

[No date on fiche]

SB-401 Bulletin No:
SSB Transmitter SB-401-1D

LMO Change

The [PN 110-32] is no longer available. In order to use [PN 100-40-LMO] it is necessary to add decoupling capacitors [See SB-101 installation procedure].

May 15, 1968

SB-401 Bulletin No:
SSB Transmitter SB-401-2D

Filter Choke Replacement

PN 46-36 filter choke 4.5H @ 120 MA is replaced by PN 46-32 filter choke 4.5 H @ 150 MA. This part should only be changed when the original has failed.

April 10, 1967

SB-401 Bulletin No:
SSB Transmitter SB-401-3D

Improving Grid Drive On 20 Meters

To improve the 14.0 MHZ grid drive add a 100 ohm 1/2 watt resistor between the two 10 meter coils on the driver grid side.

February 16, 1973

SB-401 Bulletin No:
SSB Transmitter SB-401-1

Carrier Null Control Failure

Recently an improved mounting method was devised for the [PN 10-147] controls in kit models SB-102, SB-401 and HW-101. Current production utilizes a fiber washer for greater clearance and the case of the control is grounded by a separate wire. We are anxious to know if this will reduce the failure rate. Please make note of any change, good or bad, and keep us posted.

January 29, 1974

SB-401 Bulletin No:
SSB Tranmitter SB-401-2

Relay RL-2 Hang-up

After a period of transmission, the relay remains in the transmit [energized] mode, rather than returning to the receive [de-energized] mode.

This problem is caused by gassy 6146 output amplifier tubes. When these tubes become hot, there is enough secondary emission from the screen grids to keep RL-2 energized.

The solution is to ground lug 7 of RL-1. This grounds the 6146 screen grids in receive, thus preventing the secondary emission current flow from holding RL-2. The SB-401 manual will be revised to reflect this change in new production.

May 23, 1974

SB-401

Bulletin No:

SSB Transmitter

SB-401-3

Alignment of SB-301/SB-401 As Transceiver

The following method of aligning the SB401 SSB Transmitter for use as a transceiver with the SB-301 SSB receiver may be preferred by those who are not familiar with the units.

The SB-301 should be aligned according to the manual. Upon beginning alignment of the SB-401 the heterodyne oscillator crystals, LSB and USB crystals should be removed from the SB-301 and installed in the SB-401. [This step is not necessary if the SBA-401-1 accessory crystal pack is installed]. Do not connect any cables between the two units. Proceed with alignment as given on page 97 of the SB-401 manual.

Upon completion of the alignment, remove the crystals and reinstall in the SB-301. Connect all cables and set LMO switch to locked position and function switch to transceive on SB-401. The receiver heterodyne oscillators may need to be retouched for maximum drive to the transmitter finals, in some cases going to the top peak on the coils.

The receiver BFO coil will also have to be adjusted. The voltage may be measured during adjustment at the 50 MFD capacitor, C127, just to the right of V2 on the carrier generator board in the SB-401. This will eliminate the need for taking the transmitter out of the cabinet and tipping on its side.

The two units are then ready for transceiver operation.

May 23, 1974

SB-401
SSB Transmitter

Bulletin No:
SB-401-4

Spotting With The SB-301 & SB-401

In using the SB-301 SSB receiver and SB-401 SSB transmitter in independent operation with all cables connected, some difficulty has been experienced in spotting in the single sideband mode. This has been in the form of feedback, inability to zero beat a station, etc.

The feedback problem can be reduced or eliminated by dressing the red wire between the receiver antenna jack and lug 3 of the antenna relay away from the final amplifier tube sockets. If feedback is still excessive, the red wire may be replaced by coax with the shield connected to the ground lug on the receiver antenna jack.

The accepted method of zero-beating a SSB station is to "talk" yourself in on frequency. Tune in the signal for maximum intelligibility, then with the function switch in spot, "talk" yourself in on frequency until you can also understand your voice. With this method the transmitter is exactly on frequency.

You may wish to use a pair of headphones while talking yourself in on frequency.

May 23, 1974

SB-401
SSB Transmitter

Bulletin No:
SB-401-5

CW Sidetone With Headphones

The attached pictorial shows a simple change of interconnecting cables on the SB-401, SB-303 or SB-301 which will allow CW sidetone of the SB-401 to be heard on headphones while defeating the speaker.

SB401 & SB-301

With this combination, make the cable changes shown and then just plug your headphones into the headphone jack. The speaker will automatically be cut off with headphones plugged in.

SB-401 & SB-303

With this combination, make the cable changes as shown and then plug your headphones into the headphone jack. The difference here is that you must pull the speaker disable switch on the front panel of the SB-303 to mute the sidetone from the speaker.

((Sorry, but even with magnifying glass I cannot read the connections shown on the backs of the examples. Also, the rear of the 401 & 301 isn't like the ones I have sitting here? [But then, my manuals are dated 1966!])

May 23, 1974

SB-401

Bulletin No:

SSB Transmitter

SB-401-6

SB-401 RF Voltage Service Guide

On the attached schematic we have indicated RF voltages as measured in an SB-401 in the 80-meter CW key down condition. RF voltages are provided at the grid and plate of each stage so that it can be determined if the problem is in the grid or plate circuit of the stage.

An 11 megohm input VTVM and Heath 309C RF probe was used to make the measurements.

The voltages will vary from transmitter to transmitter and should be expected. Crystal oscillator voltages will vary considerable.

This procedure traces the RF signal voltage from stage to stage. It is an easy method to isolate a problem stage so that steps can be taken to correct the trouble.

We suggest starting at the carrier generator and working trough to the final, as each stage is dependent on the previous stage.

Trace the RF up to the point it is lost, then back up one stage. Should one or two bands be operating properly and the rest have difficulty, make reference RF voltage measurements on one of the operating bands and make comparison measurements on the inoperative bands. In this way the stage causing difficulty is quickly isolated.

Once the stage is isolated steps can be taken to correct the problem. Check for wiring errors, intermittent solder connections, loose hardware and bent switch contacts.

((NOTE: Voltages shown on the schematic were:

1.5V [Pin 2 of V9]

36V [Pin 6 of V9]

36V [Pin 5 of V10]))

Voltages taken on 80 M. 260 mils plate current

125 watts output on HM-102 Level control at 10:30
position

.5 mils grid current Measurements taken in
tune position with exception of one at
 V5 (USB)

May 23, 1974

SB-401
SSB Transmitter

Bulletin No:
SB-401-7

SB-400 / SB-401 CW VOX Troubleshooting Guide

It is assumed that the basic steps such as making DC voltage measurements, checking the tubes and reviewing the soldering, have been completed.

The following information was compiled using SB-400 and SB-401 transmitters in the 80M CW key down condition.

The AC signal voltages have been measured with a VTVM throughout the CW Vox circuit and are as follows. Note: The voltages may vary some from transmitter to transmitter.

	SB-400	SB-401
Pin 11 of V13	.5VAC	.5VAC
Pin 9 of V13	25VAC	20VAC
Pin 9 of V12	1.6VAC	1.2VAC
Pin 10 of V12	90VAC	70VAC
Pin 11 of V12	1.7VAC	1.5VAC
Pin 2 of V12	45VAC	45VAC
Pin 7 of V12	18VDC	21VDC

By tracing the AC signal from stage to stage the point of trouble can be isolated and steps taken to correct it.

Check for bias removal at pin 9 of V12 when the key is closed. If the bias voltage is not removed check the wiring of FIR LUGS 11 and 12. Also check for continuity from the key jack to R127 through FIR.

A change in VOX delay after operating for a period of time can be caused by leakage in diode [SB-400 D-2] [SB-401 D105]. The other possibility is a change in value of capacitor [SB-400 C123] [SB-401 C141]. Either component could experience a change in operating characteristics due to heat. In such a case mount the two parts on the bottom of the circuit board to correct this condition.

May 23, 1974

SB-401
SSB Transmitter

Bulletin No:
SB-401-8

Alternate Tune-up Procedure For SB-401

Before proceeding, review and understand the description for each of the controls indicated in figure 1-2, fold-out from page 86.

Preset controls as follows:

Function Switch	TRCV or TRAN
Mode Switch	CW
Band Switch	Desired band
Meter Switch	Rel PWR
Level Control	Full CCW
Freq Control	Locked or Unlocked
Final Load	50 Ohm Mark
Final Tune	Desired Band
Driver Tune	First Mark from full CCW
Main Tuning	To desired frequency

NOTE:

If the SB-401 is used with a receiver other than the Heathkits SB-300 or SB-301 the function switch should be at [TRANS] and the freq control at unlocked.

NOTE:

The key should be closed during and opened after each step, unless otherwise stated.

*****DO NOT HOLD THE TRANSMITTER IN A KEY DOWN CONDITION IN EXCESS OF**

SECONDS OR DAMAGE COULD RESULT TO THE FINAL AMPLIFIER TUBES.***

1. Plug the key in the keyjack.
2. Advance the level control to 12:00 o'clock.
3. Close the key and peak the meter for maximum REL PWR with the final tune control.
4. Peak the driver tune control for maximum REL PWR indication.
5. Peak the final load control for maximum REL PWR indication.
6. Repeat steps 3, 4, 5
7. Turn the meter switch to Grid; DO NOT CLOSE KEY.
8. Close the key and check the grid current. If in excess of half scale, turn the level control counter clockwise to bring the meter reading to half scale or less. If less than half scale but above zero do not adjust.
9. Tune the meter switch to plate; DO NOT CLOSE KEY.
10. Close the key and check the plate current, It should be between 200 and 240 MA.
11. Repeat steps 3, 4 and 5 with meter in the REL PWR position.
12. The transmitter is now fully loaded and ready for CW operation.
13. For SSB operation set the mode switch to the desired SSB mode.
14. During SSB operation turn the meter switch to the ALC position. Adjust the mike level control for proper ALC indication as indicated on page 108 of the manual.
15. Antennas which resonate to the transmitting frequency, presenting a low SWR and an impedance of 50 ohms, should be used.

May 23, 1974

SB-401

SSB Transmitter

Bulletin No:

SB-401-9

SB-401 Instability and Corrective Information

We suggest you check for each of the following possible causes

1. Intermittent, rosin or cold solder joints.
2. Loose hardware at tube sockets, terminal strip, circuit boards and shields.
3. Poor lead dress at V5, V8, V9, V10 and V11. The component leads must be as short as possible, while dressing the part down against the chassis.
4. Check RFC 4 and RFC 6 to be sure they are not interchanged.

5. Coil leads to the band switch should be as short as possible.
6. Check all edges of the final enclosure for proper grounding to the main chassis.
7. Check C26 [Final tune capacitor] to be sure it is isolated from its turning shaft. This is to prevent RF from traveling on the shaft to the front panel.
8. Check for good contact of the ground clip to the coil box.
9. Be sure the shield plates are properly installed in the coil box.
10. A 100 Ohm 1/2 W resistor should be installed between lugs 1 of coils CM and CN. This replaces a short length of buss wire between the two coils.
11. The leads for capacitor TA should be down on the chassis not run through the air.
12. If the SB-401 is being used with the SB-300 or SB-301 in the transceive mode the accessory crystal pack should not be installed in the SB-401.
13. Change the driver and final tubes then reneutralize per manual instructions.
14. Improper adjustment of the Het OSC coils could cause improper mixing action, resulting in the final operating at a different frequency, appearing as instability.
15. Check for a good ground between the front panel and chassis.
16. Check the SWR of the antenna system at frequency of operation.
17. Check the COAX for leakage.
18. Is the transmitter properly grounded?
19. Realign using a properly terminated 50 Ohm not-reactive dummy load. [[[NOTE: THIS DOES NOT INCLUDE A LIGHT BULB]]].
20. Be sure all shield and tube shields are installed.

May 23, 1974

SB-401
SSB Transmitter

Bulletin No:
SB-401-10

SB-400 & SB-401 Hum Troubleshooting Guide

1. Disconnect one lead of the low voltage filter choke and measure its resistance. Its normal resistance is 120-140 ohms. If the resistance is below 100 ohms the choke is shorted and should be replaced.

2. Check the following capacitors for leakage:

SB-400	SB-401
C180 C183	C78 C403
C181 C184	C79 C404
C179 C147	C81 C402
C182A C185	C77A C106
C182B	C77B

3. Check terminal strip and terminal board grounds.

4. Retighten hardware at tube sockets, terminal strips, circuit boards and shields.

5. Check the tubes for heater to cathode leakage.

6. Check the grounds for the shield lead of each length of shield cable.

7. Recheck all solder connections. Be sure that the [C79 SB-401], [C181 SB-400] mounting lug is securely soldered to the metallic mounting wafer.

May 23, 1974

SB-401
SSB Transmitter

Bulletin No:
SB-401-11

SB-400 & SB-401 Driver Stage Troubleshooting Guide

It is assumed that the basic steps such as making DC voltage measurements, checking tubes and reviewing soldering have been completed.

Normal drive to the grid of the 6CL6 is 1.5-2.5V RF on all bands. In some cases it will be higher.

1. Check to see if the blocking bias is being removed from pin 2 of the

tube during the key down or tune conditions. The bias is about -15VDC in a key up condition; in the key down condition it is about -.5VDC.

2. Check the cathode resistor to be sure it is of the correct value [SB-401 -- 150 ohms], [SB-400 -- 100 ohms] and correctly installed.
3. Check the wiring of [SB-400 - C90, A, B, C, D], [SB-401 - C4, A, B, C, D], to bandswitch decks BS3R and BS4R. If two of the sections are interchanged, peaking of the coils will be incorrect and very low drive will be present.
4. Incorrect adjustment of the 8MHZ trap can cause suck out on one or more bands. To adjust the trap correctly complete the outlined steps in the manual.
5. Check the screen and plate voltages for the 6CL6 in the key down position. If 50V or better low, check the following components: SB-400; R-93, R-94, RFC-92, C-164, C-97 AND C-99. SB-401; R-4, R-5, RFC-4, C-8, C-7 AND C-58.
6. The capacitors mounted on the driver coils should have as short leads as practical. All leads from the coils to the andswitch should not be any longer than necessary.
7. Bypass capacitors should have short leads and be placed as close as practical to the chassis.
8. Check the ground of the shield for the shielded cable used in the plate circuit of the 6CL6.
9. Check the value of [SB-40 R-94] [SB-401 R-5]. The value should be 6.8K and 1W. This resistor determines the drive to the final amplifier stage. This is accomplished due to the RF voltage drop across the resistor.
10. Retighten hardware at the tube sockets, terminal strips and shields.

July 24, 1974

SB-401
SSB Transmitter

Bulletin No:
SB-401-12

Incorrect Resistance Reading at Terminal Strip AC

Refer to manual # 595-947-07, Page 88. The resistance readings at lugs 2 and 4 of terminal strip AC will be zero, since the addition of the ground

wire to lug 7 of the main relay RL-1.

July 24, 1978

SB-401

Bulletin No:

SSB Transmitter

SB-401-13

LMO Drift, Intermittent Frequency Shift

Check for a dirty or corroded phono connector on the rear of the LMO.

Clean if necessary.

August 7, 1978

SB-401

Bulletin No:

SSB Transmitter

SB-401-14

Loading Capacitor Turns as Plate Capacitor is Rotated

This problem can be caused by:

- Insufficient friction in the loading capacitor or;
- Excessive friction between the plate and load tuning shafts.

If the problem persists after freeing and lubricating the shafts, install a rubber grommet [PN 73-3] on the loading capacitor shaft between the pulley and the RF cage. Apply slight pressure to the grommet as the pulley set-screw is tightened. This will add enough friction to keep the loading capacitor still while tuning the plate control. Use only as needed.

January 21, 1980

SB-401

Bulletin No:

SSB Transmitter

SB-401-15

Driver Plate Resistor Overheats

++++ Information not yet available +++++

March 7, 1980

SB-401

Bulletin No:

SSB Transmitter

SB-401-16

Will Not Work With HDP-1220 BW Clipper

++++ Information not yet available +++++

April 10, 1980

SB-401
SSB Transmitter

Bulletin No:
SB-401-14

Germanium Diode Change

++++ Information not yet available +++++

That is all I presently have for the SB-401 [1966-89]. Enjoy!

73 de Joe W7LPF/4 [NNN0KUU]
QWCA - SOWP - NCVA - FISTS - RCC
Gordonsville, Va 22942 [Orange Co]