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Yaesu FT-920 MF/HF/6 Meter Transceiver
Tune in the World for Less Than $300: Drake SW1 and Radio Shack DX-394
October 1997

Product Review

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The Amateur Radio transceiver has changed substantially since its advent in the 1950s. Each generation has provided new features that have gone from option to standard. Some of these, though revolutionary for their time, have become commonplace.

The latest generation of transceivers feature expanded band coverage. Where once 80 through 10 meter coverage was standard (with only a few offering 160 meters), most manufacturers now offer at least one transceiver that at least covers 160 through 6, and nearly all with general-coverage receivers. The expanded coverage coincides nicely with the beginnings of a new sunspot cycle, and many countries of the world allow 6 meter operation than ever before. Extended coverage plus more availability will increase activity on 6 meters throughout the world. The new generation of transceivers will be ready for this upsurge and may even drive it.

This leads us to the FT-920, Yaesu’s latest entry in the current generation and its first “HF” transceiver to include 6 meters. The ‘920, which replaces the FT-990 in the Yaesu lineup, packs in a lot of features per dollar and couples them with great performance to boot. Some standard features, such as its digital voice recorder, are ones not found on other units in this price class. Shuttle jog tuning, which allows for rapid band excursions, is another (it debuted on Yaesu’s more upscale FT-1000MP, which the FT-920 somewhat resembles). One standard feature we had not seen before is the linear tuning pulse system. This menu option provides a pulsed signal (pulses of equal duration) for low-duty cycle (ie, 15% or 20%) linear amplifier tuning up or down. It’s also possible to adjust power output and duration of the tuning signal.

The FT-920 provides 100 W output on all bands, including 6 meters. It has MOSFET power amplifiers in the transmitter’s final stage.

Other standard features, such as the automatic antenna tuner and the CW keyer, have come to be considered almost necessities. With the exceptions of FM and transmit on AM (both require optional boards), the FT-920 offers a pretty complete package. Little remained on my “wish list” once I’d had a chance to get familiar with it.

This brings up one point that should be made about this transceiver: you need to read the instruction manual first, not only to get optimum performance, but to get it on the air. It’s entirely possible for a new owner to manipulate this radio to the point where you won’t hear anything at all if enough knobs are turned the wrong way!

Up Front

This is a pretty busy panel, with 79 buttons or controls to contend with (all the more reason to study the manual). Once you get the gist of it, however, it’s not as intimidating as it might first appear. Pushing the power switch brings forth the orange light of the Omni-Glow LCD display, which indicates most of the radio’s functions in some cases, the only way you can be sure a particular function is engaged is to check the display. The FT-920’s display features nice, big numbers—approximately 1/8-inch high—for the VFO A and VFO B readouts. I found the display could be seen from any angle in any room lighting condition, including bright sunlight.

The main VFO A tuning knob dominates the center of the radio. The outer part of the concentric main tuning knob includes the shuttle jog control, a feature we first saw on the FT-1000MP. You simply twist the ring to one side or the other for rapid frequency excursions, and the tuning speed depends upon how far you turn it. This is great for getting from one end of a band to the other for contest search-and-pounce operation, but it does take a little practice. Additionally, the main tuning knob may be set to a fast, normal or fine tuning rate, depending upon operator preference, by pressing the GRIP button to the left of the tuning knob. The display shows the rate. The GRIP button can control the tuning rate of either of the radio’s two VFOs.

Front-panel buttons set VOX or (MOX) manual transmission mode. You must use the menu to set VOX delay and gain or CW semi or full-break-in. Both the headphone and key jacks are stereo types. I got adequate headphone output with either the Heil ProSet or Yaesu YH-55 headsets. The MIC GAIN, AF GAIN, RF GAIN and RF PWR controls are clustered on the panel’s left-hand side. A set of four trim controls are along the bottom of the front panel: SQL (squelch), COMP (speech processor compression level) GAIN (for the speech monitor) and LEVEL (for the noise blanker). Pushbutton switches interspersed in the same row let you turn the processor, speech monitor and noise blanker on or off. While the controls are small, these are functions that don’t have to be set very often, so their size is not necessarily a disadvantage.

Meter selection is via a pushbutton switch. You can step through ALC, SWR, COMP (compression level), VOLT and AMP (and back to ALC). Being able to monitor the supply voltage is great if you’re operating from a storage battery in the field. The IPO switch controls the Intercept Point Optimization, which essentially allows the operator to switch out the receiver RF preamplifier. Actually, the FT-920 has two preamps. One is a JFET, which defaults for use on 160

BOTTOM LINE

The FT-920 offers lots of standard features at each price level, including a digital voice recorder and terrific DSP—plus excellent receiver performance. Many of its best features can be found in its extensive menu system.
**Table 1 Yaesu FT-920, serial number 7F020059**

**Manufacturer’s Claimed Specifications**


Modes of operation: USB, LSB, CW, AM, FM, FSK, AFSK

Power requirement: Receive, 2.0 A (no audio); transmit, 22 A (max). 13.5 V (±10%).

Size (height, width, depth): 5.4 x 16.4 x 12.6 inches; weight, 25.3 pounds.

**Receiver**

SSB/CW sensitivity, 2.4 kHz bandwidth, default preamp on, 10 dB (S+N)/N: 150-250 kHz, –88 dBm; 250-500 kHz, –95 dBm; 0.5-1.8 MHz, –101 dBm; 1.8-2.45 MHz, –121 dBm; 24-55 MHz, –125 dBm.

AM sensitivity, default preamp on, 6-kHz bandwidth, 10 dB (S+N)/N: 150-250 kHz, 40 μV; 250-500 kHz, 32 μV; 0.5-1.8 MHz, 16 μV; 1.8-24.5 MHz, 20 μV; 24.5-54 MHz, 1.3 μV.

FM sensitivity, 12 dB SINAD, default preamp on: 28-29.7 MHz and 50-54 MHz, 0.25 μV.

Blocking dynamic range: Not specified.

Two-tone, third-order IMD dynamic range: Not specified.

Third-order input intercept: Not specified

Second-order intercept point: Not specified

First IF rejection: >70 dB on HF; >50 dB on VHF.

FM adjacent channel rejection: Not specified

FM two-tone, third-order IMD dynamic range: Not specified

S-meter sensitivity: Not specified

Squelch sensitivity: SSB, CW, RTTY, AM, preamp on, less than 2.0 μV; FM, preamp on, less than 0.32 μV.

Receiver audio output: 1.5 W at <10% THD into 4 Ω.

Notch filter depth: >35 dB.

**Transmitter**

Power output: SSB, CW, RTTY, and FM, 100 W maximum, AM, 25 W, continuously adjustable in all modes.

Spurious-emission suppression: 50 dB (HF bands); 60 dB (50 MHz band).

SSB carrier suppression: 40 dB.

Undesired sideband suppression: 50 dB

Third-order intermodulation distortion (IMD) products: –31 dB or better at 100 W output.

CW keyer speed range: Not specified.

CW keying characteristics: Not specified.

Transmit-receive turnaround time (PTT release to 50% audio output): Not specified.

Receive-transmit turnaround time (“tx delay”): Not specified.

Composite transmitted noise: Not specified.

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Composite transmitted noise: Not specified.

Note: Unless noted otherwise, all dynamic range measurements were taken at the ARRL Lab standard of 20 kHz.

*Measurement was noise-limited at the value indicated. †Third-order intercept point was determined using S5 reference.
through 15 meters. The other is a lower-noise, dual-gate MOSFET which defaults for use on 12 through 6 meters. (You can select which preamp you want via the menu system.) An ATTenuator has 6, 12 or 18 dB steps, a big improvement on the 20-dB fixed attenuators of the past. The AGC switch is also a step switch, and successive pushes go through fast, slow, and off.

One nice touch a lot of operators will appreciate is the front-panel ANTENNA switch to switch between two antennas. Antenna selection stays in the radio’s band memory, too. For example, connect antenna A for 20 meters and antenna B for 6 meters. As you switch back and forth between the two bands, the antennas change automatically. Even better: a separate RX (receive) antenna switch lets you choose a separate receive antenna (or, alternatively, a VHF or UHF transverter, receiving converter or other accessory) via a rear-panel phono jack. This separate receive antenna function is especially well-executed. A menu option lets you choose to protect the transceiver’s front end against pickup of stray RF from the transmittor by switching the receiving antenna out of the line during transmit.

The radio has separate switches for each mode: SSB, CW, AM (optional board required for transmit), FM (available with the optional FM-1 board), and DATA (FSK or AFSK). The SSB and CW buttons also let you toggle between the desired sideband for those modes. The LOCK switch to the right of the VFO knob allows locking the VFO A frequency—a handy feature when youngsters walk into the shack (there’s another LOCK button for the VFO B knob).

The A→B button moves the frequency of VFO A to VFO B. The A<→B knob swaps the contents of the two VFOs. The RPT button allows the operator to set a repeater offset (by menu) for 29 or 52 MHz FM operation. If you need a CTCSS tone, you set this

Figure 3—CW keying waveform for the FT-920 showing the first two dits in full-break-in (QSK) mode. The equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transceiver was being operated at 100 W output at 14.2 MHz. Note that both dits are somewhat shortened. This does not occur in semi-break-in (VOX) mode.
The **DW** button activates the Dual Watch function. Dual watch sets the radio up to periodically check the VFO B frequency for activity while you’re tuned to VFO A. In theory, this sounds great. In practice, using dual watch requires enabling the squelch. This means that you hear **nothing** on either frequency unless there’s a signal. When the radio hears a signal on the VFO B frequency, it breaks the squelch and goes to that frequency. Some users were disappointed to find out that this was not a true dual-receive function, but more like a priority scanning system. Since it works only while the receiver is squelched, it might be useful for times when the operator is otherwise occupied.

A keypad dominates the area to the immediate right of the VFO A (main tuning) knob. It’s used primarily for one-touch band selection. The FT-920 stacks the last two sets of parameters for each band into memory registers. You can also use it for direct frequency entry on either VFO, and it controls memory selection for the digital voice recorder and the CW memory keyer. For FM, the keypad serves as a DTMF keyboard. The **REC** and **PLAY** buttons work for both the digital voice recorder and the CW memory keyer. The radio has **UP** and **DOWN** keys for rapid frequency excursions or to step through the memories—whichever is selected.

The **Green RX** and **red TX** light/button combinations flank both VFO knobs. Pressing one or the other sets the VFO in use for either transmitting or receiving. These replace the “split” buttons on many other transceivers and are very intuitive. Just touch the one you want for transmit or receive. This should minimize use of the wrong VFO in pileups and contests!

Beneath the VFO B tuning knob are the clarifier (RIT) and keyer controls. **RX** and **TX** clarifier may be selected independently, and the **CLEAR** button lets you return to the original frequency. Clarifier tuning is via the VFO B tuning knob; users were split on whether they liked this doubling up.

Momentarily pressing the **TUNER** switch activates the automatic antenna tuner, which can be enabled via the menu to work on receive, if desired. Holding the button in for a half second activates the automatic matching mode. The tuner works on all bands, including 6 meters. It operates very quickly and quietly.

Yaesu says the tuner can match from approximately 17 to 150 MHz. Power is automatically reduced to 50 W while tuning. The LCD display indicates the tuner’s operation, and mode (TX, RX or both). The tuner automatically stores settings of less than 1.5:1 SWR, but does not store those above that level. This automatically reduces to 50 W while tuning. The LCD display indicates the tuner’s operation, and you can apply seven character alphanumeric names to all memory channels except the quick memory bank channels. The **PRST** button lets you swap the VFO B frequency display for alphanumeric memory names the operator may have plugged into memory.

**DSP Delights**

The DSP works at audio frequencies rather than at a low-frequency IF, as it does in some other transceivers (including big brother FT-1000MP). Execution of the DSP functions was excellent. The heart of the radio’s DSP features is a prominent set of concentric **LOW CUT/HIGH CUT** controls on the righthand side of the panel. You activate this part of the DSP by pushing the **DSP** button, then use the **LOW CUT/HIGH CUT** to set your passband cutoff frequencies. Many users found this implementation very convenient, and the DSP worked so well you had to remind yourself that it was only working at audio and after the AGC. As Yaesu points out in the FT-920 manual, strong signals outside the DSP passband still can pump the AGC. The **LOW CUT/HIGH CUT** controls are designed to move through half rotation for best results, and I preferred the **HIGH CUT** control at 12 o’clock and the **LOW CUT** control at 8 o’clock. These settings conformed the passband to my tastes, both on CW and SSB.

Through a menu setting, you can have the display provide a graphical representation of the relative audio passband. The **NOTCH** button activates the automatic DSP notch, handy for nulling out those pesky carriers on SSB. You don’t have to press the DSP button to use it. The notch captures the offending heterodynes and lowers them to a tolerable level—in most cases totally eliminating them. Touching up the **LOW CUT/HIGH CUT** controls can eliminate any residual heterodynes in most cases. The lack of an IF notch may be a problem on CW for some operators.

The **NR** knob adjusts the level of the DSP-based noise reduction—super for cutting down on “background” noise. Again, you don’t have to press the DSP button to enable noise reduction. Simply rotating the front panel control brings it into play, and the receiver is most comfortable to listen to with at least a little bit cranked in. The DSP NR can help reduce operator fatigue during long operating periods.

**Digital Voices**

It was a pleasant surprise to find a digital voice recorder as a standard feature of this midrange radio. It’s something you’d certainly expect to find only in a top-of-the-line set. The DVR records both incoming audio (16 seconds worth) plus four outgoing messages. To record incoming audio, you touch the **REC** button, then the **50 MHz** key on the keypad. The received audio plays through the monitor—so you can bask in the glow of hearing that rare DX station you just worked come back to you again and again.

Recording outgoing messages is easy, but the instructions in our FT-920 manual were incorrect, and when we’d attempt to air the message, it would hang up for several seconds in transmit. After Yaesu told us that the correct way to stop recording was to press the **REC** button again, the message would play back properly. The manual indicates that outgoing message buffers are 16 seconds apiece. We timed two buffers at approximately 8 seconds each and two at approximately 4 seconds each, however.

Some users did not like the fact that you had to first momentarily press the **PLAY** button, then quickly select the proper memory buffer to air your message. If you don’t press the memory key (1-4) fast enough, the memory key will revert to its original function, and you’ll probably find yourself on another band altogether.

It is not possible to control the digital voice recorder via computer.

For audio processing, the FT-920 uses a digital speech compressor at audio level. This is a break with Yaesu tradition, as most past offerings have used RF clipping. Activating the **PROC** switch and adjusting the compression level is all that is necessary for adjustment. We found that turning the **COMP** control to around 3 o’clock yielded optimum results.

In addition to the audio processor, you can use the menu to select four different DSP voice pattern contours. On the air reviews were mixed on how well the four digital con-
tours did their job in tailoring transmit audio. Consensus was that audio level appeared to drop off on all four settings; you had to compensate with higher gain level or by using a bit more compression. The high-emphasis selection successfully produced “contest” type audio to cut through QRM; the changes wrought by the other settings were more subtle. But several stations said they thought the audio sounded “best” in the default position, with the digital equalization turned off. The manual seems to say that you have to enable the DSP system via the front panel in order to take advantage of this feature, but we found this to be incorrect.

The speech monitor comes in handy while using the digital voice recorder during contests. The clarity of audio through the FT-920 operation. A five-pin DIN connector (the connection to the remote switching plus a for use with a foot switch or other type of tor) and an RCA jack. The rear panel also provides an additional (stereo) store). The rear panel also provides an amplifier switching. There are two possibilities for its use: With the TR-RY switch set in the “RY” (relay) position, a relay capable of switching 125 V at 500 mA is used, so you can safely switch your old SB-220. For break-in use with some amplifiers, the “TR” position employs a quiet transistor switch, rated at 50 V dc at 500 mA.

Another jack provides 13.5 V at up to 200 mA for accessories. You’ll also find an EXT SPEAKER jack (3.5 mm, two-conductor) and an AF OUT jack for low-level audio recording, TNC, or WEFAX. It provides 100 mV into a 600-Ω and the level is not controlled by the front panel AF gain control. A similar jack for PATCH output is independent of the GAIN control.

There’s an FSK-AFSK switch for digital operation. A five-pin DIN connector (the only other one, thankfully) is available for data input. The connection is provided via an RCA jack.

We already mentioned the separate receive antenna jack. While the FT-920 does not offer a transverter port as such, the Operating Manual includes information on how to use the RX jack and/or one of the SO-239 antenna connectors to accommodate a transverter.

Overall, the back panel offers ample flexibility. The only drawback is that, except for the antenna and power connections, nothing on the rear panel is marked. A legend affixed to the top panel of the radio provides a map to all connections, but it’s difficult to refer to this chart when the radio is beneath a shelf and the operator is behind it!

May I see the Menu?

Overall, operation is straightforward. Some users got the hang of the FT-920 without spending a whole lot of time with the manual, which, as we’ve already noted, contained a few errors (Yaesu says it’s working on these). But some features are not terribly obvious, and many of the radio’s best features only are accessible through the menu (shades of the FT-1000MP). For best results, it’s wise to pay special attention to the section of the manual that describes the 73 menu functions.

The MENU switch activates the menu mode and allows customization of many parameters. Normal menu operation is simple. Just press the MENU button, dial up the desired function with the VFO B knob, press the ENT key on the keypad, use the VFO B knob to set the desired parameter, press ENT again, and MENU to exit.

A handy panel menu feature retains five frequently used menu items for quick recall, including the display dimmer, VOX hang time in CW, multi-panel display choice, enhanced tuning scale display, and CTCSS tone frequency. In addition, the FT-920 has a quick menu option that lets the user pick out certain menu items for quick and easy access. This quick menu bar operates almost identically to the normal menu except it only gives you the menu items you’ve asked to make available. To get to the quick menu, you press the MENU button momentarily; to access the normal menu, you hold in the MENU button for one-half second. Pretty nifty.

On the Air

While the profusion of knobs and buttons on the front panel might suggest a steep learning curve, the FT-920 is really pretty simple to use. For instance, for SSB operation, just touch the SSB button. The LCD display shows which sideband has been selected. While the default is according to convention (LSB below 10 MHz, USB above), you can swap sidebands by pressing the ENT button again. Adjust the GAIN control for proper ALM metering, and you’re all ready to go.

VOX operation is smooth. There are two different menu settings available, one for voice, the other for semi-break-in CW.

The FT-920 provides effortless CW operation, both semi-break-in and full-break-in (QSK). Full-break-in CW was free of the pops found in some radios, and it was possible to hear between dits at 35 WPM or so. When using a non-QSK linear amplifier, you’ll want to use semi-break-in with the proper VOX adjustment. It’s easy to adjust the delay for just the right balance between fast transition to receive and absence of relay chatter.

We did notice we could still hear a very strong CW signal on the opposite side of zero beat, even with the 500-Hz filter enabled. The opposite side signal was down by more than 50 dB, however.

Receiving with the radio was a pleasure. It handled strong signals well, but the combination of a good basic receiver with DSP resulted in excellent overall performance for a radio in this price class (see Table 1). Two filters are available as options: a 500-Hz CW filter and a 6-KHz AM filter. The radio can only accommodate these filters, and Yaesu does not offer an optional narrow SSB filter.

We found out that you must install the AM filter in order to transmit on AM (Yaesu now offers a free “pass-through” board that enables AM transmit). Our unit had both filters installed, and filtering was very good, although the AM filter is too narrow for suitable AM broadcast reception. On CW, you can further reduce the bandwidth by using the DSP, and the combination of the two provided excellent single-signal CW reception.

By the way, the FT-920 receiver is double conversion on HF (68.985 MHz and 8.215 MHz). The accessory filters are in the 8.2 MHz IF. The radio is triple conversion only on FM, where the lowest IF is at 455 kHz.

The CW memory keyer works well, but some users felt its two-button operation was less than convenient. The keyer allows for automatic character spacing to be enabled or disabled, or use as an electronic “bug” type key. Especially noteworthy was the fact that you can adjust dot and dash lengths (ie, weighting) separately, not just the dot-to-dash ratio. The keyer has six memories, and it permits sequential contest serial numbering. The primary drawback is that, as with the digital voice keyer, you have to press the PLAY button, then (quickly) the memory number to air a message. On the other hand, the CW memories may be controlled by a computer program.

The noise blanker worked well against electric motor noise. At my place, there is usually no noise, so I generated some S9 noise by turning on a vacuum cleaner. The blanker reduced the noise to a negligible level. Other users also found the noise blanker to be very effective, especially in combination with the DSP noise reduction.

When our unit first arrived, it exhibited a strange hissing or buzzing sound (sort of like a small hand full of tin cornflakes) when either the noise blanker was on. The MONI LEVEL control was turned up (it made no difference if the monitor was engaged or not). We returned our unit to Yaesu, which determined that some earlier production units like ours suffered a crosstalk problem. Yaesu fixed our FT-920 and says it has corrected this problem in subsequent production units.
Somewhat disconcerting were the results of the transmit intermodulation distortion (IMD) tests (see Figures 1 and 2). Almost as disturbing as the prominence of third and fifth-order products was the prominence of higher-order (i.e., seventh, ninth, eleventh) products. Yaesu specified a third-order IMD figure of –31 dBc (see Table 1), a specification it met on 15, 17, 20, 40, 80 and 160 meters, where IMD performance was much better but not spectacular. For comparison, the best case was 40 meters, where third-order products were 32 dB down, and fifth-order were 45 dB down, and higher-order products were almost non-existent.

On HF, the ARRL Lab measured worst-case performance on 12 meters, where third-order products were just 25 dB down and fifth-order 31 dB down. That’s marginal in comparison to other transceivers in this price class that we’ve looked at recently. Exacerbating this performance was the fact that higher-order products do not drop below 50 dB until the 13th order!

The worst-case performance on 50 MHz was only a shade better. Third-order products were down by 27 dB and fifth-order products by 33 dB, but, once again, higher-order products remain prominent through the 13th order.

As we’ve said in past reviews, this is the kind of IMD performance that may lead to problems with splatter and “wide” signals, especially when the transceiver is used with an amplifier.

The ARRL Lab measured comparable IMD performance on a second FT-920. This marginal IMD performance was the only serious problem we encountered with this transceiver. Yaesu advised that its production units as of mid-August were “displaying less variation in performance, due to tightening of production part tolerances.” Yaesu supplied one of these units for us to test. The unit barely met its third-order IMD specification on the HF bands but not on 6 meters; higher-order products overall were less prominent, however.

Additional Observations

The reactions of several users appear to prove out the proverbial notion that “you can’t please all of the people all the time.” Take the radio’s ergonomics, for example. One user called the ergonomics “some of the best of the radios I have recently used,” while another called the front panel “awkwardly laid out” and the radio “not as comfortable to operate” as others he’d used. For my part, I tend to feel that the rig is generally comfortable, except for the location of the clarifier and keyer controls.

Users were ambivalent about the double-duty VFO both for the VFO and for RIT. One tester found that this scheme “worked out much better than I would have thought,” while another said it was “awkwardly shared with the VFO.”

Overall, I enjoyed using this radio. In comparison to what was available 10 or 15 years ago in price and performance, the FT-920 shows that it’s possible to increase value in greater proportion to price. The ‘920 offers lots of standard features and performance, and it’s a worthy contender among the other offerings in this price category.

Many thanks to Randy Thompson, K5ZD; Emil Pocock, W3EP; Larry Wolfgang, W1R; Rick Lindquist, N1RL; and Mike Tracy, KC1SX, and Ed Hare, W1RFI, of the ARRL Lab for their contributions to this review.

Manufacturer: Yaesu USA, 17210 Edwards Rd., Cerritos, CA 90703; tel 310-404-2700. Manufacturer’s suggested retail price, $2300; 500-Hz YF-116C CW filter, $127; 6-kHz YF-116A AM filter, $127; FM-1 FM board, $62; TCXO-7 temperature-compensated oscillator, $99.

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**Tune in the World for Less Than $300!**

**Drake SW1 and Radio Shack DX-394**

Reviewed by Rick Lindquist, N1RL
Senior Assistant Technical Editor
and Bill Moore, NC1L
Century Club Manager

One of the surest routes to ham radio over the years has been shortwave listening (SWLing) and broadcast listening (BCLing). Very often, the fascination of listening to broadcasts and other transmissions from far-off places has led to a desire on the part of listeners to put a signal of their own on the air. We looked at a couple of economical receivers for the beginning SWL or BCL to air. We looked at a couple of economical receivers for the beginning SWL or BCL to air. We looked at a couple of economical receivers for the beginning SWL or BCL to air.

Drake and Radio Shack have been making receivers for novice and veteran SWLS and BCLs for years (decades in the case of Drake, which recently re-entered the Amateur Radio market). In the past, we’ve looked at the Radio Shack DX-302 receiver (see “Product Review” QST Aug 1981) and the Drake R7, R8 and SW8 receivers (see “Product Review”, QST, Jan 1980, Mar 1992, and Oct 1994, respectively).

Both of these receivers are tabletop sets designed primarily for installing in a home listening post. Both are equipped to operate from 120 V ac, have built-in speakers and digital displays. Both cover the standard broadcast (530-1710 kHz) and shortwave bands—and then some. But perhaps the best part is that each receiver sells for less than $300.

**Drake SW1**

The SW1 designation says it all. This is Drake’s entry-level receiver, and these days, you won’t find a set much more basic and down-to-earth than the Drake SW1. This is a fairly compact, utilitarian, lightweight box (except for the plastic front panel, the cabinet is steel) with a front-firing speaker on the left and a big green LED display on the right above the TUNING knob. The radio continuously covers from 100 kHz to 30 MHz. It’s double conversion, with IFs at 45 MHz and 455 kHz. There are controls for RF GAIN and VOLUME, plus a 16-button keypad (that includes the power and display dimmer buttons) and big up and down buttons labeled with arrows. AGC is fixed. You’ll find the mini-phone jack on the left-hand panel for headphones. Drake did not provide a signal-strength indicator of on the SW1. That’s unfortunate, since an S meter is a staple for hobby listeners.

The US-made SW1 receives one mode—AM. It has 32 programmable memories to save frequency settings (it comes from the factory pre-programmed with SW stations), and you can enter frequencies directly from the keypad. Hook your antenna to the rear panel (the SW1 has an SO-239 for a coaxial feed connector or a set of screw terminals for a wire antenna and a ground connection), and apply power and you’re all set. To help get you started, Drake supplies a little wire antenna with the SW1 that’s suitable for a temporary indoor setup. The SW1 can operate from 12 V dc into the coaxial power connector on the rear panel. An ac “wall cube” adapter is supplied for typical home use, but the dc capability makes it handy for use away from home (or even in an emergency).

As an AM-only receiver, the fact that the smallest tuning increment is 1 kHz is not necessarily a hardship (the radio tunes in 5-kHz steps using the up/down keys). The synthe-
Table 2

Dxke SW1, serial number 6H12910064

Manufacturer’s Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency coverage</td>
<td>100 kHz-30 MHz</td>
</tr>
<tr>
<td>Modes of operation</td>
<td>AM</td>
</tr>
<tr>
<td>Power requirements</td>
<td>120 V ac; 12 V dc at 400 mA</td>
</tr>
<tr>
<td>Size (HWD)</td>
<td>4.4&quot; x 10.9&quot; x 7.6&quot; in; weight, 4.7 lb</td>
</tr>
<tr>
<td>Sensitivity (bandwidth not specified)</td>
<td>2.0 µV or less (typical)</td>
</tr>
<tr>
<td>Blocking dynamic range</td>
<td>Not specified</td>
</tr>
<tr>
<td>First IF rejection</td>
<td>Not specified</td>
</tr>
<tr>
<td>IF/audio response</td>
<td>Not specified</td>
</tr>
<tr>
<td>Power output</td>
<td>Not specified</td>
</tr>
</tbody>
</table>

Measured in ARRL Lab

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AM, test signal modulated 30% with a 1-kHz tone, 10 dB (S+N)/N</td>
<td>100 kHz, 10.5 µV; otherwise, as specified.</td>
</tr>
<tr>
<td>14 MHz, 87 dB (noise-limited) at 100-kHz spacing.</td>
<td></td>
</tr>
<tr>
<td>14 MHz, 72 dB (noise-limited) at 100-kHz spacing.</td>
<td></td>
</tr>
<tr>
<td>Frequency coverage</td>
<td>100 kHz-30 MHz</td>
</tr>
<tr>
<td>Sizes (HWD)</td>
<td>4.4&quot; x 10.9&quot; x 7.6&quot; in; weight, 4.7 lb</td>
</tr>
</tbody>
</table>

Radio Shack DX-394

This is Tandy’s top-of-the-line general-coverage receiver, the latest of its type in Radio Shack’s consumer electronics lineup. Since it debuted on the market, the DX-394 has gone through two updates, identified by an A or B suffix after the model number on the back panel. When we purchased our DX-394, our local Radio Shack store still had A-suffix models in stock, and that’s what we tested. The A-suffix units include decreased gain of the second mixer, extended AGC release time, and modified audio compensation for SSB.

The DX-394 tout lots of features, especially considering its price class: continuous coverage from 150 kHz to 30 MHz; AM, SSB, and CW modes; 160 frequency memories; digital readout; dual clocks; a mike-level tape-recorder output; search and scan; and direct frequency entry from its front-panel keypad.

This is a compact set in a charcoal-gray plastic cabinet with two fold-down front legs. It features a large LCD display, five front-panel controls, plus a bunch of push buttons—including a keypad. Like the SW1, this set is a dual-conversion superhet (the IFs also are 45 MHz and 455 kHz) with PLL synthesized tuning. You can dim the green-background display but you won’t want to. The DX-394 has a built-in power supply, so you can plug it right into the wall outlet. It also can run off 13.8 V dc, and it has a little built-in telescoping whip antenna on top of the case, making it fairly portable.

Front-panel push buttons let you jump immediately to any of the international shortwave broadcasting bands—from 120 to 11 meters (the 11-meter BC band is right below the 11-meter Citizens Band). The display clearly shows which BC band you’re listening to (ie, 41 m, 19 m). There’s a front-panel mini-jack for headphones.

You can set the tuning step size (100 Hz, 1 kHz, 5 kHz or 10 kHz) using two front-panel STEP keys, and it displays the selection on the front panel (9-kHz AM channel spacing used in some parts of the world is available as a power-up option). Programmable timers let you store frequencies and on/off times. The front panel also includes a digital replication of an analog S meter. AGC is not adjustable.

Using the manual tuning knob can be a little squirrely, since the actual tuning rate varies with the speed with which the knob is spun (something the Owner’s Manual did not explain). Tune very slowly and carefully, and it covers approximately 2.5 kHz per rotation when you’re set to the smallest tuning step (100 Hz). Spin it very rapidly and you’ll move up or down 15 or 20 kHz or more in short order. A continuous-tuning FINE TUNE control gives you somewhat greater control, covering approximately 2 kHz per rotation, independent of step size.

The rear panel includes connections for a high- or low-impedance antenna, an extension speaker, tape out, and external dc power. It also has a recessed button to perform a hard microprocessor reset. The set also has a rear-panel 20-dB ATTenuator switch, which we left on when the set was connected to an external antenna; it engages a passive attenuator. Hooking it up to an external antenna is neither necessary nor especially desirable, except that an external antenna might be less prone to pick up household interference. The noise blanker was not very effective in reducing interference from an oil-burner igniter.

The DX-394 is ultra-simple to use. Just plug it in, extend the little antenna on top, turn it on, set the MODE switch, VOLUME and RF GAIN controls and tune away. The DX-394 gives you several ways to tune in stations. You can manually tune them in using the main tuning knob, reading the frequency right off the display. Manual tuning was accompanied by synthesizer “chuffing” typical of inexpensive sets like this. You also can directly enter a frequency via the keypad on the front panel. Or you can use the unlabeled arrow keys. In addition, the radio’s search mode will automatically look for the next strong signal, although you probably will want to first turn down the RF GAIN control, as the Owner’s Manual suggests. Otherwise, the radio might mistake whatever noise it’s “hearing” for a signal and not start searching.

Among the best features of the DX-394 is its memory system. It’s very easy to store a frequency (and only a frequency) in one of the memories. The DX-394 sets aside 10 memories for each of the bands (LW, MW and SW), plus 10 apiece in each of the “meter” bands,
like 49 or 31 meters—160 memories in all. Of course, this can make for a little confusion when you’re trying to recall which set of 10 memories you’re operating with at any given moment. A separate MON button lets you store and recall a frequency in a “scratchpad” memory. An internal, rechargeable cell backs up memories a month or more, when power is removed from the receiver.

On any given evening—especially here in the Northeast—the 40-meter amateur phone band (41-meter SW BC band) can be a radio listener’s nightmare, particularly for a receiver lacking in dynamic range. Of course, we put the DX-394 to that test. While the needle-pinning AM broadcast stations dominated the band (and the DX-394’s front end and/or AGC), we still were able to locate and copy some of the amateur SSB stations that had shoehorned their way among the BC behemoths. We pulled out several stations in a crowded 75-meter band as well. CW and SSB share the same IF filter, but additional audio filtering is switched in when you move to the CW position. In actual use, we even were able to hear weaker CW signals, but also lots of other stations at the same time—and some of them overloaded the front end, reducing sensitivity. Backing off on the RF GAIN control was a big help. The rear-panel ATT switch was a necessity. ARRL Lab testing also determined that the radio’s noise floor varies considerably with frequency.

The DX-394 did a decent job of receiving AM signals, and we were able to copy many international broadcasters with no problem, even using the built-in whip antenna. AM stations on the DX-394 had a comfortable sound—especially on the standard AM broadcast band. We also were able to monitor some AM activity on the amateur bands, and, of course, we eavesdropped on some local 11-meter CB chatter. For those demanding narrower, more consistent filtering, a 6.5-kHz AM filter, model LFH-4S, is available for $15, shipping included, from Kiwi Electronics, 612 South 14th Ave, Yakima, WA 98902; tel 509-453-5492 or (orders only) 800-398-1146; e-mail kiwa@wolfe.net; http://www.wolfe.net/~kiwa/index.html.

The 31-page DX-394 Owner’s Manual included nice tables of the international broadcasting bands and even pointed out that both 3900-4000 and 7100-7300 kHz are shared between hams and international broadcasters and “interference is heavy in this range.” It has a useful troubleshooting table, too.

Manufacturer: Tandy Corp, 1900 One Tandy Center, Ft Worth, TX 76102; tel 817-390-3700. The DX-394 is available from Radio Shack retail outlets. Manufacturer’s suggested retail price, $249.99; optional DC adapter model 270-1533, $4.49.

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