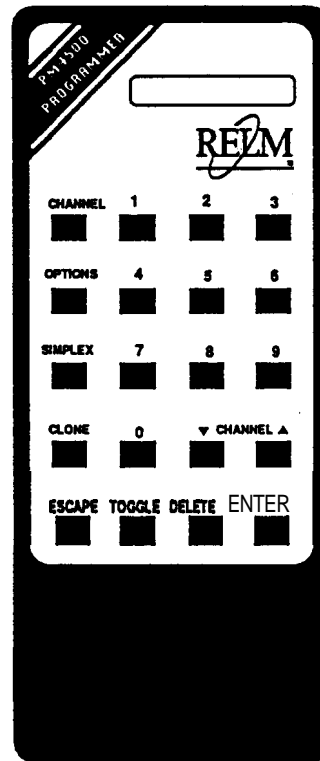


MODEL PM4500 PROGRAMMER

Instruction Manual

Programming Mini-Corn@ Plus SM Series Transceivers

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Section V

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PACKING LIST

- 1—Model PM4500 Programmer w/Modular Coupler
- 1—SL & PT Series Instruction Manual (PM 7001-1841-901)
- 1—RM Series Instruction Manual (P/N 7001-I 841-902)
- 1—RSP Series Instruction Manual (P/N 7001-I 841-903)
- I-LMV2548 Instruction Manual (P/N 7001-1841-904)
- 1—SM Series Instruction Manual (P/N 7001-I 841-905)

IMPORTANT: Please read this manual thoroughly before proceeding to program a SM Series Radio.

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INTRODUCTION

This manual contains instructions for using the PM4500 Programmer (simply referred to as the Programmer) to program the Mini-Corn® Plus 16 and 99 Channel SM Series Transceivers.

The Programmer has a non-volatile memory that requires no battery to maintain data.

The Programmer is used for:

1. Assigning to the Transceiver the following Options or Configuration Parameters:
 - Transmit Time-Out Timer
 - Scan Delay
 - Priority Delay
 - Key Pad Beep
 - Channel 1 Beep
 - Off Hook to Priority Channel
 - Off Hook Scan
 - Power Up on Channel 1
 - TX Carrier Delay
 - Message Annunciator
 - Talk Around
 - Range
2. Assigning to each channel the following parameters:
 - Receive Frequency
 - Busy Channel Lockout (BCL)
 - RX' Tone, DCS' Code or External Decoder
 - Transmit Frequency
 - TX' Tone, DCS' Code or External Encoder
3. Cloning:
 - Transferring data *from* the Transceiver to the Programmer (**Read Operation**)
 - Transferring data *from* the Programmer **to** the Transceiver (Write Operation)

'DCS stands for Digital Coded Squelch

RX stands for Receive: TX stands for Transmit

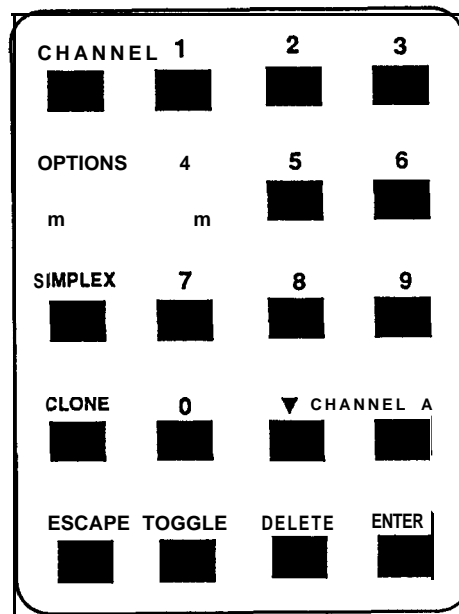
PROGRAMMER DETAILS

The Programmer contains a keyboard (see Figure below) with 20 keys arranged in a 4 x 5 matrix. A 6-character LCD* display lights up when power is applied.

All Programming and Cloning information is indicated on the Programmer's LCD display.

The Unit operates on 12VDC power from the Transceiver. Data between the Programmer and the Transceiver is transferred through a modular plug connected to the Microphone jack on the Transceiver.

*LCD stands for Liquid Crystal Display



KEYBOARD

A description of the 20 keys follows:

CHANNEL

Press this key and a digit key(s) to access a channel.

OPTIONS

Use this key for programming and reviewing the Options Parameters.

SIMPLEX

This key is NOT functional for the SM Series Transceivers.

CLONE

This key is used for transferring or cloning data *from* the Transceiver to the Programmer, or *from* the Programmer to the Transceiver.

ESCAPE

Press this key to abort or leave a programming function and to check the Programmer's display.

TOGGLE

Press this key to change Y (Yes) to N (No) and vice-versa.

DELETE

Use this key to delete numerical data *prior* to pressing **ENTER**, or to delete a channel.

ENTER

Use this key to complete an operation. Press this key to store the displayed information into the memory of the Transceiver and/or to advance to the next parameter for a selected channel. Also, use this key for reviewing the Transceiver's channel data or Options Parameters. In addition, press this key to answer Yes to any prompt that is displayed as a question.

A

Use this key to go to the next higher channel. The new channel's number will be displayed.



Use this key to go to the next *lower* channel. The new channel's number will be displayed.

0-9

These are *digit* (numeral) keys. Use these for entering numerical data or selecting a channel.

PRELIMINARIES (Start-up)

Whether you are programming or cloning, start with the following 4 steps:

1. Turn the Transceiver OFF.
2. Connect the modular plug from the Programmer to the Microphone jack of the Transceiver. You will hear a *click* when the modular plug is fully seated.
3. a. Turn the Transceiver ON. Its display will

show:



- b. The display on the Programmer should first

show:



and then



4. The Unit is now ready to program the Transceiver.

PROGRAMMING PROCEDURE

NOTES:

1. Each time a Programmer key is pressed, a **beep** will be heard if an external speaker is plugged into the SM Series Transceiver.
2. If an invalid number is tried, the Programmer will simply not accept it. A *Beep* will still be heard, indicating a key has been pressed.
3. Use the A for stepping up (or ▼ for stepping down) to the next channel.
4. Press **ESCAPE** to abort any programming function or to stop. Display will momentarily show the Display Test pattern (see page 25) and then:



5. It is recommended that you program the Options *Parameters* before programming the individual Channel Parameters.

OPTIONS PARAMETERS

NOTES:

1. These parameters pertain to the Unit as a whole, not for a specific channel.
2. If an error is made in entering the data, press **DELETE** and start over.
3. To REVIEW the Options, repeatedly press **OPTIONS**.

OPTIONS (Continued)

1. Press **OPTIONS**. The display will show the **Transmit Time-Out Timer**. For example:



Blinking

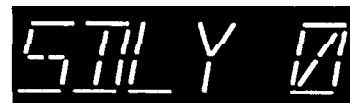
2. Enter a value 0 - 7 (see Table 1 below). Press **ENTER** to store **TOT** in memory and advance the display to **Scan Delay**.

Table 1. Transmit Time-Out (TOT) Values.

Numeral	TOT (Seconds)	Numeral	TOT (Minutes)
0	No time out	4	2
1	15	5	4
2	30	6	8
3	60	7	16

3. **Scan Delay**.

Display will show, for example:



Blinking

4. Enter a value 0, 1, 2 or 3. (See Table 2 below.) Press **ENTER** to store **Scan Delay** in memory and advance the display to **Priority Delay**.

Table 2. Delay Values (Seconds).

Numeral	Scan	Priority
0	1/2	1
1	1	2
2	2	3
3	4	4

5. **Priority Delay.**

Display will show, for example:



Blinking

6. Enter a value 0, 1, 2 or 3. (See Table 2, page 7.)
Press **ENTER** to store **Priority Delay** in memory and advance the display to **Key Pad Beep**.

7. **Key Pad Beep.**

The display will show one of the following:



Blinking



Blinking

8. Press **TOGGLE** key to toggle Y (Yes) to N (No) or vice *versa*.
Press **ENTER** to store in memory and advance the display to **Channel 1 Beep**.

9. **Channel 1 Beep.**

The display will show one of the following:



Blinking



Blinking

10. Press **TOGGLE** key to toggle Y (Yes) to N (No) or vice *versa*.

Press **ENTER** to store in memory and advance the display to **Off Hook to Priority Channel**.

11. **Off Hook to Priority Channel.**

The display will show one of the following:



Blinking



Blinking

12. Press **TOGGLE** key to toggle Y (Yes) to N (No) or vice *versa*.

Press **ENTER** to store in memory and advance the display to **Off Hook Scan**.

13. **Off Hook Scan.**

The display will show one of the following:



Blinking



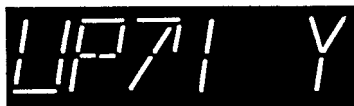
Blinking

14. Press **TOGGLE** key to toggle Y (Yes) to N (No) or vice *versa*. If Yes is selected, the **Off Hook to Priority Channel** (Step 11) Yes selection is disregarded.

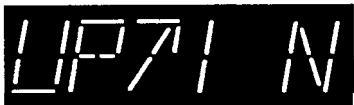
Press **ENTER** to store in memory and advance the display to **Power Up on Channel 1**.

15. **Power Up on Channel 1.**

The display will show one of the following:



Blinking \longrightarrow \uparrow



Blinking \longrightarrow \uparrow

16. Press TOGGLE key to toggle Y (Yes) to N (No) or vice versa. If Yes is selected, the Radio will always be on Channel 1 whenever it is turned ON (powered-up). If it was in the MANUAL Mode on Channel 13 (for example) when turned OFF, it will power-up on Channel 1. If it was in the SCAN Mode when turned OFF, it will power-up in the SCAN Mode and start *scanning*. Press ENTER to store in memory and advance the display to **TX Carrier Delay**.

17. **TX Carrier Delay.**

Display will show, for example:



Blinking \longrightarrow \uparrow

18. Enter a value 0, 1, 2 or 3. (See Table 3, below.) TX Carrier Delay is the amount of time the carrier (no modulation) is still present **after the PTT** switch is released.

Table 3. Delay Values (mS).

Numeral	Delay	Numeral	Delay
0	165	2	400
1	300	3	500

Press ENTER to store in memory and advance the display to **Message Annunciator**.

19. **Message Annunciator.**

The display will show one of the following:



20. Press TOGGLE key to ON or OFF. If ON is selected, the Message Annunciator feature is enabled. If OFF is selected, the Message Annunciator feature is disabled. Press ENTER to store in memory and advance the display to **Talk Around**.

21. **Talk Around.**

The display will show one of the following:



Blinking \longrightarrow \uparrow



Blinking \longrightarrow \uparrow

22. Press TOGGLE key to toggle Y (Yes) to N (No) or vice versa. Press ENTER to store in memory and advance the display to **Range**.

23. **Range.**

The display will show, for example:



WARNING: The Transceiver's proper Range is determined at the time of manufacture. It should NOT be programmed unless components that affect the Unit's memory have been replaced. It should **never** be changed to a *different* value.

- If programming is necessary, key in the proper value. See Table 4, below.
- Press **ENTER** to store **Range number** in the Transceiver's memory. The display will return to the start of Options and show **Transmit Time-Out Timer**.

CAUTION: If the Range number is *changed*, the display will show, for example:

Blinking ——— ↑

After **ENTER** is pressed, the display will return to the start of Options. All channels are changed to invalid frequencies. Thus, each channel to be used will have to be programmed again for its **proper** receive and transmit frequency.

Table 4. Ranges

No.	Frequency Range (MHz)	Channel Steps (kHz)
1	150—174	5, 6.25
2	450—482	12.5
3	450—482	6.25

REVIEWING PROGRAMMED DATA

You may wish to review the Options Data you entered into the Unit.

After Step 23 on page 11, press **OPTIONS** in succession to step through the Options Parameters.

CHANNEL PARAMETERS

NOTES:

- Programming steps should be performed in the following **order as shown**.
- It is recommended that Channel Parameters be programmed **after** you have programmed the Options Parameters.
- See page 24 for examples of programmed channels.

1. Channel Access

Press **CHANNEL**.

The display will show:

↑ Blinking

- Press the desired Channel's Number (1 = 9; 10 = 16 or 10 = 99). The display will show, for example:

↑↑ Blinking

Y shown only for reference

If:

Y = ?, Channel has both a Receive *and* a Transmit frequency.

Y = R, Receive *only*. Hence, it can't transmit. See page 17 for procedure.

Y = D, Channel is deleted. Hence, it has no receive or transmit frequency.

- a. To delete the channel at this time, press **DELETE**. The display will show:



Blinking

Press **ENTER** to answer Yes.

NOTE: To answer **No**, press **TOGGLE** or any diait kev.

Display will show, for example:



See page 24 for display sequence of a deleted channel.

NOTE: If you make an error in number entry, start over by pressing **CHANNEL** and the correct number.

- b. To step to Receive Frequency, press **ENTER**.

3. Receive Frequency

Display will show, for the VHF models, one of the following:



Blinking

if previously programmed



Blinking

or, if none is programmed

For UHF models, the display will show one of the following:



Blinking

if previously programmed



Blinking

or, if none is programmed

4. Key in the six digits of the desired RX frequency. The valid frequency range is between 150 and 174 MHz for VHF models and between 450 and 482 MHz for UHF models.

Examples of keyed in frequencies:

56045 (158.045 MHz; VHF models)

167237 (167.2375 MHz; VHF models)

470012 (470.0125 MHz; UHF models)

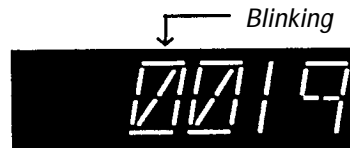
NOTE: Ignore the decimal.

If an error is made in entering the digits, press **DELETE** and start over.

Press **ENTER** to store the Receive Frequency in the Transceiver's memory. The display will advance to **RX BCL and Tone Code**.

5. RX BCL and Tone Code

Display will show, for example:



Blinking

BCL Code Tone Code

6. a. Enter a single digit code corresponding to the desired BCL status.

BCL No = 0 BCL Yes = 1

The display will show, for example:



↑ *Blinking*

- b. Enter a three-digit code corresponding to the desired CTCSS Tone Code from Table 5 on page 19 or DCS Code from Table 6 on pages 20 through 22. If you make an error in entering the digits, press **DELETE** and start over.

NOTE: External Decode is selected by entering 155 or higher (up to 169) for the RX Tone Code. See Table 7 on page 23.

- c. Press **ENTER** to store the RX BCL and Tone Code in the Transceiver's memory and to advance the display to **Transmit Frequency**.

7. Transmit Frequency

Display will show, for VHF models, one of the following:



↑ *Blinking*

if previously programmed



↑ *Blinking*

or, if none is programmed

For UHF models, the display will show one of the following:



↑ *Blinking*

if previously programmed



↑ *Blinking*

or, if none is programmed

- a. To program the channel for *Receive Only*: Press **DELETE**. The display will show the following:



↑ *Blinking*

Then press **ENTER** and go to Step 10 on page 18 to continue. See page 24 for the display sequence of a *Receive Only* Channel.

- b. To program the TX Frequency:
Enter the six digits of the desired TX frequency. The valid frequency range is between 150 and 174 MHz for VHF models and between 450 and 462 MHz for UHF models.

Examples of keyed in frequencies:
54010 (154.010 MHz; VHF models)
171312 (171.3125 MHz; VHF models)
460775 (460.775 MHz; UHF models)

NOTE: Ignore the decimal.1

If an error is made in entering the digits, press **DELETE** and start over.

Press **ENTER** to store Transmit Frequency in memory. The display will advance to TX Tone Code.

8. TX Tone Code

Display will show, for example:



Not programmable; it will always be the same as the RX BCL Code

9. Enter a three-digit code corresponding to the desired CTCSS Tone Code from Table 5 on page 19 or DCS Code from Table 6 on pages 20 through 22.

NOTE: External Encode is selected by entering 155 (or higher, up to 189) for the TX Tone Code. See Table 7 on page 23.

If you make an error in entering digits, press **DELETE** and start over.

Press **ENTER** to store TX Tone Code in the Transceiver's memory. The display will return to showing the channel number.

10. For other channels, repeat procedural steps 1 - 9, or repeatedly press **CHANNEL A** (or **▼**) to step to the next desired channel.

Reviewing Programmed Data

You may wish to review the data you have entered into a channel. There are two methods for doing this.

1. After step 9 above, press **ENTER** in succession to step through the channel's parameters.
2. Press **CHANNEL** and the desired channel's number. Then press **ENTER** in succession to step through the desired channel's parameters.

NOTE: See page 24 for a summary of display sequences during channel parameters programming.

Table 5. PM4500 Codes vs. CTCSS Tones.

Code #	TONE (Hz)	Code #	TONE (Hz)	Code #	TONE (Hz)
000	No Tone	017	118.8	034	218.1
001	67.0	018	123.0	035	225.7
002	71.9	019	127.3	036	233.6
003	74.4	020	131.8	037	241.8
004	77.0	021	136.5	038	250.3
005	79.7	022	141.3	039	69.4
006	82.5	023	146.2	040	159.8
007	85.4	024	151.4	041	165.5
008	88.5	025	156.7	042	171.3
009	91.5	026	162.2	043	177.3
010	94.8	027	167.9	044	183.5
011	97.4	028	173.8	045	189.9
012	100.0	029	179.9	046	196.6
013	103.5	030	186.2	047	199.5
014	107.2	031	192.8	048	206.5
015	110.9	032	203.5	049	229.1
016	114.8	033	210.7	050	254.1

NOTE (Concerning Table 6 that follows on pages 20, 21 and 22): For communication systems utilizing only SM Series transceivers, it is recommended that Standard PM4500 DCS (Standard DCS) codes be used. For existing communication systems employing DCS, it may be necessary to use the Inverted (or complemented) DCS and corresponding PM4500 Code for proper Transceiver operation.

Table 6. PM4500 Codes vs. DCS* Codes.

STD PM4500 Code	DCS Code		INV PM4500 Code
	STD	INV	
051	023	047	058
052	025	244	090
053	026	464	127
054	031	627	141
055	032	051	059
056	036	72	082
057	043	145	121
058	047	123	051
059	051	132	055
080	053	152	123
061	054	413	117
062	065	271	100
083	071	306	102
084	072	245	091
065	073	506	131
066	074	174	083
067	114	712	148
088	115	152	077
069	116	754	154
070	122	225	087
071	125	365	113
072	131	364	112
073	132	546	136
074	134	223	086
075	143	412	116
076	145	274	101
077	152	115	068
078	155	731	050
079	156	265	098
080	162	503	130
081	165	251	093
082	172	036	056
083	174	074	066
084	205	263	097
085	212	356	111

* DCS stands for Digital Coded Squelch.

Table 6 continued on next page.

Table 6. PM4500 Codes vs. DCS* Codes
(Cont'd).

STD PM4500 Code	DCS Code		INV PM4500 Code
	STD	INV	
086	223	134	074
087	225	122	070
088	226	411	115
089	243	351	110
090	244	025	052
091	245	072	064
092	246	523	133
093	251	165	061
094	252	462	126
095	255	446	122
096	261	732	151
097	263	205	084
098	265	156	079
099	266	454	124
100	271	065	062
101	274	145	076
102	306	071	063
103	311	664	146
104	315	423	118
105	325	526	134
106	331	465	128
107	332	455	125
108	343	532	135
109	346	612	139
110	351	243	089
111	356	212	085
112	364	131	072
113	365	125	071
114	371	734	152
115	411	226	088
116	412	143	075
117	413	054	061
118	423	315	104
119	431	723	149
120	432	516	132

* DCS stands for Digital Coded Squelch.

Table 6 continued on next page.

Table 6. PM4500 Codes vs. DCS* Codes
(Cont'd).

STD PM4500 Code	DCS Code:		INV PM4500 code,
	STD	INV	
121	445	043	057
122	446	255	095
123	452	053	060
124	454	266	099
125	455	332	107
126	462	252	094
127	464	026	053
128	465	331	106
129	466	662	145
130	503	162	080
131	506	073	065
132	516	432	120
133	523	246	092
134	526	225	105
135	532	343	108
136	546	132	073
137	565	703	147
138	606	631	142
139	612	346	109
140	624	632	143
141	627	031	054
142	631	808	138
143	632	624	140
144	654	743	153
145	662	466	129
146	664	311	103
147	703	565	137
148	712	114	067
149	723	431	119
150	731	155	078
151	732	261	096
152	734	371	114
153	743	654	144
154	754	116	089

* DCS stands for Digital Coded Squelch.

Table 7. PM4500 Codes vs. External
Decoder Delay Times

PM4500 Code	Delay (Seconds)
155	0
156	0.1
157	0.2
158	0.3
159	0.4
160	0.5
161	0.6
162	0.7
163	0.8
164	0.9
165	1.0
166	1.1
167	1.2
168	1.3
169	1.4
170	1.5
171	1.6
172	1.7
173	1.8
174	1.9
175	2.0
176	2.1
177	2.2
178	2.3
179	2.4
180	2.5
181	2.6
182	2.7
183	2.8
184	2.9
185	3.0
186	3.1
187	3.2
188	3.3
189	3.4

NOTE: To enable an Encoder (TX), use Code #155, although any Code # from 155 to 189 may be used.

DISPLAY SEQUENCE DURING CHANNEL PARAMETER PROGRAMMING

OPERATION	EXAMPLES OF DISPLAY INDICATION				
Press CHANNEL and Ch. No. for Channel Indicator*	CH 4-7	CH 5-7	CH 13R	CH 6 B	-----
Press ENTER for Receive Frequency	155325	158745	162557A	-----	-----
Press ENTER for Receive BCL and Tone Code	171717 121212	1155	171717 121212	CH P	-----
Press ENTER for Transmit Frequency	157477A 121212	154657A	-----	CH 6 B	-----
Press ENTER for Transmit Tone Code	171717 121212	1717 1212	CH 13R	-----	-----

*Channel Indicators: ? = RX/TX Channel; R = Receive Only Channel; D = Deleted Channel

DISPLAY TEST

Press and **hold** ESCAPE. The Programmer's display will show a characteristic Test Pattern with all segments on, thus:



(Blow-up of a single digit of the display)

and then revert to:



in the display when ESCAPE is released.

UNIT TURN OFF

After Programming or Cloning is completed:

1. Turn Transceiver power **off**.
2. Remove inter-connecting cable from transceiver.

CLONING PROCEDURE

This feature permits duplicating (cloning) the same programmed data into any number of transceivers. Be sure to use the proper Start-up (see PRELIMINARIES, page 5) and Unit Turn Off procedures (above) when cloning.

NOTE: The **CLONE** key toggles from the **Read** function to the **Write** function, or vice versa, each time it is pressed.

If a Transceiver *a/ready* contains the data to be cloned, connect it to the PM4500 and proceed with Step 3 on page 26, using proper Start-up procedure.

If the data to be duplicated (cloned) is NOT already in a Transceiver, proceed as follows:

1. Connect the PM4500 to the Transceiver to be *programmed* using proper Start-up procedure.
2. Enter the data into the transceiver by using the PM4500 normal programming functions.
3. Press CLONE.
If "READ?" is in the display, press **ENTER**. If not, press CLONE again and then **ENTER**. This will copy the Transceiver's entire data into the Programmer's memory.
4. Turn OFF the Transceiver and then disconnect the **PM4500**.
5. Connect the PM4500 to a Transceiver to be *cloned*, using proper Start-up procedure.
6. Press CLONE ("WRITE?" must be in the display) and then **ENTER**.
7. Repeat steps 4, 5 and 6 for all other Transceivers to be *cloned*.

A detailed description of the **CLONE (READ and WRITE)** operations follows:

TRANSFERRING DATA *INTO* THE PROGRAMMER (READ OPERATION)

1. Press CLONE. Display will show:



Blinking 

NOTE: If not, **press CLONE again.**

2. Press ENTER (to answer Yes).
Processing will begin. During data transfer, the display will show:




3. When transfer is complete, the display will show:



TRANSFERRING DATA *INTO* THE TRANSCEIVER (WRITE OPERATION)

1. Press CLONE. Display will show:



Blinking 

NOTE: If not, press CLONE again.

2. Press ENTER (to answer Yes).
Processing will begin. During data transfer, the display will show:



NOTE: If you attempt to transfer SM (for example) Series data in the Programmer to a different series Radio (such as PT, RSP, etc.), the display will show:



The Transceiver will emit a series of beeps and no transfer will take place.

3. When transfer is complete, the display will show:



