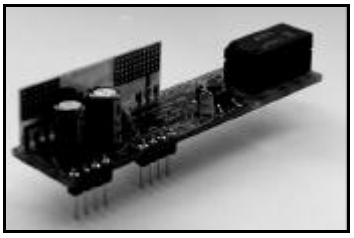
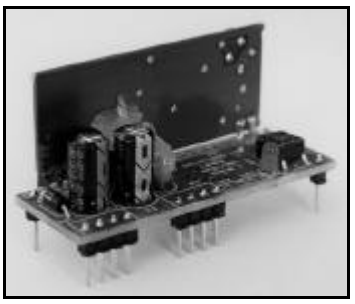
AM / FM DECODER MODULES RS VERSION





FEATURES

- MINIATURE RF RECEIVER /DECODER.
- 40 PIN DIP I/C PROFILE.
- SUPPLIED AS AM OR FM.
- LED INDICATION OF DATA RECEPTION.
- EASY LEARN TRANSMITTER “SWITCH” FEATURE.
- CAN BE USED WITH AUTO TRANSMITTING ENCODER.
- CMOS/TTL OUTPUTS, MOMENTARY, LATCHING OR TIMED.
- SINGLE SUPPLY EITHER 5V OR 12V.
- LOW POWER CONSUMPTION.
- AVAILABLE AS HIGH SECURITY CODE HOPPING VERSION.
- FITS INTO RELAY EXPANDER BOARD.
- REQUIRES NO RADIO LICENCE.

APPLICATIONS

- GENERAL REMOTE CONTROL SYSTEMS.
- GARAGE DOOR OPENERS.
- CAR, CARAVAN, MOTORCYCLE ALARMS
- REMOTE SWITCHING.
- REMOTE GATES.
- PAGING.

DESCRIPTION

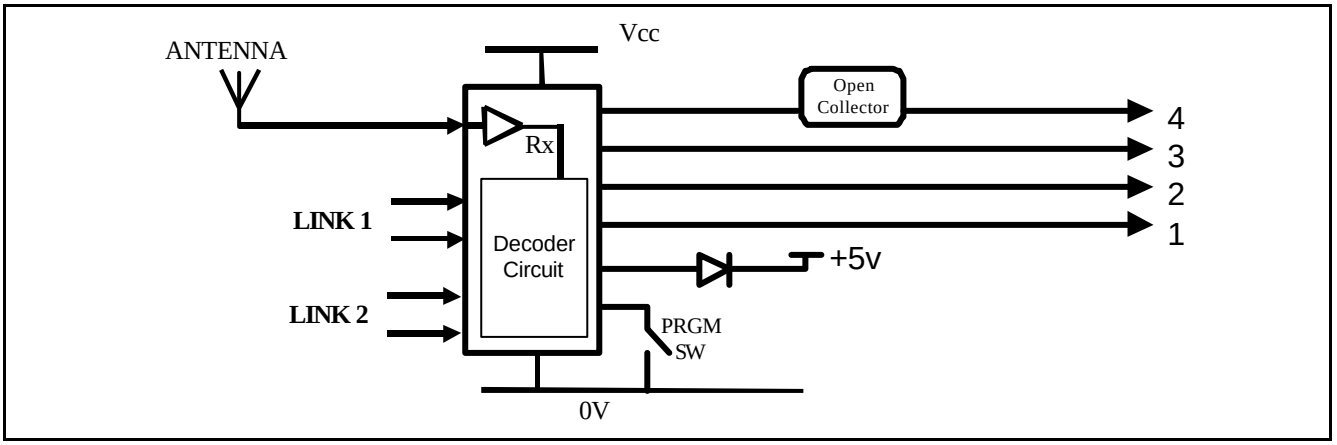
This range of miniature modules are complete three/four channel RF Receiver/Decoders that can be configured for many different, low power, short range telemetry applications. Supplied as either AM or FM, they have been designed to simply “plug-in” to the application circuit, requiring connections to the power supply, and data outputs only. An LED indicates data reception.

The module has the same profile as a standard 40pin Dual in Line (DIL) I/C for easy PCB mounting and can be supplied form either 12Vdc, or 5Vdc. The module may be incorporated into the “Relay Expander board” (RS Stock code 226-3405) which provides facility for a mains power supply and up to four mains rated relays.

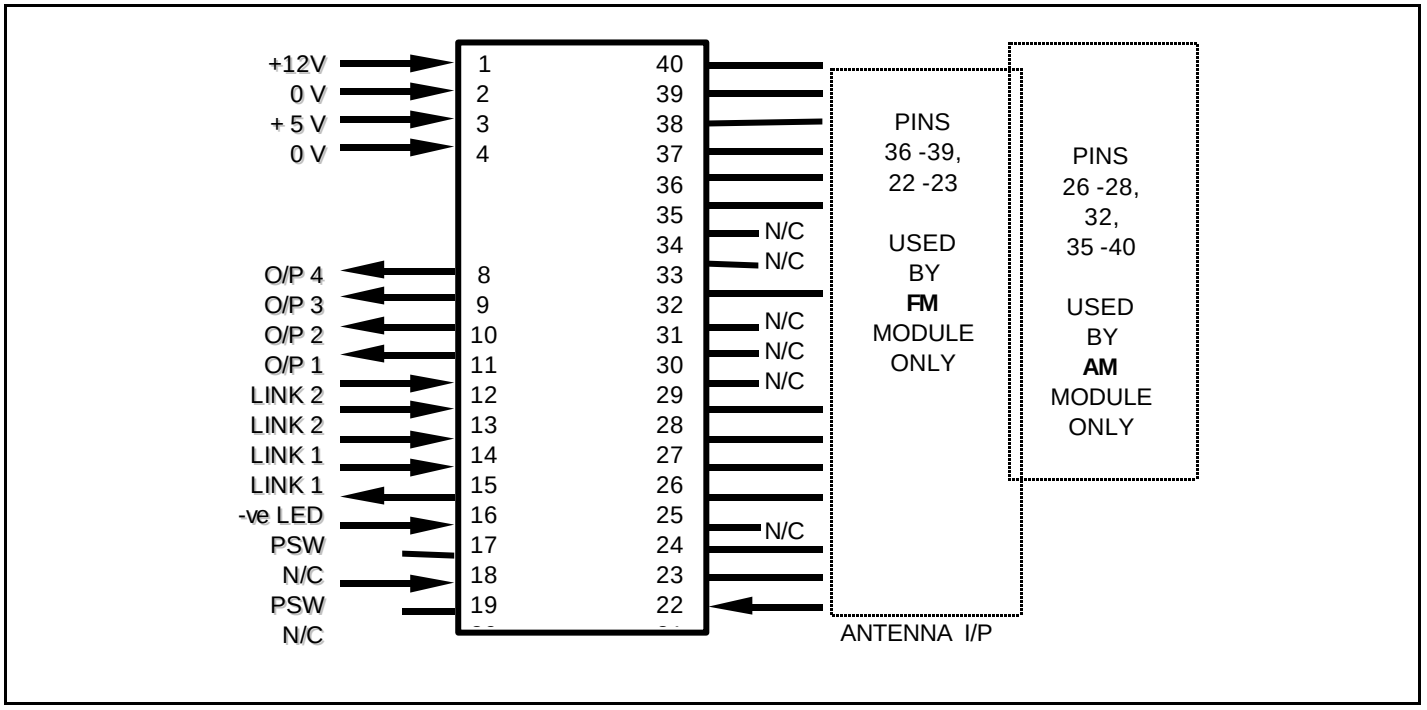
The decoder has an easy-to-use 'LEARN' facility to enable the user to program the decoder’s outputs to correspond to a matching transmitter/encoder switch. The decoder can allocate each of its outputs to operate when the appropriate transmitter/encoder switch is operated. The decoder has a maximum memory capacity of learning up to eight switches. These may be from a single or many different encoders and be allocated to a single output on the decoder or a combination of all the outputs. The outputs may also be set to operate as momentary or latching via an on-board link.

The module may be powered from either 12Vdc, or 5Vdc.

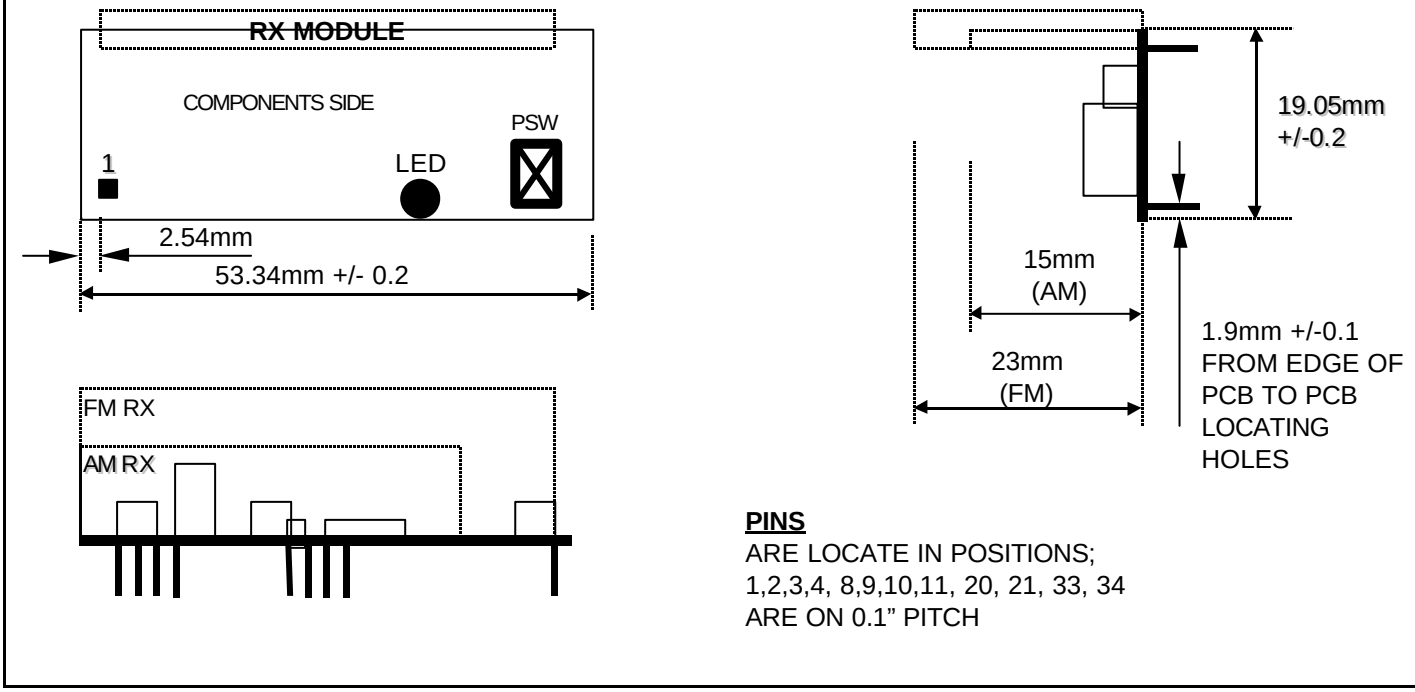
BLOCK DIAGRAM



SIGNAL ALLOCATION (from plan view of module)



MECHANICAL DETAILS



PINS
ARE LOCATE IN POSITIONS;
1,2,3,4, 8,9,10,11, 20, 21, 33, 34
ARE ON 0.1" PITCH

PIN DESCRIPTION

Pin No	*Name*	Description
1	***+12V***	+12V Supply Voltage. Must be used for Relay operation
2	***0 VOLT***	Ground for +12V Supply.
3	***+5V***	+5V Supply Voltage. Alternative supply if 12v supply not used.
4	***0 VOLT***	Ground for +5V Supply.
8	***O/P4***	Data output channel 4. Open collector Transistor output. (This is used to drive the relay when fitted)
9	***O/P3***	Data output channel 3. CMOS/TTL with series 220 Ω resistor
10	***O/P2***	Data output channel 2. CMOS/TTL with series 220 Ω resistor
11	***O/P1***	Data output channel 1. CMOS/TTL with series 220 Ω resistor
12	***LINK2***	Connect to pin 13 to make “Link2”
13	***LINK2***	Connect to pin 12 to make “Link2”
14	***LINK1***	Connect to pin 15 to make “Link1”
15	***LINK1***	Connect to pin 14 to make “Link1”
16	***-ve LED***	External LED sink output, connected directly to cathode of LED1. Anode of the LED1 connected to +5V. Indicates Data reception, and programming status.
17	***PSW***	Programming Switch, This is used when learning new transmitters.
18	***N/C***	Not connected. Can be used as locating pin for mounting the module
19	***PSW***	Connect to 17 to make “PSW” switch.
20	***N/C***	Not connected. Can be used as locating pin for mounting the module
21	***ANT I/P***	Connect Antenna to this input
22 - 23		These pins are used by the module when configured as FM.
24 - 25	***N/C***	Not connected. Can be used as locating pin for mounting the module
26 - 28		These pins are used by the module when configured as AM.
29 - 31	***N/C***	Not connected. Can be used as locating pin for mounting the module
32		These pins are used by the module when configured as AM.
33 - 34	***N/C***	Not connected. used as locating pin for mounting the module
35		These pins are used by the module when configured as AM.
36 - 40		These pins are used when configured as an AM or FM module.

NOTE
The module is designed to be powered from either 12v or 5v **not both!**

“STANDARD DATA FORMAT” DESCRIPTION (AM-DS0)

The transmitter/encoders used in a standard system each have a unique signature code (pre-programmed at manufacture) from one in >16,000,000 combinations. Error checking techniques are also used to ensure data integrity. Each time the transmitter/encoder is operated this unique signature code is transmitted along with command (which switch has been operated).

“HOPPING DATA FORMAT” DESCRIPTION (AM-DH0, FM-DH0)

The transmitter/encoders used in a Code Hopping system each have a random number signature code, as in the standard format, and also transmit a unique signature code each time the switch is pressed. The number of possible codes is >16,000,000 combinations, the same code is never repeated, even if the batteries are changed. Error checking techniques are also used to ensure data integrity.

LINK 1 & 2

These links configure the mode of operations.

Stand Alone Module						
Configuration	**Link 1**	**Link 2**	**O/P1**	**O/P2**	**O/P3**	**O/P4**
Remote Control	Connected	Open	Latch	Latch	Mom	Mom
Remote Control	Connected	Connected	Mom	Mom	Mom	Mom

When Used in Conjunction with Remote Control System (PCB motherboard RFSL016)						
Configuration	**Link 1**	**Link 2**	**O/P1**	**O/P2**	**O/P3**	**O/P4**
Remote Control	Connected	Open	Latch	Latch	Mom	Timed
Remote Control	Connected	Connected	Mom	Mom	Mom	Timed

When Used in Conjunction with FM-ECAC-XXX (RS Stock Code 226-3398)						
Configuration	**Link 1**	**Link 2**	**O/P1**	**O/P2**	**O/P3**	**O/P4**
For use with FM-ECAC Auto Transmitting Encoder	Open	Don't Care	Auto O/P	N/A	Low Battery	Trig I/P's

Note : The Links status is read ONLY at power-up. After changing either link position, remember to remove and re-apply the power.

USING THE MODULE WITH THE AUTO TRANSMITTING ENCODER.

Configuration of the decoder module for use with the FM-ECAC-418, auto transmitting encoder are listed in the FM-ECAC data sheet.

LEARNING A NEW TRANSMITTER SWITCH

These decoders are capable of 'learning' the transmitter/Encoder signature code, and switch number.
The decoder allocates the transmitter/encoder switch against the chosen output. The decoder has a maximum memory capacity of learning up to eight switches. These may be from a single or many different encoders and be allocated to a single output on the decoder or a combination of all the outputs.

To learn a new transmitter switch follow these procedures;

1. Firstly determine which switch on the encoder and which output channel on the decoder you wish to allocate to each other.
2. In order to select the appropriate decoder output channel, the user must step through the outputs until the desired channel is selected (these may be 1, through 4).
3. Each time the decoders programming switch is briefly pressed and released, the LED will flash a number of times to indicate which channel is currently selected.
4. If the desired channel is overstepped or missed, simply wait for 5 seconds and the decoder will start from channel 1 again, or step right through the outputs, and the decoder will automatically return to channel 1.
5. Note that after flashing 4 times to select channel 4, the decoder flashes 9 times. This is normal and is detailed below in the "Erase memory" section.
6. To enter "Programming mode" the user must hold down the programming switch whilst the desired channel (indicated by the appropriate number of flashes) is currently selected. After flashing the required number of flashes, the LED will go out for approx. 4 seconds and then illuminate. The decoder is now in learn mode. (Keep the programming switch depressed)
7. Depress the transmitter once, LED on the decoder will flash. (PSW is still depressed).
8. Wait for LED to stop flashing.

9. Depress the transmitter again, LED will turn off. (PSW is still depressed).
10. Release the programming switch (PSW).
11. The decoder has now learnt the encoder switch and will now operate the system.

Note:

1. Do not teach the same switch to more than one output of the same decoder!
2. These decoder modules are for use only with the RS range of encoders.

ERASING the Decoder Module MEMORY.

To completely erase the FM-ECAC signature code form the FM-DH0 decoder's memory;

1. Press the programming switch (PSW) briefly. (The LED will flash once).
2. Press the programming switch (PSW) again briefly. (The LED will flash twice).
3. Press the programming switch (PSW) again briefly. (The LED will flash three times).
4. Press the programming switch (PSW) again briefly. (The LED will flash four times).
5. Press the programming switch (PSW) and hold. (The LED will flash nine times, go out for several seconds then illuminate again.
6. The programming switch (PSW) may be released. (When the LED goes out, the decoder's memory is erased)

SYNCHRONISATION (Hopping Models only)

This equipment requires the transmitter and receiver to be synchronised. If the transmitter has been pressed more than 50 times outside the range of the receiver, the receiver will lose synchronisation with the transmitter. To re-synchronise:
Press the transmitter key for two seconds within range of the receiver,
Release the key momentarily, and press the key again.

ANTENNA DESIGN

For 99% of applications a 16.5cm piece of wire is quite adequate. The range achieved from the system is dependant on the choice and position of the antenna. The space around the antenna is as important as the antenna itself. The optimum position is to locate the antenna so that is protrudes directly out the top of the transmitter box. If this is not possible due to other design constraints, try to keep the antenna away from other metal in the system such as transformers, batteries and PCB tracks, especially ground planes. In particular, the 'HOT' end of the antenna should be kept as far away as possible from these. For further information on Antenna design please see our full product catalogue.

DATA OUTPUTS

Outputs 1, 2, & 3 are digital CMOS/TTL with a series 220 Ω protection resistor The outputs are normally logic 'low', and go 'high' when activated.
Output 4 is an open collector type output.

Connecting a Relay to Output '4'

A relay may easily be connected to Output '4' as it is an open collector type output. The simplest method of achieving this is to connect the relay coil between output 4 and the positive supply rail. When the output switches then the open collector will close the connection to GND thus energising the relay coil. Please note that the maximum voltage on output '4' is 16V.

ABSOLUTE MAXIMUM RATINGS (AM & FM)

Supply Voltage (+12Vcc to GND).....-0.3 to +17 Volts.
Supply Voltage (+5Vcc to GND).....-0.3 to + 6 Volts.
Storage Temperature.....-30 to +85o Celsius.
Operating Temperature..... 0 to +55o Celsius.

TECHNICAL SPECIFICATION (AM & FM)

Ambient temperature = 25° Celsius.

ELECTRICAL CHARACTERISTICS	MIN	TYPICAL	MAX	DIMENSION	NOTE
Supply Voltage for +12 v	9	12.0	16.0	V	SINGLE
Supply Voltage for +5 v	4.5	5.0	5.5	V	SUPPLY ONLY!
Supply Current (quiescent)		20		mA	
Data output: (Ch 1, 2 & 3)					
Logic Low	0	0.2	0.8	V	I out = 10mA
Logic High	3.5	3.8	5	V	I out = 10mA
Data output: (Ch 1, 2 & 3)					
Logic Low			-25	mA	
Logic High			20	mA	
Data output :Ch 4 (open collector)			50	mA	
Overall Frequency Accuracy	-100	0	+100	KHz	
Sensitivity for 20dB S/N	-	0.5	1.0	µV	
IF Bandwidth		250		KHz	

DECODER PART NUMBERING

PART No	DESCRIPTION	RS Stock Code
AM-DS0-418RS	AM Decoder - 1-4 Ch, Standard code, 418MHz	226-3332
AM-DH0-418RS	AM Decoder - 1-4 Ch, Hopping code, 418MHz	226-3360
AM-DS0-433RS	AM Decoder - 1-4 Ch, Standard code, 433MHz	250-0439
AM-DH0-433RS	AM Decoder - 1-4 Ch, Hopping code, 433MHz	250-0467

PART No	DESCRIPTION	RS Stock Code
FM-DH0-418RS	FM Decoder - 1-4 Ch, Hopping code, 418MHz	226-3483
FM-DH0-433RS	FM Decoder - 1-4 Ch, Hopping code, 433MHz	250-0631

TRANSMITTER / ENCODER PART NUMBERING

AM 418MHz	
Description	**RS Stock Code**
1 SW STANDARD	226-3304
2 SW STANDARD	226-3326
1 SW HOPPING	226-3348
2 SW HOPPING	226-3354

FM 418MHz	
Description	**RS Stock Code**
ENCODER 1 SW IN CASE	226-3433
ENCODER 2 SW IN CASE	226-3461
ENCODER 3 SW IN CASE	226-3455
ENCODER 4 SW IN CASE	226-3449

AM 433MHz	
Description	**RS Stock Code**
1 SW STANDARD	250-0417
2 SW STANDARD	250-0423
1 SW HOPPING	250-0445
2 SW HOPPING	250-0451

FM 433MHz	
Description	**RS Stock Code**
ENCODER 1 SW IN CASE	250-0546
ENCODER 2 SW IN CASE	250-0552
ENCODER 3 SW IN CASE	250-0568
ENCODER 4 SW IN CASE	250-0574