

# SRT RADIO MODEM SERIES

SYNTHESIZED  
RADIO  
TECHNOLOGIES



*The SRT Series is available in two ranges: the low power SRT450 and SRT869 which meet the licence-exempt ETS300-220 specification; and the SRT170 and SRT470 which are available in a 1Watt and 5Watt configuration and meet the tougher ETS300-113 and the USA and Canadian specifications.*

## MODES OF OPERATION AND PROTOCOL HANDLING

### OPERATION

#### **Simplex and Semi-Duplex**

The SRT's can be programmed for simplex or semi-duplex operation. If two antenna simplex or full duplex is required, then the ART must be used.

#### **Store and Forward or Repeater Operation:**

The SRT's can be used in a single or dual role (two connected together) configuration for Store & Forward and Repeater applications. In Store & Forward operation the message is received, the address checked and is only forwarded if the address matches one in the routing table. In the Repeater mode, any message being received will be passed on.

### MODES AND PROTOCOL HANDLING

The basic operating modes are as follows:

#### **Dumb mode**

The radio has no knowledge of the data it is transmitting; data is simply transmitted and received under hardware control with the option of RTS control or initiation of transmit after receipt of serial data, with CTS providing an optional flow control.

This configuration is useful when expanding older systems where the radios must be compatible with others of a different manufacture.

#### **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, DNP3 and IEC 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.

## CHANNEL SELECTION

The SRT Series can be PC programmed with up to 80 channels. Alternatively, complete band allocations like the UK MPT1329 and MPT1411 bands, can be downloaded. Once programmed the channels can then be selected via rotary switches on the front panel, from a PC program, via the serial port or over the radio link.

## PROGRAMMABILITY

All the parameters of the SRT Series can be programmed via the serial port using either DOS or Windows 95/98 based software or over the radio link via the SRT's secure "over air programming mode". The individual program can be stored on disc for future use or printed.

## INTERNAL SOFT MODEM

The SRT features an 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 unit can be programmed for 150-2400bps FSK/FFSK with Bell202 and V23 supported, 4800bps GMSK and 9600bps 4 Level FSK. Data is presented to the modem via the RS232/TTL port at speeds up to 38400 and then transmitted at the programmed baud rate. Buffering is provided when the data rate is higher than the transmission rate.

## POWER SAVE MODE

The SRT Series has both internal and external power save modes.

### Internal Power Save Mode

The microprocessor controls the on/off function of the receiver and after a pre-programmed time the MPU will switch on the receiver to look for a carrier. If a carrier is not detected then the transceiver goes back into sleep mode. If during the time the transceiver is awake a carrier is received, the unit will stay awake. After the carrier drops out, the receiver will stay awake until the programmed resume time elapses. Once the resume time has elapsed the transceiver will go back into sleep mode. The save ON/OFF and resume time are all programmable via the PC program.

### External Power Save Mode

In the external mode the ON/OFF function of the modem is controlled by the host via the DTR line.

## SQUELCH TAIL ELIMINATION

For old or non tolerant protocols, where the presence of a mute (Squelch) tail may cause a problem 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 FEC's, the overhead will reduce through put. However, since the "SoftModem" offers many data speeds, data integrity can be improved simply by running a lower speed.

## "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 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

## RF POWER

The SRT's are available in two power ranges: 10mW to 750mW for ultra low power requirement, and 50mW to 5 Watts. The calibrated RF power level is PC and over air programmable directly in Watts & Milli-watts with an accuracy of +/-1dB.

## STATUS LED's

The SRT has 11 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.

## TX TIME-OUT-TIMER

The transmitter within the SRT has a time-out timer which allows the maximum continuous transmission time to be set in order to prevent channel blocking due to a fault. The timer operates in all modes and can be programmed in one second steps between 0 and 255 seconds. If programmed and the time is exceeded, transmission will cease until the action that normally causes transmission is removed and then re-applied.

## EXTERNAL I<sup>2</sup>C BUS

The SRT Series features an I<sup>2</sup>C Bus which is used to communicate with other modules over short or medium distances. The main feature of the bus is its address mode, which will only wake up modules that are being addressed, thereby ensuring low power operation.

## PC SOFTWARE

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



# TECHNICAL SPECIFICATIONS

## General

Frequency Range: SRT170 138 – 175MHz  
SRT450/470 406 – 512MHz  
SRT869 869 – 870MHz  
SRT870 820 – 950MHz  
50MHz – 950MHz available on special order

Power Requirements: 12VDC (10V – 15.5DC)  
Standby: <75uA  
Receiver on and decoding: <70mA  
Transmitter: Dependent on power

Number of Channels: 80 user programmable frequencies

Min. Programmable Channel Step: 6.25 or 5KHz

Channel Spacing: 12.5KHz, 20KHz or 25KHz

Operating Temp. Stability: 2ppm –30 to +60°C

Construction: Milled aluminium enclosure

Size: 90mm W x 125mm L x 45mm H

Mounting: DIN or can be screwed to a flat surface

Weight: 550gms

Connectors: RS232: 9Way "D" Type  
12VDC 2Way Klippon Type  
RF BNC

Led Indicators: TX, BUSY, SYSTEM, RXD, TXD, RTS, CTS, DCD, DTR, DSR, RI

Approvals: The products have been designed to meet the following specifications.  
*(for full information please contact the sales office)*

UK RF : MPT1411  
European: ETS 300-220  
ETS 300-113  
ETS301-489  
Australian: AS4268.2-1995  
USA: FCC Part 90/15  
Canadian: DOC

## Transmitter

RF Output Power: 1Watt unit: 10mW to 750mW  
5Watt unit: 50mW to 5Watts  
Type is signified by –1 or –5

Bandwidth: Without alignment: VHF 10MHz  
UHF 12MHz  
900MHz 30MHz

Modulation: FFSK, 2 Level FSK, 4 level FSK & GMSK via the internal modem.

Max. Deviation: ± 7.5KHz max

Adj. Channel Power: >65dB

Transient response: As per ETS300-113

Spurious Emissions: <250nW and 4nW in specified bands

Rise Time: <9mS

## Receiver

Sensitivity: -120dBm for 12dB SINAD  
De-emphasised  
-117dBm for 12dB SINAD Flat

Bandwidth: Without re-alignment VHF 5MHz  
UHF 12MHz  
900MHz 20MHz

Spurious Response: >70dB/65dB\*

Blocking: >90dB/85dB\* relative to 1uV

Intermodulation: >65dB/60dB\*

Adjacent Channel: >65dB at 12.5KHz

IF Frequencies: 45MHz and 455KHz

Spurious Emissions: <2nW

Mute Response Time: <2msec

\*SRT170, 470 & 870/SRT450 & 869

## Internal Modem

Serial Interface: Asynchronous or Synchronous with custom software.  
Baud rate programmable between 150bps and 38400bps  
Interface selectable for RS232 or inverted/non-inverted 5V TTL, Programmable; Odd, Even or No Parity, 1/2 stop bits, 7/8 data bits.

Radio Baud Rate: 150 – 9600bps within 12.5KHz

Signalling Formats: Programmable for a 12.5KHz channel: FFSK; V23, Bell202 up to 1200baud, 2400 baud uses coherent 1200/2400Hz (1200/1800Hz by special order) GMSK at 4800 baud 4 Level FSK at 9600 baud.

NRZI: On or Off

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

F.E.C. Programmable on/off at 9600 bps