TRACKER
COMMUNICATIONS PTY LTD

MAINTENANCE MANUAL

Scout Base and Mobile HF Transceivers

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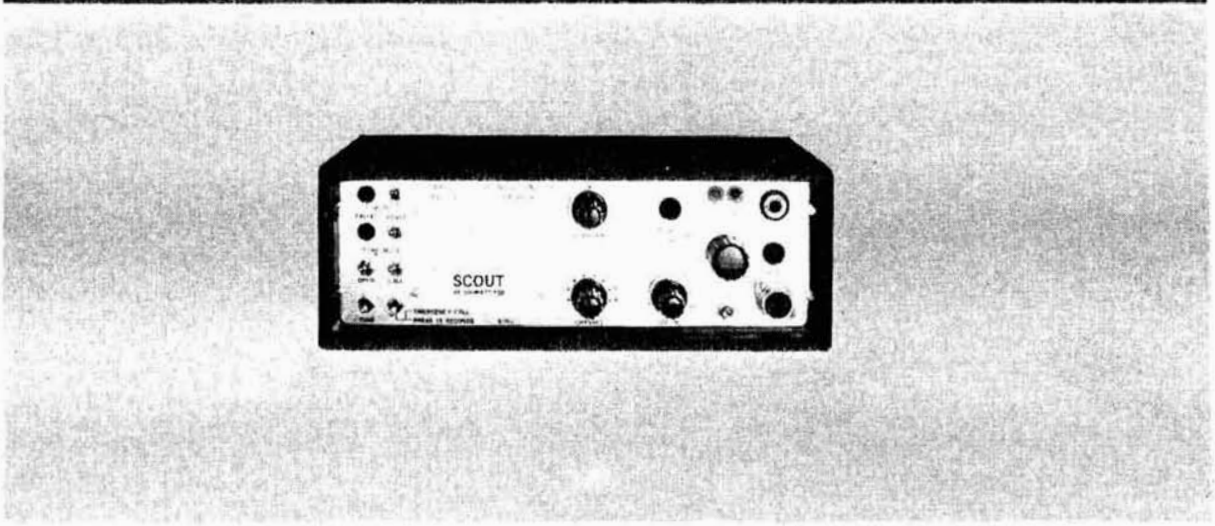

Manual for
SCOUT
BASE AND MOBILE TRANSCEIVERS

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1.0 INTRODUCTION

1.1 GENERAL

The Tracker SCOUT is an H.F. transceiver designed primarily for use in land-based fixed station and mobile installations. All solid-state circuitry is employed on fibreglass plated-through printed circuit boards for reliability, low weight and low current drain.

Three fuses protect all sections of the transceiver. Reverse connection of the 12 volt d.c. connections will not cause damage and will not blow any fuses. A "floating chassis" caters for negative and positive earth systems.

A receiver clarifier, audio mute, permanently enabled I.F. noise blanker, extension speaker socket and headphone jack are fitted as standard.

1.2 OPTIONS

Emergency Call Encoder - generates a continuous two-tone transmit signal for as long as the emergency call button is depressed. Both audio tones are crystal locked. The encoder complies with Australian Specification RB240 and is suitable for use in the Royal Flying Doctor Service. Standard tones are 880Hz and 1320Hz with others available to special order.

Lower Sideband - may be supplied with or without upper sideband for use outside Australia. With more than one mode a MODE switch must be fitted.

C.W. (Morse) Facility - for use outside Australia and must be supplied with a MODE switch. Operation is "semi break-in" with a sidetone generator. The audio tone frequency is 800Hz.

Aerial Tuning Inductor - for reactive loads such as long wire aerials. Two aerial terminals and an earth (chassis) terminal are also supplied at the rear of the transceiver. Adjustment is by means of an extra knob on the front panel. Correct tuning is indicated by the standard "RF" indicator LED.

Selective Call Encoder/Decoder - consists of a crystal locked two-tone generator and a narrow bandwidth audio difference tone decoder on the one plug-in p.c.b. The standard design complies with Australian State Energency Services (SES) requirements which uses 880Hz and 1240Hz tones. However, other tones may be used which makes the device useful for HF tone-operated mute or selective-call applications. More details are available upon application.

4½ Digit LED Frequency Display - a seven segment, 8mm red LED display which employs a fusible link ROM to store the channel frequencies to the nearest KHz. The ROM must be programmed at the factory but is field replaceable.

Two-frequency Simplex - allows the transceiver to transmit and receive on different frequencies without manually changing channels. Any transmit/receive pair of crystal locked frequencies may be factory pre-programmed from the maximum of eight. A combination of single and two-frequency channels may be programmed in any order and any crystal frequency may be used more than once. The fusible link ROM is field replaceable. A second combination of frequencies may be stored in the ROM and may be selected by a front panel switch (special) or a link on the front panel p.c.b. (standard).

600 Ohm Balanced Audio Output - up to +20dBm is available at a rear panel connector. This option is NOT approved for connection to Australian Department of Telecommunications telephone lines.

Low Transmitter Power - lower power versions, in particular 25 watts pep, are available.

Trunk Mount - allows the transceiver to be installed up to ten metres from a local Control Head which features all the normally available controls except the Aerial Tuning Inductor.

R.T.T.Y. Interface - (Available mid 1981) 20mA current loop, 75 baud. This option will allow the transmission and reception of printed information via F.S.K. signals.

1.3 ACCESSORIES

PS1215M Power Supply - Converts 240 volts 50Hz to 12.6 volts at 15 amps continuous duty for base-station operation and is housed in a matching aluminium cabinet. It features current limiting, thermal overload protection, output overvoltage protection and incorporates a choke input filter. Provision has been made for the connection of a lead-acid battery to enable transceiver operation during mains failure. An internal trickle charger maintains the battery in a fully charged state.

PS1215SSB Power Supply - A lower duty cycle version (25%) of the PS1215M incorporating a capacitor input filter but housed in the same aluminium cabinet.

R10 Remote Antenna Tuning Unit - Used to remotely tune various non-resonant aerials for use with the transceiver. All adjustments are pre-set on site by a technician during installation. No further adjustments are required by the operator when changing channels. Another advantage is that the RATU may be located up to 100 metres from the transceiver if required.

RC110/LTU110 Remote Control - Enables a SCOUT base station to be controlled up to 40km away via a single 600 ohm telephone line. The extra equipment required is the RC110 Operator's Console and the LTU110 Line Terminating Unit. The LTU110 plugs into the base station and also allows full local operation when required.

PC2412 24 to 12 Volt Converter - A device housed in a small die-cast box which converts a 24 volt dc supply to 12 volts dc suitable for a standard 12 volt transceiver. It features current limiting, thermal overload protection and output overvoltage protection.

Telephone Handset - Enables the operator to hear messages with some privacy. The internal loud-speaker is disconnected when the handset is lifted.

Vehicle Mounting Cradle - Slide-in construction with two fixing screws.

Aerials - A wide range of aerials is available. Consult Trackers or their Agents for more details.

2.0 TECHNICAL SPECIFICATIONS

GENERAL

Impedance:	50 ohms resistive - standard Reactive with 25 to 100 ohms resistive component - optional
Range:	2 - 15MHz
Channels:	8 single-frequency simplex OR 4 two-frequency simplex OR combination (8 crystals maximum)
Modes:	Standard - USB Optional - LSB and/or USB
Stability:	$\pm$ 50Hz over $0^{o}C$ - $60^{o}C$ with $\pm$ 10% supply variation
Controls:	Standard: Power ON/OFF - Volume, Channel selector, Clarifier, Mute ON/OFF, Tune button, Push-to-talk (on microphone) Optional: Emergency call button, Aerial tune, Call button Reset button, Open button, Mode switch
Indicators:	Standard: Power ON (RED) Mute Open (GREEN) Transmitter Output (AMBER) Optional: Open (GREEN) 4½ Digit LED Frequency display
Connectors:	Standard: Microphone - PTT, Extension speaker, Phones, 50 ohm Antenna, Remote ATU channel select, Power input Optional: Key jack, Reactive antenna terminals (2), 15-way rear panel connector
Voltage:	12 volts dc nominal, 12.6 volts dc test voltage, 16 volts dc maximum
Chassis:	Floating
Current Drain:	Receive, no signal - 300mA Receive, 3 watts audio - 800mA Transmit, SSB average voice - 5A Transmit, SSB 2-tone - 12.5A N.B. Add 400mA for 7 Segment Frequency Display option
Temperature:	Operating - $30^{o}C$ to + $60^{o}C$
Duty Cycle:	80% receive, 20% transmit (2-tone)

Weight:	5 Kg
Colour:	Black textured enamel
Dimensions:	Transceiver only: 330L x 275W x 93H mm

RECEIVER

Type:	Solid-state, single conversion
IF Frequency:	1650 KHz
Sensitivity:	At 100mW audio output min: 0.5uV for 10dB (S+N)/N or better
Bandwidth:	300 Hz - 2700 Hz at -6dB
Selectivity:	-65dB at -1KHz, +4HKz or better
Image, IF rejection:	-60dB or better
Cross Modulation:	A signal 75dB above a wanted signal producing 10dB (S+N)/N, modulated 30% and removed 20 KHz will produce an increase in receiver output of less than 3dB
Intermodulation:	To produce a 3rd order intermodulation product equivalent to a wanted signal producing 10dB (S+N)/N, two unwanted signals greater than 30 KHz away from the wanted signal must have a level greater than 65dB above the wanted signal
Blocking:	A signal 85dB above a signal producing 10dB (S+N)/N and removed 20 KHz from the wanted signal will cause a change in audio output of less than 3dB
A.G.C.	Less than 5dB audio change for a signal strength variation of 5uV to 100mV rms.
Audio Power:	3.0 watts at 10% T.H.D. into 8 ohm load
Clarifier Range:	± 30 Hz nominal
Maximum Input	15 volts r.m.s. at 50 ohm antenna socket
Mute Sensitivity:	3dB (S+N)/N to open or better
Noise Blanker:	1650 KHz I.F. Noise Blanker, permanently enabled

TRANSMITTER

Type	Solid-state

Power Output:	SSB: 100 watts pep
Intermodulation:	At least 32dB below pep
Audio Response:	For constant sound pressure at microphone - rises 6dB/octave from 300 Hz - 2700 Hz
Harmonics:	-55dB below pep or better
Carrier Suppression:	-65dB below pep or better
Unwanted Sideband:	-65dB below pep or better
Residual Noise:	-50dB below pep or better
A.L.C.	Less than 1dB output change for 30dB increase in input level

3.0 INSTALLATION

3.1 GENERAL

This section covers the more important aspects of installing the transceiver.

Sufficient hardware will be supplied with the transceiver for the average installation. Special installation kits may be supplied upon request.

3.2 TRANSCEIVER

The transceiver should be located so as to be isolated from moisture, dust and the environment as far as possible. For mobile installation, bolt the mounting cradle to a non-rigid (e.g. plastic) frame member if possible to minimise vibration.

A power cable with a four pin line socket is supplied. Connect the black wire to battery negative and red to positive using two 3/8" lugs supplied. This cable should be cut to the minimum length required and under no circumstances should it be lengthened beyond approximately three metres.

In order to protect the equipment from static electricity aerial discharges during electrical storms, the transceiver chassis should be securely grounded to a water pipe or earth stake. If a mains power supply is used, its chassis should be connected to that of the transceiver.

Ensure that all UHF coaxial connectors are properly located and tight.

3.3 AERIALS

3.3.1 General

This section provides some comment on suitability and installation of the more common antennae used on H.F. Specific installation instructions vary among the various manufacturers and should be supplied with the antenna.

For more information please contact Tracker Communications or their Agents.

3.3.2 Half-wave Dipole (See figure 1)

The half-wave dipole is a popular and effective base station antenna. It consists of a length of copper cable supported by insulators and fed at the centre by a coaxial cable and balun. The length "L" determines its resonant frequency and is given by the following formula:

$$L \text{ (feet)} = \frac{468}{\text{frequency (MHz)}}$$

This length may need to be altered for best S.W.R. according to height and effect of nearby earthed objects. The dipole should be installed as high as possible. Often only one mast is used with one end of the dipole attached to a lower building etc. (via an insulator).

Advantages:

- No earth systems required
- No antenna tuning unit required
- Simple and cheap

Disadvantages:

- Only useful at one frequency
- Directional - minimum radiation off the ends

3.3.3 Divorced Dipole (See figure 2)

The divorced dipole consists of several half-wave dipoles fed from a common balun and coaxial cable. To minimise interaction, they are usually spread apart at the ends. Their resonant frequencies should be separated by a minimum of 15%. The longest dipole is usually highest above ground. Due to limitations of space the

maximum number of dipoles is about four.

Advantages:

No earth system required
No antenna tuning unit required
Up to four channels possible

Disadvantages:

Initial tuning is a little tedious due to interaction
Directional - minimum radiation off the ends

3.3.4 Multi-channel Tuned Dipole (See figure 3)

The simple dipole antenna can be resonated at frequencies other than its half-wave resonant frequency by using an antenna tuning unit (ATU). The ATU may be conveniently located at ground level by using an open wire feeder to the dipole. Such a feeder maintains a low loss while operating at a high S.W.R. For base station use the REMOTE antenna tuning unit (RATU) is preferred since it requires no adjustment by the radio operator when changing channels and can be located remote from the transceiver.

Advantages:

No earth system required
Simple and small
Number of channels only limited by the capability of the RATU (12 for Traeger model R10)

Disadvantages:

A.T.U. is required
Open wire feeder must be kept clear of conductive objects (unlike coaxial cable)
Some performance is sacrificed at the lower frequencies (2MHz)

3.3.5 Vertical Mast Radiator (See figure 4)

The vertical mast radiator uses a mast which is insulated from the ground as the antenna. It is resonant at ¼ wavelength (half the length of a dipole) but can be tuned to several frequencies using an antenna tuning unit. The guy wires must be broken with insulators at regular intervals to reduce losses due to induced currents.

A good ground-wave is produced which makes communication with mobiles over short ranges more reliable providing the terrain is fairly flat.

However, a good ground is required and since top soil is often too dry an artificial GROUND MAT is used. It consists of six or eight radials of heavy copper wire laid on or just below the soil surface and connected to a central copper ring (see figure 5). The length of the radials should be at least a quarter wavelength at the lowest operating frequency. Sometimes galvanised steel spikes are driven into the ground and soldered to the radials at regular intervals to improve contact with the surrounding soil.

Advantages:

- Good ground-wave
- Number of channels only limited by the capability of the RATU
- Omni-directional

Disadvantages:

- Requires a large area of clear ground
- Guy wires must be insulated at regular intervals

3.3.6 Long Wire (See figure 6)

The operation and capabilities of the long wire are similar to the vertical mast radiator but it is cheaper. Also a much simpler ground system such as a water pipe or ground stake is used. Since the wire is generally slanting it will be somewhat directional. In conjunction with the SCOUT internal antenna tuning inductor the long wire makes a good emergency antenna.

Advantages:

- Low cost
- May be tuned to several frequencies using a tuning unit
- Semi-portable

Disadvantages:

- Less efficient than vertical mast radiator
- May be slightly directional
- Requires an earth connection

3.3.7 Broadband Dipole (See figure 7)

As the name implies, this antenna will cover a wide spectrum of frequencies with no antenna tuning unit.

It can be considered as a lossy open wire feeder which is terminated in a resistor. Most losses are due to radiation while the remainder

of the input power is dissipated in the resistor. It is usually fed with a coaxial cable and balun.

Since it responds to all radio signals over a broad frequency range, it may cause the receiver to respond to strong signals on the receiver image frequency and other spurious frequencies which would be attenuated by a resonant or tuned antenna.

Advantages:

Covers a wide frequency range with no ATU

Disadvantages:

May cause spurious responses in the receiver
Inefficient in the 2MHz range unless it is made very long (150 feet)
S.W.R. may be excessive at some frequencies

3.3.8 35 foot Telescopic Whip (See figure 8)

This antenna is intended as a portable version of the vertical mast radiator described in section 3.3.5. It consists of six sections which telescope down to six feet with a detachable five foot wooden support section. The SCOUT aerial tuning inductor is required for tuning while the vehicle body serves as an adequate earth. No guy wires are required but the whip should be collapsed during strong winds.

Advantages:

Portable
More efficient than shorter mobile whips
Wide frequency range

Disadvantages:

No significant disadvantages when used as a portable antenna.

3.3.9 Helical Whip (See figure 9)

Typical lengths vary from six to twelve feet. The whip consists of a fibreglass former or "blank" on which is wound many turns of copper wire. This construction causes the whip to resonate as a quarter wavelength and may be fed directly with 50 ohm coaxial cable.

The multi-channel helical whip has sockets (taps attached along the copper winding so that varying lengths of wire may be selected by inserting a shorting lead into the appropriate socket. Frequencies must be specified when ordering. The operator must change taps when changing channels. The vehicle body serves as an earth.

Advantages:

Small and physically robust

Several channels available

Disadvantages:

Not as efficient as a full-size base station antenna - hence not recommended for base station use

Inefficient at low frequencies - particularly the shorter versions.

3.3.10 Helical Whip (Base Station) (See figure 10)

This antenna consists of a pole-mounted balun assembly, to which are assembled pairs of single-frequency, long helical whip elements. Up to 3 pairs of elements may be fitted, allowing operation on up to 3 frequencies.

A common coaxial feeder cable connects the antenna system and balun to the transceiver. The feeder should be clipped to the mast. Typically, each whip element may be 4 metres in length and efficiency is reasonably good. Performance characteristics are similar to those of a divorced dipole.

Advantages:

Single pole or aerial mast

May be installed in a limited area

Reasonably efficient

No antenna tuning unit required

Disadvantages:

Less efficient than a full size antenna, particularly at low frequencies.

3.4 ON-SITE PERFORMANCE CHECKS

HF communications are effected by atmospheric conditions, local noise, frequency and antenna etc. Some of the following checks may be used to verify that the transceiver is operational.

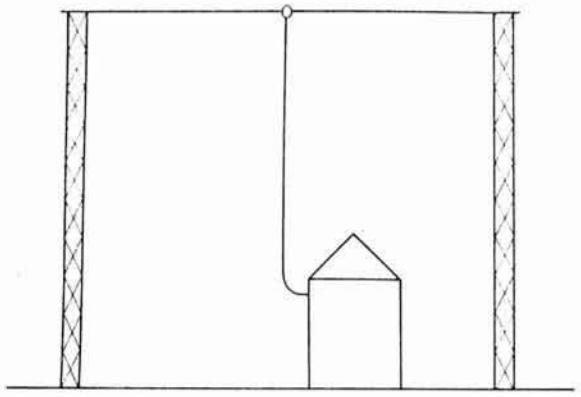
(a) Transmitter

The SWR at the transceiver output socket should be 1.5:1 or better on all channels.

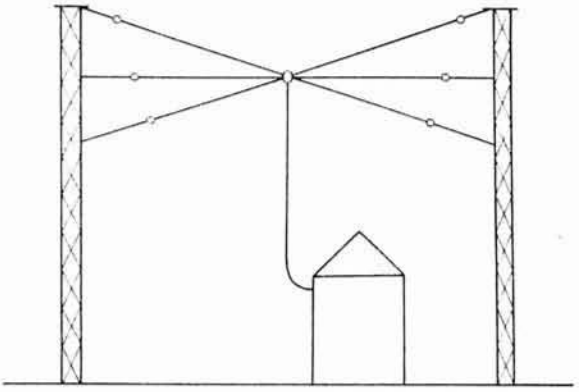
The RF LAMP on the transceiver should flash with speech on SSB and light continuously on TUNE.

(b) Receiver

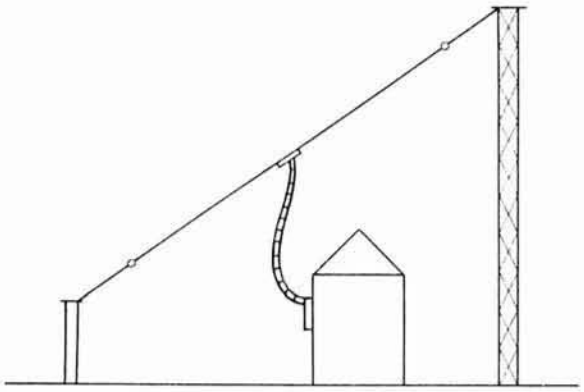
Turn the channel selector through all used and blank channels.



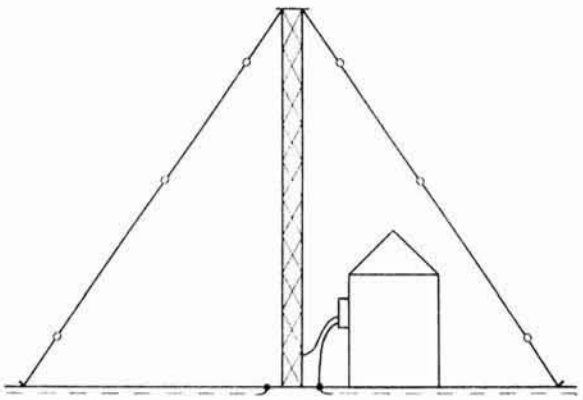
Half-wave Dipole
fig. 1.



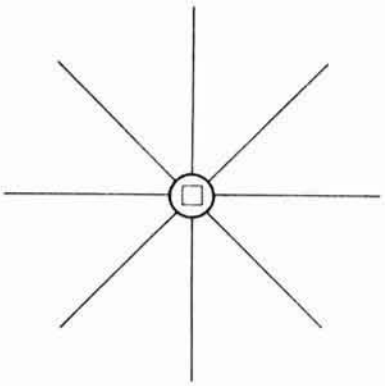
Divorced Dipole
fig. 2.



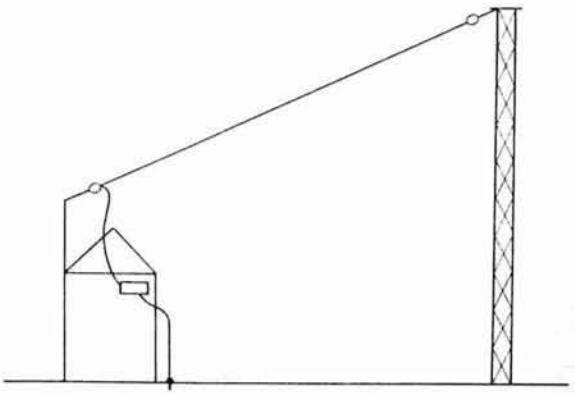
Multi-channel Tuned Dipole
fig. 3.



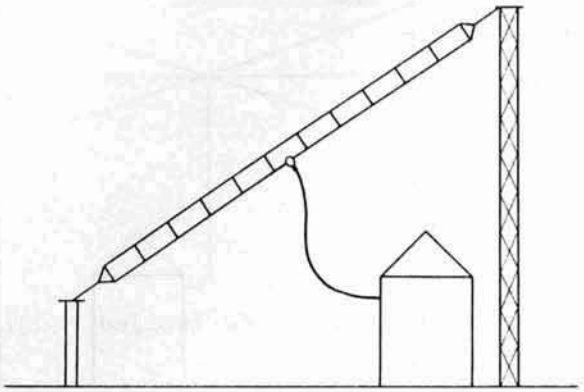
Vertical Mast Radiator
fig. 4.



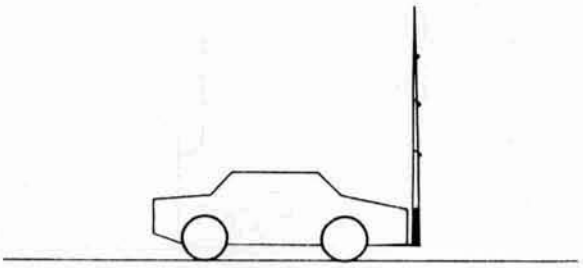
Ground Mat
fig. 5.



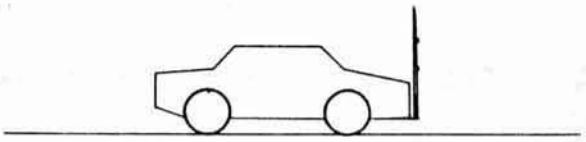
End-fed Wire (Zep)
fig. 6.



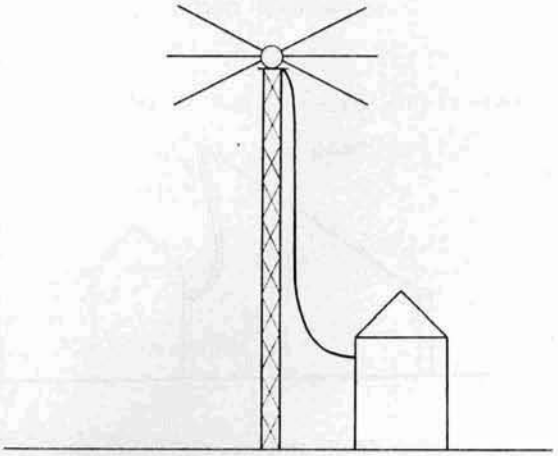
Broadband Dipole
fig. 7.



35 foot Telescopic Whip
fig. 8.



Tapped Helical Whip
fig. 9.



Helical Whip (Base Station)
fig. 10.

The receiver noise output should be markedly higher on used channels compared with blank ones.

If receiver noise appears to be excessive check for the following noise sources: (Also refer section 3.5)

Nearby power lines

Petrol engine ignition

Alternator whine or hash

Servo-systems (e.g. auto navigation systems)

The noise blanker should reduce vehicle ignition noise.

The MUTE should silence the loud-speaker after a three-second delay and should operate on all channels where there are no signals present.

3.5 ENGINE NOISE SUPPRESSION

This is a complex problem which varies from one installation to another.

Methods of suppression which are adequate for broadcast receivers are often entirely inadequate for high frequency receivers in the 2.0 to 15MHz range. If it is essential that the transceiver be used with the engine running, it is worth trying the conventional suppression methods which include:

(a) Suppressor resistors in the spark plug caps and suppressor resistor in the high tension lead connecting the coil to the distributor.

*N.B. Some engines may already employ special "carbon" leads for suppression.

(b) A 0.5uF/250Vdc capacitor from the alternator output to the alternator case.

(c) A 0.5uF/250Vdc capacitor from the voltage regulator to chassis.

(d) A 0.5uF/250Vdc capacitor from the ignition switch side of the coil to chassis.

If satisfactory results cannot be obtained, refer to Tracker Communications or their Agents.

SECTION 4 - CIRCUIT DESCRIPTION

4.1. BLOCK DIAGRAM DESCRIPTION

The transceiver uses the same frequency conversions in the receive and transmit modes and therefore some parts of the circuit are common to both modes. The transmit mode is selected by operation of the PTT switch on the microphone. The common sections are powered by a continuous +12V supply, while the transmit and receive sections are powered by the +Tx and +Rx supplies respectively.

The front-panel mode switch generates two positive logic signals, LSB and USB, which are used to select the required I.F. sideband filter. If no mode switch is fitted, then the USB line is permanently wired high.

4.1.1. Transmit Mode

Microphone ALC Amplifier

Audio signals from the microphone are amplified to a constant level to drive the Balanced Modulator.

Carrier Oscillator

A temperature-compensated crystal oscillator provides a 1650 kHz carrier to the Balanced Modulator. The clarifier control, when fitted, operates on receive only.

Balanced Modulator

The 1650 kHz carrier is modulated by the audio signals from the microphone amplifier and produces a double-sideband (DSB) signal with suppressed carrier. The DSB signal is passed via a diode switch to the single-sideband (SSB) crystal filters.

Tone Signalling

In order to operate tone decoders in other equipment, facilities are provided to feed the Balanced Modulator with signalling tones, instead of audio from the microphone.

CW Operation

When the CW option is fitted, the output of an audio frequency oscillator is selected by the front-panel mode switch to replace the microphone input to the transmitter. Operation of the morse key automatically selects transmit and the equipment remains in the transmit state for approximately 0.7 seconds following the last character, before reverting to the receive state. CW output is monitored by an internal sidetone generator.

SSB Filters

Since sideband inversion takes place in the Channel Mixer (which is described later) an LSB filter is required for USB operation and vice versa. The desired filter is selected by the front-panel mode switch. The filter passes only the desired set of sidebands and the unwanted set is attenuated highly. The crystal filter also further suppresses the carrier.

Channel Oscillator

A separate temperature-compensated crystal oscillator is switched into operation for each channel by the channel selector. The crystal frequency is 1650 kHz higher than the channel frequency.

Channel Mixer

This stage is a balanced mixer in which the 1650 kHz SSB signal is mixed with the channel oscillator output. The desired signal, at the channel frequency, is later selected from the output and the undesired products of the mixer are attenuated.

RF Pre-amplifier

The output of the channel mixer is amplified and passed to the RF tuned circuits.

RF Tuned Circuits

The channel selector operates diode switches, which connect in circuit a pair of coupled tuned circuits, resonant at the channel frequency. These circuits pass the required signal from the Channel Mixer and attenuate the undesired mixer products.

PA Preamplifiers

A linear Class A amplifier stage increases the signal to the level necessary at the input of the PA Driver Amplifier.

PA Driver Amplifier

The PA Driver Amplifier is a broadband linear push-pull Class B amplifier, which produces the necessary power to drive the transmitter output stage.

Linear Power Amplifier

The Linear Power Amplifier (LPA) is a broadband linear push-pull Class B amplifier which produces the transmitter SSB output signal.

Harmonic Filters

The cut-off frequencies of four low-pass filters are arranged so that they are approximately in octave relationship. When a channel is selected, the low-pass filter with cut-off frequency nearest to the channel frequency is switched in series with the transmitter output to attenuate harmonic output.

Aerial Coupler

The output from the harmonic filter is directly suitable for connection to a 50 ohm resistive load through a rear-panel co-axial socket. If fitted, a variable inductor may be used to resonate short wire aerials, connected to rear-panel terminal A1. Longer wire aerials, which may appear inductive at higher channel frequencies, may be connected to the coupler through rear-panel terminal A2, which places a high-voltage capacitor in series with the aerial.

Tuning Indicators

In conjunction with a Tune button, which produces transmitter output, a current source illuminates a front-panel indicator L.E.D. according to the aerial output current. This may be used to adjust the aerial circuit for correct tuning.

4.1.2. Receive Mode

RF Tuned Circuits

Received signals from the aerial are coupled through the harmonic filter and the aerial change-over relay contacts to the same pair of RF tuned circuits as are used in the transmit mode. The function of the tuned circuits on receive is to reject image, I.F. and spurious response frequencies.

In the receive mode, an additional high-pass filter is incorporated in order to prevent breakthrough from high-power medium wave broadcast stations, which may be troublesome when broadband aerials are installed.

RF Amplifier

The RF Amplifier is an AGC-controlled stage which amplifies the low-level input signal from the tuned circuits and feeds the receiver mixer. This stage has sufficient gain only to determine the overall receiver noise figure.

Receiver Mixer

This stage combines the incoming SSB signal from the RF amplifier with injection from the channel oscillator, to produce a 1650 kHz I.F. signal. Undesired mixer products are filtered out by two circuits, tuned to the desired I.F. The output of the mixer feeds the I.F. amplifier and the noise blanker circuit.

Noise Blanker

The noise blanker suppresses impulse noise, such as that generated by motor vehicle ignition systems. It operates by open-circuiting the I.F. signal path for the duration of an interference pulse. The noise blanker contains a broadband I.F. amplifier, detector and AGC loop.

SSB I.F. Amplifier & Detector

The mixer output, after gating by the noise blanker, passes through the I.F. crystal filter, which selects the desired set of sideband frequencies from the incoming signals. The signal is then amplified by a two-stage gain-controlled amplifier, before application to the product detector, in which it is mixed with the 1650 kHz oscillator output in order to recover the audio signal.

AGC Amplifier

The recovered audio signal is amplified and detected, prior to generating the gain control voltages for application to the R.F. and I.F. amplifiers.

Audio Output Amplifier

This stage amplifies the output of the product detector to a level suitable to drive a loudspeaker.

Mute

When no signal is present, the mute short-circuits the volume control to ground and so silences the loudspeaker. It operates by comparing the average outputs of two audio bandpass filters. When a signal is received, the filter outputs become unbalanced and the circuit unmutes the loudspeaker amplifier. At the same time, a LED indicates that the mute is open.

Tone Signalling

When the tone signalling decoder option is fitted and is selected, the audio output of the receiver is muted until a tone pair of the correct frequencies is received.

After pre-selection by bandpass audio filters, the incoming tones are mixed and the difference frequency is passed through a narrow band filter, detector and integrator. If the correct difference frequency is received for more than 6 seconds, then a latch circuit is set and the receiver is unmuted.

Line Output

A balanced line transformer is connected at the output of the loudspeaker amplifier and provides a maximum line level of +20 dBm.

Loudspeaker and Headphone Output

Provision is made for the connection of an extension loudspeaker to a rear-panel socket. Headphones may be connected to a front-panel jack socket.

4.1.3. Channel Select

Front Panel Selection

In the direct-control version of the SCOUT, channel selection is by means of an 8-position rotary switch. When the frequency display, dual-frequency simplex, full remote control or synthesiser options are fitted, the switch output is converted to a 3-line code by a binary encoder integrated circuit.

When the dual-frequency simplex or full remote control options are fitted the 3-line code is re-converted to a 1-of-8 code by a read-only memory integrated circuit. This memory circuit is programmed to generate the user-specified frequency select signals for receive and transmit.

Extended Control Selection

In the Extended Local Control version of the SCOUT, the channel select lines are directly binary-encoded at the input to the transceiver. The binary encoder integrated circuit is therefore not included.

The method of frequency selection is identical with that used in the dash-mounting transceiver.

4.2. DETAILED DESCRIPTION

4.2.1. TRANSMIT CIRCUITS

4.2.1.1. Microphone ALC Amplifier (Function Card)

The microphone input is fed through L400, a 1mH inductor, in order to prevent RF feedback into the amplifier. The input line is terminated by R410, with the shunt capacitor C408 reducing any residual RF.

The signal is fed into the first stage of the microphone amplifier via R415, R422 and the blocking capacitor C416. Shunt capacitor C415 further reduces any residual RF input.

The input impedance of the first stage V406 is high, so that under normal circumstances the signal is not significantly attenuated by the series input resistors R415 and R422. However, when ALC action takes place, the gate electrode of V406 is shunted by FET V403, which acts as a variable resistor and so reduces the input signal in order to maintain a constant audio level.

When the transmitter is activated for tuning, tone signalling or CW operation, the microphone amplifier is disabled. The junction of R415 and R422 is shunted to the common rail by the collector of V404, which is turned on by a DC control to the base through R445. The control voltage to R445 is OR connected through diodes V402, V414 and V419.

V406 is configured as a source follower in order to drive the low input impedance of common-emitter stage V407. The operating point of this stage is determined by the DC emitter resistor R433, while R434 (which is coupled to the emitter through C429) provides negative current feedback at audio frequencies. This increases the input impedance of V97 and reduces the effect of transistor variations upon the gain of the stage.

One section of operational amplifier IC402 is connected as a feedback amplifier, with the ratio of R435 to R439 setting the gain to approximately 80. R435 also provides DC feedback to stabilise the operating point of the amplifier, while C431 is a DC blocking capacitor. The output of V407, which is developed across collector resistor R432, is coupled into IC402 via C430. R438 provides a DC return to the +5V supply for the input of the operational amplifier.

The other section of IC402 acts as an audio level detector. Normally, the inverting input of IC402 (pin 2) is held at +5V DC level by the output on pin 7, while the non-inverting input (pin 3) is biased to about +3V by resistors R426 and R427. When the peak negative audio voltage on pin 2 of IC402 falls below +3V, the amplifier operates and produces a positive output on pin 1. Capacitor C409 is charged rapidly through diode V405 and series resistor R416. The gain of the detector is set by negative feedback through R421, while the gain is further reduced once V405 conducts by negative feedback through R418.

The DC control voltage which appears across C409 is attenuated by potential divider R414-R413 and applied to the gate of a depletion mode JFET transistor, V403. The drain electrode of V403 shunts the microphone input signal at the gate of V406 and so controls the level of the audio signal. In the quiescent state, V403 is biased off by the application of +5V to its source via R403. C403 bypasses the source to ground for audio frequencies.

The attack time of the ALC circuit is set by the value of R416, while the total resistance of R413 and R414, connected across capacitor C409, determines the decay time of the ALC control voltage.

4.2.1.2. B.F.O. (Oscillator Card)

The B.F.O. (part of the oscillator module) is a conventional Colpitts crystal oscillator, operating at a frequency of 1650kHz. The DC supply to the oscillator is stabilised by a low-power IC regulator, IC300.

The oscillator is temperature-cycled in the factory to select the correct compensating capacitors in position C329 to ensure stability of operating frequency over the rated temperature range of the equipment.

The clarifier circuit operates on receive to adjust frequency over a limited range, in order to allow manual compensation for frequency error in received signals. Inductor L300 and C375 form a series-resonant circuit, tuned to 1650kHz by the collector-emitter capacitance of transistor V334. Adjustment of the base bias of V334, by the clarifier control, varies the collector capacitance and so adjusts the nett reactance of the tuned circuit. In this way, the frequency of the BFO may be adjusted above and below nominal frequency. The clarifier control range is preset by variable resistor R321, in the emitter of V334.

The 1650kHz sine wave appearing across the crystal, B300, is attenuated by voltage divider C325, C326 and is applied to the base of emitter follower transistor V308. DC bias for V308 is provided by the potential divider R301, R302.

In the transmit mode, pin 5 of X400 goes to 0V, removing bias from the base of V336. Current through R323 forward biases V335, so that the clarifier circuit is bypassed by the low collector-emitter resistance of V335.

4.2.1.3. Balanced Modulator (RF Card)

The audio signal from the microphone amplifier is fed through a potential divider to balanced modulator IC111.

A negative temperature coefficient resistor, R214, connected in parallel with R215, reduces the attenuation of the potential divider at elevated temperatures and compensates for temperature-dependent gain variations in the system.

IC111 is fed by the transmit power line, +TX, and operates only in the transmit condition of the transceiver.

The balanced modulator produces two sets of sidebands, centred on the carrier frequency, but the carrier is attenuated in the output.

The output at pin 12 of IC111 is coupled via C249 to the sideband filter through diode switch V172. The switch is turned on in the transmit condition by DC current through R222 and provides a low impedance signal path.

4.2.1.4. Tone Signalling Circuits (Function Card)

Tone signalling, to activate frequency-sensitive detector circuits at other stations, is generated by tone generators which replace the normal microphone input.

In the simplest system, the transmit mode is selected and tones are generated under the control of the E.C.E. push-button on the front panel of the transceiver or remote control unit.

The operation of the push-button applies +12V to +5V regulator IC410. The common terminal of IC410 is returned to the 0V line through a 3.3V zener diode and so produces a nominal +8V regulated supply.

Crystal oscillator V416 is activated and generates output at 5406.7kHz. (This frequency is used to generate the R.F.D.S. difference tone of 440Hz. Other crystal frequencies may be fitted to produce other difference tones. For example, a crystal frequency of 4423.6kHz may be used to produce a difference tone of 360Hz.)

IC406 is a 14-stage ripple-carry binary counter. The crystal oscillator output across R450 is applied to the clock input at pin 10. Reset pin 11 is grounded. One of the required two tones (1320Hz for the R.F.D.S. standard) is derived directly from the 12th. stage output at pin 1 and is a square wave.

The square wave output from the 10th. stage of IC406 (5280Hz for the R.F.D.S. standard) drives the clock input of IC407, a programmable 4-bit BCD counter. IC407 is connected to divide by 3, producing a rectangular waveform (1760Hz for the R.F.D.S. standard) at pin 12. One half of IC409, a dual D flip-flop, divides the output of IC407 by two and produces a square waveform at half frequency (880Hz for the R.F.D.S. standard.)

The two audio tones are combined in a low pass filter R456, R461 and C445. The values of R456 and R461 are chosen to provide tones of equal amplitude at the output of the filter. Further harmonic filtering is provided by the low pass filter R464 and C446. The total harmonic distortion of each tone is less than 5%.

The output of the tone generator is coupled into the microphone amplifier through R447, the value of which is chosen to attenuate the level to suit the transceiver requirement.

When the tone generator is activated by the push-button, diode V421 conducts, so that transistor V415 is biased on by base current through resistor R444. The collector current of V415 switches the microphone PTT line to ground. This places the transceiver in the transmit mode.

At the same time, the microphone amplifier is muted by V404, which is biased on by current through diode V419.

Provision is made for the addition of a second tone encoder or of an encoder/decoder as an option for other standard requirements.

This plugs in to the Function Card on connector X401 and is controlled by the front-panel RESET, OPEN and CALL buttons. Please refer to the relevant section of this manual for a description of the operation of this option.

4.2.1.5. CW Oscillator & Sidetone Generator (Function Card)

When the front-panel mode switch, S44, is set to the CW position, diode V77 selects upper sideband operation.

Diode V78 applies +12V to the input of a three-terminal regulator, IC409. The common terminal of IC409 is returned to the negative power supply rail through V425, a 3.3V zener diode, so that the regulated output from IC409 is approximately 8V.

Capacitor C436 is normally charged to +8V through resistor R446, so that the output at pin 10 of IC404 (one section of a quad 2-input NOR gate connected as an inverter) is near to 0V. When the morse key is operated, C436 is discharged and the output at pin 10 of IC404 rises to near +8V.

The output at pin 11 of IC404, this section of which is connected as a 2-input NOR gate, therefore switches to 0V turning transistor switch V422 off. Transistor V423 is connected as an RC phase shift oscillator, gated by V422, and oscillating at approximately 800Hz. The tone output is buffered by emitter follower V424. Emitter resistor R462 is a preset potentiometer, which is used to set the tone output level before application to a complementary pair of emitter followers, V426 & V427, which are AC coupled through capacitor C448 to the sidetone monitor.

The output of the tone oscillator, at the slider of the level adjustment potentiometer, is fed through series resistor R466 to the input of the final stage of the microphone amplifier, IC402B. The carrier output level produced is set by the value of R466 to be compatible with an acceptable level in the sidetone monitor.

When the output at pin 10 of IC404 is high, current through diode V418 discharges capacitor C441, so that pins 1 & 2 of IC405 are driven high and the output at pin 3 of IC405 goes to near 0V. This is applied to pins 12 & 13 of IC405, so that the output at pin 11 goes high and biases transistor V415 ON through diode V420 and resistor R444. Transistor V444 shunts the PTT line and therefore the transmit mode is selected.

During switch-on, pins 1 & 2 of IC405 are held at +8V by capacitor C437, so that pin 3 of IC405 will be low. This provides a low impedance path through diode V418 which rapidly charges C441, so holding the transceiver in the receive mode. C437 is charged through resistor R448, so that subsequently pins 1 & 2 of IC405 are held at 0V, pin 3 produces +8V, and V418 does not conduct.

The transceiver remains in the transmit mode, with the key up, until C441 charges through R451 to produce approximately +4V on pins 1 & 2 of IC405, i.e. for approximately 0.7 seconds after the last key operation. The transmitter then reverts to the receive mode.

4.2.1.6 Tune Operation

The transmitter may be energised, for the adjustment of aerial tuning, using the tone oscillator system described above but without the use of a morse key and in USB or LSB mode.

When the front-panel TUNE button is operated, +12V is applied to IC409 through diode V79. Current through diode V413 operates the transmit select transistor V415, and +12V applied to potential divider R452-R453 drives the

output at pin 11 of NOR gate IC404 low, thus enabling the tone oscillator.

4.2.1.7. SSB Filters

Switching diode V172 is biased on in the transmit mode by current through R222 and R220, so that it provides a low impedance path for the output of the balanced modulator via C249.

When in USB configuration (standard within Australia) diode switch V163 is biased on by current fed into the filter through R204. The DC return for the diode current is through R195. At the same time, no current is applied to the base of transistor switch V165, which is therefore open. The double sideband signal from the balanced modulator is thus fed through the upper sideband filter.

The cathode of diode switch V166, in the lower sideband filter circuit, is reverse-biased by the DC voltage developed across R195, while current is fed through R201 to the base of transistor switch V187 so that the anode of V166 is effectively grounded. V166 is therefore open circuit and no signal is coupled through the LSB filter.

In LSB mode, the LSB filter is selected and the USB filter is de-selected.

Capacitors C232, C234, C240 and C241 tune the input and output transformers of the crystal filters to the I.F. of 1650kHz.

The selected filter attenuates the undesired set of sidebands and further reduces the level of residual 1650kHz carrier.

In the transmit mode, diode V162 is biased on by current through R159 and R191, while diode V161 is reverse biased. The sideband output from the filter is coupled through V162 and capacitor C184 to the input of the transmit mixer, IC108, on pin 1.

4.2.1.8. Channel Oscillator (Oscillator Card)

The channel oscillator, which provides the injection to the channel mixer, is located on a separate module. In standard form, a separate temperature-compensated colpitts crystal oscillator is used for each of the required channel frequencies.

The stability of the standard channel oscillators is better than +/-20Hz over the temperature range 0 to 60C.

The required channel oscillator is selected by the 1-of-8 control voltage generated by the front panel or remote control circuit.

Each oscillator is provided with a preset fine frequency adjustment, C364 - C371, to allow for precise netting. LEDs V309 - V316, which are connected in the COMMON pins of the 3-terminal regulators, increase the output voltage of IC309 - IC316 to approximately +6.7V. They also aid alignment by indicating which oscillator is enabled.

In export applications with severe environmental requirements, the channel oscillator module may be replaced by a synthesiser, which derives its frequency reference from a single oscillator. Depending upon the temperature range specified, this may either be specially compensated to provide the required accuracy or is oven-stabilised. Where a synthesiser is fitted, the

binary select lines are used for frequency selection.

4.2.1.9. Channel Mixer (RF Card)

IC108 is a double-balanced modulator integrated circuit, in which the selected set of sidebands is combined with the channel injection oscillator output to produce a single sideband signal at the desired channel frequency. An image signal is also produced.

Both the channel injection signal and the original IF sideband components are suppressed in the output of IC108.

The TX IF IN at 1650kHz is coupled into pin 1. Channel injection is applied to pin 10 via C176. The output is taken from pin 12, while preset potentiometer R149 is used to adjust the overall gain of the stage.

The bias for IC108 is individually adjusted for each channel in order to compensate for frequency dependent gain variations in the transmitter chain. The 1-of-8 channel select lines are fed to individual low power +5V regulators, IC100-107, each of which is coupled through a preset potentiometer and blocking diode to IC108 pin 5, via R130 and bypass capacitor C174.

4.2.1.10. RF Pre-amplifier (RF Card)

The output of the channel mixer is fed to V135, a common-emitter amplifier.

The output of V135 appears across the collector load, L117.

The DC operating point of the stage is determined by the DC emitter load resistor, R146. This is shunted by the network C124, R136, C127, which provides frequency-dependent gain compensation at medium and high frequencies.

4.2.1.11. RF Tuned Circuits (RF Card)

The output of the RF pre-amplifier contains two sets of sidebands. The frequency of the desired set is equal to the channel injection oscillator frequency minus 1650kHZ, while the image at the channel oscillator frequency plus 1650kHz is also present.

The desired signal is selected by a pair of coupled parallel resonant circuits, tuned to the channel frequency. The required circuits are connected by diode switches, which are made to conduct by DC bias current provided by the 1-of-8 channel select lines.

Referring to the circuit diagram, for Channel 1, +12V is applied through R121 and forward biases light emitting diode V118. Current flows through R137 and forward biases V138 through L116 and R134. Diode V126 also conducts through R117. Both V138 and V126 therefore present a low resistance at signal frequencies.

The output of the RF pre-amplifier is fed via C126 and V138 to a tap on the input tuned circuit inductor, L119. The tuned circuit L119/C162, which is resonant at Channel 1 frequency, is top-capacity coupled to tuned circuit L108/C128. The value of the coupling capacitor, C146, is chosen to provide critical coupling.

The filtered output of the coupled pair of tuned circuits is taken from a tap on L108, through V126, and is developed across R117.

Diode switch V114 is biased on by current through R111 and R102, fed from the +TX line, with return to the 0V line through R113. Capacitor C103 decouples the bias line.

4.2.1.12. PA Pre-amplifier (RF Card)

The sideband signal from the RF tuned circuits is coupled through C110 and V114 to the base of a class-A pre-amplifier stage, V117, through the frequency-dependent gain compensating network R114, C114, R115.

The operating point of V117 is determined by forward bias produced by the potential divider R119/R118 and by emitter resistor R120. The network C121, C122, R129 provides frequency-dependent gain compensation for the stage.

The collector drives the primary of wideband transformer T100, which feeds the PA driver amplifier. Inductor L105 and capacitor C116 decouple the collector circuit.

4.2.1.13. PA Driver Amplifier

V136 and V137 form a class-B amplifier, which produces the necessary power to drive the final stage of the transmitter.

T100 has a balanced secondary to drive V136 and V137 in push-pull. Forward bias to reduce the generation of intermodulation distortion is provided by potential divider R131 with R132/135 in parallel. V134, strapped as a diode, is connected in the earthy end of the potential divider to compensate for the effects of temperature change upon the forward bias required.

The stage drives the centre-tapped primary of wideband transformer T101. Capacitor C172 compensates for the effects of the transformer leakage inductance at high frequencies.

4.2.1.14. Linear Power Amplifier (RF Card)

RF appearing at the secondary of T101 is applied to the bases of the push-pull class-B power output transistors, V146 and V147, via resistors R151 and R152. Forward bias is applied through RF chokes L127 and L128.

The collector currents flow in separate windings of RF choke T102 in such a way as to aid in the cancellation of even-order harmonics. A one turn link on T102 supplies negative feedback via R162 and R163 into the input, in order to equalise the gain versus frequency response.

The output transformer, T103, couples the collectors of V146 and V147 to the antenna changeover relay contacts, K103/2. Capacitors C192 and C195 in parallel across the primary of T103 compensate for the effects of transformer leakage inductance at high frequencies.

The bias supply for the power amplifier comprises the two transistors V148 and V151. V151 is the series pass transistor, while V148 is a voltage sensor and inverter that drives the base of V151. The output voltage of the bias supply is equal to the base-emitter voltage of V148, plus a small voltage drop which appears across the parallel resistors R166 and R167. Resistor R175, in the collector of V151, provides short circuit protection. C173 and

C175 are bypass capacitors.

4.2.1.15. Harmonic Filters (RF Card)

Depending upon the frequency selected, the oscillator module will energise one of relays K101, K102, K104 or K105, each of which connects a low-pass filter into the aerial feed line.

All filters have a characteristic impedance which is nominally 50 ohms, although some component values have been deliberately changed to compensate for the variations in power amplifier output impedance with change in frequency. The filter characteristics are as follows: Chebyshev low-pass, n=7, ripple=0.1dB maximum, Qo=127, fmax=fmin x 1.65.

The filter selection relay coils are fed through RF chokes L100-103 in order to prevent instability caused by induced voltages in the relay coils. Capacitors C104, C107, C112 and C118 bypass the coils at RF. Diodes V101, V112, V115 and V116, connected across the relay coils in reverse polarity, suppress inductive spikes on de-selection.

4.2.1.16. Aerial Tuning Inductor (Rear Chassis)

The output of the sub-harmonic filters is fed through wideband current transformer T104 to the 50 ohm co-axial antenna socket. T104 is mounted on the RF Card.

Optionally, variable inductor L151 may be fitted to allow the use of non-resonant wire antennas. Short antennas, which present a capacitive reactance, may be brought into resonance by L151 when connected to terminal A1. Antennas which have inductive reactance may be connected via a series high voltage capacitor, C246, to terminal A2, so that they also may be resonated by adjustment of L151.

L151 is a toroidally-wound inductor, possessing a low external magnetic field, which is mounted in a screened enclosure.

4.2.1.17. Tuning Indicator (RF Card)

The transmitter RF output current is monitored by current transformer T104. The voltage across the load resistor, R206, is proportional to the primary current and is rectified and filtered by diode V168 and capacitor C236.

The resultant DC voltage is applied to current amplifier transistor V170 which drives the front-panel RF indicator LED, V40. Diode V169 and resistor R255, in the base circuit of V170, partially remove the 0.5V step in the transfer characteristic due to the Vbe drop. The natural LED characteristic of brilliance/current tends to compress variations in indicated brilliance, so that correct adjustment of the antenna tuning inductor is facilitated.

4.2.2. RECEIVE CIRCUITS

4.2.2.1. R.F. Input Tuned Circuits (RF Card)

Incoming signals from the aerial connector are passed through the sub-octave harmonic filters and through the aerial changeover relay, K103/2, to a high-pass filter formed by C119, C123, C145, L106 and L107.

The filter reduces any possible breakthrough of signals at the 1650kHz intermediate frequency and prevents blocking in the receiver RF stages by strong, local medium wave broadcast stations.

In the receive mode, switching diode V113 is biased on by current from the +RX line through R116 and R112, with return to the 0V line via R113. Capacitor C109 decouples this bias supply.

The incoming signals are coupled into the input RF tuned circuits by capacitor C111.

As in the transmit mode, the correct RF tuned circuits are selected by the switching diodes V126-V133 and V138-V145.

The output of the selected tuned circuits is coupled through capacitor C178 to the RF amplifier stage, V149.

4.2.2.2. R.F. Amplifier (RF Card)

V149 is a dual-gate MOSFET R.F. amplifier, with signal input on gate 1 and AGC voltage applied to gate 2. The gain of V149 is deliberately kept low to avoid intermodulation under strong signal conditions but is just great enough to determine the overall receiver noise figure.

The AGC range of the R.F. stage is increased by connecting LED V150 in the source circuit, which provides a fixed bias potential of about 1.7V. The indication of source current by the LED also aids servicing of the equipment.

4.2.2.3. Receiver Mixer

V152 is a dual-gate MOSFET mixer, with the amplified signal input connected to gate 1 and the local oscillator connected to gate 2. The output of the mixer feeds a coupled pair of circuits, resonant at the I.F. of 1650 kHZ, i.e. L130/C193 and L134/C198/C199.

C197 is the coupling capacitor between the two tuned circuits. The capacitive divider C198/C199 matches the output tuned circuit to the relatively low input impedance of the next stage.

Local oscillator injection to gate 2 of V152 is derived from the channel oscillators (described in the transmitter section of this manual) and is coupled in through C189.

4.2.2.4. Noise Blanker (RF Card)

The I.F. output from the mixer is coupled through capacitor C187 to the input of dual-gate MOSFET amplifier V153. Source-follower V155 couples the output to a second stage of amplification, junction transistor V156.

Both V153 and V156 are broadly tuned at 1650 kHz, so that noise impulses will not be degraded.

The detector diode V160 is forward-biased by regulator transistor V164, which is connected in a D.C. feedback circuit to generate approximately 2V. The output of the detector is fed to pulse amplifier V167, which controls the gate input of the fet series switch, V157.

The noise detector output is also filtered, level shifted and fed to D.C. amplifier V158, which produces AGC voltage to control the gain of the first noise amplifier, V153.

Fixed bias of approximately 1.7V is developed at the source of V153 by LED V154.

In normal operation, detector output is controlled so that V167 is not quite conducting. Noise pulses cause V167 to conduct heavily, turning the series fet gate V157 off for the duration of the pulse.

4.2.2.5. SSB I.F. Amplifier & Detector (RF Card)

V159 is an I.F. pre-amplifier which feeds the crystal filters, B100 and B101.

In the receive mode, diode switch V161 is turned on by current from the +RX line through resistor R190, with return to 0V through R191. The IF output from V159 is coupled into the crystal filters through capacitor C220.

In standard form, only one crystal filter is fitted to the SCOUT. When both filters are fitted, the front-panel mode switch selects the upper or lower sideband filter in the same manner as has already been described in the transmitter section of this manual.

In the receive mode, switching diode V171 is biased on by current from the +RX line through R221, with return to 0V through R220. The IF output from the filter is coupled via C244 and C247 to the IF amplifier.

V174 and V177 form a two-stage broadband I.F. amplifier, following the crystal filter and driving the product detector. Dual-gate MOSFET devices are used for their high gain and excellent AGC characteristics. Delayed AGC is applied to gate 2 of V174.

The LED, V175, which is connected in the source circuit of V174 acts as a low voltage zener diode, providing a fixed bias which improves the AGC range of the stage. The LED also provides a convenient indication of the current in V174 and so aids servicing.

V179 and V182 form a conventional balanced modulator type of product detector, with V180 being used as a constant-current source in the common emitter lead. IF signal is applied to the gate of V180 to modulate the emitter current in the product detector, while the 1650 kHz BFO oscillator is applied to the base of V179 to switch the circuit at the carrier frequency. The audio product appears at the collector of V182.

4.2.2.6. AGC Amplifier (RF Card)

The audio output from the product detector is amplified approximately 30X by FET-input operational amplifier IC113A and fed to the peak-to-peak detector V183/V184.

IC113B is connected as a unity-gain feedback amplifier to isolate the output of the detector from loading. Zener diode V181 limits the excursion of the detector output, to improve speed of response to overload.

The detector output is compared with the voltage present at the junction of R233 and R235. The difference is amplified about 5X by D.C. amplifier IC112A. The operating point is shifted by zener diode V176 and the output is fed as AGC voltage to the R.F. amplifier, V149. Delayed AGC for the I.F. amplifier, V174, is derived by potential divider R226/R227.

4.2.2.7. Audio Output Amplifier (RF Card)

The audio frequency signal from the product detector is coupled to the output stage by C275, into R252 and the front-panel volume control, R41. The preset volume control, R253, is fitted in lieu of the front- panel control in trunk-mounted or remotely controlled versions of the SCOUT.

The mute circuit switch, V411, shorts the signal at the junction of R252 and R253 to ground, except when the audio chain is un-muted.

Audio input from the volume control is fed through capacitor C276 to the base of V186, a common emitter pre-amplifier stage. Capacitor C274, connected between the base of V186 and the OV rail, attenuates any residual IF signal at this point and provides response shaping at higher audio frequencies. DC current feedback developed across the emitter resistor of V186 increases the input impedance of the stage and reduces loading upon the volume control.

The audio output stage consists of a pair of integrated circuit power amplifiers, IC114 and IC115, which are bridge-connected in push-pull. The network R237 and C255/C256 across the output of the amplifiers ensures loop stability. The supply to the audio amplifier is derived from the +RX line, via diode V178, and is bypassed by capacitors C257 and C261.

Since C261 is of large capacity, the +RX line would remain active during the first part of each transmit period if the audio output stage were connected directly to +RX, and this would cause acoustic feedback. However, V178 becomes non-conducting when transmit is selected and so the +RX line is discharged rapidly.

The output of the audio amplifier is connected to the internal loudspeaker, to the headphone socket on the front panel and to the extension loudspeaker socket on the rear panel.

When the 600 ohm line drive option is fitted, the output is also connected through a preset line level control, R402, to the primary of isolating transformer T400. The maximum line level is adjustable by insertion of either, but not both, of links LK401 or LK402. The secondary of T400 is connected to the rear-panel accessory socket, X56.

4.2.2.8. Mute (Function Card)

The audio signal from the product detector is coupled via C277 and the front panel connectors to the voice-operated mute circuit.

On the Function Card, audio input is coupled through C400 and R400 to the input of operational amplifier IC400C, which functions as a limiter producing approximately 1V peak to peak of output.

The output of the limiter is coupled to two two-stage active filters, using all four sections of operational amplifier IC401. Each filter has a bandpass response, but with different centre frequencies.

The output of each filter is peak-detected and the resultant D.C. outputs are compared by IC400B.

The mute control, R436, is adjusted so that with noise only as signal from the product detector, the D.C. output of IC400B is low.

Diode V410 is therefore non-conducting and the output of IC400D is high. Transistor switch V411 is turned on and mutes the audio output amplifier by shunting the input to the volume control.

Upon receipt of an audio signal from the product detector, the ratio of the outputs from the active filters change, so that the output of IC400B goes high, diode V410 conducts and C433 is charged. The output of IC400D is driven low and the mute switch V411 is turned off, thus enabling the audio output amplifier. C433 is charged rapidly through V410 and R440, so producing a short attack time, while R441 sets the decay time to approximately 2 seconds.

The mute signal is also connected to IC400A, which operates as a comparator. The output of IC400A drives the mute indicator LED on the front panel, which is illuminated when a signal is received.

When switched OFF, the front-panel MUTE switch shorts the base-emitter of transistor V411, and so disables mute circuit operation.

4.2.3. CHANNEL SELECTION LOGIC

4.2.3.1. Standard SCOUT

In the SCOUT, selection of each channel is achieved by applying an active high signal to one of 8 selector lines.

The channel selector line powers the channel gain control via one of the three terminal regulators IC100 - IC107, each of which is followed by a preset adjustment of the gain control voltage applied to pin 5 of the RF mixer, IC108. These controls allow transmitter output power to be individually adjusted on each channel.

The channel selector lines also feed bias current to the RF tuned circuit switching diodes, via resistors R121 - R128, in order to activate the correct pair of tuned circuits for the selected channel.

Finally, the channel selector lines power the channel oscillator circuits via three-terminal regulators IC301 - IC308.

Note that the Oscillator Card is equipped with a diode matrix, so that the correct sub-octave harmonic filter relay may also be selected for each channel.

4.2.3.2. Extended Local Control Option

When the E.L.C. option is fitted, the external Control Head generates a 3-line binary encoded channel select. The binary select is decoded to provide a 1-of-8 select by a read-only memory integrated circuit, IC60.

The open-collector outputs of IC60 are pulled up to +5V by resistors R64 - R71 and the output logic level is converted to +12V by transistor amplifiers V60 - V67, V69 - V76, which produce the required channel selector lines.

Link LK70, which normally feeds +12V to the front-panel channel selector switch, should be disconnected.

4.2.3.3. Dual-Frequency Simplex Option

The read-only memory integrated circuit, IC60, and the associated select line drive amplifiers discussed in the previous section, are fitted to provide the dual frequency simplex option.

Transistor switch V68 is biased on in the receive mode by current from the PTT line, via resistor R96.

Input pin 13 of the read-only memory, IC60, is therefore held at a logic 0 level. The 3-line binary channel select therefore produces a set of 8 channel select signals, the sequence of which is determined by the programming of the read-only memory to meet customer requirements.

In the transmit mode, V68 is turned off and pin 13 of IC60 is pulled up to +5V by resistor R60. A second set of 8 channel select signals is therefore produced by IC60 for the transmit mode and, as for the receive mode, the sequence is determined by customer requirements.

Normally, pin 14 of IC60 is connected to +5V by LK60, but may instead be

connected to 0V either through LK61 or through a changeover switch. When pin 14 is grounded, IC60 generates fresh receive and transmit channel select sequences, which are normally set for single-frequency simplex operation of the fitted channels, but which may be user-specified to meet special requirements.

In this way, all fitted channels may be utilised in either single or dual frequency simplex modes, with two available selection combinations.

When the dual-frequency simplex option is fitted to an under-dash or table-top SCOUT, the binary-coded select signals for IC60 are generated by an 8-input priority encoder integrated circuit, IC61. In this configuration, the rotor of the front-panel channel selector switch, S40, is connected to 0V by LK71. LK70 is open circuit.

Links LK62 - LK69 are also open circuit, in order to disconnect the front-panel selector switch lines from the channel selector lines.

IC61 generates the required binary select code at the TTL level required to drive IC60.

4.2.3.4. Frequency Display Option

The Frequency Display Option for the SCOUT is provided by five 7-segment LED displays, multiplexed at approximately 400Hz.

Two sections of quad CMOS NAND gate integrated circuit, IC2, are connected as an astable multivibrator, which generates a square wave at approximately 1600Hz. This clocks a dual D flip-flop circuit, IC3, which forms a modulo-4 counter.

The four states of IC3 are decoded by a quad CMOS NAND gate, IC4, and drive the common anodes of the LED displays through darlington transistors V6, V7, V8 and V17. The leftmost pair of LED displays is connected together.

With the exception of the leftmost digit, the corresponding segment cathodes of each LED display are connected in parallel and are illuminated when grounded through current limiting resistors R3 - R9 and switching transistors V10 - V16.

The leftmost digit is either blank or has two segments illuminated (to generate the digit 1). The two segments required are illuminated when grounded through resistors R1 and R2 and switching transistor V9.

The binary coded channel select lines, derived remotely or from IC61 depending upon the configuration of the SCOUT, address 8 sets of 4 8-bit words in read-only memory integrated circuit IC1.

Each 8-bit word is programmed to produce the segment drive for one digit, each being selected in turn by the outputs of the modulo-4 counter, IC3, which multiplexes the display. The read-only memory output bit Y1, on pin 1 of IC1, is used solely to drive the leftmost digit. The remaining seven outputs Y2 - Y8 of IC1 drive the seven segments of the other four LED displays.

The required segment drive pattern for the display is factory-programmed in IC1 for the user-specified transmit channel frequencies, to the nearest kilohertz.

5.0 ALIGNMENT AND FACTORY CHECKS

5.1 PRE-SET CONTROLS

This table contains descriptions of all pre-set adjustments and also several factory checks and adjustments.

Pre-set Controls:

	CONTROL	REF	PCB	DRAWINGS	
BFO FREQUENCY (Tx)	TRIMCAP	C346	OSC.PCB	1096	1105
*RF TUNED CIRCUITS	INDUCTORS	(L108-115 (L119-126	RF PCB	1096	1101
*Tx POWER (EACH CHANNEL)	TRIMPOT	R103-110	RF PCB	1096	1101
Tx POWER (OVERALL GAIN)	TRIMPOT	R149	RF PCB	1096	1101
CW/TUNE RF OUTPUT	TRIMPOT	R462	FUNCTION PCB	1096	1102
*CHANNEL OSC. FREQUENCY	TRIMCAP	C364-371	OSC.PCB	1096	1105
***AERIAL TUNE	INDUCTOR	L151	REAR CHASSIS	1096	—
BFO CLARIFIER (Rx)	INDUCTOR	L300	OSC.PCB	1096	1105
CLARIFIER RANGE	TRIMPOT	R321	OSC.PCB	1096	1105
IF TUNED CIRCUITS (Rx)	INDUCTORS	L130,L134	RF PCB	1096	1101
AGC THRESHOLD	TRIMPOT	R232	RF PCB	1096	1101
MUTE SENSITIVITY	TRIMPOT	R436	FUNCTION PCB	1096	1102
**VOLUME PRE-SET	TRIMPOT	R253	RF PCB	1096	1101
***LINE OUTPUT LEVEL	TRIMPOT	R402	FUNCTION PCB	1096	1102

*Duplicated for each channel.

**Trunk mount and remotely controlled versions only.

***Optional.

5.2 TRANSMITTER

5.2.1 Test Equipment

EQUIPMENT	SUGGESTED TYPE
POWER SUPPLY, 12.6V, 15A	TRAEGER PS1215M
OSCILLOSCOPE, 50MHz preferred	TELEQUIPMENT D83
DUMMY LOAD/ATTENUATOR 50 ohm, 50 watt rms, 30dB	PHILCO 661A - 30
HF VOLTMETER	HEWLETT-PACKARD 410C
with HF PROBE	" " 11036A
with T CONNECTOR	" " 11042A
RF AMMETER, 1.5A fsd	
FREQUENCY COUNTER, Temp. Stab: $\pm$0.1ppm, 0°C-50°C, or better	SYSTRON-DONNER 6252 (Option 11)
AUDIO TWO-TONE GENERATOR 1000/1600 Hz, THD < 0.1%	TRAEGER
TEST BOX WITH PTT SWITCH and AF isolation transformer	TRAEGER
D.C. AMMETER 15A fsd	
REACTIVE LOAD TRANSFORMER input: 20 ohm series 100pF output: 50 ohms resistive	TRAEGER

N.B. The HF voltmeter may not be required if the oscilloscope is accurate to at least 15MHz.

5.2.2 BFO Oscillator

1. Turn the channel selector to an unused channel or ensure that NO transmit audio drive is available.
2. Switch the transceiver to the TRANSMIT mode to disable the clarifier circuitry.
3. Observe the waveform at the emitter of V308 on the oscillator pcb using an oscilloscope and high impedance probe.
   The waveform should be a sine wave of approximately 1.5V p-p.

4. Maintaining conditions 1 and 2 above, connect a frequency counter to the emitter of V308.
5. Adjust trimmer capacitor C346 until the counter reads 1650.000KHz plus or minus 5Hz.

5.2.3 Transmitter ALC (refer drawings 1096, 1102)

The ALC system should not require adjustment in the field. However, its operation may be checked as follows:

1. Turn the CHANNEL selector to an unused channel.
2. Connect a 1000Hz sinewave audio generator to the microphone socket.
3. Monitor the waveform at IC402B pin 7 with an oscilloscope.
4. Increase the audio generator output level until the waveform at pin 7 just reaches its maximum level. This is the ALC THRESHOLD level.
   The input waveform should be approximately 4mV p-p.
   The waveform at pin 7 should be approximately 3.1V p-p.
5. Increase the audio signal generator 3dB past the ALC threshold and note the amplitude of the waveform at pin 7.
6. Increase the audio signal generator output a further 20dB and again note the amplitude of the waveform at pin 7.
   The increase in the level at pin 7 should be less than 12% (1dB) and is typically less than 6%.

5.2.4 RF Tuned Circuits

1. Turn the CHANNEL selector to channel 1.
2. Connect a two-tone audio generator and PTT switch to the microphone socket.
3. Connect a 50 ohm resistive dummy load to the antenna socket.
4. Connect some power measuring device at the input to the load,
   e.g.: (a) RF ammeter in series
   (b) Oscilloscope with high impedance probe in parallel
   (c) HP410C HF voltmeter and RF probe in parallel
5. Switch the PTT switch to TRANSMIT.
6. Adjust inductor L108 for maximum power output. (A LED indicates the selected inductor pair).
7. Adjust inductor L119 for maximum power output.
8. Repeat these adjustments on all other channels.

5.2.5 Transmitter Output

1. Maintain conditions 1 to 5 in 5.2.4 above.
2. Ensure that the audio two-tone drive is about 3dB past the ALC threshold.
3. Adjust potentiometer R103 for 100 watts pep output. A LED indicates the selected trimpot. The dc current drain should be 12.5A plus or minus 1A.

   For a two-tone waveform:

   100 W pep = 200V p-p on a CRO

   " = 1.0A rms on a RF ammeter (for undistorted waveform)

   " = 71V rms on HP410C (Peak responding device)
4. Repeat for all channels.
5. If there is insufficient range in potentiometers R103-110 to obtain 100 watts pep on one or more channels, resistor R149 on the RF pcb should be changed in value to alter the overall gain of the transmitter. Rotating R149 clockwise increases the output power.
6. The r.f. LED should light to full brilliance on all channels.

5.2.6 C.W./Tune r.f. Output

1. Turn the CHANNEL selector to any channel that has been adjusted for 100W pep output.
2. Connect a 50 ohm dummy load and power measuring device to the antenna socket.
3. Press the TUNE button and adjust trimpot R462 for 30W plus or minus 5W r.f. output. The r.f. output should be a carrier relatively free of modulation and at a frequency approximately 800Hz above the suppressed carrier frequency (for u.s.b. operation). The r.f. LED should light to almost full brilliance.

N.B. 30W rms = 110V p-p on a CRO

" = 0.77A rms on an RF ammeter

" = 39V rms on an HP410C

4. If the C.W. option is fitted, plug a key into the KEY jack and press the key down. The r.f. output should be identical to that obtained with the TUNE button.
5. Release the key. The transceiver should stay in the transmit mode for approximately 0.7 seconds.

5.2.7 Transmitter Frequency

1. Ensure that the 1650KHz BFO oscillator has been adjusted - see section 5.2.2
2. Connect a 50 ohm dummy load and attenuator to the antenna socket and connect a frequency counter to the attenuator.
3. Connect a p.t.t. switch and an accurate 1000Hz audio generator to the microphone socket.
4. Select channel 1.
5. Set the p.t.t. switch to transmit and adjust the 1000Hz audio level for sufficient r.f. output to register on the counter.
6. Adjust trimmer capacitor C364 until the counter reads (fc + 1000)Hz plus or minus 5Hz.

N.B. For lower sideband operation, adjust for (fc - 1000)Hz

7. Repeat for all other channels.

5.2.8 Aerial Tuning Inductor (optional)

The aerial tuning inductor, L151, may be checked as follows:

1. Select channel 1.
2. Connect a reactive load transformer between the A1 aerial terminal and earth.
3. Connect a 50 ohm dummy load, a CRO and a power measuring device to the transformer output.
4. Connect a 2-tone audio generator and PTT switch to the microphone socket.
5. Set the p.t.t. switch to transmit and turn the TUNE control for maximum brightness of the r.f. LED.
6. The output power should be in excess of 50W pep. Some clipping of the waveform will result if the TUNE control is not correctly set.
7. Turn the TUNE control either side of resonance and check that the transmitter waveform does not indicate instability.

N.B. the TUNE button may be used in lieu of the 2-tone audio generator but the resulting carrier may not show up instability as easily.

8. Repeat on all channels.
9. Repeat on at least one channel using the A2 terminal.

5.2.9 Emergency Call Encoder (optional)

1. Turn the CHANNEL selector to any used channel.
2. Connect a 50 ohm dummy load, power meter and CRO to the antenna socket.
3. Press the ECE button and note the power output and the waveform.
4. The output power should be approximately 100W pep and the two tones should be balanced to within 20%.
5. Monitor the ECE transmission with an A.M. radio receiver tuned to the channel.
6. Measure the de-modulated receiver audio frequency with a counter. The frequency should be 440Hz plus or minus 1Hz for RFDS and 360Hz plus or minus 1Hz for SES use.

5.3 RECEIVER

5.3.1 Test Equipment

EQUIPMENT	SUGGESTED TYPE
POWER SUPPLY, 12.6V, 15A	TRAEGER PS1215M
OSCILLOSCOPE	TELEQUIPMENT D83
FREQUENCY COUNTER	SYSTRON-DONNER 6252
RF SIGNAL GENERATOR	HEWLETT-PACKARD 606B
MULTIMETER, AC range with dB	

5.3.2 Clarifier

N.B. Prior to adjustment, ensure that the BFO oscillator is set to frequency - see 5.2.2

1. Connect a frequency counter to the emitter of V308 on the oscillator pcb.
2. Set the CLARIFIER control to MID position.
3. Adjust inductor L300 until the counter reads 1650.000KHz plus or minus 5Hz.
4. Note the counter readings with the CLARIFIER control fully anti-clockwise and then fully clockwise.
   The nominal clarifier range is plus or minus 30Hz. The measured range should fall with the limits:
   (plus or minus) 25 to 40Hz.
5. If the clarifier range is outside the limits, alter the setting of trimpot R321 and readjust L300 as per step 3.
6. Again check the clarifier range and repeat step 5 until the range is within limits.

5.3.3 Receiver Tuned Circuits, Receiver SINAD

1. Turn the channel selector to channel 1.
2. Connect an RF signal generator to the antenna socket.
3. Connect an AC voltmeter across the loud-speaker terminals or to an 8 ohm load connected to the external speaker socket.
4. Tune the signal generator until a 1000Hz tone is heard from the loud-speaker.

5. For a two-frequency simplex channel, adjust the appropriate pair of inductors (indicated by LED) for maximum audio output. For single frequency simplex channels, L108 and L119 are common to the transmitter and receiver and are best adjusted in TRANSMIT mode for maximum output power.
6. Adjust the IF inductors L130 and L134 for maximum audio output.
7. Reduce the RF signal generator output to 0.5uV rms and adjust the receiver VOLUME control such that the ac voltmeter reads 0dB. Reduce the RF signal generator output to 0uV and note the reduction in voltmeter reading. This is a measure of receiver SINAD and should be 10dB or better.
8. Repeat for all channels.

5.3.4 A.g.c. Threshold

1. Turn the channel selector to channel 1.
2. Connect a dc voltmeter (10 volt range) to the anode of zener diode V176.
3. Connect an RF signal generator to the antenna socket.
4. Adjust the signal generator output to 1.5uV rms and tune until a 1000Hz tone is heard from the receiver speaker.
5. Adjust trimmer potentiometer R232 until the voltmeter reads 6.0 volts dc.
6. The AGC RANGE may be checked by connecting an ac voltmeter across the speaker terminals or across an 8 ohm resistive load plugged into the external speaker socket at the rear of the transceiver.

   For an RF signal variation of 2.5uV to 100mV rms, the audio output variation must be less than 10dB and is typically less than 5dB.

5.3.5 Mute Sensitivity

1. Select any convenient low frequency channel.
2. Connect an r.f. signal generator to the aerial socket.
3. Set the generator output to 0.1uV and tune for an 800Hz tone.
4. Set the MUTE switch to ON (down).
5. Turn potentiometer R436 fully clockwise and wait for the mute to "close" (up to 2 seconds).
6. Slowly turn R436 anticlockwise until the mute just opens.
7. Remove the r.f. signal generator and check that the mute closes again after a two-second delay.

5.3.6 Noise Blanker

The SCOUT noise blanker is permanently enabled and needs no adjustment. However, its performance may be verified as follows:

1. Connect an audio square wave generator having a fast rise-time to the aerial socket via a small coupling capacitor, e.g. 100pF. A waveform with an amplitude of about 1V p-p and frequency in the range 20Hz to 100Hz is most suitable.
2. Select a low frequency channel.
3. Turn the VOLUME control to mid-position.
4. Turn the MUTE off.
5. Disable the noise blanker by connecting a 10nF capacitor from the drain of MOSFET V153 to ground. A loud "buzz" should be heard from the loudspeaker.
6. Remove the 10nF capacitor to enable the noise blanker. The buzz should be almost completely eliminated.

N.B. With some very good signal generators, the noise may be so strong that the noise blanker will not eliminate it completely, and the level should be reduced.

It should be noted that the bandwidth of signals entering the noise blanker is only limited by the IF and RF tuned circuits on the RF PCB. Hence, a strong signal out of the receiver pass-band may cause AGC action in V153 thus reducing noise blanker efficiency. This effect is usually only noticed at night on the higher frequencies when the HF bands are congested. However, no adverse effects on the desired in-band signals should be noticeable.

5.3.7 Volume Pre-set

The volume pre-set trimpot R253 is included on the RF pcb for trunk-mounted (extended local control) and fully remote-controlled transceiver systems.

1. Ensure that the receiver has been aligned as per the previous paragraphs.
2. Select any used channel.
3. Connect an r.f. signal generator to the aerial socket and tune for a 1000Hz tone.
4. Connect an 8 ohm load to the external speaker socket.
5. Increase the generator output to 100mV rms.

6. Monitor the audio output with a CRO and adjust R253 for 11.0 Vp-p output. The waveform should be a sine wave with no clipping or other distortion evident.

5.3.8 Line Output Level

1. Ensure R253 has been set as per 5.3.7 above.
2. Select any used channel.
3. Connect an r.f. signal generator to the aerial socket and tune for a 1000Hz tone. Set the generator output to 100mV rms.
4. Connect a 600 ohm load across pins 13 and 14 of X56 on the rear panel and monitor the level with an a.c. voltmeter.
5. For line levels $\leqslant$ 10dBm insert link LK402.
   For line levels between 10dBm and 20dBm insert link LK401.
6. Adjust trimpot R402 for the required output.

5.4 CHANNELISATION PROCEDURE

5.4.1 General

The following sections provide component references and values of components that may be required for channelisation.

The SCOUT transceiver must be returned to an Agent or to the factory for channelisation.

Read-only memories (ROM) have been used for reduced component count and flexibility. ROM's are of the fusible link variety and must be programmed at the factory.

5.4.2 RF Pcb Components

Table 5.1 gives component references for the tuned circuit and associated switching components that must be added to the RF pcb for each channel. Refer to RF pcb layout, drawing 1101.

*The values for some components vary with the channel frequency and these are detailed in Table 5.2.

TABLE 5.1

	CHANNEL							
VALUE	1	2	3	4	5	6	7	8
*	L108	L109	L110	L111	L112	L113	L114	L115
*	L119	L120	L121	L122	L123	L124	L125	L126
*	C128	C129	C130	C131	C132	C133	C134	C135
*	C146	C147	C148	C149	C150	C151	C152	C153
*	C162	C163	C164	C165	C166	C167	C168	C169
100n	C136	C137	C138	C139	C140	C141	C142	C143
100n	C154	C155	C156	C157	C158	C159	C160	C161
470	R137	R138	R139	R140	R141	R142	R143	R144
1K	R121	R122	R123	R124	R125	R126	R127	R128
4.7K POT	R103	R104	R105	R106	R107	R108	R109	R110
SMALL RED	V118	V119	V120	V121	V122	V123	V124	V125
BA243	V126	V127	V128	V129	V130	V131	V132	V133
IN914A	V103	C104	V105	V106	V107	V108	V109	V110
IN914A	V138	V139	V140	V141	V142	V143	V144	V145
78L05	IC100	IC101	IC102	IC103	IC104	IC105	IC106	IC107

N.B. The inductors L108-115 and L119-126 must be adjusted as per sections 5.2.4 and 5.3.3.

The trimpots R103-110 must be adjusted as per section 5.2.5.

TABLE 5.2

	RF TUNED CIRCUITS				CHANNEL OSCILLATORS
CHANNEL FREQUENCY	L108-115	L119-126	C128-135 C162-169	C146-153	C330-337 C338-345
			Polystyrene		
2.0 MHz	2-34E3	13-21E3	270 pF	4.7NPO	220 pF
2.2	"	"	220 "	4.7 "	"
2.4	"	"	180 "	3.3 "	"
2.6	"	"	150 "	3.3 "	"
2.8	"	"	120 NPO	2.7 "	"
3.1	"	9-26E3	100 "	2.2 "	"
3.4	"	"	82 "	1.8 "	"
3.7	"	"	68 "	1.5 P100	"
4.0	"	"	56 "	1.2 "	"
4.5	"	"	47 "	1.0 "	120 pF
5.0	"	"	39 "	0.82 "	"
5.5	"	"	33 "	0.82 "	"
6.0	"	"	27 "	0.68 "	"
6.5	"	"	22 "	0.68 "	"
7.0	1-15E3	3-13E3	120 "	2.7 NPO	"
7.5	"	"	100 "	2.7 "	"
8.0	"	"	82 "	2.2 "	"
8.5	"	"	82 "	1.8 "	"
9.0	"	"	68 "	1.5 P100	"
9.5	"	"	56 "	1.2 "	"
10.0	"	"	56 "	1.0 "	"
10.5	"	"	47 "	1.0 "	"
11.0	"	"	47 "	0.82 "	"
11.5	"	"	39 "	0.82 "	"
12.0	"	"	39 "	0.82 "	"
12.5	"	"	33 "	0.68 "	"
13.0	"	"	33 "	0.68 "	"
13.5	"	"	27 "	1M Res.	"
14.0	"	"	27 "	1M Res.	"
14.5-15.0	"	"	27 "	1M Res.	"

1 GREEN DOT
2 RED DOTS
2 GREEN DOTS
1 BLUE DOT
2 BLUE DOTS
N750
NPO

5.4.3 Channel Oscillators

Table 5.3 gives component references for the oscillator components that must be added to the oscillator pcb for each channel. Refer to layout drawing 1105.

*The values for some components vary with the channel frequency and these are detailed in table 5.2.

TABLE 5.3

	CHANNEL							
VALUE	1	2	3	4	5	6	7	8
SEE BELOW	B301	B302	B303	B304	B305	B306	B307	B308
10p TRIM.	C364	C365	C366	C367	C368	C369	C370	C371
SEE BELOW	C347	C348	C349	C350	C351	C352	C353	C354
SEE BELOW	C355	C356	C357	C358	C359	C360	C361	C362
*	C330	C331	C332	C333	C334	C335	C336	C337
*	C338	C339	C340	C341	C342	C343	C344	C345
100n	C317	C318	C319	C320	C321	C322	C323	C324
100n	C301	C302	C303	C304	C305	C306	C307	C308
100K	R313	R314	R315	R316	R317	R318	R319	R320
1K	R304	R305	R306	R307	R308	R309	R310	R311
PN3564	V318	V319	V320	V321	V322	V323	V324	V325
PN3564	V326	V327	V328	V329	V330	V331	V332	V333
SMALL RED	V309	V310	V311	V312	V313	V314	V315	V316
78L05	IC301	IC302	IC303	IC304	IC305	IC306	IC307	IC308

Crystals B301-308:- Must be style D and meet Tracker specification TG5A.

Crystal frequency = fc + 1650KHz

where fc is the required channel carrier frequency in KHz.

Temperature Compensation:- Replace C330-337 and C338-345 with a single 27pF NPO ceramic capacitor per oscillator.

Place the oscillator pcb in a test jig and measure the frequencies at $0^{o}C$ (f0) and $60^{o}C$ (f60).

$$\frac{\text{f0 - f60}}{2} = \text{f for each oscillator.}$$

Select suitable values and temperature co-efficients for C330-337 and

C338-345 from production charts held by Trackers according to the magnitude and sign of f. The value for f should be recorded on the crystal cans and should be added to the nominal crystal frequencies when final frequency adjustment is done. The parallel combination of each pair of capacitors should be approximately 30pF.

5.4.4 Harmonic Filter Select

Diodes V300-307, pertaining to channels 1 to 8 respectively, must be added to the oscillator pcb in order to actuate the appropriate harmonic filter for each channel.

Table 5.4 indicates the frequency range for each filter. See the layout drawing 1105 for the location of the diodes and the F1, F2, F3 and F4 select lines.

TABLE 5.4

Frequency MHz	Filter
2.000 - 3.300	F1
3,301 - 5.500	F2
5.501 - 9.000	F3
9.001 - 15.000	F4

5.4.5 Front Panel Pcb

When the SCOUT transceiver is not intended for use with the "two-frequency simplex" option or the "digital frequency display" option many components may be omitted from the front panel pcb. In this case channel selection is accomplished by switching +12 volts directly to the required channel select line via the rotary switch S40, link LK70 and links LK62-69.

Both options mentioned above require read-only memories (ROM) which require that the channel select lines be binary encoded (turn to the circuit description for a more detailed explanation). See Table 5.5 for a summary of the additional components required to achieve this.

furnished prior to programming:

(a) The total number of crystal-locked frequencies to be installed on the oscillator and RF pcb's. These will normally be installed in order of ascending frequency. The maximum number is eight.

(b) The transmit/receive combinations of these frequencies required for each channel as selected by the channel select switch.
N.B. Any combination of the crystal frequencies in any order is acceptable and each may be used more than once.

(c) One alternative combination to that selected in (b) above. This is purely optional but may be used to allow for expected future addition of channels or changes in transmit/receive pairs.

5.4.6 Digital Frequency Display

This option displays information stored in the ROM, IC1, on a 4½ digit seven-segment l.e.d. display. Normally the suppressed carrier transmit frequency is displayed in KHz but channel numbers and special user codes may also be programmed.

Once again ROM IC1 is field replaceable but not field programmable.

N.B. There is NO alternative programme available as in 5.4.4(c) above.

6. SERVICE NOTES

6.1 DE-SOLDERING PLATED HOLES

The transceiver uses plated holes where appropriate on all pcb's.

In most ungrounded pads the solder has flowed through to the top surface. Firstly, a good solder sucker or solder wick should be used to remove as much solder as possible from inside the hole and from both the upper and lower pads. The component lead should then be gently prised away from the inner hole plating using a pair of long nosed pliers and then withdrawn.

In the case of pads which are grounded to a ground-plane via the hole plating, some difficulty may be experienced in melting the solder inside the hole due to the heatsink effect of the gound-plane. In this case heat the component lead and solder from the ground-plane side and withdraw the lead. If the hole plating is removed the pad will no longer be grounded.

6.2 TRANSMITTER PRECAUTIONS

Do not continuously operate the transmitter with a two-tone test signal at 100W pep for more than ten minutes.

Low-level measurements prior to the RF tuned circuits may be done on a blank channel. Measurements prior to the LPA should be done with the LPA drive disabled. This also prevents low level waveform distortion due to the high level RF fields in the vicinity of the LPA.

6.3 LPA TRANSISTOR SELECTION

All LPA output and driver transistors are fitted in matched pairs for optimum performance. The transistor current gain category is designated by a code letter printed near the type number. Only replace a transistor with one of the same category.

7. OBTAINING OPTIMUM PERFORMANCE

7.1 General

Reliable communication in the high frequency (HF) spectrum depends on many factors other than the radio itself. The following paragraphs will help the operator to obtain maximum performance from his radio installation.

7.2 Choice of Aerial

The ideal HF aerial is a half-wave wire dipole, which is cut to a specific length according to the operating frequency.

$$\text{Approximate length (feet)} = \frac{468}{\text{frequency (MHz)}}$$

Such an aerial would be fed by a coaxial cable and balun system which can be connected directly to the transceiver and which is not sensitive to nearby metal objects often encountered in installation wiring.

However, it has two major disadvantages:

(1) Physical size, e.g. a dipole for 2,524KHz is 185 feet long.
(2) Only useful on one frequency.

Most HF aerials are a compromise to overcome these disadvantages. They are often shorter than half-wave and are artificially tuned to several frequencies using an ANTENNA TUNING UNIT.

For best results, use the longest suitable recommended aerial and keep it as high as possible.

Some aerials require an earth system and the earth connection should be made with at least 3/8" wide copper braid and should be kept as short as possible.

Where antenna height and earth cable length conflict, (e.g. loaded whips and helical whips) a short earth cable should take priority. See section 3.5 or consult Trackers for more details.

7.3 HF PROPAGATION

Other factors affecting HF communication are:

(1) Frequency
(2) Distance between stations
(3) Time of day
(4) Time of year
(5) Geographical location
(6) Sunspot activity
(7) Overseas interference
(8) Local man-made noise

For communication over small distances over water (around 100 miles) low frequencies in the 2MHz band are best. Low frequencies are more predictable and suffer less from overseas interference at night. Note, however, that short aerials are not very efficient on these frequencies.

For communication over land on 2MHz over short distances, an antenna with a good ground-wave is preferred.

For longer distances higher frequencies will generally be more reliable but no communication may be possible over shorter distances. This "skip" effect becomes more pronounced as frequency increases and is very noticeable above 6MHz.

Local man-made noise often emanates from electrical machines, power lines and engines etc. Aerials should always be installed as far away as possible from such noise sources. A NOISE BLANKER may improve reception greatly in such cases.

PARTS LIST FOR DISPLAY P.C.B.

REF	CAT #	DESCRIPTION OF ITEM	
R1	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R2	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R3	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R4	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R5	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R6	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R7	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R8	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R9	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R11	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R12	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R13	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R14	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R15	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R16	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R17	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R18	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R19	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R20	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R21	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R22	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R23	01070	RESISTOR, FIXED, CARBON FILM	33K 0.25W 5% CR25
C1	01710	CAPACITOR, FIXED, TANTALUM TAG	10 MFD. 16V
C2	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C3	01647	CAPACITOR, FIXED, POLYESTER	0.01 MFD. GREEN CAP
V1	01865	DIODE, LIGHT-EMITTING	MAN72A 7 SEGMENT DISPLAY
V2	01865	DIODE, LIGHT-EMITTING	MAN72A 7 SEGMENT DISPLAY
V3	01865	DIODE, LIGHT-EMITTING	MAN72A 7 SEGMENT DISPLAY
V4	01865	DIODE, LIGHT-EMITTING	MAN72A 7 SEGMENT DISPLAY
V5	01865	DIODE, LIGHT-EMITTING	MAN72A 7 SEGMENT DISPLAY
V6	01926	TRANSISTOR, SILICON, JUNCTION	BD676 DARLINGTON PNP
V7	01926	TRANSISTOR, SILICON, JUNCTION	BD676 DARLINGTON PNP
V8	01926	TRANSISTOR, SILICON, JUNCTION	BD676 DARLINGTON PNP
V9	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V10	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V11	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V12	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V13	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V14	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V15	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V16	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V17	01926	TRANSISTOR, SILICON, JUNCTION	BD676 DARLINGTON PNP
IC1	02093	INTEGRATED CIRCUIT, DIGITAL	CUSTOM-PROGRAMMED 74188 PROM
IC2	02060	INTEGRATED CIRCUIT, DIGITAL	CD4011
IC3	02098	INTEGRATED CIRCUIT, DIGITAL	74C74
IC4	02060	INTEGRATED CIRCUIT, DIGITAL	CD4011
IC5	02002	INTEGRATED CIRCUIT, LINEAR	UA7805UC +5V REGULATOR

PARTS LIST FOR FRONT PANEL P.C.B.

REF	CAT #	DESCRIPTION OF ITEM	
R40	01386	RESISTOR, VARIABLE, CARBONFILM	10K, CURVE A
R41	01390	RESISTOR, VARIABLE, CARBONFILM	10K, CURVE C
R60	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R61	01030	RESISTOR, FIXED, CARBON FILM	270 OHM 0.25W 5% CR25
R62	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R63	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R64-71	01190	RESISTOR, FIXED, CARBON FILM	4K7 X 8 DIL RESISTOR PACK
R72-79	01190	RESISTOR, FIXED, CARBON FILM	4K7 X 8 DIL RESISTOR PACK
R80-87	01190	RESISTOR, FIXED, CARBON FILM	4K7 X 8 DIL RESISTOR PACK
R88-95	01190	RESISTOR, FIXED, CARBON FILM	4K7 X 8 DIL RESISTOR PACK
R96	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
C60	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C61	01736	CAPACITOR, FIXED, ELECTROLYTIC	220 MFD. 16V RB
C62	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C63	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C64	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C65	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C66	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C67	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C68	01710	CAPACITOR, FIXED, TANTALUM TAG	10 MFD. 16V
L60	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L61	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L62	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L63	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L64	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L65	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L66	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L67	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L68	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
V40	01876	DIODE, LIGHT-EMITTING	YELLOW
V41	01872	DIODE, LIGHT-EMITTING	GREEN
V42	01874	DIODE, LIGHT-EMITTING	RED
V43	01872	DIODE, LIGHT-EMITTING	GREEN
V60	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V61	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V62	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V63	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V64	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V65	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V66	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V67	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V68	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V69	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V70	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V71	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V72	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V73	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V74	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V75	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V76	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V77	01814	DIODE, SILICON, SIGNAL	1N914A
V78	01814	DIODE, SILICON, SIGNAL	1N914A
V79	01814	DIODE, SILICON, SIGNAL	1N914A
V80	01839	DIODE, SILICON, ZENER	BZX79/C3V3
IC60	02093	INTEGRATED CIRCUIT, DIGITAL	CUSTOM-PROGRAMMED 74188 PROM

PARTS LIST FOR FRONT PANEL P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
IC61	02110	INTEGRATED CIRCUIT, DIGITAL	74LS148 8 I/P PRIORITY ENCODER
IC62	02002	INTEGRATED CIRCUIT, LINEAR	UA7805UC +5V REGULATOR
IC63	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
S40	02410	SWITCH, ELECTRICAL, ROTARY	1 POLE, 12 POSITION, LORLEND
S41	02429	SWITCH, ELECTRICAL, TOGGLE	MINIATURE SPDT PCB
S42	02429	SWITCH, ELECTRICAL, TOGGLE	MINIATURE SPDT PCB
S44	02410	SWITCH, ELECTRICAL, ROTARY	1 POLE, 12 POSITION, LORLEND
S45	02461	SWITCH, ELECTRICAL, BUTTON	SPDT PCB MOUNTING
S46	02461	SWITCH, ELECTRICAL, BUTTON	SPDT PCB MOUNTING
S47	02461	SWITCH, ELECTRICAL, BUTTON	SPDT PCB MOUNTING
S48	02461	SWITCH, ELECTRICAL, BUTTON	SPDT PCB MOUNTING
S49	02461	SWITCH, ELECTRICAL, BUTTON	SPDT PCB MOUNTING
X40	03070	CONNECTOR, ELECTRICAL	SOCKET, PHONE JACK, STANDARD
X41	03070	CONNECTOR, ELECTRICAL	SOCKET, PHONE JACK, STANDARD
X62	03199	CONNECTOR, ELECTRICAL	7 PIN DIN FIXED SOCKET

PARTS LIST FOR RF P.C.B.

REF	CAT #	DESCRIPTION OF ITEM	
R100	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R102	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R103	01352	RESISTOR, PRESET, CARBON FILM	4K7 TAB, MINIATURE, VERTICAL
R104	01352	RESISTOR, PRESET, CARBON FILM	4K7 TAB, MINIATURE, VERTICAL
R105	01352	RESISTOR, PRESET, CARBON FILM	4K7 TAB, MINIATURE, VERTICAL
R106	01352	RESISTOR, PRESET, CARBON FILM	4K7 TAB, MINIATURE, VERTICAL
R107	01352	RESISTOR, PRESET, CARBON FILM	4K7 TAB, MINIATURE, VERTICAL
R108	01352	RESISTOR, PRESET, CARBON FILM	4K7 TAB, MINIATURE, VERTICAL
R109	01352	RESISTOR, PRESET, CARBON FILM	4K7 TAB, MINIATURE, VERTICAL
R110	01352	RESISTOR, PRESET, CARBON FILM	4K7 TAB, MINIATURE, VERTICAL
R111	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R112	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R113	01038	RESISTOR, FIXED, CARBON FILM	560 OHM 0.25W 5% CR25
R114	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R115	01027	RESISTOR, FIXED, CARBON FILM	150 OHM 0.25W 5% CR25
R116	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R117	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R118	01028	RESISTOR, FIXED, CARBON FILM	180 OHM 0.25W 5% CR25
R119	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R120	01011	RESISTOR, FIXED, CARBON FILM	10 OHM 0.25W 5% CR25
R121	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R122	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R123	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R124	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R125	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R126	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R127	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R128	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R129	01007	RESISTOR, FIXED, CARBON FILM	4.7 OHM 0.25W 5% CR25
R130	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R131	01310	RESISTOR, FIXED, WIRE WOUND	100 OHM, 5W 5% RGB5
R132	01000	RESISTOR, FIXED, CARBON FILM	1 OHM 0.25W 5% CR25
R153	01030	RESISTOR, FIXED, CARBON FILM	270 OHM 0.25W 5% CR25
R134	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R135	01000	RESISTOR, FIXED, CARBON FILM	1 OHM 0.25W 5% CR25
R136	01020	RESISTOR, FIXED, CARBON FILM	56 OHM 0.25W 5% CR25
R137	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R138	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R138	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R140	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R141	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R142	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R143	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R144	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R145	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R146	01029	RESISTOR, FIXED, CARBON FILM	220 OHM 0.25W 5% CR25
R147	01066	RESISTOR, FIXED, CARBON FILM	15K 0.25W 5% CR25
R148	01055	RESISTOR, FIXED, CARBON FILM	6K8 0.25W 5% CR25
R149	01344	RESISTOR, PRESET, CARBON FILM	1K TAB, MINIATURE, HORIZONTAL
R150	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R151	01154	RESISTOR, FIXED, CARBON FILM	2.2 OHM 1W 5% CR52
R152	01154	RESISTOR, FIXED, CARBON FILM	2.2 OHM 1W 5% CR52
R153	01011	RESISTOR, FIXED, CARBON FILM	10 OHM 0.25W 5% CR25
R154	01030	RESISTOR, FIXED, CARBON FILM	270 OHM 0.25W 5% CR25
R155	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
R156	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R157	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R158	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R159	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R160	01045	RESISTOR, FIXED, CARBON FILM	1K5 0.25W 5% CR25
R161	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R162	01154	RESISTOR, FIXED, CARBON FILM	2.2 OHM 1W 5% CR52
R163	01154	RESISTOR, FIXED, CARBON FILM	2.2 OHM 1W 5% CR52
R164	01041	RESISTOR, FIXED, CARBON FILM	820 OHM 0.25W 5% CR25
R165	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R166	01003	RESISTOR, FIXED, CARBON FILM	2.2 OHM 0.25W 5% CR25
R167	01003	RESISTOR, FIXED, CARBON FILM	2.2 OHM 0.25W 5% CR25
R168	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R169	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R170	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R171	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R172	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R173	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R174	01144	RESISTOR, FIXED, CARBON FILM	220 OHM 0.5W 5% CR37
R175	01305	RESISTOR, FIXED, WIRE WOUND	10 OHM, 5W 10% RGB5
R176	01077	RESISTOR, FIXED, CARBON FILM	68K 0.25W 5% CR25
R177	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R178	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R179	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R180	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R181	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R182	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R183	01035	RESISTOR, FIXED, CARBON FILM	330 OHM 0.25W 5% CR25
R184	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R185	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R186	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R187	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R188	01045	RESISTOR, FIXED, CARBON FILM	1K5 0.25W 5% CR25
R189	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R190	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R191	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R192	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R193	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R194	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R195	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R197	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R198	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R199	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R200	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R201	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R202	01030	RESISTOR, FIXED, CARBON FILM	270 OHM 0.25W 5% CR25
R203	01070	RESISTOR, FIXED, CARBON FILM	33K 0.25W 5% CR25
R204	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R205	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R206	01028	RESISTOR, FIXED, CARBON FILM	180 OHM 0.25W 5% CR25
R207	01046	RESISTOR, FIXED, CARBON FILM	1K8 0.25W 5% CR25
R208	01048	RESISTOR, FIXED, CARBON FILM	2K7 0.25W 5% CR25
R209	01049	RESISTOR, FIXED, CARBON FILM	3K3 0.25W 5% CR25
R210	01050	RESISTOR, FIXED, CARBON FILM	3K9 0.25W 5% CR25
R211	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
R212	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R213	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R214	01334	RESISTOR, N.T.C.	4K7 THERMISTOR
R215	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R216	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R217	01018	RESISTOR, FIXED, CARBON FILM	39 OHM 0.25W 5% CR25
R218	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R219	01035	RESISTOR, FIXED, CARBON FILM	330 OHM 0.25W 5% CR25
R220	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R221	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R222	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R223	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R224	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R225	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R226	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R227	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R228	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R229	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R230	01085	RESISTOR, FIXED, CARBON FILM	150K 0.25W 5% CR25
R231	01075	RESISTOR, FIXED, CARBON FILM	56K 0.25W 5% CR25
R232	01354	RESISTOR, PRESET, CARBON FILM	10K TAB, MINIATURE, HORIZONTAL
R233	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R234	01070	RESISTOR, FIXED, CARBON FILM	33K 0.25W 5% CR25
R235	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R236	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R237	01009	RESISTOR, FIXED, CARBON FILM	6.8 OHM 0.25W 5% CR25
R238	01019	RESISTOR, FIXED, CARBON FILM	47 OHM 0.25W 5% CR25
R239	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R240	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R241	01045	RESISTOR, FIXED, CARBON FILM	1K5 0.25W 5% CR25
R242	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R243	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R244	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R245	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R246	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R247	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R248	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R249	01026	RESISTOR, FIXED, CARBON FILM	120 OHM 0.25W 5% CR25
R250	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R251	01087	RESISTOR, FIXED, CARBON FILM	220K 0.25W 5% CR25
R252	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R253	01354	RESISTOR, PRESET, CARBON FILM	10K TAB, MINIATURE, HORIZONTAL
R254	01070	RESISTOR, FIXED, CARBON FILM	33K 0.25W 5% CR25
R255	01035	RESISTOR, FIXED, CARBON FILM	330 OHM 0.25W 5% CR25
C100	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C101	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C102	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C103	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C104	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C105	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C106	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C107	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C108	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C109	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C110	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
C111	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C112	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C113	01746	CAPACITOR, FIXED, ELECTROLYTIC	1000 MFD. 16V RB
C114	01460	CAPACITOR, FIXED, CERAMIC	180 PFD. N750
C115	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C116	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C117	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C118	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C119	01622	CAPACITOR, FIXED, POLYSTYRENE	1200 PFD. 5% 500V
C120	01746	CAPACITOR, FIXED, ELECTROLYTIC	1000 MFD. 16V RB
C121	01459	CAPACITOR, FIXED, CERAMIC	150 PFD. N750
C122	01538	CAPACITOR, FIXED, CERAMIC	0.001 MFD. (YELLOW TOP)
C123	01616	CAPACITOR, FIXED, POLYSTYRENE	750 PFD. 5% 500V
C124	01460	CAPACITOR, FIXED, CERAMIC	180 PFD. N750
C125	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C126	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C127	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C128	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C129	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C130	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C131	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C132	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C133	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C134	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C135	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C136	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C137	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C138	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C139	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C140	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C141	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C142	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C143	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C144	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C145	01622	CAPACITOR, FIXED, POLYSTYRENE	1200 PFD. 5% 500V
C146	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C147	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C148	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C149	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C150	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C151	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C152	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C153	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C154	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C155	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C156	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C157	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C158	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C159	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C160	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C161	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C162	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C163	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C164	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C165	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
C166	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C167	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C168	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C169	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C170	01680	CAPACITOR, FIXED, POLYCARB	0.47 MFD.
C171	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C172	01608	CAPACITOR, FIXED, POLYSTYRENE	470 PFD. 5% 500V
C173	01716	CAPACITOR, FIXED, TANTALUM TAG	33 MFD. 10V
C174	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C175	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C176	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C177	01680	CAPACITOR, FIXED, POLYCARB	0.47 MFD.
C178	01555	CAPACITOR, FIXED, CERAMIC	0.0047 MFD. 63V (T CAP)
C179	01538	CAPACITOR, FIXED, CERAMIC	0.001 MFD. (YELLOW TOP)
C180	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C181	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C182	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C183	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C184	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C185	01555	CAPACITOR, FIXED, CERAMIC	0.0047 MFD. 63V (T CAP)
C186	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C187	01538	CAPACITOR, FIXED, CERAMIC	0.001 MFD. (YELLOW TOP)
C188	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C189	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C190	01538	CAPACITOR, FIXED, CERAMIC	0.001 MFD. (YELLOW TOP)
C191	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C192	01620	CAPACITOR, FIXED, POLYSTYRENE	1000 PFD. 5% 500V
C193	01462	CAPACITOR, FIXED, CERAMIC	270 PFD. N750
C194	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C195	01624	CAPACITOR, FIXED, POLYSTYRENE	1600 PFD. 5% 250V
C196	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C197	01402	CAPACITOR, FIXED, CERAMIC	2.7 PFD. NPO
C198	01463	CAPACITOR, FIXED, CERAMIC	330 PFD. N750
C199	01641	CAPACITOR, FIXED, POLYESTER	0.0022 MFD. GREEN CAP
C200	01648	CAPACITOR, FIXED, POLYESTER	0.0068 MFD. GREEN CAP
C201	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C202	01538	CAPACITOR, FIXED, CERAMIC	0.001 MFD. (YELLOW TOP)
C203	01708	CAPACITOR, FIXED, TANTALUM TAG	4.7 MFD. 25V
C204	01624	CAPACITOR, FIXED, POLYSTYRENE	1600 PFD. 5% 250V
C205	01618	CAPACITOR, FIXED, POLYSTYRENE	820 PFD. 5% 500V
C206	01606	CAPACITOR, FIXED, POLYSTYRENE	430 PFD. 5% 500V
C207	01592	CAPACITOR, FIXED, POLYSTYRENE	220 PFD. 5% 500V
C208	01626	CAPACITOR, FIXED, POLYSTYRENE	2000 PFD. 5% 250V
C209	01622	CAPACITOR, FIXED, POLYSTYRENE	1200 PFD. 5% 500V
C210	01616	CAPACITOR, FIXED, POLYSTYRENE	750 PFD. 5% 500V
C211	01608	CAPACITOR, FIXED, POLYSTYRENE	470 PFD. 5% 500V
C212	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C213	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C214	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C215	01704	CAPACITOR, FIXED, TANTALUM TAG	1 MFD. 35V
C216	01626	CAPACITOR, FIXED, POLYSTYRENE	2000 PFD. 5% 250V
C217	01622	CAPACITOR, FIXED, POLYSTYRENE	1200 PFD. 5% 500V
C218	01616	CAPACITOR, FIXED, POLYSTYRENE	750 PFD. 5% 500V
C219	01608	CAPACITOR, FIXED, POLYSTYRENE	470 PFD. 5% 500V
C220	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
C221	01540	CAPACITOR, FIXED, CERAMIC	0.0022 MFD. (YELLOW TOP)
C222	01622	CAPACITOR, FIXED, POLYSTYRENE	1200 PFD. 5% 500V
C223	01614	CAPACITOR, FIXED, POLYSTYRENE	680 PFD. 5% 500V
C224	01606	CAPACITOR, FIXED, POLYSTYRENE	430 PFD. 5% 500V
C225	01594	CAPACITOR, FIXED, POLYSTYRENE	240 PFD. 5% 500V
C226	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C227	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C228	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C229	01648	CAPACITOR, FIXED, POLYESTER	0.0068 MFD. GREEN CAP
C230	01680	CAPACITOR, FIXED, POLYCARB	0.47 MFD.
C231	01708	CAPACITOR, FIXED, TANTALUM TAG	4.7 MFD. 25V
C232	01425	CAPACITOR, FIXED, CERAMIC	100 PFD. NPO
C233	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C234	01425	CAPACITOR, FIXED, CERAMIC	100 PFD. NPO
C235	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C236	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C237	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C238	01718	CAPACITOR, FIXED, TANTALUM TAG	47 MFD. 6.3V
C239	01680	CAPACITOR, FIXED, POLYCARB	0.47 MFD.
C240	01425	CAPACITOR, FIXED, CERAMIC	100 PFD. NPO
C241	01425	CAPACITOR, FIXED, CERAMIC	100 PFD. NPO
C242	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C243	01704	CAPACITOR, FIXED, TANTALUM TAG	1 MFD. 35V
C244	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C245	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C246	01510	CAPACITOR, FIXED, CERAMIC	47 PFD. 3KV
C247	01555	CAPACITOR, FIXED, CERAMIC	0.0047 MFD. 63V (T CAP)
C248	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C249	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C250	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C251	01538	CAPACITOR, FIXED, CERAMIC	0.001 MFD. (YELLOW TOP)
C252	01417	CAPACITOR, FIXED, CERAMIC	33 PFD. NPO
C253	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C254	01538	CAPACITOR, FIXED, CERAMIC	0.001 MFD. (YELLOW TOP)
C255	01677	CAPACITOR, FIXED, POLYCARB	0.22 MFD.
C256	01677	CAPACITOR, FIXED, POLYCARB	0.22 MFD.
C257	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C258	01417	CAPACITOR, FIXED, CERAMIC	33 PFD. NPO
C259	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C260	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C261	01746	CAPACITOR, FIXED, ELECTROLYTIC	1000 MFD. 16V RB
C262	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C263	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C264	01708	CAPACITOR, FIXED, TANTALUM TAG	4.7 MFD. 25V
C265	01708	CAPACITOR, FIXED, TANTALUM TAG	4.7 MFD. 25V
C266	01710	CAPACITOR, FIXED, TANTALUM TAG	10 MFD. 16V
C267	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C268	01648	CAPACITOR, FIXED, POLYESTER	0.0068 MFD. GREEN CAP
C269	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C270	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C271	01702	CAPACITOR, FIXED, TANTALUM TAG	0.47 MFD. 35V
C272	01710	CAPACITOR, FIXED, TANTALUM TAG	10 MFD. 16V
C273	01670	CAPACITOR, FIXED, POLYCARB	0.047 MFD. 250V
C274	01651	CAPACITOR, FIXED, POLYCARB	0.022 MFD. GREEN CAP
C275	01651	CAPACITOR, FIXED, POLYCARB	0.022 MFD. GREEN CAP

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
C276	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C277	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C278	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C279	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C280	01417	CAPACITOR, FIXED, CERAMIC	33 PFD. NPO
C281	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
L100	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L101	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L102	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L103	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L104	05608	ASSEMBLY, COIL	AF POT-CORE BOBBIN (5X5)
L105	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L106	05625	ASSEMBLY, COIL	2.55UH INDUCTOR - LP FILTER
L107	05625	ASSEMBLY, COIL	2.55UH INDUCTOR - LP FILTER
L108	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L109	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L110	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L111	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L112	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L113	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L114	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L115	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L116	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L117	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L118	02550	CORE, ROD, FERRITE	CHOKE FORMER
L119	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L120	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L121	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L122	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L123	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L124	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L125	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L126	05624	TUNING INDUCTOR	REFER TO HANDBOOK FOR VALUE
L127	02550	CORE, ROD, FERRITE	CHOKE FORMER
L128	02550	CORE, ROD, FERRITE	CHOKE FORMER
L129	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L130	05611	ASSEMBLY, COIL	I.F. COIL (1650 KHZ)
L131	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L134	05611	ASSEMBLY, COIL	I.F. COIL (1650 KHZ)
L135	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L136	05606	ASSEMBLY, COIL	3.5 UH (HARMONIC FILTER)
L137	05604	ASSEMBLY, COIL	2.1 UH (HARMONIC FILTER)
L138	05603	ASSEMBLY, COIL	1.3 UH (HARMONIC FILTER)
L139	05600	ASSEMBLY, COIL	.77 UH (HARMONIC FILTER)
L140	05607	ASSEMBLY, COIL	3.8 UH (HARMONIC FILTER)
L141	05605	ASSEMBLY, COIL	2.3 UH (HARMONIC FILTER)
L142	05602	ASSEMBLY, COIL	1.4 UH (HARMONIC FILTER)
L143	05601	ASSEMBLY, COIL	.85 UH (HARMONIC FILTER)
L144	05606	ASSEMBLY, COIL	3.5 UH (HARMONIC FILTER)
L145	05604	ASSEMBLY, COIL	2.1 UH (HARMONIC FILTER)
L146	05603	ASSEMBLY, COIL	1.3 UH (HARMONIC FILTER)
L147	05600	ASSEMBLY, COIL	.77 UH (HARMONIC FILTER)
L148	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L149	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L150	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
L151	05626	ASSEMBLY, COIL	AERIAL TUNING INDUCTOR
L152	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L153	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L154	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L155	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L156	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
T100	05615	ASSEMBLY, COIL	HF LPA TRANSFORMER
T101	05616	ASSEMBLY, COIL	HF LPA TRANSFORMER
T102-3	05617	ASSEMBLY, COIL	HF LPA TRANSFORMER PAIR
T104	05618	ASSEMBLY, COIL	HF LPA TRANSFORMER
K100	02392	RELAY, ELECTROMAGNETIC	TYPE FB221 DO12 DPDT 12V
K101	02392	RELAY, ELECTROMAGNETIC	TYPE FB221 DO12 DPDT 12V
K102	02392	RELAY, ELECTROMAGNETIC	TYPE FB221 DO12 DPDT 12V
K103	02397	RELAY, ELECTROMAGNETIC	NC4-DP-12 (PCB MOUNTING)
K104	02392	RELAY, ELECTROMAGNETIC	TYPE FB221 DO12 DPDT 12V
K105	02392	RELAY, ELECTROMAGNETIC	TYPE FB221 DO12 DPDT 12V
V100	01814	DIODE, SILICON, SIGNAL	1N914A
V101	01814	DIODE, SILICON, SIGNAL	1N914A
V102	01814	DIODE, SILICON, SIGNAL	1N914A
V103	01814	DIODE, SILICON, SIGNAL	1N914A
V104	01814	DIODE, SILICON, SIGNAL	1N914A
V105	01814	DIODE, SILICON, SIGNAL	1N914A
V106	01814	DIODE, SILICON, SIGNAL	1N914A
V107	01814	DIODE, SILICON, SIGNAL	1N914A
V108	01814	DIODE, SILICON, SIGNAL	1N914A
V109	01814	DIODE, SILICON, SIGNAL	1N914A
V110	01814	DIODE, SILICON, SIGNAL	1N914A
V111	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V112	01814	DIODE, SILICON, SIGNAL	1N914A
V113	01810	DIODE, SILICON, SIGNAL	BA243
V114	01810	DIODE, SILICON, SIGNAL	BA243
V115	01814	DIODE, SILICON, SIGNAL	1N914A
V116	01814	DIODE, SILICON, SIGNAL	1N914A
V117	01956	TRANSISTOR, SILICON, JUNCTION	2N4427
V118	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V119	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V120	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V121	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V122	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V123	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V124	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V125	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V126	01810	DIODE, SILICON, SIGNAL	BA243
V127	01810	DIODE, SILICON, SIGNAL	BA243
V128	01810	DIODE, SILICON, SIGNAL	BA243
V129	01810	DIODE, SILICON, SIGNAL	BA243
V130	01810	DIODE, SILICON, SIGNAL	BA243
V131	01810	DIODE, SILICON, SIGNAL	BA243
V132	01810	DIODE, SILICON, SIGNAL	BA243
V133	01810	DIODE, SILICON, SIGNAL	BA243
V134	01922	TRANSISTOR, SILICON, JUNCTION	BD433
V135	01946	TRANSISTOR, SILICON, JUNCTION	PN3563
V136	01935	TRANSISTOR, SILICON, JUNCTION	BLY87C
V137	01935	TRANSISTOR, SILICON, JUNCTION	BLY87C
V138	01814	DIODE, SILICON, SIGNAL	1N914A

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
V139	01814	DIODE, SILICON, SIGNAL	1N914A
V140	01814	DIODE, SILICON, SIGNAL	1N914A
V141	01814	DIODE, SILICON, SIGNAL	1N914A
V142	01814	DIODE, SILICON, SIGNAL	1N914A
V143	01814	DIODE, SILICON, SIGNAL	1N914A
V144	01814	DIODE, SILICON, SIGNAL	1N914A
V145	01814	DIODE, SILICON, SIGNAL	1N914A
V146	01938	TRANSISTOR, SILICON, JUNCTION	1487
V147	01938	TRANSISTOR, SILICON, JUNCTION	1487
V148	01922	TRANSISTOR, SILICON, JUNCTION	BD433
V149	01973	TRANSISTOR, SILICON, MOSFET	40673
V150	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V151	01922	TRANSISTOR, SILICON, JUNCTION	BD433
V152	01973	TRANSISTOR, SILICON, MOSFET	40673
V153	01973	TRANSISTOR, SILICON, MOSFET	40673
V154	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V155	01970	TRANSISTOR, SILICON, F.E.T.	2N5485 (N CHANNEL)
V156	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V157	01970	TRANSISTOR, SILICON, F.E.T.	2N5485 (N CHANNEL)
V158	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V159	01970	TRANSISTOR, SILICON, F.E.T.	2N5485 (N CHANNEL)
V160	01814	DIODE, SILICON, SIGNAL	1N914A
V161	01814	DIODE, SILICON, SIGNAL	1N914A
V162	01814	DIODE, SILICON, SIGNAL	1N914A
V163	01814	DIODE, SILICON, SIGNAL	1N914A
V164	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V165	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V166	01814	DIODE, SILICON, SIGNAL	1N914A
V167	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V168	01814	DIODE, SILICON, SIGNAL	1N914A
V169	01814	DIODE, SILICON, SIGNAL	1N914A
V170	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V171	01814	DIODE, SILICON, SIGNAL	1N914A
V172	01814	DIODE, SILICON, SIGNAL	1N914A
V173	01877	DIODE, SILICON, POWER	EM404 (1A, 400V)
V174	01973	TRANSISTOR, SILICON, MOSFET	40673
V175	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V176	01839	DIODE, SILICON, ZENER	BZX79/C3V3
V177	01973	TRANSISTOR, SILICON, MOSFET	40673
V178	01877	DIODE, SILICON, POWER	EM404 (1A, 400V)
V179	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V180	01970	TRANSISTOR, SILICON, F.E.T.	2N5485 (N CHANNEL)
V181	01840	DIODE, SILICON, ZENER	BZX79/C5V6
V182	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V183	01814	DIODE, SILICON, SIGNAL	1N914A
V184	01814	DIODE, SILICON, SIGNAL	1N914A
V185	01839	DIODE, SILICON, ZENER	BZX79/C3V3
V186	01916	TRANSISTOR, SILICON, JUNCTION	BC549
V187	01914	TRANSISTOR, SILICON, JUNCTION	BC548
IC100	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC101	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC102	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC103	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC104	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC105	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR

PARTS LIST FOR RF P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
IC106	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC107	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC108	02040	INTEGRATED CIRCUIT, LINEAR	LM1496N
IC109	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC110	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC111	02040	INTEGRATED CIRCUIT, LINEAR	LM1496N
IC112	02016	INTEGRATED CIRCUIT, LINEAR	TL082CP
IC113	02016	INTEGRATED CIRCUIT, LINEAR	TL082CP
IC114	02026	INTEGRATED CIRCUIT, LINEAR	LM380N
IC115	02026	INTEGRATED CIRCUIT, LINEAR	LM380N
IC116	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC117	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
F100	02344	FUSELINK, CARTRIDGE	2.5A, TYPE L562
F101	02350	FUSELINK, CARTRIDGE	20A, TYPE 3AG
F102	02350	FUSELINK, CARTRIDGE	20A, TYPE 3AG
B100	02520	FILTER, ELECTRICAL	QF 01602 (1650KHZ U.S.B.)
B101	02524	FILTER, ELECTRICAL	QF 01606 (1650KHZ LSB)

PARTS LIST FOR OSCILLATOR P.C.B.

REF	CAT #	DESCRIPTION OF ITEM	
R300	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R301	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R302	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R303	01045	RESISTOR, FIXED, CARBON FILM	1K5 0.25W 5% CR25
R304	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R305	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R306	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R307	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R308	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R309	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R310	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R311	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R312	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R313	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R314	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R315	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R316	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R317	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R318	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R319	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R320	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R321	01360	RESISTOR, PRESET, CARBON FILM	100K TAB, MINIATURE HORIZONTAL
R322	01079	RESISTOR, FIXED, CARBON FILM	82K 0.25W 5% CR25
R323	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R324	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
C300	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C301	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C302	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C303	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C304	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C305	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C306	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C307	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C308	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C317	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C318	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C319	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C320	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C321	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C322	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C323	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C324	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C325	01405	CAPACITOR, FIXED, CERAMIC	4.7 PFD. NPO
C326	01423	CAPACITOR, FIXED, CERAMIC	82 PFD. NPO
C327	01463	CAPACITOR, FIXED, CERAMIC	330 PFD. N750
C328	01463	CAPACITOR, FIXED, CERAMIC	330 PFD. N750
C329	01414	22 PFD CAPACITOR SELECTED T/C	REFER TO HANDBOOK FOR VALUE
C330	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C331	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C332	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C333	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C334	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C335	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C336	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C337	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE

PARTS LIST FOR OSCILLATOR P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
C338	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C339	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C340	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C341	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C342	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C343	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C344	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C345	01429	TUNING CAPACITOR (CHANNEL)	REFER TO HANDBOOK FOR VALUE
C346	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C347	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C348	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C349	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C350	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C351	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C352	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C353	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C354	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C355	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C356	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C357	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C358	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C359	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C360	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C361	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C362	01428	CAPACITOR (TEMP. COMPENSATION)	REFER TO HANDBOOK FOR VALUE
C363	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C364	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C365	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C366	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C367	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C368	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C369	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C370	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C371	01780	CAPACITOR, PRESET, PLASTIC	10 PFD. TRIMMER
C372	01708	CAPACITOR, FIXED, TANTALUM TAG	4.7 MFD. 25V
C373	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C374	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C375	01418	CAPACITOR, FIXED, CERAMIC	39 PFD. NPO
L300	05613	ASSEMBLY, COIL	5X5 CLARIFIER INDUCTOR CL2
V300	01814	DIODE, SILICON, SIGNAL	1N914A
V301	01814	DIODE, SILICON, SIGNAL	1N914A
V302	01814	DIODE, SILICON, SIGNAL	1N914A
V303	01814	DIODE, SILICON, SIGNAL	1N914A
V304	01814	DIODE, SILICON, SIGNAL	1N914A
V305	01814	DIODE, SILICON, SIGNAL	1N914A
V306	01814	DIODE, SILICON, SIGNAL	1N914A
V307	01814	DIODE, SILICON, SIGNAL	1N914A
V308	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V309	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V310	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V311	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V312	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V313	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V314	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V315	01866	DIODE, LIGHT-EMITTING	RED (SMALL)

PARTS LIST FOR OSCILLATOR P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
V316	01866	DIODE, LIGHT-EMITTING	RED (SMALL)
V317	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V318	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V319	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V320	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V321	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V322	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V323	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V324	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V325	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V326	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V327	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V328	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V329	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V330	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V331	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V332	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V333	01948	TRANSISTOR, SILICON, JUNCTION	PN3564
V334	01910	TRANSISTOR, SILICON, JUNCTION	BC337
V335	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V336	01914	TRANSISTOR, SILICON, JUNCTION	BC548
IC300	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC301	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC302	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC303	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC304	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC305	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC306	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC307	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC308	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
B300	02502	RESONATOR, QUARTZ CRYSTAL	TG10 1650KHZ
B301	02512	CRYSTAL TG5A (NOMIMATED FREQ)	REFER TO HANDBOOK FOR VALUE
B302	02512	CRYSTAL TG5A (NOMIMATED FREQ)	REFER TO HANDBOOK FOR VALUE
B303	02512	CRYSTAL TG5A (NOMIMATED FREQ)	REFER TO HANDBOOK FOR VALUE
B304	02512	CRYSTAL TG5A (NOMIMATED FREQ)	REFER TO HANDBOOK FOR VALUE
B305	02512	CRYSTAL TG5A (NOMIMATED FREQ)	REFER TO HANDBOOK FOR VALUE
B306	02512	CRYSTAL TG5A (NOMIMATED FREQ)	REFER TO HANDBOOK FOR VALUE
B307	02512	CRYSTAL TG5A (NOMIMATED FREQ)	REFER TO HANDBOOK FOR VALUE
B308	02512	CRYSTAL TG5A (NOMIMATED FREQ)	REFER TO HANDBOOK FOR VALUE

PARTS LIST FOR FUNCTION P.C.B.

REF	CAT #	DESCRIPTION OF ITEM	
R400	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R401	01111	RESISTOR, FIXED, CARBON FILM	3.3M 0.25W 5% CR25
R402	01344	RESISTOR, PRESET, CARBON FILM	1K TAB, MINIATURE, HORIZONTAL
R403	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R404	01087	RESISTOR, FIXED, CARBON FILM	220K 0.25W 5% CR25
R405	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R406	01065	RESISTOR, FIXED, CARBON FILM	12K 0.25W 5% CR25
R407	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R408	01068	RESISTOR, FIXED, CARBON FILM	22K 0.25W 5% CR25
R409	01050	RESISTOR, FIXED, CARBON FILM	3K9 0.25W 5% CR25
R410	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R411	01083	RESISTOR, FIXED, CARBON FILM	120K 0.25W 5% CR25
R412	01087	RESISTOR, FIXED, CARBON FILM	220K 0.25W 5% CR25
R413	01073	RESISTOR, FIXED, CARBON FILM	47K 0.25W 5% CR25
R414	01073	RESISTOR, FIXED, CARBON FILM	47K 0.25W 5% CR25
R415	01073	RESISTOR, FIXED, CARBON FILM	47K 0.25W 5% CR25
R416	01029	RESISTOR, FIXED, CARBON FILM	220 OHM 0.25W 5% CR25
R417	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R418	01090	RESISTOR, FIXED, CARBON FILM	330K 0.25W 5% CR25
R419	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R420	01065	RESISTOR, FIXED, CARBON FILM	12K 0.25W 5% CR25
R421	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R422	01073	RESISTOR, FIXED, CARBON FILM	47K 0.25W 5% CR25
R423	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R424	01083	RESISTOR, FIXED, CARBON FILM	120K 0.25W 5% CR25
R425	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R426	01077	RESISTOR, FIXED, CARBON FILM	68K 0.25W 5% CR25
R427	01085	RESISTOR, FIXED, CARBON FILM	150K 0.25W 5% CR25
R428	01045	RESISTOR, FIXED, CARBON FILM	1K5 0.25W 5% CR25
R429	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R430	01068	RESISTOR, FIXED, CARBON FILM	22K 0.25W 5% CR25
R431	01068	RESISTOR, FIXED, CARBON FILM	22K 0.25W 5% CR25
R432	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R433	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R434	01025	RESISTOR, FIXED, CARBON FILM	100 OHM 0.25W 5% CR25
R435	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R436	01358	RESISTOR, PRESET, CARBON FILM	47K TAB, MINIATURE, HORIZONTAL
R437	01073	RESISTOR, FIXED, CARBON FILM	47K 0.25W 5% CR25
R438	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R439	01065	RESISTOR, FIXED, CARBON FILM	12K 0.25W 5% CR25
R440	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R441	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R442	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R443	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R444	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R445	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R446	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R447	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R448	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R449	01081	RESISTOR, FIXED, CARBON FILM	100K 0.25W 5% CR25
R450	01043	RESISTOR, FIXED, CARBON FILM	1K 0.25W 5% CR25
R451	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R452	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R453	01066	RESISTOR, FIXED, CARBON FILM	15K 0.25W 5% CR25
R454	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25

PARTS LIST FOR FUNCTION P.C.B. (CONTINUED)

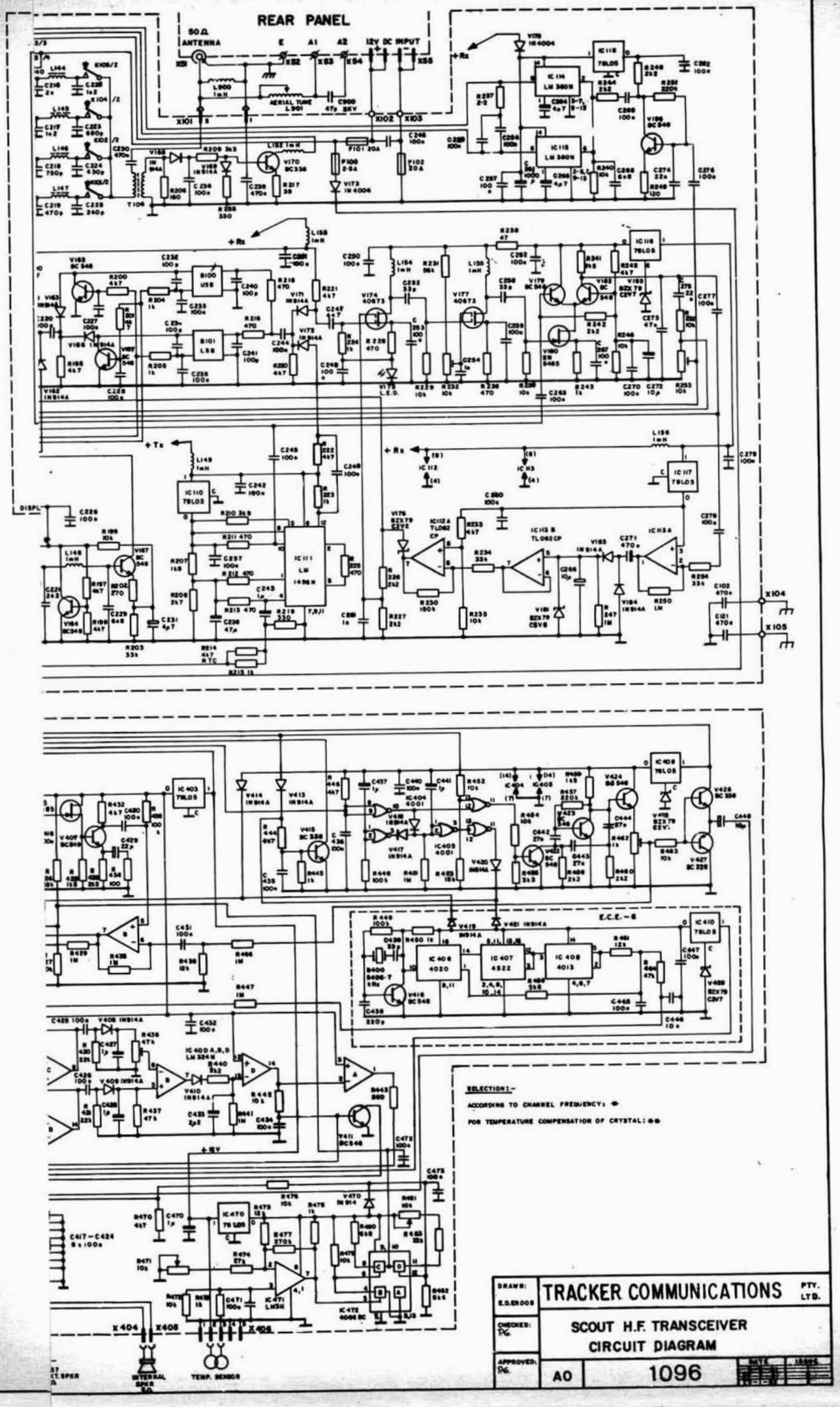
REF	CAT #	DESCRIPTION OF ITEM	
R455	01049	RESISTOR, FIXED, CARBON FILM	3K3 0.25W 5% CR25
R456	01053	RESISTOR, FIXED, CARBON FILM	5K6 0.25W 5% CR25
R457	01087	RESISTOR, FIXED, CARBON FILM	220K 0.25W 5% CR25
R458	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R459	01045	RESISTOR, FIXED, CARBON FILM	1K5 0.25W 5% CR25
R460	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
R461	01065	RESISTOR, FIXED, CARBON FILM	12K 0.25W 5% CR25
R462	01344	RESISTOR, PRESET, CARBON FILM	1K TAB, MINIATURE, HORIZONTAL
R463	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R464	01073	RESISTOR, FIXED, CARBON FILM	47K 0.25W 5% CR25
R465	01051	RESISTOR, FIXED, CARBON FILM	4K7 0.25W 5% CR25
R466	01105	RESISTOR, FIXED, CARBON FILM	1M 0.25W 5% CR25
R467	01036	RESISTOR, FIXED, CARBON FILM	390 OHM 0.25W 5% CR25
R468	01047	RESISTOR, FIXED, CARBON FILM	2K2 0.25W 5% CR25
C400	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C401	01704	CAPACITOR, FIXED, TANTALUM TAG	1 MFD. 35V
C402	01647	CAPACITOR, FIXED, POLYESTER	0.01 MFD. GREEN CAP
C403	01710	CAPACITOR, FIXED, TANTALUM TAG	10 MFD. 16V
C404	01660	CAPACITOR, FIXED, POLYCARB	0.01 MFD
C405	01660	CAPACITOR, FIXED, POLYCARB	0.01 MFD
C406	01660	CAPACITOR, FIXED, POLYCARB	0.01 MFD
C407	01660	CAPACITOR, FIXED, POLYCARB	0.01 MFD
C408	01427	CAPACITOR, FIXED, CERAMIC	120 PFD. NPO
C409	01718	CAPACITOR, FIXED, TANTALUM TAG	47 MFD. 6.3V
C410	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C411	01660	CAPACITOR, FIXED, POLYCARB	0.01 MFD
C412	01660	CAPACITOR, FIXED, POLYCARB	0.01 MFD
C413	01660	CAPACITOR, FIXED, POLYCARB	0.01 MFD
C414	01660	CAPACITOR, FIXED, POLYCARB	0.01 MFD
C415	01427	CAPACITOR, FIXED, CERAMIC	120 PFD. NPO
C416	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C417	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C418	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C419	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C420	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C421	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C422	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C423	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C424	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C425	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C426	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C427	01704	CAPACITOR, FIXED, TANTALUM TAG	1 MFD. 35V
C428	01704	CAPACITOR, FIXED, TANTALUM TAG	1 MFD. 35V
C429	01714	CAPACITOR, FIXED, TANTALUM TAG	22 MFD. 16V
C430	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C431	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C432	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C433	01706	CAPACITOR, FIXED, TANTALUM TAG	2.2 MFD. 35V
C434	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C435	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C436	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C437	01704	CAPACITOR, FIXED, TANTALUM TAG	1 MFD. 35V
C438	01461	CAPACITOR, FIXED, CERAMIC	220 PFD. N750
C439	01417	CAPACITOR, FIXED, CERAMIC	33 PFD. NPO
C440	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)

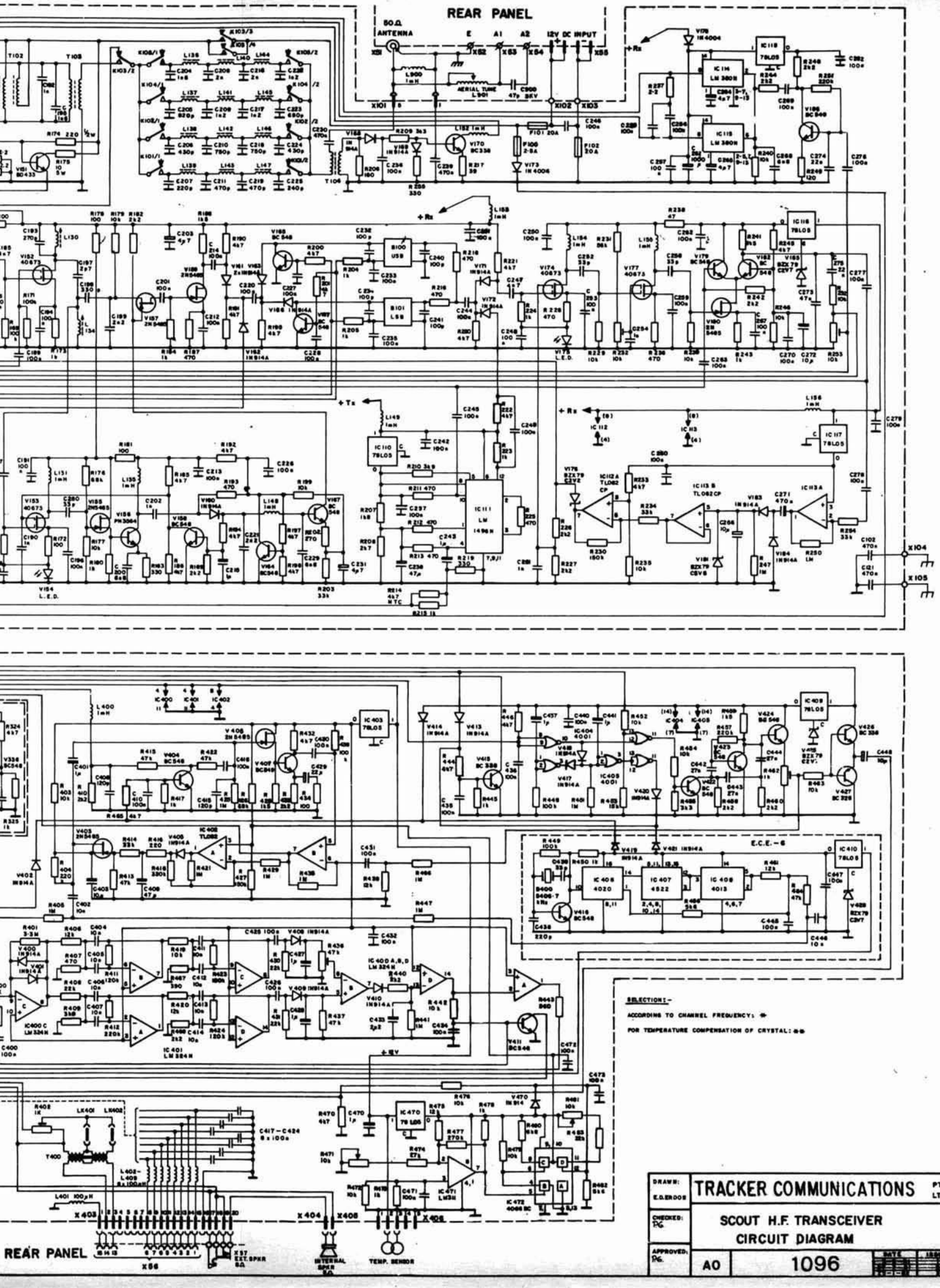
PARTS LIST FOR FUNCTION P.C.B. (CONTINUED)

REF	CAT #	DESCRIPTION OF ITEM	
C441	01704	CAPACITOR, FIXED, TANTALUM TAG	1 MFD. 35V
C442	01647	CAPACITOR, FIXED, POLYESTER	0.01 MFD. GREEN CAP
C443	01647	CAPACITOR, FIXED, POLYESTER	0.01 MFD. GREEN CAP
C444	01647	CAPACITOR, FIXED, POLYESTER	0.01 MFD. GREEN CAP
C445	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C446	01647	CAPACITOR, FIXED, POLYESTER	0.01 MFD. GREEN CAP
C447	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C448	01710	CAPACITOR, FIXED, TANTALUM TAG	10 MFD. 16V
L400	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L401	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L402	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L403	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L404	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L405	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L406	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L407	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L408	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L409	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
T400	03842	TRANSFORMER, A.F.	600 OHM LINE, PCB MOUNTING
V400	01814	DIODE, SILICON, SIGNAL	1N914A
V401	01814	DIODE, SILICON, SIGNAL	1N914A
V402	01814	DIODE, SILICON, SIGNAL	1N914A
V403	01970	TRANSISTOR, SILICON, F.E.T.	2N5485 (N CHANNEL)
V404	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V405	01814	DIODE, SILICON, SIGNAL	1N914A
V406	01970	TRANSISTOR, SILICON, F.E.T.	2N5485 (N CHANNEL)
V407	01916	TRANSISTOR, SILICON, JUNCTION	BC549
V408	01814	DIODE, SILICON, SIGNAL	1N914A
V409	01814	DIODE, SILICON, SIGNAL	1N914A
V410	01814	DIODE, SILICON, SIGNAL	1N914A
V411	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V412	01814	DIODE, SILICON, SIGNAL	1N914A
V413	01814	DIODE, SILICON, SIGNAL	1N914A
V414	01814	DIODE, SILICON, SIGNAL	1N914A
V415	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V416	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V417	01814	DIODE, SILICON, SIGNAL	1N914A
V418	01814	DIODE, SILICON, SIGNAL	1N914A
V419	01814	DIODE, SILICON, SIGNAL	1N914A
V420	01814	DIODE, SILICON, SIGNAL	1N914A
V421	01814	DIODE, SILICON, SIGNAL	1N914A
V422	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V423	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V424	01914	TRANSISTOR, SILICON, JUNCTION	BC548
V425	01839	DIODE, SILICON, ZENER	BZX79/C3V3
V426	01912	TRANSISTOR, SILICON, JUNCTION	BC338
V427	01908	TRANSISTOR, SILICON, JUNCTION	BC328
V428	01839	DIODE, SILICON, ZENER	BZX79/C3V3
IC400	02020	INTEGRATED CIRCUIT, LINEAR	LM324
IC401	02020	INTEGRATED CIRCUIT, LINEAR	LM324
IC402	02016	INTEGRATED CIRCUIT, LINEAR	TL082CP
IC403	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC404	02052	INTEGRATED CIRCUIT, DIGITAL	CD4001
IC405	02052	INTEGRATED CIRCUIT, DIGITAL	CD4001
IC406	02066	INTEGRATED CIRCUIT, DIGITAL	MC14020BCP

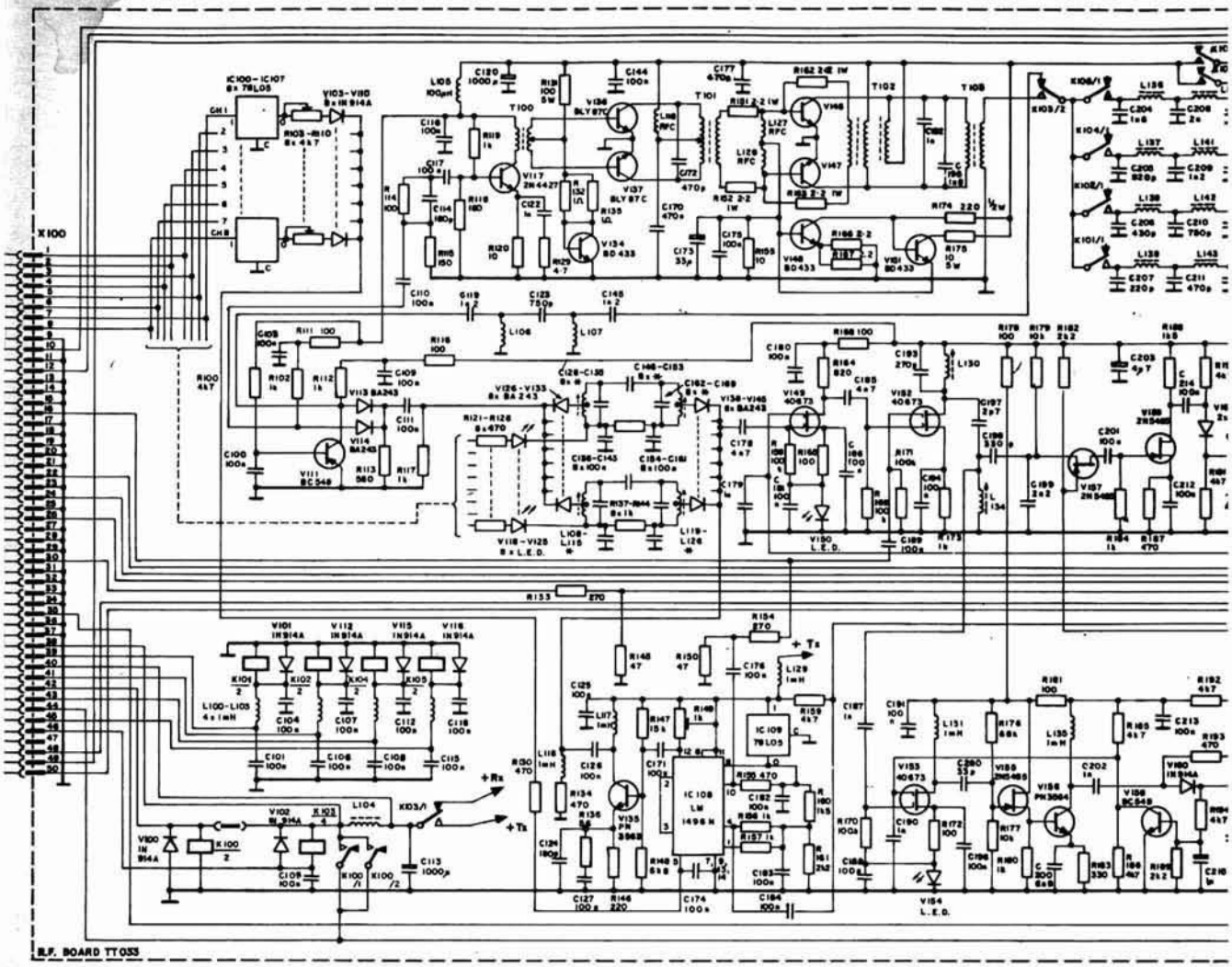
PARTS LIST FOR FUNCTION P.C.B. (CONTINUED)

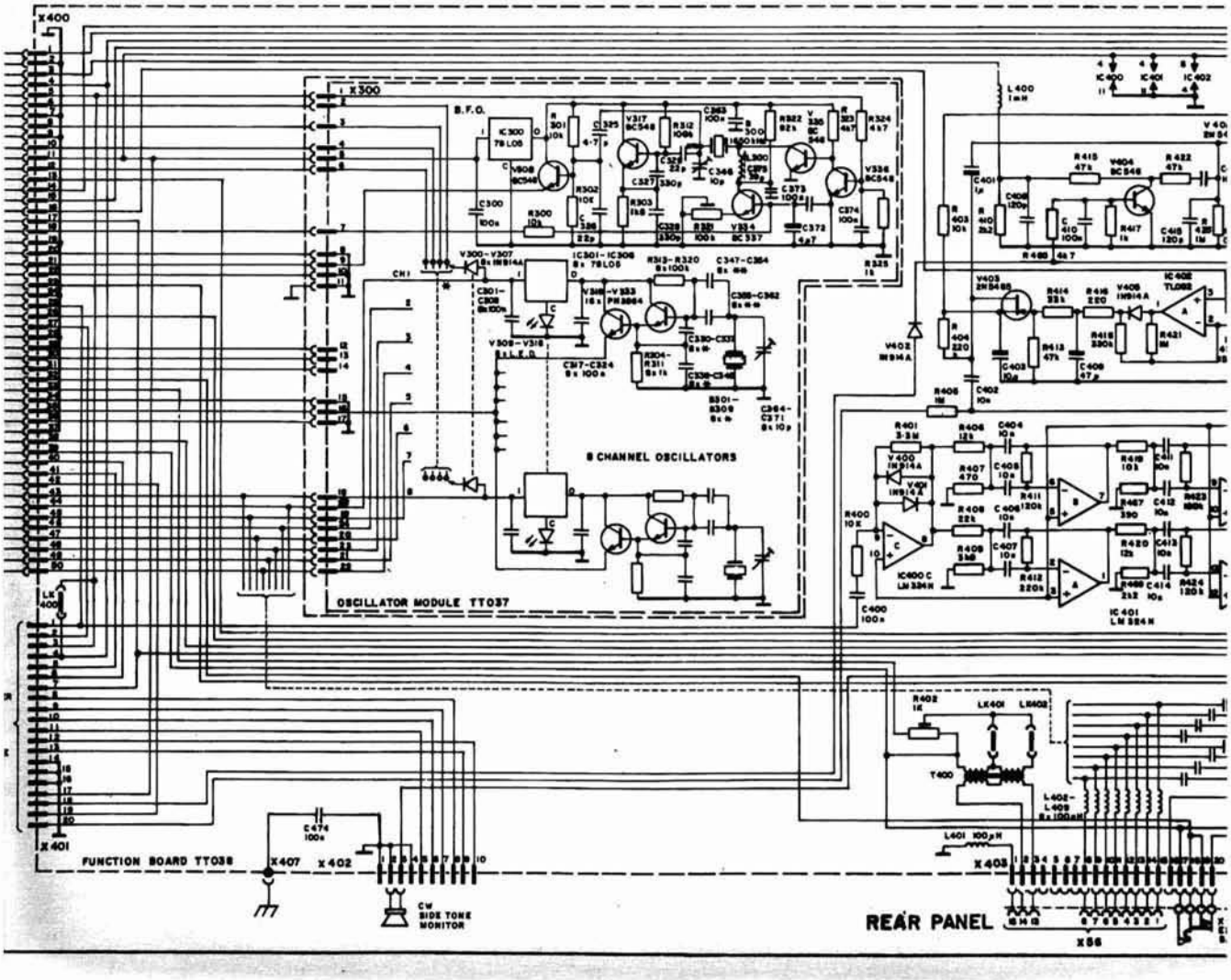
REF	CAT #	DESCRIPTION OF ITEM	
IC407	02080	INTEGRATED CIRCUIT, DIGITAL	14522
IC408	02062	INTEGRATED CIRCUIT, DIGITAL	CD4013
IC409	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
IC410	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
B400	02504	RESONATOR, QUARTZ CRYSTAL	TG7 5406.7KHZ (440HZ E.C.E.)

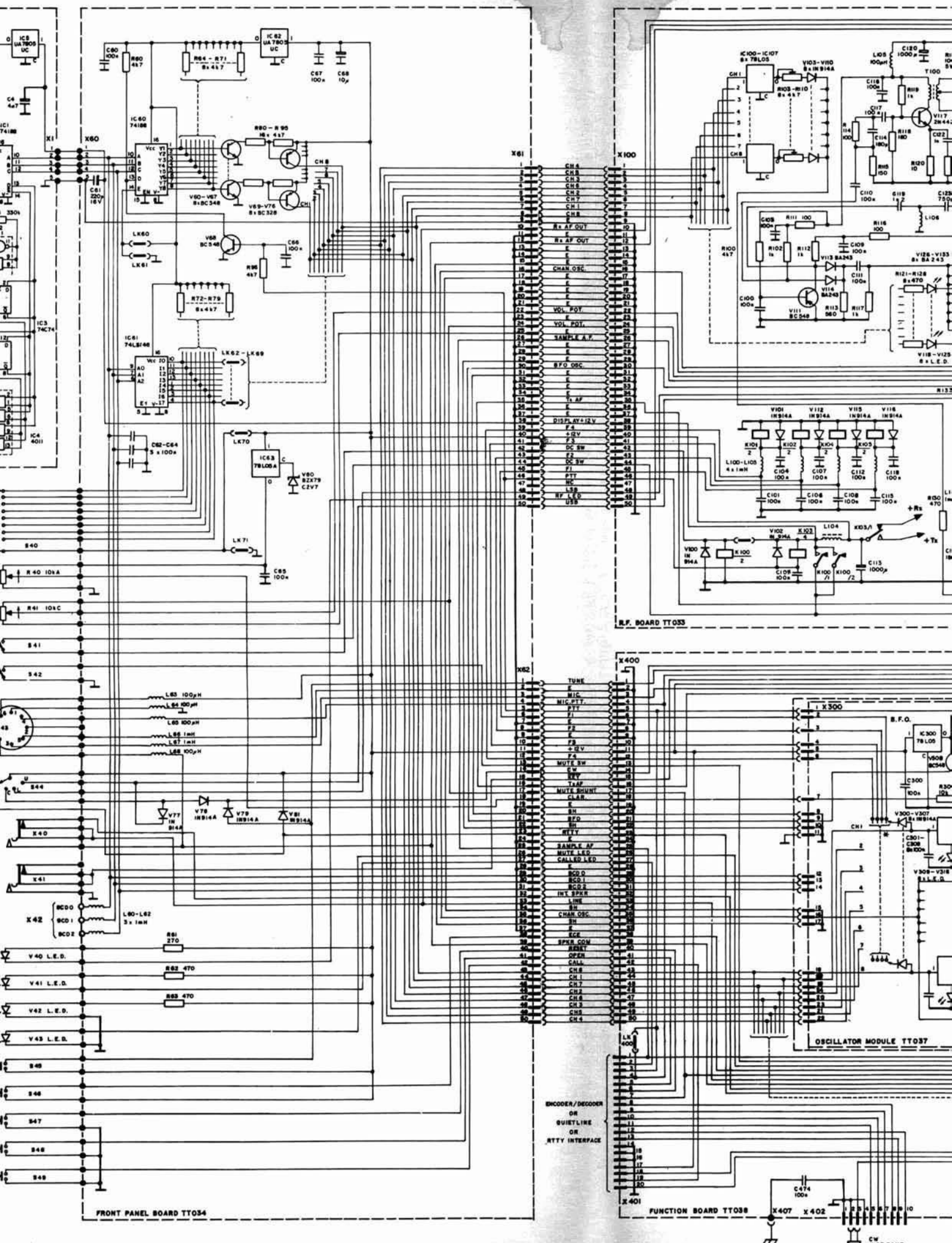

REAR PANEL
50Ω ANTENNA
E
A1
A2
12V DC INPUT
AERIAL TUNE L901
SELECTION:-
ACCORDING TO CHANNEL FREQUENCY: ⊕
FOR TEMPERATURE COMPENSATION OF CRYSTAL: ⊕⊕
E.C.E.-6
TRACKER COMMUNICATIONS PTY. LTD.
SCOUT H.F. TRANSCEIVER
CIRCUIT DIAGRAM
DRAWN: E.G.ERDOS
CHECKED: PG.
APPROVED: PG.
A0
1096
DATE
ISSUE
INTERNAL SPKR
TEMP. SENSOR

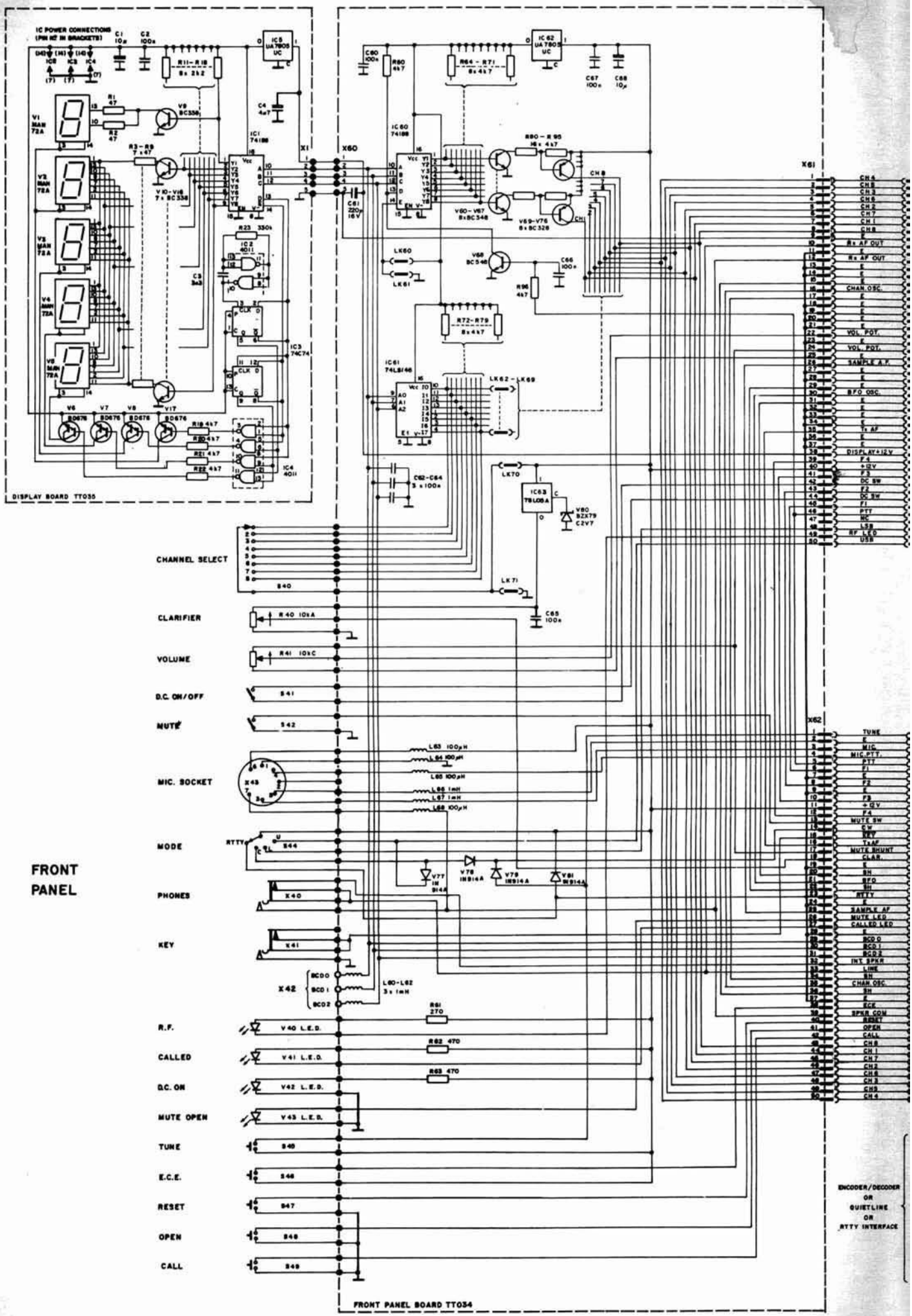


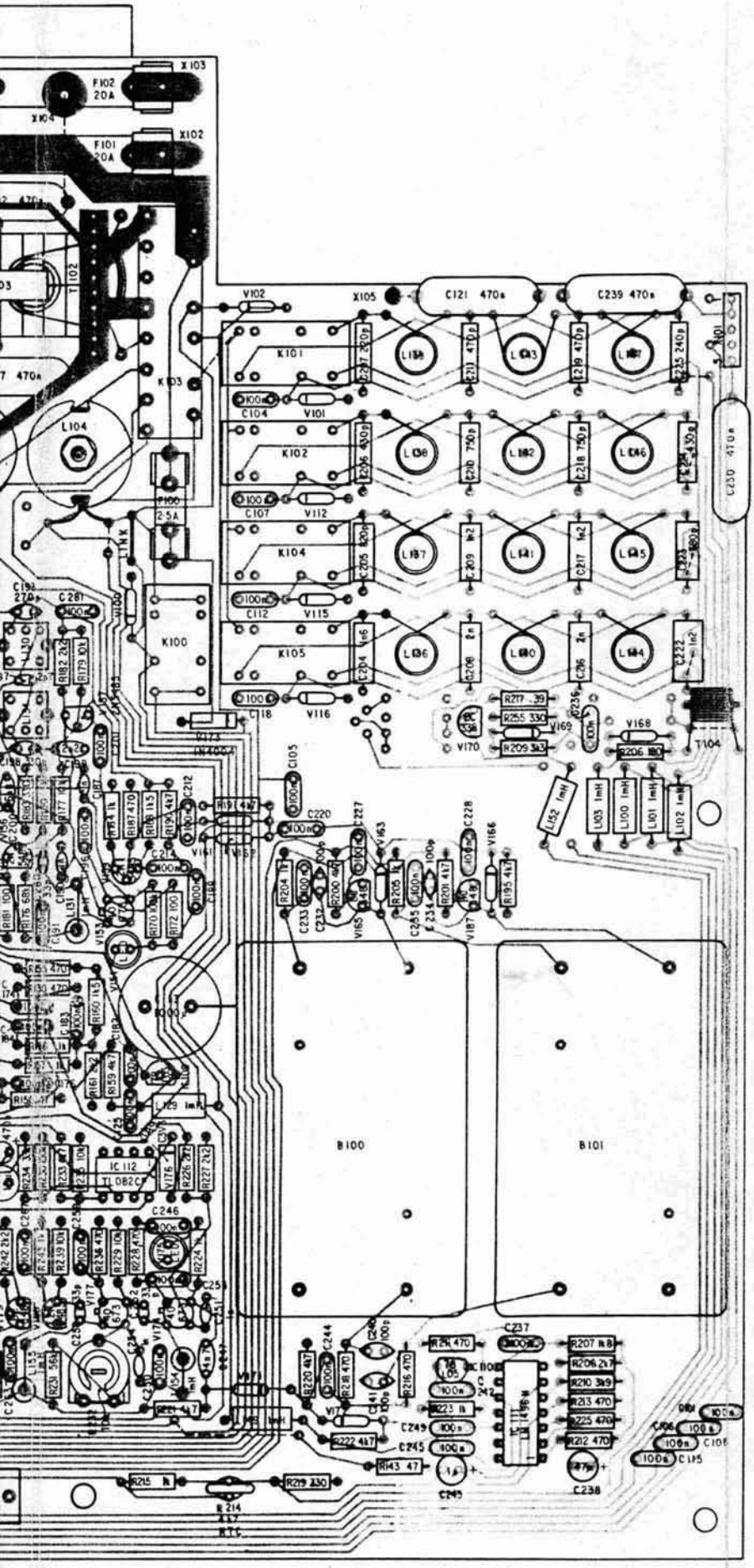
DRAWN: E.G.ERDOS	TRACKER COMMUNICATIONS PTY. LTD.		
CHECKED: P.G.	SCOUT H.F. TRANSCEIVER CIRCUIT DIAGRAM		
APPROVED: P.G.	A0	1096	DATE / ISSUE


X100
IC100 - IC107 8 x 78L05
V103 - V110 8 x IN 914A
R103 - R110 8 x 4k7
V136 BLY87C
V137 BLY87C
V117 2N4427
V134 BD433
V146 BD433
V151 BD433
T100
T101
T102
T103
K106/1
K106/2
K104/1
K102/1
K101/1
V111 BC548
V113 BA243
V114 BA243
V126 - V133 8 x BA243
V138 - V145 8 x BA243
V118 - V125 8 x L.E.D.
V150 L.E.D.
V157 2N5486
V158 2N5486
R121 - R128 8 x 470
R137 - R144 8 x 1k
C126 - C133 8 x *
C134 - C141 8 x 100n
C142 - C149 8 x *
C150 - C157 8 x 100n
C162 - C169 8 x *
C184 - C191 8 x 100n
L108 - L116 *
L119 - L126 *
R.F. BOARD TT033
V101 IN914A
V112 IN914A
V115 IN914A
V116 IN914A
K101 K102 K104 K105
L100 - L105 4 x 1mH
V100 IN 914A
V102 IN 914A
K100 /1
K100 /2
K103/1
+Rx
+Tx
IC 109 78L05
IC 108 LM 1496 N
V135 PN 3563
V153 40673
V154 L.E.D.
V155 PN 3564
V156 BC548
V160 IN914A


X400
X300
B.F.O.
IC 300 78L05
V317 BC548
V308 BC548
V322 BC548
V325 BC548
V326 BC548
V334 BC337
V300 - V307 8 x IN914A
IC301 - IC308 8 x 78L05
V309 - V316 8 x PN3564
V309 - V318 8 x L.E.D.
8 CHANNEL OSCILLATORS
OSCILLATOR MODULE TT037
IC 400
IC 401
IC 402
V401 2N5485
V402 IN914A
V403 2N5485
V404 BC548
V405 IN914A
IC400 C LM324N
IC 401 LM 324 N
V400 IN914A
V401 IN914A
L400 1mH
L401 100µH
L402 - L409 8 x 100mH
T400
LK400
LK401
LK402
X401
X402
X403
X407
C474 100n
FUNCTION BOARD TT038
CW SIDE TONE MONITOR
REAR PANEL
X56


FRONT PANEL BOARD TT034
R.F. BOARD TT033
OSCILLATOR MODULE TT037
FUNCTION BOARD TT038
ENCODER/DECODER OR QUIETLINE OR RTTY INTERFACE
CW SIDE TONE MONITOR
X60
X61
X62
X100
X400
X401
X402
X407
X42
IC60 74188
IC61 74LS146
IC62 UA7805 UC
IC63 78L05A
IC100-IC107 8x78L05
IC300 78L05
B.F.O.
CH1
CH2
CH3
CH4
CH5
CH6
CH7
CH8
TUNE
MIC
MIC PTT
PTT
F1
F2
F3
+12V
F4
MUTE SW
TEV
TxAF
MUTE SHUNT
CLAR.
BH
BFO
RTTY
SAMPLE AF
MUTE LED
CALLED LED
BCD0
BCD1
BCD2
INT SPKR
LINE
CHAN OSC.
SPKR COM
RESET
OPEN
CALL
Rx AF OUT
VOL. POT.
SAMPLE A.F.
BFO OSC.
Tx AF
DISPLAY+12V
DC SW
RF LED
USB
LSB
+Rx
+Tx
V60-V67 8xBC548
V69-V76 8xBC328
V68 BC548
V77 IN914A
V78 IN914A
V79 IN914A
V80 BZX79 C2V7
V81 IN914A
V100 IN914A
V101 IN914A
V102 IN914A
V103-V110 8x IN914A
V111 BC548
V112 IN914A
V113 BA243
V114 BA243
V115 IN914A
V116 IN914A
V117 2N4427
V118-V125 8x L.E.D.
V126-V133 8x BA243
V300-V307 8x IN914A
V308 BC548
V309-V316 8x L.E.D.
V40 L.E.D.
V41 L.E.D.
V42 L.E.D.
V43 L.E.D.
R60-R67 8x4k7
R72-R79 8x4k7
R80-R95 16x4k7
R103-R110 8x4k7
R121-R128 8x470
R40 10kA
R41 10kC
R61 270
R62 470
R63 470
L60-L62 3x1mH
L63 100µH
L64 100µH
L65 100µH
L66 1mH
L67 1mH
L68 100µH
L80-L82 3x1mH
L100-L105 4x1mH
C60-C64 5x100n
C65 100n
C66 100n
C67 100n
C68 10µ
C85 100n
C300 100n
C301-C308 8x100n
C474 100n
LK60
LK61
LK62-LK69
LK70
LK71
LK400
S40
S41
S42
S44
S45
S46
S47
S48
S49


DISPLAY BOARD TT035
FRONT PANEL BOARD TT034
FRONT PANEL
CHANNEL SELECT
CLARIFIER
VOLUME
D.C. ON/OFF
MUTE
MIC. SOCKET
MODE
PHONES
KEY
R.F.
CALLED
D.C. ON
MUTE OPEN
TUNE
E.C.E.
RESET
OPEN
CALL
ENCODER/DECODER OR QUIETLINE OR RTTY INTERFACE



NOTE:—

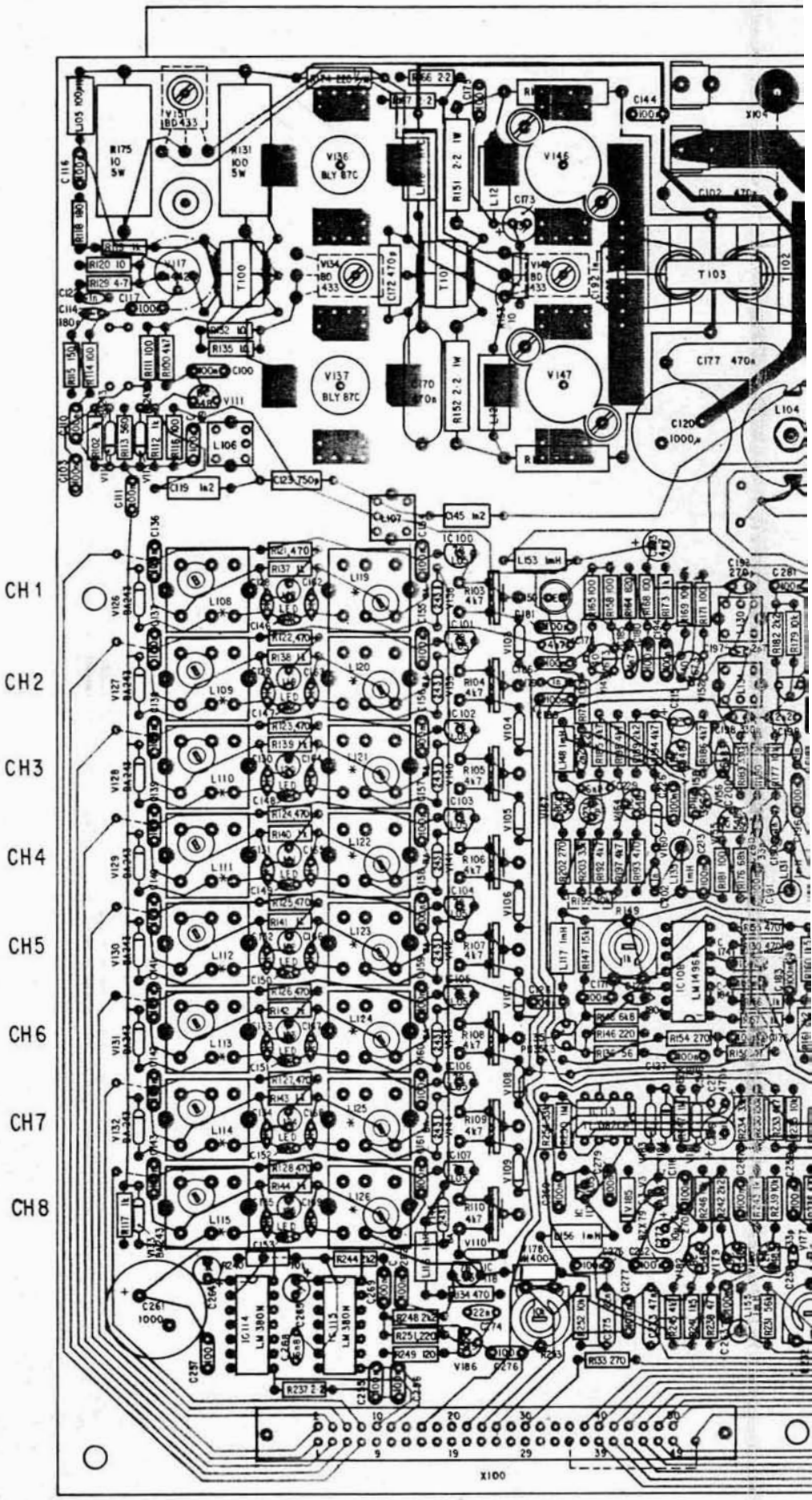
COMPONENTS MARKED WITH * SELECTED ACCORDING TO CHANNEL FREQUENCY.

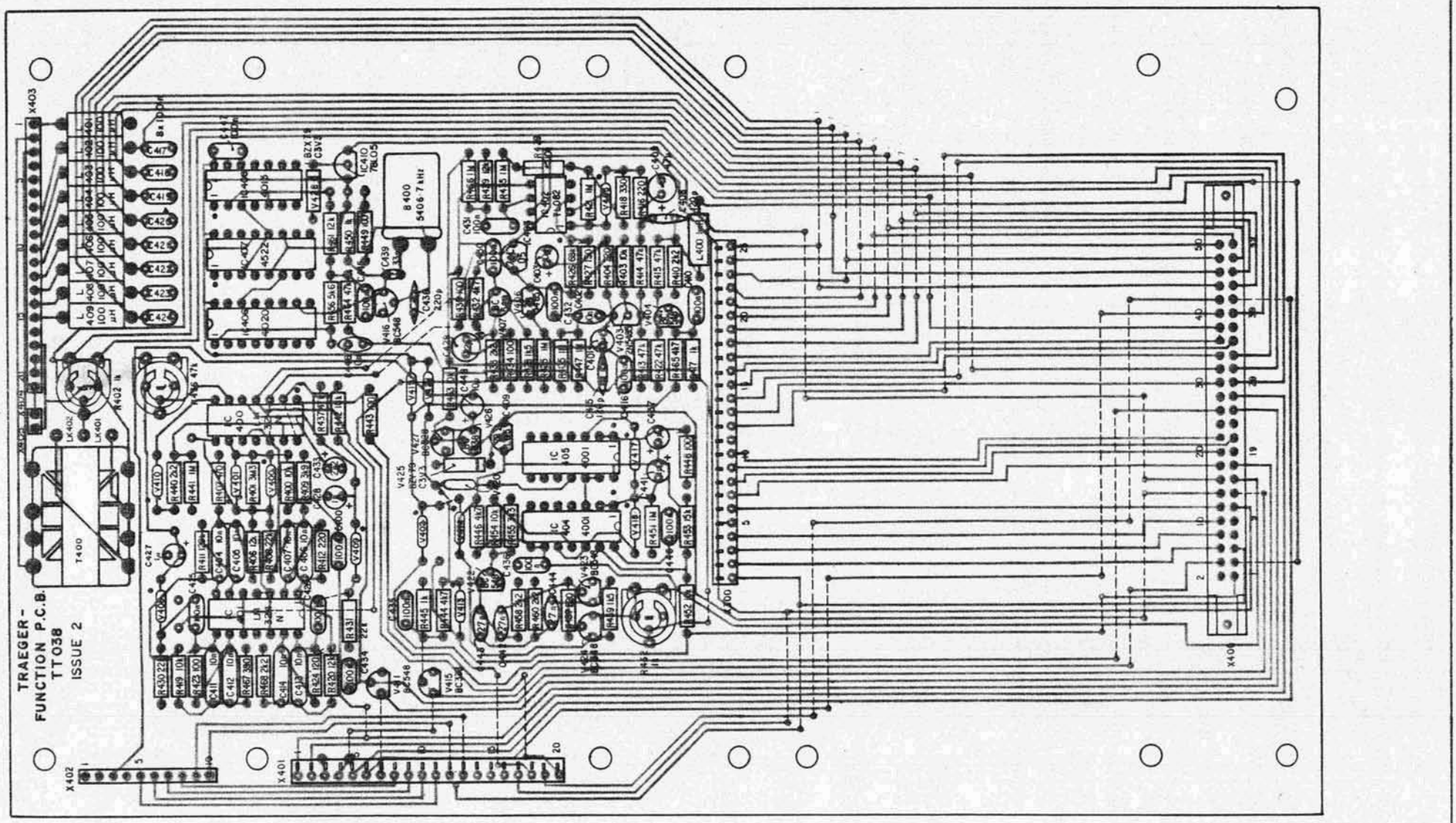
ALL DIODES IN 914A UNLESS OTHERWISE STATED.

P.C.B. TT033

CCT. DIAGRAM 1096

DRAWN: E.D. ERDOS	TRACKER COMMUNICATIONS PTY. LTD.			
CHECKED: K.D.W.	SCOUT – R.F. P.C.B. COMPONENT LAYOUT			
APPROVED: K.D.W.	A1	1101	ISSUE: 1	DATE: 4-5-81


CH1
CH2
CH3
CH4
CH5
CH6
CH7
CH8
X100

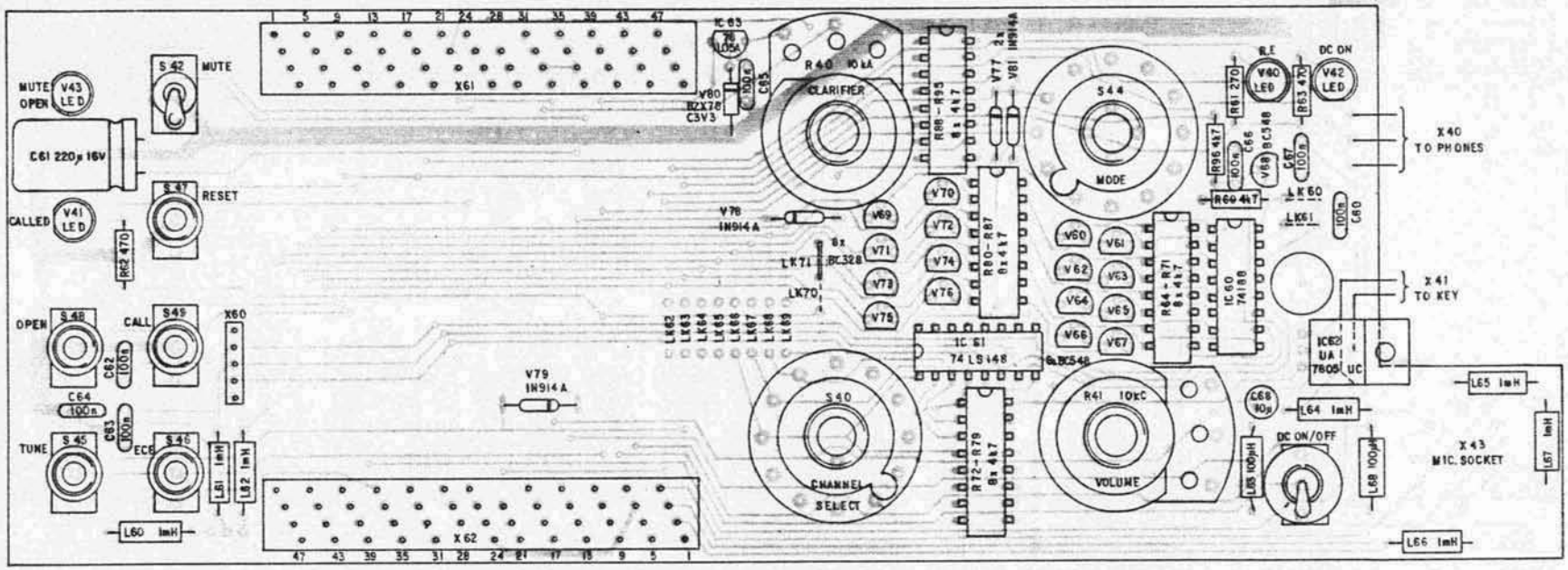


NOTE:
ALL DIODES IN914A UNLESS STATED OTHERWISE.

PCB TT038

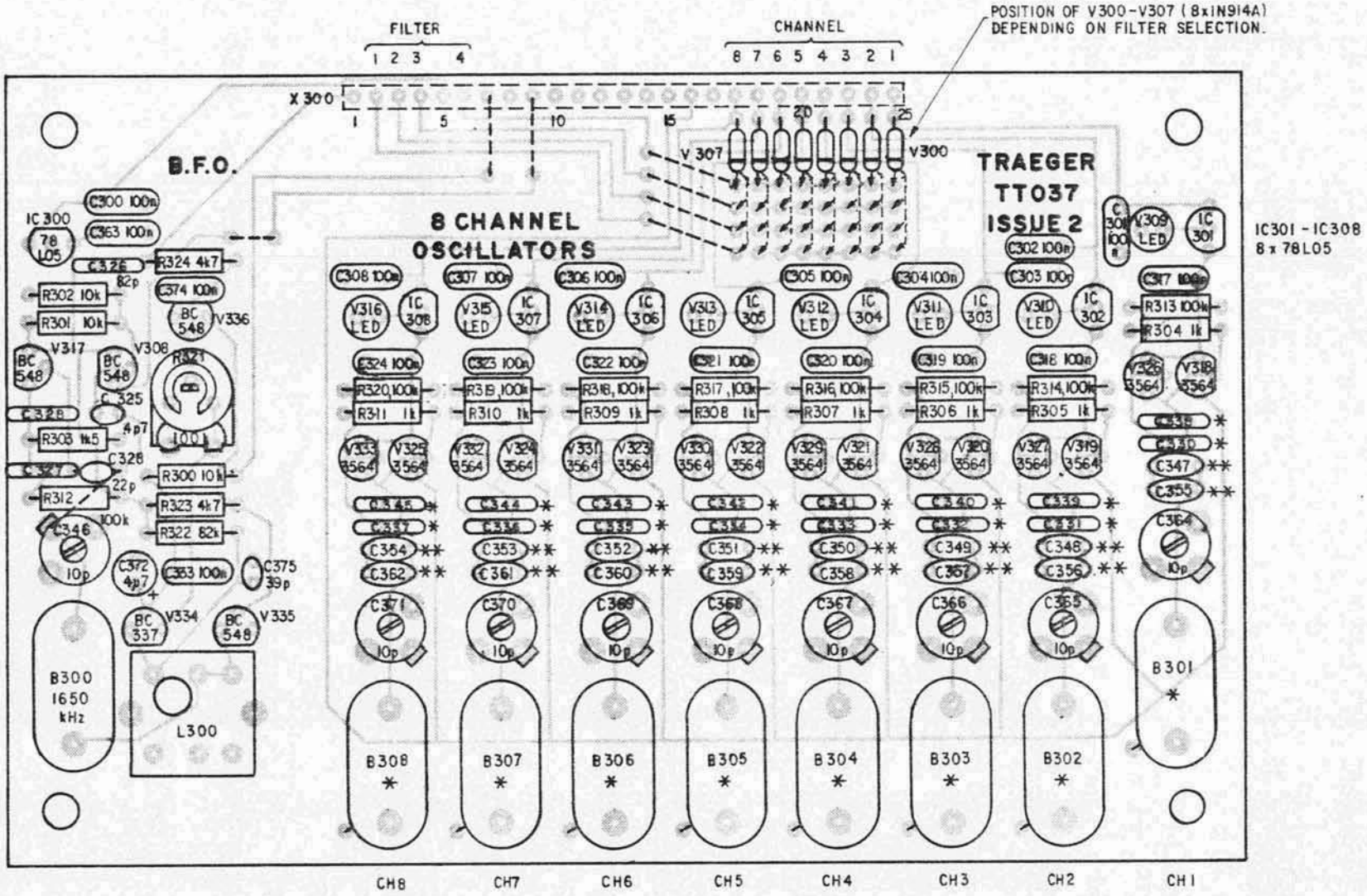
CCT DIAGRAM 1096

DRAWN: E.D.ERDOS	TRACKER COMMUNICATIONS PTY. LTD.		
CHECKED: K.D.W.	SCOUT - FUNCTION P.C.B. — COMPONENT LAYOUT		
APPROVED K.D.W.	A2	1114	DATE 19-4-81 / ISSUE 1



NOTE:
P.C.B. TC034
CCT DIAGRAM 1096

DRAWN: E.D.ERDOS	TRACKER COMMUNICATIONS PTY. LTD.		
CHECKED:	SCOUT - FRONT PANEL P.C.B. COMPONENT LAYOUT		
APPROVED	A2	1103	DATE 14-12-81 / ISSUE 2



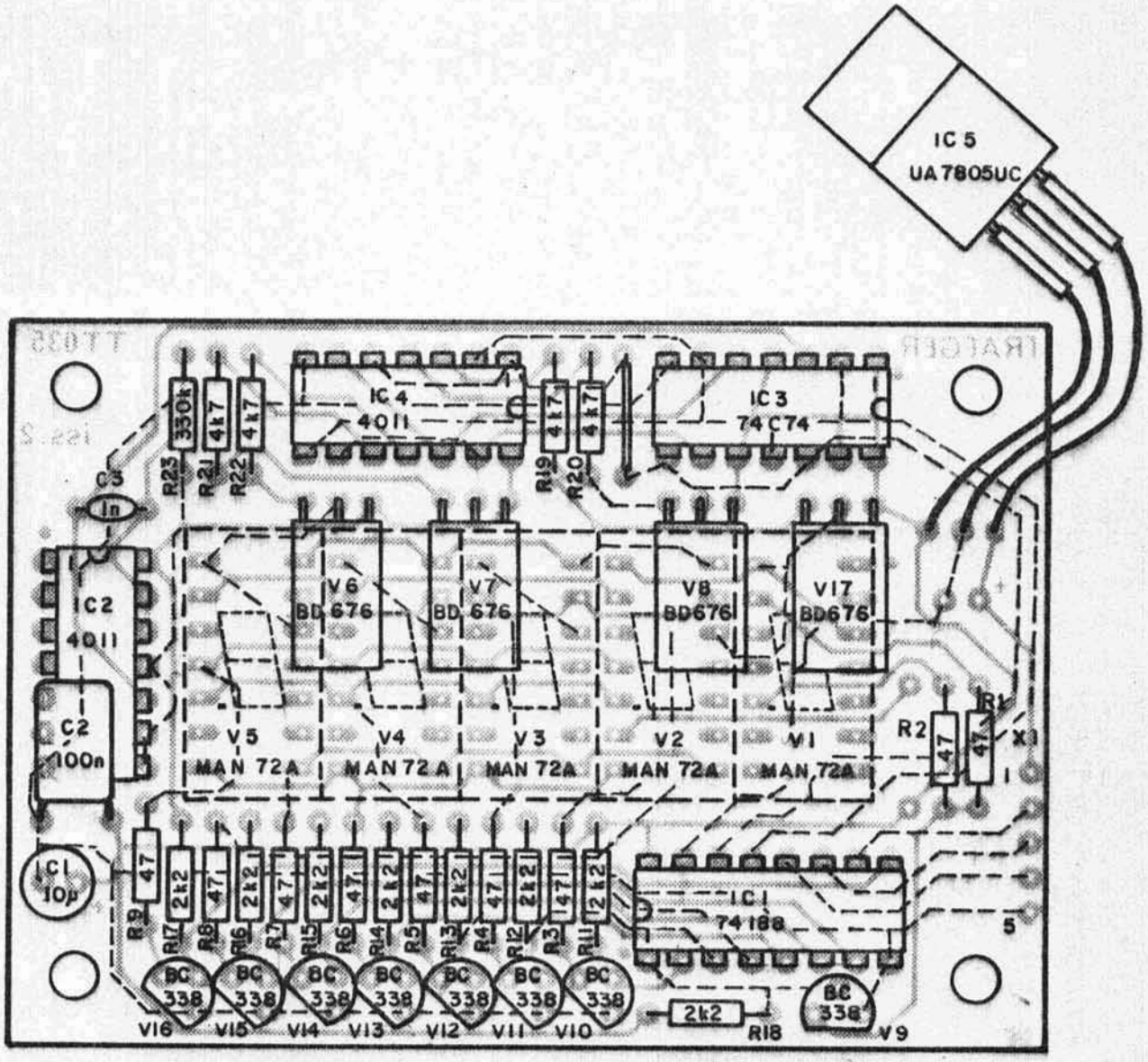
NOTE:

* SELECTED ACCORDING TO CHANNEL FREQUENCY.

** SELECTED FOR TEMPERATURE COMPENSATION OF CRYSTAL.

CIRCUIT DIAGRAM 1096

DRAWN: E.D.ERDOS	TRACKER COMMUNICATIONS PTY. LTD.			
CHECKED: K.D.W.	SCOUT B.F.O. AND 8 CHANNEL OSC. P.C.B. LAYOUT			
APPROVED: K.D.W.	A3	1109	DATE: 7-4-81	ISSUE 1



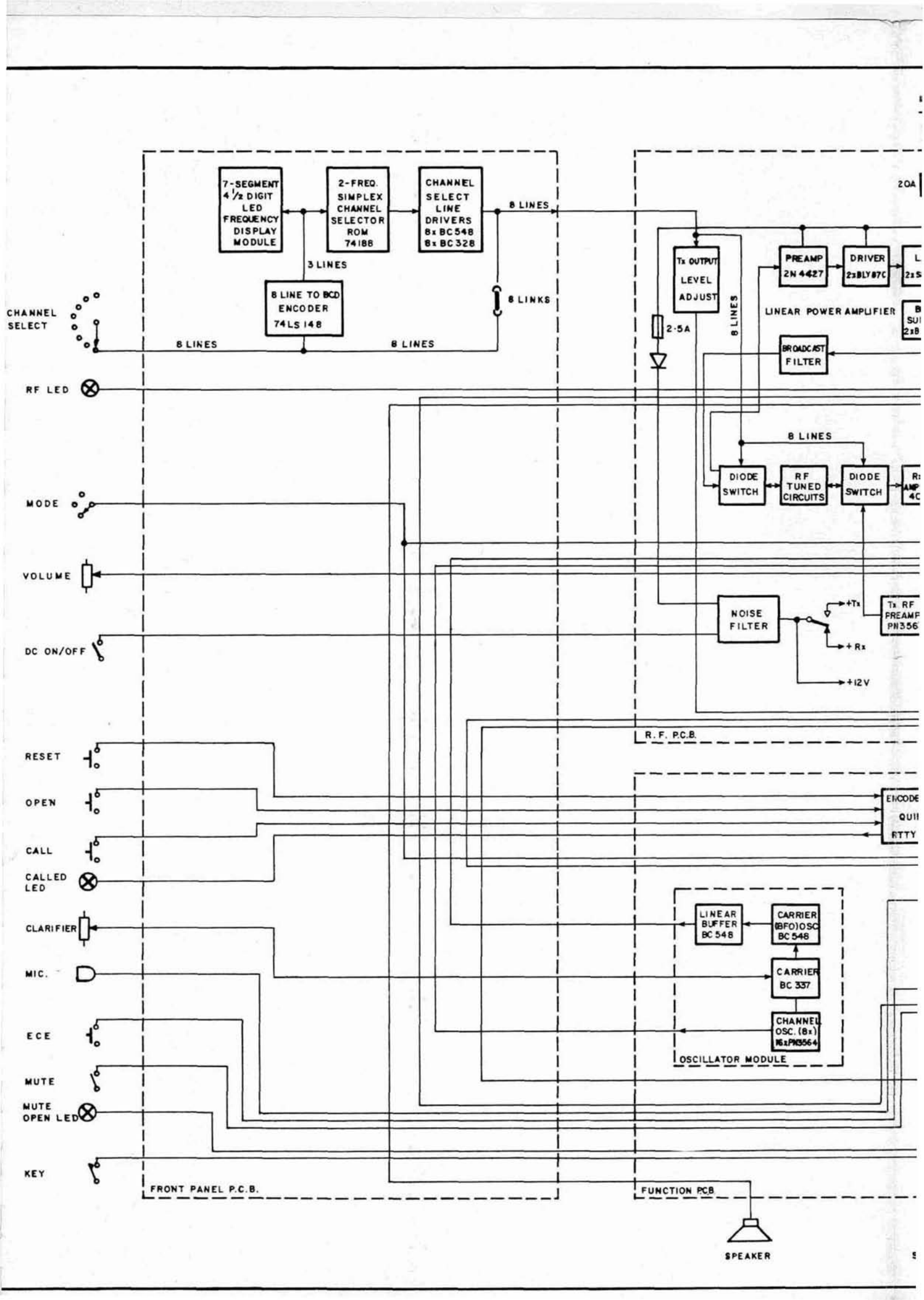
NOTE:

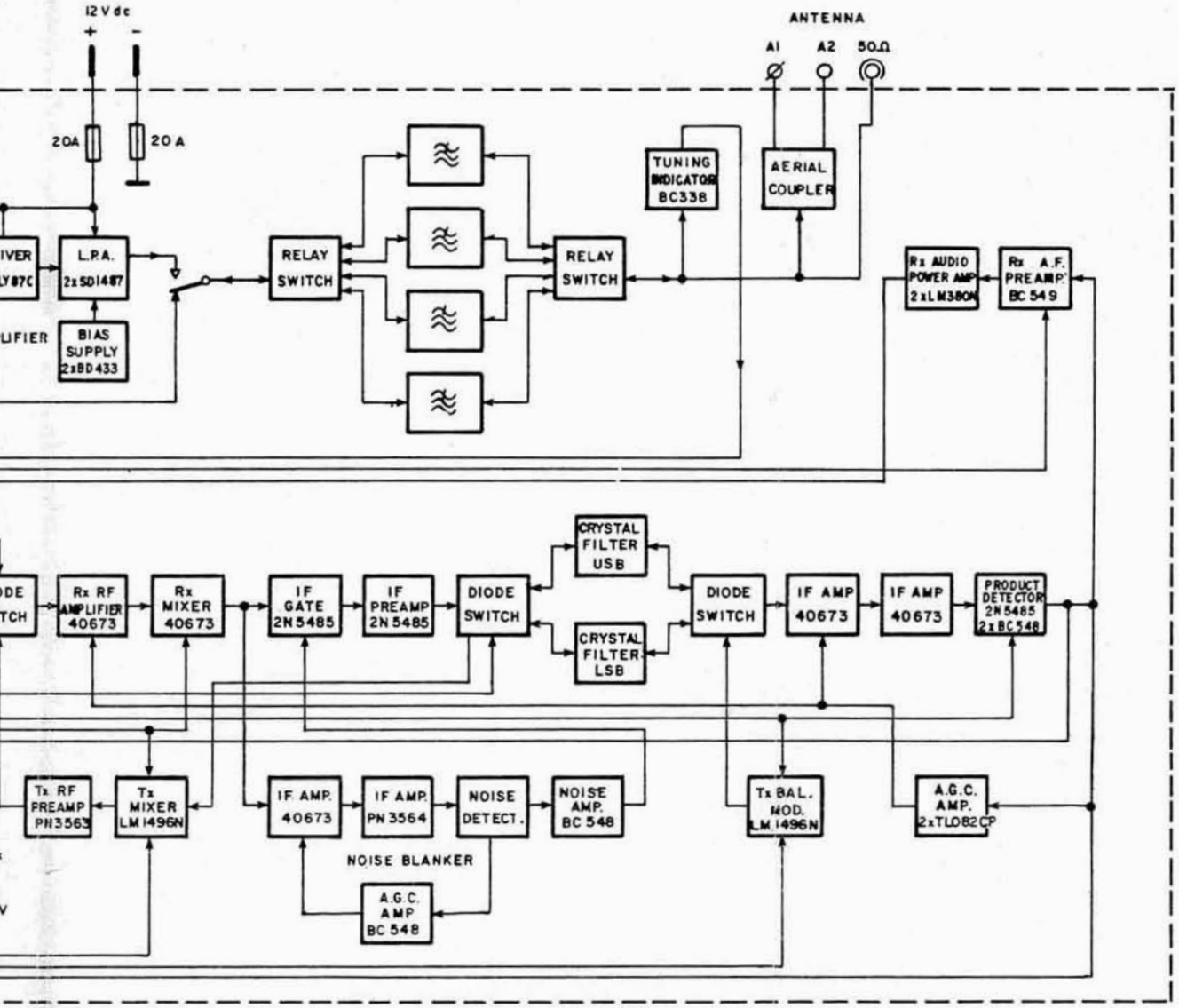
ALL COMPONENTS MOUNTED ON UNDERSIDE OF P.C.B. EXCEPT DISPLAYS V1 – V5

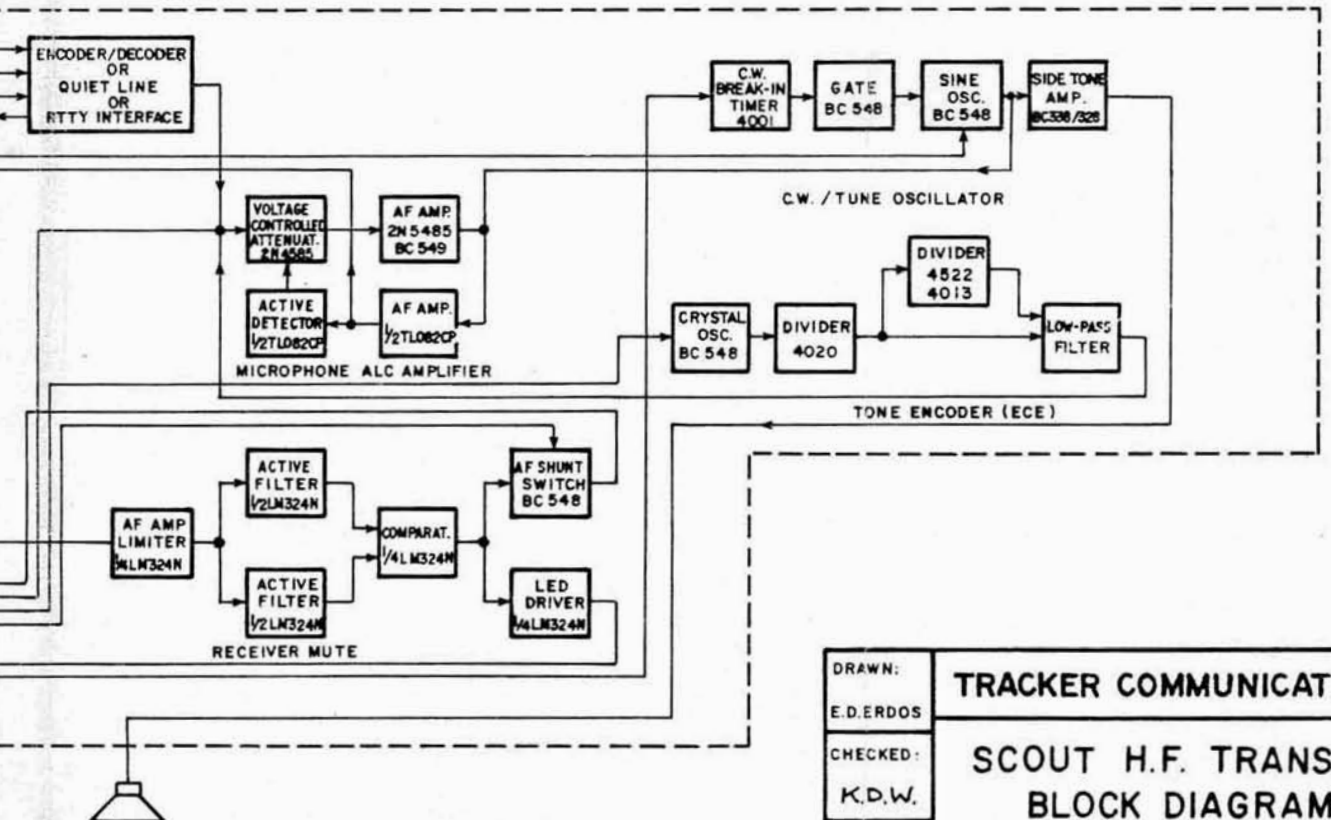
CIRCUIT DIAGRAM 1096

P.C.B. TT035 ISSUE 2

DRAWN: E.D.ERDOS	TRACKER COMMUNICATIONS PTY. LTD.			
CHECKED: K.D.W.	SCOUT – DISPLAY BOARD COMPONENT LAYOUT			
APPROVED: K.D.W.	A4	1104	DATE 13-4-81	ISSUE 1


7-SEGMENT 4½ DIGIT LED FREQUENCY DISPLAY MODULE
2-FREQ. SIMPLEX CHANNEL SELECTOR ROM 74188
CHANNEL SELECT LINE DRIVERS 8x BC548 8x BC328
8 LINES
3 LINES
8 LINE TO BCD ENCODER 74LS148
8 LINKS
CHANNEL SELECT
8 LINES
8 LINES
RF LED
MODE
VOLUME
DC ON/OFF
RESET
OPEN
CALL
CALLED LED
CLARIFIER
MIC.
ECE
MUTE
MUTE OPEN LED
KEY
FRONT PANEL P.C.B.
Tx OUTPUT LEVEL ADJUST
2·5A
8 LINES
PREAMP 2N4427
DRIVER 2xBLY87C
LINEAR POWER AMPLIFIER
BROADCAST FILTER
8 LINES
DIODE SWITCH
RF TUNED CIRCUITS
DIODE SWITCH
NOISE FILTER
+Tx
+Rx
+12V
R.F. P.C.B.
LINEAR BUFFER BC548
CARRIER (BFO) OSC BC548
CARRIER BC337
CHANNEL OSC. (8x) 16xPN3564
OSCILLATOR MODULE
FUNCTION PCB
SPEAKER





DRAWN: E.D.ERDOS	TRACKER COMMUNICATIONS PTY. LTD.			
CHECKED: K.D.W.	SCOUT H.F. TRANSCEIVER BLOCK DIAGRAM			
APPROVED: K.D.W.	A2	1110	DATE: 7-4-81	ISS: 1

TRACKER COMMUNICATIONS PTY. LTD.

MANUAL SUPPLEMENT

SCOUT L/R

December 1981

TRACKER COMMUNICATIONS PTY. LTD.
MANUFACTURERS OF ELECTRONICS EQUIPMENT
75 KING WILLIAM STREET, KENT TOWN, 5067
POSTAL ADDRESS: P.O. BOX 286 NORWOOD, SOUTH AUSTRALIA 5067
Telex: AA 89094 MICROA Ph: (08) 42 8966

INDEX

1.0 INTRODUCTION

1.1 GENERAL

The Tracker SCOUT L/R is an HF transceiver designed for use in mobile installations where underdash space is minimal. The transceiver can be placed in a more convenient position and a small (150 x 50 x 110mm) control head used to operate the equipment.

In addition, the Tracker SCOUT L/R can be operated directly in local mode. The mode (Local or Remote) is selected by a single switch on the transceiver.

1.2 OPTIONS

All the options available for the standard SCOUT are available for the SCOUT L/R with the exception of:-

a) Lower Sideband facility
b) C.W. (Morse) facility
c) Aerial Tuning Inductor

The 4½ digit LED frequency display can be fitted to the transceiver but not to the control head.

1.3 ACCESSORIES

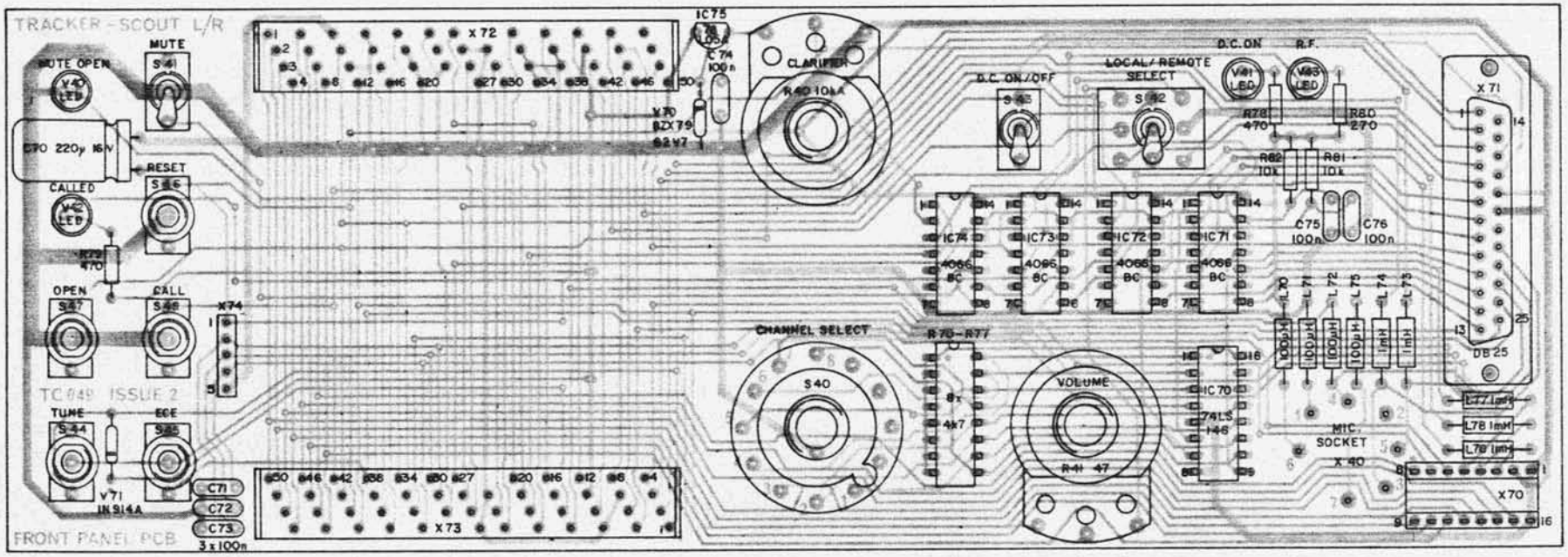
All accessories available for the standard SCOUT are available for the SCOUT L/R.

2.0 TECHNICAL SPECIFICATIONS

The technical specifications for the SCOUT remain the same for the SCOUT L/R except for the changed controls and additional connector.

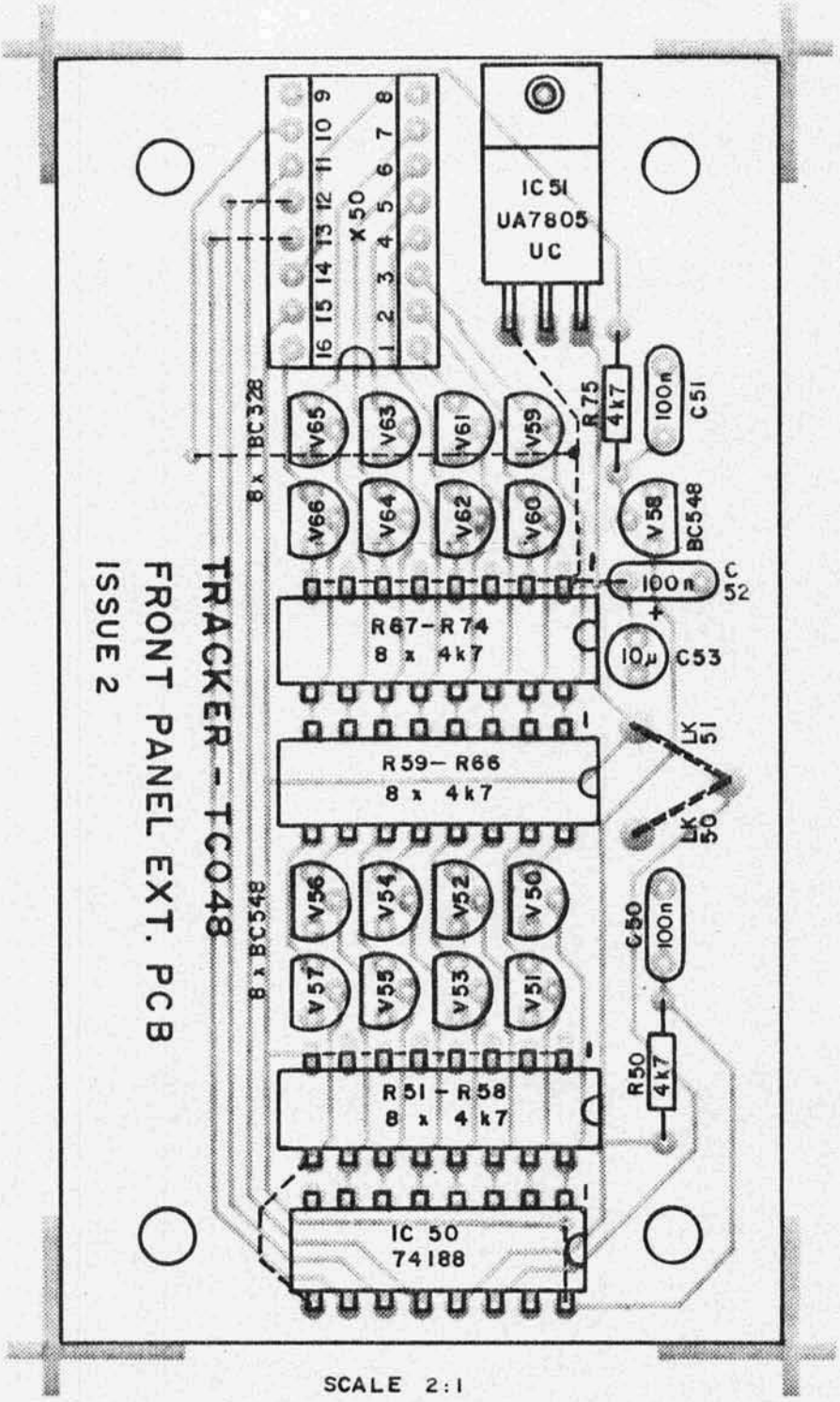
PARTS LIST FOR SCOUT L/R FRONT PANEL CARD

REF	CAT #	DESCRIPTION OF ITEM	
R40	01386	RESISTOR, VARIABLE, CARBONFILM	10K, CURVE A
R41	01396	RESISTOR, VARIABLE, WIRE WOUND	50 OHM, CURVE A
R70-77	01190	RESISTOR, FIXED, CARBON FILM	4K7 X 8 DIL RESISTOR PACK
R78	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R79	01037	RESISTOR, FIXED, CARBON FILM	470 OHM 0.25W 5% CR25
R80	01030	RESISTOR, FIXED, CARBON FILM	270 OHM 0.25W 5% CR25
R81	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
R82	01060	RESISTOR, FIXED, CARBON FILM	10K 0.25W 5% CR25
C70	01736	CAPACITOR, FIXED, ELECTROLYTIC	220 MFD. 16V RB
C71	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C72	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C73	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C74	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C75	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
C76	01570	CAPACITOR, FIXED, CERAMIC	0.1 MFD. BLUE CAP (SIEMENS)
L70	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L71	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L72	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L73	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L74	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L75	03794	INDUCTOR, FIXED, FERRITE CORE	100 MICROHENRY CHOKE
L76	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L77	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
L78	03790	INDUCTOR, FIXED, FERRITE CORE	1MH CHOKE
V40	01872	DIODE, LIGHT-EMITTING	GREEN
V41	01874	DIODE, LIGHT-EMITTING	RED
V42	01872	DIODE, LIGHT-EMITTING	GREEN
V43	01876	DIODE, LIGHT-EMITTING	YELLOW
V70	01837	DIODE, SILICON, ZENER	BZX79/C2V7
V71	01814	DIODE, SILICON, SIGNAL	1N914A
IC70	02110	INTEGRATED CIRCUIT, DIGITAL	74LS148 8 I/P PRIORITY ENCODER
IC71	02045	INTEGRATED CIRCUIT, LINEAR	CD4066BCN BILATERAL SWITCH
IC72	02045	INTEGRATED CIRCUIT, LINEAR	CD4066BCN BILATERAL SWITCH
IC73	02045	INTEGRATED CIRCUIT, LINEAR	CD4066BCN BILATERAL SWITCH
IC74	02045	INTEGRATED CIRCUIT, LINEAR	CD4066BCN BILATERAL SWITCH
IC75	02000	INTEGRATED CIRCUIT, LINEAR	LM78L05ACZ +5V REGULATOR
S40	02410	SWITCH, ELECTRICAL, ROTARY	1 POLE, 12 POSITION, LORLEND
S41	02429	SWITCH, ELECTRICAL, TOGGLE	MIN SPDT PCB (M2015SSW06)
S42	02431	SWITCH, ELECTRICAL, TOGGLE	3 POLE DT, C&K, PCB MOUNTING
S43	02429	SWITCH, ELECTRICAL, TOGGLE	MIN SPDT PCB (M2015SSW06)
S44	02432	SWITCH, ELECTRICAL, TOGGLE	SPDT PCB BIASED (M2015ESW06)
S45	02432	SWITCH, ELECTRICAL, TOGGLE	SPDT PCB BIASED (M2015ESW06)
S46	02432	SWITCH, ELECTRICAL, TOGGLE	SPDT PCB BIASED (M2015ESW06)
S47	02432	SWITCH, ELECTRICAL, TOGGLE	SPDT PCB BIASED (M2015ESW06)
S48	02432	SWITCH, ELECTRICAL, TOGGLE	SPDT PCB BIASED (M2015ESW06)



PRINTED CIRCUIT BOARD TC049
CIRCUIT DIAGRAM 1117

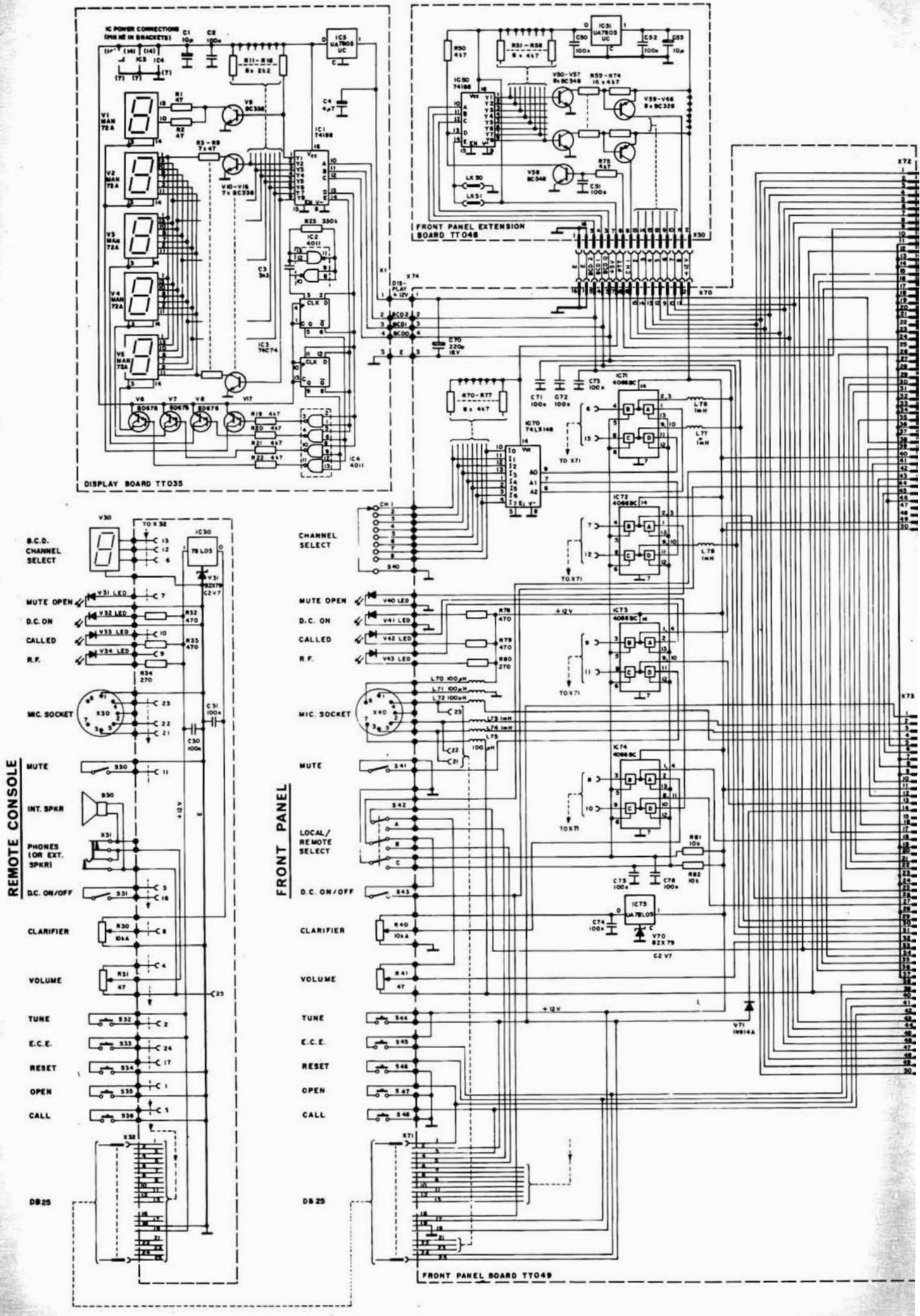
DRAWN: E.D. ERDOS	TRACKER COMMUNICATIONS PTY. LTD.			
CHECKED: PG	SCOUT L/R – FRONT PANEL P.C.B. COMPONENT LAYOUT			
APPROVED: PG	A2	1119	ISSUE 1	DATE 30-7-81

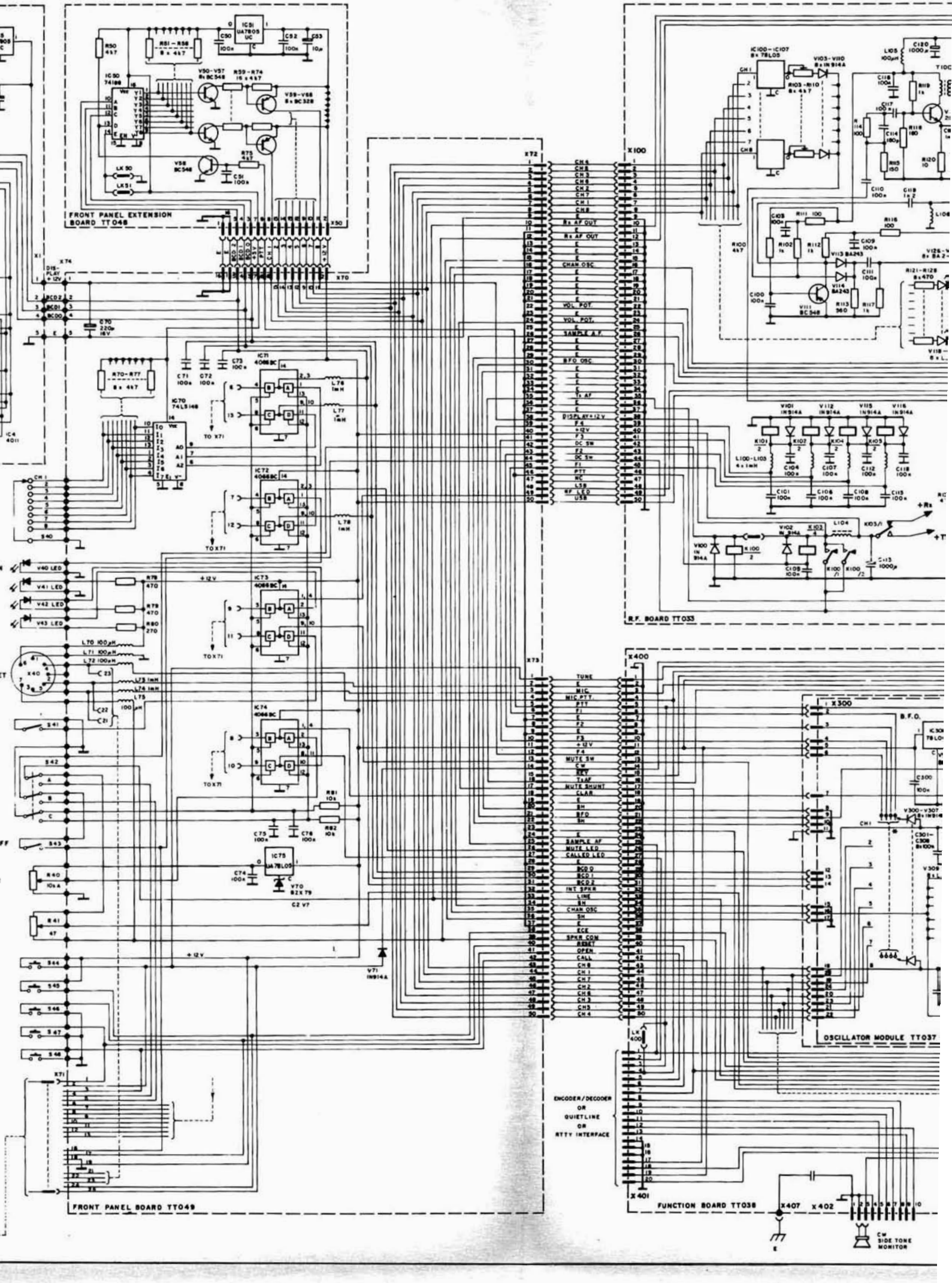


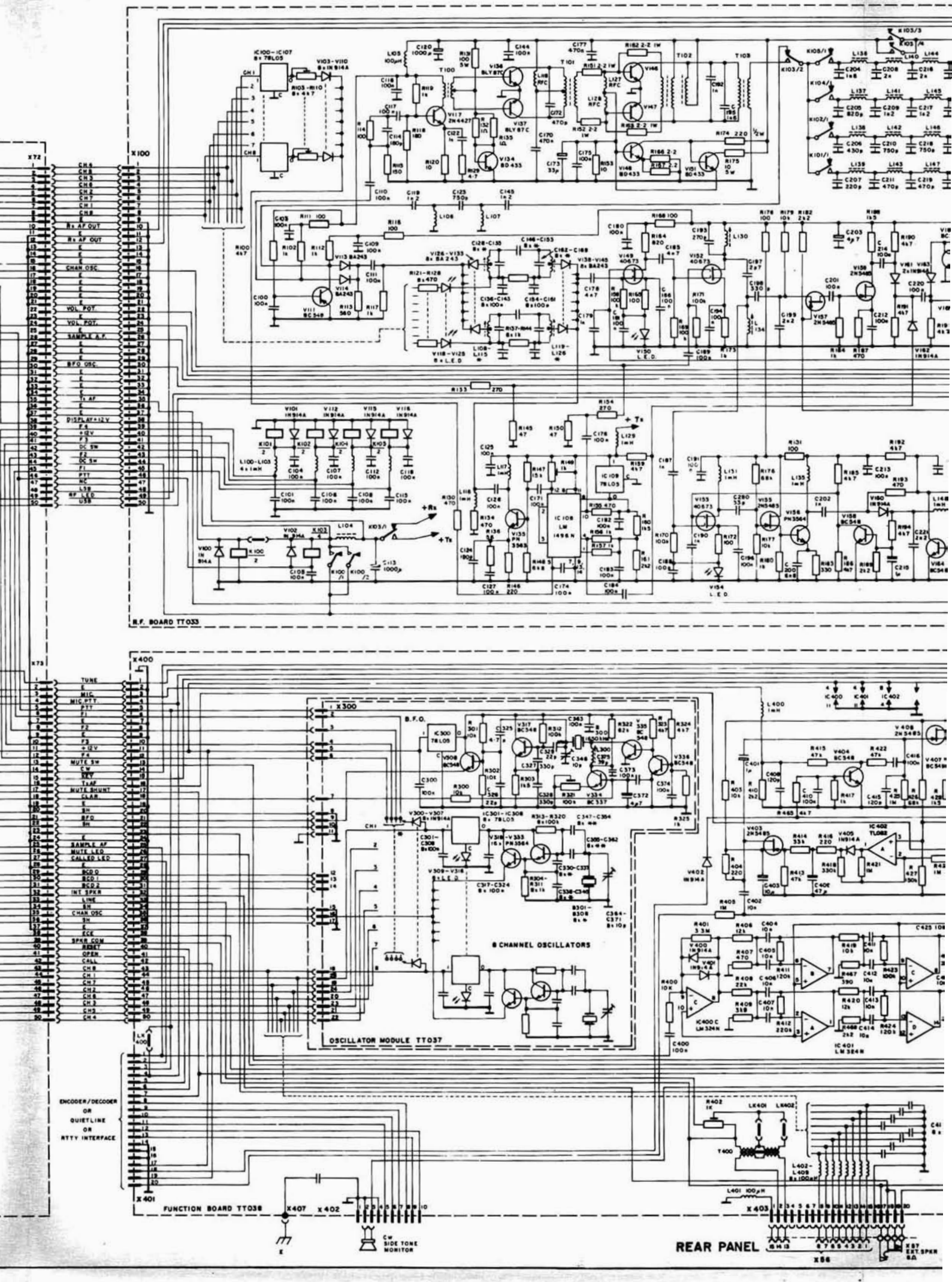
SCALE 2:1

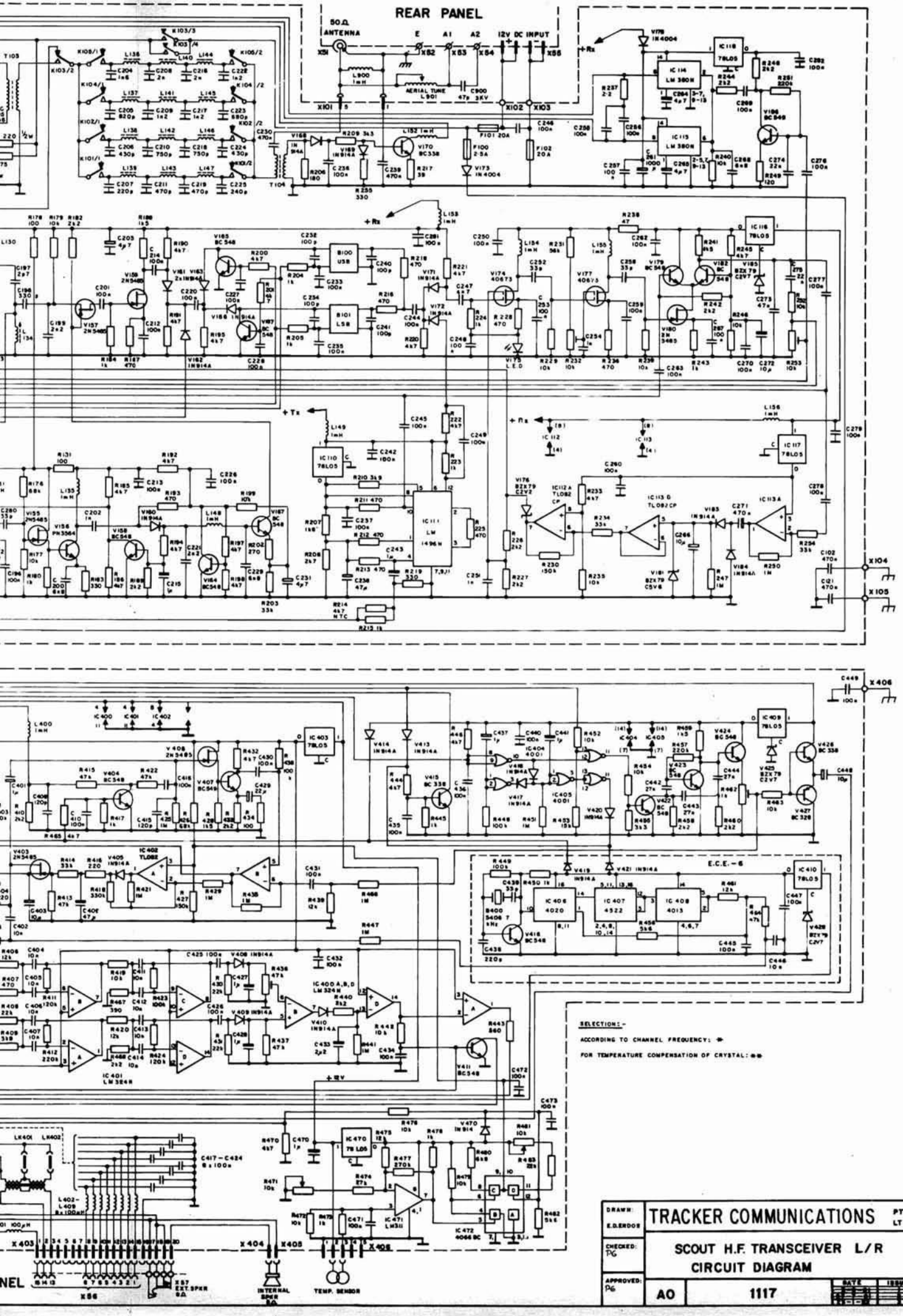
CIRCUIT DIAGRAM 1117

DRAWN: E.D. ERDOS	TRACKER COMMUNICATIONS PTY. LTD.		
CHECKED: P.G.	FRONT PANEL EXTENSION P.C.B. COMPONENT LAYOUT		
APPROVED P.G.	A4	1118	DATE 6-7-81 / ISSUE 1


DISPLAY BOARD TT035
FRONT PANEL EXTENSION BOARD TT048
REMOTE CONSOLE
FRONT PANEL
FRONT PANEL BOARD TT049
B.C.D. CHANNEL SELECT
MUTE OPEN
D.C. ON
CALLED
R.F.
MIC. SOCKET
MUTE
INT. SPKR
PHONES (OR EXT. SPKR)
D.C. ON/OFF
CLARIFIER
VOLUME
TUNE
E.C.E.
RESET
OPEN
CALL
DB25
CHANNEL SELECT
LOCAL/ REMOTE SELECT
+12V


FRONT PANEL EXTENSION BOARD TT048
R.F. BOARD TT033
OSCILLATOR MODULE TT037
FRONT PANEL BOARD TT049
FUNCTION BOARD TT038
ENCODER/DECODER OR QUIETLINE OR RTTY INTERFACE
B.F.O.
CW SIDE TONE MONITOR


R.F. BOARD TT033
OSCILLATOR MODULE TT037
FUNCTION BOARD TT038
REAR PANEL
B.F.O.
8 CHANNEL OSCILLATORS
ENCODER/DECODER OR QUIETLINE OR RTTY INTERFACE
SIDE TONE MONITOR
EXT. SPKR 8Ω
+Rx
+Tx
+ Tx
IC 108 LM 1496 N
IC 109 78L05
IC 400 LM 324 N
IC 401 LM 324 N
IC 402 TL082
L.E.D.



DRAWN: E.D.ERDOS	TRACKER COMMUNICATIONS PTY. LTD.		
CHECKED: PG	SCOUT H.F. TRANSCEIVER L/R CIRCUIT DIAGRAM		
APPROVED: PG	AO	1117	DATE / ISSUE