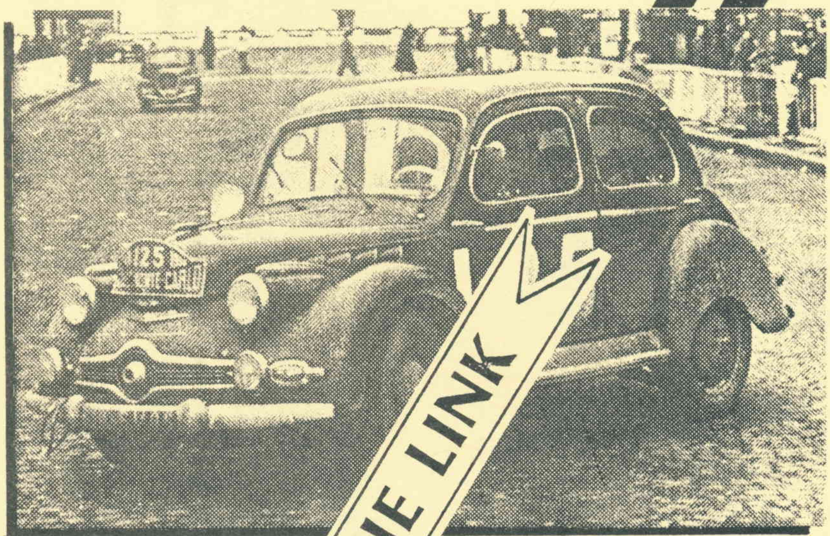
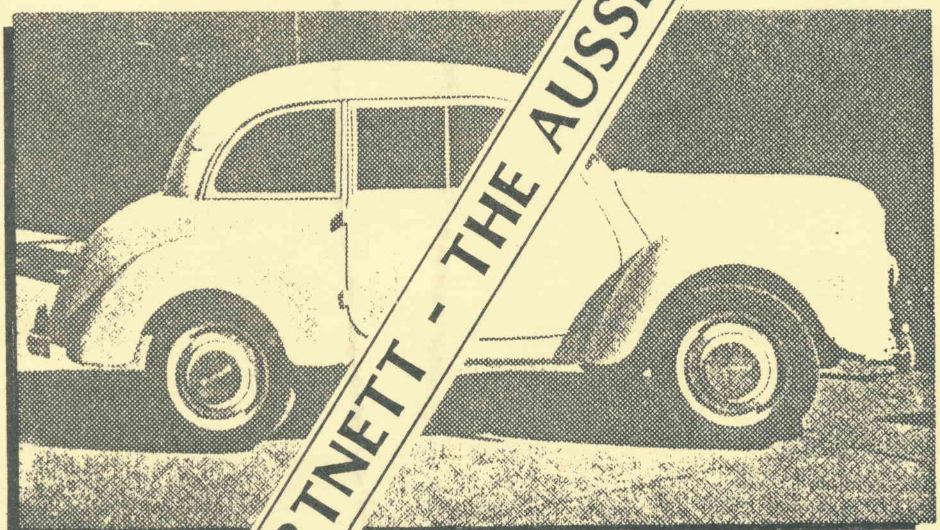
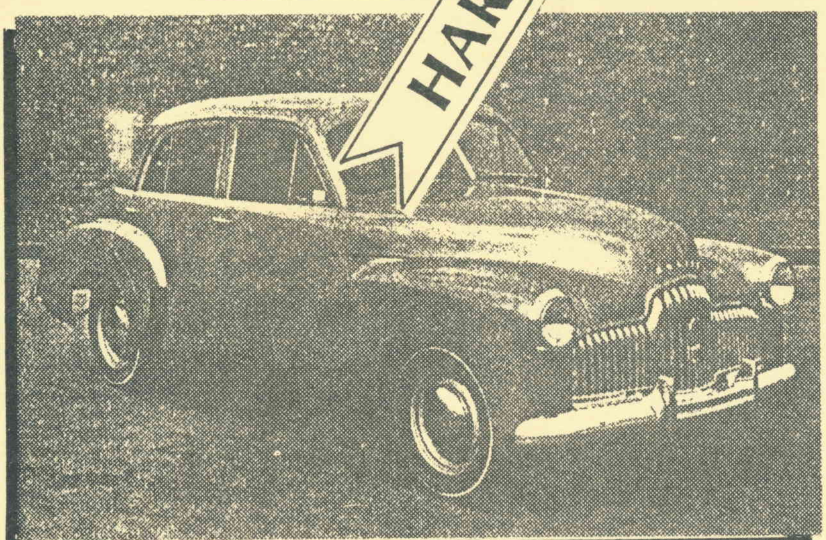
FRONT DRIVE

INDEX

HARTNETT - THE AUSSIE LINK



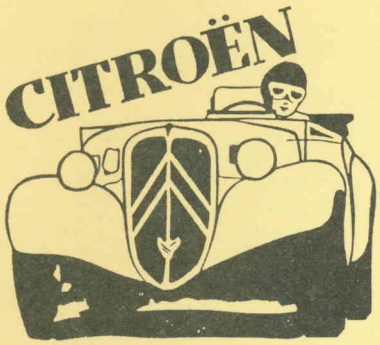




Gearbox + driveshaft -

FRONT DRIVE Volume 10 No. 2 July/August 1986
Registered by Australia Post Pub. No. VBH 2127.

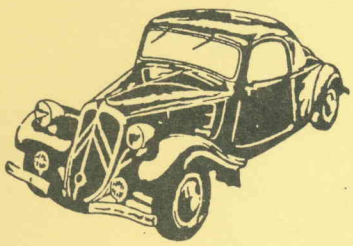
Windcheater & T shirt designs



ROADSTER

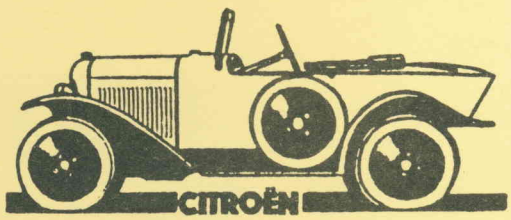
AVAILABLE ONLY TO
2 CYLINDER OWNERS
& ONLY GREEN ON
YELLOW COLOURS.

CLUB BADGE
3 SIZES:
SMALL (BREAST POCKET)
MEDIUM, LARGE



COUPE

2CV



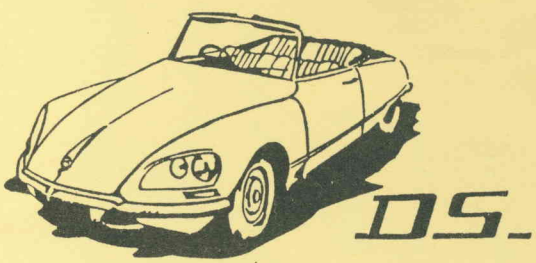
5CV
BREAST POCKET
SIZE ONLY

LIGHT 15

ANNIVERSARY

SCROLL
BREAST POCKET
SIZE ONLY

BIG 6



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CHEVRON BADGE

Dates of issue for magazine: Mid-January, March, May, July, September, November.

Closing dates for copy: Mid-February, April, June, August, October, December.

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The magazine of the Citroen Classic Owners Club of Australia

EDITORIAL

CCOCA POSTAL ADDRESS:

~~P.O. Box 377
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Victoria.

Note new CCOCA postal address:

P.O. Box 52
Balwyn 3103
Victoria.

In this issue, we pay a particular tribute to the late Sir Laurence Hartnett, "Father of the Holden", who set out to make a lightweight Australian car which, if the Panhard was "Citroen's Cousin", would have been "Citroen's second cousin".

More restoration technicalities, courtesy of Kenn Gilbert, for the Tractionists among us.

Moves to increase the service to our 2 CV members - spare parts and most importantly, a workshop at David Gries's on 2 CVs and relatives on Sunday, August 10th. Vital that all should be there - maybe even you will decide to get one of the little brutes yourself! And Raid 88.

Special thanks to the members who contributed material for future "Members' Cars" when at Kyneton. These will grace the pages of future Front Drives.

Bill Graham, Peter Simmenauer,
Paul Chapman, Peter Hore.

COMING RALLIES

July 30, Wednesday	General Meeting, Nunawading.
August 10, Sunday	2 CV workshop, Gries's.
August 27, Wednesday	Open night, Nunawading.
September 21, Sunday	Concours at Como.
September 24, Wednesday	General Meeting, Nunawading.
October 19, Sunday	Auction & BBQ.

Cover: Elements in the Hartnett link-up: Panhard Dyna 120, Hartnett sedan, Holden 48-215.

CCOCA MEMBERSHIP:
Annual Subscription: Full Member $20.00, Associate Member $15.00

Joint Membership available to spouse of full member, no cost.
Overseas postage rate: additional $7.00.

Meetings are held on the last Wednesday of every month at 8.00 pm at the Coffee Shop* Meeting Room at the Nunawading Civic Centre, Maroondah Highway, Nunawading, east of Springvale Road.

Printed by Veevers Printing Co., 121 Ferrars St. Sth. Melb. 3205

*NOTE: THE COFFEE SHOP AT THE NUNAWADING CIVIC CENTRE IS NOW CALLED THE COURTYARD ROOM

Hartnett Co. Well Under Way

Cars Should be on Sale by End of 1950

AUSTRALIAN MONTHLY MOTOR MANUAL—March, 1950.

A prototype Hartnett car is being exhaustively tested under the varying conditions throughout Australia. In the course of these tests a prototype car is now in Sydney.

This car is not a sales exhibit, and, in fact, has covered 80,000 miles of gruelling testing, but because of the widespread interest shown in this Australian product the public is being given an opportunity of viewing the prototype during its short stay here.

Since its incorporation recently the Hartnett Motor Co. Ltd. has made rapid progress with its programme for the initial importation from suppliers in Great Britain of the major components for its low cost four-passenger car.

A very large quantity of parts is already on hand and arrangements made through the Company's London office are expected to result in the shipment of parts for the first chassis to Australia in June of this year.

It is expected that the first cars should be available in about November of this year, but the first deliveries will be small, increasing progressively to a target of six hundred cars per month by April or May of next year.

Inquiries for cars are being recorded, but orders are not being accepted at this stage.

The design work has been executed for the Company by the eminent French designer, Monsieur Gregoire, whose patents and developments in the automobile field of engineering are world renowned.

The Company has exclusive manufacturing and distributing rights of this design throughout the British Commonwealth of Nations and qualified rights in other parts of the world.

A patented independent suspension gives the vehicle the riding qualities of a large American car, and its twin air-cooled four-cycle engine gives a petrol consumption of between 50 and 60 miles per gallon and a maximum speed in excess of 60 miles per hour.

The front wheel drive arrangement allowing of a flat floor in the body of the car, gives more than ordinary leg room and comfort, and the use of aluminium alloys results in the production of a four-passenger saloon weighing only 980 lbs.

The result is that this 6.2 rated horsepower car has approximately the same power to weight ratio as a normal ten horsepower vehicle, which accounts for its outstanding performance.

A total of over 250,000 miles of testing has been completed under varying conditions and climates and the performance, particularly in Australia, has been highly satisfactory.

QUEENSLAND DISTRUTORS.

The Hartnett Motor Co. announces appointment of L. H. Green Pty. Ltd. as distributors to handle assembly, sales and service in Queensland and Northern Rivers district of New South Wales.

Mr. Green resigned as director of Eager & Sons Ltd., Queensland, distributors for General Motors Holdens Ltd., to accept the Hartnett franchise.

W.A. DISTRIBUTORS.

Hartnett Motor Co. Ltd. has appointed Westralian Auto Services Ltd. as distributors for Western Australia to handle assembly sales and service for that State.

Mr. R. Goyne Miller, managing director of the distributing company is well known in Perth business circles and has served as president of the Chamber of Commerce.

• New French Gregoire Front Wheel Drive Saloon has just been Announced

AUSTRALIAN MONTHLY MOTOR MANUAL—December, 1949.

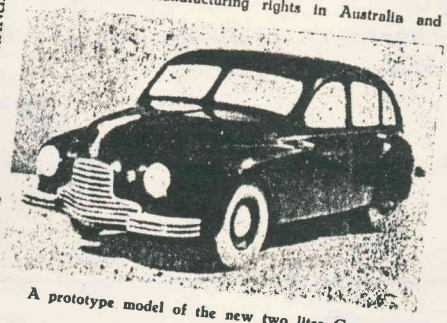
This new Gregoire "R" type two litre front-wheel drive car is to be manufactured by the French firm of Hotchkiss.

The firm has signed an agreement with J. A. Gregoire, who also designed the Hartnett car to be marketed in Australia.

The "R" type is a flat six and has a cruising speed of 82 m.p.h., a maximum of 100 m.p.h. and a petrol consumption og 32 m.p.g.

Some are to be marketed in Australia soon, according to Mr. L. J. Hartnett.

Selling and manufacturing rights in Australia and



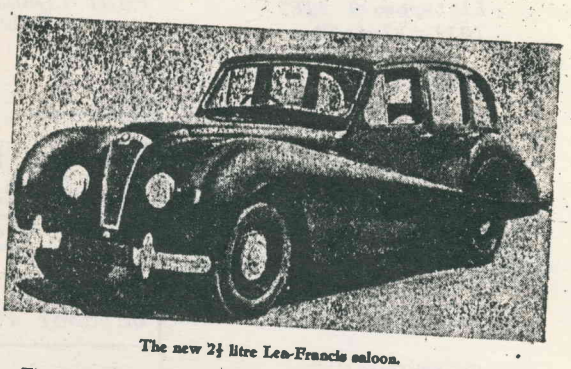
A prototype model of the new two litre Gregoire.

New Zealand are held by the Hartnett Motor Co. Ltd.

State distributors for the larger "R" type and the Hartnett "people's" car have been appointed in Sydney and Melbourne.

Mr. Hartnett says firm orders have been placed for 250 Hartnetts. First cars should be delivered within a year.

Hartnett to Import Lea-Francis Cars



The new 2½ litre Lea-Francis saloon.

The Australian franchise for Lea-Francis cars, which are among the finest of the British high-performance sports cars, has been obtained by the Hartnett Motor Company Ltd.

Demonstration models will soon be available, and distribution will be handled in each State by the distributor already appointed to handle the Hartnett car.

.....

In addition to Hartnett and Lea-Francis cars, the Hartnett Motor Company has become the sole Australian distributor for the magnificent 2 litre Gregoire, the French Lago-Talbot, and the well known German B.M.W. car. The first Hartnett cars would be tourers and these would be followed at a later date by sedans, the first models should be on the road by the end of the year, by which time assembly would be under way at the Geelong factory. Eventually, State distributors will be handling their own assembly. State distributors for the Hartnett Moar Company Ltd., are as follows:—

Victoria—Hartnett Distributors (Vic.) Pty. Ltd., 62 Ryrie Street, Geelong, Victoria.

New South Wales—Hartnett Distributors (N.S.W.) Pty. Ltd., 222 George Street, Sydney, N.S.W.

Queensland—L. H. Green Pty. Ltd., 74 Eagle Street, Brisbane, Q'land.

South Australia—Universal Motors Ltd., 125 Flinders Street, Adelaide.

West Australia—Westralian Auto Services Ltd., 68 St. George's Terrace, Perth W.A.

NEW MORRIS OXFORD MANUAL.

An excellent workshop book on the new Morris Oxford is now available at Collins Book Depot, 361 Swanston Street, Melbourne. The price is 19/6.

HARTNETT - THE AUSSIE LINK

L. J. Hartnett, 1964.

HARTNETT, Sir Laurence John, Kt., cr. 1967, C.B.E. 1945, B.B.M. (Singapore), F.R.S.A., F.I.E.Aust.; Company Director; son of J. J. Hartnett; *b.* May 26, 1898; *ed.* Kingston Gram. Sch., Epsom Coll. Surrey; served mech. eng. apprenticeship Vickers Ltd.; Lt. R.N. Air Service & R.A.F. 1917-19; Senior Executive General Motors, India, Ceylon, Malaya, Singapore, Sweden, Finland, USA, UK, Mg. Dir. Gen. Motors-Holden's Ltd. Aust. 1934-47; Dir. C'wealth Aircraft Corp. Pty. Ltd., Melb., from inception 1935-47; Dir. Ordnance Production, Munitions Dept., 1940-45; Chrmn. Army Inventions Directorate 1942-46; Chrmn. Ferro Corporation (Aust.) Pty. Ltd., John Hart Pty. Ltd.; Chrmn. & Mg. Dir. Hartnett Holdings Pty. Ltd. since 1949; Memb. Cl. Science Musemm of Vic. 1945-71; Public Service Star of Republic of Singapore 1974; *publication,* Big Wheels and Little Wheels; *m.* Feb. 20, 1925, Gladys W., d. C. W. Tyler, 3 d.; *recreations,* yachting, tennis, golf, swimming; *clubs,* Roy. Aero (Lon.), Athenaeum (Melb.); *address,* Rubra, Mt. Eliza, Vic., 3930.

Sir laurence Hartnett died in Frankston Hospital near Melbourne on April 4th, 1986, at the age of 87. Regarded by many as the elder statesman of the Australian automobile industry, he also contributed heavily to the automobile industry in the UK, Europe and Asia, as well making major contributions to Australian defence efforts in World War II. As Managing Director of GM-H, he was father of the Holden car, but sadly, he left GM-H before the car's release. For Citroën enthusiasts in Australia, Hartnett was particularly notable for his efforts to build his own car, based on the French designer J.A. Gregoire's prototypes which were commercialized by the old firm of Panhard-Levassor and taken over by Citroën in 1965 to become "Citroën's cousin". In love with his adopted homeland to the end, Hartnett was even proud to have been fitted with an Australian-made cardiac pacemaker.

Born in Woking, England, Hartnett resisted family pressures favouring medicine and turned to motorcycles and an apprenticeship with the huge engineering firm of Vickers in 1914. In WWI, he was flying in the Royal Naval Air Service (later RAF). His demobilization pay was used to buy his own motor repair business. Next, he was selling Buicks in S.E, Asia. Then with General Motors itself, he went to India, later to Canada and New York. In 1927, he became sales manager for the new GM assembly plant in Stockholm. Then he was called to Luton where he helped restore the flagging Vauxhall fortunes, and introduced the Bedford truck as an alternative to Chevrolet that could be pushed in the Sterling zone of the British Commonwealth.

In March 1934, Hartnett came to Australia as Managing Director of the troubled GM-H, formed in 1931 through the union of General Motors (Australia) Pty Ltd and the Adelaide family firm, Holden Motor Body Builders Ltd. He instantly liked the country and its people. At this time, the Australian motor industry was based on imported chassis and front panels combined with locally-built bodies, a major builder being Holdens who built for virtually all manufacturers (assemblers), not just for GM. Hartnett re-vamped GM-H and built the new plant at Fishermans Bend, Melbourne, providing for a foundry which was to have subsequent value in war and peace. Restricted rural credit at this time led Hartnett to develop that peculiarly Australian phenomenon, the coupe utility, to meet the farmers' needs. Through it all though, he saw that major advantages lay in building an "all Australian car" in reasonable numbers and this became his goal.

A number of factors (the London-to-Melbourne air race of 1934, forebodings of war, lack of modern aircraft in Australia) led to the formation of the Commonwealth Aircraft Corporation with Hartnett at the forefront. The CAC was of immense value during WWII, but to Hartnett's intense disappointment, it got insufficient encouragement in peacetime.

Hartnett warned of the need for war preparedness and, because of his background and skills, he was appointed Director of Ordinance Production by Prime Minister Menzies in June 1940. The wartime experience proved to Hartnett once again the ability of Australians to do virtually anything given the chance and incentive. They were resourceful, inventive, efficient and energetic. Sadly, he found in peacetime, their self-confidence faded and they deferred to foreign products and skills.

Hartnett addressed the problem of post-war rehabilitation and saw that a fully Australian produced car would provide the right demands and incentives. Prime Minister Chifley agreed and manufactures' submissions were sought. Hartnett persuaded a reluctant GM to participate, but he had to raise the funding in Australia.

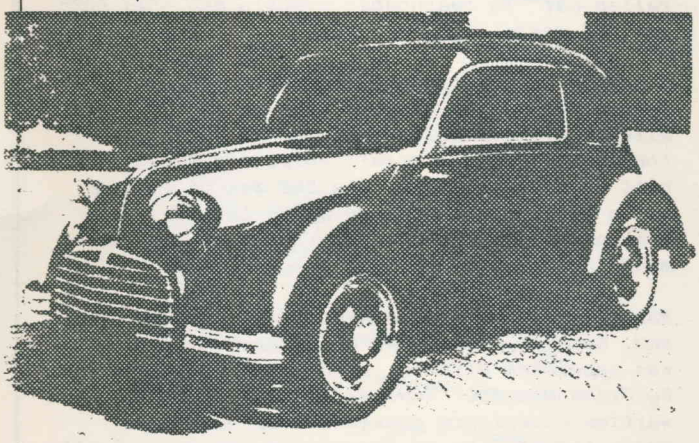
An existing GM protype in Detroit was selected to be the basis of the new car so as to shorten development time. GM-H was to do the body and styling to suit Australia. A combined US-Australian team was to develop the mechanicals in US.

Then tension built up. Hartnett wanted to retain the agreed Australian development of the car. GM wanted him to go to the States for "rehabilitation". Hartnett was hurt. He would not shift from Australia. He resigned. The Holden 48/215, later called the Holden FX, the GM-H car which he fought for, reached the market in 1948.

Meanwhile, after his resignation in 1946, Hartnett took his family overseas for a holiday and to look over car designs which he might produce himself. What he wanted would be cheaper than the GM-H car, more suited to the working man and his family. Chifley encouraged him.

Nothing in Britain interested him. He saw the Renault 750 and talked to Fiat. Neither would permit him the flexibility in making Australian versions which he wanted. He could have taken the German Volkswagen, but rejected it as too expensive to produce for the small Australian market. A seemingly odd decision, but, as Hartnett pointed out, the British and Americans also rejected the VW.

Hartnett then heard of a car designed by Jean Gregoire with French government backing via L'Aluminium Francaise. A strong friendship and respect developed between the two men, as revealed in their writings and correspondence. The brilliant Gregoire was already known for the front wheel drive Tracta car of the mid-20s, the Tracta constant velocity drive joint used in the prototype Citroën Traction Avants and in other fwd cars, and for the lightweight fwd Amilcar Compound.



Kendall people's car

Gregoire's car solved the problem of weight affecting performance and economy by using much aluminium in sheet and cast forms in its construction. Hartnett drove the Kendall-Gregoire prototype in England and was very impressed with the power-to-weight ratio, the ride and the economy. This was to be the basis of the Hartnett car. The project to build the car in UK as a Kendall fell through and Hartnett obtained the Kendall tools and pieces, and exclusive international manufacturing rights from Gregoire.

Government approval was obtained and Hartnett set up his plant at Frankston. Then commenced his "hell on earth". Promised government financial assistance did not come good. However, he persisted and arranged for mechanicals and cast aluminium parts from UK and France. Panels were to be made in Australia. The European parts arrived in Australia and assembly began. However the Australian supply of panels did not arrive. This failure was never satisfactorily explained, and it effectively killed the project. Some 100-150 cars were completed with hand-made panels and sold.

The Gregoire design was taken up by Panhard in the form of the Dyna 120 which was quite similar in appearance to the Hartnett. In their enlarged and more streamlined form, the Panhards were eventually absorbed into the Citroën camp and disappeared after 1967.

An attractive four-cylinder two-litre version of the Gregoire was produced in France in limited numbers (250) by Hotchkiss up to 1951. Hartnett had also planned to market this two-litre version along with his own 594 cc flat twin.

When the Hartnett project failed, Hartnett planned to market German Lloyd cars in Australia (as "Lloyd Hartnetts") but stopped short of local manufacture when the parent Borgward company collapsed.

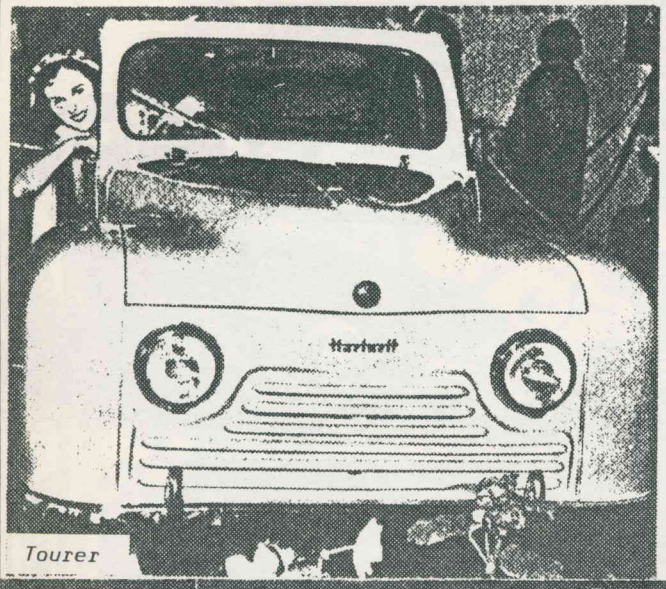
Later, and before the Japanese set up their own facilities in Australia, Hartnett established the Nissan/Datsun Bluebird on the Australian market.

Somewhat ironically, the GM-H Australian "people's car", the Holden, has been replaced by an Opel derivative, the (Holden) Commodore in recent years, and now its aging GM six has been replaced by an advanced six-cylinder motor from Nissan, the stable which Hartnett established on the local market. Even today, the Hartnett influence on the Australian automotive scene continues on!

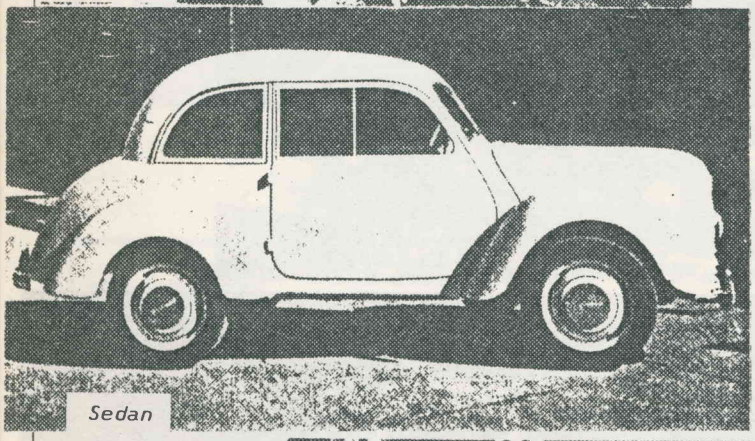
It is interesting to speculate on the light, technically-advanced, fuel-efficient, locally-made cars we might now be driving in Australia if Hartnett had been given even half the support he deserved.

Sources:
Hartnett, L.J. (1964). Big wheels and little wheels. Lansdowne Press. Melbourne.
Gregoire, J.A. 50 ans d'automobile.
Georgano, G.N. (1982). The complete encyclopedia of motorcars. Ebury Press. London.
Polson, T. (1982). 1950 Hartnett Pacific HG. Restored Cars No. 50 pp. 24-25. E.L. Ford Pubs. Newstead, Victoria.

Footnote: In preparing the above notes, I am particularly grateful for the helpful comments and other information provided by the youngest of Sir Laurence's three daughters, Mrs. Diedre Barnett of Melbourne. She advises that some three Hartnetts exist in Victoria, including a sedan held by the State Museum. The restored tourer from Queensland is described in Restored Cars (above). A station wagon from Western Australia is to go to the South Australian Motor Museum. The (Simca)-Gregoire prototype, which was shown around Australia and retained by Sir Laurence, is being given by the family to the SA Motor Museum. Sir Laurence had an early Panhard, model uncertain, and his late secretary, Leila Williamson had a "small grey Panhard" for many years.

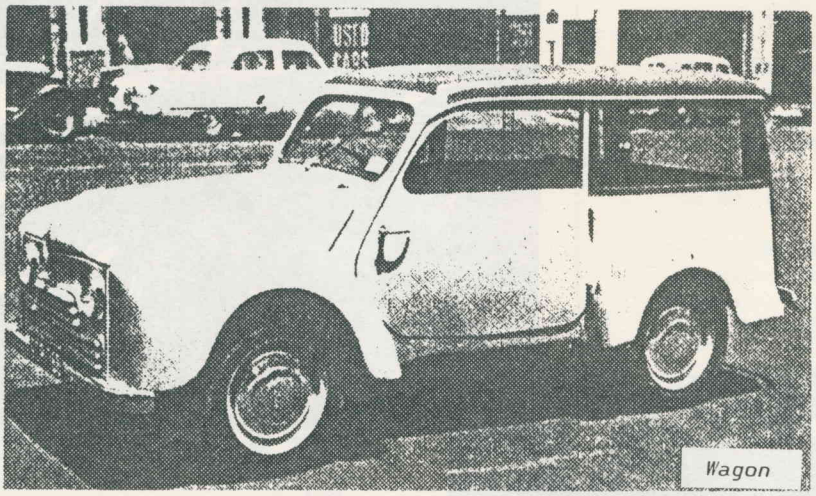


Tourer



Sedan

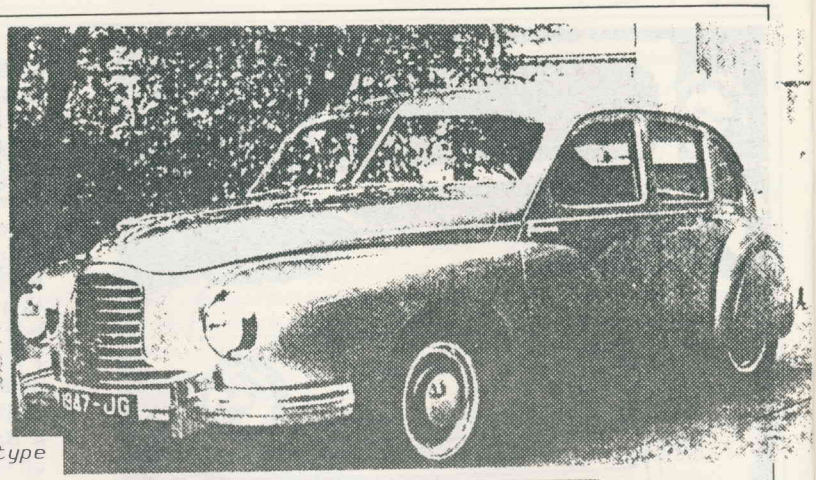
SPECIFICATIONS → *Hartnett Pacific tourer in Qld.* **Make, Model & Year of Manufacture** Hartnett Pacific H.G. 1950. **Price when new (or approx.)** 450 pounds. **Engine—Type** Flat twin. **Bore & Stroke** 72 x 73 mm. **Displacement** 600 cc. **Max B.H.P. @ R.P.M.** 19 at 4000. **Compression Ratio** 6 to 1. **Induction System** d draft Solex. **Electrical system** 6 v. **Engine number** N61E. **Clutch—Type** Single dry plate. **Transmission—Type** 4 speed & reverse. **Ratios—1st** 17.58 to 1. **2nd** 8.79 to 1. **3rd** 5.71 to 1. **4th** 4.46 to 1. **Reverse** 12.68 to 1. **Overdrive** Yes **Synchros** except low. **Differential—Type** bev drive. **Ratio** 6 to 40. **Drive Axles** 2 F.W.D. Gregoire Tracta c.v. joints. **Steering—Type** rack pinion. **Turning circle** 30 ft. May be less. **Brakes—Type** Girling Hydro-mechanical. **Two or Four Wheel** 4W. **Chassis & Body—of car** cast alloy 5 pieces bolted together make up frame and fire wall. **Body construction** Steel. **Body style** Convertible. **Chassis Number** 100-1. **Suspension type—Front** 2 transverse. **Shockers** hydraulic. **Rear** Gregoire trailing arm with coil. **Shockers.** Hydraulic. **Wheels type** cast alloy. **Tyres size** 450 x 15. **Weights & measures—Wheelbase** 6 ft 7 in. **Overall length** 11 ft 4 in. **Overall height** 4 ft 9 in. **Overall width** 4 ft 8 in. **Ground clearance** 7½ in. **Curb weight** 1,100 lb. **Capacities—Crankcase** 5 pt. **Cooling system** air. **Fuel tank** 5 gall. **Fuel consumption—Best** Make claim 60 M.P.G. **Estimated top speed** 70 M.P.H. Cruises well 45-50 in O.D. Never pushed it past 60 but still had loads to spare 70 could well be possible. **Details of car—Paint type—Lacquer** Dulon Acrylic. **Paint color—Body** Cashmere. **Upholstery—Type** Vinyl. **Color** Cream. **Design** 2½ in pleats in centre. **Paint Shop Name & Address** Self. **Upholsterer Name & Address** Self. **Top material** vinyl. **Color Grey (original). Wheels color** Alloy with Brass and chrome H-cap (Large). **Brightware—Chrome** Bumperbars and H-cap. **Polisher or Plater** still original. **Gauges type** Hartnett printed in centre **Speedo** Yes 0-70 mph. **Oil Pressure** light. **Fuel** Yes. **Amps** Yes.



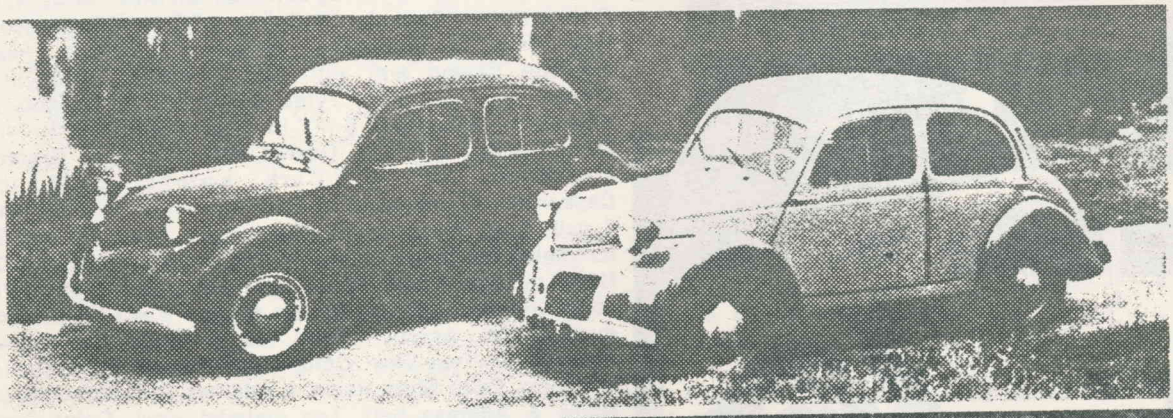
Wagon

Assembled Hartnetts awaiting body panels

Simca Gregoire in Ausralia



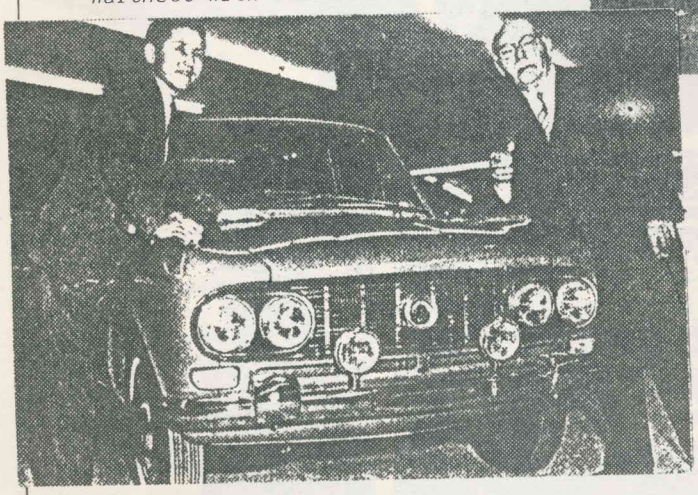
Four-cylinder Gregoire prototype



Panhard Dynas 1946

The first Holden produced in Australia, 1948.

Hartnett with Datsun Bluebird

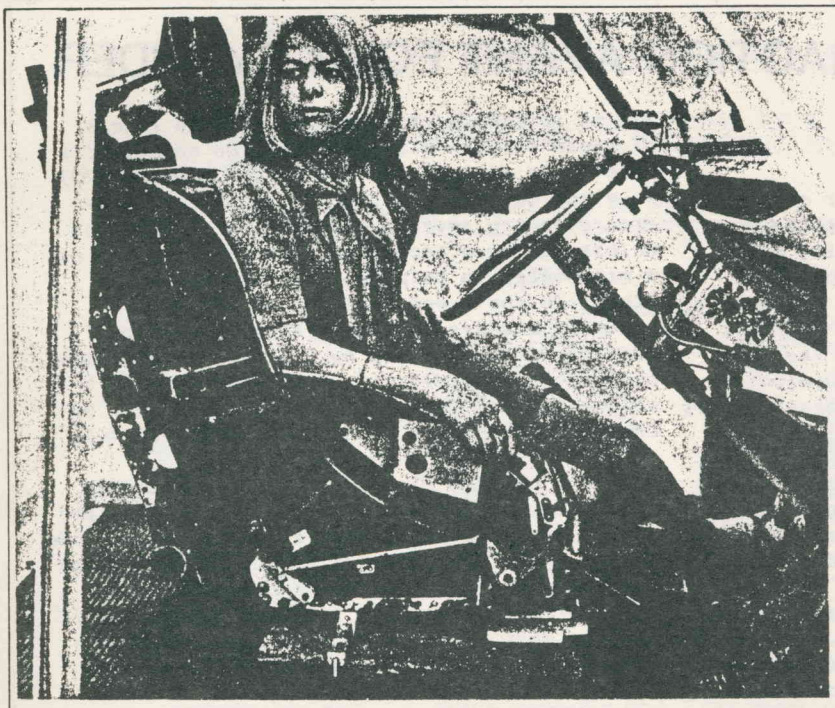


Incidentally, the Barnetts' current family transport is a recent Citroën CX 2500, and they belong to the Citroën Car Club of Victoria. Another example of the Hartnett link?

John Couche points out how closely the specifications of the flat-twin aircooled Hartnett match those of the later (602 cc) 2 CV Citroën. Check it out.

Bill Graham.

Twin Pot Topics



For a really rapid exit from his 2CV (straight through the roof!), Rudiger Haug fitted an old Canadair ejector seat. (Autocar 10/8/67). Right: Melb. Age 27/10/83.

DON'T FORGET: The 2CV workshop at David Gries's, Sun., August 10th. BYO BBQ lunch. Mechanicals, functions, & failures - an introductory exposé. Everyone welcome.

On a good thing

AS ANY traveller fresh back from his (or her) 21-day, 12-country tour of Europe knows, the most popular, practical and prestigious way of motoring on the Continent is by Deux Chevaux. That literally means two horses, but several decades ago the people at Citroen managed to get them both under the bonnet of a funny little car that hasn't changed much since.

The Deux Chevaux, which looks very much like a ladybird beetle that has lost her (or his) spots, is as strong as an ox and as docile as a cart-horse. But its friendliness belies its new role in an intense political debate raging throughout Europe, and even elsewhere, we hear.

As you might realise, Deux Chevaux owners are sensible, liberal people, stoics and thinkers. Good people, and tears of nostalgia tumble down your diarist's cheeks when he recalls having to part with his Deux Chevaux last year.

Not usually militant, they nonetheless have their say. And it seems that NUCLEAR POWER - NO THANKS stickers on Deux Chevaux have proliferated so much that the Citreon people are putting them on at the factory. What is more, you may choose the message from four languages. STOP THE BLOODY WHALING may also be supplied (applied?) on request.

RAID 88: ACROSS AUSTRALIA BY 2CV OR SIMILAR!!

The Victorian contact is still Roger Brundle at 88 Clarence St, Brunswick, 3056. However, there is yet another Western Australian contact: I understand it is Stewart Pekin, possibly contactable via Robin Norton, 198 Westfield St, Maddington WA 6109, phone (09) 459 2435. Locally, David Gries, (03) 890 3266 is also trying to keep up to date on developments, and has been punting around suggestions as to where the route might go. It sounds like there will be substantial desert travel via Alice Springs in going from Perth to Sydney.*

NEW MEMBERS

Welcome to:

Brian GLADMAN
5/1 Walsh St.
South Yarra 3141
ph. 266-2349

'72 SM.

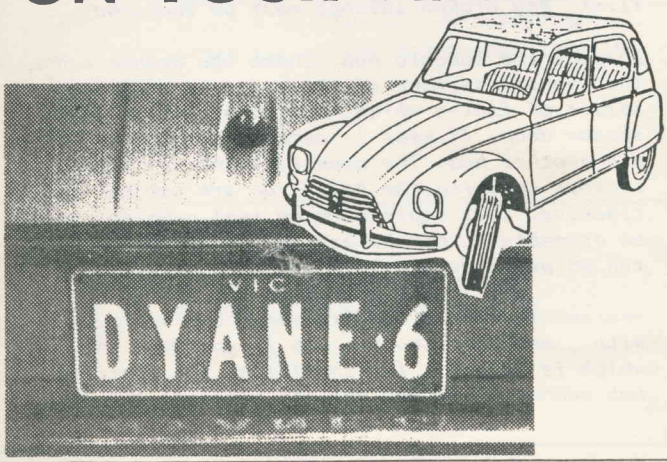
Ron LAWRENCE and Hayden CHAPMAN
7 Poulton Close
Bayswater North 3153
ph. 729 4641

2 x L15, 2 x B15

Max Graham
P.O. Box 522
Bacchus Marsh 3340
ph. (057) 67-4116

'54 L15

ON YOUR PLATE



A fairly recent phenomenon in Australia is the personalized number plate. A BX Citroen in SA has "CITROEN". I've seen "FIZZIO" (someone who sooths aches and pains?), and "RKITEC" (bloke who designs houses - get it?). Former CCOCA President Couche has recently acquired the plate "DYANE 6" for pretty obvious reasons. There must be heaps of clever, amusing, suggestive(?) plates around. Let us know what good ones you have seen.

*STOP PRESS: Stick with Robin Norton(Pres. CCC WA) for info. Details coming out soon. WA planning bit to Ayers Rock (GUNBARREL HIGHWAY !!), other States doing rest.

GEARBOX REPAIRS

TRACTION AVANT FOUR CYLINDER

Continued from Front Drive 9 (2), 9 (6).

When removing the mainshaft (84), other components - the synchro assembly (19, 22), third gear (18), thrust washer (38) and locking key (37) - may well have been displaced. Do not be disturbed by this as their sequence of assembly is readily seen in Figure 7 on page 13 of Front Drive 9 (2). Washer 38 is identical to the one located before the second speed idler pinion (35), i.e. item (34). In most cases, these washers can be re-used.

The locking key (37) is partly relieved at each end. This is done so that the key engages the inner notches of washers 34 & 38 and prevents them rotating relative to the shaft and synchro hub when assembled. If the locking key is damaged, it is probable that at least one of the washers need to be replaced along with the key. This can be readily discerned upon inspection of the thrust surfaces of the washers - both sides of each must be free of any circular score marks.

You will notice that one face of each of these washers has four vee-shaped oil grooves cut into it. Often a crack may be found at the base of one of these grooves. Cracks may also occur at the corners of the locking key rebate. These cracks are not always readily visible. Therefore insert the jaws of a pair of long-nozed pliers into the bore of the washer, ensuring that they align with one of pair of grooves. Now attempt to open the jaws, so tending to ovalize the washer and expose any latent cracks. Repeat this test with the jaws aligned with the other pair of grooves.

The locking key is made of mild steel. If a replacement is not available, a 100 mm (four inch) nail of suitable gauge will do quite well if cut to length and suitably filed to shape at the ends.

Having taken the necessary steps (new bush etc - see F.D. 9 (6)) to obtain a minimum diametric clearance of 0.04 mm (0.0016 inch) between the bush (86) of the second speed idler pinion and the mainshaft, the pinion (35) may now be refitted to the mainshaft. If clearance is less than about 0.04 mm, the bush may "pick up"(gall) on the shaft. If the clearance is much more than 0.04 mm (i.e. more than a just perceptible "wiggle" on the shaft), it is excessive e.g. 0.25 mm is "bad" - see earlier comments.

Firstly offer up the washer (34) from the rear (unthreaded) end of the shaft, ensuring that the oil grooves face towards the second speed idler pinion which is fitted next, followed by a Celeron washer (36). Now fit the retaining (locked thrust) washer (21) and rotate it in the mainshaft groove so that it cannot slide back. This done, check the lateral play of the gear (35) by inserting feeler gauges between the washer (34) and the end of the splined section of the mainshaft where it accomodates the synchro hub (22). The clearance should be between 0.05 mm and 0.10 mm (0.002 - 0.004 in.).

If. as is likely, the clearance is in excess of these values, a thicker Celeron washer will have to be fitted. The spring and plunger (20) have not yet been fitted as it will be necessary to try several thicknesses of Celerons unless you have access to a vernier caliper or a micrometer to help you sort through your stock. In the event that you do not have a stock of washers to choose from, a washer of suitable thickness may be produced in phosphor bronze. This material is available in a suitable extrusion form from Geo. White & Co., 527 Church St, Richmond, Vic. Tel. (03) 428 1462.

When the correct clearance has been obtained, remove the retaining washer and fit the spring and plunger. To refit the retaining washer, the spring and plunger must first be depressed and kept down until the washer encroaches on it. This operation can be a little tedious, and is perhaps most effectively achieved through the use of a feeler gauge blade of 0.15 mm - see Figure 8. With the feeler gauge now removed, the retaining washer having been slid fully home, the washer then needs to be rotated until the plunger enters one of the splined rebates. An audible click will be emitted when this happens, indicating the end of this sequence.

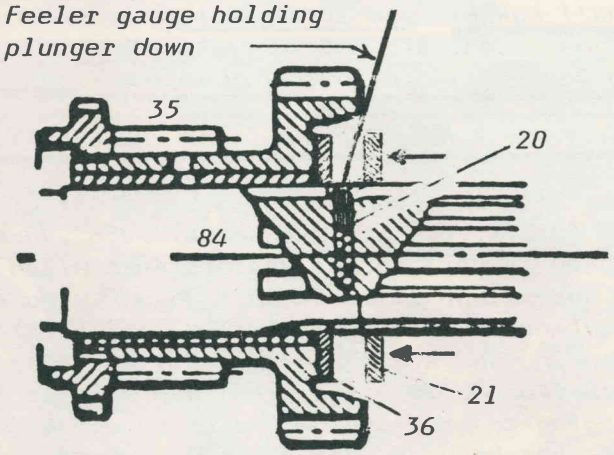


FIG. 8: FITTING LOCKED THRUST WASHER

The synchromesh assembly (19 & 22) should be dismantled by pushing the hub (22) out of the ring (19) by hand. To avoid loss of the locating balls and springs (33, 32 - six of each), place the assembly in a plastic bag or a cloth first. Any broken springs must be replaced.

Inspect the synchro hub. Check the bronze bands, the tapered surface of which are segmented by series of flutes which must be more than just shadow deep. If wear is excessive, try to obtain another hub. The crests of the six spline sectors on which the balls run are subject to tracking. This represents no real problem, since on assembly it can be arranged that the balls run on previously unworn crests.

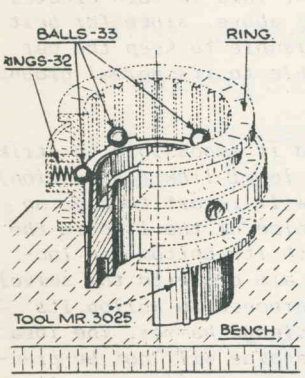
Reassembly of the synchro assembly can be done with a modified synchro hub if you have one which is only fit for sacrifice. The modified hub cannot be reused for its original purpose.

— FITTING SYNCHROMESH GEAR —

TOOL MR.3025 IS MADE OF A CITROEN FRONT WHEEL DRIVE "11" (LIGHT 15 OR BIG 15) SYNCHROMESH CENTRE SLIDE MODIFIED AS FOLLOWS. AFTER MODIFICATION THIS PART CANNOT BE USED IN A GEARBOX.

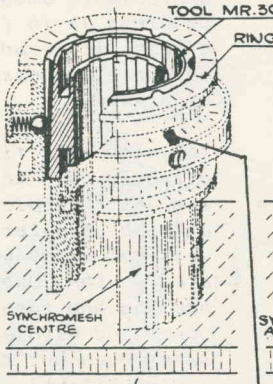
1. Anneal part.
2. Make 6 tapered grooves to receive balls as shown below.
3. Ease off all splines to get free movement of synchromesh ring.

— Fig 9 —



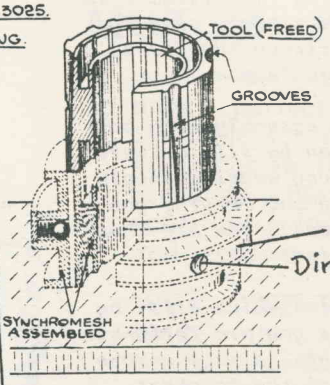
PLACE SYNCHROMESH RING ON TOOL. PLACE 6 SPRINGS IN THEIR HOUSINGS. PLACE 6 BALLS IN GROOVES. PUSH SYNCHROMESH RING DOWN ON TOOL.

— Fig 10 —



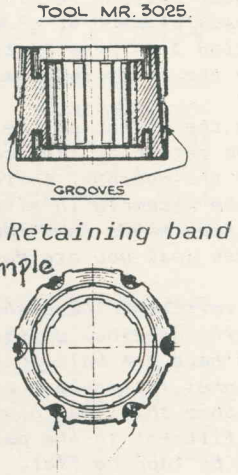
PLACE ASSEMBLY OF SYNCHROMESH RING ON TOOL. PUSH DOWN THE SYNCHROMESH RING TO RETURN THE BALLS.

— Fig 11 —



CONTINUE TO PUSH DOWN RING TO FREE TOOL.

— Fig 12 —



Each groove to be cut out from the middle spline of a group of 3 splines.

Mark location of hole if replacing balls & springs by removing band.

Details of the modification are shown in Figures 9 - 12. An alternative method which I have used requires that the steel retaining band on the outer circumference of the synchro ring be removed. To do this, stand the synchro ring on a solid surface, place a pin punch into one of the holes which accomodate the detent springs (32) and strike the punch so as to push out the retaining dimple in the retaining band. Repeat this operation for for all six holes. Once all six indentations have been relieved, the retaining band can be tapped off.

The hub can now be placed in the ring with ease. This done, first the balls then the springs are fitted into the holes. So as to ensure that the balls and springs stay put, first pack the holes with grease. A fabricated band must be placed around the ring to enable compression of the springs.

The compression band can be fabricated from an empty 825 g food can, cutting a narrow strip of tinplate about 5 mm wide and of sufficient length to enclose the uncompressed springs with enough length left that the two ends can be gripped by narrow-nozed pliers. The pliers are then used as a key to wind up the surplus strip, thereby compressing the springs and enabling the fitting of the retaining band by carefully sliding it into place.

Once in place, the retaining band must again be secured. Place the synchro assembly on a stout piece of wood supported on a solid surface. The pin punch is used again to reform the depressions in the retaining band by tapping down over the detent spring holes. Before the springs are refitted, it will facilitate the subsequent punching of the depressions in the band if the location of at least one of the spring holes is marked with paint ot a felt pen on the vertical face of the selector fork groove adjacent to the hole (see Figure 10). It is important to cushion the underside of the synchro ring when reforming the indentations in the retaining band since repeated striking on a hard surface would "stretch" the band to the point where it would no longer stay in place.

(To be continued)

Kenn Gilbert.

CLASSIFIEDS

Wanted: Set of four side windows to suit Light 15. Also possibly bumpers & o/riders.

Max Graham
P.O. Box 522
Bacchus Marsh 3340.
(057) 67 4116.

DRIVESHAFT REMOVAL

MORE LOCAL COMMENTS ON THE PUBLISHED METHOD:
See Front Drive 10 (1), Pages 7-9.

A. When refitting the shims and cover plate of the lower suspension ball joint, instead of using a lever as described in the text (second last para P. 9), having to hold it, stand on your head to see where you are putting the shims, simply try this instead. Assume a squatting pose in front of the swivel assembly, offer up the outer bearing retaining ring (item 9 in the diagrams of page 4, also clearly seen in Illustration 3 on page 8) between the drive shaft and the lower suspension arm.

By taking the weight of the assembly with both knees, the retaining ring can be slid outward away from the gearbox, thereby wedging snugly to hold the assembly in situ and leaving you with two free hands (and knees). You are then free to see what you are doing!

B. When refitting these shims which will by now be quite numerous unless you are fortunate enough to have new ball joints, always ensure that the ones fitted last are the thickest. Reason? Some shims may have been damaged thro' improper fittment in the past and even though rectified by tapping flat, they could still cause the total thickness of the uncompressed stack to be a good deal greater than the final compressed value. Therefore, it is likely that as one secures the cover plate, the lower shims may shift sideways and become trapped between the cover plate and the edge of the recess in lower arm, especially if a thin shim is put in last. The displaced shim(s) result in a less effective bearing support and of course more damage to the shims as above.

Should the shims have become displaced and trapped, it is revealed by the presence of a gap between the cover plate and the machined face of the arm after tightening. This is rectified by backing off the three screws retaining the plate a fraction and inserting another shim or similar into the gap and pushing until the offending shim(s) moves into the proper location. Then retighten the screws and recheck for a gap.(The screws, shims, arm etc are clearly seen in Illustrations 11 & 12).

C. If attempting to break (remove, free) the lower ball joint without the special puller, a few points are well worth noting:

(1) This point also applies when using the special puller. Ensure that the centre line of the jack or whatever support is used is directly in line with the pivot pins of the swivel housing. Failure to do so may result in not being able to break the joint and almost certainly the threaded section of the pivot pin would be bent and probably compressed at the end.

(2) In order to attempt to jar the joint by hammering the lower link arm, the mudguard on that side should be removed first.

(3) Hammering may jar the car off the jack. For convenience sake therefore, erect a support of criss-crossed timber (4x2 in.) under but not in contact with the cradle.

This is preferable to locating a jack stand beneath the cradle, for in order to do so requires the car to be raised an appreciable amount. This in turn creates problems as in (1) above, since for best effect, it is advisable to keep the car as close as possible to its normal ground clearance.

(4) You will find it impossible to strike directly upon the lower link (suspension) arm. Most people will resort to placing a piece of water pipe or the like in the vertical plane with its bottom end located on the lower arm close to the swivel housing and then proceed to wollop its upper end with a sledge hammer. The idea seems good but the pipe will not be precisely vertical. Ergo, the blows are less effective than they should.

I would recommend instead that you get a metre long piece of 37 mm (1 3/4 x 39 in.) heavy wall water pipe - it comes in two grades - and place it horizontally across the lower arm, with the bulk of the pipe extending to the rear of the car.

You will find that the rear end of the pipe will comme up under the seam of the body below the sill. This is undesireable. Place a scrap of timber, approximately 25x100x150 mm between the underfloor and the end of the pipe. The packing piece of timber should be placed such that it contacts the underfloor at the seam made by the floor and the firewall, and straddling the seam. The pipe should should be sited near the seam, but slightly toward the rear of the car. The end of the pipe will need to be located by another jack, holding it snugly against the packing piece.

Thus set up, the front end of the pipe should protrude about 15 cm ahead of the lower arm, providing an easy target for the sledge hammer to strike.
This configuration enables a direct line of force to act in a plane parallel to the centre line of the swivel housing, as would be done by the special puller. Due to this, it is likely that the ball joint will break free on the first blow, given that the blow is a substantial one.

D. With regard to the cardan (inner) joint, I would remove it, for although it may well be a long-wearing part, its life can be increased.

This may be done by dismantling the universal joint and repacking it with fresh grease. When reassembling, the cross should be first turned through 180 ° i.e. about one of the journal axes. This puts the drive thrust on the previously unworked faces of the journals.

Kenn Gilbert.

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IN BRIEF.

Price £195.—Tax £8.

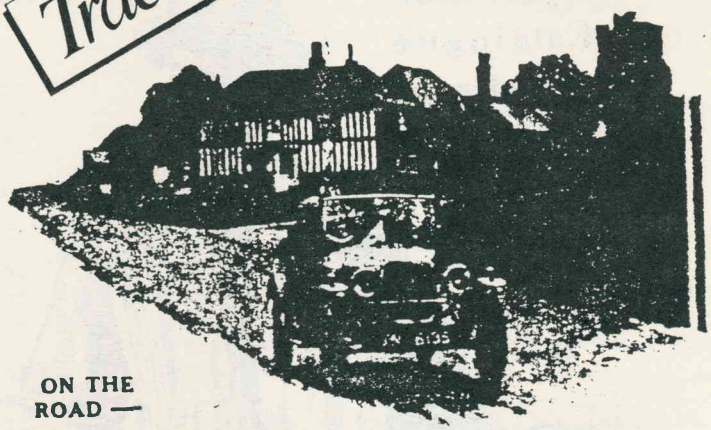
ENGINE : Four-cylinder water cooled 55 mm. by 90 mm., 855 c.c. R.B. magneto, Solex carburetter.

TRANSMISSION : Plate clutch, 3 speed gearbox and enclosed drive to differential.

EQUIPMENT includes 5 lamps, electric starting and horn, spare wheel, hood cover, and full kit of tools.

Traction arrière

Excellent Road Performance of a David Amongst the Goliaths of the Automobile World.



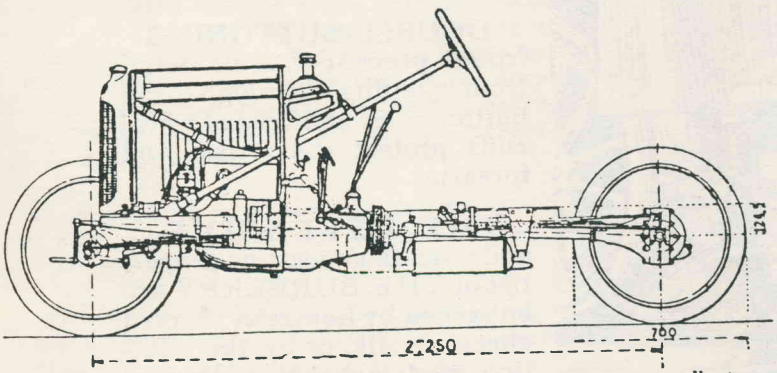
ON THE ROAD —

The upper photograph shows the 7·5 Citroen rounding the hair-pin near the summit of Ashford hill in the Peak district. Below, a snap on the St. Albans Road which shows the graceful lines of the car and the ample accommodation provided for two passengers.

WHEN the 7.5 h.p. Citroën was introduced over two years ago, the writer must plead guilty to expressing scepticism as to the abilities of an engine with such a small cubic capacity, i.e., 855 c.c., to haul with satisfaction two adults and luggage, together with a well-made chassis, comfortable touring body, and all the appurtenances thereof over give-and-take roads.

An earlier test undertaken by a member of the staff of this journal entirely dispelled such ideas, whilst a more recent run on a model boasting of detail refinement, and, what is even more important, the substitution of magneto for coil ignition, has shown up this diminutive car in an even more favourable light, particularly as what may be termed more than usually severe touring country, taking as a standard the route of the London-Manchester trial, was traversed.

The specification, with the exception, as already stated, of magneto ignition, remains practically identical with the earlier models, and comprises a four-cylinder water-cooled engine cast en bloc, with 55 mm. by 90 mm. cylinders.



AN INTERESTING CHASSIS.

This scale drawing conveys an excellent idea of the lay-out and should be compared with the sketch on the next page, which reveals how the magneto has been fitted in place of the coil ignition unit shown above.

An "Eleven" in Miniature.

The engine, single dry-plate clutch, and three-speed gearbox with central control, are in one unit, the final drive being by enclosed propeller shaft, the well-known Citroën Chevron gears, and differential.

The wheels are of the Michelin detachable type, shod with 700 mm. by 80 mm. Michelin tyres ; suspension is by quarter-elliptics all round, steering is of the worm and sector irreversible pattern, whilst the foot brake operates on the transmission and the hand brake on the rear wheels. The car is equipped with dynamo lighting and electric starter, electric horn, R.B. magneto, and horizontal type Solex carburetter.

One of the most astonishing features of the 7 h.p. Citroën is that in road performance, "handling," and general appearance, it is very similar to its larger brother, the 11.4 h.p. model. More particularly does this apply to the sound when running, the all-out speed—about 45 m.p.h.—and the peculiar

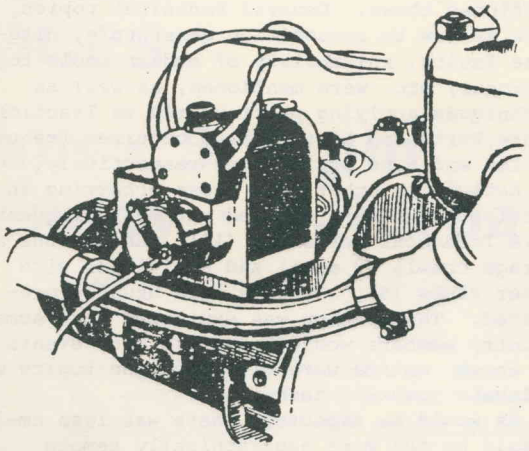
B37

Taken from Floating Power, Jan. 1985. Originally published in "The Light Car & Cyclecar", 1923.

capability for hanging on to top gear on even the longest and most tiring gradients; in fact, one might very easily deceive oneself into believing that one was handling the larger car.

No better tribute could be paid to its pulling powers than to make such a statement, when it is borne in mind that the engine capacity of one is 855 c.c., with a total weight (unladen) of 10¼ cwt., whilst the engine capacity of the other is 1,453 c.c., with a total weight (unladen, four-seater) of 17 cwt.

When one gets down to rock-bottom, however, it becomes evident that it is a question solely of power-weight ratio and that the manufacturers have arrived at the most satisfactory combination by very careful calculation.



The mounting of the magneto is effected by an extension bracket on the side of the timing case. Note the position of the generator on the forward end of the same casing.

To say definitely that the magneto is an improvement over the coil ignition previously fitted is possibly stretching a point, but we have no hesitation in asserting that, with the former type of ignition the car is handier.

The magneto is more foolproof, if such an advantage may be offered without implying anything of a derogatory nature to coil ignition, and is, therefore, more suited to the every-day use of the average owner-driver.

We have yet to discover any Citroën which did not give way within a few seconds to the gentle persuasion of the electric starter, even from dead cold, and the 7 h.p. model is exemplary in this respect. The gearbox—a replica on a slightly smaller scale of the larger box—is childishly easy to handle, the steering is good, and the brakes, particularly that operated by the foot on the transmission, are powerful to a degree, which imbues one with the utmost confidence either in traffic or when very hilly country has to be covered.

A Good Hill-climber.

The transmission brake on the particular model which we tested required very careful treatment, the lightest pressure of the toe alone serving to produce a velvety action, whilst, if the foot were pressed down hard on the pedal, the resulting deceleration can only be described as fierce.

On main-road hills the car is essentially a top-gear performer. As an instance, the steep rises leading out of several villages between St. Albans and Stony Stratford, not to mention the long drags encountered between them, were negotiated easily on top; in fact, only one change of gear was necessary on account of gradient until reaching the first test hill—Ashford—included in the London-Manchester.

High-powered cars might struggle over this—at any rate, until the final hair-pin—on second gear, but it can safely be said that the average car must perforce come down to first. The Citroën was not sufficiently powerful to achieve the more meritorious performance, but it went up on its lowest gear, with an ample margin of power, and was restarted successfully on the worst portion of the gradient.

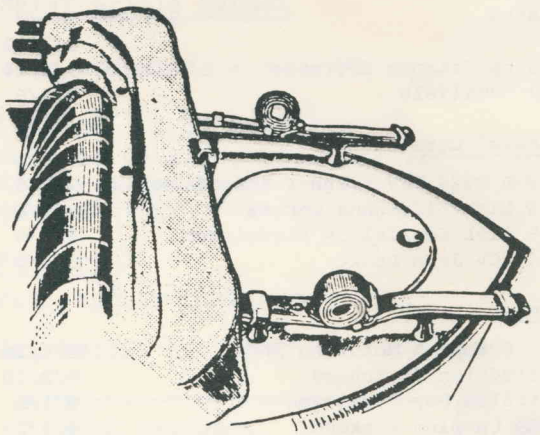
In view of the fact that such a small power unit is fitted, it is not surprising that a petrol consumption as low as 45 m.p.g. can be obtained, with a correspondingly good consumption of oil, but these points are well worth bearing in mind by those with an eye to economical motoring.

The Long-stroke "Punch."

A fact which may at first be overlooked in the engine is the relation between the bore and stroke dimensions, the latter being particularly long and accounting, no doubt, in a large measure for the undoubted "punch" of which the power unit boasts. That the small bore has a corresponding effect on the annual tax is also a point worth bearing in mind.

We have two criticisms to offer: The first centres in the shape of the seat squab, which is rounded slightly to fit the back of each passenger, and, therefore, makes it rather difficult to carry a child, for whom, otherwise, there is ample room.

The second centres in the fact that, when cornering at speed, the back of the car is inclined to dither. Perhaps it would be fairer to say that, for such an extremely lightweight vehicle, it corners remarkably well, but we think that an improvement out of all proportion to the expense involved would be effected were shock absorbers fitted, and we understand that the manufacturers are favourably considering a suggestion to this end which we have made to them direct.



Luggage carriers, to which two suit cases can comfortably be strapped, leave the locker free for tools, spares, and oddments. There is still room in the locker for spare petrol and oil.

Throughout our run of over 400 miles we had no occasion to open the toolkit. The locker at the rear, as a happy photograph in a previous issue showed, is much larger than anticipated, whilst a refinement is the fitting of luggage-carrying brackets and straps. No water at all was added to the radiator over the whole distance, and a pint of oil sufficed to replenish the sump.

The price of the two-seater model is £195, coupé £245. The car is handled by Gaston, Ltd., the Sales and Service Department being at Larden Road, Acton Vale, London, W. 3; the showrooms at 60, Piccadilly, London, W. 1.

INDEX

Index to Front Drive Volume 9

An index to Vols. 1-5 appears in Vol. 6 no. 1; to Vol. 6 in Vol. 7 no. 1; to Vol. 7 in Vol. 8 no. 1 and to Vol. 8 in Vol. 9 no. 1.

References are described below as Vol. no./ Issue no./page no. and are classified into General, Technical, Specific Model, Members' Cars, Events and Advertisement sections.

ADDRESSES

CCOCA ACTIVITIES QUESTIONNAIRE

Some of you may be curious about the kind of responses received to the questionnaire on preferences for CCOCA activities that was sent to members in March. Well, here they are!

Twenty-seven usable replies were received, eleven from country and interstate members and sixteen from members in Melbourne and suburbs. One respondent found the questionnaire form inadequate and returned a four-page itemised list - unusual, but much appreciated.

Top scorers in preferences for activities at meetings were films and technical demonstrations - nearly half of all respondents mentioned these. General technical topics, such as how to recondition generators, diagnose faults, suitability of modern tools to Citroens, etc. were mentioned, as well as techniques applying particularly to Tractions. Spare Parts and Library also occurred frequently ten and nine preferences respectively.

Activities other than those occurring in meetings that were singled out most frequently were Technical workshops (13), Sunday runs and Garage crawls (9 each) and activities with other clubs (8). Sundays were usually preferred. The opinion was expressed that some country members would travel to such events if enough notice were given and the topics were relevant (usually technical).

As would be expected, there was less emphasis by the more geographically remote members on certain activities, particularly those that were not part of regular meetings, but the front runners, technical workshops, demonstrations and films, received uniformly strong support from both groups.

Country and interstate members in particular mentioned Front Drive in glowing terms, which is gratifying, because the magazine does use by far the greatest part of club funds.

A puzzle for the Committee, when trying to decide what changes should be made to the club activities schedule, will be how to reconcile high preferences with low appearance (I mean low attendance) levels that have been experienced with some events in the past, such as workshops - it can't always have been the weather!

Favourite comments: "Do not attend meetings - leave this to husband" (Melbourne), and "Austraction should be more than 100 - 200 miles from Melbourne - any direction would be OK as long as you lot had to drive further" (Queensland).

We are grateful to the 20% of members who took the trouble to respond - your detailed comments will be carefully considered by the Committee.

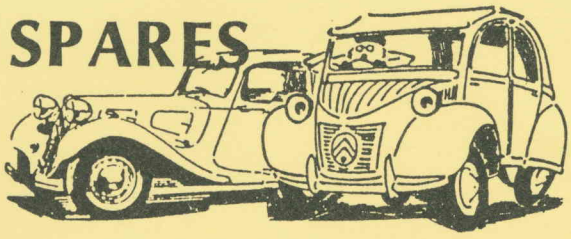
Peter Simmenauer.

CHANGES OF ADDRESS

Frank and Wendy Rouse are now at:
"Balbirnie"
Garfield 3814

Noel and Vi Cammock are now at:
2 Parker St.
Hornby, Christchurch 4,
New Zealand.

SPARES



SPARE PARTS OFFICER:

Peter Boyle
35 Newman St
Thornbury 3071.
Phone: (03) 480 3560.

HOURS:

10am - 5.30pm
Monday - Saturday

PLEASE NOTE THE NEW HOURS FOLKS. Please, oh, please try to restrict your calls to these hours. Remember, the name's not Arkwright and we're not open all hours.

NOTE: ORDER FORMS TAKE PRECEDENCE OVER PHONE CALLS.

At this stage, I'm doing a stocktake and a complete list of spares is not available for this issue, but I expect to have it for next issue.

One word of warning. Some of the parts have undergone a pretty substantial price hike e.g. a set of dovetail rubber blocks for the doors is now $34.50 - previously they were only $6.96 a set. This is the result some 800 blocks being purchased some years ago and this old stock is now exhausted. With the dollar so weak, the new prices from Holland will be steep.

This shows that money spent on spares and put on the shelf (i.e. your shelf!) will only appreciate in value as those who purchased crown-wheel and pinions will confirm.

Again, those with 2CVs etc - please forward your needs, as I'll be getting a variety of parts in for these models.

By the way, I just can't justify the time to chase up second-hand parts, so if you need them, please advertise in the classifieds in the magazine.

Don't forget the firm's motto:

Never fear!
Luigi's here,
When your motor needs new gear!

(within the hours shown above!).

Peter Boyle.

CLUB SHOP

Contact:

Robin Smith
411 Glenhuntly Rd.
Elsternwick 3185
(03) 527 5429

Windcheaters & T-shirts

Designs: as shown inside front cover, plus: Club design as on back cover.

Supply your own windcheater or T-shirt and we will print your chosen design for $2.00 each, or

Order a T-shirt printed from our stock for $6.00.

Fiftieth Anniversary T-shirts at $6.50.

PLEASE SPECIFY SIZE, COLOUR AND DESIGN WHEN ORDERING.

Windscreen Stickers

Club Emblem - $1.50

Cloth Badges

Club Emblem in blue on white oval background - $1.75

Lubrication Charts

High quality reprint of original Traction "Oil and Grease" chart - $1.00

Metal Grille Badges

New stock

Blue and White - $12. ←

Front Drive Back Issues

Cost $1.00 each, plus postage.
If issue requested is out of print, a good quality photocopy will be supplied.

Posters

Full colour Light 15 - $2.50.

ALL PRICES PLUS POSTAGE AND PACKING.

NEW ITEM!!!: 2CV Puzzle Cards - $5 per set. A nice gift for your Citroen friends. You can be sure they will appreciate them.