As our way of life has become less secure, some radio amateurs have been looking for economical equipment that will continue to operate under harsh emergency conditions. SGC has taken one such radio, the SG-2020, and made it even better and more flexible by adding "Adaptive Digital Signal Processing," or ADSP, on a board that can also be used in other radios.

CQ Reviews:

The Noise-Reduced SG-2020 ADSP2 HF Transceiver and Separate ADSP2 Board

BY BRUCE PRIOR,[1] N7RR

A review of the SGC SG-2020 HF transceiver, by Dave Ingram, K4TWJ, was published in the June 1999 issue of *CQ.* The basic SG-2020 is a rugged, compact 20 watt transceiver that is especially designed for mobile and portable operation. We could rely on the SG-2020 in a prolonged emergency. Covering all amateur bands from 160 through 10 meters, the rig includes 20 programmable and tunable memory channels, an RF gain control, a noise blanker to fight pulsed ignition noise in a motor vehicle, passband tuning, RIT, XIT, SPLIT operation, speed-adjustable fast tuning, a comfortable tuning knob with a rubber cover, an analog SCAF bandwidth filter ranging from 100 Hz to 2.7 kHz, and a mode B internal iambic keyer with a very wide speed range (from 5 to 60 wpm). Now there's an enhancement of this basic model, the SG-2020 ADSP^2 (see photo A)!

The staff members at SGC call themselves "the SSB people." Although the SG-2020 ADSP^2 is capable of CW as well as LSB and USB operation, the transceiver is most suitable for the many radio amateurs who concentrate their operating on single sideband and digital operation, using CW only occasionally. Transmit-Receive switching is performed with a mechanical relay system, which is no impediment to SSB, but the T-R change-over introduces staccato clicking to the operating environment during CW transmission. Because its T-R switching time is less than 10 ms, this transceiver will also operate with the use of an external modem in the numerous digital modes that computer sound cards have made possible.

Photo A– The SG-2020 ADSP^2 works the same as the basic SG-2020 except that the internal ADSP^2 board adds interfering carrier attenuation, atmospheric noise-fighting capability, and bandwidth filter.

Since Dave's review appeared, SGC has added a significant digital enhancement to the AF stage of the SG-2020. The additional internal ADSP^2 module includes what SGC calls "Adaptive Digital Signal Processing," or ADSP™, combined with "Spectral Noise Subtraction," or SNS™. The SG-2020 with the new ADSP^2 module installed offers the user an entirely new listening experience. The SG-2020 ADSP^2 is one of the finest noise-fighting transceivers in its price class.

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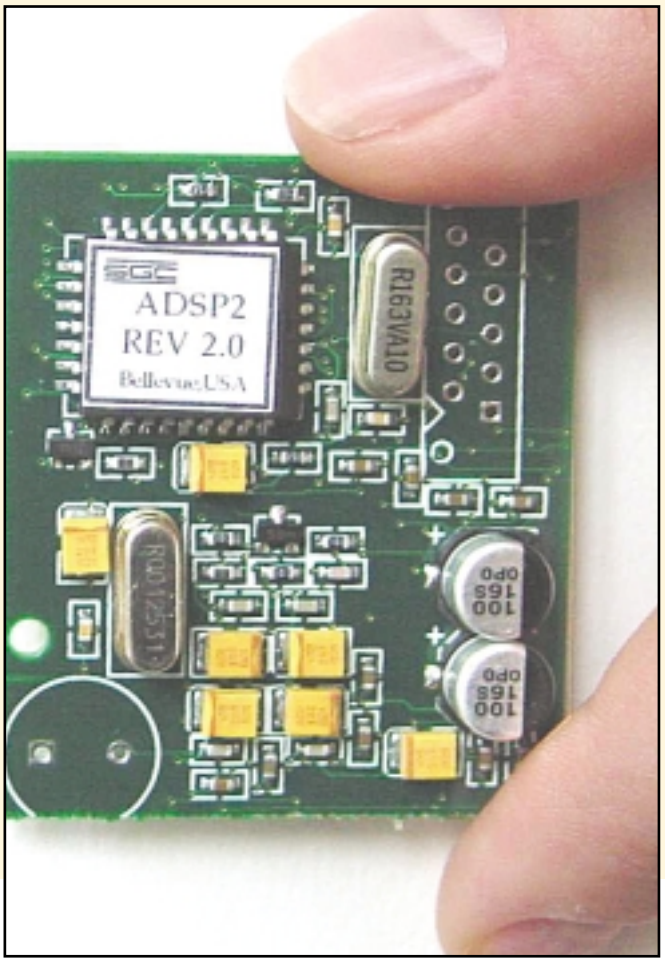

Photo B– The Low Audio ADSP^2 board is designed for internal installation in the SG-2020 or many other receivers or transceivers.

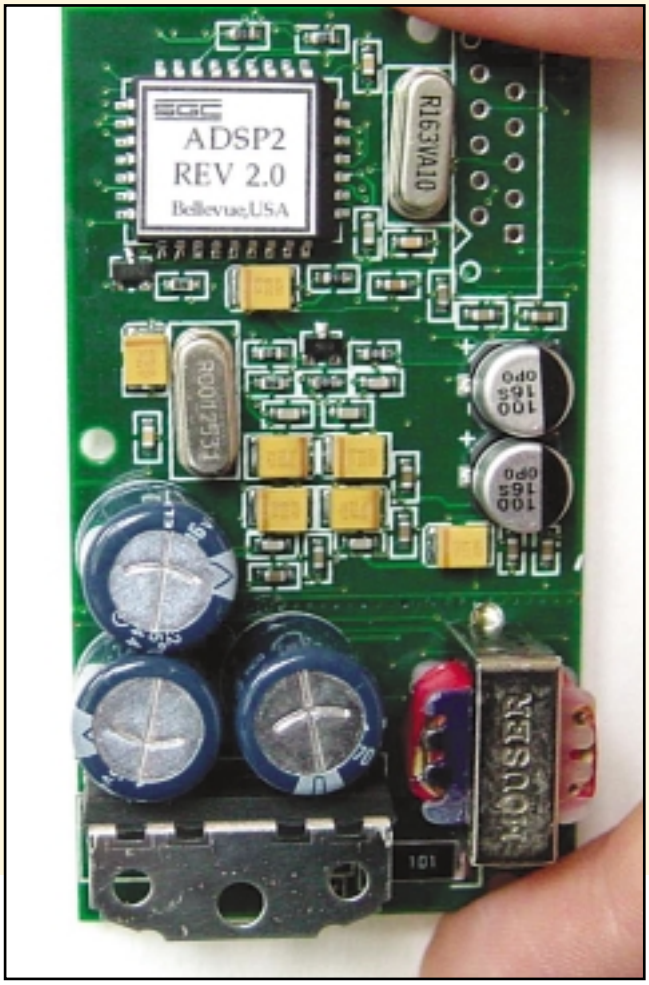

Photo C– The High Audio ADSP^2 board can be installed either internally or externally following the audio amplifier.

Whether operating SSB, CW, or digital, by holding the **CMD** button while depressing the **SPLIT** button, ADSP™ Level 1 significantly reduces the ambient noise surrounding the signal. ADSP™ Level 1 works best when copying relatively weak signals in the presence of moderate atmospheric noise. The improvement is especially marked when the incoming signal is just barely above the normal noise level. Repeat the same **CMD-SPLIT** button sequence and ADSP™ Level 2 is implemented, radically reducing noise levels. ADSP™ Level 2 introduces enough signal processing that some of the signal properties are also changed. ADSP™ Level 2 is therefore a better choice for copying moderate to strong signals during high-noise conditions. The ADSP™ noise reduction impacts both atmospheric noise and receiver noise. Up to five interfering heterodynes can also be nulled simultaneously.

In spite of the very fast signal-processing action shown in the specifications box, the automatic tone rejection filter includes enough of a delay that it does not interfere with any CW reception above extremely low-speed. Even 5 wpm CW comes through just fine. Current SG-2020 owners can improve their transceiver significantly by investing in the ADSP^2 module.

The ADSP^2 card in the SG-2020 has a second function as well. Hold **CMD** and depress **BW** to introduce digital bandwidth filtering, in addition to the analog filtering which is already present in the SG-2020 SCAF circuit. ADSP^2 bandwidth filtering has three stages: 1800 Hz, 500 Hz, and 100 Hz.

ADSP^2 for any Receiver or Transceiver

Now here's the really good news: You don't have to own an SG-2020 transceiver to take advantage of the new ADSP^2 technology. SGC sells two versions of the ADSP^2 board, the Low Audio ADSP^2 board (photo B) and the High Audio ADSP^2 board (photo C). The Low Audio ADSP^2 board can be factory installed in any SG-2020 transceiver. This version can also be mounted inside many *other* receivers and transceivers.

In my review of the Ten-Tec Argonaut V in the March 2003 issue of *CQ,* I wrote, "The nine-step noise blanker achieves some atmospheric noise reduction, but it is not the best implementation of this feature on the amateur radio market in the price class of the Argonaut." I had already tried out the first-generation of the ADSP™ board in the SG-2020 when I wrote that. The original ADSP™ board had one function: the equivalent of level 1 noise and carrier attenuation on the ADSP^2 board. It included neither ADSP™ level 2 noise and carrier attenuation nor bandpass filtering.

Our Argonaut V now sports an internal ADSP^2 board, which means that two of the six items on my Argonaut V "quibbles"

SGC ADSP^2 Technical Specifications

Specification	Low Audio Version	High Audio Version
Size	1.7" × 1.475" (4.32 cm × 3.75 cm)	2.645" × 1.475" (6.72 cm × 3.75 cm)
Weight	0.6 oz (17.0 g)	1.1 oz (31.2 g)
Input voltage	12 V_{DC}	12 V_{DC}
Audio Limits		
Minimum Input	10 mV_{RMS}	100 mV_{RMS}
Maximum Input	150 mV_{RMS}	5 V_{RMS}
Maximum Output	0.5 V_{RMS}	9 V_{RMS}
Power Output	(inside AF circuit)	5 W_{RMS}
Current Consumption		
idle	80 mA	110 mA
full out	80 mA	500 mA
Out of Band Rejection	–45 dB	–45 dB
Both Versions:	**ADSP Level 1**	**ADSP Level 2**
Noise Reduction	13 dB	26 dB
Time Delay	6.5 ms	13 ms
Tone Rejection	–50 dB	–65 dB
Filters @ 3 dB Bandwidth		
Voice Narrow	300–2100 Hz	
CW Wide	400–900 Hz	
CW Narrow	600–700 Hz	

list have evaporated. We now have a fine automatic notch filter against interfering carriers as well as very effective atmospheric noise attenuation and extra bandpass filtering. With the ADSP^2 board installed, the receiver in the Argonaut V has finally surpassed the well-respected Ten-Tec Omni VI+. (The Omni VI+ has no filtering, which is effective against atmospheric noise, and its automatic notch filter reacts too quickly to be useful for CW operation.)

The only disadvantage of ADSP^2 installation in a non-SGC rig is that there are no visual indicators when any of the ADSP^2 functions are operational, and it must be controlled by a pair of tiny SGC-supplied momentary switches which can be attached adhesively to the rig. The Low Audio ADSP^2 board is wired in series with the receiver audio stage, just ahead of the audio amplifier. It can be mounted inside the battery compartment of a Yaesu FT-817.

High Audio Board

The High Audio ADSP^2 board is designed to be mounted externally. It connects between the audio output of the receiver or transceiver and the speaker or headphones. Either version of the ADSP^2 board costs $180. Since the ADSP^2 board is fully integrated with the command system in the SG-2020, it must be installed at the SGC factory. Before the end of June of this year, SG-2020 owners may upgrade to ADSP^2 for $120, including factory installation. When the installation is performed by SGC on other radios, there is an additional charge of $49.95.[2]

My company, Kairos Research[3], sells a comprehensive, laminated two-card Quick Guide for the SG-2020 ADSP^2 for $8.00 by check or money order, including shipping.