

Harley-Davidson XR750

Mick Phillips pics John Noble

You cannot talk about American racing motorcycles without discussion centring on Harley-Davidson's XR750. On Stateside dirt ovals, paved short circuits or a mixture of the two in the American TT events, the XR and its side-valve predecessor the KR, were crushingly dominant.

For British race fans at least, the XR is best remembered in the hands of the charming, self-effacing and effortlessly brilliant Cal Rayborn. In 1972 he came to England for the TransAtlantic Match Race series, held over Easter at Brands Hatch, Mallory Park and Oulton Park. Although a Harley works rider, Rayborn had been forbidden by gifted race team boss Dick O'Brien to ride the iron-engined XR in Britain. A new alloy-engined bike was already being campaigned, but was not yet up to speed, and O'Brien, nicknamed OB, didn't want the iron motor to be disgraced by the more powerful British triples.

But Rayborn fancied his chances and convinced the factory to let him race a bike owned privately by Harley technician Walt Faulk. The pair came over with limited spares and Rayborn entered the series. Few people in Britain expected much from the Yanks, and especially not from an iron-engined V-twin Harley 'Waffle Iron'. And who was this Rayborn bloke?

What followed were six thrilling battles between Rayborn and Briton Ray Pickrell, each winning three of the six races while



VALVE CLEARANCE

Eccentric rocker spindles (small locknut) are turned to adjust valve clearance, which is then checked by removing the hexagonal inspection cap

ENGINE BREATHER

Effective crankcase breathing is essential for optimum lubrication. The Team Obsolete system runs from the front to rear rocker boxes to the oil tank then through a catch tank under the seat hump before venting to the air

BRAKES

Tokico calipers front and back are stock Honda CB750K0. Team Obsolete floating brackets improve performance. Discs are modified CB750, skimmed from 0.25in thick to 0.20in for lightness. Iron-engined model used 4ls Fontana front drum

PRIMARY DRIVE

A triple chain drives the multiplate clutch with its seven Raybestos fibre plates and six 35lb springs. The chain runs in oil, but the clutch runs dry. The original case was stamped steel and prone to leaks, hence the cast alloy case

EXHAUSTS

These Supertrapp silencers are non-standard but improve performance for what is, after all, still a racing bike. The original pipes were tuned length megaphones and are kept at Team Obsolete's Brooklyn headquarters in New York

◀ the other came runner-up. Yet that series said as much about Rayborn's unearthly riding talent as it did about the iron XR because by then it was an obsolete model, and had only ever really been a stop-gap.

The XR had been brought in for the 1970 season, following a rule change by the US racing control body, the AMA, making 750cc ohv engines eligible for racing. Harley was keen to develop a 750cc ohv racer and used its muscle on the AMA board to press for the rule change.

Race team boss Dick O'Brien had been working on a 750 since the mid-Sixties, but was periodically forced to drop development work by a cash-strapped factory unsure of the project's worth. When the rule change came through it was a mad dash to produce something race worthy and designer Pieter Zylstra drew up the complete motor in just 16 weeks.

The iron motor had a troublesome birth and it took much development to make it faster than the side-valve KR model it was meant to be replacing. The first motors used a single Tillorson carb, but O'Brien almost immediately swapped to twin Mikunis. Yet two main problems dogged the XR. Overheating, an inherent problem of an iron engine because iron is relatively slow to dissipate heat, and the self destruction of the pressed together crank (even the factory teams were affected, despite having the mainshafts welded in place).

Both problems were rectified on the alloy-engined machine as lessons learned on the iron motor were put into practice, along with a host of new developments. The bike first rode in anger in the 1972 season, though not at Daytona, Harley wishing to avoid exposing its baby to huge public scrutiny while still shaking down. By the end of '72 they were getting 83bhp, not much more than the iron motor, but the bike was well on its way to reliability and huge success.

The XR7TT seen here (the TT suffix denotes a road racer as opposed to a dirt tracker) is believed by owner Rob Iannucci of Team Obsolete to be that ridden by Rayborn on his less successful return to the Match Races in 1973 (nursing a broken shoulder sustained in a racing spill). As most race bikes are pulled apart after each race, it's hard to trace a machine's history. But when Iannucci bought the bike from the factory in 1980 the seat cowl was painted with Rayborn's name, and on the underside of the tank was 'Cal' in marker pen. These factors plus the fact that the bike was set up in Rayborn's style and that various factory men verified its status, leads Iannucci to be as sure as anyone can be that this is a Rayborn bike.

Rayborn, often touted as the finest road racer in the world, was probably held back by the XR. Despite his strong loyalty to the Milwaukee factory a move to faster machinery was inevitable if he was to realise his massive potential. Sadly he was killed in New Zealand on 29 December 1973 on a borrowed 500 aircooled Suzuki 500 while racing at Pukekohe. Aged 33, he'd signed for the works Suzuki team only three days earlier.

FRAME

The tubular steel frame was made by Nichols Engineering. Between 40-50 were made. Seven or eight, strengthened by extra heliarc welding, went to the factory team

CARBURETTORS

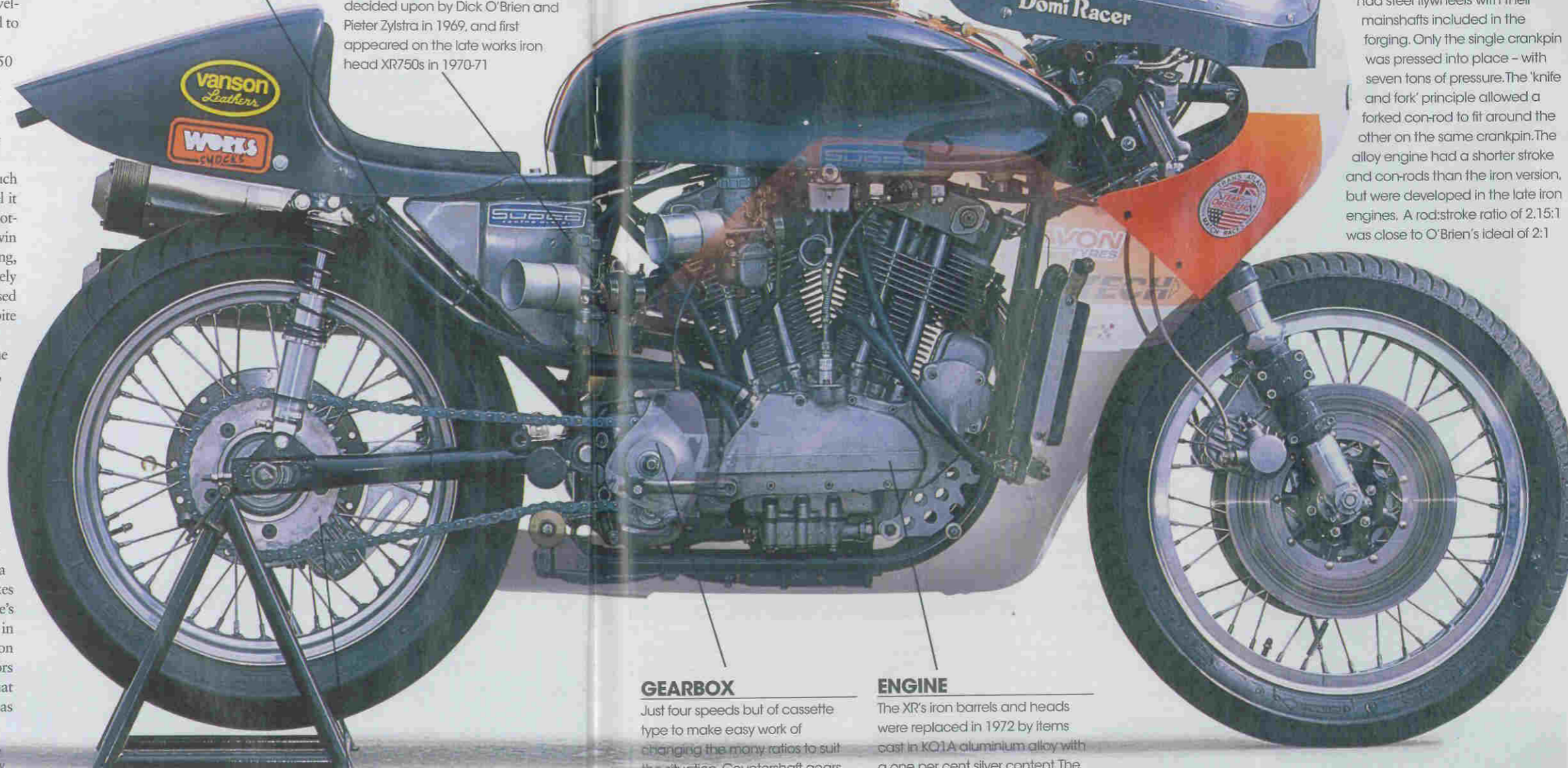
Mikuni flat slide carbs have always been a feature of the XRs. These have 38mm venturis bored out to 39mm. Siting both carbs on the rear right of the cylinders was decided upon by Dick O'Brien and Pieter Zylstra in 1969, and first appeared on the late works iron head XR750s in 1970-71

RIDING POSITION

The XR7TT is small. For the tall Cal Rayborn III to race it today the seat has been moved back 1in and the footpegs down and forward

CRANKSHAFT

Iron XR engines used a pressed together crank which was prone to work loose, causing awful damage, even on factory team racers with welded cranks. The alloy engines had steel flywheels with their mainshafts included in the forging. Only the single crankpin was pressed into place - with seven tons of pressure. The 'knife and fork' principle allowed a forked con-rod to fit around the other on the same crankpin. The alloy engine had a shorter stroke and con-rods than the iron version, but were developed in the late iron engines. A rod:stroke ratio of 2.15:1 was close to O'Brien's ideal of 2:1



REAR SPROCKET

The XR7TT sprocket is flat and bolts to a carrier, as opposed to the dished XR item which bolts to the hub

GEARBOX

Just four speeds but of cassette type to make easy work of changing the many ratios to suit the situation. Countershaft gears have four dogs, mainshaft gears five dogs. Oil capacity is one US pint (0.83 UK pint)

ENGINE

The XR's iron barrels and heads were replaced in 1972 by items cast in KQ1A aluminium alloy with a one per cent silver content. The alloy, plus heavier finning, dissipates heat far better than iron. The cylinders feature iron liners. Pistons have shallow hemispheres and cutaways for the valves

IGNITION

This bike now runs electronic ignition, but its fall back is the original Fairbanks-Morse magneto. The notoriously unreliable mag has the nickname 'can't get worse' and has failed the team more than once

HARLEY-DAVIDSON XR750 FACTS

- The now famous Jet fire orange and black livery so closely associated with Harley-Davidson factory race teams was the idea of team boss Dick O'Brien. He instigated the move soon after taking control of the team in the late Fifties, his inspiration being Harley's packaging colours.
- The factory race team was traditionally known as the Wrecking Crew. The name goes

back to pre-First World War days when the team was so dominant in all aspects of the sport it could regularly demolish the opposition.

- The XR750 was first raced by the factory in 1970, but things didn't go well. Four bikes entered Daytona that year, ridden by defending champion Merf Lawwill, Mark Brelsford, Cal Rayborn Jr and Bart Markel. At less

than 150mph they weren't fast enough and none qualified in the top ten. Every XR blew during the race. The best H-D to finish was a private side-valve KR in sixth place, the model the iron-engined ohv XR was meant to replace.

- The XR's unit construction can be traced back to the side-valve K (and racing KR) model first seen in 1952.

- In the 1972 TransAtlantic Match Race series in Britain Cal Rayborn won three out of six races. He could have won four, but the iron XR was only good for about 200 racing miles before a full rebuild. This meant often zero practice for Rayborn on unknown tracks. Despite the attentions of ace mechanic Walt Faulk, the exhausted engine went off song in the last race

and Rayborn came in second. He returned the next year on an alloy XR, but was slower.

- For homologation purposes, Harley built 200 iron XRs. But by late 1971, with the alloy engined XR on the horizon, there were still 100 iron XRs sitting unsold at the factory. The firm was in financial straits and almost all the bikes were scrapped to help balance the books.



Cal Rayborn on the alloy XR7TT leads Paul Smart (Suzuki) at Mallory Park, April 1973

Harley-Davidson XRTT750 (1972)

Specification

Engine: 45.7cu in (748.7cc) aircooled ohv 45-degree V-twin with 79.4mm x 75.7mm bore x stroke and 10:1 compression. Two 39mm Mikuni carburettors, triplex chain primary drive, dry multiplate clutch, four-speed gearbox. Dry sump lubrication with two-level pump driven at one quarter engine speed. Electronic ignition (with original Fairbanks-Morse magneto option).

Chassis: tubular steel duplex cradle by Nichols Engineering. Tubular steel swinging arm with twin shocks. Ceriani air-assisted 35mm front fork. Brakes: twin 29.7cm (11.7in) stainless steel discs with single-piston Tokico callipers on floating brackets. Rear 25.4cm (10in) disc with single-piston Tokico calliper on floating bracket. Original tyre sizes: 3.25 x 18in front, 3.50 x 18in rear.

Dimensions: Wheelbase 54in (137.2cm). Seat height 28in (71.1cm). Rake 27 degrees. Trail 3.62in (9.2cm). Dry weight 324lb. Fuel capacity 6 US gallons (5 UK gallons).

Performance: Approx 88bhp @ 8500rpm, 165mph (estimated, dependent on gearing).

What they said

"Cal Rayborn's Harley-Davidson has iron cylinder barrels and only a four-speed gearbox - but it was still quick enough to beat the cream of Britain's works machinery at Brands Hatch on Friday. Rayborn became the first American to win a match race in this country when he rode the 70bhp Harley to victory in the second leg of the John Player TransAtlantic Trophy series."

Mike Nicks, *Motor Cycle News*, 5 April 1972

"After losing the Easter match race series for two years, I honestly think that America is going to be right in there this time

"This year I'll be riding the new XR750 Harley-Davidson. Although the engine is an new all-alloy unit the bike will probably not be much faster than the iron-barrel machine I used last year. That old iron thing actually went fine, but it kept wanting to break down."

Cal Rayborn, *Motor Cycle News* 18 April 1973

Where can I see an XRTT 750?

Team Obsolete continue to race the XRTT at selected events, often with Rayborn's son, Cal Rayborn III, in the saddle. Watch *CB* for details.

■ Credit for much of the information in this article must go to Allan Girdler's superb book *Harley-Davidson XR750. The Complete Story* (Motorbooks International 1991) ISBN 0 87938 510 3

FAIRING

The two-piece fairing and the seat unit were designed in the California Institute of Technology wind tunnel and are made of very high quality glass fibre. The fuel tank is also glass fibre and has a large filler for quick refuelling

FORKS

The 35mm Ceriani racing forks, along with the Mikuni carbs, illustrate not only O'Brien's pragmatism in race development, but also the factory's link with the Italian Aermacchi firm, of which H-D bought a 50 per cent share in 1960

WHEELS

This bike runs flanged alloy rims. The original 18in diameter front and rear was decided on to enable use of the best racing tyres of the late Sixties and early Seventies



EXHAUST PORTS

After much experimentation with the iron heads, the alloy heads had both exhaust ports sited on the left and at the front of the head, where air cooling is at its strongest



COCKPIT

Basic and functional. Smiths tacho is mechanical. Bars are set wider than original to give extra leverage to cope with modern sticky tyres. Though an option, forks are run without air