

EQUIPMENT REVIEW:

THE ASTRO 200 SSB TRANSCEIVER

When Peter Schultz of Sideband Electronics Sales, Loftus, NSW, offered us an ASTRO 200 transceiver to try out, we quickly accepted. In spite of quite extensive advertising in Amateur Radio magazine, the ASTRO seems to be almost unknown amongst active amateur operators. Introduced into this country with a full page advertisement in the November 1976 issue of AR and followed with a double page spread in the March 1977 issue, it must remain a mystery just why this is so.

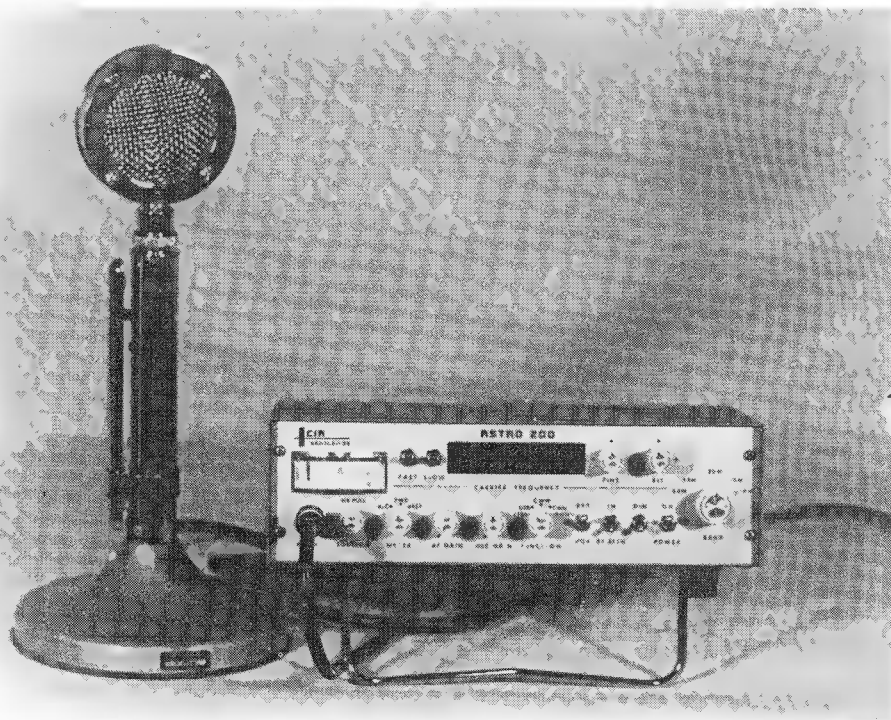
Well, just what is the ASTRO 200? In a few words, it is a miniaturised 100 watt output 80 to 10 metre transceiver with fully synthesized tuning. There is a lot more to be told, of course, but before that, let's go back a few years and look at the development of the amateur band transceiver as we know it today. One would be excused for thinking that the amateur transceiver was a Japanese invention and had been developed to its present state in that country.

Not so. The transceiver was devised in the United States and to date every new development in its history has come from the United States. This of course infers that the ASTRO is a product of the United States, which it certainly is. The manufacturer is CIR Industries Inc., of California. However, let's get back to the transceiver itself and see just what sets it apart from the others. Two things stand out straight away. Tuning is fully synthesized, that is, the bands are covered in 100 Hz steps rather than continuously as with a conventional VFO system. The manufacturer claims that the ASTRO has 40,000 channels. He is probably right, but we didn't count them.

The next and probably the most revolutionary development is that there is no conventional tuning system. Tuning is accomplished by a scanning device operated by spring loaded switches. A fast and slow scanning rate is provided to enable either quick excursions from one portion of the band to another for easy SSB resolution.

Reference to the illustration will give a good idea of its relative size. The Astatic D-104 microphone looks huge in comparison. The actual dimensions of the ASTRO are 7.2 cm high, 30.8 cm deep and 24.13 cm wide and the weight only 3.6 kg. There is of course no AC power supply built in, the transceiver being designed primarily as a mobile unit or for home station use with an external high current DC supply. Nominal operating voltage is 12 to 14 volts.

As there is no conventional tuning system it follows that the frequency readout is digital. A six digit readout gives



100 Hz resolution. The brightness of the readout can be reduced for night time operation.

Most of the usual facilities we expect to find in modern transceivers are included in the ASTRO. These include: VOX or PTT, built-in SWR meter, noise blander, RF attenuator on receive, fine tuning control or VXO to tune between the 100 Hz points, a separate receiver offset tuning control and an entirely separate WWV receiver on 10 MHz. Perhaps one of the more interesting features is the inclusion of an in-line RF power meter to actually read the output power in watts.

TECHNICAL FEATURES OF THE ASTRO 200

From the above it is obvious that the ASTRO is no run-of-the-mill transceiver, so a closer look at the circuitry is of great interest.

The set is made up with good quality plug-in circuit boards and the overall internal appearance is clean and orderly. At a guess it would seem that the manufacturers, CIR Industries, have a background of high quality commercial manufacture. The receiver is a single conversion design with a 5.6 MHz IF frequency. Gain in front of the 8 pole crystal filter is kept low with a dual gate MOS FET RF stage driving a double balanced mixer stage. PIN diodes are used in the AGC circuit and a dynamic range of greater than 100 dB is claimed. The switched RF attenuator increases this to over 120 dB. Perhaps an

unusual omission, however, is a normal RF gain control and a strange inclusion is a squelch control. The eight pole filter has 1:8 shape factor with a 2700 Hz bandpass at the 6 dB points, and 4900 Hz at the 60 dB points. Diode switching is employed in selecting either the SSB or CW filter. The well known LM-380 is used as the receive audio output chip.

RF bandpass filtering is switched into the receiver front end with the transceiver band switch, and as is common with modern solid state design, no peaking or front end tuning controls are provided or needed for either transmitter or receiver.

The transmitter line up is straightforward and uses the same 5.6 MHz filter as used in the receiver. The power output section uses three stages with the last two in push-pull. All the transmitter stages are broadbanded with separate bandpass filters switched in for each band. Considerable attention has been given to TVI suppression and general spurious output. Double balanced mixers are used throughout both transmitter and receiver, and in addition to the bandpass filters in the transmitter output and receiver input, a three section low-pass filter is included at the transmitter output.

Some form of speech processing is considered essential these days, and the ASTRO uses a very interesting approach. Incorporated in the microphone is a logarithmic compressor followed by a 3 kHz filter. The design then allows the final

transmitter stage to be over-driven to produce a degree of controlled RF compression. We shall see later just how effective this is.

The heart of the whole transceiver is of course the frequency synthesizer. In effect the synthesizer generates crystal controlled frequencies in 100 Hz steps for each of the amateur bands. The basis of all this is a very stable 5 MHz crystal oscillator driving two phase locked loops. The major PLL generates the heterodyne frequencies to convert the received and transmitted signals to and from the 5.6 MHz IF channel. This loop also generates the 100 Hz steps from a programming code and an up/down counter. The up/down counter is in turn controlled by the front panel frequency selecting switches.

THE ASTRO 200 IN OPERATION

Sideband Electronics Sales kindly loaned us a heavy duty 20 amp 13.8 volt power supply to use with the ASTRO. For home operation use a similar type of power supply would be needed.

Used in the car, however, the average current drain over a period of time would be quite low. At 200 watts peak input the drain would be something over 15 amps, but as this would only occur on absolute speech peaks, the drain as measured on a normal ammeter does not exceed about six amps. With full use of the speech processor this would rise to about ten amps. Even so, a normal car battery in reasonable condition would operate the ASTRO for the duration of the field day and still start the car after.

When the ASTRO is first turned on, it takes several seconds for the PLLs to actually lock. During this time signals rush back and forth in random fashion. Tuning the ASTRO is a new experience and certainly takes time to master. The tuning switches are three position spring-loaded with centre normal. Fast tunes at a rate of 1 kHz per second, ideal for hopping from one end of the band to the other. Pushing the switches up increases the frequency, while pushing down has the opposite effect. The SLOW switch tunes at the rate of 400 Hz per second. After a few minutes practice one becomes expert and the whole thing becomes easy albeit strange to operate. While all this is happening the digital readout is showing the exact frequency.

Received audio quality was excellent and strong signal handling first class. As mentioned earlier no RF gain control is included. As a personal choice I would swap the squelch control for one. When listening to strong signals I normally prefer to reduce the RF gain and benefit from the quiet background so obtained. The RF attenuator included in the set did not provide this effect. However in all other respects the receiver was pleasant to operate. The noise blanker was effective on ignition type noise but did introduce some cross modulation particularly on the eighty metre band at night when signals

can be extremely strong. The WWV receiver built in is definitely a "Why didn't they think of it before". A separate direct conversion receiver is used. That is direct from RF to audio. It can be selected at any time by the function switch and appears to be most effective. An internal preset trimmer allows the master 5 MHz oscillator to set spot on with WWV.

Perhaps one question that will come up is, what is it like tuning in 100 Hz steps? Is it possible to get an SSB signal spot on? The answer is a definite yes — even a fussy operator when it comes to getting the pitch right will be quite satisfied. Nevertheless, the ASTRO does include a FINE and an RIT control but as both of these only has a range of ± 50 Hz it seemed perhaps a waste of time to include them.

Most of the transmit tests were carried out on the twenty and eighty metre bands. Using a fair degree of the RF compression all DX contacts reported on the excellent audio. At the time of the tests, conditions were only fair, perhaps the best time to check transmit readability.

Power output was right up to specification with the built-in power meter agreeing with my usual station RF watt meter. In short, 100 watts on all bands from 80 to 15 and 90 watts on 10 metres.

SUMMING IT UP

Just where does a transceiver like the ASTRO fit into the scheme of things? There is no doubt that it would be an ideal mobile unit and also an ultra compact home station with a suitable power supply. Why, then, is it still largely unknown? I am sure that if amateurs could see one in action they would find it hard to resist, even at the rather high price they are selling for. Perhaps in relation to the advanced technology tied up in that small box, the price is not high at all. But maybe at this point some criticism could be stated. Unfortunately, the overall appearance and external finish does not match the price. There is no doubt that this is the point where most manufacturers throughout the world fall short of their Japanese competitors. Perhaps a little more time spent on good industrial design might have paid off with the ASTRO. I am sure though that in time we will see many of its features incorporated in amateur transceivers.

The instruction book supplied is well produced, but as is usual these days, does not include much information for the home repairer. A complete circuit running to nine pages is provided but no circuit board layouts are provided. A letter from Peter Schultz states the following. The Warranty is for 90 days from the date of purchase for faulty workmanship and parts except power output transistors. However, they are protected in the usual manner — read user's manual. Please also note this is a highly sophisticated transceiver. I do have service facilities for complete alignment,

but at the moment changeover boards available if major faults occur, supplied by the manufacturer.

Further details on the ASTRO 200 can be obtained from the agent, Sideband Electronics Sales, 24 Kurri Street, Loftus, NSW 2232.

Specifications ex March 1977 AR. ■

CLOSE FEDERAL LOOK AT CB

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The following is a direct copy of a story published in the *Townsville Daily Bulletin* on May 24, 1978.

Further details on the Ministerial statement are at present unavailable.

The Federal Government is looking closely at the "problems" and "absurdities" of CB radio.

The Post and Telecommunications Minister, Mr. A. A. Staley, said this in Townsville yesterday.

A questioner had said that "everyone has CB radio, and we are told that in 1982 CB radio as such will cease to exist". Would there be a problem in regard to changing the law?

Mr. Staley said it was unreal to think that in 1982 the hundreds of thousands of people with CB radios would suddenly find it was illegal to operate them.

"You would need a policeman in every street, and even then they wouldn't catch them," he said.

Mr. Staley said the policy on introduction of CB radio in Australia had been well intentioned, but the "difficulties it would lead to" had not been foreseen.

He said he was trying to produce a new set of regulations governing the use of CB, "and we are looking at that 1982 date".

"CB has great advantages for certain people in certain areas, such as people on the land, or living outside cities," Mr. Staley said.

"It's a toy for some in the cities, a plaything.

"But it causes no end of interference to pre-existing services such as TV."

Mr. Staley said it was an "absurd situation" where you can sell a set which you cannot licence.

"I want something done about that," he said.

"You can import sets which you cannot licence. This is madness again. It only introduces a state of lawlessness.

"CB is here to stay, but we have to have sensible regulations so that the life we all lead can be made a little more comfortable and contended," he said. ■