SG-2020 Compact Battery Pack By Phil Salas – AD5X (ad5x@arrl.net

Introduction

For portable operation, being able to run an SG-2020 from a battery pack is definitely a benefit. However, reasonable operation time at the 20-watt level requires a pretty substantial battery pack. And as many SG-2020 owners know, the SG-2020 is often unhappy if the battery voltage drops below 12-volts. The SG-2020 is spec'd to operate from 10-18 volts DC, but this should probably really be more like 12-18 volts DC, at least for older SG-2020 radios.

The Battery Pack

Recently I've been looking at NiMH R/C-type battery packs since they tend to be pretty inexpensive. Popular voltages are 7.2- and 9.6 volts. The 7.2-volt packs are very interesting, because two of these in series will give you 14.4 volts. And reasonably priced packs have up to 3300 mah of capacity each. I purchased a pair of 7.2 volt 3300 mah packs, along with a fast/smart charger for \$55 from www.batteryspace.com. The small fast charger will charge 6-12 volt NiMH batteries, puts out 2-amps of charging current, and then automatically switches to 50 ma of trickle charge when it detects a full charge on the battery. For these 3300 mah packs, the charge time is less than two hours for a fully depleted pack.

With a nominal series voltage of 14.4 volts, this battery pack will have a fully charged voltage of just over 16 volts, and a discharged voltage of 12 volts. This is perfect for the SG-2020! While you're at it, buy a pair of male R/C connectors - needed if you want to connectorize everything inside the box. You can also buy these R/C connectors at Radio Shack (the 7.4V R/C Repair kits called out in the parts list provide everything necessary).

The Serpac Model 171-B plastic enclosure is perfect for housing the batteries. These cases are available from Mouser Electronics (<u>www.mouser.com</u>) for \$8 each.

Building The Battery Pack

Referring to Figure 1, you'll see that the two battery packs have to be wired in series, but provisions must be made to charge them individually. For charging purposes, I used Anderson PowerPole connectors connected across each battery and mounted directly on the plastic case. A hobby knife and some patience, or a Dremel tool, will let you make the necessary cutouts. The charging connector positions are not critical. I positioned them as close to the sides of the pack as I could as can be seen in the photos. The batteries themselves fit snugly in the box as shown in photos. As you can also see, I connectorized the wires so the batteries can be removed easily. Double-sided tape and a small piece of foam over the batteries helps keep them snug and immobile when the cover is in place. I also made a PowerPole-to-RC adapter for the charger, which is necessary for the PowerPole charging jacks. I also included a 10-amp internal ATC fuse as can be seen. These batteries can source up to 30-amps for short periods of time! Finally, put rubber feet on the bottom of the case. I labeled the case and charging

connectors with "White on Clear" Casio labeling tape. Incidentally, the total weight of this battery pack and charger is less than two pounds.

Operation

How long does the battery last? Over a period of two days, I logged a total QSO-only time of just over 95 minutes at a full 20 watts CW on 40 meters. There was also some additional "in-between QSO time" when I was looking for QSOs, but I didn't count this in the total operating time. My end-of-charge was defined to be when the battery voltage fell to 12-volts. I monitored this voltage on the SG-2020 (press "CMD-SPEED" to display the voltage). When the metered voltage drops to around 13 volts, it's really time to consider re-charging the batteries, as you are getting very close to a depleted pack.

I also measured the current drain of my SG-2020 so as to give you an idea of how you might do at different power levels. Obviously, you'll get longer operating time at lower power levels. For my ADSP2-equipped SG-2020, the measured key-down current drain data is as shown below:

Receive current: 540 milliamps with ADSP2 on or off.

TX Pwr	<u>160-20 m</u>	<u>17m</u>	<u>15m</u>	<u>12m</u>	<u>10m</u>
20 watts	3.8 amps	4.2A	4.8A	4.5A*	4.6A*
10 watts	3.0 amps	3.4A	3.7A	3.8A	3.5A
5 watts	2.5 amps	2.7A	2.9A	3.0A	2.7A

* On 12/10 meters, the maximum output was 15 watts.

Conclusion

This article has described an effective and relatively inexpensive battery pack for the SG-2020. And since this battery pack can be re-charged so quickly, you may even want to consider using this pack as the primary power supply for your SG-2020!

Parts List – Battery Pack

<u>QTY</u>	Description	Source	Price each
1	2 Batteries/Charger	www.batteryspace.com	\$55
1	Serpac 171-B box	Mouser 635-171-B	\$8.00
2	7.2V R/C Repair Kit	Radio Shack 23-444	\$1.99
1	ATC fuse holder	Mouser 441-R347C	\$1.48
1	10-amp ATC fuse	Mouser 576-0257010.PxPV	\$0.40
*5 sets	s PowerPole connectors	www.connex-electronics.con	<u>n</u>

*3-sets for battery pack, one set for charger adapter, one set for SG-2020.



Internal View



Figure 1 - Battery Pack Schematic



Internal Close-up



Back View



SG-2020, Pack & Charger



SG-2020 and Battery Pack