

# Secrets of the SIX

Inside Honda's 250cc six-cylinder racer of the sixties / Mick Duckworth

**WORLD EXCLUSIVE**

SPRUNG on an astonished Grand Prix scene late in 1964, Honda's six-cylinder 250cc racer represents a pinnacle of achievement in the history of motorcycle racing engine development. Designed by 24-year-old genius Soichiro Irimajiri, this incredibly compact machine was taken from the drawing board to the track in a few months.

Fielded in response to Yamaha's two-stroke twin, the 17,000rpm, 150mph Honda RC165 forced the rival company to develop V-fours.

Mike Hailwood joined Honda from MV Agusta in 1965, and won ten out of twelve 250GPs in 1966 on the updated RC166. In 1967 he took another 250 world title, and won the 350 championship on a 297cc RC174 version.

Honda were understandably secretive about details of their wonder engine in the 1960s. Only a tiny number of people outside Honda have ever been able to peek



Jim Redman on a 250cc Honda six in 1965.

inside the extraordinary six-pack unit—until now.

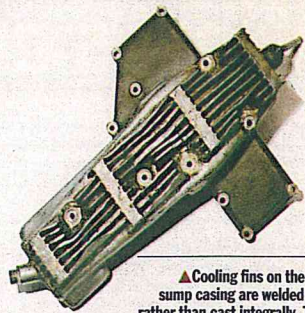
Our photos were taken during the restoration of a six bought by New York's Team Obsolete equipu from a European collector in 1992. This engine has an RC165 code, altered to RC166 by over-stamping.

TO's Robert Iannucci says that former Honda team mechanic Nobby Clarke recognises the engine as one of the earliest sixes to have been raced. Iannucci believes that his could be the machine on which Jim Redman led the 250cc Italian GP in 1964, before being slowed by overheating, and then won that year's 250cc Japanese Grand Prix.

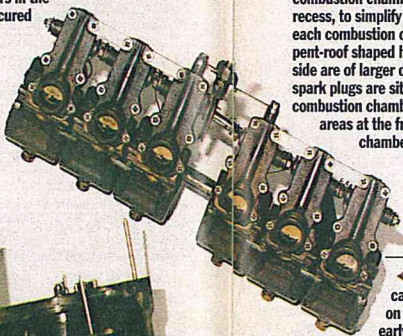
The only major damage revealed during a strip-down is a crankshaft breakage. This damage is believed to date from 1969, when the Honda was owned by wealthy German racer Gerhard Heukerott. Repair should be straightforward: modern test methods indicate that the rest of the shaft is sound. Otherwise the engine shows no signs of abnormal wear or abuse.

Iannucci says that once TO rider Dave Roper has ridden the restored six on a few occasions, the Honda will be put up for sale.

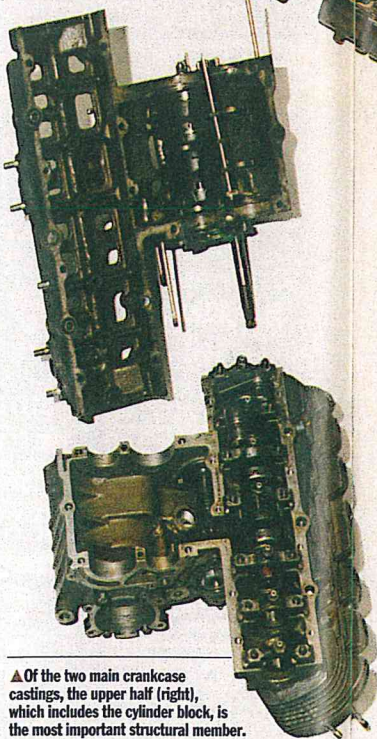
Outside Honda's own collection the only other six publicly accounted for is Honda Canada's 250, track tested by CB in 1982. An ex-Hailwood 250, the subject of a 1987 court case, is thought to be in the possession of Dutchman Jan Keeson. Reputedly two more, including a 297, are in a private collection in Japan.



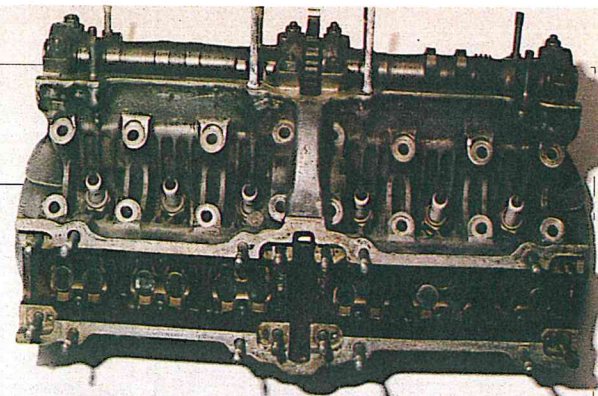
▲ Cooling fins on the oil sump casing are welded on rather than cast integrally. This suggests that they may have been added in response to the overheating that plagued early outings of the six. Mounting oil-cooling radiators in the fairing eventually cured overheating



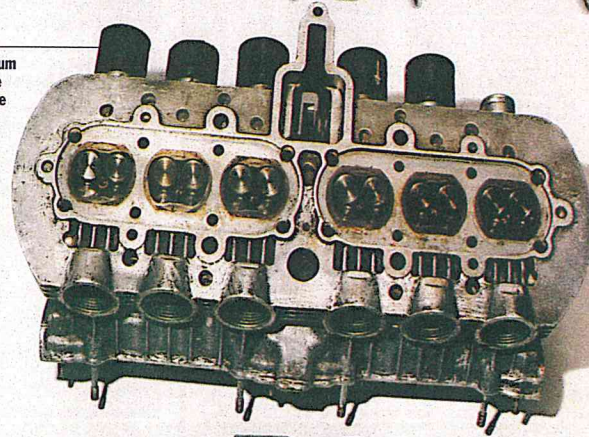
◀ Left: Keihin flat-slide carburetors were used on Honda's fours from the early 1960s. For the six, each group of three is linked by ties under the heads of countersunk-head screws. A single cable turns a pulley, operating the six slides via shafts and levers. Flexible induction hoses link carbs to cylinder head



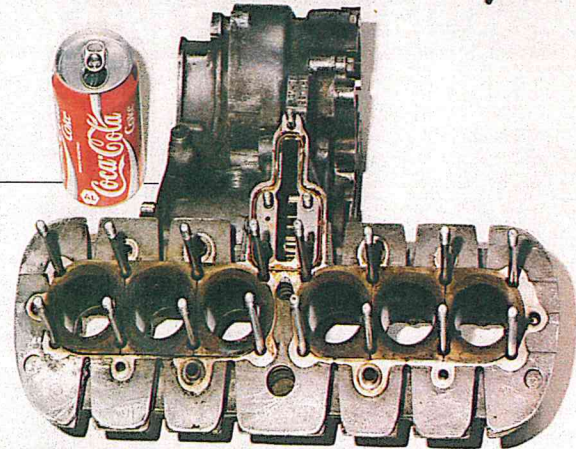
▲ Of the two main crankcase castings, the upper half (right), which includes the cylinder block, is the most important structural member. Hangers for the seven plain main bearings are bolted to it, and a primary drive jackshaft between the crank and gearbox provides drive for the camshafts, oil pump and magneto



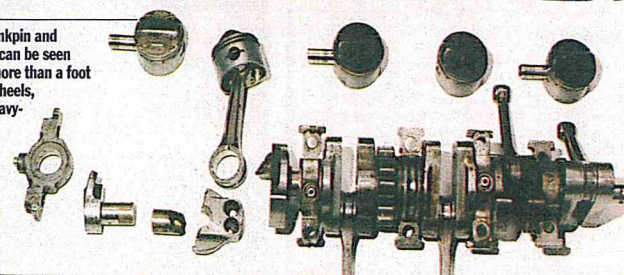
► Right: cylinder head casting viewed from above, with exhaust camshaft removed. Although the 24 valves are tiny, the solid camshafts are of robust dimensions. Each lobe bears on a valve-pusher 'bucket'. Pairs of pushers run in guide blocks screwed to the head. Worm drive for the rev counter can be seen on the inlet camshaft, between the lobes for two of the outer cylinders



► Right: there's a lot of metal in the aluminium alloy cylinder head casting. Each set of three combustion chambers has a shared joint face recess, to simplify sealing. The four valves in each combustion chamber are arranged in pent-roof shaped heads: valves on the inlet side are of larger diameter. Single tiny 8mm spark plugs are sited centrally in the combustion chambers. There are flat squish areas at the front and rear of each chamber



► Right: combined cylinder block and upper crankcase half, with a soft drinks can to give an idea of its actual size. Six cast-iron cylinder liners are pressed into the aluminium alloy casting; they have generous flanges at the top of their bores. The flanges are shaped so as to form head joints for each group of three cylinders. Primary and camshaft drives are by gears, sited between the two sets of three cylinders. The tiny pistons run in 39mm bores, and stroke is 34.8mm



► Right: breaks in one crankpin and one web of the crankshaft can be seen clearly. The shaft, barely more than a foot long, has no full-circle flywheels, but its crank webs have heavy-metal balancing inserts. The connecting rods are I-section steel components. Two-ring pistons have pronounced humps, with pockets for valve clearance. Compression ratio is 12:1