MOBEXCOM DVE

Users Manual

8A084X03 Rev. 1.3

FUTURECOM SYSTEMS GROUP INC.

1. TABLE OF CONTENTS

Section Page

Notes, Attentions, Important

Throughout this manual, you will see Notes, and Attentions, Important
Their meaning is as follows:

NOTE
A clarifying statement that expands on the text that follows.

IMPORTANT
An important statement that should be considered and / or implemented in order to achieve adequate equipment operation.

ATTENTION!
An instruction that must be followed in insure compliance with the appropriate standards or proper equipment operations.

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

ATTENTION!

Changes or modifications not expressly approved by Futurecom Systems Group Inc. could void the user's authority to operate the equipment.

IMPORTANT

This manual contains important safety and operating instructions, therefore keep this manual always on hand!

Prior to using any product, follow all warning, safety and operating instructions written on the product and in the Users Manual. **All instructions should be saved for reference in the future!**

RF EXPOSURE

Model	Minimum Separation Distance From 0dBd Omni Directional Antenna
DVE VHF	66cm (26.0")
DVE UHF	40cm (15.75")
DVE 700	28cm (11.02")
DVE 800	28cm (10.63")

Table 1 DVE Minimum Separation Distance for Different Frequency Bands

ATTENTION!

To satisfy FCC/IC RF exposure requirements, a separation distance as per Table 1 or more should be maintained between 0dBd (2.15dBi) onmi directional antenna of this device and persons. To ensure compliance, operation at closer than this distance is not allowed.

RADIO OPERATOR

Futurecom requires the MOBEXCOM DVE operator to ensure FCC Requirements for Radio Frequency Exposure are met. The DVE output power has to be set such that the maximum power into 0dBd (2.15dBi) omni directional antenna does not exceed 3.0W at the antenna connector. The minimum distance between all possible personnel and the antenna at 3.0W must be at least as shown in Table 1.

FAILURE TO OBSERVE THE MPE DISTANCE EXCLUSION AREA AROUND THE ANTENNA MAY EXPOSE PERSONS WITHIN THIS AREA TO RF ENERGY ABOVE THE FCC EXPOSURE LIMIT FOR BYSTANDERS (GENERAL POPULATION). **IT IS THE RESPONSIBILITY OF THE OPERATOR TO ENSURE THAT MPE LIMITS ARE OBSERVED AT ALL TIMES DURING TRANSMISSIONS. THE OPERATOR MUST ENSURE AT ALL TIMES THAT NO PERSON COMES WITHIN MPE DISTANCE FROM THE ANTENNA.**

ATTENTION!

The MOBEXCOM DVE is intended for use in occupational / controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC limits. This radio is NOT authorized for general population, consumer, or any other use.

ANTENNA INSTALLATION

IMPORTANT

The maximum allowed gain of the λ/4 omni-directional antenna for the Mobexcom DVE is Unity (0dBd).

IMPORTANT

To assure optimum performance and compliance with RF Energy Safety standards, these antenna installation guidelines and instructions are limited to metal-body vehicles with appropriate ground planes and take into account the potential exposure of back seat passengers and bystanders outside the vehicle.

Selecting an Antenna Site/Location on a Metal Body Vehicle

External installation

Check the requirements of the antenna supplier and install the vehicle antenna external to a metal body vehicle in accordance with those requirements.

Roof top

For optimum performance and compliance with RF Energy Safety standards, mount the mobile radio antenna in the center area of the roof.

Trunk lid

For optimum performance and compliance with RF Energy Safety standards, mount the DVE antenna in the center area of the trunk.

Before installing an antenna on the trunk lid:

- Ensure that the distance from the antenna location on the trunk lid will be at least the distance specified in Table 1 from the front surface of the rear seat-back to assure compliance with RF Energy Safety standards.
- Ensure that the trunk lid is grounded by connecting grounding straps between the trunk lid and the vehicle chassis.
- Ensure that the antenna cable can be easily routed to the radio. Route the antenna cable as far away as possible from any vehicle electronic control units and associated wiring.
- Check the antenna location for any electrical interference.

NOTE:

Any two metal pieces rubbing against each other (such as seat springs, shift levers, trunk and hood lids, exhaust pipes etc.) in close proximity to the antenna can cause severe receiver interference.

FCC Label

This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
1) This device may not cause harmful interference, and
2) This device must accept any interference received, including interference that may cause undesired operation.

RF Exposure Label

RF EXPOSURE LABEL INSTALLATION LOCATION

IMPORTANT

The RF Exposure Label should be affixed in the vehicle beside the mobile radio control head. The label should be in the direct view of the operator. The label is supplied with the MOBEXCOM DVE.

2. INTRODUCTION

The Futurecom MOBEXCOM DVE® is designed to interface to a range of mobile radios and control heads. It permits expanded operation of portable radios. The DVE system consists of a mobile radio, MOBEXCOM DVE® unit and a mobile radio Control Head. The Control Head communicates with the DVE and the mobile using a serial data protocol.

MODES

The DVE operates in one of two modes. The mode of operation is selectable from the Mobile Control Head by the mobile radio operator.

The modes are known as the MOBILE (DVE OFF) and SYSTEM modes. The function and purpose of each mode is described as follows.

Mobile Mode

In the MOBILE mode, the DVE is completely disabled. The mobile radio is operational and will permit the mobile radio user to communicate conventionally, using the mobile radio. The mobile user may select the desired mobile operating channel, adjust the receiver volume level and transmit using the microphone Push-to-Talk (PTT).

This mode is used when DVE operation is not desired. The DVE System operates similarly to a standard mobile radio system, as if the DVE were not present. The MOBILE mode should be selected if several DVE equipped vehicles are in the same area and another DVE already has SYSTEM mode enabled.

System Mode

In the SYSTEM mode, both the Mobile Radio and the DVE are enabled to permit the full exchange of communications among nearby portable radio users and the dispatcher and other users on the Mobile Radio channel. Signals received by the DVE receiver are heard in the mobile speaker and will also be retransmitted by the Mobile transmitters. Signals received by the Mobile receiver are heard in the mobile radio speaker and are also retransmitted out of the DVE transmitter. However, all functions of the mobile radio operate normally, except for scan, scan activation, mode selection, zone selection, home channel operation and mobile channel selection. When the SYSTEM repeat mode is selected, the mobile radio scan is deactivated and the mobile radio reverts to the selected mobile channel. When signals are present in both the DVE and Mobile receivers simultaneously, the signal from the DVE will have priority in the mobile speaker. (Note that the receiver/PTT and speaker priorities are programmable.)

The DVE receiver has full priority over the mobile radio operator microphone Push-to-Talk. The mobile radio operator microphone Push-to-Talk has priority over the Mobile receiver.

When signals are present in both the DVE and Mobile receivers simultaneously, the signal from the DVE has priority in the mobile speaker.

The SYSTEM repeat mode is used when full communications among all radio parties is desired.

CONTROL HEAD

The control unit is a standard mobile radio control head. The DVE is designed to operate with a variety of control heads. It is a ruggedly constructed weatherized control unit, incorporating an array of pushbuttons, a Liquid Crystal display, 2 knobs and 2 LED indicators. The display and pushbuttons are backlit for night time visibility.

The control unit is housed in a two-piece plastic, weather-resistant housing. The external radio/DVE connections are made to connector on the rear of the unit. A microphone is provided and is secured to the control unit connector on the front of the control unit.

A serial-control data interface is used to provide a communications connection between the control unit, the DVE and the mobile radio.

The following features are provided:

Knobs for:

‘Volume’ with integral Power On/Off pushbutton switch

‘Channel’ selection

Pushbuttons for:

'Zone'

'Page'

'Monitor' ON/OFF

'Alarm' (Δ)

'Private' (∅)

' mode' selection (H/L)

'Phon'

'Scan'

'Call'

'Opt'

'Home Menu'

'Sel'

LED Indicators for:

'Mobile Transmit' (Red LED)

'Mobile Receiver Busy' (Orange LED)

Display:

Alphanumeric LCD (with backlighting)

Indicators are provided to display the receiver and transmitter status of the mobile. The 'Mobile Transmit' red indicator lights whenever the mobile transmitter is keyed. The 'Mobile Receiver Busy' orange indicator lights whenever the receiver is busy, regardless of presence or absence of any CTCSS (Channel-Guard) tone coding.

DVE RADIO UNIT

The DVE is designed to implement a DVE System, to provide portable radio users greater communication range by repeating signals through the vehicle's mobile radio to the dispatch centre. Two modes of DVE operation are available, to suit different operational requirements. The DVE Radio is the central connection point for the system. It connects to an external Control Head and Mobile Radio.

It includes all the necessary hardware for DVE operations. The DVE is housed in a weather resistant metal enclosure with 2 removable covers. The covers provide protection for the connectors.

The DVE communicates with the control head and the mobile radio via serial communication bus.

MOBILE RADIO UNIT

The Mobile Radio used in the DVE System is a standard mobile radio. Refer to the mobile radio's user manual for details of operation of this radio. The DVE is designed to operate with a variety of mobile radio units.

3. OPERATION

CONTROL HEAD

The DVE Control Head selects mode of operation for both the and the Mobile Radio.

To Turn the ON or OFF

Press the button in the Volume knob located on the left side of the control unit. The display should become active when the system turns ON. A test message appears briefly on the display. When the system is turned ON, the Mobile Channel and DVE Mode will automatically return to the same settings that were in effect when the power was last turned OFF. Press the button in the Volume knob second time to turn the DVE OFF.

To Change the Speaker Volume

Turn the Volume knob until the desired volume level is reached.

To Change the Mode

Press the 'H/L' button once. The DVE mode is changed in the following sequence: MOBILE-SYSTEM-… In the Mobile mode the alphanumeric display shows ‘ZONE CHANNEL’. In the System mode the display changes to ‘RSYS CHANNEL’. (‘ZONE’ is the selected Mobile zone name while ‘CHANNEL’ is the selected Mobile channel name.) When the SYSTEM mode is selected, the mobile radio scan is deactivated and the mobile radio reverts to the selected mobile channel.

NOTE

The Mobile zone and channel cannot be changed while in SYSTEM mode.

Refer to the earlier description of repeat modes.

MOBILE XMIT Status Indicator

The 'MOBILE XMIT' red LED indicator is one of two status indicators that is provided on the Control Head, located in the upper left corner. This indicator will light whenever the Mobile Transmitter is keyed. This will occur in 'MOBILE' or 'SYSTEM' mode when the microphone Push-to-Talk is being pressed or when a signal from the DVE is being retransmitted by the Mobile Radio (In 'SYSTEM' mode).

MOBILE BUSY Status Indicator

The 'MOBILE BUSY' orange LED indicator is one of two status indicators that are provided on the Control Head, located in the upper left corner. This indicator will light whenever the Mobile Radio is receiving any signal on the selected Mobile Channel. If CTCSS (Channel Guard) tone coding is used, the signal may not be audible if the coding does not match.

Note that if the microphone is “off-hook”, the Mobile/ audio will be heard on the speaker even if CTCSS is not present or is incorrect. This is the same as the Monitor function.

ALPHANUMERIC Status Indication

The ‘ZONE’ is not displayed in the SYSTEM repeat mode. Instead, this portion of the alphanumeric display shows the status of the DVE in these two modes together with 'MOBILE XMIT' and 'MOBILE BUSY' status indicators.

The following tables summarize indicators for different DVE states:

CONTROL HEAD INDICATORS AND ALPHANUMERIC DISPLAY – MOBILE MODE

STATE	'MOBILE BUSY'	'MOBILE XMIT'	DISPLAY
MOBILE RECEIVE WITH CTCSS	ON		'ZONE CHANNEL'
MOBILE RECEIVE WITHOUT CTCSS	ON		'ZONE CHANNEL'
MICROPHONE PTT		ON	'ZONE CHANNEL'
RECEIVE WITH CTCSS			'ZONE CHANNEL'
RECEIVE WITHOUT CTCSS			'ZONE CHANNEL'

CONTROL HEAD INDICATORS AND ALPHANUMERIC DISPLAY – SYSTEM MODE

STATE	'MOBILE BUSY'	'MOBILE XMIT'	DISPLAY
MOBILE RECEIVE WITH CTCSS	ON		'RS TX CHANNEL'
MOBILE RECEIVE WITHOUT CTCSS	ON		'RSYS CHANNEL'
RECEIVE WITH CTCSS		ON	'RS RT CHANNEL'
RECEIVE WITHOUT CTCSS			'RS RX CHANNEL'

Note that 'ZONE' and 'CHANNEL' are the selected Mobile zone and channel names, respectively.

Functions Disabled in SYSTEM Mode

There are several control unit button and knob functions, which are disabled in the SYSTEM mode. These are Scan activation, Mode selection, Zone selection, Home channel operation and Mobile channel selection.

NOTE

A standard audible error signal "bop" as well as an error message is displayed 'RSYS VR ACTIVE' if any of the above functions are attempted in the SYSTEM modes.

Other Button and Knob Functions

The available functions are:

- 'Monitor' - unmutes speaker audio when Mobile or DVE RF carrier is present.
- 'H/C' - changes Repeat mode of operation.
- 'Call' - sends call signal via Mobile transmission.
- 'Opt' - dims alphanumeric display.

All other buttons and knobs function as programmed in the standard mobile radio. Please refer to the mobile radio's documentation for details of operation.

APPENDIX 1

General Specifications	
Dimensions Height / Width / Depth	92mm (3.63”) / 186mm (7.32”) / 315mm (12.41”)
Weight	5.2 kg (11.5 lbs) approx.
Channel Spacing	12.5 kHz or 25 kHz Analog Voice or P25 Modulation
Power Supply	13.8 VDC ± 20%, negative ground only
DC Current Drain OFF	Max. 0.01 A
RPTR Standby	Max. 0.8 A
Receive	Max 0.8 A
Transmit	Max. 2.0 A @ 3 W RF output at TX Connector
Operating Temperature	-30°C to +60°C
Protection Against Liquids	IP6 (water jet proof)
RF Connector Impedance	50 Ohms
Duty Cycle	100% TX
External Connectors	
RF Connector	Mini UHF female
Computer Interface	USB, 9 pin male circular
Mobile Radio	20 pin male circular
DC Power	6 pin male circular
Power Output at TX Connector	3.0 W Max. (programmable per channel from 0.3 W Min.)
CCT Option	15 sec to 15 min. or disabled
Carrier Frequency Stability	± 1.5 ppm, from –30° to +60°C, ambient +25°C reference
Audio Distortion	<2%
Model (TX and RX Frequency Band)	
DVE VHF	136 - 174 MHz
DVE UHF	380 - 512 MHz
DVE 700	764 - 806 MHz
DVE 800	806 - 869 MHz

Applicable Standards	Test
MIL-STD 810C,D,E,F	For rain, dust and salt atmospheres
MIL-STD 810C,D,E,F	For shock and vibration