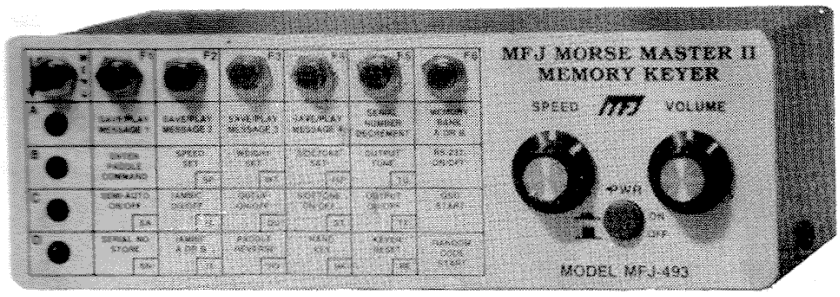
Super Menu Driven Memory Keyer™ / Keyboard

Model MFJ-493



The MFJ-493 *Super Menu Driven Memory Keyer / Keyboard* keys CW from a paddle, a keyboard and from a serial compter interface. All code parameters are changed with an easy to use menu driven interface. The MFJ-493 has eight 4,000 character message memories which can be loaded by paddle, keyboard or from a computer with a terminal program. The MFJ-493 *Super Menu Driven Memory Keyer / Keyboard*™ can repeat messages continuously, insert timed pauses within messages, insert an auto-incrementing serial number, have messages call other messages or insert command mode commands into a message with embedded message commands.

The MFJ-493 has controls for speed and volume on the front unit. The paddle jack connects to any iambic or single lever (dual contact) key paddle. The keyboard port allows use of an optinal keyboard for keyboard keying operation. The serial interface allows connection of most RS-232 compatible computers. The MFJ-493 has both Direct and Grid-Block outputs and a port for an optional remote control.

INSTRUCTION MANUAL

CAUTION: Read All Instructions Before Operating Equipment

MFJ ENTERPRISES, INC.

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VERSION 1.0

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o 15.838 Class B computing device: Information to user.

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential Installation. However, there is no guarantee that interference will not occur in a particular Installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measure:

Reorient the receiving antenna
Relocate the Computer with respect to the receiver
Move the Computer away from the receiver
Plug the Computer into a different outlet so that Computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems".

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

Warning- When connecting this device to your Computer, shielded interface cables must be used.

Remark: Blue written text is not in the official manual!

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MFJ-493
Super *Menu Driven Memory Keyer / Keyboard*™

Specification

Memories:
Eight memories of 4000 characters each. Saved by paddle, keyboard or uploaded from a Computer.

Keyboard Keyer:
Add an optional keyboard to make the MFJ-493 a keyboard keyer.

Keyer Terminal:
Plug your Computer into the MFJ-493's serial port to talk to the keyer. Upload files to memory, change the keyer configuration, or use the online manual for easy Operation.

Morse Code Trainer:
Random code generator with 5 character or random 1-8 character length words. Random characters are selectable from alphabetic, numeric, or punctuation sets or specific 6 character sets. Word recognition mode allows practice of many common words used in amateur radio.

FCC Exam Simulator:
Sends random QSOs, just like an FCC code test.

QSO Simulator:
Simulate "real" contacts with the keyer to practice on-the-air Operation by calling or answering CQ.

Embedded Commands:
Auto-incrementing serial numbers, Timed pauses up to 99 minutes 99 seconds, Message loop, Linked messages and Message insertion.

Adjustable Code:
Code speed is variable from 5 to 100 WPM, weight varies from 5 to 95 %.

Parameter Save:
Message memory and keyer parameters are saved with a lithium battery.

Keying Modes:
Iambic On/Off, Iambic A or Iambic B, Hand Key (straight key), Semi Auto (bug), and Reverse Paddle modes are user selectable.

Positive or Negative Key Output:
Supports both positive and negative keyed radios.

Connections

Power
A 12 VDC 500 milliamp power supply should be used with the MFJ-493. The power jack accepts a 2.1 mm coaxial plug with the center conductor positive. An optional DC supply, the MFJ-1315, is available from MFJ. Connect your MFJ-1315 Power Adapter or compatible DC supply (coaxial line with shield ground) into the power jack on the MFJ-493.

Keying
This unit supports both positive and negative keyed radios. Connect a standard shielded RCA cable between your radio key input and to the MFJ-493's Direct output for positive keyed radios (most solid state radios) or to the Grid-Block output for negative keyed radios (most radios with tube finals.)

Paddle
An Iambic or single lever (dual contact) paddle connects to the stereo phone jack with a shielded cable through the back of the unit. ***Note: The features of this unit are not usable with a straight key.*** Connect the dot wire of the paddle to the ring on the plug and the dash wire to the center conductor. The shield on the plug should be attached to the paddle ground.

Keyboard
The keyboard port accepts most standard IBM-AT style keyboards. The MFJ-551 keyboard is guaranteed to be fully compatible with the keyer and available for $39.95 from MFJ. ***Switching any keyboard to "X" or "XT "mode may damage both the keyboard and the keyer.***

Keyer Terminal
The serial port on the back of the unit accepts a DB-9 plug. Only three pins are used: pin 2, pin 3, and pin 5. Pin 2 is the receive data line, pin 3 is the transmit data line, and pin 5 is common. Connect pin 2 to the transmit data line on your computer. Connect pin 3 to your computer's receive data line. Connect pin 5 to your computer's RS-232 port ground. To connect an MFJ-493 to an IBM-PC compatible you can order a cable from MFJ for $12.95. Order MFJ-5409 for connection to a 9 pin serial port or MFJ-5425 for connection to a 25 pin serial port. Your computer will need a terminal program to talk to the keyer. Set your terminal program to 1200 baud, 8 data bits, no parity and 1 stop bit, xOn/xOff flow control.

Remote
The last port in the back of the unit is for the optional remote control. The remote control gives you remote access to the keyer menu if the main unit is out of reach. The remote has each of the menu buttons and mounts on your Bencher type or MFJ-564 Paddle. The remote connector combines both the remote functions and the paddle jack so that only one cable from the paddle to the keyer is needed.

Basic Operation

The *Super Menu Driven Memory Keyer™/ Keyboard* is simple to operate. The pushbutton marked PWR controls power to the unit. After turning the unit on, the keyer will light the front panel LEDs sequentially and send the characters "ON" in Morse Code using the sidetone speaker. This tells you the MFJ-493 is ready for operation.

Start sending with a paddle or keyboard. Adjust the volume and speed to your preference. If the speed is still too fast or too slow, adjust the range of the speed knob using the Speed Set feature. See Menu Operation.

All characters or code sent by the user are played on the sidetone speaker This allows the user to hear what he is keying, typing, or sending with a computer.

Only when the keyer is used with a paddle is the code sent as soon as it is keyed. When using a keyboard or keyer terminal, you may type ahead of the code that is being transmitted. This allows you to enter words and phrases faster than the transmitted code. This permits smoother code with less pauses because you can fix misspelled words and think of the right phrase to use while your previous sentence is being sent. ***Note:*** Holding a keyboard key down continues to produce that character.

When you are entering commands or saving memories no code is sent to the key outputs and your radio. This keeps all erroneous code off of the air.

Keyer Reset

Each time the keyer is turned off, the microprocessor powers down into a sleep mode. This allows all memories and configurations to remain in memory until the unit is turned on again. If the keyer does not retain its settings see the section on the lithium battery.

If you want to clear the keyer's memory you can do a reset. To reset the keyer, hold down the MENU key and turn the keyer "ON". This resets all settings to the factory defaults:

- All memory messages are cleared.
- Speed set to 20 WPM.
- Weight set to 50 % duty cycle.
- Sidetone frequency set to 2000 Hz.
- Iambic A mode selected.
- Queue mode off.
- Break mode off.
- Output enabled.

Menu Operation

The MFJ-493 menu system consists of a button marked MENU, six menu buttons marked F1 - F6, and four menu LEDs marked A-D. Pressing the MENU button changes the menu level. The keyer will sound a key click and light the Menu LED of the new level. The row of boxes beside that LED now contains the functions of buttons F1 - F6.

For example, to enable the Tune (key down) function, look for the box marked Output Tune on the front panel. It is found on Menu B under the column F5. Press the MENU key until the LED marked B lights up. Then press the F5 button. The keyer will respond by entering the Tune mode. Squeeze the paddles or press F5 to exit that mode.

Note: If you are using a single lever (dual-contact) paddle you must always press a Menu button (F1 - F6) instead of squeezing the paddles together. The iambic modes will not work with a single lever paddle.

You will notice that Menu A has an LED that is lit either red or green. Menu A accesses both banks of memories. The banks are switched with Bank Select (F6). The red LED indicates memories (1 - 4) and the green LED indicates memories (5 - 8). F5 and F6 remain Serial Number Decrement and Bank Switch on both levels

Paddle Operation

Plug an iambic or single lever (dual contact) paddle into the paddle jack of the MFJ-493. Begin sending code using the paddles. If you would like to change speed, sidetone, or weight see the sections pertaining to the commands.

The iambic paddle has a unique feature that the single lever paddle does not have. Notice that the two paddles are independent and can be squeezed together. Both the dot and dash contacts touch the chassis, therefore ground. The MFJ-493 senses this condition and uses it as a separate keying state. When you squeeze the paddles the keyer will automatically alternate sending code elements, dashes and dots. This is called iambic keying.

Iambic keying has two modes: A and B. In iambic A mode the keyer will stop sending as soon as you release the paddles. In iambic B mode an extra element, either dot or dash is sent after the paddle is released.

Keyboard Operation

When you plug in a standard IBM style AT keyboard, your keyer becomes a powerful keyboard keyer. The MFJ-493 uses the alphanumeric keys (A - Z 0 - 9), the function keys (F1 - F12) the space bar, the arrow keys, and the punctuation characters that have Morse equivalents. Prosigns have been assigned to some of the other punctuation characters for quick operation. See the table on page 19.

The operation of the keyboard is simple. Begin typing on the keyboard. Typed characters are sent to key outputs at the code speed of the keyer. If a typing mistake occurs, the backspace key can be pressed to erase the last character typed before it is sent. If you want to "flush" all the text that has not yet been sent press Esc.

When typing speed is greater than the WPM code speed, characters will begin to fill a type ahead buffer. The code sent to the radio and over the sidetone speaker will lag behind the typing of each character. Most of the time this will not cause a problem. Only for very fast typists that send slow code will the type ahead buffer fill significantly. The maximum size of the type ahead buffer is 80 characters. When the buffer fills to 70 characters the sidetone will lower. This is a signal to slow typing speed because when the buffer fills to 80 characters each new keypress will be lost. It is best to never type much faster than your code speed.

If you want to send a special prosign you can use the Alt key. Press and hold Alt, press and release the first character of the prosign, press and release the second character of the prosign, release Alt. This will remove the intercharacter space between two letters making it a prosign. Any prosign can be made this way, even special local prosigns.

Keyboard Function Keys

Press a function key F1 - F8 to play a saved message. To record a message, press and hold the Alt key, press a function key (F1 - F8) and release Alt. The keyer will respond with "GO". Now a message can be typed into memory. Use the embedded memory commands the same way as on a paddle.

The F9 through F12 keys are used for other commands.

The F9 key enters the command mode. Enter a two character command just like in Menu Operation.

The F10 key enters speed set mode. Change speed with the left and right arrows or type in the two digit speed in WPM. Press Esc to exit.

The F11 key engages the output tune. The 493 will key to tune your station. Press Esc to exit.

The F12 key decrements the serial number. The keyer will echo a "D" for each number decremented.

Keyer Terminal Operation

The Keyer Terminal mode allows a computer to talk to your MFJ-493. All code sent from the paddle and keyboard is echoed to the Keyer Terminal. All commands are accessible through the Keyer Terminal.

Your computer will need a terminal program to talk to the keyer. The program should be capable of uploading and downloading ASCII text files. Any good commercial or freeware terminal program should be satisfactory for use with this keyer. If you would like to customize your keyer terminal you can write your own terminal program for your computer as a learning experience.

After you have connected the MFJ-493 to the serial port of your computer with the correct cable (see the section on connections) turn on your computer and load your terminal program. Set the baud rate to 1200 and set data bits to 8, parity to none, and stop bits to 1. Now turn on your MFJ-493. You should see a sign on message. A correct sign on message will show that everything is working properly between the computer and keyer. If you do not get a sign on message recheck your terminal program and serial port cable pin configurations. If you get extra linefeeds you may need to set your terminal program to not add linefeed to carriage returns.

After the sign on message you are ready to send with the keyer. All characters sent to the keyer must be in uppercase to be sent over the air. Lowercase is reserved for keyer commands. Turn caps lock on and type in a message.

To make a special prosign with the keyer terminal, begin and must end with the prosign with "\". If you leave off the last slash all the intercharacter spacing will be removed. Example: to make AA, type in \AA\ .

Configuration

The MFJ-493 has a special feature to allow the user to view the configuration on the keyer terminal screen. To view the configuration type "[show-config]". The keyer configuration will appear on the screen.

You can also write a file that can be sent to the keyer with all the configuration information your keyer needs. Several files can be saved with different configurations to allow quick changing of parameters. The file is saved as an ASCII text file and uploaded to the MFJ-493 with your terminal program's text upload (send text file] command. The file must have "{sconfig:" in front of the settings and end with "}". For a complete description of the file format see the table on page 19.

On-Line Help

While you are using your keyer terminal you can access the on-line manual. If you type in [help] you will get a list of commands. Type [help-"command"] for help on a certain command. Type "{help-list]" for a list of commands

Menu A

Message Memory

To play or save to a message memory, select Menu A. Press F6 (Bank Select] to select the correct bank: 1 - 4 Red, 5 - 8 Green. To play a message press and release the correct message button. The message will play (and be sent to your radio). To save a message to memory, press and hold a Menu button (F1 - F4) until the keyer plays "GO" in Morse code. You may now key in a message on either the paddle, keyboard or terminal.

Paddle

Begin keying your message. As you pause after every word, the keyer will play a "W" over the sidetone speaker to show that it is inserting a word break. If the keyer does not recognize your code as a valid character, the keyer will play a series of 8 dots and that character will not be saved. Continue keying in the rest of the word.

If you make a mistake entering a word, you can back up over it by keying in 8 continuous dots. The keyer will erase the previous word, then play the word before it (if any) to let you know where you stopped.

To end your message press the same Function button again. The keyer will respond by sending an end of message character AR.

Keyboard

With the keyboard you can also store or play messages using the keyboard function keys. To play a message press any keyboard function key F1 - F8. To store a message press and hold the Alt key, press the keyboard function key, F1 - F8, and release Alt.

Begin typing in your message pressing the space bar between words. The keyer echoes each character as it is typed. Press the Backspace key to delete the last character.

At the end of your message press Enter. The keyer will play an end of message character (+) and save your message.

Keyer Terminal

To play a message in the terminal mode without the keyer menu you type "[send*]" where # is 1 - 8. The message is sent to the radio and displayed, echoed, on the terminal screen.

There are two different ways to save a message in the keyer terminal. First you can type a message manually. Type "(start#]MESSAGE TEXT[stop]". You can also upload a message that you have saved in a text file by adding "{#" to the front and "}" to the end. Remember that all message text should be in upper case. Use your terminal program to do a text upload. If you have local echo off in your terminal program, the keyer will not echo anything to the terminal or sidetone speaker. If local echo is on, the message will echo. View a message by typing "[show#]" where # is 1 - 8. The memory will echo to the terminal.

Embedded Commands

While saving messages you may use embedded commands for special features. To use an embedded command simply store the two character, embedded command within your message.

/N Inserts a serial number into a message. All nines are sent as "N" and zeros are sent as "T". A serial number is automatically incremented each time it is sent. To decrement the serial number, press the serial number Decrement menu button. A new serial number can be saved by using the serial number store menu feature.
Example: YOU ARE CONTACT NR /N

/D Decrements the serial number. This feature allows a serial numbers to be sent twice in one message.
Example: UR RST 559 559 SN /N /D SN /N

/L Create a message loop (Message Repeat). Always put the /L at the end of the message. Any characters after the /L will not be repeated.
Example: BEACON AA5CS 5 W /L

/P Inserts a timed pause into a message. This command is followed by 4 numbers in xx minutes xx seconds format.
The command may be in either / Pxxxx or /Pxxxx format.
Example: TIMEOUT 1 HOUR /P6000 TIMEOUT 1.5 MIN / P0090 TIMEOUT 1 H 40MIN 39 S /P9999

/# # = 1 - 8 inserts memory message number # into message (Message Call). This command allows you to include any other message into another message. A message may not call another message that contains an embedded message call. If there is no message saved for that number nothing will play at the /#. If you call a message that loops, only the looped message will repeat after the first play.
Example: message 1: CQ CQ CQ CQ
message 2: /1 DE KB5VKY

Sending message 2 plays CQ CQ CQ DE KB5VKY

/S Can be added into messages to insert an extra word space.

// To store a / in a message you must use the embedded command //.

Commands can be combined in messages:
Set the serial number to 0030.
FOXHUNT DE AA5MT BEACON /S /S U HAVE /N /D /D TIMES 3 MINS TO FIND ME/P 0300 /L

Serial Number Decrement

Use Serial Number Decrement to decrement the current serial number by one. The unit will echo a "D" for every number that is decremented. If you decrement down from zero you will get 9999 for your serial number. When a message plays 9999 the serial number will then increment to zero which will not play.

Memory Bank Select

Press the Memory Bank Select button to change from one memory bank to the other. When the Menu A LED is red the keyer is in the first bank of message memories (1 - 4). Press Memory Bank Select to change to message memories (5 - 8) and change the Menu A to LED green.

Menu B

Command Mode

The first function on menu B is the command mode. After you push the menu button F1 the keyer will respond with "CO". Now a two character command can be entered on your paddle, keyboard or keyer terminal. If the instruction is invalid then the keyer will send 8 rapid dots (error) and return the keyer to normal mode. If the user wishes to re-attempt modifying features using command mode, he must re-enter command mode by pressing F1 again.

Paddle

After pressing the F1 menu B button, enter a command mode command.

Keyboard

When using the keyboard, press F9 to enter command mode. Type in a two or four character command.

Keyer Terminal

In the keyer terminal you can access command mode without using the menu. Type "[co]" to enter command mode. The keyer will echo "CO". Type in a command mode command in upper-case.

Most of the menu commands can also be accessed through the Command Mode using the two character shorthand found on the front panel. However, some commands are not on the menu. A summary of those commands and a brief description of each feature follows:

Command Mode Commands

BK Use Break On/Off to toggle break mode on and off. The keyer responds with the current mode "ON" or "OFF". Break mode allows you to insert code into a message memory that is playing. Press a message memory button. Now press a key on the keyboard, keyer terminal or a paddle to break into a message. The keyer will stop sending the current message memory. Begin sending code. After you finish sending code, press the same message button to resume playing the message where you interrupted it. Press Menu to clear a message in break.

C# Where # = 0 - 9. Use character break to customize the length of the inter character spacing. A standard character break is 3 dot lengths long. The number following the C is the number of extra dot lengths added to a character break.

FA Use FA to toggle Farnsworth mode on and off. Farnsworth mode sets the speed of the random code generator. Character speed is set to 18 words per minute while keeping the overall word speed at the keyer's current setting. If the keyer is set to 5 WPM in Farnsworth mode, the keyer will send 18 WPM characters while inserting extra word break and inter character timing to maintain an effective speed of 5 WPM. At speeds above 18 WPM the keyer reverts to normal timing. This feature allows learners to associate Morse characters with their sound rather than by counting dots and dashes.

KC## ## = 00-15 sets a keying compensation value. Some radios have a key delay of 5 mS or more. By entering KC05, the keyer will add 5 mS to the dots and dashes. This eliminates the problems with a keying delay.

R# Where # = 1 - 8. Use R# to toggle settings in the Random Code Generator. The keyer will play "OK" after your command has been entered. The keyer is set at default to send 5 character words in alphabetic characters. Use R2 - R5 to toggle punctuation marks, prosigns, numbers and letters. To study certain characters toggle R6 to set fixed character sets. The default is set 01 [A - F]. Toggling R1 will send random word length. In word recognition mode, R8, the MFJ-493 sends common words heard on the air.

- **R1:** Enable either 5 character word length or random (1-8 character) word length.
- **R2:** Toggle random numeric characters on and off.
- **R3:** Toggle random punctuation characters on and off.
- **R4:** Toggle random prosign characters on and off.
- **R5:** Toggle random alphabetic characters on and off.
- **R6:** Enable either enabled sets (R2 - R5) or fixed character sets (D1 - 09). See ## command.
- **R7:** Enable either repeat code session or new code session.
- **R8:** Toggle word recognition mode on and off

W# Where # = 0 - 9. Use word break to customize the length of the inter-word spacing. A standard word break is 7 dot lengths long. The number following the W is the number of extra dot lengths added to a word break. Keyer echoes "OK" upon entry.

VR Enter VR and the keyer will echo the firmware release number.

= 00 - 09. Select one of the six character sets for the random code generator. Keyer echoes "OK" upon entry.

01	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**
A	G	M	S	Y	4	.	_	;
B	H	N	T	Z	5	?	+	(
C	I	O	U	0	6	"	,	)
D	J	P	V	1	7	$	-	/
E	K	Q	W	2	8	`	=	Start
F	L	R	X	3	9	¶	:	Invite

Speed Set (SP)

Use Speed Set (WPM) mode to change the speed of code. An alternating dot/dash is produced and the speed is modified by using the paddles, keyboard or keyer terminal.

Paddle

Press either the dot or dash paddle to increase or decrease speed. Squeeze paddles to exit.

Keyboard

To enter speed set either press the speed set menu button or press F10 on the keyboard. Press either the left arrow or right arrow to decrease or increase speed. Or press two numbers 05 to 99 to set the code speed. Esc exits.

Keyer Terminal

To use speed set with the keyer terminal either use the menu button or command mode in the keyer terminal. Type "[co]SP". Press ⇧ and the < and > keys to change speed or type in two numeric characters 05 - 99 to set speed. Press Esc to exit.

Weight Set (WT)

Use weight Set to modify the weight settings for code. An alternating dot/dash is produced and the paddle, keyboard or keyer terminal is used to change weight.

Paddle

Press either the dot or dash paddle to increase or decrease weight. Squeeze paddles to exit.

Keyboard

Press the weight set menu button. Press either the left and right arrows or the paddles to change weight. Squeeze paddles or press Esc to exit.

Keyer Terminal

To use weight set with the keyer terminal either use the menu button or command mode in the keyer terminal. Type [co]WT. Then use the < > keys to change weight. Press Esc to exit.

Sidetone Set (Hz)

Use Sidetone Set to change the sidetone speaker frequency.

Paddle

Press either the dot or dash paddle to increase or decrease sidetone. Squeeze paddles to exit.

Keyboard

To enter sidetone set, press the sidetone set menu button. Press either the left and right arrows or the paddles to change sidetone. Squeeze paddles or press Esc to exit.

Keyer Terminal

To use sidetone set with the keyer terminal, either use the menu button or command mode in the keyer terminal. Type [co]HZ. Then use the < > keys to change sidetone. Press Esc to exit.

Output Tune (TU)

Use Output Tune to tune up your station. A constant key is sent to allow tuning of your tuner or antenna.

Paddle

Squeeze the paddles to exit.

Keyboard

Press F11 to enable the output tune. Press Esc to exit.

Keyer Terminal

Type [co]TU to enable the output tune. Press Esc to exit.

Edit Message (ED)

Use Edit message to change a message memory. Press the edit message button, the keyer will respond with "ED". Enter the number of the message to edit 1 - 8 on you paddle, keyboard, or keyer terminal. The keyer will begin playing the message. At any time during the message, press the paddle or Esc key to begin editing. If you do not interrupt it the message will play to its end and exit edit message mode.

When you interrupt the message you set an insertion point. You can do four things from an insertion point. You can delete the last word, insert a word, end the message, or continue playing the message by keying in "P".

To delete the last word played enter "D". The keyer will play the word before the word that was deleted. Now you can delete another word, insert text, end the message, or continue playing the message by entering "P".

To insert text enter "I". Enter your text. At the end of your text enter "+". The keyer will exit the insert mode. Now you can delete a word, insert text, end the message, or continue playing the message by keying in "P".

To end the message at your insertion point enter "+". The keyer will end the message and exit the edit mode.

The edit feature is adequate for short messages where there are few changes. However, to edit a large message, 100 - 4000 characters, the edit message mode is very impractical, if you use large messages, edit your messages with an ASCII text editor and then upload them into a memory.

Paddle

Press the edit message button. The keyer will play "ED". Key in the memory number. The keyer will begin playing your message. From command mode key in "E#"(# = 1 - 8). The keyer will begin playing your message.

Keyboard & Keyer Terminal

Press the edit message button. The keyer will play "ED". Type in the memory number. The keyer will begin playing your message. From command mode type in "E#"(# = 1 - 8). The keyer will begin playing your message.

Menu C

Semi-Auto On/Off (SA)
Use Semi-auto On/Off to toggle between semi-auto (bug) mode on and off. The keyer responds with the current mode "ON" or "OFF". Semi-auto mode creates automatic dots but requires dashes to be hand keyed. Note: Semi-Auto mode may not be used to enter messages, serial numbers or in command mode.

Iambic On/Off (IA)
Use Iambic On/Off to toggle between iambic modes on and off. The keyer responds with the current mode "ON" or "OFF". Iambic mode allows you to squeeze both paddles and get alternating dashes or dots. Non-iambic mode does not alternate between dots and dashes during a squeeze. It plays whatever side made contact first until it is released. See Iambic A or B.

Queue On/Off (QU)
Use Queue On/Off to toggle between queue mode on and off. The keyer responds with the current mode "ON" or "OFF". Queue mode enables the user to load messages into a buffer to play sequentially. In queue mode, if you press a memory button while a message is playing, that message will play after the current message is done. In normal operation pressing a message memory will abort any message being played and play the new message.

Sidetone On/Off (ST)
Use Sidetone On/Off to toggle between sidetone speaker on and off. The keyer responds with the current mode "ON" or "OFF". If the sidetone is turned off, it will still play command messages and status information.

Output On/Off (TX)
Use Output On/Off to toggle between output on and off. The keyer responds with the current mode "ON" or "OFF". If the output is turned off, signals are not sent to the keyer's gridblock or direct outputs allowing practice operation. The output is automatically disabled during memory message storing, command mode operation, status information and keyer setup.

FCC Exam (FC)
FCC Exam sends a random QSO just like in a real exam. Copy a test in Morse and then check your copy against what is on your keyer terminal screen.

Menu D

Serial No. Store (SN)
Use Serial Number Store to set the current serial number. You must enter four numbers in Morse code for a valid serial number. All numbers may not be in shorthand. For example, the number "1" must be "·----" and the number "0" must be "-----". The serial number can be set from 0000 to 9999. See /N under Embedded Commands and also see Serial Number Decrement.

Iambic A or B (IX)
Use Iambic A or B to toggle between iambic a and iambic b. The keyer responds with the current mode "A" or "B". The Iambic modes work when you squeeze both paddles together. See Iambic On/Off. In iambic B mode the keyer plays the alternating element after the paddles are released during an element. Iambic A mode does not produce an alternating element when the paddles are released during an element. For example, a release during the dash in "·–" produces "·–" or "A" in iambic a mode but produces "·–·" or "R" in iambic b mode.

Paddle Reverse (RV)
Use Paddle Reverse to change the dot/dash paddle assignments. The keyer responds with "RV" and changes the dot paddle to dash and the dash paddle to dot.

Hand Key (HK)
Use Hand Key to use your paddle or space bar as a hand {straight) key. The keyer responds with "HK". Dots and dashes are made manually by using either key of the paddle or the space ban on your keyboard or keyer terminal. You must exit this mode to use any other keyer feature by squeezing the paddies or pressing Menu.

Random Code (RC)
Use Random Code to start the random code generator. Set the Random Code generator defaults using the Command Mode. Use FA, R1 - 8 and the set selection numbers to customize your session to study exactly what you need to learn. Squeeze paddles to exit.

QSO Simulator (QS)
Use the interactive QSO simulator to practice on the air contacts. Learn code the way that is used on the air. After you press the QSO Simulator button you may send CQ and the keyer will answer you. If you wait without sending CQ, the keyer will initiate the QSO and you can answer it.

Typical Settings for a Contest

This is an example of some typical settings for a contest. Each contest has different rules for exchanges etc. and you may have a different method of contesting. This is an example of one contester's settings.

Memory #1: CQ TEST DE DC7XJ DC7XJ DC7XJ TEST
Memory #2: TEST DC7XJ DC7XJ
Memory #3: UR 5NN SN /N /D /S /N OH DE DC7XJ
Memory #4: R 73 TEST DC7XJ

Memory #1 is set for CQ at slow periods or at the end of a contest when most stations have already been worked.

Memory #2 is set for busy times when contacts are plentiful. Each of these memories are set with simple to the point messages. A listener will immediately know who is calling and what they want. The call is repeated after a short CQ TEST so that someone will not spend much time listening to stations they have already worked.

Memory #3 is set with the contest exchange. It gives the serial number twice [using the serial number decrement command] with a space in between and some other contest information. Remember all contests require different exchanges.

Memory #4 is set to close a QSO and announce that you are ready to for another contact.

Learning Code with the Random Code Generator

This is an example of a typical code practice session. Work first on the letters A-F. You can do all our practice in Farnsworth mode so that you will learn the sound of each character at a high speed.

Enter Command Mode and key in 'FA'. This enters Farnsworth mode.

Now fix the code generator to the 6 character sets by entering R6 in the command mode.

Enter '01' in the Command Mode to choose the A - F character set. The default settings are set to fixed 5 character length and repeat session.

Now adjust the speed with the speed set feature. Remember you are in Farnsworth mode so you can only adjust word spacing. All character speed is set to 18 words per minute.

Get ready to copy.

Press the Random Code Function key and take code for a couple minutes. When you get to a stopping point squeeze the paddles together to end the session.

Restart the session again by pressing the Random Code Function key. The code session will start again and you should be able to check your copy. The same code session will repeat until you turn off the power, press the Menu button or toggle the R7 command in the Command Mode.

After you have practiced the A-F set you can move to the next set by entering 02-08 in the command mode.

Practicing With the FCC Exam Simulator

After you have practiced individual characters you can go on to practice a simulated FCC exam. Press the FCC Exam Simulator button and begin copying.

The keyer terminal is extremely useful when practicing exams. The keyer echoes all text to the terminal so you can check your copy when the test is over.

If you give tests you can save your favorite randomly generated test to an ASCII file and save it until the next test date.

Teaching Code

Those that give practice sessions will find the MFJ-493 of great help. Practice sessions can be written and edited, up to 4000 characters for a single memory, in a text editor and send it as ASCII to one of the message memories. The MFJ-493 can be taken to the classroom and give several sessions of practice. The code sent is always perfect and can be modified to whatever method of teaching one prefers.

Battery Removal and installation

The lithium cell on this keyer should last 2 years or more. The battery can be tested by removing the cover and turning the unit ON. Test the voltage of the battery from the battery (+) to the chassis (–). The voltage tested should be over 2.7 volts or the battery should be replaced. To replace the battery, the unit must have power connected and be turned ON. The battery is carefully removed and a new one carefully inserted.

Technical Assistance

If you have any problem with this unit first check the appropriate section of this manual. If the manual does not reference your problem or your problem is not solved by following the manual you may call MFJ toll-free at 1-800-647-TECH [8324] or FAX to 601-323-6551, or TELEX 53 4590 MFJ STKV. Outside of the continental U.S.A. 601-323-5869. You will be best served if you have your unit, manual and all information on your station handy so you can answer any questions the technicians may ask.

You can also send questions to MFJ Enterprises, INC., P. O. Box 494, Mississippi State, MS 39762. Send a complete description of your problem, an explanation of exactly how you are using your unit and a complete description of your station.

http://www.mfjenterprises.com

Configuration File Format

```
          A   B    C    D  E  F  G  H  I  J  K   L   M    N    O  P  Q  R  S
{sconfig: ##, ##, ####, #, #, #, #, #, #, #, ##, ##, ##, ####, #, #, #, #, #,
          T  U  V   W
          #, #, ##, #}
```

NOTE: Do **not** insert spaces into a configuration file. The spaces in the above example are for readability.

Example:
{sconfig:20,45,2000,1,1,1,1,1,1,0,07,03,00,0001,0,0,0,0,0,1.0,01,1}

Item A = 2 digit speed in words per minute
Item B = 2 digit weight in percent on duty cycle (5 % resolution)
Item C = 4 digit sidetone frequency {300 - 3300 Hz)

Item D = Iambic On/Off flag	1 = On,	0 = Off
Item E = Iambic A/B flag	1 = B,	0 = A
Item F = Queue On/Off flag	1 = On,	0 = Off
Item G = Sidetone On/Off flag	1 = On,	0 = Off
Item H = Output On/Off flag	1 = On,	0 = Off
Item I = Break-in On/Off flag	1 = On,	0 = Off
Item J = Reverse paddle flag	1 = Reversed,	0 = Normal

Item K = Interword spacing as decimal dot lengths (7 - 16)
Item L = Intercharacter spacing as decimal dot lengths [3 - 12)
Item M = Keying compensation in milliseconds (0 - 15)
Item N = 4 digit serial number (0000 - 9999)

Item O = Farnsworth On/Off flag	1 = On,	0 = Off
Item P = Word length flag	1 = 5 character length,	0 = random length
Item Q = Random Number flag	1 = numbers enabled,	0 = disabled
Item R = Random Punctuation flag	1 = punctuation enabled,	0 = disabled
Item S = Random Prosigns flag	1 = prosigns enabled,	0 = disabled
Item T = Random Alphabetic flag	1 - alphabet enabled,	0 = disabled
Item U = Random Character set	1 = random sets enabled,	0 = disabled

Item V = 2 digit random character set selected (01 - 09)

Item W = Repeat On/Off flag	1 = On,	0 = Off

Command Mode Quick Reference

COMMAND		DESCRIPTION
BK		TOGGLES BREAK-IN MODE ON/OFF
C#	# = 0 - 9	SELECTS CHARACTER BREAK LENGTH
E#	# = 1 - 8	ENABLES EDIT MODE
FA		TOGGLES FARNSWORTH MODE ON/OFF
FS		ENABLES FCC SIMULATOR MODE
HK		ENABLES HAND KEY (STRAIGHT KEY) MODE
HZ		ENABLES SIDETONE FREQUENCY SET MODE
IA		TOGGLES IAMBIC MODE ON/OFF
IX		TOGGLES IAMBIC MODES A/B
KC##	##= 00 - 15	SELECTS KEYING COMPENSATION VALUE
QS		ENABLES QSO SIMULATOR MODE
QU		TOGGLES MESSAGE QUEUE MODE ON/OFF
RC		ENABLES RANDOM CODE MODE
RV		TOGGLES DOT/DASH PADDLE ASSIGNMENTS
R#	# = 1 - 8	SELECTS RANDOM CODE MODES
SA		ENABLES SEMI-AUTOMATIC [BUG] MODE
SN		ENABLES SERIAL NUMBER STORE MODE
SP		ENABLES SPEED [WPM]
ST		SET MODE TOGGLES SIDETONE ON/OFF
TU		ENABLES TUNE [KEY UP) MODE
TX		TOGGLES OUTPUT KEY ON/OFF
WT		ENABLES WEIGHT SET MODE
W#	# = 0 - 9	SELECTS WORD BREAK LENGTH
##	##= 01 - 09	SELECTS RANDOM CODE 6 CHARACTER SETS

Keyboard Character to Morse Code Table

Keyboard	Morse
A	·–
B	–···
C	–·–·
D	–··
E	·
F	··–·
G	––·
H	····
I	··
J	·–––
K	–·–
L	·–··
M	––
N	–·
O	–––
P	·––·
Q	––·–
R	·–·
S	···
T	–
U	··–
V	···–
W	·––
X	–··–
Y	–·––
Z	––··
1	·————
2	··–––
3	···––
4	····–

Keyboard	Morse	
5	·····	
6	–····	
7	––···	
8	–––··	
9	––––·	
0	–––––	
.	·–·–·–	
,	––··––	
;	–·–·–·	
:	–––···	
‘	·————·	
“	·–··–·	
/	–··–·	
?	··––··	
-	–····–	
_	··––·–	
=	–···–	
+	·–·–·	(1)
!	····–·	(2)
@	·——·—·	(3)
#	·–·–··	(4)
$	···–··–	
%	–·–·–	(5)
^	–·–	(6)
&	·–···	(7)
*	···–·–	(8)
(	–·––·	
)	–·––·–	
tab	·–·–··	(4)

Notes: (1) Also 'End of Message' AR
(2) Understood SN
(3) Error HH
(4) Paragraph AL
(5) Start Signal KA
(6) Invitation to Transmit K
(7) Wait AS
(8) End of Work SK

CW Abbreviations

73	best regards
88	love and kisses
ABT	about
AGN	again
ANT	antenna
BK	break
CPY	copy
CQ	general call to any station
CUL	see you later
CU	see you
DE	from
DX	distance, rare station
ES	and
FB	fine business
PER	for
FREQ	frequency
GA	good afternoon, go ahead
GE	good evening
GM	good morning
HR	here
HW	how
K	go ahead
MSG	message
NR	number
NW	now
OM	old man
OP	operator
R	are, received, roger
RCVR	receiver
RIG	equipment
RST	readability, strength, tone report
SIGS	signal
STN	station
TEMP	temperature
TKS	thanks
TNX	thanks
UR	you are
U	you
WL	well
WT	watt
WX	weather
XCVR	transceiver
XMTR	transmitter
XYL	wife

Meaning of Q Signals

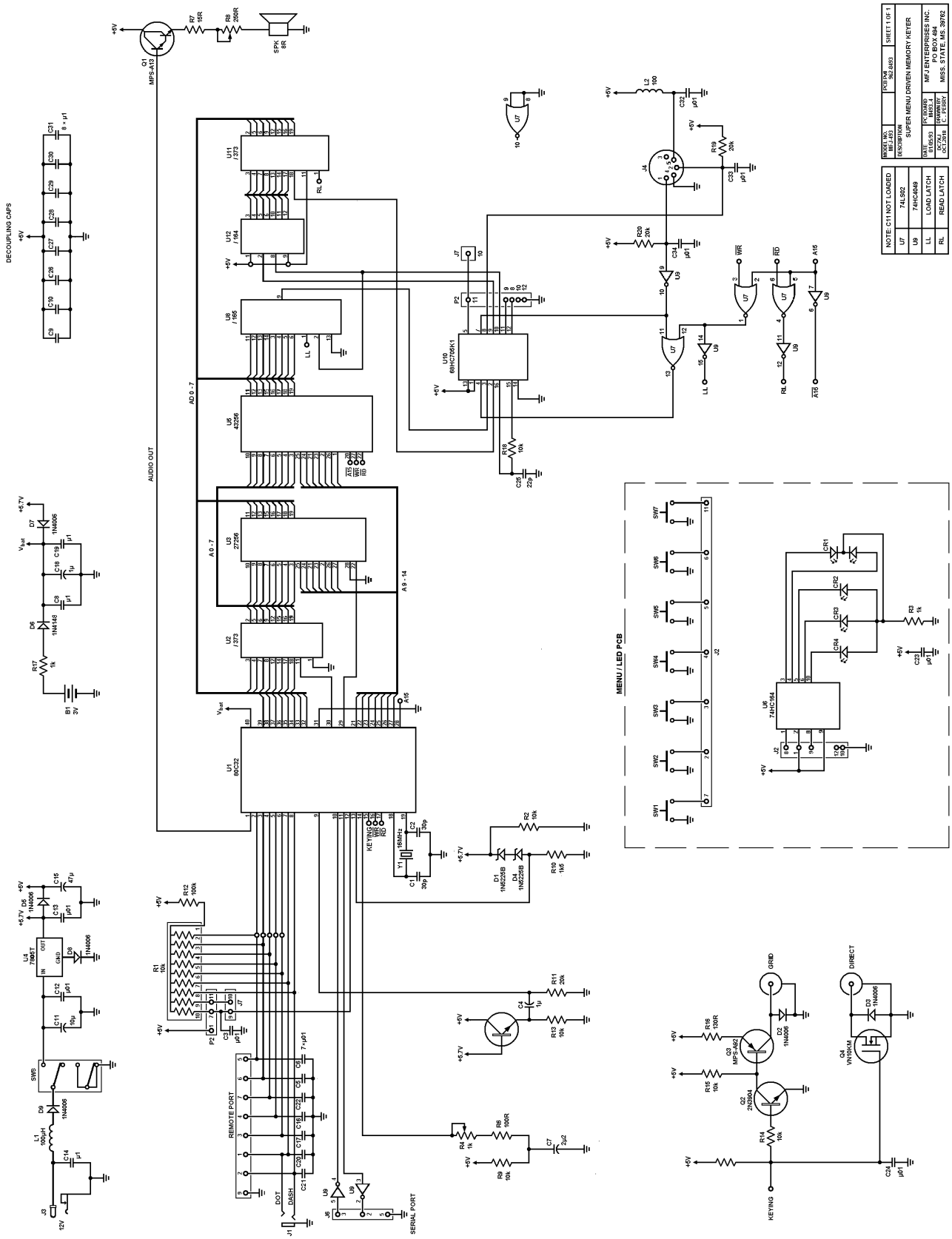
QRA	The name of my station is
QRL	I am busy! Do not interfere
QRM	I am being interfered with
QRN	Conditions are bad
QRO	Increase power
QRP	Decrease power
QRQ	Send faster
QRR	I am ready for automatic operation
QRS	Send more slowly
QRT	Stop sending
QRU	I have nothing for you
QRX	I will call again at ..., wait
QRZ	Who is calling me?
QSB	You signal is fading
QSD	Your keying is defective
QSK	I can hear you between my signals
QSL	I am acknowledging receipt
QSU	Reply on this freq. or class
QSX	I am listening to ... on ... kHz
QSY	Change freq., change to xmit on ... kHz
QTH	My location (home) is
QTR	The correct time is
QTS	I will send so my freq. can be measured
QUB	Here is the info you requested
QUM	The distress traffic has ended

MFJ-493 Parts List

Part Designator	Description
R1	Resistor, Network, SIP, Common, 9 Elements, 10 kOhm
R2, R12	Resistor, 1/4 Watt, 5 %, Film, 100 kOhm
R3, R17	Resistor, 1/4 Watt, 5 %, Film, 1 kOhm
R4	Resistor, Pot, PCS, Linear Taper, 1 kOhm
R5, R11, R19, R20	Resistor, 1/4 Watt, 5 %, Film, 20 kOhm
R6	Resistor, 1/4 Watt, 5 %, Film, 100 Ohm
R7	Resistor, 1/4 Watt, 5 %, Film, 15 Ohm
R8	Resistor, Pot, PCB, Linear Taper, 250 Ohm
R9, R13, R14, R15, R18	Resistor, 1/4 Watt, 5 %, Film, 10 kOhm
R10	Resistor, 1/4 Watt, 5 %, Film, 1.5 kOhm
R16	Resistor, 1/4 Watt, 5 %, Film, 130 Ohm
C1, C2	Capacitor, Multilayer Cer, NPO, 5 %, 50 V, 33 pF
C3, C5, C6, C12, C13, C16	Capacitor, Disc Ceramic, 1 kV, 20 %, .01 µF
C4, C18	Capacitor, Electrolytic, Radial, 50 V, 1 µF
C7	Capacitor, Electrolytic, Radial, 35 V, 2.2 µF
C8, C9, C10, C19, C26, C27	Capacitor, Multilayer, .2, X7R, 10 %, 50 V, .1 µF
C14	Capacitor, Disc Ceramic, 1 kV, 20 %, .1 µF
C11	Capacitor, Electrolytic, Radial, 50 V, 10 µF
C15	Capacitor, Electrolytic, Radial, 35 V, 47 µF
C17, C20, C21, C22, C24	Capacitor, Multilayer Cer., NPO, 5 %, 50 V, 33 pF
C23	Capacitor, Disc Ceramic, 1 kV, 20 %, .001 µF
C25	Capacitor, Disc Ceramic, 50 V, 20 %, 22 pF
C28, C29, C30, C31	Capacitor, Multilayer Cer., NPO, 5 %, 50 V, 33 pF
C32, C33, C34	Capacitor, Disc Ceramic, 1 kV, 20 %, .001 µF
Q1	Transistor, Darlington, TO-92, NPN, MPS-A13
Q2, Q5	Transistor, General Purpose, NPN, MOT 2N3904
Q3	Transistor, High Voltage, 300 V, PNP, MPS-A92
Q4	Transistor, FET, Switching, VN10KM
Y1	CrystaI, HC18/U, 16 MHz
D1, D4	Diode, Zener, DO-35, 500 mW, 3 V, 1N5225B
D2, D3, D5, D7, D8, D9	Diode, Rectifier, DO-41, 1 A, 1N4006
D6	Diode, Switching, DO-3 5, 10 mW, 1N4148
L1, L2	100 mH

U1	IC, CPU, 40, 8-Bit, INTEL, P80C32-1
U2, U11	IC, HCT 20, Tri-State Octal Latch, 74HCT373
U3	IC, EPROM, 28 Pin, 256K, 21V, CMOS, 27C256
U4	Voltage Regulator, TO-220, +5 Volts, 7805T
U5	IC, RAM, 28 Pin, 32k × 8, 150 nS, 43256-15L
U7	IC, LS, 14, Quad 2-Input Nor Gate, 74LS02
U8	IC, HC, 8 BIT Shift Register, IN, 74HC165
U9	IC, HC, 16, Inverting Hex/Buffer/Conv,74HC4049
U10	IC CPU, 16 Pin 4 MHz, 68HC705K1
U6, U12	IC, HC, 8 BIT Shift Register, Out, 74HC164
FOR U1	Socket, IC, Low Profile, 40 Pin
FOR U2, U11	Socket, IC, Low Profile, 20 Pin
FOR U3, U5	Socket, IC, Low Profile, 28 Pin
FOR U8, U9, U10	Socket, IC, Low Profile, 16 Pin
FOR U6, U7, U12	Socket, IC, Low Profile, 14 Pin
P2	Jumper, Ribbon, 12 Pos., Singleline
J1	Jack, 1/4" Phone, PCB, Open, Stereo
J2, J5	Jack, RCA Phono, PCB, Single
J3	Jack, 2.1 mm, PCB, DC Coaxial Jack
J4	Connector, DIN, PCB, Rt. Ang, F, 5 Pin
J6	Connector, D-Sub, PCB Rt. Ang, 9 Pin F, DB-9S
J7	Connector, Header, Rt. Ang., .1, 10 Positions
SW1-SW7	Switch, Push Button, 125 VAC, SPST (N.O.) Mem
SW8	Switch, Push Button, PC, .5 A, 125 VAC, 2P2P
FOR SW8	Knob, Plastic, Push Button, .350" Dia, RED
B1	Battery, Coin, 3V, Lithium, (1480)
FOR B1	Holder, Battery, PCB MT, Coin, 3 V, Lithium
SP	Speaker, 2", Round, .2 Watt, 8 Ohm
CR1	LED, 5 mm, Round, Red/Green
CR2,CR3,CR4	LED, 5 MM Round, Red, MV5753

MFJ-493 Schematic



ADDENDUM

If you power up the keyer while it's attached to a terminal emulator you can see some interesting information:

```
MFJ-493 MEMORY KEYER VERSION 1.1.2C.     COPYRIGHT MFJ ENTERPRISES, 1993.

TYPE "[help]" (USING BRACKETS AND LOWER CASE LETTERS) FOR ON LINE HELP INDEX.

[help]

HELP INDEX FOR MFJ-493 MEMORY KEYER

1.  TYPE [help-program] FOR HELP ON PROGRAMMING MESSAGES

2.  TYPE [help-transmit] FOR HELP ON SENDING MESSAGES

3.  TYPE [help-setup] FOR HELP ON CONFIGURING YOUR MFJ-493

4.  TYPE [help-list] FOR LIST OF ALL COMMANDS

[help-list]

HELP-LIST INDEX FOR MFJ-493 MEMORY KEYER

[help]           LISTS GENERAL TOPICS

[help-program]   LISTS MEMORY STORING INSTRUCTIONS

[help-transmit]  LISTS TRANSMITTING INSTRUCTIONS

[help-setup]     LISTS KEYER SETUP INSTRUCTIONS

[help-list]      LISTS ALL COMMANDS

[start#]         STARTS KEYER MESSAGE NUMBER # STORAGE ROUTINE

[stop]           ENDS KEYER MESSAGE STORAGE ROUTINE

[{#}]            MARKS FILE FOR ASCII UPLOAD TO MEMORY

[send#]          SENDS MESSAGE NUMBER #

[show#]          DISPLAYS MESSAGE NUMBER # CONTENTS

[co]             STARTS KEYER COMMAND MODE
```

Among other commands, there are also commands for printing out the contents of the memories. So the keyer has a sort of built-in manual if you connect it to a terminal.

Nits

A couple features that are completely useless are the "hand key" mode and the "semi-automatic-mode". Once the hand-key mode is enabled you can use either paddle as a straight key but it is very unresponsive at anything over 5 - 10 wpm. So keep your straight key wired into the output of this keyer. Similarly the "semi-automatic" mode is supposed to simulate a bug, where the DITS are sent automatically but the DAHS are manual. Well it's even worse than the hand-key mode, don't bother as it's for entertainment purposes only.

Another problem with this keyer is related to the weighting commands 'C' and 'W'. If you have either of them set to a value other than zero you cannot accurately record a message into memory using the paddles.

72/73
Richard AA4OO

http://hamradioqrp.com