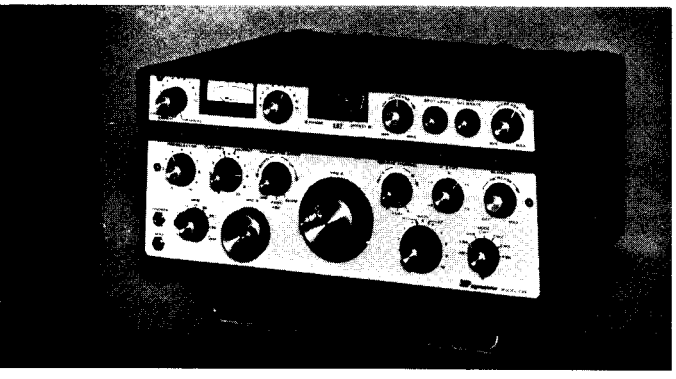


the integrated station

A quick look at some of the design highlights of the new Signal/One amateur transceiver

Skip Tenney, W1NLB, Publisher, ham radio magazine

Nearly all of us have had our curiosity aroused by a recent series of advertisements by a new name in the amateur field, Signal/One in St. Petersburg, Florida. While I was in the Sunshine State to attend the Tropical Hamboree in Miami I decided to take an extra day and see just what was going on on the other side of the state.

I found Signal/One in a small modern plant in the shadow of their parent company, the ECI Division of NCR. A quick tour of ECI disclosed approximately 2000 people producing all types of military equipment from sophisticated satellite terminals to small man-pack sets for use in underdeveloped parts of the world.

But the visit became really interesting when Don Fowler, W4YET, project engineer for the CX7 of Signal/One and Dick Ehrhorn, W4ETO, the general manager, introduced me to their new integrated station.

It is a transceiver, whether or not their ads are willing to accept the fact, but the title "integrated station" is also a very appropriate description. Not only do they offer an excellent transceiver, they have included in the same box a 115/230-volt, 60-Hz power supply, an extra vfo, an IC keyer, an rf clipper plus a noise blanker. The complete transceiver is solid state with the exception of the final power-amplifier stage.

The standard unit covers all amateur bands between 1.8 and 29.7 MHz. A $5 crystal permits operation in one 1-MHz segment in any one of the bands from 2 to 3, 4 to 7, or 8 to 14 MHz; three spare bandswitch positions are included for this purpose. As an extra feature the CX7 offers a four-digit frequency counter with Nixie® tube readout that gives you tuning accuracy down to 100 Hz.

You have your choice of broadband or tunable transmitter output at the change of a switch; if your antenna has an swr below 1.5:1 it is absolutely unnecessary to tune the transmitter in any way—the receiver preselector needs peaking, of course—just dial the frequency at which you wish to operate, and start talking. The transmitter features an RCA 8072 operating at a conservative 300 watts PEP under steady-state conditions. It is conduction cooled and has more than ample heat dissipation. The alc circuitry offers both grid and screen protection assuring the longest possible tube life.

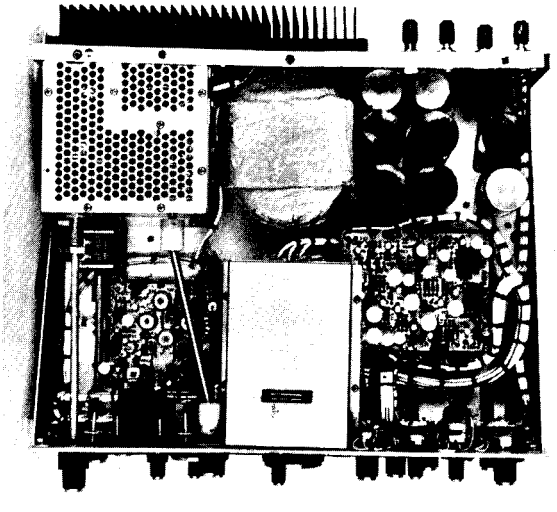
Probably the most interesting part of the CX7 is the receiver. The designers have incorporated two extremely steep-sloped filters, with a combined bandpass of 2.0 kHz at 6 dB down and 3.0 kHz at 60 dB down, together with the niftiest new passband tuning arrangement (Electronic i-f shift*) that anyone has yet to come up with. Signal/One is also promising an outstanding CW filter, but it was not in the unit which I used.

By tuning the bfo crystal oscillator (**fig. 1**) both second mixer injection and bfo injection into the product detector are varied by an equal amount. Thus, as you vary this tuning control, the signal you are listening to remains unchanged but its relationship to the i-f passband can be completely altered. With the very sharp filter skirts you can listen to a CW signal and drop an interfering signal in and out almost as though it was being switched on and off. Even a 1000 microvolt signal from a signal generator was easily eliminated —whether just above or just below the desired signal. When listening to the 40-meter phone band I found no signal that could not be comfortably copied through the European broadcast QRM that is so prevalent on the East Coast in the late afternoon.

* patent applied for

Don Fowler, W4YET, project engineer at Signal/One, left, and Skip Tenney, W1NLB, right, with the engineering prototype of the Signal/One integrated station.

Compact but uncrowded layout of the CX7.



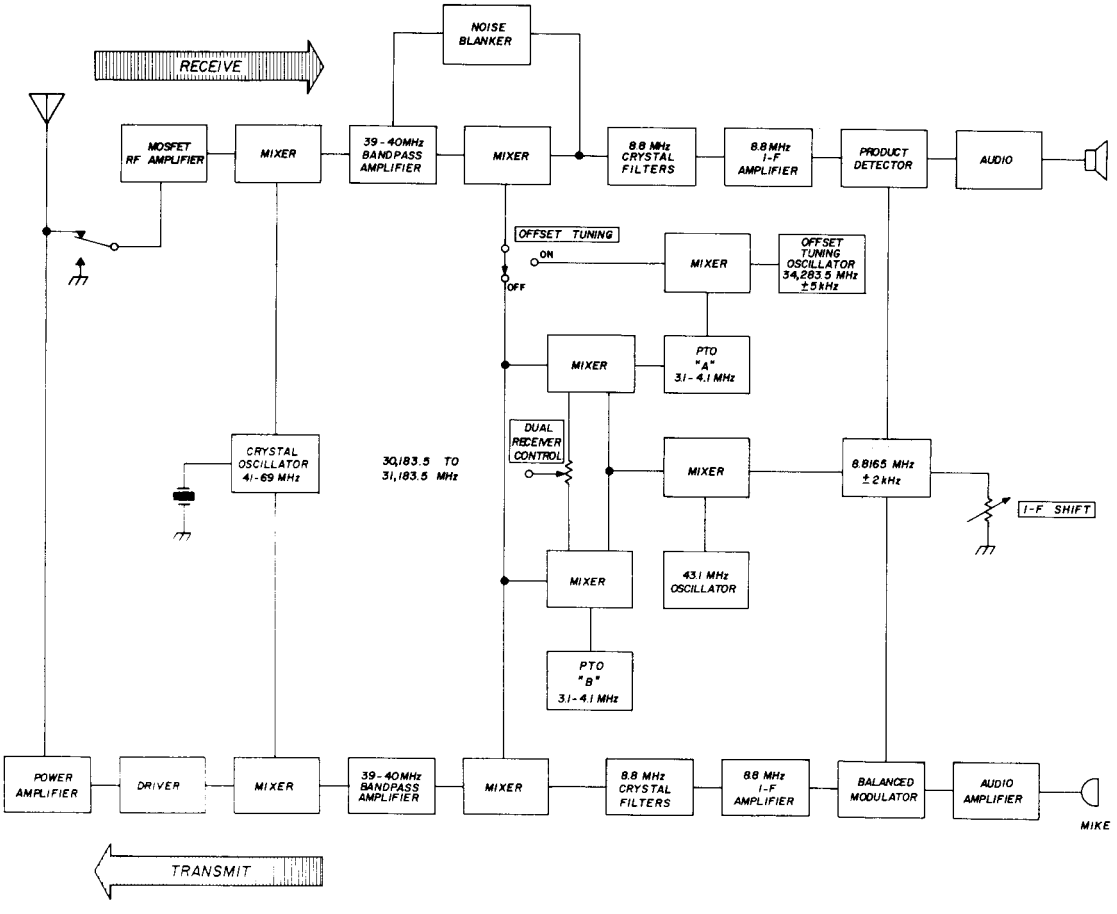
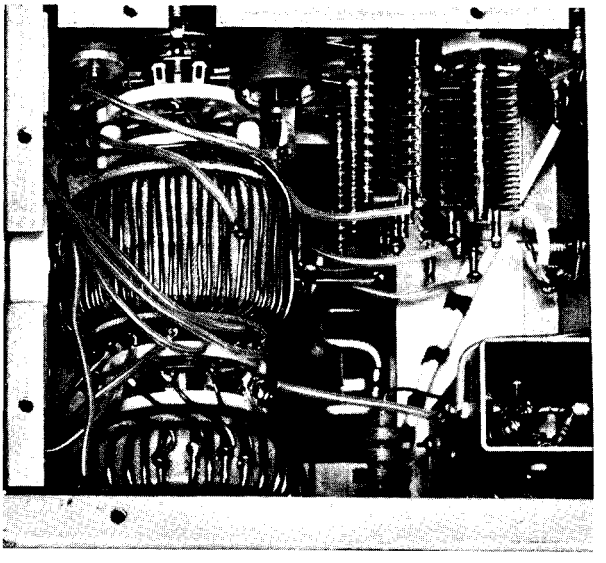


fig. 1. Block diagram of the Signal/One CX7.

Not only does this rig offer outstanding selectivity, it scores very high in the versatility department too. It can be operated as a straight transceiver offering several kHz of offset tuning, or you may listen to two channels simultaneously and transmit on either channel at the push of a button. Receiver preselector tuning is independent of the transmitter so split-frequency operation can literally be from one end of the band to the other; the broadband transmitter circuits completely eliminate any form of transmitter tuneup.

In the block diagram you can see many of the interesting features. The diagram has been simplified to eliminate much of the special switching, but all of the basic functions are shown. Special functions such as vox have been left out for clarity al-



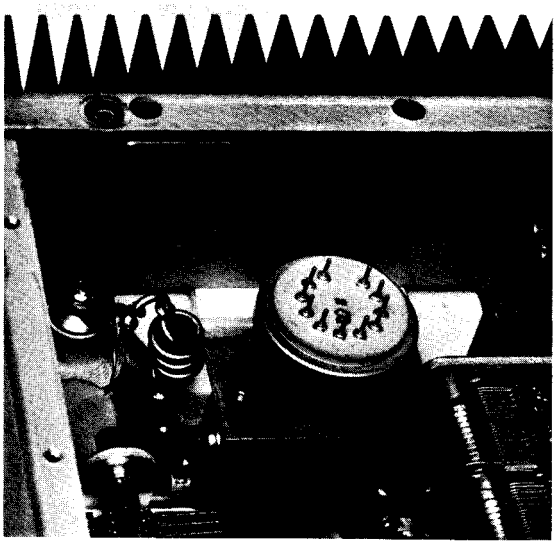
though they add much to the usefulness of the entire unit.

This design has made extensive use of the latest devices. For instance, dual-gate mosfets are used in the front end, in most mixers and in the high-frequency i-f stages. IC's are incorporated into the audio output, the electronic keyer, the frequency counter, the low-frequency i-f strip and the final broadband mixer in the transmitter.

Another interesting design innovation is the use of ground-plane circuit boards. This refers to the use of printed-circuit boards with copper foil on both sides. On the side on which the components are mounted the foil is grounded and acts in much the same manner as a chassis in conventional construction. The foil on the other side of the board is used for circuit wiring in the normal manner. Signal/One claims this offers much better stage isolation and stability.

Although there is much more that is new in this unit and well worthy of comment, I have only tried to hit the high spots of this new design. There should be a number of complete technical reviews published as the CX-7 becomes more available.

The final-amplifier tube is clamped to a block of Beryllium oxide that provides a thermal path to the heat sink as well as high-voltage insulation. The final tank circuit (left) uses a low-Q toroid design.



specifications

general

frequency coverage:	1.8 to 29.7 MHz transceive,
vfo's:	dual permeability-tuned oscillators, resetability to 100 Hz
frequency readout:	built-in frequency counter with digital readout to 100 Hz
stability:	less than 100 Hz in first half hour; less than 50 Hz in any hour thereafter at fixed ambient
CW keyer:	built-in, 5 to 50 wpm
power supply:	built-in, 115/230 volts, 60 Hz
sensitivity:	better than 10 dB signal-plus-noise-to-noise ratio with .33 μV at 10 meters (2-kHz bandwidth)
selectivity:	2 kHz at —6 dB, 3 kHz at —60 dB provided by two cascaded crystal filters; optional CW filter available
image rejection:	80 dB
i-f rejection:	60 dB
agc:	less than 6 dB audio output change for signal level from 1 μV to 100 mV; selectable hang time
i-f shift:	variable up to 2 kHz above and below normal
noise blanker:	active blanker with adjustable threshold
power:	300 watts PEP input, 150 watts minimum PEP output on all modes and bands
carrier suppression:	60 dB
unwanted sideband:	60 dB down
distortion:	third-order intermodulation 30 dB below each of two equal tones at full-rated output
tuning controls:	none for amateur bands when load swr does not exceed 1.5:1
power amplifier:	conduction-cooled 8072 ceramic-metal tetrode
duty cycle:	continuous at full-rated input, all modes
speech processing:	rf envelope clipper built-in