

**Installing  
and  
Operating:**

**The PK-AM keyer  
from Jackson Harbor Press  
A Morse code keyer chip with pot speed control**

The PK-AM keyer is a modification for the PK-AM kit, it changes the AM transmitter to a basic memory keyer which can be used to key a transmitter or for code practice. The mod is simple, a new keyer chip is swapped for the original PK-AM chip, a keying transistor is connected via a 4.7 kohm resistor to the new keyer chip and a piezo speaker can be connected to provide a sidetone.

**General notes on modifying the PK-AM kit:**

The integrated circuit (U1) is a CMOS device. This means that it should be handled as little as possible to prevent static damage. The builder should use a grounding strap and anti-static mat if available or at the very least, work on a grounded metal surface and be sure to touch ground prior to touching the IC.

Note that the PK-AM chip and the PK-AM keyer chip look identical, builders can ID them by looking on the bottom of the chip, the PK-AM has a 14 written on the bottom with a magic marker, the PK-AM keyer chip has a 1. These may be hard to see, use a strong light and hold the chip at a angle for better viewing.

**Modifying the PK-AM**

Step 1) Get the parts together: All of the board mounted components have been supplied but you will still have to provide off-board items to fully implement the modification. These items include a keying output jack and a piezo.

Step 2) Identify and orient the components: The main part is the PN2222a keying transistor, holding the transistor with the flat face towards you with the leads down, the emitter (E) is the left lead, the base (B) the center and the collector (C) is the right lead.

step 3) Use the parts placement picture / diagram for information on the placement and orientation of the parts. Clip the leads of the parts after soldering. These items don't have circuit board holes, they are soldered to the top of the circuit board using the square pads on the left side of the board. Alternatively, they could also be soldered to the bottom of the board, this makes the connection to ground a little easier, this is up to the builder.

Here is a suggested sequence:

- a) remove the original PK-AM chip from the socket and store it in the anti-static tube/bag from the original kit OR use aluminum foil.
- b) Clip (or unsolder, carefully!) the lead (close to the board) of R2, 240 ohm resistor, small 1/6 watt (red, yellow, brown, gold) which is farthest away from the socket.
- c) Solder the red lead of the piezo speaker (for sidetone) to pin 2 of the PIC. This is easiest to do on the bottom of the board as shown on the bottom view diagram. Solder the negative (black) lead of the piezo to ground.
- d) Q1, TO-92 NPN transistor (marked PN2222a). Place Q1 as shown on the parts placement diagram, at the lower left of the circuit board with the flat face of the transistor to the left top, connect the collector (C) to the left corner pad, the base (B - center connection) to the pad above the collector and the emitter (E) to the grounded pad and solder in place.
- e) C6, .01 uF yellow multilayer ceramic capacitor (marked 103). Place C6 as shown on the parts placement diagram, between the C and E of Q1 and solder in place.

f) R5, 4.7 k ohm resistor (yellow, purple, red, gold). Place R5 as shown on the parts placement diagram, with one end connected to the unsoldered lead of R2 (item b above) and the other end connected to the base ( B) of Q1 and solder in place.

g) Solder a wire from a ground connection to the ground of the keyer output (to the transmitter) jack. Solder another wire from the collector of Q1 to the tip connection of the keyer output jack.

Step 4) Check the board: Before proceeding, take the time to check the board for solder bridges. Use the parts placement and bottom view diagrams as a guide to visually check for these shorts. It may help to clean the flux from the board and then use a strong light in conjunction with a magnifying glass to see these problems. Also, double check the orientation of the critical components such as the Q1 transistor. After you are convinced that the board is OK, form the leads of U1 (the PIC 12F629 keyer chip) and insert it into the 8 pin socket with pin 1 oriented towards the top edge of the board. Connect the board to a battery of less than 5.5 volts. A Morse code FB should be heard through the piezo speaker. If you don't hear the FB, power down and re-check the board for shorts and polarity problems. If the board seems to be working correctly, connect the paddle, key, mem switch, optional speed pot and transmitter. The PK-AM keyer should now be ready to operate.

**Operation:** General notes on using the dit, dah and mem switch to control the keyer: The switch on pin 4 of the keyer chip will be referred to as the mem switch. Multiple functions result from multiple switch-press combinations (mem alone, mem+dit, mem+dah). Also, the switches can be pressed and released (PAR) OR pressed and held for two seconds (PAH). This doubles the number of combinations of the three control switches.

Generally, PAR is used for actions: send the code speed or send a memory. PAH is used for settings: change the code speed (no pot) or record a memory or change the iambic mode.

3 menus are used for setting various options - they are activated by a PAH of the mem switch alone or plus a simulpress of dit or dah or both. The menu selections are made by pressing either the dit or dah switches - you will then normally hear a corresponding dit or dah via the sidetone, the selection will be made and you are then returned back to normal keyer mode. In general, the operator can skip a menu item by a PAR of the mem switch.

Note that the keyer sidetone will be lower in pitch for keyer commands such as the menu prompts, recording a memory or the FB sent at powerup. The normal pitch for routine sending is higher and can be set with the mem+dah menu item SS (Set Sidetone).

A function table of the PK-AM keypress combinations:

keys used	PAR (press and release)	PAH (press and hold)
mem switch	send memory	beacon: BE, record memory: ?
mem + dit	send speed	paddle set of speed, pot options, main menu
mem + dah	nothing	Sidetone Set, SS menu item
mem + both	nothing	nothing

**Powerup:** Immediately after powerup the keyer will send an FB (with the lower frequency command tone) to signal correct operation.

**Speed Readout:** The speed (in WPM) will be played through the sidetone if the mem switch is simulpressed with the dit switch and then both are released. I normally press the mem switch first and hold it, press and release the dit switch and finally release the mem switch.

**Speed Control and Menu:**

Initially the keyer will powerup at a default speed of 8 WPM in paddle speed set mode. The speed can be adjusted by pressing and holding the mem switch along with the dit switch. Usually I PAH the mem switch and then PAR the dit switch. After 2 seconds, the keyer will send an S (for speed set). Press the mem switch to advance to the next menu item without changing the speed. Or, pressing the dit switch will increase the speed by 1 WPM and send a dit. Pressing the dah switch will decrease the speed by 1 WPM and send a dah. You can continuously adjust the speed by holding either switch but note that if you run the keyer “off the scale” at either 8 or 49 WPM, the keyer will “wrap around” to the opposite speed extreme. Exit the speed adjust routine by pressing and releasing the mem switch.

If the pot circuitry is connected AND the P menu is invoked to turn on the pot speed control the speed can be adjusted by turning the pot. Maximum possible speed is 49 WPM, minimum possible speed is 8 WPM. Note that the minimum and maximum speed can be affected by component tolerances on the speed pot and the resistors - see the pot calibration menu item if an 8 WPM minimum speed is required. The pot position is read continuously when the keyer is sending code, just before each dit, dah or space is sent. This allows the operator to adjust the code speed even in the middle of a memory send or record.

Mem + dit menu (PAR mem to advance to the next menu item)

	Menu item	pressing a dit:	pressing a dah:
S	Speed set from paddle	increases speed by 1 WPM	decreases speed by 1 WPM
P	Pot / paddle speed control	selects pot speed control	selects paddle speed control
C	Calibrate pot speed control	enters the calibration routine	restores default pot calibration
A	iambic mode A or B	enables iambic mode A	enables mode B (default)
R	Reverse paddle mode	reverse dit and dah switches	return dit and dah to normal
AU	Autospace on / off	turns on character autospace	turns off autospace (default)

**P - Select Pot or Paddle speed control:** Allows the keyer to be switched between pot or paddle speed control. The keyer defaults to paddle speed control.

**C - Calibrating the Pot speed control:** Due to the variation in resistors and pots it is likely that the minimum setting of the pot will result in a minimum speed higher than 8 WPM. This menu item will compensate and store an updated calibration value. Before entering the menu, be sure to turn the pot to the minimum speed. Then press the dit to go into the calibration routine - then one dit will be sent after a short delay and the keyer will exit from the menu. If the pot calibration is run with the pot not set at the minimum, rerun the cal with the pot correctly set. Pressing a Dah will restore the default powerup calibration value.

**A - Iambic mode A or B:** The A mentioned above signifies the mode A/B select menu item. The iambic mode of the keyer can be set to either mode using this routine. Check the JHP web site for an Acrobat (.pdf) file which explains the difference between the A and B keying modes.

**R - Reverse paddle mode:** Reverses the dit and dah switches (easier than resoldering a jack).

**AU - Autospace on/off:** The autospace feature inserts a character space (1 dah in length) automatically if the operator has not pressed a paddle switch 1 dit space after the last dit/dah sent. This feature is always on in the memory record routines (needed for the recording process).

Mem + dah menu (PAR mem to exit)

	Menu item	Pressing a dit:	Pressing a Dah
SS	Sidetone Set	decreases sidetone frequency	increases sidetone frequency

**SS - Sidetone Set:** The sidetone frequency can be decreased with a dit PAR and increased with a dah PAR. Either the dit or dah can also be PAH for a continuous frequency change. The frequency will wrap around at either the high or low frequency limit. Exit the SS menu item with a PAR of the mem switch. This will write the current sidetone setting to memory.

Mem switch menu (PAR mem to advance to the next menu item)

	Menu item	pressing a dit:	pressing a dah:
BE	BEacon mode	starts the beacon going	Exits the menu
?	Record memory	records a dit	records a dah

**BE - Beacon Mode:** Beacon mode will send the contents of the memory continuously. Start the beacon by pressing the dit switch - the beacon starts to play. Exit beacon mode by tapping the dit or dah switch. Extra word

spaces can be added during memory recording by sending the special character didahdahdit.. This can be handy for adding extra time between memory sends in beacon mode.

**? - Record Memory:** The memory is recorded by sending normally. Note that the keyer output is off during the recording and that the lower command sidetone is used. When complete, PAR the mem switch. The routine will be exited automatically after the 120th character is sent. The memory is saved in flash memory which means that it will still be there even if power is removed. Extra word spaces can be added during memory recording by sending the special character didahdahdit.. This can be handy for adding extra time between memory sends in beacon mode.

**Playing Memory:** Play the memory with a PAR of the memory switch. - the memory starts to play after the mem switch is released. A tap of either the dit or dah switch will stop the message play.

### Notes:

To perform a full keyer reset (parameters to their default values, memory untouched):

- 1) remove power to the keyer
- 2) press and hold the mem switch
- 3) powerup the keyer keeping the switch depressed until the FB is sent.

One unique feature of the PK-AM keyer is 5 ditdah tune mode. If both paddles are held for at least 5 ditdahs and then released, the keyer will enter tune mode (key down, sidetone on). To exit, tap either the dit or dah. Thanks to Lew Paceley, N5ZE, for inventing this mode.

As mentioned before, extra word spaces can be added during memory recording by sending the special character didahdahdit.. This can be handy for adding extra time between memory sends in beacon mode.

If the PK-AM keyer doesn't seem to wake up correctly after being switched off, try turning off the power, pressing the mem switch for a couple of seconds, releasing the mem switch and then turning on the power. This will bleed off any voltage on the bypass capacitor which may be causing the startup problem.

Avoid trying to mix paddle presses with straight key presses, this will prevent unwanted di-dah-di-dah when the straight key is pressed. I wait a little while between either the last paddle press or last key press for the keyer chip to time out before changing to the other input (key or paddle). The unwanted di-dahing is due to the fact that when using the straight key, both the dit and dah inputs are pressed at the same time (I think this mode originated on the Elecraft K2). If the PK-AM keyer isn't sleeping, it may not realize that the straight key is being pressed rather than both paddles.

Please feel free to email with any questions, comments, suggestions or problems with the PK-AM keyer. Email to: [wb9kzy@wb9kzy.com](mailto:wb9kzy@wb9kzy.com)

Thanks and  
Best Regards,

Chuck Olson, WB9KZY

## PK-AM keyer modification parts list

<u>Qty.</u>	<u>Ref.</u>	<u>Part Name</u>	<u>Description</u>
1	U1	12F629	PK-AM keyer 8 pin DIP keyer chip
1	C6	.01 uF	marked 103, yellow radial multi-layer ceramic capacitor
1	R5	4.7 K ohm	yellow-violet-red-gold - 1/4 watt carbon film resistor
1	Q1	PN2222a	NPN transistor

The following items are **NOT** included with the kit:

1	mono keying output jack
1	piezo speaker, external drive

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Charles J. Olson, WB9KZY

Jackson Harbor Press  
1418 Foss Rd.  
Washington Island, WI 54246  
<http://wb9kzy.com>

please email questions & suggestions to: [wb9kzy@wb9kzy.com](mailto:wb9kzy@wb9kzy.com)