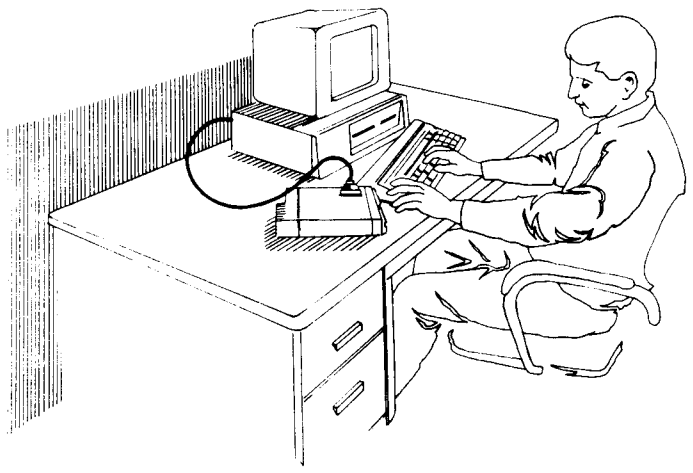
MIDLAND LMR
LAND MOBILE RADIO

COMPUTER BASED PROGRAMMER FOR SYN-TECH XTR AND 8-CHANNEL MOBILES

USER'S MANUAL

VERSION 2.0



70-999993
05-XTR MCUM-12/90-2M

This manual section is designed to facilitate the set-up and service of the Midland 70-1489 Computer Based Programmer for Syn-Tech XTR and 8-Channel Mobiles. As necessary, service maual supplements will be published and distributed on the following forms:

Manual Addition (MA) ..... For supplemental information useful in product service or improvement. Printed on BLUE paper.

Change Notice (CN) ..... For details about changes made during software upgrades by model and serial number. Printed on YELLOW paper.

Manual Correction (MC) ..... For correcting literature errors not related to software upgrades. Printed on GREEN paper.

Technical Bulletin (TB) ..... For solutions to field problems and tips for performance improvement. Printed on PINK paper.

Comments or suggestions concerning areas of manual improvement are welcome.

The symbols shown below are used in this manual to indicate keys on your computer keyboard.

Symbol	Key(s) Indicated
[↵]	Enter (Return) key
[Fx]	Function key, where "x" represents a number, 1 through 10
[X]	Key, where "X" represents an alphanumeric character
[Home]	Home key
[End]	End key
[Esc]	Escape key
[↑] and [↓]	Up and Down Arrow keys, respectively
[←] and [→]	Left and Right Arrow keys, respectively
[PgUp]	Page Up
[PgDn]	Page Down

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SECTION 1

GENERAL INFORMATION

NOTES

DESCRIPTION

The Computer Based Programmer is designed to produce configuration data used to program Midland Syn-Tech XTR and 8-Channel Mobiles. Using this program, radio configuration is created and maintained by a service technician and then transferred to the radio as a single packet of data. This packet of data will be referred to in this manual as the Configuration Data. If a radio configuration should need to be changed, the Configuration Data can be extracted from the radio, edited by this program and again transferred back to the radio. This Configuration Data can be stored in a DOS disk file for archival storage or for later use. The Configuration Data can also be printed using the computer's parallel printer interface.

A test mode is also provided wherein a service technician can perform various tests on a connected radio.

The Configuration Data consists of Radio Identification Data, Channel Data (for up to 99 channels), and Radio Option Data.

PC HARDWARE REQUIREMENTS

The Computer Based Programmer has been designed to run on IBM-PC class machines. This includes PC, XT, and AT clones.

In order to run, the program requires at least a monochrome board and 80-column monitor (you can also use a color system), 512K of RAM, and disk storage. A hard drive is recommended, but a floppy disk system will also work. An optional parallel printer can be used to print reports.

A Midland 70-1308A cable is required for connecting the radio to the computer.

To connect the radio to the computer, first connect the 70-1308A to either COM1 or COM2 of the computer. Then connect the 70-1308A to programming port of the radio. Power up the radio when you are ready to begin programming.

A diagram of the required hardware connections is shown in **Figure 1 - 1**.

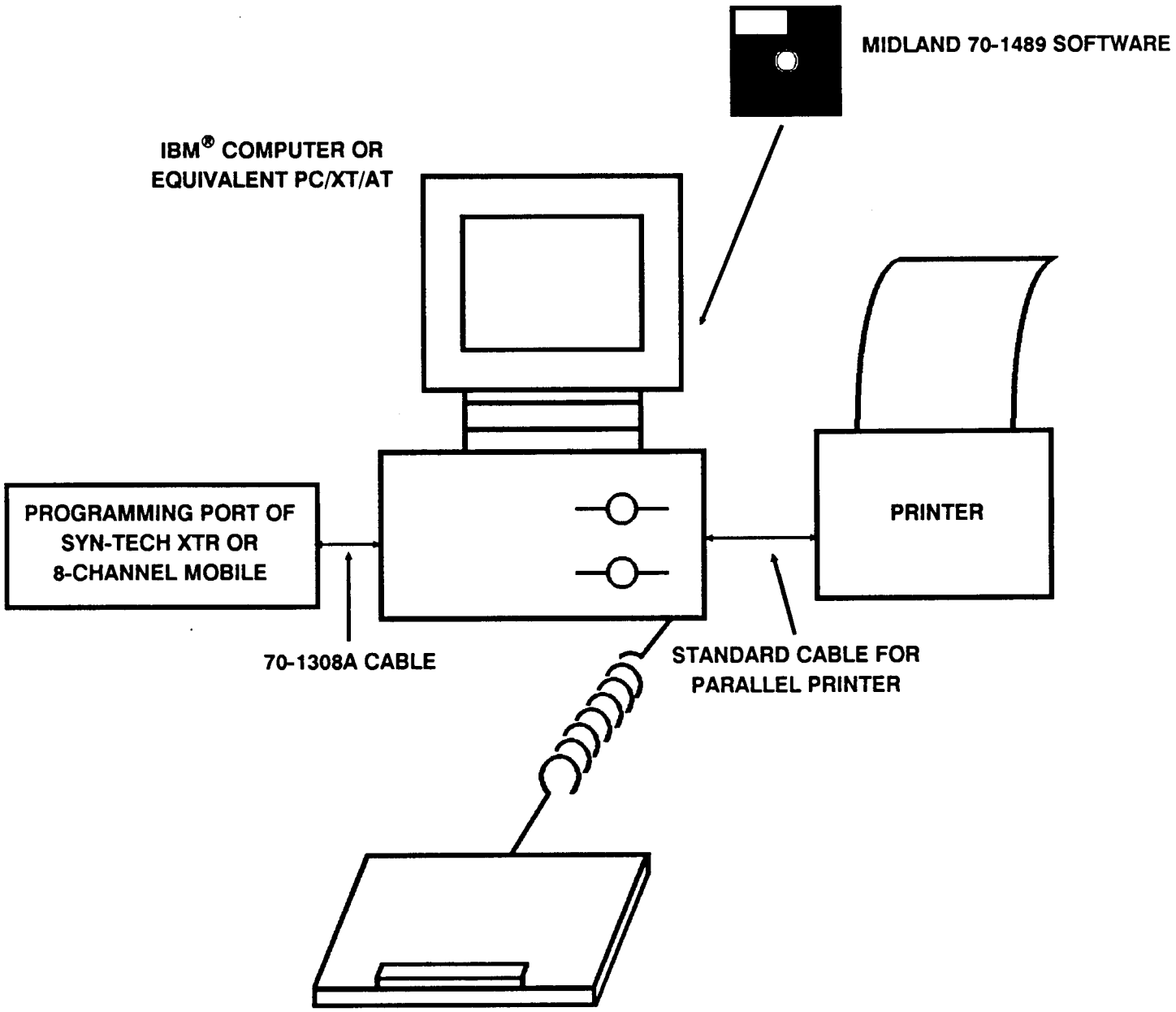


Figure 1 - 1 — Computer Based Programmer Connections

SECTION 2

OPERATION

NOTES

INSTALLATION

MAKING A BACK-UP

Make a copy of the distribution diskette with the Computer Based Programmer software and support files, using the DOS commands Diskcopy or Copy. Check to make sure that your copy contains the following files:

- xtr.exe — the Computer Based Program itself
- xtr.hlp — Help text for the on-line help system
- xtr.cfg — personalized program setup data
- xtr.chl — support file for certain data entry fields
- xtr.clr — Power Up default Configuration Data
- xtrinst.bat — the installation batch file
- v13-v20.exe — Version 1.3 to Version 2.0 file conversion program

INSTALLING THE SOFTWARE ON A HARD DRIVE

After you have made your back-up copy, you are ready to install the software. The installation will create a new directory named "XTR" on the specified drive and will place the necessary files in this directory. For example, if you wish to install the program on hard drive C from floppy drive A, and if you want the installation program to put the XTR directory in drive C's root directory, insert the back-up copy into drive A and type the following:

c: ↵

cd\ ↵

a: ↵

xtrinst c: ↵

The program will respond with:

```
Making an xtr directory on drive C.
```

The computer will then list and copy all of the program files. After all files are copied, the computer will display:

```
Done with installation.
```

The program is now installed on your hard drive, and is ready to run. To return to the C: root directory, type:

c: ↵

START UP

Although the program will run in the directory where you installed the Computer Based Programmer software, this will not limit where you can store individual Configuration Data files.

To start the program, type the following:

c: ↵

cd\xtr ↵

xtr ↵

The program will display the Radio Programmer Main Menu, as shown in **Figure 2 - 1**.

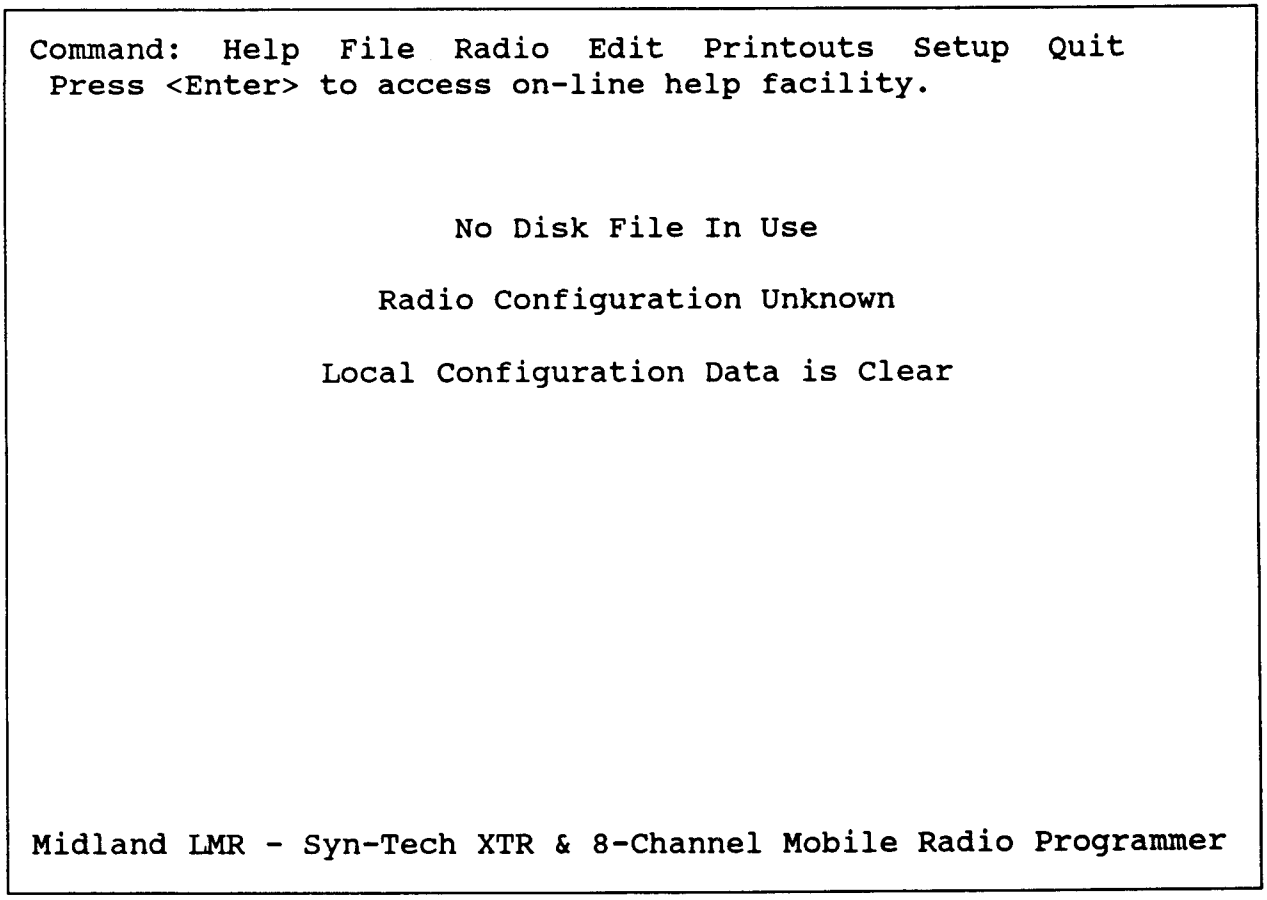


Figure 2 - 1 – Radio Programmer Main Screen

USING MENUS

The top row of the screen shows the current Radio Programmer menu. The second line shows a brief description of the highlighted menu item. Menu operations include:

- Highlight with [↑], [↓], [←], or [→] keys – item can be selected if highlighted.
- Select with [↵] key – shows a submenu or invokes a function.
- AutoSelect with initial character – select item with one keystroke.
- Exit Up with [Esc] key – immediately go to previous menu.
- Help with [F1] key – display information about highlighted item.

USING FORMS

A data entry form consists of data entry fields and prompt text. A field is highlighted when it is active. Left and right arrow keys are active within a field to facilitate editing.

- Highlight with [↑], [↓], [←], or [→] keys – field can be selected if highlighted.
- Exit with [Esc] or [F10] key – field edits are kept.
- List Choices with [↵] or [F2] key – display list of all possible values for highlighted field.
- Help with [F1] key – display information about highlighted field.
- Clear/Recall Field with [F3] / [F4] key – erase/recall information in current field.
- Large/Small Increment with [F5] / [F6] keys – increment value in current field by 10/1.
- Large/Small Decrement with [F7] / [F8] keys – decrement value in current field by 10/1.
- Next Field with [↓] key – go to the next field in the form.
- Prev Field with [↑] key – go to the previous field in the form.
- First Field with [Home] key – go to the first field on the form.
- Last Field with [End] key – go to the last field on the form.
- Next Form with [PgUp] key – go to next high numbered page.
- Prev Form with [PgDn] key – go to next lower numbered page.

COMMANDS

The program is organized as shown in **Figure 2 - 2**. All features are accessed through the Command line, on the Main Screen.

HELP	FILE	RADIO	EDIT	PRINTOUTS*	SETUP	QUIT
	Load	**Upload**	**Radio-ID**	**Report**		
	Save	**Download**	**Channels**	**Manual**		
		Verify	**Options**			
		Test	**Manual**			
		RX-TX	**Clear**	*Disposition:		
		Beep		(Browse, Print,		
		Lamp		File)		
		Display				

Figure 2 - 2 — Program Organization

HELP

There are various ways to get help while running the program. The menu message line gives a one line description of the menu item. It appears immediately below the menu bar. Move the cursor on a menu item or a data entry field and press **F1** once for more information about that item or field. Next, press **F1** twice on a data entry field to get general help. Press **Esc** to exit back to current menu after viewing any help.

FILE

This command allows you to save and load Configuration Data to and from a disk. Select **FILE** using arrow keys or initial character as instructed under "Using Menus" (page 2 - 5).

- **Save**

After editing Configuration Data, use **SAVE** to write the data to a disk file. To do so, select *SAVE*. The program will then respond with:

```
Save to disk using file name:
C:\XTR\*.*
The current directory is:
C:\XTR\
```

Enter a valid DOS filename and directory, then press ↵. Filenames and directories can be viewed by using wildcard characters. The highlighted filename or directory can be selected by pressing ↵. Use the control cursor keys to highlight other filenames or directories. Once a filename is selected, the filename can be changed or used as is by pressing ↵ again. Press **Esc** to return to the **FILE** menu without saving edited Configuration Data. Press **F3** to clear filename.

• **Load**

The parameters that define the functionality of a Midland Syn-Tech XTR or 8-Channel mobile are stored in the radio in an electrical device known as a EEPROM. Use **LOAD** to read a previously saved image of a EEPROM from a DOS disk. To **LOAD**, select *LOAD*. The program will then respond with:

```
Load from disk using file name:
C:\XTR\*.*
The current directory is:
C:\XTR\
```

Enter a valid DOS filename, then press [↵]. Filenames and directories can be viewed by using wildcard characters. The highlighted filename or directory can be selected by pressing [↵]. Use the control cursor keys to highlight other filenames or directories. Once a filename is selected, the filename can be changed or used as is by pressing [↵] again. Press [Esc] to return to the **FILE** menu without loading. Press [F3] to clear filename.

RADIO

This command allows communication between the PC and the radio. Refer to Section 3 for more information.

EDIT

This command allows you to edit Configuration Data. Refer to Section 4 for more information.

PRINTOUTS

Use this command to generate printed reports. See Section 5 for more information and example reports.

SETUP

The setup form allows you to change the serial port used in communicating with Syn-Tech XTR and 8-Channel mobiles. Select *SETUP*, then press [↵] . The program will then respond with:

```
Serial Port connected to Radio:   COM1
```

Press [↵] . The program will give you a choice of COM1 or COM2. Use [↑] and [→] to highlight the desired port, then press [↵] . If you have the option to use color, the program will next ask:

```
Display in Color?  Y
```

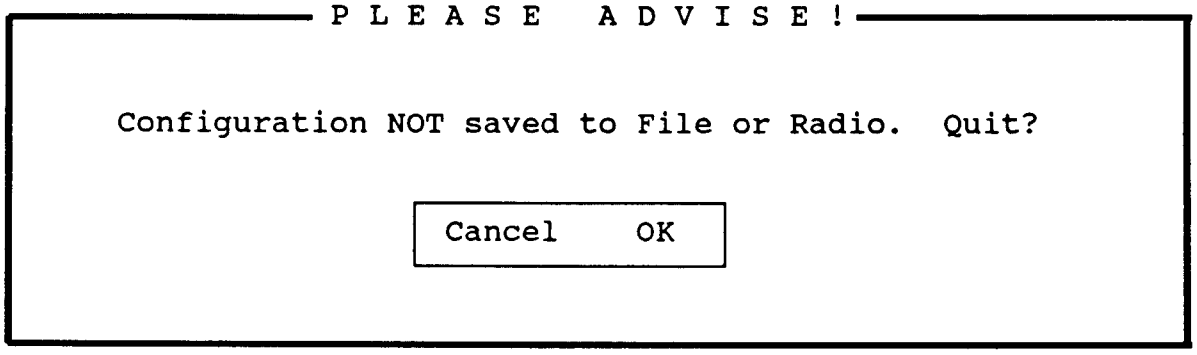
Just press [↵] if you wish the program to display in color. If you wish the program to display in shades of gray, press [N] , then [↵] . The program will then ask:

```
Save SETUP to file on Exit?  N
```

If you wish the port change to be permanent (so that it will load automatically the next time you run the program), press [Y] , then [↵] to save. Otherwise, just press [↵] . Press [Esc] to return to the main menu.

QUIT

Selecting *QUIT* allows you to exit the Syn-Tech XTR or 8-Channel Mobile PC radio programmer back to DOS. If you have made some edits to the Configuration Data image without saving them to a disk file or downloading them to a radio, the program will respond with:



If you wish to save your data, highlight *Cancel* and press [↵] to return to the main menu. If you do not wish to save your data, highlight *OK* and press [↵] to end the program.

SECTION 3

RADIO

NOTES

RADIO COMMANDS

The **RADIO** commands allow communication between your Midland Syn-Tech XTR or 8-Channel mobile and your PC, via a serial port on your computer through a cable available from Midland. Before selecting *Radio*, set the PC communication port using **SETUP** (see page 2 - 7).

UPLOAD

The parameters that control the functions of a Midland Syn-Tech XTR radio are stored in the radio in an electrical device known as a EEPROM. The information in this EEPROM can be uploaded from a radio when you select *Upload* in the Radio Menu.

EEPROM information can also be loaded from a DOS disk file using the **LOAD** function in the **FILE** menu (see page 2 - 7).

DOWNLOAD

Configuration Data is kept in the PC's memory where you can edit it using any of the **EDIT** menu's functions (see Section 4). This data will be sent to the radio's EEPROM when you select *Download* in the Radio Menu.

VERIFY

You can verify that the contents of a radio are identical to the Configuration Data in the computer by selecting *Verify* in the Radio Menu. The program compares the contents of the local Configuration Data memory with the contents of the radio byte by byte. If there is no discrepancy, then you will be told that the verify passed. If there is a difference, you will be shown the memory location (radio EEPROM base relative) of the problem bytes, and the bytes themselves.

You will be given the opportunity to continue comparing the local Configuration Data memory and the radio contents, or you can immediately cancel the verify operation.

TEST

This command will allow you to perform the following tests:

- RX -TX Test
- Beep Test
- Lamp Test
- Display Test

For more information on these tests, refer to Section 5.

NOTES

SECTION 4

EDIT

NOTES

EDIT COMMANDS

These commands allow you to program the many optional parameters available on Midland Syn-Tech XTR and 8-Channel Mobiles. Edited Configuration Data memory can be read or written to the radio or to a DOS file. Generally, the Configuration Data should be programmed in the order that the menu items are listed. The model number must be defined before any other programming can occur.

Display field choices by pressing [↵]. Select items using the arrow keys and [↵]. Press [Esc] to leave form. Refer to page 2 - 5 for more information on using menus and forms.

RADIO-ID

NOTE: The Radio Identification Form must be successfully completed in order to program the channel and option information. Selecting *Radio-ID* allows you to edit the following fields:

- Model
- Injection Aspect
- PLL Reference Frequency
- Serial Number
- Customer
- Date

• Model

The model information is used internally to define certain formula constants. The available models are shown below. **NOTE:** When programming 8-Channel Mobiles, only those frequencies marked by "*" are allowed.

VHF(L) A-Band	(29.7 – 36)	UHF A-Band	(406 – 430 MHz)*
VHF(L) B-Band	(36 – 42)	UHF B-Band	(450 – 470 MHz)*
VHF(L) C-Band	(42 – 50)	UHF C-Band	(470 – 494 MHz)
VHF(M) A-Band	(66 – 77)*	UHF D-Band	(494 – 520 MHz)
VHF(M) B-Band	(77 – 88)*	800 MHz	(806 – 870 MHz)
VHF(H) A-Band	(136 – 156 MHz)*		
VHF(H) B-Band	(150 – 174 MHz)*		

• Injection Aspect

Select either Low Side or High Side Local Oscillator Injection Aspect. High Side is the default for VHF High Band radios and Low Side is the default for UHF and 800 MHz radios (use default value unless an injection kit has been installed).

• PLL Comparator Reference Frequency

For VHF Band radios, 2.5 kHz is the Reference Frequency. For UHF radios, select either 12.5 kHz (default) or 5.0 kHz. For 800 MHz radios, select either 12.5 kHz (default) or 6.25 kHz.

- **Serial Number**

Enter the radio serial number if desired or any eight characters: 0-9, A-E, or space. Serial number input is not a prerequisite for radio operation.

- **Customer Number**

Enter the customer number if desired or any ten characters: 0-9, A-E, or space. Customer number input is not a prerequisite for radio operation.

- **Date**

Enter the current date if desired, or up to six digits: 0-9 or space. Date input is not a prerequisite for radio operation.

CHANNEL

Parameters entered in this form are associated with each of up to 99 channels. Each form page is unique to each channel. A valid model number must have been entered, loaded, or uploaded before channel parameters can be entered. You will be asked to enter a valid model number first if necessary. This is a multi-page form. You can move to any particular channel by typing the channel number explicitly into the channel number field or you can use the **PgUp** and **PgDn** keys to move sequentially from channel to channel. Channel parameters programmed here are:

- Channel Number
- Receive Channel Frequency
- Receive Signaling Type
- Transmit Channel Frequency
- Transmit Signaling Type
- Transmit Power Control
- Scrambler Enable
- Auxiliary Data
- Channel in Scan Group A
- Channel in Scan Group B

Selecting *Channels* will result in the display shown in **Figure 4 - 1**.

- **Channel Number**

Select a channel to program by directly entering a channel number between 1 and 99 or use the **PgUp** or **PgDn** keys on the numeric key pad to increment or decrement the channel number.

```
Edit:   Radio-ID  Channels  Options  Manual  Clear
  Edit radio related parmeters.
                                        CHANNEL DATA FORM

    Channel Number                  1
    Receive Parameters
        Receive Channel Freq (MHz)      000.000 000
        Receive Signaling Type          None
    Transmit Parameters
        Transmit  Channel Freq (MHz)    000.000 000
        Transmit  Signaling Type        None
        Tx Power Control                Normal
     Miscellaneous Parameters
        Scrambler Enable ?          N
     Auxiliary Data
        1 1 1 1 1 1 1 1
     Group Registry
        Channel in Scan Group A ?   N
        Channel in Scan Group B ?   N


              <PgUp> Prev Channel   <PgDn? Next Channel

Press <F1> for help. Press <Esc> to exit form.
```

Figure 4 - 1 – Channel Form

- **Receive Channel Frequency**

Enter a valid frequency in MHz within the operating range of the radio. Frequencies must be an integral multiple of the PLL Ref Frequency which is determined by the radio model or option kit. Press **F3** (Clear) to clear the frequency value. Press **F4** (Recall) to recall the previously entered frequency value. **NOTE:** When programming 8-Channel Mobiles, only those frequencies marked by "*" are allowed.

VHF(L) A-Band	(29.7 – 36)	UHF A-Band	(406 – 430 MHz)*
VHF(L) B-Band	(36 – 42)	UHF B-Band	(450 – 470 MHz)*
VHF(L) C-Band	(42 – 50)	UHF C-Band	(470 – 494 MHz)
VHF(M) A-Band	(66 – 77)*	UHF D-Band	(494 – 520 MHz)
VHF(M) B-Band	(77 – 88)*	800 MHz	(806 – 870 MHz)
VHF(H) A-Band	(136 – 156 MHz)*		
VHF(H) B-Band	(150 – 174 MHz)*		

- **Receive Signaling Type**

You have a choice of three signaling types: NONE, CTCSS, and DCS.

NONE: The radio will operate in "carrier-squelch" mode. The radio squelch will not require that a coded-squelch tone or code be present with the signal to open the audio path.

CTCSS: If you selected CTCSS for the Receive or Transmit Signaling Type, you will be asked to enter a valid standard coded-squelch tone frequency in Hz. Press [↑] to increment from one code to the next, or press [↓] to decrement to the previous code.

DCS: If you selected DCS for the Receive or Transmit Signaling Type, you will be asked to enter a valid DCS code. This code is entered as three octal digits. If there is an leading minus (–) sign, the code will be inverted. Any octal digit from 000 to 777 can be entered but only the 83 standard codes listed in Appendix A are useful. [↑] can be used to increment from one code to the next, or [↓] can be used to decrement to the previous code.

- **Transmit Channel Frequency**

Select as for Receive Channel Frequency.

- **Transmit Signaling Type**

Select as for Receive Signaling Type.

- **Transmit RF Power**

This field selects the maximum RF Power output level allowed on this channel. If the normal (high) power level is chosen, the unit can be switched to the low power level on this channel with an optional front panel button. If the low power level is chosen, the unit cannot transmit at the high power level on this channel. This field does not apply to 8-Channel Mobiles.

- **Scrambler Enable/Disable**

This programming step applies only if the radio is equipped with a voice scrambler. If so, then each channel can be tagged to enable or disable the descrambler. Press [Y] to enable this option, or press [N] to disable it. If enabled, scrambler operation can be disabled again by pressing an optional front panel push button on the radio.

- **Auxiliary Data**

Eight bits are available to control auxiliary functions as required when some options are installed. If required, instructions will be furnished with these options.

- **Selecting Scan List (Group Registry)**

A channel can be registered in either or both of two scan lists (groups). Scan Group A channels will be scanned with Priority Sampling and Scan Group B channels will be scanned with no Priority Sampling. Press [Y] to add the channel to a scan list or [N] to omit it. **NOTE:** If programmed for PS type scan operation (see Option Definition Programming), only the Scan A list is used. Any Scan B list programming is ignored. Both Scan A and B lists are accessible if other scan types are programmed.

OPTIONS

This form prompts for input of the following option definitions and operating parameters affecting the entire radio. This form can not be entered until a valid Model Number has been entered on the Radio-ID form.

- Auxiliary Key Type
- Channel Roll Over
- Priority Sampling Rate
- Priority Sampling Rate During Scan
- Scan Hold Conditions
- Scan Hold Delay On Receive
- Scan Hold Delay On Transmit
- Restore Omitted Channels (Delete Table Clear Condition)
- Scan Stop w/Mic Off-Hook
- Scan Type
- Busy Channel Lock-Out
- Transmit Timeout Timer
- Beep Control

Selecting *Options* will result in the form shown in **Figure 4 - 2.**

• Auxiliary Key Type

This field prompts for the choice of operation an auxiliary button on the radio. "Type 1" operation allows the button to control the function of the Aux Out line for the control of options. Do not program Type 1 unless an option is installed which specifies this key type. "Type 2" operation causes the auxiliary button to function as the A/D SEL (Add/Delete Select) button for modification of the scan lists as well as continuing to control the Aux Out line.

• Channel Rollover

This field selects the operation of the UP-DOWN channel selector. Press [Y] to cause the channel list to "roll-over" at the top and the bottom or [N] to cause channel changes and beep indications to stop at both ends of the channel list.

```
Edit:   Radio-ID  Channels  Options  Manual  Clear
  Edit radio usage parmeters.
                                    OPTION PARAMETERS FORM
    Auxiliary Key Type              Type 2
    Enable Channel Roll-Over ?       Y
    Pri Ch Monitor Time             1.00 sec
    Pri Ch Monitor Cycle            1 to 8
    Scan Hold Conditions            Busy/Signaling
    Scan Hold After RX              2.5 sec
    Scan Hold After TX              5.0 sec
    Delete Table Clear Conition     No Clear
    Scan Stop w/Mic Off-Hook?        N
    Scan Type                       PS
    Busy Channel Lock-Out           Disable
    TX Time-Out Timer               Infinte
    Beep Control
       Beep A ?                      Y
       Beep A ?                      Y
       Beep A ?                      Y
       Beep A ?                      Y

Press <F1> for help. Press <Esc> to exit form.
```

Figure 4 - 2 – Option Parameter Form

- **Priority Sampling Rate (Pri Ch Monitor Time)**

Select Priority Channel sampling rate which will occur while scanning is stopped on a non-priority channel. Note that sampling of the Priority 2 channel (if selected) will occur automatically at one half the rate of the Priority 1 channel. Select from the following:

0.50 SEC
0.75 SEC
1.00 SEC (default)
1.50 SEC

- **Priority Sampling Rate During Scan**

Select Priority Channel sampling rate while scanning. Note that sampling of the Priority 2 channel (if selected) will occur automatically at one half the rate of the Priority 1 channel. Choose between:

1 to 8 – after every 8 non-priority channels (default) or,
1 to 4 – after every 4 non-priority channels

- **Scan Hold Conditions**

Select one of the following set of conditions which will cause scan hold to occur.

Busy/NSQ	Carrier present.
Busy/Signaling	CTCSS tone or DCS code present. (default)
Open/NSQ	No carrier while Priority Sampling looks for carrier presence on a Priority Channel.
Open/Signaling	No carrier while Priority Sampling looks for correct CTCSS tone or DCS code on a Priority Channel.

- **Scan Hold Delay On Receive**

Select the delay period after loss of carrier before scan resumes. Choices are:

0.3 SEC
2.5 SEC (default)
5.0 SEC
INFINTE

- **Scan Hold Delay On Transmit**

Select the delay period after transmit before scan resumes. Choices are:

0.3 SEC
2.5 SEC
5.0 SEC (default)
INFINTE

- **Restore Omitted Channels**

Select one of the following set of conditions under which deleted scan channels are restored to scan lists.

No Clear	No Clear – scan list must be manually restored (default)
Power Off	On Unit power off
Scan Off	When scan is turned off
Clear	When scan is turned off or the unit power is cycled

- **Scan Stop w/Mic Off-Hook**

If enabled, scan will stop when the microphone is removed from the hang-up box. Press [Y] to enable this option or [N] to disable it.

- **Scan Type – Syn-Tech XTR Mobiles**

Select one of the following scan types:

NORMAL SCAN (Default – displayed as PS): Recommended for radios where the P SCAN button is the only scan button, or for radios with a P SCAN/N SCAN configuration. Normal scan allows the selection of two scan lists: a Priority Scan list and a non-Priority scan list. The Priority Scan list is activated by P SCAN after the Priority 1 channel is manually selected (using the Channel knob). During P SCAN operation, transmit can occur only on the Priority 1 channel. The non-Priority scan list is an independent scan list and is activated by N SCAN.

MODIFIED SCAN: Recommended for radios with a combination of P SCAN/ESC buttons. Modified scan allows the P SCAN/N SCAN operation as described for Normal Scan, but the control panel is normally labeled P SCAN and ESC (which replaces N SCAN). In ESCape mode, scan is stopped on the last received channel, but the previously selected Priority 1 channel is held in memory and becomes active when ESC is pressed again. This allows the user to answer traffic on a non-priority channel without having to manually leave scan, select the calling channel, and losing the Priority 1 channel in the process.

SECONDARY SCAN: Recommended for radio with P MON/N SCAN buttons. Secondary scan allows the user to transmit and receive on a selected channel called the Secondary channel while sampling the Priority and 2 channels. It is activated by P MON after selecting the Priority 1 and 2 channels in the normal manner. The channel selected after initiating P MON mode is the Secondary channel. If either the Priority 1 or 2 channels become active, receive operation will change to the highest priority active channel, and transmit will occur on that channel. If the configuration also includes N SCAN, non-priority type scan is also available. If both P MON and N SCAN are pressed, P SCAN operation results (non-priority scan plus priority monitoring).

- **Scan Type – 8-Channel Mobiles**

PS SCAN (Default): PS Scan allows the selection of all channels programmed in the Scan A list (see Scan Channel Assignment), while sampling the Priority 1 channel (and Priority 2 channel, if assigned).The Priority 1 channel is displayed during scan and can be changed at any time by the UP and DN buttons. Transmit always occurs on the Prioirty 1 channel. Busy channels cannot be deleted during scan.

MODIFIED SCAN: Modified Scan allows the scanning of all channels in the Scan A list, while sampling the Priority 1 channel (and Priority 2 channel, if assigned). The Priority 1 channel is assigned by the UP and DN buttons prior to activating scan operation and cannot be changed while scan is active. Transmit always occurs on the Priority 1 channel. Busy channels can be deleted during scan using the DN button.

SECONDARY SCAN: Secondary Scan allows the user to transmit and receive on a selected channel (called the Secondary channel) while sampling the Priority 1 channel (and Priority 2 channel, if assigned). The Priority 1 channel is selected using the UP and DN buttons prior to activating scan operation and cannot be changed while scan is active. If either Priority 1 or 2 channels become active, receive operation will change to the highest priority active channel, and transmit will occur on that channel. The Secondary channel can be changed during scan using the UP and DN buttons, and is the transmit channel if the Priority 1 and 2 channels are not active.

- **Busy Channel Lockout**

Select one of the following types of BCLO operation:

DISABLE	Disable (default)
NSQ	Cause BCLO operation on noise squelch signals.
SIGNALING	Cause BCLO operation on CTCSS or DCS signals.
SPECIAL	Cause "special" BCLO operation. In this mode, PTT is inhibited when a carrier without CTCSS or DCS (or with incorrect signaling) is received. Transmit is enabled when no carrier (or a carrier with the correct signaling) is received.

- **Transmit Timeout Timer**

Select one of the following periods of the transmitter time-out.

INFINITE	Timer disabled operation (default)
30 SEC	30 second operation
60 SEC	60 second operation
90 SEC	90 second operation
120 SEC	120 second operation
150 SEC	150 second operation
180 SEC	180 second operation
210 SEC	210 second operation

- **Beep Control**

You may choose to allow the selective enabling or disabling of the following four groups of alert tones.

SET	CONDITION
Group A	Message detected on PRI1 and PRI2 channels
Group B	Time-out timer expired and BCLO indicator
Group C	Push button and channel change feedback
Group D	Powerup test and error indication

Press [Y] to enable a tone group, or [N] to disable it.

MANUAL

Selecting *Manual* results in the form shown in **Figure 4 - 3**. This function provides direct access to the local Configuration Data memory. It is used when the installation of special options kits requires special programming. In the event such kits become available, instructions will be included with the kits which contain the necessary Manual Programming details.

Fields in this form are:

- EEPROM Address
- EEPROM Value

CAUTION: It is important to note that no check is performed to ensure that only "safe" changes have been made to the configuration data. You should have access to specific details as to what values to change before attempting to change any value using manual programming as you can render the radio inoperable if incorrect values are entered

- **EEPROM Address**

This address is the location in local configuration data memory within the range of 000H to 3FFH that you are viewing or modifying. You may specify any valid address to view or modify the byte at that memory location.

Default: none
Minimum: 0 hex
Maximum: 3FF hex

- **EEPROM Value**

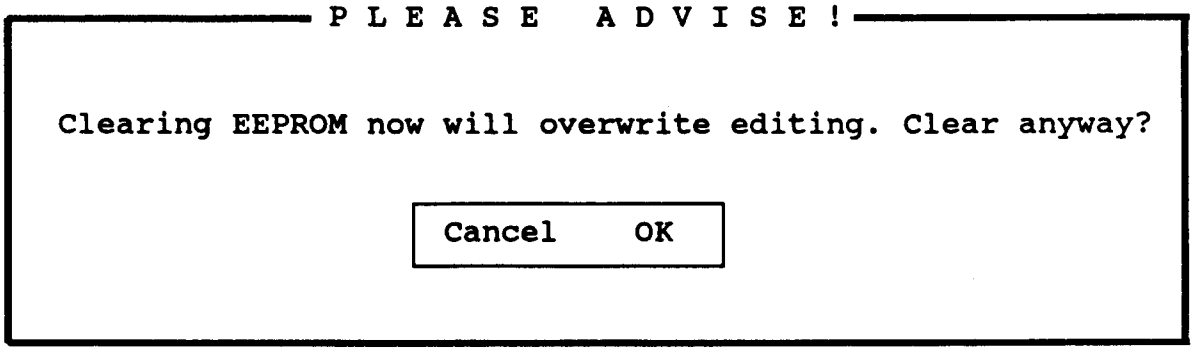
The EEPROM value at the address selected above may be entered as a 2-digit hex number, or an 8-digit binary number. Use the arrow keys to choose the type of entry (hex or binary), then enter new value. Press [↵] to change the byte value at the current address. Press [→] to access each bit of the byte value. Return to the hexadecimal representation of the byte value by pressing [↵].

```
Edit:   Radio-ID  Channels  Options  Manual  Clear
  Directly access local Configuration Data memory.
                                   MANUAL PROGRAMMING FORM

EEPROM Address (hex)        0
EEPROM Value   (hex)       FF    1 1 1 1   1 1 1 1   (binary)
                                 7 6 5 4   3 2 1 0   (bits)

                    WARNING!
          Incorrect changes to radio configuration
            data can render the radio inoperable.

          <PgUp> Prev Address  <PgDn> Next Address

Enter hex number between 00 and 3FF. Press <F1> for help.
```

Figure 4 - 3 – Manual Programming Form

CLEAR

Selecting *Clear* will cause the Program to display:



Select *OK* if you wish to erase all editing and start over. Otherwise, select *Cancel*.

NOTES

SECTION 5

TEST

NOTES

TEST COMMANDS

Selecting *Test* (in the Radio Menu) command will allow you to perform the following tests:

- RX-TX (Receive / Transmit tests)
- Lamp (Performs various lamp tests)
- Display (Send characters to the LED display)
- Beep (Beep On / Beep Off test)

Display field choices by pressing [↵]. Select items using the arrow keys and [↵]. Press [Esc] to leave form. Refer to page 2 - 5 for more information on using menus and forms.

RX-TX

Selecting *RX-TX* will allow you to make receive and transmit parameter adjustments. Monitor the parameter on test equipment while adjusting to desired value. These values can be entered directly or with the increment/decrement functions keys, where: [F5] – large increment (+10), [F6] – small increment (+1), [F7] – large decrement (–10), [F8] – small decrement (–1). Press [↵] to send parameter value to the radio.

MAXIMUM MODULATION (DEVIATION): Minimum = 0; Maximum = 63; Default = current value.

NORMAL POWER ADJUSTMENT: Minimum = 0; Maximum = 63; Default = current value.

LOW POWER ADJUSTMENT: Minimum = 0; Maximum = 63; Default = current value.

REFERENCE FREQUENCY ADJUSTMENT: Minimum = 0; Maximum = 63; Default = current value.

CRYSTAL TYPE: Press [↵] to open the choice window. Select Type 1, Type 2, or Type 3 and press [↵] again to change crystal type, or press [Esc] to escape without changing crystal type.

CAUTION: Be sure to terminate the radio antenna connector with the proper 50-Ω RF load before initiating the transmitter test. In addition, only leave the transmitter on for a short time.

Once Transmit control parameters have been set to your satisfaction, you must save the parameters now stored in the radio's temporary memory to the radio's permanent memory with the *TX-Save* function.

LAMP

Selecting *Lamp* causes lamp-on commands to be sent to the radio in sequence.

DISPLAY

Selecting *Display* causes the radio to display a sequence of digits in all LED positions (in ascending order). All possible characters are displayed in all positions.

BEEP

Select *Beep* to turn radio beep off (disable) or on (enable).

SECTION 6

PRINTOUTS

NOTES

PRINTOUTS

The program is able to produce organized reports of radio programming.

Select items using the arrow keys and [↵]. Press [Esc] to leave menu. Refer to page 2 - 5 for more information on using menus and forms.

Select *Printouts*. You will first be asked to choose *Report* (which results in a report of the programmed Configuration Data), or *Manual* (which results in a list of the hex data in the radio EEPROM). Then you will be given a choice among Browse, Print, and File.

BROWSE

The report is sent to the screen. You can browse through the report using [←], [→], [↑], [↓], [PgUp], [PgDn], [Home], or [End] keys.

When finished, press [Esc] to return Disposition Menu .

PRINT

Selecting *Print* will send the report to the printer in exactly the same format as shown on the screen. Make sure the printer is on and able to communicate with the computer.

When the printer is finished, you will be asked to press any key to continue .

FILE

This function will save the report shown in the report window on the screen to a disk file. The report will be saved in exactly the same format as shown on the screen. Filenames and directories can be viewed by using wildcard characters. The highlighted filename or directory can be selected by pressing [↵] again. Press [Esc] to return to Disposition Menu without saving. Press [F3] to clear filename.

SAMPLE REPORTS

Figure 6 - 1 is a sample a Manual printout (hex data in EEPROM). **Figure 6 - 2** is a sample of a Report printout (programmed Configuration Data). **NOTE:** These samples are reports for Syn-Tech XTR Mobiles. Reports for 8-Channel Mobiles will look similar.

*** MIDLAND XTR MOBILE ***

ADRS	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0000	70	19	59	9B	81	62	41	85	00	10	17	90	26	8A	00	A5
0010	38	E0	61	FF	9A	AC	BD	F7	F3	CF	F2	EF	11	3F	FC	7F
0020	FF	3F	FF	F2	8F	0A	FF	F1	D9	82	DC	FF	0B	02	8F	32
0030	0B	01	D9	AA	D7	FF	FF	F2	8A	90	FF	F1	D4	A0	D7	FF
0040	FF	F2	96	80	FF	F1	E1	20	D5	FF	FF	F2	A3	00	FF	F1
0050	ED	A0	DB	FF	FF	F2	AF	80	FF	F1	FA	20	D1	FF	FF	F2
0060	BC	00	FF	F2	06	A0	D5	FF	FF	F2	C8	80	FF	F2	13	20
0070	DA	FF	FF	F2	D5	00	FF	F2	1F	A0	D0	FF	FF	F2	A3	00
0080	FF	F1	D9	82	D0	FF	FF	F2	A3	28	FF	F1	ED	A0	D1	FF
0090	FF	F2	C1	9C	FF	F2	0C	14	D9	FF	41	32	8A	90	41	31
00A0	D4	A0	F7	FF	25	02	8A	90	25	01	D4	A0	F7	FF	00	02
00B0	90	BA	00	01	DB	32	C2	FF	41	32	90	88	41	31	DB	00
00C0	CC	FF	FF	F2	90	88	FF	F1	DB	00	FC	FF	41	32	90	88
00D0	41	31	DB	00	FC	FF	41	32	90	88	41	31	DB	00	FC	FF
00E0	FF	F2	90	88	FF	F1	DB	00	FC	FF	FF	F2	90	88	FF	F1
00F0	DB	00	FC	FF	FF	F2	90	88	FF	F1	DB	00	FC	FF	FF	F2
0100	90	88	FF	F1	DB	00	FC	FF	0B	02	90	88	0B	01	DB	00
0110	FC	FF	0B	02	90	88	0B	01	DB	00	FC	FF	0B	02	90	88
0120	0B	01	DB	00	FC	FF	0B	02	90	88	0B	01	DB	00	FC	FF
0130	FF	F2	90	88	FF	F1	DB	00	FC	FF	0B	02	90	88	0B	01
0140	DB	00	FC	FF	FF	F2	90	88	FF	F1	DB	00	FC	FF	FF	F2
0150	90	88	FF	F1	DB	00	FC	FF	0B	02	90	88	0B	01	DB	00
0160	FC	FF	FF	F2	90	88	FF	F1	DB	00	FC	FF	FF	F2	90	88
0170	FF	F1	DB	00	FC	FF	FF	F2	90	88	FF	F1	DB	00	FC	FF
0180	FF	F2	90	88	FF	F1	DB	00	FC	FF	0B	02	90	88	0B	01
0190	DB	00	FC	FF	0B	02	90	88	0B	01	DB	00	FC	FF	0B	02
01A0	90	88	0B	01	DB	00	FC	FF	0B	02	8F	32	0B	01	D9	AA
01B0	F7	FF	FF	F2	8F	32	FF	F1	D9	AA	F7	FF	FF	F2	8F	32
01C0	FF	F1	D9	AA	F7	FF	FF	F2	8F	32	FF	F1	D9	AA	F7	FF
01D0	0B	02	8F	32	0B	01	D9	AA	F7	FF	FF	F2	8F	32	FF	F1
01E0	D9	AA	F7	FF	FF	F2	8F	32	FF	F1	D9	AA	F7	FF	FF	F2
01F0	8F	32	FF	F1	D9	AA	F7	FF	FF	F2	8F	32	FF	F1	D9	AA
0200	F7	FF	FF	F2	8F	32	FF	F1	D9	AA	F7	FF	FF	F2	8F	32
0210	FF	F1	D9	AA	F7	FF	FF	F2	8F	32	FF	F1	D9	AA	F7	FF

Figure 6 - 1a – Manual Sample Prinout

```
0220   FF F2 8F 32   FF F1 D9 AA   F7 FF FF F2   8F 32 FF F1
0230   D9 AA F7 FF   FF F2 8F 32   FF F1 D9 AA   F7 FF FF F2
0240   8F 32 FF F1   D9 AA F7 FF   FF F2 8F 32   FF F1 D9 AA
0250   F7 FF FF F2   8F 32 FF F1   D9 AA F7 FF   FF F2 8F 32
0260   FF F1 D9 AA   F7 FF FF F2   8F 32 FF F1   D9 AA F7 FF
0270   FF F2 8F 32   FF F1 D9 AA   F7 FF 0B 02   8F 32 0B 01
0280   D9 AA F7 FF   0B 02 8F 32   0B 01 D9 AA   F7 FF FF F2
0290   8F 32 FF F1   D9 AA F7 FF   FF F2 8F 32   FF F1 D9 AA
02A0   F7 FF 0B 02   8F 32 0B 01   D9 AA F7 FF   0B 02 8F 32
02B0   0B 01 D9 AA   F7 FF 0B 02   8F 32 0B 01   D9 AA F7 FF
02C0   FF F2 8F 32   FF F1 D9 AA   F7 FF FF F2   8F 32 FF F1
02D0   D9 AA F7 FF   FF F2 8F 32   FF F1 D9 AA   F7 FF FF F2
02E0   8F 32 FF F1   D9 AA F7 FF   FF F2 8F 32   FF F1 D9 AA
02F0   F7 FF FF F2   8F 32 FF F1   D9 AA F7 FF   FF F2 8F 32
0300   FF F1 D9 AA   F7 FF FF F2   8F 32 FF F1   D9 AA F7 FF
0310   41 32 8F 32   41 31 D9 AA   F7 FF 41 32   8F 32 41 31
0320   D9 AA F7 FF   41 32 8F 32   41 31 D9 AA   F7 FF 41 32
0330   8F 32 41 31   D9 AA F7 FF   41 32 8F 32   41 31 D9 AA
0340   F7 FF 0B 02   8F 32 0B 01   D9 AA F7 FF   FF F2 8F 32
0350   FF F1 D9 AA   F7 FF FF F2   8F 32 FF F1   D9 AA F7 FF
0360   FF F2 8F 32   FF F1 D9 AA   F7 FF 0B 02   8F 32 0B 01
0370   D9 AA F7 FF   FF F2 8F 32   FF F1 D9 AA   F7 FF 0B 02
0380   8F 32 0B 01   D9 AA F7 FF   FF F2 8F 32   FF F1 D9 AA
0390   F7 FF 0B 02   8F 32 0B 01   D9 AA F7 FF   0B 02 8F 32
03A0   0B 01 D9 AA   F7 FF FF F2   8F 32 FF F1   D9 AA F7 FF
03B0   FF F2 8F 32   FF F1 D9 AA   F7 FF FF F2   8F 32 FF F1
03C0   D9 AA F7 FF   41 32 8F 32   41 31 D9 AA   F7 FF 41 32
03D0   8F 32 41 31   D9 AA F7 FF   FF F2 8F 32   FF F1 D9 AA
03E0   F7 FF FF F2   8F 32 FF F1   D9 AA F7 FF   FF F2 8F 32
03F0   FF F1 D9 AA   F7 FF 0B 02   8F 32 0B 01   D9 AA F7 FF

END
```

Figure 6 - 1b – Manual Sample Prinout (Continued)

```
***  MIDLAND XTR MOBILE    ***

MODEL VHF(H)-B

  BAND : 150 - 174  MHZ
  INJ  : H
  REF  : 2.50 KHZ

S/N ..... 7019599B

CUSTOMER .. 8162418500

DATE ..... 10-05-90

PROGRAMMED CHANNEL

CH   RXF[MHZ]   RX-DEC   TXF[MHZ]   TX-ENC   PWR   SCR  AUX

 1   151.62500  100.0T   151.62500  023 +D    N     D    FF

SCAN A
 1

SCAN B
 1

AUX KEY TYPE.............. TYPE2
CH ROLL OVER.............. ENABLE
PRI MONI(T)............... 1.0 SEC
PRI MONI(N)............... 1/8
SCAN HOLD................. BUSY/SGNLG
SCHLD-RX.................. 2.5 SEC
SCHLD-TX.................. 5.0 SEC
DEL TABL CLR.............. NO CLEAR
SCAN HANG UP.............. DISABLE
SCAN TYPE................. PS
BCLO...................... DISABLE
TXTOT..................... INFINITE
BEEP A/B/C/D.............. E/E/E/E


END
```

Figure 6 - 2 – Report Sample Printout

SECTION 7

APPENDIX

NOTES

APPENDIX A

SQUELCH CODES

CTCSS CODES AND FREQUENCIES			
TONE FREQ.(Hz)	E.I.A. GROUP	TONE FREQ.(Hz)	E.I.A. GROUP
67.0	A	131.8	A
71.9	B	136.5	B
74.4	C	141.3	A
77.0	A	146.2	B
79.7	C	151.4	A
82.5	B	156.7	B
85.4	C	162.2	A
88.5	A	167.9	B
91.5	C	173.8	A
94.8	B	179.9	B
97.4	not EIA	186.2	A
100.0	A	192.8	B
103.5	B	203.5	A
107.2	A	210.7	B
110.9	B	218.1	A
114.8	A	225.7	B
118.8	B	233.6	A
123.0	A	241.8	B
127.3	B	250.3	A

VALID DCS CODES			
±023	±152	±343	±606
±025	±155	±346	±612
±026	±156	±351	±624
±031	±162	±364	±627
±032	±165	±365	±631
±043	±172	±371	±632
±047	±174	±411	±654
±051	±205	±412	±662
±054	±223	±413	±664
±065	±226	±423	±703
±071	±243	±431	±712
±072	±244	±432	±723
±073	±245	±445	±731
±074	±251	±464	±732
±114	±261	±465	±734
±115	±263	±466	±743
±116	±265	±503	±754
±125	±271	±506	
±131	±306	±516	
±132	±311	±532	
±134	±315	±546	
±143	±331	±565	

APPENDIX B

TRANSCEIVER ERROR CODES

When the SYN-TECH XTR radio is turned on, it performs a self-test that reports success by illuminating all displays and indicators momentarily. If a problem occurs, an error code appears in the channel display with an identifiable beep. Please note that multiple error codes will be displayed in sequence when the radio is turned on if multiple conditions exist. In many cases, the error display can be cleared by pressing any button, but will re-occur at next unit power up.

CODE	MEANING
E1	Microcomputer error - ROM/RAM
E2	No Model/No Channel Data Programmed
E3	Synth Unlock
E4	Sum error of channel data
E7*	Power disconnected – previous front panel control conditions were lost
E8	Programmer I/F error
E9	Clone I/F error

* Note that E7 is the normal power-up display when the power has been disconnected for some period of time. When E7 is displayed, it simply means that the last selected channel number and front panel switch configuration (SCAN on or off, etc.) has been lost. All basic radio data (channel frequencies, etc.) is written in non-volatile memory and cannot be changed or lost without reprogramming.

APPENDIX C

EDITING SUMMARY

MODE	PAGE	PARAMETER	CHOICES (Defaults are **bold**)	NOTES
RADIO I.D.	4 - 3	**MODEL** (NOTE: If programming an 8-Channel Mobile, only those choices marked by "*" are applicable.	VHF(L) A-Band VHF(L) B-Band VHF(L) C-Band VHF(M) A-Band* VHF(M) B-Band* VHF(H) A-Band* VHF(H) B-Band* UHF A-Band* UHF B-Band* UHF C-Band UHF D-Band 800 MHz	Sets formula constants for later parameter entries. Must be entered before further programming.
	4 - 3	**INJECTION ASPECT** (High/Low), that the radio is equipped with	Low Side (default for UHF) High Side (default for VHF)	An alternate injection kit is available from MIDLAND.
	4 - 3	**PLL COMPARTOR REFERENCE FREQUENCY** of the radio	**12.5 kHz** 5.0 kHz (option for UHF) 6.25 kHz (option for 800 MHz)	Selection available for UHF and 800 MHz radios only. PLL freq for VHF is 2.5 kHz
	4 - 3	**SERIAL NUMBER**	8 alphanumeric digits, maximum (0-9,A-E only)	Entry optional
	4 - 4	**CUSTOMER NUMBER**	10 alphanumeric digits, maximum (0-9,A-E only)	Entry optional
	4 - 4	**DATE**	6 digits, maximum (0-9 or space only)	Entry optional
CHANNEL (for each channel)	4 - 5	**RECEIVE FREQUENCY**	Frequency within radio operating range, in MHz	Radio ID must be completed first
	4 - 5	**SIGNALING TYPE** Coded squelch decode frequency or code	**NONE** CTCSS DCS	
	4 - 6	**TRANSMIT FREQUENCY**	Frequency within radio operating range, in MHz	
	4 - 6	**SIGNALING TYPE** Code squelch tone or code to be transmitted with voice	**NONE** CTCSS DCS	
	4 - 6	**TRANSMIT RF POWER** (Not applicable for 8-Channel Mobiles)	**High (normal) power** Low power	
	4 - 6	**SCRAMBLER ENABLE/DISABLE** Voice scrambler/descrambler for this channel	**Scrambler disabled** Scrambler enabled	If enabled, scrambler can be disabled by optional front panel button
	4 - 6	**AUXILIARY DATA** For control of auxiliary functions when some options are installed	Eight bits are available	If required, instructions will be furnished with these options
	4 - 6	**SELECTING A SCAN LIST** Place Channel in a Scan List	Scan List A (Yes or No) Scan List B (Yes or No)	

MODE	PAGE	PARAMETER	CHOICES (Defaults are **bold**)	NOTES
OPTIONS	4 - 7	**AUXILIARY KEY TYPE SELECTION** Operation of auxiliary button on radio	Type 1 **Type 2**	Type 1 – select if an option is installed which uses the Aux Out line. Type 2 – auxiliary button becomes a A/D DEL switch.
	4 - 7	**CHANNEL ROLLOVER** Release electrical rotation stops on Channel Knob	**Rollover enabled** Rollover disabled	
	4 - 8	**PRIORITY SAMPLING RATE** Rate of priority sampling while scan is stopped on a non-priority channel	Every 0.5 seconds Every 0.75 seconds **Every second** Every 1.5 seconds	
	4 - 8	**PRIORITY SAMPLING RATE DURING SCAN** Decides the rate of Priority Channel sampling during scan.	after every 4 (1 to 4) non-priority channels **after every 8 (1 to 8) non-priority channels**	
	4 - 9	**SCAN HOLD CONDITIONS** Decides conditions which will cause scan hold to occur	Busy/NSQ **Busy/Signaling** Open/NSQ Open/Signaling	
	4 - 9	**SCAN HOLD DELAY ON RECEIVE** Decides delay after loss of carrier before scan resumes	0.3 second delay **2.5 second delay** 5 second delay Infinite (manual restart)	
	4 - 9	**SCAN HOLD DELAY ON TRANSMIT** Decides delay after transmit before scan resumes	0.3 second delay 2.5 second delay **5 second delay** Infinite (manual restart)	
	4 - 9	**RESTORING OMITTED CHANNELS** Decides conditions which will cause deleted scan channels to be restored to the scan lists	**No Clear (manual restoration only)** Power Off Scan Off Clear	
	4 - 9	**SCAN STOP WITH MICROPHONE OFF-HOOK**	**Disabled** Enabled	
	4 - 10	**SCAN TYPE** Decides scan type	Normal Scan Modified Scan Secondary Scan **Public Safety Scan**	See pages 4 - 9 and 4 - 10 for scan type descriptions
	4 - 11	**BUSY CHANNEL LOCKOUT** Decides conditions for Busy Channel Lock-Out	• **Disabled** • On noise squelch signals • On CTCSS/DCS signals • PTT is inhipited when a carrier without CTCSS/DCS or incorrect CTCSS/DCS is received; transmit is enabled when no carrier or carrier with valid CTCSS/DCS is received	

MODE	PAGE	PARAMETER	CHOICES (Defaults are bold)	NOTES
OPTIONS (cont)	4 - 11	**TRANSMIT TIMEOUT TIMER** Decodies length of timeout timer operation	**0 = timer disabled** 1 = 30 seconds 2 = 60 seconds 3 = 90 seconds 4 = 120 seconds 5 = 150 seconds 6 = 180 seconds 7 = 210 seconds	
	4 - 11	**BEEP CONTROL** Use to decide when beeps occur.	Group A (**Yes** or No) Group B (**Yes** or No) Group C (**Yes** or No) Group D (**Yes** or No)	Enable Group A for Priority 1 and 2 detection beeps. Enable Group B for TOT and BCLO indication beeps Enable Group C for pushbutton and channel change beeps. Enable Group D for powerup test and error indication. See page 4 - 11.

APPENDIX D

EDITING WORKSHEET

RADIO I.D.

1. **MODEL (circle one):**
   VHF(L) A-Band VHF(L) B-Band VHF(L) C-Band VHF(M) A-Band VHF(M) B-Band
   VHF(H) A-Band VHF(H) B-Band UHF A-Band UHF B-Band UHF C-Band
   UHF D-Band 800 MHz

2. **INJECTION ASPECT (circle one):**
   High (**VHF default**) Low (**UHF default**)

3. **PLL COMPARATOR REFERENCE FREQUENCY (circle one):**
   (UHF Band and 800 MHz only): **12.5 kHz** 5.0 kHz (UHF) 6.25 kHz (800 MHz)

4. **SERIAL NUMBER:**__ __ __ __ __ __ __ __
   (Optional – 8 digits maximum)

5. **CUSTOMER NUMBER:**__ __ __ __ __ __ __ __ __ __
   (Optional – 10 digits maximum)

6. **DATE/TIME:**__ __ __ __ __ __
   (Optional – 6 digits maximum)

CHANNEL AND SCAN LIST PROGRAMMING (Duplicate page for second Scan List)

SCAN LIST: __A __B

CHANNEL NUMBER (1-2 digits)	RECEIVE FREQUENCY (in MHz)	RX SQUELCH TONE OR CODE	TRANSMIT FREQUENCY (in MHz)	TX SQUELCH TONE OR CODE	TRANSMIT[2] POWER (high or low)	SCRAMBLER[3] (yes or no)	AUXILIARY DATA[4] (8 bits available)

[1]Up to 22 channels, or 99 with option, for Syn-Tech XTR Mobiles, or up to 8 channels for 8-Channel Mobiles.
[2]Not used by 8-Channel Mobiles.
[3]Add-on kit required.
[4]Used only with some options. Instructions furnished if required.

– Default conditions are **bold** –

OPTIONS PROGRAMMING

1. **AUXILIARY KEY TYPE SELECTION (circle one):**
   Type 1 **Type 2**

2. **CHANNEL ROLLOVER (circle one):**
   Enable Disable

3. **PRIORITY SAMPLING RATE DURING SCAN HOLD (circle one):**
   Every 0.5 seconds Every 0.75 seconds **Every second** Every 1.5 seconds

4. **PRIORITY SAMPLING RATE DURING SCAN (circle one):**
   After every 4 non-priority channels **After every 8 non-priority channels**

5. **SCAN HOLD CONDITIONS (circle one):**
   BUSY/SIG BUSY/NSQ OPEN/NSQ OPEN/SIG

6. **SCAN HOLD DELAY ON RECEIVE (circle one):**
   0.2 seconds **2.5 seconds** 5.0 seconds Infinite

7. **SCAN HOLD DELAY AFTER TRANSMIT (circle one):**
   0.3 seconds 2.5 seconds **5.0 seconds** Infinite

8. **RESTORING OMITTED CHANNELS (circle one):**
   No Clear Power Off Scan Off Clear

9. **SCAN TYPE (circle one):**
   Normal Modified Secondary **Public Safety**

10. **BUSY CHANNEL LOCKOUT (circle one):**
    Disabled Noise Squelch Signalling Special type

11. **TRANSMIT TIMEOUT TIMER (circle one):**
    Infinite 30 seconds 60 seconds 90 seconds
    120 seconds 150 seconds 180 seconds 210 seconds

12. **BEEP CONTROL:**
    Group A: ____Enable (Y) ____Disable (N)
    Group B: ____Enable (Y) ____Disable (N)
    Group C: ____Enable (Y) ____Disable (N)
    Group D: ____Enable (Y) ____Disable (N)

– Default conditions are **bold** –

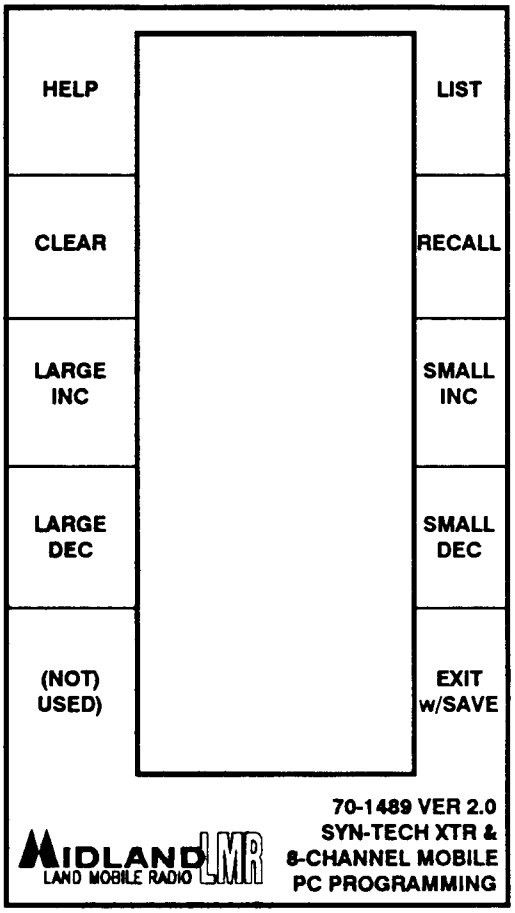
APPENDIX E

TEMPLATES

Copy and cutout the appropriate template (Type 1 or Type 2) and lay it across the function keys on your computer keyboard. Refer to it when editing forms. See page 2 - 5 for more detailed explanation of keyboard functions.

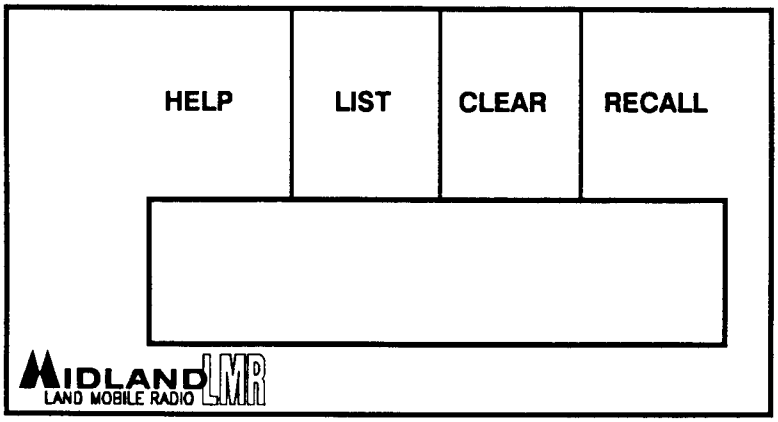
TYPE 1

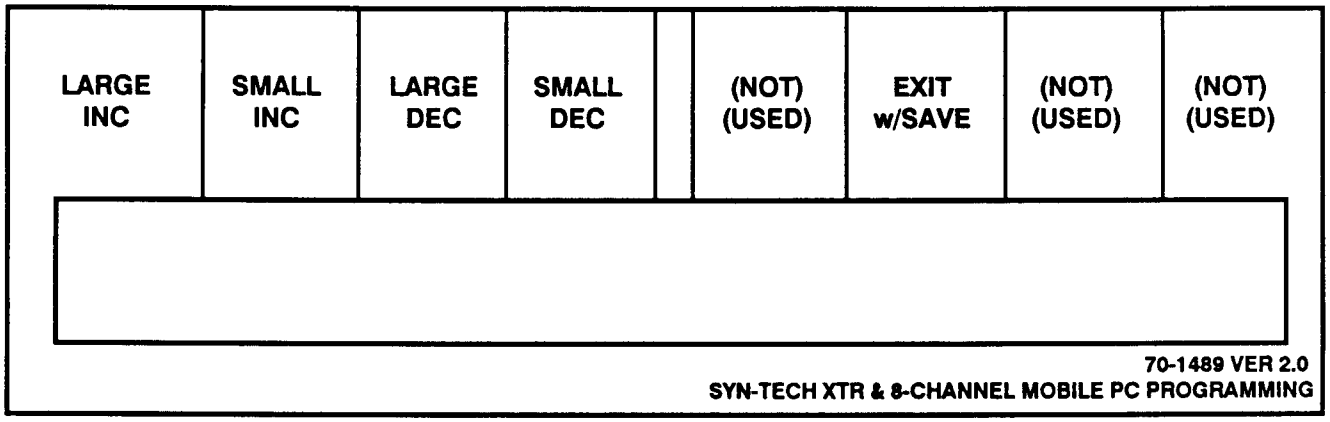
(Cut along the heavy lines)



TYPE 2

(Cut along the heavy lines)





APPENDIX F

FIRMWARE SUMMARIES

- **VERSION 1.3 First Release (1990)**
- **VERSION 2.0 Second Release (1990)**

1. Added capability to program 8-Channel Mobiles.
2. Added capability to view files in directories when using **FILE LOAD** and **FILE SAVE** functions.
3. Improved programming for VHF Low-Band radios.
4. Improved use of disk space by files created using the **FILE SAVE** function .

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- **VERSION 2.1 Third Release (1991)**

1. Corrected setting of Busy Channel Lock-Out (BCLO) and Transmit Time-Out Timer (TXTOT) parameters in "EDIT OPTIONS" form.
2. Improved PRINT function.

MIDLAND LMR
LAND MOBILE RADIO

1690 NORTH TOPPING · KANSAS CITY · MISSOURI · 64120
(P.O. BOX 419903 · KANSAS CITY · MISSOURI · 64141)
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CHANGE NOTICE

APPLICABLE MODEL NO(s).: 70-1489-5.25-2.0 and 70-1489-3.5-2.0
SERVICE MANUAL NO(S).: 70-999993
MANUAL PRINTING DATE: 12/90

CHANGE NOTICE NO.: CN-593
DATE: 1/30/91
SUBJECT: PC Software for Syn-Tech XTR and 8-Channel Mobiles

The EDIT OPTIONS form of the XTR and 8-Channel Mobile PC Software Version 2.0 changed the wrong EEPROM location in attempting to set the Busy Channel Lock-Out (BCLO) and Transmit Time-Out Timer (TXTOT) parameters. Version 2.1 correctly sets these parameters but Version 2.0 may have set EEPROM Address 1E to an incorrect value.

To correct the value at this EEPROM Address for radios which have been programmed with Version 2.0 software or configuration files created by Version 2.0 software, do the following:

1. Enter the RADIO UPLOAD form to upload the radio configuration into the computer or enter the FILE LOAD form to load a filed configuration into the computer.

2. Exit RADIO menu or FILE menu and enter the EDIT MANUAL form.

3. Enter hexadecimal 1E for the EEPROM Address and press the Enter key.

4. Change the EEPROM Value to hexadecimal FF and press the Enter key.

5. Exit the EDIT MANUAL form and enter the RADIO DOWNLOAD form to download the configuration in the computer to the radio or enter the FILE SAVE form to save the configuration to a file.

Product Bulletin No:1008

RE: PC Software for XTR & 8 CH
Version 2.1 Update

Date: February 27, 1991

The 70-1489 Version 2.1 software still uses the Version 2.0 manual as its guide, dated 12/90. Enclosed is CN-593 & an updated copy of page 7-12.

MIDLAND
CANADA LIMITED

MIDLAND LAND MOBILE RADIO

SERVICE/INSTALLATION MANUAL

70-1308A

PC INTERFACE CABLE ASSEMBLY

DESCRIPTION

The model 70-1308A assembly is used to interface an IBM PC/XT/AT or compatible computer to a Syn-Tech II, Syn-Tech XTR, or 8-Channel mobile transceiver, or to a Syn-Tech XTR Handheld for programming or test purposes.

If you are programming a mobile transceiver, the 25-pin connector plugs into a serial port of the computer while the 10-pin connector plugs directly into the transceiver, and the 70-1308A is powered by the transceiver.

If you are programming a Syn-Tech XTR Handheld, you will also need to connect the 70-1053A interface cable, the 70-1056A universal test box, or the 70-1057A programming/RF test cable to the radio. The 25-pin connector of the 70-1308A plugs into a serial port of the computer while the 10-pin connector plugs directly into the 70-1053A, 70-1056A, or 70-1057A.

Associated Manuals:

70-999375	Computer-Based Programmer for Syn-Tech II Mobile Transceiver User's Manual
70-999598	Computer-Based Programmer for Syn-Tech XTR Mobile Transceiver User's Manual
70-999993	Computer-Based Programmer for 8-Channel Mobile Transceiver User's Manual
70-999970	Computer-Based Programmer for Syn-Tech XTR Handhelds User's Manual

"AT" STYLE DB-9 SERIAL CONNECTOR PIN CONFIGURATION

DB-9 PIN NO.	FUNCTION	EQUIVALENT DB-25 PIN NO.
1	Data Carrier Detect	8
2	Received Data	3
3	Transmitted Data	2
4	Data Terminal Ready	20
5	Signal Ground	7
6	Data Set Ready	6
7	Request To Send	4
8	Clear To Send	5
9	Ring Indication	22

Note A: Pin 9, Ring Indication, is used in conjuction with phone modems.

Note B: Confusion over whether equipment is DCE or DTE may require that the following pairs of pins be reversed:
2 & 3, 4 & 6, and 7 & 8.

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