



## INSTALLATION INSTRUCTIONS - BASE OR MOBILE

SILTRONIX SENSOR VFO-1, MODEL 40-1, MODEL 80-1, AND MODEL 90-1

FOR THE FOLLOWING MODELS: Siltronix SSB-23 (Instructions on Reverse Side)  
Midland 13-873, 13-880, 13-880B, 13-885  
Pearce-Simpson Panther & Bengal  
Courier Spartan  
SBE Sidebander, SBE-6CB, SBE-8CB, SBE-14CB  
Cobra 135  
Pace Sidetalk, Pace-23  
Mark 46  
Robyn 747  
and other synthesized crystal transceivers  
with an 11.955 MC crystal.

1. Remove the 11.955 MC crystal from the transceiver.
2. Cut coax to length making as short as possible.
3. Solder the coaxial cable from the VFO to the transceiver PC board at the circuit pads that the 11.955 crystal was soldered. (The Midland 13-873 has plug-in crystals, so solder to pads that empty socket is soldered to). Solder the braid of the coax to the circuit pad that is nearest the center of the board, and inside wire to the other pad. This should be done from the bottom side of the circuit board. (NOTE: Make sure coax braid is soldered to the ground return on the circuit board).
4. Base Operation: Plug in transceiver and VFO and turn on. Switch transceiver to Channel 23. The VFO will now allow you to receive on any frequency in the 11 meter band.
5. Mobile Operation: The VFO will operate in mobile as well as base by connecting +12 volts from the car to the insulated stud on the back panel and minus (-) to the solder lug. The AC cord should be wrapped up to keep it out of the way.
6. The VFO may be recalibrated with the trimmer on the bottom of the VFO. Use a small blade screwdriver.

(SEE REVERSE SIDE FOR  
SILTRONIX SSB-23 VFO  
INSTRUCTIONS)

## SILTRONIX SSB-23

### ADDITION OF EXTERNAL VFO TO SSB-23 TRANSCEIVER

1. Remove cabinet and locate crystal oven.
2. Remove crystal oven cover.
3. Remove crystal marked "F" from socket. The frequency is 11.995. The crystal is the third from the rear towards the right hand side of the box.
4. Using an ohmmeter, find the position on the PC board where the crystal socket is soldered in.
5. On one side of this socket is a wire going to the channel selector.
6. Check the VFO and determine that it operates at the correct frequency - a Siltronix number one. The VFO must put out from 11.705 to 11.955 Mhz to be usable.
7. Attach the center lead of the coax to the side of the crystal socket that has the wire leading to the channel selector switch connected to it.
8. Solder the braid (shield) side of the coax to any convenient portion of the board that is at ground.
9. At this time the unit is ready for operational test.
10. Connect the transceiver to 12VDC and the antenna into a dummy load wattmeter.
11. Set the channel selector at 23 in the AM function.
12. Plug in VFO to 115 volts AC, turn both the set and VFO on.
13. Set the VFO to the center of Channel One and key the set. Observe the output level. Switch to Channel One on the frequency selector and observe the output. There should be little or no change in output. Normally the VFO has higher output than the crystal; however, a slight reduction is alright.
14. Replace the cover of the crystal oven and install unit in cabinet.

CAUTION: To use the VFO, the set must be set on Channel 23 ONLY! Using other channels could cause operation on frequencies other than the CB channels.

NOTE: With this installation, Channels 1 - 19 remain crystal controlled. Channels 20 - 23 can now be used only with VFO.

**SILTRONIX**

A Cubic Corporation Company

CB EQUIPMENT

269 Airport Road Oceanside, CA 92054 (714) 757-8860

## INSTALLATION INSTRUCTIONS - BASE OR MOBILE

SILTRONIX SENSOR VFO-3, MODEL 40-3, MODEL 80-3, AND MODEL 90-3

FOR THE PALOMAR SKIPPER 71, 71B, 546, SWAN 1046, BROWNING SSB-15 AND THE  
BROWNING MARK III

1. Remove the Channel 23 crystal from the transceiver.
2. Cut coax to length making as short as possible.
- 3a. Skipper 71, 71B and Swan 1046: Solder the center conductor of the coax cable from the VFO to the pad on the crystal board nearest the switch contact that the #23 crystal was soldered. Solder the braid to the circuit board ground.
- 3b. Browning SSB-15: Solder the center conductor of the coax cable to the ungrounded contact that the #23 crystal was connected. Solder the braid to the circuit board ground.
4. OPERATION: Plug the VFO in and turn on. Turn the channel selector on the transceiver to Channel 23, the VFO will now allow you to receive on any frequency in the 11 meter band. The VFO will operate mobile by connecting +12 volts to the insulated stud on the back of the VFO and a ground wire to ground.
5. The VFO may be recalibrated by adjustment of the trimmer located through the bottom of the VFO. Use a thin blade screwdriver.

INSTALLATION FOR THE BROWNING MARK III:

1. Remove the Channel 23 crystal from the transceiver.
2. Cut coax to length making as short as possible.
3. Browning Mark III: Solder the center conductor of the coax cable to the inner contact of the #23 crystal switch. Solder the braid to the circuit board ground.
4. Do not connect shield to outer pin of Channel 23.
5. OPERATION: Plug in the VFO and turn on. Turn the channel selector on the transceiver to Channel 23, the VFO will now allow you to receive on any frequency in the 11 meter band. The VFO will operate mobile by connecting +12 volts to the insulated stud on the back of the VFO and a — ground wire to ground.
6. The VFO may be recalibrated by adjustment of the trimmer located through the bottom of the VFO. Use a thin blade screwdriver.



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INSTALLATION INSTRUCTIONS - BASE OR MOBILE

SILTRONIX SENSOR VFO-5, MODEL 40-5, MODEL 80-5, AND MODEL 90-5

FOR OPERATION OF THE FOLLOWING MODELS:

Cheetah  
Simba  
Courier Gladiator  
Cobra 138 and 139  
Midland 13-893  
(and all other receivers  
having a 11.100 crystal)

1. Remove the crystal from Channel 23
2. Cut coax to length making short as possible.
3. Solder the center conductor of the coax cable from the VFO to the pad on the crystal board nearest the switch contact that the #23 crystal is soldered. Solder the coax braid to the circuit board ground.
4. BASE OPERATION: Plug in transceiver and VFO and turn on. Switch to Channel 23. The VFO will now allow you to receive on any frequency in the 11 meter band.
5. MOBILE OPERATION: The VFO will operate in mobile as well as base by connecting +12 volts from the car to the insulated stud on the VFO back panel and minus (-) to the chassis ground lug.
6. The VFO may be recalibrated with the trimmer on the bottom of the VFO. Use a small blade screwdriver.



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## INSTALLATION INSTRUCTIONS - BASE OR MOBILE

### SILTRONIX MODELS 80-7 AND MODEL 90-7

FOR OPERATION WITH FOLLOWING: New Cobra 135, S/N's R30,000  
and higher  
Browning LTD  
Tram Dia-60

INSTALLATION OF THE COBRA-135 (S/N's R-30,000 and higher):

1. Remove the Channel 23 crystal from the transceiver (marked 16.215 X306).
2. Cut coax to length making short as possible.
3. Solder center conductor of 80-7 or 90-7 output coaxial cable on PC board where 23 Channel crystal was removed, making sure it is the same point that wire to switch is attached (the ungrounded side of crystal). Solder the shield of the coaxial cable to the grounded side of Crystal X306 or any convenient chassis ground.
4. OPERATION: Plug the VFO in and turn on. Turn the channel selector on the transceiver to Channel 23, the VFO will now allow you to receive on any frequency in the 11 meter band. The VFO will operate mobile by connecting +12 volts to the insulated stud on the back of the VFO and a ground wire to ground.
5. The VFO may be recalibrated by adjustment of the trimmer located through the bottom of the VFO. Use a thin blade screwdriver.

NOTE: No information available for hook-up for the Browning LTD and Tram Dia-60 at this time; however, installation should be similar to above.

MODEL 80 SILTRONIX #'s	CH. 1	CH. 16	CH. 23
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80-1	11.665	11.855	11.955
80-3	16.265	16.455	16.555
80-5	10.810	11.000	11.100
80-6	23.290	23.480	23.580
80-7	15.925	16.115	16.215

NOTE: Calibration: Model 90: CB C12, HF C17 Model 80: C12

MODEL 90 SILTRONIX #'s	CH. 23 XTAL REPLACED BY VFO	RADIOS THIS MODEL WILL WORK ON
90-1	11.950 MHz	<u>PACE</u> - Sidetalk SSB, 1023, 1023B & 1024, CBST-23. <u>SBE</u> - 6-CB, 8-CB, 14-CB, 18-CB, CB-12 Sidebander II, III & 16, Console II
90-1	11.955MHz	<u>COBRA</u> - 130, 131, 132A, 135A ("A" Models, Ser. # below 30,000) <u>EXT</u> - 2325 <u>JOHNSON</u> - 352 <u>MARK</u> - Sidewinder 46 <u>MIDLAND</u> - 13-873, 13-880, 13-880B, 13-885 <u>RAYTHEON</u> - Raycom IV <u>SILTRONIX</u> - SSB-23, SSB-23A
90-1	11.990 MHz	<u>PACE</u> - 1000M
90-3	16.560 MHz	<u>BROWNING</u> - Mark II SSB-15, Mark III SSB (on X-mit only)
90-3	16.555 MHz	<u>PALOMAR</u> - Skipper 71, 71B, 73, 73C
90-3	16.5585 MHz	<u>TRAM</u> - Diamond D-201
90-5	11.0435 MHz	<u>COBRA</u> - 138, 139 <u>MIDLAND</u> - 13.893, 13-895
90-5	11.250 MHz	<u>OLSON</u> - RA-590 SSB-II <u>PEARCE SIMSON</u> - Simba

MODEL, 90 SILTRONIX #'s	CH. 23 XTAL REPLACED BY VFO	RADIOS THIS MODEL WILL WORK ON
90-6	23.580 MHz or 7.860, x 3 = 23.580  (7.8625 on some Royce 640's)	<u>LAFAYETTE</u> - SSB-23, SSB-25, SSB-25A, SSB- <u>MIDLAND</u> - 13.896, 13.898, 13-898B  <u>HYGAIN</u> - Hyrange 5 <u>REALISTIC</u> - TRC-47, TRC-48
90-6	23.540 MHz	<u>COBRA</u> - 21, Cam-89, 29 <u>COURIER</u> - Conqueror, Caravelle <u>HYGAIN</u> - 670, 671, 672 <u>KRIS</u> - 99'er, T-23 <u>LAFAYETTE</u> - Comstat 25A, 25B, 35, HB-525/ B, D, E, & F, HB-625  <u>MIDLAND</u> - 13.868 <u>PEARCE-SIMSON</u> - Cougar, Tomcat 23 <u>REALISTIC</u> - TRC-30, TRC-24B & C <u>REGENCY</u> - Formula 23 <u>SBE</u> - 7CB Sierra
90-7	16.215 MHz	<u>BROWNING</u> - LTD <u>COBRA</u> - 132B, 135B ("B" Model are late version w/serial # 30,000 or higher) <u>TRAM</u> - Diamond-60

TRANSCEIVERS THAT WILL NOT FUNCTION WITH SILTRONIX VFO'S

BROWNING - Eaglette, Eaglette II, Golden Eagle (AM Version), SST.

COBRA - 20, 23, 24, 25, 880

COURIER - 23 Plus, Centurion, Classic II, Gladiator, Spartan SSB,  
Traveller I, Traveller II.

E. F. JOHNSON - Messenger III, 100, 110, 122, 123, 123A, 124, 125, 223,  
300, 320, 323.

HYGAIN - 623

KRIS - 23

LAFAYETTE - HB-23, HB-100, HB-111, HB-115A, HB-222, HB-333, HB-400, HB-444,  
HB-500, HB-501, HB-555, HB-600, Comstat 23, Telstat 50, Telstat 1.

MIDLAND - 13-150, 13-156, 13-160, 13-845, 13-862, 13-864, 13-870D, 13-871,  
13-872, 13-877, 13-879.

PACE - 100, 123, 200, 223, 2300, Plus 23.

PEARCE SIMSON - Bearcat 23, 23C, Bengal, Bobcat 23B, Cheetah SSB, Cougar (later  
Companion, Escort, Guardion 23, Lynx 23, Panther, version)  
Puma 23, Tiger 23, Wildcat.

REALISTIC - TRC-5, TRC-8D, TRC-11, TRC-12, TRC-14, TRC-15, TRC-18, TRC-23B,  
TRC-24, TRC-40, TRC-46, TRC-49, TRC-50.

REGENCY - Range Gain II, Ranger CB 270, Imperial I, Imperial II, CR-142.

ROBYN - SS-747, SS-747A, SS-747B.

SBE - 1CB, 2CB, 9CB, 10CB, 11CB, 21CB.

SEARS - 7531

SONAR - FS-23, J-23

TEABERRY - Model Big "T". Model Mini "T" II.

TRAM - Corsair 464, Titan, Titan II, Titan III, Titan IV.





SILTRONIX  
MODEL 90 VFO OPERATING INSTRUCTIONS

GENERAL

The Siltronix Model 90 Variable Frequency Oscillator (VFO, Slider, etc.) is designed to be used as an external device with various Citizen's Band Radios. It will allow continuous receiver coverage of the Citizen's Band by allowing you to change a crystal-controlled receiver to a tunable receiver. The Model 90 features extended frequency coverage from 26.925 MHz to 27.350 MHz and 27.350 MHz to 27.830 MHz. It can operate from 110 VAC or 12 VDC (negative ground), thus permitting either base or mobile operation.

Presently, there are five series of Model 90 VFO's (90-1, 90-3, 90-5, 90-6 and 90-7). Each series is applicable to certain CB receivers. A large, black number on the rear of the VFO indicates which kind of Model 90 you have. It should be determined beforehand which Model 90 series is the correct one to use with your CB receiver.

Dimensions: 6½" wide X 9" deep X 7" high.

Weight: Approximately 7 lbs.

INSTALLATION

A simplified installation instruction sheet is included with each Model 90. Normally, installation is achieved by removing the channel 23 crystal from the CB transceiver and replacing the channel



23 crystal with the VFO. The CB transceiver channel selector switch is then set to channel 23. With the Model 90 power switch on and the CB radio power switch on, the radio's frequency is now controlled by the Model 90.

### OPERATION

#### Rear Apron

- A. C. Power Cord: For base operation. Plug into nearest 110 VAC wall outlet in your home.
- +12V Terminal: For mobile operation (negative ground only). Connect a +12VDC source to this terminal and ground the VFO to the chassis or your vehicle. CAUTION: DO NOT CONNECT ANY ACCESSORY TO THE +12V TERMINAL WHILE VFO IS PLUGGED IN. THE VFO CAN BE DAMAGED BY EXCESSIVE CURRENT DRAIN.
- GRD Terminal: For mobile operation using a negative ground, connect this terminal to the chassis of your vehicle. For base operation, connect this terminal to the chassis of your CB radio (Radios with capabilities for neg. grnd. only)
- Output Jack: Plug the short coaxial cable (supplied with each Model 90) into this jack. Connect the other end of this cable to your radio as stated in the instruction sheet. Cut the coaxial cable as short as possible when installing the VFO to your receiver.

#### Front Panel

- Power On-Off Switch: Controls the power (12VDC or 110 VAC) applied to the Model 90. For VFO operation, turn switch to "ON" position.
- Tuning Control: Controls your receiver's frequency. The large, outer knob is for fast frequency changes. The black, inner knob is for fine tuning



## OPERATION

### Front Panel - Cont'd.

CB/HF/ XTAL 1, 2, 3: This switch serves several functions. With this switch on:

CB Position: The Model 90 VFO will now operate in the receiving frequency range, 26.925 MHz to 27.350 MHz, as read from the bottom portion of the dial.

HF Position: The Model 90 VFO will now operate in the high frequency (HF) range, 27.350 MHz to 27.830 MHz, as read from the top portion of the dial.

### XTAL Positions

1, 2, & 3: This is an extra feature of the Model 90 VFO that allows you to go back to crystal-controlled, fixed-frequency operation. You have the capability of installing one, two, or three crystals for fixed-frequency operation.

## CALIBRATION

Should it become necessary, the Model 90 dial may be calibrated very simply. Two calibration trimmer capacitors are available for this purpose. They are located on the bottom of the VFO and are accessible through two holes in the bottom cover. The calibration trimmer, located nearest the front panel, is used to calibrate the HF portion of the dial while the trimmer capacitor, located near the middle of the bottom cover, is used to calibrate the CB portion of the dial. Always adjust the CB trimmer first.

Set the dial of the Model 90 to channel 23 for CB or to 27.400 MHz for HF, with an insulated screwdriver, carefully adjust the proper calibration trimmer capacitor to calibrate the Model 90 dial.



The dial is calibrated in increments of 10 KC's. Since the two calibration trimmers interact, it may be necessary to repeat this procedure several times before good calibration is achieved.

#### INSTALLATION OF CRYSTALS IN THE MODEL 90

1. Remove black cabinet top by taking out six screws.
2. After cabinet has been removed, you will notice three crystal sockets inside on the Model 90 chassis. The crystal socket nearest the front panel is for Xtal. 1. The socket nearest the rear is for Xtal. 3. The middle socket is for Xtal. 2. Insert the appropriate type xtal or xtals in any desired xtal socket.
3. After the xtal/s are installed in the VFO, turn the VFO on. Switch the function switch to any of the three xtal positions that now have xtals installed. You are now crystal controlled. (The VFO tuning control will now be inoperative).
4. Beside each xtal socket you will notice a ceramic trimmer. They are used to align or "lock" their adjacent xtal on frequency. An insulated tuning tool may be used to turn each trimmer when aligning xtals.

#### TYPES OF CRYSTALS FOR MODEL 90

1. The Channel 23 xtal that was removed from your CB radio when the Model 90 was installed may be used. Make sure the xtal/s fit the xtal socket/s in the VFO.
2. Custom-made xtals for any special preselected CB or HF frequency may be obtained from various crystal manufacturers: International Crystal Co., Texas Crystal Co., etc. You must correctly calculate the proper crystal frequency for any preselected frequency you desire to operate on. (Be sure you order correct xtal holder size HC-25/U, parallel-resonant mode type).

EXAMPLE: TRANSCEIVER - Siltronix SSB-23A  
VFO REQUIRED - Siltronix 90-1 VFO  
CRYSTAL CONTROLLED FREQUENCY DESIRED - 27.155 MHZ  
(CH. 16). After calculations have been made,  
the desired xtal frequency results in 11.860 MHZ.

7.800 MHZ	(I.F. freq. for SSB-23A)
7.495 MHZ	(LSB OSC freq. for CH. 16 in SSB-23A)
+11.860 MHZ	(Required xtal to install in VFO)
<u>27.155 MHZ</u>	Desired xtal-controlled Operating freq. as calculated.

## TROUBLE SHOOTING GUIDE

1. Poor operation when going back to xtal-controlled operation (setting CH. selector on radio to CH. 1-22) while VFO is still hooked up to receiver.

This can be a serious problem due to the added capacity of the VFO in the receiver oscillator circuit. For this reason, it is recommended that if the owner desires to use xtal operation, he should install the correct xtal into one of the three xtal sockets the Model 90 has available for this purpose.

2. Poor VFO operation with receivers that have built-in "slider", fine tune, or clarifier control.

The problem here is in connecting the shield of the VFO coax to a proper ground. In some cases, the "cold side" or grnd. side of the CH. 23 xtal socket does not provide a proper ground.

- A. In sets that have the capability of both a negative ground and a positive ground, connect the coax out shield to P.C. board ground (floating ground).
- B. In sets that have negative ground only, connect the coax shield to chassis ground.

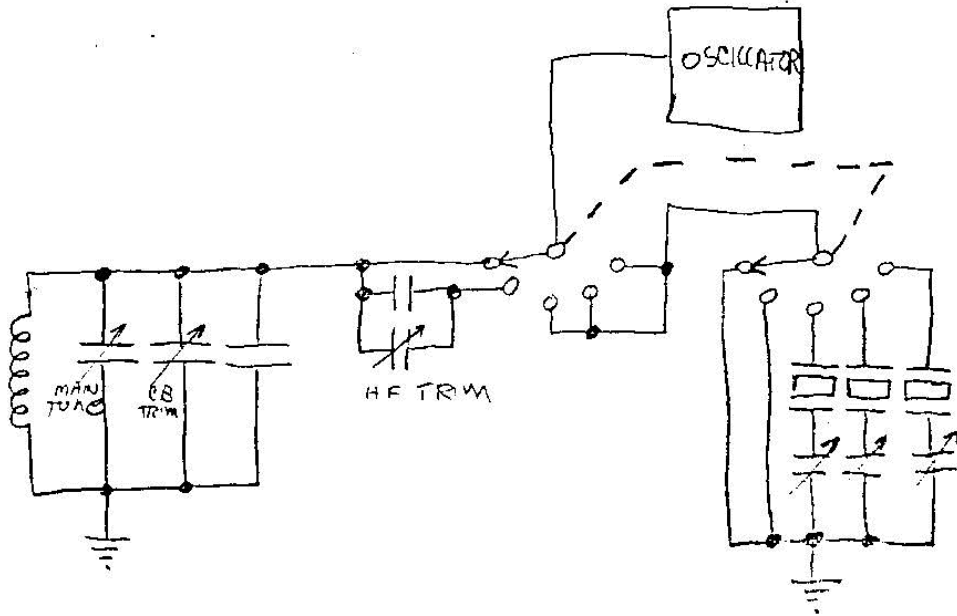
In either case (A or B), the fine tune, clarifier or "slider control" on the receiver will be bypassed and will not function when VFO is installed.

3. Distortion, hum, or "warble sound" encountered when using VFO, most noticeable on SSB operation.

It is caused by ground loops between the A.C. power supply in the VFO and the A.C. power supply in the receiver. The solution is to operate the VFO on DC- either on a battery, or better yet, from the +12 VDC supply in the radio. Most solid-state type sets will have such a built-in voltage available. Connect this +12 VDC to the +12 V terminal on the rear of the VFO. DO NOT PLUG THE VFO INTO THE 110 VAC WALL OUTLET, LEAVE IT UNPLUGGED.

4. Poor receiver performance above CH. 23 (27.255 MHz).

Most CB radios are aligned or "peaked" for operation only from CH. 1 through CH. 23. If good receiver sensitivity and gain is to be expected at HF frequencies (above CH. 23), the receiver will have to be aligned for these HF frequencies. However, this will, in most cases, affect the receiver's performance at the low end of the band (CH. 1). A compromise should be expected when peaking the receiver for HF.



MODIFIED BANDSWITCH CIRCUIT  
Model 90 VFO