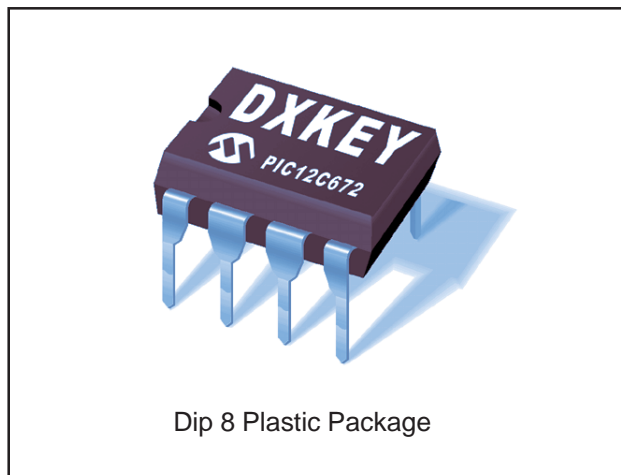# DXKEY

DESCRIPTION

DXKEY, based on the 12C672 PIC Microprocessor, gives you one of the most versatile and powerful iambic memory keyers available today. Developed by Stephano, IK5XCT over the last 4 years the **DXKEY** programme has been enhanced to make life easy for day-to-day CW operating and has been optimised for working DX and minimising the stress of contests and pile-ups. With its beacon mode you can operate QRP or even EME with confidence and simplicity.

DXKEY enables you to automate all the repetitive keying such as initiating and answering CQ calls. **DXKEY** gives you a flexible and easy to use command structure that enables you to control each whole message, even increasing and decreasing the speed mid-message! All instructions are simply entered using Morse characters.

Every **DXKEY** is personalised with your callsign but this can be temporarily overridden with other callsigns for special events, portable operating, etc.

FEATURES

- Remote two button special function keypad

- Small and compact – only 3 x 3 x 1 inch

- Default speed from 5 to 60 WPM

- External speed adjustment from front panel dial

- Iambic mode A or B

- Weighting selectable – Light / Normal (1:3) / Heavy

- Beacon Mode (20wpm) with programmable inter-message delay (from 1-90 seconds)

- 4 separate memories – progammable up to 200chrs using the simple macro language

- Contest serial counter (001-9999) – auto-increment or repeat

- Auto speed increase/decrease by 40% using macro commands to control your messages.

- Personalised with your own callsign – can be overwritten.

- Tune facility – key down until interrupted.

- Programme by using Morse characters to select commands.

- Reset to default settings by command (and password) or internal jumper.

Dip 8 Plastic Package

POWER-ON settings

By default, the **DXKEY** uses the following settings:

- **IAMBIC Mode B**

- **Weighting 1:3** (dit/dah ratio)

MESSAGE TRANSMISSION

The **DXKEY** can store 4 Messages up to 200 characters each by using the in-built macro language. The 4 Messages are transmitted by briefly holding down one of the two keys on the remote keypad (BT1 or BT2) together with pressing either the dit or dah paddle. The simple combination of function keypad and keyer makes the selection of the four messages both simple and accurate. Your hand doesn't need to leave the key to either start or stop a message. This allows you to quickly start sending directly from your key.

The **DXKEY** really does work with you to make sure that your keying is precise and fluid and with four memories you can quickly decide which message suits the siuation or just go straight back to keying manually.

The simultaneous use of both iambic key and the remote keypad really does make operating a breeze! This was the most important practical design concept and from using the DXKEY in real life situations it has proved its worth many times over especially in DX, contest or pile-up situations.
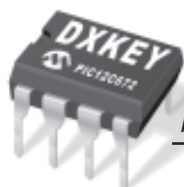
The four messages are transmitted in the following way:

MESSAGE 1:   Press button **BT1** and hold.
                     Key a **DIT**

Note: In default mode the message will continue until you release the Keypad function button. This can be altered (command A) so that you can release the button and only by preesing a dit or dah paddle will the transmission stop.

MESSAGE 2:   Press button **BT1** and hold.
                     Key a **DAH**

MESSAGE 3:   Press button **BT2** and hold.
                     Key a **DIT**

MESSAGE 4:   Press button **BT2** and hold.
                     Key a **DAH**

Note: In default mode, if at the end of the message transmission you are still holding down the function keypad button after a brief break the selected message will restart.

PROGRAMMING THE DXKEY

*For convention red characters depict the **DXKEY**'s output, such as a reply to a command or the message as sent*

To programme the **DXKEY** press the remote keypad buttons BT1+BT2 together. The **DXKEY** will reply with the characters **E E E**. Having entered command mode the **DXKEY** will then prompt you for a command character by sounding **? E**. If you do not reply immediately with a command character it will repeat **? E** until you do. If you release one or both of the keypad buttons before the third E is sounded you will return to keyer mode immediately.

VALID COMMAND CHARACTERS
and their action

A Message interruption mode (Toggle)
B Beacon: Inter-message gap and initial delay
C CALLSIGN Memory (12 Characters) preset/override
D Message store 1 (12 Macro-Cells)
E Message store 2 (12 Macro-Cells)
F Message store 3 (12 Macro-Cells)
G Message store 4 (12 Macro-Cells)
J Change Iambic Mode A/B (toggle)
L Phrase store L (12 Characters)
M Phrase store M (12 Characters)
N Phrase store N (12 Characters)
O Phrase store O (7 Characters)
P Phrase store P (7 Characters)
R Progressive counter - Initial value (set or reset)
T Tone on (key down) for tuning transceiver
W Weighting adjustment : Light / Normal (1:3) / Heavy
X DXKEY Version Information
Z RESET chip to default settings

General notes when programming the DXKEY

The period, or full stop (di dah di dah di dah), cannot be used as a valid character when programming any memory as this is used to exit programming mode. Use a period in the following circumstances:

● **To finish storing characters.** if you enter a period after any **E** in the character storage sequence the **DXKEY** responds with an **R** and returns to KEYER mode retaining the message stored.

● **To add space when storing characters.** If you wish to add space into any message then DO NOT exit by using a period but allow the **DXKEY** to respond with another (one or more) **E** without entering a character e.g. this will allow you to enter the phrase IK5XCT QRP with a valid inter-word space.

● **If the first character Inserted is the period** during message or phrase storage the **DXKEY** will respond with **R E** and will then return to KEYER mode.

● **If you fill the available memory space** The **DXKEY** will terminate entry mode by responding with an **R** and returning to KEYER mode retaining the message stored.

● **If you need to exit any from any programming command** without making changes then immediately enter a period and **DXKEY** will respond with a **K** and will then return to KEYER mode.

CHARACTER AND MACRO-CELL
PROGRAMMING

As you can see from the list of valid command characters there are two types of memory. Character based or Macro-Cell based.

CHARACTER based memories (phrase stores L,M,N,O,P) allow you to store up to 12 individual morse characters, with spaces. No prosigns are allowed. These can then be referred to by their lookup-code to programme complex messages in the four message stores.

MACRO-CELL based memories (message stores D,E,F,G) allow you to pick from a number of preset (and user defined) phrases as defined below by their lookup-code. Combining up to 12 lookup-codes will enable you to quickly and easily set-up messages without entering whole passages.

Lookup-codes and their corresponding stored message/action

A [FAST; Increase the speed of the out-going message by 40%. Also, cancel FAST and return to normal speed]
B BK
C [CALLSIGN]
D DE
E PSE
F INFO
G QRP
H 599 (5NN)
I [Increment and then send: SERIAL NO]
J QSL
K K
L [Send contents of Phrase Store 1]
M [Send contents of Phrase Store 2]
N [Send contents of Phrase Store 3]
O [Send contents of Phrase Store 4]
P [Send contents of Phrase Store 5]
Q CQ
R [Repeat COUNTER, no increment]
S [SLOW the speed of the outgoing mes-sage by 40%. Also, cancel SLOW and return to normal speed]
T TEST
U UR
V VIA
W BURO
X DX
Y TU
Z 73
1 MY NAME IS
2 MY QTH IS
3 MY RIG IS
4 MY ANT IS
5 MY PWR IS
6 TNX FER NICE QSO HPE CUAGN
7 QSL IS SURE VIA
8 73 TO U AND FAMILY GB GDX
9 CQ CQ
0 [Sends the CALLSIGN twice]
? ?
BT [Dah Dit Dit Dit Dah] if placed as the first lookup-code in message 2,3 or 4 when selected it will start the beacon (message 1) without going into programming mode, com-mand B.

This is ONLY available with Interruption mode 2 (see command A - 2)

By using the above lookup-codes in a message store we can send the following message UR 599 DE IK5XCT TU by just entering **U H D C Y.**

DXKEY will automatically add any inter-word spacing to

send properly formed characters and words.

Let us look at the Command Characters in more detail with some examples of how to use them in practice.

Command Descriptions

Before entering a command character enter the program-ming mode by holding down BT1 and BT2 together. The **DXKEY** will send **E E E** and will then prompt you for a com-mand character by sounding **? E**. **Enter a command char-acter as followed:**

A Message Interruption Mode (1 or 2) - Toggle

Enter programming mode as directed.
Key an **A**.
DXKEY will reply **A E E E** and will then tell you which mode it is now in i.e. **1** or **2 R**

DXKEY will then return to KEYER Mode.

Repeating this process again will switch DXKEY back to the previous mode.

Message Interruption MODE 1: This is the default mode (in versions 001 to version 004 it is the only mode avail-able). This mode is most often used for DXing and Pile-ups. The message is sent until the Function key BT1 or BT2 is released. This allows the operator to concentrate on the signals and respond quickly.

Message Interruption MODE 2: This is a new mode (ver-sion 005). it is most often used in contests or on a DXexpedition. The message will continue automatically without keeping the BT1 or BT2 function keys pressed. This will keep the operator from becoming tired. The mes-sage can be interrupted during sending by pressing a func-tion key or a paddle.

B Programming Beacon DELAY and Start Beacon

Note: Message store 1 is used as the Beacon message.
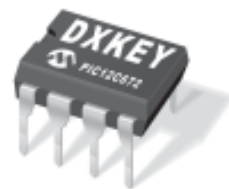
Enter programming mode as directed.
Key a **B**
DXKEY will reply **B ? E**

Key any character from **0** (or **T**) to **9** as the inter-message delay.

0 = 1second
9 = 90 seconds

DXKEY responds with **R** and will start sending MESSAGE1 - Space - MESSAGE1. And will continue until the operator presses any function key or paddle. **DXKEY** will then return to KEYER mode.

C Programming New CALLSIGN (12 CHARACTERS)

Enter programming mode as directed.
Key a **C**
DXKEY will reply **C ? E**

Key each character of the new CALLSIGN waiting for an **E** between each one. You can exit programming mode by keying a PERIOD.

Example:
C ? E I E K E 5 E X E C E T E / E P E (PERIOD) R

The CALLSIGN has now become **IK5XCT/P**

The CALLSIGN can be inserted in a Message store by using the look-up code **C**.

D Programming Message store 1 (12 Macro-Cells)

Enter programming mode as directed.
Key a **D**
DXKEY will reply **D ? E**.

Key each lookup-code for your new message waiting for an **E** between each one (up to 11). You can exit programming mode at any time by keying a PERIOD.

Example:
D ? E Q E Q E D E C E C E E E K E (PERIOD) R

When activated, the message will read
CQ CQ DE IK5XCT/P IK5XCT/P PSE K

E Programming Message 2 (12 Macro-Cells)

Enter programming mode as directed.
Key an **E**
DXKEY will reply **E ? E**.

Key each lookup-code for your new message waiting for an **E** between each one (up to 11). You can exit programming mode at any time by keying a PERIOD.

Example:
E ? E H E I E D E S E C E S E Z E Y E (PERIOD) R

When activated, the message will read
599 001 DE (SLOW) **IK5XCT/P** (Cancel SLOW) **73 TU**

This example shows the power of the Macro Lenguage; Firstly, an RST report and then the incremented SERIAL NO is sent followed by the CALLSIGN previously defined, however, to ensure the other operator can copy your callsign correctly it is sent 40% slower. Then the rest of the message is send at normal speed.

By referring to the Lookup-code table and entering characters into the Macro-cell memories you can create many combinations of message to make operating easier.

F Programming of Message 3 (12 Macro-Cells)

Enter programming mode as directed.
Key an **F**
DXKEY will reply **F ? E**.

Key each lookup-code for your new message waiting for an **E** between each one (up to 11). You can exit programming mode at any time by keying a PERIOD.

Example
F ? E A E U E H E A E R E A E D E C E Y E (POINT) R

When activated, the message will read
(FAST) **UR 599** (Cancel FAST) **001** (FAST) **DE IK5XCT/P TU**

This time the standard phrases are faster by 40%, yet the incremented SERIAL NO is send at the normal speed, so that the other operator can copy it without wasting time.

G Programming of Message 4 (12 Macro-Cells)

Enter programming mode as directed.
Key a **G**
DXKEY will reply **G ? E**.

Key each lookup-code for your new message waiting for an **E** between each one (up to 11). You can exit programming mode at any time by keying a PERIOD.

Example
G ? E F E E 1 E L E 2 E M E J E V E N E 8 E D E C R

This is a very long call but only needs the 12 Macro Cells to give the following message:

INFO (space) **MY NAME IS STEFANO QTH IS PISA QSL VIA GQRP 9597 73 TO U AND FAMILY GB GDX DE IK5XCT/P**

In this message you will see that between the second and the third E we insert nothing so the **DXKEY** produces a space.
Lookup-code **L** sends the contents of Phrase store 1 previously programmed with the characters **STEFANO**.
Lookup-code **M** sends the contents of Phrase store 2 previously programmed with the characters **PISA**.
Lookup-code **N** sends the contents of Phrase store 3 previously programmed with the characters **GQRP 9597**.

J Change Iambic Mode A/B (from A to B or from B to A)

Enter programming mode as directed.
Key an **J**
DXKEY will reply **J ? E**.

The keyer will immediately toggle Iambic mode from A to B or from B to A depending on the starting state.

if changed from Mode B to Mode A **A R** will be sent.
if changed from Mode A to Mode B **B R** will be sent.

L Programming of Phrase store 1. (12 Characters)

Enter programming mode as directed.
Key an **L**
DXKEY will reply **L ? E**.

Key each lookup-code for your new message waiting for an **E** between each one (up to 11). You can exit programming mode at any time by keying a PERIOD.

Example:
L ? E S E T E E E F E A E N E O E (POINT) R

The contents of Phrase store 1 is now **STEFANO.**
The Lookup-code will be **L.**

Having these programmable Phrase stores enables complete flexibility of the message output so you can enter personal details to complete some of the standard phrases, such as Lookup-code 1 which will send **MY NAME IS...**

The Phrase stores can also be useful in the contests when after 599 we need to pass other information such as zone, WW Locator, etc..

M Programming of Phrase store 2 (12 Characters)
As L but the lookup-code is M.

N Programming of Phrase store 3 (12 Characters)
As L but the lookup-code is N.

O Programming of Phrase store 4 (7 Characters)
As L but the lookup-code is O.

Note that for both **O** and **P** the number of characters available only 7. Use these phrase stores for brief messages.

For example, when working QRP, you may like to complete the phrase in lookup-code 8 **73 TO U AND FAMILY GB GDX** by prefixing that sentence with **72 ES.** This will be enough to fill either phrase store **O** or **P**. Doing this will give you the complete sentence **72 ES 73 TO U AND FAMILY GB GDX.**

P Programming of Phrase store 5 (7 Characters)
As L but the lookup-code is P.

R Set or Reset SERIAL NO.

Enter programming mode as directed.
Key an **R**
DXKEY will reply **R ? E**

Now, key each of 4 numbers to set a new SERIAL NO waiting for an **E** between each number (up to 4). Numbers must be between **0000 to 9999**.

Note 1: The **DXKEY** will reset the SERIAL NO (0000) in two cases:
1. If you don't enter any characters before the 4th **E**.
2. If non-numeric characters are entered.

Note 2: Numeric characters can be entered by using abbreviations such a T for 0 or N for 9.

Example:
R ? E 1 E 2 E 9 E 0 R

Using the sequence above the SERIAL NO will be set to 1290 ready to be incremented and sent when the Lookup-code **l** is next used. Subsequent use of the message with the embedded Lookup-code **l** will result in 1291, then 1292 and so on being sent.

Instead, using the Lookup-code **R** will repeat the SERIAL NO so **DXKEY** will send **129T** without any increment.

We will for example have a situation of the kind
R ? E T E 1 E 2 E 3 R The counter is now to 123

If the thousand numeric is entered as **T** or **0 DXKEY** will not send that (thousands) 0, giving only **123.** All other zeros (0) are sent.

T TONE (key down) for tuning the TX

Enter programming mode as directed.
Key a **T**
DXKEY will reply **T R**

DXKEY will now send key-down (continuous tone) until either paddle is pressed. This is to aid TX tuning.

W Weighting options: **L**ight / 1:3 **N**ormal / **W**eight (heavy)

Enter programming mode as directed.
Key a **W**
DXKEY will reply **W ? E**

You can now key your choice of weighting as either **L, N** or **W** to give the characteristics below.

Once you have entered your choice **DXKEY** it will confirm this by repeating the letter (**L, N** or **W**) followed by a **R**

Mode **L** (Light) it increases comprehension by decresing the duration of the Dit element
Mode **N** (Normal) uses a Dit to Dah ratio of 1:3;
Mode **W** (Weiight/Heavy) for a more musical sound which increases the duration of the Dit with respect to the Dah Element.

X Software Version of DXKEY

Enter programming mode as directed.
Key an **X**
DXKEY will reply **X E E E** and will then procede to send the software version in this format.

DXKEY VER 005X... etc....

Z RESET to Initial Memory Value for DXKEY

Enter programming mode as directed.
Key a **Z**
DXKEY will reply **Z PW ?**

PW? DXKEY is waiting for the password to stop you accidentally losing all your settings. The Password is **R S T** and goes manipulate to the following way (if we will commit an error the
Z PW ? E R E S E T then the DXKEY will complete the re-initialization transmitting the message, **EEE OK**

If an error is made in keying the password then DXKEY will not RESET.

With these settings the DXKEY is ready to face the Pile-UP, with the messages of the BT2 (3 and 4), ready to call CQ with the message 1.. also in automatic Mode (in the Beacon) and to automatically answer in the Contest to Progressive with the message 2... hello, above all, be.... completely custom designed! **Good DX and good CW**

DXKEY's Initial settings and messages are as follows:

CALLSIGN (C) Your CALLSIGN will be inserted in this field

Message 1 (D) (Beacon) **9 Q D 0 9 Q D 0 E K** gives:

CQ CQ CQ de (CALLSIGN) (CALLSIGN) CQ CQ CQ de (CALLSIGN) (CALLSIGN) PSE K

Message 2 (E) U H I R D C B gives:

UR 5NN (Incremented SERIAL NO) (Repeat SERIAL NO) DE (CALL) BK

Message 3 (F) C C C C C C C C gives:

(CALLSIGN) repeated 8 times

Note: Whilst sometimes this may be useful for DX purposes it is best to use this with Interruption mode 1 so that the message will stop when BT2 key is released

Message 4 (G) U H D C Y gives:

UR 5NN DE (CALLSIGN) TU

Phrase store 1 (L)	EMPTY
Phrase store 2 (M)	EMPTY
Phrase store 3 (N)	EMPTY
Phrase store 4 (O)	EMPTY
Phrase store 5 (P)	EMPTY
COUNTER (R)	0000
PESATURA (W)	3:1 (N)
JAMBIC (J)	B
Interruption Mode (Á)	MODE 1

There are many pages to this manual as I did not want to leave out anything of value. I am sure that with the many examples that are given you will quickly become familiar with how the DXKEY works so that you can start using it on-air as soon as possible.

Example of BT1/BT2 special function keypad construction
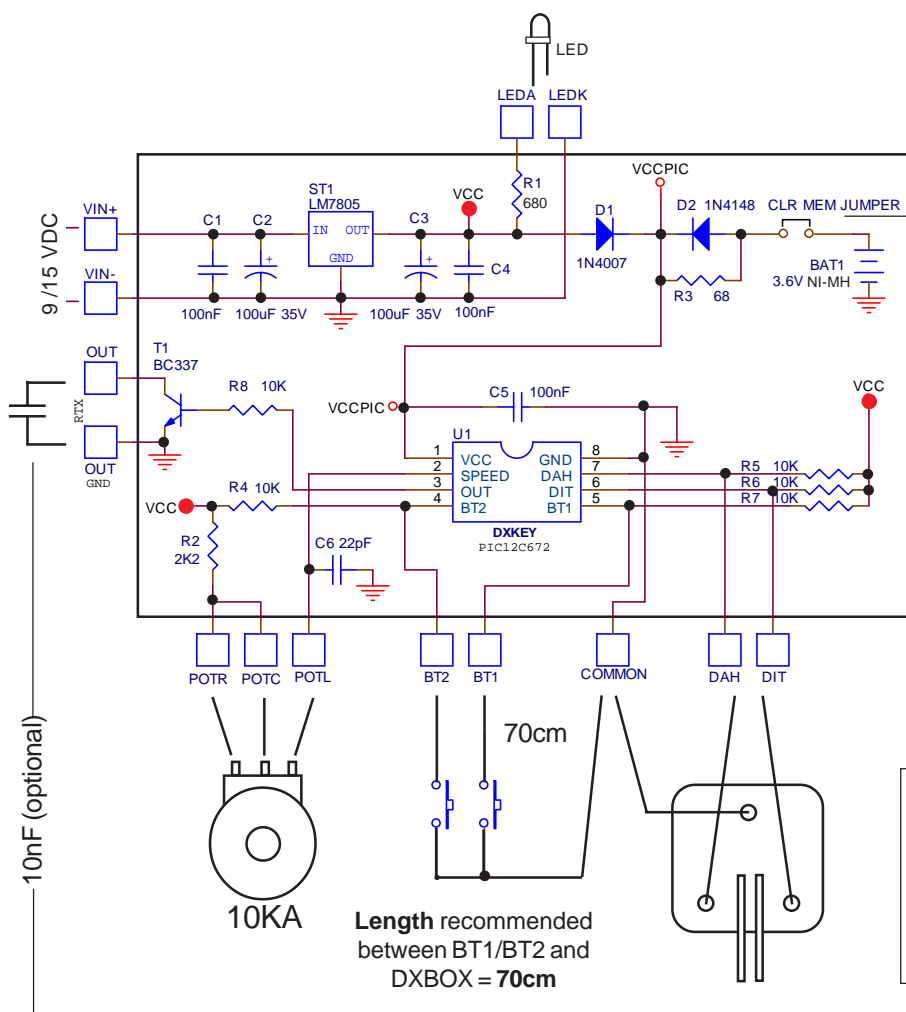

The special function keypad BT1/BT2 is easily used with the forefinger and thumb of your free hand. As it is remote from the DXKEY it enables you to easily control memory selection and other functions without taking your hand off the key.
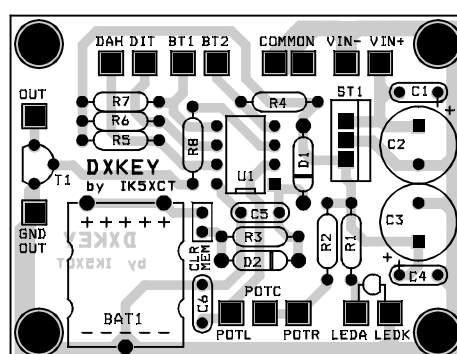
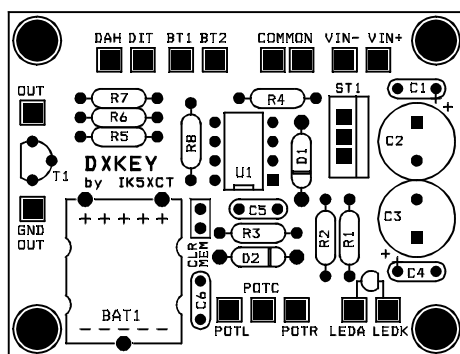## Circuit diagram of DXKEY including memory clear jumper.

COMP. PART LIST

R1 680
R2 .... 2K2
R3 68
R4-R8 .... 10K
C1,C4,C5 ... 100nF
C2,C3 .. 100uF35V
C6 .... 22pF
D1 .... 1N4007
D2 .... 1N4148
T1 .... BC337
BAT1 .. 3.6V NI-MH
JUMPER 2PIN
ST1 .... LM7805
U1 .... DXKEY
POT 10KA
LEDA-K .... LED
BT1-BT2 ..... KEY NA
DAH/DIT.. Iambic KEY

Removing the Jumper **CLR MEM** momentarily will disconnect the battery from the circuit thereby clearing all memory cells.
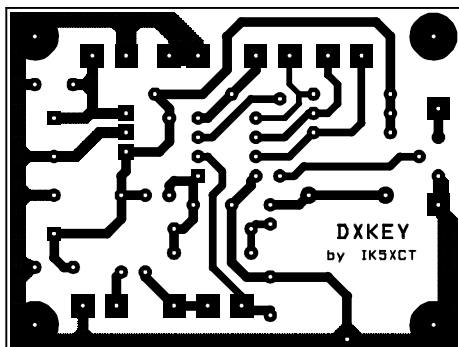
If you experience strong radio frequencies in the shack you can improve the RF immunity by inserting a 10nF capacitor across the output terminals of the DXKEY. Place this capacitor as close to, or on, the PCB. This should minimise any possible RF saturation of the output transistor (T1).

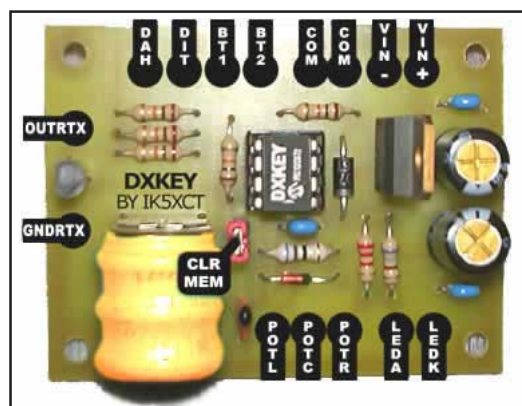## P.C.B. DXKEY - Plain Assemblage DXKEY

P.C.B. SOLDER SIDE (SCALE 1:1)

DXKEY
by IK5XCT

DXKEY assembled

DAH DIT BT1 BT2 COM COM VIN- VIN+

OUTRTX

GNDRTX

DXKEY
BY IK5XCT

CLR
MEM

POTL POTC POTR LEDA LEDK

Completed DXKEY in **DXBOX** *and Remote Function KEY BT1/BT2*

DXKEY
INTERACTIVE CW KEYER

+

-

ON

BT1/BT2 FUNCTIONAL KEY

BT1 WIRE

DXKEY   BT   BT

COMMON   BT2 WIRE

YOU CAN USE
SHIELD WIRE 2 POLE
USE SHIELD for COMMON

BT   BT

┌─ CONTACT DETAILS ─┐

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Cell.   +39 328 / 324.369.7

N.B. e-mail is the preferred contact method

DXKEY owners are welcome
to insert the DXKEY emblem
on their QSL Cards

DXKEY
PIC12C672
INTERACTIVE MEMORY KEYER CW for DXer in PILE-UP - CONTEST
www.qsl.net/ik5xct/dxkey

Send me an e-mail and
let me know what format
you require:
B/W or Colour
(TIF, JPG, PSD)