

Baudot 3590 45B ah 219

TONO

COMMUNICATIONS TERMINAL

Ⓟ - **550**

INSTRUCTION MANUAL



TONO CORPORATION

98 MOTOSOJA-MACHI, MAEBASHI-SHI, 371, JAPAN

TABLE OF CONTENTS

1. FEATURES & PRECAUTIONS

1-1. Features	1
1-2. Precautions	4

2. LOCATIONS

2-1. Locations	5
----------------	---

3. CONNECTIONS

3-1. Basic System	6
3-2. Expand System	7
3-3. Connections	8

4. PRELIMINARY SETTING

4-1. MORSE (CW) Mode	9
4-2. BAUDOT (RTTY) Mode	11
4-3. ASCII (RTTY) Mode	13
4-4. MORSE Code Random Generator Mode	15
4-5. How to Modify the Preliminary Setting	15

5. OPERATION

5-1. MORSE (CW) Mode	16
5-2. BAUDOT (RTTY) Mode	18
5-3. ASCII (RTTY) Mode	20

6. SPECIAL FUNCTIONS

6-1. Anti-Noise Circuit	22
6-2. Unshift-On-Space Function	22
6-3. Echo-Back Function	22
6-4. Morse Code Random Generator	22
6-5. Morse Practice	23
6-6. Recording of Received Signals	23
6-7. Automatic CR/LF after Receiving	23
6-8. Word-Wrap-Around	23
6-9. Send Function	23

7. MEMORY CHANNEL PROGRAMMING AND USE

7-1. Programming	24
7-2. Transmission	25

8. SELECTIVE CALLING SYSTEM

8-1. Sel-Cal of Local Station	27
8-2. Sel-Cal of Distant Station	27

9. APPENDIX

9-1. Introduction to the Function Keys	28
9-2. Input/Output Circuit	30
9-3. Block Diagram	31
9-4. CW(MORSE) CODE	32

1. FEATURES & PRECAUTIONS

1-1. Features

1. Communications Terminal Theta-550

TONO Theta-550 is the Microprocessor-Controlled Communications Terminal which features automatic receive of CW (MORSE) and RTTY (BAUDOT & ASCII).

You can enjoy the extra performance in a very compact size.

2. Built-in Squeeze Keyer for CW transmit

With a paddle key, a built-in microprocessor-controlled squeeze keyer enables transmitting CW.

Iambic operation is now available.

The most advanced, high-voltage, high-current keying circuit is used for the keyer.

3. Large Capacity Display Memory

Two page display memory contains 40 characters x 16 lines per page. Page selection is keyboard-selectable.

4. Self-contained, high-performance Demodulator

Three-step shift selects either 170Hz, 425Hz or 850Hz shift with manual fine tune control for odd shifts.

Mark only or space only copy capability for selective fading.

Two tones (395Hz and 790Hz) are provided for CW operation.

5. Bar Graph Meter for Tuning Indicator

Bar Graph Meter with LED offers you simple and easy tuning.

6. Anti-Noise Circuit

Well designed anti-noise circuit prevents garbled message in the absence of signal.

7. VHF and Composite video output

RF convertor and composite video output allow connecting to any standard video monitor or home TV set.

8. Printer Interface for Hard Copy

Centronics-compatible interface is provided for parallel input printers.

9. Wide Range of Receiving Speeds

CW : 5 to 50 WPM in 10 keyboard selectable steps.

Autotrack on receive. Fine adjustment is available.

RTTY (BAUDOT & ASCII) : 9 keyboard selectable speeds with fine UP/DOWN speed adjustment.

10. Word-Wrap-Around

Prevents the last word on a line from becoming split in two. Moves the whole word to the next line.

11. Selective-Calling System

Receipt of your own "SEL-CAL Characters" signal causes the storage of text in memory.

With your own "End of Text" signal, the Theta-550 terminates the receiving and further messages are ignored.

12. "ECHO" Function

The received signal can be applied to the keying circuit. This allows to connect to the printer with current-loop or conventional teleprinter etc..

13. CW Random Generator

Random CW signals can be used as CW copy practice.

14. CW Practice Function

The Theta-550 reads data from a hand key and displays the characters on the screen.

15. Built-in Side Tone Oscillator

A built-in crystal synthesized side tone oscillator offers you accurate transmit in CW.

16. Audio Monitor Circuit

Audio Monitor circuit with automatic receive switching enables checking of the receive tones.

It is possible to monitor the output of the mark channel, the space channel or incoming audio from the AGC amplifier prior to the channel filters.

17. Oscilloscope Outputs

Mark and Space channel filter outputs on rear panel. Supplements the tuning LED's and audio monitor.

18. Message Memory

The Theta-550 has 4 keyboard-selectable, battery-back-up Message Channel each of which can hold 23 characters. Data in these memories is alterable at any time and retained when power is removed.

19. Send Function

Message prepared on the screen can be sent as an entire page.

20. Test Message

Built-in test message "QBF" .

**** SPECIFICATIONS ****

1. Code:
MORSE code (CW), BAUDOT code (RTTY), ASCII code (RTTY)
2. Characters:
Alphabet, Figures, Symbols, Special Characters
3. Speed:
[CW Receiving] 5--50 WPM (Automatic track)
[CW Transmitting] 5--50 WPM (Built-in Squeeze keyer)
Iambic operation is available
[RTTY(BAUDOT & ASCII) Receiving]
45.45, 50, 56.88, 74.2, 100, 110, 150 baud
Fine adjustment is available
[TTL(BAUDOT & ASCII) Receiving]
45.45, 50, 56.88, 74.2, 100, 110, 150, 200
300, 600 baud
fine adjustment is available
4. Input:
[AF input] Impedance 500 ohms
[TTL level input] common to CW, RTTY(BAUDOT & ASCII)
5. AF Input Frequency:
[CW] 790Hz, 395Hz
[RTTY(BAUDOT & ASCII)]
Mark: 1275Hz (low tone), 2125Hz (Hi tone)
Shift: 170Hz, 425Hz, 850Hz and fine tuning] or rev.
6. Battery-back-up memory:
23 characters x 4 channels (User memories)
23 characters x 5 channels (System memories)
7. Display Output:
[VHF output impedance] 75 ohms
[Composite Video Signals output impedance] 75 ohms
8. Printer Interface:
Centronics Parallel Compatible
9. Number of Characters and Pages to be Displayed:
640 characters (40 characters x 16 lines) / page x 2
(total: 1280 characters)
10. Keying Circuit:
100mA, 200V (optically coupled)
11. Output for Oscilloscope:
Output impedance 200 Kohms
12. AF Output:
150mW, Output impedance 8 ohms
13. Power Supply:
DC +12V, 0.8A
14. Accessories:
Instruction Manual 1
Pin Plug 10
Coaxial Cable 4m
15. Dimension: 250mm(W) x 55mm(H) x 225mm(D)

* Note: All of the features and specifications are subject to change without notice.

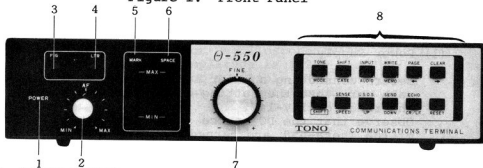
1-2. Precautions

1. You should plan to read this INSTRUCTION MANUAL thoroughly to become familiar with your Theta-550.
2. Be sure that the connections to the input circuits and output circuits are appropriate.
Input signal and load should be within the range mentioned in the Specifications.
3. Voltage of the DC power supply should be within the range of DC11V -- 14V.
4. If the input impedance of the TV set is 300 ohms (not 75 ohms), put a matching transformer of 75 ohms : 300 ohms between the Theta-550 and the TV set.
5. It is suggested that the Theta-550 is put at a well-ventilated dry place not exposed to the direct sun with special care to avoid intense heat.
6. Use internal demodulator at 150 baud or less.

2. LOCATIONS

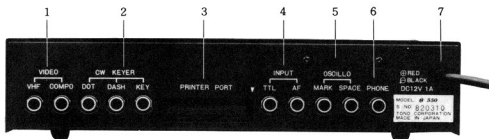
2-1. Locations

Figure 1. Front Panel



1. Power Switch
2. AF Volume Control: controls the volume of a monitor speaker.
3. Figure Indicating LED: indicates Figure case in RTTY.
4. Letter Indicating LED: indicates Letter case in RTTY.
5. Mark Indicating LED: indicates tuning of the mark filter.
6. Space Indicating LED: indicates tuning of the space filter.
7. Fine Tuning Control: Fine adjustment of the shift width while receiving BAUDOT or ASCII.
8. Function Keys: Refer to page 28-29.

Figure 2. Rear Panel



1. Video [VHF] : feeds to a home TV set.
[COMPOSITE] : feeds to a video monitor.
2. CW Keyer [Dot] : connects to the dot of iambic operation keyer.
[Dash] : connects to the dash of iambic operation keyer.
[Key] : connects to the keying terminal of the receiver.
3. Printer Port
4. Input [TTL]: This is an input accepting TTL level of non-modulated signals in CW, BAUDOT or ASCII.
[AF] : connects to EXT SP terminal of the receiver.
5. OSCILLO [MARK] : connects to the oscilloscope for Mark output of cross hatch.
[SPACE] : connects to the oscilloscope for SPACE output of cross hatch.
6. Phone Jack: connects to an earphone.
7. Power supply cord

3. CONNECTION

3-1. BASIC SYSTEM

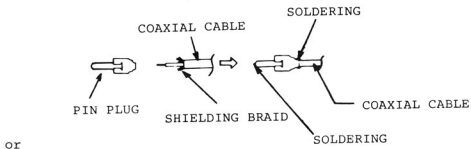
(1) Power Supply

Before connecting a power lead to your DC power supply, make sure that the setting of the voltage is within the range of 11V-14V. Observe that the DC source switch and the POWER switch of the Theta-550 are turned OFF. Then, connect a red power lead of the Theta-550 to a plus (+) terminal of the DC power source; a black power lead to a minus (-) terminal.

(2) TV set and Video Monitor

- i) Solder an ancillary coaxial cable and a pin plug as shown in Figure 3. After this procedure, connect the pin plug to the RF pin jack of the Theta-550 and the other end of the coaxial cable to an antenna terminal of a home TV set.
Tune TV set to CH4. (CH3 in U.S.A.)

Figure 3.



or

- ii) Connect the pin plug to COMPOSITE pin jack of the Theta-550. We recommend you TONO's CRT DISPLAY Model: CRT-1200G, which is specially designed for Amateur Radio communications and offers a very stable display without radio frequency interference.

(3) Receiver

If you desire to use a transceiver for reception, be sure that SWR is as follows for the proper operation.

Table 1

OUTPUT	SWR
10W	Maximum 1.5
10W ---- 100W	" 1.3
100W ---- 500W	" 1.1

3-2. EXPANDED SYSTEM

(1) Oscilloscope

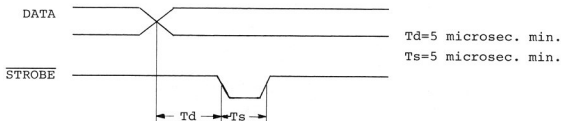
The output impedance for Oscilloscope (MARK, SPACE) is 200 K ohms. (maximum amplitude is 1.2Vp-p approx.) Large cross-hatch is not available when connecting to the oscilloscope without horizontal amplifier.

(2) Printer

Connect a printer to CN3 pin header on CPU board.
Each pin drives five standard TTL loads.
Avoid overload.

- i) When READY is Low level, timing of data for printer is as follows;

Figure 4.



When READY is High level, the port for printer holds the previous data.

- ii) A printer with Centronics Compatible interface can be connected directly to the Theta-550.
- iii) Refer to Figure 12 for Pin Connections.

(3) Squeeze Keyer

Connect the dot terminal of iambic operation keyer to the CW keyer-dot jack of the Theta-550.
Likewise, connect the dash terminal of iambic operation keyer to the CW keyer-dash jack of the Theta-550.
Then, plug the CW key terminal of the transceiver to the CW keyer-key jack of the Theta-550.
Be sure that the CW key terminal of the transceiver, which is connected to the pin side of the pin plug, has the highest voltage.

3-3. CONNECTIONS

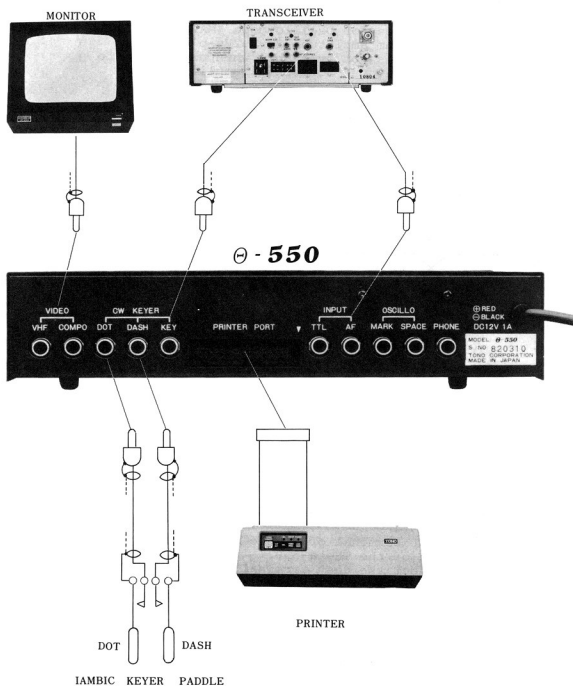


Figure 5.

4. PRELIMINARY SETTING

When you unpack your Theta-550, be sure that batteries for memory-back-up are secure (remove the top cover and check the polarity of the two SUM-3 batteries located in the battery holder) before applying any power to the Theta-550. Insure again that all connections are appropriate.

Apply power, turn the power switch ON in the following order;

1. Video Monitor
2. DC Power Supply
3. Theta-550

Observe the LTR LED (on the front panel) illuminates. Refer to Figure 6 for an introduction to the monitor screen indicators. Follow the procedure 4-1. thru 4-5. so that TONE, SHIFT, INPUT, SPEED and SENSE are set automatically even if the mode is changed

or key is depressed. Notice that if the setting is not

made correctly, the screen indicators are as Figure 6 when you press

key. Or Figure 6 thru Figure 9 when you press .

Figure 6. MORSE

Figure 7. BAUDOT

MODE=MORSE TONE=HI AUDIO=A INPUT= AF-N
SPEED=11W SHIFT=N KEY=N FNC=

MODE=BAUDOT TONE=LO AUDIO=A INPUT= AF-N
SPEED=45B SHIFT=N KEY=N FNC=

Figure 8. ASCII

Figure 9. RANDOM GENERATOR

MODE=ASCII TONE=LO AUDIO=A INPUT= AF-N
SPEED=110B SHIFT=N KEY=N FNC=

MODE=RANDOM TONE= AUDIO= INPUT=
SPEED=11W SHIFT= KEY=N FNC=

4-1. MORSE (CW) MODE

(1) TONE

By pressing + (hold down and tap)

TONE=HI or TONE=LO is displayed alternately on the screen.

TONE=HI indicates that the input frequency of CW is set to 790Hz. TONE=LO indicates that the input frequency of CW is set to 395Hz.

(2) INPUT

By pressing + , INPUT=AF or INPUT=TTL is displayed alternately on the screen.

INPUT=AF shows that the input from INPUT AF jack is acceptable. INPUT=TTL shows that the input from TTL INPUT is acceptable.

(3) SENSE

With the keystroke + followed by ,
SHIFT SENSE SPEED U.S.O.S. UP

INPUT= -N or INPUT= -R is displayed alternately.

(AF or TTL is shown in)

INPUT= -N shows that NORMAL sense has been selected.

INPUT= -R shows that REVERSE sense has been selected.

With the keystroke + followed by
SHIFT SENSE SPEED SEND DOWN

KEY=N or KEY=R is displayed alternately.

KEY=N means that the sense of keyer is set to NORMAL.
(MARK=ON, SPACE=OFF)

KEY=R means that the sense of keyer is set to REVERSE.
(MARK=OFF, SPACE=ON)

(4) SPEED

Every time key is depressed, the WPM indication
SENSE SPEED
of the speed changes as the following cycle.

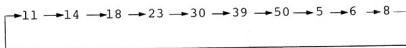


Table 2

With a keyboard entry of or , fine adjustment
U.S.O.S. SEND UP DOWN

of the speed is available. Note that screen indicator of WPM remains unchanged even if the speed is adjusted.

(5) ANTI-NOISE function

ANTI-NOISE function is activated or deactivated with

the keystroke and FNC= A (ON) or
CLEAR
FNC= (OFF) is displayed alternately.

(6) How to store the preliminary setting in memory

When you finish the preliminary setting in MORSE mode,
hold down and tap .
SHIFT WRITE MEMO

By this process, every parameters are retained according to your stored setting even if the mode is changed or key is depressed.
RESET

4-2. BAUDOT (RTTY) MODE

(1) MODE

With the keystroke $\begin{matrix} \text{TONE} \\ \boxed{} \\ \text{MODE} \end{matrix}$, the mode is changed from MORSE to BAUDOT. Screen indicators are shown in Figure 7.

(2) TONE

By depressing $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{TONE} \\ \boxed{} \\ \text{MODE} \end{matrix}$, TONE=HI or TONE=LO

is displayed on the screen alternately.
When TONE=HI, the Mark frequency is set to 2125Hz.
When TONE=LO, the Mark frequency is set to 1275Hz.

(3) SHIFT

Every time $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{SHIFT} \\ \boxed{} \\ \text{CASE} \end{matrix}$ is depressed, SHIFT=N, SHIFT=M

or SHIFT=W is displayed on the screen cyclically.

When SHIFT=N, shift width is set to 170Hz.

When SHIFT=M, shift width is set to 425Hz.

When SHIFT=W, shift width is set to 850Hz.

Mark and Space frequency are variable according to the combination of TONE and SHIFT.

Refer to Table 3.

Table 3

SHIFT TONE		N (170Hz)	M (425Hz)	W (850Hz)
HIGH	Mark	2125Hz	2125Hz	2125Hz
	Space	2295Hz	2550Hz	2975Hz
LOW	Mark	1275Hz	1275Hz	1275Hz
	Space	1445Hz	1700Hz	2125Hz

(4) INPUT

By pressing $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{INPUT} \\ \boxed{} \\ \text{AUDIO} \end{matrix}$, INPUT=AF or INPUT=TTL

is displayed alternately.

INPUT=AF shows the input from INPUT AF jack is active.

INPUT=TTL shows the input from INPUT TTL jack is active.

(5) SENSE

When $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{SENSE} \\ \boxed{} \\ \text{SPEED} \end{matrix}$ is depressed followed by $\begin{matrix} \text{U.S.O.S.} \\ \boxed{} \\ \text{UP} \end{matrix}$,

INPUT=□-N or INPUT=□-R is displayed. (AF or TTL is shown in □)

In case of INPUT=□-N, polarity is NORMAL.

In case of INPUT=□-R, polarity is REVERSE.

With the keystroke

SHIFT

 +

SENSE
SPEED

 followed by

SEND
DOWN

 ,

KEY=N or KEY=R is displayed on the screen.

KEY=N indicates the sense of the keyer is set to NORMAL.

(MARK=ON, SPACE=OFF)

KEY=R indicates the sense of the keyer is set to REVERSE.

(MARK=OFF, SPACE=ON)

(6) SPEED

Whenever the key

SENSE
SPEED

 is pressed, the indication of the

baud rate changes in the following sequence. **Table 4**

→45→50→57→74→100→110→150→200→300→600→

The relation between the screen indicators and the actual baud rate is shown in Table 5 .

Table 5

Indicators	45	50	57	74	100	110	150	200	300	600
Actual baud rate	45.45	50	56.88	74.2	100	110	150	200	300	600

Every time

U.S.O.S.
UP

 is depressed, the length of 1 bit is shortened

by about 136μsec..

Likewise, whenever

SEND
DOWN

 is depressed, the length of 1 bit

is lengthened by 136μsec..

(7) ANTI-NOISE

With the keystroke

CLEAR
→

 , ON/OFF of ANTI-NOISE is available

and FNC=□ A □ □ □ (ON) or FNC=□ □ □ □ (OFF) is displayed alternately.

(8) How to store the preliminary setting in memory.

When you finish the preliminary setting for BAUDOT mode,

hold

SHIFT

 down and tap

WRITE
MEMO

 . Now, every parameter

is retained according to your setting even when the Theta-550 is reset or the mode is changed from BAUDOT mode to another.

4-3. ASCII (RTTY) MODE

(1) MODE

With the keystroke $\begin{matrix} \text{TONE} \\ \boxed{} \\ \text{MODE} \end{matrix}$, the mode is changed from BAUDOT to ASCII. Screen indicators are shown in Figure 8.

(2) TONE

By depressing $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{TONE} \\ \boxed{} \\ \text{MODE} \end{matrix}$, TONE=HI or TONE=LO is displayed on the screen alternately.

TONE=HI shows the Mark frequency is set to 2125Hz.
TONE=LO shows the Mark frequency is set to 1275Hz.

(3) SHIFT

Every time $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{SHIFT} \\ \boxed{} \\ \text{CASE} \end{matrix}$ is depressed, SHIFT=N or SHIFT=M or SHIFT=W is displayed on the screen cyclically.

SHIFT=N indicates that shift width of 170Hz has been selected.
SHIFT=M indicates that shift width of 425Hz has been selected.
SHIFT=W indicates that shift width of 850Hz has been selected.
Mark and Space frequency are determined by the combination of TONE and SHIFT as shown in Table 3.

(4) INPUT

By pressing $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{INPUT} \\ \boxed{} \\ \text{AUDIO} \end{matrix}$, INPUT=AF or INPUT=TTL is displayed alternately.

When INPUT=AF, the input from the INPUT AF jack is active.
When INPUT=TTL, the input from the INPUT TTL jack is active.

(5) SENSE

If $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{SENSE} \\ \boxed{} \\ \text{SPEED} \end{matrix}$ is depressed followed by the keystroke $\begin{matrix} \text{U.S.O.S.} \\ \boxed{} \\ \text{UP} \end{matrix}$, INPUT= \square -N or INPUT= \square -R is displayed. (AF or TTL is shown in \square)
INPUT= \square -N shows that NORMAL polarity has been selected.
INPUT= \square -R shows that REVERSE polarity has been selected.

With the keystroke $\begin{matrix} \boxed{} \\ \text{SHIFT} \end{matrix} + \begin{matrix} \text{SENSE} \\ \boxed{} \\ \text{SPEED} \end{matrix}$ followed by the keystroke $\begin{matrix} \text{SEND} \\ \boxed{} \\ \text{DOWN} \end{matrix}$, KEY=N or KEY=R is displayed.

KEY=N indicates that the sense of the keyer is NORMAL. (MARK=ON, SPACE=OFF)
KEY=R indicates that the sense of the keyer is REVERSE. (MARK=OFF, SPACE=ON)

(6) SPEED

By depressing

SENSE SPEED

 , the indication of the Baud rate is changed in the following sequence.

→110 →150 →200 →300 →600 →45 →50 →57 →74 →100

Table 6

The relation between the screen indicators and the actual baud rate is shown in Table 5 .

Be sure that every time

U.S.O.S. UP

 is depressed, 1 bit's

length is shortened by about 136μsec.. and the keystroke makes 1 bit's length longer by about 136μsec..

SEND DOWN

(7) ANTI-NOISE function

With the keystroke

CLEAR

 , ANTI-NOISE function is activated or deactivated and FNC=□A□□□ (ON) or FNC=□_□□□ (OFF) is displayed alternately.

(8) How to store the preliminary setting in memory

When the preliminary setting for ASCII mode is completed,

WRITE SHIFT

 +

WRITE MEMO

 may be depressed. Now each parameter is

retained as per your setting even if the Theta-550 is reset or the mode is changed from ASCII to another.

4-4. MORSE CODE RANDOM GENERATOR MODE

(1) MODE

With the keystroke

TONE
MODE

, the MORSE CODE RANDOM GENERATOR mode is active.
Refer to Figure 9 for the screen indicators.

(2) SPEED

By pressing

SENSE
SPEED

, you can change the WPM indication in the following sequence.

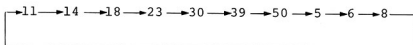


Table 7

The keystroke

U.S.O.S.
UP

 or

SEND
DOWN

 covers the fine adjustment of the speed. (note that the speed indicator on the screen remains unchanged even when the speed is adjusted.)

(3) How to store the preliminary setting in memory

When you finish the preliminary setting for speed, press

WRITE
SHIFT

 +

MEMO

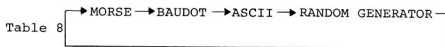
. Then, the speed is set automatically to your setting whenever the reset key in this mode is pressed or the mode is changed from the another one to MORSE CODE RANDOM GENERATOR mode.

4-5. HOW TO MODIFY THE PRELIMINARY SETTING

By depressing

TONE
MODE

, you can change the mode as the following cycle.



Select the mode you desire and modify the preliminary setting in the same manner as explained in each section.

5. OPERATION

Apply power to ---- 1. Video Monitor
 2. DC power
 3. Theta-550
 5. Transceiver or Receiver

Now LTR LED illuminates and each functions are set as shown below:

	If the preliminary setting has been made	If the preliminary setting has not been made
MODE	Same as the last state before power is removed	MORSE
tone	Same as preliminary setting	HI (790Hz)
SHIFT	"	----
SPEED	"	11 WPM
INPUT	"	AF
SENSE	"	NORMAL
ANTI-NOISE	"	OFF
ECHO	OFF	OFF
U.S.O.S.	OFF	OFF
SEL-CAL	OFF	OFF
AUDIO	AGC	AGC

Table 9.

5-1. MORSE MODE

(1) MODE SETTING

Press TONE key until MODE=MORSE appears on the screen.
 MODE

(2) SPEED SETTING

Receiving speed : MORSE -- Low speed (auto track)

Transmitting speed : Press SENSE key repeatedly until
 SPEED
 WPM of speed indicates the speed you desire.
 Then you are ready to transmit the signal from squeeze keyer and channel memory.
 U.S.O.S.

Fine Adjustment : UP -- One dot's length is shortened by 0.8msec. every time you press it.
SEND
DOWN -- One dot's length is lengthened by 0.8msec. every time you press it.

(3) INPUT

To apply AF signal from the transceiver to the Theta-550, the screen indicator should be as INPUT=AF-N .

Unless INPUT=AF-N , press + and +
U.S.O.S. SHIFT AUDIO SHIFT SPEED
→ .
UP

(4) TONE

Press + so as to get the tone you like.

TONE=HI shows the center frequency of BPF is set to 790Hz.
TONE=LO shows the center frequency of BPF is set to 395Hz.

(5) TUNING

a. Using Bar Graph Meter

- i) Receive MORSE code with the receiver.
- ii) Tune VFO or RIT so that the bar has full length on SPACE side.

b. Using Audio level

- i) Press

INPUT
AUDIO

 key until AUDIO=S is displayed on the screen.

In this state, the filter output for MORSE can be applied to audio monitor.

- ii) Tune VFO or RIT of the transceiver so that output level from audio monitor is at maximum.
Be sure that the SPACE indicating Bar Graph Meter is also its full length.

When tuning of the transceiver is completed and Bar Graph Meter follows the MORSE code, the Theta-550 reads MORSE code and displays on the screen.

* Special characters are displayed as shown in Table 10.

Table 10.

SPECIAL CHARACTERS	INDICATIONS	SPECIAL CHARACTERS	INDICATIONS
\overline{BT}	=	\overline{KN}	(
\overline{HH}	<	\overline{AR}	+
\overline{AS}	\wedge	\overline{VA}	;
\overline{AA}	@		

Note: Upon receipt of \overline{KN} , \overline{AR} , \overline{VA} , line feed is performed.

(6) How to use Squeeze Keyer

Connect the dot and dash terminal of squeeze keyer paddle to the dot and dash jack of the Theta-550 respectively. Plug the CW key terminal of the transceiver into the key jack of the Theta-550 as shown in Figure 5.

Now, you can enjoy the iambic operation!
If you desire to change the speed, follow the procedure mentioned in section(2) SPEED .
The MORSE code you manipulate will display on the screen after the transmit of one character is completed.

If there is the combination of dot and dash which is not found in MORSE code, space will be added on the screen.

5-2. BAUDOT MODE

(1) SPEED, TONE AND SHIFT WIDTH SETTING

When the mode is changed to BAUDOT (by pressing TONE
SPEED, TONE and SHIFT WIDTH are set as follows; MODE

Table 11.

	If the preliminary setting has been made	If the preliminary setting has not been made
SPEED	Same state as preliminary setting	45.45 baud
TONE	"	Low tone
SHIFT	"	170Hz

If you desire a different speed, press SENSE
until the required speed is viewed on the screen. SPEED
The relation between screen indicator and actual baud rate is shown in Table 5.

* Fine adjustment of speed

U.S.O.S.

UP increases the speed. One keystroke makes 1 bit's length shorter by about 136μsec..

SEND

DOWN decreases the speed. One keystroke makes 1 bit's length longer by about 136μsec..

You can change TONE by performing + TONE
SHIFT MODE

SHIFT WIDTH by SHIFT + CASE

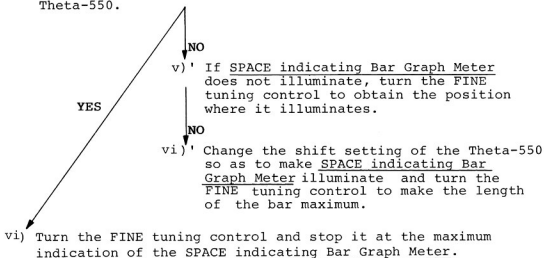
MARK and SPACE frequency are determined by the combination of TONE and SHIFT WIDTH. Refer to Table 3.

For amateur communication, 45.45 baud, 170Hz shift is commonly used; for business communication, 50 baud, 425Hz shift and 850Hz shift are popular.

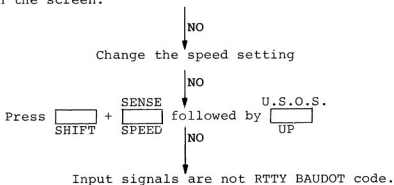
(2) TUNING

- Tune in RTTY signals with the receiver.
- Increase the AF output frequency gradually from a lower pitch with the VFO or RIT until MARK indicating Bar Graph Meter is at full length.
- Keep increasing the frequency.
- Stop increasing the frequency when the MARK indicating Bar Graph Meter begins to flash to its full length.

v) SPACE indicating Bar Graph Meter may illuminate at this moment. This shows the shift width of RTTY signal corresponds to the setting value of the Theta-550.



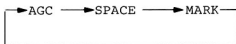
When tuning is completed, the correct characters will be displayed on the screen.



INPUT

key selects the audio signal from the audio monitor.
AUDIO

Every time this key is depressed, the output of the filter changes as the following cycle.



Mark position monitors output of Mark filter.
Space position monitors output of Space filter.
AGC position monitors all incoming audio.

* Tuning by Cross-Hatch

In the case of tuning with a cross-hatch made on the oscilloscope, adjust VFO and RIT of a receiver and the FINE tuning control of the Theta-550 to make amplitude both in V-direction and H-direction the maximum.

5-3. ASCII MODE

(1) SPEED, TONE AND SHIFT WIDTH SETTING

When the mode is changed to ASCII mode (by pressing TONE MODE),
SPEED, TONE and SHIFT WIDTH are set as follows:

Table 12.

	If the preliminary setting has been made	If the preliminary setting has not been made
SPEED	Same state as preliminary setting	110 baud
TONE	"	Low Tone
SHIFT	"	170Hz

If you desire a different speed, press SENSE SPEED key until the required speed is seen on the screen.
The relation between screen indicator and actual baud rate is shown in Table 5 .

* Fine adjustment of speed

U.S.O.S.

UP increases the speed. One keystroke makes the length of a bit shorter by about 136μsec..

SEND

DOWN decreases the speed. One keystroke makes the length of a bit longer by about 136μsec..

TONE is changeable by pressing SHIFT + TONE MODE

Likewise, SHIFT WIDTH is changeable by performing SHIFT + SHIFT

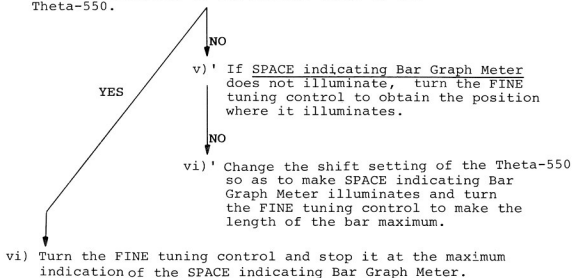
CASE

Mark and Space frequency are determined by the combination of TONE and SHIFT WIDTH. Refer to Table 3 .

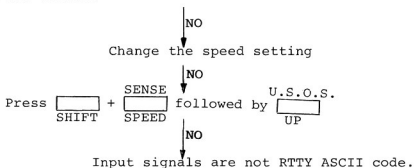
(2) TUNING

- i) Tune in RTTY signals with the receiver.
- ii) Increase the AF output frequency gradually from a lower pitch with the VFO or RIT until MARK indicating Bar Graph Meter is its full length.
- iii) Keep increasing the frequency.
- iv) Stop increasing the frequency when the MARK indicating Bar Graph Meter begins to flash again to its full length.

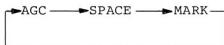
- v) SPACE indicating Bar Graph Meter may illuminate at the moment. This shows the shift width of RTTY signal corresponds to the setting value of the Theta-550.



When tuning is completed, the correct characters will be displayed on the screen.



INPUT
 key selects the audio signal from the audio monitor.
AUDIO
 Every time this key is depressed, the output of the filter changes as the following cycle.



Mark position monitors output of Mark filter.
 Space position monitors output of Space filter.
 AGC position monitors all incoming audio.

* Tuning by Cross-Hatch

In case of tuning with a cross-hatch made on the oscilloscope, adjust VFO and RIT of a receiver and the FINE tuning control of the Theta-550 to make amplitude both in V-direction and H-direction the maximum.

6-1. ANTI-NOISE CIRCUIT

When there is garbled text caused by noise in the absence of the signal, press . If FNC=A is viewed on the screen, ANTI-NOISE circuit is activated. Re-depress to release the function.

6-2. UNSHIFT-ON-SPACE

When weak signals and noise cause errors, press the key + to activate the UNSHIFT-ON-SPACE mode.

This will cause the terminal to return to the "LETTERS" case upon receipt of a space signal.

Another + disables the function.
UP (FNC=U is displayed when this function is working)

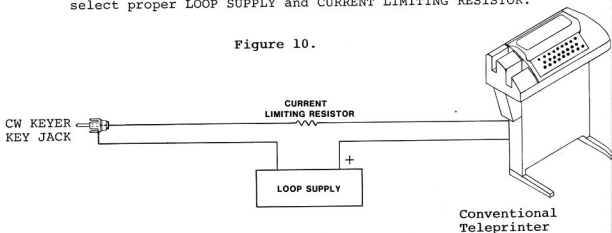
6-3. ECHO-BACK FUNCTION

If you desire to connect to the printer with current-loop-type interface, press + to activate the ECHO-BACK function. Now, the input signal is used for switching the built-in keyer.

NOTE: It is required that baud rate and code of the printer with current-loop-type interface corresponds to that of received signal which is usually transmitted directly.

Make appropriate connections as Figure 10. Check the polarity and note the maximum voltage and current of keying circuit to select proper LOOP SUPPLY and CURRENT LIMITING RESISTOR.

Figure 10.



6-4. MORSE CODE RANDOM GENERATOR

Generates 5-characters-sequence, random MORSE code. To activate this function, continue to press until MODE=RANDOM is seen on the screen. With the keystroke , the Theta-550 begins to generate MORSE code. Another keyboard entry of releases this function.

If you desire to change the speed, should be depressed until your required speed is on the screen.

Fine adjustment of the selected speed is available with U.S.O.S. SEND

or
UP DOWN

6-5. MORSE PRACTICE

Connect the straight key to INPUT-TTL jack. By pressing TONE MODE

key, set the mode to MORSE and by pressing SHIFT + INPUT AUDIO , set the input switch to TTL.

Manipulate the key so that the reading is displayed on the screen. Monitor sound can be heard by operating ECHO-BACK function.

6-6. RECORDING OF RECEIVED SIGNALS

Recording while receiving is available by connecting PHONE jack of the Theta-550 to the microphone terminal of a tape recorder.

6-7. AUTOMATIC CR/LF AFTER RECEIVING

In several seconds after completion of receiving messages CR/LF is performed on the screen. CR/LF signal is also sent to the printer port automatically.

6-8. WORD-WRAP-AROUND

The Theta-550 has a special Word-Wrap-Around feature which prevents the splitting of a word on the screen.

6-9. SEND FUNCTION

Message written on the screen by using squeeze keyer or message loaded from the cassette tape recorder to the screen can be sent as an entire page.

To activate this function, press SHIFT + SEND DOWN .

Be sure that the selected range for "SEND" function is from the top of the screen to where the cursor is placed.

To interrupt the transmission, press any key except RESET .

7. MEMORY CHANNEL PROGRAMMING AND USE

The Theta-550 contains 9 different, non-volatile memory channels as below:

1. CH1 23-characters Message Memory for transmit
2. CH2 "
3. CH3 "
4. CH4 "
5. CH5 ID memory for "QBF" transmit (23 chara.)
6. CH6 "SEL-CAL Characters" for local station (23 chara.)
7. CH7 "End of Text" for local station (23 chara.)
8. CH8 "SEL-CAL Characters" for distant station (23 chara.)
9. CH9 "End of Text" for distant station (23 chara.)

7-1. PROGRAMMING

- (1) Press the key WRITE
[]
MEMO
- (2) Depress any of the key below according to the channel number you desire to program.

CH1 TONE [] MODE	CH6 SENSE [] SPEED
CH2 SHIFT [] CASE	CH7 U.S.O.S. [] UP
CH3 INPUT [] AUDIO	CH8 SEND [] DOWN
CH4 PAGE [] ←	CH9 ECHO [] CR/LF
CH5 CLEAR [] →	

*Note: The selected channel number is indicated at the last column of the function indication.

FNC= [] [] [] └── channel no. indication

- (3) With the keystroke SHIFT + WRITE
[]
MEMO, the WRITE mode is active.

Note that alpha-numeric and symbols are indicated as

■BCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 ← SPACE

! " # \$ % & ' () * + , - . / : ; < = > ? @ [\] ^ _ CL

on the screen. (C: CR, L: LF) ← SPACE

- (4) By pressing PAGE
[]
← or CLEAR
[]
→, move the cursor to the character which you desire to store in the channel memory. If you desire to add space, move the cursor to the place anywhere the underline shown in (3) is drawn.

- (5) With the keystroke $\boxed{\text{SHIFT}} + \boxed{\text{WRITE MEMO}}$, chosen characters are indicated on the screen.
- (6) The keystroke $\boxed{\text{INPUT AUDIO}}$ enables to delete the miswritten character one by one from the end.
- (7) Repeat the procedure (3) thru (5) to complete to edit your message or ID.
Be sure that a capacity characters of CH1~CH9 is 23 long.
- (8) When you finish editing your message or ID, press $\boxed{\text{WRITE MEMO}}$ to store in the channel memory. At the same time, this function may be released.

7-2. TRANSMISSION

7-2-1. CH1~CH4 (Message Memory)

- (1) Press the key $\boxed{\text{WRITE MEMO}}$
- (2) If you press any of the key below according to the channel number you desire to transmit, the channel number is indicated at the last column of the function indication.

CH1	$\boxed{\text{TONE MODE}}$	CH3	$\boxed{\text{INPUT AUDIO}}$
CH2	$\boxed{\text{SHIFT CASE}}$	CH4	$\boxed{\text{PAGE}} \leftarrow$

- (3) The stored message can be transmitted by pressing $\boxed{\text{SHIFT}} + \boxed{\text{SEND DOWN}}$
- (4) You may interrupt the transmission at any time, by pressing any of the key except $\boxed{\text{RESET}}$

7-2-2. CH5 ("QBF" Memory)

- (1) Press $\boxed{\text{WRITE MEMO}}$
- (2) With the keystroke $\boxed{\text{CLEAR}} \rightarrow \boxed{\text{SHIFT}} + \boxed{\text{SEND DOWN}}$, the following test message is transmitted.

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG DE _____

the identification written in CH5 _____ \uparrow

- (3) Any of the key except $\boxed{\text{RESET}}$ may interrupt the transmission.

7-2-3. CH6 ~CH9 (Selective Calling Memory)

- (1) Press the key

WRITE
[]
MEMO
- (2) Press any of the key below according to the channel number you desire to transmit.

CH6 ("SEL-CAL Characters" of local station) ...

SENSE
[]
SPEED

CH7 ("End of Text" of local station)

U.S.O.S.
[]
UP

CH8 ("SEL-CAL Characters" of distant station)..

SEND
[]
DOWN

CH9 ("End of Text" of distant station)

ECHO
[]
CR/LF
- (3) The stored "SEL-CAL Characters" or "End of Text" are transmitted with the keystroke

[]
SHIFT

 +


SEND
[]
DOWN

 .
- (4) Any of the keystroke except

[]
RESET

 can interrupt the transmission.

8. SELECTIVE CALLING SYSTEM

SEL-CAL mode is activated with a keyboard entry of  PAGE
Make sure that S is indicated at the fourth column of the function indication on the screen.

FNC=    S 


Note: When the data for "Sel-Cal Characters" and "End of Text" is not provided in the channel memory, Sel-Cal mode will not be activated even if the above key is pressed.

8-1. SEL-CAL OF LOCAL STATION





When using SEL-CAL mode, the received messages are not indicated on the screen nor printed out to the printer until "SEL-CAL Characters" of local station (written in CH6) is received. Receipt of this "SEL-CAL Characters" causes the display and printing of messages.





After receiving "SEL-CAL characters", FNC=E is displayed and Echo-Back function is available. The same signal as input is transmitted from the key jack.

Once "End of Text" of local station (written in CH7) is received, the Theta-550 can not accept the messages any more.

Another  PAGE
can release the function.

8-2. SEL-CAL OF DISTANT STATION

With the keystroke  followed by  and  + ,
"SEL-CAL Characters" of distant station (written in CH8) can be transmitted. (This signal will open the SEL-CAL system of distant station.) Your message may be sent after this process.

Press    +  to transmit "End of Text" of distant station (written in CH9) when you complete the transmission.

9-1. Introduction to the Function Keys

Table 13-1.

KEY	UNSHIFT	<input type="checkbox"/> SHIFT (Hold this key down and tap the following key)	WRITE <input type="checkbox"/> MEMO (After pressing the above, tap the following key)
<input type="checkbox"/> RESET	initializes the microprocessor	initializes the microprocessor	initializes the microprocessor
<input type="checkbox"/> SHIFT	When you hold this key down and tap any other key except <input type="checkbox"/> RESET, the upper side of the function becomes active. In MORSE RANDOM GENERATOR mode start/stop of random MORSE code is available by pressing and releasing this key.	selects the input frequency	selects CH1 (message memory)
tone <input type="checkbox"/> MODE	selects the mode. Every time this key is pressed, the mode is changed cyclically as MORSE→BAUDOT ASCII→MORSE RANDOM GENE .	changes the shift width of tone pair in BAUDOT and ASCII mode.	selects CH2 (message memory)
SHIFT <input type="checkbox"/> CASE	In BAUDOT mode, the case of LETTERS/FIGURES is switchable with the keystroke.	selects AF input or TTL input	selects CH3 (message memory)
INPUT <input type="checkbox"/> AUDIO	monitors output of AGC filter, SPACE filter and MARK filter.	Modifies the states of TONE, SHIFT...etc. to the one written on the screen when the Theta-550 is reset or the mode is changed. If the message memory is selected, this keystroke activates message memory programming mode.	causes the storage of edited message and deselects the message memory.
WRITE <input type="checkbox"/> MEMO	Press this key prior to writing or reading the data in CH1~CH9 .		

Table 13-2.

KEY	UNSHIFT	SHIFT	WRITE MEMO
	(Hold this key down and tap the following key)		(After pressing the above, tap the following key)
PAGE	moves the cursor to left when the message memory programming mode is active.	changes the page of the screen.	selects CH4 (message memory).
CLEAR	allows to activate or deactivate ANTI-NOISE function. Moves the cursor to right when the message memory programming mode is active.	clears the screen	selects CH5 (ID memory for "QBF").
SENSE SPEED	changes the speed of squeeze keyer in MORSE mode. Also changes transmit/receive speed in BAUDOT and ASCII mode.	inverts the polarity of MARK/SPACE input and MARK/SPACE output separately.	selects CH6 (ID memory for "Sel-Cal Characters" of local station).
U.S.O.S. UP	makes a fine adjustment of the selected speed. One key-stroke makes the length of one bit shorter by 0.8msec. in MORSE mode. In BAUDOT and ASCII mode, one keystroke makes the length of one bit shorter by 136µsec.	allows to activate or deactivate UNSHIFT-ON-SPACE function.	selects CH7 (ID memory for "End of Text" of local station).
SEND DOWN	makes a fine adjustment of the selected speed. Every time it is pressed, one bit's length is lengthened by 0.8m sec. in MORSE mode and 136µ sec. in BAUDOT and ASCII mode.	activates "SEND" function and transmits the message displayed on the screen. When the message memory channel is selected, the message stored in that channel is transmitted.	selects CH8 (ID memory for "Sel-Cal Characters" of distant station).
ECHO CR/LF	moves the cursor to the head of the next line. Provides CR/LF command output to the printer port.	With this keystroke, "ECHO-BACK" function is activated and released.	selects CH9 (ID memory for "End of Text" of distant station).

9-2. Input/Output Circuit

FIG. 11 I/O CIRCUIT

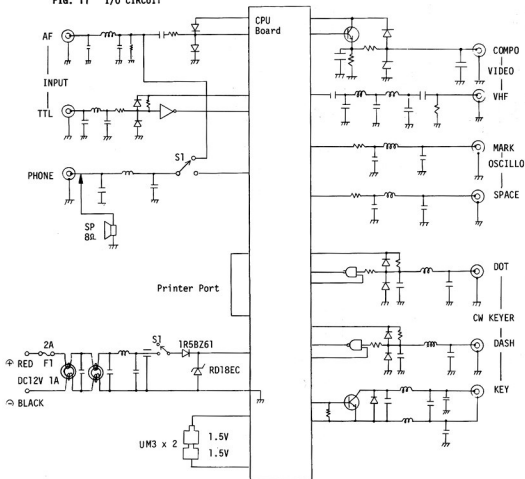
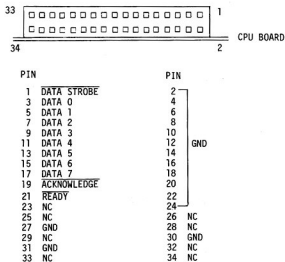
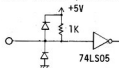


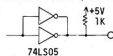
FIG. 12 Printer Port



INPUT CIRCUIT (ACKNOWLEDGE, READY)



OUTPUT CIRCUIT (DATA STROBE)



DATA 0 - DATA 7

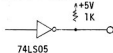
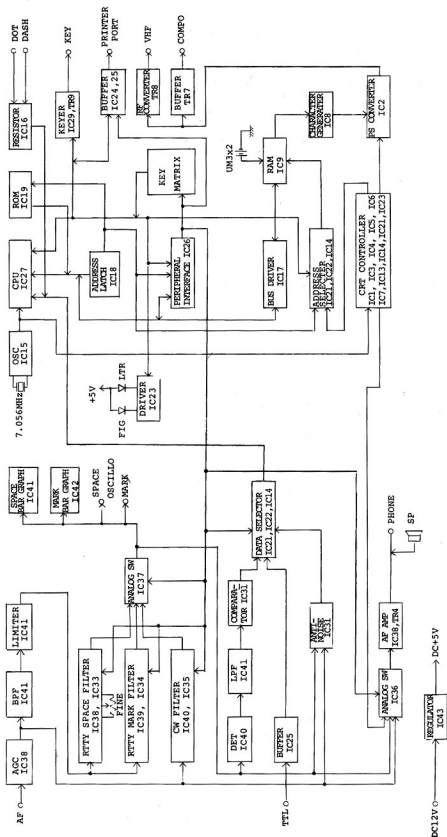


Figure 12



9-4. CW(MORSE) CODE

Table 14. CW(MORSE) CODE

	Display	Signals		Display	Signals		Display	Signals
A	A	..	S	S	...	,	,	-----
B	B	....	T	T	-	.	.	-----
C	C	....	U	U	---	:	:	-----
D	D	---	V	V	....	?	?	.....
E	E	.	W	W	---	/	/	....
F	F	....	X	X	---	-	--
G	G	---	Y	Y	---	"	"	.....
H	H	....	Z	Z	---))	-----
I	I	..	1	1	-----	'	'	-----
J	J	----	2	2	-----			
K	K	---	3	3	-----	$\overline{BT},$	=	-----
L	L	....	4	4	-----	$\overline{KN},$	(-----
M	M	--	5	5	.....	$\overline{AR},$	+	-----
N	N	-.	6	6	-----	\overline{AA}	@	----
O	O	----	7	7	-----	\overline{AS}	\wedge	-----
P	P	....	8	8	-----	\overline{VA}	;	-----
Q	Q	----	9	9	-----	\overline{HH}	<	.....
R	R	---	\emptyset	\emptyset	-----			.