

# Adding FM to the FT200

J. W. K. Adams, VK5SU  
34 Lambeff Street, Ceduna, 5690

During the 1972 VHF DX season an FT200 transceiver was used with transverters to transmit CW, AM, SSB and FM modes. The word soon went around that an FT200 was producing FM and many questions were asked by interested amateurs. In response to requests for information (and after much arm-twisting by the Editor) the following article has been prepared. This deals specifically with the FT200 but could be applied to other transceivers in the Yaesu Museu series.

## Circuit

The modification is very simply achieved and involves the varicap diode clarifier circuitry associated with the 5-5.5 MHz VFO and normally used for offsetting the receiver frequency from the transmit frequency by up to  $\pm 5$  kHz. This is achieved by varying the dc voltage on a 1S1007 varicap diode (D104) by means of the re-

ceiver clarifier control. When transmitting, fixed bias is provided for the varicap diode from a voltage divider network and the clarifier control is inoperative.

## Transceiver Modification

The clarifier circuit and the modification for FM are shown in Fig. 1.

First mount an RCA chassis type phono socket or a Jabel spring loaded terminal post in the vacant hole marked "AUX" on the rear of the FT200 chassis. Mount a three tag, tag strip at the socket and solder in the .0047  $\mu$ F RF by-pass disc ceramic capacitor and the .1  $\mu$ F polyster capacitor. The latter isolates the external audio driver amplifier from the dc voltage present on the varicap diode.

Next, run a short length of PVC covered shielded microphone cable from the tag strip round and through the chassis to the clarifier connection point on the side of the VFO box (Fig. 2). Earth the cable shield to the VFO earth tag and at the three tag strip.

This completes the modification to the FT200.

## External Audio Amplifier

There is plenty of scope here and individual requirements will dictate the complexity of circuitry and whether valves or transistors are used.

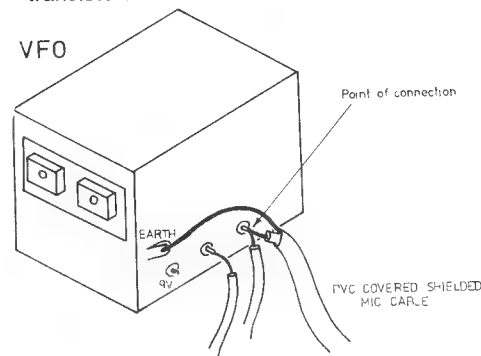


FIG. 2 FT200 VFO CONNECTIONS

It is important that the amplifier has a low impedance output as the audio frequencies are shunted by .01  $\mu$ F by-pass capacitors in the varactor diode circuit. Originally, to be operational in time for the 1972 DX season, the three ohm output from a tape recorder monitor amplifier was used as a source of audio.

The valve mic amp shown in Fig. 3 is currently in use (lots of valves still in the junk box), and is built into an FM/AM tuneable IF receiver. Carrier deviation of  $\pm 10$  kHz is easily obtained and the audio quality is excellent.

The output transformer used came from the popular disposals SCR-522 VHF transceiver. The characteristics and pin connections are as follows:

## Audio Output Transformer 296:

**Primary** — pins 1 and 2; plate load.

DC resistance — 870 ohms.

Impedance — 15,000 ohms.

**Secondary** — pins 4, 5, 6 and 7; audio output.

DC resistance — 390 ohms.

Impedance pins 4-7, 4,000 ohms.

Impedance pins 4-6, 300 ohms.

Impedance pins 4-5, 50 ohms.

**HT choke** — pins 2 and 3; HT filtering.

Dc resistance 340 ohms.

Rating 6H/50MA.

Some power is wasted in the terminating resistor but this is included to maintain a load on the transformer.

The output should be shorted or disconnected when the FT200 is used for CW/AM/SSB otherwise unwanted FM of the carrier can occur on transmit and receive.

## Operation

Tune up and operate, as for AM operation.

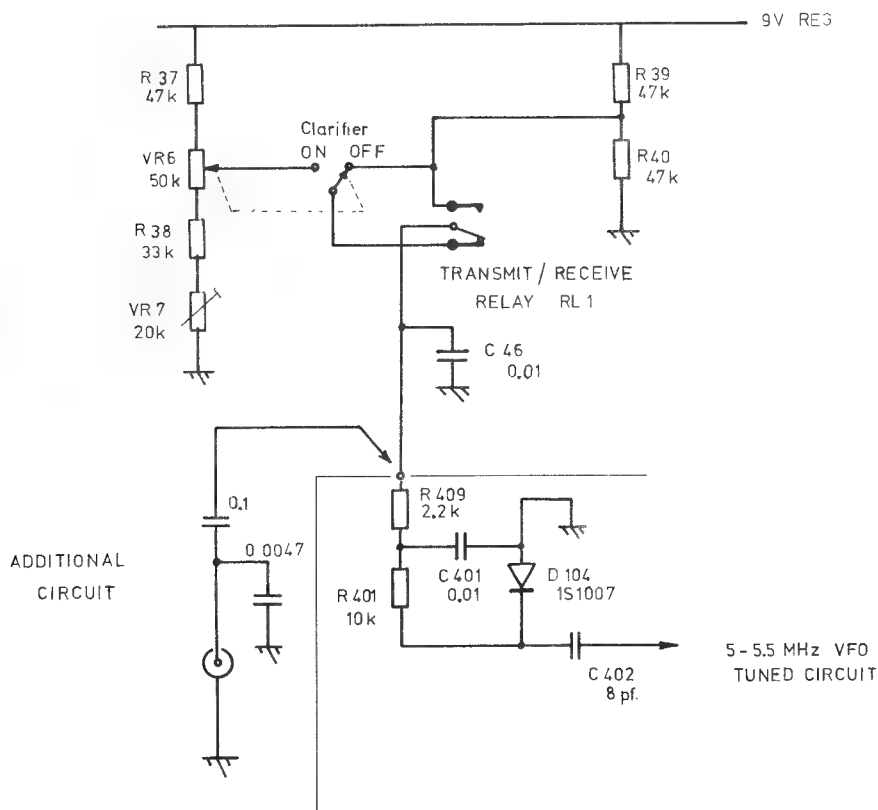


FIG 1 FT200 CLARIFIER CIRCUIT

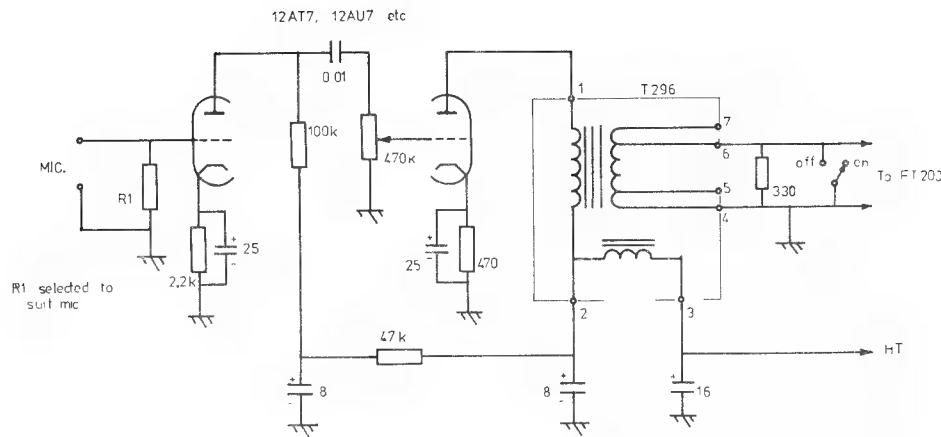


FIG. 3 MICROPHONE AMPLIFIER

Turn down the FT200 microphone gain control to prevent unwanted modulation.

### Receiving FM

The FT200 has not been modified to receive FM. A transistorised audio driver amplifier and a 9 MHz IF strip with discriminator or phase lock loop detector could be incorporated without too much difficulty. The 9 MHz IF signal should be taken from the 6U8 receiver mixer, before the sideband filter. I take the 28 MHz IF output from the FTV650 6 metre transverter to a minimum loss resistive splitting network so that the FT200 (receiver) can be used simultaneously with the tuneable IF AM/FM receiver or other tuneable IF receivers.

One advantage of this multiple receiver/mode set up is the ability to monitor amateur beacons, TV stations and net frequencies whilst in QSO on another frequency. VOX or PTT operation is used.

### Reference

1. "Adding FSK to the FT200". VK3ASV "AR" September, 1972.