

VINTAGE RADIO

The Sky Buddy Saga



By Marc Ellis

Preface

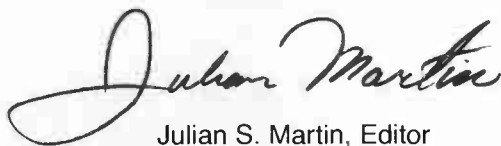
What makes vintage radio so interesting to so many is that we recall our youthful days. Admittedly, many of you fail to recall the first transistor radio; receivers of that type and era are vintage, if not antique, to you. But we will all agree that at one time or another we saw and heard a vacuum-tube radio play.

The author, Marc Ellis, reaches way back to the 1930's to discuss how he restored the Hallicrafters Sky Buddy communications receiver. It's an interesting tale because it involves digging into the past, getting dirt under your fingernails and accepting a dose of vacuum-tube theory.

Furthermore, the steps the author took to restore the Sky Buddy will parallel those steps you will take should you pick up a golden-oldie receiver at a flea market and wish to recondition it to pristine appearance and make it fully operational.

But then, the author spins an interesting yarn of the times when radio was king. I found it interesting. I hope you do, too!

Credit must be given to **Popular Electronics** magazine and Marc Ellis' "Antique Radio" column contained therein. Several of those columns were recently devoted to restoring the Sky Buddy and they follow as a combined story.



Julian S. Martin, Editor

VINTAGE RADIO

The Sky Buddy Saga

By Marc Ellis

Here is a typical restoration project that you will enjoy reading about.

We're going to be working on an inexpensive Hallicrafters shortwave receiver of the late 1930's—the *Sky Buddy*. It was the kind of set that a radio-minded teenager of the era could reasonably expect to buy with the profits from a part-time job.

The *Sky Buddy*, like its well-known postwar descendent the S-38, was nothing but a consumer broadcast radio fitted up with extra coils for the shortwave bands and a few additional controls. But even though the radio was a bottom-of-the-line model, the Hallicrafters designers succeeded in achieving a high-powered and businesslike appearance.

The engaging little receiver was the starter set for a whole generation of ham operators and shortwave listeners. Later, those with the means and interest might upgrade to more advanced models like the *Sky*

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SUPER SKYRIDER
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This is a precision-engineered Hallicrafters Receiver for every amateur or short wave listener, whether he's just a beginner on the air or an "Old Timer" who is playing with 5 meters, and whatever the state of his purse!

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AMERICA'S LEADING MANUFACTURER OF COMMUNICATIONS RECEIVERS

This October 1937 Hallicrafters advertisement in QST Magazine shows the original Sky Buddy (lower right) and other members of its product line.

Champion and Skyrider.
The radios in this series have become strongly tinged with 1930's nostalgia, not only for those who used them at the time but also for hobbyists of succeeding generations.

THE ORIGINAL SKY BUDDY

Thanks to Max De Henseler's book, *The Hallicrafter's Story*, pub-

lished by Antique Radio Club of America, we have a definitive picture of the Sky Buddy's evolution. A set bearing that name (and also the model designation 5T) first appeared in 1936, not quite three years after the founding of the Hallicrafters firm. It used the old tall glass ("G"-type) tubes in a four-tubes-plus-rectifier configuration typical of inexpensive

superheterodyne broadcast receivers of the period.

The radio covered the frequency range 545 kHz through 16 MHz in three bands, which was similar to the coverage offered by the better consumer "all-wave" receivers of the time. The tuning dial, with its clock-style design and concentric scales was also reminiscent of consumer all-wave designs. However, De Henseler tells us that the dial had a 36-to-1 tuning ratio in order to provide bandspread action. And pictures of the set seem to indicate that there was an extra "second-hand" type of pointer that probably worked with a separate bandspread scale.

But the resemblance to consumer radios ended right there. The no-nonsense, black-crackle-finished metal cabinet, plain round speaker grill, phone jack, and toggle switch controls made it clear that this was a radio for the serious hobbyist. The cost: \$29.50 in 1936 dollars.

Interesting as the original Sky Buddy is from an historical point of view, it doesn't seem to have had a great deal of impact on the ham/SWL community. Few examples of it survive today, and it's definitely not the radio people associate with the Sky Buddy name. That set appeared a couple of years later, in 1938.

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A PRACTICAL, QUALITY BUILT COMMUNICATIONS RECEIVER AT A NEW LOW PRICE

Only an organization with the facilities, experience and resources of the Hallicrafters could build a practical communications receiver to sell at this low price.

The 1935 SKY BUDDY is an amateur's receiver in every respect, covering everything on the air from 18.5 MC to 545 KC, including the 20, 40, 80 and 160 meter amateur bands, with a degree of sensitivity and selectivity usually found only on communications receivers, selling at many times its modest price. It's an A.C. set, of conventional Power Transformer construction. All the components of the SKY BUDDY are one of the finest, and it has all the basic controls required for amateur communications, including built-in speaker—there is nothing else to buy! The separate Band Spread is better than the A.R.R.L. Handbook recommendations for band spread against scale calibration on all the amateur bands.

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6.5 Tubes @ Complete Coverage
18.5 MC to 545 KC @ built-in
Speaker @ Phone Jack @ Band-
spread Switch @ A.C. Switch @ 4
Bands @ Separate Band Spread Dial
@ Best Frequency Oscillator @ Push
controls @ Easily adapted for
factory operation.

AMATEUR'S NET PRICE

\$29.50

including speaker
and tubes

FOR DETAILS OF THE
SKY CHAMPION
SEE NEXT PAGE . . .

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"WORLD'S LARGEST BUILDERS OF AMATEUR COMMUNICATIONS RECEIVERS"

In May 1938, this ad appeared in QST to announce the S-19 Sky Buddy and its big brother, the S-20 Sky Champion.

THE S-19 OF 1938

The improved Sky Buddy of 1938 (model S-19) was really quite similar electrically and physically to its predecessor. The 545-kHz to 18.5-MHz (as opposed to the original's 16.0-MHz) tuning range was also divided into three bands. Circuitry was quite similar, employing the usual four-tubes-plus-rectifier design. But the tubes were now types using the newly-introduced octal base.

Both sets were housed in black-crackle-finished metal cabinets, but aesthetically they were quite different. The original model 5T set had a generic, upright, early-thirties appearance. Contributing to this image were such things as the sharp square edges of the cabinet, the toggle switches, and the all-in-a-row mounting of the controls. The radio looked like it could have been designed and built by a skilled amateur in his basement.

By contrast, the S-19 presented a modern, sleek, finished appearance. For one thing, the left and right edges of the front panel were gently rounded rather than sharp. (In fact, the cabinet front and sides were actually formed of one piece of metal, wrapped at the corners.) For another, the toggle-switches (except for the "send-receive" control)



A detail from an October 1939 QST ad shows features of the improved (S-19R) Sky Buddy.

were now gone, with all functions controlled by attractive round knobs formed of Bakelite.

But the biggest change in appearance stemmed from improvements in the radio's tuning system. The old clock-style pointer dial was replaced by Hallicrafters' attractive "German silver" dial, which rotated under a fixed top-mounted cursor. This arrangement was previously found only in the more expensive sets in the line. Another feature taken from the more expensive sets was the bandspread indicator.

Mechanically, bandspread in the S-19 was accomplished just as it was in the old 5T—by gearing down the tuning rate so that the dial moved slowly with respect to the knob. However, now there was a separate bandspread dial that would allow the user to accurately track the smallest tuning adjustment.

The dial was mounted behind a large meter-style window—the same one used in the top-of-the-line *Super Skyrider*, where it balanced the signal-strength meter mounted on the other side of the panel. The much smaller, porthole-style, bandspread dial window from the intermediate sets in the 5T's product line could have been used, but wasn't.

The new bandspread window was positioned between, and slightly above, the speaker and tuning dial—which were moved farther apart to accommodate it. That made the front panel of the S-19 seem wider and more expansive than that of the 5T, even though the width of the two radios was almost identical. In addition, the tuning knob, formerly in the row of controls at the bottom of the front panel, was moved upward and centered under the bandspread window.

The new positioning of

the window and tuning knob did much to break up the compulsive, row-oriented organization of the original front panel, making for a much more pleasing appearance. And as a finishing touch, the speaker opening—formerly plain grillwork—was adorned with the now famous stylized “h” Hallicrafters logo.

Of course, all those design changes weren't made solely for the purpose of improving the Sky Buddy. They also applied to most of the other new radios introduced during 1938, including the S-19's big brother, the eight-tube S-20 Sky Champion.

It's an interesting commentary on both the ingenuity of the Hallicrafters designers and the flat economic times in which the radio was introduced that this much improved Sky Buddy sold for \$29.50, exactly the same price as the original model!

ENTER THE S-19R!

Though the S-19 received quite a bit of acceptance in the amateur and SWL community, selling about 10,000 units during its short lifetime of less than a year, it did have one important drawback. Its highest frequency range cut off at 18.5 MHz—too low to reach the amateur-radio 10-meter band, which was just becoming popular. Early in

1939, that was remedied with the release of a revised version, the S-19R.

The S-19R Sky Buddy had a fourth tuning range covering 16 to 44 MHz—which would handle the ten-meter band and then some. Another striking change was the substitution of an electrical bandspread system for the mechanical one employed in predecessor models. Now there were two tuning controls: the main tuning knob with an appropriate gear ratio for general-purpose work and the bandspread knob used to tune among closely spaced signals.

Perhaps as a result of the improved station separation possible with the electrical bandspread system, the new Sky Buddy's German silver tuning dial no longer carried frequency markings around its entire circumference. The frequency bands were compressed so that they fit onto the top half of the circle, making the markings easier to read.

Other changes included substitution of individual slide-type on-off switches for the single rotary switch previously used to control the beat-frequency oscillator (BFO) and automatic volume control (AVC) functions; redesign of the IF amplifier and BFO circuits around separate

tubes rather than a single dual-purpose type; and (at least in the late S-19R models) the addition of a rear-apron socket for operation of the radio on an external power source.

Somehow, Hallicrafters managed to hold firm on the price, and the further-improved Sky Buddy was still selling for \$29.50.

A FIRST LOOK AT OUR SKY BUDDY

The Sky Buddy that we'll be working with is a late model S-19R. I say late because it's equipped with the rear-apron power socket—a feature that does not appear in the original Rider Manual schematic of the set, but is seen in the later schematic (dated 1942) in the De Henseler book.

Our S-19R's tube complement includes an 80 rectifier, a 6K8 oscillator-mixer, a 6SK7 intermediate-frequency amplifier, a 6SQ7 detector and automatic volume-control amplifier, a 76 beat-frequency oscillator, and a 41 audio-output amplifier. The presence of the 6SK7 and 6SQ7 is another indication of a later model because the original schematic for the radio indicated older 6K7 and 6Q7 tubes.

The presence of the 76 and 42 tubes is a bit puzzling. These are older-generation, tail-glass, non-octal tubes. In fact, a 6K6,

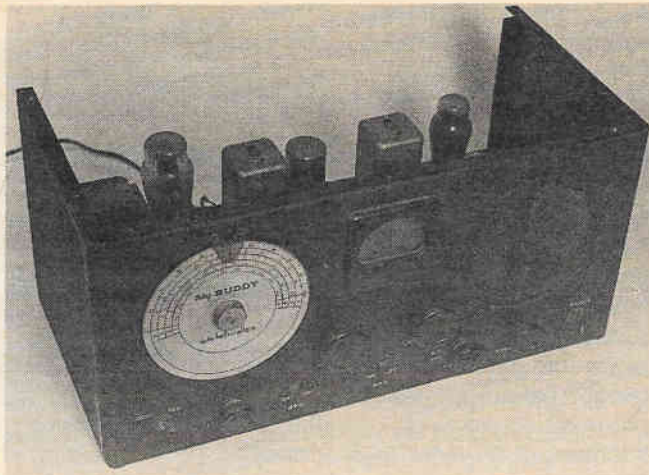
which is a more modern equivalent of the type 41, was used as the audio output in the previous version (S-19) of the Sky Buddy. I can only guess that the company got a good deal on those older types.

My preconception about this set is that it was the 1930's equivalent of the famous postwar S-38 series. And, at least as far as its basic circuitry and position in the product line are concerned, that's true. But once I got an actual Sky Buddy into my hands, I formed quite a different impression.

First of all, it's several inches wider than the S-38, affording a much more spacious and impressive panel layout. It's also quite a bit weightier because of its larger chassis and cabinet as well as its transformer-type power supply (the S-38 series have AC-DC supplies, and thus no transformer). All-in-all, the S-19R was quite a formidable radio.

CRACKING THE COVERS

One gains access to the S-19R Sky Buddy by unscrewing and removing the heavy-gauge metal covers forming the top and bottom of the cabinet. That exposes both sides of the chassis for inspection and repair. My first official act was to remove those covers so that I could make a



Front view of the model S-19R Sky Buddy with its covers removed for inspection and cleaning. The front panel has a very neat, attractive, and businesslike appearance.

complete visual assessment.

With the covers off, I could see that the set is evidently complete and in reasonable condition. Except for a missing tube (an easy-to-replace 6SK7), all of the parts seem to be present. I couldn't see (or smell) any burned components and none of the wiring appears to have been modified or tampered with.

About the worst thing I can say about the appearance of the radio is that it definitely has a tired look. The finish is dirty and scuffed; the chassis is covered with a sticky grime and—here and there—shows signs of corrosion; the bright metal parts, including the IF transformer cans and dial, have coatings of that varnish-like yellowish

deposit often found on old radios (maybe it's grease from cooking or tar from cigarette smoke). Finally, the presence of some neatly opened seed hulls suggests that a small rodent may once have made a comfortable home under the chassis.

The removal of the covers has also exposed an odd constructional quirk. The chassis can't be separated from the cabinet, but is permanently attached—apparently by spot welding.

TESTING FOR LIFE SIGNS

Though the Sky Buddy's zip-cord power lead was brittle and cracked, I decided that it was probably still safe enough to carry power for a few initial checks. Accordingly, I plugged it into

the isolation transformer/variable voltage source that I use for set testing.

The variable voltage feature allows me to apply power gradually. This is a must for restoring the electrolytic filter capacitors in the power supplies of long-unused sets. Such capacitors may well short out with sudden application of full power, but *gradual* application of power promotes an electrochemical rejuvenation or "forming" process.

Electrolytic capacitors are not permanent components; eventually the moist electrolyte inside dries out to the point where the unit will not function. After that, the only cure is replacement. However, if a long-unused electrolytic has any potential life left at all, an initial "forming" will probably keep it going.

For my initial "signs of life" test, however, I usually pull the rectifier tube so that the DC power supply is not functioning. Hence, there is no voltage on the electrolytic. With the Sky Buddy's type-80 rectifier removed and full line voltage applied, I snapped on the power switch and was gratified to see the set's pilot light come on, illuminating the bandsread dial. I could also see the filaments of the two glass tubes light up.

That meant the power

transformer's 6.3-volt filament winding was OK. I used my multimeter to check the other windings, and was happy to observe that five volts was present at the filament pins of the type 80's socket and that well over 700-volts AC could be measured across the plate pins. So the power transformer seems to be in good shape.

Now it was time to check the state of the electrolytic capacitor. I connected my multimeter to monitor the power supply's DC output, plugged in the type 80, and powered up the set with a line voltage of about 60. My eyes were glued to the meter, because if no DC voltage were to appear, or if it appeared and suddenly dropped to a low value, the electrolytic capacitor would probably be shorted.

At first I was worried because, even after several seconds of warm-up, no DC voltage appeared. But after quickly shutting off the set and thinking for a moment, I realized what was wrong. The S-19R's SEND-RECEIVE switch was in the SEND position, which cuts the DC power in order to silence the receiver during periods when the operator is transmitting.

With the switch reset to RECEIVE, I tried again. This time, I watched the DC voltage climb smoothly to 60 or 70 and hold there with

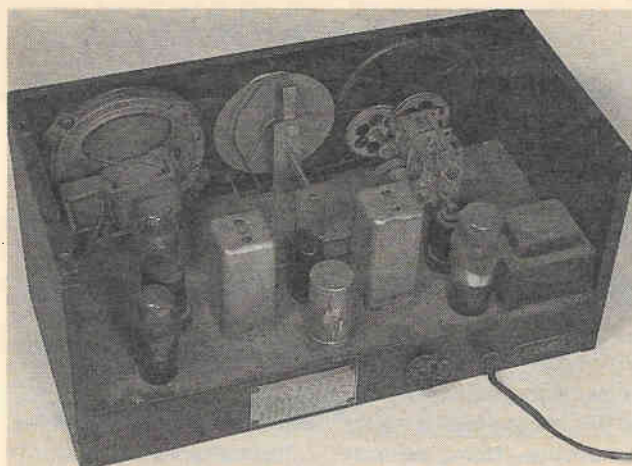
no sign of fluctuation. Now I knew I could expect the electrolytic capacitor to function normally.

SOUNDS FROM THE SPEAKER

Apparently the audio stages and loudspeaker were also working, because I could hear crashes in the speaker when rotating the set's very noisy volume control. Increasing the line voltage to about 90 caused a further increase in DC voltage, and now I was able to hear a rush of static in the speaker as the radio's RF circuits began to function.

The S-19R requires an external antenna, and I didn't have one connected. But since the DC voltage was still holding steady, I tried tuning for broadcast-band stations with my finger on the antenna terminal. I also turned on the BFO (beat-frequency oscillator) switch to help me detect any faint signals that might come in.

For those who may not know, the BFO generates a low-power radio signal that mixes with incoming signals to create a heterodyne, or whistle. That is normally used for reception of Morse-code (CW) signals, which are formed by interrupting a radio "carrier wave." The pure carrier wave does not carry any sound. So without the BFO, CW signals would be heard only as patterns



The rear view of the opened-up Sky Buddy shows the dirt and grime that has settled into this set. The chassis is not a separate unit, but a shelf-like assembly spot-welded to the cabinet front and sides.

of sporadic hisses.

As I tuned, I did hear some faint whistles, indicating that stations were being picked up. With the BFO turned off, however, the signals disappeared, being too faint to hear on their own. The set's DC voltage was still holding steady, so I decided to boost the line voltage to the full 120. Now one broadcast station was coming in fairly loudly:

What I heard, believe it or not, was our local nostalgia music station—which at the moment happened to be playing that moody '40's favorite *Tangerine*. The sound was distorted, and eventually faded to a very low level. But for a brief moment, I seemed to be living out that science-fiction writer's fantasy: picking up

antique-radio programs with an antique radio. It was a neat experience!

TAKING STOCK

So now we know that the power supply is in good shape and that the electrolytic probably won't have to be changed. We also know that the audio stages and speaker are functioning. The latter is quite a relief, because the S-19R has a dynamic speaker (one requiring a source of DC power in order to function). These are subject to burn out with failure of the electrolytic capacitor, and exact replacements are hard to come by.

The major components in the RF section of the set are probably OK, too, since we were able to hear some

kind of a signal. Finally, I did run all the tubes through a tube checker without uncovering any serious problems. The 80 rectifier did show somewhat low emission on both plates, but I doubt that the condition is serious enough to affect the radio's performance. Eventually, however, I'll probably substitute a better one.

The next step for the Sky Buddy will be a serious housekeeping and deep-cleaning job. It doesn't pay to troubleshoot a set as neglected as this one because dirty contacts at switch terminals, tube pins, and potentiometer wipers can cause mysterious symptoms that make the real problems hard to find. Once that's done, we can get serious about any major problems that may remain.

I plan to remove all the tubes, as well as certain other chassis-mounted components. Those include the speaker (which is a separate housekeeping project all by itself) and the sub-chassis holding the tuning capacitor and dial drives. The latter disassembly is necessary to replace the four hardened shock-mounting grommets intended to cushion the tuning assembly, as well as to restring the dial cords.

Since the main chassis can't be separated from the cabinet, removal of this

subchassis is about the only way to obtain access to pulleys and shafts for re-stringing. Though the dial cords are OK now, sad experience has taught me that these old cords will probably snap soon after the set is put back into service. Better to replace them while the set is already disassembled for cleaning rather than later, after the project is completed.

I've learned from experience that it doesn't pay to troubleshoot a long-neglected set like this one without first taking care of some basic housekeeping issues. It's not only unpleasant to work on such a radio without getting rid of the dust, rust, and grime, but any dirt and corrosion on the switch, tube, and volume-control contacts can

cause intermittent malfunctions that make it difficult to uncover the real problems.

Cleanup of the S-19R, which came into my possession laden with plenty of deep-seated crud, would be somewhat complicated by its unusual mechanical construction. Although the radio's removable top and bottom panels give good access to components above and below the chassis, the chassis itself is non-removable—being permanently attached to the wrap-around, one-piece, cabinet/front panel.

In order to facilitate cleaning above the chassis, I decided to remove two of the bulkier components: the loudspeaker, which was dirty enough to require a separate housekeeping project of its own, and a large subchassis containing

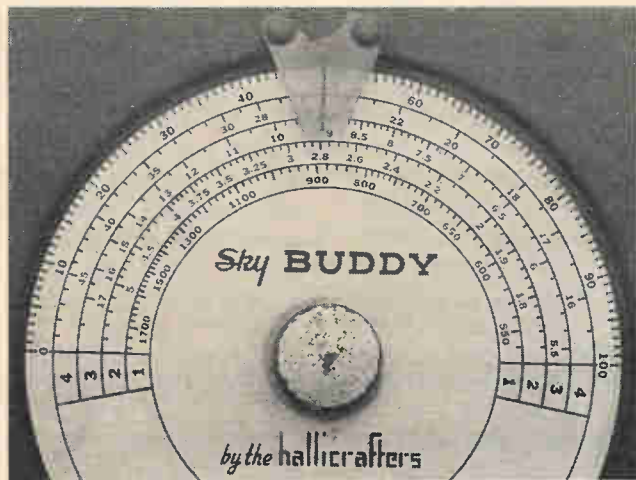
the tuning capacitor, with its main tuning- and bandspread-dial drive systems. Removal of the latter would require taking off the two tuning knobs and the main tuning dial. And while I was at it, I decided to remove all other control knobs, as well as the bandspread-dial bezel, to make cleaning the front panel as easy as possible.

TUNING DIAL REMOVAL

The celluloid dial cursor mounted over the top of the main tuning dial appeared to be a problem. A piece of it had already cracked off, and it looked as if the cursor might be further damaged by pulling the dial out from under.

The cursor assembly was held in place by a couple of small slotless screws tapped into the front panel. There was no way to remove them with a screwdriver, and I couldn't even imagine what kind of tool had been used to install them in the first place. But as luck would have it, there was no problem at all. The screws were easily turned by pressing and twisting with the thumb.

With the cursor removed, taking off the main tuning dial was a matter of releasing its set screw, and then twisting and pulling with one hand while preventing the tuning capacitor from turning with the other. The



This close-up of the Sky Buddy's "German Silver" dial shows a cracked dial cursor.



To facilitate the cleaning process, both the loudspeaker and the tuning capacitor/bandspread drive subchassis to the right of it would be removed.

control knobs were no problem either, although in some cases I had to twist the screwdriver with pliers to loosen frozen threads.

I was really puzzled by the area of the front panel that was revealed by removing the tuning dial. Originally, there had been a circular opening whose diameter was about an inch less than that of the dial. But this opening had been filled with a round metal plate (attached by spot-welding) with a hole at the center just a little bit larger than necessary to accommodate the dial drive shaft.

Why was the opening made so large in the first place? Maybe to give access to the dial-drive pulleys for facilitation of restringing—a job that is now virtually impossible without removing the tuning capacitor/bandspread dial

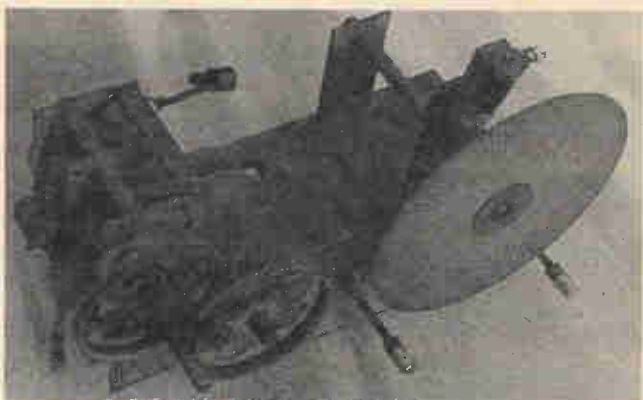
subchassis. Maybe the large hole was necessary so that the front-panel recess for the tuning dial could be formed without wrinkling the metal. Or maybe the hole was somehow necessary in the original S19 (which had an almost identical front panel but a different bandspread arrangement), but became obsolete when the set was

revised to become the S-19R.

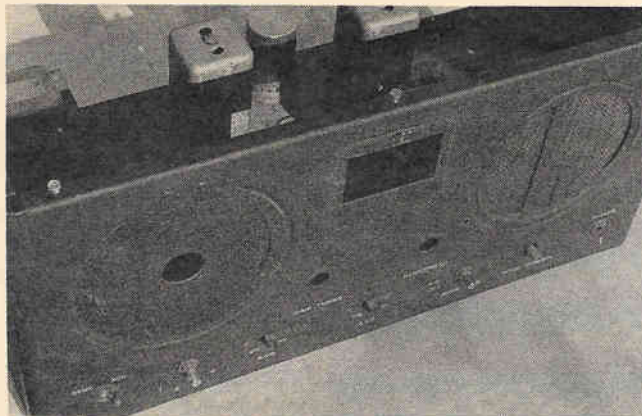
Even more curious, why was the hole, once made, so carefully filled—presumably at some expense? I can't even venture a guess about that. I doubt that it would have been necessary to keep dust out, since the round dial plate fits very nicely into its circular recess, making a reasonably effective seal even with a large central opening. And, in any case, there is no sign that the back of the S-19R's cabinet was ever closed in at all!

REMOVAL OF CHASSIS-MOUNTED COMPONENTS

The loudspeaker was very readily removed, requiring only desoldering of its six under-chassis connections and removal of the four screws holding it to the panel. The metal-mesh speaker grille had to re-



With the tuning capacitor/bandspread drive subchassis out of the set, it will now be possible to restring the dial cords.



The front panel of the S-19R as stripped for cleaning. Note the filler plate (see text) reducing the diameter of the round dial opening at left.

main because it was riveted in place.

In a letter quoted earlier, reader Paul Daulton mentioned that his grille originally had some type of now-disintegrated flocking, and he was wondering how to replace it. My grille doesn't even show the signs of previous flocking. Perhaps someone can tell us what it looked like and suggest how it can be restored.

Removal of the tuning capacitor/bandspread dial can best be described as an aggravating task. It's not for the fainthearted, being difficult to accomplish without damage to the set. To avoid giving up, I had to keep telling myself how necessary this step was to a good restoration.

First of all, access to the chassis for deep cleaning would be very much improved by its removal.

Second, I'd be able to replace the four rubber shock-mount gaskets, which were meant to insulate the subchassis from vibration and which were now petrified to a rock-like consistency. Finally, and perhaps most important, it would give me access to the drive-pulley system, making it possible for me to replace the bandspread and main tuning-dial cords. From sad experience, I've learned that these cords are very likely to break soon after a long-unused set is put back into service.

To get the subchassis out, the two tuning-capacitor stator connections had to be removed by desoldering them via access holes buried deep under the main chassis wiring. The wiring in that area is associated with the RF circuits and, as such, is very sensitive to changes

in position. Modification of lead dress could cause dead spots, oscillations, and/or "birdies" that might be very difficult to eliminate later.

I was able to remove the stator connections with only a little difficulty, but the real problem was the heavy copper braid grounding the tuning capacitor rotors to a solder lug mounted under the chassis. Since that lug is in physical contact with the chassis, which serves as a very large heat sink, and since the heavy braid and other connections made to the lug also tended to funnel heat away, it was almost impossible for me to melt the solder on that joint.

My 40-watt Radio Shack iron would hardly touch it. I even tried a 60-watt iron of traditional design without much better results. I eventually gave up and released the subchassis by snipping the braid; I'll worry about how to reattach it later.

CLEANING STRATEGIES

While our S-19R was not really in bad condition cosmetically, it had obviously spent some time stored in a less-than-ideal location. The top surface of the chassis, as well as all of the above-the-chassis parts, were coated with heavy grime combined with a touch of corrosion. The first area to

be cleaned was the chassis itself, which happens to be coated with black, semi-gloss paint.

I began by wiping down the chassis with a rag soaked in a mild solution of dishwasher detergent, using a small screwdriver to force the rag into difficult-to-reach corners. Following that were a couple of wipe-downs using rags dampened with plain water. This left the painted surface clean, but splotchy and dull looking. There were also a couple of small areas that were extra rough due to patches of corrosion under the paint.

Since I had some very fine (triple-zero) steel wool on hand, I decided to try that on the roughened areas. But as one might expect, the paint started to flake off rather than smooth out—exposing raw metal underneath. Accordingly, I decided to leave those areas alone—especially since they were in inconspicuous locations.

To get rid of the splotchy, dull-looking effect, I polished all of the painted surfaces with a cleaner/wax made for automotive use. That didn't exactly make the chassis look like new (which probably would be inappropriate, anyway), but the overall impression was now much more uniform and attractive.

The unpainted metal

components, such as the IF transformer cans and speaker housing, were a different problem. Those were coated with a yellowish deposit, slightly pitted in spots, that my detergent solution wouldn't budge. Even a rubbing with Brasso—normally very effective in restoring luster to grimy metal parts—didn't help a whole lot.

In an experimental mood, I dampened a piece of the triple-zero steel wool with Brasso and rubbed with that. It worked like a charm! With very little effort, I was able to remove the yellow deposit and buff the metal to a like-new appearance.

The IF transformer cans were a little easier to clean than the speaker housing, because the latter had many hard-to-reach nooks and crannies. Liberal use of Q-tips removed most of the loose dirt from the difficult spots around the housing. And I restricted the steel-wool-and-Brasso work to accessible areas that were in full view. While I can't say that the cleaned-up speaker looks absolutely perfect, the overall effect is quite convincing.

THE MAIN TUNING/ BANDSPREAD SUBCHASSIS

The subchassis holding the main-tuning/bandspread capacitor, the

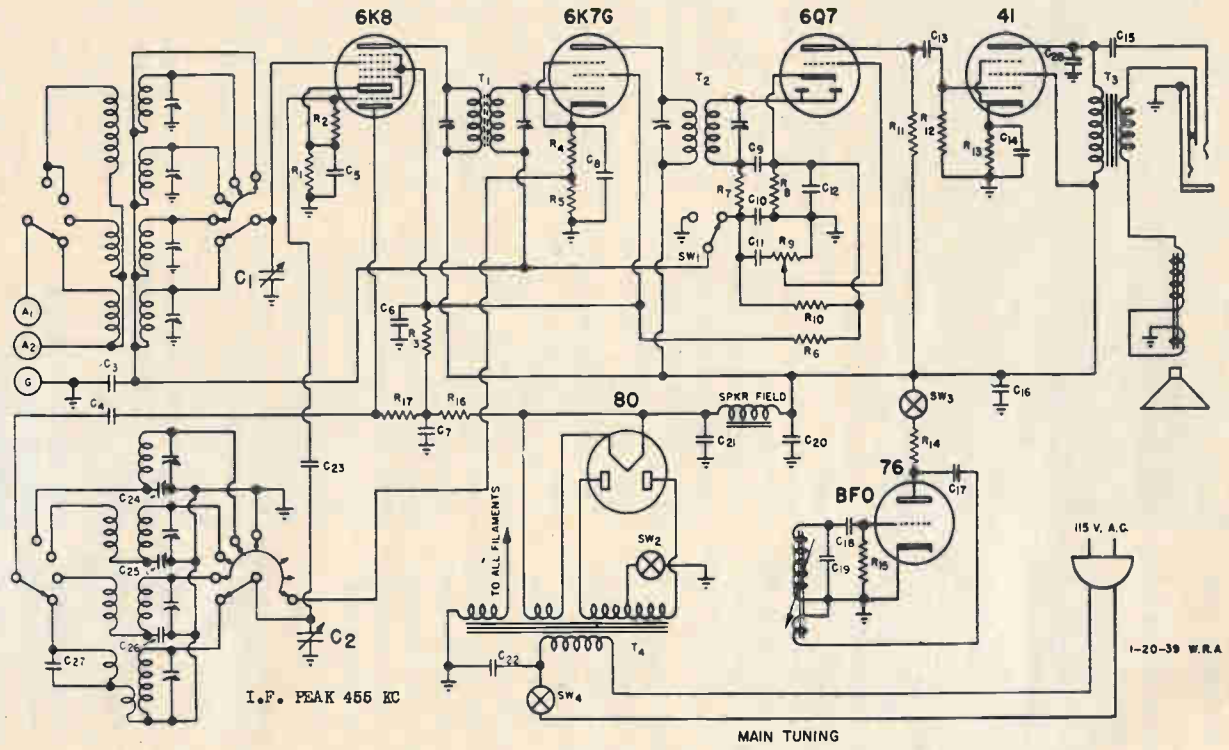
bandspread dial, and the main-tuning/bandspread dial drive systems was removed for reasons that went beyond ease of cleaning. For one thing, removal of this unit would make it possible to replace the shock-absorbing grommets (now quite hardened) on which it was mounted.

Removing the unit would also make it possible to replace the dial cord in both the main-tuning and bandspread drives. While both drives were functioning when the radio came into my hands, experience has shown that dial cords in long-unused sets frequently break soon after being placed into service again.

As it happens, the Rider Manual data for the S-19R does not include a dial-cord stringing guide. So before taking off the old cords, I was careful to make an accurate diagram of their configuration. And after using the diagram for restringing, I slipped it into a labeled envelope—which I inserted in Riders at the S-19R page for possible future use.

To complete the work on this subchassis, I removed the old shock-mounting grommets from the mounting holes in the main chassis, inserting a fresh set of grommets in their place. Finally, cleaning of the painted and unpainted parts on the subchassis pro-

Figure 1. The Sky Buddy schematic shows the set's simplicity of design.



ceeded as already described for the main chassis.

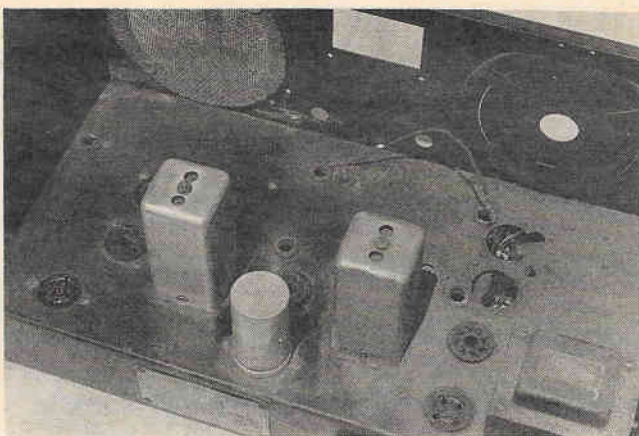
With the work on the sub-chassis completed, I turned my attention to the S-19R's rather tired-looking and grimy cabinet/front panel. A dishwasher-detergent-and-water sponge bath—followed up with a couple of plain-water rinses—did wonders for the appearance of the finish.

SKY BUDDY CIRCUITRY

The schematic shown in Fig. 1 is for a slightly earlier version of the S-19R than the one I have; it doesn't show the plug for external battery power that is one of the features of my unit. However, it should be otherwise almost identical.

The first thing you might notice on the schematic is that this radio has a transformer power supply (utilizing the ubiquitous type-80 rectifier tube). That's a nice touch for an inexpensive radio. During the late 1930's, when the S-19R was released, transformerless (AD-DC) designs were very common among low-end sets. Such sets presented a definite electric-shock hazard, had shorter tube life than transformer sets, and, because of their lower operating voltages, did not perform quite as well.

Moving to the front end



The partially cleaned main chassis. The area shown at the left has been washed and wiped; the area at the right is still "as found."

of the radio, you'll see that there are four sets each of switch-selected antenna and oscillator coils. These provide the set with its four bands (540 kHz to 1700 kHz, 1.7 MHz to 5.5 MHz, 5.5 MHz to 17.0 MHz, and 16.0 MHz to 46.0 MHz).

A type-6K8 tube functions as the oscillator-mixer. The signal from the antenna circuit enters it and is mixed with a signal generated by the oscillator section of the tube to create a third signal equal to the difference in frequency between the original two. This lower frequency signal, known as the *intermediate frequency* (IF) is amplified by the IF tube.

The schematic shows a type 6K7G as the IF tube and a 6Q7 at the detector-first audio amplifier position. The latter tube removes (or "detects") the audio from

the IF signal and provides some amplification.

In my slightly later model S-19R, these tubes were replaced, respectively, by types 6SK7 and 6SQ7. The latter are electronically identical to the former, but are unlike them in having no grid caps. Connections to *all* of the tube elements are brought out to pins in the base. (The "S" in the tube designations stands for "single ended.")

Between and below the 6Q7 detector-first audio amplifier and the type-41 power audio amplifier is the type-76 BFO (beat-frequency oscillator) tube. The BFO generates a radio signal that mixes with the signal at the IF amplifier to create an audio "beat note" equal in frequency to the difference between the BFO output and IF. The pitch of the beat note can be changed by

varying the frequency of the BFO, which is accomplished by adjusting the variable inductor shown in the grid circuit of the type-76 tube.

The type-41 power amplifier feeds either the speaker or a set of headphones plugged into the jack shown to the right of audio transformer T3.

Note also that the speaker is a *dynamic* type, which means that the magnetic field required for its operation is supplied by an electromagnet. This electromagnet, also known as the speaker field, can be seen associated with the type-80 tube—where it receives its energizing voltage while serving as the choke coil in the power-supply filter circuit.

THE DIAL CORD HASSLE

Last month's column chronicled the disassembly, cleaning, reassembly, and reinstallation of the subchassis containing the main tuning/bandspread capacitor and associated drive pulleys. In the process, both the main tuning and bandspread control drives were restrung with new cord. And that cord had better last quite a long time! There's no way to restring those controls without disconnecting the subchassis (an arduous job indeed) and removing it from the main chassis.

The removal (not to mention the subsequent reinstallation) was almost as difficult as the disconnection. The subchassis is virtually locked in place by the radio's front panel, which must have been installed after the subchassis was. And the front panel is not now removable because it was fastened to the main chassis by some type of a spot-welding process.

THE LOUDSPEAKER HASSLE

With the tuning sub-assembly back in place, the only major component still to be installed was the loudspeaker. That took a little longer than necessary because of uncertainties about the lead connections. And while I can probably blame the Hallicrafters design engineers for the previously described hassle, I can blame only myself for the difficulty I had with the speaker. The moral: Take the time to make good clear notes when disconnecting wiring.

The speaker in the S-19R has six leads: two to the field coil (which also serves as the power-supply filter choke), two to the primary of the output transformer (which is mounted on the speaker frame), and two from the voice-coil circuit to the closed-circuit headphone jack (which mutes the speaker when phones

are plugged in).

In a hurry to get on with the restoration work, I had made only a few rough sketches to indicate where those leads were connected. When reinstallation time rolled around, I found that I hadn't adequately differentiated between a pair of terminal lugs where a couple of the wires were to be connected. (I'd carefully marked one "top" and one "bottom," but now I wasn't sure whether "top" referred to the terminal that would be uppermost with the set in operating position or to the terminal that was uppermost with the chassis upside down for servicing.)

"Big deal," you may think. "Ellis has a schematic of the set. What's so hard about finding the connection points for six speaker leads?" In actuality, however, that was more of a problem than it seemed. Set designers of the era were not as concerned about keeping interconnecting leads short as they were about cabling them neatly together. So I found myself attempting to trace circuit pathways from one side of the chassis to the other via wires obscurely bundled up in harnesses.

The confusion I created for myself extended what should have been a 10-minute job into one that lasted for more than an hour. So don't make the

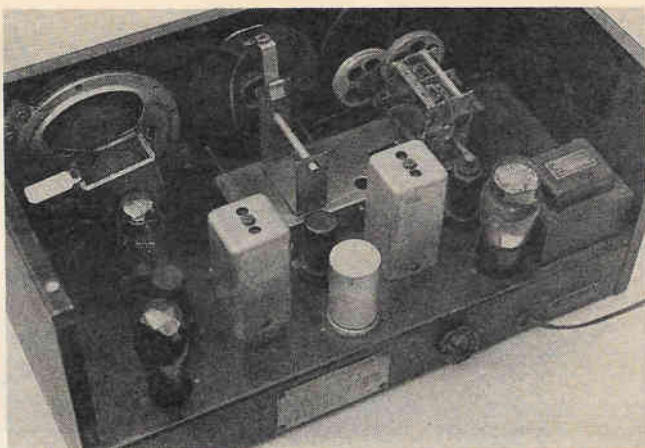
mistake I did! Take the time to sketch accurate diagrams showing the locations of all the connections that you remove.

FINAL ASSEMBLY AND TEST

After cleaning and re-installing the knobs, tuning dial, and dial pointer, all I had left to do before the S-19R could be tried out was to add a line cord. The old one, dangerously cracked and deteriorated, had been removed early in the restoration project.

I wish I could tell you that I'd been able to dig up a perfect period replacement for the cord, but I'm not even sure what the original looked like. The clumsy solder joints and shreds of previous wiring at the set's cord connections indicated that the deteriorated cord had itself been a replacement. So I satisfied myself by installing a length of modern black zip-cord having an innocuous molded plug.

When I first turned the set on, not a sound came forth. My heart sank because the set had played a bit when I tried it out prior to disassembly. I figured that I must have messed up the speaker wiring after all, perhaps burning out the unit in the process. Then I realized that the problem could just as well be dirty contacts on the phone jack's speaker-



The newly reassembled Sky Buddy as seen from the rear. The tuning control subchassis (behind the IF cans) was a bear to get back in!

muting switch.

That hunch was correct, since shorting out the switch with a clip lead immediately brought the Sky Buddy back to life. I could hear activity on all bands and, since I was hooked up to a good antenna, I even pulled in several foreign shortwave stations.

Performance was lackluster, however, particularly on the broadcast band—where I definitely was not receiving the full complement of local stations. The tuning in that band also seemed a little broad, and signals were weak. A bad IF stage maybe? Only further testing will tell!

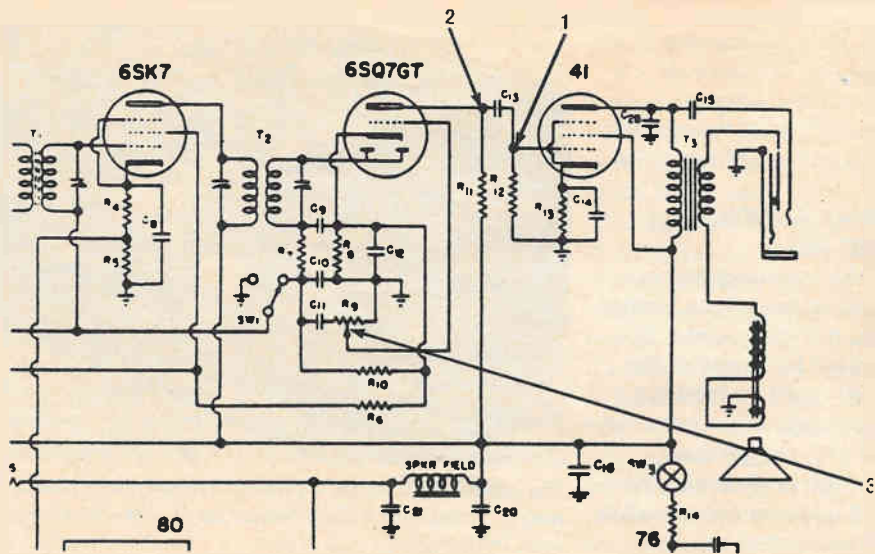
HANDSOME BUT INSENSITIVE

Now that the Sky Buddy's cleanup and physical restoration are complete, it is

an impressive receiver. With its black-crackle finish and white silk-screened lettering free of grime, and its German-silver dial and Bakelite knobs shining, the set is ready to grace a display shelf. The Sky Buddy's performance, however, was still a problem.

The audio was quite weak—scarcely above a murmur—and would occasionally fade out entirely. Although the level could be adjusted with the volume control, audio could still be heard with the control in its full counterclockwise position.

Broadcast-band reception was a disaster. Even when connected to a good antenna, the set would pick up only a few local stations. Reception on the short-wave bands was difficult to judge because of the va-



This schematic shows the Sky Buddy's audio circuitry. The connections labeled "1," "2," and "3" are those that were checked by the "finger probe" method (see text).

garies of propagation, but (apart from the volume problem) seemed fairly normal. Band 3, especially, (5.5–17 MHz) seemed alive with signals.

The few tests performed to date had turned up no clues. All tubes had checked good, and voltages measured at the tube sockets seemed in line with the operating parameters given in the RCA tube manual.

LOCALIZING THE TROUBLE

I decided to start with the audio problem. Since I had spares for the 6SQ7 (detector-first audio) and 41 (audio-output) tubes, I began by substituting them for the ones in the radio. Tube checkers have been known

to be wrong, or to miss an intermittent condition. No such luck, though. The audio remained as weak as ever.

Still looking for an easy way out, I decided to try some tests using the time-honored index-finger method. Placing that digit on the grid terminal of the type-41 audio-output tube, I was able to induce what seemed to be a normal hum level in the speaker. For the time being, then, I was prepared to assume that the audio-output stage was okay.

Moving my finger to the other side of the grid-coupling capacitor (see schematic), I heard about the same amount of hum. Since that capacitor was capable of passing audio, I

could probably assume that it wasn't open-circuited.

By the way, don't try this method of diagnosis at home unless you're quite aware of the safety hazards involved. When doing index finger tests, always keep your other hand in your pocket (or at least well away from the radio). Also make sure that the finger used as a probe touches *only* the connection in question and that no other part of your "test hand" comes in contact with any part of the radio.

Dangerous, even lethal, high voltages are present in all tube sets. For instance, when I moved my finger to the other side of the grid-coupling capacitor, it was in contact with the 6SQ7's

plate-voltage supply. If any other part of me had touched the Sky Buddy's chassis at that time, I definitely would have received a nasty jolt.

Actually, if the coupling capacitor had been leaky (a definite possibility), I might have been in contact with the 6SQ7's plate voltage even on the *grid* side of the capacitor. Moral: When a radio's in need of repair, dangerous voltages can appear in very unlikely places!

Just one more point before I finish my safety speech. Don't touch *any* metal part on an AC-DC (transformerless) set while it is plugged in. Many of those have the chassis directly connected to the AC line, which is a dangerous situation indeed. Hands-on contact is okay *only* if you are powering the set through an isolation transformer—which is a must when working with those radios.

Getting back to the troubleshooting, I next moved my "test probe" back one stage, to the center connection of the volume control, which is wired (see schematic) to the grid of the 6SQ7's triode section (otherwise known as the first audio amplifier). Because it should now be undergoing amplification by an additional tube, the hum being picked up from my finger

should now have sounded much louder in the speaker. However, just the opposite turned out to be the case. The hum was actually a little weaker! I had now located the trouble somewhere in the first audio stage.

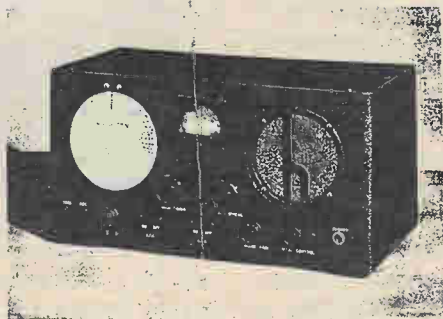
WE HAVE AUDIO!

Continuing to move backward though the Sky Buddy's stages in methodical fashion, I decided to

isolate the first audio amplifier from the detector stage preceding it. Both of these stages utilize the 6SQ7 tube—but they could be separated by disconnecting the grid of the triode (or amplifier) section of the tube from the diode (or detector) section. That was handled simply by removing the wire connected to the center contact of the volume control.

Touching the free end of

OPERATING ALIGNMENT & SERVICING INSTRUCTIONS FOR SKY BUDDY RECEIVER MODEL S-19R



the hallicrafters inc.
2611 INDIANA AVENUE
CHICAGO

The front cover of the Sky Buddy's instruction booklet. Quaint, isn't it?

that wire (the other end being still connected to the grid) resulted in a loud, hum! So, with its grid removed from the network of components associated with the volume control, the first audio stage was now operating as it should. Something in the network was causing the trouble.

I started my investigation with the detector-to-first-audio coupling capacitor, a 0.01- μ F unit connected to one end of the volume control. Disconnecting one of its leads so that I could check continuity independently of the rest of the circuit, I put an ohmmeter across the capacitor. Sure enough, it was leaky—showing a resistance of less than a thousand ohms. A capacitor of this kind should read as virtually an open circuit; its resistance should be somewhere in the 10-megohm range.

Replacing the coupling capacitor with a good unit solved the audio problem. Signals now come it at normal volume, except on the broadcast band—where reception continues weak to nonexistent. That is a separate problem, probably in the RF circuitry at the front end of the receiver. We'll look into it on another occasion.

I've already made one front-end check, however. As I was putting away my tools after the audio-fixing

session, I was struck with the horrible thought that the broadcast-band antenna coil might have burned out.

That could easily have happened if the radio had been left connected to the antenna, with the band-switch set to the broadcast position, during a thunderstorm. A static discharge from a nearby lightning strike could then have wasted the broadcast antenna coil.

I quickly connected an ohmmeter across the Sky Buddy's antenna terminals with the bandswitch set to band 1 (broadcast). And I was relieved to see that the coil was not open, but showing a resistance of about 30 ohms. That is about 10 times the resistance of the shortwave coils for bands 3 and 4,

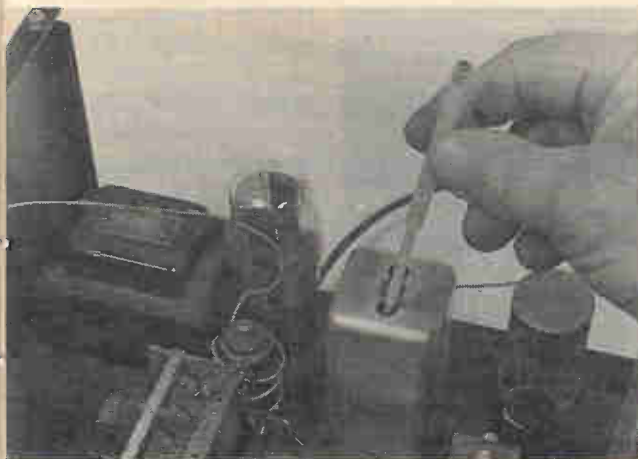
which check out at just a few ohms. Though the broadcast coil's resistance seems a bit excessive, a higher reading is to be expected because the broadcast coil would have many more turns than the shortwave coils. Band 2 doesn't have a separate antenna coil, but uses the band 1 coil.

ALIGNMENT WITH THE LM21

With the antenna-coil primary given a clean bill of health, the next sensible move seemed to be to check the Sky Buddy's alignment. Such a move is always appropriate when servicing a receiver of this age since tube replacement over the years, deterioration of insulating and dielectric materials,



Here's the LM21 at work providing alignment signals for the Sky Buddy repair project. The power supply is at left; the calibration book is partially under the headphones (which are used to zero-beat the frequency-meter output with the signal from the internal reference crystal).



Here's one of the IF transformers in the process of being tweaked for maximum gain. Note the wire signal-injection loop wrapped around the 6K8 oscillator tube (see text).

and the absorption or loss of moisture content can all affect the resonant frequencies of the various tuned circuits.

In addition, the various screw-adjusted trimmer and padder capacitors used to tweak the tuned circuits are favorite targets for amateur "repair experts," whose uninformed twiddling can easily cause disastrous results.

My favorite signal source for the alignment of simple AM receivers is a World War II-vintage Navy surplus LM21 frequency meter. I have to admit that this is an ungainly looking unit, lacking the trim packaging of the better-known Army Signal Corps version, the BC221. The latter unit is housed in a trim wooden case, complete with a protected lectern-

style housing for the unit's all-important calibration book and a handy compartment that can be used to hold an AC power supply.

However, LM21 units come with switch-selectable 400-Hz tone modulation. This is a feature that is quite important if one is to monitor the strength of the frequency meter's signal in the radio under repair by the usual method of connecting an AC voltmeter to the audio-output stage.

Few BC221's have either tone modulation or an AC power supply built to government standards. Apparently, in government service, that handy compartment was generally used for battery storage—AC power being a lot more common on shipboard

than under army field-communications conditions.

Admittedly, the Navy power supply for the LM21 is a true boat anchor. It's housed in a case the same size as that of the LM21 itself, and is connected to the LM21 and the power line by a clumsy system of cables and plugs. Yet its battleship-like construction and custom-engineered design are comforting to have when operating an extremely sensitive and accurate instrument such as this frequency meter.

The LM21 (there are also earlier and similar models with lower "LM" numbers) and BC221 generate a signal whose frequency is within a percent or two of that indicated by the setting of the smooth-operating vernier dial. The official usable frequency range is 125–20,000 kHz, though higher frequencies can be attained through the use of harmonics. Accuracy is maintained through comparison with calibration signals generated by an internal 1000-Hz crystal.

The frequency-meter signal can be picked up by a receiver under repair and used for testing and calibration. But the LM21 or BC221 can also be used in a manner somewhat similar to that of a modern frequency counter. A signal from a transmitter or os-



The light-colored alignment tool points to the horizontal row of oscillator trimmers for bands 1-3. The vertical row of RF trimmers for the same bands can be seen to the right of photo. The remaining, separately mounted, trimmers are oscillator and RF adjustments for band 4.

cillator under test can be received at the meter's antenna terminal and its frequency measured (by comparison with the meter's own signal).

I hadn't intended to digress so far on the subject of the LM21. But the fact is that the instrument is a very valuable tool for the antique-radio restorer.

These instruments still turn up in surplus catalogs, and are very commonly found at hamfests and other electronic flea markets. You'll usually find them at very reasonable prices because they are so under-appreciated and (I have to admit it) ugly. When considering the purchase of an "LM" frequency meter, check to see that the calibration book is present and that its serial number matches that

on the frequency meter itself. The books are not interchangeable.

The government power supply, with the necessary interconnecting plugs and cables, should also be part of the deal. A manual would help, too. And after you get your meter home, take it apart and see if the reference crystal inside (this is a replaceable plug-in unit) is in a seamless, hermetically-sealed case.

The accuracy of non-hermetically-sealed units can't be trusted. If you're in doubt about yours, use it to set up your meter on one of the WWV frequencies or on the known frequency of a local radio station. Pick up the frequency meter signal on a receiver tuned to one of those stations and check for zero beat. If you hear any

kind of a whistle, even a slow "growling" noise, your crystal may be off.

One good mail-order source to check for crystals, manuals, interconnecting plugs, and even the frequency meters and power-supplies themselves is Fair Radio Sales, 1016 E. Eureka St., Lima, Ohio 45802.

RESULTS OF THE ALIGNMENT

I started the alignment, as is standard procedure, with the IF channel. The LM21 was set to the manufacturer's specified IF frequency of 455 kHz, and its output coupled into the Sky Buddy by wrapping the wire from the meter's antenna terminal a couple of times around the body of the 6K8 oscillator-mixer tube (grid cap removed). I was readily able to hear the LM21's signal in the Sky Buddy's speaker and to observe a reading on the audio voltmeter I had connected across the speaker's voice-coil leads.

Using the "Increase Output" control on the LM21, I kept the signal strength low enough to just barely attain a usable reading with the receiver's volume control advanced about one-third. Although the Hallicrafter's service notes advised leaving the Automatic Volume Control on, I felt more comfortable with it off. That way, I could be sure that any

observed changes in receiver output would be caused by my adjustments, and not the action of the AVC.

As I adjusted each of the four IF trimmer screws, the output began to increase considerably, and as it did, I kept reducing the output of the signal generator to a minimal amount in order to reduce the possibility of false readings due to overloading. And I adjusted all the IF trimmers several times, as is standard practice, because the adjustments are interdependent.

When I had finished, I was satisfied that I had squeezed a lot more gain out of the IF channel. And I felt that its somewhat misadjusted condition had probably been caused solely by aging effects and not tampering.

After completing the IF alignment, I went on to work on the receiver's RF adjustments. That involved setting the LM21 to a manufacturer-specified frequency at the high end of each band, picking up the signal on the receiver by coupling it to the antenna terminal (via a 400-ohm resistor as suggested by the Hallicrafters service notes), and setting a specific oscillator trimmer to make the receiver's dial setting correspond to the test frequency. After each oscillator adjust-

ment, the matching mixer trimmer is adjusted for maximum indication on the audio-output meter (as before, the signal is kept as weak as possible during this process to avoid overloading).

After setting the high end of each band, the LM21 is set to a frequency (specified by the manufacturer) much lower in the band, and the dial setting checked. On bands 1 and 2, a screw-adjusted padder capacitor is provided to adjust the dial setting to conform to this lower frequency, if necessary (after which, the oscillator and mixer trimmers may need readjusting because of interlocking effects). On the higher bands (3 and 4), no padders are provided, but these are supposed to be unnecessary.

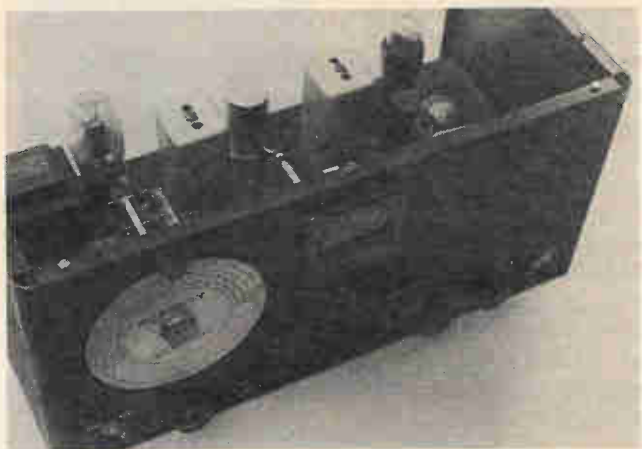
The RF alignment of this

receiver was an extremely frustrating experience. Once again, I saw no sign of misadjustment due to tampering, but I found it impossible to arrive at a perfect setting for each band within the adjustment range of the trimmers and padders provided. I found myself screwing some of the capacitors all the way closed and opening others to the maximum to get settings that—while close to acceptable—are definitely a compromise.

To top it off, no amount of tweaking helped the broadcast-band problem. The LM21 signal simply came in over a broad area of the dial, and was not tunable by the trimmers or padder.

A SURPRISING PROBLEM

By now every possible



The front view of the Sky Buddy—all together again and with a problem on the broadcast band.

cause of the problem had been investigated—except for the broadcast-band antenna and oscillator coils. Perhaps there was an open winding somewhere.

Actually, I had already checked out the antenna-coil primary because it was a prime suspect. Connected between antenna and ground when its band is selected, this coil can easily be burned out by static charges induced during a thunderstorm if proper precautions are not taken.

Having previously checked out the primary of this coil, I decided to go ahead and test the secondary. Bingo! It was wide open, showing no continuity on my ohmmeter.

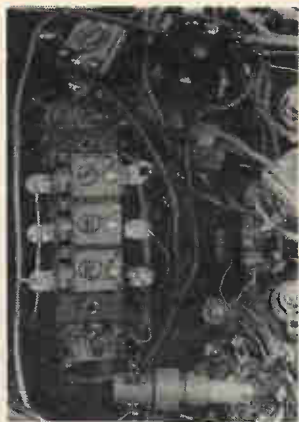
I had found the problem, but I couldn't explain it. Sometimes a radio will lose an IF or RF coil because a shorted capacitor has sent a jolt of high voltage through it. However, there was no such opportunity for high voltage to enter the circuitry associated with this coil. Refer to Fig. 2.

An interelectrode short in the 6K8 oscillator/mixer tube might have caused damaging high voltage to appear across the antenna-coil secondary, and I suppose that's a possibility. However, if that had happened, I'd guess that the secondaries of the antenna coils for some or all of the

other bands also would have been burned out.

The reason: It would have been natural for the owner of the defective set to check other bands to see if they were also dead—burning out each coil, in turn, as it was selected. In any case, for what it's worth, the 6K8 tube that came with the radio tests okay on the tube checker and shows no interelement shorts.

As already mentioned, an antenna-coil *primary* is susceptible to being burned out during thunderstorms. It's possible that a damaging voltage could be induced in the secondary if the primary became charged. But if that were



The original antenna-coil assembly is the vertically-oriented cylinder surmounted by three trimmer capacitors. The new coil is attached to bottom of the original and is at right angles to it. Note the primary and secondary windings.

the case, one would think that the primary would be burned out as well.

The only other possibility I can think of is mechanical damage.

A "BAND-AID" FIX

I'd uncovered a surprising problem, all right, and for a while it seemed as if it might be a problem without a solution. The damaged coil was part of a specialized assembly containing the antenna coils for three of the Sky Buddy's four bands. They don't carry parts like that at Radio Shack.

It's just possible that the broken wire in the open secondary is not buried in the coil, but out in the clear where it could be accessed for repair. But here's the rub: In order to see if that's the case, the assembly would have to be removed from the radio—definitely a tedious and risky operation. Tedious because about a dozen wire connections would have to be carefully desoldered so that wires could be labeled and removed. Risky because disturbing those connections might break one or more of the very fine, fragile coil leads—disabling still other bands.

As I weighed my alternatives, I was of two minds. On the one hand, many readers undoubtedly expect me to go to the ends

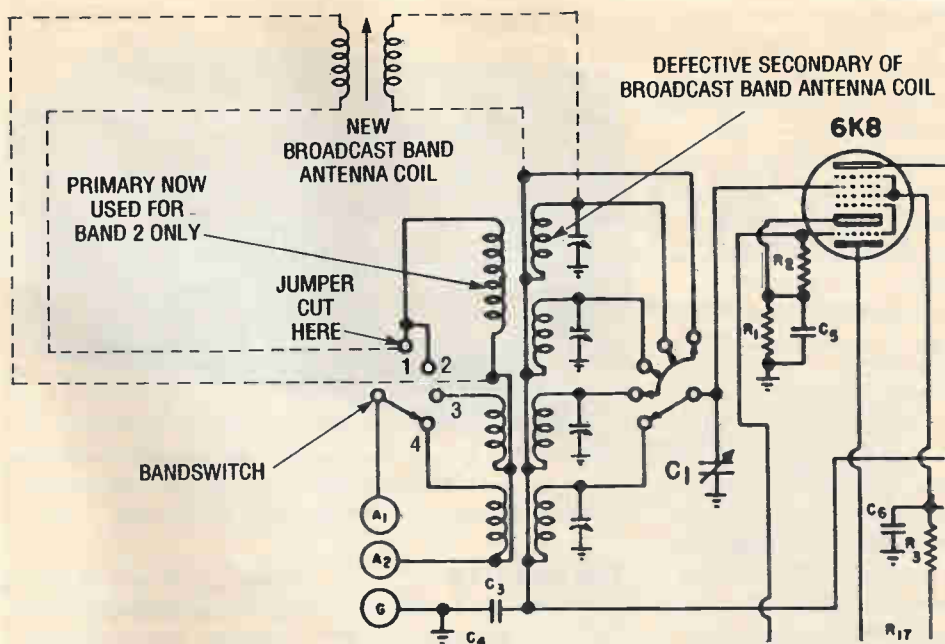


Fig. 2. This schematic diagram of the Sky Buddy's RF stage shows the location of the defective broadcast-band antenna-coil secondary winding and the method of wiring in the replacement antenna coil.

of the earth to complete any restoration undertaken in this column. And that's a reasonable point of view. On the other hand, successful removal of the coil assembly is no guarantee that the defective winding could be repaired.

If it turned out that repair wasn't an option, I doubt that I'd be strongly motivated to reinstall the defective unit. The radio would then essentially become a junker until such time (if ever) that a Sky Buddy in even worse condition—but with a good coil assembly—might fall into

my hands.

Finally I decided to try a good temporary fix, a "band aid" approach that would restore broadcast-band operation without performing invasive procedures on the set.

A check of the Sky Buddy's specs had shown that the main tuning capacitor is a 365-pF unit. That is the standard-size for broadcast receivers. An ordinary broadcast receiver antenna coil therefore could be installed in place of the damaged one in the Sky Buddy without disturbing the other connections on

the antenna-coil assembly.

INSTALLING THE COIL

At first, I thought I could probably cannibalize an antenna coil from a junked broadcast receiver. But the junk sets I had on hand were all equipped with loop antennas. Such sets don't have separate antenna coils because the loop itself is the coil.

Then I remembered having seen broadcast-antenna coils advertised in the *Antique Electronic Supply* (6221 S. Maple Ave., Tempe, AZ 85283) catalog. I took a look and, sure

enough, there they were. The catalog copy stated that they would "replace broadcast band coils in any tube-type radio." That sounded good to me, and I immediately ordered one. It arrived. I quickly heated up my soldering iron and made the installation.

The secondary of the new coil was connected across the open secondary of the old band 1 (broadcast-band) antenna coil. The primary of the old coil was still needed because it also serves as the primary for the band 2 antenna coil. Luckily, a connection was provided on the band-switcher for switching in a separate band 1 primary.

In the original installation, this connection was jumpered to the corresponding band 2 connection (see schematic) so that the same primary would serve for both. Cutting this jumper allowed me to hook up the new independent primary for band 1.

The new coil was small and lightweight enough that I was able to mount it simply by soldering one of its terminal lugs directly to the appropriate lug on the original coil. The other three connections were made via short wire leads.

With the new coil installed, I broke out my trusty LM-21 frequency meter and performed the RF alignment procedure.



The Sky Buddy with its cover back on and ready for the display shelf. I decided to leave the original dial pointer (which has a broken tip) in place, rather than craft a replacement.

THE RESULTS

With the Sky Buddy connected to a good antenna and ground, strong signals are now received all across the broadcast band and throughout most of the set's shortwave-frequency range. Band 4 (16–46 MHz) is an exception, being relatively insensitive.

The electrical band-spread control operated very smoothly and made it a lot easier to tune through stations that were very closely spaced on the main tuning dial. The BFO (beat-frequency oscillator) also works well, and its pitch control provides a wide range of tones on received CW (International Morse Code) signals.

I noticed that stations at the lower end of the broadcast band seemed to tune a little broader than stations

at the upper end. That may be a normal characteristic of the Sky Buddy, or it may be a result of inaccurate tracking of the replacement antenna coil.

Quoting the well-known radio writer William Orr, from the anthology *The Golden Years of Radio* (Ham Radio Publishing Group, 1978), the S-19-R was "... insensitive, unstable, broad tuning, and full of images and birdies. But for the beginning ham who was thrilled to hear signals from across town, the receiver was an outstanding hit! The impressive dial, plus instant bandspread and a beat oscillator, transformed a simple broadcast set into an acceptable ham receiver that sold over 20,000 units before the model was dropped on the eve of World War II."

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