mally it is not necessary to remove the modulation transformer but if desired C225 should be changed to 200uF, and a bridge taken from C223 to C225. The 12V line can then be taken across the original pins of the transformer from the 12V line to the diode D207.

In the receiver the IF output is taken from the base of Q104 (secondary of the IF transformer) direct to the board via a screened lead, the screen acting as the earth return. The audio output is then taken to the top of the volume control after lifting the wire from the C121/C122 function. This removes the AM detector from the circuit but allows the AGC and squelch to operate and keeps the signal meter in circuit.

The device used in the discriminator is the Plessey 6691, a high quality quadrature detector with its own built-in pre-amp and audio circuit. The audio output is adequate to drive the normal AF amplifier devices found in the sets commonly used and gives an extremely good performance with a high degree of AM rejection.

The use of a modulator and discriminator on the one board requires a degree of separation on T/R since the modulator can create audio oscillation if allowed to operate on receive. Accordingly, a T/R switching network which switches the modulator on and the discriminator off during transmit and vice-versa on receive is used. The T/R line operating this function is derived from the coil side of R325. Due to circuit conditions a certain residual voltage is present on this line in the off position so the 3V zener in series with the line at the input to the board ensures that at least 3V must appear before the circuit switches.

Prior to this the residual voltage was capable of leaving the modulator on during receive.

For anyone wishing to convert an AM to set to the HO MPT 1320 condition, the above conversions are acceptable to the HO and providing a Customs clearance form is filled in and the relevant fee paid a set infinitely superior to the majority of the so-called FM sets on the market today can be produced. It is easy to recognise a properly converted set since the audio quality is so superior to the normal 'muppet box'.

The discriminator shown can only operate at IF values up to 1.5MHz or so and a suitable circuit and board layout for a higher IF using a Plessey 6600 is shown in **Fig.14**. In this instance the use of tracking oscillator techniques gives a superb AM rejection and very good interference suppression since only frequency variations are recognised. By reducing the IF to 100kHz a good audio output level can be achieved.

The AM rejection of the discriminator normally used is very good and the only adjustment required is to adjust the core of the quad transformer for maximum readability on the FM signal. This automatically gives the best AM rejection. Final adjustments are to peak the RX front end to 29MHz and retune the TX stages to the new frequencies.

The only other consideration is the poor front end and early IF stages performance of the usual receiver. By changing the front end RF transistor for a more suitable type (choose one suitable for use up to 150MHz) with a slightly lower gain the cross modulation performance can be substantially improved. The normal ceramic 10.7MHz filter installed can also be changed for a crystal filter (costing from £3 — £6) with marked effect on adjacent channel performance. The crystal filters have centre frequencies of 10.695MHz. Appendix 1 shows the breakdown into types of most of the PLL devices commonly used. In some cases combinations of devices are used as in the Sharps series, where a divider is separate from the phase detector. In the Sharps (probably the best of the older CB sets) the mixing technique uses two 11MHz crystals for transmit and receive offset. When the count conversion is carried out by simply lifting the grounded 64 pin and putting it to logic 1 the frequency automatically moves up 640kHz. In order to bring the 4.75kHz required to meet MPT 1320 into operation, simply cut the track alongside each crystal and place a 27pF cap across the break. This shifts the crystals by about 4.75kHz.

The codes used in three different devices are shown in **Fig.15.** Only channels 1, 10, 20 and 40 are shown to illustrate the code sequences but the patterns should be obvious from the sequence shown.

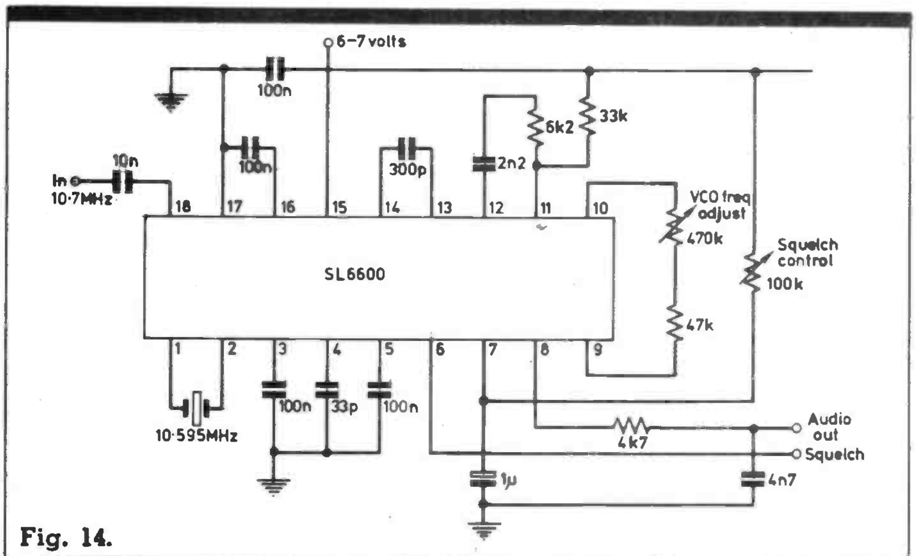

Fig. 14.

Device	2^n	= →	64	32	16	8	4	2	1	
	Channel No	Code Sum	IC pin No							
			9	10	11	12	13	14	15	
PLL02A pins 7&8 high	1	74	1	0	0	1	0	1	0	
	10	63	0	1	1	1	1	1	1	
	20	50	0	1	1	0	0	1	0	
	40	30	0	0	1	1	1	1	0	
			7 bit straight binary							
	Powers of 2^n →		4	2	1	8	4	2	1	
	Pin No →		13	14	15	2	3	4	5	
MSC42502 pin 12 high	1	0·1	0	0	0	0	0	0	1	
	10	1·2	0	0	1	0	0	1	0	
	20	2·5	0	1	0	0	1	0	1	
	40	4·5	1	0	0	0	1	0	1	
			7 bit binary coded decimal							
	Powers of 2^n →			2	1	8	4	2	1	
	Pin No →			6	5	4	3	2	1	
LC7120	1	0·1		0	0	0	0	0	1	
	10	1·0		0	1	0	0	0	0	
	20	2·0		1	0	0	0	0	0	
	40	0·0		0	0	0	0	0	0	
			6 bit binary coded decimal							
	Powers of 2 not used in logical sequence									
	Pin No →		17	16	15	14	13	12	11	10
TC9109	1		1	1	1	1	1	1	1	1
	10		1	1	0	0	0	1	0	0
	20		1	0	1	0	0	1	0	0
	40		0	1	0	0	0	1	0	0
			8 bit random code							

Showing code distribution in different modes

Fig. 15. Powers of 2

And attempt has been made to bring about three objectives:

a) To stimulate interest in building something yourself at low cost.