

Compact and (relatively) lightweight, the SPE Expert 1K-FA amplifier is a no-tune, solid-state, legal-limit “smart” power amplifier designed with the contester in mind. AD5X puts it through its paces...

CQ Reviews:

SPE Expert 1K-FA Solid-State HF/50-MHz 1-KW Power Amplifier

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While vacuum-tube-based HF power amplifiers still dominate the amateur radio market, we are starting to see more and more new solid-state HF amplifiers becoming available. This is due to lower prices for high-power FETs (field-effect transistors), higher costs for high-voltage power-supply components and tubes, and the convenience of no-tune operation. A new solid-state amplifier introduced at Dayton this year is the Expert 1K-FA amplifier from SPE in Rome, Italy. Array Solutions (www.arrayolutions.com) is the exclusive U.S. distributor of this amplifier.

The Expert 1K-FA amplifier provides 1000 watts PEP/900 watts CW on 160–10 meters, and 700 watts PEP/CW on 6 meters. The amplifier is quite compact at just 11 inches wide, 6 inches high, and 13.5 inches deep and weighs about 45 pounds. Included within this amplifier package is a 120/240-VAC linear power supply. SPE chose a linear power supply with a highly efficient toroidal hyper-sil transformer to eliminate the possibility of switching tones. Photo A shows the attractive front panel with LCD screen, photo B is an inside view of the power supply (bottom) portion of the amplifier, and photo C shows the RF compartment with the internal RF shields removed.

The Expert 1K-FA can serve as the center of a fully coordinated contest station, as it includes a two-transceiver input control interface, a four-port antenna switch, and a high-power automatic antenna tuner that can separately manage antennas on each of the four antenna ports. Thus, any two transceivers can be connected to any one of



Photo A— The SPE 1K-FA solid-state amplifier puts out 1000 watts on 160–10 meters and 700 watts on 6 meters.

four antennas. When the amplifier is off, transceiver 1 is connected to antenna 1, while antenna ports 2, 3, and 4 are grounded. The two transceiver control interfaces are 15-pin D-connectors that provide band-data interfaces to most transceivers. Even if your transceiver has no band-data output, the Expert 1K-FA senses the keyed transceiver's frequency and automatically selects that transceiver and the correct antenna.

There are also two separate ALC (automatic level control) and amplifier keying interfaces for the two transceiver inputs. The ALC interfaces are very well thought out. When you connect the ALC cables between the 1K-FA and your transceivers, the amplifier automatically controls the drive power from the selected radio necessary to give you the full amplifier output. Therefore, you can leave your transceivers set for maximum power all the time, and the 1K-FA will control the transceiver power levels from band to band with no operator

adjustments necessary. Also, when the amplifier is placed in “Standby,” you have full transceiver power available. However, what if you don't need the full 1-KW power? The 1K-FA has a “Power” switch on the front panel that lets you select between half power (approximately 500 watts) and full power. Again, the amplifier controls the ALC line as necessary to control the drive so there is nothing for you to do other than punch the “Power” button. Five-hundred watts is 7 dB more power (over an S-unit) than the typical 100-watt transceiver, which often is all it takes to make the difference in snagging that DX contact.

The 1K-FA also has a rear SO2R (Single-Operator 2-Radio¹) connector for contesters. This is a receive-only port that permits you to listen on one transceiver while you are operating your main transceiver. If you hear a station you want to work on the secondary transceiver, you just start transmitting with this transceiver and the amplifier

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Photo B— The bottom (power supply) portion of the amplifier. Look at that power transformer!



Photo C— RF section of the amplifier with the internal shields removed.

automatically switches to this transceiver and the correct antenna. I've found this convenient even outside of contests for monitoring 6 meters with my ICOM IC-706MkIIIG with a 6-meter loop on the SO2R connector, while operating HF with my Yaesu FT-1000 MkV. When something pops up on the 6-meter calling frequency, I just hit the PTT button on my 706 and the amplifier automatically selects that radio and my 6-meter beam. Pretty neat!

Full monitoring of the Expert 1K-FA is provided by the amplifier's LCD screen. From this screen you can accurately monitor amplifier FET drain voltage and current, exciter and amplifier output power and reflected power (with simultaneous bar-graph and digital readings), the selected transceiver and antenna, and an alarm log. The LCD screen provides menus for programming the amplifier for radio-specific interfaces and antenna selections as well. You can also interconnect the amplifier to a PC with a supplied RS-232 cable and display (in color) all amplifier parameters and control the 1K-FA from your computer. If your desktop computer does not have an RS-232 port, I found that a cheapie USB-to-serial converter works just fine. Photos D and E show the display indicating exciter power when the amplifier is in standby, and full amplifier output power, respectively.

Amplifier Protection

The Expert 1K-FA has a very extensive protection system. The parameters monitored and acted on by the amplifier are heatsink temperature, FET drain

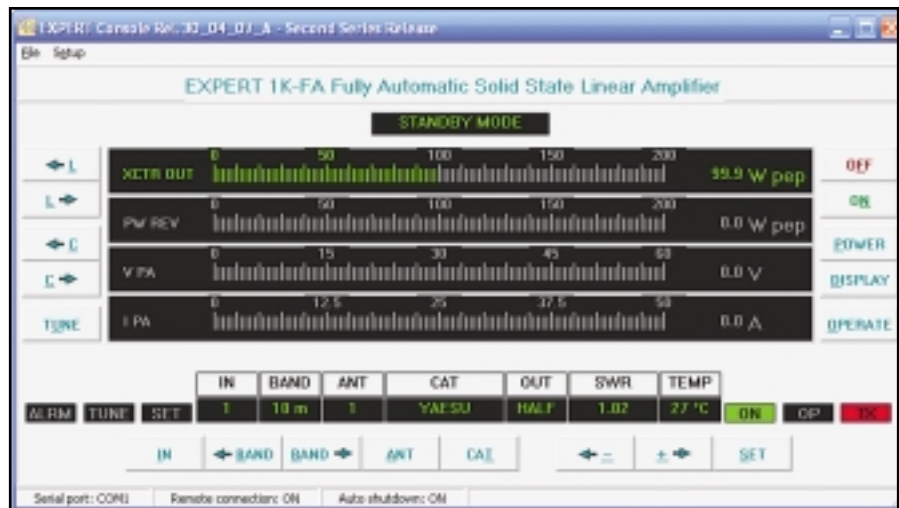


Photo D— Computer screen display when the amplifier is in standby.

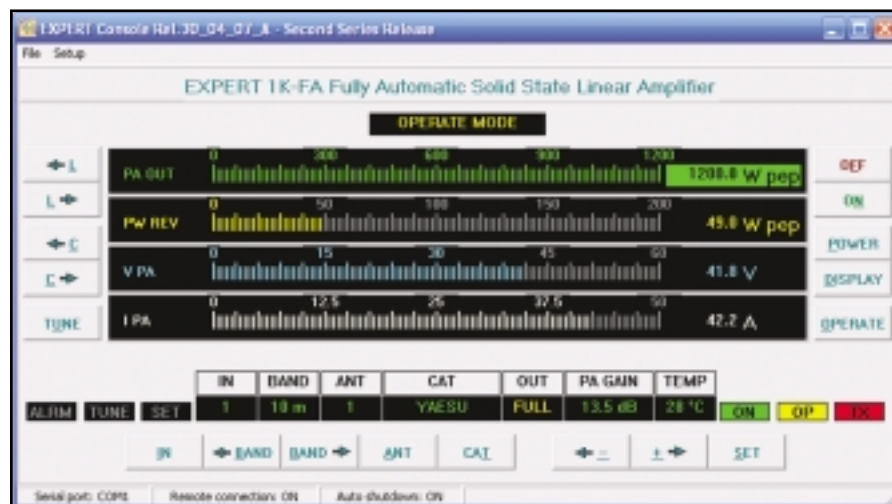


Photo E— Computer screen display when the amplifier is operating at full power output.



Photo F— Interfaces for transceivers and antennas are well-marked and self-explanatory. Note the SO2R connector.

voltage, PA current, SWR, reflected power (which includes reflected harmonic power), input overdrive, and power combiner balance. Any fault condition provides an audible and visual alarm and puts the amplifier into the standby/bypassed condition. All alarms are also stored in an “Alarm History” buffer which can be called up on the amplifier’s LCD display.

Connecting the Amplifier

The 1K-FA comes strapped for 240 VAC, so you first need to decide on whether or not to change this to 120 VAC. The amplifier will easily operate from 120 VAC in the half-power mode. I measured the 120-VAC AC current at 10.5 amps when operating at half-power. I also found that I could operate the amplifier at full power on 120 VAC, but I did have it connected to an AC branch that is separate from the AC circuit from which my two transceivers are powered. I measured the full-power 120-VAC current at 19 amps, so you really should run the amplifier from 240 VAC unless you have a separate 120-VAC 20-amp circuit available.

As discussed earlier, all the connectors for automatic interfacing with up to two transceivers and four antennas are provided on the rear of the amplifier, as can be seen in photo F. SPE provides two sets of RCA-type cables for ALC and amplifier keying, and two 15-pin D-connectors for making up transceiver interface cables. In my case I wanted to connect both my Yaesu MkV and my IC-706 transceivers to the amplifier. I purchased a 9-pin female D-connector from RadioShack for the Yaesu CAT end of the cable, and used one of the SPE-supplied 15-pin D-connectors for the amplifier side of the interface cable. For the IC-706MKIIG, I used an Ameri-

tron ARB-704 transceiver/amplifier buffer which provides ALC and amplifier keying outputs from the transceiver’s accessory socket. For the IC-706MKIIG band-data information, I made a CI-V cable using a 3.5-mm mono plug for the ICOM end, and the second SPE-supplied 15-pin D-connector for the amplifier end. Detailed instructions in the amplifier manual show how to make cables for virtually any transceiver.

Next I went into the 1K-FA setup menu and set the interfaces for the Yaesu and ICOM radios. I also set the default selected antennas for each radio and trained the internal auto-tuner for each antenna on the different bands.

Performance

My amplifier testing included measuring the amplifier power output into a legal-limit dummy load and checking the amplifier’s internal power metering against an external Array Solutions PowerMaster digital wattmeter. I measured key-down, string of “dits,” and PEP SSB power on both the 1K-FA internal power meter and the external PowerMaster. As you can see in Table I, the 1K-FA does a good job of meeting its typical power-output specifica-

tions. It is interesting to note that the PowerMaster typically reads 0.5–1 dB more power than the amplifier metering. The amplifier measures power at the input to the internal auto-tuner, and the PowerMaster measures power at the output of the auto-tuner. The internal auto-tuner is always in-line and cannot be bypassed. Therefore, these measurements seem to indicate the intrinsic loss of the auto-tuner.

On the Air

Most of my operating during the evaluation period was on 160, 80, 40, and 20 meters using my Yaesu MkV, and on 6 meters using the IC-706MKIIG. Operation is truly easy in that the amplifier automatically selects the keyed radio and the primary antenna previously chosen for that radio and band. You literally don’t need to worry about which microphone or key you start using, or which antenna needs to be connected. Your pre-programmed radio-vs.-antenna is taken care of for you by the amplifier. Of course, you can manually change these combinations at any time. Finally, as a CW operator I really appreciated the smooth QSK (break-in keying) operation of the amplifier.

Conclusion

The SPE 1K-FA is definitely an amplifier to consider. With its multi-radio, multi-antenna, SO2R, and auto-tuner features, this amplifier is very easy to use—from normal rag-chewing to contesting and DXing. Introductory price is \$3,975. For more information, including a downloadable user’s manual, check the Array Solutions website at <<http://www.arrayolutions.com>>.

Note

1. Single-Operator 2-Radio (SO2R) is a popular entry category in some contests. It permits a single contestant to operate on one band while monitoring for new score multipliers on another band on a second radio, and then to briefly switch to that second radio to make the contact for a new multiplier.

Band	Amp Key-Down	PM Key-Down	Amp “Dits”	PM “Dits”	Amp PEP	PM PEP
160m	1178	932	1118	970	975	1200
80m	1115	946	1033	980	1161	1044
40m	938	915	1018	930	1004	937
20m	850	740	950	810	1070	957
17m	1011	870	1100	1007	1200	1100
15m	1100	1025	1075	1000	1200	1062
12m	1031	936	950	950	1143	953
10m	1200	1025	1200	1115	1200	1100
6m	765	616	810	760	818	745

Table I— Amplifier power-output measurements, where Amp = internal amplifier meter reading; PM = external PowerMaster meter reading. See text for discussion of differences in readings, all of which are in watts.