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Mobilizing the SPR-4 Receiver

Because of its relatively small size (5.5H x 10.75W x 12.25D in., or 13.97H x 27.30W x 31.13D cm.) and light weight (18 lbs., or 6.7 kg.), the Drake SPR-4 is an ideal candidate for mobile and portable MW DXing. It does have some shortcomings, however, that should be compensated before its full potential can be used.

First, the SPR-4 input impedance presents a considerable mismatch to the typical automobile MW whip antenna, especially when the SPR-4 is operated in the 500-1000 kHz band. This limits the useable sensitivity when the SPR-4 is used with the automobile MW whip. Second, the SPR-4 suffers a drop in gain, and some loss in sensitivity, when operated from 12-V automotive power. This problem may not be common to all serial numbers of the SPR-4, but mine (SN 060) has it, and it is probably present in higher serial numbers. Uncompensated, these make an SPR-4 unuseable for portable or mobile MW DXing.

To compensate for the first problem, I took some time to design a small antenna tuning unit (ATU), to provide an impedance match between the SPR-4 and our 1963 Buick's 4-foot whip. The schematic of the ATU, along with a parts list showing corresponding Radio Shark (Radio Shack) stock numbers, is shown in figure 1.

In building the ATU, no particular care is required. The interconnecting leads between the components should be held to minimal lengths, to prevent RFI pick-up. I chose a plastic box for the enclosure for the ATU because a small metal enclosure would, in close proximity to L1 and L2, act as a shorted turn around them, and enormously affect their Qs and inductances. A larger, metal enclosure would be useful to further reduce RFI. L1 and L2 should be separated by about 3 times a single coil diameter, to prevent intercoupling (but, if properly phased, this coupling will not be detrimental to the operation of the ATU; however, it may make it difficult to get a full tuning spread from 1000 to 1600 kHz).

In initially tuning up the ATU, begin at 540 kHz, fully mesh C2, open S1, and tune L2 for a maximum SPR-4 response to a station on 540 kHz. With the SPR-4 tuned to a station at 1000 kHz on the 500-1000 kHz band, it should be possible to discern a peak in the SPR-4 response as C2 is rotated. Then retune the SPR-4 to a station at 1000 kHz on the 1000-1500 kHz band, remesh C2, close S1, and tune L1 for peak SPR-4 response. Retune the SPR-4 to a station on 1600 kHz, and tune C2 for a peak in the SPR-4 response. It is important that the SPR-4 be tuned to the 500-1000 kHz band for setting up L2, and to the 1000-1500 kHz band for setting up L1, as there is a wide disparity between the SPR-4 input impedances in the 1000-1500 kHz band and the 500-1000 kHz band. After initial ATU tuneup, if you find that you cannot achieve resonance at both ends of each band, experiment with the value of C1. While C1 affects the matching into and out of the ATU, it can be varied considerably in value (and even eliminated in some instances) with only minimal effect on SPR-4 performance. As a matter of fact, you should play with the value to optimize performance. In general, for a shorter antenna whip, increase the value of C1; and vice-versa.

If you are so lucky (unlucky?) as to have a CB whip, give it a try with the ATU. The greater height of the bumper-mount type ought to be useful.

Having suffered with the second problem of the SPR-4 several times, I investigated to determine the cause. The nominal B+ voltage that supplies the entire circuitry of the SPR-4, is a nominal, regulated 12 volts, according to the instruction manual. Therefore, there ought to be compatibility with automotive power. In fact, it was found that this B+ voltage was about 15 volts. This is evidently a factory modification. My own thoughts are that this revision was made to increase the gain and sensitivity of the SPR-4. Unfortunately, it doesn't yield commensurate mobile performance.

Rather than undertake extensive modification of the SPR-4 circuitry, in order to improve its performance with a 12-V supply, two alternatives were considered: 1. Use an inverter (12-V DC to 117-V AC); 2. Use a separate, 15-V battery to power the SPR-4. I chose the former alternative, since I already have a Heath MP-10 inverter.

Another minor problem became evident when measuring voltages in the SPR-4 power supply: The SPR-4 power supply voltage, before regulation, is only about 16.5 volts when the SPR-4 is operated from 120-V AC. There is little headroom between that and the regulated output of 15 volts, and one can anticipate problems with the power supply breaking regulation when operating the SPR-4 from AC mains whose voltage is low (below about 115-V AC). I had this problem when using the Heath MP-10, whose output is squarewave, forcing the use of an autotransformer to boost the voltage back to 120-V AC. Since there is plenty of above-chassis free space within the SPR-4, it would be worthwhile to replace the power transformer with a center-tapped one capable of supplying about 20-V AC to center tap. This will not solve the problem of low gain and sensitivity experienced when operating the SPR-4 directly from 12-V DC, however.

A D-C power cord, which mates with the SPR-4 at one end, and with the cigarette (hawf-kawf) lighter outlet of an automobile, at the other; is available from the R.L. Drake Company, 540 Richard Street, Miamisburg, Ohio 45342, for about $5.00 (in 1977). The part number of this cord is 1001229.

It might be noted here that the SPR-4 seems to match the automobile MW whip antenna well on SWBC bands, yielding good results.

When using the SPR-4 in portable mode, outside an automobile or aboard a boat, for example, excellent reception can be attained by using a good, amplified loop (such as the Worcester SM-2, the Palomar, or the Radio West models). Even when operated from 12-V DC directly, good results can be attained.

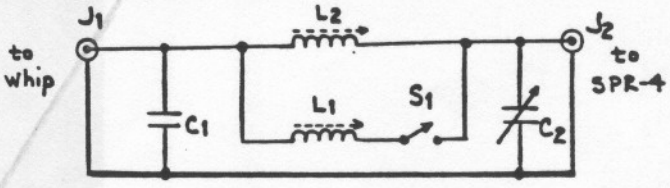

fig. 1 Antenna tuning unit.

C1 220 pF mica capacitor
C2 RS 272-1431 35-365 pF variable capacitor
J1 RS 274-712 Motorola-type jack
J2 RS 274-346 RCA-type phono jack
L1 RS 270-1430 250 uH (max.) variable inductor
L2 (as L1)
S1 RS 275-612 single-pole, single-throw toggle switch

miscellaneous:
enclosure, bakelite, with metal cover RS-231
knob, bakelite RS 274-407
hardware; screws RS 64-3003 6-32x$\frac{1}{2}$",
nuts RS 64-3007 6-32,
washers RS 64-3009 #6 flat