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**TONO**

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**COMMUNICATIONS COMPUTER**

***Q - 550***

**INSTRUCTION MANUAL**

**TONO CORPORATION**

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

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# 1. FEATURES & PRECAUTIONS

## 1-1. Features

1. **Communications Terminal Theta-550**  
TONO *θ-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 × 16 lines per page. Page selection is keyboard-selectable.
4. **Self-contained, high performance Demodulator**  
Three-step shift selects either 170 Hz, 425 Hz or 850 Hz shift with manual fine tune control for odd shifts. Mark only or space only copy capability for selective fading.
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 allows 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 *θ-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 *θ-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 LEDs and audio monitor.

18. **Message Memory**

The *θ-550* has a 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 Ω

[TTL level input] Common to CW, RTTY (BAUDOT & ASCII)

5. **AF Input Frequency:**

[CW] 790 Hz, 395 Hz

[RTTY] Mark: 1275 Hz (low tone), 2125 Hz (high tone)

Shift: 170 Hz, 425 Hz, 850 Hz and fine tuning

} or rev.

6. **Battery-back-up memory:**

23 characters × 4 channels (User memories)

23 characters × 5 channels (System memories)

7. **Display output:**

[VHF output impedance] 75 Ω

[Composite Video Signals output impedance] 75 Ω

8. **Printer Interface:**  
Centronics Parallel Compatible
9. **Number of Characters and Pages to be Displayed:**  
640 characters (40 characters × 16 lines) / page × 2 (total: 1280 characters)
10. **Keying Circuit:**  
100 mA, 200 V (optically coupled)
11. **Output for Oscilloscope:**  
Output Impedance 200 kΩ
12. **AF Output:**  
150 mW, Output impedance 8 Ω
13. **Power Supply:**  
DC +12 V, 0.8 A
14. **Accessories:**  
Instruction Manual ..... 1  
Pin Plug ..... 10  
Coaxial Cable ..... 4 m
15. **Dimension:**  
250 mm (W) × 55 mm (H) × 225 mm (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 and DC power supply should be within the range of DC 11 V – 14 V.
4. If the input impedance of the TV set is 300 Ω (not 75 Ω), put a matching transformer of 75 Ω : 300 Ω between the *θ-550* and the TV set.
5. It is suggested that the *θ-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

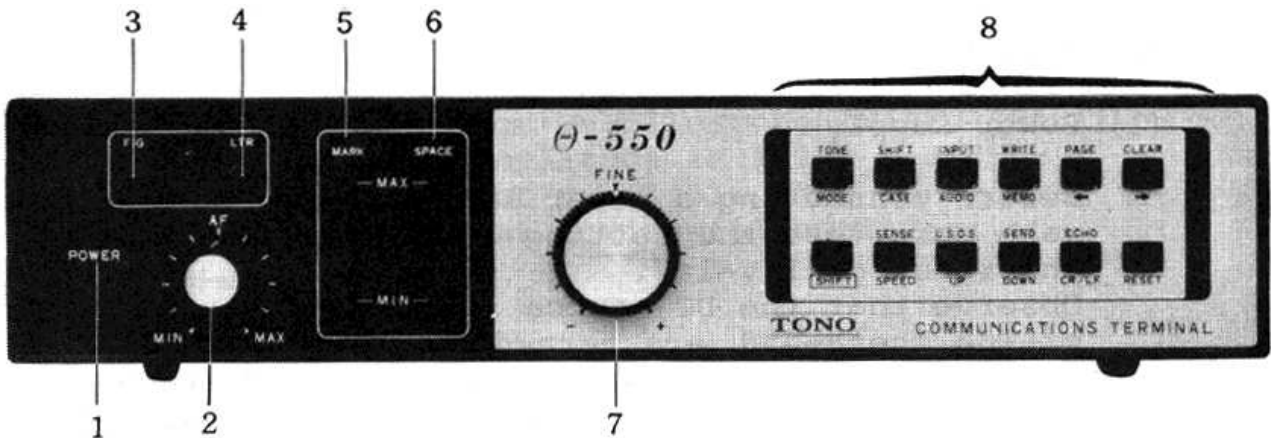


Figure 1. Front Panel

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 22-23.

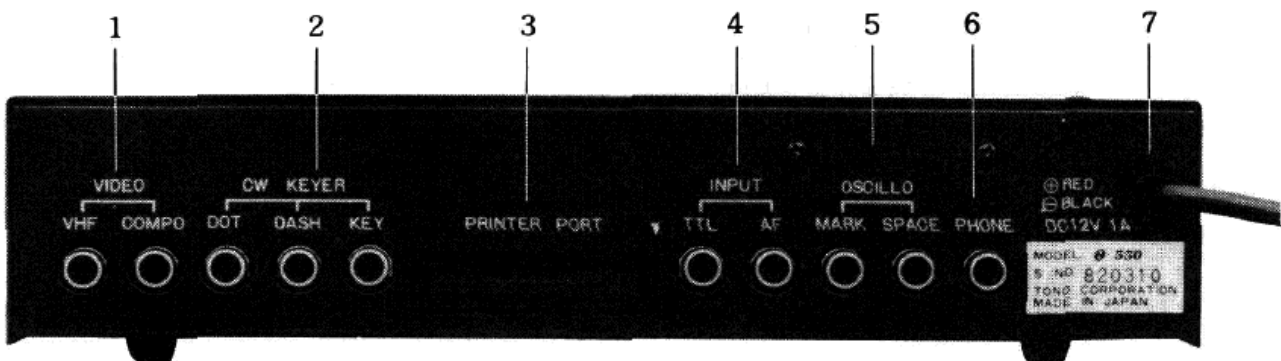


Figure 2. Rear Panel

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 transceiver.
3. Printer Port
4. Input [TTL]: This is an input accepting TTL level of nonmodulated 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 11 – 14 VDC. Observe that the DC source switch and the POWER switch of the *θ-550* are turned OFF. Then, connect a red power lead of the *θ-550* to a plus (+) terminal of the DC power source; a black power lead to a minus (-) terminal.

(2) **TV set and Video Monitor**

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 *θ-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.)

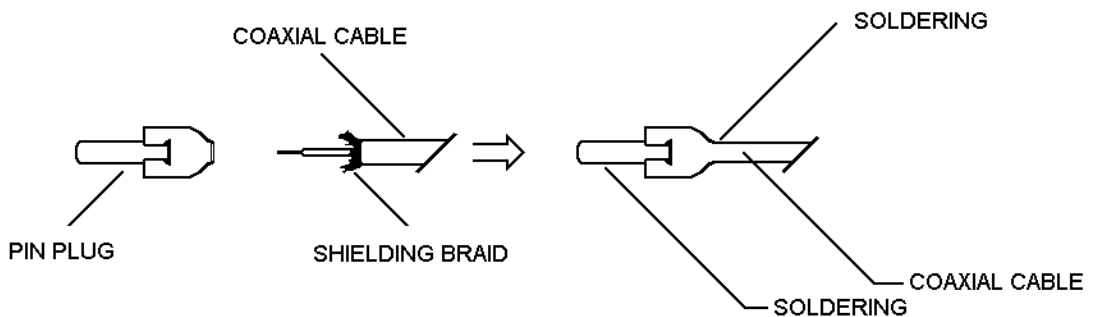


Figure 3.

or

Connect the pin plug to COMPOSITE pin jack of the *θ-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.

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

Table 1

### 3-2. EXPANDED SYSTEM

(1) **Oscilloscope**

The output impedance for Oscilloscope (MARK, SPACE) is 200 k $\Omega$ . (Maximum amplitude is 1.2 V<sub>p-p</sub> 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 a five standard TTL loads. Avoid overload.

When READY\* is Low level, timing of data for printer is as follows:

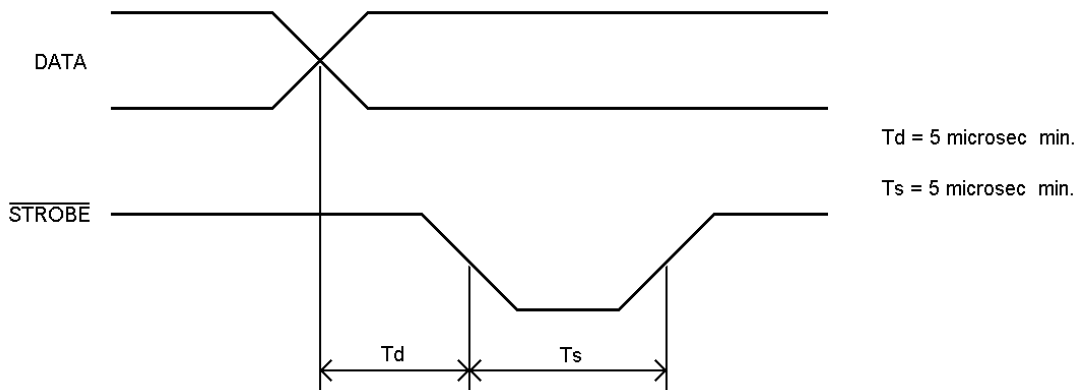


Figure 4.

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

A printer with Centronics Compatible interface can be connected directly to the  $\theta$ -550.

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 keyer terminal of the transceiver, which is connected to the pin side of the pin plug, has the highest voltage.



### 3-3. CONNECTIONS

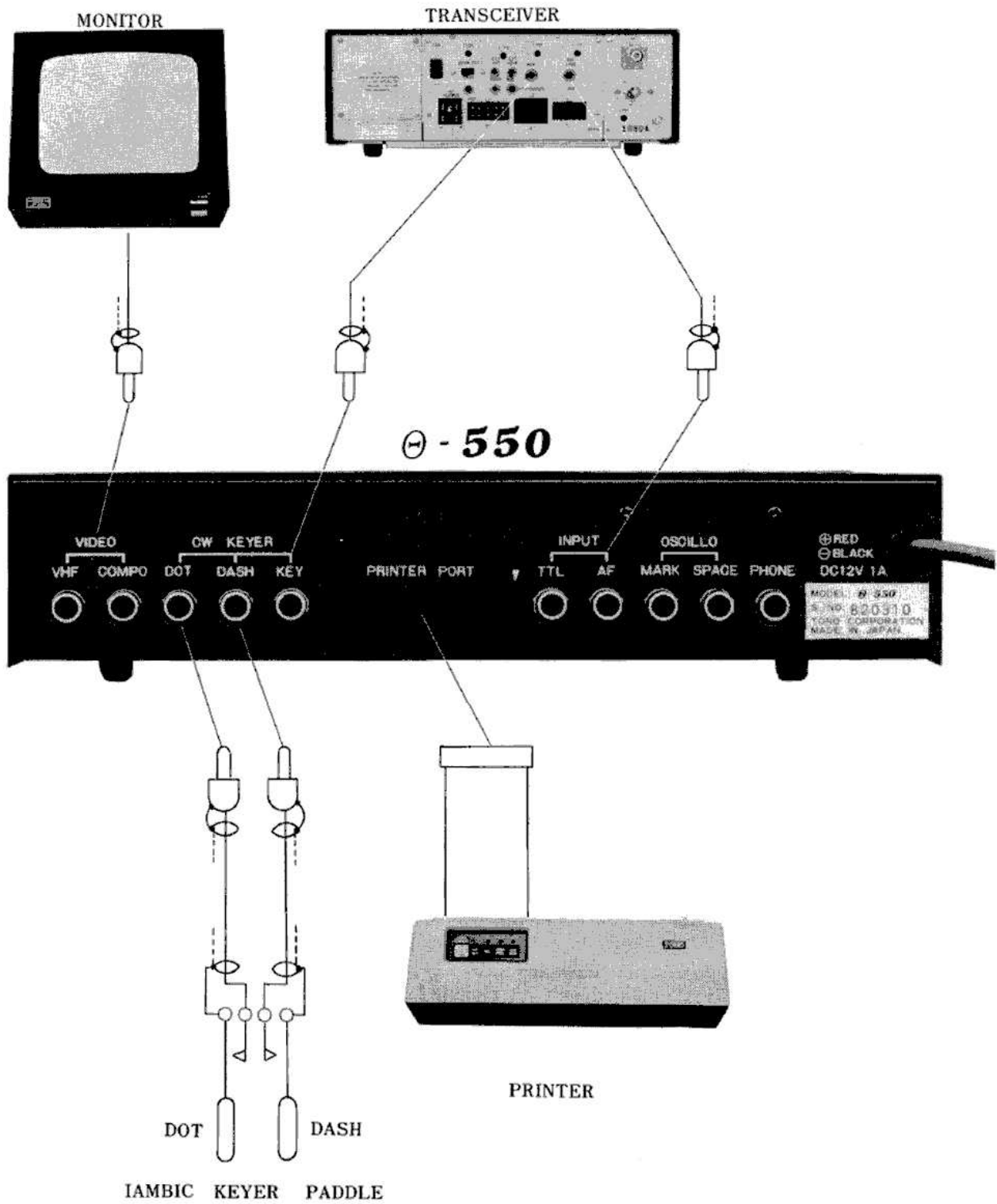


Figure 5.

## 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 [RESET] key is depressed. Notice that if the setting is not made correctly, the screen indicators are as Figure 6 when you press [RESET] key. Or Figure 6 thru Figure 9 when you press [TONE]/[MODE].

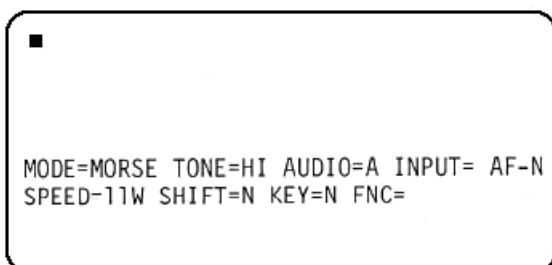


Figure 6. MORSE

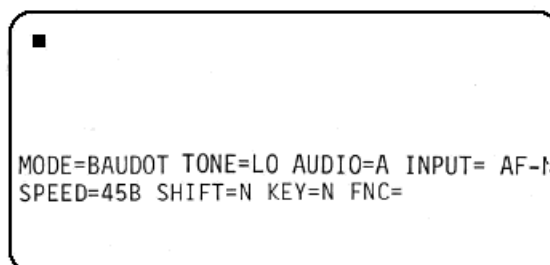


Figure 7. BAUDOT

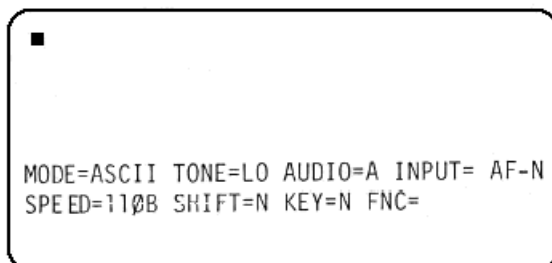


Figure 8. ASCII

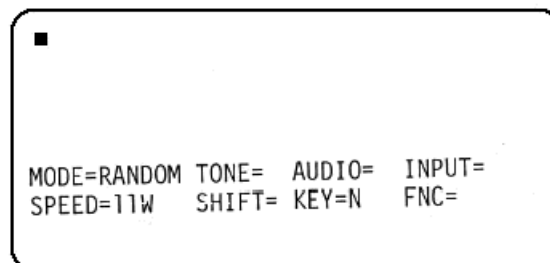


Figure 9. RANDOM GENERATOR

### 4-1. MORSE (CW) MODE

#### (1) TONE

By pressing [SHIFT] + [TONE]/[MODE] (hold [SHIFT] down and tap [TONE]/[MODE]) TONE=HI or TONE=LO is displayed alternately on the screen. TONE=HI indicates that the input frequency of CW is set to 790 Hz. TONE=LO indicates that the input frequency of CW is set to 395 Hz.

#### (2) INPUT

By pressing [SHIFT] + [INPUT]/[AUDIO], 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 [SHIFT] + [SENSE]/[SPEED] followed by [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 [SHIFT] + [SENSE]/[SPEED] followed by [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 [SENSE]/[SPEED] key is depressed, the WPM indication of the speed changes as the following cycle:

[ > 11 -> 14 -> 18 -> 23 -> 30 -> 39 -> 50 -> 5 -> 6 -> 8 ]

Table 2

With a keyboard entry of [U.S.O.S.]/[UP] or [SEND]/[DOWN], fine adjustment of the speed is available. Note that the 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 [CLEAR]/[ ] and FNC=[ ]A[ ] (ON) or FNC=[ ]\_[ ] (OFF) is displayed alternately.

(6) **How to store the preliminary setting in memory**

When you finish the preliminary setting in MORSE mode, hold [SHIFT] down and tap [WRITE]/[MEMO]. By this process, every parameter are retained according to your stored setting even if the mode is changed or [RESET] key is depressed.

## 4-2. **BAUDOT (RTTY) MODE**

(1) **MODE**

With the keystroke [TONE]/[MODE], the mode is changed from MORSE to BAUDOT. Screen indicators are shown in Figure 7.

(2) **TONE**

By depressing [SHIFT] + [TONE]/[MODE], TONE=HI or TONE=LO is displayed on the screen alternately. When TONE=HI, the Mark frequency is set to 2125 Hz. When TONE=LO, the Mark frequency is set to 1275 Hz.

(3) **SHIFT**

Every time [SHIFT] + [SHIFT]/[CASE] is depressed, SHIFT=N, SHIFT=M or SHIFT=W is displayed on the screen cyclically.

When SHIFT=N, shift width is set to 170 Hz, when SHIFT=M, shift width is set to 425 Hz and when SHIFT=W, shift width is set to 850 Hz.

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

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

Table 3

(4) **INPUT**

By pressing [SHIFT] + [INPUT]/[AUDIO], 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 [SHIFT] + [SENSE]/[SPEED] is depressed followed by [U.S.O.S.]/[UP], 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:

> 45 -> 50 -> 57 -> 74 -> 100 -> 110 -> 150 -> 200 -> 300 -> 600 ]

Table 4

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

Table 5

Every time [U.S.O.S.]/[UP] is depressed, the length of 1 bit is shortened by about 136 μsec. Likewise, whenever [SEND]/[DOWN] is depressed, the length of 1 bit is lengthened by 136 μsec.

(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 *θ-550* is reset or the mode is changed from BAUDOT mode to another.

#### 4-3. **ASCII (RTTY) MODE**

(1) **MODE**

With the keystroke **[TONE]/[MODE]**, the mode is changed from BAUDOT to ASCII. Screen indicators are shown in Figure 8.

(2) **TONE**

By depressing **[SHIFT]** + **[TONE]/[MODE]**, **TONE=HI** or **TONE=LO** is displayed on the screen alternately.

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

(3) **SHIFT**

Every time **[SHIFT]** + **[SHIFT]/[CASE]** is depressed, **SHIFT=N** or **SHIFT=M** or **SHIFT=W** is displayed on the screen cyclically.

**SHIFT=N** indicates that shift width of 170 Hz has been selected. **SHIFT=M** indicates that shift width of 425 Hz has been selected. **SHIFT=W** indicates that shift width of 850 Hz 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 **[SHIFT]** + **[INPUT]/[AUDIO]**, **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 **[SHIFT]** + **[SENSE]/[SPEED]** is depressed followed by the keystroke **[U.S.O.S.]/[UP]**, **INPUT=[]-N** or **INPUT=[]-R** is displayed (AF or TTL is shown in []).

**INPUT=[]-N** shows that NORMAL polarity has been selected. **INPUT=[]-R** shows that REVERSE polarity has been selected.

With the keystroke **[SHIFT]** + **[SENSE]/[SPEED]** followed by the keystroke **[SEND]/[DOWN]**, **KEY=N** or **KEY=R** is displayed.

**KEY=N** indicates that 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 136 µsec. and the keystroke [SEND]/[DOWN] makes 1 bit's length longer by about 136 µsec.

(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, [SHIFT] + [WRITE]/[MEMO] may be depressed. Now each parameter is retained as per your setting even if the *θ-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:

[ > 11 -> 14 -> 18 -> 23 -> 30 -> 39 -> 50 -> 5 -> 6 -> 8 ]

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 [SHIFT] + [WRITE]/[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 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:

[ > MORSE -> BAUDOT -> ASCII -> RANDOM GENERATOR ]

Table 8

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
  4. 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 (790 Hz)
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]/[MODE] key until MODE=MORSE appears on the screen.

#### (2) SPEED SETTING

Receiving Speed: MORSE Low speed (auto track)

Transmitting speed: Press [SENSE]/[SPEED] repeatedly until WPM of speed indicates the speed you desire. Then you are ready to transmit the signal from squeeze keyer and channel memory.

Fine Adjustment: [U.S.O.S.]/[UP] One dot's length is shorted by 0.8 msec. every time you press it.  
 [SEND]/[DOWN] One dot's length is lengthened by 0.8 msec. 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 [SHIFT] + [INPUT]/[AUDIO] and [SHIFT] + [SENSE]/[SPEED] -> [U.S.O.S.]/[UP].

(4) **TONE**

Press [SHIFT] + [TONE]/[AUDIO] so as to get the tone you like. TONE=HI shows the center frequency of BPF is set to 790 Hz. TONE=LOW shows the center frequency of BPF is set to 395 Hz.

(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 *θ-550* reads MORSE code and displays on the screen. Special characters are displayed as shown in Table 10.

SPECIAL CHARACTER	INDICATION
<u>BT</u>	=
ERROR	<
<u>AS</u>	^
<u>AA</u>	@

SPECIAL CHARACTER	INDICATION
<u>KN</u>	(
<u>AR</u>	+
<u>VA</u>	;

Table 10

**NOTE:** Upon receipt of KN, AR, 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 *θ-550* respectively. Plug the CW key terminal of the transceiver into the key jack of the *θ-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 the 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]/[MODE]), SPEED, TONE and SHIFT WIDTH are set as follows:

	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	"	170 Hz

Table 11

If you desire a different speed, press [SENSE]/[SPEED] until the required speed is viewed on the screen. The relation between screen indicator and actual bud 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 136 μsec. [SEND]/[DOWN] decreases the speed. One keystroke makes 1 bit's length longer by about 136 μsec.

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

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

(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 begins to flash to its full length.
- iii) Keep increasing the frequency.
- iv) 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 *θ-550*.

NO

- v)' If SPACE indicating Bar Graph Meter does not illuminate, turn the FINE tuning control to obtain the position where it illuminates.

NO

- vi)' Change the shift setting of the *θ-550* so as to make SPACE indicating Bar Graph Meter illuminate and turn the FINE tuning control to make the length of the bar maximum
- vi) Turn the FINE tuning control and stop it at the maximum indication of the SPACE indicating Bar Graph Meter.

When tuning is completed, the correct characters will be displayed on the screen. If not:

Change the speed setting

If NO

Press [SHIFT] + [SENSE]/[SPEED] followed by [U.S.O.S.]/[UP].

If NO

Input signals are not RTTY BAUDOT code.

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

[ AGC -> SPACE -> MARK ]

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:

	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	"	170 Hz

Table 12

If you desire a different speed, press [SENSE]/[SPEED] until the required speed is viewed on the screen. The relation between screen indicator and actual bud 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 136  $\mu$ sec. [SEND]/[DOWN] decreases the speed. One keystroke makes 1 bit's length longer by about 136  $\mu$ sec.

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

Please follow the description at the Baudot mode!

## 6. SPECIAL FUNCTIONS

### 6-1. ANTI-NOISE CIRCUIT

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

### 6-2. UNSHIFT-ON-SPACE

When weak signals and noise cause errors, press the key [SHIFT] + [U.S.O.S.]/[UP] 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 [SHIFT] + [U.S.O.S.]/[UP] disables the function. 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 [SHIFT] + [ECHO]/[CR/LF] 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.

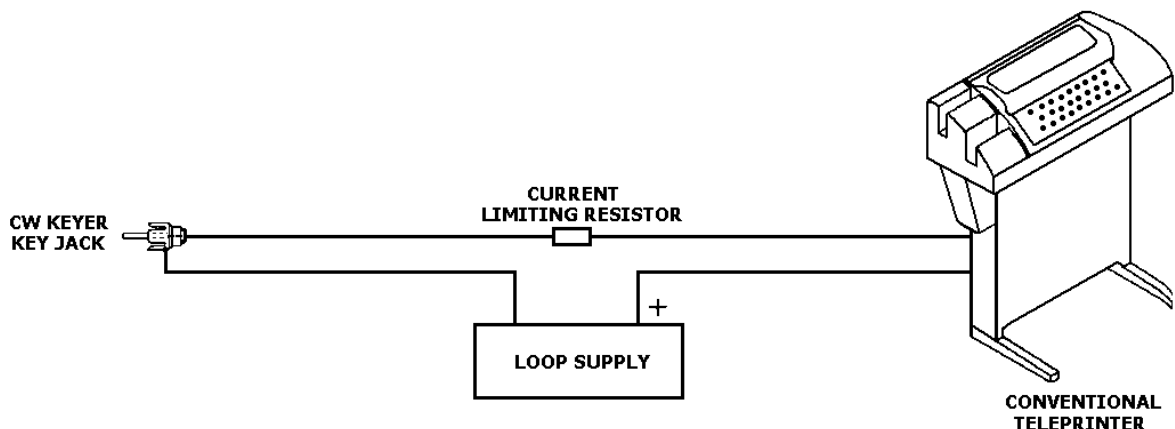


Figure 10

### 6-4. MORSE CODE RANDOM GENERATOR

Generates 5-character-sequence, random MORSE code. To activate this function, continue to press [TONE]/[MODE] until MORSE=RANDOM is seen on the screen. With the keystroke [SHIFT], the *θ-550* begins to generate MORSE code. Another keyboard entry of [SHIFT] releases this function.

If you desire to change the speed, [SENSE]/[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.]/[UP] or [SEND]/[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 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 *Ø-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 characters)
6. CH6 ..... "SEL-CAL Characters" for local station (23 characters)
7. CH7 ..... "End of Text" for local station (23 characters)
8. CH8 ..... "SEL-CAL Characters" for distant station (23 characters)
9. CH9 ..... "End of Text" for distant station (23 characters)

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

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

FNC= [ ] [ ] [ ] [ ] \_

- (3) With the keystroke **[SHIFT]** + **[WRITE]/[MEMO]**, the WRITE mode is active. Note that the alpha-numeric and symbols are indicated as

♣BCDEFGHIJKLMNOPQRSTUVWXYZ0123456789 \_\_\_\_\_ <-- SPACE  
 !"#\$%&'()\*+,-./:;<=>?@[ \ ] ^ \_ CL \_\_\_\_\_ <-- 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 **[SHIFT]** + **[WRITE]/[MEMO]**, chosen characters are indicated on the screen.
- (6) The keystroke **[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 **[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 [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 ....	[TONE]/[MODE]	CH3 ....	[INPUT]/[AUDIO]
CH2 ....	[SHIFT]/[CASE]	CH4 ....	[PAGE]/[→]

- (3) The stored message can be transmitted by pressing [SHIFT] + [SEND]/[DOWN].
- (4) You may interrupt the transmission at any time by pressing any of the keys except [RESET].

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

- (1) Press [WRITE]/[MEMO].
- (2) With the keystroke [CLEAR]/[→], [SHIFT] + [SEND]/[DOWN], the following test message is transmitted:

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG DE \_\_\_\_\_  
the identification written in CH5 ⑨

- (3) Any of the key except [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 pressed.

### 8-1. SEL-CAL OF LOCAL STATION

When using SEL-CAL mode, the received message 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 *θ-550* can not accept the messages any more. Another [PAGE]/[→] can release the function.

### 8-2. SEL-CAL OF DISTANT STATION

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

Press [WRITE]/[MEMO] ⇒ [ECHO]/[CR/LF] ⇒ [SHIFT] + [SEND]/[DOWN] to transmit "End of Text" of distant station (written in CH9) when you complete the transmission.

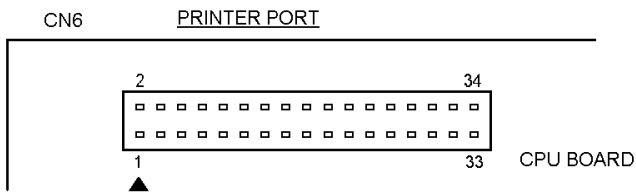
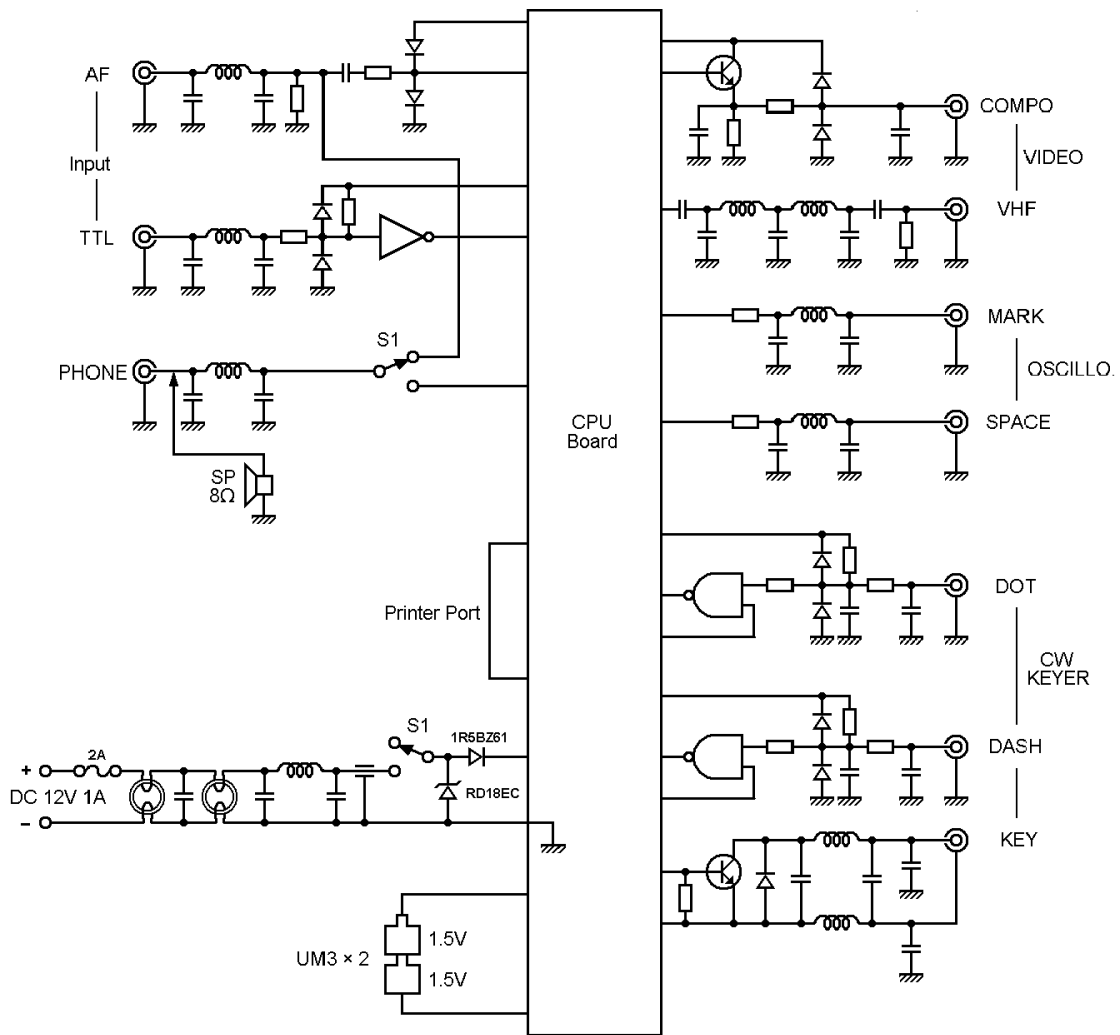
## 9. APPENDIX

KEY	UNSHIFT	[ ] SHIFT	WRITE [ ] MEMO
		(Hold this key down and tap the following key)	(After pressing the above, tap the following key)
[ ] RESET	Initializes the microprocessor	Initializes the microprocessor	Initializes the microprocessor
[ ] SHIFT	When you hold this key down and tap any other key except [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 release this key.	-----	-----
TONE [ ] MODE	Selects the mode. Every time this key is pressed, the mode is changed cyclically as MORSE $\Rightarrow$ BAUDOT $\Rightarrow$ ASCII $\Rightarrow$ MORSE RANDOM GENE.	Selects the input frequency	Selects CH1 (message memory)
SHIFT [ ] CASE	In BAUDOT mode, the case of LETTERS/FIGURES is switchable with the keystroke.	Changes the shift width of tone pair in BAUDOT and ASCII mode.	Selects CH2 (message memory)
INPUT [ ] AUDIO	Monitors output of AGC filter, SPACE filter and MARK filter.	Selects AF input or TTL input.	Selects CH3 (message input)
WRITE [ ] MEMO	Press this key prior to writing or reading the data in CH1 ~ CH9.	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.
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.	Select CH7 (ID memory for "SEL-CAL Characters" of local station)



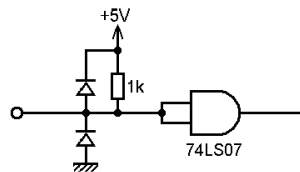
<p>U.S.O.S. [ ] UP</p>	<p>Makes a fine adjustment of the selected speed. One keystroke makes the length of one bit shorter by 0.8 msec. in MORSE mode. In BAUDOT and ASCII mode, one keystroke makes the length of one bit shorter by 136 µsec.</p>	<p>Allows to activate or deactivate UNSHIFT-ON-SPACE function.</p>	<p>Selects CH7 (ID memory for "End of Text" of local station)</p>
<p>SEND [ ] DOWN</p>	<p>Makes a fine adjustment of the selected speed. Every time it is pressed, one bit's length is lengthened by 0.8 msec. in MORSE mode an 136 µsec. in BAUDOT and ASCII mode.</p>	<p>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.</p>	<p>Select CH8 (ID memory for "SEL-CAL Characters" of distant station).</p>
<p>ECHO [ ] CR/LF</p>	<p>Moves the cursor to the head of the next line. Provides CR/LF command output to the printer port.</p>	<p>With this keystroke, "ECHO-BACK" function is activated and released.</p>	<p>Selects CH9 (ID memory for "End of Text" of distant station)</p>

Figure 11 INPUT/OUTPUT CIRCUIT

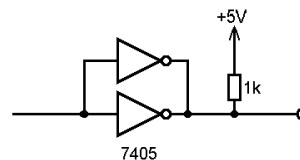


PIN	PIN
1 DATA STROBE	2
3 DATA 0	4
5 DATA 1	6
7 DATA 2	8
9 DATA 3	10
11 DATA 4	12 GND
13 DATA 5	14
15 DATA 6	16
17 DATA 7	18
19 ACKNOWLEDGE	20
21 READY	22
23 NC	24
25 NC	26 NC
27 GND	28 NC
29 NC	30 GND
31 GND	32 NC
33 NC	34 NC

INPUT CIRCUIT (ACKNOWLEDGE, READY)



OUTPUT CIRCUIT (DATA STROBE)



DATA 0 - DATA 7

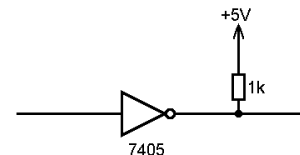
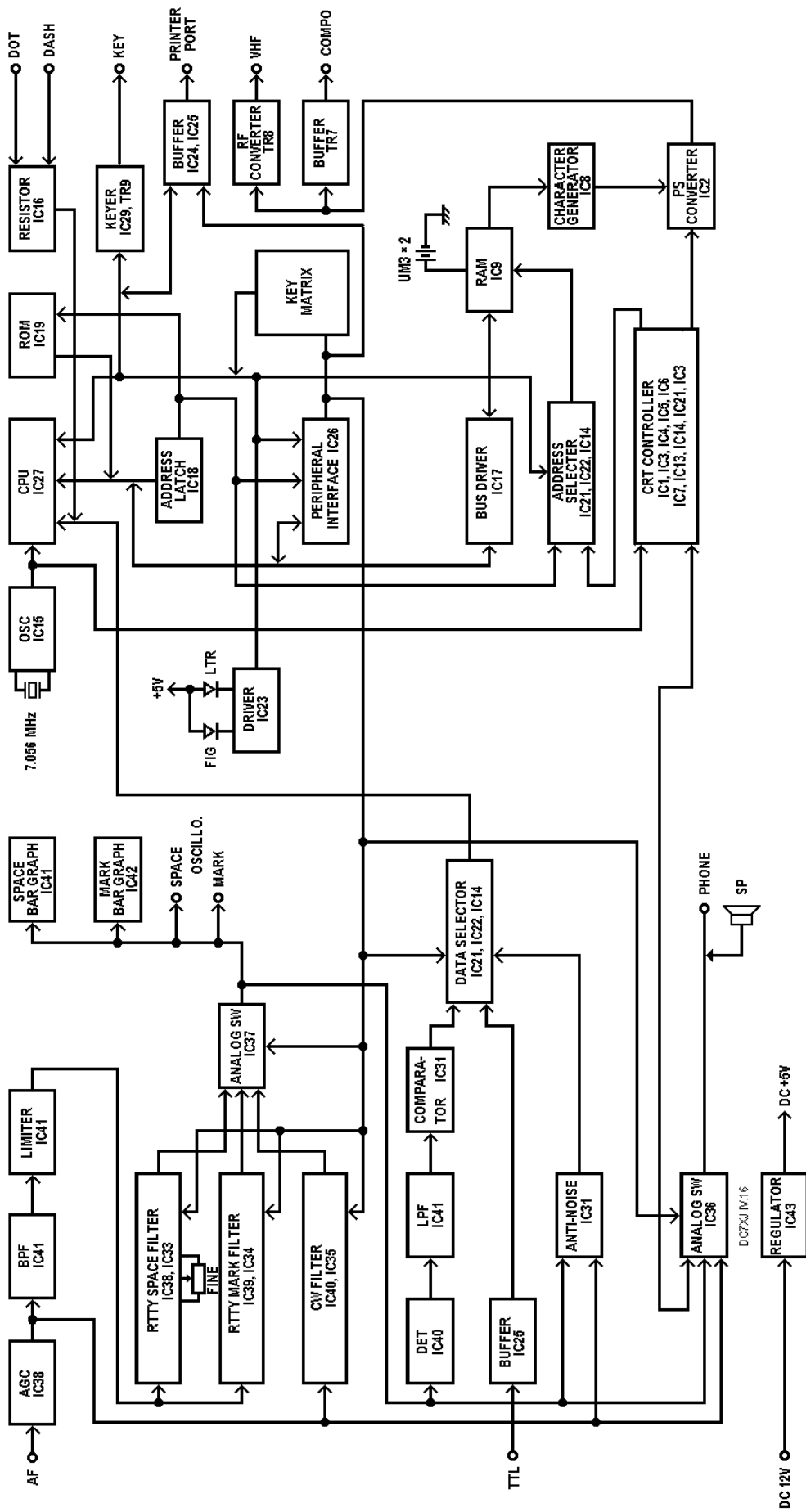


Figure 12 **BLOCK DIAGRAM**



## CW (MORSE) CODE

	DISPLAY	SIGNALS
A	A	·-
B	B	-···
C	C	-···
D	D	-··
E	E	·
F	F	····
G	G	---
H	H	····
I	I	··
J	J	·---
K	K	---
L	L	····
M	M	--
N	N	-·
O	O	---
P	P	····
Q	Q	---·
R	R	···

	DISPLAY	SIGNALS
S	S	···
T	T	-
U	U	··-
V	V	···-
W	W	·---
X	X	-··-
Y	Y	-···
Z	Z	---·
1	1	·----
2	2	··----
3	3	····-
4	4	····-
5	5	·····
6	6	-····
7	7	---··
8	8	----·
9	9	-----
∅	∅	-----

	DISPLAY	SIGNALS
,	,	·-----
.	.	·-----
:	:	-----
?	?	·-----
/	/	·-----
-	-	-----
"	"	·-----
)	)	-----
'	'	·-----
<u>BT</u> ,	=	-----
<u>KN</u> ,	(	-----
<u>AR</u> ,	+	·-----
<u>AA</u>	@	·---
<u>AS</u>	^	·-----
<u>SK</u>	;	·-----
<u>HH</u>	<	·······