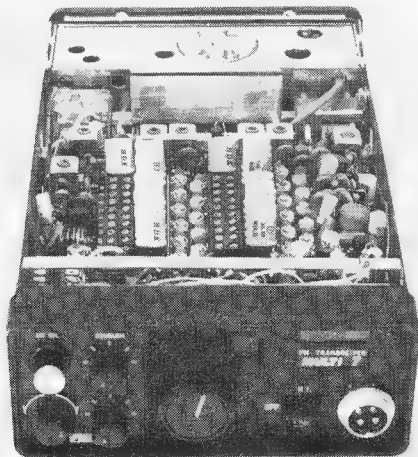
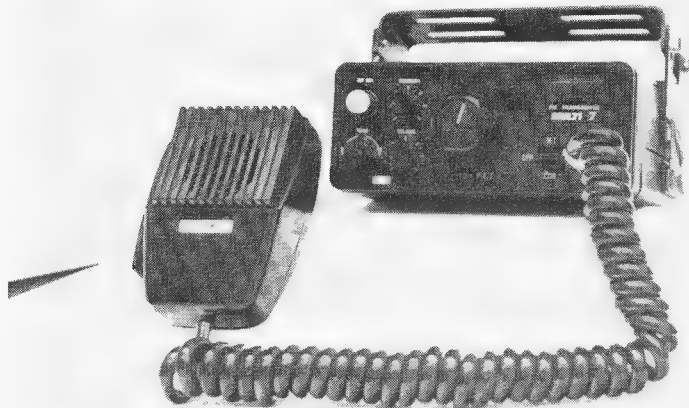


A REVIEW OF THE MULTI-7 2 METRE FM TRANSCEIVER

In the December 1974 issue of *Amateur Radio* we reviewed the Icom IC22 and stated that more two metre FM transceivers would be reviewed in the future. Here then is the second in this series.

The Multi-7 is a product of the FDK Company of Fukushima, Japan. It is distributed in Australia by Sideband Electronic Sales and Engineering of Springwood NSW, who supplied the unit used in our review. De-



tails of price and delivery can be obtained from the above company.

In keeping with the latest approach the Multi-7 has provision for 22 channels plus a priority channel and also an external VFO. There is no indication that the FDK Company produce a matching VFO nor is any information supplied on the use or construction of one.

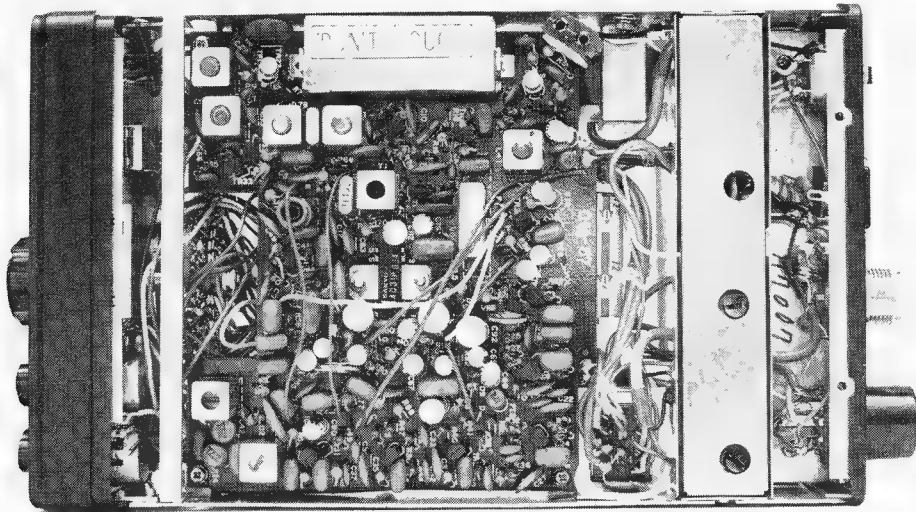
Naturally, the unit is fully solid state and employs 27 transistors, 3 FETs, 1 IC, 1 SCR and 18 diodes. The Multi-7 is the smallest two metre transceiver currently on the Australian market. The overall dimensions are: 134 mm wide, 216 mm deep and 75 mm high. The weight is 1.6 kg.

No doubt, to match the non-reflecting finish of modern car dash boards, the Multi-7 is finished in a dull black plastic on the front panel while the metal cabinet is painted in satin black. The overall appearance is first class with colour relief provided by touches of satin chrome on the control knobs. The meter and channel

selector are both illuminated from the rear and an "on air" indicator is placed to the right of the meter. Channel selector markings are unusual in that they are numbered for the frequencies commonly used in Japan, with the colour changing to signify either 144 or 145 MHz. As supplied by Sideband Electronics, 10 Australian channels are included, these being a receive and transmit crystal on every 100 kHz point from 146 MHz to 147 MHz with the exception of 146.6 MHz. In effect this allows operation on simplex channels 40 and 50 plus repeaters 1, 2, 3 and 4 and then the same four repeaters in reverse. Additional crystals are available from the distributor.

The Multi-7 is supplied with the usual accessories, a good quality dynamic microphone, mobile mount with quick release facility, DC connecting cable and spare fuses.

The transmitter is rated at either one or 10 watts output, this being selected by



A Review of the Multi-7 2 metre FM transceiver. The receiver section of the Multi-7 incorporates two interesting features which to date appear to be unique in a strictly mobile unit. First there is an offset tune control. This enables the receiver to be tuned a few kHz either side of the nominal frequency. This is achieved by pulling the second conversion crystal oscillator, hence the same frequency offset occurs on all channels. So that this control can be effectively used, a rear mounted slider switch changes the meter from its normal functions of RF output and receive signal strength to that of a discriminator zero indicator. The meter is designed to have its zero about a fifth of the way up the scale, so that the actual meter movement is rather small.

Power consumption is rated at 2.3 amps on high power transmit, 1.2 amps on low power transmit and 400 mA on receive. This is at a nominal input voltage of 13.5.

CIRCUIT DESCRIPTION

Apart from the features mentioned above, the circuitry of the Multi-7 is rather typical of modern thought in amateur 2 metre gear. It follows tried and proven methods. The receiver uses two dual gate Mos FETs in the front end, one for the RF stage and the other for the first mixer. The coupling between is via a three stage helical filter. This system is capable of good sensitivity combined with good immunity to strong out-of-band signals. The first conversion oscillator uses crystals in the 45 MHz region followed by a tripler stage. The receive crystals do not have individual trimmers as this function is well taken care of with the front panel "TUNE" control. It also saves considerable internal space and no doubt contributes to the overall compact size of the transceiver.

Many amateurs might query the lack of receive trimmers, however the fact is that even were these provided, there is no guarantee that the crystal frequency will stay put. With this system it is at least possible to compensate for temperature changes and off-frequency stations.

The IF strip is conventional with a 10.7 MHz, 455 kHz set-up. A standard Murata

filter is used in the 455 kHz section, giving a band pass of 15 kHz.

Receive audio consists of a single transistor stage driving an IC as the output. Audio power is rated at two watts with 10 per cent distortion. The speaker size is 92 mm or about 3½ inches. It is mounted in the lid of the cabinet which can be either the top or bottom of the set, the two being interchangeable. This is a handy feature as it overcomes the problem of the speaker firing into the floor of the car.

Transmitter starts off with a 12 MHz crystal oscillator and as is usual is phase modulated. The modulator is followed up with a tripler and two doublers, two amplifiers, a driver and power output stage. High SWR protection is taken from a pick-up link at the output stage, fed to a silicon controlled rectifier which controls the supply voltage to the first tripler stage. I often wonder why some form of SWR indicator is not provided from this circuit. It might not be too difficult to incorporate. High/low power switching is arranged by reducing the voltage on the driver stage with a series resistor.

THE MULTI-7 ON THE AIR

The channel selector was rather stiff in its action and this, combined with a round knob set on a fairly cramped front panel, did not encourage channel swapping. The priority channel, rather quaintly called "MY" channel was easily selected by pushing the buttons. This selected "MY" channel regardless of the position of the main channel selector. With "MY" channel selected the main dial light was extinguished. The meter is rather small and difficult to read at a distance but nonetheless effective. This discriminator position proved most useful when used with the "TUNE" control. Stations off-frequency on simplex channels could be put right on the nose.

Received audio quality was good, but not outstanding considering that the speaker was rather larger than is usually found in this type of transceiver. The transmit frequency was checked on each channel and was found to have been set within ±150 Hz. Stability was exceptional. Checked two weeks later after having been

put through all its tests, crystals were still spot on.

Deviation was set at 10 kHz as received from the distributor. Transmit quality was very smooth.

THE MULTI-7 ON TEST

A series of tests were carried out to determine the performance. The transmitter power output was measured with 13.5 volts applied to the set. In the high power setting, 11 watts was indicated on the Horwood PM502 meter with 1.3 watts in the low setting. Current drain was 2.4 and 1.0 amps at the respective powers. Receive current drain was 275 mA with the set muted, 200 mA with "MY" channel selected (Dial light out), and 350 mA at normal listening level.

Receiver performance was checked next using a Marconi TF995 signal generator tuned to channel 40 (146.0 MHz) and the following results were obtained. With the mute set to the just-on point a signal input of .3 uV opened the receiver. Quieting was 17 dB at .5 uV and 25 dB at 1.0 uV with a signal-to-noise ratio of 23 dB and 34 dB at the same two levels. We later discovered that the figures were better at 146.0 than at 146.5 MHz which indicated that the receiver was in fact peaked at a lower frequency. However, as the figures were actually better than the published specification, we did not attempt to repeak the front end. At a later date the receiver was repeaked with a very worthwhile increase in sensitivity. No figures were taken at this point. The signal strength meter was checked and the following calibration was recorded:

5	1 uV
2	2 uV
4	3.2 uV
6	5 uV
8	8 uV
10	25 uV

Receiver audio output was measured with steady 400 Hz tone. At the onset of audible distortion one watt was indicated. Although this is well down on the specified two watts, no doubt more power would be delivered on voice peaks. All the above figures were obtained with 7.5 kHz deviation on the signal generator.

The front panel "TUNE" control had a total range of 10 kHz with the centre point at the three o'clock point.

INSTRUCTION MANUAL

Two manuals are supplied with the Multi-7 one of which appears to be fairly complete although it is written in Japanese. The second is written in rather odd Japanese English and contains basic operating information but little more. There is a circuit and block diagram but no printed layouts. Alignment and maintenance do not even rate a mention.

CONCLUSIONS

This little set is well built and attractive in appearance. It meets all the published specifications with the exception of audio output, however it would be wise to check the receiver front end alignment if you want all the performance you are paying for. With the number of channels included it represents very good value at the advertised price. ■