Android Interactive Learning Morse App [Learn Morse]

Introduction:

Caution! Don't even *look at* a table of Morse code before commencing!

This is **guaranteed** to slow you down by imprinting the lookup table in your brain the wrong way round!

This Android morse app interactively teaches audio Morse reading, from scratch. Audio Morse is sent through the devices internal speaker or head phones/set if attached. The volume being controlled via the standard Android control for media sounds. Farnsworth spacing is used for character speed and standard Words Per Minutes (wpm) for overall code speed.

Installation:

As the morse app is currently at final test stage, the installation can only be achieved by downloading the .apk file from qsl.net/g0hyn onto the target Android device (or as an email attachment by request to g0hyn@qsl.net), and then following the system prompts when the file is selected.

To install this test version you will have to enable 'Unknown sources' in your Android devices Security settings. I'd suggest enabling, installing the app, and then disabling to be safe.

You may be asked to accept the privilege request for read/write access to external media (e.g. SD card). This is because the morse app creates (if it does not already exist) a file named morse.txt on the external memory. This file is user editable to create your own practice sentences when the app is in 'Listen' mode ([see Practice Listen Mode for more details]).

"Quickstart" Procedure:

If you want to get going without reading all the boring details, then launch the app, which will default to Learn mode, and assume the user hasn't ever heard morse before...

Follow the instructions displayed i.e.

> *Learn Mode:*
>
> *Set Chars, Tone and Farnsworth as required.*
>
> ▶ *Press Play when ready.*

Once you're ready, press the "Play" button (top left of screen), and after a short pause, the first character in the learning sequence will be sent.

If you think you recognize the character sent, press the corresponding character button. And if you're right it will appear on the screen and after a short pause, another character will be sent.

If you don't recognize the character, which should be the case if your just starting to learn morse code, do not worry, the app will after a reasonable delay, display the character and resend it.
In response you should press the corresponding key, and the app will repeat the character before moving on.

Once you have responded to each new character successfully, the app will introduce the next character in the learn sequence. Initially sending it twice, and then randomly other characters that you have successfully recognized so far, slowly building up the number of characters in use (which will be reflected by the Chars slider) when you have all the ones already in use 'mastered'.

▶ ❚❚ ■

You will find that the "Play", "Pause" and "Stop" buttons are enabled/disabled as appropriate e.g. Play is disabled in running and paused states.

Whilst Learn mode is running, you can press "Pause" to temporarily halt the sending

of morse, and then either press "Pause" again to continue the session, or press "Stop" to end it.

So that your progress can be noted and used as the new starting point the next time you open the morse app, the current Characters in use is saved (along with all the other settings) whenever the app is closed.

Recommended Learning Procedure:

- You've got to practice *regularly*! If you don't, what you've learned will decay exponentially from your mind.
- What you're attempting will become boring. So is filling in your income tax form. But the benefits are worth it.

One or two 20 minute practice sessions per day is fine. Some people find early morning practice, when the mind is fresher, works best. But if you practice for too long, or too frequently, your mind will become saturated. Make your own decision.

Start with the interactive Learn mode, even if you think you know all of the characters already. If you do, this will confirm it. If you don't, run completely through it several times. You'll need several sessions to imprint all characters.

If you respond from the keyboard fast, the app gradually reduces its maximum "waiting" time to match your response time. If you find it's "not waiting long enough", make no keyboard response for a few characters. The app will increase its waiting time again.

As the app remembers the characters you learned in the previous session, it will automatically start from where you left off. If it has been some time since your last session, you might want to adjust the "Chars" slider to initially reduce the number of included when Start is pressed.

The aim is to see your "Mastery Rating" improve with each session (which is displayed when "Stop" pressed).

When you can get through all of the characters in a single session, you can start on practice texts (in File mode). These can those that come with the app, an editable plain text file named morse.txt that you will find on your devices external storage, or randomly generated QSO examples.

Start at (the lowest selectable) overall speed of 3 wpm, which gives about 2 seconds between characters. Send yourself 3 - 4 minute text segments, and make a hard copy

on paper. When you miss a character, blot it out of your mind and concentrate on the next one.

Increase speed when you're getting 60% - 80% correct. You'll probably find that 5 wpm doesn't seem much more difficult than 3 wpm. To make sure of the test, try to get up to 8 - 10 wpm.

Many people find it helpful to regularly listen to a text sent *much faster* than they can read - say at 20 wpm for a beginner. Just *listen,* with eyes closed and mind in neutral. You'll find that letters, then words begin to pop out. After some minutes of that, 5 wpm seems a lot easier, since the higher speed has revved up the mind.

This works for me. I still do it.

The rate at which different people learn Morse varies widely. Don't be discouraged by other's apparent ease of skill acquisition, or the comments of well-meaning old-timers, who can no longer remember how boring it was.

If you're *serious* about using Morse on the air, listen to at least some of the "typical ZL QSO" file or select Gen QSO for randomly generated. These will help to familiarise you with standard procedures and abbreviations. Not *all* QSOs follow the exact pattern you'll see, but if you use their format, you can't go wrong.

Detailed Instructions:

Morse App operates in 2 different modes:

1. **Learn Mode:** You can learn all common Morse characters in interactive mode. **Use this mode first to begin the learning process.**

2. **Listen Mode:** You can play randomly selected entries from any of the supplied text files for receiving practice. Use this mode when you have mastered all of the characters using Learn mode.

The "Learn/Listen" button is used to switch between these two modes.

1. Interactive Learn Mode:

When the morse app is first started, Learn mode is the default and text will be displayed showing a condensed version of these instructions. It will vanish after the "Play" button is pressed, but will always redisplayed when the Learn button is pressed.

1. Pressing the "Play" button will:
   - Clear the display area ready to prompt or echo correct responses

- The histogram will initialise to reflect the number of already learned characters in use

2. A Morse character will sound. If you know what it is, press the appropriate key on the keypad. If you don't, wait. After a reasonable delay the app will tell you, so you'll know.

3. The histogram above the keypad will be continually updated as learning proceeds. *See Histogram section for an explanation of what it's telling you.*

4. Further characters will sound. Keep pressing keys. More characters will be introduced as the app becomes convinced that you know the ones in use sufficiently well.

5. To stop at any stage, press the "Stop" button. A message will appear telling you how you're doing (mastery rating).

6. To temporarily halt the session at any stage, press the "Pause" button. Pressing the "Pause" button again will continue the session.

2. Practice Listen Mode:

Pressing the "Listen" button (top right) will switch the app into practice mode.

Follow the instructions displayed i.e.

Listen Mode:

Random text will be sent.

Set Farnsworth, WPM and Tone as required.

▶ *Press Play when ready.*

A number of text files, are included for reading practice, after you have mastered all characters.

These files contain textual entries of varying subject mater:

- Morse.txt - This text file is user editable, and resides on the devices 'external storage' (*See note 1 below*)
- P1 - Mixed subjects, mostly sport. Includes numbers, but no punctuation
- P2 - Mixed subjects, mostly sport. Includes numbers, but no punctuation
- P3 - Mixed subjects, mostly sport. Includes numbers, but no punctuation
- P4 - Mixed subjects, mostly sport. Includes numbers, but no punctuation
- P5 - Mixed subjects, mostly sport. Includes numbers, but no punctuation
- Gen RND - Instead of reading from file, random words will be generated and sent *(See note 2 below)*

- Gen QSOs - Instead of reading from file, random QSOs will be generated and sent (*See note 3 below*)
- Lyrics - Top 100 music quotes. Includes some punctuation
- ZL QSOs - Sample QSOs. Callsigns are currently NZ related (although imaginary)

Note 1: The app will check for the file morse.txt on the external storage. If it doesn't find it (which it won't the very first time you open the app.), it will attempt to create the file and write a few explanatory lines to it. This text will be displayed on screen so that you can note it's location for later editing (using your favourite text editor). Or use the inbuilt edit function (see Editing morse.txt section)

Note 2: Selecting Gen RND from the menu will make the app switch from using the predefined files, to generating random groups of characters (min 5 groups), of varying group length (min 1 character), using only the 'Learn sequence' Characters in current use. Also note, the Characters in use slider is enabled whilst GenRND is selected. The characters sent are displayed in lower case to enable easier discrimination between the number zero and the letter 'o'.

Note 3: Selecting Gen QSOs from the menu will make the app switch from using the predefined files, to generating random QSOs in the format:
[callsign-1] de [callsign-2] - [greeting] - hr name [name] - rst [xxx] - es qth [location] - rig hr is [rig] - [power] - [antenna] - [weather] - [employment] - [comments] - hw [name]? [callsign-1] de [callsign-2] k
(callsigns will start with 1 or 2 leters, followed by a single numeric, and ended with 2 or 3 letters)

To send practice text:

- Set the Speed (WPM), Farnsworth Speed (Farns), and Audio Frequency (Tone) desired. *Note: Chars slider is disabled in File mode.*
- Select the desired practice file/generator using the app "Menu"
- Press the "Play" button, which will clear the display and 'zero' the histogram. *Note: Histogram is not updated in listen mode.*
- A randomly selected entry (or generated example QSO) will the sounded and displayed character by character
- To temporarily halt the session at any stage, press the "Pause" button. Pressing the "Pause" button again will continue the session.
- To stop at any stage, press the "Stop" button

- When the entry has been completed, another one will be randomly selected (or generated) and sent.
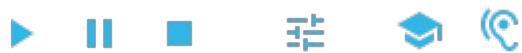
Try not look at the display, but write down what your hearing using pen and paper, and check how you did when your finished. Text will remain displayed if "Pause" or "Stop" is pressed, and the screen can be scrolled back to review previous text.

Slider controls:

The four 'slider' controls are used in Learn and File modes to:

- The **"Farns" (Farnsworth speed)** slider sets the *character speed*. *Note: If the Farns value is set below the WPM value, then the WPM value will be set equal to Farns.* It's default position (14 wpm) is recommended for initial learning.
- The **"WPM" (code speed)** slider sets the *overall code speed* in words per minute. Note: If the WPM value is set above the Farns value, the Farns value will be set equal to WPM.
- The "**Chars**" **(characters in use)** slider sets the number of characters of the 'learn sequence' in use when the next randomly selected morse character is sent. *Note: This value will be automatically increased as you correctly respond to the characters introduced and sent.*
- The **"Tone" (Audio Frequency)** slider sets the output audio between 500 and 900 Hz. Set it to what suits your ears best.

The Buttons:

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▶️ The **"Play"** button initiates sending in either mode

⏸️ The **"Pause/Un-pause"** button temporarily halts sending in either mode

⏹️ The **"Stop"** button halts sending in either mode, but in the case of Learn mode, also trigger the display of how well you are getting on. Use this as a target to beat at your next session.

🎚️ The "**Controls**" button toggles the visibility of the slider controls. *Note: This feature has been included to help users with small screen devices and will only present if the app detects a 'small screen'.*
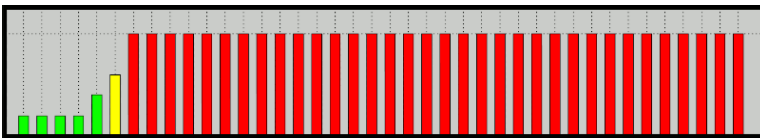
The **"Learn/Listen" button** toggles between Interactive Learn Mode and Practice File Mode. *Note: The button is not enabled whilst sending is in progress.*

The Keypad:

The keypad at the bottom of the screen is only used in Interactive Learn Mode to response to characters sounded, and includes all the characters within the learn sequence. *Note: only correct responses to the character sounded will echo on the display.*

Histogram:

This is a graphic representation of the progress being attained through the learn sequence i.e. how you are doing.

Each vertical bar represents a character (A-Z, 0-9, plus some punctuation characters), and will be updated as the app is running through the learn sequence.

Basically a full red bar means a character is not yet learned, and a low green bar means you have successfully responded to it when it has been sent (with the bar being yellow indicating learning 'in-progress').

When Start is pressed, the app check the Chars setting and updates the histogram accordingly, so if you set Chars to say 10, then the first 10 bars will be dropped, and update according to your future responses.

If you respond correctly to the character sent, then its corresponding bar will be reduced (if not already at min).

If however you respond incorrectly, then the bar will be raised (if not already at max) and the character will be resent.

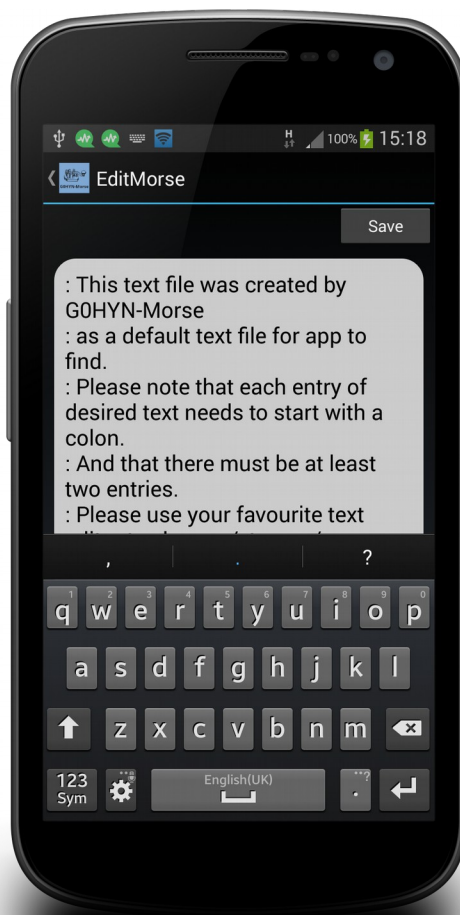*Note: Histogram is only displayed in Learn Mode.*

Editing morse.txt

The app action bar includes an 'Edit icon', which when pressed, switches the screen to edit mode, and the current contents of the file morse.txt is displayed ready for editing.

You can change, delete, or add text to create your own sample text which will be used in File mode when morse.txt is selected from the menu.

The screen should open with the Android system soft keyboard active, but touching the screen inside the text field will activate it.

Once you have completed your editing, press 'Save' to keep your changes, and then press the Action bar back icon ('<') to return to the main app. Note: If you don't want to change the current text or discard any changes you have made, then just select the back icon without pressing 'Save'.
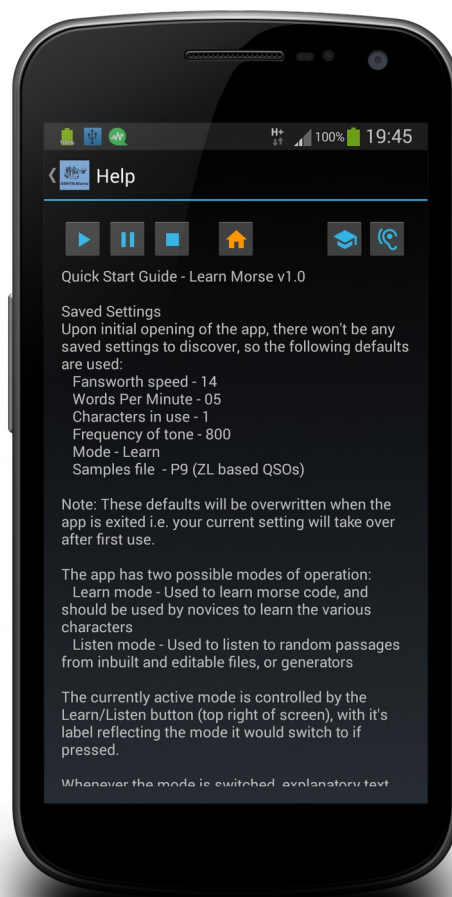

Edit Example

Help

The app includes a help screen selectable via the main screen menu, and contains both a quick start guide and details about the modes and button functions.

The initial help screen displays the 'Quick Start Guide', which explains how to get going with the app without reading loads of information.
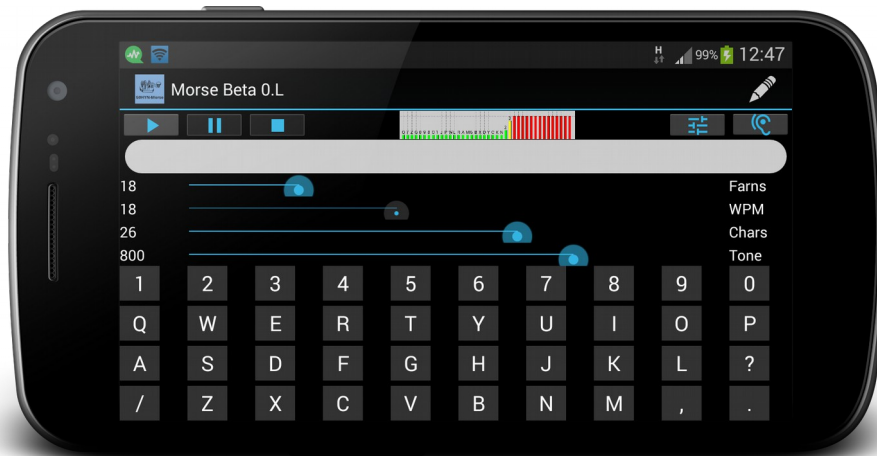
Should you want/need further information, pressing one of the buttons at the top of the screen will display the associated help text for that button/function
i.e. Play, Pause, Stop, Learn, and Listen *Note: Learn/Listen is really just one button in the main app, but for the purposes of giving the right help text, they are shown separately.*

🏠   There is one additional icon only found on the help screen, and that is the help

'Home' button, which will redisplay the Quick Start Guide' when pressed.

Auto rotation (portrait and landscape)

The app includes automatic reaction to rotation of the device from portrait to landscape and visa versa. If the app is running at the time of rotation, it will stop, redraw the in the new layout and await restart.

Landscape example

The following has been taken from the Gary E.J. Bold. ZL1AN help file within his Morse Teaching Program, with his kind permission to provide a more complete background information. I have merely attempted to duplicate the method within an Android app. The text currently contains references to Gary's program, and I hope to go through shortly with a view aligning it to the Android app where appropriate, but there is just too much good knowledge and experience to miss it out:

Expanded Explanations:

Interactive Teaching Mode:

The "Teach Mode" algorithm was devised by Howard Cunningham, and published in QST, May 1977. The principal ideas are:

- **Give audio stimulus only:** The characters must be learned by *sound,* not *sight,* and indexed the *right way around.* Since everybody has more trouble *reading* than *sending,* the "lookup table" that the mind compiles should be ordered with the *characters* indexed by their *sound,* not the *sound,* or *pattern* indexed by *character.* For example if you learn from a printed table that

  "C is -.-."

  you have learned to relate a *character* to a *pattern,* which has been converted

into a *sound.* To decode, your mind then has to do an ordered search of the table, sounding each pattern in the mind ("is it A? Is it B? Is it C? yes!"). If you learn the characters indexed by *sound,* your mind becomes quickly programmed to jump straight to the right character, which is much faster. ("dahdidahdit - that's C")

- **Make learning paced, and progressive:** New information should be introduced at a rate accessible to the student, and only after current information has been sufficiently mastered. Hence, new characters should be introduced one by one at a "comfortable" rate. This means that we must
- **Make learning interactive:** Feedback from the student should be continuously monitored to pace the teaching process. A taped teaching system cannot do this, and even the best human teachers find it hard.
- **Conclusion: Use a computer:** A good software algorithm can implement all these features easily. Computers are non-judgemental, infinitely more patient than human teachers, and can keep track of everything. They are thus far better at teaching tasks involving the imprinting of "stimulus and response" skills - *providing* that a good algorithm is used.

I've used Howard's algorithm for 15 years in my Morse teaching programs, and it teaches Morse better than I can. It monitors the error rate of each character, the average error rate, the maximum error rate, and the response time of the student. Using these parameters, it decides

- which characters need to be sent most often,
- when new characters should be introduced,
- a comfortable "response time" for the student.

The Progress Histogram:

When Teach mode starts, A 40 bar histogram appears at screen bottom. If you are starting from scratch, all bars will initially be set at 1. Each bar is associated with a Morse character. As each character is introduced, its corresponding histogram bar begins to change. A *correct* response *lowers* a histogram bar, an *incorrect* one *lengthens* it. Thus, the height of each histogram bar is related to your *probability of error* on the corresponding character.

The number of characters in use is shown for you to monitor. As the session progresses, this will continuously increase.

When the program judges that you're sufficiently familiar with all characters currently

in use, it introduces another. You will see changes progressing along the histogram reflecting this. Initially, the bars are not labelled with corresponding characters. This is to stop you getting visual clues, which will inhibit your learning. All learning *must* be audio-based.

If you don't respond to any character (you don't know it yet, or have forgotten) the program waits a decent time, tells you what it was, and sends it again. It adjusts the time it waits by averaging the time you take to respond, so you don't have to be a good typist. In fact your response time has *nothing* to do with its evaluation of your performance.

Postponed Discrimination Order.

The order Howard selected is

q7zg098o1jpwlram6bxdyckn23fu45vhsite.,?/

Most long, or less common characters are introduced *early* . This reinforces listening to the *whole* symbol before deciding what it was. If less common characters are introduced *last* (as with many teaching systems) you don't get nearly as much practice listening to and decoding them! With Teach, by the time all the symbols have been introduced, you will *really know* all of those "terrible uncommon letters at the end of the alphabet", as well as *all* of the numbers.

The four final punctuation symbols are included for completeness, since they are often used on the air. However, they will *not* appear in the New Zealand test (see the Appendix for test parameters).

Many systems introduce the numbers *last* . This *guarantees* that they will give most trouble later. Nobody who learns with this system *ever* has great difficulty with numbers. (They are actually easier, since they take "longer to go past").

Terminating the Session:

After pressing the "Stop Teach" button, two things happen.

- Your "mastery rating" will be shown. This is related to the number of characters in use, and your average error rate. When this is 100, you know all of the characters well.
- Character labels replace the numbers designating the histogram bars. Thus, you will be able to see which characters are giving you most trouble.

Recommended Learning Procedure:

- You've got to practice *regularly* ! If you don't, what you've learned will decay exponentially from your mind.
- What you're attempting will become boring. So is filling in your income tax form. But the benefits are worth it.

One or two 20 minute practice sessions per day is fine. Some people find early morning practice, when the mind is fresher, works best. But if you practice for too long, or too frequently, your mind will become saturated. Make your own decision.

Start with the interactive teaching mode, even if you think you know all of the characters already. If you do, this will confirm it. If you don't, run completely through it several times. You'll need several sessions to imprint all characters.

If you respond from the keyboard fast, Teach gradually reduces its maximum "waiting" time to match your response time. If you find it's "not waiting long enough", make no keyboard response for a few characters. Teach will increase its waiting time again.

For subsequent sessions, you can advance to the un-learned characters quickly by entering the number of characters active at the close of the last session in the "Characters to Start" box. The early characters will still be used, but new ones will be introduced almost immediately. You should see your "Mastery Rating" increase with every session.

When you can get through all of the characters in a single session, you can start on practice texts. These can either be those that come with the program, or any other plain text files on your disk. Start at (the lowest selectable) overall speed of 3 wpm, which gives about 2 seconds between characters. Send yourself 3 - 4 minute text segments, and make a hard copy on paper. When you miss a character, blot it out of your mind and concentrate on the next one. If you can't resist cheating, clear the "Show Text" checkbox at the top of the screen so that the text is hidden until you've finished (press the "Abort/Show Text" button).

Increase speed when you're getting 60% - 80% correct. You'll probably find that 5 wpm doesn't seem much more difficult than 3 wpm. To make sure of the test, try to get up to 8 - 10 wpm.

Many people find it helpful to regularly listen to a text sent *much faster* than they can read - say at 20 wpm for a beginner. Just *listen,* with eyes closed and mind in neutral. You'll find that letters, then words begin to pop out. After some minutes of that, 5 wpm seems a lot easier, since the higher speed has revved up the mind.

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If you're *serious* about using Morse on the air, listen to at least some of the "typical QSO" files (901 to 950). These will help to familiarise you with standard procedures and abbreviations. Not *all* QSOs follow the exact pattern you'll see, but if you use their format, you can't go wrong.

Some Common Problems, and What you can do about them.

"Thinking" about the text. This commonly occurs when you move from copying "single characters" to "words". Now what you hear "makes sense", and the mind becomes distracted thinking about the context. With experience, this goes away, but initially it can be troublesome. Here's what some people have done, and reported that it worked. All methods involve "removing temptation" from the eyes.

- Copy with your eyes shut.
- Copy while looking out the window.
- Move a piece of paper along behind your copy, covering up what you've written.
- Write with a sharpened meat skewer with carbon paper and another piece of paper underneath the top sheet. You can still check the copy afterwards.

"Guessing Ahead". We all had this problem, which is associated with the one above. The mind becomes convinced that the "WOM" it has just copied will turn into "WOMAN", but instead it turns into "WOMBAT", and you miss it. Try to keep an open mind. With experience, this problem goes away.

"Rogue Characters." When copying text, you may find that you sometimes miss parts of whole words. This can be because some character appearing near the word start is giving you trouble. Thinking about it, you miss the rest of the word.

Research has shown that different people have different rogue characters, but some common ones are J, W, J, P, Q, and Z. These are all introduced *early* in the interactive TEACH process for this reason.

Try to identify these characters. Then set up a text consisting of groups of these characters appearing in random order. To do this, click on "Advanced", then "RandomChars", on the top menu bar. A new text box and a button labelled "Generate String" will appear. You'll be told to enter the characters you wish to practise in the

box, then to push the button.

This will generate the random groups in the text box, composed of the characters you entered, appearing in random order, but with no more than 2 consecutive characters the same, and with 2 to 5 characters in each group. You can make them invisible to stop yourself cheating by un-checking the "Show Text" box.

Send this string of random characters by clicking the "Send Text" button. Practice copying it a few times, working on just these few characters. You can generate a *different* group set with the *same* characters by clicking "Advanced/Randomchars" again - the same set you entered will still be shown in the text box.

Often, just identifying and fixing these rogue characters can make a dramatic difference to your copy accuracy.

This mode is also useful for *number* copying practice. Enter the string "1234567890" and you'll get a random assortment of numbers, good for practicing for contests or Field day!

What NOT to do!

- *Never* try to memorise letters using *sequences* ("eish5"), as this guarantees that you'll form a habit of running through the whole sequence every time "5" is sent.
- *Never* try to memorise letters using *opposites* (r and k, a and n etc) as this will confuse them in your mind forever.
- *Never* use any code practice program that shows you pictures of dits and dahs on the screen. This will re-inforce *visual* learning, which is counter-productive.

A Comment on Code Speed.

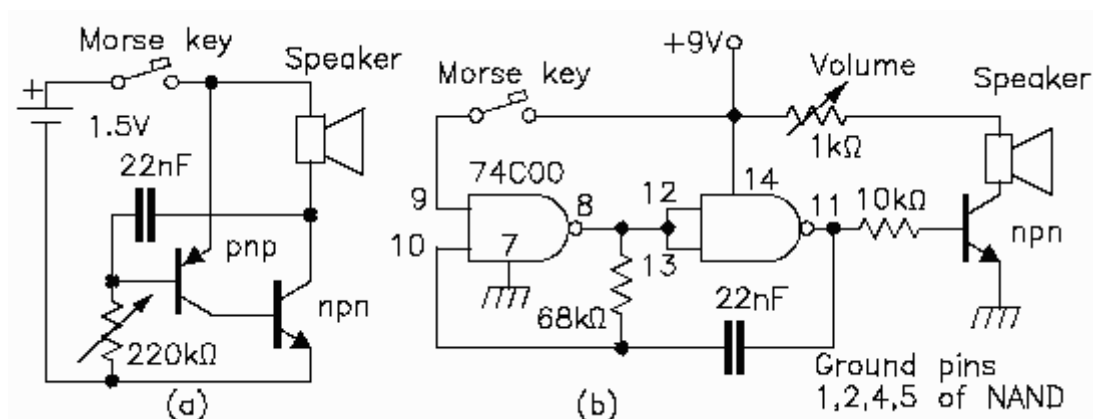Don't *ever* listen to Morse characters sent at less than 12 - 14 wpm!

A considerable body of psychological research shows that below this speed (the "transition speed") characters are heard as "individual sounds". Above this speed, they begin to be heard as "words". Hearing them this way from the beginning eliminates the infamous "plateau" that many have experienced going through the "transition speed barrier"

"Farnsworth Morse" (see the following appendix) means that individual characters are always sent at or above the "transition speed", but longer spaces are used *between* characters to decrease the overall rate to the "overall speed".

Learning to Send:

Start sending practice *only* after you have the correct *sound* and *rythm* of the characters embedded in your mind using Teach. *If at all possible,* visit the shack of an expert, and closely watch what he or she does with the key.

You'll need an audio oscillator to monitor your keying. There are many types. Two simple ones I recommend are shown in the figure below.

Circuit (a) is a blocking oscillator, which runs even with junk-box transistors, powered by a single torch cell. The tone is sharp and horrible, but it's simple. The 220 kohm potentiometer adjusts the frequency.

Circuit (b) uses 2 gates of a quad 74C00 CMOS NAND chip in a square-wave oscillator, driving a speaker or phones through an npn transistor. The pin connections are correct for this chip, but other CMOS NAND chips are different. Ground pins 1,2,4 and 5 (the other inputs) to reduce current drain. Change the 68 kohm resistor to change the frequency, and adjust the volume with the 1 kohm potentiometer.

Morse Keys:

You can take the test sending with a bug or electronic keyer, but these are harder to master, though they require less movement and effort. Unless you have some disability that restricts your hand mobility, stick to the standard, up-and-down, "pump handle" type.

Ham radio suppliers still sell morse keys, and so does Dick Smith Electronics. But the cheap DSE key is too flimsy for serious use. Ask around at the local NZART Branch, and see if a local will sell or lend you one. Go for a large, solid, heavy model. Most ZL Hams prefer the rounded "European" knob - not the flat or slightly dished "American" knob. Some have replaced a knob not to their taste with a replacement pot-lid knob from the local hardware store.

Check out the key before using it! Clean the contacts by pulling a *piece of paper* through them while pressing firmly - *don't* use a points file! Oil the bearings if they look cruddy, and adjust them if possible to take out any sideways movement. I recommend starting with a gap of about 1 mm, and spring tension adjusted so the key closes with the weight of 2 D cells placed on the knob. (You may want to change these settings to something "more comfortable" after you gain experience). If the start and finish of elements sounds "ragged", try connecting about 0.1 uF across the key contacts to zap keybounce transients.

Secure the key firmly *near the table edge* . Some operators use bluetack or plasticine at each edge of the bottom, or even a G cramp or velcro. It must not walk around! Adjust your chair height such that your sending arm is *parallel to the floor* , and *not* touching the table . Grasp the key *loosely* with two fingers atop the knob, thumb at the side or underneath.

Form dots and dashes by "pumping the wrist", *not* by pressing with the fingers! The wrist moves up and down about 1 - 2 cm, with the *elbow stationary.* The arm must be relaxed. Tense muscles will tire you, cause RSI or "glass arm" and lead to later problems. Relax.

To get the relative lengths of dits and dahs correct, start off with this exercise: Relax: Send the continous element stream

<u>di </u>di di di <u>dah </u>dah <u>di </u>di di di <u>dah </u>dah .....

Tap your foot regularly on the accented (underlined) symbols. The "4 dit" and "2 dah" segements should take *exactly* the same time. (Although the dit:dah ratio is 1:3, when the "dot-space" separator is included the ratio becomes 1:2.)

Relax! Do *not* try to send fast! Almost everyone does, and the tendency is to speed up during practice. Listen periodically to TEACH to hear again what "5 wpm sounds like". You'll find this speed quite easy.

However, you *can* send faster for the test if you wish, and many people actually find this easier, because judging the long spaces implicit in Farnsworth Morse is difficult. I can't do it accurately either. Try listening to 12 wpm Morse sent with a Farnsworth

speed of 14 wpm, and model your sending on that. This will also be closer to what you'll end up sending on the air. But remember, you only *have* to send at an overall speed of 5 wpm for the test!

Spaces! Leave *plenty* of space between letters, and *even more* between words! Almost everybody tends to run things together. This is the most common and *horrible* fault you'll hear on the air!

Evaluating your Sending:

Comment: Almost *everybody* I have tested in the last 5 years has had some sort of problem with their grip or action which will later cause fatigue, poor character formation, maybe RSI - which the old-timers called "glass arm". *Nothing* beats an "eyeball" demonstration by an expert and a correction of possible faults *before* you develop bad habits!

Here are several recommendations:

- Find an active CW operator. If at all possible, visit one, or invite one around so he or she can *demonstrate* the grip and action, and check *yours.* If this is impossible, and you have VHF/UHF voice capability, you can ask an expert to listen to you on a simplex channel. Send some text with your audio oscillator close to the microphone, and ask for comments.

- Start TEACH sending one of the supplied texts. Read the text on the screen, and *send along* with the computer. If you have a good ear, you'll be able to hear the difference between the "perfect" morse and your own. (This is *much* harder than it sounds! Even experienced operators have difficulty!

- My original DOS teaching software, which I still distribute (contact me by email, phone or letter), contains a program called MREAD. The instructions tell you how to connect a morse key to 2 pins of a COM (serial) port. Pressing the key sounds an audio monitor tone through the computer speaker (not the soundcard) and the computer attempts to decode the morse you send, and prints it to the screen. It doesn't expect perfect sending, and is comfortable with "reasonable" morse. If it can read you, you'll certainly pass the sending test. Unfortunately, some later versions of Windows, even though they are able to bring up a "DOS box", seem unable to connect the COM port to the program, even though the program appears to run.

- The DOS software also contains a program "DK", for "Doctor". You send a single

word. The computer displays an oscilloscope picture of your morse, gives you some statistics about it, and allocates you a mark out of 100. You'll rapidly see your faults, and will be able to correct them. Again, the DOS box in later versions of Windows is sometime unable to find the COM port and key.

- Sergei, UA9SOV, distributes an excellent shareware Windows program called "CWget". Download it from

  http://www.dxsoft.com/index.html

  CWget reads audio morse through the soundcard, and displays the text on the screen. You'll probably need to pass your oscillator waveform through an attenuator (try a 10:1 voltage divider of 1 kohm and 100 ohm) before applying it to the soundcard input. This is the best morse reading program I know.

A good exercise: Fire up CWget or MREAD, and ensure it's decoding OK. Then, without looking at the screen, send several repetitions of

THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG

Check to see what the computer read. If you see incorrect letters, practise them! If you can't see what's wrong, run up program DK and look critically at these letters. You'll soon see the trouble.

Remember! *Nothing* beats an "eyeball" evaluation by an experienced operator!

If all else fails, send me a cassette tape of your sending for a diagnostic check. I'll send it back with comments and a recorded comment.

Calibrating Electronic Keyers:

Electronic keyers send elements automatically. A "paddle" is used, with *two* horizontally-operated levers. Conventionally, the thumb (left) lever sends a continuous stream of dits, the forefinger (right) lever sends a continuous stream of dahs. Most modern keyers also implement *iambic* operation, where closing *both* paddles sends an alternating sequence of dits and dahs. Elements are guaranteed to be in the correct 1:3 ratio, separated with a correct ditspace.

All keyers vary the sending speed by changing the frequency of a clock, either by front-panel control, or, in microprocessor-controlled units, by commands from the paddle itself.

The *best* way to check the speed, or to calibrate that of an unknown keyer, is to digitize the audio of a continuous dit-stream with a software package such as *GoldWave,* and observe the resulting waveform. Find the average time, *T,* taken to send *one dit and the following dit-space.* The speed *S,* in WPM is then

$S = 2400/T$

Where T is measured in *milliseconds.* That is, if a dot plus the following dotspace take 100 ms, the character speed is 24 wpm.

A less accurate but more convenient method is to send a stream of dits of known speed, and at the same time send dits from the keyer. Then adjust the keyer's speed control until both sound at exactly the same rate. Some people, especially those with musical training, can do this more easily than others. You will hear "beats" near the correct setting, as the sounds slowly move in and out of synchronism.

To send such a calibrated dit-stream using Teach, click on "Advanced" in the top tool-bar, then "Dits". A text of 10 "@" characters will be loaded into the text box, which can then be sent by clicking the "Send Text" button. "@" is coded as a special character, a stream of 20 dits with *no* following character-space. Hence this character string sends 200 dits at whatever speed is set. This will take 40 seconds at 12 wpm. This is normally enough to tune the speed, but the operation can be repeated by clicking "Send Text" again.

The default Farnsworth speed is set at 14 wpm. To set keyer speeds below this, shift the Farnsworth speed bar at 12 (lowest setting). However, I recommend that you *never* use characters speeds less than 14 wpm for reasons covered earlier. If you want to send slower than this, put longer spaces between your characters and words.

If you want to construct an electronic keyer, I strongly recommend the "K9" kitset developed and distributed by Steve, K1EL. I use this keyer whenever I operate portable.

Bug Reports:

Send all bug reports to Robbie Robertson, G0HYN, email G0HYN@qsl.net

Anyway, please have fun with it and let me know if it was of any use, **particularly users new to morse**.

Thanks, 73 Robbie G0HYN