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The Basics

Introduction

The MFJ-418 Pocket Morse Code Tutor is the most capable and versatile Morse code training tool on the market. This unit can be used by a beginner to learn Morse code or an experienced Ham to increase code speed. The Code Tutor contains words, names, and callsigns used in amateur radio, and a random QSO generator to simulate "on the air" contacts.

Its strong, high-quality audio makes it a valuable tool for any training environment. The MFJ-418 can provide:

- Individual or group code practice with random sending of:

    Basic, advanced or custom-configured character groups, including:
        All characters in the FCC code tests and more
        Preprogrammed or custom-configured sets of words
        Exam-style sample amateur QSOs

- Practice or demonstrations for groups via either its built-in speaker or by feeding its audio output to a Public Address system.

Battery

The Code Tutor uses a nine-volt battery (not included). MFJ recommends the use of alkaline (or rechargeable nicad) batteries to reduce the risk of equipment damage from battery leakage. Avoid leaving battery in this unit during periods of extended storage. Battery life will vary depending on usage, so always keep spares on hand. Remove weak battery immediately! When the display flashes or fades, your battery is weak and has only enough power to run a little while. Although the Tutor will still provide code practices, you need to replace the battery as soon as possible.

To install a nine-volt battery:
1. Turn off the power to the Tutor.
2. Slide battery cover from back of the Tutor.
3. Remove old battery and insert the new battery.
4. Slide battery cover back in place, then turn the Tutor ON.

WARNING:	**Always make sure the power is off before removing and installing the battery.**

In this manual, we'll start by explaining the basics of the MFJ-418, then show how you can quickly start using it for some of its major functions. In the Fast Start section, we'll concentrate on putting the unit to work for you immediately. As you'll see, you can start using it in just a few minutes. In later sections, we'll cover all its capabilities and features in full detail.

Getting Started: How to Use the Menu System

You may set up the MFJ-418 to perform any of its many functions by making the appropriate selections from its menu system. This system consists of ten main menus, eight of which have submenus. You make your selections using the three buttons on the control panel−Next, Previous and Select. These buttons do the following:

- Next−Selects the next main menu, or the next item in a submenu.

- Previous−Selects the previous main menu, or the previous item in a submenu.

- Select−Enters a submenu to allow changing your choices within that submenu. To do this, press and release the Select button within one second (as we'll see later, this button does other things when held down longer than one second).

The menus are arranged in a "wrap-around" structure, so that pressing the Next or Previous button will bring up another menu or submenu item in a sequence. Figure 1 shows the sequence of the main menus. Notice the availability of the Combine, the Group and the QSO Tone menus depends on the selection in the Set menu; that is, if any one of these three menus are not applicable to the current active set, it is automatically skipped. When power is turned on, the menu displayed is the one that was displayed when the unit was last turned off.

To see how the menu system works, consider the following example.

EXAMPLE: If the display shows that you are in the Overall Speed menu, pressing the Next button would put you in the Farnsworth menu and pressing the Previous button would put you in the Repeat Play menu. Pressing the Select button would put you in the Overall Speed submenu. This is indicated by a blinking block at the right side of the LCD display. While this block appears, you may raise the speed by pressing the Next button or lower it by pressing the Previous button. Once you have selected the speed you desire, you may leave the submenu by pressing the Select button again.

Once you have made your choices within the unit's submenus, they will be saved in non-volatile memory for your next session.
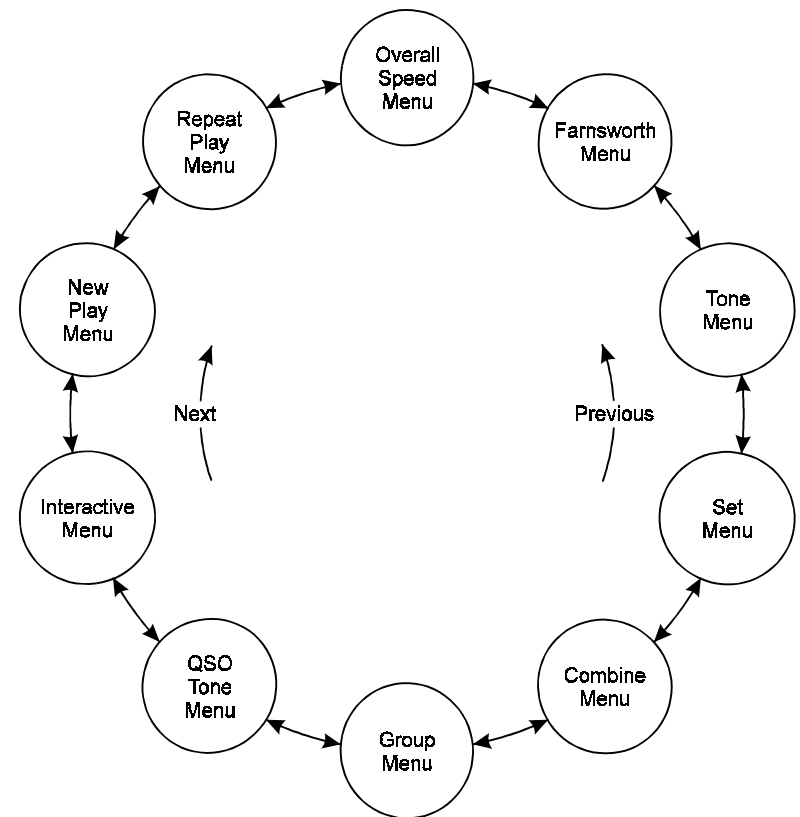
Figure 1. MFJ-418 Main Menu System.

Fast Start: Using the MFJ-418

In this section, we'll show how you can quickly set up the MFJ-418 to perform each of its major functions. To start, turn on the unit using the Off/Volume control and press the Next button until you reach the first menu mentioned, then follow the instructions.

- Overall Speed Menu−Enter this submenu by pressing Select and choose your overall sending speed (using the Next and Previous buttons), then exit the submenu by pressing Select again.

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- Farnsworth Menu−Farnsworth spacing means that individual characters are sent faster than the overall sending speed. For example, many 13-wpm Amateur Radio examinations consist of characters sent at 18 wpm, but spaced out to reduce the overall sending speed to 13 wpm. To choose Farnsworth spacing, press Select. The blinking block will appear. Use the Next and Previous buttons to select the Farnsworth speed you desire. Setting the Farnsworth speed the same as the overall sending speed will turn Farnsworth spacing off.

- Tone Menu−Press Select to enter this submenu and select the audio tone you desire. If you're preparing for a code examination, you should know that most exams are given using audio tones between 700 and 800 Hz, so you may want to stay within that range so it sounds familiar to you during the exam. Pressing Select again will exit the Tone menu and return you to the main menu sequence.

- Set Menu−This selects the set of characters, words or QSOs that will be randomly sent. The MFJ-418 offers a wide variety of practice sessions applicable to many different code-training techniques and to all stages of your code training. The character sets available are: nine beginner sets, eleven advanced sets, and four custom sets you may program yourself. As you step through these options, the contents of the sets are displayed on the LCD.

  When you have selected the second or higher Beginner Set or Custom Character Set, the Combine menu allows you to combine previous Beginner or Custom Character sets into a single set for practice purposes.

  When you have selected a *character* set, the Group menu lets you set the number of characters to be sent in each group.

  When you have selected the *QSOs* set, the QSO Tone menu lets you set the audio tone for the second station of each QSO session.

  For complete details of the Set menu, see page 9.

  To decide which of these sets to choose, you must first decide how you are going to approach the task of gaining code proficiency. See the section titled "Learning Morse Code" on page 5 for information about different code-training techniques.

- Interactive Menu−With the Interactive function turned on, the unit will halt after sending one or more (your choice) words or code groups and wait for you to press the Next button before sending the next word(s) or group(s). If you want this feature activated, press Select to turn Interactive on, then Next or Previous to choose how many words or groups the unit should send

before halting. When you have made this selection, press Select again to exit this menu.

- New Play Menu−Press Select to have the unit start sending code. To pause the sending, press Select again (the word "PAUSE" will appear in the display). To stop the sending, press the Select button and hold it down for more than one second (the word "STOP" will appear in the display).

- Repeat Play Menu−If you wish to hear the previous session sent again, press Select.

Learning Morse Code

Learning Morse code is a matter of practice, practice and more practice. Whether you're just starting to learn the characters or working on high-speed "head copying," you'll succeed through regular, frequent practice. That is why the MFJ Pocket Morse Code Tutor is the ideal tool for learning the code. It provides an extremely wide variety of practice sessions, all sent in truly random fashion and with high-quality audio like that used in examination sessions.

Unlike tapes, which you quickly can memorize and thus defeat the purpose of the practice, the Pocket Code Tutor sends a new practice session every time to hone your skills. With speeds from 3 to 60 wpm and sets from a few characters to the entire character set, then words and QSOs, this unit can take you from no code skills at all up to the ranks of high-speed CW contesters.

Over the years, many different programs for building code proficiency have been developed, but the common element to all these programs is regular practice. With the MFJ-418, you may follow any training program you desire. This unit is extremely versatile and allows you to tailor its functions to provide the type of code practice you desire. It also allows you to customize your practice sessions to focus on any particular trouble spots that may arise during your training.

A traditional method of gaining code proficiency has been to learn all the characters, then slowly build speed. While this succeeds for many people, it proves frustrating for others. A common complaint is that, at about 10 wpm, students hit a "plateau," where they see no increase in their copying speed for some time. An alternative method, devised by a psychologist in the 1930's, starts students at full speed, say 15 or 20 wpm, but with only a limited set of characters at the beginning. This Koch Method, named after its inventor, showed the fastest training progress of any method ever published in the psychological journals.

The MFJ-418's Custom Character sets allow you to use the Koch Method in an easy, straightforward manner. For full details on the Koch Method, as well as on CW operating and the history of Morse code, see the book, "Morse Code: Breaking the Barrier" (MFJ-3400), available from MFJ Enterprises, Inc..
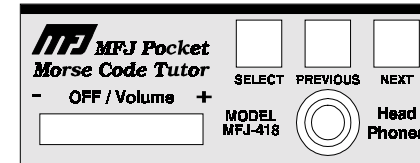
Interface Components and Accessories

Figure 2. MFJ-418 Control Panel.

- **Next button:** Press to display the next menu or setting.

- **Previous button:** Press to display the previous menu or setting.

- **Select button:** Press to select the current menu or setting.

- **Off/Volume control:** Turns the unit on/off and controls the audio volume to the speaker and headphones.

- **Head Phones jack:** A 3.5 mm jack that accepts both stereo and mono plugs. A set of headphones can be used for privacy. Use of headphones will disable the internal speaker. An optional foam earpiece earphone, the MFJ-291I, is available from MFJ Enterprises, Inc..

> *WARNING:* **To prevent suffering hearing damage when using headphones, turn the Volume control to minimum before putting on the headphones, then slowly adjust for a comfortable volume.**

- **LCD display:** A 2-line by 16-character alphanumeric display.

- **Internal Speaker:** An 8-ohm speaker located at the back of the unit. Use of headphones will disable the internal speaker. An optional external speaker, the MFJ-281, is available from MFJ Enterprises, Inc..

- **Battery:** This unit uses a nine-volt battery (not supplied).

- **Protective Pouch:** The MFJ-26, available from MFJ Enterprises, Inc., is an optional soft leather pouch custom-made for the MFJ-418. It has a pocket/belt clip, a clear protective window for LCD display and cutouts for buttons, control, jack and speaker.

The Menus

Setup Mode

Entering the Setup mode allows you to change some basic functions of the Code Tutor. To enter the Setup mode, first turn off power to the unit, then press and hold *both* the Previous and Select buttons while turning power on. When "ON-THE-FLY SPEED" appears, release the buttons. In the Setup mode, press Next or Previous button to select the next or previous submenu, respectively, and press the Select button to toggle the options within that submenu.

To exit the Setup mode, press and hold the Select button for one second. Release the button after "EXIT" appears to resume with normal operation.

You choose Setup options from two submenus. These are:

- **On-the-Fly Speed:** With this option ON, you may change the sending speed while the Tutor is sending, as described below in the section on the Play menus. In Setup mode, you may turn this feature OFF to avoid accidentally changing the speed during a session.

- **Play Format:** This selects the order in which the character is sent to the display and the speaker. You may choose to have the character sent to the display first, then the speaker, or vice-versa.

Overall Speed Menu

This menu allows you to select a sending speed from 3 to 60 words per minute (wpm). By "overall" speed, we mean the speed at which the words or groups are sent. A "word" is defined as 50 units of time, and the word "PARIS" is exactly 50 units in length. Therefore, if "PARIS" is sent 13 times in one minute, the sending speed is 13 wpm.

Standard Morse code timing defines a dit as one unit of time and a dah as three units of time. Within each character, there is one unit between elements (dits and dahs). Three units separate characters and seven units separate words. Farnsworth spacing (see below) will increase the amount of time between characters and words.

When "OVERALL SPEED" is displayed, press Select to enter the menu, then Next will increase the overall sending speed and Previous will lower it, both in 1-wpm increments. Once you have selected your speed, press Select again to exit the

menu. Note that setting the overall speed greater than or equal to the Farnsworth speed will disable Farnsworth spacing.

Speed requirements for U.S. amateur licenses are: 5 wpm for Novice and Technician-Plus, 13 wpm for General and Advanced, and 20 wpm for Amateur Extra Class. Many amateur exams are administered using Farnsworth spacing. For example, many 5- and 13-wpm exams are administered by sending 18-wpm characters spaced out to provide the slower overall speed. In order to provide themselves a "buffer" to overcome possible test-day jitters, many amateurs practice at a slightly higher speed than that at which they will be tested. Someone trying for the 13-wpm test, then, might practice with 18 or 20 wpm characters spaced out to an overall speed of 15-16 wpm. That way, when test day comes, the exam may sound slow and easy, boosting your chances of success.

Farnsworth Menu

As explained previously, Farnsworth spacing adds more time between characters to slow down the overall sending speed. The advantage of this is that, by hearing the characters sent at a faster speed, you learn to recognize each character by its distinctive rhythm, rather than by trying to "count dits." This greatly assists you in copying Morse code at higher speeds.

To activate Farnsworth spacing, press Select when "FARNSWORTH OFF" is displayed. A blinking block will appear on the right-hand side of the display. Press Next to increase the Farnsworth speed or Previous to reduce it. The Farnsworth speed, however, must be higher than the overall speed. To turn Farnsworth off, reduce the Farnsworth speed to the same speed as the overall speed.

Tone Menu

The Tone menu allows you to select the audio frequency sent by the unit. You may select frequencies from 305 to 1006 Hz. While you can choose an audio frequency that pleases you, you should be aware that most amateur code exams are given using audio frequencies between 700 and 800 Hz. Also, most CW transceivers use sidetone frequencies in the 700 to 800 Hz range.

To select your audio frequency, press Select when "TONE" is displayed. Then, you can use Next to raise the frequency or Previous to lower it. Press Select again to exit the Tone menu.

The MFJ-418 features smooth, clean audio, with sine wave output, instead of the harsh square wave audio used by many other code-training machines. Also, the MFJ-418 produces each dit and dah with a rise and decay time of approximately 5 milliseconds, avoiding the "spikes" that cause distracting key clicks. The MFJ-418's audio sounds like that of the high-quality tapes frequently used for exams or that of a good CW transceiver.

Set Menu

The Set menu allows you to select the set of characters, words or QSOs from which the MFJ-418 will send random practice when playback is started. These are classified as Beginner Sets, Advanced Sets and Custom Sets. There are nine Beginner Sets, 11 Advanced Sets and four Custom Sets. The Combine feature (detailed below) allows you to combine Beginner and Custom Character sets for your practice sessions.

Beginner Sets

The nine Beginner sets include letters, numerals, punctuation marks and prosigns (procedural signals used on the air). When a single Beginner set is selected, each playback will begin with the characters in that set sent in the sequence listed below three times, separated by a word space. Then the characters will be sent randomly. The three repetitions at the beginning are designed to familiarize you with the sound of the characters before random sending begins. This familiarization sequence is not sent when the Combine function is enabled, indicated by a "+" character on the right side of the display.

The Beginner Sets are:

- EISHTMO   letter1
- AWJNDB   letter2
- UVGZKRPX   letter3
- FCLQY   letter4
- 12345   number1
- 67890   number2
- . , ? / + * =   prosign1
- ; : ' " - _ $ prosign2
- ( ) & ! % @ ¶ K prosign3

Prosign	Represent By	Display As
End of Message	+	<AR>
End of Work	*	<SK>
Wait	&	<AS>
Understood	!	<SN>
Starting Signal	%	<KA>
Error	@	<HH>
Go Ahead	K	K

Table 1. Procedural Signals.

Note: In the above listings, punctuation marks are included in the prosign sets. In addition, prosigns are represented by symbols and most prosigns are displayed within "<" and ">" during playback as shown in Table 1. The prosign1 set consists prosigns required on the FCC Amateur Radio tests.

The Combine Menu:

When you have selected any Beginner or Custom Character set other than the corresponding first sets (EISHTMO and CST CHR1), the Combine menu will be available to you. This feature allows you to combine Beginner or Custom Character sets into a larger pool of characters from which the unit will send. By combining sets, previously learned sets are combined with new sets to reinforce all that you have learned.

When the second or higher Beginner or Custom Character set is selected, Combine will appear in the main menu sequence. To make your choice, press Select to activate the Combine menu, then press either Next or Previous to toggle the Combine function on or off. Then press Select again to leave the Combine menu.

When the Combine function is on, the current character set is combined with all previous Beginner or Custom Character sets (a "+" character will appear on the right-hand side of the display in the Set menu). When off, *only* the current character set is used (no "+" character displayed).

The Group Menu:

When sending from character sets, rather than words, callsigns or QSOs, the unit sends the characters in groups, with word spacing between groups. You may select either random-length groups or fixed-length groups with lengths up to 8 characters per group. When you have selected a character set, the Group menu is activated. To change the group type, press Select, then, using the Next or Previous button, choose either random-length groups or the number of characters for fixed-length groups.

Advanced Sets

The Advanced sets are designed for the later stages of code training, after the student has learned all the characters. These include letters, numbers, prosigns, and combinations of these, as well as callsigns, words and sample QSOs–the format of the FCC Amateur Radio tests. Anyone preparing for an Amateur code exam should practice copying sample QSOs such as those sent by the MFJ-418. Be sure you copy such details as the stations' callsigns, the operators' names, their QTHs, rigs, and any other details that could be asked in a multiple-choice or fill-in-the-blanks test question.

In addition to preparing for tests, Amateurs who already have passed the tests and wish to improve their code proficiency will find these advanced sets very

useful. The sets of callsigns and words and the sample QSOs are an excellent way to help build the ability to copy at higher speeds and to copy "in your head." The callsign practice can be useful for contesters who wish to improve their ability to work CW contests where the speeds can be quite high.

The Advanced Sets are:
- LETTERS   All letters
- NUMBERS   All numbers
- PROSIGNS   All prosigns
- LETTERS+NUMBERS   All letters and all numbers
- LETTERS+PROSIGNS   All letters and all prosigns
- NUMBERS+PROSIGNS   All numbers and all prosigns
- FCC CHAR   The 43 characters required on FCC code tests [†]
- ALL CHAR   All characters
- CALLSIGNS   Randomly-generated USA callsigns
- WORDS   Random words (500 words database)
- QSOs   Randomly-generated sample QSOs

[†] FCC testing requirement consists the 26 letters, the 10 numerals, the period, the comma, the question mark, $\overline{AR}$, $\overline{SK}$, $\overline{BT}$ and fraction bar $\overline{DN}$.

The QSO Tone Menu:

The QSO Tone menu allows you to select the audio frequency sent by the unit for the second station when playing the QSOs set. This allows different audio tones to be used for the two QSO stations. This menu is only available when the QSOs set is the active set. You may select frequencies from 305 to 1006 Hz or let the unit randomly choose a frequency from 305 to 1006 Hz for each QSO session. While you can choose an audio frequency that pleases you, you should be aware that most amateur code exams are given using audio frequencies between 700 and 800 Hz. Also, most CW transceivers use sidetone frequencies in the 700 to 800 Hz range.

To select your audio frequency for the second station, press Select when "QSO TONE" is displayed. Then, you can use Next to raise the frequency or Previous to lower it. Press Select again to exit the QSO Tone menu.

Custom Sets

There are three custom character sets (CST CHR1, CST CHR2 and CST CHR3) and one custom word set (CST WORD). The custom character sets can contain up to 16 characters each and the custom word set may contain up to 10 words. These may be configured with the characters or words you wish. In addition, the custom character sets may be combined with the Combine function, described above, to make a single custom set of up to 48 characters.

The custom character sets allow you to use the MFJ-418 to learn Morse code using the *Koch Method*. To do this, configure the first custom character set with your first two characters for Koch practice, and practice using that set. When your copying accuracy reaches 90 percent, add another character to this custom set. As you again reach 90 percent accuracy with the next character, add another. By combining the three custom character sets, you can add characters to your Koch practice sessions until you have learned all the characters required for the FCC exam, at which point you can switch to copying words and QSOs. For full details on the Koch Method of code training, see the book "Morse Code: Breaking the Barrier" (MFJ-3400), available from MFJ Enterprises, Inc.

At any time in your training, you can configure a custom character set to provide extra practice on characters that prove troublesome.

Custom Characters:

Here is how to configure a custom character set:

- Go to the Set menu and press Select. A blinking cursor will appear.
- Go to any of the three Custom Character submenus by using the Next or Previous button.
- Press and hold the Select button for one second. The blinking cursor will then move to the second line of the display.
- You may then change the character under the cursor by pressing Next or Previous. The order of the characters is the 26 letters in alphabetical order, the blank character, the 10 numerals, then the prosigns in the order they appear in the chart on page 17.
- Press Select to set the character under the cursor and move the cursor to the next character.
- A character may be repeated to have it sent more often.
- A character may be erased by changing it to the blank character. The first character in any set cannot be erased; a set must contain at least one character.
- Press both Next and Previous to erase all remaining characters, including the one under the cursor.

- To stop programming and save the custom character set, press Select for one second. The blinking cursor will disappear. You may now start a practice session using the custom set you have built.

Custom Words:

To configure the Custom Words set, first read the Custom Characters section.

- Go to the Set menu and press Select. A blinking cursor will appear.
- Go to the Custom Words submenu using the Next or Previous button.
- Press and hold the Select button for one second until [CST WORD] is replaced by [WORD XX].
- You may select any word in the set by using the Next or Previous button.
- Press Select to modify the word displayed. You then may modify it character by character just as you would change Custom Characters as described above. To set the word and return to the word-selection submenu, press Select for one second.
- The first letter in any word cannot be erased. Compound words, such as "ham radio" and "code tutor," may be used.
- You may include prosigns in the Custom Words set by using "<" and ">" to build the prosigns. A custom prosign must begin with "<", end with ">", and contain at least one character and may not contain spaces. Examples are <IMI>, <AAA> and <AS>. Violation of this format, such as custom prosigns containing spaces or not ending with ">", will result in wrong timing during playback.
- To stop programming and save the current word set, press Select button for one second. The blinking cursor will disappear and [WORD XX] will be replaced by [CST WORD].

Interactive Menu

The Interactive function allows you to have the unit send one or more words, groups of characters or QSOs, then pause. With the Interactive function turned on, the unit will halt ("HALT" appears) after sending one or more (your choice) words, code groups or QSOs; and wait for you to press the Next or Select button before sending the next word(s), group(s) or QSO(s). To repeat the previous word(s), group(s) or QSO(s), press the Previous button.

If you want this feature activated, press Select to turn Interactive on, then Next or Previous to choose how many words, groups or QSOs the unit should send before halting. When you have made your selection, press Select again to exit this menu. To turn the Interactive function off, press Previous to reduce (or Next

to increase) the number of words, groups or QSOs. When you reduce the number below 1 (or increase above 100), Interactive is turned off.

Important: The word "HALT" must appear on the display *before* pressing either the Next or Previous button *once-and-only-once* to send anther set of word(s), group(s) or QSO(s); otherwise, the overall speed will unintentionally be changed on-the-fly (if it's enabled).

New Play Menu

Pressing the Select button when "NEW PLAY" is displayed will begin a new practice session. From the set you have selected, the unit will send random practice. All current settings, such as speed, tone, etc., will be in effect for your practice session. To pause sending, press Select and "PAUSE" will appear. To resume sending, press any button. To stop the session, press and hold Select for one second ("STOP" will appear).

Repeat Play Menu

Pressing the Select button when "REPEAT PLAY" is displayed will repeat the previous practice session. To pause the session, press Select. To stop the session, press and hold Select for one second. During playback, the sending is also displayed on the LCD. The length of a session that can be repeated is unlimited. Repeating a session allows you to recopy the same code to check your accuracy, perhaps at a slower speed and/or with interactive mode enabled.

Note: During New or Repeat Play, while the unit is sending, the speed may be changed during the sending by pressing Next to increase or Previous to decrease the speed. This feature is called on-the-fly speed changing. By pressing Next or Previous once quickly, you change the speed by one wpm. If you hold the button down, the speed continues to change. After the fifth change, the rate of the speed change will increase. During on-the-fly speed changes, two numbers will appear on the second line of the display. The first is the overall speed and the second is the Farnsworth speed (00 if Farnsworth is disabled). If you bring the overall speed up to the Farnsworth speed, that will turn the Farnsworth function off. Speed changes take effect after the button is released and the element in progress is completed. If you do not want the on-the-fly feature in effect during your sessions, you may turn it off from within the Setup menu.

Hint: A short-cut to the *last-used* Play menu is by pressing and holding the Select button for one second from any *main menu* (no blinking block).

Appendices

Factory Defaults

The unit is shipped with the following default settings:

- OVERALL SPEED = 13 WPM
- FARNSWORTH OFF
- TONE = 701 Hz
- SET [ADVANCED] FCC CHAR
- COMBINE OFF
- GROUP = 5-CHAR
- QSO TONE = RANDOM
- INTERACTIVE OFF
- NEW PLAY

- ON-THE-FLY SPEED ON
- PLAY FORMAT DISPLAY → AUDIO

To reset the MFJ-418 to these defaults, first turn off power to the unit, then press and hold *both* the Next and Select buttons while turning power on. When "DEFAULTS RESET" appears on the display, release the buttons to resume operation.

Self Test

A self-test routine will check the functions of the MFJ-418. This routine checks the display, the buttons, the internal memory and the audio circuitry. During the self-test, you may stop the test by turning off the unit; however, this should NOT be done during the memory test or the memory could be corrupted. The self-test can be completed in approximately 30 seconds.

Note: Performing the self-test will reset the unit to its factory default settings.

Here is the self-test procedure:
1. Turn off the power to the Tutor.
2. Press and hold *only* the Select button while turning the power on.
3. The test begins by displaying a copyright message. This is the test of the display. Release the Select button before the message completes.
4. You will be prompted to press each of the control-panel buttons.
5. The unit then tests its non-volatile memory. Notice this step will reset the unit to its factory default settings.
6. If the unit is okay, a repetitive message "PASS" will be displayed and sent as audio. If there is a problem, a failure message will be displayed and sent.
7. Once you have confirmed that the audio is okay, turn the unit off.

Failure Message Meanings:
- EEPROM FAIL   Non-volatile memory circuitry is improperly connected.
- MEMORY FAIL   Non-volatile memory is bad.
- NEXT FAIL   Next button is shorted or improperly connected.
- PREVIOUS FAIL   Previous button is shorted or improperly connected.
- SELECT FAIL   Select button is shorted or improperly connected.
- VPP FAIL   Logic line Vpp is not pulled low to ground.

Troubleshooting

Q. Why is the display flashing or fading?
A. The battery is weak, replace it with a new one.

Q. Why is nothing shown on the display when the power is on?
A. The battery is probably dead, replace it with a new one.

Q. Why does the overall speed change after playing a session?
A. When playing with the Interactive mode enabled, the overall speed might have accidentally changed on-the-fly when either the Next or the Previous button is pressed before "HALT" appears. If so, the on-the-fly speed feature can be disabled in the Setup mode.

Q. Why can't I change the speed on-the-fly?
A. This feature is disabled, go to the Setup mode and enable it.

Q. Why can't I enable the Farnsworth mode?
A. The overall speed is at its maximum of 60 WPM.

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 reading the manual you may call *MFJ Technical Service* at **601-323-0549** or the *MFJ Factory* at **601-323-5869**. You will be best helped 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 by mail to MFJ Enterprises, Inc., 300 Industrial Park Road, Starkville, MS 39759; by Facsimile to 601-323-6551; or by email to techinfo@mfjenterprises.com. Send a complete description of your problem, an explanation of exactly how you are using your unit, and a complete description of your station.

Morse Code Character Set[1]

A	di-dah	•—		N	dah-dit	—•
B	dah-di-di-dit	—•••		O	dah-dah-dah	——
C	dah-di-dah-dit	—•—•		P	di-dah-dah-dit	•——•
D	dah-di-dit	—••		Q	dah-dah-di-dah	——•—
E	dit	•		R	di-dah-dit	•—•
F	di-di-dah-dit	••—•		S	di-di-dit	•••
G	dah-dah-dit	——•		T	dah	—
H	di-di-di-dit	••••		U	di-di-dah	••—
I	di-dit	••		V	di-di-di-dah	•••—
J	di-dah-dah-dah	•———		W	di-dah-dah	•——
K	dah-di-dah	—•—		X	dah-di-di-dah	—••—
L	di-dah-di-dit	•—••		Y	dah-di-dah-dah	—•——
M	dah-dah	——		Z	dah-dah-di-dit	——••
1	di-dah-dah-dah-dah	•————		6	dah-di-di-di-dit	—••••
2	di-di-dah-dah-dah	••———		7	dah-dah-di-di-dit	——•••
3	di-di-di-dah-dah	•••——		8	dah-dah-dah-di-dit	———••
4	di-di-di-di-dah	••••—		9	dah-dah-dah-dah-dit	————•
5	di-di-di-di-dit	•••••		0	dah-dah-dah-dah-dah	washing —————

Name	Symbol	Sound	Code	Prosign
Period	[.]	di-dah-di-dah-di-dah	•—•—•—	$\overline{AAA}$
Comma	[,]	dah-dah-di-di-dah-dah	——••——	$\overline{MIM}$
Question Mark or Request for Repetition	[?]	di-di-dah-dah-di-dit	••——••	$\overline{IMI}$
Fraction Bar or Slash Bar	[/]	dah-di-di-dah-dit	—••—•	$\overline{DN}$
End of Message, Plus Sign, or Cross	[+]	di-dah-di-dah-dit	•—•—•	$\overline{AR}$
End of Work	[*]	di-di-di-dah-di-dah	•••—•—	$\overline{SK}$
Double Dash, Equal Sign, Pause, or Break	[=]	dah-di-di-di-dah	—•••—	$\overline{BT}$
Semicolon	[;]	dah-di-dah-di-dah-dit	—•—•—•	$\overline{KR}$
Colon	[:]	dah-dah-dah-di-di-dit	———•••	$\overline{OS}$
Apostrophe	[']	di-dah-dah-dah-dah-dit	•————•	$\overline{WG}$
Quotation Mark	["]	di-dah-di-di-dah-dit	•—••—•	$\overline{AF}$
Hyphen or Dash	[-]	dah-di-di-di-di-dah	—••••—	$\overline{DU}$
Underline	[_]	di-di-dah-dah-di-dah	••——•—	$\overline{IQ}$
Dollar Sign	[$]	di-di-di-dah-di-di-dah	•••—••—	$\overline{SX}$
Left Parenthesis or Go Only	[(]	dah-di-dah-dah-dit	—•——•	$\overline{KN}$
Right Parenthesis	[)]	dah-di-dah-dah-di-dah	—•——•—	$\overline{KK}$
Wait or Stand By	[&]	di-dah-di-di-dit	•—•••	$\overline{AS}$
Understood	[!]	di-di-di-dah-dit	•••—•	$\overline{SN}$
Starting Signal	[%]	dah-di-dah-di-dah	—•—•—	$\overline{KA}$
Error	[@]	di-di-di-di-di-di-di-dit	••••••••	$\overline{HH}$
Paragraph	[¶]	di-dah-di-dah-di-dit	•—•—••	$\overline{AL}$
Invitation to Transmit or Go Ahead	[K]	dah-di-dah	—•—	K

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1. FCC test requirement consists the 26 letters, the 10 numerals, the period, the comma, the question mark, $\overline{AR}$, $\overline{SK}$, $\overline{BT}$ and fraction bar $\overline{DN}$.

Some CW Abbreviations

73	Best regards	NR	Number; near
88	Love and kisses	NW	Now
ABT	About	OM	Old man
AGN	Again	OP	Operator
ANT	Antenna	R	Are; received; roger
BK	Back; break	RCVR	Receiver
CPY	Copy	RIG	Station equipment
CQ	Calling any station	RITE	Right
CUL	See you later	RST	Readability, strength, tone report
CU	See you	SIGS	Signals
DE	From	SKED	Schedule
DEG	Degree	STN	Station
DX	Distance; rare station	TEMP	Temperature
ES	And; "&"	TKS	Thanks
FB	Fine business; excellent	TNK	Thank
FER	For	TNX	Thanks
FREQ	Frequency	UR	Your; you're; you are
GA	Good afternoon	U	You
GE	Good evening	WL	Well; will
GM	Good morning	WTS	Watts
GN	Good night	WX	Weather
HR	Hear; here	XCVR	Transceiver
HW	How	XMTR	Transmitter
K	Go ahead	XYL	Wife (ex-young-lady)
MSG	Message	YL	Young lady

Meaning of Q Signals

QRA   The name of my station is
QRL   Do not interfere, Frequency busy
QRM   Being interfered with
QRN   Static
QRO   Increase power, High power
QRP   Decrease power, Low 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, I am
QSB   Your 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 frequency or mode
QSX   I am listening to ... on ... kHz
QSY   Change frequency, change to xmit on ... kHz
QTH   My location (home) is
QTR   The correct time is
QTS   I will send so my frequency can be measured
QUB   Here is the info you requested
QUM   The distress traffic has ended

Send a "?" after a Q signal to ask for information or an action.
Example: QRZ: station (call) is ....   QRZ?: what is your station (call)?

Menus System Chart

OVERALL SPEED	FARNSWORTH	TONE	SET	COMBINE
OVERALL SPEED = 3 WPM	FARNSWORTH OFF	TONE = 305 Hz	SET [BEGINNER] EISHTMO	COMBINE OFF
OVERALL SPEED = 4 WPM	FARNSWORTH ON SPEED = 10 WPM	TONE = 335 Hz	SET [BEGINNER] AWJNDB	COMBINE ON
OVERALL SPEED = 5 WPM	FARNSWORTH ON SPEED = 11 WPM	TONE = 366 Hz	SET [BEGINNER] UVGZKRPX	
OVERALL SPEED = 6 WPM	FARNSWORTH ON SPEED = 12 WPM	TONE = 396 Hz	SET [BEGINNER] FCLQY	
OVERALL SPEED = 7 WPM	FARNSWORTH ON SPEED = 13 WPM	TONE = 427 Hz	SET [BEGINNER] 12345	
•••	FARNSWORTH ON SPEED = 14 WPM	TONE = 457 Hz	SET [BEGINNER] 67890	
OVERALL SPEED = 60 WPM	•••	TONE = 488 Hz	SET [BEGINNER] . , ? / + * =	
	FARNSWORTH ON SPEED = 60 WPM	•••	SET [BEGINNER] ; : ' " - _ $	
		TONE = 1006 Hz	SET [BEGINNER] ( ) & ! % @ ¶ K	
			SET [ADVANCED] LETTERS	
			SET [ADVANCED] NUMBERS	
			SET [ADVANCED] PROSIGNS	
			SET [ADVANCED] LETTERS+NUMBERS	
			SET [ADVANCED] LETTERS+PROSIGNS	
			SET [ADVANCED] NUMBERS+PROSIGNS	
			SET [ADVANCED] FCC CHAR	
			SET [ADVANCED] ALL CHAR	
			SET [ADVANCED] CALLSIGNS	
			SET [ADVANCED] WORDS	
			SET [ADVANCED] QSOs	
			SET [CST CHR1] MORSE-CODE-TUTOR	
			SET [CST CHR2] CUSTOM	
			SET [CST CHR3] CHARACTERS	
			SET [CST WORD] MFJ	

Word Menu:

SET [CST WORD]

SET [WORD 1] MFJ	
SET [WORD 2] MORSE	
SET [WORD 3] CODE	
SET [WORD 4] TUTOR	
SET [WORD 5] COPYRIGHT	
SET [WORD 6] (C)	
SET [WORD 7] MFJ	
SET [WORD 8] ENTERPRISES	
SET [WORD 9] INC.	
SET [WORD 10] 1997	

Setup Options:

ON-THE-FLY SPEED	PLAY FORMAT
ON-THE-FLY SPEED ON	PLAY FORMAT DISPLAY → AUDIO

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ON-THE-FLY SPEED	PLAY FORMAT
OFF	AUDIO → DISPLAY

GROUP	QSO TONE	INTERACTIVE	NEW PLAY	REPEAT PLAY

GROUP	QSO TONE	INTERACTIVE
GROUP = RANDOM	QSO TONE = RANDOM	INTERACTIVE OFF
GROUP = 1-CHAR	QSO TONE = 305 Hz	INTERACTIVE ON EVERY 1 WORD
GROUP = 2-CHAR	QSO TONE = 335 Hz	INTERACTIVE ON EVERY 2 WORDS
GROUP = 3-CHAR	QSO TONE = 366 Hz	INTERACTIVE ON EVERY 3 WORDS
GROUP = 4-CHAR	QSO TONE = 396 Hz	INTERACTIVE ON EVERY 4 WORDS
GROUP = 5-CHAR	QSO TONE = 427 Hz	• • •
GROUP = 6-CHAR	• • •	INTERACTIVE ON EVERY 100 WORDS
GROUP = 7-CHAR	QSO TONE = 1006 Hz	
GROUP = 8-CHAR		

or

INTERACTIVE
INTERACTIVE OFF
INTERACTIVE ON EVERY 1 QSO
INTERACTIVE ON EVERY 2 QSOs
INTERACTIVE ON EVERY 3 QSOs
INTERACTIVE ON EVERY 4 QSOs
• • •
INTERACTIVE ON EVERY 100 QSOs

Schematic