Product Review Column from *QST* Magazine

October 1998

SGC SG-2020 Transceiver

Alinco's Amazing Credit Card H-Ts

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SGC SG-2020 Transceiver

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After SGC missed its scheduled delivery date of September 1997, we eventually started referring to this little transceiver as "the long-awaited SG-2020." The anticipation had begun to couple with controversy (fueled by speculation on the Internet about the difficult delivery) by the time SGC started shipping radios to backordered customers just before Dayton. The big question is: Was it worth the wait?

We'll get to that in a moment. First, a bit of background. The first hint of the SG-2020 was in the spring of 1997, when SGC announced that it had contracted with Bruce Franklin, KG7CR—late of Index Laboratories and the father of the Index QRP Plus and New QRP Plus—to develop a new transceiver retaining "the basic architecture" (Franklin's words) of the now-discontinued Index QRP Plus (see "Product Review," *QST*, Sept 1996). SGC, known best as a maker of commercial gear, would manufacture and market the radio. The idea, according to Franklin, was to offer a product with at least one foot in the QRP camp but that might also appeal to hams who don't necessarily consider themselves low-power ops.

The SG-2020 has a foothold in the commercial and the amateur arenas, too. In addition to being an amateur product, the SG-2020 replaces SGC's single-IF commercial, portable SG-715, introduced in 1982. SGC emphasizes that the SG-2020 is not simply a new and improved Index QRP Plus, and the company cautions against direct comparisons.

We should also point out up front that SGC has no connection with the former Index Laboratories other than its contract arrangement with Bruce Franklin. SGC neither supports nor provides repair service for Index Laboratories' products.

What SGC delivered is an impressive-looking 20 W SSB/CW transceiver that, for starters, looks much more like ham gear than did its Index ancestor. This is one rugged package, and, at 4.4 pounds, it's not exactly a lightweight! (By comparison, the IC-706MkII weighs 5.5 pounds.) Most of this appears to be in the heavy aluminum case. We didn't try driving over it with a car, but it likely would survive almost unscathed. The radio is a bit smaller than the '706 or a Kenwood TS-50S, and there's a nice big tuning knob, several rubberized pushbuttons, **RF** and **VOLUME** knobs, an LCD display, and a surprising number of features for a radio at this price.

The receiver is a single-conversion upconverting design with a 60 MHz IF. The synthesizer tunes from 60.4 to 89.7 MHz (corresponding to 0.4 to 29.7 MHz). The amplified IF signal passes through a 7-pole 2.7 kHz crystal filter. No optional IF filters are available. A switched-capacitance audio filter (SCAF) performs all additional filtering, providing bandwidths from 100 Hz to 2.7 kHz in 100 Hz steps.

Price vs Value

In terms of all-band HF amateur transceivers, the SG-2020—for now at least—represents the lowest end of the price scale. You must keep this price "position" in mind when discussing whether the SG-2020 represents a good value. You'd have to spend at least another $200 or so to find the closest market "peer" to this radio. It's clear that at least some members of the QRP community were hoping this radio would be a substantial improvement over the Index Laboratories' New QRP Plus. For now, let's just say: It is and it isn't.

BOTTOM LINE

An attractive, compact, rugged low-power SSB/CW HF transceiver that includes several very desirable features. Its overall performance is in line with its economical price tag.

Because of the preponderance of higher-priced, full-featured transceivers—new and used—on the market, it's pretty natural to start asking yourself, "How many compromises and trade-offs will I have to accept if I decide to get an SG-2020?"

The answer is: Some. What you get for your money is really quite a bit—a relatively low-power (but not strictly QRP-level) CW and SSB transceiver (also capable of data modes) in a very attractive package that's suitable for home, mobile, or portable use. In addition to the SCAF, it has 20 memories; a built-in CW keyer; a noise blanker; RIT, XIT, and split capability; variable passband tuning; an RF gain control (the lack of which we'd complained about in the New QRP Plus); and an LED bar graph S/power-output meter that can be set for peak reading.

The LCD display is simple but adequate. It either displays the operating frequency or gives information on the settings of the various menu items. It's clear and easy to read at most angles. You can backlight it or not, depending on whether you want to conserve power (ie, when running off batteries).

A word about current drain. Our receive current drain measurement in the ARRL Lab

Table 1

SGC SG-2020, serial number 79654218

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receive, 1.8-30 MHz†; transmit, 1.8-2, 3.5-4, 7-7.3, 10.1-10.15, 14-14.35, 18.068-18.168, 21-21.45, 24.89-24.99, 28-29.7 MHz.	Receive, 1.7-30 MHz; transmit, as specified.
Power requirement: Receive, 430 mA; transmit, 4 A (max output).	Receive, 550 mA; transmit, 4.7 A. Tested at 13.8 V†.
Modes of operation: SSB, CW.	As specified.
Receiver	*Receiver Dynamic Testing*
SSB/CW sensitivity, bandwidth not specified, 10 dB S+N/N: 1.8-30 MHz, <0.5 μV.	Minimum discernible signal (noise floor), 500 Hz filter: 3.5 MHz –131 dBm 14 MHz –130 dBm
Blocking dynamic range: Not specified.	Blocking dynamic range, 500 Hz filter: 3.5 MHz 110 dB* 14 MHz 110 dB*
Two-tone, third-order IMD dynamic range: Not specified.	Two-tone, third-order IMD dynamic range, 500 Hz filter: 3.5 MHz 86 dB* 14 MHz 88 dB
Third-order intercept: +18 dBm, bandwidth not specified.	3.5 MHz +12.7 dBm† 14 MHz +15.5 dBm†
Second-order intercept: Not specified.	+32 dBm.
S-meter sensitivity: Not specified.	S9 signal at 14.2 MHz: 47 μV.
Receiver audio output: 1 W, distortion and impedance not specified.	1.1 W at 10% THD into 4 Ω.
IF/audio response: Not specified.	Range at –6 dB points, (bandwidth): CW-N (500 Hz filter): 714-1136 Hz (422 Hz); CW-W: 746-2703 Hz (1958 Hz); USB-W: 714-2667 Hz (1953 Hz); LSB-W: 444-2353 Hz (1909 Hz).
Spurious and image rejection: Not specified.	First IF rejection, 14 MHz, 87 dB; image rejection, 14 MHz, 72 dB.
Transmitter	*Transmitter Dynamic Testing*
Power output: SSB, CW, 20 W high, 0 W low.	As specified.
Spurious-signal and harmonic suppression: ≥50 dB	40 dB. Meets FCC requirements for spectral purity for equipment in its power output class and frequency range.
SSB carrier suppression: Not specified.	35 dB.
Undesired sideband suppression: Not specified.	>60 dB.
Third-order intermodulation distortion (IMD) products: Not specified.	See Figure 1.
CW keyer speed range: 5-60 WPM.	As specified.
CW keying characteristics: Not specified.	See Figure 2.
Transmit-receive turn-around time (PTT release to 50% audio output): Not specified.	S9 signal, 9.5 ms.
Receive-transmit turn-around time (tx delay): Not specified.	SSB, 20 ms. Unit is suitable for use on AMTOR.
Composite transmitted noise: Not specified.	See Figure 3.
Size (height, width, depth): 2.8×6.0×7.0 inches; weight, 4.4 pounds.	

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

†See text.

*Measurement was noise-limited at the value indicated.

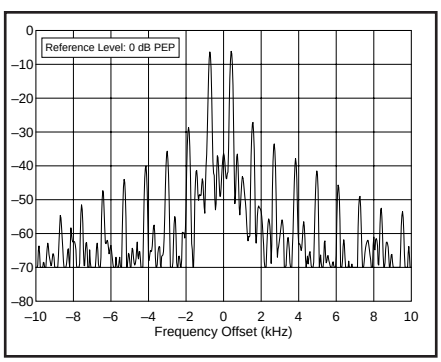

Figure 1—Worst-case spectral display of the SG-2020 transmitter during two-tone intermodulation distortion (IMD) testing on HF. The worst-case third-order product is approximately 28 dB below PEP output, and the worst-case fifth-order product is approximately 34 dB down. The transmitter was being operated at 20 W output at 18.120 MHz.

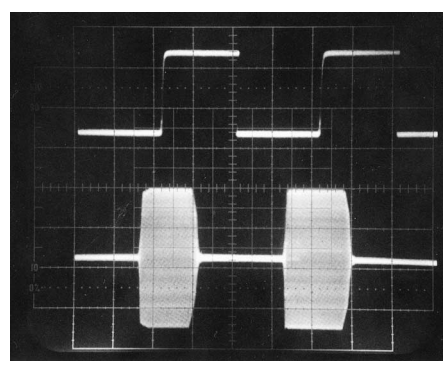

Figure 2— CW keying waveform for the SG-2020 showing the first two dits. The equivalent keying speed is 60 WPM. The upper trace is the actual key closure; the lower trace is the RF envelope. Horizontal divisions are 10 ms. The transmitter is being operated at 20 W output at 14.2 MHz.

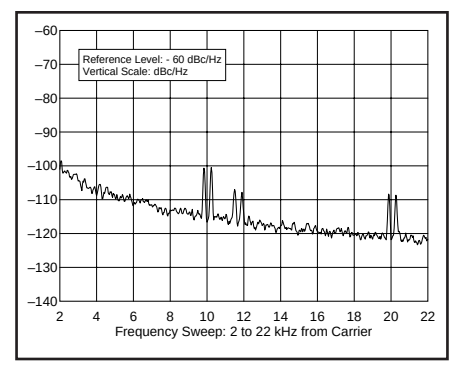

Figure 3—Worst-case tested spectral display of the SG-2020 transmitter output during composite-noise testing. Power output is 20 W at 3.520 MHz. The carrier, off the left edge of the plot, is not shown. The plot shows composite transmitted noise 2 to 22 kHz from the carrier.

(see Table 1) was 120 mA greater than SGC's 430 mA spec. SGC determined its current drain spec with the display backlighting disabled and with the volume control all the way down. Our measurement was taken with the display backlighting in its default state (on) and with the volume all the way up—but with no signal, just noise.

The radio also offers RF-level speech processing; a top-firing speaker; fixed audio-derived AGC; scanning capabilities; and, overall, commercial-grade construction. SGC sure didn't skimp on the case and knobs; this radio appears to be physically indestructible. Unlike the New QRP Plus (given its heritage, comparisons are inevitable), a microphone is included.

What you *don't* get are features that you'll have to pay more for (in some cases, *much* more) in another new transceiver and even many used ones. These include things like additional IF crystal filters; built-in DSP; a memory keyer; adjustable, IF-based AGC; a bandswitch; VOX, dual VFOs; adjustable CW offset; adjustable sidetone; adjustable transmit audio processing; finer tuning steps and readout; all-mode general-coverage receive; and greater immunity against strong-signal overload.

Hands On

There's not much that's intuitive about using the SG-2020. SGC does supply a very handy *Quick Start Card*, however, that tells you which buttons or combination of buttons you must press to access various primary and secondary functions (secondary functions are akin to menu items). These can be a test of your manual dexterity, especially if the radio is not firmly mounted.

Some control operations require pressing and holding one button while pushing a second button. In two instances—changing modes and storing frequencies—the desired buttons are tightly packed between the volume control and the main tuning knob. This makes performing these particular functions inconvenient.

Varying other settings, such as the internal keyer speed, tuning step size, SCAF filter bandwidth, passband tuning position, stepping through the memories, and changing frequency at the fast tuning rate, require holding down a button and turning the main tuning dial simultaneously. This seems a bit awkward at first and took some getting used to.

The Index QRP Plus didn't have a bandswitch and neither does the SG-2020. SGC has programmed ham band frequencies into the unit's 20 memories. To switch bands, you either have to access memory mode or push and hold the **FAST** button and twirl the tuning knob. You can set the fast-tuning rate up to 10 kHz (or as low as 500 Hz). At the 10-kHz setting, the radio covers about 5 MHz for every dial rotation.

You can program the memories to your own favorite frequencies, but remember that if you program several frequencies on the same bands, you'll soon run out of room to save the general "band" frequencies in memory. Holding down the **MEM** button while turning the power on will restore the factory default amateur band settings. Each memory will retain information on frequency, mode, RIT or split settings, SCAF bandwidth, and transmitter power level.

One thing I noticed right off was that SGC needs to offer some kind of a bail to prop up the radio at an angle so you can see its face (the Index had a little fold-down peg-leg). What you get are four rubber stick-on feet that you can apply yourself.

Those wishing to use the '2020 for mobile operating will be pleased that it's quite compact and considerably shallower in depth than most currently available transceivers. SGC provides two adhesive backed $^3/_4\times$ 6-inch hook and loop fastener pads for attachment to a flat surface. Permanent mounting is possible using the included screw-down mounting plate that can be attached to the bottom of the radio. An optional pedestal mount system is also available.

The power cable—slightly longer than 3 feet—is heavy and stiff. The unusual power connector uses set screw type terminals, so it would be easy to substitute a more flexible alternative. The transceiver is fused internally with a 5 A self-resetting circuit breaker, so no external fuses are included in the stock cable. Those installing this unit in a vehicle should certainly consider installing fuses at the battery end of the cable.

On the Air

"Hey, that sounds darn good for only 20 W!" That was the most frequently heard report on SSB and sometimes on CW. We also found that 20 W is plenty of power to work the world—even with a modest antenna.

The unit's transmit audio processing circuit is always on, and there's no mike gain control. Instead, the SG-2020 uses a voice-operated gain-adjusted device (VOGAD) to automatically set the correct level. The resulting transmit audio is very good and does not sound overly processed. This system also works quite well in reducing background noise.

The radio has decent CW keying (see Figure 2), but when using the built-in iambic keyer, it's not full-break-in (QSK). Sending at moderate speeds, received signals can be heard between characters, but not between character elements. The unit switches between transmit and receive fairly fast (you can hear the relay, but it's not annoying), but not *that* fast. It will operate full-break-in when using an external electronic keyer or straight key. The CW pitch (offset) is fixed.

Kudos to SGC for including separate hand key and paddle jacks. Separate jacks are something I sure miss on my Kenwood TS-850S, where it's an either/or situation.

I found myself wishing that received signals could be as clear and unruffled as the transmitted ones. The receiver is pretty sensitive (see Table 1), but, frankly, I was disappointed by the radio's signal-handling capability—or, should I say, by its lack of same. Nearby signals—even if they're not terribly strong—can render on-channel copy difficult or impossible. You can effect some improvement, especially on stronger signals, by backing off the **RF** control. But this affects your S-meter reading, and the audio-derived AGC does not willingly pick up the slack for weaker signals. There's also no way to vary the AGC attack time.

The receiver's strong-signal performance is consistent with measurements encountered during testing in the ARRL Lab, with several receiver measurements being noise-limited at the values shown in Table 1. We note, however, that while the performance was limited by receiver noise, the third-order intercept point, +15.5 dBm on 20 meters (measured at an S5 receiver output level), is actually quite good—better, in fact, than some transceivers in the higher price brackets.

For avoiding QRM on SSB, the combination of the SCAF and the PBT can help a great deal, but performance in this regard is not up to crystal—or even good ceramic filter—standards (think of the SCAF in the same way you would an after-market DSP box; it does nothing at the IF, only at baseband audio).

While I found the passband tuning to be very useful on SSB, it was nearly worthless on CW because it shifted not only the IF passband but the frequency of the signal I was trying to copy! It was almost as though you were turning the RIT knob. The PBT control provides a shift between –1000 Hz and +300 Hz in 100 Hz steps.

The SCAF does a creditable job, and it's great fun to be able to just dial up a wider or narrower bandwidth as needed. But, most DSP boxes do a better job—and provide noise reduction to boot.

I never quite got used to the way the radio sounded when tuning through a band. It sounds raspy and noisy, and this can impair your ability to pick out weaker signals when you're just trolling. If the band is active, you'll hear a lot of trash too.

When tuning on SSB, it sounds almost as though the PLL is not locking up as you tune through a signal—unlike any other receiver I've ever heard. Once you're on target, the audio is okay.

It's a similar situation on CW; signals—especially the stronger ones—often first appear to have a T6 note. There's also lots of popping noise. Once tuned in, signals can be made to sound normal by tweaking the various controls at hand, but even in its narrowest setting (100 Hz), the SCAF won't keep a nearby (and especially stronger) CW signal from literally punching holes in your copy.

If you don't tune around a lot but tend to work a few favorite frequencies, you might be less bothered by these peculiarities.

Speaking of distortion, you might get

some if you use low-impedance headphones, even though the rear-panel jack indicates **SPEAKER/PHONES**. SGC has suggested using an audio attenuator in this situation. By the way, this is a stereo jack. I discovered this after trying to hook up my mono external speaker and getting very "thin" and low audio. Pulling the plug out part of the way cured this.

The noise blanker worked reasonably well on pulse-type ignition noise and didn't seem to degrade the overall audio quality of received signals.

You can listen to AM shortwave and broadcast stations on the SG-2020. Although there is not a specific AM mode, reception in upper and lower sideband works quite well, and the ability to select the received sideband actually adds some interference rejection capability. For Standard Broadcast AM and NAVTEX reception between 400 and 1600 kHz you will need to bypass the unit's broadcast band filter by moving an internal jumper. Those who experience interference from strong nearby AM broadcast stations will want to leave this filter enabled. It's noteworthy that SGC has included provisions for optimizing the filter's rejection frequencies. The broadcast filter actually consists of two high-pass elliptical filters. From the factory, these are set to provide maximum signal rejection at 700 and 1300 kHz. The nicely done *Installation & Operations Manual* includes information on locating the bypass jumper and adjustment instructions for fine tuning the filters. We did not try this.

Xtreme QSX!

Some not-so-good news and some really interesting news in the RIT department: Push the **RIT** button and the unit goes from transceive (**XCVE**) mode to RIT mode, as indicated by little front-panel LEDs (these are next to the **RIT**, **XCVE**, and **SPLIT** buttons). In RIT mode, the main tuning knob controls only the receiver's frequency. Once RIT is enabled, however, there's no way to simply turn it off and return to your original frequency. To get out of RIT, you push the **XCVE** button, but this makes the transmit frequency match the receive frequency—ie, the last frequency you'd dialed up while in RIT mode. This could be a distinct disadvantage during an on-air "roundtable" where one station might be slightly off-channel, or during a contest where someone calls you slightly off frequency. One workaround for this is to program the primary transceive frequency into one of the memory positions. That's the not-so-good news.

Now for the really interesting part: There's absolutely *no limit* to how much RIT you can dial up. As long as you're somewhere the SG-2020 will tune, you can go there in RIT mode (the same holds true for split mode). This literally means that you can transmit on 10 meters and receive on 160 meters, or vice versa! It should be possible to operate satellite Mode K with this radio, transmitting on 15 meters and receiving on 10 meters.

The unit lets you change the transmit frequency (XIT) in a similar fashion by pressing the **REV** button while in RIT mode.

Listening Up

Credit goes to SGC for paying attention and responding to user comments and complaints. The company has posted an "important information update" section on its Web site at **http://www.sgcworld.com/products/SG2020/2020update.htm** that responds to issues users have raised. The update also posts changes made in later firmware versions.

Final Final

For an economical, compact transceiver, the SG-2020 is a nice start. But I'd like to think that SGC could develop this product into one that works every bit as good as it looks. In this price range, however, this could be as good as it gets.

Manufacturer: SGC Inc, 13737 SE 26th St, Bellevue, WA 98005; tel 425-746-6310; e-mail **sgc@sgcworld.com**; **http://www.sgcworld.com**. Manufacturer's suggested retail price: $625.

The included 90-day limited *Standard Warranty* covers parts and labor. A *Premium Extended 3-Year Warranty* is also available within the first 90 days of ownership. This $139.95 option gives the owner an extended warranty period, a 10 business day turnaround time on repairs, and one free software upgrade during the first three years of ownership.

Alinco's Amazing Credit Card H-Ts

By Rick Lindquist, N1RL
Senior Assistant Technical Editor

Wow! Neat! Those were some of the reactions at the 1997 Dayton Hamvention when Alinco formally debuted its first "credit card" H-Ts. The appropriately nomenclatured DJ-C1 (2 meters) and DJ-C4 (70 cm) were as close as any manufacturer had come to bringing Dick Tracy's famed wrist radio to fruition in the ham radio world. Here was a real FM transceiver—albeit very low power—that not only was extremely small and lightweight. Its almost flat, rectangular form factor (hence the credit card label, although they're just fractions of an inch wider, longer, and thicker) made for a unit you could literally stick into a shirt or jacket pocket and forget you had it there. Except in the case of the C1 and C4, if you wanted to hear anything, you had to have the included "earplug" stuck in one ear. (Alinco offers both a speaker-microphone and an earphone-microphone as optional accessories.)

"Hey! Why not lose the 'earplug' and put in a tiny speaker?" the pundits posited. Now, *there's* a concept, Alinco replied.

Manning the Alinco booth, PR man Jeff Reinhardt, AA6JR, joked to visitors that all they had to do to have a dual-band radio was to stick a C1 and a C4 together with double-sided tape (they certainly were inexpensive enough), and, voilá, instant dual-band credit-card radio! But *seriously*, they pleaded.

BOTTOM LINE

With a C1 or a C5 in your pocket, you'll never again be "out-of-pocket" in your local ham radio community. These fun units provide limited VHF and UHF transmit range but lots of listening fun, and the battery lasts and lasts.

For the answer, they had only to wait until the 1998 Dayton Hamvention, when Alinco formally went public with the DJ-C5, which—in case you haven't already heard—also has a little speaker.

"It's just like a *real* dual-bander," one observer remarked after hefting (hardly the right word for a radio that weighs slightly less than 3 ounces) the DJ-C5 and (what else?) stuffing it in a shirt pocket.

Okay, so what's the skinny (pun intended) on these little H-Ts? Are these real radios? Or are they novelty items? We looked at a C1 and a C5 to find out.

The DJ-C1T Begets the DJ-C5T

There's a German saying that translates "The apple doesn't fall far from the tree"

(it's the Teutonic equivalent of "Like father, like son," but more politically correct and apt in the present situation). If we apply the analogy to these diminutive transceivers, this is the case with the C1 and the subsequent C5. The radios are exactly the same size (in fact, the lab inadvertently swapped the back from the C1 onto the C5 and we never noticed until we happened to spot the label with the model number). Except for the telltale speaker grille on the DJ-C5, it's hard to tell these radios apart (the C1 keypad has a light blue background; the C5's has a silver-gray background). Both units also come in a package that includes a tiny desk charger "stand" for the lithium-ion battery, and a little *Instruction Manual* (booklet?) that pretty much covers all the bases. Both also have a nice little plastic protective sleeve (almost like a pocket protector).

If you used to belong to the Secret Service, you'd likely feel right at home using the C1. During a presidential visit to my city a few years back, I remember seeing these guys wearing "earplugs" and sunglasses communicating with one another by talking into their shirt cuffs. The C1 gives you similar capability.

This is, indeed, a *real* radio. It's also a novelty. After tinkering with the C1 for a while, most users very likely will yearn for the accessory speaker microphone. But, "as is," it's still got a lot of utility—and the advent of the C5 has also caused the street price of the C1 and C4 to plummet dramatically. You can put one of these into your shirt pocket or your purse for well under $100. (Alinco says it will continue to sell C1s and C4s until its stocks are exhausted.)

The necessity of the "earplug" aside, the radio actually is fun—and in those instances where you really need to have the privacy (or if you're in the midst of the typically boisterous hamfest crowd), the C1 is just the ticket. The audio quality on both receive and transmit is quite good—in fact, on transmit it's indistinguishable from a larger H-T.

Yes, a transceiver that only puts out in the vicinity of 1/3 W is not going to hit that distant repeater. For shorter-range repeater and simplex applications, however, the C1 is super!

The C1 has a little built-in telescoping antenna. It extends out 3 3/4 inches. Because this could impede usability in the typical "shirt-pocket" application, Alinco has thoughtfully supplied a little "wire" antenna (shades of those Secret Service radios) that you can snap onto the collapsed telescope so you won't get poked. Alinco says the wire is not as efficient as the telescoping antenna; actually, neither antenna is terribly efficient, and it's not easy to attach a "real" antenna to the C1 because it does not offer an external antenna connector.

Push buttons control all functions on the C1 (and on the C5, for that matter). At first glance, this might seem a major inconvenience. In fact, once you get the hang of it—and it doesn't take long—the push buttons are second nature. To set the volume level (we found most people kept the C5 at or near top volume), you press the **VOL/SQL** button once, then use the **UP** or **DOWN** arrow key to set; push the button twice to set the squelch.

Many secondary functions are accessed by first pressing the well-labeled **FUNC** button then another button (the C1 has seven front-panel buttons; the C5 has eight). Some users were a little put off at first by the fact that Alinco put the label for each key's major secondary function in the middle of the button (and in the same color as the **FUNC** button) and the label for the key's primary function above the key. But, it's a good idea to have the booklet handy to keep some unlabeled secondary functions straight (for example, to jump in frequency 1 MHz at a time, you first press the **FUNC** button and then either the **UP** or **DOWN** arrow key). A radio this small would benefit from a little quick reference card that the user could tack onto the radio's back.

All the expected functions are there—from CTCSS tone encode (encode and decode in the C5) to auto power-off, plus

Table 2
Alinco DJ-C1T, serial number T001698

Manufacturer's Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receive, 118-136 MHz, AM; 136-174 MHz FM; transmit, 144-148 MHz.	As specified.
Power requirements: 3.7 V dc. Receive, ≈30 mA; transmit, (max), ≈240 mA.	Receive, 31 mA; transmit, 230 mA.
Size (HWD); 3.7×2.2×0.4 in; weight 2.6 oz.	
Receiver	*Receiver Dynamic Testing*
FM sensitivity, 12 dB SINAD: 0.16 μV.	For 12 dB SINAD: 0.16 μV.
Two-tone, third-order dynamic range: Not specified.	20 kHz offset, 50 dB*; 10 MHz offset, 72 dB.
Adjacent channel rejection: Not specified.	49 dB.
First IF and image rejection: Not specified.	IF rejection, 90 dB; image rejection, 57 dB.
Squelch sensitivity: Not specified.	At threshold, 0.13 μV.
Audio output: 20 mW into 32 Ω, distortion not specified.	22 mW at 10% THD into 32 Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output: 0.3 W with ML11-1657, 3.7 V battery pack; with external supply, not specified.	0.34 W with ML11-1657 3.7 V battery pack; 0.34 W at 3.7 V dc (external supply).
Spurious signal and harmonic suppression: 60 dB.	60 dB. Meets FCC requirements for spectral purity for equipment in its power output class and frequency range.
Transmit-receive turn-around time (PTT release to 50% of full audio output): Not specified.	Squelch off, S9 signal, 220 ms.
Receive-transmit turn-around time ("tx delay"): Not specified.	110 ms.

Note: Unless otherwise noted, all dynamic range measurements were made at the ARRL Lab standard spacing of 20 kHz.
*Measurement was noise-limited at the value shown.

Table 3
Alinco DJ-C5T, serial number T000755

Manufacturer's Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receive, 118-136 MHz, AM; 136-174 MHz, 420-450 MHz FM; transmit, 144-148 MHz, 420-450 MHz.	As specified.
Power requirements: 3.7 V dc. Receive (squelched), ≈30†; transmit (max), ≈300 mA.	Receive, 80 mA; transmit, 220 mA.
Size (HWD); 3.7×2.2×0.4 in; weight 2.6 oz.	
Receiver	*Receiver Dynamic Testing*
FM sensitivity, 12 dB SINAD: VHF, 0.16 μV; UHF, 0.17 μV.	For 12 dB SINAD: VHF, 0.16 μV; UHF, 0.19 μV†.
Two-tone, third-order dynamic range: Not specified.	20 kHz offset: VHF, 46 dB, UHF, 48 dB*. 10 MHz offset: VHF, 65 dB; UHF, 70 dB.
Adjacent channel rejection: Not specified.	VHF, 46 dB; UHF, 48 dB.
First IF and image rejection: Not specified.	IF rejection: VHF, 144 dB; UHF, 133 dB. Image rejection: VHF, 83 dB; UHF, >144 dB.
Squelch sensitivity: Not specified.	At threshold, VHF, 0.15 μV; UHF, 0.15 μV.
Audio output: 60 mW into 8 Ω, distortion not specified.	59 mW at 10% THD into 8 Ω.
Transmitter	*Transmitter Dynamic Testing*
Power output: 0.3 W with ML11-1657, 3.7 V battery pack; with external supply, not specified.	VHF: 0.31 W, UHF: 0.34 W with ML11-1657 3.7 V battery pack; VHF: 0.34 W, UHF: 0.34 W with 3.7 V dc (external supply).
Spurious signal and harmonic suppression: 60 dB.	VHF, 67 dB; UHF, 72 dB. Meets FCC requirements for spectral purity for equipment in its power output class and frequency range.
Transmit-receive turn-around time (PTT release to 50% of full audio output): Not specified.	Squelch off, S9 signal: VHF, 180 ms; UHF, 170 ms.
Receive-transmit turn-around time ("tx delay"): Not specified.	VHF, 124 ms; UHF, 100 ms.

Note: Unless otherwise noted, all dynamic range measurements were made at the ARRL Lab standard spacing of 20 kHz.
*Measurement was noise-limited at the value shown.
†See text.

plenty of memories (20 main and one call channel memory in the C1 and 50 main and one VHF and one UHF call channel memories in the C5) and even a battery-saver feature. You don't get an S meter or RF output meter on either radio. Instead, there's a little red LED on top that tells you you're transmitting, and when you hear a signal, the little LCD display says "BUSY" right below the frequency readout.

By the way, the display is plenty large enough—as large as we've seen on a few "full-size" H-Ts in fact. Alinco has managed to squeeze quite a bit of information onto this display window. Beside the frequency, it can tell you the memory channel number, frequency shift (+, –), and whether tone is enabled, among other things. Neither the C1 or the C5 has a lighted display, however—perhaps not surprising given the minuscule 3.7 V battery (you have to take the radio apart to even see it), but possibly a drawback for some applications.

The Apple: The DJ-C5T

Everyone liked the DJ-C5T—or at least they liked the *idea* of it. Given its flea power transmitter, the receiver's reach often exceeds its transmitter's grasp. As with other H-Ts in this power level—and they are becoming legion—you can hit the local machines without any trouble—*most* times. With either unit you soon get used to hearing machines very well that you cannot hit. Perhaps because the little antenna is less of a compromise on 70 cm, it sometimes seemed that you were more likely to luck out with repeaters on that band as opposed to 2 meters.

The tiny speaker is a huge addition in terms of real-world functionality for a radio like this. It sounds like an itty-bitty speaker too; audio is tinny but recognizable. The eight-step audio controls on these units don't provide room-filling volume, and the audio will distort some at high levels, but it's quite adequate for all but the noisiest environments. In some instances, you'll find yourself wanting an "earplug" on the C5; it's a little ironic, but Alinco does not supply one as standard equipment.

One noteworthy feature that the DJ-C5T provides is the bell function. If you enable the bell, it alerts you with a double-beep when the squelch opens. It's a bit like setting an alarm clock; the function automatically cancels once the bell goes off.

As have other makers of low-power transceivers like these, Alinco points out that you can extend its very finite transmit range by using the DJ-C5T in conjunction with a dual-band mobile transceiver that has crossband repeat capability.

The C5 appeared to be very easy on its battery. With the battery-saver and auto power-off modes enabled, the radio would go for several days before requiring recharging. Alinco informs us that the receive power consumption specification of 30 mA currently listed in the C5's owners manual is a typographical error. They indicate that the nominal value probably is closer to the 80 mA we measured. Obviously, this will vary with usage patterns, and the more you transmit, the shorter the time between charges. Charging time for the internal lithium-ion battery is about two hours.

It's also possible to operate these radios using the included wall transformer and charger tray as a power supply. An optional car cord is also available which can be connected to the tray to charge or power the units from a cigarette lighter socket.

The Big Plus

One of the most enjoyable features on both of these radios is their extended receive capabilities. You can listen to a lot of VHF spectrum outside of the amateur bands with these units. And, even given the nec-

essarily dinky antennas (the DJ-C5T has a skinny rubber ducky antenna that stands 4 1/2 inches tall and has a non-standard screw-in connector) they can hear quite well. The rubber ducky antenna on the C5 is a real improvement over the C1 in form, but not necessarily in function.

Aside from amateur frequencies, the VHF receivers in the C1 and C5 cover from approximately 118 to 174 MHz, which means you can hear National Weather Service broadcasts and bulletins, marine frequencies (I put marine channel 16—157.10 MHz—into a memory so I could monitor while in the galley of my boat), some police and public service frequencies, and, of course AM aircraft (the unit automatically switches to AM mode in receive when you're in the aircraft band). If you're a frequent air traveler, one of these could reduce the boredom of those long layovers. The C5 offers no additional receive coverage on UHF, however.

On the down side, adjacent channel rejection and dynamic range on the C5 are not terribly good—in the 46-48 dB range. In very congested areas, this could become an issue. Many relatively inexpensive H-Ts offer much better numbers, but they don't offer the portability of the C5. Wideband dynamic range—a measure of immunity to so-called "intermod" from paging systems and the like, was much better, however, and on a par with other H-Ts we've looked at (see Table 3).

The receiver in the C5 is pretty sensitive, but our unit just missed its 0.17 µV spec on UHF.

Go Where You Wanna Go

These credit card radios have made ham radio more portable than ever before. Users marveled at Alinco's ability to accomplish the technological equivalent of putting 10 pounds of spuds into a 5-pound (3-ounce?) bag.

Shortcomings aside, for local repeater use or just for monitoring activity, these little units are hard to beat. Ham radio families, clubs that travel together, or ARES groups might consider equipping themselves with several of them: they're inexpensive, charge quickly, and won't weigh you down. Just don't forget to take it out of your pocket before tossing your shirt or jacket into the laundry hamper.

The C1, C4, or C5 are easy to overlook, but we'd suggest you make it a point to check them out. Given the reasonable street price lately for the C5, we wouldn't be surprised to see one sprouting from *your* pocket very soon.

Manufacturer: Alinco USA, 438 Amapola Ave, Suite 130, Torrance, CA 90501; tel 310-618-8616; fax 310-618-8758; **http://www.alinco.com**. Manufacturer's suggested retail price, DJ-C1T, $199.95; DJ-C4T, $199.95; DJ-C5T, $249.95. QST

W1AW schedule

Pacific	Mtn	Cent	East	Sun	Mon	Tue	Wed	Thu	Fri	Sat
6 am	7 am	8 am	9 am					Fast Code	Slow Code	
7 am	8 am	9 am	10 am					Code Bulletin		
8 am	9 am	10 am	11 am					Teleprinter Bulletin		
9 am	10 am	11 am	noon							
10 am	11 am	noon	1 pm		Visiting Operator Time					
11 am	noon	1 pm	2 pm							
noon	1 pm	2 pm	3 pm							
1 pm	2 pm	3 pm	4 pm	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code
2 pm	3 pm	4 pm	5 pm	Code Bulletin						
3 pm	4 pm	5 pm	6 pm	Teleprinter Bulletin						
4 pm	5 pm	6 pm	7 pm	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code
5 pm	6 pm	7 pm	8 pm	Code Bulletin						
6 pm	7 pm	8 pm	9 pm	Teleprinter Bulletin						
6:45 pm	7:45 pm	8:45 pm	9:45 pm	Voice Bulletin						
7 pm	8 pm	9 pm	10 pm	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code	Fast Code	Slow Code
8 pm	9 pm	10 pm	11 pm	Code Bulletin						
9 pm	10 pm	11 pm	Mdnte	Teleprinter Bulletin						
9:45 pm	10:45 pm	11:45 pm	12:45 am	Voice Bulletin						

W1AW's schedule is at the same local time throughout the year. The schedule according to your local time will change if your local time does not have seasonal adjustments that are made at the same time as North American time changes between standard time and daylight time. From the first Sunday in April to the last Sunday in October, UTC = Eastern Time + 4 hours. For the rest of the year, UTC = Eastern Time + 5 hours.

❑ ***Morse code transmissions:***

Frequencies are 1.818, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675 and 147.555 MHz.

Slow Code = practice sent at 5, 7 1/2, 10, 13 and 15 wpm.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice text is from the pages of *QST*. The source is given at the beginning of each practice session and alternate speeds within each session. For example, "Text is from July 1992 *QST*, pages 9 and 81," indicates that the plain text is from the article on page 9 and mixed number/letter groups are from page 81.

Code bulletins are sent at 18 wpm.

W1AW qualifying runs are sent on the same frequencies as the Morse code transmissions. West Coast qualifying runs are transmitted on approximately 3.590 MHz by W6OWP, with K6YR as an alternate. At the beginning of each code practice session, the schedule for the next qualifying run is presented. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send it to ARRL for grading. Please include your name, call sign (if any) and complete mailing address. Send a 9×12-inch SASE for a certificate, or a business-size SASE for an endorsement.

❑ ***Teleprinter transmissions:***

Frequencies are 3.625, 7.095, 14.095, 18.1025, 21.095, 28.095 and 147.555 MHz.

Bulletins are sent at 45.45-baud Baudot and 100-baud AMTOR, FEC Mode B. 110-baud ASCII will be sent only as time allows.

On Tuesdays and Saturdays at 6:30 PM Eastern Time, Keplerian elements for many amateur satellites are sent on the regular teleprinter frequencies.

❑ ***Voice transmissions:***

Frequencies are 1.855, 3.99, 7.29, 14.29, 18.16, 21.39, 28.59 and 147.555 MHz.

❑ ***Miscellanea:***

On Fridays, UTC, a DX bulletin replaces the regular bulletins.

W1AW is open to visitors during normal operating hours: from 1 PM until 1 AM on Mondays, 9 AM until 1 AM Tuesday through Friday, from 1 PM to 1 AM on Saturdays, and from 3:30 PM to 1 AM on Sundays. FCC licensed amateurs may operate the station from 1 to 4 PM Monday through Saturday. Be sure to bring your current FCC amateur license or a photocopy.

In a communication emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

Headquarters and W1AW are closed on New Year's Day, President's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving and the following Friday, and Christmas Day.