

# SP-5 External Loudspeaker and LL-5 Phone Patch Option

The SP-5 combines the benefits of a high fidelity loudspeaker with selectable audio frequency filters to optimize audio characteristics for amateur and general communications modes, as well as for broadcast listening, including wideband functions ideal for music and FM.

Independently adjustable low-cut and high-cut filters offer twelve possible audio response configurations selectable from the front panel, enabling the operator to select his audio preference in all conditions and modes. Two separate inputs can be connected, and then selected by a front panel switch (the SP-5 supports only one audio channel at a time, however). Monaural output for headphones is also provided on the front panel, so that the frequency tailoring capability of the SP-5 can also be used with separate headphones.

Installing the LL-5 Phone Patch option in the SP-5 turns it into a balanced hybrid radio/telephone interface, for linking the telephone line to the radio. The LL-5 includes separate RX and TX gain controls and level meter, and can be operated either manually or under control of the transceiver's VOX (with transceivers so equipped).

## Filter Operation

The low-cut filter selector includes two filter positions in addition to the **NORM** (through) position, while the high-cut selector includes three, plus **NORM**. The audio frequency response graph on the front panel indicates which combination of positions are recommended for each mode being received.

## AM & FM

These wideband modes usually call for the widest audio bandwidth for maximum fidelity. Set both filter selectors to **NORM**. However, if very low or high frequency interference appears due to a nearby station or man-made or atmospheric noise, adjust the filter selectors accordingly to maintain comfortable reception.

## SSB

For the most natural sounding reception of these signals, set the **LOW** selector to the **NORM** position, and the **HIGH** selector to position 1. Again, under crowded band conditions or high noise levels, reset these selectors for best overall reception.

## CW

In this narrow mode the **LOW** selector should be set to position 2 and the **HIGH** selector to position 3, resulting in a narrow audio response centered around 600- to 700 Hz. This filter characteristic is especially useful for CW reception with receivers that do not include narrow filters in their IF circuits, as well as for cutting any residual internally generated noise from the latter stages of receivers using very narrow IF filters.

## Specifications

### Loudspeaker Transducer

Diameter:	120 mm
Power Rating:	3 watts
Impedance:	8 ohms
Frequency Range:	100-12000 Hz

### General

Case Dimensions (WHD): 230 × 150 × 294 mm  
Weight: 3 kg

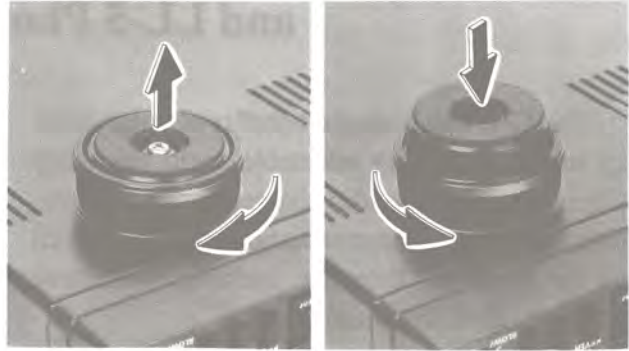
### Filter Cutoff Frequencies (-6dB/octave)

<b>LOW 1:</b>	below 300 Hz
<b>LOW 2:</b>	below 600 Hz
<b>HIGH 1:</b>	above 2.4 kHz
<b>HIGH 2:</b>	above 1 kHz
<b>HIGH 3:</b>	above 700 Hz

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## Adjusting the Front Feet

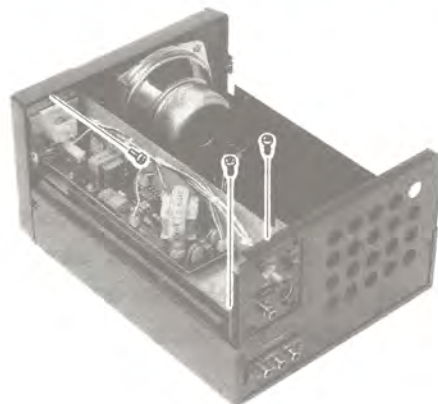
The two front feet of the SP-5 can be set in either of two positions. By turning the knurled ring around a (retracted) foot clockwise, the middle of the foot will extend about one centimeter. Turn the ring as far as it will go (about 1/4-turn) to lock the extended foot in place. To retract an extended foot, turn the knurled ring counterclockwise 1/4-turn while pressing on the center of the foot.



## LL-5 Phone Patch Installation

The LL-5 Phone Patch Unit can be purchased separately and installed in the SP-5. If you purchased the SP-5 with the LL-5 already installed, skip ahead to "Interconnections".

- Referring to the diagrams at the right, remove the eight screws affixing the top cover of the SP-5. Slide the cover back, and remove it.
- Locate the screw inside of the top panel, just behind the Frequency Response plate. Remove the screw, and then push the plate out from behind. This plate is not used when the LL-5 is installed, but you may wish to keep it for reference to the chart.
- On the rear panel, just behind the plate removed in the last step, locate the sheet metal cover over the rectangular cut-out. Remove its two screws, and remove this cover.
- Slide the LL-5 into the front of the SP-5, and affix it at the back with the two screws removed in the last step, and at the front with the screw from the Frequency Response plate.
- Replace the top cover and its 8 screws (put the two long screws in the front edge of the cover).

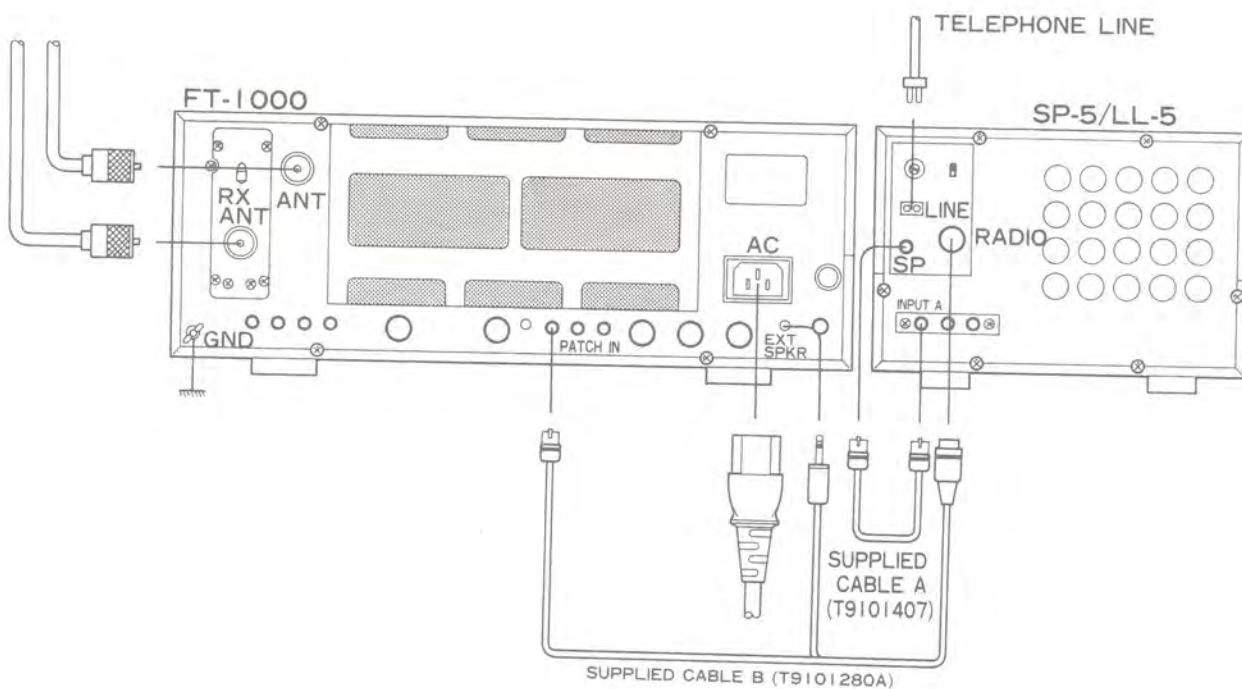


## Interconnections

- ❑ Connect the LL-5 **SP** jack to the **INPUT A** jack on the SP-5, using the short phono jack jumper cable supplied with the LL-5.
- ❑ Using the other cable supplied with the LL-5, connect the **RADIO** DIN jack on the LL-5 to your transceiver's **EXT SP** or **AF OUT** (mini phone) jack and **PATCH IN** (phono) jack.
- ❑ Using the supplied 2-pin plug, connect the (600-Ω) telephone line to the **LINE** jack on the rear of the LL-5.

### Note

You may need to contact your telephone company for permission to connect another device to the phone circuit. Also, you should use a proper 600-Ω three-way transformer if connecting the LL-5 with a telephone set to the same phone line.



## Phone Patch Operation

Phone Patch transmit/receive switching may be done manually using the PTT (Push-To-Talk) method, or automatically using the VOX (voice-actuated transmit) circuit in the transceiver (if it is so equipped). While the PTT method does not require balancing the bridge circuit in the LL-5, it does require more work by the operator: switching the microphone PTT or transceiver MOX button at each “over” during patched conversations. Therefore most operators prefer to use the VOX method whenever the telephone signal-to-noise ratio permits. If the telephone noise level is high, however, the PTT method may still be necessary, so you should be familiar with both methods.

Regardless of which patch control method is used, you may need to instruct the person on the telephone to speak slowly at a clear, normal volume, and to say “over” and then keep quiet whenever they expect a response from the other radio station. This serves as a notice to you (if using PTT control) to switch to receive while signalling the other station to go ahead and transmit, and will help avoid “doubling” with the other station.

During all phone patch operation you should monitor both sides of the conversation at all times (this may be required by law). This requires a telephone at the operating position.

### Manual (PTT) Patch Control

- With the transceiver carefully tuned to the station for whom the patch is being made, preset its **VOX GAIN**, **DELAY** and **MIC GAIN** controls all fully counterclockwise (minimum). Also set the transceiver's meter to indicate ALC. On the LL-5, preset the **RX GAIN** and **TX GAIN** controls to their 12-o'clock positions.
- Bring the telephone party on the line, and after instructing them about patch operation (saying "over") ask them to please stand by.
- Press the **PATCH** pushbutton on the LL-5 to turn it on, and if necessary, set the volume control on the transceiver to about the 10-o'clock position (or wherever you usually have it set). Now adjust the LL-5's **RX GAIN** control for comfortable volume in the telephone receiver.
- Close the **PTT** or **MOX** switch, and speak into the telephone. While watching the ALC indication on the transceiver's meter, advance the **MIC GAIN** control on the transceiver for a normal ALC level.
- While still keying the transmitter, tell the person on the telephone to speak (to the other station, over the air), and repeak the **MIC GAIN** slightly, if necessary, for proper ALC.

*Remember to switch back to receive when they say "over"!*

### Null Alignment for VOX Operation

If automatic VOX patch control is to be used, this procedure must be performed at least once when the transceiver and LL-5 are first connected. Later, fine adjustments can be made during patch operation to compensate for slight variations in the telephone line.

- Preset the **RX GAIN** and **TX GAIN** controls on the LL-5 fully clockwise, and set the **NULL/MONI** switch on the rear of the LL-5 to **NULL**.
- Turn on the transceiver's heterodyne marker, and tune for a strong heterodyne of about 1-kHz.
- Preset the transceiver's **VOX GAIN** control fully counterclockwise, and lift the telephone handset from the cradle.

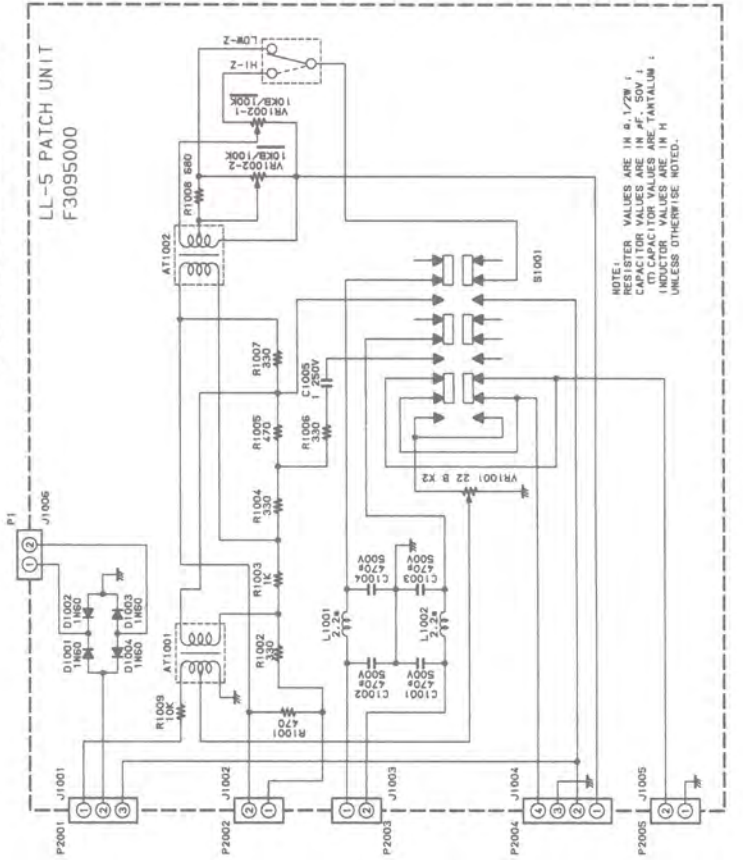
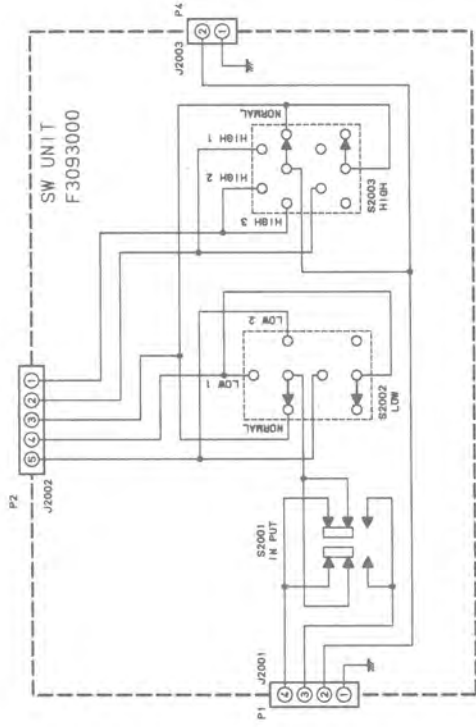
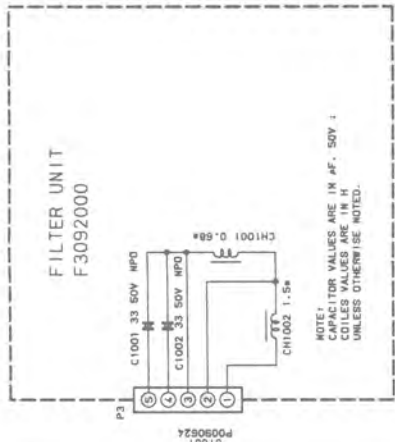
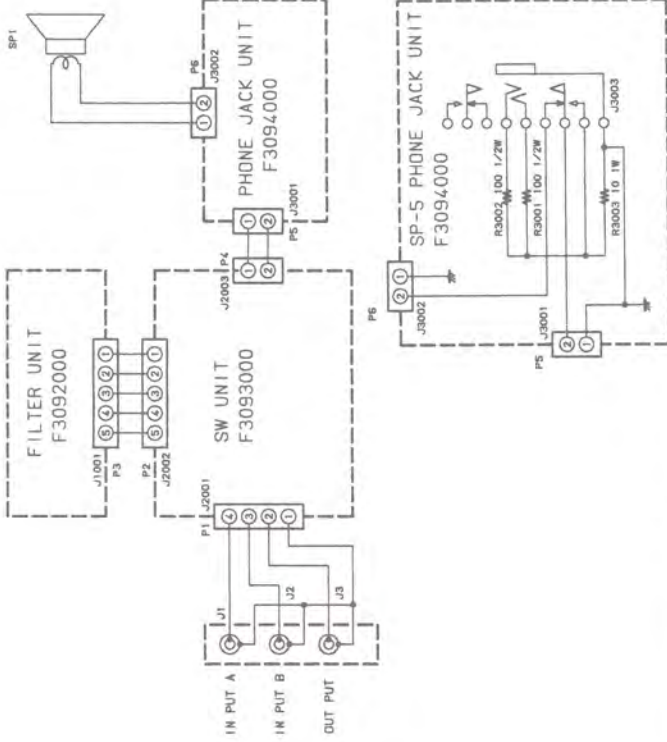
- Press the **PATCH** button on the front of the LL-5 (—), and turn the receiver volume control on the transceiver fully clockwise (maximum).
- Adjust the **BALANCE** control on the rear of the LL-5 to obtain minimum (null) deflection on the LL-5's meter.
- Switch the transceiver's marker off, and reduce the volume control to normal, or about the 10-o'clock position. Return the **NULL/MONI** switch on the rear of the LL-5 to **MONI**.
- The LL-5 is now ready for VOX patch control.

### Automatic (VOX) Patch Control

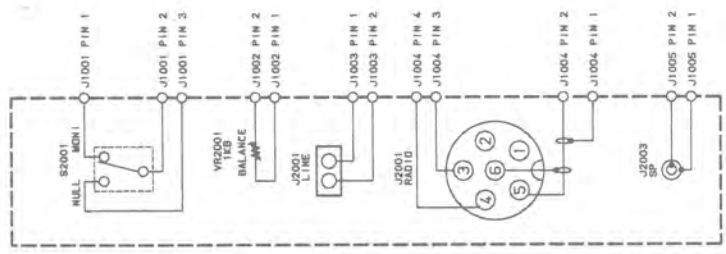
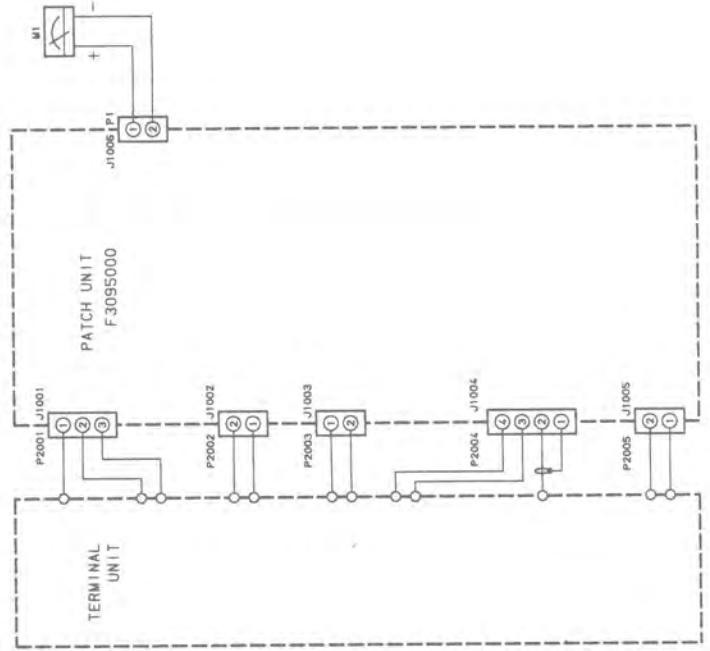
Before using VOX control for the first time, perform the *Null Alignment* procedure just described to match your transceiver's audio output to the phone line.

- Set up the transceiver for regular VOX operation in LSB or USB mode as described in the transceiver's operating manual.
- When ready to make a patch, follow the same procedure as described above for Manual Patch Control, except when you instruct the person on the telephone to start talking, instead of pressing the **PTT** or **MOX** switch, advance the **VOX GAIN** control on the transceiver just to the point where their voice keys the transmitter.
- Now adjust the transceiver's **DELAY** control for stable transmission and return to reception when they stop speaking.
- If necessary, adjust the transceiver's **A-TRIP** control to prevent receiver audio from keying the VOX (and the transmitter) when the person on the telephone is not speaking.

If you have difficulty setting the **VOX GAIN** and **A-TRIP** controls for smooth operation, move the **NULL/MONITOR** switch on the rear of the LL-5 to the **NULL** position, and adjust the **BALANCE** control (also on the rear of the LL-5) slightly for minimum meter deflection while receiving the signal from over the air. If instability persists, try reducing the transceiver's volume slightly.



NOTE:  
RESISTOR VALUES ARE IN  $\Omega$ , 1/2W, 1%  
CAPACITOR VALUES ARE IN  $\mu$ F, 50V  
(T) CAPACITOR VALUES ARE TANTALUM  
INDUCTOR VALUES ARE IN H  
UNLESS OTHERWISE NOTED.



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