



Instruction Manual AEA KEYER-TRAINER MODEL KT-2

Congratulations on your decision to purchase the versatile AEA KT-2 Keyer Trainer. You will find it is truly a gem for CW operation.

The KT-2 has two basic modes of operation. You may choose between a keyer and a Morse trainer. Control for each mode is provided from the keypad for full feature programming.

You have a fully programmable trainer with an incredible range of features for learning or teaching Morse code. You also have a programmable keyer with selectable speed, tone, dot-dash ratios and automatic and semi-automatic (bug) capabilities.

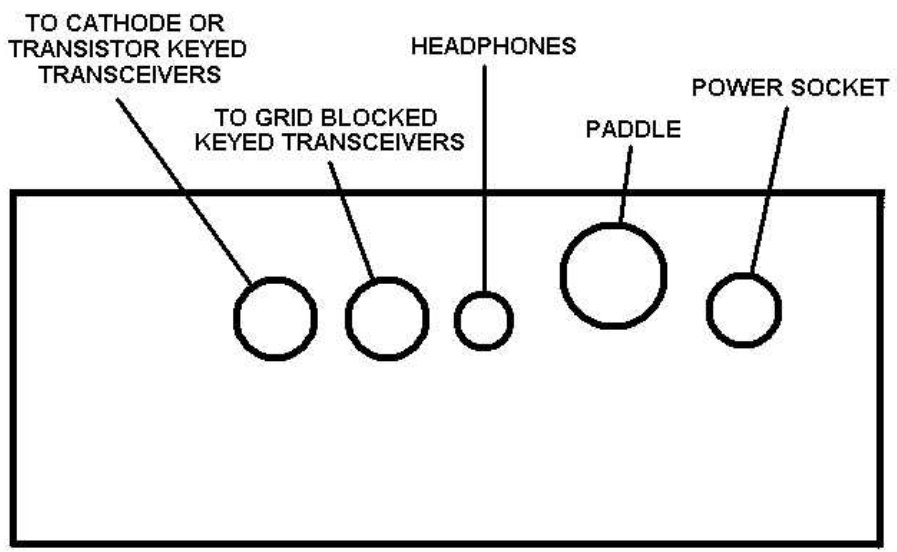
There's a lot more and the possibilities are endless! Just look in the pages that follow and learn how to perform your own KT-2 Morse magic.

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Top Panel



Rear Panel

HOOK-UP INSTRUCTIONS

1. Power

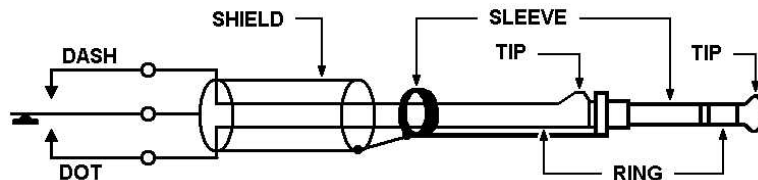
To perform the Check-Out Procedures in the following section and familiarize yourself with the KT-2, it is first necessary to apply 13 volts to the power input jack on the Rear Panel of the KT-2. This may be easily accomplished by connecting the cord attached to the optional AC-1 or AC-2 wall adapter to the power socket on the Rear Panel of the KT-2.

If you do not have one of the optional power supply units, it is necessary to supply 10–15 Volts DC to the KT-2 from any external 12 volt source (including batteries) capable of delivering at least 300 ma. Use the mating power connector supplied for interfacing the KT-2 and the power source. BE SURE TO OBSERVE PROPER POLARITY. The center pin is positive.

The KT-2 may be used in an automobile by using the optional DC-1 power cord. The KT-2 will also operate for 2 to 3 hours between charges from the optional DC-2 Ni-Cad battery pack.

2. Paddle

Wire your external keyer paddle to a stereo phone plug (not supplied) using two conductor plus shield cable (available from any Radio Shack store). Connect the shield to paddle common and the other wires to the dot and dash contacts. By convention, for right-handed operators, the thumb should activate the dot contact and the index and middle fingers should operate the dash contact.



3. Straight Key

A straight key may be used for sending. Use a three conductor stereo plug with the key across the tip (dash) terminal and the sleeve (common) terminal. The KT-2 must be programmed for Semiautomatic mode.

4. Headphones

The headphone jack will drive low, medium or high impedance headphones. A standard 3.5 mm two conductor headphone plug is necessary.

5. Transmitter

The KT-2 will key virtually any modern amateur radio transmitter. There are two output jacks which are diode protected against inadvertent hook-up to the wrong keying polarity. The ground side of the RCA phone jack (keyer output) should be connected to the transmitter chassis ground on the key input jack. The center conductor of the KT-2 keyed output jack should be connected to the "hot" terminal of the transmitter key input jack. Use a shielded coaxial cable for best R.F. immunity. Use the + keyed output jack to key cathode keyed and most keyed transmitters. Use the – keyed output jack to key grid-block keyed and some transistor keyed transmitters. If you connect your transmitter key input to the wrong KT-2 keyed output, either the transmitter will not key, or it will be keyed continuously. To correct the situation, simply plug the output line into the other output jack. No damage should occur to either the transmitter or the MM-1 if you connect to the wrong keyed output jack!

CHECK-OUT PROCEDURE

We recommend that you perform the following functions to quickly acquaint yourself with the KT-2 and to ensure the unit is operating properly.

KEYER SEND MODE

1. Turn the power switch on.
2. On the keypad, press and release [*], then hold your finger on [1]. The monitor tone will increase in frequency.
3. Press [*][*] and hold [1]. The monitor tone will decrease in frequency.
4. Send a series of letters with the external paddle to "get a feel" for the perfect code the KT-2 produces.
5. Press [*][2][0][#] and send more Morse characters. Note that the length of the dots has shortened by one half.
6. Press [*][*][2][4][#][0] and send more Morse characters. Note that the length of the dashes has increased by four-thirds.
7. Turn the power switch off and back on. The monitor tone will return to 1111 Hz and the dot and dash ratios will return to perfect 1:1 and 3:1 respectively.
8. Press [*][6][0][2] and note that the speed has slowed to 2 WPM.
9. Press the dot paddle and very quickly (before the dot has finished sending) press the dash paddle and then let up quickly. After the dot has finished and a proper intracharacter space inserted, a dash will automatically be sent. This is called Dash Memory.
10. Similar to step 9, press the dash paddle quickly and then press the dot paddle momentarily. After the dash is finished and an intracharacter space is inserted (automatically), the Keyer will send a dot automatically. This is called Dot Memory or automatic dot insertion.
11. Press [*][3] and repeat step 10. Note that the Dot Memory is no longer present.
12. Press [*][4] and repeat step 9. Note that the Dash Memory is no longer present.
13. Press [*][*][3] and then [*][*][4]. Note that both Dot and Dash Memories are re-enabled.
14. Enter [*][6] and a two digit number corresponding to a sending speed you feel comfortable with. (If less than 10 WPM use 0 as the first digit.) Practice sending at that speed for about a minute. Because the KT-2 has almost perfect dot and dash ratios and spacing, many operators feel the speed calibration is low. Actually the MM-1 probably has the best speed calibration on the market. It is calibrated using the FCC definition of "PARIS" being the standard word. (See Appendix B.) You might also note that many practice code tapes are actually faster than the advertised speed.
15. Press [*][5] and note that a tone will appear as long as you hold the dash paddle. This is called Semiautomatic or "Bug" mode. Press [*][*][5] and the Keyer will return to fully automatic operation.
16. Press [*][*][7] and very quickly release the [7] button before the feedback tone stops. The KT-2 should then key continuously until you press any keypad button or touch either paddle. This is the Automatic Tune feature. The Tune feature operates only in the KEYER/MEMORY SEND mode. (If you hold the 7 button down, the KT-2 will not go into the Tune mode.)

MORSE TRAINER MODE

1. Press [*][6][0][5] and [*][*][6][2][0] for a starting speed of 5 WPM and an ending speed of 20 WPM. Press *70#5 for a practice duration of 0.5 minutes.
2. Press [*][*][*][#] and the Keyer should start sending code at a 20 WPM character speed with space between characters such that the beginning word speed is only 5 WPM. The space between characters will shorten during the half minute until the spacing is proper for 20 WPM. The Trainer will now continue to send until you halt it by pressing the # button and hold it through at least one character. The Trainer may continue to send a couple of characters before final termination.
3. Press [*][B] and then [*][*][*][#]. The Trainer should repeat sending as in step 2 except that difficult characters will be included. Press and hold to terminate.

4. Press [*][*][9]. Now press [*][*][*][#] and notice that the Trainer is sending random word lengths and not continuous five-letter code groups. Press and hold [#] to terminate.
5. Press [*][*][9] and [*][0]. Pressing [*][*][*][#] will now start slow code in five letter code groups. The slow characters will gradually speed up to 20 WPM in 0.5 minutes.

This concludes the check-out of your KT-2 unit. If all these features operate properly, your KT-2 is in good operational condition. If not, please reread the instructions and if necessary, start over from the beginning. Providing you still have difficulties, contact the AEA Sales Department at 206-775-7373 for advice.

OPERATING INSTRUCTIONS

General

The AEA Keyer Trainer is a compact, full feature keyer and a sophisticated Morse trainer. The trainer features user-programmable automatically increasing code speed, two sets of Morse characters (common and common plus uncommon), five letter groups or random code groups and selectable slow or Farnsworth code training.

Keyer Operation

1. Speed Set

The keyer is set to 20 WPM on turn-on. To change the speed, push [*][6] and enter the new speed as two digits, eg. 15. If the new speed is less than 10 WPM, the first digit must be zero.

Example: To enter 40 WPM, press [*][6][4][0].
To enter 7 WPM, press [*][6][0][7].

Speed may also be entered by [*][*][6].

2. Sidetone Change

The keyer-trainer sidetone is set to 1111 Hz on turn-on. To increase the pitch, press [*][1] and hold the [1] until the desired pitch is reached.

The sidetone pitch may be lowered by pressing [*][*][1] and holding the [1] key.

3. Automatic and Semiautomatic Operation

On turn-on the keyer is set for automatic, lambic operation. The Keyer may be operated as a bug by pressing [*][5]. To return to full automatic operation, press [*][*][5].

4. Straight Key Operation

For code practice or on the air use, the keyer must be used with a straight key by keying the dash input in semi-automatic (bug) mode.

5. Dot-Space, Dash-Space Ratios (Weighting)

"Perfect" Morse code is formed with the length of dot equal to three intra space (a dash-space ratio of 3.0).

To change the dot space ratio, press [*][2] and enter the new ratio using the pound [#] key as a decimal point.

Example: To enter a dot ratio of 0.7, press [*][2][0][#][7] or [*][2][#][7].
To enter a ratio of 1.3, press [*][2][1][#][3].

If the dot-space ratio entered exceeds 1.5 or is less than 0.5, the ratio will be set to 1.0.

The dash space ratio is set to 3.0 on turn-on and is adjustable from 2.0 to 4.0. To change the dash-space ratio, enter [*][*][2] and the new dash ratio using the pound [#] key as a decimal point..

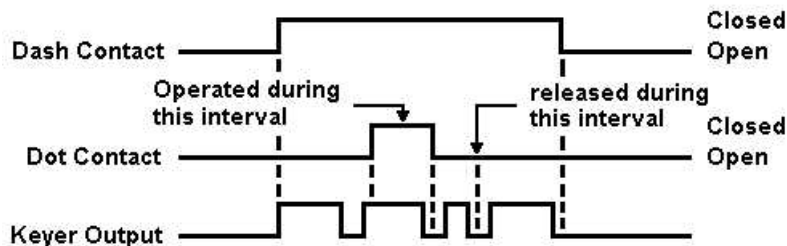
Example: To enter a dash-space ratio of 3.7, press [*][*][2][3][#][7].

If the dash-space ratio entered exceeds 4.0 or is less than 2.0, the ratio will be set to 3.0.

The code speed is automatically adjusted for other than "perfect" dot and dash, ratios and is based on the word "PARIS" (see Appendix B).

6. Dot and Dash Memories

The selectable dot and dash memories are enabled on turn-on. The dot memory allows insertion of a dot during a string of dashes. For example, the letter "Q" could be generated in the following manner:



The Dash Memory operates in the same fashion, allowing the insertion of a dash in a string of dots.

To disable the Dot Memory, press [*][3].

To enable the Dot Memory, press [*][*][3].

To disable the Dash Memory, press [*][4].

To enable the Dash Memory, press [*][*][4].

7. Iambic Operation

Full iambic operation is available with the dot and dash memories enabled or disabled. The iambic feature is useful for generating characters with alternating dots and dashes such as the period and the letter "C". To utilize this feature, hold both the dot and dash paddles closed.

8. Transmitter Tune

To allow transmitter tuning, the Keyer output transistor is operated by pressing [*][*][7]. The [7] key must be released before the keypad tone is completed. Tuning will be terminated by pressing any pad button or operating the dot or dash paddle.

9. Mistakes

Incomplete, undesired keypad entries may be terminated by pressing the pound [#] key twice. If the entry has been completed, simply repeat with the correct entry. Unacceptable entries will be ignored. For example, if a speed change is entered [*][6][2][*], the result will be no speed change.

TRAINER OPERATION

1. General

This Morse Trainer generates a sequence of pseudo-random Morse characters which repeats after approximately 24.000 characters.

For code practice, ten fixed and one random starting points are available. Answer sheets for the ten fixed starting points are available from AEA.

The trainer can be programmable starting and finishing speeds during a programmable time.

Several other features are also program selectable.

2. Trainer Starting Speed (Farnsworth word speed)

The trainer starting speed is set to 5 WPM when turned-on. To change the starting speed, press [*][6] and enter the two digit speed. For speeds less than ten WPM the first digit must be zero.

Example: For a 7 WPM starting speed, press [*][6][0][7].

When a new starting speed is entered, the finish speed must also be entered. Also the finish speed must be higher than the starting speed.

3. Trainer Finishing Speed

The trainer finishing speed is set to 20 WPM on turn-on. To change the finishing speed, press [*][*][6] and enter the two digit finish speed. For speeds less than ten WPM the first digit must be zero.

Example: For finishing speed of 25 WPM, press [*][*][6][2][5].

4. Trainer Speed Increase Duration

On turn-on, the trainer period is set to ten minutes. To change the training period, press [*][7] and enter the new period in minutes and tenths of minutes using the pound [#] key as the decimal point. The digit following the decimal [#] concludes the entry and is necessary. The range is from 0.1 to 99.9 minutes.

Example: For a training period of 5 minutes and 30 seconds (= 5.5 minutes), press [*][7][#][5].
For a training period of 60 minutes, press [*][7][6][0][#][0].

5. Programming Constant Speed

In both slow code and Farnsworth mode, the trainer may be programmed for no speed change by programming a training period of 0.0.

Example: For no speed change, press [*][7][0][#][0].

In the slow code mode, the trainer will send at the starting speed. A finishing speed higher than the starting speed should be entered even for constant speed operations.

6. Initiating Trainer Operation

After the various trainer operations have been selected, the trainer may be started by pressing [*][*][*] and then any of the digits. Each digit starts its own unique character sequence and your copy may be compared with the published answer book.

If you find that you are memorizing the character sets press [*][*][*][#] for a random starting point.

7. Terminating Trainer Operation

To stop the trainer, press and hold the pound [#] key until the trainer quits sending. After the key is released, a few additional dots and dashes may follow. The key paddles may also be used in place of the pound [#] key.

8. Code Training Method – Farnsworth or Slow

Many people have found that it takes far less time to learn Morse code if the Morse characters are set at speeds greater than 12 to 15 WPM, but with the spaces between characters much longer than normal for these speeds. This method is referred to as "fast code" in this trainer. It is also called the Farnsworth method. In this mode, the characters are sent at the finishing speed and the intracharacter space is initially set to make the code speed equal to the starting speed. The extra inter character space is gradually shortened throughout the training period. At the end of the training period the code will continue to be sent at the finish point.

"Slow" code sends code with the proper inter character spacing. Unless you can copy code at speeds greater than 12 WPM, we strongly urge use of the fast code method.

The trainer selects fast code operation during turn-on. To select "slow" code, press [*][0]. To reselect "fast" code, press [*][*][0].

9. Five Character Code Group or Random Spacing

On turn-on, the trainer is set to transmit five character groups of code. If desired, random groups and spacing may be selected by pressing [*][9]. To reselect five character groups, press [*][*][9].

10. Common or All Morse Characters

For the advanced code student, additional uncommon Morse characters may be selected by pressing [*][8]. To reselect common characters, momentarily turn off the power switch. Tables of the common and uncommon character sets are listed in appendix A.

APPENDIX A

Common Character Set

A	.--	P	.---	1	.-----
B	....	Q	----	2	.....
C	....	R	..-	3	.....
D	...-	S	...-	4	.....
E	.	T	-	5	.....
F	....	U	..-	6	.....
G	--.	V	...-	7	.....
H	....	W	---	8	.....
I	..	X	...-	9	.....
J	....	Y	----	0	.....
K	..-	Z	....	
L	....		Question Mark		.....
M	--		Comma		.....
N	..-		Period		.....
O	---		Fraction bar		.....

Less Common Characters

Colon	-----	Double Dash	-----
Semicolon	.....	Understood	.....
Parenthesis	.....	Wait	.....
Apostrophe	.....	End of Work <u>SK</u>	.....
Exclamation point	.....	Break BK	.....
Quote	.....	End of Message <u>AR</u>	.....
Hyphen	.....	

APPENDIX B

CODE SPEED

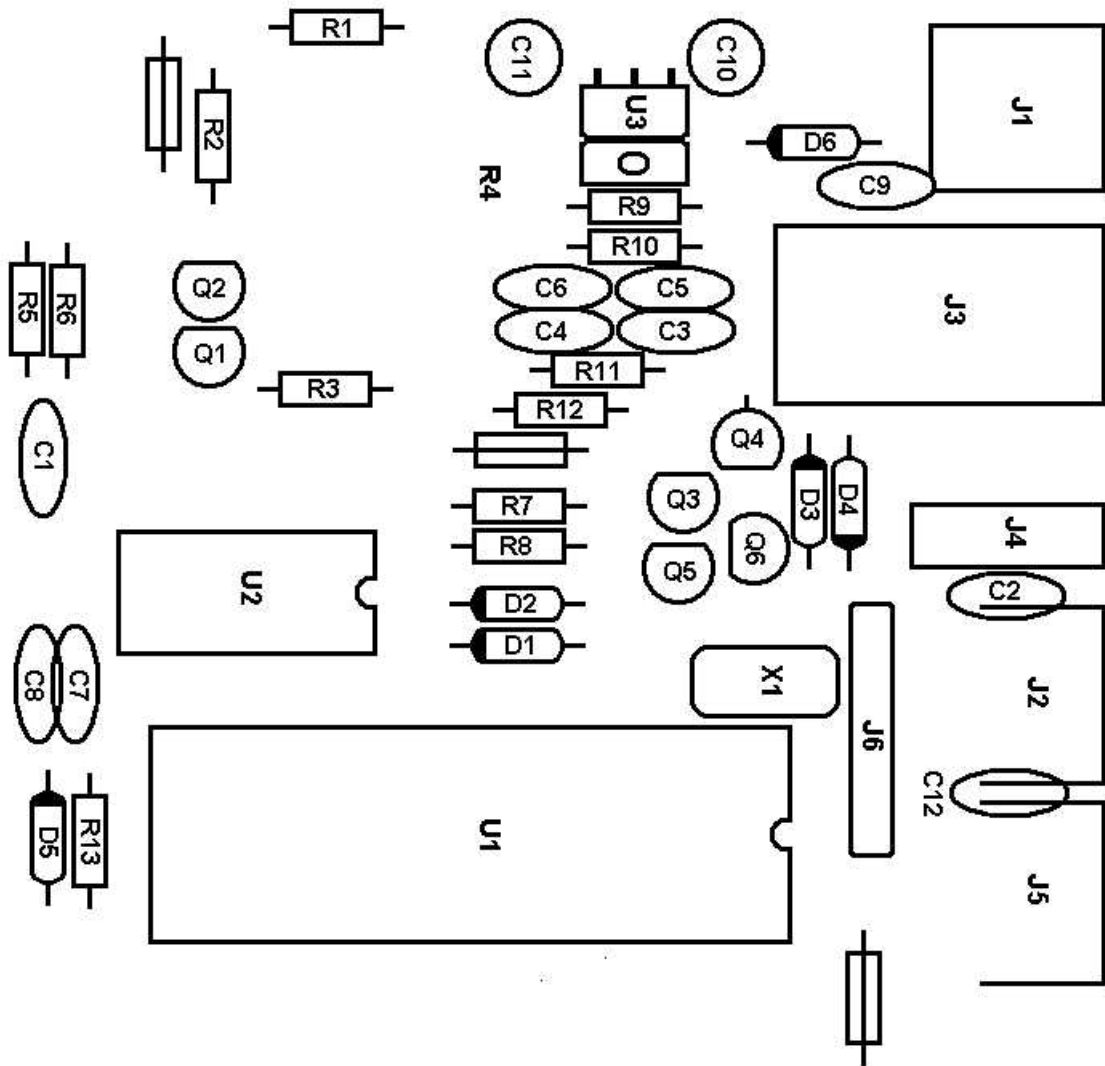
The international Morse code speed is defined by the word "PARIS". It has 10 dots, 4 dashes, 9 in-tracharacter spaces, 4 inter-character spaces and one word space for a total equivalent of 50 code elements (dot or space Time). To adjust code speed for various dot-space and dash-space ratios, the number of code elements in the word "PARIS" is used as a reference so that with any allowable dot-space and dash-space ratios, the code speed is correct for the reference word "PARIS".

ABBREVIATED INSTRUCTIONS

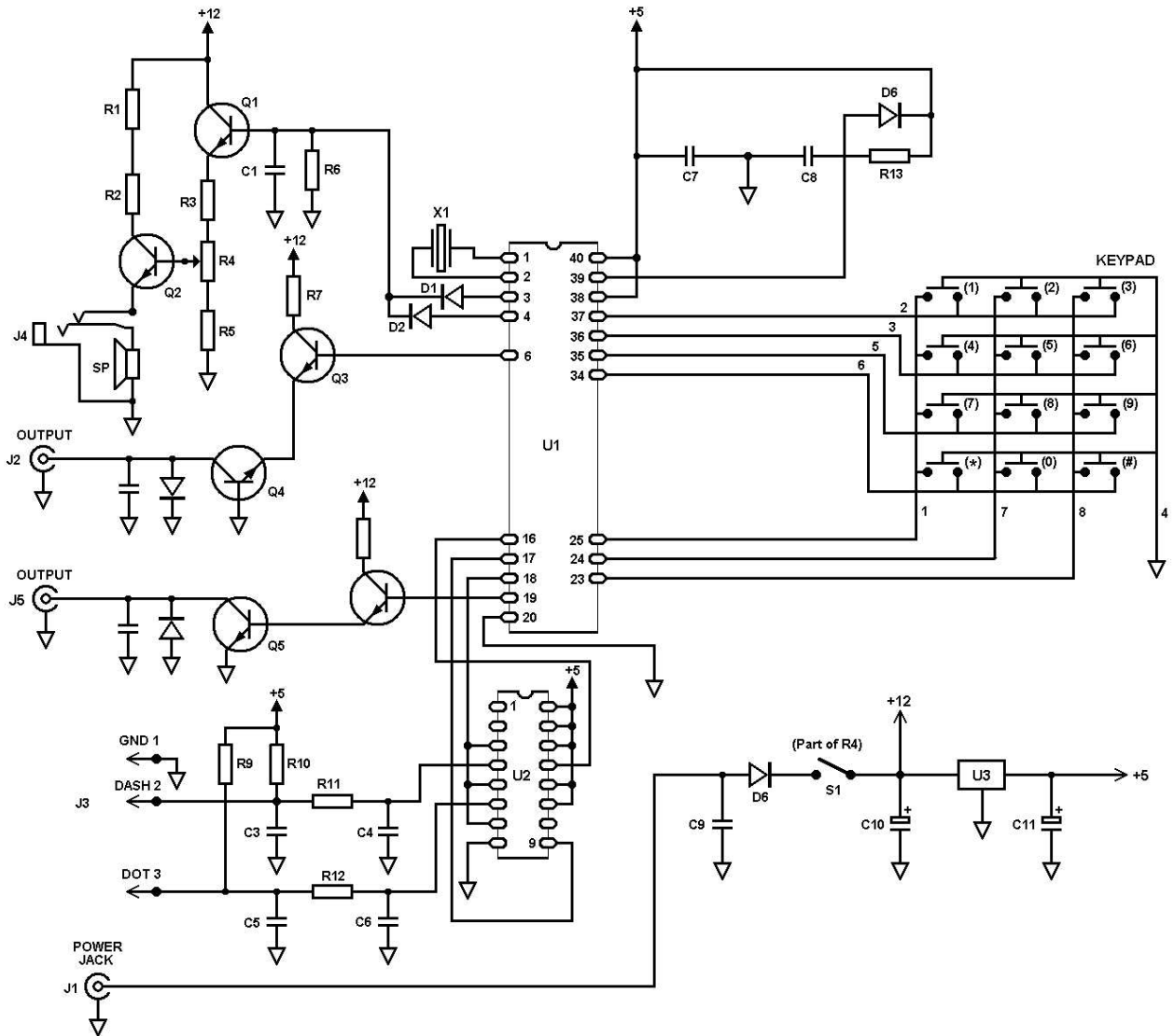
MODE	INSTRUCTION	LIMITS/ COMMENTS	AT TURN ON
KEYER:			
Code Speed	[*][6][N][N]	02–99 in 1 WPM increments	20 WPM
Tone Increase Decrease	[*][1] [*][*][1]	100 Hz to 2500 Hz	500 Hz
Dot-Space Ratio	[*][2][N][#][N]	0.5–1.5 in 0.1 increments	1.0
Dash-Space Ratio	[*][*][2][N][#][N]	2.0–4.0 in 0.1 increments	3.0
Dot Memory On Off	[*][*][3] [*][4]	N/A	On
Dash-Memory On Off	[*][*][4] [*][4]	N/A	On
Semiautomatic (Bug)	[*][5]	N/A	Off
Automatic	[*][*][5]	N/A	On
Tune On Off	[*][*][7] Any button or key paddle	N/A	Off
MORSE TRAINER:			
Start Speed Set (Farnsworth word speed)	[*][6][N][N]	02–99 in 1 WPM increments	5 WPM
Finish Speed Set (Farnsworth char. speed)	[*][*][6][N][N]	02–99 in 1 WPM increments	15 WPM
Duration of Speed Increase (Set minutes and tenths)	[*][7][N][N][#][N]	00.1 to 59.9 in 0.1 min. increments	10 Min.
Fast Code Method	[*][*][0]	N/A	On
Slow Code Method	[*][0]	N/A	Off
Characters Common Uncomm.	[*][*][8] [*][8]	N/A	Common
Character Groups: 5 Character Groups Random Char. Groups	[*][*][C] [*][C]	N/A	5 Char. Groups

NOTE: [N] = one of the numbered buttons.

Parts Pictorial



Schematic



KT-2 PARTS LIST

C1	μ 0047	50 V disc cer
C2, 7, 9, 12	μ 01	50 V disc cer
C3, 4, 5, 6	μ 001	50 V disc cer
C8	μ 01	50 V disc cer
C10, 11	10 μ	25 V dipped tantalum
D1, 2, 5	1N4448	
D3, 4	1N4006	
D6	1N4003	
Q1, 3, 5	2N3904	
Q2	MPS6561	
Q4	MPSA92	
R1, 2	13 Ω	$\frac{1}{2}$ W 5% Carbon Comp
R3	330 Ω	$\frac{1}{4}$ W 5% Carbon Comp
R4	1 k Ω	pot w switch, audio taper
R5	240 Ω	$\frac{1}{4}$ W 5% Carbon Comp
R6, 11, 12	47 k Ω	$\frac{1}{4}$ W 5% Carbon Comp
R7, 8	120 Ω	$\frac{1}{4}$ W 5% Carbon Comp
R9, 10	1 k Ω	$\frac{1}{4}$ W 5% Carbon Comp
R13	10 k Ω	$\frac{1}{4}$ W 5% Carbon Comp
U1	AEA1980 MT-1	
U2	CD4044	
U3	7805	Voltage regulator
X1	4.00 MHz	Xtal

**PROGRAMMING KEY
MODEL KT-2 MORSE KEYS TRAINER**

	*	**	***
1	Tone Frequency Up	Tone Frequency Down	TRAINER TEST POSITION
2	Dot Ratio	Dash Ratio	
3	Dot Mem. Off	Dot Mem. On	
4	Dash Mem. Off	Dash Mem. Off	
5	Semi-Auto (bug)	Auto	
6	Start Speed	Finish Speed	
7	Practice Duration	Tune	
8	All Characters	XXXXXXXXXXXXXX	
9	Random Space	5 Letter Groups	
0	Slow Code	Farnsworth	Random
#	HALT Trainer		