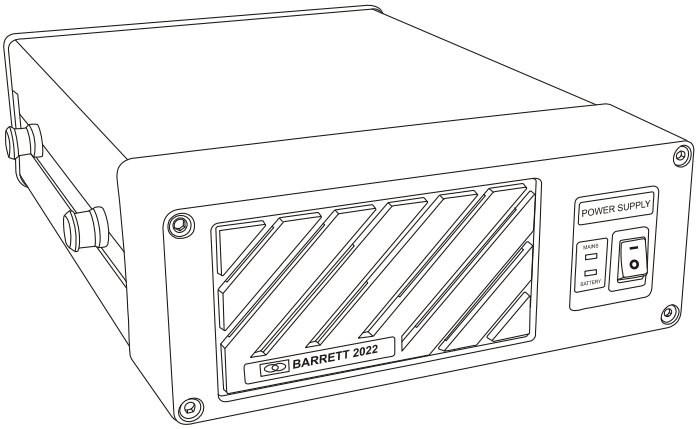
BARRETT 2022
MAINS POWER SUPPLY

Operating and Technical Manual



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Introduction

The Barrett 2022 Power Supply is designed to provide regulated power to one 2050 transceiver and one accessory such as a 2023 modem. The 2022 also has provision for a battery backup system in case of mains power failure. The battery backup incorporates a true automatic no break change over circuit with battery charging system.

Specifications

Output Voltage	13.8 VDC
Output Current	21 Amps Max
Input Voltage	88-256 VAC @ 50/60Hz auto ranging.
Input Connector	IEC Type
Overload Protection	22 Amps - Auto-recovery
Over Voltage Protection	Auto - Recovery
Battery Charge Voltage	13.1 VDC
Battery Charge Current	3 Amps Max

Operation

The Barrett 2022 is a low noise switch mode power supply that is capable of delivering 13.8V at 21 Amps continuously with a mains input supply that can vary from 88 VAC to 256 VAC. This combined with the ability of the power supply to operate with a backup battery, makes the 2022 ideal for use in areas where mains voltages vary dramatically and occasionally fail altogether. An internal fan provides airflow to keep the power supply operating at a safe temperature level even during the most demanding duty cycles.

The 2022 is normally operated from a mains supply. When the mains supply is connected and the power switch is in the ON position, the upper Green indicator LED, next to the power switch, will be illuminated. When the 2022 power supply is operated with the optional backup battery connected, again if the mains supply is available, the upper Green indicator LED will be illuminated. If the mains supply fails the 2022 will automatically switch over to the backup battery. In this case the lower Indicator LED will show a Green indication. The lower indicator LED will change to indicate RED and the battery will be disconnected when the battery voltage falls below a safe level.

If this occurs you must either wait for the mains supply to be re-established or a fresh battery should be connected to the power supply. When the mains supply is re-established the 2022 power supply will again take the load and the battery will commence charging.

The 2022 Power Supply also contains an 8ohm 2 Watt loudspeaker for use when the 2050 is configured as a base station. The volume for this speaker is controlled from the front panel of the 2050 Transceiver.

The 2022 is supplied in a standard bench mounting configuration. Several other mounting options are available including a 19” Rack mounting kit that can mount one or two units or a set of stacking plates can also be supplied to secure two, three or four units together.

Technical Manual

Circuit Description

The rear panel PCB of the 2022 provides an interface between the switch mode module, external backup battery and device outputs. The front PCB contains the control circuitry for the automatic battery switch over system. The battery switch over control is based around the quad voltage comparator U1.

U1B forms the control section for the switch mode module. With the switch mode module turned on and operating correctly, a voltage of 5.4V is present at Pin 6 of U1 and the voltage at Pin 7 is 4.8V. This results in the output of the comparator being low. The low output keeps Q1 in the OFF state and relay RL1 is switched to the switch mode module. If the voltage from the switch mode falls below 12.5V, from loss of mains voltage or a fault in the switch mode module, then the output of U1B will go HIGH causing Q1 to turn on. Once Q1 turns on the relay is switched over to the battery supply. The power supply will stay in this condition until the mains voltage is restored or the switch mode fault is cleared.

To prolong the life of the backup battery it is important that it is not discharged excessively. To ensure that this never occurs, the voltage of the battery is monitored by U1C. When a battery is connected to the power supply there are three possible states. Switch mode module operating correctly, battery being trickle charged. Switch mode module off, battery voltage high and supplying power to the load. Switch mode off, battery voltage low and no power being supplied to the load.

In the first situation with the switch mode ON and the battery being charged, U1C has no control over the relay RL1. In this operating state the switch mode module is keeping the output of U1B LOW and the Relay RL1 switched to provide the output voltage from the switch mode module.

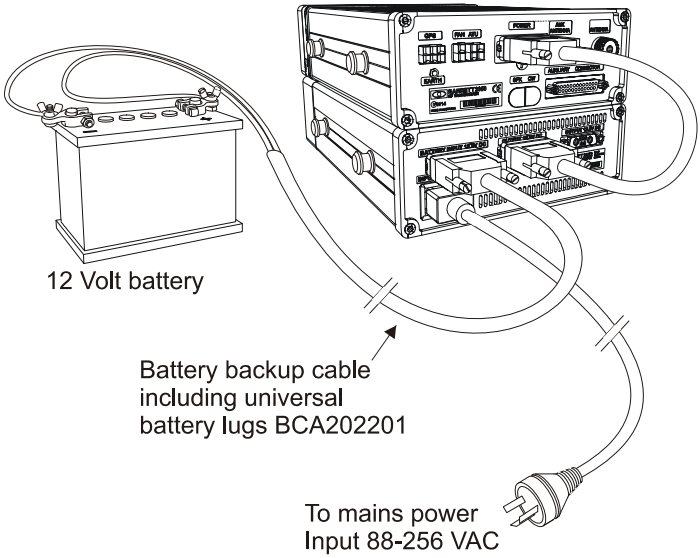
Once the switch mode module fails, either due to a fault condition or the loss of mains voltage, then this part of the circuit becomes active. When a fully charged battery is connected a voltage of 5.3V is present at Pin 9 of U1. The voltage regulator IC U2 keeps a constant voltage of 5V on Pin 8 of U1. As the positive input of comparator U1C is at a higher voltage than the negative input, the output of U1C is High. This results in a positive voltage on the gate of MOSFET Q1, turning it ON. Once this MOSFET turns on relay RL1 is switched and the output voltage is supplied by the batteries.

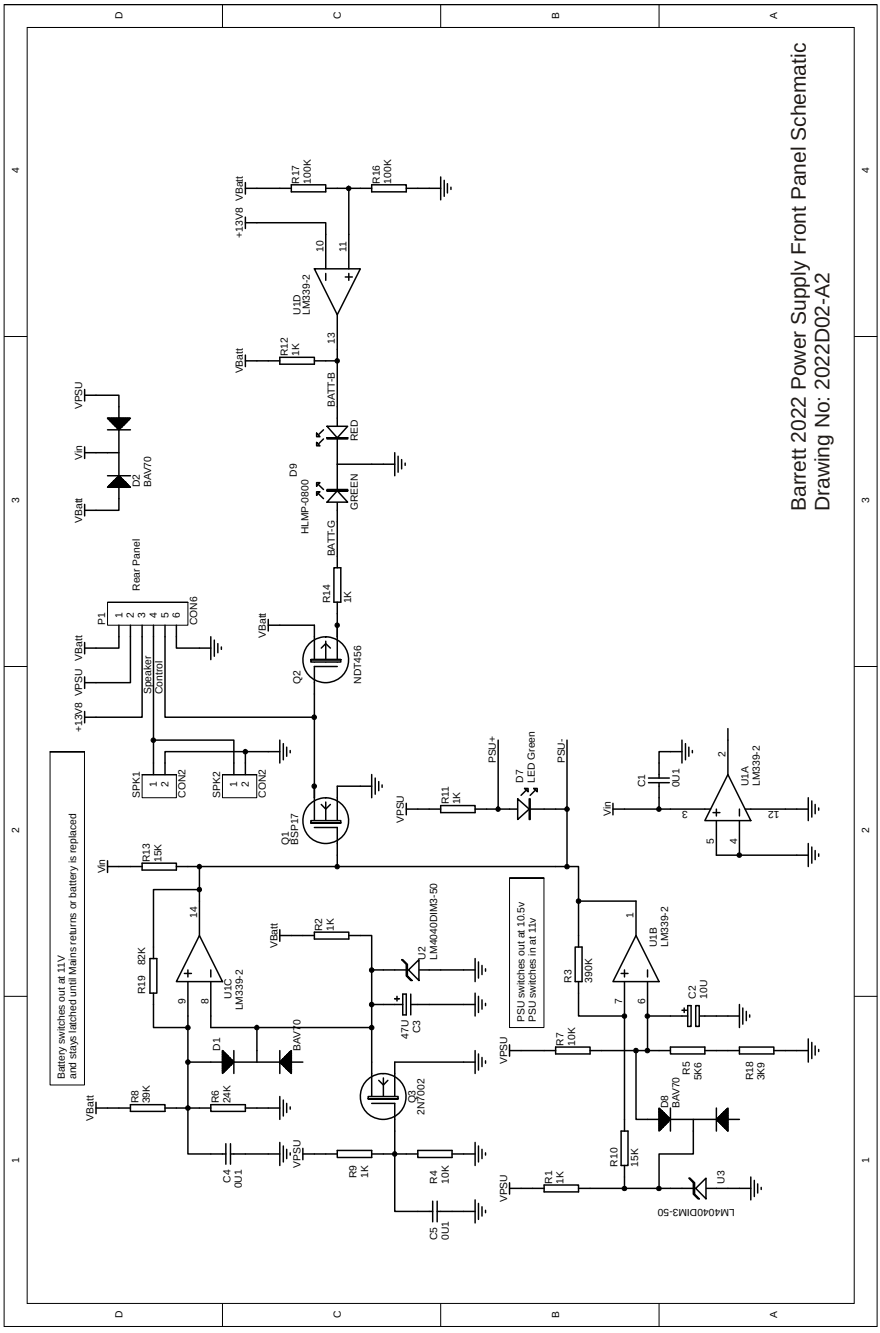
The voltage of the battery is constantly monitored by this circuit during normal operation. The voltage of a battery drops as the battery is being discharged and the corresponding voltage at Pin 9 of U1 will also fall. Once this voltage falls below 5V, the output of U1C will change from a High to a Low state. This will result in the MOSFET Q1 turning off and relay RL1 switching the battery away from the output devices. To avoid the battery circuit from oscillating, a large hysteresis loop is designed into the circuit.
If the mains voltage continues to remain unavailable and the battery falls below a safe value the only way to restore power is to disconnect the discharged battery and replace it with a fully charged one.

Battery charge circuit

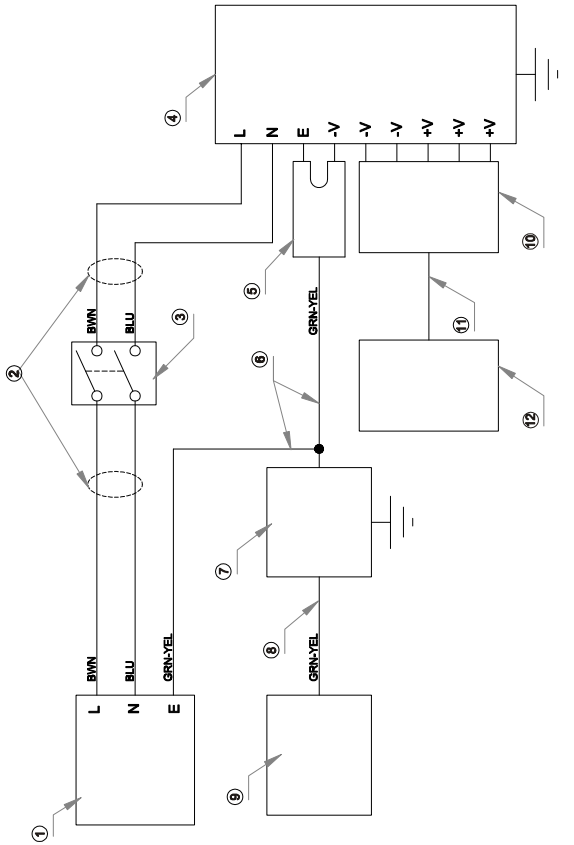
The battery is trickle charged through resistor R9, diode D3 and thermistor RT1. D3 is used to stop the battery from discharging back into the power supply if the mains voltage is lost. Battery charge current is controlled by R9 and RT1. If the battery charge is low then it will demand a higher charging current from the power supply. This will cause RT1 to heat up resulting in an increase in the resistance of the thermistor and a reduction in the current supplied to the battery. This circuit limits the maximum charge current to the battery to 3 Amps.

Using the 2022 power supply with a backup battery




Barrett 2022 Power Supply Front Panel Schematic
Drawing No: 2022D02-A2
Battery switches out at 11V
and stays latched until Mains returns or battery is replaced
PSU switches out at 10.5v
PSU switches in at 11v
Rear Panel
Speaker Control
LM4040DIM3-50

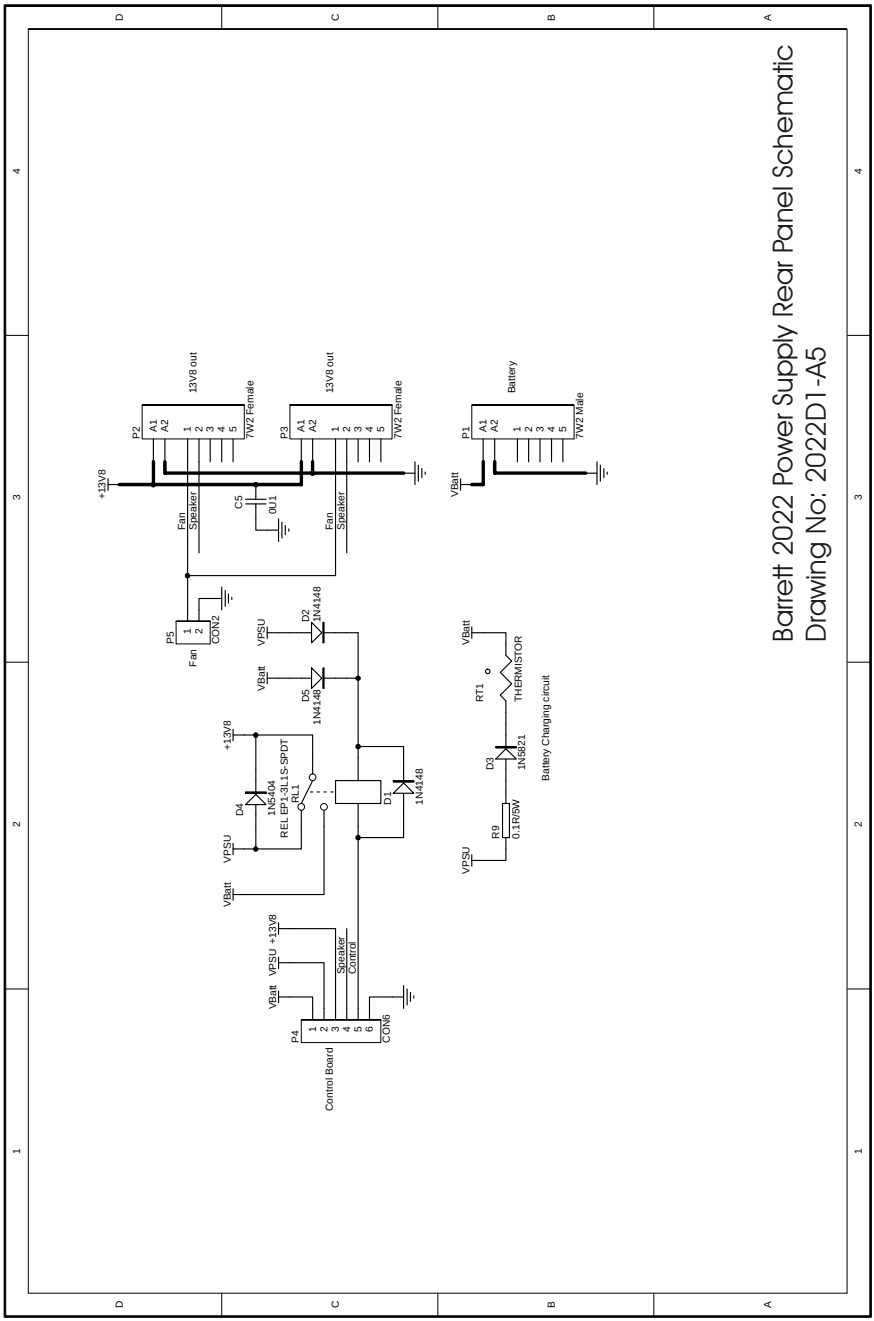
No	Description	Barrett Part No
1	IEC Socket	CN-24148
2	Front Panel Loom	SA-22207
3	Rocker Switch - DPST	SW-05560
4	Power Supply Unit	PS-02200
5	Earth Plate	MW-22218
6	Earth Loom - 1	SA-22208
7	Internal Mounting Plate	MW-22210
8	Earth Loom - 2	SA-22223
9	Top Chassis	MW-22222
10	Rear Panel PCA	SA-20221
11	Front Panel Loom	SA-22203
12	Front Panel PCA	SA-20222



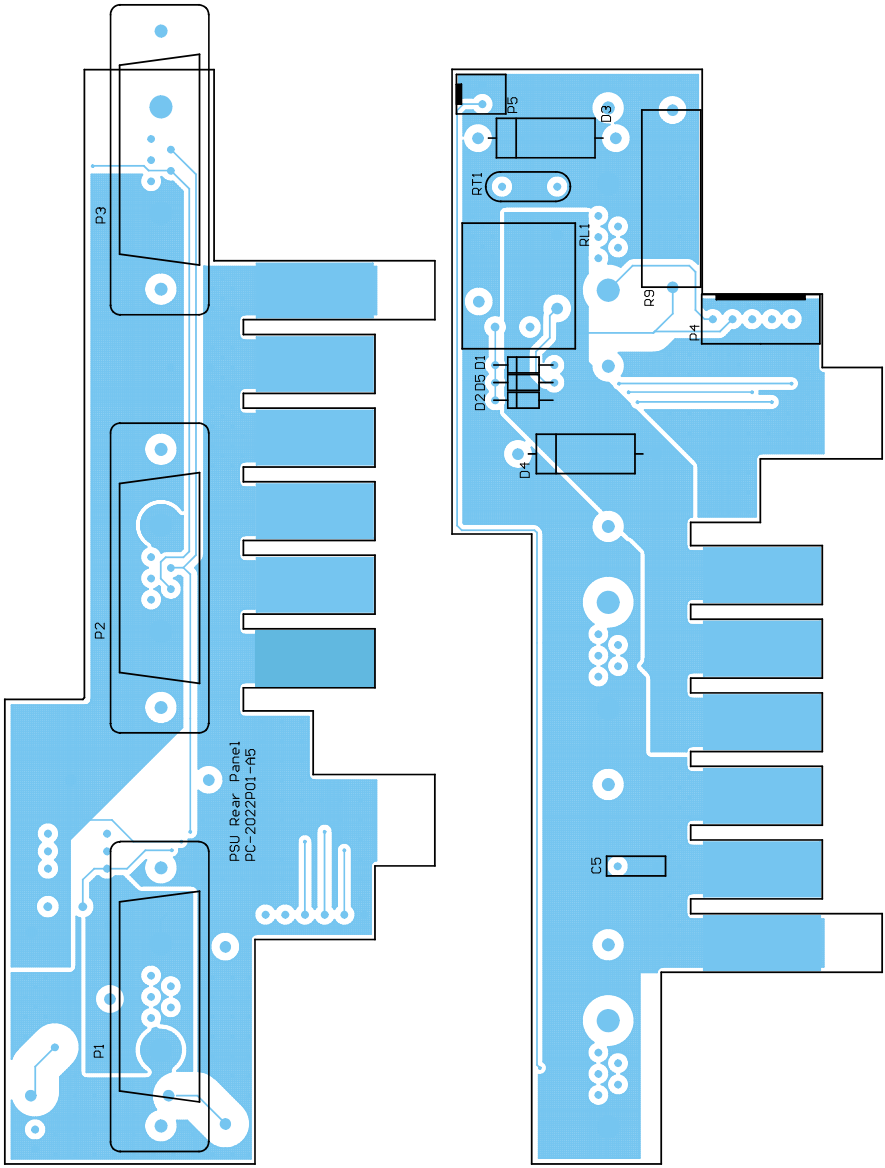
Barrett 2022 Power Supply
AC Wiring Diagram

Barrett 2022 Power Supply Front Panel PCB
Drawing No: 2022P02-A2

Parts list 2022 power supply front panel PCB		
Component Designator	**Description**	**Barrett Part Number**
C1	Cap 100nF 20% 63V 1206 NO PHILIPS	CP-00916
C2	Cap 10uF 20% Tant 25V Case C	CP-01575
C3	Cap 47uF 16v 10% Case D	CP-11665
C4	Cap 100nF 20% 63V 1206 NO PHILIPS	CP-00916
C5	Cap 100nF 20% 63V 1206 NO PHILIPS	CP-00916
D1	Di BAV70 SMD	DI-03316
D7	Led Green 5x2 rectangle	LE-02909
D8	Di BAV70 SMD	DI-03316
D9	Led Rectangular Bi-color	LE-02918
P1	Plug 6 pin Polarised	CN-14106
Q1	Trans BSP17 SOT223 Mosfet	TR-02207
Q2	Trans NDT456 SOT-223 PCH Power FET	TR-02292
Q3	Trans 2N7002 LT-1 Fet SOT23	TR-02282
R1	Res 1k 5% 0.063W 0603 NB	RE-10287
R2	Res 1k 5% 0.063W 0603 NB	RE-10287
R3	Res 390k 0.063W 5% 0603 NB	RE-10319
R4	Res 10k 5% 0.063W 0603 NB	RE-10277
R5	Res 5k6 0.063W 5% 0603 NB	RE-10328
R6	Res 22k 0.063W 5% 0603 NB	RE-10311
R7	Res 10k 5% 0.063W 0603 NB	RE-10277
R8	Res 39k 0.063W 5% 0603 NB	RE-10322
R9	Res 1k 5% 0.063W 0603 NB	RE-10287
R10	Res 15k 0.063W 5% 0603 NB	RE-10307
R11	Res 1k 5% 0.063W 0603 NB	RE-10287
R12	Res 1k 5% 0.063W 0603 NB	RE-10287
R13	Res 15k 0.063W 5% 0603 NB	RE-10307
R14	Res 1k 5% 0.063W 0603 NB	RE-10287
R16	Res 100k 5% 0.063W 0603 NB	RE-10291
R17	Res 100k 5% 0.063W 0603 NB	RE-10291
R18	Res 3K9 0.063W 5% 0603 NB	RE-10324
R19	Res 82k 0.063W 5% 0603 NB	RE-10344
U1	IC LM339D SO14 SMD	IC-02730
U2	Di LM4040DIM3-50 SOT23	DI-03355
U3	Di LM4040DIM3-50 SOT23	DI-03355
C1	Cap 100nF 20% 63V 1206 NO PHILIPS	CP-00916
C2	Cap 10uF 20% Tant 25V Case C	CP-01575
C3	Cap 47uF 16v 10% Case D	CP-11665
C4	Cap 100nF 20% 63V 1206 NO PHILIPS	CP-00916
C5	Cap 100nF 20% 63V 1206 NO PHILIPS	CP-00916
D1	Di BAV70 SMD	DI-03316


Barrett 2022 Power Supply Rear Panel Schematic
Drawing No: 2022D1-A5
+13V8
P2
13V8 out
7W2 Female
P3
13V8 out
7W2 Female
P1
Battery
7W2 Male
Fan
Speaker
C5
0U1
VBatt
VPSU
D2
1N4148
D5
1N4148
P5
Fan
CON2
+13V8
D4
1N5404
REL EP313 S-SPDT
RL1
D1
1N4148
VPSU
VBatt
P4
Control Board
CON6
Speaker Control
RT1
THERMISTOR
D3
1N5821
R9
0.1R/5W
Battery Charging circuit

2022 Power Supply Rear Panel PCB
Drawing No: 2022P01-A5



Parts list 2022 power supply rear panel PCB		
Component Designator	**Description**	**Barrett Part Number**
C5	Cap 100nF Mono 5mm SPC	CP-01018
D1	Di 1N914/1N4148	DI-03302
D2	Di 1N914/1N4148	DI-03302
D3	Di 1N5821 Power	DI-03353
D4	Di 1N5404 Power	DI-03313
D5	Di 1N914/1N4148	DI-03302
P1	Conn D 7W2 (2P/5D) M ST	CN-24150
P2	Conn D 7W2 (2P/5D) F ST	CN-24149
P3	Conn D 7W2 (2P/5D) F ST	CN-24149
P4	Plug 6 pin Polarised	CN-14106
P5	Plug 2 pin Polarised	CN-14101
R9	Res 0R1 5W WW	RE-00751
RL1	Relay EP1-3LIS NEC	RL-05020
RT1	Fuse Resettable Polyswitch 4A	FU-02534

Limited 3 Year Warranty

Barrett Communications Pty Ltd provides a maximum three year warranty on all equipment it manufactures which is to be used expressly for high frequency, single sideband radio communications. This warranty covers faults arising from defects in design, workmanship or materials. Please note that this warranty does not cover batteries.

Should any fault due to bad design, workmanship or materials be proven at any time within the warranty period, the company will rectify such fault free of charge providing the equipment is returned freight paid to Barrett Communications Pty Ltd or to an authorised service centre. The warranty period for all products is twelve months after shipment from the factory or an authorised Barrett agent or dealer. In the event that the end user completes and lodges warranty registration documents within three months of receipt of the shipment from the factory or an authorised Barrett agent or dealer, the warranty period shall be extended by an extra twenty four months giving a total warranty period of three years.

This warranty shall not cover any abuse, accident, improper installation, connection, adjustment or use other than in accordance with the instructions issued by the company.

In addition, this warranty shall not cover the distance which transceiver products will operate over or quality of transmission or reception as a result of unfavourable environmental conditions. Nor shall this warranty cover the quality of transmission and reception of transceivers mounted in vehicles or vessels that have not been sufficiently electrically suppressed.

Subject to the matters set out in this warranty, no liability, expressed or implied is accepted for any consequential loss, damage or injury arising as a result of a fault in the equipment and, all expressed or implied warranties as to quality or fitness for any purpose are hereby excluded.

This warranty does not extend to products supplied by the company which are not designed or manufactured by it. Barrett Communications Pty Ltd will however make every endeavour to ensure that the purchaser receives full benefit on any warranty given by the manufacturer.

This warranty is restricted to the original purchaser. Where the original purchaser is a reseller who has purchased for the purpose of resale, warranty shall be extended to the reseller's customer.

Warranty registration and customer support

Thank you for purchasing Barrett HF communications products.

The standard and automatic warranty on Barrett products is one year. By completing the registration form on the next page and sending it to us by mail, fax or email, this warranty will be extended to a total of three years at no extra cost.

By registering for the extended warranty period Barrett Communications will also provide the following services:-

Your contact details will be registered against the serial numbers of the equipment.

Barrett Communications will keep you informed of any developments relating to this equipment.

Barrett Communications will provide you with direct access to a support telephone contact line manned from 0000hrs GMT to 1600 Hrs GMT, 7 days a week.

The registration forms can be returned by mail, (no postage stamp required in Australia) or by facsimile (08) 9418 6757 (International + (618) 9418 6757).

If you have access to the Internet you can use the warranty registration page in the support section of our website to register your warranty form. Please go to www.barrettcommunications.com.au

We will mail or email you if you have registered via the Internet details of your support package within 7 days of receiving your completed registration form.

Barrett Communications is proud of its reputation for support of its customers. This registration process has been introduced so that we may continue to improve our level of support to you.