

## RR7855 Radio Direction Finding System



### 1. System Features

- ✓ A General Purpose Mobile Radio Receiving and Direction Finding system
- ✓ Frequency range 20-500MHz.
- ✓ Designed for detecting and tracing radio interference with licensed operators and tracking unlicensed or criminal operators.
- ✓ Comprises a broadband DF antenna system and combined radio DF processor.
- ✓ The processor includes the RF tuner and demodulation facilities for AM, FM, WFM, SSB and CW as well as the DF processor.
- ✓ Bluetooth compatible display as a physically separate unit, through cordless link
- ✓ Remote control via laptop/palm top computer and cordless link

## 2. System Description

The system is intended for rapid deployment in a standard saloon vehicle or MUV. The standard antenna is mounted on the roof of the vehicle using a standard roof rack or interface frame. The radio DF processor is located inside the vehicle, either in the passenger compartment or the luggage trunk (boot). A cable connection is made between the antenna and the radio DF processor. This carries RF from the antenna to the controller and power and control signals from the controller to the antenna. The prime power is drawn from the vehicle's battery supply, usually through the cigarette lighter on the dash board. Alternatively the system can be supplied with integral batteries which give up to 4 hours continuous operation before needing recharge.

The DF system can be set up before a mission through its own front panel. The mission might set the frequency and the demodulation mode. The audio and the DF information can then be monitored through Bluetooth compatible auxiliaries. That is a headset and/or loudspeaker for the audio and a separate DF display mounted on the dashboard of the vehicle.

In addition, the system can be controlled and monitored through a Bluetooth compatible laptop computer (or palmtop). This would usually be operated by the passenger in the vehicle, in the interests of safety on the road.

### 2.1 System Specification

Frequency Range	: <b>25-500MHz</b>
Minimum Received RF Field Intensity	: 10uV/m
Bearing Accuracy	: 2 degrees RM

## 3. Antenna Array

The system uses an existing design of DF antenna array and goniometer, illustrated in Figure 2. The array comprises four flat printed circuit antennas mounted on a metal base with a dielectric radome for protection against mechanical and weather damage. The antenna also houses the electronic compass (if fitted).

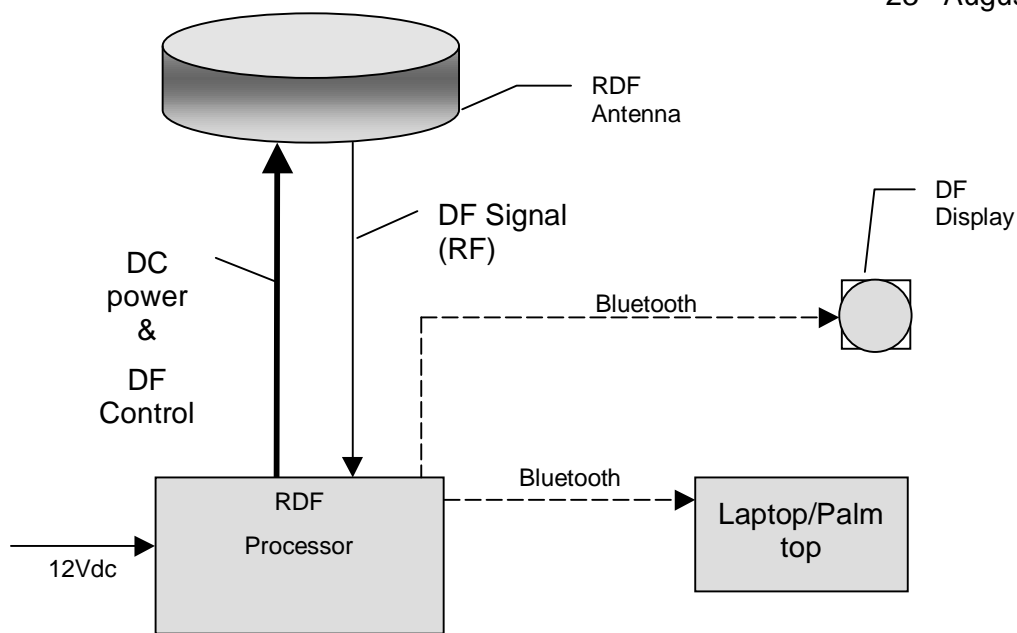


Figure 1 - RR7855 System Block Diagram



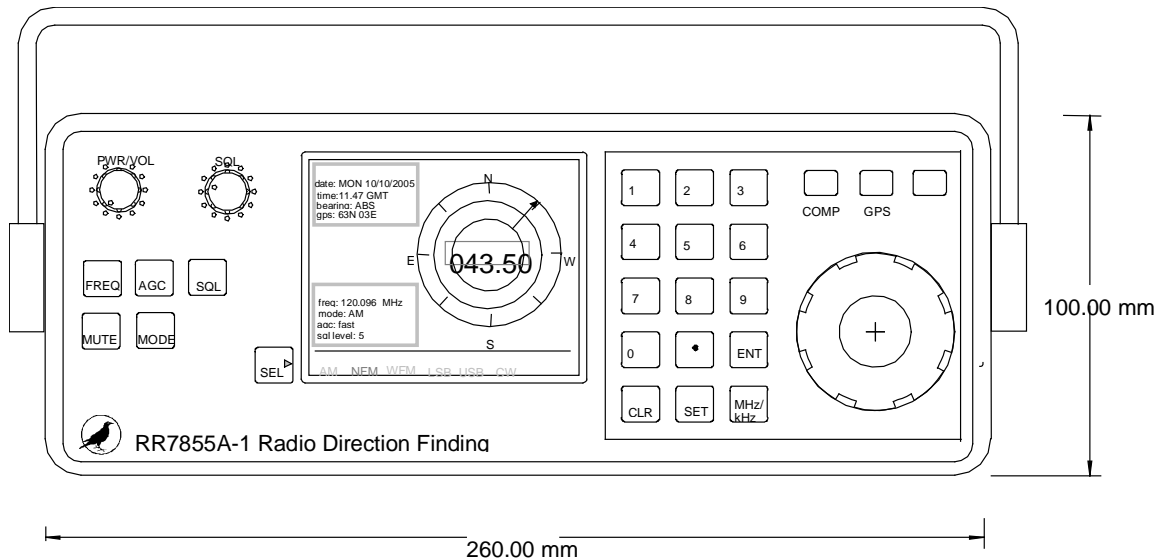
Figure 2 - RR6551 RDF Antenna

This provides an extremely low physical profile and makes this antenna ideally suited for deployment on a vehicle roof. In fact, the antenna can be provided in its basic form, without the radome, so that it can be mounted in the roof panel of the vehicle and hidden completely from external view.

### 3.1 Antenna Specification

Overall Height		: 20mm
Overall Diameter		: 500mm
Weight		: 10kg
Mounting Fixture	- Oval holes (8)	: 8 x 19mm bolts
	- Pitch Circle	: 230mm
Operating Temperature		: -10 to +50 deg. C

### 4. Radio Monitor and DF Processor



**Figure 3 - RDF Processor Unit - Front Panel**

#### 4.1 Tuner Features

The system uses a proprietary embedded receiver.

##### *Tuner Specification*

Frequency Range 25 -500 MHz

Receive Modes WFM, NFM, SFM, WAM, AM, NAM, USB, LSB, CW

Sensitivity 30 MHz ~ 470 MHz

Mode	Sensitivity	Note
AM:	1.5 $\mu$ V	10dB S/N
NFM:	0.7 $\mu$ V	12dB SINAD
WFM:	1.0 $\mu$ V	12dB SINAD

##### Selectivity

Mode	BW (Rejection)	BW (Rejection)
SSB/NAM	3kHz (-6dB)	9kHz (-60dB)
AM/SFM	9kHz (-6dB)	20kHz (-40dB)
WAM/NFM	12kHz (-6dB)	25kHz (-40dB)
WFM	150kHz (-3dB)	380kHz (-40dB)

IF : 10.7MHz,  
 IF Bandwidth : +/- 2MHz.  
 Audio Output power : 800mW (@ 10% THD).  
 Audio Output : Internal speaker and front panel 3.5mm socket

Audio impedance	: 8Ω
Memory channels	: 1,000 (20 banks)
Scan/Search Rate	: 37 increments per second maximum

## 4.2 DF Processor

The DF Processor provides the IF detection and DF processing circuitry. It also provides the control synchronising signals and power for the DF antenna and goniometer. This unit is built in together with the wideband tuner with standard demodulation facilities described above.

Controls and status display for the RDF and the tuner are incorporated on the front panel of this unit. Signal and power connections are located on the rear panel.

## 4.3 DF Processor Specification

Prime Power		: 12Vdc
Power Consumption		: 600mA (Typical usage)
Dimensions	- Width	: 480mm
	- Height	: 149mm
	- Depth	: 360mm
	- Weight	: 12kg.
Rear Panel Connectors	- prime power	: 2-pin
	- RDF Antenna	: 12 pin DIN
	- IF Output	: BNC (50Ω)
	- RS232 Serial Bus	: 15-way D-type
Front Panel Connection	- phones	: 3mm socket

## 5. Remote DF Display

The remote DF Display is a separate unit which provides a compass rose display to indicate direction of arrival of signal and a digital and numeric readout of DOA. This unit is battery powered and connected to the main DF processor through a Bluetooth radio link.



### 5.1 Display Specification

Displays	- DF	: 72 section LED
	- DF	: 3-digit LED
	- Signal Quality	: 2 digit LED
Power On/Off		: toggle switch
Prime Power		: 6Vdc @50mA
Duration from fully charged battery pack		: 4 hours

## 6. Remote Control by Laptop/Palmtop

The system can be operated via a laptop, tablet or palmtop computer through a Bluetooth link. This is intended to be used as an alternative control and display facility in a mobile application where the driver has a passenger who operates the system.

The use of this 'auxiliary control panel' also allows the system to be integrated together with other sources of information (such as maps, intercept database, etc.)