

**Tactical Data-Entry Device
(TDED)**

MA 4450 Version 1

Operators Handbook

Racal-Comsec Limited

Milford Industrial Estate, Tollgate Road, Salisbury, Wilts., England.

Tel: Salisbury 23911 Telex: 477276 Fax: 0722-330016

Prepared by Group Technical Handbooks Department, Racal Group Services Limited

RACAL

The Electronics Group

Ref. TH 8426

Printed in England

Issue 1
April 87-320

RESTRICTED

CHAPTER 1

=====

GENERAL DESCRIPTION

=====

CONTENTS

<u>Para.</u>		<u>Page</u>
1.	INTRODUCTION	1-1
2.	OPERATION	1-1
8.	CONSTRUCTION	1-2
16.	CONNECTION TO SYSTEM	1-3
	ANCILLARY EQUIPMENT	
17.	Rapier Interface Box	1-3
18.	Carrying Case	1-3
19.	Cable Satchel	1-3
20.	Cables	1-4

ILLUSTRATIONS

Fig No.

1.1.1	MA 4450: General View	Back of Contents Page
1.1.2	MA 4450: Construction: Simplified Diagram	End of Chapter

RESTRICTED

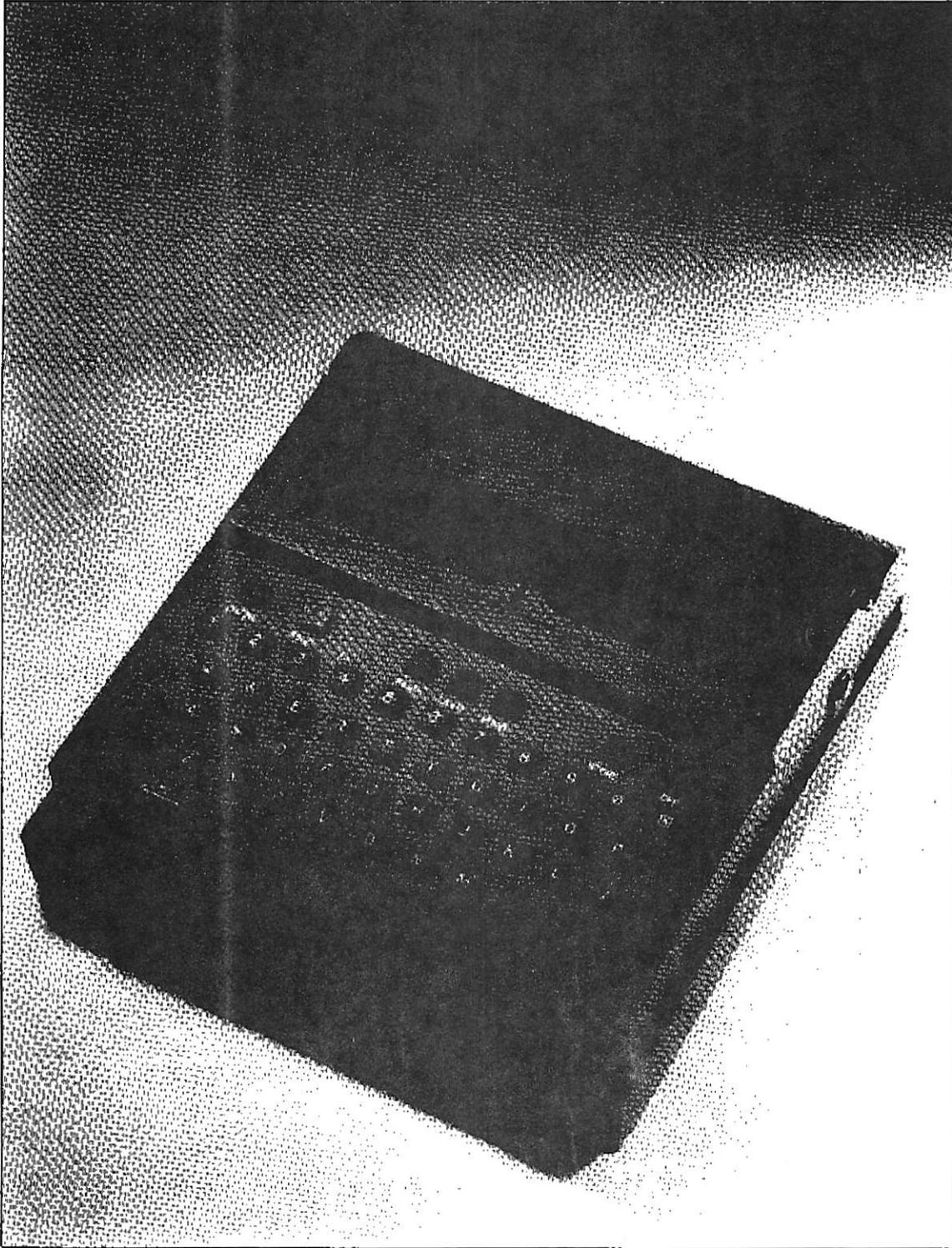


Fig.1.1.1.

MA4450
General View : Lid not fitted

RACAL
TH8426

RESTRICTED

CHAPTER 1

=====

GENERAL DESCRIPTION

=====

INTRODUCTION

1. The MA 4450 Version 1 Tactical Data-Entry Device (TDED) is a portable message terminal which allows a radio operator to send secure (encrypted) messages in a greatly-reduced transmission time (compared with normal voice transmission). Also, built-in error detection and correction facilities permit reliable communications to occur under propagation conditions that would make voice communication unreliable.

OPERATION

2. Up to six messages can be entered into the unit for transmission. In each instance, the operator selects the Transmit store (1 to 6) in which the message is to be entered, then types a message of up to 475 characters via the standard full-size keyboard. During entry, the message is shown on the liquid-crystal dot-matrix display, so the operator can check or alter it as necessary (via the keyboard). The unit stores the message until the operator is ready to transmit it. When the message is transmitted, it is not lost, but is retained in the store until it is deleted by the operator.
3. To send a message, the operator connects the unit to the handset connector of the radio transceiver, displays the message and presses the SEND key. The operator then enters the address of the unit that is to receive the message (it can be addressed to up to four specified units, or to groups of units, or to all units in a network), and selects the base key (any one of up to four entered by the operator) to be used to encrypt the message. The unit automatically adds a start sequence and synchronising preamble to the start of the message, provides error-protection for the encrypted message data, then converts the data to the FSK format required; the message is transmitted. If a message is being received when the operator attempts to send a message, the received message can be aborted (lost) and the transmission carried-out: or the transmission can be inhibited until the incoming message has been processed; the operator can then complete the send-operation by pressing the new-line key.
4. Received messages are stored, and an indicator informs the operator that a message has been received. Up to sixteen messages can be stored. The operator can read the stored messages on the display, then delete them as necessary.
5. A printer can be used with the MA 4450V1, to print entered and received messages. A remote computer/data terminal can be connected to the MA 4450V1 (in which case the integral keyboard and display are not used once the system has been set-up). Also, the radio handset can be connected to the radio via the MA 4450V1.
6. When setting-up the unit for printer or remote operation, the operator selects the mode of operation by responding to a series of prompts that appear on the display. The options and prompts are described in detail in Part 4, Chapter 2.

RESTRICTED

7. The MA 4450 requires power from an external source (eg. radio). The unit is switched on when power is applied and the operator presses either the ENTER, SEND or READ key. It is switched-off when the OFF key is pressed (or power is disconnected). Non-rechargeable lithium back-up batteries provide power for the memories when the unit is off; this retains essential information in the memories.

WARNING

Lithium batteries are non-rechargeable. Attempts to charge them may result in injury or damage. See WARNING at front of handbook.

CONSTRUCTION

8. The MA 4450 is housed in a rectangular alloy casting, which is sealed and should not be opened during normal operations. Operator's controls (standard keyboard plus function keys) and indicators (alpha-numeric display plus status indicators) are on the top of the unit. External connections (radio, printer, remote port, handset) are made to sockets on the rear of the unit.
9. Logic components (mainly CMOS) are mounted on four printed circuit boards. Three boards have microprocessors which control the specific functions that the boards perform. From top to bottom the unit consists of top assembly, centre section assembly, and bottom cover. The memory back-up battery assembly is fitted at the rear of the top cover. (See Figure 1.1.2).
10. The top cover has apertures through which the keys and display panel project. The keys are raised parts of a flexible keysheet moulding, and when a key is pressed it bears down on a snap dome on the keyboard circuit. (See Figure 1.1.2). The keyboard circuit is mounted on a rigid plastic moulding below which is mounted the Man/Machine Interface Board (which scans the keyboard to detect pressed keys, and drives the display and indicators), with its component side facing downwards. The liquid crystal display (LCD) and indicators are mounted on the upper side of the Man/Machine Interface Board and project through apertures in the plastic moulding.
11. Connections between the two printed circuit boards are via connector strips located in apertures in the plastic moulding. When the two boards are secured in position the contacts in the flexible connectors press on to the appropriate connection pads on the boards. The Man/Machine Interface Board also has a flat ribbon cable connection to the Power Board. This cable connects the top assembly to the centre section and it is sufficiently long for the two parts to be separated for maintenance purposes.
12. The centre section has the Main Processor Board (which controls the overall functioning of the unit) mounted in the top part of the frame, with components facing upwards. The lower part of the centre section is occupied by the Synchronous Input/Output Board (which converts logic signals to/from the form used by the external equipment), and the Power Board (which distributes power and converts the levels of signals to/from the external equipment). The Sync I/O Board is at the front of the section, with components facing downwards, and the Power Board is at the rear, with components facing upwards (through cut-outs in the frame).

RESTRICTED

13. Connections between the boards on the centre section are made via connector strips (through the frame). In addition, the Power Board has a connector for the ribbon cable from the top assembly, and two ribbon cables to the external connector boards. The external connectors are fixed to the rear of the frame (with RF de-coupling capacitors fitted to the external connector boards).
14. The top cover fits over the top of the centre section and the bottom of the centre section fits inside the bottom cover. The unit is sealed by combined RF and weather gaskets between the top cover and centre section and between the centre section and bottom cover. A hole in the side of the top cover allows pressure testing of the seal to be carried out. (In normal operation, the hole is sealed by a screw which should not be removed unless maintenance is being carried out (in a clean, dry environment)).
15. A flip-up lid, hinged to each side of the top cover at the rear, provides keyboard illumination when required. The lid is fitted with LEDs, which are powered via a connector plugged into the Printer socket, and controlled from the keyboard by the operator.

CONNECTION TO SYSTEM

16. A single plug-in cable connects the MA 4450 to the handset connector of a radio transceiver. If a printer or a remote control terminal is used, a single plug-in cable connects it to the unit. DC power can be supplied to the MA 4450 via the V Ext pin of the Printer or Remote Port sockets. See also the MA 4271 (paragraph 17). For details of all connections, see Part 3, Chapter 2.

ANCILLARY EQUIPMENT

MA 4271 Rapier Interface Box

17. The MA 4271 Rapier Interface Box (RIB) (Racal Part number: 450275) allows the MA 4450 to be powered from vehicle supplies of either polarity, and generates an audible alarm to the operator when activated by the MA 4450. The MA 4271 is connected to the MA 4450 Remote Port socket: Computer/data terminal connections to the MA 4450 are passed directly through the MA 4271. For details, see Appendix.

Carrying Case

18. Racal part number: 461377

The Carrying Case provides a man-portable stowage for the MA 4450 TDED and the MA 4271 RIB. The Carrying Case is hung from the bearer's neck and secured at the waist by adjustable straps. Velcro-fastened flaps enable access to connectors and controls, and hence the TDED/RIB can be operated from the Carrying Case.

Cable Satchel

19. Racal part number: 461378

The Cable Satchel provides stowage for the nine associated cables detailed in paragraph 20. It is provided with an adjustable shoulder-strap.

RESTRICTED

Cables

20. The following cables are provided:

(1) 453840 (two metre)

Connects RIB SKA to the computer.

(2) 453841 (two metre)

Connects TDED Radio socket SKD to either:

(a) Clansman Radio (CNR)

(b) Communications Unit Rapier (CUR)

(3) 453842 (six metre)

Connects TDED Radio socket SKD to the CNR.

(4) 453844 (two metre)

Connects RIB PLG (power supply input) to any of:

(a) CUR (heated-glove socket)

(b) Branch-cable 453847 (see sub-paragraph 7).

(c) Cable 453846 (vehicle-battery: see sub-paragraph 6).

(d) Cable 453856 (TDED Standby Pack: see sub-paragraph 9).

(5) 453845 (six metre)

As cable 453844 (sub-paragraph 4).

(6) 453846 (one metre)

Mates with either cable 453844 (see sub-paragraph 4) or cable 453845 (see sub-paragraph 5) to enable connection between RIB PLG and the vehicle battery.

(7) 453847

"Y" Branch cable: mates with cable 453844 (see sub-paragraph 4) and CUR heated-glove socket.

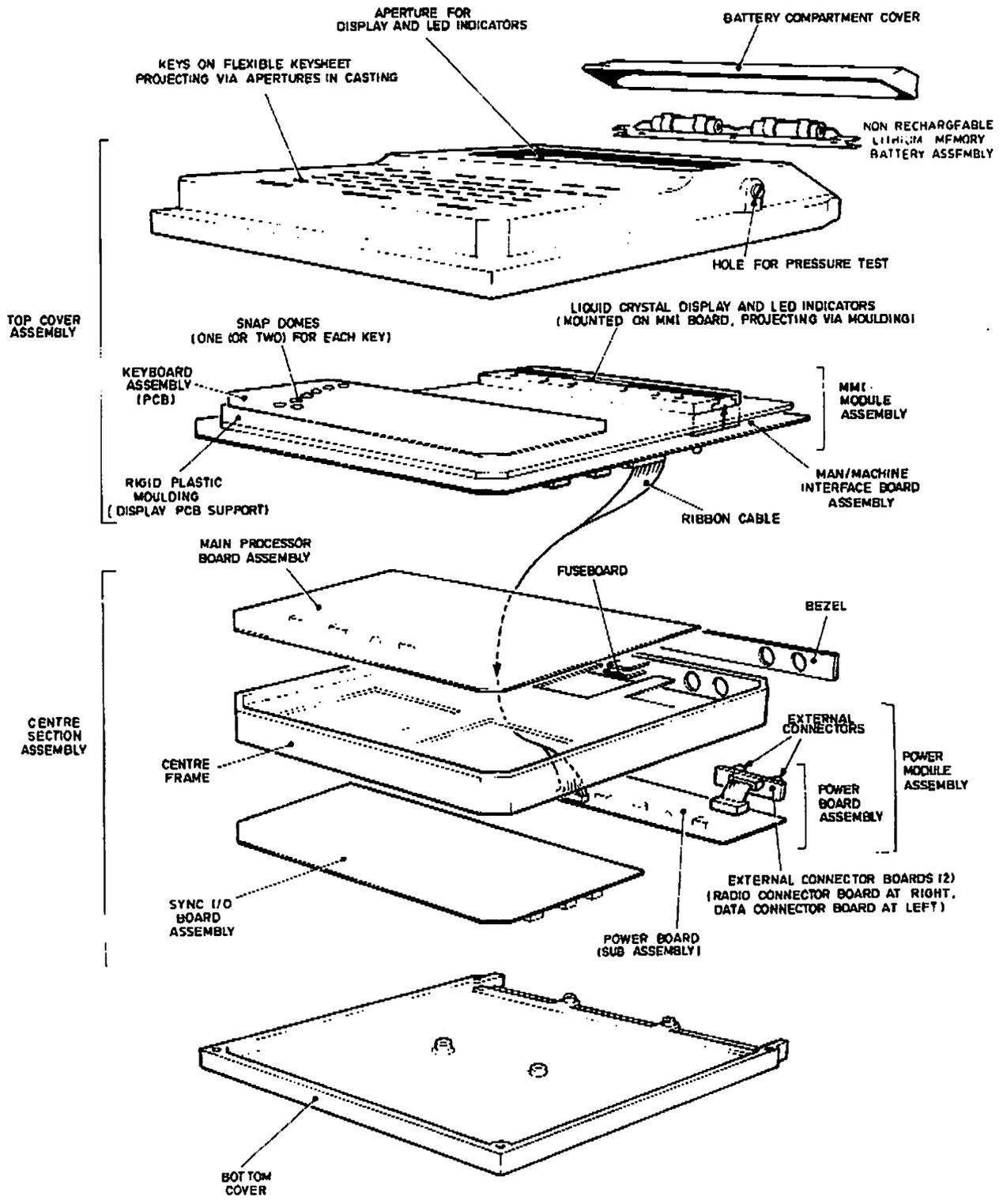
NOTE: The second branch provides connection to the heated gloves.

(8) 453848 (0.4 metre)

Connects RIB SKL to TDED Remote Port socket SKA.

(9) 453856 (one metre)

Mates with either cable 453844 (see sub-paragraph 4) or cable 453845 (see sub-paragraph 5) to connect the TDED Standby Pack to RIB PLG.



RESTRICTED

CHAPTER 1

=====

TECHNICAL SPECIFICATION

=====

CONTENTS

<u>Para.</u>		<u>Page</u>
1.	GENERAL	1-1
2.	OPERATOR'S INTERFACE	1-1
3.	MESSAGE STORE	1-1
4.	ENCRYPTION	1-1
5.	INTERFACE WITH RADIO	1-2
6.	INTERFACE WITH PRINTER	1-2
7.	REMOTE PORT	1-2
8.	HANDSET	1-2
9.	POWER REQUIREMENTS	1-3
10.	MECHANICAL SPECIFICATION	1-3
11.	ENVIRONMENT	1-3

RESTRICTED

RESTRICTED

CHAPTER 1

=====

TECHNICAL SPECIFICATION

=====

GENERAL

1. (1) Message preparation Off-line, with full editing.
- (2) Transmission High-speed synchronous data, 150 or 600 baud.

OPERATOR'S INTERFACE

2. (1) Message entry QWERTY keyboard.
- (2) Controls Seven mode and control keys.
- (3) Display Single-row, 32-character, dot-matrix liquid crystal display. It displays:
 - (a) Prompts (instructions and warnings to the operator).
 - (b) Messages entered into transmit store.
 - (c) Received messages.
- (4) Status indicators Six LEDs (light-emitting diodes): Enter, Send, Read, Msg Rec'd, Ack, Power.

MESSAGE STORE

3. (1) Transmit store Six messages, each up to a maximum of 475 characters, and to a maximum overall total of 2000 characters.
- (2) Receive store Up to 16 messages, not exceeding a total of 4000 characters.

4. ENCRYPTION

- (1) Number of base keys that can be entered and stored Four: each of 16 alphanumeric characters.
- (2) Number of available base keys 7.9×10^{24}

RESTRICTED

INTERFACE WITH RADIO

5. (1) Transmission rate 150 or 600 baud.
(2) Transmission format To STANAG 4202.
(3) Modulation Wide shift FSK (frequency shift-keying), 1575 Hz, 2425 Hz.
(4) Demodulation Tones detected independently to achieve in-band diversity.
(5) Tone output level 2.0 mV rms into 300 ohms or 0 dBm into 600 ohms. (Internally switchable).
(6) Tone input level -20 dBm to +10 dBm, into 56k ohms.
(7) PTT output Isolated contact closure. (Maximum inrush current 1 amp, maximum continuous current 450 mA, maximum open-contact voltage 100 V).

INTERFACE WITH PRINTER

6. (1) Data output format Asynchronous 5-bit ITA2 code (Baudot) or 7-bit ITA5 (ASCII).
(2) Data output rate Standard speeds, 50 to 9600 baud.
(3) Output levels V28. (Also a 5 V - 0 V open-collector output, max. current 0.5 mA).
(4) Clear to send Ground to request data.

REMOTE PORT

7. (1) Data input/output format Asynchronous 7-bit ASCII.
(2) Data input/output rate Standard speeds, 50 to 9600 baud.
(3) Input/output levels V28
(4) Remote Port Select Ground to select.

HANDSET

8. The radio's handset can be connected to the radio via the MA 4450 (which uses the radio's connector that is normally used by the handset). The MA 4450 is transparent to the handset audio signals (except when the MA 4450 is transmitting, in which case the sidetone signal is attenuated). PTT is an isolated contact-closure.

RESTRICTED

POWER REQUIREMENTS

9. (1) Power consumption 10.0 to 30.0 V DC, 220 mA maximum.
or
(2) Using the MA 4271 20.0 to 30.0 V DC, 280 mA maximum.
Rapier Interface Box

MECHANICAL SPECIFICATION

10. (1) Enclosure Sealed, fully-immersible, RFI-screened, lightweight cast-alloy case.
(2) Dimensions: Height 64 mm.
Width 230 mm.
Depth 230 mm.
(3) Weight 3 kg.

ENVIRONMENT

11. (1) Operating temperature -31°C to $+55^{\circ}\text{C}$
(2) Storage temperature -40°C to $+70^{\circ}\text{C}$.
(3) Height (altitude) Up to 3500 m above sea-level.

RESTRICTED

CHAPTER 1

=====

UNPACKING

=====

CONTENTS

Para.

Page

1. GENERAL

1-1

MA 4450V1
FD 184A

Part 3
Chapter 1
Contents

RESTRICTED

RESTRICTED

CHAPTER 1

=====

UNPACKING

=====

GENERAL

1. The MA 4450V1 is supplied in a polystyrene shock-resistant transit package.
 - (1) Remove the unit from the transit package.
 - (2) Inspect the unit for possible damage caused during shipment.
 - (3) Check that the contents of the transit package are complete as detailed on the packing slip/advice note.

RESTRICTED

CHAPTER 2

=====

INTERFACE

=====

CONTENTS

<u>Para.</u>		<u>Page</u>
1.	GENERAL	2-1

TABLES

Table No.

1.	Functions of Pins in SKA, Remote Port	2-1
2.	Functions of Pins in SKB, Printer Connector	2-2
3.	Functions of Pins in SKC, Handset Connector	2-3
4.	Functions of Pins in SKD, Radio Connector	2-3

ILLUSTRATIONS

Fig. No.

3.2.1	MA 4450 Rear Connector Details	2-2
-------	--------------------------------	-----

RESTRICTED

RESTRICTED

CHAPTER 2
=====

INTERFACE
=====

GENERAL

1. The functions of the 'pins' (socket-contacts) in the four connectors SKA, SKB, SKC, SKD on the rear of the MA 4450V1 are shown in Tables 1, 2, 3, 4.

TABLE 1 - FUNCTIONS OF PINS IN SKA, REMOTE PORT

Pin	Title	Function
A	Data In	V28 level input, asynchronous 7-bit ASCII, standard speeds, 50 to 9600 baud (set from keyboard).
B	V Ext	External supply, 10 to 30 V d.c. For details see Specification (Part 2). Internally connected to SKB pin B.
C	<u>Alarm Control</u>	Signal, output low to activate MA 4271 audible alarm.
D	0 V	Ground.
E		No connection.
F	Data Out	V28 level output, asynchronous 7-bit ASCII, standard speeds up to 9600 baud (set from keyboard).
G	<u>Remote Port Select</u>	Signal, input low (ground) to select remote port operation.

TABLE 2 - FUNCTIONS OF PINS IN SKB, PRINTER CONNECTOR

Pin	Title	Function
A	Data Out	V28 levels, asynchronous 5-bit Baudot or 7-bit ASCII, standard speeds, 50 to 9600 baud (set from keyboard).
B	V Ext	External supply, 10 to 30 V d.c. For details see Specification (Part 2). Internally connected to SKA pin 8.
C	CTS	Clear To Send; signal, input low (ground) when printer ready to receive data.
D	0 V	Ground.
E	5 V Data Out	Data, as for pin A, but at 5 V logic levels (5 V/0 V open-collector), 0.5 mA maximum current (e.g. for MA 4233 Miniature Printer).
F	Keyboard Light	Switched 5 V 20 mA supply for keyboard illumination.
G		No connection.

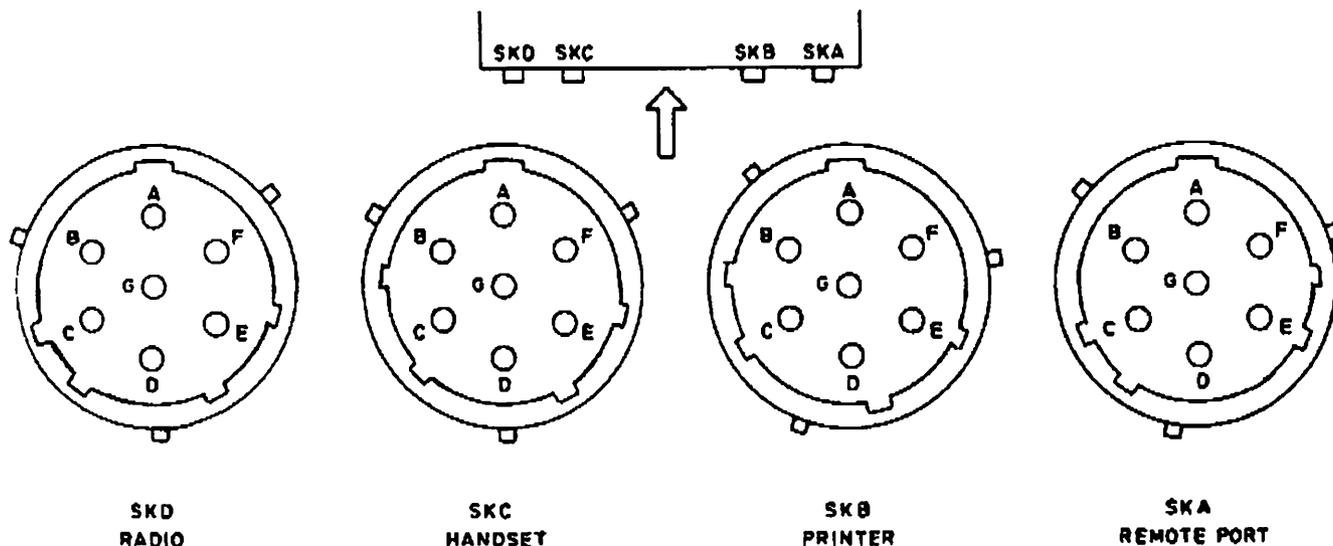


Fig.3.2.1 MA 4450 Rear Connector Details

RESTRICTED

TABLE 3 - FUNCTIONS OF PINS IN SKC, HANDSET CONNECTOR

Pin	Title	Function
A	Mic	Handset microphone input.
B	Mic Gnd	Microphone ground input.
C		No connection.
D	Audio	Handset audio output.
E	Audio Ground	Ground.
F	Pressel	Contact-closure to Audio ground to transmit.
G	System Tones	System tones-output.

TABLE 4 - FUNCTIONS OF PINS IN SKD, RADIO CONNECTOR

Pin	Title	Function
A	Tone Out	150 or 600 baud, FSK; 2.0 mV into 300 ohms, or 0 dBm \pm 2 dBm into 600 ohms. (Internally switched).
B	Tone Gnd	Ground reference for audio signals.
C	0 V	Ground.
D	Tone In	-20 dBm to +10 dBm into 56k ohms.
E	PTT(-)	Contact-closure to pin F to transmit.
F	PTT(+)	Contact-closure to pin E to transmit. Maximum inrush current 1A, maximum continuous current 450 mA, maximum open contact voltage 100 V.
G	System Tones	System tones-input.

RESTRICTED

CHAPTER 1

=====

CONTROLS AND INDICATORS

=====

CONTENTS

<u>Para.</u>		<u>Page</u>
1.	GENERAL	1-1
2.	AUDIBLE ALARM	1-3

TABLES

<u>Table No.</u>		
1	Control Functions	1-1
2	Indicator Functions	1-3

ILLUSTRATIONS

<u>Fig No.</u>		
4.1.1	MA 4450V1 : Controls and Indicators	Back of Contents Page

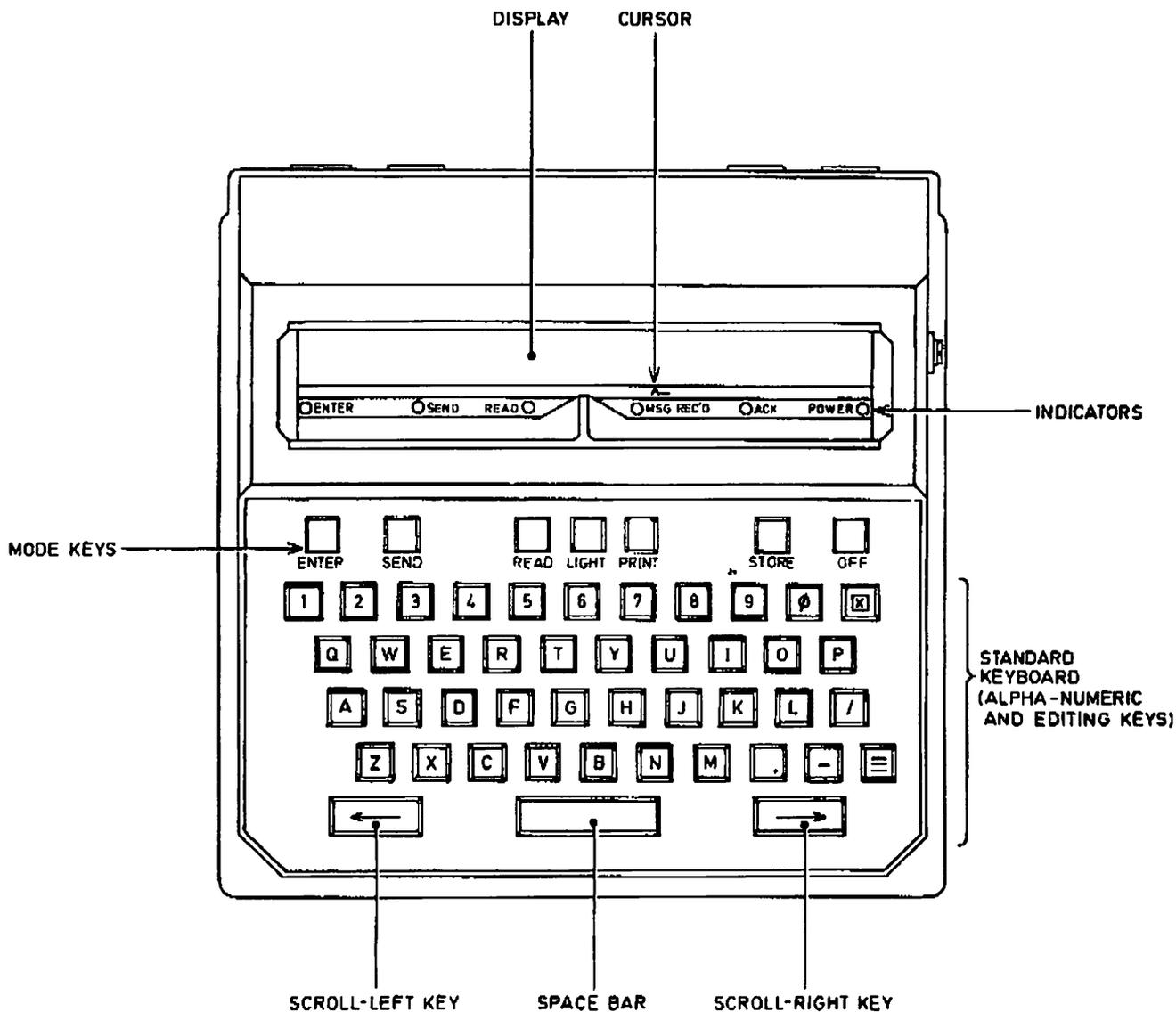


Fig. 4.1.1

MA4450 : Controls and Indicators



RESTRICTED

CHAPTER 1

=====

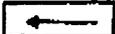
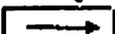
CONTROLS AND INDICATORS

=====

GENERAL

1. The MA 4450V1 is controlled by a 51-key keyboard with an associated 32-character display. Six LED indicators provide status information. The functions of the controls and indicators are listed in Tables 1 and 2.

TABLE 1 - CONTROL FUNCTIONS

Control/key	Function
39 alpha-numeric and punctuation keys	Used to enter messages and instructions, and select formats and addresses.
(delete) 	Causes the character appearing over the cursor line to be deleted (when unit is in applicable mode). When pressed while STORE is held pressed, deletes the displayed message from the memory. (See STORE).
(new-line) 	Used as a new-line key when a message is being entered (activates instructions as called-for by prompts on the display). Used to release the message when sending.
Space bar 	Inserts a space into the part of the message indicated by the cursor point.
(left)  scroll keys (right) 	Permit a displayed message to be scrolled left or right across the display. Each time a key is pressed, the message is stepped by one character position. When a key is held down the message is block-scrolled 12 characters per second. (Also, see STORE key).
 ENTER	Selects the Enter mode. Allows access to the transmit memory (for message entry), or allows the unit to be set-up. Also, switches-on the MA 4450V1 when power is present.

RESTRICTED

Control/key	Function
<input type="checkbox"/> SEND	Selects the Send mode. Also, switches-on the MA 4450 when power is present.
<input type="checkbox"/> READ	Allows access to the receive memory. Each time the key is pressed, a different received message is displayed. First, in order of reception: when all received messages have been read, they are displayed in reverse order. Also, switches-on the MA 4450V1 when power is present.
<input type="checkbox"/> STORE	Pressed and held pressed while <input checked="" type="checkbox"/> is pressed to delete a displayed message from the memory. Also, pressed and held pressed while → or ← is pressed to display beginning or end (respectively) of currently-displayed message.
<input type="checkbox"/> OFF	Switches off the MA 4450V1.
<input type="checkbox"/> LIGHT	Pressed to switch-on the display backlight and optional keyboard illumination. When pressed again, switches-off the light. The light is used under poor ambient light conditions. The status LEDs are dimmed at the same time to prevent dazzling.
<input type="checkbox"/> PRINT	Causes print-out of currently-displayed message (if a printer is connected).
32-character display	Allows inspection of the messages in the memories, and displays prompts and status information.

RESTRICTED

TABLE 2 - INDICATOR FUNCTIONS

Indicator	Function
ENTER (LED)	Unit in Enter mode. The operator has access to the transmit memory, or can set-up the unit.
SEND (LED)	Unit in Send mode.
READ (LED)	Unit in Read mode. The operator has access to the receive memory. Flashes when displayed message contains errors.
MSG REC'D (LED)	Flashes to indicate that a received message has been entered into the receive memory.
ACK (LED)	Acknowledgement message has been received.
POWER (LED)	Unit switched-on.
^ (cursor) (marked on Front LCD Clamp)	Indicates the place in the message where correction can be made during editing. (Has no relevance during option-selection procedure).

AUDIBLE ALARM

2. The Rapier Interface Box MA 4271 (see Appendix) includes an audible alarm, 3,500 Hz. When connected to the MA 4450V1, the facility can be selected by the operator during the setting-up procedure: see Part 4, Chapter 2. When the facility is selected, the alarm is activated when:

- (1) The Transmit store is full.
A one-second tone after attempted store-entry.
- (2) A message is received.
One-second tone with one-second intervals: maintained until all received messages are read.
- (3) The Receive store is nearly-full, or sixteen messages are held in the Receive store.
Quarter-second tone with quarter-second intervals: maintained until sufficient messages have been deleted from the Receive store.

RESTRICTED

CHAPTER 2

=====

OPERATING INSTRUCTIONS

=====

CONTENTS

<u>Para.</u>		<u>Page</u>
1.	GENERAL	2-1
2.	SWITCHING-ON	2-1
3.	SWITCHING-OFF	2-1
4.	CHARACTER-ENTRY AND DISPLAY	2-2
6.	Character-Deletion	2-2
8.	Character-Insertion	2-2
11.	SELECTING THE OPERATING OPTIONS	2-2
14.	Operating Options	2-3
15.	Option-Selection	2-5
36.	Base-Key Entry	2-10
41.	Base-Key Deletion	2-12
42.	TRANSMIT OPERATION	2-12
46.	Message-Entry	2-13
53.	Message-Deletion	2-14
54.	Prompt Modes	2-14
58.	Message-Transmission	2-15
65.	Automatic Acknowledgement	2-17
66.	Received-Message Re-transmission	2-17
67.	Re-transmit	2-17
68.	Manual Acknowledgement	2-17
69.	RECEIVE OPERATION	2-17
77.	Reading Received Messages	2-19
80.	Message-Deletion	2-20
82.	Manual Acknowledgement	2-20

RESTRICTED

CONTENTS (continued)

<u>Para.</u>		<u>Page</u>
83.	Automatic Acknowledgement	2-20
84.	DISPLAY AND KEYBOARD ILLUMINATION	2-20
86.	PRINTER	2-21
89.	FAULT MESSAGES	2-21
90.	RAPIER INTERFACE BOX	2-22
91.	REMOTE CONTROL	2-22

RESTRICTED

CHARACTER-ENTRY AND DISPLAY

4. The unit has a 32-character liquid crystal display: see Fig. 4.1.1. As the operator presses the keyboard character-keys one at a time, each appears in turn just to the left of the cursor. With each character-entry, the characters already displayed move one space to the left. Twenty characters (or spaces) can be displayed to the left of the cursor: they are always the last twenty characters entered (other than when characters are also displayed to the right of the cursor - see next paragraph).
5. The entire display can be stepped to the left or the right (past the cursor) by the ← and → scroll-keys respectively. When either key is pressed briefly, the entire display moves one space in the relevant direction: when either key is pressed and held pressed, the entire display block-scrolls twelve-spaces at a time, approximately once per second, in the relevant direction.

Character-Deletion

6. To delete a previously-entered character from the display (and the unit's memory):
 - (1) On the display, position the character to be deleted immediately to the right of the cursor-point ^ (over the "flat" portion).
 - (2) Press and release the delete key ☒ .
7. The character is deleted: all characters (and spaces) to the right of it, move one space to the left to close the gap. Each time that ☒ is pressed, the character/space to the right of the cursor-point is deleted.

Character-Insertion

8. To insert a character into the display (and the unit's memory):
 - (1) On the display, position the required insertion-point immediately above the cursor-point ^ .
 - (2) Press the required character-key.
9. The character is inserted: all characters to the left of it move one space to the left to make room for it, as in normal character-entry (see paragraph 4).
10. Whatever is shown on the display remains until further action is taken by the operator, or the unit is switched-off. Note also that when any of the ENTER, SEND or READ keys are pressed to select a particular mode of operation, the relevant LED illuminates.

SELECTING THE OPERATING OPTIONS

11. To set-up the unit to conform with a particular system, the operator selects Store 0, and then enters information into the unit in response to a sequence of prompts shown on the display. To enter base keys and the unit address, the operator selects Store 9: see paragraphs 36 to 39 inclusive.

RESTRICTED

12. Each prompt displays a choice of options (usually two) to the operator. The option shown on the left of the display is the option-setting that is stored within the unit's memory: if this is the required option, the operator presses briefly the new-line key (\equiv) to step-on to the next prompt in the sequence. However, if the option required is that shown on the right of the display, then the operator presses the key (usually \emptyset or 1) identified on the display to the right of the required option. The display changes to show the newly-selected option on the left: the operator then presses the \equiv key to confirm that the required option has been selected, and to step-on to the next prompt in the sequence.
13. The selected operating-options are stored in the unit's memory, where they are maintained whether the unit is switched-on or off. Hence, once entered, option-selection is not again necessary unless a change of usage occurs or the stored options are lost, due to a unit-fault.

Operating Options

14. The operator selects Store \emptyset and enters the required operating options, as detailed:

(1) Unit Address

The unit address is entered by selecting Store 9. When an address has been entered, it is displayed when Store \emptyset is selected. The address comprises two, three or four characters: selected from numbers \emptyset to 9, letters A to Z. Each character can be entered more than once. The unit address cannot be entered until base-key 1 has been entered into the unit (also by selecting Store 9: see paragraph 36). When the address has been entered; if the first address-character is a letter, that character (and ONLY that character) can subsequently be changed to any other letter (when Store \emptyset is selected and the address is displayed). Otherwise, before an entered address can be further changed, base-key 1 must be (re-)entered.

NOTE: The unit ignores all messages not addressed to it ("selective-call" messages), other than a "general address" message, which is accepted by ALL receiving units. See also paragraph 58.

(2) Data Rate

The unit can be set to operate at either of two rates: 150 or 600 baud (bits per second). The unit transmits and receives at the selected rate only.

(3) Automatic Acknowledgement

The unit can be enabled to acknowledge automatically a correctly-received selective-call message (a message that contains an error is NOT acknowledged). The receiving unit sends an acknowledgement message to the transmitting unit, where the ACK LED is then illuminated (to indicate to the sender that his message was received successfully). The automatic acknowledgement facility is disabled when the unit is first powered-up.

RESTRICTED

(4) Receive Message Errors

The unit can be set to either accept or reject messages received with uncorrectable errors. If rejection is selected: messages with errors are not stored and message-reception is not reported. If acceptance is selected: messages are stored, prefixed with an "E"; and characters known to be in error are masked to (replaced by) "+".

(5) Audible Alarm

The unit can be set to enable or disable the audible alarm in the Rapier Interface Box (see Appendix). When enabled, the alarm is activated by a signal from the TDED when:

(a) Transmit Store Full

More than 475 characters have been entered into any one of the unit's 6 Transmit stores; or an overall total of 2,000 characters have been entered into the unit's Transmit stores.

(b) A Message Is Received

(c) Receive Store Is Full or Nearly Full

Less than a total of 500 character-spaces remain available in the unit's Receive store.

(d) Sixteen Messages In Receive Store

Sixteen received messages are stored (regardless of character-spaces remaining).

(6) Network

Parameters for message-transmission can be set as detailed:

(a) Permitted Message-Lengths, in Blocks

Messages are transmitted in selected numbers of blocks: one block = 16 characters/spaces. The minimum message-length (2 blocks) and the maximum message-length (32 blocks) are fixed. The unit can be set to transmit up to five additional message-lengths within these limits (between 3 and 31 blocks). When a message is transmitted, it is padded with extra characters until its length reaches the next-highest selected message-length (number of blocks).

(b) Keytime Delay

Transmissions after radio PTT can be delayed by a pre-set interval of between zero and approximately 3.3 seconds in 32 steps (each approximately 100 mseconds).

RESTRICTED

(c) Automatic Digital Rebroadcast

The unit can be set to operate with a remote rebroadcast facility. When set (enabled), all transmissions are preceded by an additional (inverted) preamble.

(7) Printer

Select the format of data-output to a connected printer, as detailed:

(a) ASCII or Baudot

(b) Baud-rate: select one of eleven available rates, from 50 to 9600.

(c) Parity: select odd, even or none.

(d) Number of stop-bits.

(8) Remote Port

Select the format of data exchanged via the Remote Port (SKA), as detailed:

(a) Baud-rate: select one of eleven available rates, from 50 to 9600.

(b) Parity: select odd, even or none.

Option-Selection

15. With the unit switched-on, and the self-test result known to be satisfactory (and regardless of presently-selected mode): press ENTER

The display shows:

SELECT STORE: _ Ø > 6/9, ≡

(1) Press Ø

The display shows:

SELECT STORE: Ø Ø > 6/9, ≡

(2) Press ≡

16. The unit enters the setting-up mode, and the display shows, either:

(1) UNIT ADDRESS = _ A > Z, ≡

(2) UNIT ADDRESS = (address) A > Z, ≡

If the previously-entered address (instance (2)) is correct: press ≡
The unit steps-on to the next option: see paragraph 18.

RESTRICTED

17. (1) If no unit address is displayed (paragraph 16(1)), further options in the sequence cannot be displayed. To enable further option-selection:
- (a) Enter base-key 1, as detailed in paragraphs 36 to 38.
 - (b) Enter address, as detailed in paragraph 39(2).
- (2) If an address has been entered (paragraph 16(2)):
- (a) If the first address-character is a letter, it can be replaced by another letter. To change the letter; press the required replacement-letter: the selected letter then replaces the original letter. Note that if the first address-character is NOT a letter, or the replacement character is NOT a letter; the key-operation is ignored. To step-on to the next option (paragraph 18): press ≡
 - (b) If the displayed address requires more than a first-letter change (sub-paragraph (a)):
 - (i) Enter base-key 1.
 - (ii) Enter required address.

18. The display shows, either:

TX SPEED = 150 ≡ OR 600 = 0
or
TX SPEED = 600 ≡ OR 150 = 1

- (1) If the required option is shown on the left: press ≡
- (2) If the required option is shown on the right, press:
 - (a) 1 or 0, as required.
 - (b) ≡

19. The display shows, either:

AUTO ACK ≡ OR NO AUTO ACK = 1
or
NO AUTO ACK ≡ OR AUTO ACK = 0

- (1) If the required option is shown on the left: press ≡
- (2) If the required option is shown on the right, press:
 - (a) 1 or 0, as required.
 - (b) ≡

RESTRICTED

20. The display shows, either:

ERROR ACCEPT ≡ OR REJECT = 1
or
ERROR REJECT ≡ OR ACCEPT = 0

- (1) If the required option is shown on the left: press ≡
- (2) If the required option is shown on the right, press:
 - (a) 1 or 0, as required.
 - (b) ≡

21. The display shows, either:

ALARM ENABLED ≡ OR DISABLED = 1
or
ALARM DISABLED ≡ OR ENABLED = 0

- (1) If the required option is shown on the left: press ≡
- (2) If the required option is shown on the right, press:
 - (a) 1 or 0, as required.
 - (b) ≡

22. The display shows:

NETWORK SET-UP? YES = 1

- (1) If the unit transmit parameters are already set-up: press ≡ (the sequence then jumps to the Printer Set-Up option: see paragraph 26).

23. The display shows:

LENGTHS = 2 32 (0 to 5 lengths).

NOTE: Unless pre-set, the unit automatically defaults to select and display the following message-lengths: 4, 8, 12, 16, 24.

- (1) If the displayed lengths (number of blocks per message) are correct: press ≡
- (2) If any of the displayed lengths (other than 2, 32) are incorrect; or none of those displayed are required:
 - (a) Press repeatedly. As the key is pressed, the message-lengths are deleted, one number at a time, FROM THE RIGHT-HAND-SIDE of the display.

RESTRICTED

- (b) Enter any required lengths (up to a maximum of five), in any order.

NOTE: Enter a space between each selected length.

- (3) When the display shows the required lengths (or none, as preferred):
press ≡

24. The display shows:

KEYTIME DELAY FACTOR = (factor) 0 > 31, ≡

- (1) If the required option is shown: press ≡
(2) To change the factor:
(a) Press to delete the factor.
(b) Enter the required factor (0 to 31 inclusive).
(c) Press ≡

NOTE: Each factor-digit represents approximately 100 mseconds (e.g. 20 = approximately 2 seconds); the sequence cannot advance until a factor is entered.

25. The display shows, either:

AUTO REBRO ≡ OR NO REBRO = 1
or
NO REBRO ≡ OR AUTO REBRO = ∅

- (1) If the required option is shown on the left, press ≡
(2) If the required option is shown on the right, press:
(a) 1 or ∅, as required.
(b) ≡

26. The display shows:

PRINTER SET-UP? YES = 1

- (1) If the unit is already set-up for printer-operation, or a printer is not to be used: press ≡ (the sequence then jumps to the Remote Port option - see paragraph 31).
(2) If the unit is to be set-up: press 1

RESTRICTED

27. The display shows, either:

ASCII ≡ OR BAUDOT = 0
or
BAUDOT ≡ OR ASCII = 1

- (1) If the required option is shown on the left: press ≡
- (2) If the required option is shown on the right, press:
 - (a) 1 or 0, as required.
 - (b) ≡

28. The display shows:

BAUD RATE = (baud rate) ≡ OR >

(The rate shown is one of eleven available, between 50 and 9600).

- (1) If the required rate is shown: press ≡
- (2) If the required rate is NOT shown: press →
 - (a) Press repeatedly until the required rate is shown (the unit continuously sequences through the eleven rates as → is pressed).
 - (b) ≡

29. The display shows one of:

EVEN PARITY ≡ OR NONE = 0, ODD = 1
or
ODD PARITY ≡ OR NONE = 0, EVEN = 2
or
NO PARITY ≡ OR ODD = 1, EVEN = 2

- (1) If the required option is shown on the left: press ≡
- (2) If the required option is one of the two shown on the right, press:
 - (a) 0 or 1 or 2, as required.
 - (b) ≡

30. The display shows, either:

1 STOP BIT ≡ OR 1.5/2 BITS = 0
or
1.5/2 STOP BITS ≡ OR 1 BIT = 1

RESTRICTED

- (1) If the required option is shown on the left: press ≡
- (2) If the required option is shown on the right, press:
 - (a) 1 or Ø, as required.
 - (b) ≡

31. The display shows:

REMOTE PORT SET-UP? YES = 1

- (1) If the unit is already set-up for Remote Port operation, or the Remote Port (SKA) is not to be used: press ≡ (the sequence then jumps to the unit identification prompt - see paragraph 34).
- (2) If the unit is to be set-up: press 1

32. The display shows:

BAUD RATE = (baud rate) ≡ OR >

- (1) If the required rate is shown: press ≡
- (2) If the required rate is NOT shown, press → repeatedly until it is (as detailed in paragraph 28(2)); then: press ≡

33. The display shows the parity options detailed in paragraph 29: select in the same way, then; press ≡

34. The display shows unit and unit-software identification. For instance:

MA445Ø SOFTWARE ISSUE 1 (460145)

35. Press ≡

The unit returns to the beginning of the setting-up mode, as detailed in paragraph 16. Note that it is not possible to select an option/prompt out of sequence. To exit from the setting-up mode, press one of the following, as required:

- (1) ENTER
- (2) SEND
- (3) READ
- (4) OFF

Base-Key Entry

36. Up to four base keys (identified 1 to 4) can be entered into the unit. Each base key comprises sixteen characters, which can be any of Ø to 9 and A to Z. Each character can be used more than once in any key. To enter a base key into the unit: press ENTER.

RESTRICTED

The display shows:

SELECT STORE: _ 0 > 6/9, ≡

(1) Press 9

The display shows:

SELECT STORE: 9 0 > 6/9, ≡

(2) Press ≡

37. The unit enters base-key entry mode and the display shows:

SELECT KEY NUMBER: _ 1 > 4, ≡

(1) Select the identification-number (1 to 4) of the base key to be entered.

(2) Press ≡

38. The display shows:

ENTER BASE KEY (ident-number): _ Ø > 9/A > Z, ≡

(1) Enter sixteen (base-key), characters into the unit. Characters can be deleted (by) from the end of the base key. Also, the base key can be scrolled during entry. However, when the cursor is not at the end of the base key (the base key is in a scrolled-position): when a character is entered, it overwrites the character above the cursor, and the delete key is non-effective.

(2) Press ≡

NOTE: The sequence cannot advance until sixteen valid characters have been entered.

39. The display shows, either:

(1) When base-key 2, 3 or 4 entered:

BASE KEY PROCESSED (CHECK = (base-key check sum))

The base-key check sum is four (hexadecimal) characters (Ø to 9, A to F) that provides a confirmation of correct key-entry.

(2) When base-key 1 entered:

KEY ENTERED (base-key check sum), ≡ FOR ADDRESS

(a) To display the unit address, press ≡

The display shows, either:

UNIT ADDRESS: _ 0 > 9/A > Z, ≡

or

UNIT ADDRESS: (address) 0 > 9/A > Z, ≡

- (b) To alter a previously-entered address: press . This deletes the last character of the displayed address (it does not have to be positioned above the cursor). Each time that is pressed, the last-displayed address-character is deleted. Thus, the entire address can be deleted, and a new address then entered.
- (c) To enter the unit address, press briefly the required alpha/numeric keys in sequence. The display shows the address as it is entered: it can be edited as detailed in sub-paragraph (b). When the correct address is displayed: press to enter it into the unit store. The display shows:

UNIT ADDRESS ENTERED

- (d) To exit the address-entry mode, press one of the ENTER, SEND, READ, or OFF keys, as required.
40. (1) To enter another base key, repeat the procedure from paragraph 36.
- (2) To exit the base-key entry mode, press one of the ENTER, SEND, READ, or OFF keys, as required.

Base-Key Deletion

41. To delete and overwrite all base-key and message stores:

- (1) Select base-key entry mode (paragraph 36).
- (2) Simultaneously, press:
- (a) STORE
- (b)

The display shows:

BASE KEYS AND PLAINTEXT DELETED.

TRANSMIT OPERATION

42. Up to a maximum of six separate messages can be entered into the unit's Transmit store for subsequent transmission, provided that the sum of the entered characters does not exceed 2,000. After 2,000 characters have been entered into the Transmit store, or 475 characters have been entered into any one Transmit store; at the next attempted character-entry:

- (1) Character-entry is disabled.
- (2) The display shows:
- TRANSMIT STORE FULL
- (3) The RIB audible alarm (if enabled - see paragraphs 14(5) and 21) is activated for one second.

RESTRICTED

43. Each message entered is prefixed by an operator-selected Transmit store identification-number (T1 to T6). Any stored message can be transmitted at any time, other than when a message is actually being received. The operator can transmit each message to up to a maximum of four different addresses simultaneously. Transmitted messages are not lost: they remain in the Transmit store until deleted by the operator (see paragraph 53).
44. The operator can send a manual acknowledgement of a received message in the Receive Store.

NOTE: Acknowledgement messages are not themselves acknowledged: nor are they entered into the Receive store (normal Receive operation - see paragraph 71).

45. Received messages in the unit's Receive store can also be transmitted.

Message-Entry

46. To enter a message into the unit's Transmit store; with the unit switched-on (and the self-test result satisfactory): press ENTER

The display shows:

SELECT STORE: _ 0 > 6, ≡

- (1) Press a number from 1 to 6 inclusive (Transmit store identification-number) - for instance 2. The display shows:

SELECT STORE: 2 0 > 6, ≡

- (2) Press ≡

- (3) The display shows one of:

SELECT MODE TEXT = 0, PROMPTS = 1 > 4

or
T2 (followed by message-data already in Transmit store number 2)

or
(Prompt Title),

NOTE: For Prompt-data entry, see paragraph 54.

47. To add message-data to data already stored in T2, proceed as detailed in paragraph 49.

48. To enter text (paragraph 46(3)): press 0

The display shows, either:

ENTER MESSAGE INTO TX STORE 2

or (see paragraph 42)

TRANSMIT STORE FULL

RESTRICTED

49. The message is entered and edited from the keyboard, one character at a time, as detailed in paragraphs 4 to 10 inclusive. However, the Transmit store identification-number (T2 in this instance) CANNOT be deleted.

50. To show the START of the stored message, simultaneously press:

(1) STORE

(2) →

The first twelve characters of the stored message are shown on the display, starting from the right of the cursor.

51. To show the END of the stored message, simultaneously press:

(1) STORE

(2) ←

The last twenty characters of the stored message are shown on the display, ending to the left of the cursor.

52. Any stored message can be displayed at any time by pressing, in sequence:

(1) ENTER

(2) Store identification-number (1 to 6)

(3) ≡

Message-Deletion

53. To delete a message from the Transmit store:

(1) Select the store (1 to 6) and display any part of the message.

(2) Simultaneously, press:

(a) STORE

(b) ☒

(3) The display shows:

TRANSMIT STORE (identification-number (1 to 6)) DELETED

Prompt Modes

54. See paragraph 46(3). There are four Prompt Modes (1 to 4), each of which requires data to be entered into the TDED. In each Prompt Mode, a series of prompts are displayed on the TDED one at a time: as each prompt is displayed, the operator enters the required data and the TDED then displays the next prompt in the sequence.

RESTRICTED

55. Each Prompt Mode data-entry is entered into a separate Transmit store (T1 to T6), selected by the operator, and can be transmitted at any time. At the start of each Prompt Mode sequence, the display shows the title-prompt for the selected message-type. Data cannot be entered into this title-prompt. To display the first data-entry prompt of the selected sequence: press ≡
56. The display shows the data-entry prompts in sequence. Data entered into the prompts can be edited with the delete (☒) key, which (when pressed) deletes the last-displayed character. Each prompt has a maximum number of characters that can be entered into it: when these have been entered, further attempts at character-entry are ignored. Non-valid characters (data unacceptable to this prompt) are also ignored. When the data has been entered into the prompt: press ≡ . The display shows the next prompt in the sequence. Note that if sufficient valid data has not been entered into the prompt, the ≡ is ignored and the prompt sequence cannot advance.
57. When data has been entered into the last prompt in the sequence and ≡ is pressed; the display shows the title-prompt of the sequence (again). As ≡ is pressed, the display shows the data-prompts again, in sequence, with the data entered into each. The data can be edited.

Message-Transmission

58. To send a message, select and display any part of the message to be transmitted (the entire contents of the store, but not the store identification-number (T1 to T6), will be transmitted): press SEND
- (1) The display shows:
- SELECT ADDRESSES: _ Ø > 9/A > Z/-, ≡
- (2) Enter up to a maximum of four addresses of the units intended to receive the message, each address of 2, 3 or 4 characters (or a single hyphen), selected from Ø to 9, A to Z and hyphen (-). The hyphen is a "wild-card" character, and represents each of characters Ø to 9 and A to Z. Thus, a single hyphen used alone, simultaneously addresses every unit in the network. When the hyphen is used with other characters, a group of units can be simultaneously addressed (e.g, --- A addresses all units whose addresses end with A). Note that the hyphen CANNOT be used as a part of the unit's own address (see paragraphs 14 and 16). As each character is entered, it is shown on the display. After each address is entered (except the last): press the space key.
- NOTE: The unit cannot transmit unless at least one address has been entered.
- (3) After ALL the addresses have been entered: press ≡
- (4) The display shows:
- SELECT KEY NUMBER: _ 1 > 4, ≡

RESTRICTED

59. (1) Enter the identification number (1 to 4 only) of the base key to be used to encrypt the transmit message.
- (2) Press ≡
60. The message is processed (encrypted and error-protected) and transmitted; the display shows, in sequence:
- (1) MESSAGE BEING PROCESSED
- (2) MESSAGE BEING TRANSMITTED
- (3) MESSAGE TRANSMITTED
61. If the unit is receiving a message when ≡ is pressed (paragraph 59(2)), the display shows:
- MESSAGE BEING RX'D, ABORT RX = 1
- (1) If the transmit message has priority; press 1 to abort (ignore) the receive message. Transmit-message processing starts (paragraph 60) and the receive message is lost.
- (2) If the receive message is NOT aborted; it is either rejected (not addressed to this unit) or stored in the Receive Store (MSG REC'D LED flashes: see paragraph 72). The display then shows:
- CHANNEL NOW FREE, PRESS ≡ TO TX
- (a) Press ≡
- (b) Transmit-message processing starts (paragraph 60).
62. When the unit has started to transmit a message (paragraph 60(2)), the operator can use the keyboard for another operation. If the operator attempts to transmit a further message before the present transmission is completed; when the new message has been processed, the display shows:
- NET BUSY - STILL TRANSMITTING
63. When the present transmission is completed, the display shows:
- CHANNEL NOW FREE, PRESS ≡ TO TX
- (1) Press ≡
- (2) Message-transmission starts (paragraph 60).
64. If SEND is pressed (see paragraph 58) when no message-data is displayed:
- (1) Transmit operation is disabled.

RESTRICTED

- (2) The display shows:

NO MESSAGE DATA DISPLAYED

NOTE: The SEND LED is illuminated.

Automatic Acknowledgement

65. When an error-free message is received that is addressed to only one unit, and the option is enabled at the addressed unit; an automatic acknowledgement is returned. When the acknowledgement is received, the receiving unit ACK LED illuminates: it remains illuminated until the operator presses one of ENTER, SEND, READ or OFF keys.

Received-Message Re-transmission

66. To transmit a message stored in the Receive store (R1 to R16), select and display any part of the message, as detailed in paragraph 77 (the entire message will be transmitted): press SEND

- (1) The display shows:

SELECT - ACK = Ø, RETRANSMIT = 1

- (2) Press 1 or Ø, as required.

Re-transmit

67. When 1 is pressed (paragraph 66), the display shows:

SELECT ADDRESSES: _ Ø > 9,A > Z/-, ≡

Enter the required addresses: action is as detailed in paragraphs 58(2) to 63. The identification-number (R1 to R16) of the stored message is not transmitted: however, the address of the original sending-unit and the Error-indicator (if relevant - see paragraph 71) are transmitted, as is the present sending unit's address.

Manual Acknowledgement

68. When Ø is pressed (paragraph 66), an acknowledgement is sent automatically to the unit (and only that unit) from which the stored message was received. The acknowledgement includes the sender's address (this unit) and the first few characters of the acknowledged message. The acknowledgement is enciphered with the base key used to decipher the received message. The procedure is as detailed in paragraphs 60 to 63.

RECEIVE OPERATION

69. When it is switched-on, the TDED can receive messages addressed to it (see paragraph 14(1)) at any time (and store up to a maximum of sixteen - see paragraph 73), except when the unit is transmitting. Message-reception and storage is automatic and does not require action by the operator.

RESTRICTED

70. During message-reception; reading and editing functions can be carried-out as normal. However, transmission is inhibited: if the operator attempts to transmit while the unit is receiving a message (see paragraph 61), the display shows:

MESSAGE BEING RX'D, ABORT RX = 1

71. When a message is received, it is prefixed by the next-lowest identification-number available (R1 to R16, but not necessarily consecutive), and the address of the sending unit, and is then entered into the Receive store. If the unit detects uncorrectable errors in a received message, it prefixes the sending-unit address with an E, as a warning to the operator when the message is shown on the display or printed-out.

72. When a complete message has been received, processed and stored:

- (1) The MSG REC'D LED flashes continuously.
- (2) If enabled (see paragraphs 14(5) and 21) the RIB audible alarm is activated: one-second tone with one-second intervals.

The LED continues to flash (and the alarm to sound) until the message is read.

73. The unit stores up to a maximum of sixteen messages, after which:

- (1) Message-reception is disabled.
- (2) If enabled, the RIB audible alarm is activated: quarter-second tone with quarter-second intervals.
- (3) The display shows:

RX STORE FULL - 16 MESSAGES

A further message is not accepted until at least one message is deleted from the Receive store (see paragraph 80) to cancel the alarm state.

74. Similarly, and regardless of the NUMBER of messages received and stored; when more than 3,525 characters have been received/stored, and hence less than 475 character-spaces are still available in the Receive store:

- (1) The display shows:

MESSAGE RX'D - NEAR FULL (character-spaces left)

- (2) If enabled, the RIB audible alarm is activated: quarter-second tone with quarter-second intervals.

RESTRICTED

75. The unit continues to accept messages; with each further message received, the character-spaces-left number is decremented. The alarm state is not cancelled until sufficient messages have been deleted from the Receive store to allow reception of a maximum-length-message. If there is insufficient space in the Receive store to store a complete received message, the entire message is "lost". ie, The TOED does not store part-messages.
76. Received messages are not lost when read-out by the operator: they remain in the Receive store until deleted (see paragraph 80).

Reading Received Messages

77. To read-out a received message from the Receive store onto the display (flashing MSG REC'D LED indicates UNREAD message(s)): press READ
- (1) If there is more than one unread message in the Receive store (R1 to R16), the "oldest-unread" message is the first to be shown on the display. The next time that READ is pressed, the "next-oldest" unread message is shown. The sequence continues as READ is pressed, until all the unread messages have been shown on the display: the MSG REC'D LED is then extinguished. If READ is then pressed again, the display shows:
- ALL RX'D MESSAGES REVIEWED
- After this, action is as detailed in sub-paragraph (2).
- (2) If there are NO unread messages in the Receive store (MSG REC'D LED not flashing), the latest-received message is the first to be shown on the display. The next time that READ is pressed, the immediately - prior message is shown. The sequence continues as READ is pressed, until all the messages in the Receive store have been shown. If READ is then pressed again, the display shows:
- NO MORE MESSAGES IN RX STORE
- If READ is then pressed again, the sequence recommences with the latest-received message.
- (3) If there are NO messages in the Receive store, the display shows:
- NO MESSAGES IN RX STORE
78. Messages shown on the display can be stepped forwards or backwards one character at a time by pressing briefly the ← or → keys, respectively. If either key is pressed and held pressed, the message is block-scrolled forwards or backwards, twelve characters at a time. To show the beginning or the end of a message on the display, simultaneously press:
- (1) STORE
- (2) → or ← , as required.

RESTRICTED

79. When received messages are being displayed, the READ LED normally is illuminated steadily. However, if the displayed message includes uncorrectable errors (indicated by an "E" at the start of the message), the READ LED flashes.

Message-Deletion

80. To delete a received message:

(1) Use READ to sequence through the messages in the Receive store until the required message (any part of it) is shown on the display.

(2) Simultaneously, press:

(a) STORE

(b)

81. Following the action detailed in paragraph 80(2), the next-received message is shown on the display. If there is no next-received message in the Receive store (ie. the deleted message was the latest-received), the previously-received message to that deleted is shown on the display. If there is also no previously-received message (ie. the deleted message was the only one in the Receive store), the display shows:

ALL RECEIVE STORES DELETED

NOTE: Message-deletion is the reason that received messages are not necessarily numbered consecutively: see paragraph 71.

Manual Acknowledgement

82. When a manual acknowledgement (see paragraph 68) is received:

(1) The ACK LED is illuminated.

(2) The display shows:

ACK RX'D FROM (sending-unit address) - (the first eight to ten characters of acknowledged message)

NOTE: The acknowledgement is not stored in the Receive store.

Automatic Acknowledgement

83. When an automatic acknowledgement (see paragraphs 14(3) and 19) is received, action is as detailed in paragraph 82(1). See also paragraph 65.

DISPLAY AND KEYBOARD ILLUMINATION

84. To improve display-readability under poor ambient light conditions: press briefly LIGHT

(1) The backlight behind the display illuminates.

RESTRICTED

(2) The LEDs are dimmed (to prevent dazzle).

(3) If connected, the LEDs in the unit-lid are illuminated:

NOTE: If a printer is connected to the unit, the lid LEDs are inoperable.

85. To restore the original display-illumination: press briefly **LIGHT**
PRINTER

86. When a printer is connected; to obtain a print-out of a message from a Receive or Transmit store:

(1) Show any part of the message on the display: see paragraphs 52 and 77.

(2) Press: **PRINT**

87. While the data is being printed-out:

(1) The keyboard is disabled.

(2) The unit can still receive messages.

(3) The display shows:

MESSAGE BEING PRINTED

88. When the print-out is completed:

(1) The keyboard is enabled.

(2) The display shows:

PRINT COMPLETE

FAULT MESSAGES

89. See paragraph 2. Fault messages indicate faults in specific areas or functions, detected during the unit self-test. Faults are to be rectified and a satisfactory unit self-test carried-out before the unit is used operationally. The most-likely fault-location is indicated by the twenty five fault-numbers, as detailed:

(1) Fault-numbers 1, 10 to 17 inclusive, 24, 25: indicate a fault on the Main Processor Board.

(2) Fault-numbers 2 to 9 inclusive, 21, 22, 23: indicate a fault on the Sync I/O Board.

(3) Fault-numbers 18, 19, 20: indicate a fault on the Man/Machine Interface Module.

RESTRICTED

RAPIER INTERFACE BOX

90. The only operator's control on the RIB is the HIGH/LOW volume-switch: set to the operator's personal requirement. When enabled (see paragraphs 14(5) and 21), the RIB audible alarm (3500Hz) is activated by any of four circumstances, as detailed:
- (1) Transmit Store Full
See paragraph 42. A single, one-second tone.
 - (2) Message Received
See paragraph 72. One-second tone with one-second intervals.
 - (3) Receive Store Nearly-Full
See paragraph 74. Quarter-second tone with quarter-second intervals.
 - (4) Sixteen Messages In Receive Store
See paragraph 73. Quarter-second tone with quarter-second intervals.

REMOTE CONTROL

91. When Remote Port Select is input low to Remote Port SKA pin G, the TDED enters the remote-control mode.
- (1) The TDED display is blanked.
 - (2) All LEDs (except POWER) are switched-off.
 - (3) The TDED keyboard is disabled.
 - (4) Operation of the TDED is as detailed in MA 4450 REMOTE OPERATING INSTRUCTIONS.
92. When the TDED is powered-up with the remote-control cable connected; the LEDs flash and the display shows 32 dots (as detailed in paragraph 2) as the self-test is carried-out. The display is then cleared and the remote device controls the TDED until it is disconnected. The remote device can read-out the result of the TDED self-test: see REMOTE OPERATING INSTRUCTIONS.

RESTRICTED

RAPIER INTERFACE BOX MA 4271

=====

CONTENTS

<u>Para.</u>		<u>Page</u>
1.	INTRODUCTION	1
3.	INTERCONNECTIONS	1
5.	AUDIBLE-ALARM VOLUME CONTROL	1
7.	CONSTRUCTION	1

RESTRICTED

RAPIER INTERFACE BOX MA 4271
=====

INTRODUCTION

1. The Rapier Interface Box (RIB) allows the MA 4450V1 Tactical Data-Entry Device (TDED) to be powered from a DC supply of either polarity, and contains an audible alarm (buzzer) which is controlled by the TDED. The RIB is automatic in operation and has only one operating control.
2. Two 7-way sockets enable the RIB to be connected between the remote data-terminal/computer/VDU etc, and the TDED Remote Port: data between the two is passed directly through. The DC supply to the RIB is applied via a 4-pin plug.

INTERCONNECTIONS

3. The DC supply to the RIB is input via the DC SUPPLY connector pins A (positive or negative) and B (0V).
4. The remote data-terminal/computer etc is connected to the BCPP connector, and the MA4450V1 remote port is connected to the TDED connector (see Part 3, Chapter 2, Table 1).

AUDIBLE-ALARM VOLUME CONTROL

5. The volume of the audible alarm is set by a two-position VOLUME switch to either a HIGH or a LOW level.
6. The low-level setting of the audible alarm can be adjusted by preset control R12, within the RIB. It is set to mid-volume during manufacture.

CONSTRUCTION

7. The components of the RIB are mounted on two printed circuit boards (pcb's) housed within a small, rectangular die-cast aluminium box: the removeable box-lid is secured by four pozi-drive screws.
8. Most of the components are mounted on a pcb secured in the bottom of the box: the two sockets are mounted directly on a second pcb, secured to a side of the box: the plug is mounted directly to an end of the box: the HIGH/LOW volume switch is secured to the end of the box alongside the plug.