RTTYCW INSTRUCTIONS

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RTTYCW is an advanced amateur radio teletype and CW receive and transmit program. Despite these features a special effort has been made to include as much human factors considerations as possible. The program is written in 6809 machine language code and will run on any TRS-80C with 16K or more memory. The program gains control of the computer, and does not allow the use of other programs and Basic. The program requires the use of two interfaces for its operation. If you wish to run only RTTY construct only this interface at this time, more on this later. If you wish to upgrade your machine to 32K instructions are provided. This upgrade allows a considerable improvement in buffer sizes and is recommended. Since you will probably now want to load the casette tape, lets load it and discuss how to use the program.

PROGRAM LOADING

Since the program is written in machine language you must use the Basic CLOADM command to load the program. Place the tape in your recorder and press play. Type CLOADM then hit ENTER you will see a S on on the top left hand corner of the screen. The display on the screen will inform you that the program will load automatically and execute. As it loads the name of the program RTTYCW will be displayed. The first display on the screen will ask for a CW ID to be entered. This ID is used for transmit when the RTTY or CW program option is selected. After this ID is selected the main option menu will appear on the screen. Lets discuss these options.

PROGRAM OPERATION

Prior to discussing the program options you should understand how the buffers are organized. The program has three types of buffers: station, keyboard, and receive. The station buffers consist of four 254 byte buffers. The keyboard buffer consists of one buffer up to 12K bytes in size on a 32K TRS-80C. The receive buffer is used to contain all the received RTTY and CW. This buffer also is 12K in size on a 32K TRS-80C. One feature of RTTYCW is that the buffer sizes are displayed on the fourth line from the bottom of the screen in reverse video. The receive buffer is identified by REC BUF >(5 digits decimal) and the Keyboard buffer with XMIT BUF >(5 digits decimal). You will see the numbers change as characters are received or entered into the buffers. All characters received are automatically entered into the receive buffer. The BREAK key can pressed to reset

the keyboard and receive buffers.

The CLEAR key can be used to escape from any sequence. If you do not like what is happening and all else fails hit the CLEAR key.

Lets now discuss each of the options on the main menu:

A Audio- This option selects the speaker audio if you wish to output CW on the TV set. This feature is a convenient option if you wish to monitor what you are transmitting. The defalt option is audio on.

B Automatic Carriage Return(CR)- This option allows you to transmit on RTTY an automatic carriage line feed after every 58th character transmitted. This feature is useful if you are transmitting RTTY and it is being received by a hard copy printer like a Model 15. When the option is selected the program will ask for a Y or N response. Y means yes and N means no. The defalt option is automatic carriage return.

C CW- This option selects the CW split screen receive and transmit option. Its operation is exactly the same as RTTY with the exception of the RY buffer. When you select this option a sub menu appears. When this is done you will now receive CW. The CW speed is automaticaly adjusted for speed and self corrects from a very low rate to about 60WPM. Like all software receive programs hand keying is not received well. The computer algorithm used with this program assumes that a ratio of 1 to 3 is for the dot to dash duration. Most hand keys or bugs do not meet this criteria, therefore, copy may not be very reliable. An added feature is that the receive speed is placed on the upper left hand corner of the screen. The first receive speed is assumed to be 85 WPM. As a signal is received the speed will be adjusted to the correct value. Lets assume you are now receiving CW and wish to use use some of the program options let explore how they work:

Clear- This key allows you to terminate reception and return to the primairy menu. On CW this step may allow you to re-sync the receiving speed with a new station.

Break- This key allows you to reset the buffer pointers to the start of the keyboard and receive buffers. This key will allow you to start all over again on the use of these buffers.

Up Arrow- This key will place the program into the transmit mode and transmit the last entry in the keyboard

buffer. The last portion of the buffers is the portion entered since the last transmission.

Shift and up arrow- These keys allow the transmission of the entire keyboard buffer from all transmissions. Note that the shift and up arrow keys must be pressed simutaneously.

Right hand arrow- Transmit the last portion of the receive buffer, received since the last transmission.

Shift and right hand arrow- Transmit the entire receive buffer.

Shift and @ key- Transmit the station buffers. A secondary menu will appear on the screen asking for a buffers Ø through 3. The number of this buffer should be entered for transmission. During this transmission the clear key and can be struck for early termination.

Shift and down arrow- Allows the transmission of 32 RY's on RTTY. This option does not function on the CW routines.

Down Arrow- Will allow the transmission of the CW ID entered when the program was first initiated at the speed selected by the speed option. The defalt option is approximately 13 WPM.

D Automatic Letters on Space- This option is used to automaticaly select a letter shift after every space encountered. This option is only used on baudot RTTY. The defalt setting is off.

E Enter Station Buffers- The program will ask for the buffer number from zero to three. When this number is entered start typing the message to be entered. As soon as 254 characters are entered or the CLEAR key is struck the entry will be terminated.

L Load Buffers- This option allows you to load buffers from tape. When selected a secondary menu will appear on the screen. This menu will ask for keyboard buffer(K), or station buffers(Ø-3). The program will also ask for a file name. This is the name placed on the tape when it was saved. The name is up to eight characters in length. If you do not enter a name and hit the ENTER key the program will load the next file on tape in that buffer. Keyboard buffers are loaded in a similar manner. If you wish to load a Basic Program for transmission over the air use the following procedure. The Basic program must be saved by use of the CSAVE "name",A option. Programs saved by Basic without the ,A cannot be loaded. 1. Load the Basic

Program into the keyboard buffer by the above procedure. 2. You can then make contact over the air and transmit as normal. When you transmit the keyboard buffer use the up arrow. When you are ready to transmit the Basic program use the shift up arrow and the program will be transmitted over the air.

M Code Practice- This selection allows the transmission of groups of five characters on CW. If the audio option has been selected a tone will also be outputted on the speaker of the TV set. The rate at which the code is transmitted is controlled by the program speed option which will be discussed later. If the speed option was not selected when the program was first brought up the speed will assumed to be 13 WPM.

P Print Buffers- This option allows the TRS-80C to print buffers in memory. For example if you have been copying W1AW for one hour and would like a hard copy of the transmission. Go to the main menu and select the P option. The program will ask for the buffer name. In this case select the receive buffer. You must have provisions on your hardware to switch the RS-232 port over to your printer in this case. The buffer will be outputted on the printer with 7 or 8 bit ASCII code (no parity). If Tandy Basic Ver 1.0 is used the output is 7 bit ASCII. If Basic Ver 1.1 is used the output will be 8 bit ASCII (no parity). The baud rate is assumed to be 600 baud unless otherwise changed. This baud rate is menu selected by the speed option.

R RTTY- This option allows you to receive and transmiitt RTTY at the rates specified in the speed option. Its operation is the same as CW with only one exception the RY buffer. To use this feature:

Shift and down arrow- These keys allow you to transmit 32 RY's on RTTY

S Speed- This option is a menu which is self prompting, and allows the selection of, RTTY, CW and Printer baud rates and speeds. When the program is first executed without the selection of this option the defalt rates for CW is 13WPM, RTTY 60 WPM baudot, and the Printer 600 Baud. When executed a menu appears on the screen. The RTTY baud rates can be selected by options A through I. The CW speed is in WPM. For example if you wish to send 20WPM type a 20. If you want 5WPM type a 5 then hit the ENTER key. To selecte the printer baud rates options J through M will select the correct speed.

T Save Buffers- When selected this option displays a menu for the selection of buffers to be saved. To use this place

a tape in the recorder and press the record and play buttons on the recorder. Select the buffer to be saved: receive (R), keyboard (K), station (Ø to 3). The program will next ask for a name, type in up to eight characters and then hit enter. The buffer will be placed on tape with the name you have specified. If you wish to save a Basic program on tape for later transmission over ham radio, bring up Basic and load the program. Save the program on tape by: CSAVE "NAME",A (ENTER).This will place the program on tape in an ASCII format. You can now load it directly into RTTYCW with no additional changes.

HARDWARE INTERFACE

The RTTYCW program must be used in conjunction with two hardware interfaces. These interfaces are used to remove noise from the signal, and to provide an on/off condition to the computer.

Many types of interfaces are possible, both commerical and home brew. In all cases the interfacing is made through the RS-232 connector on the rear of the computer.

The RS-232 on the TRS-8ØC provides an output of plus and minus 8 volts and will accept an input of the same voltage levels. The RS-232 input will also accept levels of standard TTL. For example a low level of Ø volts will be acceptable for a low level and any voltage above 2.4 volts will be acceptable for a high voltage.

RTTY INTERFACE

Attached is the schematic of an interface which functions well with the TRS-8ØC. This circuit is a enhanced revision of the one published in QST Magazine December 1981. During 1982 a PC board will be available for this circuit with additional features and the CW interfaces. In addition to the basic circuit switching through IC's will be provided to allow the operation to be switched between the various modes with a front panel switch. For more information send a SASE to:

Dynamic Specialities
P.O. Box 2Ø9Ø3
San Jose, Calif 95160

Another interface which functions well is the Flesher interfaces. The DM-17Ø interface is a RTTY demodulator which can be used with the TRS-8ØC. This interface can be purchased from the Flesher Corp assembled or in kit form. The price of the kit is $47.95 plus 1 percent shipping. The unit is a single card pluggable into a connector. Some very

minor changes are suggested to attach this card to the TRS-80C. Some demodulators do have problems when you try and copy 110 Baud ASCII. The bandwith of the interface is optomized for lower rates. To increase the bandwdth for ASCII insure: C19,C20,C23 are .005MFD and C22,C24 are .22MF mylar caps. Also insure that R42 is 24K and R44 is 12K. Some units may incorporate these changes others may have to be modified. The AFSK modulator can be assembled from the attached schematic or purchased from Flesher Corp, 507 Jackson, P.O. Box 976, Topeka, Kansas 66601 Ph: (913) 234-0198. The Flesher modulator is called the FS-1 and its price kit form is $31.95 plus 1 per cent shipping. Another unit if the TU-170. This is a complete TU unit. It contains a RTTY modulator and demodulator and comes in an attractive box with power supply. The price of this unit is $169.95 (kit). Make sure you tell Flesher it is to be used with the TRS-80C. They will either add or provide you with a schematic to provide a RS-232 interface.

Another interface which is adaptable to the TRS-80C is the RTTY demodulator from IRL. This Interface provides more features than the Flesher equipment, in that shifts of 170 HZ, 425 Hz and 850 Hz are possible. The interfacing to these units are through a built in RS-232 interface. A meter reading and LED read out provide accurate tuning of the input signal. The electronics in these units provide a sophisticated active filter, and special limiter circuit to reduce QRM due to noise. These IRL demodulators are available assembled and tested and are available in two models the FSK-1000 and FSK-500. The costs of these units are: $498 and $249. Both units are enclosed in an attractive enclousure which should fit into any ham shack. For more information contact: IRL, 700 Taylor Rd., Columbus, Ohio 43230. (814) 884-2464.

CW INTERFACE

This interface first appeared in QST magazine as an input interface for a hardware CW receiver. The circuit was later published in an Australian Magazine "Amateur Radio" with modification. Its construction and operation is simple, the only critical adjustment is the threshold. Connect up the circuit when constructed to your ham radio receiver. Tune in a station and look at the red LED. Adjust it till it never turns on. Then turn the pot just till the LED follows the on off conditions of the CW signal. This is the correct point to leave the pot. You will find copy on hand keyed CW not to be very good copy. But when automatic keyers and other computers are used the copy will be much better. Do not overdrive this interface from the receiver audio. Keep the gain as low as possible on the receiver.

A slightly modified version of this interface will be available

from Dynamic Specialities in 1982.

An assembled CW interface is available from MFJ Enteprises, P.O. Box 494, Mississippi State, MS 39762. Reports from customers have indicated that the performance is excellent. On transmit the RS-232 output from the TRS-80C must be inverted. The model number of this interface is MFJ-1200-CW.

MEMORY UPGRADE (32)

This upgrade does not allow the video display page to be moved to the upper 16K of the 32K. But if you follow a few percautions you should have no problems. 1. Install the new 16K or RAM chips for at least a week before upgradeing you machine to insure you do not have a preliminary memory failure. 2. Run the memory Tandy diagonstic on the both sets of memory before the update. 3. When you solder the chips in a piggy back fashion, short all the leads together by aluminum foil or black insulating foam. 4. Use a small soldering iron of about 40 watts or less. The extra 4116 RAM chips are available from many sources. Currently prices run mail order $15 for 8 chips, with a speed of 250 nano seconds. You will find the update quite easy and if you use care it should work the first time.

PROGRAM CONSIDERATIONS

This program takes control of the TRS-80C and can only be removed from the computer by powering it down. Program patches or program duplication are not possible by normal means. These features were placed in the program to make mass unauthorized duplication of the program difficult. If you have any special requests along these lines please contact me. Any reasonable request will be considered. However, the price of the program was made intentionally low enough, that if you neighbor wants a copy send him my way.

The program timings are controlled by program interrupts at a horizontal sync frequency. This scheme provides very accurate timings and and changes should not have to be made. The program counts the number of horizontal sync pulses and from this information determines how long to make each pulse.

The reset button on the rear of the computer will have no effect on the program. When it is pushed the program will return to the main menu and reset all buffers. So use care if you do this you might lose all your data in the buffers.

The buffer sizes in this program are: Keyboard 4K with a 16K TRS-80C 12K with a 32K TRS-80C, Receive 4K with a 16K and 12K with a 32K. For the price of eight 4116 chips you can have a three times improvement in buffer space.

Basic programs received over ham radio can be loaded by Basic as ASCII files. This is accomplished by: CLOAD "NAME" (ENTER KEY). You may have to correct some transmission errors once the program is loaded. But once these errors have been corrected re-save it on tape again.

If you use the program for Video Text select the 300 Baud ASCII mode. This program will operate as a half duplex ASCII terminal. This may present some problems. But the program is primairly intented for Amateur Radio use and performance in this mode is not guaranteed.

A special 50 Hz version of this program will be made available for TRS-80C unit purchased out of the USA. The horizontal frequency of these units are different from US versions.

PROBLEMS ?

If you have any problems contact Clay Abrams Software by mail. I do not have a listed telephone number at this time. However, I can arrange a sked on ham radio to discuss the problem or concern. However, I would perfer all comunications by mail. I try and answer all letter the day they are received. Good luck with your new program and I hope to catch you over the air.

73's Clay Abrams K6AEP