



**MFJ-452**

**MORSE KEYBOARD KEYS**

## MFJ-452 Super CW Keyboard

### Features

- Includes eight independent 250-character message memories.
- 150-character type-ahead buffer available with audible "buffer full" warning.
- Paddle jack makes MFJ-452 a keyboard-controlled iambic keyer. Iambic paddle, space bar, or single-lever usable as straight keys.
- Embedded commands include auto-incrementing serial numbers, timed pauses up to 99 minutes 99 seconds, and message loops.
- Adjustable parameters vary code speed from 5 to 100 WPM and code weight from 5 to 95 %.
- Internal sidetone speaker with adjustable volume and frequency.
- Output tune mode has constant key to adjust tuners or antennas.
- LCD readout displays buffer contents and transmitted text.
- Practice operation using key-output disable and Farnsworth mode for random code generator.

### Installation

The MFJ-452 is supplied with an IBM-AT compatible keyboard. The MFJ-452X package does not include a keyboard. The unit is guaranteed to support the supplied keyboard but may be used with other standard 101 key AT-style keyboards. However, the use of an AT-compatible keyboard from other manufacturers may cause an increase in susceptibility to radio frequency interference. If using a switchable keyboard, move the A-X switch on the back of the keyboard to the "A" position.

***Using an XT style keyboard or turning a switchable keyboard to "X" mode may damage both the keyboard and the MFJ-452. This unit will function only with AT compatible keyboards.*** Plug the keyboard into the 5 pin DIN connector marked **KEYBOARD INPUT** on the MFJ-452.

The MFJ-452 Morse Keyboard requires a 12 VDC 250 milliamp power supply. The power jack accepts a 2.1 mm coaxial plug with the center conductor positive and shield ground. An optional DC supply, the MFJ-1312B, is available from MFJ Enterprises. Connect your MFJ-1312B Power Adapter or compatible DC supply into the jack marked **POWER** on the MFJ-452 back panel.

This unit supports both positive and negative keyed radios. Connect a standard shielded RCA cable between your radio key input and the MFJ-452's **KEYING OUTPUT**. The MFJ-452 is set up for a direct or positive keyed radio (most solid state radios). The unit can be adjusted for grid block or negative radios (most radios with tube finals) by shorting the left most pair of pins on JMP1. JMP1 is located, with the POWER switch toward you, to the right rear of the PC board.

Connect the paddle to the 3.5 mm stereo phone jack with a shielded cable through the back of the unit. Connect the dot wire of the paddle to the ring on the plug and the dash wire to the tip. The shield on the plug should be attached to paddle ground. An external speaker can be connected to the **EXT. SPKR.** on the rear of the unit using the 3.5 mm mono plug.

## **Keyboard Operation**

When the MFJ-452 is activated, it will send the characters "ON" in Morse code over the sidetone speaker and turn on the POWER LED. This confirms that the unit is ready for operation. Character message memories can now be set along with the speed, tone, and weight of the code. Volume level can also be adjusted using the volume control on the front of the unit.

Pressing a key will send a character to the key output and the speaker. Characters typed faster than can be transmitted at the current code speed will fill the type-ahead buffer. This buffer empties as the code is played. Characters may be removed from the buffer by pressing the backspace key. When the buffer reaches 130 characters the sidetone frequency will lower. If the buffer fills to capacity, an error tone will sound every time a key is pressed, and any characters typed over 150 will be lost.

Transmitted characters and buffer text may be monitored using the LCD display on the MFJ-452. This readout is comprised of two lines of text, each containing 16 characters. The top line shows the text in the buffer. The bottom line shows the text currently being transmitted.

During transmission, the type ahead buffer may be cleared by pressing **Esc**. When the buffer is empty, a new message may be played, or new text entered. Selecting **Pause** during transmission stops playback of the buffer text and allows entry of text with the paddle. **Esc** resumes the playback of the buffer text from the point where it was interrupted.

## **Adjusting Code Parameters**

**Note:** The output key is disabled during parameter changes so that no erroneous code is transmitted.

### **Code WPM Speed**

Code speed is set using the **F10** key. After **F10** is pressed, the MFJ-452 sends a series of dot-dashes over the sidetone speaker to indicate the current speed. The **▲** and **▼** arrow keys can be used to vary the speed gradually. Code speed can also be set to an approximate words-per-minute by entering a two-digit number (i.e., 05 or 13). The speed will then change to the new setting automatically. When all speed changes are complete, press **Esc** or **Enter** to exit the speed change mode.

### **Code Weight**

To adjust the code weight, select **F9** to enable the command mode and press **W**. A series of dot-dashes is played from the sidetone speaker. The **▲** and **▼** arrows may be used to adjust the on-time and off-time length of a dot or dash. Press either **Esc** or **Enter** to exit. This feature allows personalized code and can help to avoid clipping if the radio or amplifier has a send delay. It can also increase the radio's power out by increasing on time.

### **Sidetone Frequency**

To adjust sidetone frequency, press **F9** to enable the command mode, and press **T**. This command will toggle the sidetone on, and the unit will sound the present tone setting. Use the **▲** and **▼** arrow keys to increase or decrease the sidetone setting. Note that the tone will not affect the transmitted signal. Only the sidetone speaker frequency changes. Press either **Esc** or **Enter** to exit the tone change mode.

**Note:** All code parameters, speed, weight, sidetone, random code setup, and message memories are saved in nonvolatile memory. Memory life is rated greater than 20 years.

## **Message Memories**

The MFJ-452 has eight 250-character message memories. These memory locations are represented by the function keys **F1** – **F8**. To record a message to memory, press and hold the **Alt** key while selecting a memory position. When the MFJ-452 signals the characters "--- ---" or "GO" in Morse, it is ready to record the message, which is displayed on the bottom line of the LCD readout as it is typed. If the typed message exceeds 240 characters in length, playback frequency lowers to indicate that memory is short. Characters may be removed from memory by using the **Backspace** and new characters may be entered. No more than 250 characters may be stored in any message location. Any attempt to enter additional characters will generate a long, low-frequency tone for each character entered.

To complete the saving of a message, press **Enter**. An end of message character (.....) will sound to confirm the save. A programmed message can be replayed by pressing the appropriate function key **F1** – **F8**. The keyer will display a lower case character to indicate message play when the function key is pressed. The character "a" is displayed in the buffer when sending message 1 (F1).

**Example:** Select **Alt-F2**. The keyer signals "--- ---" to indicate readiness. Type the message **AA5MT BEACON BEACON 5 W BEACON**. Press **Enter** and the message is stored at memory location F2. Select **F2** to play message.

## **Removal of Message**

To remove the message, choose the designated function key (**F1** – **F8**) you want to remove (**F2** in this case). Press the **Alt** and that function key, then **Enter** without typing or keying anything into memory. The message is now removed.

## **Embedded Commands**

**Note:** To use the **Ctrl-#** command, where "#" represents a keyboard character, press and hold **Ctrl**, press and release the **#** key, then release the **Ctrl** key.

While a message is being saved, one or more embedded commands may be added as special features.

**Ctrl-L** creates a repeating message. Use the **Ctrl-L** at the end of the message before pressing **Enter**. The MFJ-452 will play the message to the point where **Ctrl-L** is entered and then repeat.

**Example:** **AA5MT BEACON 5 W Ctrl-L Enter**. This message repeats until **Esc** is pressed.

**Ctrl-P** creates a timed pause within a message. Use **Ctrl-P** followed by four numbers in a "xxxx" format to set the pause duration from 00 minutes, 01 seconds to 99 minutes, 99 seconds.

**Example:** **CQ CQ CQ DE KB5JOB Ctrl-P 0045 Ctrl-L Enter**. This message repeats every 45 seconds until **Esc** is pressed.

**Ctrl-S** controls the serial numbering feature. Use **Ctrl-S** at the end of the message before pressing **Enter**. The MFJ-452 will play the message to the point where **Ctrl-S** is entered, at which point the serial number is played and auto-incremented up to 9999. The serial number function sends an "N" character for nine and a "T" for zero. A new serial number may be stored by selecting **F9** to enable the command mode and then pressing **S** followed by four numbers in a "xxxx" format. Pressing **F12** will decrement the serial number and the keyer will echo "D" for every decrement.

Example: YOU ARE CONTACT NR **Ctrl-S** FOR THE BRYANT MEMORIAL WD4DAT **Enter**.

### **Command Mode**

During normal operation, the **F9** key is used to enter the command mode. When the command mode has been enabled, the keyer responds by signaling "GO." The unit is now ready to receive one of the available one-character commands listed below through the keyboard or paddle. The keyer responds to an invalid entry by returning to normal mode.

- H** This command allows use of the space bar or paddle as a hand (straight) key. The keyer responds to this command by sending : "HK." Dots and dashes are then made manually by using either the space bar on the keyboard or one of the paddle keys. Press **Esc** to exit.
- T** This command is used to set the frequency of the sidetone speaker with the keyboard by using the up and down arrows to vary sidetone. Press **Esc** to exit.
- W** This command enables the code weight settings mode. An alternating dot and dash signal is produced and the signal is modified with the keyboard by using the up and down arrows to vary code weight. Press **Esc** to exit.
- O** This command enables the operator to turn off the output of the keyer.
- S** This command is used to store a new serial number. The serial number must four digits in length, and can range from 0000 to 9999. After entering the 4 characters, Press **Enter** to embed the number.
- Q** This command queries the unit for code parameters. The display is in the following format:

### **Factory Settings**

<b>S = 2 0</b>	<b>W = 5 0</b>	<b>T = 0 7 1 4</b>
<b>N = 0 0 0 1</b>	<b>0 0 0 1 0 0 0</b>	
	<b>F L C A P G N</b>	

S = speed in WPM

W = weight in % on time

T = sidetone frequency in Hz

N = serial number

1x = Farnsworth mode on/off

2x = 5 character length on/off

3x = 6 character length on/off

4x = alphabetic character on/off

5x = punctuation on/off

6x = prosign on/off

7x = Numeric character

In order to operate the different sections of the random code, you must first check the settings of the parameters of the keyer. There are various settings for the parameters to isolate a particular group of characters. After setting the parameters to activate the transmission of the characters, you must enter the random code mode **F9** **R** then **Enter**.

- F** This command toggles Farnsworth mode on and off. This mode sets the speed of the random code generator. Character speed is set to 18 WPM while keeping the overall word speed at the keyer's current setting. If the keyer is set to 5 WPM in Farnsworth mode, it will send characters at 18 WPM while inserting extra word-break and inter character timing to maintain an effective speed of 5 WPM. This feature allows novices to learn Morse characters by sound rather than by counting dots and dashes. While in this mode, the keyer's output is disengaged.
- L** Toggles between 5-character word length or random word length from 1-8 characters. The keyer signals "OK" after the command is entered. The keyer's default setting sends 5-character words in alphabetic characters. To study certain characters, select C to choose a fixed character set. The default set is 01 (A – F).
- C** Toggles between enabling sets N, P, G, and A and enabling fixed character sets 01 – 09. (See # command.)
- #** A one-digit entry between 1 and 9 is entered to choose a six-character set. The available sets, and the entries needed to choose them, are as follows:

1	2	3	4	5	6	7	8	9
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	¶	:	Invitation to transmit

*See Morse Code Table on page 8 for a more complete listing of the code.*

- A** Toggles random alphabetic characters on and off
- P** Toggles random punctuation characters on and off
- G** Toggles random prosign characters on and off
- N** Toggles random numeric characters on and off
- R** This command is used to start the random code generator after the code generator-defaults have been set ( see F, L, N, P, G, A and C ). Press **Esc** to exit the code generator.

When choosing the parameter in which you wish to operate, you must decide what and how you want the codes sent. Some examples of setting up the parameters are as follows:

Example: 1000101 setting for parameter (Farnsworth mode, punctuation and numeric character)

Example: 1101000 (Farnsworth, Random word length 1-8 characters, alphabetic character)

Example: 1100001 (Farnsworth, Random word length 1-8 characters, numeric character)

Example: 0001000 (Alphabetic character)

Example: 0101000 (Random word length, alphabetic character)

The examples given are some of the ways you can set your parameters. By deciding if you want numbers, letters, punctuations, prosigns, or all, you can set your parameter to do so. You must remember to enter random code mode to activate the setting of your parameter (press **F9** **R**, then press **Enter**).

## **Keyboard Commands**

### **Message Memories**

The function keys **F1** through **F8** are used to store and send messages. The **Alt** key is used with a function key to store a message. The function key is then used alone to send the stored message. See the *MESSAGE MEMORIES* section for more details.

### **Command Mode**

The command mode is accessed by selecting the **F9**. This selection is followed by a one-character keyboard command.

### **Code WPM Speed**

The speed of the code is accessed through the **F10** key. The speed can then be varied using the up and down arrow keys or direct two-character entry. Press **Esc** to exit.

### **Output Tune**

An output tune is activated by selecting **F11**. A constant tune is sent to the antenna and tuner. Press **Esc** to exit.

### **Serial Number Decrements**

The **F12** command decrements the serial number. This command should be selected as a message is being sent. The keyer will echo "- . ." or "D" for every decrement in the serial number.

### **Paddle Operation**

The paddle input allows iambic keyer operation. The speed, weight, and tone for the paddle are the same as that for the keyboard. All iambic paddle parameters are controlled by the keyboard.

**Keyboard Character to Morse Code Table**

<b>Keyboard Key</b>	<b>Morse Character</b>	<b>Keyboard Key</b>	<b>Morse Character</b>
A	A ..	5	5 .....
B	B ....	6	6 .....
C	C ....	7	7 .....
D	D ...	8	8 .....
E	E .	9	9 .....
F	F ....	0	0 .....
G	G ---	.	. .....
H	H ....	,	, .....
I	I ..	;	; .....
J	J ....	:	: .....
K	K ---	'	' .....
L	L ....	"	" .....
M	M --	/	/ .....
N	N ..	?	? .....
O	O ---	-	- .....
P	P ....	_	_ .....
Q	Q ....	=	= .....
R	R ...	+	+ .....
S	S ...	!	! .....
T	T -	@	Error .....
U	U ...	#	Paragraph .....
V	V ....	\$	\$ .....
W	W ---	%	% .....
X	X ....	^	K ---
Y	Y ....	&	& .....
Z	Z ....	*	* .....
1	1 .....	(	( .....
2	2 .....	)	) .....
3	3 .....	tab	Paragraph .....
4	4 .....		

AAAMIMKROSWGAFDNIMIDUIQBTAR <sup>1</sup>SN <sup>2</sup>HHALSXKA <sup>3</sup>K <sup>4</sup>AS <sup>5</sup>SK <sup>6</sup>KNKKAL<sup>1</sup> Also 'End of Message'<sup>2</sup> Also 'Understood'<sup>3</sup> Also 'Start Signal'<sup>4</sup> Also 'Invitation to Transmit'<sup>5</sup> Also 'Wait'<sup>6</sup> Also 'End of Work'



## Function Key Quick Reference

Key	Usage
F1	Message memory #1
F2	Message memory #2
F3	Message memory #3
F4	Message memory #4
F5	Message memory #5
F6	Message memory #6
F7	Message memory #7
F8	Message memory #8
F9	Enables command mode. See <i>Command Mode Quick Reference</i> .
F10	Sets speed mode. Changes the WPM of the code. <b>Esc</b> exits.
F11	Engages the output tune. <b>Esc</b> exits.
F12	Decrements the serial number. The keyer will echo a "D" for every decrement.
Alt	Used for making prosigns by removing the intercharacter spacing of keys pressed while the <b>Alt</b> key is also pressed. For example, to produce the prosign AAA (·-·-·-·) hold the <b>Alt</b> key down, press <b>A</b> three times, then release <b>Alt</b> . Also used in conjunction with keys <b>F1</b> – <b>F8</b> to store message memories.
Alt-Print	Plays the EPROM code version number of your unit.
Backspace	Deletes the last character entered into message memory or the last character entered into the type-ahead buffer if that character has not already been transmitted.
Esc	Exits any mode.
Pause	Enters pause mode. The keyer will stop the current message being played and will resume when <b>Esc</b> is pressed.
Enter	Stores a stop character at the end of message memory.
Shift	Enables upper case characters if applicable. If the upper case character does not have a Morse translation then the keyboard simply repeats the lower case character. For example, <b>Shift   A</b> is the same as "A" but <b>Shift   ;</b> produces ":"
Spacebar	Inserts a word break space into the message in normal operation. While the MFJ-452 is in handkey mode the spacebar is a straight key.

**Command Mode Quick Reference**

<b><u>Command</u></b>	<b><u>Description</u></b>
<b>W</b>	Weight set mode
<b>T</b>	Sidetone frequency set mode
<b>O</b>	Output key on/off
<b>S</b>	Serial number store
<b>H</b>	Handkey mode
<b>R</b>	Enable random code generator
<b>F</b>	Farnsworth random code spacing on/off
<b>Q</b>	Query (see "Q" in the COMMAND MODE section)

<b><u>Random Code Command</u></b>	<b><u>Description</u></b>
<b>A</b>	Random alphabetic characters on/off
<b>N</b>	Random numeric characters on/off
<b>P</b>	Random punctuation characters on/off
<b>G</b>	Random prosign
<b>L</b>	Random 1-8 character group length on/off (off denotes fixed 5 character group length)
<b>C</b>	Fixed 6 character sets on/off (off denotes random characters selected from full alphabet, numbers, punctuation, etc.)
<b>1</b>	Sets fixed character set 1
<b>2</b>	Sets fixed character set 2
<b>3</b>	Sets fixed character set 3
<b>4</b>	Sets fixed character set 4
<b>5</b>	Sets fixed character set 5
<b>6</b>	Sets fixed character set 6
<b>7</b>	Sets fixed character set 7
<b>8</b>	Sets fixed character set 8
<b>9</b>	Sets fixed character set 9 (see "#" in the COMMAND MODE section)

## Schematic Diagram

