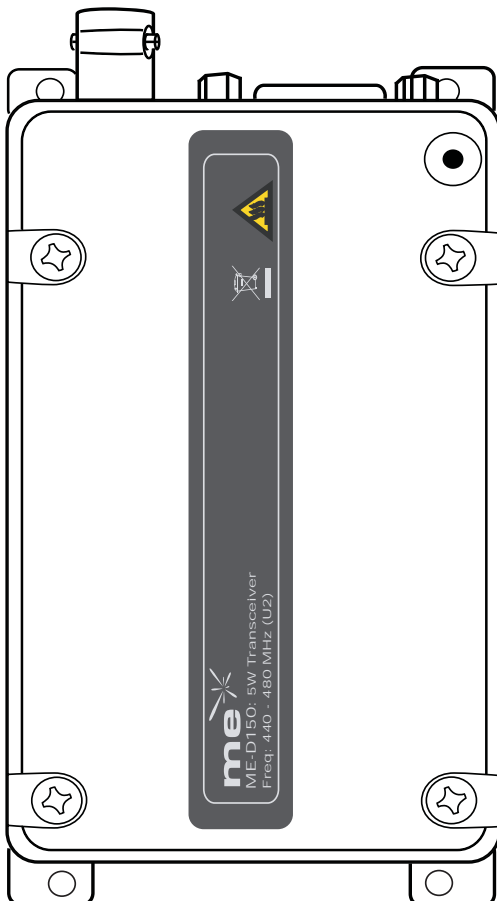


User Guide



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Introduction

The me-D150 range is a 1 to 5 Watt PMR data modem at VHF and UHF frequencies.

The me-D150 is housed in a rugged cast-aluminium box sealed to IEC 529 (IP54) making it suitable for a wide range of mobile and fixed applications.

The me-D150 modem is designed to meet international levels of safety and performance. To maintain this the installation and safety information must be adhered to

- The me-D150 modem must only be installed where unintentional contact cannot be made. The surface of the device may be hot to touch under certain transmit conditions. The D150 is not designed for permanent transmission. If prolonged transmission periods are used, the unit will become hot and will require an additional heatsink to be fitted.
- When fitting the me-D150 into a fixed installation, care must be taken in the routing of all cabling such that the insulation cannot become damaged.
- The recommended supply sources for use with the D150 are a standard 12V / 2A dc supply, but is capable of operating in the range 9V - 18V. It is recommended that suitable in-line fusing is added to the +ve (positive) line. See Sections 6 and 7 for further detail.

Preparing for use

Description of modem

The me-D150 is a network free, point to point data radio that offers great flexibility in varied applications where wireless data or voice communication is needed.

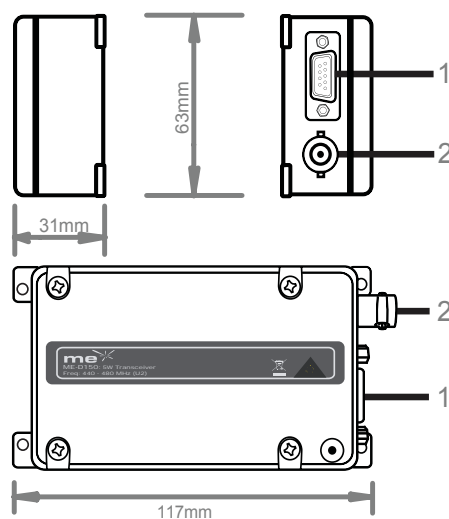
It is used as a transparent radio to allow users to facilitate the use of their own modem and protocol. The correct signal levels need to be used with the use of separate control lines and/or serial commands, see the pin out table.

The me-D150 also operates as a standard radio with microphone input and speaker output to allow speech to be transmitted and received. In this mode CTCSS and DCS, software controlled squelch, time out timer options and busy channel lockout are available.

Features

- Compact and rugged die cast box
- Resistant to dirt, dust and water ingress (IP54 rated)
- Network free, point to point communication
- 1/5 watt programmable output power
- Synthesised operation with 16 channel capability
- CTCSS & DCS encode and decode
- programmable 12.5 / 25kHz channel spacing
- External modem / Direct FM
- Voice (ext mic and speaker).
- Busy' output
- 9 – 18 volt supply input
- Enhanced Power Save Mode (sleep)

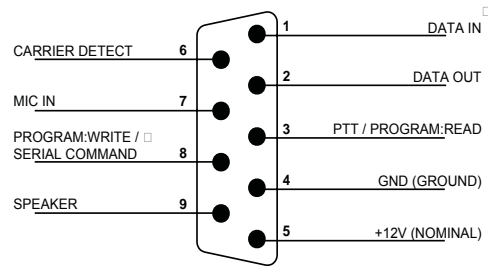
External connections



- 1 HD 15-way d-type (data and control signals)*
- 2 BNC antenna connection

*The power supply is connected via pin5 (+ve) and pin 4 (GND) of the 9 way D-type.

DB-9 Pin Interface Connector



Pin In/Outs of DB-9 connector.

The table on the following pages indicates the DB-9 Pin descriptions with input and output levels.

| Pin No. | Function | Description | Signal Type | I/O |
|--------------------------------|--|--|--|-----|
| 1 Program | Data modulation IN. (used with an external modem) | AC coupled signal directly injected to MOD through data low pass filter without pre-emphasis. | Analogue Input signal 1KHz audio at 60% peak dev. input level = 100 to 120mVrms | I/P |
| 1 Program option | TTL input (POCSAG) | DC coupled direct signal designed to work with TTL signals. Frequency and Dev adjustable to application | TTL Levels | I/P |
| 1 Program Opt & H/W changes | AC coupled direct FM modulation | AC coupled direct FM signal, without filtering. Program to TTL | Analogue Input signal 350mV @ 60% dev adjustable | I/P |
| 2 | Unfiltered Data OUT (RX disc) | Discriminator audio from the D-150. Unprocessed AF signal (prior to tone filtering and de-emphasis) Link 413 fitted and link 414 not fitted | Output signal 1KHz audio at 60% peak dev. produces 200 to 300mVrms | OP |
| 3 | PTT In (Tx Key) Program READ | Signal, which keys the transmitter (active low). Program : READ used for outputting programming data from mode | TTL level 0V = Tx open cct = Rx TTL level (RS 232 converter in cable) | I/P |
| 4 | Ground | Ground connection | 0V (Chassis) | |
| 5 | +Ve | Power connection | +12 Volts nominal 9v~18v extreme | I/P |
| 6 | Busy (CD) | Logic level output to indicate presence of a carrier. | TTL level 0V = carrier 5V = no carrier | OP |
| 7 | MIC IN / Monitor | Audio signal that is filtered (high pass and pre- emph) then follows same route as data mod through LPF. Sub-audio tone is mixed with audio after the LPF Grounding line activates monitor action | 1 KHz audio at 60% peak system deviation input level = 6 to 8mV rms 10k Ohm resistor to ground | I/P |
| 8 | Program : WRITE/ Serial command | Used for inputting programming data and use of serial command | TTL level (RS232 converter in cable) | I/P |
| 9 | SPEAKER OUT | Audio output from the audio amplifier. Filtered by tone-filter and de-emphasis circuit. | 1KHz audio at 60% peak dev. produces nominal 1Vrms @ 8Ω | OP |

Operation

Channel selection

The Channels can be changed either by internal switches or via a serial command (see later) inputted from the external control system, on pin 8 of the D type connector.

Channels are also selected by the use of internal switches and can be set as shown below. The top 4 screws will need to be removed to gain access to the switches, care must be taken to avoid any damage which could invalidate the warranty.

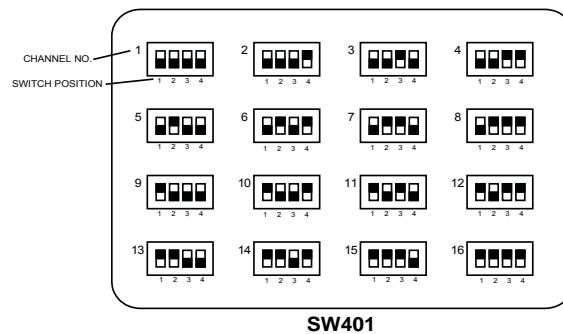


Figure: Setting of channel selector switch for each channel.

Transmit/receive operation

The D150 is put into transmit/receive either by using TTL levels, or Serial Command, depending on the application.

Using TTL - PTT is active low (Pin 3). Receive/standby is high or disconnected.

For serial command control refer to the table below.

Serial commands

The modem can be controlled by using the serial command (pin 8) data in, sending commands to the radio such as PTT or change channel

The format for these commands (asynchronous) is:

- Baud rate: 4800 bit/sec
- Data: 8 bit
- Parity: Non parity
- Stop Bit (SP): 1 bit
- MSB first transmission

Each serial command consists of 3 bytes. The first byte is the command (CMD), the second is data required by the command (DATA) and the third is the check sum (CS) to validate contents

TX Command format:

| | | |
|----------|----------|----------|
| CMD | DATA | CS |
| 1st byte | 2nd byte | 3rd byte |

N.B. Check Sum = 1st byte + 2nd byte. CS = CMD + DATA

Response format:

| | | | | |
|-----|-------|-------|-----|-------|
| CMD | DATA1 | DATA2 | ... | DATAn |
|-----|-------|-------|-----|-------|

The response CMD is in the form of:

ACK, acknowledge, Hex: 0xAA; (then data if any)

NACK, no acknowledge (error in command) Hex: 0x55

NOK, not okay (cannot carry out command) Hex: 0x65

N.B. The D150 only response when in programming mode and not in normal radio operation, due to the PTT line and Program Read using the same Pin out(pin3).

Command and data

| Mode | Transmit command (CMD) | Transmit Data (DATA) | Response (CMD) | Response Data | Remark |
|--|------------------------|------------------------------|----------------|---|-----------------------------------|
| Channel Change | 0x64 | 0x00 : Chn 1 0x01 : Chn 2 | | | No response |
| Enter TX mode | 0x61 | 0x74 | | | No response |
| Enter RX mode | 0x61 | 0x72 | | | No response |
| *Enter Sleep mode | 0x57 | 0x4f | | | No response |
| *Exit Sleep mode | 0x57 | 0x58 | | | No response |
| Request Current Channel | 0x53 | 0x00 | | | No response |
| Active Program Mode | 0x87 | 0x00 | | | No response |
| Request Current Channel after Program Mode activated | 0x53 | 0x66 | ACK/NACK | 1st byte : Chn no. 2nd byte : Software Version | Returns to normal radio operation |
| Scan start | 0x62 | 0x73 | | | No response |
| Scan Stop | 0x62 | 0x46 | | | No response |
| Scan delete | 0x62 | 0x4f | | | No response |

*Software version 5.0 and above.

A comprehensive list of serial commands is available on our web site www.mobile-expertise.co.uk/support

Standard radio commands

Scanning

A scan function is available whereby any or all 16 channels can be monitored for activity. Scanning parameters such as scan speed and delay are programmable (refer to programming guide)

Control of the scan channels is by serial commands.

Note The priority channel (the transmit channel during scanning) is the channel selected via the dip switch.

Timings

Radio timings parameters are available for alteration via the programmer.

These include:

- Time-out timer,
- Hang timer -transmit after dis-asserting PTT
- Tx delay - prevents squelch noise when using CTCSS/DCS

Busy Channel Lockout

Prevents TX when while the radio is receiving. Refer to programming guide more detail.

Power Save Mode

The modem will go into power save mode for short periods of time to minimise power consumption when a battery supply is being used. Parameters are programmable.

Enhanced Power Save Mode (sleep)

The modem in this mode deactivates all circuitry with the exception of the micro controller. It is activated and deactivated using serial commands (see Command List).

Current consumption is significantly reduced to approximately 7mA and represents an 85% saving on normal standby consumption.

Squelch

The modem offers 2 forms of squelch, which are programmable as RSSI level check or busy port .

- RSSI level uses the RSSI level from the FM detector chip and the point of squelch is programmable..

Status indicators and Audible alerts

The LED indicates the current status of the radio and if an external speaker is connected to pin 9 of the DB-15, audible tones can be heard under certain fault conditions. The details are shown in the table.

| Status | Description | LED colour | Audible tone (if speaker fitted) |
|----------------------|-------------------------|---|----------------------------------|
| Normal | Power ON | Green-Orange-red | |
| | Busy channel | Orange | |
| | Correct Call (with SAT) | Green | |
| | Transmit | Red | |
| Warning | Busy channel lockout | Green flashes | Single Beep tone |
| | Time out time | Green flashes (PTT active) Red LED extinguishes (serial command) | |
| | 5 secs before TOT | 1 Green flash | Single Beep tone |
| Errors | EEPROM error | 1 Orange flash | |
| | Out of lock | Continuous Orange flashes | |
| | Comms error with module | Green LED flash | |
| | Transmit hang on time | | Single Beep tone |
| | Wrong model programmed | After "Power ON sequence -two extra Orange flashes. | |
| Program | Read Mode | Red LED flashes | |
| | Write mode | Green LED flashes | |
| Squelch program mode | Initial data load | Green-Orange-Red | |
| | Open squelch mode | Three Green flashes | |
| | Close squelch mode | Two Green flashes | |
| | Save squelch mode | One Green flash | |

Programming

The data modem is pc programmable. The parameters available for programming include:

- Frequency, channel spacing and sub-audible tones on a per channel basis
- Radio settings such as power save mode, TX lockout, TX timeout, Squelch

The pc program also allows for squelch adjustments and calibration. Refer to programming manual and PC software.

Installation

Antennas

It is important that any antennas are installed in a suitable location with an adequate ground plane. Ideally, multiple antennas should be separated by a minimum of a wavelength (at the lowest frequency), whilst still retaining a good ground plane for each antenna. Therefore, for a 400MHz system, the ideal separation should be a minimum of 0.75m (~30in), and for 150MHz system the minimum should be 2.5m (~98in).

Warning: If installing an antenna near people it is necessary to ensure the minimum separation is maintained. This particularly important where prolonged exposure is likely.

For a full range of antenna options and other accessories visit the Mobile Expertise Global web site.

Power sources

It is important that a "clean" source of power is used for the nominal 12V dc supply to the modem.

The power source must be capable of safely delivering 9-18V dc at up to 2 Amps. For added safety and protection of the modem it is recommended that an in-line or similar method of fuse is used in +ve line. The recommended safety fuse to be fitted is 250V T2A (Time Lag)

Cabling

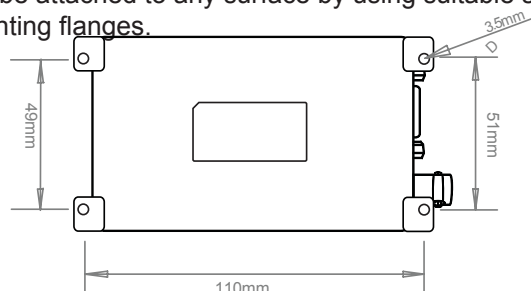
If possible, run RF cables separately from other cables and keep RF cables apart from one another to avoid interference / coupling.

When fitting the modem into a fixed installation care must be taken in the routing of all cabling such that the insulation cannot become damaged.

Fixing

We recommend that the D150 is securely fixed to a surface, either directly, or with a suitable bracket. The fixing hole centre dimensions are as shown.

The modem can be attached to any surface by using suitable size screws through the M3 holes in the mounting flanges.



Safety and general information

Important information on safe and efficient use of your Radio device.

Exposure to radio frequency energy

Your modem is a high power radio transceiver. When it is on, it receives and also sends out radio frequency (RF) signals. To help minimise human exposure to RF electromagnetic energy, keep transmission time to 50% or less.

As with all radio devices, holding the antenna affects transmission quality and may cause the radio to operate at a higher power level than required. Do not hold the antenna when the radio is in use.

Do not use radios with damaged or modified antenna, this may violate compliance with relevant international standards.

Where prolonged human exposure is likely, the minimum separation from the antenna should be 0.8m.

Electromagnetic interference/compatibility

Most modern electronic equipment is shielded from RF energy. However certain electronic equipment may not be shielded against RF signals. The modem needs to be switched off in any facility where posted notices instruct you to do so to avoid electromagnetic interference or compatibility conflicts. Special care should be taken near facilities such as hospitals or health care centres may be using equipment that is sensitive to external RF energy.

Medical devices (Pacemakers)

If you use any personal medical device, consult the manufacturer of your device to determine it is adequately shielded from RF energy. Your physician may be able to assist you in obtaining this information.

Vehicles with airbags

Air bags inflate with great force. Do not place a radio in the area over an airbag or in the airbag deployment area, any radio may be propelled with great force and cause serious injury to the occupant of the vehicle.

Potentially explosive atmospheres

Turn off your modem prior to entering any area with a potentially explosive atmosphere, unless it is a radio type especially qualified for use in such areas. Do not remove install or charge batteries in such areas. Sparks in potentially explosive atmospheres can cause an explosion or fire resulting in bodily injury or death.

Potentially explosive atmospheres include fuelling areas such as petrol stations, below decks on boats, fuel or chemical transfer or storage facilities, vehicles using liquid petroleum gas (such as propane or butane); areas where the air contains chemicals or particles such as grain, dust or metal powders, and any other area where you would normally be advised to turn off your vehicle engine. Areas with potentially explosive atmospheres are often but not always posted.

Warranty and repairs

The me-D150 is a low maintenance device. Once installed it requires no ongoing maintenance.

In the event that your Mobile Expertise Global me-D150 modem needs repair, return your radio to an authorised Mobile Expertise Global supplier. Do not disassemble, modify or repair the unit unless the work is carried out by a Mobile Expertise Global approved supplier. Incorrect assembly, modification or repair may cause irreparable damage to your unit and will invalidate any warranty.

Care of the equipment

- Do not immerse the me-D150 modem in water or other fluids.
- Do not use solvents or spirits for cleaning as this may cause damage to the case materials.
- Do not over tighten connection to the modem.

Disposal / Recycling

The me-D150 is a Class 3 product in accordance with the Waste of Electrical and Electronic Equipment (WEEE) Directive. Disposal of this class of equipment must be carried out through an authorised recycling centre.



Declaration of conformity*

The me-D150 range is a 1 to 5 Watt radio data modem, in V2 (146-173MHz), U1(400-440MHz) or U2 (440-480MHz) frequency ranges,

These frequencies are licensed, restriction of use may apply in some countries.

This equipment is intended for use in:-

Model me-D150:

United States of America & Canada.

This equipment can also be used worldwide, where the equipment is approved for use.

Note : For European applications our me-D150 model applies. Contact Sales@mobile-expertise.co.uk for more information.

FCC / Canadian Specifications

| | |
|--------|----------------------|
| FCC | Part 15*, 90 |
| Canada | RSS-119 issue 9 2007 |

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Any queries regarding information in this manual, please contact the Technical Services Group Leader at the above address.

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