

THE YAESU FT-901DM HF TRANSCEIVER

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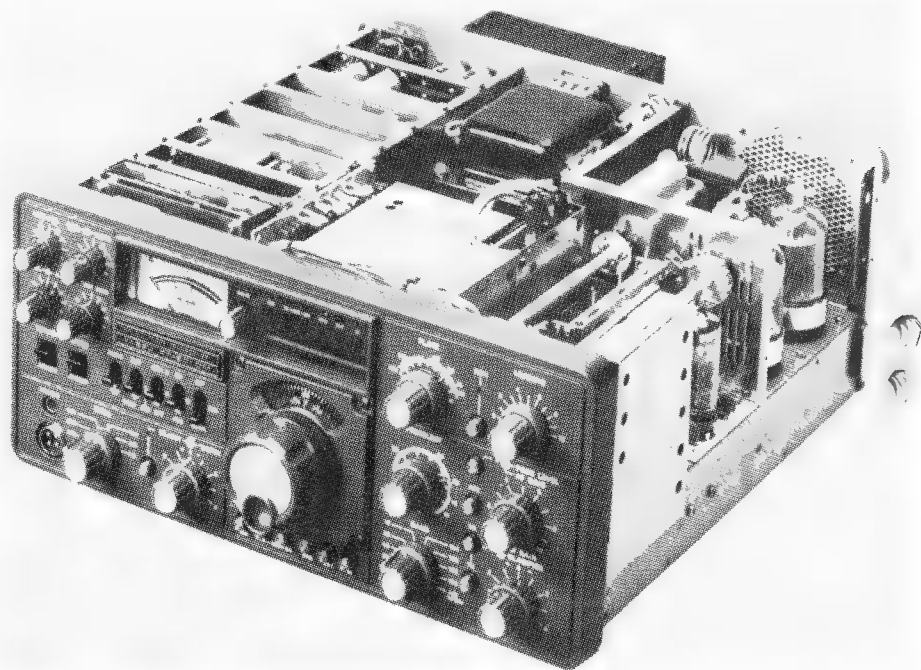
When Mr. Fred Bail, of Bail Electronics Services rang and suggested that I might like to try out the new Yaesu FT-901DM transceiver, I was delighted to do so. The 901 has been the subject of quite extensive advertising and it has been billed as a COMPETITION-GRADE HF Transceiver. Whether this refers to competition with other transceiver manufacturers or competition in the form of amateur contests is not quite clear. However, it seems that it could qualify in both areas. Well, just what does the FT-901DM do that other HF transceivers don't do? Perhaps this depends on your particular requirements, but it is clear that the Yaesu design team must have spent a long time and did a lot of head scratching to think up all the features that have gone into this transceiver. It would in fact be very hard to think of any other feature that could have been added.

Let's look at the list. Digital frequency readout with one hundred hertz resolution, Yaesu's new memory frequency control, Curtis electronic keyer, rejection tuning, variable IF bandwidth tuning, audio peak frequency tuning, RF processing, a squelch system on the transmit audio to eliminate background noise between words, which Yaesu term their AMGC system. In addition to all these there is provision to transmit and receive FM presumably for use on VHF bands with external transverters. A squelch control is included for FM receive.

For the first time as far as I can remember, Yaesu have decided to use 6146s in the transmitter output stage. They also employ negative RF feedback over the final stages to reduce distortion products. All of the usual Yaesu features are of course still there. Ten to one-sixty coverage, selectable AGC, VOX, noise blanker, AC or 12 volt DC operation.

Let's now look a little more closely at the overall design of the FT-901. It bears a similarity with several earlier Yaesu transceivers. Perhaps at first glance it could be called an updated FT-101, and there is no doubt that the 101 must have influenced the designers to quite a large extent. When we look inside, though, there is a resemblance to the FT-301 series.

While we normally don't make mention of competing equipment in these reviews, I am sure that the Yaesu Co. won't mind me saying that the overall appearance is very reminiscent of the Kenwood TS-820. Perhaps the undoubted success of that transceiver reflects in the 901. Whatever, the FT-901DM is a very attractive rig. The new style dial is now fully illuminated with two rotating scales, the larger of which is the kilohertz indicator, and the smaller or inner the 100 kilohertz indicator. The rear illumination is a soft blue which is very easy on the eyes over a long



period of operation. "S" meter illumination is also excellent, and is the first translucent rear lit type that Yaesu have used.

A look at the circuit reveals that a great deal of effort has been put into producing a cleaner received signal. A single conversion scheme has now replaced the old double conversion of the FT-101 and the IF used is 8.9875 kHz. The receiver front end uses the usual 3SK40M dual gate MOSFET as an RF stage feeding a source follower stage with two FETs in parallel. The first mixer is balanced with two FETs. In fact a great deal of use has been made of balanced stages throughout circuitry. The IF signal receives some amplification through two parallel connected FETs, and is then fed through a ± 10 kHz monolithic filter before going into the switchable filter and the noise blanker. This assures low cross modulation when the blanker is in use. Three filters can be specified in the 901 with the 2.4 kHz SSB unit supplied as standard. A 600 Hz filter for CW and a 6 kHz filter for AM are both optional extras. Output to the FM IF strip is taken out before the switchable filters and taken off to a special FM board which contains both the transmit and receive facilities for that mode. The bandwidth control has some very interesting circuitry behind it. The IF signal at 8.9875 kHz is converted to a frequency of 10.76 MHz, where it passes through another filter. However, as the heterodyning crystal oscillator frequency for this conversion is controlled by the bandwidth

setting; the actual bandpass can be varied in relation to the normal first SSB filter.

It should be noted that in both the AM and FM modes the bandwidth control is not available. The rejection tuning control operates in a similar way to the FT-301 transceiver set-up. The series resonant frequency of a crystal at the IF frequency is tuned across the bandpass by means of a varactor diode. In the review of the FT-301D we commented on the simplicity of this arrangement and also its effectiveness.

The receive audio section is worth looking at. It incorporates the APF circuitry which used an MC3403P op. amp. as a selective amplifier in a very effective and yet simple circuit. The peak frequency is variable between 400 and 900 Hz.

The digital frequency display on the FT-901DM is controlled by the VFO frequency only and hence requires to be recalibrated when bands or modes are changed. It seems a pity that Yaesu didn't go the whole way and provide mixing for all internal oscillators to give accurate readout. This does not infer that accurate readout cannot be obtained, it can, but the display must be calibrated against the transceiver calibrator to be sure. While on the subject of calibration, it is high time that Yaesu devised a means of changing modes without changing frequency and hence the need to recalibrate. With a transceiver of this complexity there is just no excuse for the lack of this feature.

At long last Japanese designers have discovered that RF inverse feedback produces cleaner signals — a very necessary

thing on today's crowded bands. The FT-901DM is in fact the second Japanese transceiver to incorporate RF feedback but when we consider that the American Collins Co. introduced this back in the late 1950s we wonder why it took so long. Yaesu claim 6 dB of feedback and state their 3rd order distortion products at better than 31 dB below rated output. As this would bring the distortion up to about -25 dB without the feedback, one wonders how the FT-101 and other transceivers produced their "better than -30 dB" specs.

Be that as it may, the 901 does put out a very clean signal. The difference under local strong signal conditions is very noticeable.

The 901 uses the excellent permeability tuning system well perfected in the 101 and 301 series. Combined with the other features mentioned earlier, this helps yet again to contribute to a clean signal on both transmit and receive. The new Yaesu memory is an interesting albeit complicated system. It is a complete synthesizer locked to the normal transceiver VFO. When the memory button is pushed, the VFO counter is latched and the VCO is locked on to that frequency. When recall is required, the output from the VCO is fed into the system in place of the normal VFO.

THE FT-901DM ON THE AIR

Basic operation of the 901 is soon mastered, however it takes time to become acquainted with all the accessories. The new tuning dial is smooth and a pleasure to use. The front finger hole on the tuning knob makes it easy to spin from one end of the range to the other. From personal preference I still like the old protruding spinner that we got used to on most of the older design Yaesu gear, however the CW type does look smoother. With both the power and heater switches on, the transmitter can be put straight into the tune mode by using Yaesu's new ten second automatic tune up device. Just push the tune button, the red LED indicator comes up, the transmitter goes into TUNE and you have ten seconds to complete the operation. This feature might help the final tubes live a bit longer when used by some of those perpetual "Tuner-uppers" that we hear so often on the bands. Received audio quality sounded rather restricted and no amount of playing with the bandwidth control seemed to put this right. In fairness, though, it must be said that another member of our technical staff found the audio response to his liking, particularly when using the headphone output. The operation of the bandwidth control was not quite as expected. Having been brought up on the old style communications receivers, I expected the selectivity to increase in a symmetrical manner. This does not happen. Instead one can push the response either higher or lower and so achieve either a lopping off of high or low frequency audio but not

both. It is now clear to see why Yaesu offer a CW filter as an optional extra.

The bandwidth control is useful in eliminating interference to some extent, useful for balancing up poor transmitted quality from other stations, but the reject control is by far the more useful of the two. AGC action is smooth in either the fast or slow position — attack time is fast with no hint of any distortion on strong signals.

On the transmit side, audio quality reports were excellent and the RF processor proved to be effective although a little hard to adjust first off. Amateurs who don't possess a monitor scope should take their time and get plenty of reports from locals. Better perhaps, borrow a scope.

Back to receive, the clarifier operates on either transmit or receive or both. Quite a handy feature if you want to shift onto the received frequency when offset.

Not being an ardent CW man I can only say that the built-in Keyer worked very smoothly. The only external attachment needed is a paddle. The keying speed can be adjusted by a front panel control. With the adjustable audio filter, rejection filter and keyer, the FT-901DM makes a superb CW rig. Here at last is a transceiver that has given some thought to the keen CW operator.

The AMGC or automatic microphone gain control, could be useful in reducing unwanted household noises particularly when the processor is in use. It works by providing a threshold level on the microphone amplifier. Input via the microphone below normal close talking conditions just does not come through. Handy if you have noisy children.

The memory system proved a useful feature. While not quite as handy as an external VFO, it does enable split frequency operation. It is possible to transmit on a fixed channel and the receive elsewhere. Very useful if a DXpedition is listening up 10 kHz or you like to work the "Ws" on 40 metres. As we didn't have a two metre transverter available, we were not able to fully check out the FM mode. It does appear to be an economical way to get on to two metres with all modes.

One point mentioned in the FT-901 advertising that needs comment is *Yaesu's unique slug tuning system provides for the possibility of expanded amateur bands at WARC 79*. Perhaps so, but the band switch on the 901 does not have an auxiliary position. So where does the new band fit in?

INSTRUCTION BOOK

The FT-901DM instruction book is in the usual excellent Yaesu manner. Clear operating instructions explain every control in full detail. The circuit description section will enable the new owner to fully understand just how his set operates. A full schematic and block diagram is included, but no circuit board layouts are provided. All points that might need adjustment are clearly indicated.

CONCLUSIONS

While we could not say that the FT-901DM is a "State of the art design", it does offer a startling array of facilities that would be hard to duplicate in any other available transceiver. While the total package is fairly expensive, the 901 is available, less some of these features, at of course a lower price. For the CW man it offers perhaps the best performance package available anywhere and for the SSB man a smooth operating set with just about every convenience he will ever need. Our FT-901 was loaned by Bail Electronics Services, to whom all enquiries on price and delivery should be directed. ■

A SECRETARY'S CONSOLATION

If a secretary writes a letter, it is too long.
If he sends a postcard, it's too short.
If he issues a bulletin, he's a spendthrift.
If he attends a committee meeting, he's butting in.
If he stays away, he's a shirket.
If he offers a suggestion, he's a "know all".
If he says nothing, he is useless.
If the attendance at the meeting is slack, he should have called the members up.
If he calls them up, he's a pest.
If he asks a member for his subscription, he is insulting.
If he doesn't, he is lazy.
If the meeting is a big success, the committee gets the praise.
If it is a failure, the secretary is to blame.
If he asks for advice, he is incompetent.
If he does not, he is swollen headed.
Ashes to ashes, dust to dust,
If the others won't do it, the secretary must.
Anon.—Submitted by Ron Jardine VK3PR. ■

QSP

HOME TRUTH

"It is operating and technical investigation, not regulatory hassling, which are the essence of amateur radio. Were it not for the sheer enjoyment we amateurs derive from the former, we wouldn't concern ourselves with the latter." From QST editorial, Feb. '78.

DX ITEMS

From Feb. '78 QST it is learned that US maritime mobiles must always observe US phone band limitations even when they are outside Region 2. Also that any amateur or club in Quebec province may substitute the prefix VZ for VE to 12.10.1978 inclusive to celebrate Radio Canada TV's 25th anniversary.

LONG DELAYED ECHOES

LDEs have been recorded over a period of many years on HF but nobody has come up with any acceptable answers. A recent impetus was the observation of LDEs by 0Z9CR during EME tests on 7.7.1974 at a time when many solar flares were observed. The frequency of observations however was 1296 MHz and the echoes some two seconds after the return EME signals. This alone has triggered much speculation as set out in two articles in Feb. '78 QST. ■