DRAKE

H-7000 E

COMMUNICATIONS TERMINAL

OPERATOR'S MANUAL

LIMITED WARRANTY

R. L. DRAKE COMPANY warrants to the original purchaser that this product shall be free from defects in material (except tubes and RF output transistors) or workmanship for ninety (90) days from the date of original purchase.

During the warranty period the R. L. DRAKE COMPANY or an authorized Drake service facility will provide free of charge both parts (except tubes and RF output transistors) and labor necessary to correct defects in material or workmanship.

To obtain such warranty service, the original purchaser must:

(1) Complete and send in the Warranty Registration Card.

(2) Notify R. L. DRAKE COMPANY or its nearest authorized service facility, as soon as possible after discovery of a possible defect, of:

(a) The model number and serial number, if any;

(b) The identity of the seller and the approximate date of purchase;

(c) A detailed description of the problem, including details on the electrical connection to associated equipment and the list of such equipment.

(3) Deliver the product to the R. L. DRAKE COMPANY or the nearest authorized service facility, or ship the same in its original container or equivalent, fully insured and shipping charges prepaid.

Correct maintenance, repair and use are important to obtain proper performance from this product. Therefore, carefully read the Instruction Manual. This warranty does not apply to any defect that R. L. DRAKE COMPANY determines is due to:

(1) Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.

(2) Misuse, abuse, neglect or improper installation.

(3) Accidental or intentional damage.

All implied warranties, if any, terminate ninety (90) days from the date of the original purchase.

The foregoing constitutes R. L. DRAKE COMPANY'S entire obligation with respect to this product, and the original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations on how long an implied warranty lasts or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation and exclusion may not apply to you.

This warranty gives specific legal rights and you may also have other rights which vary from state to state.

R. L. DRAKE COMPANY
540 Richard Street • Miamisburg, Ohio 45342

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DRAKE-TONO THETA-7000E COMMUNICATIONS TERMINAL

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INTRODUCTION

Description

The DRAKE TONO THETA-7000E is a complete communications terminal incorporating modern microprocessor technology. In this single package is a demodulator (terminal unit), a modulator (A. F. S. K. generator), a speed converter, a keyboard, a station identifier, a video generator, memory, and printer interface. The THETA-7000E will receive and transmit Morse (C. W.) code, RTTY (Baudot) code, and ASCII (American Standard Code for Information Interchange) at all standard speeds used in the communications field. This terminal accepts and transmits A. F. S. K. (audio frequency shift keying) tones commonly known as "high" tones and "low" tones at narrow (170 Hz.), commercial (425 Hz.), or wide (850 Hz.) shifts. Kansas City Standard (KCS) tones are also available in the ASCII mode. The KCS tones are commonly used by computer enthusiasts for cassette exchange of data.

For a complete amateur station you need only this terminal. a video monitor or standard television with R. F. modulator, your transceiver, and a source of 12VDC power capable of providing one ampere. Printer and cassette tape recorder are optional. When using Drake equipment, power may be obtained from your model PS-3, PS-7, PS-75, or AC-10 power snpply.

RTTY Basics

There are many modes and formats for data communications. This is a basic discussion of the modes in common use by radio amateurs, all offered by the DRAKE THETA-7000E

Morse code (C. W.) is usually transmitted by keying a carrier on and off with dots and dashes (short and long durations). This mode is commonly known as A1 transmission. It is also possible to leave the carrier on and transmit information in the form of audio modulation. Transmission types A2 and F2 are commonly used on the V. H. F. amateur bands. The 7000E communications terminal supports both modes of operation by providing a C. W. key output and a switched audio oscillator output.

RTTY (Baudot) code is a five level code transmitted in serial form consisting of a start bit, five data bits and one to two stop bits. There are both upper case anb lower case characters; both transmitting and receiving machines remembering the last case change transmitted. In the H. F. amateur bands, RTTY is transmitted using frequency shift keying (FSK) where a continuous carrier is transmitted but its frequency is shifted to indicate MARK or SPACE conditions. MARK and SPACE are teleprinter terms for current loop on and current loop off, respectively. A frequency shift of 170 Hertz is commonly used on the H. F. amateur bands but 850 Hertz is also sometimes found. The 425 Hertz shift mode is used by commercial stations. FSK is usually qenerated by introducing AFSK tones to the microphone input of a single-sideband transmitter, the result being a steady carrier offset from the suppressed carrier by the frequency of the AFSK tones. It is also possible to FSK the transmitter's oscillator directly by providing a switching voltage and means of shifting the oscillator's frequency but with modern single-sideband equipment this method of accomplishing FSK has become unpopular. The DRAKE 7000E will, however, support either method. On V. H. F., data is usually transmitted with audio in the AFSK mode. In the amateur bands the 60 word-per-minute sqeed of 45. 45 baud is popular with 75 and 100 WPM speeds just occasionally used.

ASCII is transmitted serially with a start bit, seven or eight data bits, and one or two stop bits. Standard speeds are 110 baud and 300 baud. Transmission is the same as RTTY.

Specifications

1. MODES : Morse (CW), RTTY (Baudot), and ASCII

2. SPEEDS : CW : 5-50 words per minute with automatic tracking on receive and 10 preset speeds on transmit. Weight is variable in the range of 1 : 3 to 1 : 6 dot to dash ratio.

   RTTY and ASCII : The following preset baud rates with fine adjustment available :

45. 45	baud	(60 WPM in Baudot)
50	baud	(65-67 WPM in Baudot)
56. 88	baud	(75 WPM in Baudot)
74. 2	baud	(100 WPM in Baudot)
100	baud	
110	baud	(10 CPS in ASCII)
150	baud	
200	baud	
300	baud	(30 CPS in ASCII)

3. INPUTS : Receiver or tape input @ 500 ohms
   ASCII KCS input @ 100 ohms
   TTL input from external demodulator or key

4. INPUT FILTER FREQUENCIES :
   CW : center frequency of 830 Hz.
   ASCII : Kansas City Standard Mark = 2400Hz.
   Space = 1200Hz.
   ASCII or RTTY :
   MARK SPACE tones with following shifts :

tone	170 Hz.	425 Hz.	850 Hz.	TONE GROUP
1275Hz.	1445Hz.	1700Hz.	2125Hz.	LOW TONES
2125Hz.	2295Hz.	2550Hz.	2975Hz.	HIGH TONES

   Reverse of all tone groups available from panel.

5. OUTPUTS : AFSK tones @ 500 ohms impedance
   TTL (0-5 volts)

CW keyer (pos)	+300VDC @ 100ma. max capacity
CW keyer (neg)	−300VDC @ 100ma. max capacity
FSKkeyer	+300VDC @ 100ma. max capacity
FSK ID keyer	+300VDC @ 100ma. max capacity
Remote (PTT)	+50VDC @ 300ma. max capacity

   Oscilloscope monitor outputs 200K ohms
   Audio output for phones ext. speaker 8 ohms
   Printer port @ TTL level with handshake
   (Centronics parallel compatible)
   Composite video output 75 ohms 1V P-P

6. SCREEN FORMAT 32 characters per line
   16 lines per page
   2 pages

7. MEMORY	7 memories with battery back-up 64 characters per memory 53 character type-ahead buffer
8. POWER	12 volts DC @ about 850 ma.
9. CABINET	All metal construction to prevent R. F. I. 15. 75 in. x 11. 8 in. x 4. 73 in.

Accessories

The following accessories are included with your DRAKE THETA-7000E:

1 instruction manual
16 RCA type phono plugs
1 1/4" headphone plug
1 printer port connector
3 cables with molded phono plug
2 cables with molded phono plug to 1/4" phone plug
1 spare fuse 2 ampere
length of power cable
length of shielded audio cable

Also available through the R. L. Drake Company is a Panasonic Video Monitor. Ask your dealer for part number 100-7009. A receiver line amplifier Model LA-7 may be ordered thru your dealer as part number 100-1230.

INSTALLATION

Unpacking

Carefully remove the DRAKE TONO THETA-7000E from the shipping carton and examine it for evidence of damage. If any damage is found. immediately contact the transportation company responsible for delivery of the unit or contact the the dealer where the unit was purchased. Keep the shipping carton and all packing material for the transportation company to inspect. The original carton and packing material will make it much easier to ship the unit, if necessary. Inspect the packing material for any accessories or printed matter before storing. Locate the registration card, fill out immediately, and return to the R. L. Drake Company to insure registration and validation of the warranty.

AT THIS TIME READ THE REST OF THE INSTRUCTION MANUAL. DAMAGE CAUSED BY REVERSED POLARITY OR OTHER IMPROPER CONNECTIONS WILL NOT BE REPAIRED UNDER WARRANTY.

Location

It is suggested that the DRAKE THETA-7000E be placed close to the associated transmitting eguipment since long cables to the microphone input of the transceiver increase the probability of noise and R. F. interference. It is also recommended that the plastic keyboard not be subjected to the direct sun or other intense heat.

In order to prevent the possibility of receiver interference from the microprocessor clock, it is recommended that the receiving antenna not de adjacent to the 7000E terminal. The transmitting antenna should be well matched and also should not be located adjacent to the terminal to prevent R. F. interference to the logic and vibeo generating circuits of the unit. This terminal is well bypassed and is designed in a metal enclosure to minimize any intereference problem.

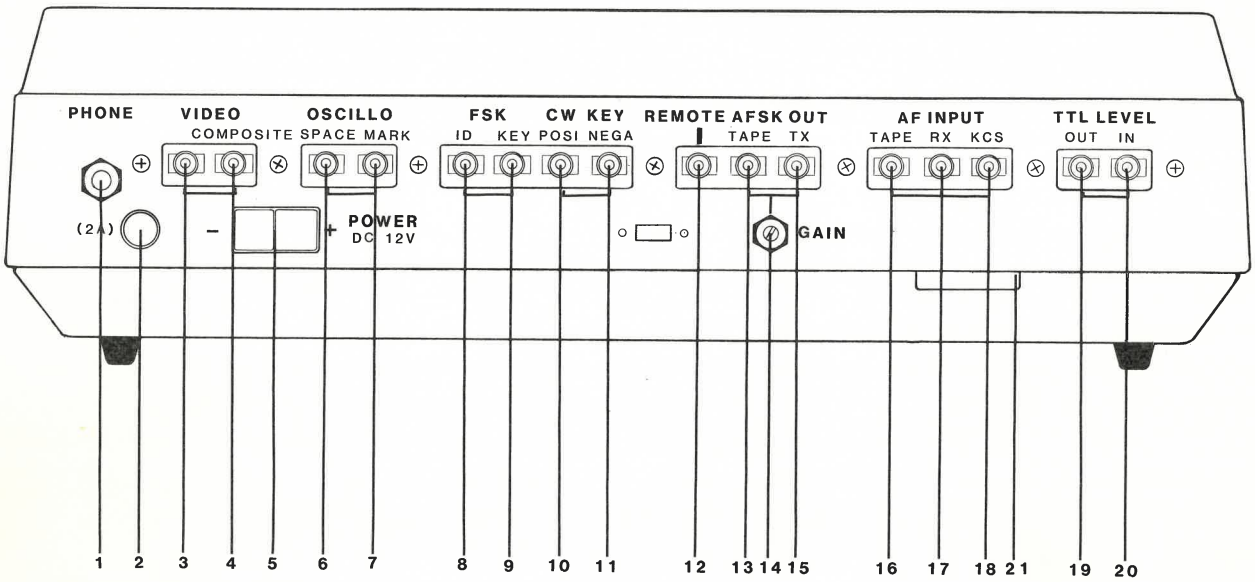
New Federal Communications Commission (Part 15) regulations reguire that the following caution notice be published:

"Warning: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation, it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of the FCC Rules which are designed to provide reasonable protection against such intereference. Operation of this equipment in a residential area is likely to cause interef-erence in which case the user at his own expense will be required to take whatever measures may be required to correct the intereference."

Rear Apron Connections

This section will introduce you to the rear apron connections on this terminal. Refer to Figure 1 for the legend of the rear apron:

Figure 1



1. PHONE JACK: to defeat internal speaker and use external speaker or headphones. If using low impedance headphones, it is recommended you use a 100 ohm resistor in series to prevent overload.
2. FUSE: replace with 2 amp fuse only
   Buss type GMA-2 or Littelfuse type 212002
   R. L. Drake replacement part # 342-0126
3. vacant jack for future use
4. COMPOSITE VIDEO: feeds a video monitor, 75 ohms.
5. POWER SUPPLY: 12 volts D. C. Red terminal is positive.
6. OSCILLOSCOPE SPACE OUTPUT: Connects to oscilloscope for cross-hatch display tuning aid. Output of space filter.
7. OSCILLOSCOPE MARK OUTPUT: Connects to oscilloscope for cross-hatch display tuning aid. Output of mark filter.
8. FSK ID JACK: A transistor collector output which turns on only in the C. W. I. D. mode. In a true F. S. K. connection this jack has a resistor across it which determines the shift of the I. D. The value resistor must be determined by the associated transmitting equipment. In the normal AFSK mode this jack may be ignored.

9. FSK KEY JACK: This data is the same as the C. W. key (positive) jack but inverted. In a true FSK connection this jack is used to switch the FSK equipment. This may also de used to key a teleprinter loop. It is an open collector output.

10. CW KEY (positive): This jack is normally connected to key jack of a cathode (positive voltage) keyed transmitter. It is a data output in all modes of operation. This is an open collector output.

11. CW KEY (negative) JACK: This jack performs the same function as its corresponding positive jack but is for use with transmitters with gridblock keying (negative voltage on key line).

12. REMOTE: This jack controls the push-to-talk line of the transmitter if desired. It switches on when the terminal is in the transmit mode. Open collector for positive voltages only.

13. AFSK OUT TAPE JACK: This is an audio output from the AFSK generator and may be used to feed a tape recorder or second transmitter.

14. GAIN CONTROL: Adjusts the output level of the two AFSK output jacks.

15. AFSK OUT TX JACK: This is an audio output from the AFSK generator sending tones to the transmitter microphone input.

16. AF INPUT TAPE JACK: This is an audio input from a tape recorder or secondary receiver.

17. AF INPUT RX JACK: This is an audio input from the main receiver's audio output (headphone jack).

18. AF INPUT KCS JACK: This jack is used only for KCS tones in the ASCII mode. It is an audio input from a computer or cassette tape recorder.

19. TTL LEVEL OUT JACK: This is a data output for driving customer provided equipment. It is normally not connected. As indicated, it is TTL compatible.

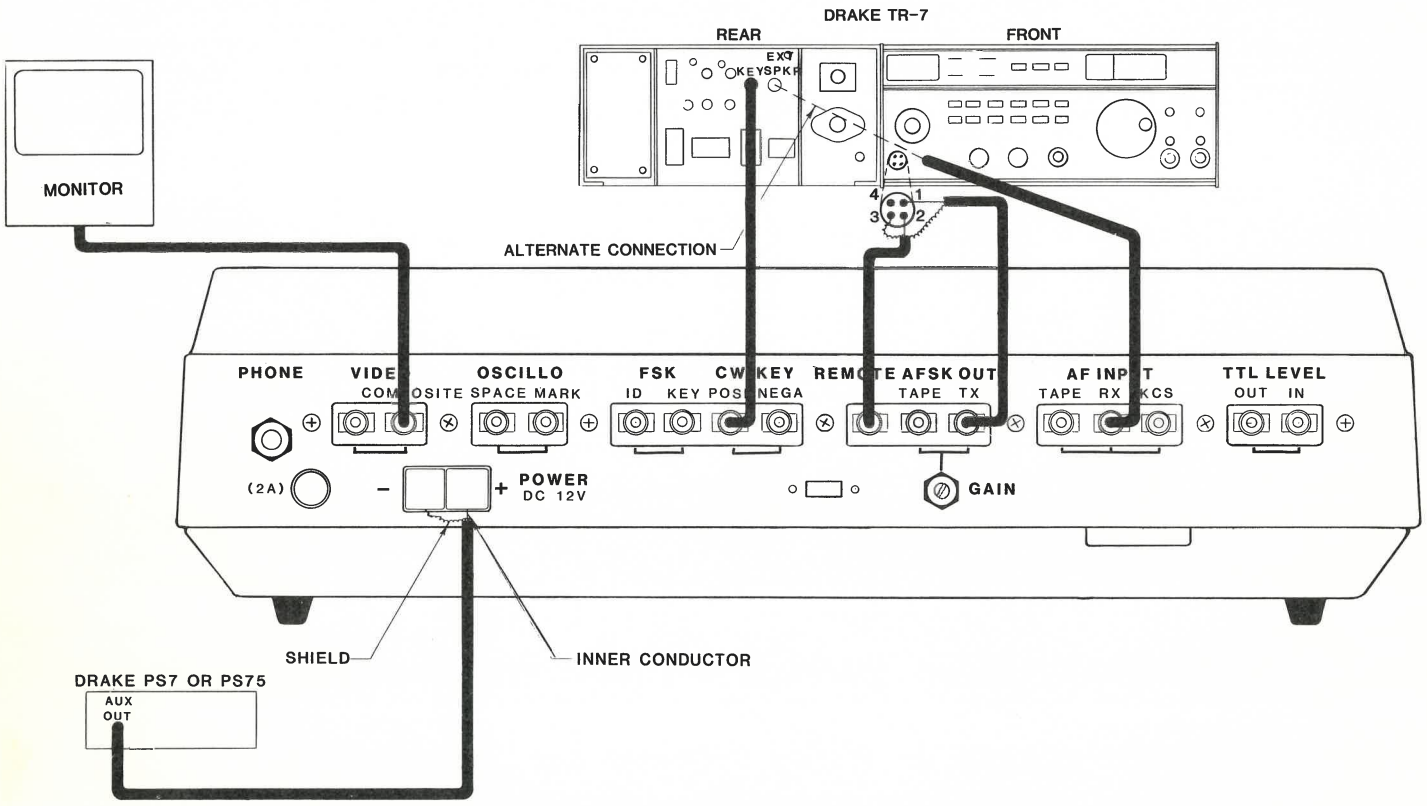
20. TTL LEVEL IN JACK: This is an input accepting TTL levels for connection of an external terminal unit or key driving the input of the 7000E. Its use is selected from the front panel.

21. PRINTER CABLE OUTLET: Slot provided in cabinet for exit of a ribbon cable. Printer connector is inside the terminal. Provided is parallel ASCII data with strobe and handshake lines.

Connections to Equipment

This section will describe the connections for a common installation. It is assumed in the first illustration that the transceiver is a H. F. single-sideband or V. H. F. F. M. unit and is capable of accepting AFSK tones. Figure 2 illustrates with the Drake TR-7 transceiver.

Figure 2



Connect the COMPOSITE VIDEO output to the input of your monitor or to a customer provided R. F. modulator. The monitor or modulator should have no D. C. present at its input.

Connect the power to a source of 12 volts D. C. The source should be well filtered, regulated, and capable of one amp. The red post is positive; the black post is the negative connection. Should you own other Drake equipment, this power may be obtained from the phono plug output connector on your model AC-10, PS-3, PS-7, or PS-75 power supplies. IF IN DOUBT AS TO THE POLARITY OF THE POWER SOURCE, CHECK IT WITH A VOLTMETER. REVERSE POLARITY WILL BLOW THE FUSE AND WILL CAUSE EXTENSIVE DAMAGE TO COMPONENTS INSIDE THE TERMINAL. SUCH DAMAGE CANNOT BE COVERED BY THE WARRANTY !

Connect the CW key input of the transmitter to the appropriate CW KEY output on the terminal. AGAIN, IF IN DOUBT AS TO THE PROPER POLARITY.... MEASURE IT FIRST ! The Drake TR-7 uses the CW KEY (positive) jack. Previous models in the Drake 3-Line and 4-Line use the CW KEY (negative) jack. This output switches in all modes of operation so be sure your transmitter does not require the key line to be closed for modes other than CW. If this is the case, the key must be unpluged from the

transmitter when using modes of operation other than C. W.

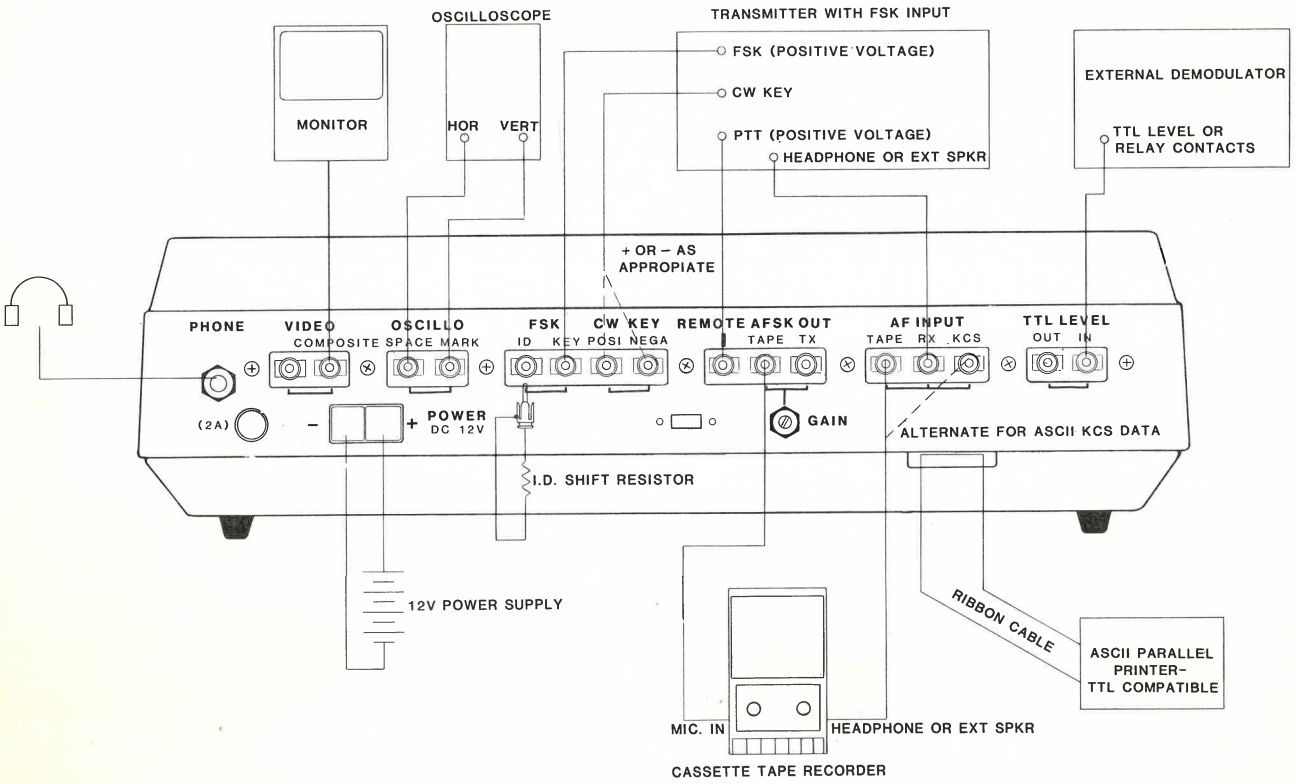
The REMOTE connection should be connected to the transceiver's push-to-talk (PTT) line, providing it has no greater than +50 volts D. C. potential when open and carries no more than 300 ma. when closed. The Drake TR-7, UV-3, TR-22, TR-22C, and TR-33 meet these criteria. The Drake TR-3, TR-4, T4-XB, T4-XC, and TR-4C DO NOT use a positive RTT voltage and SHOULD NOT be connected to this line but should be switched by VOX, a manual switch, or a relay. The user may provide a 12 volt reed relay, connecting one lead of the coil to the 12 volt power connection and the other to the center pin of the REMOTE plug. The transceiver PTT line is then connected to the switched contacts and will be isolated from the terminal.

The AFSK TX OUTPUT should be connected through shielded audio cable to the microphone input of the transmitter. If the transmitter has selectable input level connections, use the one with the most attenuation; the terminal has adequate drive for any microphone input.

Connect the AF RX INPUT to the headphone jack of the transceiver or receiver. Also acceptable are external speaker jacks or "line output" jacks. Those wishing to feed the terminal independent of the receiver volume control may wish to add the R. L. Drake LA-7 line amplifier, an independent amplifier capable of driving a 600 ohm line. Note: The external "audio" jack on the Drake TR-7 is not capable of driving the input of the terminal with the required levels; the speaker jack, headphone jack, or LA-7 line amplifier must be used.

These cables are the only ones required for a basic AFSK installation. Figure 3 illustrates changes in cabling for FSK installations and connections of optional accessories:

Figure 3



In the FSK installation the transmitter oscillator or VFO is shifted in frequency by a change in a DC voltage instead of by generating a carrier with audio tones. Therefore the AFSK TX OUTPUT to transmitter microphone input is NOT required. Taking its place should be a cable from the FSK KEY OUTPUT to the FSK input at the transmitter. The shift of the transmitted FSK is then determined inside the transmitter, not at the terminal keyboard. A narrow shift for CW identification is achieved by placing a resistor across a phono plug and inserting in the FSK ID OUTPUT jack. The value of the resistor must be determined by the transmitter's requirements.

Accessories which may be connected include an oscilloscope for tuning, an external demodulator (or equivalent data input), a cassette tape recorder to simulate punched paper tape, and a parallel ASCII printer for hard copy.

The oscilloscope may be connected to display the traditional cross-hatch tuning indicator. The OSCILLOSCOPE SPACE OUTPUT should be connected to the horizontal amplifier input of the scope. The OSCILLOSCOPE MARK OUTPUT should be connected to the vertical amplifier input of the scope. Set each input of the scope for equal sensitivity.

An external demodulator, key, or data source may be introduced via the TTL LEVEL IN jack. Be sure that this source is TTL level compatible. The terminal will represent one

standard TTL load. Voltages other than TTL levels WILL DAMAGE the input devices of the terminal.

A cassette tape recorder or second transceiver may be added using the AFSK OUTPUT TAPE and AF INPUT TAPE jacks. The recorder may be used to store off-the-air copy or long data such as a "brag" tape, replacing the traditional punched paper tape. The second transceiver might be a V. H. F. transceiver while the primary unit is a H. F. rig. In either case the connection is the same. The AF INPUT TAPE jack should connect to the headphone or external speaker jack of the device. The microphone input of the device should be connected to the AFSK OUTPUT TAPE jack.

A printer connection is provided for connection of a ASCII parallel printer with handshaking. The terminal converts all modes of transmission or reception to parallel ASCII for the printer. These levels are TTL compatible and should be used only with printers so designed. Refer to Figure 4A for wiring of the connector. This port is located internally. Six screws remove the bottom plate. The printer connector is located in the lower left corner of the main circuit board as viewed from the bottom. There is a wide space between connector pins 1 and 2 in order to key the connector and prevent improper insertion of the mating connector. Pin connections are as follows:

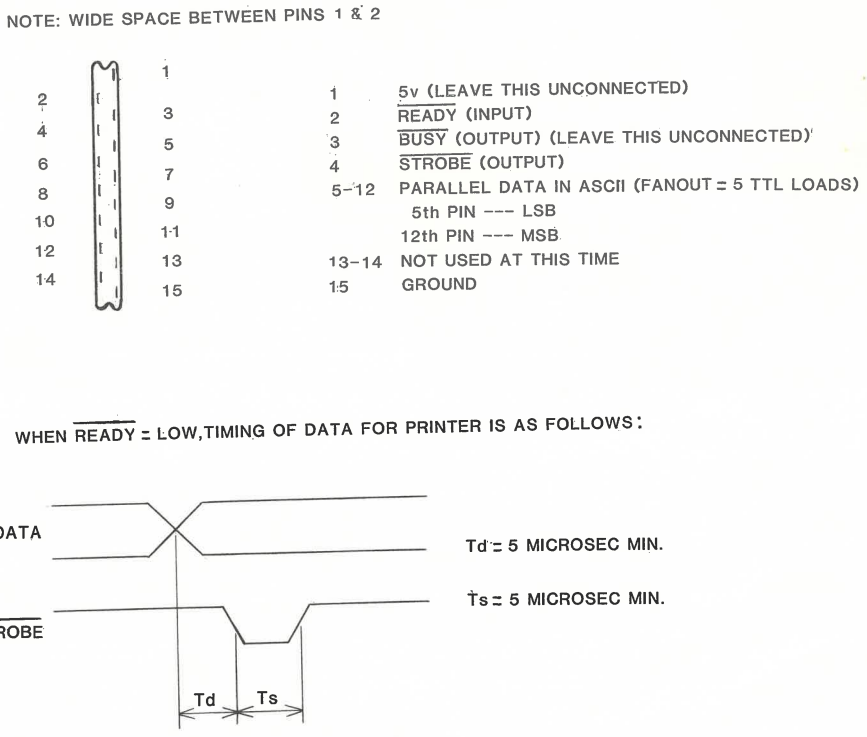


FIGURE 4A
ASCII PRINTER

The strode line will pull low for a minimum of five microseconds to indicate the stable presence of data. It will not strobe data as long as the ready line is in a high state. This port is compatible with Centronics printers. It is not suitable for use with serial printers or conventional teleprinters.

It is possible to connect á conventional teleprintr with a 60ma. loop supply to this terminal. The conventional teleprinter WILL NOT, however, print all speeds and modes. It will only print the speed and mode in which the printer is configured. Figure 4B depicts the proper connection; the switched loop should be capable of being grounded and should have the positive connection to the center pin of the phono plug at the FSK KEY JACK. To activate the printer, make the keyboard entry of SHIFT-"E". Another SHIFT-"E" disables it. You may not use the FSK KEY JACK for this purpose when it is also connected to the transmitter for keying purposes.

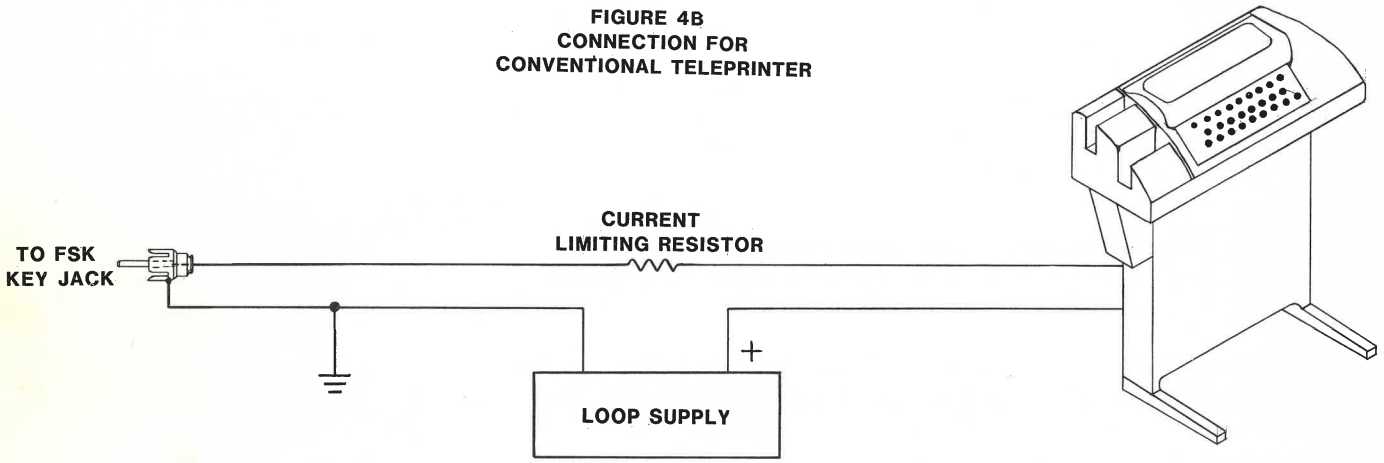


FIGURE 4B
CONNECTION FOR
CONVENTIONAL TELEPRINTER

Setup Adjustments

At this time you are ready to apply power. Insure again that all connections are appropriate. Apply power, turn the power switch on, and observe the power indicator. Press the RESET button to clear the terminal's microprocessor.

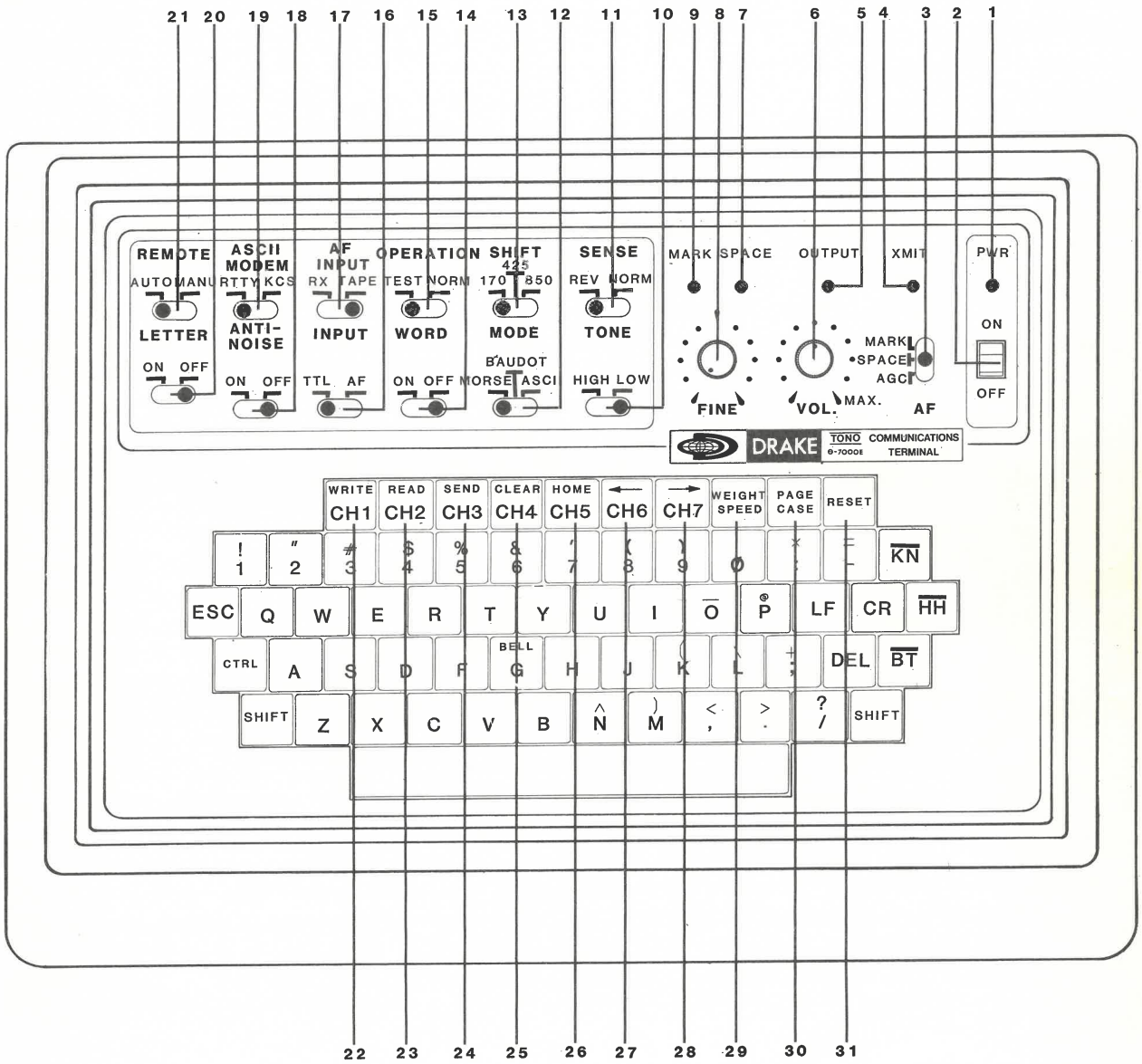
The AFSK gain control is the only adjustment to be made. Place the transmitter microphone gain control in a normal operating position (such as 50% rotation). Then adjust the AFSK GAIN control on the rear apron to just reach a normal modulation indication (according to the manufacturer's instructions). The Drake TR-7 indicates normal peak modulation by just lighting the green ALC indicator. The audio output of the 7000E is now set to be compatible with your transmitter.

You may also wish to adjust the video monitor brightness and contrast at this time.

Keyboard Introduction

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

Figure 5



1. POWER ON LED : indicates power is on
2. POWER SWITCH : controls all power to terminal
3. AF SWITCH : Selects the audio signal sent to the speaker.
   MARK position monitors output of mark filter
   SPACE position monitors output of space filter
   AGC position monitors all incoming audio
4. XMIT LED : Indicates that the REMOTE (PTT) line is on.

5. OUTPUT LED : Indicates status of output lines.
   ON = SPACE OFF = MARK Senes switch in normal.
   ON = MARK OFF = SPACE Sense switch in rev.

6. VOLUME : Controls the volume of the monitor speaker.

7. SPACE LED : Indicates tuning of the space filter.

8. FINE TUNING : Fine adjustment of the center frequency of the space filter.

9. MARK LED : Indicates tuning of the mark filter.

10. TONE : HIGH selects a 2125 Hz. AFSK mark tone.
    LOW selects a 1275Hz. AFSK mark tone.
    This is preempted in the ASCII mode when the ASCII MODEM switch is switched to KCS.

11. SENSE : NORMAL provids normal operation with the mark tone being the lower frequency of the pair.
    REVERSE inverts the mark and space tones on both transmit and receive.

12. MODE : Selects Morse, RTTY (Baudot), or ASCII functions.

13. SHIFT : Determines the space tone relationship to the frequency of the mark tone on both transmit and receive.

14. WORD : When this switch is on entries into the type-ahead buffer are held until CR, LF, or the space keys are pressed.

15. OPERATION : In TEST position the C. W. Key contacts are closed to permit transmitter tune-up. Audio tone is also provided at the AFSK output jacks for level adjustment. The REMOTE (PTT) line is not affected by the TEST mode. Proper output is not available from keyboard entries until this switch is returned to the NORMAL position.

16. INPUT : In the TTL position input is accepted from an external device connected to the TTL LEVEL IN jack. In the AF position, input is selected at the AF INPUT and ASCII MODEM switches.

17. AF INPUT : Selects the RX or TAPE audio inputs on the rear apron. In the ASCII mode this is preempted by the setting of the ASCII MODEM switch.

18. ANTI-NOISE : Placing this switch in the ON position decreases sensitivity to random noise and weak signals. Note: With this switch in the ON position some very fast C. W. signals may be sensed as noise pulses and may be suppressed.

19. ASCII MODEM : In the ASCII mode only, this switch selects the use of Kansas City Standard (KCS) input or the RTTY source selected by the AF INPUT switch.

20. LETTER Also known to amateur radio operators as the "diddle" mode. In the ON position the LETTER mode will transmit the "LETTERS" shift character while the keyboard is idle in order to keep the receiving machine in syncronization. This mode only operates in RTTY (Baudot).

21. REMOTE: Selects MANUAL or AUTOMATIC keying of the REMOTE (PTT) line. In the automatic mode, the REMOTE line activates the transmitter upon presence of characters to transmit (KOX- keyboard operated transmit). In the manual mode it is necessary to perform the keyboard entry of SHIFT-"X" in order to key the transmitter's PTT line. Another SHIFT-"X" returns the unit to receive.

22-28. CURSOR CONTROLS AND MEMORY CHANNEL KEYS : Discussed in depth in the appropriate operations section.

29. WEIGHT/SPEED: SHIFT-"WEIGHT" and a keystroke of 0-9 will change the Morse Code dot:dash ratio within the range of 1:3 to 1:6 in ten steps; 0 being the 1:3 ratio and 9 being the 1:6 ratio. SPEED and a keystroke of 0-9 changes the preset transmit speed in all three modes and the receive speed in RTTY and ASCII. See the operations section for specific speed codes.

30. PAGE/CASE: SHIFT-"PAGE" changes the display to the next page. There are two pages available. CASE selects the alternate "letters" or "figures" character set in the RTTY (Baudot) mode of operation. This function is normally automatic but the CASE key is used to manually override the last received case change.

31. RESET: The reset key initializes the microprocessor and clears the screen and keyboard options. The channel memories are not cleared. It is recommended that RESET be depressed whenever changing modes.

Screen Indicators

Refer to Figure 6 for an introduction to the monitor screen indicators:

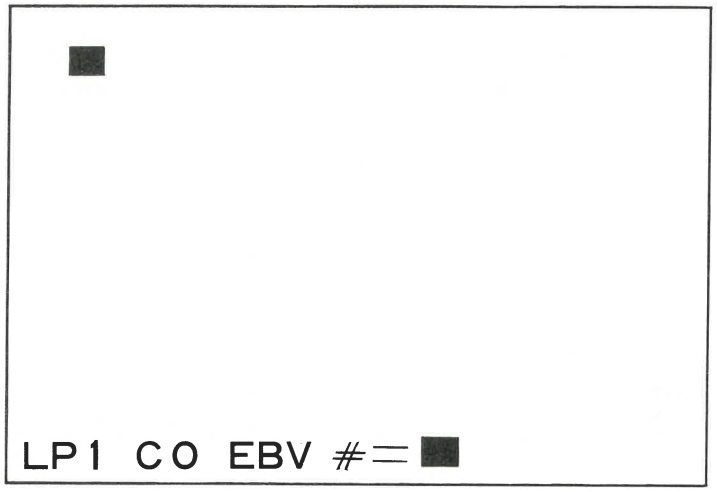


FIGURE 6
MONITOR SCREEN
INDICATORS

At the top of the screen, the white square indicates the position of the next character to be printed on the screen. It is called a cursor. In the seventeenth or eighteenth line is another cursor indicating the position of the next entry to the type-ahead keyboard buffer. If you insert the contents of a channel memory into this string of text, another reservation cursor is displayed and only one character of the buffer is used for the entry.

Other indicators in the seventeenth line of the display include the following:

L or F	to indicate "LETTERS" or "FIGURES" case in the RTTY (Baudot) mode. Manually changable with the CASE key.
P1 or P2	to indicate which page of text is presently on display.
C0 - C7	indicating which channel of memory is active with Channel zero being the type-ahead keyboard buffer.
V	indicates a hold on the type-ahead keyboard buffer. Activate or release with a keyboard entry of SHIFT-"V".
B	indicates the split-screen mode permitting composition of text in the top half of page 1 and receiving on the bottom half of page 1 scrolling into page 2. Activated and released with the keystroke SHIFT-"B".

E — indicates the Echo-back mode where incoming data is repeated to the TTL, AFSK, CW KEY, and FSK KEY jacks. Used for recording on tape or relaying to a teleprinter. Activated and deactivated with the keystroke SHIFT-"E".

= — With this indicator on, the RTTY (Baudot) mode does not respond to a CR or a LF but places an indicator on the screen instead: CR (carriage return) represented by = and LF (line feed) represented by - (underline). In the transmit screen mode or split screen mode, a CR is transmitted for each equal sign encountered and a LF is transmitted for each underscore encountered. Normally these screen indicators are transmitted as a "letters" character. Activate and deactivate with the keystroke SHIFT-"BT".

or * — The normal # is replaced with a * when USOS (unshift on space) is active. When in RTTY (Baudot) mode the receipt of a space causes an automatic switch to the "letters" case. This is activated and deactivated with the keystroke SHIFT-"Y".

OPERATION

C. W. Operation

Refer to Figure 7 and place switches in the following positions. Switches not listed may be in any position.

AF INPUT - RX
INPUT - AF
OPERATION - NORMAL
MODE - MORSE
SENSE - NORMAL
WORD - OFF
AF - SPACE
VOLUME - to suit

Since this unit will automatically track receiving speed on C. W. you are now ready to receive. Turn the unit on and press the reset button. Tune your receiver for a C. W. note of about 830 Hz. as indicated dy pulsing of the SPACE LED. Within a few characters automatic speed tracking will be acomplished. If you wish to expedite this tracking process, use the following keystrokes. Press SPEED followed by "H" to make tracking speed higher or "L" to make tracking speed lower. The monitor speaker amplifies the output of the C. W. detection filter.

Accessory receiving filters as narrow as 300 Hz. may be selected at the transceiver as long as the center of their passband is near the 830 Hz. frequency detected by this terminal. The Drake TR-7 satisfies this requirement while using the optional SL-300 C. W. crystal filter.

Special C. W. characters are represented by display symbols as shown in Table 1.

In preparation for transmitting you may now set the sending speed by using the keystrokes SPEED and a number from 0 to 9. Transmission speed will be preset as shown in Table 2. The dot to dash ratio is preset to a 1:3 ratio. Should you wish to change it use the keystrokes SHIFT-WEIGHT and a number from 0 to 9. The ratio may be increased as high as 1:6 in ten increments.

To tune your transmitter place the OPERATION switch to the TEST position, adjust the transmitter, and return the switch to the NORMAL position. Place your transmitter in the C. W. mode. As you type at the keyboard characters are placed in the type-ahead buffer and transmitted at the speed you have selected. The OUTPUT LED indicates the keying of the CW KEY line and sidetone is heard thru the monitor speaker.

If your transmitter also requires the push-to-talk (PTT) line be keyed in order to transmit C. W. you have your choice of two methods: manual and automatic. Select your choice with the REMOTE switch. In the automatic mode the REMOTE (PTT) line will be keyed anytime there are characters to transmit. In the manual mode it will be necessary to use the keystroke SHIFT-"X" to activate the REMOTE (PTT) line. The same keystroke returns to the receive mode.

Special C. W. characters of BT, HH, and KN are available directly from the keyboard. Other characters are available by keying the corresponding charcters as shown in Table 1.

Special features such as split-screen, use of memories, buffer hold, and screen transmission will be discussed later in a section common to all three modes of operation.

Table 1

CW special character	display
$\overline{BT}$	=
$\overline{KN}$	(
$\overline{HH}$	<
$\overline{AR}$	+
$\overline{AS}$	^
$\overline{SK}$	;
$\overline{AA}$	@

Table 2

0	about 4 wpm	% 5	about 17 wpm
! 1	about 6 wpm	& 6	about 23 wpm
" 2	about 8 wpm	7	about 29 wpm
# 3	about 10 wpm	(8	about 38 wpm
$ 4	about 14 wpm	) 9	about 50 wpm

RTTY Operation

Refer to Figure 7 and place switches in the following positions. Switches not listed may be in any position.

AF INPUT - RX
OPERATION - NORMAL
SHIFT - as desired (170 Hz. most common in amateur bands)
SENSE - NORMAL
LETTER - OFF
INPUT - AF
WORD - OFF
MODE - BAUDOT
TONE - as desired (discussion will assume HIGH tones)
AF - AGC
FINE - centered
VOLUME - to suit

Turn the terminal on and press the RESET key. The unit will default to a speed of 60 words per minute (45. 45 baud). If you desire a different speed, depress SPEED followed by a number from 0 to 9. A chart of available speeds is in Table 3. Fine adjustment of the selected speed is available in fine increments of .16 ms. The keystroke SHIFT-"Z" increases the speed and the keystroke SHIFT-"S" decrements the speed.

Table 3

Key	Baud	Notes	Key	Baud	Notes
0	45. 45	Default In RTTY 60 wpm RTTY	% 5	110	Default In ASCII 10 CPS ASCII
! 1	50	65 wpm RTTY	& 6	150	
" 2	56. 88	75 wpm RTTY	7	200	
# 3	74. 2	100 wpm RTTY	(8	300	30 CPS ASCII
$ 4	100		) 9	300	

Place your transceiver in the RTTY mode (in absence of this mode use LSB). The RTTY mode on the Drake TR-7 is preset for a "high" tone group passband. When using the Drake TR-7 the "low" tone group may be selected by using the P. B. T. control or LSB. See the transmitter VOX is off. Tune in a known 170Hz. shift, 60 W. P. M. RTTY signal. On single sideband units, adjust the tuning so that the MARK and SPACE LEDs illuminate alternately. Tune for the most reliable switching indication on the MARK LED. Fine tuning of the SPACE LED should take place with the FINE adjustment on

the terminal. During pauses in the transmission, the MARK LED should remain illuminated. Proper text copy should be received. In the event that pauses in transmission cause the SPACE LED to remain illuminated the signal is a reverse transmission and the SENSE switch should be placed in the REVERSE position.

If the transceiver passband does not respond well to the high frequency tones, you may wish to switch to the LOW TONE switch setting and retune the receiver for the new tone set. Refer to the specifications section for specific tone frequencies. When using a wide shift, accessory filters of 1500 to 1800 hertz are acceptable. When using 170 Hz. shift, filters as narrow as 500 Hz. are acceptable. Such accessory filters are front panel selectable on the Drake TR-7.

Before transmitting familiarize yourself with some special features unique to the RTTY (Baudot) mode:

A screen display of "L" indicates the "letters" case is being received. A display of "F" indicates the "figures" case is being received. You may manually change the case with the keystroke CASE.

A keystroke SHIFT-"Y" will cause the U. S. O. S. (unshift on space) mode to become active and will cause the terminal to return to the "letters" case upon receipt of a space character. The # indicator on the screen changes to a * to indicate USOS is active. Another SHIFT-"Y" disables the function.

Amateur radio operators in the United States must identify themselves with Morse code while operating RTTY. This is accomplished by waiting all text is transmitted, using the keystroke SHIFT-"I", sending the call sign manually or from a channel memory, and performing another SHIFT-"I".

It is possible to have carriage return and line feed characters indicate on the screen rather than execute their function. When this mode is activated, the CR or LF characters are replaced with an equal sign and an underline, respectively. Using the screen transmission mode (discussed later) the replacement characters will be reinterpeted as CR and LF characters while transmitting. The keystroke SHIFT-"BT" controls this feature.

Carriage returns and line feeds are automatically inserted 72 characters after the last carriage return. This feature may be changed with the keystroke SHIFT-"C" followed by a number from 0 to 3.

0 = defeat automatic CR/LF
1 = automatic CR/LF after 64 characters
2 = automatic CR/LF after 72 characters (default)
3 = automatic CR/LF after 80 characters

To tune your transmitter place the OPERATION switch to the TEST position, adjust the transmitter, and return the switch to the NORMAL position. You are ready to transmit.

Your transmitter push-to-talk line may be keyed automatically (KOX) by placing the REMOTE switch in the AUTOMATIC position. If you have left the REMOTE switch in the MANUAL position it will be necessary to perform the keystroke SHIFT-"X" in order to key or unkey the PTT line. As you type at the keyboard, characters are placed in the type-ahead buffer and transmitted at the speed you have selected. Transmitted AFSK tones are the same group and shift as selected for receiving.

ASCII Operation

Refer to Figure 7 and place switches in the following positions. Switches not listed may be in any position.

AF INPUT - RX
OPERATION - NORMAL
SHIFT - as desired (170 Hz. most common in amateur bands)
SENSE - NORMAL
ASCII MODEM - RTTY
INPUT - AF
WORD - OFF
MODE - ASCII
TONE - as desired (discussion will assume HIGH tones)
AF - AGC
FINE - centered
VOLUME - to suit

Turn the terminal on and press the RESET key. The unit will default to a speed of 110 baud (10 characters per second). If you desire a different speed, depress SPEED followed by a number from 0 to 9. A chart of the available speeds is in Table 3. Fine adjustment of the selected speed is available in fine increments of .16 ms. The keystroke SHIFT-"Z" increases the speed and the keystroke SHIFT-"S" decrements the speed.

Place your transceiver in the RTTY mode (in absence of this mode use LSB). The RTTY mode on the Drake TR-7 is preset for a "high" tone group passband. When using the Drake TR-7 the "low" tone group may be selected by using the P. B. T. control or LSB. See that transmitter VOX is off. Tune in a known 170Hz. shift, 110 baud ASCII signal. On single sideband units, adjust the tuning so that the MARK and SPACE LEDs illuminate alternately. Tune for the most reliable switching indication on the MARK LED. Fine tuning of the SPACE LED should take place with the FINE adjustment on the terminal. During pauses in the transmission, the MARK LED should remain illuminated. Proper text copy should be received. In the event that pauses in transmission cause the SPACE LED to remain illuminated the signal is a reverse transmission and the SENSE switch should be placed in the REVERSE position.

If the transceiver passband does not respond well to the high frequency tones, you may wish to switch to the LOW TONE switch setting and retune the receiver for the new tone set. Refer to the specifications section for specific tone frequencies. Selection of receiving filters narrower than a normal single-sideband filter may be desirable to attenuate strong adjacent signals. When using a wide shift, accessory filters of 1500 to 1800 hertz are acceptable. When using a 170 Hz. shift, filters as narrow as 500 Hz. are useful. Such accessory filters are front panel selectable on the Drake TR-7.

Before attempting to transmit, familiarize yourself with operations unique to the ASCII mode.

Control characters (00-1F hexidecimal) may be transmitted by pressing the CONTROL key while pressing a key A-Z or 1-6. The chart of these codes is in Table 4.

Placing the ASCII MODEM switch in the KCS position will select the audio input from the AUDIO KCS INPUT jack. AFSK tones outputed to the transmitter will also switch to the KCS tone set of MARK=2400Hz. and SPACE=1200Hz. This mode is used to interface to a cassette tape recorder or a personal computer designed to accept the

Kansas City Standard. NOTE : THE KANSAS CITY STANDARD MODE SHOULD NOT BE TRANSMITTED ON THE AIR IN THE UNITED STATES SINCE F. C. C. AMATEUR RADIO REGULATIONS LIMIT FREQUENCY SHIFT TO A MAXIMUM OF 900 HERTZ.

To tune your transmitter place the OPERATION switch to the TEST position, adjust the transmitter, and return the switch to the NORMAL position. You are ready to transmit.

Your transmitter push-to-talk line may be keyed automatically (KOX) by placing the REMOTE switch in the AUTOMATIC position. If you have left the REMOTE switch in the MANUAL position it will be necessary to perform the keystroke SHIFT-"X" in order to key or unkey the PTT line. As you type at the keyboard, characters are placed in the type-ahead buffer and transmitted at the speed you have selected. Transmitted AFSK tones are the same group and shift as selected for receiving.

Table 4

Key	Hexidecimal Code	Name
& 6	00	NUL
A	01	SOH
B	02	STX
C	03	ETX
D	04	EOT
E	05	ENQ
F	06	ACK
BELL G	07	BEL
H	08	BS
I	09	HT
J	0A	LF
K	0B	VT
\ L	0C	FF
M	0D	CR
^ N	0E	SO
_ O	0F	SI

Key	Hexidecimal Code	Name
@ P	10	DEL
Q	11	DC1
R	12	DC2
S	13	DC3
T	14	DC4
U	15	NAK
V	16	SYN
W	17	ETB
X	18	CAN
Y	19	EM
Z	1A	SUB
! 1	1B	ESC
" 2	1C	FS
# 3	1D	GS
$ 4	1E	RS
% 5	1F	US

Memory Channel Programming and Use

The DRAKE THETA-7000E contains seven memories of 64 characters each. They will retain your programmed message when power is removed when battery back-up cells are installed. Memory channels 1-6 are identical in function. Channel 7 is divided into four sub-sections which may be used individually or as one contiguous channel.

In order to program a memory channels 1 thru 6 follow this procedure:

1. Depress the desired channel key: CH 1 thru CH 6
2. Press SHIFT-"WRITE"
3. Enter text up to 64 characters including spaces, CR, LF
4. If you make a mistake depress "HH" to backspace.
5. Press SHIFT-"READ"

To read memory channels 1 thru 6, depress the desired channel number key (CH1 thru CH6) and a number from 1 to 9. This is the number of times you wish the memory message to repeat. Any key other than 1 thru 9 will cancel the memory call.

Memory channel 7 is divided into four subsections:

Section 1 is position 0 - 15
Section 2 is position 16 - 31
Section 3 is position 32 - 47
Section 4 is position 48 - 63.

The fourth section is also used by the QUICK BROWN FOX test message to transmit your call sign. To write individual sections of channel 7, use the following procedure:

1. Press CH7.
2. Press SHIFT-"WRITE" then the section number 1-4.
3. Enter text. 16 characters if writing one section only but up to 64 characters if starting at section one and wishing to overwrite into sections 2, 3, and 4.
4. If you make a mistake depress "HH" to backspace.
5. Press SHIFT-"READ"

To read memory channel 7, press CH7 and the section number of 1 thru 4. If you have written an expanded message starting in the first section, it will be read to completion. If you call another section, the message will be segmented; beginning at the start of the section and continuing to the end of the text. Memory channel 7 is called once for each key entry and is not repeated as are channels 1 thru 6.

Memory calls may be interspersed with any other text you are preparing; on screen or in the type-ahead keyboard buffer.

Special Screen Functions

The DRAKE THETA-7000E communications terminal offers two screen modes to permit composition of text longer than the 53 character type-ahead character buffer. The first is the transmit screen mode and the second is the split-screen mode.

In the transmit screen mode the cursor begins at the start of the screen and transmits all characters on the screen to the place of the last screen entry. The text may have been received from off the air or may have been generated from the keyboard. The procedure to transmit is to enter SHIFT-"SEND". If you are not receiving and wish to compose text, switch the terminal to an unused input (such as INPUT TTL) and permit the entries to write from the type-ahead buffer to the screen. After the entire text is composed, it may be sent. One hint is to use screen page 2 for this function and reserve page 1 for interactive communications. The transmission may be aborted by pressing SHIFT-"ESC".

The split-screen mode permits you to compose text at the same time as you are receiving off the air. It is activated by the keystroke SHIFT-"B". The receiving text is displayed in the lower half of page 1 and scrolls into page 2. The upper half of page 1 is available for you to prepare your reply. Clear the upper half of the screen with the keystroke CONTROL-"CLEAR". The lower half of the screen may be cleared with the keystroke SHIFT-"CLEAR". You may transmit normally with the appropiate keyboard entries. In order to pre-type to the split-screen press SHIFT-"WRITE". Compose the text (you may insert memory messages in the text) you wish and when finished press SHIFT-"READ". You are returned to normal keyboard transmission. When ready to transmit the text press SHIFT-"SEND". It is possible to be writing to the upper half of the screen and have the other station request an immediate reply to a question. When this happens it is possible to press SHIFT-"READ", respond, and re-enter the SHIFT-"WRITE" mode and continue to enter your text. As before, transmission may be interrupted by pressing SHIFT-"ESC".

It is possible to interrupt the transmission and insert some manual text such as a signal report. This is available in either the transmit screen mode or the split screen mode. In order to instruct the microprocessor to wait for inserted text enter a backslash in the prepared text. This is done with the keystroke SHIFT-"\". Resume the screen transmission by pressing SHIFT-"SPACE BAR".

Channel memories may be used within the text in both of the above modes just as they are available in normal operation. The only restriction is that a call for a channel memory may not take place just after a backslash halt. At least one character must seperate them, a space is recommended.

Special Keyboard Commands

Several keyboard features have been discussed in the previous operation sections. The following are functions which are applicable in all modes of operation.

The cursor position may be fully controlled. Use the following commands:

Cursor up	SHIFT-"U"
Cursor down	SHIFT-"D"
Cursor left	SHIFT-"←"
Cursor right	SHIFT-"→"
Cursor home	SHIFT-"HOME"
Cursor home & clear	SHIFT-"CLEAR"

Cursor move controls may be used to correct entered text in the transmit screen mode or the split screen mode. Return the cursor to the end of the text after corrections. There is another procedure for correcting errors while typing interactively.

When typing into the type-ahead keyboard buffer and making a mistake, deprss the "HH" key. If the character in error has not yet left the buffer the key will act as a backspace. If the character has already been transmitted, an error code will be transmitted to let the receiving station know you are going to send corrected text. This error cobe is eight dots in C. W., a slash bar in RTTY, and a control backspace in ASCII.

It is possible to shift the display from page 1 to page 2 and back at any time by pressing SHIFT-"PAGE".

There are two test messages pre-stored within the terminal' s firmware. The first is a QUICK BROWN FOX message, popular because it contains every character of the alphabet. This message also sends your call sign as retrieved from memory channel 7 (section 4). The other message is a continuous string of "RY". The RY test is popular because in RTTY (Baudot) it results in a pattern of alternating data bits and can test accurate speed tracking of a teleprinter. Activate these messages with the SHIFT-"Q" and SHIFT-"R" keystrokes. The messages are terminated automatically when any keyboard key is depressed.

In the receive mode, this terminal has a special WORD WRAP feature which prevents the splitting of a word on the screen. The feature is automatically activated upon RESET but may be manually switched off and on with the keystroke SHIFT-"W". DO NOT CONFUSE this receiving feature with the WORD switch on the front panel; that is a transmitting feature. When the WO RD switch is in the ON position, the type-ahead ke-yboard buffer holds text until the receipt of a space indicating the end of a word.

The text in the type-ahead buffer may also be manually held by the keystroke SHIFT-"V". The buffer hold is released with another SHIFT-"V".

An echo function is available which repeats the received signal at the outputs. This is used to activate a conventional teleprinter when connected to the FSK Key jack.

It may also be used to repeat a tape input on the air or record incoming signal off the air. As an example, a picture or "brag" tape could be stored on a cassette tape. The outqut of the recorder is sent to the AF TAPE INPUT jack and the text is transmitted by activating the echo-back mode. To activate and deactivate this mode use the keystroke SHIFT-"E".

To stop transmission at anytime, press SHIFT-"ESC".

Auxiliary Functions and Connections

Some features not specifically explained in the preceeding sections are offered to familiarize you with this terminal.

A bell is generated and amplified by the monitor speaker upon receipt of the upper case "G" in RTTY and ASCII. This same bell sounds if you attempt to overtype the memories or type-ahead buffer. It also sounds when RESET is pressed.

Undefined characters usually transmit a space in CW and a "letters" code in RTTY.

Keys, if held down, will cause characters to repeat.

If tuning with an oscilloscope, tune for a straight vertical and horizontal cross display with the vertical and horizontal displays equal in amplitude.

The ANTI-NOISE switch acts to reduce sensitivity to random noise by demanding an average signal strength from the mark and space detectors. Short CW pulses may be interpeted as noise and ignored.

Headphones or an external speaker may be plugged into the PHONES jack on the rear apron. It is suggested that if you use low impedance headphones that you place a 100 ohm resistor in series with the headphone to control the maximum level. When the terminal power switch is off the receiver audio is heard in the terminal' s speaker or the speaker plugged into the PHONES jack.

The TTL INPUT and TTL OUTPUT jacks offer a multitude of opportunities to interfaca this terminal with other user provided equipment. The INPUT switch on the front panel overrides all other inputs in favor of the TTL INPUT jack, making it practical for external demodulators, code practice keys, or selective calling equipment. The TTL OUTPUT jack normally rests at a logical high and goes low for a "space" indication or to produce a dot or dash in CW.

The terminal demodulator will continue to copy with selective fading of either MARK or SPACE signals automatically.

The WORD switch on the front panel holds the type-ahead buffer until reception of a space, carriage return, or line feed. RTTY users will want to use this feature in conjunction with the LETTERS switch to add a smooth transmission style.

When selecting different functions from the panel, it may be necessary to wait until the next character cycle has completed before the change is effective. It is always advisable to perform a RESET when changing modes to assure that the microprocessor is receiving all the correct instructions.

Service Information

Normally the only required maintenance is the replacement of the memory back-up battery cells. It is recommended that these be replaced at least every six months so that no set of batteries has the opportunity to deteriorate and corrode the inside of the terminal. Should the batteries grow weak before six months you will notice the loss of memory retention in the absence of power. It is also recommended that you remove the batteries if theunit is to be stored for a long period of time. Use Alkaline Penlite "AA" size batteries. To gain access to the battery holder, remove six screws and lift the bottom cover.

Do not attempt to clean the THETA-7000E keyboard with any solvents or cleaning fluids. Clean the keyboard only with a barely damp cloth being careful to keep water out of the electronics beneath the keytops.

Since the DRAKE THETA-7000E is a complex microprocessor based terminal, we do not recommend field repair. The R. L. Drake service department is always at your service, however, to assist you with any problem you might have. You must have prior authorization before returning any equipment to the factory for service. Our service department is open Monday thru Friday from 8:00 A. M. until 4:00 P. M. Eastern time. Telephone: (513) 866-3211. Telex users: 288-017.

APPENDIX

Figure 7

Front Panel

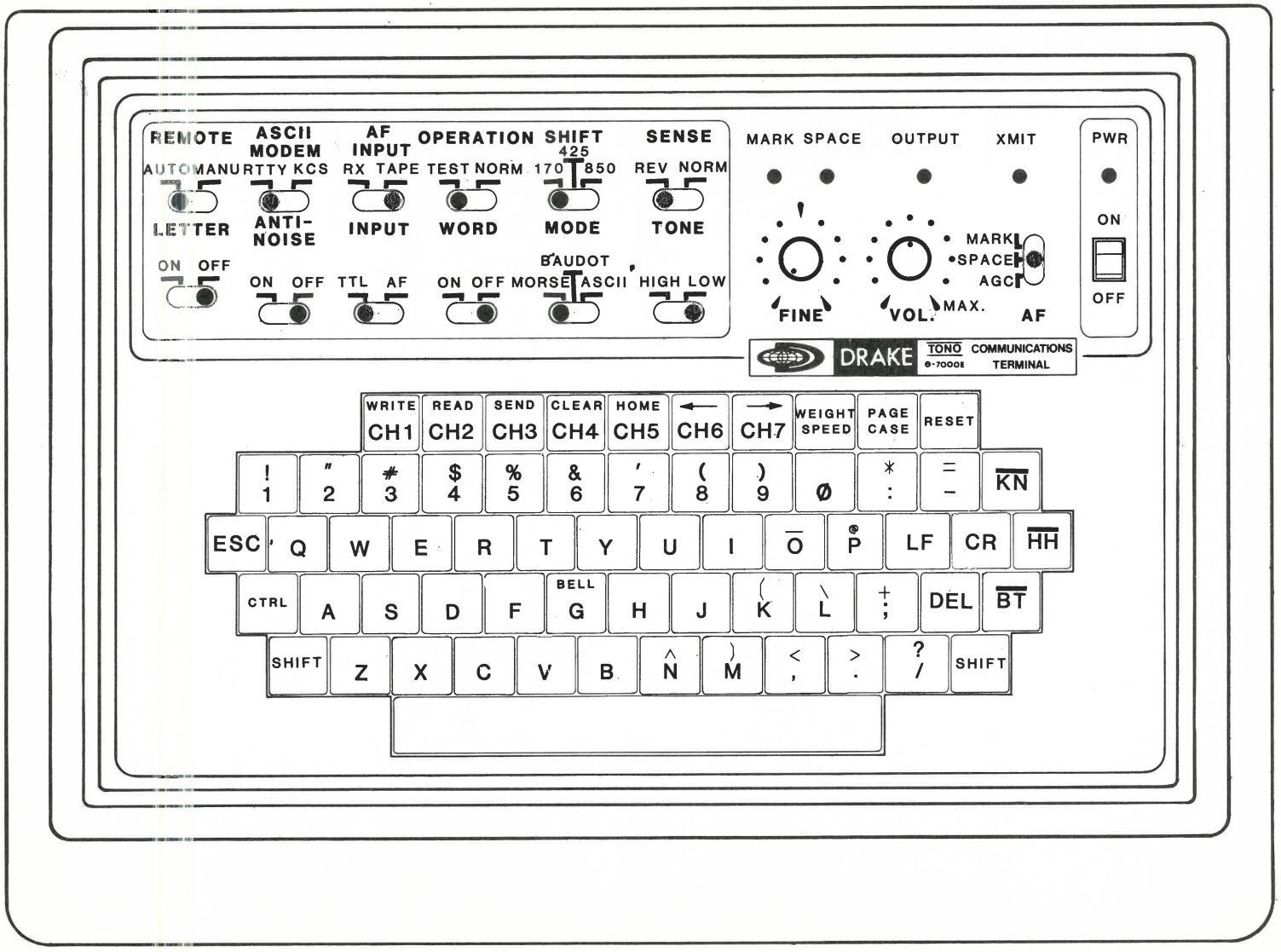
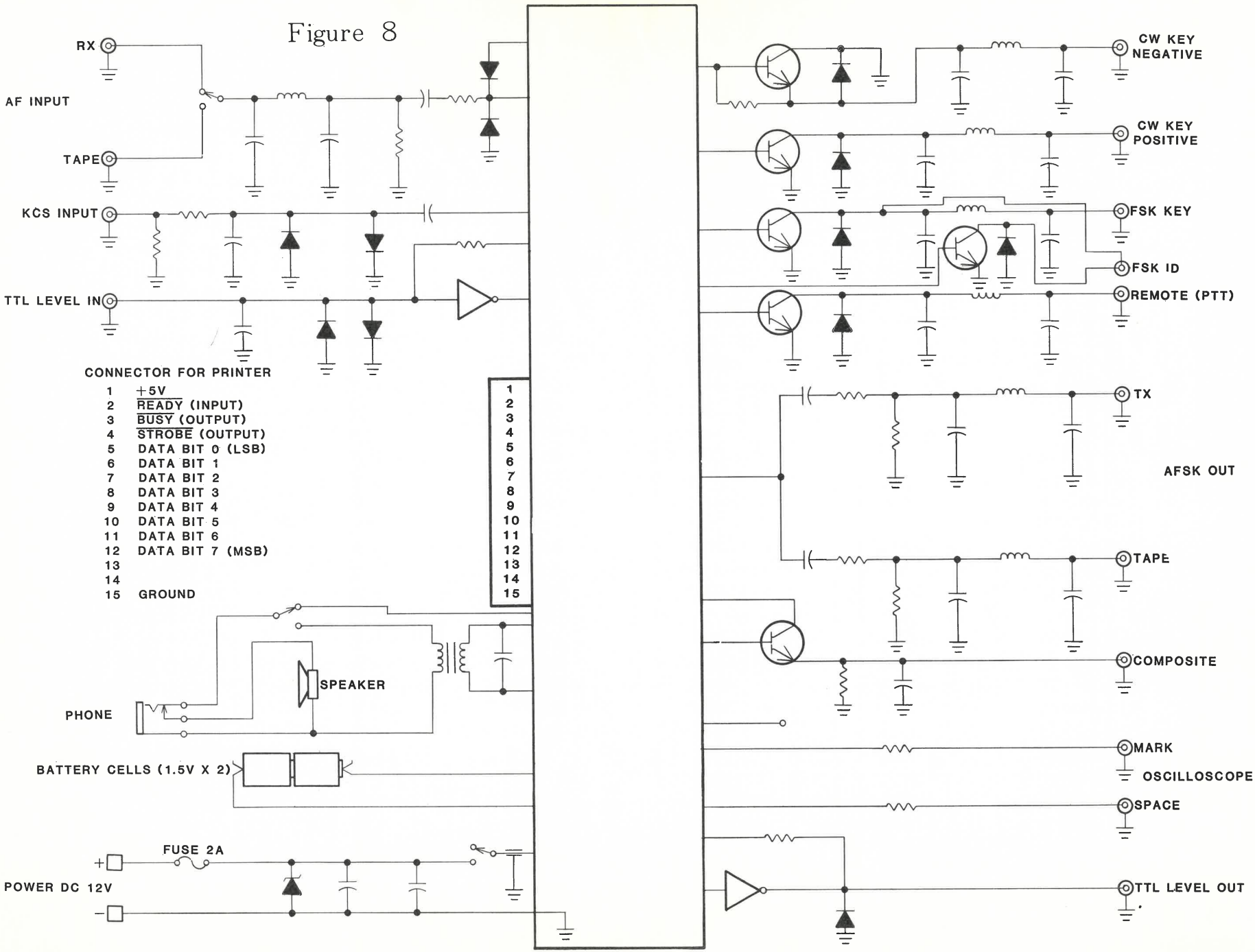


Figure 8


RX
AF INPUT
TAPE
KCS INPUT
TTL LEVEL IN
CONNECTOR FOR PRINTER
1 +5V
2 READY (INPUT)
3 BUSY (OUTPUT)
4 STROBE (OUTPUT)
5 DATA BIT 0 (LSB)
6 DATA BIT 1
7 DATA BIT 2
8 DATA BIT 3
9 DATA BIT 4
10 DATA BIT 5
11 DATA BIT 6
12 DATA BIT 7 (MSB)
13
14
15 GROUND
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
SPEAKER
PHONE
BATTERY CELLS (1.5V X 2)
FUSE 2A
+
POWER DC 12V
−
CW KEY NEGATIVE
CW KEY POSITIVE
FSK KEY
FSK ID
REMOTE (PTT)
TX
AFSK OUT
TAPE
COMPOSITE
MARK
OSCILLOSCOPE
SPACE
TTL LEVEL OUT

BLOCK DIAGRAM OF THETA-7000E

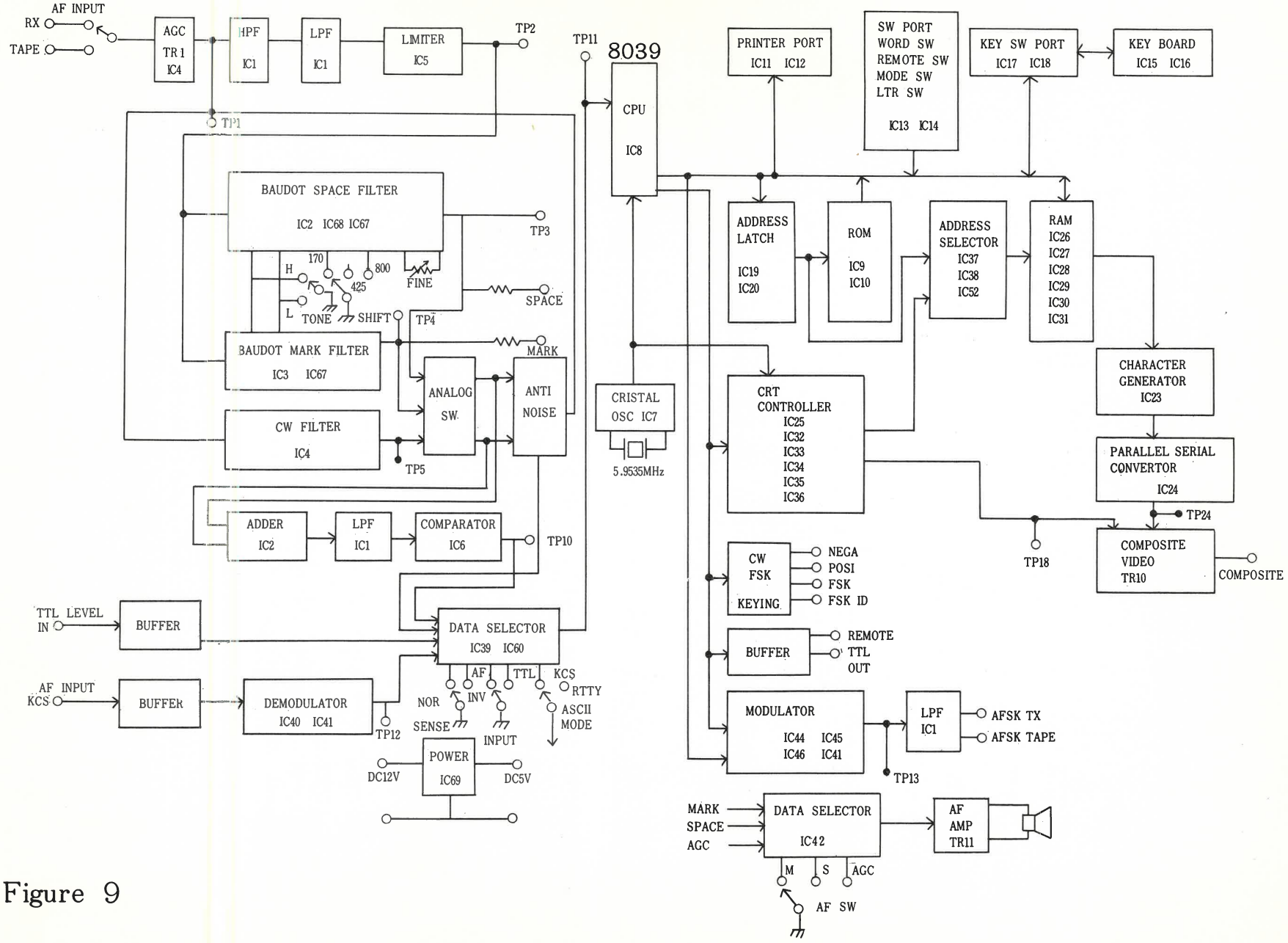


Figure 9

Table 5

QUICK REFERENCE CHART

SHIFT B	SPLIT SCREEN MODE
SHIFT C	AUTO CR/LF INSERTION IN RTTY
SHIFT D	CURSOR MOVE DOWN
SHIFT E	ECHO BACK MODE
SHIFT H	CW SPEED SYNC INCREASE
SHIFT I	CW IDENTIFICATION IN RTTY
SHIFT L	CW SPEED SYNC DECREASE
SHIFT Q	QUICK BROWN FOX TEST MESSAGE
SHIFT R	"RY" TEST MESSAGE
SHIFT S	FINE SPEED DECREASE IN RTTY & ASCII
SHIFT U	CURSOR MOVE UP
SHIFT V	TYPE-AHEAD BUFFER HOLD
SHIFT W	RECEIVING WORD WRAP AROUND OFF/ON
SHIFT X	MANUAL ENABLE OF PUSH-TO-TALK LINE
SHIFT Y	UNSHIFT ON SPACE DURING RTTY MODE
SHIFT Z	FINE SPEED INCREASE IN RTTY & ASCII
SHIFT WRITE	WRITE TO SCREEN OR MEMORY
SHIFT READ	TERMINATES WRITE FUNCTION
SHIFT SEND	TO TRANSMIT SCREEN CONTENTS
SHIFT CLEAR	CLEARS SCREEN AND HOMES CURSOR
SHIFT HOME	HOMES CURSOR
SHIFT ←	CURSOR MOVE LEFT
SHIFT →	CURSOR MOVE RIGHT
SHIFT WEIGHT	SETS DOT : DASH RATIO IN CW
SHIFT PAGE	SELECTS PAGE 1 OR PAGE 2
SHIFT ESCAPE	HALTS TRANSMITTING
SHIFT SPACE BAR	CONTINUES AFTER PAUSE
SPEED	SELECTS SPEED
CASE	CHANGES CASE IN RTTY (Baudot)
CONTROL CLEAR	CLEARS UPPER HALF OF SPLIT SCREEN
CONTROL 1-6, A-Z	SENDS ASCII CONTROL CHARACTERS

END