

T6-RV BLOCK DIAGRAM AND DESCRIPTION

FCC ID: C8LT6-RV

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REVISION HISTORY

Version	Date	Changes	Sections Affected
1.0	11 th May 2015	Initial release	None

1 INTRODUCTION

1.1 Purpose

The purpose of this document is to show how the T6-RV operates.

1.2 Scope

The scope of this document is the PARK AIR T6 VHF Receiver, T6-RV.

1.3 Definitions, Acronyms, Abbreviations

Term	Meaning
AGC	Automatic Gain Control
FFC	Flat Flexible Cable
IF	Intermediate Frequency
LO	Local Oscillator
PA	Power Amplifier
TCF	Technical Construction File
RF	Radio Frequency
R&TTE	Radio and Telecommunications Terminal Equipment
VHF	Very High Frequency

1.4 References

None.

2 OVERVIEW

The receiver is one of the PARK AIR T6 products which includes the following models:

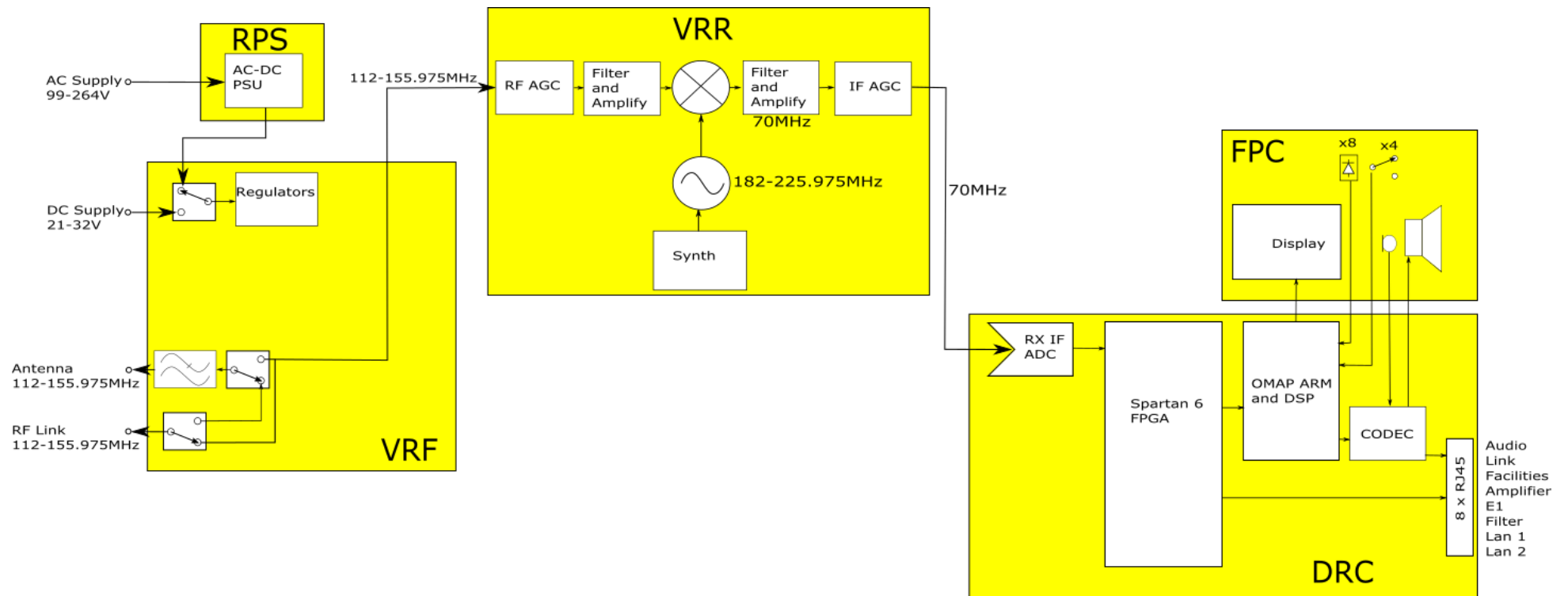
Model	Part Number	Description
T6-TV	24-04635031/1	T6 VHF Transmitter
T6-TRV	24-05655031/1	T6 VHF Transceiver
T6-RV	24-03610031/1	T6 VHF Receiver

The T6 radios all use a common chassis, digital control board, interconnection board and front panel with different sub-assemblies fitted depending on their model. The table below shows the sub-assemblies that are fitted to which models.

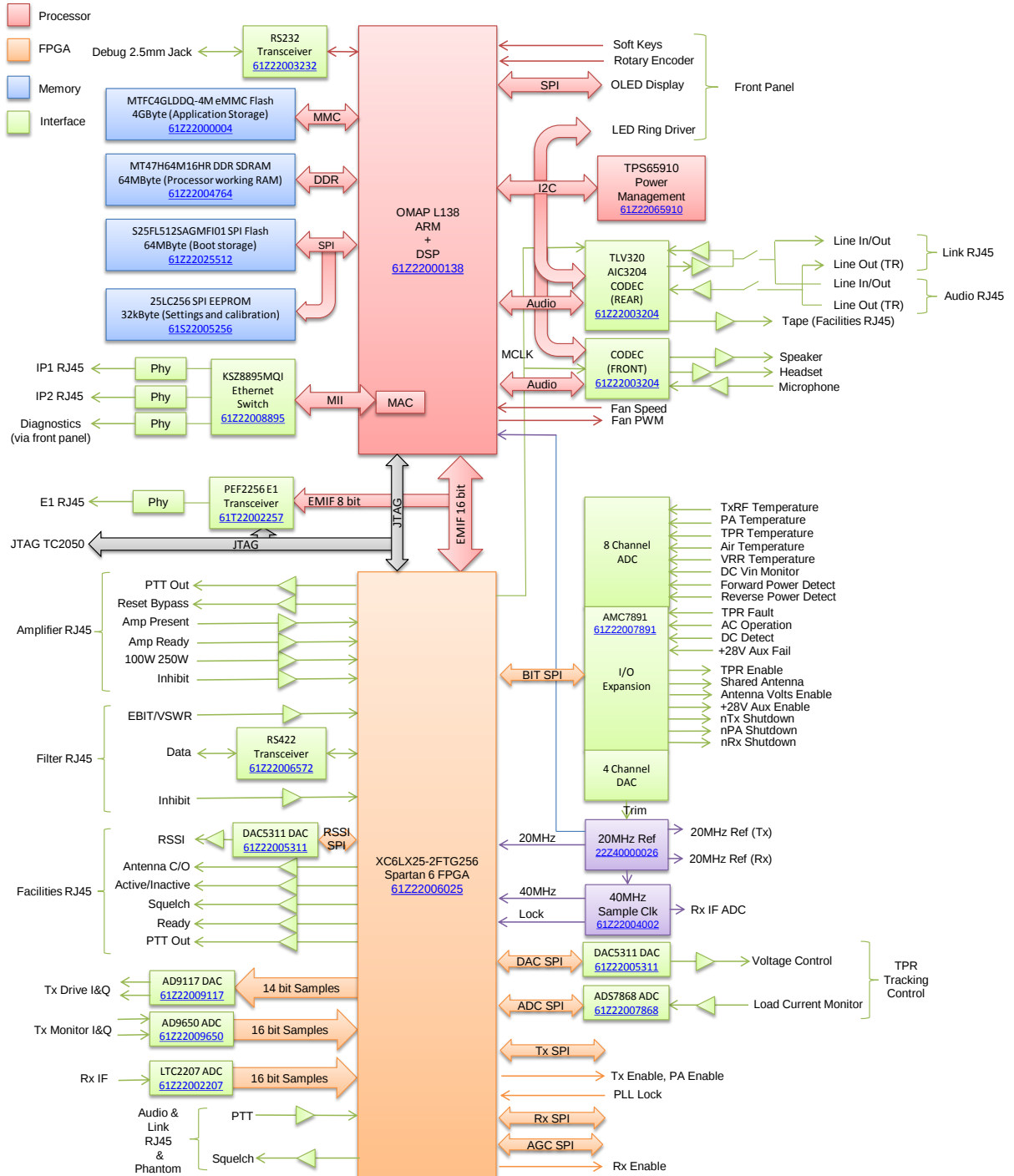
Sub-Assembly	Part Number	Description	T6-TV	T6-TRV	T6-RV
DRC	68-60000769/1	Digital Radio Control	✓	✓	✓
FPC	68-60000773/1	Front Panel Control	✓	✓	✓
ICB	98-60000782/1	Inter-Connection Board	✓	✓	✓
VRR	68-60000778/1	VHF Receiver RF		✓	✓
VTR	68-60000779/1	VHF Transmitter RF	✓	✓	
VTP	98-60000780/1	VHF Transmitter PA	✓	✓	
TPR	98-60000776/1	Transmitter Power Regulator	✓	✓	
VRF	98-60000788/1	VHF Receiver Front End			✓
TPS	69Z21250000S	Transmitter Power Supply	✓	✓	
RPS	69A61000065S	Receiver Power Supply			✓
	69A12006025	FAN-24V-60MM-TACH-PWM	✓	✓	✓

3 BLOCK DIAGRAMS

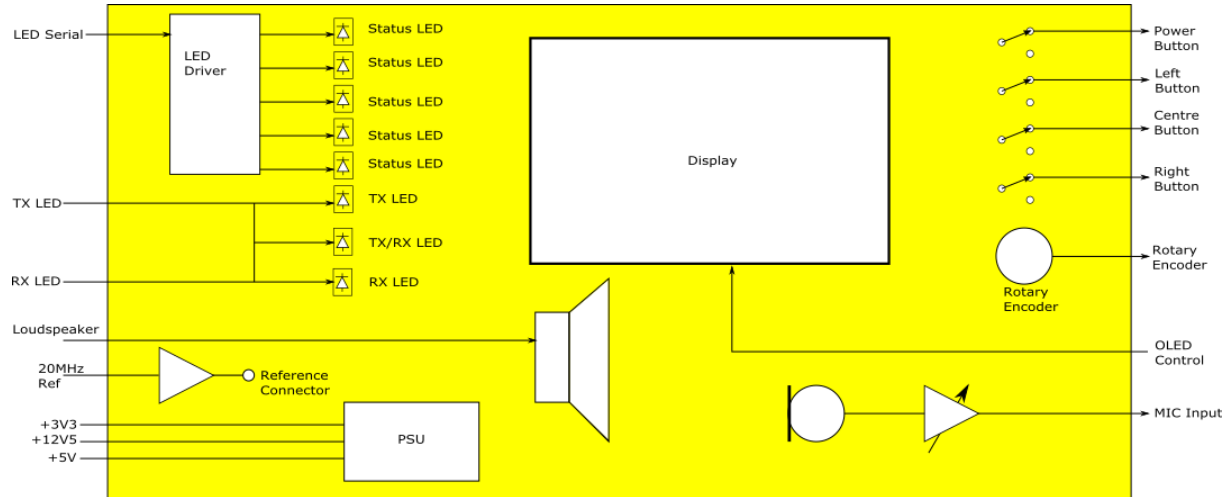
3.1 T6-RV



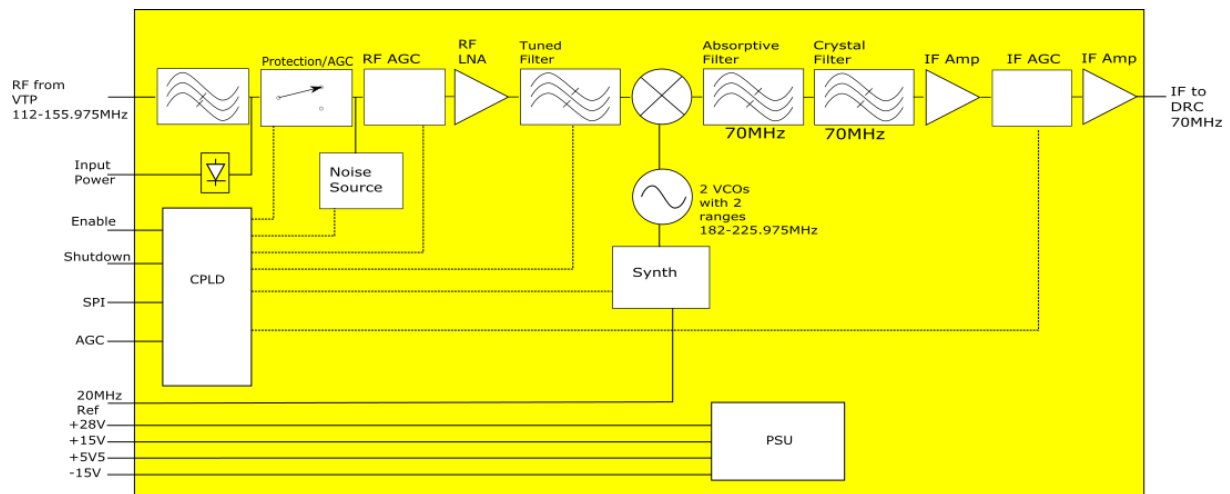
3.2 Digital Radio Control (DRC)



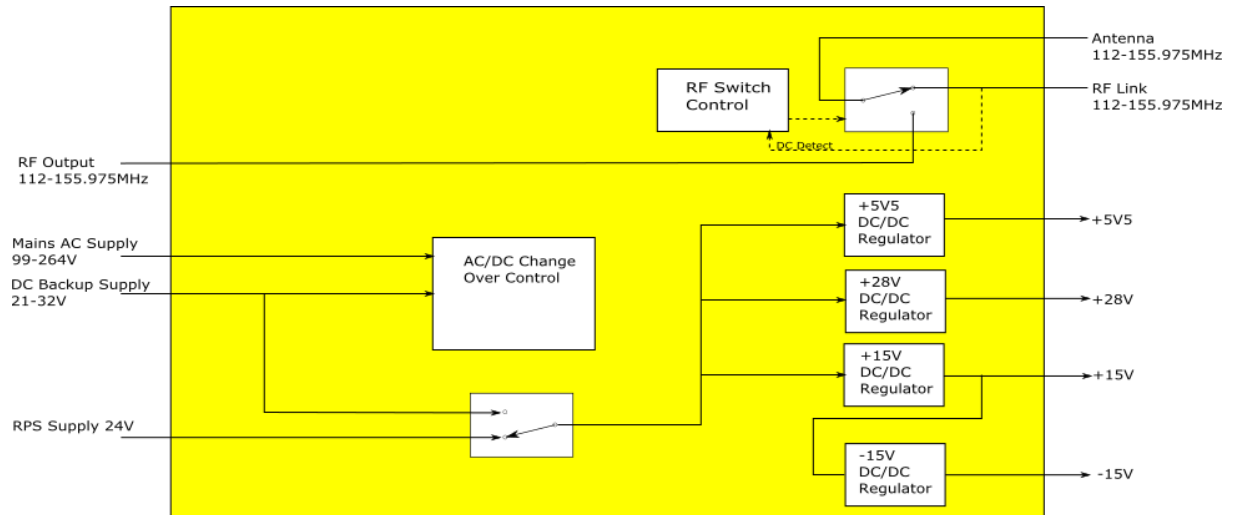
3.3 Front Panel Control (FPC)



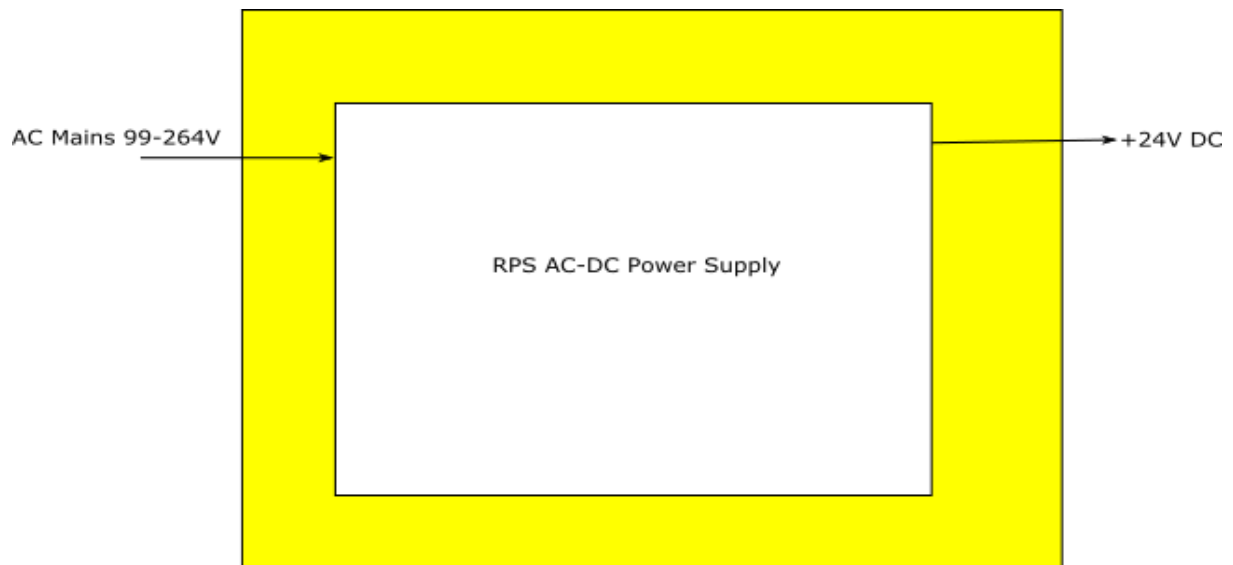
3.4 VHF Receiver RF (VRR)



3.5 VHF Receiver Front End (VRF)



3.6 Receiver Power Supply (RPS)



4 TECHNICAL DESCRIPTION

4.1 Receiver Signal Flow

Input connector	Output connector	Description	Output Power Levels
Radio Antenna	Antenna (CN27) on VHF Receiver Front-end	Antenna connection into radio	-110dBm to +17dBm carrier, with 0% to 100% AM modulation (1)
Antenna (CN27) on VHF Receiver Front-end	Receive (CN9) to VHF Receiver RF	VRF switches between antennas and low-pass filters the input	-110dBm to +17dBm carrier, with 0% to 100% AM modulation (1)
Receive (CN2) on VHF Receiver RF	RX IF (CN1-44) Inter-Connection Board to the Digital Radio Control	VRR filters, protects, amplifies and mixes the RF to an IF of 70MHz	-66.5dBm to +10dBm carrier, with 0% to 100% AM modulation (1)
RX IF (CN1-44) on Digital Radio Control	Rear panel audio lines, VOIP, E1 and front panel audio to speaker and headset.	DRC samples the IF signal at 40MHz, down-sampled, channel filtered and AM demodulated.	

(1)-100% modulation will give an average power of 1.5x carrier power and peak power of 4x carrier power.

4.2 Digital Radio Control (DRC)

The DRC (Digital Radio Control) controls all aspects of radio operation, including HMI and ground interfaces. It performs all waveform modulation and demodulation.

In the receive path (receiver or transceiver), the DRC has a 70MHz IF input from the RF/IF stages and samples this with an analogue-to-digital converter running at a sample rate of 40MHz. The DRC applies the appropriate gain both via analogue control (AGC) and digital scaling, then demodulates the signal (amplitude modulation), applies appropriate channel filtering and band-pass filtering before outputting the audio in analogue form (headset, loudspeaker, 4 wire lines, tape) or digital (E1 and IP).

In the transmit path (transmitter or transceiver) the DRC takes in audio either in analogue form (microphone, 4 wire lines) or digital (E1 and IP). It applies gain (VOGAD) to the line inputs. The DRC selects the appropriate audio source based on PTT, applies the appropriate channel filtering and drives converters at 20MHz sample rate to provide analogue baseband quadrature drive signals to the transmit RF stages, which will amplitude modulate the RF carrier. Quadrature analogue feedback signals from the RF stages are digitised at a sample rate of 20MHz allowing the DRC to close the transmitter linearization feedback loop in the digital domain.

4.3 Front Panel Control (FPC)

The FPC (Front Panel Control) forms the HMI for the radio. The HMI may be used for display and set-up of a sub-set of the radio functions and this is carried out via a display, rotary encoder and 3 soft function keys. The rotary encoder and 3 soft function key's use can be changed according to the menu screen displayed. The FPC has a 3 part Busy indicator to indicate Tx \ Rx activity. The Status indicator surrounds the rotary encoder and indicators equipment state. The Front Panel Control sub-assembly is encased in an injection moulded plastic fascia which also houses the display and loudspeaker for local audio monitoring.

The Front Panel Control sub-assembly is connected internally via an FFC connection. External interfaces are provided for Maintenance via an Ethernet connection, Reference frequency adjustment via an SMB connector and Headset functionality via a self-locking connector.

4.4 Inter-Connection Board (ICB)

The ICB (Inter-Connection Board) carries all signals between the sub-assemblies. The only exceptions are connected using coax cables:

- Receive, RF from VTP to VRR.

4.5 VHF Receiver RF (VRR)

The VRR (VHF Receiver RF) performs the RF processing and amplification required between the VTP /VRF and the DRC for receive. The VRR converts the RF input signal (112MHz to 155.975MHz) to a 70MHz IF signal for the DRC to demodulate. The frequency of the receiver is determined by the settings of this sub-assembly adjusting the input filter to the radio frequency and the LO frequency to 70MHz above the radio frequency. The VRR has RF and IF AGC to give the receiver sufficient dynamic range.

4.6 VHF Receiver Front End (VRF)

The VRF (VHF Receiver Front-end) has two distinct roles in a receiver: power supply regulation and RF signal switching.

As a power supply regulator, the VRF draws a supply either from the Receiver Power Supply or the backup DC supply on the rear panel of the radio and uses these to generate regulated DC supplies to power the radio.

The radio has two rear panel RF ports: "ANTENNA" and "RF LINK" which are switched by the VRF. The "ANTENNA" RF port is used to pass the received signal to the VRR receiver sub-assembly. "RF LINK" can be connected to the "ANTENNA" RF port on a 2nd radio allowing two radios in a pair to share a single antenna without the need for an external RF relay. Also the VRF low-pass filters the input, giving the RF a pass-band of 112MHz to 155.975MHz.

4.7 Receiver Power Supply (RPS)

The RPS (Receiver Power Supply) takes power from the AC mains and supplies a DC 24V to the VHF/UHF Receiver Front-end (VRF/URF).

Main features are:

- Output power capacity of 65W.
- Mains input suitable for 99V to 264V AC operation.

4.8 Fan Assembly

The fan assembly comprises a speed controlled fan with a speed output and a fan mounting plate. The fan direction of airflow is air from inside the radio blown out. This airflow cools all parts of the radio.