

OPERATING INSTRUCTIONS

for

TELEREADER (CW, Baudot and ASCII)

MODEL CWR 685E

This manual is only for Telereader version CWR-685E with keyboard encode ROM code name "K1"
(dark grey keys only)

New features with firmware version 1.5 are on page 12, 16-17, 19

CW685E (CWR6850) TELEREADER

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1. PANEL FUNCTIONS

1.1 FRONT PANEL

POWER LED	Displays when the power source is turned on.
CW LED	For CW code transmission and reception. Flickers along with monitor sound. Not interpreted if it is not lit when receiving. If lighting when transmitting, the CW keying output is turned on simultaneously.
MARK, SPACE LED	Lights up when the AF input coincides with the MARK or SPACE frequency when receiving RTTY.

Slide VR controls

INPUT	Volume control of input signal monitor speaker.
VOLUME	Volume control of monitor oscillator.
SPEED	A sliding VR for adjusting the transmission speed when transmitting CW. Since the CW reception speed automatically follows up the speed of the transmitting side, it is not affected by the set speed of this VR.
FINE	A sliding VR for fine adjustment of tuning frequency of the space filter when receiving RTTY, by using the built-in demodulator.

Lever switches POWER

POWER	power switch.
SEND-AUTO-RECEIVE	SEND: This is a position for test 'to force the unit to transmission mode. AUTO: Usually set to this position. When set in this position only, transmission and reception can be changed over from the keyboard. Set also in this position when the unit is used for reception only. RECEIVE: This is a position for test to force the unit to reception mode.

Pushbutton switches

RESET-ON	Erase receive screen, return cursor to initial receive position, display 1 st display page. Clear printer output register and erase memory transmission buffer.
FILTER-ON	Turns an CW PLL tracking filter; gives narrow bandwidth CW receive response.
SPACE-NARROW	Reduces CW reception interpretation time of word spacing by 25 % at NARROW position, and the cursor moving speed is accelerated.

CW ID A- CW ID A: When transmitting CW ID, the AFSK output performs frequency shift keying.
 CW ID B CW ID B: When transmitting CW ID, the AFSK output performs 800 Hz mark tone keying.

When receiving CW, CW ID A displays alphabetic letters, and CW ID B expresses codes such as BT and BK by special characters.

└ DISPLAY ┘
 PAGE
 MODE A \ MODE B

Cycle display pages an screen.
 MODE A: Page cycles between pages 0 and 1; used for receive only.
 MODE B: Page cycles through all four pages; used for TX/RX.

CW-RTTY Selects between CW (Morse code) and RTTY (Baudot or ASCII) codes.

ASCII \ BAUDOT Selects between the ASCII (8 unit) and BAUDOT (5 unit) RTTY codes at RTTY mode.

LTR-ON Restores Baudot receive to LTRS case.

FIG-ON Restores Baudot receive to FIGS case.

LOCK UOS \ ON In Baudot gives return to LTRS case after reception of a space character. In ASCII locks receive and transmit characters to upper case only.

NOR \ REV Reverses the sense of received signals - does not change sense of transmitted tones.

BAUD Six interlocked switches set data rate for RTTY transmit and receive to: 45.45, 50.0, 56.88, 74.2, 110, 300 baud.

Panel character	45.5	50	57	75	110	300
Actual baud rate	45.45	50	56.88	74.2	110	300

(unit: baud)

SHIFT Three interlocked switches set RTTY transmit and receive shift to 170, 425 or 850 Hz of built in demodulator, difference from space filter frequency (shift width), and shift width of AFSK output frequency, when communicating RTTY. The space frequency is higher than the mark frequency by the portion corresponding to the shift width.

TONE HIGH: Select RTTY "HIGH" tones for transmit and receive; mark = 2,125 Hz.
 LOW: Select RTTY "LOW" tones for transmit and receive; mark = 1,275 Hz.

RX-TAPE This is a selector for AF input terminals.
 RX: Audio signal connected to AF IN - RX jack is interpreted by the CW and RTTY demodulators.
 TAPE: Audio signal connected to AF IN - TAPE jack is interpreted by the CW and RTTY demodulators.
 Local "echo" of transmitted data is suppressed, giving full duplex operation. If the switch is set to the RX side in the event of echo-back, the transmitted code is written again in the transmission buffer.

1.2 REAR PANEL

BRIGHT	Adjusts the brightness of the built-in CRT.
VIDEO OUT	The output terminal used when displaying in the external monitor CRT, besides the built-in CRT. It can be connected to the CRT display of the composite video signal system.
EXT SP	The input selected by the RX-TAPE switch on the front panel is delivered from this terminal. The output level is adjusted by the INPUT knob on the front panel. When this terminal is used, the built-in input monitor speaker is separated. Connect the external speaker linked to the transceiver to this terminal.
PHONE	The oscillation output from the built-in oscillator is delivered from this terminal. The output level is adjusted by the VOLUME knob on the front panel. When this terminal is used, the speaker for the built-in monitor oscillation sound is cut off. Instead, a speaker of 1 W, 8 Ohms or higher can be connected to this terminal.
TELEGRAPH KEY	For connection of keys for Morse code transmission. When the keys are operated, the CW terminal in the SW OUT CW terminal becomes ON, and the 800 Hz monitor sound oscillates, and the CW LED lights up at the same time.
FSK DEMOD INT:	Internal FSK demodulator used or reception of RTTY.
INT \ EXT EXT:	Internal FSK demodulator disconnected and received data interpreted from the FSK TTL IN connector. Keep at INT Position except when using an external demodulator.
FSK TTL IN	When using external demodulator, without using the built-in demodulator, the TTL level signal from the external demodulator is fed to this terminal. Set the mark to H level, space to L level. Use this terminal when connecting KCS or BELL 103 demodulator or the like.
FSK TTL OUT	The signal to an external AFSK modulator is delivered with the mark at H level and space at L level. Use this terminal when connecting KCS or BELL 103 modulator or the like. Regardless of the FSK DEMOD INT-EXT switch, the signal is delivered simultaneously with SW OUT FSK.
AF OUT	The audio signal fed from AF IN RX or AF IN TAPE is selected by the RX-TAPE selector on the front Panel, and is delivered. When AF IN terminal is not used, this terminal can be used as AF IN.
SW OUT FSK (REMOTE CONTROL KEYING OUT)	The output of transistor switch to ground to switch direct. Voltage = +50 VDC maximum Current = 140 mA maximum Isolation relay or circuit required to switch negative voltage control lines.

SW OUT FSK (FSK CONTROL KEYING OUT)	The output of transistor switch to ground to switch direct. FSK keying circuit ("SW.OUT - FSK") Voltage = +100 VDC maximum Current = 20 mA maximum Standard: "ON" = space; "OFF" = mark; may be reversed with internal jumper JP-1.
SW OUT CW (CW TRANSMISSION KEYING OUT)	A transistor switch connected to the key connection terminal of the transceiver commonly used for both +keying and –keying. It can be used directly at ± 100 V but since there is a residual voltage of about 0.8 V at the time of +keying, connect a relay to outside if switching is impossible.
OSCILLO SPACE \ MARK	When receiving RTTY, with the built-in demodulator, when this output is connected to the oscilloscope, tuning operation becomes easy. Use the oscilloscope in X-Y scope mode.
AFSK GAIN	Controls output level to both AFSK OUT -TX and -TAPE connectors.
AFSK OUT TX	When transmitting RTTY, with a transceiver without FSK input, and used A2 or F2 Mode CW, this output is connected to MIC terminal.
AFSK OUT TAPE	Used when recording AFSK output into a tape recorder.
AF IN TAPE	Connected to the output terminal of tape recorder.
AF IN RX	Connected to the external speaker terminal of transceiver.
FS	Use 2 A small-size, glass tube fuse.
DC13.8V	The power source input terminal. Connect a power supply of +12 to 14.5 V DC. The current consumption is about 1.65 A. If the power source is connected in wrong polarity, the fuse melts down.
PRINTER	The data output terminal for the printer of Centronics Compatible Parallel Interface. Received and transmitted text may be printed on the ASCII printer.
KEYBOARD	Connect to the furnished keyboard.

2. METHOD OF USE

When turning on the power, do not set the send-autoreceive selector to SEND position, but keep it in other position.

In the CW mode, do not press the clear button while this selector is placed in SEND position.

Immediately after the power switch is turned on, a "P" mark is displayed in the status display area to show it is ready to deliver the printer data.

Method of reception

2.1 Reception of CW

Set the switches as follows:

SEND -AUTO -RECEIVE: AUTO CW-RTTY:

- Adjust the reception sound volume to a proper level by means of INPUT knob and AF control on the transceiver. In a receiver set with CW filter, put the CW filter in effective Position.

- Turn on power switch, and press RESET button. Then POWER LED lights up, and about 15 seconds later, page 1 is displayed in the built-in CRT. As for the contents of display, see the paragraph relating to the screen display types. Right after turning on the power, a "P" mark appears in the status display area to show it is ready to deliver the printer data. Also, at the right end of this area, a negative character **1** is displayed to indicate the page number on display.

If no display appears on the screen, turn the BRIGHT control knob on the rear panel.

- Since the AF input unit of this machine is adjusted to the center frequency of 800 Hz, turn the main dial, RIT, and clarifier of the transceiver to set the reception sound to 800 Hz, then the CW LED flickers along with the signal, and the monitor oscillation sound is delivered. The monitor oscillation sound volume can be controlled by the VOLUME knob. If the CW LED does not flicker along with the signal, normal interpretation is not made.

- If interference exists, turn on the FILTER switch.

- When receiving codes of narrow character space, set the SPACE-NARROW switch to the NARROW side.

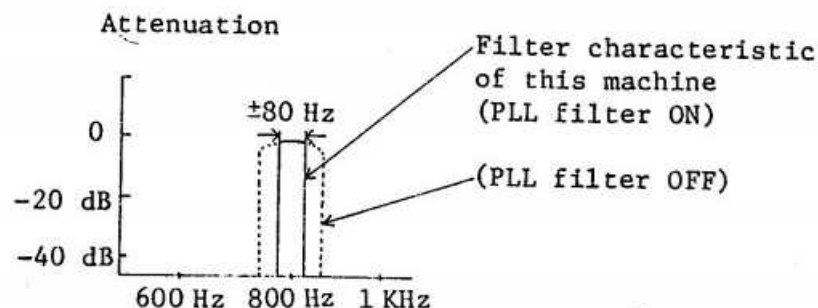
Characteristics of AF input unit and selection of filter

- ◆ The AF input unit of this machine has two kinds of band pass filters, using OP amplifier and PLL IC.

- ◆ When the front panel FILTER switch is turned on, the signal is amplified by an active BPF of center frequency 800 Hz, -6 dB band, 150 Hz, and is converted into a digital signal by PLL filter of center frequency 800 Hz, lock range ± 80 Hz.

- ◆ When the filter switch is turned off, the PLL filter does not operate as narrow band filter, but works as tone decoder with built-in noise filter.

◆ Characteristic chart



Use of PLL filter for telegraph

◆ This PLL filter, unlike an ordinary audio filter, is designed to lock the PLL at the frequency of input frequency to convert the lock into switching action (digital signal), thereby operating the monitor oscillator. Because of this method, it is a telegraph-only filter of infinite S/N ratio, not delivering oscillation sound except in the lock range.

◆ Since the PLL filter has a very high selectivity, it is deviated from the lock range of PLL if the frequency drift of the own station or partner station exceeds the filter band. In such a case, fine-adjust by means of the clarifier (RIT).

■ Control the monitor sound volume properly by turning the VOLUME control knob.

Code interpretable range and word-space

◆ A standard code consists of dots and dashes expressed by 1:3 in length. This equipment can interpret, with respect to 1 unit of a dot, up to 2 to 4 units of a dash. That is, a dash shorter than 2 units is regarded as a dot, and a corresponding character is displayed. Example:

1 : 3	1 : 1.9
A	I

A dash longer than 4 units may be correctly interpreted, but the code coming next may be misinterpreted in relation to the standard calculation speed of the computer.

However, since the standard speed is always computing the average of codes of preceding 8 characters, mixture of one or two characters is practically negligible for the interpretation.

The character space, on the other hand, is based on three dots, generally. In this machine, when there is no input (of time code corresponding) to two dots, it is regarded the coding for one character has been finished, and a corresponding character is displayed. Example:

D	E

◆ The word space standard is 7 dots. In this equipment, when there is no input of time code corresponding to 2 dots, it is regarded as a word space, and one-character portion is made blank.

- * In this equipment, when an un-interpretable code is input, an underline is displayed.
- * When a continuous signal longer than 8 bits is fed in this equipment, the signal is divided into every 8 bits, and corresponding characters are displayed.
- * The correspondence of display characters to the telegraph codes is shown in the attached chart.

Cautions for use of space switch

◆ When the SPACE switch is set to NARROW side, the basis for judging the character space and word space is shortened by 25 % so that a code shorter in space time can be interpreted. However, it may invite confusion in the case of deformed or other inferior codes.

Interpretation speed

The initial set speed is about 90 characters/minute. Thereafter, the interpretation follows up automatically according to the computation by the computer. As far as the speed change is less than double (ex. from 45 to 90 characters per minute), the characters can be interpreted without error; when changing suddenly more than double (ex. from 45, jumping to 100), the first two to four characters may be misinterpreted.

However, when the speed change is gradually, the characters may be interpreted correctly from 15 to 250 characters per minute.

◆ When the SPACE switch is placed at NARROW, the interpretation cannot follow up when the speed decreases suddenly to less than 1/8. In such a case, once set to NORMAL, and follow up correctly, then set back to NARROW.
(This is necessary only when the speed slows down; the interpretation follows when the speed increases even in NARROW position.)

2.2 Reception of Baudot

Set the switches as follows:

SEND-AUTO-RECEIVE:	AUTO
CW-RTTY:	RTTY
ASCII-BAUDOT:	BAUDOT

■ Set to the RTTY mode if the transceiver has the RTTY mode.
In the case of a transceiver without RTTY position, better results may be obtained by using the low tone rather than the high tone. In such an event, use the low tone in spite of the description below.

■ Set the NOR-REV switch by referring to the table below.

	Transceiver mode switch			
	RTTY	AM, FM	USB	LSB
Reception of amateur station (HF band)	NOR	NOR	REV	NOR
Reception of amateur station (over VHF band)	NOR	NOR	NOR	REV
Reception of commercial station	REV	NOR	NOR	REV

- Set the reception baud rate. Most amateur stations are using 45.45 bauds – hence select 45.5; while commercial stations mostly use 50 bauds.
- Determine the shift width. In amateur stations, usually 170 Hz shift is used.
- Set the mark frequency. In the HF band, the mark frequency is usually 2125 Hz, so set the TONE HIGH-LOW selector to HIGH side.
Turn the VFO dial of the transceiver so that the MARK and SPACE LEDs flicker along with the signals.
The SPACE filter frequency can be adjusted by the SHIFT sliding knob.
- Use the FIG-ON, LTR-ON, LOCK UOS \ ON switches as necessary.

2.3 Reception of ASCII

- The ASCII is usually used under the KCS standard (mark frequency 2400 Hz, space frequency 1200 Hz), or BELL 103 MODEM (mark 1270 Hz, space 1070 Hz) Since this equipment is not provided with demodulator, it should be manufactured by the user. When transmitting or receiving by means of a transceiver, the recommended conditions are HIGH tone, 170 Hz shift, and 110 bauds.
- In the case of ASCII mode, the LTR-ON, and FIG-ON switches do not operate.
- When the LOCK UOS switch is turned on, a lower case will be changed to a capital if a code for lower case alphabet is received.
When this switch is at OFF position, a lower case remains so in display.

3. METHOD OF TRANSMISSION

- Transmission is disabled if the SEND-AUTO-RECEIVE switch is placed at the RECEIVE position.
- When this switch is at the neutral position, the transmission and reception are changed over by the command from the keyboard.
- When this switch is at the SEND position, the SW OUT REMOTE switch turns on, and in the case of RTTY, the output of mark frequency is also delivered from the AFSK OUT terminal.

At this time, when a character has been written in the transmission buffer, its data is sent out.

In the case of CW, on the other hand, the SW OUT CW and SW OUT FSK switch turns on, together with the monitor sound of the AFSK, lighting up the CW LED at the same time. In the event of RTTY, codes are delivered to the SW OUT FSK and AFSK OUT, together with the monitor sound of the AFSK.

- The AFSK output of this equipment delivers a mark at a low frequency and a space at a frequency higher than the mark frequency by the portion of the shift width.

The transistor switch of the SW OUT FSK of this equipment turns ON at mark, and OFF at space.

The output of SW OUT FSK may be inverted by changing the connections of the JP-1 of the main printed substrate of this equipment.
In this case, short the bridge land JP-1 with solder, an OFF output may be obtained at mark, and an ON output at space.

- The RTTY in the HF band in an amateur station is usually communicated by shifting the space frequency lower than the mark frequency (which is called lower shift).

By contrast, in commercial stations and amateur stations over VHF band, the space frequency is shifted higher than the mark frequency (upper shift).

Anyway, set properly by referring to the descriptions of the RTTY transmission and reception of the transceiver.

- When using AFSK in an amateur station, set the transceiver mode by referring to the table below.

	Transceiver mode switch			
	AM	FM	USB	LSB
HF band	●	●		●
Over HF band	●	●	●	

NOTE: If a column without circle mark is used, a code of reverse shift with respect to other station is sent out.

- When transmitting Baudot, the LTR and FIG codes are added automatically, and sent out.

It must be noted that the UOS function appears to be dead because LTR or FIG code is automatically inserted also after sending out a space code.

- When transmitting Baudot if a space code is inserted when 58 or more characters are sent out, after sending out CR code, the CR, CR, LF, LTRS codes are automatically inserted into the codes being sent out.

When the codes being sent out each 71 characters, the CR, CR, LF, LTRS codes are automatically inserted after sending out the codes for the 71st character.

- When the LOCK UOS switch is turned on when transmitting ASCII codes, lower cases of alphabet are all changed to capitals to be transmitted (capital lock function). When communicating with a receiver without lower case function by using ASCII codes, set the LOCK switch in UOS ON position.

4. KEYBOARD MANIPULATION

- This set is furnished with a full keyboard of ASCII type, and communications are effected through this keyboard.
- The ASCII full keyboard has the following special keys that are not found in an ordinary typewriter. They are intended to directly deliver the function codes for computer controlling.

ESC RETURN LF RUBOUT TAB F1 F2

- There are 33 function codes in all. A function code without direct designation key is delivered by pressing the keys according to the attached table (Designation of ASCII Function Codes) while pushing the **CTRL** key.
- When a function code is designated right after pressing the **ESC** key. This equipment writes a corresponding function code in the transmission buffer.
- If a function code is delivered without pressing the **ESC** key. This equipment interprets that the function code was given as the control command for this equipment, not as transmission data, and starts the following operation.

The actions are summarized in a simplified list, which is attached to the end of this book.

- **CTRL | A** If written as shown on the left, press the **A** key while pushing the **CTRL** key.
- **SHIFT | TAB** If written as shown on the left, press the **TAB** key while pushing the **SHIFT** key.
- **RETURN** Sends out CR, CR, LF, LTRS when sending Baudot code.

On the receiving screen, it is interpreted as a new line code and the cursor moves to the head of next line at Baudot code. (At ASCII code, sends out carriage return code, the cursor does not move.)

- **LF** Sends out line feed code. On the receiving screen, it is interpreted as a new line code, and the cursor moves to the head of next line.
- **BS** Erases one character of the latest data written in the transmission buffer or memory channel.

If the character is not written in the transmission buffer, a correction code is sent out, namely HH in CW, / in Baudot, and BS in ASCII.

- **RUBOUT** Returns from memory channel write mode to ordinary mode.
- **F1** Delivers LTRS shift code when in Baudot code.
- **F2** Delivers FIGS shift code when in Baudot code. (Since LTRS and FIGS shift code are automatically inserted and sent out, this manipulation is not necessary in usual communications.)
- **TAB** When this key is pressed, the display screen is changed over just as when the page button on the front panel is pressed.
- **SHIFT | TAB** This key input produces the same screen as by the **CTRL | Q | 5** operation.
- **CTRL | 57** All reception data is cleared away.
- **SHIFT | 57** A special character "●" having a slit in the middle of a circle is shown in the transmission buffer or memory channel.

When this character is read when sending, the commands of **CTRL | A** or **CTRL | X** are canceled, and the machine returns to reception state. Therefore it can be used as a

- direct command for returning to reception state when there is no data in the transmission buffer.
- **CTRL | G** Sends out BEL. When the receiver set has a bell ringing function, it can ring an operator call bell. (No effect in CW.)
 - **CTRL | O** Delivers LTRS shift code when in Baudot code.
 - **CTRL | N** Delivers FIGS shift code when in Baudot code. (Since LTRS and FIGS shift codes are automatically inserted and sent out, this manipulation is not necessary in usual communications.)
 - **CTRL | @** Sends out NUL in ASCII, or BLANK code in Baudot.
- ★ The following commands will invert ON and OFF positions alternately whenever the key is manipulated. When switched to ON, a corresponding character is displayed in the status display area.
- Operation of automatic transmission/reception selector function

CTRL | A When the SEND-RECEIVE switch is placed in the neutral (AUTO) position, if the transmission buffer is filled with characters when the following manipulation is made, the mode is automatically changed to transmission and codes are sent out. When data are used up in the transmission buffer, the transceiver automatically returns to the reception mode.
 - Selection of transmission and reception from keyboard

CTRL | X While the SEND-RECEIVE switch is placed in the neutral (AUTO) position, the transmission and reception are changed over whenever the following manipulation is made when changed to transmission, if the transmission buffer is filled with characters, codes are also sent out. When data are used up in the transmission buffer, code sending is stopped, but the transceiver remains in the transmission mode.
 - Command to hold the transceiver in transmission mode and stop sending out codes from the transmission buffer.

CTRL | ^ This command stops sending out codes temporarily while transmitting data from the transmission buffer. The transceiver holds the status of transmission, and sends out LTRS shift code in Baudot, or NUL code in ASCII as a synchronizing signal.
 - Command to designate block transmission of word unit

CTRL | Y It enables operation of Word Mode in CW. In this mode, no code is sent out at CW mode unless space is inserted in the transmission buffer.
 - **CTRL | X**, **CTRL | Y**, **CTRL | ^**
 SYNC IDLE works with Word Mode at RTTY mode.
- ★ Automatic reception reset feature disabled and works if both **CTRL | A**, **CTRL | Y** at RTTY mode.
- When **CTRL | ^** is further added, SYNC IDLE is automatically inserted at RTTY mode.

If **CTRL | X** is used instead of **CTRL | A**, the machine operates in word mode at RTTY mode.

- Command to delay the RTTY transmission speed without changing baud rate

CTRL | U Transmission speed is slowed down to 25-baud equivalent without changing the baud rate of Baudot or ASCII transmission.

- Command to enable reception of ASCII function code and output to printer port

CTRL | C When this command is OFF, only LF is delivered to the printer. While receiving in ASCII mode, all other function codes than CR, LF, BS are ignored, but this command enables reception and display of function codes and output of data to the printer.

- ★ With the **CTRL | C** active, the 00 (NUL) and 7F (DEL) codes of ASCII codes are not shown on the screen. Also no output is delivered from the printer data output port.

- Command to switch on and off the data output to printer port

CTRL | P This is the only command that can be preset to ON before turning on the power of this equipment. Right after the power switch is turned on, a "P" mark is displayed in the status display area to indicate that this command is ON. By using this command, the printing of the printer can be controlled from the keyboard.

- Weighting on codes in CW transmission

CTRL | D This command changes the ratio of dot to dash of the CW transmission codes from the standard 1:3 to 1:4.

- CW ID command (the method of changing from RTTY mode to CW ID transmission mode).

CTRL | I Unlike the other two CW ID transmission methods, this mode is intended to change to the CW ID mode immediately. This command is also used when returning from the CW ID mode status to the RTTY mode.

- Method of transmission using the data recorded in a tape recorder (Echo-Back method)

CTRL | E When the RX-TAPE selector is at TAPE position, the received data are written into the transmission buffer. At this time, it is possible to send out the received data while they are being received. It is also possible to transmit data while reading them out from a tape recorder. When the RX-TAPE selector is at RX position, the transmitted data are written again into the transmission buffer.

- ★ Break command

CTRL | B This is effective only when the SEND-AUTORECEIVE switch is at SEND. While codes are being sent out, normal operation is prohibited. When data are contained in the transmission buffer, stop the code sending with **CTRL | ^** and then effect the command. When this command is put into effect, it shifts to space in RTTY and sets in Key pressed-down state in CW.

This command is reset by any key.

This command is used when testing the set (such as measurement of space frequency), or when adjusting the final stage part of the transmitter in CW transmission.

The following commands are effected by pressing two or more keys in succession.

At ON, a display is made in a two-character wide area in the same position left side of the page number indicated at the tail of the status display area.

The first character refers to the command name, and the second character has the following meaning.

- "◆" Shows the state of waiting for next key input.
- ★ Except for ESC command, commands showing "◆" can be canceled by **RUBOUT** key.

If other key than the one demanded by is pressed, that command is canceled, and a corresponding character is written in the transmission buffer at the same time. However, while the **CTRL | W** is showing "◆", only the cancellation of the command and return to the "Base display page" are effective.

Or if the operation corresponds to a new command, this command is entered.

- Numeral Shows the memory channel number in writing process.
- ⇨ Show that the command is active.
 - ➔ Indicates the memory load is started.
- While ⇨ or ➔ is being displayed, data input from keyboard is not accepted. At this time, the command can be canceled **RUBOUT** key.
- ★ Underline type cursor

One of the transmission buffer, memory channel and status display is indicated by a blinking underline type cursor to point out the position in which data is written by next key input or to show the Operation is started by keyboard command. Hereinafter, this underline type cursor is referred to only as "the cursor".

- Memory channel write command

CTRL | W At this time, "W ◆" is displayed. The screen automatically changes to page 3.

0 – 9 in succession.

When key "2" is pressed at this time, the display will be "W2", which means it is ready to write in channel 2. When a wrong letter is written, one character can be erased by pressing **BS** key. When writing of sentences necessary for memory channel is over, press the **RUBOUT** key, then the mode returns from memory channel write mode to the ordinary mode, and the display screen returns to the "Base display page" at the same time.

- ★ Memory channel numbers are displayed in inverted characters on page 3. When a number not shown in memory channel area is specified, the input is ignored and the machine waits for an input of correct number.
- ★ Immediately after the power is turned on, six memory channel numbers from 0 to 5 are displayed on page 3 in this machine. This composition of memory channels may be freely changed as described below.

Changing method of memory channel composition

While data is being written in memory channel by executing a write command of memory channel, the composition of memory channels can be changed by the following key inputs. (The effect of key input appears in the position indicated by the cursor in the memory channel.)

- **BS** The data in the cursor position is erased, and the vacancy is indicated by a small "+" mark. (When a set of data is divided into two or more portions by this character within a same channel number, the data after the "+" mark is invalid at the time of transmission.)
- **CTRL | 1...9** An inverted numeral representing the memory channel is written in the cursor position. (If two or more memory channels having an identical number are made, only the first memory channel number is valid.)

By this command, the memory channel area can be divided into up to ten channels.

The writing position or order of memory channel numbers is free, but the position of memory channel 0 cannot be changed.

- **CTRL | <** Cursor moves to the left.
- **CTRL | >** Cursor moves to the right.
- **CTRL SHIFT | <** Cursor moves one line up.
- **CTRL SHIFT | >** Cursor moves one line down.
- **CTRL | +** Additional space for one character portion is made in cursor position.
- **CTRL | -** Data in cursor position is deleted.
- ★ In order to prevent written data from being rewritten by mistake, the position in which a memory channel is written is protected, and usual key data cannot be entered or, in the case of **BS** key input, the cursor cannot be moved to that position. However, by using a cursor move command, it is possible to insert, delete or correct data by moving the cursor on these characters or beyond them, or to write data in succession to other memory channel area.
- ★ A total data of 383 characters can be written in the memory channel when only channel number **0** is used and all other channel numbers are erased.
- ★ The memory channel possesses a buffer area corresponding to 4 lines (128 characters), which is, however, not shown on the screen. Therefore the data forced out of the screen by **CTRL | +** command may be recalled by the **CTRL | -** command if the data

is within 128 characters in length. Or if the expelled portion of the data is continuous with the memory channel data in the final part shown on the screen, it can be effectively read as the data of that memory channel.

- ★ This fact means that it is possible to store further data of 128-character portion at the tail of memory channel screen when the **CTRL | +** command is used while paying attention to the number of characters.
- ★ The memory save and memory load commands have ability of saving and loading another 128-character portion in addition to the 384-character portion shown on the screen, and saving and loading may take about 55 seconds. In both save and load command, the cursor moves to indicate the position of the data to be saved or loaded.
- ★ CW ID transmission method using memory channel **0** (AUTO CW ID)

Using sentences written in the following format in the memory channel 0, CW ID of the automatic changeover system can be sent out.

Press **SHIFT** | ***** keys while writing into the memory channel **0**.

(Example or writing)

0 CR LF CW ID SHIFT | * DE YOUR CALL SIGN SHIFT | * CR LF
L CW OUTPUT J

By reading out the memory channel **0**, the sentences written between the **SHIFT | *** are transmitted in CW.

(When writing of memory channel is started by **CTRL | W | 0**, the CW ID format can be written also into other memory channel by using cursor move command or **CTRL | 1...9** command.)

- Memory channel readout command

CTRL | R 0..9

When a memory channel number is registered in the transmission buffer and is read out from the transmission buffer, the data in the corresponding memory channel are once transferred to the memory channel transmission buffer and then transmitted.

At this time, the memory channel number being transmitted is displayed at the head position in the status display area.

CTRL | 0...9 This is the same command as CTRL | R 0...9

Method to cancel the transmission of data in memory channel

CTRL | SHIFT | 14 When a wrong number is entered as memory channel and it actually begins to be sent out, the transmission of that memory channel can be canceled.

- Display screen changeover command by keyboard operation

In succession to **CTRL | Q**, when **0**, **1**, **2**, or **3** is depressed, the screen is changed to a corresponding page.

- 4 is depressed, the pages are changed over continuously as in the case of operation of the page button on the front panel.
- 5 is depressed, the screen returns to the "Base display page". The screen displayed by this command is identical with the one returning at the time of memory channel write command. When the power switch of the unit is turned on, page No. 1 is set, which is changed to other screen by the **CTRL | Q | 6** operation.
- 6 is depressed, the **Q** command is cut off, and the screen being displayed as registered as a new "Base display page". This command is intended to change the screen displayed by **CTRL | Q | 5** to other screen. To cut off only the Q command, press the **RUBOUT** key.
- 7 is depressed, moves up the display screen by one line.
- 8 is depressed, moves down the display screen by one line.
- ★ When the display screen is moved up or down by **7** or **8** key operation, a shaded square appears in the page No. indicating position. By using together with **CTRL | Q | 6** split screen display may be indicated.

Example of operation:

CTRL | Q | 1 | 7 | 7 | 7 | 7 | 7 | 7 | 6

As a result of the operation above, a split screen display appears in 9 lines in the reception area and 9 lines in the transmission buffer, and this screen is displayed at the **CTRL | Q | 5** or end of memory channel write command.

Method of erasing the final one line of the transmission buffer

CTRL | Z | BS The final one line of the transmission buffer is erased.

When the entire transmission buffer is erased, the **Z** command is cut off at the same time.

Method of erasing all transmission buffer

CTRL | Z | SHIFT ** The transmission buffer is entirely erased, and the **Z command is cut off.

Method of registering the CW ID changeover in the transmission buffer

CTRL | Z | SHIFT * When read out from the transmission buffer, the mode is changed from RTTY to CW ID, or from CW ID to RTTY mode.

Method of recording the data written in memory channel into tape recorder (memory SAVE)

- Set to 110 baud.
- Set to the usual shift width and tone.
- Connect the AFSK OUT TAPE and record input terminal of tape recorder.

- Start the tape recorder in record mode.
- The push `CTRL | S` and `RETURN` key, then the memory save operation is started.

Method of loading the data for memory channel recorded in the tape recorder into memory channel (memory LOAD)

- Set to 110 baud.
- Set to the same shift width and tone as in the case of memory save operation.
- Set the CW-RTTY selector to RTTY side.
- Set the NOR-REV selector to NOR side.
- Set the RX-TAPE selector to TAPE side.
- Connect the output terminal of tape recorder and AF TAPE.
- After pressing **CTRL | L** and **RETURN** keys, start the tape recorder in playback mode.

Automatic transmission of Test Message

CTRL | Z 0...9

- 1 Sends RYRY in 70 characters.
 - 2 Sends QBF once.
If call sign for ID is written in a position within two lines above the memory channel area, this call sign is automatically added to the tail of QBF. This ID is, however, sent in RTTY code.
 - 3 Sends all characters usable in Baudot code once.
 - 4 Sends all characters usable in ASCII code once.
 - 5 Sends RYRY continuously. Line Feed is given every 70 characters.
 - 6 Sends pattern of 2 continuously.
 - 7 Sends pattern of 3 continuously.
 - 8 Sends pattern of 4 continuously.
 - 9 Stops transmission of test message temporarily when there is no data in the transmission buffer. Continues to send out data of transmission buffer when there is data in the transmission buffer.
 - 0 Stops transmission of test message temporarily when there is no data in the transmission buffer. Starts to send out data of transmission buffer, when there is data in the transmission buffer, after once sending out all test messages being transmitted.
- ★ The commands 1 through 4 return to the mode of sending the transmission buffer data automatically after sending out a full cycle of test messages.
- ★ The characters that can be sent in test message are as shown below.

1, 5 (RY)

[illegible]

2, 6 (QBF)

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG'S BACK
0123456789

3, 7 (Baudot all characters)

ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890 !"#&(),-. /:;?

4, 8 (ASCII all characters ... 20H to 7EH)

!"#\$%&'()*+,-./0123456789:;<=>?
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_
'abcdefghijklmnopqrstuvwxyz{|}~

Insertion of the SYNC IDLE at RTTY mode

1. SYNC IDLE only works if both word mode **CTRL | Y** and SYNC character insertion **CTRL | ^** are activated.
2. With the SEND-AUTO-RECEIVE switch in AUTO position and **CTRL | A** (or **CTRL | X**) off, the user starts pretyping (while receiving, usually).
3. When the user decides to transmit, he uses **CTRL | A** to start. All pretyped text will now be transmitted with fill characters.
4. When the transmitted output has "caught-up" with the user's typing, fill characters are automatically inserted until the next complete word has been typed (indicated by the space bar code at present).
5. As each new word is typed and completed, the fill characters are stopped and the word is transmitted.
6. When a transmission has been completed, the transmission is stopped with a second **CTRL | A** (or **CTRL | X**) command, returning this equipment to receive.
 - ★ Automatic reception reset feature disabled and works if both **CTRL | A**, **CTRL | Y** at RTTY mode.

In case of **CTRL | A**, **CTRL | Y**, **CTRL | ^**, SYNC IDLE is automatically inserted.

In case of **CTRL | X**, **CTRL | Y**, **CTRL | ^**, SYNC IDLE is automatically inserted, the machine operates in Word Mode.

5. RATING

1) Transmission and reception codes

CW

Morse code Alphabet, numerals, symbols, special signs.

RTTY

Baudot code 5-unit Baudot codes (American Informations)
1 start bit, 5 code bits, 1.5 stop bits: total 7.5 bits.

ASCII code 7 units (ISO/CCITT No. 5)
(There is no parity check in reception.)

2) Transmission and reception speeds

CW Reception: 15 to 250 characters/minute (automatic follow up).

CW Transmission: 25 to 200 characters/minute (continuously variable).

Weight: 1:3 or 1:4.

RTTY 45.45, 50, 56.88, 74.2, 110, 300 bauds.
(300-baud speed is possible when external MODEM is used.)

3) Input

AF input CW, RTTY, input impedance 8 Ohms, 30 mV to 2 V rms.

Key input CW, input withstand voltage max. ± 15 V.

TTL level input RTTY (mark = H, space = L).

4) AF frequency

CW: 800 Hz (AF active filter + PLL filter used)

RTTY Mark = 2125 Hz

HIGH TONES: Space = 2295 Hz (170 Shift)
= 2550 Hz (425 Shift)
= 2975 Hz (850 Shift)
CW ID = Space tone (all shifts)

RTTY Mark = 1275 Hz (170 Shift)

LOW TONES: Space = 1445 Hz (170 Shift)
= 1700 Hz (425 Shift)
= 2125 Hz (850 Shift)

CW ID = Space tone (all shifts) (Mark, space filter type demodulator used).

- 5) Output

Keying output CW	Transistor switch for both positive and negative: +100 V, 100 mA, -100 V, 10 mA, (V_{CEO} 120 V, IC 1.5 A, PC 20 W) residual voltage less than 0.8 V.
FSK	Transistor switch +100 V, 20 mA (V_{CEO} 300 V, IC 0.1 A PC 0.75W) (mark=ON, space=OFF, invertible by changing internal connections).
AFSK output	CW, RTTY, impedance 500 Ohms, max. 100 mV rms.
TTL level output	RTTY (mark=H, space=L). CW (mark=L)
- 6) AFSK output frequency

RTTY & CW ID OUT	Mark 1275 Hz (low tone), 2125 Hz (high tone). Upper shift Shift width 170 Hz, 425 Hz, 850 Hz.
CW	800 Hz mark tone
- 7) Display output

5-inch green light emitting CRT.	
Built-in CRT External CRT	Composite video signal (Video positive modulation, synchronous negative modulation, 1.0 ±0.2 Vp-p, 75 Ohms).
- 8) Printer interface

Parallel, Centronics - compatible printer output; Received and transmitted text may be printed on the ASCII printer, regardless of code.
- 9) Remote control Key

Transistor switching, +50 V, 140 mA. (**V_{CEO}** 60V, IC 1A, PC 0.75 W)
- 10) Number of display characters

640 characters (32 characters × 20 lines) × 4 pages, Display format is shown in attached drawing.

PAGE MEMORY:	56 lines of 32 characters per line (4 pages); 25 MEMORY: lines of receive text, 15 lines of pretype transmit.
--------------	---
- 11) Output for oscilloscope

RTTY	Separate mark and space connections for crossed ellipse indication on X-Y scope display. Voltage = 1.0 V p-p typical, 100 kOhms loads, or 0.5 V p-p typical, 10 kOhms loads.
------	---

- 12) AF output
- PHONE terminal CW: Delivers oscillation sound of monitor OSC.
- RTTY and CWID: Delivers AFSK oscillation sound.
- 100 mW, 8 Ohms.
- EXT. SP terminal Delivers signal fed in AF input terminal.
- 13) Keyboard
- ASCII full keyboard.
- 14) Power source
- 12 to 14.5 V DC (13.8 V DC nominal), 1.65 Amps, 23 Watts.
- 15) Overall dimensions
- W 336 mm × D 317 mm × H 140 (not including plug protrusions).
- 16) Weight
- 16.5 lbs net, 20 lbs shipping (including keyboard)
- 7.5 kg net, 9.1 kg shipping (including keyboard)
- 17) Accessories
- | | |
|-----------------------|-----------------------|
| R type phone pin plug | 4 |
| Mini earphone plug | 1 (for telegraph key) |
| Fuse 2 A | 1 (spare) |
| DC power cord | 1 |
| ASCII full key board | 1 |

6. REPLACEABLE KEYBOARDS

This machine is furnished with the ASCII type full keyboard, which may be, however, replaced with other one by the user. Or, other computer may be connected instead of the keyboard.

When replacing keyboards, note the following requirement.

- 1) It must be a full keyboard of ASCII code output. If the keyboard does not have 7 or 8-bit positive logic Parallel data including ASCII function codes and 1-bit negative logic strobe, it should not be used for the this equipment.
- 2) The keyboard should work on +5 Volt power source, and the current consumption of the keyboard should be less than 150 mA.
- 3) The signal names of the keyboard connector of the this equipment are as follows:

- | | | |
|--------|---------------------------------------|---------------------|
| 1. GND | 7. D6 | 13. to 24. Not used |
| 2. D1 | 8. D7 | |
| 3. D2 | 9. D8 | |
| 4. D3 | 10. <u>STROBE</u> | |
| 5. D4 | 11. <u>ACK</u> | |
| 6. D5 | 12. +5V, output possible up to 150 mA | |

(An underlined signal name means negative logic.)

ACK is not used at the present. Do not use it when replacing keyboard. When sending data into the this equipment from other computer, ACK is used. At this time, after checking the response of ACK, enter the next data and STROBE.

- ★ The data delivered from the keyboard attached to this machine are as follows.

When a 7-bit ASCII code is entered, some of the commands are not operated.

When a printer output port of computer or the like and a keyboard data input port of this machine are connected, deliver the data according to this list.

The name of keyboard plug is P-1624-BAC.

List of keyboard output codes:

1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
CTRL	29	30	31	32	33	34	35	36	37	38	39	40	41
SHIFT	42	43	44	45	46	47	48	49	50	51	52	SHIFT	
REPT	53	54									55	56	57

(Keyboard encode ROM code name K1)

	NORMAL	SHIFT	CTRL	CTRL-SHIFT
1	1	!		
2	2	"		
3	3	#		
4	4	\$		
5	5	%		
6	6	&		
7	7	'		
8	8	(
9	9)		
10	0	NUL		
11	-	=	(-)	(=)
12	^	~	RS	(^)
13	\	|	FS	(\)
14	(BS)	(ETB)	BS	(CAN)
15	(ESC)	(SUB)	(DLE)	CAN
16	q	Q	DCI	(Q)
17	w	W	ETB	(W)
18	e	E	ENQ	(E)
19	r	R	DC2	(R)
20	t	T	DC4	(T)
21	y	Y	EM	(Y)
22	u	U	NAK	(U)
23	i	I	HT	(I)
24	o	O	SI	(O)
25	p	P	DLE	(P)
26	@	`	NUL	(@)
27	[	{	ESC	([)
28	(CR)	CR	CR	CR
29	a	A	SOH	(A)
30	s	S	DC3	(S)

	NORMAL	SHIFT	CTRL	CTRL-SHIFT
31	d	D	EOT	(D)
32	f	F	ACK	(F)
33	g	G	BEL	(G)
34	h	H	BS	(H)
35	j	J	LF	(J)
36	k	K	VT	(K)
37	l	L	FF	(L)
38	;	+	(;)	(+)
39	:	*	(:)	(*)
40	]	}	GS	(J)
41	LF	LF	LF	LF
42	z	Z	SUB	(Z)
43	x	X	CAN	(X)
44	c	C	ETX	(C)
45	v	V	SYN	(V)
46	b	B	STX	(B)
47	n	N	SO	(N)
48	m	M	CR	(M)
49	,	<	(,)	(<)
50	.	>	(.)	(>)
51	/	?	(/)	(?)
52	BEL	_	US	(DEL)
53	(HT)	(VT)	(FF)	(SHO)
54	SP	(SP)	(FS)	(GS)
55	(SI)	SI	SI	SI
56	(SO)	SO	SO	SO
57	(DEL)	ENQ	(ACK)	DEL

7. CONNECTABLE PRINTER

A printer of Centronics Compatible Parallel Interface Can be used. Use the printer of this standard specification.

To connect the printer with this equipment, purchase the following parts.

- 1) HIROSE 12-pin plug, P-1612-BAC, 1 piece
- 2) Connection cord (12-wire), less than 1.5 meter
- 3) Printer side plug (as specified in the Printer Instruction Manual), 1 piece

The LING register for printer output of this equipment is for 80-character portion. In the case of 110 bauds or higher speed, a printer of slow action type may skip prints.

The signal names of the printer connector are as follows:

1	GND	7	<u>STROBE</u>
2	BUSY (<u>RDY</u>)	8	D1 (LSB)
3	<u>ACK</u>	9	D2
4	D8 (MSB)	10	D3
5	D7	11	D4
6	D6	12	D5

(An underlined on signal name means negative logic.)

Select a printer which incorporates buffer register for one-line portion, and automatically feeds line when this buffer register becomes full, and also feeds line when control code (1)A (LF: line feed codes) is entered.

The output of STROBE is a negative pulse of about 10 μ sec. The input of ACK is not read. When the input of BUSY (RDY) is L level only, data is delivered. The data output is latched just before the next STROBE output. The D8 output is always delivered at L level.

The output code is 7-bit parallel ASCII code.

BRIDGE LAND FUNCTION (User Adjustments)

Modem substrate	OPEN	SHORT
JP-1	UPPER SHIFT AFSK OUTPUT (Set Mark Tone)	OWER SHIFT AFSK OUTPUT (Set Space Tone)

*1.

Main substrate	OPEN	SHORT
JP-1	SW OUT FSK MARK = "ON"	SW OUT FSK SPACE = "ON"
JP-2	SW OUT CW +keying residual voltage 0.8 V (can be used \pm keying)	SW OUT CW +keying residual voltage 0.2V (only used +keying)
JP-3		

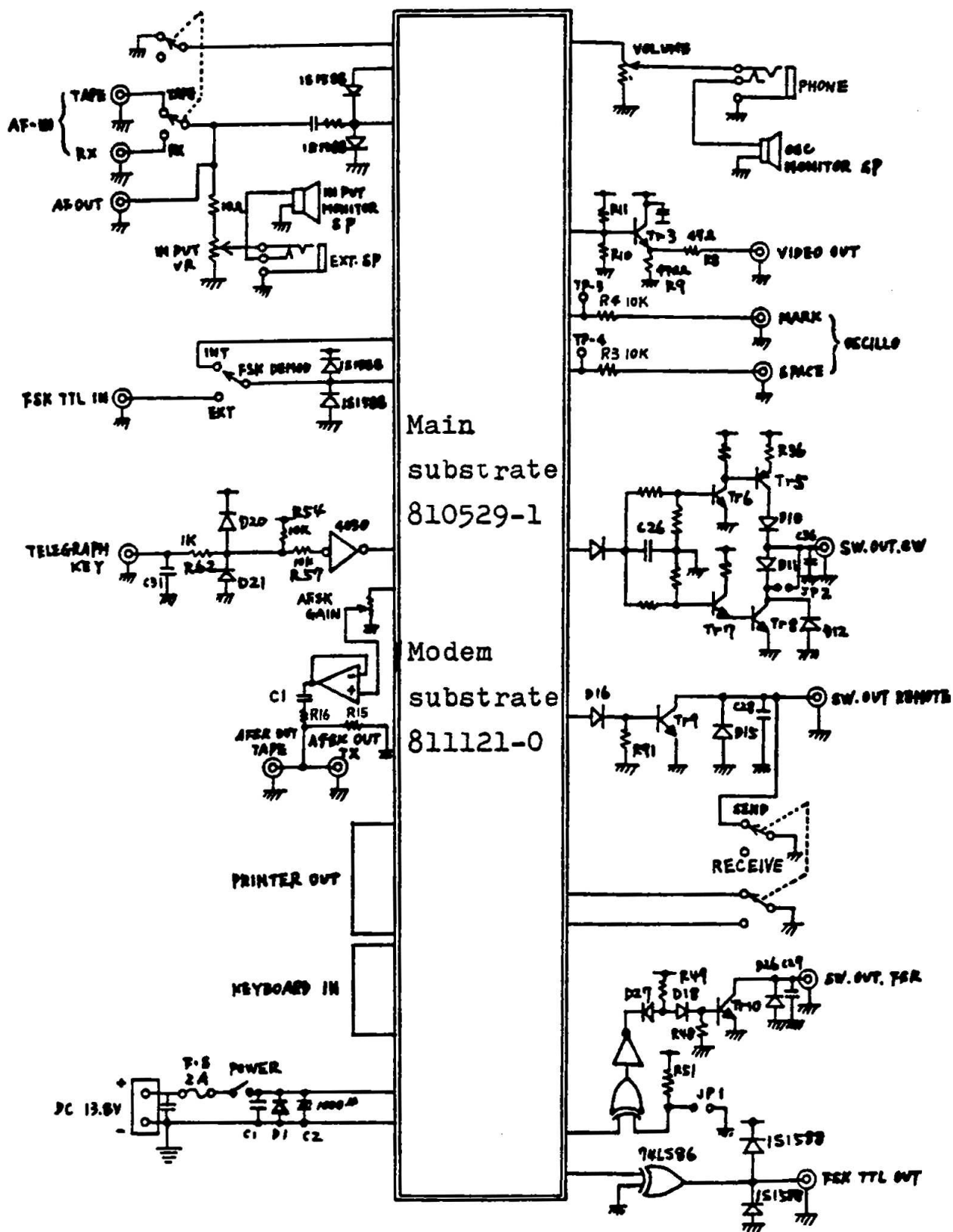
*2.

NOTES: *1. JP-1 is used to align the transmit AFSK tones; use clip to chassis ground from pin at JP-1.

 *2. Use "solder-bridge" to "short" JP-1 & JP-2.

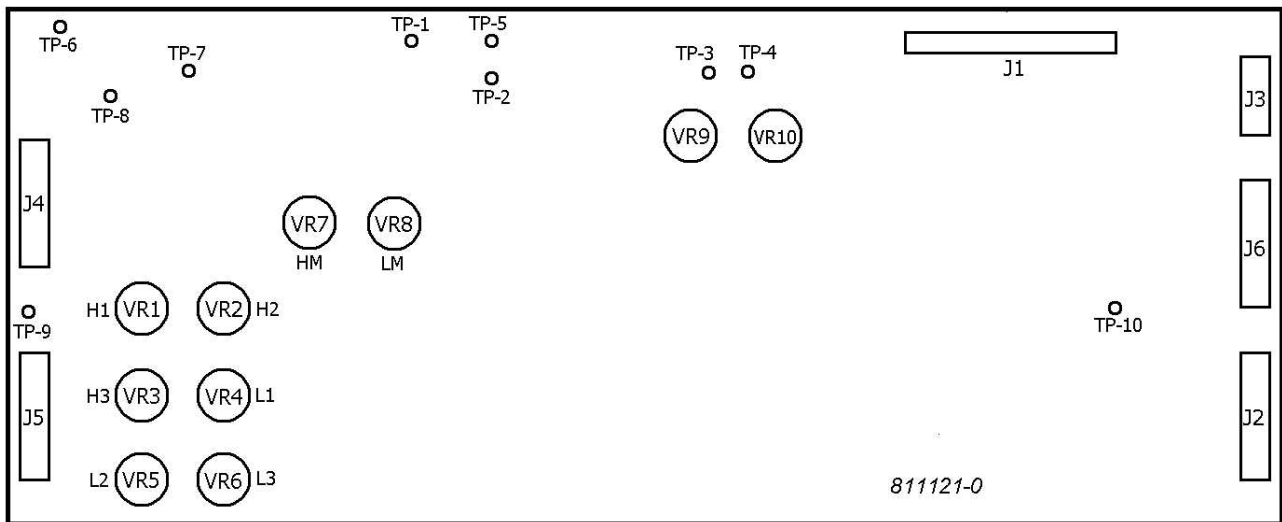
★ Since the other bridge lands are set at time of manufacture, the user should not change the setting.

8. INPUT AND OUTPUT CONNECTION DIAGRAM

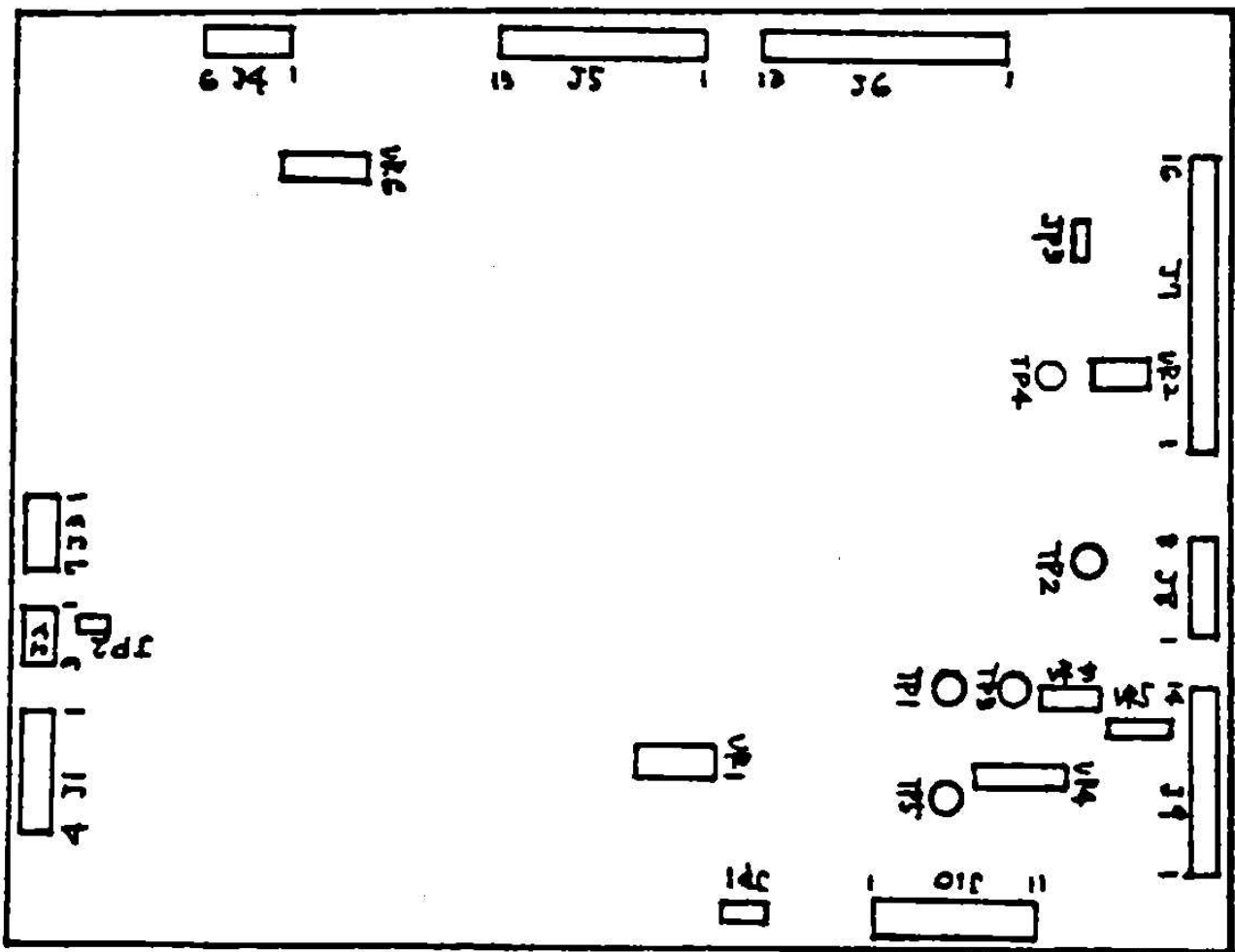


9. PARTS LAYOUT ON PRINTED CIRCUIT BOARD

Modem substrate (case lower side)



Main substrate (case upper side)



ADJUSTMENTS of the circuit board

Though necessary parts have been adjusted at the time of shipping, deviations may be caused due to aging or other conditions in the course of months of use. In such case, readjust in the following procedure.

Adjustment of semivariable resistors an COMPUTER substrate (TOP-BOARD)

CONTROL/TP ACTION

- VR-1 Adjusts frequency of CW sidetone oscillator; set to 800 Hz at TP-1 AFTER ADJUSTING VR-2.
- VR-2 Adjust center frequency of CW PLL filter; ADJUST BEFORE VR-1. Set SPACE-NARROW switch is NARROW, Shift the adjustment of VR-1 out of 800 Hz beforehand, With no signal input, set VR-2 for 800 Hz at TP-2.
- VR-3 Adjust minimum CW transmit speed. Set SPEED slide control to minimum (0) and adjust VR-3 for CW transmit speed desired. (Measured at TP-3.)
- VR-4 Adjust maximum CW transmit speed. Set SPEED slide control to maximum (10) and adjust VR-4 for CW transmit speed desired. (Measured at TP-3.)
- VR-5 Adjusts center frequency of CW active filter. Feed 10-20 mV, 800 Hz signal into AF input, adjust VR-5 for maximum signal at TP-5 (use oscilloscope).
- VR-6 Adjust contrast of the internal CRT display.
- TP-6 Measure CW transmit speed; $CW\ WPM = 2.667 \times \text{freq.}$

Adjustment of semivariable resistors on MODEM substrate

Adjust the mark and space filter frequency by using the output of AFSK.

Set the SEND-RECEIVE switch to SEND and RX-TAPE switch to TAPE position.

Connect the AFSK OUT TAPE and AF IN-TAPE.

Set the SHIFT sliding VR to 0 position.

Turn the AFSK GAIN control fully clockwise.

Under the conditions above, observe TP-3 (mark filter output check point) of TP-4 (space filter output check point) on oscilloscope, and adjust to the maximum amplitude.

Tone	Shift switch	Test point	JP1 connection	VR to be used
HIGH	Arbitrary	TP-3	Open	VR7 HM
	170	TP-4	Jumper or CTRL B	VR1 H1
	425	"	"	VR2 H2
	850	"	"	VR3 H3
LOW	Arbitrary	TP-3	Open	VR8 LM
	170	TP-4	Jumper or CTRL B	VR4 L1
	425	"	"	VR6 L2
	850	"	"	VR5 L3

OTHER USER ADJUSTMENTS:

The only remaining user-adjustable controls are those in the CRT monitor sub-assembly. The functions of these controls are clearly marked on the circuit board and you may adjust them if required. The available controls are:

MARKING	LOCATION	FUNCTION
V-LIN	Right side	Adjust vertical linearity
V-HEIGHT	Right side	Adjust vertical height
V-HOLD	Right side	Adjust vertical oscillator frequency
VIDEO CENTER	Right side	Adjust horizontal centering
SUB-BRIGHT	Right side	Adjust brightness of CRT
FOCUS	Right side	Adjust focus of display

These are the ONLY user-adjustable controls in the CWR685E (CWR6850). Please do attempt re-adjustment of any other controls or use of any jumpers not mentioned in the above discussion. If your CWR685E (CWR6850) still exhibits problems or cannot be adjusted as explained, please contact your dealer or the factory for more information.

10. DISPLAYS

Line Display
No. content

1	..... blank .....	.....	Page 0 shown
2	.....	
3	.....	
4	.....	
5	.....	
6	.....	
7	.....	
8	.....	
9	.....	
10	.....	Page 0	
11	.....	
12	.....Reception data.....	.....
13	.....display areas.....		
14	.....26 lines, 832 characters.....		
15	.....	
16	.....	
17	.....	
18	.....	
19	.....	
20	.....	
21	.....	
22	.....	Page 1	
23	.....	
24	.....	
25	█←Reception cursor start position..	.....
26	.....	
27	.....	
28	...Memory ch transmission buffer...		Page 3 (lower 8 lines)
29	.....Status Display.....	█←Page # shown 1, 2, 3	
30	.....	
31	.....	
32	.....	
33	.....	
34	.....	Page 2	
35	.....	
36	.....Transmission buffer.....		
37	.....line 30-44.....		
38	.....15 lines, 480 characters.....		
39	.....	
40	.....	
41	.....	
42	.....	
43	.....	
44	.....	
45	.....Memory 0.....		
46	.....lines 45-46.....		
47	.....Memory 1.....		
48	.....lines 47-48.....		
49	.....Memory 2.....		
50	.....lines 49-50.....		
51	.....Memory 3.....		
52	.....lines 51-52.....		
53	.....Memory 4.....		
54	.....lines 53-54.....		
55	.....Memory 5.....		
56	.....lines 55-56.....		

PAGE 0 DISPLAY FORMAT:

LINE NO	DISPLAY CONTENT
1	.....Blank..... 0 (Page No.)
2
3
4
5	....Top Portion of Receive.....
6	.....Display.....
7	...(19 lines, 608 characters)...
8
9
10
11
12
13
14
15
16
17
18
19
20

.....
 |
 Repeated
 on
 Page 1
 |

PAGE 1 DISPLAY FORMAT:

LINE NO	DISPLAY CONTENT
13	.....
14	.....
15	.....
16	.....
17	.....
18	.....
19	.....
20	...Bottom Portion of Receive....
21	.....Display.....
22	...15 Lines, 480 Characters.....
23	.....(Lines 13-27).....
24	.....
25	<input type="checkbox"/>
26	.....
27	.....
28	...Tape Store Output Buffer.....
29	....Status Indicators..... 1 (Page No.)
30	....Top of Transmit Buffer.....
31	....3 Lines, 96 Characters.....
32	.....(Lines 30-32).....

.....
 |
 Repeated
 from
 Page 0
 |

Note: ONLY Page 0 and Page 1 are available in "MODE A"

PAGE 2 DISPLAY FORMAT:

LINE NO	DISPLAY CONTENT
25	<input type="checkbox"/>
26	....3 Lines, 96 Characters.....
27	.....(Lines 25-27).....
28	...Tape Store Output Buffer.....
29	....Status Indicators..... 2 (Page No.)
30	.....
31	.....
32	.....
33	.....
34	.....
35	.....
36	....All of Transmit Buffer.....
37	...15 Lines, 480 Characters.....
38	.....(Lines 30-44).....
39	.....
40	.....
41	.....
42	.....
43	.....
44	.....

PAGE 3 DISPLAY FORMAT:

LINE NO	DISPLAY CONTENT
45	.....HERE IS 0.....
46	.....(Lines 45, 46).....
47	.....HERE IS 1.....
48	.....(Lines 47, 48).....
49	.....HERE IS 2.....
50	.....(Lines 49, 50).....
51	.....HERE IS 3.....
52	.....(Lines 51, 52).....
53	.....HERE IS 4.....
54	.....(Lines 53, 54).....
55	.....HERE IS 5.....
56	.....(Lines 55, 56).....
25	<input type="checkbox"/> ...Bottom of Receive Buffer....
26	....3 Lines, 96 Characters.....
27	.....(Lines 25-27).....
28	...Tape Store Output Buffer.....
29	....Status Indicators..... 3 (Page No.)
30	....Top of Transmit Buffer.....
31	....3 Lines, 96 Characters.....
32	.....(Lines 30-32).....

Note: "MODE B" must be selected to view Pages 1 and 2.

11. DESIGNATION OF ASCII FUNCTION CODES

Data (hexadecimal)	Name of data	Method of operation
00	NUL	Press CTRL | @
01	SHO	After once pressing ESC press CTRL | A
02	STX	-"- CTRL | B
03	ETX	-"- CTRL | C
04	EOT	-"- CTRL | D
05	ENQ	-"- CTRL | E
06	ACK	-"- CTRL | F
07	BEL	Press CTRL | G
08	BS	Press BS
09	HT	After once pressing ESC press CTRL | I
0A	LF	Press LF
0B	VT	After once pressing ESC press CTRL | K
0C	FF	-"- CTRL | L
0D	CR	Press RETURN
0E	SO	Press F2
0F	SI	Press F1
10	DLE	After once pressing ESC press CTRL | P
11	DC1	-"- CTRL | Q
12	DC2	-"- CTRL | R
13	DC3	-"- CTRL | S
14	DC4	-"- CTRL | T
15	NAK	-"- CTRL | U
16	SYN	-"- CTRL | V
17	ETB	-"- CTRL | W
18	CAN	-"- CTRL | X
19	EM	-"- CTRL | Y
1A	SUB	-"- CTRL | Z
1B	ESC	Press ESC twice
1C	FS	After once pressing ESC press CTRL | \
1D	GS	-"- CTRL | ]
1E	RS	-"- CTRL | ^
1F	US	-"- CTRL | RUBOUT
7F	DEL	Press RUBOUT

- ★ Effective only in ASCII mode.
- ★ When using as printer setting command, press **CTRL | C** beforehand.
- ★ If **ESC** key is pressed first by mistake, the next key to be pressed should be other than **CTRL** or direct function key.

12. CORRESPONDENCE CHART OF DISPLAY CHARACTERS AND CODES (CW)

Display	Code	Display	Code
A	.-	1	.-----
B	2	..----
C	---.	3	...---
D	---	4-
E	.	5	.....
F	...-	6	-----
G	--.	7	-----
H	8	-----
I	..	9	-----
J	-----	0	-----
K	--- (period)
L	,	----- (comma)
M	--	:	----- (colon)
N	..	-	----- (dash)
O	---	'	-----
P	/	----- (slash)
Q	----	"	..... (BT)
R	...-	?	..... (query)
S	...	@	--- (AA)
T	-	+	--- (AR)
U	..-	^	.... (AS)
V	...-	]	----- (BK)
W	---	=	----- (BT)
X	----	%	----- (CL)
Y	-----	[	--- (KA)
Z	LF	----- (VA, SK)
		\$	----- (SX)
		>	--- (VE)
		<	..... (HH)

13. KEYBOARD CONTROL COMMAND LIST

CONTROL KEY	STATUS INDICATOR	FUNCTION
CTRL | A	A	On - off control of automatic transmit-receive Operation; SEND-AUTO-RECEIVE switch must be in AUTO position.
CTRL | B	B	On/off control of "break" transmit (SWITCH is in the SEND position).
CTRL | C	C	On - off control of reception and transfer to the printer of ASCII control codes.
CTRL | D	D	Extends CW transmit dash length by 25 % reducing the effective CW "weight".
CTRL | E	E	On - off control of echo-back from transmit to receive buffer areas.
CTRL | G		Inserts signal bell code in transmit buffer; effective only in ASCII and Baudot.
CTRL | I		Changes transmit mode from RTTY to CW ID for all text to be transmitted. Shows reverse video star ★ in receive buffer.
CTRL | TAB		Same function as above CTRL | I.
CTRL | RETURN	L	Load start command to load contents of all 10 HERE IS memories from tape; control passes to tape and CWR685E (CWR6850) will not respond to further keyboard commands until an ASCII STX character is received from tape.
CTRL | P	P	On - off control of the printer.
CTRL | Q 0	Q	Set display to page 0.
CTRL | Q 1	Q	Set display to page 1.
CTRL | Q 2	Q	Set display to page 2.
CTRL | Q 3	Q	Set display to page 3.
CTRL | Q 4	Q	Changes display screen in order of 0-1-2-3-0 or 0-1-0.
CTRL | Q 5	Q	Returns display screen to "Base display page".
CTRL | Q 6	Q	Registered as a new "Base display page", and reset CTRL | Q command.
CTRL | Q 7	Q	Moves up the display screen by one line.
CTRL | Q 8	Q	Moves down the display screen by one line.
CTRL | Q other		Reset CTRL | Q command.

TAB		When this key is pressed, the display screen is changed over just as when the page button on the front panel is pressed.
SHIFT | TAB		Returns display screen to "Base display page".
CTRL | R | 0	R	Read contents of HERE IS 0 for transmission.
CTRL | R | 1	R	Read contents of HERE IS 1 for transmission.
CTRL | R | 2	R	Read contents of HERE IS 2 for transmission.
CTRL | R | 3	R	Read contents of HERE IS 3 for transmission.
CTRL | R | 4	R	Read contents of HERE IS 4 for transmission.
CTRL | R | 5	R	Read contents of HERE IS 5 for transmission.
CTRL | R | 6	R	Read contents of HERE IS 6 for transmission.
CTRL | R | 7	R	Read contents of HERE IS 7 for transmission.
CTRL | R | 8	R	Read contents of HERE IS 8 for transmission.
CTRL | R | 9	R	Read contents of HERE IS 9 for transmission.
CTRL | R | other		Reset CTRL | R command.
CTRL | 0...9		This is the same command as CTRL | R | 0...9 .
CTRL | SHIFT | 14		When a wrong number is entered as HERE IS channel and it actually begins to be sent out, the transmission of that HERE IS transmission can be canceled.
CTRL | S | RETURN	S	Transmit contents of all 10 HERE IS messages to tape recorder for storage.
CTRL | U	U	RTTY transmit speed is slowed down to 25-baud equivalent speed by increasing the length of the stop pulse. The baud rate of the character itself is not changed from that set by the BAUD switch.
CTRL | W | 0	W0	Program HERE IS #0; end with RUB OUT key.
CTRL | W | 1	W1	Program HERE IS #1; end with RUB OUT key.
CTRL | W | 2	W2	Program HERE IS #2; end with RUB OUT key.
CTRL | W | 3	W3	Program HERE IS #3; end with RUB OUT key.
CTRL | W | 4	W4	Program HERE IS #4; end with RUB OUT key.
CTRL | W | 5	W5	Program HERE IS #5; end with RUB OUT key.
CTRL | W | 6	W6	Program HERE IS #6; end with RUB OUT key.

CTRL | W | 7	W7	Program HERE IS #7; end with RUB OUT key.
CTRL | W | 8	W8	Program HERE IS #8; end with RUB OUT key.
CTRL | W | 9	W9	Program HERE IS #9; end with RUB OUT key.
CTRL | W | other	Reset	CTRL | W command.

- ★ (When writing into a memory channel, if number not shown in the memory channel area is specified, that number is ignored, and the machine waits for an input of correct number.)
- ★ (As for the method of adding memory channel numbers, see the changing method of memory channel composition on page 16.)

CTRL | X	X	Turn on transmitter and transmit data; works when SEND-AUTO-RECEIVE switch is in AUTO; transmitter stays on until second CTRL | X is used to turn transmitter off.
CTRL | Y	Y	On - off control of word mode transmission in CW mode. (block transmission by word unit).
CTRL | Z | BS	Z	Deletes final line in transmit buffer area; repeated BS operation deletes preceding line without further need of CTRL | Z .
CTRL | Z | SHIFT | +		Deletes all text in transmit buffer.
CTRL | Z | SHIFT | *		On - off control of insertion of CW text in stream of otherwise RTTY in transmit buffer.
CTRL | Z | 0...9	Z	Transmission of test message. (See page 19.)
CTRL | ^	^	Turns an sync-idle; stops sending transmit text until turned off with 2 nd CTRL | ^.
CTRL | @		Inserts NUL code in transmit buffer in ASCII; BLANK code in Baudot. No effect in CW.

*SYNC IDLE Works if both **CTRL | A**, **CTRL | Y**, **CTRL | ^**.

*SYNC IDLE With word mode works if both **CTRL | X**, **CTRL | Y**, **CTRL | ^**.

★ Automatic reception reset feature disabled and works if both **CTRL | A**, **CTRL | Y** (only effect in RTTY).

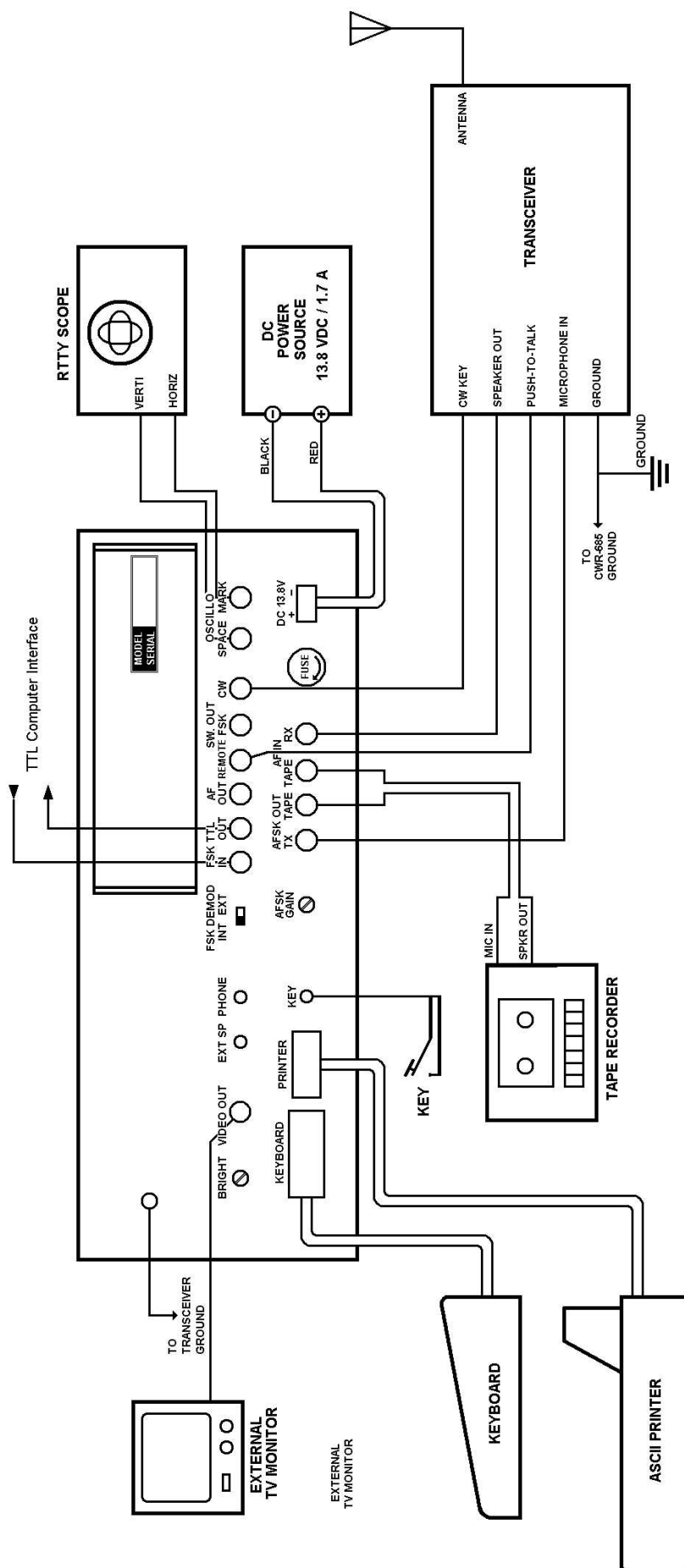
★ **BS** Deletes one character when writing in transmission buffer or memory channel.

F1 or **CTRL | O** In Baudot, inserts LTRS character in transmit buffer; in ASCII inserts SI. No effect in CW.

F2 or **CTRL | N** In Baudot, inserts FIGS character in transmit buffer; in ASCII inserts SO. No effect in CW.

- ★ **RETURN** Sends out CR, CR, LF, LTRS when sending Baudot code.
Sends out carriage return code when sending ASCII code.
- ★ **LF** Sends out line feed when sending RTTY.
Sends out VA when sending CW.
- ★ **CTRL | 57** All reception data is cleared away.
- ★ **SHIFT | 57** A special character "●" having a slit in the middle of a circle is shown in the transmission buffer or memory channel. When this character is read when sending, the commands of **CTRL | A** or **CTRL | X** are canceled, and the machine returns to reception state.
Therefore it can be used as a direct command for returning to reception state when there is no data in the transmission buffer.
- ★ **RUBOUT** Returns from Commands mode to Transmit Buffer write (ordinary) mode.
- ★ The other functions than above are effective only in ASCII mode. When sending of function code is necessary in ASCII mode, refer to the "designation of ASCII function codes".
- ★ As far as the keys enclosed by are operated, preliminary operations are not necessary, and repeated operation is possible only with the keys.

14. SIMPLIFIED CONNECTIONS TO THE CWR685E (CWR6850)



15. Precautions when using with ICOM HF transceivers

The following precautions apply when using the CWR685E (CWR6850) with the ICOM brand of HF transceivers (IC710, 720, 720A, 730):

- a. When using SW-OUT FSK connection (see PAGE 5 of the manual) to drive the direct FSK connection of the ICOM transceivers, it is necessary to invert the normal sense of the FSK output from mark = "on" to space = "on". To make this change, refer to PAGE 27 of the manual and short-across jumper JP-1 on the digital board (top board). See PAGE 29 for the location of JP-1. Refer to item (c) below for further considerations.
- b. On the IC710 (IC701) and IC720 (but NOT the IC720A), the FSK TTL OUT connection may be used in place of the SW-OUT FSK connection for direct FSK, subject to conditions listed in (c) below.
- c. Measure the voltage at the FSK input terminal to the ICOM transceiver:
 - i. If a voltage larger than 5 Volts is measured, use the SW-OUT FSK connection outlined in step (a) above.
 - ii. If no voltage is measured, use the FSK TTL OUT connection as discussed in step (b) above.
- d. Do NOT use the audio signal on pin 4 of the ICOM accessory connector for audio output connection; connect the EXT-SP terminal of the ICOM to the AF IN RX connector of the CWR685E (CWR6850) instead.
- e. When transmitting CW, place a solder short across JP-2 on the digital board (top board) as explained in PAGE 7 and PAGE 45 of the manual.
- f. If problems are experienced with transmit-receive control of the ICOM transceiver by the CWR685E (CWR6850), it may be necessary to change the value of R50 on the digital board.

R50 is located at the center rear of the circuit board and is presently a 1500 Ohm resistor. Because of the high current relays used in the ICOM transceivers, it may be necessary to replace the 1500 Ohm resistor with a 470 Ohm resistor. This has not been found to a problem in our testing of the CWR685E (CWR6850), but may be present on some units due to ICOM production variations between units.

The special considerations for the ICOM brand of HF transceivers does not seem to apply to other manufacturer's brands of transceivers with the possible exception of the choice of audio output connection to the transceiver. ALWAYS use a low-impedance audio output such as the external speaker connection (or Kenwood phone patch output) rather than a high-impedance, low-level output (such as the TR7 auxiliary output).