DIGITAL WIRELESS CORPORATION

DM-3010 Digital Transceiver

406-470 MHz 25 watts

User Manual

09-05-0003-00

FCC Interference Warning

The FCC requires that manuals pertaining to Class A and Class B computing devices must contain warnings about possible interference with local residential radio and TV reception. This warning reads as follows:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

This product has been tested and complies with the specifications for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used according to the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which is found by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna

Increase the separation between the equipment or devices

Connect the equipment to an outlet other than the receiver's

Consult a dealer or an experienced radio/TV technician for assistance

Computer Software Copyrights

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Modifications

Any modifications or changes to the circuitry or settings not approved by Digital Wireless Corporation could void the user's authority to operate this product.

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1 General Overview

The DM-3010 Digital Transceiver is a narrowband mobile transceiver specifically designed for DV/IP format digital transmissions used on the i2way Network. The radio receives and transmits i2way Network signals containing audio (voice), text and control data. i2way Network signals contain call control information, streaming digital voice and customer payload data. i2way format stations do not respond to or "hear" analog transmissions, or any other "foreign" form of digital transmission.

The DM-3010 Digital Transceiver is available in various models that cover the 138-520 MHz bands. The radio receives and transmits data at 10,000 bps using four level frequency shift keying ("4FSK") in 12.5 kHz spaced channels and at 5,000 bps in 6.25 kHz spaced channels.

The radio's construction is modular, and may be field-repaired by a factory-certified technician by replacing plug-in modules. It may be configured in single channel "conventional" or multi-channel "trunked" modes. Multi-channel systems are typically trunked, with one channel operating as the "control channel" and the remaining channels as "transaction channels".

This manual details the version for 12.5 kHz and 6.25 kHz spaced channels in the 406-470 MHz bands. This radio may be used in international service down to 380 MHz.

2 Installation

The DM-3010 radio is designed to be installed either in a vehicle, in a railroad locomotive or indoors. It is has no moving parts or switch contacts.

2.1 Unpacking after Shipment Receipt

The station is normally shipped in a cardboard carton protected in a plastic suspension mount. The unit is ready-to-operate, and generally the only included accessories are the microphone, loudspeaker and cables. *Do not apply power to the radio unless a suitable antenna or load is connected to the transmitter output. In the United States and Canada this radio requires a suitable FCC or Industry Canada license to operate.*

2.2 Mounting

The radio is intended to be installed either with the transceiver unit mounted in a vehicle trunk, under a seat or in any other convenient, protected location, and the radio's "control head" (control panel) unit mounted in a location accessible to the operator. Two different brackets are available to facilitate mounting of the control head, an adjustable angle trunion mount and a flush-mounting bracket. The loudspeaker, which mounts on its own trunion mount, should be installed in a location where the front of the speaker faces towards the operator without any obstructions.

The transceiver may be secured to any surface using four self-tapping screws. Mount the transceiver in a location where it is protected from the weather and dirt. Reasonable air flow around the heat sink fins should be provided. Normally the unit does not get hot, however after extensive transmitting, or under unusual conditions, the heat sink fins of the radio may get warm or hot and care should be taken to prevent accidental exposure to human skin.

Optional rubber shock mounts are available to assist in mounting the radio in locations that present extreme shock and vibration.

2.3 DC Power Connection

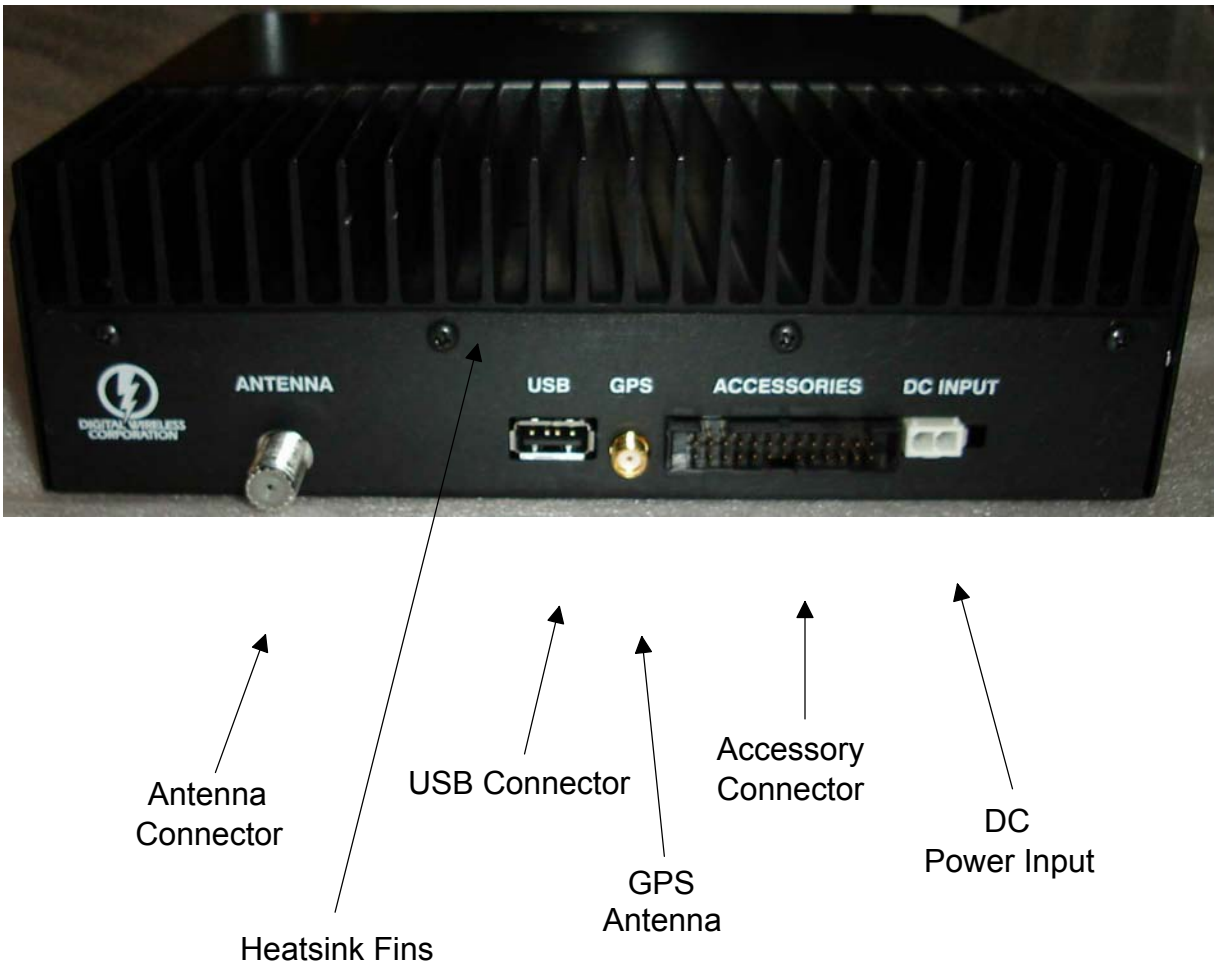
The radio is intended to be powered from normal "12 volt" vehicle power systems. Such 12 volt systems actually operate normally between 12 and 15 volts. The red and black "zip cord" power cable should normally be connected directly across the a vehicle battery. The provided in-line fuse should be installed in the positive (RED) lead as close to the battery as possible in order to protect the cable from accidental shorts. In locomotive applications an external 72 volt to 12 volt power convertor rated at a minimum of 10 amps continuous is required.

The power cable should be installed in the vehicle in such as way that it is not liable to accidentally be shorted to ground. It is advisable to shield the power cable where possible with "split loom" or other form of durable cable protection. Where the power cable passes through the firewall or any other metal bulkhead or bracket, ensure that proper grommets or other insulation protection devices are used to prevent rubbing and chafing of the insulation against sharp metal edges, which can cause shorts.

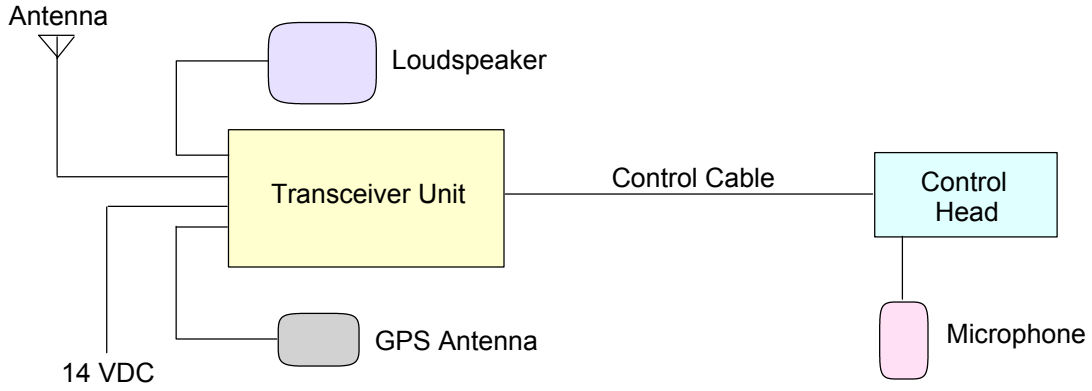
If the vehicle's power supply is suspected of "alternator whine" or other power problems, a 10 amp DC line filter should be installed, close to the battery.

2.4 Transceiver Real Panel Connectors

There are several connectors on the rear panel:



2.5 Typical Connections



2.6 Environmental Considerations

The radio is normally intended to be operated in environments that are maintained between -30° C and +50° C. The nominal operating temperature is +25° C ±3° C (77° F ±5° F). Please consult the factory for installation assistance in environments that vary from these parameters.

The radio can be operated with a relative humidity of less than 95% at altitudes below 10,000 feet above sea level. Storage temperature range (unpowered) is from -40° C and +70° C.

2.7 Exposure to Radio Frequency Energy

The DM-1000 Digital Transceiver is a "mobile radio" and is intended to have its antenna properly installed externally on a vehicle where the center of radiation (the antenna) when transmitting does not cause human exposure beyond safe limits. During installation planning, care should be taken to research and understand relevant government radiation regulations and to ensure that the final installation will meet such regulations. Since every installation is unique, radiation safety is beyond the scope of this manual. Transmit only when people inside and outside the vehicle are at least the minimum distance away from a properly installed, externally-mounted antenna. When the radio is not transmitting, no non-ionizing radio frequency electromagnetic energy are being radiated.

2.8 Mandatory Safety Instructions to Installers

The minimum safe distance from a person(s) to the antenna when this radio is transmitting is at least 41 inches or 1 meter.

The Federal Communications Commission has adopted a safety standard for human exposure to RF (Radio Frequency) energy, which is below OSHA (Occupational Safety and Health Act) limits.

Antenna Minimum Safe Distance: 41 inches or 1.0 meter

Antenna Gain: 2.5 dBi maximum.

Antenna Mounting: The antenna should be a fixed-mounted, properly installed, externally-mounted antenna with a minimum safe distance (when transmitting) for general Population/Uncontrolled Exposure of at least 41 inches or 1 meter.

Warning: Maintain a separation distance from the antenna to a person(s) of at least 41 inches (when transmitting) for general Population / Uncontrolled Exposure.

The operation of this transmitter must satisfy the requirements of Occupational/Controlled Exposure Environment, for work-related use. Transmit only when person(s) are at least the minimum distance from the properly installed, externally mounted antenna.

The best location for an antenna is in the center of a large, flat, conductive metal area. In many vehicles, this requirement is satisfied by mounting the antenna in the center of the roof. If the trunk lid is used, connect suitable grounding straps between the trunk lid and the vehicle chassis to ensure that the trunk lid is a chassis ground.

2.9 Operational Warnings

2.9.1 Vehicles with Air Bags

Do not install this radio in the area over an air bag or in the air bag deployment area. Air bags inflate with great force with no warning. If this radio is place in the deployment area and the air bag inflates, the radio may be projected with great force and cause serious injury to occupants of the vehicle

Installation in vehicles with air bags should be performed by a installer/technician qualified in the requirements of such installations. Contact the vehicle's manufacturer for specific air bag information and requirements for your specific make, model of vehicle and configuration.

2.9.2 Explosive Atmospheres

Turn off your two-way radio when you are in an area with potentially explosive atmosphere. Sparks in a potentially explosive atmosphere can cause an explosion or fire resulting in bodily injury or even death.

2.9.3 Blasting Areas

To avoid possible interference with blasting operations, turn off your radio when you are near areas posted: “Turn off two-way radio”, near a blasting area or near electrical blasting caps. Obey all signs and instructions.

2.9.4 Installation damage to critical vehicle components

Care must be taken when installing this radio to not damage critical vehicle systems including wiring, vacuum hoses and other systems. Screws installed through vehicle panels may puncture, pierce or otherwise damage wiring, hoses and other systems. If not properly installed, screws holding the radio may become loose and break free on collision or upon any impact.

2.10 Turning on the Radio Power

The radio should not be connected to a DC power source unless all of the components provides are connected (control head, loudspeaker, microphone). The power switch is located in the top left hand corner of the control head/front panel. The radio should not be powered unless all of the components are connected. When radio power is applied and the radio is “powered on”, care must be taken to not depress the push to talk transmit button on microphone unless a suitable 50 ohm antenna load is attached to the transmitter output “mini UHF” connector on the rear panel. If the load is an antenna, do not cause the radio to transmit unless the minimum safe distance to humans is maintained.

2.11 Mobile Antenna System

This radio needs an external antenna system, which should be any suitable style of antenna with a gain of no more that 2.5 dB and an impedance of 50 ohms at the operating frequencies. This antenna should be properly installed in an appropriate location externally on the vehicle. The antenna should be located in such a position so that it may not be touched by a person when transmitting, or the antenna should be fully insulated. The antenna should not be mounted near ladders, light bars or any other object which may affect or degrade its performance.

2.12 GPS Antenna

This radio utilizes a GPS antenna. The GPS antenna must be of a type approved by the factory for use with the DM-3010 mobile radio. The GPS antenna is for receive only and presents no radio frequency emission hazard.

3 Operation

The main operational control to this radio is the Push-To-Talk button on the microphone. Depression of this switch causes the radio to transmit. Additional controls are contained on the front of the Control Head:

3.1 Transceiver Front Panel

The Base Station Transceiver Module has a number of pushbutton controls, an LED status indicator, and a lighted, alphanumeric LCD display.

A suitable DWC transistorized microphone plugs into the front panel by way of a six-conductor telecom-style connector. The connector latches to the control head connector in the same way a telephone cord latches to a telephone set.

When the radio is powered on, the keyboard and the liquid crystal display are both backlighted with green light-emitting diodes (which may not be visible in direct sunlight).

3.2 Keyboard Switch and Control Locations

3.3 Keyboard Commands

PWR	Power Switch
*	Instant Replay
3 GRP	Select Group
4 2 6 UNT	Select Private Call, Press PTT button.
	Two "beeps" indicate private call
	Resets to group mode in 10 seconds
1 3 END	Send a Status Message (1 to 3 digits)
FCN 3	Display last text message
FCN 5	Display GPS latitude/longitude
FCN UNT 3	Display vehicle battery voltage
CLR	Clear

3.4 Changing Volume

The radio's receive volume is adjusted by pressing the "Up Arrow" and "Down Arrow" pushbuttons to change volume up or down. Volume settings are stored when the radio is powered off.

3.5 Changing Talkgroups

The radio's talk groups may be changed by entering the number of the desired talkgroup and pressing the "Group" button. Alternatively, the radio's "Clear" button and then the "GRP" button may be pressed and then the Up and Down arrow keys used to select the desired group name, with the Group button pressed to store the selected group.

3.6 Calling an individual Mobile

A two-way radio call may be made to a selected individual mobile unit by first entering that mobile unit's ID number and then pressing the "UNT" button.

After 10 seconds of no activity, the radio returns to Group Calling Mode.

3.7 Making a Telephone Call.

Enter the telephone number and press "SND". To talk, press the PTT button. Release to listen. To terminate the call press "END".

3.8 Instant Replay

The last received audio transmission may be replayed by pressing the "*" button.

3.9 GPS Display

The geographic coordinates of the radio may be displayed by entering "FNC" "5".

4 Adjustments

The radio's programming is password protected, and are available only to the factory and factory-trained maintenance personnel. Authorized, factory-trained personnel should consult the maintenance manual for the radio for further information.

5 Control Station Installation

The DM-3010 mobile transceiver may be used as a fixed-mounted "control station" in a building. It may be powered from a suitable AC power supply which provides 12.2 to 15 volts at 10 amps. A factory-built desktop power supply is available from Digital Wireless which provides suitable mounting for the radio's transceiver and control head and provides the necessary AC power supply as well as a standby battery. A 19 inch wide rack-mounting version is also available which also provides connections for Digital Wireless-provided "local remote" telephone-style desksets and an enhanced desktop dispatch console.

5.1 Fixed Antenna

When the radio is installed indoors, a suitable outdoor antenna must be utilized. The antenna should be installed outside the building in such a location as to comply with the minimum spacing requirements as specified in paragraph 2 of this manual.

When used as a control station or for other fixed usage, the relevant regulatory effective radiated power (ERP) regulations much be consulted in order to select the correct type of antenna, transmission line and installation location in order to comply with regulations concerning radio frequency emissions exposure.

5.2 Transmission Line

When a transmission line (antenna cable) is used to connect to an external antenna mounted on a roof, external pole or tower, suitable grounding must be provided where the cable enters the building and close to the radio. Extreme caution must be used to ensure that the antenna does not come in contact with power lines.

It is also recommended that a suitable lightning protection device be installed in the transmission line and connected to a suitable ground connection. A suitable ground connection is generally a purpose-installed ground rod driven into the earth and not the neutral or ground wire of a building's electrical wiring.

6 Maintenance and Repair

6.1 General

There are no user-servicable components in the radio. There are no manual adjustments or alignment controls. No hazardous voltages are present inside the radio although the danger of an RF burn is possible if the radio is transmitting and a person comes in contact with the transmitter output or internal transmitter circuitry. Testing, installation and repair must be performed by qualified technicians trained in the handling of this equipment. The covers of the radio should only be removed by experienced and qualified technicians trained in the handling of this equipment.

CONTACT THE FACTORY FOR MAINTENANCE, REPAIR AND WARRANTY INFORMATION.

6.2 User Routine Maintenance

6.2.1 Quarterly

- Dust and debris should be removed from heat sink fins.

- Using a DV/IP compatible mobile or portable radio ("the test radio"), place the test radio into "ECHO" mode and "TECHNICIAN" display mode, and make several ten second voice transmissions through the station from a location where normal or better coverage is routinely experienced. The test may be performed at the station's installation (tower) location. Observe the two frame error readings on the front panel of the test radio. Typically 1 or less frame errors should be observed. If an unusually high number of errors are observed, contact your factory authorized service person or the factory.

- The antenna mounting base outside the vehicle should be inspected for corrosion and any visible degradation.

6.2.2 Annually

- The transmitter frequency and power output should be checked by a factory trained service technician using service procedures recommended by the factory.

- The radio's transmit frequency(s) should be checked by a factory trained service technician using service procedures recommended by the factory.

- Additional tests should be performed as recommended by the factory by a factory trained service technician using service procedures recommended by the factory.

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