

Building and Operating

The PK-DC from Jackson Harbor Press A replacement keyer chip for the stock DC keyer chip

The PK-DC is a replacement for the stock DCxx series transceiver keyer chip (and simple keyer chip) with more features using a FLASH PIC microcontroller chip from Microchip Technology. Because the Atmel chip originally used in the DC-xx series and Simple Keyer has a different pinout than the PIC part, a surface mount PIC is mounted on a small circuit board which translates the PIC pinout to the Atmel keyer chip socket.

A schematic isn't provided for the PK-DC board, here is a table of the pin correspondence between the original Atmel chip and the PIC chip:

Atmel pin	PIC pin
1	4
2	6
3	5
4	8
5	7
6	3
7	2
8	1

The PK-DC is a CMOS (Complimentary Metal Oxide Semiconductor) device. This oxide is very thin which means that the chip should be handled as little as possible to prevent static damage. The installer 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 chip.

The pads and traces are small and delicate - a small tipped, low power (25 watts or less) soldering iron should be used. The use of good quality desoldering braid or solder wick is suggested for cleaning up any short circuits between the IC leads. The cheap stuff isn't worth the trouble. I use the no-clean SODER WICK from Chemtronics, available from Digi-key.

Building the PK-DC

Step 1) Identify and orient the components, the main thing is to identify pin 1 of the keyer chip. This will be used to orient the chip on the circuit board. Pin 1 has a small circular indentation on the top of the part nearby. In addition, when the part is positioned so that the marking on the part is readable, pin 1 is the bottom left-most pin of the 8 pins of the PIC.

Step 2) place and solder U1, the SO packaged IC (keyer chip). Put it down on the board per the diagram. Adjust the leads until they all are aligned correctly, then hold the part down while tack soldering one corner pin. Double check the alignment of the other pins and if they are OK, solder the rest of the pins down to the board. Don't worry if there are solder bridges, just use some solder wick to clean them up after you have soldered all the leads.

Step 3) From the bottom of the board (flip the board over), insert the short end of the 8 gold pins into the holes. To align the pins so that the resulting connections are square, lower the included 8 pin socket onto the long ends of the 8 gold pins until each pin registers with the corresponding socket hole. Then flip the board over. and gently press until the pins are just slightly held (doesn't have to be fully inserted) and even. Solder the 8 pins on the top of the board.

Step 4) Check the board: Before proceeding, take the time to check the board for solder bridges. Use the parts placement diagram 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.. After you are convinced that the board is OK remove the current keyer chip from the DC-xx socket (or the Simple keyer) (also, remove the PK-DC from the socket used to assure the squareness of the pins during assembly) and insert the PK-DC into the DC-xx or Simple Keyer socket (pin 1 of the PK-DC is the one with the square pad, the other 7 pins have round pads). Power up the board and if the install was successful, the PK-DC should send an FB.

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, mem+both dit and 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.

4 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 at about 670 Hz.

A function table of the PK-DC keypress combinations:

keys used	PAR (press and release)	PAH (press and hold)
mem switch	send memory 3	record memory 3, O?, also beacon items: BE and BA, etc.
mem + dit	send speed	paddle set of speed, main menu
mem + dah	send memory 2	record memory 2: M?
mem + both	send memory 1	record memory 1: T?

Powerup: Immediately after powerup the keyer will send an FB through the sidetone to signal correct operation,

If either the dit or dah input was pressed during powerup the PK-DC will enter a compatibility mode with the original part. The paddle opposite to the one pressed at powerup will act as a straight key.. Note that the switch must be pressed each time the transceiver is powered up to enter compatibility mode - it is NOT stored in EEPROM as the other mode changes are. This mode is included if the operator wants to bypass the internal keyer for use with an external keyer or key. Important: for the best keying be sure to set the code speed of the PK-DC slightly above the highest speed that will be sent with the external keyer or key.

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 the dit switch and finally release both.

Speed Control and Menu:

Initially the keyer will powerup at a default speed of 16 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 tap 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 4 or 50 WPM, the keyer will “wrap around” to the opposite speed extreme. Exit the speed adjust routine by pressing and releasing the mem switch.

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
B	Bug / straight key mode	enables bug mode (dah = key)	disables bug mode (default)
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)

B - Bug / Straight-key mode: Dits are sent normally but dahs are sent like a straight key.

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). Remember that the pot speed control will be changed to the dit paddle which means that pot speed control changes while the dit is pressed will be ignored until the dit is released.

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).

Recording Memory 2: A memory of up to 41 characters long can be recorded. The memory 2 record menu is entered by simulpressing the memory and the dah keys and holding them for 2 seconds. I usually PAH the mem switch and then tap the dah key.

Mem + dah menu (PAR mem to exit)

	Menu item	Pressing a dit:	Pressing a Dah
TU	Tune mode	will enter tune (key down)	will enter tune (key down)
M?	Record memory 2	records a dit	records a dah

TU - Tune mode: A PAR or either the dit or dah will enter tune mode, turning on the transmitter and sidetone. Press either paddle again to turn the transmitter off. This on-off can be done as many times as required. Exit tune mode with a PAR of the mem switch. Tune mode can also be entered by a PAH of both dit and dah for at least 5 didahs, then when the paddles are released, tune mode will be entered.

M? - Record Memory 2: 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 41st character is sent. The memory is saved in flash memory which means that it will still be there even if power is removed. If this menu item is entered by mistake, PAR the mem switch to exit without changing the memory.

Playing Memory 2: Play memory 2 by simulpressing and releasing the memory and the dah keys. I usually PAH the mem switch and then tap the dah 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.

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
O?	Record memory 3	records a dit	records a dah
JM	Join Memory mode	joins mem 1 to end of mem 3	send of mem 3 only (default)
BD	Beacon Delay set	increases delay by 1 second	decreases delay by 1 second

BE - Beacon Mode: Beacon mode will send the contents of mem 1 continuously. Start the beacon by pressing the dit switch - the beacon starts to play. Exit beacon mode by tapping the dit or dah switch.

O? - Record Memory 3: 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 43rd character is sent. The memory is saved in flash memory which means that it will still be there even if power is removed. If this menu item is entered by mistake, PAR the mem switch to exit without changing the memory.

Playing Memory 3: Play memory 3 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.

JM - Join Memory mode: JM joins memory 1 (mem+both) to the end of memory 3 (mem alone) for both the beacon mode and the regular send of memory 3. A word space is put between the play of memory 3 and memory 1. In beacon mode, the beacon delay occurs after the memory 1 play (mem 3, word space, mem 1, beacon delay). If JM is off then the beacon delay follows the memory 3 play.

BD - Beacon Delay set: This routine allows the operator to set a delay time between beacon memory sends. The default is 1 second between beacon sends. This can be increased (up to a maximum 255 seconds) with a PAR of the dit for each second. The delay can be decreased (down to 0 seconds) with a PAR of the dah. Exit with a PAR of the mem switch.

Mem + both menu (PAR mem to exit)

	Menu item	pressing a dit:	pressing a dah:
T?	Record memory 1	records a dit	records a dah

T? - Record Memory 1: Enter record mode for memory 1 with a PAH of the mem switch and both paddle switches for 2 seconds. Hold the mem switch down, then squeeze both paddle switches simultaneously (they both must be down at the same time), then release the paddle, keep holding the mem switch until after 2 seconds the keyer will send T?. Memory 1 can now be recorded. Start sending your message. when complete, press the mem key. The memory is 41 characters long - recording will terminate automatically after the 41st character. If this menu item is entered accidentally, just PAR the mem switch to exit without recording.

Playing Memory 1: First, hold the mem switch down, next, squeeze both paddle switches (they both must be down at the same time) then release the paddle and finally release the mem switch before 2 seconds elapse. The memory will start to play right after the mem switch release.

Notes:

To perform a full keyer reset (parameters to their default values, memories 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-DC 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, PAR the mem switch. Thanks to Lew Paceley, N5ZE, for inventing this mode.

Please feel free to email with any questions, comments, suggestions or problems with the RMK. Email to: jacksonharbor@att.net

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PK-DC parts list

<u>Qty.</u>	<u>Ref.</u>	<u>Part Name</u>	<u>Description</u>
1	U1	12F629	PK-DC 8 pin SO surface mount keyer chip
1	-	PCB	PK-DC circuit board
8		pins	
1		socket	8 pin socket

Not included with the kit: solder wick to clean up solder shorts between pins

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