FOUR-WHEEL-DRIVE Z-CARS

Ferguson Conversions on Police Ford Zephyrs

By Edward Eves

THE first of the batch of 25 four-wheel-drive Ford Zephyrs ordered jointly by the Metropolitan Police and Mintech is now complete and undergoing test. Based on the conversion carried out on a Ford Mustang earlier this year, the modifications to the 3-litre police Zephyr are extremely neat, using some of the same parts designed for the Mustang. We were told that the design of these conversions is now so definitive that individual cars of the same configuration as the Zephyr, that is with a vee engine and Borg-Warner Type 35 transmission, can now be undertaken on a commercial basis once Ferguson Research commitments to the police and Mintech have been met.

As a measure of cost, the price would not be more than £1,000 per vehicle if a batch of a dozen identical vehicles were converted. It is interesting to hear that costing exercises have been done on representative quantities up to 5,000 cars per year. In these numbers the extra cost to the customer would be about £400.

The most fundamental change to the standard Zephyr has been to convert the front suspension from the MacPherson strut type of the standard Zephyr to an unequal-length wishbone layout in order to allow the front drive shafts to pass through to the front hubs. This has entailed designing new front wheel carriers with live hubs, and modifying Mustang top wishbones to fit them and the revised suspension geometry. The MacPherson bottom "wishbone" formed by the front swey bar and transverse link is retained. Springing is by means of coil springs co-axial with Armstrong dampers, mounted above the top wishbones and butting into a special sheet metal housing welded to the inner faces of the front wing vallances. It has also been necessary to fabricate a new front cross member, passing below the engine, to clear the front differential and to carry the inner pivots of the Mustang wishbones.

The decision to concentrate conversion round the Borg-Warner Type 35 transmission was helped by the police preference for automatic gear boxes on the score that they reduce driver fatigue and eliminate the cost of replacing clutches. Ferguson Research welcome the idea because, on private orders, there would be less tendency for customers to specify out-of-the-ordinary axle ratios. The transfer box casing is a mirror image of that of the Mustang conversion—the drive passes along the right hand side of the engine instead of on the left to clear the steering idler, with detail changes to match it to the Type 35 casing. Internally it has the same Morse Hi-Vo chain drive stepping the drive sideways to the Ferguson self-locking fore-and-aft differential. This is geared to the Dunlop Maxaret unit which is mounted external by on the back face of the transfer casing. A new, cast aluminium sump incorporating the front drive casing replaces the original Ford sheet metal unit and it has been necessary to raise the engine approximately one inch and set it sideways to the left about two inches to get the ideal drive run. There is adequate clearance under the bonnet for this modification and there is no external visible evidence of it. Individual lubricants are used in the engine and front

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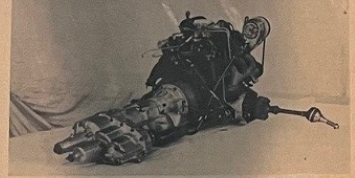
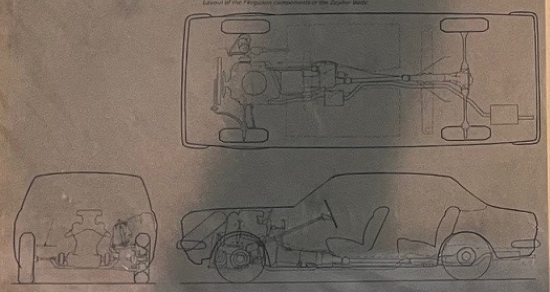


Complete engine and front transmission package. Gearbox is the Borg-Warner type 35 and the front differential is housed in a new aluminium sump casting



Layout of the Ferguson components in the Zephyr body

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£8,000 A YEAR

The companies concerned are tooled up for pre-production supplies of the four-wheel drive system, with capital plant worth £1.5m. ready to run. It is expected the company will aim for 50,000 units a year as an economic exercise.

Mr. Maxwell said this was but one of many new devices to come out of the group in the future affecting the car. And with antiskid legislation due to come into effect in the U.S. in three to four years, GKN aims to make the antiskid safety aspects of four wheel drive within the pocket of the average motorist.

Major Tony Ball, director Harry Ferguson Research Ltd., said the Ferguson system was suitable for cars with a good power to weight ratio and with engines of 2 litres and above.

At present Sir Alec Issigonis is driving an Austin 1800 fitted with FF.

NCIAL TIMES

ect. ISSUE DATED 15 OCT 1969

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THE TIMES
PRINTING HOUSE SQUARE, LONDON, E.C.4
ISSUE DATED 17 OCT 1969

Big step towards safer cars

By GEOFFREY CHARLES, Motoring Correspondent

While Motor Show visitors at Earls Court yesterday gazed on the £7,705 four-wheel-drive Jensen FF in the Brompton Room offices of Britain's giant G.K.N. engineering group, the world's press were hearing news of a technical link-up that should bring four-wheel-drive within reach of the everyday motorist's pocket within the next five years.

Marking the real innovation of the late Harry Ferguson's revolutionary concept of motoring, it could lead to a significant advance in driving safety and a reduction in road accidents caused by skidding and loss of vehicle control.

For the past 10 years Harry Ferguson Research Ltd., of Coventry, have been steadily developing their "all wheel control system". But up to now its production application has been confined to the expensive, high-performance Jensen car, the world's first production car to carry four-wheel-drive and anti-skid braking. Yesterday it was announced that world manufacturing and marketing rights of the Ferguson Formula had been acquired by the transmission division of G.K.N.

Having already earmarked £1.5m. on production plant for the system, which incorporates Dunlop's Maxaret anti-skid devices, G.K.N have set a minimum output volume of 50,000 four-wheel-drive kits a year, which they plan to market to the motor industry worldwide, for application to small family cars of up to 2 litres engine capacity.

At this stage there is no firm agreement with any of the major car makers for its adoption, although Ford, British Leyland and several European and American companies have been taking an active interest.

The biggest uncertainty for four-wheel-drive on the mass motoring market concerns its price. On a car like the Jensen it accounts for more than £1,000 (the two-wheel-drive Interceptor costing £1,867 less, tax paid, than the FF model).

But yesterday Major Tony Ball, managing director of Harry Ferguson Research, told me: "I am prepared now to stick my neck out and put the extra cost at 10 to 15 per cent of the basic price."

Any car with a high power-to-weight ratio will benefit from the four-wheel-drive system which, apart from the 6.3-litre V8 engined Jensen, has also been applied experimentally to a wide range of cars. The first use of the system was on the "all-Ferguson" cars built in the 1950s, but these never went into regular production, and the system did not get its real boost until Jensen installed it in the FF in 1966.

By then Ford were showing an interest and had commissioned a design study for their Zephyr/Zodiac "Z" cars, leading this year to a £56,000 contract sponsored jointly by the Ministry of Technology, Home Office and Ministry of Transport for 20 specially converted four-wheel-drive Zephyrs, which are now being assessed by five police forces in Britain over 40,000 miles of regular operation.

CONVERSION OF PLYMOUTH FURY

TO

GKN FF ALL-WHEEL CONTROL

COMPARATIVE SPECIFICATIONS AND TECHNICAL DATA

GKN Birfield Transmissions Limited
in conjunction with
Harry Ferguson Research Limited

N.O. Howard

HARRY FERGUSON RESEARCH LTD.

PROJECT 134

CONVERSION OF FORD ZEPHYR POLICE CARS

TO

FERGUSON FORMULA ALL-WHEEL-CONTROL

COMPARATIVE SPECIFICATIONS

AND TECHNICAL DATA