MFJ GRANDMASTER II
CONTEST MEMORY KEYER
MFJ-486

PLEASE READ THIS ENTIRE MANUAL BEFORE OPERATING THIS EQUIPMENT!

The MFJ-486 Grandmaster Keyer is a state of the art microprocessor controlled iambic memory keyer. This keyer has been engineered to combine sophistication with ease of use and should provide many years of trouble-free service.

This manual contains the instructions for the operation of the various features in the 486 as well as an on-line sample edit session to make learning the advanced memory and edit functions as easy as possible.

INSTALLATION

1. The MFJ-486 requires 12–15 VDC for operation. A 2.5 mm subminiature plug is needed. Wire the plug so that the tip is positive and the sleeve is ground. AC adapter (MFJ-1312) is optional. First plug the adapter into the subminiature jack on the rear panel, marked POWER, and then plug the adapter into the 110 VAC wall socket. It is not necessary to unplug the adapter when the keyer is not in use.

2. A squeeze key should be used. This will allow IAMBIC operation. Use a standard quarter inch stereo phone plug and a two conductor shielded cable or two separately shielded cables. Tie the shields together and use it for ground. The dot wire should connect to the ring of the plug, the dash wire to the tip, and the shield to the ground.

3. A reliable solid state keying circuit allows keying of all grid blocks, cathode, and solid state transmitters. For grid block keying use the "Grid Block" keying output. For cathode keyed and solid state transmitters, use the "Direct" keying output. Try both outputs if you are uncertain as to which output to use. The keyer outputs are self protected. The "Grid Block" output keys a maximum negative voltage of 300 volts to ground at 10 ma. The "Direct" output keys a maximum positive voltage of 300 volts to ground at a maximum current of 100 ma. Use a shielded cable to connect between the memory keyer and the transmitter key input.

4. If private listening is desired the headphone jack may be used. The headphone jack requires a standard 3.5 mm mono plug with the sleeve being ground and the tip being positive. The internal speaker is automatically disabled upon insertion of a plug into the headphone jack.

5. A socket is provided for the connection of an external control. This remote control will control the memory location and the edit functions that are also controlled by the smaller red pushbutton switches on the face of the keyer. This remote control is the MFJ-77 and is available from MFJ Enterprises Inc.

6. A coin type lithium battery is provided for power-off memory retention. After a period of time, this battery may become exhausted. The battery may be removed by removing the top cover (remove the two screws at the top back corners of the unit and slide the top rearward) and using a screw driver to remove the battery. The battery should be replaced by a BR-2325 coin type lithium battery.

OPERATION

NOTE: The Farnsworth Spacing feature is only operative in the Random Code Generation mode. Farnsworth does not affect the normal keying or Memory Playback modes.

A & B Type Keying:
The MFJ-486 features selectable A-type or B-type iambic keying modes. Type "A" does NOT produce a following alternate element when a squeeze is released during a dot or dash. Type "B" does produce a following alternate element after squeeze release. For example, in Type "A", squeeze release during the "dah" in the letter A will produce just the A. In Type "B", squeeze release during the "dah" in the letter A will produce an R. The MFJ-486 is shipped in the B-type keying mode. To change keying modes, follow these steps:

A. Place all pushbutton switches in the "off" or "out" position. The power should now be off.

B. Squeeze both the dot and dash paddles.

C. While maintaining the squeeze on the dot and dash paddles, turn the power on. The Delay/Edit LED should turn on.

D. When the Delay/Edit LED turns on, release the dot and dash paddles. The keying modes are now changed.

This is a toggle function so if you are in the A-type keying mode you will be changed to the B-type keying mode. Likewise if you are in the B-type keying mode, you will be changed to the A-type keying mode.

SPEED ADJUSTMENT:
The Speed Control Potentiometer is used in conjunction with the Speed Set Switch to adjust keying speed. The Speed Control Potentiometer will adjust the keying speed over a 5 to 1 ratio. The Speed Set Switch will make the current speed control setting equal to 20 WPM. For example, if the Speed Control Pot is all the way clockwise and the Speed Set Switch is pressed, the keyer will be set to 20 WPM. The Speed Control Pot will then adjust the speed from a minimum of 4 WPM to a maximum of 20 WPM. If the Speed Control Pot is set all the way counter-clockwise and the Speed Set Switch is pressed, the keyer will again be set to 20 WPM and the control pot will adjust the speed from a minimum of 20 WPM to a maximum of 100 WPM. When the Speed Control Pot is set midrange and the Speed Set Switch is pressed, the keying speed will be set to 20 WPM and the range of the pot will be adjusted accordingly. The speed is set in this manner to avoid making the Speed Control Pot setting too critical.

This technique gives the user the widest range of speeds possible and allows for simple operation.

SPEED SET SWITCH:
This switch is used in conjunction with the Speed Control Pot to adjust keying speeds. Another function of this switch is weight reset. When this switch is pressed the weight will be reset to a ratio of 1:3:1.

DOT WEIGHT ADJUSTMENT:
The dot weight is adjusted by holding the dot paddle down for more than eight consecutive dots and adjusting the weight control. This adjustment should be made slowly as the weight changes only after the eighth dot. The dot-dash weight may be reset to 1:3:1 by pressing the speed I V set switch.

DASH WEIGHT ADJUSTMENT:
The dash weight is adjusted the same way as the dot except that you hold the dash paddle down.

TONE AND VOLUME ADJUSTMENTS:
Potentiometer controls are provided to adjust the sidetone tone and volume.

DELAY ADJUSTMENTS:
This pot is used to set the delay time before a message is repeated when the MFJ-485 is used in the normal contest keyer mode. The Delay LED is on during the delay period. When the 486 is used in the random code generation mode this same Delay pot is used to increase the spacing between words and characters.

WORD SPACE SWITCH:
When in the record/edit mode. this switch selects either manual or automatic word spacing. When in the random code generation mode, this switch selects either a fixed or random group of characters.

MEMORY SWITCH:
The Memory switch controls which memory bank is being used. There are two memory banks with five addresses on each bank. The banks are "A" and "E". The memory locations are numbered from 1 to 5. Memory locations A1 through A4 and E1 through E4 are for general use. Memory locations A5 and E5 are reserved for a four digit contest number.

MEMORY CLEAR:
The entire memory may be cleared. In order to do this you must start with the power off and all pushbutton switches in the out or "off" position. Press the A1 and A2 switches simultaneously and turn the power on. When the POWER and EDIT LEDs turn on, release the A1 and A2 switches. The entire RAM memory is cleared.

NOTE: Because the weight settings and the speed settings are stored in RAM, they should be readjusted after using the MASTER MEMORY CLEAR function.

VERSION NUMBER:
The Firmware (EPROM) in the MFJ-486 may be updated as new features and innovations become available. The EPROM in your keyer may be identified by its Version Number. The Version Number may be obtained in the following manner: Turn the POWER off and set all pushbuttons to the out or "off" position. Press the BANK SWITCH to the IN or "E" position. Simultaneously press the E1 and E2 switches and turn the POWER on. When the POWER and EDIT LEDs turn on, release the E1 and E2 switches. The Version Number will I then be sent as a Morse code message.

NOTE: The Version Number is also labeled on the EPROM inside the keyer. You may remove the two screws at the top rear of the 486 cabinet and slide the top back to read the Version Number. The EPROM is directly behind the REPEAT switch and the Version Number may be found on the EPROM label.

RECORDING/EDITING FUNCTION SWITCHES

There are five functions in the record/edit mode:

1. A1/E1 switch: ADD Word Spaces while in the Manual Word Space mode. This switch also is used to enter and exit the "Add" mode.

2. A2/E2 switch: BACKUP one word from the current point.

3. A3/E3 switch: CONTINUE to play the message from the current point. When it gets to the end, the message will repeat after a short delay as set by the DELAY pot.

4. A4/E4 switch: DELETE the last word played.

5. A5/E5 switch: ERASE the entire message address.

The DELAY/EDIT LED is on during the edit session to indicate that the EDIT switch is on. It will be turned off briefly to indicate that the momentary switch input has been accepted.

Wait for the DELAY/EDIT LED to be turned on before pressing another switch.

RECORDING MESSAGES

NOTE: If during the process of entering a message you are keying with the key paddles and you hear a long low tone, the 486 does not recognize the character being keyed. You may immediately retry the character without pressing any other buttons. The keyer will automatically delete the invalid character. This is most often caused by operator error such as not putting a space between two otherwise perfectly valid characters. You may test this feature by keying in seven consecutive dots while in the "Add" mode of the CW Editor.

1. To record a message, first press the RECORD/EDIT pushbutton. The DELAY/EDIT LED should light.

2. Set the WORD SPACE switch out for Manual Word Spacing or in for Automatic Word Spacing. If you selected Manual word spacing continue on here. If you selected Automatic word spacing skip to step number 10.

3. Select the proper memory bank with the Memory switch. The switch should be out for bank A and the LEDs should be red. The switch should be in for bank E and the LEDs should be green.

4. Select the desired address by pressing the appropriate address pushbutton. The appropriate LED should light when the button is pressed.

5. If You wish to start from "scratch" press the ERASE button. The DELAY/EDIT LED should turn off then bank an to indicate that the operation has been performed.

6. To put the keyer in the "Add" mode press the ADD button. Again the DELAY/EDIT LED should turn off then back on. Always wait for the LED to turn back on before pressing any other switches.

7. Now you may send your first word from the key paddles. After the first word is completed press the ADD button. This will add a word space and store the word to memory. A beep of a different tone will signify that this operation is being performed.

8. You are now ready to send year second word. Again after the word is complete press the ADD button. You should repeat step 7 for all the words in the message.

9. After the last word is completed and you have pressed the ADD button to insert the word space and store the word, you must press the ADD button once more to exit the "Add" mode. The DELAY/EDIT LED should blink to indicate this action. Now go to step number 15.

10. Set the memory switch to the desired bank. Bank A will be selected with the button out and is indicated by Red LEDs. Bank E will be selected with the button in and is indicated by Green LEDs.

11. Select the appropriate address by pressing the address pushbutton. The appropriate LED should turn on when the button is pushed.

12. If you wish to start from "scratch" press the ERASE button. This will erase the entire address. The DELAY/EDIT LED should turn off and back on to indicate that the action has been per- formed. Always wait for the DELAY/EDIT LED to turn back on before pressing another switch.

13. Now press the ADD button. This will put the keyer in the "Add" mode. This action should also make the DELAY/EDIT LED blink.

14. Now you may send your entire message from the key paddles. When the message is com- pleted press the ADD button again to exit the "Add" mode. This locks your message into mem- ory. Now you may move on to step 15.

    NOTE: When using the keyer in the Automatic Word.Space mode, you must send from the key paddles with correct character and word spacing. Improper spacing will not be accepted by the 486.

15. Press the CONTINUE button to check the message. The DELAY/EDIT LED will blink and the message will be played. When the message is completed, it will be repeated after a delay as determined by the DELAY control. For this reason it is better to have the DELAY pot set to a relatively low (CCW) value during recording or editing. If the message is correct, press the dot paddle to stop the playback at the end of the current word. Then press the RECORD/EDIT switch to exit the Edit mode. If the message is not correct, or if you wish to change part of the message, move to step 5 under EDITING A MESSAGE.

EDITING A MESSAGE

1. Turn RECORD/EDIT switch ON to enter the CW Editor. DELAY/EDIT LED will light.

2. Set WORD SPACE switch to either manual (out) or automatic (in) style whichever is desired as in step 2 under RECORDING MESSAGES.

3. Select the desired memory address as in steps 3_& 4 under RECORDING MESSAGES.

4. Press the CONTINUE button and the keyer will start playing the message. When it reaches the end, the keyer will repeat the message after a delay determined by the setting of the DELAY pot. For this reason the DELAY pot should be set to a relatively low (CCW) value during record- ing or editing.

5. If you wish to Delete a word, press the dot paddle during the word to be deleted. This will make the keyer stop directly after the word. Pressing the DELETE button will then delete the desired word.

6. Also, you may stop the keyer on the word following the word to be deleted. Then press the BACKUP button to make the editor move backwards one word. The DELETE button will then delete the desired word. You may just as effectively stop the keyer five words after the desired word to be deleted and backup five words. However, the more words you have to back up, the more confusing it may become.

7. You may also insert words into the message. First stop the keyer and use the BACKUP function to locate the desired position in the message. Then use the ADD button to enter the "Add" mode and enter the desired words as in RECORDING MESSAGES above. After exiting the "Add" mode recheck your message with the CONTINUE button. You may then exit the edit mode by pressing the RECORD/EDIT switch to the out position.

The following is a sample Edit session:

1. Turn the MFJ-486 POWER on with all other switches in the out position. The POWER LED should turn on in the Red color to signify that the A bank is active.

2. Press the RECORD/EDIT switch. The DELAY/EDIT LED should turn on.

3. Press the A3 address switch. The A3 LED should turn on to signify that this address has been selected.

4. Press the ERASE switch. The DELAY/EDIT LED should blink to signify that the operation is being performed.

5. Press the ADD switch. The DELAY/EDIT LED should blink. This puts the Editor in the "Add" mode.

6. Send WORD1 from the key paddles. Press the ADD button to add a Word Space. The 486 will emit a lower tone to acknowledge the word space input.

7. Send WORD2 from the key paddles. Press the ADD button to add a Word Space. Another lower tone will be emitted.

8. Send WORD3 from the key paddles. Press the ADD button to add a Word Space. Again the tone will be emitted.

9. Send WORD4 from the key paddles. Press the ADD button to enter the Word Space. Another tone will be heard.

10. Press the ADD button again to exit the "ADD" mode. The DELAY/EDIT LED will blink to acknowledge the operation.

11. Press the CONTINUE button to check the message. The DELAY/EDIT LED will blink and the message will be played. When the message reaches the end there will be a delay as set by the DELAY control and then it will be repeated. The DELAY/EDIT LED will turn off during the Delay period.

12. After hearing and checking the message, press the dot paddle during the playing of WORD3. This will stop the editor after the completion of WORD3. The DELAY/EDIT LED will blink when the keyer stops.

13. After the keyer stops, press the BACKUP button. The Backup function will make the editor move backwards one word. The DELAY/EDIT LED will blink to acknowledge the operation. Pressing this button will make the editor move from the end of WORD3 to the end of WORD2.

14. Press the DELETE button. The DELAY/EDIT LED will blink. You have just deleted WORD2.

15. Press the ADD button to enter the "Add" mode. The DELAY/EDIT LED will blink.

16. Send WORD5 from the key paddles. Press the ADD button to add a Word Space. The low tone should be heard.

17. Press the ADD button to exit the "Add" mode. The DELAY/EDIT LED should blink.

18. Press the RECORD/EDIT switch to exit the CW Editor. The DELAY/EDIT LED should turn off.

19. Press the A3 address button to play the message.

You have just created a message: WORD1 WORD2 WORD3 WORD4 and changed it to: WORD1 WORD5 WORD3 WORD4.

PLAYBACK OF MESSAGE

1. Set the Record/Edit switch out (Play).

2. If you want the message to repeat, the Repeat switch should be pushed in. The delay potentiometer sets the delay time. For minimum delay before the message is repeated. set the delay knob all the way CCW. For the maximum delay set the DELAY control all the way CW. This should result in a maximum delay of approximately 3 minutes. This allows you to use the keyer as a beacon. If repeating is not desired, the REPEAT button should be out.

3. Press MEMORY switch in for memory bank E, out for memory bank A. The Power LED will be green for bank E and red for bank A.

4. To start a message press one of the five address switches marked A1/E1. A2/E2, A3/E3, A4/E4, or A5/E5.

5. To stop a playing message, press the appropriate address switch. The 486 will stop the message after completing the word being sent. The message will then be reset back to the beginning.

6. At any time while the message is playing, you may interrupt the message by sending from the key paddles. The message will automatically pause. The address indicator LED will remain lit to signify that the message has not finished playing. When the address switch is again pressed, the message will finish playing from the point it was paused.

NOTE: A5/E5 message locations are reserved for a number (up to 4 digits). Programming either A5 or E5 will also program the other. The difference in these locations is that location E5 increments before the number is sent out. So if you program the number five, for instance, pressing E5 will send the number six.

RECORDING MESSAGES WITHIN MESSAGES

A special feature of the MFJ-486 is that you may record any of the messages within any other message. To accomplish this you key in the message number of the message to be inserted at the point which you want to call it in step 4 above. For example, if you wanted to insert message A3 inside message A2 you would key in didahdidididahdah at the point in message A2 you wanted A3 to play. If you wanted message E2 to play in A2 you would instead key in dididahdahdah at the point where you wanted E2 to play. Note that when calling a memory location, there is no space in the address.

AUTOMATIC CONTEST NUMBER

Messages A5 and E5 are reserved for a four digit contest number. Sending message A5 will send the number stored in this location. Sending message E5 will increment the number and then send it. Recording a number in either location will store the number in both locations. If you attempt to store any morse code except numbers in these messages, the computer will change the code to 0.

RANDOM CODE GENERATOR

The MFJ-486 is equipped with a Random Code Generator which can be used to learn code and increase code speed. It has two basic modes of operation- character sets and English messages. In order to operate the character set generator:

1. Put RANDOM CODE switch on with the REPEAT switch off.

2. If you want all the Morse characters including punctuation put the RECORD/EDIT switch out. If you do not wish to use punctuation, put the RECORD/EDIT switch in.

3. The AUTOMATIC WORD space switch on will result in groups of five characters. AUTOMATIC WORD space switch off gives random group length from 1 to 8 characters.

4. Press a message switch and the random code will begin. It can be stopped at any time with the DOT paddle and restarted with the DASH paddle.

5. The DELAY pot can be used to increase the spacing while using the RANDOM CODE GENERATOR. This allows you to send practice code in the Farnsworth Method.

6. Messages E1 through E5 are always constant. Messages A1 through A5 will repeat until the power is turned off and then back on. When the power is turned off and then on, messages A1 through A5 will be changed.

In order to operate the RANDOM CODE GENERATOR in the English message mode:

1. Put the RANDOM CODE switch on and the REPEAT switch on.

2. Put the RECORD switch on.

3. Press one of the momentary message switches and a random English message will begin. It can be stopped at any point with the DOT paddle and will resume with the DASH paddle.

4. Items 5 & 6 above applies equally to the English messages.