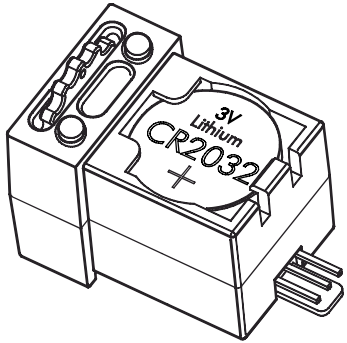


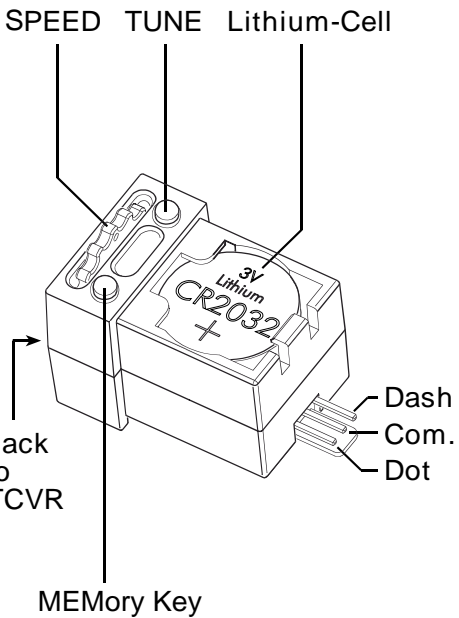
CODE CUBE 83P / IR



English

10.06

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Important Notes

- The Code Cube 83P is designed to switch max. plus 24 volts to ground. Continuous current may not exceed 200 mA, otherwise the switching transistor will become too hot.
- Do not attempt to key either grid-block or cathode keyed tube transmitters! For negative keying voltages make sure to use a suitable outboard circuit adaptor.
- In case of high SWR, block common mode waves using a balun.
- The lithium cell may not be shorted or put into fire. Empty cells have to be disposed off properly.

Menu Overview Code Cube 83P

Menu 1 Activate: MEM + DIT

Menu item	DIT-Paddle	DAH-Paddle
SH SPEED-Pot high limit	1 WpM up	1 WpM down
SL SPEED-Pot low limit	1 WpM up	1 WpM down
W Weight	increases 0,8%	decreases 0,8%
C Calibrate SPEED-Pot	calibration	restores default
TM 3 or 2 memories	3 memories	2 memories

Menu 2 Activate: MEM + DAH

Menu item	DIT-Paddle	DAH-Paddle
TU Tune mode	on - off	enter Menu 2a
CL CQ-Loop	on	off
? Call - Memory	records a dit	records a dah
CS Number of »CQ« (def. 4)	increases by 1	decreases by 1
Q »QRP« after last <Call>	on	off
RP CQ-call transits (def. 1)	increases by 1	decreases by 1
CR Number of <Call> (def. 2)	increases by 1	decreases by 1
PS »PSE« suffix to CQ	with PSE	without PSE

Menu 2a

Menu item	DIT-Paddle	DAH-Paddle
TO Timeout after 128 elements	off	on
SP Single-Paddle-Tune	on	off
H »long« keypress	≥ 1 sek	≥ 2 sek
SF Sidetone Float mode	floats AF	floating off
ST SideTone	off	on

Menu 3 Activate: MEM

Menu item	DIT-Paddle	DAH-Paddle
BE Beacon mode	starts/stops beacon	enter Menu 3a
M? Memory 1	records a dit	records a dah
KD Beacon delay mode	key down	no key down
BA Beacon alternate mode	M 1 + M 2	only Memory 1
D Beacon delay (default 0 s)	increases 1 s	decreases 1 s

Menu 3a

Menu item	DIT-Paddle	DAH-Paddle
SS Sidetone frequency	down	up
DD Debounce delay	increases 1.66 ms	decreases 1.66 ms
AU Autospace	on	off
ES Straight key	on	off
DI DIT memory	off	on
DA DAH memory	off	on

Menu 4 Activate: MEM + DIT + DAH

Menu item	DIT-Paddle	DAH-Paddle
B Bug mode	on	off
T? Memory 2	records a dit	records a dah
PR Practice mode	transistor disabled	output enabled
A Iambic mode	mode A	mode B
U »Ultimatic« mode	on	off
R Reverse paddle	switch paddles	switch paddles

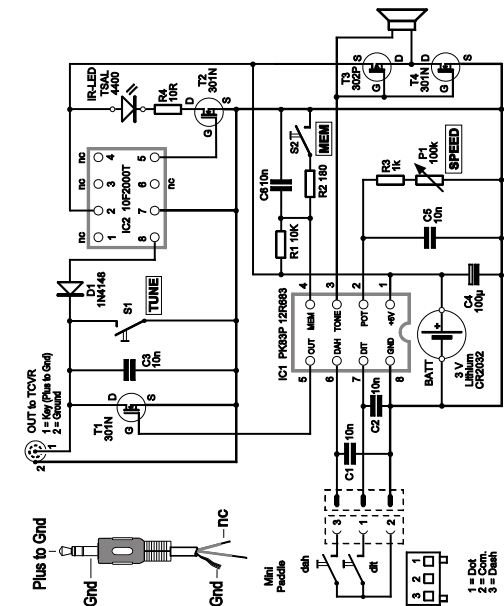
MEM	Memory 1	MEM+DAH	CQ
MEM+DIT	Speed	MEM+DIT+DAH	Memory 2

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Circuit Diagram

Code Cube 83P/IR



1. General

The original Code Cube and the new Code Cube 83P were designed as an addition to the Palm Radio Mini Paddle. The combination of these two units creates the world's smallest full featured electronic memory keyer and paddle. A sidetone oscillator is included and offers enough volume to practice morse code in a quiet environment.

The Code Cube 83P (CC) can optionally be equipped with an infrared transmitter. In combination with the Palm IR Receiver, it allows cordless transmission of Morse code from the (Mini) Paddle to a transmitter.

The infrared option is either already installed upon delivery or it can easily be added. (See "Appendix A"). The additional infrared link allows for the keying of one transceiver via a connecting cable and the simultaneous keying of other transceivers via the infrared link.

A housing kit (Aluminium, powder-coated) for the Code Cube is also available. It is useful

1

3.4 MEM key

To select the various functions and menus of the keyer, multiple key-press combinations are used. The MEM key can be pressed and released (short) or pressed and held for two seconds (long). It is often used in combination with the DIT and/or DAH paddle.

Hint: It is advisable to press MEM always a little ahead of the additional DIT and/or DAH keys to avoid unwanted transmitting of a dot or a dash.

Pressing and holding the MEM key ≥ 2 seconds (long) alone or in combination with the DIT or DAH lever selects one of the four main menus.

Within a menu, menu items (characterized by their abbreviations in CW) can be skipped by a short press of the MEM key

Return to the normal keyer mode:

- after changing a menu item
- upon reaching the end of the menu
- through renewed push and release MEM (after entering <CALL> or texts etc.)

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if you want to use your CC in combination with other brand paddles.

The electronic part of the Code Cube is based on a PK4-processor from Jackson Harbor press with customized software (version 83P) for Palm Radio.

The CC keying speed is adjustable via a handy thumbwheel. A built-in »TUNE« key facilitates continuous keying of the transmitter.

A callsign-memory, two text memories and several CQ and beacon options make the Code Cube usable for everyday use and for most contest exchanges.

The infrared electronics consist basically of a PIC which translates Morse Code into special 40 KHz pulses for the infrared diode (See Appendix B)

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4. Operating

A short press on the MEM key (in combination with DIT or DAH, see table) reads the following memories:

MEM	sends memory 1
MEM + DIT	sends keyer speed
MEM + DAH	sends CQ
MEM + DIT + DAH	sends memory 2

The memories are preloaded with the following messages:

Menu 1, »TM«	memory 3	„H“ (default off)
Menu 2, »?«	call memory	„VV“
Menu 3, »M?«	memory 1	„73 de palm radio“
Menu 4, »T?«	memory 2	„83P“

5. Example 1: Entering own call sign

Please unfold front and back pages of this manual at first. Your own call sign can be recorded through menu 2, item »?«.

Hints: 1. Adjust adequate speed at first.
2. Notice that the »auto space« feature is always active in the memory record routines (see also page 17, item »AU«).

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2. Specifications

Dimensions:	25 x 25 x 34 mm (without plug)
Processor 1:	12F683 - firmware by WB9KZY
Processor 2:	10F200T-I/O - firmware by DL4SDV
Speed:	5 - 50 WPM
Memory:	text: 2 x 80 char. - call: 40 char.
Power supply:	3 Volt - 0,6 mA (sleep mode - 1 μ A)
Lithium-cell:	CR2032 - 220 mAh
Sidetone:	adjustable from 325 Hz to 4 kHz
Keyer output:	N-FET max. 25 V/0,2 A; typ. 15 Ohm
Life (MTBF):	pot: 10k cycles - key: 100k plays

3. Operating

3.1 Powerup

The CC is delivered ready for operation (M1 - M3 pre-programmed, default-parameters).

3.2 Speed

The CC is equipped with a SPEED control pot utilizing a handy thumbwheel.

Turn counterclockwise (ccw) for lower, clockwise (cw) for higher speed.

Important: DO NOT turn the thumbwheel to it's end positions using force!

3

3. To avoid mistakes it can be necessary to change Iambic mode A/B (menu 4, »A«) and the DIT/DAH memories (menu 3a, »DI«, »DA«).

- Press MEM plus DAH for about 2 s. The Code Cube (CC) sends the first corresponding menu item: „TU“ „U“ „U“ etc. Release both keys now!
- Press MEM short again, CC will send: „CL“
- Press MEM short once again: CC will send „?“ This is the menu item for your own call.
- Now record your call - press MEM short when done. That's all!
- You can control your call sign by making the CC call CQ (short MEM plus DAH).

6. Example 2: Changing the sidetone

The frequency of the sidetone can be adjusted through menu 3a, item »SS«.

- Press MEM long to activate menu 3. CC responds: „BE“ „E“ „E“ etc. Release key!
- Press DAH shortly to access menu 3a. CC sends „SS“
- Hit DIT or DAH: Hear the sidetone and change its frequency (325 Hz to 4 kHz).
- Hit MEM again to store the desired tone and leave the menu.

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The speed (in WpM) will be played in CW through the sidetone if the MEM key is simulpressed with the DIT lever and then both released.

Press the MEM key first and hold it, then press the DIT lever and finally release both.

Note: You may continuously change the keying speed while keying.

The speed range is from 5 WpM to 50 WpM. Both high and low limits can be defined through a software menu. The Code Cube is being delivered with a calibrated speed-pot and a default setting of 16 to 32 WpM (low and high limit). Menu 1, »SL« and »SH« allows to preset both limits according to personal needs.

3.3 TUNE key

Pushing this key on the right side of the Code Cube keys the transmitter.

There are 3 additional means to key the TX via the »Quick Tune« software feature:

- send ≥ 5 „a“ or „n“ in a row
- send ≥ 10 „e“ or „t“ in a row (default off)
- use »TU« in Menu 2

4

7. Using the memories

7.1 Recording memories

Recording of memory texts will be made with the paddles as described above. Before you record, select the corresponding menu item:

- Call-memory - menu 2, »?«
- Text-memory 1 - menu 3, »M?«
- Text-memory 2 - menu 4, »T?«

The memories are preloaded with the messages mentioned on page 6.

You can insert your <CALL> at any given point in the message by recording 6 DAHs.

Insert a pause by recording »as« (di-dah-di-di) to stop memory play at the embedded pause. »Di-dah-dah-dah-dit« compels a pause of 6 dits.

Multiple use of those special signs is possible and each use counts as one character in the capacity of the memory.

In case of making errors, the complete memory text will have to be recorded again.

Short pressing of MEM terminates the recording mode.

Permanent keying by the »quick tune« feature, described on page 4, can not be embedded in the memory message.

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7.2 Playing memories

The CQ memory and the text memories can be played with the following MEM and paddle combinations:

- CQ-call - MEM + DAH
- Text-memory 1 - MEM
- Text-memory 2 - MEM + DAH + DIT

Remember: Press keys only shortly and always press MEM first.

When playing any of the memories a longer tap of MEM will stop the message play to pause the message at the end of the current character. This allows manual insertion of text and the message play will automatically resume after a word space length delay. If a pause into the memory was embedded by recording »as«, the Code Cube waits for a text entry before continuing the memory play.

All informations given under 7.1 und 7.2 also apply for the optional third memory. Restriction: M3 is only 40 characters long.

Remark: After a reset (the CC will send „FB” to indicate correct operation) all parameters are set to default values but the memory contents will not be erased.

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8. Explaining the menu items

8.1 Menu 1 Activate: long MEM+DIT

SH Speed pot, set High limit

Important, only after a reset: Calibrate the speed-pot first (see menu item »C«) After the message „SH” „H” „H” etc. shortly press DAH or DIT. The Code Cube sends out the high limit, e.g. „50”

To decrease this limit, press DAH as often as necessary - decrease is 1 WpM per DAH-press. To set the limit e.g. to 36 WpM press DAH 14 times.

A press on MEM finalizes the input, the Code Cube reads out the new setting.

To increase the limit: Press the DIT paddle as often as necessary.

SL Speed pot, set Low limit

After the message „SL” set the low limit as described in „SH”

W »Weight«

The normal (!) DAH-DIT ratio of 1:3 can be changed. Both DITs and DAHs are shortened or lengthened about 0,8% of a DIT length (max. 50 percent in 63 steps)

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8.3 Menu 2a Activate: from menu 2, »TU«

TO TimeOuts default: on

To prevent neverending strings of DITs and/or DAHs caused by a stuck paddle, a timeout mode has been added to the CC. This mode will put the keyer to sleep if the paddle is held for 128 straight DITs and/or DAHs. Also, tune mode will be automatically exited after about 14 seconds.

These timeouts can be turned off with DIT.

SP Single-Paddle-Tune default: off

This menu item allows the single lever paddle user to key the TX after either 10 DITs or 10 DAHs in a row. Tuning will be stopped with a tap to DIT or DAH.

H Half delay length default: 2 s

Press a DIT to shorten the delay length of the »long« key-pressing from 2 to 1 second.

SF Can be ignored - not relevant for the CC.

ST SideTone on - off default: on

This item allows the user to employ his rig sidetone. The »signal tone« will still be engaged during any menu or recording entry.

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DAH-Paddle: decrease 0,8 % Control character: „N”
DIT-Paddle: increase 0,8 % Control character: „A”
DIT + DAH: reset to 1:3 ratio Control character: „R”

C Calibrate the speed pot range

Important: Before entering the calibrating mode the speed-pot has to be in fully ccw-position. Then press DIT to go into the calibration routine - you may hear some dits and then the keyer will exit from the menu. (Hitting DAH will restore the default value.)

TM Third Memory default: off

This option enables (then records) or disables an optional 3rd memory. The 80 character callsign memory is then split into two 40 character memories.

After selection with DIT „O?” ist sent and then the new memory has to be recorded.

Record memory 3 in the same fashion as the other 2 memories.

Note: You can also insert the <CALL>, a stop (as) or a pause (di-dah-dah-dah-dit).

The speed send (formerly MEM+DIT) is **now moved** into the MEM + DIT menu as the first item. To exit the menu 1 after speed has been sent press either DIT or DAH.

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8.4 Menu 3 Activate: long MEM

BE Beacon Mode

The Beacon mode will send the contents of memory 1 (or M1 and M2 alternating) continuously.

The **delay length** is adjustable (»D«). This delay is also the delay between calls in the CQ-loop. (see menu 2, item »CL«)

The sending of a constant key down during the interval between sending the beacon message (»KD«) can also be selected (There is no key down in the CQ mode!)

Start: Press MEM (≥ 2 s) until „BE” in side-tone, then press DIT.

Be careful: hitting of DAH would activate submenu 3a!

Stop: Short DIT or DAH stops the beacon.

M? Record Memory 1

Start the record of your message. When complete, press MEM. (The memory is 80 characters long - recording will terminate automatically after the 80th character)

Hint: See also 7.1, page 8

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8.2 Menu 2 Activate: long MEM+DAH

Remarks: This menu records the operators call sign <CALL> and selects the different CQ features. The <CALL> can be up to 40 characters long - it remains stored even if the battery is removed permanently.

TU Selecting menu 2a

Press DAH to activate submenu 2a.

Status message: „TO”

DIT en-/disables tune mode (key down).

CL CQ Loop mode default: off

Changes the normal CQ call to a continuous CQ sequence, spaced apart by the beacon delay set in menu 3, item "D".

? Record the Callsign

The Callsign <CALL> can now be recorded. When complete, hit the MEM key.

CS CQ Select Default: 4 x CQ

The number of CQs sent during the CQ-call can be varied from ∅ (no CQ) to 7 with this menu item. The CC sends corresponding numbers to confirm the changes. Short pressing of MEM will exit the menu and send the number of CQ repeats.

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KD Key Down default: No key down

Pressing DIT inserts a key down between every message in beacon mode.

BA Beacon Alternat default: only M1

This routine selects/deselects alternating the beacon between M1 and M2.

D Increase the beacon Delay default: 0

The beacon delay will default to ∅ seconds (only 7 bits). See also menu 2, »CL«.

DIT extends beacon delay by 1 s, DAH shortens it by 1 s. The maximum beacon delay is 63 seconds.

MEM stores the desired delay time - it will be sent through the side tone and the menu will be left.

Pressing both paddles at the same time will reset the delay to zero. Control character: „R” and after storing with short MEM: „∅”.

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Q „/QRP” after last callsign default: off

This option will allow the operator to append a „/QRP” to the last callsign sent. Example: CQ CQ CQ de <CALL> <CALL> /QRP k

RP ReRepeat of CQ calls default: 1

The number of times the entire CQ-call is repeated can be varied from 1 to 4 with this menu item. Changes are confirmed by corresponding numbers.

Short pressing of MEM will exit the menu and send the number of CQ-call repeats.

CR Callsign Repeat default: 2

The number of recurrences of <CALL> used in the CQ-call can be varied from 1 to 4 with this menu item. Changes are confirmed by corresponding numbers.

Short pressing of MEM will exit the menu and send the number of <CALL> repeats.

PS „PSE” at end of CQ-call default: off

DIT adds „PSE” between the last call and the final „K”. Example: CQ de <CALL> PSE k

Note: When playing CQ or any of the memories a tap of either the DIT or DAH will stop the play directly after the running character. „/QRP” will be always finished too.

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8.5 Menü 3a Activate: from menu 3, »BE«

SS Sidetone Set default: 580 Hz
The Sidetone can be adjusted from 325 Hz to 4 kHz. (Refer to page 7, »Example 2: Changing the sidetone frequency«).
The »signal tone« frequency remains unchanged at 4 kHz.

DD Debounce Delay set default: 20 ms
The debounce delay (to prevent errors caused by contact bouncing) can be adjusted from 1ms (count 0) to 104 ms (count 63). Default is 20 ms (count 12).
DAH will decrease the delay by about 1.66 ms - DIT will increase the delay by 1.66 ms. Short MEM will exit the routine, the updated debounce count will be sent. The actual delay is 1.66 ms times the count value. Simulpressing DAH+DIT resets the delay to 20 ms, sending „R” and after MEM: „12”.

AU Autospace on - off default: off
The autospace feature inserts a character space automatically if the operator has not pressed a paddle 1 dit after the last dit/dah is sent. Note that this feature turns a dirty given character into a real wrong character!

10. Changing the lithium battery

The battery (CR2032) can be removed by using a toothpick in one of the slots on the backside of the CC.
Note: Do not short-circuit the battery or press the MEM key while changing the battery.
Reason: C4 can hold the content of the RAM for more than 60 minutes. This saves you from the hassle of reprogramming all parameters.

11. Reset

Should the processor have gone in an undefined mode (mostly through bad programming, Hi!) a reset can be enforced by removing the battery and shortening both battery contacts on the Code Cube.
After that, MEM needs to be pressed during reinstalling the battery until the CC sends „FB”.
All parameters are now reset to default values! Memories M1, M2 (M3) and <CALL> are not affected. If you want to erase them, simply overwrite the old text.
Important: The speed pot also needs to be calibrated: Menu 1, »C«

ES Can be ignored - not relevant for the CC
DI DIt memory on - off default: on
DA DAh memory on - off default: on

8.6 Menu 4 Activate: long MEM+DIT+DAH

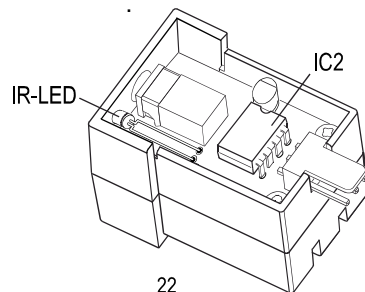
B Bug / Straight-key mode default: off
Dits are sent normally but dahs are sent like a straight key.
T? Record Memory 2
Start the record of your message. When complete, press MEM.
Note: See the remarks on page 8.

PR PRactice mode default: off
The output transistor is not keyed but the sidetone is retained. (This allows to get used the CC without disconnecting the rig.)

A Curtis Mode A or B default: mode B
The iambic mode of the keyer can be set to either mode A or B. Keep in mind that these keying modes are not identical with dit or dah

Appendix A Upgrading to the IR-Option

The Code Cube is ready to be upgraded to the infrared version. The upgrade set consists merely of IC2 (10FT200T) with the necessary software and the IR-LED TSAL 4400. Both can easily be plugged into their holders on the CC circuit board. Note that Pins 4 and 5 of IC2 must be stuck through relatively small holes in the PCB.
The circuit diagram on page 26 shows the IR-option.
The only challenge is to drill a 3 mm hole through the front panel of the CC. The center of the hole is already marked (6,5 mm from the middle and 4,2 mm from the lower rim).



memory! Check this web site for more information:

Chuck Olson, WB9KZY
(www.jacksonharbor@worldnet.att.net)

U »Ultimatic«-mode default: off
Ultimatic differs in this way from iambic: instead of an alternation between dit and dah when both levers are pressed, ultimatic will output the element of the last lever pressed.

Note that Ultimatic setting takes precedence over either of the iambic modes. A DIT will turn on ultimatic mode, a DAH turns ultimatic mode off (default).

R Reverse Paddle mode default: off
Reverses the DIT and DAH levers (easier than resoldering a jack).

Appendix B Notes on infrared links

Unlike data communication that uses an RF link (e.g. »Bluetooth«), optical rules must be kept in mind when using an infrared link.
That means that the transmitter and the receiver communicate via a straight line or reflected path, that is, »line of site« or via reflections from bright surfaces.
The output power of the IR-LED can unfortunately not be expanded arbitrarily because this would shorten operation time dramatically, also the relatively high internal resistance of the battery doesn't allow current pulses over 100 mA.

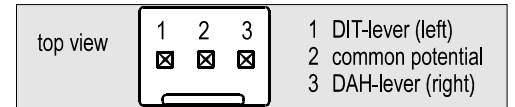
That means that the range of operation is limited. Theoretically it would be 10 meters (30 feet) with accurate orientation and clear line of site but it should purposely be reduced by an optical attenuator to the minimally required distance.

Unfortunately most infrared remote controls that are used in consumer electronics use the same range of infrared waves.

9. Connections

The Code Cube was developed for use together with the Palm Radio »Mini Paddle« and the connection of those two units is made by a 3-pin connector (Molex, available through »Mouser«)
If you want to use paddles from other makers, e.g. Bencher or Schurr, the Code Cube has to be connected by cable. A fitting cable and an aluminum housing is available for that purpose.
The input of the Code Cube is protected against contact bouncing, but not very resistant against RF fields or big RF peaks. The output (see schematic on page 26) has to be connected to the TRX with a suitable and preferably short cable. Also this connection can be sensitive to RF fields.

Important: A »hot« TRX-housing will indicate high SWR and RF on the shield of the coax. In this case, the use of a balun as an isolation transformer is indispensable.



Disruptions by IR remote controls therefore are likely and need to be expelled from the first.
This also applies to infrared computer mice, IR links used in laptops and transmitters for IR headphones.
You should avoid using them at the same time as your IR-Code Cube 83P.

One effect of interference deserves special mention because it can create a special transcription error.
Every element of a Morse code character is embedded between a start and a stop pulse - which saves 99 percent of current! If a character is started but for some reason the stop pulse is not detected, the output will be locked in »key-down« or continuous transmit.

To prevent this, a watchdog function deactivates the keying transistor after about one second if the stop pulse is missing.