



# OPERATING INSTRUCTIONS

FOR

**TELEREADER MODEL CWR-880**

## FOREWORD

The TELEREADER CWR-880 you have purchased is a new model of the communication computer system which incorporates many improvements through the experiences since we released the first model of the TELEREADER.

Read through this manual to enjoy the TELEREADERs performance to the maximum for a long service life.

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## 1 – FEATURES OF THE CWR-880

1. CWR-880 is capable to decode any of the data currently used in radio communication and display them on the CRT screen and built-in LCD display while printing them out at the same time.
2. Either regular color or monochromatic television set, character display CRT or graphic display CRT can be used as the display monitor. (Display is given in monochrome in every case.)
3. Built-in printer output interface allows connection of a printer to get a hard copy.
4. Built-in CW random signal generator provides for practice in telegraph reception.
5. By directly connecting a key to the CWR-880, you can practice telegraph transmission.
6. In RTTY, the CWR-880 can be used as a test code generator because the test code generating function is provided in every mode.
7. With the built-in audio monitor circuit, the received or generated signals can be monitored at a desired volume level.

## 2 – SPECIFICATIONS

### 1) Receivable codes

CW:	Morse code of alphabet and numeral characters and symbols.
RTTY:	5-unit Baudot code, alphabetic teletype.
TOR:	7-bit international FEC and ARQ error correction system in conformity with CCIR recommendation 476.
ASCII:	7-unit ASCII code.

### 2) Signal reception speed

CW:	20 characters/min. ... 200 characters/min. (4...40 wpm), automatically adjusted.
BAUDOT:	45.5, 50, 57, 74.2 baud.
TOR:	100 baud.
ASCII:	75, 110, 300 baud.

### 3) Input

AF input:	70 mV or over with input impedance of 2.2 k $\Omega$ .
Key (TTL) input:	Key, contact input or TTL level input.

### 4) Audio frequency

CW:	Center frequency 800 Hz (750...850 Hz, continuously changeable).
RTTY:	1275...2125 Hz, continuously changeable.

## 5) **Output**

VIDEO OUT: 1 V<sub>pp</sub> composite video signal, NTSC system.  
RF OUT: UHF (591.25 MHz) NTSC system.  
Printer: Centronics compatible parallel data transmission.  
KEY OUT: Key output for transmission and test code output (Transistor switching for + keying).

## 6) **Number of characters displayed**

CRT: 40 characters × 24 lines (2-page buffer) with the operation status indication in the bottom line.  
LCD: 16 characters × 2 lines (60 -page buffer).

## 7) **Morse code, random code generator**

Alphanumeric characters  
Speed: 4...30 wpm (20 characters/min. to 150 characters /min.)

## 8) **Text code generator**

BAUDOT: Continuous output of QBF.  
ASCII: Continuous output of QBF.  
TOR: Continuous output of QBF.

Speed of test code generation

BAUDOT: 45.5, 50, 57, 74.2 baud.  
ASCII: 75, 110, 300 baud.  
TOR: 100 baud.

## 9) **Power requirement**

DC 12...14 V, 720 mA

## 10) **Overall dimensions**

W 220 mm × D 170 mm × H 50 mm

## 11) **Weight**

approx. 1.5 kg

## 12) **Accessories**

Instruction manual	1 copy
Video cable	1 pc.
Audio cable	1 pc.
Earphone plug	2 pcs.
Fuse (1 A glass tube)	1 pc.

### 3 – HOOK-UP

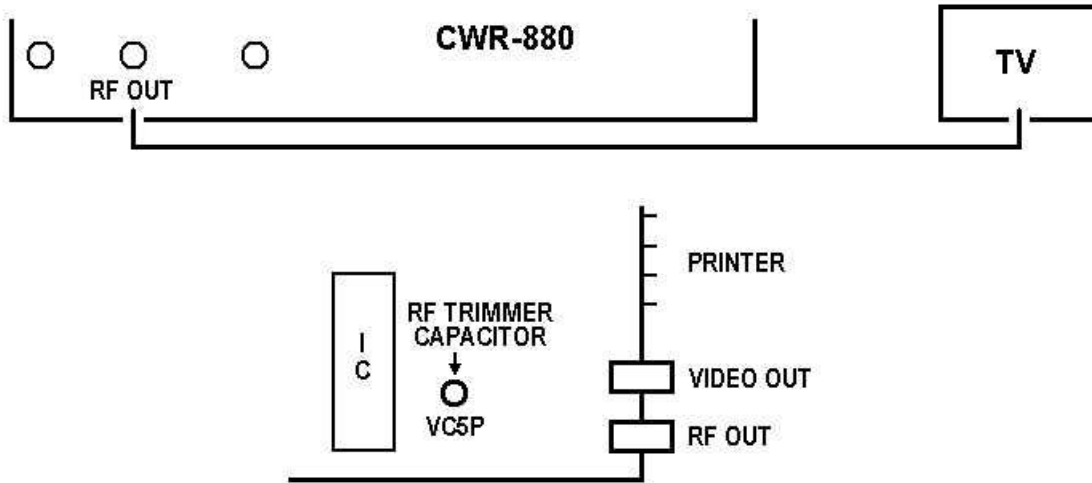
#### 1) Hooking up the power supply

After making sure that the stabilized power source provides voltage within the range from 12 V to 14 V, turn off the the power switches of the power source and the CWR-880. Then connect the red wire of the CWR-880s power cable to the positive terminal and the black wire to the negative terminal of the power source.

#### 2) Hooking up a television set

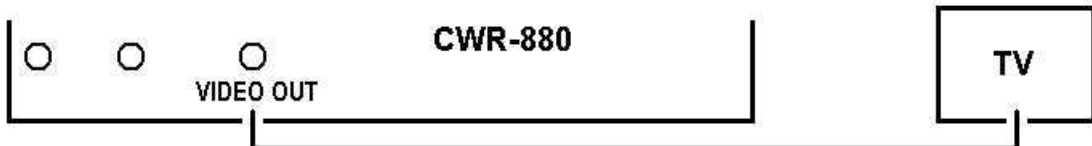
Connect the RF OUT terminal of the CWR-880 and the UHF antenna terminal of the television set with the attached video cable, after cutting off the RCA plug at one end of the cable. The RF output uses the 591.25 MHz channel of the television. If you receive a television broadcast in this channel, change the output frequency of the CWR-880 by adjusting the trimmer capacitor (VX5P) within the range from 573.25 MHz to 603.25 MHz.

While both monochromatic and color television sets can be used, display is given in monochrome in both cases.



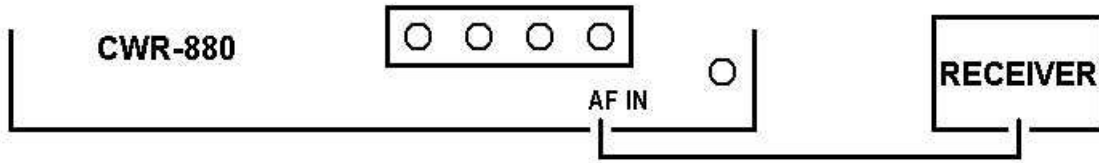
#### 3) Hooking up a display monitor

Connect the VIDEO OUT terminal of the CWR-880 and the VIDEO IN terminal of the display monitor with the attached video cable. While a color display monitor can be used, display is shown in monochrome. Display monitors of horizontal synchronization frequency other than 15.75 kHz cannot be used.



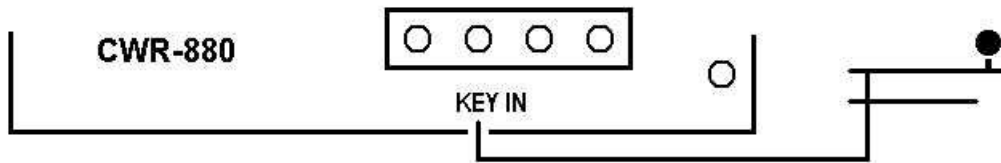
#### 4) Hooking up a receiver

The CWR-880 decodes audio signal fed from a receiver. Connect the AF IN terminal of the CWR-880 and the headphone output terminal of the receiver with the attached audio cable.



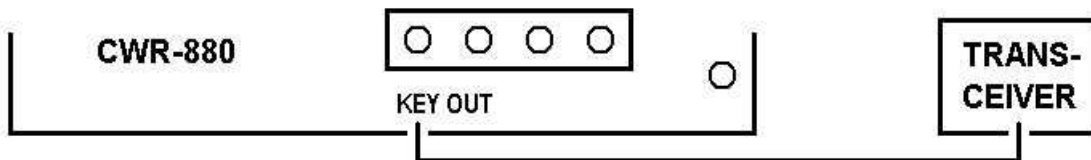
#### 5) Hooking up key

Connect the KEY IN terminal of the CWR-880 and the contact terminal of the key with the attached earphone plug. Prepare a shielded wire or a 2-core cable for the connection by yourself.



#### 6) Connection for KEY OUT signal

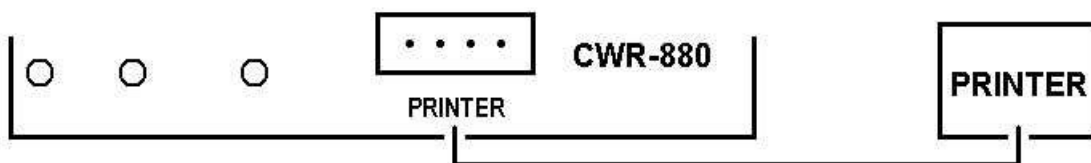
Connect the KEY OUT terminal of the CWR-880 and the KEY terminal of the transceiver with the attached earphone plug. Prepare a shielded wire or a 2-core cable for the connection.



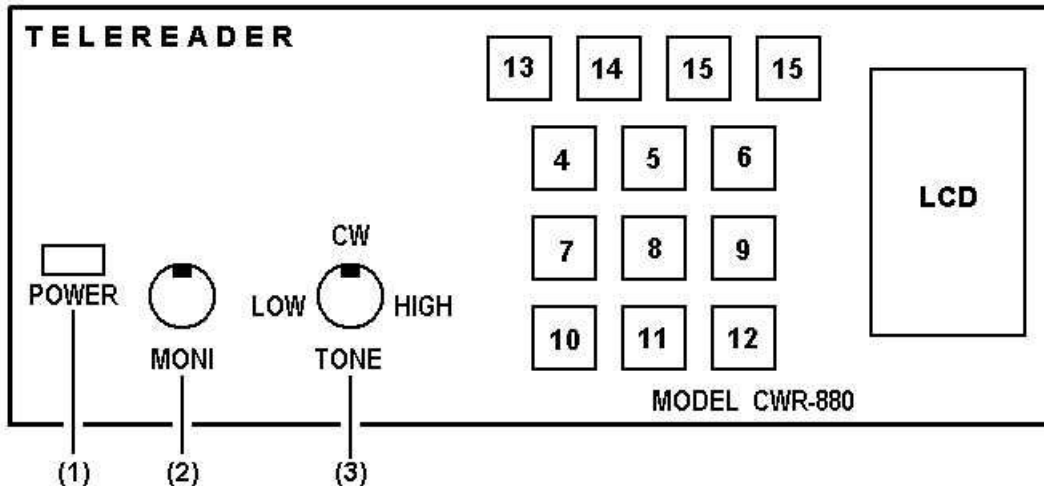
#### 7) Hooking up a printer

Centronics- compatible printer of parallel interface can be used with the CWR-880. This means that the CWR-880 can use almost all printers which are used with personal computers. A printer is to be connected with the printer cable available as an optional accessory.

Since LF is the only code for line feed on the CWR-880, set up the printer to enable printing with line feed.



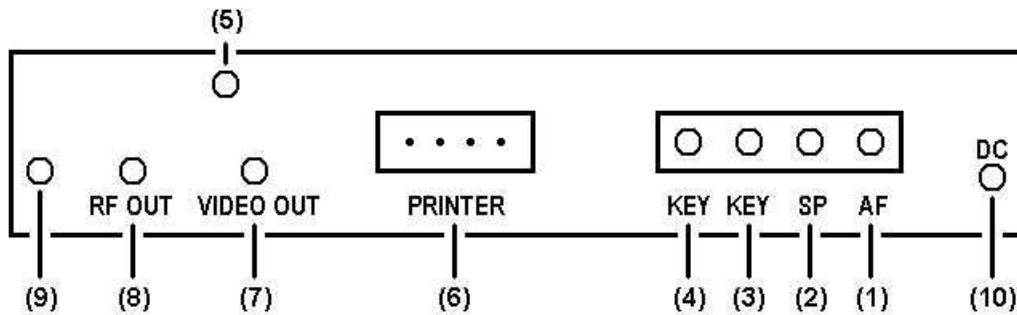
## 4 – FRONT PANEL CONTROLS



- 1) POWER: Power switch
  - 2) MONI: Volume adjustment of audio monitor
  - 3) TONE: Frequency adjustment of input audio signal  
 CW: 75...850 Hz, continuously changeable  
 RTTY: 1275...2125 Hz, continuously changeable
  - 4) CW/RTTY: CW (telegraph) / RTTY (radio teletype) selector pushbutton switch
  - 5) MODE: Operation mode selector pushbutton  
 In CW operation: Alphabetical letters  
 In RTTY operation: Baudot → TOR → ASCII
  - 6) SPEED: Baudot 45 → 50 → 57 → 75  
 TOR Synchronized reset  
 ASCII 110 → 300 → 75
  - 7) USOS  
 AUTO In RTTY operation: Unshift-on-space function pushbutton
  - 8) NOR  
 REV Input polarity selector pushbutton in RTTY operation: Normal → Reverse
  - 9) LTR  
 FIG Letter case changeover pushbutton in RTTY operation: LTR → FIG
  - 10) GEN: CW operation: Starts random code generation. ON → OFF
  - 11) UP: Scroll up the screen
  - 12) DWN: Scroll down the screen
- (UP and DWN switches effects continuous scrolling when kept being pressed.)

- 13) POWER    Power indicator LED
- 14) CW        Telegraph synchronization indicator LED
- 15) MARK     RTTY synchronization indicator LED
- SPACE

### **5 – CONNECTION ON REAR PANEL**



- 1) AF IN:    Input terminal for audio signal.
- 2) EXT SP:    Output terminal for external speaker (Connected to AF IN internally.).
- 3) KEY IN:    CW operation: Input terminal for key.  
RTTY operation: Input terminal for external demodulator signal in TTL level.
- 4) KEY OUT:    CW operation: Output terminal for the key signal to a transceiver. Random code generated is also provided on this terminal.  
RTTY operation: Output terminal for test code.
- 5) LCD:        Contrast adjust knob for LCD.
- 6) PRINTER:    Output terminal for printer.
- 7) VIDEO OUT:  
    Output terminal for display monitor.
- 8) RF OUT:    Output terminal for a domestic television set.
- 9) GROUND:    Grounding terminal.
- 10) Red & black cable:  
    Power cable to connect an external stabilized power source of 12 VDC to 14 VDC, 1 A or over.

## 6 – DECODING WHEN RECEIVING TELEGRAPH

- 1) Set the desired reception sound volume with the AF control of the receiver.
- 2) If your receiver set is equipped with a CW filter, make the CW filter effective.
- 3) If your receiver is equipped with IF shift control, pass band tuner or notch filter, set the peak reception volume at the frequency of 800 Hz.
- 4) Set the TONE control knob of the CWR-880 at the center position and tune the receiver to receive 800 Hz signal. CW LED will flicker in synchronization with the reception sound and decoded characters will be shown on the display monitor. If the CW LED does not flicker in synchronization with the reception sound, decoding is not done normally; tune the receiver again or make fine adjustment with the TONE knob.

## 7 – DECODING WHEN RECEIVING RTTY

### ● Teletype for amateur radio station

- 1) When the CW/RTTY selector of the CWR-880 is set to RTTY, a message "BAUDOT SPEED 45b NOR" appears on the display, which shows that the reception with an amateur radio station is enabled. Place the TONE VR knob at the position "HIGH" and set the receiver in LSB or FSK mode. Turn the receiver tuning dial gradually from the position of lower beat to that of higher beat. First the MARK LED flickers. Tuning the dial further to higher position (shifting by 170 Hz), the MARK LED and SPACE LED will flicker with correct decoding started. Flickering of only the SPACE LED indicates improper tuning. In such a case tune the receiver again or adjust the TONE VR finely to make the MARK LED also flicker.
- 2) When the received characters are changed to numerical figures or symbols due to noise or other interference during reception of ordinary alphabetical characters, set the USOS switch in ON position and normal alphabet will be obtained when space signal is received.
- 3) LTR/FIG switch is to changeover between alphabet and numeral every time it is pressed. When alphabet is changed to numeral due to noise or other interference, press this switch to obtain the normal decoding.
- 4) Set the NOR/REV switch to REV to receive signals of reverse shift. Reverse shift is obtained also when receiving from KEY IN (TTL IN).

### ● Teletype in commercial station

While setting procedures for teletype in commercial station are almost the same as those of amateur station, the receiver mode is to be set to USB. As the transmission speed of 50 baud is widely used, set the SPEED to 50b. Since some stations transmit at 57 or 75 baud, try these speeds if normal decoding is not obtained. Signals from many unidentified stations cannot be decoded at all. Because signals from commercial stations have wide shift width, tuning is easier than amateur station.

### ● Teletype of TOR system

TOR system teletype is equipped with automatic error correction function which corrects a mis-received character automatically. Intermittent reception sound like "chee chee chee" is given in

ARQ operation and rapid continuous reception sound at 100b is given in FEC operation. The reception speed is fixed to 100b by pressing the MODE switch to select TOR.

The following status indications are shown on the display:

WAIT: Standby for signal reception where all signals and noises are ignored until TOR signal is received.

IDLE: When a TOR signal is received and tuned with the CWR-880, IDLE is displayed instead of WAIT.

TRAF: When a message is received in IDLE status, the indication changes from IDLE to TRAF and decoding is started.

ARQ and FEC are discriminated in the CWR-880 automatically and ARQ or FEC is indicated.

AMTOR used by amateur radio stations are conformity with international coding system and synchronization resetting can be done with the SPEED button.

- In ASCII and JIS codes, which are rarely used in short wave and, 110 baud is usually adopted. The demodulator incorporated in the CWR-880 can match at a speed of up to 110 baud. For signal reception at a speed over 110 baud, use a high speed modem with its output signal fed to the KEY IN (TTL IN) terminal.

## **8 – PROCEDURE FOR PRACTICE OF TELEGRAPH TRANSMISSION AND RECEPTION**

- 1) Turn on the power switch and a message "MORSE ENG" will appear.
- 2) Connect a key to the KEY IN (TTL IN) terminal of the CWR-880 and strike Morse code. The decoded characters will be shown on the display.
- 3) Strike the key correctly so that correct characters are displayed, for a signal not defined in the Morse code system cannot be decoded.

## **9 – PRACTICE OF TELEGRAPH RANDOM CODE RECEPTION**

- 1) Select "MORSE ENG" mode and press GENE button. Transmission sound will be given followed by the display of character corresponding to the generated code. Five characters are sent as one block.
- 2) Every time the SPEED switch is pressed, the speed is increased by 1 wpm from 4 wpm to 30 wpm. 4 wpm comes next to 30 wpm.
- 3) With a printer connected, the displayed characters can be continuously printed out.
- 4) Press the GEN button again to stop the random code generation.

NOTE: Speed can be converted from wpm to characters/min. by multiplying wpm by 5.

## 10 – TEST CODE GENERATING PROCEDURE

- 1) Set the CW/RTTY selector to RTTY.
- 2) Set the MODE button to the desired mode.
- 3) Press the GEN button. The audio monitor will give a transmission sound and, at the same time, a test code will be provided at the KEY OUT terminal.
- 4) The speed can be changed by pressing the SPEED button.
- 5) In TOR mode, ARQ or FEC is selected by pressing the USOS/AUTO switch.
- 6) Press the GEN button again to stop the test code generation.

## 11 – TOR

The CWR-880 is equipped with TOR mode decoder function which is not widely known. Here the outline of the TOR mode and the operating procedure will be explained.

TOR is a communication system in conformity with the CCIR recommendation 476-2 which was adopted in the second general meeting of CCIR in 1970 for the purpose of improving the maritime communication, comprising two fundamental communication modes, ARQ (Automatic Request for Repetition) and FEC (Forward Error Correction).

ARQ (Automatic Request for Repetition)

ARQ is used mainly in individual communication between a coast station and a ship station. In ARQ mode, if an error is detected in the received characters, request for retransmission is sent automatically until the correct character is received, ensuring virtually error-free transmission. In this mode, however, only one receiving station is allowed, rendering the communication privacy. (But the CWR-880 is capable of decoding the communication between two stations by means of a special method.)

FEC (Forward Error Correction)

FEC is a one-way error correction system of time diversity feature which transmits the same character twice. An erroneous character which cannot be corrected is shown by a space. This system is suited to the transmission of a same message to a number of stations, such as broadcast transmission.

Amateur radio station

(Since AMTOR for amateur stations conforms to international standard, an amateur station can receive with international TOR system.)

3.5 MHz band:	Around 3.574 MHz, around 3.630 MHz
7 MHz band:	7.075 MHz – 7.095 MHz
10 MHz band:	Around 10.145 MHz
14 MHz band:	14.070 MHz – 14.080 MHz
21 MHz band:	Around 21.075 MHz
28 MHz band:	Around 28.705 MHz