

# SE-415 CW Operation and Modification

*as designed and tested 05-02, used on Field Day '02*

The SE-415, while it offers a CW (A1) mode and included a straight telegraph key in its accessories, is in its original state NOT usable for radio amateur CW use.

There are essentially two problems at the root of this:

## 1. Transmit-Receive changeover delays

### 1.1. Problems

The CW signal is a tone that activates the transmitter via VOX. The delay in switching to transmit causes the first „dit“ of the signal to always be lost. The timing circuits also cause the radio to switch back to receive too late for speedy operations.

### 1.2. Solution

For the initial key-up delay there is no electrical modification to the circuit possible – the Field Day '02 proven solution is to use a foot pedal to activate the transmitter just before starting to send with the key or bug (as most contesters do anyway).

To shorten the return-to-receive delay, C1 on CH322 in the control drawer CH300 is changed to 680nF MKT (was 1uF). *Note:* lower values for C1 result in the radio switching back during word spaces – the value here was also proven on Field Day '02.

## 2. Output power rise delay

### 2.1. Problem

When depressing the key to transmit a tone (transmitter already activated by e.g. the foot pedal), signal power needs initially 2-3s (yes, seconds) to come up to full power. This leads to a low signal output level just when it is needed most e.g. when calling in a contest. The effect is caused by the transmit power leveling circuit which overshoots a lot first and then only slowly recovers.

### 2.2. Solution

There are electrical modifications (also Field Day '02 tested by CW experts) to the regulating loop characteristics which were developed in various steps and variants analyzing the circuit with a scope and testing the transmitter in CW and also in SSB. The work involves changing/adding components on several units in the transmitter (CH100, top drawer) and results in about 200-300ms needed to go to full power. *Note:* all changes need to be made to obtain the result!

### 2.3. Modification

- On CH105, CH106, CH107 (the control boards are identical) add diode 1N4148 in parallel to R5 (10k) between pins 2 and 4 of the boards. Cathode of diode to pin 4. This bridges R5 for negative control voltages from pin 4 to pin 2 and provides a fast-attack channel for the control voltage from CH103 to CH102.
- In CH102 (regulating amp) change R18 on the little subboard F9 near the connector to 4.7k (was 1k) to change loop frequency response and insert choke 47mH from connector ST10/21 to pin 2 of same subboard (decoupling).
- In CH103 (driver unit) on subboard F3 insert resistor 330 ohms in series with diode GL4 (1N4148) on the emitter of T4 (2N1613) to reduce control loop gain. Add capacitor 22nF in parallel with R36 (15k) on collector of T4 to change loop frequency response.

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**Footnote:** the sidetone is rather loud (too loud for the experts). Its level is controlled by the voltage divider on subboard F1 (pins 11, 10, 7) in the control drawer CH300. Changing R5 to a lower value e.g. 220 ohms (was 390 ohms) solves the problem.