



XRT BASE STATION SERIES



The “State of the Art” XRT Base Station Series was designed for the scanning Telemetry market, as a result of extensive market research into the requirements of utility companies.

The product can be used in an open architecture mode, where it can communicate with many existing products or in protocol specific modes, where it is limited to certain outstations.

The unique feature of the XRT Series is the advanced microprocessor with integrated “SoftModem” which enables all of the radio’s parameters to be controlled by software. A large flash memory and EEPROM enables software upgrades, code changes or bespoke client code to be programmed via the serial port or over the radio link.

As a further enhancement, the XRT has individual synthesisers for the receiver and transmitter to enable full duplex operation. Even in the half-duplex mode the receiver can be left on all the time to achieve a very fast turnaround time.

The XRT9000 is supplied in a 1U rack mountable shelf which can be supplied for 110/220V AC mains supplies , 24V DC supplies or 48V DC supplies. In each case there is an auxiliary 12V DC facility. This can be used with an external 12V supply or can be connected to a rechargeable battery to provide supply protection. While the primary supply is present, the unit provides an output to recharge the battery, but if the primary supply fails, the XRT automatically takes power from the battery or external 12V supply.

MODES OF OPERATION AND PROTOCOL HANDLING

OPERATION

Simplex and Duplex Operation

The XRT can be supplied for simplex, semi-duplex with single or dual antenna operation, or full duplex dual antenna operation. For single antenna full duplex operation an external duplexer will be required.

MODES AND PROTOCOL HANDLING

The various operating modes are as follows:

Transparent Mode

The radio has no knowledge of the data it is transmitting. All data is transmitted transparently with minimal delay. Transmission control can either use RTS control signals or be configured for automatic initiation of transmission on receipt of serial data. In either case, the radio provides a CTS output which can optionally be used for flow control. The ZRT incorporates an internal buffer to cope with situations where the interface data rate differs from the over-air rate.

Frame Specific Mode

The radio recognises a complete frame and only transmits and receives data conforming to that format. No addressing of radios or routing of data is performed. Protocols such as MODBUS can be supported in this way.

Protocol Specific Mode

The radios recognise a protocol specific frame and the address to which the frame is to be sent. Routing information must be stored in any radio that originates a call. Any radio in the system can operate as a repeater. The radio does not perform any acknowledgement or retries. Any protocol using a fixed address field such as MODBUS or DNP3, etc can be supported.

Dial Up Mode

Hayes protocol is used to dial up the radio link which may include repeaters or store & forward stations. The route information is not stored but is passed in the dial up command in the form of a telephone number. Once the link is established it is transparent and therefore independent of the protocol being transported. This allows point to point protocols such as SLIP and PPP (and hence TCP/IP) to be conveyed. The dial up mode is less efficient for small data transactions because of the data transactions carried out during the connect and disconnect operation.

Custom Protocol

Custom protocols can be written and downloaded via a PC or over the air as systems require change, thereby minimising disruption. Should a special protocol or interface be required please contact the sales office.

CHANNEL SELECTION

The XRT Series can be PC programmed with up to 80 channels. Alternatively, complete band allocations like the UK MPT1329 and MPT1411 bands, can be downloaded and stored within the radio. Once programmed, channels can then be selected via rotary switches on the front panel or via a PC.

PROGRAMMABILITY

All the parameters of the XRT Series can be programmed via the front panel programming & management port using either DOS or Windows 95/98/XP based software. The individual program can then be stored on disc for future use.

INTERNAL/EXTERNAL MODEM OPERATION

Both internal and external modems are supported: the external interface provides both flat and de/pre-emphasised response for compatibility with older systems.

Internal Soft Modem

Data is presented to the modem via the RS232/TTL port at speeds between 150 and 38400 and then transmitted at the programmed baud rate. Buffering is provided when the data rate is higher than the transmission rate. The XRT features a full duplex internal "soft modem" which offers unparalleled performance and flexibility over a wide range of speeds and formats and enables future formats to be downloaded from a PC or over the air. Within a 12.5kHz channel, the over-air transmission from the unit can be user programmed for a range of speeds. If the maximum speed is not required, the unit can be configured for a lower speed to give an improved receiver threshold.

For 150, 300, 600,1200 & 2400 baud, FSK/FFSK is used with both Bell202 and V.23 supported. At 4800bps GMSK modulation is used, while at 9600bps, the modulation is 4-level FSK.

External Modem Applications

In external mode the 600 ohm input and output will accommodate a programmable range of +3dBm to -30dBm. The output can be muted in the absence of a carrier.

Tone Operated Switch (TOX)

When using an external modem via the 600 ohm port, the soft decoder within the XRT can be programmed to detect incoming FFSK or PSK signals. Once detected the transmitter will key up and pass the incoming data.

SQUELCH TAIL ELIMINATION

For old or non tolerant protocols, where the presence of a mute (Squelch) tail may cause dribble bits at the end of a message, a simple packetising option can be enabled from within the PC programming software.

FORWARD ERROR CORRECTION

Forward error correction is a programmable option at 9600bps, but as with all FECs, the associated overhead will reduce the effective throughput rate when it is selected. Error correction offers insignificant performance improvements at rates below 9600bps, so the option is permanently disabled at these lower rates.

" RSSI " RECEIVE SIGNAL STRENGTH INDICATION

The RSSI signal is accurately measured by an internal A-D converter and compared to an individually calibrated RSSI graph held within the processor. The signal strength can then be accurately read in dB micro volts from a PC connected to the serial port or remotely over the air. A dc voltage output proportional to signal level is also provided on the auxiliary connector for external use.

RF P O W E R

The XRT is available in two power ranges: 50mW to 5 Watts or 5W to 10Watts. Calibrated RF power levels are PC and over air programmable directly in Watts & milli-watts with an accuracy of +/-0.5dB.

STATUS LEDs

The XRT has 12 LEDs to enable the operator to see at a glance the status of the radio, serial port and hardware/software. The System LED provides the operator with a quick visual health check and if the software detects an error, a code is flashed on the LED to indicate the error and the radio will reset. The fault can then be determined simply by counting the number of flashes and looking up the error code in the installation, operation and programming manual. If the error persists the radio will stay in the error mode permanently.

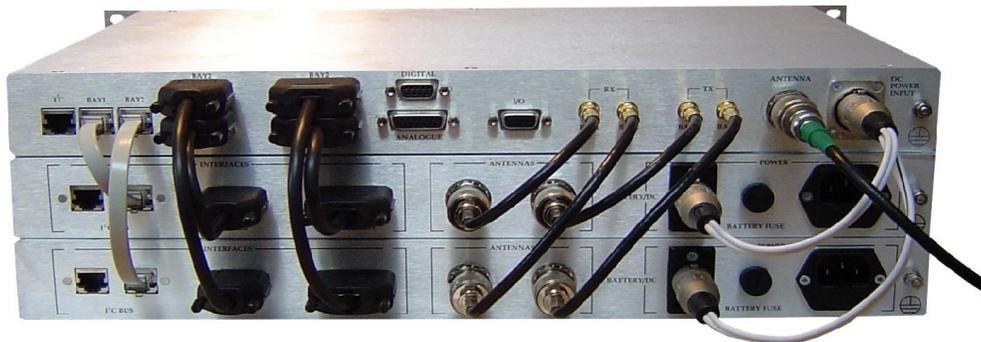
BAYCHANGER FOR A FULLY DUPLICATED BASE STATION

Two XRT's can work in a fully duplicated mode for critical applications with the addition of an XRT baychanger.

The baychanger is housed in a 1U 19" rack mounting shelf and is designed to mount directly above the two radio shelves it is controlling.

The baychanger provides automatic changeover in the event of radio failures and can also be configured to carry out routine changeovers on a pre-determined cycle to exercise both halves of the protected system.

The XRT series baychanger monitors and switches the transmitters and receivers separately. It is therefore possible to use the transmitter from radio 1 and the receiver from radio 2 at the same time. The system can therefore continue to carry traffic even if there is a Tx fault in one radio and an Rx fault in the other.



VOLTAGE AND TEMPERATURE MEASUREMENT

The internal 12V rail and the internal temperature of the base station can be measured and read from a PC connected to the front panel serial port or from remote PC connected into the systems management port.

EXTERNAL I²C BUS

The XRT Series features an I²C bus which is used to communicate with other modules over short or medium distances. In the case of the base station this is normally a bay changer or external I.O.

PC SOFTWARE

Dedicated PC software packages for Programming, Installation, Network Management and Service have been written to run under DOS or Windows 95/98/XP. These packages provide unrivalled versatility combined with ease of use.

TECHNICAL SPECIFICATIONS

General

Frequency Range:	Full MPT1411/VNS2111 band without re-alignment. Other allocations in the range 406 – 512MHz are possible.	
Power Requirements:	110/220 V AC or 24V DC (19-36V) or 48V DC (36V-72V) additional 12V DC (10V – 15.5V DC) input available on all versions	
Power Consumption:	Receiver only:	< 3W
	Transmitting:	< 40W (5W version) or < 100W (10W version)
Aux DC Output Fuse:	4A quick-blow 20mm mounted on rear panel.	
Internal Charger Fuse:	4A quick-blow 20mm mounted internally on charger board.	
Number of Channels:	80 sequential or 32 discrete user programmable channels.	
Channel Step Size:	6.25kHz	
Channel Spacing:	12.5KHz	
Frequency Stability:	1ppm –20 to +60°C	
Construction:	19” rack mountable 1U aluminium enclosure.	
Size:	5W:	44.5mm H x 438mm W x 295mm D (excluding handles, brackets & connectors)
	10W:	44.5mm H x 438mm W x 350mm D (excluding handles, brackets & connectors)
Weight:	5W version:-	3.5kg
	10W version:-	4kg
Connectors:	RS232 Traffic	9-way D-Type Female
	RS232 Programming	9-way D-Type Female
	Ancillary Connections	15-way D-Type Female
	I2C Bus Connectors	10-way RJ45 Socket (2 off)
	Tx Antenna	Type N Female (50 ohm)
	Rx Antenna	Type N Female (50 ohm)
	Primary AC Supply	IEC (alternative to DC connector below)
	Primary DC supply	XLR (alternative to AC connector above)
	Auxiliary 12V	3-pin XLR Male
Led Indicators:	ON TX, BUSY, SYSTEM, RXD, TXD, RTS, CTS, DCD,DTR,DSR,RI	
Approvals:	The products have been designed to meet the following approvals: UK MPT1411/VNS2111 European ETS EN300-220 ETS EN300-113 ETS EN300-086 CE: ETS EN301-489 Australian: AS4268.2-1995 USA: FCC Part 90/15 Canadian: DOC	

Transmitter

RF Output Power:	5W version :- 50mW to 5W 10W version:- 5W to 10W
Bandwidth:	12MHz without re-alignment
Tx Duty Cycle:	up to 100%
Internal Modulation:	Programmable FFSK, 2 Level FSK, 4 level FSK & GMSK.
Analogue Modulation:	Programmable over the range +3dBm to -30dBm into 600ohm, with a programmable pre-emphasised or flat response.
Max. Deviation:	$\pm 7.5\text{kHz}$ max, normally limited to 2.5kHz
Adj. Channel Power:	<-65dB at 12.5kHz
Hum and Noise:	<-37dB
Spurious Emissions:	<250nW and 4nW in specified bands
Tx Intermodulation:	40dB at 5Watts without using an external circulator
Transient response:	As per ETS 300-113
TX Rise Time:	<5mS

Receiver

Sensitivity:	0.25uV (-120dBm) for 12dB SINAD de-emphasised 0.355uV (-117dBm) for 12dB SINAD flat
Bandwidth:	12MHz without re-alignment
Spurious Response:	> 80dB
Blocking:	> 90dB relative to 1uV
Intermodulation:	> 70dB (2 signal) > 65dB (3 signal)
Adjacent Channel:	> 70dB down at 12.5KHz
IF Frequencies:	45MHz and 455KHz
Spurious Emissions:	< ETS 300-113
Analogue Mode:	Programmable audio output levels in the range +3dBm to -30dBm into 600ohm Selectable for de-emphasised or flat response. Programmable mute enable.
Mute Response Time:	< 3ms

Internal Modem

Serial Interface Rate:	Programmable between 150bps and 38400bps
Interface:	Selectable for RS232 or 5V TTL, inverted/non-inverted.
Data Format:	Programmable; Odd, Even or No Parity, 1/2 stop bits, 7/8 data bits.
Radio Baud Rate:	150 – 9600bps over-air
RF Bandwidth:	12.5kHz
Signalling Formats:	Programmable for 12.5kHz channel:- Up to 1200bps - FSK with V23 and Bell202 supported. 2400bps - coherent 1200/2400Hz or 1200/1800Hz FFSK. 4800bps - GMSK 9600bps - 4 level FSK.
Bit Error Rate:	
2400 baud	less than 1 in 10 ⁻³ at -120dBm
4800 baud	less than 1 in 10 ⁻³ at -117dBm
9600 baud	less than 1 in 10 ⁻³ at -115dBm (FEC on)
9600 baud	less than 1 in 10 ⁻³ at -112dBm (FEC off)
FEC:	Programmable option at 9600bps

Optional Baychanger Shelf

Tx Selection	Relay
Tx Selection Modes	Prefer Bay 1 Prefer Bay 2 Timed Changeovers
Rx Splitter	0dB lossless splitter
Rx Selection Modes	Alternate after end of each incoming signal Prefer Bay 1 Prefer Bay 2
Contact Closure Inputs	Force to Bay 1 Force to Bay 2
Relay Contact Outputs	Bay 1 Enabled for Tx Bay 2 Enabled for Tx Bay 1 Fault Bay 2 Fault VSWR Fault

In the interest of improvement the above specifications are subject to change without notice.