▲▲IDLAND LMR
LAND MOBILE RADIO
E/PROM PROGRAMMER
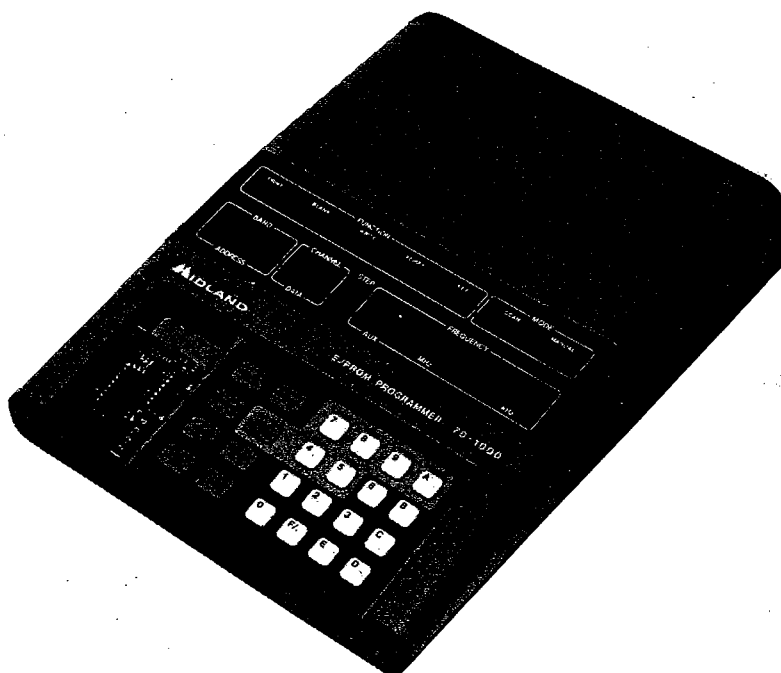
OPERATOR'S MANUAL
MODEL 70-1000

Related Manuals

1.   Refer to Operator's Manual for Model 70-1100/1101 (E/PROM Eraser)
     for detailed erasing instructions.

2.   Refer to Operator's Manual for Model 70-1300A/B (Printer) for
     detailed printer instructions.

3.   Refer to Service Manual for Model 70-1000 (E/PROM Programmer) for
     detailed servicing instructions.

OPERATORS MANUAL ADDITION

MODEL NO.: 70-1000
SERIAL NO.(S):   ALL
OPERATOR'S MANUAL NO.: 70-999113
OPERATOR'S MANUAL PRINTING DATE: 3/88

MANUAL ADDITION NO.: MA-128A
DATE: 4/1/88
SUBJECT: L3 SOFTWARE UPDATE

This information is intended to be used with the 70-1000 Operator's Manual 70-999113 dated 5/85. The following information applies only to programmers upgraded with "L3" version software and provides additional instructions necessary to program Z-383 type E/PROM modules for Midland models 70-336 and 70-526 transceivers. The software configuration of the 70-1000 is displayed at unit power-up as described on page 4 of the 5/85 Operator's Manual.

The following changes/additions should be made on the pages noted:

L3 Software Version Description (Page 1)

The "L3" version software is required to program E/PROMs used in Midland mobile transceiver models 70-336 and 70-526. The "L3" software is required to program the 70-155B for 2.5 KHz channel stepping and to program the 70-255. The "L3" version also retains all the capabilities of the previous versions (AO through H1) as described in the 70-1000 Operator's Manual dated 5/85.

E/PROM TYPE SELECTION (Page 5)

In addition to the E/PROM type selection choices of 1, 2 and 7, the following type selection should be added.

Key in 3: For Z-383 E/PROM modules used with models 70-336 and 70-526 mobile transceivers.

BAND SELECTION (Page 9)

When the Type Selection for the Z-383 E/PROM module has been made, the only available Band Code Selections are 2, 2A, 2B, 2C, 2D, 2E for the 70-336 and 3, 3A, 3B, 3C, 3D, 3E for the 70-526. Other band selections are inhibited since transceivers accepting the Z-383 type E/PROM do not exist for these bands. Unless channel stepping or inverse injection kits have been installed, Band Code 2 should be selected for 70-336 E/PROM programming and Band Code 3 for the 70-526.

CHANNEL PROGRAMMING (Pages 10-13)

Channel programming for the Z-383 E/PROM begins at channel 1 (instead of 0) and up to 8 channels maximum can be programmed.

VALID AUXILIARY CODE LIST (Page 14)

The 70-2160 and 70-2161 CTCSS/CDCSS Encoder/Decoder options are not compatible with the 70-336 and 70-526 series radios. Therefore the CDCSS codes shown on page 14 are not valid for these radios, although the programmer will accept CDCSS code entries when programming the Z-383 E/PROM module. The CTCSS frequency entries are valid for the 70-336 and 70-526.

SCAN CHANNEL PROGRAMMING (Pages 16, 17)

Up to 10 channels can be programmed in each of the two scan groups A and B (8 channels plus duplicates, if desired). A count of the number of channels entered is shown in the BAND display as 0-9.

FUNCTION CODE PROGRAMMING (Pages 17, 18)

The Function Code Programming for the 70-336 and 70-526 is identical to that described for the SYN-TECH mobile.

PROGRAMMING THE E/PROM MODULE (Pages 25, 26)

To allow the Z-383 E/PROM module to be programmed by the 70-1000, a new adapter, the 70-1072 programming adapter, is required. Plug the 70-1072 adapter into the 70-1000 programmer, then plug the Z-383 module into the 70-1072.

Programmer Error Codes

An "ERR 10" in the FREQUENCY display indicates that the E/PROM type selection does not match the module that is installed in the programmer adapter. Press the RESET key to remove the error indication.

An "ERR 11" in the FREQUENCY display indicates that a channel has been entered without a receive frequency. Press the RESET key to remove the error indication. Enter a receive frequency on all channels before performing the WRITE operation.

****** IMPORTANT - READ THIS PAGE FIRST ******

The following manual contains programming procedures to be used with the 70-1000 E/PROM Programmer equipped with the "H1" version System E/PROM, but does <u>not</u> apply to earlier version "Ø.Ø","AO", "CO", or "EO" equipped programmers. (The system configuration is displayed in the FREQUENCY readout at unit turn-on). "Ø.Ø", "AO", "CO" and "EO" version units can be upgraded to "H1" status by installation of the 70-1408 E/PROM Programmer Upgrade Kit.

H1 Version Software

The "H1" version E/PROM programmer software is required to program E/PROMs used in SYN-TECH mobile transecivers equipped with the CDCSS/CTCSS option (70-2159/2160/2161/2162). The "H1" version also retains all the capabilities of the previous versions listed below.

Ø.Ø Version Software

The "Ø.Ø" version software is required to program E/PROMs used in SYN-TECH mobile transceivers equipped with the Talk Around feature or for the SYN-TECH handheld transceivers. The "Ø.Ø" version programmer will program all SYN-TECH mobile transceivers with the HD44840A22 and HD44840A27 version microcomputers and will program all mobile transceivers with the appropriate 2.5 KHz Channel Spacing Kit installed. E/PROMs for use in the mobile transceivers equipped with the original microcomputer type HD44801A74 can be programmed with the "Ø.Ø" version programmer, however, some programming procedure changes are necessary. Refer to the appropriate manual section for details.

EO Version Software

The "EO" version E/PROM software will program E/PROMs <u>ONLY</u> for use in standard configuration SYN-TECH mobile transceivers and not SYN-TECH handheld transceivers. The "EO" version can program E/PROMs for the mobile transceivers equipped with HD44840A22 or HD44840A27 microcomputer. For mobile transceivers equipped with the original microcomputer HD44801A74 some programming procedure changes are necessary.

CO Version Software

The "CO" version E/PROM software will program E/PROMs for use <u>ONLY</u> in SYN-TECH mobile transceivers with the original microcomputer HD44801A74 and with the 70-2181 80 channel kit installed. The "CO" version will not program the SYN-TECH handheld transceivers or mobile transceivers equipped with HD44840A22 or HD44840A27 microcomputer.

AO Version Software

The "AO" version E/PROM software will program E/PROMs for use <u>ONLY</u> in SYN-TECH mobile transceivers with the original microcomputer HD44801A74 for only 36 channels. The "AO" version will not program the SYN-TECH handheld transceivers or mobile transceivers equipped with HD44840A22 or HD44840A27 microcomputer.

GENERAL

The 70-1000 programmer is a portable programmer designed for use with the full line of Midland SYN-TECH Mobile and Handheld Frequency Synthesized FM Transceivers.

The 70-1000 programmer is capable of programming Receiver and Transmitter frequencies, channel scanning sequence and optional functions.

The 70-1000 programmer can read the contents of an E/PROM module and transfer it to another E/PROM module.

The 70-1000 programmer has a TTL level parallel printer interface, which allows a quick printout of the contents of an E/PROM module on the optional 70-1300 printer.

SPECIFICATIONS

Programmable E/PROM Modules	Type Z-273, Z-273TA or Z-350
Display	Hexadecimal 7-segment Green LEDs, 13 digits and 7 Green LEDs for status indicator
Key Board	8 Control keys and 16 Data keys
Microcomputer	6802 type
RAM Capacity	2K bytes
ROM Capacity	16K bytes
Power Requirement	From 100 VAC – 240VAC 50/60 Hz (Withstand voltage; 1.5 KV/1 min.)
Printer Interface	Centronics type TTL level parallel interface
Operating Temperture Range	0 degrees thru 40 degrees Celsius
Operating Humidity Range	90% at 35C (non-condensing)
Dimensions	W: 210 mm (8.3 in) D: 280 mm (11.0 in) H: 65 mm (2.6 in)
Weight (approximate)	1.9 Kg (4.2 lb.)

(1)   Power ON/OFF

(2)   Alphanumeric Key Board (Allows keying in of data and control of all functions.)

(3)   SCAN (Allows programming primary and secondary channel scanning sequence.)

(4)   MANUAL (Allows entry of optional functions and display of all address data and entering of Heading information.)

(5)   CLEAR (Clears an incorrect entry or, if pressed after FUNCTION, completely clears all previously entered data.)

(6)   FUNCTION (Allows entry to the COPY, BLANK CHECK, WRITE, VERIFY, B.W.V., PRINT, CLEAR and Function codes input mode.)

(7)   COPY (Transfer the content of an attached E/PROM module to the buffer RAM.)

(8)   BLANK CHECK (Checks whether the E/PROM module is erased.)

(9)   WRITE (Writes the contents of the buffer RAM into the E/PROM module.)

(10) B.W.V. (Activates functions of BLANK CHECK, WRITE and VERIFY.)

(11) VERIFY (Compares the content of the buffer RAM with the content of the E/PROM module.)

(12) PRINT (Outputs all data to the optional printer.)

(13) RESET (Used to return to the channel programming mode from one of the FUNCTION modes, SCAN mode or MANUAL mode.)

(14) ENTER (Causes keyboard entries to be stored in the buffer RAM.)

(15) ▽ (Allows incrementing of channel data, scan information, function codes, heading information and address display.)

(16) △ (Allows decrementing of channel data, scan information, function codes, heading information and address display.)

CAUTION

NEVER TURN THE POWER ON OR OFF WHILE THE E/PROM MODULE IS PLUGGED INTO THE E/PROM MODULE ADAPTER AND MAKE SURE THAT THE CORRECT PROGRAMMER SELECTION HAS BEEN MADE FOR THE E/PROM MODULE BEING PROGRAMMED.

1. To turn the power on, press the power switch on the back of the 70-1000. To turn the power off, press the power switch a second time.

2. When the power is turned "ON", all the mode and function indicator lights (except PRINTER) will illuminate and the alphanumeric readouts will display all "8's" for about one second.

3. Then, PASS0H1 (or PASS1H1) will be displayed for about one second to indicate all self-tests are complete.
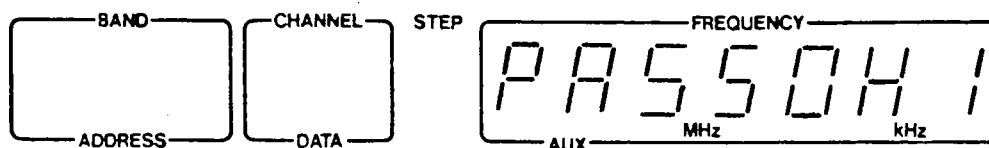
   If an error code is displayed instead of PASS0H1 (or PASS1H1), turn the 70-1000 off and contact your Midland dealer.

4. After one second of PASS0H1 or PASS1H1, a "TYP" will be displayed in the band section of the readout. The 70-1000 is now ready for use.
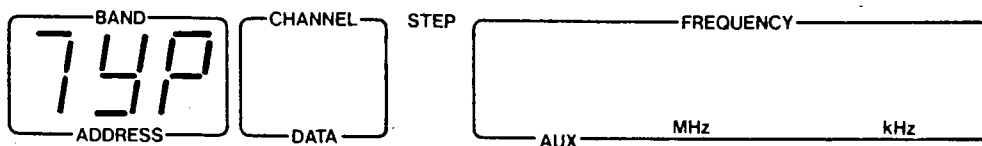
5. When the FUNCTION then CLEAR keys are pressed the above sequence steps 2, 3, and 4 will be performed. This operation can be used to reset the 70-1000 programmer to program a new E/PROM module.

PROGRAMMING SEQUENCE

The recommended programming sequence is as follows:

1. Heading Input
2. E/PROM Type Selection
3. Band Selection
4. Channel Programming
5. Center Frequency Programming
6. Scan Channel Programming
7. Function Code Programming
8. Programming the E/PROM Module

The following variations and restrictions on the programming sequence should be noted:

1. The Heading Input can be entered at any point prior to Programming the E/PROM Module or it may be omitted if no heading printout is desired.
2. Function Code Programming can be performed at any point prior to programming the E/PROM Module and can be omitted if the built-in default conditions are acceptable.
3. E/PROM Type Selection must be made immediately prior to Band Selection.
4. Band Selection must be made prior to Channel Programming inputs.
5. Scan Channel Programming cannot be done until Channel Programming has been completed.

E/PROM TYPE SELECTION

The E/PROM type selection must be made for the different types of E/PROM modules used with the Midland SYN-TECH mobile transceivers of standard or Talk-Around configurations or for the SYN-TECH handheld transceivers. The E/PROM Type Selection must be made before proceeding to the E/PROM programming sequence.

1. The E/PROM Type Selection is made as follows:

   Key in 1: For Z-273 E/PROM modules (70-2401) used with the standard SYN-TECH mobile/base transceivers and 70-2402 E/PROM modules used in mobiles/bases equipped with the CDCSS/CTCSS option.

   Key in 2: For Z-350 E/PROM modules used with the SYN-TECH handheld transceivers.

   Key in 7: For Z-273TA E/PROM modules (70-2401 E/PROM module modified for Talk-around operation in High Band Wideband mobile/base models or standard 70-2401 used in other models when programmed for pushbutton T/A operation.)

   After the appropriate key is pressed the band section of the display will show TYP. In the channel section a Z is displayed. A "-" is displayed in the step section and the E/PROM type is displayed in the frequency section.

2. E/PROM Type Selection example:

   Press 1
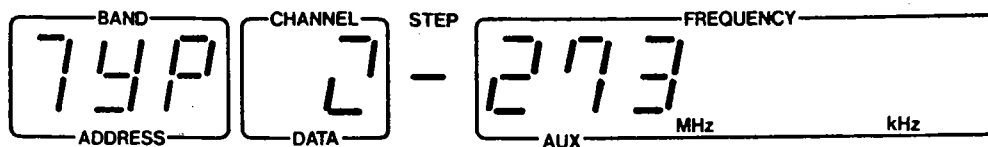
   Press ENTER
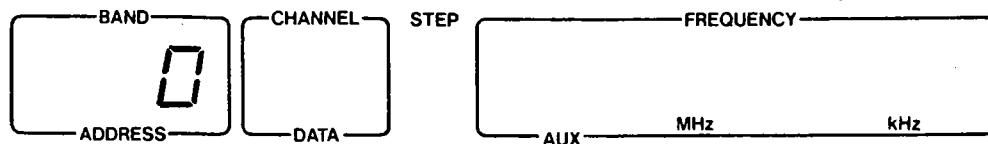
3. The type of E/PROM module that is being programmed can be displayed
   at any time, such as after a COPY operation, by pressing the RESET
   key. The module type will be displayed for about two seconds before
   reverting to the channel programming mode.

HEADING INPUT

A model number, serial number, customer number and date can be entered
to be printed out as a report heading. If no heading is desired, go
directly to the BAND SELECTION step.

1. Heading input sequence:
   The heading input mode is selected by pressing MANUAL then ENTER
   keys. The display will show HdG 1 70- . The 1 in the CHANNEL
   display is a prompt for the first of five heading inputs as
   follows:

   Input 1 – Unit model number suffix composed of any 4 characters (0-
   9 and/or A-F). If less than 4 characters are entered, the
   remainder will be filled by zeroes. Press ENTER .
   Input 2 – Unit serial number, up to 8 numbers of letters. When the
   eighth key is pressed the first character will appear in
   the step display. Press ENTER .
   Input 3 – Customer number, first three characters only. Press
   ENTER .
   Input 4 – Remaining seven characters (or less) of the customer
   number or letters. Press ENTER .
   Input 5 – Date entry, input as 1 or 2 digits (month), F/. , 1 or 2
   digits (day), F/. ,then two digits (year), followed by
   ENTER . Press RESET to complete the heading input.

   Any of the above inputs can be deleted by pressing only ENTER when
   the input prompt is displayed, causing the printout of that heading
   portion to be blank. However, heading printout will not occur
   unless at least one input is made.

2. Heading input example.

   Press MANUAL ENTER

   Press 5 3 0 B (model number suffix)

Press ENTER

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY (AUX / MHz / kHz)
Hd6	2		

Press 1 2 3 4 5 6 7 8 (Serial Number)

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY (AUX / MHz / kHz)
Hd6	2	1	2345678

Press ENTER

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY (AUX / MHz / kHz)
Hd6	3		

Press 2 2 4 (customer number, 1st 3 digits)

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY (AUX / MHz / kHz)
Hd6	3		224

Press ENTER

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY (AUX / MHz / kHz)
Hd6	4		

Press 1 7 3 9 4 A C (customer number, last 7 digits)

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY (AUX / MHz / kHz)
Hd6	4		17394AC

Press ENTER

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY (AUX / MHz / kHz)
Hd6	5		

Press 6 F/. (month)

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY (AUX / MHz / kHz)
Hd6	5		6 0

7

Press ⬚1 ⬚3 ⬚F/. (day)

BAND	CHANNEL	STEP	FREQUENCY
Hd6	5		6 1 3 0
ADDRESS	DATA	AUX	MHz kHz

Press ⬚8 ⬚3 ⬚ENTER (year)

BAND	CHANNEL	STEP	FREQUENCY
Hd6	5		06 1 983
ADDRESS	DATA	AUX	MHz kHz

Press ⬚RESET

BAND	CHANNEL	STEP	FREQUENCY
0			
ADDRESS	DATA	AUX	MHz kHz

BAND SELECTION

1. To prepare the 70-1000 for channel frequency entry, a band selection code must be entered from the following table. The standard radio requires only a single digit band code entry 0-4 depending on the frequency band. The modifier code must be added only if the radio has been modified for inverse 1st local oscillator injection and/or special channel spacing.

2. Programming Example

   A standard configuration 70-530B is to be programmed. The radio operating range falls in the range of 403-520 MHz, so BAND CODE 3 is selected.

   Press ⬚3

BAND	CHANNEL	STEP	FREQUENCY
400			
ADDRESS	DATA	AUX	MHz kHz

   Press ⬚ENTER

BAND	CHANNEL	STEP	FREQUENCY
400	01	1	00000
ADDRESS	DATA	AUX	MHz kHz

   A BAND display of 400 is indicated and the 70-1000 is ready for channel programming.

BAND SELECTION TABLE

BAND CODE	MODIFIER CODE ①	BAND DISPLAY	BANDWIDTH MHZ	RX-IF MHZ	TX-IF MHZ ②	REF. KHZ	LOCAL INJECTION
0	– – –	50	25 – 55	10.7	10.24	5.0	HIGH
0	A	5A	"	"	"	"	LOW
0	B	5b	"	"	9.6	12.5	HIGH
0	C	5C	"	"	"	"	LOW
0	D	5d	"	"	10.24	2.5	HIGH
0	E	5E	"	"	"	"	LOW
1	– – –	80	60 – 90	21.4	20.48	5.0	HIGH
1	A	8A	"	"	"	"	LOW
1	B	8b	"	"	19.2	12.5	HIGH
1	C	8C	"	"	"	"	LOW
1	D	8d	"	"	20.48	2.5	HIGH
1	E	8E	"	"	"	"	LOW
2	– – –	150	136 – 174	21.4	20.48	5.0	LOW
2	A	15A	"	"	"	"	HIGH
2	B	15b	"	"	19.2	12.5	LOW
2	C	15C	"	"	"	"	HIGH
2	D	15d	"	"	20.48	2.5	LOW
2	E	15E	"	"	"	"	HIGH
3	– – –	400	403 – 520	21.4	19.2	12.5	LOW
3	A	40A	"	"	"	"	HIGH
3	B	40b	"	"	20.48	10.0	LOW
3	C	40C	"	"	"	"	HIGH
3	D	40d	"	"	"	5.0	LOW
3	E	40E	"	"	"	"	HIGH
4	– – –	800	806 – 866	47.0	19.2	12.5	LOW
4	A	80A	"	"	"	"	HIGH

Notes: ① Modifier Codes must not be used unless the corresponding component or kit changes have been made to the radio.

② TX-IF MHz is not used on the SYN-TECH handheld transceivers. The TX-IF MHz is 0.

The following describes how to program the receiver and transmitter frequencies and Auxiliary codes (CTCSS frequencies and CDCSS codes).

1. Operation sequence for Channel Programming
   Initially, the 70-1000 is ready for programming on channel "0". Channel programming can begin at any other channel number, however, as described below. As the RX frequency, RX Auxiliary code, TX frequency and TX Auxiliary codes are entered, the channel number will be automatically incremented.

   The STEP display prompts the user to input the proper data as follows:

   Step 1 - Receiver frequency input
   Step 2 - Receiver Auxiliary code (See page 14 for valid code list)
   Step 3 - Transmitter frequency input
   Step 4 - Transmitter Auxiliary code (See page 14 for valid list)

2. Programming Example:
   A channel 1 receiver frequency of 464.500 MHz and transmitter frequency of 469.5 MHz is to be programmed. The receive auxiliary code is CTCSS frequency 100.0 Hz, and the transmit auxiliary code is CTCSS frequency 162.2 Hz. Press ▽ once to index the channel display to channel "1".

   Press 4 6 4 F/. 5 0 0 for receiver frequency input.

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY / AUX (MHz / kHz)
400	1	1	464 500

   Press ENTER

BAND / ADDRESS	CHANNEL / DATA	STEP	FREQUENCY / AUX (MHz / kHz)
400	1	2	0

   The 70-1000 is now ready for input of the receiver Auxiliary code which in this example is the CTCSS frequency 100.0 Hz. (CTCSS frequencies and CDCSS codes can be intermixed without restrictions in the same E/PROM, CTCSS on receive and CDCSS on transmit and vice versa, if desired). Auxiliary codes can be programmed for future use even if CTCSS or CDCSS is not currently installed. NOTE: If Noise Squelch operation only is desired on any channel (no CTCSS or CDCSS), simply press ENTER when steps 2 or 4 are displayed. Entering the "0" disable code will have the same effect.

   Press 1 0 0 F/. 0 to input the receive CTCSS frequency. (The decimal point must be entered; the final "0" is optional).

Press [ENTER]
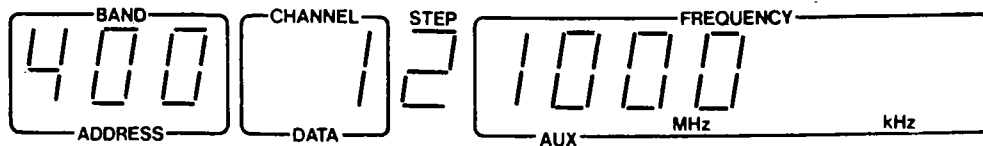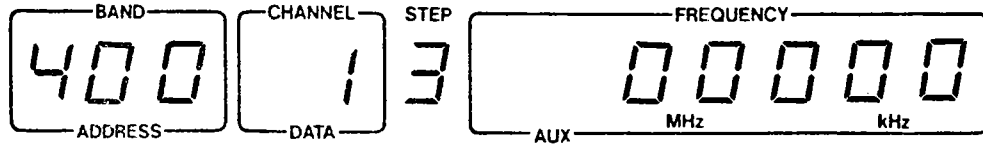
Press [4] [6] [9] [F/.] [5] [0] [0] for transmitter frequency input.

Press [ENTER]

Press [1] [6] [2] [F/.] [2] for transmit CTCSS frequency input.

Press [ENTER]
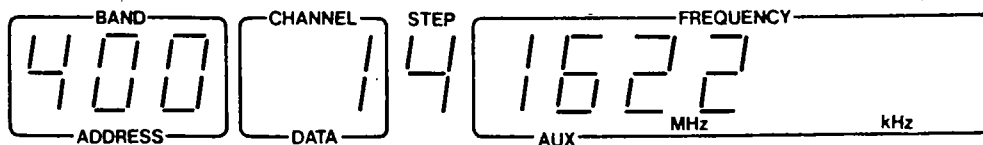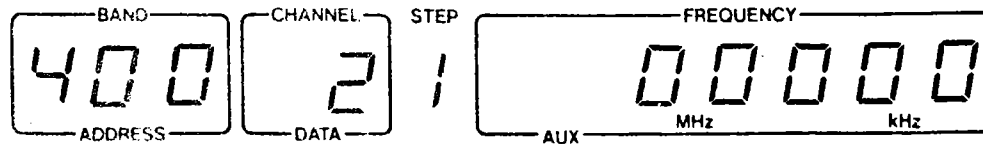
The 70-1000 is now ready for the Receiver and Transmitter information to be entered for channel "2".

3. Second Programming Example:
   After programming channel 1 as shown above, assume the user wants to skip channels 2, 3 and 4 and program channel 5. The receive frequency is 460.0 MHz, the receive auxiliary code is CDCSS code 072, the transmit frequency is 465.0 MHz and the transmit auxiliary code is CDCSS code 506 inverted.

   Press [▽] three times to index the channel to "5".

Press [4] [6] [0] [F/.] [0]   to input the receive frequency.

```
┌──BAND──┐  ┌CHANNEL┐ STEP  ┌─────FREQUENCY─────┐
│  400   │  │   5   │  1    │  4600             │
└─ADDRESS─┘  └─DATA─┘       └───AUX──── MHz   kHz┘
```

Press [ENTER]

```
┌──BAND──┐  ┌CHANNEL┐ STEP  ┌─────FREQUENCY─────┐
│  400   │  │   5 2 │       │        0          │
└─ADDRESS─┘  └─DATA─┘       └───AUX──── MHz   kHz┘
```
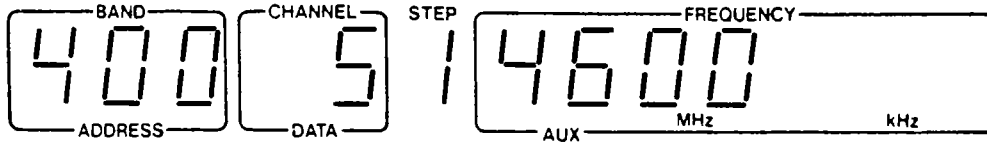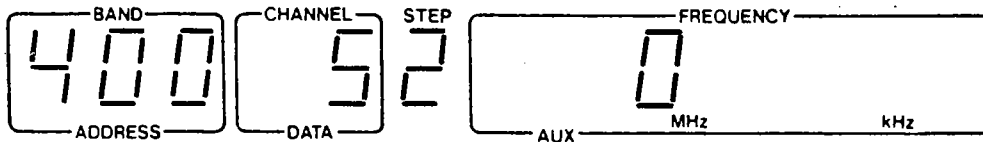
Press [0] [7] [2]   to input the CDCSS code. The "0" <u>must</u> be entered.

```
┌──BAND──┐  ┌CHANNEL┐ STEP  ┌─────FREQUENCY─────┐
│  400   │  │   5 2 │       │  072              │
└─ADDRESS─┘  └─DATA─┘       └───AUX──── MHz   kHz┘
```

Press [ENTER]

```
┌──BAND──┐  ┌CHANNEL┐ STEP  ┌─────FREQUENCY─────┐
│  400   │  │   5 3 │       │     00000         │
└─ADDRESS─┘  └─DATA─┘       └───AUX──── MHz   kHz┘
```
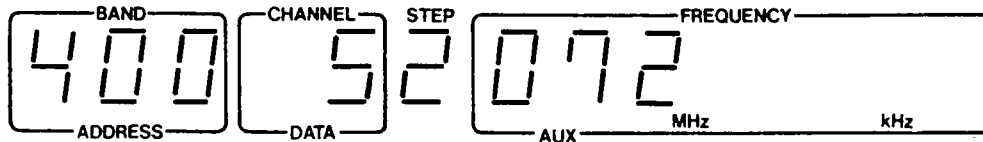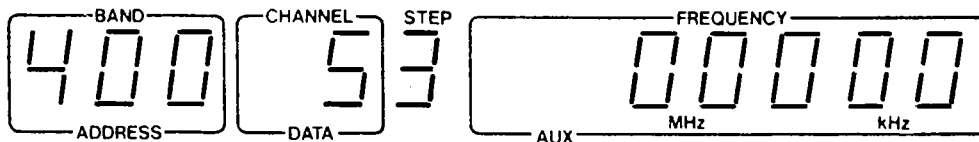
Press [4] [6] [5] [F/.] [0]   to input the transmit frequency.

```
┌──BAND──┐  ┌CHANNEL┐ STEP  ┌─────FREQUENCY─────┐
│  400   │  │   5 3 │       │  4650             │
└─ADDRESS─┘  └─DATA─┘       └───AUX──── MHz   kHz┘
```

Press [ENTER]

```
┌──BAND──┐  ┌CHANNEL┐ STEP  ┌─────FREQUENCY─────┐
│  400   │  │   5 4 │       │        0          │
└─ADDRESS─┘  └─DATA─┘       └───AUX──── MHz   kHz┘
```
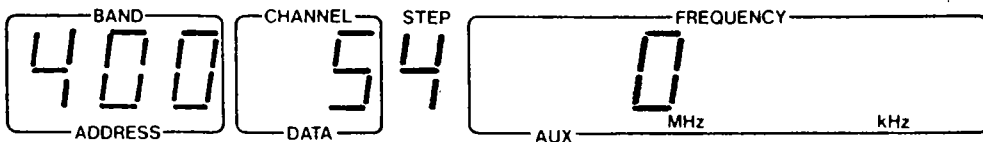
Press [5] [0] [6] [A]   to input the inverted CDCSS code. The "-"
following the 6 in the frequency display indicates the code is
inverted.

```
┌──BAND──┐  ┌CHANNEL┐ STEP  ┌─────FREQUENCY─────┐
│  400   │  │   5 4 │       │  506-             │
└─ADDRESS─┘  └─DATA─┘       └───AUX──── MHz   kHz┘
```

Press   ENTER

```
 ┌──────BAND──────┐  ┌─CHANNEL─┐  STEP  ┌─────────FREQUENCY─────────┐
 │   4 0 0        │  │   6     │   1    │        0 0 0 0 0          │
 └─────ADDRESS────┘  └──DATA───┘        └─AUX──    MHz        kHz───┘
```

The 70-1000 is now ready for Receiver and Transmitter information to be input for channel "6".

4. Alternate Auxiliary code input method
   The 70-1000 contains a sequential list of valid CTCSS frequencies and CDCSS codes which can be displayed for the programmer's reference and allows direct entry of the displayed code or frequency. The valid code list, shown on page 14, can be displayed during step 2 or 4 of the channel programming sequence by pressing the D or C keys. If the first displayed code is the desired CTCSS tone or CDCSS code, simply press ENTER . If some other code is desired, press C to shift the display to lower frequencies or codes, or press D to display higher frequencies and codes. Press ENTER when the desired frequency or code is displayed. The desired frequency or code may also be manually entered in the normal manner while the list is displayed. NOTE: CDCSS codes are not displayed when programming the Z-350 module for portables.

5. When the frequencies entered are incorrect (out of band or non-integer multiples of the reference frequency), the frequency indication display will flash to alert the operator. If this occurs, press the CLEAR key or re-enter the correct frequency. If an incorrect entry has been made in the KHz portion, it can be cleared by pressing the F/. key only. A flashing display during Auxiliary code entry indicates an invalid code entry or an attempt to enter an Auxiliary code without a corresponding channel frequency.
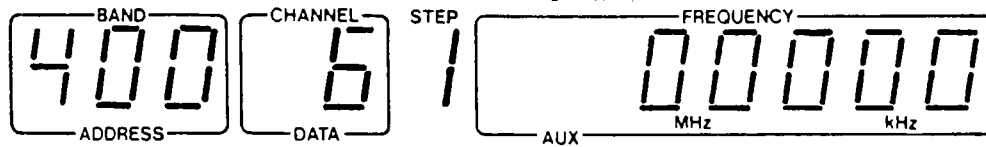
6. The frequencies and Auxiliary codes already entered into the Buffer RAM can be read by pressing the △ or ▽ and ENTER keys in that order. △ and ▽ keys are used for incrementing or decrementing the channel numbers. Channel numbers "rollover" to 0 after channel 79 so that either △ or ▽ can be used to reach any channel number.

CTCSS FREQUENCIES   CDCSS CODES (4)

CTCSS FREQUENCIES		CDCSS CODES			
0 Disable Code		0 Disable Code	265		723
67.0 Hz	(1)	023	271		731
71.9 Hz		025	306		732
74.4 Hz	(1)	026	311		734
77.0 Hz		031	315		743
79.7 Hz	(1)	032	331		754
82.5 Hz		043	343	Enter "A"	
85.4 Hz	(1)	047	346	after the	
88.5 Hz		051	351	CDCSS code	
91.5 Hz	(1)	054	364	to program	
94.8 Hz		065	365	an inverted	
97.4 Hz	(1) (2)	071	371	code.	
100.0 Hz		072	411		
103.5 Hz		073	412		
107.2 Hz		074	413		
110.9 Hz		114	423		
114.8 Hz		115	431		
118.8 Hz		116	432		
123.0 Hz		125	445		
127.3 Hz		131	464		
131.8 Hz		132	465		
136.5 Hz		134	466		
141.3 Hz		143	503		
146.2 Hz		152	506		
151.4 Hz		155	516		
156.7 Hz		156	532		
162.2 Hz		162	546		
167.9 Hz		165	565		
173.8 Hz		172	606		
179.9 Hz		174	612		
186.2 Hz		205	624		
192.8 Hz		223	627		
203.5 Hz		226	631		
210.7 Hz		243	632		
218.1 Hz		244	654		
225.7 Hz		245	662		
233.6 Hz		251	664		
241.8 Hz		261	703		
250.3 Hz	(3)	263	712		

(1) C Group Tone, directly programmable for all portables and all mobiles with the CDCSS/CTCSS option. For mobiles with the standard 70-2101 or 70-2102A CTCSS option, the CTCSS board must be modified to program this tone. See the radio service manual for details. For important programming information, see the appendix of this manual.

(2) Directly programmable for all portables and all mobiles with the CDCSS/CTCSS option. To program this tone for mobiles with the 70-2101 or 70-2102A CTCSS option, the 97.4 Hz capability must be specified when the CTCSS option is ordered.

(3) Directly programmable for all portables and for mobiles with the CDCSS/CTCSS option. For mobiles with the standard CTCSS options, 250.3 Hz is not available. If programmed for such models, an encode/decode frequency of 241.8 Hz will result.

(4) CDCSS codes are not valid for portable models or for mobiles without the CDCSS/CTCSS option.
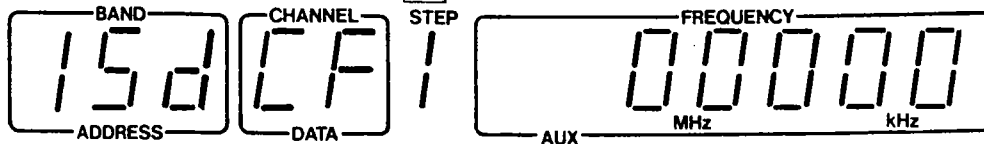
For   High Band Wide Band model radios <u>Only</u>,   if optional kits for   in-
verse 1st L.O.,   2.5 KHz Channel Stepping or 12.5 KHz Channel Stepping
have   been   installed,   Center Frequency programming   inputs   must   be
entered   prior to the WRITE operation. The need for Center   Frequency
programming is indicated if you use Bands 15A,   15B,   15C,   15d, or 15E
in programming your Wide Band High Band radio.

1. Prior to the WRITE operation, perform the following steps:

   a) First press RESET then the decrement key. The display will
      now show channel CF, step 1.
   b) Enter the proper Receiver Center frequency from the table below.
      The display will now show channel CF, step 3.
   c) Enter   the   proper Transmitter Center frequency from   the table
      below. When a frequency print out is made from the   programmer
      the Center Frequency is listed after the channel frequencies.

2. Programming Example. (Band display 15d, B Band radio)

Press [RESET] then the [△] DECREMENT keys.

BAND: 15d CHANNEL: CF STEP: 1 FREQUENCY: 00000 MHz kHz

Press [1] [6] [0] [F/.] [9] [2] [0] then [ENTER]

BAND: 15d CHANNEL: CF STEP: 1 FREQUENCY: 1609200 MHz kHz

Press [1] [6] [0] [F/.] [0] [0] [0] then [ENTER]

BAND: 15d CHANNEL: CF STEP: 3 FREQUENCY: 1600000 MHz kHz

PROGRAMMING TABLE OF CENTER FREQUENCIES

Band Display	Radio Band	Receiver Frequency	Transmitter Frequency
15A	A Band	146.980MHz	147.150MHz
15A	B Band	159.670MHz	160.500MHz
15b	A Band	147.000MHz	147.000MHz
15b	B Band	160.000MHz	160.000MHz
15C	A Band	147.000MHz	147.000MHz
15C	B Band	160.000MHz	160.000MHz
15d	A Band	148.120MHz	147.200MHz
15d	B Band	160.920MHz	160.000MHz
15E	A Band	146.920MHz	147.840MHz
15E	B Band	159.720MHz	160.640MHz

1. Any of the channels for which a receive frequency has been entered can now be programmed in either or both of two scan groups A and B, with up to 64 channels in each group. These two scan groups are independently activated by corresponding scan pushbuttons on the transceiver. The order of channel number entry in each group determines the order of scan. (Refer to the FUNCTION CODE PROGRAMMING section of this manual for details of operation of each of the programmable scan modes.)

   If a scan channel is entered for which no receive frequency has been programmed, an error is indicated by the flashing of the channel number LEDs. Press CLEAR or enter a valid channel number.

2. Programming Example

   Assume that receive frequencies have been programmed in channels 1-24 and it is desired to scan channels 1 and 9 in Scan A and channels 6 and 24 in Scan B.

   Press SCAN A
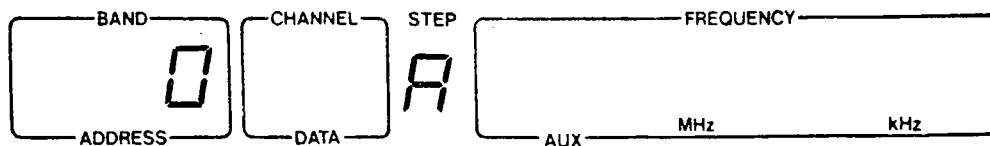
   The Scan Mode LED illuminates and the letter A in the STEP readout indicates that A Scan channel numbers can be entered.

   Press 1 to input channel 1 as the first channel scanned.
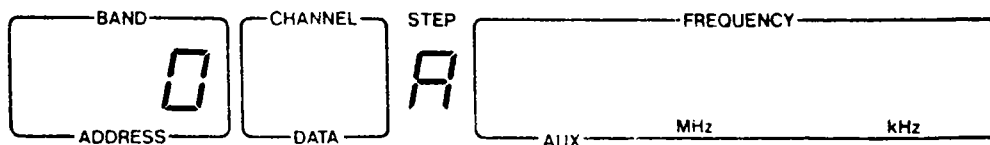
   Press ENTER

   Channel 1 is entered into the buffer RAM and the 70-1000 is ready for the next channel number to be entered.

   Press 9 ENTER to program the second channel to be scanned.
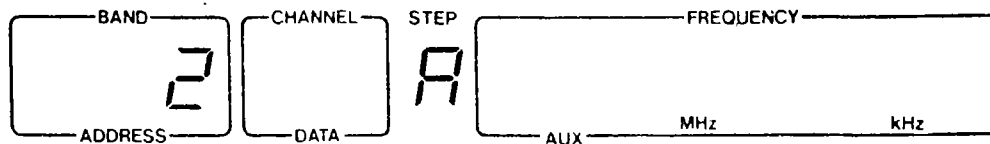
Press   SCAN   B   to allow Scan B channel entry.
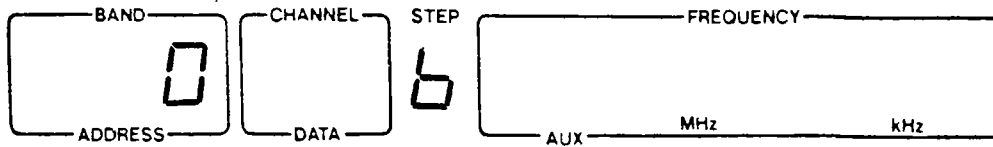
The Scan Mode LED is on and the letter "b" in the STEP readout indicates that B Scan channel numbers may now be entered.

Press [6] [ENTER] and [2] [4] [ENTER] to complete Scan B channel entry.

Press [△] or [▽] to read the channels already entered.
Press [CLEAR] to clear the channel displayed.
Press [RESET] to exit the scan programming mode.

FUNCTION CODE PROGRAMMING

Eight functions of the SYN-TECH transceiver are programmable by function code inputs as detailed in the following table and description. Note that each function has a default condition denoted by "*" which is automatically programmed in E/PROM unless another code is entered. If all default conditions listed in the following table are acceptable, proceed directly to the "Programming the E/PROM Module" section.

FUNCTION CODE TABLE

| STEP	FUNCTION	CODE	DEFAULT
1	Busy Channel Lockout		
	No Function	3	*
	B.C.L.O. without alert	0	
	B.C.L.O. with alert	2	
2	TX Time Out Timer		
	No Function	0	*
	30 seconds with alert	1	
	60 seconds with alert	2	
	90 seconds with alert	3	
	120 seconds with alert	4	
	150 seconds with alert	5	
	180 seconds with alert	6	
	210 seconds with alert	7	
3	Interval A (Noise Squelch)		
	25 milliseconds	1	*
	50 milliseconds	2	
	75 milliseconds	3	
	100 milliseconds	4	
	12.5 milliseconds	5	(Portables only)

```
4          Interval B (Signalling options)
                   100 milliseconds        1
                   200 milliseconds        2
                   300 milliseconds        3        *
                   400 milliseconds        4


5          Scan Hold Timer (Squelch close)
                   0.3 seconds             0
                   2.5 seconds             1        *
                   5.0 seconds             2
                   Infinite                3


6          Scan Hold Timer (PTT)
                   0.3 seconds             0
                   2.5 seconds             1
                   5.0 seconds             2        *
                   Infinite                3


7          Priority Monitor
                   No Function             4
                   4 channels/1 sec        0
                   8 channels/1 sec        1        *
                   4 channels/2 sec        2
                   8 channels/2 sec        3


8          Scan Mode
                   "NORMAL"
                       Noise Squelch/Busy      0
                       CTCSS/CDCSS/Busy        1        *
                       Noise Squelch/Open      2
                       CTCSS/CDCSS/Open        3

                   "MODIFIED"
                       Noise Squelch/Busy      4
                       CTCSS/CDCSS/Busy        5
                       Noise Squelch/Open      6
                       CTCSS/CDCSS/Open        7

                   "SECONDARY"
                       Noise Squelch/Busy      8
                       CTCSS/CDCSS/Busy        9
                       Noise Squelch/Open      A
                       CTCSS/CDCSS/Open        B
```

1. Busy Channel Lockout (BCLO)

   The BCLO function, if programmed, inhibits the transmitter if the selected channel is busy. If BCLO with alert is selected, the operator will be warned by an audio beep when transmission is inhibited. The BCLO function can be jumper selected in the transceiver to operate, if programmed, on the presence of either CTCSS/CDCSS signal or carrier.

2. TX Time Out Timer (TOT)

   The TOT function, if programmed, automatically shuts off the transmitter and gives an audio beep when the programmed period of continuous transmission has occurred. This function prevents repeater hangup or transmitter overheating if the transmitter is accidentally locked on.

3. Interval A

   Interval A, programmable for 12.5 (portables only), 25, 50, 75, or 100 msec, is a time allotted for noise squelch operation while the scan is stopped on each scan channel. At the end of Interval A the microcomputer, based on the noise squelch output status, either causes the scan sequence to resume or acitvates Interval B (if CTCSS/CDCSS scan is programmed). For all SYN-TECH mobiles Interval A should be 25 msec, the default condition. For all SYN-TECH portables only, Interval A should be programmed for 12.5 msec for optimum scanning speed. Programming longer periods for Interval A will cause unnecessary delays in the scan sequence and result in slower scan operation.

4. Interval B

   Interval B is programmable for 100, 200, 300, or 400 msec and is the time period allotted for operation of the CTCSS, CDCSS or other signalling system during the scan stop period on each channel. Interval B is activated following Interval A in the scan stop period only if two conditions are met:
   1. The noise squelch must be open at the end of Interval A, indicating a busy channel condition, and
   2. A non-zero Auxiliary code must be programmed on the channel being scanned (see function 8 selection below).
   If either condition is not met, the scan sequence resumes immediately. All SYN-TECH mobiles and portables using CTCSS or CDCSS scan should be programmed for an Interval B of 300 msec, the default condition. Longer Interval B periods will result in slower scan operation and shorter periods may cause improper CTCSS/CDCSS decoder operation.

5. Scan Hold Timer (after squelch close)

The Scan Hold Timer introduces a delay before resuming scan after the channel becomes clear. This timer is programmable for 0.3, 2.5, 5.0 seconds or an infinite time period with a 2.5 second default. The choice of delay is highly dependent upon user preference and system requirements.

6. Scan Hold Timer (after PTT)

After completing a transmission, a second Scan Hold Timer delays scan resumption to allow reception of a reply. A programmable choice of 0.3, 2.5, 5.0 seconds and an infinite delay is available, with a default of 5 seconds.

7. Priority Monitor

Priority Channel monitoring is available in each of the three scan modes defined in step 8 below.This function can be deleted or programmed for frequency of occurrence by appropriate code entry. Programming "No function" means that in all instances where Priority Channel monitoring is mentioned in the Scan Mode description below, this function will not occur. If Priority Channel monitoring is desired as described below, the sampling rate during scan (once after every four or eight non-priority channels) and during scan hold on a non-priority channel (once every second or every 2 seconds) must be programmed. The default condition causes priority channel sampling after every eight channel during scan and once every second during scan hold.

8. Scan Mode

Three separate modes of scan operation labeled "Normal", "Modified", and "Secondary" are available for selection by function code. The features of the selected mode are activated by two scan pushbuttons PRI and SCAN located on the transceiver front panel or control head. In addition to selecting one of the 3 scan modes, a selection between Noise Squelch and CTCSS/CDCSS scan type must be made. The final variable to be selected is between scan stop on a busy or open channel. The following description of each major mode and scanstop type will aid in programming selection.

NORMAL SCAN MODE

.The Normal Scan mode allows scanning of two groups of channels programmed as "A" and "B" groups and selectable by the pushbuttons marked PRI (Scan A) and SCAN (Scan B).

PRI (Scan A) OPERATION

The PRI button activates scanning of all channels programmed in the "A" Scan group while rapidly sampling the PRIORITY channel. (The PRIORITY channel is the channel number selected by the user before the PRI button is pressed and can be any channel programmed in the radio, regardless of whether it is in the "A" Scan group). If the

PRIORITY channel is found active when sampled, the scanner locks on the PRIORITY channel and a 2-beep tone alerts the user that the channel being received is the PRIORITY channel. When the PRIORITY channel signal disappears, the scanner waits for a short period then resumes the scan sequence. If the scanner stops on a non-priority channel, the PRIORITY channel is rapidly sampled for activity. If the priority channel becomes active, the scanner alerts the user and locks on the priority channel as described above.

If the microphone is keyed at any time while the PRI button is engaged, the radio will transmit on the PRIORITY channel. When the microphone key is released, the scanner waits on the PRIORITY channel for a short period, then resumes scanning.

SCAN (Scan B) OPERATION

The SCAN pushbutton activates scanning of all channels programmed in the "B" Scan group without sampling a PRIORITY channel. (The channel displayed when the SCAN button is pressed is not sampled but will cause a beep alert if it is active when scanned. This beep can be eliminated by selecting a channel outside the "B" scan group before engaging the SCAN button). If a scanned channel is found to be active, the scanner will lock on the channel until it disappears. While the scanner is stopped on a channel, keying the microphone will activate the transmitter on the same channel. If the microphone key is pressed after scanning has resumed, the radio will transmit on the last channel on which the scanner was stopped. This allows the operator to reply to a call even though the scan has restarted. When the SCAN switch is released, the radio will return to the last scan stop channel.

PRI plus SCAN OPERATION

When both the PRI and SCAN buttons are pushed in, the A and B group channels are sequentially scanned (A group, then B group, then A, etc.). All Scan A features apply while A group channels are scanned, and Scan B features apply during group B Scan. This is <u>NOT</u> a recommended mode of operation since the operator may not know whether Scan A or Scan B type operation is applicable at any given moment.

<u>MODIFIED SCAN MODE</u>

The Modified Scan mode allows scanning of A and B group channels in a manner identical to that of the Normal Scan mode. This mode also provides a crossover mode between the PRI and SCAN operation.

PRI (Scan A) OPERATION

Identical to operation described for the Normal mode.

SCAN (Scan B) OPERATION

Identical to operation described for the Normal mode.

PRI plus SCAN OPERATION

When both the PRI and SCAN buttons are pressed, scanning stops on the current scan stop channel (or the last previous scan stop channel if scanning is occurring). There is no PRIORITY channel monitoring and transmit will occur on the displayed channel. This mode is most often used by an operator who wants to answer a call on a non-priority channel while in the PRIORITY scan mode (PRI button engaged). To do this the operator presses the SCAN button and the receiver and transmitter is immediately locked on the calling channel. The operator can also transmit and receive on other channels by manual activation of the channel selector switch. When the SCAN button is released, PRI mode operation is restored with the previously selected PRIORITY channel still applicable.

SECONDARY SCAN MODE

The Secondary Scan Mode allows scanning of A and B group channels in a manner identical to that of the Normal Scan mode. The Secondary mode also provides the capability of operating on a manually selected SECONDARY channel while monitoring the PRIORITY channel.

PRI (Scan A) OPERATION

PRI operation allows transmit/receive operation on an operator-selected SECONDARY channel with rapid sampling of the operator-selected PRIORITY channel while in the receive mode. The PRIORITY channel is manually selected with the channel selector switch before pressing the PRI button. The SECONDARY channel is then manually selected with the channel selector switch. The PRIORITY and SECONDARY channels may be chosen from any programmed channel whether programmed for scan or not. If the PRIORITY channel becomes active, the receiver switches from the SECONDARY channel to the PRIOROTY channel and a 2-beep alert is sounded in the speaker. The receiver stays on the PRIORITY channel for a period after the the channel clears. If the microphone key is pressed during this period, transmit occurs on the PRIORITY channel. After the micro-phone key is released, the receiver stays on the PRIORITY channel for a period of time. If the channel stays clear and the microphone is not keyed during this period, the receiver reverts to the SECONDARY channel. When the PRI button is released, the radio returns to manual operation on the previously selected PRIORITY channel. If the PRI button is re-engaged, the radio goes to the SECONDARY channel.

SCAN (Scan B) OPERATION

Identical to that described for the Normal Scan mode except that the unit reverts to the manually selected channel when the SCAN button is released.

PRI plus SCAN OPERATION

Identical to PRI operation in the Normal mode.

SCAN STOP SELECTION (All Scan Modes)

Noise Squelch/CTCSS/CDCSS Scan Stop: A selection between carrier
(Noise Squelch) or signalling (CTCSS/CDCSS) type scan stop must be
made in Scan Mode programming. The default condition of CTCSS/CDCSS
scan is recommended ·since the radio automatically defaults to
carrier scan operation if the CTCSS or CTCSS/CDCSS options are not
installed. No sacrifice in scan speed is incurred if CTCSS/CDCSS
scan is programmed for a carrier scan radio. All standard SYN-TECH
radios equipped with scan and CTCSS or CTCSS/CDCSS options are
automatically capable of CTCSS/CDCSS signal and/or carrier scan-
ning when the signalling option is installed. Noise Squelch scan
programming may be useful if carrier scan operation is desired in a
CTCSS br CDCSS equipped radio.

Busy/Open channel scan stop: A selection of scan stop operation
between busy or open channel must be made in Scan Mode programming.
For all normal applications busy channel scanning would be select-
ed. The capability of scanning for an unused channel may be useful
in special applications.

PROGRAMMING EXAMPLE:

Assume a user wants BCLO function with alert, no TOT, a receive scan
hold time of 0.3 seconds and transmit scan hold time of 2.5 seconds,
priority monitoring every fourth channel and every 2 seconds, Second-
ary type scan with CTCSS/CDCSS/Busy channel scan stop.

The Function Code input mode is accessed by pressing FUNC. ENTER .
The ▽ or ENTER keys can be used to reach the input step(s) for
which the default condition is not desired.

Press   FUNC.   ENTER
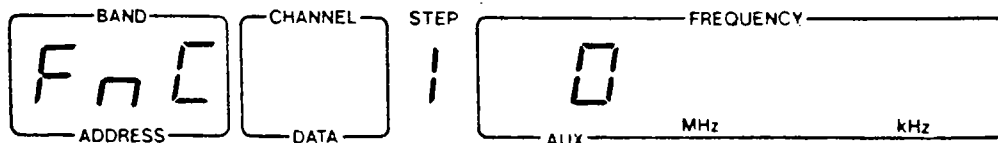
The "1" in the STEP display indicates a step 1 input. The BCLO code
can now be entered.

Press   2   (BCLO with alert)

Press   ENTER

```
┌──BAND──┐  ┌─CHANNEL─┐  STEP  ┌────────FREQUENCY────────┐
│  F n C │  │         │   2   │      4                   │
└─ADDRESS─┘  └──DATA──┘       └──AUX──────MHz──────kHz──┘
```
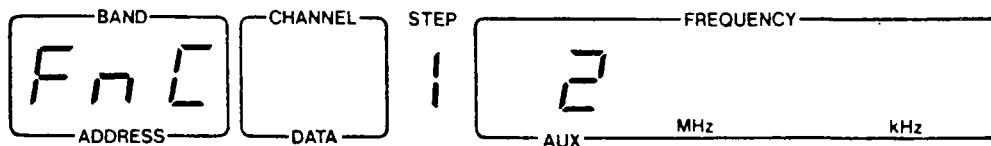
The Step 2 (TX TOT) default condition of NO FUNCTION is acceptable as
are the defaults for Intervals A and B. The next desired change is
Step 5, so ▽ is pressed 3 tines.

Press ▽ ▽ ▽

```
┌──BAND──┐  ┌─CHANNEL─┐  STEP  ┌────────FREQUENCY────────┐
│  F n C │  │         │   5   │      5                   │
└─ADDRESS─┘  └──DATA──┘       └──AUX──────MHz──────kHz──┘
```

Press ⓪ (0.3 sec receive scan hold)

```
┌──BAND──┐  ┌─CHANNEL─┐  STEP  ┌────────FREQUENCY────────┐
│  F n C │  │         │   5   │      0                   │
└─ADDRESS─┘  └──DATA──┘       └──AUX──────MHz──────kHz──┘
```

Press ENTER

```
┌──BAND──┐  ┌─CHANNEL─┐  STEP  ┌────────FREQUENCY────────┐
│  F n C │  │         │   6   │      5                   │
└─ADDRESS─┘  └──DATA──┘       └──AUX──────MHz──────kHz──┘
```

Continue entering function codes for Steps 6 (Code 1), Step 7 (Code 2)
and Step 8 (Code 9). If an incorrect key is pressed, simply press the
correct key. The CLEAR key is not operable in this mode. The △ key
can be used to recall previous steps for correction or change.

If all entries are correct, the data in the 70-1000 buffer RAM can now
be written (programmed) in the E/PROM.

   NOTE: Data programmed in E/PROM cannot be changed unless all data
   is first erased, thus the buffer RAM data should be carefully
   reviewed for correctness before the E/PROM is programmed. This can
   be done by pressing ENTER repeatedly while in the channel pro-
   gramming mode. Each channel and corresponding data will be dis-
   played in order. If the optional printer is attached, a quick
   printout of all entries can be obtained. (See Printer Operation)

   If correct, the data in the 70-1000 buffer RAM is now ready to be
   written to the E/PROM module.

CAUTION

NEVER TURN THE PROGRAMMER POWER ON OR OFF WHILE THE E/PROM MODULE IS
PLUGGED INTO THE MODULE ADAPTER. MAKE SURE THE CORRECT PROGRAMMER
SELECTION HAS BEEN MADE FOR THE E/PROM MODULE BEING PROGRAMMED. IF A
Z-350 E/PROM MODULE IS BEING PROGRAMMED, MAKE SURE THE 70-1071 ADAPTER
IS ATTACHED TO THE PROGRAMMER AND THE Z-350 MODULE IS INSERTED IN THE
ADAPTER WITH THE E/PROM FACING TO THE RIGHT. IF THE E/PROM IS
INCORRECTLY INSERTED, THE CONTACTS WILL NOT MATE WITH THE ADAPTER AND
PROGRAMMING WILL NOT OCCUR.

1. BLANK CHECK　(DO NOT use the COPY function to perform Blank Check)

The Blank Check is first used to check if the E/PROM has been properly
erased. To check, press the FUNC. BLANK keys.

```
                  BLANK
Press    FUNC.     7
```

The Function Blank LED will be lit for the duration of the test. The
Frequency readout will display PASS if the E/PROM is blank. If the
Frequency readout displays numbers and flashes, the E/PROM has not
been erased. After a PASS display or flashing frequency readout, press
the RESET key to revert to the channel programming mode.

```
Press    RESET
```

2. WRITE Operation

This operation is used to write (program) the contents of the buffer
RAM into the E/PROM module. To perform this operation, press the FUNC.
WRITE keys.

```
                WRITE
Press  FUNC.      8
```

The Function Write LED will be on for the duration of the writing
operation. The Frequency readout will display "PASS" when the writing
operation is successfully completed. If the Frequency readout shows a
flashing "Err", the E/PROM is defective or has not been erased
thoroughly. Press the RESET key to revert to the channel programming
mode.

```
Press    RESET
```

3. VERIFY

The VERIFY function checks the E/PROM data for correctness by
comparison with the buffer RAM contents. To check press the FUNC.
VERIFY keys.

```
                VERIFY
Press   FUNC.     9
```

The Function Verify LED will be lit for the duration of the
verification check. The Frequency readout will display "PASS" if the
E/PROM data is correct. If the Frequency readout displays numbers and
flashes, the E/PROM data is incorrect and the E/PROM must be erased

and reprogrammed. Press the RESET key to revert to the channel progrmming mode.

Press RESET

4. B.W.V. Operation

This operation combines the operation of BLANK CHECK, WRITE, and VERIFY and can be used to speed the programming operation. To perform this operation, press the FUNC. B.W.V keys.

                 B.W.V.
Press   FUNC.   4

The Blank Check, Write, and Verify LEDs will illuminate as each operation is performed. The Frequency readout will display "PASS" if all operations are performed correctly. Flashing of the Frequency readout during any of the three operations will require corrective measures as described above. Press the RESET key to revert to the channel programming mode.

Press   RESET

When the Blank Check, Write and Verify operations have been satisfactorily completed, the E/PROM module can be removed from the programmer and installed in the transceiver.

5. COPY Operation (Do NOT use for BLANK CHECK)

This operation transfers the contents of the E/PROM module already programmed to the buffer RAM of the 70-1000. Plug the E/PROM to be copied in the 70-1000 and press the FUNC. COPY keys.

                COPY
Press   FUNC.   A

After this operation is completed the Frequency readout will display "PASS". Press the RESET key to revert to the channel program mode.

Press   RESET

PRINTER OPERATION

When the 70-1000 is connected to a printer such as the optional Midland 70-1300, a printout of all programmed channels and functions can be obtained.

               PRINT
Press   FUNC.   5

The PRINT FUNCTION LED will illuminate, the FREQUENCY display will show "Prnt" and the data will be printed. After printing is complete the FREQUENCY display will show "PASS". Press RESET .

If no printer is connected, "Prnt" will be displayed but the PRINT LED will not be illuminated. If a printer is connected but not turned on, the PRINT LED will remain off and the FREQUENCY display will show "PASS".

The APPENDIX contains several sample printouts for purposes of illustration. Note that the actual CTCSS tone frequency or CDCSS code is printed out along with a "T" to indicate "Tone" or "D" to indicate "Digital". The "+" or "-" following the CDCSS code indicates a normal or inverted code, respectively. If no CTCSS/CDCSS code has been entered on a channel, the word "NONE" is printed in the Auxiliary code location.

ERASER OPERATION

The 70-1100/1101 E/PROM Eraser allows up to 8 E/PROM modules to be quickly and thoroughly erased. Slide the tray out of the unit till the end of the black tray pad is visible. Check the clear window in the center of each E/PROM for cleanliness, wiping with a soft cloth if necessary. Center the E/PROM modules along the long axis of the tray pad, making sure the window side of the E/PROM is facing up. DO NOT attempt to erase more modules than can be placed on the tray pad. Slide the tray completely closed. Set the timer according to the following:

      To erase 1-4 modules   45 minutes
      To erase 5-8 modules   60 minutes

The lens on the tray front should glow blue indicating the eraser lamp is operating. The eraser will shut off automatically when the preset time has elapsed. Remove the E/PROM when the erasing period is complete.

> NOTE: Attempting to shorten the erase times can result in incomplete erasure, which may not become apparent until after the E/PROM is reprogrammed.

ADDING DATA TO A PROGRAMMED E/PROM

A previously programmed E/PROM module will accept additional inputs without erasure as described below. Any other changes require E/PROM module erasure and reprogramming.

1. Heading Input
   Any heading input which was left blank when programmed can be added at a later time.

2. Channel Programming
   Transmit/receive frequencies and auxiliary codes can be added on any or all blank channels below the highest numbered channel previously programmed. For example, an E/PROM programmed on channels 1 and 10 will accept programming on channels 0 and 2-9 at a later date, but not on channels 11-79.

3. Scan Programming
   Additional scan channels can be added to the end of either of the previously programmed scan groups A and B. Also, scan groups A and/or B can be entered even if no scan channels had previously been programmed.

4. Function Code Input
   Any or all of the 8 function code inputs can be changed without E/PROM erasure <u>if</u> that function code was originally programmed with the default condition.

5. To make any of the additions described above, perform the following steps:
   a) COPY the data from the E/PROM into the 70-1000 buffer RAM.
   b) Access the desired function or functions in the normal manner and make the necessary additions.
   c) Review the additions for correctness on the 70-1000 display or by generating a printout on the 70-1300. At this point corrections can be made if necessary.
   d) Install the E/PROM in the 70-1000 and perform a WRITE operation. DO NOT attempt a BLANK CHECK or BLANK/WRITE/VERIFY (B.W.V.) operation.
   e) After the WRITE operation, perform a VERIFY check to confirm the E/PROM is programmed correctly.

CONVERTING MOBILE E/PROM DATA FOR PORTABLE PROGRAMMING

Data programmed in Z-273/273TA E/PROM modules for mobile use may be copied into the 70-1000 programmer and converted to the correct format to program Z-350 E/PROM modules for use in SYN-TECH portables. Use the following procedure.

1. COPY the Z-273 or Z-273TA E/PROM data into the 70-1000 programmer.

2. Press [FUNC.] [C]

   The FREQUENCY display will show "bUSY" during the conversion process. DO NOT press any key until "PASS" is displayed.

3. Insert the Z-350 E/PROM module and adapter, then program using the normal procedures. The data may be modified in the normal manner before programming, if necessary.

4. If the above conversion process is attempted on data which is already in the Z-350 format, "ERR" will be displayed. Press [RESET] to return to the channel programming mode.

5. If the Z-273/273TA E/PROM module has been programmed with CDCSS codes, the conversion to the Z-350 format will change these codes to the "0" or tone disable code, resulting in noise squelch operation in the portable radio on these channels.

6. NOTE: All channels which were originally programmed with the tone disable "0" code will now show 250.3 Hz as the auxiliary code. To restore the tone disable code, press [CLEAR] and [ENTER] at steps 2 and 4 of each such channel. Check all channels for correctness before programming.

CONVERTING BETWEEN Z-273 AND Z-273TA DATA FORMATS

Data programmed in Z-273 or Z-273TA E/PROM modules can be converted to program modules of the other configuration by the following procedure.

1. COPY the original E/PROM into the 70-1000 programmer.

2. To convert Z-273 data to Z-273TA press:

   MANUAL 3 F 9 ENTER 7 A ENTER RESET

3. To convert Z-273TA data to Z-273 format press:

   MANUAL 3 F 9 ENTER F F ENTER RESET

4. The new data type Z-273 or Z-273TA will be displayed for 2 seconds, followed by the normal channel display. Press ENTER repeatedly until all programmed channels and auxiliary codes have been displayed. A blinking of some channel frequencies is normal during this process.

5. A printout of the converted data may include an asterisk * before some channel frequencies, indicating that step 4 above was not completed. Perform step 4 again if necessary.

RE-FORMATTING E/PROMS FOR THE A22/A27 MICROCOMPUTERS

E/PROMs programmed for the A74 type microcomputer may be re-formatted for installation in a radio using the A22 or A27 type microcomputers without re-entering data. Use the following procedure.

1. Copy the original E/PROM into the programmer.

2. Press RESET. Press ENTER repeatedly until all programmed channels and auxiliary codes have been displayed. A blinking of some channel frequencies is normal during this process. Press RESET .

3. (Scan programmed modules only)
   Unless re-formatted as shown below, all channels originally programmed in the B Scan group will appear in the A Scan group only. Reformat scan channels as follows:
   a. Press SCAN A
   b. Press ▽ repeatedly and observe that all Scan A channels are consecutively displayed in the CHANNEL/DATA readout. When all Scan A channels are displayed, pressing ▽ will then cause the consecutive display of all channels originally programmed in Scan B. As each of these Scan B channels appears, press CLEAR ENTER which clears them from the Scan A group. Recheck to confirm that only the desired Scan A channels remain.
   c. Press SCAN B and enter the desired Scan B channels in the normal manner.

4. A printout of the re-formatted data may include an asterisk * before a channel frequency, indicating that step 2 above was not completed. Perform step 2 again if necessary.

If the "H1" version programmer is to be used to program E/PROMs for use with the A74 (original) type microcomputer, the following programming changes should be noted.

1. Scan channel entries
   Both scan groups A and B must be entered as scan A channels. All group A channels must be entered under addresses 0-31 and group B channels under addresses 32-63. Enter Scan A channels normally, then press ▽ until the BAND/ADDRESS display shows 32 and enter channels for B group.

   Programming Example
   Assume that receive frequencies have been programmed in channels 1-10 and it is desired to scan channels 1 and 3 in Scan A and channels 7 and 9 in Scan B.

   Press [SCAN] [A]

   The Scan Mode LED illuminates and the letter A in the STEP readout indicates Scan A entries should be made.

   Press [1] to enter channel 1 as the first Scan A channel.

   Press [ENTER]

   Press [3] [ENTER] to program the second channel to be scanned.

Scan A entries are now complete. To prepare for Scan B entries, press ▽ and hold until the BAND/ADDRESS display shows 32.

Press ▽ and hold.

BAND/ADDRESS: 32 CHANNEL/DATA: FF STEP: A FREQUENCY: (blank) MHz kHz / AUX

Scan B channels can now be entered.

Press 7

BAND/ADDRESS: 32 CHANNEL/DATA: 7 STEP: A FREQUENCY: (blank) MHz kHz / AUX

Press ENTER

BAND/ADDRESS: 33 CHANNEL/DATA: FF STEP: A FREQUENCY: (blank) MHz kHz / AUX

Press 9 ENTER to complete Scan B channel entry.

BAND/ADDRESS: 34 CHANNEL/DATA: FF STEP: A FREQUENCY: (blank) MHz kHz / AUX

Press RESET

The A74 type microcomputer will ignore any entries made after pressing SCAN B.

2. Channel capacity
   When programming E/PROMs for use with the A74 microcomputer, it should be noted that the "H1" version programmer allows up to 40 channels to be programmed, an increase from the 36 channels programmable with "AO" or "CO" programmers.

3. Scan Speed and Delay Programming
   The scan speed and scan delay period can be programmed by manual mode entries in the same manner as with "AO" and "CO" version programmers. To allow these manual mode entries the "J188" jumper must be installed in the programmer as described elsewhere in this manual.

   To alter the standard 3 channels/second scan rate and 5 second scan delay, before performing the write operation make the following entries, referring to the accompanying chart for "XX" inputs.

31

| "XX" ENTRY | SCAN SPEED, CH/SEC | SCAN RESUME DELAY, SECONDS | |
		HOME REVERT CHANNEL	OTHER CH.
72	3	5	5
62	3	2.5	5
52	3	5	2.5
42	3	2.5	2.5
32	10	5	5
22	10	2.5	5
12	10	5	2.5
02	10	2.5	2.5

RESET

MANUAL

[4][0][4]

ENTER

[X][X]

ENTER

RESET

Note: If the transceiver has been converted for TONE SCAN
operation, the 10 scan channels/second program option
should not be used, since reliable tone detection will
not occur at this scan rate.

1. To allow programming of some infrequently used functions, manual mode data entry is necessary by entering the required data directly into the buffer RAM address. The 70-1000 must be configured to accept these entries by addition of a jumper between the pads located directly behind the "J188" label at the rear right hand corner of the main printed circuit board. The programmer configuration is indicated at powerup by display of "PASS1H1" (jumper J188 absent) or "PASS0H1" (jumper J188 present). No other programmer functions are affected by presence or absence of this jumper.

2. By manual mode entry a transmit-to-receive delay timer can be activated for a period of 50, 100, 150, or 200 milliseconds. Before performing the WRITE operation, make the following keyboard entries, choosing "XX" from the accompanying chart.

RESET		"XX" ENTRY	FUNCTION
MANUAL		00	NO delay (default)
3 F 4		01	50 msec
ENTER		02	100 msec
X X		03	150 msec
ENTER		04	200 msec
RESET			

3. When connected to the 70-1300 printer, the programmer can provide a page break signal which will cause 7 lines to be skipped after printing 59 lines. The function code printout can also be modified to show the transmit-receive delay time. Make manual mode entries as shown in the following matrix to enable either or both of these functions.

RESET		"YY" entry	Function
MANUAL		FF	No page break, no TX DLY printout (default)
7 F 0		FC	Page break, TX DLY printout
ENTER		FD	No page break, TX DLY printout
Y Y		FE	Page break, no TX DLY printout
ENTER			
RESET			

4. If an E/PROM is to be programmed with many simplex channels (having the same transmit and receive frequency), the programmer can be configured to allow single keystroke entry of the transmitter frequency. Make the following entries before performing the WRITE operation:

$$\boxed{\text{MANUAL}} \quad \boxed{7} \quad \boxed{F} \quad \boxed{4} \quad \boxed{\text{ENTER}}$$

$$\boxed{E} \quad \boxed{0} \quad \boxed{\text{ENTER}} \quad \boxed{\text{RESET}}$$

Enter the receiver frequency on each channel in the normal manner. At step 3 (transmitter frequency input), press the "D" key. The receiver frequency will be displayed. Press ENTER to input the displayed frequency as the transmitter frequency. If the trans-mitter frequency differs from the receive frequency on any channel, input the transmitter frequency in the normal manner.

5. If a large number of equally spaced frequencies are to be program-med, the programmer can be configured to allow rapid entry by making manual mode entries as follows:

$$\boxed{\text{MANUAL}} \quad \boxed{7} \quad \boxed{F} \quad \boxed{4} \quad \boxed{\text{ENTER}}$$

$$\boxed{X} \quad \boxed{Y} \quad \boxed{\text{ENTER}} \quad \boxed{\text{RESET}}$$

The entry X is either "A", which will cause a given increment to be <u>added</u> to the previous channel frequency, or "5", which will cause the increment to be <u>subtracted</u> from the previous channel frequency.

The entry Y is the multiplier of the reference frequency (for the selected band) which determines the increment to be added to or subtracted from the previous channel frequency. The Y entry can be any number from 0 to 9 or A (10), B (11), C (12), D (13), E (14), or F (15).

The resulting frequency available for single keystroke entry on any channel can be expressed as:

F(any channel) = F(previous channel) $\pm$ Y times Reference Freq.

The first channel is input in the normal manner. The transmitter and receive frequencies can be input independently. At the frequen-cy input step of any subsequent channel, pressing "D" will cause a frequency to be displayed which differs incrementally from the previous channel frequency according to the X and Y entries. Press-ing ENTER will cause this frequency to be entered for the current step. Frequencies can also be entered in the normal manner if desired.

6. For SYN-TECH mobiles or portables equipped with scan capability; channels deleted from the scan sequence are normally restored when the SCAN and PRI buttons are released <u>or</u> when the radio is turned off and back on. If an application requires that scan deleted channels be restored to the scan sequence <u>only</u> when the unit is cycled off and on (and not when the SCAN and PRI buttons are released), the following manual mode entries should be made before performing the WRITE operation:

| MANUAL | | 4 | 0 | C | | ENTER |

| 5 | F | | ENTER | | RESET |

6. All SYN-TECH mobiles and portables normally power up on the channel that was in use when the radio was turned off if the power source is not disconnected. If an application requires the radio to always power up on the same channel regardless of the channel in use at turnoff, make the following manual mode entries before performing the WRITE operation:

| MANUAL | | 4 | 0 | C | ENTER |

| 5 | 0 | | ENTER | | RESET |

When programmed in this manner the radio will always power up on the <u>lowest</u> programmed channel number.

7. Portable Radios <u>only</u>- When the UP-DOWN channel switches are pressed, actual channel change is slightly delayed by the micro-computer to allow for normal switch contact bounce. In applications where these switches are subject to being accidentally pressed, the delay can be increased to help prevent undesired channel changes. The delay can be altered from the default of 16 milliseconds up to 66 milliseconds by making the following manual mode entries before performing the WRITE operation:

| MANUAL |

| 404 |

| ENTER |

| ZZ |

| ENTER |

| RESET |

"ZZ" ENTRY	DELAY
72	16 ms(default)
7F	30 ms
7C	40 ms
79	52 ms
76	66 ms

APPENDIX

SAMPLE PRINTOUTS

```
*** MIDLAND SYN-TECH ***

MODEL NO.70-155B     S/N 501235
CUSTOMER NO.553           05-22-85


TYPE : Z-350
BAND : 150 MHZ
REF  : 5 KHZ
INJ  : L

CH   RXF[MHZ]  RX-DEC      TXF[MHZ]  TX-ENC

01   151.6250  162.2T      151.6250  162.2T
02   151.7850  NONE        151.7850  NONE
03   153.4500  250.3T      153.4500  250.3T
04   151.7150  NONE        151.7150   67.0T
05   152.4150  100.0T      152.4850   97.4T


SCAN-A

01 02 03 04 05


SCAN-B

02 03 05


BCLO............... W/ALERT
TX TOT............. 90 SEC
INT A.............. 12.5 mSEC
INT B.............. 300 mSEC
SCAN HOLD TIME RX. 2.5 SEC
SCAN HOLD TIME TX. 5 SEC
PRI MON............ 8/1
SCAN MODE......... NORMAL/CTCSS/BUSY


END
```

SAMPLE PRINTOUTS

```
*** MIDLAND SYN-TECH ***

MODEL NO.70-055C    S/N 365241
CUSTOMER NO.5  4DC1      07-06-82


TYPE : Z-273
BAND : 50 MHZ
REF  : 5 KHZ
INJ  : H

CH    RXF[MHZ]  RX-DEC      TXF[MHZ]  TX-ENC

01    45.0000   162.2T      45.0000   162.2T
02    45.0600   115 +D      45.0600   115 +D
03    45.5000   NONE        45.5000   NONE
04    45.7400   233.6T      45.7400   116 -D


SCAN-A

01 02 03 04


SCAN-B

01 02


BCLO............... W/O ALERT
TX TOT............. 150 SEC
INT A.............. 25 mSEC
INT B.............. 300 mSEC
SCAN HOLD TIME RX. 2.5 SEC
SCAN HOLD TIME TX. 5 SEC
PRI MON............ 4/2
SCAN MODE......... SECONDARY/CTCSS/BUSY


END
```

SAMPLE PRINTOUTS

```
*** MIDLAND SYN-TECH ***

MODEL NO.70-382B    S/N 501423
CUSTOMER NO.BC3DC32563  06-26-84


TYPE : Z-273TA
BAND : 150 MHZ
REF  : 2.5 KHZ
INJ  : L

CH   RXF[MHZ]  RX-DEC      TXF[MHZ]  TX-ENC

01   151.6250  100.0T      151.6250  100.0T
02   152.8250  047 +D      156.9350  365 +D
03   168.4125  NONE        168.4925  NONE
04   172.8050  743 +D      171.6775  156.7T
10   162.5500  NONE


SCAN-A

01 02 03


SCAN-B

03 04


BCLO............... NONE
TX TOT............. NONE
INT A.............. 25 mSEC
INT B.............. 300 mSEC
SCAN HOLD TIME RX. 2.5 SEC
SCAN HOLD TIME TX. 5 SEC
PRI MON............ 8/1
SCAN MODE......... MODIFIED/CTCSS/BUSY


END
```

C GROUP CTCSS TONE PROGRAMMING

When C Group CTCSS tones are programmed for mobiles or bases with the 70-2101 or 70-2102/2102A options, the 70-2101/2102/2102A boards must be modified as described in the unit service manual. In addition, tones must be entered in the programmer as shown below.

1. <u>Simultaneous Group A and C Programming</u>

Modify the CTCSS board as described in the unit service manual. Enter the Tone Disable Code and all Group <u>A</u> tones normally. Enter all <u>C</u> Group tone frequencies according to the following crossover chart. Note that a printout of an E/PROM programmed as shown below will display the entered tone frequencies rather than the actual tone frequencies. Group B tones are <u>not</u> available with this configuration.

Desired Tone Frequency	Tone Frequency Which Must Be Entered
67.0 Hz	71.9 Hz
74.4 Hz	82.5 Hz
79.7 Hz	94.8 Hz
85.4 Hz	103.5 Hz
91.5 Hz	110.9 Hz
97.4 Hz *	118.8 Hz

* Available only with replacement Encoder/Decoder IC (P/N 70-076153).

2. <u>Simultaneous Group B and C Programming</u>

Modify the CTCSS board as described in the unit service manual. Enter all B and C Group tone frequencies according to the following crossover chart. Note that a printout of an E/PROM programmed as shown below will display the entered tone frequencies rather than the actual tone frequencies. Group A tones are <u>not</u> available with this configuration.

Desired Tone Frequency	Tone Frequency Which Must Be Entered	Desired Tone Frequency	Tone Frequency Which Must Be Entered
67.0 Hz	71.9 Hz	118.8 Hz	123.0 Hz
71.9 Hz	77.0 Hz	127.3 Hz	131.8 Hz
74.4 Hz	82.5 Hz	136.5 Hz	141.3 Hz
82.5 Hz	88.5 Hz	146.2 Hz	151.4 Hz
79.7 Hz	94.8 Hz	156.7 Hz	162.2 Hz
94.8 Hz	100.0 Hz	167.9 Hz	173.8 Hz
85.4 Hz	103.5 Hz	179.9 Hz	186.2 Hz
103.5 Hz	107.2 Hz	192.8 Hz	203.5 Hz
91.5 Hz	110.9 Hz	210.7 Hz	218.1 Hz
110.9 Hz	114.8 Hz	225.7 Hz	233.6 Hz
97.4 Hz *	118.8 Hz		

* Available only with replacement Encoder/Decoder IC (P/N 70-076153).

3. <u>Simultaneous Group A, B, and C Programming</u>

Modify the CTCSS Board per the unit service manual. Program all A and B Group tones normally. Program C Group tones as in 1. above.

70-1000
E/PROM PROGRAMMER/PRINTER INTERFACE

CABLE CONNECTION

70-1000				70-1300	
	1	GND	19		
2		STROBE			1
	3	GND	20		
4		DATA 1			2
	5	GND	21		
6		DATA 2			3
	7	GND	22		
8		DATA 3			4
	9	GND	23		
10		DATA 4			5
	11	GND	24		
12		DATA 5			6
	13	GND	25		
14		DATA 6			7
	15	GND	26		
16		DATA 7			8
	17	GND	27		
18		DATA 8			9
	19	GND	28		
20		ACKNLG			10
	21	GND	29		
22		BUSY			11
	23	GND	30		
24					12
	25		31		
34					18
			36		

CONNECTOR: 70-1000
3M TYPE 3414-
6000/3414-6500
OR EQUIVALENT

CONNECTOR: 70-1300
AMPHENOL TYPE 57-30360

42
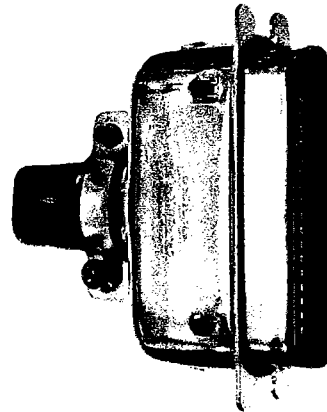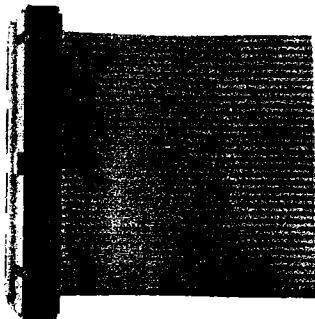
SCAN FUNCTION CHART

SCAN MODE*	SWITCH ON	MAX. SCAN CHNLS	SCAN	STOP*	PRI SAMPLING RATE SCAN*	PRI SAMPLING RATE HOLD*	TX CHNL PTT DURING HOLD	TX CHNL PTT DURING SCAN	SCAN MODE EXIT CHNL HOLD	SCAN MODE EXIT CHNL SCAN	SCAN/REVERT HOLD TIMER AFTER SQL CLOSE SEC*	SCAN/REVERT HOLD TIMER AFTER PTT REL SEC*	SCAN INTERVAL TIMER A MSEC*	SCAN INTERVAL TIMER B MSEC*	RX CHANNEL	SCAN CHNL SKIP
NORMAL (A)	PRI	64	BUSY, OPEN	NSQ, CTCSS	NONE, 1/4, 1/8 CHNLS	NONE, 1/SEC, 1/2SEC	PRI	PRI	PRI	PRI	0.3, 2.5, 5.0, inf	0.3, 2.5, 5.0, inf	12.5, 25, 50, 75, 100	100, 200, 300, 400	PRI OR DISPLAYED	YES
	SCAN	64	BUSY, OPEN	NSQ, CTCSS	NONE	NONE	DISPLYD	LAST SCAN HOLD	DISPLYD	LAST SCAN HOLD	0.3, 2.5, 5.0, inf	0.3, 2.5, 5.0, inf	12.5, 25, 50, 75, 100	100, 200, 300, 400	DISPLAYED	YES
MODI-FIED (B)	PRI	64	BUSY, OPEN	NSQ, CTCSS	NONE, 1/4, 1/8 CHNLS	NONE, 1/SEC, 1/2SEC	PRI	PRI	PRI	PRI	0.3, 2.5, 5.0, inf	0.3, 2.5, 5.0, inf	12.5, 25, 50, 75, 100	100, 200, 300, 400	PRI OR DISPLAYED	YES
	SCAN	64	BUSY, OPEN	NSQ, CTCSS	NONE	NONE	DISPLYD	LAST SCAN HOLD	PRI	PRI	0.3, 2.5, 5.0, inf	0.3, 2.5, 5.0, inf	12.5, 25, 50, 75, 100	100, 200, 300, 400	DISPLAYED	YES
	PRI AND SCAN	64	N/A	N/A	N/A	NONE	DISPLYD	N/A	PRI	N/A	NONE	NONE	NONE	NONE	DISPLAYED	NO
SECOND-ARY (C)	PRI	NONE	BUSY, OPEN (PRI)	NSQ, CTCSS (PRI)	NONE	NONE, 1/SEC, 1/2SEC	PRI	SECONDARY	N/A	N/A	0.3, 2.5, 5.0, inf	0.3, 2.5, 5.0, inf	12.5, 25, 50, 75, 100	100, 200, 300, 400	PRI OR SECONDARY	NO
	SCAN	64	BUSY, OPEN	NSQ, CTCSS	NONE	NONE	DISPLYD	LAST SCAN HOLD	PRI	PRI	0.3, 2.5, 5.0, inf	0.3, 2.5, 5.0, inf	12.5, 25, 50, 75, 100	100, 200, 300, 400	DISPLAYED	YES
	PRI AND SCAN	64	BUSY, OPEN	NSQ, CTCSS	NONE, 1/4, 1/8	NONE	PRI	PRI	PRI	PRI	0.3, 2.5, 5.0, inf	0.3, 2.5, 5.0, inf	12.5, 25, 50, 75, 100	100, 200, 300, 400	PRI OR DISPLAYED	YES

NOTES

1. * Programmable by EPROM
2. _ Default condition
3. BCLO controls TX in all modes if programmed
4. Unless noted PRI/SCAN functions retain their individual characteristics while both activated.
5. TX achieved by 1 PTT activation in all modes. (subject to BCLO)
6. Hold condition on PRI channel indicated by a 2-beep tone
7. Radio capacity - 80 channels (0-79 displayed)
8. "DISPLAYED" channel denotes any currently displayed non-priority scan channel.
9. "SECONDARY" channel denotes any manually selected non-priority channel

ERROR CODES DISPLAY ON SYN-TECH RADIOS

The following information is an explanation of the error codes that are displayed on the channel readout of the Syn-Tech radios.

Error Code 90 - Missing or Wrong Data at Hex Address 400, Missing, Bad, or Improperly Installed E/PROM module
Error Code 91 - Missing or Wrong Data at Hex Address 404, or Improperly Installed E/PROM module
Error Code 92 - Missing or Wrong Data at Hex Address 408, or Improperly Installed E/PROM module
Error Code 93 - Missing or Wrong Data at Hex Address 40C, or Improperly Installed E/PROM module
Error Code 94 - Bad Parity Data from the E/PROM module
Error Code 95 - The Main VCO is out of Alignment
Error Code 96 - Reserved
Error Code 97 - Reserved
Error Code 98 - Reserved
Error Code 99 - Reserved

For Error Codes 90, 91, 92, 93 or 94 condition, substitute a known good E/PROM module or erase and reprogram the E/PROM module over again.

For Error Code 95 condition, follow the standard service manual alignment instructions for the Main VCO.

For Error Codes 96, 97, 98 or 99 condition, refer to the standard service manual CPU/PLL trouble shooting chart and begin checking all of the Input, Output lines and signals on the microprocessor IC901.