

— O P E R A T O R T R A I N I N G —

Programmer

MA 4073C

RACAL TRAINING SERVICES LTD
HECKFIELD PLACE

RACAL TRAINING
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ILLUSTRATIONS

Frontispiece MA4073C/MA4073G Programmer

APPENDIX A FILL GUN OPERATING INSTRUCTIONS

INTRODUCTION

- 1 The MA4073C and MA4073G Programmer is a channel and key variable data storage and loading device for use with Racal Programmable Transceivers in the COUGAR range. The MA4073C Programmer is used with Transceivers bearing Part Number with suffix S. The MA4073G Programmer is used with Transceivers bearing Part Numbers with suffix U, for example PRM4515H3TCU. All other COUGAR Transceivers will accept frequency fill but not key fill from MA4073C and MA4083C devices.
- 2 Data to be stored is entered via a keyboard, and can be verified on a display prior to storing in the internal memory. Stored data is 'filled' (loaded) into the transceiver (or other unit) via a cable connection.
- 3 If required, channel and key variable data can be loaded separately into the MA4083C or MA4083G Fill Gun which is then used to load the radio.
- 4 The Programmer is suitable for use with the Racal PRM4515 Personal and SRM4523 Static, Mobile and Transportable COUGARNET radios, the PRM4735 Covert radio and with the BCC 584D Control and Display Unit (CDU).

POWER SUPPLIES

- 5 During a radio FILL operation power to both units (the Programmer and the radio) can be supplied from either the Programmer battery or the radio battery. It is recommended that the Programmer battery is fitted and the radio battery is removed.

NOTE: A Programmer battery must be fitted when filling an MA4083C or MA4083G Fill Gun.
- 6 The Programmer uses an MA4516A 10 V battery mounted on the unit. The battery is charged using an MA4517A single battery charger or an MA4518A six-way battery charger. The battery is removed from the unit for charging, by pulling the release button and turning the battery anti-clockwise. No provision is made for battery charging in situ.
- 7 The battery is replaced by pulling the release button, pressing the battery downwards and turning clockwise.

TYPES OF STORED DATA

- 8 The Programmer can store the following data:
- Thirty transmit channel frequencies.
 - Thirty receive channel frequencies.
 - Four Key Variables (encryption/decryption codes).
- 9 The transmit and receive channel frequencies can be in the range 0 to 999.999 MHz. The actual frequencies stored must be suitable for the radio to be loaded i.e.
- | | |
|---|---|
| PRM4515L or SRM4523L
VHF Transceiver | 68 MHz to 88 MHz. 10 channels. |
| PRM4515N or SRM4523N
VHF Transceiver | 68 MHz to 88 MHz. 10 channels. (The Tone ON/OFF function is inoperative when filling this radio). |
| PRM4515H or SRM4523H
VHF Transceiver | 132 MHz to 174 MHz. 10 channels. (Individual radios operate in a 20 MHz segment of the band). |
| PRM4515U or SRM4523U
UHF Transceiver | 380 MHz to 470 MHz. 10 channels. (Individual radios operate in a 20 MHz segment of the band). |
| PRM4735
Covert VHF Transceiver | |
| PRM4735L | 76 MHz to 86 MHz |
| PRM4735HA | 138 MHz to 156 MHz |
| PRM4735HB | 156 MHz to 174 MHz |
| BCC 584D | 30 Channels |
- 10 The four Key Variables each consist of 36 digits (0 to 7). The Key Variables can be specifically programmed or programmed automatically using a random number generator in the MA4073C Programmer only.
- 11 After entering the data into the MA4073C or MA4073G it is recommended that the chosen radio be experimentally filled and any errors shown by the MA4073C or MA4073G corrected. This should be repeated until no error messages are given on the Programmer.

BITE

- 12 At switch-on, the unit carries out Build In Test Equipment (BITE) functions to check that it is operating correctly. A fault condition is indicated on the display as:
- (1) RAM DATA ERROR, or
 - (2) MAIN RAM FAULT, or
 - (3) NOVDRAM (non-volatile RAM) FAULT (see para 14).
- 13 If a RAM DATA ERROR is indicated the unit should be zeroised and re-loaded. The other fault indications cannot be cleared without dismantling and repairing the unit.

MEMORY

- 14 The unit uses non-volatile memory devices therefore data stored in the unit is retained at switch-off, or when the battery is removed.

CONTROL FUNCTIONS

- 15 The front panel controls provide the following functions:
- ON OFF : Turns the unit on and off by quick depression of switch.
 - Z ALL : Initialises memory erase.
 - Z FD : In channel entry mode enables a single frequency to be zeroised.
 - FILL : Initialises data fill.
 - ^ : Alters display brightness; 3 levels are provided. On power up the middle brightness is selected.
 - ∨
 - RND : In key entry mode, the MA4073C provides a means of entering a complete key via a random number routine. The key is not operative on the MA4073G.
 - A/D : In key mode provides a means of scrolling through keys A to D or for the examination of the key data.
 - KEY : Selects key entry mode.

FORMAT SELECTION

21 As stated in para 18, a five digit or a six digit channel frequency format can be selected. The procedure must be carried out following a Zeroise procedure (para 32).

NOTES: (1) If the Zeroise procedure has not been carried out the format selected prior to switch-off will be retained.

(2) If format 2 is in use frequencies below 100 MHz can be entered by entering a leading zero.

ENTER

(Zeroise procedure)

1 (for 5 digit frequencies
i.e. below 100 MHz)

OR

2 (for 6 digit frequencies
i.e. 100 MHz and above)

EXEC (to enter)

OR

CE (to change)

DISPLAY

FORMAT <1/2>

<100 MHz <EX/CE>

<100 MHz <EX/CE>

Channel frequency

CHAN/FILL

KEY VARIABLE ENTRY

22 Each key consists of 36 octal digits (0 to 7). The thirty-six digits can be individually entered (using the keypad) or the complete key can be a pseudo-random number entered by pressing RND (MA4073C only).

NOTE: When entering a key from the keypad all 36 octal digits must be entered.

23 To view an existing key:

ENTER

DISPLAY

KEY

<A/D> A <EX/FI>

EXEC (for Key A)

<A/D> TO SCROLL

OR

A/D (successively for Keys B to D) <A/D> B/C/D <EX/FI>

EXEC

<A/D> TO SCROLL

A/D (successively) for

A1 = first 12 digits of 36 digit key

A2 = second 12 digits of 36 digit key

A3 = third 12 digits of 36 digit key
(and finally exit viewing)

24 A new key can be entered when the first 12 digits of the present key are displayed. The asterisk indicates the position of the next digit to be keyed.

EXEC, CHAN, KEY and FILL functions are disabled until 36 digits have been entered. The display auto scrolls on the 13th and 25th entries. The asterisk disappears after the 12th, 24th and 36th entry, but remains active. The CE key deletes the number to the left of the asterisk on the current line only.

25 To complete a key entry from the keypad press EXEC after the last (36th) digit. The unit responds with:

ENTER

DISPLAY

VIEW/SAVE ? 1/2

1 To view key

OR

2 To enter keys in memory

The new key overwrites the previous key when 2 is pressed.

RADIO (OR FILL GUN) FILLING INSTRUCTIONS

26 A radio (or fill gun) is loaded as follows:

Remove radio battery (see para 5). Connect the PRM4515 radio or the MA4083C or MA4083G Fill Gun using the ST792252 cable. Connect the PRM4735 radio using the ST792658 cable. For PRM4515 radio, switch on and select key A; for PRM4735 radio, connect the microphone/loop. If an error message is given during filling, repeat the fill procedure.

N.B. Channel data and key variable data must be entered into the radio or Fill Guns in two separate operations.

Filling Procedure - All Channels

27	<u>ENTER</u>	<u>DISPLAY</u>
	CHAN	CH * * SELECT
	FILL	CH ALL FILL
	EXEC	> ---- < followed by
	(or CE to return	<CHAN/KEY>
	to menu)	(or fault indication, para 31)

Filling Procedure - Single Channel (Transmit and Receive)

28	<u>ENTER</u>	<u>DISPLAY</u>
	CHAN	CH * * SELECT
	Channel No (0 to 29)	CHnn SELECT
	FILL	CHnn ALL FILL
	EXEC	> ---- < followed by
	(or CE to return	<CHAN/KEY>
	to menu)	(or fault indication, para 31)

Filling Procedure - Single Channel (Transmit or Receive)

29	<u>ENTER</u>	<u>DISPLAY</u>
	CHAN	CH * * SELECT
	CHAN NO (0-9 or 0-29)	CHnn SELECT
	FRX OR FTX	CHnn FTX (or FRX)
	FILL	CHnn FTX (or FRX) FILL
	EXEC	> ---- < followed by
	(or CE to return	<CHAN/KEY>
	to menu)	(or fault indication, para 31)

Filling Procedure - Key Variables

30

ENTER

DISPLAY

KEY
FILL
EXEC
(or CE to return to menu)

<A/D> A EX/FI
ALL KEYS FILL
>----< (during loading)
<CHAN/KEYS> (loading successful)
(or fault indication, para 31)

NOTE: All four keys are transferred.

Fill Failure

31

A fill failure is indicated as follows:

DISPLAY

RADIO FAIL indicates (a) the radio is not connected
(during channel (b) the radio is switched off
or key filling) (c) the radio is otherwise faulty
(d) BCC 584D CDU not set to radio
(keyfill only).

NO RADIO ALARM indicates (a) the radio is set to CLEAR
(during key (b) the radio or programmer may
filling) be faulty
(c) an alarm signal path is not
provided by the radio system
(d) a crypto module is not fitted
to the radio.

KEY FILL FAIL indicates a corruption of data.
(during key
filling)

ERROR Txx Ryy P indicates a transmit channel xx
(during channel failed, receive channel yy
fill) failed or a pilot tone select
command failed.

NOTE: only the lowest failed
channel number is shown.

NO CHANNEL DATA indicates no data in store
(during channel fill)

NOTE: (1) Press CE to return to main menu or press CHAN, KEY or
select required function.

(2) Press EXEC to send data again.

ZEROISING THE PROGRAMMER

32 Three levels of memory erasure are available:

(1) Erase entire contents (channel frequencies and keys).

(2) Erase channel frequencies only.

(3) Erase key variables only.

NOTE: The zeroised crypto key is all 7s.

Zeroising Entire Contents

33	<u>ENTER</u>	<u>DISPLAY</u>
	CE	<CHAN/KEY> (must be displayed before zeroising)
	ZALL	SURE ? <EX/CE>
	EXEC (must be entered within five seconds)	<CHAN/KEY>

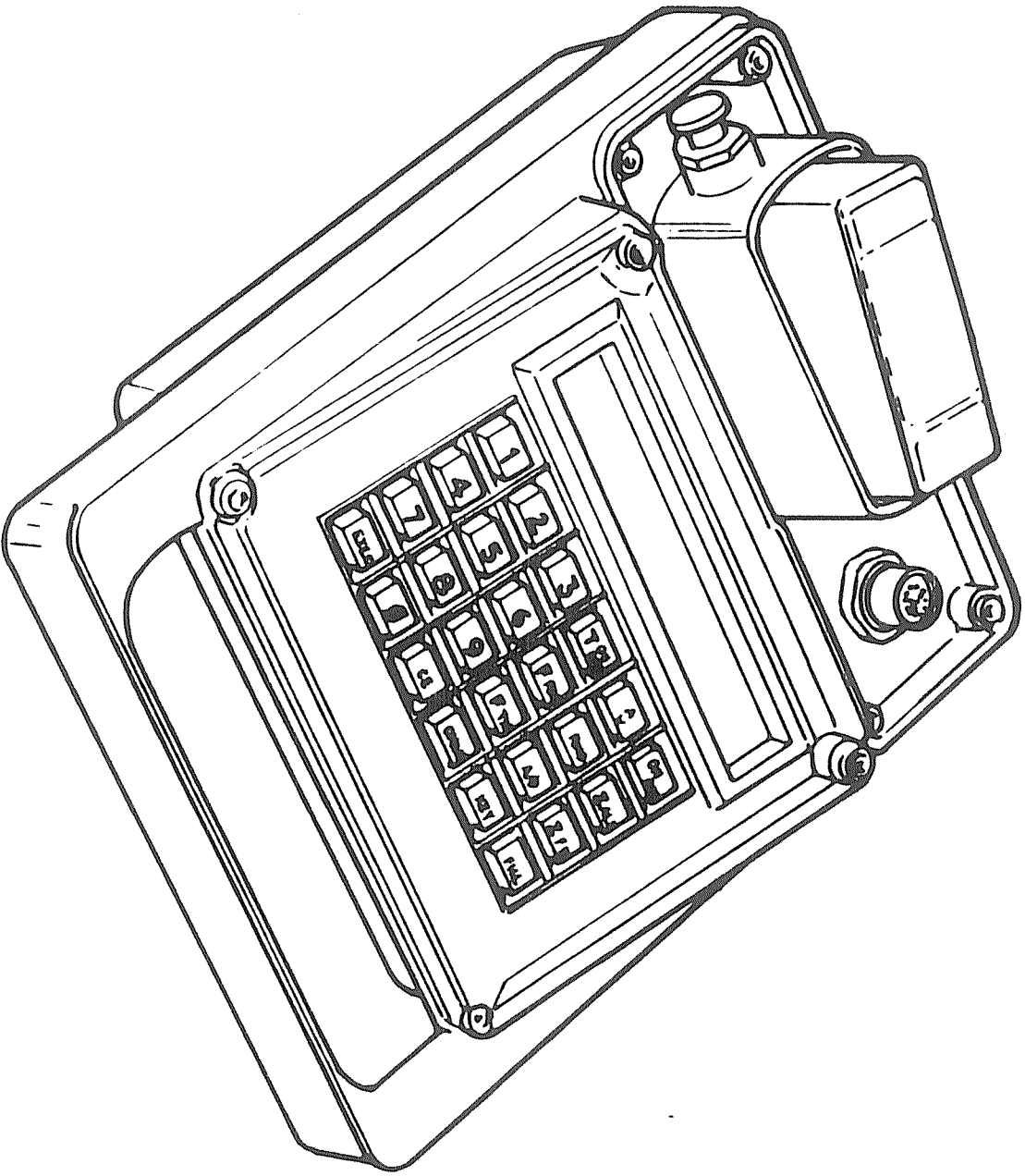
Zeroising Channel Frequencies Only

34	<u>ENTER</u>	<u>DISPLAY</u>
	CHAN	CHAN ** <SELECT>
	ZALL	SURE ? <EX/CE>
	EXEC (must be entered within five seconds)	<CHAN/KEY>

Zeroising Key Variables Only

35	<u>ENTER</u>	<u>DISPLAY</u>
	KEY	<A/D> A <EX/FI>
	ZALL	SURE ? <EX/CE>
	EXEC (must be entered within five seconds)	<CHAN/KEY>

NOTE: Prior to entering EXEC any Zeroising action can be cancelled by (a) waiting longer than five seconds, or (b) entering CE.



RACAL
TH8225
CHAP 2

MA4073C: Control Panel

Fig.1