M40FM CB RIG MODIFICATIONS

Our review of the DNT rig in March suggested some improvements - we've implemented them to give a significant improvement in performance. Modifications are also described which convert the DNT to a 10M Amateur Band FM Tranceiver.

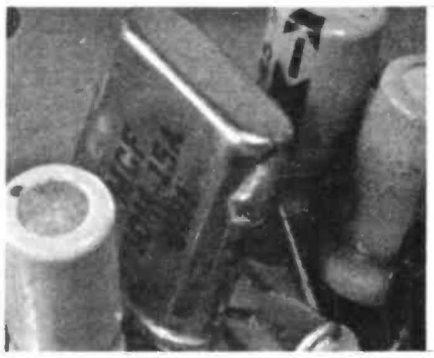
HAVING SAID IN OUR original review of the DNT M40FM rig that it suffers from some serious shortcomings, we thought it a good idea to publish a few notes on some improvements. It is possible that these modifications will also be of benefit to some other rigs, but we haven't checked this.

The most significant improvement is achieved by replacing CF1 with a two pole crystal filter. We used a 10M15A (10.7MHz 15KHz BW) but better results should be attainable with a 8KHz BW 10.695MHz filter - if you can get one. A narrow filter at this point in the circuit removes some of the signals which cause severe blocking and intermod problems in the MC3357's mixer. There is a slight mismatch to the 10M15A, but in practice it is not a problem.

The first mixer, Q2, is the cause of further intermodulation products. Changing the 2SC9626 to a 3SK45 as shown made a further improvement. A side effect of these modifications are the more sensible readings obtained from the S-meter.



The 3SK45 is 'nested' on the back of the PCB—this proves easier than fitting in the usual way.



The 10M 15A filter in place. Take care not to short the resistor leads to the can.

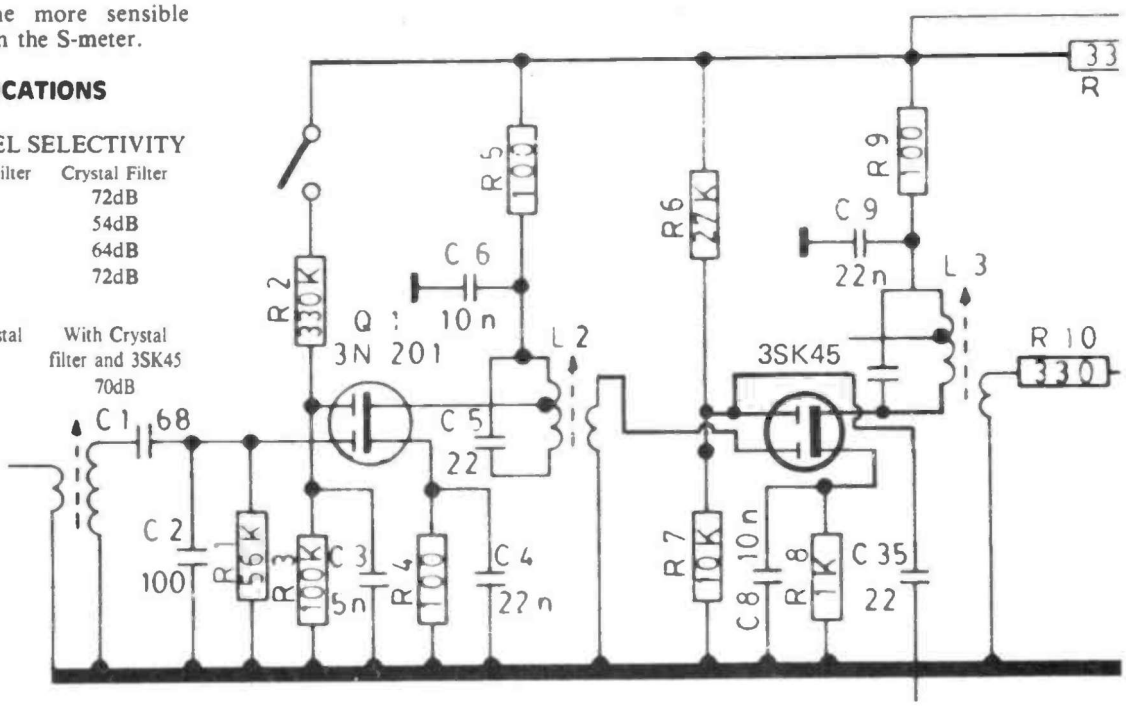
RESULTS OF MODIFICATIONS

ADJACENT CHANNEL SELECTIVITY

	Ceramic Filter	Crystal Filter
2CH High	-	72dB
1CH High	47dB	54dB
1CH Low	48dB	64dB
2CH Low	-	72dB

IMD

As Supplied	With Crystal filter	With Crystal filter and 3SK45
36dB	60dB	70dB

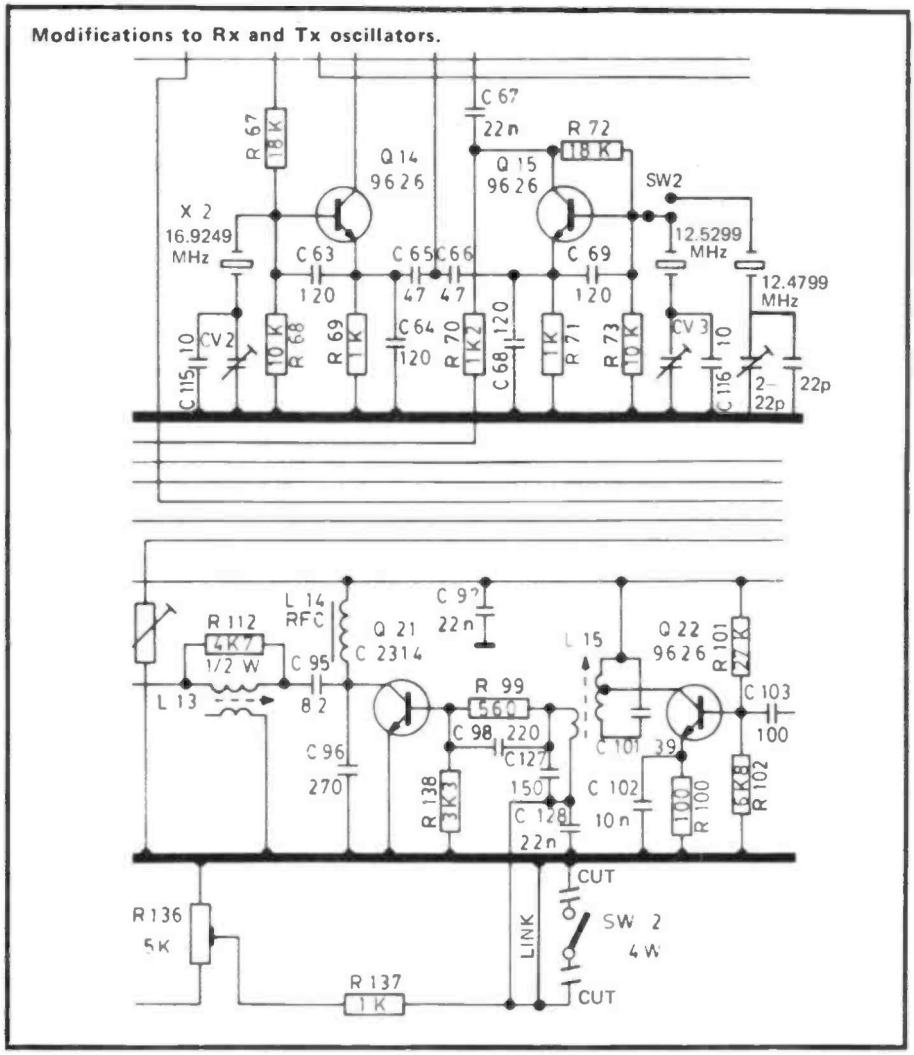


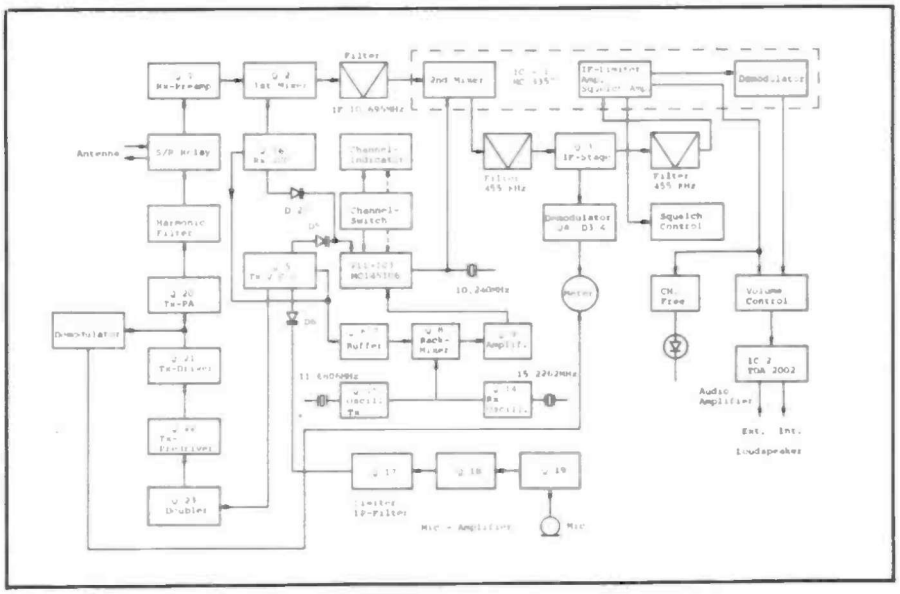
Modified mixer circuit.

	SYNTHESISER RANGE	VCO RANGE (CB)	VCO RANGE (10M)	MIXER CRYSTAL (10M)	FREQUENCY RANGE
Rx	1.68005MHz-2.07005MHz	16.90625MHz-17.29625MHz	18.605MHz-18.995MHz	16.9249MHz	29.300MHz-29.69MHz
Tx(normal)	2.1200125MHz-2.315015MHz	13.800625MHz-13.995625MHz	14.650MHz-14.485MHz	12.5299MHz	29.300MHz-29.69MHz
Tx(−100kHz)	As Above	N/A	14.600 MHz-14.795MHz	12.4799MHz	29.200MHz-29.5900MHz

10M FM TRANCEIVER

Converting a CB set to the 10M band is one of the cheapest ways of HF operation. The DNT (and its LCL equivalent) is a basically good radio which offers a very simple conversion.





Block diagram of the M40FM.

CONVERTING DNT M40 TO 10M AMATEUR BAND

The DNT is one of only a few rigs that don't use an LC7137 dedicated synthesizer. The system used in the M40FM is based around a CMOS synthesizer which operates at about 2MHz. The required output frequency is achieved by mixing the VCOs down to the synthesizer's operating range. This means that by changing two crystals and returning the set it is fairly simple to convert this set for use on the 10M band.

A switch (the high/low power switch) is located conveniently close to the crystals and may be used to switch from normal operation to -100KHz transmit offset for repeater use.

Table 1 gives the frequencies present at various parts in the circuit. The operation of the synthesizer was fully described in our review published in March 1982.

In order to change the operating frequency of the set, the mixer crystals X2 and X3 must be changed to the frequencies given in *Table 1*. If the -100KHz transmit offset is required, SW2 should be rewired to switch two crystals in place of X3. The track between X3 and Q16 must be cut and replaced by the switch. If SW2 is removed, a replace its function by adding a link as shown.

SETTING UP

After changing the capaciters and crystals as indicated in *Table 1*. Set the channel selector to CH20 and monitor the voltage on pin 8 of the MC145106 (IC3). Adjust the RX VCO coil, L18, until pin 8 goes high (synthesizer in lock). Continue to tune L18 until pin 8 goes low. Set the core to the middle of these two positions. Check that the synthesizer remains in lock over all 40 channels. Using a local signal or, if possible, a signal generator peak L1, L2 and L3 for best signal to noise.

Connect a dummy load and power meter. Monitor pin 8, IC3 and switch to transmit. If the synthesizer is not in lock, the transmit condition will be inhibited. In order to tune the TX VCO, L6, press and release the PTT whilst adjusting L6 until pin 8 goes high. Set the core of L6 in the centre of its operation range as for the RX VCO. Tune the transmit amplifier chain (Q20 to Q23) for maximum power output starting with L17. Initially, tune the transmitter at the centre of the band coverage then check that the power remains fairly constant over the range.

Finally set both transmitter and receiver exactly on channel by adjusting the relevant trimmer (CV2, CV3 and new 2-22pf).

The modified 10M FM tranceiver is probably one of the cheapest ways of getting on the HF bands. Conditions on the 10M band are such that given a quiet channel the 4 watts output of this set can be all that is needed to work stations in many continents. If more power is wanted, there are some quite good (and bad, so be careful) CB power amplifiers which will work very well on the 10M band,. The extra power, although not always necessary, will make communication much easier especially while the sunspot activity is declining.

■ R & EW

Your Reactions.....	Circle No.
Immediately Interesting	100
Possible application	101
Not interested in this topic	102
Bad feature/space waster	103