

. Super Combo Keyer

Manual Version 1.03

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1 General Description

1.1 Overview

The *Super Combo Keyer* is a dual-mode (Phone and CW) multi-purpose keyer designed for DXers, Contesters, DXpeditioners and casual operators who want to reduce the amount of wiring and clutter on the operating desk. The unit incorporates a CMOS Super Keyer III for CW keying, retaining the user interface of that keyer for CW use.

Features include:

- 6 Message memories on CW and Phone
- Two Radio Switching for SO2R
- PC Keyer interface, via LPT & Serial Port
- Isolated audio output for EMI/RFI
- Audio Compressor and Noise Gate
- CI-V Interface
- Voice and CW Message Loop/Beacon Function
- Dual Mode Message Button sharing

1.2 Physical description



The unit's front panel contains all the controls used during normal operations, and several controls used only during initial configuration. The figure shows the location of all front panel controls. Details about their use can be found in the relevant sections of Chapter 4.

The rear view of the keyer is shown in the wiring summary in Chapter 6. The unit measures 65H x 180W x 170D mm (2-9/16”H x 7-1/16”W x 6-11/16”D) and weighs 1350 g (3.03 lbs). Power consumption is rated at 13.8 V, 200 mA.

2 Feature Description

2.1 CW Keyer

It was decided not to re-invent the wheel and produce yet another CW keyer with a few fancy features. Several options were investigated, but the Super Keyer III, distributed by Bob Locher W9KNI through his Idiom Press, was an obvious choice. This keyer's tremendous flexibility allows it to be tailored to each operator's tastes.

2.2 Voice Keyer

Several types of voice keyers are available on the market, some as standalone units and some as PC Cards with wonderful features for the home-based contester and DXer.

With the *Super Combo Keyer* it was decided to have most of the functions controlled by a microcontroller inside the unit and to provide a simple but versatile interface to a PC.

The programming and playback functions of the voice keyer operate in much the same way as the CW keyer.

An analog voice storage chip from ISD forms the heart of the voice keyer with all the input and output functions controlled by a microprocessor. The user can program six messages - each up to ten seconds long. The message audio output level can be adjusted separately from the microphone audio input level.

The first message (MSG1) can be configured to run in a "repeat loop" mode to repeat continuously with a preset delay.

The first four messages can be accessed from logging programs such as TRLog, CT, NA and WriteLog. *Message Abort* for all logging programs using the NA Standard LPT pinout is also supported.

2.3 Two-Radio Switching

Logging programs like NA, TRLog, WriteLog and CT offer users the ability to switch between two radios. Two-radio operation is becoming popular in contesting circles, but individuals might also want to use this facility during DXpeditions or even for casual operation.

In most if not all cases the user is required to wire up some sort of switching array using relays to switch the audio and key lines to the radios. Switching units are available commercially to do the switching, but mostly it is just another box that clutters up the operating environment with extra cables and their attendant risk of RFI or ground loops.

The *Super Combo Keyer* offers the ability to control SO2R (Single Operator 2 Radio) functions with a single cable from the computer's LPT port to the keyer. The signal that controls the **Radio 1/Radio 2** switch control is fed into the *Super Combo Keyer*. The

keyer switches the **AF**, **CW-key** & **Amp-key** lines to the radio selected by the logging program. No receive audio switching is done by this Keyer.

The user can also override the PC selection by means of a 3-way toggle switch on the front panel. If the toggle switch is in the centre (**PC**) position, it follows the control signals from the PC. The up and down positions select **Radio 1** and **Radio 2** respectively.

http://www.qth.com/ka9fox/two_radio_operating.txt contains a good article about the intricacies of two-radio contesting. While the *Super Combo Keyer* eliminates most of the drudgery of implementing the necessary hardware, you will have to spend a fair amount of time updating your own operating “firmware” before you’ll be able to operate two radios seamlessly!

2.4 PC Keyer Interface

The *Super Combo Keyer* interfaces directly to the PC’s LPT and COM port. Depending on the type of logging program and configuration required, the user only needs a standard pin-to-pin serial and/or parallel cable.

The **COM** connector on the back panel of the unit is multi-functional and provides an interface for the CW-key and PTT signals from a logging program as well as the PC connection for a CI-V interface that can be used to control an Icom radio from the logging program.

The **LPT In** connector on the back panel provides the unit with access to PC control of the first four messages, CW keying, PTT and **Radio 1/Radio 2** switching from the computer.

The LPT pin controlling the **Radio 1/Radio 2** switching differs between contesting logging programs. TRLog, CT and WriteLog uses pin 14 to switch while NA uses pins 7,8, & 9 to provide a slightly more versatile switching arrangement. NA users will have to move the wire connected to pin 14 of the LPT to pin 7 or 8 for the switch to function.

2.5 Isolated Audio Output

The audio outputs to **Radio 1** and **Radio 2** are isolated from the rest of the circuitry with an audio transformer. One of the transformer pins are fed through an audio cap to provide DC decoupling.

The isolated transformer outputs minimize chances of ground loops and RFI. The user must however still ensure that proper grounding techniques are used - especially in a high level RF power environment and where a port of the PC is also connected to the keyer.

2.6 Audio Amplifier

The microphone input is routed through a high pass filter (HPF) to reduce any low frequency noise or hum that may be present on the audio input. Following the HPF is a single-chip amplifier/noise gate/compressor. The audio gain of the amplifier is adjustable

from the front panel. The audio level setting is adjusted to the proper level to match your type of microphone to the level required by the message-recording chip. There is also a 5 V pull-up pin on the microphone socket for use with an electret condenser microphone.

2.7 Noise Gate

The audio chip also contains a noise gate feature, used in this unit to reduce background noise. The noise gate is especially useful in high ambient noise levels, such as those produced by amplifier fans and other operators in a multi-operator contest crew. The level of the noise gate threshold is fully adjustable, and a typical reduction of 6 dB in unwanted noise is possible. This feature not only allows for a cleaner-sounding signal on the air but also enables the user to make higher quality voice message recordings. The noise gate can be disabled by a toggle switch on the front panel.

2.8 Compressor

The compressor on the audio chip is also fully adjustable from the front panel and can be switched in and out of the audio circuit with a toggle switch. The compressor can be used in cases where the transmitter does not have a compressor or where the output level of a microphone is not able to drive the audio stage of the radio sufficiently. It is not advisable to use the compressor on the *Super Combo Keyer* at the same time as the compressor on the radio. Such a combination is likely to generate on-the-air comments about halitosis or worse...

2.9 CI-V Interface

A CI-V interface was added to the Super Combo Keyer for Icom radio users. The PC connection is via a DB-9 connector (**COM**) on the back panel. A 3.5 mm mono phono connector provides the connection to the radio.

2.10 Dual Mode

In a typical contest setup CW keying is done from the PC via the LPT or COM interface in the *Super Combo Keyer*. Some operators prefer to send CW with the paddle connected to their external keyer to arrange a sked or to repeat an exchange. After sending with the paddle the operator can recall a CQ or QRZ? message directly from the external memory keyer without having to move his hand back to the PC keyboard.

The Dual Mode feature was added to simplify use of the *Super Combo Keyer* in a contest where multipliers can be worked on both SSB and CW.

The *Super Combo Keyer* has the feature that the CW keying still works from the paddle even if the Mode switch on the front panel is set to "Phone". When moving multipliers between modes and bands it may happen that the wrong mode is selected on the *Super Combo Keyer* and the Voice instead of the CW message or vice versa is selected when the operator presses a button to manually request a message from the keyer.

The "Dual Mode" feature was added to eliminate the frustration of having to change the mode switch on the *Super Combo Keyer* when changing modes on the radio. In the Dual Mode, MSG 1 to 4 will remain Voice messages while MSG 5 and MSG 6 will be CW messages as it has been pre-recorded.

Voice messages MSG 1 - 4 are still controlled from the PC logging program or manually by pressing the MSG 1 – 4 buttons. The two CW messages on MSG5 & 6 can be recalled manually by the operator.

The Dual Mode is entered by pressing MSG 2 & 3 while in **Phone** mode. The RECORD LED will flash "D" in Morse code. When 2 & 3 is pressed again "M" will flash indicating "Manual" mode. The SCK will also flash "M" and revert to the standard manually selected mode if the mode toggle switch is moved from **Phone** to **CW**.

3 Installation

3.1 Microphone and PTT Wiring

The microphone input is on the back panel of the unit via a 4 pin Mini-DIN socket.

The pin connections are as follows:

Pin 1	Audio In	~400 mV maximum
Pin 2	PTT/Footswitch	Contact to Ground activates PTT
Pin 3	Ground	PTT & Audio Ground (0 V reference)
Pin 4	5 V Pull-up	For electret condenser microphone
Cover Plate	Ground	DC Ground (0 V reference)

Note: Only high quality shielded cable should be used for microphone and PTT/Footswitch leads. Use double shielded cable for audio lines if possible to reduce chances of RFI.

It is difficult to solder wires onto a Mini-DIN connector. Professional-grade soldering equipment is recommended to modify factory wiring or to make custom interface leads. Heat-shrink sleeving must be used over all connections soldered to the connector. The heat-shrink sleeving will ensure that no short circuits occur inside the connector once the connector's plastic jacket is pushed back on.

The quality of the soldering and the wiring used will have an impact on the performance and reliability of your keyer.

3.2 Radio Wiring

The two DB-9 female output connectors for the two radios and amplifiers are located on the unit's back panel.

The pin-out is as shown in the table, and is the identical for both **Radio 1** and for **Radio 2**

Pin 1	Audio Out 1	0 to 600 mV (DC decoupled – see text)
Pin 2	PTT Out	Open Collector (20 V/100 mA)
Pin 3	CW-Key Out	Open Collector (20 V/100 mA)
Pin 4	Ground	
Pin 5	Amp-Key Out	Open Collector (20 V/1 A) with diode protection
Pin 6	Audio Out 2	Audio Ground (Floating – see text)
Pin 7	Ground	
Pin 8	Ground	
Pin 9	Ground	

Pins 1 and 6 are connected to the output of a 600 Ω 1:1 transformer. Pin 1 is decoupled with a 10 μ F non-polarized audio capacitor.

3.3 PC to Keyer Wiring

The unit has been designed to reduce the amount of effort and wiring required to implement a two-radio setup with computer control. Depending on the type of configuration required, the user only needs a standard pin-to-pin serial (RS-232) and/or parallel (LPT) cable. (See important note at end of 3.3)

The *Super Combo Keyer* uses the “NA Standard” of DVK control from an LPT port. Several other logging programs such as TRLog, WriteLog and CT adopted the same method of DVK control.

The **COM** connector (DB-9 Male) on the back panel of the unit is multi-functional and provides an interface for the CW-key and PTT signals from a logging program as well as the PC connection for a CI-V interface that can be used to control an Icom radio from the logging program.

COM Port Wiring.

Pin 1	N/c	No connection
Pin 2	RXD	Receive data from radio control software
Pin 3	TXD	Transmit data to radio control software
Pin 4	CW-key	CW-key input from PC logging program
Pin 5	Ground	Chassis Ground
Pin 6	N/c	
Pin 7	PTT In	PTT signal from PC logging program
Pin 8	N/c	
Pin 9	N/c	

The **LPT In** connector (DB-25 Female) on the back panel provides the unit with access to PC control of the first four Voice and CW messages, CW keying, PTT and **Radio 1/Radio 2** switching from the computer. Band decoding signals are provided on the back panel for external decoding.

The pin connections for the **LPT In** connector are as follows:

LPT Pinout	Super Combo Keyer
Pin 1 *	Strobe Signal
Pin 2 *	DVK Message Abort
Pin 3 *	DVK Msg 1
Pin 4 *	DVK Msg 2
Pin 5 *	DVK Msg 3
Pin 6 *	DVK Msg 4
Pin 7 **	Band output bit 1
Pin 8 **	Band output bit 2
Pin 9 **	Band output bit 3
Pin 12 **	DIT paddle input
Pin 13 **	DAH paddle input
Pin 14 *	Radio1/2 Switch Signal
Pin 15 **	Foot switch input
Pin 16 *	PTT signal from PC
Pin 17 *	CW signal from PC
Pin 18 *	GND for CW & PTT
Pin 25 **	GND for paddle

* These pins are used by the Super Combo Keyer

** These pins are not used by the Super Combo Keyer. They are extended to a mini-DIN connector for access by the user. **Note:** These pins are not buffered by the keyer and are connected directly to the LPT port on the PC.

! Important Note when connecting to LPT and COM ports !

Depending on the configuration chosen by the user there are some instances that pin-to-pin cables on the LPT and COM may cause unwanted operations to occur. Keep the following notes in mind when doing your wiring between the *Super Combo Keyer* and the PC.

- Using the Serial (COM) port as the CW-keying port: Some of the logging programs do not utilise pin 7 for the PTT function and the PTT LED will be continuously lit while the radio connected to the *Super Combo Keyer* will also be kept in PTT mode. The simple cure is not to connect pin 7 on the DB9 cable between the PC and the *Super Combo Keyer*. TRLog users can switch the PTT OFF by selecting PTT ENABLE=FALSE in the CTRL J Menu. Also keep in mind that some logging programs may assert the CW-key (pin 4) line until CW is actually sent from the program.
- Using the LPT Port for CW & PTT Keying: When CW-key and PTT is selected on the LPT port the user must keep in mind that the PTT and CW-key signals from the COM is in parallel with the LPT signals. If the CI-V function is used it and the radio control program on the PC does not “disable” pin 4 and 7 of the

COM it may cause the CW-key and PTT to “lock” and the PTT and CW LED’s will stay lit. If this configuration is chosen it is best only to connect pins 2,3 and 5 on the **COM** cable.

- Starting the PC while **COM** and LPT is connected: Take precaution when the PC is initially switched or restarted during operation. During the typical startup routine of a PC the **COM** and LPT ports are “polled” to test the ports and to check for peripheral devices. Typically the **COM** will assert the CW-key and PTT lines for about 2 seconds during a start up routine. If the LPT cable is connected while during the startup routine it may force the keyer into RECORD mode. To avoid any unwanted actions keep the *Super Combo Keyer* switched OFF during PC startup and disable the PTT and CW signals to the radio.
- Entering Windows™ after using a DOS based logging program: If the LPT port was used to control the DVK in e.g. TRLog and Windows™ is started while the LPT is connected it could also force the keyer in RECORD mode. Avoid unwanted actions by switching the keyer OFF or removing the LPT cable during a Windows session. Writelog is a Windows based logging program and while the program is running the LPT output signals should remain predictable.

3.4 Amplifier Keying

An open-collector transistor capable of switching 1 A at a maximum open circuit voltage of 20 V is used to minimize the chances of hot switching the amplifier relay. The transistor switches in conjunction with the PTT, Voice Messages or CW pulses. The delay on the on/off switching of this transistor is much less than that of a relay. If your amplifier does not support full break in CW mode, you will have to keep the transceiver key line to the amp connected in parallel with the output from this transistor. The purpose of this transistor is to speed up the initial keying of the amplifier to prevent hot-switching the amplifier’s transceive relay. Once the transistor has keyed the amplifier, the transceiver’s internal control relay will keep the amplifier keyed until the end of the transmission.

The transistor switch can also be used to switch an antenna changeover relay when separate receiving antennas are used.

4 Operation

4.1 Programming CW Messages

Ensure that the mode switch on the front panel is set to the CW mode. To program a CW message, hold down the desired message button until a beep is heard on the speaker. Now send the message with the paddle, possibly including embedded messages that are allowed (see section 5.6). An acknowledgement beep will be heard from the speaker during each word space. After the message is completed, press the message button once to store the message.

For further information about the Super Keyer III features and programming, refer to the complete Super Keyer III Operating Manual as supplied by Idiom Press. The complete manual is reproduced as Chapter 5 of this document.

4.2 Programming Voice Messages

Six different voice messages, each up to 10 seconds long, can be programmed into the *Super Combo Keyer*.

Ensure that the mode switch is set to the **Phone** mode. Hold down the desired message button (e.g. MSG1) in for about two seconds until RECORD starts flashing. When you let go of the button, the DVK is in Program Mode.

To load the message, press and hold the desired button and speak clearly into the microphone. While the recording is in progress, RECORD will be continuously illuminated. When you release the button, RECORD turns off and the message is stored in that specific message.

To listen to the recording, ensure that **Mon** is on, so that the keyer's speaker is turned on. Press the message button again. The first time that the message button is pressed after recording, it will only play back the message on the monitor speaker, without keying the PTT. This feature allows the user to listen to the recorded message without transmitting it over the radio.

When the button is pressed again, the keyer activates PTT so that the message can be sent out over the air.

***Note:** If your radio is in VOX mode, the first playback may let your radio transmit, even if PTT is not active!*

To obtain a clear recording, it may be necessary to adjust the **Mic** control on the front panel to suit your microphone's output level. Several recordings may be required to determine the best setting for your type of microphone. Amplitude clipping of the recorded message will occur if the message is recorded "too loud". **Compressor** and **Noise Gate** can also be switched in or out of the line when the recording is made (see sections 4.3.3 & 4.3.4). It has been found that the noise gate improves the recording

quality, but when the microphone being used has enough drive it is not necessary to use the compressor at all.

4.3 Playing back Messages

Sending a message over the air is as simple as pressing the desired message button (e.g. MSG1). The radio then transmits the recorded voice message.

It is important to set the audio output levels to the radio before attempting to play back the DVK messages. Once all settings have been completed, **Mon** can be switched off, disabling the internal monitor speaker.

4.3.1 Setting the Microphone Output Level

Before any DVK message is sent, the normal microphone level to the radio must be set. Retain the **Mic** setting used during the recording of the messages.

Set the Radio Select switch to the required position (**Radio 1** or **Radio 2**). Ensure that the wiring to the radio has been done according to the manual (see Chapter 6 for detailed information). If the radio has a built-in compressor, it is recommended that the Keyer's compressor be switched OFF. The noise gate should also initially be disabled.

Speak clearly into the microphone and adjust the relevant **Radio 1** or **Radio 2** level on the back panel of the Keyer so that the ALC setting is the same it is when the microphone is connected directly to the radio.

There should be no audible difference with the microphone connected through the Keyer compared to being connected directly to the radio.

4.3.2 Setting the DVK Output Level

After the proper setting for the microphone output level has been obtained, set the DVK output level as follows:

Ensure that you are on a clear frequency. It is preferable to have a friend listen to your transmission over the air while the DVK level is being set.

Press the button that contains the longest message. While it is playing, adjust **DVK** on the front panel for the same ALC indication on the radio as when the microphone is used. Listen on the side-tone or ask your friend for a report on the normal (microphone) and DVK audio.

The DVK is now ready to use on the air.

4.3.3 Setting the Noise Gate

As described earlier, the noise gate will reduce the level of the background noise by approximately a 6 dB margin if adjusted properly. The noise gate can be enabled and disabled by the **Noise Gate** switch on the front panel.

Speak into the microphone in a normal tone of voice while adjusting the **Noise Gate** level control on the front panel clockwise. At the same time, keep an eye on the ALC level on the radio.

At some point while adjusting, the ALC level will start to decrease. At this point, even your own voice level is being seen as noise. Turn the **Noise Gate** slightly back (counterclockwise) until the ALC level is back to normal.

A way to determine if the noise gate is working is to listen to your own audio with headphones using the transmitter monitor. First switch **Noise Gate** off. Listen carefully to the background noise in your headphones while you key the radio with PTT. Now switch **Noise Gate** in and out. You should hear a marked difference in the amount of background noise being transmitted with your signal.

If you have a high level of fan noise around the microphone, you may also be able to see the effect of the noise gate on your wattmeter level when the radio is transmitting.

4.3.4 Setting the Compressor

Switch the compressor on with the **Compressor** toggle switch on the front panel. Ensure that the compressor on the radio is switched off before you attempt to use the compressor on the Keyer.

Adjust **Compressor** level control on the front panel until the desired level of compression is reached. It is not advisable to do the voice message recording with the compressor switched on.

4.3.5 Aborting a Voice Message

Three different ways exist to stop or abort a voice message after the message has been started.

- Logging programs using the NA DVK interface use **ESCAPE** on the PC keyboard to abort the outgoing message.
- With TRLog after 4 seconds of the message have elapsed, pressing **F10** will abort the outgoing message.
- Alternatively, the user can dedicate any of the message memories as a **Stop** button. A very short recording must be made in this memory position. If the Keyer is not in the Message Queue Mode, pressing this **Stop** button will halt the previous message immediately.

4.3.6 Queuing Messages

In Normal mode, the voice keyer will abort the current message and transmit the new message if any new message button is pressed. If the same button is pressed twice, the second press will cause the message to be restarted immediately.

To toggle between Queue and Normal Modes, press MSG5 and MSG6 simultaneously. The RECORD LED will flash “Q” or “N” in Morse code to indicate the appropriate mode that has been entered..

In the Queue Mode the current message will be completed before any other message is played. It is possible to queue up to five messages at a time. If more than five button closures are made, RECORD will light until the first message has been completed, resulting in a vacant space in the queue.

4.3.7 Message Loop Mode

The voice keyer can be programmed to act as a voice beacon or as a CQ machine in a contest. Only message 1 can be repeated, with one of three pre-set delays.

To enter Repeat Mode, ensure the Keyer is in **Phone Mode**. Press MSG1 and MSG2 simultaneously and release them. Message 1 is transmitted immediately. At the end of the message, RECORD will flash “2” in Morse Code. After a two second delay, Message 1 is transmitted again. The cycle is repeated until MSG1 is pressed again.

Pressing MSG1 and MSG3 gives a 5 second delay between transmissions, while MSG1 and MSG4 yield a 10 second delay. In these modes, “5” or “10” is flashed on RECORD, rather than the “2” described above.

4.4 Footswitch Operation

A footswitch can be connected to **Mic** on the back panel. A contact closure to ground activates PTT.

Alternatively, TRLog users can utilize the Footswitch pin (pin 15) on the LPT interface to control the PTT function.

Pin 15 on **LPT** is made available (unbuffered) as pin 7 of **LPT Out**. This function ensures that users can still use an external footswitch with TRLog, even when the only available LPT port on the computer is used by the *Super Combo Keyer*. TRLog can be configured to use the footswitch input for one of several keyboard functions, one being the Radio1/2 switch.

4.5 PC Control DVK

The *Super Combo Keyer* allows direct connection of a pin-to-pin LPT cable from the PC to the keyer. This cable carries the signals required to select the first four messages from

the logging program, as well as several control signals (PTT, CW, band code etc.). There should be no need to make up any additional interface cables.

The *Super Combo Keyer* uses the “NA Standard” of DVK control from an LPT port. Several other logging programs such as TRLog, WriteLog and CT adopted the same method of DVK control which is a short 200 ms pulse on the allocated pins to start the messages. NA uses pin 7 & 8 of the LPT to switch between radios while TRLog, CT and WriteLog uses pin 14. The *Super Combo Keyer* also uses pin 14 of the LPT to switch between radios.

TRLog users must have TWO RADIO MODE enabled. The SWAP RADIO RELAY SENSE must be set to TRUE (0 V output activates **Radio 1**). DVK PORT = LPT1 selects LPT1 for DVK messages.

TRLog prompts the user for the rest of the commands required to use the two-radio mode when the program is initialized.

WriteLog users must set the DVK port and Radio Switch in *Setup Port Setup*. Select “NA Interface” in the “DVK Type” window.

In CT the **Radio 1/Radio 2** feature is always enabled. CW Port and DVK Control are subject to software setup to enable the outputs. Note that with CT the DVK option must be set to W9XT on the desired LPT port. If only “DVK” is selected for a specific LPT port the message abort by pressing ESC from the PC keyboard will not function.

NA users can set the LPT port and DVK type in the configuration file. The **Radio 1/Radio 2** switch is activated by configuring the same LPT for SO2R.

4.6 CW and PTT signals from the PC

Most logging programs make the PTT and CW signals available on a LPT and/or **COM** port. The *Super Combo Keyer* supports PTT and CW keying from either the LPT or the Serial port.

The CI-V function on the serial port will still function even if the serial port was selected for PTT and CW keying.

The commands to select either the LPT or Serial port for the key functions can be found in the logging software manuals.

A red LED on the Keyer’s front panel indicates that the PTT is active, while an amber LED indicates CW keying.

4.7 Two-Radio Switching

The *Super Combo Keyer* has two DB-9 connectors on the back panel, to connect to two different radios and amplifiers. The wiring is explained in Paragraphs 3.2 and 3.4 (Radio Wiring and Amplifier Wiring, respectively).

The operator can select between the two radios manually or under computer control. Selections are made through a three-position toggle on the front panel. The centre position provides automatic control by the computer, while the upper and lower positions select **Radio 1** and **Radio 2** respectively.

If automatic control is selected, the keyer will switch to the correct radio, based on a signal from the computer. Forcing Pin 14 low selects **Radio 1**, while high (5 V) selects **Radio 2**. The polarity of the control signal can be changed in software in TRLog.

The **PTT**, **Mic**, **CW-key** and **Amplifier** lines are switched from one radio to the other. No receive audio switching is done by this Keyer.

4.8 Multiple-Button Functions (Voice Keyer)

Pressing a single button sends a message, both on Phone and CW. Pressing a combination of buttons generally activates a command or sequence of commands. The CW keyer's commands are described in the following chapter. The following combinations are active in **Phone** mode:

- 1-2 Message 1 Loop Mode: 2 seconds repeat delay.
- 1-3 Message 1 Loop Mode: 5 seconds repeat delay.
- 1-4 Message 1 Loop Mode: 10 seconds repeat delay.
- 2-3 Dual Mode: MSG 1-4 Voice & MSG 5&6 CW.
- 3-4 Firmware version request: REC LED will flash version in Morse Code.
- 4-5 Tune: PTT remains active until any message button is pressed.
- 5-6 Toggle Queue/Normal mode. record flashes "Q" or "N". Unit defaults to N at power-up.

5 CMOS Super Keyer III Operating Manual

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Designed by KC0Q and N0II

The CMOS Super Keyer III is a compact, full-featured memory keyer combining a CMOS microprocessor and a non-volatile RAM chip for a full featured, low cost, high reliability design. Unlike other advanced keyers, it needs no myriad of switches and knobs nor complex keypad sequences. Instead, commands are simply sent to the keyer in Morse code using your paddles! Some of its features:

5.1 Features

1. Iambic keyer with dot and dash memories.
2. Six active messages plus 12 "banked" messages, 1530 characters total.
3. Messages may `call' others and contain programmed functions.
4. Input queue to store multiple message activations.
5. Contest serial number \ 001 to 9999.
6. Digital and linear analog speed control \ 5 to 60 WPM.
7. Adjustable weight on code elements \ 25% to 75%.
8. Built-in adjustable frequency side tone monitor.
9. Tune function for transmitter adjustment.
10. Selectable automatic character spacing.
11. Timed pauses within messages.
12. Message loop capability for continuous replay.
13. Messages can allow break-in for paddle-inserted text.
14. Emulation available for other keyers, including Curtis "A" timing.
15. Ultra Speed mode allows messages at speeds to 990 WPM!
16. Ultra-low power consumption for battery operation.
17. Full beacon capability.
18. Message editing capability.
19. Messages and keyer configuration saved when power is lost.
20. Keyer can compensate transmitter character shortening.

5.2 Start - Up

After power is applied, the keyer responds with "OK" and is ready for operation. It is initialized as follows:

Speed range:	5-40 WPM	Load mode:	character
Weight:	50%	Input queue:	on
Monitor:	On	Serial number:	001
Auto-space:	Off		
Emulation:	Super Keyer II/III		
Function speed:	Equals Paddle speed		
Monitor Tone:	700 Hertz		

Note: At start-up, the speed control knob should be turned fully clockwise and a few dots sent, then turned fully counterclockwise and a few more dots sent. This allows the keyer to calibrate the speed range.

5.3 Re-set

A new reset command has been added to the latest version of the firmware. This command erases all settings and messages from the EEPROM memory. If the keyer is not acting properly, even on initial start up, try the RE-SET command. The command is implemented by pressing buttons 1,3,4 and 6 all down simultaneously and release. Remember, all stored messages and settings will be lost.

5.4 Function Commands

Commands to the keyer are entered in Morse code using your paddle. To alert the keyer that a function is desired, momentarily press buttons 1 and 2 simultaneously. The keyer enables the monitor, disables output keying, and acknowledges your request by sending "F".

After hearing the "F", simply paddle in the desired function character(s) explained below. When the function is complete, the monitor is automatically restored to its previous state, output keying is enabled, and the previous operating speed is restored.

Input command strings and the function performed are as follows:

- A Auto-space toggles the automatic character spacing feature on or off. The keyer confirms the new state by sending "ON" or "OFF". When on, auto-spacing aids the operator in forming properly spaced characters within a word. Character crowding is prevented by forcing at least 3 elements of space whenever more than 1 space has been detected. This effect is very noticeable at low speeds and can be felt by high-speed operators as well. Without auto-spacing, character spaces are determined by the operator.
- B d Bank - Message banking is provided as an option to support multiple operators or preloaded messages for different contest exchanges. In the default mode, there are six messages of 255 characters each. As an option, the available memory can

be configured as three distinct banks each having 6 messages of 85 characters. Bank 1 is activated by the "B1" command. Similarly, commands "B2" and "B3" activate banks 2 and 3 respectively. Banking is disabled by the "BØ" command, and the currently active bank can be queried with the "?B" command.

- D Decrement - decrements the serial number by one, effectively canceling the automatic increment applied when last played from a message. The decrement function accommodates resending the last serial number, as might be needed when a repeat of a contest exchange is requested, or canceling the exchange with a station that proved to be a "dupe."
- E d Edit allows the operator to append onto or edit an existing message by entering the "E" command in function mode, followed by the number of the desired message. The keyer will find and play the last word in that message. Then paddle in more text, or use the error symbol (seven or more dots) to erase existing words, just like the delete procedure when loading a message.
- F dd Function speed sets the speed used for function entry to dd WPM, where dd are two digits in the range 06 to 30. This speed is employed for entering commands and loading messages. It is independent of the operating speed and is unaffected by the analog speed control. Alternatively, the function speed can be made to follow the operating speed by using dd = 00.
- H Hand-key The keyer enters hand-key mode. Keying output follows closures of the dot or dash paddle levers, allowing hand-sent code. Normal iambic keyer operation is regained by any button closure.
- K dd Keying Compensation increases keying on-time and decreases keying off-time by dd milliseconds, where dd are two digits in the range 00 to 25. Although similar to increasing weight, the adjustment is independent of speed. This setting is used primarily to correct keying distortion by certain transceivers.
- L Load mode toggles the load mode between character and real-time. The keyer confirms the new mode by sending "C" or "R" as appropriate.
- M Monitor toggles the 700 Hz side tone monitor on or off. To conserve battery power, the keyer should normally be operated with the monitor off in favor of the rig's side tone.
- N dddd Number initializes the contest serial number to dddd, where dddd are four digits in the range 0000 to 9999. Note that 4 digits must be entered, with leading zeros if needed. Also note that in transmission of a serial number that a 4th place leading zero is never sent.
- Q Queue toggles the input queue on or off. The keyer confirms the new mode by sending "ON" or "OFF" as appropriate. When off, message button activations are acted upon immediately, canceling any message in progress. When on, up to 8 button presses are remembered in order and acted upon in succession as each message completes.

- R ddee Range programs the speed range covered by the pot, with a range of 5 - 60 words per minute. Sets the current operating speed to dd WPM, where "dd" is the low setting, and "ee" the high setting. A command of R0545 would set a range of 5 to 45 words per minute, and the present position of the pot would determine the keyer speed within that range. Control via the knob is linear and increases speed clockwise.
- T dd Tone frequency Available range is 500 - 990 hertz, where dd is the first two digits of the desired monitor frequency.
- V d Emulation allows the operator to select emulation of the timing characteristics of other keyers. See EMULATION
- W dd Weight \ sets to code weight to dd percent, where dd are two digits in the range 25 to 75. Weight is the duty cycle of a continuous string of dots, which is 50% for perfect code. A higher weight produces a heavier sound, and a lower weight causes characters to sound lighter. Once set, weight remains constant and independent of speed.
- X Xmit (tune) Continuously keys the output for purposes of transmitter and amplifier adjustment. Tuning is stopped by simply tapping either the dot or dash paddle lever.
- Z d Zeros and Nines: controls the way that zeros and nines are sent in a contest style serial number. See SERIAL NUMBER OPTIONS.

5.5 Inquiry Functions

Inquiry functions allow the current state of the keyer to be determined. State information is played to the operator in Morse code with the monitor automatically enabled and keying output disabled. Inquiries operate just like command functions: to enter an inquiry, momentarily press the right two buttons (#5 & #6) simultaneously. After receiving the "?" reply, enter the desired inquiry command as follows:

- A Inquire Auto-space - the keyer responds by sending "ON" or "OFF" as appropriate.
- B Inquire Bank setting - the keyer sends the current operational bank number, B0, B1, B2, or B3.
- F Inquire Function Speed - the keyer sends the current function speed setting in WPM as two digits.
- K Inquire Keying Compensation - the keyer sends the current compensation in milliseconds as two digits.
- L Inquire Load mode - the keyer responds by sending "C" if in character mode or "R" if in real-time mode.

- N Inquire Number - the keyer plays the current contest serial number (but does not increment it).
- Q Inquire Queue - the keyer responds with "ON" or "OFF" as appropriate.
- R Inquire Range - the keyer sends the current operating speed range in WPM as four digits with a pause between the slow limit and the fast limit.
- S Inquire Speed - the keyer sends the current speed setting in wpm.
- T Inquire Tone setting for monitor - the keyer sends the current monitor tone setting.
- V Inquire Emulation Setting - the keyer sends the current emulation. See EMULATION.
- W Inquire Weight - the current weight percentage is sent by the keyer as two digits.
- Z Inquire Zeros and Nines: the keyer responds with the option number (0-9) currently in effect.
- 1 Inquire Message 1 (or 2,3,4,5 or 6) - message 1 (or 2,3,4, 5 or 6) is played exactly as it would go over the air, but with the output disabled.

Note: You can also play back a message sounding the embedded function commands. (See below) To do so, momentarily press the right two buttons (#5 & #6) simultaneously. After receiving the "?" reply, press the message memory button you wish to review. The message will be played back with any embedded commands.

5.6 Embedded Functions

Certain functions can be embedded within character messages. To distinguish them from normal text, the command strings are prefixed by a "/" and are entered as a separate word. When encountered during a message play, the functions are executed. Note that if "/" is part of a single word, as in W9KNI/ZA2, it is sent as expected and is not interpreted as a command prefix. Embedded command strings and their use are explained below:

- /B Break - message play is suspended to allow insertion of paddle text. The operator may then insert one or more words using the paddle. Once paddle input has begun, the break function is canceled when inactivity exceeding a word space is detected. The interrupted message is then resumed. A break may also be aborted by pressing a button, which will cause the corresponding message to play immediately.
- /D Decrement - decrements contest serial number by one.
- /Gd Gap - the normal 7-element interword space is modified to 3+d, where d is a digit in the range 0 - 9. It is used to exaggerate inter-character or inter-word spacing. For example, a call like WØEJ can be entered with slight lengthening of the

space between the "E" and the "J" for emphasis, making it easier to copy. Note that /GØ yields a normal character space, while /G4 yields a normal word space.

- /N Number - the current value of the contest serial number is played. Its value is then automatically incremented by one. Also see SERIAL NUMBER OPTIONS.
- /Pdd Pause - a speed-independent pause of dd seconds is inserted, where dd are two digits in the range 00 to 99. For example, /P35 will result in a delay of 3.5 seconds. Pauses longer than 9.9 seconds are obtained by using consecutive commands that total the value desired.
- /R Resume -Stops message play back to allow hand sent entry. When manual keying is completed, press the button for the message being played and the message will resume transmitting from that point on. Multiple "/R" commands are permitted.
- /Sdd Speed - the operating speed is set to dd WPM, where dd are two digits in the range 6 to 60.
- /SUdd Speed Up - increases the operating speed by d WPM, where dd is a number in the range 01 and up.
- /SDdd Slow Down - decreases the operating speed by d WPM, where dd is a number in the range 01 and up.
- /Udd Ultra-speed -sets the ultra-speed speed mode for a message. Range is 70 - 990 words per minute, where dd are the two digits representing the first two numbers of the speed setting desired. For example, "Ø7" is 70 WPM, "77" is 770 WPM. This command is used primarily for meteor scatter work. Note that Weighting (W) and Compensation (K) and Tone (T) settings are disabled during Ultraspeed message transmission. Also, messages using both regular speeds and ultra speeds can be created. To exit the Ultraspeed mode, it is necessary to use a work-around. At the end of the desired ultraspeed text, send /SUØ1 /SDØ1. This trick tells the keyer that the ultraspeed part is ended, and returns the keyer to the regular speed. Alternately, the message can be returned to a lower range speed by use of the /S command, such as "/S2Ø" but this will send text following the ultraspeed text at 20 WPM in this case, rather than the speed set by the panel speed control.
- /X Close key -allows the keyer to send beacon messages that include extended key down periods. Once started, the output keying will remain on until either the paddle is closed on either side or it is timed-out by a Pdd embedded command. (see above) The Pdd command controls the length of the key closure. The Pdd command should be followed by a letter "e" which will not be transmitted but instead is used to "break" the key down mode. Regular text may then follow.
- /1 Message 1 - message 1 is played in its entirety followed by resumption of the current message. To create a continuous loop, end the message with the number of the message as an embedded command, such as "/1", where the "1" is the message being programmed or played. Also, other messages can be appended. For example, message #2's contents can be appended to the end of message #1 by

ending message #1 with a "/2" embedded command. And a loop could then be created by ending message #2 with a "/1" embedded command.

5.7 Multiple-Button Functions

Single-button closures are reserved for activating messages. As already discussed, the 1-2 combination alerts the keyer for paddle-entry functions. Certain functions are duplicated, wholly or in part, by other button combinations:

- 3-4 Decrement \ the keyer acknowledges with "D" and then decrements the serial number.
- 5-6 Inquiry \ the keyer acknowledges with "?" and then waits for paddle entry of the desired option.
- 2-3 Hand-key \ the keyer acknowledges with "H", then enters hand-key mode until another button closure occurs.
- 4-5 Tune \ the keyer acknowledges with "X" and then keys the output continuously until a paddle closure occurs.
- 2-5 Reverse \ the keyer acknowledges with "RV" and then reverses the paddles.
- 1-6 Speed Range Reset \ the keyer speed range is reset to a range of 5 - 40 WPM, and the function-entry speed is defaulted to follow the knob. After pressing the buttons, the keyer acknowledges with "OK". Turn the speed pot fully clockwise and send a few dots, then turn the pot fully counter-clockwise and send a few more dots. This recalibrates the pot position.
- 1-3-4-6 Complete Reset \ All stored setting, memories etc. are erased and the keyer returns to original default settings.

Note: To kill a message already transmitting without sending a "dit" over the air, press any two buttons and release.

5.8 Loading Character Messages

In character mode, each Morse character uses one byte of message memory. Precise 3-element intercharacter and 7-element interword spaces are employed when the message is played (unless modified using the /Gd function). To load a message, first confirm that character-mode loading is in effect by using the "L" Inquiry function. Then press and hold the desired message button. After 2 seconds, a tone is emitted and the button may be released. The keyer then sends "C" to confirm character mode and waits for input.

Morse code text and embedded functions can then be entered with the paddles. When each word is complete, simply stop sending. The keyer will detect and insert a word space, and then prompt you for the next word by sending "I". There is no limit to the elapsed time between words, so there is no need to hurry your sending.

The keyer includes an edit feature for immediate correction of errors during message loading. If a mistake occurs, simply send an error indication of 7 or more dots. The keyer will erase the last word sent. It will then play the `new' last word (if any) so that the position in the message is known exactly. As many words as needed can be erased this way. When the desired position is achieved, continue to enter the remainder of the message.

After the keyer responds with "I" following the final word, the message is closed by a momentary press of the button. To completely clear a message from memory, just end the load in this way immediately after the "C" is sent. In the event that message capacity is exhausted during the load, the keyer will send the raspy "error" message and the message will terminate at that point. The operator might wish to then delete the last word with the error string, then have the balance of the message continue in another new message channel, and use the embedded command number command (i.e. "\") to tie the messages together.

5.9 Loading Real-Time Messages

Some operators prefer messages containing stretched or compressed spacing rather than perfect timing. Real-time mode stores and replays messages exactly as entered. Along with somewhat reduced message capacity, the primary disadvantage of real-time messages is that they cannot contain embedded functions. Use the Inquiry function "L" command to insure that real-time load mode is in effect. Then press and hold the desired message button. After 2 seconds, a continuous tone will emit, at which time loading is enabled and the button may be released. The keyer then responds by sending "R" to confirm real-time mode and waits for paddle input.

Since the keyer waits until the first paddle closure, there is no need to rush the first entry. Once entry begins, however, the keyer loads continuously \ any pauses are stored as spaces in the message. All intercharacter and interword spacing is strictly up to the operator. To end the message, simply press the message button momentarily. Note that the elapsed time from the end of the last character to message termination is stored as space at the end of the message. If room is exhausted during the load, the message is terminated automatically, and the raspy error signal is sent by the keyer, indicating that the loading has terminated. The operator will also notice that messages are not as easy to enter in this mode, since the keyer clock is free-running and thus not resynched with paddle closures. However the stored message will play back cleanly.

5.10 Playing Messages

It couldn't be simpler: just tap the desired message button. Both character-mode and real-time messages can be played regardless of the current load mode.

If the input queue is enabled, multiple message button closures will be remembered. Each message will be played in succession as the previous completes. As a simple example, suppose that message 1 contains "CQ" and message 4 contains "DE WB8ZRL". Then pressing button 1 three times and button 4 once, in quick succession, will cause "CQ CQ CQ DE WB8ZRL" to be played. As many as 8 button activations will be remembered in

this mode. With the input queue disabled, however, a button closure immediately cancels any current message and starts the commanded one.

When a paddle closure is detected, messages are immediately aborted and the input queue flushed. The only exception is during execution of a /B break function when paddle input is expected. Otherwise, the paddles always take priority over message playback.

5.11 Emulation Options

This parameter allows the keyer timing to mimic that of other keyers, making the "feel" of the keyer more comfortable for operators used to different timing patterns. The default setting is V0, a timing pattern which has proven to be the most user-friendly for many operators. Other values are as follows:

- V0 Super Keyer II/III timing w/dot and dash memory
- V1 Super Keyer II/III timing w/dot memory only
- V2 Super Keyer II/III timing w/dash memory only
- V3 Accukeyer timing w/dot and dash memory
- V4 Accukeyer timing w/dot memory only
- V5 Accukeyer timing w/dash memory only
- V6 Curtis "A" timing w/dot and dash memory
- V7 Curtis "A" timing w/dot memory only
- V8 Curtis "A" timing w/dash memory only
- V9 Iambic timing w/no dot or dash memory

Note that this makes a full featured memory keyer finally available to those used to the Curtis "A" timing! Tell your Curtis equipped friends! To implement a setting different from V0, enter the Function Mode and send "Vd", where "d" is the desired setting. To determine the present setting of the V parameter in your keyer, enter the Inquiry Mode and respond to the "?" prompt with a "V". The keyer will announce the "V" setting.

5.12 Error Indication

When an erroneous input or exceptional condition is detected, the operator is notified by a distinctive raucous tone burst. Examples include nonexistent functions, invalid numeric parameters, and exhaustion of message capacity during a load.

5.13 Serial Number Options

The "Zd" command selects one of 10 options for sending zeros and nines in the contest serial number. Zeros may be replaced by "O" or "T", nines replaced by "N", and leading zeros suppressed. The options available are:

Option :	Leading	Other	
(d) :	Zeros	Zeros	Nines
.....			
Ø :	Ø	Ø	9
1 :	\	Ø	9
2 :	O	Ø	9
3 :	O	O	9
4 :	\	O	9
5 :	T	Ø	9
6 :	T	T	9
7 :	\	T	9
8 :	T	T	N
9 :	\	T	N

Note: For numbers less than 1000, the first zero is always suppressed.

5.14 Embedded Function Examples

Perhaps the most powerful feature of the keyer is its ability to store functions within messages. The stored commands are executed as encountered when the message is played. A consecutive serial number, for example, is needed in several contest exchanges. An ARRL Sweepstakes exchange, for an answering station, could be programmed as exemplified by: "NR /N/GØ A KC ØQ 80 IA BK". A second message might contain a serial number repeat message. This makes use of the decrement function: "/D NR /N BK".

Speed changes within messages are also permitted, allowing parts of a message to be played at differing speeds. Using relative changes as in "/SU15 QRZ DE WØSR/70 UP 5 /SD15" plays the message faster but then returns to the previous operating speed.

Messages may 'call' other messages. Suppose message 4 contains "WA9CNS/KH7". Then the message "CQ CQ CQ DE /4 /4 K" will, when played, yield "CQ CQ CQ DE WA9CNS/KH7 WA9CNS/KH7 K". Call nesting may be as deep as desired. Thus, message #2 can call message #1 which calls message #4 which calls message #3! In fact, continuous loops can be programmed. A loop will result if a message calls itself (directly or via some other message).

Loops can be very useful. A CQ loop in message 1, using a pause, is a good example: "CQ DX CQ DX DE WØWP WØWP K /P35 /1". The message will play continuously, with 3.5 seconds in between. When an answering station is heard, simply tap either paddle to cancel the loop.

If you are fortunate enough to be able to "run 'em" in a contest, the break function and looping can be a real advantage. Message 1 might contain: "QRZ TEST DE WØWP /B

599 IA BK /B /1". Here, activating message 1 first causes "QRZ TEST DE WØWP" to be sent. The /B breaks the message and allows the responding station's call sign to be copied. The call is then sent via the paddles. The message then automatically continues and sends "599 IA BK" followed by another break. The other station's report is then copied while the keyer waits. A simple "TU" or "R" is then sent via the paddles to acknowledge the exchange. This completes the break and causes an automatic loop back, restarting the whole sequence.

If no one responds to the QRZ, simply tap button 1 again to resend the QRZ (remembering that a /B is canceled by a button closure). If the responding station's exchange is missed during the second break, use message 2 to ask for a repeat: "AGN? BK /B /1". After getting the repeat, acknowledge with "TU" or "R" as before, and the QRZ loop is automatically resumed.

Setting up a beacon message can be useful for certain functions. Here would be a typical beacon message attached to message #1: "/S2Ø TEST TEST DE KØHGB KØHGB /X /P5Ø E /1". This would send the message "TEST" twice at a speed of 20 WPM, then sign the call, then send a 5 second carrier. The "E" at the end will not actually go out over the air, but will serve to "break" the key-down condition, then the message will loop back to the start, and recycle ad infinitum ad nauseum.

User Note: If the keyer gets excessive RF on the input or output leads it is possible that the keyer will hang up, and operate improperly or not at all. In such cases, the user should first try removing power from the keyer for 30 seconds, then reapply. If that does not cure the fault, do a complete reset by pressing buttons 1-3-4-6. If this fails to correct the keyer's problem there is some other fault.

5.15 Function, Inquiry and Default Summary

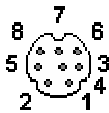
Cmd	Operation	Function	Default	Inquiry	Range
A	Autospace - toggle	Autospace on or off	off	A	-
B	Bank - select message bank	d or disable	Ø	B	-
D	Decrement - subtract one from serial #		-	-	-
Ed	Edit - begin editing existing message	d	-	-	-
Fdd	Function Speed -use dd wpm for entry		ØØ	F	Ø5-30
H	Hand Key - Output follows paddle		-	-	-
Kdd	Keying Compensation		ØØ	K	-
L	Load Mode - Toggle character/real time		char	L	C
M	Monitor - toggle monitor on or off		on	-	-
Ndddd	Number - set serial # to dddd		ØØ1	N	9999
Q	Queue - toggle input queue on or off		on	Q	-
Rddee	Range - limit speed from dd to ee wpm		05-40	r	05-60
Tdd	Tone - Set monitor frequency to ddØ Hz.		70	T	50-99
Vd	Variant - select keying emulation d		Ø	V	0-9
Wdd	Weight - set weight to dd percent		50	W	25-75
X	Xmit - continuous key down		off	-	-
Zd	Zeros & nines - use serial # option d		Ø	Z	Ø-9
?	Inquire - current setting or msg. content		-	-	-

6 Wiring Summary

6.1 Rear View



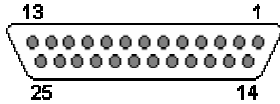
6.1.1 Remote: Message Buttons and Paddle Input



This input allows the user to set up a separate handy console with message buttons (MSG1 to MSG6) and a paddle. This option might be handy if the user wants to place the Keyer above the operating position, or when multiple operators must have access to the same keyer.

Pin 1	Message 1	Contact closure to ground
Pin 2	Message 2	Contact closure to ground
Pin 3	Message 3	Contact closure to ground
Pin 4	Message 4	Contact closure to ground
Pin 5	Message 5	Contact closure to ground
Pin 6	Message 6	Contact closure to ground
Pin 7	Dah input	Paddle Dah contact
Pin 8	Dit input	Paddle Dit contact
	Ground	Use case of connector for ground

6.1.2 LPT In Connector:



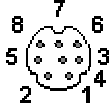
This connector allows all routine operations of the Keyer to be controlled from the computer keyboard.

LPT Pinout	Super Combo Keyer
Pin 1 *	Strobe Signal
Pin 2 *	DVK Message Abort
Pin 3 *	DVK Msg 1
Pin 4 *	DVK Msg 2
Pin 5 *	DVK Msg 3
Pin 6 *	DVK Msg 4
Pin 7 **	Band output bit 1
Pin 8 **	Band output bit 2
Pin 9 **	Band output bit 3
Pin 12 **	DIT paddle input
Pin 13 **	DAH paddle input
Pin 14 *	Radio1/2 Switch Signal
Pin 15 **	Foot switch input
Pin 16 *	PTT signal from PC
Pin 17 *	CW signal from PC
Pin 18 *	GND for CW& PTT
Pin 25 **	GND for paddle

* These pins are used by the Super Combo Keyer

** These pins are not used by the Keyer. They are extended to the LPT Out connector for access by the user. **Note:** These pins are not buffered; they are connected directly to the PC LPT port output wires.

6.1.3 LPT Out: Band data and PC Paddle Input

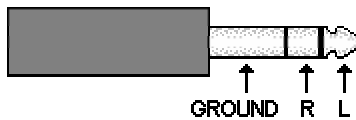


This input allows the user access to all the LPT lines not used by the Keyer. This feature is particularly useful if the computer has only one LPT port, and the user wants to remote-control filters or antennas or wants to use a paddle with the computer, without losing direct control of the *Super Combo Keyer*.

Pin 1	Pin 13 LPT	Dah Paddle Input (10K pull-up to 5 V required)
Pin 2	Pin 12 LPT	Dit Paddle Input (10K pull-up to 5 V required)
Pin 3	Pin 7 LPT	Band Output Bit 1
Pin 4	Pin 8 LPT	Band Output Bit 2
Pin 5	Pin 9 LPT	Band Output Bit 3
Pin 6	Pin 25 LPT	Ground for paddle
Pin 7	Pin 15 LPT	Foot switch Input to TRLog
Pin 8	Pin Ground	Chassis Ground

Modification note: Band Output Bit 0 can be wired internally onto pin 2 of this connector to provide the full Band data output for this port. After the modification pin 2 can also be used to drive an external SO2R device. This modification removes the ability to use a paddle on the logging program via the Keyer.

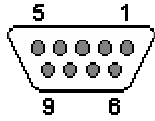
6.1.4 Key: CW Key Input:



Ground	Ground
R	Right Paddle Input
L	Left Paddle Input

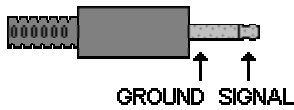
Note: Pressing MSG2 and MSG5 in CW Mode will reverse the paddle sense as used by the Super Keyer III chip (i.e. which paddle is used for Dit and which for Dah).

6.1.5 CI-V Connector to PC:



Pin 1	N/c	No connection
Pin 2	RXD	Received data from radio control software
Pin 3	TXD	Transmit data to radio control software
Pin 4	CW-key	CW-key input from PC logging program
Pin 5	Ground	Chassis Ground
Pin 6	N/c	
Pin 7	PTT In	PTT signal from PC logging program
Pin 8	N/c	
Pin 9	N/c	

6.1.6 CI-V Connector to Radio:

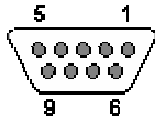


6.1.7 13.8 V: DC Input

The DC supply to the unit must be able to handle a continuous current of up to 200 mA, at a voltage of between 10 and 15 V DC. The centre pin of the 2.5 mm coaxial DC jack must be Positive.

The input is protected against reverse polarity with a series diode and is fused internally with a 250mA fuse.

6.1.8 Radio 1 and Radio 2 Connectors:



Note: The pin layout is identical for **Radio 1** and **Radio 2**.

Pin 1	Audio Out 1	0 to 600 mV (DC decoupled)
Pin 2	PTT Out	Open collector (20 V/100 mA)
Pin 3	CW-Key Out	Open Collector (20 V/100 mA)
Pin 4	Ground	
Pin 5	Amp-key Out	Open Collector (20 V/1 A) with diode protection
Pin 6	Audio Out 2	Audio Ground (Floating)
Pin 7	Ground	
Pin 8	Ground	
Pin 9	Ground	

Pins 1 and 6 are connected to the output of a 600 Ω 1:1 transformer with the lead to pin 1 being decoupled with a 10 μ F non-polarized audio-type capacitor.

6.1.9 Microphone Connector:



This socket allows the user to connect an external microphone and PTT (e.g. a footswitch) to the Keyer.

Pin 1	Audio In	~ 400 mV Maximum input
Pin 2	PTT/Footswitch	Contact to Ground effects PTT
Pin 3	Ground	PTT & Audio Ground, (0 V reference)
Pin 4	5 V Pull-up	For Electret Condenser Mic
Cover Plate	Ground	DC Ground, (0 V reference)

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Notes:

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