OPERATOR'S MANUAL MIDLAND MODEL 71-506-10D FULL-DUPLEX MOBILE

Preliminary



August, 2006

SAFETY/WARNING INFORMATION

This radio is restricted to occupational use, work related operations only where the radio operator must have the knowledge to control the exposure conditions of its passengers and bystanders by maintaining the minimum separation distance of 0.3 m(1 foot).

Failure to observe these restrictions will results in exceeding the FCC RF exposure limits.

ANTENNA INSTALLATION:

The antenna must be located at least 0.3m (1 foot) away from bystanders in order to comply with the FCC RF exposure requirements.

Important Information

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1.0 INTRODUCTION

Thank you for purchasing the MIDLAND MODEL 71-506-10D Full-Duplex Mobile Radio. This manual contains information to assist you in the application and operation of the radio.

The 71-506-10D is a building block intended for use in systems requiring a compact radio for full duplex, repeater, link, etc. The radio is capable of both analogue and digital modulation.

The 71-506-10D is designed to operate with an external, custom designed, control system, which may be supplied by MIDLAND or by the customer. MIDLAND will provide engineering assistance and technical information to assist in the design of the control system by the customer.

Use of the many features available in the radio will depend on the complexity of the control system.

2.0 FEATURES & PRODUCT DESCRIPTION

2.1 Standard Inclusions

The 71-506-10D transceiver is supplied complete with the following items: 71-506-10D transceiver DC Supply Cable with Fuse and Plug Operators Manual Spare Fuse Two Magnetic Keys Mounting Plate with Hardware

2.2 Features

- Designed for use with external control system
- Simplex or two frequency Duplex operation
- EEPROM programmable with a PC computer
- Up to 64 Channels
- Optional Internal Duplexer
- All FM Frequency Bands from 66 to 520 MHz
- Transmit Time Limiter to prevent channel jamming
- TX and RX Encryption
- All-Scan and Program Scan Scanning Modes
- 5 Tone Encoder & Decoder plus DTMF Encoder & Decoder
- 22, 26, or 35 MHz switching bandwidth (model dependant)

- Receiver front end covers full sub band without any tuning
- Channel selectable Wide or Narrow channel spacing
- Channel selectable High / Low power
- CTCSS/DCS on a per channel basis
- Rugged Housing
- Heavy gauge mounting plate with key lock
- Step-Up VCO Voltage for Superior Selectivity
- Low Stand-by Current is ideal for Solar Installations
- Watch Dog Timer

2.3 Product Description

The **Midland model 71-506-10D** transceivers represent a great advance on the previous rugged & time proven KG106 transceiver. They consist of separate modules all housed within one rugged, compact mobile cabinet. The receiver, the transmitter, and the PA Unit are each enclosed within their own diecast housings that are directly mounted to the main chassis. A full-featured logic module controls all parameters of the radio under the control of a microprocessor. The RF Power Output is 1 - 10 Watts on a continuous duty basis. The CTCSS module supports all EIA tones, which may be set on a per channel basis during radio programming.

The **71-506-10D** is supplied with TX and RX antenna ports to allow connection to an external duplexer or feeder cables. Space is provided inside the housing for an antenna relay or mobile type 6-cavity duplexer.

2.4 Front Panel Features

The front panel includes the following:

- 1. UHF Type connector for the Transmitter (optional type "N")
- 2. LEDs to indicate: A=POWER, B=BUSY, C=TRANSMIT, D=ALARM, and E=REPEAT
- 3. Miniature jack for speaker audio output
- 4. BNC Connector for the Receiver
- 5. DC Power Connector
- 6. 25 position D sub connector for interface to the external control system
- 7. 9 position D sub connector for connection to a PC for programming
- 8. Model Number / FCC Label



2.5 Indicator Functions

A POWER On Indicator LED

The Power ON Indicator LED will illuminate in Green color whenever the Power ON/OFF switch is switched to the "ON" position.

B BUSY Mode Indicator LED

The Busy Mode Indicator LED will illuminate in Green color whenever the 71-506-10D receives a carrier signal on the selected channel that is greater then the Squelch setting.

C TRANSMIT Mode Indicator LED

The Transmit Mode Indicator LED will illuminate in Red color whenever the 71-506-10D is transmitting.

D ALARM Mode Indicator LED

The Alarm Mode Indicator LED will illuminate (Flashing) in Amber color whenever the transceiver detects a fault in the receiver module, the transmitter module, or the PA module on the selected channel.

E REPEATER Mode Indicator LED

The Repeater Mode Indicator LED will illuminate in Yellow color when the selected channel has been programmed for Repeater operation. This LED will NOT illuminate on any channel that is programmed to operate in Base Station mode.

3.0 OPERATION

3.1 Installation and Programming

71-506-10D can be installed to operate Fixed Station in any mode of operation. The antenna(s) used for this transmitter must be fixed-mounted on outdoor permanent structures. RF exposure is addressed at the time of licensing, as required by the responsible FCC Bureau(s), including antenna co-location requirements of \$1.1307(b)(3).

The radio may also be used for mobile and transportable applications.

The 71-506-10D must be programmed before it will operate correctly. This is best done by the equipment supplier or a competent radio engineer. They will require the correct programming kit and a computer. Complete programming instructions are provided with the kit. If a duplexer is used, please observe the maximum frequency range permitted by the duplexer notches.

It is important that the 71-506-10D be correctly installed at its working location. It is recommended that this be done by a competent radio engineer.

As a minimum, it is necessary to:

- Securely attach the mounting plate to the desired location.
- Connect the DC Input power lead to a suitable 13.8 Volt Regulated DC Power supply that has sufficient capacity. (Ensure that the DC Polarity is correct, otherwise the fuse will blow).
- Connect the antenna feed line(s). (Check that the VSWR of the antenna is acceptable).
- Connect the Control System to the 25 position sub D connector.

3.2 Basic Operation

Note that controls and functions will vary with different control systems and with programming.

- 3.2.1 Switch On Switch the 71-506-10D "ON", the POWER indicator should illuminate.
- 3.2.2 Adjust the Volume Setting Rotate the Volume Knob clockwise until the audio level from the speaker is suitable.
- 3.2.3 Adjust the Squelch Setting Rotate the Squelch Knob clockwise (from the fully counter clockwise position) slowly until the background noise can no longer be heard. It is wise to slightly rotate the knob further in the clockwise direction so that variations in the background noise level do not "break" the squelch setting and cause annoying noises to be heard from the speaker.
- 3.2.4 Select the Channel Select the desired channel.
- 3.2.5 Receiving

You should now be able to hear any radio traffic that occurs on channel. It may be necessary to further slightly adjust the Volume setting to suit your listening requirements.

3.2.6 Transmitting

Depending on the legal requirements in your country and the operating requirements within your organization, it may be necessary to announce your Call Sign, and will probably be necessary to announce the Call Sign of the party you are calling at the start of your transmission.

Press the PTT switch before beginning to speak. When transmitting, it is necessary to hold the microphone about 75mm (3") from your mouth and speak clearly into the grill of the microphone.

4. CONTROL INTERFACE CONNECTOR DESCRIPTION

A 25 position D-sub connector for remote control is provided on the front panel of KG506. The functions of each pin are as follows;

1 CH 0, 1 2 CH 1, 2 3 CH 2, 4 4 CH 3, 8 5 CH 4 16	apply 1 to 6 bits of binary input to pins 1 thru 6 to select 64 channels, pull "LOW" for active state. Pin 1 is LSB.
6 CH 5 32	MSB
7 GROUND	Ground
8 RSSI	Receive Signal Strength Indication, 0 to 5 V DC
9 DISC. OUT	Discriminator audio output, low level
10 SQ. CONT.	To external Squelch control, 10K pot to ground
11 BUSY	Goes to 5V logic high when squelch is opened by signal
12 MUTE	When pulled low, mutes RX and Repeat audio
13 MOD-1	Microphone modulation input
14 GROUND	Ground
15 PTT	Pull low to transmit
16 MOD-2	Digital modulation input, TTL level, DC sensitive
17 SIMPLEX	Provides logic output during simplex operation
18 ERROR	Provides "flashing" high/low if error/alarm is present
19 DECODE	Logic low upon decoding 5-tone or DTMF code
20 RX AUD-1	With pin 21, provides balanced "0 dBm" audio
21 RX AUD-2	With pin 20, provides balanced "0 dBm" audio
	Indicates error in PA, low power or high SWR
	Connect to ground through external POWER switch
24 VOLUME	To external volume control, 10 K pot to ground
25 +12V (NON)	Switched 13.0 VDC to external accessories
CN1 Mini phone jack	Balanced Speaker output both sides above ground.

6. SPECIFICATIONS

6.1 General

Frequency Range

<u> </u>	
Version SA	300 - 335MHz
Version A	335 - 370MHz
Version B	365 - 400MHz
Version C	400 - 435MHz
Version DS	420 - 455MHz
Version D	440 - 475MHz
Version E	465 - 500MHz
Version F	485 - 520MHz

Number of Channels64Channel Spacing12Operation ModeSeAntenna Impedance50Power SupplyD0Consumption8 aEnvironmental Conditions-32Dimensions22Weight6 1

64 channels (<u>observe duplexer limitations</u>) 12.5/20/25/30KHz Semi Duplex/Full Duplex 50 ohm unbalanced DC 13.6V negative ground only (external) 8 amperes or less -30 to +60 degree C, 95% humidity @35C 220 (w) 82 (h) 347 (d) mm 6 kgs.

6.2 Transmitter

Output Power Switchable Bandwidth Frequency Deviation Frequency Stability Frequency Response Signal to Noise Ratio Modulation Distortion Spurious & Harmonics

6.3 Receiver

Switchable Bandwidth IF Frequencies Frequency Stability Sensitivity Squelch Sensitivity Selectivity Blocking Intermodulation Spurious Response AF Response AF Distortion Signal to Noise Ratio 10W continuous, 13W maximum Full sub-band 5KHz(wide band) 2.5KHz(narrow band) +/- 1KHz Within +1, -3dB, 300-3000Hz @1KHz ref. 50dB or more @1KHz 70% mod. (45dB at narrow) 3% or less 0.25uW or less

full sub-band 1st IF 73.35MHz, 2nd IF 455KHz +/- 1KHz 0.4uV or less for 20dB N.Q. / 0.3uV for 12dB SINAD 0.25uV or less 70dB or more at 25KHz 90dB or more 70dB or more 70dB or more Within +1, -3dB, 300-3000Hz @1KHz ref. 5% or less @1KHz 70% mod 50dB or more @1KHz 70% mod. (45dB at narrow)