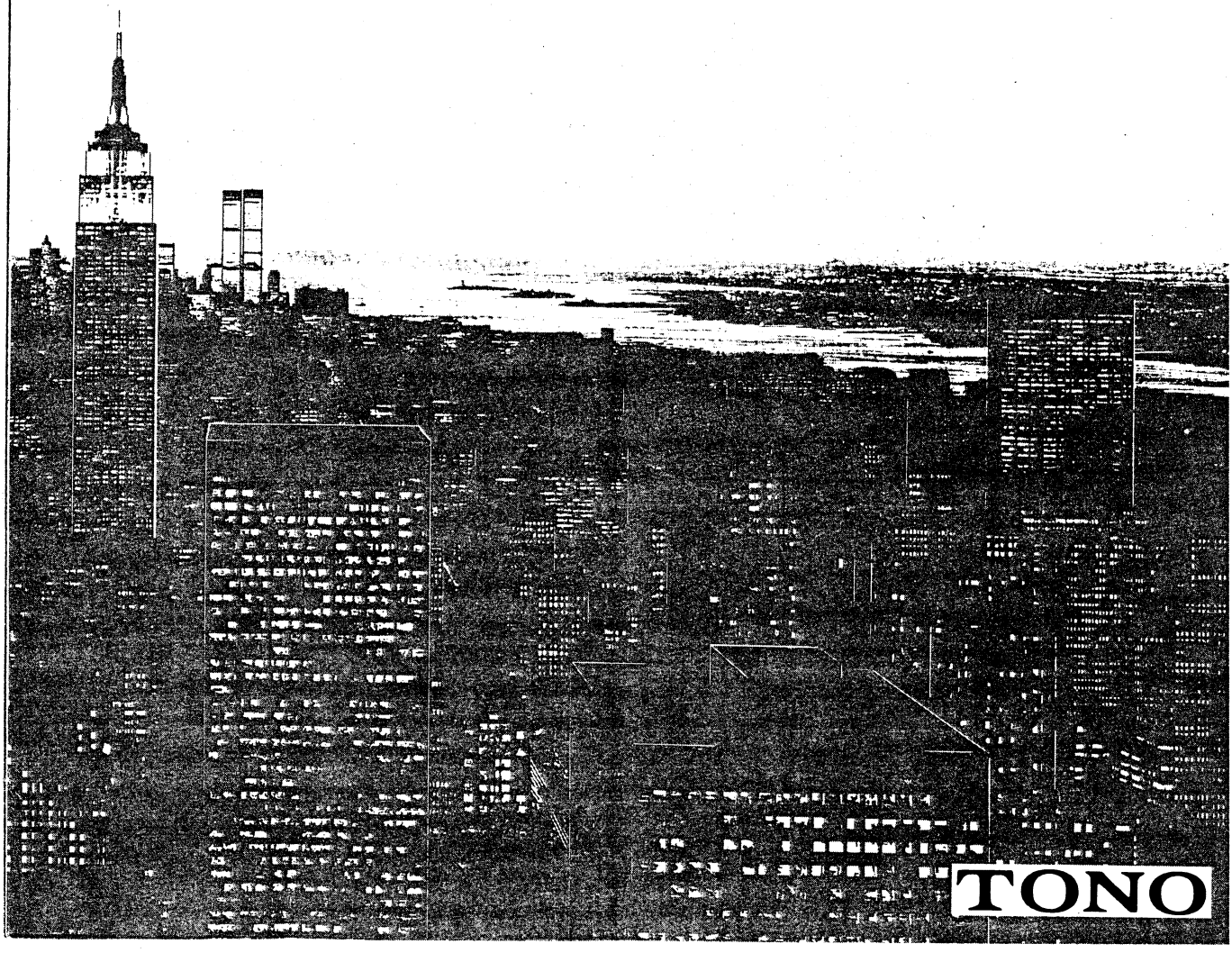
Ⓗ-5000E

INSTRUCTION MANUAL

SECOND ISSUE



PRECAUTIONS

1. Before applying power to the unit, make sure that the AC voltage selector setting corresponds to the operating voltage.

2. The batteries for the memory back-up are not placed in the unit on shipment from factory. Install them on CPU board according to **Battery Replacement** (page 45).

3. WATCH OUT FOR HIGH VOLTAGE!! Pull out the plug of power supply cord before opening the upper case. Do not touch the parts, terminals and the inside of CRT frame.

4. Never open the upper case unnecessarily except when you replace battery, plug in printer cable or make fine adjustment of CRT monitor.

5. It is suggested the unit be placed in a dry place, avoiding direct sun and dust.

6. The unit employs a High-resolution, Long-persistence tube that will not flicker even under fluorescent light.
   Because of this, slight residual images may sometimes appear on the screen when characters move at high speed.

7. The picture may occasionally be disturbed when **RESET** button is pressed-in, however, this will return to normal condition when the **RESET** button is released.

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FEATURES OF THETA-5000E

With the most up-to-date computer technology, just a terminal and keyboard allows complete automatic send/receive of Morse Code (CW), BAUDOT Code (RTTY), ASCII Code (RTTY) and new ARQ/FEC (AMTOR).

Built-in Monitor

5-inch High-resolution green monitor is built-in. The unit also has a provision for Composite Video Signal output.

ARQ/FEC Feature

AMTOR A, B and L communication is possible.

Time Clock built-in

Displays Month, Date, Hour and Minute on the display screen.

Timer Transmission/Receiving Feature

The inner timer enables complete automatic TX/RX.

Selcal (Selective Calling) System

With the feature the unit only receives messages following the preset code.

Built-in Demodulator for High Performance

Newly designed high speed RTTY demodulator has receiving capability of as fast as 300 bauds. Three-step shifts selects either 170Hz, 425Hz or 850Hz shift with manual fine tune control of space channel for odd shifts.
HIGH(Mark Frequency 2125Hz)/LOW(Mark Frequency 1275Hz) tone pair select.
Mark only or Space only copy capability for selective fading.
ARQ/FEC feature newly incorporated.

Crystal Controlled AFSK Modulator

A transceiver without FSK function can transmit RTTY mode by utilizing the high stability crystal-controlled modulator controlled by the computer.

Optoisolator CW, FSK Keyer built-in

Very high-voltage, high-current optoisolator keyer is provided for CW, FSK keying.

Automatic Transmit/Receive Switch

The transmit/receive switch is controlled by the microprocessor. Built-in remote control key function automatically controls the transmit/receive circuitry of the transceiver. Manual operation is also available.

Battery Back-up Memory

Data in the battery back-up memory, covering 72 characters x 7 channels and 24 characters x 8 channels, is retained even when the external power source is removed. Messages can be recalled from a keyboard instruction and some channels can be read out continuously. You can write messages into any channel while receiving.

Large Capacity Display Memory

Covers up to 1,280 characters. Screen Format contains 40 characters x 16 lines x 2 pages.

Screen Display Type-Ahead Buffer Memory

A 160-character buffer memory is displayed on the lower part on the screen. The characters move to the left, erasing one by one as soon as they are transmitted. Messages can be written during the receiving state or the performance with battery back-up memory or SEND function.

Pre-load Function

The buffer memory can store the messages written from the keyboard instead of sending them immediately. The stored messages can be sent with a keyboard command.

"RUB-OUT" Function

You can correct mistakes while writing messages in the buffer memory. Misspellings can also be erased while the information is still in the buffer memory.

"SEND" Function

Sends the transmit text displayed on the screen, including the data stored in every channel of the battery back-up memory, with a command from the keyboard. The messages can be stopped and easily restarted.

Function Display System

Each function (mode, channel, number, speed, etc.) is displayed on the screen.

Wide Range of Transmitting and Receiving

Morse Code transmitting speed can be set from the keyboard at any rate between 5 - 100 WPM (every word per minute). AUTOTRACK on receive.
For communication in BAUDOT and ASCII Codes, rate is variable by a keyboard instruction between 12 - 300 bauds when using RTTY Modem and between 12 - 600 bauds when using TTL level.
The variable speed feature makes the unit ideal for amateur, business and commercial use.

Automatic CR/LF

While transmitting, CR/LF is automatically sent every 64, 72 or 80 characters, as selected.

Cursor Control Function

Full cursor control (up/down, left/right) on the transmitting screen is available from the keyboard.

WORD MODE Operation

Characters can be transmitted by word groupings, not by every character, from the buffer memory with the keyboard instruction.

LINE MODE Operation

Characters can be transmitted by line groupings from the buffer memory.

WORD-WRAP-AROUND Operation

In receive mode, WORD-WRAP-AROUND prevents the last word of the line from spliting in two and makes the screen to be easily read.

Automatic Idle Signal Insertion

Idle signal (letters code) can be automatically inserted in a pause of transmission in BAUDOT-RTTY mode.

"ECHO" Function

With a keyboard instruction, received data can be read and sent out at the same time. This function enables a cassette tape recorder to be used as the back-up memory, for operation just like telex (which uses paper tape).

Test Message Function

"RY" and "QBF" test messages can be repeated with this function.

CW Identification Function

In RTTY mode, keyboard-controlled CW identification is available if required.

MARK-AND-BREAK (SPACE-AND-BREAK) System

Either mark or space tone can be used to copy RTTY.

Variable CW Weights

For CW transmission, weights (ratio of dot to dash) can be changed within the limits of 1:3 - 1:7.

CW Practice Function

The unit reads data from the hand key and displays the characters of the screen. CW keying output circuit works according to the key operation.

CW Random Generator

Output of CW random signal can be used as CW reading practice.

Audio Monitor Circuit

A built-in audio monitor circuit with an automatic transmit/receive switch enables checking of the transmitting and receiving state. In receive mode, it is possible to check the output of the mark filter, the space filter and AGC amplifier prior to the filters.

Printer Interface

Centronics Parallel Comatible interface enables easy connection of a low-cost dot printer for hard copies.

Convenient ASCII Key Arrangement

The keyboard layout is ASCII arrangement. Automatic insertion of LTR/FIG code simplifies operation.

Bargraph LED Meter for Tuning

Tuning of CW and RTTY is very easy with the bargraph LED meter for tuning. Provision has been made for attachment of an oscilloscope to aid tuning. This supplements the tuning bargraph LED and audio monitor provided in the system.

Both AC/DC Usable

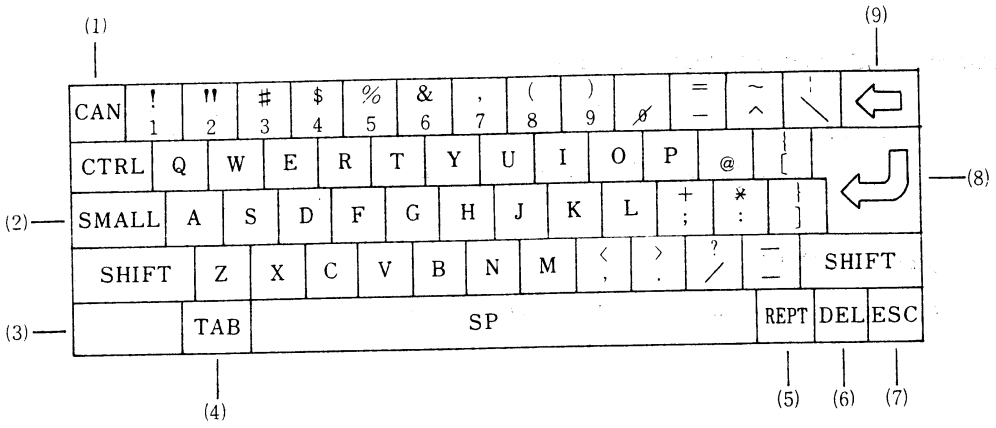
Power Supply is switchable as required; 100-120V AC / 220-240V AC / +13.8V DC.

1. INSTALLATION

1.1 Keyboard Controls

This section will assist you in becoming familiar with the keyboard controls.

Keyboard



(1) "CAN"

1. transmits ホレ in Japanese CW mode. After the transmission the unit selects and locks in Japanese Kana characters.
2. transmits FIG in BAUDOT mode and AMTOR modes.
3. The keystroke "SHIFT-CAN" cancels "⇦" key instructions and returns the unit from the setting state to the ordinary transmit/receive state.

(2) "SMALL"

1. selects European characters in Japanese CW mode.
2. In ASCII and JIS modes, the keystroke switches the selection of capital and small letters.

(3) "UNMARKED (KANA)"

1. In Japanese CW mode, the unit selects Japanese Kana characters.
2. In JIS mode, the keystroke changes the selection of Kana, alphabet, figures and symbols.

(4) "TAB"

1. stops the screen transmission of the data written in Page 2. (PTT is not turned off even when set to PTT=AUTO.)

2. With the keystroke "SHIFT-TAB", on/off of the PTT jack is switched when the PTT jack is set to be manually switched. It inserts automatic stop signal in the buffer and page 2 and turns off the PTT when set to be automatically switched.

(5) "REPT"

a function key for transmission to be used when sending data in battery back-up memory, Page 2, or test messages.

(6) "DEL"

1. transmits $\overline{BT}$ in Japanese CW mode. After the transmission of $\overline{BT}$, the unit selects alphabets.

2. transmits LTR code in BAUDOT and AMTOR modes.

3. The keystroke "SHIFT-DEL" allows correction of data written in the buffer memory, battery back-up memory or Page 2.

(7) "ESC"

The keystroke "SHIFT-ESC" stops transmission immediately. Buffer memory is cleared.

(8) "↵"

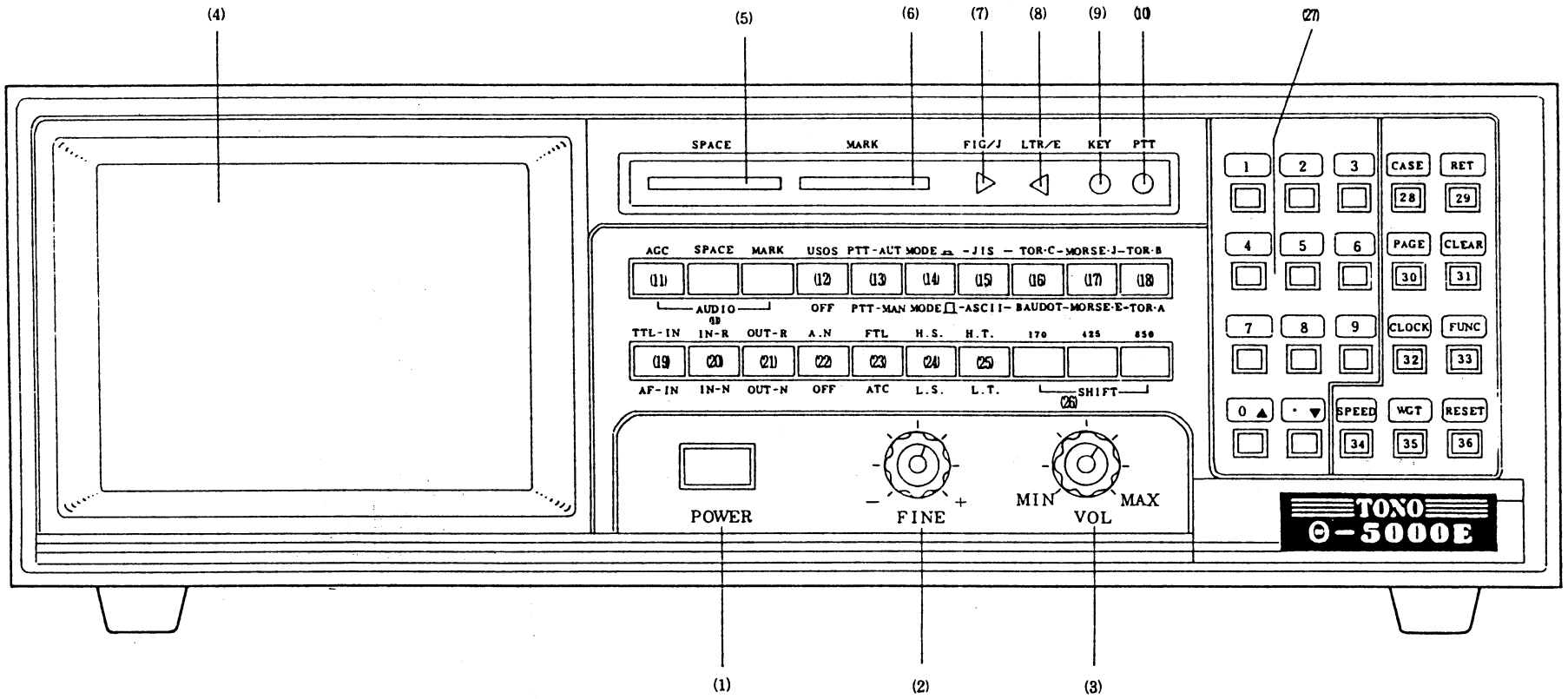
transmits CR and LF.

(9) "⇦"

is a function key used to set various functions or to write in the battery back-up memory and Page 2.

NOTE: Certain keyboard commands require pressing two keys simultaneously. Such commands are denoted in this manual as, for example, "SHIFT-TAB". Other commands require pressing two keys, one after the other, but separately. Such commands are denoted as, for example, "⇦" "C".

Front Panel


(4)
(5)
(6)
(7)
(8)
(9)
(10)
(27)
SPACE
MARK
FIG/J
LTR/E
KEY
PTT
AGC
SPACE
MARK
USOS
PTT-AUT MODE
-JIS
TOR-C
MORSE-J
TOR-B
(11)
(12)
(13)
(14)
(15)
(16)
(17)
(18)
AUDIO
OFF
PTT-MAN MODE
-ASCII-
BAUDOT
MORSE-E
TOR-A
TTL-IN
IN-R
OUT-R
A.N
FTL
H.S.
H.T.
170
425
850
(19)
(20)
(21)
(22)
(23)
(24)
(25)
AF-IN
IN-N
OUT-N
OFF
ATC
L.S.
L.T.
SHIFT
(26)
POWER
FINE
MIN
MAX
VOL
1
2
3
CASE
RET
28
29
4
5
6
PAGE
CLEAR
30
31
7
8
9
CLOCK
FUNC
32
33
0
SPEED
WGT
RESET
34
35
36
TOXO
Θ-5000E
(1)
(2)
(3)

1.2 Front Panel Keyboard Controls

This section will assist you in becoming familiar with the push button controls on the front panel.

(1) POWER switch: controls all power to the unit. (both AC/DC)

(2) FINE tuning: Fine adjustment of the shift width in the RTTY modes or the AMTOR modes.

(3) VOLume: controls the volume of the monitor speaker.

(4) CRT Display

(5) SPACE LED: indicates tuning of the space filter.

(6) MARK LED: indicates tuning of the mark filter.

(7) FIG/J LED: indicates that FIGURE is selected in the RTTY modes ot that Japanese Morse code is selected in the CW mode.

(8) LTR/E LED: indicates that LETTER is selected in the RTTY modes or that European Morse code is selected in the CW mode.

(9) KEY LED: indicates that the keying line is in Mark state when the polarity of transmitting signals are normalized.

(10) PTT LED: indicates that the PTT (Push-to-talk) line is on.

(11) AUDIO button: selects the audio signal sent to the speaker.
AGC button - monitors all incoming audio.
SPACE button- monitors output of the space filter.
MARK button - monitors output of the mark filter.

(12) U.S.O.S. button: controls the UNSHIFT-ON-SPACE feature (ON/OFF).

(13) PTT button: selects MANUAL or AUTOMATIC keying of the PTT line. In the automatic mode, the PTT line activates the transceiver upon presence of characters to transmit (KOX - keyboard operated transmit). In the manual mode it is necessary to press "SHIFT-TAB" in order to key the transceiver PTT line.
Another "SHIFT-TAB" returns the unit to receive.

(14) MODE button: effects upper selection of the mode instruction buttons 15 - 18.

(15) JIS/ASCII: selects JIS mode (Japanese 8-bit RTTY) or ASCII mode. To select JIS mode **MODE** button (14) should also be pressed.

(16) TOR·C/BAUDOT: selects AMTOR modes (A, B or L) in the RTTY system or BAUDOT mode (5-bit RTTY). To select AMTOR modes in the RTTY system **MODE** button should also be pressed. In this event, the RTTY modem can be used for the AMTOR modes.

(17) MORSE·J/MORSE·E: selects Japanese CW mode or European CW mode. To select Japanese CW mode **MODE** button should also be pressed.

(18) TOR·B/TOR·A: selects AMTOR modes used in the CCIR system.

(19) TTL IN/AF IN: selects input terminal. With **TTL IN** selected, input is accepted from an external device connected to the INPUT TTL terminal. With **AF IN** selected, input is accepted from an external device connected to the INPUT AF terminal.

(20) IN-R/IN-N: reverses/normalizes the polarity of incoming signals.

(21) OUT-R/OUT-N: reverses/normalizes the polarity of transmitting signals.

(22) A. N. button: controls the ANTI-NOISE feature.

(23) FTL/ATC: selects FTL (Fixed Threshold Level) or ATC (Automatic Threshold Control). ATC is usually selected.

(24) H.S./L.S.: selects High Speed modem or Low Speed Modem in the RTTY modes (Baudot, ASCII).

(25) H.T./L.T.: [RTTY modes (Baudot, ASCII)]
selects 2125Hz or 1275Hz mark tone. H.T. stands for High Tone (2125 Hz) and L.T. for Low Tone (1275 Hz).
[CW]
autotracks higher speed RX signals (above 50 WPM)

(26) SHIFT buttons: selects shift width of 170Hz, 425Hz or 850Hz.

(27) number push buttons: numbers for command entries such as speed or weight setting.

(28) CASE button: in receiving, selects the alternate "letters" or "figures" character set in the RTTY modes, or between Japanese and European Morse Codes in the Japanese CW mode.

(29) RET button: performs CR and LF on the screen and outputs CR/LF signal to printer.

(30) PAGE button: switches the display betwen available two pages, Page 1 and Page 2. Page 1 is displayed in the initial state.

(31) CLEAR button: clears the buffer, Page 1 and Page 2.

(32) CLOCK button: faciliates time/date set or timer transmission setting.

(33) FUNC button: keys FUNCTION instruction entries.

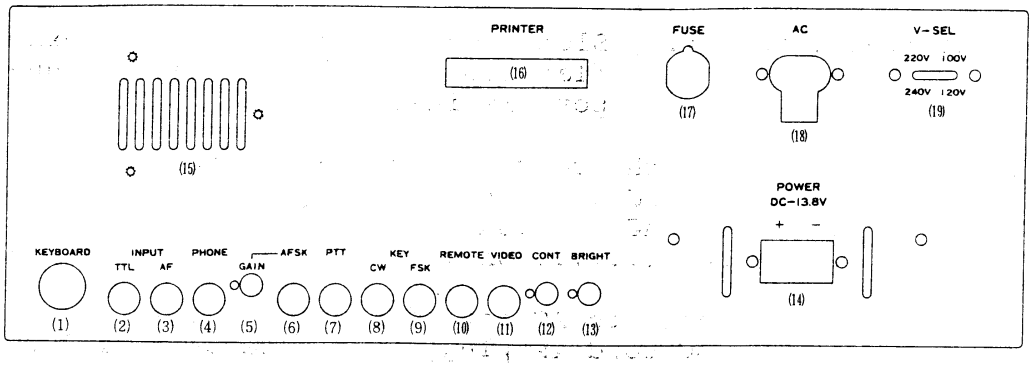
(34) SPEED button: for the speed setting entries.

(35) WGT button: for the weight setting entries. (along with any number Ø through 9)

(36) RESET button: initializes the microprocessor and clears the buffer, Page 1 and keyboard options. The channel memories and Page 2 are not cleared. It is recommended the **RESET** be pressed whenever changing modes.

1.3 Rear Apron Connections

This section will introduce you into the rear apron connections on the unit.



(1) KEYBOARD jack: connected to keyboard.

(2) INPUT TTL jack: This is an input accepting TTL levels for connection of an external terminal unit or key driving the input of the Theta-5000E. Its use is selected from the front panel.

(3) INPUT AF jack: This is an audio input from a transceiver, tape recorder, etc.

(4) PHONE jack: to defeat internal speaker and use external speaker or headphones.

(5) AFSK GAIN control: adjusts the output level of the AFSK jack.

(6) AFSK jack: This is an audio output from the AFSK generator and may be used to feed a transceiver, or tape recorder.

(7) PTT jack: This jack controls the PTT (Push-to-talk) line of the transceiver if desired. It switches on when the unit is in the transmit mode.

(8) KEY CW jack: CW keying jack

(9) KEY FSK jack: RTTY keying jack

(10) REMOTE jack: This is a keying output for use with accessory equipment.

(11) VIDEO jack: Provides a composite video signal for an external CRT (75 ohms).

(12) CONT. control: controls contrast of the display on the built-in CRT.

(13) BRIGHT control: controls brightness of the display on the built-in CRT.

(14) POWER supply: for a 13.8V DC (13.5 - 16V DC) power source. (The AC cord should be disconnected when the DC source is connected to the unit.

(15) built-in speaker to monitor audio signals.

(16) PRINTER cable outlet: Slot provided in cabinet for exit of a flat ribbon cable. Printer connector port is inside the cabinet.

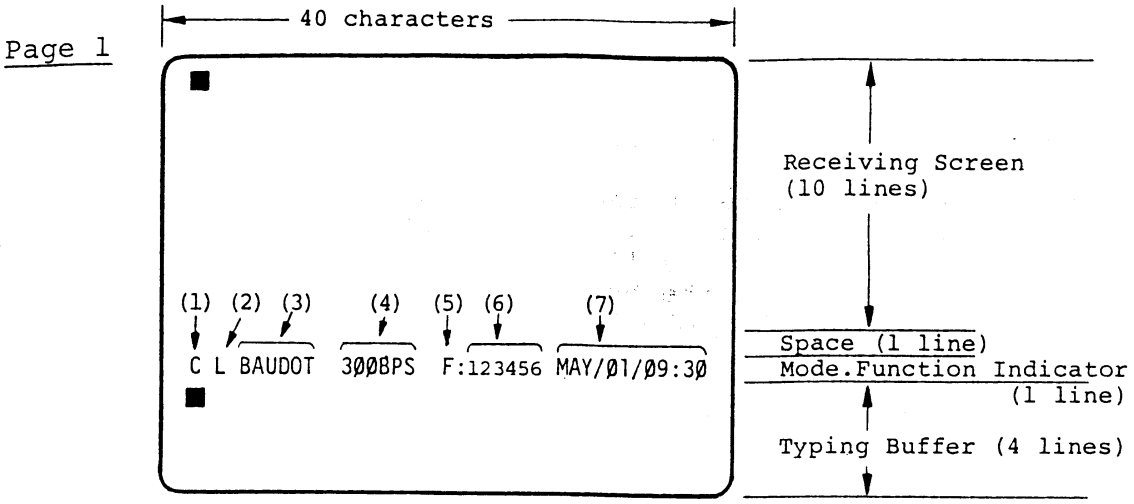
(17) FUSE: replace with the correct size fuse only:
100V/120V AC .... 1A] fuse holder on rear panel
220V/240V AC .. 0.5A
13.8V DC ..... 3A .. fuse holder on power source board

(18) AC cord socket: accepts AC cord for power supply. When the AC cord is plugged in, the unit will not accept power.

(19) V-SEL: AC voltage selector

WARNING: Incorrect voltage setting will cause serious damage to the unit.

1.4 Screen Format



(1) indicates what letters are selected to print.

in Morse mode
E(European CW): prints English characters
J(Japanese CW): prints Japanese kana characters

in other modes than Morse
C(CAPITAL): prints capital letters when not shifted.
S(SMALL) : prints small letters when not shifted.
K(KANA) : prints kana characters.

(2) indicates case of received signal.

in BAUDOT & AMTOR
L: LETTER case
F: FIGURE case

in Morse
E: European CW
J: Japanese CW

(3) indicates which communication mode is selected.

(4) indicates communication speed selected.

in Morse by WPM
in other modes than Morse by BPS (=bauds)

* In AMTOR modes, indicates state of your station (Waiting, Traffic, etc.).

(5) F: : Title for function indicators
number: a channel number to be indicated while accessing a channel memory
X : indicated while accessing page 2.

(6) Function Indicators

1. R: Remote control terminal (REMOTE jack on rear panel) is on. press **FUNC 3**

2. indicates the buffer state;

   none: transmits data character by character "⇦" "C"
   W: transmits data by word groupings "⇦" "W"
   L: transmits data by line groupings "⇦" "L"
   P: loads data in the buffer "⇦" "P"
   (Another keystroke "⇦" "P" releases the data.)

3. E: Echo Back function is activated. press **FUNC 2**
   or "⇦" "E"

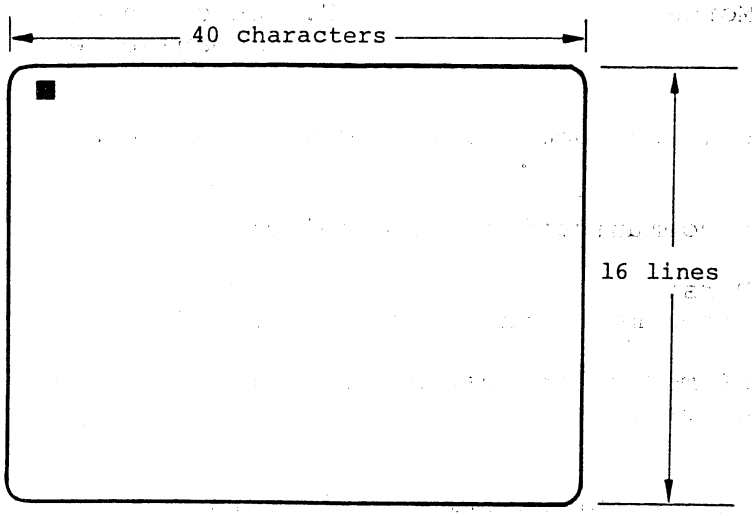
4. T: Timer Transmission feature is activated.
   press "⇦" "T"

   * Presetting of desired transmission time is necessary by pushing buttons **CLOCK** + **.** + 6 digits (for date, hour and minute).

5. S: Selcal function is activated. press "⇦" "S"

6. N: Printer-select is disactivated and the signal is not sent to the printer. press **FUNC 1**
   or "⇦" "N"

(7) Clock



2. CONNECTIONS

Power Supply

The POWER switch of the Theta-5000E should be OFF before the AC cord is plugged into the socket.
DC power requirement is 13.8 Volt (13.5 V - 16 V). Undersized screen display may occur when voltage is too low.

External CRT

The Theta-5000E has a CRT built-in but also has an output to feed an external CRT. TONO's CRT-1200G provides larger screen display especially for this purpose.

Printer

Printers with Centronics Parallel Compatible interface can be connected. The connection will be faciliated by the printer cable model FC-35 designed for the Theta-series units. Carefully removing the upper case of the Theta-5000E, plug the printer cable into CN4 on the CPU board.

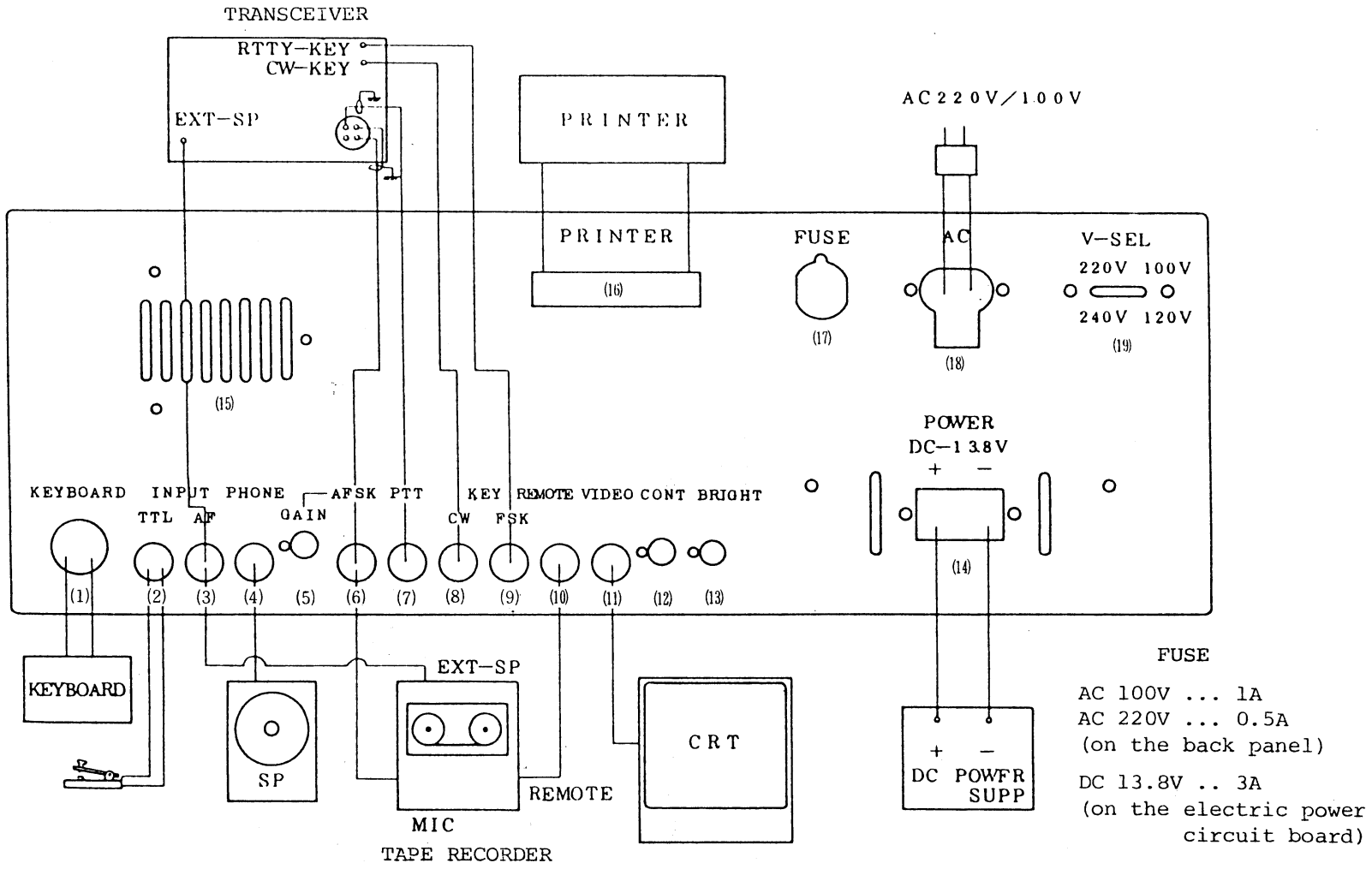
Oscilloscope

An oscilloscope may be used for cross-hatch tuning aid. Carefully remove the upper case of the Theta-5000E, and connect an oscilloscope to J10 and J11 on the PC board. These terminals have an output impedance of 200K ohms, 1.5 Vp-p. An oscilloscope of more than 1-M-ohm input impedance may be used with the unit.

Keyboard

The keyboard should be plugged into the socket on the rear panel of the unit. The POWER switch of the unit should be OFF when the keyboard is connected or disconnected.

Connections to the Peripheral Equipment



FUSE

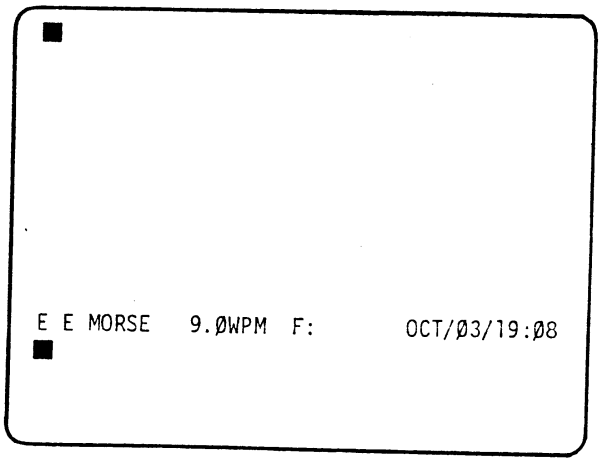
AC 100V ... 1A
AC 220V ... 0.5A
(on the back panel)

DC 13.8V .. 3A
(on the electric power circuit board)

3. OPERATION

3.1 CW (European Morse) Mode

Place **MODE** button unlocked and press **MORSE·J/MORSE·E** button on the front panel to initialize the CW mode. The initial screen indication will be as follows:



Initial Screen Indication in CW mode

Receiving

Practice tuning using VFO (RIT) of the transceiver to the point where the maximum amplitude of the mark LED is achieved. The Theta-5000E automatically tracks the speed and starts decoding when properly tuned. Press **H.T./L.T.** button for AUTOTRACK of higher speeds (above 50 WPM). For lower speeds, this button should not be pressed.

Monitoring

Press one of the **AUDIO** buttons to select signal monitoring.

AGC	monitors signals through the AGC circuit
SPACE	(not applicable in CW)
MARK	monitors signals through the MARK filter

Anti-noise Feature

Press **A.N.** button if noise causes unwanted random-character reception with no existing signals.

Input Selection

Press or release **TTL IN/AF IN** button to select input terminal. Press the button to select TTL IN terminal for an electric keyer or other

TTL level input. Release this button to select AF IN terminal for audio signal input from a transceiver, tape recorder, or other audio device.

Transmission

Automatic/Manual P.T.T. (push-to-talk) line keying

Press **PTT-AUTO/PTT-MAN** button to select automatic P.T.T. line keying. The P.T.T. line is keyed whenever there are characters to transmit. "SHIFT-TAB" unkeys the P.T.T. line.
To select manual P.T.T. line keying, release the button. The P.T.T. line is keyed/unkeyed by the keyboard instruction "SHIFT-TAB".

Buffer Transmission

In the initail state, data is sent character by character. It is also switchable to other manners by the keyboard instructions.

Char. by char.	"⇦" "C"
In word groupings	"⇦" "W"
By line	"⇦" "L"

Weight Setting (Dot to Dash Ratio)

Weight is adjustable in the range of 1:3 - 1:7. Press **WGT** button followed by desired number (Ø through 9) on the front panel.

Speed Fine Tuning

Fine tuning of the speed is achieved by the front panel instruction.

Speed up	[SPEED] + [Ø]
Speed down	[SPEED] + [.]

Speed Setting

On receiving the Theta-5000E autotracks in the range of 5 - 100 WPM (word/minute). Press **H.T./L.T.** button for higher speeds (above 50 WPM). Release the button for lower speeds.
On transmitting the speed is set by number of word per minute. Any speed down to one decimal place can be entered in the range of 5 - 100 WPM. Always use number keys on the front panel of the Theta-5000E. .

eg.	9 WPM =	[SPEED] [9] [.] [Ø]
	63.5 WPM =	[SPEED] [6] [3] [.] [5]
	100 WPM =	[SPEED] [1] [Ø] [Ø]

NOTE: 100 WPM is the maximum CW speed that the Theta-5000E can offer. Any possible screen indication of over 100 WPM does not indicate an actual speed in use.

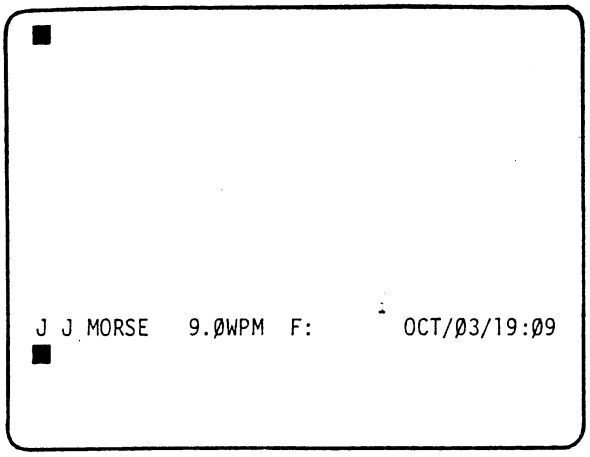
Special Characters

Upon any of the following special characters the Theta-5000E performs CR/LF on the screen and sends CR/LF information to the connected printer.

Special Characters	Screen Display
$\overline{KN}$	(
$\overline{AR}$	+
$\overline{VA}$	*

3.2 CW (Japanese Morse) Mode

Press **MODE** and MORSE·J/MORSE·E buttons to select the Japanese CW mode which is initially set to print English characters. screen indication will be as follows:



Initial Screen Indication in CW(Japanese) mode

To select Japanese kana characters for the contact, press "CAN" to transmit $\overline{\text{ホレ}}$. Japanese kana characters are also selected on reception of $\overline{\text{ホレ}}$ code.

The output of $\overline{\text{BT}}$ by pressing "DEL" or receiving $\overline{\text{BT}}$ code returns the unit to print English characters.

The switching of alphabets/kana characters can be made without transmission of $\overline{\text{ホレ}}$ or $\overline{\text{BT}}$ by performing the following keystrokes;

"UNMARKED (KANA)"	selects Japanese kana characters for printing
"SMALL"	selects alphabets for printing

When receiving, pushing button **CASE** or the keystroke "⇦" "K" enables the English/kana characters switching function.

Judging of $\overline{\text{BT}}$ and ✗

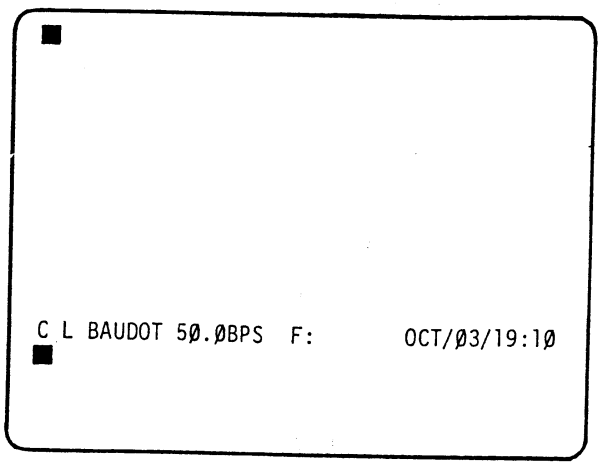
When '-...-' code is received in Japanese CW mode, the unit cannot judge which signal of $\overline{\text{BT}}$ or ✗ is sent since both two signals correspond to the code.

With the push button **USOS**, the unit judges the code to be ✗ and locks in printing Japanese kana characters. So prelock **USOS** button to keep your contact in Japanese kana characters. With **USOS** button unlocked, the unit judges the code to be $\overline{\text{BT}}$ and changes to print English characters.

3.3 Baudot (RTTY) Mode

Connection should be made between the RTTY or FSK terminal of the transceiver and FSK jack of the Theta-5000E. In the absence of RTTY or FSK modes, use LSB (AFSK) and connect microphone terminal to the AFSK jack of the Theta-5000E.

Place **MODE** button unlocked and press **BAUDOT** button on the front panel to initialize the Baudot Mode. The initial screen indication will be as below:



Initial Screen Indication in BAUDOT mode

MARK Tone

Set the mark tone frequency **H.T./L.T.** button on the front panel. H.T. stands for High Tone (2125 Hz), and L.T. for Low Tone (1275 Hz). The button locks (H.T.)/unlocks (L.T.) by pressing.

SHIFT Width

Set the shift width by pressing **SHIFT** buttons as desired. 170Hz shift width is most common in amateur bands, and 425Hz and 850Hz are common in commercial bands.

Transmission from Buffer

In the initial state, data is sent character by character. It is also switchable to other formats by the keyboard instructions.

Char. by char.	"⇦""C"
In word groupings	"⇦""W"
By line	"⇦""L"

Reverse/Normalize the Polarity of TX/RX Signals

Polarity of TX/RX signals is switchable by the push buttons.

Transmission	Lock/unlock **OUT-R/OUT-N** button *1
Reception	Lock/unlock **IN-R/IN-N** button

Input Jack Selection

Input jack is selectable by pressing/releasing **TTL IN/AF IN** button on the front panel.

Automatic/Manual PTT (push-to-talk) line keying

Press **PTT-AUTO/PTT-MAN** button to select automatic PTT line keying. The PTT line is keyed whenever there are characters to transmit. "SHIFT-TAB" unkeys the PTT line.
Place the button released to select manual PTT line keying. The PTT line is keyed/unkeyed by the keyboard instruction "SHIFT-TAB".

Audio Monitor Selection

Press one of the **AUDIO** buttons to select signal monitoring.

AGC	monitors signals through the AGC circuit.
SPACE	monitors signals through the SPACE filter.
MARK	monitors signals through the MARK filter.

Character Setting

The alternate "letters" or "figures" character set is selectable by pressing **CASE** button on the front panel. "⇦" "K" also selects the same setting.

Automatic CR/LF Insertion

CR/LF is automatically inserted by the keyboard instruction.

no automatic CR/LF insertion	Press "⇦" "R" "Ø"
64 characters after last CR/LF	Press "⇦" "R" "1"
72 characters after last CR/LF	Press "⇦" "R" "2"
80 characters after last CR/LF	Press "⇦" "R" "3"

Speed Setting

Speed may be set as desired in the range of 12-600 bauds. 45.5, 50, 56.9, 74.2, 100, 110, 150, 300 and 600 bauds are most commonly used. Among those rates, 45.5 bauds is most commonly used in amateur bands, and 50 bauds is common in commercial use. Always use number keys on the front panel of the Theta-5000E for speed setting. Three significant figures including decimal place may be entered, such as:

100 bauds = [SPEED] [1] [Ø] [Ø]
45.5 bauds = [SPEED] [4] [5] [.] [5]
50 bauds = [SPEED] [5] [Ø] [.] [Ø] *2

Diddle Feature

The "LETTERS" shift character will be transmitted while the keyboard is idle in order to keep the receiver in synchronization or to keep the threshold level of the ATC circuit in the demodulator at a fixed level.

Unshift-on-Space

This function causes the unit to return to the "LETTERS" mode upon receipt of a space character. It is very useful when noise causes case errors.
The feature turns by pressing and releasing the U.S.O.S. button.

CW ID

The keystroke "REPT" "I" transmits CW identification. The identification code should be previously written in Channel #E.

Speed Find Adjustment

Fine adjustment of the transmitting speed is achieved by the front panel instruction.

Speed up	[SPEED] [Ø]
Speed down	[SPEED] [.]

*1 NOTE: Some transceivers have different polarity setting of FSK TX signals than others.

Examples: DRAKE, TRIO-KENWOOD transceivers: use OUT-R
ICOM, YAESU transceivers: use OUT-N

*2 NOTE: "Ø" must be entered after the decimal point when a two-figure speed is selected.

Receiving Operation

1. Place your transceiver in the RTTY mode (for most transceivers, this is LSB).

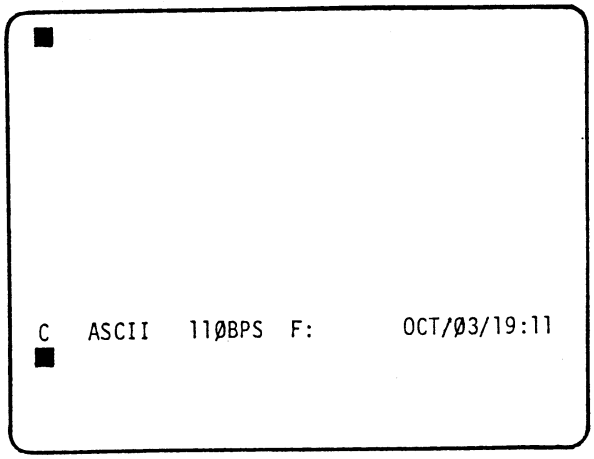
2. Practice tuning using VFO (RIT) of the transceiver from lower level to the second point where the mark LED illuminates.

3. Tune using FINE control to the point where the maximum amplitude of the space LED is achieved. If the space LED does not illuminate, press the **SHIFT** buttons from 170Hz to 850Hz to get it to illuminate, and then tune using FINE control.

4. If a meaningful screen display is not achieved when both mark and space LEDs illuminate, try changing the polarity. If this does not work, speed adjustment is needed. Any signals that cannot be received successfully with any speed/polarity are probably encoded.

3.4 ASCII (RTTY) Mode

Place **MODE** button unlocked and press **JIS/ASCII** button to initialize the ASCII mode.
Operational procedures and functions are the same as in BAUDOT mode.



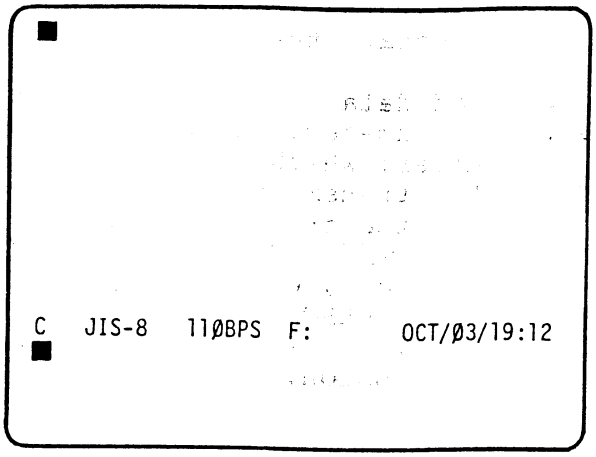
Initial Screen Indication in ASCII mode

Capital letters / Small letters Switching

'C(Capital)' at the left end of the screen indicates that capital letters are selected to print. In the same manner, 'S(Small)' indicates that small letters are selected.
Press "SMALL" to switch from capital letters to small letters, and vice-versa.
In either mode, the numbers and symbols are printed the same.

3.5 JIS (RTTY) Mode

Press **MODE** and **JIS/ASCII** buttons to initialize the RTTY (JIS) mode. Operational Procedures and Functions are the same as in the BAUDOT mode.



Initial Screen Indication in JIS mode

The JIS mode is initially set to print English characters. The keystroke "unmarked(KANA)" selects Japanese Kana characters. Only one size Kana characters are available, so "SHIFT" or "SMALL" keyboard instructions have no effect. Another "(KANA)" keystroke returns the unit to English characters, and "SHIFT" keystroke again becomes effective to change capital letters and small letters.

Screen Indications

C (English, Capital letters)

S (English, Small letters)

K (Japanese Kana Characters)

Preloaded Buffer Transmission

The Theta-5000E has a 160-character type-ahead buffer memory.

Enter "⇦" "P" to preload data in the buffer. "F: P " will be indicated in the screen parameter. Data entered from the keyboard will be loaded in the buffer, which can be visually checked on the screen. Another "⇦" "P" transmits the data and deactivates the feature upon completion of the transmission. The transmission may be halted by the keystroke "⇦" "P". If you wish to transmit the rest of the data after the halt, enter another "⇦" "P". The buffer is cleared when "SHIFT-ESC" is entered. "SHIFT-DEL" is effective for error correction, as long as the error is still in the buffer, prior to transmission.

Preloading status entry	"⇦" "P"
To transmit preloaded data	"⇦" "P"
To halt transmission	"⇦" "P"
To continue transmission after halt	"⇦" "P"
To clear the buffer	"SHIFT-ESC"
Error correction	"SHIFT-DEL"

Channel Memory Transmission

The Theta-5000E has 15 battery back-up memory channels. The allocation is:

Channel #1	72 characters
	NOTE: In mode A (ARQ) or Mode B (FEC) of AMTOR, Channel #1 is used as system memory.
Channel #2,3,4,5,6,7	72 characters
Channel #8,9,Ø	24 characters
Channel #A,B,C,D	24 characters (for Selcal data)
Channel #E	24 characters (for CW ID, Selcal Answer-back, QBF test message, etc.)

1. Programming

Press "⇦" "M" and then enter a number or letter from the keyboard to select a channel. The channel number or letter will be indicated on the screen. Enter message and press "⇦" at the end.

Programming	"⇦" "M" + (channel) + (message) + "⇦"
Error Correction	"SHIFT-DEL"

2. Transmission

Press "REPT", then the desired channel number (letter), and then the number of times of transmission. When memory call instruction is given, the channel and the number of repetitions will be entered in the buffer or page 2. The channel will be indicated on the scre screen.

"REPT" + (channel) + number of times to be transmitted

NOTE: Programming is not possible during channel transmission.

Screen Page Transmission

The Theta-5000E offers two screen pages: Page 1 is reserved for interactive communications, and Page 2 may be used for composition of text longer than 160-characters. Data from the type-ahead buffer or memory channels may also be interspersed in the text.

1. Programming

Call Page 2 on the screen by the keystroke "⇦" "2" or the front panel instruction **PAGE**. Press "⇦" "X" and enter text. "X: " will be indicated on the screen. Channel memories ("REPT" + channel + number of times) may be inserted in the text. Press " " after loading the message.

Cursor Control	home (starting) position	"CTRL-Q"
	up	"CTRL-W"
	down	"CTRL-Z"
	left	"CTRL-A"
	right	"CTRL-S"
Error Correction	"SHIFT-DEL"	
Halt or stop-off	"TAB" (Screen indication: P) The P. T. T. line remains keyed when set at PTT-AUTO.	
	"SHIFT-TAB" (Screen indication: S) The P. T. T. line gets unkeyed when set at PTT-AUTO.	

2. Transmission

The keystroke "REPT" "Z" starts transmission at the home position of Page 2. The screen indication will be "X: ".

If you wish to start transmission at a place other than the home position, move the cursor to the place. "REPT" "X" starts transmission. The screen indication will be "X: ".

The transmission stops wherever P or S signals have been inserted. The keystroke "REPT" "X" restarts transmission from P or S. "F: " will be indicated in the screen parameter while stopping and "X: " after transmission restarts.

Transmission from home position	"REPT" "Z"
Transmission from other position	"REPT" "X"
Restart after halt	"REPT" "X"
To move the cursor home	"⇦" "Q"

Echo Back Transmission

The Theta-5000E can receive and simultaneously retransmit data from an external device. The input should be either AF (eg.: signals recorded on cassette tape) or TTL (eg.: electric keyer signals.) Select input terminal using **TTL IN/AF IN** button on the front panel. The keystroke "⇦" "E" activates/deactivates the feature.

NOTE: This feature is not available in the AMTOR modes.

Test Messages

"REPT" "Q"	QBF	THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG 123456789Ø DE (data memorized in Channel #E)
"REPT" "Y"	RY	RYRYRYRYRYRYRYRYRYRYRYRYRYRY.....
"PEPT" "R"	CW random feature for CW practice	

Any keystroke will stop the QBF, RY, or CW random signals.

5. SPECIAL FEATURES

Selcal (Selective Calling) System

This is a system for receiving certain calls selectively among many other incoming calls. With this system, the Theta-5000E decodes calls only when they accompany a set of signals previously agreed upon. In other words, all the calls at a frequency will be ignored except the ones with "password" (selcal) signals.

Two selcals are required for a station; one to open and another to close a contact. It is prerequisite for the system to store the selcals in channel memory.

NOTE: The selcal feature described here is not available in the AMTOR modes. In AMTOR, a different form of selcal is used.

1. Selcal programming

Channel	A	B	C	D	E
	Opening Selcal of other station	Closing Selcal of other station	Opening Selcal of your station	Closing Selcal of your station	Answer-back

Follow the procedure of programming in channel memories.

NOTE: The code for Opening Selcal of your station must be different from the Answerback code.

2. The keystroke "⇦" "S" activates the selcal feature. (The screen indication is F: S.) Any data entered from the keyboard will be written in the buffer and may be sent, although nothing will be written in Page 1 nor transmitted to printer.

3. Upon receipt of the proper selcal, the Theta-5000E starts decoding and keys the REMOTE line for external equipment such as a tape recorder. Upon receipt of the closing selcal it unkeys the REMOTE line, keys the P.T.T. line temporarily to send Answerback.

4. Another "⇦" "S" deactivates the feature.

Timer Transmission

This feature enables to send a message without an operator's attendance. *

1) The message must be entered in Page 2 in advance. Press "SHIFT-TAB" to enter S at the end of the text.

2) Enter the time and date you wish to send the message. The instruction format is "." and six digits.

   Example: 8:05 a.m. of the 25th date of the month

   CLOCK + "." "2" "5" "0" "8" "0" "5"

   date hour minute

3) Set at PTT-AUTO and press "⇦" "T". (The screen indication is F: T .) The transmission will be made automatically at the scheduled time and date.

4) Upon completion of the transmission, 'T' on the screen will disappear and the feature will be deactivated.

5) To cancel the function at any time before transmission, press "⇦" "T" again.

   * **NOTE:** FCC regulations require that an operator be present when an amateur station is used for transmitting.

6. AMTOR MODE

6.1 Basic Theory

A conventional RTTY signal consists of one start bit, five data bits and one stop bit. A start bit can synchronize the receiver decoding. Each signal can be separated from the following signal by a stop bit. However, there are some problems in this convenient start/stop system. Any noise or other interference which reverses the polarity of the receiving data bits results in misprinting. The start/stop bit can cause errors when mutilated. There is no way to confirm whether or not transmitted signals are decoded correctly by the distant receiver.

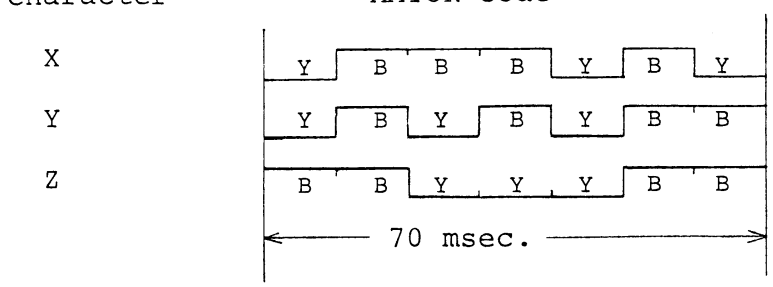
The Amtor system was developed to improve the conventional system. The basic concept of AMTOR is to ensure that an error in the received signal will not cause an error in printing. This is achieved by transmitting extra information together with the data, if any. In this system a character is constructed with seven data bits, instead of five. Four bits are of one polarity (B, High frequency) and the rest are of the other (Y, Low frequency). There are 35 possible combinations of seven bits, and 32 of them are translated to the standard RTTY characters. The remaining three combinations are used as special control signals. Any received signal other than 4B3Y ratio is to be processed as an error.

The AMTOR system consists of three different modes. They are: Mode A (ARQ, Automatic ReQuest), Mode B (FEC, Forward Error Correction) and Mode L (Listen to the ARQ contact).
Mode A is used for communication between two specified stations, in conjunction with a special selcal system. Mode B is for transmission to a large number of stations. It can be used for broadcast messages such as news or CQ calls. With mode L one can monitor mode A (ARQ) communication between two other stations.
In mode A, upon receipt of an error, the receiver automatically requests the transmitter to repeat the same signal till it is decoded correctly. In mode B, seven-bit characters are transmitted twice and the distant receivers select which of the two is of the 4B3Y ratio. Thus communication with the AMTOR system is considerably more reliable than conventional RTTY communication.

Data Construction

A character consists of seven data bits. Four bits of them are of B (High frequency) and the three are of Y (Low frequency). When any signal other than 4B3Y ratio is received, the receiver automatically requests the sending station to repeat the signal. It takes 70 msec. to transmit a seven-bit character at the speed of 100 bauds.

example of the construction



The Theta-5000E employs two AMTOR systems; one is described in the CCIR476-2*, and the other is based on the RTTY system.

1. CCIR System (The system described in the CCIR476-2)

   This system is exclusive for ARQ/FEC codes with B frequency 1785 Hz and Y freq. 1615 Hz.

2. RTTY System (The system based on the RTTY system)

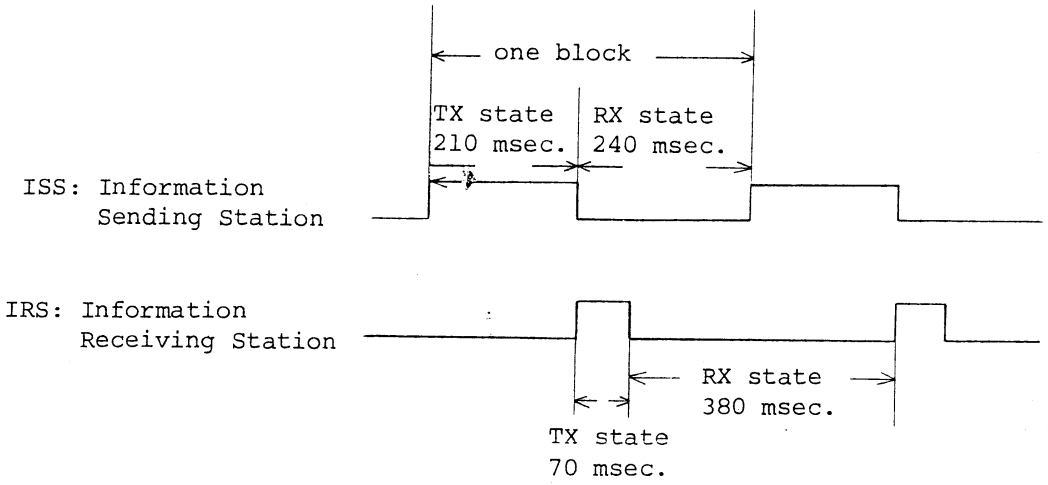
   Works with Y freq. 1275 Hz and 2125 Hz, and Shift width 170 Hz, 425 Hz and 850 Hz which are used in the RTTY mode.

The unit employs different modems for the two systems.

* CCIR476-2: An item described in the recommendation of the International Radio Consultative Committee. The content is on the system for marine communications of professional stations. The AMTOR modes are made by arranging this recommendation for amateur use.

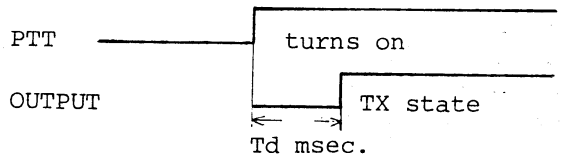
6.2 Mode A (ARQ, Automatically ReQuest)

In AMTOR mode A, 450 msec. is considered as one block. During a block a group of three seven-bit characters (210 msec.) is transmitted serially, and then the transceiver switches to the receiving state for 240 msec. to receive a seven-bit control signal. The control signal determines next group of three characters to be transmitted.



In case there is any signal detected to be an error, the same block will be retransmitted till it is decoded correctly. No error will be printed. Signals are transmitted block by block as shown above.

The relation between the PTT keying and the transmission is as follows:



The PTT line is keyed Td msec. before the beginning of transmission. The time delay, "Td" can be varied by 2 msec.-step from 7 msec. through 43 msec. Td is indicated in the leftmost of the status indicating line on the screen. With the keystroke "⇦" + "V", Td is decreased by 2 msec.-step. The initial value is set on 19 msec. Set Td in accordance with the time which is required for transmit/receive changeover of your transceiver. This delay time remains stored after the power off, provided that CH1 is not used in the modes other than AMTOR.

Some terms should be defined before discussing the operation in detail.

Master Station (MS): the station that starts the communication. (It does not mean who is sending data at any one time, but only who begins the contact.)

Slave Station (SS) : the station that is called by the MS.

Information Sending Station (ISS): the station that is generating or sending data at a given moment. The term "transmitter" may also be used.

Information Receiving Station (IRS): the station that is receiving and printing data at a given moment. The term "receiver" may also be used.

The relation between the MS and the SS does not change even when the MS becomes IRS and vice versa.

Select mode A in accordance with either CCIR or RTTY standards. The communication starts when a station (MS) calls the distant station (SS) with its selcal. Only the station whose selcal corresponds with the one transmitted is able to respond. If "CQCQ" is used instead of any particular selcal, anybody can respond to the CQ call. On receiving its own selcal, the SS sends back the control signal. Signals are transmitted in the following procedure.

example To transmit "TNX FER UR CALL"

The transmitter sends the first three-character block "TNX". The receiver replies with one control signal that says either, "Correctly received. Send the next three " or " Missed the group. Send it again."

During pauses in the keyboard typing or when signals fade out, idle signals are transmitted to maintain synchronization.

In case the signal fades out and nothing is received for more than 32 blocks while the MS is ISS, the MS automatically returns to PHASING state and the SS switches to WAITING state to regain synchronization. Similarly, if the same thing happens while the SS is ISS, the SS switches to WAITING state and the MS returns to PHASING state. As soon as getting synchronized, the SS returns to transmitting state and the MS does to receiving state.

The MS sends a combination of "+" and "?" to finish its transmission. On receiving it, the SS takes its turn to transmit. End of a contact is always initiated by the ISS by pressing "SHIFT-TAB". The keystroke "REPT" "W" returns only ISS to the WAITING state. (Refer to Operation Table P. 40)

When IRS has necessity of transmitting message while ISS is still transmitting the data, the changeover of ISS/IRS role will be performed by the keystroke "REPT" "/". Careful attention should be paid to use this function.

How to Form and Store Selcal for Mode A Operation

In order to operate in mode A, it is necessary to use selcal system and you should memorize selcals in advance as follows:

selcal of your station ..... enter "⇦" "H" "four letters"
selcal of other station of
your intended mode A contact .. enter "⇦" "U" "four letters"

A selcal for the AMTOR communication consists of four capital letters* and is usually formed combining the first letter together with the last three letters of a call sign. Thus the selcal for JI1ZNZ should be "JZNZ".

* NOTE: Numbers are not to be used.

6.3 Mode B (FEC, Forward Error Correction)

In mode B signals are transmitted unilateraly by one station to any number of stations. Transmit/Receive changeover is not performed.

Set the unit in mode B in accordance with the Mode Selection. The sending station transmits continuously at the speed of 100 bauds. Signals are transmitted in the following procedure.

example To transmit "ABCDEF.*.GHI (* ... stands for typing pause)

$\overline{\text{PH2}}$ $\underline{\text{PH1}}$ $\overline{\text{PH2}}$ $\underline{\text{PH1}}$ $\overline{\text{A}}$ $\underline{\text{PH1}}$ $\overline{\text{B}}$ $\underline{\text{PH1}}$ $\overline{\text{C}}$ $\underline{\text{A}}$ $\overline{\text{D}}$ $\underline{\text{B}}$ $\overline{\text{E}}$ $\underline{\text{C}}$ $\overline{\text{F}}$ $\underline{\text{D}}$ $\overline{\text{PH2}}$ $\underline{\text{E}}$ $\overline{\text{PH2}}$ $\underline{\text{F}}$ $\overline{\text{G}}$ $\underline{\text{PH1}}$ $\overline{\text{H}}$ $\underline{\text{PH1}}$ $\overline{\text{I}}$

PH1 and PH2 represent idle signals. They are transmitted regularly at the start of each contact and every 32 characters for synchronization. They are also sent when signals fade out temporarily. Each seven-bit character is transmitted again in five signals, so that the receiver can select which of the two passes the 4B3Y ratio test.

A keyboard instruction "SHIFT-TAB" ends a contact, then both ISS and IRS return to the initial state. Only ISS returns to the WAITING state by the keystroke "REPT" "W".

6.4 Mode L (Listen to ARQ)

In mode L the Theta-5000E can monitor an ARQ contact between two other stations. This mode is used only for receiving.

While monitoring in mode L, you may receive a meaningless four-letter combination repeatedly. This, however, does not always mean an error. Most of the time these four letters are the selcal of the SS being called by a MS. The phenomenon often occurs when you monitor two stations that are trying to get synchronized.

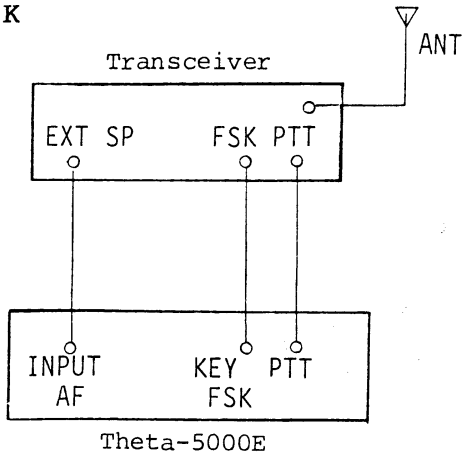
example of the screen display

ZNZ J ZNZ J ZNZ J ZNZ J

The head letter of the selcal is printed between two spaces. Thus the selcal of the above example should be read "JZNZ".

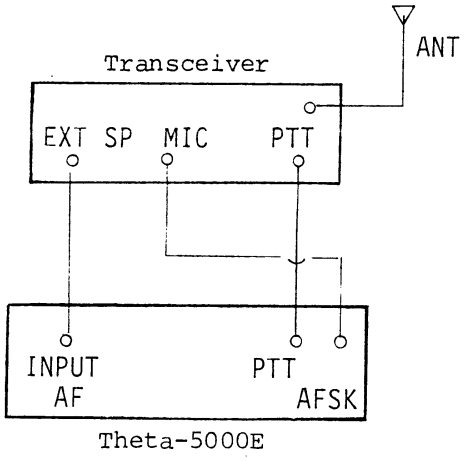
6.5 Connections

FSK



1) Emitted frequency is based on the FSK generator of your transceiver.
2) The FSK connection should be made the same as for RTTY (Baudot & ASCII).
3) Connect the PTT jacks of your transceiver and the Theta-5000E.

AFSK



1) The tone pair exclusive for ARQ/FEC codes, and both Low tone and High tone pair for RTTY use are available.
2) The connections should be made the same as for RTTY (Baudot & ASCII).
3) Connect the PTT jacks of your transceiver and the Theta-5000E.

FSK, CW OUT and AFSK OUT

LO tone, Shift Width 170 Hz

SENSE: OUT-N

Signal	B B B	Y Y Y	B
AFSK OUT	1445 Hz	1275 Hz	1445 Hz
FSK KEYER	ON	OFF	ON
CW KEYER	OFF	ON	OFF

SENSE: OUT-R

Signal	B B B	Y Y Y	B
AFSK OUT	1275 Hz	1445 Hz	1275 Hz
FSK KEYER	OFF	ON	OFF
CW KEYER	ON	OFF	ON

6.6 Operation

Mode Selection

Follow the procedure below to select each AMTOR mode:

CCIR System

Mode A (ARQ)

Place **MODE** button unlocked and press **TOR-B/TOR-A** button, **FUNC** and **7** buttons to initialize mode A. "TOR-A S WAIT" will be displayed on the screen. TOR-A indicates that the mode A of AMTOR is selected. S stands for Slave and WAIT for waiting status.

NOTE: It is not necessary to press **FUNC** and 7 buttons if "TOR-A" is already displayed on the screen.

Mode L (Listen to ARQ)

Place **MODE** button unlocked and press **TOR-B/TOR-A** button, **FUNC** and **9** buttons to initialize mode L. Screen indication will be "TOR-L WAIT".

NOTE: It is not needed to press **FUNC** and 9 buttons when "TOR-L" is already displayed.

Mode B (FEC)

Press **MODE** and **TOR-B/TOR-A** buttons to initialize node B. "TOR-B WAIT" will be displayed on the screen.

RTTY System

On each mode, press **MODE** and **TOR-C/BAUDOT** buttons first and then follow the procedure below:

Mode A

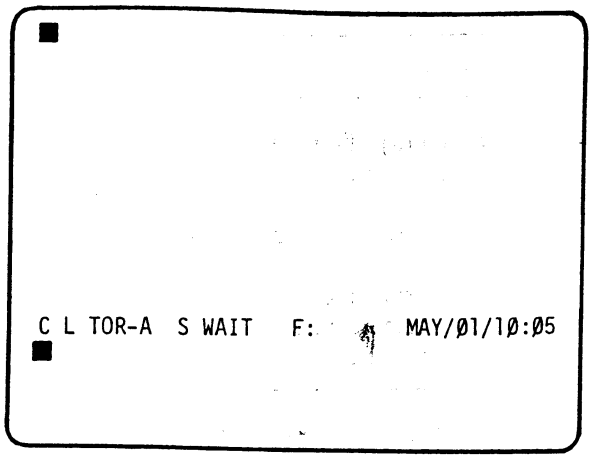
Press **FUNC** and 7 buttons on the front panel. "TOR-A S WAIT" will be displayed.
When mode B signal comes during mode A operation of RTTY system, the Theta-5000E automatically becomes receiving state of mode B signal, and automatically returns to mode A state when the mode B signal is not received. The unit becomes transmitting state of mode A with the keystroke "REPT" "G" even while the mode B signal is received. Receiving of mode A signal takes priority of receiving of mode B signal.

Mode B

Press **FUNC** and **8** buttons. Screen indication will be "TOR-B WAIT".

Mode L

Press **FUNC** and **9** buttons. Screen indication will be "TOR-L WAIT".



Initial Screen Indication in AMTOR modes

Introduction to the screen indicators Example (See illustration above):

TOR-A indicates which AMTOR mode is selected. TOR-A is for mode A, TOR-B for mode B and TOR-L for mode L.

S indicates that your station is Slave in mode A. Indication will change to "M" when you are Master. Reversed character indicates that you are ISS and normal one indicates that you are IRS.

WAIT displays the status in the AMTOR modes. The indication will change automatically corresponding to the status as follows:

in mode A

Indication	Status
WAIT	Waiting for a call from a distant station. (the initial state in mode A)
PHASE	Master station is calling Slave station with its selcal to achieve synchronization.
U.PHA	Slave station is under phasing and sending back a control code responding to the call from Master station.
TRAFF	Transmit/receive state between the Master and Slave
IDLE	Transmitting or receiving idle signal. It starts idling when transmission is broken for any reason.
RQ	ISS is requested by IRS to repeat the data.
ERR	Not able to decode received data or control signal.

in mode B

Indication	Status
WAIT	Waiting for a call from a distant station. (the initial state in mode B)
TRAFF	In transmit or receive in mode B
IDLE	Transmitting or receiving idle signal when transmission is broken for any reason. (refer to 7.3)

NOTE: When you are ISS, reversed "T" appears next to TOR-B.

in mode L

Indication	Status
WAIT	Waiting for receiving signals. (the initial state in mode L)
TRAFF	Receiivng contact between ARQ stations.
IDLE	Receiving idle signal sent when transmission is broken for any reason (refer to 7.2)
RQ	Receiving three continuous "RQ" signals.
ERR	Receiving the same three-character-block.

Operation Table

To enter your own selcal	"⇦" "H" + four letters	Press "⇦" "H", then enter your own four-letter selcal. First four letters are valid when more than five letters are entered.
To enter selcal of other ARQ station	"⇦" "U" + four letters	Press "⇦" "U", then enter the selcal of your intended receiver. First four letters are valid when more than five letters are entered. Refer to How to form and store AMTOR selcal for details.)

Example: to complete selcal entry of other ARQ station "JZNZ"

Press "⇦" "U" "J" "Z" "N" "Z"

To transmit selcal of other ARQ station	"REPT" "G"	This instruction enables Master station to start sending other ARQ station's selcal and keeps on calling until synchronized. The indications are: Master station PHASE Slave station U.PHA
To switch transmit/ receive role (ISS/IRS change)	"SHIFT-+" + "SHIFT-?"	To switch transmitting and receiving role. ISS should send '+' and '?'. Upon receipt of these two signals, IRS becomes ISS and vice versa.
(achieved only by IRS)	"REPT" "/"	To switch transmit/receive role before ISS completes its transmission. IRS transmits ISS/IRS changeover code to ISS. Upon ISS's receipt of the code, IRS becomes ISS and vice versa.
To end a contact	"SHIFT-TAB" or "REPT" "W"	returns both ISS and IRS to the waiting status (indication=WAIT) returns only your station to the waiting status.
To display your own selcal memorized	"REPT" "H"	displays your own selcal.
To display selcal of other ARQ station	"REPT" "U"	displays selcal of your intended ARQ station.

NOTE: Before entering operation in mode A, you should verify with the instruction "REPT" "H" and "REPT" "U" that newly memorized selcals are stored properly.

Other transmission related functions activated by the keystrokes "REPT" + "Y", "REPT" + "X", "REPT" + "Z" or "⇦" + "P", "⇦" + "T" are all available in the AMTOR mdoes. (See External Keyboard Controls and Commands for details.)

When your station is being called by a distant station in mode A and can not synchronize with it in spite that;

Your selcal is memorized correctly
Both Mark and Space LED bargraph meters illuminate
Cross-Hatch shows proper form

the polarity of the incoming signal may be reversed. Reverse the polarity of receiving by pressing or releasing IN-R/IN-N, and see if this results in synchronization.

When the screen indication says "U.PHA" for a while, the polarity of the output signal may be reversed. Reverse the polarity of transmission (OUT-R/OUT-N).

Similar problems in mode B or mode L may be solved in the same manner.

NOTE:

1. In each AMTOR mode, Channel 1 of battery back up memory is used as system memory, so it not available as message memory.
2. Operate transceivers in USB mode.
3. Because the speed is fixed at 100 bauds, it is not indicated on the screen.
4. Switch off the ANTI-NOISE (A.N.) function.
5. In AMTOR modes the screen may flicker slightly, but this is normal.

7. VARIOUS FUNCTION KEYS

External Keyboard Controls and Commands

"SHIFT-DEL"	deletes miswritten characters in the buffer, battery back-up memory or Page 2.
"SHIFT-ESC"	- in AMTOR modes returns the unit from Traffic state to Idle state. Data in the buffer will be cleared. - in other modes than AMTOR interrupts transmission. Data in the buffer will be cleared.
"SHIFT-TAB"	- in AMTOR modes sends the end of contact signal S. - in other modes than AMTOR writes S in the buffer or Page 2 when in automatic PTT keying. turns on/off the PTT terminal when in manual PTT keying.
"SHIFT-CAN"	disables the functions instructed by the key-stroke "⇦" or "REPT".
"⇦" "C"	sends data from the buffer character by character.
"⇦" "D"	transmits DIDDLE signal in BAUDOT mode. (toggle switching)
"⇦" "E"	activates Echo Back function. (toggle switching)
"⇦" "H" + 4 letters	enters your selcal in AMTOR(ARQ) mode.
"⇦" "K"	changes the case of received signal in Japanese CW, BAUDOT or AMTOR modes.
"⇦" "L"	sends data from the buffer by line groupings.

"⇦" "M" + number (1--E) + message + "⇦"
enables channel memory programming. (Refer to page 25 for details.)

"⇦" "N" activates printer-select and outputs signal to printer. (toggle switching)

"⇦" "P" activates Preload function.

"⇦" "Q" moves the cursor to the home position (leftmos of headline) of Page 2 to prepare for programm ing or transmission.

"⇦" "R" + 0,1,2 or 3
selects automatic CR/LF insertion; 0=non, 1=6 char., 2=72 char., 3=80 char.

"⇦" "S" activates Selcal function. (toggle switching)

"⇦" "T" activates Timer Transmission. (toggle switcni

"⇦" "U" + 4 letters
enters selcal of other ARQ station.

"⇦" "W" sends data from the buffer by word groupings.

"⇦" "X" + message + "⇦"
programms message in Page 2 transmission memor

"⇦" "1" displays Page 1.

"⇦" "2" displays Page 2.

"REPT" + channel number (1--E) + number (1--9)
transmits the message memorized in each channe memory desired number of times.

"REPT" "G" - in AMTOR mode A (ARQ)
transmits selcal of other ARQ station.

- in AMTOR mode B (FEC)
starts transmission.

"REPT" "H" - in AMTOR mode A (ARQ)
indicates your own selcal.

"REPT" "I" transmits CW ID in RTTY (BAUDOT, ASCII & JIS) modes.

"REPT" "Q"	outputs QBF test message. Any keystroke stops the transmission.
"REPT" "R"	starts CW random output. Any keystroke stops the output.
"REPT" "T"	transmits the time displayed on the screen.
"REPT" "U"	indicates the selcal of other station in AMTOR mode A (ARQ).
"REPT" "W"	returns your station only to Waiting state in AMTOR modes.
"REPT" "X"	transmits data written in Page 2 from where the cursor is located.
"REPT" "Y"	transmits "RY" test message. Entering any keystroke stops the transmission.
"REPT" "Z"	transmits data written in Page 2 from leftmost of its headline.
"REPT" "/"	In ARQ operation, IRS transmits ISS/IRS changeover code to ISS. Upon ISS's receipt of the code, IRS becomes ISS and vice versa.

Front Panel Keyboard Controls and Commands

SPEED + **Ø** or **.**	Speed fine control; Ø=up, .=down
SPEED + 3 digits	Speed setting
SPEED RET	programms the initial speed setting of the mode.
SPEED CLEAR	returns the initial speed setting to the factory original setting.

WEIGHT + number (**Ø--9**)
CW weight setting; 1:3 - 1:7

CLOCK + 9 digits	Time setting First digit; Ø=normal year, 1=leap year eg. 7:30 of June 25, 1984 **CLOCK + 1 + Ø + 6 + 2 + 5 + Ø + 7 + 3 + 0**
CLOCK + . + 6 digits	Time setting for Timer Transmission.
RET	CR/LF for screen and printer only.
CLEAR + **Ø**,**1** or 2	clears the screen; Ø=buffer, 1=Page, 2=Page 2.
PAGE	Page switching
RESET	reset
FUNC 1	activates printer-select and outputs the signal to printer. (same action with "⇦" "N") -toggle switching
FUNC 2	activates Echo Back function. (same action with "⇦" "E") -toggle switching
FUNC 3	Manual on/off switching of REMOTE terminal.
FUNC 5	selects V-SYNC 50 Hz.
FUNC 6	selects V-SYNC 60 Hz.
FUNC 7	selects AMTOR Mode A (ARQ) when **MODE** button is unlocked and **TOR-A** is locked or **MODE** and **TOR-C** buttons are locked.
FUNC 8	selects AMTOR Mode B (FEC) when **MODE** and **TOR-C** buttons are locked.
FUNC 9	selects AMTOR Mode L when **MODE** buttons is unlocked and **TOR-A** button is locked or **MODE** and **TOR-C** buttons are locked.

8. APPLICATION

Recording

Set the mode and speed.
Connect AFSK OUT jack to the microphone terminal of the cassette tape recorder.
Set GAIN control of the back panel to the medium level so as to prevent excess input to the recorder.
Set the recorder in recording status.
Send the data which you want to record from the Theta-5000E.
Stop the recorder after the data transmission is completed. Make sure to let the cassette tape run for a few seconds before stopping.

Play Back

Adjust the mode and speed to the recording state of cassette tape recorder.
Clear the screen if required.
Connect the microphone terminal to INPUT AF jack in other modes than ARQ and FEC.
Adjust the volume of the recorder to make output level about 100mV to 1Vp-p. Any tone should be adjusted to the highest position at this moment.
Sentences are read and displayed on the screen when play back starts. Depressing "⇦" "E" or **FUNC + 2** activates the ECHO-BACK function and the unit outputs the received data to AFSK, CW, FSK jacks at the same time as the reading. You can use another tape recorder for storage.
To release this function, redepress "⇦" "E" or **FUNC + 2**.

9. MAINTENANCE

Battery Replacement

The battery for battery back up memory should be replaced once a year.
Use two dry batteries of SUM-(3) 1.5V.
Pull out the plug of power supply cord before replacement.
Never touch the trimmer capacitor and the semi-fixed volume.
Remove each M3 screws at the top case to open the unit. Set the battery in the battery holder on the CPU board.
Be sure the polarity is correct.

Fuse Replacement

If the fuse burns out, replace it with the proper-sized spare as shown below. The fuse holders are on the electric power circuit board and the back panel.

For DC power supply (on the electric power circuit board)

125V 3A

For AC power supply (on the back panel)

125V 1A	for 100 -- 120V use
250V 0.5A	for 220 -- 240V use

Please inquire of our distributor/dealer in your district regarding monitor or filter adjustment, or when you have a problem with the unit.

When sending a unit to our distributor, please include a complete description of any and all problems.

SPECIFICATIONS

Code	Morse (European & Japanese CW), ASCII (RTTY), Baudot (RTTY), JIS (RTTY), ARQ (AMTOR Mode A, Mode L), FEC (AMTOR Mode B)
Characters	Alphabet, Figures, Symbols, Special Characters
Speed	Morse Receiving: 5 - 100 Words/Minute (AUTOTRACK) Transmitting: 5 - 100 Words/Minute RTTY (Baudot, ASCII, JIS) 12 - 300 bauds TTL (Baudot, ASCII, JIS) 12 - 600 bauds ARQ/FEC 100 bauds
Input	AF Input Impedance: CW and RTTY 75 ohms TTL Level Input: common to CW, RTTY ASCII & JIS
AF Input Frequency	CW: 830Hz RTTY (Baudot, ASCII, JIS): Mark 1275Hz (Low Tone), 2125Hz (High Tone) Shift 170Hz, 425Hz, 850Hz + fine tuning AMTOR (ARQ/FEC): B 1785Hz, Y 1615Hz [CCIR 476-2] + same frequencies as RTTY
Output	Keying Output: CW .... 80mA, 200V (Optoisolator) FSK ... 80mA, 200V (Optoisolator) AFSK Output Impedance: 600 ohms (Common to CW, RTTY)
AFSK Output Frequency	CW: 830Hz RTTY (Baudot, ASCII, JIS): Mark 1275Hz (Low Tone), 2125Hz (High Tone) Shift 170Hz, 425Hz, 850Hz AMTOR (ARQ/FEC): B 1785Hz, Y 1615Hz [CCIR 476-2] + same frequencies as RTTY
Time Clock	Displays month, date, hour and minute on the screen.
Display Output	5-inch High-resolution green monitor built-in Composite Video Signal Output Impedance: 75 ohms
Interface for Printer	Centronics Compatible Parallel Interface
PTT Keyer	Capability: 300mA, 50V (Positive Voltage Only)
Remote Control Keyer	Capability: 300mA, 50V (Optoisolator)
Number of Characters Displayed	Screen Format/Page: 40 characters x 16 lines = 640 characters x 2 pages
Battery Back-Up Memory	72 characters x 7 channels, 24 characters x 8 channels
Buffer Memory	160 characters
Output Impedance for Oscilloscope	200K ohms
AF Output	300mW, Output Impedance ... 8 ohms
Power Supply	AC 100 - 120V / 220 - 240V 50/60Hz DC +13.8V, 2A
Dimensions	Terminal Unit 363 mm (W) x 351 mm (D) x 121 mm (H)
Accessories	Keyboard (1), Instruction Manual (1), Pin Plug (9), Coaxial Cable (4 m), Stand (1), Dry Battery (2), AC Cord (1)

The specifications are subject to change without prior notice.

Control Codes

The following keys should be depressed at the same time as the CTRL key is depressed.

KEY	Special Character		BUFFER DISPLAY
@	00H	NUL	SP
A	01H	SOH	'
B	02H	STX	'
C	03H	ETX	'
D	04H	EOT	'
E	05H	ENQ	'
F	06H	ACK	'
G	07H	BEL	Å
H	08H	BS	B
I	09H	HT	T
J	0AH	LF	L
K	0BH	VT	'
L	0CH	FF	'
M	0DH	CR	C
N	0EH	SO	'
O	0FH	SI	'

KEY	Special Character		BUFFER DISPLAY
P	10H	DLE	'
Q	11H	DC1	'
R	12H	DC2	'
S	13H	DC3	'
T	14H	DC4	'
U	15H	NAK	'
V	16H	SYN	'
W	17H	ETB	'
X	18H	CAN	N
Y	19H	EM	'
Z	1AH	SUB	'
} [	1BH	ESC	E
¦ \	1CH	FS	'
}]	1DH	GS	'
~ ^	1EH	RS	'
_ _	1FH	US	'

CODE TABLE

KEY	BUFFER DISPLAY	ASCII		BAUDOT(CCITT NO.2) AMTOR (ARQ/FEC)		MORSE	
		SCREEN DISPLAY	OUTPUT CODE	SCREEN DISPLAY	OUTPUT CODE	SCREEN DISPLAY	OUTPUT CODE
!	!	!	! (21H)	!	!	!	....- (UNDERSTOOD)
1	1	1	1 (31H)	1	1	1	.----
"	"	"	" (22H)	BLK	LTR	"	.-..-.
2	2	2	2 (32H)	2	2	2	..---
#	#	#	# (23H)	#	#	#	-.-.- (STARTING)
3	3	3	3 (33H)	3	3	3	...--
$	$	$	$ (24H)	$	$	$	...-..-
4	4	4	4 (34H)	4	4	4	....-
%	%	%	% (25H)	BLK	LTR	BLK	SP
5	5	5	5 (35H)	5	5	5	.....
&	&	&	& (26H)	&	&	BLK	SP
6	6	6	6 (36H)	6	6	6	-....
'	'	'	' (27H)	'	'	'	.----.
7	7	7	7 (37H)	7	7	7	--...
(	(	(	((28H)	(	(	(CR/LF	-.--. ((, $\overline{KN}$)
8	8	8	8 (38H)	8	8	8	---..
)	)	)	) (29H)	)	)	)	-.--.-
9	9	9	9 (39H)	9	9	9	----.
	SP	SP	SP (2ØH)	SP	SP	SP	SP
Ø	Ø	Ø	Ø (3ØH)	Ø	Ø	Ø	-----
=	=	=	= (3DH)	=	=	=	-...- (=, $\overline{BT}$)
-	-	-	- (2DH)	-	-	-	-....-
~	~	~	~ (7EH)	BLK	LTR	BLK	SP
^	^	^	^ (5EH)	BLK	LTR	^	.-... ($\overline{AS}$)
¦	¦	¦	¦ (7CH)	BLK	LTR	BLK	SP
\	\	\	\ (5CH)	BLK	LTR	\	.-..- (SEPARATION)
	q	q	q (71H)	BLK	LTR	BLK	SP
Q	Q	Q	Q (51H)	Q	Q	Q	--.-
	w	w	w (77H)	BLK	LTR	BLK	SP
W	W	W	W (57H)	W	W	W	.--
	e	e	e (65H)	BLK	LTR	BLK	SP
E	E	E	E (45H)	E	E	E	.
	r	r	r (72H)	BLK	LTR	BLK	SP
R	R	R	R (52H)	R	R	R	.-.
	t	t	t (74H)	BLK	LTR	BLK	SP
T	T	T	T (54H)	T	T	T	-

KEY	BUFFER DISPLAY	ASCII		BAUDOT(CCITT NO.2) AMTOR (ARQ/FEC)		MORSE	
		SCREEN DISPLAY	OUTPUT CODE	SCREEN DISPLAY	OUTPUT CODE	SCREEN DISPLAY	OUTPUT CODE
y Y	y Y	y Y	y (79H) Y (59H)	BLK Y	LTR Y	BLK Y	SP -.--
u U	u U	u U	u (75H) U (55H)	BLK U	LTR U	BLK U	SP ..-
i I	i I	i I	i (69H) I (49H)	BLK I	LTR I	BLK I	SP ..
o O	o O	o O	o (6FH) O (4FH)	BLK O	LTR O	BLK O	SP ---
p P	p P	p P	p (7OH) P (5OH)	BLK P	LTR P	BLK P	SP .--.
\ @	\ @	\ @	\ (6OH) @ (4OH)	BLK BLK	LTR LTR	BLK @	SP .--.-
{ [	{ [	{ [	{ (7BH) [(5BH)	BLK BLK	LTR LTR	BLK BLK	SP SP
a A	a A	a A	a (61H) A (41H)	BLK A	LTR A	BLK A	SP .-
s S	s S	s S	s (73H) S (53H)	BLK S	LTR S	BLK S	SP ...
d D	d D	d D	d (64H) D (44H)	BLK D	LTR D	BLK D	SP -..
f F	f F	f F	f (66H) F (46H)	BLK F	LTR F	BLK F	SP ..-.
g G	g G	g G	g (67H) G (47H)	BLK G	LTR G	BLK G	SP --.
h H	h H	h H	h (68H) H (48H)	BLK H	LTR H	BLK H	SP ....
j J	j J	j J	j (6AH) J (4AH)	BLK J	LTR J	BLK J	SP .---
k K	k K	k K	k (6BH) K (4BH)	BLK K	LTR K	BLK K	SP -.-
l L	l L	l L	l (6CH) L (4CH)	BLK L	LTR L	BLK L	SP .-..
+ ;	+ ;	+ ;	+ (2BH) ; (3BH)	+ ;	+ ;	+ CR/LF ;	.-.-. (+, $\overline{AR}$) -.-.-.
* :	* :	* :	* (2AH) : (3AH)	BLK :	LTR :	* CR/LF :	...-.- ($\overline{VA}$) ---...
}]	}]	}]	} (7BH)] (5BH)	BLK BLK	LTR LTR	BLK BLK	SP SP

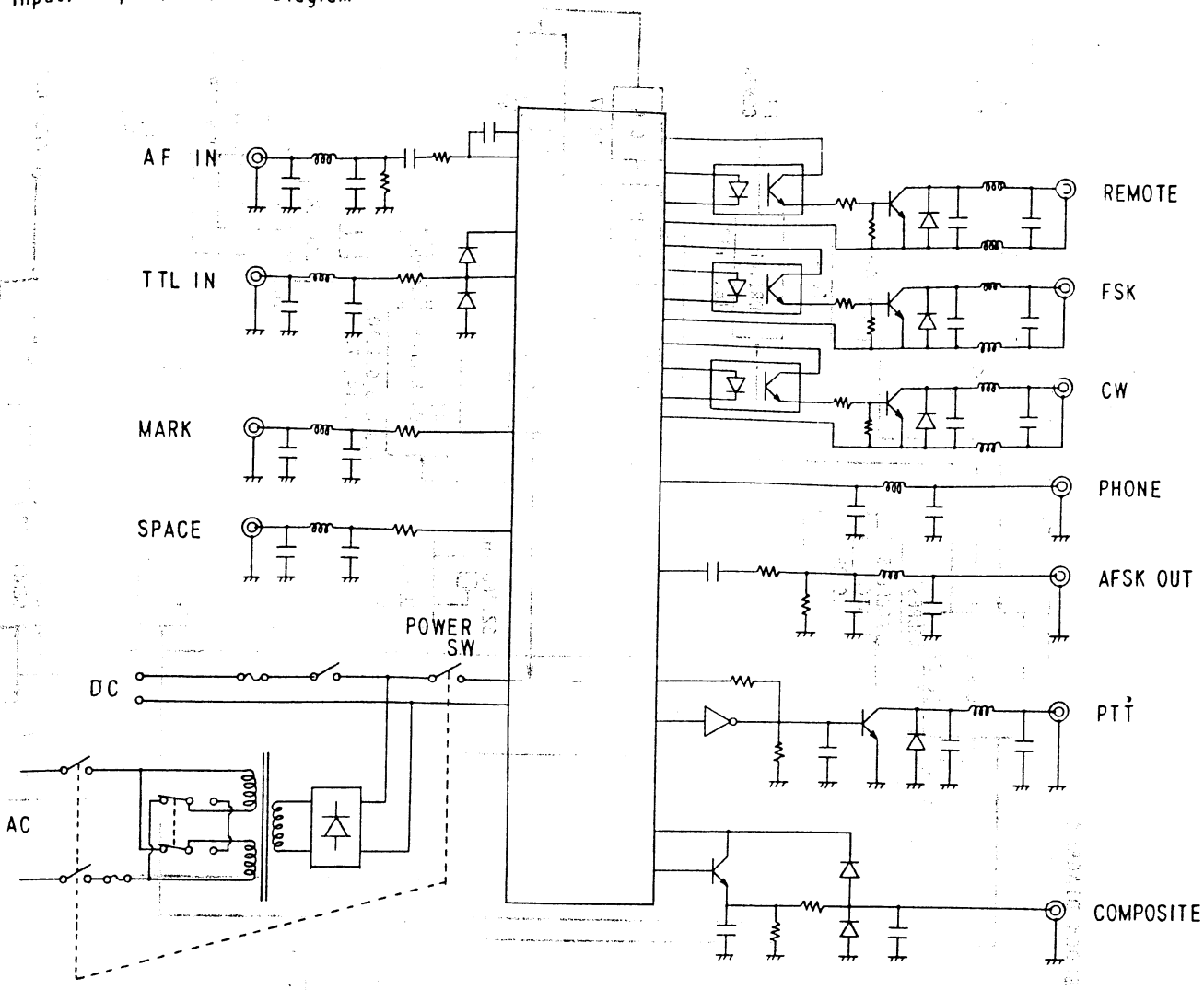
KEY	BUFFER DISPLAY	ASCII		BAUDOT (CCITT NO. 2) AMTOR (ARQ/FEC)		MORSE	
		SCREEN DISPLAY	OUTPUT CODE	SCREEN DISPLAY	OUTPUT CODE	SCREEN DISPLAY	OUTPUT CODE
	z	z	z (7AH)	BLK	LTR	BLK	SP
Z	Z	Z	Z (5AH)	Z	Z	Z	--..
	x	x	x (78H)	BLK	LTR	BLK	SP
X	X	X	X (58H)	BLK	LTR	BLK	-..-
	c	c	c (63H)	BLK	LTR	BLK	SP
C	C	C	C (43H)	C	C	C	-.-.
	v	v	v (76H)	BLK	LTR	BLK	SP
V	V	V	V (56H)	V	V	V	...-
	b	b	b (62H)	BLK	LTR	BLK	SP
B	B	B	B (42H)	B	B	B	-...
	n	n	n (6EH)	BLK	LTR	BLK	SP
N	N	N	N (4EH)	N	N	N	-.
	m	m	m (6DH)	BLK	LTR	BLK	SP
M	M	M	M (4DH)	M	M	M	--
<	<	<	< (3CH)	BLK	LTR	BLK	..... (HH)
,	,	,	, (2CH)	,	,	,	--.---
>	>	>	> (3EH)	BLK	LTR	BLK	SP
.	.	.	. (2EH)	.	.	.	.-.-.-
?	?	?	? (3FH)	?	?	?	..--..
/	/	/	/ (2FH)	/	/	/	-..-.
_	_	_	_ (5FH)	BLK	LTR	_	..--.-
_	_	_	_ (5FH)	BLK	LTR	_	..--.-
CAN	N	BLK	CAN (18H)	BLK	FIG	BLK	SP
TAB	T	BLK	HT (Ø9H)	BLK	LTR	BLK	SP
DEL	D	BLK	DEL (7FH)	BLK	LTR	BLK	SP
ESC	E	BLK	ESC (1BH)	BLK	LTR	BLK	SP
SP	SP	SP	SP (2OH)	SP	SP	SP	SP
↵	C L	CR/LF	CR/LF (ØDH/ØAH)	CR/LF	CR/LF	CR/LF	SP/SP

KEY	Buffer Display	JIS Screen Display	JIS Output Code	Japanese Morse Screen Display	Japanese Morse Output Code
K	、	、	、(φC9H)	、	・・－－
L	「 リ	リ	リ(φD8H)	「 リ	－・－・－ －－・
＋ ;	レ	レ	レ(φDAH)	レ	－－－
* :	ケ	ケ	ケ(φB9H)	ケ	－・－－
{]	」 ム	」 ム	」(φA3H) ム(φD1H)	」 ム	・－・－・・ －
Z	ッ ツ	ッ ツ	ッ(φAFH) ツ(φC2H)	BLK ツ	SP ・－－・
X	サ	サ	サ(φBBH)	サ	－・－・－
C	ソ	ソ	ソ(φBFH)	ソ	－－－・
V	ヒ	ヒ	ヒ(φCBH)	ヒ	－－・・－
B	コ	コ	コ(φBAH)	コ	－－－－
N	ミ	ミ	ミ(φDφH)	ミ	・・－・－
M	モ	モ	モ(φD3H)	モ	－・・－・
< ,	、 ネ	、 ネ	、(φA4H) ネ(φC8H)	BLK ネ	SP －－・－
> .	。 ル	。 ル	。(φA1H) ル(φD9H)	BLK ル	SP －・－－・
? ／	・ メ	・ メ	・(φA5H) メ(φD2H)	BLK メ	SP －・・・－
－ －	ロ	ロ	ロ(φDBH)	ロ	・－・－

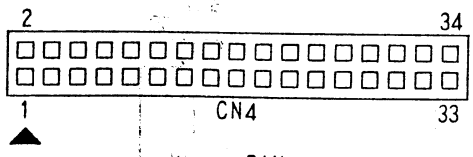
KEY	Buffer Display	JIS Screen Display	JIS Output Code	Japanese Morse Screen Display	Japanese Morse Output
(SP)	SP	SP	SP(2φH)	SP	SP
CAN	N	BLK	CAN(18H)	「	－・・－－－
DEL	D	BLK	DEL(7FH)	＝	－・・・－
ESC	E	BLK	ESC(1BH)	BLK	SP
TAB	T	BLK	HT(φ9H)	BLK	SP
↵	CL	CR/LF	CR(φDH) LF(φAH)	CR/LF	SP/S

NOTE: TX/RX of KANA characters is available when the keyboard state is "K" or "J".
Upper columns.. available only when shifted.

Input/Output Circuit Diagram



Printer Port



PIN		PIN	
1	DATA STROBE	2	
3	DATA 0	4	
5	DATA 1	6	
7	DATA 2	8	
9	DATA 3	10	
11	DATA 4	12	GND
13	DATA 5	14	
15	DATA 6	16	
17	DATA 7	18	
19	ACKNOWLEDGE	20	
21	BUSY	22	
23	NC	24	
25	SELECT	26	NC
27	GND	28	NC
29	NC	30	GND
31	GND	32	NC
33	GND	34	NC

KEY	BUFFER DISPLAY	ASCII		BAUDOT(CCITT NO.2) AMTOR (ARQ/FEC)		MORSE	
		SCREEN DISPLAY	OUTPUT CODE	SCREEN DISPLAY	OUTPUT CODE	SCREEN DISPLAY	OUTPUT CODE
M°	C	CR	CR (ØDH)	CR	CR	CR	SP
J°	L	LF	LF (ØAH)	LF	LF	LF	SP

NOTES: 1) This table is applicable when 'C(Capital)' is selected in RTTY modes or 'E(European)' in CW mode.

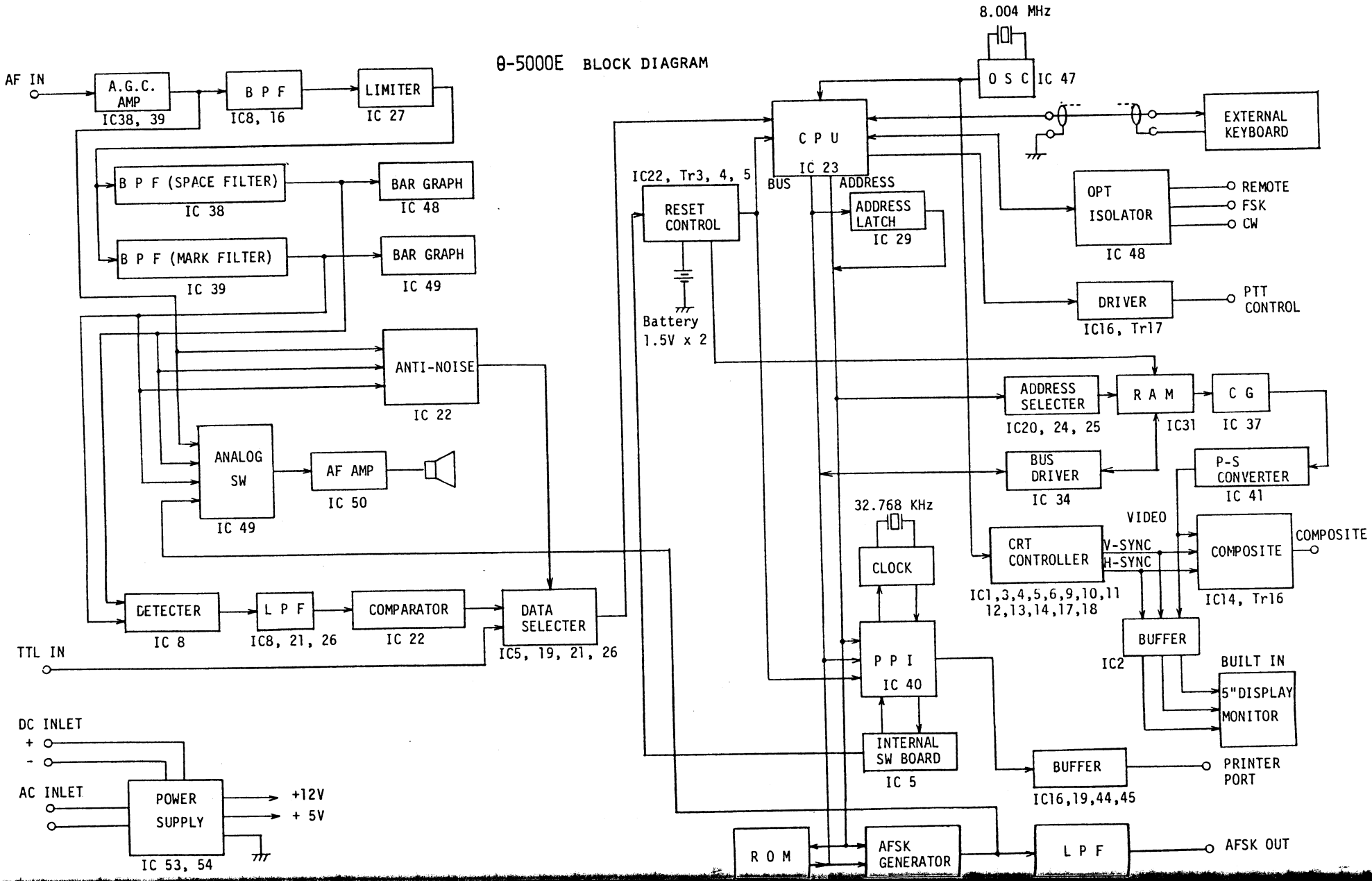
2) Upper columns are available only when shifted.

3) The '°' marked codes are available when pressed with "CTRL" key.

4) BLK: displays nothing
SP: displays or outputs Space code.

Buffer Display	JIS Screen Display	JIS Output Code	Japanese Morse Screen Display	Japanese Morse Output Code	KEY	Buffer Display	JIS Screen Display	JIS Output Code	Japanese Morse Screen Display	Japanese Morse Output Code
						]			]	・－・・－・
ヌ	ヌ	ヌ(φC7H)	ヌ	・・・・	R	ス	ス	ス(φBDH)	ス	－－－・－
フ	フ	フ(φCCH)	フ	－－・・	T	カ	カ	カ(φB6H)	カ	・－・・
ア	ア	ア(φA7H)	BLK	SP						
ア	ア	ア(φB1H)	ア	・－・－－	Y	ン	ン	ン(φDDH)	ン	・－・－・
ウ	ウ	ウ(φA9H)	BLK	SP		¯ウ			¯ウ	・・－・・－(ウウ)
ウ	ウ	ウ(φB3H)	ウ	・・－	U	ナ	ナ	ナ(φC5H)	ナ	・－・
エ	エ	エ(φA4H)	エ	・－－・・						
エ	エ	エ(φB4H)	エ	－・－－－	I	ニ	ニ	ニ(φC6H)	ニ	－・－・
ォ	ォ	ォ(φABH)	BLK	SP		¯ラ			¯ラ	・・・－・(ラタ)
オ	オ	オ(φB5H)	オ	・－・・・	O	ラ	ラ	ラ(φD7H)	ラ	・・・
ャ	ャ	ャ(φACH)	BLK	SP						
ヤ	ヤ	ヤ(φD4H)	ヤ	・－－	P	セ	セ	セ(φBEH)	セ	・－－－・
ュ	ュ	ュ(φADH)	BLK	SP	、					
ユ	ユ	ユ(φD5H)	ユ	－・・－－	@	ミ	ミ	ミ(φDEH)	ミ	・・(ダク点)
ョ	ョ	ョ(φAEH)	BLK	SP	｢	「	「	「(φA2H)	「	－・・－－－(¯ホレ)
ヨ	ヨ	ヨ(φD6H)	ヨ	－－	［	°	°	°(φDFH)	°	・・－－・(半ダク点)
ヲ	ヲ	ヲ(φA6H)	ヲ	・－－－						
ワ	ワ	ワ(φDCH)	ワ	－・－	A	チ	チ	チ(φC1H)	チ	・・－・
¯ホ			¯ホ	－・・－・・(¯ホホ)						
ホ	ホ	ホ(φCEH)	ホ	－・・	S	ト	ト	ト(φC4H)	ト	・・－・・
ヘ	ヘ	ヘ(φCDH)	ヘ	・	D	シ	シ	シ(φBCH)	シ	－－・－・
ー	ー	ー(φBφH)	ー	・－－・－(長音)	F	ハ	ハ	ハ(φCAH)	ハ	－・・・
タ	タ	タ(φCφH)	タ	－・	G	キ	キ	キ(φB7H)	キ	－・－・・
テ	テ	テ(φC3H)	テ	・－・－－	H	ク	ク	ク(φB8H)	ク	・・・－
ィ	ィ	ィ(φABH)	ィ	・－・・－						
イ	イ	イ(φB2H)	イ	・－	J	マ	マ	マ(φCFH)	マ	－・・－

θ-5000E BLOCK DIAGRAM



—MEMO—

—MEMO—

—MEMO—

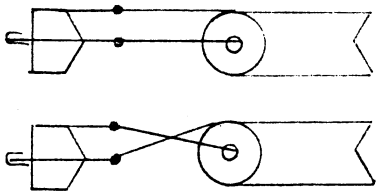
ADDENDUM

CW OPERATION - TRANSMIT: The 5000E is designed to provide for either negative or positive keying of the CW line, depending upon the requirements of the transmitter or transceiver.

If the CW line remains in KEY DOWN mode, after the interconnecting cables are installed, simply reverse the connections on one end of the interconnecting cable so that the shield goes to the center conductor and the center conductor of the cable goes to the shield (please see drawing below).

KEY DOWN TUNE UP: Depressing the OUT-R button (#21, P.7) will key the CW line for tune up, etc.

AMTOR HINTS: For U.S. AMTOR operation, set the buttons as follows - TOP ROW: "MODE" (RED)- IN, "TOR-C"- IN, BOTTOM ROW: "H.T./L.T." - IN, "170"- IN. USE USB. See "QUICK CHART" and manual for setting mode.



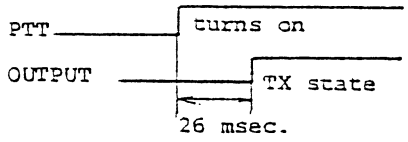
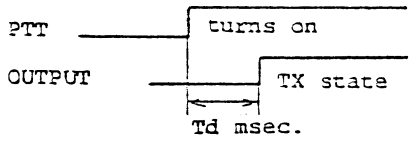
SETTING THE CLOCK on the EXL-5000E: The clock is set from the front panel, not the keyboard, by pushing "CLOCK" followed by 9 digits. The first digit is "Ø" for normal years or "1" for Leap Years. The next 2 digits are the month ("06" would be June). Next two are the date of the month ("25" for the twenty-fifth of the month), and the last four digits are the time ("0730" for 7:30).

Example: 7:30 on June 25th of a leap year:

Push: CLOCK + 1 + 0 + 6 + 2 + 5 + Ø + 7 + 3 + Ø

Please take note of the following corrections.

ERRATA

page		
2	Battery Back-up Memory ..., covering 72 characters x 7 channels and 24 characters x 5 channels, is retained ...	..., covering 72 characters x 7 channels and 24 characters x 8 channels, is retained ...
4	Convenient ASCII Key Arrangement The keyboard layout is ASCII arrangement with function keys.	The keyboard layout is ASCII arrangement.
24	Initial Screen Indication in JIS mode (figure)	[delete E from the figure]
32	 The PTT line is keyed at 26 msec. before the beginning of transmission. Transmit/Receive changeover of a transceiver should be performed within 26 msec.	 The PTT line is keyed at Td msec. before the beginning of transmission. The time delay, "Td" can be varied by two msec.-step from 7 msec. through 43 msec. Td is indicated in the leftmost of the status indicating line on the screen. With the keystroke "⇦" + "V", Td is decreased by two msec.-step. The initial value is set on 19 msec. Set Td in accordance with the time which is required for transmit/receive changeover of your transceiver. This delay time remains stored after the power off provided that CH1 is not used in the modes other than AMTOR.
42	CLOCK + 9 digits Time Setting eg. 7:30 of June 25, 1984 CLOCK + Ø + 6 + 2 + 5 + Ø + 7 + 3 + Ø	Time setting: CLOCK + 9 digits First digit; Ø=normal year, 1=leap year example: June 25, 1984, 7:30 AM CLOCK+1+Ø+6+2+5+Ø+7+3+Ø
46	AFSK Output Frequency CW: 800 Hz	CW: 830 Hz

Please take note of the following addendum.

A D D E N D U M

<table>
<tr><td>Page.</td><td></td></tr>
<tr><td>33</td><td>(Refer to Operation Table page 39.)

Add ⌐ When IRS has necessity of transmitting any message while ISS is still transmitting the data, the changeover of ISS/IRS role will be performed by the keystroke "REPT" "/". Careful attention should be paid to use this function. ⌙</td></tr>
<tr><td>36</td><td>RTTY System Mode A

"TOR-A" S WAIT" will be displayed.

Add ⌐ When mode B signal comes during mode A operation of RTTY system, the Theta-5000E automatically becomes receiving state of mode B signal, and automatically returns to mode A state when the mode B signal is not received. The unit becomes transmitting state of mode A with the keystroke "REPT" + "G" even while the mode B signal is received. Receiving of mode A signal takes priority of receiving of mode B signal. ⌙</td></tr>
<tr><td>38</td><td>in mode L

Add ⌐
<table><tr><th>Indicator</th><th>Status</th></tr><tr><td>RQ</td><td>receiving three continuous "RQ" signals.</td></tr><tr><td>ERR</td><td>receiving the same three-character-block.</td></tr></table>⌙</td></tr>
<tr><td>39</td><td>To switch transmit/receive role (ISS/IRS change) "SHIFT-+" + "SHIFT-?" ... Upon receipt of these two signals, IRS becomes ISS and vice versa.

Add ⌐ (achieved only by IRS) "REPT" "/" To switch transmit/receive role before ISS completes its transmission. IRS transmits ISS/IRS changeover code to ISS. Upon ISS's receipt of the code, IRS becomes ISS and vice versa. ⌙</td></tr>
<tr><td>42</td><td>"REPT" "Z" transmits data written in Page 2 from leftmost of its headline.

Add ⌐ "REPT" "/" In ARQ operation, IRS transmits ISS/IRS changeover code to ISS. Upon ISS's receipt of the code, IRS becomes ISS and vice versa. ⌙</td></tr>
</table>

AMATEUR-WHOLESALE ELECTRONICS

DIRECT ALL COMMUNICATIONS TO:

8817 S.W. 129th TERRACE
MIAMI, FLORIDA 33176, U.S.A.
TELEPHONE: (305) 233-3631
TELEX: 80-3356

VHF and HF PACKET RADIO with the

TONO EXL - 5000E !!

Sensational ! - push one button to choose between PACKET RADIO or RTTY, AMTOR,CW.

Here's how:

(1) Purchase the superb new Kantronics Packet Communicator, KPC-II, from Amateur Wholesale Electronics. If you already have an earlier unit, the KPC-I, 1.4,1.5 or 1.6 series, a new PROM and update instructions are available from Kantronics.

(2) AWE can supply a pre-wired cable to connect the KPC to the EXL - 5000E. Order cable K-1, $9.00. If you prefer, wire the RS-232 cable supplied with the Kantronics unit as follows: Brown wire to an RCA phono plug. White wire to another RCA phono plug. Tie black wire and shield together and connect to the shields of each of the previously wired phono plugs. The other wires are not used.

(3) On the rear panel of the EXL - 5000E, plug the **brown** wire phono plug into the **"TTL"** jack. Plug the **white** wire phono plug into the **"FSK"** jack.

(4) **VERY IMPORTANT !!** Carefully remove the front panel of the Kantronics Packet Communicator (2 screws). On the KPC-I, the jumper to change from RS-232 (as shipped) to TTL is accessible with the front panel removed. On the KPC-II remove the screw securing the tab on the 78M05 to the case, and slide the circuit board out. The RS-232/TTL jumper is numbered "K2" and is located near the center-line of the board about 2/3 of the way back. On either unit, move the jumper from the RS-232 position to the TTL position. Re-assemble.

(5) On the EXL - 5000E, start with all the front panel push buttons in the OFF (out) position. Push IN "TTL-IN" and "ASCII". Turn on the EXL - 5000. Set speed to 300.

(6) Turn on the Kantronics Packet Communicator. Following the Kantronics manual directions, hit **" SHIFT *"** and the KPC will identify.

(7) **Very Important:** Use "CRTL" and "M" at the same time to generate the "CR" main control signal required by the KPC. **DO NOT** use the "CR/LF" (crooked arrow) on the EXL - 5000E keyboard as the control

(8) Change Kantronics KPC "ECHO" to "OFF". Follow the manual instructions.

(9) **ALL** other commands are standard and correct from the keyboard of the EXL - 5000E.

(10) Follow the Kantronics KPC manual instructions for all interconnections, etc.

(11) **That is all there is to it !**

USING THE MFJ-1270 TNC2 with the TONO EXL - 5000E !!

(1) Purchase the MFJ-1270 TNC2 from Amateur-Wholesale Electronics.

(2) AWE can supply a pre-wired cable to connect the MFJ TNC to the EXL-5000E. Order cable MFJ-1, $9.00. Or, you may wire your own connector as follows: Using 2 quality shielded audio cables (Radio Shack or equivalent), wire MFJ "TTL" jack "RXD" to 5000E "TTL (1)", "TXD" to 5000E "FSK(9)" and "GND" to both audio cable shields.

(3) See #5 on reverse side.

(4) See #7 on reverse side.

(5) See #8 on reverse side.

(6) See #9 on reverse side.

(7) Follow the MFJ TNC manual instructions for all interconnections, etc.

(8) Leave the dip switch settings on the back of the MFJ TNC at their default values (1 and 7 on, all the rest off).

(9) That is all there is to it!.

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(3) See #5 on reverse side.

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(6) See #9 on reverse side.

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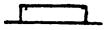
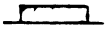
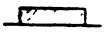
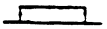
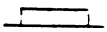
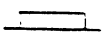
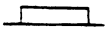
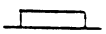
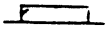
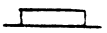
(8) Leave the dip switch settings on the back of the MFJ TNC at their default values (1 and 7 on, all the rest off).

(9) That is all there is to it!.

AMTOR MODE SELECTION

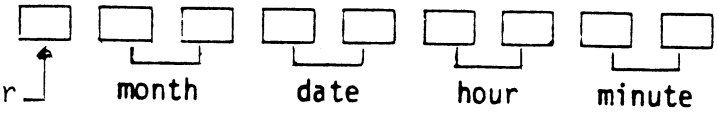
		MODE button	TOR-A/TOR-B button	**
CCIR System	mode A			FUNC + 7
	mode B			
	mode L			FUNC + 9

		MODE button	TOR-C/BAUDOT button	**
RTTY System	mode A			FUNC + 7
	mode B			FUNC + 8
	mode L			FUNC + 9

** On the front panel, press the FUNC button, then the number button.

CLOCK SETTING

To set clock: Press **CLOCK** + 9 digits



Ø = normal year
1 = leap year

TIMER TRANSMISSION

To preset the desired transmission time: Press **CLOCK** + . + 6 digits (date, hour, minute)

To activate Timer Transmission feature: Press "⇦" "T"

To cancel Timer Transmission before an actual transmission: Press "⇦" "T"

CHANNEL MEMORY CALLING

Procedure	Channel #1	Channel #2, 3, 4, 5, 6, 7	Channel #8, 9, Ø	Channel #A, B, C, D	Channel #E
'WRITE' setting	"⇦" "M"				
Channel Selection	[1]	[2] ~ [7]	[8] ~ [9]	[A] ~ [D]	[E]
Text	Enter text up to 72 characters including spaces, CRs and LFs.	Enter text up to 72 characters including spaces, CRs and LFs.	Enter text up to 24 characters including spaces, CRs and LFs.	Enter text up to 24 characters including spaces, CRs and LFs.	Enter text up to 24 characters including spaces, CRs and LFs.
Closing	"⇦"				

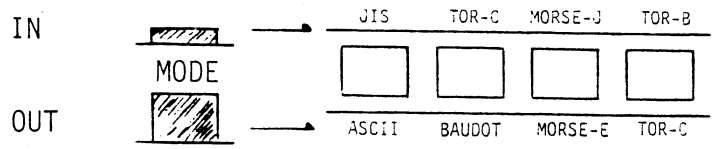
MEMORY CALL (TRANSMISSION)

'SEND' setting	"REPT"				
Channel Selection	[1]	[2] ~ [7]	[8] ~ [9]	[A] ~ [D]	[E]
Repeating		[1] ~ [9]	number of times you wish to repeat.		
NOTE:	In ARQ/FEC, Channel #1 is used as a system memory.			Channel #A-D may be used for Selcal data. Refer to the Manual.	Channel #E is for CW ID, Selcal Answer-back, QBF test message, etc.

5000E QUICK CHART

FRONT PANEL BUTTON SETTING

When the red "MODE" button on the front panel is OUT, the lower columns are activated. When the "MODE" button is IN, the upper columns are activated.



MARK/SHIFT FREQUENCY

To select high tone (2125Hz): Press H.T./L.T. button
To select low tone (1275Hz): Press H.T./L.T. button

SPEED SETTING

Press SPEED + 3 digits (number buttons on front panel)
NOTE: Press H.T./L.T. button when receiving in CW mode at above 50 WPM.

FINE ADJUSTMENT OF SPEED

To increase speed: Press SPEED + Ø
To decrease speed: Press SPEED + .

SENSE

To change sense Polarity
receive: lock/unlock IN-R/IN-N
transmit: lock/unlock OUT-R/OUT-N

WORD/LINE MODE

for character by character: Press "⇦" "C"
for WORD : Press "⇦" "W"
for LINE : Press "⇦" "L"

BUFFER

To write data, to release it, to stop sending and restart at a pause: Press "⇦" "P"
To stop buffer transmission and clear the data in the buffer: Press"SHIFT-ESC"

RUB-OUT FUNCTION

To edit any errors in the buffer memory and in the channel memory: Press"SHIFT-DEL"

UNSHIFT ON SPACE

Press USOS. The terminal always returns to LETTER case after a space signal.

PTT CONTROL

To change to 'AUTO': Press PTT-AUTO/PTT-MANU
To change to 'MANU': Release PTT-AUTO/PTT-MANU
When 'MANU', to switch on/off PTT:Press "SHIFT-TAB"
When 'AUTO', to switch off PTT Press "SHIFT-TAB"
to switch on, press any key in the keyboard

DIDDLE

To activate/deactivate automatic "IDLE signal" insertion: Press "⇦" "D"

INPUT JACK SELECTION

To select TTL IN: Press TTL IN/AF IN button
To select AF IN: Release TTL IN/AF IN button

ECHO-BACK FUNCTION

The input data of AF or TTL fed to the corresponding jack can be printed on the screen and be resent simultaneously.

Press FUNC 2 or "⇦" "E"

AUTOMATIC CR/LF INSERTION

no automatic CR/LF insertion: " ⇦ " "R" "0"
64 char. after last CR/LF : " ⇦ " "R" "1"
72 char. after last CR/LF : " ⇦ " "R" "2"
80 char. after last CR/LF : " ⇦ " "R" "3"

SELCAL

To activate/deactivate Selcal feature: Press " ⇦ " "S"

SEND FUNCTION--SCREEN PAGE TRANSMISSION

To call page 2 : Press " ⇦ " "2"
For 'WRITE' setting: Press " ⇦ " "X"
For closing : Press " ⇦ "
To send the data written on the screen
from the head of the screen : Press "REPT" "Z"
from where the cursor is placed: Press "PEPT" "X"
To give a pause to screen transmission by including screen indication of P or S:
Press "TAB" or "SHIFT-TAB"
To restart screen transmission at S or P: Press "REPT" "X"

Frequency Shift	Baud Rate	Speed	Tone	Tone Polarity	Service
170Hz	45 baud	60 wpm	High	Normal (LSB)	Almost All Amateur Radio
170Hz	74 baud	100 wpm	High	Normal	Amateur Radio
850Hz	45 baud	60 wpm	High	Normal	Amateur Radio
425Hz	50 baud	67 wpm	High	Normal	News Commercial
425Hz	74 baud	100 wpm	High	Normal	News Commercial
850Hz	50,57,74	67,75,100	High	Normal	Commercial Private
No-Standard Shifts	50,57,74	67,75,100	High Or Low	Normal	Private Military

TONO CORPORATION

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