

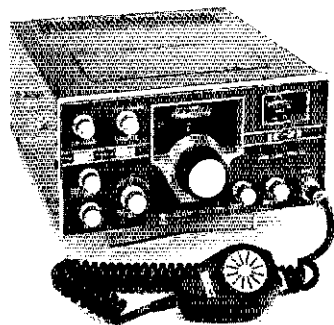


Recent Equipment



To acquaint you with the technical features of current amateur gear.

Inoue Icom IC-21 Two-Meter FM Transceiver



WE'RE SUPPOSED to be objective about write-ups of recent equipment, but it's pretty hard not to be enthusiastic about a unit like the IC-21, which has a number of intriguing features and so few marks against it.

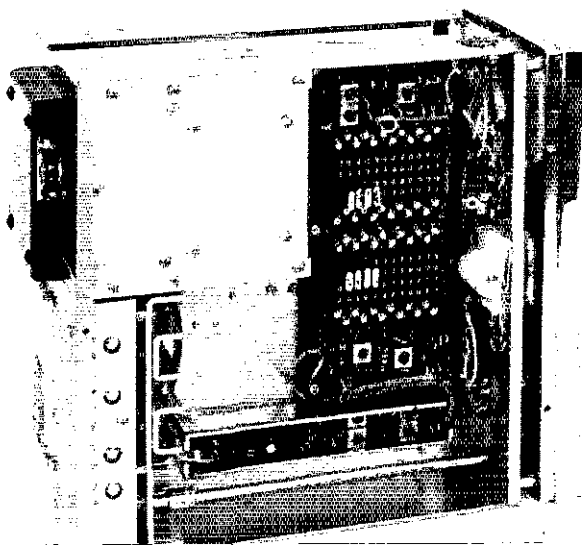
Let's take the minus side first. The dial lights are too bright. No kidding! Driving down a dark road, their glare is a bit overpowering and, since there is no dimming rheostat built into the unit, we found a simple solution to be the draping of a handkerchief over the front of it. Not a very grand solution, but certainly effective.

One other thing. If you get involved in the instruction book, it takes a little bit of study to get squared away on the various circuit symbols that are used. The Japanese do things differently. For instance, variable controls have two kinds of symbols. On one, the oblique bar has an arrow at its upper end — this indicates that it is a panel control. On the other type, instead of an arrow there is a shorter bar at right angles — this indicates that the control is mounted on the circuit board

Front view of the IC-21. The large center knob is the crystal switch, and just above it is the zero-reading meter which indicates whether or not the receiver is tuned correctly. The meter at the upper right indicates either SWR or incoming signal strength along with relative rf output. That COURSE switch works in conjunction with the center CRYSTAL switch, which has 12-positions. You operate either on Course 1-12 or Course 13-24, to give you the 24 channels. You'll note that the controls are arranged conveniently for most mobile operators (except in the U.K.) since the most-often used controls are at the center and left on the panel.

and can be adjusted only by opening the cabinet. Each of the ten circuit boards has its own sequence of R1 through R20 or whatever and this is slightly confusing when you're puzzling out the circuits. But, these are all relatively minor points, and it takes only a modest amount of effort to make the translation.

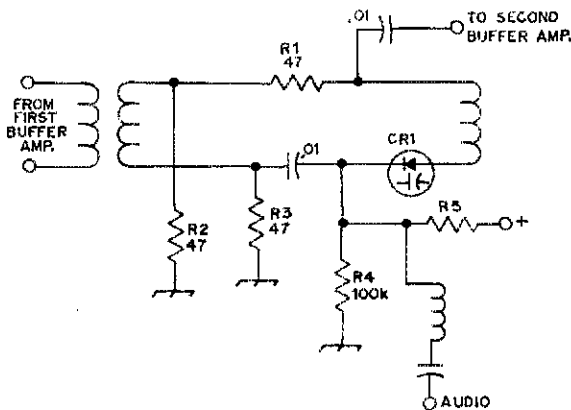
Everything else is positive. Among the features which we found especially attractive were the built-in SWR indicator, the receiver incremental tuning control, a meter which indicates when the receiver is tuned to the center of the incoming carrier, the automatic transistor-protection circuits which disable the transmitter if the VSWR becomes too high (or there's a shorted connector or some other antenna foul-up), and the great audio quality on both receive and transmit modes. All of this comes with ten watts output and a 24-channel



Top view of the IC-21. There are sockets for 24 transmit and receive channels, each with its individual trimmer capacitor which is easily accessible through a 3 X 6-inch plate at the top of the unit. This model is delivered with crystals for 34-94, 94-34, 76 simplex, and 56 simplex.

QST for

Fig. 1 - Circuit diagram giving details of the modulation system used in the IC-21 transceiver. Component designations are those listed by the manufacturer.



crystal switch in a package that occupies less than one quarter of a cubic foot and weighs 14 pounds.

The IC-21 is completely solid state, with a built-in power supply which works either from 117- (or 235) volts ac, or from 13.5 volts dc. Separate power cords make the switch from ac to dc an easy one.

The transmitter is straightforward in its basic design. The crystals oscillate at 18 MHz. This energy is buffered and multiplied eight times through eight stages before reaching the final amplifier which is followed by a low-pass filter and the SWR indicator. On ac power, the output was measured at 13 watts; on dc it was 10 watts. A front-panel switch permits reducing the power output to one watt when higher output is not necessary to maintain communication.

The Circuit

A tuning diode is used to modulate the signal. With reference to Fig. 1, resistors R4 and R5 apply a reverse bias to CR1. Audio is applied at the junction of these two resistors, overcoming the bias and phase modulating the signal. A potentiometer at the input of the first audio amplifier controls the amount of modulation.

The SWR indicator at the output of the transmitter senses a high-reflected power and uses this energy to reduce the voltage applied to the driver and output transistors, protecting them from damage.

The receiver is similarly straightforward. Incoming signals pass through two if amplifier stages and a filter to the first mixer, and then to the first i-f amplifier at 10.7 MHz. Then conversion to the second i-f at 455 kHz takes place. Incremental tuning is accomplished by means of a diode at the second local oscillator, 10.245 MHz.

If this unit is to be operated for home-station use it can be wired to operate from either 117 V or 235 V ac. There is provision for plugging in an external VFO in the receive mode.

This transceiver has been in daily use for a couple of months, both during the rush-hour rally between home and office, and on the weekend jaunts to the great state of Maine. The operation has been faultless and, with a 5/8 wavelength antenna mounted on the hood, the author has been

able to key every repeater that can be heard. Perhaps, because our hearing is not quite as good as it used to be (too many years of copying cw?) we're a bit more critical of audio quality and clarity than some of our friends. But the IC-21 has the sort of audio that *this* operator finds easy to copy, even under difficult ambient noise conditions. - WIRU

ICOM IC-21 FM Transceiver

Dimensions (HWD) and Weight:

4-1/2 x 9 x 10-inches, 14 pounds.*

Power requirements: 13.5 V dc, or 117 (or 235 V) ac.

Price class: \$400.

U.S. distributor: Adirondack Radio Supply Co., Amsterdam, NY 12010.

Power Output: 13 watts for ac operation, 10 watts on dc.*

Sensitivity: 0.3 μ V for 20 dB of quieting.*

Channel Capability: 24 channel positions.

* Measurements made in ARRL lab.

A bottom view of the ICOM IC-21. The various sections of the transceiver are built on separate circuit boards, and mounted on a metal framework or chassis. Should a fuse blow out it is accessible by removing the base plate (four screws). The leads at the right in the photo go to the 2-1/2-inch speaker, which is mounted on the base plate. There's a jack on the rear panel for connecting an 8-ohm external speaker.

