

Commercial Kinks

With Ron Fisher,* VK3OM

THE YAESU FT200

But first off I must make an apology for the non-appearance of the notes on vox units as promised in the July issue. We ran into a few problems with copyright of the circuits, so until this is cleared up in the near future this particular article will be held over. However, the additional notes on the Trio 9R 59D must have filled a need if the amount of correspondence I have received over the last few weeks is any indication. I am working on more modifications for this series of receivers and along with some of the experiences and problems of readers, you can look forward to more in the near future.

It would indeed be hard to find a piece of commercial gear so universally accepted as the Yaesu FT200. This rig must surely have put more Australian Amateurs on s.s.b. than any other, or perhaps all other transceivers, transmitters and receivers combined.

It must also stand as a tribute to the designers of the FT200 that in its three years on the Australian market very few problems have come up and certainly none of them serious. Also, the latest model is very little different to the original FT200 of three years ago. Some of the differences are, however, interesting and will be discussed during the course of these notes.

First though, some service notes. The Australian Agents for Yaesu, **Bail Electronic Services**, have compiled a most informative trouble shooting guide on the FT200 and with their kind permission I intend to reproduce this over the next couple of months. Even if you don't own an FT200, I think you will find many of these hints applicable to your rig.

Sympton: Transmitter output down; low operating IC; low IC off tune. Probable cause: Faulty p.a. tubes. Cure: Replace tubes.

Sympton: Transmitter not operating; no p.a. resting IC; receiver okay. Probable cause: P.a. inoperative. Cure: Check that the 11-pin accessory plug is plugged into socket at rear of set. Refer to instructions book for details. If the p.a. is still inoperative, then check h.t. voltage, bias and p.a. components.

Sympton: Output low on all bands; standing IC okay. Probable cause: Driver circuits out of alignment. Cure: Re-align all stages as per the instruction book.

Sympton: No p.a. dip obtainable on 80 metres; indications of p.a. oscillations. Probable cause: High gain in driver causing oscillation. Cure: Try installing a 22K $\frac{1}{2}$ w. resistor on 80 metre switch contact, similar to the 10K resistor R64 which is in circuit on 40 metres.

Sympton: No output on 80, 15 and 10 metres. Probable cause: Faulty sideband crystal. Cure: Check in the reverse sideband position and

if output becomes normal, suspect the sideband crystal and replace. This problem can also be caused by faulty components associated with the carrier oscillator tube V106 and will also show up as lack of sideband reception. That is, a.m. only reception in all function switch positions.

Sympton: Transmitter output low on 21 MHz. and weak reception. Probable cause: Maladjustment of trap L22. Cure: Adjust as per instructions book.

Sympton: Transmitter output down and poor c.r.o. pattern on the lower frequency bands; output normal on 10 metres and on 15 metres, but plate tuning in 40 metre position; insulation burnt on h.t. lead to p.a. r.f.c.; p.a. coil slightly discoloured showing signs of overheating. Probable cause: 15 metre tap shorted to 10 metre tap on p.a. coil. Cure: Separate and re-solder any shorted taps.

Sympton: Transmitter output down or receiver insensitive on one band only. Probable cause: Misalignment of driver circuits on defective band. Cure: First try the other bands to confirm that these are okay. Re-align driver and r.f. coils on defective band. Also check any appropriate heterodyne crystal.

Sympton: Receiver losing sensitivity accompanied by low drive or variation in transmitter output. Probable cause: Fault in L12, r.f. driver plate coil, possible dry joint or open circuit. Cure: Repair coil or re-solder as necessary.

Sympton: No a.l.c. reading or incorrect zero setting of meter on a.l.c. Probable cause: First i.f. tube or metering circuit. Cure: Check V104 and all a.l.c. circuitry. Note that the meter reads in reverse for a.l.c. and provides an indication of effect of a.l.c. voltage by reading V104 cathode current. The meter zero is a full scale deflection of the needle. To adjust "zero" switch transmitter to s.s.b. Mike gain off. Meter switch to a.l.c., rec./opr. switch to opr., press mike p.t.t. button and adjust the small preset pot VR101 on top of the printed circuit board next to the crystal filter. I have noticed in quite a few FT200s that the meter zeros right at the extreme setting of VR101, or in many cases will not quite reach zero. Replace R122 with either a slightly larger or smaller value. Its size varies in production models from 1K to 1 $\frac{1}{2}$ K ohms. Also the value of the a.l.c. zero pot has been changed from 1K to 2K in later models.

More trouble shooting next month, but before ending, one quick modification. If you have operated some of the better sideband receivers or transceivers the first thing you will notice when using the FT200 is the excessively fast a.g.c. decay. It is so fast that even the S meter is hard to read. The remedy is simple, a bit more capacity across the a.g.c. line. A value of 0.22 to 0.33 μ F. appears to be about right and the best place for it is across C124. Some of the perfectionists say you should wire a 100K resistor in series

with the new condenser so that the a.g.c. attack is not slowed down too much. However, I have found no noticeable difference either way.

While on the subject of the received signal, another simple change comes to mind. In the earlier models the cathode of the product detector V102A was earthed through a small r.f. choke L106. It seems that there was insufficient d.c. resistance to produce adequate bias. In the current series this choke has been replaced with a 100K $\frac{1}{2}$ w. resistor, which has made a marked improvement to strong signal reception. If you find that signals over S9 sound better with the r.f. gain backed off, give this one a try.

I'll be back again next month with more on the FT200.

TRANSCIVER TYPE NUMBERS

No doubt readers of overseas magazines have noticed advertisements for Yaesu Musen transceivers, but with different type numbers and in some cases different even in name. In Europe Yaesu has been sold under the name of Sommer Kamp and in the U.S.A. Tempo. These are both manufactured by Yaesu in Japan and are identical to types sold here in Australia. Here is a handy reference guide to identify the various types:

| Yaesu Musen | Sommer Kamp | Spectronics |
|----------------|----------------|-------------|
| FT-DX100 | FT-DX101 | — |
| FT101 | FT727/277 | FT101 |
| FT200 | FT250 | Tempo 1 |
| FT-DX400 | FT-DX500 | FT-DX560 |
| FT-DX401 | FT-DX505 | FT-DX570 |
| FT-DX560 | FT-DX747 | — |

This information has been supplied to us by the advertisers in "A.R." of Yaesu equipment.

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* 3 Fairview Avenue, Glen Waverley, Vic., 3150.

Commercial Kinks

With Ron Fisher,* VK3OM

Help. If you are one of the many who tried a 100K ohm resistor in the cathode of your FT200 product detector and found that it would not work, try a 10K resistor. This will have the desired effect.

THE FT200, Part 2

I wonder if any reader has successfully modified an early model FT200 for use with an external v.f.o., in particular the Yaesu FV200? It appears on the surface to be a fairly complicated job. If you would like to give it a try, I can supply all the circuit modifications that would be needed. Any takers?

I am also after a volunteer to design an effective noise blander, but here I regret that I cannot supply any details.

Now back to our service notes as supplied by Mr. Fred Bail, of Bail Electronic Services, the Australian Agents for Yaesu.

Symptom: R28 plate dropping resistor burns out. **Probable cause:** Intermittent internal short in V3. **Cure:** Replace V3.

Symptom: Vox relay intermittent and erratic in operation. **Probable cause:** Diode D2 and/or valve V8. **Cure:** Replace D2 which is a type SH1 silicon diode. Check both valves V8 and V9. The voltage across the vox relay should be approximately 60 volts. Trouble in the vox section will show up in both the vox and p.i.t. positions as most of the circuitry is common to both. If you tend to use vox either on s.s.b. or c.w., trouble may initially show up as a shortening of the vox delay time to the point where you cannot adjust for enough delay on the delay control. Any low voltage silicon diode is suitable in this section. An EM401 100 p.i.v. diode is typical.

Symptom: V.f.o. jumping in frequency after warm up. **Probable cause:** Component and lead-in wire eyelets on v.f.o. printed circuit board not soldered to copper laminate. **Cure:** Remove board and re-solder all eyelets and components.

Symptom: V.f.o. jumping in frequency during tuning. **Probable cause:** Bad contact between tuning condenser wiper forks and shaft. **Cure:** First try cleaning with pressure-pack contact cleaner. If there is no improvement, remove the forks, re-tension and replace them in position.

Symptom: V.f.o. jumping in frequency during mechanical shock. **Probable cause:** Dry joint or loose mounting screws on v.f.o. printed circuit board. **Cure:** Solder joints on the board and tighten screws where necessary.

Symptom: Pulling or f.m. of v.f.o. frequency on voice peaks, also may show up as frequency shift on c.w. **Probable cause:** Defect in voltage reg-

ulator causing slight variation in regulated voltage to the v.f.o. **Cure:** Locate the voltage regulator which is on a printed circuit board under the chassis to the rear of the v.f.o. box. Check the regulator components and also the input and output voltages. The output should be 9 volts and this can be adjusted by means of VR501. If the fault exists only when operating on 12 volts d.c. power supply, check that the battery voltage is normal at the d.c. 200 input terminals.

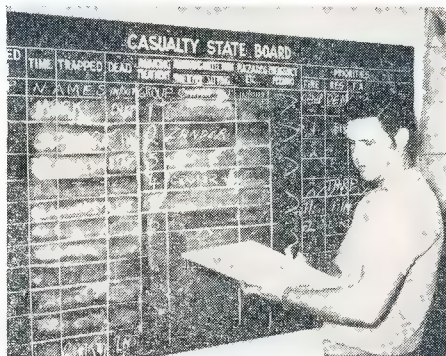
Symptom: Calibrator signal weak or intermittent. **Probable cause:** Faulty connections or dry joints on the calibrator printed circuit board. **Faulty diode D103.** **Cure:** Check voltages on the board. Re-solder eyelet rivets to supply voltage tags. If D103 is faulty, this can cause low or no output on the higher bands. Replace with a small germanium diode, a 1N60 is typical.

Symptom: Receiver loses sensitivity. **Probable cause:** Break in continuity of antenna to r.f. coil L12. **Cure:** Check continuity, especially at junction of co-ax cable and receiver r.f. coil L12. Also check the antenna change-over relay and clean the contacts if necessary.

There is still quite a bit to go with the trouble shooting, but I think I might hold them over until next month and perhaps use the space left to cover a few simple modifications.

C.w. operators will have noticed that there is no control over the carrier power when switched to the c.w. position. As it is possible to vary the carrier level in the a.m. position with the a.m. carrier control at the rear of the chassis, all that is necessary is to wire this control to the c.w. position on switch S3e. Cut the connection to position four and then bridge to position five. Now you can adjust the c.w. level to give 150 watts d.c. input.

Key clicks seem to be a problem with the FT200. If you are having trouble try this one. Remove the 470K resistor from pin 1 of the 7360 balanced modulator tube. Replace this resistor with two 220K resistors in series. Connect a 0.01 μ F. paper condenser from the junction of these two resistors to earth.



Bill Sebbens, VK4XZ, at the Townsville Civil Defence casualty state board. Bill, along with several other Townsville Amateur Radio Club members, is active with the Civil Defence organisation. Main communication links were manned by Amateurs immediately after Cyclone "Althea" wrecked Townsville.

The ZL FT200 Club. If you own an FT200 could I suggest that you consider joining this live-wire club. Their object is to keep members informed of current improvements and modifications to the FT200. They do this by means of a well presented monthly newsletter. The annual subscription is only 75c. Further information can be obtained from the Secretary, D. J. Parkinson, ZL1BJP, 36 Western Road, Tauranga, New Zealand.

I will be back next month with more on the FT200 plus more on the Trio 9R 59D and a 160 metre modification for the R1155 receiver. In the meantime the Editor is still pondering on how many sharp eyes managed to miss "Sympton".

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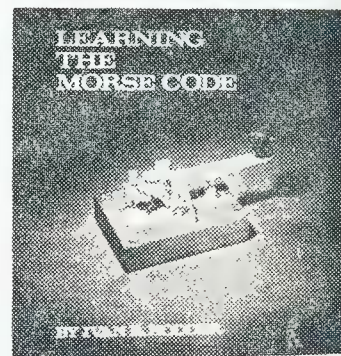
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This month, Part Three of the FT200, some modifications on the Marconi R1155 receiver, but first off, some data on carphones. Following my plea for information on these; Peter Campbell, VK2AXJ, answered my prayer and how! I can now supply circuits for the following A.W.A. units. Low band: MR10C/20A, MR15A and MRT25A; high band: MR10C/20A, MR20B, MR15A, MR6A, MRT25A, MR3A, MR10B. If you would like a copy of any of these, drop me a note with details of your requirements, plus an s.a.e.

Peter also forwarded conversion information on A.W.A. carphones and this will be published over the next two issues.

CONVERSION OF A.W.A. CARPHONES

High band MR10B to 146 MHz. Transmitter: increase IC14 to 82 pF., IC12 to 47 pF., IC21 to 15 pF. Add 4.7 pF. across the secondary of IT2 pins 2 and 3. Add 2.2 pF. across both primary and secondary of IT3. Close up IL4 and IT6A as required. Receiver: Increase C15 and C16 to 33 pF., C31 to 22 pF. Rewind both primary and secondary of T9 with 6 turns.

High band MR10C and MR20A to 146 MHz. Transmitter: T8 increase C92 to 22 pF., C89 to 33 pF. Add 2.2 pF. across L9. Close up L11, L12 and L16 as required. Receiver: Add 1.8 pF. across L1. Add 1.8 pF. across L5. Increase C54 to 15 pF. Increase C6 and C7 to 39 pF., C58 to 22 pF.

High band MR20B to 146 MHz. Transmitter: Increase C117 to 39 pF., C118 to 22 pF. Add 2.2 pF. across L9. Close up L11. Receiver: Add 1.8 pF. across L1, L3 and L6. Increase C66 to 47 pF., add 4.7 pF. across primary of TR2 and secondary of TR1.

High band MR3A to 146 MHz. See October 1965 "Amateur Radio" or contact Commercial Kinks for a copy of the details. More carphone conversion details next month.

THE FT200, PART THREE

Here is the last part of the service data on the FT200 as supplied by Mr. Fred Bail, of Bail Electronic Services.

Symptom: No drive on "Tune". No side tone on c.w. position, but meter kicks up with speech on s.s.b. This fault is sometimes of an intermittent nature, but it is normal for the drive on "Tune" to diminish slightly if the set, and thus the audio oscillator, becomes very hot. Probable cause: Failure of the audio tune-up oscillator. Cure: Re-adjust the oscillator feedback preset pot. VR504. A slight adjustment of the output preset pot. is sometimes sufficient. Both these controls are mounted on the oscillator printed circuit board under the chassis. If the above

adjustments are not effective, check other components and voltages on the board. Until the fault is rectified, the transmitter can be tuned up in the a.m. position. The carrier insertion can be adjusted with a.m. carrier level pot. at the rear of the chassis.

Symptom: Transmitter self oscillation on 21 MHz. band only. This shows up as constant high Ic meter reading at no drive condition. Probable cause: Misadjustment of L22 trap. Cure: Adjust as per the instruction book. If the transmitter self-oscillation still persists, slightly back-off the L22 adjustment until the oscillation just ceases.

Symptom: Transmitter self oscillation. High Ic meter reading at no drive condition. Ic reading varies with grid and plate tuning. Probable cause: P.a. neutralisation out of adjustment. Defective 12BY7 driver valve. Excessive voltage on 12BY7 driver valve. Cure: Connect the transmitter to a load, preferably to a 50/75 ohm dummy antenna. First tune the transmitter on 21.3 MHz. with an Ic meter reading of about 100 to 150 mA. Adjust the p.a. neutralising condenser TC-3. Adjust TC-3 so that Ic dip at p.a. resonance coincides with maximum r.f. output. Check 12BY7 driver valve. Try a replacement. Check that the 300v. line in the FP200 is not reading high. If it is, modify the 300v. filter section to a choke input type.

Although that finishes the service data on FT200s, it is by no means the end of the FT200 in Commercial Kinks. I will be back next month with plenty of ideas for you to try out on your rig. Don't forget to tell me of any problems or modifications relating to the FT200.

THE R1155 AND 160 METRES

My thanks to Mr. R. G. Edmeades for the following notes on the R1155 receiver.

"After suffering from QRM when using the broadcast band as a tunable i.f., it was decided to adjust the broadcast band of the 1155 to include the 160 metre band. Here is how it was done.

"Turn the r.f. coil slug out as far as it will go. Turn out the two No. 3 coil slugs until the tops are just below the edge of the coil box. These are the 1st, 4th in the row nearest the front. Turn out the No. 3 trimmers two turns. Set the pointer to 628 on the dial, then tune oscillator slug (1st on the left)

until the set tunes to 730 kHz. Now peak the mixer coil slug (4th from the left). Turn the dial pointer to 1325 and turn the oscillator trimmer until 1600 kHz. is heard. Peak the mixer and screw out the r.f. trimmer until it has no further effect.

"This is the limit of adjustment and the set now tunes from 700 to 1900 kHz. This provides a tuning range of 1600 to 1900 kHz. for use with converters, giving very little chance of QRM from break-through. A new paper scale can be pasted over the old broadcast calibrations."

In a later thought Mr. Edmeades says that some improvement can be achieved by cutting off half of the r.f. coil slug. To do this, remove two screws and the metal cover. Mark the top of the pot, so that it can be replaced as is. Remove the long clamp screws and lift off, unscrew the slug and cut half of it off. You will now be able to peak the trimmer at 1600 kHz.

Thanks Mr. Edmeades. I am sure this will be most useful to all 1155 owners. If you want more data on 1155s, consult the September 1960 issue of "Amateur Radio," or contact Commercial Kinks for copies of this.

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THE FT200, Part 4

It seems that FT200 mods will go on for ever, at least I rather hope they will. Two letters just to hand are from Phil VK5NN and Kerry VK5SU, both of whom report on modifications and adjustments they have made. First off, over to Phil.

"Further to the valuable material already published, there are several matters which appear to require attention and for which solutions are not yet available. Everybody wants information, but it seems most are quite happy to wait for Yaesu to come out with new mods for all to copy. I am numbered with the many as time is at a premium, but here are a few tips on the adjustment of the FT200 which may overcome common defects:

Balancing of Product Detector Injection

"After replacement of L106 in the cathode of the product detector V102 by a 10K resistor, the set sometimes lacks sensitivity, and even on some unmodified sets there are complaints of this; also the fact that the S meter gives different readings on the various bands. It has been found necessary to re-balance the b.f.o. injection by adjusting C165. This, of course, is difficult as this component is only a few pF. of twisted wire between pins 2 and 8 of V102 (12AX7). This may be done by putting in two pieces of wire $\frac{1}{2}$ " longer than the original ones, but as the adjustment is best done by reducing capacitance, a 1-4 pF. trimmer is preferred. A small 'Polar' concentric capacitor was used with 40% of the plunger screw removed.

"To adjust correctly, first remove the antenna co-ax plug and switch to 21 or 28 MHz. Screw in C165 until there is an increase in the S meter reading due to an excess of b.f.o. signal on the a.g.c. tube. Now slowly reduce C165 to the point where the S meter is just back to zero. You can hear the receiver sensitivity come up to maximum. The calibrator may be used as a strong signal source on 3.6 MHz. and a weak signal source on 28 MHz. This adjustment is recommended to those who have complaints about the FT200 S meter.

Setting the BFO/Carrier Oscillator Frequencies

"Most FT200s and FT101s give very good clean signals when seen on a spectrum analyser, but there are some that sound rather low pitched and the speech is therefore indistinct. The manual simply says that the carrier crystals should be adjusted for best speech quality, but gives no instruction as to how this is best done.

"The filters employed in these transceivers are not always symmetrical, but are good enough to produce good crisp speech on all bands with either upper

or lower sideband. The filter has three peaks, the outer two about 1.8 or 1.9 kHz. apart and the third somewhere in between. There may be 6 to 8 dB. of difference between them, but this appears to be of little consequence.

"Setting the carrier crystals can be done by means of a plastic knitting needle sharpened as a screw driver to go between the slots in the top cover for adjusting the trimmers adjacent to the carrier crystals. Remove the antenna plug, zero the S meter and use the calibrator crystal as a signal for alignment on the 3.6 MHz. band. Tuning through the signal the peaks should appear at about 600-700 Hz. for the lower one and 2400 Hz. for the upper one. Adjust the r.f. tuning for a 20 dB. over S9 indication on the S meter, then tune down in beat frequency until zero beat gives a pulsation on the meter between S3 and S5, dropping to zero as the beat note rises in pitch when the signal slides further down the skirt of the pass-band.

"Repeat with the sideband switch in the reverse position, adjusting the input signal lower peak to 20 over S9 again if the peaks are not symmetrical—as usually they are not. Re-adjust the carrier frequency trimmers until you achieve a result something like the above for both the normal and reverse sidebands. The zero beats should then be about 3 kHz. apart on the main dial.

"Similar tests may be done with many other makes of equipment with worthwhile results. This test costs nothing and requires no test equipment. If you have either an audio signal generator, piano, or even a guitar, you can check where the peak frequencies lie. The lower peak is about D sharp or E above middle C, and the upper peak two octaves higher.

"This series of adjustments will change the sound of a transmission from what could best be described as muffled, to one which can be said to have 'presence' even with only 2.7 kHz. of band width."

Over now to Kerry VK5SU who has worked out a few very simple but interesting modifications.

Peak-Reading Type of Meter

The action of the meter can be slowed down and made into a peak-reading type by connecting a 100 μ F. electrolytic condenser across the meter terminals. As the voltage across the meter is very low, a ten-volt working type would be quite large enough.

Kerry reports that the a.l.c. indication is now slowed down and easier to read.

Sensitivity on 28 MHz.

Sensitivity is a problem on the 28 MHz. band. Kerry makes the suggestion that amongst other things the oscillator injection at the 6U8 is insufficient, and that perhaps a buffer amp. after the heterodyne oscillator could be tried. However, one way round the problem is to substitute a 6GM6 for the 6BZ6 r.f. amplifier stage. The 6GM6 has a gm. of 13,000, quite a bit up on the 6BZ6. The following

changes need to be made to the circuitry round the r.f. stage.

(a) A resistor of about 66 ohms across the 6CB6 filament which is wired in series with the new 6GM6, to balance heater voltages.

(b) Replace the existing 100 ohm cathode resistor R25 with one of 56 ohms.

(c) Replace R32 1K ohm decoupling resistor with one of 1.5K ohms in order to bring the h.t. down to 125 volts for the 6GM6.

(d) Wire a 3.9K ohm resistor in parallel with R24, the 15K ohm screen divider, to increase to 125 volts the voltage on the 6GM6 screen.

Finally, Kerry passes on a hint to improve the insulation of the e.h.t. wiring. After an h.t. short one night, Kerry traced the fault to the bolt holding the r.f. choke in the final compartment. The bolt was just long enough to cause an arc to the lug anchoring one end of the r.f. choke winding. Cure: Put a spacer washer under the choke.

Kerry is also the proud owner of an FT-DX401 and with a bit of luck might be tempted to come up with a few ideas on this set in the near future.

* * *

I seem to run out of space each month, just when I really get going. In other words, the Trio modifications will have to wait until next month. To all those who have written to me for carphone circuits, I am getting these out as fast as I can, however sometimes there is an unavoidable delay of a week or two before I can arrange copying of them.

DOW-KEY CO-AXIAL RELAYS SERIES "60" S.P.D.T.



Features: The 60-2328 is a remote operation, ruggedly constructed S.P.D.T. co-axial relay designed for operation from low-level to 1 kw. For transmitter-receiver applications, it is fitted with a special high isolation 'G' connector in the receive position. This 'G' connector increases the isolation to greater than -100 dB. at frequencies up to 500 MHz. when the receiver is switched to earth whilst transmitting.

Model 60-2328 employs UHF connectors, but other types of connectors are also available.

Specifications: Model, 60-2328; coil voltage, 24v. DC (19-31v.); power rating, 1 kw.; impedance, 50 ohms; operating time, 25 ms.; VSWR, less than 1.5 at 500 MHz.;

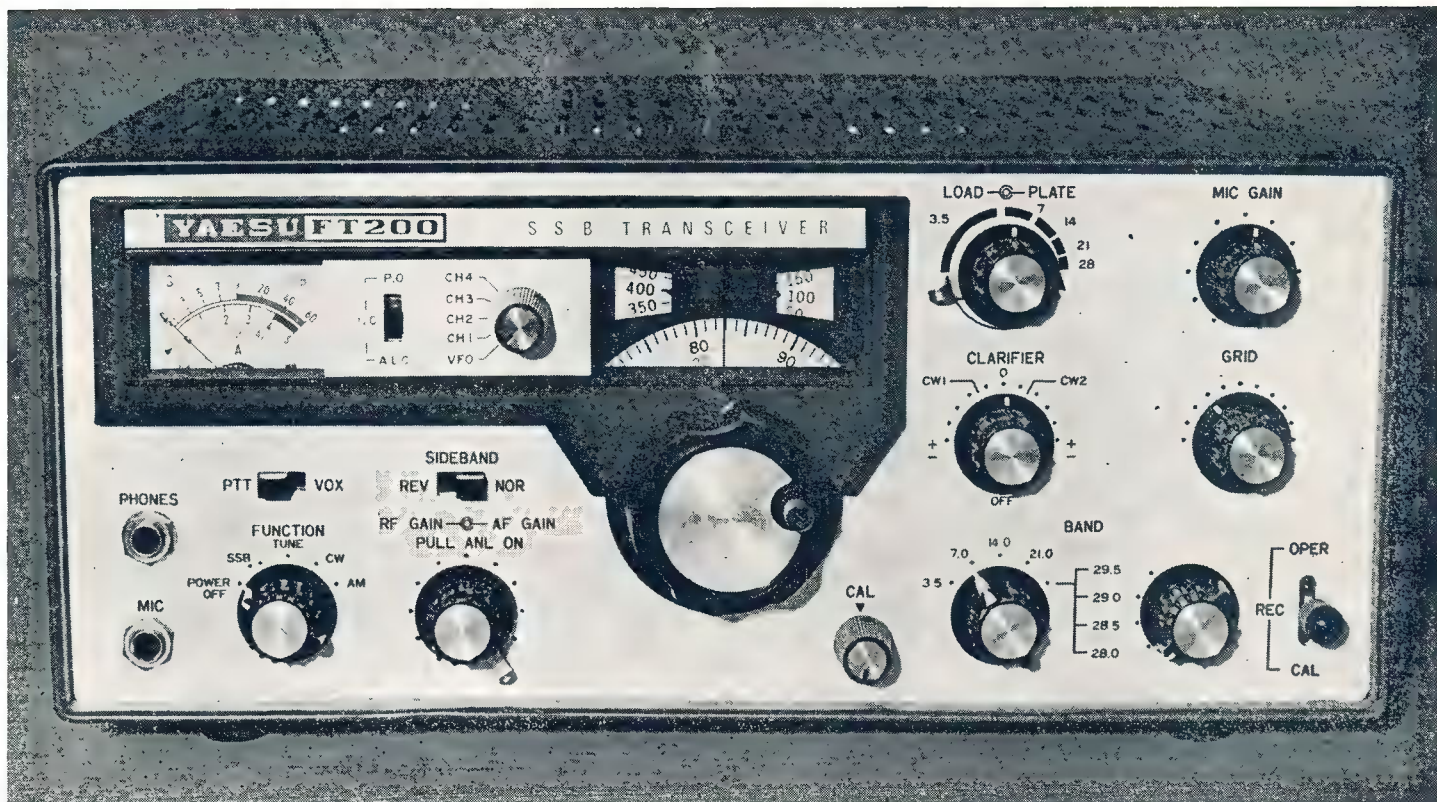
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A superb quality, low cost, versatile transceiver. Covers 80-10 mx, tuning range 500 Kc. each band. On 10 mx, crystal supplied for 28.5-29 Mc. (Crystals available optional extra for full 10 mx coverage.) SSB, CW, AM; with a speech peak input of 300w. Transistorised VFO, voltage regulator, and calibrator. 16 valves, 12 diodes, 6 transistors. PA two 6JS6A pentodes. ALC, AGC, ANL, PTT and VOX. Calibrated metering for PA cathode current, relative power output, and receiver S units. Offset tuning ± 5 Kc. Uses a 9 Mc. crystal filter with bandwidth of 2.3 Kc. at -6 db. Selectable sidebands, carrier suppression better than -40 db. Sideband suppression better than -50 db.

Provision for use of optional external VFO, FV-200. VFO includes fixed channel facility.

Operates from conservatively rated separate 230 volt 50 c.p.s. AC power supply, FP-200, which includes built-in speaker. A 12 volt DC power supply, DC-200, is also available. Transceiver incorporates power take-off and low level R.F. drive outlets suitable for transverters.

Latest model includes (1) provision for use of external VFO FV-200, and (2) factory installed key-click filter.

Cabinet finished in communication grey lacquer. Panel, etched, satin finish aluminium.

| | |
|--------------------------------|-------|
| FT-200 Transceiver | \$395 |
| FP-200 AC Power Supply | \$90 |
| DC-200 DC Power Supply | \$135 |
| FV-200 External VFO | \$115 |
| M-200 Mobile Mount | \$14 |

Prices include S.T. Freight is extra. Prices and specs. subject to change.

All sets checked before despatch. After sales service, spares availability, warranty. All Yaesu sets sold by us are complete with plugs, power cables, English language instruction manuals, and three-core AC cable and 3-pin plug installed where applicable.

Sole Australian Agent:

BAIL ELECTRONIC SERVICES

60 Shannon St., Box Hill North,
Vic., 3129. Phone 89-2213

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South Aust. Rep.: **FARMERS RADIO PTY. LTD.**, 257 Angas St., Adelaide, S.A., 5000. Telephone 23-1268
Western Aust. Rep.: **H. R. PRIDE**, 26 Lockhart Street, Como, W.A., 6152. Telephone 60-4379