

The SGC SG-2020 SSB/CW HF Transceiver

BY DAVE INGRAM*, K4TWJ

Feeling a bit bored with uneventful daily routines? Want to experience new amateur radio thrills and excitement? Gear up with a new rig, hit the bands in high style, and start living the good life!

Dumb advice? Not at all. It works great and turns good results every time. Really! But new transceivers with a respectable number of fancy features cost a bundle, right? Not necessarily. All-out deluxe units are expensive, true, but look beyond that "front line" of gear and you will discover some real treats at surprisingly affordable prices. Yes, and generally speaking, these less-expensive rigs are capable of working almost anything the "super rigs" can work.

One good example of this fact is the subject of this CQ review: SGC's new SG-2020 SSB/CW transceiver. This is a high-calibre rig with a proven, solid background. It makes a very nice unit for home, mobile, or portable operation, and it sports a fair and square price tag to boot. Sound appealing? Read on!

The Basic Facts

SGC's new SG-2020 checks in with measurements of 2.75"H x 6"W x 7"D, a weight of 4.5 pounds, and a blue-gray color case that seems impervious to rough handling or abuse. It has a well-balanced, rubberized tuning knob, backlit multifunction frequency readout, LED-type bar meter, front flip-up foot, and hefty top-mounted speaker. Recessed front-panel LEDs indicate when the rig is operating transceive or split frequencies, when its noise blanker and/or RIT is on, and when it is in transmit mode. Combined with the meter's green and red LEDs, this produces a captivating "bright lights and glamour" look during use.

The SG-2020 operates SSB and CW on all nine HF bands with up to 20 watts output and receives (SSB and CW only) from 1.8 to 30.0 MHz with very good sensitivity and selectivity (additional specs of interest are listed in Table I). It requires 12 to 14 volts DC at 4 to 5 amps for operation at 20 watts output or approximately 1.5 amps for QRP operation at the 4 or 5 watt level. Receive-only current is around

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The new SGC SG-2020 HF transceiver is small, rugged, and built for action with an impressive array of big-time features which include 20 memories, built-in keyer, digital SCAF filters, SWR monitor, SSB speech compressor, and more.

400 ma with the readout's backlight switched off—just right for battery-powered QRP field operations.

Speaking of QRP, I should also mention Bruce Franklin, KG7CR, of Index Labs and father of the now-famous QRP Plus transceiver was a key member of the SG-2020's design team. As such, it is an even more elaborate and feature-packed version of that popular unit. This is a real compliment to the SG-2020, because QRPers traditionally thrive on copying weak DX-like signals through QRM and adverse band conditions. And since the little rig's power is front-panel adjustable from 1 watt to full output, it addresses both traditional amateur and QRP markets very effectively.

Deluxe and Special Features

Touring the SG-2020's front panel and punching some of its rubberized buttons hints at more special features and func-

tions in this ultra-compact transceiver than first meet the eye. The little tiger has 20 fully tunable memories, digital SCAF CW filters from 2.7 kHz to 100 Hz, built-in iambic keyer, passband tuning, RIT, split-frequency capability, and SWR monitoring—all in one box. These features are first accessed by pushbuttons, and then changed by rotating the main tuning knob. Band selection, for example, involves using that two-step process for recalling a memory to the VFO. Any desired frequency can then be tuned in plus programmed back into memory for quick access to a favored operating spot.

Here's the special kicker. You can recall a memorized frequency and check activity, tune the band for more activity, punch the "MEM" button to recheck or operate the memorized frequency, then punch "MEM" again for toggling frequencies. Even a third frequency can be included in this toggling concept, or favorite frequencies can be programmed into adjacent



Optional snap-on front and rear covers convert the SG-2020 into a self-contained station that goes with you anywhere and anytime. Batteries install in rear, and microphone and key store in front. (Photo courtesy SGC, Inc.)

memories for quick-check access. Overall flexibility is remarkable.

Selection of narrow-band filters, keyer speed, passband tuning adjustments, and separate receive frequencies are handled in a similar "push related button and rotate main tuning knob" manner. In each case, the SG-2020's frequency readout changes to indicate your selection when accessed, and shifts back to your operating frequency when the related button is released. Adjusting the passband tuning

with the main knob while watching the display show minus or plus 1, 2, or 3 may seem unusual, but after a few minutes of use it actually proves very clever and convenient. Some functions, incidentally, are accessed by simultaneously pressing two buttons—for example, by holding in the BandWidth and REVERSE buttons to switch operating modes.

The SG-2020's SCAF filters deserve favorable mention, as they work great for cutting QRM and can even narrow receive

bandwidth down to 100 Hz without ringing. Did I mention this transceiver also has band and memory scanning to help you find the action requiring narrow filters and sharp operating savvy? Indeed, the SG-2020 is a lot of rig for the money.

Inclusion of SWR metering and an iambic keyer complete with speed display give the SG-2020 very good flexibility and portability. (Why fumble with extra pieces if you get them built into your transceiver?!) Both keying and sidetone, incidentally, are clean and pleasant to copy. Whether the rig works full or semi CW break-in depends, in my opinion, on your keying speed. At slow hand-key speeds the T/R relay switches between dots and dashes for full QSK action. At higher bug or keyer speeds, it switches between letters or words for semi QSK. T/R delay is not readily adjustable. T/R relay noise is between "barely noticeable" and "rather noticeable," depending on your personal point of reference. I do not find it overly objectionable, but I also appreciate the heartwarming sounds of a classic telegraph office in the shack. Amateur radio life should be flashy and fun, right?

Taking It With You

If you travel or pursue outdoor hamming to any reasonable degree, the SG-2020 has one option worthy of your investigation: snap-on front and rear covers with integral shoulder strap for easy carrying. A bank of 10 D cells for power fit in the rear cover, and the rig's included hand microphone (plus maybe a scratch pad and small key or paddle of your choice) can be stored in the front cover. Wrap a

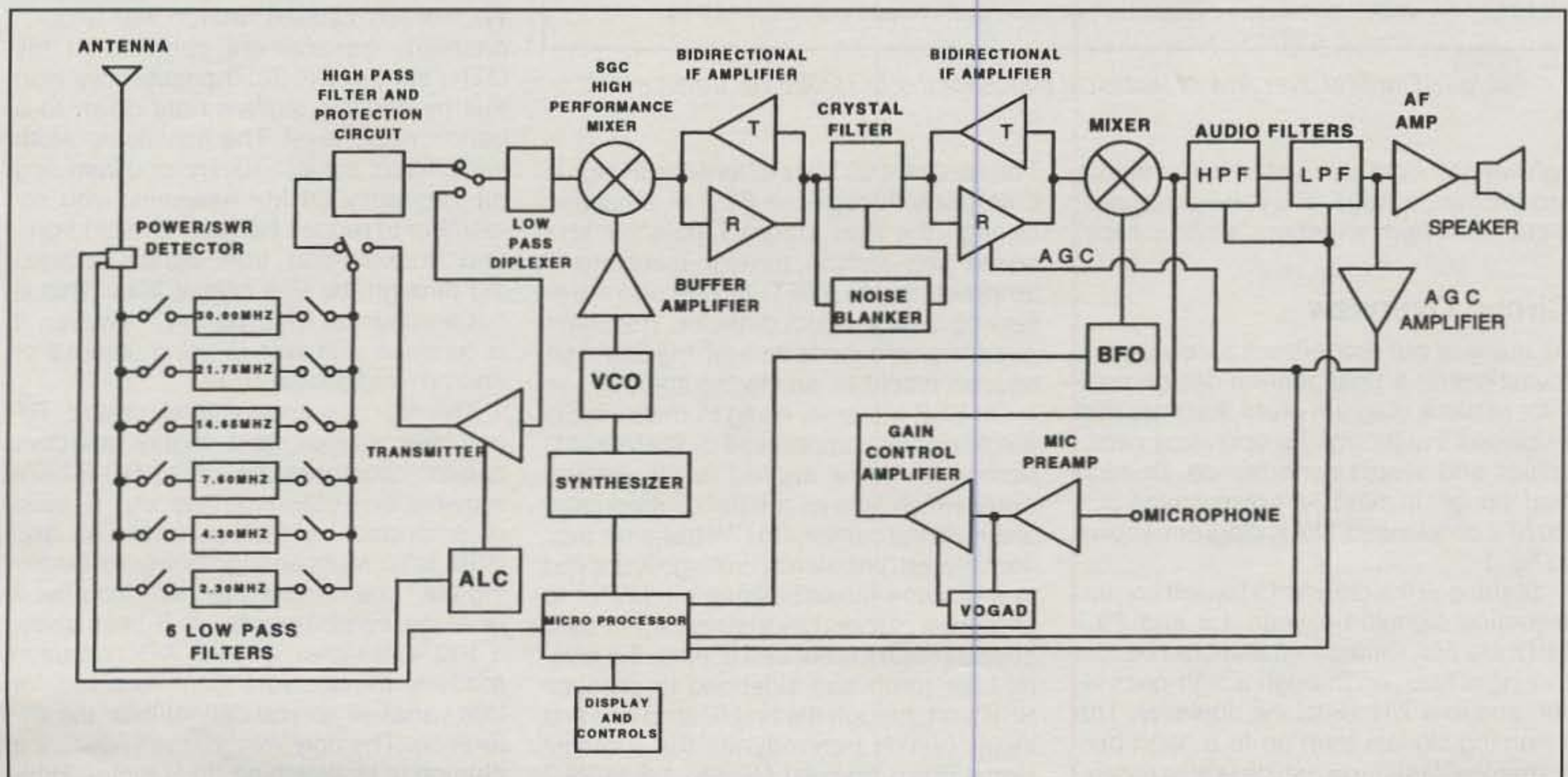


Fig. 1—Conceptual block diagram of the SG-2020. (See full discussion text.)

Specifications of the SGC SG-2020 SSB HF Transceiver

GENERAL

General Operating Modes:	USB, LSB, and CW
Receiver frequency range:	1.8 to 30.0 MHz, general coverage (400 kHz to 1600 kHz with broadcast filter bypassed)
Transmit frequency range:	1.8 to 29.7 MHz (U.S. ham bands only) 1.8 to 29.7 MHz (U.S. ham bands only) 1.8 TO 30.0 MHz (general coverage, export)
Operational temperature range:	-30 to +70°C
Microprocessor:	MC68HC711E9
Frequency stability:	3ppm per 10°C* (see example below)
Frequency resolution:	10 Hz
Frequency display:	100 Hz
Rx/Tx changeover:	less than 10 ms
Memories:	20 (factory preset, user definable)
Reflected power metering:	built in
LCD:	back light selectable
Keyer:	fully adjustable iambic mode "B," 5 to 60 wpm
Memory scan:	adjustable
Dimensions:	2.75H x 6W x 7L
Approximate weight:	4.4 lbs.
Microphone:	fist, dynamic
Battery voltmeter:	digital; front-panel controlled

RECEIVER

Sensitivity:	better than .5µV for 10 dB S/N+N
Intermodulation:	+18 dBm third order intercept
Selectable AF bandpass:	100 Hz to 2700 Hz
Audio output:	1 watt RMS
AF distortion at nominal output power:	less than 3%
Internal speaker:	5 watts maximum, 4 ohms
Noise blanker:	pulse/ignition
RF gain:	front panel controllable
BFO:	processor controlled
Total power consumption:	less than 400 ma (receive only)

TRANSMITTER

Output power:	front panel adjustable, 0 to 20 watts PEP
RF speech processing:	VOGAD baseband and RF clipping
Transmit current consumption:	maximum output power, 4 amperes
Transmit intermods, 20 watts:	-28 dB or better
Transmit spurious:	-50 dB (ham bands)

*Example: At 14.2 MHz = 14.2 x 3 + 42.6 Hz. A total frequency drift of 42.6 Hz for a temperature change of 10°C. If the ambient temperature changes from 20° to 30°C, there could be a drift of 42.6 Hz.

Table I—General overview of technical specs for the SG-2020 HF transceiver.

lightweight and insulated-wire dipole around this package, and you have a complete "work from anywhere" station. Nice!

Circuit Overview

As many of our readers will surely agree, investigating a rig's general design concept or block diagram gives accurate and unbiased insight into its operating capabilities and overall performance. Bearing that thought in mind, let's discuss the SG-2020's condensed block diagram shown in fig. 1.

Starting at the diagram's top left corner, incoming signals between 1.8 and 29.7 MHz are first routed to a selected band's low-pass filter, on through a high-pass filter, and to a T/R switching duplexer. The incoming signals then go to a "high performance" first mixer, which is also receiving a 61.8 to 87.9 MHz local oscillator/injection signal frequency synthesizer.

The resultant 60 MHz difference/IF signal then goes through an FET IF amplifier, through the (two stage) 7 pole/2.7 kHz crystal filter section, through a second IF amplifier, and to a BFO-fed second mixer serving as a product detector. Resultant audio then proceeds through the SCAF filters, an amplifier, and to the speaker.

On SSB transmit, audio from the mic is amplified and compressed by the VOGAD section and then applied to the second mixer which acts as a balance modulator and nulls the carrier. On CW transmit, incidentally, an "unbalance" voltage is applied to this same mixer/balance modulator to produce a carrier. The transmit signal then goes through the second IF amp, the crystal filter (drop one sideband to produce SSB), on through the first IF amp and first mixer (which heterodynes the transmit signal down from 60 MHz to 1.8 to 29.7 MHz), and to the transmitter's amplifier. This section is shown as one block/trian-

gle, but actually consists of four broadband stages complete with a pair of 40-watt rated transistors in its output. From there, the signal passes through a band's related filter and to the output. Now let's quickly discuss a couple of fine points.

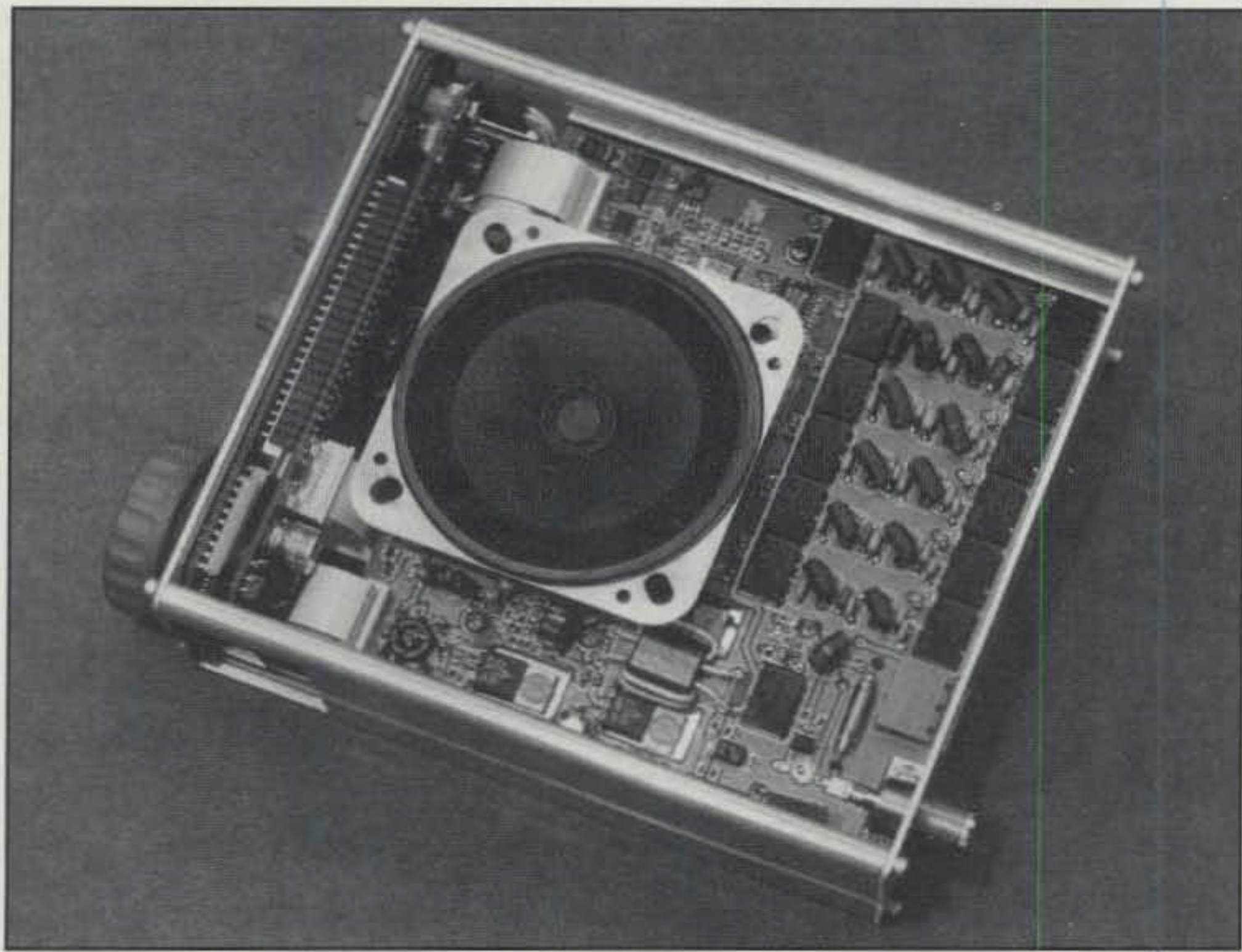
Both first and second mixer stages use diode ring-type circuits rather than active ICS (like an NE 602, for example). This is a prime reason why the receiver exhibits wide dynamic range and a low noise floor. Also, many "birdies" are eliminated by the use of up conversion and a 60 MHz IF (incoming signal minus local oscillator equals IF). AGC voltage is derived at the SCAF filter output and fed back to the second IF amp to maintain a stable audio output level. You control overall receiver sensitivity with the (front panel) RF gain. Finally, the SSB's VOGAD circuit acts like audio speech compression, while the ALC circuit serves double duty in RF speech compression and SWR protection.

Overall, the SG-2020's circuitry is simple enough to be understandable, but elaborate enough to "do the job" without unnecessary shortcuts or compromises. An interior view of the SG-2020's circuit boards, etc., incidentally, is included in the accompanying photo.

On The Air

So how does the SG-2020 rate in actual operation and performance, you ask? "Exceeds expectations" is, in my opinion, a good quick reply. All of the rig's features except its non-adjustable T/R delay are terrific. The receiver section is particularly good, not just in sensitivity and selectivity, but also in high intermod immunity. Interference from shortwave superstation WEWN has caused "wall to wall birdies" on many transceivers checked at my QTH, but the SG-2020 passed this acid test by copying signals right down to a band's noise level. The adjustable-width audio filters are also dandy for minimizing on-frequency QRM—assuming you remember to reduce RF gain to avoid front-end "buckshotting" from signals squeezing through the IF's crystal filter. This is not an unusual idiosyncrasy, however. It is common with any rig using (internal or add-on) audio-level DSP.

Thanks to conservatively rated RF amplifier stages and highly effective speech compression, the SG-2020's transmitter section pumps out a most commendable signal on both CW and SSB. Is 20 watts enough power for "working out" in a reliable manner? You bet it is! At the worst, it is only two S-units below a 100 watt signal, and the AGC circuit in modern transceivers compensates for that variation so you cannot hear the difference. The only way you will notice the change is by watching an S-meter. Honest! Check my words of wisdom on your own rig and see for yourself! High-power-



Interior view of SG-2020 reveals a stouthearted layout with "breathing room" for cool operation under hot conditions.

or-nothing devotees will discover T/R connections for keying an external linear amplifier are not included in the SG-2020, but alas, everything old is new again. Just

insert a shorting plug in your amplifier's external T/R socket and then use its front-panel standby/operate switch for manual T/R switching. It works just as good in

"Y2K" as it did in the fabulous '50s.

I gave the SG-2020 a hearty multiband workout during a recent DX contest and filled two log pages with contacts on all continents in less than an hour. The little rig ran cool and calm and handled just like a big rig. It is nice!

Conclusion

All aspects considered, I would say the SG-2020 is an outstanding, rugged little transceiver with an affordable price tag. It has more than enough big-time operating features to please any amateur—at home or in the car. The transceiver's operating manual, quick start guide, and support booklets are also well-detailed and very helpful in initially setting up the transceiver or a full station. SGC, incidentally, is an acronym for Stoner Goral Corporation, a company founded by Don Stoner, W6TNS, and Pierre Goral, KI7UA, for the purpose of producing high-grade communications gear made and serviced in the U.S.

The SGC SG-2020 is available in stand-alone form or with a wide variety of special accessories. Suggested retail price of the transceiver alone is \$675, or \$1195 with its optional "PortaPak" front and rear covers/containers.

For more information, contact SGC, 13737 S.E. 26th Street, P.O. Box 3526, Bellevue, WA 98005 (425-746-6310). ■

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