TONO

COMMUNICATIONS COMPUTER

Θ - 7000

INSTRUCTION MANUAL

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************************** **CONTENTS** **************************

1. FEATURES

(1) <u>COMMUNICATION COMPUTER</u>

The Θ-7000 is made with the newest technique of computer; transmits and receives the CW (Morse Code), RTTY (Baudot code) and ASCII (American Standard Code for Information Interchange) and projects them to a home TV set. It may be used as an intelligent terminal for a microcomputer as well as for a wireless set.

(2) <u>WIDE RANGE OF TRANSMITTING AND RECEIVING</u>

Its transmitting-receiving speeds are 10 steps for transmitting the CW, automatic-following for receiving the CW, 4 steps for transmitting-receiving the RTTY and 2 steps for transmitting-Receiving the ASCII. It may be effectively used not only for the radio amateur communications but also for the business communications.

(3) <u>HIGH PERFORMANCE DEMODULATOR</u>

It has an active filter type demodulator of high stability and reliability in it, which results in a very high communication performance. For the RTTY, three steps (shift with 170 Hz, 425 Hz and 850 Hz) and 'FINE TUNING' are available, so the demodulator may be very easily operated.

(4) <u>CRYSTAL-CONTROLLED MODULATOR</u>

It has a high precision, high stability crystal-controlled modulator which is controlled by the computer attached to it and the RTTY may be transmitted and received even with a machine without FSK function.

(5) <u>EASILY OPERATEABLE KEYBOARD ARRANGEMENT</u>

It has a keyboard arrangement about the same as the ordinary typewriter; even for RTTY it is not necessary to change LTR and FIG manually and the code of LTR and FIG may be added automatically.

(6) <u>LARGE CAPACITY DISPLAY MEMORY</u>

It has the capacity for two pages of 32 characters × 16 lines and the pages may be changed easily by operating the key switch, so such a use that one page is for receiving and the other page is for transmitting may be available. When the screen is filled up, the lines go up automatically with the scrolling function.

(7) <u>AUTOMATIC CHANGE FROM/TO TRANSMITTING TO/FROM RECEIVING</u>

Change of transmitting and receiving is controlled automatically by the computer.

(8) <u>A BATTERY BACKED-UP MEMORY</u>

It has a battery backed-up memory for 32 characters × 7 channels; the sentences do not volatilize when the power source is cut off. The computer will let the machine work automatically at any time with your key switch operation if you put your call sign or sentences which you often use it.

(9) <u>OUTPUT REPEATING</u>

The sentence memorized in the battery backed-up memory may be put out repeatedly with the key switch operation. It may be used very conveniently at calling.

(10) 'SEND-OUT' FUNCTION

The sentence on the screen sent from the keyboard or received from the outside may be sent out with the key operation of one time from the first character to the character before the cursor. A sentence of up to 511 characters may be sent out at one time.

(11) USE OF A CASSETTE TAPE-RECORDER AS A SUPPLEMENTARY MEMORY

The sentence may be put in the cassette tape-recorder or the sentence may be led in and displayed on the screen from the cassette tape-recorder. This function may be very effectively utilized being connected with the 'SEND-OUT' function, so paper tapes are no more necessary for the RTTY.

(12) BUFFER MEMORY FOR DISPLAYING ON THE TV

The information in the buffer memory which has the capacity of 23 characters may be put on the lowest line (17th line) on the screen and they move to the left every time one of them is sent out, so the going -out sentence may be well observed.

(13) 'RUB-OUT' FUNCTION

When a wrong character is sent to the buffer memory from the keyboard, the character may be canceled before it is sent out of the buffer memory and a correcting code may be put out after it is sent out.

(14) SIMULTANEOUS ACCESS

During receiving the communication, the sentence may be put in the buffer memory or the battery backed-up memory. Efficient QSO may be made because the sentence may put in the buffer memory even when the battery backed-up memory is transmitting or the displaying memory is transmitting with the 'SEND-OUT' function.

(15) PRELOADING FUNCTION

Buffer memory may memorize the sentence sent from the keyboard and by using this function at the time of receiving, transmitting may be made just after receiving and beautiful continuous may be sent out.

(16) ONLY THE RECEIVED SENTENCES MAY BE DISPLAYED IF NECESSARY

When you don't need the display of the sent out sentence, only the received sentence may be displayed though both of them are available.

(17) DISPLAYING CHANNEL NO., PAGE NO. AND THE CASE

The channel number of the battery backed-up memory, the page number of the screen, the case (LTR or FIG) in the RTTY may be displayed on the lowest (17th) line.

(18) FUNCTION OF CANCELING CR AND LF

When CR (carriage return) or LF (line feed) is received or at writing with the keyboard, CR and LF are replaced with = (equal) and _ (underline) on the screen respectively and the screen may be used effectively.

(19) FUNCTION OF CONTROLLING CURSOR MOVEMENT

Cursor movement may controlled by the keyboard. In the case of the ASCII mode, the cursor movement may be controlled by the external signals and it is effective when the machine is con-

nected to a microcomputer.

(20) SINGLE-SIDED RTTY MAY BE RECEIVED

So-called single-sided RTTY of intermission of either marks or spaces may be clearly received.

(21) 'UNSHIFT ON SPACE' FUNCTION

When you receive a space (space of Baudot code) in the case of the RTTY, the CASE changes to LTR regardless of the case so far. It may be effective to be used for receiving signals very close to the noise level.

(22) A MONITOR CIRCUIT

A monitor circuit which automatically changes transmitting and receiving to each other is attached; the situation of transmitting and receiving may be found through the speaker. At the time of receiving, the output from the mark filter, the output from the space filter and the output from the AGC amplifier in the front stage of the filter may be monitored.

(23) CW PRACTICE FUNCTION

If you connect the key to this machine and operate the key, the machine will read it and display it on the screen. In this case, the CW key operation's output circuit works according to the operation of the key.

At the time of receiving CW, always different sentences may be received by using the output repeating function (9) and the 'SEND-OUT' function (10), which makes your practice effective and interesting.

(24) CW WEIGHT IS CHANGEABLE

At transmitting the CW, the length of the dash may be changed in the range of 1:3 ~ 1:6.

(25) OUTPUT TERMINALS FOR OBSERVING THE CROSS PATTERN

The demodulator of this machine may be easily tuned with the tuning indicating LED or the monitor circuit. Output terminals for observing the cross pattern with an oscilloscope are attached.

(26) OUTSPUT PORTS FOR A PRINTER

8 bit parallel I/O port is attached for connecting to a printer. In this case, the output is ASCII and a strobe pulse comes out every time of putting out a character.

(27) DC TWO WAY POWER SOURCE SYSTEM

Both power supplies +12 VDC and +5 VDC may be used.

(28) FUNCTIONAL DESIGN

The keys, switches and others are arranged functionally to be used easily and everything as well as the case is designed functional and elegant.

(29) CARETAKING COMMUNICATION IS AVAILABLE

Messages may be received while you are out by attaching the option part Θ-22 and making a network with your group members and in this case, no messages may be received from outside the network. Also the RTTY's function may be expanded by the Θ-22.

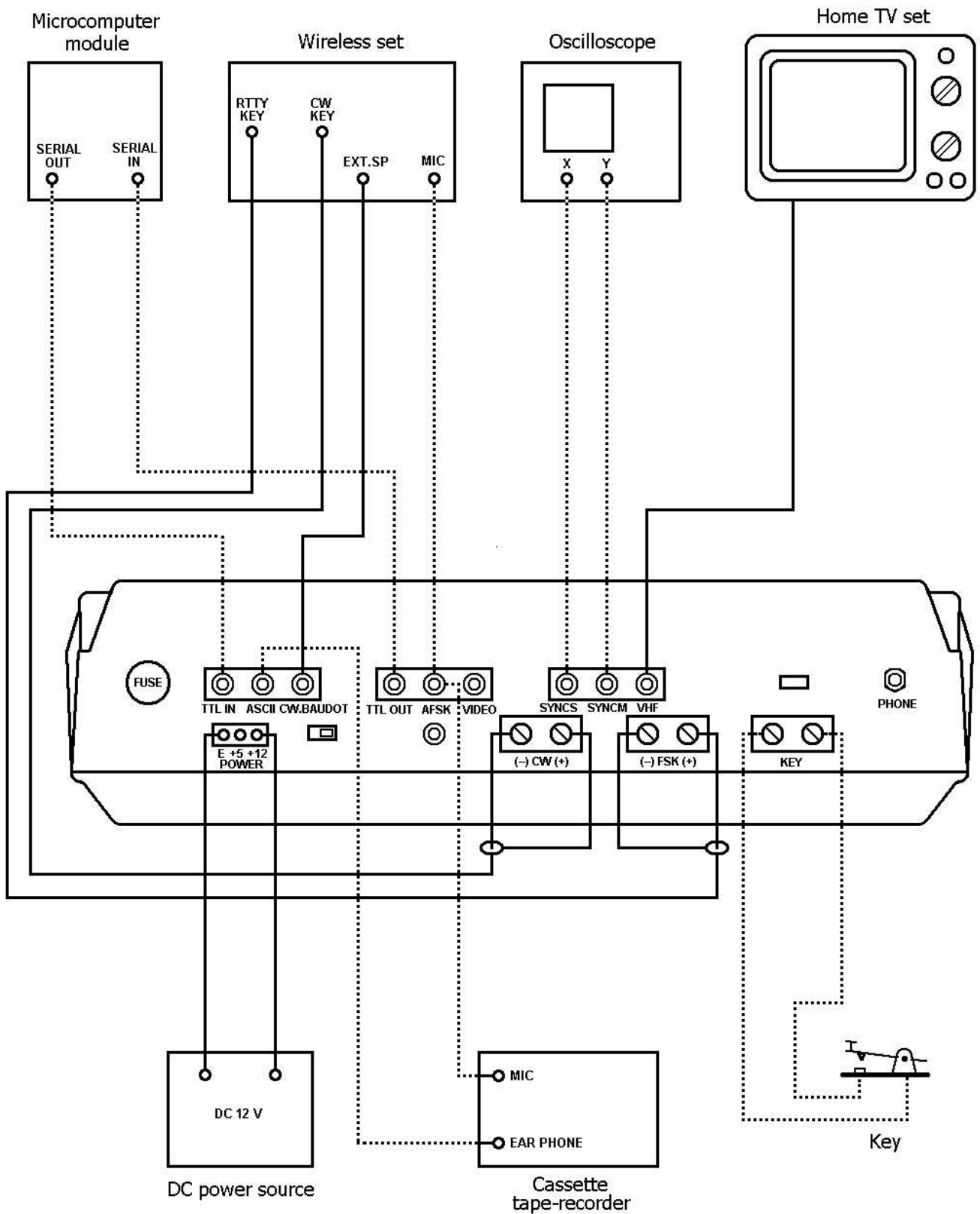Figure 1: Connection

2. HOW TO USE

2.1 Accessories for the Θ-7000

Instruction manual	1
Pin plug	9
Earphone plug	1
Power source cord	1
Coaxial cable	4 m

2.2 Installation

The Θ-7000 should be installed at a well-ventilated dry place not exposed to the direct rays of the sun with special care for heat radiation.

2.3 Connection

(1) Power supply

An ancillary source power supply cord is connected for 12 VDC. In the case of using 5 VDC, change the connection within source cord connector as shown in Fig. 2.
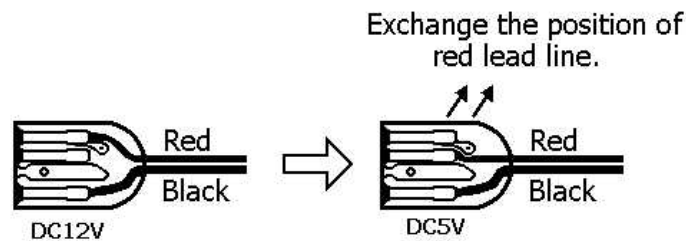
Figure 2

Before connecting a source cord to your DC power supply, the setting of source voltage is necessary as follows:

In the case of 12 VDC	11 V ~ 13,8 V
In the case of 5 VDC	4.75 V ~ 5.25 V

Source voltage should be stabilized without ripple in the case of 5 VDC. After confirming a DC source switch and a power switch of the computer indicate OFF, connect the red source cord of the computer to a plus (+) terminal of DC source, a black source cord to a minus (−) terminal.

(2) TV set

Solder an ancillary coaxial cable and a pin plug as shown in Fig. 3. After having soldered, connect the pin plug to a VHF pin jack of the Θ-7000 and the other end of the coaxial cable to an antenna terminal of a home TV set.

Figure 3

(3) <u>Wireless set</u>

Before connecting, adjust SWR as follows:

In the case of output less then 10 W: less than 1.5
In the case of output from 10 W to 100 W: less than 1.3
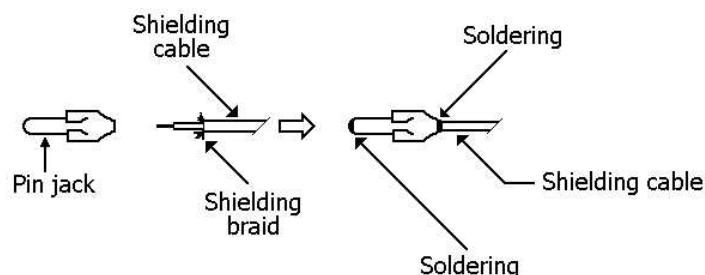In the case of output from 100 W to 500 W: less than 1.1

(i) Speaker

Solder the ancillary coaxial cable and a pin plug as shown in Fig. 3. After soldering, connect the pin plug to the CW/BAUDOT pin jack of the Θ-7000 and the other end to an external speaker terminal or an earphone terminal of a wireless set.

(ii) In CW mode

Connect the cable to a key jack for CW of a wireless set, check the polarity by a tester and connect its plus (+) to the plus (+) of a screw terminal for CW of the computer; its minus (−) to the minus (−) of the computer. Take care not to exceed the rated capacity of keying circuit of 1.5 A, 150 V.

(iii) In RTTY mode

° In the case of a wireless set with FSK function:
Connect the cable to a KEY jack for RTTY of the wireless set, check the polarity by a tester and connect its plus (+) to the plus (+) screw terminal for FSK of the computer, its minus (−) to the minus (−) terminal. Special care should be exercised not to exceed the rating: 1.5 A for the maximum keying circuit current and 150 V for the maximum voltage.

° In the case of a wireless set without FSK function:
Solder the ancillary coaxial cable and a pin plug as shown in Fig. 3. After soldering, connect the pin plug to a pin jack for AFSK of the Θ-7000 and the other end to a microphone terminal of the wireless set. The shielding braids of the cable should be connected to GND side of the micro-phone terminal.

(4) <u>Key</u>

For manipulation practice in CW mode, connect keys to a screw terminal for KEY of the com-puter.

(5) <u>Oscilloscope</u>

Cross pattern can be observed with oscilloscope by the following procedures: solder the coax-ial cable or shield cable with two pin plugs respectively as shown in Fig. 3; after soldering, connect the pin plugs to pin jacks, SYNCM and SYNCS; connect the cable in SYNCM to the V-axis input to the oscilloscope and the cable in SYNCS to the H-axis input.

3. Designation and Explanation of parts

3.1 Keyboard
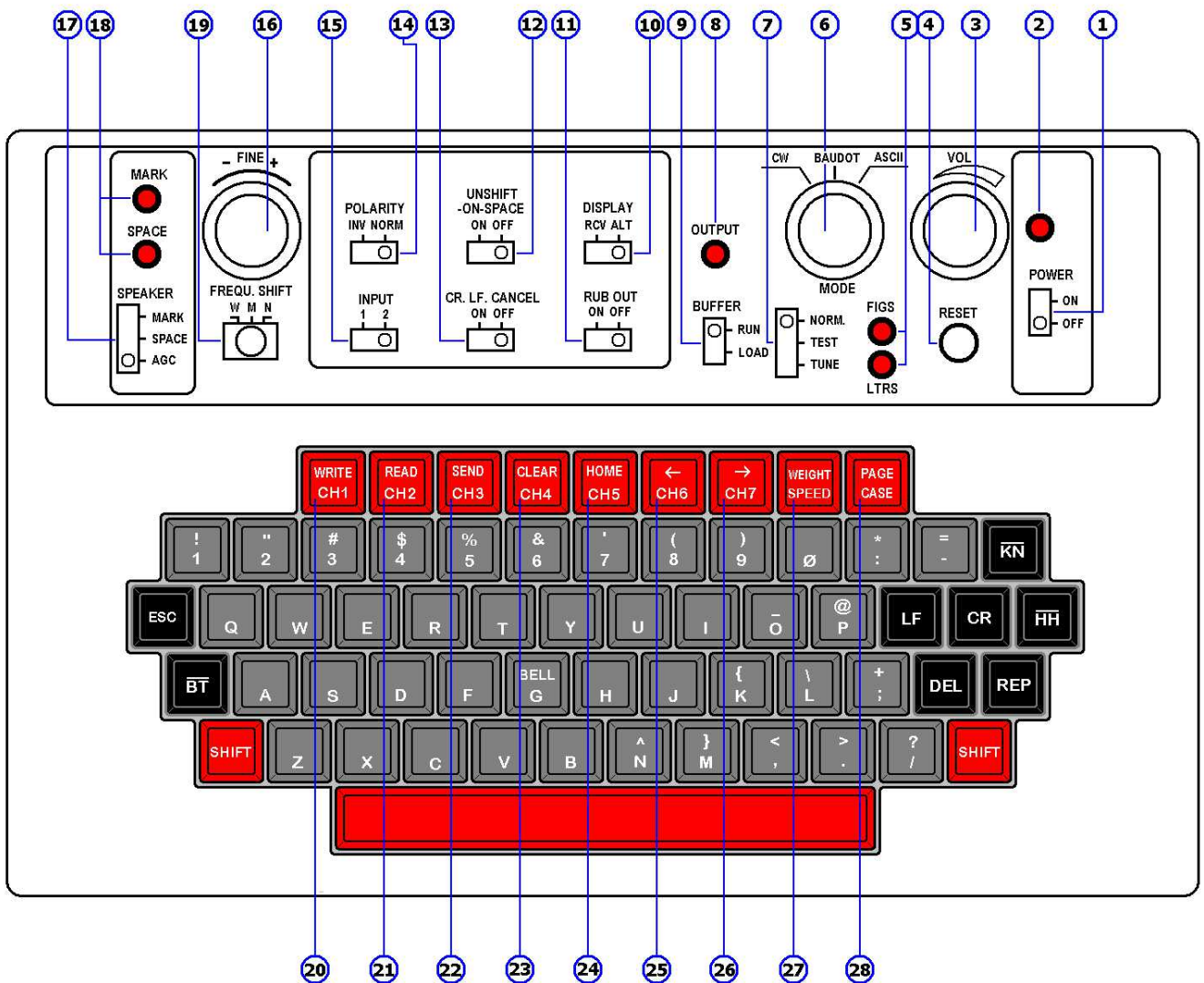
Figure 4

(1) POWER switch: Power Switch

(2) POWER pilot LED: Lights when the power switch is turned on.

(3) VOL: Controls the volume of a monitor speaker.

(4) RESET switch: Initializes the computer

(5) LTRS/FIGS indicating LEDs: Indicate LTRS/FIGS in RTTY mode

(6) MODE switch: For mode selection among CW, BAUDOT (RTTY) and ASCII.

(7) NORM/TEST/TUNE switch: TEST position of the switch makes the keying circuit OFF; NORM provides an ordinary use condition; TUNE makes the keying circuit ON and provides the output level control.

(8) OUTPUT indicating LED: Indicates output level. Lights at the time of "mark" and does not light at the time of "space".

(9) BUFFER switch: At RUN, data are put out in order of key input; at LOAD, data are sent to the buffer memory in order of input, not being put out. They are put out with the switch returning to RUN.

(10) RUB OUT switch: Miswritten characters sent to the buffer memory or the battery backed-up memory can be cleared by pushing HH key with ON position of RUB OUT switch. Correct data can be sent to after this clearing. The rub-out function is not available when the switch is OFF.

(11) DISPLAY switch: Only the received data are displayed when the switch is at RCV; both received and transmitted sentences at ALT.

(12) CR.LF CANCEL switch: In BAUDOT mode and ASCII mode, CR and LF are obtained with OFF; with ON, CR and LF are respectively replaced by = (equal) and _ (underline).

(13) UNSHIFT ON SPACE switch: When the space in BAUDOT code is put in with the switch being ON, the CASE is changed to LTR.

(14) PROGRAM switch: Changes built-in ROMs.

(15) POLARITY switch: Changes the polarity of mark/space in input and output.

(16) FREQ.SHIFT: Changes output and input shift width in BAUDOT mode.
     N: 170 Hz
     M: 425 Hz
     W: 850 Hz

(17) SPEAKER: When AGC is indicated, output from AGC can be monitored; when MARK or SPACE are indicated, output from respective filters can be monitored.

(18) MARK.SPACE indicating LEDs: Light corresponding to mark/space of input signal. In CW mode, SPACE indicating LED lights.

(19) FINE tuning volume: Provides the fine tuning of shift width in receiving in BAUDOT mode.

(20) `WRITE | CH1` key: Selects channel 1. When it is pushed with `SHIFT` key, the channel 1 is made to be ready for being written in.

(21) `READ | CH2` key: Selects channel 2. When it is pushed with `SHIFT` key, selected channel comes to be read.

(22) `SEND | CH3` key: Selects channel 3. When it is pushed with `SHIFT` key, displayed data on the screen are transmitted from the beginning.

(23) `CLEAR | CH4` key: Selects channel 4. When it is pushed with `SHIFT` key, the screen is cleared.

(24) `HOME | CH5` key: Selects channel 5. When it is pushed with `SHIFT` key, the cursor returns to the head.

(25) `← | CH6` key: Selects channel 6. When it is pushed with `SHIFT` key, the cursor is made to return for a single character.

(26) → | CH7 key:
Selects channel 7. When it is pushed with SHIFT key, the cursor is made to advance for a single character.

(27) WEIGHT | SPEED key:
Sets the speed of transmitting and receiving of a message in CW, BAUDOT and ASCII.

(28) PAGE | CASE key:
Change the CASE either LTR or FIG. When it is pushed with SHIFT key, page change on the displayed screen is made.

3.2   The back panel
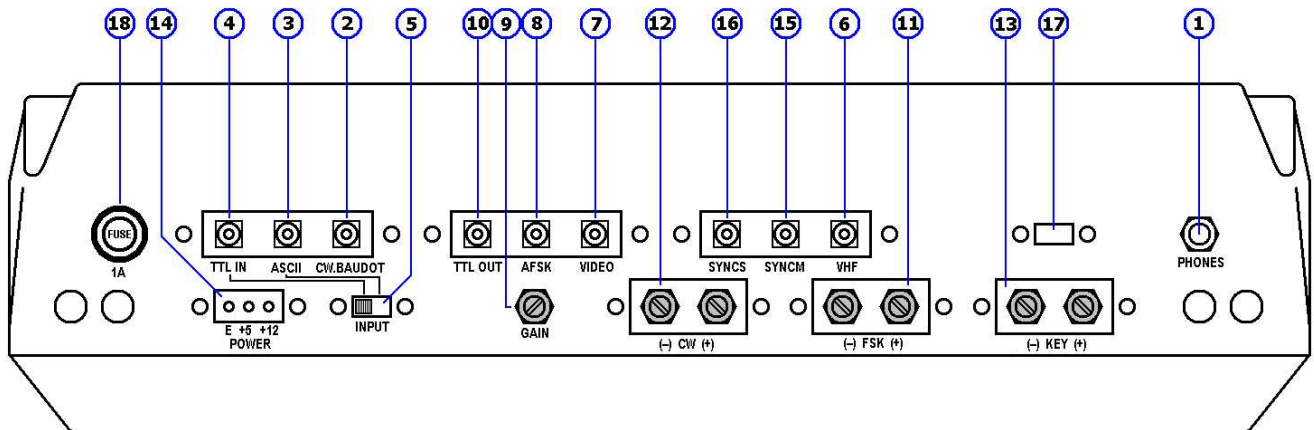
Figure 5

(1) PHONE jack:
Connects an earphone with the computer.

(2) CW.BAUDOT input jack:
In CW or BAUDOT mode, AF output of a wireless set (speaker output terminal or earphone terminal) is connected to this jack.

(3) ASCII input jack:
In ASCII mode, AFSK in accordance with KCS is put in from a tape recorder or a microcomputer.

(4) TTL IN jack:
In CW, BAUDOT or ASCII mode, non-modulated signals in TTL level are put in.

(5) INPUT switch:
Makes the input selection. TTL or AF.

(6) VHF output jack:
A terminal of a home TV set is connected to this jack. Data are displayed in CH1 and CH2 resp. CH3 and CH4 in European TV system.

(7) VIDEO output jack:
Outputs combined video signals. Monitor TV set is connected with this jack.

(8) AFSK output jack:
A microphone terminal of a wireless set or a tape recorder is connected with this jack.

(9) AFSK GAIN volume:
Controls the AFSK output level.

(10) TTL OUT jack:
Outputs in TTL level without modulation.

(11) FSK keying output terminal:
In BAUDOT or ASCII mode, a RTTY keying terminal of a wire less set and the like is connected to this terminal.

- 9 -

(12) CW keying output terminal:	In CW mode, a CW keying terminal of a wireless set is connected to this terminal.
(13) KEY input terminal:	Key is connected to this terminal.
(14) Power supply jack:	12 VDC or 5 VDC is put in.
(15) SYNCM output jack:	Oscilloscope is connected to this jack in mark-side output for cross pattern.
(16) SYNCS output jack:	Oscilloscope is connected to this jack in space-side output for cross pattern.

(17) Hole for option switch mounting.

(18) Fuse

3.3 Connector for a printer

Connector CN4 on the CPU board is a connector for a printer. The function of each pin is as follows. The fan-out of each pin is 1 standard TTL. Avoid overload!

1, 2, 3:	Leave these non-connected. Take care not to make these in contact with the power supply line or the ground line.
4:	Strobe: negative pulse with about 5 micro-sec width is put out with each output of one character.
5 ~ 12:	Data: 5th pin is LSB, 12th pin is MSB.
13	GROUND
14, 15:	Leave these non-connected.

The CPU board can be taken out of the computer by the following procedure:

1. Remove eight M4 screws from the bottom of the computer.
2. Remove the bottom plate.
3. Remove M4 screws at the four corners of the CPU board.

4. How to operate

4.1 Initialization

In case of operation miss, push the RESET switch in order to make the computer revert to the initial state.

4.2 Preliminary setting

Θ-7000		
Front panel	POWER switch VOL MODE switch NORM/TEST/TUNE switch BUFFER switch DISPLAY switch RUBOUT switch UNSHIFT ON SPACE switch CR.LF CANCEL switch POLARITY switch PROGRAM switch FREQ.SHIFT	OFF medium Set at any of CW, BAUDOT or ASCII NORM RUN ALT ON OFF OFF NORM 1 In case of BAUDOT mode, select among N (170 Hz shift), M (425 Hz shift) and W (850 Hz shift) to set.
Back panel	FINE tuning volume SPEAKER INPUT switch AFSK GAIN volume	medium AGC AF near the mid point
Under panel	VHF CH switch 2K/4K switch ENG/JPN switch	Set either to 1CH or to 2CH 2K ENG
DC power supply		
Power switch		OFF
TV Set		
Source switch		OFF
VHF channel		Set either to 1CH or to 2CH.
Wireless set		
MODE switch		Set to any among the three MODEs corresponding to the MODE switch setting of the Θ-7000, except in the case that LSB setting is required for RTTY mode with a wireless set without FSK function.
Power switch		OFF
AF volume		Set this so as to make the input voltage into the Θ-7000 ranging from 50 mV to 1 V (ordinary listening volume).

4.3 Procedures for power ON

After having confirmed the completion of preliminary setting, make a DC power supply switch and a source switch of a TV set ON. Set POWER switch of the Θ-7000 to ON and set a source switch of a wireless set to ON.

POWER pilot LED and LTR indicating LED light. OUTPUT LED also lights in the case of BAUDOT or ASCII. Indications are obtained on the TV screen as shown in Fig. 6 and the Θ-7000 begins to work.
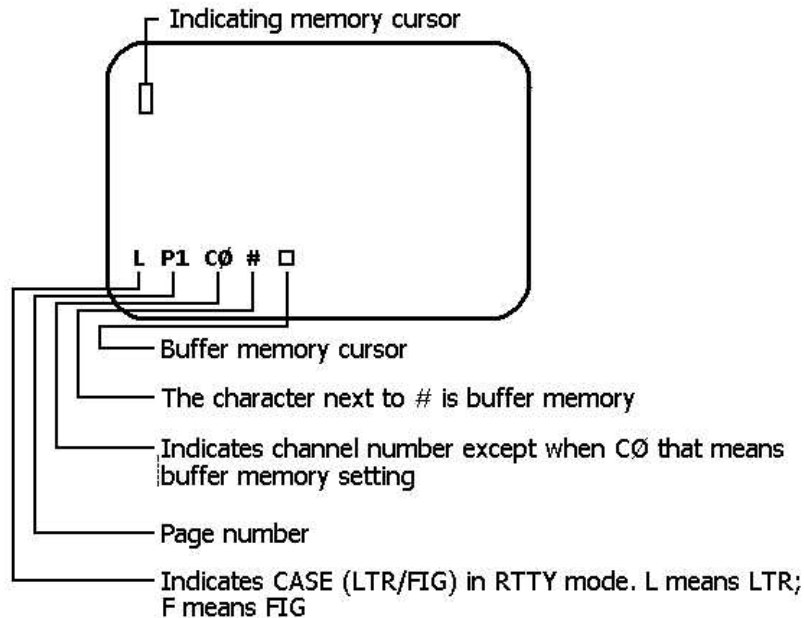
Figure 6

If the DC source power switch is set to ON after POWER switch of the Θ-7000 is set to ON, the program may run away because power-on-reset function fails to work. In the case of miss in procedure order, push the RESET switch. Miss in procedure order may result in bad influence to the Θ-7000 by the spike that may occur when DC source is ON.

4.4 Tuning of a wireless set for transmission

In no transmission condition in CW mode, keying output is OFF (KEY break state). When the NORM/TEST/TUNE switch is set to TUNE, keying output (CW screw terminal) becomes ON and tuning for transmission comes to be done even in CW mode.

After tuning, set the switch to NORM.

In the case of RTTY by means of AFSK, make tuning with microphone-gain of a wireless set and AFSK GAIN volume of the computer, taking care not to bring about excess modulation.

4.5 Speed setting for transmitting and receiving

(1) <u>In CW mode</u>

Receiving speed is determined automatically. Quick CW of which the length of 1 dot is less than 50 msec may be regarded as noise. In case of receiving such a high speed CW, push `H` key after pushing `WEIGHT | SPEED` key.

In the contrary case that slow CW is to be received immediately after rather quick CW, characters from 2 to 4 are required for following. To push `L` key after `WEIGHT | SPEED` key makes the following quicker.

When receiving speed of signals suddenly goes down to less than half, it sometimes happens that T or E is indicated until 8 to 12 marks pass. Right reading will be obtained with continuous following.

By the power-on-reset or by pushing RESET switch, transmitting speed is automatically set at about 49 characters per minute. For the speed change, push `Ø` - `) | 9` after `WEIGHT | SPEED` key. 10 steps of range can be selected as shown in Table 2.

`Ø`	About 17 characters/min.	`% | 5`	About 63 characters/min.
`! | 1`	About 23 characters/min.	`& | 6`	About 81 characters/min.
`" | 2`	About 29 characters/min.	`/ | 7`	About 105 characters/min.
`# | 3`	About 38 characters/min.	`( | 8`	About 136 characters/min.
`$ | 4`	About 49 characters/min.	`) | 9`	About 176 characters/min.

Table 2

(2) In BAUDOT (RTTY) mode

Transmitting-receiving speed is set at 45.45 baud by power-on-reset or by pushing RESET switch. For the speed change, push `Ø` - `) | 9` after `WEIGHT | SPEED` key. Selection will be obtained as shown in Table 3.

45.45 baud is popular among amateurs and 50 baud is usually used with business communication.

NEXT PAGE MISSING

If the SPACE indicating LED begins to turn on and off corresponding to signals, right reading will begin and be displayed on the TV screen.

Special characters are displayed as shown in Table 5.

CW special character	Indication
$\overline{BT}$	=
$\overline{KN}$	(
$\overline{HH}$	<
$\overline{AR}$	+
$\overline{AS}$	^
$\overline{VA}$	:
$\overline{AA}$	@

Table 5

(2) In BAUDOT (RTTY) mode

Receive RTTY signals with a wireless set. Gradually increase the frequency of AF output from the lower value with VFO or RIT of the wireless set. Confirm that the MARK indicating LED lights first. Stop increasing the frequency when when the MARK indicating LED lights again and comes to light at the maximum brightness. SPACE indicating LED lights at this moment if the shift width of RTTY signals agrees with the setting of the computer. Turn the FINE tuning volume; stop turning at the maximum brightness of SPACE indicating LED.

If SPACE indicating LED does not light, turn the FINE tuning volume to catch the position that makes it light. If the position cannot be caught, it is because of disagreement of shift width of RTTY signals and FREQ.SHIFT setting of the computer. Adjust the setting so as to make SPACE indicating LED light and turn the FINE tuning volume to lighting the brightest.

Right characters are to be displayed on the screen by the tuning mentioned above. If not, change the speed setting. If not, even after changing the speed setting, turn POLARITY switch to INV. In the case that all of these procedures result in failure, input signals are judged not to be RTTY. For amateur communication, 170 Hz shift is most commonly used; for business communication, 850 Hz and 50 Hz shift are usually used.

In addition, monitoring of the output of MARK filter and that of SPACE filter are obtainable by turning SPEAKER switch to MARK and speaker switch to SPACE respectively. The output of MARK filter and SPACE filter can function in lieu of MARK indicating LED and SPACE indicating LED.

FREQ.SHIFT	Shift width	Mark	Space
N	170 Hz	2125 Hz	2295 Hz
M	425 Hz	2125 Hz	2550 Hz
W	850 Hz	2125 Hz	2975 Hz

Table 6

When error in CASE (LTR or FIG) is often made with much noise, make the UNSHIFT ON SPACE switch ON. For errors in CR.LF, make CR.LF CANCEL switch ON. CR is replaced by = (equal) and LF by _ (underline), and double writing error can be avoided.

In the case of tuning by cross pattern made on oscilloscope, adjust VFO and RIT of a wireless set and FREQ.FINE tuning volume of the computer to make amplitude both in V-direction and in H-direction the maximum.

(3) In ASCII mode

Receive ASCII signals from a tape recorder or from a microcomputer. MARK indicating LED and SPACE indicating LED do not light. Monitoring with speaker is impossible. Receive signals of 2400 Hz for mark and 1200 Hz for space in accordance with KCS.

4.8 Recording of signals during receiving

In the case of CW and BAUDOT (RTTY) mode, recording is enabled by connecting PHONE jack of the computer with the microphone terminal of a tape recorder.

Recorded signals can be displayed again on the screen by connecting an earphone terminal or external speaker terminal of the tape recorder with CW or BAUDOT pin jack of the computer.

4.9 Transmission

(1) <u>In CW mode</u>

Make a wireless set in transmitting condition or prepare the semi-break-in condition by making VOX being ON. Tap the key and CW characters corresponding to the respective keys as in Table 7 are sent out and displayed on the screen. OUTPUT indicating LED lights at mark, does not light at space and transmitting sound is heard from a speaker at this time.

On the completion of transmitting, the computer automatically enters into receiving state. However, in the case of no use of VOX, return the wireless set to the receiving state.

(2) <u>In BAUDOT (RTTY) mode</u>

Make a wireless set being in transmitting state, manipulate the keyboard of the computer and BAUDOT characters corresponding to the respective keys as in BAUDOT column of Table 7 will be sent out and displayed on the screen. At this time, OUTPUT indicating LED lights at mark, does not light at space and transmitting sound is heard from a speaker.

The computer automatically enters into receiving condition when transmitting comes to an end. Make, however, the wireless set return to receive condition at this end, because keying output continues to be ON (condition of MARK) and AFSK output maintains 2125 Hz (MARK frequency).

(3) <u>In ASCII mode</u>

In the case of recording in a tape recorder, make it recording condition; in the case of sending out data to a microcomputer, make it receiving condition. Tap the keys and ASCII characters corresponding to the respective keys as shown in ASCII column of Table 8 are sent out and displayed on the screen. At this time, OUTPUT indicating LED lights at mark, does not light at space and transmitting sound is heard from a speaker. On the completion of transmitting, the computer automatically enters into receiving condition.

(4) <u>Buffer memory</u>

When the BUFFER switch is set at RUN, characters tapped with the keys are written in buffer memory and put out in order of writing. If the tapping speed exceeds the transmitting speed, characters are stored in the buffer memory up to 23 characters. With 23 characters being stored, the cursor disappears, gives a sound signal and inputs from the keys are rejected.

When the BUFFER switch is set at LOAD, character tapped with the keys are written in buffer memory but not put out. At the time when 23 characters are stored, the cursor disappears, gives a sound signal and inputs from the keys are not made. Characters are put out from the head of buffer memory by setting the BUFFER switch to RUN. If the sentences that are to be transmitted next are written in the buffer memory during receiving, continuous smooth sentences can be transmitted immediately after the completion of receiving.

(5) <u>Displaying on the screen</u>

In the case that there is no need for display of transmitted sentences on the screen and that only the display of buffer memory is required, turn the DISPLAY switch to RCV. The screen will come to be used for receiving only.

(6) <u>Correction of miswritten characters</u>

In the case that RUBOUT switch is ON and miswritten character is in the buffer memory push the ▨HH▨ key once, and the cursor of the buffer memory goes back for one character and the one character is canceled. If the ▨HH▨ key is pushed when the buffer memory is empty, characters shown in Table 7 are put out.

In the case that RUBOUT switch is at OFF, pushing the ▨HH▨ key does not provide the cancel of miswritten characters and characters shown in Table 7 are written in buffer memory and put out.

CW	H̄H̄
BAUDOT	/
ASCII	BS

Table 7

(7) <u>Output repeating</u>

Push the key for a character with pushing REP key for output repeating of the character.

KEY	CW	BAUDOT	ASCII	BUFFER	DISPLAY
! 1	SP 1	! 1	! 1	! 1	! 1
" 2	" 2	" 2	" 2	" 2	" 2
# 3	SP 3	# 3	# 3	# 3	# 3
$ 4	$ 4	$ 4	$ 4	$ 4	$ 4
% 5	SP 5	LTR 5	% 5	% 5	% 5
& 6	SP 6	& 6	& 6	& 6	& 6
' 7	' 7	' 7	' 7	' 7	' 7
(8	(.<u>KN</u> 8	(8	(8	(8	(8
) 9	(9	(9	(9	(9	(9
 0	SP 0	LTR 0	NULL 0	@ 0	0
* :	SP :	LTR :	* :	* :	* :
= -	=.<u>BT</u> -	LTR -	= -	= -	= -
Q	SP Q	LTR Q	DC1 Q	Q Q	Q

W	W	W	W	W	W
E	E	E	E	E	E
R	SP R	LTR R	DC2 R	R	R
T	SP T	LTR T	DC4 T	T	T
Y	Y	Y	Y	Y	Y
U	U	U	U	U	U
I	SP I	LTR I	HT I	I	I
̄O	SP O	LTR O	̄O	̄O	̄O
@ P	**AA** P	LTR P	@ P	@ P	@ P
A	A	A	A	A	A
S	SP S	LTR S	DC3	S	S
D	D	D	D	D	D
F	F	F	F	F	F
BELL G	SP G	BELL G	BELL G	G	(SOUND SIG.) G
H	SP H	LTR H	BS H	H	(BACK SPACE) H
J	SP J	LTR J	VT J	K J	J
(K	SP K	LTR K	(K	(K	(K
\ L	SP L	LTR L	\ L	\ L	\ L
+ ;	+.**AR** **VA**	LTR ;	+ ;	+ ;	+ ;
Z	SP Z	LTR Z	SUB Z	Z	Z
X	SP X	LTR X	CAN X	X	X
C	C	C	C	C	C
V	V	V	V	V	V

B	**B**	**B**	**B**	**B**	**B**
^ **N**	**<u>AS</u>** **N**	**LTR** **N**	**^** **N**	**^** **N**	**^** **N**
) **M**	**SP** **M**	**LTR** **M**	**)** **M**	**)** **M**	**)** **M**
< **,**	**<u>HH</u>** **,**	**LTR** **,**	**<** **,**	**<** **,**	**<** **,**
> **.**	**SP** **.**	**LTR** **.**	**>** **.**	**>** **.**	**>** **.**
? **/**	**?** **/**	**?** **/**	**?** **/**	**?** **/**	**?** **/**
LF	**SP**	**LF**	**LF**	**J**	**LF._***
CR	**SP**	**CR**	**CR**	**M**	**CR and LF** **Return.=***
DEL	**SP**	**LTR**	**DEL**	**?**	
ESC	**STOP XMIT** **SP**	**STOP XMIT** **LTR**	**STOP XMIT** **ESC**	**(**	
B̄T̄	**<u>BT</u>. =**	**LTR**	**=**	**=**	**=**
K̄N̄	**<u>KN</u>.(**	**(**	**(**	**(**	**(**
H̄H̄	**<u>HH</u>**	**/**	**BS**	**<./.H**	**<./.BS**
SPACE BAR	**SP**	**SP**	**SP**	**SP**	**SP**

Table 8

NOTE: 1. Characters in lower part of each column are obtained by pushing each key only; characters or function in upper part are obtained by pushing each with `SHIFT` key.

2. *: function obtained when CR.LF CANCEL is ON.

4.10 How to use battery backed-up memory

(1) Composition

Battery backed-up memory is composed of 7 channels. One channel can contain 32 characters.

(2) Writing

1 Select a channel to write by pushing among `WRITE | CH1` key to `→ | CH7` key. Selected channel number is shown at the lowest line on the screen.

2 Push `WRITE | CH1` with pushing `SHIFT` key.

3 Tap the keys to write sentences in. A sound signal is heard after 32 characters are written in. Characters from the keyboards are thereafter to be written on the 32nd character.

4 For correction of a miswritten character, make RUBOUT switch being ON and push `HH` key. This results in going back for one character and its correction.

5 After writing sentences in, push `READ | CH2` key with pushing `SHIFT` key. Channel number at the lowest line on the screen indicates " CØ ".

(3) Output

1 Select a channel by pushing a key among `WRITE | CH1` key to `→ | CH7` key. Selected channel number is shown at the lowest line on the screen. If you want to send the putout back to the buffer memory at the time of channel setting, push `Ø` key or push `READ | CH2` with pushing `SHIFT` key.

2 Designate the number of times of output by pushing among `! | 1` key to `) | 9` key. Outputs for the designated number of times are obtained from the channel.

3 Writing in the buffer memory is possible also during output from the battery backed-up memory. When BUFFER switch is at RUN, as soon as transmitting from the battery backed-up memory stops, transmitting from the buffer memory begins.

4.11 How to use SEND function

Push `SEND | CH3` key with pushing `SHIFT` key and then characters from the head on the screen up to one before the cursor are transmitted.

What can be transmitted is confined to characters that can be written in the screen; special characters such as DEL, ESC, CR or LF cannot be transmitted.

However, in BAUDOT mode, CR is put out in lieu of = (equal) when = (equal) is written in the screen; LF is put out in lieu of _ (underline) when _ (underline) is written in the screen. When CR.LF CANCEL switch is ON, pushing CR key makes = (equal) written on the screen; pushing LF key makes _ (underline) written in the screen. This mechanism is convenient in RTTY mode if it is composed with SEND function.

In BAUDOT mode, with making CR.LF CANCEL switch being ON, received sentences can be immediately repeated to transmit by SEND function because received CR.LF are to be replaced respectively by = (equal) and _ (underline).

4.12 Stop of transmission

In need of stop of transmission from battery backed-up memory or of sentences on the screen by SEND function or from the buffer memory, push `ESC` key with pushing `SHIFT` key. Transmission stops on the completion of transmitting the character that was being transmitted when the key was pushed.

Take notice that in the case of transmission from the buffer memory, pushing `SHIFT` and `ESC` keys makes buffer memory cleared at the same time as the stop of transmission.

Besides, in receiving condition and with BUFFER switch being LOAD, to push `SHIFT` and `ESC` keys makes buffer memory cleared.

4.13 "Stand-by" procedure

To turn NORM/TEST/TUNE switch to TEST position provides "stand-by" condition by breaking between CPU (Central Processing Unit) and input circuit (demodulator and TTL IN) and between CPU and keying output circuit. AFSK output continues.

It is possible in this condition to write sentences in the buffer memory, battery backed-up memory or on the screen.

4.14 How to use function key

(1) Manual operation of CASE change

In receiving in BAUDOT mode, CASE (LTR/FIG) may be changed manually by pushing `PAGE | CASE` key.

(2) Change of screen page

To push `PAGE | CASE` key with pushing `SHIFT` key makes page on the screen change.

(3) Clearing the screen

To push `CLEAR | CH4` key with pushing `SHIFT` key makes the page now shown on the screen cleared and makes the cursor return to the head of the screen.

(4) Cursor control

The cursor goes back to the head if `HOME | CH5` is pushed with `SHIFT` key.

The cursor goes back for one character if `← | CH6` key is pushed with `SHIFT` key.

The cursor advances for one character if `→ | CH7` is pushed with `SHIFT` key.

The cursor moves to the head of the next line if `CR` key is pushed with `SHIFT` key.

4.15 How to use a tape recorder

Tape recorder can be used as supplementary memory as follows:

(1) Connection

Connect AFSK pin jack of the computer with a microphone terminal of the tape recorder. Connect ASCII pin jack of the computer with an earphone terminal or with an external speaker terminal of the tape recorder.

(2) Editing sentences

Select ASCII mode that has high speed of transmission and receiving and that can make sentences commonly usable in CW and RTTY. The quickest recording is obtained with speed setting at 300 baud.

Set CR.LF CANCEL switch to ON.

Write sentences on the screen from keyboards. Correct miswritten characters by cursor control function. for using the sentences in RTTY, put CR.LF at every 64 to 72 characters.

After editing sentences, put the cursor at the following place of the last character of the sentence to be recorded.

(3) Sentence recording

Set AFSK GAIN volume to the medium level in order to prevent excess input to a tape recorder. Make the recorder recording condition, leave it working for 5 to 10 seconds so as to get feed. After that, push `SEND | CH3` key with pushing `SHIFT` key. After sending out sentences, leave it work for 5 to 10 seconds so as get feed and stop it.

(4) Sentence reading

Set the mode and speed as recorded in the tape recorder. Clear the screen. Set the playback beginning part of the tape to or just before the feed part. Adjust the volume of the tape recorder to make putout level more than 1 V. Sentences are read in the screen with playback start.

(5) Transmission of read-in sentences

Select the mode of transmission and set up the speed. Push `SEND | CH3` with pushing `SHIFT` key.

4.16 CW practice

Connect key to KEY screw terminal on the back panel after turning POWER switch to OFF. Set NORM/TEST/TUNE switch to NORM and make POWER switch ON.

Manipulate the key and reading is gained and displayed on the screen. Keying output turns ON and OFF corresponding to the working of key.

4.17 Application of a microcomputer as an intelligent terminal

In the case that serial input and serial output of a microcomputer module are compatible with TTL, TTL OUT and TTL IN of the computer can be used as an intelligent terminal of a microcomputer module by connecting them respectlvely to serial input and serial output of the microcomputer module.

4.18 Operating example

1. You may come to be at a loss for making sentences during transmitting from the keyboard in RTTY mode. For such a case, prepare 32 characters of LTR in advance in either of the channels of the battery backed-up memory. Make that prepared characters put out repeatedly several times while writing a next sentence into the buffer memory. On the completion of writing, push `SHIFT` and `ESC` keys and stop the output from the channel. The sentence will be immediately put out from the buffer memory.

2. If you want to repeated output of a sentence longer than 32 characters by easy operation, divide it into some shorter parts and make it be memorized in some channels of the battery backed-up memory in advance.

Set NORM/TEST/TUNE switch to TEST position, make the screen cleared and make the putout from the channels in order of the sentence to write in the screen. After writing in, push `SEND | CH3` key with NORM/TEST/TUNE switch being set at NORM. The sentence will be put out continuously.

RATINGS

1. Code: CW (English), RTTY (Baudot code), ASCII

2. Character: alphabet, figures, symbols, special characters

3. Communication speed:

CW	receiving:	15 ~ 220 characters/min. (automatic follows)
	transmitting:	17 ~ 176 characters/min.
		weight: 1:3 ~ 1:6
RTTY	45.45 baud, 50 baud, 56.88 baud, 74.2 baud	
ASCII	110 baud, 300 baud	

4. Input

AF Input	CW, RTTY	Input impedance 500 ohms
	ASCII	Input impedance 100 ohms
TTL Level Input (common to CW, RTTY and ASCII)		

5. AF Input frequency:

CW	830 Hz
RTTY	Mark: 2125 Hz
	Space: 2295 Hz, 2550 Hz, 2975 Hz changeable and Fine Tuning in the normal state
ASCII	Mark: 2400 Hz
	Space: 1200 Hz in the normal state

6. Output:

Keying	1.5 A, 150 V
AFSK output	Output impedance 500 ohms
TTL level	Fan-outs 5 (standard TTL)

7. AFSK output frequency:

CW	830 Hz
RTTY	Mark: 2125 Hz
	Space: 2295 Hz, 2550 Hz, 2975 Hz changeable in the normal state
ASCII	Mark: 2400 Hz
	Space: 1200 Hz

8. Display output: TV, VHF and Compounded video signals. Impedance 75 ohms

9. Data output for printer: Data: 8 bits, Strobe: 1 bit

10. Number of characters and number of pages to be displayed:
    512 characters (32 characters × 16 lines) × 2 pages (total 1024 char.)

11. Battery backed-up
    memory: 32 characters × 7 channels

12. Buffer memory: 23 characters

13. AF output: 150 mW (DC 12 V), 8 ohms

14. Power source: DC +12 V, 1 A or DC +5 V, 1 A

15. Size: 400 mm × 300 mm ×120 mm − 57 mm

Θ-7000

INPUT/OUTPUT CIRCUIT