CCT. REF.	DESCRIPTION				MANUFACTURER	NOTES
R30	1M	Ohm	5%	1/3W	Philips CR25	
R31	47K	Ohm	5%	1/3W	Philips CR25	
R32	1M	Ohm	5%	1/3W	Philips CR25	
R33	47K	Ohm	5%	1/3W	Philips CR25	
R34	100K	Ohm	5%	1/3W	Philips CR25	
R35	10K	Ohm	5%	1/3W	Philips CR25	
R36	220	Ohm	5%	1/3W	Philips CR25	
R37	560	Ohm	5%	1/3W	Philips CR25	
R38	1K8	Ohm	5%	1/3W	Philips CR25	
R39	1K8	Ohm	5%	1/3W	Philips CR25	
R40	470K	Ohm	5%	1/3W	Philips CR25	
R41	470K	Ohm	5%	1/3W	Philips CR25	
R42	3M3	Ohm	10%	1/3W	Philips CR25	
R43	3M3	Ohm	10%	1/3W	Philips CR25	
R44	Select on test		5%	1/3W	Philips CR25	
TR1	741C	Integrated Circuit			Fairchild	
TR4 -TR10	BC148	NPN Silicon			Philips	
TR11	AY115	PNP Silicon			Fairchild	
TR12	OC946	NPN Silicon			Philips	
RV1 & RV3	10K Ohms 20% Lin. Type MP/PC Carbon Potentiometer				404/8/02857/028	
RV2	3K3 ohms 20% Lin Type MP/PC Carbon Potentiometer				Plessey 404/8/02857/028	

1. Cont.

NOTE : A setting of the SET COARSE SERVO pot must be found such that this meter reading is zero when the transmitter has self tuned for if this is not the case, the advantages of the automatic phase comparason is lost and in fact the anode circuit will be forced to tune at the wrong point.

The correct tuning requires only sufficient RF signal to operate it, and it is not unduly level sensitive. The presence of the feedback circuits etc, do not influence the operation since the sensing of phase is entirely within the feedback loop.

The correct setting for the load capacitor is established by recognising the correct ratio of grid swing to anode swing of the PA stage. A sample of the grid voltage is rectified and bucked by a voltage derived in a similar way from the anode circuit. When these two voltages are equal, the net output is zero and the correct loading point will be achieved. If the transmitter is under loaded the anode swing will be too high and the output of the bridge is positive and vice versa.

The correct transmitter loading is first established by disabling the ALC, ensuring that 1KW PEP can be achieved in the A3J mode without flat-topping in the anode circuit with the mains voltage input 5% low.

The transmitter is then switched to tune, and the preset LOAD ADJUSTMENT set such that when the transmitter is caused to auto-tune, the load capacitor dial takes up the same setting. The mains are then restored to normal voltage, the transmitter switched back to A3J and the two-tone audio input increased. The ALC adjustment is then made to give 1KW PEP output (640mA) when the audio signal is increased by 2dB, above that when the loading adjustment was made. The exciter should then be switched to A3H if that mode is to be used.

Once the correct adjustment of the load preset is established for the transmitter it should not need readjustment unless components in the loading bridge itself are changed. The load preset should not be adjusted on making tube changes.

The balance point of the loading bridge is level sensitive because of curvature in the input/output characteristic of the PA tubes. Because of this, the loading adjustment is only made in the TUNE mode, and the meter reading will not show balance when the transmitter is operating normally in other modes.

When the servo system is tuning, a special tune signal (limited to Ia = 400mA) is derived from the exciter. This tune signal continues until the voltage on both servo motors has fallen to zero whence the flip-flop toggles, the tune signal is switched off and the green lamp lights. At the same time, the FET switches in the servo motor amplifiers open and their gain is greatly reduced such that the motors will not run again until the TUNE mode is selected.

2. <u>Sequence of Adjustments</u>

If, for example, it is necessary to check and re-adjust the circuits in the transmitter, the following points should be bourne in mind.

2.1 The transmitter is designed for A3J operation (A3H mode is an additional facility) and hence all adjustments, current readings etc, are based on A3J mode using a 2-tone test signal as required.

2.2 Screen potentiometers are provided for the purpose of balancing the quiescent current of the four tubes. In order to set this current, the transmitter should be switched to TRANSMIT (A3J) without an audio input signal. Under these conditions the standing plate current should be about 60mA per tube (240mA total). All screen pots should be set at maximum and the tube with the lowest current noted. The SET BIAS control is adjusted to make the standing current of this (lowest) tube 60mA. The screen potentiometer of the remaining three tubes only are then adjusted to reduce their standing current to 60mA (see 7.6(v)).

2.3 Assuming the transmitter is correctly loaded, the ALC sets the maximum anode swing and hence the maximum anode current under signal drive conditions. Increase in audio drive does not cause an increase in RF output after the ALC threshold is reached. However this is independent of the loading in so far as the loading determines the plate swing and current required for a given power output. The correct adjustment of the loading is achieved when the transmitter delivers 1KW PEP A3J from a 2-tone test signal without significant flat-topping. The ALC is then set to see that increased audio drive does not cause the RF output to rise which would then take the operation into the region of increasing intermodulation distortion. In order to make the loading adjustment the mains supply is first reduced by 5% to ensure that (when operating normally) a drop in mains voltage is not accompanied by an increased distortion due to reduced anode HT voltage. Although a Variac auto-transformer, a CRO and a dummy load and watt meter are used in the factory for the loading set-up, a good approximation can be achieved in the field by operating the transmitter on 240 volt tap to give the effect of a 5% reduction in mains voltage. Also, instead of observing the flat-topping on a CRO, the screen current meter can be used as an indicator since there is a sudden rise in screen current when the maximum anode swing is reached.

2.4 In general, then, it is necessary to disable the ALC by advancing the SET ALC pot fully clockwise (as mentioned in 7.6(b) and reduce the loading by setting the LOAD ADJ pot fully anticlockwise as mentioned in 7.6 (c).

2.4 Cont.

When switched to TUNE, THE TRANSMITTER should tune and load, the adjustment of 7.7.2(d) and (e) should be made to see that the operation is in the dead-band of the coarse servo amplifier. Loading should now be attempted as in 7.7.4. The procedure in 7.7.4(d) may be used if desired and after Ia = 640mA is achieved, the ALC LEVEL ADJUSTMENT must be made according to 7.9. It should be recognised that alteration of the LOAD pot will not have any effect until TUNE is selected and the transmitter caused to auto-tune. The effect of the re-loading so caused is then observed by switching back to LOCAL with the standby switch in the TRANSMIT position. Further, there is an interdependence of load capacitor and anode tuning capacitor setting such that changes in loading will affect the position of the anode tuning. It is necessary therefore to keep checking (and readjusting as necessary) the position of the SET COARSE SERVO using the SERVO BALANCE position of the meter as an indicator whilst the loading procedure is carried out.

2.5 After the tuning and loading adjustments are complete A3H may be selected. The anode current reading will be about 680mA. This current is set by the characteristics of the ALC circuit and is related to the current for full PEP (640mA) set under A3J conditions. Transmitter adjustment, however, should not be attempted in the A3H mode.

3. Tube Changing

The effects of tube ageing are substantially reduced by the amount of negative feedback applied. In general, the effect of low tubes will be an increase in intermod distortion at full PEP (N.B. intermod distortion can only be measured with a 2-tone test signal in the A3J mode).

The setting of the ALC preset pot, and preset LOADING ADJ pot are controlled essentially by parameters established in the transmitter itself, and once set, should not require alteration unless component parts have been changed.

If new tubes are fitted it should only be necessary to set all screen pots to maximum, readjust the SET BIAS for 60mA for the lowest tube and adjust the screen pots for the others for 60mA also (TRANSMIT MODE A3J, no audio input). Further readjustment should not then be required.

If readjustment of the COARSE SERVO pots appear necessary accompanied with a change in dial reading of the Anode Tuning Capacitor and dial reading of the Loading control, this suggests the antenna impedance presented to the transmitter has changed from that existing when originally set-up. In general this will be accompanied by a change in SWR indicator reading and leads to an examination of the antenna system.

3. Cont.

Variation of dial readings of Tuning and/or Loading capacitors where the antenna circuits are known to be correct (or a change in previous readings established on a known dummy load) suggest a mal-function in the phase comparator or load comparator circuits.

The 4CX250B tubes used in this equipment operate at almost zero screen current. In some cases, depending upon the particular tube and working condition, the screen current may be negative.

4. Record this amendment on the AMENDMENT RECORD PAGE and insert this section in lieu of Section 6, (Factory use only).

7. TEST AND ALIGNMENT

This section is applicable to a complete equipment assembled into a cabinet. Figures in brackets refer to 500W LIN AMP.

7.1 General

(a) The HF SSB EXCITER Type 7021 must be an operational unit, fully set-up and tested.

(b) The POWER CONTROL UNIT must be a checked unit with time-delay and overcurrent trips etc functionable.

7.2 Visual Examination

(a) Remove covers from the DRIVER and PA compartments of the amplifier.

(b) Open the PA STAGE compartment, ensure valves and chimneys are are correctly fitted and anode leads are secure. The compartment should be clean.

(c) Inspect plugs and sockets and ensure they are correctly mated on the POWER CONTROL UNIT, EXCITER and AMPLIFIER with those on the cabinet harness. The RF cable from EXCITER to AMPLIFIER should be fitted.

(d) Check that FAN impeller turns freely. Check FAN connections, left to right should be BLACK, BLUE, BROWN, SLATE.

(c) Check the voltage taps selected on the :-

MAIN POWER TRANSFORMER T1 (Ref DWG C04-00103)

AUXILIARY TRANSFORMER T2 (Ref DWG C04-00103)

MINOR HT TRANSFORMER T4 (Ref DWG B04-00102)

If the equipment is to be used on other than 50 Hz supply, special components will be fitted :-

POWER SUPPLY (L1 and C1)
FAN Capacitor (C47)
and the AUXILIARY TRANSFORMER T2 will require a different tapping (Ref DWG C04-00103).

7.3 Test Equipment Required

(a) AUDIO OSCILLATOR (600 ohm output).
(b) C.R.O. with response to 10 MHz and low capacity probe.
(c) AVO Model 8 or similar 20K 10PV multimeter.
(d) RF Dummy Load 50 ohm, 500W.
(e) Peak-reading VTVM (300V AC Range)
(f) EILCO SSB DISTORTION METER Type 6918 or SPECTRUM ANALYSER

7.4 CHANNEL SELECTION (MULTI-CHANNEL TRANSMITTER)

(a) Use 10/0.010 wire of the appropriate colour for the channel number (e.g. Channel 1 - brown etc) and connect pin 10 of Relays A, B, D, F, H or K to the correct tap on the DRIVER Tank inductor L6 as shown on the TUNING CHART DWG. D10-00027 (30)
If the chart indicates turn 21 (counting down from coil top) no physical connection is made as the circuit is completed by the parasitic suppressor L7-R22.

(b) For frequencies below 8 MHz damping resistors (PHILIPS Type CR52) are fitted across capacitors C14A-C19A between the common bus line and the wire joining each capacitor to its selection relay. The value is shown on the TUNING CHART DWG. D10-00027 (30)

(c) For frequencies below 3.5 MHz additional tuning capacitors C14B-C19B are added in parallel with the appropriate variable capacitor. These are DUCON Styroseal 630V 5% the value as shown on the TUNING CHART DWG D10-00027 (30)

(d) Use 14 SWG (0.080") TCW and connect the PA TANK COIL (L12) tap to the appropriate channel relay C, E, G, J or L. Ensure that solder eyes are filled with solder and keep the tap wires as short and direct as possible bending to maintain adequate clearances.

Note that there is no relay allocated for the lowest frequency channel and the tank tap should be connected directly to the common relay contact bus bar. The taps are shown on the TUNING CHART DWG. D10-00028 (31)

(e) Refer to the TUNING CHART DWG D10-00028 (31) and add diodes (EM402) to the DIODE MATRIX PCB to select relays M and/or N to operate on lower frequency channels where required

The diodes (D13-D24) are connected between the channel select line (cathode) and the relay coils bus bars (anode).

7.5 CHANNEL SELECTION (SINGLE CHANNEL TRANSMITTER)

(a) Use 10/0.010" wire (BROWN) and connect the tuning capacitor C14A direct to the DRIVER tank inductor L6 as shown on the TUNING CHART DWG D10-00027 (30)

(b) For frequencies below 8 MHz a damping resistor (PHILIPS Type CR52) is fitted across C14A the value as shown on the TUNING CHART DWG D10-00027 (30)

(c) For frequencies below 3.5 MHz an additional tuning capacitor C14B is added in parallel with C14A. The value (DUCON Styroseal 630V 5%) as shown on the TUNING CHART DWG. D10-00027 (30)

(d) Select the appropriate PA TANK COIL (L12) inductance from the TUNING CHART DWG D10-00028(31) and connect the tap to the lowest point of the coil with 3 mm auto cable. Ensure that the solder eye is filled with solder and keep the tap wire as short and direct as possible.

(e) Refer to the TUNING CHART DWG D10-00028(31) and add additional loading capacitors as indicated. These are DUCON Type CTP CERAMIC CAPACITORS Style F N150 10% 330 pF and are wired directly between C38 and/or C39 and ground at C39.

7.6 Preliminary Adjustments

(a) Switch to OFF, SCREEN SUPPLY, SW1

(b) Set the following controls fully clockwise :-

SET-SCREEN VOLTS, RV1-RV4.
SET BIAS
ALC LEVEL, 2RV2

(c) Set the following controls fully ANTI-CLOCKWISE :
SERVO PRESETS, 3RV1-3RV6 (Multi-Tx only)
BIAS TRIP, SRV1
LOAD, 2RV1

(d) Remove SERVO AMPLIFIER PCB from underside of amplifier chassis (Multi-Tx only).

(e) Set NEUTRALISING CAPACITORS, C23 to minimum capacity and C20 to half-capacity.

(f) Set the EXCITER controls as follows :-

LOCAL MODE	(SW7)	to A3J (Amplifier rear)
OUTPUT	(SW4)	to AMPLIFIER.
LOCAL CONTROL	(SW5)	to STANDBY.
FUNCTION	(SW2)	to LOCAL CONTROL.
AUDIO INPUT	(SW1)	to 1.
CHANNEL	(SW3)	to highest frequency
channel fitted,	(Multi -Tx only).	
POWER	(SW6)	to ON.

(g) Remove the blank panel immediately above the POWER CONTROL PANEL and remove the MAIN POWER SUPPLY cover plate.

WARNING

THE HIGH VOLTAGES PRESENT ARE LETHAL.

Check that the DANGER - HIGH VOLTAGE label attached to cover is in good order and legible.

7.6 (h) Check that MAJOR HT switch is OFF, then switch-ON the CIRCUIT BREAKER CB1. Observe that the AC MAINS, AUXILIARY, AND RELAY supply lamps light. The FAN should start and run up to speed and when the air pressure switch closes the FILS, BIAS & MINOR HT lamp should light.

(j) Check the Filament Voltages at transformer T1,

(i) PA Valves 6.1 Volts
(ii) DRIVER Valve 6.3 Volts

(k) Switch OFF CB1, remove the FILS, BIAS & MINOR HT fuse F3, switch ON CB1. Check that all Channel relays operate correctly.

(l) Connect AUDIO OSCILLATOR to the audio input jack of the EXCITER, set to 1 KHz, 0 dBm at 600 ohms.

(m) Connect CRO proble to RF INPUT SK1 on the amplifier

(n) Switch EXCITER LOCAL CONTROL switch to TRANSMIT

(o) Observe RF input signal at SK1 and adjust AUDIO OSCILLATOR output until CRO measures 3V peak.

(p) Use a low capacity probe, AC coupled and connect CRO to the hot-end of the DRIVER tank inductor (junction of L7-R22 and tuning capacitor or relay bus-bar.) Adjust appropriate tank tuning capacitor (highest channel fitted) for maximum deflection. Then NEUTRALISE driver stage by adjusting C4 (attached to V5 socket) for minimum deflection (less than 10 mV peak).

(q) Disconnect the wire to V5 cathode at capacitor C6 by unscrewing 2BA nut. Use a male BNC connector fitted with short leads and connect the EXCITER output cable inner to V5 cathode (pin 5) and ground the outer at the earthy end of R9.

(r) Adjust AUDIO OSCILLATOR output until RF signal is approximately 5V peak. Connect the CRO probe to SK1 and observe the RF waveform. The waveform will be unsymmetrical consisting of one positive peak and several negative peaks for each cycle.

Adjust C2 until all the negative peaks are in line, disregard the positive peaks. This neutralises the negative feedback bridge.

(s) Reduce AUDIO OSCILLATOR output to zero. Switch EXCITER LOCAL CONTROL switch to STANDBY. Re-connect EXCITER output cable to SK1, disconnect male BNC adaptor and reconnect cathode lead of V5 to C6.

(t) Switch OFF, CIRCUIT BREAKER CB1, replace fuse F3 and switch ON, CB1. Adjust 6RV1 (on MINOR HT REGULATOR PCB) to give a reading of 350V on the SWITCHED METER, and with an AVO check the +300V rail.

(u) Connect a DC Voltmeter (2500V Range) to the high voltage rail in the MAIN POWER SUPPLY. Switch ON the MAJOR HT (SW1) observe that

7.6 the MAJOR HT pilot lamp lights. Check the MAJOR HT Voltage on the SWITCHED METER and compare with the DC Voltmeter reading. Adjust SWITCHED METER sensitivity by adding a calibration resistor across R32 (this will be greater than 3K3 ohms).

Adjust SET BIAS (RV6) to Max (clockwise).

Switch OFF, MAJOR HT, remove DC Voltmeter, replace MAIN POWER SUPPLY cover, then switch ON, MAJOR HT.

(v) Switch EXCITER LOCAL CONTROL switch to TRANSMIT (no audio input to exciter), check cathode currents for V1, V2, V3 and V4 on the PA CATHODE CURRENT Meter.
Observe which valve passes the lowest cathode current and adjust SET BIAS until this valve current is 60 mA.
Switch the PA CATHODE CURRENT meter to each other valve in turn and adjust the corresponding SET SCREEN VOLTS (RV1-RV4) until all four cathode currents read 60 mA. (Do not adjust the SET SCREEN VOLTS potentiometer for the valve originally passing the lowest cathode current.

(w) Switch the PA CATHODE CURRENT meter to ALL and re-adjust the SET BIAS potentiometer for 440 mA (top scale). (220 mA for 500W)

Slowly turn the BIAS TRIP potentiometer 5RV1 clockwise until the BIAS TRIP operates. Check that the BIAS FAIL fault indicator lamp lights, MAJOR HT lamp extinguishes and FILS, BIAS and MINOR HT fails as the B relay releases. Rotate SET BIAS anticlockwise approximately $\frac{1}{4}$ turn (90°)

Reset the FAULT INDICATOR by switching OFF CB1 for 2 to 5 seconds, switch ON again. When the time delay has expired and the MAJOR HT is restored, re-adjust the SET BIAS to give a PA CATHODE CURRENT of 240 mA (ALL - top scale), (approx -60V).
Switch EXCITER LOCAL CONTROL switch to STANDBY, observe that PA CATHODE CURRENT falls to 80 mA (top scale) or less. (40 mA for 500W)
Switch - OFF, MAJOR HT switch.

(x) Adjust SWR BALANCE potentiometer 2RV3 until SWR indicated on SWITCHED METER reads infinity (meter zero). This adjustment is temperature sensitive and should only be attempted after the equipment has been running at least ten minutes.

(y) Connect a jumper lead across the PA ANODE-TUNING capacitors C36 and C37 to ground. Switch ON, MAJOR HT. Switch EXCITER LOCAL CONTROL SWITCH to TRANSMIT. Check GRID tuning.
Observe PA CATHODE CURRENT meter (ALL) and increase AUDIO OSCILLATOR input to EXCITER until the HT OVERCURRENT TRIP operates.
(Do NOT run amplifier under these conditions for longer than necessary to observe trip point). The trip should operate below 850 mA (425 mA for 500W)
Check that the HT OVERCURRENT fault indicator lamps lights and MAJOR HT lamp extinguishes. Reduce audio input to zero and reset the trip as in (w) above.

A calibrating resistor R2 (PHILIPS Type CR37) must be fitted in parallel with R1 (10 ohm) on the RELAY INTERLOCK PCB. Choose the highest standard value (E10 series) which allows the trip to operate at just over 850mA. (425mA for 500W)

(z) Switch EXCITER LOCAL CONTROL switch to STANDBY. Switch OFF, MAJOR HT. Switch OFF, CIRCUIT BREAKER CB1. Remove anode circuit jumper lead. Re-fit SERVO AMPLIFIER PCB.

7.7 TUNING, NEUTRALISING AND LOADING (MULTI-CHANNEL)

7.7.1 General

The procedure differs from single-channel transmitters inasmuch as the tuning and loading capacitors are adjusted through the SERVO AMPLIFIER. In addition the normal operation of the EXCITER is inhibited until tuning and loading has been satisfactorily completed.

7.7.2 Tuning and Preliminary Loading

(a) Connect the 50 ohm RF DUMMY LOAD and peak-reading VTVM to the output SKT2.

(b) Select the highest frequency channel on the EXCITER and place the FUNCTION switch to TUNE.

(c) Switch ON, CIRCUIT BREAKER CB1. Switch the TUNE meter to GRID and adjust the appropriate GRID TUNING capacitor until the TUNE meter balances. (Ensure the meter needle moves in the same direction as the GRID TUNING knob when adjusting)

(d) Switch TUNE METER to ANODE and SWITCHED METER to SERVO BALANCE. Switch ON, MAJOR HT. Adjust the appropriate SERVO PRESET potentiometer slowly clockwise, the servo-system will follow and attempt to tune the transmitter. Continue until the TUNE INDICATOR DIAL approximates the expected indication for the channel frequency (refer P.A. TUNING CHART, Dwg. 10-00028 if unknown), and the TUNE, LOAD and SERVO BALANCE meters all read zero. (Note, meter readings may not provide significant indications until resonance is approached).

(e) Switch EXCITER FUNCTION switch to LOCAL and the SYSTEM READY LAMP should light after a slight delay. Switch to another channel briefly then reselect channel under adjustment. The servo-system should re-tune the transmitter and when auto-tuning completed, again light the SYSTEM READY lamp. If hunting occurs proceed to para (f), adjust then repeat para (e). A PA CATHODE CURRENT of less than 400mA may be used if the system has any tendency to hunt. Log the level finally selected.

(f) Adjust the TUNE LEVEL potentiometer 1RV1 EXCITER (furthest from crystal filter of pair at LHS of PCB), to give a PA CATHODE CURRENT (ALL) of 400mA (max) (200mA for 500W) (300mA for 750)

(g) Repeat (b), (c), (d) and (e) for each channel fitted. The amplifier is then tuned on all channels but the loading will be too light.

(h) Switch to the highest frequency channel fitted and allow the SERVO SYSTEM to re-tune and load.

(j) Switch EXCITER FUNCTION switch to LOCAL CONTROL Check that LOCAL CONTROL switch is at STANDBY.

7.7.3 Neutralising

This should be done on the highest frequency channel fitted, check that 7.7.2 (h) and (j) is completed before proceeding.

(a) Switch OFF at CB1 and remove the SERVO AMPLIFIER PCB.

This allows the EXCITER output level to be controlled by the external audio input level.

(b) Connect the CRO (low capacity probe, AC coupled) to the hot end of the DRIVER TANK inductor (junction of L7-R22 and relay bus).

Switch OFF, MAJOR HT
Switch OFF, SCREEN SUPPLY
Check EXCITER FUNCTION switch is at LOCAL CONTROL

(c) Switch ON, CIRCUIT BREAKER CB1.
Switch EXCITER LOCAL CONTROL switch to TRANSMIT. Increase AUDIO OSCILLATOR input to the EXCITER until the CRO indicates approximately 50V peak RF. (Trim GRID TUNING for maximum)

(d) Transfer CRO probe to the PA ANODE TUNING CAPACITOR C36-C37 and retrim the GRID TUNING capacitor (TUNE meter switched to GRID).

Adjust C23 by sliding the collar UP or DOWN until deflection on CRO is a minimum. (approx 150 mV).

CAUTION C23 is at approximately - 100 Volts with respect to ground and a short circuit during adjustment will cause the BIAS FAIL trip to operate.

An indication of the accuracy of adjustment can be obtained by adjusting C20. Approaching balance by increasing C20 indicates C23 collar is too high and vice versa.

(e) Switch EXCITER FUNCTION switch to STANDBY
Disconnect CRO
Switch OFF, CB1
Refit SERVO AMPLIFIER PCB
Switch ON, SCREEN SUPPLY
Switch ON, MAJOR HT
Switch ON, CB1.

7.7.4 Loading

For this adjustment it is necessary to drive the EXCITER with a two-tone audio source since full measurement of PEP is required. (SSB DISTORTION METER Type 6918 audio output).

7.7.4 (a) Connect a two-tone audio signal source to the EXCITER AUDIO INPUT SKT 1.
Connect CRO probe to sample the RF waveform. This may be done by inserting CRO probe into PA valve compartment, taking care that it does not come into contact with the connections the valve anodes.

Reduce mains input by 5%

(b) Switch EXCITER LOCAL CONTROL switch to TRANSMIT Increase two-tone audio input level until peak flattening is noticable on the RF output waveform. The power output will be less than 1 KW PEP (224 volts ~~peak~~ across 50 ohms). RMS (316V peak)
(500W PEP = 158 volts peak across 50 ohms)

(c) Rotate LOAD potentiometer 2RV1 slightly clockwise. Switch EXCITER FUNCTION switch to TUNE, allow servo system to tune and load, return switch to LOCAL CONTROL

Observe the new power output.

Repeat (c) until power output is 1 KW PEP. (500W).

Proceed to section 7.9 ALC LEVEL ADJUSTMENT.

(d) If a means of measuring power (RF Wattmeter or peak-reading VTVM) is unavailable :-

(i) instead of observing flat topping of RF waveform on the CRO, increase audio drive until screen current goes slightly positive e.g. 2½ mA, (b).

(ii) load the PA until PA CATHODE CURRENT (ALL) rises to 640 mA, (c). (320 mA for 500W)

7.8 TUNING, NEUTRALISING AND LOADING (SINGLE CHANNEL)

7.8.1 General

The procedure for a single channel transmitter is relatively simple, as there is no SERVO AMPLIFIER and associated interlocks to inhibit the EXCITER operation.

7.8.2 Tuning and Preliminary Loading

(a) Connect the 50 ohm RF DUMMY LOAD and peak reading VTVM to the output SKT 2.

(b) Switch EXCITER FUNCTION switch to TUNE
Switch ON, CB1.
Switch TUNE meter to GRID, adjust GRID TUNING capacitor until meter balances.
Switch TUNE meter to ANODE

(c) Turn LOADING control to 0 (min. loading, max. capacity).
Turn TUNING control to 0 (min frequency)
Switch EXCITER FUNCTION switch to TUNE
Switch ON, MAJOR HT and adjust TUNING control until TUNE meter balances.

When the PA Anode circuit is detuned the PA CATHODE CURRENT will rise and under these conditions should be limited to 400 mA by adjusting TUNE LEVEL potentiometer 1RV1 in the EXCITER (furthest from crystal filter of pair at LHS of PCB). DO NOT operate th e amplifier in a detuned state for longer than necessary to make the adjustment. (200 mA for 500W)

(d) Switch EXCITER FUNCTION switch to LOCAL CONTROL Switch OFF, MAJOR HT.

7.8.3 Neutralising

The transmitter will be tuned and lightly loaded when procedure 7.8.2 is completed.

(a) Connect the CRO (low capacity probe, AC coupled) to the hot end of the DRIVER TANK inductor (junction of L7-R22 and C14A).
Switch OFF, SCREEN SUPPLY
Switch EXCITER LOCAL CONTROL switch to TRANSMIT

(b) Connect AUDIO OSCILLATOR to EXCITER AUDIO INPUT and increase signal input until CRO indicates 50 Volts peak RF (trim GRID TUNING capacitor for maximum)

(c) Transfer CRO probe to PA ANODE TUNING CAPACITOR C36-C37 and retrim the GRID TUNING capacitor (TUNE meter switched to GRID).

Adjust C23 by sliding the collar UP or DOWN until deflection on CRO is a minimum.

CAUTION : C23 is at approximately - 100V with respect to ground and short circuit during adjustment will cause the BIAS FAIL trip to operate.

An indication of the accuracy of adjustment can be obtained by adjusting C20. Approaching balance by increasing C20 indicates C23 collar is too high and vice versa.

(d) Switch EXCITER FUNCTION switch to STANDBY. Disconnect CRO.

Switch ON, SCREEN SUPPLY.
Switch ON, MAJOR HT.

7.8.4 Loading. (Single channel)

For this adjustment it is necessary to drive the EXCITER with a two-tone audio source since the full measurement of PEP is required. (SSB DISTORTION METER Type 6918 audio output).

(a) Connect a two-tone audio signal source to the EXCITER AUDIO INPUT SKT 1
Connect CRO probe to sample the RF waveform. This may be done by inserting CRO probe into the PA valve compartment taking care that it does not come into contact with the connections to the valve anodes.

Reduce mains supply by 5%.

(b) Switch EXCITER LOCAL CONTROL switch to TRANSMIT. Increase two-tone audio input level until peak flattening is noticeable on the RF output waveform. The power output will be less than 1 KW PEP (224 volts ~~peak~~ RMS across 50 ohms). (500W PEP = 158 volts peak across 50 ohms). ← 316 V peak

RMS at peak of envelope →

(c) Turn LOADING control to increase loading and at the same time adjust the TUNING control to keep the TUNE meter (ANODE) centred. (The two controls are interdependant). Continue until required output 1 KW PEP is achieved. (500W)

Proceed to section 7.9 ALC LEVEL ADJUSTMENT.

(d) If a means of measuring power is unavailable (i.e. RF wattmeter or peak reading VTVM) refer to the notes in para 7.7.4 (d).

7.9 ALC LEVEL ADJUSTMENT.

(a) Raise the mains voltage again to the nominal value (refer 7.7.4 (a) and 7.8.4 (a)).

(b) Increase the two-tone audio signal to the EXCITER by approximately 2 dB (20%) to obtain a power output in excess of 1 KW PEP. (500W)

(c) Rotate the ALC LEVEL potentiometer 2RV2 anticlockwise until the output power reduces to 1KW PEP (or PA CATHODE CURRENT reads 640 mA if no wattmeter is available). (320 mA for 500W)

(d) On multi-channel transmitter switch to each channel in turn and check that power output is 1KW PEP $\pm \frac{1}{2}$ dB. (500W PEP $\pm \frac{1}{2}$ dB)

(e) Check the INTERMODULATION DISTORTION on all channels
The intermodulation products (D3 and D5+) must be less than -34dB with respect to either tone of the two tone test. (Eilco Type 6918 Distortion meter reading 34dB)

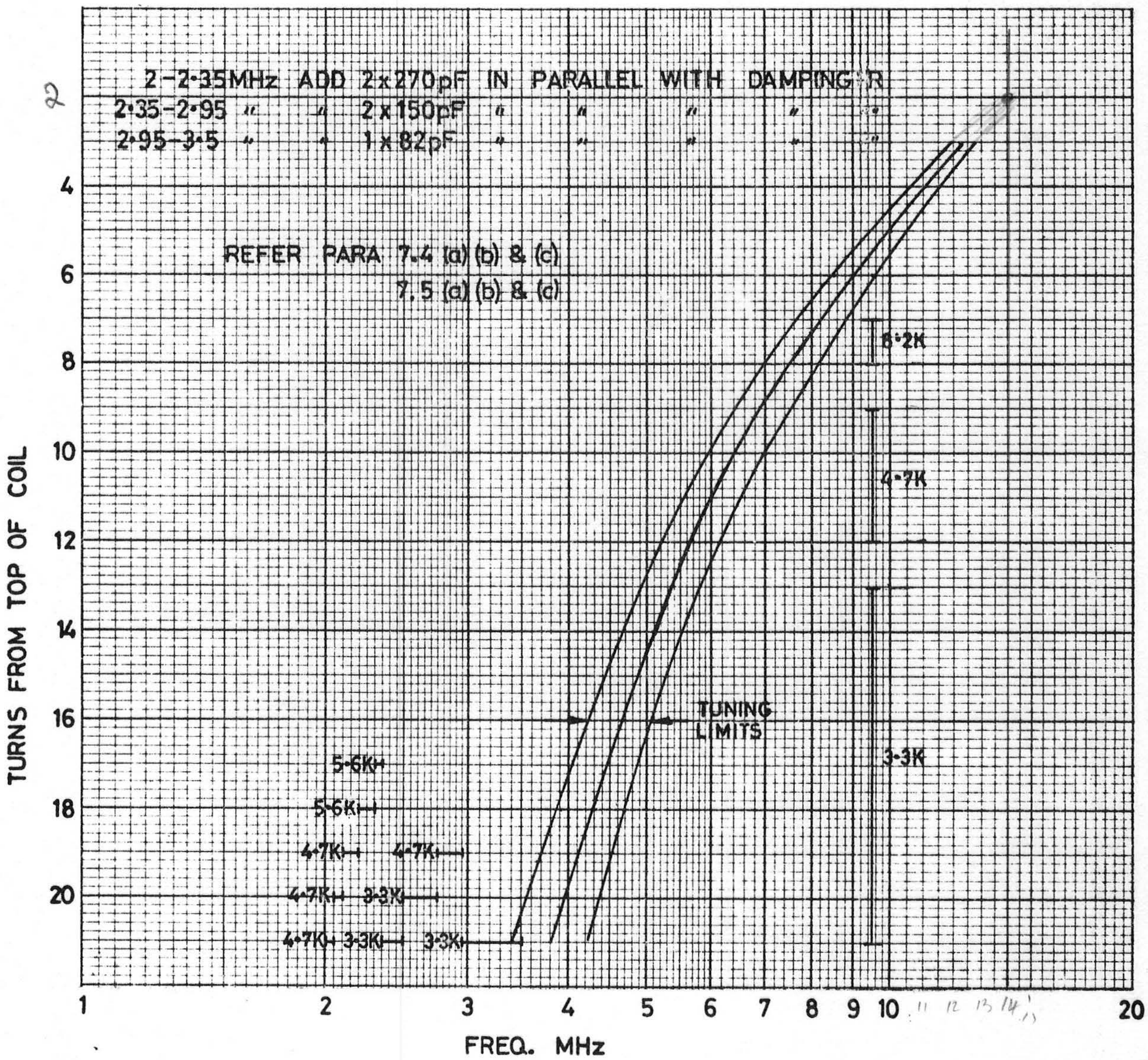
Proceed to section 7.10

7.10 SWR BRIDGE BALANCE

(a) Switch EXCITER LOCAL CONTROL switch to STANDBY.
Switch EXCITER FUNCTION switch to TUNE.

(b) Adjust IC2 (on SWR DETECTOR PCB) for maximum meter deflection on SWITCHED METER set to SWR (i.e. minimum SWR).

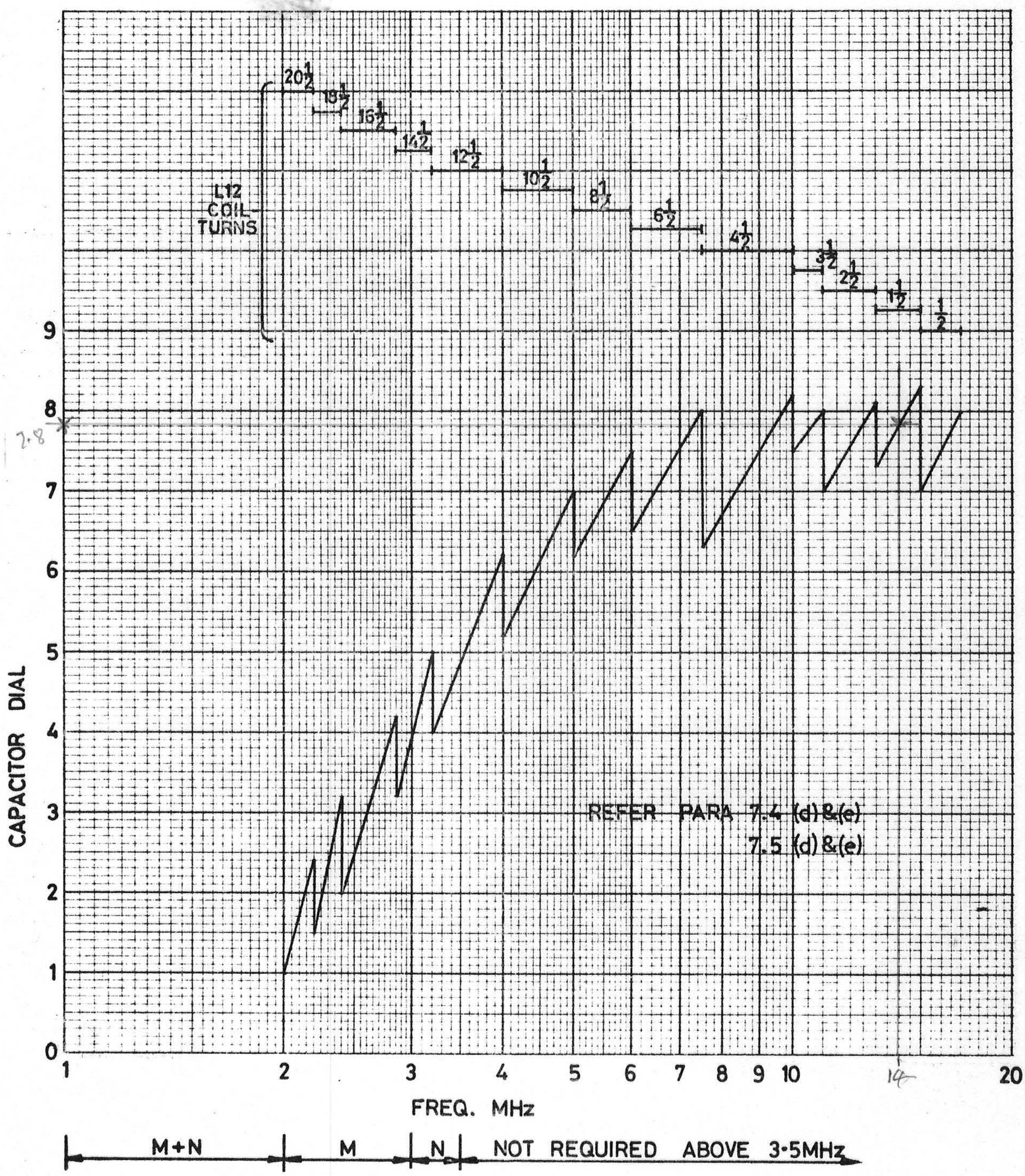
(c) Switch EXCITER FUNCTION Switch to LOCAL CONTROL so that meter returns to zero. If necessary trim SWR BALANCE potentiometer 2RV3 (para 7.6. (x)).



GRID TUNING CHART

10-00027

1KW



ADD DIODES TO DIODE MATRIX (D13–18) TO OPERATE RELAYS AS SHOWN WHEN CHANNEL FREQUENCY LIES WITHIN BANDS INDICATED

P.A. TUNING CHART
10-00028
1KW

8. PARTS LIST

The parts list contains the following information.

(a)	Circuit reference number	Each component is prefixed. This prefix must be stated when ordering the component. The prefix is given in the table below and at the beginning of each section of the parts list.
(b)	Description	Gives the value and type of component
(c)	Manufacturer	States the manufacturer and component series. Where no manufacturer is stated, the number given is a CODAN part number.

When ordering, it is necessary to quote all of this information for the particular component required to minimise the risk of obtaining the wrong part.

Note :
1. All resistor values are in Ohms
2. All resistors are carbon film unless otherwise stated.
3. All electrolytic capacitors are aluminium foil unless otherwise stated.

Parts lists are assembled in order of their prefix.

CCT REF.	DESCRIPTION			MANUFACTURER	NOTES
8.1.1	MAIN CHASSIS				
	All components prefixed 1.				
C1	32uF +50%-10%	300V	Electrolytic	Ducon ET5B	
C2a	18pF Trimmer	500V	Ceramic	Philips 802	
C2b	22pF 5% NPO	500V	Ceramic	Philips 555	
C3	330pF 5%	630V	Styroseal	Ducon DFB	
C4	3pF Trimmer	500V	Ceramic	Philips 801	
C5	220pF 5%	630V	Styroseal	Ducon DFB	
C6	0.01uF 20% Y	2KV	Ceramic	Ducon CAD103	
C7	1000pF +50%-20%	500V	Ceramic	Philips 563	
C8	0.01uF +80%-20%	25V	Ceramic	Ducon CDR	
C9	0.01uF +80%-20%	25V	Ceramic	Ducon CDR	
C10	0.01uF +80%-20%	25V	Ceramic	Ducon CDR	
C11	39pF 10% NPO	10KV	Ceramic	Ducon CAA33	
C12	4700pF 10%	400V	Polyester	Philips 315	
C13	0.01uF +80%-20%	25V	Ceramic	Ducon CDR	
C14a, C19a	6-150pF Trimmer		Air	Polar/Jackson C804	
C14b, C19b	Selected during set-up 5%	630V	Styroseal	Ducon DFB	
C20	15-130pF compression trimmer		Mica	Arco 302	
C21	1500pF 20% Y	2KV	Ceramic	Ducon CAD	
C22	0.1uF 10%	400V	Polyester	Philips 315	
C23	Neutralising capacitor			08-00413	
C24-27	2700pF integral with valve socket				
C28	1000pF +50%-20%	20KV	Ceramic	Ducon CVH	
C29	1000pF +50%-20%	20KV	Ceramic	Ducon CVH	
C30	1000pF +50%-20%	20KV	Ceramic	Ducon CVH	
C31	4700pF 20%	3KV	Ceramic	Ducon CTP	
C32	2.2pF 5%	5KV	Ceramic	Ducon CDI	
C33	2.2pF 5%	5KV	Ceramic	Ducon CDI	
C34	2.2pF 5%	5KV	Ceramic	Ducon CDI	

CCT REF.	DESCRIPTION		MANUFACTURER	NOTES
8.1.1	Cont.			
C35	3300pF 10% 400V	Polyester	Philips 315	
C36	23-347pF Variable	Air	E.F. Johnson 154-10	1KW only
C37	23-347pF Variable	Air	E.F. Johnson 154-10	1KW only
C38	23-1000pF Variable	Air	E.F. Johnson 154-0030-001	
C39	23-1000pF Variable	Air	E.F. Johnson 154-0030-001	
C40	330pF 10% N150 1KV	Ceramic	Ducon CTR-F	
C41	330pF 10% N150 1KV	Ceramic	Ducon CTR-F	
C42	330pF 10% N150 1KV	Ceramic	Ducon CTR-F	
C43	330pF 10% N150 1KV	Ceramic	Ducon CTR-F	
C44	330pF 10% N150 1KV	Ceramic	Ducon CTR-F	1KW only
C45	330pF 10% N150 1KV	Ceramic	Ducon CTR-F	1KW only
C46	330pF 10% N150 1KV	Ceramic	Ducon CTR-F	1KW only
C47	2uF 5% 440V AC	Paper	Ducon GPE420	50Hz
OR	3uF 5% 440V AC	Paper	Ducon GPE430	40Hz
C48	2x100uF +50%-10% 500V	Electrolytic	Ducon EMG1016S	
OR	200uF +50%-10% 500V	Electrolytic	Ducon EMG/F2050S	
D1	OA91 Germanium diode		Philips	
D2	OA91 Germanium diode		Philips	
D3	OA91 Germanium diode		Philips	
D4	OA91 Germanium diode		Philips	
D5	BY127/800 Silicon diode		Philips	
D6	EM402 Silicon diode		Philips	
L1	Peaking Inductor		44-80065	
L2	RF choke		44-80008	
L3	1mH RF choke		Philips 535	
L4	1mH RF choke		Philips 535	
L5	1mH RF choke		Philips 535	
L6	Driver tank inductor		44-70071	
L7	Parasitic suppressor		44-80006	
L8	1mH RF choke		Philips 535	

CCT REF	DESCRIPTION			MANUFACTURER	NOTES
8.1.1	Cont.				
L9	1mH RF choke			Philips 535	
L10	180uH RF choke			44-80054	
L11	4uH RF choke			44-80026	
L12	Anode tank inductor			44-80064	
L13	180uH RF choke			44-80054	
LP1	Indicator lamp green 5V 0.06A			Plessey BFK5	
M1	50-0-50uA M/C Scale X693			Master S225	
M2	50-0-50uA M/C Scale X693			Master S225	
M3	0-1mA 100 ohm M/C Scale X692			Master S225	
M4	0-1mA 100 ohm M C Scale X694			Master S225	
M5	12V 23 rpm DC motor			Philips 9904-120-52607	Multi channel only
M6	12V 23 rpm DC motor			Philips 9904-120-52607	Multi channel only
M7	240V fan and motor (EBM120-2)			08-00194	
PL1	24 way chassis mtg plug			Painton P24MFS	
R1	220	5%	½W	Philips CR37	
R2	470K	5%	½W	Philips CR37	
R3	56K	5%	½W	Philips CR37	
R4	10	5%	1/3W	Philips CR25	
R5	330	5%	2/3W	Philips CR52	
R6	10	5%	½W	Philips CR37	
R7	470	5%	5W	IRC PW5	
R8	15K	5%	2W	Philips CR93	
R9	33K	5%	2W	Philips CR93	
R10	1.5K	5%	7W	IRC PW7	
R11	10K	5%	1/3W	Philips CR25	
R12	10K	5%	1/3W	Philips CR25	

CCT REF.	DESCRIPTION			MANUFACTURER	NOTES
8.1.1	Cont.				
R13	10	5%	1/3W	Philips CR25	
R14	10	5%	1/3W	Philips CR25	
R15	4K7	5%	1/3W	Philips CR25	
R16	10K	5%	1/3W	Philips CR25	
R17	10K	5%	1/3W	Philips CR25	
R18	10K	5%	1/3W	Philips CR25	
R19	10	5%	1/3W	Philips CR25	
R20	10	5%	1/3W	Philips CR25	
R21	4K7	5%	1/3W	Philips CR25	
R22	Part of L7			Philips CR52	
R23	Selected during set-up			Philips CR52	
R24	Selected during set-up			Philips CR52	
R25	Selected during set-up			Philips CR52	
R26	Selected during set-up			Philips CR52	
R27	Selected during set-up			Philips CR52	
R28	Selected during set-up			Philips CR52	
R29	1K	5%	½W	Philips CR37	
R30	1K	5%	½W	Philips CR37	
R31	6.8K	5%	2/3W	Philips CR52	
R32	10	5%	½W	Philips CR37	
R33	10	1%	½W	Philips CR37	
R34	10	1%	½W	Philips CR37	
R35	10	1%	½W	Philips CR37	
R36	10	1%	½W	Philips CR37	
R37	6.8	5%	½W	Philips CR37	
R38	6.8	5%	½W	Philips CR37	
R39	100	5%	½W	Philips CR37	
R40	10	5%	½W	Philips CR37	
R41	10	1%	½W	Philips CR37	
R42	10	1%	½W	Philips CR37	
R43	10	1%	½W	Philips CR37	

CCT REF	DESCRIPTION			MANUFACTURER	NOTES
8.1.1	Cont.				
R44	10	1%	½W	Philips CR37	
R45	6.8	5%	½W	Philips CR37	
R46	6.8	5%	½W	Philips CR37	
R47	100	5%	½W	Philips CR37	
R48	523	1%	½W	Philips MR30	
R49	10	5%	½W	Philips CR37	1KW only
R50	10	1%	½W	Philips CR37	1KW only
R51	10	1%	½W	Philips CR37	1KW only
R52	10	1%	½W	Philips CR37	1KW only
R53	10	1%	½W	Philips CR37	1KW only
R54	6.8	5%	½W	Philips CR37	1KW only
R55	6.8	5%	½W	Philips CR37	1KW only
R56	100	5%	½W	Philips CR37	1KW only
R57	10	5%	½W	Philips CR37	1KW only
R58	10	1%	½W	Philips CR37	1KW only
R59	10	1%	½W	Philips CR37	1KW only
R60	10	1%	½W	Philips CR37	1KW only
R61	10	1%	½W	Philips CR37	1KW only
R62	6.8	5%	½W	Philips CR37	1KW only
R63	6.8	5%	½W	Philips CR37	1KW only
R64	100	5%	½W	Philips CR37	1KW only
R65	174K	1%	½W	Philips MR30	
R66	18K	1%	½W	Philips MR30	
R67	174K	1%	½W	Philips MR30	
R68	174K	1%	½W	Philips MR30	
R69	3K3	5%	1/3W	Philips CR25	
R70	220K	5%	2/3W	Philips CR52	
R71	4K7	5%	2/3W	Philips CR52	500W only
R72	4K7	5%	2/3W	Philips CR52	500W only

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES
8.1.1	Cont.		
RV1	5K WW Potentiometer	IRC 2W	
RV2	5K WW Potentiometer	IRC 2W	
RV3	5K WW Potentiometer	IRC 2W	
RV4	5K WW Potentiometer	IRC 2W	
RV5	10K 20% Linear Potentiometer	22-10399	multi channel only
RV6	50K 20% Linear Potentiometer	Plessey E	
RLA	4 pole C/O relay 820 Ohm coil	Siemens V23154-D0721-B110	
RLB	4 pole C/O relay 820 Ohm coil	Siemens V23154-D0721-B110	
RLC	Frequency select relay	Part of 08-00169	
RLD	4 pole C/O relay 820 Ohm coil	Siemens V23154-D0721-B110	
RLE		Part of 08-00169	
RLF	4 pole C/O relay 820 Ohm coil	Siemens V23154-D0721-B110	
RLG		Part of 08-00169	
RLH	4 pole C/O relay 820 Ohm coil	Siemens V23154-D0721-B110	
RLJ		Part of 08-00169	
RLK	4 pole C/O relay 820 Ohm coil	Siemens V23154-D0721-B110	
RLL		Part of 08-00169	
RLM	Load select relay	08-00170	
RLN	Load select relay	08-00170	

NOTE : RLA-RLN MULTI CHANNEL ONLY

SK1	BNC jack receptacle VG-1094/U	Acme	
SK2	C jack receptacle VG-568/U	Acme	
	Value socket with integral screen by-pass capacitor (4 off 1KW) (2 off 500W)	EIMAC SK600	
	Value chimney (1 per socket)	EIMAC SK606	

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES
8.1.1	Cont.		
SW1	DPDT toggle switch	MSP8373B3	
SW2	Meter switch	14-00011	
SW3	PA metering switch	14-00012	
SW4	Tune select switch	14-00013	
SW5	Microswitch	Burgess CR1K2 or CT2K2	
T1	RF input transformer	44-80052	
T2	RF current transformer	44-80053	
T3	RF current transformer	44-80053	
T4	Power transformer 40Hz	44-00963	
OR	Power transformer 50-60Hz	44-00897	
V1	Valve type 4CX250B	EIMAC	
V2	Valve type 4CX250B	EIMAC	
V3	Valve type 4CX250B	EIMAC	1KW only
V4	Valve type 4CX250B	EIMAC	1KW only
V5	Valve type E55L	Philips	
Z1	BZY88C3V3 zener diode	Philips	

8.1.2 LOAD, ALC AND SWR DETECTOR

All Components Prefixed 2

CCT. REF	DESCRIPTION	MANUFACTURER	NOTES
	Complete Sub-assy	08-00147	
	Printed Circuit Board	07-00106	
C1	4.7 pF ± 0.5 pF 500V NPO Ceramic	Philips 555	
C2	22 pF 5% 125V Polystyrene	Allied TCS0122	
C3	200 uF +50% -10% 10V Electrolytic	Philips 001	
C4	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	
C5	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	
C6	33 pF 5% 100V Styroseal	Ducon DFB0133	
C7	270 pF 5% 630V Styroseal	Ducon DFB 605	
C8	0.047uF + 80% -20% 25V Ceramic	Ducon CDR	
C9	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	
C10	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	
C11	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	
C12	0.01 uF + 80% -20% 100V Ceramic	Ducon CDR	
C13	470 pF 5% 630V Styroseal	Ducon DFB608	
C14	2200 uF + 100% -10% 25V Electrolytic	Elna RT	
C15	2200 uF +100% -10% 25V Electrolytic	Elna RT	
C16	3300 pF 10% 100V Ceramic	Philips 630	
C17	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	
C18	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	
C19	0.047 uF + 80% -20% 25V Ceramic	Ducon CDR	
C20	160uF + 50% -10% 2.5V Electrolytic	Philips 001	
C22	0.047uF +80% -20% 25V Ceramic	Ducon CDR	
C23	0.047uF +80% -20% 25V Ceramic	Ducon CDR	
C25	160 uF +50% -10% 2.5V Electrolytic	Philips 001	
C26	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	
C27	0.047 uF + 80% -20% 25V Ceramic	Ducon CDR	
C28	3300 pF 10% 100V Ceramic	Philips 630	
C29	0.047 uF +80% -20% 25V Ceramic	Ducon CDR	

CCT REF.	DESCRIPTION				MANUFACTURER	NOTES
D1-D4	1N914 Silicon Diode					
D5-D8	BY126/200 Silicon Diode				Philips	
D9	IN914	Silicon Diode				
D10	EM402	Silicon Diode				
D11 & D12	IN914	Silicon Diode, Matched pair to specification 10-00017				
Z1	BZY88/C6V2	Zener Diode			Philips	
Z2	BZY88/C6V2	Zener Diode			Philips	
L1	1mH RF Choke				Philips 535	
R1	22K	Ohms	5%	1/3W	Philips CR25	
R2	10K	Ohms	5%	1/3W	Philips CR25	
R3	22K	Ohms	5%	1/3W	Philips CR25	
R4	10K	Ohms	5%	1/3W	Philips CR25	
R5	10K	Ohms	5%	1/3W	Philips CR25	
R6	10K	Ohms	5%	1/3W	Philips CR25	
R7	33K	Ohms	5%	1/3W	Philips CR25	
R8	10K	Ohms	5%	1/3W	Philips CR25	
R9	120K	Ohms	5%	1/3W	Philips CR25	
R10	330	Ohms	5%	1/3W	Philips CR25	
R11	4.7K	Ohms	5%	1/3W	Philips CR25	
R12	10K	Ohms	5%	1/3W	Philips CR25	
R14	1K	Ohms	5%	1/3W	Philips CR25	
R15	100	Ohms	5%	1/3W	Philips CR25	
R17	1K	Ohms	5%	1/3W	Philips CR25	
R21	10	Ohms	5%	1/3W	Philips CR25	
R22	Select-on-Test		5%	1/3W	Philips CR25	(180 Ohm)
R23	1K	Ohms	5%	1/3W	Philips CR25	
R25	100	Ohms	5%	1/3W	Philips CR25	
R28	4.7K	Ohms	5%	1/3W	Philips CR25	
R29	10K	Ohms	5%	1/3W	Philips CR25	

CCT REF	DESCRIPTION	MANUFACTURER	NOTES
8.1.3	SERVO PRESET		
	All Components Prefixed 3		
	Complete Sub-assy	08-00152	
	Printed Circuit Board	07-00072	
VR1-VR6	10K Ohms 20% Lin. Type MP/PC	Plessey	
	Carbon Potentiometer	404/8/02857/028	

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES

8.1.4 SERVO AMPLIFIER

All Components Prefixed 4

	Complete Sub-assy	08-00148	
	Printed Circuit Board	07-00102	
C1-C5	0.047 uF + 80% - 20% 25V Ceramic	Ducon CDR	
C6	0.047 uF 10% 200V Polyester	Soanar 'N'	
C7-C10	0.047 uF + 80% -20% 25V Ceramic	Ducon CDR	
C11	10 uF + 50% - 20% 25V Electrolytic	S.T.C. Tag	
C12 - C15	0.047 uF + 80% -20% 25V Ceramic	Ducon CDR	
D1-D18	IN914 Silicon Diode		

R1	470	Ohms	5%	1/3W	Philips CR25
R2	1.8K	Ohms	5%	1/3W	Philips CR25
R3	68K	Ohms	5%	1/3W	Philips CR25
R4	68K	Ohms	5%	1/3W	Philips CR25
R5	1.8K	Ohms	5%	1/3W	Philips CR25
R6	470	Ohms	5%	1/3W	Philips CR25
R7	220K	Ohms	5%	1/3W	Philips CR25
R8	4.7K	Ohms	5%	1/3W	Philips CR25
R9	1K	Ohms	5%	1/3W	Philips CR25
R10	1K	Ohms	5%	1/3W	Philips CR25
R11	10K	Ohms	5%	1/3W	Philips CR25
R12	1M	Ohms	5%	1/3W	Philips CR25
R13	100K	Ohms	5%	1/3W	Philips CR25
R14	10K	Ohms	5%	1/3W	Philips CR25
R15	2.2K	Ohms	5%	1/3W	Philips CR25
R16	1K	Ohms	5%	1/3W	Philips CR25
R17	220K	Ohms	5%	1/3W	Philips CR25
R18	4.7K	Ohms	5%	1/3W	Philips CR25

CCT. REF	DESCRIPTION				MANUFACTURER	NOTES
R19	1K	Ohm	5%	1/3W	Philips CR25	
R20	330	Ohm	5%	1/3W	Philips CR25	
R21	330	Ohm	5%	1/3W	Philips CR25	
R22	1K	Ohm	5%	1/3W	Philips CR25	
R23	4.7K	Ohm	5%	1/3W	Philips CR25	
R24	680	Ohm	5%	1/3W	Philips CR25	
R25	680	Ohm	5%	1/3W	Philips CR25	
R26	4.7	Ohm	5%	1/3W	Philips CR25	
R27	4.7	Ohm	5%	1/3W	Philips CR25	
R28	47K	Ohm	5%	1/3W	Philips CR25	
R29	4.7K	Ohm	5%	1/3W	Philips CR25	
R30	10K	Ohm	5%	1/3W	Philips CR25	
R31	10K	Ohm	5%	1/3W	Philips CR25	
R32	4.7K	Ohm	5%	1/3W	Philips CR25	
R33	10K	Ohm	5%	1/3W	Philips CR25	
R34	10K	Ohm	5%	1/3W	Philips CR25	
R35	1M	Ohm	5%	1/3W	Philips CR25	
R36	100K	Ohm	5%	1/3W	Philips CR25	
R37	10K	Ohm	5%	1/3W	Philips CR25	
R38	2.2K	Ohm	5%	1/3W	Philips CR25	
R39	1K	Ohm	5%	1/3W	Philips CR25	
R40	470K	Ohm	5%	1/3W	Philips CR25	
R41	4.7K	Ohm	5%	1/3W	Philips CR25	
R42	1K	Ohm	5%	1/3W	Philips CR25	
R43	330	Ohm	5%	1/3W	Philips CR25	
R44	330	Ohm	5%	1/3W	Philips CR25	
R45	1K	Ohm	5%	1/3W	Philips CR25	
R46	4.7K	Ohm	5%	1/3W	Philips CR25	
R47	680	Ohm	5%	1/3W	Philips CR25	
R48	680	Ohm	5%	1/3W	Philips CR25	
R49	4.7	Ohm	5%	1/3W	Philips CR25	
R50	4.7	Ohm	5%	1/3W	Philips CR25	

CCT REF	DESCRIPTION				MANUFACTURER	NOTES
R51	47K	Ohms	5%	1/3W	Philips CR25	
R52	4.7K	Ohms	5%	1/3W	Philips CR25	
R53	10K	Ohms	5%	1/3W	Philips CR25	
R54	10K	Ohms	5%	1/3W	Philips CR25	
R55	4.7K	Ohms	5%	1/3W	Philips CR25	
R56	10K	Ohms	5%	1/3W	Philips CR25	
R57	47K	Ohms	5%	1/3W	Philips CR25	
R58	1K	Ohms	5%	1/3W	Philips CR25	
R59	100K	Ohms	5%	1/3W	Philips CR25	
R60	4.7K	Ohms	5%	1/3W	Philips CR25	
R61	1K	Ohms	5%	1/3W	Philips CR25	
R62	10K	Ohms	5%	1/3W	Philips CR25	
R63	10K	Ohms	5%	1/3W	Philips CR25	
R64	10K	Ohms	5%	1/3W	Philips CR25	
R65	4.7K	Ohms	5%	1/3W	Philips CR25	
R66	4.7K	Ohms	5%	1/3W	Philips CR25	
R67	47K	Ohms	5%	1/3W	Philips CR25	
R68	10K	Ohms	5%	1/3W	Philips CR25	
R69	1K	Ohms	5%	1/3W	Philips CR25	
R70	10K	Ohms	5%	1/3W	Philips CR25	
R71	150K	Ohms	5%	1/3W	Philips CR25	
R72	10K	Ohms	5%	1/3W	Philips CR25	
R73	10K	Ohms	5%	1/3W	Philips CR25	
R74	100K	Ohms	5%	1/3W	Philips CR25	
TR1	741C Integrated Circuit				Fairchild	
TR2	2N5461 P Channel FET				Fairchild	
TR3	741C Integrated Circuit				Fairchild	
TR4	BC148 NPN Silicon				Philips	
TR5	AY1115 PNP Silicon				Fairchild	
TR6	AY1115 PNP Silicon				Fairchild	
TR7	BC148 NPN Silicon				Philips	
TR8	TIP 32 PNP Power Silicon				Texas	

CCT REF	DESCRIPTION			MANUFACTURER	NOTES
TR9	TIP 31 NPN Power Silicon			Texas	
TR10	BC148	NPN	Silicon	Philips	
TR11	BC148	NPN	Silicon	Philips	
TR12	AY1115	PNP	Silicon	Philips	
TR13	2N5461 P Channel FET			Philips	
TR14	741C Integrated Circuit			Fairchild	
TR15	BC148	NPN	Silicon	Philips	
TR16	AY1115	PNP	Silicon	Fairchild	
TR17	AY1115	PNP	Silicon	Fairchild	
TR18	BC148	NPN	Silicon	Philips	
TR19	TIP 32	PNP	Power Silicon	Texas	
TR20	TIP 31	NPN	Power Silicon	Texas	
TR21	BC148	NPN	Silicon	Philips	
TR22	BC148	NPN	Silicon	Philips	
TR23	AY1115	PNP	Silicon	Philips	
TR24	BC148	NPN	Silicon	Philips	
TR25	BC148	NPN	Silicon	Philips	
TR26	AY1115	PNP	Silicon	Philips	
TR27	OC926	PNP	Silicon	Philips	
TR28	OC946	PNP	Silicon	Philips	
TR29	BC148	NPN	Silicon	Philips	
TR30	BC148	NPN	Silicon	Philips	
TR31	BC148	NPN	Silicon	Philips	
Z1	BZY88	C7V5		Philips	
Z2	BZY88	C7V5		Philips	
Z3	BZY88	C15V		Philips	

CCT. REF	DESCRIPTION				MANUFACTURER	NOTES

8.1.5 BIAS REGULATOR

All Components Prefixed 5

	Complete Sub-assy				08-00149	
C1	47 uF + 50% - 10% 160V Electrolytic				Elna RT	
C2	0.047 uF 10% 400V Polyester				Philips 311	
D1-D4	BY126/400				Philips	
D5 & D6	IN914					
D7 & D8	BY126/400				Philips	
R1	1.5K	Ohms	5%	1/3W	Philips CR25	
R2	15K	Ohms	5%	1W	Philips CR68	
R3	3.9K	Ohms	5%	Metal Oxide	Welwyn F33	
R4	8.2K	Ohms	5%	1W	Philips CR68	
R5	2.2K	Ohms	5%	1/3W	Philips CR25	
R6	12K	Ohms	5%	1/3W	Philips CR25	
R7	82K	Ohms	5%	½W	Philips CR37	
R8	2.2K	Ohms	5%	1/3W	Philips CR25	
R9	1K	Ohms	5%	1/3W	Philips CR25	
R10	2.7K	Ohms	5%	1/3W	Philips CR25	
R11	33K	Ohms	5%	1/3W	Philips CR25	
R12	56K	Ohms	5%	1/3W	Philips CR25	
R13	560	Ohms	5%	½W	Philips CR37	
R14	560	Ohms	5%	½W	Philips CR37	
R15	560	Ohms	5%	½W	Philips CR37	
R16	22K	Ohms	5%	1/3W	Philips CR25	
R17	22K	Ohms	5%	1/3W	Philips CR25	
R18	22K	Ohms	5%	1/3W	Philips CR25	
R19	3.3K	Ohms	5%	1/3W	Philips CR25	
R20	15K	Ohms	5%	½W	Philips CR37	
R21	100K	Ohms	5%	1/3W	Philips CR25	

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES
RLA	2 Pole C/O 7600 Ohm Cradle 'N'	Siemens	
TR1 & TR2	BC148 NPN Silicon	Philips	
TR3	AY1115 PNP Silicon	Fairchild	
TR4-TR7	OC926 PNP Silicon	Philips	
VR1	10K Ohms 20% Lin. Type MP/PC Carbon Potentiometer	Plessey 404/8/02857/028	
Z1	BZY88 C12V	Philips	
Z2	BZY88 C6V2	Philips	
Z3	BZY88 C6V2	Philips	
Z4	BZY88 C6V8	Philips	
Z5	BZX70 C51V	Philips	
	Printed Circuit Board	07-00077	

CCT.REF	DESCRIPTION	MANUFACTURER	NOTES

8.1.6 MINOR HT REGULATOR

All Components Prefixed 6

	Complete Sub-assy	08-00150	
	Printed Circuit Board	07-00076	
C1	250 uF + 50% -10% 25V Electrolytic	Philips 023	
C2	1000 pF 5% 50V Styroseal	Ducon DFB0512	
C3	0.1 uF 10% 630V Polyester	Philips 315	
D1-D4	BY127/800 Silicon Diode	Philips	
D5 & D6	BY126/200 Silicon Diode	Philips	
D7	IN914 Silicon Diode		
D8	BY126/200 Silicon Diode	Philips	
D9	BY127/800 Silicon Diode	Philips	
Z1-Z4	BZX70/C12	Philips	
R1	100K Ohms 5% ½W	Philips CR37	
R2	100K Ohms 5% ½W	Philips CR37	
R3	100K Ohms 5% ½W	Philips CR37	
R4	6.8K Ohms 5% 1/3W	Philips CR25	
R5	6.8K Ohms 5% 1/3W	Philips CR25	
R6	1K Ohms 5% 1/3W	Philips CR25	
R7	2.7K Ohms 5% 1/3W	Philips CR25	
R8	330K Ohms 5% ½W	Philips CR37	
R9	2.7K Ohms 5% 1/3W	Philips CR25	
R10	390 Ohms 5% 1/3W	Philips CR25	
R11	2.2K Ohms 5% 1/3W	Philips CR25	
R12	27 Ohms 5% 1/3W	Philips CR25	
R13	390 Ohms 5% 1/3W	Philips CR25	
R14	100K Ohms 5% 2/3W	Philips CR52	
R15	100K Ohms 5% 2/3W	Philips CR52	

CCT REF	DESCRIPTION	MANUFACTURER	NOTES
TR1	723 C Integrated Circuit	Fairchild U6E 7723393	
TR2-TR4	40313 NPN Silicon Transistor	R.C.A.	
VR1	10K Ohms 20% Lin. Type MP/PC Carobon Potentiometer	Plessey 404/8/02857/028	

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES

8.1.7 SWR BRIDGE

All Components Prefixed 7

	Complete Sub-assy	08-00145	
	Printed Circuit Board	07-00118	
C1	10 pF ± 0.5 pF 500V NPO Ceramic	Philips 555	
C2	5.5-65 pF Film Dialectric Trimmers	Philips 808	
C3	390 pF 5% 630V Styroseal	Ducon DFB 607	
C4	1000 pF + 50% - 20% 500V Pin-up Ceramic	Philips 563	
C5	1000 pF + 50% - 20% 500V Pin-up Ceramic	Philips 563	
D1 & D2	1N914 Silicon Diode - Matched Pair to Specification 10-00017		
L1	1 mH RF Choke	Philips 535	
R1	47 Ohms 5% ½W	Philips CR37	
R2	47 Ohms 5% ½W	Philips CR37	
R3	4.7K Ohms 5% ½W	Philips CR37	
R4	4.7K Ohms 5% ½W	Philips CR37	
T1	Toroidal Transformer	44-80051	
	75 Ohm Type PT11M Coaxial Cable	Telcon 16PK1/06	

CCT REF	DESCRIPTION	MANUFACTURER	NOTES
8.1.8	DIODE MATRIX		

All Components Prefixed 8

	Complete Sub-assy	08-00146	
	Printed Circuit Board	07-00119	
D1-D24	BY126/200 Silicon Diode	Philips	
R1	330 Ohms 5% 2W	Philips CR93	

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES
8.2.1	POWER CONTROL UNIT		
	All components prefixed 1		
CB1	10 Amp Circuit Breaker	Heinemann CF1	
D25	BY126/200	Philips	
D26	BY126/200	Philips	
D27	BY126/200	Philips	
D28	BY126/200	Philips	
D29	BY126/200	Philips	
D30	BY126/200	Philips	
D31	BY126/200	Philips	
D32	BY126/200	Philips	
D33	BY126/200	Philips	
F1	1 Amp Delay Fuse	Australux 3AG	
F2	750mA Delay Fuse	Australux 3AG	
F3	2 Amp Delay Fuse	Australux 3AG	
LP1	240V Neon Indicator-Red	IRH FP7/CL/NRH	
LP2	240V Neon Indicator-Red	IRH FP7/CL/NRH	
LP3	240V Neon Indicator-Red	IRH FP7/CL/NRH	
LP4	240V Neon Indicator-Red	IRH FP7/CL/NRH	
LP5	30V 20mA Liliput T6	Tanuslicht	
	Lamp Holder	Widmaier 188	
	Lamp Cap-Red	Widmaier 182	
LP6	30V 20mA Liliput T6	Tanuslicht	
LP7	30V 20mA Liliput T6	Tanuslicht	
LP8	30V 20mA Liliput T6	Tanuslicht	

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES
8.2.1	Cont.		
RLA	3 Pole double throw 24V DC relay	ITT SL-7721319	
RLB	3 Pole double throw 24V DC relay	ITT SL-7721319	
RLC	3 Pole double throw 24V DC relay	ITT SL-7721319	
RLJ	3 Pole double throw 24V DC relay	ITT SL-7721319	
SK1	18 way chassis mounting socket	Painton S18/MFS	
SW1	2 Pole, single throw 10A toggle switch	MSP 7360 K8	
T2	Power transformer auxiliary	44-00925	

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES
8.2.2	RELAY INTERLOCK		
	All components prefixed 2		
C1	2200uF +100%-10% 35V Electrolytic	Elna RT	
C2	4.7uF 10% 100V Polyester	Philips 341	
C3	4.7uF 10% 100V Polyester	Philips 341	
D1	BY126/200 Diode	Philips	
D2	BY126/200 Diode	Philips	
D3	BY126/200 Diode	Philips	
D4	BY126/200 Diode	Philips	
D5	BY126/200 Diode	Philips	
D6	BY126/200 Diode	Philips	
D7	BY126/200 Diode	Philips	
D8	BY126/200 Diode	Philips	
D9	IN914 Diode	Philips	
D10	IN914 Diode	Philips	
D11	BY126/200 Diode	Philips	
R1a	10 5% 1W	Philips CR68 1K only	
OR	12 5% 1W	Philips CR68 500W only	
R1b	Select on test 5% 1W	Philips CR68	
R2	2.2M 5% 1/3W	Philips CR25	
R3	10K 5% 1/3W	Philips CR25	
R4	6.8M 5% ½W	Philips CR37	
R5	2.2K 5% 1/3W	Philips CR25	
R6	10K 5% 1/3W	Philips CR25	
RLD	2 Pole C/O 1700 coil	Siemens V23154-C0722-B104	
RLE	2 Pole C/O 1700 coil	Siemens V23154-C0722-B104	
RLF	2 Pole C/O 1700 coil	Siemens V23154-C0722-B104	
RLG	2 Pole C/O 1700 coil	Siemens V23154-C0722-B104	
RLH	2 Pole C/O 18 coil	Siemens V23154-C0710-B104	
Z1	BZY88/C10V Zener Diode	Philips	
Z2	BZY88/C3V3 Zener Diode	Philips	

CCT REF	DESCRIPTION	MANUFACTURER	NOTES
8.2.3	START DELAY PCB ASSY		

All Components prefixed 3

	Complete Sub-assy	08-00603	
	Printed Circuit Board	07-00234	
C1-C2	2200uF + 100% - 10% 35V	ELNA RT	
R2	4.7K Ohms 5% ½W	Philips CR37	
R1-R3	47 Ohms 5% 2/3W	Philips CR52	
R4	15 Ohms 20W Type DG	I.R.C.	

CCT REF.	DESCRIPTION	MANUFACTURER	NOTES
8.2.4	POWER SUPPLY CHASSIS		
	All components prefixed 4		
C1	0.22uF 10% 1200V AC Paper 50x60Hz	Ducon GPH 12022N	
C2	0.22uF 10% 1200V AC Paper 40Hz only	Ducon GPH 12022N	
C3	200uF 500V Electrolytic	Ducon EMG/F 2050S	
C4	200uF 500V Electrolytic	Ducon EMG/F 2050S	
C5	200uF 500V Electrolytic	Ducon EMG/F 2050S	
C6	200uF 500V Electrolytic	Ducon EMG/F 2050S	
C7	200uF 500V Electrolytic	Ducon EMG/F 2050S	
C8	680uF 40V Electrolytic	Philips	
C9	680uF 40V Electrolytic	Philips	
D1-D24	BY100 Silicon Diode	Philips	
L1	Power Choke 50Hz	44-40562	
OR	Power Choke 40x60Hz	44-40565	
R1-R24	Voltage Dependent Resistor "Violet"	Philips 2322-564-02622	
R25	5.6 10% 10W Wire Wound	IRC PW10 (1KW)	
OR	6.8 10% 10W Wire Wound	IRC PW10 (500W)	
R26	220K 5% 1W	Philips CR68	
R27	220K 5% 1W	Philips CR68	
R28	220K 5% 1W	Philips CR68	
R29	220K 5% 1W	Philips CR68	
R30	220K 5% 1W	Philips CR68	
R31	150K 5% vitreous wire 50W 50Hz	Welwyn AP3134	
OR	110K 5% vitreous wire 50W 40Hz	Welwyn AP3134	
R32	1K 5% 1W 50Hz	Philips CR68	
OR	680 5% 1W 40Hz	Philips CR68	
T1	Power transformer EHT 50-60Hz	44-00922	
OR	Power transformer EHT 40Hz	44-00948	