Allied Radio's *Space Spanner* Receiver: Reliving a Kit-Building Adventure

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. . . But nostalgia is a strong force, and many of us yearn for the radios that started us off on a lifetime of radio adventures.

Let's go back, say 55 years or so . . . it's now 1957. The Cold War rages while the race to space seems lost to the USSR — winner of Round 1 by launching Sputnik I into orbit in October.

Thousands of ears tuned to 20.005 MHz, straining to hear the satellite's faint radio signal as it circled the earth every 96 seconds.

SWL was a booming hobby and the airwaves were filled with foreign stations and propaganda of all types. Many a beginning SWL or ham cut their teeth with modest gear — such as the Space Spanner receiver kits débuted in the Allied Radio 1957 catalog under its Knight-kit line up.

Reader Todd F. contacted us a few months back and shared the following tale:

I have a Knight-kit Space Spanner that I am trying to get going . . . it works, barely, but not well. It is identical to the one I built with proceeds from my paper route money when I was 14 or 15 years old in 1959. My kit didn't work! I laid awake wondering why, until I discovered I had run one wire through a solder lug rather than the two as shown in the instructions. Voila! The radio then worked.

It was a very big deal to me as a child. I used to get Radio Moscow on it, the BBC and Radio Havana . . . we lived in Florida during the Cold War era. It was all a great adventure — a turning point in my young life, which I only realized decades later — leading me to buy an example of that kit and the manual so I could relive that epochal moment.

The Space Spanner was the slightly bigger brother to the Ocean Hopper. Both were simple AC-powered regenerative receivers. Ed Engelken was kind enough to provide a scan of the catalog page for Space Spanner from his library of old catalogs (see **Figure 1**).

Alas, while the 17-MHz upper tuning limit precluded receiving the historic 20.005 MHz Sputnik I broadcasts, these little receivers rewarded their owners with countless hours of listening of what was perhaps shortwave broadcasting's golden era.

knight-kit "Space Spanner" Receiver Kit
THRILLING SHORTWAVE AND BROADCAST RECEPTION

ONLY **$15.95**

- Built-in PM Speaker
- Sensitive Regenerative Circuit
- Standard and Short Wave Bands
- Convenient Bandswitching

Sensitive 2-band receiver in easy-to-build kit form. Short wave band covers 6 to 18 megacycles—pulls in exciting foreign broadcasts from many parts of the world, plus Amateur, aircraft, police and marine radio. Specially designed regenerative circuit also provides highly sensitive reception on broadcast band. Broadcast band or short wave is selected simply with the built-in bandswitch.

Built-in 4" PM speaker and beam-power output tube for plenty of volume. Headphone connectors on rear panel allow private, quiet listening; slide switch cuts out speaker. Sensitive circuit employs 12AT7 regenerative detector and audio amplifier; 50C5 power output; 35W4 rectifier. 6 controls allow precise, accurate tuning; Bandspread, Main Tuning, Antenna Trimmer, Bandswitch, Regeneration, and Volume. Panel is finished in attractive gray; has black knobs. Detailed, step-by-step instructions include pictorial and schematic diagrams. With all parts, punched chassis and tubes. Less cabinet (below). Size, 7x10½x6". For 110-120 v., 50-60 cycle AC or DC. Shpg. wt., 4½ lbs.
83 Y 243. NET.....15.95

CABINET FOR ABOVE. Smart, wood cabinet with durable, gray pyroxylin covering. Gives receiver handsome, professional appearance. Shpg. wt., 2 lbs.
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"Space Spanner" Under Chassis View

Simple, Uncrowded Layout of Parts—Easy to Build

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Figure 1: Allied Radio's 1957 catalog page for the Knight-kit Space Spanner receiver kit.

Photo A: Todd's tired, old Space Spanner, an eBay auction site purchase. It had seen better days. *(Photographs courtesy of K1ZJH)*

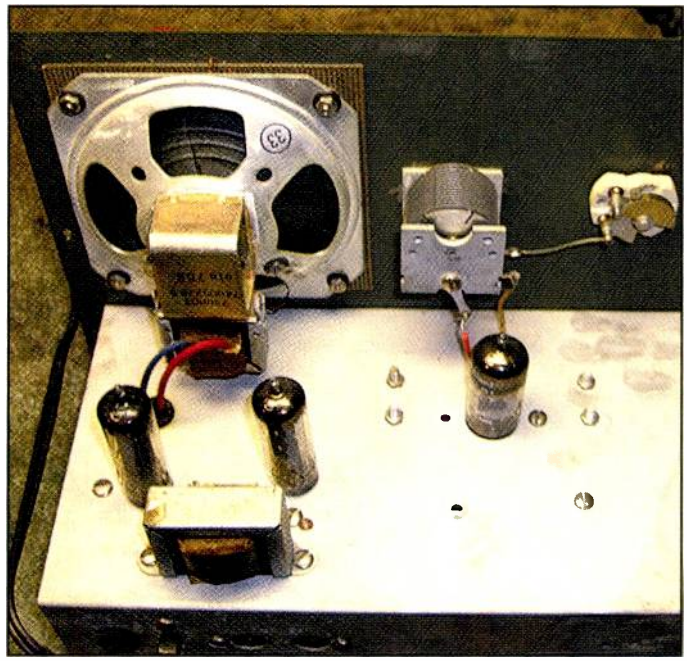

Photo B: The top chassis view shows that the receiver is a rather spartan, three-tube regenerative design.

Todd continued: *I recall it was $14.95 for the kit without the case. It was another $5 for the case, which I did not order with the original kit. I built the kit and had it standing naked on my little desk because $5 was another whole week's paper route income for me! I see in the manual that the antenna kit was $1.03. I bought that with the kit, and stretched the wire between insulators, with the rubber-insulated downlead fed under a steel casement window.*

I have in my hands now a discontinued Radio Shack long wire antenna kit that is very similar to the original. I'm about to string it up and tune in some shortwave on the newly rebuilt radio as I did so many years ago.

Today I'm building solar electricity, solar hot water and solar hot air systems onto my remote, off-grid mountain cabin. These skills all started with this radio, which will now have its little shrine on my shelves — in working condition.

So, for this column we'll be showing what went into restoring Todd's Space Spanner. And by now hopefully he's reliving those childhood memories.

Todd's tale is similar to those of many of us old timers. My kit nemesis was the Lafayette KT-200, a more advanced superhet kit that I intended to use in my KN1ZJH Novice ham station back in the early '60s. Unfortunately, the receiver wasn't quite up to the task of dealing with the crowded Novice CW bands, and the career of a budding ham was almost cut short by that misstep!

But nostalgia is a strong force, and many of us yearn for the radios that started us off on a lifetime of radio adventures. I confess to now owning both a KT-200 and the later model KT-320.

Finding Manuals

One thing you'll need to properly service or reconstruct any electronic kit is a copy of the original factory manual. Fortunately, there are several good manual suppliers who have excellent inventories at very fair prices.

Manuals — both originals and copies — are offered on Internet auction sites, as well. Contact information for a few vendors I've used are listed with this article.

If you're Internet savvy, this URL < http://bama.edebris.com/manuals/ > will bring you to the boat anchor archives, where users share downloaded manuals for vintage communications radios and vintage test equipment. Note that many of the Heathkit manuals are claimed to be under copyright protection, and are available only from authorized dealers.

It can be difficult to find the exact manual for a piece of gear that has undergone numerous factory revisions over the life of the production cycle. There are also many other Internet user groups that support specific manufacturers where information and restoration tips are freely shared among participants. For example, I belong to the Heathkit, Hewlett Packard and Hallicrafters user forums on *Yahoo!*

Kit designs spanned from the worst imaginable to some of the finest and most innovative equipment available. Yet any kit was only as a good as the workmanship of the builder.

The gamut runs from *expert* — kits that look factory made — to kits that were assembled by youngsters with no prior soldering experience. Alas, so it was with Todd's Space Spanner.

Photo A shows the Knight Space Spanner as it was found. A rear chassis view can be seen in **Photo B.** So far, everything looked good! But, the underside of the chassis in **Photo C** revealed that this restoration would be a bit more involved than I had planned.

I had expected I'd be replacing a few out-of-tolerance resistors, improve the AC safety features of the hot AC/DC chassis and replace any vintage filter or wax capacitors with modern, new components to get Todd's set into reliable working order.

Photos D and **E** give a better idea of the reality of what I was getting into. The Space Spanner instructions advised the builder to use short leads, but the youngster who assembled this radio carried the advice to extremes.

Resistor bodies were pulled tight against the socket terminals, placing undue mechanical stress on the components. Note the messy wiring and poor parts placement seen in **Photo D.**

The plastic wire insulation was burned and overheated, leaving areas of exposed or bare wires. It was impossible to correct these problems without causing more problems.

Photo E shows another area where the workmanship was less than desirable. Grainy and cold solder joints, poor mechanical connections on the solder lugs and more damaged wire insulation.

So, Where to Go From Here?

I had a few options. First, I could carefully remove all of the components and old wiring, leaving the original sockets, terminal strips, coils and controls in place.

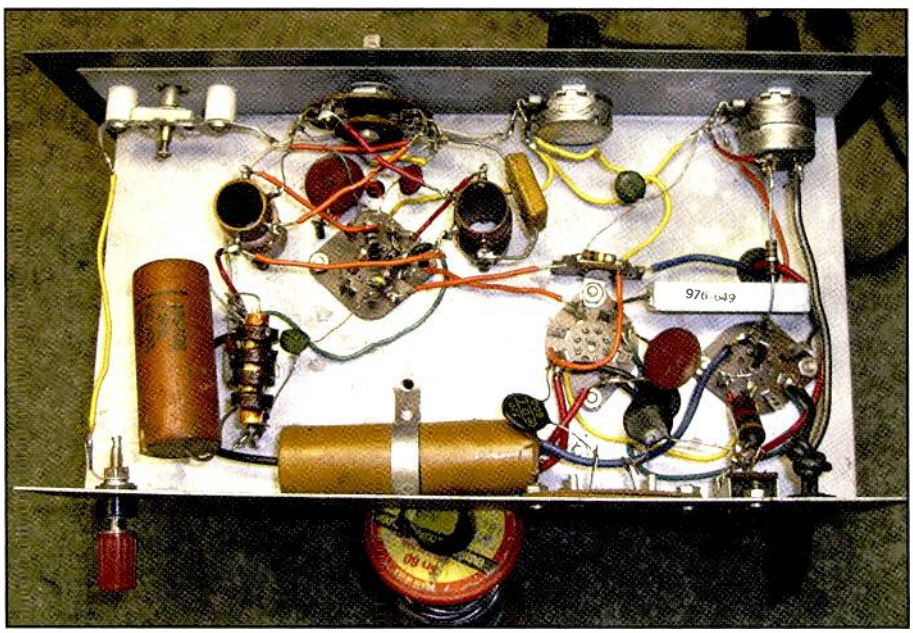

Photo C: The soldering and workmanship left much to be desired. It was probably the first time an anxious youngster had ever attempted such a ponderous challenge.

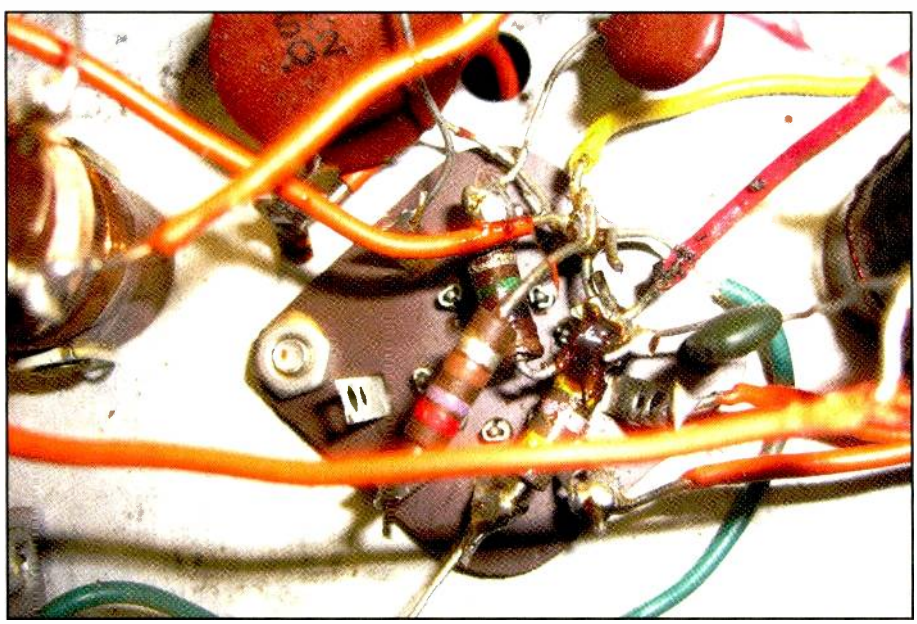

Photo D: This is the area around the 12AT7 dual triode. Unfortunately, components and leads are very crowded in this area — and vying for a dearth of solder terminal real estate. The engineers who laid out this kit could have done better.

The receiver is a simple, three-tube design, and only needs a reasonable quantity of commonly available and inexpensive parts.

Unfortunately, attempting to remove the old components ended up damaging the socket terminals, which were a brittle metal that easily snapped. Luckily my parts bins had exact replacements for the two, seven-pin- and one, nine-pin-wafer tube sockets. Rather than try working in tight confines of the chassis, I found it was safer to temporarily remove the two control potentiometers and band switch to facilitate cleaning their terminals.

Be *very careful,* as it is very easy to damage parts when trying to remove old leads that are wrapped around terminals. What I ended up with is shown in **Photo F.** The old, removed parts are shown in **Photo G.**

Tearing Down Old Kits

If you're willing to spend the time, money and effort, rebuilding old kits can be a rewarding experience. I've seen examples of many major rebuilds of early kits, including many of the larger ham transmitters and receivers.

It's not unusual to see these stripped down to a bare chassis and even replated to look like new. The restorer is rewarded with the experience of reliving those early kit days.

I decided to follow the original instruction manual to guide me through the kit. With more than 45 years of electronics experience behind me, I would feel confident working from the schematic alone, but I decided it might be more fun to follow the manual step-by-step, just as if I was building this radio for the first time.

I should add that attempting to build a kit from the schematic could lead to many problems. It is not uncommon to find errors in schematics, especially if the kit has undergone revisions. And, there are many critical steps regarding lead orientation and other concerns that cannot be conveyed by the schematic alone. A scan of the schematic from the manual is shown in **Figure 2.**

Space Spanner Design and Manual

The schematic reveals that the Space Spanner is a simple, AC/DC regenerative receiver. A dual section triode tube (type 12AT7) serves as the regenerative detector and first audio amplifier, followed by a 50C5 as the second audio power stage.

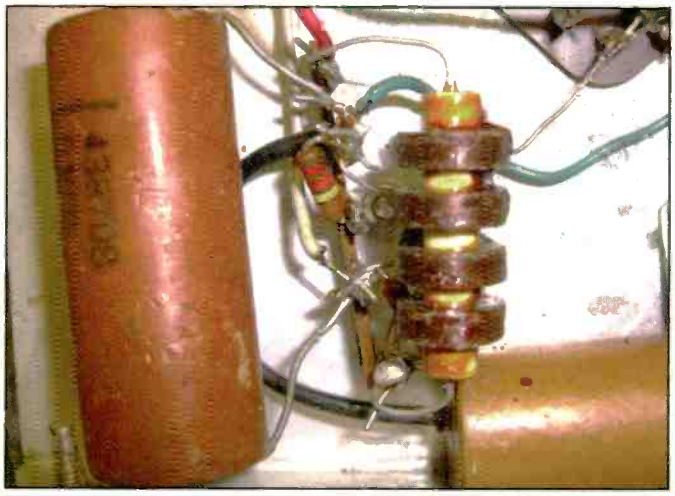

Photo E: Things aren't so crowded here, but again the workmanship could have been much nicer.

Photo F: Most of the original components couldn't be salvaged and except for a few major pieces, the chassis was stripped bare.

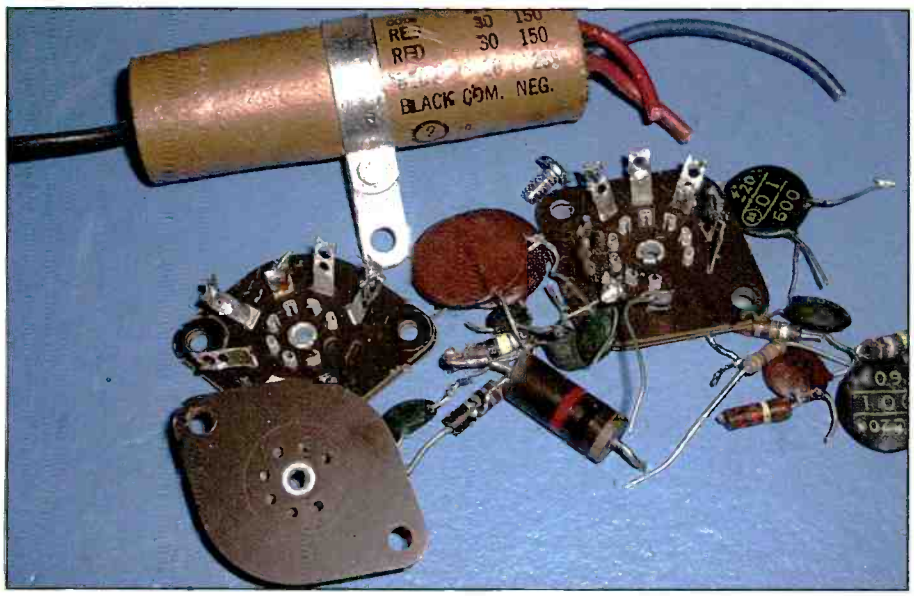

Photo G: Here are some of the removed components that will be replaced when the kit is rebuilt.

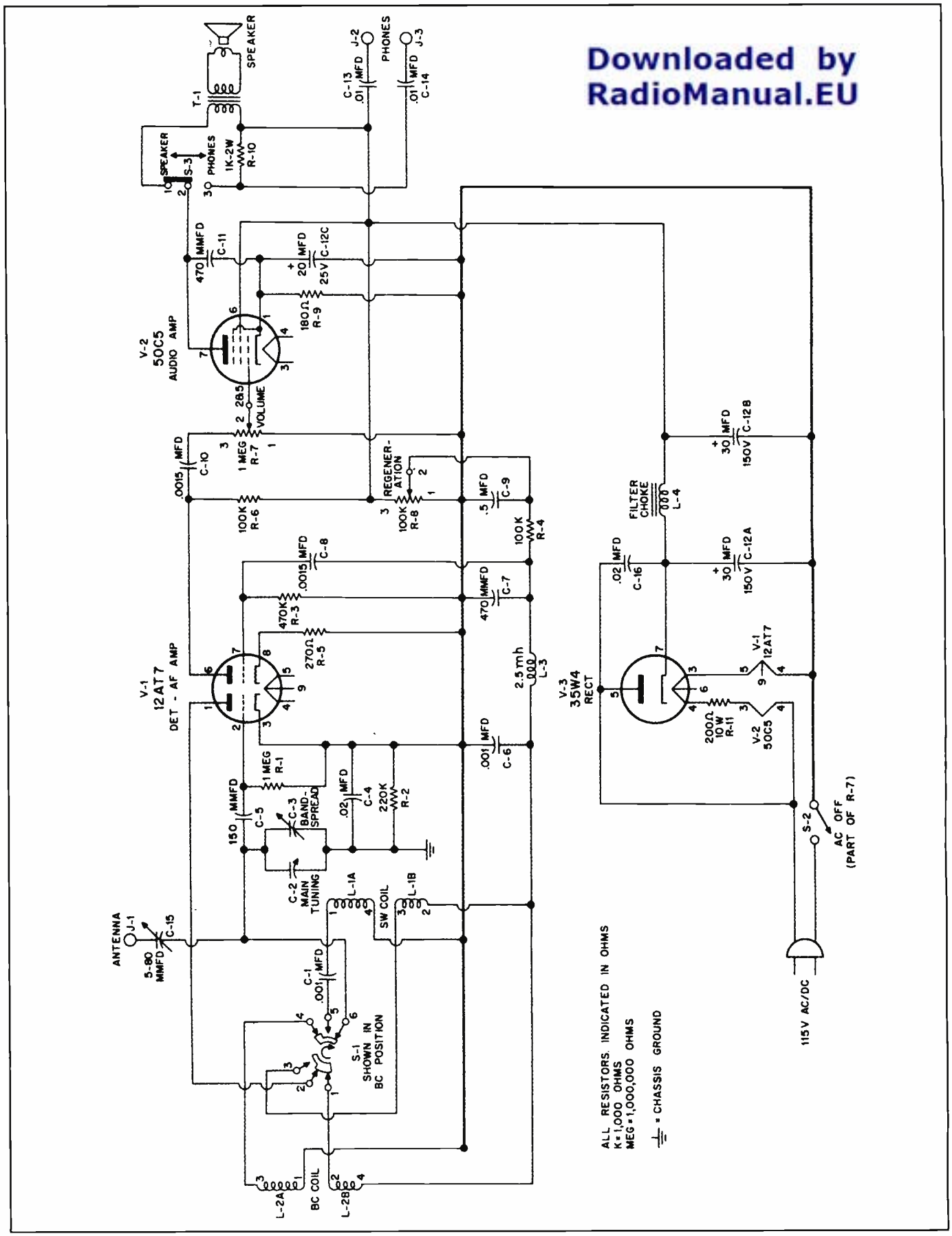

Figure 2: The Knight-kit Space Spanner schematic.

A 35W5 is the half-wave rectifier for the DC supply voltage. Since the three 150-mA tube filaments are wired in series, a 200-ohm power resistor is used to drop AC voltage by another 30 volts. If you replace this part, use a power resistor with a 10-watt rating.

The Knight-kit assembly manuals were well written and clearly illustrated.

Photo H shows the chassis at the stage identified in the manual as "first chassis wiring view." Both the manual and schematic were placed on the bench so they could be easily seen and referenced while the chassis wiring progressed.

Many of the early components used in the original Space Spanner kit are now obsolete and the modern equivalents are physically much smaller. For example, the humungous, .5-mFd, 400VDC wax paper capacitor (part C-9) seen in **Photo E** was replaced with a tiny modern Mylar film, .47-mFd, 630VDC capacitor — barely visible in **Photo H.**

This capacitor, and the multisection filter capacitor C-12, should both be replaced. I used a .47-mFd, 630VDC Mylar capacitor for C-9, and two discrete 33-mFd, 160VDC electrolytic capacitors to replace the two, 30-uF sections of C-12 and a single 22-mFd, 60VDC electrolytic to replace the 20-mFd section used for the cathode bypass for the 50C5 audio stage.

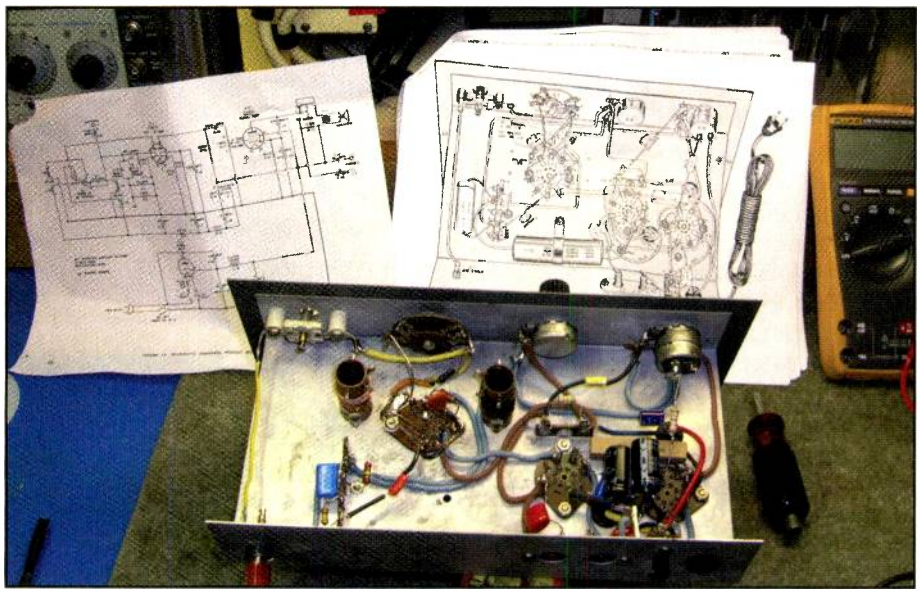

Photo H: Work progresses. New wafer tube sockets were installed and the wiring is nearing the first major *check point* in the manual.

Photo I: The restored chassis, ready for burn-in and testing.

A terminal strip was added to provide a tie point for the negative lead returns for these capacitors, since the individual leads were not long enough to reach the original tie points shown in the manual. This terminal strip is visible on the rear chassis apron wall in **Photo I.**

The kit used a ground lug under one of the mounting ears for the 12AT7 socket. This is a poor practice, since the metal-to-metal contact area is reduced, and it is likely that the mechanical connection will eventually develop a high resistance. I suggest soldering the lug to the chassis to ensure a good electrical connection.

Next: Capacitor Choices

Many of the capacitors were disc ceramic. These were generally considered to be reliable components. Unfortunately, I am finding more and more defective disc capacitors, so I've been adding them to my *must change* list.

As time passes, those parts we once thought would last indefinitely in reality aren't. Almost all of the capacitors used in this receiver, except for C5, the 100-pF grid leak capacitor, and C4, the .02-mFd line bypass capacitor, may be replaced with modern Mylar capacitors, new disc ceramics or dipped silver micas. C5 will need to be either disc ceramic or silver mica due to its small pF value.

The AC line-bypass capacitor will be discussed in the next section. The capacitance value and its application will often dictate the most practical choice for a replacement capacitor. For example, you wouldn't want to use an expensive dipped silver mica capacitor for RF bypassing or audio coupling. It would be a waste, and the large values are extremely expensive.

SAFETY CONCERNS: Potentially Deadly AC Line Voltages

The Space Spanner is an AC/DC radio, and thus there is always the risk of contact with deadly AC line voltages.

The radio uses a metal chassis, but it is isolated from either side of the AC line. The common return ground bus is not directly connected to the chassis, but for RF bypass purposes it is bypassed to the chassis using capacitor C4, a .02-mFd ceramic disc.

This part should be replaced with a UL-approved, AC line-bypass rated capacitor of no more than .015-mFd value. This limits the AC leakage current to up-to-date, UL approved levels for U.S. line voltages. Note this capacitor is not

Photo J: The Space Spanner is back in the cabinet, ready to be shipped back to Todd.

shown on the schematic. Also, I strongly suggest replacing the original AC line cord with one with a polarized plug. The neutral side of the line cord should be routed directly to the common return bus (where the negative leads for the three electrolytic capacitors connect.)

The AC *hot* side of the cord should be wired so it connects to the AC power switch on the volume control, and the other side of the switch should be moved to junction of pin 5 of the 35W4 and pin 4 of the 50C5.

Figure 3 shows these changes. This revision has the switch controlling the *hot* side of the line instead of the neutral. The polarized plug assures that the *hot* is the switched side.

There is always the chance of finding miswired AC outlets — *nothing is foolproof.* Take great care when wiring the filaments and the switch contacts to ensure that the common bus connections are not inadvertently shorting to the chassis.

The Legacy Continues . . .

Photo I shows the restored Space Spanner chassis. It looks far better than when we started, but in retrospect I might have done a few things differently. Wire dress and some other aspects could have been done a bit neater. The first time is always a learning experience.

Photo J shows the Space Spanner back in the cabinet and ready to go back to Todd for many more years of faithful service.

Todd's parting comments: *I'm building solar electricity, solar hot water and solar hot air systems onto my remote, off grid mountain cabin. These skills all started with this radio, which will now have its little shrine on my shelves — in working condition.*

The Next Generation

By 1970 the little budget-minded Space Spanner had evolved into a newer four-band Spanmaster II receiver kit with coverage to 30MHz, selling for $29.95 in kit form, cabinet included, for the next generation of aspiring hams and SWLs.

That will wrap up this column, and until next time, keep those soldering irons hot and those old tubes glowing!

References

Heathkit parts and original manuals:

Data Professionals
1807 Santa Rita Road
Suite D PMB 277
Pleasanton, CA 94566
(925) 548-6404
Web: < http://www.d8apro.com/ >
Email: < Sales@D8aPro.com >

Manuals for all manufacturers:

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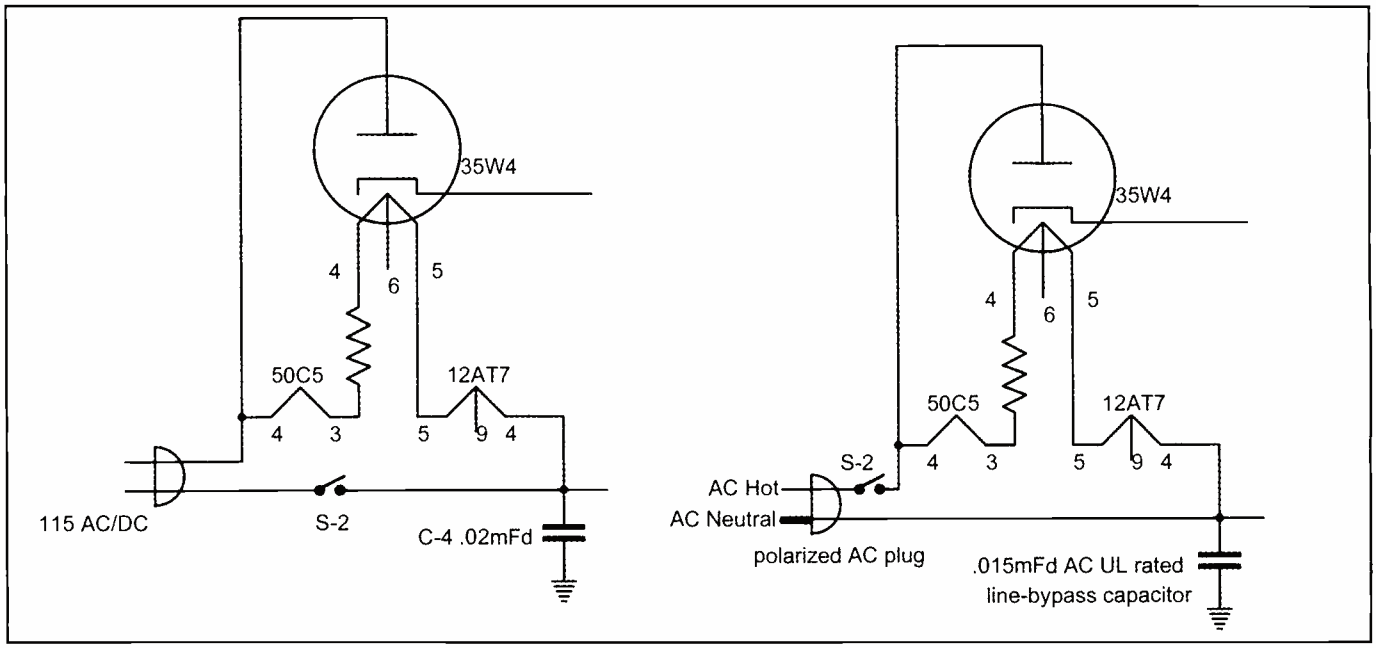

Figure 3: Here are the AC wiring changes.