

Product Reviews

October 2025

Alinco DR-CS10HT 2- Meter FM Transceiver

Tripp-Lite SMART1500PSGLCD UPS

CyberPower CP1500PFCLCD UPS

APC Schneider Electric Pro BN1500M2 UPS

Product Review

Alinco DR-CS10HT 2-Meter FM Transceiver

Reviewed by Steve Ford, WB8IMY
ford_steven@sbcglobal.net

With the DR-CS10HT, Alinco appears to be taking a back-to-basics approach to single-band FM transceiver design. Selling for less than $170 at the time of this writing, the DR-CS10HT is likely to draw attention from those who desire a radio that simply works, putting the emphasis on ease of use above everything else.

When you unpack the radio and examine the manual, it becomes obvious that the DR-CS10HT is essentially an amateur radio version of a commercial transceiver. The layout is utilitarian, and so is the feature set.

The front-panel knobs and buttons are minimal, with much of the control being accomplished from the multi-function microphone instead. The assumption is that you'll have little need to make adjustments once the radio is programmed. You simply turn it on, select the desired memory channel (there are 200 available), and talk.

At just 5.5 × 1.375 × 7.0 inches, the DR-CS10HT is compact and able to fit within just about every mobile environment. The front-panel display is well lit and easy to read (the background color is adjustable). The top-firing speaker supplies plenty of audio, although there is also a rear-panel 3.5-millimeter mono jack if you wish to connect an external speaker (see Figure 1). The rear panel also offers a single SO-239 antenna connection and a USB port. The function of the USB port is not explained in the manual, other than referring to it as a "repeater" jack. Contrary to what you might assume, this is not a data port for programming, which takes place via the microphone jack.

Despite its small physical size, the DR-CS10HT packs a substantial RF punch. At the high-power setting, the rig produces 60 W output. The current drain while transmitting at 60 W was slightly more than 10 A. While this is a 2-meter-only transceiver, it offers receive coverage from 136 to 173.9975 MHz. See Table 1 for the manufacturer's specifications.

Getting Acquainted

The DR-CS10HT isn't a feature-rich radio, but for many amateurs that may be one of its strong points.



It includes the basic features you'd expect, such as programmable memories with alphanumeric tagging and a number of selective-calling options, which reveal its commercial pedigree. You have your choice of DTMF, tone burst, CTCSS, DCS, and more.

Among the "more," there is automatic number identification (ANI). Think of it as a kind of caller ID for analog transceivers. With ANI enabled, the DR-CS10HT will send a quick tone sequence with each transmission. If another (presumably Alinco) radio has been programmed to recognize the ANI code you are sending, your ID — such as your call sign — will appear on the display. The trick, though, is that everyone in your group must be using the same code set and have their radios programmed accordingly.

The manual doesn't describe the ANI function in detail, but it is primarily a "fleet management" feature. In the land mobile radio world, a *fleet* is a collection of radios

Bottom Line

The Alinco DR-CS10HT is a simple 2-meter analog transceiver. It provides plenty of power with up to 60 W output, and it's easy to operate because of its intuitive and user-friendly design.



Figure 1 — The Alinco DR-CS10HT rear panel.

grouped by function, department, or region (police, fire, EMS, public works, etc.), each with predefined communication channels, call groups, and access permissions.

Speaking of fleet management, the manual makes a brief reference to the DR-CS10HT having "stun, revive, kill" functionality. This line is an eyebrow raiser to say the least, but it is yet another commercial feature. It allows a fleet manager to remotely disable a designated transceiver — either temporarily or permanently — or reactivate a disabled radio. The manual doesn't describe how to implement this function in the DR-CS10HT, which is probably just as well, because I suspect it is enabled only in commercial versions.

Programming

As I mentioned previously, a unique aspect of the DR-CS10HT is that most of the control is implemented through the multifunction microphone. There are no touchscreens or front-panel keypads. For example, if you want to enter a specific frequency directly, you must punch the corresponding digits into the microphone keypad. The four front-panel buttons labeled **P1** through **P4** provide a degree of menu access, but I found it was best to use the microphone to make selections in most instances.

You can even program the channel memories, along with their alphanumeric tags, through the microphone. This worked well during my review, as I needed to set up only a few memory slots for local repeaters.

RT Systems (**www.rtsystemsinc.com**) offers the *APK-CS10*, a complete software package for the DR-CS10HT that includes the microphone interface cable. I didn't have an opportunity to test the RT Systems software, but I'm confident that it would be much easier to program the radio in that fashion.

Because you're likely to rely on programmed memory selections when operating this transceiver, as opposed to random tweaks while in VFO mode, the RT Systems package would be a worthwhile investment.

Taking It on the Road

It is tempting to power the DR-CS10HT from a vehicle's accessory power port, but you're far better off going directly to the battery, especially considering the transmit current requirements. I used the direct battery connection and didn't experience any issues. Even receive interference from my vehicle electronics was minimal.

I secured the rig within a handy slot in the center console, which provided just enough room to allow the speaker to be heard clearly. In a permanent installation I would have chosen a separate external speaker. The DR-CS10HT produced plenty of audio, more than enough to overwhelm the road noise.

After connecting the antenna feed line, I started by just placing the transceiver into its memory scanning mode. The scan was blindingly fast and lacked the annoying clicks or pops you sometimes hear with other radios. As with most scanning functions, you can select how you want the radio to respond when receiving a signal — stop the scan for a short time only, stop until the signal disappears, or stop completely.

Selecting the DR-CS10HT's 10 W output mode, I was able to hit all my local repeaters without difficulty. While I could have stepped the power up to 25 or even 60 W, it really wasn't necessary. According to reports, my transmit audio was clean and crisp.

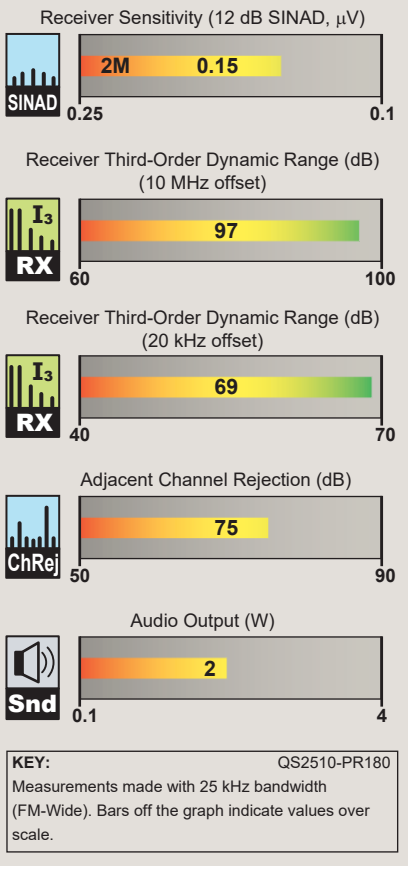
I couldn't do a mobile test, however, without sampling the 60 W experience, so I programmed several distant repeaters, along with 146.52 MHz simplex, into memory and drove to the nearest hilltop. The

Table 1 — Alinco DR-CS10HT 2-Meter Transceiver S/N A000585, FCC ID# PH3D-CS10HT

	Manufacturer's Specifications	Measured in the ARRL Lab
	Frequency coverage: Receive, 136 – 173.9975 MHz. Transmit, 144 – 147.9975 MHz.	Receive and transmit as specified.
	Power requirements: 13.8 V dc ± 15%; receive current 0.6 A max, transmit current 10 A max.	At 13.8 V dc: Receive, max brightness and volume, no signal, 300 mA, transmit, 8.2 A at 56 W RF output.
	Mode of operation: FM (12, 20, 25 kHz BW).	As specified.
Receiver		**Receiver Dynamic Testing**
	FM sensitivity: 12 dB SINAD: wide band: ≤ 0.25 µV; narrow band: ≤ 0.35 µV.	12 dB SINAD, 3 kHz deviation: FM-W[1] FM-N[2]: 146 MHz –123/0.15 –124/0.14 dBm/µV; 162 MHz –122/0.17 dBm/µV
	FM two-tone third-order IMD dynamic range: Wide band ≥ 65 dB. Narrow band ≥ 60 dB.	FM-W FM-N: 20 kHz offset 69 71 dB; 10 MHz offset 97 100 dB
	FM two-tone second-order IMD dynamic range: Not specified.	146 MHz, 84 dB
	Adjacent channel rejection: Wide band, ≥ 70 dB; narrow band, ≥ 60 dB.	FM-W FM-N: 146 MHz 75[3] 78[3] dB
	Squelch sensitivity: Not specified.	At threshold, 146 MHz, 0.1 µV; 0.3 µV (max).
	S-meter sensitivity: Not specified.	For five bars, 146 MHz, –100 dBm/2.18 µV.
	Audio output: ≥ 2 W (8Ω, ≤ 10% THD).	As specified. THD 1.8% at 1 VRMS.
Transmitter		**Transmitter Dynamic Testing**
	Power output: 60W/25W/10W	146 MHz @ 13.8 V dc, 56W/21W/9W.
	Spurious signal and harmonic suppression: ≥ 60 dB.	146 MHz, ≥ 70 dB. Complies with FCC emissions standards.
	Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.	180 ms (typical).
	Receive-transmit turnaround time: Not specified.	73 ms.
	Size (height, width, depth, including protrusions): 1.375 × 5.5 × 7 inches.	
	Weight: 2.0 pounds.	

[1] 25 kHz BW.
[2] 12 kHz BW.
[3] Noise limited at the value shown.

Alinco DR-CS10HT Key Measurements Summary



KEY: QS2510-PR180
Measurements made with 25 kHz bandwidth (FM-Wide). Bars off the graph indicate values over scale.

results were impressive, even with just a ¼-wavelength magnetic-mounted antenna. From my location in central Connecticut, I worked repeaters in Massachusetts to the north and Long Island to the south. I even managed to make a few simplex contacts, including one with a station about 100 miles away. The DR-CS10HT lacks a cooling fan, and the heatsink became quite warm during this exercise, but not excessively so. Still, you'd want to install the radio in a location where air can circulate freely.

At home, I connected the DR-CS10HT to a 2-meter ground plane antenna on the roof and enjoyed many contacts there as well. It was nice to have the ability to use high power when necessary, particularly when working mobiles (and even some handhelds) on simplex.

Conclusion

The Alinco DR-CS10HT stands out for its intuitive operation and user-friendly design. When combined with considerable RF output, a competent receiver, and an economical price tag, the result is a transceiver worthy of any mobile station — and more than a few home stations as well.

Manufacturer: Alinco, Incorporated Electronics Division, Yodoyabashi Dai-Bldg 13F, 4-4-9 Koraibashi, Chuo-ku, Osaka 541-0043, Japan, **www.alinco.com**. Price: $169.95.

Three 1500 VA UPS Units: Introduction

Reviewed by Paul Danzer, N1II
n1ii@arrl.net

Years ago, if asked if you needed an uninterruptable power supply (UPS), you would probably be tempted to answer "No" or "What for?" Older equipment with higher voltages and transformer-based power supplies were much less susceptible to power interruptions and improper voltages. Additionally, there were fewer firmware updates that could brick your device if there was a power outage during the upgrade. Today, most personal computers and microprocessor radios are based on designs that are often vulnerable to power interruption and corruption. You might not just lose your unsaved files, but also corrupt software in ways you may not notice. You can use a dc-only battery backup system, or another solution is the insertion of a UPS between the equipment and the ac line supplying power. This is especially useful if your equipment is running directly from an ac outlet.

In the following reviews, I compare three widely available consumer-grade UPS units to see what is available for a common station. All three are rated for 1500 volt-amperes (VA); the manufacturers usually use 900 W as an equivalent practical load.

A UPS supplies "keep alive power" to electronic equipment in case of a power outage or voltage drop. When the power line is lost, the reviewed UPS provides at a minimum:

- Switching to a storage battery system to replace the power previously supplied from an ac line
- Enough power to continue short tasks or to manually do an orderly shutdown, minimizing the possibility of loss of data before it is stored
- An automatic shutdown of your PC via software (USB connection needed)
- Between five and six battery-protected ac outputs
- Passive surge suppression on the incoming voltage (the UPS does not have to be turned on)
- Surge protection on both protected outlets and non-protected outputs
- Passive surge suppression on various other lines, such as analog telephone lines, coax data lines, and wired network data lines
- An LCD display with status monitoring, such as loads and remaining battery capacity
- Protection of your equipment by maintaining a stable voltage (in case of power variation)

In the past, when choosing a UPS, the primary considerations were how much surge suppression and how much backup time the UPS provided. Now, due to the common availability of other functions, there are many more things to compare. For this review, I examined three UPS units with some testing to get an idea of what is available. All three systems had "1500" in their model number, meaning the manufacturer rates their UPS at 1500 VA. With loads inducing a possible phase angle, this 1500 VA may translate to 900 W on average in a non-stressing (altitude, temperature) situation.

See Table 2 for a list of common features, capabilities, and limitations as supplied by each manufacturer. Each unit comes with manuals.

However, each manufacturer may provide specifications and performance numbers based on different assumptions and different design and test conditions. Therefore, even if the manufacturer's name of a parameter is the same as that of other manufacturers, there is not total assurance that the two numbers measure the same thing under the same conditions.

Keep in mind that if a UPS is connected to a PC via a USB cable, they will usually be detected by the PC operating system (OS) as a battery backup, but with limited information (like showing the percentage of battery left in the Windows tray). On Windows and MacOS desktop computers, the UPS should be shown with a similar visual as an internal battery in a laptop using the same OS, without the need to install any extra software.

Many operators are reluctant to add a UPS unit to their amateur radio station because it may cause interference at some frequencies, so the ARRL Lab tested the three reviewed units; you will find the Lab Notes and three figures at the end of the three UPS reviews. In most cases, when adding a UPS in line with your radio equipment, interference is not an issue.

The ARRL Lab also did a load test on all three units; you will find the results on *QST* in Depth (see **www.arrl.org/qst-in-depth**).

APC Schneider Electric Pro BN1500M2 UPS

Reviewed by Paul Danzer, N1II
n1ii@arrl.net

If you turn on this UPS for the first time and it does not seem to work correctly, trying again won't help. It most probably means you skipped page 3 of the user manual. The unit is usually shipped with the battery not connected, and both page 3 and the large yellow sticker remind you to connect the battery before turning on the unit for the first time. In fact, it is a good idea to connect the battery and plug the UPS into the ac supply for a few hours to charge.

This model is a heavyweight, measuring slightly more than 25 pounds. The user manual comes in three languages: English, Spanish, and French. Small drawings plus a small amount of text provide brief explanations of the controls and the display. The manufacturer has several groups of UPS units. A single group may have identical backup capability — in the case of the unit reviewed here, the number 1500 represents the VA rating. However, often there are characters preceding and following the main number. Sometimes the additional characters are significant and there are important differences, and sometimes not.

Included in the package as shipped with the UPS unit is the user manual and a USB patch cord. At one end, the cord has an RJ-45 connector matching the data plug input on the back of the UPS (see Figure 2). The other end of the cord has a standard USB-A plug to match a computer. This cord allows connection with your computer and can also be used with downloadable software (to be described later). Note that this software is only for Windows PC.

Installation

Make sure the battery is plugged in; if it's not, go to page 3 of the user manual. There is also a battery connection demonstration video at **https://youtu.be/k3miAvgiQaI?si=WECqaXnqbHY1ITGE**. Next, plug your rig or equipment into one of the 120 V sockets on the back of the UPS and turn it on. You may have to press the UPS front-panel power pushbutton for a fraction of a second. Wait until it's fully charged, and you are now backed up. At this point you can tweak the various settings to take advantage of the various features of the UPS (more on this later).



Primary Outputs

There are 10 ac outputs divided into two groups on the rear panel. Five are in line on the left side, each providing both backup power and surge suppression. In addition, one outlet with backup capability is located on the top of the right-hand column, giving a total of six outlets for backup and suppression. The remaining four outlets on the rear panel provide surge suppression only.

The UPS ac input (line cord) is located at the very bottom of the panel with a circuit breaker directly above the line cord almost halfway up the panel. This is the unit circuit breaker; it functions when the UPS is overloaded.

Bottom Line

The APC Schneider Electric Pro BN1500M2 does the job, but operating the buttons for settings can be tricky at times.

The five outlets providing surge suppression continue to provide this function even when the UPS is shut off. This is very useful for equipment such as printers, card readers, and scanners, which need surge protection. However, if they lose primary power, the probability of losing data or a file is negligible.

On the very top right is a socket labeled **DATA PORT**, which provides a connection to a computer for external control. Just below it is a ground screw connected to the UPS chassis and a third (ground wire green) of the ac input cord.

To the left of the ground screw are two coax screw connectors such as those used with cable TV. These ports are also passively protected. Passive surge suppression is also on the 2 Gb LAN ports (**IN** and **OUT**) on the left side opposite the **DATA PORT**.

Just below the ground screw is an LED labeled **BUILDING WIRING FAULT**. The only information on this red warning LED is an instruction to contact an electrician immediately. This capability was not tested for this review.

The Backup

A 2.75 × 2.75-inch LCD display on the top of the front panel gives a look into the various conditions and operations of the backup system. Below the LCD panel are three switches that are used to select the information on the display. The right-hand button has only one function: disabling the audible alarm. This allows you to quiet it when it has been energized by the system, and you do not have to suffer through the alarm sound until the condition causing the alarm has been changed. Almost in line with this button and about halfway up the display there is a loudspeaker symbol that has a crossline through it — to turn the alarm off.

All three pushbuttons require a physical click for feedback to assure you the button push has been accepted. The leftmost button and the center button select the mode display and the mode settings.

The user manual provides instructions on how to select objects on the display and make certain operation selections. Most symbols are indicative of the function they control. For example, on the top left of the display is a battery symbol with the lettering **ON BATT**. This indicates the system is generating ac from the UPS battery.

The top right triangular symbol has the label **LOAD**, and the number of boxes filled in the symbol indicates the amount of load. In the lead photo just one of five boxes is filled, thus reporting a light load. Below this symbol is another drawing of the outline of a penlight battery that looks like an AA battery. The filled boxes show the amount of battery capacity at this time. Here, five out of five boxes are filled; roughly 100 percent of the battery is available, meaning that it's fully charged.

Finally, the symbol on the left is a clock defining a number of minutes to the right. This shows that there are approximately 120 minutes of battery capacity, assuming the load stays light.



Figure 2 — The APC Pro BN1500M2 rear panel.

Two More Buttons to Go

The center button, glowing brightly in green, is the **POWER** button. It has several functions, including turning the system on and off. The left-hand button, called **DISPLAY**, allows selecting certain displays in conjunction with the **POWER** button.

As an example, these two buttons following a sequence can adjust the sensitivity. Sensitivity is what the manufacturer calls the ac line input voltage range that will cause the UPS to switch to battery backup. Three ranges can be selected: Low means the input ac can be within the limits of 78 to 142 V ac before automatically switching to battery backup. Medium sensitivity is between 88 and 130 V ac before switching, and High is from 88 to 136 V ac. The manufacturer recommends medium for computer equipment.

Another selection called *automatic voltage regulation* (AVR) can be made with these two buttons. When selected, AVR shows a sine wave with a horizontal line through it. This mode is designed to compensate for low voltage input and appears to add internally generated voltage to the input voltage. Thus, it provides a higher output when needed but not low enough to require use of the backup battery alone. For more information on this feature, please visit **https://apc.com/us/en/faqs/FA158913**.

Finally, there is an amount of self-test; results are displayed on the LCD and through the alarm beeping pattern, assuming the alarm has not been turned off. The panel can also be set up to continuously monitor output voltage and frequency as well as input voltage.

Final Pieces

In the backup mode, the output voltage and frequency are specified but the waveform is not. Some other brands of UPS units specify that their output, during backup, is standard sine waves. Therefore, during this review, the output was isolated and measured using an oscilloscope, and the output was observed to be a modified sine wave output. A modified sine wave has a stepped, square wave-like output, and is good for running low-power devices, but can cause buzzing and audio noise in RF receivers and might make your lights flicker. It's not ideal to be running your radio equipment on the air; for that application, look into devices that specify that they have a "pure sine wave" output. This was also confirmed by the ARRL Lab load test (see **www.arrl.org/qst-in-depth**).

The total package as shipped consists of the main unit, the user manual, and a data cable that has a USB connector on one end and a communications cable plug matching a UPS socket on the other end. This permits downloading software such as a package titled *PowerChute Personal Edition*, which can be found by searching on **www.apc.com**. It is compatible only with Windows, and you must specify the UPS model exactly, including any suffixes such as "Pro."

In Summary

Tests and exercises done in preparing this review did not find any performance problems. However, the use of just two pushbuttons (with a further requirement in some cases that the button be pushed for a certain amount of time — 0.2 second, 2.0 seconds, 6.0 seconds) might be a problem at times, but fortunately once it's set you won't use these frequently. The user manual did cover the operation but was not augmented with further information online. The online documentation consisted of only a downloadable copy of the user manual.

Manufacturer: Schneider Electric, sold under the APC brand. Available from many electronic retailers in the US. **www.apc.com.** Price: $208.

CyberPower CP1500PFCLCD UPS

Reviewed by Paul Danzer, N1II
n1ii@arrl.net



Similar to other UPS models, this 1500 VA unit weighs approximately 25 pounds, and the front panel has a 2.5 × 3-inch LCD display and four pushbutton switches. When delivered, the carton contains the main unit and data cable similar to a standard USB printer cable (USB-A to USB-B). Also included in the carton is a multi-page user manual in foldout format — approximately the equivalent of 10 pages with some duplication.

The manual has a representative block diagram that serves to introduce the unit's AVR function. This works in conjunction with the setting that is selected to determine when the battery backup becomes active (more on that later).

The leftmost switch is both the on/off switch and the power indicator. Slightly different from some UPS models when the power switch turns the unit off, it also disconnects the UPS output from the ac line so no power is applied to the load.

Unpack and Plug It In

One page of the user manual provides a quick summary of the uses of the front-panel buttons. The unit is shipped with factory default settings and usually only requires connection to the ac line to plug in the load. The "basic operating" page gives a quick overview of the screen, displays, and button function. However, when the instruc-

tion on this page says “2 seconds,” you must hold the button down for a full 2 seconds or a bit more. As an example, suppose you were in an area where the ac line often makes wide swings and you want the backup to turn on in such conditions. Here are the steps:

1. Press **ENTER (SET UP)** for 2 seconds. This brings up the list of items that can be set (more on this later). Short press the up or down (triangle marked) button until it brings up the function you want to set. In this example, we want to set **SENSITIVITY** — in the voltage range, the backup switches on.

2. When **SENSITIVITY** comes up, short press **ENTER**.

3. Use the triangle buttons to select the value of sensitivity you want.

4. Pressing **ENTER** fixes the value to your selection.

5. Wait a few seconds; the display reverts back to its original picture.

There is no definition of the term “short press,” but it did not appear critical. Sensitivity is explained in the “Function Setup Guide,” which is part of the owner’s manual.

The Front Panel

The four front-panel buttons are defined in the “Basic Operation” section of the user manual. The leftmost button is used to turn the unit on and off, along with its indicating light. Many UPS units have such a button to turn the UPS on and off; in the off position, the ac line is fed directly (through surge protection) on the output sockets. In this model, however, turning the power off also shuts the line input power off.

The use of the two buttons marked with up and down triangles has been explained in the preceding example; these buttons also have other functions related to the button names on the panel. The **DISPLAY** button, used by itself, selects the content of the display when it is not being used for programming. Short pressing this button changes these selections; pressing it for 2 seconds will keep the display continuously off or on.

The **MUTE** button, pressed for more than 2 seconds, silences the alarm. When the alarm is shut off, a mute symbol appears on the display screen.

Bottom Line

The CyberPower CP1500PFCLCD is a full-featured UPS with a great deal of capability.

Remaining on the front panel, below the display, are two USB charging ports (type A and type C). It provides 5 V dc with 3.1 A power output even on battery backup.

Back-Panel Connections

All connections are through the back panel (see Figure 3). The row of six sockets on the left are both surge-suppressed and backup-connected. The six on the right are only surge-protected. Both sets have the top socket spaced away from the others. This is to permit plugging in a wall wart without interfering with the next adjacent socket. Along the center of the panel is the line cord on the bottom and a circuit breaker farther up.



Figure 3 — The CyberPower CP1500PFCLCD rear panel.

At the top left is a cover for an optional Remote Management Card (RMCARD) that adds remote monitoring and management of the UPS.

According to the manufacturer’s website, this model is compatible with both the RMCARD205 and the RMCARD100. The RMCARD205 supports many network protocols like Simple Network Management Protocol (SNMP) traps, *Syslog*, and many other protocols, but its price is higher than the UPS unit itself (MSRP $439). The RMCARD100 is less expensive (MSRP $79) but provides only remote monitoring via the CyberPower mobile and web-based applications.

Just below this cover are two RJ-45 ports surge-protected for use with an ethernet line; these ports don’t communicate with the UPS. Just to the right are two USB ports that can be used with the cable supplied, to connect the UPS to a PC, and that allows communications. Various versions of the software are available on the manufacturer’s website. The serial port can also be used to communicate with the software. Finally, just below the serial port is a red LED. It is designed to go on if the UPS is connected to an ac line

with a wiring fault such as reversal of neutral and hot wire or ground.

Other Functions and Capabilities

There is an ability to select when you want the backup to switch on due to a problem with the incoming ac. There are three selectable ranges and the ability to customize the trigger point range. This setting is called **SENSITIVITY** and is used with AVR.

The installation information defines AVR as a system that automatically increases low utility power to a consistent and safe output voltage while preserving battery power for outages. There is no apparent adjustment for this function; in the block diagram it is permanently set to increase output voltage for short periods, leaving the battery for full power outages.

In Summary

This is a full-featured UPS with a great deal of capability; however, the available documentation and explanations are very limited. One small but very helpful diagram in the owner's manual is a composite picture of all applicable graphics allowing you to understand any item that shows up on the display.

Manufacturer: Cyber Power Systems (USA), Inc. Available from electronic retailers in the US. **www.cyberpowersystems.com**. Price: $275.

Tripp-Lite SMART1500PSGLCD UPS

Reviewed by Paul Danzer, N1II
n1ii@arrl.net

If you are used to a minimal UPS, this husky unit has a few surprises for you. First, the weight as shipped is approximately 29.3 pounds. This is primarily due to the battery size. The 1500 in the model number specifies a rating of 1500 VA. The next surprise may be the unit's ability to display the state of the battery and how much charge is left. The final surprise, for a UPS, is the ability to control it through either a remote LCD panel or a USB connection.

The owner's manual, which accompanies the hardware, is trilingual (English, French, and Spanish), but the first 23 pages are in English. The text and illustrations in the manual are actually large enough to read!

Simple Installation

The manufacturer suggests that you plug the unit into the 120 V supply for 5 hours to ensure a full-charge start. Next, plug the line cord into the wall socket — the unit specification lists a 12 A circuit. There are 10 ac sockets on the rear panel; as a start, use the one labeled **MASTER**. The on/off button is in the center of the front panel, just below the LCD display. Pressing it and holding it for 2 seconds will turn the unit on or off; a quick press turns the LCD light on or off. Multiple presses bring up various functions. If you accidentally press too short, too long, or several times, you can always shut down the UPS and start over. Keep in mind that when a UPS is set up, you don't necessarily have to go in the menu very often.



Bottom Line

The Tripp-Lite SMART1500PSGLCD UPS offers a wireless remote head to control the unit and programmable LED lights to match any color in your shack.

Capabilities

Figure 4 shows the 10 ac sockets divided into two groups. The right-hand group of five provides surge suppression only and no backup function. The left-

hand group provides both surge suppression and power backup. The lowest of this group is labeled **MASTER** and has an additional capability called **ECO MODE**. When enabled by a setting in the menu, power drain is monitored. If the power drain from the **MASTER** drops to less than 20 W, the other four outlets in this group are disabled. As an example, suppose your rig draws more than 20 W when receiving. If it is plugged into the **MASTER** and you have plugged wall warts that power some accessories into the remaining four outlets, when you shut off your rig the wall warts will automatically lose power.

Across the top of the rear panel is a cover plate labeled **BATTERY**. To extend the storage capacity of the unit, an external battery can be connected to the enclosed terminals. It is recommended to use the Eaton external battery extension for this unit. Centered just below this cover plate is a USB connector for monitoring and control with a PC via external software. The software, called *PowerAlert*, can be downloaded from **https://tripplite.eaton.com/products/power-alert**.

Also centered are two modem/telephone jacks for surge protection. Finally, on the left side at the bottom is the input ac line cord, with the input circuit power breaker opposite it on the right.



Figure 4 — The Tripp-Lite SMART1500PSGLCD rear panel.

Front-Panel Controls

There are three effective ways this UPS can be monitored and controlled. The first, mentioned earlier, uses software and an external computer. The other two are through the front panel.

The unit measures approximately 17 × 11 × 4 inches. This size, combined with the unit weight of approximately 30 pounds, may be a bit much for your installation. All controls and the display are on the front mounted on a removable sub-panel. By pressing the sub-panel slightly in and directly up, you can remove the sub-panel.

A self-contained battery and wireless link allow remote control of the main unit. As an example, when writing some of this review, the main unit and test load sat on my workbench. My computer remained on my desk, where there was not enough room to install the UPS. I was able to change controls and menu item settings comfortably at my desk instead of having to run back and forth to my workbench. Thus, the remote control allows you to monitor UPS status while using your rig without being concerned about the main unit location.

Control

In addition to the pushbutton controls, status and commands are displayed on an LC readout behind a mount below the controls. The USB connector on the back panel is a data interface; the front-panel USB charging ports (type A and type C) provide 5 V dc with 3.1 A power output, and the unit also works on battery backup.

The left button is a great convenience when you lose power to shut off the alarm. If your UPS is not easy to find after 5 minutes of listening to the alarm, you will probably want to shut off the alarm. You don't want to be searching around, flashlight in hand, for a way to shut off the alarm noise. Just push and hold for 2 seconds to silence the alarm.

This button has a second function. A quick press will return the display to a standard display and shut off the menu function.

The center button has on it the standard power symbol, used on many electronic units. Press and hold for 2 seconds to turn the UPS on or off. If the UPS is in the **MENU MODE** (more on this later), the on/off button is used for function selection. There are several other functions for this button explained in the owner's manual. These are functions related to the wireless connection between the main unit and the front panel.

The Menu

The third button has a symbol that represents two arrowheads, back-to-back, and facing up and down. A press and 2-second hold bring up the menu display. There are 14 menu items, and quick presses cycle the LCD display through the list.

The top legend shows an input of 0 V when there is no line voltage. The system is running as a backup, and the legend in the lower left-hand corner shows **BATT MODE**. The slant bar on the left shows the battery

voltage, and the slant bar with the legend **LOAD** on the right shows system output.

At the bottom, the set of filled-in squares represents the battery charge level for the small NiMH battery in the removable front panel. In the center of the screen are two symbols reminiscent of the Wi-Fi symbols on a personal computer. The two left-hand symbols show the wireless link of the front panel to the main unit is paired; the right-hand one on the line indicates the removable front panel is docked.

Finally, the center site wiring fault (SWF) symbol shows a fault; in this case, it shows because the UPS is not connected to an ac line. The owner's manual has drawings of the symbols as well as controls for color and other functions.

The menu item could be changed to show input voltage, output frequency, and many other operating parameters.

Other Information

This unit is listed as having a sine wave output. Putting an oscilloscope on the output shows a sine wave similar to the usual household ac waveform that's normally there.

This unit targets the gaming market. On the left and right of the case's edge, including the remote unit, there are programmable RGB LED banks that, according to the manufacturer, offer more than 16 million color combinations, which is more than enough to match any color in your shack.

In the manual there is a derating table. If you live at an altitude, any air-cooled equipment may have to be derated. A derating factor of 1 up to 100 meters was given (i.e., no derating). At almost 10,000 feet (3,000 meters), derating is 0.82. The manual also contains a 22-item specification table and a second table of fault codes and probable causes for the fault.

In Summary

The Tripp-Lite SMART1500PSGLCD UPS is a unit designed to be a permanent installation in your shack. The detailed fault information and ability to expand the battery capacity by using external batteries, and remote head capability, should make it a major counterpoint of your battery backup power systems.

Manufacturer: Tripp-Lite, 1111 W. 35th Street, Chicago, IL 60609. Available from electronic retailers in the US. **https://tripplite.eaton.com**. Price: $285.

Table 2 — Three 1500 VA UPS Reviewed Units

Manufacturer's Advertised Specifications

Brand **Model**	**APC** **Pro BN1500M2**	**CyberPower** **CP1500PFCLCD**	**Tripp-Lite** **SMART1500PSGLCD**
Input voltage range	88 – 139 V	88 – 144 V	97 – 145 V
Output frequency	60 ± 3 Hz	60 Hz ± 1%	Range 45 – 63 Hz
Input frequency	60 Hz ± 3 Hz	57 – 63 Hz	Not specified
Output voltage	120 V	120 V ± 5%	120 V
Voltage accuracy	Not specified	± 5%	± 10%
Output power	900 W / 1500 VA	1000 W / 1500 VA	900 W / 1500 VA
Output waveform	Three level stepped	Sine wave	Sine wave
Max output current	12 A	Not specified	12 A
Full load on battery	3.07 minutes, full load	2.5 minutes, full load	3 minutes, full load
Battery recharge time	16 hours	8 hours	7 hours from 10% to 90%
Transfer time	8 ms typical, 10 ms max	4 ms typical	6 ms typical, 10 ms max
Backup and surge outlets	6	6	5
Surge-only outlets	4	6	5
PC data control via USB	Yes	Yes	Yes
Remote-control detachable panel	No	No	Yes
Programmable LED lights	No	No	Yes
Automatic voltage regulation	± 11.3%	± 11.5%	± 10.3% over, ± 11.5% under
USB charging port (5 V)	3.0 A	3.1 A	3.0 A
Building wiring fault indication	Yes	Yes	Yes
Battery type	Sealed lead-acid	Sealed lead-acid	Sealed lead-acid
Dimension (depth, width, height)	14.5 × 4 × 10.25 inches	14 × 3.9 × 11 inches	11 × 4.1 × 16.93 inches
Weight with batteries	25.1 pounds	24.9 pounds	29.3 pounds
Connected equipment guarantee	Lifetime, $250,000	Lifetime, $500,000	Lifetime, $250,000
Hardware warranty	3 years	3 years	3 years

Lab Notes: Three UPS Units

The ARRL Lab assessed the emissions from three UPS units provided to the Lab prior to the full review of the units. Conducted emissions were measured — both the emissions going onto the ac mains when the unit is plugged in, and the emissions coming from the inverter when utility power is interrupted. The units were tested under the following conditions:

1. Plugged into ac mains at full load

2. Plugged into ac mains at full load and a USB device (a smartphone) connected to the USB power outlet

3. During a power outage (i.e., unplugged from the ac mains) at full load

The units tested were (1) APC Schneider Electric Pro BN1500M2, (2) CyberPower CP1500PFCLCD, and (3) Tripp-Lite SMART1500PSGLCD. The Tripp-Lite device arrived at ARRL with a screw and a piece of plastic broken and loose inside the unit, and it had to be returned to the vendor before testing. All the devices had an FCC label, indicating that the equipment is covered in an application for equipment authorization.

As might be expected, the worst-case condition for testing emissions was found to be plugged into the ac mains, operated at full load and with a USB device connected. As such, these notes are all relative to those conditions. As can be seen in Figure A, emissions from the units were passing in all areas except the lower portions of the HF spectrum, below the 630-meter ham band. The APC unit had the highest emissions and also had a rise in emissions between the 30- and 40-meter ham bands (peaking at about 9 MHz). Although compliant with FCC limits, those emissions were easily addressed with a 31-material common-mode choke on the power cord, located close to the UPS device. See Figure B for a chart showing the improvement with a choke, and Figure C showing the choke used on the unit, a 1-inch ID snap-on with about three turns of the power cord wrapped on it.

As a general rule, it's a good idea to keep some 31-material snap-ons as well as some cores (e.g., 2.4-inch outer-diameter cores) in your shack in case you suspect a noisy device and want to try a common-mode choke.

— *Steve Anderson, W1EMI, Lab RFI Engineer*

See *QST* in Depth for More!

Visit www.arrl.org/qst-in-depth for the following supplementary materials and updates:

✓ Additional ARRL Lab test results

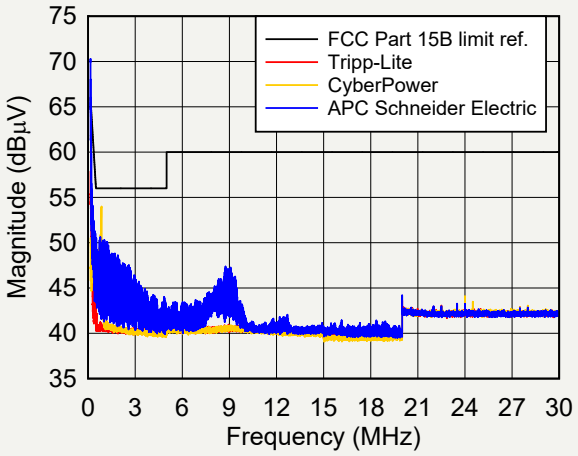


Figure A — Full-load quasi-peak emissions (ARRL Lab "pre-compliance" test result; pre-compliance refers to a result from an EMC lab that is not fully certified for demonstrating compliance with Part 15 emission limits, but does utilize the test equipment and setup for making measurements using ANSC and other regulatory standards).

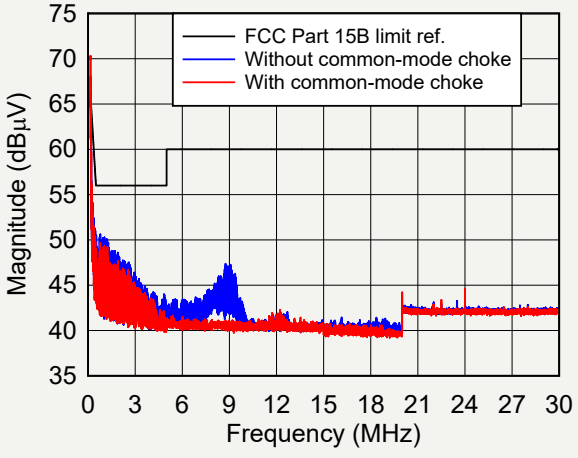


Figure B — APC unit choke comparison at full load conditions.



Figure C — Snap-on choke used for the APC unit.