

# **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

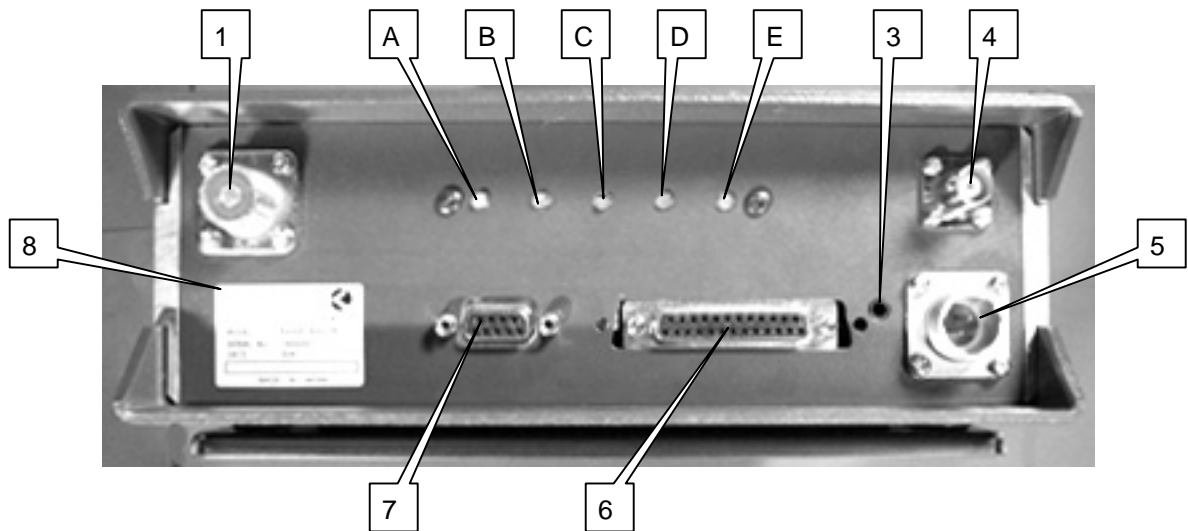
The **Midland model 71-506-10D** transceivers represent a great advance on the previous rugged & time proven KG106 transceiver. They consist of separate modules all housed within one rugged, compact mobile cabinet. The receiver, the transmitter, and the PA Unit are each enclosed within their own diecast 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 than 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	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.
2	CH 1, 2	
3	CH 2, 4	
4	CH 3, 8	
5	CH 4, 16	
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
22	TX OUT	Indicates error in PA, low power or high SWR
23	EXT. POW SW	Connect to ground through external POWER switch
24	VOLUME	To external volume control, 10 K pot to ground
25	+12V (nom)	Switched 13.6 VDC to external accessories
CN1 Mini phone jack		<u>Balanced Speaker output both sides above ground.</u>

## 6. SPECIFICATIONS

### 6.1 General

#### Frequency Range

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 Channels	64 channels ( <u>observe duplexer limitations</u> )
Channel Spacing	12.5/20/25/30KHz
Operation Mode	Semi Duplex/Full Duplex
Antenna Impedance	50 ohm unbalanced
Power Supply	DC 13.6V negative ground only (external)
Consumption	8 amperes or less
Environmental Conditions	-30 to +60 degree C, 95% humidity @35C
Dimensions	220 (w) 82 (h) 347 (d) mm
Weight	6 kgs.

### 6.2 Transmitter

Output Power	10W continuous, 13W maximum
Switchable Bandwidth	Full sub-band
Frequency Deviation	5KHz(wide band) 2.5KHz(narrow band)
Frequency Stability	+/- 1KHz
Frequency Response	Within +1, -3dB, 300-3000Hz @1KHz ref.
Signal to Noise Ratio	50dB or more @1KHz 70% mod. (45dB at narrow)
Modulation Distortion	3% or less
Spurious & Harmonics	0.25uW or less

### 6.3 Receiver

Switchable Bandwidth	full sub-band
IF Frequencies	1 <sup>st</sup> IF 73.35MHz, 2 <sup>nd</sup> IF 455KHz
Frequency Stability	+/- 1KHz
Sensitivity	0.4uV or less for 20dB N.Q. / 0.3uV for 12dB SINAD
Squelch Sensitivity	0.25uV or less
Selectivity	70dB or more at 25KHz
Blocking	90dB or more
Intermodulation	70dB or more
Spurious Response	70dB or more
AF Response	Within +1, -3dB, 300-3000Hz @1KHz ref.
AF Distortion	5% or less @1KHz 70% mod
Signal to Noise Ratio	50dB or more @1KHz 70% mod. (45dB at narrow)