

Tecsun PL-880 Multiband Portable Receiver

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For avid shortwave radio enthusiasts, the allure of finding an unusual or rare broadcast station is strong, and some listeners expend quite a bit of effort to hear what's out there — just like the serious ham radio DXer. Portable multiband receivers on the market today range from inexpensive, simple AM receivers with analog tuning to models that use phase lock tuning, have multiple memory locations and can detect single sideband (SSB) or CW transmissions. The Tecsun PL-880 from China has many of the features found on expensive portables, yet it has an affordable price. It covers 0.1 – 30 and 64 – 108 MHz and receives AM, FM, SSB, and CW.

Out of the Box

After cracking open the box, I was greeted by a color poster that unfolded into an Amateur Radio World Map, complete with a call sign prefix chart and CQ zones. The other side is a handy *Quick Start Guide* to using the PL-880, which I frequently referred to.

Under the poster was a good quality leatherette case containing the PL-880 with that familiar “new radio smell.” Also included was an 18 foot end-fed wire antenna with a clip at the far end, a USB cable for charging the internal lithium-ion battery, and a set of ear buds for private listening. A cable with a 1/8 inch phone plug on one end and an SO-239 jack on the other can be used to connect the receiver to an external antenna feed line.

Packaging and Controls

The Tecsun PL-880 front panel is dominated by a grill that covers a 2.5 x 3.5 inch speaker. The backlit LCD has 1/2 inch high digits, making the frequency easy to read from various angles. When powered off, a 24-hour clock, the alarm wakeup time and the battery condition indicator are displayed. The front panel has 26 buttons, many of which are multipurpose. Main tuning, fine tuning and volume controls can be twirled easily.

The left side panel (Figure 6) features a 1/4-inch external antenna jack (SW ANT), an RF gain switch labeled LOCAL, NORM, and DX, a stereo headphone jack, a LINE OUT



jack and a USB jack (DC IN 5V) used to power the internal battery charger. The top panel sports a SNOOZE button that turns on the display backlight for five seconds and a sturdy 39-inch telescoping whip antenna.

The right side panel has the tuning and volume controls and switches for backlight and tone control. The rear panel has a somewhat flimsy plastic stand that folds out for desktop operation, elevating the back side of the receiver nearly 2 inches. The battery compartment holds a single 18650A type lithium-ion battery (included).

Features

From a radio amateur's point of view, several features stand out from other portables I've used. At the top of the list is 10 Hz tuning resolution while in SSB mode. This resolution helps you find the natural sound of the voice at the other end, instead of the “hams on helium” sound you often settle for with 100 Hz or 1 kHz tuning steps.

The fine tuning step is 1 kHz for AM shortwave, medium wave, and long wave reception, and 10 kHz for FM broadcast

band reception. For faster tuning, the main tuning control has 10 kHz steps on medium and long wave (selectable to 9 kHz for ITU Regions 1 and 3), 50 kHz steps for shortwave, and 100 kHz steps for FM broadcast. You can hop from one shortwave band to another by using the up or down arrow buttons.

Another feature that caught my interest is the DSP bandwidth control, which can be set to 0.5, 1.2, 2.3, 3, or 4 kHz in SSB mode and 2.3, 3.5, 5, or 9 kHz in AM mode. Variable bandwidth is normally found on more expensive radios.

The PL-880 has two signal strength indicators at the top right of the display. One is signal strength in dBμ, which is referenced to a 1 μV (-107 dBm) signal. A reading of 34 dBμ would indicate S-9 (50 μV, -73 dBm) on an S meter. The other display is a signal-to-noise indicator in dB.

I was happy to see that attenuation of input signals is possible using the SW ANT GAIN switch. Portables can be overloaded by strong signals from nearby transmitters, causing unwanted effects. With this switch, the user has a chance to reduce or eliminate interference caused by very strong signals near the tuned frequency.

The PL880 has an enormous memory capacity, with 3050 station memories locations divided up by 25 memory storage pages. The AUTO SORT feature does a good job of keeping all of those memory locations in order. This feature eliminates

Bottom Line

The Tecsun PL880 is an excellent portable multiband receiver with many features normally found in more expensive portables. It pays to experiment with the adjustments and controls to get the most enjoyment from this radio.

Table 2
Tecsun PL-880, serial number n/a, firmware version 8820

Manufacturer's Specifications	Measured in the ARRL Lab
Frequency coverage: Receive only, 0.1-0.519, 0.52 – 1.711, 1.711 – 29.999, 64 – 108 MHz.	As specified.
Power requirement: 5 V dc via USB jack; 5 V dc, >300 mA to charge 3.7 V dc Li-ion internal battery.	At 4 V dc (full charge): 260 mA (lights on, maximum volume), 100 mA (comfortable listening level, lights off).
Modes of operation: SSB, CW, AM, wideband FM (FM broadcast band only).	As specified.
Receiver	Receiver Dynamic Testing
Sensitivity: SSB, <-107 dBm (1 µV) at 10 dB S/N.	Noise floor (MDS), 3 kHz bandwidth: <i>Frequency Local Normal DX*</i> 14 MHz -112 -119 -122 dBm
AM sensitivity: for S/N = 26 dB, <3 mV/m (LW), <1 mV/m (MW), <20 µV.	10 dB (S+N)/N, 1-kHz, 30% modulation, 5 kHz bandwidth: <i>Frequency Local Normal DX</i> 0.25 MHz 1 mV 1 mV 1 mV 3.20 MHz 5.21 µV 3.31 µV 2.54 µV 6.02 MHz 5.82 µV 2.57 µV 2.09 µV 15.0 MHz 3.02 µV 1.17 µV 0.91 µV 17.5 MHz 4.62 µV 1.76 µV 1.33 µV 29.0 MHz 12.6 µV 4.73 µV 3.93 µV
FM sensitivity: for S/N = 30 dB, <3 µV.	For 12 dB SINAD, 15 kHz deviation: DX, 3 µV.
S-meter sensitivity: Not specified.	S-9 (50 µV) signal at 14.2 MHz: 24.5 µV (local), 10.5 µV (norm), 8.31 µV (DX).
IF/audio response: Not specified.	Range at -6 dB points, SSB: 500 Hz, ** to 1150 Hz; 1200 Hz, ** to 1600 Hz 2300 Hz, ** to 2300 Hz 3000 Hz, ** to 2700 Hz Range at -6 dB points, AM (bandwidth): 2.3 kHz, 40-1850 Hz (3620 Hz) 5.0 kHz, 40-3430 Hz (6780 Hz) 9.0 kHz, 40-4670 Hz (9340 Hz)
Size (height, width, depth): 4.4 × 7.6 × 1.3 inches; weight, 1.3 lbs.	
Price: \$160.	
*MDS decreases to -135 dBm with Sync function turned on (SSB mode only).	
**Due to AGC action, the lower frequency limits could not be measured in SSB mode.	



Figure 6 — The side panel of the Tecsun PL-880 has connections for headphones, LINE OUT, an external antenna and a USB port charging cable. The SW ANT GAIN switch selects among three sensitivity levels.

duplicate stations and sorts each memory page from lowest to highest in frequency. Pressing the RESET button, located in a recessed hole on the front panel, does not affect the stored memories.

Other features include direct frequency entry, an alarm and snooze feature, a

display lock and a built in ferrite loop stick antenna for long wave and medium wave reception. I used the fixed line level output jack to hook up to the auxiliary audio input jack of our Ford Escape.

It is important to read the manual, as the array of controls can be overwhelming at

first. Some functions are performed with the power off, for instance. Other features I found by accident, such as holding down the 6 button for a few seconds brings up the word ON. Changing it to OFF raised the background noise and as it turned out, I had just discovered one of the “hidden features” not in the manual: digital noise reduction on/off. Various websites confirmed this and other hidden features not mentioned in the manual.

Lab Testing

I found a few quirks during lab testing. During sensitivity testing, a continuous (CW) input signal at any level resulted in an audio tone containing a small amount of flutter, similar to, but not quite like the warble of PSK31. Overall sensitivity is good. Another hidden feature, turned on by holding down either the LSB or USB button, is called SYNC (synchronous detection). With it on, the sensitivity is greater, but the audio distortion products increase. I preferred to use the receiver with the SYNC feature off.

The signal strength metering was optimistic, not close to an S-9 reading with a -73 dBm signal applied. The signal-to-noise (S/N) meter readings were pessimistic, with a 10 dB S+N/N input signal resulting in a 0 dB S/N indication on the display.

Tuning Around

Overall, the PL-880 is quite satisfactory for casual listening and the audio quality is excellent from the speaker. Selectivity on AM is good as well. I was able to pull out a weak station next to a very strong local station by using the 2.3 kHz filter. Most other portables I’ve tried have failed this test miserably. AM sensitivity is on par with other portables I have owned. At home in Coventry, Connecticut, WCBS 880 in New York City is a benchmark signal source that is received with mild background noise during the daytime. The PL-880 sounded about the same as two other portables I set up at the same time for this experiment. FM broadcast audio quality is excellent, and sensitivity is good.

Shortwave reception is good, but on marginal signals the volume can suddenly drop if the signal fades and becomes weak, and then pop back up again as the signal strength increases. I’ve observed this behavior with modern AM broadcast car radios. This is actually the digital noise reduction circuit kicking in and out.

DNR can be useful for knocking down the background noise so that communication is not lost, but for casual listening I'd rather tolerate signal fades with the background noise included.

As with some other portable receivers I've tried, the Tecsun PL-880 mutes the audio level partially when the frequency is changed. Perhaps some shortwave listeners appreciate this feature, but I would rather hear a continuous audio level while tuning so I don't miss weak signals. By pressing and holding the 9 button, then turning the tuning knob so the display reads 00, the muting threshold is reduced (another hidden feature).

As observed in the Lab, CW signals have flutter on their associated audio tones. I could still copy off-air CW just fine, but the flutter takes getting used to. Flutter is not as obvious with either the USB or LSB mode. The 10 Hz tuning resolution worked very well and no distortion was present on all but the strongest signals with the gain switch set to DX. With strong SSB signals I noticed there was quite a bit of "pumping" on voice peaks at the beginning of a spoken sentence. The audio is momentarily loud, then is reduced by the receiver's automatic gain

control. Unfortunately, this AGC action affects the ability to hear weaker signals that are close in frequency to a strong SSB signal. The effect can be reduced somewhat by setting the gain switch to NORMAL or LOCAL. Still, it was a treat to be able to listen to amateur CW and SSB signals at all.

Final Thoughts

The rechargeable battery lasted through two trips and several nights of listening. The display eventually indicated LO, after which the radio did not operate, though the clock still worked. Charge time is about 6 hours with the USB charging cable connected

to a PC. The smart charger knows when to stop charging, but it generates RF hash, making listening unpleasant when receiving moderate to strong signals.

The Tecsun PL-880 has a solid feel during operation. The knobs are firm and spin freely. Each button is firmly rooted on the front panel and has a solid feeling when pressed. In general, I enjoyed the experience of operating this portable receiver.

Manufacturer: Tecsun General Electric Manufacture Co, Guangdong, China; www.tecsun.com.cn. Available in the US through Universal Radio and other retailers.



[Click here for a video overview of the Tecsun PL-880 Multiband Portable Receiver.](#)

DX Engineering AAPS3-1P Receiving Array

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For the low-band DXer who waits patiently along the game trails of the ionosphere or the contester who spends hours enduring static crashes and various manmade noises in search of multipliers, these are good times. In the past few years, the design of receiving antenna systems has advanced steadily, raising DXCC totals and lowering blood pressures across the land. The DX Engineering AAPS3-1P Active Antenna

Phasing System, featuring the NCC-1 Receive Antenna Phasing Controller (Figure 7), is one such advance.

Noise Rejection vs Noise Canceling

As explained in the April 2014 issue of *QST*, receiver sensitivity is not the issue at HF and MF.¹ What is the issue is the ability to reject the noise that may come from any direction. The best way to reduce noise is to simply not receive it in the first place!

Receiving antennas such as the Beverage improve the signal-to-noise ratio (SNR) not through receiving more signal but by receiving less noise from unwanted directions.² Beverage antennas for 160 through 40 meters, hundreds of feet long, are not practical for most hams. Small receiving

arrays such as the phased dipoles of K6STI and the EWE and loop-style K9AY and Flag antennas that act as a pair of short verticals were a step forward.³⁻⁷

Another advance has been to combine signals from external antennas in an adjustable desktop box to cancel the noise and leave the signal, assuming they arrive from different directions. Noise canceling systems

Bottom Line

The DX Engineering AAPS3-1P receiving array provides high-quality noise cancelling performance at MF and HF that makes reception of weak signals easier in the presence of strong signals and noise.

¹C. Luetzelschwab, K9LA, "Array Solutions AS-SAL-20 Shared Apex Loop Array Receiving Antenna," *QST*, Apr 2014, pp 55 – 58. See the "Noise" sidebar on page 58.

²W. Silver, N0AX, "A Cool Beverage Four-Pack," *QST*, Apr 2006, *QST*, pp 33 – 36.

³B. Beezley, K6STI, "A Receiving Antenna that Rejects Local Noise," *QST*, Sep 1995, pp 33 – 36.

⁴G. Breed, K9AY, "The K9AY Terminated Loop — A Compact, Directional Receiving Antenna," *QST*, Sep 1997, pp 43 – 46.

⁵F. Koontz, WA2WVL, "Is This EWE for You?," *QST*, Feb 1995, pp 31 – 33; Feedback Apr 1995 p 75.

⁶E. Cunningham, K6SE, "Flag, Pennants and Other Ground-Independent Low-Band Receiving Antennas," *QST*, Jul 2000, pp 34 – 37.

⁷S. Lawrence, WB6RSE, "A Roof Mount for a Rotatable 160 Meter Receiving Loop," *QST*, Mar 2011, pp 40 – 42.