

## THE LAST OF THE HF VALVED MANPACKS

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A fascinating aspect of vintage technology is to compare and contrast different items of equipment. You can trace the development of a particular design, speculate on why a certain feature was developed - and why another was dropped. But the starting point is usually the different ways in which similar requirements can be fulfilled.

To those of us who share this interest, a rather interesting 'case study' is provided by the surprisingly wide range of HF manpacks which were used by the British army during the final stages of the valve era.

#### ***The requirement***

By the mid 1950s, the British Army faced a problem: for short range purposes, VHF was now firmly established but, despite its advantages, it was unsuitable for certain conditions. In particular, it did not work well in the jungles of Malaya and could not provide communications over the distances which might be required by long range patrols. For these, HF was still a necessity.

The switch to VHF manpacks - the WS 31 and 88 - had left HF a rather specialised and neglected area. The staples of WW II - the WS 18, 38 and 46 - were badly out of date, but no provision had been made for their replacement. Until the first transistorised HF sets eventually started to arrive, the result was a policy of buying in equipment from sources outside the normal channels of procurement.

#### ***The solution***

Given the rather specialised use to which these radios were destined, and the relatively small numbers involved, it is surprising to find that at least three different types of set were acquired - and even more so when it is realised that this all took place in no more than seven or eight years.

The earliest of these purchases was probably the A510, a small Australian set which looked, when carried, rather like the WS 88. Slightly afterwards, special forces such as the SAS seem to have adopted the SR128 (or Mk.128). Finally, at the start of the 1960s, a third set, the HF 156, was introduced.

#### ***Basic specifications***

All three sets had crystal controlled transmitters, operating in the same general range and capable of skywave working with wire aerials.

The 128 was possibly the most specialised of the three, sending only on CW (although it could receive AM) and having no facility for use on the move. The A510 and HF 156 had two way AM facilities in addition, and were fitted with rod aerials for use at shorter ranges - during the early stages of a landing, perhaps. Although opinions differ, I do not think that either of these sets was designed with CW primarily in mind. Their bandwidths are relatively wide and a strong station on a nearby channel can bring the AGC rushing in, just when you are trying to copy a weak CW signal.

Of the three, the A510 was the least powerful, with a maximum RF output of about 0.5W, whereas the HF 156 - which was rather heavier and more cumbersome - could manage no less than 2.5W on CW, an unusually high figure for a manpack of that era.

#### ***The three sets compared***

But these factors apart, it is difficult to see the subtle differences which would have led to a preference for one set over another. Of the three, the A510 is the most versatile, if slightly underpowered and fiddly to carry and to operate. The 128 beats it in terms of weight and is definitely nicer to use; but if it had not been available, would it have been necessary to invent it? Possibly its primary users - the SAS, with a predilection for clandestine equipment<sup>1</sup> - just felt more comfortable with their traditional sources: I do not know, however, whether the 128 was developed specifically for their use or was already available.

The most puzzling acquisition is the HF 156. It is basically rather crude and heavy, with the disadvantage of fixed channels, the frequency of which cannot be changed by the operator. It is, in many ways, a version of the WS 46 with miniature valves; perhaps it was this resemblance that led to its use by the Royal Marines. Possibly, also, it was thought to be time to give a British manufacturer a chance. But it would not have been my first choice for anything very much.

Apart from the A510, none of these sets looks as if much time was spent on their design, although technology was of course a lot simpler in those days and the basic parameters had been well established. Moreover, towards the

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<sup>1</sup> They were already using the Mk 119, the 'big brother' of the 128, and a range of suitcase sets.

end of the 1950s it must have been apparent that valved equipment had a limited life expectancy and would not justify much investment - although, as usually happens, estimates of the arrival date for transistorised equipment were receding rapidly into the future.

Perhaps by luck or perhaps by good judgement, the designers of these sets do not seem to have been tempted to embellish them unnecessarily - the usual curse of a new design. There is a rather telling comment in the user trials for the A16, carried out in 1966, to the effect that the set should be put straight into production, without trying to improve it; but it *is* an absolutely classic design, which was got right pretty well first time. Ironically, perhaps, it has almost the same functional specification as the HF 156 - but with just those extra touches to make it a real success: it is even more remarkable when one considers that only six years separate the introduction of the two sets.

Summary details of each set are given in the following pages. They are based, to some extent, on my own observations and experience. The latter are distinctly amateur and not at all military, and certainly do not run to extensive use on CW! But I hope that readers will find this comparison interesting and that, with luck, some may be able to fill in a few of the gaps.

### ***The next generation***

It is not entirely clear how long these valved sets remained in use. They appear to have been regarded as current for some time after transistorised sets began to arrive in the mid 1960s. But they would clearly have been at a disadvantage compared with their replacements and may simply have been held in reserve.

The final point of the era is probably marked by the introduction of Clansman radios in the late 1970s. Amongst other things, this provided a

### **A510**

#### ***Basic data:***

Frequency range	2 - 10 Mc/s
Receiver sensitivity	3 - 5 $\mu$ V for 10dB S/N
Receiver selectivity	5 - 6 kc/s at 6dB down
Receiver IF	455 kc/s
RF output	0.15 - 0.5W <sup>2</sup>
Weight (complete station)	29 lbs

<sup>2</sup> These figures are taken from the handbook and are more or less confirmed by my own measurements. The EMERs give rather higher figures.

much more rationalised series of equipment. It is arguable that the first generation of transistorised sets, like their immediate predecessors, also suffered from the problem of having several sets with only marginal differences in functionality - but that's another story.

#### ***Further reading and references***

Most of the data quoted above is drawn from the relevant technical manuals and EMERs; some of these can be a good read in their own right. You will also find a longer article on the SR 128 (although I almost hesitate to mention this) in the August/September 1998 edition of *Radio Bygones*.

Apart from these, a fascinating insight into the development of British Army manpacks can be found in a 1965 Parliamentary report *Electrical and Electronic Equipment for the Services* (HC 358). Its account of the frustrating and, in certain respects, rather chaotic situation must have made uncomfortable reading for some people at the time.

References to these sets in official histories are fairly sparse, although the A510 appears in *The Vital Link*, in the context of the Kenya emergency. Use of the SR 128 in Oman is mentioned in *Soldier Against the Odds* (Lofty Large, 1999), the autobiography of an SAS soldier: I would not normally put much weight on such sources, but this one seems more reliable than most.

The Royal Signals Museum at Blandford - well worth a visit anyway - had examples of the A510 and HF 156, but not the SR 128, when I went there last. It did have a small section devoted to the SAS, however, which included a number of other clandestine sets.

***General description:*** Separate transmitter and receiver, designed to be worn in place of ammunition pouches.

***Receiver:*** Five valve superhet; RF and two IF stages, the second of which is reflexed to provide an AF amplifier as well; fixed frequency BFO. Continuously variable tuning, which is netted on to the transmitter frequency in use.

***Transmitter:*** Four valves, of which two operate in parallel as PA. Four switched, crystal controlled channels: crystals (HC6 pattern) can be changed by the operator.

**Aerial system:** 8 ft rod, half and quarter wave end fed wire, half wave dipole.

**Power supply** Dry batteries providing 1.5V LT, 90V HT and 7.5V bias.

**Origin** Developed in Australia and manufactured by the Amalgamated Wireless (Australasia). Purchased in limited numbers by the British army (750 units in 1954 and a further 230 units in 1963).

**Remarks:** While electrically straightforward, considerable thought and ingenuity is evident in its design and construction. Functionally, this is the most sophisticated of the three sets - and, equally, the most complicated to operate: the wide variety of aerials and associated matching arrangements, probably intended to make the

most of its rather low power, accounts for much of this.

The construction is reasonably robust and physically the set is not at all cumbersome. But it was perhaps a mistake, in retrospect, to have a separate transmitter and receiver, which could be inconvenient to carry in any but the standard arrangement. The handbook actually suggests that the operator should experiment with the set slung on a strap across the shoulder, for example. But judging by one of the EMER modifications, the interconnecting cable often seems to have been used - wholly unofficially! - for carrying purposes.



**The A510 Manpack**

## **HF 156**

### **Basic data:**

Frequency range	2.5 - 7.5Mc/s
Receiver sensitivity	3µV for 12dB S/N
Receiver selectivity	6 kc/s at 6dB down
Receiver IF	465 kc/s
RF output	0.9 - 2.5W
Weight (complete station)	36 lbs

**General description** The entire equipment is contained in a single die cast case, whose

dimensions are very slightly larger than the boxed versions of the SR 128. It is, however, much more solid, and weighs more than twice as much.

**Receiver** Six valve superhet; RF and two IF stages; variable BFO. AM and CW facilities. Six switched, crystal controlled channels on a selection of frequencies designed to allow communication throughout the day and night:

crystals cannot be changed in the field. Separate crystals are used for the receiver and transmitter, the crystals for the receiver being signal frequency minus IF.

**Transmitter** Five valves, of which two operate in parallel as PA. Six switched, crystal controlled channels. AM and CW facilities.

**Aerial system** 8ft rod; quarter wave end fed wire with counterpoise; half wave dipole. The wire aerials are cut into preset lengths, with jumpers, to match the channel in use. The handbook suggests that it may not always be necessary, in practice, to change the aerial length on changing frequency<sup>3</sup>.

**Power supply** 4V lead acid accumulators feeding a transistorised inverter; alternatively a battery supplying 4.5V LT, 60 and 150V HT and 19.5V bias could be used with a special adaptor (it is unclear whether this version was used by British forces).

**Origin** Appears to have been a private venture by the British Communications Corporation (later part of the Racal group), probably aimed at the overseas market: Burmese and Malayan versions were produced, and the set is known to have been used by the Nigerian and Indonesian armies. Purchased in limited numbers by the British army in about 1961; also by the Royal Marines, judging by the names *Albion* and *Bulwark* which someone has written inside my set.

### SR128 (also known as Mk.128)

#### **Basic data:**

Frequency range	2 - 8 Mc/s
Receiver sensitivity	15-40µV for 15dB S/N
Receiver selectivity	4 kc/s at 6dB down
Receiver IF	470 kc/s
RF output (CW only)	1W
Weight (complete station)	17½

**General description** The receiver and transmitter are constructed as separate units, normally carried as a single item. The earlier models are built into a wooden case - the later ones are carried in a canvas haversack.

**Receiver** Five valve superhet, continuously tuneable, with variable BFO: AM and CW.



**The HF156 Manpack**



**The SR128 Manpack**

<sup>3</sup> A practice encountered, I believe, but not so officially endorsed, on the later A16/PRC-316.

**Transmitter** Two valves, crystal controlled: CW only. Individual crystals (10X or FT-243 pattern) are selected by the operator and netted to the receiver.

**Power supply** Dry batteries providing 1.5V LT and 135V HT.

**Aerial system** A 100ft end fed wire is provided as standard, but the transmitter 'can be matched to almost any antenna system likely to be used'.

**Origin** Unclear, but of very similar construction to sets from the Foreign Office Radio Service and possibly developed specially for the SAS. In service from mid 1950s.

**Remarks** Lightweight and not at all rugged, although the carrying arrangements give some protection. Not hermetically sealed, unlike the A510 and HF 156. Generally very pleasant to operate, despite a slightly insensitive receiver with a tendency to drift.

**Remarks** I would have thought that the accumulators could have been a bit of a problem, but my set shows remarkably little damage from spilled electrolyte. From personal experience, the inverter can be extremely temperamental. Crystals are an obsolete 10XJ design, but not particularly difficult to change in the workshop.