

until all alignments have been completed and the unit has been fully checked out. I made that mistake as well, and desoldering one of those panels was not fun. While on the subject of front/rear panels, if you need more than one PL frequency, you might want to add a stereo mini-jack on the rear panel for an external encoder. Of course, you could always cheat and use the external speaker jack—as I did.

And speaking of PL, the place I injected tone was the junction of R22 and R23. The wiper of the deviation pot could also be used. Use a piece of shielded cable to connect to the rear-panel jack. If you need only one PL frequency, secure the encoder (using double-sided tape) to the inside of the same case half as the speaker and connect it using shielded cable. Switched TX voltage can be taken from either side of R149.

Alignment

The alignment instructions are very good and no problems should be encountered, assuming the unit was constructed properly. Presetting the small red variable caps can be a little tricky, so pay close attention to the drawing in the errata sheet. You should be able to attain reasonable receiver sensitivity doing the adjustments with a weak over-the-air signal, but alignment using a signal generator is preferable if you have one available. My unit ended up at .3 μ V for 12 dB Sinad, which is more than good enough for repeaters.

Transmitter alignment should not be attempted with a dummy load mounted on the back of the radio! Rf will leak back into the radio and will interfere with PLL adjustments. Locate your dummy load about three feet away and you won't have any rf feedback

problems. Be sure to perform the broadband transmitter alignment (page 64 of the manual) carefully and don't forget the additional step included in the errata sheet. If you do it right, the power should be just about flat from 440 to 450. Mine made 12 Watts across the band, and the spectrum analyzer showed no spurious signals at all. Not bad!

I would suggest waxing the vco area before trying to adjust deviation, as the vco tends to be just a little harmonic before you "pot" it. An easy way to melt wax is to place it in a tablespoon and heat it over an electric stove burner. Don't use gas—remember that wax burns. Be sure that the vco shield is close to the PC board or you'll have leaking hot wax all over the board. A shield of double-sided PC board above and below the vco housing also helps.

Transmitter modulation should be done last. You may find that even when you get the deviation adjusted for 5 kHz, the radio still sounds "loud." I suspect that this is because the microphone amplifier is the same as the one in the 2-meter radio, whose vco output is not doubled. There are several changes suggested in the errata sheet that will improve the loud sound and compensate somewhat for the "communications" type microphone.

Operation

Frequency selection is handled by push-button BCD switches on the front panel that are much better than the ones in the 2-meter kit. These have a very smooth feel to them and are easy to use, even in a mobile environment. Receive audio could use a little more "punch." Modifying the amplifier for a little more gain would help, as does an external

speaker. Adjacent channel rejection is very good and the unit does not seem to be susceptible to intermod.

On-the-air reports of transmit audio ranged from "tinny" to "thin and hollow," although I found one guy who thought it sounded just fine. The mods in the errata sheet will help, but the big culprit is the microphone. One report said it sounded like the two-way radio in "Adam 12," and that is what is referred to as "communications quality." I suppose it's a matter of personal preference, but I like my audio to sound better than that. An old microphone from the junk box made a major improvement. My understanding is that DSE is researching other microphones to replace the one presently supplied.

Summary

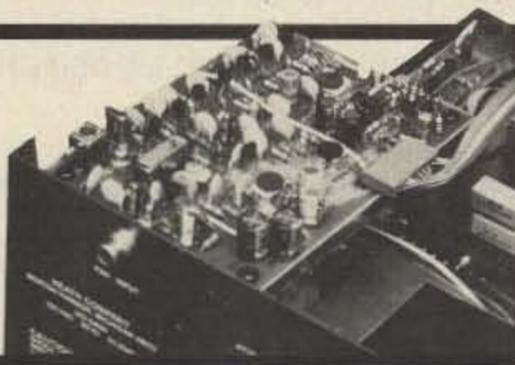
This was a fun kit to build, though the experience gained in building the 2-meter kit previously was an advantage. It's not a fancy radio, but I don't need a fancy radio and a fancy price tag. Since I built it myself, I suspect that I can also fix it myself should something ever go wrong. That would be hard to say about any of the "rice rockets" that I've seen lately.

This 440 rig delivers excellent value for the price: an adequate output power level and a suitably sensitive receiver. Mobile operators may find that a little extra filtering may be in order if the power leads aren't run directly to the battery. I had problems using the cigarette lighter plug in my Buick—too much hash, especially with the air conditioning blower on. Running leads directly to the battery eliminated all but a little alternator whine, and I can live with that. I defy you to find another new, fully synthesized, UHF mobile radio for \$170. ■

Heath HOA-5404-1 Pan Adapter

by Marc Stern N1BLH

Heath Company Dept. 011-442
Benton Harbor MI 49022 Price class: \$100



Building the Heathkit HO-5404 Station Monitor without the Pan Adapter module (HOA-5404-1) is like making toast without butter—it will work, but it just won't be right.

Imagine trying to use a monitor scope to tune in a weak CW signal near your frequency—but without a Pan Adapter. You may be able to do it by watching the trace of the pattern generated by the scope's internal sawtooth generator, or you may be able to do it with the RTTY setting. But if you do, you'll be very lucky because you still really won't have any idea where the signal is in relation to yours and you may actually tune in a different, slightly stronger signal than you had wanted. The result could easily be some missed rare DX because you tuned to the wrong signal.

A Pan Adapter module would eliminate this. Because it interfaces directly with the i-f strip of your receiver or transceiver, any signals

within the i-f passband will be indicated on the Pan Adapter's display trace. With the Heathkit HOA-5404-1, any signals within about 100 kHz of your frequency will appear on the trace. The frequency you are on is indicated in the center of the scope's graticule, and signals below and above it are on either side.

With the Pan Adapter module installed, you would be able to match your frequency to that of the station you are attempting to contact and establish contact.

The Pan Adapter module is also invaluable in another way. Let's say someone is QRMing your signal. The Pan Adapter module would indicate where the offending station was in relation to yours, and you would then be able to turn your beam—providing you have a beam for that band—and get a heading on the offending station.

Of course, even if you didn't have a Pan

Adapter module installed in your scope, you would still be able to use the scope quite handily for monitoring phone signals and RTTY and checking transmitter performance. But the Pan Adapter adds a great deal of capability.

A one-board project, the HOA-5404-1 is meant to be installed within the HO-5404 Station Monitor Scope. Provisions are made for its installation on the upper right rear of the chassis (looking at the scope from the front). The Pan Adapter interfaces with the monitor scope's circuit board through three connector pins, which bring voltage to the board.

A multi-colored, multi-conductor ribbon cable interfaces the module with the switches at the front of the scope. Be careful when you prepare the ribbon cable to cut it exactly as the instructions note. The reason precision is needed is that the cable must bend at a 90-degree angle so that it can fit into the edge connector. If the cable isn't cut correctly, it won't seat correctly with the edge connector pins on the circuit board.

As you would expect with Heathkit products, there's very little left to the imagination. Everything is arranged logically and the instructions follow suit.

Like nearly every modern Heathkit, the transistors, capacitors, integrated circuits, resistors, chokes, and anything else needed are arranged logically in the box. Parts are stored

in separate modules until you reach that particular step.

Even with this type of organization, working slowly will ensure that the kit will go together and work correctly on the first try. But if it doesn't, you can easily work back to the point where you made your mistake by simply re-tracing your steps.

For example, I found that after I'd assembled the project it wouldn't fire correctly. As I went through the troubleshooting routines, I found one of the key transistors wasn't working—no voltage—and I substituted my own for it. This cured one problem and I thought I was on my way, but the adapter hid a second, much more frustrating problem that resulted in several long-distance calls to customer assistance. In fact, the Pan Adapter ended up back in Benton Harbor. The reason it did will become apparent shortly.

As you work with the oscillator section of the

board, you soon realize that the key circuit is the one containing transistor Q310. It is the crystal oscillator circuit, which operates at a frequency of 3.395 or 8.830 MHz. These frequencies cover many of the major rigs on the market. This circuit places the Pan Adapter's pip on the screen at the tuned frequency and tells you where your rig is tuned in relation to others.

As you're building this section, you run into a couple of capacitor insertions that look puzzling. Instead of two holes, there are three and you are instructed "to use the holes that best fit the capacitor supplied with your kit." Evidently, this instruction is incorrect because I couldn't get the oscillator section to oscillate, although I used the capacitor supplied and used the "holes that best fit."

So, after about a week of troubleshooting, I sent the kit back to Benton Harbor. On its return, the technician who worked on it in-

formed me my choice of capacitor holes was incorrect. Since this is the case, I would urge Heathkit to correct the documentation and instructions.

Another troubling error occurred in the information sheet describing the intermediate frequencies of various transceivers. As you look at the listing for Kenwood—the Pan Adapter was set up to work with a Kenwood TS-520SE—you notice something interesting: Just about all the i-f frequencies are listed as 8.830, except the 520. And, as most people know, the 520 was a less expensive version of the 820 and one would wonder why essentially the same rigs would have two differing i-f's. It doesn't make much sense, does it?

I thought so, too, and I explored the schematic thoroughly and came up with the conclusion that the Heath information sheet was wrong. I'm happy I took the time to do the detective work beforehand; with the amount of componentry on the printed circuit board, it would have been a job to desolder the components needed for the 3.395-MHz i-f and insert the new components.

In more than five years of having built various Heathkits, I haven't run across such a glaring error before, and I would urge Heath to check documentation more closely before it gets a final approval.

And, speaking of the documentation, it took me more than an hour to make all the changes needed to update the manual to reflect new components. It probably would have been easier for Heath to rewrite the brief manual, rather than rely on the buyer to do it.

That buyer had better be an intermediate level kit builder because the Pan Adapter is definitely not a kit for beginners. You have to build the Monitor Scope first and make sure it is aligned before building the Pan Adapter. But, like all Heathkits, the builder is led step by step through the building process with explicit detail.

In operation, the scope and the module work very well together. I was able to find signals and move over to them very easily. It also helped me find a clear frequency quite easily, which isn't easy on 20 meters these days.

It is actually simple to use and merely takes pressing three buttons—two at the same time—on the front of the scope to fire up the Pan Adapter. Simply pushing SSB, RTTY, and 100 kHz swings the Pan Adapter into action. There's a marker pip that indicates where you are in relation to the other stations in the passband of your radio.

Be aware, though, that you have to connect the module to the i-f of your transceiver or receiver. It's easy to do and Heath supplies the decoupling capacitors and instructions on how to do it. They also supply the miniature RG-174 coax to make the connection.

In the final analysis, the Heathkit Pan Adapter module is a worthy addition to the HO-5404 Monitor Scope. In fact, I think it should be included as part of the whole kit, rather than being an extra cost option at \$99.95. Without it, the kit is like dry toast. It's filling, but isn't nearly as good.

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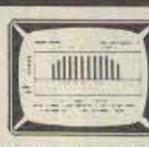
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