Modifying the PYE PF1 Pocketfone Receiver for VHF Operation

This modification of the Pye PF1 Pocketfone receiver by A K Whatmore and B J Dennis produces a small, rugged unit that is ideal for Raynet or similar operation on 144MHz

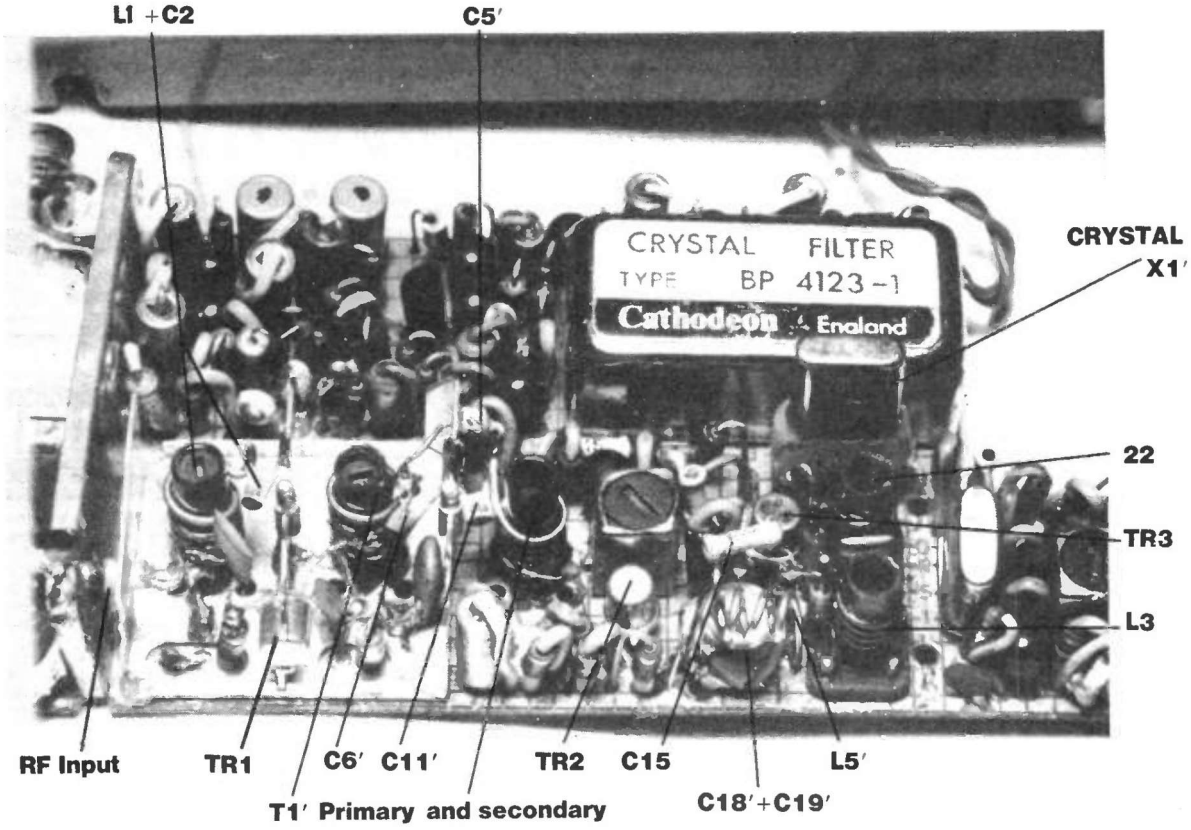

Fig 1 *The receiver after modification*

Anyone who has attempted to use the PF1 on 433MHz will be aware of its somewhat disappointing performance. Even when used in conjunction with a 5-watt base station using a high gain antenna, five to six miles is the best range that can be expected in a rural area; in town the range is considerably less.

It was this poor performance and the need for a small 144MHz portable receiver which prompted the authors to modify the PF1. Basically, the modifications can be divided into two parts:

(1) The retuning of the front-end and mixer stages,

(2) Modification of the oscillator and multiplier.

Type of oscillator

The original PF1 unit uses a 5th overtone crystal at around 90MHz and a diode multiplier to produce 450MHz. In order to operate on 2 metres the oscillator is modified to accept 3rd overtone crystals in the 44-45MHz range. With this arrangement the diode multiplier is retained and the output circuit is tuned to 134-135MHz.

The retuning of the front-end and mixer stages is accomplished by replacing the UHF parallel tuned circuits with similar VHF circuits.

Practical details

(1) Remove two 4 BA bolts to split the plastic case.

(2) Unscrew four 10 BA nuts to remove silver-plated case (screening).

(3) Locate C2, C6, C11, unscrew their six 10 BA securing nuts and bolts, and discard the capacitors.

(4) Unsolder the tuned circuit assemblies, T1 (primary and secondary) and L1.

(5) If necessary, drill out capacitor adjusting holes to accommodate bases of 4mm coil formers.

MODIFYING THE PYE PF1

COMPONENT DETAILS

L1'...4.5 turns, 4mm diameter, 22 SWG; taps at 2 and 3 turns from earthy end.

T1'...Primary — 4.5 turns, 4mm diameter, 22 SWG; tap at 3 turns from HT supply end.
Secondary — 4.5 turns, 4mm diameter, 22 SWG; tap at 2 turns from earthy end.

All above formers fitted with VHF–type adjustable dust–iron core.

L5'...4 turns, 3mm diameter, 26 SWG; tap at 1 and 3 turns, no dust–iron core.

X1'...Crystal Type WW962, supplied by *Webster Electronics, Rose Mills, Hart Bridge, Ilminster, Somerset TA19 9QA*

Note: *All capacitors (except C18') are fixed ceramic types. Those marked' are adjusted during alignment by varying their orientation.*

(6) Fit three coil formers complete with coils L1' and T1' which replace L1 and T1 (refer to Parts List).
(7) Fit replacement capacitors C2', C6' and C11'.
(8) Connect tappings on to L1' and T1' coils and fit C5'.
(9) Remove 2.2pF capacitor C3 from between collector and base of oscillator TR3.
(10) Fit 47pF capacitor (Cc) between emitter and base of TR3 on underside of board.
(11) Remove and discard 15pF capacitor (C8) and 2k7 resistor (R74) from oscillator collector coil (L3).
(12) Fit 70pF (C8') across collector coil (L3).
(13) Rewind frequency adjustment coil, L2, if necessary to 8 turns.
(14) Remove and replace L5, C18 and C19 with L5', C18' and C19'.
(15) Remove existing crystal and fit replacement.

When these modifications have been carried out, the PF1 is ready for alignment.

Retuning

First disable the battery-saver circuit. This is done by shorting out R51 (33k) on the underside of the board. This will result in a constant roar from the receiver as the volume control is advanced, in place of the usual ticking. To facilitate tuning, the silver-plated aerial is unsoldered from the PTFE feedthrough and is replaced with a coaxial cable and socket.

A strong local signal should now be introduced to the unit via the station antenna. L2 and L3 are first adjusted for best quieting. If a 10.7MHz frequency standard is available, L2 should be adjusted for zero beat. Alternatively, L2 should be adjusted for best received audio. C18' is now adjusted for best quieting.

The front-end should now be aligned in the same manner as above, i.e. by adjusting L1' and T1' for best quieting, and reducing the incoming signal as and when necessary by movement of the station antenna. L1' is fairly flat in its adjustment, however, T1' should peak quite sharply. When no further improvement can be achieved (it is worth running through the stages several times) the station antenna should be replaced by 19in of plastic-covered wire of a suitable size to feed through the plastic grill. L1' can now be adjusted again on a weak signal. Alignment is now complete and the short-circuit across R51 can be removed to restore the battery saver.

Half a dozen PF1s have been modified to date and so far all of them come up to the following specification:

f_{mod}.....1kHz
Δf.....5kHz
0.3μV PD gave greater than 12dB S/N ratio

When modified, the units made an inexpensive and rugged monitor receiver ideal for Raynet or similar operation. They have given very satisfactory results when operated some 30 miles from the beacon. The whole modification can be made for less than £15.

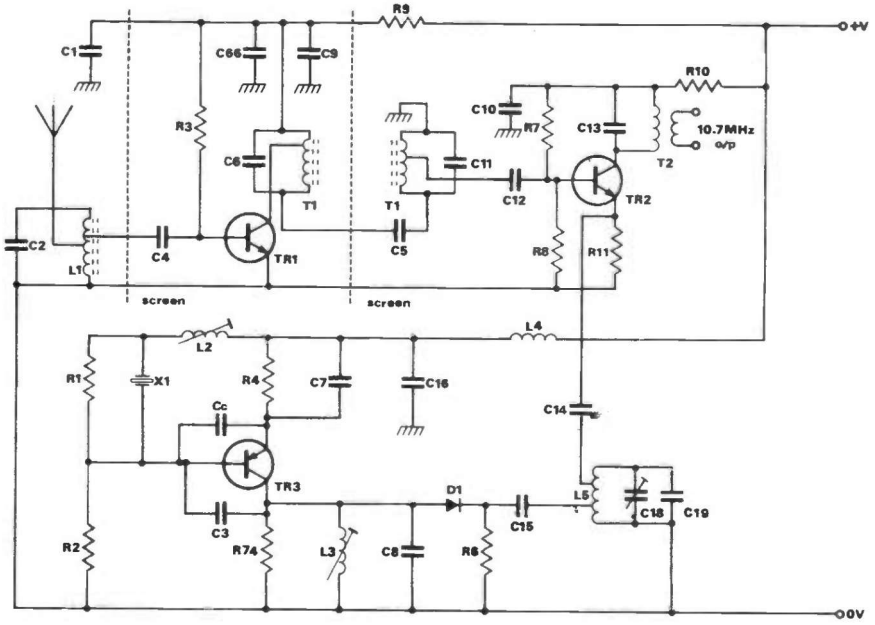

Fig 2 *Circuit detail before modification but showing connections for C_c*

MODIFICATION PARTS LIST

Existing Component	Replacement Component		Action
Resistors			
R1 680Ω	–		None
R2 6.8kΩ	–		
R3	–		
R4 470Ω	–		
R6 15kΩ	–		
R7 33kΩ	–		
R8 6.8kΩ	–		
R9 390kΩ	–		
R10 270Ω	–		
R11 560Ω	–		
R74 2.7kΩ	–		Remove
Capacitors			
C1 2.2nF	–		None
C2	C2'	8.2pF	Remove/replace
C3 2.2pf			Remove
C4 100pF	–		None
C5	C5'	2.2pF	Remove/replace
C6	C6'	15pF	
C7 15pF	–		None
C8	C8'	70pF	Remove/replace
C9 10nF	–		None
C10 10nF	–		
C11	C11'	8.2pF	Remove/replace
C12 1nF	–		None
C13 70pF	–		
C14 10nF	–		
C15 100pF	–		
C18	C18'	4.5–20pF trimmer; plus 15–20pF fixed, as required	Remove/replace
C19	C19'	18pF	
C66	1nf	-	None
–	Cc	47pF	Fit new
Other			
L1	L1'		Remove/replace
L2	-		Rewind if necessary
L5	L5'		Remove/replace
T1	T'		
X1	X1'		