T830 Series

Base Station Equipment

Service Manual

Issue 100

February 1996

M830-00-100

Head Office
New Zealand

Tait Electronics Ltd
558 Wairakei Road
P.O. Box 1645
Christchurch
New Zealand
Phone: 64 3 358-3399
Fax: 64 3 358-3636

Radio Infrastructure Division

535 Wairakei Road
P.O. Box 1645
Christchurch
New Zealand
Phone: 64 3 358-3399
Fax: 64 3 358-2825

Australia

Tait Electronics (Aust) Pty Ltd
275 Toombul Road
Northgate 4013
P.O. Box 679
Virginia
Queensland 4014
Australia
Phone: 61 7 3260-7799
Toll Free: 1800 077-112
Fax: 61 7 3260-7990

Canada

Tait Mobile Radio Inc.
Unit 5, 158 Anderson Avenue
Markham
Ontario L6E1A9
Canada
Phone: 1 905 472-1100
Toll Free: 1 800 890-8248
Fax: 1 905 472-5300

France

Tait France Sarl
2 Avenue de la Cristallerie
92 316 Sèvres, Cedex
France
Phone: 33 1 41 14-05-50
Fax: 33 1 41 14-05-55

Germany

Tait Mobilfunk GmbH
Willstätterstraße 50
D-90449 Nürnberg 60
Germany
Phone: 49 911 96 746-0
Fax: 49 911 96 746-79

New Zealand

Tait Communications Ltd
Unit 4, 75 Blenheim Road
P.O. Box 1185
Christchurch
Phone: 64 3 348-3301
Fax: 64 3 343-0558

Singapore

Tait Electronics (Far East) Pte Ltd
4 Leng Kee Road
SIS Building #05-11A
Singapore 159088
Phone: 65 471-2688
Fax: 65 479-7778

United Kingdom

Tait Mobile Radio Ltd
Ermine Business Park
Ermine Road
Huntingdon
Cambridgeshire PE18 6YA
United Kingdom
Phone: 44 1480-52255
Fax: 44 1480-411996

USA

Tait Electronics (USA) Inc.
9434 Old Katy Road
Suite 110
Houston
Texas 77055
USA
Phone: 1 713 984-8684
Toll Free: 1 800 222-1255
Fax: 1 713 468-6944

About This Manual

Scope

This manual contains general, technical and servicing information on T830 25W and 50W base stations which comprise the following equipment:

25W base station	T835 receiver T836 25W transmitter
50W base station	T835 receiver T837 exciter T838 50W power amplifier

Format

We have published this manual in a ring binder so that "revision packages" containing additional information pertaining to new issues of PCBs can be added as required.

Revision Packages

Revision packages will normally be published to coincide with the release of information on a new PCB, and may also contain additions or corrections pertaining to other parts of the manual.

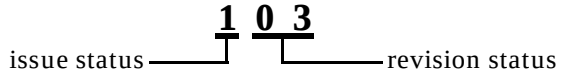
If you return the address card at the front of this manual, you will be notified when revision packages containing new PCB information and/or text are available. You may then order as many packages as you require from your local Tait Company. Revision packages are supplied ready-punched for inclusion in your manual.

Revision Control

Each page in this manual has a date of issue. This is to comply with various Quality Standards, but will also serve to identify which pages have been updated and when. Each page and its publication date is listed in the "List of Effective Pages", and a new list containing any new/revised pages and their publication dates will be sent with each revision package.

Any portion of text that has been changed is marked by a vertical line (as shown at left) in the outer margin of the page. Where the removal of an entire paragraph means there is no text left to mark, an arrow (as shown at left) will appear in the outer margin. The number beside the arrow will indicate how many paragraphs have been deleted.

The manual issue and revision status are indicated by the last three digits of the manual IPN. These digits start at 100 and will increment through 101, 102, 103, etc., as revision packages are published, e.g:



Thus, Issue 103 indicates the third revision to issue 1 and means that three packages should have been added to the manual. The issue digit will only change if there is a major product revision,

or if the number of revision packages to be included means that the manual becomes difficult to use, at which point a new issue manual will be published in a new ring binder.

PCB Information PCB information is provided for all current issue PCBs, as well as all previous issue PCBs manufactured in production quantities, and is grouped according to PCB. Thus, you will find the parts list, grid reference index (if necessary), PCB layouts and circuit diagram(s) for each individual PCB grouped together.

Errors If you find an error in this manual, or have a suggestion on how it might be improved, please do not hesitate to contact the Technical Writer, Tait Radio Infrastructure Division, Tait Electronics Ltd, P.O. Box 1645, Christchurch, New Zealand.

Technical Information

Any enquiries regarding this manual or the equipment it describes should be addressed in the first instance to your nearest approved Tait Dealer or Service Centre. Further technical assistance may be obtained from the Customer Support Group, Radio Infrastructure Division, Tait Electronics Ltd, Christchurch, New Zealand.

Updating Equipment And Manuals

In the interests of improving performance, reliability or servicing, Tait Electronics Ltd reserve the right to update their equipment and/or manuals without prior notice.

Copyright

Ordering Tait Service Manuals

Service Manuals should be ordered from your nearest Tait Branch or approved Dealer. When ordering, quote the Tait Internal Part Number (IPN) and, where applicable, the version.

Date Of Issue

IPN M830-00-100 T830 Series Service Manual

Issue 100 published February 1996

Table Of Contents

This manual is divided into eight parts as listed below, with each part being further sub-divided into sections. There is a detailed table of contents at the start of each part and / or section.

List Of Effective Pages

The total number of pages in this Manual is 296, as listed below.

Page	Issue Date		Page	Issue Date	
1	31/01/96		1.1	31/01/96	
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			3.12	31/01/96	
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Page	Issue Date	
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Part A Introduction To Servicing

This part of the manual is divided into the sections listed below. These sections provide some general and advisory information on servicing procedures, a brief history of T800 programming software, and a list of Technical Instructions pertaining to T830 Series equipment.

1 General

If further information is required about T830 Series equipment or this Manual, it may be obtained from Tait Electronics Ltd or accredited agents. When requesting this information, please quote the equipment type number (e.g. T835-20) and serial number. In the case of the Service Manual quote the Tait Internal Part Number (IPN), e.g. M830-00-100, and for circuit diagrams quote the 'Title', 'IPN' and 'Issue'.

1.1 Caution: CMOS Devices

This equipment contains CMOS Devices which are susceptible to damage from static charges. Care when handling these devices is essential. For correct handling procedures refer to the manufacturers' data books, e.g. Philips data books covering CMOS devices, or Motorola CMOS data books, Section 5 'Handling', etc.

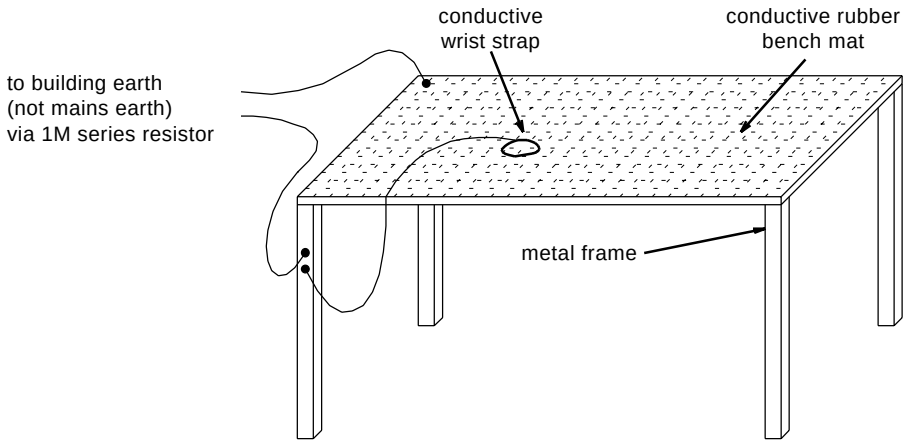


Figure 1.1 Typical Anti-static Bench Set-up

An anti-static bench kit (refer to Figure 1.1) is available from Tait Electronics Ltd under the usual consumable goods ordering system. The kit is held in stock under IPN 937-00000-34 and contains:

- 1 conductive rubber bench mat
- 1 earth lead to connect the mat to ground (c/w 1M series resistor)
- 1 wrist strap
- information leaflet.

1.2 Caution: Aerial Load

The equipment has been designed to operate safely under a wide range of aerial loading conditions. However, it is strongly recommended that the transmitter should not be operated in the absence of a suitable load. Failure to observe this warning may result in damage to the transmitter output power stage.

1.3 Caution: Beryllium Oxide & Power Transistors

The RF power transistors in current use all contain some beryllium oxide. This substance, while perfectly harmless in its normal solid form, can become a severe health hazard when it has been reduced to dust. For this reason the RF power transistors should not be broken open, mutilated, filed, machined, or physically damaged in any way that can produce dust particles.

2 Mechanical

2.1 Pozidriv Recess Head Screws

Pozidriv recess head screws are the preferred standard on all Tait manufactured equipment. The very real advantages of this type of screw will not be realised unless the correct screwdrivers are used by servicing personnel.

2.2 Disassembly/Reassembly

2.2.1 Receivers/Exciters

To carry out alignment or change option links it is necessary to remove only the top cover, i.e. the one adjacent to the front panel handle and on the opposite side to the main D-range connector.

Removal of the bottom cover is necessary to:

- access SMD components
- change solder blob links
- fit test leads to circuit block access points.

2.2.2 Power Amplifiers

The tuning and power output level setting procedures should be carried out with the cover on.

2.3 Cover Screw Torques

Receivers / Exciters	.. 12lb-in. / 1.36Nm
Power Amplifiers	.. 8lb-in. / 0.9Nm

3 Component Replacement

3.1 Leaded Components

Whenever components are removed from or fitted to the PCB, care must be taken to avoid damage to the track. The two satisfactory methods of removing components from PTH PCBs are detailed below.

Note: The first method requires the use of a desoldering station, e.g. Philips SBC 314 or Pace MBT-100E.

3.1.1 Desoldering Iron Method

Place the tip over the lead and, as the solder starts to melt, move the tip in a circular motion.

Start the suction and continue the movement until 3 or 4 circles have been completed.

Remove the tip while continuing suction to ensure that all solder is removed from the joint, then stop the suction.

Before pulling the lead out, ensure it is not stuck to the plating.

If the lead is still not free, resolder the joint and try again.

Note: The desoldering iron does not usually have enough heat to desolder leads from the ground plane. Additional heat may be applied by holding a soldering iron on the tip of the desoldering iron (this may require some additional help).

3.1.2 Component Cutting Method

Cut the leads on the component side of the PCB.

Heat the solder joint ***sufficiently*** to allow ***easy*** removal of the lead by drawing it out from the component side: do ***not*** use undue force.

Fill the hole with solder and then clear with solderwick.

3.2 Surface Mount Devices

Caution: **Surface mount devices (SMD's) require special storage, handling, removal and replacement techniques. This equipment should be serviced only by an approved Tait Dealer or Service Centre equipped with the necessary facilities. Repairs attempted with incorrect equipment or by untrained personnel may result in permanent damage. If in doubt, contact Tait Electronics Ltd or your nearest Tait Branch or Subsidiary.**

4 To Replace PA Transistors

Caution: **As the location of certain components in the PA is critical to performance, it is important that any components removed or disturbed are refitted in *exactly* the same position.**

Caution: **Before attempting to remove a transistor, measure the distance between the capacitors and transistor body to the nearest 0.5mm (measurements "A" and "B" in Figure 4.1) so that the capacitors can be replaced in *exactly* the same position. These measurements are shown in Figure 4.1 for the 6LFL package, however the same procedure applies for the SOE (stud) package.**

Caution: **Do not solder the tabs before torquing down otherwise the device may be broken.**

Desolder the tabs by heating with a soldering iron and lifting away from the PCB with a thin stainless steel spike, or screwdriver. Unscrew the transistor stud nut and remove the device.

Trim the tabs of the replacement device to make them similar to the faulty device, and tin the underside lightly. Smear the face of the device with heatsink compound and tighten it securely (torque setting 8lb-in./0.9Nm) to the heatsink. Then solder the tabs.

Replace each capacitor in exactly the same position as measured previously.

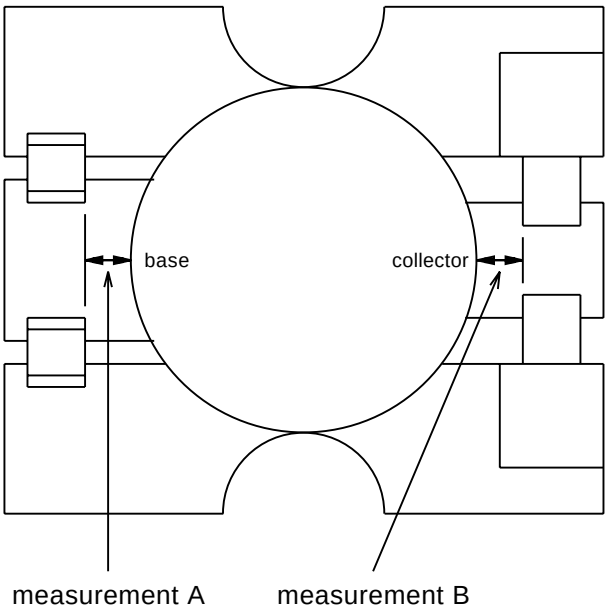


Figure 4.1 Typical Transistor/Capacitor Spacing (Not To Scale)

5 To Remove The T838 PA PCB From The Heatsink

Most components are soldered topside only, but in some cases access to the underside of the PCB is necessary.

Remove the cover from the N-connector shield.

Remove the D-range connector.

Remove the 10 PCB retaining screws (2 are hidden beneath the harmonic filter shield).

Push the LEDs back from the front panel.

Remove the transistor stud nuts.

Remove the front panel.

Remove the mounting screw for the TO-220 device (Q5).

Remove the output 50 ohm coaxial connector by unscrewing it from the heatsink casting and unsoldering it from the PCB.

Disconnect the input 50 ohm coaxial cable from the heatsink.

Lift the PCB gently from the heatsink to gain access to the underside of the PCB.

Caution: **Do not operate the PA with the PCB detached as the heatsink is used for earthing and for the dissipation of heat generated within the transistors.**

To replace the PCB, reverse the order of removal, taking care that the wiring is correctly routed and is not subjected to 'pinching'.

6 To Remove Cased Mica Capacitors

Cased mica capacitors can be removed by heating the top with a heavy-duty soldering iron and gently lifting the capacitor off the PCB with a solder-resistant spike or equivalent.

7 Software History

23/11/89	BASEPROG Version 1
23/08/90	PGM800 Version 2
11/06/91	PGM800 Version 2.01
03/10/95	PGM800 Version 2.21

7.1 BASEPROG V1/PGM800 V2

T800 programming software was originally developed as BASEPROG V1 and released as PGM800 V2.

7.2 PGM800 V2.01

The major changes introduced with V2.01 are as follows:

- Full support for different display adaptors.
- Programming of CTCSS frequency data (optional) for individual channels.
- Full cursor control in edit mode.
- User selectable output file format (hex or binary).
- Support for wider range of T800 equipment.
- DOS shell facility implemented.
- CTCSS defeat possible when CTCSS tone is not selected.
- Channel numberings changed from 0-127 to 1-128.
- An "X" included on the printout to indicate that there are 8 switches on the DIP switch and the state of the MSB is dependent on the size of the EPROM used.

Note: The data files produced by BASEPROG V1.0 are still compatible with PGM800 V2.01.

7.3 PGM800 V2.21

PGM800 V2.21 is an updated and expanded version of the earlier PGM800 V2.01 software.

PGM800 V2.21 includes many new and improved features over PGM800 V2.01. There are a number of changes to the user interface to make data entry and editing significantly easier.

Major changes are outlined below:

- Includes several new radio models which are not programmable with PGM800 V2.01.
- Default file names with ‘dash’ are saved with ‘dash’ instead of ‘underscore’.
- Default file extension in Save File page is BIN instead of HEX.
- Out of range frequencies will result in warning messages, but will still be accepted as valid entries.
- Channel numbers are selectable between 0-127 and 1-128.
- Automatic insertion feature to input frequencies.

Note: The datafiles produced by BASEPROG V1.0 and PGM800 V2.01 are still compatible with PGM800 V2.21.

8 Technical Instructions

From time to time Technical Instructions (TIs) are issued by the Radio Infrastructure Engineering Division of Tait Electronics. These TIs may be used to update equipment or information, or to meet specific operational requirements.

Printed below is a list of TIs applicable to T800 and T830 Series equipment. You may wish to file a copy of each TI in this Section for your own reference.

TI No.	Title	Date
346D	T800-02 CTCSS encoder / decoder	07 / 11 / 94
356C	T800-07 multichannel memory PCB	22 / 03 / 94
358	T807 / 808 remote sensing of output voltage	10 / 06 / 91
365	T807 / 808 improved earthing for noise interference suppression	29 / 07 / 91
373A	T800-30 / 35 DFSK modulator PCB	16 / 11 / 94
403	T800 group delay	07 / 11 / 94
416B	T800 Series VCO trimmer replacement	06 / 09 / 94
418	T800 Selcall: T800 Sigtec S1530 installation	03 / 11 / 95
422	T800 Series: Rx de-sensing by auxiliary boards	23 / 08 / 95

Part B T835 Receiver

This part of the manual is divided into six sections, as listed below. There is a detailed table of contents at the start of each section.

Section	Title
1	**General Information**
2	**Circuit Operation**
3	**Initial Tuning & Adjustment**
4	**Functional Testing**
5	**Fault Finding**
6	**PCB Information**

1 T835 General Information

This section provides a brief description of the T835 receiver, along with detailed specifications and a list of variants available.

The following topics are covered in this section.

1.1 Introduction

The T835 is a high performance FM base station receiver designed for single or multichannel operation in the 136 to 174MHz frequency range.

The receiver is a dual conversion superhet with a synthesised local oscillator. The first IF is 21.4MHz, allowing exceptionally high spurious signal rejection to be achieved in the receiver front end. The second IF section (455kHz) combines amplitude limiting, detection and RSSI within a single integrated circuit. It also drives a noise level detector for gating the audio output. RSSI is also used to drive a carrier mute for audio output gating.

The audio section output can be adjusted to deliver >+10dBm to a 600 ohm balanced output, and 1W to a local monitor speaker. A flat or de-emphasised audio response is link selectable.

The synthesiser frequency is programmed via an EPROM which is attached to a separate plug-in memory board. A DIP switch on the memory PCB allows fast single channel selection from a multichannel programmed EPROM, but for true multichannel capability the EPROM must be addressed separately via an additional D-range plug at the rear of the set.

All components except those on the VCO and memory boards are mounted on a single PCB. This is secured to a die-cast chassis which is divided into compartments to individually shield each section of circuitry. Access to both sides of the main PCB is obtained by removing each of the two chassis lids. There is provision within the chassis to mount small option PCBs.

The front panel controls include gate sensitivity, line level, monitor volume and a mute disable switch. This switch disables the mute (squelch) signal to the monitor amplifier as an aid to servicing.

1.2 Specifications

1.2.1 Introduction

The performance figures given are minimum figures, unless otherwise indicated, for equipment tuned with the maximum switching band and operating at standard room temperature (+22°C to +28°C).

Where applicable, the test methods used to obtain the following performance figures are those described in the EIA specification. However, there are several parameters for which performance according to the CEPT specification is given.

Details of test methods and the conditions which apply for Type Approval testing in all countries can be obtained from Tait Electronics Ltd.

1.2.2 General

Frequency Range	.. 136-174MHz
Type	.. dual conversion superheterodyne
Frequency Increment	.. 5 or 6.25kHz
Switching Range	.. 3MHz
Number Of Channels:	
Standard	.. 1
Optional .	.. 8
Internally Selectable	.. 128
Supply Voltage:	
Operating Voltage	.. 10.8 to 16V DC
Standard Test Voltage	.. 13.8V DC
Polarity	.. negative earth only
Polarity Protection	.. crowbar diode
Supply Current:	
Standby	.. 350mA
Full Audio	.. 750mA
Input Impedance	.. 50 ohms
Operating Temperature Range	.. -30°C to +60°C
Frequency Stability (see also Section 1.3)	.. ±2.5ppm, -30°C to +60°C

Signal Strength Indicator	.. -115dBm to -70dBm, 3.5 to 6.5V at approx. 15dB/V

Dimensions:

Height	.. 191mm
Width	.. 60mm
Length	.. 324mm

Weight	.. 2.13kg

1.2.3 RF Section

IF Amplifiers:

Frequencies	.. 21.4MHz and 455kHz
Bandwidths-	
Narrow Band (NB)	.. 7.5kHz
Wide Band (WB)	.. 15kHz

Sensitivity:

Single Channel	.. -117dBm
Bandspread (12dB Sinad)	.. -115dBm

Signal+Noise To Noise Ratio:

RF Level -107dBm	.. 30dB
RF Level -83dBm (NB)	.. 50dB CEPT (typical)
RF Level -57dBm (WB)	.. 55dB EIA (typical)

Selectivity:

Narrow Band (±12.5kHz)	.. 88dB CEPT (typical)
Wide Band (±25kHz)	.. 95dB

Offset Selectivity (Canada only)	.. 20dB
Spurious Response Attenuation	.. 100dB

Intermodulation Response Attenuation:

Narrow Band	.. 80dB CEPT (typical)
Wide Band	.. 85dB EIA

Blocking	.. 100dB
Co-channel Rejection	.. 6dB
Amplitude Characteristic	.. 3dB

Spurious Emissions:

Conducted	.. -90dBm to 4GHz
Radiated	.. -57dBm to 1GHz -47dBm to 4GHz

1.2.4 Audio Section

Outputs Available .. line and monitor

Frequency Response .. flat or de-emphasised (link selectable)

Flat Response:

Bandwidth .. 67 to 3400Hz
Response .. within +1, -2dB of output level at 1kHz

De-emphasised Response:

CTCSS Band-
Bandwidth .. 67 to 260Hz
Response .. within +1, -2dB of output level at 100Hz

Speech Band-
Bandwidth .. 300 to 3400Hz
Response .. within +1, -3dB of a 6dB/octave de-emphasis characteristic (ref. 1kHz)

Line Output:

Power .. adjustable to >+10dBm
Load Impedance .. 600 ohms
Distortion -
(@ -70dBm signal level, links set to de-emphasis)
Narrow Band .. 4%
Wide Band .. 2%

Monitor Output:

Power .. 1W
Speaker Impedance .. 3.5 ohms
Distortion .. 3%
(@ -70dBm signal level, links set to de-emphasis)

Mute Operation (Gate)

Systems Available .. noise mute and carrier mute

Noise Mute:

Operating Range .. 6-20dB sinad
Hysteresis .. 1.5 to 6dB
Threshold .. adjustable to -105dBm
Opening Time .. 20ms
Closing Time .. 50ms

Carrier Mute (Optional):

Operating Range .. -115 to -80dBm
Hysteresis .. 2 to 10dB
Opening Time .. 5ms
Closing Time .. 50ms

1.3 Versions

Description	Version			
	10	15	20	25
136-156MHz	●	●		
148-174MHz			●	●
7.5kHz IF Bandwidth		●		●
15kHz IF Bandwidth	●		●	
±2.5ppm TCXO (-30°C to +60°C)	●	●	●	●

Note: A TCXO with a stability of ±1ppm (0°C to +60°C) is available to suit specific requirements. Contact your nearest authorised Tait Dealer or Service Centre for further details.

2 T835 Circuit Operation

This section provides a basic description of the circuit operation of the T835 receiver.

The following topics are covered in this section.

2.1 Introduction

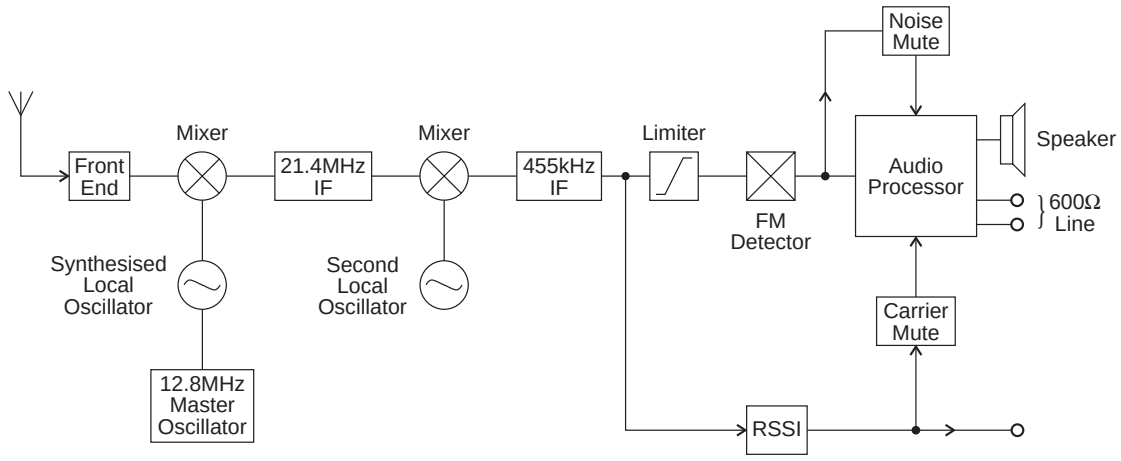


Figure 2.1 T835 High Level Block Diagram

The T835 receiver consists of a number of distinct stages:

- front end
- mixer
- synthesised local oscillator
- IF
- audio processor
- mute (squelch)
- regulator circuits
- received signal strength indicator (RSSI).

These stages are clearly identifiable in Figure 2.1. Refer to the circuit diagrams at the rear of the Manual for further detail.

2.2 Receiver Front End

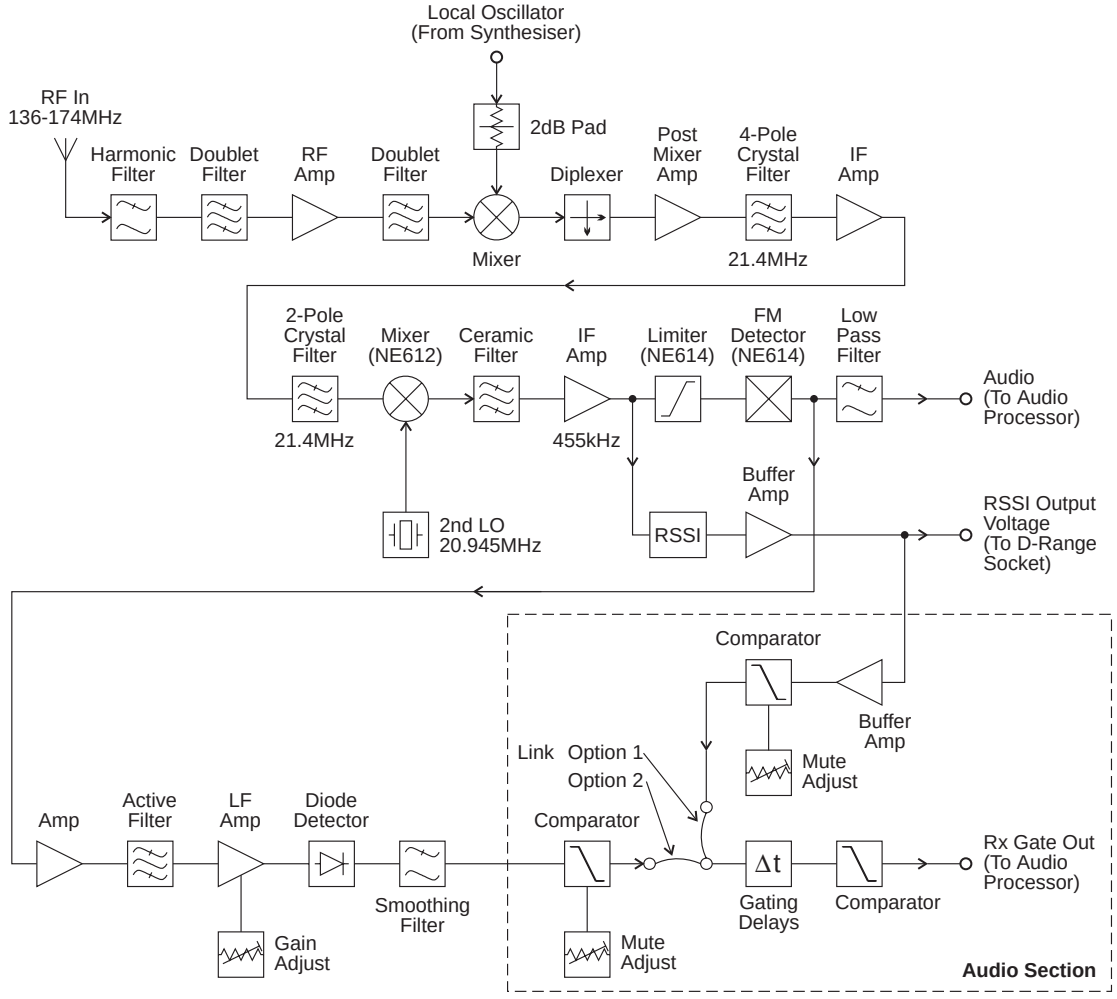


Figure 2.2 T835 Front End, IF and Mute Block Diagram

The incoming signal from the N-type antenna socket is fed through a 7-pole, low pass filter with a cut frequency of approximately 200MHz. This low loss filter (typically less than 0.5dB over 136-174MHz) provides excellent immunity to interference from high frequency signals.

The signal is then further filtered, using a notched doublet (L304, L305) which provides exceptional image rejection, before being amplified by approximately 12dB (Q302). The signal is then passed through a further doublet (L309, L310) before being presented to the mixer.

Each sub-block within the front end has been designed with 50 ohm terminations for ease of testing and fault finding. The overall gain from the antenna socket to the mixer input varies from 0-2dB.

2.3 Mixer

(Refer to Figure 2.2.)

IC301 is a high level mixer requiring a local oscillator (LO) drive level of +17dBm (nominal). The voltage controlled oscillator (VCO) generates a level of +22dBm (typical) and this is fed to the mixer via a 2dB attenuator pad. A diplexer terminates the IF port of the mixer in a good 50 ohms, thus preventing unnecessary intermodulation distortion.

2.4 IF Circuitry

(Refer to Figure 2.2.)

Losses in the mixer are made up for in a tuned, common gate, post mixer amplifier (Q303). Several stages of amplification and filtering are employed in the IF circuitry. The first crystal filter is a 4-pole device (&XF301) which is matched into 50 ohms on both its input and output ports. This stage is followed by a two-stage amplifier which is designed as a 50 ohm block, after which the signal is mixed down to 455kHz with the second local oscillator (20.945MHz).

The 455kHz signal is filtered using a six-pole ceramic filter (&XF303) before being limited and detected.

The second IF mixer, limiter, detector and RSSI is in a 16-pin IC (IC303). Quadrature detection is employed, using L319, and the recovered audio on pin 7 of IC303 is typically 0.3V p-p for 60% system deviation.

2.5 Noise Mute (Squelch)

(Refer to Figure 2.2.)

The noise mute operates on the detected noise outside the audio bandwidth. An operational amplifier in IC304 is used as an active band pass filter centred on 70kHz to filter out audio components. The noise spectrum is then further amplified in a variable gain, two-stage amplifier (Q306 & Q307) with additional filtering. The noise is then rectified (D301) and filtered to produce a DC voltage proportional to the noise amplitude. The lowest average DC voltage corresponds to a high RF signal strength and the highest DC voltage corresponds to no signal at the RF input.

The rectified noise voltage is compared with a threshold voltage set up on RV100, the front panel mute potentiometer. Hysteresis is introduced by the feedback resistor (R106) to prevent the received message from being chopped when the average noise voltage is close to the threshold. R111 and R110 determine the mute opening and closing times. The mute control signal at pin 7 of IC100 is used to disable the speaker and line audio outputs. The speaker output can be separately enabled for test purposes by operating the front panel mute disable switch, SW100.

The mute control line is available on pad 101 (Rx gate out) for control of external circuitry. A high (9V) on pad 101 indicates that the audio is disabled and a low (0V) indicates that a signal above the mute threshold level is being received.

The audio can also be disabled using the "Rx-disable" inputs, pads 100 or 113, having connected the "Rx-disable" link between pins 1 & 2 of PL100. An adjustable time delay (RV101) is provided on these lines. In order to disable the audio, either pad must be pulled to 0V.

The red front panel LED (D102) indicates the status of the mute circuit. When a signal above the mute threshold is received, the LED is illuminated. An undedicated relay is provided (RL100) for transmitter keying or other functions and this can be operated from the mute line by linking PL102.

2.6 Carrier Mute

(Refer to Figure 2.2.)

A high level carrier mute facility is also available. The RSSI (refer to Section 2.10) provides a DC voltage proportional to the signal strength. This voltage is compared with a preset level, set up on RV104, and may be linked into the mute timing circuit using PL104. PL104 selects either the noise mute or the carrier mute. From this point both mute circuits operate in the same manner, using common circuitry.

2.7 Audio Processor

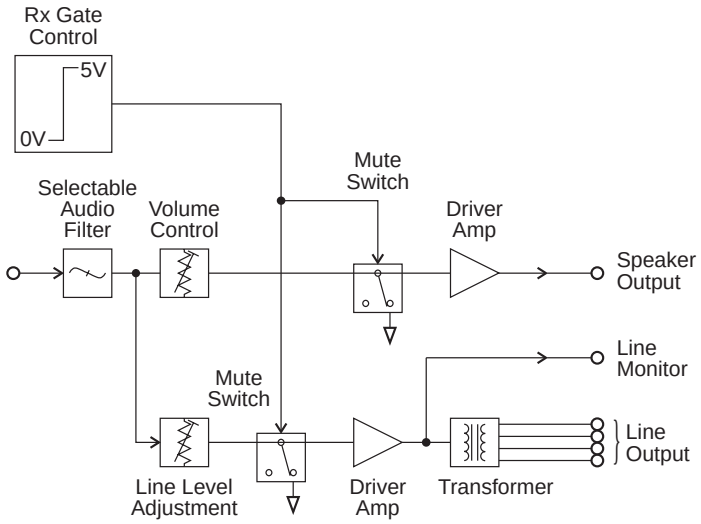


Figure 2.3 T835 Audio Processor Block Diagram

The recovered audio on pin 7 of IC303 is processed in a third order elliptic active filter to give the required response. Linking (PL101 & PL103) is available to give either a flat or de-emphasised audio response, with de-emphasis giving a 6dB/octave roll off. The output of IC101 is split to provide separate paths for the speaker and line outputs.

The speaker volume is set using the front panel volume knob (RV103) and the line level is set using the recessed potentiometer (RV102). The signals are passed to audio drive amplifiers IC102 and IC103. Under muted conditions the inputs of these amplifiers are shunted to ground via transistors Q105 and Q106 respectively.

The audio output of IC102 has a DC component which is removed by C122, and this then drives a speaker directly. The output of IC103 is fed into a line transformer to provide a balanced 2-wire or 4-wire, 600 ohm output.

2.8 Power Supply And Regulator

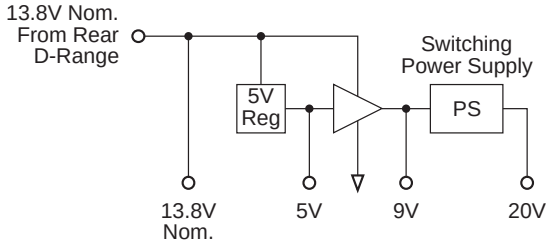


Figure 2.4 T835 Power Supply And Regulator Block Diagram

The T835 is designed to operate off a 10.8-16V DC supply (13.8V nominal). A 5.3V regulator (IC202) runs directly off the 13.8V rail, driving much of the synthesiser circuitry. This is used as the reference for a DC amplifier (IC201, Q200 & Q201) which provides a medium current capability 9V supply. A switching power supply, based on Q202 and Q203, runs off the 9V supply and provides a low current capability +20V supply. This is used to drive the synthesiser loop filter (IC4), giving a VCO control voltage of up to 20V. The 13.8V supply drives both output audio amplifiers without additional regulation.

2.9 Synthesised Local Oscillator

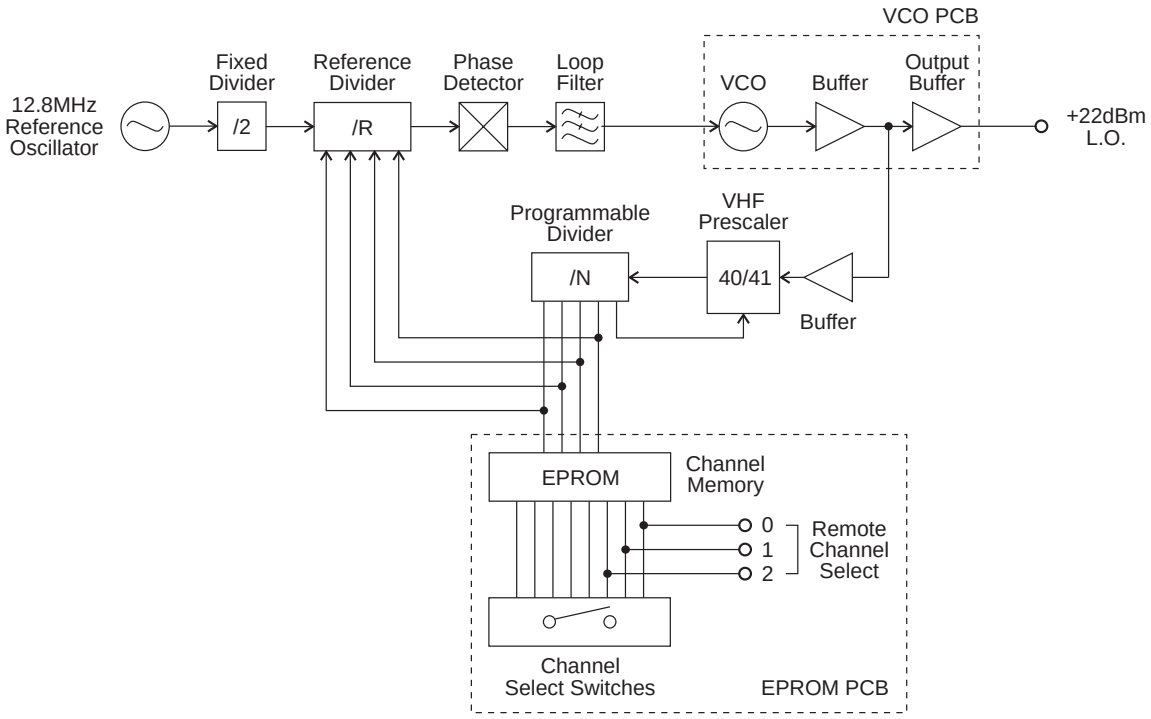


Figure 2.5 T835 Synthesiser Block Diagram

The synthesiser employs a phase-locked loop (PLL) to lock a VCO to a given reference frequency.

A master oscillator at 12.8MHz (IC2) is buffered, divided by two and then divided down to 6.25kHz or 5kHz within the synthesiser IC (IC3). A buffered output of the VCO is fed to a programmable divider, comprising a VHF prescaler (IC1) and a divider internal to IC3. These two signals are applied to the phase detectors in IC3. A digital phase detector (PDB) provides rapid coarse tuning of the VCO until the phase error is within the range of the high gain sample and hold detector (PDA). The phase detector outputs are passed through an active loop filter (IC4a) which produces a DC voltage between 0 and 20V to tune the VCO. This VCO control line is further filtered to attenuate noise and spurs. As the control line voltage increases, the VCO frequency also increases.

The division ratio of the programmable divider is stored within EPROM memory (IC1). Up to 128 frequencies can be stored within the memory and are addressable using the internal DIP switches. Three of the address lines are also available for external frequency control via an extra D-range connector at the rear of the chassis. A change of state of any of these three lines (CH SEL 0-2) commences a programming cycle during which the frequency data in the EPROM is down-loaded to a divider within IC3. 32 bits of data are loaded in eight 4-bit words.

The VCO transistor (Q1) operates in a common source configuration, with an LC tank circuit coupled between its gate and drain to provide the feedback necessary for oscillation. The VCO control voltage from the loop filter (IC4) is applied to the varicaps (D1-D4) to facilitate tuning within a 3MHz band of frequencies. A trimcap (VC1) is used for coarse tuning of the VCO. The output from the oscillator circuit drives a cas-

code amplifier stage (Q2, Q3) which supplies +10dBm (typically) to a further stage of amplification, Q5. This is the final amplifier on the VCO PCB, and delivers +22dBm (typically) to the receiver mixer input pad.

A low level "sniff" is taken from the input to Q5 and used to drive the divider buffer for the VHF prescaler (IC1). The prescaler divide ratio is 40/41.

The VCO operates at the actual frequency required by the first mixer, i.e. there are no multiplier stages.

The VCO frequency spans from either 157-177MHz or 169-196MHz according to version. The VCO is tuned to 21.4MHz above the desired receive frequency to produce a 21.4MHz IF signal on the output of the mixer.

2.10 Received Signal Strength Indicator (RSSI)

The RSSI provides a DC voltage proportional to the signal level at the receiver input and is an on-chip function of IC303. Buffering and temperature compensation are provided by IC304 and the voltage is available at the rear D-range connector.

The RSSI also provides the capability for high level signal strength muting, which may be selected on PL104 (refer to Section 3.3). The mute threshold may be set between -125dBm and -70dBm at RV104.

3 T835 Initial Tuning & Adjustment

The following section describes the full tuning and adjustment procedure and provides information on:

- channel programming
- channel selection
- selecting required audio links
- synthesiser alignment
- receiver front end and IF alignment
- noise mute adjustment
- setting line output level
- setting monitor output level
- setting up the RSSI
- carrier level mute adjustment.

3.1 Channel Programming

Up to 128 channel frequencies can be stored in the EPROM memory (IC1). Each channel can be addressed using the bank of 8 switches (SW1). The most significant bit of this switch is set according to the type of EPROM fitted:

ON = 27C16
OFF = 27C64

Up to 8 channels may be addressed externally when the optional extra rear D-range connector is fitted.

Programming is accomplished by using an IBM[1] PC, a PROM programmer and the PGM800 software package. For a full description of the programming procedure, refer to the T800 Programming Software User's Manual.

3.2 DIP Switch Codes For Channel Addresses

The PGM800 software used to programme the EPROM will present the user with a DIP switch code for each channel address (refer to Section 3.11). For example, channel 125 will be assigned a switch code of X0000011 (1-128 channel numbering), in which case the switches should be set as shown in Figure 3.1, i.e. **0**0000011.

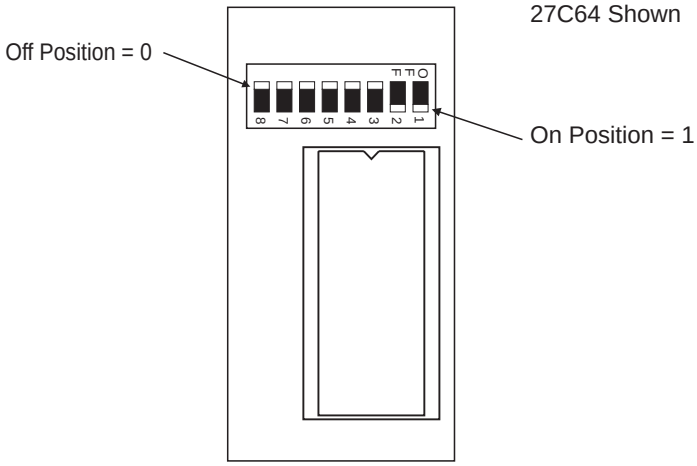


Figure 3.1 Channel DIP Switch Setting

Note 1: For remote multichannel applications using the T800-07 multichannel memory PCB, the DIP switch is not used and should have the first 3 least significant bits (1-3) in the ***off*** position. The next 4 bits (4-7) should be ***on***, while the most significant bit (8) is selected according to the EPROM used (refer to Section 3.1). This will allow the existing CHSEL lines to be used to select up to 8 channels. It is possible to address blocks of 8 channels throughout the 128 channel EPROM capacity by switching bits 4 to 7 on the DIP switch.

Note 2: Alternatively, all 128 channels may be remotely addressed on the T800-07, but bits 1-7 of the DIP switch should be in the ***off*** position. In this case it will be necessary to drill a hole to route the 7 channel select lines from the synthesiser compartment to the D-range connector. Later models have an access slot between these two compartments.

1. IBM is a registered trademark of International Business Machines.

3.3 Audio Processor Links

3.3.1 General

The links available for various circuit block options are listed by function as follows:

Plug	Link	Function
PL100	1 - 2 2 - 3	Rx disable link not connected
PL101	1 - 2 2 - 3	flat response de-emphasised response
PL102	1 - 2 2 - 3	relay link not connected
PL103	1 - 2 2 - 3	de-emphasised response flat response
PL104	1 - 2 2 - 3	noise mute carrier mute
PL105*	1 - 2 2 - 3 or 3 - 4 4 - 5	bypass high pass filter 300Hz high pass filter in circuit audio input via audio 2 or 3
PL106	1 - 2 2 - 3	audio input via audio 2 pad audio input via audio 3 pad

*Refer to Section 3.3.2 for further details.

The required options should be selected before alignment of the receiver is attempted.

3.3.2 Audio Processor Linking Details For CTCSS

The audio processor links must be appropriately connected for the CTCSS option used, as shown in the table below.

CTCSS Option	PL105	PL106
standard, no CTCSS	2 - 3	2 - 3
CTCSS tone + speech to line output	1 - 2	2 - 3
internal CTCSS	4 - 5	2 - 3
external CTCSS	4 - 5	1 - 2

The conditions stated in the above table are defined as follows:

- standard, no CTCSS
  - CTCSS or other sub-audio signalling used
  - audio bandwidth 300Hz to 3kHz
  - hum & noise -55dB
- CTCSS tone + speech to line output
  - tone and speech transmitted down 600 ohm line
  - audio bandwidth 10Hz to 3kHz
  - hum & noise -45dB
  - decoding performed in exciter / transmitter
- internal CTCSS
  - decoding performed in receiver by T800-02 or similar
  - re-encoded tone output via "audio 2", speech sent down 600 ohm line
- external CTCSS
  - decoding performed through the receiver (but externally) by T310-05 or similar
  - speech injected back into receiver via "audio 2" and sent down 600 ohm line

3.4 Test Equipment Set-up

Set up the test equipment as shown below:

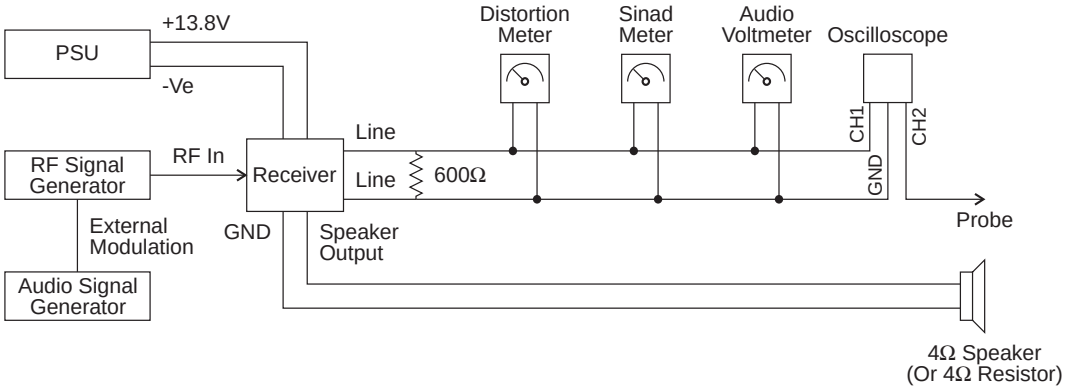


Figure 3.2 Test Equipment Set-up

3.5 Synthesiser Alignment

- Ensure that the EPROM (IC1) has been programmed with the required frequencies using PGM800 software.

- **Single Channel** Select a channel on the EPROM PCB DIP switch.

  Multichannel Select the middle channel via the EPROM PCB DIP switch.

  If there is no channel near the middle of the required switching range, it may be necessary to programme an additional channel specifically for alignment purposes.

- Connect a high impedance voltmeter to PL4-1 or the junction of L1 & R1 in the VCO (this measures the synthesiser loop voltage).

- **Single Channel** Tune VCO trimmer VC1 for a synthesiser loop voltage of 9V.

  Multichannel Tune VCO trimmer VC1 for a synthesiser loop voltage of 9V on the middle channel.

  All channels should lie within the upper and lower limits of 13V and 5V respectively.

  Do not attempt to programme channels with a greater frequency separation than the specified switching range of 3MHz.

- The TCXO (IC2) output frequency should be trimmed when the IF is tuned - refer to Section 3.6.

3.6 Alignment Of Receiver Front End And IF

Note 1: In this and following sections deviation settings are given first for wide band sets, followed by settings in brackets for narrow band sets [ ].

Note 2: **Frequency Range**

136-156MHz: With the power supply switched off, solder bridge links 1-6 and link B in the front end.

148-174MHz: Solder bridge link A and ensure links 1-6 and link B are not connected.

Align the synthesiser as instructed in Section 3.5. For multichannel operation the receiver should be aligned on a frequency in the middle of the required band.

Inject a strong on-channel RF signal with 3kHz deviation [1.5kHz] at 1kHz into the antenna socket and adjust L304, L305, L309 & L310 to give best sinad.

Continually decrease the RF level to maintain 12dB sinad.

Roughly tune IF coils L315/L316/L317, VC301 and quad coil L319 for best sinad.

While maintaining a low level unmodulated RF input to the receiver, loosely couple into the first IF an additional high level signal at 21.4MHz - a beat note will be heard.

Trim the synthesiser TCXO (IC2) for zero beat.

Readjust the front end doublets (L304, L305, L309 & L310) to give best sinad.

Change the RF signal level to -75dBm and modulate with 3kHz deviation [1.5kHz] at 1kHz.

Connect an oscilloscope probe to the RSSI test point (pad 115 or 125) and connect plugs PL101 and PL103 to give a flat audio response (refer to Section 3.3).

Readjust IF coils L315/L316/L317, VC301 and quad coil L319 to give a maximum amplitude response on the oscilloscope with minimal amplitude modulation.

Further adjust these coils, along with L319, for minimum audio distortion, ensuring that the 455kHz level (on the oscilloscope) does not fall significantly.

Check that the distortion reading is less than 2%.

Reconnect plugs PL101 and PL103 to give a de-emphasised audio response (if required) and reduce the RF level until 12dB sinad is reached. The receiver sensitivity should be better than -117dBm, assuming that the audio levels are not being overdriven (refer to Section 3.8).

3.7 Noise Mute Adjustment

Connect pins 1 & 2 of PL104 to enable the noise mute.

Align the receiver as instructed in Section 3.5 and Section 3.6.

Set the RF level to -105dBm with 3kHz deviation [1.5kHz] at 1kHz.

Set RV100 (gate sensitivity) fully anticlockwise.

Adjust RV301 to close the mute (if necessary turn off the RF signal and then turn it on again).

Rotate RV301 anticlockwise until the mute just opens.

Once the mute has been set up as described above, RV100 (gate sensitivity) on the front panel may be adjusted for the required opening sinad.

3.8 Audio Processor

3.8.1 Line Amplifier Output

Apply an on-channel signal from the RF generator at a level of -70dBm with 3kHz deviation [1.5kHz] at 1kHz.

Adjust the front panel line level pot. (RV102) to give an output of +10dBm on the 600 ohm line.

Check for any clipping or distortion on the oscilloscope.

Set the line level to the required output level.

3.8.2 Monitor Amplifier Output (Speaker Output)

Adjust the front panel monitor volume control (RV103) to give an output of 2V rms into a 3.5 ohm resistive load.

Check for any clipping or distortion on the oscilloscope.

Switch to a 3.5 ohm speaker load and adjust RV103 to the required level.

3.9 RSSI

Align the receiver as instructed in Section 3.5 and Section 3.6.

Apply an on-channel signal from the RF generator at a level of -100dBm with 3kHz deviation [1.5kHz] at 1kHz.

Adjust RV303 to give 4.5V RSSI output on pin 5 on the rear D-range connector when measured with a high impedance DMM.

3.10 Carrier Level Mute

Connect pins 2 and 3 of PL104 to enable the carrier mute and disable the noise mute.

Apply an on-channel signal from the RF generator at the required mute opening level with 3kHz deviation [1.5kHz] at 1kHz.

Adjust the carrier mute pot. (RV104) to close the mute (if necessary, momentarily turn off the RF), then slowly adjust it until the mute just opens. The mute should now open at this preset level.

3.11 PGM800 DIP Switch Codes

PGM800 channel numbers can range from 0-127 or 1-128, depending on which version you are using:

Version	Channel Numbers
V2 and earlier	0-127
V2.01	1-128
V2.21 and later	0-127 or 1-128

The following sections provide DIP switch code lists for both numbering systems.

3.11.1 DIP Switch Codes For Channel Numbers 0-127

0 = off 1 = on

Channel	DIP Code	Channel	DIP Code	Channel	DIP Code
0	X1111111	45	X1010010	90	X0100101
1	X1111110	46	X1010001	91	X0100100
2	X1111101	47	X1010000	92	X0100011
3	X1111100	48	X1001111	93	X0100010
4	X1111011	49	X1001110	94	X0100001
5	X1111010	50	X1001101	95	X0100000
6	X1111001	51	X1001100	96	X0011111
7	X1111000	52	X1001011	97	X0011110
8	X1110111	53	X1001010	98	X0011101
9	X1110110	54	X1001001	99	X0011100
10	X1110101	55	X1001000	100	X0011011
11	X1110100	56	X1000111	101	X0011010
12	X1110011	57	X1000110	102	X0011001
13	X1110010	58	X1000101	103	X0011000
14	X1110001	59	X1000100	104	X0010111
15	X1110000	60	X1000011	105	X0010110
16	X1101111	61	X1000010	106	X0010101
17	X1101110	62	X1000001	107	X0010100
18	X1101101	63	X1000000	108	X0010011
19	X1101100	64	X0111111	109	X0010010
20	X1101011	65	X0111110	110	X0010001
21	X1101010	66	X0111101	111	X0010000
22	X1101001	67	X0111100	112	X0001111
23	X1101000	68	X0111011	113	X0001110
24	X1100111	69	X0111010	114	X0001101
25	X1100110	70	X0111001	115	X0001100
26	X1100101	71	X0111000	116	X0001011
27	X1100100	72	X0110111	117	X0001010
28	X1100011	73	X0110110	118	X0001001
29	X1100010	74	X0110101	119	X0001000
30	X1100001	75	X0110100	120	X0000111
31	X1100000	76	X0110011	121	X0000110
32	X1011111	77	X0110010	122	X0000101
33	X1011110	78	X0110001	123	X0000100
34	X1011101	79	X0110000	124	X0000011
35	X1011100	80	X0101111	125	X0000010
36	X1011011	81	X0101110	126	X0000001
37	X1011010	82	X0101101	127	X0000000
38	X1011001	83	X0101100		
39	X1011000	84	X0101011		
40	X1010111	85	X0101010		
41	X1010110	86	X0101001		
42	X1010101	87	X0101000		
43	X1010100	88	X0100111		
44	X1010011	89	X0100110		

3.11.2 DIP Switch Codes For Channel Numbers 1-128

0 = off 1 = on

Channel	DIP Code	Channel	DIP Code	Channel	DIP Code
1	X1111111	46	X1010010	91	X0100101
2	X1111110	47	X1010001	92	X0100100
3	X1111101	48	X1010000	93	X0100011
4	X1111100	49	X1001111	94	X0100010
5	X1111011	50	X1001110	95	X0100001
6	X1111010	51	X1001101	96	X0100000
7	X1111001	52	X1001100	97	X0011111
8	X1111000	53	X1001011	98	X0011110
9	X1110111	54	X1001010	99	X0011101
10	X1110110	55	X1001001	100	X0011100
11	X1110101	56	X1001000	101	X0011011
12	X1110100	57	X1000111	102	X0011010
13	X1110011	58	X1000110	103	X0011001
14	X1110010	59	X1000101	104	X0011000
15	X1110001	60	X1000100	105	X0010111
16	X1110000	61	X1000011	106	X0010110
17	X1101111	62	X1000010	107	X0010101
18	X1101110	63	X1000001	108	X0010100
19	X1101101	64	X1000000	109	X0010011
20	X1101100	65	X0111111	110	X0010010
21	X1101011	66	X0111110	111	X0010001
22	X1101010	67	X0111101	112	X0010000
23	X1101001	68	X0111100	113	X0001111
24	X1101000	69	X0111011	114	X0001110
25	X1100111	70	X0111010	115	X0001101
26	X1100110	71	X0111001	116	X0001100
27	X1100101	72	X0111000	117	X0001011
28	X1100100	73	X0110111	118	X0001010
29	X1100011	74	X0110110	119	X0001001
30	X1100010	75	X0110101	120	X0001000
31	X1100001	76	X0110100	121	X0000111
32	X1100000	77	X0110011	122	X0000110
33	X1011111	78	X0110010	123	X0000101
34	X1011110	79	X0110001	124	X0000100
35	X1011101	80	X0110000	125	X0000011
36	X1011100	81	X0101111	126	X0000010
37	X1011011	82	X0101110	127	X0000001
38	X1011010	83	X0101101	128	X0000000
39	X1011001	84	X0101100		
40	X1011000	85	X0101011		
41	X1010111	86	X0101010		
42	X1010110	87	X0101001		
43	X1010101	88	X0101000		
44	X1010100	89	X0100111		
45	X1010011	90	X0100110		

4 T835 Functional Testing

The following test procedures will confirm that the T835 has been tuned and adjusted correctly and is fully operational.

Note: In this and following sections deviation settings are given first for wide band sets, followed by settings in brackets for narrow band sets [ ].

The following topics are covered in this section.

4.1 Current Consumption

Connect the T835 to a 13.8V power supply.

Rotate the front panel mute pot. anticlockwise until the mute LED is extinguished.

Turn the front panel "Monitor Mute" switch to the ***on*** position.

Check that the current in the 13.8V power cable is less than 350mA.

Rotate the mute pot. clockwise until the mute LED is lit.

Rotate the line level adjuster and the volume control to give maximum outputs.

Check that the current is less than 750mA.

4.2 Sensitivity

Apply an on-channel signal from the RF generator with 3kHz deviation [1.5kHz] at 1kHz.

Adjust the RF level to give 12dB audio sinad.

Check that the sensitivity is better than -117dBm.

4.3 Switching Band (Multichannel Only)

Apply an on-channel signal from the RF generator at various frequencies within the 3MHz front end bandwidth, corresponding to pre-programmed channels.

Measure the sensitivity at each frequency as described in Section 4.2.

Ensure that the sensitivity is better than -115dBm across the whole band.

4.4 Audio Distortion

The level of distortion measured at the line output gives a good indication of the accuracy of the IF alignment.

Apply an accurate on-channel signal from the RF generator at a level of -70dBm with 3kHz deviation [1.5kHz] at 1kHz.

Adjust the front panel line level control (RV102) to give +10dBm into 600 ohms.

Check that the distortion is approximately 1% THD.

Note: For a de-emphasised response, the distortion should always be better than 2% for wide band sets or 4% for narrow band sets.

Adjust the front panel monitor volume control (RV103) to give 2V rms into a 4 ohm resistive load.

Check that the distortion at the monitor output is better than 2% THD.

4.5 Ultimate Signal-To-Noise Ratio

Apply a signal from the RF generator at a level of -57dBm with 3kHz deviation [1.5kHz] at 1kHz.

Select de-emphasis on the links provided in the audio processor (refer to Section 3.3), and link pins 2 & 3 of PL105 to include the 300Hz filter.

Adjust RV102 (line level) to provide +10dBm output.

Switch off the modulation, checking that the residual noise is lower than -45dBm [-39dBm] at the line output (this corresponds to S/N of 55dB [49dB] and is in accordance with EIA measurement conditions).

Note: The measurement can be made without the 300Hz high pass filter but will give a result which is 10dB worse.

4.6 De-emphasised Audio Frequency Response

Set RV102 (line level) to provide 0dBm output at 1kHz modulating frequency.

Sweep the modulating frequency, checking that the response closely follows that shown in Figure 4.1 - the limits should not be exceeded.

Note: The curve is shown for wide band sets. The narrow band response is similar, but rolls off earlier at 2.5kHz.

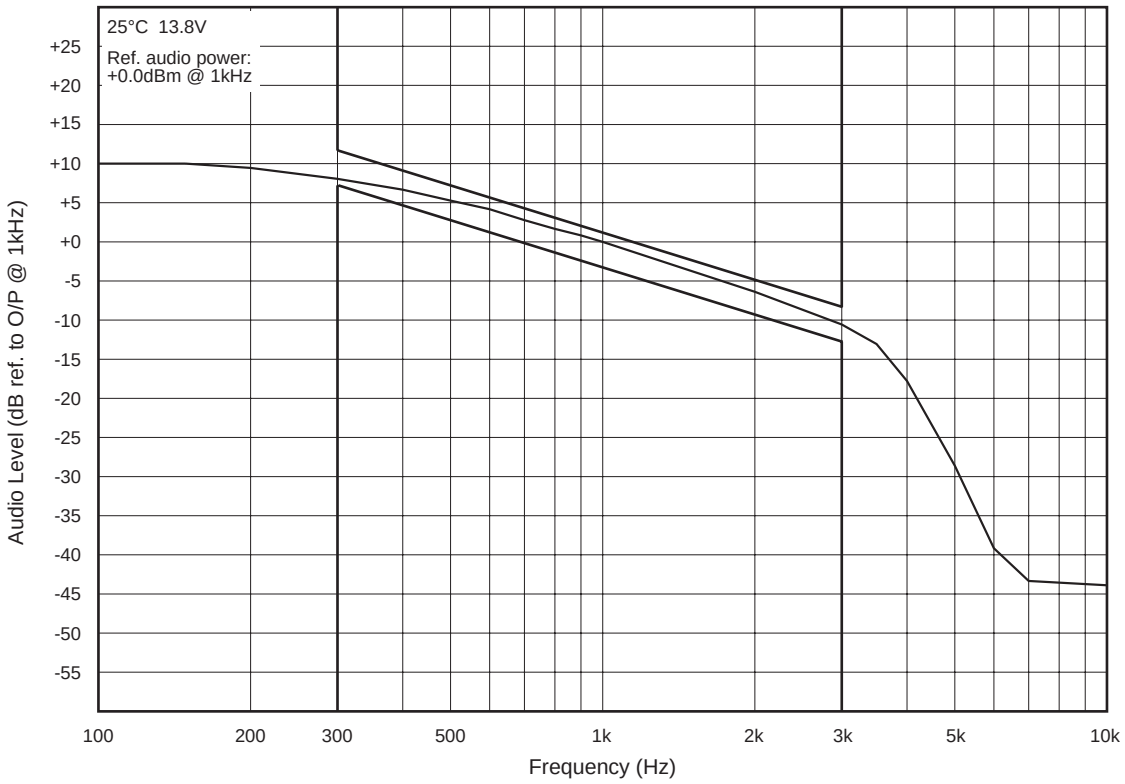


Figure 4.1 De-emphasised Audio Frequency Response

4.7 Noise Mute (If Linked In)

Rotate the front panel mute pot. (RV100) fully anticlockwise.

Apply an on-channel signal from the RF generator at a level of -110dBm with 3kHz deviation [1.5kHz] at 1kHz.

Increase the RF level in 1dB steps, checking that the mute opens for an RF input level of approximately -105dBm.

Turn the RF off and check that the mute closes.

Rotate the mute pot. clockwise and check that the mute opens.

Reset the mute pot. to give the required opening sinad.

4.8 RSSI

Apply an on-channel signal from the RF generator at a level of -100dBm with 3kHz deviation [1.5kHz] at 1kHz.

Using a high impedance DMM, check that the RSSI output voltage on pin 5 of the rear D-range connector is 4.5V (nominal).

Vary the RF level in 5dB steps and check that the RSSI output voltage changes at a rate of approximately 15dB/V over the range of -115dBm to -70dBm (refer to Figure 4.2 for RSSI voltage vs signal strength).

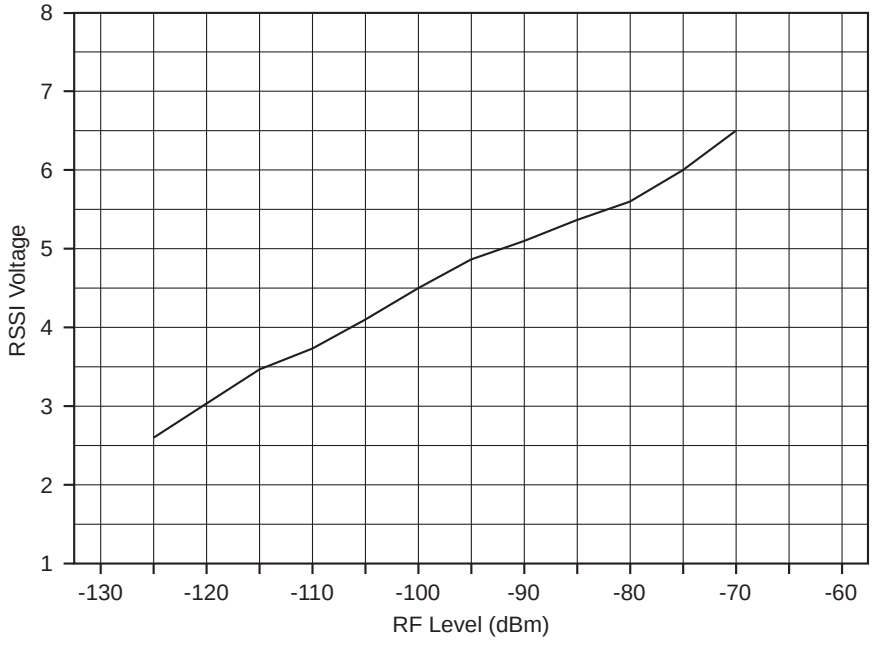


Figure 4.2 RSSI Voltage vs Signal Strength

4.9 Carrier Level Mute (Carrier Mute Linked In)

Apply an on-channel signal from the RF generator at a level of -120dBm with 3kHz deviation [1.5kHz] at 1kHz.

Increase the RF level in 2dB steps and check that the mute opens at an RF level which corresponds with the preset level on RV104 (i.e. between -115dBm and -70dBm).

5 T835 Fault Finding

The following test procedures and fault finding flow charts may be used to help locate a hardware problem, however they are by no means a complete fault finding procedure. If the fault still exists after having progressed through them in a logical manner, contact your nearest authorised Tait Dealer or Service Centre. Further assistance may be obtained from the Customer Support Group, Radio Infrastructure Division, Tait Electronics Ltd, Christchurch, New Zealand.

The following topics are covered in this section.

5.1 Visual Checks

Remove the covers from the T835 and inspect the PCB for damaged or broken components, paying particular attention to the surface mounted devices (SMDs).

Check for defective solder joints. If repair or replacement is considered necessary, refer to Section 3 of Part A.

5.2 Component Checks

If a transistor is suspected of faulty operation, an indication of its performance can be assessed by measuring the forward and reverse resistance of the junctions. First make sure that the transistor is not shunted by some circuit resistance (unless the device is completely desoldered). A 20k ohm/V or better multimeter should be used for taking the measurements, using only the medium or low resistance ranges.

The collector current drawn by multi-junction transistors is a further guide to their performance.

If an IC is suspect, the most reliable check is to measure the DC operating voltages. Due to the catastrophic nature of most IC failures, the pin voltages will usually be markedly different from the recommended values in the presence of a fault. The recommended values can be obtained from either the circuit diagram or the component data catalogue.

5.3 DC Checks

5.3.1 Power Rails

Refer to the test points & options diagrams for test point locations, and to the regulator fault finding chart (Section 5.5.1) for fault diagnosis.

Check the 9V (TP2) and 13.8V (TP1) power supply test points in the audio compartment with a DMM.

Check the 20V regulator output at the test point (TP3) in the regulator compartment.

Check the 5V regulator output at the test point (TP4) in the regulator compartment and on pin 4 of IC303.

5.3.2 VCO Locking

Using a DMM, monitor the VCO control voltage at PL4-1 or the junction of L1 & R1 (located adjacent to the electrolytic capacitor on the VCO PCB).

If the synthesiser is locked and the VCO aligned, the voltage at this point should be between 5 and 13V.

If the VCO is not locked, refer to the synthesiser fault finding chart (Section 5.5.2).

5.3.3 Mute Operation

The front panel LED will show the status of the mute circuitry. It will be lit when a signal is received above the threshold level. It should always be possible to open the mute gate by rotating the mute potentiometer fully clockwise, or by enabling the monitor with the front panel switch.

If the mute fails to operate correctly, refer to the mute fault finding chart (Section 5.5.3).

5.4 RF Checks

5.4.1 VCO Frequency

Check that the VCO is phase locked (refer to Section 5.3.2).

Connect a frequency counter (level +19dBm) to the VCO input to the mixer (IC301).

Monitor the local oscillator frequency and check that it is 21.4MHz ***above*** the required receive frequency.

Refer to the synthesiser fault finding chart (Section 5.5.2) for further information.

5.4.2 RF Sensitivity

Ensure that the VCO is on the correct frequency and the receiver correctly aligned.

Check that the sensitivity into the front end is -117dBm (typical).

If the sensitivity is poor, the fault can be traced by measuring the sensitivity into successive circuit blocks. Prepare a test cable by connecting a 1nF capacitor to the end of a length of coax cable as shown in Figure 5.1.

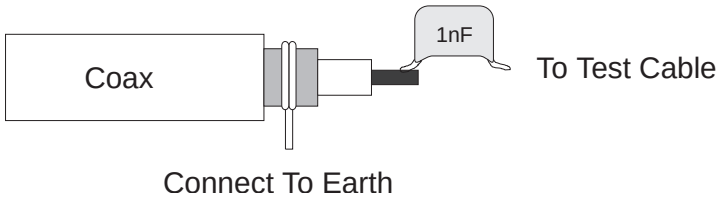


Figure 5.1 RF Test Cable

Note: Before using the test cable, ensure the coax braid is connected to an earth point on the PCB.

Using the RF test cable, apply a modulated 21.4MHz signal to the test breaks in the IF section, or an on-channel RF signal to the front end test breaks.

Check that the sensitivity at each test break is within 2dB of the levels shown on the circuit diagram.

Poor sensitivity indicates a fault in one of the circuit blocks following the test break.

Note: Poor sensitivity into the mixer can be caused by lack of drive level from the VCO (the drive level should be >+17dBm).

Refer to the receiver fault finding charts (Section 5.5.5) for further information.

5.4.3 Oscillator Stability

5.4.3.1 TCXO

While maintaining a low level unmodulated RF input to the receiver, loosely couple into the first IF an additional high level signal at 21.4MHz - a constant low frequency beat note should be heard.

Tap the TCXO with a finger and replace it if the beat note permanently changes.

5.4.3.2 Second IF

While maintaining a low level unmodulated RF input to the receiver, loosely couple into the second IF an additional high level signal at 455kHz - a constant low frequency beat note should be heard.

Adjust the frequency of the 455kHz signal for zero beat.

If the second IF is more than 300Hz off frequency, check IC302, X301, C361 and C362 and replace if necessary.

5.4.4 Demodulator Output

Apply an on-channel RF signal modulated by 1kHz with 3kHz [1.5kHz] deviation at an amplitude of -65dBm.

Connect an oscilloscope probe (DC coupled) to IC303 pin 7 (audio output).

Check that an audio signal of approximately 380mV peak to peak is present.

Optimum tuning of the quad coil (L319) for minimum audio distortion (with a "flat" audio response) should coincide with maximum audio amplitude and a DC level of approximately 1.3V.

5.4.5 IF Distortion

If after careful IF alignment (Section 3.6) the audio distortion is still high, the IF should be swept to investigate the bandpass response.

Apply an on channel RF signal modulated at 10Hz with 12kHz [6kHz] deviation at an amplitude of -80dBm.

Connect the modulating 10Hz audio signal to the "X" input of an oscilloscope and observe the 455kHz IF input to IC303 pin 16 via a suitable RF probe on the "Y" input.

Note: The X input should be DC coupled.

Check that the swept response has a rounded top and no sharp non-linearities (refer to Figure 5.2).

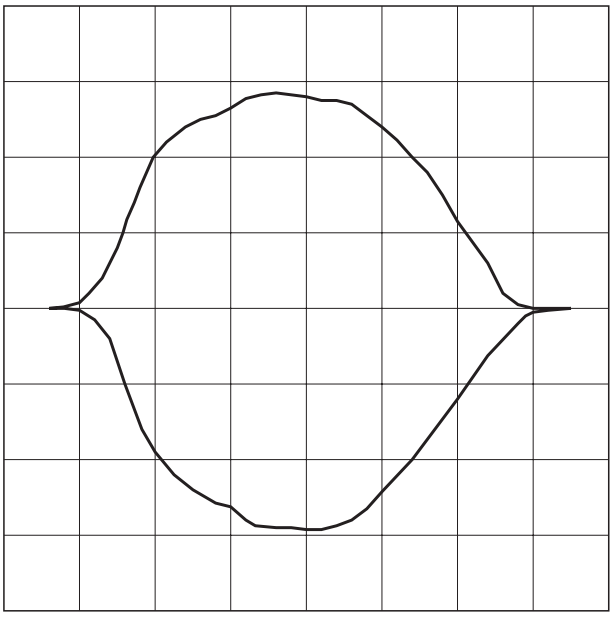


Figure 5.2 IF Swept Response

Increase the RF level to -50dBm; the trace will now show the shape of the 455kHz ceramic filter (&XF303).

Check that the response has no sharp non-linearities.

If sharp non-linearities do occur, replace the filter and sweep to confirm a satisfactory solution (refer to Figure 5.3).

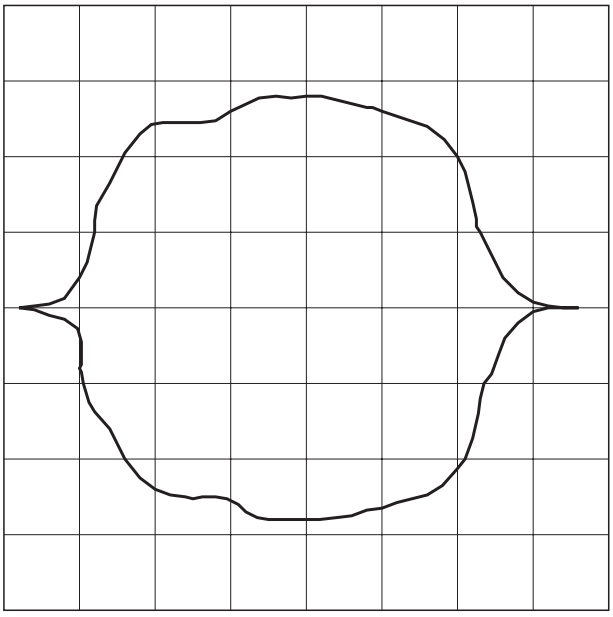


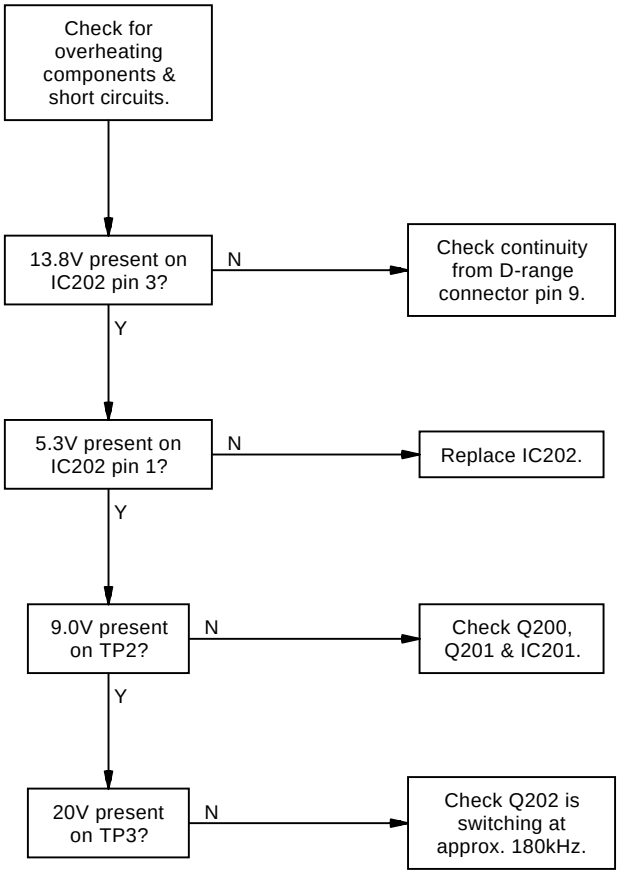
Figure 5.3 Ceramic Filter Swept Response

5.5 Fault Finding Charts

Note: The standard test point designations as used in this section are as follows:

TP1	13.8V
TP2	9V
TP3	20V
TP4	5V

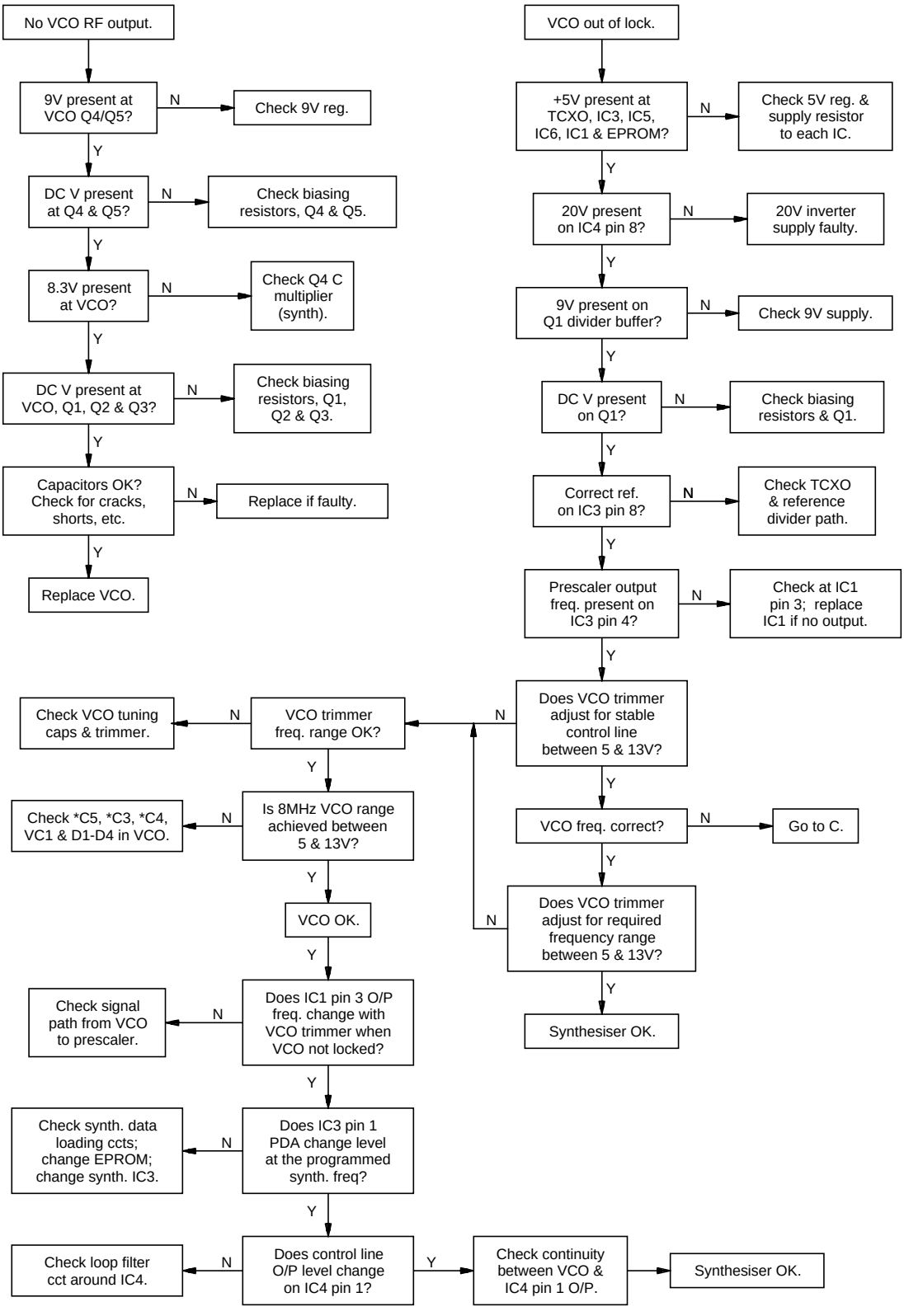
5.5.1 Regulator



5.5.2 Synthesiser

A (Refer to VCO circuit diagram)

B (Refer to synth. circuit diagram)



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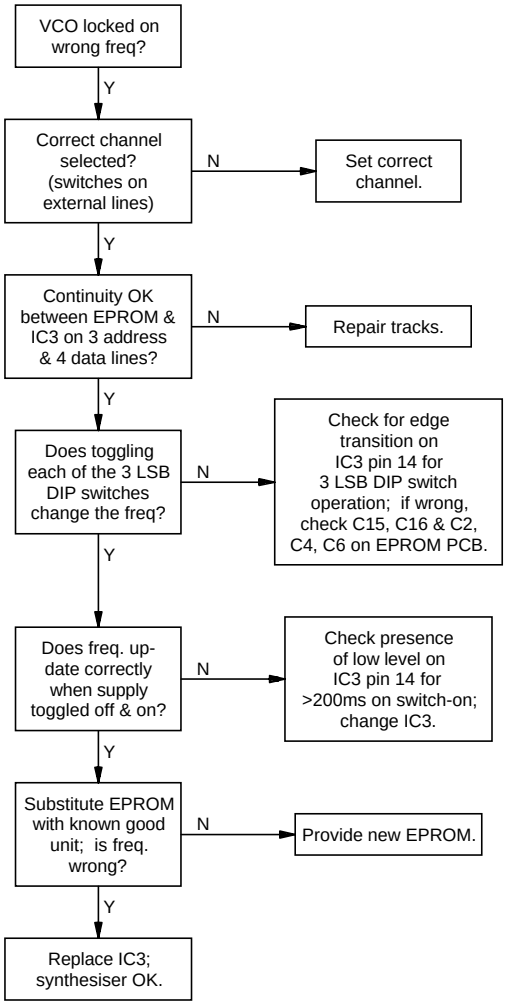
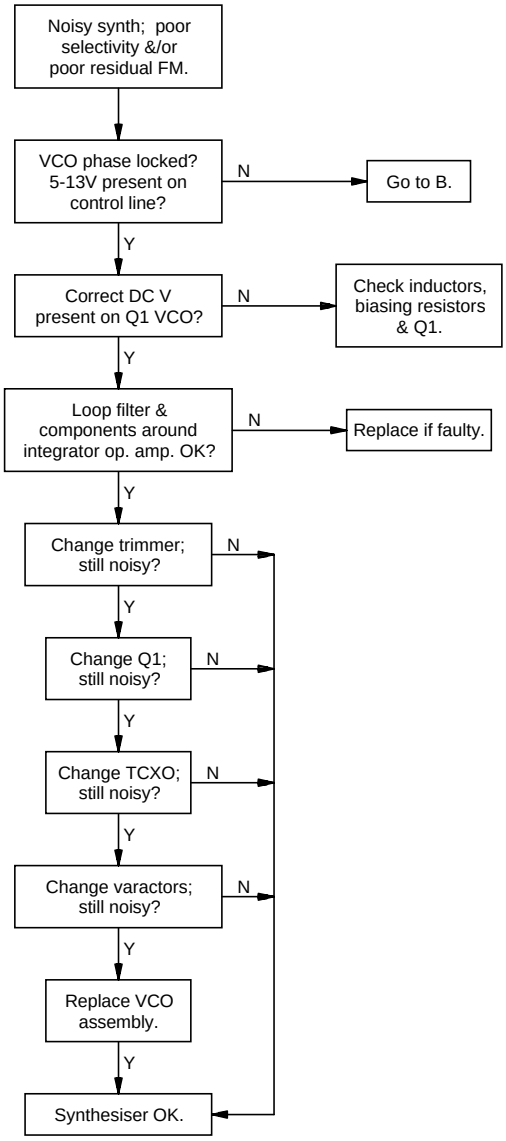
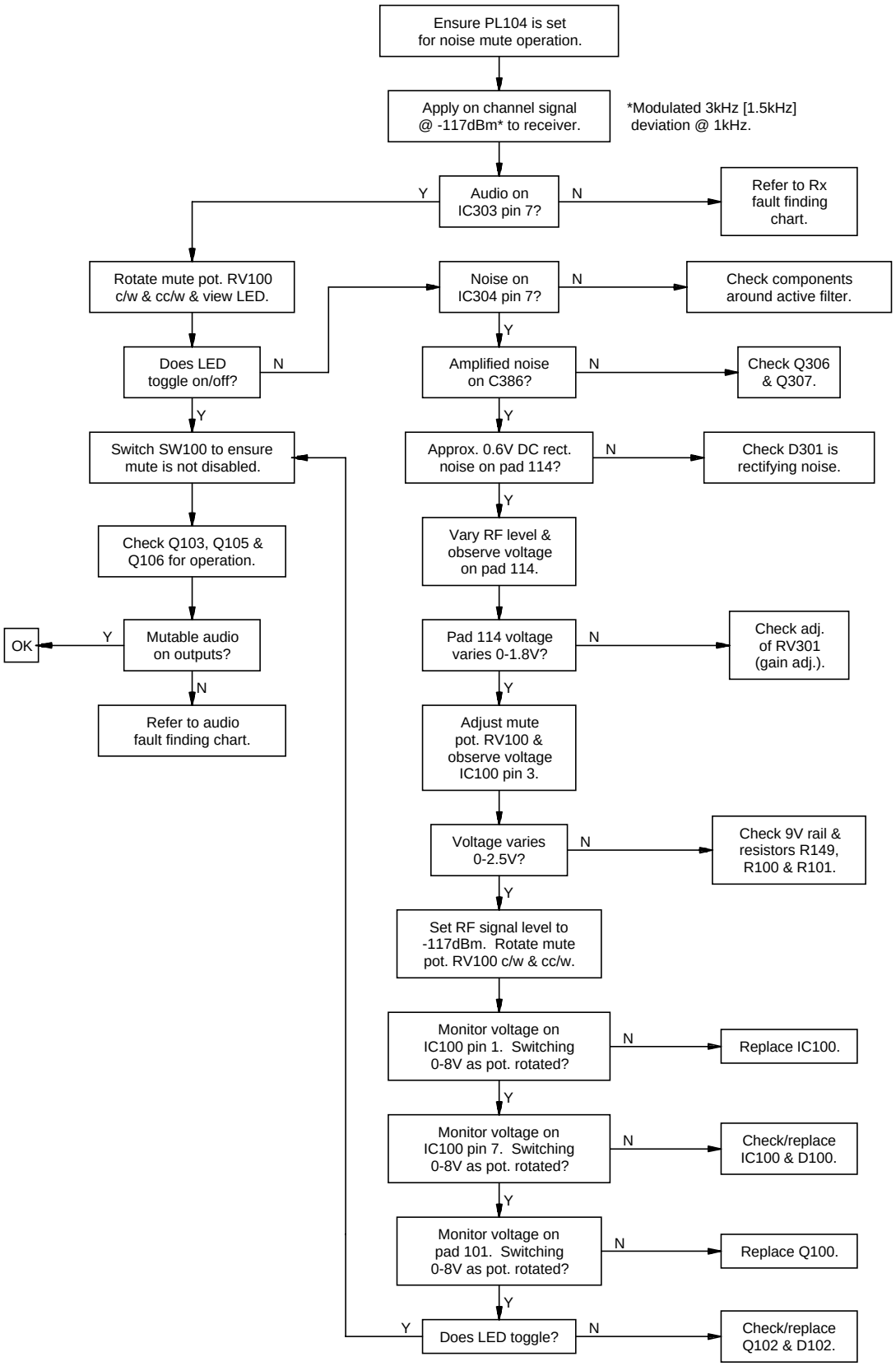
C (Refer to synth. circuit diagram)



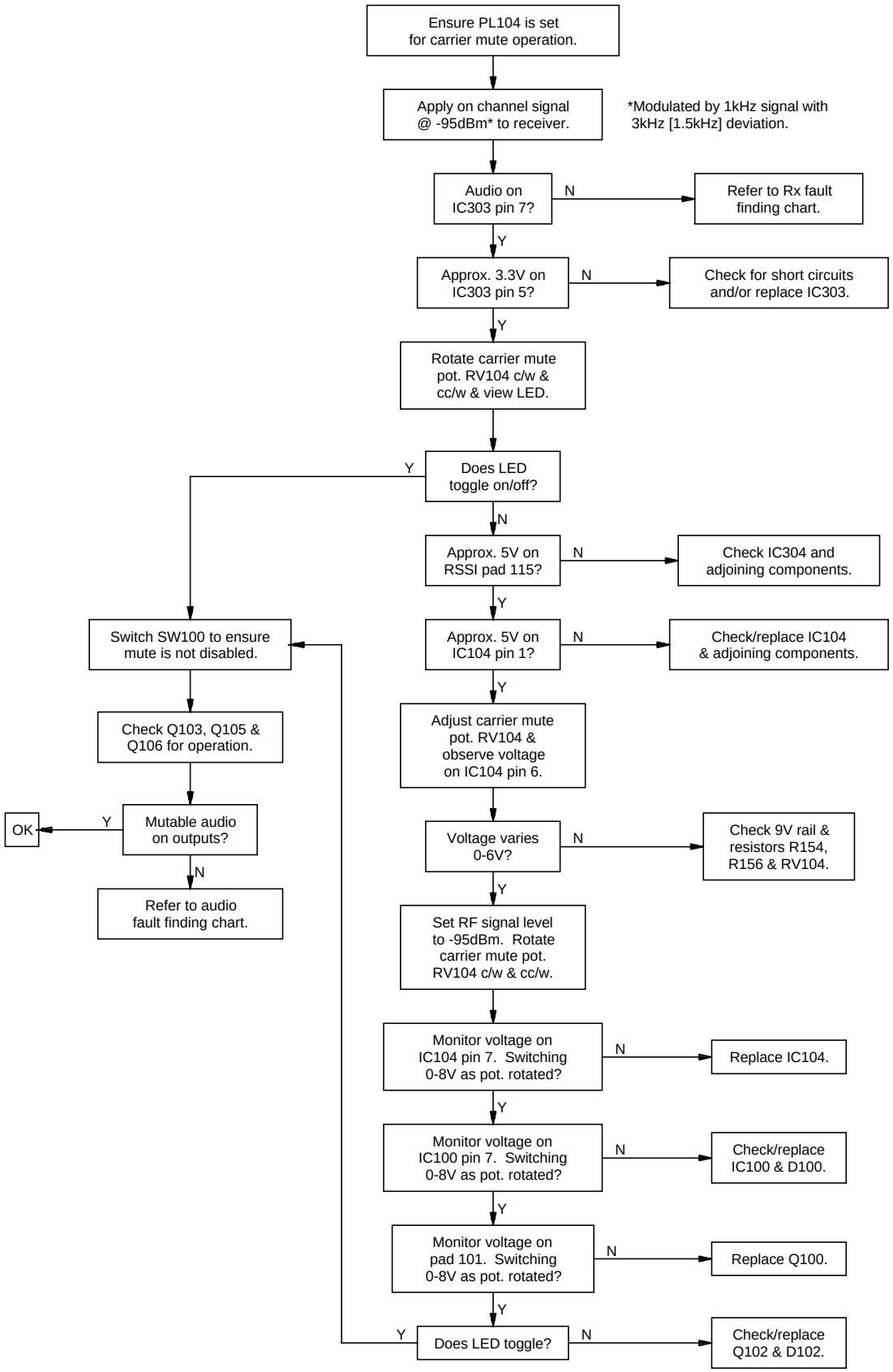
D (Refer to synth. & VCO circuit diagrams)



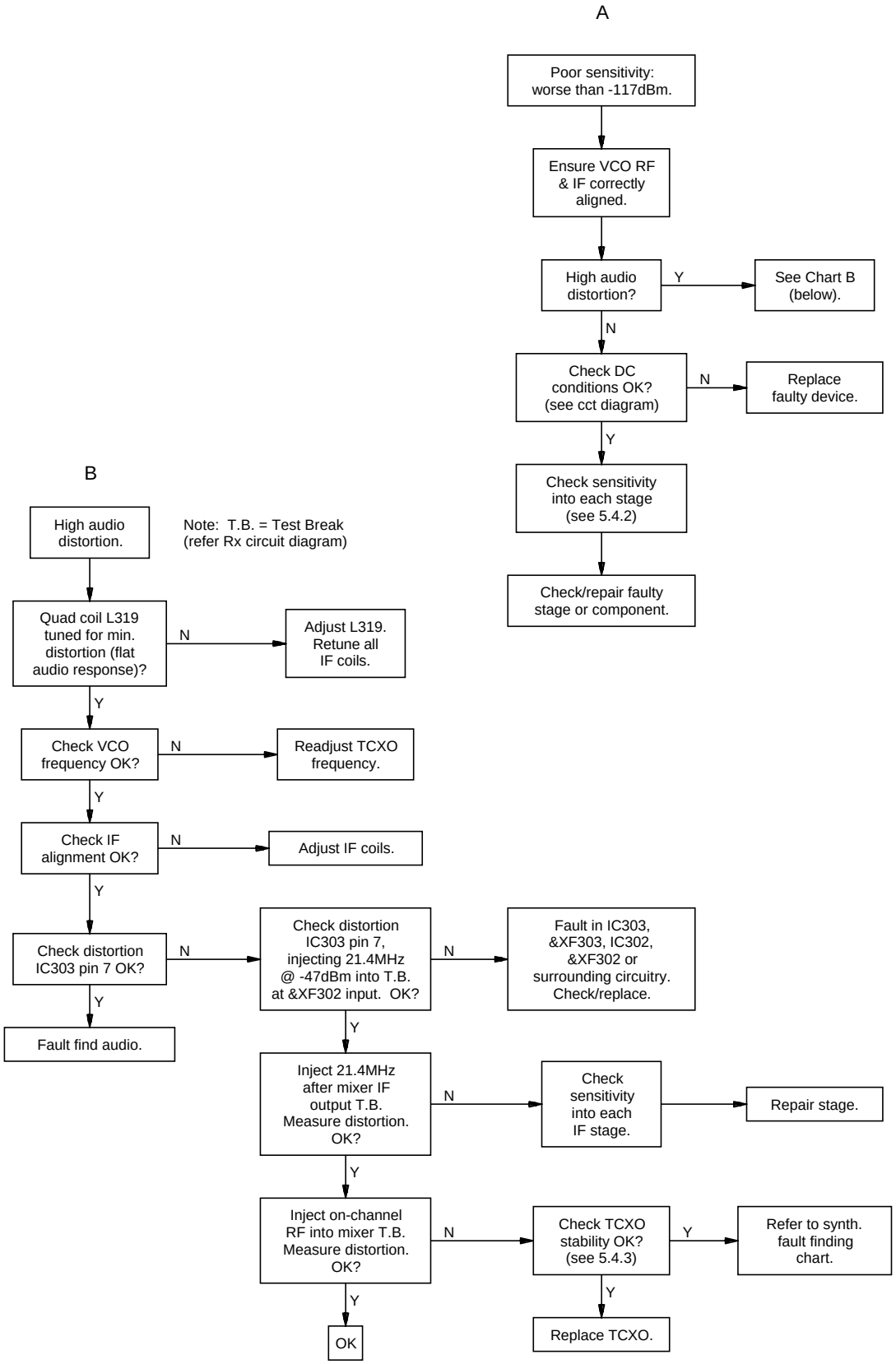
5.5.3 Noise Mute



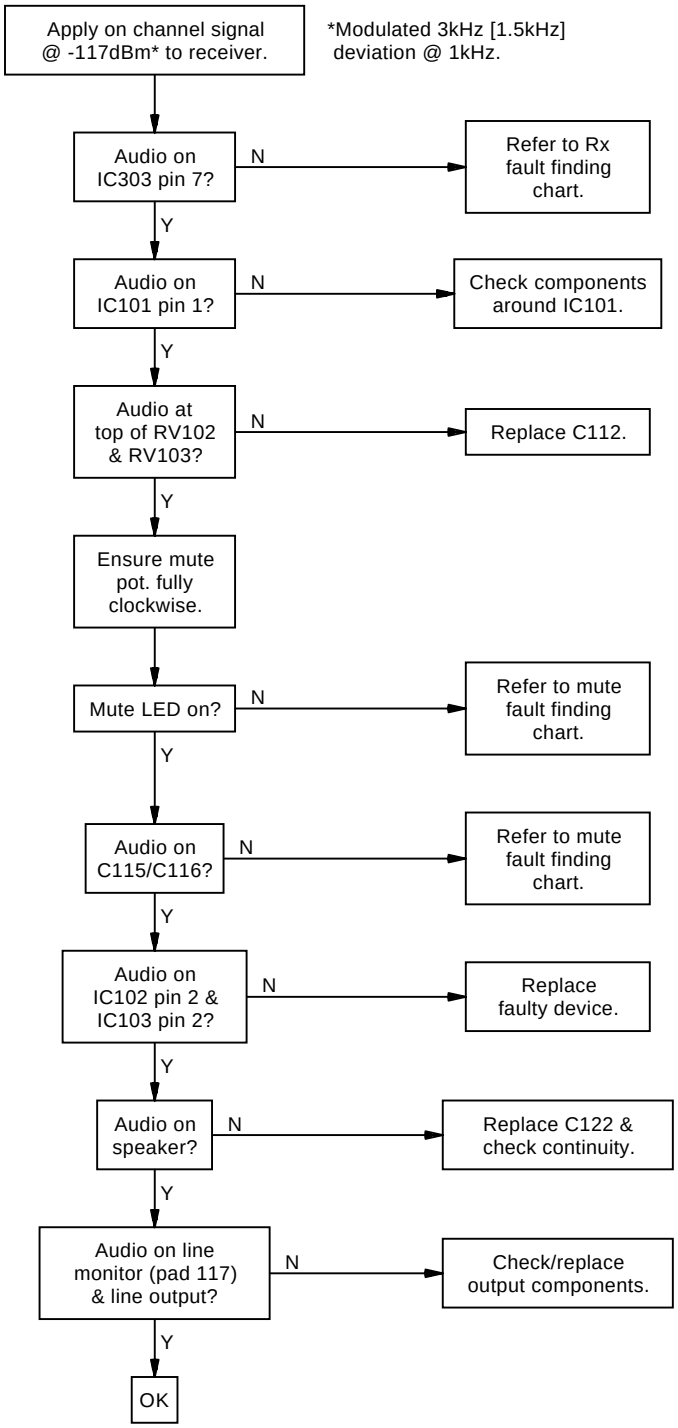
5.5.4 Carrier Mute



5.5.5 Receiver



5.5.6 Audio



6 T835 PCB Information

This section provides parts lists, a grid reference index, PCB layouts, test points and options drawings and circuit diagrams for the T835 receiver.

This section contains the following information.

6.1 Introduction

PCB Identification

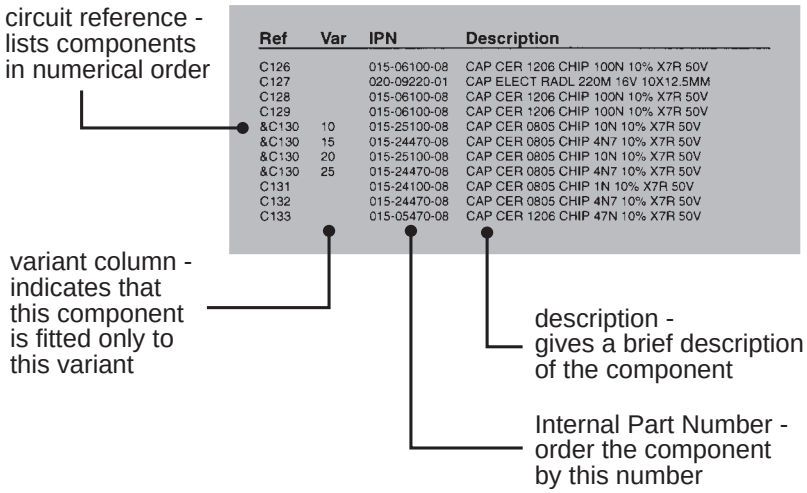
All PCBs are identified by a unique 10 digit number, the last 2 digits of which define the issue status. The issue status starts at 00 and increments through 01, 02, 03, etc. as the PCB is updated. Some issue PCBs never reach full production status and are therefore not included in this manual. A letter following the 10 digit IPN has no relevance in identifying the PCB for service purposes.

Parts Lists

The 10 digit numbers (000-00000-00) in this Parts List are “internal part numbers” (IPNs). Your spare parts orders can be handled more efficiently if you quote the IPN and provide a brief description of the part.

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc.) and those without (miscellaneous and mechanical).

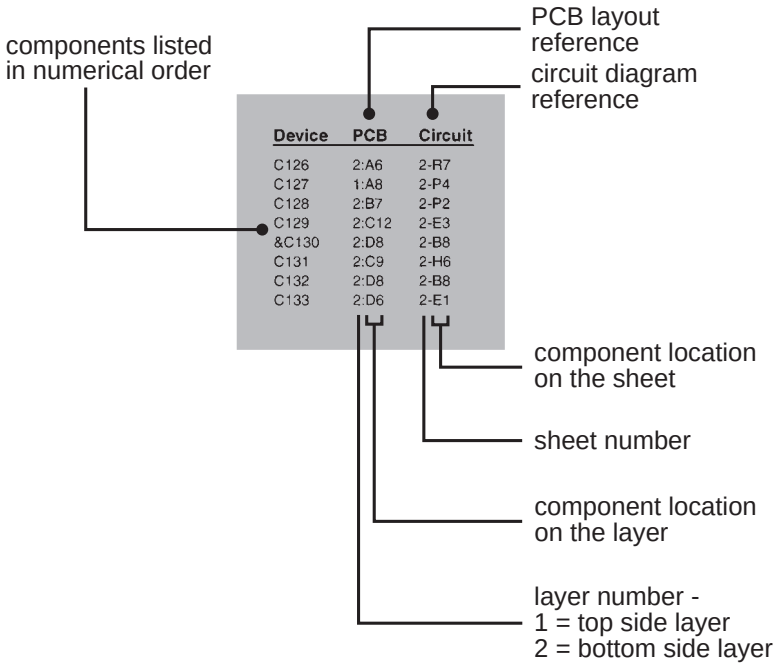
Those with a circuit reference are grouped in alphabetical order and then in numerical order within each group. Each component entry comprises three or four columns, as shown below:



The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Grid Reference Index

To assist in locating components and labelled pads on the PCB layouts and circuit diagrams, a component grid reference index has been provided. This index lists the components and pads in alphabetical order, along with the appropriate alphanumeric grid references, as shown below:



Using CAD Circuit Diagrams

Reading a CAD circuit diagram is similar to reading a road map, in that both have an alphanumeric border. The circuit diagrams in this manual use letters to represent the horizontal axis, and numbers for the vertical axis. These circuit diagram “grid references” are useful in following a circuit that is spread over two or more sheets.

When a line representing part of the circuitry is discontinued, a reference will be given at the end of the line to indicate where the rest of the circuitry is located. The first digit refers to the sheet number (printed on the bottom right hand corner of the CAD diagram) and the last two characters refer to the location on that sheet of the continuation of the circuit (e.g. 1-D4).

If more than one line is represented (indicated by a double thickness line), a dot with a reference label will follow the route each individual line represents.

6.2 T835 Receiver PCB

This section contains the following information.

T835 Parts List (IPN 220-01186-02)

How To Use This Parts List

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped by component type in numerical order. Each component entry comprises three or four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this component is fitted only to that variant.

The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Parts List Amendments

There were no amendments to the parts list at the time of publication.

Ref	Var	IPN	Description
C1		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C2		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C4		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C5		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C6		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C7		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C8		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C9		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C13		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C14		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C15		015-22560-01	CAP CER 0805 CHIP 56P 5% NPO 50V
C16		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C17		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C19		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C20		025-08100-02	CAP TANT BEAD 10M 10% 16V
C21		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C22		015-25150-08	CAP CER 0805 CHIP 15N 10% X7R 50V
C23		022-06330-03	CAP METAL POLYES 330N 10% 50V 5MM L/S
C24		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C25		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C26		025-08100-02	CAP TANT BEAD 10M 10% 16V
C27		025-08100-02	CAP TANT BEAD 10M 10% 16V
C28		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C30		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C31		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C32		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C33		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C34		015-21820-01	CAP CER 0805 CHIP 8P2 +/-0.25P NPO 50V
C35		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C36		025-08100-02	CAP TANT BEAD 10M 10% 16V
C37		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C38		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C39		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C40		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C100		020-57100-02	CAP ELECT AI RDL 1M 50V 5X11MM
C101		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C102		020-58470-02	CAP ELECT AI RDL 47M 16V 6X11MM
C103		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C104		015-21220-01	CAP CER 0805 CHIP 2P2 +/-0.25P NPO 50V
C105		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C106		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C107		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C108		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C110		020-59100-06	CAP ELECT AI RDL 100M 16V 6.3X11MM
C111		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C112		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C113		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C114		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C115		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C116		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C117		020-59100-06	CAP ELECT AI RDL 100M 16V 6.3X11MM
C118		020-59100-06	CAP ELECT AI RDL 100M 16V 6.3X11MM
C119		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C120		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C121		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C122		020-09470-05	CAP ELECT RADL 470M 16V 10X12.5MM
C123		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C124		020-59100-06	CAP ELECT AI RDL 100M 16V 6.3X11MM
C125		020-09220-01	CAP ELECT RADL 220M 16V 10X12.5MM
C126		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C127		020-09220-01	CAP ELECT RADL 220M 16V 10X12.5MM
C128		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C129		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
&C130	10	015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C130	15	015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
&C130	20	015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C130	25	015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C131		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C132		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C133		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C134		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C135		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C136		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C137		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C138		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C139		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C140		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C141		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C142		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C143		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C200		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C201		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C202		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C203		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C204		020-09470-07	CAP 470M 16V 20% ELEC VERT 8*20 3.5MM L
C205		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C206		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C207		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C210		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C211		025-08100-02	CAP TANT BEAD 10M 10% 16V
C212		025-07330-01	CAP TANT BEAD 3M3 35V
C213		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C214		020-57100-02	CAP ELECT AI RDL 1M 50V 5X11MM
C215		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C216		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C217		015-23120-01	CAP CER 0805 CHIP 120P 5% NPO 50V
C218		015-23120-01	CAP CER 0805 CHIP 120P 5% NPO 50V
C219		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C220		015-23120-01	CAP CER 0805 CHIP 120P 5% NPO 50V
C221		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C222		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C301		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C302		015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
C303		015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
C304		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C305		015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
C306		015-21560-01	CAP CER 0805 CHIP 5P6 +/-0.25P NPO 50V
C307		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C308		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C309		015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
C310		015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
C311		015-22120-01	CAP CER 0805 CHIP 12P 5% NPO 50V
C312		015-21560-01	CAP CER 0805 CHIP 5P6 +/-0.25P NPO 50V
C313		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C314		015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
C315		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C316		015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
C317		015-22220-01	CAP CER 0805 CHIP 22P 5% NPO 50V

Ref	Var	IPN	Description
C318		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C319		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C320		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C321		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C322		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C323		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C324		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C325		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C326		015-21680-01	CAP CER 0805 CHIP 6P8 +/-0.25P NPO 50V
C327		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C328		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C329		015-22100-01	CAP CER 0805 CHIP 10P +/-0.5P NPO 50V
C330		015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
C331		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C332		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C333		015-21680-01	CAP CER 0805 CHIP 6P8 +/-0.25P NPO 50V
C334		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C335		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C336		015-23180-01	CAP CER 0805 CHIP 180P 5% NPO 50V
C337		015-23180-01	CAP CER 0805 CHIP 180P 5% NPO 50V
C338		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C339		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C340		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C341		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C342		015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
C343		015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
&C344	10	015-22270-01	CAP CER 0805 CHIP 27P 5% NPO 50V
&C344	15	015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
&C344	20	015-22270-01	CAP CER 0805 CHIP 27P 5% NPO 50V
&C344	25	015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
&C345	10	015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C345	15	015-22820-01	CAP CER 0805 CHIP 82P 5% NPO 50V
&C345	20	015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C345	25	015-22820-01	CAP CER 0805 CHIP 82P 5% NPO 50V
&C346	10	015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C346	15	015-22820-01	CAP CER 0805 CHIP 82P 5% NPO 50V
&C346	20	015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C346	25	015-22820-01	CAP CER 0805 CHIP 82P 5% NPO 50V
&C347	10	015-22270-01	CAP CER 0805 CHIP 27P 5% NPO 50V
&C347	15	015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
&C347	20	015-22270-01	CAP CER 0805 CHIP 27P 5% NPO 50V
&C347	25	015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
C348		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C349		020-58100-03	CAP ELECT AI RDL 10M 50V 5X11MM
C350		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C351		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C352		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C353	10	015-22270-01	CAP CER 0805 CHIP 27P 5% NPO 50V
&C353	15	015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
&C353	20	015-22270-01	CAP CER 0805 CHIP 27P 5% NPO 50V
&C353	25	015-22390-01	CAP CER 0805 CHIP 39P 5% NPO 50V
&C354	10	015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C354	15	015-22820-01	CAP CER 0805 CHIP 82P 5% NPO 50V
&C354	20	015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
&C354	25	015-22820-01	CAP CER 0805 CHIP 82P 5% NPO 50V
&C355	10	015-20050-01	CAP CER 0805 CHIP 0P5 +/-0.5P NPO 50
&C355	15	015-21180-01	CAP CER 0805 CHIP 1P8 +/-0.25 NPO 50
&C355	20	015-20050-01	CAP CER 0805 CHIP 0P5 +/-0.5P NPO 50
&C355	25	015-21180-01	CAP CER 0805 CHIP 1P8 +/-0.25 NPO 50
C357		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C358		025-08100-02	CAP TANT BEAD 10M 10% 16V
C359		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C360		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C361		015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
C362		015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
C363		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C364		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C365		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C366		015-23150-01	CAP CER 0805 CHIP 150P 5% NPO 50V
C367		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C368		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C369		015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
C370		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C371		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C372		015-23100-01	CAP CER 0805 CHIP 100P 5% NPO 50V
C373		025-08100-02	CAP TANT BEAD 10M 10% 16V
C374		025-08100-02	CAP TANT BEAD 10M 10% 16V
C375		025-08100-02	CAP TANT BEAD 10M 10% 16V
C376		015-23100-01	CAP CER 0805 CHIP 100P 5% NPO 50V
C377		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C378		015-23100-01	CAP CER 0805 CHIP 100P 5% NPO 50V
C379		015-23100-01	CAP CER 0805 CHIP 100P 5% NPO 50V
C380		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C381		025-08100-02	CAP TANT BEAD 10M 10% 16V
C382		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C383		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C384		015-23120-01	CAP CER 0805 CHIP 120P 5% NPO 50V
C385		015-23120-01	CAP CER 0805 CHIP 120P 5% NPO 50V
C386		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C387		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C388		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
&C500	10	015-20050-01	CAP CER 0805 CHIP 0P5 +/-0.5P NPO 50
&C500	15	015-22100-01	CAP CER 0805 CHIP 10P +/-0.5P NPO 50
&C500	20	015-20050-01	CAP CER 0805 CHIP 0P5 +/-0.5P NPO 50
&C500	25	015-22100-01	CAP CER 0805 CHIP 10P +/-0.5P NPO 50
D1		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23 CO
D2		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23 CO
D100		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE IN
D101		001-10000-56	(S) DIODE SMD BAW56 DUAL SWITCH SOT-23
D103		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D104		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D106		001-00011-70	(S) DIODE 1N4001 1A/50V
D107		001-00011-70	(S) DIODE 1N4001 1A/50V
D108		001-00011-70	(S) DIODE 1N4001 1A/50V
D200		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE IN
D201		001-00011-60	(S) DIODE SR2607 6A/30V
D203		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D301		001-10000-56	(S) DIODE SMD BAW56 DUAL SWITCH SOT-23
IC1		002-00017-51	(S) IC SP8793 DUAL MOD PRESC 40/41
IC2		539-00010-41	TCXO 12.8MHZ +-2.5PPM -30 TO +70C NDK
IC3		002-00017-63	(S) IC NJ8820DP FREQ SYNTHESIZER
IC4		002-00012-47	(S) IC MC33078 DUAL OP AMP LO NOISE
IC5		002-74000-04	(S) IC 74HCU04 UNBUFF HEX INVERTER
IC6		002-74000-74	(S) IC 74HC74 DUAL D F/F
IC100		002-00012-40	(S) IC 358 DUAL OP AMP
IC101		002-00012-40	(S) IC 358 DUAL OP AMP
IC102		002-00014-05	(S) IC TDA7231 1.6W AF PWR
IC103		002-00014-05	(S) IC TDA7231 1.6W AF PWR
IC104		002-00012-40	(S) IC 358 DUAL OP AMP
IC201		002-00012-40	(S) IC 358 DUAL OP AMP
IC202		002-00014-62	(S) IC 317L 100MA REG 3 TERMINAL TO-92
IC301		002-00022-01	(S) MIXER DOUBLE BLNCD TAK-1WH MIXER 2
IC302		002-00061-20	(S) IC NE612AN DBM & OSCILLATOR
IC303		002-00061-40	(S) IC NE614AN LO PWR FM IF SYSTEM DIP
IC304		002-00012-25	(S) IC TL084 QUAD OP AMP JFET I/P
L1		052-08160-25	COIL A/W 2.5T/6.0MM HOR 0.8MM WIRE
L100		056-00021-02	IND FXD 100UH AXIAL
L301		052-08140-35	COIL A/W 3.5T/4.0MM HOR 0.8MM WIRE
L302		052-08140-35	COIL A/W 3.5T/4.0MM HOR 0.8MM WIRE
L303		052-08140-35	COIL A/W 3.5T/4.0MM HOR 0.8MM WIRE
L304		050-00016-59	COIL TAIT 659 RF 3.5T C/W SLUG & CAN
L305		050-00016-59	COIL TAIT 659 RF 3.5T C/W SLUG & CAN
L306		052-08135-65	COIL A/W 6.5T/3.5MM HOR 0.8MM WIRE
L307		056-00021-04	IND FXD 330NH AXIAL
L308		056-00021-04	IND FXD 330NH AXIAL
L309		050-00016-59	COIL TAIT 659 RF 3.5T C/W SLUG & CAN
L310		050-00016-59	COIL TAIT 659 RF 3.5T C/W SLUG & CAN
L311		056-00021-04	IND FXD 330NH AXIAL
L312		056-00021-04	IND FXD 330NH AXIAL
L313		056-00021-07	IND FXD 33UH AXIAL
L314		056-00021-09	IND FXD 820NH AXIAL 4X9MM
L315		050-00016-58	COIL TAIT 658 2MH IF 7.5*7.5 12.5 HI
L316		050-00016-58	COIL TAIT 658 2MH IF 7.5*7.5 12.5 HI
L317		050-00016-58	COIL TAIT 658 2MH IF 7.5*7.5 12.5 HI
L319		050-00016-55	COIL TAIT NO 655 455KHZ QUAD COIL 7MM C
LED1		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
LED2		008-00013-35	(S) LED 3MM GREEN LO CURRENT NO MTG
PL5		240-00020-57	HEADER 10 WAY 1 ROW PCB MTG
PL03		240-00020-59	HEADER 3 WAY 1 ROW PCB MTG
PL100		240-00020-59	HEADER 3 WAY 1 ROW PCB MTG
PL101		240-00020-59	HEADER 3 WAY 1 ROW PCB MTG
PL102		240-00020-59	HEADER 3 WAY 1 ROW PCB MTG
PL104		240-00020-59	HEADER 3 WAY 1 ROW PCB MTG
PL105		240-00020-58	HEADER 5 WAY 1 ROW PCB MTG
PL106		240-00020-59	HEADER 3 WAY 1 ROW PCB MTG
Q1		000-10057-10	(S) XSTR SMD MMBR571 NPN SOT-23 UHF LO PW
Q3		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 AF
Q4		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 AF
Q100		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q101		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q102		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q103		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q104		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q105		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q106		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q107		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q108		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q109		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q200		000-00011-30	(S) XSTR BC557B PNP AF SML SIG TO92
Q201		000-00012-15	(S) XSTR BD234 PNP AF PWR TO126
Q202		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q203		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q301		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q302		000-10095-10	(S) XSTR SMD MMBR951 NPN UHF SOT-23
Q303		000-00020-18	(S) XSTR BF247A JFET TO-92 VHF SMALL SI
Q304		000-10095-10	(S) XSTR SMD MMBR951 NPN UHF SOT-23
Q305		000-10095-10	(S) XSTR SMD MMBR951 NPN UHF SOT-23
Q306		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q307		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
R1		036-12100-00	RES M/F 0805 CHIP 10E 5%
R2		036-17100-00	RES M/F 0805 CHIP 1M 5%
R3		036-14100-00	RES M/F 0805 CHIP 1K 5%
R4		036-17100-00	RES M/F 0805 CHIP 1M 5%
R5		036-14330-00	RES M/F 0805 CHIP 3K3 5%
R6		036-12680-00	RES M/F 0805 CHIP 68E 5%
R7		036-13220-00	RES M/F 0805 CHIP 220E 5%
R8		036-17100-00	RES M/F 0805 CHIP 1M 5%
R10		036-17100-00	RES M/F 0805 CHIP 1M 5%
R12		036-17100-00	RES M/F 0805 CHIP 1M 5%

Ref	Var	IPN	Description
R13		036-17100-00	RES M/F 0805 CHIP 1M 5%
R14		036-12100-00	RES M/F 0805 CHIP 10E 5%
R15		036-17100-00	RES M/F 0805 CHIP 1M 5%
R16		036-12220-00	RES M/F 0805 CHIP 22E 5%
R20		036-12220-00	RES M/F 0805 CHIP 22E 5%
R21		036-15220-00	RES M/F 0805 CHIP 22K 5%
R22		036-15100-00	RES M/F 0805 CHIP 10K 5%
R23		036-17100-00	RES M/F 0805 CHIP 1M 5%
R24		036-13220-00	RES M/F 0805 CHIP 220E 5%
R25		036-14100-00	RES M/F 0805 CHIP 1K 5%
R26		036-17100-00	RES M/F 0805 CHIP 1M 5%
R27		036-17100-00	RES M/F 0805 CHIP 1M 5%
R28		036-15100-00	RES M/F 0805 CHIP 10K 5%
R29		036-16100-00	RES M/F 0805 CHIP 100K 5%
R30		036-15100-00	RES M/F 0805 CHIP 10K 5%
R31		036-15100-00	RES M/F 0805 CHIP 10K 5%
R32		036-16470-00	RES M/F 0805 CHIP 470K 5%
R33		036-16470-00	RES M/F 0805 CHIP 470K 5%
R34		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R35		036-12220-00	RES M/F 0805 CHIP 22E 5%
R36		036-13680-00	RES M/F 0805 CHIP 680E 5%
R37		036-14100-00	RES M/F 0805 CHIP 1K 5%
R38		036-15150-00	RES M/F 0805 CHIP 15K 5%
R39		036-16100-00	RES M/F 0805 CHIP 100K 5%
R40		036-12220-00	RES M/F 0805 CHIP 22E 5%
R41		036-12100-00	RES M/F 0805 CHIP 10E 5%
R42		036-12100-00	RES M/F 0805 CHIP 10E 5%
R43		036-13100-00	RES M/F 0805 CHIP 100E 5%
R44		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R45		036-12220-00	RES M/F 0805 CHIP 22E 5%
RV100		040-05100-21	POT 10K LIN VERT PCB MTG 15MM SLOT SHA
R100		036-15270-00	RES M/F 0805 CHIP 27K 5%
RV101		042-05100-06	RES PRESET 10K CARBON 6MM FLAT
R101		036-13100-00	RES M/F 0805 CHIP 100E 5%
RV102		040-05100-23	POT 10K LOG VERT PCB MTG 15MM SLOT SHA
R102		036-14220-00	RES M/F 0805 CHIP 2K2 5%
RV103		040-05100-22	POT 10K LOG DUAL PCB MTG 6MM OD SHAFT
R103		036-15220-00	RES M/F 0805 CHIP 22K 5%
RV104		042-05100-06	RES PRESET 10K CARBON 6MM FLAT
R104		036-15100-00	RES M/F 0805 CHIP 10K 5%
R105		036-16220-00	RES M/F 0805 CHIP 220K 5%
R106		036-16330-00	RES M/F 0805 CHIP 330K 5%
&R107	10	036-15220-00	RES M/F 0805 CHIP 22K 5%
&R107	15	036-15180-00	RES M/F 0805 CHIP 18K 5%
&R107	20	036-15220-00	RES M/F 0805 CHIP 22K 5%
&R107	25	036-15180-00	RES M/F 0805 CHIP 18K 5%
R108		036-14820-00	RES M/F 0805 CHIP 8K2 5%
R109		036-15150-00	RES M/F 0805 CHIP 15K 5%
R110		036-16100-00	RES M/F 0805 CHIP 100K 5%
R111		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R112		036-15390-00	RES M/F 0805 CHIP 39K 5%
R113		036-16100-00	RES M/F 0805 CHIP 100K 5%
R114		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R115		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R116		036-13100-00	RES M/F 0805 CHIP 100E 5%
R117		036-15470-00	RES M/F 0805 CHIP 47K 5%
R119		036-15100-00	RES M/F 0805 CHIP 10K 5%
R120		036-14390-00	RES M/F 0805 CHIP 3K9 5%
R121		036-14100-00	RES M/F 0805 CHIP 1K 5%
&R122	10	036-14680-00	RES M/F 0805 CHIP 6K8 5%
&R122	15	036-14390-00	RES M/F 0805 CHIP 3K9 5%
&R122	20	036-14680-00	RES M/F 0805 CHIP 6K8 5%
&R122	25	036-14390-00	RES M/F 0805 CHIP 3K9 5%
R123		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R124		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R125		036-14100-00	RES M/F 0805 CHIP 1K 5%
R126		036-15470-00	RES M/F 0805 CHIP 47K 5%
R127		036-16100-00	RES M/F 0805 CHIP 100K 5%
R128		036-13560-00	RES M/F 0805 CHIP 560E 5%
R129		036-14100-00	RES M/F 0805 CHIP 1K 5%
R130		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R131		036-14100-00	RES M/F 0805 CHIP 1K 5%
R132		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R133		036-14120-00	RES M/F 0805 CHIP 1K2 5%
R134		036-15390-00	RES M/F 0805 CHIP 39K 5%
R135		036-14820-00	RES M/F 0805 CHIP 8K2 5%
R136		036-15470-00	RES M/F 0805 CHIP 47K 5%
R137		036-15470-00	RES M/F 0805 CHIP 47K 5%
R138		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R139		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R140		036-14820-00	RES M/F 0805 CHIP 8K2 5%
R141		036-15470-00	RES M/F 0805 CHIP 47K 5%
R142		036-15470-00	RES M/F 0805 CHIP 47K 5%
R143		036-15470-00	RES M/F 0805 CHIP 47K 5%
R144		036-11470-00	RES M/F 0805 CHIP 4E7 10%
R145		036-11470-00	RES M/F 0805 CHIP 4E7 10%
R146		036-14100-00	RES M/F 0805 CHIP 1K 5%
R147		036-13150-00	RES M/F 0805 CHIP 150E 5%
R148		036-14100-00	RES M/F 0805 CHIP 1K 5%
R149		036-13100-00	RES M/F 0805 CHIP 100E 5%
R150		036-14100-00	RES M/F 0805 CHIP 1K 5%
R151		036-14470-00	RES M/F 0805 CHIP 4K7 5%
&R152	10	036-14470-00	RES M/F 0805 CHIP 4K7 5%
&R152	15	036-14330-00	RES M/F 0805 CHIP 3K3 5%
&R152	20	036-14470-00	RES M/F 0805 CHIP 4K7 5%
&R152	25	036-14330-00	RES M/F 0805 CHIP 3K3 5%
R153		036-15100-00	RES M/F 0805 CHIP 10K 5%
R154		036-13100-00	RES M/F 0805 CHIP 100E 5%
R155		036-15150-00	RES M/F 0805 CHIP 15K 5%
R156		036-14560-00	RES M/F 0805 CHIP 5K6 5%
R157		036-16220-00	RES M/F 0805 CHIP 220K 5%
R158		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R159		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R160		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R161		036-16100-00	RES M/F 0805 CHIP 100K 5%
R162		036-15470-00	RES M/F 0805 CHIP 47K 5%
R163		036-15150-00	RES M/F 0805 CHIP 15K 5%
R164		036-14390-00	RES M/F 0805 CHIP 3K9 5%
R165		036-13470-00	RES M/F 0805 CHIP 470E 5%
R200		036-12330-00	RES M/F 0805 CHIP 33E 5%
R201		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R203		036-14100-00	RES M/F 0805 CHIP 1K 5%
R204		032-33270-00	RES M/F PWR 270E 5% 1W 12X4.5MM
R205		032-31100-00	RES M/F PWR 1E0 5% 1W 12X4.5MM
R206		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R207		036-15100-00	RES M/F 0805 CHIP 10K 5%
R208		032-31100-00	RES M/F PWR 1E0 5% 1W 12X4.5MM
R209		036-13100-00	RES M/F 0805 CHIP 100E 5%
R210		036-12330-00	RES M/F 0805 CHIP 33E 5%
R212		036-12100-00	RES M/F 0805 CHIP 10E 5%
R213		036-15150-00	RES M/F 0805 CHIP 15K 5%
R214		036-16100-00	RES M/F 0805 CHIP 100K 5%
R215		036-15560-00	RES M/F 0805 CHIP 56K 5%
R216		036-14150-00	RES M/F 0805 CHIP 1K5 5%
R217		036-13470-00	RES M/F 0805 CHIP 470E 5%
RV301		042-04220-06	RES PRESET 2K2 CARBON 6MM FLAT
R301		036-14390-00	RES M/F 0805 CHIP 3K9 5%
R302		036-14100-00	RES M/F 0805 CHIP 1K 5%
RV303		042-05470-06	RES PRESET 47K CARBON 6MM FLAT TOP ADJ
R303		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R304		036-13470-00	RES M/F 0805 CHIP 470E 5%
R305		036-12100-00	RES M/F 0805 CHIP 10E 5%
R306		036-13180-00	RES M/F 0805 CHIP 180E 5%
R307		036-12330-00	RES M/F 0805 CHIP 33E 5%
R308		036-13470-00	RES M/F 0805 CHIP 470E 5%
R309		036-12120-00	RES M/F 0805 CHIP 12E 5%
R310		036-13470-00	RES M/F 0805 CHIP 470E 5%
R311		036-17100-00	RES M/F 0805 CHIP 1M 5%
R312		036-10000-00	RES M/F 0805 CHIP ZERO OHM
R313		036-17100-00	RES M/F 0805 CHIP 1M 5%
R314		036-13470-00	RES M/F 0805 CHIP 470E 5%
R315		036-12120-00	RES M/F 0805 CHIP 12E 5%
R316		036-13470-00	RES M/F 0805 CHIP 470E 5%
R317		036-12470-00	RES M/F 0805 CHIP 47E 5%
R318		036-13100-00	RES M/F 0805 CHIP 100E 5%
R319		036-12100-00	RES M/F 0805 CHIP 10E 5%
R320		036-13680-00	RES M/F 0805 CHIP 680E 5%
R321		036-14100-00	RES M/F 0805 CHIP 1K 5%
R322		036-14330-00	RES M/F 0805 CHIP 3K3 5%
R323		036-14100-00	RES M/F 0805 CHIP 1K 5%
R324		036-11470-00	RES M/F 0805 CHIP 4E7 10%
R325		036-13100-00	RES M/F 0805 CHIP 100E 5%
R326		036-12560-00	RES M/F 0805 CHIP 56E 5%
R327		036-12390-00	RES M/F 0805 CHIP 39E 5%
R328		036-13470-00	RES M/F 0805 CHIP 470E 5%
&R329	10	036-17100-00	RES M/F 0805 CHIP 1M 5%
&R329	15	036-14330-00	RES M/F 0805 CHIP 3K3 5%
&R329	20	036-17100-00	RES M/F 0805 CHIP 1M 5%
&R329	25	036-14330-00	RES M/F 0805 CHIP 3K3 5%
R330		036-13680-00	RES M/F 0805 CHIP 680E 5%
R331		036-14120-00	RES M/F 0805 CHIP 1K2 5%
R333		036-15820-00	RES M/F 0805 CHIP 82K 5%
R334		030-53470-20	RES FILM AI 470E 5% 0.4W 4X1.6MM
R335		036-15470-00	RES M/F 0805 CHIP 47K 5%
R336		036-15470-00	RES M/F 0805 CHIP 47K 5%
R338		036-16100-00	RES M/F 0805 CHIP 100K 5%
R339		036-17100-00	RES M/F 0805 CHIP 1M 5%
R340		036-15220-00	RES M/F 0805 CHIP 22K 5%
R341		036-15100-00	RES M/F 0805 CHIP 10K 5%
R342		036-14100-00	RES M/F 0805 CHIP 1K 5%
&R343	10	036-15100-00	RES M/F 0805 CHIP 10K 5%
&R343	15	036-14820-00	RES M/F 0805 CHIP 8K2 5%
&R343	20	036-15100-00	RES M/F 0805 CHIP 10K 5%
&R343	25	036-14820-00	RES M/F 0805 CHIP 8K2 5%
R344		036-15100-00	RES M/F 0805 CHIP 10K 5%
R345		045-03500-01	RES NTC 500E 5MM DISC UNCOATED
R346		036-13220-00	RES M/F 0805 CHIP 220E 5%
R347		036-15100-00	RES M/F 0805 CHIP 10K 5%
R348		036-14150-00	RES M/F 0805 CHIP 1K5 5%
R349		036-17100-00	RES M/F 0805 CHIP 1M 5%
R350		036-16330-00	RES M/F 0805 CHIP 330K 5%
R351		036-12100-00	RES M/F 0805 CHIP 10E 5%
R352		036-14330-00	RES M/F 0805 CHIP 3K3 5%
R353		036-14100-00	RES M/F 0805 CHIP 1K 5%
R354		036-15150-00	RES M/F 0805 CHIP 15K 5%
R355		036-14330-00	RES M/F 0805 CHIP 3K3 5%
R356		036-16100-00	RES M/F 0805 CHIP 100K 5%
R357		036-15220-00	RES M/F 0805 CHIP 22K 5%
R358		036-13100-00	RES M/F 0805 CHIP 100E 5%
R359		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R360		036-14100-00	RES M/F 0805 CHIP 1K 5%
R361		036-15100-00	RES M/F 0805 CHIP 10K 5%
R362		036-15470-00	RES M/F 0805 CHIP 47K 5%
R363		036-15470-00	RES M/F 0805 CHIP 47K 5%
R364		036-15100-00	RES M/F 0805 CHIP 10K 5%
R365		036-12120-00	RES M/F 0805 CHIP 12E 5%

Ref	Var	IPN	Description
R366		036-12680-00	RES M/F 0805 CHIP 68E 5%
R367		045-06100-01	RES NTC 100K 5% 5MM DISC
R368		036-14100-00	RES M/F 0805 CHIP 1K 5%
R369		036-15470-00	RES M/F 0805 CHIP 47K 5%
R370		036-17100-00	RES M/F 0805 CHIP 1M 5%
R371		036-10000-00	RES M/F 0805 CHIP ZERO OHM
R372		036-17100-00	RES M/F 0805 CHIP 1M 5%
R373		036-12560-00	RES M/F 0805 CHIP 56E 5%
RL300		237-00010-22	RELAY 12V DPDT 8PIN DIL PCB MTG FUJITS
SK1		240-04020-57	SKT 10 WAY 1ROW PCB MTG TOP ENTRY
SW100		230-00010-30	SWITCH TOGGLE SPDT RT ANGLE PCB MT PAR
T100		053-00010-17	XFMR T4030 LINE MATCH POTCORE
T200		050-00016-50	COIL TAIT NO 650 455KHZ 5.6MM CAN
VC301		028-02100-06	CAP TRIM 3/10P NPO TOP ADJ BLUE MUR TZ
X301		274-00010-02	XTAL 20.945MHZ SPEC TE/15 C/W TEFLON IN
&XF301	10	276-00010-43	FLTR XTAL HY-Q 1PR 21.4MHZ 15KHZ 4P
&XF301	15	276-00010-44	FLTR XTAL ONE PAIR 21.4MHZ 7.5KHZ (
&XF301	20	276-00010-43	FLTR XTAL HY-Q 1PR 21.4MHZ 15KHZ 4P
&XF301	25	276-00010-44	FLTR XTAL ONE PAIR 21.4MHZ 7.5KHZ (
&XF302	10	276-00010-47	FLTR XTAL 21.4MHZ 15KHZ B/W 2POLE 2
&XF302	15	276-00010-46	FLTR XTAL 21.4MHZ 7.5KHZ B/W 2POLE
&XF302	20	276-00010-47	FLTR XTAL 21.4MHZ 15KHZ B/W 2POLE 2
&XF302	25	276-00010-46	FLTR XTAL 21.4MHZ 7.5KHZ B/W 2POLE
&XF303	10	276-00010-14	FLTR CER 455KHZ 15KHZ B/W CFW455E
&XF303	15	276-00010-13	FLTR CER 455KHZ 9KHZ B/W CFW455G
&XF303	20	276-00010-14	FLTR CER 455KHZ 15KHZ B/W CFW455E
&XF303	25	276-00010-13	FLTR CER 455KHZ 9KHZ B/W CFW455G

T835 Mechanical & Miscellaneous Parts (220-01186-02)

IPN	Description
012-04150-01	CAP CER F/THRU 1N5 NO LEAD (C1-C15)
051-00006-02	SOLDER SPRING 1.3MM A4M1877
062-00010-13	CAN 10MM SQ X 11MM SANWA 613 A4M1017 Fit over coil T200
065-00010-13	BEAD FERRITE 7D 1.9*0.9*3.8MM STACK POLE
201-00030-02	WIRE #1 T/C WIRE 7/0.2MM PVC RED 2x30mm LED.
201-00030-10	WIRE #1 T/C WIRE 7/0.2MM PVC BLACK 2x35mm LED.
220-01186-02	PCB T835 RX 136-174 MHZ
230-00010-31	COVER LEVER FOR TOGGLE SW 230-00010-30
240-00010-55	PLUG 15 WAY D RANGE WIRE WRAP PINS PNL MTG
240-02010-54	SKT 15WAY DRANGE PNL MTG 125 DEG C
240-02100-06	SKT COAX N TYPE PNL MTG OPEN TERMN
240-04020-62	SKT 2 WAY RECEPTL SHORTING LINK
240-04020-65	SKT JACK PIN 1.3MM PCB MTG 64 WAY SIL STRAP FOR SJ2,SJ3, SJ4-1 TO SJ4-5, SJ5-1 TO SJ5-5
303-11168-00	CHASSIS HSINK PNTD CMPLT A1M2364 800 SERIES
303-23118-00	COVER A3M2247 D RANGE HOLE T855/7
303-50074-00	CLIP A3M2246 SPRING XSTR CLAMP T857
306-01010-00	FERRULE A4M948 HANDLE FXD EQUIP
308-01007-00	HANDLE A4M949 FXD EQUIP
311-01015-00	KNOB SATO K34 AG 15MM & SKIRT 6MM SHAFT FXD E
312-01052-00	LID TOP PNTD COMPL A1M2364 800 SERIES
312-01053-00	LID BOTTOM PNTD COMPL A1M2364 800 SERIES
316-06406-02	PNL FRT COMPL T835 A3M2208/4
316-85015-01	PIN A4M775 LOCATING D RANGE
316-85099-00	PLATE FLOAT A2M2248 DUAL D RANGE SKT BOX
316-85100-00	PLATE FRT A2M2249 DUAL D RANGE SKT BOX
318-01014-00	RAIL A2M2214 FOR 800 SERIES FXD EQUIP
319-01152-00	SHIELD A3M2250 F/THRU MTG T857
345-00040-06	SCREW M3*8MM PAN POZI ST BZ
345-00040-08	SCREW M3*12MM PAN POZI ST BZ 'D' range hole cover
345-00040-09	SCREW M3*6MM CSK POZI TRUNCATED HEAD ST BZ rail mounting
345-00040-10	SCREW M3*6MM PAN POZI ST BZ Rail x4, Float Plate x4.
345-00040-11	SCREW M3X10MM PAN POZI ST BZ For Final Carcassing Kit
345-00040-20	SCREW M3*8MM BUTTON SKT HD BLACK ZINC PHOS front panel
349-00020-32	SCREW TAPTITE M3X8MM PAN POZI BZ PCB mounting x8, 'N' connector x4.
349-00020-43	SCREW TAPTITE M4X12MM PAN POZI BZ top cover
349-00020-45	SCREW TAPTITE M4X20MM PAN POZI BZ bottom cover
352-00010-08	NUT M3 COLD FORM HEX ST BZ 'D' plug x2, cover x2,vco x2.
352-00010-29	NUT M4 NYLOC HEX handle
353-00010-10	WASHER M3 FLAT 7MM*0.6MM ST BZ FOR FLOAT PLATE
353-00010-11	WASHER M3 FLAT 9.5MM*0.9MM ST BZ For Final Carcassing Kit
353-00010-12	WASHER M3 SPRING BZ OR Z/C 'D' plug
353-00010-13	WASHER M3 SHAKEPROOF INT BZ 'D' hole cover x2, vco x2.
362-00010-23	GASKET SIL INSULATING TO-220 CLIP MTD
362-00010-33	GROMMET LED MTG 3MM LO CURRENT LEDS D102, D105
365-00011-53	LABEL WHITE RW2365/1 104*37MM SPECIAL ADHSV
365-00100-20	LABEL WHITE S/A 28X11MM QUIKSTIK RW718/4
365-01391-01	(L)LABEL BLNK 30*10.8MM TAMPERMARK VOID MATT
399-00010-51	BAG PLASTIC 75*100MM
400-00020-07	SLEEVING 2MM SIL RUBBER
410-01081-00	CRTN T800 MODULE KIWI REF22860 PRTD 402X192X6
410-01082-00	CRTN 10 T800 KIWI REF24417 423X410X360

T835 Grid Reference Index (IPN 220-01186-02)

How To Use This Grid Reference Index

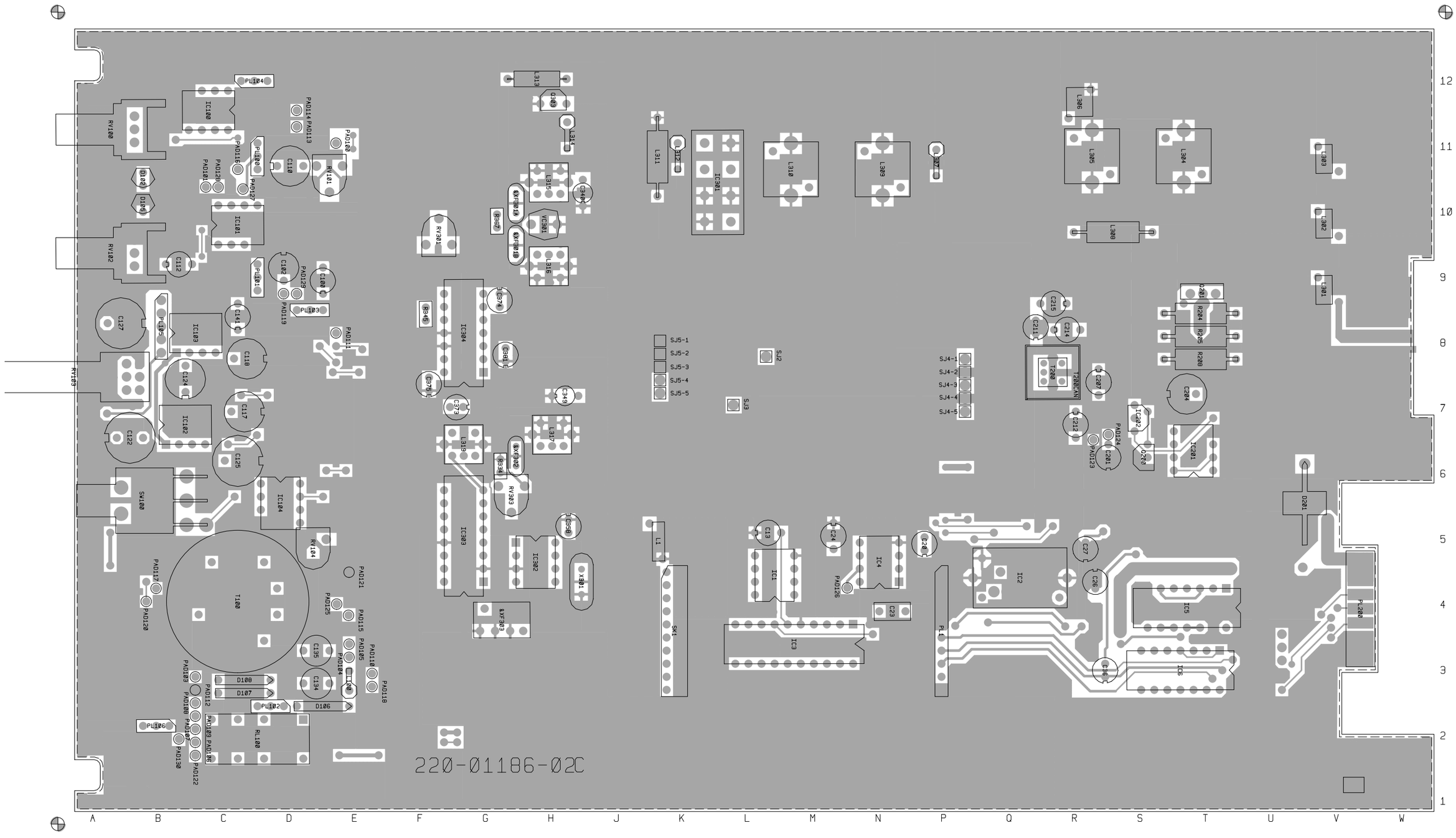
The first digit in the PCB layout reference is a "1" or "2", indicating the top or bottom side layout respectively, and the last two characters give the location of the component on that diagram.

The first digit in the circuit diagram reference is the sheet number, and the last two characters give the location of the component on that sheet.

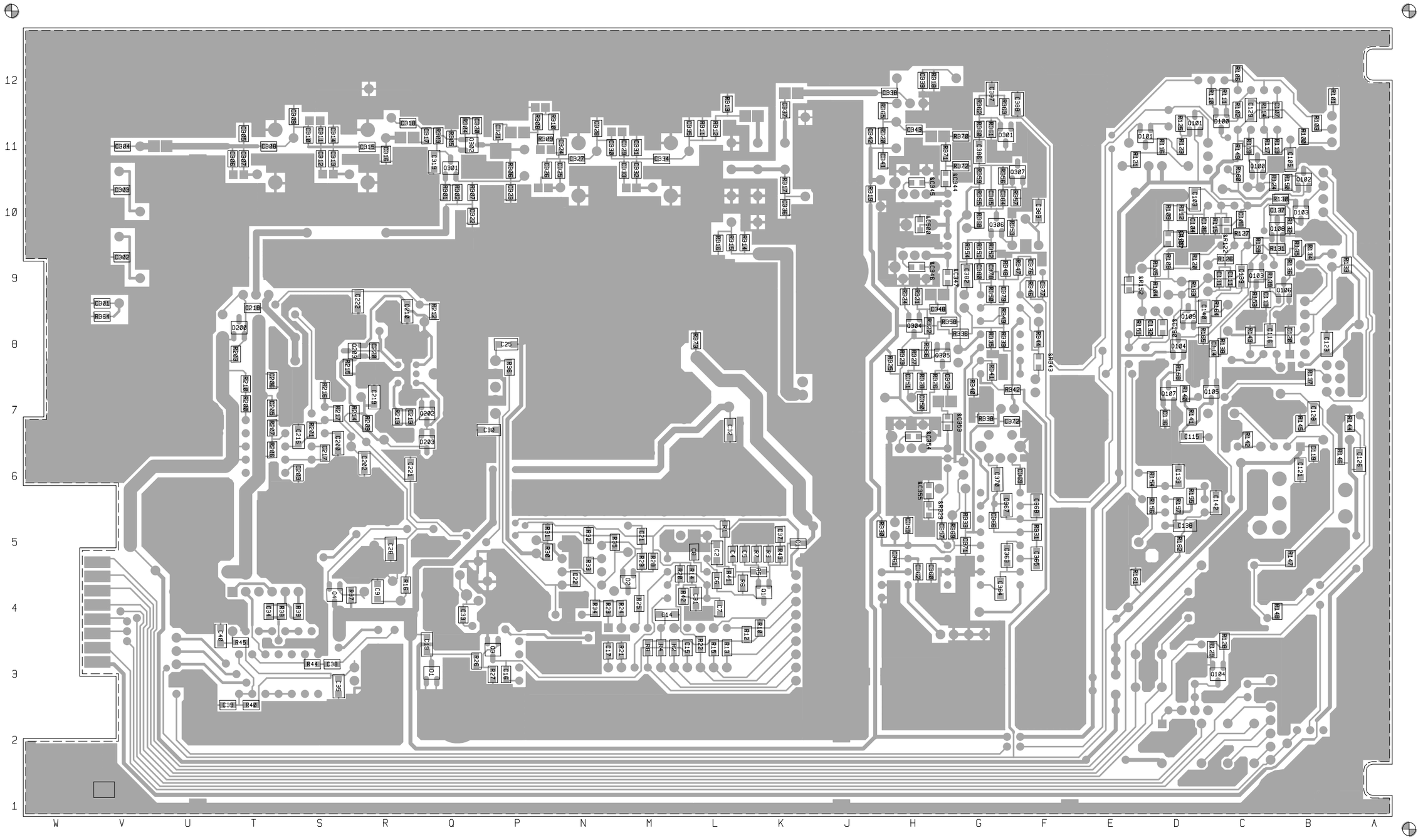
Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit
C1	2:K5	1-B4	C126	2:A6	2-R7	C322	2:Q10	4-J8	C382	2:G9	4-M2
C2	2:L5	1-B5	C127	1:A8	2-P4	C323	2:P10	4-J8	C383	2:F10	4-M0
C4	2:L5	1-B5	C128	2:B7	2-P2	C324	2:N11	4-K7	C384	2:G10	4-N1
C5	2:L5	1-C4	C129	2:C12	2-E3	C325	2:N11	4-K7	C385	2:G10	4-M1
C6	2:L4	1-D5	&C130	2:D8	2-B8	C326	2:P11	4-K8	C386	2:G11	4-P2
C7	2:L4	1-D5	C131	2:C9	2-H6	C327	2:N11	4-L7	C387	2:G12	4-Q1
C8	2:L5	1-D4	C132	2:D8	2-B8	C328	2:N11	4-L7	C388	2:F12	4-Q1
C9	2:R4	1-A8	C133	2:D6	2-E1	C329	2:M11	4-L7	&C500	2:H10	4-H3
C13	1:L5	1-F4	C134	1:D3	2-R2	C330	2:N11	4-L7	D1	2:Q3	1-K2
C14	2:M4	1-F4	C135	1:D3	2-R2	C331	2:M11	4-M7			1-K2
C15	2:L3	1-G2	C136	2:D7	2-M6	C332	2:M11	4-M7	D2	2:M4	1-M3
C16	2:P3	1-G2	C137	2:C10	2-L2	C333	2:M11	4-M8			1-L3
C17	2:N3	1-H3	C138	2:D5	2-C0	C334	2:M11	4-M7	D100	2:C11	2-D2
C19	2:Q4	1-J2	C139	2:C9	2-H9	C335	2:L11	4-N7			2-D2
C20	1:P5	1-K5	C140	2:D9	2-J9	C336	2:K10	4-C3	D101	2:E11	2-E4
C21	2:M5	1-M2	C141	1:C8	2-K8	C337	2:K12	4-D4			2-E4
C22	2:N5	1-L5	C142	2:C6	2-B0	C338	2:H12	4-D4	D102	1:B11	2-H2
C23	1:N4	1-L5	C200	2:S7	3-D1	C339	2:H12	4-E3	D103	2:B10	2-J2
C24	1:M5	1-P4	C201	1:S6	3-F1	C340	1:J10	4-D4			2-H2
C25	2:P8	1-M5	C202	2:R6	3-G1	C341	2:H11	4-E4	D104	2:D8	2-J4
C26	1:R4	1-Q8	C203	2:S6	3-J3	C342	2:J11	4-F4			2-J5
C27	1:R5	1-Q7	C204	1:T7	3-L1	C343	2:H11	4-F4	D105	1:B10	2-K1
C28	2:R5	1-R7	C205	2:T7	3-M1	&C344	2:H11	4-G4	D106	1:E3	2-L1
C30	2:P7	1-R8	C206	2:T8	3-M1	&C345	2:H11	4-G3	D107	1:D3	2-L0
C31	2:L4	1-D5	C207	1:R7	3-N6	&C346	2:H9	4-J3	D108	1:D3	2-L0
C32	2:L7	1-Q5	C210	2:R9	3-G6	&C347	2:H9	4-J4	D200	2:T8	3-K3
C33	2:Q4	1-C7	C211	1:Q8	3-G6	C348	2:H9	4-K4			3-K3
C34	2:T4	1-C8	C212	1:R7	3-L5	C349	1:H7	4-K5	D201	1:V6	3-C7
C35	2:S3	1-E9	C213	2:R7	3-J6	C350	2:H7	4-L5	D203	2:Q7	3-L7
C36	1:S3	1-E9	C214	1:R8	3-H6	C351	2:H7	4-M3			3-L6
C37	2:K5	1-B4	C215	1:R9	3-E8	C352	2:H7	4-M4	D301	2:G11	4-P1
C38	2:S3	1-G7	C216	2:S7	3-H1	&C353	2:H7	4-M4	IC1	1:M4	1-D4
C39	2:T3	1-H9	C217	2:S6	3-J2	&C354	2:H7	4-N3	IC2	1:R5	1-B8
C40	2:U4	1-J9	C218	2:T9	3-K3	&C355	2:H6	4-P3	IC3	1:N4	1-F3
C100	1:E9	2-C8	C219	2:R7	3-N6	C357	2:H5	4-P4	IC4	1:N4	1-K5
C101	2:D10	2-D7	C220	2:R8	3-G6	C358	1:H5	4-A2			1-N3
C102	1:D9	2-D8	C221	2:R6	3-M6	C359	2:H5	4-B2	IC5	1:T4	1-J8
C103	2:D10	2-E7	C222	2:R9	3-F8	C360	2:H5	4-B0			1-D7
C104	2:D10	2-E7	C301	2:V9	4-B7	C361	2:H5	4-C1			1-D7
C105	2:B11	2-D2	C302	2:V9	4-B7	C362	2:H5	4-C1			1-E7
C106	2:D10	2-E7	C303	2:V10	4-C7	C363	2:G5	4-E0			1-J8
C107	2:C12	2-F1	C304	2:V11	4-C7	C364	2:G4	4-E0			1-K8
C108	2:C10	2-R5	C305	2:T11	4-D7	C365	2:F5	4-E1			1-L8
C110	1:D11	2-G5	C306	2:T11	4-D8	C366	2:G5	4-E2	IC6	1:T3	1-H8
C111	2:C9	2-H6	C307	2:T11	4-D7	C367	2:G6	4-F2			1-F7
C112	1:B9	2-J8	C308	2:T11	4-E7	C368	2:F6	4-F1			1-F8
C113	2:C9	2-M2	C309	2:S12	4-E7	C369	2:F6	4-F1	IC100	1:C12	2-F3
C114	2:C8	2-M5	C310	2:S11	4-E7	C370	2:G6	4-F1			2-B2
C115	2:D7	2-N7	C311	2:S11	4-E7	C371	2:G5	4-G0			2-E1
C116	2:C8	2-M3	C312	2:S11	4-F8	C372	2:G7	4-G2	IC101	1:C10	2-R5
C117	1:C7	2-P7	C313	2:S11	4-F7	C373	1:G7	4-H2			2-F7
C118	1:C8	2-N2	C314	2:S11	4-F7	C374	1:G9	4-G1			2-G7
C119	2:B6	2-Q8	C315	2:R11	4-F7	C375	1:F7	4-H1	IC102	1:B7	2-P7
C120	2:B8	2-P4	C316	2:R11	4-G7	C376	2:F9	4-J2	IC103	1:B8	2-N2
C121	2:B6	2-Q8	C317	2:Q11	4-G7	C377	2:F9	4-J2	IC104	1:D6	2-E0
C122	1:B7	2-Q7	C318	2:R11	4-H7	C378	2:G9	4-K2			2-D0
C123	2:B8	2-P4	C319	2:Q11	4-G7	C379	2:G9	4-K2			2-B0
C124	1:B8	2-P3	C320	2:Q11	4-H7	C380	2:G9	4-L1	IC201	1:T6	3-H3
C125	1:C6	2-R8	C321	2:P11	4-J7	C381	1:G8	4-L2			3-H1

Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit
		3-R0	PL102	1:D3	2-L0	R26	2:Q3	1-J2	&R152	2:E9	2-B7
IC202	1:S7	3-E1			2-L1	R27	2:P3	1-J2	R153	2:C9	2-J3
IC301	1:K11	4-B4			2-L1	R28	2:M5	1-L4	R154	2:D6	2-C1
IC302	1:H5	4-B0	PL103	1:D9	2-B9	R29	2:M5	1-M3	R155	2:D6	2-C1
IC303	1:G4	4-E0			2-B8	R30	2:P5	1-J5	R156	2:D6	2-C0
IC304	1:G8	4-L2			2-B8	R31	2:P5	1-K6	R157	2:D6	2-C1
		4-H0	PL104	1:C12	2-C1	R32	2:N5	1-M4	R158	2:D8	2-L6
		4-H2			2-C1	R33	2:N5	1-M2	R159	2:C10	2-L3
		4-K2			2-C2	R34	2:N4	1-L5	R160	2:C11	2-G2
		4-K0	PL105	1:B9	2-K7	R35	2:N5	1-N4	R161	2:E5	2-A0
L1	1:K5	1-A4			2-K7	R36	2:P8	1-M5	R162	2:D5	2-B1
L100	1:E3	2-K2			2-K7	R37	2:S4	1-Q8	R163	2:D9	2-H9
L301	1:V9	4-B7			2-K7	R38	2:T4	1-C7	R164	2:C9	2-J8
L302	1:V10	4-B7			2-K8	R39	2:S4	1-D8	R165	2:D8	2-J8
L303	1:V11	4-C7	PL106	1:B2	2-L8	R40	2:T3	1-E9	R200	2:T7	3-D1
L304	1:T11	4-E7			2-L9	R41	2:L5	1-B5	R201	2:S7	3-G1
L305	1:R11	4-F7			2-L8	R42	2:M4	1-D6	R203	2:T8	3-K3
L306	1:R12	4-H6	PL200	1:V5	3-B7	R43	2:K5	1-B4	R204	1:U9	3-K2
L307	1:P11	4-H8			3-B6	R44	2:S3	1-G7	R205	1:U8	3-K3
L308	1:R10	4-H9			3-B8	R45	2:T4	1-J9	R206	2:T6	3-L1
L309	1:N11	4-L7			3-B7	RV100	1:B11	2-A2	R207	2:T7	3-L0
L310	1:M11	4-M7			3-B6	R100	2:B11	2-A3	R208	1:U8	3-L3
L311	1:K11	4-C3			3-B5	RV101	1:E11	2-F5	R209	2:R7	3-M7
L312	1:K11	4-C4			3-B5	R101	2:B12	2-A2	R210	2:T7	3-D2
L313	1:G12	4-E4			3-B9	R102	2:C12	2-B1	R212	2:Q9	3-G8
L314	1:H11	4-E4			3-B9	RV102	1:B9	2-K3	R213	2:R7	3-J6
L315	1:H11	4-G4			3-B8	RV103	1:B8	2-M7	R214	2:S7	3-J5
L316	1:H9	4-J4			3-B8	R103	2:B11	2-B2	R215	2:S8	3-H5
L317	1:H7	4-N4			3-B6	R104	2:D9	2-C9	R216	2:S7	3-E0
L319	1:G7	4-F1			3-B6	RV104	1:D5	2-C0	R217	2:S7	3-F1
PAD100	1:E11	2-A4			3-B8	R105	2:D9	2-C8	R301	2:Q10	4-G8
PAD101	1:C10	2-A3			3-B7	R106	2:C12	2-C2	RV301	1:F10	4-M1
PAD103	1:C3	2-L0	Q1	2:K4	1-C4	&R107	2:D10	2-D8	R302	2:Q10	4-G8
PAD104	1:E3	2-P8	Q3	2:P3	1-J2	R108	2:D9	2-D8	R303	2:Q11	4-H7
PAD105	1:E3	2-P8	Q4	2:S4	1-Q9	R109	2:D10	2-D8	RV303	1:G6	4-G0
PAD106	1:C2	2-P1	Q100	2:C11	2-G2	R110	2:D12	2-D2	R304	2:Q11	4-H7
PAD107	1:C2	2-P0	Q101	2:D11	2-H4	R111	2:C12	2-D2	R305	2:Q11	4-H7
PAD108	1:C3	2-Q1	Q102	2:B11	2-H2	R112	2:D10	2-E8	R306	2:P11	4-J8
PAD109	1:C2	2-Q0	Q103	2:C9	2-J4	R113	2:C11	2-E2	R307	2:Q10	4-H8
PAD110	1:E3	2-D9	Q104	2:C3	2-K0	R114	2:C12	2-F1	R308	2:P11	4-J7
PAD111	1:E8	2-A8	Q105	2:D7	2-N6	R115	2:C10	2-G6	R309	2:P11	4-J7
PAD112	1:C3	2-A5	Q106	2:B9	2-M2	R116	2:D11	2-F4	R310	2:N11	4-K7
PAD113	1:D11	2-A4	Q107	2:D7	2-M6	R117	2:C11	2-F2	R311	2:L11	4-N7
PAD114	1:D12	2-A1	Q108	2:C10	2-L2	R119	2:C11	2-F2	R312	2:L11	4-N7
PAD115	1:E4	2-A1	Q109	2:D8	2-J9	R120	2:D9	2-F8	R313	2:L12	4-P7
PAD116	1:C11	2-G2	Q200	1:S6	3-K1	R121	2:E11	2-F5	R314	2:L10	4-B5
PAD117	1:B4	2-Q3	Q201	1:T9	3-L2	&R122	2:C10	2-G7	R315	2:L10	4-B5
PAD118	1:E3	2-A9	Q202	2:Q7	3-K6	R123	2:D11	2-G4	R316	2:L10	4-B5
PAD119	1:D9	2-H9	Q203	2:S8	3-H7	R124	2:C11	2-G3	R317	2:K10	4-C4
PAD120	1:B4	2-L8	Q301	2:Q11	4-H8	R125	2:D11	2-G5	R318	2:H12	4-E3
PAD121	1:E5	2-A5	Q302	2:Q11	4-H7	R126	2:C9	2-H7	R319	2:J10	4-E5
PAD122	1:C2	2-K9	Q303	1:H12	4-E4	R127	2:C10	2-H7	R320	2:H11	4-F4
PAD123	1:R7	3-N7	Q304	2:H8	4-L4	R128	2:C4	2-H1	R321	2:H9	4-K3
PAD124	1:S7	3-G2	Q305	2:H8	4-L4	R129	2:C3	2-H0	R322	2:H8	4-L4
PAD125	1:E4	4-J0	Q306	2:G10	4-M1	R130	2:B10	2-J4	R323	2:H8	4-L5
PAD126	1:N4	1-P3	Q307	2:F11	4-N1	R131	2:C10	2-J7	R324	2:H9	4-L3
PAD127	1:C10	2-G2	R1	2:L5	1-B6	R132	2:B10	2-J2	R325	2:H8	4-L5
PAD128	1:C10	2-A4	R2	2:M3	1-B1	R133	2:A9	2-K1	R326	2:H7	4-L5
PAD129	1:D9	2-H9	R3	2:K5	1-B4	R134	2:B9	2-K3	R327	2:H8	4-L4
PAD130	1:B2	2-K9	R4	2:M3	1-B1	R135	2:B10	2-L3	R328	2:H7	4-L3
PL1	1:P5	1-R0	R5	2:K5	1-C5	R136	2:B9	2-M3	&R329	2:H6	4-P3
		1-R0	R6	2:L4	1-C5	R137	2:B8	2-M7	R330	2:J5	4-B2
		1-R1	R7	2:K5	1-C4	R138	2:C8	2-M4	R331	2:F5	4-E2
		1-R2	R8	2:M3	1-C1	R139	2:C9	2-M3	R333	2:G5	4-G0
		1-R2	R10	2:K4	1-C1	R140	2:D7	2-M7	R334	1:G6	4-G0
		1-R2	R12	2:L4	1-D1	R141	2:D7	2-N7	R335	2:G8	4-G1
		1-R2	R13	2:L3	1-D1	R142	2:C7	2-N7	R336	2:G8	4-G1
		1-R1	R14	2:L5	1-D6	R143	2:C8	2-N3	R338	2:G7	4-G2
		1-R3	R15	2:L3	1-D1	R144	2:A7	2-R6	R339	2:G8	4-H2
		1-R1	R16	2:R4	1-B9	R145	2:B7	2-P2	R340	2:G7	4-H0
PL100	1:D11	2-H3	R20	2:M5	1-G5	R146	2:B6	2-R7	R341	2:G8	4-H0
		2-H3	R21	2:M3	1-H3	R147	2:B5	2-Q3	R342	2:G7	4-J0
		2-H3	R22	2:L4	1-H4	R148	2:C4	2-Q3	&R343	2:F8	4-H1
PL101	1:D9	2-H7	R23	2:N4	1-J4	R149	2:C11	2-F3	R344	2:F8	4-H2
		2-H6	R24	2:M4	1-J3	R150	2:B11	2-G3	R345	1:F8	4-H2
		2-H7	R25	2:M4	1-K3	R151	2:E8	2-B8	R346	2:F9	4-J2

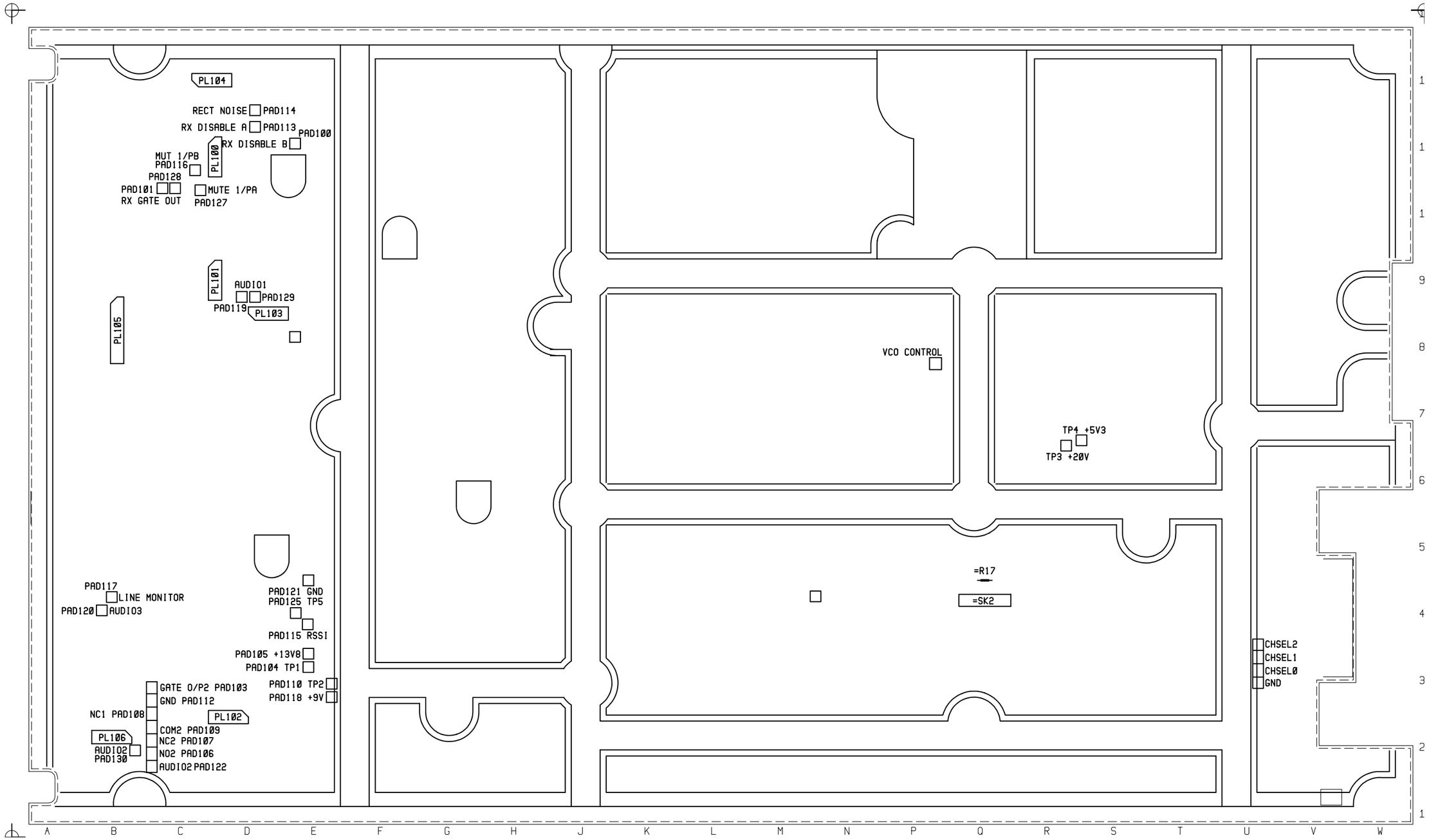
Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit
R347	2:F9	4-J2									
R348	2:G9	4-J2									
R349	2:G8	4-K1									
R350	2:G9	4-K2									
R351	2:G9	4-L1									
R352	2:G9	4-L1									
R353	2:G10	4-M1									
R354	2:G9	4-M1									
R355	2:G10	4-M1									
R356	2:G11	4-N1									
R357	2:F10	4-N1									
R358	2:G8	4-N2									
R359	2:G11	4-N2									
R360	2:G11	4-P2									
R361	2:G11	4-P1									
R362	2:G12	4-P2									
R363	2:G12	4-Q2									
R364	2:V8	4-A7									
R365	2:H12	4-E4									
R366	2:H8	4-L4									
R367	1:G10	4-M2									
R368	2:G10	4-M1									
R369	2:G5	4-G0									
R370	2:G11	4-F3									
R371	2:H11	4-G4									
R372	2:G11	4-G3									
R373	2:L8	1-A4									
RL100	1:D2	2-K1									
		2-N1									
		2-N0									
SJ2	1:L8	1-A4									
SJ3	1:L7	1-R5									
SJ4-1	1:P8	1-R5									
SJ4-2	1:P8	1-R7									
SJ4-3	1:P7	1-R6									
SJ4-4	1:P7	1-R6									
SJ4-5	1:P7	1-R9									
SJ5-1	1:K8	1-R4									
SJ5-2	1:K8	1-R4									
SJ5-3	1:K8	1-R3									
SJ5-4	1:K7	1-R3									
SJ5-5	1:K7	1-R4									
SK1	1:K5	1-A1									
		1-A3									
		1-A3									
		1-A3									
		1-A2									
		1-A2									
		1-A2									
		1-A2									
		1-A1									
		1-A1									
SW100	1:B6	2-A6									
T100	1:C4	2-Q2									
T200	1:R8	3-K7									
VC301	1:H10	4-H3									
X301	1:J4	4-C1									
&XF301A	1:H10	4-G4									
&XF301B	1:H10	4-J4									
&XF302	1:H6	4-N4									
&XF303	1:G4	4-D0									



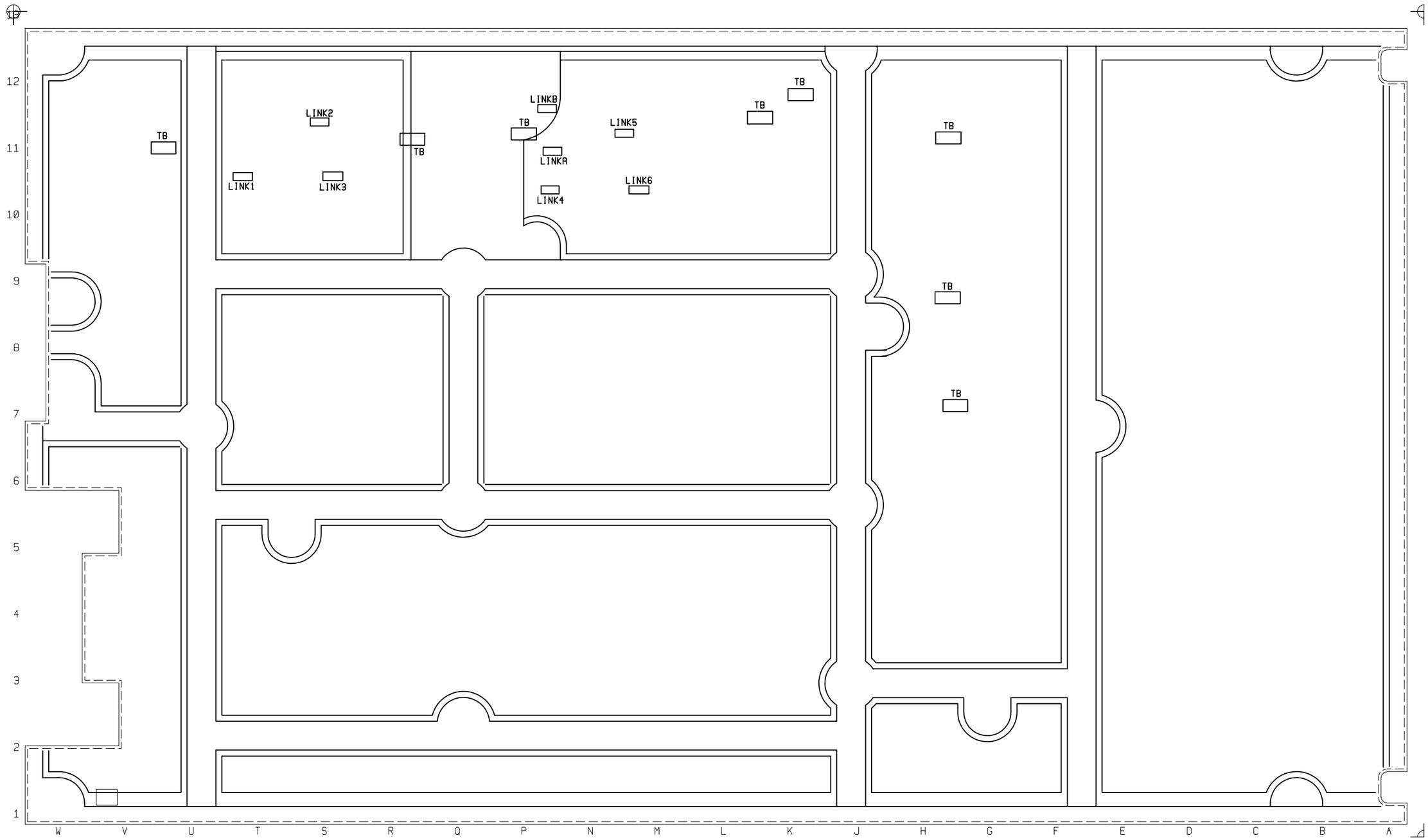
T835 PCB Layout
Top Side
220-01186-02



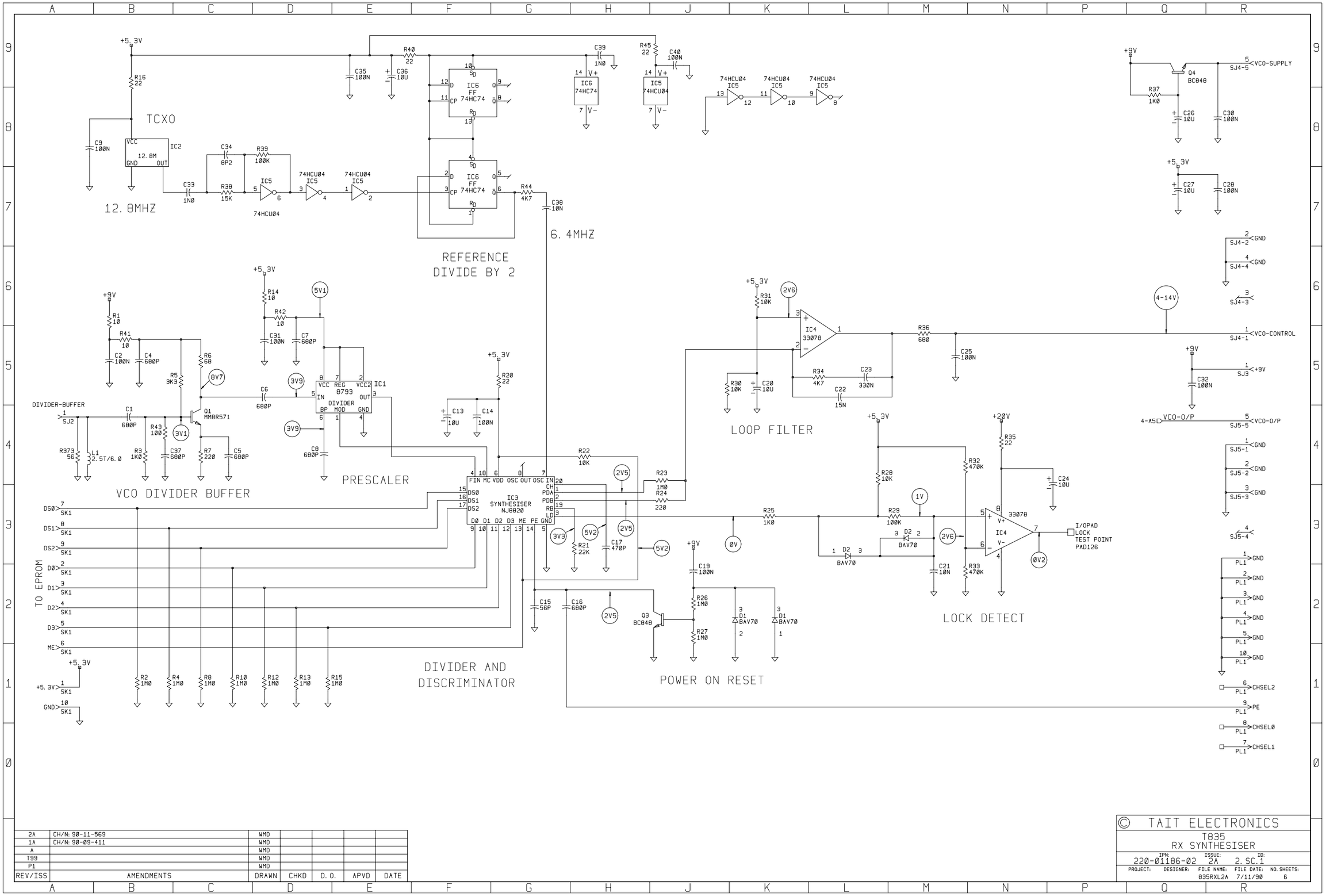
T835 PCB Layout
Bottom Side
220-01186-02



T835 Test Points & Options
Top Side
220-01186-02



T835 Test Points & Options
Bottom Side
220-01186-02



REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
2A	CH/N: 90-11-569	WMD				
1A	CH/N: 90-09-411	WMD				
A		WMD				
T99		WMD				
P1		WMD				

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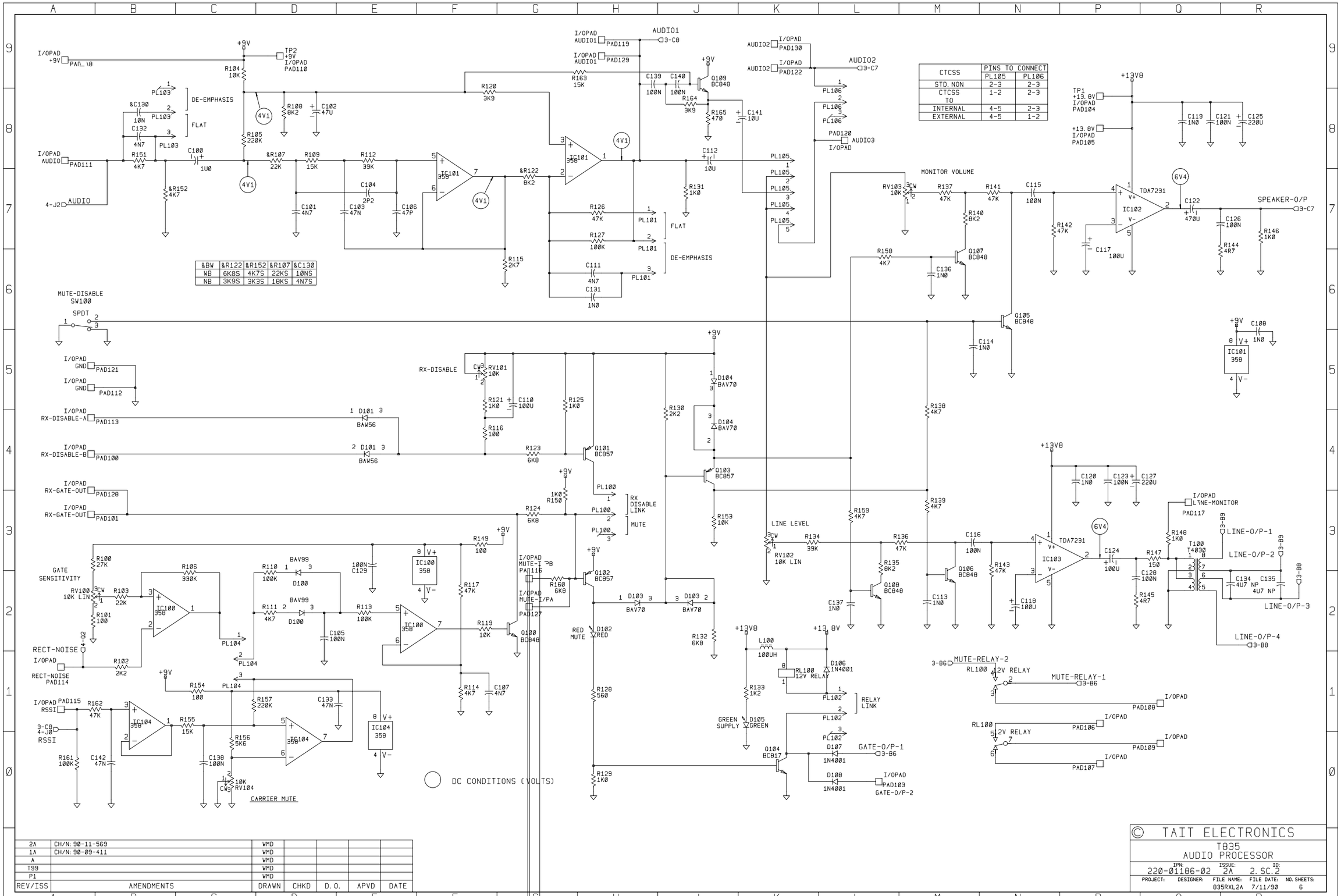
T835
RX SYNTHESISER

IPN:	ISSUE:	ID:
220-01186-02	2A	2.SC.1

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		B35RXL2A	7/11/90	6



&BW	&R122	&R152	&R107	&C130
WB	6K8S	4K7S	22KS	10NS
NB	3K9S	3K3S	18KS	4N7S

REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
2A	CH/N: 90-11-569	WMD				
1A	CH/N: 90-09-411	WMD				
A		WMD				
T99		WMD				
P1		WMD				

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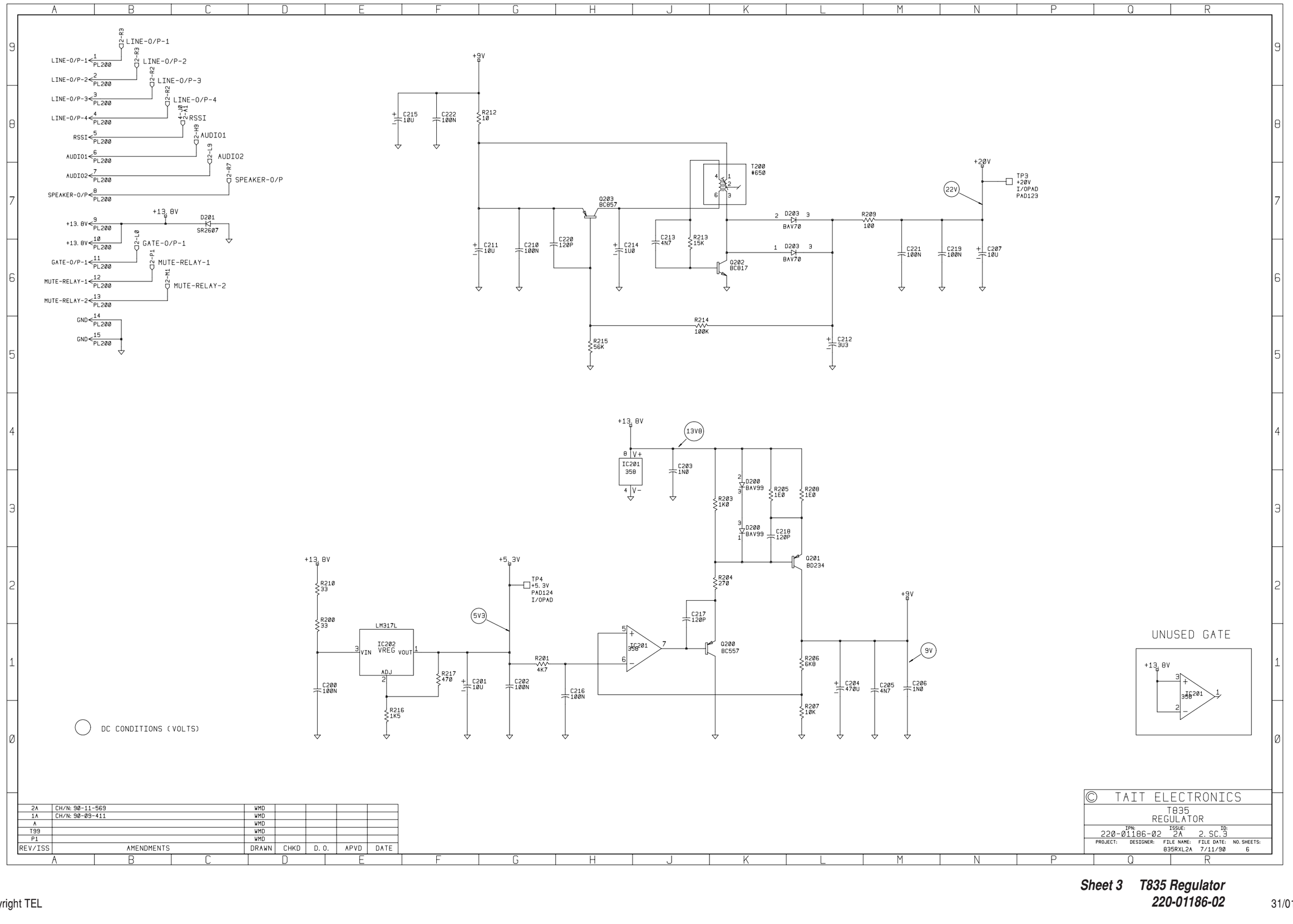
T835
AUDIO PROCESSOR

IPN:	ISSUE:	ID:
220-01186-02	2A	2.SC.2

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		835RXL2A	7/11/90	6

Sheet 2 T835 Audio Processor - 220-01186-02



REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
2A	CH/N: 90-11-569	WMD				
1A	CH/N: 90-09-411	WMD				
A		WMD				
T99		WMD				
P1		WMD				

T835
REGULATOR

IPN:	ISSUE:	ID:
220-01186-02	2A	2.SC.3

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		B35RXL2A	7/11/90	6

Sheet 3 T835 Regulator 220-01186-02

&BW	&C344	&C345	&C346	&C347	&C353	&C354	&C355	&R329	&R343	&XF301A	&XF301B	&XF302	&XF303	&C500
WB	27PS	10NS	10NS	27PS	27PS	10NS	0P5S	1MG0S	10KS	21N15B	21N15B	21N15A	CFW455E	0P5S
NB	39PS	82PS	82PS	39PS	39PS	82PS	1P8S	3K3S	8K2S	21N7.5B	21N7.5B	21N7.5A	CFW455G	10PS

FREQUENCY	135-155	155-175
LINK1	IN	OUT
LINK2	IN	OUT
LINK3	IN	OUT
LINK4	IN	OUT
LINK5	IN	OUT
LINK6	IN	OUT
LINK A	OUT	IN
LINK B	IN	OUT

T. B. = TEST BREAK

SENSITIVITY

RSSI LEVEL

NOISE MUTE GAIN

REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
2A	CH/N: 90-11-569	WMD				
1A	CH/N: 90-09-411	WMD				
A		WMD				
T99		WMD				
P1		WMD				

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T835
RECEIVER

IPN:	ISSUE:	ID:
220-01186-02	2A	2.SC.4

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		835RXL2A	7/11/90	6

Sheet 4 T835 Receiver - 220-01186-02

Part C T836 Transmitter & T837 Exciter

This part of the manual is divided into six sections, as listed below. There is a detailed table of contents at the start of each section.

Section	Title
1	**General Information**
2	**Circuit Operation**
3	**Initial Tuning & Adjustment**
4	**Functional Testing**
5	**Fault Finding**
6	**PCB Information**

1 T836/837 General Information

This section provides a brief description of the T836 transmitter and T837 exciter, along with detailed specifications and a list of variants available.

The following topics are covered in this section.

1.1 Introduction

The T836 is a synthesised, FM base station transmitter for single or multichannel operation in the 136 to 174MHz frequency range with a standard power output of 25W. The RF section of the transmitter comprises a frequency synthesiser which provides 170mW of frequency modulated RF drive to a two stage, wide band output driver followed by a 25W power amplifier.

A thermal shutdown feature is provided in the T836 should operating temperatures exceed acceptable levels.

The T837 is a synthesised, FM base station exciter for single or multichannel operation in the 136 to 174MHz frequency range. With a standard power output of only 800mW, the exciter is designed for use with the T838 50W power amplifier. The RF section of the exciter comprises a frequency synthesiser which provides 170mW of frequency modulated RF drive to a two stage, wide band output amplifier.

The synthesiser frequency is programmed via an EPROM which is attached to a separate plug-in memory PCB. A DIP switch on the memory PCB allows fast single channel selection from a multichannel programmed EPROM, but for true multichannel capability the EPROM must be addressed separately via an additional D-range connector at the rear of the set.

A wide selection of audio characteristics may be obtained from the audio processor. Optional circuit blocks are an audio compressor and a pre-emphasis stage. They can be bypassed or linked to one or both audio inputs, and then back into the remaining audio circuitry in almost any combination. All audio processor options are link selectable.

All components except those of the VCO and memory PCBs are mounted on a single PCB. This is secured to a die-cast chassis which is divided into compartments to individually shield each section of circuitry. Access to both sides of the main circuit board is obtained by removing each of the chassis lids. There is provision within the chassis to mount small option PCBs.

1.2 Specifications

1.2.1 Introduction

The performance figures given are minimum figures, unless otherwise indicated, for equipment tuned with the maximum switching band and operating at standard room temperature (+22°C to +28°C).

Where applicable, the test methods used to obtain the following performance figures are those described in the EIA specification. However, there are several parameters for which performance according to the CEPT specification is given.

Details of test methods and the conditions which apply for Type Approval testing in all countries can be obtained from Tait Electronics Ltd.

1.2.2 General

Frequency Range	.. 136-174MHz (refer to Section 1.3)
Modulation Type	.. direct FM
Frequency Increment	.. 5 or 6.25kHz
Switching Range	.. 8MHz
Number Of Channels:	
Standard	.. 1
Optional	.. 8
Internally Selectable	.. 128
Supply Voltage:	
Operating Voltage	.. 10.8 to 16V DC
Standard Test Voltage	.. 13.8V DC
Polarity	.. negative earth only
Polarity Protection	.. diode
Keying Supply (if required)	.. -50V DC
Supply Current:	
Transmit - T836	.. 4.5A (typical)
- T837	.. 600mA
Standby	.. 120mA
Load Impedance	.. 50 ohms
Operating Temperature Range	.. -30°C to +60°C
Frequency Stability (see also Section 1.3)	.. ±2.5ppm, -30°C to +60°C

Dimensions:

Height		.. 191mm
Width		.. 60mm
Length	- T836	.. 322mm
	- T837	.. 316mm

Weight .. 2.1kg

Time-Out Timer (optional) .. 1 to 4 minutes (adjustable)

Tail Timer .. 5ms to 4 seconds (adjustable)

Transmit Key Time .. <25ms

Duty Cycle (T836 Only) .. 100% @ 25W at +25°C
.. 30% @ 25W at +60°C
.. 100% @ 10W at +60°C

1.2.3 RF Section

Adjacent Channel Power (full deviation):

Wide Band (±25kHz / 15kHz B / W)	.. -75dBc
Narrow Band (±12.5kHz / 7.5kHz B / W)	.. -65dBc

Transmitter Side Band Noise:
(no modulation, 15kHz bandwidth)

At ±25kHz	.. -95dBc
At ±1MHz	.. -105dBc

Radiated Spurious Emissions:

Transmit	.. -36dBm to 1GHz -30dBm to 4GHz
Standby	.. -57dBm to 1GHz -47dBm to 4GHz

Conducted Spurious Emissions: (T836 Only)

Transmit	.. -36dBm to 1GHz -30dBm to 4GHz
Standby	.. -57dBm to 1GHz -47dBm to 4GHz

Power Output:

T836	- Rated Power	.. 25W
	- Range Of Adjustment	.. 5-25W
T837		.. 800mW

1.2.4 Audio Processor

Inputs Available .. line, microphone and CTCSS

Line Input:

- Impedance .. 600 ohms (balanced)
- Sensitivity (60% modulation @ 1kHz)-
  - With Compressor .. -50dBm
  - Without Compressor .. -30dBm

Microphone Input:

- Impedance .. 600 ohms
- Sensitivity (60% modulation @ 1kHz)-
  - With Compressor .. -70dBm
  - Without Compressor .. -50dBm

Modulation Characteristics

Frequency Response (below limiting) .. flat or pre-emphasised (optional)

Line And Microphone Inputs:

- Pre-emphasised Response-
  - Bandwidth .. 300Hz to 3kHz
  - Below Limiting .. within +1, -3dB of a 6dB / octave pre-emphasis characteristic
- Flat Response .. within +1, -2dB of output at 1kHz

Above Limiting Response .. within +1, -2dB of a flat response (ref. 1kHz)

Distortion .. 2%

Hum And Noise:

- Narrow Band .. -50dB (CEPT)
- Wide Band .. -55dB (300Hz to 3kHz [EIA]) typical

Compressor (optional):

- Attack Time .. 10ms
- Decay Time .. 800ms
- Range .. 50dB

CTCSS Input:

- Bandwidth .. 65 to 250Hz
- Response .. within ±1dB of a flat response (ref. 150Hz)

1.3 Versions

Description	Version			
	10	15	20	25
136-156MHz	●	●		
148-174MHz			●	●
2.5kHz Deviation		●		●
5kHz Deviation	●		●	
±2.5ppm TCXO (-30°C to +60°C)	●	●	●	●

Note: A TCXO with a stability of ±1ppm (0°C to +60°C) is available to suit specific requirements. Contact your nearest authorised Tait Dealer or Service Centre for further details.

2 T836/837 Circuit Operation

This section provides a basic description of the circuit operation of the T836 transmitter and T837 exciter.

The following topics are covered in this section.

2.1 Introduction

The individual circuit blocks which make up the T836 and T837 are:

- synthesiser
- VCO
- audio processor
- drive amplifier
- power amplifier (T836 only)
- voltage regulators.

Each of these circuit blocks is set in its own shielded compartment, formed as an integral part of the main chassis.

The configuration of the circuit blocks may be seen on a functional level in Figure 2.1 and Figure 2.2. Refer to the circuit diagrams for more detail.

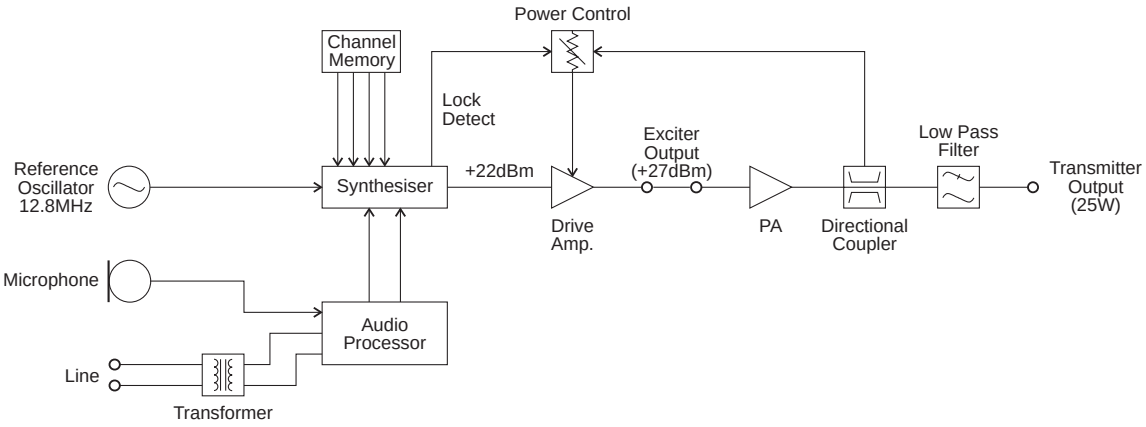


Figure 2.1 T836 High Level Block Diagram

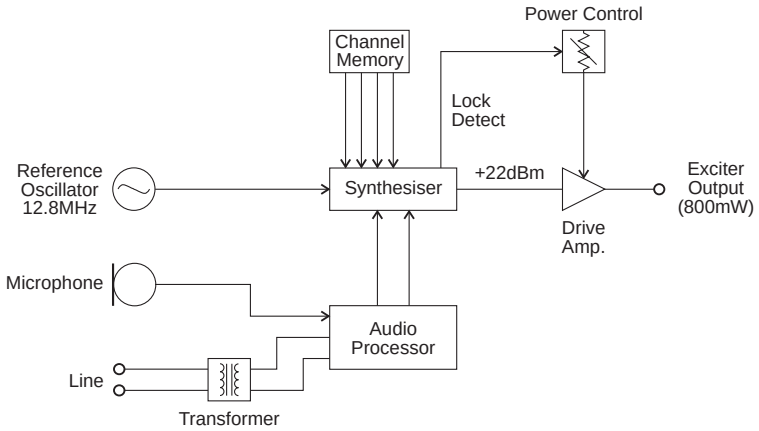


Figure 2.2 T837 High Level Block Diagram

2.2 Synthesiser

(Refer to Figure 2.3.)

The synthesiser employs a phase-locked loop (PLL) to lock a voltage controlled oscillator (VCO) to a given reference frequency. A reference oscillator at 12.8MHz (IC1) is buffered (IC7c & b) and divided down to 200kHz (IC4). This 200kHz square wave is then summed with the modulating audio and passed to an integrator (IC7f, Q8, Q9). This produces a ramping waveform which is centred around a DC level determined by the incoming audio. IC7e performs as a comparator, ultimately producing a phase-modulated 200kHz square wave. This is followed by a similar phase shifting stage (IC7d & a, Q10, Q11), before being divided down to 6.25kHz or 5kHz within the synthesiser IC (IC5).

A buffered output of the VCO is divided with a programmable divider, comprising a VHF prescaler (IC3) and a divider within IC5. This signal is compared with the phase modulated reference signal at the phase detectors in IC5. A digital phase detector (PDB) provides rapid coarse tuning of the VCO until the phase error is within the range of the high gain sample and hold detector (PDA). The phase detector outputs are passed through an active loop filter (IC6) which produces a DC voltage between 0V and 20V to tune the VCO. This VCO control line is further filtered to attenuate noise and other spurious signals. Note that the VCO frequency increases with increasing control voltage.

If the synthesiser loop loses lock, a pulsed signal appears at LD (pin 3) of IC5. This signal is filtered and buffered by IC6, producing the lock detect signal used to shut off the power supply to the drive amplifier.

The division ratio of the programmable divider is stored within EPROM memory. Up to 128 frequencies can be stored within the EPROM and are addressed using the internal DIP switches. Three of the address lines are also available for external frequency control via an extra D-range connector at the rear of the chassis. A change of state of any of these three lines commences a programming cycle, during which time the frequency data in the EPROM is down loaded to the divider (IC5). 32 bits of data are loaded in eight 4-bit words.

Note that the three address lines must change their state decisively and simultaneously. Methods which allow the states of the three lines during transition to be undefined for indeterminate lengths of time, as with some mechanical BCD switches, are unsuitable.

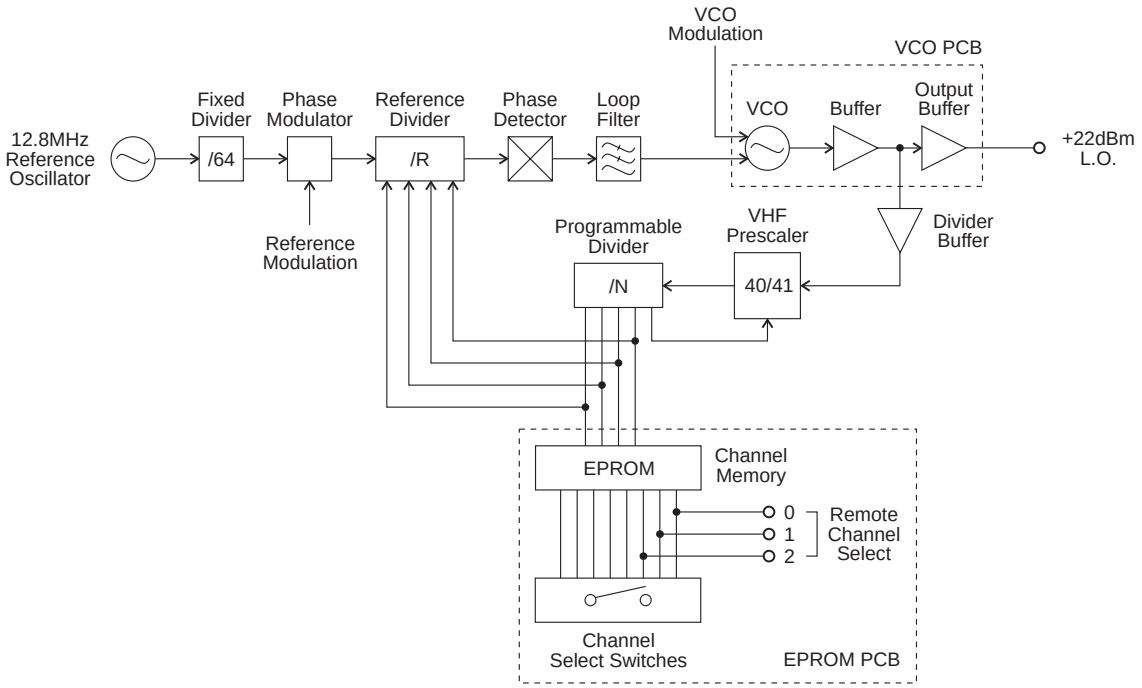


Figure 2.3 T836/837 Synthesiser Block Diagram

2.3 VCO

The VCO transistor (Q1) operates in a common source configuration, with an LC tank circuit coupled between its gate and drain to provide the feedback necessary for oscillation. The VCO control voltage from the loop filter (IC6) is applied to the varicaps (D1-D4) to facilitate tuning within an 8MHz band of frequencies. A trimcap (VC1) is used for coarse tuning of the VCO. The output from the oscillator circuit drives a cascode amplifier stage (Q2, Q3) which supplies +10dBm (typically) to a further stage of amplification, Q5. This is the final amplifier on the VCO PCB, and delivers +22dBm (typically) to the exciter drive amplifier.

A low level "sniff" is taken from the input to Q5 and used to drive the divider buffer for the VHF prescaler (IC3). The prescaler divide ratio is 40/41.

The VCO operates at the actual output frequency of the exciter, i.e. there are no multiplier stages. It is modulated by superimposing the audio signal onto the control voltage and by phase modulating the reference signal.

2.3.1 Two-Point Modulation

Both the VCO and reference oscillator are modulated so that the phase detectors of IC5 see no frequency error under modulation. Thus, the synthesiser loop will not attempt to correct for modulation and the response of the transmitter remains unaffected.

2.3.2 VCO Supply

The VCO is supplied with two switched supplies, Tx reg. and +9V rail under the control of the Tx reg. supply.

The VCO and buffer amplifier are supplied from the +9V switched supply by Q6 via the C multiplier (Q5, C34).

The output amplifier is supplied from Tx reg.

2.4 Audio Processor

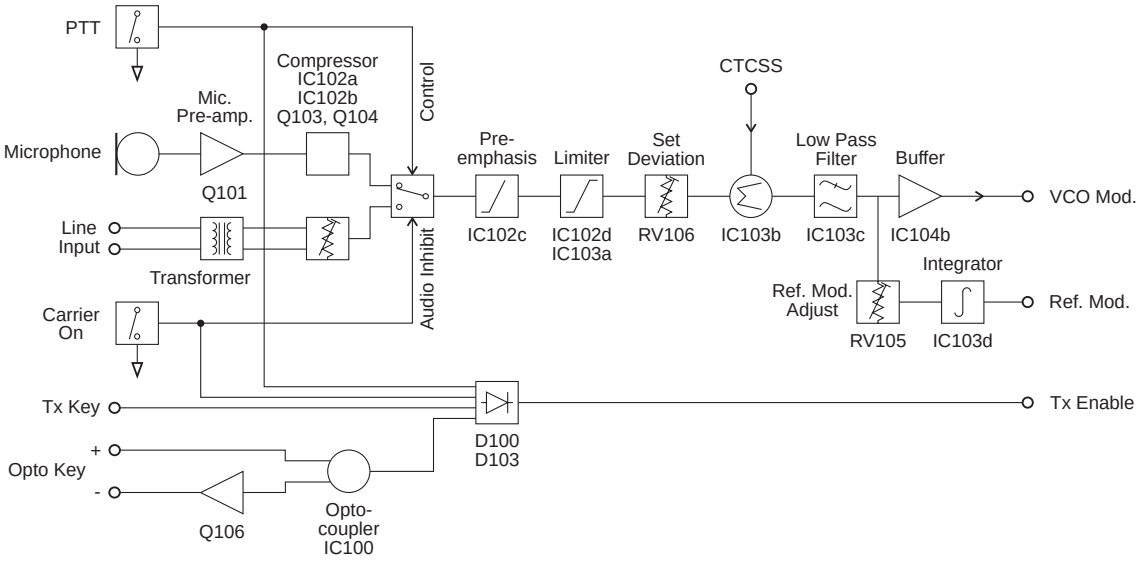


Figure 2.4 T836/837 Audio Processor Block Diagram

2.4.1 General

The audio processor comprises several link selectable circuit blocks which may be configured in a variety of combinations to suit individual requirements. The pre-emphasis network and compressor may be linked individually or cascaded between either or both audio inputs and the limiter.

Refer to Section 3.3.1 for linking details.

2.4.2 Audio Inputs

Two audio inputs are available: one from a 600 ohm balanced (or unbalanced) line, and the other from a local microphone. The microphone signal is passed first to a pre-amplifier (Q101) and ultimately to a multiplexer (IC101), but in between may pass through the compressor (depending on the linking details). The line transformer is also connected to the multiplexer and is disabled by the microphone PTT switch.

A third input for CTCSS tones is also provided.

2.4.3 Keying Inputs

There are four ways to key the exciter:

- pulling the Tx-key line low (pin 13 on the D-range connector at the rear of the set);
- pushing the "Carrier" button on the front panel - this will inhibit all audio;
- using the PTT button on the local microphone, disabling audio from the line;
- via the opto-key inputs (pins 11 and 12 on the D-range connector) where electrical isolation is required. This features a constant current source (Q106) to ensure reliable activation of the opto-coupler (IC100) at low keying voltages.

2.4.4 Compressor

The input signal is fed via a current controlled attenuator (Q103, Q104) to a high gain stage (IC102a) from which the output signal is taken. This signal is passed to a comparator (IC102b) which toggles whenever the audio signal exceeds a DC threshold determined by RV104. Thus, the comparator produces a square wave whose mark-space ratio is determined by the amplitude of the audio signal. This square wave pumps up the reservoir capacitor (C129) which controls the attenuator (Q103, Q104), thus completing the feedback loop.

The compression level is set by adjustment of the comparator threshold (RV104).

Note: Although the high dynamic range of the compressor allows the use of very low audio signal levels, such conditions will be accompanied by a degradation of the signal to noise ratio. Very low audio input levels should therefore be avoided where possible.

2.4.5 Outputs To Modulators

The output signal from the limiter (IC102d, IC103a) is added to any incoming CTCSS tone at a summing amplifier (IC103b). The signal is then low pass filtered (IC103c) and split to supply the two modulators.

Since the VCO modulator is a true frequency modulator, its audio is simply buffered (IC104b). The reference modulator, however, is a phase modulator and its audio must first be integrated (IC103d).

It is vital that the audio levels to the modulators are accurately set, ***relative to each other***. Hence the inclusion of level adjustment in the reference modulator path (RV105). Once set, adjustments to absolute deviation may be made only via the deviation pot (RV106).

2.5 Power Supply & Regulator Circuits

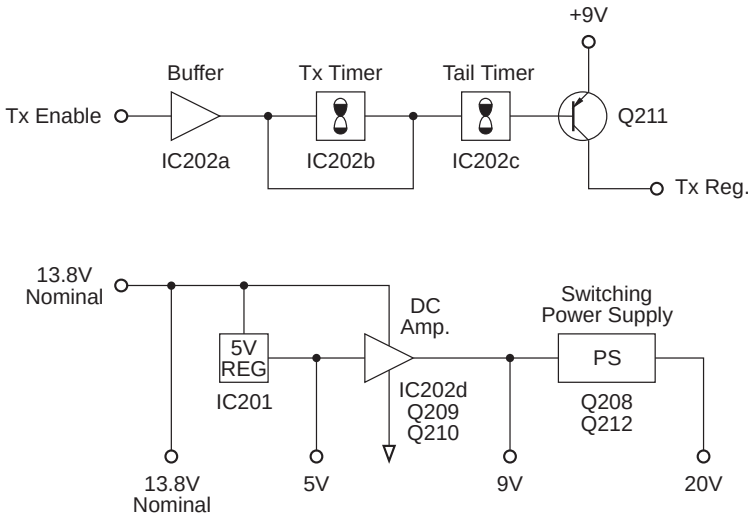


Figure 2.5 T836/837 Power Supply & Regulator Block Diagram

The T836 and T837 are designed to operate from a 10.8-16V DC supply, although the standard test voltage is 13.8V. A 5.3V regulator (IC201) running directly from the 13.8V rail drives much of the synthesiser circuitry. It is also used as the reference for a DC amplifier (IC202d, Q209, Q210) which provides a medium current capability 9V supply.

A self-oscillating, switching power supply (Q208, Q212) runs from the 9V supply, producing a low current capability +20V supply. This is used to supply the synthesiser loop filter (IC6), giving a VCO control voltage range of up to 20V.

Ultimate control of the transmitter is via the Tx reg. supply, switched from 9V by Q211. This is enabled by the Tx enable signal from the audio processor, but is subject to gating by the transmit timer (IC202b). If the transmitter is keyed continuously for a time exceeding that set by RV201 and C222, the Tx timer will force the Tx reg. supply off until the transmitter is keyed again. If required, the Tx timer may be disabled by removing R257.

The tail timer provides a repeater tail of up to several seconds and is adjusted by RV202.

2.6 T836 Drive Amplifier & PA

(Refer to Figure 2.1.)

A two-stage, wide band amplifier (Q300, Q301) provides an output level of approximately 500mW (+27dBm) for an input of 170mW (+22dBm) from the VCO. An 11V zener (D351) on the supply of IC350 provides a 10.5V regulated rail for the exciter.

To reduce the spurious output level the synthesiser out-of-lock signal inhibits the exciter via Q350 and IC350a.

R300, R301 and R302 form a 6dB attenuator to provide good VCO / exciter isolation.

The output attenuator (&R425, &R426, &R427 and &R428) aids in reducing exciter / PA interaction while also ensuring a reasonable match for Q301.

The RF output from the exciter is fed to the driver stage (&Q423) and then to the final (&Q424). DC is fed to the final via a low pass filter with special low frequency decoupling. &CV400 tunes the output matching across the entire band.

The directional coupler provides the required feedback for the power control loop while harmonics are attenuated by the low pass filter.

2.7 T837 Exciter Drive Amplifier

(Refer to Figure 2.2.)

A two-stage, wide band amplifier (Q300, Q301) provides an output level of approximately 800mW (+29dBm) for an input of 170mW (+22dBm) from the VCO. D351 (11V zener) on the supply of IC350 provides a 10.5V regulated rail for the exciter.

To reduce the spurious output level, the synthesiser out-of-lock signal inhibits the exciter via Q350 & IC350A.

R300, R301 & R302 form a 6dB attenuator to provide good VCO / drive amplifier isolation.

The output attenuator (&R425, &R426, &R427, &R428) assists in reducing exciter / PA interaction while also ensuring a good match for Q301.

3 T836/837 Initial Tuning & Adjustment

The following section describes the full tuning and adjustment procedure and provides information on:

- channel programming
- channel selection
- selecting required audio links
- synthesiser alignment
- PA alignment (T836 only)
- modulator adjustment
- limiter adjustment
- setting line level
- compressor adjustment
- timer adjustment.

3.1 Channel Programming

Up to 128 channel frequencies can be stored in the EPROM memory (IC1). Each channel can be addressed using the bank of 8 switches (SW1). The most significant bit of this switch is set according to the type of EPROM fitted:

ON = 27C16
OFF = 27C64

Up to 8 channels may be addressed externally when the optional extra rear D-range connector is fitted.

Programming is accomplished by using an IBM[1] PC, a PROM programmer and the PGM800 software package. For a full description of the programming procedure, refer to the T800 Programming Software User's Manual.

3.2 DIP Switch Codes For Channel Addresses

The PGM800 software used to programme the EPROM will present the user with a DIP switch code for each channel address (refer to Section 3.9). For example, channel 125 will be assigned a switch code of X0000011 (1-128 channel numbering), in which case the switches should be set as shown in Figure 3.1, i.e. **0**0000011.

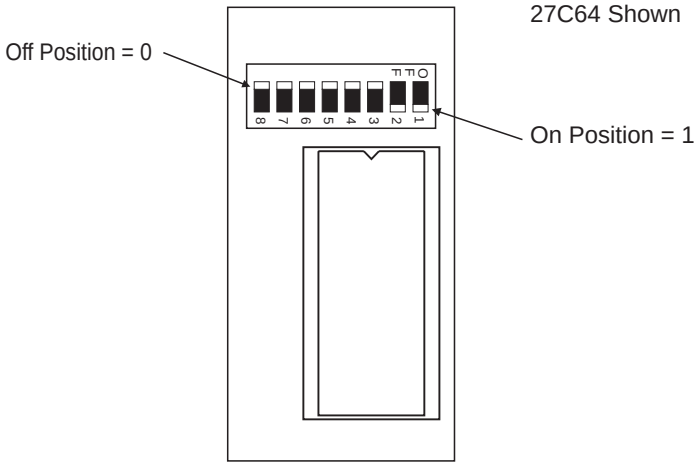


Figure 3.1 Channel DIP Switch Setting

Note 1: For remote multichannel applications using the T800-07 multichannel memory PCB, the DIP switch is not used and should have the first 3 least significant bits (1-3) in the ***off*** position. The next 4 bits (4-7) should be ***on***, while the most significant bit (8) is selected according to the EPROM used (refer to Section 3.1). This will allow the existing CHSEL lines to be used to select up to 8 channels. It is possible to address blocks of 8 channels throughout the 128 channel EPROM capacity by switching bits 4 to 7 on the DIP switch.

Note 2: Alternatively, all 128 channels may be remotely addressed on the T800-07, but bits 1-7 of the DIP switch should be in the ***off*** position. In this case it will be necessary to drill a hole to route the 7 channel select lines from the synthesiser compartment to the D-range connector. Later models have an access slot between these two compartments.

1. IBM is a registered trademark of International Business Machines.

3.3 Audio Processor Links

3.3.1 Link Details

The links available for various circuit block options are listed by function as follows:

Plug	Link	Function
PL100	1-2	not connected
	3-4	microphone pre-amp. output to compressor input
	5-6	microphone pre-amp. output to multiplexer input
PL101	1-2	multiplexer output to pre-emphasis input
	3-4	multiplexer output to compressor input
	5-6	multiplexer output to limiter input
PL102	1-2	not connected
	3-4	not connected
	5-6	compressor output to pre-emphasis input
	7-8	compressor output to limiter input
	9-10	compressor output to multiplexer input
PL103	1-2	pre-emphasis output to multiplexer input
	3-4	pre-emphasis output to limiter input
	5-6	not connected

3.3.2 Typical Options

	PL100	PL101	PL102	PL103
microphone pre-amp. compressed and pre-emphasised; line input pre-emphasised (standard set-up)	3-4	1-2	9-10	3-4
microphone pre-amp. compressed and pre-emphasised; line input unprocessed	3-4	5-6	5-6	1-2
line and microphone compressed and pre-emphasised	5-6	3-4	5-6	3-4
microphone pre-amp. compressed; line and microphone flat response	3-4	5-6	9-10	5-6

3.4 Test Equipment Set-up

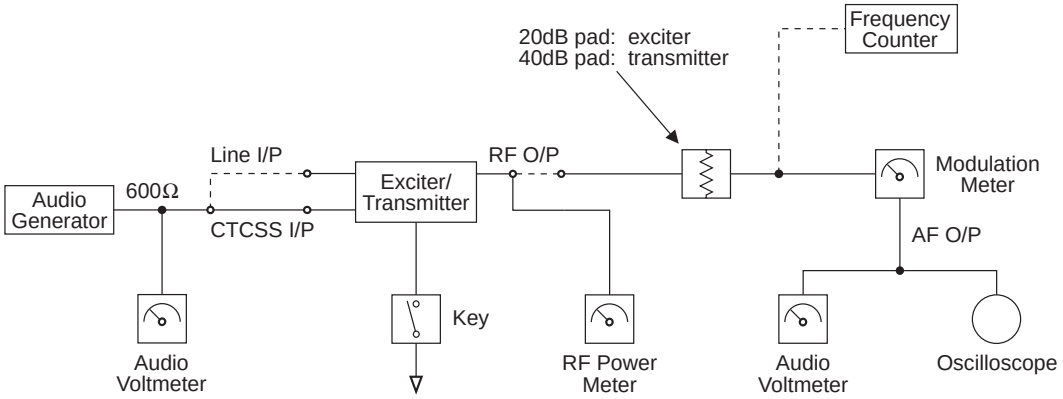


Figure 3.2 T836/837 Test Equipment Set-up

3.5 Synthesiser Alignment

- Ensure that the EPROM (IC1) has been programmed with the required frequencies using PGM800 software.

- **Single Channel** Select a channel on the EPROM PCB DIP switch.

  Multichannel Select the middle channel via the EPROM PCB DIP switch.

- Connect a high impedance voltmeter to the junction of L1 and R1 in the VCO (this measures the synthesiser loop voltage).

- Earth the Tx key line.

  Single Channel Tune VCO trimmer VC1 for a synthesiser loop voltage of 9V.

  Multichannel Tune VCO trimmer VC1 for a synthesiser loop voltage of 9V on the middle channel.

  If there is no middle channel, tune VC1 so that the channels are symmetrically placed around a loop voltage of 9V.

  All channels should lie within the upper and lower limits of 15V and 5V respectively.

  Do not attempt to programme channels with a greater frequency separation than the specified switching range (8MHz).

- Check that the exciter output power is:

T836	500mW +200, -100mW
T837	800mW +200, -100mW.

- Measure the exciter output frequency and adjust the TCXO (IC1) trimmer if required.

Caution: **This trimmer is susceptible to physical damage. Do not exert a downward force of more than 500g (1lb) when adjusting.**

3.6 PA Alignment (T836 Only)

Check that the exciter is connected to the PA with the coaxial link.

Connect an RF power meter to the PA output.

Turn &RV356 (power control) fully clockwise.

Measure and record the voltage (VL) at &L439; perform this measurement at room temperature so that the NTC &R482 is close to 25°C.

Key the transmitter.

Tune &CV400 until maximum power is obtained.

Reduce the current by approximately 1A by detuning &CV400 or until the power drops below 30W.

Check that the total current drawn is less than 4.5A for 25W output power.

Adjust &RV356 for an output power between 5 and 25W.

3.7 Thermal Shutdown (T836 Only)

Key the transmitter and set the output power to 25W as described in Section 3.6.

Short &L439 to ground.

Set &RV357 (shutdown level) for an output power of 5W.

Set &RV351 (temperature set) to 0.16VL volts (measured at IC350 pin 5), where VL is the voltage measured at &L439 in Section 3.6. This sets the thermal shutdown at 85°C at NTC &R482.

3.8 Audio Processor

3.8.1 Two Point Modulation

The T836 and T837 utilise two point modulation to obtain a wide audio bandwidth independent of the synthesiser loop filter response. This is achieved by simultaneously frequency modulating the VCO and phase modulating the synthesiser reference frequency. The relative signal levels fed to the two modulators are quite critical and cause interaction when setting up.

Both modulating signals require readjustment when the exciter is shifted in frequency greater than the switching range (i.e. $\Delta F > \pm 4MHz$).

Note: In this and following sections deviation settings are given first for wide band sets, followed by settings in brackets for narrow band sets [ ].

3.8.2 Modulator Adjustment

1. Inject an audio signal of 600Hz 1.5V rms (+5dBm) into the CTCSS input (D-range pin 8).

   Earth the key line.

2. Adjust the output from the audio generator to obtain ±3kHz [±1.5kHz] deviation at 600Hz.

3. Change the input frequency to 120Hz and adjust RV105 (ref. mod.) to obtain ±3kHz [±1.5kHz] deviation.

4. Change the input frequency back to 600Hz.

   Repeat steps 2 and 3 above until the deviations achieved at the two input frequencies are within 0.2dB of each other. This will need to be done at least four times.

5. Sweep the audio between 50 and 300Hz for peaks.

Note: A peak between 50 and 300Hz will indicate a fault condition, i.e:

- incorrectly set-up

or - modulation circuitry fault.

The specification window is ±1dB relative to 150Hz from 65 to 260Hz.

3.8.3 Limiter Adjustment

Set the audio processor links as appropriate for the required audio configuration (refer to Section 3.3).

Inject 1kHz at -10dBm into the line input (D-range pins 1 & 4; pins 2 & 3 shorted and 6 & 7 shorted; refer to Section 1.2 of Part F).

Adjust RV100 (line sensitivity) fully clockwise and earth the key line. Adjust RV106 (deviation) to set the peak deviation to ±4.7kHz [±2.3kHz].

Sweep the audio frequency from 100Hz to 4kHz and ensure that the maximum deviation does not exceed 4.7kHz [2.3kHz]. Readjust RV106 if necessary.

Note: For multichannel operation this test should be performed on the channel with the highest deviation.

3.8.4 Line Level Without Compressor

This section assumes that the compressor is not used. If the compressor is required, refer to Section 3.8.5.

Adjust the line sensitivity as follows:

- set the injected signal at the line input to the required line level (typically -10 to -20dBm);
- adjust RV100 (line sensitivity) to provide ±3kHz [±1.5kHz] deviation.

3.8.5 Compressor

The compressor may be used on the line input only, the microphone input only, or on both the line and microphone inputs. If the compressor is used, refer to one of the following sections as appropriate.

3.8.5.1 Compressor On Line Input Only

Set RV100 (line sensitivity) fully clockwise and earth the key line.

Reduce the line level to -50dBm at 1kHz and set RV104 (compression level) fully clockwise.

Check that 3kHz deviation [1.5kHz] is still available.

Slowly increase the audio input level until the demodulated waveform shows significant signs of clipping (approximately 4.5kHz [2.3kHz] deviation).

Adjust RV104 (compression level) anticlockwise until the demodulated waveform is just clipping (approximately 4kHz [2kHz] deviation).

Increase the input level to -10dBm and check that the test tone is still held just into clipping. The input line level should be typically -10 to -20dBm.

3.8.5.2 Compressor On Microphone Input Only

Open the key line and plug a microphone jack into the front panel socket.

Adjust RV104 (compression level) fully clockwise.

Acoustically couple the microphone to a tone box (1kHz) and close the PTT switch.

Increase the audio level until the demodulated waveform shows significant signs of clipping (approximately 4.5kHz [2.3kHz] deviation).

Adjust RV104 (compression level) anticlockwise until the demodulated waveform is just clipping (approximately 4kHz [2kHz] deviation).

Increase the audio level by 10dB and verify that the test tone is held just into clipping.

Whistle steadily into the microphone, checking that approximately 4kHz [2kHz] deviation is produced. The modulated waveform should be basically sinusoidal.

Speak into the microphone, checking that the modulation peaks reach about 5kHz [2.5kHz] deviation.

As the line is to be used without compression, set the line sensitivity (RV100) as described in Section 3.8.4.

3.8.5.3 Compressor On Both Line & Microphone Inputs

Set up as described in Section 3.8.5.1.

3.9 PGM800 DIP Switch Codes

PGM800 channel numbers can range from 0-127 or 1-128, depending on which version you are using:

Version	Channel Numbers
V2 and earlier	0-127
V2.01	1-128
V2.21 and later	0-127 or 1-128

The following sections provide DIP switch code lists for both numbering systems.

3.9.1 DIP Switch Codes For Channel Numbers 0-127

0 = off 1 = on

Channel	DIP Code	Channel	DIP Code	Channel	DIP Code
0	X1111111	45	X1010010	90	X0100101
1	X1111110	46	X1010001	91	X0100100
2	X1111101	47	X1010000	92	X0100011
3	X1111100	48	X1001111	93	X0100010
4	X1111011	49	X1001110	94	X0100001
5	X1111010	50	X1001101	95	X0100000
6	X1111001	51	X1001100	96	X0011111
7	X1111000	52	X1001011	97	X0011110
8	X1110111	53	X1001010	98	X0011101
9	X1110110	54	X1001001	99	X0011100
10	X1110101	55	X1001000	100	X0011011
11	X1110100	56	X1000111	101	X0011010
12	X1110011	57	X1000110	102	X0011001
13	X1110010	58	X1000101	103	X0011000
14	X1110001	59	X1000100	104	X0010111
15	X1110000	60	X1000011	105	X0010110
16	X1101111	61	X1000010	106	X0010101
17	X1101110	62	X1000001	107	X0010100
18	X1101101	63	X1000000	108	X0010011
19	X1101100	64	X0111111	109	X0010010
20	X1101011	65	X0111110	110	X0010001
21	X1101010	66	X0111101	111	X0010000
22	X1101001	67	X0111100	112	X0001111
23	X1101000	68	X0111011	113	X0001110
24	X1100111	69	X0111010	114	X0001101
25	X1100110	70	X0111001	115	X0001100
26	X1100101	71	X0111000	116	X0001011
27	X1100100	72	X0110111	117	X0001010
28	X1100011	73	X0110110	118	X0001001
29	X1100010	74	X0110101	119	X0001000
30	X1100001	75	X0110100	120	X0000111
31	X1100000	76	X0110011	121	X0000110
32	X1011111	77	X0110010	122	X0000101
33	X1011110	78	X0110001	123	X0000100
34	X1011101	79	X0110000	124	X0000011
35	X1011100	80	X0101111	125	X0000010
36	X1011011	81	X0101110	126	X0000001
37	X1011010	82	X0101101	127	X0000000
38	X1011001	83	X0101100		
39	X1011000	84	X0101011		
40	X1010111	85	X0101010		
41	X1010110	86	X0101001		
42	X1010101	87	X0101000		
43	X1010100	88	X0100111		
44	X1010011	89	X0100110		

3.9.2 DIP Switch Codes For Channel Numbers 1-128

0 = off 1 = on

Channel	DIP Code	Channel	DIP Code	Channel	DIP Code
1	X1111111	46	X1010010	91	X0100101
2	X1111110	47	X1010001	92	X0100100
3	X1111101	48	X1010000	93	X0100011
4	X1111100	49	X1001111	94	X0100010
5	X1111011	50	X1001110	95	X0100001
6	X1111010	51	X1001101	96	X0100000
7	X1111001	52	X1001100	97	X0011111
8	X1111000	53	X1001011	98	X0011110
9	X1110111	54	X1001010	99	X0011101
10	X1110110	55	X1001001	100	X0011100
11	X1110101	56	X1001000	101	X0011011
12	X1110100	57	X1000111	102	X0011010
13	X1110011	58	X1000110	103	X0011001
14	X1110010	59	X1000101	104	X0011000
15	X1110001	60	X1000100	105	X0010111
16	X1110000	61	X1000011	106	X0010110
17	X1101111	62	X1000010	107	X0010101
18	X1101110	63	X1000001	108	X0010100
19	X1101101	64	X1000000	109	X0010011
20	X1101100	65	X0111111	110	X0010010
21	X1101011	66	X0111110	111	X0010001
22	X1101010	67	X0111101	112	X0010000
23	X1101001	68	X0111100	113	X0001111
24	X1101000	69	X0111011	114	X0001110
25	X1100111	70	X0111010	115	X0001101
26	X1100110	71	X0111001	116	X0001100
27	X1100101	72	X0111000	117	X0001011
28	X1100100	73	X0110111	118	X0001010
29	X1100011	74	X0110110	119	X0001001
30	X1100010	75	X0110101	120	X0001000
31	X1100001	76	X0110100	121	X0000111
32	X1100000	77	X0110011	122	X0000110
33	X1011111	78	X0110010	123	X0000101
34	X1011110	79	X0110001	124	X0000100
35	X1011101	80	X0110000	125	X0000011
36	X1011100	81	X0101111	126	X0000010
37	X1011011	82	X0101110	127	X0000001
38	X1011010	83	X0101101	128	X0000000
39	X1011001	84	X0101100		
40	X1011000	85	X0101011		
41	X1010111	86	X0101010		
42	X1010110	87	X0101001		
43	X1010101	88	X0101000		
44	X1010100	89	X0100111		
45	X1010011	90	X0100110		

4 T836/837 Functional Testing

The following test procedures will confirm that the T836/837 has been tuned and adjusted correctly and is fully operational.

Refer to Figure 3.2 for the test equipment set-up.

Note: In this and following sections deviation settings are given first for wide band sets, followed by settings in brackets for narrow band sets [ ].

The following topics are covered in this section.

4.1 Current Consumption

Connect the T836/837 to a 13.8V power supply.

Connect an RF power meter to the T836/837 output socket.

Check that the current in the 13.8V power cable is less than 120mA.

Key the T836/837 (the "Carrier On" LED should light).

T836 Only: Adjust &RV356 (power control) to obtain 25W output power.

Check that the current is as follows:

T836	<4.5A
T837	<600mA.

4.2 Output Power

Connect an RF power meter to the T836/837 output socket.

Key the T836/837.

Check that:

T836	the output power adjusts to >30W with &RV356 turned fully clockwise
T837	the output power is 800mW +200, -100mW.

4.3 Output Frequency

Connect the T836/837 output to a frequency counter via an attenuator pad:

T836	40dB pad
T837	20dB pad.

Measure the output frequency and, if necessary, adjust the TCXO (IC1) to trim to the nominal frequency (±100Hz).

4.4 Tail Timer

Adjust RV202 fully anticlockwise.

Connect the key line to earth, then disconnect, and check that the T836/837 remains on for at least 3 seconds.

Reset RV202 fully clockwise.

Connect the key line to earth, then disconnect, ensuring that the T836/837 turns off immediately the key line is broken.

Set RV202 for the required tail time.

4.5 Transmit Timer

Ensure that R257 is in circuit.

Adjust RV201 fully anticlockwise.

Earth the key line.

Check that the T836/837 turns off after approximately 1 minute.

Adjust RV201 fully clockwise.

Open and then earth the key line.

Check that the T836/837 turns off after approximately 3 minutes.

Set RV201 for the required transmit time.

4.6 Frequency Response

If the T836/837 has been correctly adjusted, the pre-emphasis and limiting responses should closely match those shown in Figure 4.1 and Figure 4.2 respectively.

Note 1: The limits shown on these graphs should not be exceeded.

Note 2: The curves are shown for wide band sets.

- Measure the pre-emphasis response as follows:

  Reduce the line level to give 1kHz [0.5kHz] deviation at 1kHz.

  Sweep the modulation frequency.

  The response should closely match that shown in Figure 4.1.

- Measure the limiting response as follows:

  Set the line level to give 3kHz [1.5kHz] deviation at 1kHz.

  Increase the line level 20dB and sweep the modulation frequency.

  The response should closely match that shown in Figure 4.2.

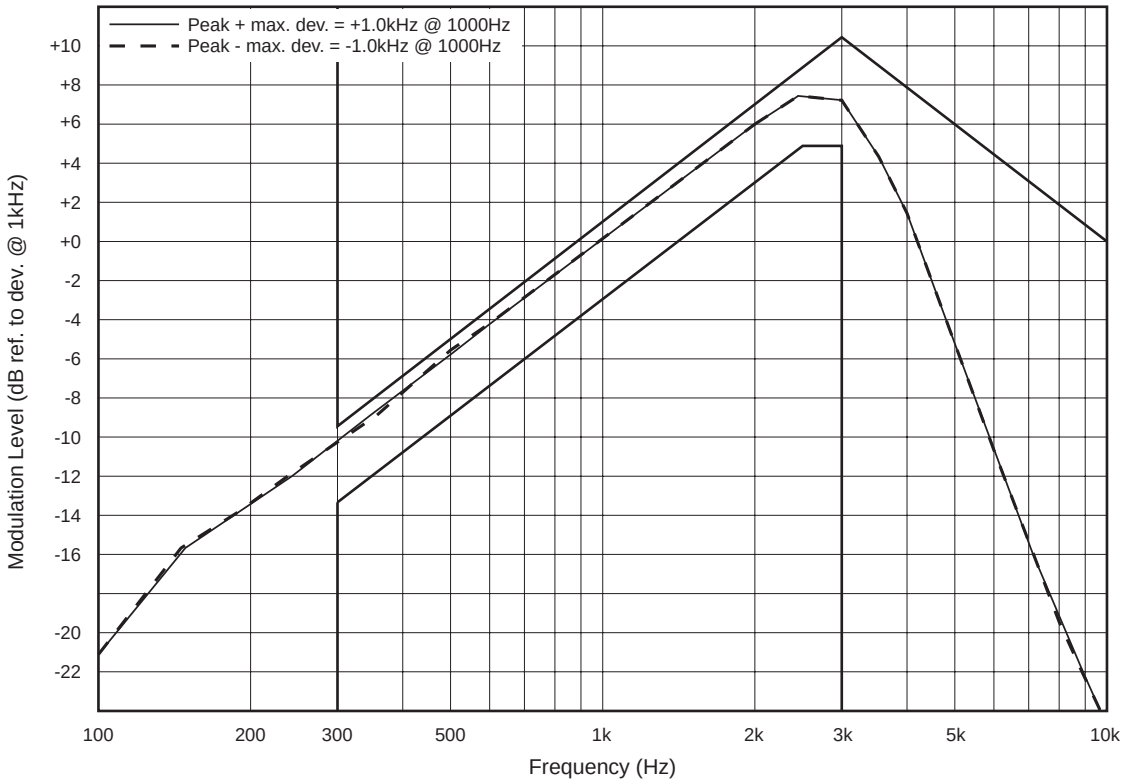


Figure 4.1 T836/837 Pre-emphasis Response

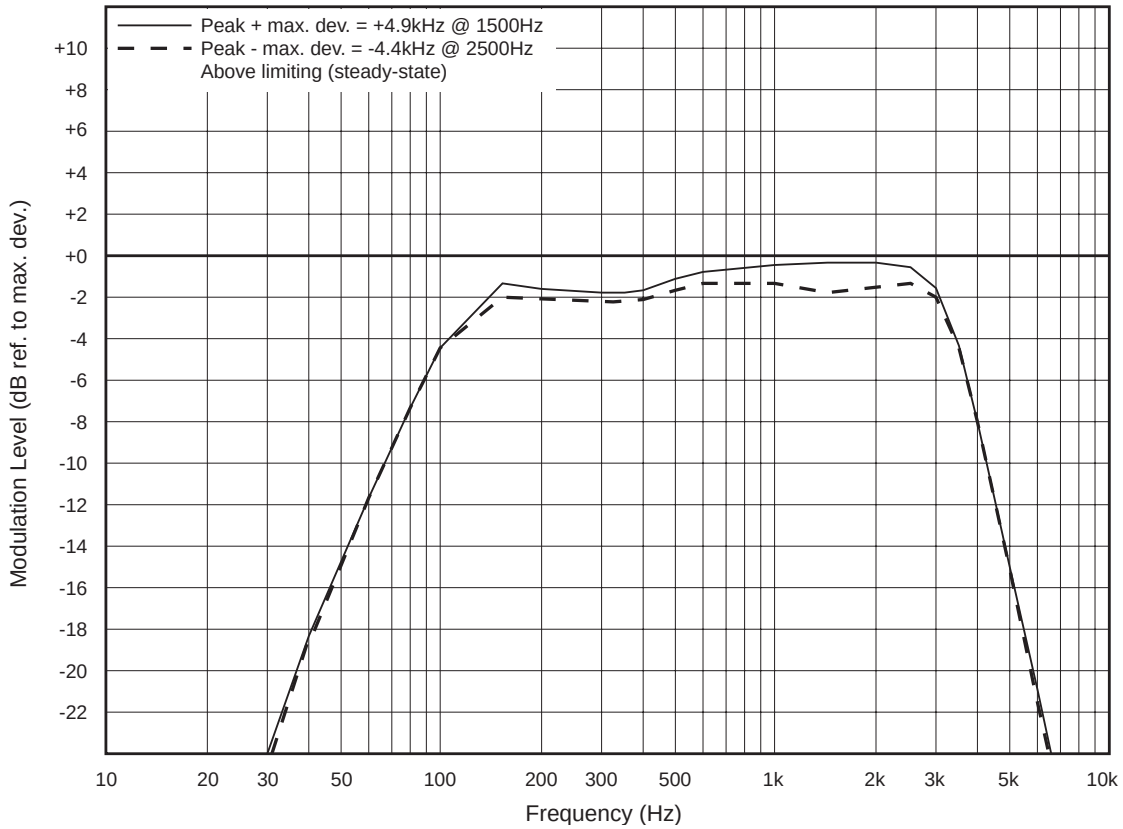


Figure 4.2 T836/837 Limiting Response

4.7 Audio Level Input Sensitivity

- Adjust RV100 (line sensitivity) fully clockwise.
- Check that the input sensitivities are better than those specified below:

Line Input	600 ohms, 3kHz [1.5kHz] deviation at 1kHz:	
	with compressor	-50dBm
	without compressor	-30dBm
Microphone Input	600 ohms, 3kHz [1.5kHz] deviation at 1kHz:	
	with compressor	-75dBm
	without compressor	-55dBm
CTCSS Input	1kHz deviation at 150Hz	500mV rms

Note: A degraded signal to noise ratio can be expected with the compressor selected. The extent of the degradation is dependent on the audio input level.

5 T836/837 Fault Finding

The following test procedures and fault finding flow charts may be used to help locate a hardware problem, however they are by no means a complete fault finding procedure. If the fault still exists after having progressed through them in a logical manner, contact your nearest authorised Tait Dealer or Service Centre. Further assistance may be obtained from the Customer Support Group, Radio Infrastructure Division, Tait Electronics Ltd, Christchurch, New Zealand.

The following topics are covered in this section.

5.1 Visual Checks

Remove the covers from the T836/837 and inspect the PCB for damaged or broken components, paying particular attention to the surface mounted devices (SMD's).

Check for defective solder joints. If repair or replacement is considered necessary, refer to Section 3 of Part A.

5.2 Component Checks

If a transistor is suspected of faulty operation, an indication of its performance can be assessed by measuring the forward and reverse resistance of the junctions. First make sure that the transistor is not shunted by some circuit resistance (unless the device is completely desoldered). A 20k ohm/V or better multimeter should be used for taking the measurements, using only the medium or low resistance ranges.

The collector current drawn by multi-junction transistors is a further guide to their performance.

If an IC is suspect, the most reliable check is to measure the DC operating voltages. Due to the catastrophic nature of most IC failures, the pin voltages will usually be markedly different from the recommended values in the presence of a fault. The recommended values can be obtained from either the circuit diagram or the component data catalogue.

5.3 DC Checks

5.3.1 Power Rails

Refer to the test points and options diagrams (Section 6) for test point locations, and to the regulator fault finding chart (Section 5.5.1) for fault diagnosis.

Check the 13.8V (TP1 in the transmitter) and 9V (TP2 in the synthesiser) supplies at their test points with a DMM.

Check the 5V (TP4 in the synthesiser) and 20V (TP3 in the regulator) rails at their respective test points.

Check that Tx reg. (TP5 in the exciter) comes up to 8.8V when the exciter is keyed.

Check for short circuits.

5.3.2 VCO Locking

Key the exciter.

Using a DMM, monitor the VCO control voltage at the junction of L1 and R1 on the VCO PCB.

If the synthesiser is locked and the VCO aligned, the voltage at this point should be between 5 and 15V.

If the VCO is not locked, refer to the synthesiser fault finding chart (Section 5.5.2).

Note: When changing frequencies, only the three least significant bits of the EPROM address (e.g. DIP switch) will initiate a synthesiser programme cycle. Changing a high order bit will therefore not result in a change of frequency unless a low order bit is also changed last.

5.4 RF Checks

In-circuit RF levels may be measured with an RF probe on which the earth lead has been shortened to a minimum (i.e. 13mm). Refer to the circuit diagrams for typical levels.

5.4.1 T836 Drive Power

Refer to the drive amplifier fault finding chart (Section 5.5.3).

Ensure that the VCO locks (refer to Section 5.3.2).

Connect the drive output to a power meter and key the transmitter.

Check that the output power is between 400 and 700mW.

Note: The lock detector (synthesiser, IC5 pin 3) will not allow the RF signal to reach the PA if the synthesiser is out of lock by switching the supply to the exciter amplifier (Q300, Q301).

5.4.2 T836 PA Output Power

Reconnect the drive output to the PA input.

Connect the PA to a power meter and key the transmitter.

Check that the output power is >30W with power control &RV356 adjusted fully clockwise.

5.4.3 T837 Output Power

Refer to the exciter drive amplifier fault finding chart (Section 5.5.5).

Ensure that the VCO locks (refer to Section 5.3.2).

Connect the exciter output to a power meter and key the exciter.

Check that the output power is between 700 and 1000mW.

Note: The lock detector (synthesiser, IC5 pin 3) will not allow the RF signal to reach the drive amplifier if the synthesiser is out of lock by switching the supply to the exciter amplifier (Q300, Q301).

5.4.4 Audio And Modulation

Refer to the audio processor fault finding chart (Section 5.5.6).

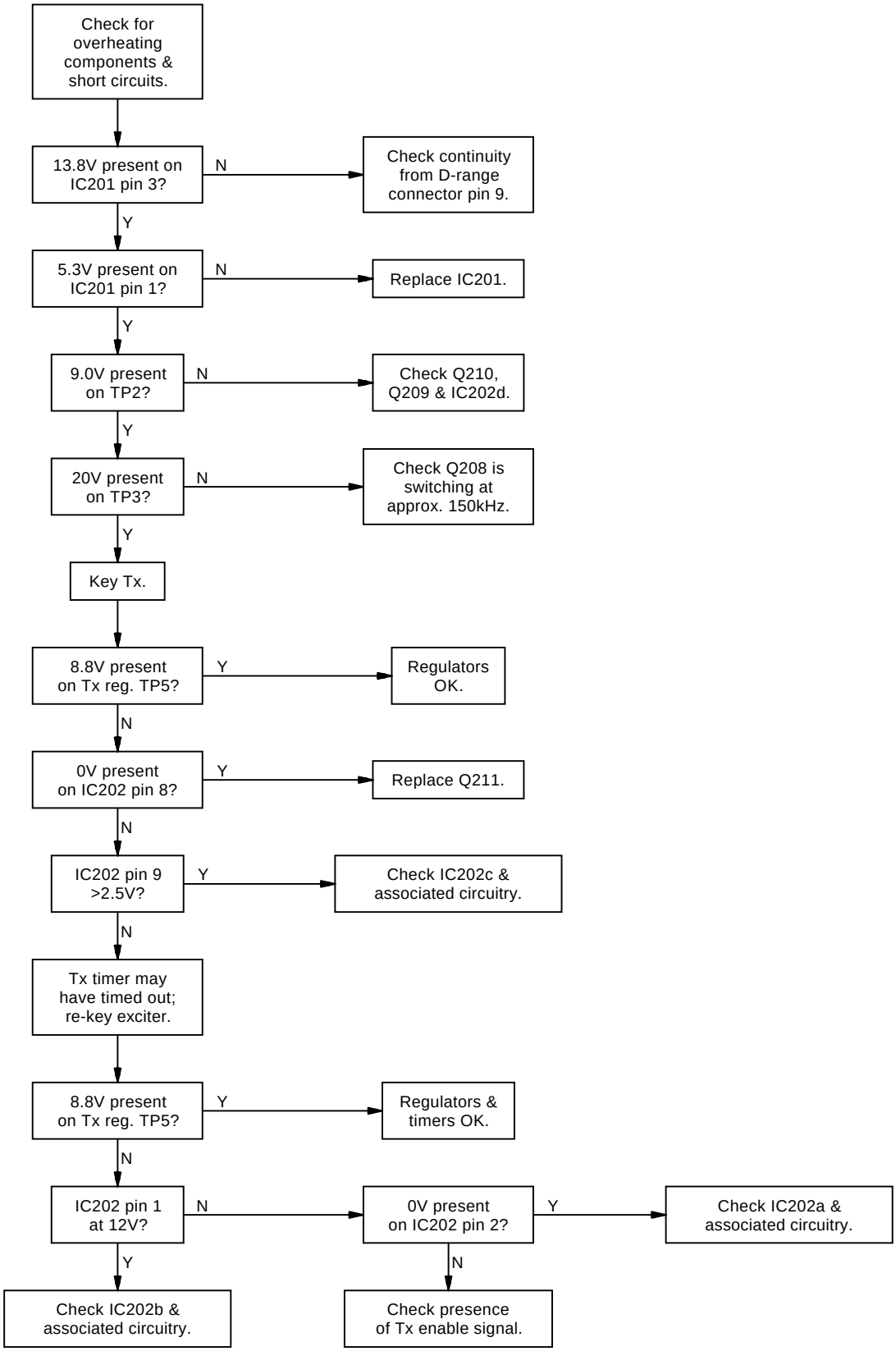
Set up the audio processor as described in Section 3.8.

Check that the demodulated RF output has the frequency response referred to in Section 4.6 with at least 5kHz [2.5kHz] deviation available at 1kHz modulating frequency.

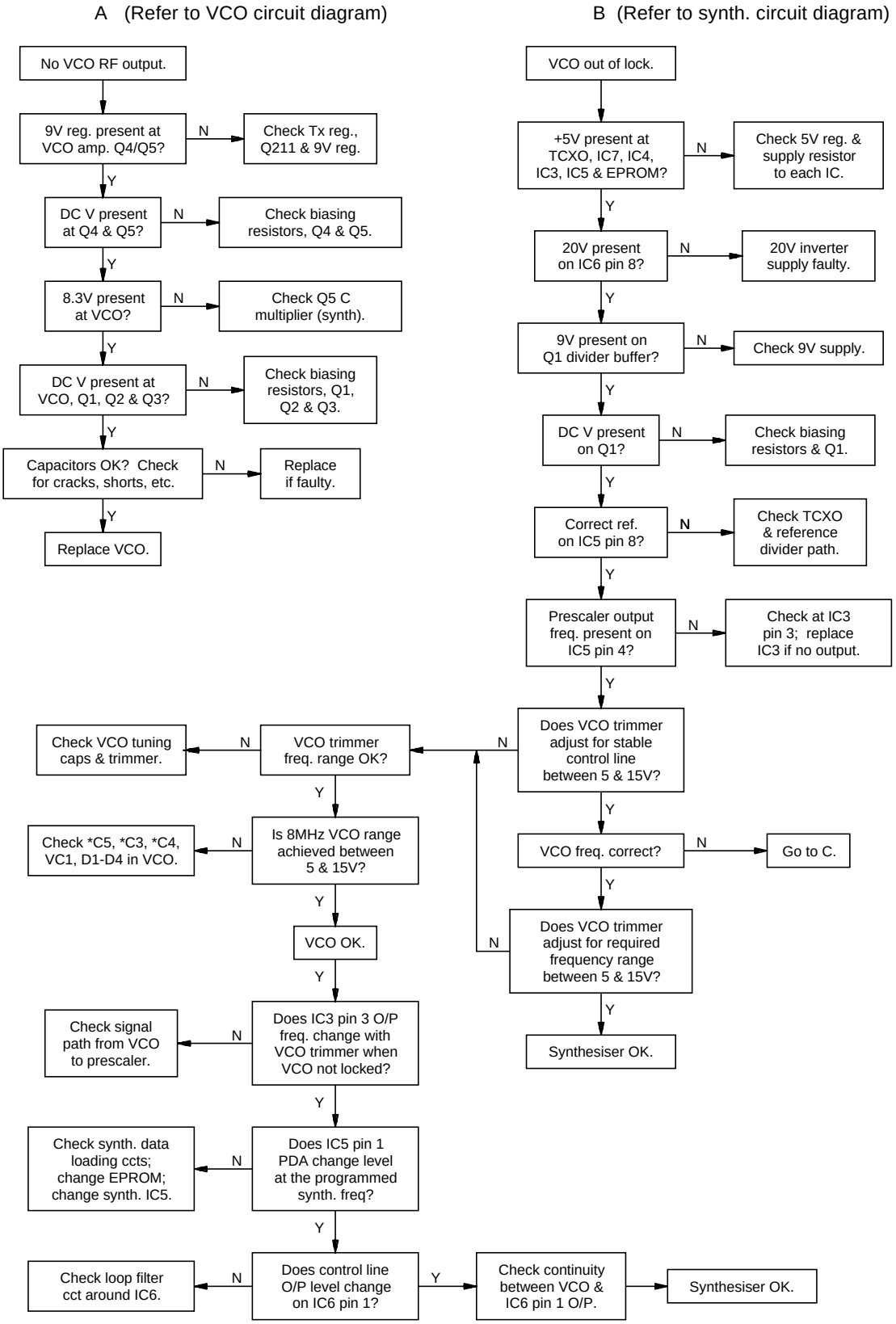
If the above result is not achieved, either the two modulators are incorrectly adjusted or a fault condition exists.

5.5 Fault Finding Charts

5.5.1 Regulator



5.5.2 Synthesiser



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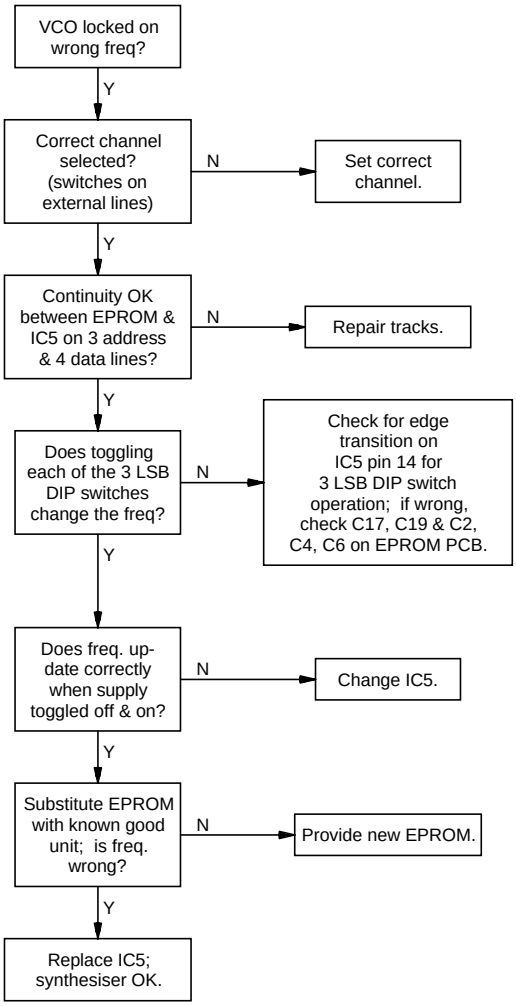
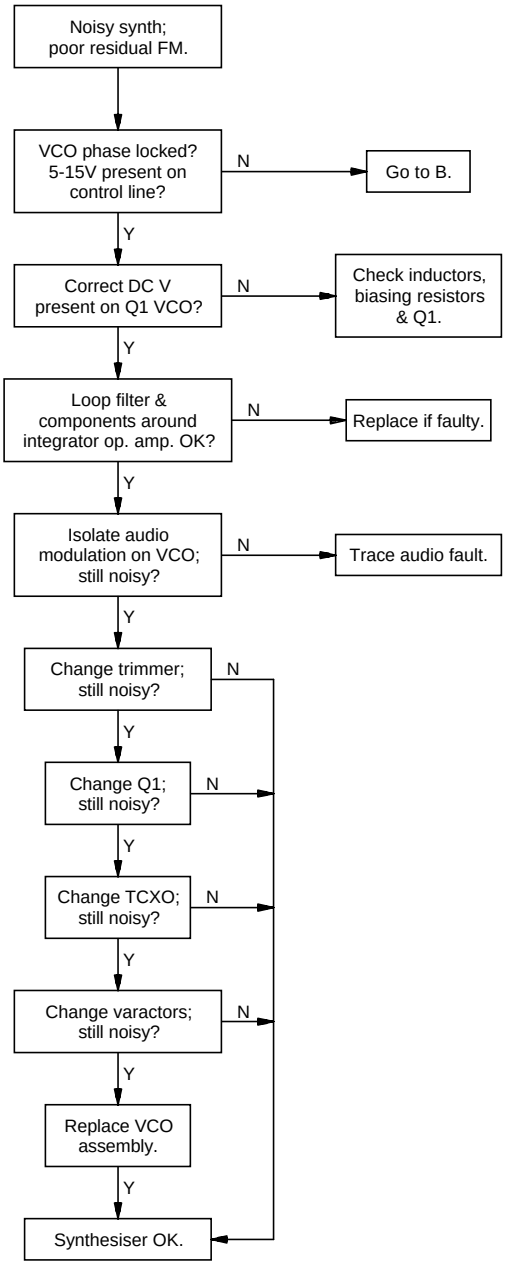
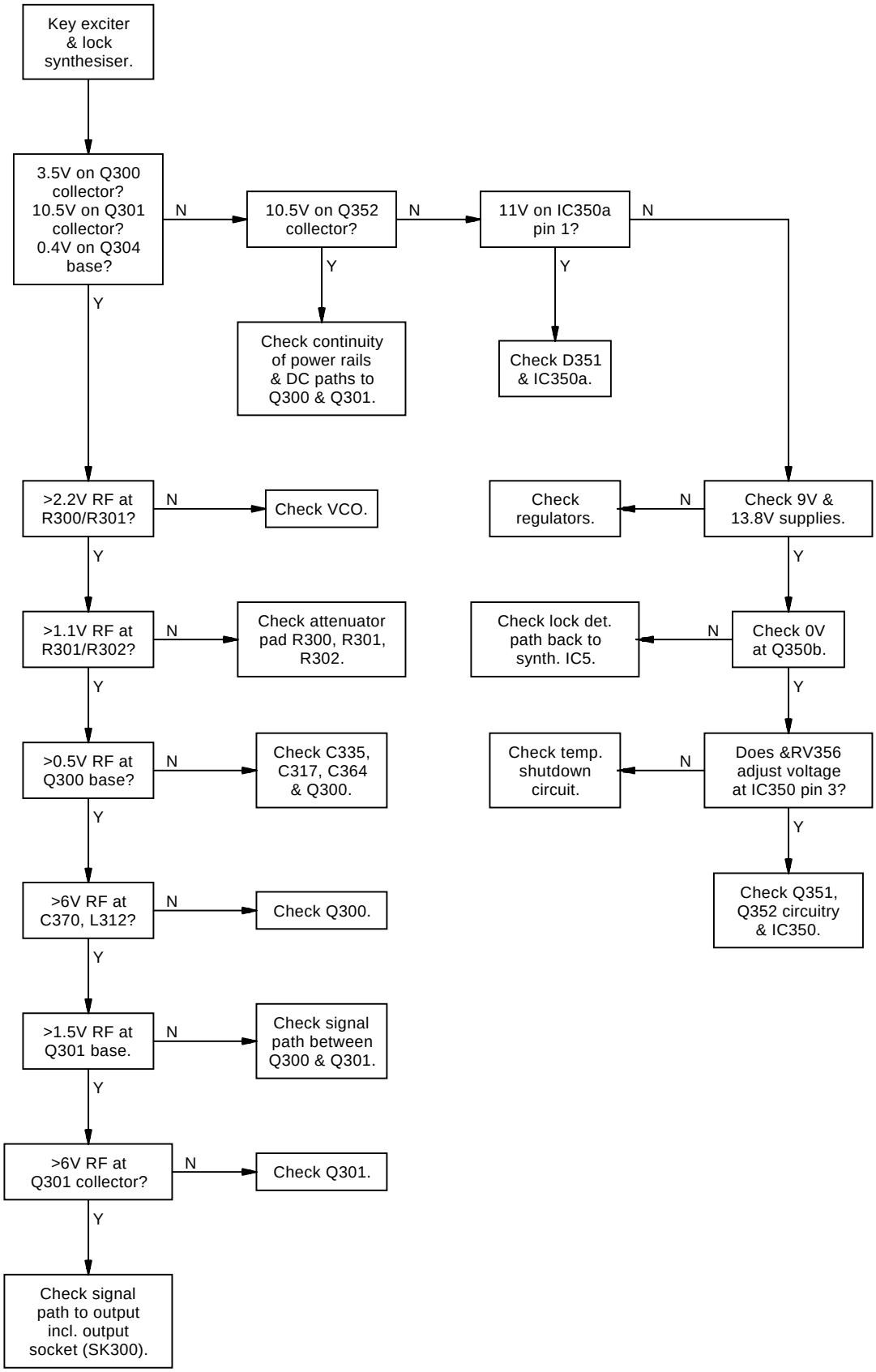
C (Refer to synth. circuit diagram)



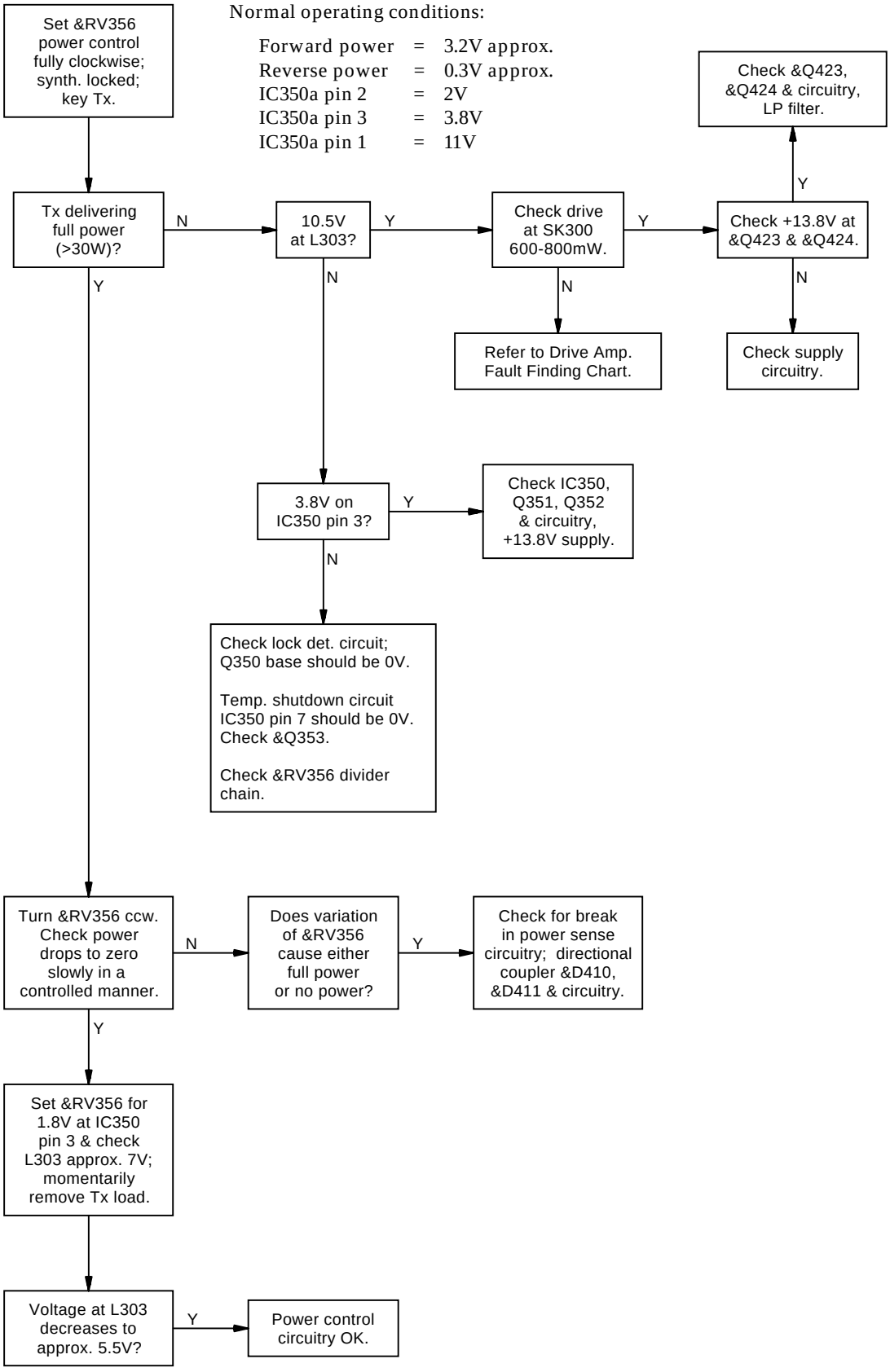
D (Refer to synth. & VCO circuit diagrams)



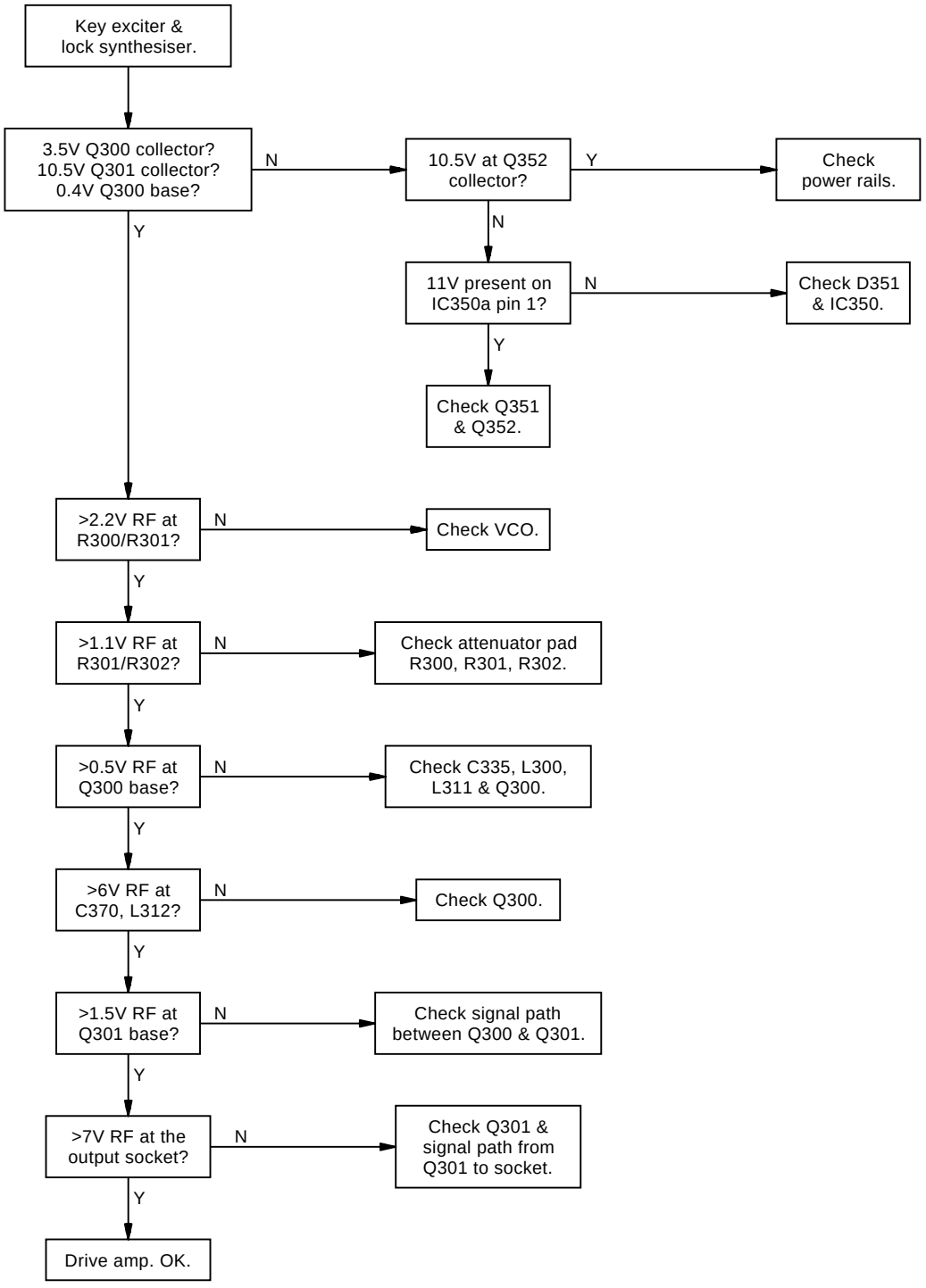
5.5.3 T836 Drive Amplifier



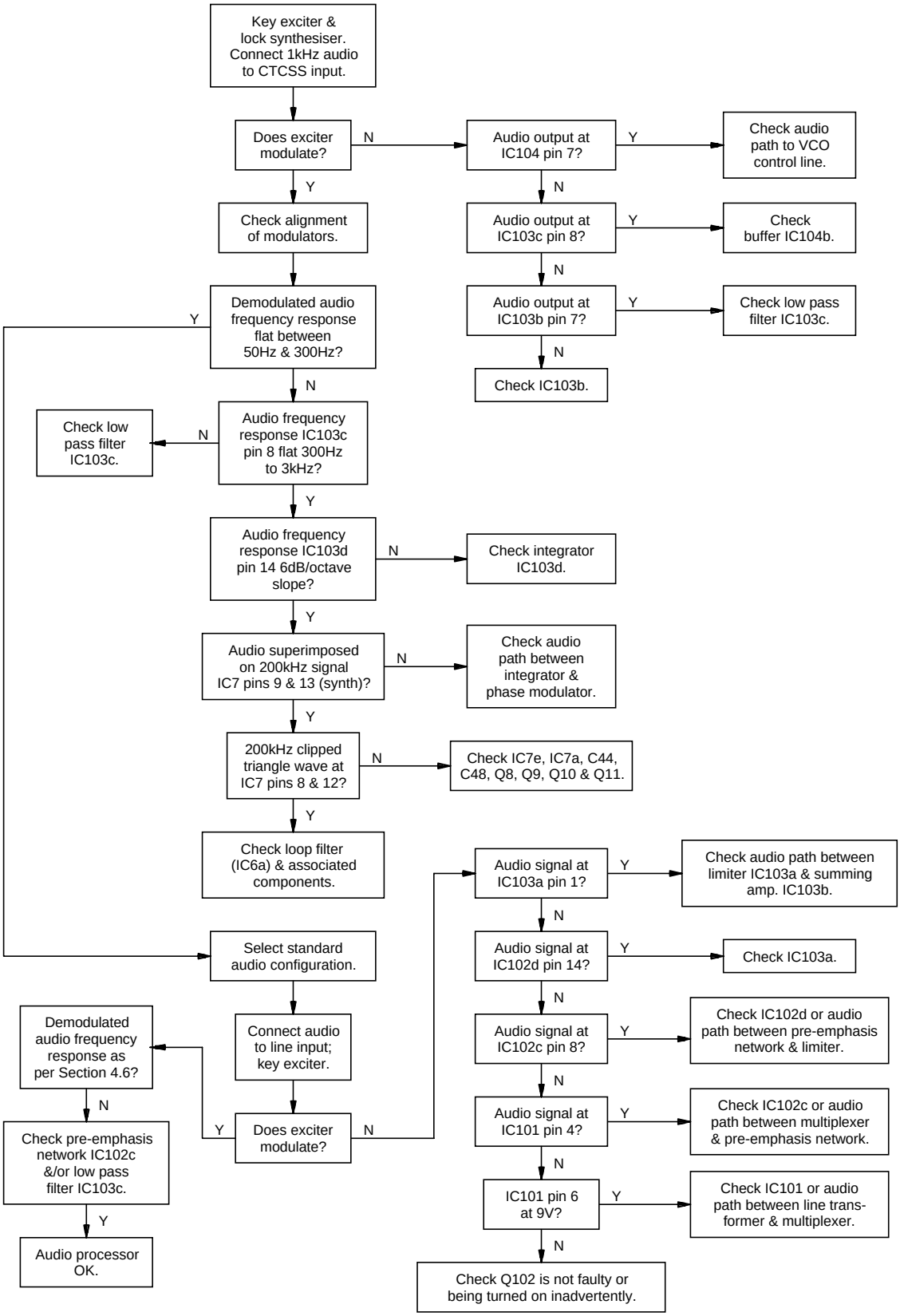
5.5.4 T836 PA & Power Control



5.5.5 T837 Exciter Drive Amplifier



5.5.6 Audio Processor



6 T836/837 PCB Information

This section provides parts lists, a grid reference index, PCB layouts, test points and options drawings and circuit diagrams for the T836 transmitter and T837 exciter.

The T836 and T837 are built on a common main PCB, with the T836 having the additional components fitted to the PA section of the board. While we have provided individual parts lists for each product, all other information provided in this section pertains to both products, with any additional T836 components clearly indicated.

This section contains the following information.

6.1 Introduction

PCB Identification

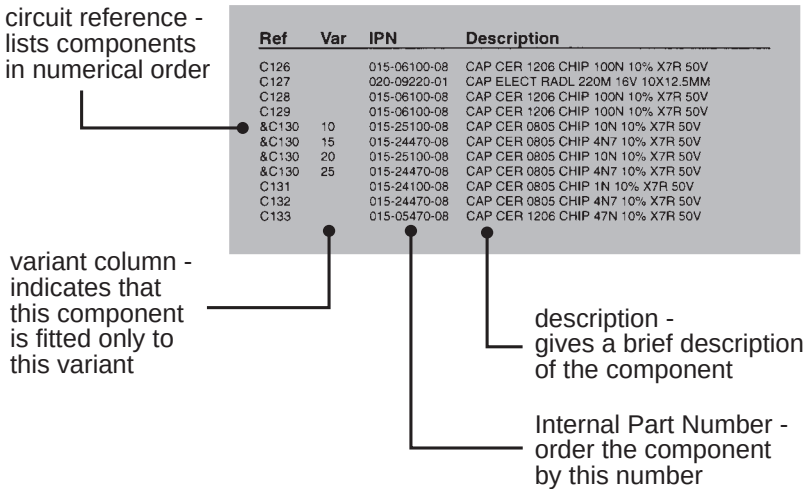
All PCBs are identified by a unique 10 digit number, the last 2 digits of which define the issue status. The issue status starts at 00 and increments through 01, 02, 03, etc. as the PCB is updated. Some issue PCBs never reach full production status and are therefore not included in this manual. A letter following the 10 digit IPN has no relevance in identifying the PCB for service purposes.

Parts Lists

The 10 digit numbers (000-00000-00) in this Parts List are “internal part numbers” (IPNs). Your spare parts orders can be handled more efficiently if you quote the IPN and provide a brief description of the part.

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc.) and those without (miscellaneous and mechanical).

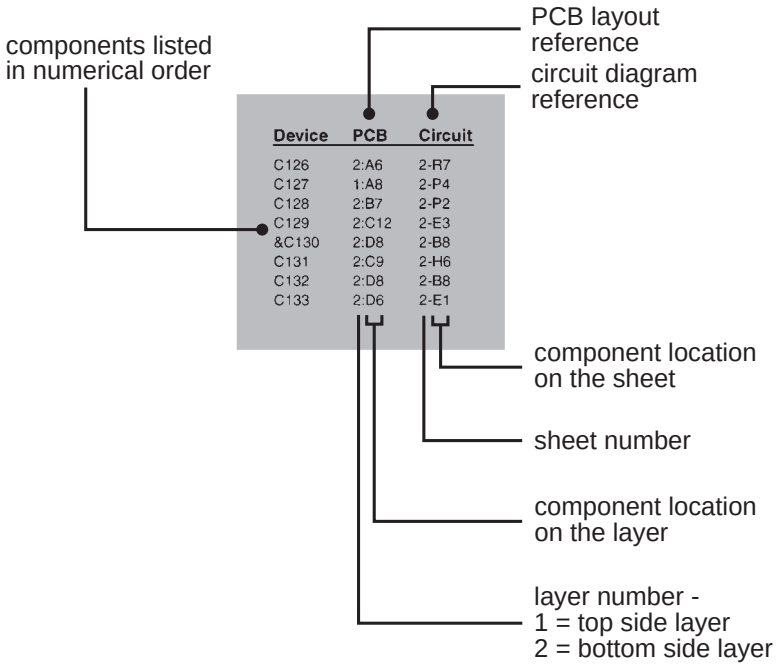
Those with a circuit reference are grouped in alphabetical order and then in numerical order within each group. Each component entry comprises three or four columns, as shown below:



The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Grid Reference Index

To assist in locating components and labelled pads on the PCB layouts and circuit diagrams, a component grid reference index has been provided. This index lists the components and pads in alphabetical order, along with the appropriate alphanumeric grid references, as shown below:



Using CAD Circuit Diagrams

Reading a CAD circuit diagram is similar to reading a road map, in that both have an alphanumeric border. The circuit diagrams in this manual use letters to represent the horizontal axis, and numbers for the vertical axis. These circuit diagram “grid references” are useful in following a circuit that is spread over two or more sheets.

When a line representing part of the circuitry is discontinued, a reference will be given at the end of the line to indicate where the rest of the circuitry is located. The first digit refers to the sheet number (printed on the bottom right hand corner of the CAD diagram) and the last two characters refer to the location on that sheet of the continuation of the circuit (e.g. 1-D4).

If more than one line is represented (indicated by a double thickness line), a dot with a reference label will follow the route each individual line represents.

6.2 T836 Transmitter & T837 Exciter PCB

This section contains the following information.

T836 Parts List (IPN 220-01178-02)

How To Use This Parts List

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped by component type in numerical order. Each component entry comprises three or four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this component is fitted only to that variant.

The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Parts List Amendments

R363 Changed from 220e (036-13220-00) to 1k to eliminate power control circuit 800kHz instability (93/11-600).

Note: With the exception of the following components:

&R425, &R426, &R427, &R428, &R367

the "&" character is used in the exciter/PA circuit diagram and this Parts List to indicate components used only in the T836 (refer to the table in the exciter/PA circuit diagram).

Ref	Var	IPN	Description
C1		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C2		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C3		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C5		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C6		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C8		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C9		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C10		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C11		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C12		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C13		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C15		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C16		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C17		015-22560-01	CAP CER 0805 CHIP 56P 5% NPO 50V
C19		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C20		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C21		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C25		025-08100-02	CAP TANT BEAD 10M 10% 16V
C26		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C29		022-06330-03	CAP METAL POLYES 330N 10% 50V 5MM L/S
C30		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C33		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C34		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C35		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C36		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C39		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C40		015-21820-01	CAP CER 0805 CHIP 8P2 +/-0.25P NPO 50V
C42		015-25150-08	CAP CER 0805 CHIP 15N 10% X7R 50V
C43		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C44		015-23220-01	CAP CER 0805 CHIP 220P 5% NPO 50V
C45		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C46		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C47		020-08470-02	CAP ELECT RADL 47M 16V 6X11MM
C48		015-23220-01	CAP CER 0805 CHIP 220P 5% NPO 50V
C101		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C102		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C103		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C104		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C105		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C106		015-24220-08	CAP CER 0805 CHIP 2N2 10% X7R 50V
C107		020-08220-01	CAP ELECT RADL 22M 16V 5X11MM
C108		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C109		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C110		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C111		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C112		020-08220-01	CAP ELECT RADL 22M 16V 5X11MM
C113		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C115		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C118		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C119		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C121		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C123		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C124		015-21470-01	CAP CER 0805 CHIP 4P7 +/-0.25P NPO 50V
C126		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C128		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C129		020-08470-02	CAP ELECT RADL 47M 16V 6X11MM
C133		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C135		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C137		020-08220-01	CAP ELECT RADL 22M 16V 5X11MM
C139		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C141		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C145		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C146		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C147		020-07100-02	CAP ELECT RADL 1M 50V 5X11MM
C148		015-05220-08	CAP CER 1206 CHIP 22N 10% X7R 50V
C149		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C150		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C151		015-21470-01	CAP CER 0805 CHIP 4P7 +/-0.25P NPO 50V
C152		020-09100-03	CAP ELECT RADL 100M 16V 8X11MM
C153		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C154		020-09100-03	CAP ELECT RADL 100M 16V 8X11MM
C156		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
*C157	10	015-21150-01	CAP CER 0805 CHIP 1P5 +/-0.25P NPO 5
*C157	15	015-21470-01	CAP CER 0805 CHIP 4P7 +/-0.25P NPO 5
*C157	20	015-21150-01	CAP CER 0805 CHIP 1P5 +/-0.25P NPO 5
*C157	25	015-21470-01	CAP CER 0805 CHIP 4P7 +/-0.25P NPO 5
C158		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C160		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C161		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C162		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C163		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C164		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C166		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C209		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C212		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C213		025-08100-02	CAP TANT BEAD 10M 10% 16V
C214		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C215		025-08100-02	CAP TANT BEAD 10M 10% 16V
C216		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C217		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C218		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C219		020-09470-07	CAP 470M 16V 20% ELEC VERT 8*20 3.5MM L
C220		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C221		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C222		020-09100-03	CAP ELECT RADL 100M 16V 8X11MM
C223		020-07220-01	CAP ELECT RADL 2M2 50V 5X11MM
C224		025-07330-01	CAP TANT BEAD 3M3 35V
C225		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C226		020-07100-02	CAP ELECT RADL 1M 50V 5X11MM
C227		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C228		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C229		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C230		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C231		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C232		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V

Ref	Var	IPN	Description
C233		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C300		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C303		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C308		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C313		015-04100-04	CAP CER 1206 CHIP 1N 10% X7R 50V
C317		015-22820-01	CAP CER 0805 CHIP 82P 5% NPO 50V
C319		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C322		015-21820-01	CAP CER 0805 CHIP 8P2 +/-0.25P NPO 50V
C330		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C335		015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
C350		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C351		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C352		022-05470-01	CAP MYLAR 47N 10% 50V
C355		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C356		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C357		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C358		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C359		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C360		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C361		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C362		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C363		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C364		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C366		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C367		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C370		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C371		025-08100-02	CAP TANT BEAD 10M 10% 16V
&C372		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C373		025-08100-02	CAP TANT BEAD 10M 10% 16V
&CV400		028-02300-03	CAP TRIM 5/30P N750 TOP ADJ GREEN MUR
&C447		015-22560-01	CAP CER 0805 CHIP 56P 5% NPO 50V
&C448		015-23180-01	CAP CER 0805 CHIP 180P 5% NPO 50V
&C449		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
&C450		015-04100-05	CAP CER HIQ 1210 CHIP 1N 10% NPO 50V
&C451		015-02820-02	CAP CER HIQ 1210 CHIP 82P 5% NPO 200V
&C452		015-02820-02	CAP CER HIQ 1210 CHIP 82P 5% NPO 200V
&C453		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLI
&C454		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
&C455		015-03180-02	CAP CER HIQ 1210 CHIP 180P 5% NPO 100V
&C456		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
&C457		015-03330-02	CAP CER HIQ 1210 CHIP 330P 5% NPO 100V
&C458		015-02270-02	CAP CER HIQ 1210 CHIP 27P 5% NPO 200V
&C459		029-03100-02	CAP MICA 5MM CASE 100P 5%
&C460		015-02220-02	CAP CER HIQ 1210 CHIP 22P 5% NPO 200V
&C461		015-04100-05	CAP CER HIQ 1210 CHIP 1N 10% NPO 50V
&C462		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
&C463		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
&C464		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
&C465		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
&C466		015-02150-02	CAP CER HIQ 1210 CHIP 15P 5% NPO 200V
&C467		015-02330-02	CAP CER HIQ 1210 CHIP 33P 5% NPO 200V
&C468		015-02270-02	CAP CER HIQ 1210 CHIP 27P 5% NPO 200V
&C469		015-02330-02	CAP CER HIQ 1210 CHIP 33P 5% NPO 200V
&C470		015-02150-02	CAP CER HIQ 1210 CHIP 15P 5% NPO 200V
&C471		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
&C472		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
&C473		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
&C475		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLI
&C476		015-21820-01	CAP CER 0805 CHIP 8P2 +/-0.25P NPO 50V
&C477		015-21820-01	CAP CER 0805 CHIP 8P2 +/-0.25P NPO 50V
D4		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23 CO
D5		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE INLI
D6		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE INLI
D100		001-10000-56	(S) DIODE SMD BAW56 DUAL SWITCH SOT-23
D101		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE IN
D102		001-10000-56	(S) DIODE SMD BAW56 DUAL SWITCH SOT-23
D103		001-10000-56	(S) DIODE SMD BAW56 DUAL SWITCH SOT-23
D104		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE IN
D106		001-00015-29	(S) DIODE ZENER 33V 0.4W BZX79/C33
D204		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D205		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D206		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE IN
D207		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D208		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D209		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D210		001-00015-17	(S) DIODE ZENER 9V1 0.4W BZX79/C9V1
D211		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D212		001-00011-60	(S) DIODE SR2607 6A/30V
D351		001-00015-69	(S) DIODE ZENER 11V 0.5W LO CURRENT HZ1
&D410		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
&D411		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
IC1		539-00010-41	TCXO 12.8MHZ +-2.5PPM -30 TO +70C NDK NS
IC3		002-00017-51	(S) IC SP8793 DUAL MOD PRESC 40/41
IC4		002-74045-20	(S) IC 74HC4520 DUAL 4BIT SYNCRO CNTR
IC5		002-00017-63	(S) IC NJ8820DP FREQ SYNTHESIZER
IC6		002-00012-47	(S) IC MC33078 DUAL OP AMP LO NOISE
IC7		002-74000-04	(S) IC 74HCU04 UNBUFF HEX INVERTER
IC100		002-00020-50	(S) IC 4N25A OPTOCOUPLER
IC101		002-00015-30	(S) IC 4053B 2CHAN MUX/DEMUX
IC102		002-00014-40	(S) IC 324 QUAD OP AMP
IC103		002-00012-25	(S) IC TL084 QUAD OP AMP JFET I/P
IC104		002-00012-40	(S) IC 358 DUAL OP AMP
IC201		002-00014-62	(S) IC 317L 100MA REG 3 TERMINAL TO-92
IC202		002-00014-40	(S) IC 324 QUAD OP AMP
IC350		002-00012-40	(S) IC 358 DUAL OP AMP

Ref	Var	IPN	Description
L1		052-08160-25	COIL A/W 2.5T/6.0MM HOR 0.8MM WIRE
L300		052-08125-15	COIL A/W 1.5T/2.5MM HOR 0.8MM WIRE
L303		065-00010-04	BEAD FERRITE F8 4X2X5MM
L308		056-00021-01	IND FXD 1.5UH AXIAL
L309		052-08145-35	COIL A/W 3.5/4.5MM HOR 0.8MM WIRE
L310		056-00021-01	IND FXD 1.5UH AXIAL
L311		052-08135-25	COIL A/W 2.5T/3.5MM HOR 0.8MM WIRE
L312		052-08140-35	COIL A/W 3.5T/4.0MM HOR 0.8MM WIRE
L313		052-08130-15	COIL A/W 1.5T/3.0MM HOR 0.8MM WIRE
L314		056-00021-01	IND FXD 1.5UH AXIAL
&L418		052-08135-15	COIL A/W 1.5T/3.5MM HOR 0.8MM WIRE
&L420		065-00010-04	BEAD FERRITE F8 4X2X5MM
&L421		065-00010-04	BEAD FERRITE F8 4X2X5MM
&L422		052-08130-15	COIL A/W 1.5T/3.0MM HOR 0.8MM WIRE
&L424		052-08140-15	COIL A/W 1.5T/4.0MM HOR 0.8MM WIRE
&L425		065-00010-04	BEAD FERRITE F8 4X2X5MM
&L431		052-08130-15	COIL A/W 1.5T/3.0MM HOR 0.8MM WIRE
&L432		056-00021-01	IND FXD 1.5UH AXIAL
&L433		056-00021-01	IND FXD 1.5UH AXIAL
&L434		052-08135-45	COIL A/W 4.5T/3.5MM HOR 0.8MM WIRE
&L435		052-08150-25	COIL A/W 2.5T/5.0MM HOR 0.8MM WIRE
&L436		052-08150-25	COIL A/W 2.5T/5.0MM HOR 0.8MM WIRE
&L437		052-08135-45	COIL A/W 4.5T/3.5MM HOR 0.8MM WIRE
&L439		056-00021-01	IND FXD 1.5UH AXIAL
&L440		065-00010-01	BEAD FERRITE 3B 6 HOLE
&L441		052-08140-25	COIL A/W 2.5T/4.0MM HOR 0.8MM WIRE
&L442		052-08140-25	COIL A/W 2.5T/4.0MM HOR 0.8MM WIRE
LED1		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
LED2		008-00013-35	(S) LED 3MM GREEN LO CURRENT NO MTG
PL1		240-00020-57	HEADER 10 WAY 1 ROW PCB MTG
PL100		240-00020-67	HEADER 6WAY 2X3 PCB MTG STD
PL101		240-00020-67	HEADER 6WAY 2X3 PCB MTG STD
PL102		240-00020-44	HEADER 10WAY 2ROW STRAIGHT PCB MTG (5*
PL103		240-00020-67	HEADER 6WAY 2X3 PCB MTG STD
Q1		000-10057-10	(S) XSTR SMD MMBR571 NPN SOT-23 UHF LO PW
Q5		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 AF
Q6		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q7		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 AF
Q8		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 AF
Q9		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q10		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 A
Q11		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q101		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q102		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q103		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q104		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q105		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q106		000-00011-91	(S) XSTR BD139 NPN AF PWR TO126
Q208		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q209		000-00011-30	(S) XSTR BC557B PNP AF SML SIG TO92
Q210		000-00012-15	(S) XSTR BD234 PNP AF PWR TO126
Q211		000-10008-07	(S) XSTR SMD BC807 PNP SOT-23 AF LO PWR
Q212		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q300		000-00031-96	(S) XSTR 3866 NPN TO-92 SW. MOT ONLY
Q301		000-00022-30	(S) XSTR 2N4427 NPN TO-39 VHF PWR DRIVE
Q350		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q351		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q352		000-00012-15	(S) XSTR BD234 PNP AF PWR TO126
&Q353		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
&Q423		000-00021-65	(S) XSTR SD1012-9 NPN STUD MTG VHF PWR
&Q424		000-00023-23	(S) XSTR SRFH1001 NPN STUD MTG VHF PWR
R1		036-12100-00	RES M/F 0805 CHIP 10E 5%
R2		036-12220-00	RES M/F 0805 CHIP 22E 5%
R3		036-17100-00	RES M/F 0805 CHIP 1M 5%
R5		036-14100-00	RES M/F 0805 CHIP 1K 5%
R6		036-17100-00	RES M/F 0805 CHIP 1M 5%
R7		036-14330-00	RES M/F 0805 CHIP 3K3 5%
R8		036-13100-00	RES M/F 0805 CHIP 100E 5%
R9		036-12680-00	RES M/F 0805 CHIP 68E 5%
R10		036-13220-00	RES M/F 0805 CHIP 220E 5%
R11		036-17100-00	RES M/F 0805 CHIP 1M 5%
R14		036-17100-00	RES M/F 0805 CHIP 1M 5%
R16		036-17100-00	RES M/F 0805 CHIP 1M 5%
R18		036-12100-00	RES M/F 0805 CHIP 10E 5%
R19		036-17100-00	RES M/F 0805 CHIP 1M 5%
R20		036-17100-00	RES M/F 0805 CHIP 1M 5%
R21		036-12100-00	RES M/F 0805 CHIP 10E 5%
R22		036-12220-00	RES M/F 0805 CHIP 22E 5%
R24		036-12220-00	RES M/F 0805 CHIP 22E 5%
R25		036-15220-00	RES M/F 0805 CHIP 22K 5%
R29		036-17100-00	RES M/F 0805 CHIP 1M 5%
R30		036-13220-00	RES M/F 0805 CHIP 220E 5%
R32		036-14100-00	RES M/F 0805 CHIP 1K 5%
R35		036-15100-00	RES M/F 0805 CHIP 10K 5%
R36		036-16470-00	RES M/F 0805 CHIP 470K 5%
R37		036-15120-00	RES M/F 0805 CHIP 12K 5%
R38		036-15100-00	RES M/F 0805 CHIP 10K 5%
R39		036-16470-00	RES M/F 0805 CHIP 470K 5%
R40		036-16470-00	RES M/F 0805 CHIP 470K 5%
R42		036-14560-00	RES M/F 0805 CHIP 5K6 5%
R43		036-12220-00	RES M/F 0805 CHIP 22E 5%
R46		036-13680-00	RES M/F 0805 CHIP 680E 5%
R47		036-14100-00	RES M/F 0805 CHIP 1K 5%
R48		036-14470-00	RES M/F 0805 CHIP 4K7 5%

Ref	Var	IPN	Description
R49		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R50		036-15100-00	RES M/F 0805 CHIP 10K 5%
R51		036-15100-00	RES M/F 0805 CHIP 10K 5%
R52		036-15100-00	RES M/F 0805 CHIP 10K 5%
R54		036-14100-00	RES M/F 0805 CHIP 1K 5%
R55		036-13100-00	RES M/F 0805 CHIP 100E 5%
R56		036-17100-00	RES M/F 0805 CHIP 1M 5%
R57		036-15100-00	RES M/F 0805 CHIP 10K 5%
R58		036-15100-00	RES M/F 0805 CHIP 10K 5%
R59		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R60		036-15560-00	RES M/F 0805 CHIP 56K 5%
R61		036-15100-00	RES M/F 0805 CHIP 10K 5%
R62		036-15100-00	RES M/F 0805 CHIP 10K 5%
R64		036-15150-00	RES M/F 0805 CHIP 15K 5%
R65		036-16100-00	RES M/F 0805 CHIP 100K 5%
R67		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R68		036-15560-00	RES M/F 0805 CHIP 56K 5%
R72		036-15150-00	RES M/F 0805 CHIP 15K 5%
R73		036-13330-00	RES M/F 0805 CHIP 330E 5%
R74		036-12100-00	RES M/F 0805 CHIP 10E 5%
R75		036-12100-00	RES M/F 0805 CHIP 10E 5%
RV100		040-05100-23	POT 10K LOG VERT PCB MTG 15MM SLOT SHA
R100		036-13100-00	RES M/F 0805 CHIP 100E 5%
R101		036-15100-00	RES M/F 0805 CHIP 10K 5%
R102		036-13470-00	RES M/F 0805 CHIP 470E 5%
R103		036-13560-00	RES M/F 0805 CHIP 560E 5%
RV104		042-05470-06	RES PRESET 47K CARBON 6MM FLAT TOP ADJ
R104		036-13560-00	RES M/F 0805 CHIP 560E 5%
RV105		042-06100-06	RES PRESET 100K CARBON 6MM FLAT
R105		036-15100-00	RES M/F 0805 CHIP 10K 5%
RV106		042-04470-06	RES PRESET 4K7 CARBON 6MM FLAT
R106		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R107		036-15100-00	RES M/F 0805 CHIP 10K 5%
R108		036-14100-00	RES M/F 0805 CHIP 1K 5%
R109		036-14390-00	RES M/F 0805 CHIP 3K9 5%
R110		036-15100-00	RES M/F 0805 CHIP 10K 5%
R111		036-16390-00	RES M/F 0805 CHIP 390K 5%
R112		036-16100-00	RES M/F 0805 CHIP 100K 5%
R113		036-16100-00	RES M/F 0805 CHIP 100K 5%
R115		036-15100-00	RES M/F 0805 CHIP 10K 5%
R116		036-16100-00	RES M/F 0805 CHIP 100K 5%
R117		036-15100-00	RES M/F 0805 CHIP 10K 5%
R118		036-13560-00	RES M/F 0805 CHIP 560E 5%
R119		036-16100-00	RES M/F 0805 CHIP 100K 5%
R120		036-16100-00	RES M/F 0805 CHIP 100K 5%
R121		036-16100-00	RES M/F 0805 CHIP 100K 5%
R122		036-15120-00	RES M/F 0805 CHIP 12K 5%
R123		036-15120-00	RES M/F 0805 CHIP 12K 5%
R124		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R127		036-16100-00	RES M/F 0805 CHIP 100K 5%
R128		036-16100-00	RES M/F 0805 CHIP 100K 5%
R131		036-17100-00	RES M/F 0805 CHIP 1M 5%
R136		036-15100-00	RES M/F 0805 CHIP 10K 5%
R141		036-16150-00	RES M/F 0805 CHIP 150K 5%
R143		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R146		036-15220-00	RES M/F 0805 CHIP 22K 5%
R147		036-15470-00	RES M/F 0805 CHIP 47K 5%
R148		036-16150-00	RES M/F 0805 CHIP 150K 5%
R149		036-15470-00	RES M/F 0805 CHIP 47K 5%
R150		036-15470-00	RES M/F 0805 CHIP 47K 5%
R151		036-14470-00	RES M/F 0805 CHIP 4K7 5%
*R152	10	036-15220-00	RES M/F 0805 CHIP 22K 5%
*R152	15	036-15270-00	RES M/F 0805 CHIP 27K 5%
*R152	20	036-15220-00	RES M/F 0805 CHIP 22K 5%
*R152	25	036-15270-00	RES M/F 0805 CHIP 27K 5%
R155		036-15100-00	RES M/F 0805 CHIP 10K 5%
R159		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R162		036-13680-00	RES M/F 0805 CHIP 680E 5%
R163		036-14100-00	RES M/F 0805 CHIP 1K 5%
R164		036-13680-00	RES M/F 0805 CHIP 680E 5%
R166		036-17100-00	RES M/F 0805 CHIP 1M 5%
R167		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R168		036-17100-00	RES M/F 0805 CHIP 1M 5%
R169		036-16120-00	RES M/F 0805 CHIP 120K 5%
R170		036-15100-00	RES M/F 0805 CHIP 10K 5%
R171		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R172		036-16470-00	RES M/F 0805 CHIP 470K 5%
R173		036-15100-00	RES M/F 0805 CHIP 10K 5%
R174		036-16330-00	RES M/F 0805 CHIP 330K 5%
R175		036-14100-00	RES M/F 0805 CHIP 1K 5%
R176		036-16100-00	RES M/F 0805 CHIP 100K 5%
R177		036-16100-00	RES M/F 0805 CHIP 100K 5%
R178		036-15560-00	RES M/F 0805 CHIP 56K 5%
R179		036-15560-00	RES M/F 0805 CHIP 56K 5%
R180		036-17100-00	RES M/F 0805 CHIP 1M 5%
R181		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R182		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R183		036-14560-00	RES M/F 0805 CHIP 5K6 5%
*R184	10	036-15150-00	RES M/F 0805 CHIP 15K 5%
*R184	15	036-15180-00	RES M/F 0805 CHIP 18K 5%
*R184	20	036-15150-00	RES M/F 0805 CHIP 15K 5%
*R184	25	036-15180-00	RES M/F 0805 CHIP 18K 5%
*R185	10	036-15470-00	RES M/F 0805 CHIP 47K 5%
*R185	15	036-15560-00	RES M/F 0805 CHIP 56K 5%
*R185	20	036-15470-00	RES M/F 0805 CHIP 47K 5%
*R185	25	036-15560-00	RES M/F 0805 CHIP 56K 5%
R186		036-15100-00	RES M/F 0805 CHIP 10K 5%
R187		036-15560-00	RES M/F 0805 CHIP 56K 5%
R188		036-17100-00	RES M/F 0805 CHIP 1M 5%
R189		036-13560-00	RES M/F 0805 CHIP 560E 5%
R190		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R192		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R194		036-15470-00	RES M/F 0805 CHIP 47K 5%
R195		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R196		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R197		036-14270-00	RES M/F 0805 CHIP 2K7 5%
RV201		042-07100-06	RES PRESET 1M CARBON 6MM FLAT
RV202		042-07100-06	RES PRESET 1M CARBON 6MM FLAT
R224		036-13100-00	RES M/F 0805 CHIP 100E 5%
R227		036-12100-00	RES M/F 0805 CHIP 10E 5%
R228		036-12330-00	RES M/F 0805 CHIP 33E 5%
R229		036-12330-00	RES M/F 0805 CHIP 33E 5%
R230		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R231		036-14100-00	RES M/F 0805 CHIP 1K 5%
R232		032-33270-00	RES M/F PWR 270E 5% 1W 12X4.5MM
R233		032-31100-00	RES M/F PWR 1E0 5% 1W 12X4.5MM
R234		032-31100-00	RES M/F PWR 1E0 5% 1W 12X4.5MM
R235		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R236		036-15100-00	RES M/F 0805 CHIP 10K 5%
R237		036-15100-00	RES M/F 0805 CHIP 10K 5%
R238		036-16100-00	RES M/F 0805 CHIP 100K 5%
R239		036-16100-00	RES M/F 0805 CHIP 100K 5%
R240		036-15470-00	RES M/F 0805 CHIP 47K 5%
R241		036-16470-00	RES M/F 0805 CHIP 470K 5%
R242		036-14100-00	RES M/F 0805 CHIP 1K 5%
R243		036-16100-00	RES M/F 0805 CHIP 100K 5%
R244		036-16100-00	RES M/F 0805 CHIP 100K 5%
R245		036-14150-00	RES M/F 0805 CHIP 1K5 5%
R246		036-15470-00	RES M/F 0805 CHIP 47K 5%
R247		036-16330-00	RES M/F 0805 CHIP 330K 5%
R248		036-16120-00	RES M/F 0805 CHIP 120K 5%
R249		036-16330-00	RES M/F 0805 CHIP 330K 5%
R250		036-14100-00	RES M/F 0805 CHIP 1K 5%
R251		036-13560-00	RES M/F 0805 CHIP 560E 5%
R252		036-16100-00	RES M/F 0805 CHIP 100K 5%
R253		036-15150-00	RES M/F 0805 CHIP 15K 5%
R254		036-15560-00	RES M/F 0805 CHIP 56K 5%
R255		036-15100-00	RES M/F 0805 CHIP 10K 5%
R256		036-15100-00	RES M/F 0805 CHIP 10K 5%
R257		036-10000-00	RES M/F 0805 CHIP ZERO OHM
R258		036-15100-00	RES M/F 0805 CHIP 10K 5%
R259		036-14150-00	RES M/F 0805 CHIP 1K5 5%
R260		036-13470-00	RES M/F 0805 CHIP 470E 5%
R300		030-53150-20	RES FILM AI 150E 5% 0.4W 4X1.6MM
R301		030-52390-20	RES FILM AI 39E 5% 0.4W 4X1.6MM
R302		030-53150-20	RES FILM AI 150E 5% 0.4W 4X1.6MM
R303		036-13330-00	RES M/F 0805 CHIP 330E 5%
R304		036-12560-00	RES M/F 0805 CHIP 56E 5%
R305		030-53560-20	RES FILM AI 560E 5% 0.4W 4X1.6MM
R306		036-12470-00	RES M/F 0805 CHIP 47E 5%
R313		036-14100-00	RES M/F 0805 CHIP 1K 5%
R350		036-15100-00	RES M/F 0805 CHIP 10K 5%
&RV351		042-04220-06	RES PRESET 2K2 CARBON 6MM FLAT
R352		036-14100-00	RES M/F 0805 CHIP 1K 5%
R353		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R354		036-16220-00	RES M/F 0805 CHIP 220K 5%
&RV356		042-05100-06	RES PRESET 10K CARBON 6MM FLAT
R357		036-14220-00	RES M/F 0805 CHIP 2K2 5%
&RV357		042-05470-06	RES PRESET 47K CARBON 6MM FLAT TOP AD
R358		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R359		036-14100-00	RES M/F 0805 CHIP 1K 5%
R360		036-13100-00	RES M/F 0805 CHIP 100E 5%
R361		036-15150-00	RES M/F 0805 CHIP 15K 5%
R362		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R363		036-14100-00	RES M/F 0805 CHIP 1K 5%
R364		036-11330-00	RES M/F 0805 CHIP 3E3 5%
R365		036-13390-00	RES M/F 0805 CHIP 390E 5%
R366		036-13390-00	RES M/F 0805 CHIP 390E 5%
R417		036-16470-00	RES M/F 0805 CHIP 470K 5%
R420		036-12100-00	RES M/F 0805 CHIP 10E 5%
R421		036-15150-00	RES M/F 0805 CHIP 15K 5%
R422		030-53220-20	RES FILM AI 220E 5% 0.4W 4X1.6MM
R423		030-53180-20	RES FILM AI 180E 5% 0.4W 4X1.6MM
R424		030-53560-20	RES FILM AI 560E 5% 0.4W 4X1.6MM
&R425		030-52180-20	RES FILM AI 18E 5% 0.4W 4X1.6MM
&R426		030-52180-20	RES FILM AI 18E 5% 0.4W 4X1.6MM
&R427		030-53560-20	RES FILM AI 560E 5% 0.4W 4X1.6MM
&R428		030-53560-20	RES FILM AI 560E 5% 0.4W 4X1.6MM
&R429		036-14470-00	RES M/F 0805 CHIP 4K7 5%
&R430		036-14470-00	RES M/F 0805 CHIP 4K7 5%
&R431		036-14220-00	RES M/F 0805 CHIP 2K2 5%
&R457		030-51330-20	RES FILM AI 3E3 5% 0.4W 4X1.6MM
&R458		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
&R459		032-33150-00	RES M/F PWR 150E 5% 1W 12X4.5MM
&R460		030-52100-20	RES FILM AI 10E 5% 0.4W 4X1.6MM
&R461		030-52100-20	RES FILM AI 10E 5% 0.4W 4X1.6MM
&R462		030-52100-20	RES FILM AI 10E 5% 0.4W 4X1.6MM
&R464		032-33180-00	RES M/F PWR 180E 5% 1W 12X4.5MM
&R466		036-15470-00	RES M/F 0805 CHIP 47K 5%
&R469		036-15470-00	RES M/F 0805 CHIP 47K 5%
&R470		036-13100-00	RES M/F 0805 CHIP 100E 5%
&R471		036-13100-00	RES M/F 0805 CHIP 100E 5%
&R480		036-14470-00	RES M/F 0805 CHIP 4K7 5%
&R481		036-14470-00	RES M/F 0805 CHIP 4K7 5%
&R482		045-04470-01	RES NTC 4K7 5% 5MM DISC

Ref	Var	IPN	Description	Ref	Var	IPN	Description
SK1		240-04020-57	SKT 10 WAY 1ROW PCB MTG TOP ENTRY				
SK100		240-02020-05	SKT STEREO PHONE JACK PCB MTG				
SK300		240-02100-44	SKT COAX MINI JACK PCB MTG ANGLED				
SK401		240-02100-44	SKT COAX MINI JACK PCB MTG ANGLED				
SW101		232-00010-26	SWITCH PUSH SPDT RT ANGLE PCB MTG NO B				
T100		053-00010-17	XFMR T4030 LINE MATCH POTCORE				
T200		050-00016-50	COIL TAIT NO 650 455KHZ 5.6MM CAN				

T836 Mechanical & Miscellaneous Parts (220-01178-02)

IPN	Description
012-04150-01	CAP CER F/THRU 1N5 NO LEAD (C1-C15)
051-00006-02	SOLDER SPRING 1.3MM A4M1877
065-00010-08	BEAD FERRITE 4S3 3*0.7*10MM RED [&L429,L302,L423]
065-00010-13	BEAD FERRITE 7D 1.9*0.9*3.8MM STACK POLE
201-00030-02	WIRE #1 T/C WIRE 7/0.2MM PVC RED 2x 30mm LEDS
201-00030-10	WIRE #1 T/C WIRE 7/0.2MM PVC BLACK 2x 35mm LEDS
206-00010-11	CABLE COAX 50 OHM RG316-U PTFE 1x 140mm 1 x 90mm
206-00010-11	CABLE COAX 50 OHM RG316-U PTFE
220-01178-02	PCB T836TX T837EX
232-00020-26	BUTTON PUSH FOR 232-00010-26 SWITCH sw101
240-00010-55	PLUG 15 WAY D RANGE WIRE WRAP PINS PNL MTG
240-00100-43	PLUG COAX MINI PIN PLUG CRIMP 1.5D COAX
240-02010-54	SKT 15WAY DRANGE PNL MTG 125 DEG C
240-02100-06	SKT COAX N TYPE PNL MTG OPEN TERMN
240-04020-62	SKT 2 WAY RECEPTL SHORTING LINK
240-04020-65	SKT JACK PIN 1.3MM PCB MTG 64 WAY SIL STRAP FOR SK301 TO SK312
303-11168-00	CHASSIS HSINK PNTD CMPLT A1M2364 800 SERIES
303-23118-00	COVER A3M2247 D RANGE HOLE T855/7 'D' range connector
303-50074-00	CLIP A3M2246 SPRING XSTR CLAMP T857
303-50078-00	CLIP A4M2630 0.1MM SPRING WIRE CABLE CLAMP T8
306-01010-00	FERRULE A4M948 HANDLE FXD EQUIP handle
308-01007-00	HANDLE A4M949 FXD EQUIP
308-13090-00	HSINK A4M2361 BRKT COPPER T856
312-01052-00	LID TOP PNTD COMPL A1M2364 800 SERIES
312-01053-00	LID BOTTOM PNTD COMPL A1M2364 800 SERIES
316-06410-01	PNL FRT COMPL T836 A3M2335/4 & 1
316-85015-01	PIN A4M775 LOCATING D RANGE
316-85099-00	PLATE FLOAT A2M2248 DUAL D RANGE SKT BOX
316-85100-00	PLATE FRT A2M2249 DUAL D RANGE SKT BOX
318-01014-00	RAIL A2M2214 FOR 800 SERIES FXD EQUIP
319-01152-00	SHIELD A3M2250 F/THRU MTG T857
345-00040-06	SCREW M3*8MM PAN POZI ST BZ skt box x2.
345-00040-08	SCREW M3*12MM PAN POZI ST BZ 'D' range cover
345-00040-09	SCREW M3*6MM CSK POZI TRUNCATED HEAD ST BZ rail mounting - pack with rails
345-00040-10	SCREW M3*6MM PAN POZI ST BZ Rail x4, Float Plate x4.
345-00040-11	SCREW M3X10MM PAN POZI ST BZ For Final Carcassing Kit
345-00040-20	SCREW M3*8MM BUTTON SKT HD BLACK ZINC PHOS front panel
349-00020-32	SCREW TAPTITE M3X8MM PAN POZI BZ [PCB mounting x8, 'N' connector x4]
349-00020-43	SCREW TAPTITE M4X12MM PAN POZI BZ for &Q423 (heatsink bracket); top cover x14
349-00020-45	SCREW TAPTITE M4X20MM PAN POZI BZ bottom cover x14
352-00010-08	NUT M3 COLD FORM HEX ST BZ 'D' socket x4, Skt cover x4, VCO mtg x3
352-00010-29	NUT M4 NYLOC HEX
352-00010-35	NUT 8-32 UNC HEX RF PWR XSTR MTG
353-00010-10	WASHER M3 FLAT 7MM*0.6MM ST BZ FOR FLOAT PLATE
353-00010-11	WASHER M3 FLAT 9.5MM*0.9MM ST BZ For Final Carcassing Kit
353-00010-12	WASHER M3 SPRING BZ OR Z/C 'D' skt & cover
353-00010-13	WASHER M3 SHAKEPROOF INT BZ VCO mtg x3, D hole cover x2
353-00010-24	WASHER M4 FLAT ST BZ A4M1957 FOR &Q423 (HEATSINK BRACKET)
362-00010-08	GASKET SIL INSULATING TO-5 TO-39 FOR Q301
362-00010-23	GASKET SIL INSULATING TO-220 CLIP MTD
362-00010-33	GROMMET LED MTG 3MM LO CURRENT LEDS
365-00011-53	LABEL WHITE RW2365/1 104*37MM SPECIAL ADHSV
365-00100-20	LABEL WHITE S/A 28X11MM QUIKSTIK RW718/4 use label ref #414
365-01391-01	(L)LABEL BLNK 30*10.8MM TAMPERMARK VOID MATT
399-00010-51	BAG PLASTIC 75*100MM
400-00020-07	SLEEVING 2MM SIL RUBBER
410-01081-00	CRTN T800 MODULE KIWI REF22860 PRTD 402X192X6
410-01082-00	CRTN 10 T800 KIWI REF24417 423X410X360

T837 Parts List (IPN 220-01178-02)

How To Use This Parts List

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped by component type in numerical order. Each component entry comprises three or four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this component is fitted only to that variant.

The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Parts List Amendments

There were no amendments to the parts list at the time of publication.

Note: The "&" character is used in this Parts List to indicate components used only in the T837 (&R367), or those components common to both T836 and T837 but with different values in each unit (&R425, &R426, &R427, &R428).

(Refer to the table in the exciter/PA circuit diagram.)

Ref	Var	IPN	Description
C1		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C2		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C3		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C5		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C6		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C8		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C9		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C10		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C11		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C12		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C13		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C15		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C16		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C17		015-22560-01	CAP CER 0805 CHIP 56P 5% NPO 50V
C19		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C20		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C21		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C25		025-08100-02	CAP TANT BEAD 10M 10% 16V
C26		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C29		022-06330-03	CAP METAL POLYES 330N 10% 50V 5MM L/S
C30		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C33		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C34		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C35		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C36		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C39		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C40		015-21820-01	CAP CER 0805 CHIP 8P2 +/-0.25P NPO 50V
C42		015-25150-08	CAP CER 0805 CHIP 15N 10% X7R 50V
C43		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C44		015-23220-01	CAP CER 0805 CHIP 220P 5% NPO 50V
C45		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C46		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C47		020-08470-02	CAP ELECT RADL 47M 16V 6X11MM
C48		015-23220-01	CAP CER 0805 CHIP 220P 5% NPO 50V
C101		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C102		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C103		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C104		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C105		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C106		015-24220-08	CAP CER 0805 CHIP 2N2 10% X7R 50V
C107		020-08220-01	CAP ELECT RADL 22M 16V 5X11MM
C108		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C109		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C110		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C111		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C112		020-08220-01	CAP ELECT RADL 22M 16V 5X11MM
C113		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C115		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C118		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C119		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C121		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C123		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C124		015-21470-01	CAP CER 0805 CHIP 4P7 +/-0.25P NPO 50V
C126		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C128		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C129		020-08470-02	CAP ELECT RADL 47M 16V 6X11MM
C133		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C135		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C137		020-08220-01	CAP ELECT RADL 22M 16V 5X11MM
C139		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C141		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C145		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C146		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C147		020-07100-02	CAP ELECT RADL 1M 50V 5X11MM
C148		015-05220-08	CAP CER 1206 CHIP 22N 10% X7R 50V
C149		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C150		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C151		015-21470-01	CAP CER 0805 CHIP 4P7 +/-0.25P NPO 50V
C152		020-09100-03	CAP ELECT RADL 100M 16V 8X11MM
C153		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C154		020-09100-03	CAP ELECT RADL 100M 16V 8X11MM
C156		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
*C157	10	015-21150-01	CAP CER 0805 CHIP 1P5 +/-0.25P NPO 5
*C157	15	015-21470-01	CAP CER 0805 CHIP 4P7 +/-0.25P NPO 5
*C157	20	015-21150-01	CAP CER 0805 CHIP 1P5 +/-0.25P NPO 5
*C157	25	015-21470-01	CAP CER 0805 CHIP 4P7 +/-0.25P NPO 5
C158		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C160		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C161		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C162		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C163		020-07470-91	CAP ELECT RADL 4M7 63V 6X11MM BI-POLAR
C164		015-23470-08	CAP CER 0805 CHIP 470P 10% X7R 50V
C166		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C209		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C212		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C213		025-08100-02	CAP TANT BEAD 10M 10% 16V
C214		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C215		025-08100-02	CAP TANT BEAD 10M 10% 16V
C216		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C217		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C218		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C219		020-09470-07	CAP 470M 16V 20% ELEC VERT 8*20 3.5MM L
C220		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C221		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C222		020-09100-03	CAP ELECT RADL 100M 16V 8X11MM
C223		020-07220-01	CAP ELECT RADL 2M2 50V 5X11MM
C224		025-07330-01	CAP TANT BEAD 3M3 35V
C225		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C226		020-07100-02	CAP ELECT RADL 1M 50V 5X11MM
C227		020-08100-03	CAP ELECT RADL 10UF 50V 5X11MM
C228		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C229		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C230		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C231		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C232		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C233		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V

Ref	Var	IPN	Description
C300		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C303		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C308		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C313		015-04100-04	CAP CER 1206 CHIP 1N 10% X7R 50V
C317		015-22820-01	CAP CER 0805 CHIP 82P 5% NPO 50V
C319		015-22470-01	CAP CER 0805 CHIP 47P 5% NPO 50V
C322		015-21820-01	CAP CER 0805 CHIP 8P2 +/-0.25P NPO 50V
C330		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C335		015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
C350		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C351		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C352		022-05470-01	CAP MYLAR 47N 10% 50V
C355		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C356		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C357		015-25100-08	CAP CER 0805 CHIP 10N 10% X7R 50V
C358		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C359		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C360		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C361		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C362		015-24470-08	CAP CER 0805 CHIP 4N7 10% X7R 50V
C363		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C364		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C366		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C367		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C370		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C371		025-08100-02	CAP TANT BEAD 10M 10% 16V
C373		025-08100-02	CAP TANT BEAD 10M 10% 16V
D4		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23 CO
D5		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE INLI
D6		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE INLI
D100		001-10000-56	(S) DIODE SMD BAW56 DUAL SWITCH SOT-23
D101		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE IN
D102		001-10000-56	(S) DIODE SMD BAW56 DUAL SWITCH SOT-23
D103		001-10000-56	(S) DIODE SMD BAW56 DUAL SWITCH SOT-23
D104		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE IN
D106		001-00015-29	(S) DIODE ZENER 33V 0.4W BZX79/C33
D204		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D205		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D206		001-10000-99	(S) DIODE SMD BAV99 DUAL SWTCH SNGLE IN
D207		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D208		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D209		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D210		001-00015-17	(S) DIODE ZENER 9V1 0.4W BZX79/C9V1
D211		001-10000-70	(S) DIODE SMD BAV70 DUAL SWITCH SOT-23
D212		001-00011-60	(S) DIODE SR2607 6A/30V
D351		001-00015-69	(S) DIODE ZENER 11V 0.5W LO CURRENT HZ1
IC1		539-00010-41	TCXO 12.8MHZ +-2.5PPM -30 TO +70C NDK NS
IC3		002-00017-51	(S) IC SP8793 DUAL MOD PRESC 40/41
IC4		002-74045-20	(S) IC 74HC4520 DUAL 4BIT SYNCRO CNTR
IC5		002-00017-63	(S) IC NJ8820DP FREQ SYNTHESIZER
IC6		002-00012-47	(S) IC MC33078 DUAL OP AMP LO NOISE
IC7		002-74000-04	(S) IC 74HCU04 UNBUFF HEX INVERTER
IC100		002-00020-50	(S) IC 4N25A OPTOCOUPLER
IC101		002-00015-30	(S) IC 4053B 2CHAN MUX/DEMUX
IC102		002-00014-40	(S) IC 324 QUAD OP AMP
IC103		002-00012-25	(S) IC TL084 QUAD OP AMP JFET I/P
IC104		002-00012-40	(S) IC 358 DUAL OP AMP
IC201		002-00014-62	(S) IC 317L 100MA REG 3 TERMINAL TO-92
IC202		002-00014-40	(S) IC 324 QUAD OP AMP
IC350		002-00012-40	(S) IC 358 DUAL OP AMP
L1		052-08160-25	COIL A/W 2.5T/6.0MM HOR 0.8MM WIRE
L300		052-08125-15	COIL A/W 1.5T/2.5MM HOR 0.8MM WIRE
L303		065-00010-04	BEAD FERRITE F8 4X2X5MM
L308		056-00021-01	IND FXD 1.5UH AXIAL
L309		052-08145-35	COIL A/W 3.5/4.5MM HOR 0.8MM WIRE
L310		056-00021-01	IND FXD 1.5UH AXIAL
L311		052-08135-25	COIL A/W 2.5T/3.5MM HOR 0.8MM WIRE
L312		052-08140-35	COIL A/W 3.5T/4.0MM HOR 0.8MM WIRE
L313		052-08130-15	COIL A/W 1.5T/3.0MM HOR 0.8MM WIRE
L314		056-00021-01	IND FXD 1.5UH AXIAL
LED1		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
LED2		008-00013-35	(S) LED 3MM GREEN LO CURRENT NO MTG
PL1		240-00020-57	HEADER 10 WAY 1 ROW PCB MTG
PL100		240-00020-67	HEADER 6WAY 2X3 PCB MTG STD
PL101		240-00020-67	HEADER 6WAY 2X3 PCB MTG STD
PL102		240-00020-44	HEADER 10WAY 2ROW STRAIGHT PCB MTG (5*
PL103		240-00020-67	HEADER 6WAY 2X3 PCB MTG STD
Q1		000-10057-10	(S) XSTR SMD MMBR571 NPN SOT-23 UHF LO PW
Q5		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 AF
Q6		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q7		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 AF
Q8		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 AF
Q9		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q10		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23 A
Q11		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q101		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q102		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q103		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q104		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q105		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q106		000-00011-91	(S) XSTR BD139 NPN AF PWR TO126
Q208		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q209		000-00011-30	(S) XSTR BC557B PNP AF SML SIG TO92
Q210		000-00012-15	(S) XSTR BD234 PNP AF PWR TO126
Q211		000-10008-07	(S) XSTR SMD BC807 PNP SOT-23 AF LO PWR
Q212		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q300		000-00031-96	(S) XSTR 3866 NPN TO-92 SW. MOT ONLY
Q301		000-00022-30	(S) XSTR 2N4427 NPN TO-39 VHF PWR DRIVE
Q350		000-10008-48	(S) XSTR SMD BCW60/BC848B215 NPN SOT23
Q351		000-10008-17	(S) XSTR SMD BC817-25 NPN SOT-23 AF LO
Q352		000-00012-15	(S) XSTR BD234 PNP AF PWR TO126
R1		036-12100-00	RES M/F 0805 CHIP 10E 5%
R2		036-12220-00	RES M/F 0805 CHIP 22E 5%
R3		036-17100-00	RES M/F 0805 CHIP 1M 5%
R5		036-14100-00	RES M/F 0805 CHIP 1K 5%
R6		036-17100-00	RES M/F 0805 CHIP 1M 5%
R7		036-14330-00	RES M/F 0805 CHIP 3K3 5%
R8		036-13100-00	RES M/F 0805 CHIP 100E 5%
R9		036-12680-00	RES M/F 0805 CHIP 68E 5%
R10		036-13220-00	RES M/F 0805 CHIP 220E 5%
R11		036-17100-00	RES M/F 0805 CHIP 1M 5%
R14		036-17100-00	RES M/F 0805 CHIP 1M 5%
R16		036-17100-00	RES M/F 0805 CHIP 1M 5%
R18		036-12100-00	RES M/F 0805 CHIP 10E 5%
R19		036-17100-00	RES M/F 0805 CHIP 1M 5%
R20		036-17100-00	RES M/F 0805 CHIP 1M 5%
R21		036-12100-00	RES M/F 0805 CHIP 10E 5%
R22		036-12220-00	RES M/F 0805 CHIP 22E 5%
R24		036-12220-00	RES M/F 0805 CHIP 22E 5%
R25		036-15220-00	RES M/F 0805 CHIP 22K 5%
R29		036-17100-00	RES M/F 0805 CHIP 1M 5%
R30		036-13220-00	RES M/F 0805 CHIP 220E 5%
R32		036-14100-00	RES M/F 0805 CHIP 1K 5%
R35		036-15100-00	RES M/F 0805 CHIP 10K 5%
R36		036-16470-00	RES M/F 0805 CHIP 470K 5%
R37		036-15120-00	RES M/F 0805 CHIP 12K 5%
R38		036-15100-00	RES M/F 0805 CHIP 10K 5%
R39		036-16470-00	RES M/F 0805 CHIP 470K 5%
R40		036-16470-00	RES M/F 0805 CHIP 470K 5%
R42		036-14560-00	RES M/F 0805 CHIP 5K6 5%
R43		036-12220-00	RES M/F 0805 CHIP 22E 5%
R46		036-13680-00	RES M/F 0805 CHIP 680E 5%
R47		036-14100-00	RES M/F 0805 CHIP 1K 5%
R48		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R49		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R50		036-15100-00	RES M/F 0805 CHIP 10K 5%
R51		036-15100-00	RES M/F 0805 CHIP 10K 5%
R52		036-15100-00	RES M/F 0805 CHIP 10K 5%
R54		036-14100-00	RES M/F 0805 CHIP 1K 5%
R55		036-13100-00	RES M/F 0805 CHIP 100E 5%
R56		036-17100-00	RES M/F 0805 CHIP 1M 5%
R57		036-15100-00	RES M/F 0805 CHIP 10K 5%
R58		036-15100-00	RES M/F 0805 CHIP 10K 5%
R59		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R60		036-15560-00	RES M/F 0805 CHIP 56K 5%
R61		036-15100-00	RES M/F 0805 CHIP 10K 5%
R62		036-15100-00	RES M/F 0805 CHIP 10K 5%
R64		036-15150-00	RES M/F 0805 CHIP 15K 5%
R65		036-16100-00	RES M/F 0805 CHIP 100K 5%
R67		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R68		036-15560-00	RES M/F 0805 CHIP 56K 5%
R72		036-15150-00	RES M/F 0805 CHIP 15K 5%
R73		036-13330-00	RES M/F 0805 CHIP 330E 5%
R74		036-12100-00	RES M/F 0805 CHIP 10E 5%
R75		036-12100-00	RES M/F 0805 CHIP 10E 5%
RV100		040-05100-23	POT 10K LOG VERT PCB MTG 15MM SLOT SHA
R100		036-13100-00	RES M/F 0805 CHIP 100E 5%
R101		036-15100-00	RES M/F 0805 CHIP 10K 5%
R102		036-13470-00	RES M/F 0805 CHIP 470E 5%
R103		036-13560-00	RES M/F 0805 CHIP 560E 5%
RV104		042-05470-06	RES PRESET 47K CARBON 6MM FLAT TOP ADJ
R104		036-13560-00	RES M/F 0805 CHIP 560E 5%
RV105		042-06100-06	RES PRESET 100K CARBON 6MM FLAT
R105		036-15100-00	RES M/F 0805 CHIP 10K 5%
RV106		042-04470-06	RES PRESET 4K7 CARBON 6MM FLAT
R106		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R107		036-15100-00	RES M/F 0805 CHIP 10K 5%
R108		036-14100-00	RES M/F 0805 CHIP 1K 5%
R109		036-14390-00	RES M/F 0805 CHIP 3K9 5%
R110		036-15100-00	RES M/F 0805 CHIP 10K 5%
R111		036-16390-00	RES M/F 0805 CHIP 390K 5%
R112		036-16100-00	RES M/F 0805 CHIP 100K 5%
R113		036-16100-00	RES M/F 0805 CHIP 100K 5%
R115		036-15100-00	RES M/F 0805 CHIP 10K 5%
R116		036-16100-00	RES M/F 0805 CHIP 100K 5%
R117		036-15100-00	RES M/F 0805 CHIP 10K 5%
R118		036-13560-00	RES M/F 0805 CHIP 560E 5%
R119		036-16100-00	RES M/F 0805 CHIP 100K 5%
R120		036-16100-00	RES M/F 0805 CHIP 100K 5%
R121		036-16100-00	RES M/F 0805 CHIP 100K 5%
R122		036-15120-00	RES M/F 0805 CHIP 12K 5%
R123		036-15120-00	RES M/F 0805 CHIP 12K 5%
R124		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R127		036-16100-00	RES M/F 0805 CHIP 100K 5%
R128		036-16100-00	RES M/F 0805 CHIP 100K 5%
R131		036-17100-00	RES M/F 0805 CHIP 1M 5%
R136		036-15100-00	RES M/F 0805 CHIP 10K 5%
R141		036-16150-00	RES M/F 0805 CHIP 150K 5%
R143		036-14220-00	RES M/F 0805 CHIP 2K2 5%

Ref	Var	IPN	Description
R146		036-15220-00	RES M/F 0805 CHIP 22K 5%
R147		036-15470-00	RES M/F 0805 CHIP 47K 5%
R148		036-16150-00	RES M/F 0805 CHIP 150K 5%
R149		036-15470-00	RES M/F 0805 CHIP 47K 5%
R150		036-15470-00	RES M/F 0805 CHIP 47K 5%
R151		036-14470-00	RES M/F 0805 CHIP 4K7 5%
*R152	10	036-15220-00	RES M/F 0805 CHIP 22K 5%
*R152	15	036-15270-00	RES M/F 0805 CHIP 27K 5%
*R152	20	036-15220-00	RES M/F 0805 CHIP 22K 5%
*R152	25	036-15270-00	RES M/F 0805 CHIP 27K 5%
R155		036-15100-00	RES M/F 0805 CHIP 10K 5%
R159		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R162		036-13680-00	RES M/F 0805 CHIP 680E 5%
R163		036-14100-00	RES M/F 0805 CHIP 1K 5%
R164		036-13680-00	RES M/F 0805 CHIP 680E 5%
R166		036-17100-00	RES M/F 0805 CHIP 1M 5%
R167		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R168		036-17100-00	RES M/F 0805 CHIP 1M 5%
R169		036-16120-00	RES M/F 0805 CHIP 120K 5%
R170		036-15100-00	RES M/F 0805 CHIP 10K 5%
R171		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R172		036-16470-00	RES M/F 0805 CHIP 470K 5%
R173		036-15100-00	RES M/F 0805 CHIP 10K 5%
R174		036-16330-00	RES M/F 0805 CHIP 330K 5%
R175		036-14100-00	RES M/F 0805 CHIP 1K 5%
R176		036-16100-00	RES M/F 0805 CHIP 100K 5%
R177		036-16100-00	RES M/F 0805 CHIP 100K 5%
R178		036-15560-00	RES M/F 0805 CHIP 56K 5%
R179		036-15560-00	RES M/F 0805 CHIP 56K 5%
R180		036-17100-00	RES M/F 0805 CHIP 1M 5%
R181		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R182		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R183		036-14560-00	RES M/F 0805 CHIP 5K6 5%
*R184	10	036-15150-00	RES M/F 0805 CHIP 15K 5%
*R184	15	036-15180-00	RES M/F 0805 CHIP 18K 5%
*R184	20	036-15150-00	RES M/F 0805 CHIP 15K 5%
*R184	25	036-15180-00	RES M/F 0805 CHIP 18K 5%
*R185	10	036-15470-00	RES M/F 0805 CHIP 47K 5%
*R185	15	036-15560-00	RES M/F 0805 CHIP 56K 5%
*R185	20	036-15470-00	RES M/F 0805 CHIP 47K 5%
*R185	25	036-15560-00	RES M/F 0805 CHIP 56K 5%
R186		036-15100-00	RES M/F 0805 CHIP 10K 5%
R187		036-15560-00	RES M/F 0805 CHIP 56K 5%
R188		036-17100-00	RES M/F 0805 CHIP 1M 5%
R189		036-13560-00	RES M/F 0805 CHIP 560E 5%
R190		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R192		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R194		036-15470-00	RES M/F 0805 CHIP 47K 5%
R195		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R196		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R197		036-14270-00	RES M/F 0805 CHIP 2K7 5%
RV201		042-07100-06	RES PRESET 1M CARBON 6MM FLAT
RV202		042-07100-06	RES PRESET 1M CARBON 6MM FLAT
R224		036-13100-00	RES M/F 0805 CHIP 100E 5%
R227		036-12100-00	RES M/F 0805 CHIP 10E 5%
R228		036-12330-00	RES M/F 0805 CHIP 33E 5%
R229		036-12330-00	RES M/F 0805 CHIP 33E 5%
R230		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R231		036-14100-00	RES M/F 0805 CHIP 1K 5%
R232		032-33270-00	RES M/F PWR 270E 5% 1W 12X4.5MM
R233		032-31100-00	RES M/F PWR 1E0 5% 1W 12X4.5MM
R234		032-31100-00	RES M/F PWR 1E0 5% 1W 12X4.5MM
R235		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R236		036-15100-00	RES M/F 0805 CHIP 10K 5%
R237		036-15100-00	RES M/F 0805 CHIP 10K 5%
R238		036-16100-00	RES M/F 0805 CHIP 100K 5%
R239		036-16100-00	RES M/F 0805 CHIP 100K 5%
R240		036-15470-00	RES M/F 0805 CHIP 47K 5%
R241		036-16470-00	RES M/F 0805 CHIP 470K 5%
R242		036-14100-00	RES M/F 0805 CHIP 1K 5%
R243		036-16100-00	RES M/F 0805 CHIP 100K 5%
R244		036-16100-00	RES M/F 0805 CHIP 100K 5%
R245		036-14150-00	RES M/F 0805 CHIP 1K5 5%
R246		036-15470-00	RES M/F 0805 CHIP 47K 5%
R247		036-16330-00	RES M/F 0805 CHIP 330K 5%
R248		036-16120-00	RES M/F 0805 CHIP 120K 5%
R249		036-16330-00	RES M/F 0805 CHIP 330K 5%
R250		036-14100-00	RES M/F 0805 CHIP 1K 5%
R251		036-13560-00	RES M/F 0805 CHIP 560E 5%
R252		036-16100-00	RES M/F 0805 CHIP 100K 5%
R253		036-15150-00	RES M/F 0805 CHIP 15K 5%
R254		036-15560-00	RES M/F 0805 CHIP 56K 5%
R255		036-15100-00	RES M/F 0805 CHIP 10K 5%
R256		036-15100-00	RES M/F 0805 CHIP 10K 5%
R257		036-10000-00	RES M/F 0805 CHIP ZERO OHM
R258		036-15100-00	RES M/F 0805 CHIP 10K 5%
R259		036-14150-00	RES M/F 0805 CHIP 1K5 5%
R260		036-13470-00	RES M/F 0805 CHIP 470E 5%
R300		030-53150-20	RES FILM AI 150E 5% 0.4W 4X1.6MM
R301		030-52390-20	RES FILM AI 39E 5% 0.4W 4X1.6MM
R302		030-53150-20	RES FILM AI 150E 5% 0.4W 4X1.6MM
R303		036-13330-00	RES M/F 0805 CHIP 330E 5%
R304		036-12560-00	RES M/F 0805 CHIP 56E 5%
R305		030-53560-20	RES FILM AI 560E 5% 0.4W 4X1.6MM
R306		036-12470-00	RES M/F 0805 CHIP 47E 5%
R313		036-14100-00	RES M/F 0805 CHIP 1K 5%
R350		036-15100-00	RES M/F 0805 CHIP 10K 5%
R352		036-14100-00	RES M/F 0805 CHIP 1K 5%
R353		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R354		036-16220-00	RES M/F 0805 CHIP 220K 5%
R357		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R358		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R359		036-14100-00	RES M/F 0805 CHIP 1K 5%
R360		036-13100-00	RES M/F 0805 CHIP 100E 5%
R361		036-15150-00	RES M/F 0805 CHIP 15K 5%
R362		036-14470-00	RES M/F 0805 CHIP 4K7 5%
R363		036-13220-00	RES M/F 0805 CHIP 220E 5%
R364		036-11330-00	RES M/F 0805 CHIP 3E3 5%
R365		036-13390-00	RES M/F 0805 CHIP 390E 5%
R366		036-13390-00	RES M/F 0805 CHIP 390E 5%
&R367		036-15470-00	RES M/F 0805 CHIP 47K 5%
R417		036-16470-00	RES M/F 0805 CHIP 470K 5%
R420		036-12100-00	RES M/F 0805 CHIP 10E 5%
R421		036-15150-00	RES M/F 0805 CHIP 15K 5%
R422		030-53220-20	RES FILM AI 220E 5% 0.4W 4X1.6MM
R423		030-53180-20	RES FILM AI 180E 5% 0.4W 4X1.6MM
R424		030-53560-20	RES FILM AI 560E 5% 0.4W 4X1.6MM
&R425		030-02120-20	RES FILM 12E 5% 0.4W 4X1.6MM
&R426		030-02120-20	RES FILM 12E 5% 0.4W 4X1.6MM
&R427		030-53820-20	RES FILM AI 820E 5% 0.4W 4X1.6MM
&R428		030-53820-20	RES FILM AI 820E 5% 0.4W 4X1.6MM
SK1		240-04020-57	SKT 10 WAY 1ROW PCB MTG TOP ENTRY
SK100		240-02020-05	SKT STEREO PHONE JACK PCB MTG
SK300		240-02100-44	SKT COAX MINI JACK PCB MTG ANGLED
SW101		232-00010-26	SWITCH PUSH SPDT RT ANGLE PCB MTG NO B
T100		053-00010-17	XFMR T4030 LINE MATCH POTCORE
T200		050-00016-50	COIL TAIT NO 650 455KHZ 5.6MM CAN

T837 Mechanical & Miscellaneous Parts (220-01178-02)

IPN	Description
012-04150-01	CAP CER F/THRU 1N5 NO LEAD (C1-C15)
051-00006-02	SOLDER SPRING 1.3MM A4M1877
065-00010-08	BEAD FERRITE 4S3 3*0.7*10MM RED [L302]
065-00010-13	BEAD FERRITE 7D 1.9*0.9*3.8MM STACK POLE
201-00030-02	WIRE #1 T/C WIRE 7/0.2MM PVC RED 2x 30mm LEDS
201-00030-10	WIRE #1 T/C WIRE 7/0.2MM PVC BLACK 2x 35mm LEDS
206-00010-11	CABLE COAX 50 OHM RG316-U PTFE
220-01178-02	PCB T836TX T837EX
232-00020-26	BUTTON PUSH FOR 232-00010-26 SWITCH SW101
240-00010-55	PLUG 15 WAY D RANGE WIRE WRAP PINS PNL MTG
240-00100-43	PLUG COAX MINI PIN PLUG CRIMP 1.5D COAX
240-00100-46	PLUG COAX PNL JACK SUHNER 24 SMC50-2-10C
240-02010-54	SKT 15WAY DRANGE PNL MTG 125 DEG C
240-02100-46	SKT COAX ELBOW SUHNER 16SMC50-2-10C
240-04020-62	SKT 2 WAY RECEPTL SHORTING LINK
240-04020-65	SKT JACK PIN 1.3MM PCB MTG 64 WAY SIL STRAP FOR SJ2,SJ3, SJ4-1 TO SJ4-5, SJ5-1 TO SJ5-5
303-11168-00	CHASSIS HSINK PNTD CMPLT A1M2364 800 SERIES
303-23055-00	COVER PLATE A4M955 N CONN HOLE T857
303-23118-00	COVER A3M2247 D RANGE HOLE T855/7 'D' range connector
303-50074-00	CLIP A3M2246 SPRING XSTR CLAMP T857
303-50078-00	CLIP A4M2630 0.1MM SPRING WIRE CABLE CLAMP T8
306-01010-00	FERRULE A4M948 HANDLE FXD EQUIP handle
308-01007-00	HANDLE A4M949 FXD EQUIP
312-01052-00	LID TOP PNTD COMPL A1M2364 800 SERIES
312-01053-00	LID BOTTOM PNTD COMPL A1M2364 800 SERIES
316-06409-01	PNL FRT COMPL T837 EX A3M2218/1 & 3
316-80031-00	PAD A4M2155 PRESSURE T306
316-85015-01	PIN A4M775 LOCATING D RANGE
316-85099-00	PLATE FLOAT A2M2248 DUAL D RANGE SKT BOX
316-85100-00	PLATE FRT A2M2249 DUAL D RANGE SKT BOX
318-01014-00	RAIL A2M2214 FOR 800 SERIES FXD EQUIP
319-01152-00	SHIELD A3M2250 F/THRU MTG T857
345-00040-06	SCREW M3*8MM PAN POZI ST BZ
345-00040-08	SCREW M3*12MM PAN POZI ST BZ 'D' range cover
345-00040-09	SCREW M3*6MM CSK POZI TRUNCATED HEAD ST BZ rail mounting - pack with rails
345-00040-10	SCREW M3*6MM PAN POZI ST BZ Rail x4, Float Plate x4.
345-00040-11	SCREW M3X10MM PAN POZI ST BZ For Final Carcassing Kit
345-00040-20	SCREW M3*8MM BUTTON SKT HD BLACK ZINC PHOS front panel
349-00020-32	SCREW TAPTITE M3X8MM PAN POZI BZ PCB mounting x8, 'N' hole cover x4.
349-00020-43	SCREW TAPTITE M4X12MM PAN POZI BZ top cover x14
349-00020-45	SCREW TAPTITE M4X20MM PAN POZI BZ bottom cover x14
352-00010-08	NUT M3 COLD FORM HEX ST BZ 'D' socket x4, Skt cover x4, VCO mtg x3
352-00010-29	NUT M4 NYLOC HEX
353-00010-10	WASHER M3 FLAT 7MM*0.6MM ST BZ FOR FLOAT PLATE
353-00010-11	WASHER M3 FLAT 9.5MM*0.9MM ST BZ For Final Carcassing Kit
353-00010-12	WASHER M3 SPRING BZ OR Z/C 'D' skt & cover
353-00010-13	WASHER M3 SHAKEPROOF INT BZ VCO mtg x3, D hole cover x2
362-00010-08	GASKET SIL INSULATING TO-5 TO-39 FOR Q301
362-00010-23	GASKET SIL INSULATING TO-220 CLIP MTD
362-00010-33	GROMMET LED MTG 3MM LO CURRENT LEDS
365-00011-53	LABEL WHITE RW2365/1 104*37MM SPECIAL ADHSV
365-00100-20	LABEL WHITE S/A 28X11MM QUIKSTIK RW718/4
365-01391-01	(L)LABEL BLNK 30*10.8MM TAMPERMARK VOID MATT
399-00010-51	BAG PLASTIC 75*100MM
400-00020-07	SLEEVING 2MM SIL RUBBER
410-01081-00	CRTN T800 MODULE KIWI REF22860 PRTD 402X192X6
410-01082-00	CRTN 10 T800 KIWI REF24417 423X410X360

T836/837 Grid Reference Index (IPN 220-01186-02)

How To Use This Grid Reference Index

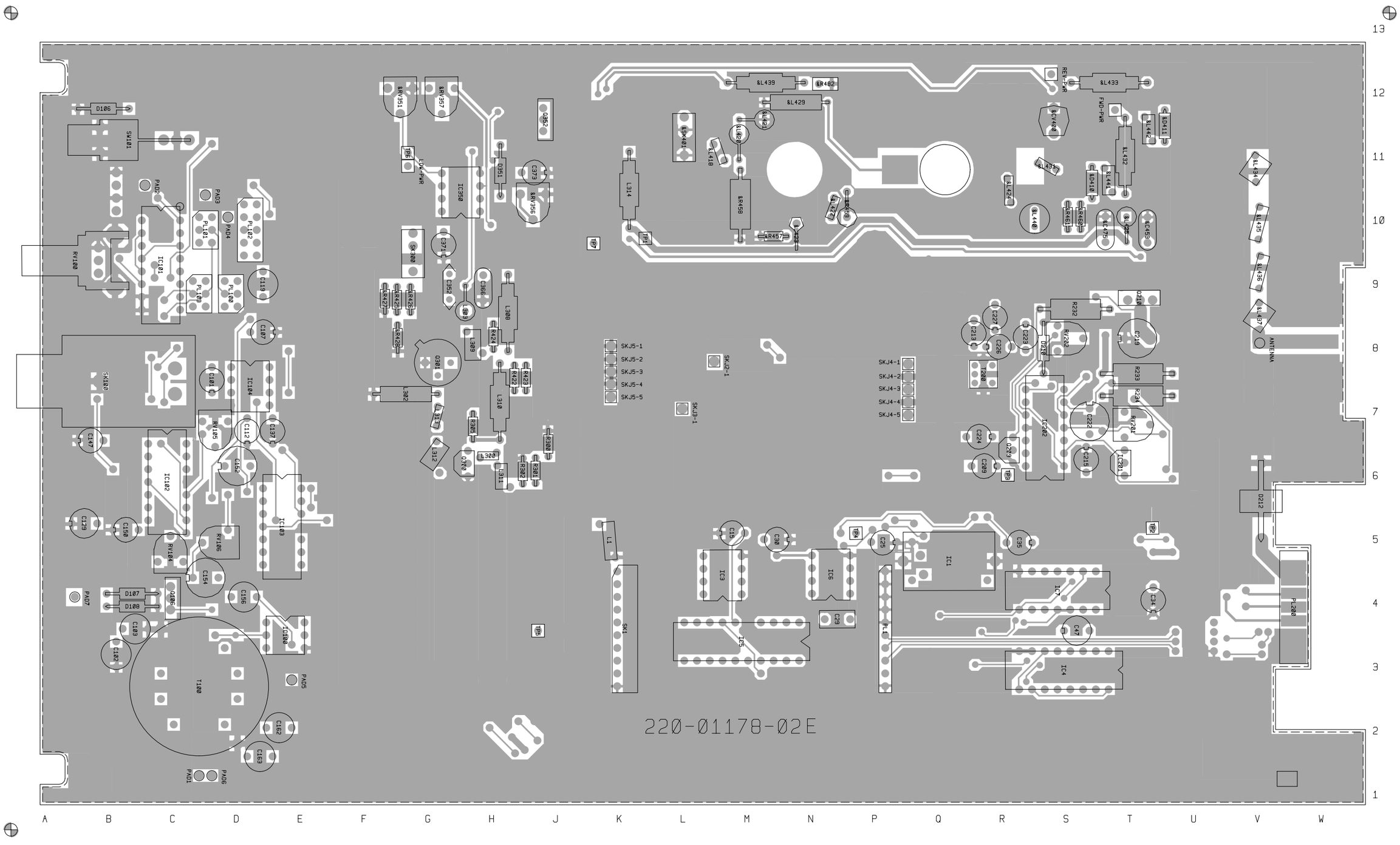
The first digit in the PCB layout reference is a "1" or "2", indicating the top or bottom side layout respectively, and the last two characters give the location of the component on that diagram.

The first digit in the circuit diagram reference is the sheet number, and the last two characters give the location of the component on that sheet.

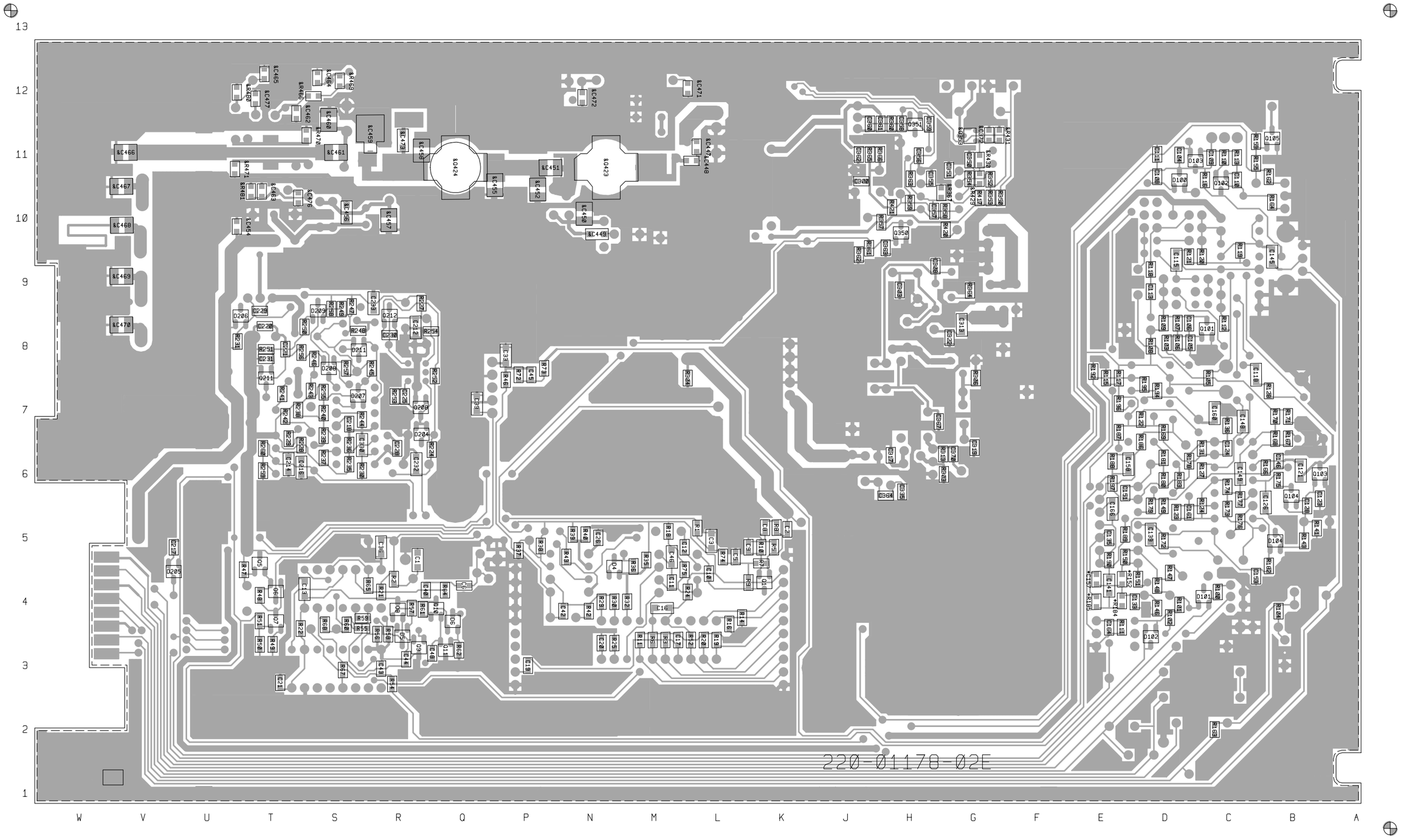
Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit
C1	2:R5	1-A8	C139	2:D5	2-H0	C358	2:H12	4-H8			2-L5
C2	2:K5	1-B4	C141	2:E4	2-R5	C359	2:H12	4-H7	D106	1:B12	2-R8
C3	2:L5	1-B5	C145	2:B9	2-C5	C360	2:J12	4-J7	D107	1:C4	2-B4
C5	2:L5	1-B5	C146	2:B6	2-F6	C361	2:H12	4-J8	D108	1:B4	2-C4
C6	2:Q4	1-B7	C147	1:B7	2-G4	C362	2:J11	4-H9	D204	2:R7	3-L7
C8	2:K5	1-C4	C148	2:C7	2-H2	C363	2:H10	4-F5			3-L6
C9	2:L5	1-C4	C149	2:C6	2-H5	C364	2:H6	4-J5	D205	2:V5	3-C6
C10	2:L4	1-D5	C150	1:B5	2-J6	C366	1:H9	4-P6			3-C6
C11	2:M4	1-E5	C151	2:E6	2-K2	C367	2:H7	4-M5	D206	2:U9	3-D4
C12	2:M5	1-E4	C152	1:D6	2-L2	C370	2:G6	4-M5			3-D5
C13	2:T4	1-E8	C153	2:C4	2-L6	C371	1:G10	4-C7	D207	2:S7	3-H3
C15	1:M5	1-G4	C154	1:D4	2-M1	&C372	2:G11	4-E5			3-J2
C16	2:M4	1-G4	C156	1:D4	2-N6	C373	1:J11	4-C8	D208	2:S8	3-L3
C17	2:M3	1-G2	*C157	2:E4	2-Q4	&CV400	1:S12	4-K1			3-L3
C19	2:P3	1-G2	C158	2:E6	2-R0	&C447	2:L11	4-B1	D209	2:S9	3-P2
C20	2:N3	1-H3	C160	2:C7	2-Q3	&C448	2:L11	4-C1			3-P2
C21	2:T3	1-F8	C161	2:D5	2-F1	&C449	2:N10	4-D3	D210	1:S8	3-L1
C25	1:P5	1-K5	C162	1:E2	2-A3	&C450	2:N10	4-D2	D211	2:S8	3-M1
C26	2:N5	1-K2	C163	1:D2	2-A3	&C451	2:P11	4-E1			3-M1
C29	1:N4	1-L5	C164	2:E4	2-D0	&C452	2:P11	4-E1	D212	1:V5	3-D7
C30	1:N5	1-L4	C166	2:E6	2-Q1	&C453	1:T10	4-F3	D351	1:H10	4-D8
C33	2:P8	1-M5	C209	1:R6	3-K6	&C454	2:U10	4-E3	&D410	1:S10	4-M1
C34	1:T4	1-P8	C212	2:R8	3-Q7	&C455	2:Q11	4-F1	&D411	1:U12	4-N2
C35	1:R5	1-D8	C213	1:R8	3-Q7	&C456	2:S10	4-G3	FWD-PWR	1:T12	4-L1
C36	2:R5	1-D8	C214	2:T6	3-A2	&C457	2:R10	4-G2	IC1	1:R5	1-B8
C39	2:Q7	1-P6	C215	1:S6	3-C2	&C458	2:R11	4-H1	IC3	1:M4	1-E4
C40	2:R4	1-C7	C216	2:T6	3-C3	&C459	2:R11	4-J1	IC4	1:T3	1-F7
C42	2:N4	1-L5	C217	2:V5	3-C5	&C460	2:S12	4-K1			1-G8
C43	2:R3	1-G6	C218	2:S7	3-H1	&C461	2:S11	4-L2	IC5	1:N4	1-F3
C44	2:R3	1-H8	C219	1:T8	3-F3	&C462	2:T12	4-L1	IC6	1:P4	1-K5
C45	2:P8	1-N5	C220	2:T8	3-F3	&C463	2:T10	4-M1			1-K3
C46	2:M5	1-D5	C221	2:T8	3-F3	&C464	2:S12	4-M3	IC7	1:T5	1-E8
C47	1:S4	1-G6	C222	1:S7	3-J3	&C465	2:T12	4-M3			1-D7
C48	2:R3	1-J7	C223	1:R8	3-N1	&C466	2:V11	4-N1			1-D7
C101	1:D8	2-B7	C224	1:R7	3-L6	&C467	2:V11	4-P1			1-K7
C102	1:B3	2-C3	C225	2:R7	3-N6	&C468	2:V10	4-P1			1-G7
C103	1:B4	2-C3	C226	1:R8	3-N6	&C469	2:V9	4-Q1			1-H7
C104	2:D11	2-C3	C227	1:R9	3-Q7	&C470	2:V8	4-R1			1-J7
C105	2:D8	2-C6	C228	2:R6	3-D3	&C471	2:M12	4-B6	IC100	1:E4	2-D1
C106	2:D8	2-C7	C229	2:T9	3-E4	&C472	2:N12	4-A6	IC101	1:C10	2-E4
C107	1:D8	2-C8	C230	2:R8	3-P7	&C473	2:R11	4-H2	IC102	1:C7	2-G5
C108	2:D11	2-D2	C231	2:T8	3-R2	&C475	1:T10	4-F3			2-K5
C109	2:C11	2-D3	C232	2:R6	3-K6	&C476	2:T10	4-M1			2-F1
C110	2:C11	2-D3	C233	2:R9	3-R7	&C477	2:T12	4-N2			2-H2
C111	2:D11	2-E2	C300	2:J11	4-C8	D4	2:N5	1-J3			2-G0
C112	1:D7	2-E6	C303	2:H9	4-P6			1-K3	IC103	1:D6	2-H0
C113	2:D9	2-E2	C308	2:H9	4-N6	D5	2:R4	1-J8			2-K2
C115	2:D9	2-F6	C313	2:G8	4-Q5			1-J8			2-N4
C118	2:C8	2-F7	C317	2:H6	4-K4	D6	2:Q4	1-K8			2-R4
C119	1:D9	2-G3	C319	2:G6	4-M4			1-K8			2-R1
C121	2:B6	2-G7	C322	2:G8	4-P4	D100	2:D11	2-C2	IC104	1:D8	2-N3
C123	2:B6	2-H7	C330	2:S7	3-C2			2-D2			2-R2
C124	2:C6	2-J1	C335	2:H6	4-J4	D101	2:C4	2-B1			2-M0
C126	2:B6	2-H0	C350	2:G11	4-C5			2-B1	IC201	1:T6	3-A2
C128	2:B6	2-J7	C351	2:G11	4-C5	D102	2:D4	2-B2	IC202	1:S6	3-C2
C129	1:B5	2-K7	C352	1:G9	4-N7			2-B2			3-H2
C133	2:E4	2-P4	C355	2:H11	4-F7	D103	2:D11	2-C3			3-K2
C135	2:E5	2-Q4	C356	2:H11	4-E8			2-D3			3-N1
C137	1:E7	2-Q1	C357	2:H10	4-F8	D104	2:B5	2-M5			3-G1

Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit
IC350	1:H10	4-D8			3-B9	R57	2:R4	1-H8	R182	2:B5	2-L5
		4-D5			3-B9	R58	2:R4	1-H7	R183	2:D6	2-L2
		4-F8			3-B8	R59	2:S4	1-H7	*R184	2:E4	2-Q5
LOW-PWR	1:G11	4-E6			3-B8	R60	2:S4	1-H6	*R185	2:E4	2-Q5
L1	1:K5	1-B4			3-B6	R61	2:R4	1-K8	R186	2:D7	2-Q2
L300	1:H6	4-L5			3-B6	R62	2:Q3	1-K7	R187	2:E7	2-Q1
L302	1:F7	4-N4			3-B7	R64	2:Q4	1-C7	R188	2:E6	2-R0
L303	1:H9	4-P7			3-B6	R65	2:S4	1-D7	R189	2:E5	2-Q4
L308	1:H8	4-P5	Q1	2:K4	1-C4	R67	2:S3	1-G7	R190	2:E5	2-R4
L309	1:H8	4-P5	Q5	2:T5	1-P8	R68	2:S4	1-G7	R192	2:E8	2-R2
L310	1:H7	4-L5	Q6	2:T4	1-P7	R72	2:P8	1-N5	R194	2:D7	2-Q3
L311	1:H6	4-K5	Q7	2:T4	1-P7	R73	2:P8	1-N5	R195	2:D7	2-R2
L312	1:G7	4-M5	Q8	2:R4	1-H8	R74	2:L5	1-B5	R196	2:E7	2-Q3
L313	1:G7	4-N5	Q9	2:R3	1-H8	R75	2:M5	1-E5	R197	2:E6	2-R0
L314	1:K10	4-K9	Q10	2:Q4	1-J8	RV100	1:B9	2-B4	RV201	1:T7	3-J3
&L418	1:M11	4-C1	Q11	2:Q3	1-J8	R100	2:C4	2-B0	RV202	1:S8	3-M1
&L420	1:M11	4-D1	Q101	2:C8	2-D7	R101	2:D4	2-B1	R224	2:R6	3-K6
&L421	1:M12	4-D1	Q102	2:C11	2-E3	R102	2:D4	2-C1	R227	2:R9	3-Q7
&L422	1:N10	4-E2	Q103	2:B6	2-H7	R103	2:D8	2-C7	R228	2:T7	3-A3
&L423	1:N10	4-E3	Q104	2:B6	2-J8	R104	2:B4	2-C4	R229	2:T7	3-A3
&L424	1:R11	4-H2	Q105	2:B11	2-Q8	RV104	1:C5	2-J6	R230	2:S6	3-C2
&L425	1:T10	4-H3	Q106	1:C4	2-C1	RV105	1:D7	2-Q3	R231	2:U8	3-D5
&L429	1:M12	4-G1	Q208	2:R7	3-M6	R105	2:C8	2-C5	R232	1:T9	3-D3
&L431	1:S11	4-J2	Q209	1:R6	3-D2	RV106	1:D5	2-L1	R233	1:U8	3-E5
&L432	1:T10	4-M1	Q210	1:T9	3-E4	R106	2:D8	2-C6	R234	1:U7	3-E5
&L433	1:T12	4-M3	Q211	2:T8	3-R2	R107	2:D8	2-D7	R235	2:S6	3-E3
&L434	1:V11	4-P2	Q212	2:R9	3-P7	R108	2:D8	2-D8	R236	2:S7	3-E2
&L435	1:V10	4-P2	Q300	1:H6	4-L5	R109	2:D8	2-D7	R237	2:S6	3-G3
&L436	1:V9	4-Q2	Q301	1:G8	4-P5	R110	2:C11	2-D5	R238	2:T7	3-G3
&L437	1:V8	4-Q2	Q350	2:H10	4-F5	R111	2:E4	2-D0	R239	2:S7	3-G2
&L439	1:N12	4-A7	Q351	2:H12	4-J7	R112	2:C8	2-D4	R240	2:S7	3-H3
&L440	1:S10	4-H3	Q352	1:J12	4-K8	R113	2:C11	2-D3	R241	2:T7	3-J3
&L441	1:T10	4-M1	&Q353	2:G11	4-E6	R115	2:E8	2-D6	R242	2:T7	3-J3
&L442	1:T11	4-N2	&Q423	2:N11	4-E1	R116	2:C11	2-E3	R243	2:S7	3-K3
PAD1	1:C1	2-R8	&Q424	2:Q11	4-H1	R117	2:E8	2-E8	R244	2:S7	3-K2
PAD2	1:C11	2-R9	REV-PWR	1:S12	4-M3	R118	2:D9	2-E2	R245	2:R8	3-K1
PAD3	1:D10	2-B2	R1	2:L5	1-B6	R119	2:C10	2-E6	R246	2:S8	3-L3
PAD4	1:D10	2-R6	R2	2:R4	1-B9	R120	2:C9	2-E4	R247	2:S9	3-N2
PAD5	1:E3	2-N6	R3	2:M3	1-B1	R121	2:D9	2-E6	R248	2:S8	3-N1
PAD6	1:D1	2-R6	R5	2:K5	1-B4	R122	2:D7	2-E2	R249	2:S9	3-P2
PAD7	1:B4	2-R7	R6	2:M3	1-B1	R123	2:D5	2-F1	R250	2:T8	3-Q2
PL1	1:P5	1-Q1	R7	2:K5	1-C5	R124	2:C6	2-F1	R251	2:T8	3-Q2
		1-Q2	R8	2:K5	1-C4	R127	2:C6	2-H3	R252	2:Q8	3-M5
		1-Q2	R9	2:L4	1-C5	R128	2:B7	2-G7	R253	2:R7	3-N6
		1-Q2	R10	2:K5	1-C4	R131	2:C6	2-J2	R254	2:R8	3-P5
		1-Q2	R11	2:M3	1-C1	R136	2:C7	2-J1	R255	2:S7	3-H3
		1-Q3	R14	2:L4	1-C1	R141	2:B5	2-K7	R256	2:T8	3-L3
		1-Q1	R16	2:L4	1-D1	R143	2:B5	2-L7	R257	2:S8	3-L2
PL100	1:D9	2-D7	R18	2:M5	1-D6	R146	2:D4	2-M6	R258	2:S9	3-P2
		2-D8	R19	2:L3	1-D1	R147	2:D5	2-M1	R259	2:T6	3-B1
		2-D7	R20	2:L3	1-D1	R148	2:D4	2-N5	R260	2:T6	3-B2
		2-E7	R21	2:R4	1-E8	R149	2:D6	2-N5	R300	1:J6	4-H4
		2-E7	R22	2:T4	1-E8	R150	2:E5	2-N4	R301	1:J6	4-J5
PL101	1:C10	2-E3	R24	2:M4	1-G5	R151	2:D4	2-P4	R302	1:J6	4-J4
		2-E3	R25	2:N3	1-G3	*R152	2:E4	2-P5	R303	2:G6	4-L4
		2-E3	R29	2:N4	1-H4	R155	2:C11	2-Q8	R304	2:M8	1-A4
		2-F3	R30	2:N4	1-H3	R159	2:C11	2-Q8	R305	1:H7	4-L5
		2-F3	R32	2:M4	1-J3	R162	2:B11	2-R9	R306	2:G8	4-N4
		2-F3	R35	2:M5	1-J3	R163	2:C2	2-R6	R313	2:H6	4-L5
PL102	1:D10	2-G3	R36	2:M5	1-J3	R164	2:B10	2-R6	R350	2:G10	4-B7
		2-G3	R37	2:P5	1-J5	R166	2:B6	2-G6	&RV351	1:G12	4-B5
		2-G3	R38	2:P5	1-K6	R167	2:B7	2-G4	R352	2:G11	4-B6
		2-F3	R39	2:N5	1-K3	R168	2:B7	2-H5	R353	2:G10	4-B7
		2-F3	R40	2:N5	1-K2	R169	2:D7	2-H3	R354	2:G11	4-D6
		2-F3	R42	2:N4	1-L5	R170	2:B7	2-H4	&RV356	1:J10	4-D7
PL103	1:C9	2-G1	R43	2:N5	1-L4	R171	2:B7	2-H4	&RV357	1:G12	4-E6
		2-G2	R46	2:P8	1-M5	R172	2:D5	2-J7	R357	2:H10	4-D7
		2-G2	R47	2:T5	1-P8	R173	2:C6	2-J5	R358	2:G10	4-G8
		2-G1	R48	2:T4	1-P7	R174	2:C6	2-J5	R359	2:H10	4-H7
PL200	1:W5	3-B7	R49	2:T3	1-P6	R175	2:B6	2-J8	R360	2:H12	4-J8
		3-B7	R50	2:T3	1-N7	R176	2:C5	2-J6	R361	2:J10	4-F5
		3-B8	R51	2:T4	1-N7	R177	2:C6	2-J5	R362	2:J9	4-F5
		3-B7	R52	2:L3	1-H4	R178	2:D6	2-K2	R363	2:H11	4-E8
		3-B8	R54	2:R3	1-G6	R179	2:D6	2-K3	R364	2:G9	4-N6
		3-B5	R55	2:S4	1-J6	R180	2:D6	2-K1	R365	2:J11	4-G9
		3-B6	R56	2:R4	1-J6	R181	2:D6	2-L1	R366	2:H11	4-G9

Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit	Device	PCB	Circuit
&R367	2:H10	4-E7									
R417	2:G10	4-D8									
R420	2:G10	4-C7									
R421	2:H10	4-D7									
R422	1:H8	4-L6									
R423	1:J8	4-L6									
R424	1:H8	4-N5									
&R425	1:G9	4-Q5									
&R426	1:G9	4-Q5									
&R427	1:F9	4-Q4									
&R428	1:G8	4-Q4									
&R429	2:G11	4-D6									
&R430	2:G11	4-E6									
&R431	2:G11	4-E5									
&R457	1:N10	4-C2									
&R458	1:M11	4-D1									
&R459	1:P10	4-E2									
&R460	1:S10	4-G3									
&R461	1:S10	4-G3									
&R462	0:B1	4-G1									
&R464	0:B1	4-G2									
&R466	2:S12	4-L1									
&R469	2:S12	4-M3									
&R470	2:S11	4-M2									
&R471	2:U11	4-N1									
&R480	2:U12	4-N3									
&R481	2:T10	4-M1									
&R482	1:N12	4-A6									
SK1	1:K5	1-B1									
		1-B3									
		1-B3									
		1-B3									
		1-B2									
		1-B2									
		1-B2									
		1-B2									
		1-B1									
		1-B1									
SK100	1:B8	2-A7									
SK300	1:G10	4-R5									
&SK401	1:L12	4-A1									
SKJ2-1	1:M8	1-A4									
SKJ3-1	1:L7	1-N8									
SKJ4-1	1:Q8	1-Q5									
SKJ4-2	1:Q8	1-Q6									
SKJ4-4	1:Q7	1-Q6									
SKJ4-5	1:Q7	1-Q7									
SKJ5-1	1:K8	1-Q3									
SKJ5-2	1:K8	1-Q3									
SKJ5-3	1:K8	1-Q4									
SKJ5-4	1:K7	1-Q4									
SKJ5-5	1:K7	1-Q4									
SW101	1:C11	2-B5									
T100	1:C3	2-B3									
T200	1:R8	3-M7									
TP1	1:K10	4-E3									
TP2	1:T5	4-B8									
TP3	1:R6	3-K6									
TP4	1:P5	1-D9									
TP5	1:J4	2-P8									
TP6	1:G11	4-C6									
TP7	1:K10	4-F6									



T836/837 PCB Layout
Top Side
220-01178-02



T836/837 PCB Layout
Bottom Side
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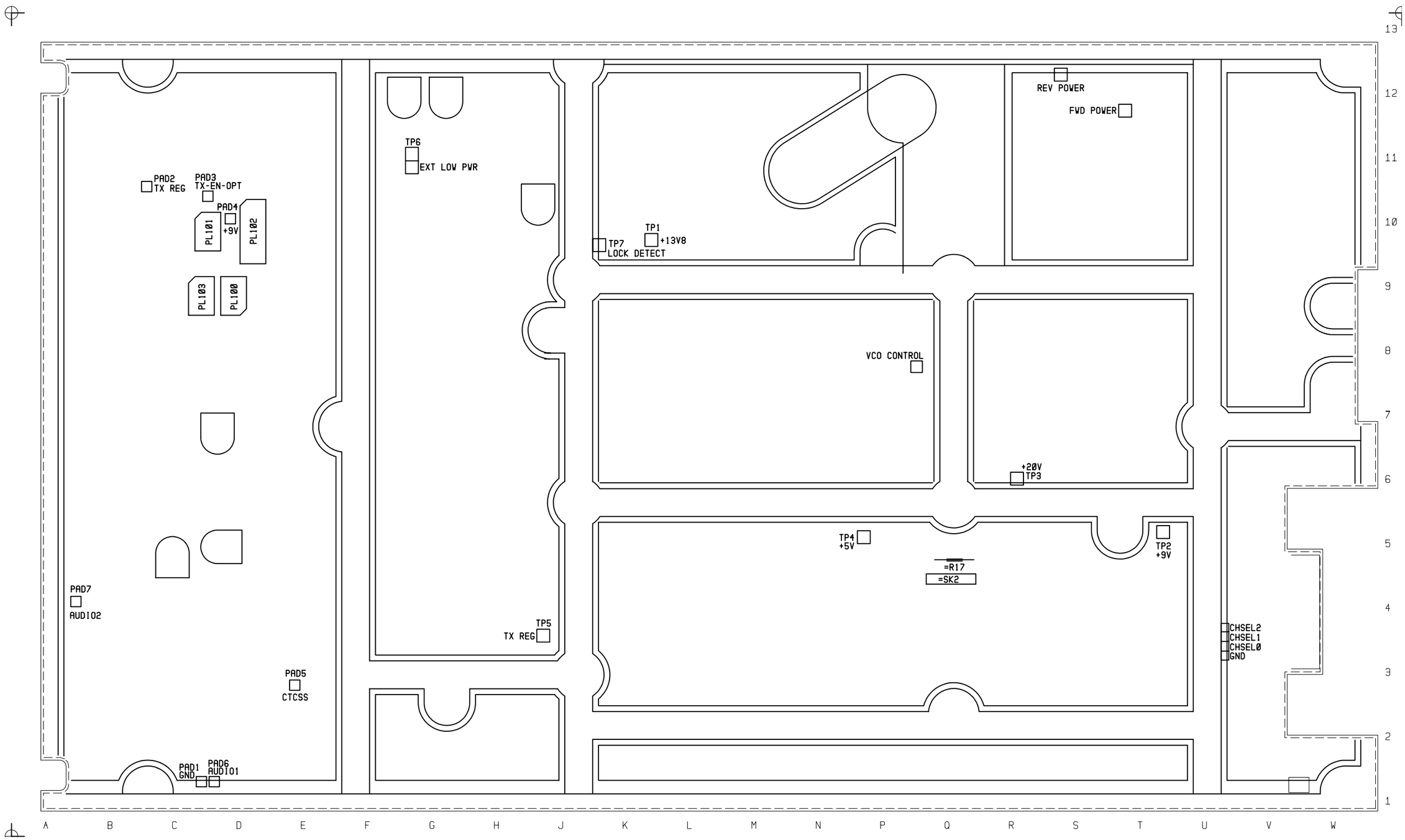

T836/837 Test Points & Options
Top Side
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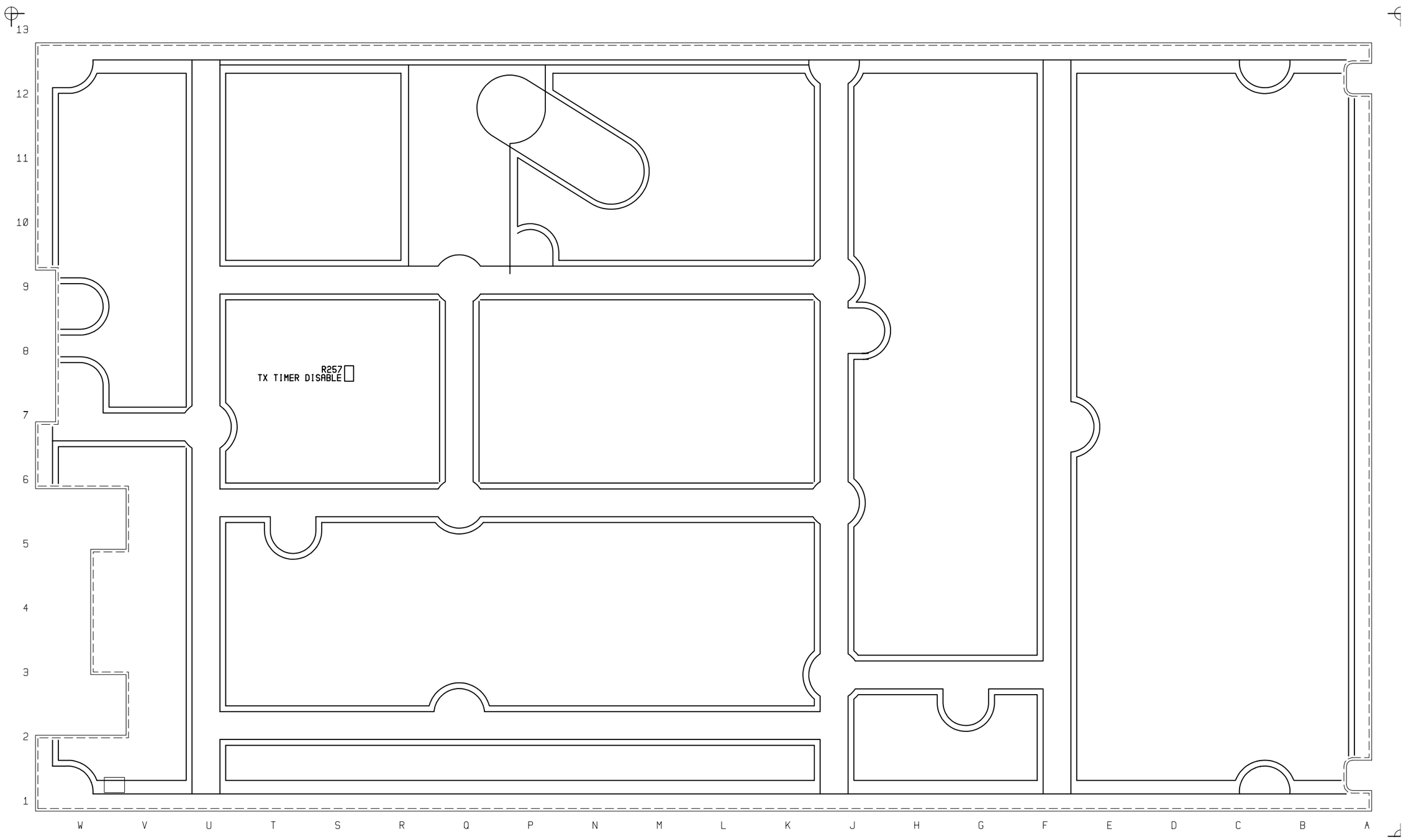

T836/837 Test Points & Options
Bottom Side
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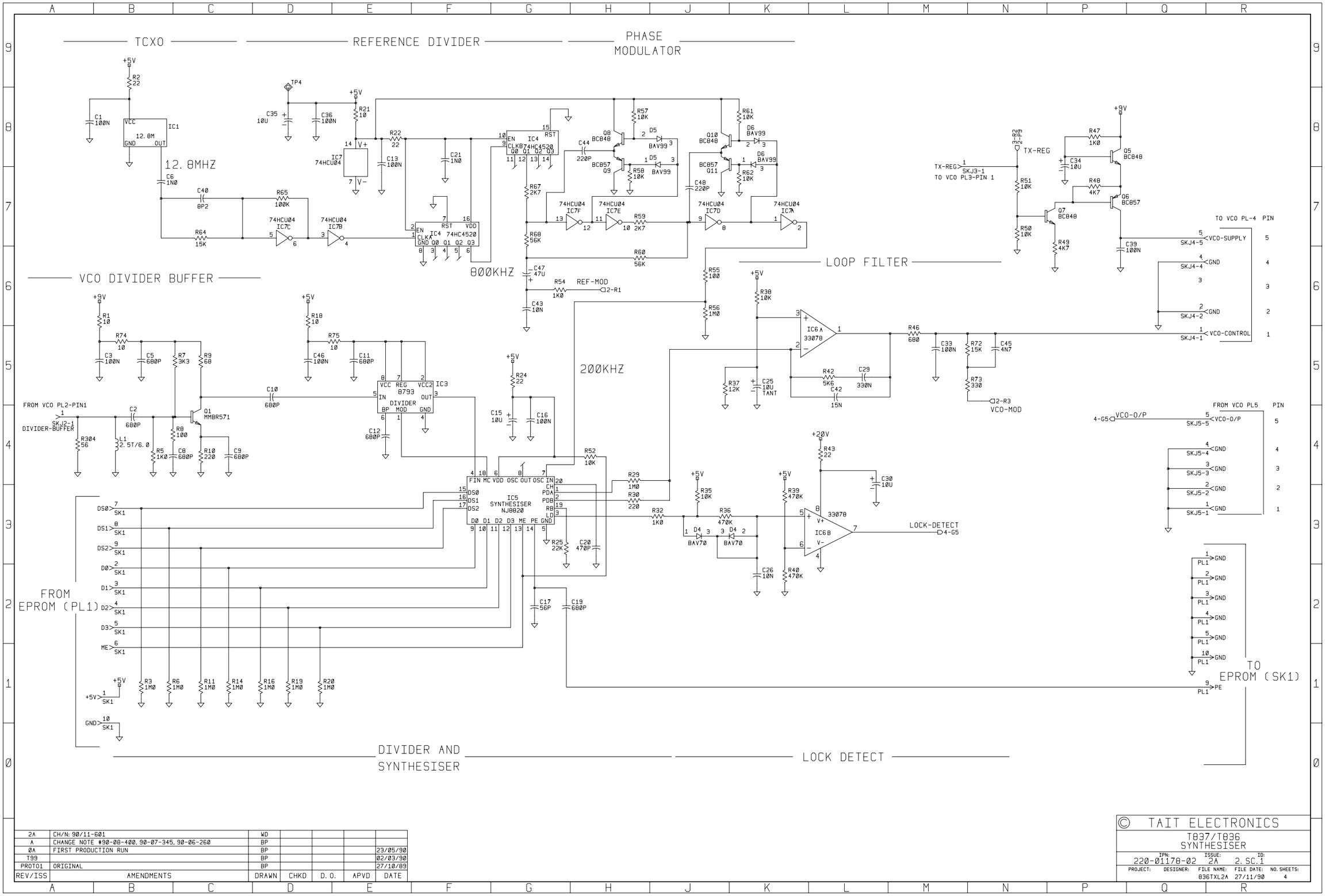

REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
2A	CH/N: 90/11-601	WD				
A	CHANGE NOTE #90-08-400. 90-07-345. 90-06-260	BP				
0A	FIRST PRODUCTION RUN	BP				23/05/90
T99		BP				02/03/90
PROTO1	ORIGINAL	BP				27/10/89

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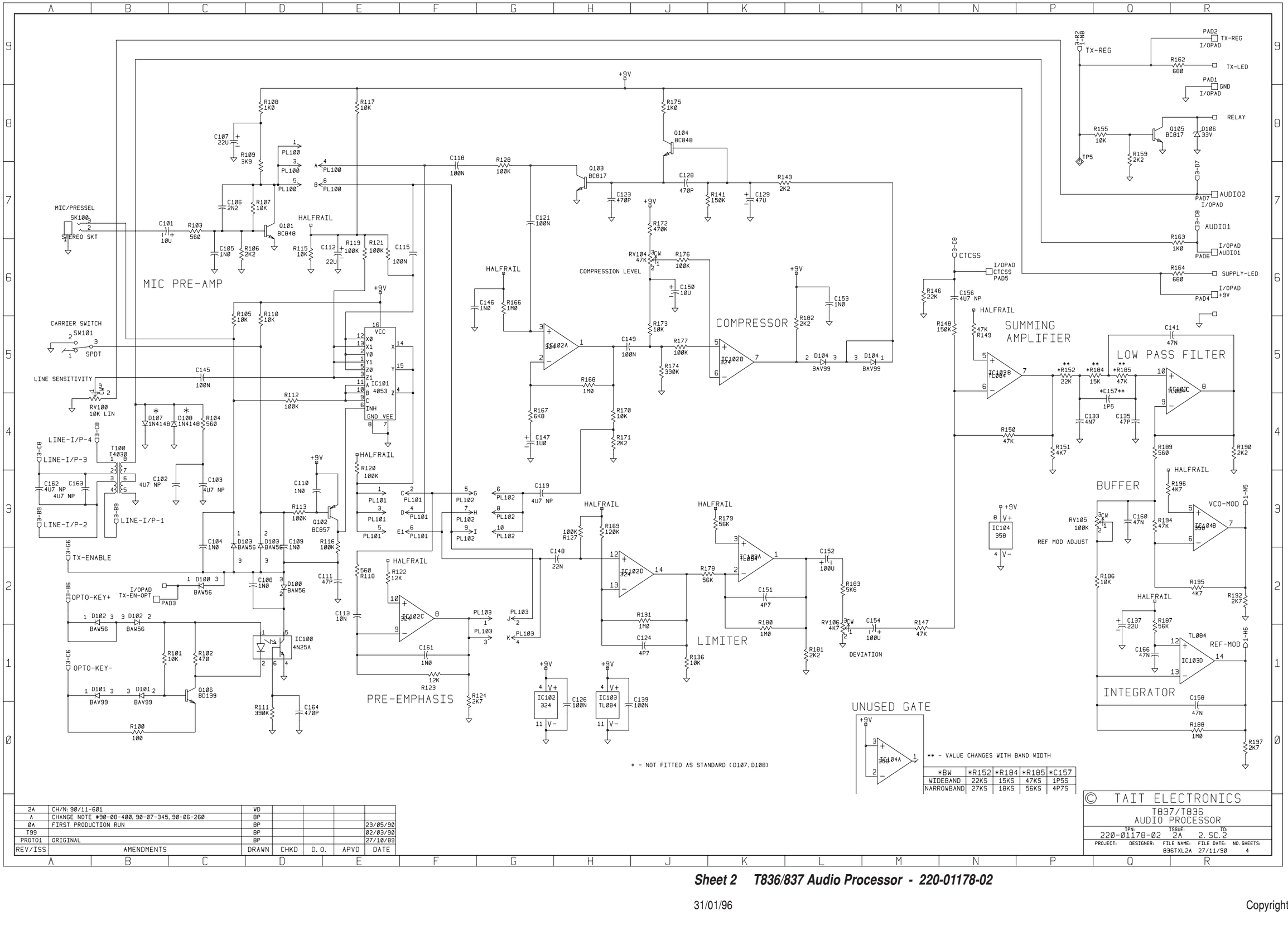
T837/T836 SYNTHESISER

IPN: 220-01178-02 ISSUE: 2A ID: 2.SC.1

PROJECT: DESIGNER: FILE NAME: 836TXL2A FILE DATE: 27/11/90 NO. SHEETS: 4

Sheet 1 T836/837 Synthesiser
220-01178-02



*BW	*R152	*R184	*R185	*C157
WIDEBAND	22KS	15KS	47KS	1P5S
NARROWBAND	27KS	18KS	56KS	4P7S

REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
2A	CH/N: 90/11-601	WD				
A	CHANGE NOTE #90-08-400, 90-07-345, 90-06-260	BP				23/05/90
ØA	FIRST PRODUCTION RUN	BP				02/03/90
T99		BP				27/10/89
PROTO1	ORIGINAL	BP				

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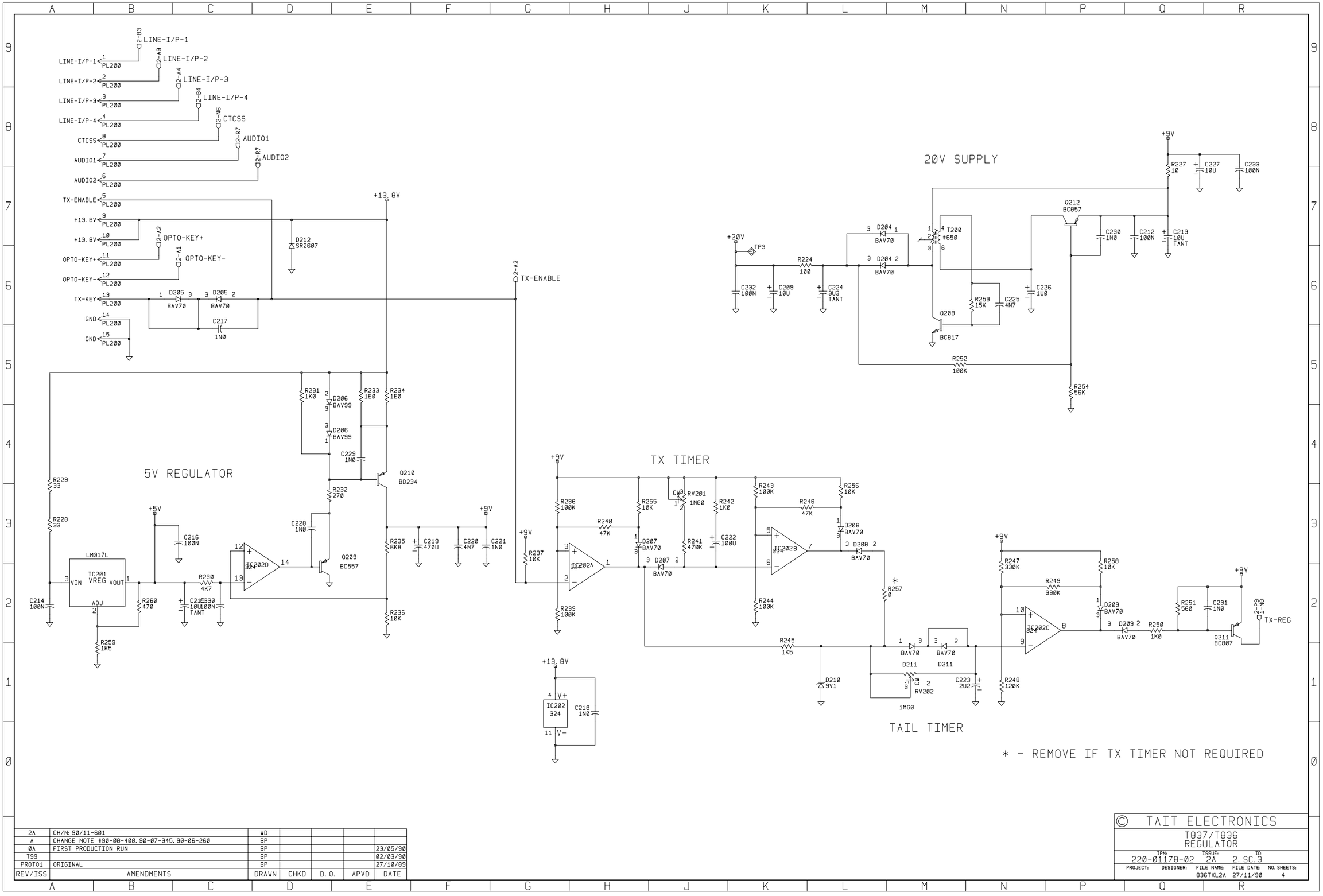
T837/T836
AUDIO PROCESSOR

IPN:	ISSUE:	ID:
220-01178-02	2A	2.SC.2

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		B36TXL2A	27/11/90	4

Sheet 2 T836/837 Audio Processor - 220-01178-02



REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
2A	CH/N: 90/11-601	WD				
A	CHANGE NOTE #90-08-400. 90-07-345. 90-06-260	BP				
0A	FIRST PRODUCTION RUN	BP				23/05/90
T99		BP				02/03/90
PROTO1	ORIGINAL	BP				27/10/89

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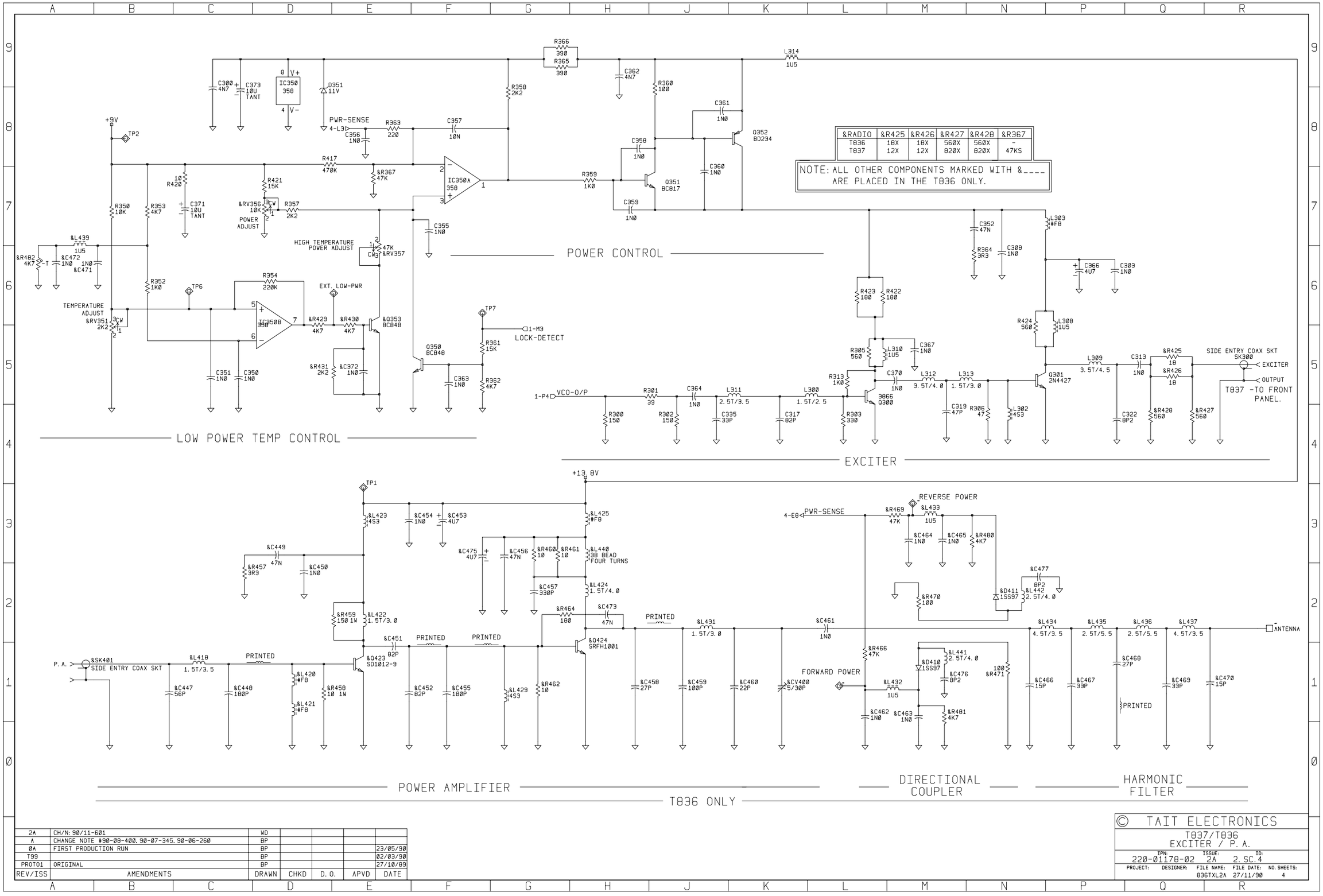
T837/T836
REGULATOR

IPN:	ISSUE:	ID:
220-01178-02	2A	2.SC.3

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		836TXL2A	27/11/90	4

Sheet 3 T836/837 Regulator
220-01178-02



REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
2A	CH/N: 90/11-601	WD				
A	CHANGE NOTE #90-08-400. 90-07-345. 90-06-260	BP				
0A	FIRST PRODUCTION RUN	BP				23/05/90
T99		BP				02/03/90
PROTO1	ORIGINAL	BP				27/10/89

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T837/T836
EXCITER / P. A.

IPN:	ISSUE:	ID:
220-01178-02	2A	2. SC. 4

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		T836TXL2A	27/11/90	4

Sheet 4 T836/837 Exciter/PA - 220-01178-02

Part D T838 Power Amplifier

This part of the manual is divided into five sections, as listed below. There is a detailed table of contents at the start of each section.

Section	Title
1	**General Information**
2	**Circuit Operation**
3	**Initial Tuning & Adjustment**
4	**Fault Finding**
5	**PCB Information**

1 T838 General Information

This section provides a brief description of the T838 power amplifier, along with detailed specifications and a list of variants available.

The following topics are covered in this section.

1.1 Introduction

The T838 is an FM base station power amplifier designed for single or multichannel operation within the frequency range 136 to 174MHz. The output power capability is 10 to 60W.

The PA comprises a broad band, three stage drive amplifier whose output is split to drive two separate output stages. The outputs from these final stages are then recombined and filtered before being fed to the output socket. This type of balanced output stage offers two advantages over single ended types:

- improved intermodulation performance in the presence of high signal levels from adjacent transmitters;
- enhanced reliability: if one of the two output stages fails, the transmitter can still produce one quarter of its rated power.

VSWR and thermal protection is incorporated into the basic design, while monitoring and alarm signals are available for both forward and reverse power. The output power is adjustable from the front panel.

The circuitry is built on a single PCB which is mounted directly on a die-cast chassis / heatsink.

The T838 has a width of 60mm, occupying a single module in a Tait rack shelf (T99-770) which will accommodate up to seven standard modules to give an attractive and convenient installation.

1.2 Specifications

1.2.1 Introduction

The performance figures given are minimum figures, unless otherwise indicated, for equipment tuned with the maximum switching band and operating at standard room temperature (+22°C to +28°C).

Where applicable, the test methods used to obtain the following performance figures are those described in the EIA specification. However, there are several parameters for which performance according to the CEPT specification is given.

Details of test methods and the conditions which apply for Type Approval testing in all countries can be obtained from Tait Electronics Ltd.

1.2.2 General

Power Output:

Rated Power	.. 50W
Maximum Power	.. 60W
Range Of Adjustment	.. 10 to 60W (typical)

Note: Actual power used will depend on regulatory requirements.

Duty Cycle Rating	.. 50W continuous to +60°C without fan[1]

Intermodulation (3rd order):

25dB External Isolation	.. -70dBc
40dB External Isolation	.. -85dBc

Mismatch Capability:

Ruggedness	.. infinity:1 VSWR at temperature and voltage extreme
Stability	.. 5:1 VSWR plus duplexer

Supply Voltage:

Operating Voltage	.. 10.8 to 16V DC
Standard Test Voltage	.. 13.8V DC
Polarity	.. negative earth only

Supply Current:

Standby	.. <50mA
Transmit (@ 50W)	.. 10.5A max., 9A typical

1. The use of a fan is to be preferred at high temperatures. Adequate ventilation must always be provided through base station equipment cabinets.

Spurious Emissions:

Conducted	- Transmit	.. -36dBm to 1GHz -30dBm to 4GHz
	- Standby	.. -57dBm to 1GHz -47dBm to 4GHz
Radiated	- Transmit	.. -36dBm to 1GHz -30dBm to 4GHz
	- Standby	.. -57dBm to 1GHz -47dBm to 4GHz

Operating Temperature Range .. -30°C to +60°C

Dimensions:

Height	.. 191mm
Width	.. 60mm
Length	.. 340mm

Weight .. 3.4kg

1.3 Versions

Description	Version		
	10		
136-174MHz	●		

2 T838 Circuit Operation

This section provides a basic description of the circuit operation of the T838 power amplifier.

The following topics are covered in this section.

2.1 Introduction

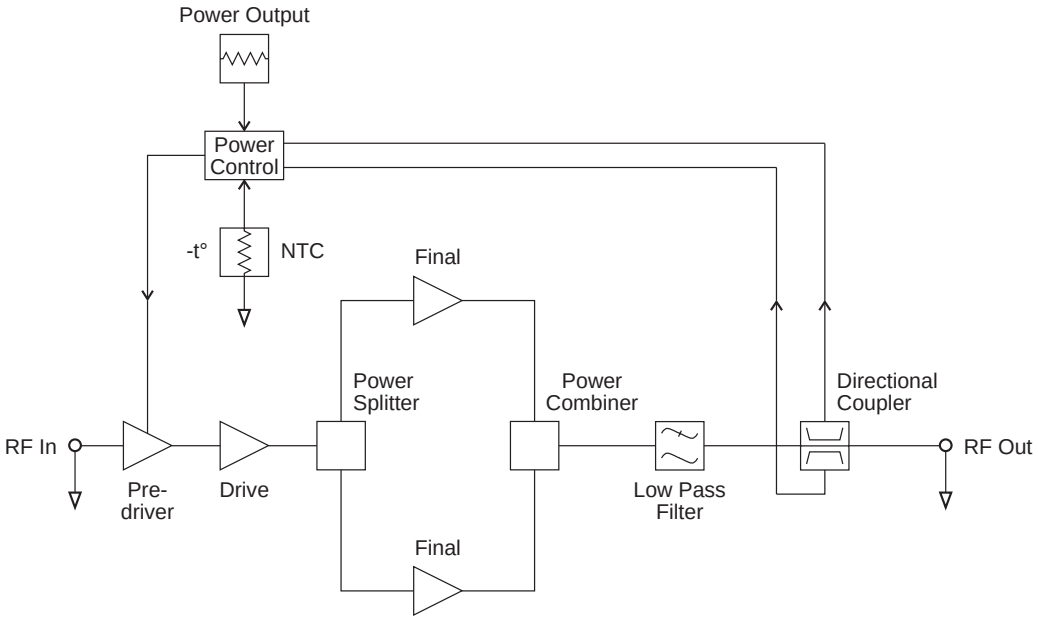


Figure 2.1 T838 High Level Block Diagram

The T838 comprises a four-stage RF power amplifier, the final two stages of which are combined, and extensive control circuitry.

The configuration of each of the main circuit blocks may be seen on a functional level in Figure 2.1.

2.2 RF Circuitry

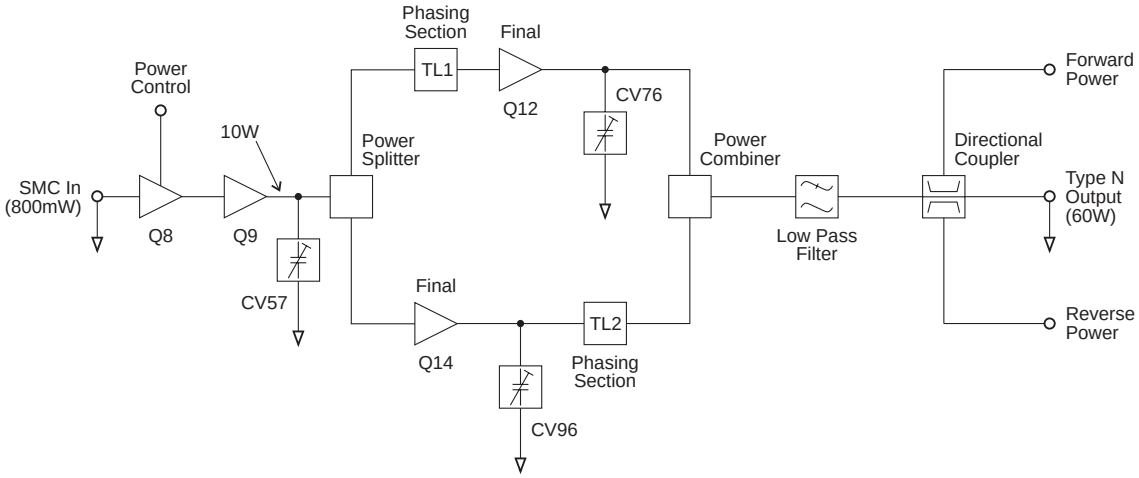


Figure 2.2 T838 RF Circuitry Block Diagram

The RF from the exciter (approximately 800mW) is fed to the power controlled stage Q8. The following stage, Q9, boosts the power to greater than 10W. A power divider network feeds the two final devices, Q12 and Q14. The outputs of these devices are combined and passed via a harmonic filter to a 'wire-line' directional coupler. The final stages incorporate phasing sections to optimise intermodulation performance.

2.3 Control Circuitry

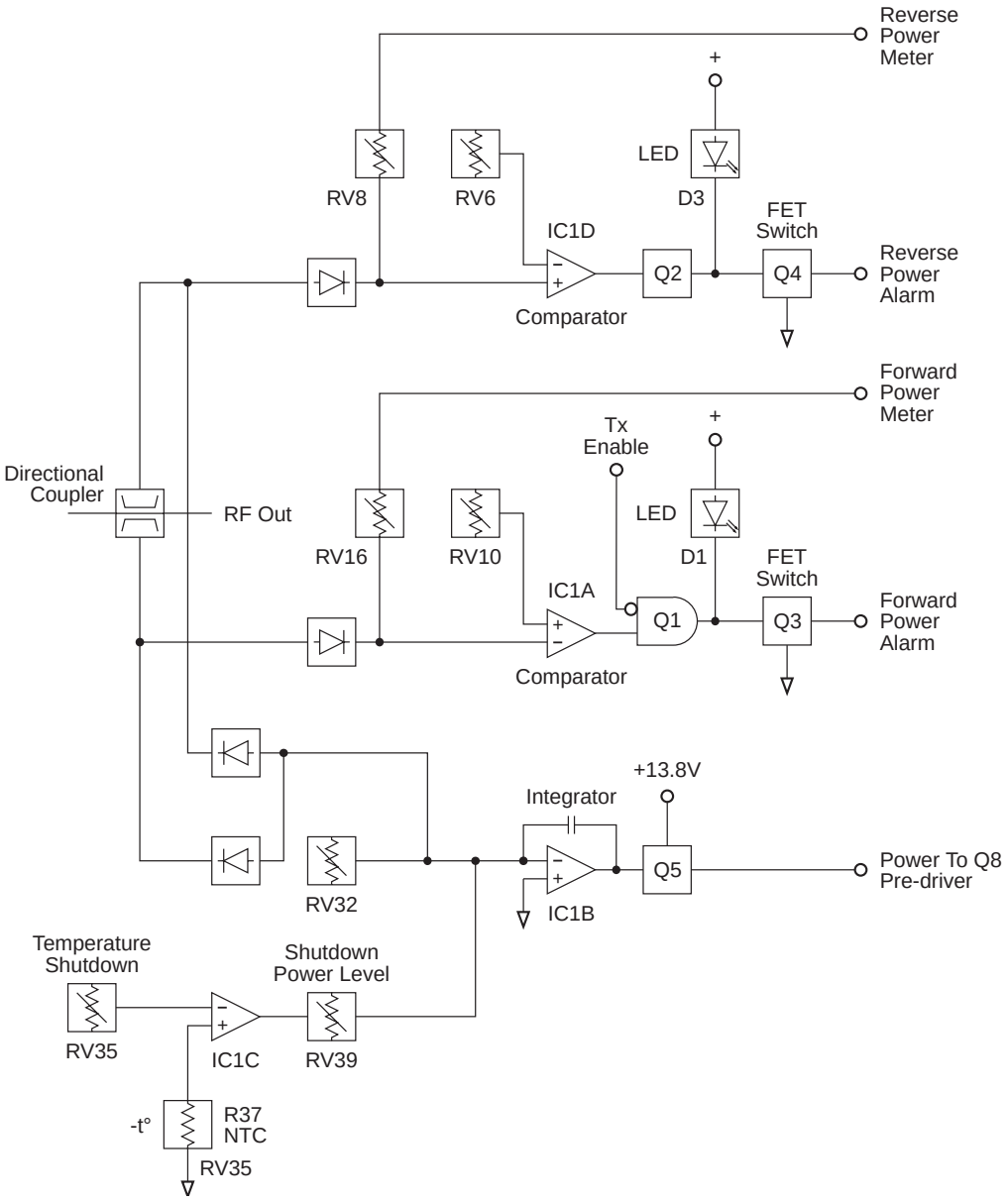


Figure 2.3 T838 Control Circuitry Block Diagram

2.3.1 Power Control

Output power is maintained at a constant level via a power control loop. The forward and reverse power levels are sensed by the 'wire-line' directional coupler and summed at an integrator (IC1b, pin 6). This drives Q5 as a series pass to supply a control voltage to the pre-driver, Q8.

Forward and reflected power are summed so that, under high output VSWR, the power control will turn the PA down.

2.3.2 Thermal Protection

At excessively high temperatures the output power will automatically reduce to a preset level, thus preventing the PA from overheating.

An NTC (R37), being part of a voltage divider (R36, R37), senses the internal temperature of the PA close to the output balance resistor (R69) and applies a voltage to a comparator (IC1c, pin 9). The threshold of the comparator is set by RV35, which sets the shutdown temperature.

The output from the comparator is summed into the power control network by RV39 so that the power level to which the PA will turn down can be set.

2.3.3 Forward And Reverse Power Alarms

If forward power drops below, or reverse power rises above, presettable limits, alarms may be triggered.

The output from the 'wire-line' directional coupler is applied to the comparators (IC1a, pin 4 & IC1d, pin 11), with thresholds adjusted by RV10 and RV6 respectively. When activated, the comparators trigger the output stages (Q3 & Q4), which are open drain with 500mA sink capability (providing the internal power dissipation is kept below 500mW). Internal diode protection makes them suitable for driving relays.

To prevent damage to the unit, the maximum externally applied voltage must not exceed 50V.

Tx enable is applied to the forward power alarm stage to prevent an alarm indicating when the transmitter is not keyed.

2.3.4 Forward And Reverse Power Metering

The levels of forward and reverse power applied to the comparators (IC1a, pin 4 and IC1d, pin 11) are available via RV16 and RV8 at the D-range connector for metering purposes.

3 T838 Initial Tuning & Adjustment

The following section describes the full tuning and adjustment procedure to be carried out before operating the T838.

The following topics are covered in this section.

3.1 Test Equipment Required

- DC power supply capable of delivering 15A at 13.8V (e.g. Tait T807).
- Multimeter or DMM (e.g. Fluke 77).
- RF power meter usable 136-174MHz (e.g. Bird 43 with 5 & 100W elements).
- Thru-line wattmeter with 5W element.
- 100W 3dB 50 ohm pad.
- 'BNC' to 'N' type adaptors (e.g. Amphenol, Greenpar).
- Appropriate trimming tools.
- Special connector 50 ohm BNC to SMC female.

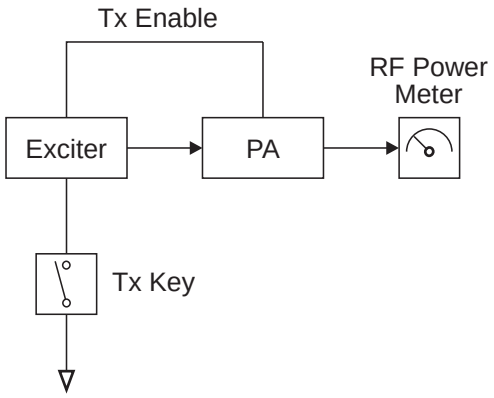


Figure 3.1 Test Equipment Set-up

3.2 Optimising Intermodulation Performance

TL1 and TL2 are phasing lines supplied cut to the maximum length at the bottom of the band.

If it is necessary to minimise IM products, TL1 and TL2 may be cut to suit the mid-switching range frequency, using the formula:

$$\text{length of centre conductor (cm)} = \frac{5250}{\text{frequency (MHz)}}$$

Refer to Figure 3.2 for stripping dimensions (in mm).

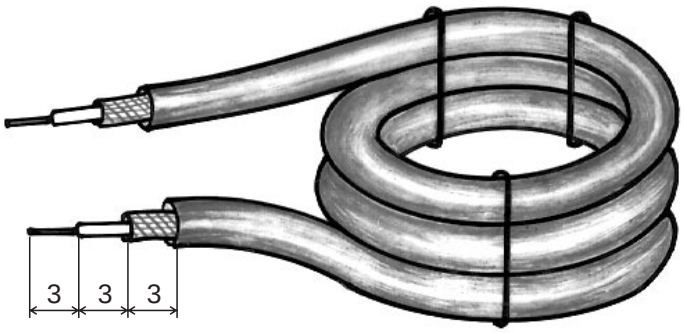


Figure 3.2 Phasing Line Details

3.3 Preliminary Checks

Check for short circuits between the positive rail and earth.

Set up the test equipment as in Figure 3.1.

Connect the T838 to a 13.8V DC supply.

Check that the quiescent current is approximately 45mA.

To key the transmitter, earth the key line (pin 13) on the exciter.

Check that the power supply is still at 13.8V under load.

Check that the regulated power control supply is approximately 7V.

3.4 RF Alignment

Refer to the circuit diagram in Section 5.

Note 1: The power amplifier circuit is 'broad band'. If the T838 is being retuned to a frequency less than 8MHz from the frequency already set up, there will be no need to retune the PA circuit.

For operation over a segment of the band, tune the PA to the centre frequency of the band of interest. If only two channels are programmed, use the highest frequency channel.

Note 2: Cables and connectors can easily cause a power loss of several watts if either too long or poorly terminated. Always use the shortest possible lead between the T838 and power meter.

Note 3: With the T838 partially withdrawn from the rack frame for tuning, the T006-80 (formerly TA-068) lead is required to connect the T838 to the T837 exciter.

Connect the exciter output to the PA input via a thru-line wattmeter with a 5W full scale reading. Special SMC/BNC leads will be required.

Connect an RF power meter to the PA output. Set the front panel power control preset (RV32) fully clockwise.

Set CV57, CV76 and CV96 to the half-meshed position.

Key the transmitter.

Check that the input to the PA is at least 0.5W.

Tune CV76 & CV96 for maximum output power, then tune CV57 for maximum output power.

Readjust CV76 and CV96 for maximum output power (60 to 70W). Some slight readjustment of CV57 may be necessary.

3.5 Setting The Output Power

Note 1: The PA cover shield should be in position when the metering and power controls are set up.

Note 2: The actual power used may be limited by regulatory requirements (e.g. NZ 33W, Australia 50W).

Once the PA has been tuned to full power, set the output power by adjusting RV32 (the front panel power adjust control) to any desired output power between 10 and 60W.

3.6 Remote Forward Power Meter Calibration

If a remote meter is connected, adjust RV16 (forward power meter) for the remote reading to agree with the RF power meter reading.

3.7 Remote Reverse Power Meter Calibration

If a remote meter is connected, connect a 50 ohm 3dB pad (with the output open circuit) to the PA output.

Apply RF drive and Tx key.

Adjust RV8 (reverse power meter) for a quarter of the forward power reading.

3.8 Setting Alarm Levels

Note 1: The PA cover shield should be in position when setting the forward and reverse power alarm levels.

Note 2: If forward and reverse power metering is being used, set up their calibration (Section 3.6 and Section 3.7) before setting the alarm levels.

3.8.1 Forward Power

Power up the T838 and adjust the power output pot. (RV32) so that the output power is at the alarm level required (e.g. 40W if the PA normally operates at 50W).

Adjust the forward power alarm set pot. (RV10) so that the forward power alarm LED lights.

Check the alarm level setting by adjusting the power up and down and observing the alarm LED. A few watts hysteresis can be expected.

Readjust the power control (RV32) for the normal operating level.

3.8.2 Reverse Power

Power up the T838 and adjust the power control pot. (RV32) for the normal operating power level.

Place a known mismatch of the required value (e.g. 5:1 VSWR) and adjust the reverse power alarm set pot. (RV6) so that the reverse power alarm LED lights.

3.9 Temperature Shutdown

Note: The temperature shutdown circuit is factory set to approximately 130°C and 5W. RV35 and RV39 should not be readjusted if normal operation is required.

Power up the T838 and adjust the power control pot. (RV32) for the normal operating power level.

Turn the temperature set pot. (RV35) fully anticlockwise.

Apply heat to the NTC (R37) with the tip of a soldering iron.

Adjust the shutdown power level pot. (RV39) to the desired level.

For continuous operation during fault conditions, set the shutdown power in the range 10 to 20W.

For normal operation, i.e. shutdown under extreme PA internal temperatures (approx. 130°C) or excessive dissipation in the combiner balance resistor (R69), adjust the temperature set pot. (RV35) for a voltage reading of 150mV on pin 8 of the LM339 (IC1).

4 T838 Fault Finding

The following test procedures and fault finding flow charts may be used to help locate a hardware problem, however they are by no means a complete fault finding procedure. If the fault still exists after having progressed through them in a logical manner, contact your nearest authorised Tait Dealer or Service Centre. Further assistance may be obtained from the Customer Support Group, Radio Infrastructure Division, Tait Electronics Ltd, Christchurch, New Zealand.

The following topics are covered in this section.

4.1 Visual Checks

Remove the cover from the T838 and inspect the PCB for damaged or broken components, paying particular attention to the surface mounted devices (SMD's).

Check for defective solder joints. If repair or replacement is considered necessary, refer to Sections 3, 4 and 5 of Part A.

4.2 Component Checks

If a transistor is suspected of faulty operation, an indication of its performance can be assessed by measuring the forward and reverse resistance of the junctions. First make sure that the transistor is not shunted by some circuit resistance (unless the device is completely desoldered). A 20k ohm/V or better multimeter should be used for taking the measurements, using only the medium or low resistance ranges.

The collector current drawn by multi-junction transistors is a further guide to their performance.

If an IC is suspect, the most reliable check is to measure the DC operating voltages. Due to the catastrophic nature of most IC failures, the pin voltages will usually be markedly different from the recommended values in the presence of a fault. The recommended values can be obtained from either the circuit diagram or the component data catalogue.

4.3 DC Checks

Check that +13.8V is present on the collectors of Q8, Q9, Q12 and Q14. Make this measurement when the transmitter is not keyed.

Check that 7.0V is present at the output of regulator IC2 and at pin 3 of IC1.

4.4 RF Checks

4.4.1 General

In circuit RF levels may be measured with an RF probe on which the earth lead has been shortened to a minimum (i.e. 13mm); refer to the PA Fault Finding Chart (Section 4.6.1).

For problems with the power control circuitry, refer to the Power Control Fault Finding Chart (Section 4.6.2).

4.4.2 PA Faults

If a PA fault has occurred, or is suspected, it is easier to isolate if the PA is split into three separate amplifiers.

The first two stages can be observed by removing R56 and attaching a power meter via a flying lead.

Q12 and Q14 can be observed individually by using a flying lead input before L41 or L26 and a flying lead output after C97 or C77 (i.e. remove R69, L34 and L49).

The first two stages should produce 10W for 0.5W drive. Each of the SRFH1001's (Q12 & Q14) should produce approx. 40W for 4W drive.

4.5 Voltage Chart

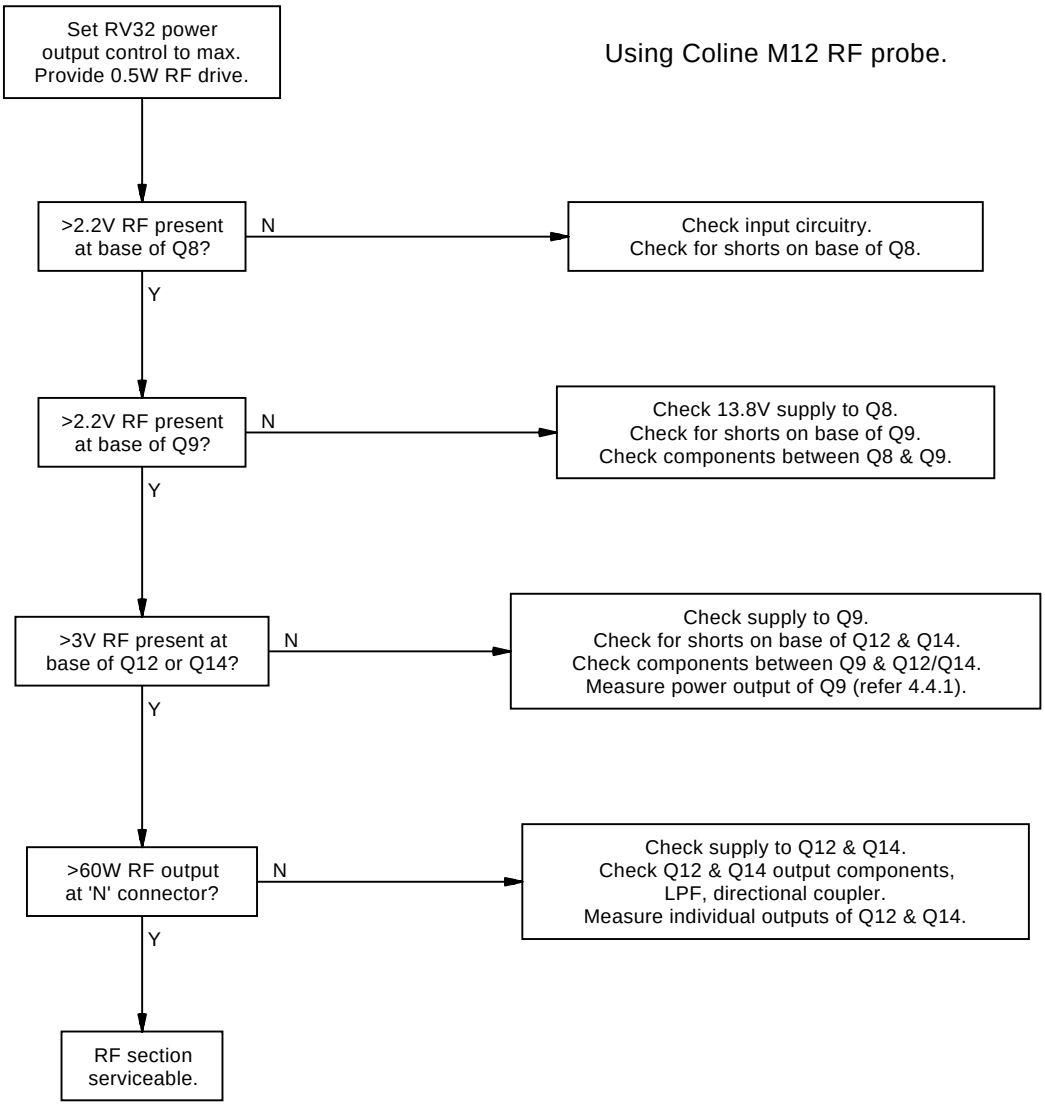
Test conditions:

- typical DC voltages measured with Fluke 77 DVM
- supply voltage 13.8V at socket
- transmitter unkeyed
- allow ±20% for spread of transistor characteristics.

Device	Emitter	Base	Collector
Q1	8.7V	7.0V	6.6V
Q2	0.0V	0.5V	5.5V
Q5	13.8V	13.0V	13.8V
Q5A	13.8V	12.5V	13.8V
Q8	0.0V	0.0V	13.8V
Q9	0.0V	0.0V	13.8V
Q12	0.0V	0.0V	13.8V
Q14	0.0V	0.0V	13.8V

4.6 Fault Finding Charts

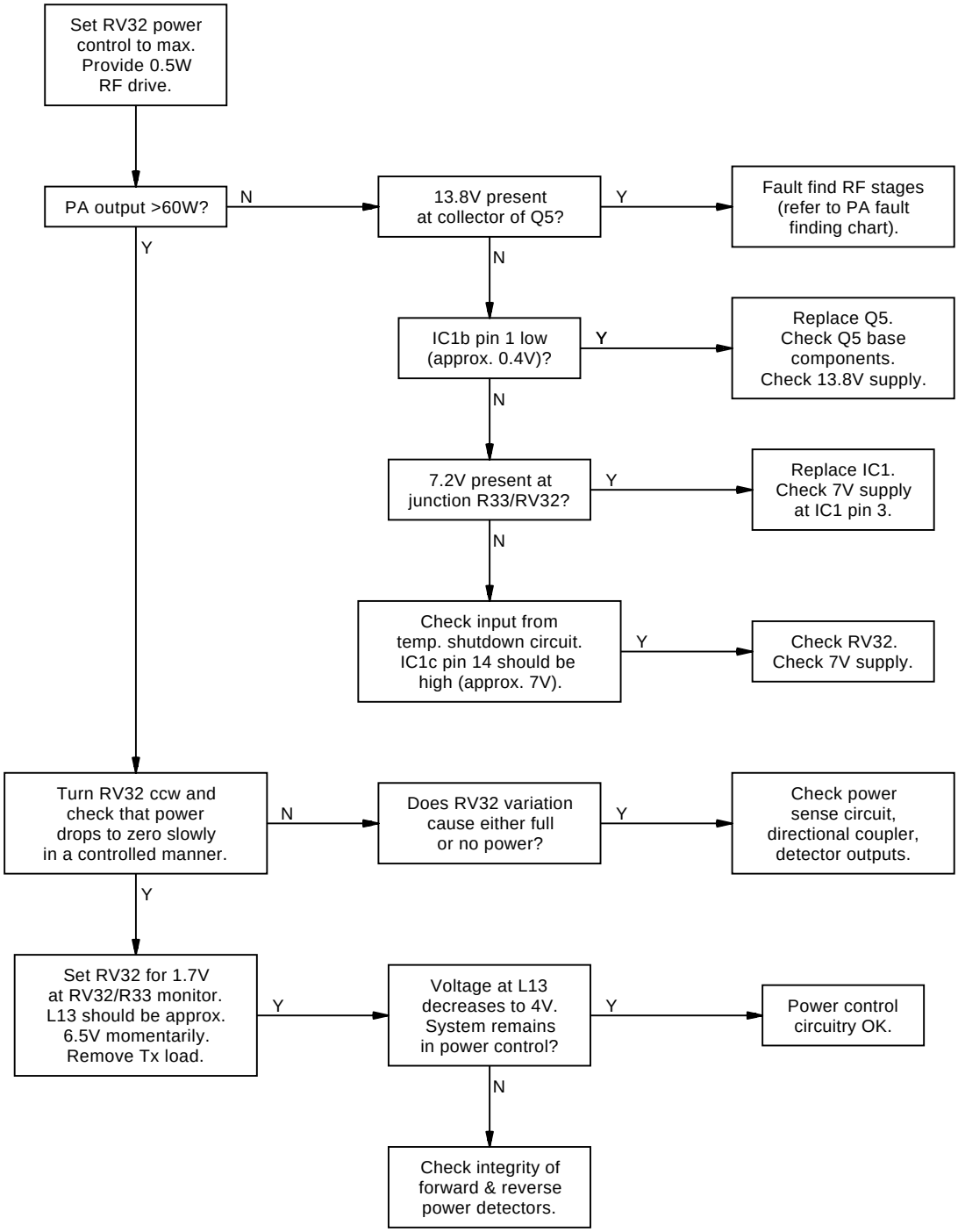
4.6.1 PA



4.6.2 Power Control

Normal operating conditions:

FP at R17	=	2.8V (RV16 fully ccw)
RP at R9	=	0.3V (RV8 fully ccw)
IC1 pin 1	=	0.4V
R33 / RV32	=	7V
L13	=	13V



5 T838 PCB Information

This section provides parts lists, PCB layouts and circuit diagrams for the T838 power amplifier.

This section contains the following information.

5.1 Introduction

PCB Identification

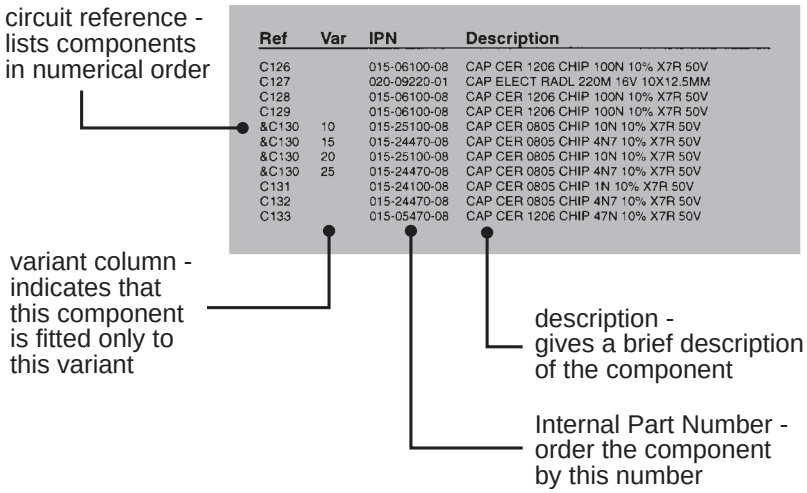
All PCBs are identified by a unique 10 digit number, the last 2 digits of which define the issue status. The issue status starts at 00 and increments through 01, 02, 03, etc. as the PCB is updated. Some issue PCBs never reach full production status and are therefore not included in this manual. A letter following the 10 digit IPN has no relevance in identifying the PCB for service purposes.

Parts Lists

The 10 digit numbers (000-00000-00) in this Parts List are “internal part numbers” (IPNs). Your spare parts orders can be handled more efficiently if you quote the IPN and provide a brief description of the part.

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc.) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped in alphabetical order and then in numerical order within each group. Each component entry comprises three or four columns, as shown below:



The miscellaneous and mechanical section lists the variant and common parts in IPN order.

5.2 T838 PA PCB

This section contains the following information.

T838 Parts List (IPN 220-01100-01)

How To Use This Parts List

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped by component type in numerical order. Each component entry comprises three or four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this component is fitted only to that variant.

The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Parts List Amendments

There were no amendments to the parts list at the time of publication.

Ref	Var	IPN	Description
C1		022-04470-01	CAP MYLAR 4N7 10% 50V
C2		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C3		022-04470-01	CAP MYLAR 4N7 10% 50V
C4		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C5		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C6		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C7		022-05100-01	CAP MYLAR 10N 10% 50V
C8		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C9		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C10		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C11		022-05100-01	CAP MYLAR 10N 10% 50V
C12		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C13		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C14		022-05100-01	CAP MYLAR 10N 10% 50V
C15		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C16		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C19		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C20		011-53220-01	CAP CER AI 220P 10% N750 50/63V
CC20A		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C21		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C22		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C23		022-04470-01	CAP MYLAR 4N7 10% 50V
C24		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C25		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C26		022-05100-01	CAP MYLAR 10N 10% 50V
C27		022-56100-10	CAP MYLAR AI 100N 5% 63V POTTED
C28		022-55680-10	CAP MYLAR AI 68N 5% 63V POTTED
C29		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C30		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C31		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C33		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C40		029-02220-02	CAP MICA 5MM CASE 22P 5%
C41		029-02820-02	CAP MICA 5MM CASE 82P 5%
C42		029-03180-02	CAP MICA 5MM CASE 180P 5%
C43		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C44		022-05470-01	CAP MYLAR 47N 10% 50V
C45		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C46		020-08470-07	CAP ELECT RADL 47M 16V 10X13MM HI TEMP
C47		029-02390-02	CAP MICA 5MM CASE 39P 5%
CC49		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C50		029-03100-02	CAP MICA 5MM CASE 100P 5%
C51		029-03220-02	CAP MICA 5MM CASE 220P 5%
C52		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C53		022-05470-01	CAP MYLAR 47N 10% 50V
C54		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C55		020-08470-07	CAP ELECT RADL 47M 16V 10X13MM HI TEMP
C56		029-02680-02	CAP MICA 5MM CASE 68P 5%
CV57		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC58		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C59		029-02270-02	CAP MICA 5MM CASE 27P 5%
C65		029-02150-02	CAP MICA 5MM CASE 15P 5%
C67		011-53150-01	CAP CER AI 150P 5% N150 50/63V
C68		029-02680-02	CAP MICA 5MM CASE 68P 5%
C69		029-02680-02	CAP MICA 5MM CASE 68P 5%
CC70		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
CC71		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
C72		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C73		022-05100-01	CAP MYLAR 10N 10% 50V
C74		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C75		029-03100-02	CAP MICA 5MM CASE 100P 5%
CV76		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC77		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C78		029-02150-02	CAP MICA 5MM CASE 15P 5%
C85		029-02150-02	CAP MICA 5MM CASE 15P 5%
C87		011-53150-01	CAP CER AI 150P 5% N150 50/63V
C88		029-02680-02	CAP MICA 5MM CASE 68P 5%
C89		029-02680-02	CAP MICA 5MM CASE 68P 5%
CC90		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
CC91		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
C92		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C93		022-05100-01	CAP MYLAR 10N 10% 50V
C94		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C95		029-03100-02	CAP MICA 5MM CASE 100P 5%
CV96		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC97		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C98		029-02150-02	CAP MICA 5MM CASE 15P 5%
C99		020-08470-07	CAP ELECT RADL 47M 16V 10X13MM HI TEMP
C105		029-02270-02	CAP MICA 5MM CASE 27P 5%
C106		029-02120-03	CAP MICA 10MM CASE 12P 2%
C106A		010-01330-01	CAP CER 3P3 +/-0.5P NPO 500V
C107		029-02270-03	CAP MICA 10MM CASE 27P 2%
C107A		010-01470-01	CAP CER 4P7+/-0.5P NPO 500V
C108		029-02330-04	CAP MICA 10MM CASE 33P 2%
C109		029-02270-03	CAP MICA 10MM CASE 27P 2%
C109A		010-01470-01	CAP CER 4P7+/-0.5P NPO 500V
C110		029-02120-03	CAP MICA 10MM CASE 12P 2%
C110A		010-01330-01	CAP CER 3P3 +/-0.5P NPO 500V
D1		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
D2		008-00013-35	(S) LED 3MM GREEN LO CURRENT NO MTG
D3		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
D4		001-50012-00	(S) DIODE AI 1N4148 SI GEN PURPOSE
D5		001-50012-00	(S) DIODE AI 1N4148 SI GEN PURPOSE
D6		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D7		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D8		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D9		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
FX1		065-00010-04	BEAD FERRITE F8 4X2X5MM
IC1		002-00010-60	(S) IC LM339 QUAD COMPTR
IC2		002-00014-62	(S) IC 317L 100MA REG 3 TERMINAL TO-92
L1		056-00021-01	IND FXD 1.5UH AXIAL
L2		056-00021-01	IND FXD 1.5UH AXIAL
L5		056-00021-01	IND FXD 1.5UH AXIAL
L10		052-08130-25	COIL A/W 2.5T/3.0MM HOR 0.8MM WIRE
L11		052-08335-10	COIL A/W 1T/3.5MM SMD 0.8MM WIRE
L13		065-00010-04	BEAD FERRITE F8 4X2X5MM
L14		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L19		052-08140-55	COIL A/W 5.5T/4.0MM HOR 0.8MM WIRE
L21		052-08130-25	COIL A/W 2.5T/3.0MM HOR 0.8MM WIRE
L25		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L30		065-00010-04	BEAD FERRITE F8 4X2X5MM
L31		052-08135-65	COIL A/W 6.5T/3.5MM HOR 0.8MM WIRE
L33		052-08335-20	COIL A/W 2T/3.5MM SMD 0.8MM WIRE
L34		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L40		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE

Ref	Var	IPN	Description
L45		065-00010-04	BEAD FERRITE F8 4X2X5MM
L46		052-08135-65	COIL A/W 6.5T/3.5MM HOR 0.8MM WIRE
L48		052-08335-20	COIL A/W 2T/3.5MM SMD 0.8MM WIRE
L49		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L52		052-08335-50	COIL A/W 5T/3.5MM SMD 0.8MM WIRE
L53		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L54		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L55		052-08335-50	COIL A/W 5T/3.5MM SMD 0.8MM WIRE
Q1		000-00011-05	(S) XSTR BC547B NPN AF SML SIG TO92
Q2		000-00011-05	(S) XSTR BC547B NPN AF SML SIG TO92
Q3		000-00020-70	(S) XSTR BS170 JFET TO-92 SMALL SIG
Q4		000-00020-70	(S) XSTR BS170 JFET TO-92 SMALL SIG
Q5		000-00030-95	(S) XSTR 2N6107 PNP TO-220 AF PWR
Q5A		000-00010-60	(S) XSTR BC327 PNP AF PWR TO92
Q8		000-00030-65	(S) XSTR 2N6080 NPN STUD MTG VHF PWR 4W
Q9		000-00030-53	(S) XSTR 2N5590 NPN STUD MTG VHF PWR 10W
Q12		000-00023-23	(S) XSTR SRFH1001 NPN STUD MTG VHF PWR 3
Q14		000-00023-23	(S) XSTR SRFH1001 NPN STUD MTG VHF PWR 3
R1		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R2		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R3		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R4		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
R5		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
RV6		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R7		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
RV8		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R9		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
RV10		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R11		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
R12		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
R13		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
R14		030-08100-30	RES FILM 10M 10% 0.25W 7X2.5MM
R15		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
RV16		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R17		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
R18		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R20		030-03470-00	RES FILM 470E 5% 0.25W 7X2.5MM
R21		030-02560-00	RES FILM 56E 5% 0.25W 7X2.5MM
R22		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
R23		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R25		030-03470-00	RES FILM 470E 5% 0.25W 7X2.5MM
R26		030-02560-00	RES FILM 56E 5% 0.25W 7X2.5MM
R30		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R31		030-03220-00	RES FILM 220E 5% 0.25W 7X2.5MM
RV32		044-04200-03	RES PRESET MULTITURN 2K 10T PNL MTG
R33		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R34		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
RV35		042-04220-02	RES PRESET 2K CERMET 9.5MM SQ FLAT TOP A
R36		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R37		045-04470-01	RES NTC 4K7 20% 5MM DISC
R38		030-06100-00	RES FILM 100K 5% 0.25W 7X2.5MM
RV39		042-05100-10	RES PRESET 10K CERMET 9.5MM SQ FLAT
R40		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R41		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R47		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R48		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R49		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R50		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R51		032-33180-00	RES M/F PWR 180E 5% 1W 12X4.5MM
R52		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R53		032-33180-00	RES M/F PWR 180E 5% 1W 12X4.5MM
R54		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R55		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R56		032-31470-01	RES M/F PWR 4E7 5% 2.5W 17X5MM
R57		032-33820-01	RES M/F PWR 820E 5% 2.5W 17X5MM
R58		032-33820-01	RES M/F PWR 820E 5% 2.5W 17X5MM
R65		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R66		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R67		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R68		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R69		032-33100-02	RES M/F PWR 100E 5% 6W 33X9MM
R74		032-33100-02	RES M/F PWR 100E 5% 6W 33X9MM
R75		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R76		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R77		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R78		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
TL3		051-00005-17	COIL TAIT NO 517 DIRNL COUPLER

T838 Mechanical & Miscellaneous Parts (220-01100-01)

IPN	Description
012-04150-01	CAP CER F/THRU 1N5 NO LEAD
051-00006-02	SOLDER SPRING 1.3MM A4M1877
065-00010-08	BEAD FERRITE 4S3 3*0.7*10MM RED
065-00010-11	BEAD FERRITE 4S3 3*1*4MM RED
065-00010-13	BEAD FERRITE 7D 1.9*0.9*3.8MM STACK POLE
065-00010-22	BEAD FERRITE BALUN F14 NEOSID
200-00010-05	WIRE T/C 0.5MM
201-00030-01	WIRE #1 T/C WIRE 7/0.2MM PVC BROWN
201-00030-02	WIRE #1 T/C WIRE 7/0.2MM PVC RED
201-00030-03	WIRE #1 T/C WIRE 7/0.2MM PVC ORANGE
201-00030-04	WIRE #1 T/C WIRE 7/0.2MM PVC YELLOW
201-00030-05	WIRE #1 T/C WIRE 7/0.2MM PVC GREEN
201-00030-06	WIRE #1 T/C WIRE 7/0.2MM PVC BLUE
201-00030-07	WIRE #1 T/C WIRE 7/0.2MM PVC VIOLET
201-00030-09	WIRE #1 T/C WIRE 7/0.2MM PVC WHITE
201-00030-10	WIRE #1 T/C WIRE 7/0.2MM PVC BLACK
201-00050-12	CABLE AUTO 152 RED 28/0.3MM PVC
201-00050-20	CABLE AUTO 152 BLACK 28/0.3MM PVC
206-00010-11	CABLE COAX 50 OHM RG316-U PTFE
206-00010-12	CABLE COAX 50 OHM RG 178 PTFE MINI
220-01100-01	PCB T377 RF PWR AMP CCT A1C543
240-00010-55	PLUG 15 WAY D RANGE WIRE WRAP PINS PNL M
240-00100-46	PLUG COAX PNL JACK SUHNER 24 SMC50-2-10C
240-02010-57	SKT 15WAY DRANGE PNL MNT DS-15AS-BT30 15
240-02100-06	SKT COAX N TYPE PNL MTG OPEN TERMN
240-04020-30	SKT 14 PIN DIL IC LO PROF
240-06010-14	CLAMP LATCHING 15 WAY D RANGE
240-06010-15	BLOCK LATCHING 15WAY D RANGE
302-05190-00	BRKT A4M1892 ADJUSTABLE STOP T377 PA
303-23108-00	COVER SIDE COMPL A2A406 A2M1874 T377 PA
306-01010-00	FERRULE A4M948 HANDLE FXD EQUIP
308-01007-00	HANDLE A4M949 FXD EQUIP
308-13068-00	HSINK A1M2274(1M1869) CASTING COMPL T377
316-06413-00	PNL FRT COMPL T838 PA A3M2219/6 A3M2219/
316-85018-00	PIN A4M1397 COAX CONDUCTOR T316 346 377P
318-01011-00	RAIL A2M1872 BOTTOM T377 PA
318-01012-00	RAIL A3M1873 TOP T377 PA
319-01152-00	SHIELD A3M2250 F/THRU MTG T857
345-00040-06	SCREW M3*8MM PAN POZI ST BZ
345-00040-09	SCREW M3*6MM CSK POZI TRUNCATED HEAD ST
345-00040-11	SCREW M3X10MM PAN POZI ST BZ
345-00040-16	SCREW M3X20MM PAN POZI ST BZ
345-00040-20	SCREW M3*8MM BUTTON SKT HD BLACK ZINC PH
349-00020-32	SCREW TAPTITE M3X8MM PAN POZI BZ
352-00010-29	NUT M4 NYLOC HEX
352-00010-35	NUT 8-32 UNC HEX RF PWR XSTR MTG
353-00010-10	WASHER M3 FLAT 7MM*0.6MM ST BZ
356-00010-03	TAG SOLDER 3MM LONG M614/3.2
360-00010-41	BUSH SHORTY BLACK HEYCO B-187-125
362-00010-07	GASKET SIL INSULATING TO-220
362-00010-13	BUSH INSULATING 1.1MM TOP HAT
362-00010-33	GROMMET LED MTG 3MM LO CURRENT LEDS
365-00011-53	LABEL WHITE RW2365/1 104*37MM SPECIAL AD
365-00100-03	LABEL BLANK 10.8X30MM S/A METLSD POLYES
365-00100-20	LABEL WHITE S/A 28X11MM QUIKSTIK RW718/4
369-00010-14	TIE CABLE NYLON 100*2.6MM
399-00010-56	BAG PLASTIC 200*250MM
400-00020-07	SLEEVING 2MM SIL RUBBER
400-00020-09	SLEEVING 3MM SIL RUBBER
410-01081-00	CRTN T800 MODULE KIWI REF22860 PRTD 402X
410-01082-00	CRTN 10 T800 KIWI REF24417 423X410X360

T838 Parts List (IPN 220-01100-02)

How To Use This Parts List

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc.) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped by component type in numerical order. Each component entry comprises three or four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this component is fitted only to that variant.

The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Parts List Amendments

R19 This resistor, shown on the PCB layout diagram as going between D7 and ground, is not fitted. The designation R19 has been reallocated to another resistor fitted between the base of Q1 and ground.

R24 This resistor, shown on the PCB layout diagram as going between D9 and ground, is not fitted. The designation R24 has been reallocated as described below.

The following four components were added to reduce RF pick-up into the power alarm circuitry:

R24 The track on the bottom of the PCB between the temperature sense input pad and IC1c pin 9 was cut and bridged with a 1k resistor, R24 (92/11-736).

R27 Fitted between the power control in pad and the blue wire (92/11-736).

R28 Fitted between the reverse power in pad and the black wire (92/11-736).

R29 Fitted between the forward power in pad and the yellow wire (92/11-736).

Ref	Var	IPN	Description
C1		022-04470-01	CAP MYLAR 4N7 10% 50V
C2		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C3		022-04470-01	CAP MYLAR 4N7 10% 50V
C4		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C5		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C6		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C7		022-05100-01	CAP MYLAR 10N 10% 50V
C8		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C9		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C10		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C11		022-05100-01	CAP MYLAR 10N 10% 50V
C12		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C13		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C14		022-05100-01	CAP MYLAR 10N 10% 50V
C15		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C16		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C19		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C20		011-53220-01	CAP CER AI 220P 10% N750 50/63V
CC20A		015-04100-06	CAP CER 1210 CHIP 1NF NPO 200V GRM42
C21		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C22		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C23		022-04470-01	CAP MYLAR 4N7 10% 50V
C24		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C25		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C26		022-05100-01	CAP MYLAR 10N 10% 50V
C27		022-56100-10	CAP MYLAR AI 100N 5% 63V POTTED
C28		022-55680-10	CAP MYLAR AI 68N 5% 63V POTTED
C29		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C30		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C31		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C33		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C40		029-02220-02	CAP MICA 5MM CASE 22P 5%
C41		029-02820-02	CAP MICA 5MM CASE 82P 5%
C42		029-03180-02	CAP MICA 5MM CASE 180P 5%
C43		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C44		022-05470-01	CAP MYLAR 47N 10% 50V
C45		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C46		020-08470-07	CAP ELECT RADL 47M 16V 10X13MM HI TEMP
C47		029-02390-02	CAP MICA 5MM CASE 39P 5%
CC49		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C50		029-03100-02	CAP MICA 5MM CASE 100P 5%
C51		029-03220-02	CAP MICA 5MM CASE 220P 5%
C52		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C53		022-05470-01	CAP MYLAR 47N 10% 50V
C54		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C55		020-08470-07	CAP ELECT RADL 47M 16V 10X13MM HI TEMP
C56		029-02680-02	CAP MICA 5MM CASE 68P 5%
CV57		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC58		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C59		029-02270-02	CAP MICA 5MM CASE 27P 5%
C65		029-02150-02	CAP MICA 5MM CASE 15P 5%
C67		011-53150-01	CAP CER AI 150P 5% N150 50/63V
C68		029-02680-02	CAP MICA 5MM CASE 68P 5%
C69		029-02680-02	CAP MICA 5MM CASE 68P 5%
CC70		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
CC71		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
C72		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C73		022-05100-01	CAP MYLAR 10N 10% 50V
C74		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C75		029-03100-02	CAP MICA 5MM CASE 100P 5%
CV76		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC77		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C78		029-02150-02	CAP MICA 5MM CASE 15P 5%
C85		029-02150-02	CAP MICA 5MM CASE 15P 5%
C87		011-53150-01	CAP CER AI 150P 5% N150 50/63V
C88		029-02680-02	CAP MICA 5MM CASE 68P 5%
C89		029-02680-02	CAP MICA 5MM CASE 68P 5%
CC90		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
CC91		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
C92		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C93		022-05100-01	CAP MYLAR 10N 10% 50V
C94		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C95		029-03100-02	CAP MICA 5MM CASE 100P 5%
CV96		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC97		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C98		029-02150-02	CAP MICA 5MM CASE 15P 5%
C99		020-08470-07	CAP ELECT RADL 47M 16V 10X13MM HI TEMP
C105		029-02270-02	CAP MICA 5MM CASE 27P 5%
C106		029-02120-03	CAP MICA 10MM CASE 12P 2%
C106A		010-01330-01	CAP CER 3P3 +/-0.5P NPO 500V
C107		029-02270-03	CAP MICA 10MM CASE 27P 2%
C107A		010-01470-01	CAP CER 4P7+/-0.5P NPO 500V
C108		029-02330-04	CAP MICA 10MM CASE 33P 2%
C109		029-02270-03	CAP MICA 10MM CASE 27P 2%
C109A		010-01470-01	CAP CER 4P7+/-0.5P NPO 500V
C110		029-02120-03	CAP MICA 10MM CASE 12P 2%

Ref	Var	IPN	Description
C110A		010-01330-01	CAP CER 3P3 +/-0.5P NPO 500V
D1		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
D2		008-00013-35	(S) LED 3MM GREEN LO CURRENT NO MTG
D3		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
D4		001-50012-00	(S) DIODE AI 1N4148 SI GEN PURPOSE
D5		001-50012-00	(S) DIODE AI 1N4148 SI GEN PURPOSE
D6		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D7		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D8		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D9		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
IC1		002-00010-60	(S) IC LM339 QUAD COMPTR
IC2		002-00014-62	(S) IC 317L 100MA REG 3 TERMINAL TO-92
L1		056-00021-01	IND FXD 1.5UH AXIAL
L2		056-00021-01	IND FXD 1.5UH AXIAL
L5		056-00021-01	IND FXD 1.5UH AXIAL
L10		052-08130-25	COIL A/W 2.5T/3.0MM HOR 0.8MM WIRE
L11		052-08335-10	COIL A/W 1T/3.5MM SMD 0.8MM WIRE
L13		065-00010-04	BEAD FERRITE F8 4X2X5MM
L14		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L19		052-08140-55	COIL A/W 5.5T/4.0MM HOR 0.8MM WIRE
L21		052-08130-25	COIL A/W 2.5T/3.0MM HOR 0.8MM WIRE
L25		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L30		065-00010-04	BEAD FERRITE F8 4X2X5MM
L31		052-08135-65	COIL A/W 6.5T/3.5MM HOR 0.8MM WIRE
L33		052-08335-20	COIL A/W 2T/3.5MM SMD 0.8MM WIRE
L34		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L40		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L45		065-00010-04	BEAD FERRITE F8 4X2X5MM
L46		052-08135-65	COIL A/W 6.5T/3.5MM HOR 0.8MM WIRE
L48		052-08335-20	COIL A/W 2T/3.5MM SMD 0.8MM WIRE
L49		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L52		052-08335-50	COIL A/W 5T/3.5MM SMD 0.8MM WIRE
L53		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L54		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L55		052-08335-50	COIL A/W 5T/3.5MM SMD 0.8MM WIRE
Q1		000-00011-05	(S) XSTR BC547B NPN AF SML SIG TO92
Q2		000-00011-05	(S) XSTR BC547B NPN AF SML SIG TO92
Q3		000-00020-70	(S) XSTR BS170 JFET TO-92 SMALL SIG
Q4		000-00020-70	(S) XSTR BS170 JFET TO-92 SMALL SIG
Q5		000-00030-95	(S) XSTR 2N6107 PNP TO-220 AF PWR
Q5A		000-00010-60	(S) XSTR BC327 PNP AF PWR TO92
Q8		000-00030-65	(S) XSTR 2N6080 NPN STUD MTG VHF PWR 4W
Q9		000-00030-53	(S) XSTR 2N5590 NPN STUD MTG VHF PWR 10W
Q12		000-00023-23	(S) XSTR SRFH1001 NPN STUD MTG VHF PWR 3
Q14		000-00023-23	(S) XSTR SRFH1001 NPN STUD MTG VHF PWR 3
R1		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R2		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R3		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R4		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
R5		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
RV6		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R7		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
RV8		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R9		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
RV10		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R11		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
R12		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
R13		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
R14		030-08100-30	RES FILM 10M 10% 0.25W 7X2.5MM
R15		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
RV16		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R17		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
R18		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R19		030-54470-20	RES FILM AI 4K7 5% 0.4W 4X1.6MM
R20		030-03470-00	RES FILM 470E 5% 0.25W 7X2.5MM
R21		030-02560-00	RES FILM 56E 5% 0.25W 7X2.5MM
R22		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
R23		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R24		030-54100-20	RES FILM AI 1K 5% 0.4W 4X1.6MM
R25		030-03470-00	RES FILM 470E 5% 0.25W 7X2.5MM
R26		030-02560-00	RES FILM 56E 5% 0.25W 7X2.5MM
R27		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R28		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R29		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R30		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R31		030-03220-00	RES FILM 220E 5% 0.25W 7X2.5MM
RV32		044-04200-03	RES PRESET MULTITURN 2K 10T PNL MTG
R33		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R34		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
RV35		042-04220-02	RES PRESET 2K CERMET 9.5MM SQ FLAT TOP A
R36		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R37		045-04470-01	RES NTC 4K7 20% 5MM DISC
R38		030-06100-00	RES FILM 100K 5% 0.25W 7X2.5MM
RV39		042-05100-10	RES PRESET 10K CERMET 9.5MM SQ FLAT
R40		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R41		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R47		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R48		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R49		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R50		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R51		032-33180-00	RES M/F PWR 180E 5% 1W 12X4.5MM
R52		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R53		032-33180-00	RES M/F PWR 180E 5% 1W 12X4.5MM
R54		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R55		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R56		032-31470-01	RES M/F PWR 4E7 5% 2.5W 17X5MM
R57		032-33820-01	RES M/F PWR 820E 5% 2.5W 17X5MM
R58		032-33820-01	RES M/F PWR 820E 5% 2.5W 17X5MM
R65		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R66		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R67		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R68		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R69		032-33100-02	RES M/F PWR 100E 5% 6W 33X9MM
R74		032-33100-02	RES M/F PWR 100E 5% 6W 33X9MM
R75		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R76		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R77		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R78		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
TL3		051-00005-17	COIL TAIT NO 517 DIRNL COUPLER

T838 Mechanical & Miscellaneous Parts (220-01100-02)

IPN	Description
012-04150-01	CAP CER F/THRU 1N5 NO LEAD
051-00006-02	SOLDER SPRING 1.3MM A4M1877
065-00010-08	BEAD FERRITE 4S3 3*0.7*10MM RED
065-00010-11	BEAD FERRITE 4S3 3*1*4MM RED
065-00010-13	BEAD FERRITE 7D 1.9*0.9*3.8MM STACK POLE
065-00010-22	BEAD FERRITE BALUN F14 NEOSID
200-00010-05	WIRE T/C 0.5MM
201-00030-01	WIRE #1 T/C WIRE 7/0.2MM PVC BROWN
201-00030-02	WIRE #1 T/C WIRE 7/0.2MM PVC RED
201-00030-03	WIRE #1 T/C WIRE 7/0.2MM PVC ORANGE
201-00030-04	WIRE #1 T/C WIRE 7/0.2MM PVC YELLOW
201-00030-05	WIRE #1 T/C WIRE 7/0.2MM PVC GREEN
201-00030-06	WIRE #1 T/C WIRE 7/0.2MM PVC BLUE
201-00030-07	WIRE #1 T/C WIRE 7/0.2MM PVC VIOLET
201-00030-09	WIRE #1 T/C WIRE 7/0.2MM PVC WHITE
201-00030-10	WIRE #1 T/C WIRE 7/0.2MM PVC BLACK
201-00050-12	CABLE AUTO 152 RED 28/0.3MM PVC
201-00050-20	CABLE AUTO 152 BLACK 28/0.3MM PVC
206-00010-11	CABLE COAX 50 OHM RG316-U PTFE
206-00010-12	CABLE COAX 50 OHM RG 178 PTFE MINI
220-01100-02	PCB T377 RF PWR AMP CCT A1C543
240-00010-55	PLUG 15 WAY D RANGE WIRE WRAP PINS PNL M
240-00100-46	PLUG COAX PNL JACK SUHNER 24 SMC50-2-10C
240-02010-54	SKT 15WAY DRANGE PNL MTG 125 DEG C
240-02100-06	SKT COAX N TYPE PNL MTG OPEN TERMN
240-04020-30	SKT 14 PIN DIL IC LO PROF
240-06010-14	CLAMP LATCHING 15 WAY D RANGE
240-06010-15	BLOCK LATCHING 15WAY D RANGE
302-05190-00	BRKT A4M1892 ADJUSTABLE STOP T377 PA
303-23108-00	COVER SIDE COMPL A2A406 A2M1874 T377 PA
306-01010-00	FERRULE A4M948 HANDLE FXD EQUIP
308-01007-00	HANDLE A4M949 FXD EQUIP
308-13068-00	HSINK A1M2274(1M1869) CASTING COMPL T377
316-06413-00	PNL FRT COMPL T838 PA A3M2219/6 A3M2219/
316-85018-00	PIN A4M1397 COAX CONDUCTOR T316 346 377P
318-01011-00	RAIL A2M1872 BOTTOM T377 PA
318-01012-00	RAIL A3M1873 TOP T377 PA
319-01152-00	SHIELD A3M2250 F/THRU MTG T857
345-00040-06	SCREW M3*8MM PAN POZI ST BZ
345-00040-09	SCREW M3*6MM CSK POZI TRUNCATED HEAD ST
345-00040-11	SCREW M3X10MM PAN POZI ST BZ
345-00040-16	SCREW M3X20MM PAN POZI ST BZ
345-00040-20	SCREW M3*8MM BUTTON SKT HD BLACK ZINC PH
349-00020-32	SCREW TAPTITE M3X8MM PAN POZI BZ
352-00010-29	NUT M4 NYLOC HEX
352-00010-35	NUT 8-32 UNC HEX RF PWR XSTR MTG
353-00010-10	WASHER M3 FLAT 7MM*0.6MM ST BZ
356-00010-03	TAG SOLDER 3MM LONG M614/3.2
360-00010-41	BUSH SHORTY BLACK HEYCO B-187-125
362-00010-07	GASKET SIL INSULATING TO-220
362-00010-13	BUSH INSULATING 1.1MM TOP HAT
362-00010-33	GROMMET LED MTG 3MM LO CURRENT LEDS
365-00011-53	LABEL WHITE RW2365/1 104*37MM SPECIAL AD
365-00100-03	LABEL BLANK 10.8X30MM S/A METLSD POLYES
365-00100-20	LABEL WHITE S/A 28X11MM QUIKSTIK RW718/4
369-00010-14	TIE CABLE NYLON 100*2.6MM
399-00010-56	BAG PLASTIC 200*250MM
400-00020-07	SLEEVING 2MM SIL RUBBER
400-00020-09	SLEEVING 3MM SIL RUBBER
410-01081-00	CRTN T800 MODULE KIWI REF22860 PRTD 402X
410-01082-00	CRTN 10 T800 KIWI REF24417 423X410X360

T838 Parts List (IPN 220-01100-03)

How To Use This Parts List

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped by component type in numerical order. Each component entry comprises three or four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this component is fitted only to that variant.

The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Parts List Amendments

C18	Added between the 7V end of R36 and ground to de-couple the 7V supply to prevent RF pick-up (94/12-594).
CC20A	Changed from 1n 0805 chip (015-24100-08) to 1n GRM42-2 to prevent cracking during soldering (93/10-526).

Ref	Var	IPN	Description
C1		022-04470-01	CAP MYLAR 4N7 10% 50V
C2		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C3		022-04470-01	CAP MYLAR 4N7 10% 50V
C4		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C5		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C6		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C7		022-05100-01	CAP MYLAR 10N 10% 50V
C8		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C9		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C10		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C11		022-05100-01	CAP MYLAR 10N 10% 50V
C12		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C13		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C14		022-05100-01	CAP MYLAR 10N 10% 50V
C15		011-54100-01	CAP CER AI 1N 10% T/C B 63V
C16		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C18		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C19		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C20		011-53220-01	CAP CER AI 220P 10% N750 50/63V
CC20A		015-04100-06	CAP CER 1210 CHIP 1NF NPO 200V GRM42
C21		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C22		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C23		022-04470-01	CAP MYLAR 4N7 10% 50V
C24		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C25		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C26		022-05100-01	CAP MYLAR 10N 10% 50V
C27		022-56100-10	CAP MYLAR AI 100N 5% 63V POTTED
C28		022-55680-10	CAP MYLAR AI 68N 5% 63V POTTED
C29		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C30		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C31		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C33		020-07470-04	CAP ELECT RADL 4M7 25V 20% 8X13MM SOLID
C40		029-02220-02	CAP MICA 5MM CASE 22P 5%
C41		029-02820-02	CAP MICA 5MM CASE 82P 5%
C42		029-03180-02	CAP MICA 5MM CASE 180P 5%
C43		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C44		022-05470-01	CAP MYLAR 47N 10% 50V
C45		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C46		020-08470-07	CAP ELECT RADL 47M 16V 8X11.5MM HI TEMP
C47		029-02390-02	CAP MICA 5MM CASE 39P 5%
CC49		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C50		029-03100-02	CAP MICA 5MM CASE 100P 5%
C51		029-03220-02	CAP MICA 5MM CASE 220P 5%
C52		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C53		022-05470-01	CAP MYLAR 47N 10% 50V
C54		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C55		020-08470-07	CAP ELECT RADL 47M 16V 8X11.5MM HI TEMP
C56		029-02680-02	CAP MICA 5MM CASE 68P 5%
CV57		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC58		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C59		029-02270-02	CAP MICA 5MM CASE 27P 5%
C65		029-02150-02	CAP MICA 5MM CASE 15P 5%
C67		011-53150-01	CAP CER AI 150P 5% N150 50/63V
C68		029-02680-02	CAP MICA 5MM CASE 68P 5%
C69		029-02680-02	CAP MICA 5MM CASE 68P 5%
CC70		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
CC71		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
C72		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C73		022-05100-01	CAP MYLAR 10N 10% 50V
C74		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C75		029-03100-02	CAP MICA 5MM CASE 100P 5%
CV76		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC77		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C78		029-02150-02	CAP MICA 5MM CASE 15P 5%
C85		029-02150-02	CAP MICA 5MM CASE 15P 5%
C87		011-53150-01	CAP CER AI 150P 5% N150 50/63V
C88		029-02680-02	CAP MICA 5MM CASE 68P 5%
C89		029-02680-02	CAP MICA 5MM CASE 68P 5%
CC90		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
CC91		015-03220-03	CAP CER CHIP 220P 5% NPO 500V HIQ GRH111
C92		017-15470-01	CAP CER SURFACE BARRIER 47N 20% 50V
C93		022-05100-01	CAP MYLAR 10N 10% 50V
C94		011-53220-01	CAP CER AI 220P 10% N750 50/63V
C95		029-03100-02	CAP MICA 5MM CASE 100P 5%
CV96		028-02600-01	CAP TRIM 5/60P FILM 3TAG PH 809
CC97		015-03680-03	CAP CER CHIP 680P 5% NPO 100V HIQ GRH111
C98		029-02150-02	CAP MICA 5MM CASE 15P 5%
C99		020-08470-07	CAP ELECT RADL 47M 16V 8X11.5MM HI TEMP
C105		029-02270-02	CAP MICA 5MM CASE 27P 5%
C106		029-02120-03	CAP MICA 10MM CASE 12P 2%
C106A		010-01330-01	CAP CER 3P3 +/-0.5P NPO 500V
C107		029-02270-03	CAP MICA 10MM CASE 27P 2%
C107A		010-01470-01	CAP CER 4P7+/-0.5P NPO 500V
C108		029-02330-04	CAP MICA 10MM CASE 33P 2%
C109		029-02270-03	CAP MICA 10MM CASE 27P 2%
C109A		010-01470-01	CAP CER 4P7+/-0.5P NPO 500V
C110		029-02120-03	CAP MICA 10MM CASE 12P 2%
C110A		010-01330-01	CAP CER 3P3 +/-0.5P NPO 500V
D1		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
D2		008-00013-35	(S) LED 3MM GREEN LO CURRENT NO MTG
D3		008-00013-32	(S) LED 3MM RED LO CURRENT NO MTG
D4		001-50012-00	(S) DIODE AI 1N4148 SI GEN PURPOSE
D5		001-50012-00	(S) DIODE AI 1N4148 SI GEN PURPOSE
D6		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D7		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D8		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
D9		001-00013-45	(S) DIODE SCHOTTKY 1SS97/2
IC1		002-00010-60	(S) IC LM339 QUAD COMPTR
IC2		002-00014-62	(S) IC 317L 100MA REG 3 TERMINAL TO-92

Ref	Var	IPN	Description
L1		056-00021-01	IND FXD 1.5UH AXIAL
L2		056-00021-01	IND FXD 1.5UH AXIAL
L5		056-00021-01	IND FXD 1.5UH AXIAL
L10		052-08130-25	COIL A/W 2.5T/3.0MM HOR 0.8MM WIRE
L11		052-08335-10	COIL A/W 1T/3.5MM SMD 0.8MM WIRE
L13		065-00010-04	BEAD FERRITE F8 4X2X5MM
L14		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L19		052-08140-55	COIL A/W 5.5T/4.0MM HOR 0.8MM WIRE
L21		052-08130-25	COIL A/W 2.5T/3.0MM HOR 0.8MM WIRE
L25		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L30		065-00010-04	BEAD FERRITE F8 4X2X5MM
L31		052-08135-65	COIL A/W 6.5T/3.5MM HOR 0.8MM WIRE
L33		052-08335-20	COIL A/W 2T/3.5MM SMD 0.8MM WIRE
L34		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L40		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L45		065-00010-04	BEAD FERRITE F8 4X2X5MM
L46		052-08135-65	COIL A/W 6.5T/3.5MM HOR 0.8MM WIRE
L48		052-08335-20	COIL A/W 2T/3.5MM SMD 0.8MM WIRE
L49		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L52		052-08335-50	COIL A/W 5T/3.5MM SMD 0.8MM WIRE
L53		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L54		052-08340-50	COIL A/W 5T/4.0MM SMD 0.8MM WIRE
L55		052-08335-50	COIL A/W 5T/3.5MM SMD 0.8MM WIRE
Q1		000-00011-05	(S) XSTR BC547B NPN AF SML SIG TO92
Q2		000-00011-05	(S) XSTR BC547B NPN AF SML SIG TO92
Q3		000-00020-70	(S) XSTR BS170 JFET TO-92 SMALL SIG
Q4		000-00020-70	(S) XSTR BS170 JFET TO-92 SMALL SIG
Q5		000-00030-95	(S) XSTR 2N6107 PNP TO-220 AF PWR
Q5A		000-00010-60	(S) XSTR BC327 PNP AF PWR TO92
Q8		000-00030-65	(S) XSTR 2N6080 NPN STUD MTG VHF PWR 4W
Q9		000-00030-53	(S) XSTR 2N5590 NPN STUD MTG VHF PWR 10W
Q12		000-00023-23	(S) XSTR SRFH1001 NPN STUD MTG VHF PWR 30
Q14		000-00023-23	(S) XSTR SRFH1001 NPN STUD MTG VHF PWR 30
R1		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R2		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R3		030-03680-00	RES FILM 680E 5% 0.25W 7X2.5MM
R4		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
R5		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
RV6		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R7		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
RV8		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R9		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
RV10		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R11		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
R12		030-07100-00	RES FILM 1M 5% 0.25W 7X2.5MM
R13		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
R14		030-08100-30	RES FILM 10M 10% 0.25W 7X2.5MM
R15		030-05100-00	RES FILM 10K 5% 0.25W 7X2.5MM
RV16		042-05470-09	RES PRESET 50K CERMET 9.5MM SQ FLAT
R17		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
R18		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R19		030-54470-20	RES FILM AI 4K7 5% 0.4W 4X1.6MM
R20		030-03470-00	RES FILM 470E 5% 0.25W 7X2.5MM
R21		030-02560-00	RES FILM 56E 5% 0.25W 7X2.5MM
R22		030-05470-00	RES FILM 47K 5% 0.25W 7X2.5MM
R23		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R24		030-54100-20	RES FILM AI 1K 5% 0.4W 4X1.6MM
R25		030-03470-00	RES FILM 470E 5% 0.25W 7X2.5MM
R26		030-02560-00	RES FILM 56E 5% 0.25W 7X2.5MM
R27		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R28		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R29		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R30		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R31		030-03220-00	RES FILM 220E 5% 0.25W 7X2.5MM
RV32		044-04200-03	RES PRESET MULTITURN 2K 10T PNL MTG
R33		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R34		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
RV35		042-04220-02	RES PRESET 2K CERMET 9.5MM SQ FLAT TOP A
R36		030-04470-00	RES FILM 4K7 5% 0.25W 7X2.5MM
R37		045-04470-01	RES NTC 4K7 5% 5MM DISC
R38		030-06100-00	RES FILM 100K 5% 0.25W 7X2.5MM
RV39		042-05100-10	RES PRESET 10K CERMET 9.5MM SQ FLAT
R40		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R41		030-04100-00	RES FILM 1K 5% 0.25W 7X2.5MM
R47		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R48		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R49		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R50		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R51		032-33180-00	RES M/F PWR 180E 5% 1W 12X4.5MM
R52		032-32100-00	RES M/F PWR 10E 5% 1W 10X4MM
R53		032-33180-00	RES M/F PWR 180E 5% 1W 12X4.5MM
R54		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R55		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R56		032-31470-01	RES M/F PWR 4E7 5% 2.5W 17X5MM
R57		032-33820-01	RES M/F PWR 820E 5% 2.5W 17X5MM
R58		032-33820-01	RES M/F PWR 820E 5% 2.5W 17X5MM
R65		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R66		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R67		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R68		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R69		032-33100-02	RES M/F PWR 100E 5% 6W 33X9MM
R74		032-33100-02	RES M/F PWR 100E 5% 6W 33X9MM
R75		032-32470-00	RES M/F PWR 47E 5% 1W 12X4.5MM
R76		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM
R77		032-31470-00	RES M/F PWR 4E7 5% 1W 12X4.5MM
R78		032-33330-00	RES M/F PWR 330E 5% 1W 12X4.5MM

Ref	Var	IPN	Description
TL3		051-00005-17	COIL TAIT NO 517 DIRNL COUPLER

T838 Mechanical & Miscellaneous Parts (220-01100-03)

IPN	Description
012-04150-01	CAP CER F/THRU 1N5 NO LEAD (FT1-FT15)
051-00006-02	SOLDER SPRING 1.3MM A4M1877
051-00006-03	LEAD F/THRU 0.7MM TCW A4M2230
065-00010-08	BEAD FERRITE 4S3 3*0.7*10MM RED L6, L12, L17, L28, L43.
065-00010-11	BEAD FERRITE 4S3 3*1*4MM RED L18, L29, L44.
065-00010-13	BEAD FERRITE 7D 1.9*0.9*3.8MM STACK POLE
065-00010-22	BEAD FERRITE BALUN F14 NEOSID L26, L41, Refer A4 P180/10.
200-00010-05	WIRE T/C 0.5MM
201-00030-01	WIRE #1 T/C WIRE 7/0.2MM PVC BROWN
201-00030-02	WIRE #1 T/C WIRE 7/0.2MM PVC RED
201-00030-03	WIRE #1 T/C WIRE 7/0.2MM PVC ORANGE
201-00030-04	WIRE #1 T/C WIRE 7/0.2MM PVC YELLOW
201-00030-05	WIRE #1 T/C WIRE 7/0.2MM PVC GREEN
201-00030-06	WIRE #1 T/C WIRE 7/0.2MM PVC BLUE
201-00030-07	WIRE #1 T/C WIRE 7/0.2MM PVC VIOLET
201-00030-09	WIRE #1 T/C WIRE 7/0.2MM PVC WHITE
201-00030-10	WIRE #1 T/C WIRE 7/0.2MM PVC BLACK
201-00050-12	CABLE AUTO 152 RED 28/0.3MM PVC 1x 260mm pin 1 & 2 - 13.8v 1x 200mm pin 9 & 10 - 13.8v
201-00050-20	CABLE AUTO 152 BLACK 28/0.3MM PVC 1x 60mm pin 7,8,14,15 - (pad nearest to 15way plug)
206-00010-11	CABLE COAX 50 OHM RG316-U PTFE 1x 150mm Strip 2.5/ 6 /11 frnt pnl rf in
206-00010-12	CABLE COAX 50 OHM RG 178 PTFE MINI 4x 60mm strip 3/6/9 - 3/6/9 Twin beads.
220-01100-03	PCB T377 RF PWR AMP CCT A1C543
240-00010-55	PLUG 15 WAY D RANGE WIRE WRAP PINS PNL MTG
240-00100-46	PLUG COAX PNL JACK SUHNER 24 SMC50-2-10C
240-02010-54	SKT 15WAY DRANGE PNL MTG 125 DEG C
240-02100-06	SKT COAX N TYPE PNL MTG OPEN TERMN
240-04020-30	SKT 14 PIN DIL IC LO PROF IC1 Under IC LM 339.
240-06010-14	CLAMP LATCHING 15 WAY D RANGE
240-06010-15	BLOCK LATCHING 15WAY D RANGE
302-05190-00	BRKT A4M1892 ADJUSTABLE STOP T377 PA
303-23108-00	COVER SIDE COMPL A2A406 A2M1874 T377 PA
306-01010-00	FERRULE A4M948 HANDLE FXD EQUIP
308-01007-00	HANDLE A4M949 FXD EQUIP
308-13068-00	HSINK A1M2274(1M1869) CASTING COMPL T377 PA
316-06413-00	PNL FRT COMPL T838 PA A3M2219/6 A3M2219/1
316-85018-00	PIN A4M1397 COAX CONDUCTOR T316 346 377PA 341 MTG to SKT coax 'N' type.
318-01011-00	RAIL A2M1872 BOTTOM T377 PA
318-01012-00	RAIL A3M1873 TOP T377 PA
319-01152-00	SHIELD A3M2250 F/THRU MTG T857
319-01175-00	(L) SHIELD T377/T838
319-01176-00	(L) SHIELD WALL T377/T838
319-01177-00	(L) SHIELD COVER T377/T838
345-00040-06	SCREW M3*8MM PAN POZI ST BZ frnt pnl to rack. pack with each PA
345-00040-09	SCREW M3*6MM CSK POZI TRUNCATED HEAD ST BZ top/bottom rails. pack with each PA.
345-00040-16	SCREW M3X20MM PAN POZI ST BZ
345-00040-20	SCREW M3*8MM BUTTON SKT HD BLACK ZINC PHOS
349-00020-07	(L) SCREW 4-40 X 5/16 PAN POZI TAPTITE BLACK MTG PCB to heatsink x 8. Coax to SKT x 4. Q5 mtg x 1. cover x18. brkt stop x2.
352-00010-29	NUT M4 NYLOC HEX
352-00010-35	NUT 8-32 UNC HEX RF PWR XSTR MTG For XSTR'S - SD6080, SRFH1001 x 2, 2N5590.
353-00010-10	WASHER M3 FLAT 7MM*0.6MM ST BZ Q5 mtg
356-00010-03	TAG SOLDER 3MM LONG M614/3.2 To help hold loom to PCB.
360-00010-41	BUSH SHORTY BLACK HEYCO B-187-125
362-00010-07	GASKET SIL INSULATING TO-220 Q5 mtg
362-00010-13	BUSH INSULATING 1.1MM TOP HAT Q5 mtg
362-00010-33	GROMMET LED MTG 3MM LO CURRENT LEDS
365-00011-53	LABEL WHITE RW2365/1 104*37MM SPECIAL ADHSV
365-00100-20	LABEL WHITE S/A 28X11MM QUIKSTIK RW718/4 use label ref #414
365-01391-01	(L)LABEL BLNK 30*10.8MM TAMPERMARK VOID MATT Australia DOTC cert No: 2070418 FCC RULE 47 CFR, PRODUCT FOR USA
369-00010-14	TIE CABLE NYLON 100*2.6MM Looming tie.
399-00010-56	BAG PLASTIC 200*250MM packing guides & rails.
400-00020-07	SLEEVING 2MM SIL RUBBER FOR LEDS & SOLDER TAGS
400-00020-09	SLEEVING 3MM SIL RUBBER DRANGE PINS
410-01081-00	CRTN T800 MODULE KIWI REF22860 PRTD 402X192X6
410-01082-00	CRTN 10 T800 KIWI REF24417 423X410X360

Part E T800 Memory & T830 VCO PCB Information

This part of the manual is divided into the sections listed below. These sections provide parts lists, PCB layouts and circuit diagrams for the T800 memory and T830 VCO PCBs. There is a detailed table of contents at the start of each section.

1 Introduction

PCB Identification

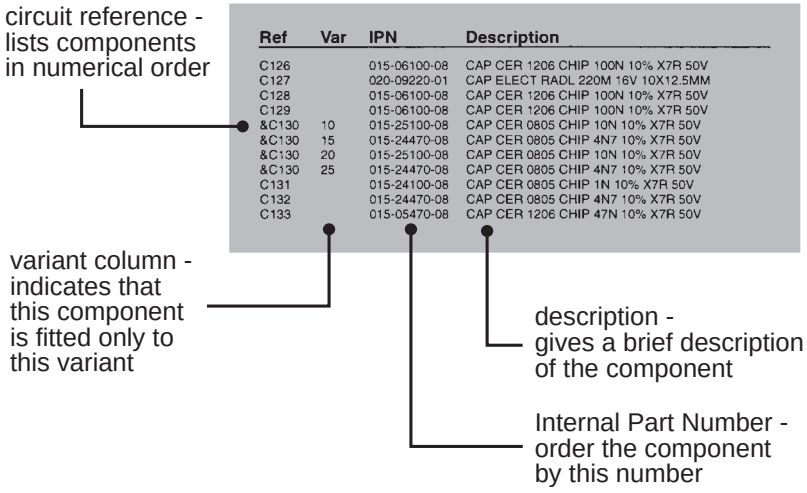
All PCBs are identified by a unique 10 digit number, the last 2 digits of which define the issue status. The issue status starts at 00 and increments through 01, 02, 03, etc. as the PCB is updated. Some issue PCBs never reach full production status and are therefore not included in this manual. A letter following the 10 digit IPN has no relevance in identifying the PCB for service purposes.

Parts Lists

The 10 digit numbers (000-00000-00) in this Parts List are "internal part numbers" (IPNs). Your spare parts orders can be handled more efficiently if you quote the IPN and provide a brief description of the part.

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc.) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped in alphabetical order and then in numerical order within each group. Each component entry comprises three or four columns, as shown below:



The miscellaneous and mechanical parts are listed in IPN order at the end of the parts list.

2 T800 Memory PCB

This section contains the following information.

T800 Memory PCB Parts List (IPN 220-01144-00)

How To Use This Parts List

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc) and those without (miscellaneous and mechanical).

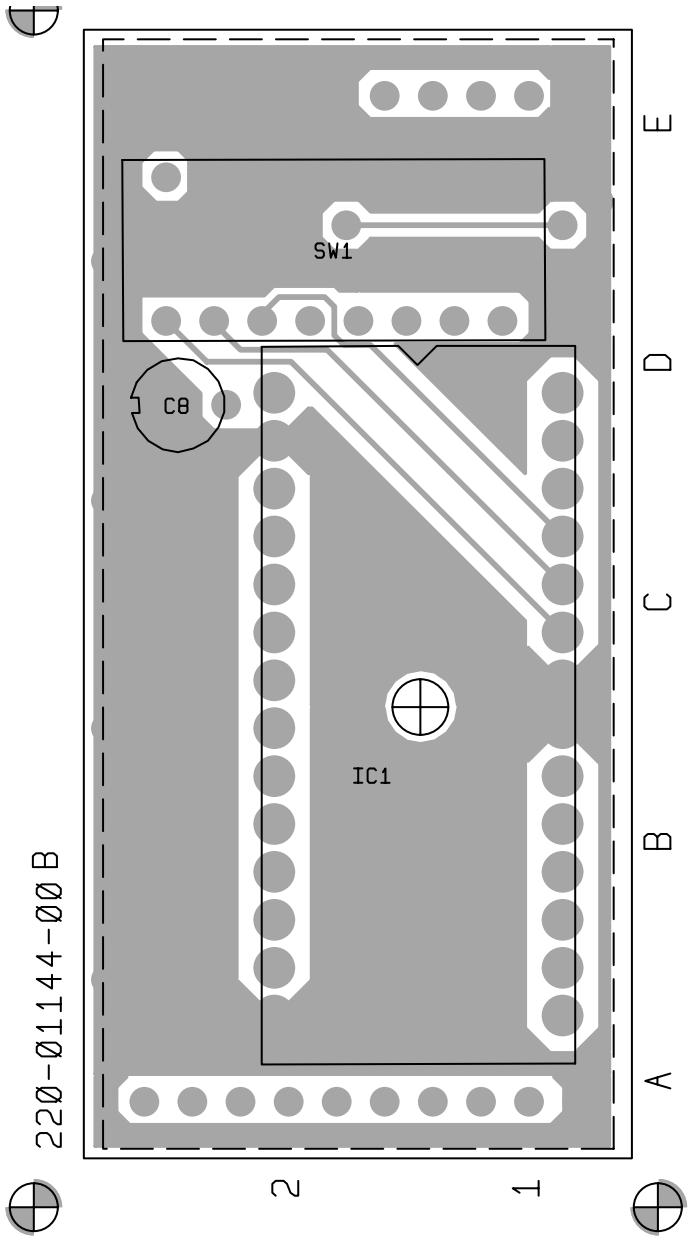
Those with a circuit reference are grouped by component type in numerical order. Each component entry comprises three or four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this component is fitted only to that variant.

The miscellaneous and mechanical section lists the variant and common parts in IPN order.

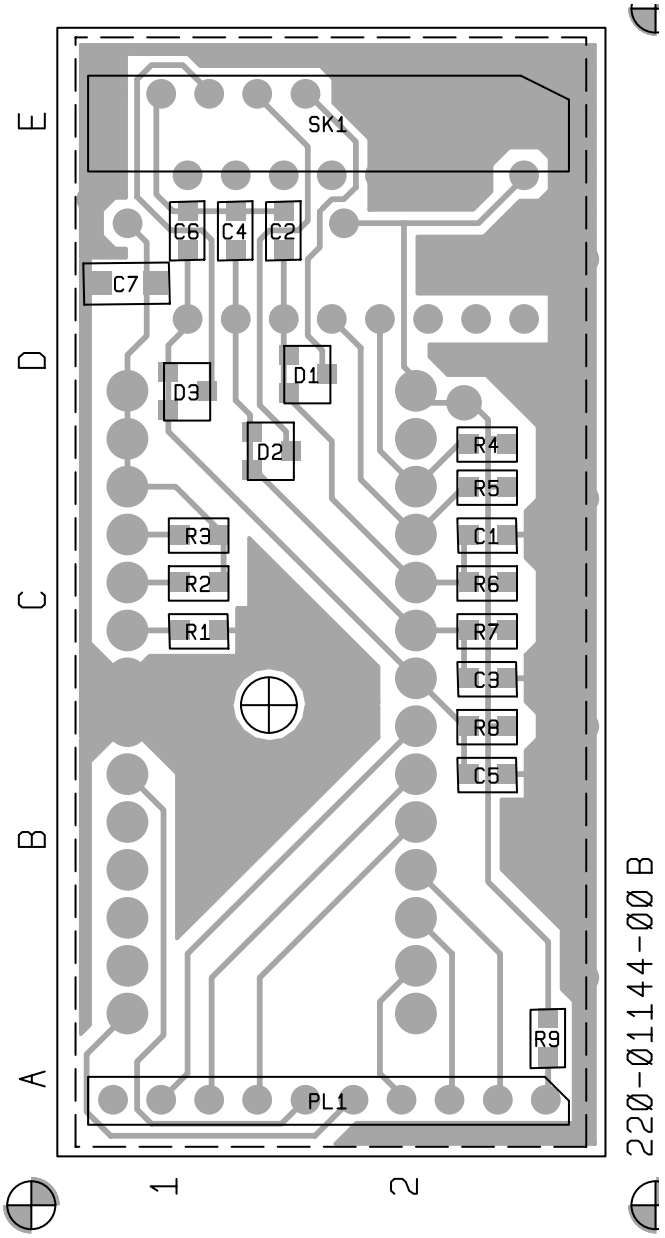
Parts List Amendments

There were no amendments to the parts list at the time of publication.

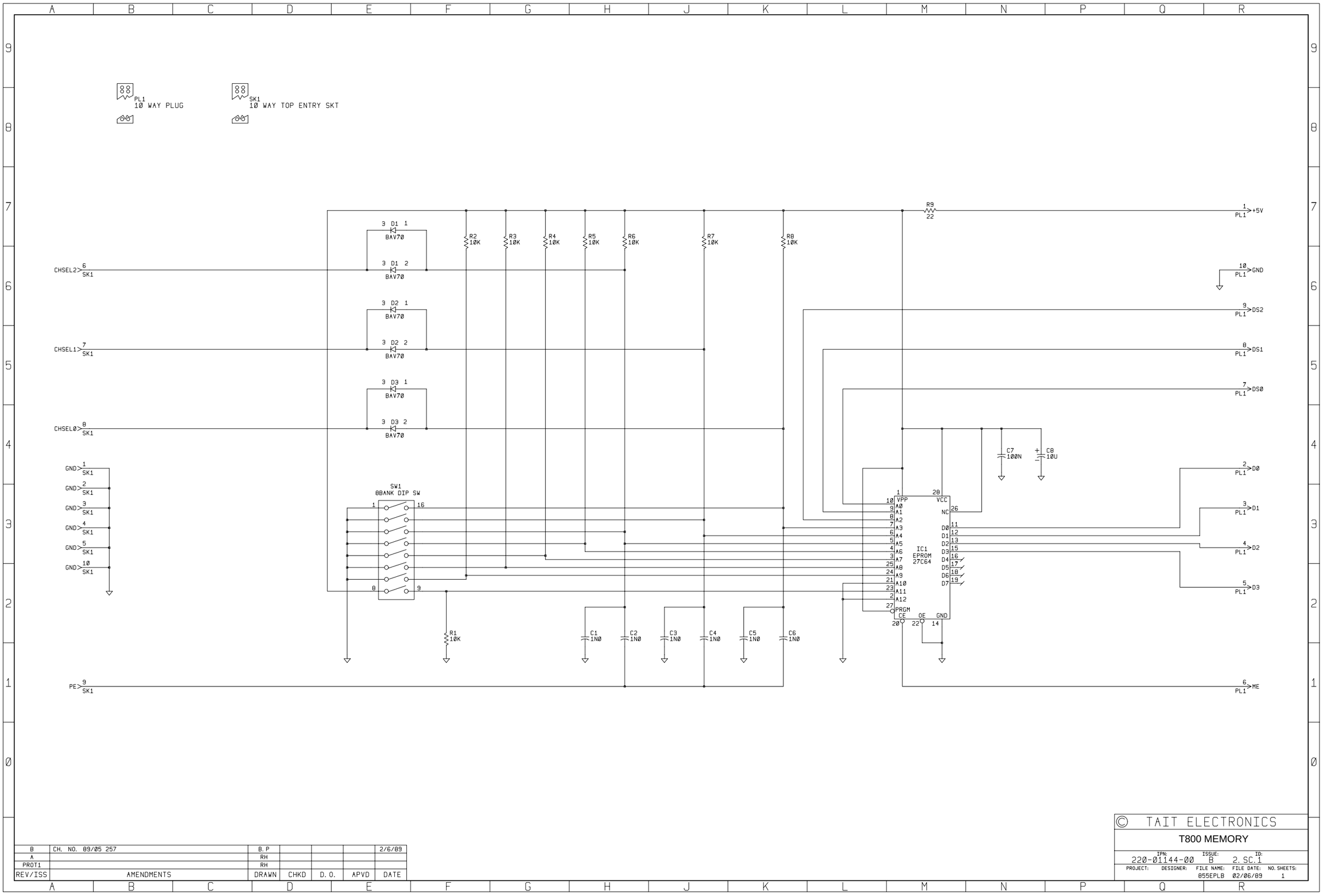
Ref	Var	IPN	Description
C1		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C2		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C3		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C4		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C5		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C6		015-24100-08	CAP CER 0805 CHIP 1N 10% X7R 50V
C7		015-06100-08	CAP CER 1206 CHIP 100N 10% X7R 50V
C8		025-08100-02	CAP TANT BEAD 10M 10% 16V
D1		001-10000-70	(S) DIODE SMD BAV70 DUAL SW SOT-23 COM-CATH
D2		001-10000-70	(S) DIODE SMD BAV70 DUAL SW SOT-23 CO CATH
D3		001-10000-70	(S) DIODE SMD BAV70 DUAL SW SOT-23 COM CATH
IC1		002-00018-04	(S) IC 27C64 CMOS 8K*8 UV EPROM 250NS - 150NS
PL1		240-00020-57	HEADER 10 WAY 1 ROW PCB MTG
R1		036-15100-00	RES M/F 0805 CHIP 10K 5%
R2		036-15100-00	RES M/F 0805 CHIP 10K 5%
R3		036-15100-00	RES M/F 0805 CHIP 10K 5%
R4		036-15100-00	RES M/F 0805 CHIP 10K 5%
R5		036-15100-00	RES M/F 0805 CHIP 10K 5%
R6		036-15100-00	RES M/F 0805 CHIP 10K 5%
R7		036-15100-00	RES M/F 0805 CHIP 10K 5%
R8		036-15100-00	RES M/F 0805 CHIP 10K 5%
R9		036-12220-00	RES M/F 0805 CHIP 22E 5%
SW1		230-00010-19	SWITCH*8 SPST DIP PKG
SKT1		240-04020-57	SKT 10 WAY 1ROW PCB MTG TOP ENTRY
		220-01144-00	PCB T855/856/857 MEM
		240-04020-35	SKT 28 PIN DIL IC LO PROF IC1
		365-00011-38	LABEL STATIC WARNING YELLOW A4A315
		365-00011-54	LABEL WHITE RW1556/2 SPECIAL ADHESIVE
		399-00010-86	BAG STATIC SHIELDING 127X203MM
		410-00010-64	PKG HEADER CARD A3M2392



T800 Memory PCB (IPN 220-01144-00) - Top Side



T800 Memory PCB (IPN 220-01144-00) - Bottom Side



REV/ISS	AMENDMENTS	DRAWN	CHKD	D. O.	APVD	DATE
B	CH. NO. 89/05 257	B. P				2/6/89
A		RH				
PROT1		RH				

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T800 MEMORY

IPN:	ISSUE:	ID:
220-01144-00	B	2.SC.1

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		855EPLB	02/06/89	1

3 T830 VCO PCB

This section contains the following information.

T830 VCO PCB Parts List (IPN 220-01176-01)

How To Use This Parts List

The components listed in this parts list are divided into two main types: those with a circuit reference (e.g. C2, D1, R121, etc) and those without (miscellaneous and mechanical).

Those with a circuit reference are grouped by component type in numerical order. Each component entry comprises three or four columns: the circuit reference, variant number (if applicable), IPN and description. A number in the variant column indicates that this component is fitted only to that variant.

The miscellaneous and mechanical section lists the variant and common parts in IPN order.

Parts List Amendments

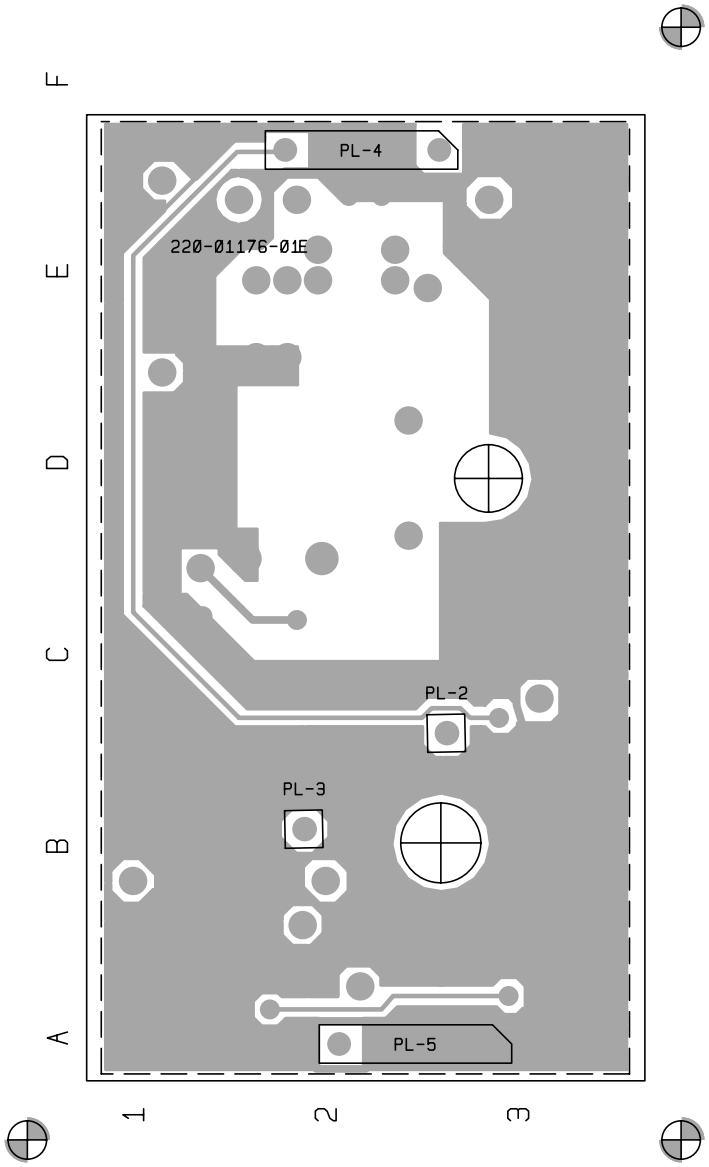
*C26 Tx low changed from 56p (015-22560-01) to 100p to allow VCO loop voltage to achieve >5V at 136MHz (94/07-347).

Variant Code	Description	T835 (MHz)	T836/837 (MHz)
A	Tx low	-	136 - 156
B	Tx high	-	148 - 174
C	Rx low	157.4 - 177.4	-
D	Rx high	169.4 - 195.4	-

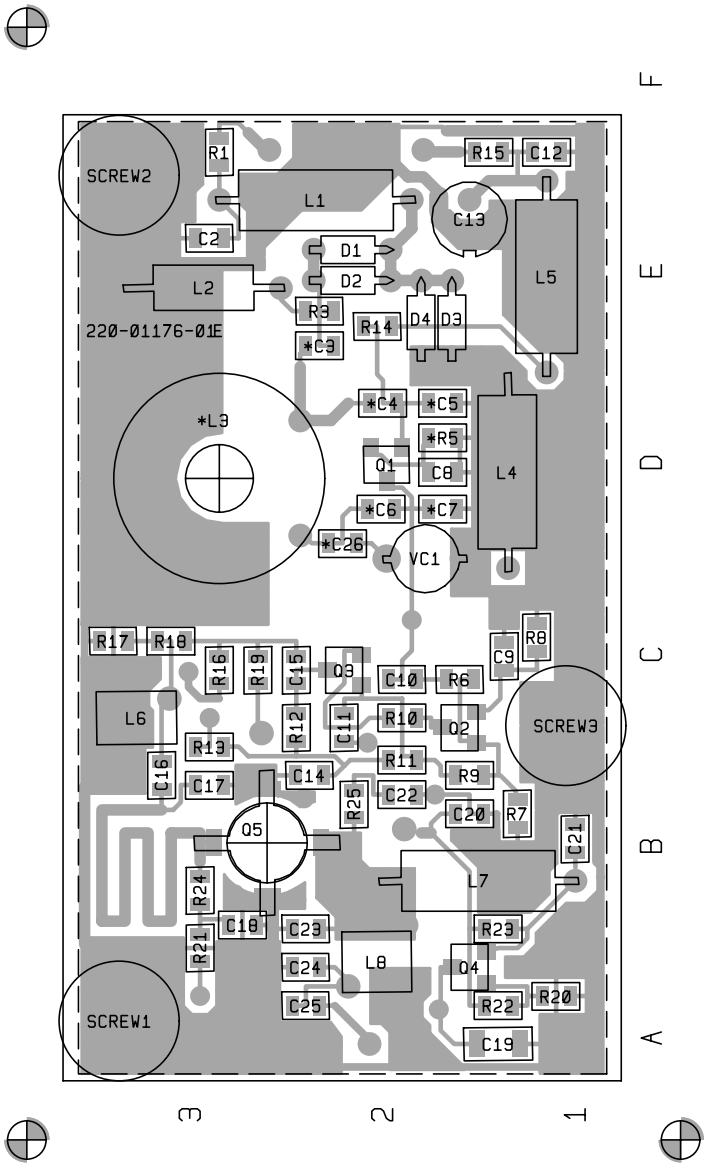
Ref	Var	IPN	Description
CV1		028-02400-02	CAP TRIM 5/40P CER 5MM KV40001
C2		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
*C3	A	015-22180-01	CAP CER 0805 CHIP 18P 5% NPO 50V
*C3	B	015-22180-01	CAP CER 0805 CHIP 18P 5% NPO 50V
*C3	C	015-22120-01	CAP CER 0805 CHIP 12P 5% NPO 50V
*C3	D	015-22120-01	CAP CER 0805 CHIP 12P 5% NPO 50V
*C4	A	015-22180-01	CAP CER 0805 CHIP 18P 5% NPO 50V
*C4	B	015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
*C4	C	015-22120-01	CAP CER 0805 CHIP 12P 5% NPO 50V
*C4	D	015-22120-01	CAP CER 0805 CHIP 12P 5% NPO 50V
*C5	A	015-22220-01	CAP CER 0805 CHIP 22P 5% NPO 50V
*C5	B	015-22220-01	CAP CER 0805 CHIP 22P 5% NPO 50V
*C5	C	015-22220-01	CAP CER 0805 CHIP 22P 5% NPO 50V
*C5	D	015-22180-01	CAP CER 0805 CHIP 18P 5% NPO 50V
*C6	A	015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
*C6	B	015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
*C6	C	015-22120-01	CAP CER 0805 CHIP 12P 5% NPO 50V
*C6	D	015-22120-01	CAP CER 0805 CHIP 12P 5% NPO 50V
*C7	A	015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
*C7	B	015-22150-01	CAP CER 0805 CHIP 15P 5% NPO 50V
*C7	C	015-22220-01	CAP CER 0805 CHIP 22P 5% NPO 50V
*C7	D	015-22220-01	CAP CER 0805 CHIP 22P 5% NPO 50V
C8		015-23120-01	CAP CER 0805 CHIP 120P 5% NPO 50V
C9		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C10		015-21220-01	CAP CER 0805 CHIP 2P2 +/-0.25P NPO 50V
C11		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C12		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C13		025-08100-02	CAP TANT BEAD 10M 10% 16V
C14		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C15		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C16		015-22560-01	CAP CER 0805 CHIP 56P 5% NPO 50V
C17		015-22560-01	CAP CER 0805 CHIP 56P 5% NPO 50V
C18		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C19		015-05470-08	CAP CER 1206 CHIP 47N 10% X7R 50V
C20		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C21		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C22		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
C23		015-21820-01	CAP CER 0805 CHIP 8P2 +/-0.25P NPO 50V
C24		015-21680-01	CAP CER 0805 CHIP 6P8 +/-0.25P NPO 50V
C25		015-23680-08	CAP CER 0805 CHIP 680P 10% X7R 50V
*C26	A	015-23100-01	CAP CER 0805 CHIP 100P 5% NPO 50V
*C26	B	015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
*C26	C	015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V
*C26	D	015-22330-01	CAP CER 0805 CHIP 33P 5% NPO 50V

Ref	Var	IPN	Description
D1		001-00012-63	(S) DIODE VARICAP BB809
D2		001-00012-63	(S) DIODE VARICAP BB809
D3		001-00012-63	(S) DIODE VARICAP BB809
D4		001-00012-63	(S) DIODE VARICAP BB809
L1		056-00021-56	IND FXD 3.3UH AXIAL 10X4.2MM PHENOLIC
L2		056-00021-60	IND FXD 330NH 6.6X2.7MM AXIAL NON MAGNETI
*L3	A	055-01004-00	COIL TOROID 103NH 22P 9T T830 TX
*L3	B	055-01004-00	COIL TOROID 103NH 22P 9T T830 TX
*L3	C	055-01004-00	COIL TOROID 103NH 22P 9T T830 TX
*L3	D	055-01003-00	COIL TOROID 91NH 22P 8T T830 RX
L4		056-00021-52	IND FXD 820NH 10% NON MAGNETIC
L5		056-00021-56	IND FXD 3.3UH AXIAL 10X4.2MM PHENOLIC
L6		052-08135-35	COIL A/W 3.5T/3.5MM HOR 0.8MM WIRE
L7		056-00021-56	IND FXD 3.3UH AXIAL 10X4.2MM PHENOLIC
L8		052-08130-45	COIL A/W 4.5T/3.0MM HOR 0.8MM WIRE
Q1		000-10003-10	(S) XSTR SMD MMBFJ310 JFET SOT-23 UHF
Q2		000-10057-10	(S) XSTR SMD MMBR571 NPN SOT-23 UHF LO PW
Q3		000-10057-10	(S) XSTR SMD MMBR571 NPN SOT-23 UHF LO PW
Q4		000-10008-57	(S) XSTR SMD BCW70 PNP SOT23 AF SML SIG
Q5		000-00032-47	(S) XSTR MRF559 NPN XPACK UHF PWR 0.5W
R1		036-12220-00	RES M/F 0805 CHIP 22E 5%
R3		036-11470-00	RES M/F 0805 CHIP 4E7 10%
*R5	A	036-13390-00	RES M/F 0805 CHIP 390E 5%
*R5	B	036-13390-00	RES M/F 0805 CHIP 390E 5%
*R5	C	036-13330-00	RES M/F 0805 CHIP 330E 5%
*R5	D	036-13270-00	RES M/F 0805 CHIP 270E 5%
R6		036-12560-00	RES M/F 0805 CHIP 56E 5%
R7		036-14100-00	RES M/F 0805 CHIP 1K 5%
R8		036-12560-00	RES M/F 0805 CHIP 56E 5%
R9		036-14100-00	RES M/F 0805 CHIP 1K 5%
R10		036-12100-00	RES M/F 0805 CHIP 10E 5%
R11		036-14270-00	RES M/F 0805 CHIP 2K7 5%
R12		036-13180-00	RES M/F 0805 CHIP 180E 5%
R13		036-12220-00	RES M/F 0805 CHIP 22E 5%
R14		036-12560-00	RES M/F 0805 CHIP 56E 5%
R15		036-12220-00	RES M/F 0805 CHIP 22E 5%
R16		036-13270-00	RES M/F 0805 CHIP 270E 5%
R17		036-13270-00	RES M/F 0805 CHIP 270E 5%
R18		036-12180-00	RES M/F 0805 CHIP 18E 5%
R19		036-14100-00	RES M/F 0805 CHIP 1K 5%
R20		036-14680-00	RES M/F 0805 CHIP 6K8 5%
R21		036-14100-00	RES M/F 0805 CHIP 1K 5%
R22		036-14220-00	RES M/F 0805 CHIP 2K2 5%
R23		036-12180-00	RES M/F 0805 CHIP 18E 5%
R24		036-12220-00	RES M/F 0805 CHIP 22E 5%
R25		036-13220-00	RES M/F 0805 CHIP 220E 5%

Ref	Var	IPN	Description	Ref	Var	IPN	Description
		220-01176-01	PCB T830 VCO				
		240-00025-36	PLUG 32WAY 1ROW PC MTG HARWIN PL-1 PL-2				
		345-00040-10	SCREW M3*6MM PAN POZI ST BZ				
		345-00060-08	SCREW M5 X 16 CHEESE SLOT PLASTIC T800 TO				
		350-00016-42	SPACER 5MM HI 8MM X M3 STUD 2.5MM X M3 HO				
		352-00010-14	NUT M5 HEX PLASTIC T800 TOROID				
		353-00010-10	WASHER M3 FLAT 7MM*0.6MM ST BZ				
		353-00010-13	WASHER M3 SHAKEPROOF INT BZ				
		353-00010-41	WASHER M6 NYLON BULTE LOCK T800 TOROID				



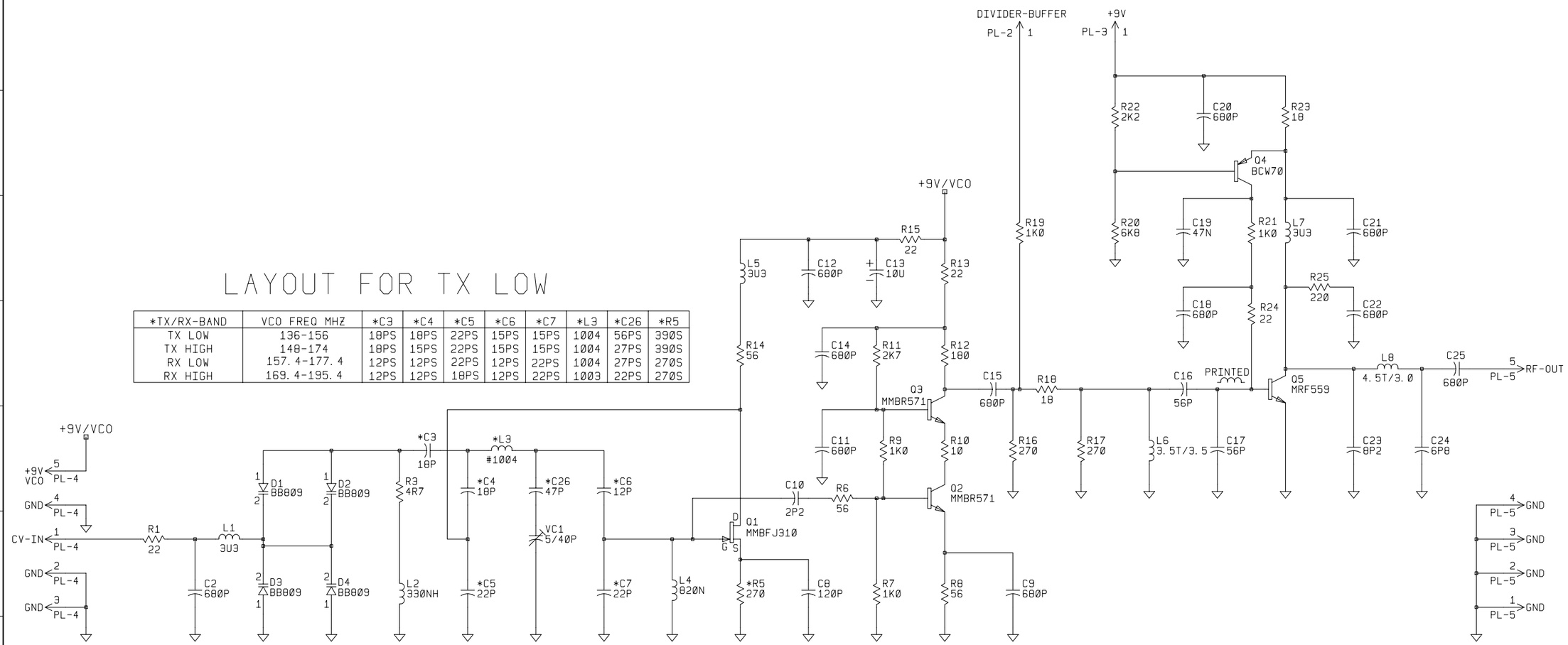
T830 VCO PCB (IPN 220-01176-01) - Bottom Side



T830 VCO PCB (IPN 220-01176-01) - Top Side

LAYOUT FOR TX LOW

*TX/RX-BAND	VCO FREQ MHZ	*C3	*C4	*C5	*C6	*C7	*L3	*C26	*R5
TX LOW	136-156	18PS	18PS	22PS	15PS	15PS	1004	56PS	390S
TX HIGH	148-174	18PS	15PS	22PS	15PS	15PS	1004	27PS	390S
RX LOW	157.4-177.4	12PS	12PS	22PS	12PS	22PS	1004	27PS	270S
RX HIGH	169.4-195.4	12PS	12PS	18PS	12PS	22PS	1003	22PS	270S



REV/ISS	AMENDMENTS	DRAWN	CHKD	D.O.	APVD	DATE
1E	ADDED ASSEMBLY DRAWINGS	MC				
1D	CH/N: 90/11-559. 90/11-595	WD				22/11/90
1C		WD				
1B	CH/N: 90/09-446	WD				
1A		WD				
0A	FIRST PRODUCTION RUN	BP				
T99		BP				11-01-90
P1	ORIGINAL	D. B. H.				

T830 VCO

IPN:	ISSUE:	ID:
220-01176-01	E	2.SC.1

PROJECT:	DESIGNER:	FILE NAME:	FILE DATE:	NO. SHEETS:
		830VCL1E	7/12/95	1

Part F Installation

This part of the manual is divided into the sections listed below. These sections give a brief description of the basic rack mounting and wiring procedures for the T835 receiver, T836 transmitter, T837 exciter and T838 power amplifier.

1 T835/836/837 Installation

1.1 Rack Mounting

The T835 receiver, T836 transmitter and T837 exciter are designed for use in a standard 483mm rack frame using a Tait T800 Series guide which locates and mates the rear D-range connectors (refer to Figure 1.1, Figure 1.2 and Figure 1.3).

A T800 Series guide is supplied with each unit. The guide is located in the rack frame with four screws, two at the rear and two at the front, and the T800 unit is secured into the guide with two front panel mounting screws.

A rear mounted N-type connector is used for RF input on the T835 receiver and RF output on the T836 transmitter, while the exciter RF output is via the front panel SMC connector. All DC, audio and control connections are via the rear mounted D-range connector. An additional rear D-range connector (T800-03) is fitted when remote multichannel operation, or additional control or low frequency lines are required.

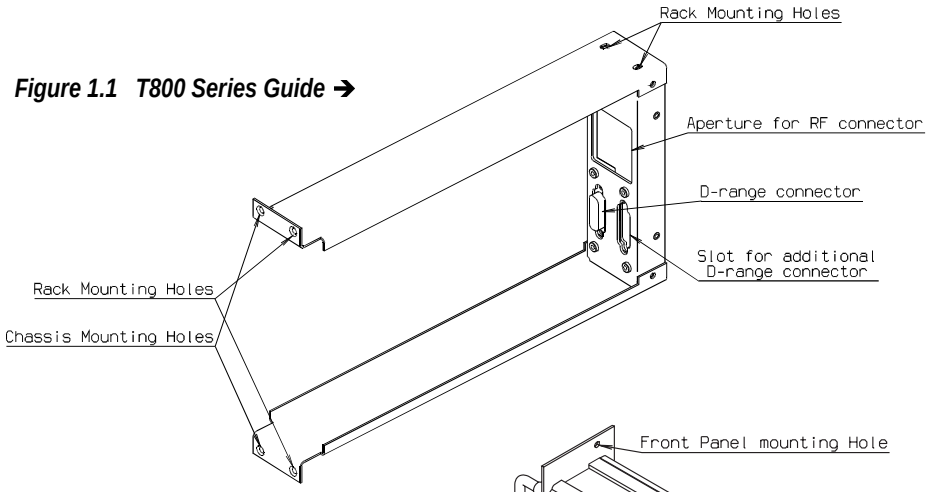


Figure 1.1 T800 Series Guide ➔

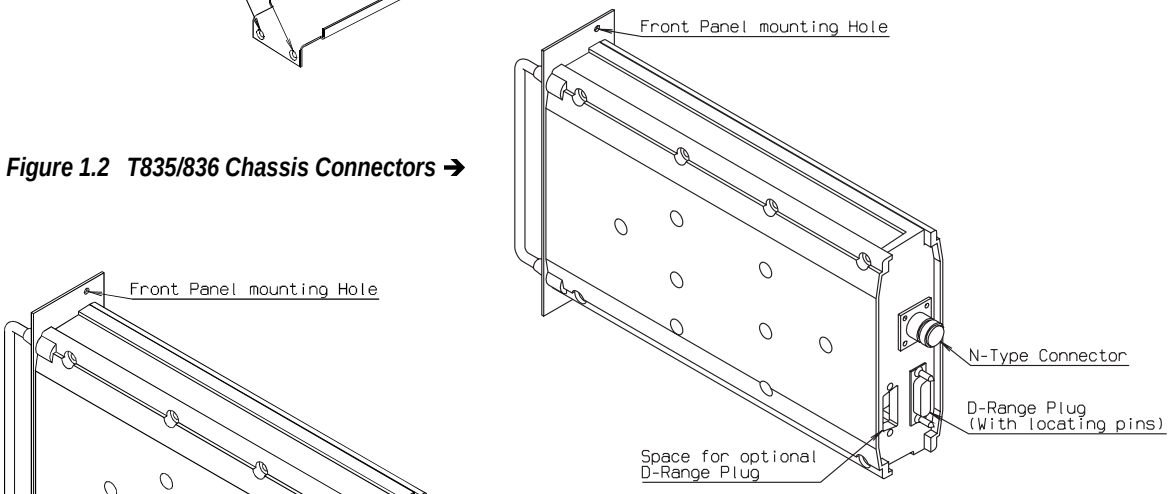
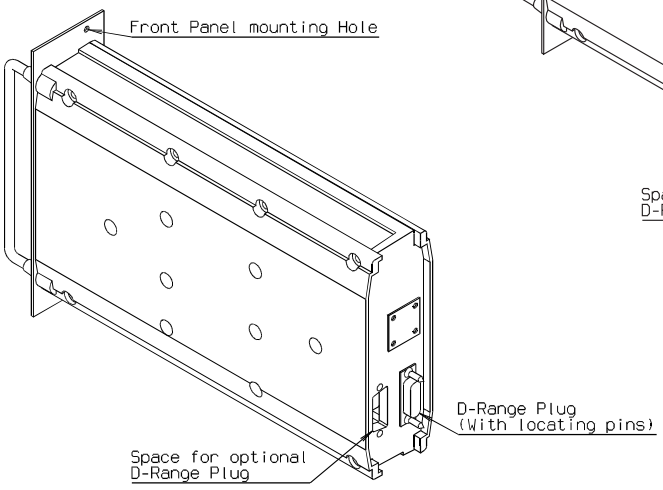


Figure 1.2 T835/836 Chassis Connectors ➔



← *Figure 1.3 T837 Chassis Connectors*

1.2 Rack Wiring

Wire the D-range connector as shown in Figure 1.4 or Figure 1.5. Ensure that the cables are not subjected to any stresses due to tight bends or incorrect lengths.

The RF coaxial cable to the N-type connector should be free from acute bends or twists. If access to the rear of the rack frame is restricted, the cable should be long enough to permit full withdrawal of the chassis from the guide.

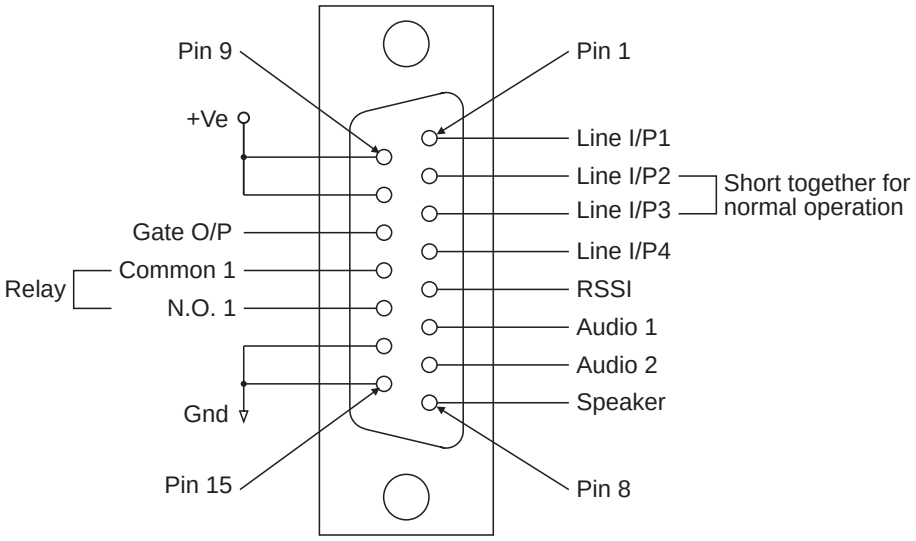


Figure 1.4 T835 D-Range Wiring - Rear View

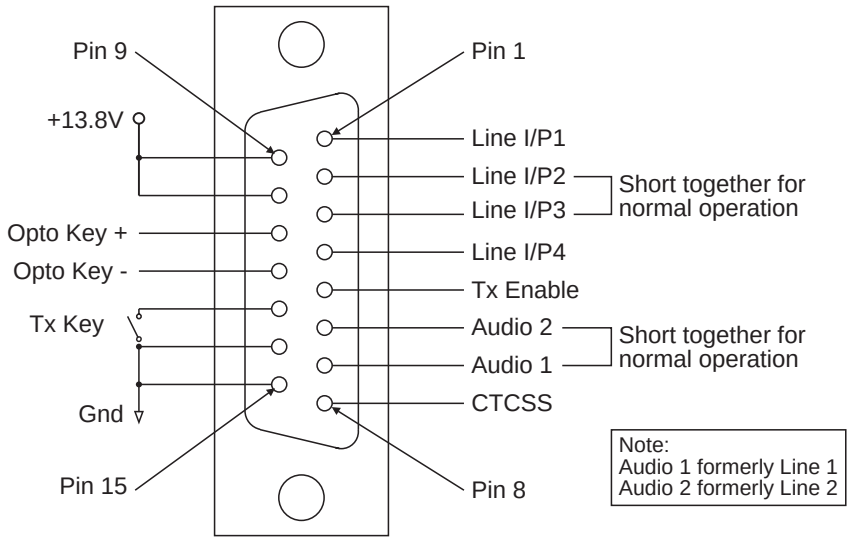


Figure 1.5 T836/837 D-Range Wiring - Rear View

1.3 Power Supply

If a power supply other than an appropriate Tait model is used, ensure that it is capable of providing enough current to drive the T800 system and is also free from excessive ripple or noise.

The system should be protected by the use of appropriately rated fuses in the power supply.

Note: It is particularly important when the prime power source is a battery that fuses be employed in all supply lines.

1.4 Reverse Polarity Protection

A shunt diode is fitted to all T835 receivers, T836 transmitters and T837 exciters for protection against connection to a power supply of incorrect polarity.

Note: A fuse must be fitted in the power supply line for the diode to provide effective protection.

2 T838 Installation

2.1 Rack Mounting

The T838 50W PA is designed for use in a standard 483mm rack frame using the supporting guide rails supplied with the units (refer to Figure 2.1).

The lower guide rail is located in the rack frame with three screws, two at the rear and one at the front. The short upper guide rail is located with just one screw. The PA is secured into the guide with two front panel mounting screws.

The RF input via the front panel SMC connector should be connected to an adjacent T837 exciter. The RF output is via the rear N-type connector, whilst all DC, audio and control connections are via the D-range connector.

The guide rails will allow the PA to be latched in the extended position (refer to Figure 2.3).

Caution: **If continuous operation of the T838 is required, the rack module position immediately adjacent to the finned heatsink should be left vacant. Adequate airflow over the fins should be maintained at all times.**

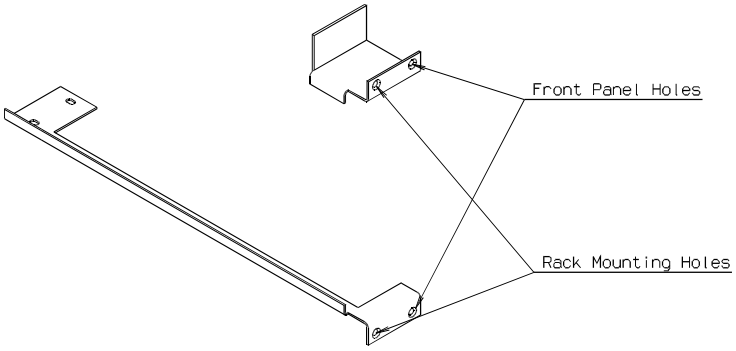
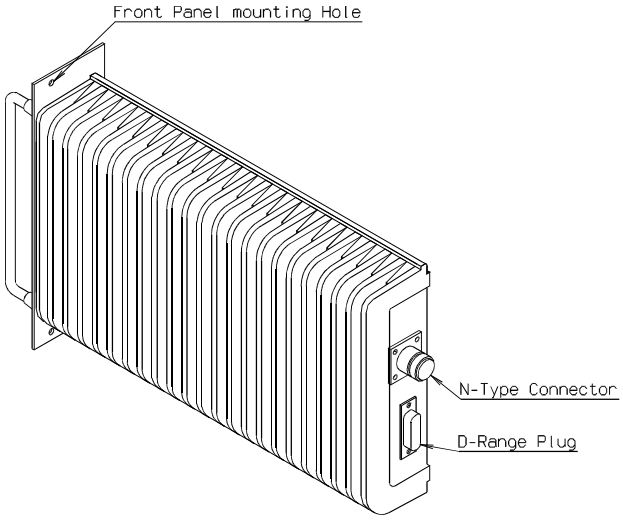


Figure 2.1 T838 Guide →



← Figure 2.2 Chassis Connectors

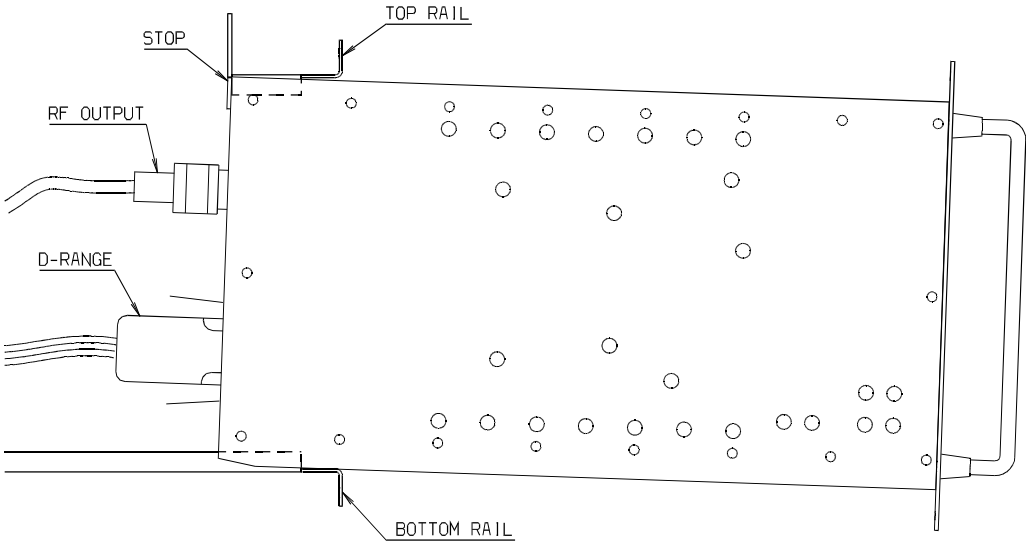


Figure 2.3 Latched Position

2.2 Rack Wiring

Wire the D-range connector as shown in Figure 2.4. Ensure that the cables are not subjected to any stresses due to tight bends or incorrect lengths.

The RF coaxial cable to the N-type connector should be free from acute bends or twists. If access to the rear of the rack frame is restricted, the cable should be long enough to permit full withdrawal of the chassis from the guide.

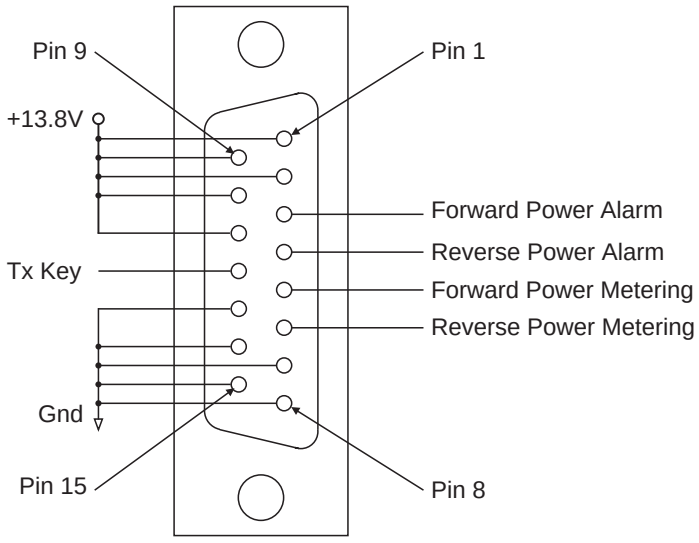


Figure 2.4 D-Range Wiring - Rear View

2.3 Power Supply

If a power supply other than an appropriate Tait model is used, ensure that it is capable of providing enough current to drive the T800 system and is also free from excessive ripple or noise.

Part G System Configurations

This part of the manual is divided into the sections listed below. These sections provide some brief information on basic system types and how to configure T830 equipment for use in them.

1 T835 Link Selectable Features

1.1 Flat Or De-emphasised Response

The links of PL101 and PL103 may be set to give either a flat or de-emphasised audio frequency response (refer to Section 3.3 in Part B for further details).

1.2 Mute Relay Control

A relay with undedicated contacts (RL100) is available in the audio processor circuit block for various switching applications. A link (PL102) is available for control of the relay from the mute circuit (refer to Section 3.3 in Part B). This makes the relay suitable for controlling the keying of a transmitter in repeater applications.

1.3 Mute Selection

Link PL104 may be set to operate with noise mute or carrier mute (refer to Section 3.3 in Part B).

1.4 Receiver Disable

The receiver audio can be disabled by pulling the "Rx disable" line low. When the circuit is pulled from low to high, the receiver audio cannot be re-enabled until the disable timer completes its operation. This time is variable from 15ms to 200ms by adjusting RV101 in the audio processor section.

If required, the operation of this circuit can be disabled by changing the link of PL100 from 1-2 to 2-3.

Typical applications of the receiver disable are as an extra mute for signalling purposes, or when the T835 is configured as a line controlled base station (refer to Section 4 in Part G).

1.5 CTCSS Configuration

Links PL105 & PL106 select various CTCSS options (refer to Section 3.3.2 in Part B).

1.6 300Hz High Pass Filter

Link PL105 also allows the insertion of this filter to improve hum and noise performance.

2 T836/837 Optional Features

2.1 Audio Processor

The T836 and T837 come with a number of link selectable features which give added system flexibility.

Refer to Section 3.3 in Part C for further details.

2.2 Line Transformer Inputs And Outputs

The line transformer (T100) is designed to provide a balanced interface to 600 ohm lines. For normal operation the two centre connections (LINE I/P 2, LINE I/P 3) are shorted together, and the 600 ohm line is connected between LINE I/P 1 and LINE I/P 4.

The secondary winding of the transformer is connected via a 1k resistor to pin 7 of the D-range connector and may be used to monitor audio on the line. It is normally shorted at the connector socket to pin 6 to route the audio signal back into the processor. If required, the audio path may be broken at this point for use with signalling options, e.g. CTCSS (refer to TI-346).

2.3 Opto Key

The keying circuitry may be completely isolated from the rest of the system by means of the optocoupler (IC100) connected between pins 11 and 12 of the D-range connector. A constant current source (Q106) allows keying voltages between 6 and 50V.

2.4 Relay Driver

A dedicated transistor (Q105) is provided for the purpose of switching an external (e.g. coaxial) relay. The output is open collector and is activated by the Tx-reg rail.

This output is not normally connected to the standard D-range connector, and use of the relay driver will necessitate manual wiring to an additional D-range connector, as supplied with the T800-03 auxiliary D-range.

2.5 Local Microphone

Use of the local microphone (via the front panel stereo socket) will disable the audio input from the line. The audio switching occurs when the PTT switch is closed.

2.6 Keying With Option PCBs

If an option PCB (e.g. CTCSS) is fitted to the exciter, keying may then be accomplished via the TX-EN-OPT pad in the audio processor. The line must be pulled low to key.

3 Talk Through Repeater

In this configuration the receiver directly keys the transmitter when the signal is received. The demodulated audio is fed via 600 ohm lines to the transmitter to modulate the carrier. The receiver and transmitter operate simultaneously and must therefore be on different frequencies. The minimum frequency separation depends on the duplexer used.

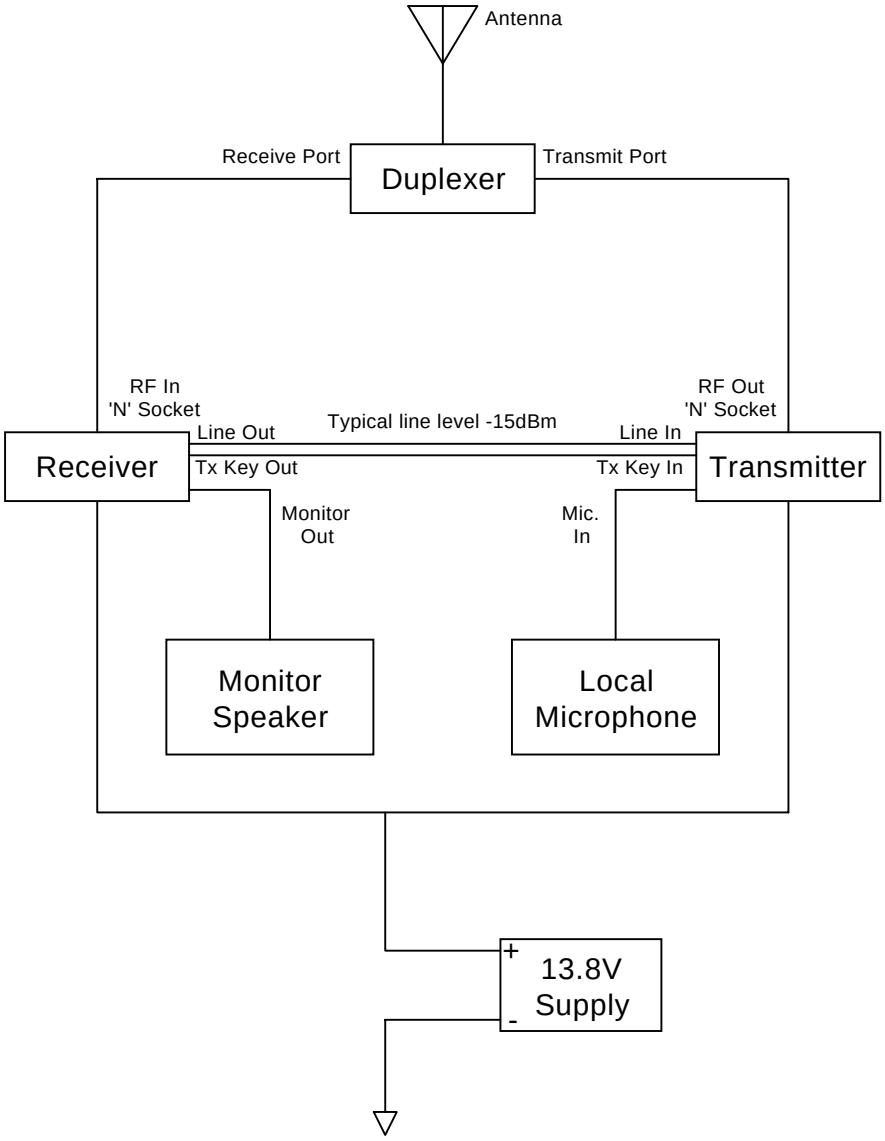


Figure 3.1 Talk Through Repeater

4 Line Controlled Base Without Talk Through

4.1 General

This installation contains a transmitter and receiver which may or may not be on the same frequency, thus simultaneous transmission and reception is not possible. When the transmitter is keyed, the coaxial relay is also energised. When the relay is in its rest position, signals from the aerial are passed to the receiver and the demodulated output is fed via 600 ohm lines to the RCU.

The receiver is disabled when the transmitter is energised to prevent the receiver mute opening from RF due to lack of isolation in the relay, direct radiation or the noise skirt of the dual frequency link.

Since the base station may be controlled via a 2-wire line and a 4-wire to 2-wire hybrid, there is a possibility of system oscillation if the receiver is not disabled during transmit. This occurs when the transmit energy enters the receiver and produces an audio response which can pass from the receive to the transmit audio part of the hybrid (impedance imbalance, etc).

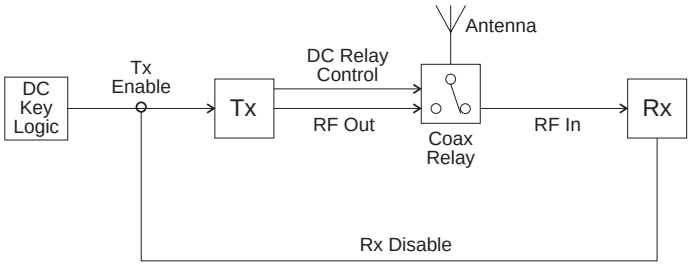


Figure 4.1 Basic Configuration

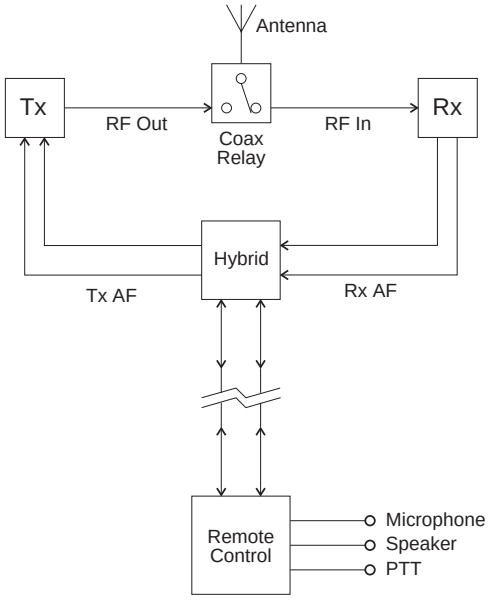


Figure 4.2 Remote Line Controlled Base Station

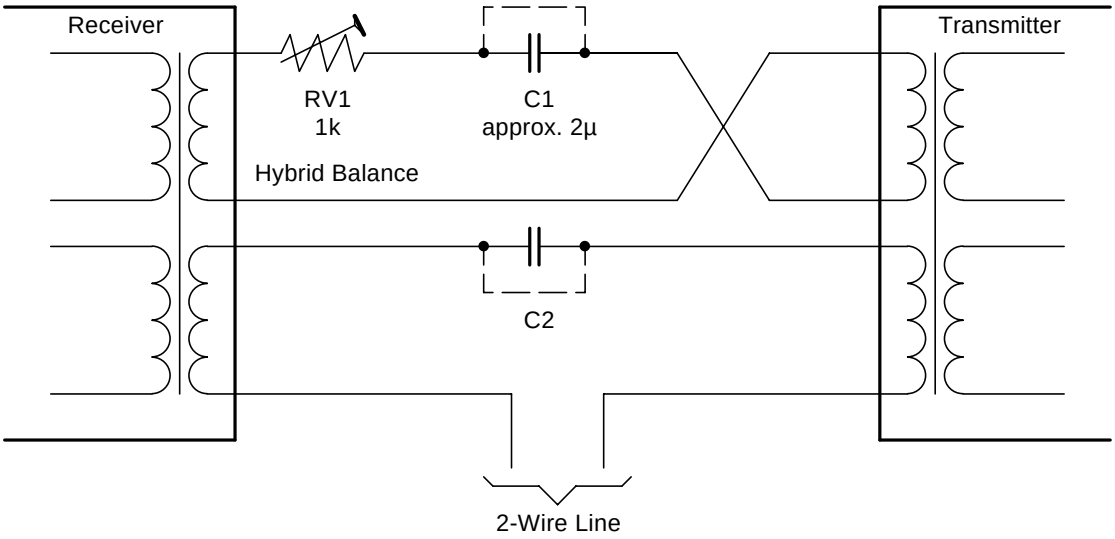


Figure 4.3 4-Wire to 2-Wire Converter

4.2 Transmitter Tail Timer

If the transmitter has a tail timer fitted:

- the receiver disable timer must be set so that $^{t}Rx/Dis > {}^{t}Tx/Tail$;

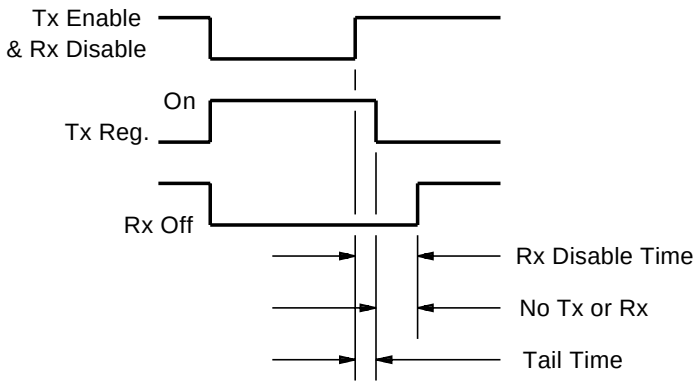


Figure 4.4 Receiver Disable Time vs Tail Time

- if the system configuration also uses an aerial changeover relay as well as the tail timer, the changeover relay must be driven from the relay driver (Q105) in the audio processor rather than by Tx key or Tx enable;

- depending on tail time requirements, it is possible for the transmitter tail time to exceed the receiver disable time capability; in this situation the receiver disable line should also be driven from relay driver Q105.

5 DC Line Keying

Where the transmitter and receiver are separated by only a short distance and DC isolation is not required, DC loop keying may be employed.

A small DC current (usually less than 10mA) can be fed via the balanced 2-wire line to provide remote control of various functions.

In a duplex system the receiver mute is used to key a transmitter, provided there is a common earth between the two units (refer to Figure 5.1).

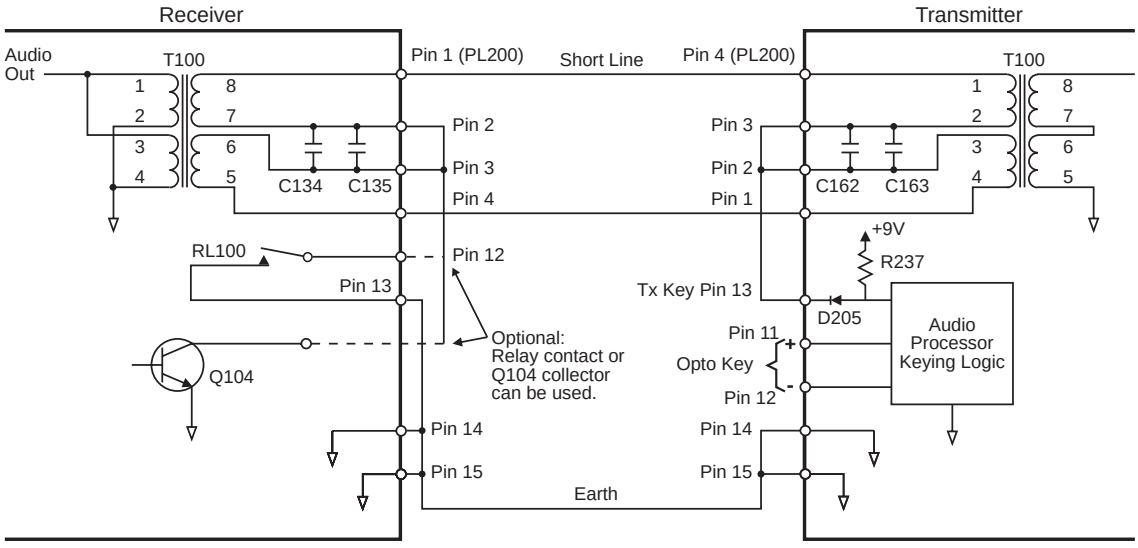


Figure 5.1 DC Loop Keying With Common Earth

Where the receiver and transmitter (or remote control) are distant, DC loop keying is provided by an isolated supply, driver and detector because an earth cannot be relied on (refer to Figure 5.2, Figure 5.3 & Figure 5.4).

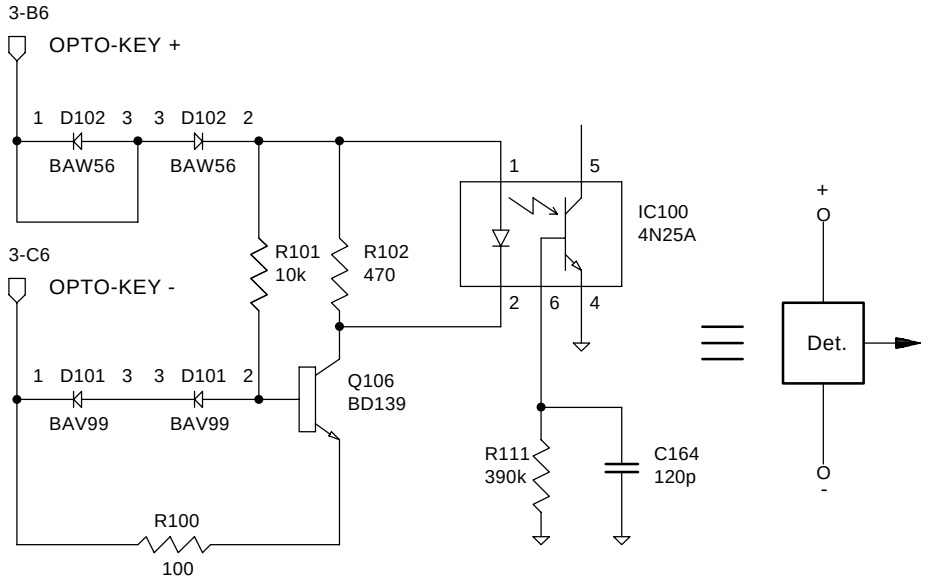


Figure 5.2 Isolated Constant Current Loop Current Detector (Opto-key input on T836 & T837)

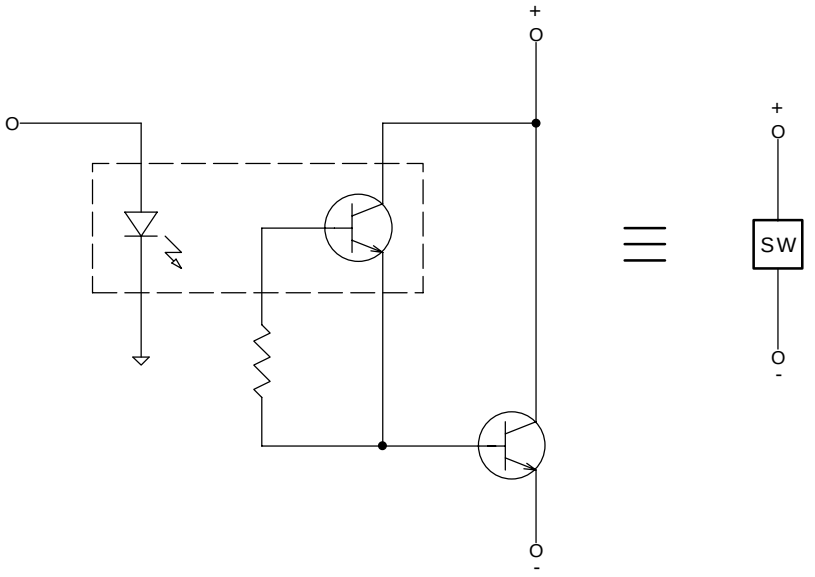


Figure 5.3 Isolated Loop Current Switch

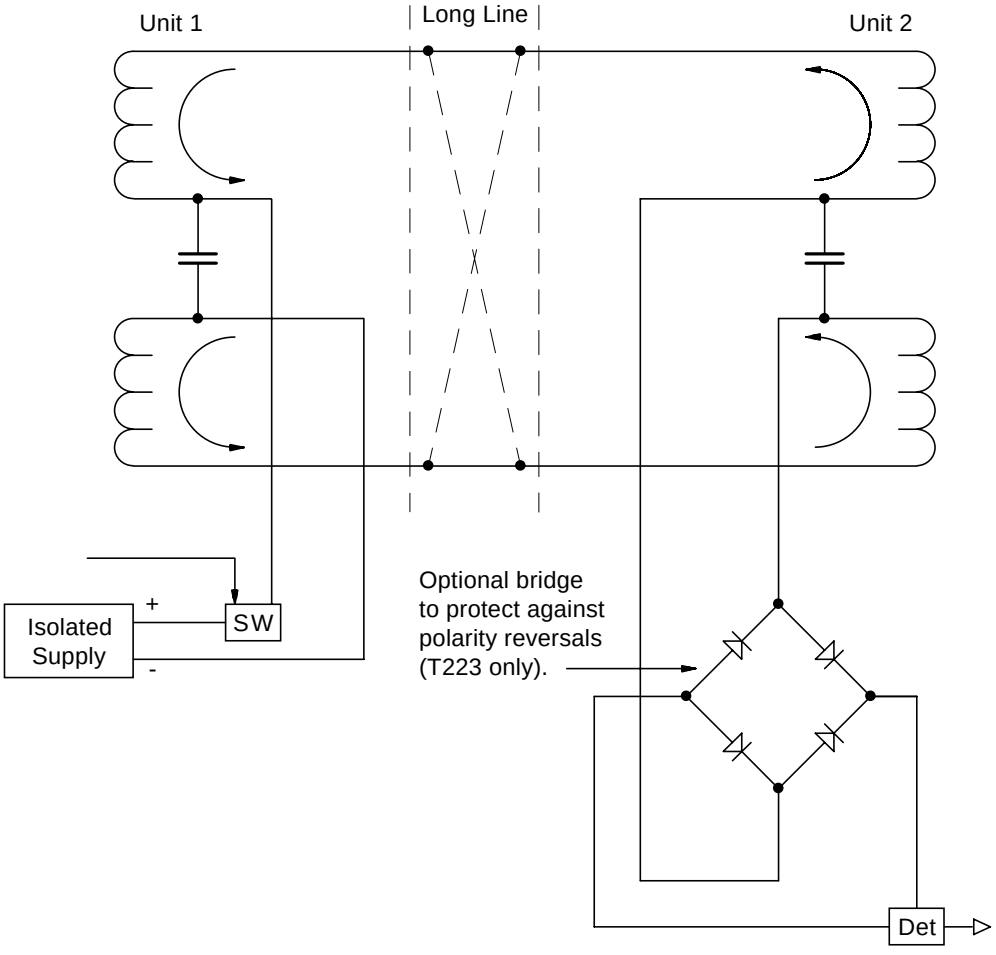


Figure 5.4 Typical System

Part H T800 Ancillary Equipment

This part of the manual gives a brief description of the ancillary equipment and accessory kits available for use with T800 series base station equipment.

T800 Ancillary Equipment

T708-91/92 Mains Power Supplies

The T708-91/92 mains power supplies are designed to power the T800-60 Slimline Repeater and mount on the front panel instead of the options tray. Two versions are available:

T708-91 230V/50Hz mains supply
T708-92 120V/60Hz mains supply.

The units are electrically the same as (although mechanically different from) the T708-01 and T708-02 respectively.

Refer to M700-00 or M708-01.

T800-01 Programming Kit

The T800-01 kit is used for programming T800 series base station equipment and must be used in conjunction with an EPROM programming device and appropriate software capable of programming an EPROM from an Intel hex format or binary file.

The kit comprises the following items:

PGM800 programming software user's manual
PGM800 programming software on a 3½" floppy disc.

T800-02 CTCSS Dencoder

The T800-02 CTCSS unit is designed to operate with the T800 range of receivers and transmitters. It will encode and decode CTCSS tone frequencies within the range 67 to 250.3Hz and is compatible with any other CTCSS unit which conforms to EIA RS220.

Refer to TI-346.

T800-03 Auxiliary D-Range

The T800-03 is an additional D-range kit comprising 1 D-range plug assembly, 1 D-range socket and 2 locating pins, nuts & washers.

T800-05 Guide Rail

The standard T800 series guide with one D-range socket for mounting in the standard 483mm rack frame assembly.

T800-06 External Frequency Reference Kit

The T800-06 kit features an additional D-range plug which incorporates a miniature RF connector to carry an externally generated 12.8MHz reference signal into a T800 module. This enables the use of very high stability external reference oscillators for special applications.

T800-07 Multichannel Kit

The T800-07 is a plug-in multichannel memory PCB (supplied with connecting cable) which is intended as a substitute for the T800-10 memory PCB. Up to 128 channels may be addressed via the on-board DIP switch or remotely via the T800-03 D-range kit. CTCSS frequencies may also be stored alongside channel information within the EPROM.

Refer to TI-356.

T800-10 Memory Module

The T800-10 is the standard, plug-in T800 channel memory PCB.

T800-13 Extender Rail

The T800-13 extender rail allows a T800 unit to be operated out of the rack with the covers off for tuning purposes. It is fitted with two 15-way D-range connectors.

T800-14 Extender Rail

The T800-14 extender rail allows a T800 unit to be operated out of the rack with the covers off for tuning purposes. It is fitted with one 15-way D-range connector and one 11-way D-range incorporating a miniature RF connector for an externally generated reference signal.

T800-15 Speaker Panel

A 60mm speaker panel fitted with a 4Ω speaker and complete with mounting hardware.

T800-19 Rack Mounting Fan

The T800-19 kit features a rack mounting fan which is designed to fit into the base of any standard 483mm rack frame without affecting its ability to house 7 modules. The kit contains all mounting hardware.

T800-30 & T800-35 DFSK Modulators

The T800-30 and T800-35 are DFSK modulators for T800 transmitters, suitable for POCSAG or similar paging data formats. Analogue transmissions (e.g. tone or speech) are still possible by disabling the data path via a control line. 512 or 1200 baud data rates are link selectable. The T800-35 is adapted for use with an external reference oscillator for simulcast transmission.

Refer to TI-373.

T800-60 Slimline Repeater Mounting Kit

The T800-60 Slimline Repeater kit enables one T800 receiver and one T800 transmitter to be mounted horizontally side-by-side in a standard 483mm rack frame. The kit contains a front panel complete with speaker, an options tray (for mounting a power supply, duplexer, etc.), and a wiring loom to connect the two T800 modules to the terminal blocks mounted on the rear of the options tray. The T708-91/92 mains power supplies (available separately) are designed for use with the T800-60. The rack height of the assembled unit is 2U.

T801 Frequency Reference Module

The T801 frequency reference module provides a high stability frequency source to which the synthesiser within a T800 base station can be locked. The master standard within the T801 is primarily intended to be rubidium, although high quality ovenised crystal oscillators can also be used in applications where more frequent readjustment of frequency is acceptable. The T801 converts the output frequency from its master standard to the 12.8MHz required by the T800 base station.

Refer to M801-00.

T802-00 Remote Monitor

The T802-00 is a microprocessor controlled remote monitor unit designed for use with Tait base station equipment. Each remote base requires one T802-00 which communicates via its integral modem with a centrally located PC based controller. The PC controller runs software to convert the raw data from the T802-00 into a user friendly form.

Refer to M802-00.

T802-10 RF Splitter

The T802-10 RF splitters are used to take attenuated RF from the transmitter to the T802–00 where it is mixed onto the receiver frequency by the shift mixer. This RF is then inserted via another splitter into the receiver. Each T802-10 kit contains 2 identical RF splitter modules.

Refer to M802-00.

T802-21 Programming Kit

The T802-21 kit provides the operating software for the T802-00 remote monitor PC controller and comprises the following items:

T802-00 PC software user's manual
T802-00 PC software on a 5¼" floppy disc.

T802-22 Modem

A CCITT V.23 modem for use with the T802-00 PC controller.

T806 Mains Power Supply

The T806 is a power supply capable of supplying up to 6A at 11-14V DC and is available in 2 versions to suit a mains supply of either 230V/50Hz or 115V/60Hz (nominal values). The T806 is designed to power T800 series 25W transmitters (plus receivers, etc.) and comes complete with a guide to mount in a standard 60mm rack frame assembly.

Refer to M806-00.

T807 Mains Power Supply

The T807 is a switching power supply capable of supplying up to 15A at 11-14V DC. It requires a mains supply of 230V/50Hz or 115V/60Hz (nominal values) which can be internally selected with a switch or wire links. The T807 is designed to power T800 series 50W transmitters (plus receivers, etc.) and comes complete with a guide to mount in a standard 60mm rack frame assembly.

Refer to M807-00.

T808 Mains Power Supply

The T808 is a switching power supply capable of supplying up to 25A at 11-14V DC. It requires a mains supply of 230V/50Hz or 115V/60Hz (nominal values) which can be internally selected with a switch or wire links. The T808 is designed to power T800 series 100W transmitters (plus receivers, etc.) and comes complete with a guide to mount in a standard 60mm rack frame assembly.

Refer to M807-00.

T1500-50 Trunking Extra D-Range (formerly T800-50)

Trunking systems require additional outputs for flat audio (FFSK) and Rx line monitoring. This kit provides the components to connect these outputs via a second D-range.

T1500-51 Trunking Transmitter Interface (formerly T800-51)

When fitted to a T800 series transmitter, the T1500-51 trunking transmitter interface PCB allows the trunking system to switch the audio processor between FFSK and normal audio. The PCB comes complete with wires, sockets and screws, but a T800-03 auxiliary D-range kit will also be required.