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*First full test:*

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JUNE 1960 2/6



**HOW TO RACE A GO-KART (P. 16)**



Whoa  
there, you

*BUCKING like a bronco, yet safe as a house: Mule takes a hurdle of ammo cans and sandbags with ease.*

**Australian Army is testing a batch of Willys-built Mechanical Mules — and they're fantastic on rough going, reports Bill Clark**

# MULE

**T**AKE four big, baggy tyres, use them to support a sturdy tabletop platform equipped with a steering wheel and a small engine, and you'll have what the Army calls a Carrier, Light Weapons, Infantry,  $\frac{1}{2}$ -ton, 4 x 4, M-274 — or, more simply, a Mechanical Mule.

Developed and produced by Willys Motors, makers of the famous wartime Jeep, the Mechanical Mule was built to satisfy the American Armed Forces' demands for an entirely new combat duty vehicle.

This vehicle had to retain the Jeep's ability to go anywhere, have good handling qualities and be able to carry a bigger payload for its own weight than the Jeep. In addition, it had to have a lower profile and be light and compact enough to be transported in large numbers by air.

This was undoubtedly a tall order — but after about seven years and two million dollars had been spent on research, Willys finally came up with the Mule. It measured up to all of the Army's requirements, and the

first production units rolled out of the Willys plant in September last year.

Australian military observers had watched the Mule's development from afar, and as soon as the vehicle was in production, they bought four units for testing in Australia.

### What Makes a Mule?

Like its big brother, the Jeep, the Mule has three forward gears and one reverse, and a choice of high or low ratios.



*"GO climb a tree," orders Sarge—and the Mule does it, one front wheel driving it up the trunk.*

Unlike the Jeep, which has a choice of 2- or 4-wheel drive, the Mule has fixed 4-wheel drive and a selection of either 2- or 4-wheel steering.

The Mule also has locked diffs, which allows power to be distributed evenly to all four wheels — so power isn't lost if one, two or even three wheels happen to be spinning. As long as there's one wheel on the ground, you have traction.

The driver, or "Muleskinner" as he is known, sits on a small detachable seat on the platform, with his feet on the foot controls in a tubular "basket" in front of the vehicle. The steering column, with its side-raked wheel, can be adjusted to three positions, so that the Mule can be operated by the driver seated on the platform, or walking, or crawling on the ground.

The brake, which is a 5½ in. tail-shaft-mounted drum, can be operated by a foot pedal or by a ratchet-type hand-lever.

Extensive use of magnesium and aluminium alloys has enabled Willys to keep overall weight (including a tankful of petrol) down to 900lb. The Mule's platform is of extruded magnesium, 8ft. 1in. long and 3ft. 10in. wide, mounted on a chassis frame of tubular members which are connected

to the front and rear axle housings.

Magneto ignition is used, eliminating the need for a heavy battery and starter. There are no headlights, instrument gauges or windscreen.

The engine, built to Willys' own design, is an opposed four-cylinder unit, air-cooled by a centrifugal belt-driven fan. Running on a modest compression ratio of 6.5 to 1, it has a capacity of 53.5cu.in. and develops 16 b.h.p. at 3600 r.p.m.

Mounted under the platform at the rear, the engine is started by an automatic-rewind pull cable, similar to that of a lawnmower or outboard motor.

For servicing in the field, the Mule's light weight makes it easy for two men to lay it on its side—and a sealed crankcase and petrol tank prevent spillage.

The Mule has no springs or shock-absorbers, and the baggy 4-ply, 5.50

*LOSING a wheel means nothing—Mule bashes on regardless. Note its simple tabletop construction, huge baggy tyres for maximum traction.*



...the Mule's only form of traction. These run on only 12lb. of air pressure; when the Mule is used, they spread out and ensure maximum traction.

Despite its extreme lightness, the Mule will carry a load of at least 1000lb. — more than its own weight — whereas most tactical vehicles can carry only about half their own weight.

### Impressive Test

The Australian Army has been testing its Mules, and training a squad of men to drive and service them, both at Holsworthy (N.S.W.) and at the Canungra jungle training centre in Queensland.

Men and Mules had just returned from a five-week driving course at Canungra when we were invited to watch them in action at the Holsworthy military camp.

The demonstration was held in an old quarry which was ideal for the purpose. The quarry has long been out of use, and its bed is now covered with dirt; occasional rocky outcrops and the steep rock-and-dirt walls provide plenty of testing hazards.

The first demonstration was for a Mule with an 800lb. load to climb a short 60 percent incline of dirt and rock, which had a rocky section jutting out near the top.

The driver selected first gear, low ratio, and tackled the climb at a crawl; at times there were only three wheels on the ground, but the Mule climbed to the top at an even speed, without faltering once.

The second demonstration was to drive over ammunition tins covered with sandbags. Keen to show the Mule's prowess as a high-stepper, the Army crew weren't satisfied to do the job the easy way. They spaced the obstacles alternately, so that while the centre one was being crossed, the offside front wheel was at least two feet off the ground!

As the Diggers warmed to their work, so our interest grew.

### Climbs Trees, Too . . .

For the next test, the Mule ran up out of the quarry to a clump of small but sturdy trees. The driver put the nearside front wheel up against the trunk of a tree and gently started to climb.

One wheel was against the tree, two were on the ground and one was turning free — but up went the Mule, until it was standing at a 45-degree angle. No doubt it could have gone farther, but the driver probably didn't want to spoil the shape of his head.

They could have ended the demonstration right there—we were sold. But they didn't: the Mules were put over more obstacles and up and down more hills.

In addition to the normal seated driving position, the adjustable steering column allows the Mule to be operated by a driver walking or crawling alongside (very handy when advancing under fire).

A clamp on the steering column is undone, and the column folds back, so that when the vehicle is in reverse the driver can operate the controls in the "basket" and steer at the same time.

For a final "star turn," the offside front wheel was taken off and the Mule driven around the quarry bed at both fast and slow speeds, straight ahead and in tight turns. The absence of the fourth wheel didn't seem to make the slightest difference.

On level ground it is even possible to take off two wheels—say the nearside front and offside rear—and drive on the remaining pair! But the condition of the quarry bed made such experiments inadvisable.

### Whoa, Mule . . . Please!

When the show was over, we were invited to try our hands at "Muleskinning," too.

First impression, of course, is "Jeepish." Clutch action is similar to a very early Austin 7—but once you get under way, all similarity ends.

The thing which strikes you most is



the 100 percent visibility from the forward driving position. With no windscreen pillars, bonnet, mudguards or wheels in front of you it's possible to glance down at the sides and place the wheels exactly where you want them.

First gear, low ratio, is governed to one m.p.h., and top-gear, high ratio is said to give up to 30 m.p.h. on a smooth road. Needless to say, we had no opportunity to check the maximum speed claim in that quarry.

The ground clearance of 11½ in. guarantees unimpeded progress over the roughest ground. But, brother, does this Mule buck!

I've never ridden a camel—but from what I hear of it, that's the animal the Mule should be called after, when it comes to riding comfort.

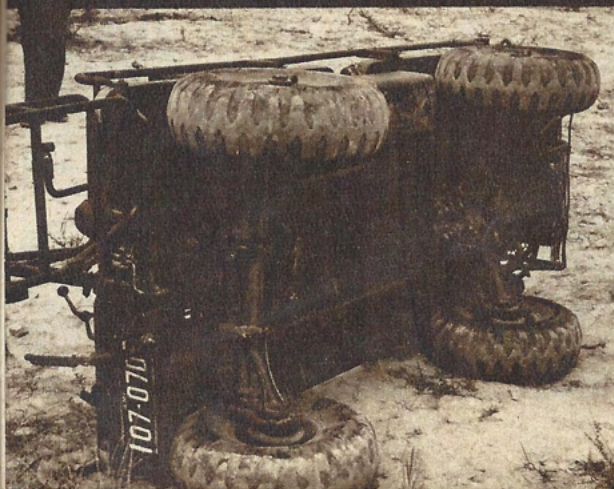
### Varied Uses

We would say that the Mule's Army career should be very successful—for where it would normally take about 18 men to transport 1000lb. of ammunition, one man and a Mule will do it. And as a stretcher-bearer, one Mule will save the work of 16 men.

Another use which the U.S. Army has found for the Mule is carrying

*(Continued on page 80)*

**TO SERVICE**, you just tip the Mule on its side; everything, including engine, is below.



**CONTROLS** swing out so vehicle can be driven while walking or crawling behind — handy if advancing under fire.



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### COMPARATIVE DATA

Accel. thru gear	STANDARD	OXENFORD
0-30 m.p.h.	6.4 secs.	4.3 secs.
0-40 "	10.3 "	6.4 "
0-50 "	15.8 "	8.5 "

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as expected, still giving an amazing 32.4 m.p.g. in overdrive and 29.5 in normal top at a steady 30 m.p.h.

But this time our goal was performance rather than economy. Having been affected by 5000 miles of over-lean running?

It had. Just as the stomach of a long-starved man refuses to digest properly, the Wolseley's engine had lost its ability to make full use of a normal supply of fuel.

Normally the 6/99 is capable of topping 100 m.p.h. in both normal and O/D top—but this one barely made 85; and O/D second peaked at 85 m.p.h. instead of its customary maximum of about 91 (the normal figures quoted here were obtained on actual road tests—they aren't mere factory claims).

The standing quarter-mile figures of 21sec. in normal top and 22sec. in overdrive were also below par.

If we quote them here at all, it's only to provide a comparison with the supplementary test that will follow as soon as the car is ready. So, as far as actual performance goes, reserve your judgment until then.

But we can deal here with such things as roadholding and braking.

On our private horror stretch of corrugated, potholed road the 6/99 acquitted itself well, holding the road safely at speeds up to 70 m.p.h. and answering promptly to correction when necessary.

The suspension system did the job efficiently if a little noisily. Steering seems to be about neutral up to 30 m.p.h. or so but tends to oversteer at higher speeds—a characteristic often found in big modern cars.

The combination of disc and drum stoppers worked extremely well: stopping distances were 31ft. from 30 m.p.h. and 168ft. from 60.

The ride was smooth and comfortable at all times. For long, fast country trips, the Wolseley 6/99 would be hard to beat, leaving you fresh and relaxed at the end of a long day's run.

But it's one of the few cars I would prefer to drive with an automatic transmission rather than with overdrive. There's too much fiddling with toggles and switches for my liking.

Automation is available, of course—at £2265 including tax, as against £2150 for the manual model. ●●●

## WHOA, MULE!

(Continued from page 29)

and operating their 106mm. recoilless rifle. The Mule's low silhouette and incredible manoeuvrability make it particularly suitable for this.

Even the Air Force is thinking of starting a Mule stable now, to simplify the loading of heavy transport planes such as the Hercules.

The Australian Army is only testing the Mules at present, of course—but if the price is right, we're tipping there will be vast herds of Mules soon in the country.

But what of commercial uses?

There seems little likelihood of the Mules being released for civilian purposes for quite a while; but when they are, their uses would be numberless.

For the farmer and grazier, especially those in hilly regions, the Mule could save a lot of work carrying fertilisers, fence-posts, sick stock and farm equipment.

In industry it would be a real Jack-of-all-trades, being used for transport and loading in factories, on construction sites, wharves, and so on.

And its ability to go anywhere would make it invaluable for such work as forestry, prospecting or oil exploration.

There is no doubt the Mule could serve a vast number of purposes in everyday life. The only question is—when will it become available to civilians? ● ● ●

## FLORIDE TEST

(Continued from page 39)

Brakes are 9 in. drums, giving about 86 sq. in. of friction area. I found the pedal pressures on the high side, and although the brakes were fade-free I thought some adjustment was called for (remember, this car had no first-service!).

Engine is an adaptation of the 850c.c. Dauphine Ventoux four-cylinder unit and puts out a useful 40 b.h.p. at 5000 r.p.m. Looking at the lovely car, one rather expects it to be a 1500c.c., 100 m.p.h. sports coupe—but you must not lose sight of the fact that it's propelled by only 0.85' of a litre.

Engine differences are a new camshaft with modified valve timing, improved porting with larger inlet valves, and a Solex downdraught carburettor. Compression ratio is 8 to 1, and maximum torque of 48lb./ft. is developed at 3300 revs.

At a kerb weight of 16wt., the Floride is 100wt. heavier than the Dauphine—but the ten extra horses and four-speed box enable the newcomer to leave its more mundane sister for dead.

The box, incidentally, is an all-indirect type, and top is very slightly "underdrive" at 1.03 to 1.

With a 4.375 to 1 rear end, the overall gearing produces the following road speeds per 1000 revs.: 1st, 41.3 m.p.h.; 2nd, 8.8; 3rd, 10.8; top, 13.3.

A three-speed box is optional in France, but here Renault are wisely

standardising on the four-speed version.

This box is apparently not the Godini-designed unit about which some overseas scribes have enthused. At least, I wasn't so keen on its long, indefinite movements and the nearness of reverse to second. Another disappointment was the position of the slender lever—just too far forward to allow the driver to swap cogs without leaving a bit.

The long, shapely bonnet houses the battery and reservoirs for the brake master-cylinder and screen-washers. The generous luggage space (8.4 cu. ft.) is unencumbered by the spare, which lies in its own compartment under the floor and is reached by opening the hinged numberplate panel, as on the Dauphine. Attractive mottled carpeting protects the luggage.

There's another 6.8 cu. ft. of stowage at the rear of the Floride's interior, so luggage space is quite exceptional for a car of this type.

Trim and finish are excellent inside. The little golden crowns and witches on the dash may look a bit feminine to the average Aussie male, but the layout is thoroughly practical, with everything in the right place.

Driving position is superb, once you get used to the offset pedals and overlook that forward-placed gear lever. The cloth-covered individual buckets are fully adjustable and shaped to hold you on corners. While I personally like the grip that cloth gives the driver, I imagine leatherette will be later used for the Australian market.

Vision all round is first-class—forward through the large panoramic screen and behind via the smoked rear-view mirror. Tinted sun visors, head and knee padding, heating and demisting, screen-washers—everything there to make driving safe and enjoyable. Instruments, similar to the Dauphine's, are ahead of the well-placed wheel; trafficators, light controls and town and country horn buttons are all at your fingertips on either side of the wheel.

The luggage shelf behind the seats clips back to reveal a bench seat with foam-rubber pad; it's strictly emergency seating for an adult, but comfortable enough for a couple of kids.

### Melbourne-Albury

I knew I was going to enjoy the Floride from the moment I saw her on the stand, balanced on four pylons and surrounded by an admiring crowd. The sleek red body was gleaming, and the red-and-white interior looked Continental and comfortable.

When the Show ended, Serge—a French mechanic with Renault—and I gave the car a hurried check-over. The S.A. numberplates were attached to the car came off a boat in Adelaide) and the critical tyre pressures

checked—14lb. front, 23 rear, to cope with the 40/60 weight distribution. As a precaution, Serge pulled down the cylinder head and reset the tappets, 6 and 8.

It was 11 p.m. when Alan McSwain—Renault's Victorian manager and 15 stone of enthusiastic motorist—and I headed out of Melbourne into the rain for Albury, 137 miles north.

During the "familiarisation" period I noted the rather bad reflection of dashboard lighting on the screen and a tendency to get my left foot momentarily stuck behind the heater unit. I had been warned of the tendency to touch reverse when selecting second from third and had no worries there.

In spite of having been up that morning since 5 a.m. (to fly down from Sydney) and the late hours, the rain and the Melbourne-bound trucks, I enjoyed the run to Albury—the engine freing up all the while—and looked forward to the morrow. Our average to Albury was 55 m.p.h., and consumption worked out at 37.4 m.p.g.

### Albury-Sydney

After a much-needed forty winks, we left Albury at 9.22 a.m. and averaged 61.5 m.p.h. to Holbrook, 58.5 from Holbrook to Tarcutta, and a scorching 70.4 from Tarcutta to Gundagai (28 miles in 24 minutes). Even more astounding, the m.p.g. between Albury and Gundagai was 39.3—an improvement due to the freing-up of the engine, we decided.

The Sunday traffic now began to get heavy and slowed us—but, even so, Gundagai-Yass (54.1 m.p.h.) and Yass-Gulburn (58.9) were respectable averages. The overall m.p.g. rose to 40.3 (Renault claim 41 at an average of 50 m.p.h. with two up).

All this was accomplished almost lazily, neither McSwain nor I feeling any fatigue. The engine was equally fresh, using no oil or water. The features that contributed most to this enjoyable motoring were the silent progress at speed (we cruised at 70/75), the absence of body roll, giving a feeling of security around corners, and the comfortable seating.

The oversteering tendency of the Dauphine is not nearly so apparent in the Floride, which has almost neutral characteristics when cornered fast. The Michelin tyres (standard on these all-imported cars) also deserve praise, particularly in the wet, and their singing on smooth bitumen is far from objectionable to my ears.

The effect of the "Aerostable" suspension isn't really noticeable until you encounter some really rough going, and then the smooth riding is wonderful.

I commented on the concave shape of the Floride's (and the Dauphine's) headlights, and McSwain explained