TRW

TRW Electronic Products, Inc.

OPERATOR'S MANUAL
KL-43C

CHAPTER 1. INTRODUCTION

General Description

The KL-43C is an off-line text encryption terminal specifically designed to send and receive classified messages over unprotected telephone lines and radio links under rugged field conditions.

The KL-43C fits conveniently in the palm of the hand, yet provides word processing features usually found in much larger computers, such as word-wrap, text insertion, and string search, while the keyboard accommodates a standard "QWERTY" layout including fifteen specially added keys that require no shifted functions. Information is viewed on a 2-line-by-40-character Liquid Crystal Display (LCD), which may be adjusted to various lighting conditions for contrast and readability.

Because the KL-43C is primarily a communications device, it uses a Dual Message Buffer that allows for the receipt of a transmitted message without the loss of a message in process. In essence, the KL-43C contains two information organizers rather than one, with each maintaining a 2600 character capacity for the storage, entry, and manipulation of plain and cipher text. Simplified use of such features as the Dual Message Buffer is made possible by the KL-43C's menu-driven software and on-screen prompts.

The KL-43C ensures the secure communication of messages by converting them from plain to cipher text using advanced cryptographic techniques that result in each message having its own set of encryption variables. Once converted to cipher text, a message may only be decrypted using a key identical to the one with which it was encrypted. The KL-43C's Key Update function allows creation of a new key while in the field without the risk of hard copy key distribution.

The KL-43C adapts to almost any field communications equipment. It is compatible with tactical radios through a standard audio connector, while the built-in modem allows telephone connections through the acoustic coupler mounted inside the case. Direct connects are established via an external adapter. Serial data transmissions utilize RS-232 (MIL-STD-188C) and RS-423 (MIL-STD-188-114) interface from 50 to 19.2K baud.

To provide for operation under rugged field conditions, the KL-43C meets MIL-STD-810C standards for temperature, altitude, immersion, drop, vibration, humidity, rain, salt fog, dust, dirt, and fungus. Automatic self-tests assure that critical features are working properly.

Other general features of the KL-43C include an internal, real-time clock, challenge/reply authentication, and the printing of either plain or cipher text with use of an optional printer.

Security Information

The KL-43C is an unclassified Controlled Cryptographic Item (CCI) and controlled under the provisions of NTISSI 4001. A security clearance is not required for access to an unkeyed KL-43C; however, access should be restricted to individuals whose duties require such access. The unkeyed KL-43C will be afforded reasonable protection against unauthorized access, theft, loss, copy or replication, tampering, or unauthorized modification.

When a key is loaded for secure KL-43C operations, the device assumes the classification of the key (1-16) and will be protected accordingly. (See the safeguards and criteria of NACSI No. 4005.) For access, users require security clearances commensurate with the classification levels of the keyed KL-43C devices and related keying material.

The KL-43C should not be used if signs of tampering or other insecurities are detected, or if the device malfunctions, causing the display to read **MALFUNCTION! DO NOT USE.** (See Appendix B "Warning Messages" for more information.)

The routine and emergency destruction of NACSI No. 4010 apply to the KL-43C and keying material. For routine and emergency destruction, the KL-43C will be treated as classified equipment and material.

The KL-43C must be zeroized prior to transportation, except when operational use requires it to be delivered to the user in a keyed condition.

Traffic Encryption Keys (keys used to pass operational traffic; also known as TEKs) are delivered to the user on paper tape and are entered by pressing the appropriate keys on the keyboard. Cryptoperiod and supersession information is packaged with each key canister.

The KL-43C Key Update Function uses guidelines contained in NTISSI 3001A, the operational doctrine for the Automanual System (AMS).

Power Requirements

The KL-43C operates on 4 size "AA" cells, either rechargeable nickel-cadium (NiCd) or non-rechargeable alkaline. Operating time for nickel cadium cells is 6 hours, while alkaline cells supply power for 24 hours (at 20% transmit usage, 25°C). A 750mAhr lithium cell (non-replaceable) is provided as a back-up for the RAM and Clock should main batteries be removed.

Low Battery Warning

When the KL-43C senses that the internal batteries are running low, it will display a visual warning message and sound an audio alarm. Under such circumstances there are approximately 4 minutes of operating time left before the unit will automatically power-down. It is recommended that a fresh set of 4 size "AA" alkaline batteries be carried with the unit to insure a minimum of down-time should the batteries become discharged.

CHAPTER 2. OPERATING INSTRUCTIONS

Turning on the KL-43C

Turn on the KL-43C by pressing the **(SRCH)/ON** key.

A prompt will then be displayed to confirm powering-up the unit:

```
Confirm-- Turn power on ? (Y/N)
```

Press the **(Y)** key to confirm power on. If the **(Y)** key is not pressed within 15 seconds of the **(SRCH)/ON** key, the unit will automatically power-down. This feature prevents accidental powering-up of the unit, which would discharge the batteries.

The KL-43C will briefly display the TRW copyright message, then display the top two lines of the Key Select Menu:

```
01 - AVAILABLE-00   02 - AVAILABLE-00   ^ or v
03 - AVAILABLE-00   04 - AVAILABLE-00   ID#
```

Note: If the KL-43C does not display the Key Select Menu, it is due to one of the following:

1. *The unit is being powered up for the very first time, in which case the user is prompted to enter 10 numbers followed by 15 letters, after which the Key Select Menu will be displayed. (The display view angle is also set to maximum when the unit is initially powered-up. See "View Angle Adjust" later in this chapter for more information.)*

2. *The Built In Test (BIT) software has detected a malfunction in the unit and notified the user. (See Appendix B for information about warning messages and how to correct them.)*

3. *The KL-43C has displayed the time and date instead of the Key Select Menu, in which case the clock must be reset to the proper settings. (See "Setting the Time and Date" later in this chapter for more information.)*

4. *The contrast of the LCD display is not properly adjusted to the lighting conditions. (See "View Angle Adjust" later in this chapter for more information.)*

The Key Select Menu shows the status of the KL-43C's sixteen key positions, numbered 01 to 16. Four positions are displayed at a time. Use the (^) and (v) keys to scroll through the Key Select Menu and observe the other positions.

Each Key position uses the following format:

01-AVAILABLE-00

Where:

01 is the Key Position identification number (01 through 16 possible).

AVAILABLE is the key name identifier (always "Available"until selected for use by the operator who then supplies a name).

00 is the key update level for that particular key. (See"Updating a Key" later in this chapter for moreinformation.)

Selecting a Key

Once a key is selected, it becomes the active key for use in encryption, decryption, authentication and communication purposes. A key will remain active until it is changed, a new key is entered, or the unit is powered-down.

ZEROIZED FOR EMU

Use the (^) and (v) keys to scroll through the Key Select Menu and locate the desired key position. The KL-43C is shipped from the factory with all its key positions "Available". Select a key position by pressing the appropriate two digit number, for example, 01:

Press **(0)** then **(1)**. JUST "1" IN EMU

The KL-43C will then display the selected key position and request a name for the key:

```
ID# 01
Enter the Key name
```

A key name may be any alphanumeric character string up to ten characters long. Once entered, it replaces the word "Available" on the Key Select Menu and serves as a means of net identification.

Enter a key name by typing the given name and then the **(ENTER)** key.

For example, press **(T) (E) (S) (T) (ENTER)**.

The KL-43C will briefly display the key name...

```
KEY NAME: TEST
```

...then request the first key set from the printed paper tape:

```
Enter Key Set 1
```

Type in the first key set, using the delete character key **(DCH)** to correct any entry mistakes. When the set has been typed in correctly, press **(ENTER)**. Repeat the procedure for the remaining sets.

If the KL-43C has detected any entry errors, it will briefly display the following message...

```
Key is Invalid
```

...and return to...

```
ID# 01
Enter the Key name
```

If this happens, start over. The KL-43C will continue to deny access to further operations until the key sets are entered correctly.

If the key sets were entered correctly, the KL-43C will briefly display the following message...

```
01 - TEST-00
is the selected key
```

...then go to the Main Menu. (Information on the Main Menu is covered later in this chapter.)

The next time the Key Select Menu is encountered, it will look like this:

```
01 - AVAILABLE-00   02 - AVAILABLE-00   ^ or v
03 - AVAILABLE-00   04 - AVAILABLE-00   ID#
```

Key Position 01, now that it has been loaded with valid key information, may be selected for operation purposes. Select the loaded key by typing in the appropriate key identification number:

Press (0) then (1) then (ENTER).

The KL-43C then displays:

```
01-TEST-00
is the selected key
```

...and goes to the Main Menu.

Main Menu

The Main Menu is the starting point for all KL-43C operations. Once a valid key has been loaded/selected, the top two lines of the Main Menu are displayed:

```
W - WORD PROCESSOR          ^ or v or
Q-QUIET OPERATION           Select Function
```

There are 14 menu functions to select from. Use the (^) and (v) keys to scroll through the functions in the Main Menu.

The items in the Main Menu are:

W	Word Processor
Q	Quiet Operation
S	Set Time and Date
K	Key Change
U	Key Update
E	Encrypt Message
D	Decrypt Message
A	Authentication
P	Print
C	Communications
R	Review
O	Turn Off Unit
V	View Angle Adjust

M1 = CHIPER
M2 - PLAIN TEST
Z = ZEROIZE
E = ENTER MASTER KEY
N = NEW " "
(ON EMU)
= AUTO POWER DOWN SET
S = AUTO PWR DOWN
N = NORMAL OP.

When the end of the menu is reached, it loops back to the top.

Select a menu function by pressing the key with the corresponding letter. Example: Press (W) for Word Processor.

A function need not be visible on the display to be selected. For instance, pressing the (S) key selects the Set Time and Date Function, even if **W-Word Processor** and **Q-Quiet Operation** are currently on the display.

Dual Message Buffer

Nearly all of the functions contained in the Main Menu are affected in some way by the KL-43C's Dual Message Buffer, which allows for the simultaneous storage of two messages, identified as Message A and Message B.

The Dual Message Buffer is especially useful in those instances when, for example, the user is editing the contents of Message A and the need arises to receive a message. The received message will automatically be stored in the Message B location. If Message B is already being used, the user will have an opportunity to delete the present Message B to make room for the incoming message. (Information regarding the transmission and reception of messages is covered in full detail in the "Communications" section of this chapter.)

Word Processor

The KL-43C word processor provides many features found in larger computers such as text insertion, word wrap, and string search.

Each buffer in the KL-43C holds approximately 2600 characters. Messages are displayed two lines at a time; each line is forty characters wide.

The word processor allows for the storage and manipulation of both plain and cipher text.

Creating a Message

Press (W) at the Main Menu to initiate word processing. The following prompt will be displayed:

```
A - Message A          Select
B - Message B          Message to Use
```

Press (A) to select Message A, (B) to select Message B.

If the Message buffer selected for use already contains stored text, the KL-43C will display the following prompt:

```
Do you wish to clear message
   from memory? (Y/N)
```

Press (Y) to erase the existing message from memory and create space for a new message. Press (N) to retain the existing message, which will then appear on the display and may be edited if necessary. (Information regarding the editing of text is covered later in this chapter.)

If the selected buffer is empty, the KL-43C will briefly display...

```
Message Space Is Empty:
      Starting New Message:
```

...then display a prompt requesting choice of mode:

```
P - Plain Text Mode  C - Cipher Text Mode
          Select Editor Mode
```

The KL-43C allows the operator to type and edit either plain or encrypted (cipher) text. Press (P) to enter a plain text message.

The KL-43C does provide for the entry of encrypted text by pressing (C) for cipher text mode. This is necessary if a message has been received on printed paper tape and must be typed into the KL-43C for storage or decryption. Encrypted text is displayed in groups of three alphanumeric characters separated by spaces:

60 Key Lengths

```
4AB NFC QWP H6F 4ER OL2 FCA 7HY 5R4 66T
ZD3 UJI 5D2 7J4 DFL NM3 SQ2 HRT 43G FHT
```

60 x 34 = 2040

This makes the message easier to read while typing. The spaces need not be typed, however; the KL-43C will automatically insert them. Only valid cipher text characters (A-Z, 2-7) are recognized in this mode. All other characters are ignored.

Note: The KL-43C does not permit the communication transmission of a cipher text message that was typed manually into the unit. (See the "Communications" section later in this chapter for more information.)

If plain text mode is selected at the editor mode prompt, the KL-43C will respond by requesting message classification:

```
Enter Classification:
```

This is an optional entry used to describe the security level of the message, for example, secret. The classification may be up to twenty characters long and becomes part of the message. After typing the classification, press (ENTER), or bypass the classification option by pressing only the (ENTER) key.

Prior to displaying an empty message editor, the KL-43C will briefly display the editor mode:

```
The Editor is in the plain text mode
```

Begin typing a message. Typed input will appear to the left of the cursor. When the first line is full, the KL-43C will "word-wrap" to the next line such that text need not be hyphenated from line to line. Do not use the (ENTER) key to begin a new line, but instead as a carriage return to create new paragraphs.

Text Editing Keys

While in the plain text mode, the following keys may be used to review and/or edit the message:

(BOT)	Moves cursor to the beginning of the text.
(EOT)	Moves cursor to the end of the text.
(v)	Moves cursor down one line.
(^)	Moves cursor up one line.
(<)	Moves cursor one character to the left.
(>)	Moves cursor one character to the right.
(BOL)	Moves cursor to the beginning of the current line.
(EOL)	Moves cursor to the end of the current line.
(DCH)	Deletes the character to the left of the cursor.
(DWD)	Deletes word to the right of the cursor.
(SPC)	Inserts a space to the left of the cursor.

Text Editing Functions

While in the plain text mode, the KL-43C provides the following text editing functions:

Text Insertion

Insert new text by moving the cursor to the desired point in the existing text and typing as usual. New text is inserted to the left of the cursor. All existing text to the right of the cursor will move over to allow room for the inserted text.

String Search

Text strings can be searched for deletion or manipulation by using the string search function. Move the cursor to the beginning of the text and pressing the **(BOT)** key, then press the search key **(SRCH)**. The KL-43C will display this prompt:

```
Search String:
_
```

Type up to twenty characters and press **(ENTER)**. If a match is found, the cursor will move to the end of the matched text. Delete or manipulate the text as desired.

Storing a Created Message

When the message is completed, press the exit key **(XIT)** to exit the word processor. The KL-43C will briefly display...

```
Stored As Message A
```

...before returning to the Main Menu. The created plain text message is now stored in memory, identified as either Message A or Message B.

Entering a New Key

In essentially the same way the Selecting a Key function provides for key entry when the KL-43C is initially powered-up, the Key Change function provides for the entry of a key when the KL-43C is in the Main Menu.

To enter a new key while in the Main Menu, press **(K)**. The Key Select Menu will be displayed:

```
01 - TEST    -00      03 - AVAILABLE-00  ^ or v
02 - AVAILABLE-00     04 - AVAILABLE-00  ID#
```

Use the **(^)** and **(v)** keys to scroll through the Key Select Menu and locate the desired key position. Since key position 01 has already been loaded, select any other key "Available" position, for example, 02:

Press **(0)** then **(2)**.

The KL-43C will display the selected key position and request a key name:

```
ID# 02
Enter the Key name
```

(Complete the procedure as outlined in the "Selecting a Key" section covered earlier in this chapter.)

Changing a Key

The Key Change Function allows the user to change the current key to another existing (loaded) key. This is often necessary prior to message transmission and encrypt/decrypt functions, all of which are covered later in this chapter.

Press **(K)** at the Main Menu to change the current key to another key. The Key Select Menu will then be displayed, (with TEST 2 as the newly entered key for this example):

```
01 - TEST    -00      02 - TEST 2    -00  ^ or v
03 - AVAILABLE -00    04 - AVAILABLE-00  ID#
```

Enter the key position ID# of the desired key. The KL-43C will briefly display the selected key, then return to the Main Menu.

Updating a Key

The KL-43C's key update function electronically modifies the existing key to produce a different key.

Note: The KL-43C will only update the currently selected key.

Press (U) at the Main Menu to begin updating the currently selected key, which will then be displayed:

```
01-TEST-00
Is this the key to be updated?
```

Press (N) to abort the update and return to the Main Menu.

Press (Y) to continue updating the current key.

The KL-43C will display a prompt requesting confirmation of the update:

```
Are you sure you want to update (Y/N) ?
```

Press (N) to abort and return to the Main Menu.

Press (Y) to confirm. The display will briefly read...

```
Key Update Complete
```


...then display the new key, with the key update field incremented from 00 to 01:

```
01-TEST-01
Press ENTER or XIT
```

Press either (ENTER) or (XIT) to return to the Main Menu.

01-TEST-01 is now the current key.

Encrypting a Message

The KL-43C's encrypt function converts the contents of a plain text message into cipher text. Messages may either be encrypted using the current key, or the key may be changed or updated during the encryption process.

Note: In the interest of security, the clock and power control is disabled during the encryption process.

Press (E) at the main Menu to begin message encryption.

The following prompt will request that the user select the message to be encrypted:

```
A - Message A          Select
B - Message B          Message to Use
```

Press (A) to encrypt Message A, (B) to encrypt Message B.

The KL-43C will then display the current key and ask if this is the correct key for encryption.

```
01-TEST-01
Is this correct (Y/N) ?
```

If the message should be encrypted using the current key, complete the procedure at the heading entitled "Current Key". If the key should be changed or updated prior to encryption, go to the heading entitled "Change or Update Key".

Current Key

Press (Y) at the correct key prompt to encrypt the message with the current key.

The KL-43C will then display:

Begin Encryption ? (Y/N)

Press (N) to return to the Main Menu and leave the message in plain text form.

Press (Y) to begin encryption. While the message is being converted to cipher text, the display will read:

Encrypting

Upon completion of the encryption process, the KL-43C will return to the Main Menu. The message now resides in memory as cipher text.

Change or Update Key

If an update (U) or key change (C) is desired, press the appropriate key and perform the function as it was explained earlier in this chapter. After the update or key change is completed, the KL-43C will display:

Begin Encryption ? (Y/N)

Press (N) to return to the Main Menu and leave the message in plain text form.

Press (Y) to begin encryption. While the message is being converted to cipher text, the display will read:

Encrypting

Upon completion of the encryption process, the KL-43C will return to the Main Menu. The message now resides in memory as cipher text.

Decrypting a Message

The KL-43C's decrypt function converts encrypted (cipher) text stored in the KL-43C into unencrypted (plain) text. A message can only be decrypted using the same key with which it was encrypted.

Note: In the interest of security, the clock and power control is disabled during the decryption process.

Press (D) at the main Menu to begin message decryption.

The following prompt will request that the user select the message to be decrypted:

A - Message A	Select
B - Message B	Message to Use

Press (A) to decrypt Message A, (B) to decrypt Message B.

The KL-43C will then display the current key and ask if this is the correct key for decryption.

```
01-TEST-01
Is this correct (Y/N) ?
```

If the message should be decrypted using the current key, complete the procedure at the heading entitled "Current Key". If the key should be changed or updated prior to decryption, go to the heading entitled "Change or Update Key".

Current Key

Press (Y) at the correct key prompt to decrypt the message with the current key.

The KL-43C will, then display:

```
Begin Decryption ? (Y/N)
```

Press (N) to return to the Main Menu and leave the message in cipher text form.

Press (Y) to begin decryption. While the message is being converted to plain text, the display will read:

```
Decrypting
```

Upon completion of the decryption process, the KL-43C will return to the Main Menu. The message now resides in memory as plain text.

Change or Update Key

If an update (U) or key change (C) is desired, press the appropriate key and perform the function as it was explained earlier in this chapter. After the update or key change is completed, the KL-43C will display:

```
Begin Decryption ? (Y/N)
```

Press (N) to return to the Main Menu and leave the message in cipher text form.

Press (Y) to begin decryption. While the message is being converted to plain text, the display will read:

```
Decrypting
```

Upon completion of the decryption process, the KL-43C will return to the Main Menu. The message now resides in memory as plain text.

Reviewing a Message

The KL-43C's review a message function allows a plain or cipher text message stored in memory to be directly accessed from the Main Menu. Only the (^) and (v) are functional during a review; the text editing features available in the word processor are disabled.

Press (R) at the Main Menu to begin reviewing a message.

The KL-43C will prompt the user to select the message to be reviewed:

```
A - Message A      Select
B - Message B      Message to Use
```

Press **(A)** to review Message A, **(B)** to review Message B.

When the review is completed, press **(XIT)** to return to the Main Menu.

Communications

The KL-43C allows the user to communicate a cipher text message via telephone, radio, RS-232 (MIL-STD-188C) and RS-423 (MIL-STD-188-114) links.

Transmissions that require the use of a telephone or radio are performed by selecting the Audio Data function.

In turn, telephone communications are performed using the acoustic coupler modem built into the back of the unit; radio communications, meanwhile, can utilize either the acoustic coupler or the six-pin audio connector located at one end of the unit.

Note: Audio Data communications that require the acoustic coupler modem may not be accessed if the unit is in Silent Mode. See "Quiet Operation" later in this chapter for more information.

Transmissions requiring the use of RS-232 or RS-423 cable interface are performed by selecting the Digital Data function and utilize the six-pin audio connector.

(See Appendix A for all KL-43C interface diagrams.)

Transmitting a Message: Audio Data-- Acoustic Coupler

Press **(C)** at the Main Menu to initiate a communications function.

The KL-43C will display the following prompt:

A - Audio Data	Select
D - Digital Data	Function

Note: The KL-43C stores the last communication set-up established by the user, if any. In the event that a communications set-up has already been established, the KL-43C will prompt the user as to whether or not these same settings should be used for the current communication.

Press **(A)** at the Audio/Digital prompt for an Audio Data transmission. The KL-43C will then display the following prompt:

A - Acoustic Coupler	Select
C - Connector Audio	Function

Press **(A)** for acoustic coupler function.

The KL-43C will display:

T - Transmit	Select
R - Receive	Function

Press **(T)** to transmit.

The KL-43C will then display a choice between use on either European phone lines or U.S. phone lines.

U - U.S. Lines	Select
E - European Lines	Message to Use

Press **(U)** for transmissions using U.S. lines, **(E)** for transmissions using European lines. The KL-43C will then display a prompt, requesting choice of message for transmission:

A - Message A	Select
B - Message B	Message to Use

Note: The KL-43C will only transmit messages in cipher text. It does not, however, permit the transmission of a cipher text message that was typed manually into the unit. Such a message must first be decrypted, then re-encrypted prior to transmission.

Press **(A)** to transmit Message A, **(B)** to transmit Message B. The KL-43C will briefly read...

Please Wait

...before displaying the following prompt:

Press ENTER when ready. Press XIT for Main Menu.

Press **(XIT)** to abort the transmission and return to the Main Menu.

Press **(ENTER)** to transmit.

Note: The transmitting operator should never transmit, (i.e., press the (ENTER) key) before the receiving operator acknowledges that they are ready to receive the message.

During transmission, the display will read:

Transmitting Message

When the transmission is completed, the display will read:

Transmission Complete. Press ENTER to Retransmit or XIT for Main Menu

Note: If the message does not transmit properly, try again, or see Appendix B "Warning Messages" for the appropriate error message and how to correct it. If the message still is not being transmitted, poor quality telephone lines or radio links could be at fault, and verbal communication of the message as provided for in Appendix C may be necessary.

Transmitting a Message: Audio Data-- Connector Audio

Press **(C)** at the Main Menu to initiate a communications function.

The KL-43C will display the following prompt:

A - Audio Data D - Digital Data	Select Function

Note: The KL-43C stores the last communication set-up established by the user, if any. In the event that a communications set-up has already been established, the KL-43C will prompt the user as to whether or not these same settings should be used for the current communication.

Press **(A)** at the Audio/Digital prompt for an Audio Data transmission. The KL-43C will then display the following prompt:

A - Acoustic Coupler C - Connector Audio	Select Function

Press **(C)** for Connector Audio function.

The KL-43C will display:

T - Transmit R - Receive	Select Function

Press **(T)** to transmit.

The KL-43C will then display a prompt, requesting choice of message for transmission:

A - Message A **B - Message B**	**Select Message to Use**

Note: The KL-43C will only transmit messages in cipher text. It does not, however, permit the transmission of a cipher text message that was typed manually into the unit. Such a message must first be decrypted, then re-encrypted prior to transmission.

Press **(A)** to transmit Message A, **(B)** to transmit Message B. The KL-43C will briefly read...

Please Wait

...before displaying the following prompt:

Press ENTER when ready.
Press XIT for Main Menu.

Press **(XIT)** to abort the transmission and return to the Main Menu.

Press **(ENTER)** to transmit.

Note: The transmitting operator should never transmit, (i.e., press the (ENTER) key) before the receiving operator acknowledges that they are ready to receive the message.

During transmission, the display will read:

Transmitting Message

When the transmission is completed, the display will read:

Transmission Complete. Press ENTER to Retransmit or XIT for Main Menu

Note: If the message does not transmit properly, try again, or see Appendix B "Warning Messages" for the appropriate error message and how to correct it. If the message still is not being transmitted, poor quality telephone lines or radio links could be at fault, and verbal communication of the message as provided for in Appendix C may be necessary.

Transmitting a Message: Digital data

All digital data transmissions use the following protocol, of which only baud rate is selectable on the KL-43C:

start bits	1
data bits	8
stop bits	2
parity	none
baud rate	50, 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19.2K bps asynchronous
handshake	DTE wired to logic high from DSR from far end in cable CTS from printer in printer mode
levels	output= +/- 9v input= +/- 30v max

Press **(C)** at the Main Menu to initiate a communications function.

The KL-43C will display the following prompt:

A - Audio Data	Select
D - Digital Data	Function

Note: The KL-43C stores the last communication set-up established by the user, if any. In the event that a communications set-up has already been established, the KL-43C will prompt the user as to whether or not these same settings should be used for the current communication.

Press **(D)** at the Audio/Digital prompt to initiate a Digital Data function. The KL-43C will then display:

T - Transmit	Select
R - Receive	Function

Press **(T)** to transmit.

The KL-43C will then display a prompt, requesting choice of message for transmission:

A - Message A	Select
B - Message B	Message to Use

Note: The KL-43C will only transmit messages in cipher text. It does not, however, permit the transmission of a cipher text message that was typed manually into the unit. Such a message must first be decrypted, then re-encrypted prior to transmission.

Press **(A)** to transmit Message A, **(B)** to transmit Message B.

The baud rate selection prompt will follow:

XX Baud ^ or v to Select Speed
Press ENTER at Desired Speed

Use the **(^)** and **(v)** keys to change the baud rate field. When the desired baud rate is shown, press **(ENTER)**.

The KL-43C will briefly read...

Please Wait

...then display the following prompt:

Press ENTER when ready.
Press XIT for Main Menu.

Press **(XIT)** to abort the transmission and return to the Main Menu.

Press **(ENTER)** to transmit.

Note: The transmitting operator should never transmit, (i.e., press the (ENTER) key) before the receiving operator acknowledges that they are ready to receive the message.

During transmission, the display will read:

Transmitting Message.

When the transmission is completed, the display will read:

Transmission Complete. Press ENTER to Retransmit or XIT for Main Menu

Note: If the message does not transmit properly, try again, or see Appendix B "Warning Messages" for the appropriate error message and how to correct it. If the message still is not being transmitted, poor quality telephone lines or radio links could be at fault, and verbal communication of the message as provided for in Appendix C may be necessary.

Receiving a Message: Audio Data-- Acoustic Coupler

Press **(C)** at the Main Menu to initiate a communications function.

The KL-43C will display the following prompt:

A - Audio Data	Select
D - Digital Data	Function

Note: The KL-43C stores the last communication set-up established by the user, if any. In the event that a communications set-up has already been established, the KL-43C will prompt the user as to whether or not these same settings should be used for the current communication.

Press **(A)** at the Audio/Digital prompt for an Audio Data transmission. The KL-43C will then display the following prompt:

A - Acoustic Coupler	Select
C - Connector Audio	Function

Press **(A)** for acoustic coupler function.

The KL-43C will display:

T - Transmit	Select
R - Receive	Function

Press **(R)** to receive.

For a message to be received by the KL-43C, there must be memory space in either Message A or Message B.

If memory space does exist, the **"Press ENTER when ready/Press XIT for main menu"** prompt is displayed and the operation can be completed.

If text is currently residing in both Message A and Message B, one of the buffers must be cleared to make room for the incoming message. Under such a condition, the KL-43C will allow for memory space with the following prompt:

Memory space for message is not empty. Do you wish to clear? (Y/N)

To abort the transmission and return to the Main Menu, press **(N)**. Message A and Message B will still reside in memory, but the potential message may not be received until one of the two is cleared.

Press **(Y)** to create memory space for the incoming message. The KL-43C will prompt the user to select the message to be cleared:

Select Message to Clear: A or B

Press **(A)** to clear Message A, **(B)** to clear Message B.

Once one of the messages has been cleared, (or if there was memory space to begin with), the KL-43C will display:

Press ENTER when ready. Press XIT for Main Menu.

Press **(XIT)** to abort the transmission and return to the Main Menu.

Press **(ENTER)** to receive.

Note: The receiving operator should always complete the necessary steps to receive a message (at which time "Waiting for Carrier..." is visible on the display) and acknowledge to the far operator that they are ready to receive before the transmitting operator begins the transmission (i.e., presses the (ENTER) key).

The KL-43C will display...

Waiting for Carrier...

...until message receipt begins, then display:

Receiving Message

When the message is received, the display will read:

Transmission Complete Press XIT to return to Main Menu

Note: If the message is not received properly, have the far operator try again, or see Appendix B "Warning Messages" for the appropriate error message and how to correct it. If the message still is not being transmitted, poor quality telephone lines or radio links could be at fault, and verbal communication of the message as provided for in Appendix C may be necessary.

Receiving a Message: Audio Data-- Connector Audio

Press **(C)** at the Main Menu to initiate a communications function.

The KL-43C will display the following prompt:

A - Audio Data	Select
D - Digital Data	Function

Note: The KL-43C stores the last communication set-up established by the user, if any. In the event that a communications set-up has already been established, the KL-43C will prompt the user as to whether or not these same settings should be used for the current communication.

Press **(A)** at the Audio/Digital prompt for an Audio Data transmission. The KL-43C will then display the following prompt:

A - Acoustic Coupler	Select
C - Connector Audio	Function

Press **(C)** for Connector Audio function.

The KL-43C will display:

T - Transmit	Select
R - Receive	Function

Press **(R)** to receive.

For a message to be received by the KL-43C, there must be memory space in either Message A or Message B.

If memory space does exist, the **"Press ENTER when ready/Press XIT for main menu"** prompt is displayed and the operation can be completed.

If text is currently residing in both Message A and Message B, one of the buffers must be cleared to make room for the incoming message. Under such a condition, the KL-43C will allow for memory space with the following prompt:

Memory space for message is not empty. Do you wish to clear ? (Y/N)

To abort the transmission and return to the Main Menu, press **(N)**. Message A and Message B will still reside in memory, but the potential message may not be received until one of the two is cleared.

Press **(Y)** to create memory space for the incoming message. The KL-43C will prompt the user to select the message to be cleared:

Select Message to Clear: A or B

Press **(A)** to clear Message A, **(B)** to clear Message B.

Once one of the messages has been cleared, (or if there was memory space to begin with), the KL-43C will display:

Press ENTER when ready Press XIT for Main Menu

Press **(XIT)** to abort the transmission and return to the Main Menu.

Press **(ENTER)** to receive.

Note: The receiving operator should always complete the necessary steps to receive a message (at which time "Waiting for Carrier..." is visible on the display) and acknowledge to the far operator that they are ready to receive before the transmitting operator begins the transmission (i.e., presses the (ENTER) key).

The KL-43C will display...

Waiting for Carrier...

...until message receipt begins, then display:

Receiving Message

When the message is received, the display will read:

Transmission Complete Press XIT to return to Main Menu

Note: If the message is not received properly, have the far operator try again, or see Appendix B "Warning Messages" for the appropriate error message and how to correct it. If the message still is not being transmitted, poor quality telephone lines or radio links could be at fault, and verbal communication of the message as provided for in Appendix C may be necessary.

Receiving a Message: Digital data

All digital data transmissions use the following protocol, of which only baud rate is selectable on the KL-43C:

start bits	1
data bits	8
stop bits	2
parity	none
baud rate	50, 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19.2K bps asynchronous
handshake	DTE wired to logic high from DSR from far end in cable CTS from printer in printer mode
levels	output= +/- 9v input= +/- 30v max

Press **(C)** at the Main Menu to initiate a communications function.

The KL-43C will display the following prompt:

A - Audio Data	**Select**
D - Digital Data	**Function**

Note: The KL-43C stores the last communication set-up established by the user, if any. In the event that a communications set-up has already been established, the KL-43C will prompt the user as to whether or not these same settings should be used for the current communication.

Press **(D)** at the Audio/Digital prompt to initiate a Digital Data function. The KL-43C will then display:

T - Transmit	**Select**
R - Receive	**Function**

Press **(R)** to receive.

For a message to be received by the KL-43C, there must be memory space in either Message A or Message B.

If memory space does exist, the **"*XX* Baud...^ or v to Select Speed/ Press ENTER at Desired Speed"** baud rate selection prompt is displayed and the operation can be completed.

If text is currently residing in both Message A and Message B, one of the buffers must be cleared to make room for the incoming message. Under such a condition, the KL-43C will allow for memory space with the following prompt:

Memory space for message is not empty.
Do you wish to clear ? (Y/N)

To abort the transmission and return to the Main Menu, press **(N)**. Message A and Message B will still reside in memory, but the potential message may not be received until one of the two is cleared.

Press **(Y)** to create memory space for the incoming message. The KL-43C will prompt the user to select the message to be cleared:

Select Message to Clear: A or B

Press **(A)** to clear Message A, **(B)** to clear Message B.

Once one of the messages has been cleared, (or if there was memory space to begin with), the KL-43C will display the baud rate selection prompt:

XX Baud ^ or v to Select Speed
Press ENTER at Desired Speed

Use the **(^)** and **(v)** keys to change the baud rate field. When the desired baud rate is shown, press **(ENTER)**.

The KL-43C will display:

Press ENTER when ready Press XIT for Main Menu

Press **(XIT)** to abort the transmission and return to the Main Menu.

Press **(ENTER)** to receive.

Note: The receiving operator should always complete the necessary steps to receive a message (at which time "Waiting for Data..." is visible on the display) and acknowledge to the far operator that they are ready to receive before the transmitting operator begins the transmission (i.e., presses the (ENTER) key).

The KL-43C will display...

Waiting for Data...

...until message receipt begins, then display:

Receiving Message

When the message is received, the display will read:

Transmission Complete Press XIT to return to Main Menu

Note: If the message is not received properly, have the far operator try again, or see Appendix B "Warning Messages" for the appropriate error message and how to correct it. If the message still is not being transmitted, poor quality telephone lines or radio links could be at fault, and verbal communication of the message as provided for in Appendix C may be necessary.

Quiet Operation

The KL-43C's quiet operation function permits silent use of the unit when it is switched from Normal Audio to Silent Mode.

Under Normal Audio condition the KL-43C will:

1. Emit a beep as well as display an error message when an error is made.
2. Sound an audio alarm as well as display a warning message when the main batteries are running low.
3. Allow access to communication routines which generate an audio output, i.e., to communications using an acoustic coupler modem.

Under Silent Mode, the KL-43C will:

1. Only display an error message (and not emit a beep) when an error is made.
2. Only display a warning message (and not sound an audio alarm) when the main batteries are running low.
3. Disallow access to communication routines which use an acoustic coupler modem.

Note: Communications which utilize RS-232, RS-423, and Connector Audio interfaces may be performed at any time, regardless of operation mode.

Press (Q) at the Main Menu to initiate Quiet Operation. The KL-43C will display the following prompt:

```
S - Silent Mode                    Select
N - Normal Mode [On]               Function
```

The [On] indicator identifies the currently selected mode. Whichever mode is indicated when the unit is powered-down will be stored. The next time the unit is powered-up, the indicated mode will automatically be in effect.

Press (S) for Quiet Operation, (N) for Normal Mode, or (XIT) to abort.

After selection of mode, the KL-43C will return to the Main Menu.

Authentication

The authentication mode generates a challenge/reply authentication using the currently selected key. If the currently selected key is not the proper key, the user will have an opportunity to change or update the key prior to authentication.

The following conditions are required for successful authentication:

1. Prior to authentication, verbal communication has been established with the far operator.
2. Transmitting and receiving ends have selected the same key.
3. The internal clocks of each device are set to within twenty minutes of each other. (See "Setting the Time and Date" later in this chapter for more information.)

Press (A) at the Main Menu to begin authentication.

The KL-43C will display the following prompt:

```
        01-TEST-01
Is this the correct key (Y/N) ?
```

If the current key is the correct key for authentication, press (Y) and complete the procedure at the "**(C) Challenge or (R) Reply ?**" prompt.

If the currently selected key should be changed or updated prior to authentication, press (N). The KL-43C will display:

```
(U) Update or (C) Change the Key?
```

If an update (U) or key change (C) is desired, press the appropriate key and perform the function as it was explained earlier in this chapter. After the update or key change is completed, the KL-43C will display:

```
(C) Challenge or (R) Reply ?
```

Challenge

Press (C) to challenge. The KL-43C will display:

```
 Challenge: EVIP  Reply: 3F6X
Press XIT to return to the Main Menu
```

Press (XIT) to abort the authentication and return to the Main Menu.

To continue with authentication, phonetically read the four character challenge over the communications media using the phonetic alphabet shown in Appendix C, and expect the four character reply. After receipt of the reply, press (XIT) to return to the Main Menu.

Reply

Press (R) at the Challenge/Reply prompt to reply.

The KL-43C will instruct:

```
Enter the Challenge:
```

Type in the four character challenge that was received and press (ENTER). The KL-43C will display:

```
Challenge: EVIP  Reply: 3F6X
Press XIT to return to the Main Menu
```

Press (XIT) to abort authentication and return to the Main Menu.

To continue with authentication, phonetically read the four character challenge over the communications media using the phonetic alphabet shown in Appendix C. When the reply has been completed, press (XIT) to return to the Main Menu.

Zeroing a Key

The KL-43C's key zeroing function allows for the deletion of all or any of the encryption keys.

Press the (ZRO) key at any time to activate the key zeroing function. The KL-43C will display the following prompt:

```
Which key is to be cleared?
Enter ID# or "A" for ALL
```

To delete a specific key enter its ID# as it appears on the Key Select Menu. For example, press (0) then (2) then (ENTER). The KL-43C will respond with the selected key:

```
02-TEST 2-01
Is this the key to be zeroed ? (Y/N)
```

Press (N) to abort the zero function and return to the Main Menu.

Press (Y) to erase the specified key.

To erase all encryption keys, press (A) at the "Enter ID# or 'A' for ALL" prompt. The KL-43C will ask for confirmation:

```
Do you want all keys cleared ? (Y/N)
```

Press (N) to abort the zero function and return to the Main Menu.

Press **(Y)** to erase all encryption keys. While zeroing is taking place, the KL-43C will briefly read...

Zeroing . . .

...before returning to the Main Menu.

Note: All keys may also be erased by pressing (ZRO) immediately after the unit is turned on. A confirmation prompt will then be displayed. Press (Y) to erase all keys. Press (N) to abort. The confirmation prevents accidental zeroing of all encryption keys.

View Angle Adjust

The KL-43C's liquid crystal display has a view angle adjust feature to provide the best possible contrast and readability.

Press **(V)** at the Main Menu to adjust the view angle. Use the **(^)** and **(v)** keys until the desired contrast is achieved.

Note: The display view angle can also be set to maximum by 1) holding down the (^) key when pressing the (SRCH)/ON key at power-up or 2) pressing the (^) key at the Key Select Menu.

When the desired contrast is achieved, press **(XIT)** to return to the Main Menu.

Setting the Time and Date

Press **(S)** at the Main Menu to set the time and date of the KL-43C's internal real-time clock. The clock will appear as follows:

DAY MONTH DATE YEAR HH:MM:SS

Use the **(<)** and **(>)** keys to move the underline cursor from field to field.

Note: The "seconds" field (SS) is not selectable. Seconds begin counting when the clock is set.

Use the **(^)** and **(v)** keys to increment and decrement the value of each field.

Set the clock by pressing **(XIT)**, after which the KL-43C will return to the Main Menu.

The clock may now be viewed by pressing the clock key **(CLK)** at any time and in any mode except Receive when actually receiving a message, Encrypt when actually encrypting a message, Decrypt when actually decrypting a message, and Authentication when generating the challenge and reply.

Printing a Message

Press **(P)** at the Main Menu to print a plain or cipher text message. The KL-43C will request the message to be printed, A or B:

A - Message A B - Message B	Select Message to Use

Press **(A)** to print message A, **(B)** to print Message B.

If the message selected for printing is in plain text form, the KL-43C will display the following warning message:

P-Print L-Line Feed F-Form Feed Select Function

Once a plain or cipher text message has been selected for printing, the printer options menu will be displayed:

WARNING !!! PLAIN TEXT. Verify Printer ONLY connected. Press a key to continue

(See Appendix B "Warning Messages" for more information.)

Press (XIT) to abort the print command and return to the Main Menu.

Press (P) to print. The display will read:

Printing Message Press XIT to Stop

When the message is printed in full, press the (XIT) key. The KL-43C will return to the printer options menu to allow for line feed (L) and form feed (F) functions.

Press (XIT) at the printer options menu to return to the Main Menu.

Power Off

Press (O) at the Main Menu to power-down the unit.

The KL-43C will display a prompt requesting confirmation of the action:

Confirm -- Turn the Unit OFF (Y/N)

Press (Y) to confirm power off.

All keys and saved messages will be retained; the internal clock will keep time; the operation mode (silent or audio) will be stored.

Press (N) to abort the power-off function. Such a choice would be necessary in the event that the (O) key was unintentionally pressed at the Main Menu, and thus provides for prevention of accidental powering-down of the KL-43C.

APPENDIX A - KL-43C INTERFACES

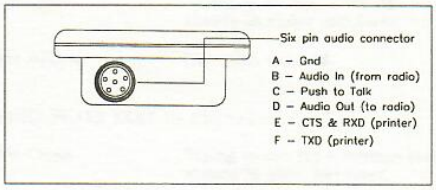


Figure 1: KL-43C Audio Connector

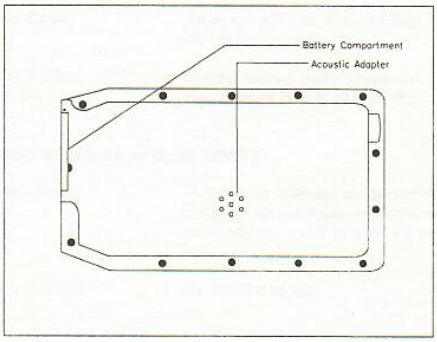


Figure 2: KL-43C Case Assembly

APPENDIX B - WARNING MESSAGES

WARNING: CIPHER TEXT IN BUFFER!

Probable Cause:	Trying to encrypt a message that is already in cipher text form.
Operator Action:	No action required.

WARNING: PLAIN TEXT IN BUFFER!

Probable Cause:	Trying to decrypt a message that is already in plain text form.
Operator Action:	No action required.

MESSAGE DOES NOT DECRYPT PROPERLY

Probable Cause:	An error was made in entering the cipher text.
Operator Action:	Correct cipher entry errors using word processor in cipher text mode.

MESSAGE SPACE (A or B) IS EMPTY

Probable Cause:	There is no message in the specified memory. Either none was entered or received, or it was deleted by power loss.
Operator Action:	Re-enter message.

MEMORY SPACE FOR MESSAGE IS NOT EMPTY DO YOU WISH TO CLEAR? (Y/N)

Probable Cause:	Both message A and B are currently being used to store text.
Operator Action:	Clear appropriate message space to make room for message to be received.

FAILURE TO ESTABLISH COMMUNICATIONS. COMMUNICATIONS ABORTED.

Probable Cause:	Poor telephone/radio links, faulty RS cable or broken connection.
Operator Action:	Retransmit. If transmission is still unsuccessful, verbal communication of the message may be necessary. (See Appendix C.)

CIPHER TEXT HAS BEEN LOCALLY ENTERED. COMMUNICATIONS DENIED.

Probable Cause:	Trying to send a cipher text message that was entered manually into the unit.
Operator Action:	The KL-43C will not allow the transmission of "untested" cipher text. Decrypt message, then re-encrypt and resend.

LOSS OF SYNCHRONIZATION. COMMUNICATIONS ABORTED.

Probable Cause:	Line Problems.
Operator Action:	Resend message.

THERE WERE UNCORRECTABLE ERRORS PRESS EXIT.

Probable Cause:	There were line problems in receiving the message.
Operator Action:	Transmitter must resend message.

MESSAGE IN PLAIN TEXT FORM COMMUNICATIONS DENIED.

Probable Cause:	Trying to send a plain text message.
Operator Action:	Encrypt message and send.

WARNING !!! PLAIN TEXT. VERIFY PRINTER ONLY CONNECTED. PRESS A KEY TO CONTINUE

Probable Cause:	Trying to print a plain text message.
Operator Action:	Verify that the KL-43C is connected only to a printer (and not to a communications device, i.e., a radio).

QUIET OPERATION: AUDIO OUTPUT DENIED.

Probable Cause:	KL-43C is in Silent Mode.
Operator Action:	If desired, return unit to Normal Audio Mode.

...BEEPING TONE WILL SOUND FOR FOUR MINUTES...
***OR* LOW BATTERY WARNING**

Probable Cause:	Batteries are drained.
Operator Action:	At this point there are four minutes left to complete the operation in process, after which the KL-43C will automatically power-down. (See "Power Off" in Chapter 2 for the results of system shut-down.) Following completion of the final operation, select the power-off function **(O)** and replace the batteries.

MALFUNCTION! DO NOT USE

Probable Cause:	There has been a software malfunction.
Operator Action:	Turn off the unit, then turn it on again. If the warning remains, turn the unit in to the proper COMSEC custodian with the date and description of the malfunction.

Note: When a malfunction occurs, the KL-43C will automatically zeroize all keys.

APPENDIX C - VERBAL COMMUNICATIONS

In the event that a communication has been aborted due to poor quality telephone lines, radio links, or a faulty RS cable, or if the far operator is not equipped with a KL-43C or compatible encryption device, a cipher text message may still be transmitted by reading it over voice media using the phonetic alphabet shown below.

The transmitting operator may either print the encrypted message and phonetically read the printed text, or use the review function and scroll keys to phonetically read the message line by line from the display.

The receiving operator may then type the received message manually into a KL-43C or compatible encryption device and decrypt it, or store the message until a suitable decryption terminal can be obtained.

Phonetic Alphabet

A-ALFA	**M-MIKE**	**Y-YANKEE**
B-BRAVO	**N-NOVEMBER**	**Z-ZULU**
C-CHARLIE	**O-OSCAR**	**0-ZE-RO**
D-DELTA	**P-PAPA**	**1-WUN**
E-ECHO	**Q-QUEBEC**	**2-TWO**
F-FOXTROT	**R-ROMEO**	**3-TREE**
G-GOLF	**S-SIERRA**	**4-FOW-er**
H-HOTEL	**T-TANGO**	**5-FIFF**
I-INDIA	**U-UNIFORM**	**6-SIX**
J-JULIETT	**V-VICTOR**	**7-SEV-en**
K-KILO	**W-WHISKEY**	**8-AIT**
L-LIMA	**X-XRAY**	**9-NIN-er**

APPENDIX D - TROUBLESHOOTING

If the KL-43C fails to function properly, the following items should be checked:

Contrast
Ensure that the contrast of the display is properly adjusted to the lighting conditions.

Battery Clips and Contacts
Ensure that the battery clips and contacts are clean.

Battery Installation
Ensure that the batteries are correctly inserted as diagrammed on the KL-43C case.

Battery Check
If the above items have been checked and the KL-43C still fails to operate properly, ensure that the batteries are "good." Either replace Alkaline batteries, recharge NiCad batteries, or replace faulty NiCad batteries.

Defective KL-43C
If the KL-43C does not function properly after the above items are checked, it is considered defective and the following steps should be taken:

Warranty
If the KL-43C is still under the one year warranty, zeroize all key variables and follow the proper procedures to return it to the TRW for repair or replacement.

Destruction
If the KL-43C is no longer under the one year warranty, zeroize all key variables and have it destroyed following the proper procedures for the destruction of CCI equipment.

APPENDIX E - CONDENSED OPERATING INSTRUCTIONS

Note: For any of these quick step instructions to be successful, the user must begin at the Main Menu (unless attempting a key zeroing function, which may be performed at any time).

Also, words in italics indicate that variable user input is required; words or letters in parentheses represent a key that must be pressed.

Creating a Plain Text Message

Step	Action	
1.	(W)	Select word processor
2.	(A) or (B)	Select space for message
3.	(P)	Select plain text mode
4.	*Type*	
	(ENTER)	Enter classification
5.	*Type/Edit*	Create a message

Entering a New Key

Step	Action	
1.	(K)	Access Key Select Menu
2.	*ID#*	Enter key ID#
3.	*Keyname*	
	(ENTER)	Give new key a name
4.	*key set 1*	
	(ENTER)	Enter first key set
5.	Repeat the above step for the remaining key sets	

Changing a Key

Step	Action	
1.	(K)	Access Key Select Menu
2.	*ID#*	Enter desired key ID#

Updating a Key

Note: The KL-43C will only update the currently selected key.

Step	Action	
1.	(U)	Access Key Update function
2.	(Y)	Continue with update
3.	(Y)	Confirm the update

Zeroing a Key

Note: the key zeroing function may also be performed when the KL-43C is powered-up. See "Zeroing a Key" in Chapter 2 for more information.

Step	Action	
1.	(ZRO)	Initiate zeroing process
2.	*ID#* (ENTER)	Select key to be zeroed
3.	(Y)	Confirm zeroing of selected key

Zeroing all Keys

Note: the key zeroing function may also be performed when the KL-43C is powered-up. See "Zeroing a Key" in Chapter 2 for more information.

Step	Action	
1.	(ZRO)	Initiate zeroing process
2.	(A)	Select all keys for zeroing
3.	(Y)	Confirm zeroing of all keys

Encrypting a Message

Note: This encrypt operation is designed to be performed using the currently selected key.

Step	Action	
1.	(E)	Initiate encryption
2.	(A) or (B)	Select message for encryption
3.	(Y)	Confirm use of the current key
4.	(Y)	Confirm encryption

Decrypting a Message

Note: This decrypt operation is designed to be performed using the currently selected key.

Step	Action	
1.	(D)	Initiate decryption
2.	(A) or (B)	Select message for decryption
3.	(Y)	Confirm use of the current key
4.	(Y)	Confirm decryption

Reviewing a Message

Step	Action	
1.	(R)	Select review function
2.	(A) or (B)	Select message for review
3.	(^) or (v)	Review message

Printing a Message

Step	Action	
1.	(P)	Select printer mode
2.	(A) or (B)	Select message to print
3.	(P)	Print
4.	(XIT)	Access line feed and form feed
5.	(L) or (F)	Feed line or form as desired

Transmitting a Message: Audio Data/Acoustic Coupler

Step	Action	
1.	(C)	Initiate communications
2.	(A)	Select audio data
3.	(A)	Select acoustic coupler
4.	(T)	Choose transmit
5.	(U) or (E)	Select U.S. or Euro. ph. lines
6.	(A) or (B)	Select message to transmit
7.	(ENTER)	Transmit message

Transmitting a Message: Audio Data/Connector Audio

Step	Action	
1.	(C)	Initiate communications
2.	(A)	Select audio data
3.	(C)	Select connector audio
4.	(T)	Choose transmit
5.	(A) or (B)	Select message to transmit
6.	(ENTER)	Transmit message

Transmit a Message: Digital Data

Step	Action	
1.	(C)	Initiate communications
2.	(D)	Select digital data
3.	(T)	Choose transmit
4.	(A) or (B)	Select message to transmit
5.	*Select Speed* (ENTER)	Establish baud rate
6.	(ENTER)	Transmit message

Receiving a Message: Audio Data/Acoustic Coupler

Step	Action	
1.	(C)	Initiate communications
2.	(A)	Select audio data
3.	(A)	Select acoustic coupler
4.	(R)	Choose receive
5.	(Y)*	Create space in memory
6.	(A) or (B)*	Select message to erase
7.	(ENTER)	Receive message

*if necessary

Receiving a Message: Audio Data/Connector Audio

Step	Action	
1.	(C)	Initiate communications
2.	(A)	Select audio data
3.	(C)	Select connector audio
4.	(R)	Choose receive
5.	(Y)*	Create space in memory
6.	(A) or (B)*	Select message to erase
7.	(ENTER)	Receive message

*if necessary

Receiving a Message: Digital Data

Step	Action	
1.	(C)	Initiate communications
2.	(D)	Select digital data
3.	(R)	Choose receive
4.	(Y)*	Create space in memory
5.	(A) or (B)*	Select message to erase
6.	*Select speed*	
	(ENTER)	Establish baud rate
7.	(ENTER)	Receive message

*if necessary

Authentication (Challenge)

Note: This authentication operation is designed to be performed using the currently selected key.

Step	Action	
1.	(A)	Initiate Authentication
2.	(Y)	Confirm use of the current key
3.	(C)	Choose challenge

Authentication (Reply)

Note: This authentication operation is designed to be performed using the currently selected key.

Step	Action	
1.	(A)	Initiate Authentication
2.	(Y)	Confirm use of the current key
3.	(R)	Choose reply
4.	*Challenge*	
	(ENTER)	Enter challenge

Powering-down the unit

Step	Action	
1.	(O)	Select power off
2.	(Y)	Confirm the above

APPENDIX F - OPERATING SPECIFICATIONS

Physical Dimensions:	Width, inches (mm) 6.65 (168.9) Height, inches (mm) 1.65 (41.9) Depth, inches (mm) 3.75 (95.3) Weight, lbs. (kg) 2.04 (.926)
Power:	4 "AA" size batteries
Battery Life:	Alkaline-- 24 hours NiCad-- 6 hours Lithium-- 75 hours
Keyboard:	Standard "QWERTY" plus fifteen special function keys with no shifted functions
Display:	2 line by 40 character Liquid Crystal Display (LCD)
Message:	Dual message buffer, each with 2600 character capacity
Data Interface:	RS-232 (compatible with RS-423) except risetime is approx. 7 μsec at 9600 and 19200 bps Compatible with MIL-STD-188C and MIL-STD-188-114 except maximum voltage is +/- 9 volts, risetime 7 μsec at +/- 3 volts, and source impedance is 300 ohms
Modem Interface:	Acoustically coupled or direct connect (via adapter), Bell-103 format, 300 baud, simplex
Radio Interface:	20 mV RMS at radio out, push-to-talk dry relay closure to the ground

Maximum DC Current Requirements:	Unit off	90 microAmperes
	Unit On	90 milliAmperes
	Unit xmt	190 milliAmperes

APPENDIX G - ENVIRONMENTAL SPECIFICATIONS

Note: The following figures for the KL-43C's environmental specifications reflect the unit's performance as tested to MIL-STD-810C standards. Actual environmental performance may vary.

TEMPERATURE

The KL-43C operates between -20°C and +50°C. It withstands storage temperatures between -40°C and 65°C.

ALTITUDE

The KL-43C operates at an altitude of 15,000 feet.

IMMERSION

The KL-43C is functional after immersion to a depth of 36" for 2 hours.

DROP

The KL-43C withstands a drop to a 2" thick plywood floor backed by concrete from a height of 48".

VIBRATION

The KL-43C may be transported as loose cargo.

HUMIDITY

The KL-43C withstands 100% humidity with condensation on the unit, both operating and non-operating.

RAIN

The KL-43C operates while exposed to rain.

SALT FOG

The KL-43C is resistant to salt fog conditions, both operating and non-operating.

FUNGUS

The KL-43C is fungus resistant.

DUST AND DIRT

The KL-43C is sealed to resist both sand and dust particles.

KL-43C OPERATOR'S MANUAL
Part No. 410-308
REVISION D
DECEMBER 8, 1989

WARRANTY:

All KL-43C devices are provided with a one year commercial warranty against defects in workmanship and material. Defective equipment covered under warranty shall be repaired or replaced at TRW's expense. This one year period begins with customer acceptance of devices at the contractor's facility.

OUT OF REPAIR WARRANTY:

TRW is capable of providing materials and repair services for the KL-43C terminal beyond the warranty period upon request.

TEK KEY = TRAFFIC ENCRYPTION KEY OPERATIONAL

KAK = EXERSIZE KEY

KMK = MAINTENANCE KEY

KTK = TRAINING KEY

TABLE OF CONTENTS

ature Comparison: KL-43 Family of Cryptographic Devices

Feature	KL-43C & F	KL-43D	KL-43E	KL-43G	KL-43H
Word Processing					
Plain or Cipher Text Entry; Word Wrap; Text Search; Cursor Control (up, down, left, right, beginning/end of line or text); Delete Character, Delete Word	x	x	x	x	x
Keyboard (A-Z, 0-9, comma, slash, period, space, zero, clock, question mark, enter, exit, 8 cursor control keys, delete character, delete word, and search)	x plus open & close parens"()"	x	x	x	x
Message Capacity (2600 Character Maximum, Deleted at power down)	Dual	Single	Single	Single	Single
Message Review (Red or Black text displayed on KL-43)	x	x	x	x	x
Encryption/Decryption	x	x	x	x	x
Key Management (Storage, Zeroize, Naming, Update)	x	x	x	x	x
Authentication	x	x	x	x	x
Printer Interface (Connector) (Red or Black Messages)	Serial I/O 1200 baud (U-229)	Parallel I/O (D-36)	Parallel I/O (D-36)	Parallel I/O (D-36)	Parallel I/O (D-36)
View Angle Control (KL-43 display contrast)	Keyboard Menu Selection	Panel Knob	Panel Knob	Panel Knob	Panel Knob
Quiet Mode (No audible tones emitted)	x				
Real Time Clock	x	x	x	x	x
Dual Language Prompts Available	F only			x	x

Notes:

1. All parameters are nominal unless otherwise noted.
2. TRW continues to improve its products. Changes to the KL-43 devices which affect the user are controlled under NSA's Authorized Vendor and/or Commercial COMSEC Endorsement Programs. This document is a compliation of product features and is subject to change without notice.

Feature Comparison - KL-43 Family

Feature	KL-43C & F	KL-43D	KL-43E	KL-43G	KL-43H
Communication (mating connector needed)					
Audio (FSK Modem)					
Acoustic Adapter to Handset	Built In	External Adapter (5 pin DIN-M)	External Adapter (5 pin DIN-M)	External Adapter (5 pin DIN-M)	External Adapter (5 pin DIN-M)
Direct Cable to Telephone		X (RJ-11)	X (RJ-11)	X (RJ-11)	X (RJ-11)
Direct Cable to Radio	X (U-229)	X (5 pin DIN-M)	X (5 pin DIN-M)	X (5 pin DIN-M)	X (5 pin DIN-M)
False Sync Imunity	X				
Enhanced Noise Imunity	KL-43F (C 1.6.9 and later s/w)				
Digital (RS-232) to PC or Communication Channel	50-19.2kbs (U-229)	Opt. Ext. Adapter (300bps)	Opt. Ext. Adapter (300bps)	Opt. Ext. Adapter (300bps)	Opt. Ext. Adapter (300bps)
Digital Sync Time	750 msec (400 msec for C ver. 1.7.0 and prior)				
Push-To-Talk (PTT) Radio Control	(U-229)				
Red Message Output	Print to Printer or PC	Print to Printer	Print to Printer	Print to Printer	Print to Printer
Red Message Input (keyboard only)	X	X	X	X	X
Black Message Output	Printer, Modem or Digital	Printer or Modem (digital with opt. adapter)	Printer or Modem (digital with opt. adapter)	Printer or Modem (digital with opt. adapter)	Printer or Modem (digital with opt. adapter)
Black Message Input	Modem, Digital or Keyboard	Modem or Keyboard (digital w/opt. adptr)	Modem or Keyboard (digital w/opt. adptr)	Modem or Keyboard (digital w/opt. adptr)	Modem or Keyboard (digital w/opt. adptr)

Feature Comparison - KL-43 Family

Feature	KL-43C & F	KL-43D	KL-43E	KL-43G	KL-43H
Power					
Power Control	Keyboard Button	Rear Switch	Rear Switch	Rear Switch	Rear Switch
External (connector)		12 VDC from 110/220 VAC adapter (3.5mm)	12 VDC from 110/220 VAC adapter (3.5mm)	12 VDC from 110/220 VAC adapter (3.5mm)	12 VDC from 110/220 VAC adapter (3.5mm)
Battery (Alkaline or NiCd)	4xAA	4xAA	4xC	4xAA	4xC
Battery Operation Time [Alk/NiCd(hrs)]	24/8	24/8	72/24	24/8	72/24
Internal Recharging of NiCd Battery		x	x	x	x
TEMPEST Tested	NACSIM 5100A				
EMI/EMC	MIL-STD-461 Class A1b, A3, A4	Design Qualified to FCC Part 15 Level A	Design Qualified to FCC Part 15 Level A	Design Qualified to FCC Part 15 Level A	Design Qualified to FCC Part 15 Level A
Environmental	Tested Per MIL-STD-810D (rain,temp. dust, altitude, submersion, drop, humidity,salt fog, fungus)	Office / Protected	Office / Protected	Office / Protected	Office / Protected
Physical Dimensions					
Width [inch(cm)]	6.6(16.8)	10.5(26.7)	10.3(26.0)	10.5(26.7)	10.3(26.0)
Depth "	3.7(9.5)	5.5(14.0)	9.3(23.5)	5.5(14.0)	9.3(23.5)
Height "	1.7(4.3)	1.5(3.8)	2.0(5.1)	1.5(3.8)	2.0(5.1)
Weight w/batteries [lbs (kg)]	2.0(.9)	1.8(0.8)	3.0(1.4)	1.8(0.8)	3.0(1.4)

Feature Comparison - KL-43 Family

Feature	KL-43C & F	KL-43D	KL-43E	KL-43G	KL-43H
Standard Accessories	Alk Batty & Manual	Carrying Bag, Power Supply, Telephone Line Cord, Acoustic Adapter, & Manual	Carrying Bag, Power Supply, Telephone Line Cord, Acoustic Adapter, & Manual	Carrying Bag, Power Supply, Telephone Line Cord, Acoustic Adapter, & Manual	Carrying Bag, Power Supply, Telephone Line Cord, Acoustic Adapter, & Manual
Optional Accessories	Radio & PC Interface Cables, Carrying Bag	Radio Interface Cables & Digital Adapter (RS-1)	Radio Interface Cables & Digital Adapter (RS-1)	Radio Interface Cables & Digital Adapter (RS-1)	Radio Interface Cables & Digital Adapter (RS-1)
Available Printer	TP-40S	TP-40P	TP-40P	TP-40P	TP-40P

INTERFACE DETAILS

ACOUSTIC INTERFACE:

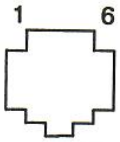
Provides 95 dBa Sound Pressure Level (SPL) output in US LINES mode, 80 dBa in EUROPEAN LINES mode. (Pressure measured 1/8" from speaker.) This generates a -12 dBm level on the Tip/Ring of a US phone line (-17 dBm on European phones with internal amplifiers).

Input level range is -35dBm to 0 dBm from a telephone line through the handset. (The is the approximate listening level using an H-250 handset.)

Acoustic Interface is provided either a) Directly through the supplied Line Cord which connects the RJ-11 connecters on the KL-43D, E, G & H to a modular jack on the phone system or b) through the Acoustic Adapter to a telephone or radio handset.

RJ-11 (LINE & TELEPHONE): (KL-43D, E, G & H)

Connection point for DIRECT wiring to telephone system.



Pin	Function
LINE Jack	Used to interface to telephone system.
1	No Connection
2	PHONE Jack pin 5
3 & 4	2 wire 600 ohm balanced, -12 dBm output, -35 to +5 dBm input (as measured on Tip/Ring of phone line), DC holding circuit in DIRECT position of TALK/DIRECT switch
5	PHONE Jack pin 2
6	No Connection
PHONE Jack	Used to connect to telephone (with supplied Telephone Line Cord). Disconnected during KL-43 Transmit and Receive (KL-43 switch in Direct position) to eliminate coupling of background noise.
1	No Connection
2	LINE Jack pin 5
3 & 4	LINE Jack pins 4 & 3 in TALK, open in DIRECT
5	LINE Jack pin 2
6	No Connection

5 PIN CIRCULAR DIN (ACOUSTIC ADAPTER): (KL-43D, E, G & H ONLY)

Connection for Acoustic Adapter or separately supplied Radio Interface Cable (TRW p/n 410-532-1).

Pin	Function
1	Audio Input to KL-43 (-35dBm to -5 dBm, 4K ohm)
2, 4, & 5	Ground
3	Audio Output from KL-43 (-9dBm; $200mV_{rms}$, 8 Ohm)

(Interface levels are on the Tip/Ring of a telephone line coupled through the Acoustic Adapter provided with the KL-43 device.)

6 PIN AUDIO (U/329) CONNECTOR: (KL-43C & F ONLY)

Pin	Function		
	Audio Interface to Radio	Digital Interface to Communications Device or PC	Digital Interface to Printer
A	Signal Ground		
B	Audio Input to KL-43 (10 - 350 mV_{rms} into 1200 Ohms)		
C	Push-to-Talk (relay closure to Signal Ground 50 msec prior to data output from KL-43), 1 ampere maximum		
D	Audio Output from KL-43 (20 mV_{rms} into 134 Ohms)		
E		Digital Data Input to KL-43	Clear To Send (or Data Terminal Ready) from printer
F		Digital Data Output from KL-43	Data to Printer (baud rate fixed at 1200)
Shield	Case Ground		

D-36 (PRINTER): (KL-43D, E, G & H)

Pin	Function
1	STROBE
2-9	Data 1-8
10,12-18,32,34-36	No Connection
11	Printer Busy
19-30, 33	Ground
31	Initialize

All signals are TTL

DIGITAL DATA SPECIFICATIONS: (KL-43C & F)

Start Bits	1
Stop Bits	2
Parity	None
Data Bits	8
BAUD Rates	50, 75, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 bps asynchronus (Above are nominal interface rates. Actual rates differ slightly but meet the interface requirements for a nominal RS-232 device. Actual rates are 50, 75, 150, 300, 601, 1202, 2404, 4808, 9868, and 18750 ± 0.2%)
Meets RS-232C except for risetime specification at 9600 and 19200 bps	
Compatible with RS-423 within risetime constrains for RS-232 above.	
Compatible with MIL-STD-188C and MIL-STD-188-114A with the following exceptions:	
Max. Output Voltage	± 9 VDC
Max. Input Voltage	± 30 VDC
Rise Time	\ 7 usec (measured through ± 3 VDC)
Source Impedance	300 Ohms