

SE-415 USB/LSB Operation and Modification

as designed and tested 07-94 and used over several years

The SE-415 is a truly ISB capable system but the sideband allocation is fixed for the modes offered: CW, voice, F1 (SE-222 compatibility mode) in LSB and F1a, F1b, pilot (AFR) in USB. Thus in amateur radio service the standard sideband is only available on the lower bands (LSB) and the radio in its original state cannot really be used on the bands 20m up (USB) - even though 1kW PEP in these bands is very attractive!

To fully use the potential of the radio i.e. make use of the existing separate LSB and USB channels with their independent filters an easy *fully reversible modification* of the modulator units in transmitter and receiver as well as the control unit was performed. The downside of this modification is the fact that the proprietary SE-415 modes F1a, F1b and the pilot signal can no longer be used, these functions are disabled. All other functions of the radio (tune-up, protection etc.) remain unchanged – selecting the modes on the front panel now is either „A1“ or „A3A“ (in red or blue).

However the radio can still be used for RTTY and other digital modes that require no fast receive-transmit changeover times (such as AMTOR) using an external digital controller e.g. the PK-232-DSP or a PC connected to the audio input. Such a controller or software will easily outperform the original non-amateur-standard F1 circuitry in the radio.

Note: what is also no longer used is the 2nd receiver as diversity is only available in F1a/b modes.

1. Control Panel CH300 and Rack Cabling

1.1. Description

There needs to be a central switch on the radio to change the sidebands in transmitter CH100 and receiver CH200 from the SI CH300 control unit drawer – without drilling holes and without adding wires to the main rack cabling.

1.2. Solution

- On the front panel of SI CH300 there is a momentary contact switch U4, used to remotely start the genset. As no genset is used (it would need to be 3-phase!) this switch position is pirated to install a sideband selector switch. The original switch needs to be replaced by a 2-pole ON-OFF or ON-ON model (which was taken from a spare parts box to look original – any 2-pole switch fitting the hole may however be used instead). The positions of the switch can be marked on the front panel using a labeling machine. *Note:* do not cut wires but unsolder carefully and insulate ends.
- As the F1a/b modes are no longer used the corresponding audio wires leading from SI (Tx ST9.82, unsolder and insulate wire to CH331/4 and Rx ST9.24, unsolder and insulate wire to P200A) to the transmitter CH100 (ST7.22 and CH101 ST4.25) and receiver CH200 (ST5.24 and CH203 ST3.5) are used to control the relays switching the sidebands. The two wires need to be wired to separate contacts on the switch (source voltages to the relays are different)! *Note:* the switch is wired to ground these wires for USB, leaving them open results in LSB.

2. Transmitter CH100

2.1. Description

There are two functions that must be changed, all inside unit CH101:

- the audio input must be connected to either F1/2 for LSB or F5/2 for USB.
- the power reduction logic on F10 for ISB operation must be removed and both channels connected equally to the bridge circuit feeding T13.

2.2. Modification

A 24VDC DPDT sealed miniature relay was installed (glued) inside CH 101 to perform the following operations:

- the first set of contacts changes the audio input from ST4/21 through C46 (10uF) to either the F1/2 (LSB) or F5/2 (USB) inputs.
- the second set of contacts applies -12V (ST4.11) to either F4/6 or F8/6. On F8 the -24V wire needs to be removed from pin 6 (insulate end) and resistor R55 (1k) between pins 6 and 17 replaced by a decoupling choke e.g. 18mH (similar to F4). In this way only the used regulating amplifier is powered up.
- the relay coil is connected through a 68 ohms resistor to -24V (ST4.15) and to ST4.25.
- on the relay subboard on the F10 printed circuit all three relays are removed from their sockets as well as attenuating resistors R50-54 unsoldered. All resistors are replaced by soldering in shorting wires (or two wires the full length of R50-52 and R53-54 resp.).

3. Receiver CH200

3.1. Description

There is only one function that needs to be changed: depending on the sideband selection the audio outputs F4/13 (LSB) and F8/13 (USB) inside CH203 need to be routed to ST3.1.

3.2. Modification

A 12VDC DPDT sealed miniature relay was installed (glued) inside CH203 to perform the needed function:

- one contact set only is used and connects either F4/13 or F8/13 to the output on ST3.1. The wire from F8/13 to ST3.5 is removed.
 - the coil of the relay is connected to -12V (ST3.3) and to ST3.5.
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