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Richard Hankins, VMARS Archivist, Summer 2004

HANDBOOK No. 899-1
DEV/GLC/EB JUNE 1970

REDIFON

Technical Information

Instruction Manual

for

DRIVER-RECEIVER

TYPE GR345D/GKR206A

Redifon Telecommunications Limited, London SW.18., England

PRINTED IN ENGLAND

A Member Company of the Rediffusion Organisatic

1 INTRODUCTION

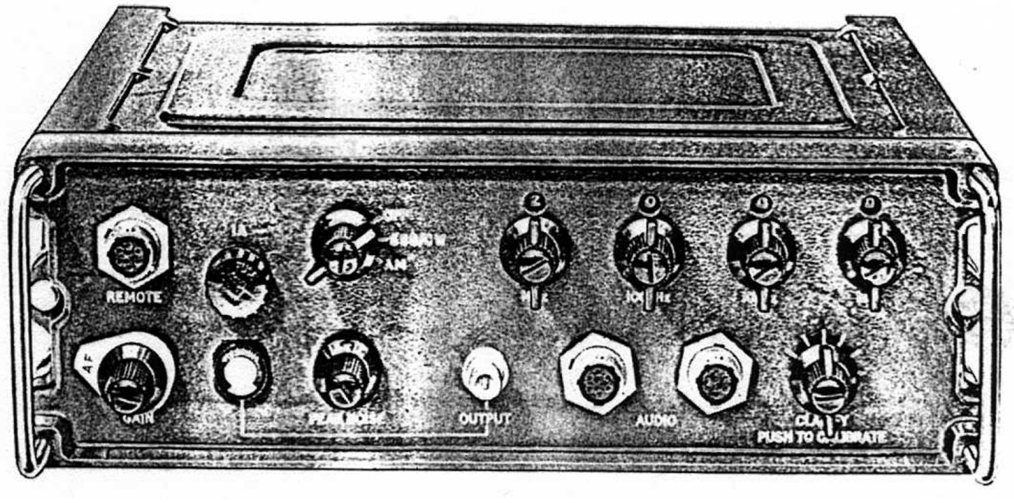


PLATE 1.1 DRIVER/RECEIVER TYPE GR345D/GKR206A

1 INTRODUCTION

1.1 GENERAL

The Redifon HF SSB Driver-Receiver type GKR206A is a lightweight low-power unit, designed for field use in conjunction with an RF linear amplifier.

The unit employs solid-state devices throughout and delivers a nominal output of 100 milliwatts.

A frequency synthesizer is incorporated, providing 10,000 channels in 1kHz steps in the frequency range 2·0 to 11·999MHz with an accuracy better than 50Hz: channels are selected on four decade switches.

For communication on AM, the unit operates on double-sideband and is compatible with other transmitter-receivers having a frequency accuracy better than 200 parts per million. For communication with less accurate equipment, the receiver can be adjusted for best reception by means of a clarifier control. CW is provided by keying a tone oscillator on SSB.

1.2 CONSTRUCTION

The driver-receiver is a sealed unit comprising an aluminium case and a die-cast front panel assembly. All controls are on the front of the panel whilst the circuit modules are attached at the rear.

The assembly is inserted in the case and is secured by two screws: sealing is by rubber gasket retained in a groove at the back of the casting. The controls are protected by carrying handles fixed to the front panel at each end.

The case is provided with threaded bushes, one at each end, for mounting a desiccator and a desiccator indicator.

A power supply socket is sealed in the bottom of the case: the contact pins are extended through the case and make contact with a connector on the equipment, when the assembly is inserted.

1.3 ANCILLARIES

The following ancillaries are used with the driver-receiver:—

Hand Microtelephone type 5458/A

Boom Microphone and Headset/Extension Control type 5477/B

Telegraphy Key type 5459/A

1.4 SUMMARY OF DATA

General

Frequency Range: 2·0-11·999MHz.

Channels: Any frequency in the above range may be selected in 1kHz steps

Frequency Control: Frequency synthesis; calibrated to integral temperature-compensated frequency standard

Types of Emission/ Reception: A3j SSB (USB—carrier suppressed)
A3 AM (carrier plus both sidebands)
A2j CW (SSB keyed tone—carrier suppressed)

Mode of Operation: Simplex; transmission and reception on the same frequency

Sidetone: Sidetone is provided on all modes

Frequency Accuracy: Typically within 25Hz (50Hz under extreme conditions)

Operating Temperature Range: −20°C to +55°C

Storage Range: −40°C to +70°C

Manual Controls:

Control	*Function*	*Circuit Ref.*
Off-SSB/CW—AM	Mode switch	S201
*Peak Noise	RF tuning control	C701, a, b, c and d
Gain RF	Gain control RF	R201
Gain AF	Gain control AF	S203, R236 to R240
MHz	Frequency switch on synthesizer, ganged to operate bandswitch on RF module	S603
100kHz	Frequency switch	S603
10kHz	Frequency switch	S602
1kHz	Frequency switch	S601
Clarify/Push to Calibrate	Clarify control	C629
	*Calibrate control	C629 and S202

*'Push' control

Meter: Top scale—Indicates RF output in the transmit condition
Bottom scale—Indicates DC supply voltage in the receive condition

Approximate Dimensions and Weight:

Height	*Width*	*Depth*	*Weight*
12½in (32 cm)	12¼in (31 cm)	3⅞in (10 cm)	15lb 1½oz (10 kg)

Receiver

SSB and CW Sensitivity: 1·55µV open circuit via 75Ω CW input, for at least 10dB signal plus noise/noise ratio (audio output set to 5mW ± 3·0dB into 300Ω by the AF Gain control—RF Gain control set to maximum)

AM Sensitivity: 6·2μV open circuit via 75Ω, modulated by 30% at 1kHz, for at least 10dB signal plus noise/noise ratio (audio output set to 5mW ± 3·0dB into 300Ω by AF Gain control—RF Gain control set to maximum).

SSB and CW Selectivity:

Attenuation	*Bandwidth*
3dB	Not less than 2·35kHz
45dB	Not greater than 7·15kHz

AM Selectivity:

Attenuation	*Bandwidth*
3dB	Not less than 4·9kHz
45dB	Not greater than 13·6kHz

AF Output: 5mW into 300Ω load with not greater than 5% distortion at 1kHz. When a second handset or earpiece (300Ω impedance) is fitted, the output of the first handset or earpiece is not reduced by greater than 2dB.

SSB and CW Overall Frequency Response:

Frequency	*Level*
1kHz	0dB (ref)
300Hz to 2·7kHz	+1 to −6dB
4kHz	at least −12dB

AM Overall Frequency Response:

Frequency	*Level*
1kHz	0dB (ref)
300Hz to 2·7kHz	+1 to −6dB
4kHz	at least −12dB

Intermediate Frequency: 1·75MHz

IF Rejection: Better than 70dB

Image Rejection: Better than 50dB

RF Gain Control Range: At least 100dB

AGC Gain Control Range: Not greater than 3·0dB change in AF output level for 80dB increase in RF input level above AGC threshold.

Clarifier Range: 1000Hz (±130Hz on some special order models).

Driver

Power Output (into 75Ω resistive load): SSB—not less than 100mW p.e.p. (microphone input of 20mV open circuit via 300Ω at 1kHz).
CW—not less than 100mW.
AM—not less than 100mW carrier power (unmodulated).

Output Impedance: 75Ω

SSB Carrier Suppression: At least −40dB with reference to p.e.p. level.

SSB Intermodulation Products: At least −35dB with reference to p.e.p. level (two-tone test using equal amplitude frequency tones in the band 300 to 2700Hz of 14mV r.m.s. combined amplitude).

SSB Unwanted Sideband Suppression: At least −40dB with reference to p.e.p. level at 1kHz modulation frequency.

SSB Modulation Frequency Response:

Frequency	*Level*
1kHz	0dB (ref).
300Hz to 2·7kHz	+2 to −6dB

AM Modulation Sensitivity: Microphone input of 20mV r.m.s. open circuit via 300Ω at 1kHz for modulation percentage of not less than 20%.

AM Modulation Frequency Response:

Frequency	*Level*
1kHz	0dB (full power into 75Ω, 20% modulation ref).
300Hz to 2·7kHz	+2 to −6dB

SSB and AM Sidetone Levels: 20mV r.m.s. open circuit via 300Ω at 1kHz for sidetone level of not less than 0·01mW.

CW Sidetone Level: Not less than 0·05mW into 300Ω (with key depressed).

CW Tone: 1,450 ± 80Hz.

CW Tone Harmonics: The level of any AF harmonic of 1,450Hz in the transmitter output is at least 40dB below the fundamental.

Keying Speed: Hand keying up to 20 bauds.

Power Supply

Voltage Source: 22V-28V DC (negative earth).

Power Consumption:
Receive Mode: Approximately 4W.
Transmit Mode: SSB—Approximately 16W (two-tone test).
CW—Approximately 16W
AM—Approximately 16W (50% modulation)

Ancillary Equipment

All dimensions and weights are approximate (dimensions are overall). Operating temperature range for the ancillary equipment is as for the driver-receiver.

Hand Microtelephone type 5458/*A*

Length:	8in (20 cm) (lead folded).
Weight:	1lb 2oz (0·5kg).

Telegraph Key type 5459/*A*

Dimensions:	3½in x 3in x 2½in (lead and webbing folded). (9cm x 7·5cm x 6·5cm).
Weight:	8oz (227gm).

Boom Microphone and Headset/Extension Control type 5457/*C*

Dimensions:	2in x 8in x 9in (lead folded). (5cm x 20cm x 23cm).
Weight:	1lb 4oz (0·55kg).

2 OPERATING INSTRUCTIONS

2 OPERATING INSTRUCTIONS

2.1 TO RECEIVE

(1) Connect the power supply—check the meter indication; it should read in the green zone.

(2) Plug a handset or headset into one of the Audio sockets.

(3) Set the four frequency controls to the required frequency.

(4) With the OFF-SSB/CW-AM switch set to AM, turn the RF Gain control to maximum and adjust the AF Gain until noise is just audible in the earpiece.

(5) Push in and rotate the Peak Noise control for maximum noise in the earpiece, then adjust the AF and RF Gain controls to a comfortable listening level.
Note. The Peak Noise control has a slow-motion drive; $1\frac{1}{2}$ revolutions are required to rotate the RF tuning capacitors over their full range.

(6) Push in the Clarify/Push-to-Calibrate control and adjust for zero beat; release the control.

(7) For SSB reception, set the OFF-SSB/CW-AM switch to SSB/CW and adjust the Clarify control for best speech quality. (Return to correct calibrated frequency before transmitting). *Do not push in the control when making this adjustment.*
Set the Gain controls for a comfortable listening level.

(8) For CW reception, set the OFF-SSB/CW-AM switch to SSB/CW and adjust the Gain controls to a comfortable listening level. The pitch of the received signal may be varied slightly by adjustment of the Clarify control.

2.2 TO TRANSMIT ON AM

(1) Switch to AM.

(2) Press the handset press-to-talk switch and speak into the microphone. Release the switch to return the equipment to the receive condition. The press-to-talk switch must always be released to enable resetting of the Function switch.

2.3 TO TRANSMIT ON SSB

(1) Switch to SSB/CW.

(2) Press the handset press-to-talk switch and speak into the microphone.

2.4 TO TRANSMIT ON CW

(1) Switch to SSB/CW and plug the morse key into one of the Audio sockets and the headset or handset into the other socket.

(2) Press the key to transmit. The equipment will stay in the transmit condition for about 2 seconds after the key is released and will then return to the receive condition.

2.5 USE OF BOOM MICROPHONE AND HEADSET/EXTENSION CONTROL

The driver-receiver Gain controls must first be adjusted to a comfortable listening level. The headset with boom microphone may then be used to control communication from an extended position, the press-to-talk button on the lapel clip being used in the same way as the press-to-talk switch on the handset.

3 CIRCUIT DESCRIPTION

3 CIRCUIT DESCRIPTION

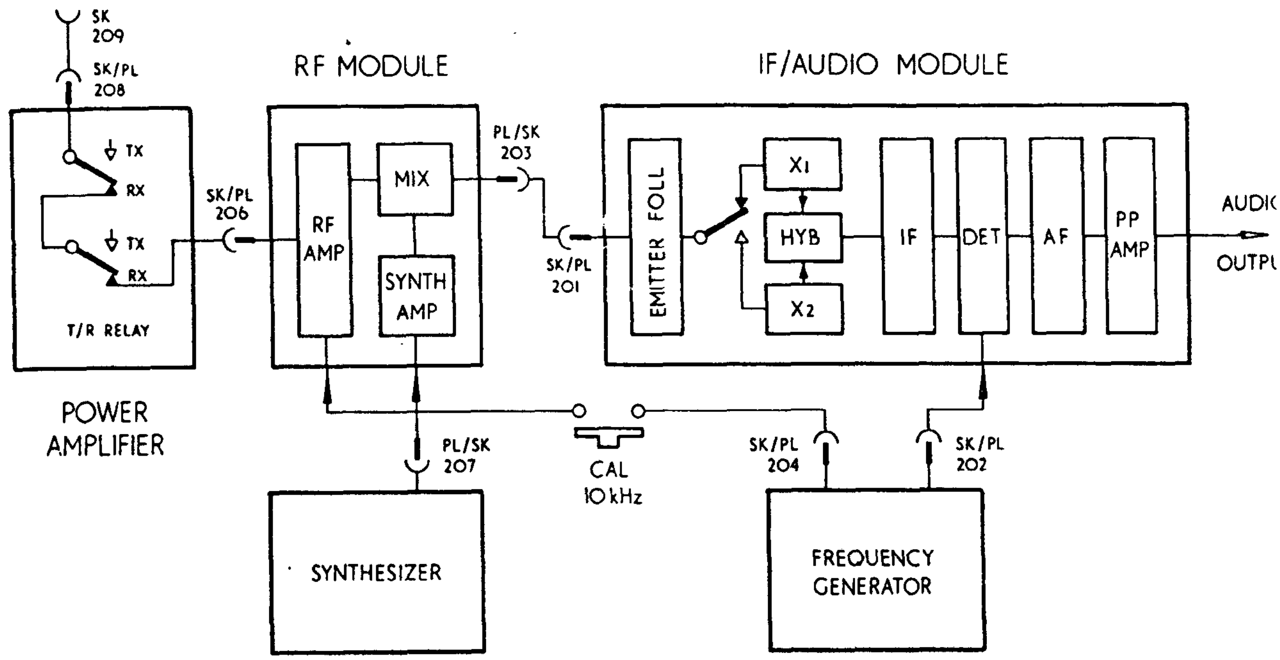
3.1 RECEIVE FUNCTION

From the aerial socket, the signal enters the RF module via the PA module.

In the RF module, the signal is amplified and passed to a mixer to which is applied the output of the frequency synthesizer. The synthesizer frequency is always 1·75MHz above the received input frequency and the output of the mixer is therefore 1·75MHz.

In the IF/Audio module, the 1·75MHz output i passed through one of two crystal filters and the II amplifiers, to the detector.

On SSB/CW, the IF voltage at the detector is mixe with a 1·75MHz carrier reference voltage to produce a audio output. On AM, the audio output is produce without need of the 1·75MHz reference voltage.



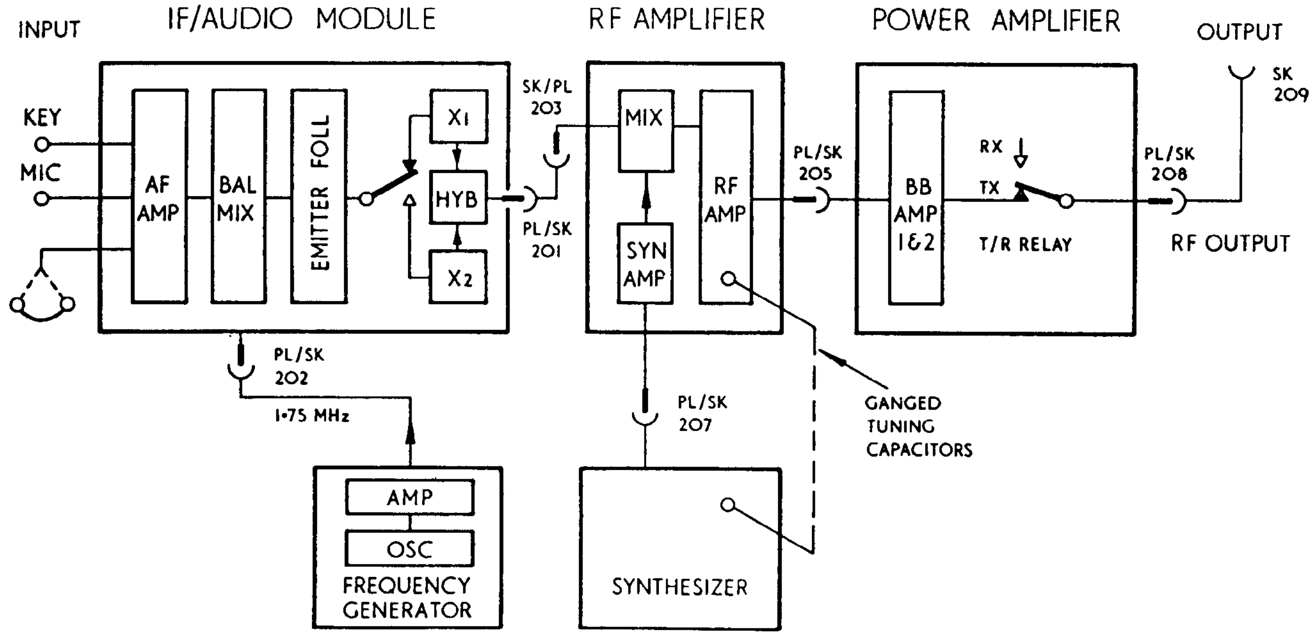
GKR206A Receive Function—block diagram (simplified) Fig. 3.1

3.2 TRANSMIT FUNCTION

Microphone output is applied to the IF/Audio module where it is amplified and passed to the balanced mixer. A portion of the amplified audio is applied to the receiver output stage for sidetone.

At the balanced mixer, the audio voltage is mixed with a 1·75MHz signal from the Frequency Generator to produce a double-sideband suppressed-carrier output a crystal filter allows only the lower sideband to b passed to the RF module.

On AM, an unbalancing bias is applied to the mixer with the result that both sidebands and carrier ar passed to the RF module.



GKR206A Transmit Function—block diagram (simplified) Fig. 3.2.

When the telegraph key is closed, a 1450Hz tone oscillator is activated and the tone is fed to the balanced mixer to produce keyed CW transmitter output. At the same time, the transmit/receive relay circuit is activated via the CW hold circuit which maintains the equipment in the transmit mode for a short time after the key is released. A small 1450Hz signal is tapped off before the balanced mixer (Z401) and fed into the AF amplifier for sidetone purposes.

In the RF module, the 1·75MHz voltage is mixed with the output of the synthesizer to produce an RF output in the range 2·0 to 11·999MHz. The signal is amplified and fed to the PA module. An automatic transmit level control, TLC, maintains constant output.

3.3 SYNTHESIZER (FIG. 7.4)

The synthesizer contains 4 incremental oscillators covering the following ranges:—

(a) 6,525 to 6,534kHz in 1kHz steps
(b) 9,025 to 9,115kHz in 10kHz steps
(c) 26,730 to 27,630kHz in 100kHz steps
(d) 29,530 to 38,530kHz in 1MHz steps

Also included in the synthesizer are mixers, bandpass amplifiers, and an output filter.

1kHz Incremental Oscillator

There are 10 crystals XL601-610, associated with the crystal oscillator VT601 and connected in the parallel resonant mode. Selection is made by switch S601A and B, and adjustment of each crystal frequency is effected by the trimmer capacitors C602-C611.

The receiver is calibrated against a 10kHz frequency spectrum and it is necessary for the synthesizer to be set to the zero position on the 1kHz oscillator for calibration purposes. For this reason, an eleventh crystal XL641, is included in the 1kHz oscillator circuit. The frequency of this crystal is the same as that of the zero position crystal, namely 6,525kHz. Crystal XL641 is connected in circuit automatically when relay RL602 is actuated (calibrate condition): its frequency is set to the correct value by capacitor C616 during factory test.

In the transmit condition, C612, in parallel with C613, is connected in place of C601 by relay RL601-1 contacts: C612 is not manually adjustable but is set during factory test.

A capacitive divider C618 and C619 provides an impedance match to the emitter circuit of mixer VT602.

10kHz Incremental Oscillator

The crystal oscillator VT603 employs 10 crystals (XL611-XL620) connected in the parallel resonant mode. Selection is made by switch S602A. Inductor L604 in series with variable capacitor C629 (and C630 in parallel), provide a circuit for adjusting the frequency of the selected crystal. During the calibration process, C629 is varied for zero beat with one of the 10kHz harmonics from the frequency generator.

Variable capacitor C629 is also used as the Clarifier control for the SSB receive condition. This allows the operator to make slight adjustments to enable a station that is not exactly on frequency to be received clearly.

100kHz Incremental Oscillator

Crystal oscillator VT607 utilises crystals connected in the series resonant mode. The crystals XL621–XL630 are selected by switch S603A. Feedback from collector to emitter is provided by capacitor C657. Oscillations occur only when the base of VT607 is at chassis potential for RF voltages, i.e. at the series resonant frequency of the crystal. Output is taken from the low-impedance secondary winding of T611. Because of the relatively narrow frequency range covered, no switching of the tuned circuit is required.

1MHz Incremental Oscillator

Crystal oscillator VT609 utilises crystals connected in the series resonant mode. The crystals XL631–XL640 are selected by switch S604A, and the tuning capacitors are selected on switch S604B.

Mixers and Bandpass Amplifiers

The process of frequency synthesis by mixing and bandpass amplification is shown in block diagram form in Fig. 3.3. The full circuit diagram of the synthesizer is given in Fig. 7.4.

The outputs of the 1kHz and 10kHz oscillators are combined in the first mixer VT602, the 1kHz output being applied to the emitter and the 10kHz output to the base. Components T601, C622, C623, C631, C632 and T602 in the mixer output combine to form a shunt capacity-coupled tuned circuit which passes the sum frequencies in the range 15,550–15.649kHz.

VT604 is an RF amplifier with a shunt capacity-coupled tuned circuit T603, C637, C638 and T604 in the output.

The output from VT604 and the output from the 100kHz oscillator are applied to the 2nd mixer which is a single-balanced diode circuit comprising T605, T606 and MR603.

Frequencies in the range 42,280–43,279kHz (sum frequencies) are selected by RF amplifier VT605; the output from the 100kHz oscillator is suppressed in the mixer circuit. VT605 is coupled to VT606 by a series capacity-coupled tuned circuit comprising T607, C643 C644, C645 and T608. VT606 is similarly coupled to a third mixer by a series capacity-coupled tuned circuit comprising T609, C650, C651, C652 and T610. The passband of the tuned circuits ensures that only frequencies in the range 42,280–43,279kHz are passed to the third mixer.

The third mixer is a double-balanced diode circuit comprised of T612, MR604 and T613. The output of the bandpass amplifiers and the output of the 1MHz oscillator are applied to the mixer; at the output, the sum and difference frequencies pass to broadband amplifier VT608, the two input frequencies having been suppressed.

The output of VT608 is fed to a filter which passes only the difference frequencies in the range, 3,750–13,749kHz, which is the final output of the synthesizer.

Table 3.1 summarises the frequencies of the incremental oscillators at each switch setting.

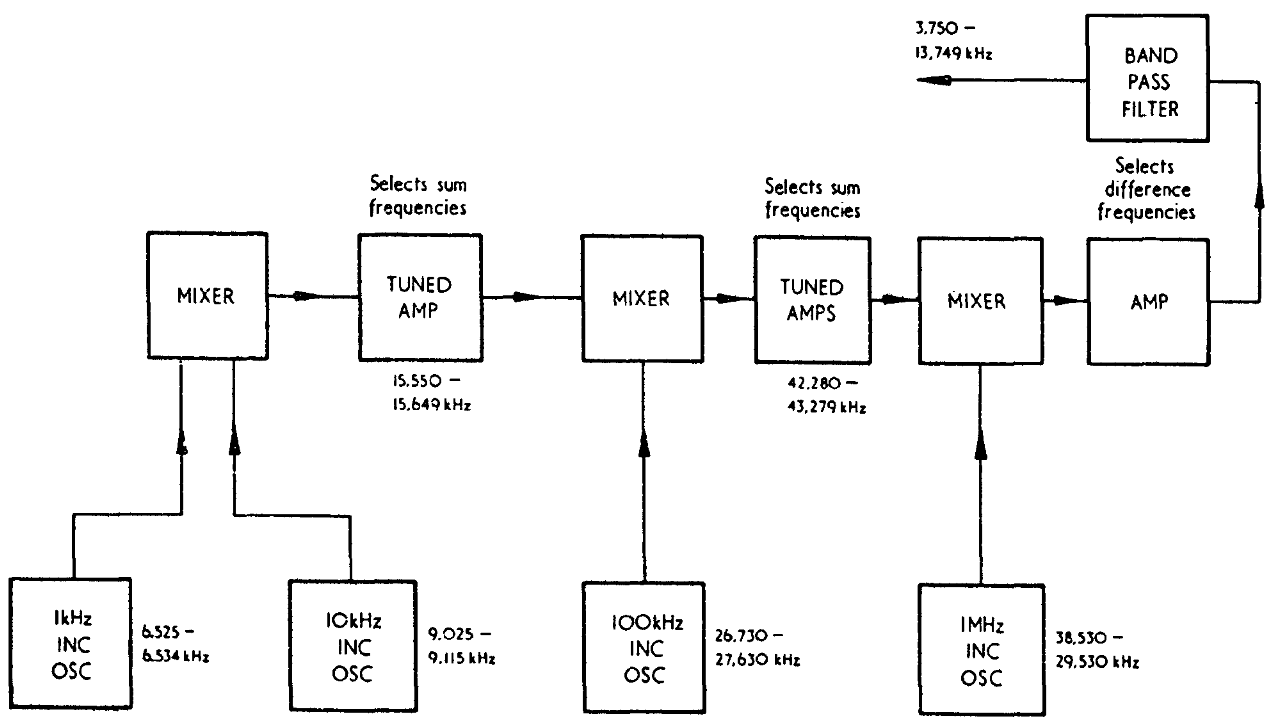


Fig. 3.3 Block Diagram of Synthesizer

Table 3.1 Frequencies of Oscillators

Switch Position	*Incremental Oscillators (Frequencies in kHz)*			
	1kHz	10kHz	100kHz	1MHz
0	6,525	9,025	26,730	—
1	6,526	9,035	26,830	—
2	6,527	9,045	26,930	38,530
3	6,528	9,055	27,030	37,530
4	6,529	9,065	27,130	36,530
5	6,530	9,075	27,230	35,530
6	6,531	9,085	27,330	34,530
7	6,532	9,095	27,430	33,530
8	6,533	9,105	27,530	32,530
9	6,534	9,115	27,630	31,530
10	—	—	—	30,530
11	—	—	—	29,530

Example

Assume the equipment is to operate on a channel frequency of 3,167kHz: the decade switches are therefore set up to read 3,167. As the intermediate frequency is 1·75MHz, the synthesizer output must be 1,750 + 3,167kHz = 4,917kHz.

The frequency of the 1kHz oscillator (position 7) and of the 10kHz oscillator (position 6) are added; 6,532 + 9,085 = 15,617kHz.

The frequency of the 100kHz oscillator (position 1) is added: 15,617 + 26,830 = 42,447kHz.

The frequency of the 1MHz oscillator (position 3) is subtracted: 42,447 – 37,530 = 4,917kHz.

Voltage Regulator

Transistor VT610 and associated components is a voltage regulator for the 9V DC supply. Diode MR605 is included for temperature compensation and zener diode MR606 is the voltage reference diode for the base circuit.

3.4 RF MODULE (FIG. 7.5)

The RF module serves two functions: in the receive condition it converts the incoming RF signal to the 1·75MHz intermediate frequency and in the transmit condition it converts the intermediate to the transmission frequency.

Tuned Circuits

A four-gang variable capacitor C701 a–d tunes three RF circuits and the frequency synthesizer output circuit.

The input to the amplifier is routed through X1, a device for protecting VT701 from signals of excessive amplitude originating from transmitters operating in close proximity.

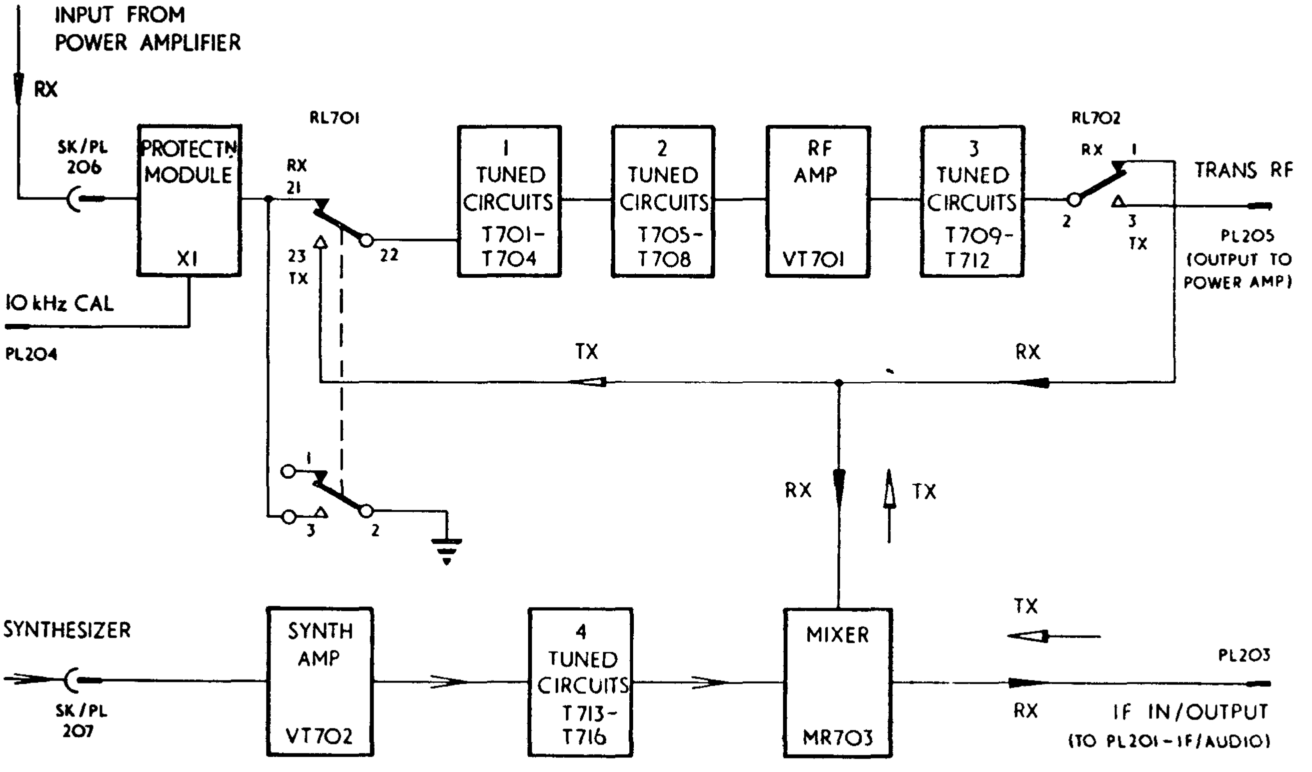


Fig. 3.4 RF Module—Simplified Block Diagram

Harmonics of 10kHz are also fed to the input via PL204, when the equipment is in the calibrate condition.

VT701 is an RF amplifier preceded by a series and shunt capacity-coupled tuned circuit. The second tuned circuit inductors are tapped to match the relatively low input impedance of the RF amplifier.

Unused tuned circuits are damped by resistors R704 (first tuned circuits) and R705 (second tuned circuits) to prevent inter-action. Transformer coupled tuned circuits act as the collector load for the RF amplifier: unused circuits are damped by R709.

The tuned circuits of the synthesizer amplifier must always tune 1·75MHz higher than the RF circuits and the resonant circuits are padded by capacitors C730, C732, C734 and C736 providing 3-point tracking. The tuned circuits are transformer coupled to the mixer MR703.

The frequency range 2·0 to 11·999 MHz is covered in four bands, as shown in Table 3.2. The required band is selected automatically when the MHz control on the front panel is operated.

Table 3.2 RF Bands and Ranges

Band	*RF range (MHz)*	*Synthesizer (MHz)*	*MHz switch setting*
1	2–2·999	3·75–4·749	2
2	3–4·999	4·75–6·749	3 or 4
3	5–7·999	6·75–9·749	5, 6 or 7
4	8–11·999	9·75–13·749	8, 9, 10 or 11

RF Amplifier

The RF amplifier VT701 employs 'forward gain control' characteristics: bias is arranged so that an increase in collector current results in a decrease in gain. Gain control bias is applied to the base of VT701 via RF choke L703. Resistor R707 and diode MR701 form one half of a voltage divider, the other half is provided by the gain control circuits. Diode MR701 counteracts the effects of temperature changes at the base-emitter junction.

Balanced Mixer

A double-balanced mixer network is employed comprising T717, T718, MR703, R716 and R717. Capacitor C738 tunes one winding of T718 to 1·75MHz.

One of the mixer inputs is the synthesizer output operating 1·75MHz above the received or transmitted channel frequency. In the receive mode, the mixer is supplied with a signal from the RF amplifier via contacts 2–1 of relay RL702; the mixer output of 1·75MHz is then fed to the IF/Audio module via PL203. In the transmit mode, the IF voltage from the IF/Audio module is fed to the mixer via PL203 and is mixed with the synthesizer output voltage, to produce the transmitting frequency.

The transmit RF voltage is applied to the RF amplifier via RL701 contacts 23–22 when the relay is actuated, and after amplification, is applied to the power amplifier module via RL702 contacts 2–3: in the transmit condition, the receive RF input is shorted to chassis via RL701 contacts 3–2.

Synthesizer Amplifier

The synthesizer amplifier VT702 increases the synthesizer output to the level required by the mixer.

3.5 IF/AUDIO MODULE (FIG. 7.6)

In the receive condition, the module filters and amplifies the IF input, then demodulates and amplifies the resulting audio output. In the transmit condition, the module, along with the synthesizer output, generates the IF voltage.

Receive Condition

The IF voltage is routed from the RF module via PL201 and RL401 contacts 1–2, to the base of VT401. VT401 is connected as an emitter-follower to match into the 100 ohm input impedance of the filters FL401 or FL402. Contacts 22–21 of RL401 connect the 9V supply to the IF and product detector stages.

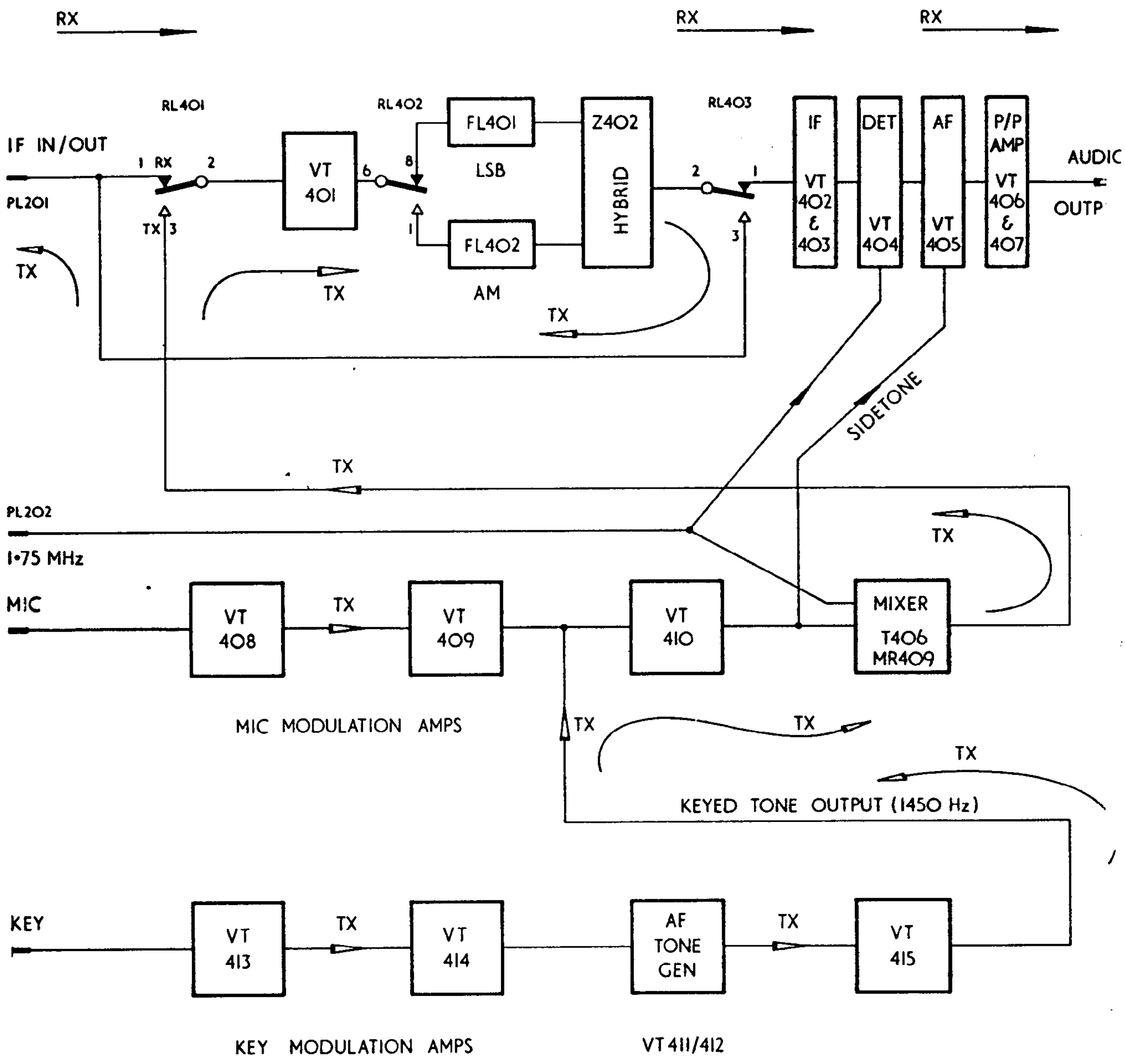


Fig. 3.5 IF/Au·io Module Type 5448/B—Simplified Block Diagram

Crystal filter FL401 passes the lower sideband signal, and FL402 passes the AM signal. The correct filter for the service required is selected by relay RL402 in accordance with the setting of the OFF–SSB/CW–AM switch.

When the receiver is being calibrated (see sub-section 3.10) the calibrate signal is exactly 1·75MHz; this constitutes the carrier of the IF signal, and filter FL402 is switched automatically into circuit by relay RL402 contacts 6–1, when the Push-to-Calibrate knob is pressed.

Transformer T402, T403 and associated components comprise a hybrid circuit which prevents interaction between the two filters. The hybrid output is applied to VT402 via relay RL403 contacts 2–1.

VT402 and VT403 are tuned IF amplifiers. Forward gain control is applied to the base of VT402 via RL403 contacts 22–21. Gain control action occurs in both VT402 and VT403 due to series DC connection.

In the detector stage VT404, the SSB IF voltage is mixed with the 1·75MHz output from the frequency standard, producing an audio difference voltage. On AM, the 1·75MHz voltage is not applied because the 9V supply to the frequency generator is not connected.

VT405 is an AF stage, transformer coupled to a push-pull amplifier VT406 and VT407. Current and voltage feedback is applied to VT405. On AM, the current feedback is reduced: a 12V polarising voltage applied to MR404 via the OFF–SSB/CW–AM switch and the diode MR414, acts as a switch to connect C435 to chassis and thereby reduces the feedback. The purpose of this circuit is to ensure approximately equal audio outputs on SSB and AM.

Transmit Condition

The 9V supply is connected to the transmit circuits via RL401 contacts 22–23. Modulation inputs are amplified by VT408, VT409 and VT410. Transformer T406, MR409 and associated components, comprise a balanced mixer in which the AF modulation is mixed with the 1·75MHz injection to produce a double-sideband suppressed-carrier output. On AM, a bias voltage is applied to the mixer via RL402 contacts 2–5. and the carrier is not suppressed. Carrier balance on SSB is set by R447: R448 controls the mixer output level.

Audio voltage at VT410 collector is fed to VT405 emitter to provide sidetone. To ensure approximately equal sidetone on AM and SSB, a 9V polarising voltage is applied to MR404 via relay RL401 contacts 22–23. to reduce feedback.

From the mixer, the IF voltage is applied to VT401 via RL401 contacts 3–2. The voltage is then fed to the hybrid circuit via the appropriate crystal filter. FL401 passes the lower sideband and FL402 passes both side-bands and the carrier. From the hybrid circuit, the IF voltage is applied to the RF module via RL403 contacts 2–3 and PL201.

When the key line is earthed, VT413 and VT414 stages are activated, causing the AF tone generator circuit VT411 and VT412 to be activated via MR413. The keyed tone output is applied to the mixer via VT415. Capacitor C450 in the VT413, VT414 stages, ensures that VT414 continues to conduct for 2 seconds after the key is released; the generator functions all the time under normal keying conditions. The tone frequency is 1450Hz and under CW conditions the transmitted signal is 1450Hz above the selected channel frequency.

3.6 POWER AMPLIFIER MODULE (FIG. 7.7)

In the transmit condition, the module amplifies the output from the RF module and passes an amplified output to the RF Out socket SK209, via PL/SK208.

In the receive condition, the signal from the RF Out socket enters the power amplifier module via the transmit/receive relay and transformer T803. The transmit and receive signal paths are shown in Fig. 3.6.

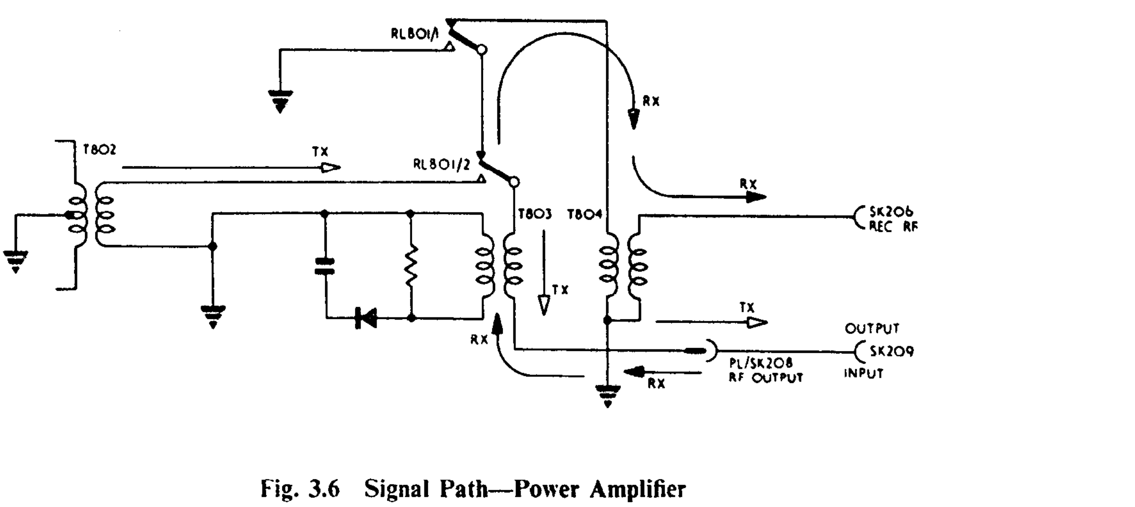


Fig. 3.6 Signal Path—Power Amplifier

Amplifier

A push-pull output amplifier VT801, VT802 and VT803, delivers a uniform RF output signal over the frequency range 2·0 to 11·999MHz.

Input from the RF module is applied to VT801 via SK205: VT801 is push-pull coupled to the class B output stages VT802 and VT803. A low impedance RF output is obtained from T802 and fed to the output socket SK208 via relay RL801 contacts 22-23 and T803; relay RL801 is energised in the transmit condition. Contacts 1-2-21 connect the received signal from the aerial socket SK209 via SK208/PL208 and T804, to the Rec. RF socket SK206.

Tuning Indicator

The tuning meter on the front panel indicates RF output current in the transmit condition: the meter indication is derived from a current transformer T803 and rectifier MR803 in the RF output circuit.

In the receive condition, the meter indicates the supply voltage.

Transmit Level Control

Transmit level control (TLC) limits the RF output to 100mW r.m.s. into 75 ohm, the drive being adjusted automatically to maintain output at this level.

The RF voltage at the collector of each output transistor is rectified by diodes MR801 and MR802 and applied to VT804 to provide a TLC voltage.

This voltage is fed via diode MR804 to the TLC line (TS801-2) to reduce the gain of the RF module (see sub-section 3·9): R821 sets the threshold level.

3.7 FREQUENCY GENERATOR MODULE (FIGS. 7.8 AND 7.9)

The frequency generator provides a 1·75MHz carrier voltage to the modulation and demodulation circuits in the IF/Audio module. During calibration 10 kHz harmonics are generated.

One of two types of frequency generator modules may be incorporated in the GKR206A. Type 5449A (Figure 7.8) employs transistor dividing circuits: type 5449B (Figure 7.9) employs integrated circuits.

The frequency generator can be regarded as two circuits; the frequency standard, common to both types and producing the 1·75MHz carrier, and the frequency divider, producing the 10kHz calibration pulses.

Frequency Standard

VT501 is an oscillator with special design considerations given to frequency stability over a wide temperature range. Crystal XL501 has a temperature characteristic compatible with temperature compensating components C501a, b & c, R501 and R502a & b. The frequency is adjusted by C504; a buffer amplifier VT502 is tuned to 1·75MHz by T501. A low impedance link-winding delivers the frequency standard output to the IF/Audio module.

Frequency Divider Type 5449A (Fig. 7.8)

VT503 is an isolating amplifier driving blocking oscillator/divider VT504: VT504 divides by 7, producing an output of 250kHz. L502 in the base of VT504 forms part of a 625kHz tuned circuit which rings each time VT504 pulses, causing the base voltage to rise rapidly on the seventh cycle of the 1·75MHz input. VT505 and VT506 are blocking oscillators each dividing by 5. This provides the 10kHz calibration frequency from the 1·75MHz source.

Frequency Divider Type 5449B (Fig. 7.9)

This is a binary divider consisting of 8 J-K flip-flops normally dividing by 256 (2^8).

To produce a 10kHz pulse from a 1·75MHz source, a division of 175 is required and to achieve this a resetting pulse is applied from the divider output, on each counting cycle, to flip-flops 1, 16 and 64 making the count 175, i.e. 256—(1+16+64).

VT507 is an isolating and matching transistor.

3.8 POWER SUPPLY MODULE (FIG. 7.10)

The power supply module provides regulated 9V and 12V outputs from a 24V nominal source.

9V Regulated Supply

The 9V regulator VT303, functions in the receive and transmit conditions. The base of VT303 is held at a constant voltage by zener diode MR307: the emitter remains at a constant 9V despite variations of load. MR306 provides a measure of temperature compensation.

12V Regulated Supply

VT301 is a series regulator stage controlled by VT302, the base of which is held at a constant potential by zener diode MR305. MR304 provides a measure of temperature compensation.

Transmit/Receive Relay

Relay RL301 is actuated by earthing the key or the press-to-talk line: when actuated, 12V is applied to other relays and circuits in the equipment.

12V is connected to the Push-to-Calibrate switch, in the receive condition only: this prevents the equipment from being accidentally placed in the calibrate condition whilst switched to transmit.

Zener diode MR303 in conjunction with R301, gives protection against transients on the 24V DC supply. MR301 protects the equipment from damage due to supply polarity reversal.

3.9 GAIN CONTROL CIRCUITS (FIG. 7.11)

RECEIVE MODE

Automatic Gain Control

1·75MHz is sampled from the IF output within the IF/Audio module, and applied to the base of VT205. The voltage is rectified by MR212 to provide a DC control voltage for VT206 and VT207. VT207 provides a low-impedance path via MR213, to charge C219b, which produces a fast attack DC control voltage from VT208 emitter.

When the input signal is removed, MR213 becomes reverse biased; C219b discharges through R230, resulting in a long release time. The control voltage from VT208 emitter is fed to the gain control board. When the Calibrate control is operated, 12V is fed to MR211, cutting off VT206 and preventing AGC operation during calibration.

Manual Gain Control

Variable resistor R201 operates as a manual RF gain control by varying the base bias of VT204. The emitter circuit of VT204 is connected to the base of VT701 in the RF module and therefore the gain of VT701 is also controlled by R201. R211 is a preset potentiometer which sets the gain of VT701 at maximum and in a forward bias condition (as described in sub-section 3.4). Increase in VT204 base current will therefor result in a decrease in gain at VT701 in the RI module. The same method is used for control of VT40: and VT403 in the IF/Audio module. Diodes MR20: prevent interaction between the two circuits.

Switch S203, with resistors R236 to R240 (front panel operates as a manual AF gain control, by varying th amount of AF decoupling by capacitor C431 at th collector of VT404 (both in IF/Audio module). Th collector of VT404 is coupled to the base of VT405, whicl is an AF driver stage, transformer coupled to th push-pull audio output transistors VT406 and VT40 (as described in sub-section 3.5).

The AF board P28427 provides the link connection for effecting AF gain control locally or remotely vi associated line terminating and remote control units.

With pins A and B linked (local operation), diod MR215 is forward biased, permitting the 6-position AI gain control to vary the amount of AF output.

With pins A and C linked (remote operation), a gai inhibiting voltage of 24V is introduced from the lin terminating unit: diode MR215 is reverse biased, thereb rendering the 6-position gain control inoperative. Diod MR214 is forward biased, providing a preset value o resistance (R234) decoupled by capacitor C220. Th resultant fixed level of audio output may then be adjuste to suit requirements, by the audio control in a remot control unit, via a line terminating unit.

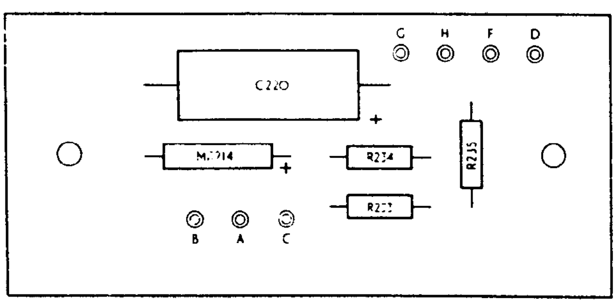


Fig. 3.7 AF Gain Control Board P28427—Component Layout

Calibrate Condition

In the calibrate condition, a large bias voltage is applied to the base of VT203 via R208. VT203 passes a large current and, consequently, the base of VT204 is brought almost to chassis potential. This ensures that the receiver gain is at maximum during the calibrate condition regardless of the RF Gain control (R201) setting on the front panel.

To prevent the AGC following the zero beat swing during calibration, the 12V calibrate line is fed to th AGC board via MR211: under push-to-calibrate opera tion, MR211 conducts, cutting off VT206 and preventin AGC action.

TRANSMIT MODE

In the transmit condition, the manual RF gai control circuits are disabled by the application of bia (via R206) to the base of VT203: as in the calibrat condition, the RF gain control is ineffective.

When a positive going signal voltage is applied to the TLC line by the RF power amplifier, both VT201 and VT202 in the gain control circuits, conduct: VT202 increases the control current, causing the gain of the RF amplifier VT701 to be reduced.

3.10 MODE CONTROL CIRCUITS

Receive Condition

When the Function switch contacts S201b are closed, 24V is applied to VT301, VT302, VT303 and relay RL301 in the power supply module, 12V is applied to TS201–4 via the contacts of RL301. VT303 provides a 9V output via TS201–7 which is applied to the IF/Audio, RF and PA modules and to the gain control circuits. The synthesizer module is fed with 12V.

12V is connected to the Function switch. S201a via the Push-to-Calibrate switch S202. In the AM position, this voltage is applied to the coil of relay RL402 in the IF/Audio module via R432.

In the SSB/CW position, 12V is applied to the other winding of relay RL402 via R218 in the mode control circuit: RL402 is a latching relay and the initial high charging current through C455 (AM) or C215 (SSB), causes the relay to be actuated.

In the SSB condition, 12V is also connected via MR204 and R220 in the mode control circuit to the frequency generator module, to enable the 1·75MHz voltage to be applied to the IF/Audio module for demodulation purposes.

Calibrate Condition

When the Push-to-Calibrate switch is operated, the 12V is removed from the Function switch contacts S201a, and contacts S202 connect 12V to the IF/Audio, Frequency Generator, Synthesizer and Power Amplifier modules, as well as to the gain and mode control circuits.

In the mode control circuit, 12V is applied via MR206 to the AM/SSB relay RL402 in the IF/Audio module, to ensure that the receiver is in the AM condition during calibration (see sub-section 3.5).

12V is applied via MR205 to the Frequency Generator module to enable harmonics of 10kHz to be applied to the RF module, and a 1·75MHz demodulation voltage to be applied to the IF/Audio module.

The connection of 12V to the Power Amplifier module actuates RL801 and disconnects the aerial circuit from the receiver input to the RF module.

In the Synthesizer module, the 12V energises RL602 and reduces the audio gain of the IF/Audio module.

Transmit Condition

When the T/R line is earthed by the operation of the press-to-talk switch or the key, relay RL301 in the Power Supply module is actuated: this removes the 12V supply to TS201–4 and ensures that the equipment cannot be placed in the calibrate condition whilst on transmit. Relay RL301 also connects a 12V supply to TS201–5 and thence to the IF/Audio, RF, Synthesizer and Power Amplifier modules, and to the gain control circuits. The Frequency Generator module is also connected to 12V via MR203 and R220 in the mode control circuits.

4 MAINTENANCE AND FAULT-FINDING

4 MAINTENANCE AND FAULT-FINDING

4.1 GENERAL MAINTENANCE

Carry out the following checks weekly:

(1) Check the operation of all controls and tighten any loose knob screws and caps.

(2) Carry out a functional check in both receive and transmit modes; on transmit mode use a non-operational frequency and a dummy load (75Ω non-inductive resistor).

(3) Check the colour of the desiccator indicator. If this has changed from blue to pink, the desiccator should be unscrewed and dried out, preferably in an oven at 280°F (138°C) for 4 hours. When replaced, the colour of the indicator should gradually revert to blue.

The desiccator is mounted at the opposite end of the case to the indicator.

If the equipment is liable to come into contact with salt water, the supply contacts should be packed with silicon grease.

4.2 FAULT FINDING

General

Before removing the unit from its case, check that the aerial, battery (and connections) and the handset are in order. Check the battery voltage (12V) on the GKR206A meter and check the handset (or headset) by substitution, testing on both Audio sockets.

A fault can cause the unit to be inoperative on either Receive mode, Transmit mode or on both modes. As some modules are common to both modes the condition of the unit will show certain modules to be faulty as indicated below:

DRIVER-RECEIVER GKR206A		
Receive mode	*Transmit mode*	*Faulty module*
1 Operative on AM only	Inoperative	Frequency Generator
2 Operative on AM and SSB/CW	Inoperative	Power Amplifier
3 Inoperative	Inoperative	RF module, Synthesizer or IF/Audio module.
4 Inoperative	Operative	Either RF module or IF/Audio module
5 Operative on SSB/CW Inoperative on AM	Inoperative	IF/Audio module

Faulty modules may be replaced with tested modules without the need for realignment of other parts of the equipment. To remove modules, see paragraph 4.3.

The following items of test equipment are required

Voltmeter	to read up to 25V e.g. Avometer model 8
RF valve-voltmeter	up to 20MHz, to read 10mV to 3V r.m.s. e.g. Airmec 301
AF valve-voltmeter	nominal 1kHz, reading up to 3V r.m.s. e.g. Marconi TF1041 or Advance VM77 'Advac'
RF signal generator	75Ω 1μV to 10V e.m.f. up to 20MHz. 1kHz modulation (not essential) e.g. Airmec 201
Resistor	300Ω 1W

Note: an AF power meter may be used in place of the AF valve-voltmeter and 300Ω resistor, e.g. Marconi TF8931.

Receive Mode Tests

Remove the driver-receiver from its case, reconnect it to the 24V DC supply with an extension lead and check that the voltage at TS201-7 is 9·4V.

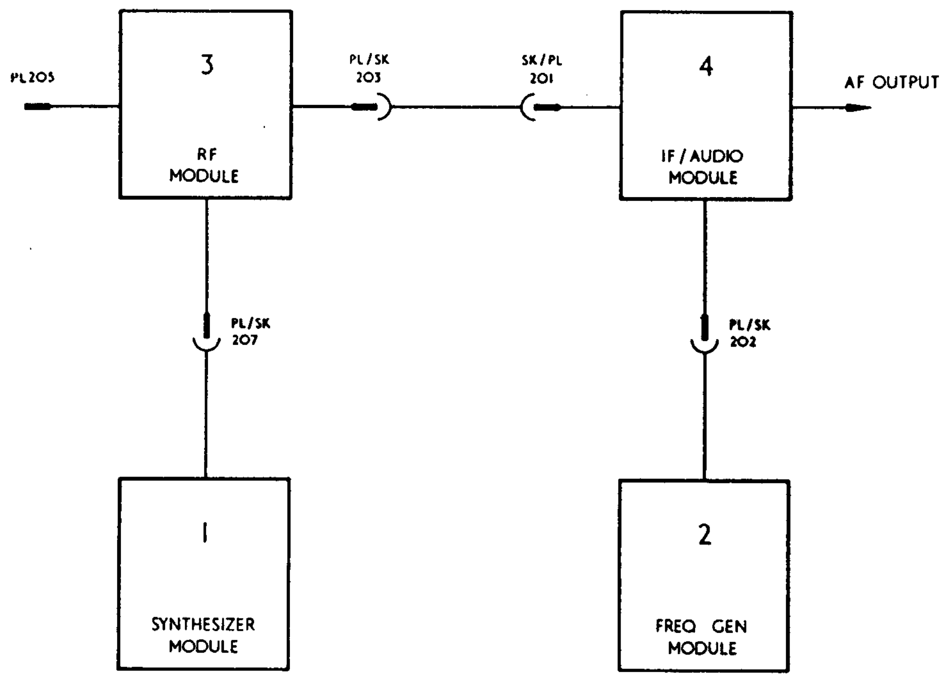
Check each module in the order given.

Synthesiser Disconnect PL207 and connect 100Ω between SK207 and earth. If the voltage measured across the resistor on an RF valve-voltmeter is less than 120mV the synthesizer is faulty.

Frequency Generator Disconnect PL202 and connect 100Ω between SK 202 and earth; if the voltage, measured across the resistor on an RF valve-voltmeter, is less than 1V ± 100mV, the frequency generator is faulty.

IF/Audio Module. Connect the signal generator to PL201 after removing SK201. Set the signal generator frequency to 1·749MHz at an output e.m.f. of 5μV CW. If the IF Audio output voltage, measured with an AF valve voltmeter, is much lower than 1·22V the IF/Audio module is faulty.

RF Module. If the IF/Audio output voltage in the test above is higher than 1·22V, the RF module is faulty.



RECEIVE MODE. Fault Location Test Sequence—Fig. 4.1

RF Gain Control Test

Turn the AF/RF Gain controls fully clockwise. Set the signal generator to 2·001MHz and connect it to the RF OUT socket SK209. Connect a 300Ω resistor between the audio output (pins D and F on SK210, 211 or 212) and earth. Connect an AF valve-voltmeter across resistor and note the reading on the valve-voltmeter when the signal generator output is 1·6μV CW.

Turn the RF Gain control fully counter-clockwise and increase the signal generator output until the initial valve-voltmeter reading is again achieved. The signal generator output should have been increased by at least 90dB.

AGC Control Range

Using the signal generator output control, determine the AGC threshold: this should be 6μV ± 3μV. Adjust the AF Gain control to give an output of 1·22V. Increase the signal generator output by 80dB: the change in AF output should not be greater than 3dB. Remove all test equipment.

After replacement of a faulty module the following RF sensitivity test should be carried out with the equipment in its case.

Sensitivity Test (Receive Mode)

Set the signal generator to 2·001MHz CW and connect it to the RF OUT socket SK209. Connect the 300Ω resistor between audio output and earth (pins D and F on audio sockets SK210, 211 or 212) and connect an AF valve-voltmeter across the resistor.

Set the GKR206A to 2·000MHz and turn the RF/AF Gain controls fully clockwise: switch to SSB/CW. Adjust the Peak Noise control for maximum reading on the valve-voltmeter. Adjust the Calibrate control for zero beat, adjusting the signal generator output level as necessary. Adjust the generator frequency to give maximum audio output.

Set the signal generator output to 1·6μV and check that the AF valve-voltmeter reading is greater than 1·22V. Repeat this test at 3·000, 5·000, 8·000 and 11·999MHz, setting the signal generator frequency 1kHz higher than the GKR206A frequency setting each time. If the reading is less than 1·22V at any frequency, the performance has deteriorated and further tests should be conducted to isolate the faulty module.

NOTE: *RF Sensitivity tests on AM.* For these tests the signal generator output should be set to 6·4μV with 30% modulation at 1kHz at whatever frequency the GKR206A is set, to give the same valve-voltmeter reading of 1·22V.

Remove all test equipment.

Transmit Mode Tests

Before carrying out module checks, test the hand microtelephone by using a known serviceable handset on both microphone inputs. If normal power output is obtainable from the unit, the original hand microtelephone is faulty. The modules should then be checked in the order given.

Synthesizer

Disconnect PL207 and connect a 100Ω resistor between SK207 and earth. Measure the voltage across this resistor with an RF valve-voltmeter. If this voltage is less than 120mV the synthesizer is unserviceable. Remove resistor and meter and reconnect PL207.

Frequency Generator. Disconnect PL202 and connect the

100Ω resistor between SKT202 and earth. Measure the voltage across this resistor with the valve-voltmeter. If this voltage is less than 1V ± 100mV the frequency generator is unserviceable. Remove resistor and meter and reconnect PL202.

Power Amplifier. Disconnect PL205, connect a signal generator, set to 2·000MHz to SK205 and inject a voltage of 100mV, as measured on an RF valve-voltmeter connected across SK205. With a 75Ω load connected between output terminal SK209 and earth, the amplifier output should be 2·5V.

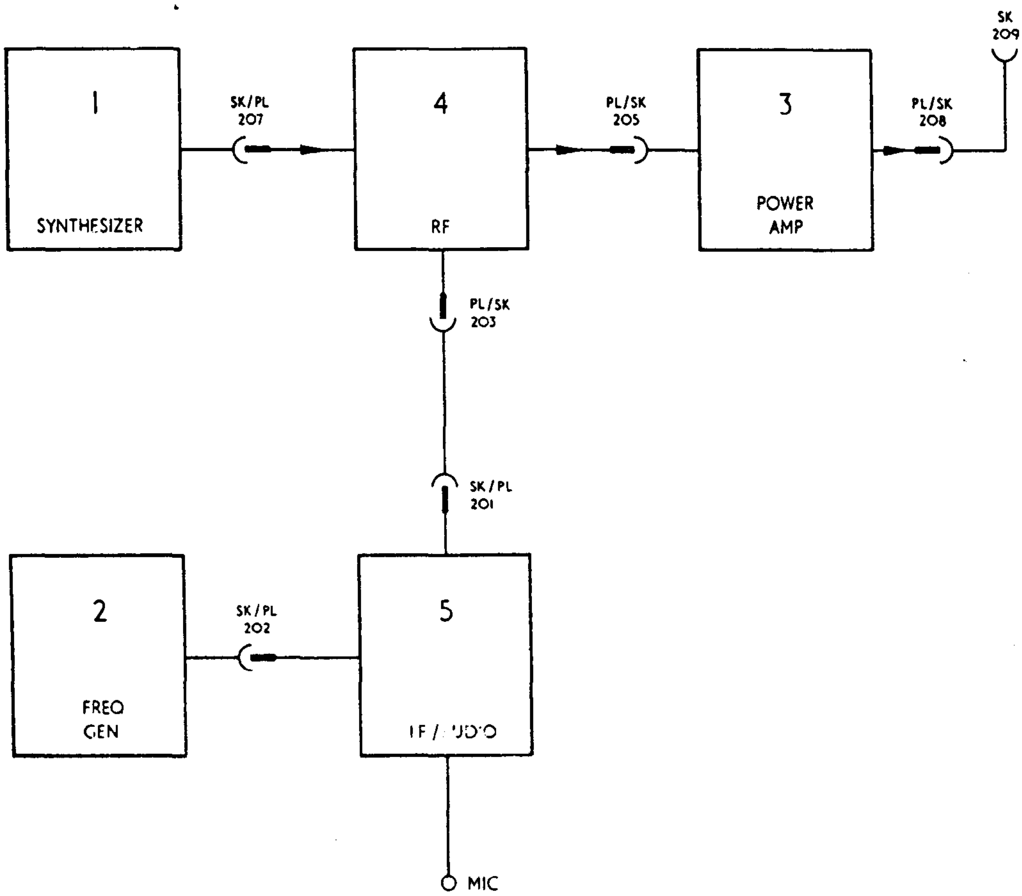
Repeat the test at 11·999MHz with 100mV maximum input, measured at SK205 with valve-voltmeter. If the amplifier output is much less than 2·5V in either test, the amplifier module is unserviceable.

RF Module. Assuming the power amplifier and synthesizer are serviceable, replace PL205. Set GKR206A frequency to 2·000MHz, set the Function switch to AM and adjust the Peak Noise control for maximum noise output. Adjust the Clarify control for zero beat. Connect the signal generator to PL203 and inject a voltage of 26mV, measured at PL203 on RF valve-voltmeter, at a frequency of 1·750MHz. If normal output is not obtained when the press-to-talk switch is operated, the RF Module is unserviceable.

IF/Audio Module. Replace SK203 on the IF/Audio module. Assuming the RF module is serviceable and with a serviceable Frequency Generator module connected to PL202, the absence of normal power output when the press-to-talk switch is operated on AM, indicates that the IF/Audio module is faulty.

Remove all test equipment.

After replacement of a faulty module the following power output test should be carried out.



TRANSMIT MODE. Fault Location Test Sequence—Fig. 4.2

Power Output Test (Transmit Mode)

Connect the 75Ω termination of the RF valve-voltmeter to the RF OUT socket SK209 and set the frequency controls to 2·000MHz. Plug in the handset. Turn Function switch to AM and adjust the Peak Noise control for maximum noise output. Tune the Calibrate control for zero beat. Press the press-to-talk switch and observe that the output voltage is not less than 2·5V.

Repeat the test at 3·000, 5·000, 8·000 and 11·000MHz

Linearity Test

Check for distortion by transmitting into a dummy load and listening on another GKR206A or any other suitable receiver.

Frequency Accuracy Test

The frequency is determined by the frequency synthesizer which is used in both the receive and transmit modes. A check on accuracy can be made by listening to a transmission of known accuracy, e.g. from another GKR206A. Voice transmission should be received clear and readable.

4.3 REMOVAL OF MODULES (PLATE 4.1)

General

Before removal, set the front panel controls so that the shaft coupling slots are vertical on the synthesizer, RF and power amplifier modules.

Set the frequency selection knobs to 2·000MHz before removing the synthesizer module, leaving them in this position until the synthesizer is replaced.

Release all leads from the modules to the main chassis terminal blocks by slackening the terminal block screws.

Access to Front Panel Components

The chassis is released from the front panel by unscrewing two screws (at the top and bottom of the chassis) and four countersunk screws (at the sides of the chassis, two on each side). The chassis may now be swung away from the front panel, still attached by the wiring.

Removal of Synthesizer Module

(1) Disconnect the terminal block leads.
(2) Release the socket connection SK207.
(3) Release the four centrally disposed screws securing the module to the main chassis.

Removal of Printed Circuit Boards

The black and green leads from boards OP5486 and OP5488 should be removed, and the pin connections noted for subsequent reassembly. The coaxial leads from boards OP5486, OP5487 and OP5488 should then be released.

On boards OP5495 and OP5486, three ordinary screws and one slot-headed screw should be released. On other boards, release the four ordinary screws.

If it is required to remove the switch units from the module, release the escutcheon collars. When dealing with the 100kHz and 1MHz switches, remove also the spacing collars which are bolted to the front of the module.

To reassemble the module, reverse the above procedure.

Removal of RF Module

(1) Release the five sockets SK203 to 7.
(2) Release the leads on the terminal block.
(3) Unscrew the nut securing the module bracket to the bracket on the Front Panel assembly adjacent to socket SK206.
(4) Remove the screw securing the module mounting bracket to the Front Panel assembly adjacent to socket SK204.
(5) Turn the main chassis over and release the four screws securing the module to the chassis.

To remove the module screening cover, release four screws: two of the screws also secure the bottom plate of the module. When removing the screen, first slacken the remaining two bottom-plate securing screws.

Removal of IF/Audio Module

(1) Remove the leads on terminal block TS202.
(2) Release the sockets SK202 and SK201.
(3) Release the four retaining screws at the rear of the module: these screws secure the module to the chassis and retain the cover of the module in position. The printed circuit boards OP5483, OP5484, and OP5585 can be released by removing four mounting screws.

Removal of Power Amplifier

(1) Disconnect the terminal block leads.
(2) Release the three coaxial connections SK205, SK206 and SK208.
(3) Remove the three screws in line with the terminal block and withdraw the module.

Removal of Frequency Generator

(1) Disconnect the terminal block leads.
(2) Release socket SK204: this is adjacent to the unit front panel and to release it fully, it may be necessary to release a second socket near the rear of the RF module.
(3) Release socket SK202.
(4) Release the three screws securing the module at the rear edge of the chassis.

Removal of Power Supply Module

(1) Disconnect the terminal block leads.
(2) Release the four retaining screws at the rear of the module: these screws secure the module to the chassis and also keep the cover in position.

4.4 TEST VOLTAGES

Below are given typical voltages for each module along with module conditions of test.

For access to some transistors, the module should be removed and connected to the main assembly by extension leads or fitted into a test jig. Alternatively, the correct conditions of test can be simulated by using suitable test equipment.

DC voltages are measured on an AVO meter model 8, and AC voltages on a valve-voltmeter, both at room temperature.

Synthesizer Module Type 5450/A

Conditions: decades set to give a frequency of 4·150MHz: Calibrate control, and Clarify control (if

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[illegible] in circuit) set to mid-capacitance; SKT207 [illegible] with [illegible]Ω; 12V applied to TS601-3; OV at TS601-1.

DC VOLTS

Transistor	Emitter	Base	Collector
VT601	2·8	3·2	8·8
VT602	1·7	1·8	7·9
VT603	3·0	3·3	8·7
VT604	2·2	2·7	8·9
VT605	1·5	2·0	8·2
VT606	2·0	2·7	8·9
VT607	1·5	1·6	7·2
VT608	1·9	2·5	5·3
VT609	1·0	0·9	7·8
VT610	8·8±0·45	9·6±0·45	12·0±0·1

The voltages on the oscillators (VT601, VT603, VT60[illegible] and VT609) will be different to those shown if the stage is not oscillating.

AC VOLTS (r.m.s.)

Conditions: decades set to give a frequency of 4·150 MHz Calibrate control and Clarify control (if connected in circuit) set to mid-capacitance; SK 207 loaded with 100Ω; 12V applied to TS601-3; OV at TS601-1 and TS6[illegible]-2.

Transistor	Emitter	Base	Collector
[illegible]	3·1	3·5	16mV
[illegible]	400mV	600mV	1·5
[illegible]	1·3	1·4	10mV
[illegible]	11mV	320mV	3·0
[illegible]	185mV	620mV	1·0
[illegible]	46mV	270mV	2·4
[illegible]	1·2	44mV	250mV
[illegible]	120mV	290mV	400mV
[illegible]	1·1	620mV	17mV

[illegible]dule Type 5451/A.

[illegible]nditions: No RF input; gain controls fully clock-[illegible] [illegible]pprox. 1·1V at TS701-2); 9V at TS701-3; OV at [illegible]-1.

[illegible]OLTS

Transistor	Emitter	Base	Collector
[illegible]T701	0·3	1·0	7·7
VT702	0·8	1·5	5·8

Conditions: 200mV at 4·150MHz measured input at PL207; 20mV at 2·400MHz measured input at PL206; PL203 loaded with 100Ω; gang tuned for maximum IF output at PL203 (approx. 30mV); gain control set for maximum IF output at PL203 (approx. 1·1V at TS701-2); 9V at TS701-3; OV at TS701-1.

AC VOLTS

Conditions: 200mV at 4·150MHz measured input at PL207; 20mV at 2·400MHz measured input at PL206; PL203 loaded with 100Ω; gang tuned for maximum IF output at PL203 (approx. 30mV); gain control set for maximum IF output at PL203 (approx. 1·1V at TS701-2); 9V at TS701-3; OV at TS701-1.

Transistor	Emitter	Base	Collector
VT701	2mV	4·6mV	94mV
VT702	100mV	110mV	3·5

IF/Audio Module Type 5448/A.

Conditions (receive): No RF input; gain control adjusted to give 1·2V at TS202-8; OV at TS202-5; TS202-7 not earthed; 9V at TS202-2.

DC VOLTS

Transistor	Emitter	Base	Collector
VT401	2·16	2·7	9·0
VT402	0·55	1·3	4·5
VT403	4·6	5·3	9·0
VT404	0·15	0·7	5·6
VT405	0·64	1·25	5·8
VT406	4·3	4·8	8·9
VT407	—	0·65	4·3

Conditions (transmit, key line not earthed): No RF or audio input. 9V at TS202-2; 12V at TS202-5; TS202-7 not earthed.

Transistor	Emitter	Base	Collector
VT408	0·4	1·1	1·9
VT409	1·2	1·9	2·7
VT410	3·1	3·8	5·1

Conditions (transmit, key line earthed): No RF or audio input; 9V at TS202-2; 12V at TS202-5; between 1-2V at TS202-6 when the key line (TS202-7) is earthed.

Transistor	Emitter	Base	Collector
VT411	1·0	0·7	3·9
VT412	1·0	0·7	2·8
VT413	9·0	8·2	8·8
VT414	—	0·8	0·4
VT415	7·9	8·3	8·7

Conditions (receive): 970mV at 1·75MHz measured input at PL202; 5μV (e.m.f. from 75Ω source) at 1·749MHz to PL201; gain control adjusted to give 1·2V at TS202-8; 0V at TS202-5; TS202-7 not earthed; 9V at TS202-2; 300Ω resistor across TS202-1 and chassis; 12V momentarily applied to TS202-3 to actuate RL402/2 and place the module in the SSB/CW mode.

AC VOLTS

Conditions (receive): 970mV at 1·75MHz measured input at PL202; 5μV (e.m.f. from 75Ω source) at 1·749MHz to PL201; gain control adjusted to give 1·2V at TS202-8; 0V at TS202-5; TS202-7 not earthed; 9V at TS202-2; 300Ω resistor across TS202-1 and chassis; 12V momentarily applied to TS202-3 to actuate RL402/2 and place the module in the SSB/CW mode.

Transistor	Emitter	Base	Collector
*VT404	116mV	15mV	138mV
VT405	136mV	136mV	386mV
VT406	2·0	2·0	—
VT407	—	13mV	2·0

*1·75MHz applied to emitter.

Conditions (transmit, key line not earthed): 970mV at 1·75MHz measured input at PL202; 20mV, 1kHz e.m.f. via 300Ω to TS202-10; 9V at TS202-12; 12V at TS202-5; TS202-7 not earthed; 12V momentarily applied to TS202-3 to actuate RL402/2 and place the module in the SSB/CW mode; PL201 loaded with 100Ω.

DC VOLTS

Transistor	Emitter	Base	Collector
VT408	2·8mV	3·1mV	22mV
VT409	19mV	22mV	81mV
VT410	71mV	75mV	138mV

Conditions (transmit, key line earthed): No audio input; 970mV at 1·75MHz measured input at PL202; 9V at TS202-2; 12V at TS202-5; TS202-7 earthed; between 1-2V at TS202-6 when key line (TS202-7) is earthed; 12V momentarily applied to TS202-3 to actuate RL402/2 to place the module in the SSB/CW mode; PL201 loaded with 100Ω.

DC VOLTS

Transistor	Emitter	Base	Collector
VT411	—	1·3	2·9
VT412	—	1·4	2·0
VT415	180mV	240mV	—

Power Amplifier Module Type 5452/B

Conditions: No RF input to SK205; 12V at TS801-3.

DC VOLTS

Transistor	Emitter	Base	Collector
VT801	0·9	1·6	9·6
VT802	1·8	2·5	12·0
VT803	1·8	2·5	12·0
VT804	10·0	12·0	—

Conditions: 60mV at 2·400MHz measured input at SK205; RF OUT socket loaded with 75Ω RF power meter; 12V at TS801-3.

AC VOLTS

Transistor	Emitter	Base	Collector
VT801	54mV	68mV	460mV
VT802	210mV	225mV	1·1
VT803	210mV	225mV	1·1

Power Supply Module Type 5447/B

Conditions: 24V input switched to RECEIVE.

DC VOLTS

Transistor	Emitter	Base	Collector
VT302	13·0	12·9	21·0
VT303	9·0	10·0	12·5
VT301	12·5	13·0	21·0

Conditions: 24V input, switched to TRANSMIT.

Transistor	Emitter	Base	Collector
VT302	13·0	13·5	15·5
VT303	9·0	10·0	12·2
VT301	12·2	13·0	15·5

AC Voltages at Interconnecting Plugs

Conditions: All modules fitted to the main chassis; driver-receiver tuned to a frequency of 2·400MHz.

SSB/RX—RF Gain control fully clockwise. Peak Noise control adjusted for peak noise; no input to the RF OUT socket.

AM/RX—as for SSB/RX.

CAL—Calibrate control knob depressed and adjusted for zero beat.

CW/TX—75Ω load connected to the RF OUT socket, key depressed.

AM/TX—75Ω load connected to the RF OUT socket, no audio input.

SSB/TX—75Ω load connected to the RF OUT socket, 20mV e.m.f. at 1kHz, applied to the Audio socket microphone input.

AC VOLTS

PLUG	*SSB/RX*	*AM/RX*	*CAL*	*CW/TX*	*AM/TX*	*SSB/TX*
PL201	—	—	—	42mV	80mV	26mV
PL202	970mV	—	970mV	970mV	970mV	970mV
PL203	—	—	—	42mV	80mV	26mV
PL204	—	—	100mV	—	—	—
PL205	—	—	—	75mV	76mV	74mV
PL206	—	—	—	—	—	—
PL207	200mV	200mV	200mV	200mV	200mV	200mV

DC Voltages on Terminal Blocks and Gain Control Board OP5482

Terminal Block Connection No.	*Voltage (V) on Terminal Block*						*Conditions*
	TS201	TS801	TS701	TS601	TS202	TS501	
1	12	0	0	0	0	0	AM (A3) Receive; RF Gain fully clockwise
2	12·1	0	1·1	0	9·4	0	
3	10·0	0	9·4	12·1	0	0	
4	12·1	9·4	0	0	11·3		
5	0	10·0			0		
6	12·1	0			12·1		
7	9·4	0			9·2		
8	0				1·2		
9					0		
10					0		
11					0		
12					0		
1	12·1	0	0	0	0	0	SSB/CW (A3J/A2J) Receive; RF Gain fully clockwise
2	12·1	0	1·1	0	9·4	9·0	
3	3·5	0	9·4	12·1	0·8	0	
4	12·1	9·4	0	0	0		
5	0	3·4			0		
6	12·1	0			12·1		
7	9·4	0			8·8		
8	0				1·2		
9					0		
10					0		
11					0		
12					0		

GAIN CONTROL BOARD VOLTAGES

Conditions: RF Gain fully clockwise; no audio input on SSB (A3J) Transmit; key down on CW (A2J) Transmit

		Voltage (V) in Various Modes					
		Receive			Transmit		
Gain Control Board Terminal No.	Wire Colour Code	AM (A3)	SSB/CW (A3J/A2J)	Calibrate/ Receive	AM (A3)	SSB (A3J)	CW (A2J)
1	RD	9·1	9·1	9·1	9·1	9·1	9·1
2	WT/GRN/BK	0	0	0	0	0	0
3	WT/RD/OR	0	0	11·5	0	0	0
4	WT/GRN/V10	1·2–1·5	1·2–1·5	1·2–1·5	6·5–7·5	6·5–7·5	6·5–7·5
6	WT/GRN	0	0	0	3·7	0	3·4
7	WT/GRN/BR	1·0–1·2	1·0–1·2	1·0–1·2	1·4–1·7	1·0–1·2	1·4–1·7
8	BK	0	0	0	0	0	0
9	WT/RD/SL	0	9·0	9·0	9·0	9·0	9·0
10	WT/BL/YL	11·5	0	11·5	0	0	0
12	WT/RD	0	0	0	12·0	12·0	12·0
13	WT/YL/GRN	0	0·5	0	0	0	0
14	WT/BL/GRN	0	11·5	0	0	0	0
16	WT/GRN/SL	0	0	0·5	0	0	0
17	WT/OR/GRN	1·6–1·8	1·6–1·8	0	0·1	0	0·1
18	WT/RD/OR	12·0	12·0	12·0	0	0	0

AUTOMATIC GAIN CONTROL BOARD VOLTAGES

Conditions: No signal input; 12V on pin 4.

DC VOLTS

Transistor	Emitter	Base	Collector
VT205	—	0·7	2·7
VT206	11·2	11·2	--
VT207	--		11·2
VT208	2·2	·	11·2

Conditions: 1750kHz input at 150mV measured to pin 1.

DC VOLTS

Transistor	Emitter	Base	Collector
VT205		0·7	2·8
VT206	11·2	11·0	3·0
VT207	2·0	3·0	11·2
VT208	3·0	3·6	11·0

Conditions: 1750kHz input at 150mV measured a pin 1.

AC VOLTS

Transistor	Emitter	Base	Collector
VT205	—	1·5mV	640mV
VT206	240mV	620mV	520mV
VT207	1·4V	520mV	—

5 REALIGNMENT

5 REALIGNMENT

5.1 GENERAL

The realignment procedures given in this chapter are based on the use of special test jigs designed by Redifon Ltd.: these can be provided to customer order but for those who wish to construct their own jigs, circuit information is included at the end of the chapter.

Realignment should be undertaken only by skilled personnel in suitably equipped workshops.

Notes

(1) In measuring signal levels, the loading effect of test equipment should be considered.

(2) When carrying out isolated tests, the comple module test procedure should be scrutinised t ascertain the correct conditions of test.

(3) To avoid damage to plating on metal work, a sma earth tag should be fitted under a convenient screv head and used for a test gear earth connection.

(4) Levels and measurements contained in the realig ment instructions, are correct for an ambient tempe ature of 20°C, unless otherwise stated.

(5) All signal generator outputs are CW, unless otherw stated.

5.2 SYNTHESIZER MODULE—Realignment

CONTENTS OF SECTION 5.2

5.2 SYNTHESIZER MODULE Type 5450A

Test Equipment

Synthesizer test jig	Redifon type 6562/A
DC Power Supply	10–16V, 200mA Roband T172
HF Valve-voltmeter	10mV—3V, up to 50MHz Airmec 301
Frequency Counter	up to 50MHz Hewlett Packard 5245/5261 Video Amp/10003A probe
Multi-range test meter	up to 20,000Ω/V Avometer Model 8
Resistors	10k, 2·2k, 1k and 100Ω, all 1/4W
Capacitor	1000pF
Climatic chamber	−40°C to +55°C

Preliminary Checks

After removing the module from the chassis as described in chapter 4.3 and before fitting the module in the test jig, verify the following resistance values with the test meter, measuring between each terminal of TS601 and chassis.

Table 5.1 Preliminary Checks

Terminal	*Resistance (approx.)*
1	30Ω
2	30Ω
3	7kΩ or > 100kΩ depending on test meter polarity
4	short-circuit

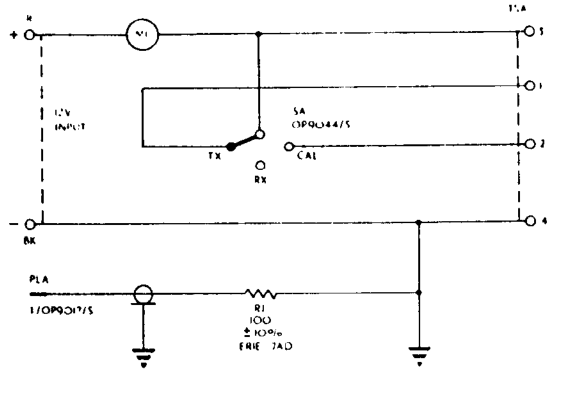


Fig. 5.1 Synthesizer Test Jig—Circuit Diagram

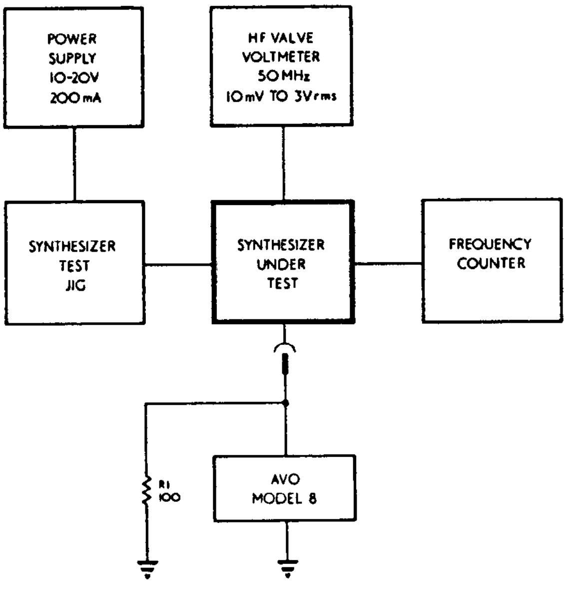


Fig. 5.2 Synthesizer Test Equipment—Block Diagram

Setting-up Procedure

(1) Fit the module to the test jig and connect the test jig terminal strip to TS601.

(2) Terminate SK207 with the 100Ω resistor.

(3) Connect the clarifier link to pin C on the front panel.

(4) Connect the power supply to the test jig and set to 10·5V.

(5) Set TX/RX/Cal switch to RX.

DC Measurements

(1) Connect test meter (10V DC range) between pin 9 on circuit board OP5495 and chassis and record the voltage with the power supply adjusted to 12V and 16V. The voltage in each case should be 9·1V ± 0·45V and the total spread should not exceed 0·4V.

(2) Check the current drawn in the TX and CAL positions of the test jig TX/RX/Cal switch. This should not exceed 130mA.

(3) Reset the supply voltage to 12·0V.

(4) Measure the DC levels on the transistors and check them against the table below.

Table 5.2 Typical transistor voltages

Transistor	*Emitter*	*Base*	*Collector*
VT601	2·8	*3·2	8·8
VT602	1·7	1·8	7·9
VT603	3·0	3·3	8·7
VT604	2·2	2·7	8·9
VT605	1·5	2·0	8·2
VT606	2·0	2·7	8·9
VT607	1·5	1·6	*7·2
VT608	1·9	2·5	5·3
VT609	1·0	0·9	7·8
VT610	8·8	9·6	12·0

*Measurements made with stage not oscillating.

1kHz Incremental Oscillator Alignment

Notes: (a) The module cover must be replaced for all measurements.

(b) Do not change individual crystals in the 1kHz incremental oscillator: if a crystal is faulty the complete set of crystals must be changed.

(1) Connect the counter to test point 11 on printed circuit board OP5495 via the 10kΩ resistor.

(2) Set the 1kHz incremental switch to 0 (fully counter-clockwise).

(3) Set the test jig TX/RX/Cal switch to CAL and adjust C616 so that the counter indicates 6525kHz ± 2Hz.

(4) Set the TX/RX/Cal switch to RX and set the Clarify control C601 to minimum capacitance.

(5) Adjust C602 to give a frequency of 6525·170kHz ± 2Hz.

(6) Set the TX/RX/Cal switch to TX and adjust C612 to give a frequency of 6525kHz ± 2Hz.

(7) Set the 1kHz incremental switch to each digit in turn, adjusting the appropriate capacitor to obtain the frequency indicated in Table 5.3 ± 2Hz.

Table 5.3 1kHz Trimmer Adjustment

Digit	*Trimmer*	*Frequency*
0	C602	6525
1	C603	6526
2	C604	6527
3	C605	6528
4	C606	6529
5	C607	6530
6	C608	6531
7	C609	6532
8	C610	6533
9	C611	6534

(8) Recheck through the ten digit positions and readjus as necessary.

(9) Set the TX/RX/Cal switch to RX and the Clarif control C601 to *maximum* capacitance.

(10) Rotate the 1kHz incremental switch through its te positions and check that each frequency is at leas 130Hz below nominal.

(11) Set the Clarify control C601 to minimum capacitanc and rotate the 1kHz incremental switch through it 10 positions once again. Check that each frequenc is at least 130Hz *above* nominal.

(12) Connect the clarifier link to the pin marked NC.

(13) Set the 1kHz incremental switch to digit 4 ar adjust C699 for a frequency of 6529kHz ± 5Hz.

(14) Rotate the 1kHz incremental switch through all te positions and check that each frequency is withi ±10Hz of nominal. Readjust C699 if necessary t achieve this.

(15) Remove resistor and counter from pin 11 anc connect the valve-voltmeter.

(16) Rotate the 1kHz incremental switch through all te positions and record the output voltages: thes should be 1·55V ± 0·75V r.m.s.

(17) Disconnect the valve voltmeter.

10kHz Incremental Oscillator Alignment

(1) Connect the counter to pin 12 of circuit boar OP5495.

(2) Set Calibrate control C629 to minimum capacitance

(3) Rotate the 10kHz switch through all ten position and observe that the frequency deviation is greate than 1·4kHz above nominal for each digit.

(4) Set C629 to maximum capacitance and again rotate the 10kHz switch through all ten positions checkin that the frequency deviation is at least 1·4kHz below nominal for each digit, as shown in Table 5.4.

Table 5.4 10kHz Oscillator Frequency Deviation

Digit	*Frequency (kHz)*	
	with C629 min.	*with C629 max.*
0	>9026·4	<9023·6
1	>9036·4	<9033·6
2	>9046·4	<9043·6
3	>9056·4	<9053·6
4	>9066·4	<9063·6
5	>9076·4	<9073·6
6	>9086·4	<9083·6
7	>9096·4	<9093·6
8	>9016·4	<9103·6
9	>9116·4	<9113·6

(5) Remove the resistor and counter from pin 12 and connect the valve-voltmeter in its place.
(6) Rot..e the 10kHz switch through the 10 positions with C629 set first to minimum then to maximum capacitance and note the voltage on each position. This should be 0·9V ± 0·6V r.m.s. in both positions.
(7) Disconnect the valve-voltmeter and *leave C629 set to maximum capacitance.*

15MHz Bandpass Amplifier Alignment

(1) Set the 1kHz and 10kHz switches to their 1 positions.
(2) Connect the valve-voltmeter to test point 3 on circuit board OP5486 and adjust T603 and T604 for maximum reading.
(3) Connect the valve-voltmeter to the base of VT604 and adjust T601 (located on board OP5495) and T602 for maximum reading.
(4) Re-connect the valve-voltmeter to pin 3 and again adjust T601 and T604 for maximum readings. The voltage at test point 3 should be between 0·4V and 1·0V r.m.s.
(5) Remove the valve-voltmeter and connect the counter to test point 3.
(6) The frequency, measured at test point 3, should be 15,561kHz ± 2·5kHz. If the frequency is outside these limits, re-align the transformers by screwing the cores one turn counter-clockwise if the frequency is low, and one turn clockwise if the frequency is high; then repeat the above tests.
(7) Disconnect the valve-voltmeter and counter.

100kHz Oscillator Alignment

(1) Connect the counter (via a 2·2kΩ resistor) and the valve-voltmeter to pin 3 on circuit board OP5487 and set the 100kHz switch to position 4.
(2) Adjust T611 for maximum indication on the valve-voltmeter.
(3) Rotate the 100kHz switch through the ten positions and note the voltage deviation from nominal (0·6V – 1·2V) and record the frequency deviation from the figures shown in the table below. (The frequency deviation figures will also be required for the 1MHz oscillator alignment test.)

Table 5.5—100kHz Oscillator Frequency Deviation

Position	*Frequency (MHz)*
0	26·730
1	26·830
2	26·930
3	27·030
4	27·130
5	27·230
6	27·330
7	27·430
8	27·530
9	27·630

(4) Disconnect test gear from pin 3.

1MHz Oscillator Alignment

(1) Connect the counter (via a 2·2kΩ resistor) and the valve-voltmeter to pin 3 on circuit board OP5488.
(2) Set the 1MHz switch to position 2 (fully counter-clockwise).
(3) Screw C674 trimmer out, flush with top of trimmer.
(4) Adjust T614 for maximum reading on the valve-voltmeter.
(5) Rotate the 1MHz switch through the ten positions and adjust the appropriate trimmer on each position to give nominal frequency without exceeding a voltage drop of 2dB from maximum reading. Note deviations, after trimming, from the nominal frequencies shown in Table 5.6.

Table 5.6—1MHz Oscillator Frequency Deviation

Position	*Frequency (MHz)*	*Trimmer*
2	38·530	C674
3	37·530	C675
4	36·530	C676
5	35·530	C677
6	34·530	C678
7	33·530	C679
8	32·530	C680
9	31·530	C681
10	30·530	C682
11	29·530	C683

(6) Take the maximum positive frequency deviation figure from the 100kHz oscillator test and the maximum negative deviation figure from the 1MHz oscillator test and add them together, ignoring the minus sign. The total deviation must not exceed 1200Hz. Take the maximum negative frequency deviation figure from the 100kHz oscillator test and maximum positive deviation figure from the 1MHz oscillator test and add them together, ignoring the minus sign. The total deviation must not exceed 1200Hz.
(7) If necessary re-adjust the 1MHz trimmers to meet this requirement, at the same time ensuring that the voltage output for all ten positions lies between the limits 160–320mV and that the overall spread of output voltages is within 2dB.
(8) Disconnect all test gear from pin 3.

100kHz Mixer Amplifier Alignment

(1) Set the 1kHz, 10kHz and 100kHz switches to position 4.
(2) Adjust the cores of T607, T608, T609 and T610 so that they are flush with the circuit board.

(3) Connect the valve-voltmeter to pin 5 on circuit board OP5487.

(4) Make up a load consisting of a 1kΩ resistor connected in series with a 1000pF capacitor, keeping the leads as short as possible.

(5) Connect this load, in turn, between each of the pins indicated and chassis, adjusting the appropriate transformer for maximum indication.

Pin 9	T608
Pin 10	T607
Pin 11	T610
Pin 12	T609

(6) Repeat these adjustments, then remove the lead. The output voltage should be between 0·6V and 1·2V r.m.s.

(7) Connect the counter to pin 5 and note that the frequency is 42·724MHz ± 2·5kHz. If the frequency is low, screw all cores out by 1 to 1½ turns. If the frequency is high, screw all cores in by 1 to 1½ turns, then repeat the adjustments of paragraph 5.

(8) When the frequency is correct, disconnect the counter.

(9) Rotate the 100kHz switch through all ten positions and observe that the output spread is not greater than 2dB and that the output voltage lies between 0·6V and 1·2V r.m.s.

(10) Disconnect the valve-voltmeter.

Synthesizer Output

(1) Connect the valve-voltmeter across the 100Ω load connected between SK601 and earth.

(2) Rotate each incremental switch, in turn, to the position giving the lowest output, and record this figure.

(3) Rotate each incremental switch, in turn, to the position giving the highest output, and record this figure.

(4) Both these outputs must be within the range 120mV to 320mV.

(5) Disconnect test gear and switch off power supply.

Test at Temperature Extremes

The synthesizer can be checked at −20°C and +55°C using a climatic chamber, if the equipment operation is suspect at these temperatures.

Carry out the following tests at both extremes.

(1) Place the module in the climatic chamber and extend the following points.

(a) Pin 11 on OP5495

(b) Pin 12 on OP5495

(c) Pin 3 on OP5487

(d) Pin 3 on OP5488

(e) SK601

(2) Run the chamber down to −20°C and leave for one hour.

(3) Connect the test jig connector and set the TX/RX/Cal switch to CAL.

(4) Connect the counter, using probe, to pin 11; set the 1kHz switch to 0 and note that the frequency deviation is less than 200Hz.

(5) Set the TX/RX/Cal switch to TX and rotate the 1kHz switch through all ten positions, recording the deviation. Each frequency must be within ±25Hz of the deviation measured on the CAL position.

(6) Set TX/RX/Cal switch to TX and connect the counter to pin 12.

(7) Rotate the 10kHz switch through all ten positions and record the deviations. These must be greater than 1400Hz below nominal.

(8) Set C629 (Calibrate) to maximum capacitance and again record the deviations in all ten positions. These must be greater than 1400Hz above nominal.

(9) Reset C629 to maximum capacitance.

(10) Connect the counter to pin 3 on circuit board OP5487 and rotate the 100kHz switch through all ten positions, recording the frequency deviation from nominal. The difference between the two greatest deviations of opposite sign must be less than 1200Hz.

(11) Connect the counter to pin 3 on circuit board OP5488 and rotate the 1MHz switch through all ten positions, recording the frequency deviation from nominal.

(12) The sum of the maximum positive deviation in the 100kHz test (para. 10) and the maximum negative deviation in the 1MHz test (para. 11) should not exceed 1200Hz; the sum of the maximum negative deviation in the 100kHz test and the maximum positive deviation in the 1MHz test should also not exceed this figure.

(13) Remove the counter and connect the valve-voltmeter to the synthesizer output socket. For any combination of incremental switch positions the output must be greater than 5mV.

(14) Run the climatic chamber temperature up to +55°C and repeat steps (3) to (13) inclusive.

(15) Remove the module from the chamber and allow at least one hour before proceeding with the next test.

Alignment of Clarify Control

(1) Connect the counter across the 100Ω resistor connected between SK601 and earth.

(2) Change the link from Non-Clarify to Clarify position.

(3) Set the MHz switch to position 2 and the other three switches to position 0.

(4) Set Clarify (C601) and Calibrate (C629) controls to the positions shown in Fig. 5.3. The slots of both couplers should be vertical with the grub screws in the positions shown.

(5) Set the TX/RX/Cal switch on test jig to CAL.

(6) Adjust C629 (Calibrate) for a reading of 3750kHz ± 5Hz on the counter.

(7) Set the TX/RX/Cal switch to RX.

(8) Adjust C601 (Clarify) very slightly for a reading of 3750kHz ± 5Hz on the counter. If the coupling slot is no longer vertical slacken the grub screws and reset.

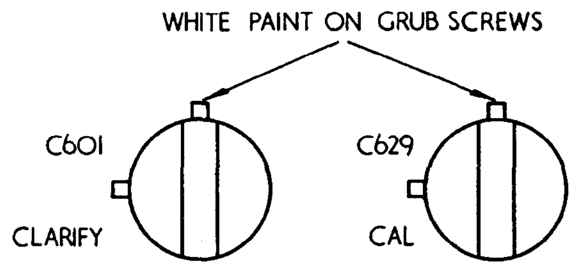
(9) Switch off the power supplies and disconnect the counter.

(10) Rotate C629 (Calibrate) so that coupling slot is vertical; *do not loosen the coupler.*

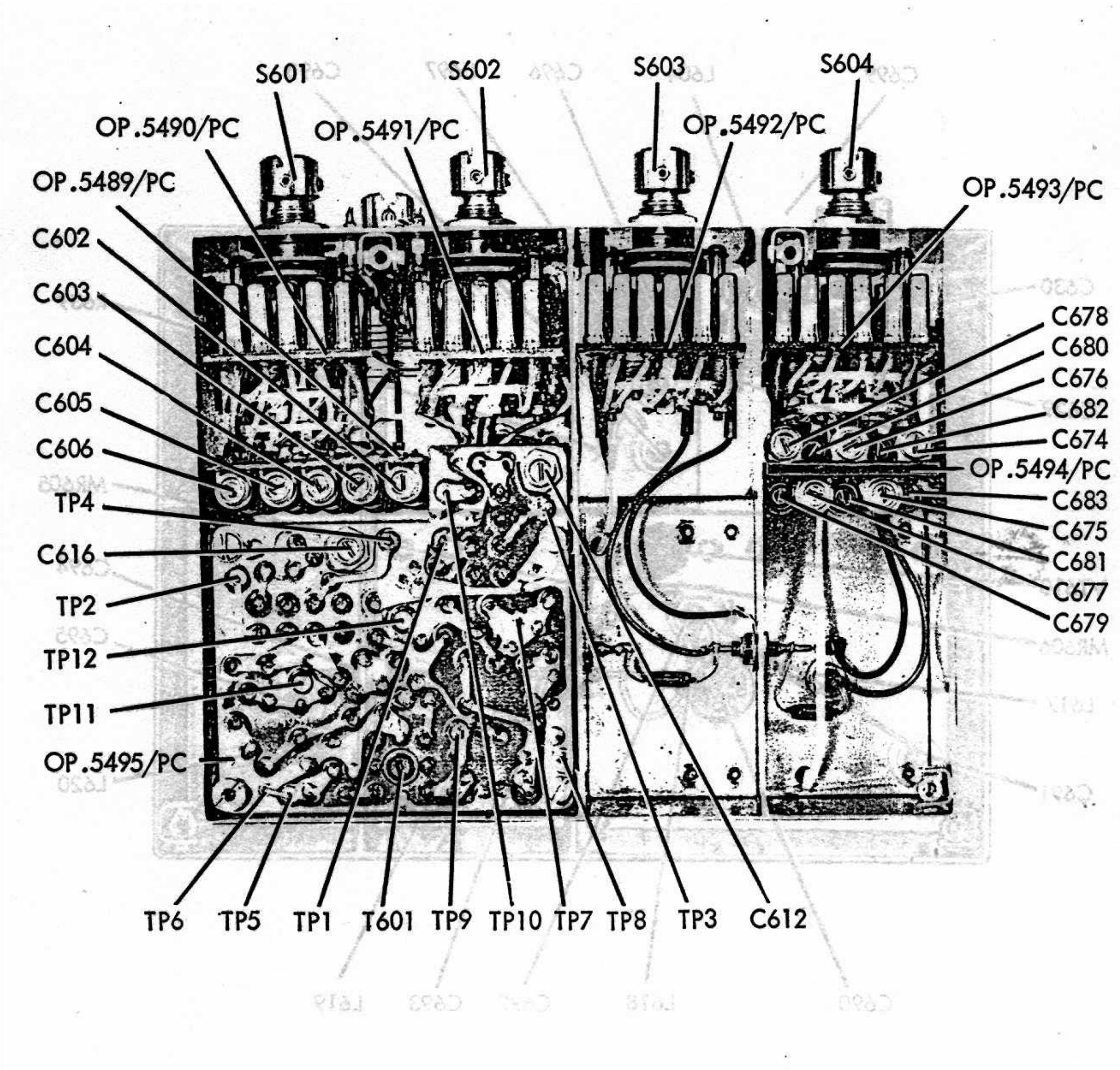
(11) Mark the grub screws arrowed in Fig. 5.3, with white paint. When the synthesizer module is fitted into the unit, both coupling slots must be vertical (white painted grub screws uppermost), and the white line on the knob, set to the centre of the scale on the front panel.

(12) Set the C/NC link to suit requirements.

(13) Set the incremental switches to 2.000MHz.



Clarify and Calibrate Control Alignment—Fig. 5.3



SYNTHESIZER MODULE — TOP (cover removed)

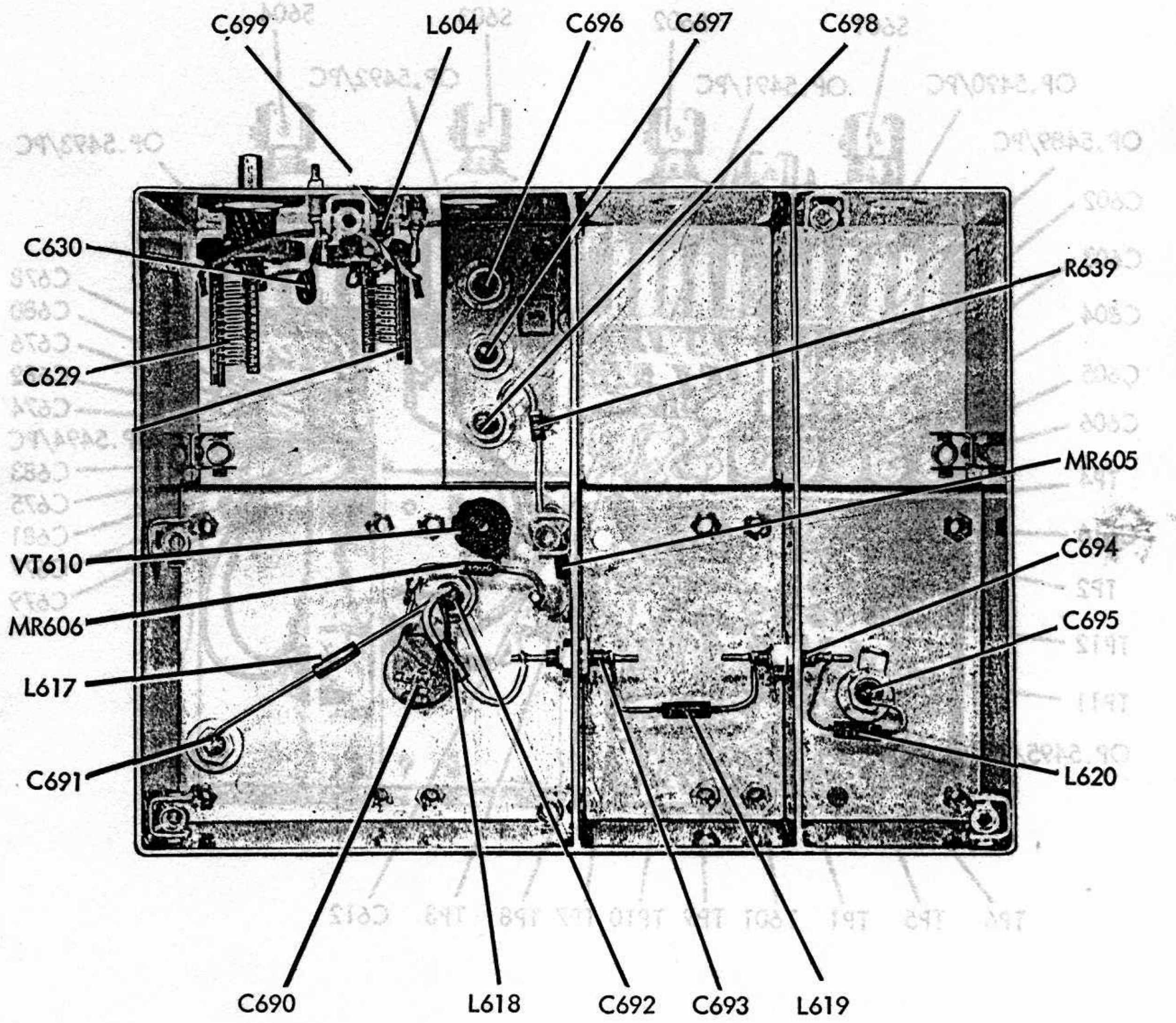
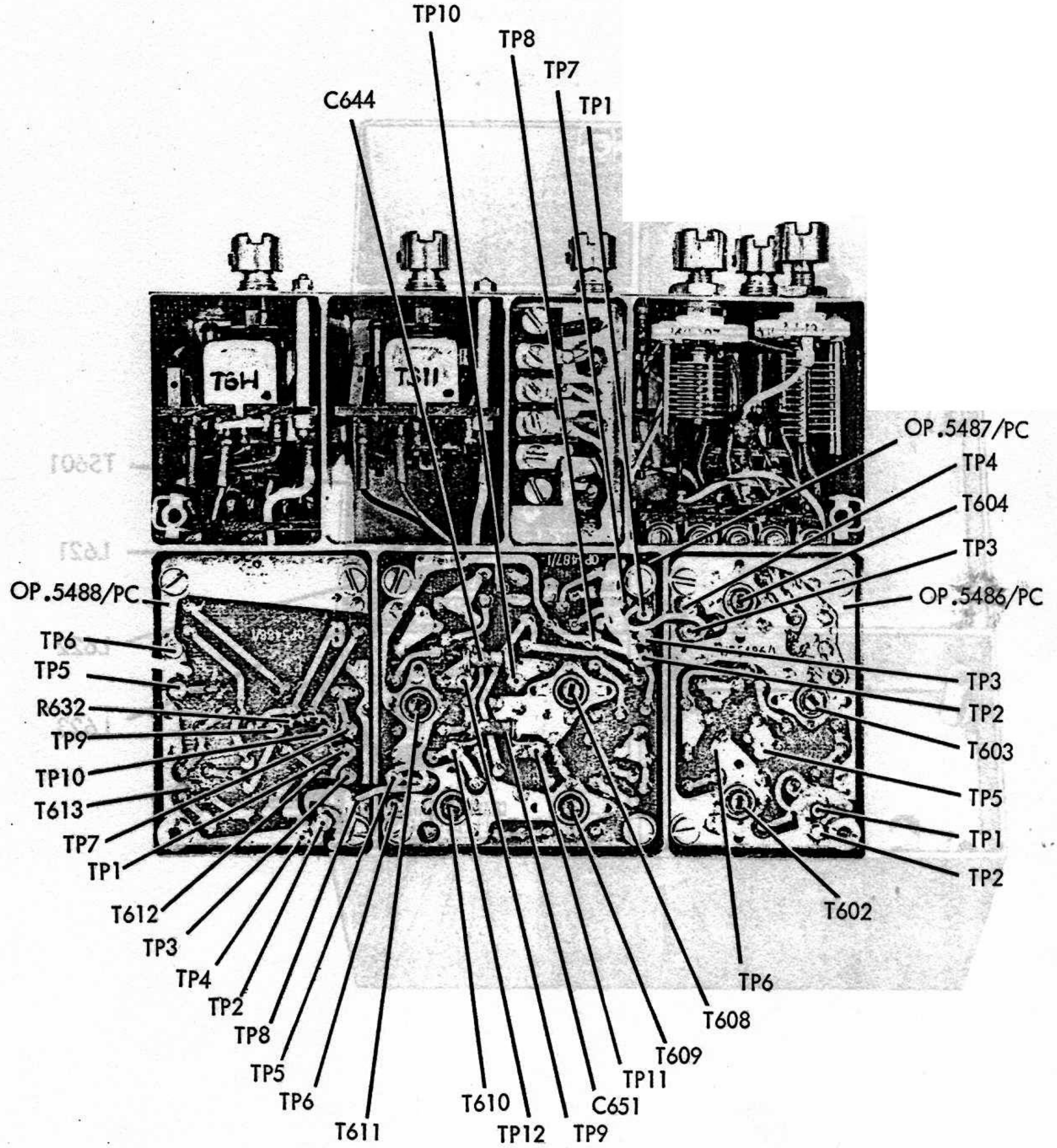


PLATE 5.2 **SYNTHESIZER MODULE — TOP**
(sub-units & boards removed)


TP10
TP8
TP7
C644
TP1
T6H
T611
OP.5487/PC
TP4
T604
TP3
OP.5488/PC
OP.5486/PC
TP6
TP5
R632
TP9
TP10
T613
TP7
TP1
TP3
TP2
T603
TP5
TP1
TP2
T602
T612
TP3
TP4
TP2
TP8
TP5
TP6
T611
T610
TP12
TP9
C651
TP11
T609
T608
TP6

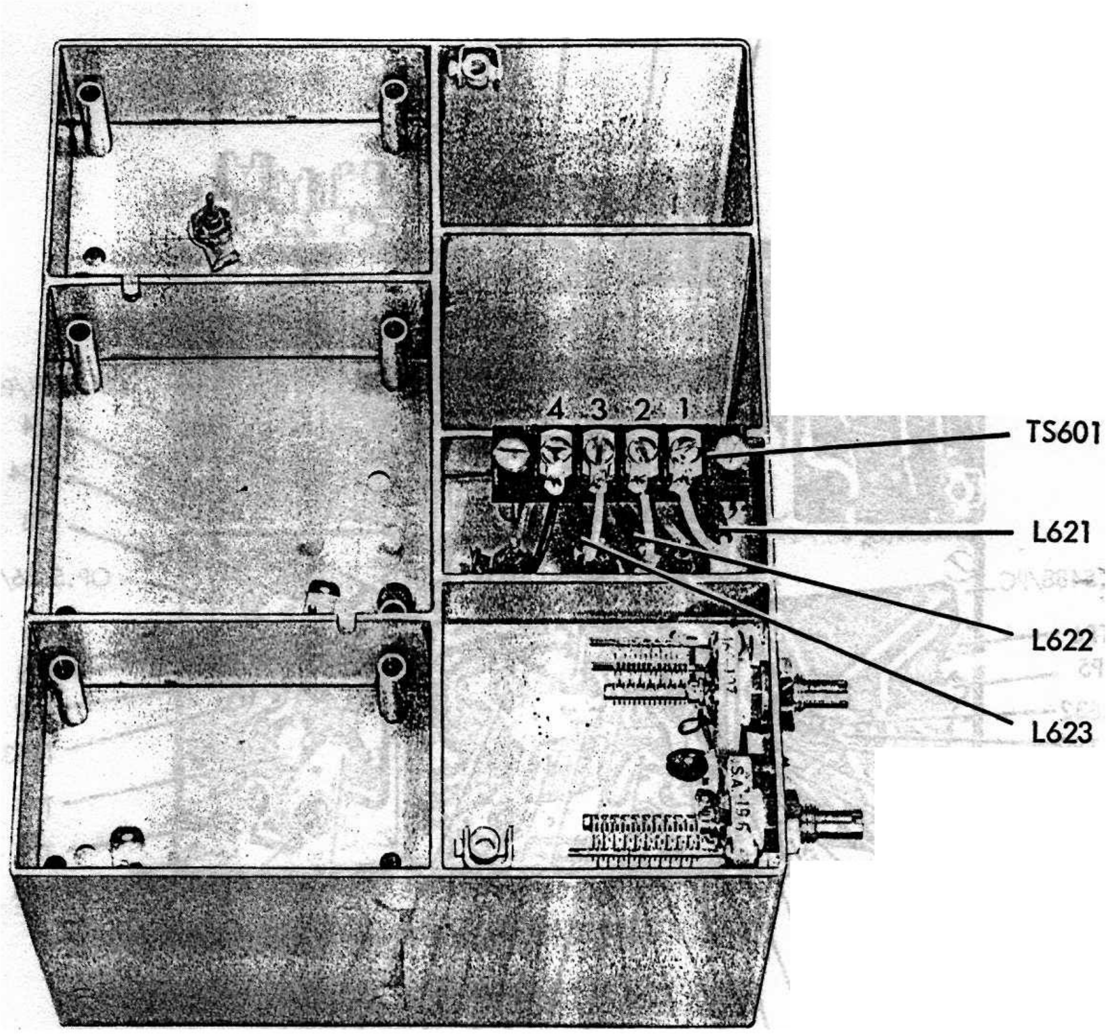
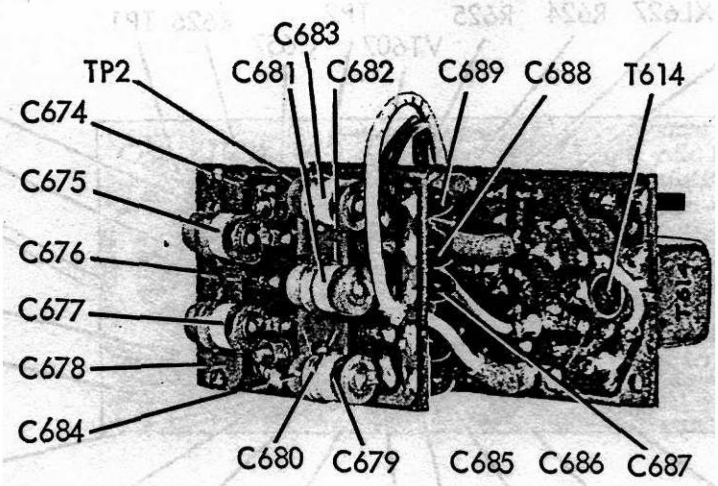


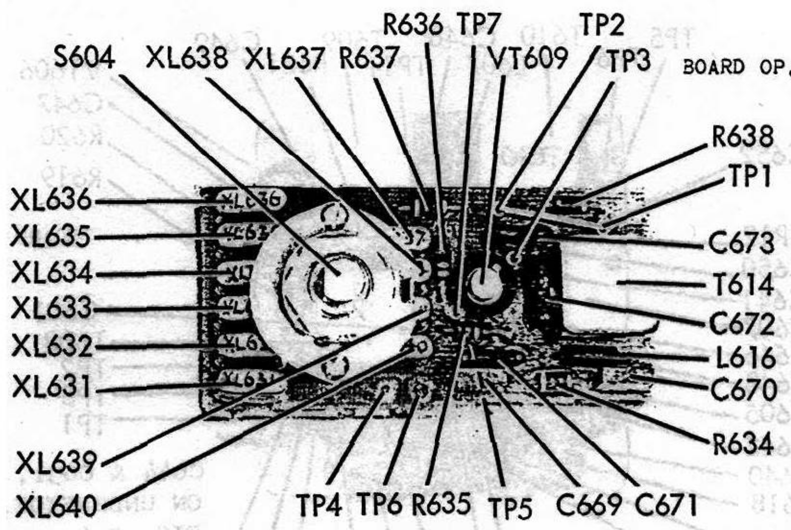
PLATE 5.4 **SYNTHESIZER MODULE — UNDERSIDE** **899-1**

(sub-units & boards removed)

BOARDS OP.5493/PC
AND OP.5494/PC

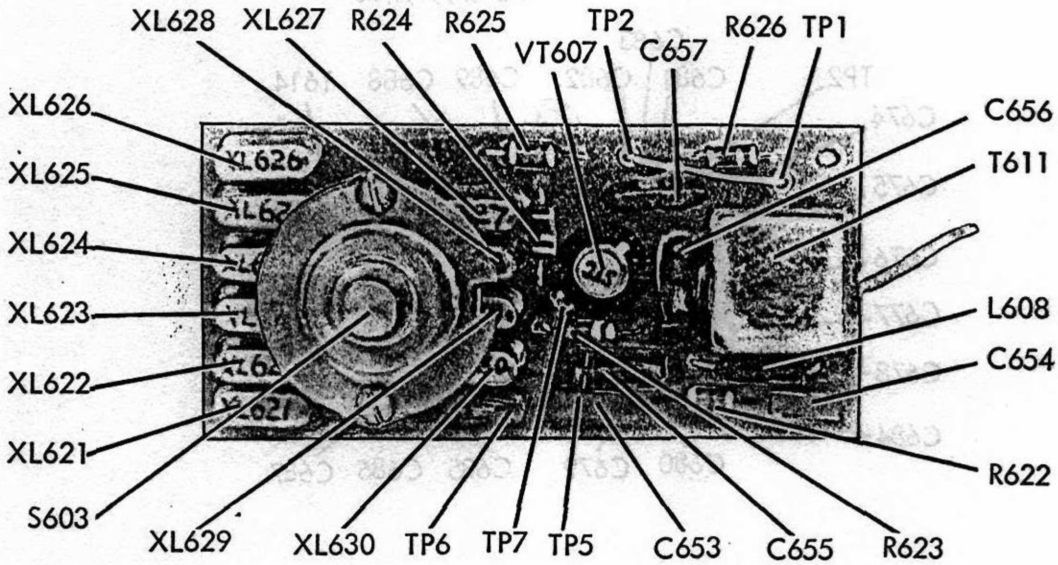


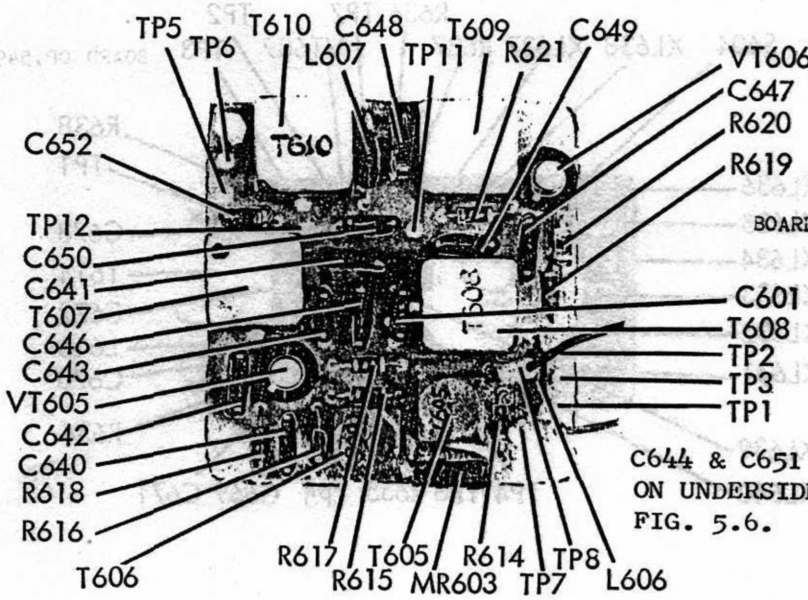
BOARD OP.5493/PC



SYNTHESIZER MODULE
1 MHz Incremental Oscillator Boards

100kHz INCREMENTAL OSCILLATOR BOARD OP.5492/PC

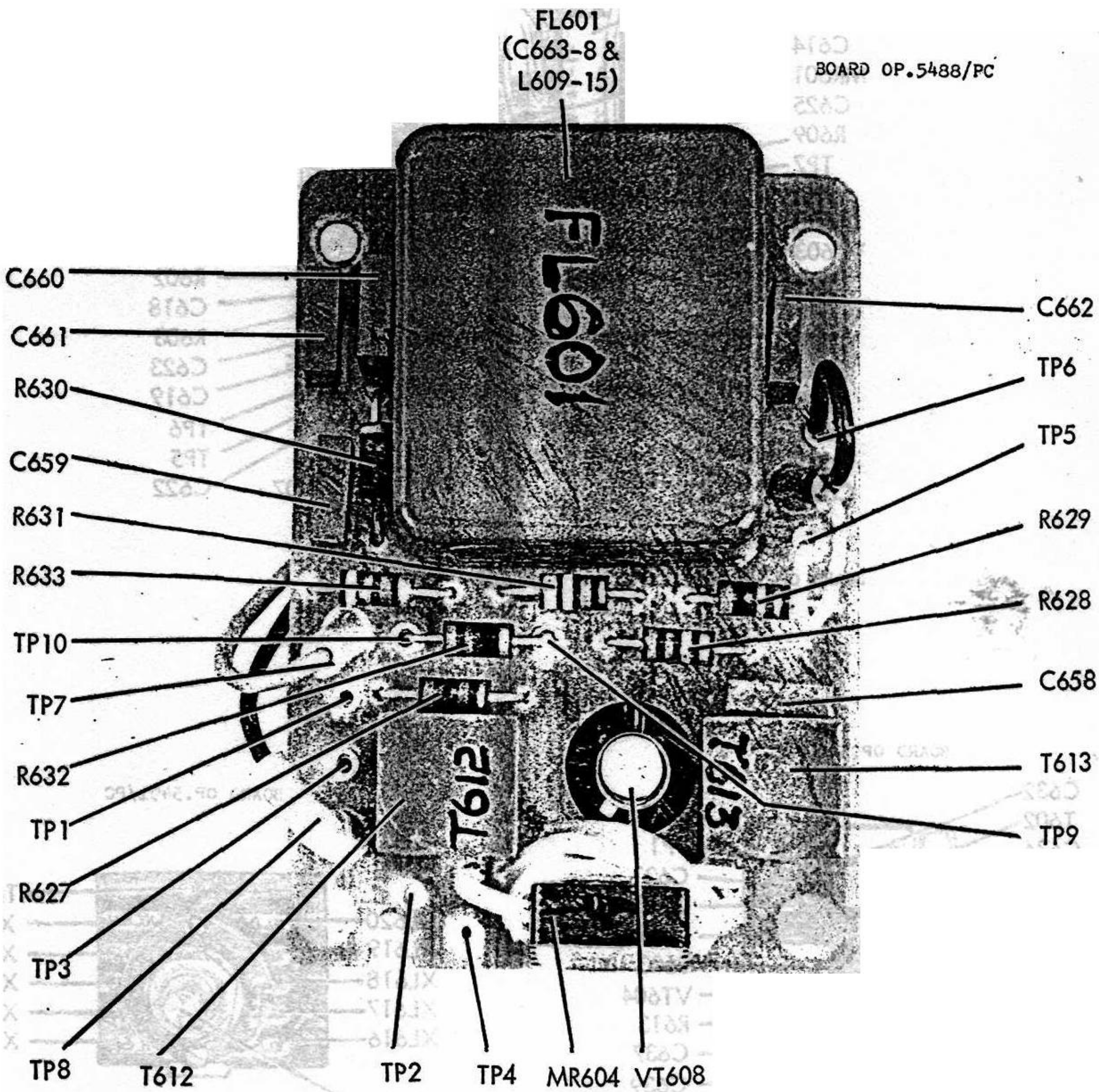




BOARD OP.5487/PC

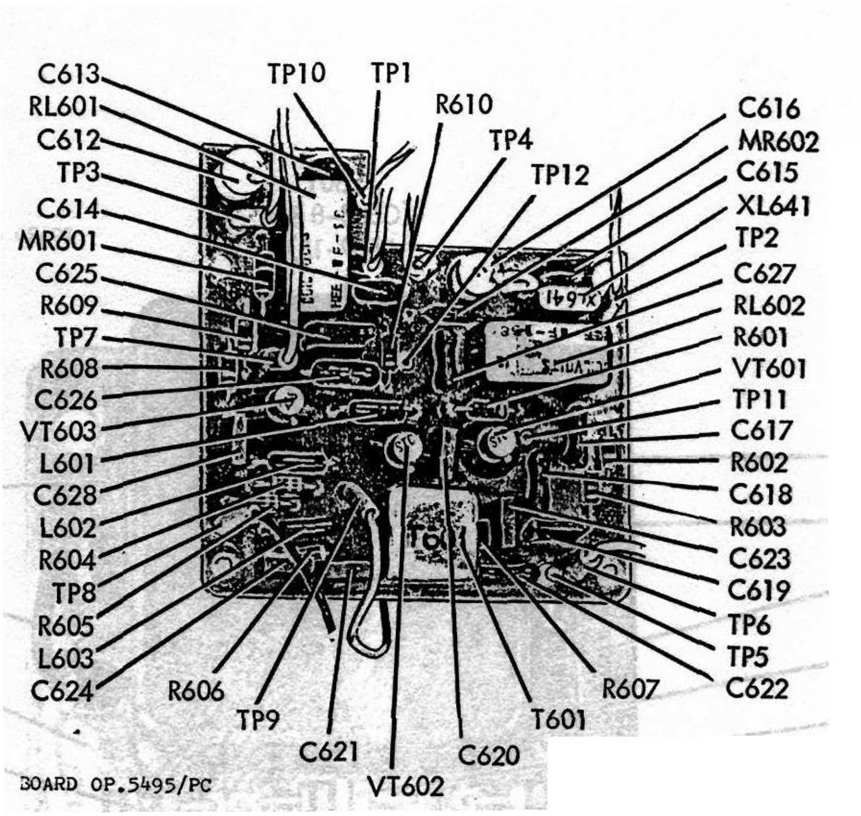
C644 & C651, TP9 & TP10 ON UNDERSIDE, SHOWN ON FIG. 5.6.

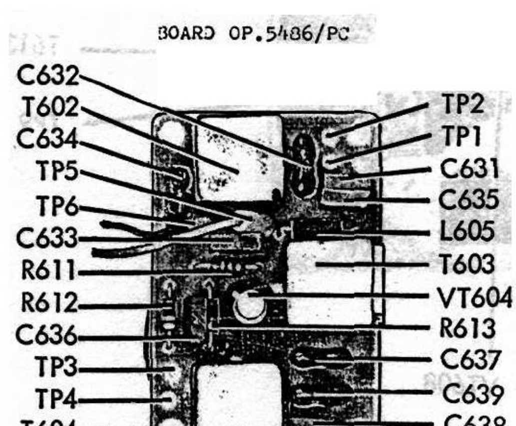
100 kHz Incremental Oscillator & Mixer/Amplifier Boards



SYNTHESIZER MODULE — MIXER/AMPLIFIER BOARD
(associated with 1 MHz Incremental Oscillator)

PLATE 5.7





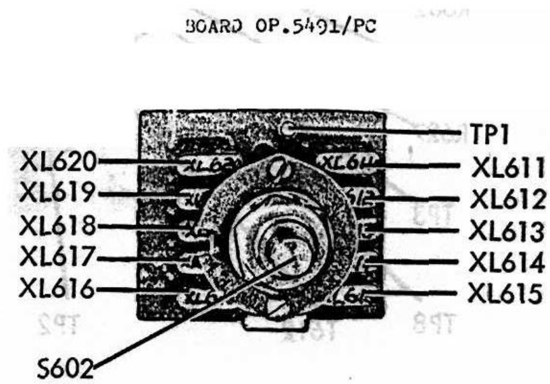


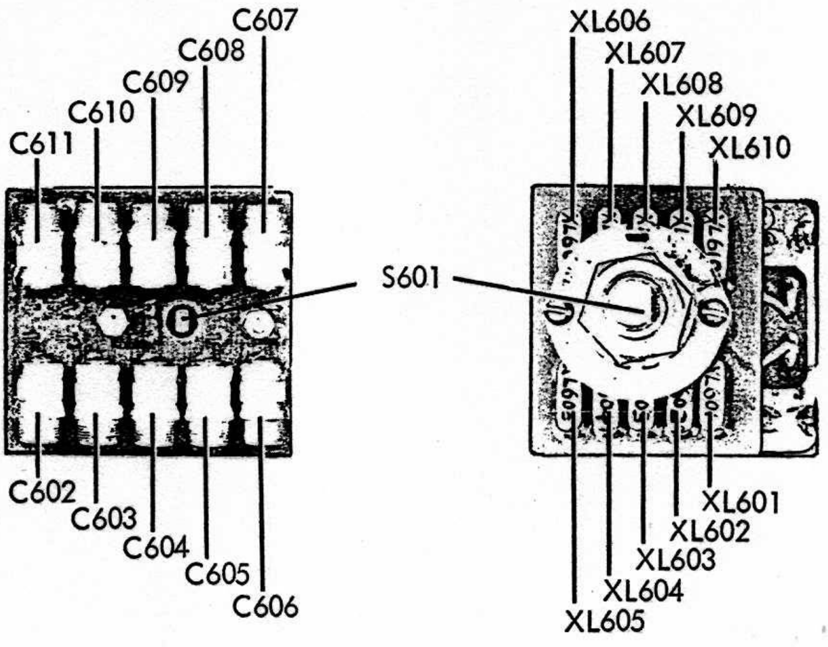
PLATE 5.8 **SYNTHESIZER MODULE** **899-1**

1 kHz & 10 kHz Incremental Oscillators/Mixer

& 10 kHz Crystal Boards

BOARD OP.5489/PC

BOARD OP.5490/PC



SYNTHESIZER MODULE

1 kHz Incremental Oscillator Trimmer & Crystal Boards

6 OVERALL TESTS

6 OVERALL TESTS

6.1 GENERAL

These tests should be carried out after realignment and replacement of any module in the GKR206A to ensure that the overall performance is satisfactory. They should be carried out in the sequence written. If only one phase of the overall tests is to be attempted then any preceding information should be scrutinised to ascertain the correct conditions of test.

All signal generator outputs are CW unless otherwise stated.

An ambient temperature of approximately 20°C is assumed.

To enable local operation of the switched AF Gain control, pins A and B on the audio frequency board P28427/L must be linked (see Fig. 6.1). With pins A and C linked the GKR206A is set-up for remote control operation. The board is located immediately to the rear of the REMOTE audio socket on the front panel and adjacent to the power amplifier module.

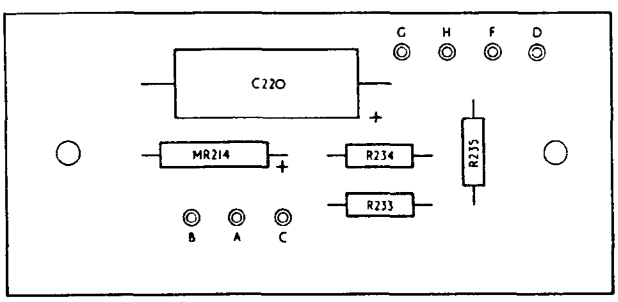


Fig. 6.1 Audio Frequency Board P28427/L

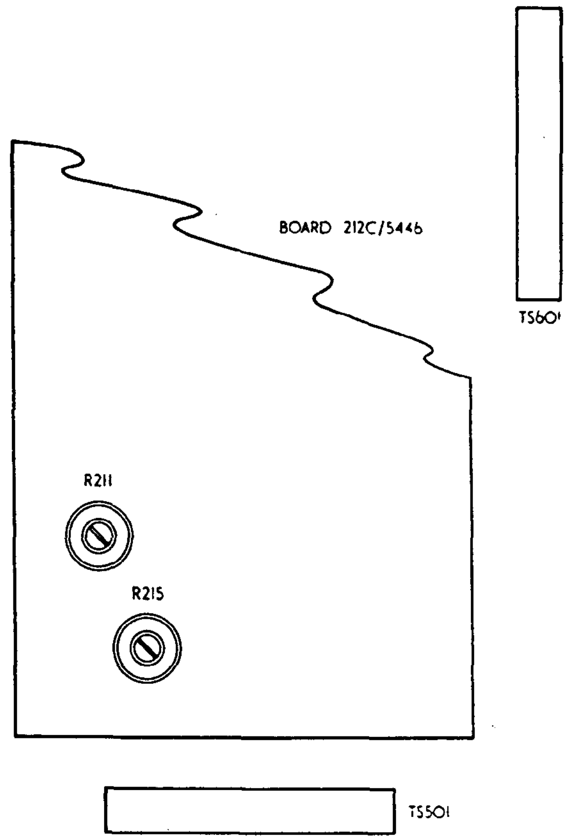


Fig. 6.2 Gain Control Board OP5482

R211 (RF Max. Gain Adj.) and R215 (IF Max. Gain Adj.) should be adjusted to give maximum audio output before receive measurements are carried out (these potentiometers are to be found on the Gain control board OP5482—see Fig. 6.2.)

Do not attempt transmit tests until the TLC system has been adjusted (as detailed in sub-section 6.5); incorrect adjustment of the TLC system will affect measurements.

6.2 TEST EQUIPMENT

DC Power Supply	18–30V at 3A; e.g. Solartron AS870.4 and ammeter to read at least 3A.
RF Valve-voltmeter	to measure 3V r.m.s., 75Ω; e.g. Airmec 301
AF Signal Generator (two required)	to give at least 10V r.m.s. over 300–10,000Hz range, 600Ω; e.g. Advance J1
RF Signal Generator	1μV–1V r.m.s., up to 20MHz 75Ω external modulation facilities; e.g. Airmec 201
AF Power Meter (an AF valve-voltmeter connected across a suitable load resistor may be used if a power meter is not available)	300Ω, 1mW to 100mW; e.g. Marconi TF8931
Modulation Meter (a suitable oscilloscope may be used if this is not available)	2–12MHz; e.g. Airmec 210
AF Valve-voltmeter	up to 3V r.m.s., maximum sensitivity 3mV, 200–10,000Hz; e.g. Advance VM77B
AF Distortion Measuring Equipment	1kHz nominal, down to less than 5%; e.g. General Radio 1932A

Spectrum Analyser	to measure down to −60dB, 2MHz nominal; e.g. Marconi OA1094A with TM6448 IF extension unit
Frequency Counter	up to 12MHz; e.g. Hewlett Packard 5245L or Advance TC4A
GKR206A Test Jig	Redifon Limited (Fig. 6.4)
Dummy Handset Type 6561/A	Redifon Limited
Morse Key Type 5459/A	Redifon Limited
Output Monitoring Box	Redifon Drawing No. SK5630 (Fig. 6.3)
Test Meter	to read up to 20V, and up to 1A; e.g. Avometer Model 8

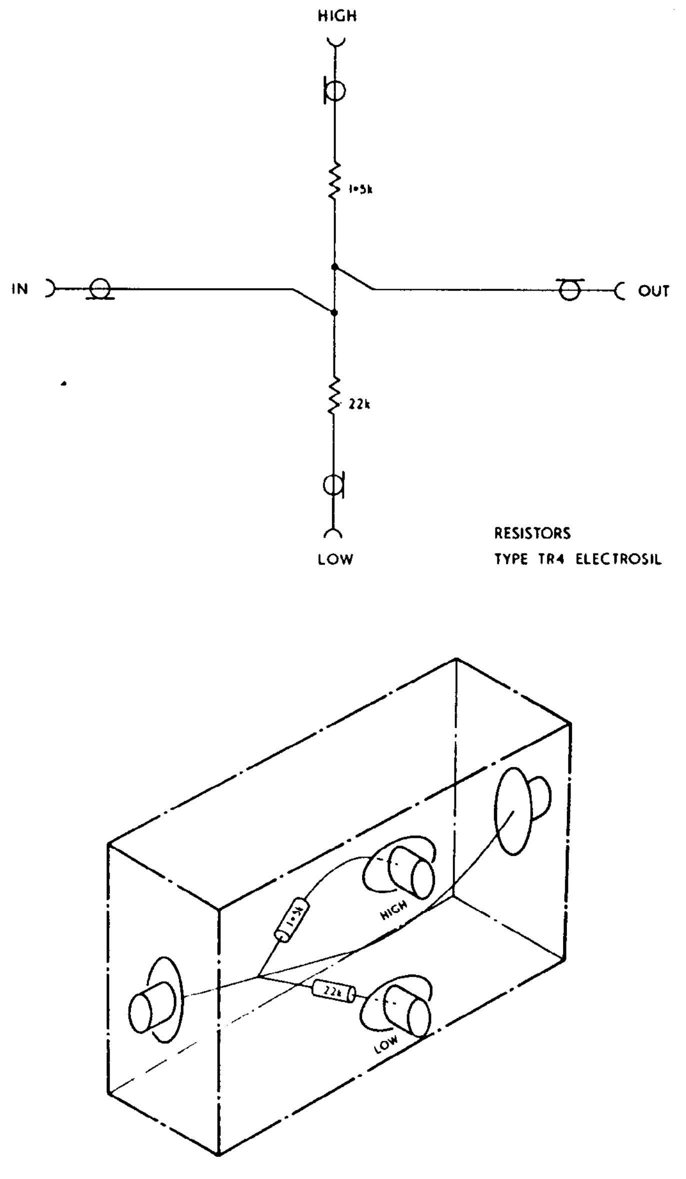


Fig. 6.3 Output Monitoring Box—No. SK5630

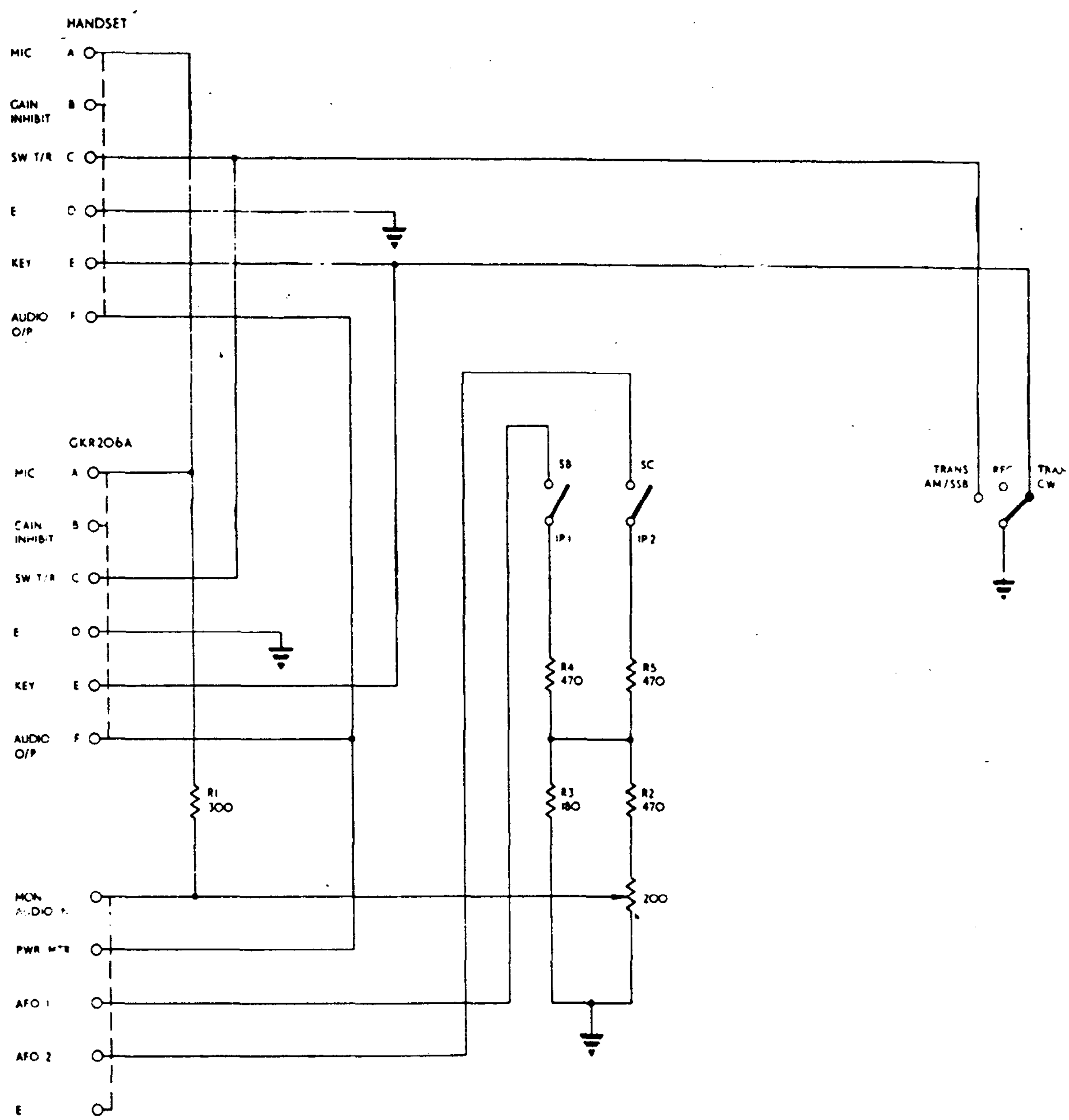


Fig. 6.4 GKR206A– Test Jig (G479D only)

6.3 MECHANICAL CHECKS

(1) Check the GKR206A for any external damage.

(2) Inspect all external plugs and sockets for secure fixing and signs of damage.

(3) Remove the GKR206A from its case. Release is effected by removal of the two front panel retaining screws.

(4) Check all front panel controls as follows:—

(*a*) *OFF-SSB/CW-AM switch*
The switch action should be positive with the white mark on the knob coinciding with each of the three indicated function positions. The knob should not be capable of being selected to any other position.

(*b*) *Peak Noise control*
Rotation of this control should not be possible until the knob is depressed. When pushed in, the control should rotate freely and when released, it should return to the locked condition.

(*c*) *MHz control*
The switch should action positively through ten positions. When rotated fully counter-clockwise, the figure 2 should appear in the indicator window above the switch. Rotating the control in a clockwise direction should increase the numbers in the window by increments of 1, to indicate 11 when fully clockwise. At each switch position, the number displayed in the window should be clearly visible and located centrally in the aperture. There should be no ambiguity of indication.

(*d*) *100kHz control*
Operation of this control should be similar to that of the MHz control with the exception that the digits extend from 0 at fully counter-clockwise to 9 at fully clockwise.

(*e*) *10kHz control*
Operation of this control is identical to that of the 100kHz control.

(*f*) *Clarify Push-to-Calibrate control*
The control should rotate freely both in its normal state and when pushed in. When released, the control should return to its normal position without any tendency to stick.

(*g*) *Gain controls*
Check that the AF Gain control has positive switching throughout all 6 positions and that the inner RF Gain control rotates smoothly and freely.

6.4 ELECTRICAL CHECKS

Preliminary Check and Alignment

(1) Link pins A and B on printed circuit board P28427/L to provide local operation of the switched AF Gain control (Fig. 6.1).

NOTE: Link A—B for local operation.
Link A—C for remote operation.

(2) Connect the 24V DC supply to the DC input socket at the rear of the GKR206A. Maintain the voltage at 24V ± 0·25V throughout the following tests.

(3) Connect the RF valve-voltmeter, via the output monitoring box, to the RF OUT socket (SK209) on the front panel.

(4) Plug a handset into the left AUDIO socket and the test jig into the right-hand AUDIO socket on the front panel assembly.

(5) Switch on the 24V DC supply.

(6) Place the OFF–SSB/CW–AM switch into the AM position.

(7) Note the front panel meter reading. The lower end of the pointer should be positioned in the green segment of the lower meter scale, indicating correct supply voltage.

(8) Connect the AF Output meter, set to 300Ω, to the Monitor Audio output terminals on the test jig.

(9) Set the frequency control selectors to indicate a frequency of 11,999kHz.

(10) Set the RF and AF Gain controls fully clockwise.

(11) Push in and rotate the Peak Noise control to produce maximum output at the handset earphone and on the output meter, adjusting the AF Gain Control for a convenient listening level.

(12) Adjust the two pre-set potentiometers R211 and R215, located on the audio gain control board, to give maximum gain.

(13) Alternately turn the RF and then the AF Gain controls counter-clockwise—the earphone noise should decrease.

(14) Set the Gain controls to maximum—fully clockwise.

(15) Depress the Clarify/Push-to-Calibrate control and adjust the setting to produce a zero beat note in the handset earphone.

(16) Set the OFF–SSB/CW–AM switch to SSB/CW.

(17) Repeat instruction (15) and check that for an equal movement of the control to either side of the zero beat note positions, the received tone pitch varies by equal amounts. Return control to zero beat note position.

Setting-up TLC

(1) Set the frequency controls to 11,999kHz.

(2) Set the OFF–SSB/CW–AM switch to AM.

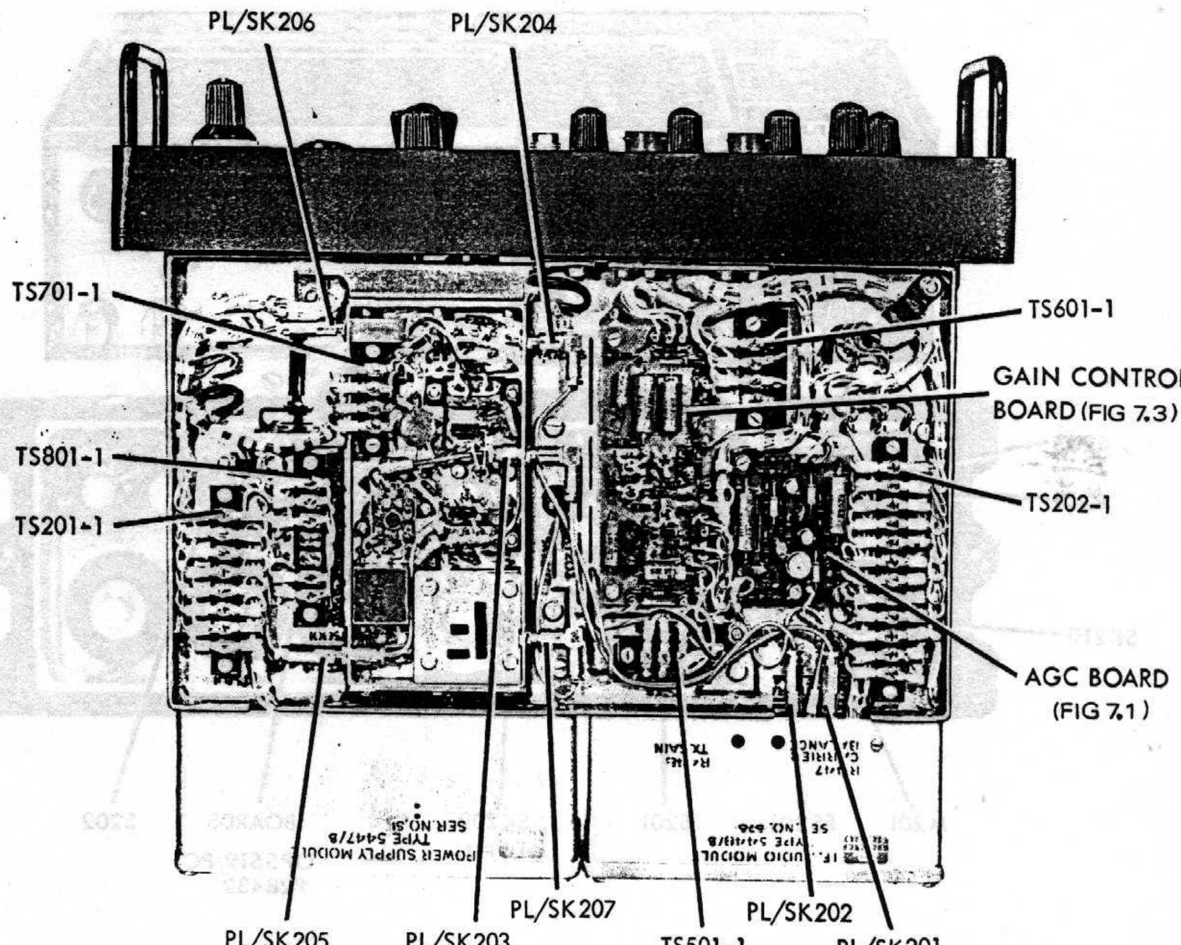
(3) Adjust Peak Noise for maximum output.

(4) Switch to transmit AM/SSB on the test jig.

(5) Note the supply current reading, which should be between 600-700mA.

(6) Note the RF output valve-voltmeter reading.

7 ILLUSTRATIONS


PL/SK206
PL/SK204
TS701-1
TS601-1
GAIN CONTROL
BOARD (FIG 7.3)
TS801-1
TS201-1
TS202-1
AGC BOARD
(FIG 7.1)
POWER SUPPLY MODULE
TYPE 5447/B
SER.NO.51
PL/SK207
PL/SK205
PL/SK203
TS501-1
PL/SK202
PL/SK201

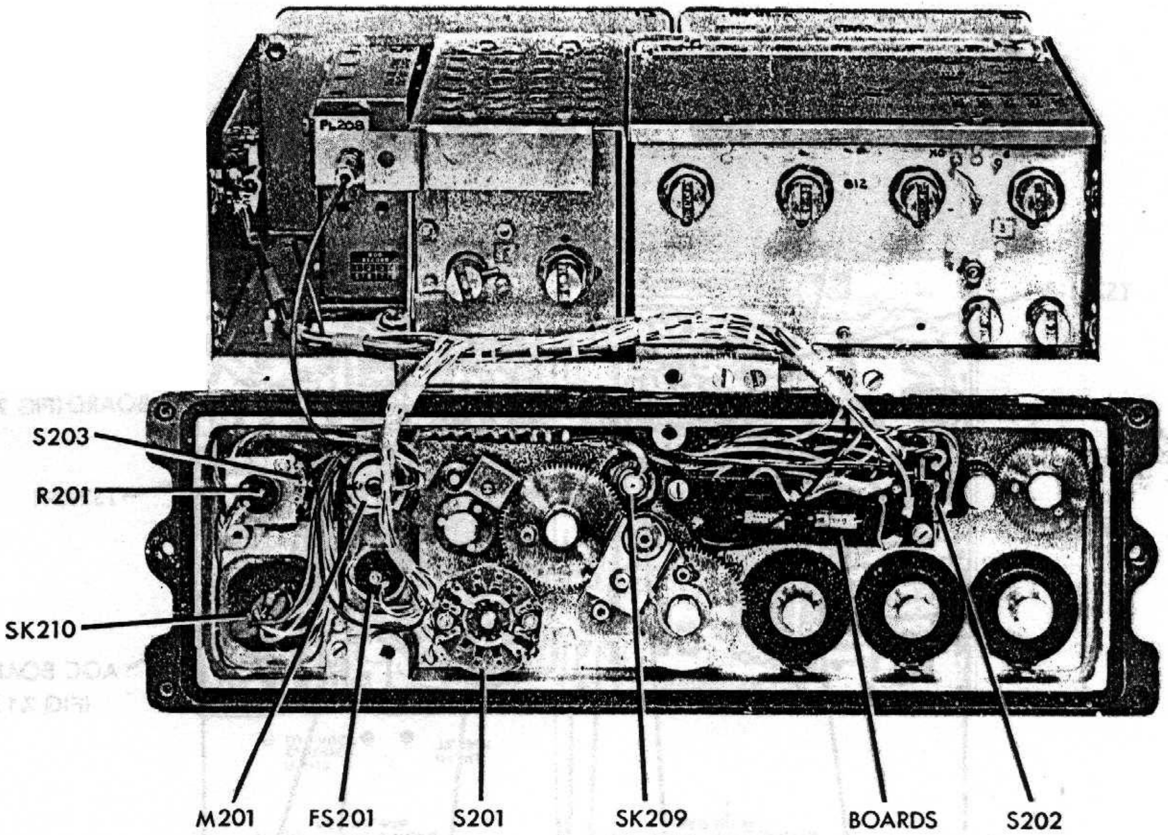


PLATE 7.2 **GKR206A — a view behind front panel**

COMPONENTS LIST

SYNTHESIZER MODULE TYPE 5450/A (FIG. 7.4)

RESISTORS

R601	22kΩ ±5% Electrosil TR4
R602	20kΩ ±5% Electrosil TR4
R603	1kΩ ±5% Electrosil TR4
R604	47kΩ ±5% Electrosil TR4
R605	20kΩ ±5% Electrosil TR4
R606	470Ω ±5% Electrosil TR4
R607	1kΩ ±5% Electrosil TR4
R608	12kΩ ±5% Electrosil TR4
R609	20kΩ ±5% Electrosil TR4
R610	1kΩ ±5% Electrosil TR4
R611	27kΩ ±5% Electrosil TR4
R612	20kΩ ±5% Electrosil TR4
R613	1kΩ ±5% Electrosil TR4
R614	200kΩ ±5% Electrosil TR4
R615	47kΩ ±5% Electrosil TR4
R616	20kΩ ±5% Electrosil TR4
R617	470Ω ±5% Electrosil TR4
R618	1kΩ ±5% Electrosil TR4
R619	8·2kΩ ±5% Electrosil TR4
R620	4·7kΩ ±5% Electrosil TR4
R621	300Ω ±5% Electrosil TR4
R622	470Ω ±5% Electrosil TR4
R623	12kΩ ±5% Electrosil TR4
R624	10kΩ ±5% Electrosil TR4
R625	470Ω ±5% Electrosil TR4
R626	200Ω ±5% Electrosil TR4
R627	200Ω ±5% Electrosil TR4
R628	12kΩ ±5% Electrosil TR4
R629	10kΩ ±5% Electrosil TR4
R630	470Ω ±5% Electrosil TR4
R631	390Ω ±5% Electrosil TR4
R632	22Ω ±5% Electrosil TR5
R633	470Ω ±5% Electrosil TR4
R634	470Ω ±5% Electrosil TR4
R635	27kΩ ±5% Electrosil TR4
R636	10kΩ ±5% Electrosil TR4
R637	470Ω ±5% Electrosil TR5
R638	22Ω ±5% Electrosil TR5
R639	680Ω ±5% Electrosil TR4

CAPACITORS

C601	3 to 32pF E. F. Johnson 160–130
C602	·8 to 10pF Johanson 2951
C603	·8 to 10pF Johanson 2951
C604	·8 to 10pF Johanson 2951
C605	·8 to 10pF Johanson 2951
C606	·8 to 10pF Johanson 2951
C607	·8 to 10pF Johanson 2951
C608	·8 to 10pF Johanson 2951
C609	·8 to 10pF Johanson 2951
C610	·8 to 10pF Johanson 2951
C611	·8 to 10pF Johanson 2951
C612	·8 to 10pF Johanson 2950
C613	5pF ±20% 500V Erie 861/NPO
C614	5pF ±20% 500V Erie 861/NPO
C615	30pF or 39pF ±5% STC 454–LWA–50 (selected)
C616	·8 to 10pF Johanson 2950
C617	360pF ±5% 300V Lemco MC15
C618	100pF ±5% 300V Lemco MC15
C619	910pF ±5% STC 454–LWA–51
C620	·01µF ±20% ERIE W5R–8123
C621	·01µF ± 20% ERIE W5R–8123
C622	100pF ±5% 300V Lemco MC15
C623	2700pF ±10% ERIE W5R–8123
C624	·01µF ±20% ERIE W5R–8123
C625	100pF ±5% STC 454–LWA–51
C626	330pF ±5% 300V Lemco MC15
C627	300pF ±5% 300V Lemco MC15
C628	·01µF ±20% ERIE W5R–8123
C629	2·7 to 19·6pF E. F. Johnson 160–110
C630	3pF ±20% 500V Erie 861/NPO
C631	2700pF ±10% ERIE W5R–8123
C632	100pF ±5% 300V Lemco MC15
C633	·01µF ±20% ERIE W5R–8123
C634	820pF ±5% Lemco MS89/1/R/820PJ/50
C635	·01µF ±20% ERIE W5R–8123
C636	·01µF ±20% ERIE W5R–8123
C637	100pF ±5% 300V Lemco MC15
C638	5600pF ±20% ERIE W5R–8123
C639	100pF ±5% 300V Lemco MC15
C640	1000pF ±5% STC 454–LWA–51
C641	1000pF ±5% STC 454–LWA–51
C642	1000pF ±5% STC 454–LWA–51
C643	30pF ±5% STC 454–LWA–50
C644	1pF ±·1pF Erie P100 A
C645	30pF ±5% STC 454–LWA–50
C646	1000pF ±5% STC 454–LWA–51
C647	1000pF ±5% STC 454–LWA–51
C648	1000pF ±5% STC 454–LWA–51
C649	1000pF ±5% STC 454–LWA–51
C650	30pF ±5% STC 454–LWA–50
C651	1pF ±0·1pF Erie P100 A
C652	30pF ±5% STC 454–LWA–50
C653	·01µF ±20% ERIE W5R–8123
C654	·01µF ±20% ERIE W5R–8123
C655	1000pF ±5% STC 454–LWA–51
C656	39pF ±5% 300V Lemco MC15
C657	91pF ±5% 300V Lemco MC15
C658	·01µF ±20% ERIE W5R–8123
C659	·01µF ±20% ERIE W5R–8123
C660	·01µF ±20% ERIE W5R–8123

C661 ·01μF ±20% ERIE W5R-8123
C662 ·01μF ±20% ERIE W5R-8123
C663 230pF ±3pF Elmenco DM10
C664 258pF ±3pF Elmenco DM10
C665 280pF ±3pF Elmenco DM10

C666 220pF ±3pF Elmenco DM10
C667 124pF ±2pF Elmenco DM10
C668 110pF ±2pF Elmenco DM10
C669 ·01μF ±20% ERIE W5R-8123
C760 ·01μF ±20% ERIE W5R-8123

C671 1000pF ±5% STC 454-LWA-51
C672 20pF ±1pF Lemco MS89/1/R/20PFP/350
C673 20pF ±1pF Lemco MS89/1/R/20PFP/350
C674 ·8 to 10pF Johanson 2951
C675 ·8 to 10pF Johanson 2951

C676 ·8 to 10pF Johanson 2951
C677 ·8 to 10pF Johanson 2951
C678 ·8 to 10pF Johanson 2951
C679 ·8 to 10pF Johanson 2951
C680 ·8 to 10pF Johanson 2951

C681 ·8 to 10pF Johanson 2951
C682 ·8 to 10pF Johanson 2951
C683 ·8 to 10pF Johanson 2951
C684 5pF ±20% 500V Erie 861/NPO
C685 5pF ±20% 500V Erie 861/NPO

C686 10pF ±1pF 300V Lemco MC10
C687 12pF ±1pF 300V Lemco MC10
C688 12pF ±1pF 300V Lemco MC10
C689 15pF ±1pF 300V Lemco MC10
C690 ·1μF +50% −25% Erie 811/T/18V

C691 1000pF +80% −20% Erie K2600/361
C692 1000pF +80% −20% Erie K2600/361
C693 1000pF +80% −20% Erie K2600/361
C694 1000pF +80% −20% Erie K2600/361
C695 1000pF +80% −20% Erie K2600/361

C696 1000pF +80% −20% Erie K2600/361
C697 1000pF +80% −20% Erie K2600/361
C698 1000pF +80% −20% Erie K2600/361
C699 ·8 to 10pF Johanson 2950

DIODES

MR601 Texas 1S131
MR602 Texas 1S131
MR603 Fairchild FA2003
MR604 Fairchild FA4000
MR605 Texas 1S131

MR606 Texas 1S2091A

TRANSISTORS

VT601 STC 2N706A
VT602 STC 2N706A
VT603 STC 2N706A
VT604 STC 2N706A
VT605 STC 2N744

VT606 STC 2N744
VT607 STC 2N706A
VT608 STC 2N744
VT609 STC 2N706A
VT610 Fairchild 2N697

CHOKES

L601 100μH Painton 58/10/0017/10
L602 100μH Painton 58/10/0017/10
L603 100μH Painton 58/10/0017/10
L604 10μH Painton 58/10/0011/10
L605 68μH Painton 58/10/0016/10
L606 10μH Painton 58/10/0011/10
L607 10μH Painton 58/10/0011/10
L608 33μH Painton 58/10/0014/10
L609 To Redifon Drawing 559/5450/S
L610 To Redifon Drawing 559/5450/S

L611 To Redifon Drawing 559/5450/S
L612 To Redifon Drawing 559/5450/S
L613 To Redifon Drawing 559/5450/S
L614 To Redifon Drawing 559/5450/S
L615 To Redifon Drawing 559/5450/S

L616 15μH Painton 58/10/0012/10
L617 68μH Painton 58/10/0016/10
L618 68μH Painton 58/10/0016/10
L619 10μH Painton 58/10/0011/10
L620 10μH Painton 58/10/0011/10

L621 33μH Painton 58/10/0014/10
L622 33μH Painton 58/10/0014/10
L623 33μH Painton 58/10/0014/10

RELAYS

RL601 12V I.T.T. 2K2A112
RL602 12V I.T.T. 2K2A112

SWITCHES

S601 To Redifon Drawing OP5462/M
S602 To Redifon Drawing OP5463/M
S603 To Redifon Drawing OP5463/M
S604 To Redifon Drawing OP5464/M

TRANSFORMERS

T601 To Redifon Drawing 1/P27114/M
T602 To Redifon Drawing 2/P27114/M
T603 To Redifon Drawing 4/P27114/M
T604 To Redifon Drawing 3/P27114/M
T605 To Redifon Drawing 453/5450/S

T606 To Redifon Drawing 454/5450/S
T607 To Redifon Drawing 5/P27114/M
T608 To Redifon Drawing 7/P27114/M
T609 To Redifon Drawing 6/P27114/M
T610 To Redifon Drawing 8/P27114/M

T611 To Redifon Drawing 9/P27114/M
T612 To Redifon Drawing 523/5450/S
T613 To Redifon Drawing 541/5450/S
T614 To Redifon Drawing 10/P27714/M

CRYSTALS

XL601 To Redifon Drawing 1/OP8816/S
XL602 To Redifon Drawing 2/OP8816/S
XL603 To Redifon Drawing 3/OP8816/S
XL604 To Redifon Drawing 4/OP8816/S
XL605 To Redifon Drawing 5/OP8816/S

XL606 To Redifon Drawing 6/OP8816/S
XL607 To Redifon Drawing 7/OP8816/S
XL608 To Redifon Drawing 8/OP8816/S
XL609 To Redifon Drawing 9/OP8816/S
XL610 To Redifon Drawing 10/OP8816/S

XL611 To Redifon Drawing 1/OP8817/S
XL612 To Redifon Drawing 2/OP8817/S
XL613 To Redifon Drawing 3/OP8817/S
XL614 To Redifon Drawing 4/OP8817/S
XL615 To Redifon Drawing 5/OP8817/S

XL616 To Redifon Drawing 6/OP8817/S
XL617 To Redifon Drawing 7/OP8817/S
XL618 To Redifon Drawing 8/OP8817/S
XL619 To Redifon Drawing 9/OP8817/S
XL620 To Redifon Drawing 10/OP8817/S

Fig. 7.4 (ii)

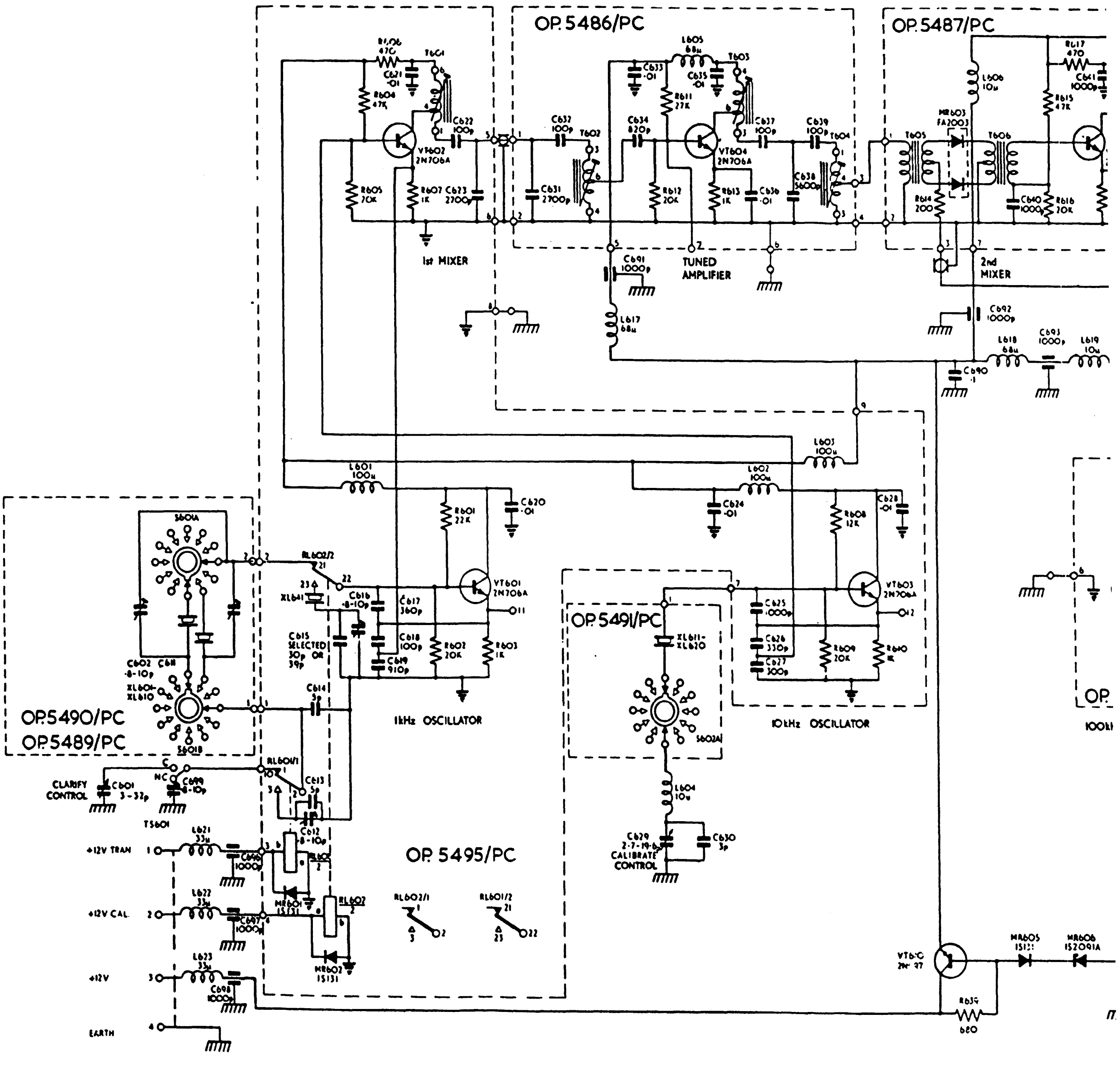
XL621	To Redifon Drawing 1/OP8936/S
XL622	To Redifon Drawing 2/OP8936/S
XL623	To Redifon Drawing 3/OP8936/S
XL624	To Redifon Drawing 4/OP8936/S
XL625	To Redifon Drawing 5/OP8936/S
XL626	To Redifon Drawing 6/OP8936/S
XL627	To Redifon Drawing 7/OP8936/S
XL628	To Redifon Drawing 8/OP8936/S
XL629	To Redifon Drawing 9/OP8936/S
XL630	To Redifon Drawing 10/OP8936/S
XL631	To Redifon Drawing 11/OP8936/S
XL632	To Redifon Drawing 12/OP8936/S
XL633	To Redifon Drawing 13/OP8936/S
XL634	To Redifon Drawing 14/OP8936/S
XL635	To Redifon Drawing 15/OP8936/S
XL636	To Redifon Drawing 16/OP8936/S
XL637	To Redifon Drawing 17/OP8936/S
XL638	To Redifon Drawing 18/OP8936/S
XL639	To Redifon Drawing 19/OP8936/S
XL640	To Redifon Drawing 20/OP8936/S
XL641	To Redifon Drawing 1/OP8816/S

TERMINAL STRIP

TS601 4 way Kulka 411-4

SOCKET

SK207 Sealectro 51-011-3196



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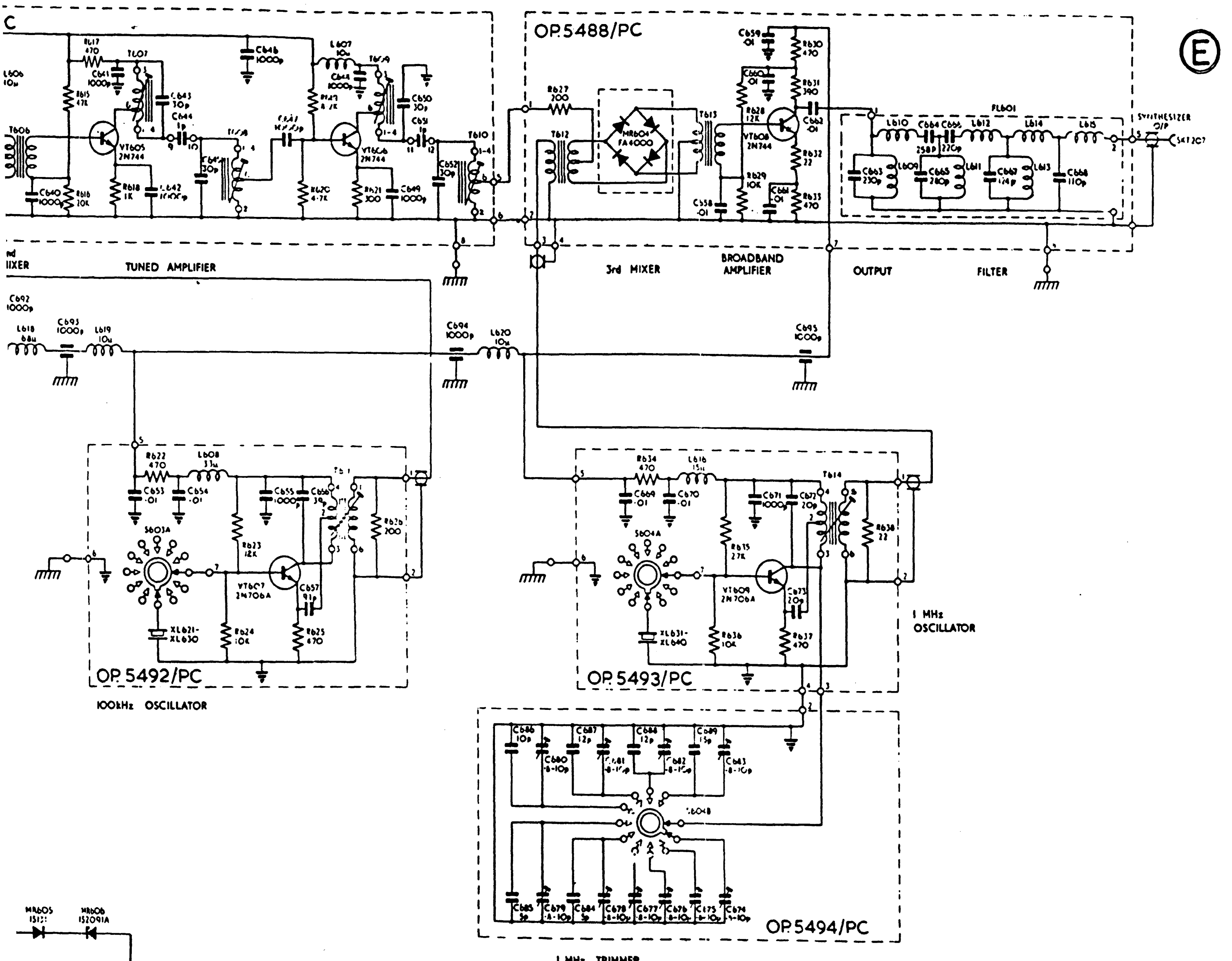


SYNTESIZER MODULE TYPE 5450/A **FIG. 7.4**

COMPONENTS LIST

RF MODULE TYPE 5451/A (FIG. 7.5)

RESISTORS

R701	100Ω ±5% Electrosil TR4
R702	100Ω ±5% Electrosil TR4
R703	220Ω ±5% Electrosil TR4
R704	100Ω ±5% Electrosil TR4
R705	100Ω ±5% Electrosil TR4
R706	150Ω ±5% Electrosil TR4
R707	240Ω ±5% Electrosil TR4
R708	51Ω ±5% Electrosil TR4
R709	51Ω ±5% Electrosil TR4
R710	160Ω ±5% Electrosil TR4
R711	3·3kΩ ±5% Electrosil TR4
R712	1·3kΩ ±5% Electrosil TR4
R713	470Ω ±5% Electrosil TR4
R714	150Ω ±5% Electrosil TR4
R715	51Ω ±5% Electrosil TR4
R716	200Ω ±2% Electrosil TR4
R717	200Ω ±2% Electrosil TR4

CAPACITORS

C701	To Redifon Drawing OP5459/S
C702	27pF ±1% 500V Lemco MC10
C703	To Redifon Drawing OP5604/S
C704	To Redifon Drawing OP5604/S
C705	To Redifon Drawing OP5604/S
C706	To Redifon Drawing OP5604/S
C707	12000pF ±5% 300V STC 454-LWA-75
C708	·75pF ±·1pF Erie Gimmicon KA
C709	27pF ±1pF 500V Lemco MC10
C710	To Redifon Drawing OP5604/S
C711	To Redifon Drawing OP5604/S
C712	To Redifon Drawing OP5604/S
C713	To Redifon Drawing OP5604/S
C714	·1µF +50% −25% Erie 811/T 18V
C715	·05µF +80% −20% Centralab DA 470 001E
C716	·05µF +80% −20% Centralab DA 470 001E
C717	0·1µF ±20% I.T.T. PMP.M100
C718	·05µF +80% −20% Centralab DA 470 001E
C719	27pF ±1pF 500V Lemco MC10
C720	To Redifon Drawing OP5604/S
C721	To Redifon Drawing OP5604/S
C722	To Redifon Drawing OP5604/S
C723	To Redifon Drawing OP5604/S
C724	·01µF +80% −20% 100V Erie "Weecon" X5V 8122/025
C725	·05µF +80% −20% Centralab DA 470 001E
C726	·05µF +80% −20% Centralab DA 470 001E
C727	·05µF +80% −20% Centralab DA 470 001E
C728	·05µF +80% −20% Centralab DA 470 001E
C729	33pF ±5% 300V Lemco MC15
C730	270pF ±5% 300V Lemco MC15
C731	To Redifon Drawing OP5604/S
C732	330pF ±5% 300V Lemco MC15
C733	To Redifon Drawing OP5604/S
C734	680pF ±5% 300V Lemco MC15
C735	To Redifon Drawing OP5604/S
C736	820pF ±5% 50V Lemco MS89/1/R/820PJ/50
C737	To Redifon Drawing OP5604/S
C738	680pF ±5% 300V Lemco MC15

DIODES

MR701	Texas 1S131
MR702	Texas 1S131
MR703	Fairchild FA4000

TRANSISTORS

VT701	Fairchild BFX18
VT702	STC 2N744

RELAYS

RL701	To Redifon Drawing OP5526/S
RL702	To Redifon Drawing OP5526/S

CHOKES

L701	2·2µH Painton 58/10/0007/10
L702	2·2µH Painton 58/10/0007/10
L703	100µH C.T. London 7837
L704	100µH Painton 58/10/0017/10
L705	100µH Painton 58/10/0017/10

TRANSFORMERS

T701	To Redifon Drawing 1/P27112/M
T702	To Redifon Drawing 2/P27112/M
T703	To Redifon Drawing 8/P27112/M
T704	To Redifon Drawing 1/P27113/M
T705	To Redifon Drawing 3/P27112/M
T706	To Redifon Drawing 4/P27112/M
T707	To Redifon Drawing 9/P27112/M
T708	To Redifon Drawing 2/P27113/M
T709	To Redifon Drawing 5/P27112/M
T710	To Redifon Drawing 6/P27112/M
T711	To Redifon Drawing 10/P27112/M
T712	To Redifon Drawing 3/P27113/M
T713	To Redifon Drawing 7/P27112/M
T714	To Redifon Drawing 11/P27112/M
T715	To Redifon Drawing 12/P27112/M
T716	To Redifon Drawing 4/P27113/M
T717	To Redifon Drawing 98/5451/S
T718	To Redifon Drawing 83/5451/M

SWITCHES

S701	To Redifon Drawing OP5466/M

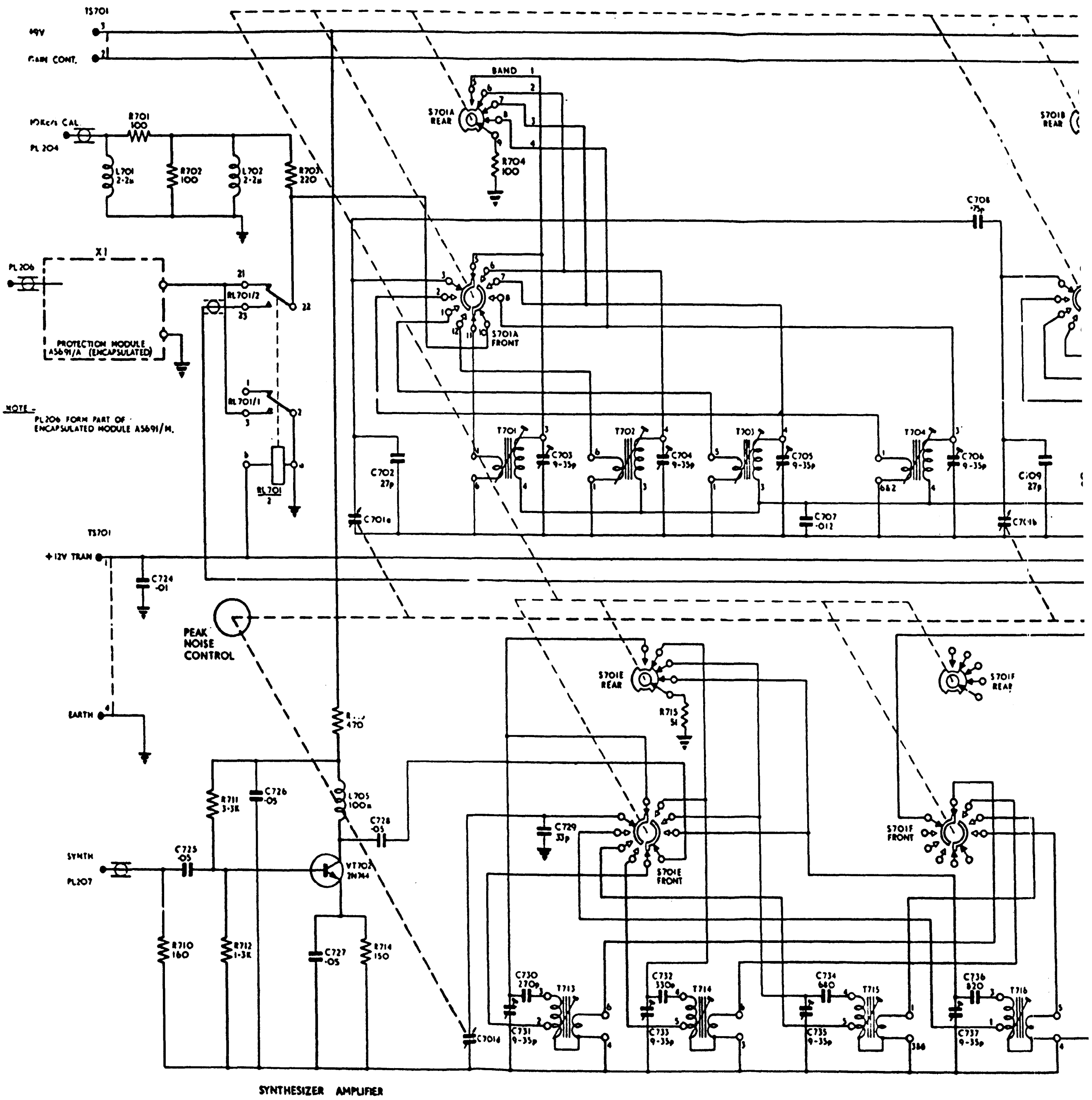
TERMINAL STRIPS

TS701	Kulka 411-4-4 way

PLUGS

PL203	Sealectro 51 010 3196
PL204	Sealectro 51 043 0000
PL205	Sealectro 51 010 3196
PL206	
PL207	Sealectro 51 043 0000

X1	Protection Module A5961/M



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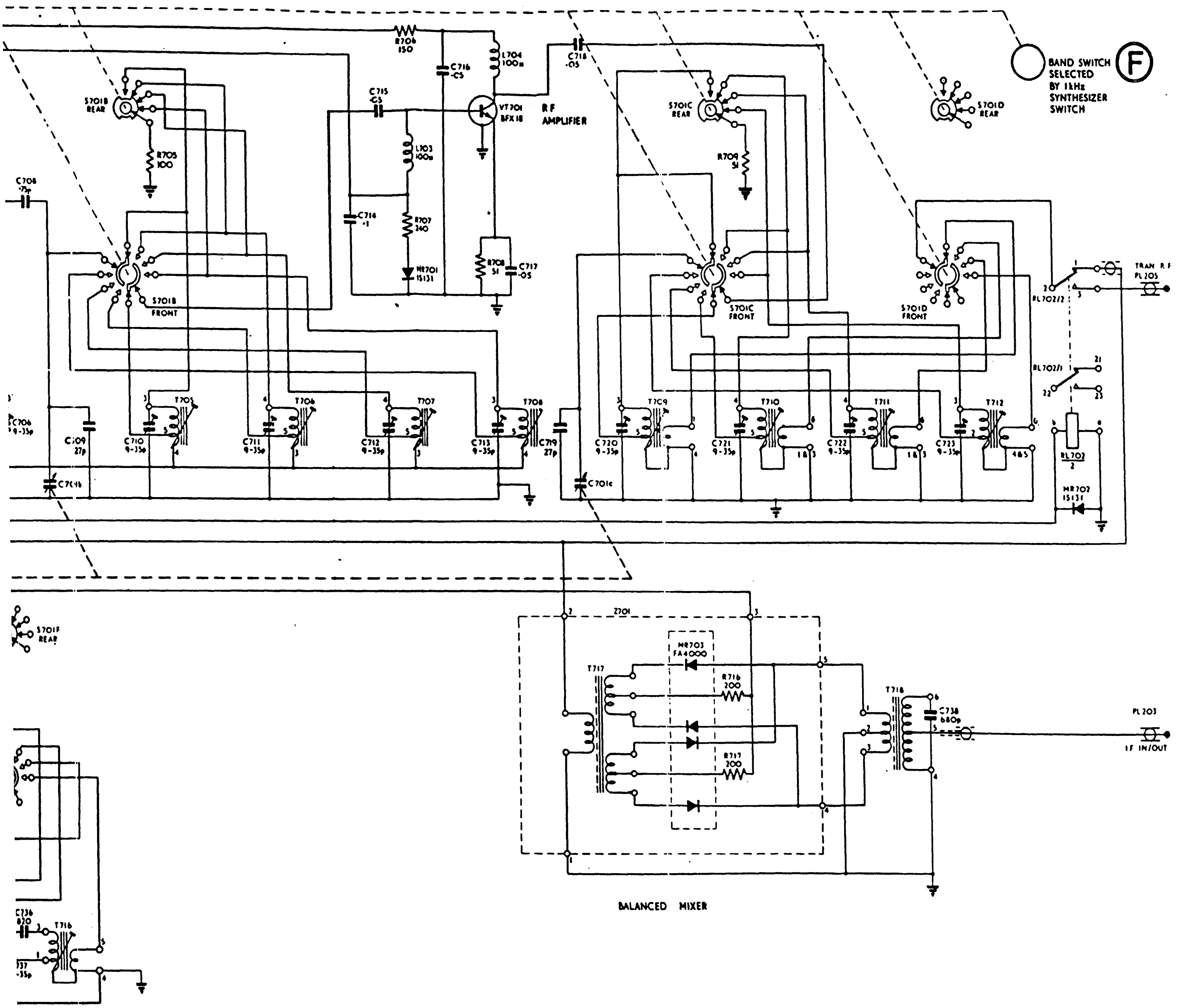


RF MODULE TYPE 5451/A **FIG. 7.5**

COMPONENTS LIST

IF/AUDIO MODULE TYPE 5448B (FIG. 7.6)

RESISTORS

R401	10kΩ ±5% Electrosil TR4
R402	5·1kΩ ±5% Electrosil TR4
R403	300Ω ±5% Electrosil TR4
R404	75Ω ±5% Electrosil TR4
R405	100Ω ±5% Electrosil TR4
R406	33Ω ±2% Electrosil TR5
R407	68Ω ±5% Electrosil TR4
R408	240Ω ±5% Electrosil TR4
R409	100Ω ±5% Electrosil TR4
R410	5kΩ Bay 50-2-1-502
R411	750Ω ±5% Electrosil TR4
R412	2·2kΩ ±5% Electrosil TR4
R413	3kΩ ±5% Electrosil TR4
R414	68kΩ ±5% Electrosil
R415	330Ω ±5% Electrosil TR4
R416	1·2Ω ±5% Electrosil TR4
R417	10kΩ ±5% Electrosil TR4
R418	47Ω ±5% Electrosil TR5
R419	560Ω ±5% Electrosil TR4
R420	4·7kΩ ±5% Electrosil TR4
R421	390Ω ±5% Electrosil TR4
R422	Not used
R423	3·3kΩ ±5% Electrosil TR4
R424	15kΩ ±5% Electrosil TR4
R425	15kΩ ±5% Electrosil TR4
R426	300Ω ±5% Electrosil TR4
R427	390Ω ±5% Electrosil TR4
R428	1kΩ ±5% Electrosil TR4
R429	1·8kΩ ±5% Electrosil TR4
R430	1·8kΩ ±5% Electrosil TR4
R431	10kΩ ±5% Electrosil TR4
R432	Not used
R433	470Ω ±5% Electrosil TR4
R434	5·1kΩ ±5% Electrosil TR4
R435	6·2kΩ ±5% Electrosil TR4
R436	470Ω ±5% Electrosil TR4
R437	200Ω ±5% Electrosil TR4
R438	5·1kΩ ±5% Electrosil TR4
R439	1kΩ ±5% Electrosil TR4
R440	4·7kΩ ±5% Electrosil TR4
R441	8·2kΩ ±5% Electrosil TR4
R442	390Ω ±5% Electrosil TR4
R443	1kΩ ±5% Electrosil TR4
R444	STC G22 Thermistor
R445	Selected ±5% Electrosil TR4
R446	100Ω ±5% Electrosil TR4
R447	200Ω Painton 47/10/0007/12
R448	200Ω Painton 47/10/0007/12
R450	1·8kΩ ±5% Electrosil TR4
R451	1·8kΩ ±5% Electrosil TR4
R453	22kΩ ±5% Electrosil TR4
R454	18kΩ ±5% Electrosil TR4
R455	10kΩ Bay 50-2-1-103
R456	750Ω ±5% Electrosil TR4
R457	1·8kΩ ±5% Electrosil TR4
R458	10kΩ ±5% Electrosil TR4
R459	5·1kΩ ±5% Electrosil TR4
R460	10kΩ ±5% Electrosil TR4
R461	2·7kΩ ±5% Electrosil TR4
R462	820Ω ±5% Electrosil TR4
R463	ITT G52 Thermistor
R464	2·7kΩ ±5% Electrosil TR4
R465	1·5kΩ ±5% Electrosil TR4
R466	12kΩ ±5% Electrosil TR4
R467	8·2kΩ ±5% Electrosil TR4
R468	10kΩ Bay 50-2-1-103
R469	68kΩ ±5% Electrosil TR4

CAPACITORS

C401	1000pF +80% −20% Erie K2600/361
C402	1000pF +80% −20% Erie K2600/361
C403	1000pF +80% −20% Erie K2600/361
C404	1000pF +80% −20% Erie K2600/361
C405	1000pF +80% −20% Erie K2600/361
C406	1000pF +80% −20% Erie K2600/361
C407	1000pF +80% −20% Erie K2600/361
C408	1000pF +80% −20% Erie K2600/361
C409	Not used
C410	1000pF +80% −20% Erie K2600/361
C411	1000pF +80% −20% Erie K2600/361
C412	1000pF +80% −20% Erie K2600/361
C413	1000pF +80% −20% Erie K2600/361
C414	1000pF +80% −20% Erie K2600/361
C415	680pF ±5% 300V Lemco MC15
C416	·05μF +80% −20% Centralab DA-470-001E
C417	·1μF +50% −25% 12V Erie 811/T/18V
C418	·05μF +80% −20% Centralab DA-470-001E
C419	·05μF +80% −20% Centralab DA-470-001E
C420	·05μF +80% −20% Centralab DA-470-001E
C421	·1μF ±20% Wima MK5
C422	240pF ±5% 300V Lemco MC15
C423	·05μF +80% −20% Centralab DA-470-001E
C424	·05μF +80% −20% Centralab DA-470-001E
C425	0·1μF ±20% TCC PMX4
C426	240pF ±5% 300V Lemco MC15
C427	·1μF +50% −25% 12V Erie 811/T/18V
C428	·01μF ±20% Erie W5R-8123
C429	6·8μF ±10% 6V Union Carbide K6R8J6KS
C430	·01μF ±20% Erie W5R-8123
C431	4·7μF ±10% 10V Union Carbide K4R7J10KS
C432	2·2μF ±10% 15V Union Carbide K2R2J15KS
C433	2·2μF ±10% 15V Union Carbide K2R2J15KS
C434	1200pF ±10% Erie NPO.8133
C435	33μF ±10% 10V Union Carbide K33J10KS
C436	1000pF ±20% Erie NPO.8133
C437	220μF ±10% 10V Union Carbide K220J10KS
C438	·01μF ±20% Erie W5R-8123
C439	33μF ±10% 10V Union Carbide K33J10KS
C440	1μF ±10% 15V Union Carbide K1J15KS

C441	·05µF +80% −20% Centralab DA-470-001E	
C442	1µF ±10% 15V Union Carbide K1J15KS	
C443	Not used	
C444	·05µF +80% −20% Centralab DA-470-001E	
C445	33µF ±10% 10V Union Carbide K33J10KS	
C446	·1µF +50% −25% 12V Erie 811/T/18V	
C447	100µF ±10% 10V Union Carbide K100J10KS	
C448	·033µF ±10% Mullard C281VV/A33K	
C449	·033µF ±10% Mullard C281VV/A33K	
C450	10µF ±10% 15V Union Carbide K10J15KS	
C451	4·7µF ±10% 15V Union Carbide K4R7J10KS	
C452	12000pF ±5% 300V STC 454-LWA-75	
C453	2·2µF ±10% 15V Union Carbide K2R2J15KS	
C454	220µF ±10% 10V Union Carbide K220J10KS	
C455	47µF ±10% Union Carbide K47J20KS	

DIODES

MR401	Texas IS131	
MR402	Texas G130	
MR403	Hughes IN457	
MR404	Texas IS131	
MR405	Texas IS131	
MR406	Texas G130	Matched Pair to Redifon Spec. OP.5656/S
MR407	Texas G130	
MR408	Texas G130	
MR409	Fairchild FA2000	
MR410	Texas IS131	
MR411	Texas IS131	
MR412	Texas IS131	
MR413	Texas IS131	
MR414	Texas IS131	
MR415	Texas IS131	

TRANSISTORS

VT401	Texas 2N736A	
VT402	Fairchild BFX18	
VT403	Fairchild BFX18	
VT404	ITT 2N706A	
VT405	ITT 2N706A	
VT406	Fairchild 2N697	Matched Pair to Redifon Spec. OP9012/S
VT407	Fairchild 2N697	
VT408	ITT 2N706A	
VT409	ITT 2N706A	
VT410	ITT 2N706A	
VT411	ITT 2N706A	
VT412	ITT 2N706A	
VT413	Mullard BCY30	
VT414	Fairchild 2N697	
VT415	ITT 2N706A	

RELAYS

RL401	12V I.T.T. 2K2A112 (ALT.HF.1201BOO CLARE)
RL402	12V I.T.T. 2KL2A112 (ALT. BR17-E1-V2) BABCOCK)
RL403	12V I.T.T. 2K2A112 (ALT.HF. 1201BOO CLARE)

FILTERS

FL401	To Redifon Drawing OP5511/S
FL402	To Redifon Drawing OP5510/S

TRANSFORMERS

T401	To Redifon Drawing 1/P27115/M
T402	To Redifon Drawing 118/5448/S
T403	To Redifon Drawing 118/5448/S
T404	To Redifon Drawing 2/P27115/M
T405	To Redifon Drawing 3/P27115/S
T406	To Redifon Drawing 253/5448/S
T407	To Hughes Spec. 995090-23

CHOKES

L401	100µH Painton 58/10/0017/10
L402	100µH Painton 58/10/0017/10
L403	100µH Painton 58/10/0017/10
L404	
L405	100µH Painton 58/10/0017/10
L406	To Redifon Drawing 379/5448/M

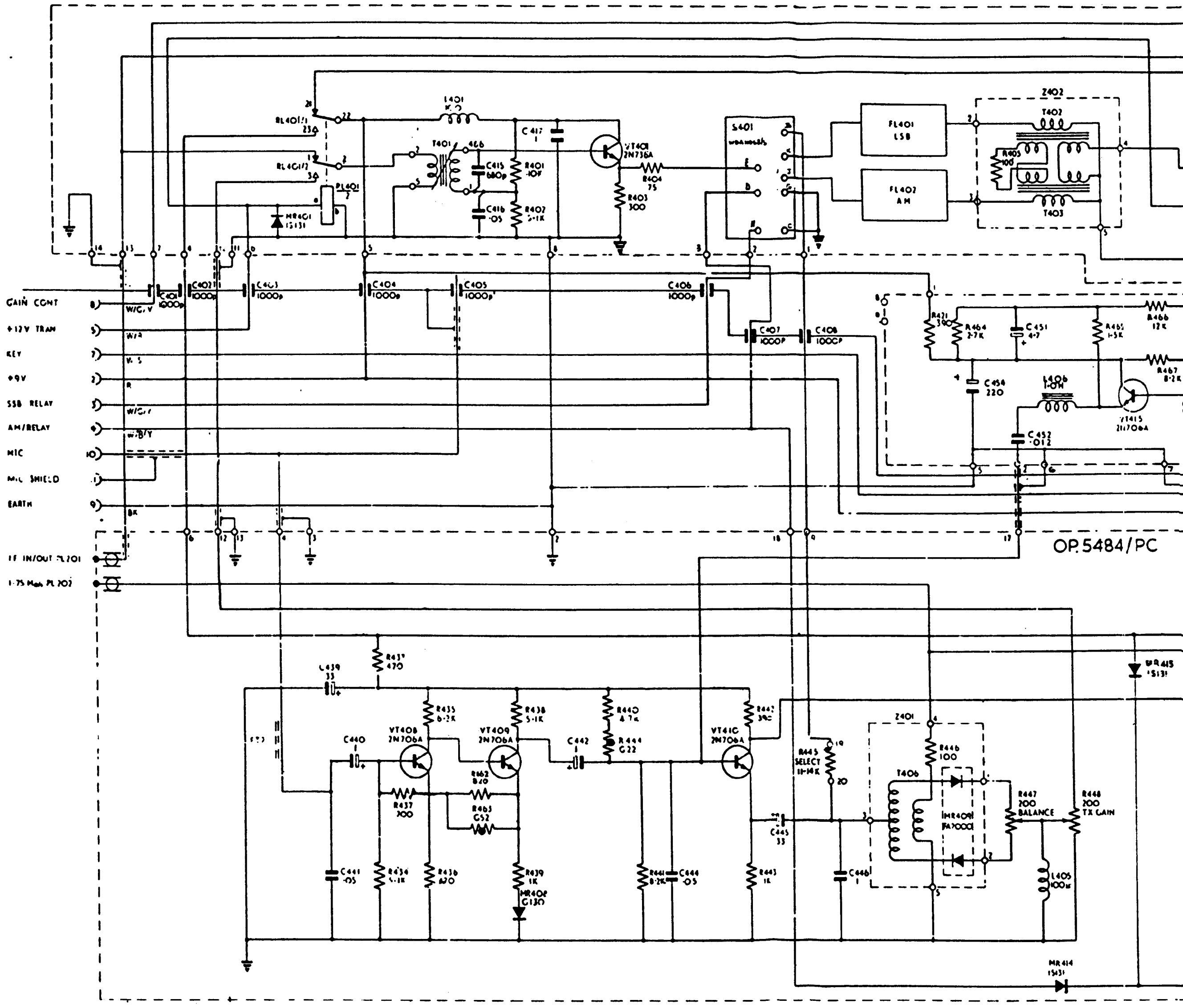
FERRITE BEAD

FT1	Mullard FX1468
FT2	Mullard FX1468

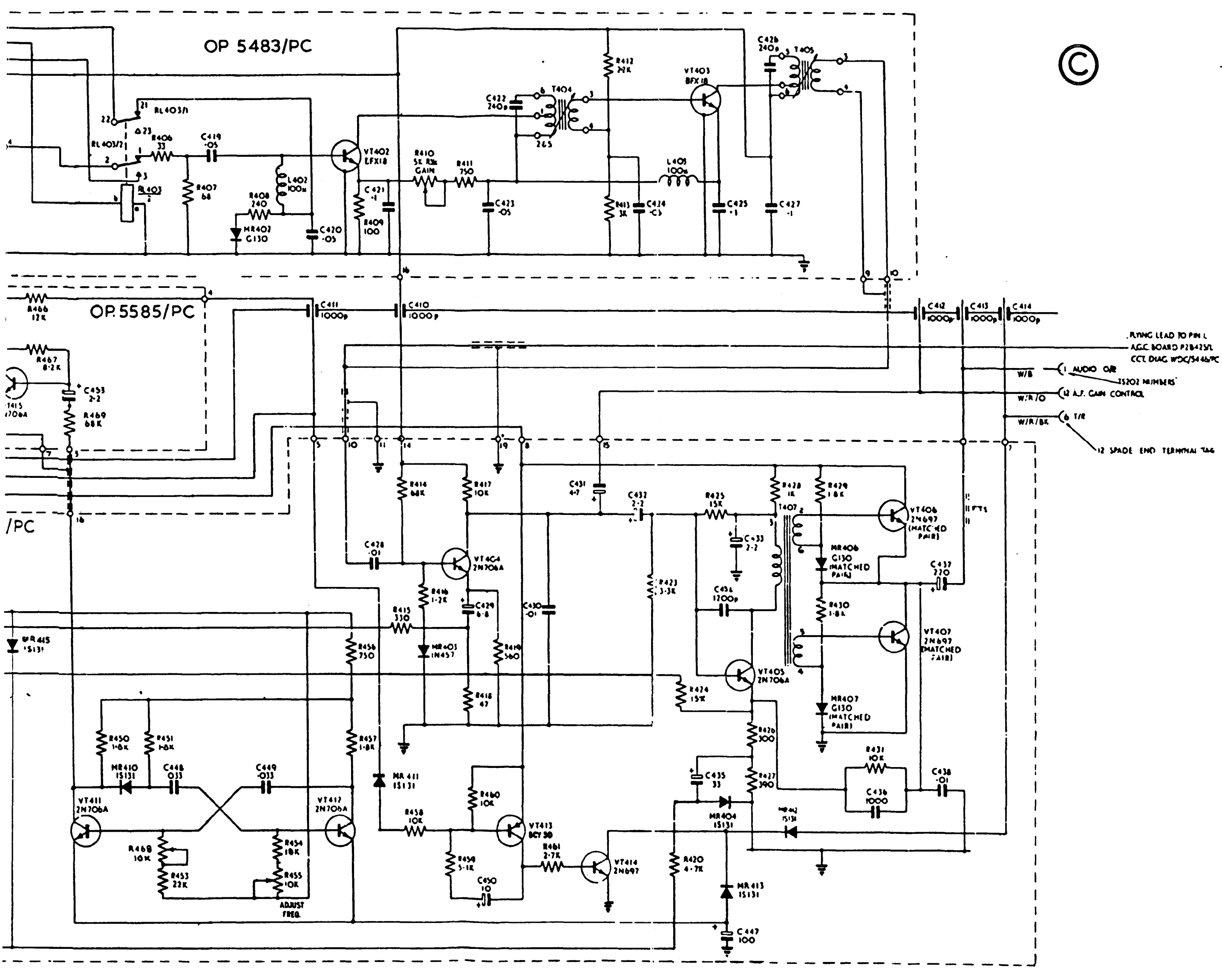
PLUGS

PL201	Sealectro 51-010-3196
PL202	Sealectro 51-043-0000

Fig. 7.6 (ii)



I/F AUDIO MODULE TYPE 5



TYPE 5448/B

FIG. 7.6

COMPONENTS LIST

POWER AMPLIFIER MODULE TYPE 5452/B (FIG. 7.7)

RESISTORS

R801	220Ω ±5% Electrosil TR4
R802	1kΩ ±5% Electrosil TR4
R803	3·9kΩ ±5% Electrosil TR4
R804	470Ω ±5% Electrosil TR4
R805	10Ω ±5% Electrosil TR4
R806	33Ω ±5% Electrosil TR4
R807	120Ω ±5% Electrosil TR4
R808	270Ω ±5% Electrosil TR4
R809	1·5kΩ ±5% Electrosil TR4
R810	1·5kΩ ±5% Electrosil TR4
R811	10Ω ±5% Electrosil TR4
R812	10Ω ±5% Electrosil TR4
R813	18Ω ±5% Electrosil TR4
R814	18Ω ±5% Electrosil TR4
R815	56Ω ±5% Electrosil TR4
R816	2·2kΩ ±5% Electrosil TR4
R817	1·5kΩ ±5% Electrosil TR4
R818	3·9kΩ ±5% Electrosil TR4
R819	2·7kΩ ±5% Electrosil TR4
R820	150Ω ±5% Electrosil TR4
R821	2kΩ Bourn Inc. 33071-1-202
R822	390Ω ±5% Electrosil TR4
R823	150Ω ±5% Electrosil TR4

CAPACITORS

C801	·1μF ±20% Wima MKS
C802	·01μF ±20% Wima MKS
C803	·1μF ±20% Wima MKS
C804	·1μF ±20% Wima MKS
C805	·1μF ±20% Wima MKS
C806	·01μF ±20% Wima MKS
C807	·01μF ±20% Wima MKS
C808	·01μF ±20% Wima MKS
C809	·1μF ±20% Wima MKS

DIODES

MR801	Texas 1N914
MR802	Texas 1N914
MR803	Texas 1N914
MR804	Texas 1S131
MR805	Texas 1S131
MR806	Texas 1S131
MR807	Texas 1S131
MR808	Texas 1N914
MR809	Texas 1N914

TRANSISTORS

VT801	RCA 40235
VT802	RCA 2N3866
VT803	RCA 2N3866
VT804	Mullard BCY30

CHOKE

L801	10μH Painton 58/10/0011/10

TRANSFORMERS

T801	To Redifon Drawing P28419/S
T802	To Redifon Drawing P28420/S
T803	To Redifon Drawing P28423/S

RELAY

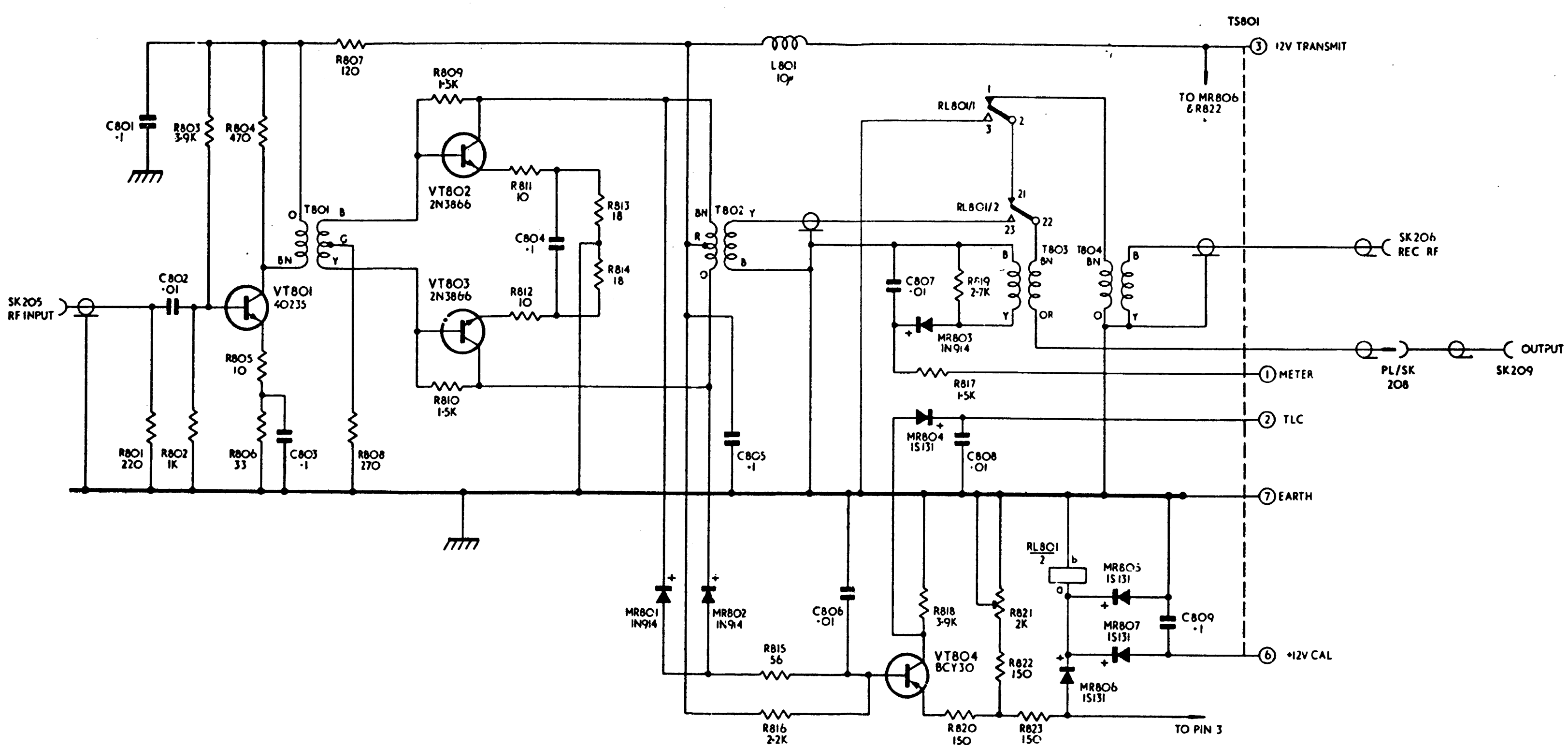
RL801	Deutsch HD58A-E4-L53H

PLUG

PL208	Sealectro 51-043-0000

SOCKETS

SK205	To Redifon Spec. OP5471/S
SK206	To Redifon Spec. OP5471/S



CDB 5452/1-1
899-1

POWER AMPLIFIER MODULE TYPE 5452/B

FIG. 7.7

COMPONENTS LIST

FREQUENCY GENERATOR MODULE TYPE 5449/A (FIG. 7.8)

RESISTORS

R501	STC G22 Thermistor
R502A	STC G22 Thermistor
R502B	STC G22 Thermistor
R503	33kΩ ±5% Electrosil TR4
R504	22kΩ ±5% Electrosil TR4
R505	3·3kΩ ±5% Electrosil TR4
R506	1·5kΩ ±5% Electrosil TR4
R507	150Ω ±5% Electrosil TR4
R508	150Ω ±5% Electrosil TR4
R509	1·8kΩ ±5% Electrosil TR4
R510	4·7kΩ ±5% Electrosil TR4
R511	6·8kΩ ±5% Electrosil TR4
R512	1kΩ ±5% Electrosil TR4
R513	18kΩ Painton 3280P-1-103 (Potentiometer)
R514	24kΩ ±5% Electrosil TR4
R515	51kΩ ±5% Electrosil TR4
R516	100Ω Electrosil TR4
R517	51Ω Electrosil TR4
R518	10kΩ Painton 3280P-1-103 (Potentiometer)
R519	15kΩ ±5% Electrosil TR4
R520	51Ω ±5% Electrosil TR4
R521	100Ω ±5% Electrosil TR4
R522	33Ω ±5% Electrosil TR5
R523	10kΩ Painton 3280P-1-103 (Potentiometer)
R524	47kΩ ±5% Electrosil TR4
R525	33Ω ±5% Electrosil TR5
R526	390Ω ±5% Electrosil TR4
R527	270Ω ±5% Electrosil TR4
R528	200Ω Painton 3280P-1-103 (Potentiometer)
R529	100Ω ±5% Electrosil TR4
R530	STC G53 Thermistor
R531	3·3kΩ ±5% Electrosil TR4

CAPACITORS

C501A	32pF Erie 831/N5600
C501B	Select on test
C501C	Erie selected type and value
C502	Select on test
C503	Select on test
C504	·8-8·5pF STC VC9GWY VAR
C505	330pF ±10% 300V Lemco MC15
C506	330pF ±10% 300V Lemco MC'5
C507	330pF ±10% 300V Lemco MC15
C508	·01µF +80% −20% Hunt CSX210
C509	510pF ±5% 300V Lemco MC15
C510	·01µF +80% −20% Hunt CSX210
C511	270pF ±5% 300V Lemco MC15
C512	680pF ±5% 300V Lemco MC15
C513	2000pF ±5% 300V Lemco MC20
C514	3900pF ±5% 300V Lemco MC20
C515	1µF ±10% Union Carbide K1J15KS
C516	1000pF ±5% STC 454-LWA-51

DIODES

MR501	Mullard OA95
MR502	Mullard OA95
MR503	Mullard OA95
MR504	Mullard OA95
MR505	Texas 1S2068A

TRANSISTORS

VT501	STC 2N706A
VT502	STC 2N706A
VT503	STC 2N706A
VT504	STC 2N706A
VT505	STC 2N706A
VT506	STC 2N706A

CHOKES

L501	100µH Painton 58/10/0017/10
L502	100µH Painton 58/10/0017/10

TRANSFORMERS

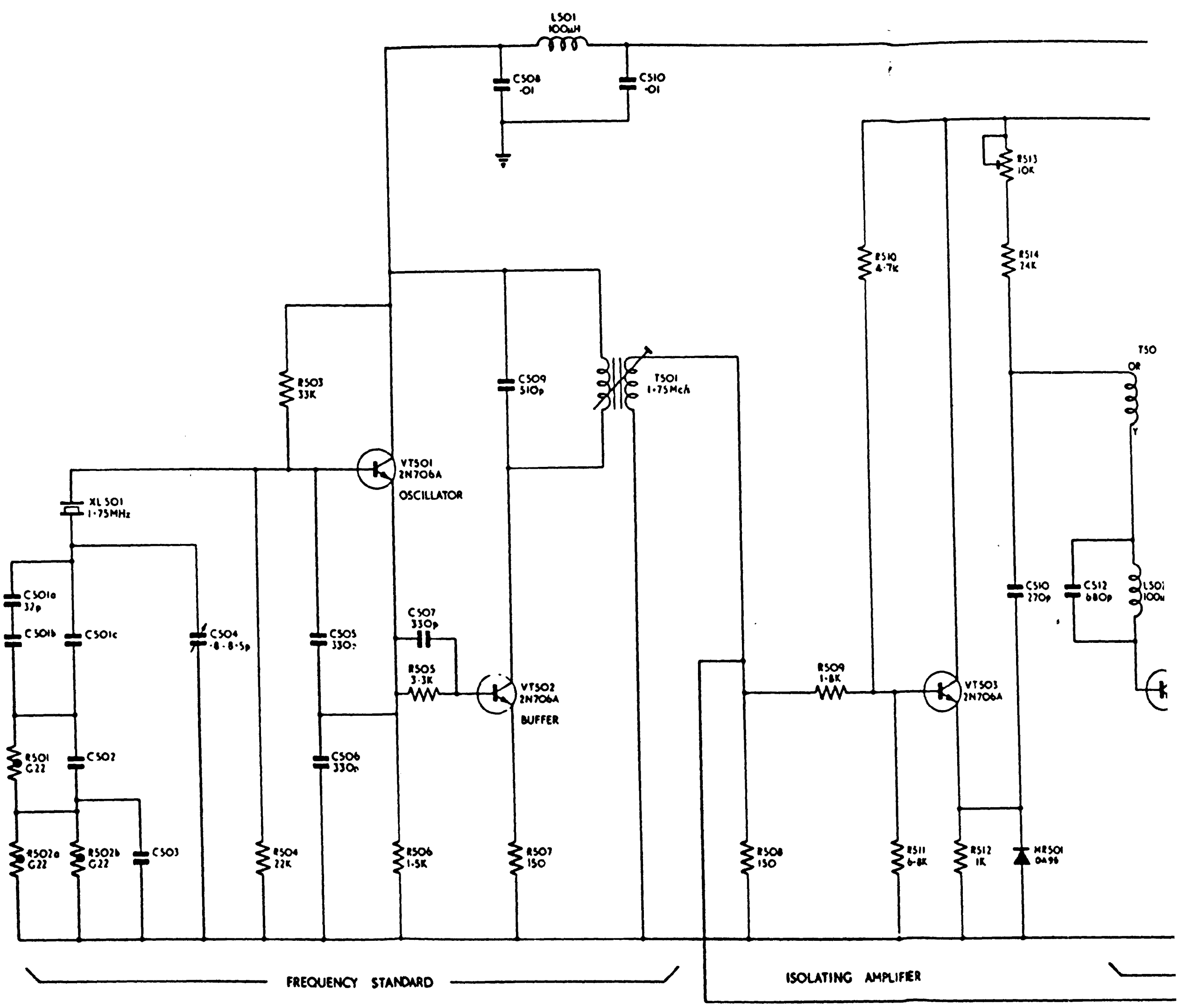
T501	To Redifon Spec. 91/5449/S
T502	UTC P1P5 Wire Ended
T503	UTC P1P5 Wire Ended
T504	UTC P1P4 Wire Ended

CRYSTAL

XL501	To Redifon Spec. OP8815/S

SOCKETS

SK202	Sealectro 51-007-3196
SK204	Sealectro 51-011-3196



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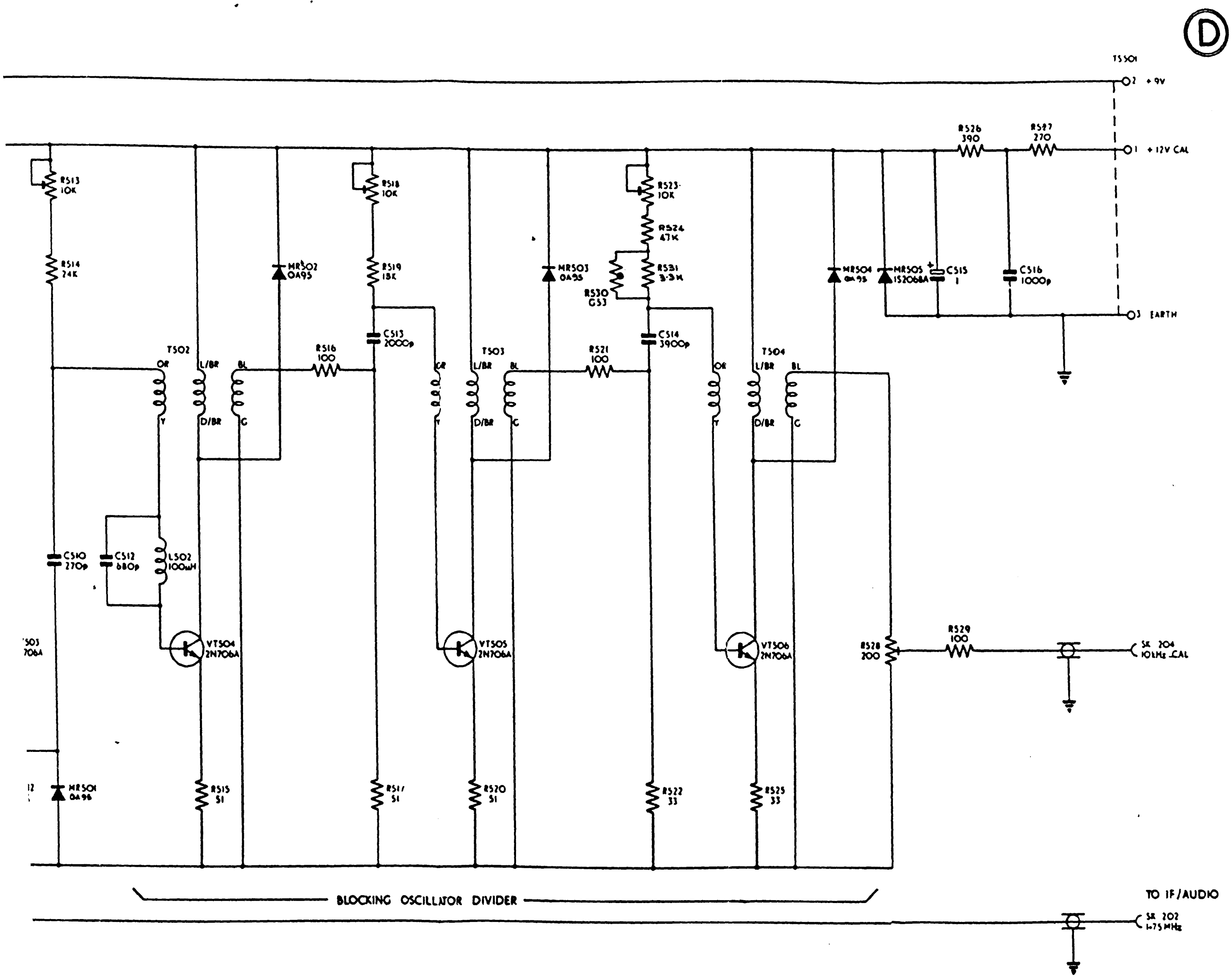
OP. 5485/PC



FREQUENCY GENERATOR MODULE TYPE 5449/A **FIG. 7.8**

COMPONENTS LIST

FREQUENCY GENERATOR MODULE TYPE 5449/B (FIG. 7.9)

RESISTORS

R501	STC G22 Thermistor
R502A	STC G22 Thermistor
R502B	STC G22 Thermistor
R503	33kΩ ±5% Electrosil TR4
R504	22kΩ ±5% Electrosil TR4
R505	3·3kΩ ±5% Electrosil TR4
R506	1·5kΩ ±5% Electrosil TR4
R507	150Ω ±5% Electrosil TR4
R508	150Ω ±5% Electrosil TR4
R526	33Ω ±5% Electrosil TR5
R527	33Ω ±5% Electrosil TR5
R530	2·7kΩ ±5% Electrosil TR4
R531	680Ω ±5% Electrosil TR4
R532	1kΩ ±5% Electrosil TR4
R533	3·3kΩ ±5% Electrosil TR4
R534	150Ω ±5% Electrosil TR4

CAPACITORS

C501A	32pF Erie 831/N5600
C501B	Select on Test
C501C	Erie select type and value
C502	Select on test
C503	Select on test
C504	8–8·5pF STC VC9GWY VAR
C505	330pF ±10% 300V Lemco MC15
C506	330pF ±10% 300V Lemco MC15
C507	330pF ±10% 300V Lemco MC15
C508	·01μF +80% −20% Erie X5V/8122/025 Weecon
C509	510pF ±5% 300V Lemco MC15
C510	·01μF +80% −20% Erie X5V/8122/025 Weecon
C515	1μF ±10% Union Carbide K1J15KS
C516	1000pF ±5% STC 454–LWA–51
C517	1000pF ±5% STC 454–LWA–51
C518	68pF ±10% 300V Lemco MC10
C519	0·1μF ±20% 300V Wima MKS

DIODES

MR506	Mullard BZY96C5V1
MR507	Mullard OA95
MR508	Hughes HG5007

TRANSISTORS

VT501	Texas 2N706A
VT502	Texas 2N706A
VT507	Texas 2N706A

CHOKES

L501	100μH Painton 58/10/0017/10

TRANSFORMERS

T501	To Redifon Spec. 91/5449/S
T505	To Redifon Spec. P28421/S

CRYSTAL

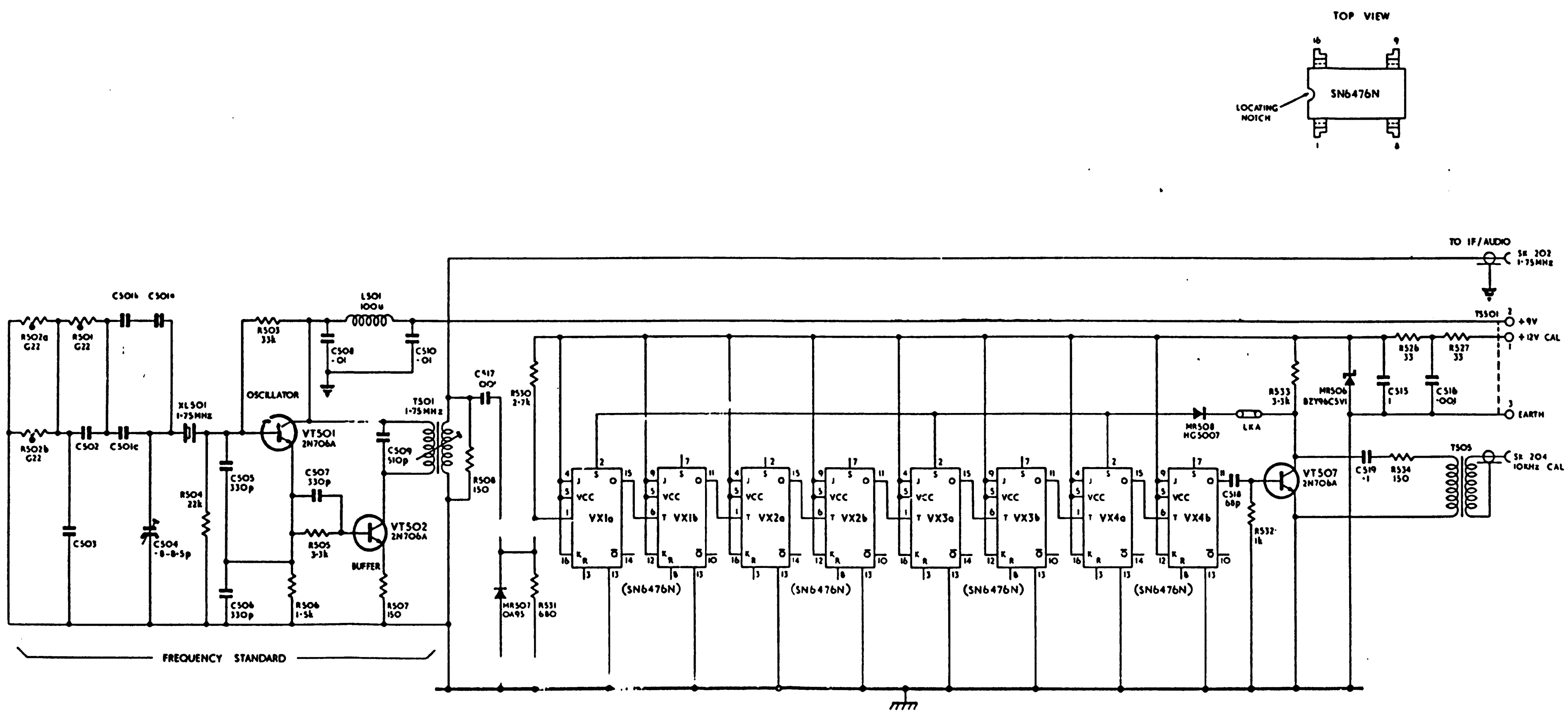
XL501	To Redifon Spec. OP8815/S

SOCKETS

SK202	Sealectro 51–007–3196
SK204	Sealectro 51–011–3196

INTEGRATED CIRCUITS

VX1	Texas SN6476N
VX2	Texas SN6476N
VX3	Texas SN6476N
VX4	Texas SN6476N



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FREQUENCY GENERATOR MODULE TYPE 5449/B

FIG. 7.9

COMPONENTS LIST

POWER SUPPLY MODULE TYPE 5447/B (FIG. 7.10)

Resistors

R301	10Ω Painton 301A
R302	470Ω ±5% Electrosil TR5
R303	220Ω ±5% Electrosil TR5

Capacitors

C301	33μF Union Carbide K33J15KS

Diodes

MR301	STC RAS310AF
MR302	Texas 1S131
MR303	Mullard BZY93–C39R
MR304	Texas 1S131
MR305	Mullard BZY93–C13R
MR306	Texas 1S131
MR307	Texas 1S2091A

Transistors

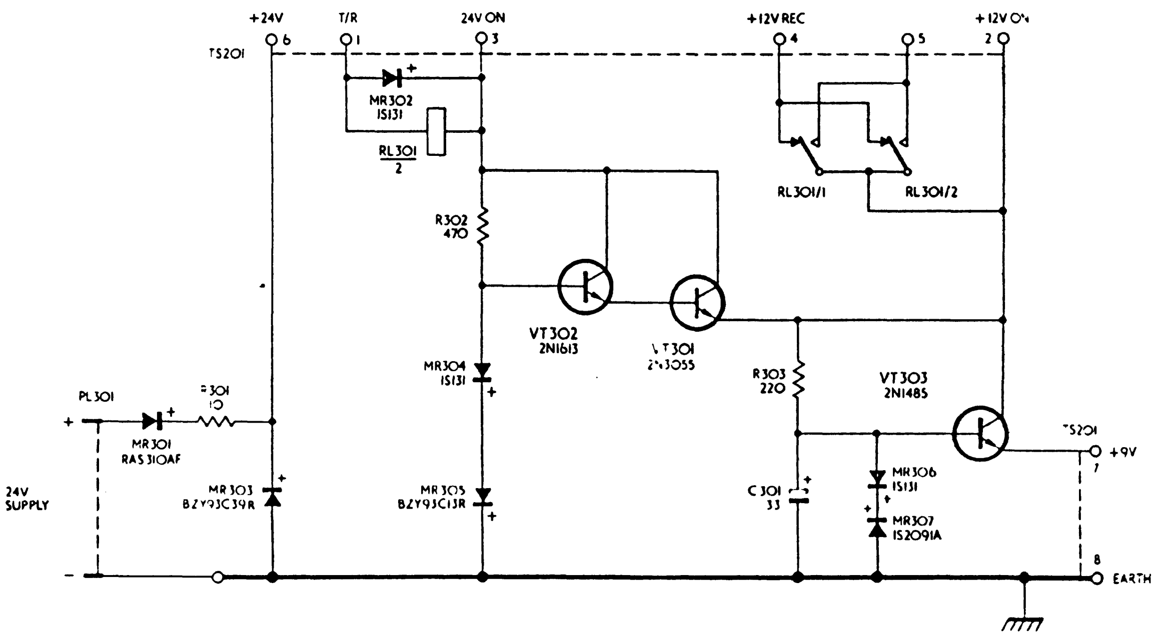
VT301	RCA 2N3055
VT302	Mullard 2N1613
VT303	Ferranti 2N1485

Relay

RL301	Deutsch HDS8A–F4–L53H

Plugs

PL301	Belling Lee L513



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POWER SUPPLY MODULE TYPE 5447/B **FIG. 7.10**

COMPONENTS LIST

FRONT PANEL AND CHASSIS TYPE 5446/C (FIG. 7.11)

RESISTORS

R201	10kΩ to Redifon Spec. OP5460/S
R202	1kΩ ±5% Electrosil TR4
R203	100kΩ ±5% Electrosil TR4
R204	22kΩ ±5% Electrosil TR4
R205	330Ω ±5% Electrosil TR4
R206	47kΩ ±5% Electrosil TR4
R207	Not used
R208	47kΩ ±5% Electrosil TR4
R209	680Ω ±5% Electrosil TR4
R210	3kΩ ±5% Electrosil TR4
R211	2kΩ Bourne Inc. 3307P-1-202
R212	Not used
R213	2·2kΩ ±2% Electrosil TR5
R214	1·8kΩ ±10% STC TM1/4
R215	2kΩ Bourne Inc. 3307P-1-202
R216	2·2kΩ ±5% Electrosil TR4
R217	16kΩ ±1% Welwyn C1
R218	3kΩ ±5% Electrosil TR4
R219	Not used
R220	220Ω ±5% Electrosil TR4
R221	470Ω ±5% Electrosil TR4
R222	1·5kΩ ±5% Electrosil TR4
R223	820Ω ±5% Electrosil TR4
R224	200Ω ±5% Electrosil TR4
R225	1kΩ ±5% Electrosil TR4
R226	10kΩ ±5% Electrosil TR4
R227	470Ω ±5% Electrosil TR4
R228	10kΩ ±5% Electrosil TR4
R229	1kΩ ±5% Electrosil TR4
R230	100kΩ ±5% Electrosil TR4
R231	1kΩ ±5% Electrosil TR4
R232	100Ω ±5% Electrosil TR4
R233	100Ω ±5% Electrosil TR4
R234	1·5kΩ ±5% Electrosil TR4
R235	1·8kΩ ±5% Electrosil TR4
R236	68Ω ±5% Electrosil TR4
R237	120Ω ±5% Electrosil TR4
R238	330Ω ±5% Electrosil TR4
R239	820Ω ±5% Electrosil TR4
R240	1·8kΩ ±5% Electrosil TR4
R241	22kΩ ±5% Electrosil TR4

CAPACITORS

C201	Not used
C202	·01μF +80% −20% 30V Erie X5V/8122/025
C203	·01μF +80% −20% 30V Erie X5V/8122/025
C204	·01μF +80% −20% 30V Erie X5V/8122/025
C205	·01μF +80% −20% 30V Erie X5V/8122/025
C206	Not used
C207	·01μF +80% −20% 30V Erie X5V/8122/025
C208	·01μF +80% −20% 30V Erie X5V/8122/025
C209	·01μF +80% −20% 30V Erie X5V/8122/025
C210	·01μF +80% −20% 30V Erie X5V/8122/025
C211	·01μF +50% −25% 25V Erie 831/T/25V
C212	220μF ±10% Union Carbide K220J10KS
C213	310pF ±10% Erie SN1600
C214	·01μF +50% −25% 25V Erie 831/T25V
C215	47μF ±10% Union Carbide K47J20KS
C216	33μF ±10% Union Carbide K33J6KS
C217	·05μF +80% −20% Centralab DA-470-001E
C218	100μF ±10% Union Carbide K100J20KS
C219a	·05μF +80% −20% 30V Centralab DA-470-001E
C219b	220μF ±10% Union Carbide K100J10KS
C220	22μF ±10% Union Carbide K22J35KS
C221	·01μF ±10% 100V Wima Tropyfol F
C222	·01μF ±10% 100V Wima Tropyfol F
C223	·05μF +80% −20% Centralab DA-470-001E

DIODES

MR201	Texas 1S131
MR202	Texas 1S131
MR203	Texas 1S131
MR204	Texas 1S131
MR205	Texas 1S131
MR206	Texas 1S131
MR207	Texas 1S2091A
MR208	Texas 1S131
MR209	Texas 1S101
MR210	Mullard BZY88
MR211	Hughes UK HG5007
MR212	Hughes UK HG5007
MR213	Hughes UK HG5007
MR214	Hughes UK HG5007
MR215	Hughes UK HG5007
MR216	Texas 1S131

TRANSISTORS

VT201	STC 2N706A
VT202	STC 2N706A
VT203	STC 2N706A
VT204	STC 2N706A
VT205	RCA 40235
VT206	Mullard BCY32
VT207	STC 2N706A
VT208	STC 2N706A

CHOKES

L201	100μH Painton 58/10/0017/10
L202	100μH Painton 58/10/0017/10

SWITCHES

S201	To Redifon Spec. OP5461/S
S202	Honeywell 11SM1-T
S203	To Redifon Spec. OP5851/S

SOCKETS

SK201	To Redifon Spec. OP5469/S	
SK203	To Redifon Spec. OP5469/S	
SK208	Greenpar BNC GE 37563	Solder Tag
SK209	Greenpar BNC GE 37561	Solder Tag
SK210	Thorn Elec. PT07A-10-6S	
SK211	Thorn Elec. PT07A-10-6S	
SK212	Thorn Elec. PT07A-10-6S	

TERMINAL STRIPS

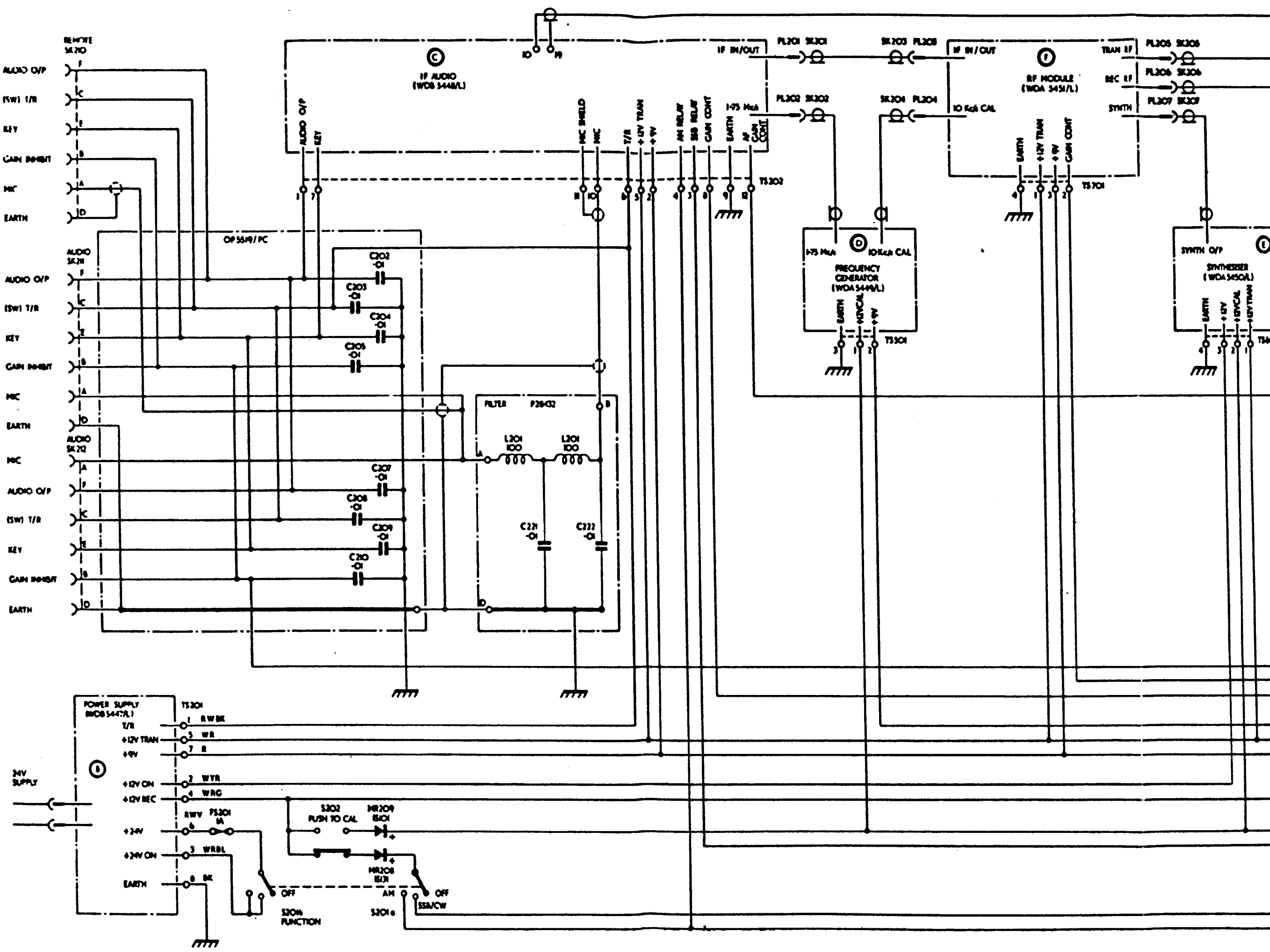
TS201	Kulka 411-8
TS202	Kulka 411-12

METER

M201	0-1MA to Redifon Spec. OP5468/S

FUSE HOLDER

FS201	Belling Lee L675



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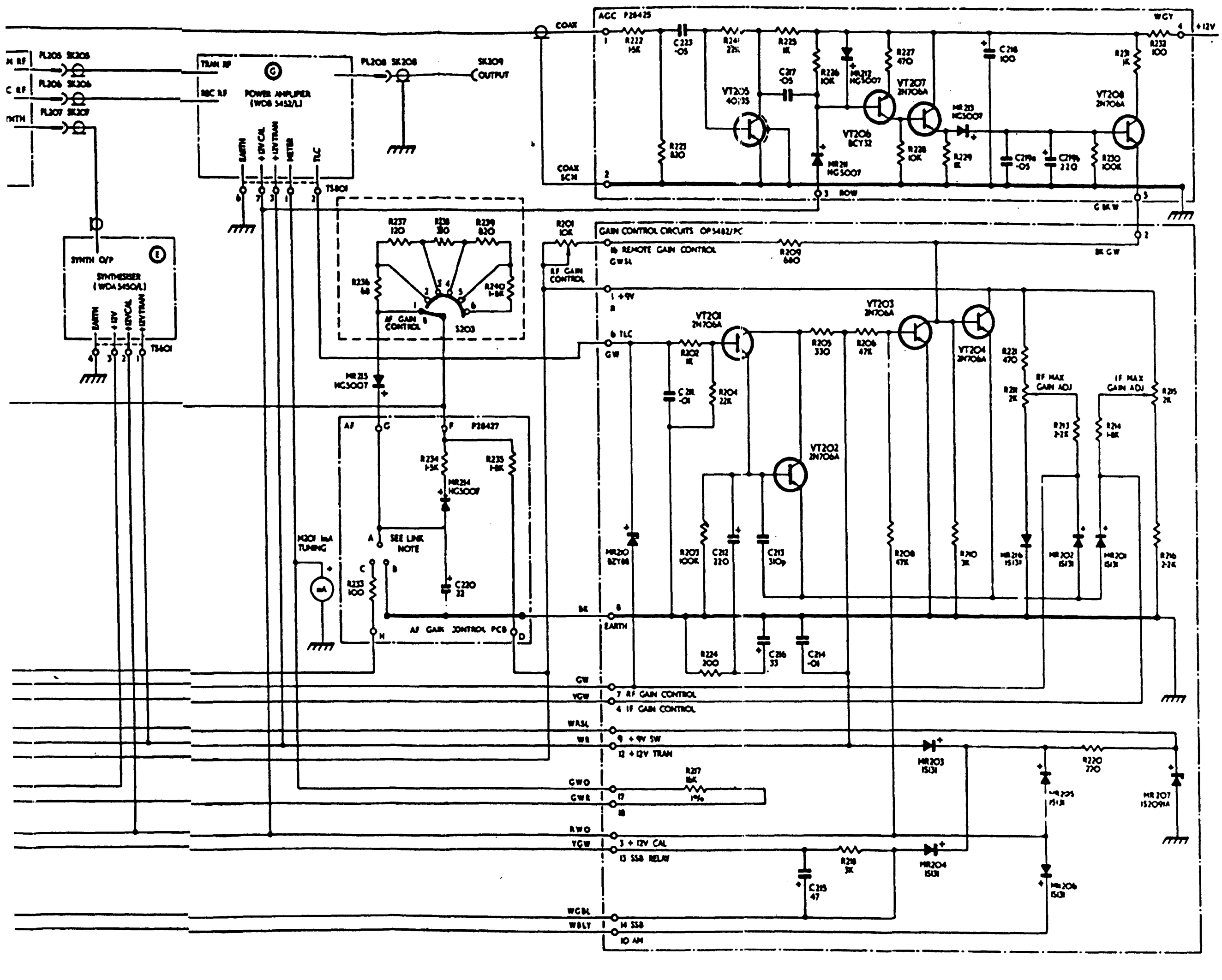

FRONT PANEL & CHASSIS TYPE 5446/C **FIG. 7.11**

8 REFERENCE DATA

8 REFERENCE DATA

8.1 REPAIRS TO PRINTED CIRCUITS

Special care is necessary in carrying out repairs to printed circuits.

Soldering

The printed circuit board must not be overheated by prolonged application of a soldering iron. The use of irons with a rating greater than 25W should be avoided.

The most convenient soldering iron bit is a pencil type not exceeding 3/16 inch diameter, with the end filed at an angle.

Only approved resin-cored solder to BS441, such as Enthoven Superspeed XX Activated, of 20 s.w.g., must be used.

Component Replacement

With wire ended components, the joint should be heated with a freshly tinned iron, and the wire pulled out from the top, or insulated side of the board, using snipe nosed pliers or stout tweezers.

With multi-spill components, the joints should be heated and the solder brushed off, using a stiff brush; a small paint brush with the bristles cut to a length of ¼ inch, is ideal. Toothbrushes should not be be used, because the bristles are often made of nylon which will melt with the heat of the soldering iron.

When the faulty component is removed, all solder must be cleared from the holes in the board. Again, a stiff brush, assisted by a fine sewing needle is the tool to employ. The needle should first be oxidised in a flame, to ensure that the molten solder does not adhere to it.

Great care is necessary when replacing the component. The wires must be bent to the exact centres of the holes, at the same time ensuring that the component is not damaged. With some types of resistor, it may be necessary to scrape the paint from the wires before they are formed.

When inserting the wires in the holes in the circuit board, the copper foil should be supported by a finger nail, close to the hole, to guard against pushing the copper away from the board.

Before soldering the joints, ensure that the component is pressed hard against the top of the board, and maintain this pressure while the solder is hardening. If a gap is left between the component and the board, subsequent pressure on the component, will tend to break the bond between the foil and the insulation.

When soldering, the iron should be applied to the wire, and the solder touched to the copper foil; immediately the solder runs, the iron should be removed. When the joint has cooled, the surplus wire should be cut off.

Heat shunts should, where possible, be used when replacing semiconductors, and the method of forming the wires should be copied from the faulty component.

Before re-assembly, inspect the circuit board for drops of solder splashed over its surface.

If a portion of the printed wiring is damaged, it may be cut out with a very sharp knife, and replaced by a piece of thin copper wire. This should be soldered between two points where components are fastened to the board, rather than to the foil itself.

Semiconductor Precautions

Low impedance devices such as buzzers, must not be used for point-to-point wiring checks. An ohmmeter may be used, provided that the current passed does not exceed 1mA, and that polarity is observed. In the majority of these instruments, the negative pole of the internal battery is connected to the positive terminal of the meter.

Electric soldering irons must always have an effective earth connection to prevent damage from leakage current.

When connecting transistors or semiconductor diodes, heat shunts should be applied to the lead-out wires to prevent heat reaching the component. The shunt which may be a pair of long-nosed pliers, must not be removed before the joint has cooled.

8.2 ORDERING SPARES AND REPLACEMENTS

When ordering spares and replacement parts, the following information should be given to ensure prompt deliver and the receipt of correct items.

(a) Type and serial number of the equipment as shown on the label.

(b) Modification state of equipment, as indicated by strike-off number on modification label.

(c) Component reference on circuit diagram, and circuit diagram number and/or figure number.

Redifon reserves the right to incorporate in equipment and to supply as spares, alternatives to components detailed in handbooks and spares schedules. The Redifon Components Group undertakes a thorough investigation of alternative components, and their suitability and interchangeability is thereby assured.

Spare Parts Schedule

A spare parts list for the GKR206A is included in Schedule No. CSD 110 which is available on request from Redifon Ltd.

Workshop Tools and Expendable Stores Schedule

Schedule No. 1439, listing workshop tools and expendable stores is available on request from Redifon Ltd.

8.3 PRINTED CIRCUIT ASSEMBLIES

The OP numbers shown on circuit diagrams refer to the printed boards only. The circuit is identified by the corresponding assembly number shown in Table 8.1.

Table 8.1 Printed Circuit Assembly Drawing Numbers

Module	*Circuit*	*Board No.*	*Assy. Drg. No.*
Synthesizer	1kHz Trimmer Board (P27813/S)	OP/5489/PC	60/5450/M
	1kHz Crystal Switch Assy. (P27813/S)	OP/5490/PC	37/5450/M
	10kHz OSC Mixer Assy. (P27813/S)	OP/5495/PC	289/5450/L
	10kHz Crystal Switch Assy.	OP/5491/PC	91/5450/M
	100kHz & 1MHz Crystal switch and OSC board Assy.		P27445/S
	10kHz Amp. Filter Board Assy.	OP/5486/PC	361/5450/M
	100kHz Mixer Amp. Board Assy.	OP/5487/PC	415/5450/C
	1MHz Mixer Amp. Board Assy.	OP/5488/PC	487/5450/M
	1MHz Trimmer Board Assy. (P27445/S)	OP/5494/PC	260/5450/M
	100kHz OSC Board (P27445/S)	OP/5492/PC	127/5450/M
	1MHz OSC Board (P27445/S)	OP/5493/PC	199/5450/M
Front Panel and Chassis	Printed Circuit Board	OP/5519/PC	171C/5446/M
	Gain Control Circuits	OP/5482/PC	212C/5446/L
	Automatic Gain Control	P89425	361C/5446/L
	AF Gain Control	P28427	379C/5446/L
	Filter	P28432	154C/5446/M
IF/Audio	Printed Circuit Board	OP/5483/PC	P28328/S
	Printed Circuit Board	OP/5585/PC	343/5448/M
	Printed Circuit Board	OP/5484/PC	169B/5448/L

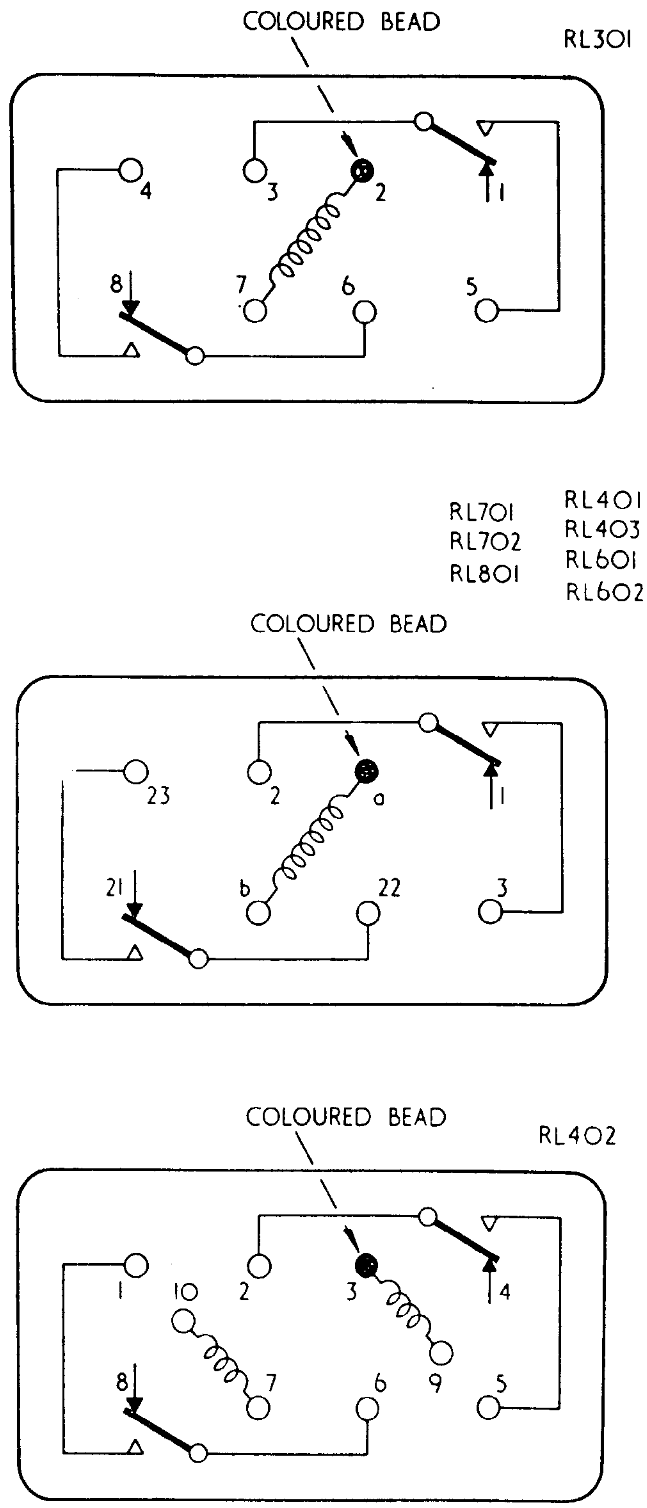

Fig. 8.1—GKR206A—Relay Wiring Connections

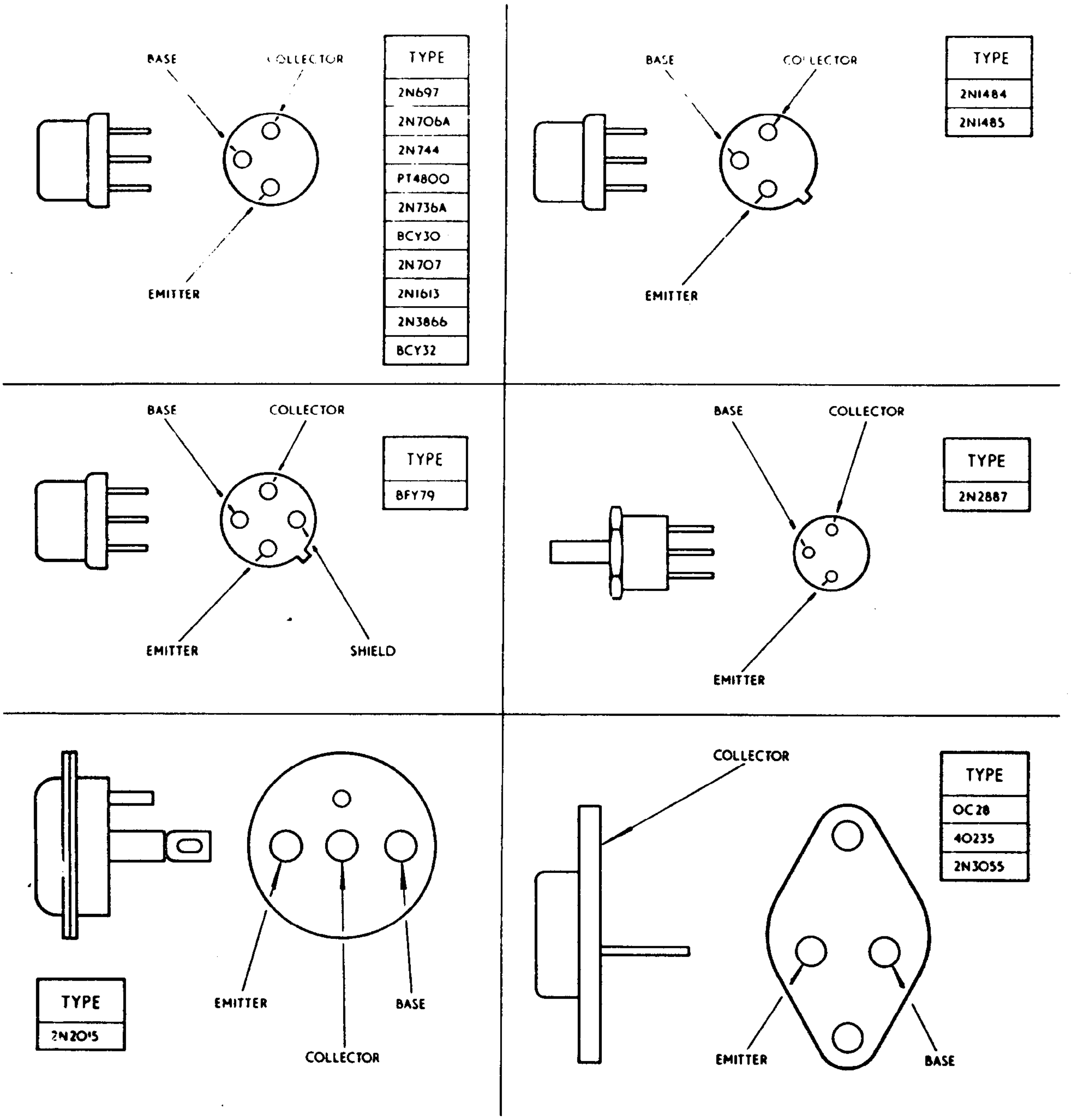

Fig. 8.2—GKR206A—Transistor Wiring Connections