

Philips - TMC

PHILIPS TELECOMMUNICATIONS MANUFACTURING COMPANY LIMITED

FM828

VHF RADIOTELEPHONE

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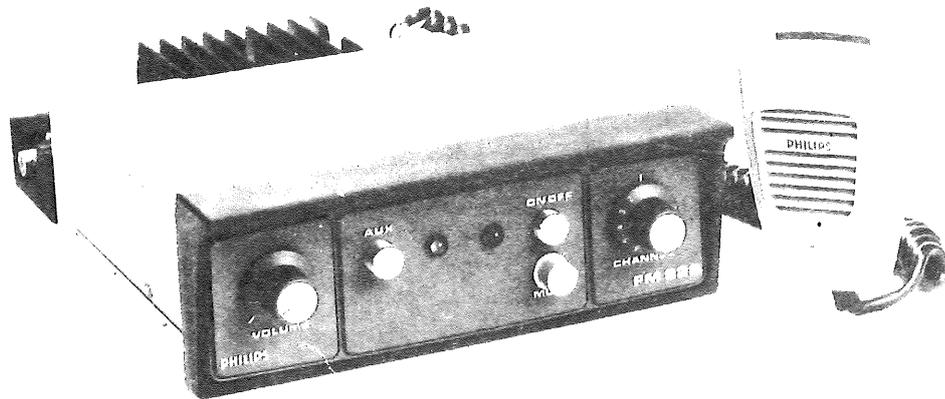
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This handbook is for the maintenance of telecommunication equipment. The performance figures quoted are typical and are subject to normal manufacturing and service tolerances. The right is reserved to alter the equipment or specifications in the light of future technical development.

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FM828 MULTICHANNEL (Local Control)

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SECTION I. INTRODUCTION

1.1 GENERAL

The FM828 radiotelephone is a compact solid state transmitter-receiver employing phase modulation and operating in the VHF bands of 146 to 175 MHz (A Band), 132 to 157 MHz (B Band) and 68 to 88 MHz (E Band). Each band is available in single channel, three channel, or ten channel versions. Channel spacing for the standard FM828 model is 30 KHz, and the transmitter power output is 25 watts. The unit operates from 12-volts (nominal) d-c supply, negative earth only.

The design of the FM828 is based on the fundamental design principles of isolating the transmitter power amplifier electrically, mechanically and thermally from other sections of the unit; and isolating the receiver mechanically and electrically from the transmitter exciter. The transmitter-receiver thus has the ability to operate as a single or two-frequency simplex unit, or as a duplex unit with continuous transmission rating.

1.1.1 MECHANICAL DESIGN

A diecast chassis is employed to provide a firm housing for all electrical and mechanical components, with a capability of extension for special applications thus enabling additional requirements to be housed in the one unit. Fibreglass circuit boards are used exclusively and the main receiver and exciter boards are hinged to provide easy access for service and adjustment.

1.1.2 CIRCUIT DESIGN

Modern circuit techniques have been employed in the design of the FM828 to provide a versatile and reliable unit.

The transmitter exciter utilises a phase locked loop system which reduces tuning adjustments to a minimum, renders alignment non-critical, and produces a consistent performance. The RF power amplifier is isolated and fully enclosed, and a generous heatsink provides adequate protection to permit continuous operation at specified output up to 60°C under any loading condition. No mismatch protection circuits are included or required. The receiver employs a single IF conversion system utilising two crystal filters and integrated circuit coincidence detector. A non-destructive polarity protection system ensures full protection of the unit against reverse polarity.

1.2 CONTROL

The FM828 is available in two basic versions, for either locally or remotely controlled operation. All input and output connection facilities are located at the rear of both models.

1.2.1 LOCAL CONTROL

The unit has been designed to be suitable for in-dash mounting in the space normally occupied by a car radio. However, a low profile mounting tray is available to provide under-dash mounting, and the transmitter-receiver is retained in the mounting tray by snap catches requiring a special key to effect release, thus providing anti-theft protection. Additionally, the mounting hardware can be inverted to provide a floor mounting facility.

All models are suitable for operation with either a handset/speaker assembly or a fist microphone and separate external loudspeaker. Where required, a loudspeaker capable of handling 3 watts can be fitted internally.

The front fascia, which includes a resilient rubber surround, holds all the controls and indicators accessible to the operator, comprising:

- a. Rotary volume control
- b. Rotary mute control
- c. Pushbutton power ON/OFF switch
- d. Pushbutton (AUX) mute defeat switch as a standard option, which may be rewired for other facilities.
- e. Rotary channel selector switch on multichannel version only.
- f. LED 'Transmitter On' indicator (Red) which may be rewired for power ON/OFF or other facilities.
- g. LED 'Channel Received' indicator (Green), which may be rewired for other facilities.

Plug and socket connections for ancillary items are provided at the rear comprising:

- h. Locking 5-pin, 45° spacing DIN socket, for fist microphone or handset/speaker
- i. Locking 5-pin, 60° spacing DIN socket, for external loudspeaker and external facilities.
- j. Locking BNC coaxial socket for antenna connection.
- k. Pressure locking 2-pin polarised d-c power input socket.

1.2.2 REMOTE CONTROL

The remotely controlled version is suitable for mounting in any location which is inaccessible to the operator and operated from a remote control unit. The low-profile mounting tray with the ability to mount the unit in all attitudes, as given in paragraph 1.2.1, is again employed.

A blank front panel is fitted as no external controls are required on the unit. A 10-pin plug and socket connection provides access to the unit from a remote control unit, and a second 10-pin socket provides connection of a multichannel switch unit for multichannel versions. Color coding of the sockets provides identification for correct location of the two plugs.

The remote control units available, as described in Section 8, provide the operator with controls and indicators comprising:

- a. Rotary volume control
- b. Rotary mute control
- c. Slide type d-c power ON/OFF switch
- d. Slide type AUX switch, used as mute/call switch when selcal is fitted.
- e. LED indicator, which may be connected for either 'DC Power ON', 'Transmit ON', or Selcall 'Call Received'.
- f. Rotary channel selector switch, for multichannel version only.

The fist microphone and extension loudspeaker or hand/speaker assembly, are connected internally in the remote control unit.

1.3 OPTIONS

The FM828 is available in special versions for 12.5 KHz or 50/60 KHz channel spacing, and for duplex and repeater modes of operation. The extendable chassis permits the inclusion of many special facilities, for example, channels in excess of ten, dual receivers, special forms of selective calling, etc.

1.3.1 INBUILT FACILITIES

Options included in all basic FM828 units which can be rendered operative by internal connections are:

- a. Transmit inhibit, which prevents transmission when a carrier is being received.
- b. Carrier received indicator, which indicates that a transmission is in progress.
- c. Transmit limit timer adjustable up to 1 minute, which is automatically reset on re-application of the press-to-talk switch.

1.3.2 ADDITIONAL OPTIONS

Additional options, which can be included in kit form to provide inbuilt facilities are:

- a. Microphone compression amplifier providing up to 35dB of compression.
- b. Quiet base/quiet mobile SC829 system to eliminate superfluous traffic.
- c. Selective calling encode/decode latched visual call received indication and automatic acknowledgement, maximum capacity of 390 mobiles.

The following table shows the combinations of additional options that can be employed with the basic model variations.

BASIC VARIANTS							OPTION COMBINATIONS		
Code No.	1 Ch	3 Ch	10 Ch	A/B Band	E Band	Int Ls	Mic Comp Amp	SC829	Selcal
9585-828-26000	X			X		X			
9585-828-23000	X			X		X	X		
High Band Single Channel Local	X			X		X		X	
	X			X		X			X
	X			X		X	X	X	
9585-828-27000 Low Band Single Channel Local	X				X	X			
	X				X	X	X		
	X				X	X		X	
	X				X	X	X	X	X
	X				X	X	X	X	X
9585-828-28000 9585-828-24000 High Band 3-Channel Local		X		X		X			
		X		X		X	X		
		X		X		X		X	
		X		X		X	X	X	X
		X		X		X	X	X	X
9585-828-29000 Low Band 3-Channel Local		X			X	X			
		X			X	X	X		
		X			X	X		X	
		X			X	X	X	X	X
		X			X	X	X	X	X
9585-828-31000 9585-828-33000 High Band 10-Channel Local			X	X		X			
			X	X		X	X		
			X	X				X	
			X	X			X	X	X
9585-828-32000 Low Band 10-Channel Local			X		X	X			
			X		X	X	X		
			X		X			X	
			X		X		X	X	X

1.4 LOW POWER BASE STATION

Used in conjunction with a power supply unit PS843, the locally controlled FM828 (as shown) or the remotely controlled FM828 with a CU938 provides a compact low power base station.



SECTION 2. TECHNICAL DATA

Data figures shown in paranthesis are typical values.

Performance data relates to unit operated at 13.8-volts d-c and 25°C.

2.1 GENERAL

Operating Voltage:	10.8 to 16.2-volts d-c						
Current Consumption:	Receive - muted > 220mA (185mA) Receive - rated audio > 600mA (550mA) Transmit - B Band > 5 Amps (4.5A) A & E Bands > 4.5 Amps (4.0A)						
Polarity:	Negative earth only						
Operation:	F3 phase modulation, single or two-frequency simplex						
Dimensions:							
Local Control Version	23.5cm deep, 19cm wide, 6cm high						
Remote Control Version	22.7cm deep, 18cm wide, 5cm high						
Remote Control Unit CU938	6cm deep, 17.5cm wide, 6cm high						
Remote Control Unit CU941	6.5cm deep, 9.3cm wide, 5.3cm high						
Weight:	2 Kilogram (approximately)						
Frequency Range:	<table><tr><td>68 - 88MHz</td><td>(E Band)</td></tr><tr><td>132 - 157MHz</td><td>(B Band)</td></tr><tr><td>146 - 175MHz</td><td>(A Band)</td></tr></table>	68 - 88MHz	(E Band)	132 - 157MHz	(B Band)	146 - 175MHz	(A Band)
68 - 88MHz	(E Band)						
132 - 157MHz	(B Band)						
146 - 175MHz	(A Band)						
Switching Bandwidth:	<table><tr><td>± 400KHz (Low Band)</td></tr><tr><td>± 500KHz (High Band)</td></tr></table> For max. 1dB change in RF sensitivity and max. 0.25dB change in RF output power	± 400KHz (Low Band)	± 500KHz (High Band)				
± 400KHz (Low Band)							
± 500KHz (High Band)							
Channel Spacing:							
Standard Version	25/30KHz (Standard Filter 30KHz)						
Option available	12.5KHz or 50/60KHz						
Frequency Stability:							
25/30KHz Channel Separation	± 10ppm 0°C to 60°C						
12.5KHz Channel Separation	± 6ppm 0°C to 60°C						
Input/Output Impedance:	50Ω unbalanced (nominal)						
Tx/Rx							

Duty Cycle: Continuous transmission up to 60°C ambient temperature. Protected against short and open circuit conditions for 5 minutes transmission at 65°C

Operating Temperature: -10°C to +65°C

2.2 RECEIVER

Audio Output: 3 watts into 5Ω at > 7% (3%) THD
4 watts into 4Ω at > 10% (7%) THD

Audio Frequency Response: Within +1dB to -3dB of a 6db/octave de-emphasis curve over 500Hz to 3000Hz relative to the response at 1KHz. (300 to 3000Hz available as option)

AF Regulation: > 1dB (0.5db) for an RF signal input variation of 100dB relative to 0.35uV pd input

Residual Noise: < 60dB (63db) relative to 2 watts at ±5KHz deviation at 1KHz modulating frequency

Audio Distortion: > 3% (2%) for 3KHz deviation at 1KHz modulation frequency and 300mW output power

Blocking:
(to APO Specification
RB 206/207) < 150mV (180mV) emf at 150KHz from on-channel frequency. (Typical value corresponds with 98db rejection)

Intermodulation: < 68db (71db). (Typical value represents a margin of +21db relative to APO Specification)

Spurious:
(to APO Specification
RB206/207) Image - < 12mV (20mV) emf. (Typical value corresponds to 88db rejection)
Other - < 25mV (50mV) emf

Selectivity:
(to APO Specification
RB206/207) < 16mV (25mV) emf. (Typical value corresponds with 80db rejection at ±26KHz)

Sensitivity: < 12db SINAD at 0.37uV (0.35uV) pd for ±3KHz deviation at 1KHz and 300mW output power into 5 ohms

Mute Range:

Mute Threshold:

≥ 0.3 μ V (0.25 μ V) pd

Mute Maximum:

≤ 0.6 μ V (0.75 μ V) pd

Typical range corresponds to 6db - 24db
SINAD for \pm 3KHz at 1KHz

Mute Hysteresis:

Built in, typically 3.5db RF level at mute
maximum

Modulation Acceptance Bandwidth:

≤ \pm 10KHz (\pm 12KHz) (EIA method)

2.3 TRANSMITTER

RF Output Power:

25 watts \pm 0.5db

Spurious Radiation:

≥ 1 μ W for spuri $f_{carrier} \pm f_{xtal}$ (\leq 75db)

All other spuri (harmonic and non-harmonic)
less than 0.2 μ W (\leq 82db)

FM Noise:

≤ 50db S/N relative to 3KHz deviation at
1KHz modulation measured without de-emphasis
in a bandwidth 300Hz to 15KHz

Audio Sensitivity:

≥ 5mV rms input for 3KHz deviation at 1KHz
modulation (adjustable to ≤ 50mV)

AF Distortion:

≥ 3% (2%) (with de-emphasis/470 μ Second) for
3KHz deviation at 1 to 3KHz modulation

Modulation Response:

Within +1db to -3db of a 6db/octave pre-
emphasis curve over 300Hz to 3000Hz relative
to deviation at 1KHz at input level below
limiting

2.4 CRYSTAL SPECIFICATION

When ordering crystals the frequency should be converted from MHz to KHz and given to three places of decimals.

2.4.1 TRANSMITTER

Crystal Specification:

9681 Type Q 16A

Crystal Frequency Formula:
A, B, E Band

= $\frac{f(\text{carrier})}{8}$

2.4.2 RECEIVER

2.4.2.1 10.7MHz IF

Crystal Specification:

9691 Q16A

Crystal Frequency Formula:
A & B Band

$$\frac{f(\text{carrier}) - 10.7}{3}$$

E Band

$$\frac{f(\text{carrier}) + 10.7}{2}$$

2.4.2.2 10.8MHz IF

When the allocated receiver channel frequency is close to a multiple of 10.7MHz it is necessary to change to a IF frequency of 10.8MHz and use a new formula to calculate the crystal frequency. The affected frequencies are given with the formulae below.

Crystal Specification:

9691 Q16A

Crystal Frequency Formula:

A Band - 149.8MHz ± 170KHz
160.5MHz ± 170KHz
171.2MHz ± 170KHz

B Band - 130.1MHz ± 150KHz
149.8MHz ± 150KHz

$$\frac{f(\text{carrier}) - 10.8}{3}$$

E Band - 74.9MHz ± 90KHz

$$\frac{f(\text{carrier}) + 10.8}{2}$$

SECTION 3. CIRCUIT DESCRIPTION

The FM828 transceiver comprises four basic board assemblies, i.e., Receiver, Audio PA and Power Supply, Exciter, and Transmitter PA pc boards. The location of the boards in the transceiver is given in Figure 4. 1, Section 4 - Alignment Procedure. Two minor pc boards, Divider and IF preamplifier, are daughter boards located respectively on the Exciter and Receiver pc boards. The following circuit description is referenced to the circuit diagrams in Section 7, with the block diagrams Figures 3. 1 and 3.2 providing additional reference.

3.1 RECEIVER

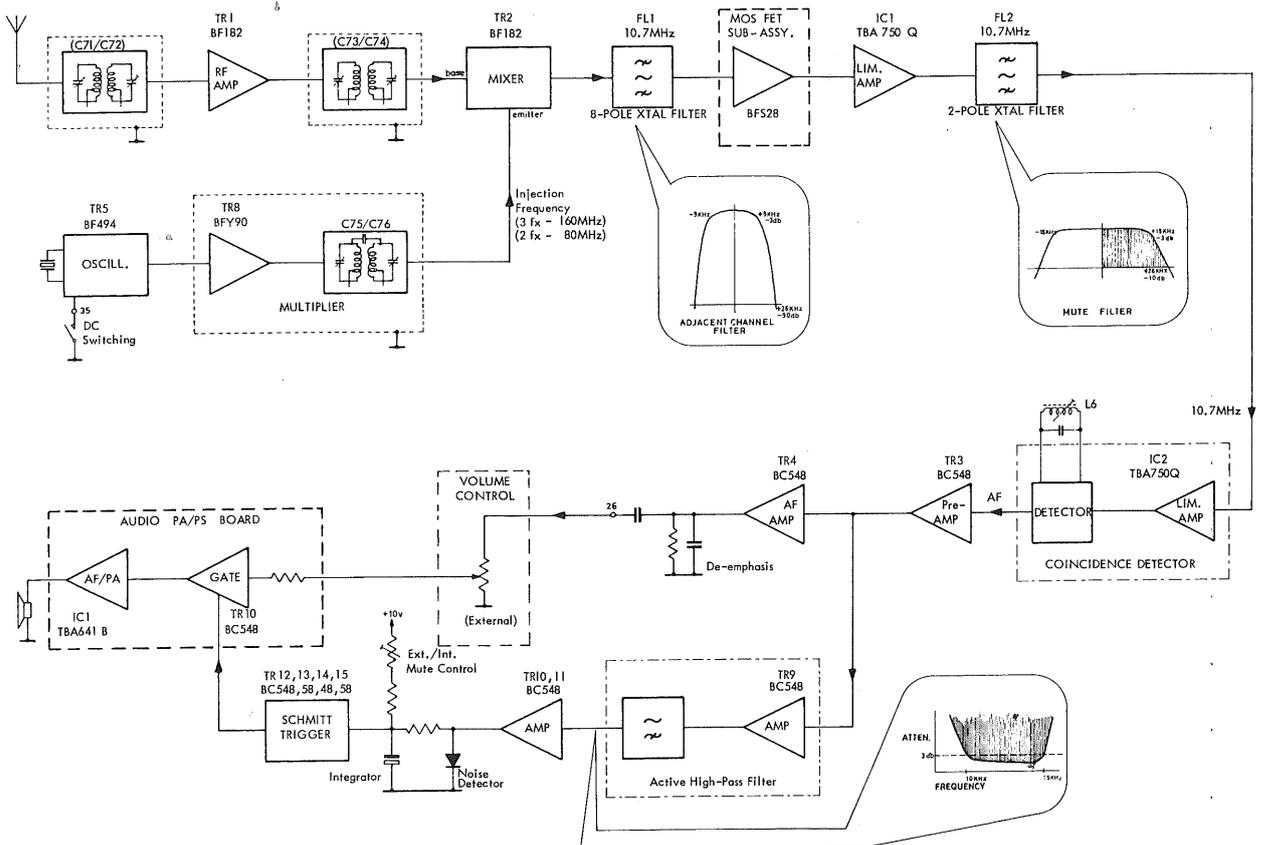


Figure 3. 1 Receiver Block Diagram

The receiver is a single conversion set with an IC IF amplifier operating at 10.7 MHz. The RF input signal from the antenna filter, located in the Transmitter PA sub unit, is coupled to a common base RF amplifier (TR1) via a pair of mutually coupled capacitive tuned circuits. A second pair of similarly tuned circuits between the RF amplifier and mixer TR2 provides additional selectivity to give an overall image frequency ($f_c - 21.4$ MHz for A and B bands, or $f_c + 21.4$ for E Band) rejection of at least 85dB. The mixer collector circuit is untuned and provides the correct matching for the adjacent channel 8-pole crystal filter FL1.

In the high band (A and B) versions the mixer injection frequency is given by $f_{inj} = f_c - 10.7$ MHz and for the low band (E) $f_c + 10.7$ MHz. The crystal oscillator frequency is tripled in the high

band, whereas a doubler is used in the low band. The multiplier transistor is TR8, and a pair of coupled tuned circuits as collector load provide selectivity for the desired injection frequency. FL1 has a -3dB bandwidth of ± 9 KHz and rejects the adjacent channel by more than 90dB. There is provision on the basic board for up to three oscillators and channel-selection is by emitter d-c switching. This is mandatory for the remote control version since the control unit could be separated from the mobile by up to 5.5 metres. The oscillator circuit is a modified "Colpitts" type and requires a third overtone series crystal. Output matching of the channel crystal filter (FL1) is provided by a coil at the input of the IF pre-amplifier. The preamplifier is a protected MOSFET which facilitates matching through its comparatively high input impedance. A limiter/amplifier ICI follows the IF preamplifier. Since the IF preamplifier and ICI are wide band devices, a second filter is required to limit the bandwidth of the IF out-of-band noise. This prevents noise saturation of the limiter/amplifier discriminator (IC2). A 2-pole crystal filter (FL2) of ± 15 KHz -3dB bandwidth gives the best compromise between overall sensitivity and mute performance. If the bandwidth of FL2 is too small the mute performance is affected by noise products generated by the effect of crystal filter phase shift on angle modulated signals.

IC2 operates as both limiter and coincidence detector. The only adjustment is L6 which is tuned for maximum AF output. Transistors TR3 and TR4 provide amplification for AF and noise before de-emphasis which is provided on the collector of TR4. The external volume control adjusts the AF input level to ICI in the Audio PA/Power Supply sub unit. Transistor TR9 on the receiver board forms the basis of an active high-pass filter for separating AF signals from the noise required for the mute circuit. The cut-off frequency is 10 KHz which provides a 5 KHz noise bandwidth input to amplifier TR10/II. The mute circuit comprises detector, integrator, and Schmitt trigger. The output detector/integrator is formed by a diode/capacitor network. The output state of the Schmitt trigger (corresponding to either receiver muted or unmuted) is dependent on the net charge on the integrator capacitor. This charge is affected by two sources - the rectified noise from the detector, and the d-c current supplied from the 10-volt regulator and adjusted by the mute potentiometer. Since the rectified noise level decreases with increased RF level, minimum and maximum mute setting is simply obtained by controlling the amount of d-c current via the mute potentiometer. Preset potentiometer R99 accounts for spread in demodulated output from the coincidence detector; it is set in the factory and is not to be adjusted in the field to preset the audio output.

3.2 AUDIO PA AND POWER SUPPLY

This printed circuit board contains the circuitry for the following functions:

- a. Audio power amplifier
- b. Reverse polarity protection
- c. RF power control
- d. 10 volt regulator
- e. PTT circuit
- f. Transmit limit timer

3.2.1 AUDIO POWER AMPLIFIER

An audio output power of > 3 watts into 5Ω is provided by an integrated circuit amplifier (ICI). Transistor TR10 provides $> 60\text{dB}$ muting by shunting the input signal to ground when gated from the Schmitt trigger.

3.2.2 REVERSE POLARITY PROTECTION

Non-destructive polarity protection is provided by polarising relay RL1 with a series silicon diode (D1). The relay also provides a simple method of remotely switching full load current.

3.2.3 RF POWER CONTROL

3.2.3.1 A and E Bands

Control of the RF power output is effected by controlling the voltage to the transmitter PA driver (TR1 - Tx PA pc board) as the supply voltage varies from 10.8 to 16.2-volts. Transistors TR2/3 and zener diode D8 form a reference source of approximately 10 volts on Pin 1 for supply voltages between 11-volts and 12.5-volts dc. As the supply voltage exceeds 12 volts, zener diode D7 conducts and the differential voltage amplified by TR1 progressively reduces the voltage at Pin 1 by controlling the base voltage of TR2. R37 affects the d-c gain of TR1 and is adjusted during alignment to ensure that the RF power does not exceed 32 watts at maximum supply voltage.

3.2.3.2 B Band

Transistors TR2/3 and zener diode D8 form a d-c regulator to maintain a constant 5.5-volts dc at pin 1, set by R37, for supply voltage in excess of 11-volts dc.

3.2.4 10 VOLT REGULATOR

The regulator circuit supplies a regulated 10-volt source for the exciter, receiver, and option pc boards. The base-emitter junction of transistor TR6 and zener diode D9 provide the reference source for the regulator. Supply voltage variations, or voltage perturbations due to load change at the collector of the series pass transistor TR4, are reflected as current perturbations in the base-emitter junction of TR6. The current change is amplified by TR5/6 and provides the necessary load regulation by controlling the base current of transistor TR4. Diode D4 provides short circuit protection by turning off current amplifier TR5 and limiting the base current drive to series pass transistor TR4.

3.2.5 PTT CIRCUIT

Transistors TR7 and TR8 form the PTT circuit to provide switching of the aerial changeover relay located on the Tx PA assembly. When link LK1 is fitted, PTT is effected by switching the emitter resistor of TR7 (R35) to ground. TR7 saturates and switches on TR8, supplying approximately 9.7 volts to the relay. The PTT circuit has been designed to permit such optional functions as transmitter inhibit, simple talk-through repeater operation, and integration with the transmit limit timer.

The VCO transistor (TR1) is operated in a common base mode and tuning is effected either manually by tuning coil L1, or electronically by varying the capacitance (by the d-c feedback signal) of a varicap assembly. Manual tuning is for coarse alignment of the frequency, whereas the varicap tuning accounts for channel selection and phase modulation.

An output power of approximately 1mW is available from the VCO. However, since the transmitter PA requires 30mW/50Ω a buffer (TR2) and tuned collector amplifier (TR3) provides the necessary power gain. A small portion of the output power from TR3 is injected into a digital divider which results in an output frequency of exactly 1/8 of the VCO RF frequency. This switching signal is applied to one side (pin 1) of a double balanced phase comparator (ICI).

The channel oscillator (TR10) output is injected to the first of two single section phase modulators via a buffer amplifier (TR9). The buffer prevents the phase modulator tuning affecting oscillator netting. TR8 is the phase modulator amplifier and has the second single section circuit as a collector load. Since the tuned circuit type phase modulator also generates AM, the output from TR8 is coupled to the other input of the phase comparator (pin 8) by a limiter/amplifier.

A voltage doubler/detector circuit is also connected to the output of TR8 to permit alignment of the modulator tuned circuits, i.e., maximum d-c output corresponds with peak tuning. If the crystal oscillator/phase modulator is faulty and no output occurs, then the transmitter PA driver is disabled through transistor switch TR6 since the VCO would free-run with a typical frequency stability of <1%.

If the VCO has been coarsely aligned to a frequency within the feedback system (phase locked loop) catching range, the VCO is automatically retuned and the frequency becomes 8 times the channel crystal frequency. The system catching window is approximately given by $8f_{\text{crystal}} \pm 3\text{MHz}$. Hence the RF catching range is approximately 6MHz, which, is more than adequate for a 1MHz RF bandwidth as specified for equipment (limit on RF bandwidth is the phase modulator bandwidth.)

When the loop is phase locked (synchronised) the switching signals at the phase comparator inputs result in a switched d-c current at the outputs (pins 6 and 12), which, when integrated to a d-c voltage is fed back to the VCO varicaps. If L1 is tuned within the catching range, the phase shift between the two comparator input signals will vary resulting in a varying duty cycle switched output current. The integrated feedback d-c voltage will now change in a manner to keep the VCO frequency always 8 times f_{crystal} .

Phase modulation of the VCO occurs through a similar mechanism since the reference signal will vary in phase resulting in a phase modulation of the feedback voltage to the varicaps. This generates the required frequency deviation of the VCO.

If the VCO is tuned outside the catching range, the feedback system will search over the holding range in an attempt to synchronise. Consequently an a-c error signal corresponding to the difference between 1/8 VCO instantaneous frequency and the crystal reference frequency occurs on the feedback line. The VCO still produces RF power but now over the spectrum given by the catching range. However, a voltage doubler/detector on output pin 12 of ICI detects the a-c error signal and prevents the unsynchronised spectrum from being transmitted by switching off the driver d-c supply through transistor switch TR5.

Transistor TR3 is the modulation preamplifier with a sensitivity of 5mV rms for line-up deviation (± 3 KHz/1 KHz). Potentiometer R96 provides de-sensitisation for noisy environments or sensitive microphone, and network C58/R70 provides pre-emphasis. Clipping for deviation limiting comprises two stages: an active clipper (TR4) and a passive clipper DI5/DI6. The combination results in symmetrical time/amplitude clipping, giving low distortion at line-up and good limiting characteristics over a large input range.

Network R77/C63 provides de-emphasis after the clipper and is followed by buffer TR15. The low-pass active filter TR16/TR17 limits the AF bandwidth to 3 KHz and provides a cut-off rate of more than 18dB/octave from 6 to 12 KHz. Transistor TR19 is the deviation amplifier which drives the phase modulator varicaps, whilst potentiometer R95 provides deviation control.

3.4 TRANSMITTER PA/ANTENNA FILTER

The transmitter PA is a conventional tuned design delivering a 25 watts ± 0.5 dB at 13.8 volts into 50 Ω for 30mW drive power. Four stages are used in the line up. TR1 is a Class A stage which is d-c supplied from the RF power control circuit in the power supply pc board (see paragraph 3.2.3). If the exciter becomes unsynchronised, then the PA is automatically disabled by removing the d-c supply to TR1. The three stages composed of TR2, TR3, and TR4 in Class C configuration provide progressive power gain up to 25 watts. Test points TP1, TP2, TP3, TP4, and TP5 provide ready means of fault isolation.

Because of adequate heatsinking a VSWR circuit is not required since all transistors operate within their failsafe limits with adequate margin, regardless of any VSWR or phase angle of the output load. The harmonic low-pass filter is connected as an antenna filter which also suppresses oscillator radiation from the receiver.

SECTION 4. FIELD ALIGNMENT PROCEDURE

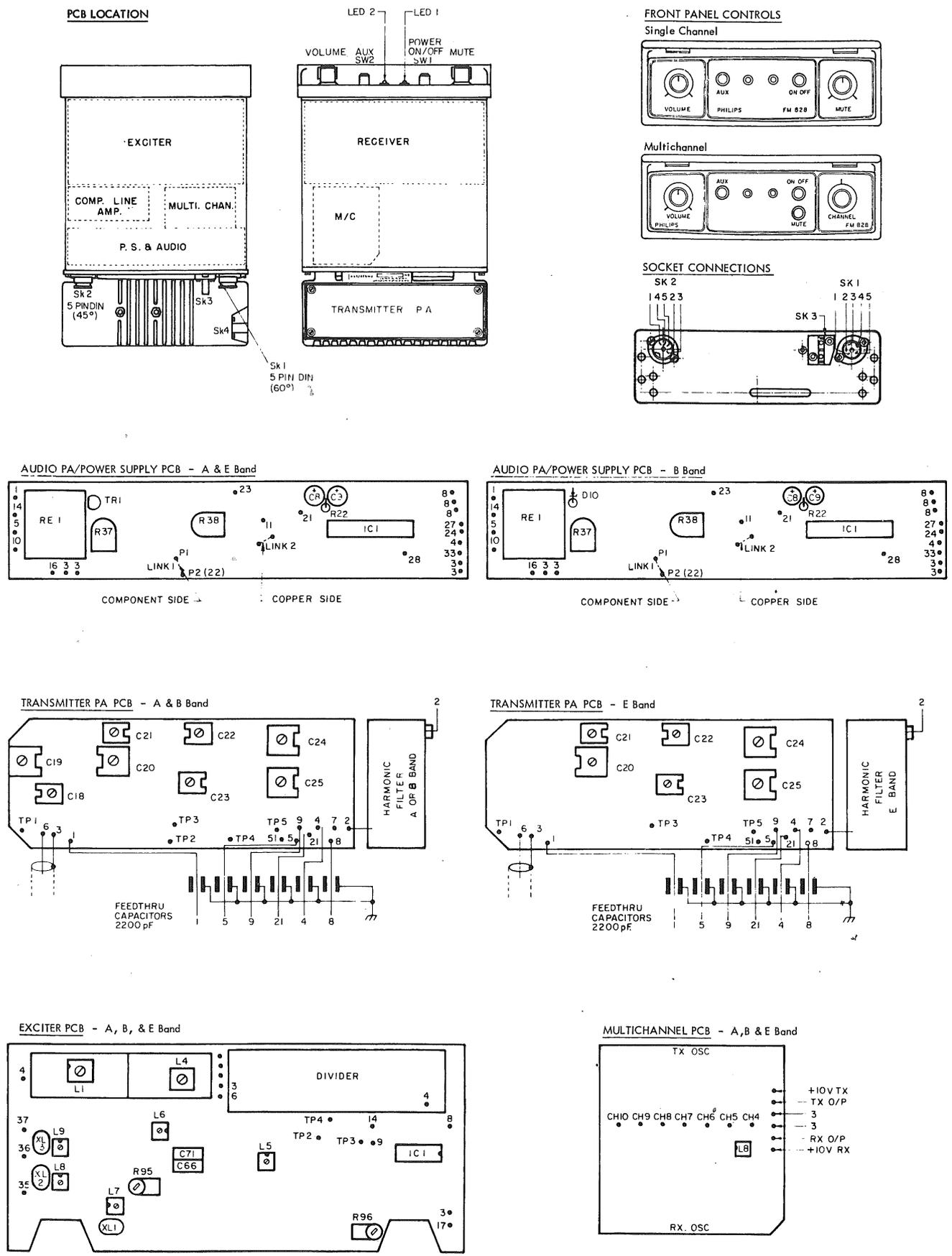


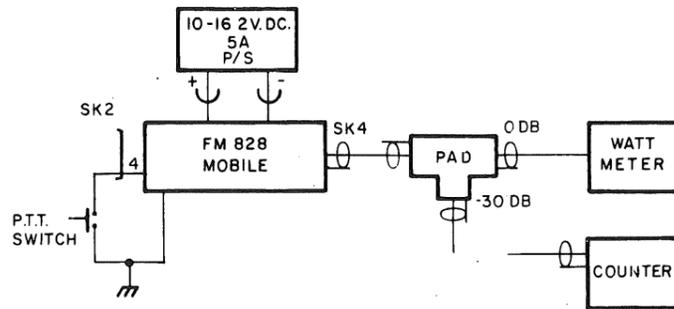
Figure 4.1 PCB Layout and Test Point Location (Transmitter)

GENERAL INSTRUCTIONS

1. A non-metallic tuning tool should be used for all tuning coil adjustments, and an insulated tool for all other adjustments where short circuits could occur.
2. The negative lead of all test equipment should be connected to pin 3 of each appropriate pcb unless otherwise stated.

PRELIMINARY ADJUSTMENTS

Set up test equipment as shown in following diagram.



TEST POINT PCB	TEST EQ'T (RANGE)	PROCEDURE	TYPICAL READING
		Prepare as shown in Fig 1, with transceiver OFF Set external power supply to 13.8-volts dc	
		Set VOLUME control fully c.c.w. Set MUTE control fully c.w.	
PS/Aud PCB pin 8	AVO (25V dc)	Switch ON, and adjust R38 (PS/Aud) for 10-volts	10V ±0.1V
		Set MUTE control fully c.c.w. Set VOLUME control for audible noise	

EXCITER PC BOARD

Prior to commencement of Exciter pcb alignment set the ferrite slugs of L1, L5, and L6 flush with former top, and L4 slug to midway in coil.

TEST POINT PCB	TEST EQ'T (RANGE)	PROCEDURE	TYPICAL READING
Exciter PCB pin 4	AVO (10V dc)	Check AVO reading zero, operate PTT and ensure reading increases to 10-volts dc	10V ±0.1V
Exciter PCB (-) TP4 (+) pin 3	AVO (10V dc)	Operate PTT, and adjust L5 and L6 for maximum reading on multimeter	A & B Band 1.5V (S/C) 0.5V (M/C) E Band 2.0V (S/C) 0.8V (M/C)
Exciter PCB TP2 (via 10k)	AVO (10V dc) CRO (1mS/cm)	Operate PTT, and adjust L1 c/w until a reading of 5-volts is obtained and a d-c signal only is observed on the CRO. NOTE: If the phase locked loop is unsynchronised an error signal of approx. 4-volts p/p will be observed.	5V ±1V
Exciter PCB TP3	AVO (10V dc)	Check AVO for zero reading when PLL synchronised	

PA PC BOARD

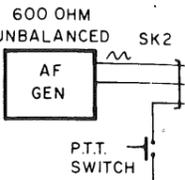
TEST POINT PCB	TEST EQ'T (RANGE)	PROCEDURE	TYPICAL READINGS		
			A-Band	E-Band	B-Band
		Set external supply voltage for appropriate band	15.6V	16.2V	11.0V
PS/Aud PCB pin 1	AVO (10V dc)	Operate PTT, and adjust R37 (PS/Aud pcb) c.c.w. until AVO reading is obtained as shown.	7.5V	7.0V	5.5V
		Reset external supply to 13.8-volts dc for A & E Bands, B Band to remain set for 11-volts	13.8V	13.8V	11.0V
PA PCB (+) TP5 (-) TP2	AVO (300uA dc)	On A & B-Band only, operate PTT and adjust C18 and C19 for maximum reading within the range 100 to 260uA depending on frequency. Adjust L4 (Exciter pcb) for maximum reading, (tuning is broad) release PTT.	180uA		140uA
PA PCB (+) TP5 (-) TP3	AVO (30uA dc)	All Bands, operate PTT and adjust C20 and C21 for maximum reading within the range 5 to 30uA depending on frequency. E-Band, adjust L4 (Exciter) for maximum reading. On A & B-Band only, if power output is indicated adjust C24 and C25 for maximum output to prevent excessive dissipation in TR4 and R12.	15uA	15uA	10uA
PA PCB (+) TP5 (-) TP4	AVO (30uA dc)	Operate PTT, and adjust C22 and C23 for maximum reading within the range 15 to 40uA depending on frequency. NOTE: Careful alternate adjustment of these trimmers is required as tuning is broad and only one setting combination results in full power output.	30uA	30uA	20uA
		Disconnect AVO and adjust C24 and C25 for maximum power output.	25W	25W	>17W
		Fit dummy tuning cover to PA and adjust all trimming capacitors for maximum (adjustment will be minimal).			
		B-Band only, Set supply voltage to 13.8-volts, operate PTT and, if necessary, detune C23 to reduce RF power to 25 watts.			25W
		Set external power supply to 16.2-volts dc, and check RF power is 29 watts when PTT is operated.	29W ±4W	29W ±4W	29W ±4W
PS/Aud PCB pin 1	AVO (10V dc)	On A & E-Band, if power output outside limit above, readjust R37 (PS/Aud pcb) ensuring that the voltage at pin 1 is greater than 6.5-volts with PTT operated.	>6.5V	>6.5V	
		Readjust supply to 13.8-volts dc, and recheck power output with PTT operated on A & E Bands	25W ±1W	25W ±1W	
		Remove crystal from holder on exciter pcb, operate PTT and ensure power output is zero. Replace crystal.			
Exciter PCB TP2 TP2 (via 10k)	AVO (10V dc) CRO (1mS/cm)	Operate PTT, and adjust L1 (Exciter pcb) c.c.w. until loop is unsynchronised (see Exciter alignment for symptoms), Check RF power is zero. Adjust L1 c.c.w until loop is just synchronised and check AVO reading is 7.1-volts ±0.4-volts dc. Adjust L1 further c.c.w. until power output falls to zero. Slowly adjust L1 c.c.w. until RF power output again reaches full output, continue adjusting until AVO reads 4.5-volts dc with power output remaining at 25 watts. Release PTT.	7.1V	7.1V	7.1V
		Operate PTT and adjust appropriate oscillator netting coil for desired frequency using frequency meter.			
		Remove dummy tuning cover and refit standard cover.			

TRANSMIT LIMIT TIMER

PROCEDURE
Ensure link LK2 on PS/Audio pcb is fitted.
Operate PTT and check that RF power output reduces to zero after a duration of 60 ±20 seconds with PTT remaining operative. Release PTT.
Re-operate PTT and ensure RF power output is again produced. Release PTT. NOTE: To alter the timer period resistor R22 should be changed. Nominal Period = $0.43 \times R22 \times (C8 + C9)$ sec. Tolerance = ± 30% R22 in MΩ C8/C9 in uF.

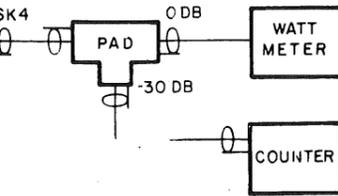
MODULATION ALIGNMENT

Set up test equipment as shown in following



AF GENERATOR		
MOD FREQ.	O/P LEVEL	
		Prep
		Set the
1 KHz	5mV rms	Set to 1
		Oper
		grea
1KHz	50mV rms	Adj
		less
		Adj
1 KHz	5mV rms	Rese
		is sy
		Adj
		Coni
		is sa

ing coil adjustments, and an
circuits could occur.
connected to pin 3 of each appropriate



PROCEDURE	TYPICAL READING
l, with transceiver OFF ly to 13.8-volts dc	
ly c.c.w. c.w.	
R38 (PS/Aud) for 10-volts	10V ±0.1V
c.c.w. audible noise	

rite slugs of L1, L5, and L6 flush with

PROCEDURE	TYPICAL READING
o, operate PTT and ensure reading	10V ±0.1V
L5 and L6 for maximum reading	A & B Band 1.5V (S/C) 0.5V (M/C) E Band 2.0V (S/C) 0.8V (M/C)
L1 c/w until a reading of 5-volts nal only is observed on the CRO. locked loop is unsynchronised of approx. 4-volts p/p will	5V ±IV
ding when PLL synchronised	

PA PC BOARD

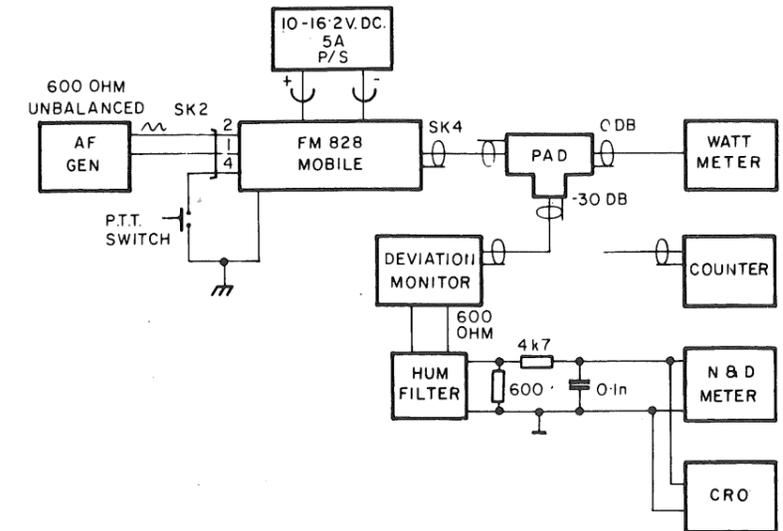
TEST POINT PCB	TEST EQ'T (RANGE)	PROCEDURE	TYPICAL READINGS		
			A-Band	E-Band	B-Band
		Set external supply voltage for appropriate band	15.6V	16.2V	11.0V
PS/Aud PCB pin 1	AVO (10V dc)	Operate PTT, and adjust R37 (PS/Aud pcb) c.c.w. until AVO reading is obtained as shown.	7.5V	7.0V	5.5V
		Reset external supply to 13.8-volts dc for A & E Bands, B Band to remain set for 11-volts	13.8V	13.8V	11.0V
PA PCB (+) TP5 (-) TP2	AVO (300uA dc)	On A & B-Band only, operate PTT and adjust C18 and C19 for maximum reading within the range 100 to 260uA depending on frequency. Adjust L4 (Exciter pcb) for maximum reading, (tuning is broad) release PTT.	180uA		140uA
PA PCB (+) TP5 (-) TP3	AVO (30uA dc)	All Bands, operate PTT and adjust C20 and C21 for maximum reading within the range 5 to 30uA depending on frequency. E-Band, adjust L4 (Exciter) for maximum reading.	15uA	15uA	10uA
		On A & B-Band only, if power output is indicated adjust C24 and C25 for maximum output to prevent excessive dissipation in TR4 and RI2.			
PA PCB (+) TP5 (-) TP4	AVO (30uA dc)	Operate PTT, and adjust C22 and C23 for maximum reading within the range 15 to 40uA depending on frequency. NOTE: Careful alternate adjustment of these trimmers is required as tuning is broad and only one setting combination results in full power output.	30uA	30uA	20uA
		Disconnect AVO and adjust C24 and C25 for maximum power output.	25W	25W	>17W
		Fit dummy tuning cover to PA and adjust all trimming capacitors for maximum (adjustment will be minimal).			
		B-Band only, Set supply voltage to 13.8-volts, operate PTT and, if necessary, detune C23 to reduce RF power to 25 watts.			25W
		Set external power supply to 16.2-volts dc, and check RF power is 29 watts when PTT is operated.	29W ±4W	29W ±4W	29W ±4W
PS/Aud PCB pin 1	AVO (10V dc)	On A & E-Band, if power output outside limit above, readjust R37 (PS/Aud pcb) ensuring that the voltage at pin 1 is greater than 6.5-volts with PTT operated.	>6.5V	>6.5V	
		Readjust supply to 13.8-volts dc, and recheck power output with PTT operated on A & E Bands	25W ±1W	25W ±1W	
		Remove crystal from holder on exciter pcb, operate PTT and ensure power output is zero. Replace crystal.			
Exciter PCB TP2 TP2 (via 10k)	AVO (10V dc) CRO (1mS/cm)	Operate PTT, and adjust L1 (Exciter pcb) c.c.w. until loop is unsynchronised (see Exciter alignment for symptoms), Check RF power is zero.			
		Adjust L1 c.c.w. until loop is just synchronised and check AVO reading is 7.1-volts ±0.4-volts dc.	7.1V	7.1V	7.1V
		Adjust L1 further c.c.w. until power output falls to zero.			
		Slowly adjust L1 c.w. until RF power output again reaches full output, continue adjusting until AVO reads 4.5-volts dc with power output remaining at 25 watts. Release PTT.			
		Operate PTT and adjust appropriate oscillator netting coil for desired frequency using frequency meter.			
		Remove dummy tuning cover and refit standard cover.			

TRANSMIT LIMIT TIMER

PROCEDURE
Ensure link LK2 on PS/Audio pcb is fitted.
Operate PTT and check that RF power output reduces to zero after a duration of 60 ±20 seconds with PTT remaining operative. Release PTT.
Re-operate PTT and ensure RF power output is again produced. Release PTT.
NOTE: To alter the timer period resistor R22 should be changed. Nominal Period = $0.43 \times R22 \times (C8 + C9)$ sec. Tolerance = ± 30% R22 in MΩ C8/C9 in uF.

MODULATION ALIGNMENT

Set up test equipment as shown in following diagram.



AF GENERATOR		DEVIATION
MOD FREQ.	O/P LEVEL	
		Prepare test set-up as shown.
		Set R96 and R95 (Exciter pcb) fully c.c.w. as viewed from the track side.
1 KHz	5mV rms	Set AF generator output to 5mV rms, and modulation frequency to 1 KHz.
		Operate PTT and the deviation on deviation monitor should be greater than 9 KHz.
1 KHz	50mV rms	Adjust AF generator level to 50mV rms, deviation should be less than 16 KHz.
		Adjust R95 until deviation is 5 KHz.
1 KHz	5mV rms	Reset AF generator output to 5mV rms and ensure deviation is symmetrical and is 3.3 KHz ±0.5 KHz.
		Adjust R96 until deviation is 3 KHz.
		Connect microphone and check that microphone sensitivity is satisfactory.

4.1 TRANSMITTER ALIGNMENT

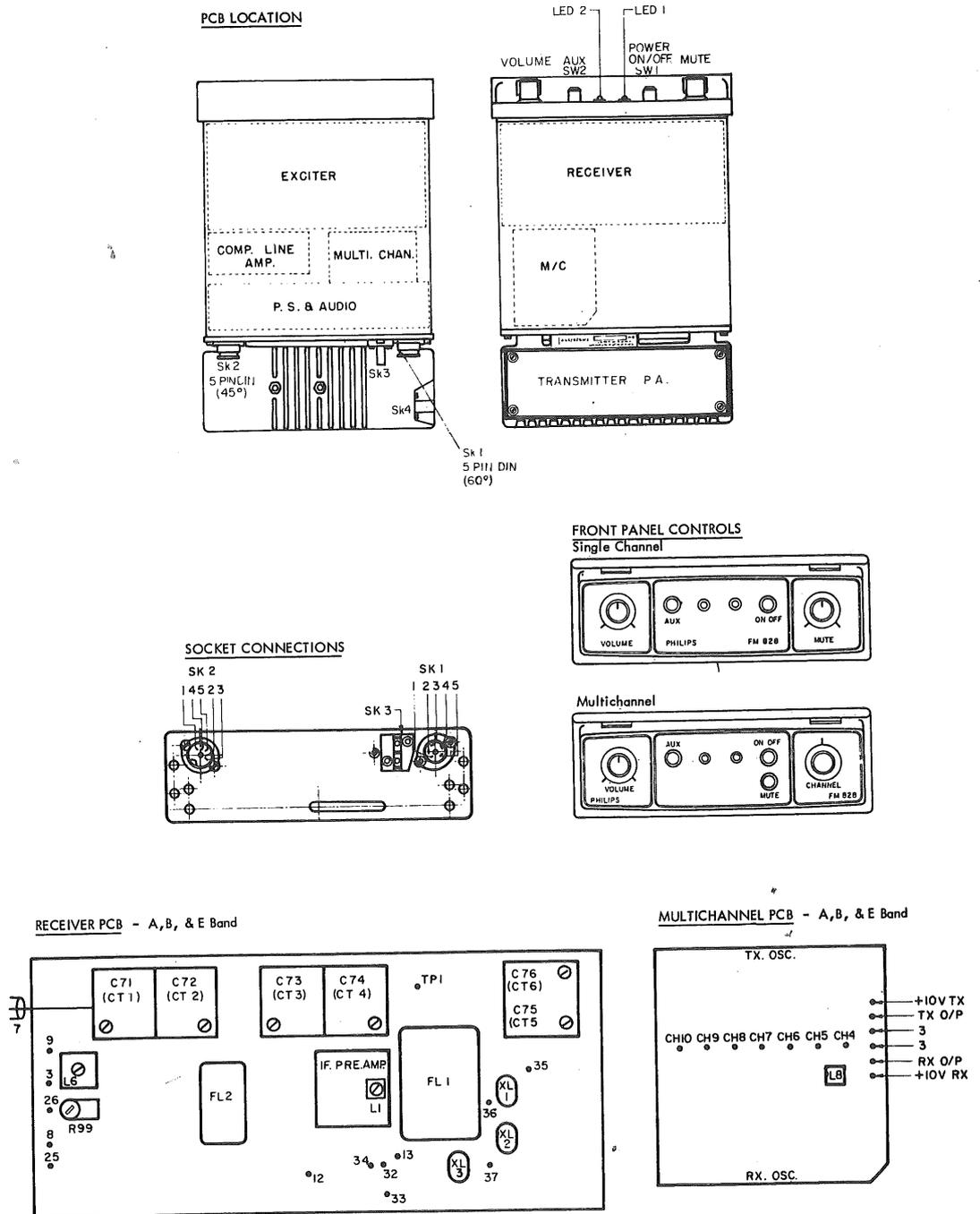


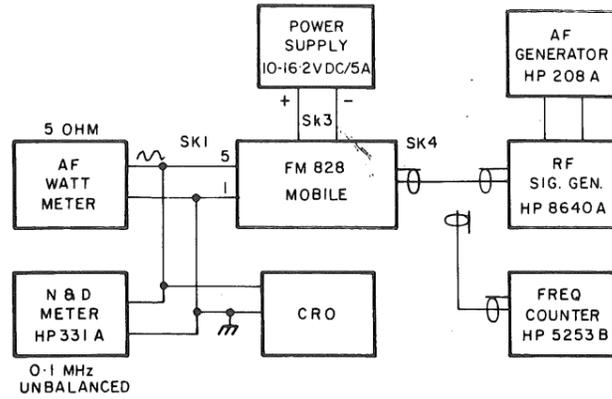
Figure 4.2 PCB Layout and Test Point Location (Receiver)

GENERAL INSTRUCTIONS

- The RF generator is to be set on appropriate carrier frequency $f_c \pm 100\text{Hz}$ (checked by frequency counter) and set for $\pm 3\text{KHz}$ deviation for 1KHz modulation unless otherwise stated. The RF output level setting is given in the appropriate procedure steps.
- A non-metallic tuning tool must be used for all tuning coil adjustments.

PRELIMINARY ADJUSTMENTS

Set up test equipment as shown in following diagram.



TEST POINT PCB	TEST EQ'T (RANGE)	PROCEDURE	TYPICAL READING
		Set external supply to 13.8-volts dc	
		Disconnect RF generator from transceiver antenna socket SK4.	
		Set volume and mute controls fully c.c.w. Rotate volume c.w. for suitable noise level. Rotate mute fully c.c.w. - ensure noise is muted - and return mute control fully c.c.w.	
		Ensure all shield lids are fitted. NOTE: Trimpot R100 if fitted is factory preset - normally fully c.w.	
Receiver PCB (+) pin 9 (-) TP1	AVO (250uA dc)	Adjust trimmer capacitors C75 and C76 alternately for maximum. NOTE: On multichannel versions, select centre channel and adjust C75/C76. Transfer crystal to one of outboard channels and adjust L8 (multichannel pcb) for maximum. Replace crystal in centre channel.	65uA \pm 10uA

RF ALIGNMENT

RF INPUT LEVEL	PROCEDURE	TYPICAL READING
10mV pd unmodulated	Reconnect RF generator to SK4. Noise should be absent on CRO (20mV/cm) Reduce RF input until noise is just indicated on CRO. Switch on marker oscillator and inject signal near transistor TR2 so that a beat signal is displayed on CRO. Adjust appropriate crystal oscillator netting coil slug so that beat signal reduces to less than 100Hz. Switch marker oscillator AF.	
10mV pd modulated	Adjust L6 for maximum audio output indicated on N & D meter.	
10mV pd unmodulated	Reduce RF input level until noise level on CRO increases, repeat as necessary. Adjust C74 and C73 for maximum quieting. Adjust C72 and C71 for maximum quieting.	
0.5uV pd unmodulated	Check that noise quieting (for 300mW reference level) of more than 18dB is obtained.	20dB

MODULATION PERFORMANCE

Only to be carried out if a N & D meter is available.

RF INPUT LEVEL	PROCEDURE	TYPICAL READING
10mV pd modulated	Adjust L1 (IF Pre-amplifier) for minimum, Total harmonic distortion (THD) of less than 3% for output power of 300mW.	2%
0.5uV pd	Measure SINAD figure using N & D meter. NOTE: At band edges ($\pm 500\text{KHz}$ A & B Bands, $\pm 400\text{KHz}$ E Band) a degradation in RF input level of 1dB is acceptable.	

MUTE THRESHOLD

RF INPUT LEVEL	PROCEDURE	TYPICAL READING
<0.2uV pd modulated	Disconnect RF generator Set mute control fully c.c.w. and adjust volume control for audible noise from loudspeaker. Adjust mute control to threshold.	
>0.2uV pd modulated	Reconnect RF generator and increase RF input until modulation is audible. RF level should be less than 0.3uV pd. The SINAD figure at threshold must be 6dB \pm 2dB. NOTE: Check RF generator tuning using marker oscillator.	0.25uV pd
	Slowly reduce RF input level until noise is just muted. The hysteresis should be more than 8dB.	10dB

MAXIMUM MUTE SETTING

RF INPUT LEVEL	PROCEDURE	TYPICAL READING
>0.5uV pd modulated	Rotate mute control fully c.w. and ensure audio output is muted. Gradually increase RF input level until modulation is audible, level should be greater than 0.6uV pd. Minimum SINAD figure is 20dB	0.75uV pd 24dB
	Slowly reduce RF input until modulation is again muted. Measure RF level hysteresis which should be greater than 2dB.	3.5dB

DEVIATION SENSITIVITY

RF INPUT LEVEL	PROCEDURE	TYPICAL READING
1mV emf modulated Deviation to zero	Set volume control fully c.w. Slowly increase RF generator deviation until AF power output reaches 3 watts. Deviation should be less than $\pm 2\text{KHz}$	1.6 KHz
	THD should be less than 7%	3%

MODULATION ACCEPTANCE BANDWIDTH

RF INPUT LEVEL	PROCEDURE	TYPICAL READING
Modulated	Adjust RF input level to give 12dB SINAD. Adjust volume control to give 300mW audio. Increase RF input level by 6dB and adjust generator deviation control until SINAD is reduced to 12dB for 300mW Deviation should be greater than $\pm 10\text{KHz}$	+12 KHz

4.2 RECEIVER ALIGNMENT

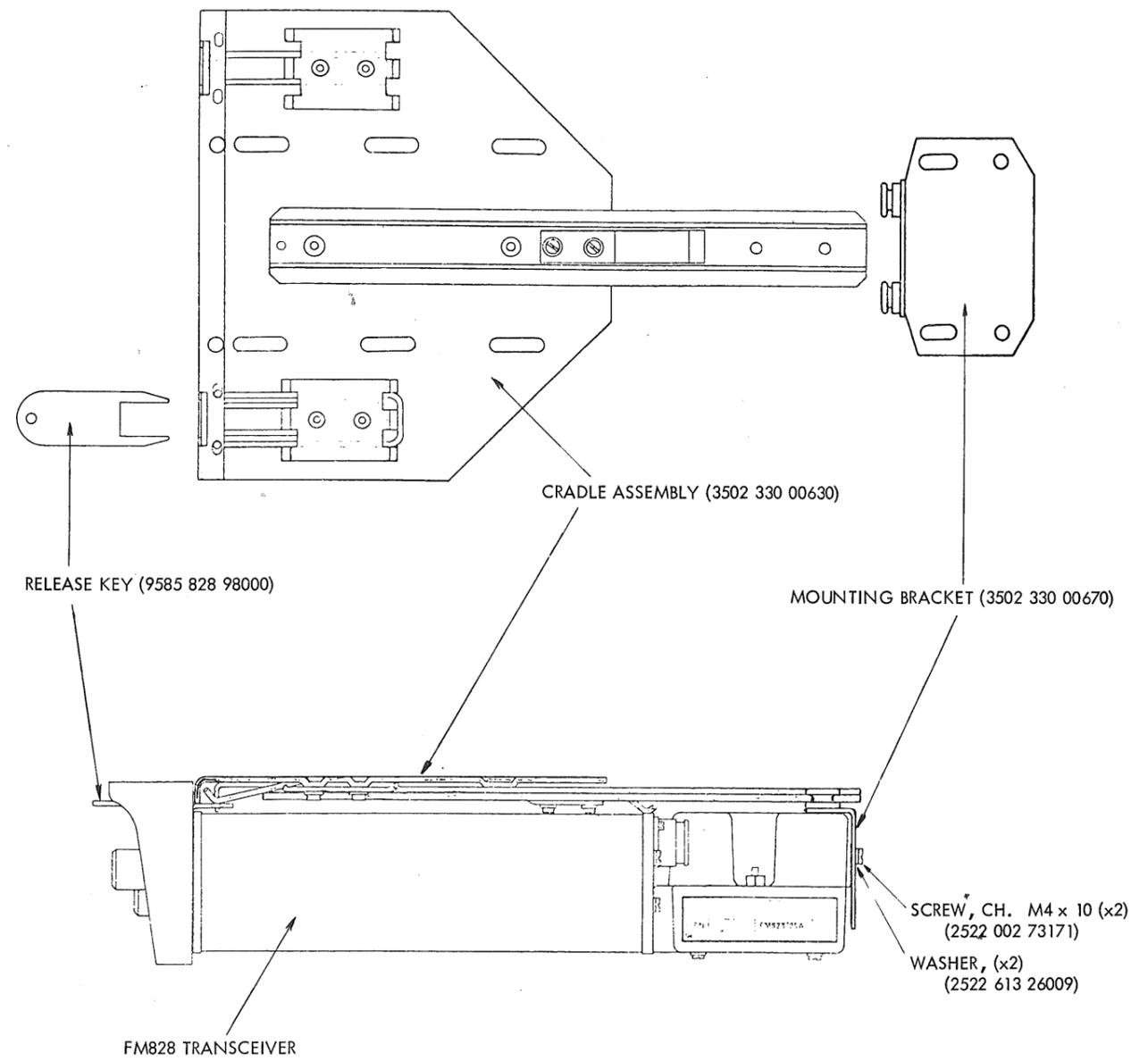


Figure 5.1 Mounting Kit Details

SECTION 5. INSTALLATION

The FM828 is suitable for installation in vehicles for operation in local or remote control modes. For local operation the transceiver can be mounted either under-dash or in-dash in a position providing accessibility of the front panel controls. For operation in the remote configuration the transceiver may be mounted in any convenient position within the vehicle and control is provided by either CU941/SA944 or CU938.

5.1 LOCAL CONTROL

5.1.1 IN-DASH MOUNTING

Providing a broadcast car radio is not fitted to the vehicle, it is possible in many cases to fit the FM828 transceiver unit in the in-dash car radio aperture. It will, however, be necessary to check each individual type of vehicle for factors such as depth available, etc., and a special plate or bracket, similar to a normal car radio installation kit, is required.

5.1.2 UNDER DASH MOUNTING

9585-828-99000 - Mounting Kit, FM828, Under-Dash

Part No.	Nomenclature	Qty
3502-330-00630	Cradle Assembly	1
3502-310-05480	Bag Plastic	1
3502-330-00670	Mounting Bracket	1
2522-002-73171	Screw, CH. HD. M4 x 10	2
2522-613-26009	Washer, 4.1 x 7.1 x 0.9	2
9585-828-98000	Release Key	1

The mounting kit (9585-828-99000) is composed of the parts required to enable the transceiver to be mounted conventionally in a position under the vehicle dash accessible to the driver. To provide correct support for the unit it is necessary to use two mounting points in the front and brace the rear to the fire wall (or convenient rigid position) to prevent vibration. The release key is required to facilitate removal of the transceiver from the cradle by releasing snap catches. This key should be retained in a safe location.

5.2 REMOTE CONTROL

When it is necessary to mount the FM828 transceiver in a position whereby the controls are inaccessible to the driver, the cradle assembly (3502-330-00630) is again used to retain the unit, and the versatility of the mounting hardware permits mounting in any attitude. The remote control units, detailed in section 8, are then located in a position accessible to the driver.

5.2.1 REMOTE CONTROL UNIT CU941/LOUDSPEAKER LS943

The control unit type CU941 and the loudspeaker assembly type LS943 can be mounted in, on, or under the dash depending on individual requirements. To enable the units to be mounted in the dash additional holes must be drilled in the fascia. Templates (3502-310-02430) are available to facilitate accurate drilling of holes.

5.2.2 REMOTE CONTROL UNIT CU938

The control unit type CU938 can be mounted on, or under-dash in any convenient position that provides accessibility of the controls.

5.3 ANTENNA INSTALLATION

5.3.1 ANTENNA SELECTION

A range of antenna manufactured by Electronics Engineering, and listed in Table 5.1, are recommended for use with VHF mobile systems; all of which have reliable characteristics of gain, VSWR, and antenna radiation pattern.

TABLE 5-1. RECOMMENDED ANTENNA

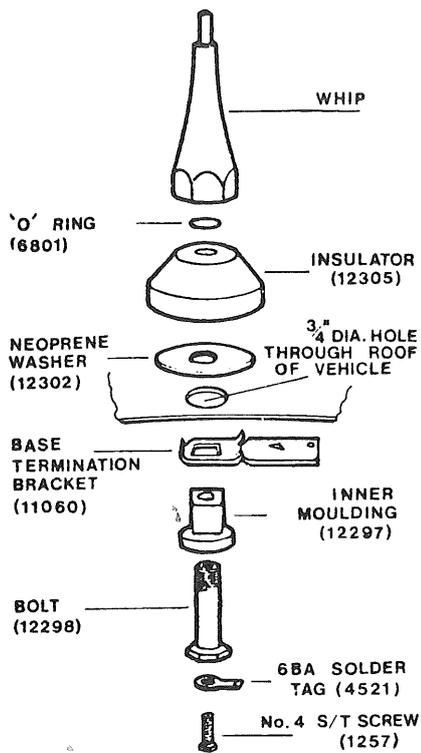
Ant. Type	Gain	Frequency (MHz)	Code No.
RMW-111	Unity	70 - 200	9585-351-41001
RMW-60L	3dB	148 - 175	9585-351-42001
RMW-201	Unity	148 - 200	9585-351-43001
RMW-2S	Unity	148 - 200	9585-351-44001

All antenna are supplied complete with base and a length of RG58AU cable.

5.3.2 ANTENNA MOUNTING

Roof mounting is to be adopted where at all possible as superior results are obtained from this location, guard or boot mounting is to be avoided except in cases of necessity as degradation of system performance could occur.

The procedure for mounting the antenna base and attaching coaxial cable and BNC type connectors are given in figures 5.2 to 5.4.



1. Drill 3/4" dia. hole in body, and pass cable from inside through to outside.
2. Strip back 3/4" of cable outer and braid. Secure cable under retaining saddle. Twist braid and solder to earth spike.
3. Fit bolt into inner moulding (12297), and inner moulding through termination bracket (11060).
4. Leave 3/8" of insulation on inner conductor and solder to tag (4521).
5. Screw assembly tool into bolt and insert bolt and bracket assembly into hole.
6. Slip neoprene washer (12302) over assembly tool and inner moulding.
7. Slip insulator over assembly tool to neoprene washer.
8. Place small 'O' ring (6801) over bolt and remove assembly tool.
9. Carefully screw whip into position.
10. If knockdown attachment (K101) or spring (S201) are used, screw first to bolt before whip (refer 9 above).

Figure 5.2 RMW Antenna Base Installation

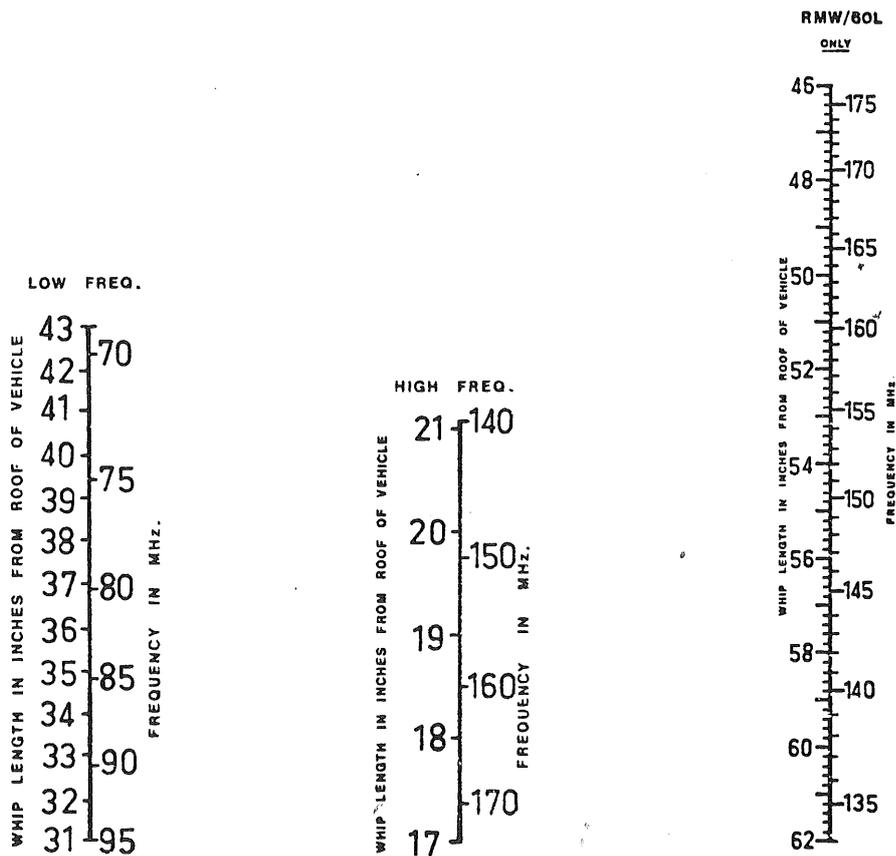
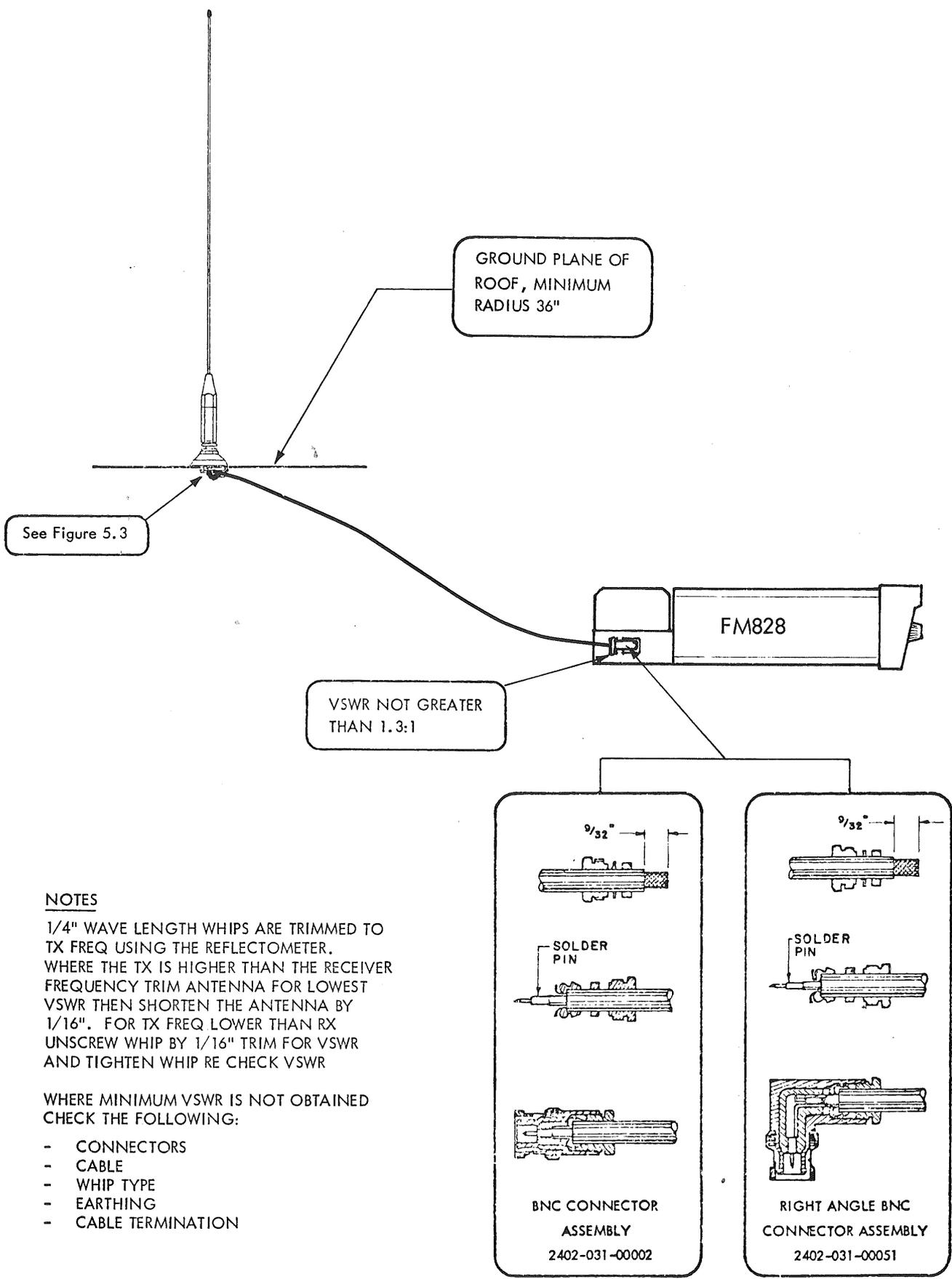


Figure 5.3 Cutting Length for Mobile Whips



NOTES

1/4" WAVE LENGTH WHIPS ARE TRIMMED TO TX FREQ USING THE REFLECTOMETER. WHERE THE TX IS HIGHER THAN THE RECEIVER FREQUENCY TRIM ANTENNA FOR LOWEST VSWR THEN SHORTEN THE ANTENNA BY 1/16". FOR TX FREQ LOWER THAN RX UNSCREW WHIP BY 1/16" TRIM FOR VSWR AND TIGHTEN WHIP RE CHECK VSWR

WHERE MINIMUM VSWR IS NOT OBTAINED CHECK THE FOLLOWING:

- CONNECTORS
- CABLE
- WHIP TYPE
- EARTHING
- CABLE TERMINATION

Figure 5.4 Typical Antenna Installation

SECTION 6. COMPONENT SCHEDULE

6.1 BASIC TRANSCEIVER CODE REFERENCES

6.1.1 LOCAL OPERATION

Type	Chan. Spacing	Freq. Band	1-Channel	3-Channel	10-Channel
FM828A	30KHz	146 - 175MHz	9585-828-26000	9585-828-28000	9585-828-31000
FM828E	30KHz	68 - 88 MHz	9585-828-27000	9585-828-29000	9585-828-32000
FM828B	30KHz	132 - 157MHz	9585-828-23000	9585-828-24000	9585-828-33000

6.1.2 REMOTE OPERATION

Type	Chan. Spacing	Freq. Band	1-Channel	3-Channel	10-Channel
FM828A	30KHz	146 - 175MHz	9585-828-11000	9585-828-13000	9585-828-17000
FM828E	30KHz	68 - 88 MHz	9585-828-12000	9585-828-14000	9585-828-18000
FM828B	30KHz	132 - 157MHz	9585-828-15000	9585-828-16000	9585-828-19000

6.1.3 RECEIVER ONLY

Type	Chan. Spacing	Freq. Range	1-Channel
FM828A	30KHz	146 - 175MHz	9585-828-51000
FM828E	30KHz	68 - 88 MHz	9585-828-52000
FM828B	30KHz	132 - 157MHz	9585-828-53000

6.1.4 TRANSMITTER ONLY

Type	Chan. Spacing	Freq. Range	1-Channel
FM828A	30KHz	146 - 175MHz	9585-828-55000
FM828E	30KHz	68 - 88 MHz	9585-828-56000
FM828B	30KHz	132 - 157MHz	9585-828-57000

6.1.5 OPTIONAL ADDITIONS

- a. FM828 Transceiver with Microphone Compressor Amplifier (9585-828-97000)
Add 00110 to last five digits of basic code.
- b. FM828 Transceiver with Selective Calling SC829-18 (9585-829-15000)
Add 00120 to last five digits of basic code.
- c. FM828 Transceiver with a and b. above.

6.2 FM828 TRANSMITTER/RECEIVER (LOCAL OPERATION)

Figure & Index No.	Cct Ref.	Nomenclature	FM828, A BAND, LOCAL CONTROL			FM828, B BAND, LOCAL CONTROL			FM828, E BAND, LOCAL CONTROL		
			1-Channel 9585 828 26000	3-Channel 9585 828 28000	10-Channel 9585 828 31000	1-Channel 9585 828 23000	3-Channel 9585 828 24000	10-Channel 9585 828 33000	1-Channel 9585 828 27000	3-Channel 9585 828 29000	10-Channel 9585 828 32000
6.1-1		Receiver PC Board, 1-Channel	3502 349 90170			3502 349 90210			3502 349 90180		
6.1-1		Receiver PC Board, 3-Channel		3502 349 90190	3502 349 90190		3502 349 90220	3502 349 90220		3502 349 90220	3502 349 90220
6.1-1		Receiver PC Board, Basic IF Preamplifier PC Board	3502 349 90160	3502 349 90160	3502 349 90160	3502 349 90160	3502 349 90160	3502 349 90160	3502 349 90160	3502 349 90160	3502 349 90160
6.1-2		Power Supply and Audio PA PC Board	3502 349 90230	3502 349 90230	3502 349 90230	3502 349 90230	3502 349 90230	3502 349 90230	3502 349 90230	3502 349 90230	3502 349 90230
6.1-3		Exciter PC Board, 1-Channel	3502 349 90240	3502 349 90240	3502 349 90240	3502 349 90730	3502 349 90730	3502 349 90730	3502 349 90240	3502 349 90240	3502 349 90240
6.1-3		Exciter PC Board, 3-Channel	3502 349 90260			3502 349 90300			3502 349 90270		
6.1-3		Exciter PC Board, Basic Divider PC Board		3502 349 90280	3502 349 90280		3502 349 90310	3502 349 90310		3502 349 90290	3502 349 90290
6.1-4		Multichannel PC Board	3502 349 90250	3502 349 90250	3502 349 90250	3502 349 90250	3502 349 90250	3502 349 90250	3502 349 90660	3502 349 90660	3502 349 90660
6.1-4		Heatsink, 25W, 828	3502 349 90530	3502 349 90530	3502 349 90530	3502 349 90530	3502 349 90530	3502 349 90530	3502 349 90690	3502 349 90690	3502 349 90690
6.1-5		Heatsink	3502 350 00210	3502 350 00210	3502 350 00210	3502 350 00380	3502 350 00380	3502 350 00380	3502 350 00190	3502 350 00190	3502 350 00190
6.1-6		Transmitter PA PC Board	3502 310 00270	3502 310 00270	3502 310 00270	3502 310 00270	3502 310 00270	3502 310 00270	3502 310 00270	3502 310 00270	3502 310 00270
6.1-7		Antenna Filter Assy. Loom Assy.	3502 349 90860	3502 349 90860	3502 349 90860	3502 349 90860	3502 349 90860	3502 349 90860	3502 349 90880	3502 349 90880	3502 349 90880
6.1-8a	D1	LED, TIL 220 (Red)	3502 350 00160	3502 350 00160	3502 350 00160	3502 350 00370	3502 350 00370	3502 350 00370	3502 350 00170	3502 350 00170	3502 350 00170
6.1-8b	D2	LED, TIL 222 (Green)	3502 350 00470	3502 350 00470	3502 350 00470	3502 350 00470	3502 350 00470	3502 350 00470	3502 350 00470	3502 350 00470	3502 350 00470
	R1	Potentiometer, 50k, Lin. Carbon	9332 677 60112	9332 677 60112	9332 677 60112	9332 677 60112	9332 677 60112	9332 677 60112	9332 677 60112	9332 677 60112	9332 677 60112
	R2	Potentiometer, 25k, Log. Carbon	9332 677 70112	9332 677 70112	9332 677 70112	9332 677 70112	9332 677 70112	9332 677 70112	9332 677 70112	9332 677 70112	9332 677 70112
6.1-9		Knob, Skirted	3502 310 01640	3502 310 01640	3502 310 01640	3502 310 01640	3502 310 01640	3502 310 01640	3502 310 01640	3502 310 01640	3502 310 01640
6.1-10		Knob, 1 - 10	3502 310 00630	3502 310 00630	3502 310 00630	3502 310 00630	3502 310 00630	3502 310 00630	3502 310 00630	3502 310 00630	3502 310 00630
	S1/S2	Switch, 2PB, DPDT	3502 330 00770	3502 330 00770	3502 330 00770	3502 330 00770	3502 330 00770	3502 330 00770	3502 330 00770	3502 330 00770	3502 330 00770
	S3	Switch, Rotary, 1 x 11 position		451 782 249	451 782 249		451 782 249	451 782 249		451 782 249	451 782 249
6.1-11	SK1	Socket, 5-pin, DIN, Locking (60°)	3502 330 00640	3502 330 00640	3502 330 00640	3502 330 00640	3502 330 00640	3502 330 00640	3502 330 00640	3502 330 00640	3502 330 00640
6.1-12	SK2	Socket, 5-pin, DIN, Locking (45°)		3502 310 01430	3502 310 01430		3502 310 01430	3502 310 01430		3502 310 01430	3502 310 01430
6.1-13	SK3	Receptacle, 2-pin, M1545 2R	2412 026 15015	2412 026 15015	2412 026 15015	2412 026 15015	2412 026 15015	2412 026 15015	2412 026 15015	2412 026 15015	2412 026 15015
6.1-14	SK4	Connector, Coax. Amphenol 31-202 Cable Assy, LT, 828	2412 026 15012	2412 026 15012	2412 026 15012	2412 026 15012	2412 026 15012	2412 026 15012	2412 026 15012	2412 026 15012	2412 026 15012
	F1/F2	Fuse, 3AG, 5 Amps	2402 034 00023	2402 034 00023	2402 034 00023	2402 034 00023	2402 034 00023	2402 034 00023	2402 034 00023	2402 034 00023	2402 034 00023
	C1	Capacitor, Cer. Pl. 1nF, 10%, 100V Capacitors, Feed Thru, 2n2, 20%	2422 031 00002	2422 031 00002	2422 031 00002	2422 031 00002	2422 031 00002	2422 031 00002	2422 031 00002	2422 031 00002	2422 031 00002
		Cover Plate (Upper)	3502 330 00470	3502 330 00470	3502 330 00470	3502 330 00470	3502 330 00470	3502 330 00470	3502 330 00470	3502 330 00470	3502 330 00470
		Cover Plate (Lower)	451 806 008	451 806 008	451 806 008	451 806 008	451 806 008	451 806 008	451 806 008	451 806 008	451 806 008
			2402 085 00037	2402 085 00037	2402 085 00037	2402 085 00037	2402 085 00037	2402 085 00037	2402 085 00037	2402 085 00037	2402 085 00037
			2222 630 01102	2222 630 01102	2222 630 01102	2222 630 01102	2222 630 01102	2222 630 01102	2222 630 01102	2222 630 01102	2222 630 01102
			3502 310 06930	3502 310 06930	3502 310 06930	3502 310 06930	3502 310 06930	3502 310 06930	3502 310 06930	3502 310 06930	3502 310 06930
			3502 330 00710	3502 330 00710	3502 330 00710	3502 330 00710	3502 330 00710	3502 330 00710	3502 330 00710	3502 330 00710	3502 330 00710
			3502 330 00920	3502 330 00920	3502 330 00920	3502 330 00920	3502 330 00920	3502 330 00920	3502 330 00920	3502 330 00920	3502 330 00920

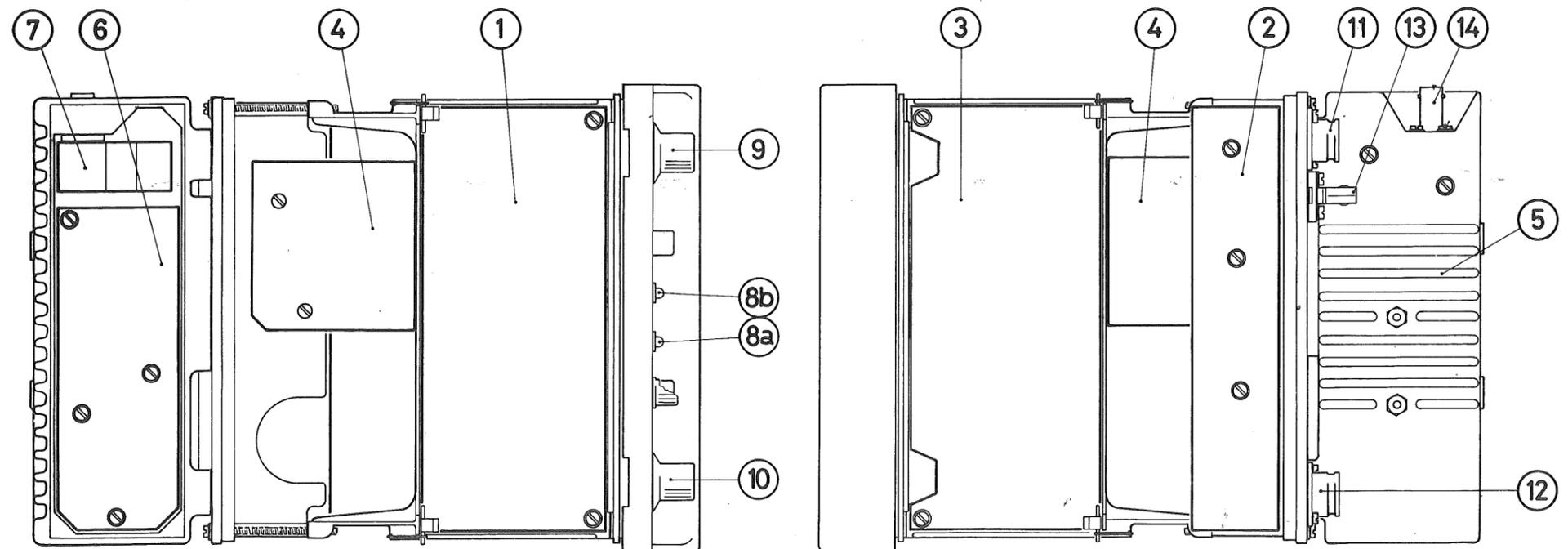
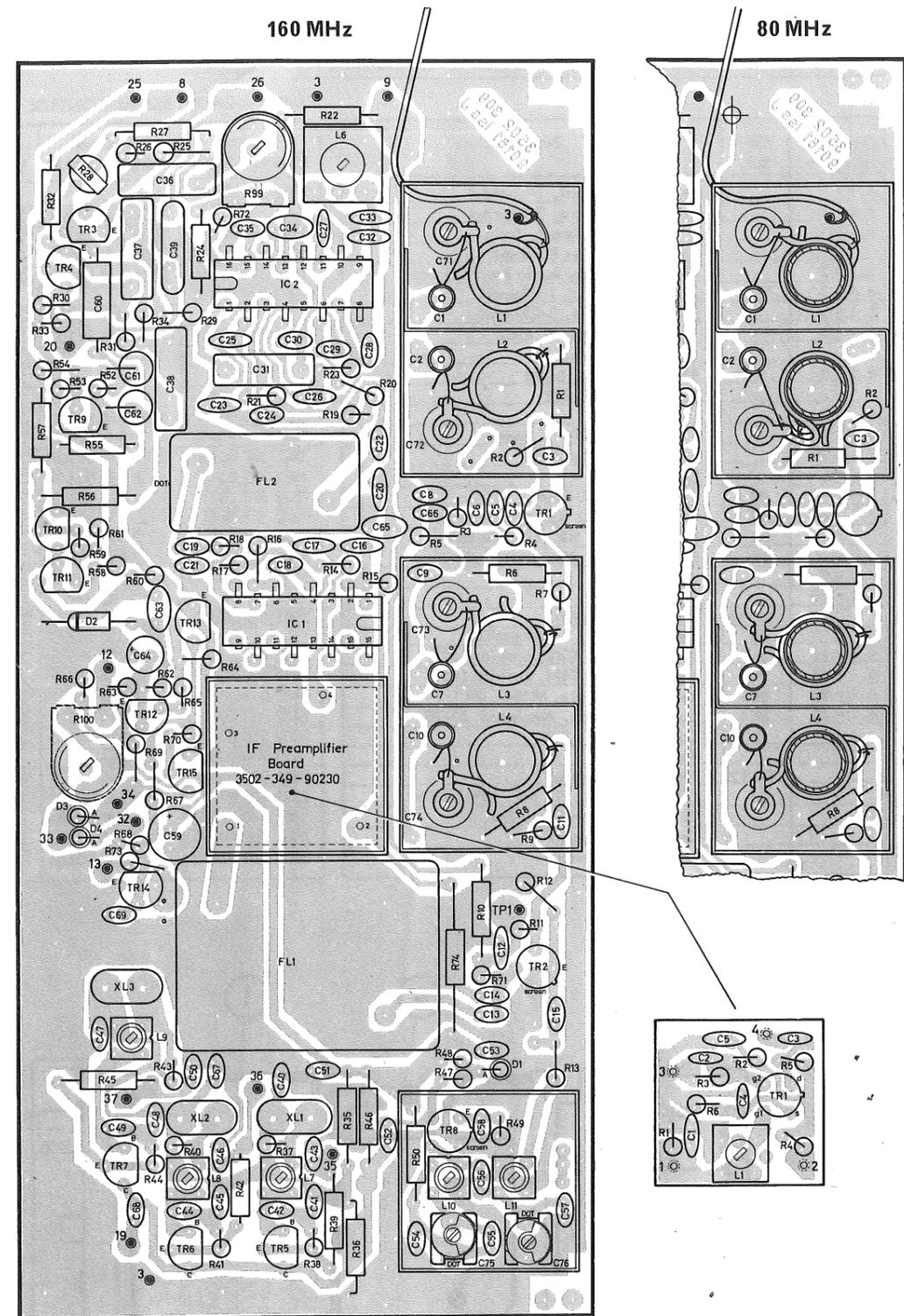


Figure 6.1 FM828 Transceiver PCB Location



6.2 FM828 Transmitter/Receiver (Local Operation) and Figure 6.1 FM828 Transceiver PCB Location under fold on page 27

Figure 6.2 Receiver PC Board Component Layout (including IF Pre-amplifier PCB)

6.3.1 RECEIVER PC BOARD (BASIC)

CAPACITORS

C5	Cer. Pl. 1n, 10%, 100V	2222-630-01102
C6	Cer. Pl. 1n, 10%, 100V	2222-630-01102
C8	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C9	Cer. Pl. 1n, 10%, 100V	2222-630-01102
C11	Cer. Pl. 1n, 10%, 100V	2222-630-01102
C12	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223
R13	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C14	Cer. Pl. 6p8, 0.25p, 100V	2222-632-09688
C15	Cer. Pl. 1n, 10%, 100V	2222-630-01102
C16	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223
C17	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223
C18	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223
C19	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C20	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223
C21	Cer. Pl. 12p, 2%, 100V	2222-632-10129
C22	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C23	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223
C24	Cer. Pl. 5p6, 0.25p, 100V	2222-632-09568
C25	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223
C26	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223
C27	Cer. Pl. 2n2, 10%, 100V	2222-630-01222
C28	Cer. Pl. 2p7, 0.25p, 100V	2222-632-09278
C29	Cer. Pl. 2p7, 0.25p, 100V	2222-632-09278
C30	Cer. Pl. 1n, 10%, 100V	2222-630-01102
C31	P. Est. 47n, 10%, 250V	2222-344-41473
C32	Cer. Pl. 100p, 2%, 100V	2222-632-34101
C33	Cer. Pl. 120p, 2%, 100V	2222-632-34121
C34	P. Est. 22n, 10%, 100V	2002-351-01223
C35	Cer. Pl. 1n, 10%, 100V	2222-630-01102
C36	P. Carb. 150n, 10%, 100V	2222-344-21154
C37	P. Carb. 150n, 10%, 100V	2222-344-21154
C38	P. Carb. 220n, 10%, 100V	2222-344-21224
C39	P. Est. 15n, 10%, 100V	2020-300-39153
C51	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C52	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C53	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C54	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C55	Cer. Pl. 2p7, 0.25p, 100V	2222-632-09278
C58	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C59	Elec. 33u, -10+100%, 10V	2038-001-64339
C60	P. Sty. 5n11, 1%, 63V	2222-424-45112
C61	P. Sty. 5n11, 1%, 63V	2222-424-45112
C62	P. Sty. 5n11, 1%, 63V	2222-424-45112
C63	P. Est. 22n, 10%, 100V	2002-351-01223
C64	Tant. 4u7, 20%, 25V	2002-140-12478
C65	P. Est. 22n, 10%, 100V	2002-351-01223
C66	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C68	Cer. Pl. 2p2, 0.25p, 100V	2222-632-09228
C69	Cer. Pl. 1n, 10%, 100V	2222-630-01102
C75	Var. 1.8 - 10p, 300V	2222-809-05002
C76	Var. 1.8 - 10p, 300V	2222-809-05002

SEMICONDUCTORS

TR2	Transistor, BF182	9330-229-40112
TR3	Transistor, BC548	9331-976-40112
TR4	Transistor, BC548	9331-976-40112
TR8	Transistor, BFY90	9330-116-40112
TR9	Transistor, BC548	9331-976-40112
TR10	Transistor, BC548	9331-976-40112
TR11	Transistor, BC548	9331-976-40112
TR12	Transistor, BC548	9331-976-40112
TR13	Transistor, BC558	9331-977-30112
TR14	Transistor, BC548	9331-976-40112
TR15	Transistor, BC558	9331-977-30112
D1	Diode, IN4148	9330-839-90112
D2	Diode, IN4148	9330-839-90112
D3	Diode, IN4148	9330-839-90112
D4	Diode, IN4148	9330-839-90112
IC1	Int. Cct. TBA 750 Q	9331-874-70112
IC2	Int. Cct. TBA 750 Q	9331-874-70112

RESISTORS

R3	Car. 1k5, 5%, 0.33W	2322-211-13152
R4	Car. 2k2, 5%, 0.33W	2322-211-13222
R5	Car. 47, 5%, 0.33W	2322-211-13479
R6	Car. 12k, 5%, 0.33W	2322-211-13123
R7	Car. 18, 5%, 0.33W	2322-211-13189
R9	Car. 1k5, 5%, 0.33W	2322-211-13152
R10	Car. 47, 5%, 0.33W	2322-211-13479
R11	Car. 15k, 5%, 0.33W	2322-211-13153
R12	Car. 100, 5%, 0.33W	2322-211-13101
R13	Car. 100, 5%, 0.33W	2322-211-13101
R14	Car. 3k3, 5%, 0.33W	2322-211-13332
R15	Car. 27, 5%, 0.33W	2322-211-13279
R16	Car. 3k3, 5%, 0.33W	2322-211-13332
R17	Car. 3k3, 5%, 0.33W	2322-211-13332
R18	Car. 2k2, 5%, 0.33W	2322-211-13222
R19	Car. 10k, 5%, 0.33W	2322-211-13103
R20	Car. 3k3, 5%, 0.33W	2322-211-13332
R21	Car. 27, 5%, 0.33W	2322-211-13279
R22	Car. 1, 5%, 0.33W	2322-211-13108
R23	Car. 3k3, 5%, 0.33W	2322-211-13332
R24	Car. 2k2, 5%, 0.33W	2322-211-13222
R25	Car. 56k, 5%, 0.33W	2322-211-13563
R26	Car. 15k, 5%, 0.33W	2322-211-13153
R27	Car. 1k2, 5%, 0.33W	2322-211-13122
R28	Therm. 100E, 10%, 0.5W N.T.C.	2322-642-12101
R29	Car. 330, 5%, 0.33W	2322-211-13331
R30	Car. 56k, 5%, 0.33W	2322-211-13563
R31	Car. 18k, 5%, 0.33W	2322-211-13183
R32	Car. 4k7, 5%, 0.33W	2322-211-13472
R33	Car. 4k7, 5%, 0.33W	2322-211-13472
R34	Car. 1k5, 5%, 0.33W	2322-211-13152
R35	Car. 4k7, 5%, 0.33W	2322-211-13472
R36	Car. 4k7, 5%, 0.33W	2322-211-13472
R46	Car. 680, 5%, 0.33W	2322-211-13681
R47	Car. 1k, 5%, 0.33W	2322-211-13102
R48	Car. 10k, 5%, 0.33W	2322-211-13103
R49	Car. 150, 5%, 0.33W	2322-211-13151
R50	Car. 100, 5%, 0.33W	2322-211-13101
R52	Car. 1k2, 5%, 0.33W	2322-211-13122
R53	Car. 27k, 5%, 0.33W	2322-211-13273
R54	Car. 56k, 5%, 0.33W	2322-211-13563
R55	Car. 3k3, 5%, 0.33W	2322-211-13332
R56	Car. 2k2, 5%, 0.33W	2322-211-13222
R57	Car. 2k2, 5%, 0.33W	2322-211-13222
R58	Car. 15k, 5%, 0.33W	2322-211-13153
R59	Car. 3k3, 5%, 0.33W	2322-211-13332
R60	Car. 2k2, 5%, 0.33W	2322-211-13222
R61	Car. 470, 5%, 0.33W	2322-211-13471
R62	Car. 10k, 5%, 0.33W	2322-211-13103
R63	Car. 22k, 5%, 0.33W	2322-211-13223
R64	Car. 10k, 5%, 0.33W	2322-211-13103
R65	Car. 4k7, 5%, 0.33W	2322-211-13472
R66	Car. 27, 5%, 0.33W	2322-211-13279
R67	Car. 2k7, 5%, 0.33W	2322-211-13272
R68	Car. 680, 5%, 0.33W	2322-211-13681
R69	Car. 470, 5%, 0.33W	2322-211-13471
R70	Car. 10k, 5%, 0.33W	2322-211-13103
R71	Car. 1k5, 5%, 0.33W	2322-211-13152
R72	Car. 390, 5%, 0.33W	2322-211-13391
R73	Car. 470, 5%, 0.33W	2322-211-13471
R74	Car. 10, 5%, 0.33W	2322-211-13109
R99	Car. Pre. Pot, 4k7, Lin	2113-390-01001
R100	Car. Pre. Pot, 47k, Lin	2113-390-01006

INDUCTORS *

L6	Coil, 1uH, 10.7MHz	3522-020-82161
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FILTERS

F2	Crystal, 10.7MHz	3502-460-00200
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6.3.2 A BAND RECEIVER PC BOARDS

Single Channel Rx PC Board (all items marked *)
3-Channel, Rx PC Board (all items listed)

3502 349 90170
3502 349 90190

CAPACITORS			RESISTORS		
* C1	Cer. Tub. 3p3, 0.5p, 500V	2222-555-08338	* R1	Car. 15Ω, 5%, 0.33W	2322-211-13159
* C2	Cer. Tub. 3p3, 0.5p, 500V	2222-555-08338	* R2	Car. 1k, 5%, 0.33W	2322-211-13102
* C3	Cer. Pl. 47p, 2%, 100V	2222-632-10479	* R8	Car. 220, 5%, 0.33W	2322-211-13221
* C4	Cer. Pl. 3p9, 0.25p, 100V	2222-632-09398	* R37	Car. 680, 5%, 0.33W	2322-211-13681
* C7	Cer. Tub. 3p3, 0.5p, 500V	2222-555-08338	* R38	Car. 22, 5%, 0.33W	2322-211-13229
* C10	Cer. Tub. 3p3, 0.5p, 500V	2222-555-08338	* R39	Car. 1k, 5%, 0.33W	2322-211-13102
* C40	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	R40	Car. 680, 5%, 0.33W	2322-211-13681
* C41	Cer. Pl. 22p, 2%, 100V	2222-632-34229	R41	Car. 22, 5%, 0.33W	2322-211-13229
* C42	Cer. Pl. 68p, 2%, 100V	2222-632-58689	R42	Car. 1k, 5%, 0.33W	2322-211-13102
* C43	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	R43	Car. 680, 5%, 0.33W	2322-211-13681
C44	Cer. Pl. 68p, 2%, 100V	2222-632-58689	R44	Car. 22, 5%, 0.33W	2322-211-13229
C45	Cer. Pl. 22p, 2%, 100V	2222-632-34229	R45	Car. 1k, 5%, 0.33W	2322-211-13102
C46	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	* R73	Car. 470, 5%, 0.33W	2322-211-13471
C47	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	SEMICONDUCTORS		
C48	Cer. Pl. 22p, 2%, 100V	2222-632-34229	* TR1	Transistor, BFY90	9330-116-40112
C49	Cer. Pl. 68p, 2%, 100V	2222-632-58689	* TR5	Transistor, BF494	9331-987-70112
C50	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	TR6	Transistor, BF494	9331-987-70112
* C56	Cer. Pl. p68, 0.25p, 100V	2222-632-03687	TR7	Transistor, BF494	9331-987-70112
* C57	Cer. Pl. 2p7, 0.25p, 100V	2222-632-09278	INDUCTORS		
C67	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	* L1	Coil Air, 828, Rx 160MHz	3502-380-00110
* C71	Var. 0.8 - 6p, 400V	2222-802-96058	* L2	Coil Air, 828, Rx 160MHz	3502-380-00120
* C72	Var. 0.8 - 6p, 400V	2222-802-96058	* L3	Coil Air, 828, Rx 160MHz	3502-380-00130
* C73	Var. 0.8 - 6p, 400V	2222-802-96058	* L4	Coil Air, 828, Rx 160MHz	3502-380-00140
* C74	Var. 0.8 - 6p, 400V	2222-802-96058	* L7	Coil Assy High Band	3502-383-00050
FILTER			L8	Coil Assy	3502-383-00050
* FL1	Crystal, 10.7N	3502-460-00190	L9	Coil Assy	3502-383-00050
			* L10	Coil Assy Rx High Band	3502-383-00060
			* L11	Coil Assy Rx High Band	3502-383-00070

6.3.3 B BAND RECEIVER PC BOARDS

Single Channel, Rx PC Board (all items marked *)
3-Channel, Rx PC Board (all items listed)

3502 349 90210
3502 349 90220

CAPACITORS			RESISTORS		
* C1	Cer. Tub. 4p7, 0.5p, 500V	2222-555-08478	* R1	Car. 15Ω, 5%, 0.33W	2322-211-13159
* C2	Cer. Tub. 4p7, 0.5p, 500V	2222-555-08478	* R2	Car. 1k, 5%, 0.33W	2322-211-13102
* C3	Cer. Pl. 47p, 2%, 100V	2222-632-10479	* R8	Car. 220, 5%, 0.33W	2322-211-13221
* C4	Cer. Pl. 3p9, 0.25p, 100V	2222-632-09398	* R37	Car. 680, 5%, 0.33W	2322-211-13681
* C7	Cer. Tub. 4p7, 0.5p, 500V	2222-555-08478	* R38	Car. 22, 5%, 0.33W	2322-211-13229
* C10	Cer. Tub. 4p7, 0.5p, 500V	2222-555-08478	* R39	Car. 1k, 5%, 0.33W	2322-211-13102
* C40	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103	R40	Car. 680, 5%, 0.33W	2322-211-13681
* C41	Cer. Pl. 22p, 2%, 100V	2222-632-34229	R41	Car. 22, 5%, 0.33W	2322-211-13229
* C42	Cer. Pl. 68p, 2%, 100V	2222-632-58689	R42	Car. 1k, 5%, 0.33W	2322-211-13102
* C43	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103	R43	Car. 680, 5%, 0.33W	2322-211-13681
C44	Cer. Pl. 68p, 2%, 100V	2222-632-58689	R44	Car. 22, 5%, 0.33W	2322-211-13229
C45	Cer. Pl. 22p, 2%, 100V	2222-632-34229	R45	Car. 1k, 5%, 0.33W	2322-211-13102
C46	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103	* R73	Car. 470, 5%, 0.33W	2322-211-13471
C47	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103	SEMICONDUCTORS		
C48	Cer. Pl. 22p, 2%, 100V	2222-632-34229	* TR1	Transistor, BFY90	9330-116-40112
C49	Cer. Pl. 68p, 2%, 100V	2222-632-58689	* TR5	Transistor, BF494	9331-987-70112
C50	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103	TR6	Transistor, BF494	9331-987-70112
* C56	Cer. Pl. p68, 0.25p, 100V	2222-632-03687	TR7	Transistor, BF494	9331-987-70112
* C57	Cer. Pl. 5p6, 0.25p, 100V	2222-632-09568	INDUCTORS		
C67	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103	* L1	Coil Air 828 Rx, 160 MHz	3502-380-00110
* C71	Var. 0.8 - 6p, 400V	2222-802-96058	* L2	Coil Air	3502-380-00120
* C72	Var. 0.8 - 6p, 400V	2222-802-96058	* L3	Coil Air	3502-380-00130
* C73	Var. 0.8 - 6p, 400V	2222-802-96058	* L4	Coil Air	3502-380-00140
* C74	Var. 0.8 - 6p, 400V	2222-802-96058	* L7	Coil Assy 828, 130 - 157MHz, Rx	3502-383-00080
FILTER			L8	Coil Assy 828, 130 - 157MHz, Rx	3502-383-00080
* FL1	Crystal, 10.7N	3502-460-00190	L9	Coil Assy 828, 130 - 157MHz, Rx	3502-383-00080
			* L10	Coil Assy 828, 130 - 157MHz, Rx	3502-383-00090
			* L11	Coil Assy 828, 130 - 157MHz, Rx	3502-383-00180

6.4 POWER SUPPLY AND AUDIO PA PC BOARD

3502 349 90240

6.4.1 POWER SUPPLY AND AUDIO PC BOARD A & E BAND

3502 349 90240

CAPACITORS

C1	P. Carb. 100n, 10%, 100V	2222-344-21104
C2	Cer. 270p, 2%, N750, 100V	2222-632-58271
C3	Tant. 4u7, -20+50%, 35V	2002-140-12478
C4	Elec. 33u, 20%, 16V	2222-121-15339
C5	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C6	Cer. 270p, 2%, N750, 100V	2222-632-58271
C7	Elec. 33u, 20%, 16V	2222-121-15339
C8	Tant. 47u, 20%, 6.3V	2002-140-19479
C9	Tant. 47u, 20%, 6.3V	2002-140-19479
C10	Cer. Pl. 100p, 2%, N750, 100V	2222-632-58101
C11	Cer. Pl. 120p, 2%, N750, 100V	2222-632-58121
C12	Tant. 4u7, 20%, 35V	2002-140-12478
C13	Tant. 3u3, 20%, 35V	2002-140-12338
C14	P. Carb. 47n, 10%, 250V	2222-344-41475
C15	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C16	Elec. 100u, -10+100%, 16V	2020-002-43101
C17	Cer. Pl. 22n, -20+100%, 40V	2222-629-01223
C18	Elec. 330u, -10+50%, 16V	2222-017-15331
C19	Elec. 330u, -10+50%, 16V	2222-017-15331
C20	P. Carb. 100n, 10%, 100V	2222-344-21104
C21	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C22	Cer. Pl. 4n7, 10%, 100V	2222-630-01472
C23	Tant. 4u7, 20%, 35V	2002-140-12478

SEMICONDUCTORS

TR1	Transistor, BC548	9331-976-40112
TR2	Transistor, BC548	9331-976-40112
TR3	Transistor, BD136	9330-911-70112
TR4	Transistor, BD136	9330-911-70112
TR5	Transistor, BC548	9331-976-40112
TR6	Transistor, BC548	9331-976-40112
TR7	Transistor, BC548	9331-976-40112
TR8	Transistor, BC558	9331-977-30112
TR9	Transistor, BC548	9331-976-40112
TR10	Transistor, BC548	9331-976-40112
IC1	Int. Cct. TBA641B	9332-039-10112
D1	Diode, 1N4148	9330-839-90112
D2	Diode, 1N4148	9330-839-90112
D3	Diode, 1N4148	9330-839-90112
D4	Diode, 1N4148	9330-839-90112
D5	Diode, 1N4148	9330-839-90112
D6	Diode, 1N4148	9330-839-90112
D7	Diode, BZX79-C12	9331-178-10112
D8	Diode, BAX79-C11	9331-178-00112
D9	Diode, BAX79-C2V5	9331-177-60112

RESISTORS

R1	Car. 470, 5%, 0.33W	2322-211-13471
R2	Car. 470, 5%, 0.33W	2322-211-13471
R3	Car. 8k2, 5%, 0.33W	2322-211-13822
R4	Car. 1Ω, 5%, 0.33W	2322-211-13108
R5	Car. 4k7, 5%, 0.33W	2322-211-13472
R6	Car. 4k7, 5%, 0.33W	2322-211-13472
R7	Car. 1Ω, 5%, 0.33W	2322-211-13108
R8	Car. 27k, 5%, 0.33W	2322-211-13273
R9	Car. 10k, 5%, 0.33W	2322-211-13102
R10	Car. 390, 5%, 0.33W	2322-211-13391
R11	Car. 270k, 5%, 0.33W	2322-211-13274
R12	Car. 15k, 5%, 0.33W	2322-211-13153
R13	Car. 39Ω, 5%, 0.33W	2322-211-13399
R14	Car. 680, 5%, 0.33W	2322-211-13681
R15	Car. 180, 5%, 0.33W	2322-211-13181
R16	Car. 1k2, 5%, 0.33W	2322-211-13122
R17	Car. 100k, 5%, 0.33W	2322-211-13104
R18	Car. 2k2, 5%, 0.33W	2322-211-13222
R19	Car. 47k, 5%, 0.33W	2322-211-13473
R20	Car. 2k2, 5%, 0.33W	2322-211-13222
R21	Car. 3k3, 5%, 0.33W	2322-211-13332
R22	Car. 1M5, 10%, 0.33W	2322-211-13155
R23	Car. 100, 5%, 0.33W	2322-211-13101
R24	Car. 220k, 5%, 0.33W	2322-211-13224
R25	Car. 22k, 5%, 0.33W	2322-211-13223
R26	Car. 18k, 5%, 0.33W	2322-211-13183
R27	Car. 47k, 5%, 0.33W	2322-211-13473
R28	Car. 100, 5%, 0.33W	2322-211-13101
R29	Car. 56Ω, 5%, 0.33W	2322-211-13569
R30	Car. 12k, 5%, 0.33W	2322-211-13123
R31	Car. 10Ω, 5%, 0.33W	2322-211-13109
R32	Car. 470, 5%, 0.33W	2322-211-13471
R33	Car. 470, 5%, 0.33W	2322-211-13471
R34	Car. 1k0, 5%, 0.33W	2322-211-13102
R35	Car. 330, 5%, 0.33W	2322-211-13331
R36	Car. 47k, 5%, 0.33W	2322-211-13473
R37	Car. Pot. 22k, Preset Lin	2113-390-01014
R38	Car. Pot. 220, Preset Lin	2113-390-01012

INDUCTORS

L1	Choke, RF, 6uH, Wide Band	4312-020-36640
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RELAY

REL	Relay, 1 c/o, 13.8V	2422-132-01875
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6.4.2 POWER SUPPLY AND AUDIO PC BOARD B BAND

3502 349 90730

Refer to Power Supply and Audio PA (3502-349-90240) above for all component references with the exception of the changes listed below

SEMICONDUCTORS

TR1	Deleted	
D1	Deleted	
D3	Deleted	
D7	Deleted	
D8	Diode, BZX79-C10	9331-178-90112
D10	Diode, BAX79-C2V8	9331-321-30112

RESISTORS

R1	Deleted	
R2	Deleted	
R3	Deleted	
R5	Car. 2k2, 5%, 0.33W	2322-211-13222
R6	Car. 8k2, 5%, 0.33W	2322-211-13822
R7	Car. 33Ω, 5%, 0.33W	2322-211-13339
R37	Car. Pot, Preset, Lin	2113-390-01006

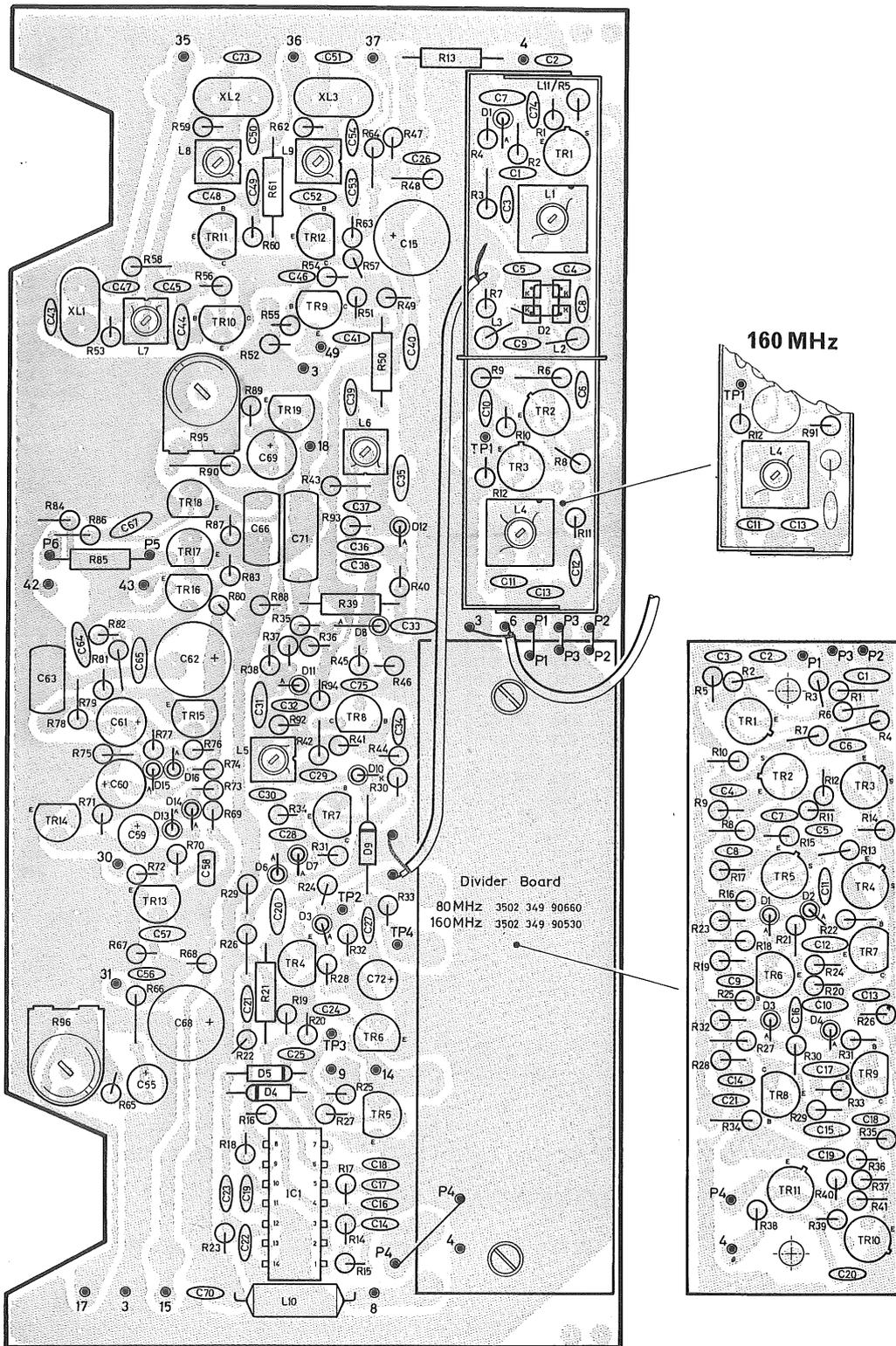


Figure 6.4 Exciter PC Board Component Layout (Including Divider PC Board)

6.5 EXCITER PC BOARDS

6.5.1 EXCITER PC BOARD (BASIC)

3502 349 90250

CAPACITORS

C1	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C2	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C3	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C6	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C10	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C12	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C14	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C15	Elec. 47u, -10+100%, 25V	2038-001-66479
C16	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C17	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C18	Cer. Pl. 18p, 2%, 100V	2222-632-58189
C19	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C21	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C22	Cer. Pl. 39p, 2%, 100V	2222-632-58399
C23	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C24	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C25	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C26	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C27	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C28	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C29	Cer. Pl. 5p6, 0.25p, 100V	2222-632-57568
C30	Cer. Pl. 5p6, 0.25p, 100V	2222-632-57568
C31	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C33	Cer. Pl. 270p, 2%, 100V	2222-632-58271
C34	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C36	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C39	Cer. Pl. 5p6, 0.25p, 100V	2222-632-57568
C41	Cer. Pl. 10n, -20+100%, 40V	2222-629-01103
C55	Tant. 4u7, 20%, 35V	2002-140-12478
C56	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C57	Cer. Pl. 330p, 2%, 100V	2222-632-58331
C58	P. Est. 10n, 10%, 400V	2002-351-01103
C59	Tant. 4u7, 20%, 35V	2002-140-12478
C60	Elec. 33u, -10+100%, 10V	2038-001-64339
C61	Elec. 33u, -10+100%, 10V	2038-001-64339
C62	Elec. 47u, -10+100%, 25V	2038-001-66479
C63	P. Est. 47n, 10%, 100V	2002-351-01473
C64	Cer. Pl. 4n7, 10%, 100V	2222-630-01472
C65	Cer. Pl. 270p, 2%, 100V	2222-632-58271
C66	P. Est. 100n, 10%, 100V	2002-351-01104
C67	Cer. Pl. 4n7, 10%, 100V	2222-630-01472
C68	Elec. 47u, -10+100%, 25V	2038-001-66479
C69	Elec. 33u, -10+100%, 10V	2038-001-64339
C71	P. Est. 47n, 10%, 100V	2002-351-01473
C72	Tant. 4u7, 20%, 35V	2002-140-12478
C74	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C75	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103

SEMICONDUCTORS

TR1	Transistor, BF183	9330-229-50112
TR2	Transistor, BSX20	9330-219-20112
TR3	Transistor, BSX20	9330-219-20112
TR4	Transistor, BC548	9331-976-40112
TR5	Transistor, BC548	9331-976-40112
TR6	Transistor, BC548	9331-976-40112
TR7	Transistor, BF494	9331-987-70112
TR8	Transistor, BF494	9331-987-70112
TR9	Transistor, BF494	9331-987-70112
TR13	Transistor, BC548	9331-976-40112
TR14	Transistor, BC548	9331-976-40112
TR15	Transistor, BC548	9331-976-40112
TR16	Transistor, BC548	9331-976-40112
TR17	Transistor, BC558	9331-977-30112
TR18	Transistor, BC558	9331-977-30112
TR19	Transistor, BC548	9331-976-40112
IC1	Int. Cct. LM1496N	9332-323-90112
D1	Diode, 1N4148	9330-839-90112
D2	Diodes, BB105A (x 4)	9332-326-90112
D3	Diode, 1N4148	9330-839-90112
D4	Diode, 1N4148	9330-839-90112
D5	Diode, 1N4148	9330-839-90112
D6	Diode, 1N4148	9330-839-90112
D7	Diode, 1N4148	9330-839-90112
D8	Diode, 1N4148	9330-839-90112
D9	Diode, 1N4148	9330-839-90112
D10	Diode, 1N4148	9330-839-90112
D13	Diode, 1N4148	9330-839-90112
D14	Diode, 1N4148	9330-839-90112
D15	Diode, 1N4148	9330-839-90112
D16	Diode, 1N4148	9330-839-90112

RESISTORS

R1	Car. 8k2, 5%, 0.33W	2322-211-13822
R2	Car. 1k2, 5%, 0.33W	2322-211-13122
R3	Car. 100, 5%, 0.33W	2322-211-13101
R4	Car. 330, 5%, 0.33W	2322-211-13331
R6	Car. 68, 5%, 0.33W	2322-211-13689
R7	Car. 1k0, 5%, 0.33W	2322-211-13102
R11	Car. 47, 5%, 0.33W	2322-211-13479
R13	Car. 10Ω, 5%, 0.33W	2322-211-13109
R14	Car. 1k, 5%, 0.33W	2322-211-13102
R16	Car. 680, 5%, 0.33W	2322-211-13681
R17	Car. 1k8, 5%, 0.33W	2322-211-13182
R18	Car. 1k, 5%, 0.33W	2322-211-13102
R19	Car. 3k9, 5%, 0.33W	2322-211-13392
R20	Car. 27k, 5%, 0.33W	2322-211-13273
R21	Car. 1k8, 5%, 0.33W	2322-211-13182
R22	Car. 6k8, 5%, 0.33W	2322-211-13682
R23	Car. 4k7, 5%, 0.33W	2322-211-13472
R24	Car. 1k0, 5%, 0.33W	2322-211-13102
R25	Car. 100k, 5%, 0.33W	2322-211-13104
R26	Car. 330, 5%, 0.33W	2322-211-13331
R27	Car. 100k, 5%, 0.33W	2322-211-13104
R28	Car. 470k, 5%, 0.33W	2322-211-13474
R29	Car. 2k2, 5%, 0.33W	2322-211-13222
R30	Car. 100, 5%, 0.33W	2322-211-13101
R31	Car. 100k, 5%, 0.33W	2322-211-13104
R32	Car. 27k, 5%, 0.33W	2322-211-13273
R33	Car. 10k, 5%, 0.33W	2322-211-13103
R34	Car. 330, 5%, 0.33W	2322-211-13331
R36	Car. 22k, 5%, 0.33W	2322-211-13223
R38	Car. 33k, 5%, 0.33W	2322-211-13333
R39	Car. 1Ω, 5%, 0.33W	2322-211-13108
R40	Car. 33k, 5%, 0.33W	2322-211-13333
R41	Car. 8k2, 5%, 0.33W	2322-211-13822
R43	Car. 47, 5%, 0.33W	2322-211-13479
R44	Car. 1k5, 5%, 0.33W	2322-211-13152
R45	Car. 82, 5%, 0.33W	2322-211-13829
R46	Car. 270, 5%, 0.33W	2322-211-13271
R48	Car. 4k7, 5%, 0.33W	2322-211-13472
R49	Car. 100, 5%, 0.33W	2322-211-13101
R50	Car. 5k6, 5%, 0.33W	2322-211-13562
R51	Car. 1k5, 5%, 0.33W	2322-211-13152
R52	Car. 470, 5%, 0.33W	2322-211-13471
R54	Car. 22k, 5%, 0.33W	2322-211-13223
R55	Car. 5k6, 5%, 0.33W	2322-211-13562
R65	Car. 3k3, 5%, 0.33W	2322-211-13332
R66	Car. 470, 5%, 0.33W	2322-211-13471
R70	Car. 470, 5%, 0.33W	2322-211-13471
R71	Car. 27k, 5%, 0.33W	2322-211-13273
R72	Car. 4k7, 5%, 0.33W	2322-211-13472
R73	Car. 1k2, 5%, 0.33W	2322-211-13122
R74	Car. 39k, 5%, 0.33W	2322-211-13393
R75	Car. 10k, 5%, 0.33W	2322-211-13103
R76	Car. 47k, 5%, 0.33W	2322-211-13473
R77	Car. 15k, 5%, 0.33W	2322-211-13153
R78	Car. 1k8, 5%, 0.33W	2322-211-13182
R79	Car. 10k, 5%, 0.33W	2322-211-13103
R80	Car. 47, 5%, 0.33W	2322-211-13479
R81	Car. 39k, 5%, 0.33W	2322-211-13393
R82	Car. 39k, 5%, 0.33W	2322-211-13393
R83	Car. 8k2, 5%, 0.33W	2322-211-13822
R84	Car. 10k, 5%, 0.33W	2322-211-13103
R85	Car. 6k8, 5%, 0.33W	2322-211-13682
R86	Car. 18k, 5%, 0.33W	2322-211-13183
R87	Car. 5k6, 5%, 0.33W	2322-211-13562
R88	Car. 15k, 5%, 0.33W	2322-211-13153
R89	Car. 10k, 5%, 0.33W	2322-211-13103
R94	Car. 47, 5%, 0.33W	2322-211-13479
R95	Car. Pot. 1k, Preset	2102-410-05007
R96	Car. Pot. 4k7, Preset	2102-410-05008

INDUCTOR

L10	Choke, 1mH	3522-020-05191
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6.5.2 A BAND EXCITER PC BOARDS

Single Channel, Exciter PC Board (All items marked *)
3-Channel, Exciter PC Board (All items listed)

3502 349 90260
3502 349 90280

CAPACITORS

* C4	Cer. Pl. 4p7, 0.25p, 100V	2222-632-09478
* C5	Cer. Pl. 22p, 2%, 100V	2222-632-58229
* C7	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
* C8	Cer. Pl. 5p6, 0.25p, 100V	2222-632-09568
* C9	Cer. Pl. 33p, 2%, 100V	2222-632-34339
* C11	Cer. Pl. 8p2, 0.25p, 100V	2222-632-09828
* C13	Cer. Pl. 1p8, 2%, 100V	2222-632-09188
* C20	Cer. Pl. 33p, 2%, 100V	2222-632-10339
* C32	Cer. Pl. 22p, 2%, 100V	2222-632-58229
* C35	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
* C37	Cer. Pl. 22p, 2%, 100V	2222-632-58229
* C38	Cer. Pl. 10p, 2%, 100V	2222-632-10109
* C40	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
* C43	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
* C44	Cer. Pl. 100p, 2%, 100V	2222-632-58101
* C45	Cer. Pl. 33p, 2%, 100V	2222-632-10339
* C46	Cer. Pl. 10p, 2%, 100V	2222-632-10109
* C47	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C48	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C49	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C50	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C51	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C52	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C53	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C54	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
* C70	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C73	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103

SEMICONDUCTORS

* TR10	Transistor, BF494	9331-987-70112
TR11	Transistor, BF494	9331-987-70112
TR12	Transistor, BF494	9331-987-70112
* D11	Diode, BA102	9330-616-60112
* D12	Diode, BA102	9330-616-60112

RESISTORS

* R5	Car. 1Ω, 5%, 0.33W	2322-211-13108
* R8	Car. 4k7, 5%, 0.33W	2322-211-13472
* R9	Car. 4k7, 5%, 0.33W	2322-211-13472
* R10	Car. 180, 5%, 0.33W	2322-211-13181
* R12	Car. 220, 5%, 0.33W	2322-211-13221
* R15	Car. 100, 5%, 0.33W	2322-211-13101
* R35	Car. 22k, 5%, 0.33W	2322-211-13223
* R37	Car. 100k, 5%, 0.33W	2322-211-13104
* R42	Car. 470, 5%, 0.33W	2322-211-13471
* R47	Car. 4k7, 5%, 0.33W	2322-211-13472
* R53	Car. 680, 5%, 0.33W	2322-211-13681
* R56	Car. 22Ω, 5%, 0.33W	2322-211-13229
* R57	Car. 560, 5%, 0.33W	2322-211-13561
* R58	Car. 1k5, 5%, 0.33W	2322-211-13152
R59	Car. 680, 5%, 0.33W	2322-211-13681
R60	Car. 22Ω, 5%, 0.33W	2322-211-13229
R61	Car. 1k5, 5%, 0.33W	2322-211-13152
R62	Car. 680, 5%, 0.33W	2322-211-13681
R63	Car. 22Ω, 5%, 0.33W	2322-211-13229
R64	Car. 1k5, 5%, 0.33W	2322-211-13152
* R67	Car. 10k, 5%, 0.33W	2322-211-13103
* R68	Car. 56k, 5%, 0.33W	2322-211-13563
* R69	Car. 2k2, 5%, 0.33W	2322-211-13222
* R90	Car. 150, 5%, 0.33W	2322-211-13151

INDUCTORS

* L1	Coil Assy	3522-022-00010
* L2	Choke, 1uH, 10%	3522-020-09911
* L3	Choke, 1uH, 10%	3522-020-09911
* L4	Coil Assy	3522-022-00010
* L5	Coil Assy	3502-383-00110
* L6	Coil Assy	3502-383-00110
* L7	Coil Assy	3502-383-00100
L8	Coil Assy	3502-383-00100
L9	Coil Assy	3502-383-00100

6.5.3 B BAND EXCITER PC BOARDS

Single Channel, Exciter PC Board (All items marked *)
3-Channel, Exciter PC Board (All items listed)

3502 349 90300
3502 349 90310

CAPACITORS

* C4	Cer. Pl. 4p7, 0.25p, 100V	2222-632-09478
* C5	Cer. Pl. 22p, 2%, 100V	2222-632-58229
* C7	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
* C8	Cer. Pl. 5p6, 0.25p, 100V	2222-632-09568
* C9	Cer. Pl. 33p, 2%, 100V	2222-632-34339
* C11	Cer. Pl. 8p2, 0.25p, 100V	2222-632-09828
* C13	Cer. Pl. 18p, 2%, 100V	2222-632-10189
* C20	Cer. Pl. 33p, 2%, 100V	2222-632-10339
* C32	Cer. Pl. 22p, 2%, 100V	2222-632-58229
* C35	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
* C37	Cer. Pl. 22p, 2%, 100V	2222-632-58229
* C38	Cer. Pl. 10p, 2%, 100V	2222-632-10109
* C40	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
* C43	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
* C44	Cer. Pl. 100p, 2%, 100V	2222-632-58101
* C45	Cer. Pl. 33p, 2%, 100V	2222-632-10339
* C46	Cer. Pl. 5p6, 0.25p, 100V	2222-632-09568
* C47	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C48	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C49	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C50	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C51	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C52	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C53	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C54	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
* C70	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C73	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103

SEMICONDUCTORS

* TR10	Transistor, BF494	9331-987-70112
TR11	Transistor, BF494	9331-987-70112
TR12	Transistor, BF494	9331-987-70112
* D11	Diode, BA102	9330-616-60112
* D12	Diode, BA102	9330-616-60112

RESISTORS

* R5	Car. 1Ω, 5%, 0.33W	2322-211-13108
* R8	Car. 4k7, 5%, 0.33W	2322-211-13472
* R9	Car. 4k7, 5%, 0.33W	2322-211-13472
* R10	Car. 180, 5%, 0.33W	2322-211-13181
* R12	Car. 220, 5%, 0.33W	2322-211-13221
* R15	Car. 100, 5%, 0.33W	2322-211-13101
* R35	Car. 22k, 5%, 0.33W	2322-211-13223
* R37	Car. 100k, 5%, 0.33W	2322-211-13104
* R42	Car. 470, 5%, 0.33W	2322-211-13471
* R47	Car. 4k7, 5%, 0.33W	2322-211-13472
* R53	Car. 680, 5%, 0.33W	2322-211-13681
* R56	Car. 22Ω, 5%, 0.33W	2322-211-13229
* R57	Car. 560, 5%, 0.33W	2322-211-13561
* R58	Car. 1k5, 5%, 0.33W	2322-211-13152
R59	Car. 680, 5%, 0.33W	2322-211-13681
R60	Car. 22Ω, 5%, 0.33W	2322-211-13229
R61	Car. 1k5, 5%, 0.33W	2322-211-13152
R62	Car. 680, 5%, 0.33W	2322-211-13681
R63	Car. 22Ω, 5%, 0.33W	2322-211-13229
R64	Car. 1k5, 5%, 0.33W	2322-211-13152
* R67	Car. 10k, 5%, 0.33W	2322-211-13103
* R68	Car. 56k, 5%, 0.33W	2322-211-13563
* R69	Car. 2k2, 5%, 0.33W	2322-211-13222
* R90	Car. 150, 5%, 0.33W	2322-211-13151
R91	Car. 470, 5%, 0.33W	2322-211-13471

INDUCTORS

* L1	Coil Assy, 130 - 157MHz	3502-383-00210
* L2	Choke, 1uH, 10%	3522-020-09910
* L3	Choke, 1uH, 10%	3522-020-09910
* L4	Coil Assy	3502-383-00210
* L5	Coil Assy	3502-383-00200
* L6	Coil Assy	3502-383-00200
* L7	Coil Assy	3502-383-00190
L8	Coil Assy	3502-383-00190
L9	Coil Assy	3502-383-00190

6.5.4 E BAND EXCITER PC BOARDS

Single Channel, Exciter PC Board (All items marked *)
3-Channel, Exciter PC Board (All items listed)

3502 349 90270
3502 349 90290

CAPACITORS			RESISTORS		
* C4	Cer. Pl. 6p8, 0.25p, 100V	2222-632-09688	* R8	Car. 6k8, 5%, 0.33W	2322-211-13682
* C5	Cer. Pl. 33p, 2%, 100V	2222-632-10339	* R9	Car. 2k7, 5%, 0.33W	2322-211-13272
* C7	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223	* R10	Car. 220, 5%, 0.33W	2322-211-13221
* C8	Cer. Pl. 6p8, 0.25p, 100V	2222-631-09688	* R12	Car. 150, 5%, 0.33W	2322-211-13151
* C9	Cer. Pl. 27p, 2%, 100V	2222-632-10279	* R15	Car. 470, 5%, 0.33W	2322-211-13471
* C11	Cer. Pl. 5p6, 0.25p, 100V	2222-632-09568	* R35	Car. 18k, 5%, 0.33W	2322-211-13183
* C13	Cer. Pl. 68p, 2%, 100V	2222-632-10689	* R37	Car. 150k, 5%, 0.33W	2322-211-13154
* C20	Cer. Pl. 82p, 2%, 100V	2222-632-58829	* R42	Car. 1k5, 5%, 0.33W	2322-211-13152
* C32	Cer. Pl. 33p, 2%, 100V	2222-632-58339	* R47	Car. 8k2, 5%, 0.33W	2322-211-13822
* C35	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223	* R53	Car. 680, 5%, 0.33W	2322-211-13681
* C37	Cer. Pl. 33p, 2%, 100V	2222-632-58339	* R56	Car. 22Ω, 5%, 0.33W	2322-211-13229
* C38	Cer. Pl. 18p, 2%, 100V	2222-632-10189	* R57	Car. 470, 5%, 0.33W	2322-211-13471
* C40	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223	* R58	Car. 1k0, 5%, 0.33W	2322-211-13102
* C43	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223	R59	Car. 680, 5%, 0.33W	2322-211-13681
* C44	Cer. Pl. 220p, 2%, 100V	2222-632-58221	R60	Car. 22Ω, 5%, 0.33W	2322-211-13229
* C45	Cer. Pl. 82p, 2%, 100V	2222-632-58829	R61	Car. 1k0, 5%, 0.33W	2322-211-13102
* C46	Cer. Pl. 10p, 2%, 100V	2222-632-10109	R62	Car. 680, 5%, 0.33W	2322-211-13681
* C47	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	R63	Car. 22, 5%, 0.33W	2322-211-13229
C48	Cer. Pl. 220p, 2%, 100V	2222-632-58221	R64	Car. 1k0, 5%, 0.33W	2322-211-13102
C49	Cer. Pl. 82p, 2%, 100V	2222-632-58829	* R67	Car. 10k, 5%, 0.33W	2322-211-13103
C50	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	* R68	Car. 56k, 5%, 0.33W	2322-211-13563
C51	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223	* R69	Car. 2k2, 5%, 0.33W	2322-211-13222
C52	Cer. Pl. 220p, 2%, 100V	2222-632-58221	* R90	Car. 68Ω, 5%, 0.33W	2322-211-13689
C53	Cer. Pl. 82p, 2%, 100V	2222-632-58221	R91	Car. 1k0, 5%, 0.33W	2322-211-13102
C54	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	* R92	Car. 12k, 5%, 0.33W	2322-211-13123
* C70	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	* R93	Car. 10k, 5%, 0.33W	2322-211-13103
C72	Tant. 4u7, 20%, 35V	2222-140-12478			
C73	Cer. Pl. 22n, -20+80%, 40V	2222-629-01223			
SEMICONDUCTORS			INDUCTORS		
* TR10	Transistor, BF494	9331-987-70112	* L1	Coil Assy	3522-020-82691
TR11	Transistor, BF494	9331-987-70112	* L2	Choke, 4.7uH, 10%	3522-020-09950
TR12	Transistor, BF494	9331-987-70112	* L3	Choke, 4.7uH, 10%	3522-020-09950
* D11	Diode, BA102	9330-616-70112	* L4	Coil Assy	3502-383-00240
* D12	Diode, BA102	9330-616-70112	* L5	Coil Assy	3502-383-00160
			* L6	Coil Assy	3502-383-00160
			* L7	Coil Assy	3502-383-00290
			L8	Coil Assy	3502-383-00290
			L9	Coil Assy	3502-383-00290
			* L11	Choke, 6.8uH, 10%	3522-020-09960

6.6 DIVIDER PC BOARDS

6.6.1 A & B BAND DIVIDER PC BOARD

3502 349 90530

CAPACITORS			RESISTORS		
C1	Cer. Pl. 1n0, 10%, 100V	2222-630-01102	R1	Car. 4k7, 5%, 0.33W	2322-211-13472
C2	Cer. Pl. 1n0, 10%, 100V	2222-630-01102	R2	Car. 390, 5%, 0.33W	2322-211-13391
C3	Cer. Pl. 1n0, 10%, 100V	2222-630-01102	R3	Car. 1k8, 5%, 0.33W	2322-211-13182
C4	Cer. Pl. 27p, 2%, 100V	2222-632-10279	R4	Car. 270, 5%, 0.33W	2322-211-13271
C5	Cer. Pl. 27p, 2%, 100V	2222-632-10279	R5	Car. 390, 5%, 0.33W	2322-211-13391
C6	Cer. Pl. 47p, 2%, 100V	2222-632-10479	R6	Car. 330, 5%, 0.33W	2322-211-13331
C7	Cer. Pl. 27p, 2%, 100V	2222-632-10279	R7	Car. 220, 5%, 0.33W	2322-211-13221
C8	Cer. Pl. 27p, 2%, 100V	2222-632-10279	R8	Car. 390, 5%, 0.33W	2322-211-13391
C9	Cer. Pl. 33p, 2%, 100V	2222-632-10339	R9	Car. 1k2, 5%, 0.33W	2322-211-13122
C10	Cer. Pl. 47p, 2%, 100V	2222-632-10479	R10	Car. 10Ω, 5%, 0.33W	2322-211-13109
C11	Cer. Pl. 22p, 2%, 100V	2222-632-10229	R11	Car. 3k3, 5%, 0.33W	2322-211-13332
C12	Cer. Pl. 47p, 2%, 100V	2222-632-10479	R12	Car. 47, 5%, 0.33W	2322-211-13479
C13	Cer. Pl. 33p, 2%, 100V	2222-632-10339	R13	Car. 47, 5%, 0.33W	2322-211-13479
C14	Cer. Pl. 39p, 2%, 100V	2222-632-10399	R14	Car. 1k8, 5%, 0.33W	2322-211-13182
C15	Cer. Pl. 47p, 2%, 100V	2222-632-10479	R15	Car. 3k3, 5%, 0.33W	2322-211-13332
C16	Cer. Pl. 22p, 2%, 100V	2222-632-10229	R16	Car. 390, 5%, 0.33W	2322-211-13391
C17	Cer. Pl. 47p, 2%, 100V	2222-632-10479	R17	Car. 1k2, 5%, 0.33W	2322-211-13122
C18	Cer. Pl. 39p, 2%, 100V	2222-632-10399	R18	Car. 680, 5%, 0.33W	2322-211-13681
C19	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	R19	Car. 2k2, 5%, 0.33W	2322-211-13222
C20	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	R20	Car. 6k8, 5%, 0.33W	2322-211-13682
C21	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103	R21	Car. 120, 5%, 0.33W	2322-211-13121
			R22	Car. 120, 5%, 0.33W	2322-211-13121
			R23	Car. 2k7, 5%, 0.33W	2322-211-13272
			R24	Car. 6k8, 5%, 0.33W	2322-211-13682
			R25	Car. 680, 5%, 0.33W	2322-211-13681
			R26	Car. 2k2, 5%, 0.33W	2322-211-13222
			R27	Car. 1k5, 5%, 0.33W	2322-211-13152
			R28	Car. 4k7, 5%, 0.33W	2322-211-13472
			R29	Car. 12k, 5%, 0.33W	2322-211-13123
			R30	Car. 220, 5%, 0.33W	2322-211-13221
			R31	Car. 220, 5%, 0.33W	2322-211-13221
			R32	Car. 4k7, 5%, 0.33W	2322-211-13472
			R33	Car. 12k, 5%, 0.33W	2322-211-13123
			R34	Car. 1k5, 5%, 0.33W	2322-211-13152
			R35	Car. 4k7, 5%, 0.33W	2322-211-13472
			R36	Car. 1k5, 5%, 0.33W	2322-211-13152
			R37	Car. 2k2, 5%, 0.33W	2322-211-13222
			R38	Car. 47, 5%, 0.33W	2322-211-13479
			R39	Car. 3k9, 5%, 0.33W	2322-211-13392
			R40	Car. 2k2, 5%, 0.33W	2322-211-13222
			R41	Car. 330, 5%, 0.33W	2322-211-13331
SEMICONDUCTORS					
TR1	Transistor, BSX20	9330-219-20112			
TR2	Transistor, BFY90	9330-116-40112			
TR3	Transistor, BF183	9330-229-50112			
TR4	Transistor, BF183	9330-229-50112			
TR5	Transistor, BFY90	9330-116-40112			
TR6	Transistor, BF198	9330-634-10112			
TR7	Transistor, BF198	9330-634-10112			
TR8	Transistor, BF198	9330-634-10112			
TR9	Transistor, BF198	9330-634-10112			
TR10	Transistor, BSX20	9330-219-20112			
TR11	Transistor, BSX20	9330-219-20112			
D1	Diode, BAW62	9331-012-20112			
D2	Diode, BAW62	9331-012-20112			
D3	Diode, BAW62	9331-012-20112			
D4	Diode, BAW62	9331-012-20112			

6.6.2 E BAND DIVIDER PC BOARD

3502 349 90660

CAPACITORS

C1	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C2	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C3	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C4	Cer. Pl. 33p, 2%, 63V	2222-632-10339
C5	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C6	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C7	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C8	Cer. Pl. 33p, 2%, 63V	2222-632-10339
C9	Cer. Pl. 39p, 2%, 63V	2222-632-10399
C10	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C11	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C12	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C13	Cer. Pl. 39p, 2%, 63V	2222-632-10399
C14	Cer. Pl. 39p, 2%, 63V	2222-632-10399
C15	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C16	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C17	Cer. Pl. 47p, 2%, 63V	2222-632-10479
C18	Cer. Pl. 39p, 2%, 63V	2222-632-10399
C19	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C20	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C21	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103

RESISTORS

R1	Car. 4k7, 5%, 0.33W	2322-211-13472
R2	Car. 100, 5%, 0.33W	2322-211-13101
R3	Car. 1k8, 5%, 0.33W	2322-211-13182
R4	Car. 560, 5%, 0.33W	2322-211-13561
R5	Car. 390, 5%, 0.33W	2322-211-13391
R6	Car. 330, 5%, 0.33W	2322-211-13331
R7	Car. 220, 5%, 0.33W	2322-211-13221
R8	Car. 470, 5%, 0.33W	2322-211-13471
R9	Car. 2k2, 5%, 0.33W	2322-211-13222
R10	Car. 10Ω, 5%, 0.33W	2322-211-13109
R11	Car. 6k8, 5%, 0.33W	2322-211-13682
R12	Car. 120, 5%, 0.33W	2322-211-13121
R13	Car. 120, 5%, 0.33W	2322-211-13121
R14	Car. 2k7, 5%, 0.33W	2322-211-13272
R15	Car. 6k8, 5%, 0.33W	2322-211-13682
R16	Car. 680, 5%, 0.33W	2322-211-13681
R17	Car. 2k2, 5%, 0.33W	2322-211-13222
R18	Car. 1k5, 5%, 0.33W	2322-211-13152
R19	Car. 4k7, 5%, 0.33W	2322-211-13472
R20	Car. 12k, 5%, 0.33W	2322-211-13123
R21	Car. 220, 5%, 0.33W	2322-211-13221
R22	Car. 220, 5%, 0.33W	2322-211-13221
R23	Car. 4k7, 5%, 0.33W	2322-211-13472
R24	Car. 12k, 5%, 0.33W	2322-211-13123
R25	Car. 1k5, 5%, 0.33W	2322-211-13152
R26	Car. 4k7, 5%, 0.33W	2322-211-13472
R27	Car. 3k3, 5%, 0.33W	2322-211-13332
R28	Car. 10k, 5%, 0.33W	2322-211-13103
R29	Car. 27k, 5%, 0.33W	2322-211-13273
R30	Car. 560, 5%, 0.33W	2322-211-13561
R31	Car. 560, 5%, 0.33W	2322-211-13561
R32	Car. 12k, 5%, 0.33W	2322-211-13123
R33	Car. 27k, 5%, 0.33W	2322-211-13273
R34	Car. 3k3, 5%, 0.33W	2322-211-13332
R35	Car. 10k, 5%, 0.33W	2322-211-13103
R36	Car. 3k3, 5%, 0.33W	2322-211-13332
R37	Car. 2k2, 5%, 0.33W	2322-211-13222
R38	Car. 47, 5%, 0.33W	2322-211-13479
R39	Car. 3k9, 5%, 0.33W	2322-211-13392
R40	Car. 3k3, 5%, 0.33W	2322-211-13332
R41	Car. 330, 5%, 0.33W	2322-211-13331

SEMICONDUCTORS

TR1	Transistor, BSX20	9330-219-20112
TR2	Transistor, BSX20	9330-219-20112
TR3	Transistor, BF183	9330-229-50112
TR4	Transistor, BF183	9330-229-50112
TR5	Transistor, BSX20	9330-219-20112
TR6	Transistor, BF198	9330-634-10112
TR7	Transistor, BF198	9330-634-10112
TR8	Transistor, BF198	9330-634-10112
TR9	Transistor, BF198	9330-634-10112
TR10	Transistor, BSX20	9330-219-20112
TR11	Transistor, BSX20	9330-219-20112
D1	Diode, BAW62	9331-012-20112
D2	Diode, BAW62	9331-012-20112
D3	Diode, BAW62	9331-012-20112
D4	Diode, BAW62	9331-012-20112

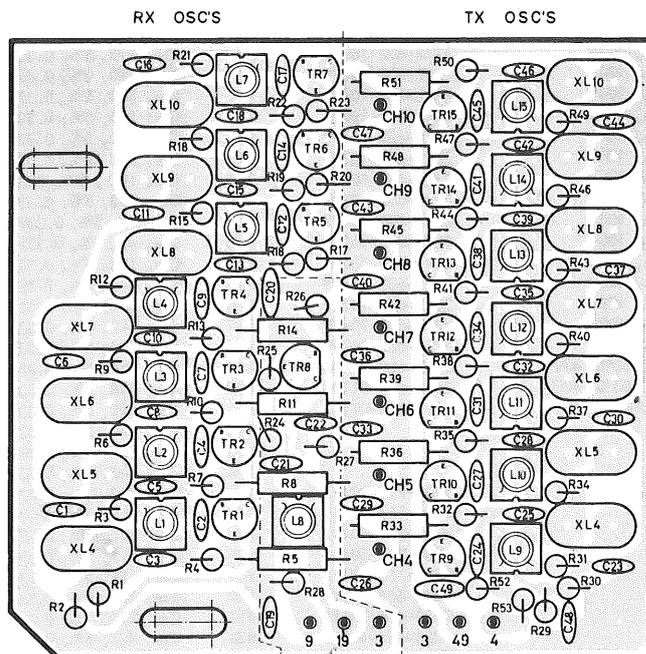


Figure 6.5 Multichannel Oscillator PC Board Component Layout

6.7 MULTICHANNEL OSCILLATOR PC BOARDS

6.7.1 A & B BAND MULTICHANNEL PC BOARDS

3502 349 90690

CAPACITORS

C1	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C2	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C3	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C4	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C5	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C6	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C7	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C8	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C9	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C10	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C11	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C12	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C13	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C14	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C15	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C16	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C17	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C18	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C19	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C20	Cer. Pl. 68p, 2%, 100V	2222-632-10689
C21	Cer. Pl. 4p7, P25, 100V	2222-632-09478
C22	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C23	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C24	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C25	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C26	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C27	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C28	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C29	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C30	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C31	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C32	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C33	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C34	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C35	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C36	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C37	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C38	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C39	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C40	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C41	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C42	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C43	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C44	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C45	Cer. Pl. 100p, 2%, 100V	2222-632-58101
C46	Cer. Pl. 33p, 2%, 100V	2222-632-10339
C47	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C48	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C49	Cer. Pl. 120p, 2%, 100V	2222-632-58121

SEMICONDUCTORS

TR1	Transistor, BF494	9331-987-70112
TR2	Transistor, BF494	9331-987-70112
TR3	Transistor, BF494	9331-987-70112
TR4	Transistor, BF494	9331-987-70112
TR5	Transistor, BF494	9331-987-70112
TR6	Transistor, BF494	9331-987-70112
TR7	Transistor, BF494	9331-987-70112
TR8	Transistor, BF198	9330-634-10112
TR9	Transistor, BF494	9331-987-70112
TR10	Transistor, BF494	9331-987-70112
TR11	Transistor, BF494	9331-987-70112
TR12	Transistor, BF494	9331-987-70112
TR13	Transistor, BF494	9331-987-70112
TR14	Transistor, BF494	9331-987-70112
TR15	Transistor, BF494	9331-987-70112

RESISTORS

R1	Car. 4k7, 5%, 0.33W	2322-211-13472
R2	Car. 4k7, 5%, 0.33W	2322-211-13472
R3	Car. 680, 5%, 0.33W	2322-211-13681
R4	Car. 22, 5%, 0.33W	2322-211-13229
R5	Car. 1k, 5%, 0.33W	2322-211-13102
R6	Car. 680, 5%, 0.33W	2322-211-13681
R7	Car. 22, 5%, 0.33W	2322-211-13229
R8	Car. 1k, 5%, 0.33W	2322-211-13102
R9	Car. 680, 5%, 0.33W	2322-211-13681
R10	Car. 22, 5%, 0.33W	2322-211-13229
R11	Car. 1k, 5%, 0.33W	2322-211-13102
R12	Car. 680, 5%, 0.33W	2322-211-13681
R13	Car. 22, 5%, 0.33W	2322-211-13229
R14	Car. 1k, 5%, 0.33W	2322-211-13102
R15	Car. 680, 5%, 0.33W	2322-211-13681
R16	Car. 22, 5%, 0.33W	2322-211-13229
R17	Car. 1k, 5%, 0.33W	2322-211-13102
R18	Car. 680, 5%, 0.33W	2322-211-13681
R19	Car. 22, 5%, 0.33W	2322-211-13229
R20	Car. 1k, 5%, 0.33W	2322-211-13102
R21	Car. 680, 5%, 0.33W	2322-211-13681
R22	Car. 22, 5%, 0.33W	2322-211-13229
R23	Car. 1k, 5%, 0.33W	2322-211-13102
R24	Car. 680, 5%, 0.33W	2322-211-13681
R25	Car. 12k, 5%, 0.33W	2322-211-13123
R26	Car. 2k7, 5%, 0.33W	2322-211-13272
R27	Car. 680, 5%, 0.33W	2322-211-13681
R28	Car. 47, 5%, 0.33W	2322-211-13479
R29	Car. 4k7, 5%, 0.33W	2322-211-13472
R30	Car. 4k7, 5%, 0.33W	2322-211-13472
R31	Car. 680, 5%, 0.33W	2322-211-13681
R32	Car. 22, 5%, 0.33W	2322-211-13229
R33	Car. 1k5, 5%, 0.33W	2322-211-13152
R34	Car. 680, 5%, 0.33W	2322-211-13681
R35	Car. 22, 5%, 0.33W	2322-211-13229
R36	Car. 1k5, 5%, 0.33W	2322-211-13152
R37	Car. 680, 5%, 0.33W	2322-211-13681
R38	Car. 22, 5%, 0.33W	2322-211-13229
R39	Car. 1k5, 5%, 0.33W	2322-211-13152
R40	Car. 680, 5%, 0.33W	2322-211-13681
R41	Car. 22, 5%, 0.33W	2322-211-13229
R42	Car. 1k5, 5%, 0.33W	2322-211-13152
R43	Car. 680, 5%, 0.33W	2322-211-13681
R44	Car. 22, 5%, 0.33W	2322-211-13229
R45	Car. 1k5, 5%, 0.33W	2322-211-13152
R46	Car. 680, 5%, 0.33W	2322-211-13681
R47	Car. 22, 5%, 0.33W	2322-211-13229
R48	Car. 1k5, 5%, 0.33W	2322-211-13152
R49	Car. 680, 5%, 0.33W	2322-211-13681
R50	Car. 22, 5%, 0.33W	2322-211-13229
R51	Car. 1k5, 5%, 0.33W	2322-211-13152
R52	Car. 560, 5%, 0.33W	2322-211-13561
R53	Car. 47, 5%, 0.33W	2322-211-13479

INDUCTORS

L1	Coil Assy High Band 828	3502-383-00050
L2	Coil Assy High Band 828	3502-383-00050
L3	Coil Assy High Band 828	3502-383-00050
L4	Coil Assy High Band 828	3502-383-00050
L5	Coil Assy High Band 828	3502-383-00050
L6	Coil Assy High Band 828	3502-383-00050
L7	Coil Assy High Band 828	3502-383-00050
L8	Coil Assy High Band 828	3502-383-00220
L9	Coil Assy Ex High Band	3502-383-00100
L10	Coil Assy Ex High Band	3502-383-00100
L11	Coil Assy Ex High Band	3502-383-00100
L12	Coil Assy Ex High Band	3502-383-00100
L13	Coil Assy Ex High Band	3502-383-00100
L14	Coil Assy Ex High Band	3502-383-00100
L15	Coil Assy Ex High Band	3502-383-00100

6.7.2 E BAND MULTICHANNEL PC BOARD

3502 349 90910

CAPACITORS

C1	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C2	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C3	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C4	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C5	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C6	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C7	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C8	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C9	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C10	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C11	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C12	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C13	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C14	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C15	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C16	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C17	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C18	Cer. Pl. 22p, 2%, 100V	2222-632-34229
C19	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C20	Cer. Pl. 68p, 2%, 100V	2222-632-58689
C21	Cer. Pl. 6p8, P25, 100V	2222-632-09688
C22	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C23	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C24	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C25	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C26	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C27	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C28	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C29	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C30	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C31	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C32	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C33	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C34	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C35	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C36	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C37	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C38	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C39	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C40	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C41	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C42	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C43	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C44	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C45	Cer. Pl. 220p, 2%, 100V	2222-632-58221
C46	Cer. Pl. 82p, 2%, 100V	2222-632-58829
C47	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C48	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C49	Cer. Pl. 120p, 2%, 100V	2222-632-58121

SEMICONDUCTORS

TR1	Transistor, BF494	9331-987-70112
TR2	Transistor, BF494	9331-987-70112
TR3	Transistor, BF494	9331-987-70112
TR4	Transistor, BF494	9331-987-70112
TR5	Transistor, BF494	9331-987-70112
TR6	Transistor, BF494	9331-987-70112
TR7	Transistor, BF494	9331-987-70112
TR8	Transistor, BF198	9330-634-10112
TR9	Transistor, BF494	9331-987-70112
TR10	Transistor, BF494	9331-987-70112
TR11	Transistor, BF494	9331-987-70112
TR12	Transistor, BF494	9331-987-70112
TR13	Transistor, BF494	9331-987-70112
TR14	Transistor, BF494	9331-987-70112
TR15	Transistor, BF494	9331-987-70112

RESISTORS

R1	Car. 4k7, 5%, 0.33W	2322-211-13472
R2	Car. 4k7, 5%, 0.33W	2322-211-13472
R3	Car. 680, 5%, 0.33W	2322-211-13681
R4	Car. 22, 5%, 0.33W	2322-211-13229
R5	Car. 1k5, 5%, 0.33W	2322-211-13152
R6	Car. 680, 5%, 0.33W	2322-211-13681
R7	Car. 22, 5%, 0.33W	2322-211-13229
R8	Car. 1k5, 5%, 0.33W	2322-211-13152
R9	Car. 680, 5%, 0.33W	2322-211-13681
R10	Car. 22, 5%, 0.33W	2322-211-13229
R11	Car. 1k5, 5%, 0.33W	2322-211-13152
R12	Car. 680, 5%, 0.33W	2322-211-13681
R13	Car. 22, 5%, 0.33W	2322-211-13229
R14	Car. 1k5, 5%, 0.33W	2322-211-13152
R15	Car. 680, 5%, 0.33W	2322-211-13681
R16	Car. 22, 5%, 0.33W	2322-211-13229
R17	Car. 1k5, 5%, 0.33W	2322-211-13152
R18	Car. 680, 5%, 0.33W	2322-211-13681
R19	Car. 22, 5%, 0.33W	2322-211-13229
R20	Car. 1k5, 5%, 0.33W	2322-211-13152
R21	Car. 680, 5%, 0.33W	2322-211-13681
R22	Car. 22, 5%, 0.33W	2322-211-13229
R23	Car. 1k5, 5%, 0.33W	2322-211-13152
R24	Car. 680, 5%, 0.33W	2322-211-13681
R25	Car. 12k, 5%, 0.33W	2322-211-13123
R26	Car. 2k7, 5%, 0.33W	2322-211-13272
R27	Car. 680, 5%, 0.33W	2322-211-13681
R28	Car. 47, 5%, 0.33W	2322-211-13479
R29	Car. 8k2, 5%, 0.33W	2322-211-13822
R30	Car. 4k7, 5%, 0.33W	2322-211-13472
R31	Car. 680, 5%, 0.33W	2322-211-13681
R32	Car. 22, 5%, 0.33W	2322-211-13229
R33	Car. 1k, 5%, 0.33W	2322-211-13102
R34	Car. 680, 5%, 0.33W	2322-211-13681
R35	Car. 22, 5%, 0.33W	2322-211-13229
R36	Car. 1k, 5%, 0.33W	2322-211-13102
R37	Car. 680, 5%, 0.33W	2322-211-13681
R38	Car. 22, 5%, 0.33W	2322-211-13229
R39	Car. 1k, 5%, 0.33W	2322-211-13102
R40	Car. 680, 5%, 0.33W	2322-211-13681
R41	Car. 22, 5%, 0.33W	2322-211-13229
R42	Car. 1k, 5%, 0.33W	2322-211-13102
R43	Car. 680, 5%, 0.33W	2322-211-13681
R44	Car. 22, 5%, 0.33W	2322-211-13229
R45	Car. 1k, 5%, 0.33W	2322-211-13102
R46	Car. 680, 5%, 0.33W	2322-211-13681
R47	Car. 22, 5%, 0.33W	2322-211-13229
R48	Car. 1k, 5%, 0.33W	2322-211-13102
R49	Car. 680, 5%, 0.33W	2322-211-13681
R50	Car. 22, 5%, 0.33W	2322-211-13229
R51	Car. 1k, 5%, 0.33W	2322-211-13102
R52	Car. 560, 5%, 0.33W	2322-211-13561
R53	Car. 47, 5%, 0.33W	2322-211-13479

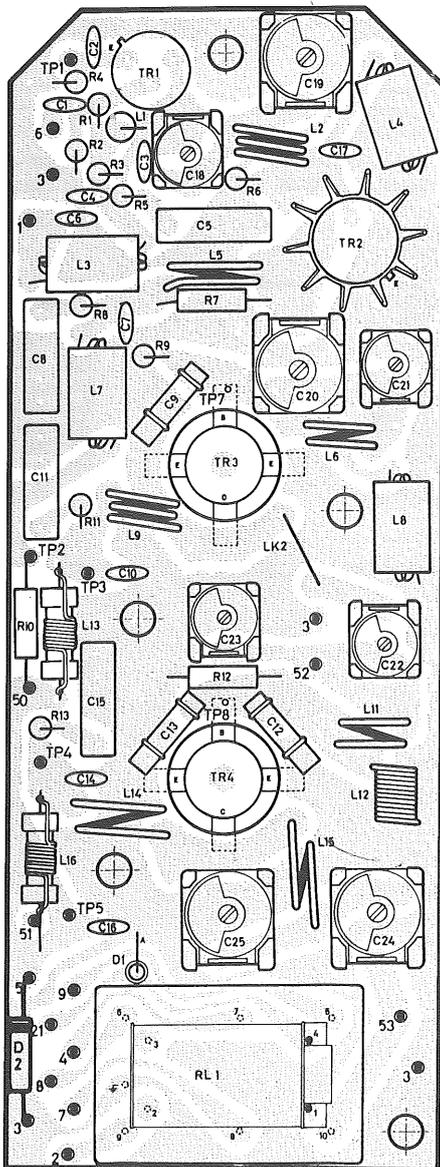
INDUCTORS

L1	Coil Assy Low Band 828	3502-383-00130
L2	Coil Assy Low Band 828	3502-383-00130
L3	Coil Assy Low Band 828	3502-383-00130
L4	Coil Assy Low Band 828	3502-383-00130
L5	Coil Assy Low Band 828	3502-383-00130
L6	Coil Assy Low Band 828	3502-383-00130
L7	Coil Assy Low Band 828	3502-383-00130
L8	Coil Assy 10 CH. 828 LB	3502-383-00230
L9	Coil Assy Ex Low Band	3502-383-00290
L10	Coil Assy Ex Low Band	3502-383-00290
L11	Coil Assy Ex Low Band	3502-383-00290
L12	Coil Assy Ex Low Band	3502-383-00290
L13	Coil Assy Ex Low Band	3502-383-00290
L14	Coil Assy Ex Low Band	3502-383-00290
L15	Coil Assy Ex Low Band	3502-383-00290

6.8 TRANSMITTER PA PC BOARDS

6.8.1 A & B BAND TRANSMITTER PC BOARD

3502 349 90860



CAPACITORS

C1	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C2	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C3	Cer. Pl. 1p8, 2%, 100V	2222-632-09188
C4	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C5	P. Carb. 150n, 10%, 100V	2222-344-21154
C6	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C7	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C8	P. Carb. 150n, 10%, 100V	2222-344-21154
C9	Cer. Tub. 47p, 5%, 500V	2222-555-56479
C10	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C11	P. Carb. 150n, 10%, 100V	2222-344-21154
C12	Cer. Tub. 47p, 5%, 500V	2222-555-56479
C13	Cer. Tub. 47p, 5%, 500V	2222-555-56479
C14	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C15	P. Carb. 150n, 10%, 100V	2222-344-21154
C16	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C17	Cer. Pl. 39p, 2%, 100V	2222-632-10399
C18	Var. 2 - 9p, 300V	2222-809-09005
C19	Var. 4 - 40p, 300V	2222-809-08002
C20	Var. 4 - 40p, 300V	2222-809-08002
C21	Var. 2 - 18p, 300V	2222-809-09006
C22	Var. 2 - 18p, 300V	2222-809-09006
C23	Var. 2 - 18p, 300V	2222-809-09006
C24	Var. 4 - 40p, 350V	2222-809-08002
C25	Var. 5 - 60p, 200V	2222-809-08003

RESISTORS

R1	Car. 820, 5%, 0.33W	2322-211-13821
R2	Car. 100, 5%, 0.33W	2322-211-13101
R3	Car. 1k, 5%, 0.33W	2322-211-13102
R4	Car. 10Ω, 5%, 0.33W	2322-211-13109
R5	Car. 10Ω, 5%, 0.33W	2322-211-13109
R6	Car. 100, 5%, 0.33W	2322-211-13101
R7	Car. 150, 5%, 0.33W	2322-211-13151
R8	Car. 10Ω, 5%, 0.33W	2322-211-13109
R9	Car. 47, 5%, 0.33W	2322-211-13479
R10	Car. 1Ω, 5%, 0.33W	2322-211-13108
R11	Car. 10Ω, 5%, 0.33W	2322-211-13109
R12	Car. 47, 5%, 0.33W	2322-211-13479
R13	Car. 10Ω, 5%, 0.33W	2322-211-13109

SEMICONDUCTORS

TR1	Transistor, BFW16A	9331-299-30112
TR2	Transistor, BFS22A	9331-587-00112
TR3	Transistor, BLY87A	9331-587-20112
TR4	Transistor, BLY89A	9331-523-91112
D1	Diode, 1N4148	9330-839-90112
D2	Diode, BZW70-16	9331 858 20112

INDUCTORS

L1	Choke, RF, 150uH, 20%	3522-020-09860
L2	Coil Air	3502-380-00000
L3	Choke, RF, 6uH	4312-020-36640
L4	Choke, RF, 6uH	4312-020-36640
L5	Coil Air	3502-380-00010
L6	Coil Air	3502-380-00020
L7	Choke, RF, 6uH	4312-020-36641
L8	Choke, RF, 6uH	4312-020-36641
L9	Coil Air	3502-380-00000
L11	Coil Air	3502-380-00030
L12	Coil Air	3502-380-00040
L13	Choke	3502-383-00030
L14	Coil Air	3502-380-00050
L15	Coil Air	3502-380-00060
L16	Choke	3502-383-00030

RELAY

RL1	Relay, AER, c/o, 10V	2422-132-01876
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LINK

LK2	Link	3502-380-00090
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Figure 6.6 A & B Band Transmitter PA PC Board Component Layout

CAPACITORS

C1	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C2	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C4	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C5	P. Carb. 150n, 10%, 100V	2222-344-21154
C6	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C10	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C11	P. Carb. 150n, 10%, 100V	2222-344-21154
C14	Cer. Pl. 1n0, 10%, 100V	2222-630-01102
C15	P. Carb. 150n, 10%, 100V	2222-344-21154
C16	Cer. Pl. 10n, -20+80%, 40V	2222-629-01103
C20	Var. 5 - 60pf, 300V	2222-809-08003
C21	Var. 5 - 60pf, 300V	2222-809-08003
C22	Var. 5 - 60pf, 300V	2222-809-08003
C23	Var. 5 - 60pf, 300V	2222-809-08003
C24	Var. 4 - 40pf, 300V	2222-809-08002
C25	Var. 5 - 60pf, 300V	2222-809-08003
C26	Cer. Pl. 33p, 2%, 100V	2222 632 10339

RESISTORS

R1	Car. 680, 5%, 0.33W	2322-211-13681
R2	Car. 100, 5%, 0.33W	2322-211-13101
R3	Car. 150, 5%, 0.33W	2322-211-13151
R4	Car. 10n, 5%, 0.33W	2322-211-13109
R5	Car. 10Ω, 5%, 0.33W	2322-211-13109
R9	Car. 10, 5%, 0.33W	2322-211-13109
R11	Car. 10, 5%, 0.33W	2322-211-13109
R12	Car. 10, 5%, 0.33W	2322-211-13109
R13	Car. 4Ω, 5%, 0.33W	2322-211-13478
R14	Car. 100, 5%, 0.33W	2322-211-13101

SEMICONDUCTORS

TR1	Transistor, BFW16A	9331-299-30112
TR2	Transistor, BLY87A	9331-587-20112
TR3	Transistor, BLY89A	9331-523-91112
D1	Diode, 1N4148	9330-839-90112
D2	Diode, BZW70-16	9331 858 20112

INDUCTORS

L1	Choke, RF, 150uH, 20%	3522-020-09860
L3	Choke, RF, 6uH	4312-020-36640
L6	Coil Air	3502-380-00160
L8	Choke, RF, 6uH	4312-020-36640
L9	Coil Air	3502-380-00160
L11	Coil Air	3502-380-00170
L12	Coil Air	3502-380-00040
L13	Choke	3502-383-00030
L14	Coil Air	3502-380-00180
L15	Coil Air	3502-380-00200
L16	Choke	3502-383-00030

RELAY

RL1	Relay, AER, c/o, 10V	2422-132-01876
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LINKS

LK1	Link	3502-380-00090
LK2	Link	3502-380-00190

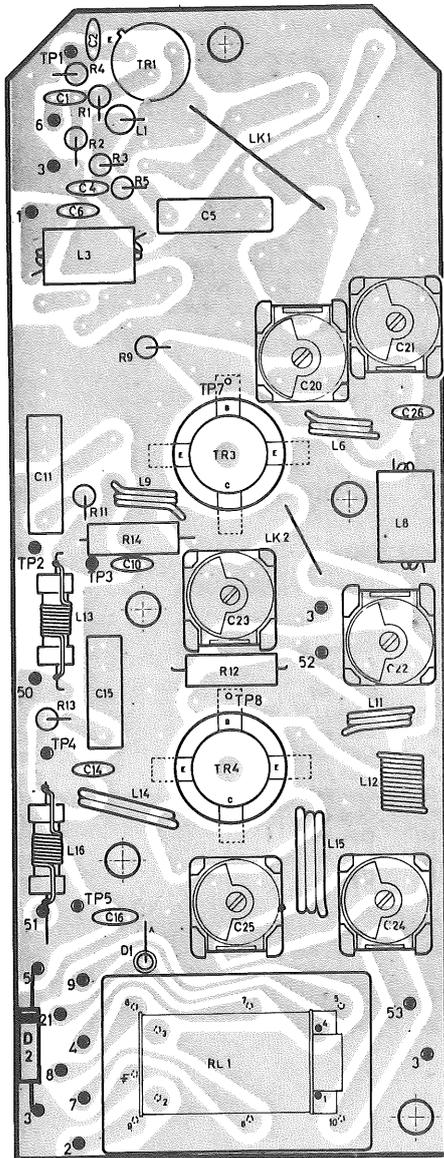


Figure 6.7 Transmitter PA PC Boards Component Layout

6.9 ANTENNA FILTER ASSEMBLIES

6.9.1 A BAND ANTENNA FILTER

3502 350 00160

CAPACITORS

C1	Cer. F/Thru, 15p, 5%, 350V	2222-702-06159
C2	Cer. F/Thru, 27p, 5%, 350V	2222-702-06279
C3	Cer. Tub. 4p7, P5, 500V	2222-555-08159
C4	Cer. F/Thru, 27p, 5%, 350V	2222-702-06279
C5	Cer. Tub. 15p, 5%, 500V	2222-555-08159

INDUCTORS

L1	Coil	3502-380-00070
L2	Coil	3502-380-00080
L3	Coil	3502-380-00070

MISCELLANEOUS

SK4	Socket, BNC 31-203-1050 Amphenol	2422-031-00106
-----	----------------------------------	----------------

6.9.2 B BAND ANTENNA FILTER

3502 350 00370

CAPACITORS

C1	Cer. F/Thru, 15p, 5%, 350V	2222-702-06159
C2	Cer. F/Thru, 27p, 5%, 350V	2222-702-06279
C3	Cer. Tub. 5p6, P5, 500V	2222-555-08568
C4	Cer. F/Thru, 27p, 5%, 350V	2222-702-06279
C5	Cer. Tub. 15p, 5%, 500V	2222-555-08159

INDUCTORS

L1	Coil	3502-380-00240
L2	Coil	3502-380-00260
L3	Coil	3502-380-00250

MISCELLANEOUS

SK4	Socket, BNC 31-203-1050 Amphenol	2422-031-00106
-----	----------------------------------	----------------

6.9.3 E BAND ANTENNA FILTER

3502 350 00170

CAPACITORS

C1	Cer. F/Thru, 27p, 5%, 350V	2222-702-06279
C2	Cer. F/Thru, 47p, 5%, 350V	2222-702-06479
C3	Cer. Tub. 12p, 5%, 500V	2222-555-08129
C4	Cer. F/Thru, 47p, 5%, 350V	2222-702-06479
C5	Cer. Tub. 27p, 5%, 500V	2222-555-08279

INDUCTORS

L1	Coil	3502-380-00210
L2	Coil	3502-380-00220
L3	Coil	3502-380-00230

MISCELLANEOUS

SK4	Socket, BNC 31-203-1050 Amphenol	2422-031-00106
-----	----------------------------------	----------------

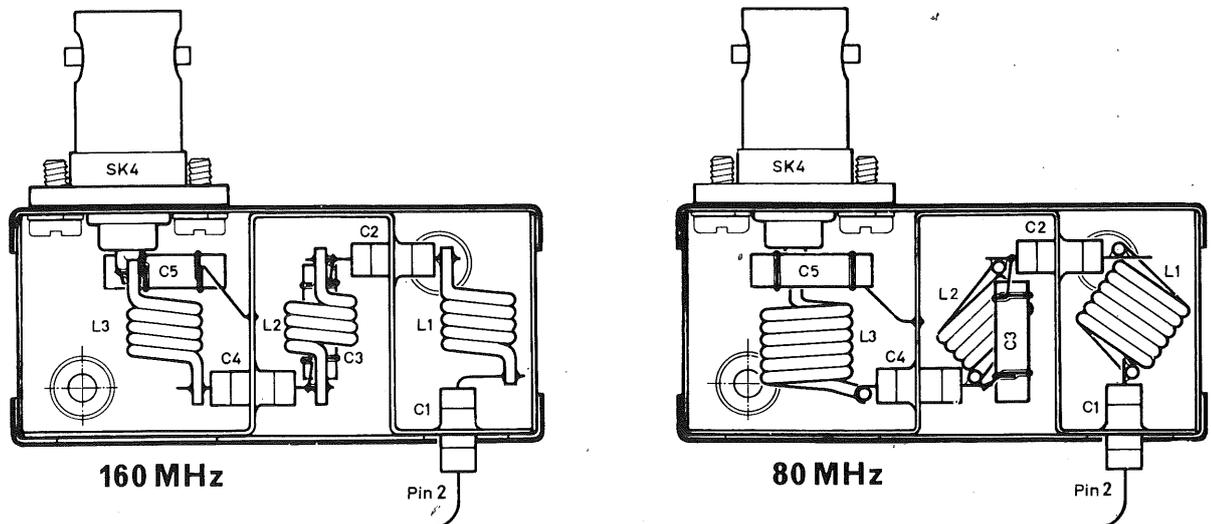


Figure 6.8 Antenna Filter Assembly

SECTION 7. CIRCUIT DIAGRAMS

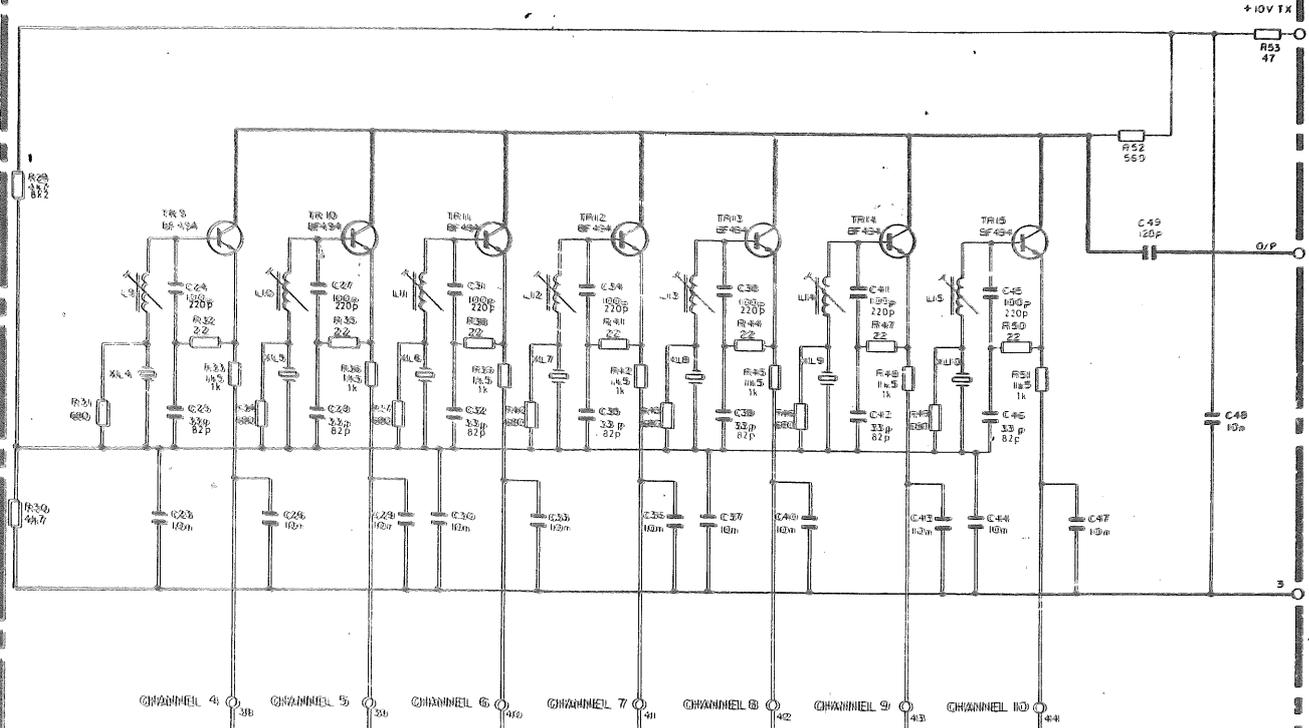
FM828 A Band VHF Transceiver

FM828 B Band VHF Transceiver

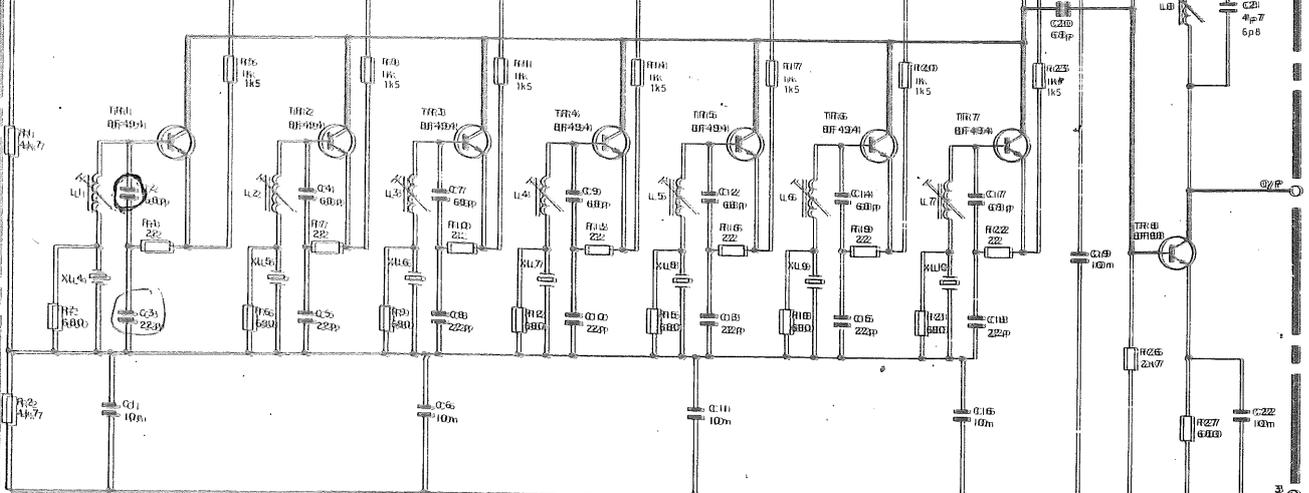
FM828 E Band VHF Transceiver

ERRATUM Circuit changes are given on a separate sheet immediately preceding each circuit, and Section 10.

TRANSMITTER OSCILLATORS



RECEIVER OSCILLATORS

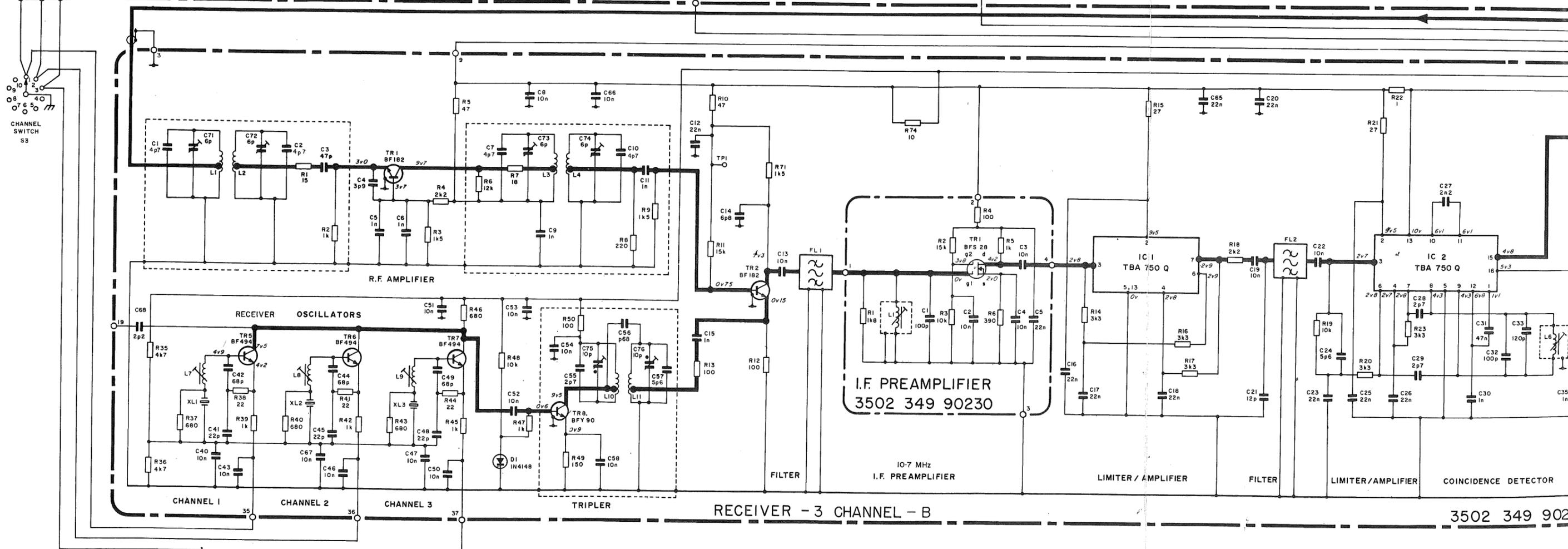
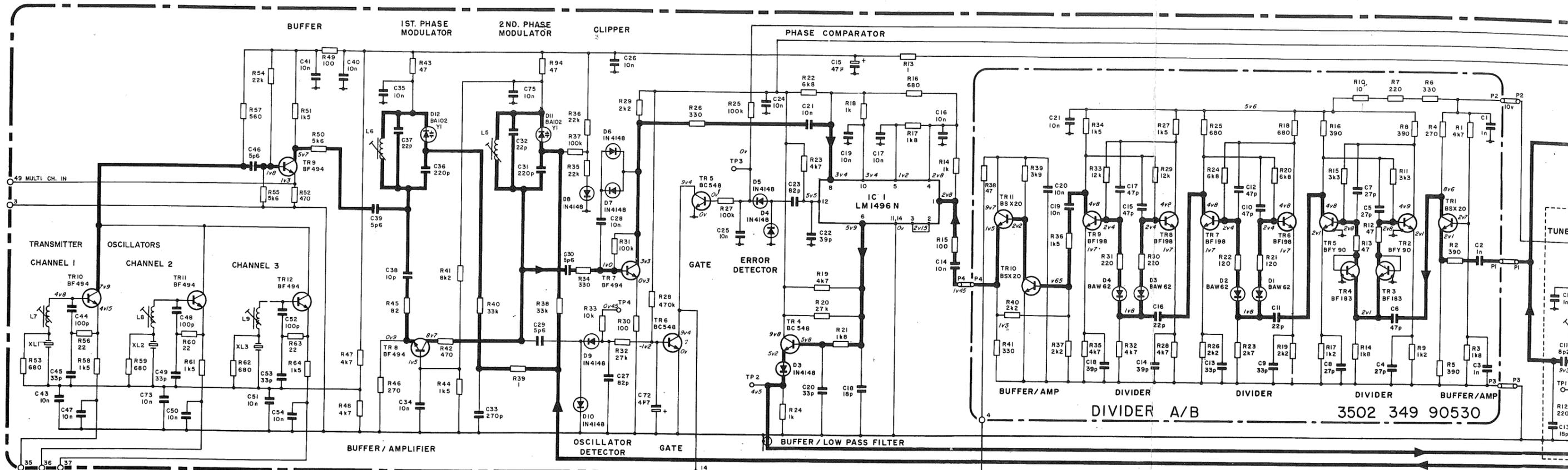


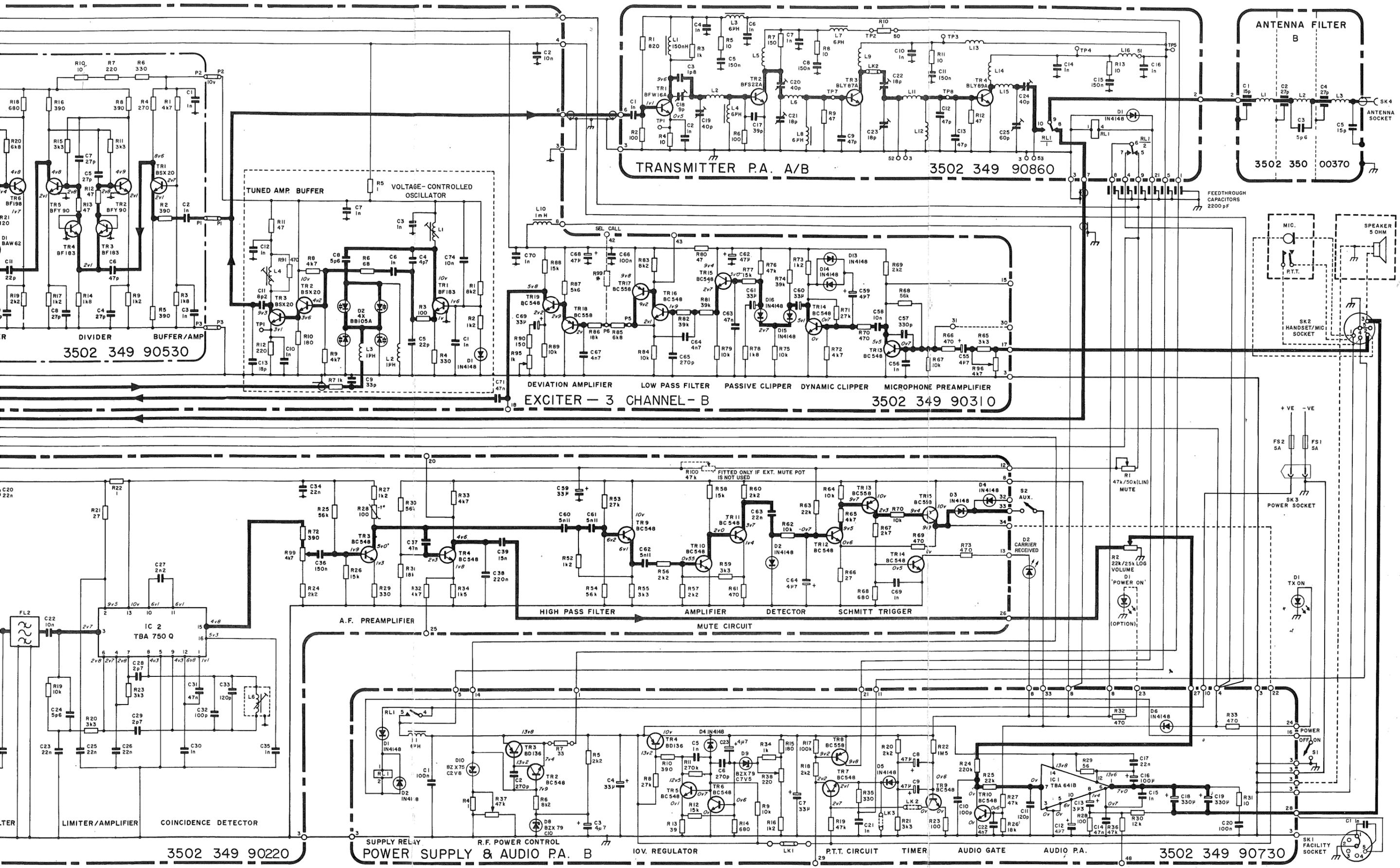
MULTI CHANNEL - A - BAND

3502 349 90690

E - BAND

3502 349 90910





D.C. READINGS (AVO ON 10V D.C. RANGE)

1. POWER SUPPLY & AUDIO P.C.B.

- (a) VOLTAGES SHOWN WHEN TX IS OPERATING.
- (b) LINKS 2 & 3 NOT FITTED.

2. RECEIVER

- (a) XTAL IN CIRCUIT.
- (b) MUTE POT FULLY CLOCKWISE.

3. EXCITER

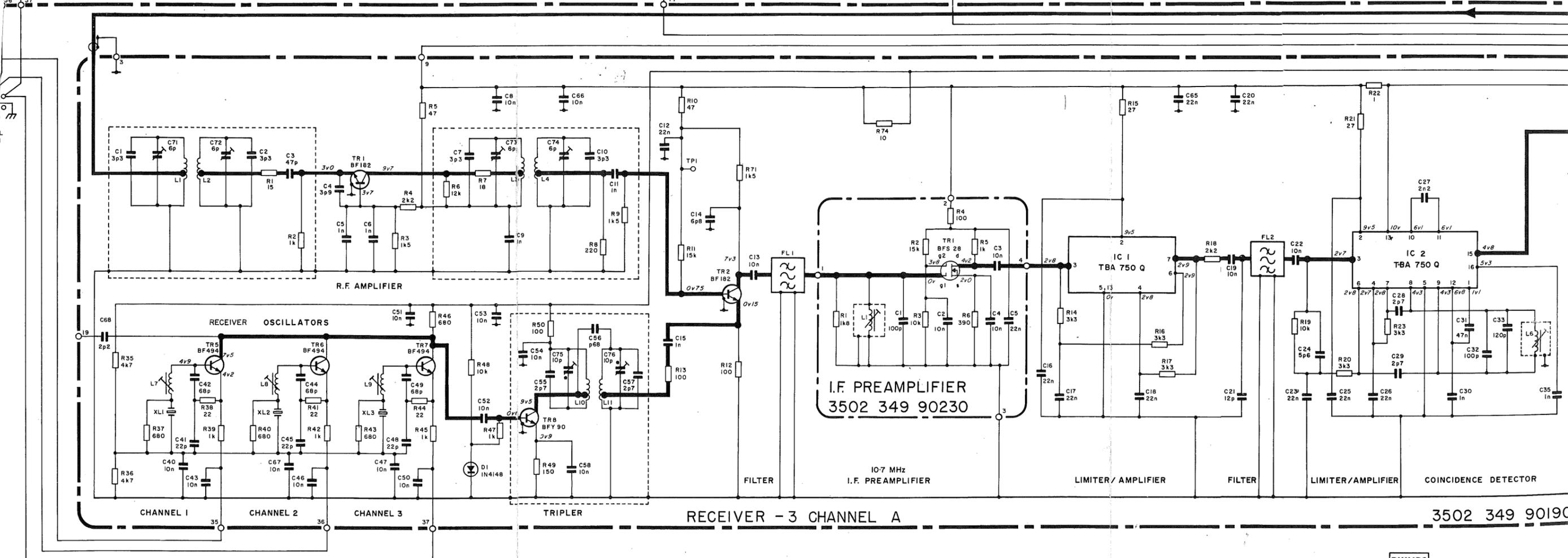
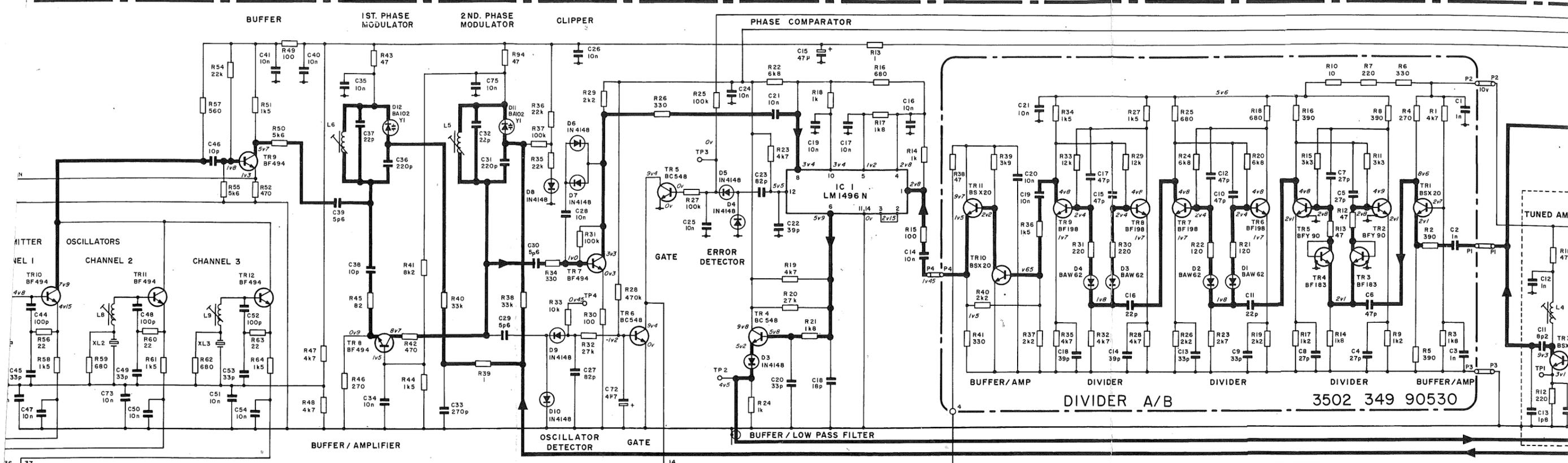
- (a) XTAL IN CIRCUIT.
- (b) EXCITER SYNCHRONIZED WITH L1 ADJUSTED TO GIVE 4.5V ON TP2.
- * TONE FROM SEL. CALL



FM 828 - B BAND V.H.F. TRANSCEIVER 30 KHz.

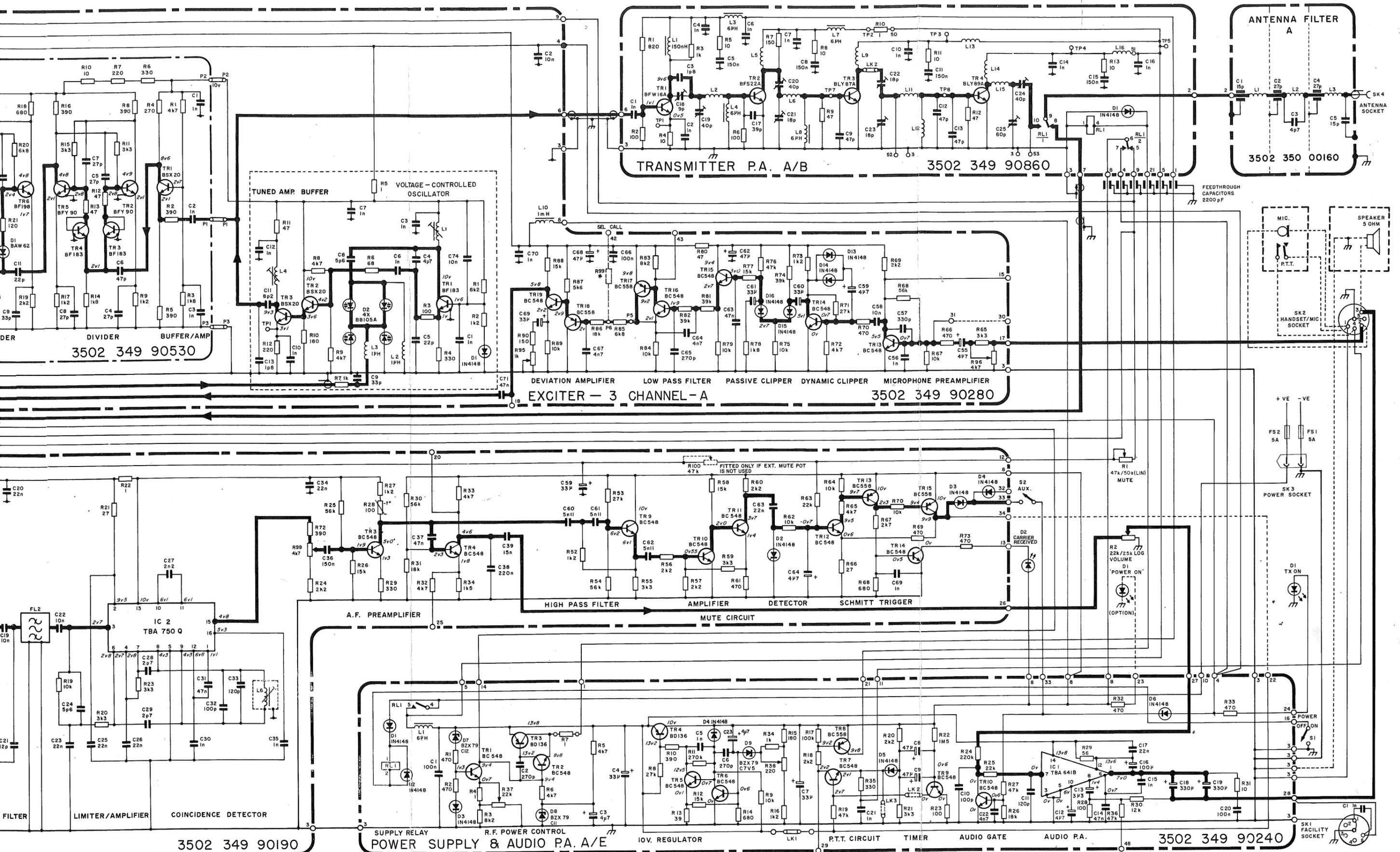
10
220
0
n
49 90860
between

502 349 90730
and 3502 349 91850
er 1976.
ls.
units
ion details.



3502 349 90190





D.C. READINGS (AVO ON 10V D.C. RANGE)

1. POWER SUPPLY & AUDIO P.C.B.

- (a) VOLTAGE'S SHOWN WHEN TX IS OPERATING.
- (b) LINKS 2 & 3 NOT FITTED.

2. RECEIVER

- (a) XTAL IN CIRCUIT.
- (b) MUTE POT FULLY CLOCKWISE.

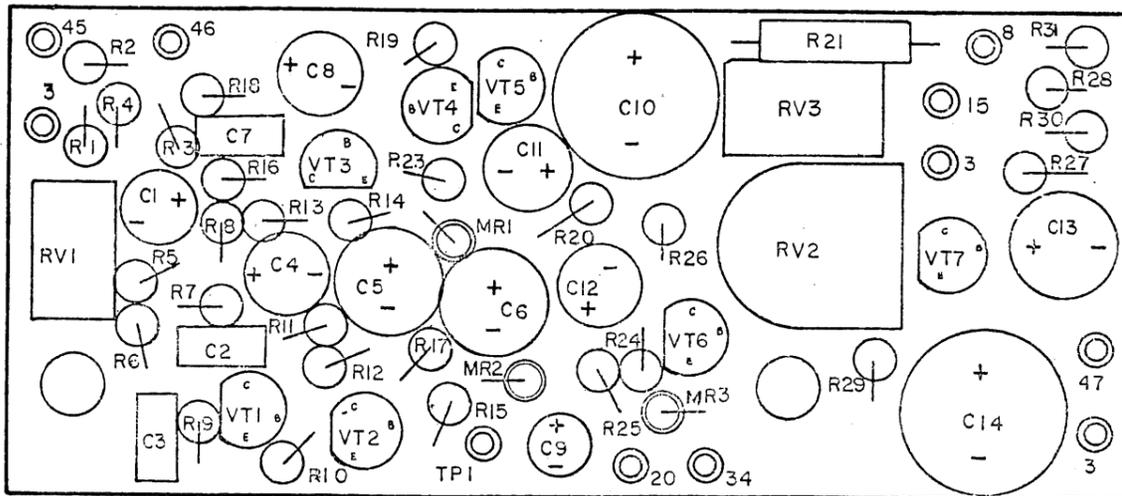
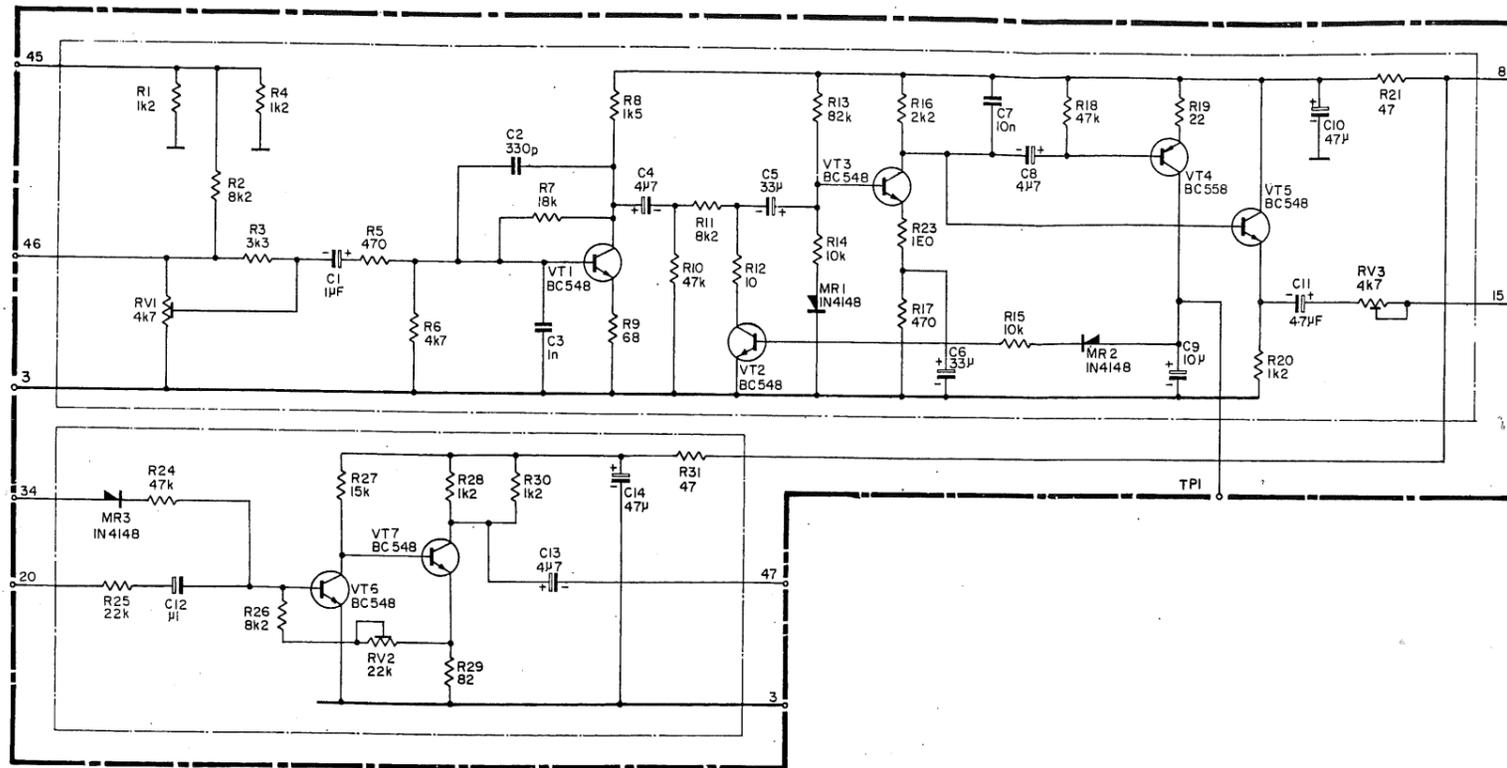
3. EXCITER

- (a) XTAL IN CIRCUIT.
- (b) EXCITER SYNCHRONIZED WITH L1 ADJUSTED TO GIVE 4.5V ON TP 2.

* TONE FROM SEL. CALL



**FM 828 - A BAND
V.H.F. TRANSCEIVER
30 KHz.**



RESISTORS

R1	Carb. 1k2, 5%	0.33W	2322 211 13122
R2	Carb. 8k2, 5%	0.33W	2322 211 13822
R3	Carb. 3k3, 5%	0.33W	2322 211 13332
R4	Carb. 1k2, 5%	0.33W	2322 211 13122
R5	Carb. 470, 5%	0.33W	2322 211 13471
R6	Carb. 4k7, 5%	0.33W	2322 211 13472
R7	Carb. 18k, 5%	0.33W	2322 211 13183
R8	Carb. 1k5, 5%	0.33W	2322 211 13152
R9	Carb. 68, 5%	0.33W	2322 211 13689
R10	Carb. 47k, 5%	0.33W	2322 211 13473
R11	Carb. 8k2, 5%	0.33W	2322 211 13822
R12	Carb. 10, 5%	0.33W	2322 211 13109
R13	Carb. 82k, 5%	0.33W	2322 211 13823
R14	Carb. 10k, 5%	0.33W	2322 211 13103
R15	Carb. 10k, 5%	0.33W	2322 211 13103
R16	Carb. 2k2, 5%	0.33W	2322 211 13222
R17	Carb. 470, 5%	0.33W	2322 211 13471
R18	Carb. 47k, 5%	0.33W	2322 211 13473
R19	Carb. 22, 5%	0.33W	2322 211 13229
R20	Carb. 1k2, 5%	0.33W	2322 211 13122
R21	Carb. 47, 5%	0.33W	2322 211 13479
R23	Carb. 1, 5%	0.33W	2322 211 13108
R24	Carb. 47, 5%	0.33W	2322 211 13473
R25	Carb. 22k, 5%	0.33W	2322 211 13223
R26	Carb. 8k2, 5%	0.33W	2322 211 13822
R27	Carb. 15k, 5%	0.33W	2322 211 13153
R28	Carb. 1k2, 5%	0.33W	2322 211 13122
R29	Carb. 82, 5%	0.33W	2322 211 13829
R30	Carb. 1k2, 5%	0.33W	2322 211 13122
R31	Carb. 47, 5%	0.33W	2322 211 13479
RV1	Carb. Preset Pot 4k7	Lin.	2322 410 05006
RV2	Carb. Preset Pot 22k	20% Lin.	2322 410 03308
RV3	Carb. Preset Pot 4k7	Lin.	2322 410 05006

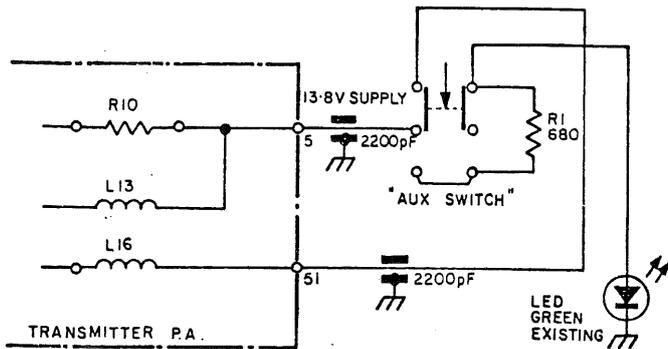
CAPACITORS

C1	Tant. 1u, 20%	35V	2002 140 12108
C2	Cer. Pl. 330p, 2%	100V	2222 632 58331
C3	Cer. Pl. 1n, 10%	100V	2222 630 01102
C4	Tant. 4u7, 20%	35V	2002 140 12478
C5	Elec. 33u, -10+100%	10V	2038 001 64339
C6	Elec. 33u, -10+100%	10V	2038 001 64339
C7	Cer. Pl. 10n, -20+80%	63V	2222 629 01103
C8	Tant. 4u7, 20%	35V	2002 140 12478
C9	Elec. 10u, -10+100%	16V	2038 001 65109
C10	Elec. 47u, -10+50%	25V	2020 002 44479
C11	Tant. 4u7, 20%	35V	2002 140 12478
C12	Tant. 100n, 20%	35V	2002 140 12107
C13	Tant. 4u7, 20%	35V	2002 140 12478
C14	Elec. 47u, -10+50%	25V	2020 002 44479

SEMICONDUCTORS

VT1	Transistor, BC548	9331 976 40112
VT2	Transistor, BC548	9331 976 40112
VT3	Transistor, BC548	9331 976 40112
VT4	Transistor, BC558	9331 977 30112
VT5	Transistor, BC548	9331 976 40112
VT6	Transistor, BC548	9331 976 40112
VT7	Transistor, BC548	9331 976 40112
MR1	Diode, 1n4148	9330 839 90112
MR2	Diode, 1n4148	9330 839 90112
MR3	Diode, 1n4148	9330 839 90112

9.6 FM828 1-WATT RF MODIFICATION



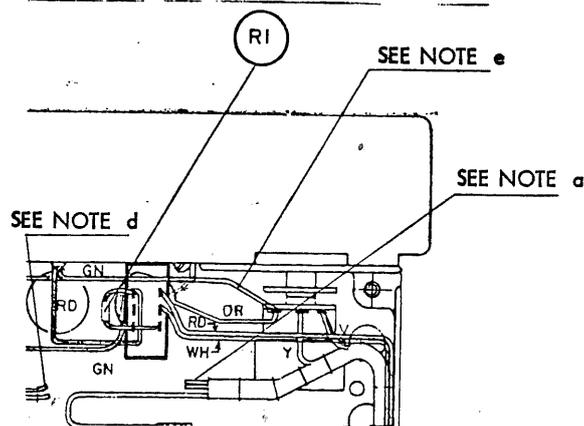
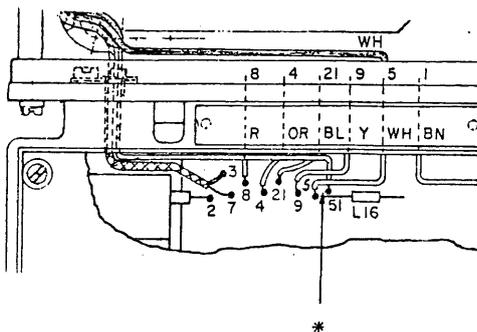
FIELD MODIFICATION KIT

Feed Thru Assy Mar. 828 110-A4
 Wire CU21/0032 PVC Red
 Wire CU21/0032 PVC White
 Sleeving PVC 80C 1 50MM CL
 Res. Carb. 680, 5%, 0 33W

9585 828 69300

3502 330 01310
 0702 182 01006
 0702 182 01004
 0802 026 22058
 2322 211 13681

- a. Remove existing "mute defeat" wiring from "Aux" switch, join wires together and sleeve.
 - b. Run white wire from feedthru, capacitor 5 through set to "Aux" switch and connect to middle terminal.
 - c. Run red wire from pin 51 of transmitter P.A. P.C.B., through feedthru capacitor (item 1 of kit) to "Aux" switch. Connect this wire to one of the changeover terminals of switch so that the connection between the white and red wire is made when pushbutton is out.
- Note: If pin 51 does not exist on transmitter P.A. P.C.B., remove L16 from P.C.B. and connect red wire to TP4.
- d. Cut off wires connected to green LED, leaving sufficient length for reconnection, and sleeve unused wires separately.
 - e. Connect red wire (LED anode) via 680Ω resistor (item 5 of kit) to remaining changeover terminal of "Aux" switch. (Use spare contacts of second changeover section as mounting points). Connect green wire (LED cathode) to earth.
 - f. Stamp a suffix .../1 on both serial No. plates.
 - g. Line the P.A. up as per section 4.1 for 25 watt output power ("Aux" switch out), preferable with dummy cover.
 - h. Push "Aux" switch in, check that green light is on and ensure that output power is 1 watt or less.
 - i. If the output power in the lower position is not close enough to 1 watt, use trimmers C22 and C25 to obtain best compromise (dummy cover required).



* Remove part of L16 between pin 51 and P.C.B.

FM828 'A' BAND CIRCUIT
Update Information Sheet

Exciter Board 3502 349 90280

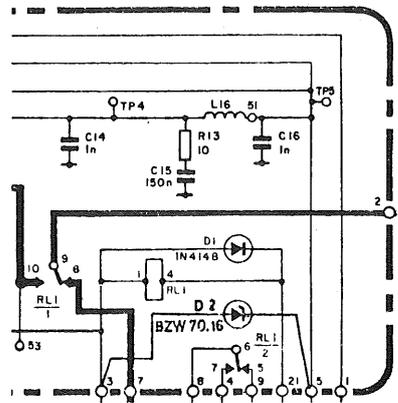
R13 - Change value to 10Ω
R19 - Change value to $3k\Omega$
R20 - Delete

Receiver Board 3502 349 90190

TR1 - Change type to BFY90
C37 - Change value to 150n

Transmitter PA Board 3502 349 90860

D2 - Add diode BZW70-16 between
pin 3 and 5 as shown



Power Supply & Audio Board 3502 349 90240
Replaced by PS & Audio Board 3502 349 90780
in units produced after December 1976.
See Section 19 for current details.

Socket SK1

Replaced by 10-way socket in units
produced after December 1976.
See Section 10 for interconnection details.

SECTION 8. REMOTE CONTROL

8.1 TRANSCEIVER (REMOTE CONTROL)

The remote control version FM828 employs the same basic circuitry as the local control version detailed in Section 1 to Section 7 of this manual, however, the following changes are made:

- a. Front panel complete with local controls is removed and a blank front panel fitted.
- b. The 5-pin sockets (SK1 and SK2) are removed and 10-pin sockets (2422-026-02002) are fitted in each position to provide sufficient remote control connections.

The interconnection diagram showing the connection of the new sockets SK1 and SK2 to the standard pc boards is shown in figure 8.1.

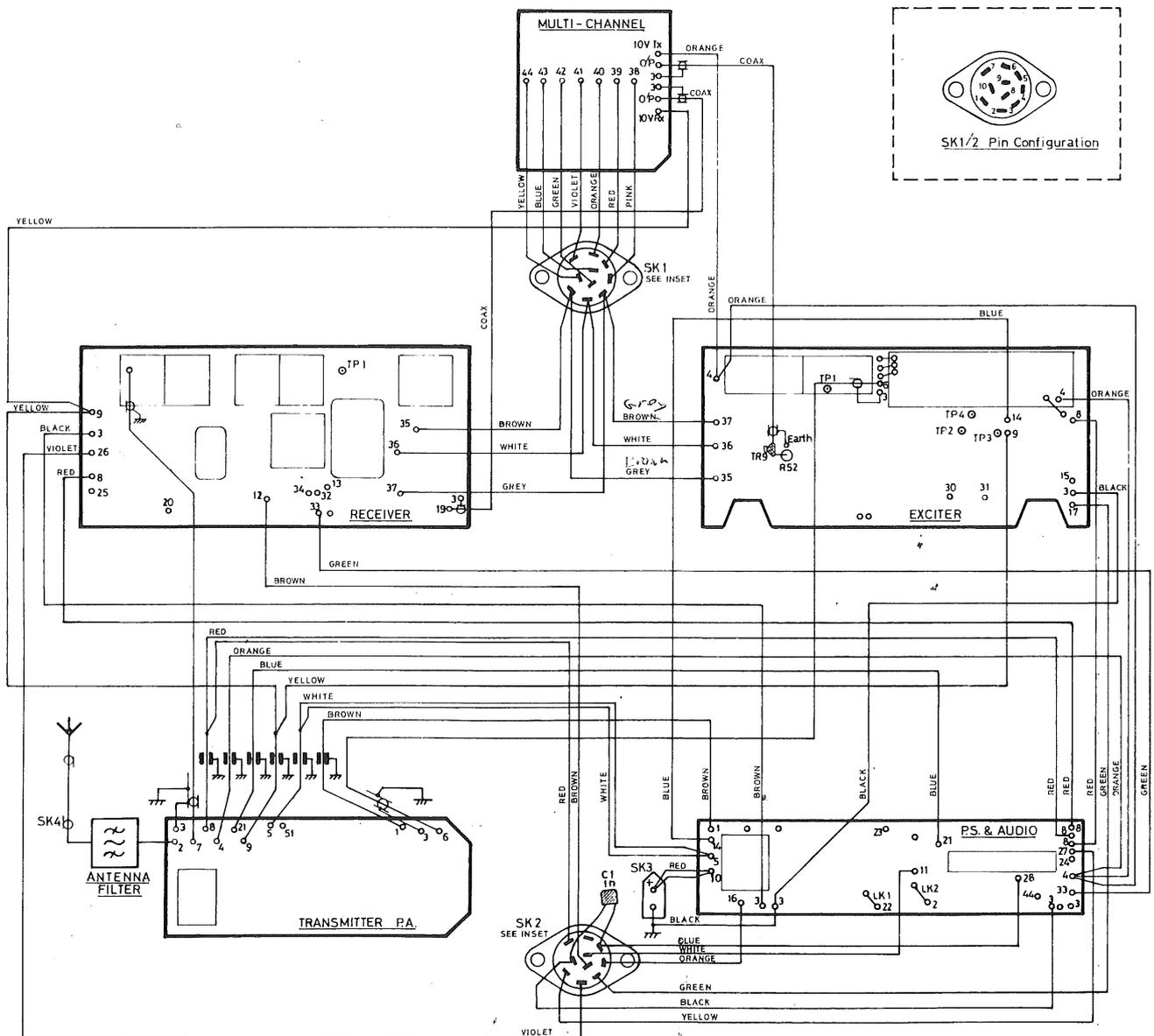


Figure 8.1 FM828 Remote Control Interconnection

8.2 REMOTE CONTROL UNITS

Where remote fitment of the transmitter receiver is mandatory, either due to space limitations or customer specifications, the operator controls must be located in a position accessible to the driver/operator. To provide this facility a family of remote control units has been designed for use with mobile radiotelephone.

8.2.1 REMOTE CONTROL UNIT CU941

The CU941 is designed for panel mounting within the vehicle dash area and comprises a control panel housing two rotary controls (volume and mute), two slide type switches (power on/off and facility), and a light emitting diode indicator. Provision is made for fitment of a 10-position switch (Switch Assembly SA944) where multi-channel switching is required.



Figure 8.2 CU941 Front Panel (with multichannel)

The control unit is extremely light and can be supported on any flat surface, plastic or metal, within the dash area. A mounting bracket and metal enclosure are available as optional accessories for special applications where panel mounting is not possible.

A combined remote control unit circuit is shown in figure 8.3.

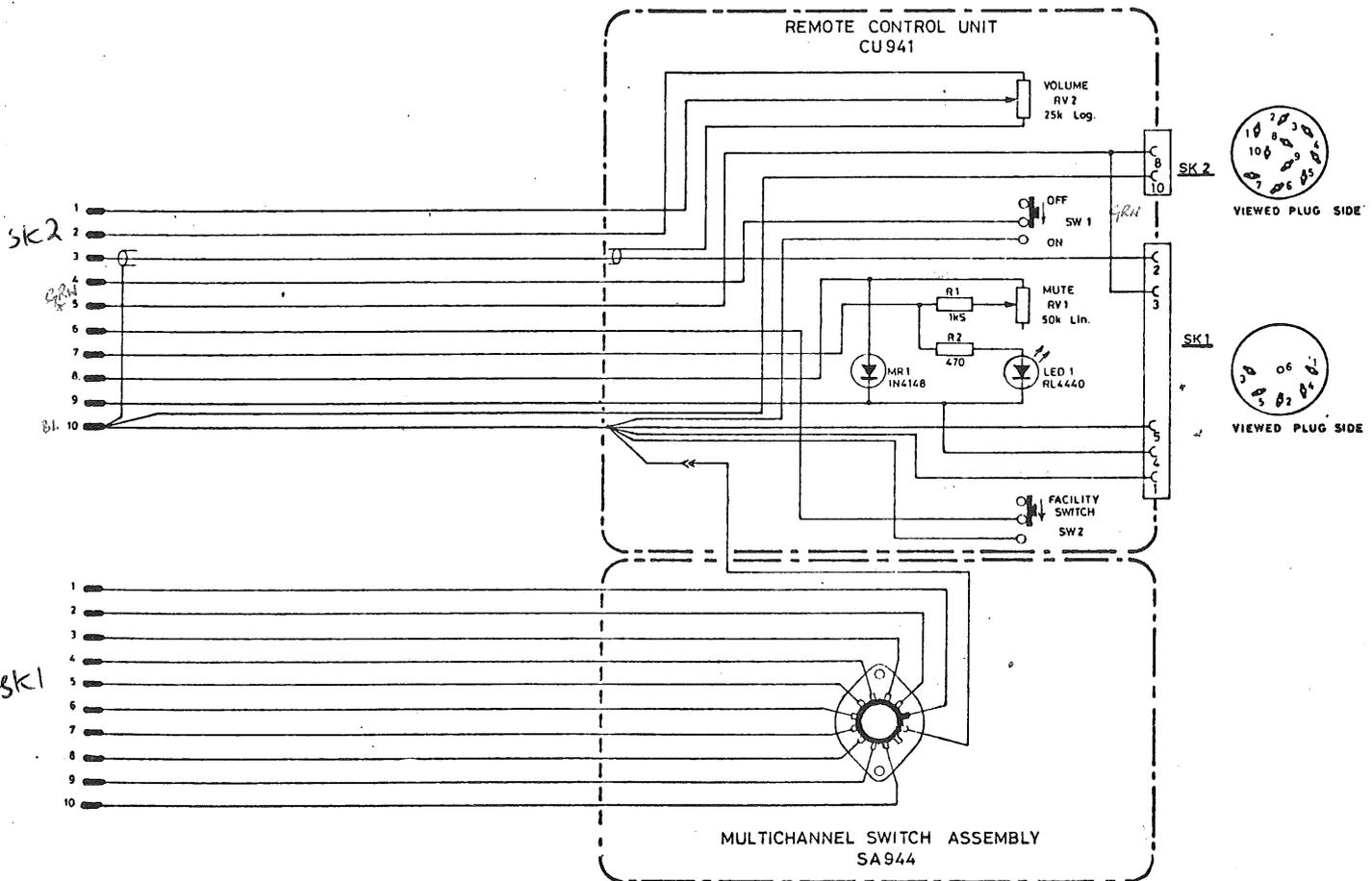


Figure 8.3 Combined Control Unit Circuit

8.2.2 REMOTE CONTROL UNIT CU938

The CU938 comprises the circuitry and controls of the CU941 combined with the complimentary loudspeaker unit LS943, and housed in a sturdy metal box covered in a resilient plastic surround.

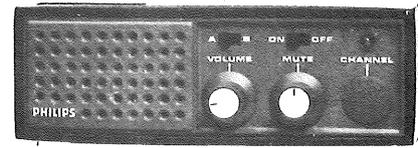


Figure 8.4 CU938 Front Panel
(for single channel)

The control unit is compact and can be mounted on any flat or slightly contoured surface by attachment of a detachable rear panel to the mounting surface. A special locking system allows the control unit to be removed from its mounting plate in confined spaces where normal attachment methods would be difficult.

8.2.3 CONTROL UNIT CONNECTION

Connection of the control units to the mobile radiotelephone is via a multiconductor cable of 6.4mm (1/4") diameter terminated in a small 10-pin DIN type plug, a similar connection is used for the multichannel switch assembly SA944. The small physical size of the cable permits routing under normal vehicle floor coverings.

All types of control units can be operated at distances up to 4.6 metres (15 ft) from the radiotelephone unit.

8.3 LOUDSPEAKERS AND HANDSETS

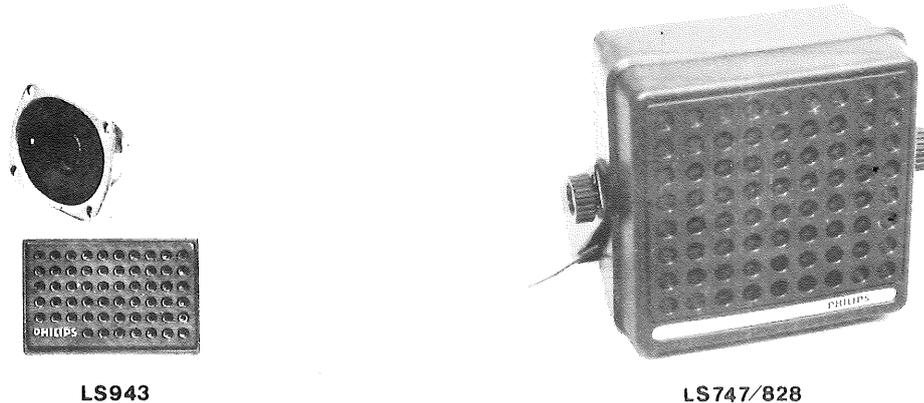


Figure 8.6 Loudspeaker Units

8.3.1 LOUDSPEAKERS UNIT LS943

The LS943 is designed for panel mounting within the vehicle dash area to compliment the CU941. The unit comprises a plastic escutcheon and a small 3" x 2" elliptical speaker (with connecting leads) capable of handling 4 watts maximum rms output.

8.3.2 LOUDSPEAKER UNIT LS747/828

The LS747/828 is designed as a loudspeaker unit that can be located anywhere within a vehicle driving area, e.g., under dash, door pillar, or even attached to the mobile radiotelephone unit. The loudspeaker housing is constructed of high impact plastic with a resilient front surround and is acoustically designed to provide the frequency response necessary for clear speech from the 3 inch loudspeaker. The loudspeaker is capable of handling 4 watts maximum rms output.

8.3.3 HANDSET HS765

The HS765 is designed to provide the operator with a telephone handset combining both microphone and earpiece for applications where privacy is a requirement, combined with a loudspeaker housing contoured to provide handset stowage. Included in the housing is a loudspeaker defeat switch to permit the optional privacy to be selected. Replacement of the handset in the stowage automatically operates the defeat switch to restore connection of the loudspeaker.

For installation of the handset assembly, four fixing holes are provided for screw mounting or alternatively, pressure sensitive adhesive pads are provided for fitment to flat polished surfaces without damage.

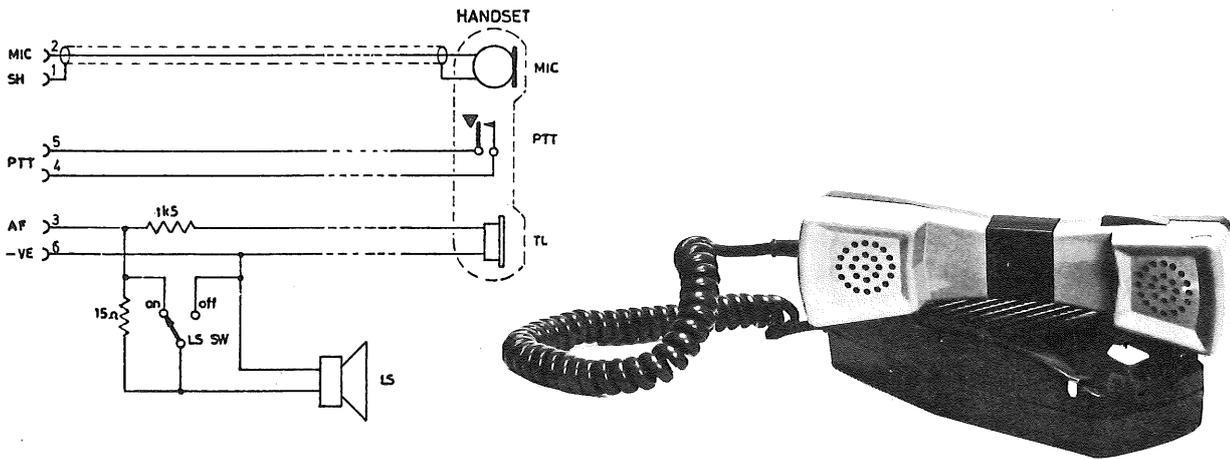


Figure 8.7 Handset HS765 and Circuit

8.4 REMOTE CONTROL UNIT PARTS BREAKDOWN

8.4.1 REMOTE CONTROL UNIT TYPE CU941/M

9585 941 22000

	Chassis	3502 310 08670
	Cover	3502 310 08690
	Brkt. Mtg.	3502 310 08710
	Front Panel	3502 310 02420
	Cable Assy, 11 core	3502 330 01850
	Knob Assy Skirted	3502 330 00770
	Collet 3/16"	3502 310 00850
	Button Embossed Moulded	3502 110 22760
	Plug, Plastic Grey	3502 310 02620
SK1	Socket 5 pin Din Stereo Locking	2412 026 15012
SK2	Socket, 10 way MEB 10	2422 026 02002
RV1	Pot. Carbon Lin. 50k, 20%,	3502 310 08210
RV2	Pot. Carbon Log 25k, 20%,	3502 310 08180
R1	Resistor, Carb. Film, 1k5, 5%, 0.33W	2322 211 13152
R2	Resistor, Carb. Film, 470, 5%, 0.5W	2322 212 13471
MR1	Diode, 1N4148,	9330 839 90112
LED1	Diode, LED TIL220 Red/MTG incl.	9332 677 60112
SW1	Switch Slide, 2 pole, 2 pos.	2422 126 01099
SW2	Switch Slide, 2 pole, 2 pos.	2422 126 01099

8.2.2 REMOTE CONTROL UNIT TYPE CU938

9585 938 12000

	Chassis	3502 330 00020
	Front Panel	3502 310 00360
	Assy, Cover, Rear 938	3502 330 00720
	Assy, Cable, 11 core	3502 330 01070
	Assy, Knob Skirted	3502 330 00770
	Collet 3/16"	3502 310 00850
	Button Embossed Moulded	3502 110 22760
	Plug, Plastic Grey	3502 310 02620
	Cloth, Speaker	3502 310 01020
R1	Resistor, Carbon Film, 1k5, 5%, 0.33W	2322 211 13152
R2	Resistor, Carbon Film, 470Ω, 5%, 0.33W	2322 211 13471
RV1	Pot. Carbon Lin. 50k, 20%,	3502 310 08210
RV2	Pot. Carbon Log. 25k, 20%,	3502 310 08180
MR1	Semiconductor, Diode, Type 1N4148	9330 839 90112
LED1	Semiconductor, Diode, LED TIL220	9332 677 60112
LS1	Loudspeaker 5Ω, 3Watt, 8050T	2402 264 00501
SW1	Switch, Slide, 2 pole 2 position	2422 126 01099
SW2	Switch, Slide, 2 pole 2 position	2422 126 01099

8.4.3 LOUDSPEAKER UNIT TYPE LS943

9585 943 11000

	Loudspeaker, 5Ω, 3 watt, 8050T	2402 264 00501
	Grill, Speaker	3502 310 02440
	Mounting Template	3502 310 02430
	Wire Tn, 2 x 14/0076 Grey	0702 221 01005
	Plug 10 pin Wist 10	2422 026 02013

8.4.4 MULTICHANNEL SWITCH UNIT ASSEMBLY SA944

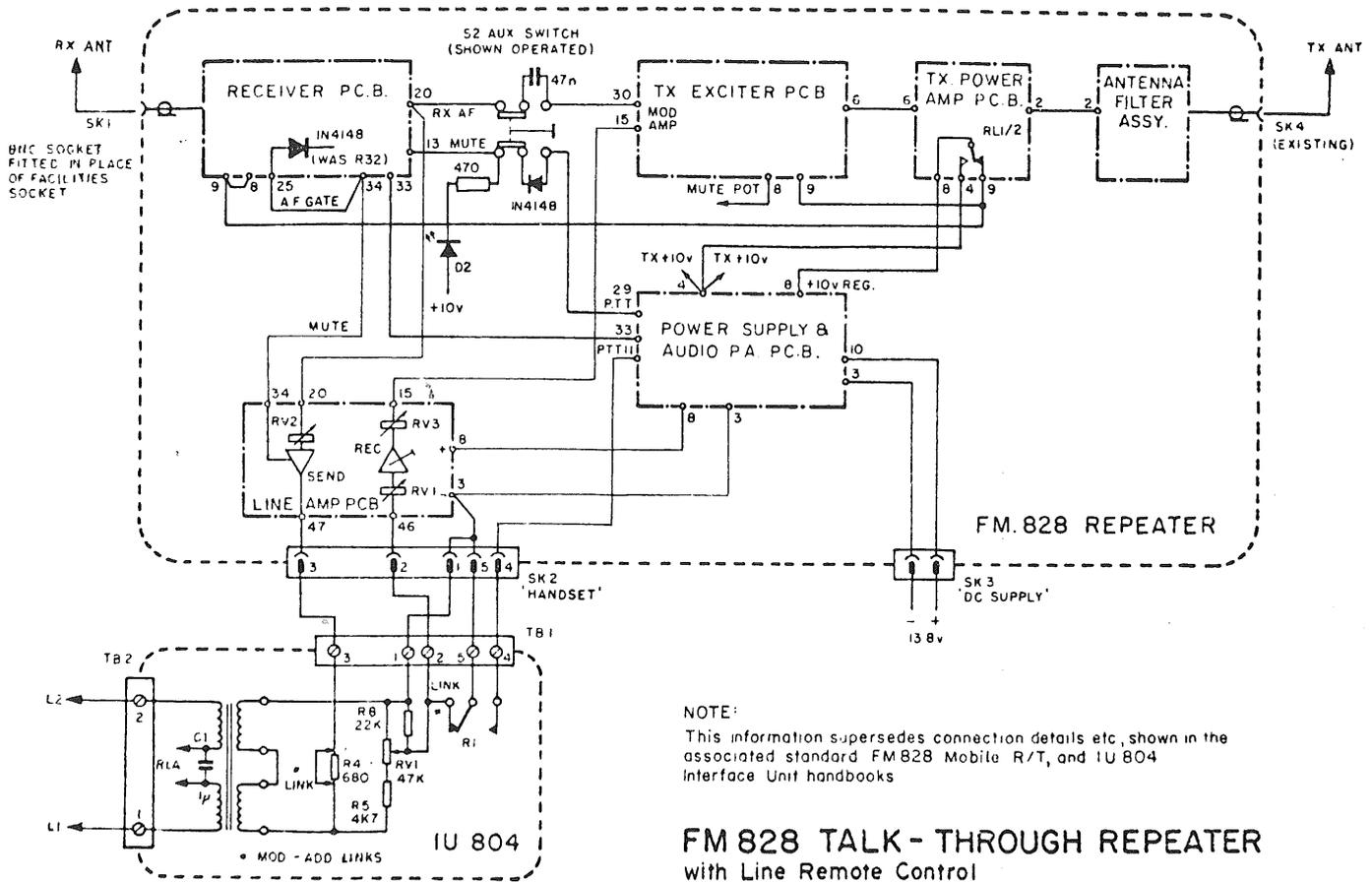
9585 944 12000

	Switch, 1 pole, 10 way	3502 310 03050
	Cable, 11 core Red	0702 376 01002
	Plug, 10 pin	2422 026 02013
	Assy. Knob	451 782 249
	Collet .250 dia.	3502 110 24090
	Button Moulded	3502 110 27750

SECTION 9

OPTIONS

9.1 TALK-THROUGH REPEATER (with Line Remote Control)



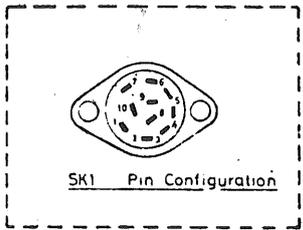
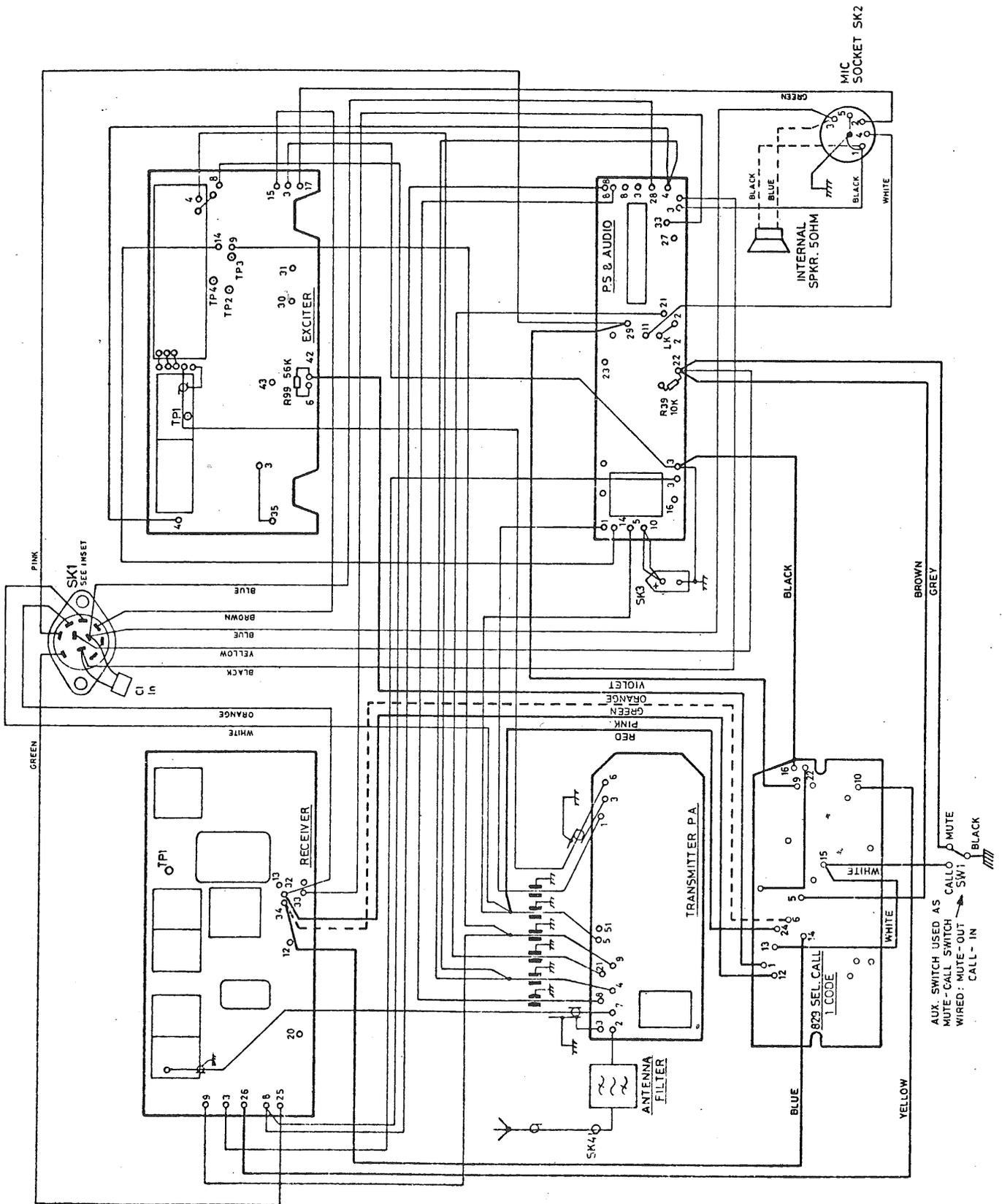
NOTE:
This information supersedes connection details etc, shown in the associated standard FM 828 Mobile R/T, and IU 804 interface Unit handbooks

FM 828 TALK - THROUGH REPEATER with Line Remote Control

NOTES:

- Remove all wires from facility socket, insulate end of each wire separate. (or remove from loom) Remove facility socket and fit in its position BNC socket. Fit solder lug over longer screw fastening socket adaptor plate and secure it with nut & S.C. washer.
- Disconnect receiver coax cable from pins 7 & 3 of Tx PA. Re-route cable & connect it to BNC socket fitted in place of facility socket. Shield of cable is to be connected to solder lug.
- Modifications to Exciter PCB:**
Remove Pin 31. Fit 100K trimpot & 22k resistor between pin 30 and place where pin 31 was fitted and wiper to trimpot connected to 22k res. change value of R85 (fitted between pins 5 & 6) to 1k. (NB 2 pins of trimpot are to be cut short).
- DC Supply & Switching Modifications**
Remove & sleeve yellow wire from mute pot & Pin 9 of Rx PCB. Using red wire make connection between:
(a) Pins 8 & 9 of receiver PCB. (b) Pin 8 of exciter PCB & mute pot. (connect to terminal where yellow wire was connected).
Remove diode D6 from PS/audio board.
- Changes to Wiring of AUX Switch**
Remove the two brown wires, connect them together and sleeve. Connect 47N cap & 1N 4148 Diode to terminals of AUX switch as shown on interconnection diagram above. Cut green wire connected to green LED D2. Connect one end of it to terminal at the rear of switch. On side where new diode has been fitted, other end is to be connected to same point via 470Ω resistor Using white wire make connection between terminal at the rear of switch on side where new cap. has been fitted and pin 20 of receiver PCB. Using pink wire connect terminal near front panel (side where new diode is fitted) to pin 29 on power supply and audio PCB terminal on other side of switch is to be connected to pin 30 of exciter (use yellow wire) (N.B terminals of AUX switch must be bent down to prevent fouling exciter PCB).
- Changes to Receiver PCB**
Replace R73 (near pin 13) by link. Replace R32 by diode 1N4148 using violet wire make connection between pins 25 & 34.
Note: In older sets R73 is not fitted on Rx PCB but adj. to AUX switch.

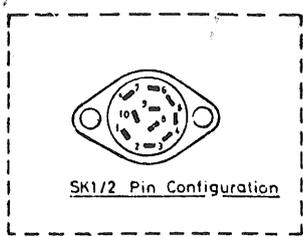
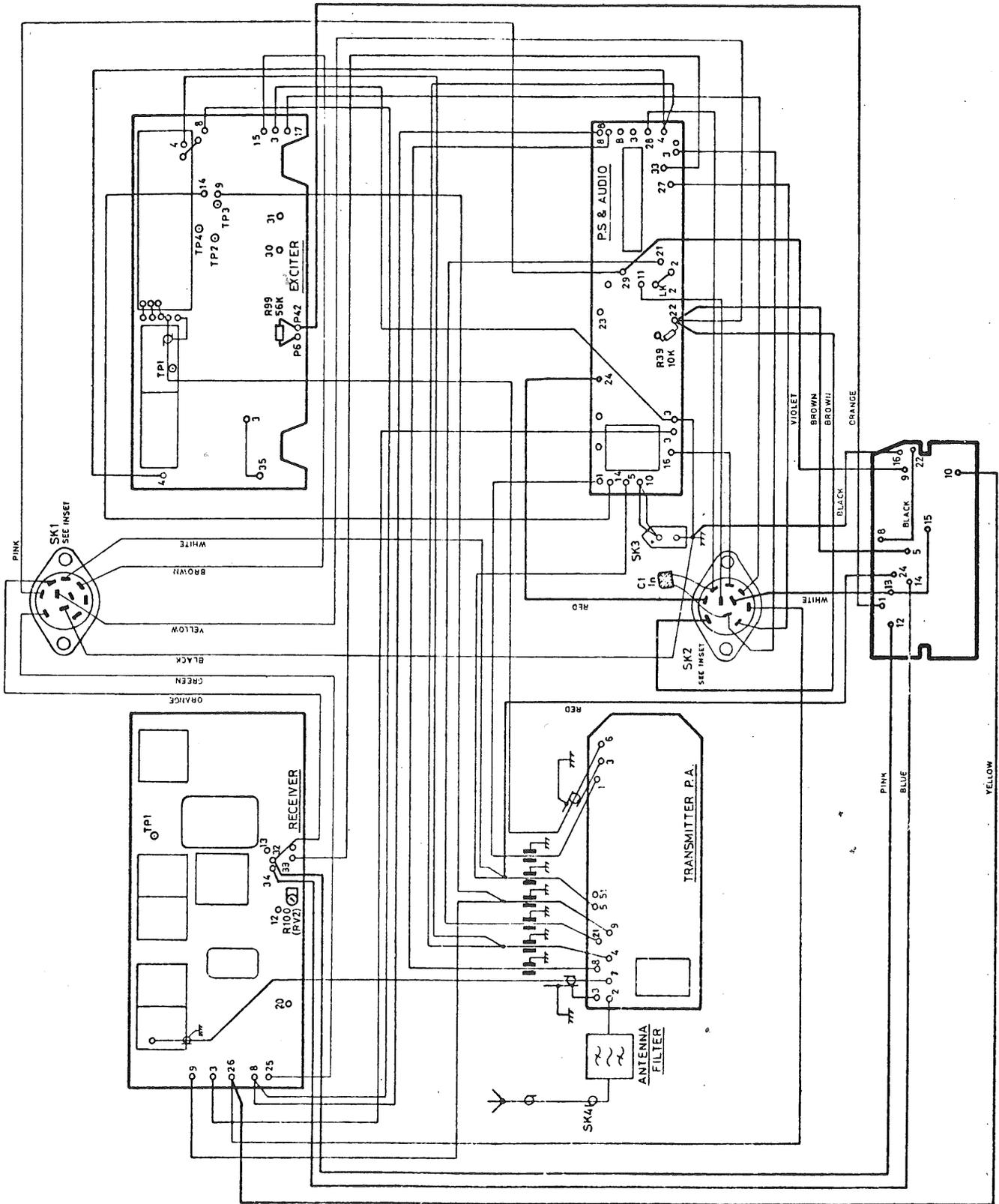
9.2 FM828 LOCAL CONTROL WITH SC829 SEL CALL



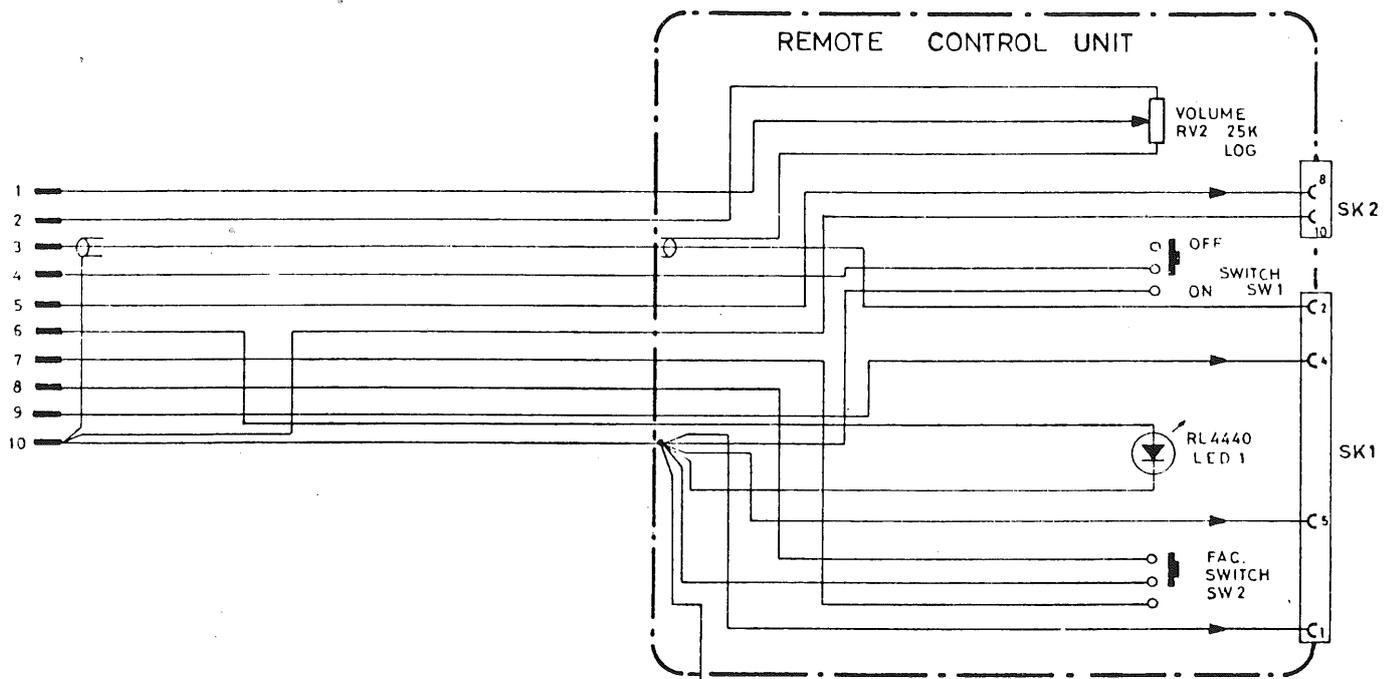
AUX. SWITCH USED AS
 CALLO MUTE
 MUTE - CALL SWITCH
 WIRED: MUTE - OUT
 CALL - IN

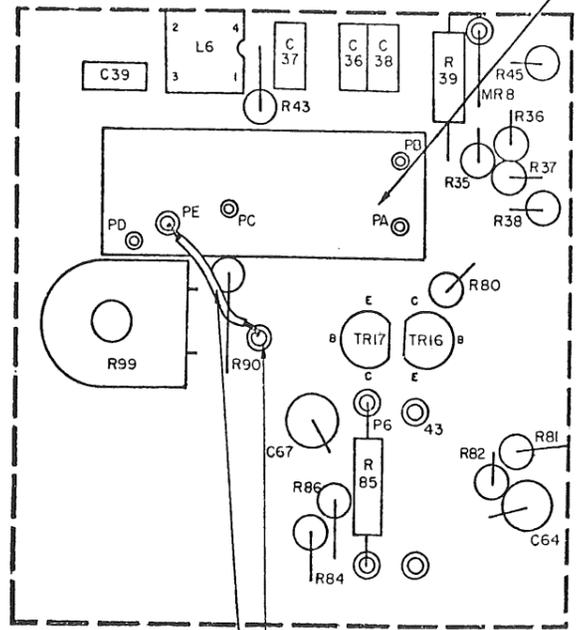
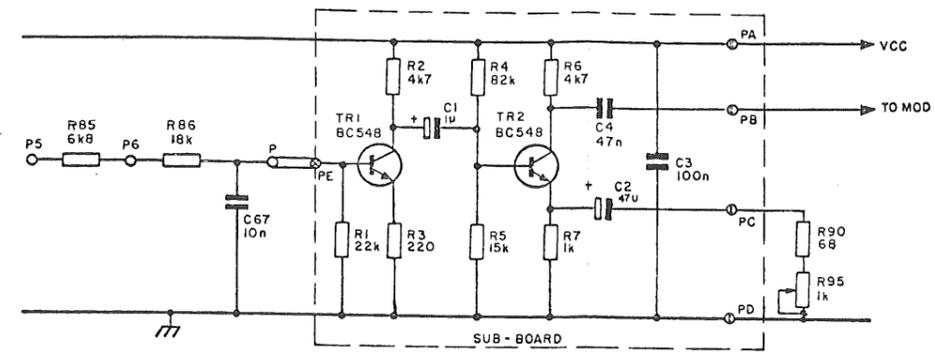
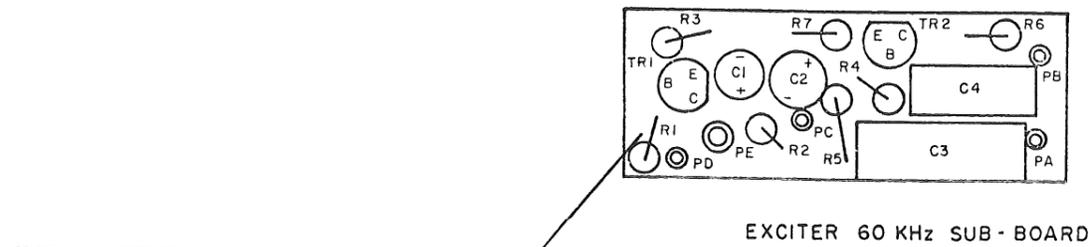
9.3 FM828 REMOTE CONTROL WITH SC829 SEL CALL

9.3.1 FM828 INTERNAL WIRING INTERCONNECTION

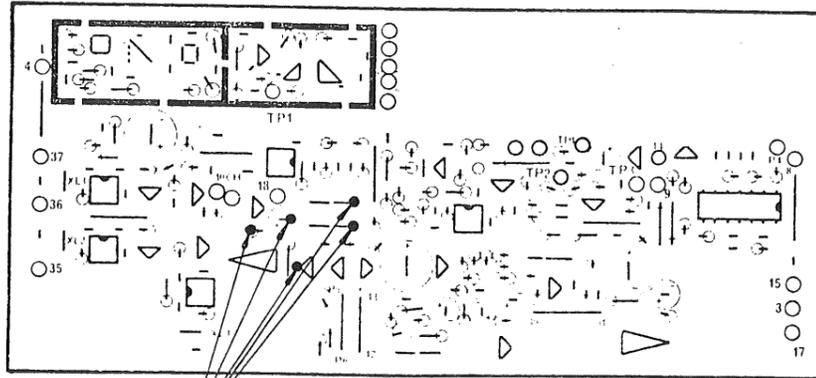


9.3.2 CU941 MODIFIED FOR FM828 REMOTE WITH SC829





CONNECT THESE TWO PINS USING ITEM 0303 OF KIT
NEW PIN



THOSE 5 HOLES ARE TO BE OPEN TO Ø1.3^{+0.1}

TABLE 1. 60KHz SUB-BOARD COMPONENTS

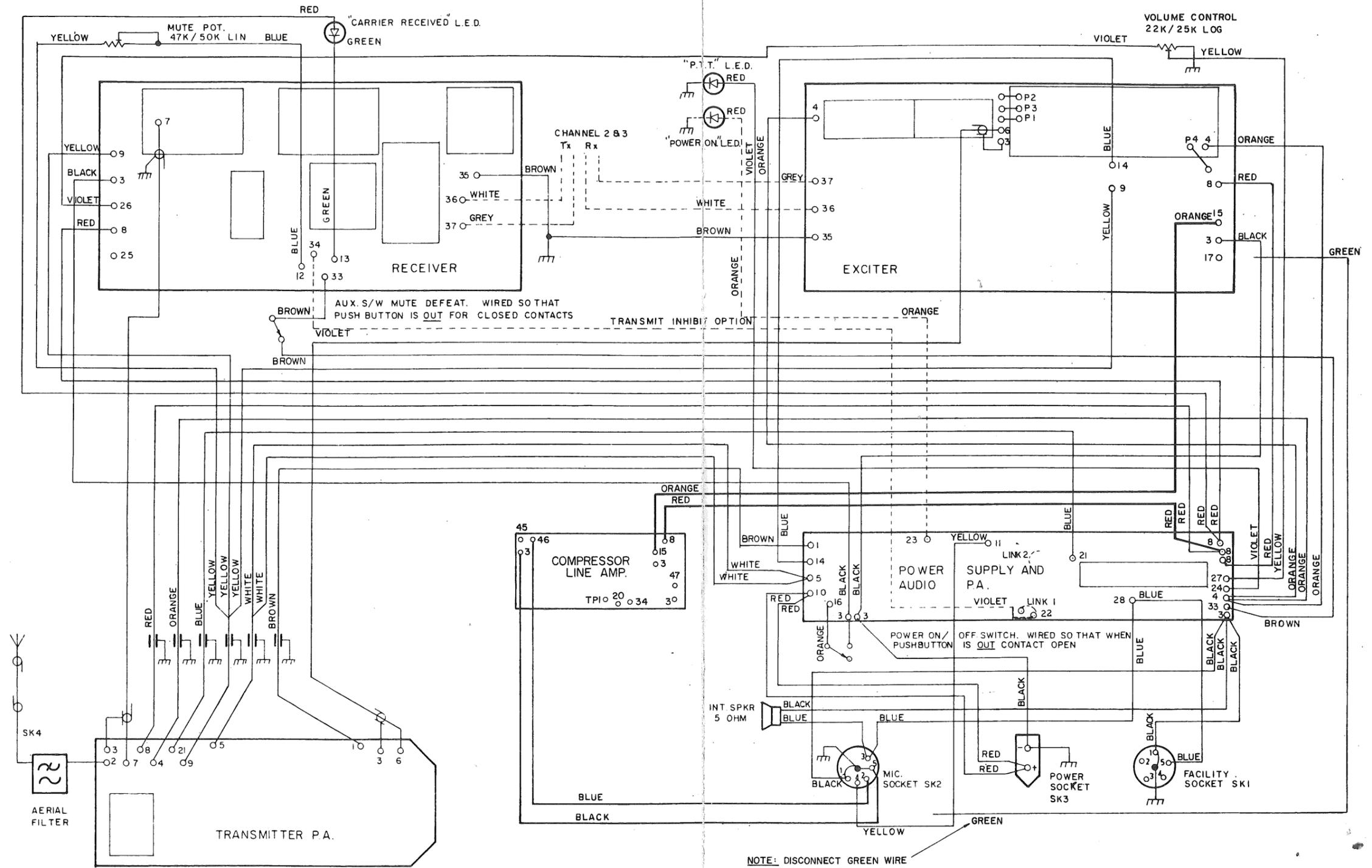
CCT REF.	DESCRIPTION	PART NO.
C1	Cap Tant. 1uf	2002 140 12108
C2	Cap. Tant. 33uf	20 12 010 00036
C3	Cap. Poly 100n	2020 300 32104
C4	Cap. Poly 47n	2020 300 32473
R1	Res 22k	2322 211 13223
R2	Res. 4k7	2322 211 13472
R3	Res. 220	2322 211 13221
R4	Res. 82k	2322 211 13823
R5	Res 15k	2322 211 13153
R6	Res. 4k7	2322 211 13472
R7	Res. 1k	2322 211 13102
TR1	Trans. BC548	9331 976 40112
TR2	Trans. BC548	9331 976 40112
	Pins (5 off)	

TABLE 2. STANDARD P.C.B. MODIFICATIONS

P.C.B.	CCT. REF.	REMOVE			ADD			REMARKS
		A	B	E	A	B	E	
EXCITER	C32	-	-	33p	-	-	22p	2222 632 58229
	C37	-	-	33p	-	-	22p	2222 632 58229
	C66	100n	-	100n	-	-	-	-
	C67	4n7	-	4n7	10n	-	10n	2020 300 32103
	C68	47u	-	47u	-	-	-	-
	C69	33u	-	33u	-	-	-	-
	C71	47n	-	47n	-	-	-	-
	R88	15k	-	15k	-	-	-	-
	R89	10k	-	10k	-	-	-	-
	R92	-	-	12k	-	-	-	-
	R93	-	-	10k	-	-	-	-
	TR18	BC558	-	BC558	-	-	-	-
	TR19	BC548	-	BC548	-	-	-	-
							REMOVE ALSO PIN 18	
RECEIVER	C36	150n	-	150n	220n	-	220n	2222 344 21224
	C37	47n	-	47n	150n	-	150n	2222 344 21154
	C39	15n	-	15n	47n	-	47n	2020 300 32473
	C60	5n11	-	5n7	2n7	-	2n7	2222 425 42702
	C61	5n11	-	5n11	2n7	-	2n7	2222 425 42702
	C62	5n11	-	5n11	2n7	-	2n7	2222 425 42702
	R24	6k8	-	6k8	2k2	-	2k2	2322 211 13222
	R31	18k	-	18k	27k	-	27k	2322 211 13273
	R34	1k5	-	1k5	3k3	-	3k3	2322 211 13332
	R63	22k	-	22k	33k	-	27k	2322 211 13332(A) 2322 211 13273(E)
	R71	1k5	-	1k5	2k7	-	2k7	2322 211 13272
R72	390	-	390	3k3	-	3k3	2322 211 13332	
FL1	10.7n	-	10.7n	10.7Q	-	10.7Q	3502 460 00230	
IF. PRE AMP.	R1	1k8	-	1k8	3k9	-	3k9	2322 211 13392

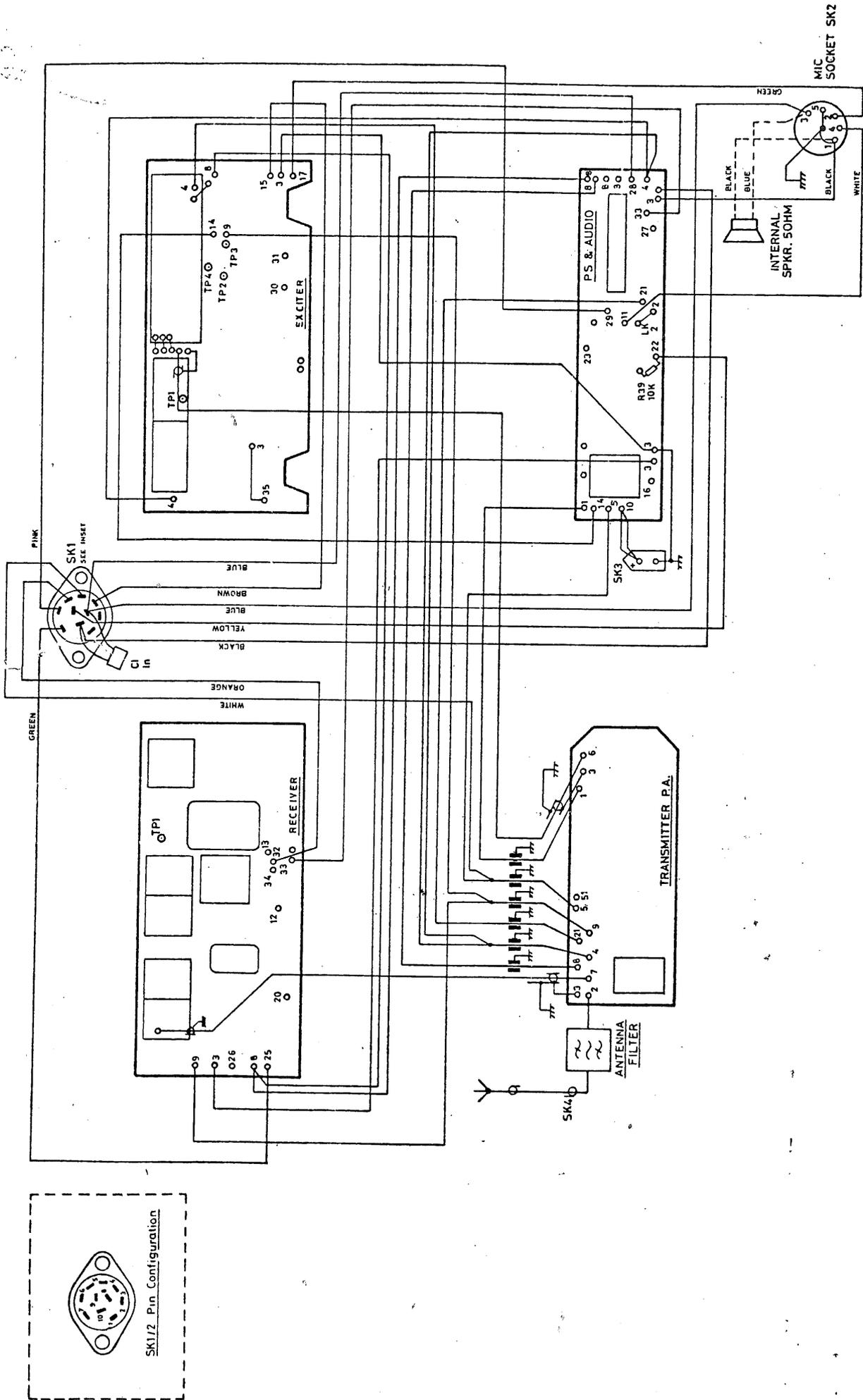
NOTE

- Exciter 60KHz subboard is to be assembled as per table 1 as part of kit. Remaining comp. are to be used to update exciter & receiver PCB.

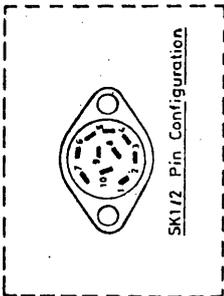
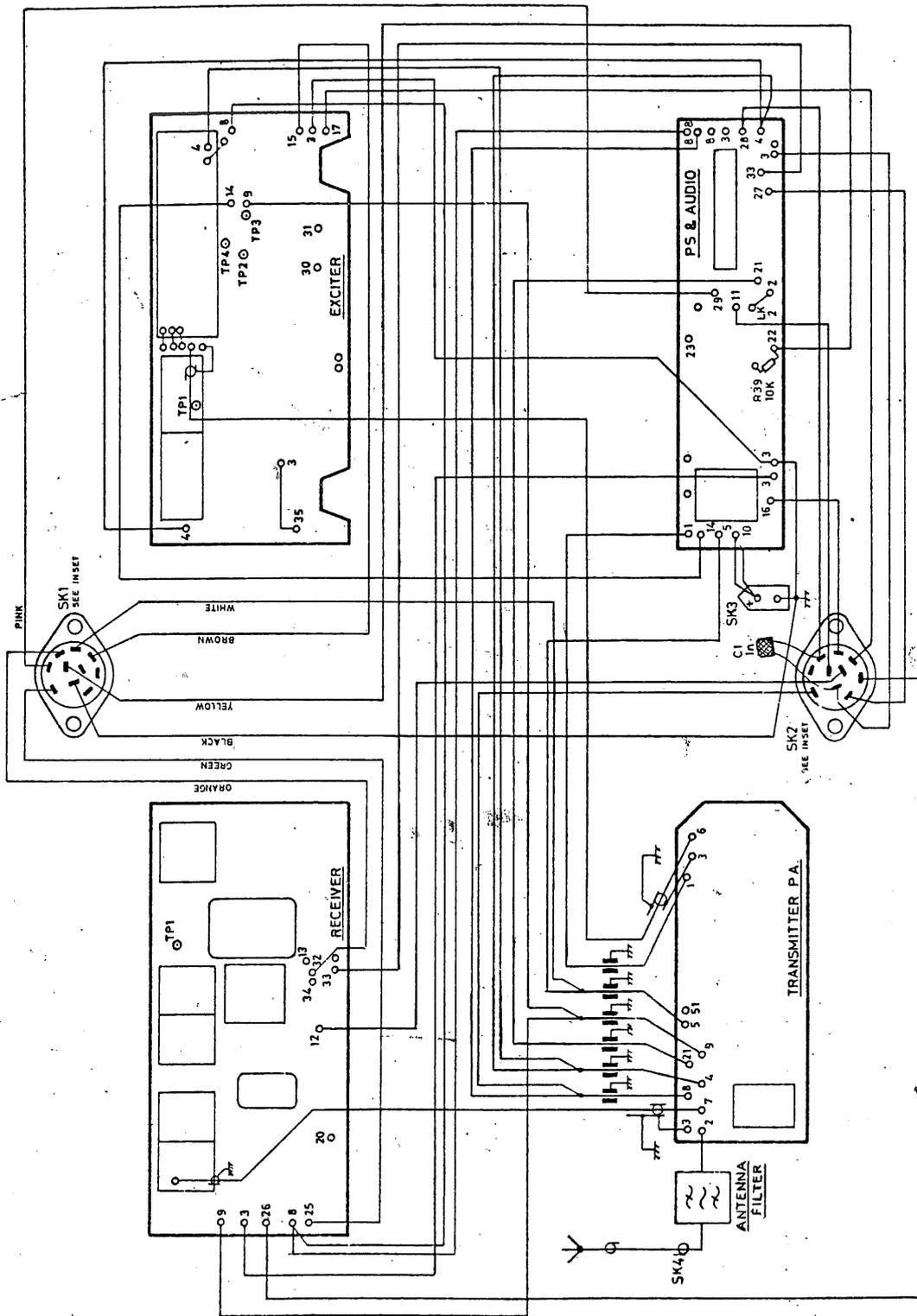


NOTE: DISCONNECT GREEN WIRE FROM SK2, PIN 2 & PIN 17 ON EXCITER P.C.B.

9.5 LINE COMPRESSOR MODIFICATION
 9.5.1 INTERWIRING DIAGRAM



10.5 SINGLE CHANNEL (LOCAL) INTERNAL WIRING DIAGRAM



10.6 SINGLE CHANNEL (REMOTE) INTERNAL WIRING DIAGRAM