Hydraulic Ram Tipsheet 50p

Find out how this beautifully simple, elegant water pump carries out its function with great efficiency and a minimum of fuss.

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The hydraulic ram

The hydraulic ram, or hydram, is a device which uses the power of flowing water (usually from a spring or a stream) to pump a proportion of that water to a considerable height above the water source. In short, it is a water powered water pump. As a method of pumping water used since the 1800s, the hydraulic ram is undergoing something of a revival for those seeking a reliable, inexpensive and environmentally friendly water supply, or a solution to specific water related problems in less developed countries.

A brief history

In 1772 John Whitehurst discovered the principles of the ram and produced a machine to raise water to the upper floors of a building. It was not, however, entirely satisfactory as a small boy had to be employed to open and close a tap. Pierre Montgolfier, one of two brothers to invent the 'hot air' balloon, developed the first automatic pulse valve in 1798, making the ram a commercial reality. Manufacture in Britain began in the early 1800s with the purchase of the original Montgolfier patterns by the firm Easton & Company. The firm was purchased in the 1920s by Green & Carter (who had been making rams themselves from the 1870s). The hydraulic ram became extremely common as a means of pumping drinking water supplies and most were installed to serve isolated rural homes and farms, though occasionally whole villages depended on them. The arrival of mains water supplies, or cheap conventional pumps and cheap power to run them, led to the near demise of the hydraulic ram in the UK. But now, encouraged by the escalating costs of mains water and the unreliability of many private supply systems, hydraulic rams are becoming an increasingly popular choice of water supply.

How it works

(See reverse for diagram.) Water is taken from a point upstream that is slightly higher than the ram, travels down the drive pipe, through the pulse valve and into the waste drain.

As the water flows, its speed increases until the pulse valve is no longer able to pass the volume of water flowing, and the pulse valve snaps shut. With the outlet closed the flow of water suddenly stops, producing an increase of pressure in the body of the ram – the extent of which depends on the height and distance from which the water is flowing. The result of this increase in pressure is that a portion of the water in the body of the ram is forced upwards through the delivery valve into the air chamber. The water, which is forced into the air chamber, finds its way through a pipe known as the rising main to the place where it is required for use, with a continuous flow being maintained so long as the ram remains working. When the pressure passes, the delivery valve shuts, preventing the water from running back, allowing the pulse valve to open and the cycle to start again. This series of events occurs from between 40 to 90 times per minute, depending on factors such as the size of the hydraulic ram and the fall of water driving the ram.

The fall of water necessary to work a ram may be as low as 500mm and, with such a fall, water may be raised to 18m. With higher falls water can be raised to upwards of 100m or more in height and 5km in distance.

Future use

Any site that is close to running water, but uphill from that supply may well be able to benefit from a hydraulic ram. It can be used for purposes such as lifting drinking water from springs in valleys to higher settlements, or lifting irrigation water from streams or raised channels. Green & Carter's 'Compound' Ram also allows pure water to be pumped using an impure source. The installation of ram systems is fairly straightforward and can be carried out by inexperienced or local labour from details provided by the manufacturer. With only two working parts, a commercial hydraulic ram may provide a water supply for over a hundred years without replacement. It needs very little maintenance and will continue to pump water as long as there is water to pump, without emitting pollutants or greenhouse gases and without running up your fuel bills.

Availability

Green & Carter and AllSpeeds manufacture hydrams in the UK:

- Green & Carter, Vulcan Works, Ashbrittle, Nr Wellington, Somerset, TA21 0LQ
  tel: 01823 672365; www.greenandcarter.com
- Blake Hydram (AllSpeeds Ltd.), Royal Works, Atlas Street, Clayton Le Moors, Lancashire BB5 5LW
  tel: 01254 615 100; www.allspeeds.co.uk/blake_hydram
- Mike Williams, Lon Parcwr, Ruthin, Denbighshire LL15 1NJ; tel: 01824 702229; supplies hydraulic rams and parts and services and repairs existing rams.

Hydraulic ram

The hydraulic ram can pump water without using any external power. All it needs is the natural flow of water from a small stream. The basic idea was developed over 200 years ago, but rams are in the spotlight again because of environmental concerns. A single ram can supply an entire village with water.