A
MR109 AA119 IN295A
MR301 OA91
MR302 BA100
MR303 BA100
MR304 BA100
MR401 MR402 MR403 MR404
MR1 BY126/50
MR2 IS689
MR3 MA102 IS689
MR4 BY126/50
MR5 BY126/400 AD4004
MR6 BAI48
MR7 TV11
BD124
Z301 BZY 94/C11
Z302 BZY88/C5V6
TR101 TR102 TR103 TR104 TR105 TR106 TR107 TR108 TR109 TR110 TR111 TR112
TR301 BC148
TR302 OC963
TR303 BC148
TR304 BC148
TR305 BC158B OC969
TR306 OC946
TR307 BC108
IFT1 IFT2 IFT3 IFT4 IFT5
T1 T2 T301 T302 T303
CH1 TR2 TR3
RV1 500 RV2 1·5K RV3 25K RV4 1K RV5 1 MEG. RV301 50K RV302 500 RV303 50K RV304 1K
VDR301
SW1a SW1b SW2
BAND
COLOUR DOT AND OR COLOUR BANDS
ANODE
ARROWS ON RV INDICATE CLOCKWISE ROTATION UNLESS OTHERWISE NOTED.
CAPACITORS MORE THAN 1=pF
CAPACITORS LESS THAN 1=µF
RESISTORS = Ω, K=1,000
M = 1,000,000
SEMI-CONDUCTOR CONNECTIONS VIEWED ON FREE END OF LEADS.
* SYNC AT ½ HORIZ. FREQUENCY.
** SYNC AT ½ VERT. FREQUENCY.
† VARIES WITH SIGNAL CONDITIONS OR CONTROL SETTINGS.
▲ DO NOT MEASURE.
MEASUREMENTS MADE WITH METER PRESENTING 20,000Ω/VOLT LOAD WITH RESPECT TO CHASSIS.

683-9203