

# Technique and Tactics with the "Manx"

by GEOFF DUKE



A NUMBER of contributors to this series have already stressed the importance of machine preparation and tailoring the model to fit the rider, and the desirability of well-fitting clothing. I propose, therefore, to restrict my comments largely to riding technique and tactics, with a view to extracting the best possible performance from the power unit at a minimum cost in wear and tear.

Even in modern Grand Prix races of distances exceeding 100 miles, a first-class start is essential, not only to ensure being "in the hunt" from the word go, just in case a spot of slipstreaming is called for, but also to eliminate the inevitable poor effect on one's morale should a bad getaway take place.

A thoroughly warm engine—and I include the contents of the oil tank in this—is necessary to make sure of a first-bump start and to obtain immediately the best performance.

Once on the starting line with your Norton, check that (a) the fuel is turned on; (b) first gear is properly engaged; (c) the engine is turned back-wards against compression; (d) the clutch frees properly. Now, with the front brake applied and your weight pushing against the handlebars, try to anticipate, but not jump, the fall of the flag. Once the flag drops and you are on the move, don't be stampeded into dropping the clutch *too* soon just because someone else's engine has already fired; this will almost certainly result in your engine kicking back when the piston comes up against compression and it may necessitate a complete re-start while the rest of the field disappears into the distance!

Above all, keep the throttle quite shut until the engine is turning over, and then only open the throttle a fraction until the unit bursts into song. The ability to get "on song" immediately the flag falls is a great asset to the rider, but it requires a little restraint at times until one gets the feel of the controls. And, in the case of a long race, don't forget the additional weight of a full fuel tank.

Short-circuit racing does help one to acquire this "quick off the mark" technique, as demonstrated so often by John Surtees, but in the T.T. I don't usually reckon to get down to serious racing until I am clear of Braddan Bridge on the first lap, and again after my pit stop for fuel.

Having made a start, many riders seem to believe that maximum revolutions in every gear will produce the best results. This, however, is a fallacy. Any improvement in lap times, when maximum revs. in the gears

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MOTOR CYCLING'S

SPORTS MACHINE SOUVENIR No. 9



# Thirty Years of Production Racers

Arthur Carroll,  
Norton's designer  
from 1930 to 1935, at  
the drawing-board on  
which some of his-  
tory's most famous  
racing machines were  
conceived.



WITH Alec Bennett's Senior T.T. win in 1927 (at 68½ m.p.h.) on the very first Norton CS1 o.h.c. racer to be built, the stage was set for the production of replicas for sale to the public. This machine had an all-iron 79 mm. x 100 mm. single-cylinder engine and a Sturmey-Archer non-positive-stop footchange gearbox. It was the work of Walter Moore, Bracebridge Street's chief designer of the period.

That renowned craftsman, the late Joe Craig, took over the preparation of "works" racers and the development of all production racing machines in time for the European G.P. of 1929. He continued with this dual task until his retirement in 1955, with a success which has become almost legendary.

For the 1931 season, a re-design was carried out by the late Arthur Carroll, who worked to the same basic engine dimensions. The machine was easily distinguished from its predecessor, and set the fashion for nearly the next three decades by having a bolted-on bottom bevel housing instead of the internally placed drive devised by Walter Moore.

For the production racer programme—with which these notes deal—the CS1 was continued in 1932, but supplemented by a semi-stripped, low-ground-clearance machine with a close-ratio box. Valves, as hitherto, were controlled by coil springs, but

the exhaust port was directed to the right of the front down-tube, instead of to the left as previously. For serious racing this machine of course superseded the CS1. It was christened the "International," a name destined to become increasingly famous over the years.

Two "extras" were listed in 1934—a light-alloy cylinder head, with a 14 mm. plug, and a positive-stop footchange.

A full racing specification for the "International" was prepared for the 1935 season; it included a racing gearbox (no kickstart) of Norton's own manufacture. Positive oil-feed to the cams was specified. Other features then current were the familiar wrap-round oil tank and the black-and-silver décor.

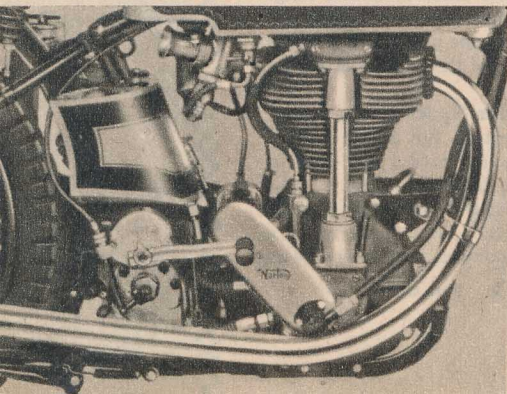
That year Arthur Carroll, whose brilliant design work had done so much for the marque, was killed in a car crash.

For 1936, a light-alloy barrel was made available as an "extra." Though still with girder forks and a rigid rear end for 1937, the "Inter" sported hairpin valve springs.

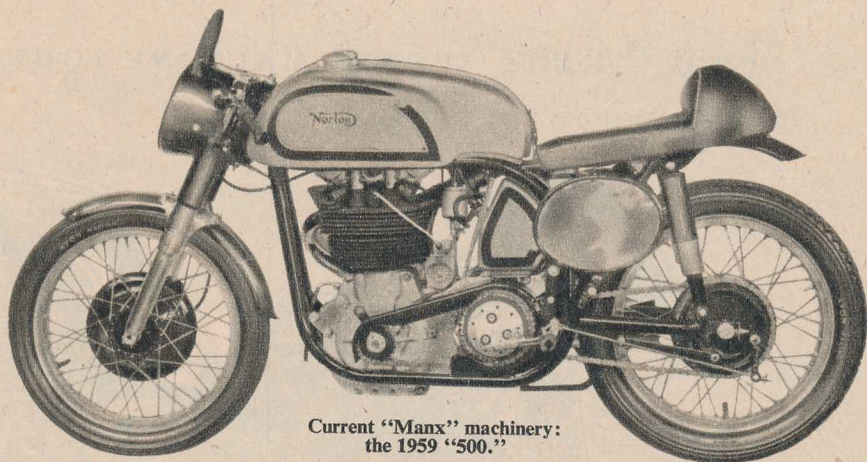
The major changes instituted in 1938 principally concerned the frame. Plunger rear suspension appeared, with rider comfort additionally catered for by the spring saddle and sponge-rubber pad of the era. The production racing engines were built with a 7.5 c.r. and used Norton's proven constant-diameter straight-through exhaust pipe. It is worth noting that a touring "International" was then in production.

Over-the-counter machines for the next year had a megaphone exhaust system and a conical front hub of malleable iron. The war stopped the 1940 catalogue being issued, but it had been produced—and it listed telescopic forks in place of the racing girders.

Light alloy head and barrel were standardized in the post-war design; a 1948 model.







Current "Manx" machinery:  
the 1959 "500."

The "teles" were undamped, except by corrector springs, and were created by the man responsible for much of the pre-war detail design, Edgar Franks.

For the first post-war production racers in 1947, the term "Manx" was coined, prefixed by the pre-war model numbers, 30 and 40 for the "500" and "350" respectively. A touring "Inter" was continued. Standardized were light-alloy head and barrel, plunger rear springing and the "Roadholder" fork—the last-named having hydraulic damping. The cylinder head was adopting its "square" look and sported an RN carburetter instead of the pre-war 10TT9 instrument. The engine was opened out to 79.62 x 100 dimensions to give the maximum capacity of 499 c.c.

In 1950 the production racers retained the plunger frame, but twin o.h. camshafts were introduced. By this time, the tanks and the conical hubs were in light alloy.

After Norton's devastating double 1-2-3 in the 1950 T.T., with their new "Featherbed" frame with its hydraulically-damped swinging-fork rear-suspension, replicas were on sale for the following season. The

"Featherbed" set a fashion which has continued at Bracebridge Street and which many privateers have copied. The first of the new frames were the joint work of designer Rex McCandless and road-tester-racer Artie Bell.

Detail modifications continued until 1954, when the two-leading-shoe front stopper was adopted and the engine was redesigned to become "square" at 86 x 85.6. All the principal parts were altered and the squish head was introduced. The next year the flanged timing-side main bearing was used.

In 1956 the exhaust valve size was reduced, the valve timing modified, a one-piece pipe and megaphone fitted, and the rotating-magnet magneto specified. A weir-type float-chamber was connected to the GP mixing chamber.

More changes followed in 1957, with a new crankpin and sleeved big-end eye, coarser-pitch bevel teeth, larger-bore carburetter, and sodium-cooled inlet and exhaust valves. Last year, the racing version of the A.M.C. gearbox was installed.

Further detail changes are in the offing for the 1959 machines, work on which will soon be in hand. They include a Ferodo bonded clutch, with the friction material on the driven plates instead of in disc form and constituting the driving plates as hitherto. A plain inlet valve is reverted to and there is a cam-box alteration at camshaft level, as well as a new method of supporting the vertical shaft at both ends. Instead of using bronze bushes and Oldham couplings, the shaft is to be rigidly supported in races and the couplings, which corrected misalignment, are to be dispensed with. A new pattern of Lucas magneto is to be used.

Present development is in the hands of D. L. Hele, working under the aegis of managing director H. Hopwood.

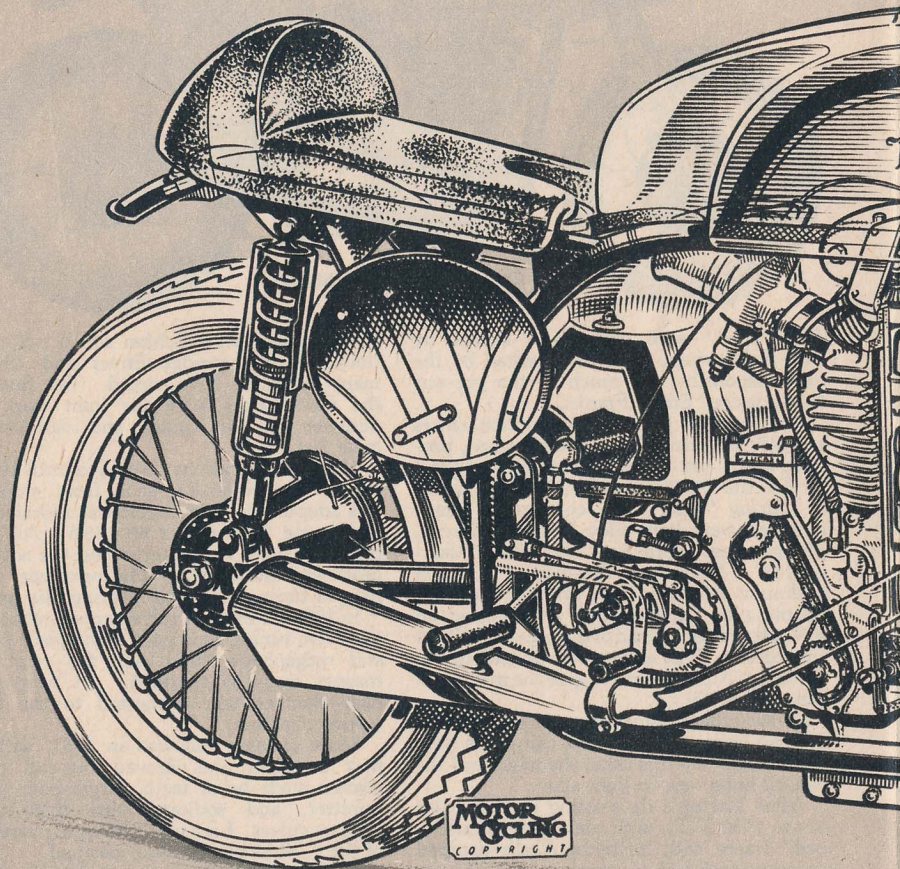


Development engineers both: the late Joe Craig (left) and D. L. Hele.



# MOTOR CYCLING'S SPORTS MACHINE SOUVENIR

© Temple Press Limited (1959)



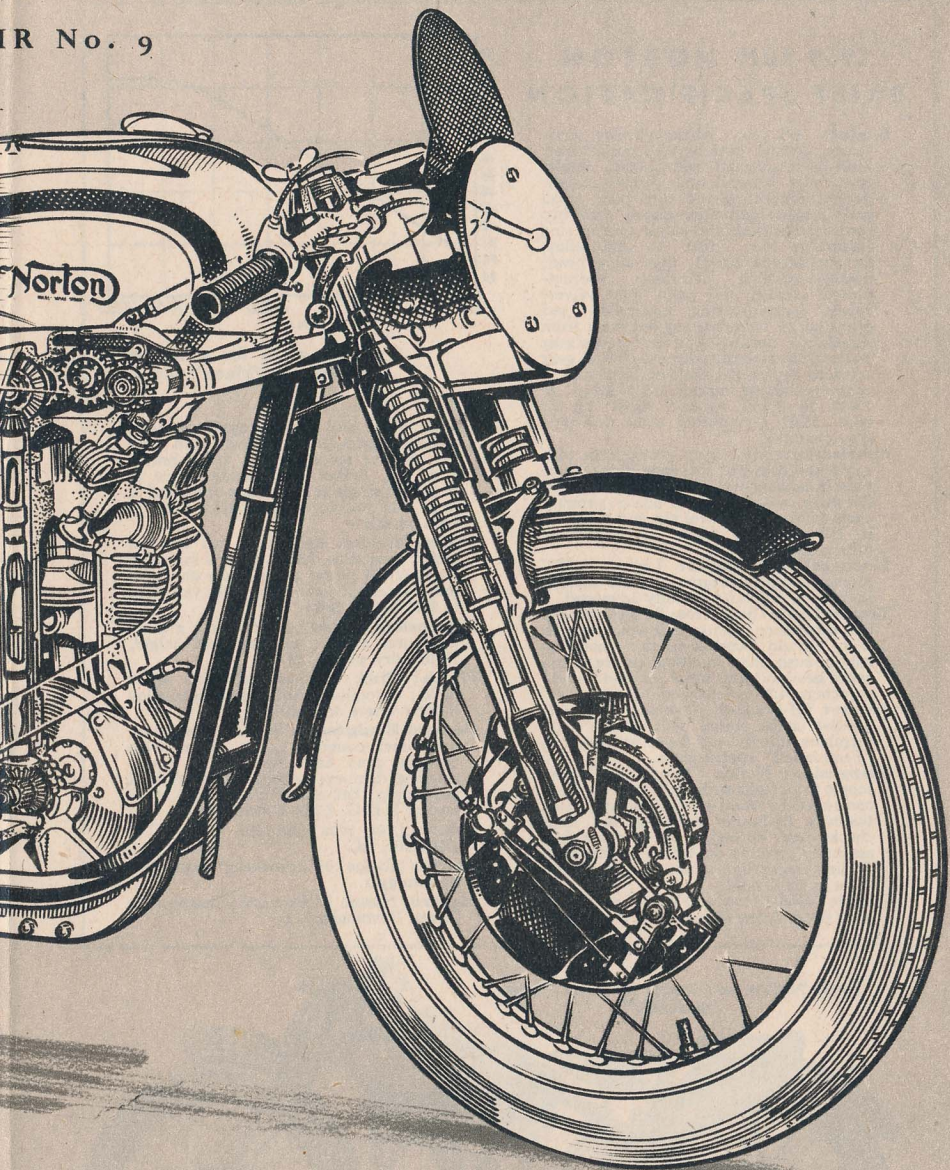
T. D. COLLINS

## The 499 c.c. "Manx" Norton





IR No. 9



on





## 1959 30M NORTON BRIEF SPECIFICATION

**Engine:** 499 c.c. single-cylinder four-stroke; 86 mm. bore by 85.6 mm. stroke; built-up crankshaft with caged, single-row roller big-end and chrome-molybdenum connecting rod with plain small end; forged light-alloy piston with two compression rings and single scraper ring assembly; c.r., 10.1:1; light-alloy, ferrous-sleeved barrel; light-alloy head; magnesium-alloy cam-box; sodium-cooled exhaust and plain inlet valves; valves hairpin-spring controlled and operated by reciprocating followers from double o.h. camshafts driven by spur gear trains from centrally-disposed bevel gear actuated by vertical shaft on right side of engine; claimed output, 50.5 b.h.p. at 7,000 to 7,250 r.p.m.; Amal  $1\frac{1}{8}$ -in. bore 5GP carburetter with weir-type float-chamber.

**Lubrication:** Triple spur gear pumps with sump and cam-box scavenge lines; gauze filter in tank on outlet line and pressurized felt filter on outlet side of pump; primary chain oiler with control tap and reservoir in left-hand top frame tube; gearbox lubrication by splash.

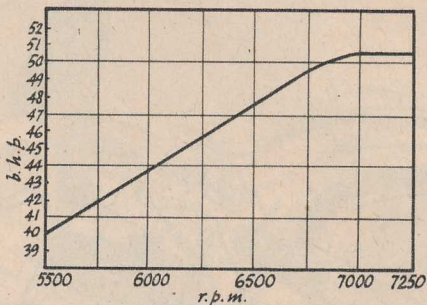
**Electrical Equipment:** Lucas 2MTT rotating-magnet magneto, chain driven; ignition at 35° b.t.d.c., fully advanced.

**Transmission:** Single-row Renold primary and secondary chains; multi-plate clutch with Ferodo bonded friction material; rubber cush drive in clutch centre; four-speed gearbox; gear ratios on 23-42-19-44 sprockets, 4.2, 4.6, 5.6 and 7.5:1.

**Frame:** Sif-bronzed Reynolds 531 steel tubular cradle frame with duplex main members, integral sub-frame and made to "Featherbed" specification.

**Suspension:** Norton "Roadholder" telescopic front forks with  $4\frac{1}{2}$  in. of movement controlled by multi-rate coil springs with two-way hydraulic damping and limit checks; rear springing by swinging-fork assembly pivoting on bronze bushes with Girling suspension units; spindle adjustment by draw bolts.

**Wheels:** WM-1 front and WM-2 rear light-alloy rims; Avon racing tyres, 3.00-in. by



Output graph for a typical 1959 499 c.c. "Manx" motor.

19-in. front and 3.50-in. by 19-in. rear; conical magnesium-alloy hubs with cast-iron liners; air scoop on front brake; 8-in. dia. brakes, twin leading-shoe at front and single at rear, cable operation to front and rod to rear; security bolts in both wheels.

**Tanks:** Welded, light-alloy fuel and oil tanks; capacities, fuel 5 gal., oil (working capacity) 7 $\frac{1}{2}$  pints; gauze filters on outlet lines; aeration tower in oil tank; vent pipe in fuel and oil tanks.

**Dimensions:** Wheelbase, 55 $\frac{1}{2}$  in.; ground clearance, 5 $\frac{1}{2}$  in.; unladen seat height, 29 in.; dry weight, 313 lb.

**Finish:** Black stove-enamel with silver tanks; chromium-plating and light-alloy buffing where appropriate.

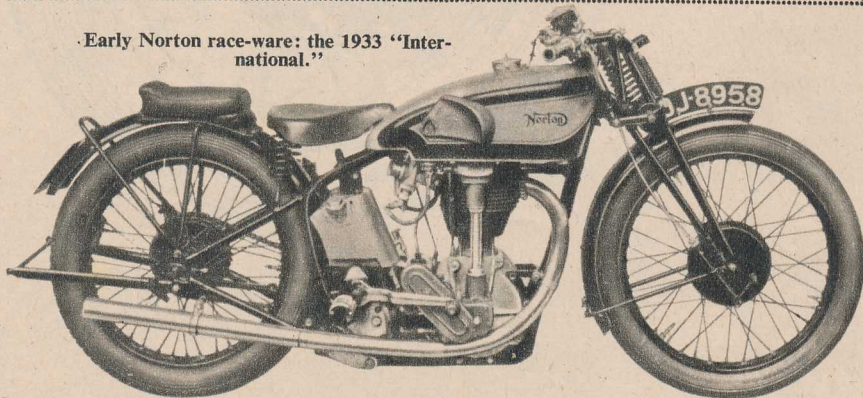
**General Equipment:** Special tools; magnetic rev. counter; comp. plates with built-in cowl and flyscreen at front; steering damper; sponge-rubber-padded tank strap; ball-ended clutch and brake levers; K.L.G. E258-2 racing plug.

**Price:** £398 plus £98 10s. 1d. P.T. = £496 10s. 1d.

**Extras:** Range of sprockets; extra low bottom gear.

**Makers:** Norton Motors Ltd., Bracebridge Street, Birmingham, 6.

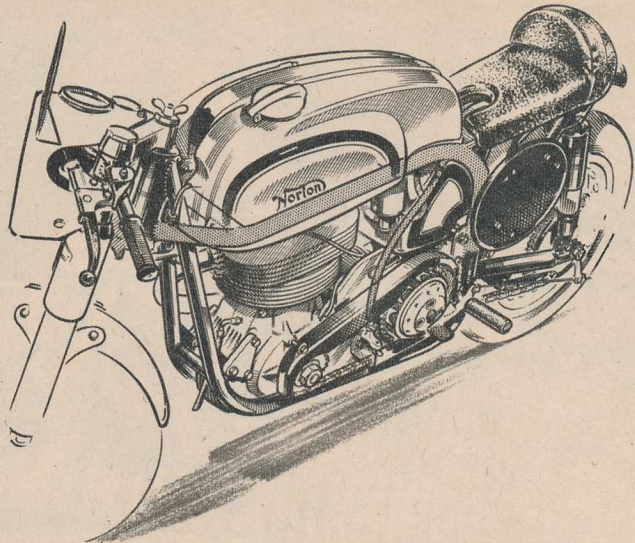
Early Norton race-ware: the 1933 "International."



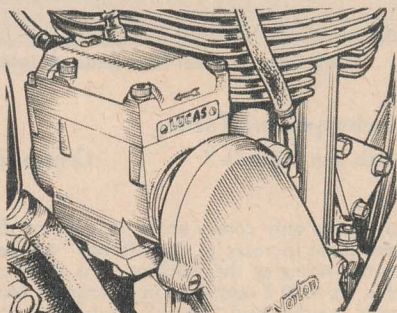
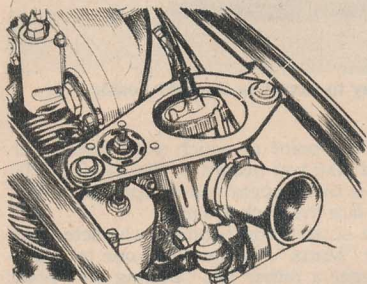


# IN DETAIL

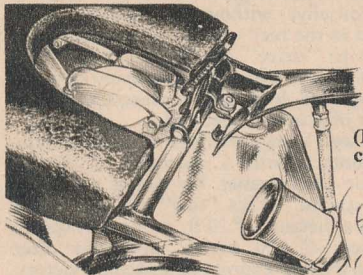
(Right) Lubricant for the primary chain-oiler is carried in the left top frame tube (shown tinted.)



(Below) The pendant weir-type float-bowl is suspended from a bracket uniting the two top frame tubes.

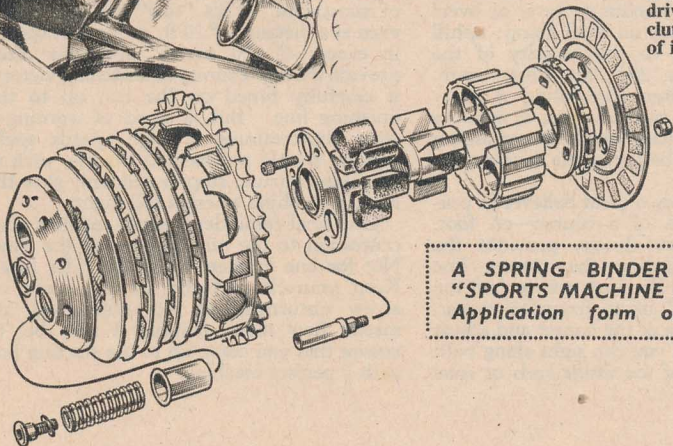


A development of the Lucas rotating-magnet magneto is to be used this season.



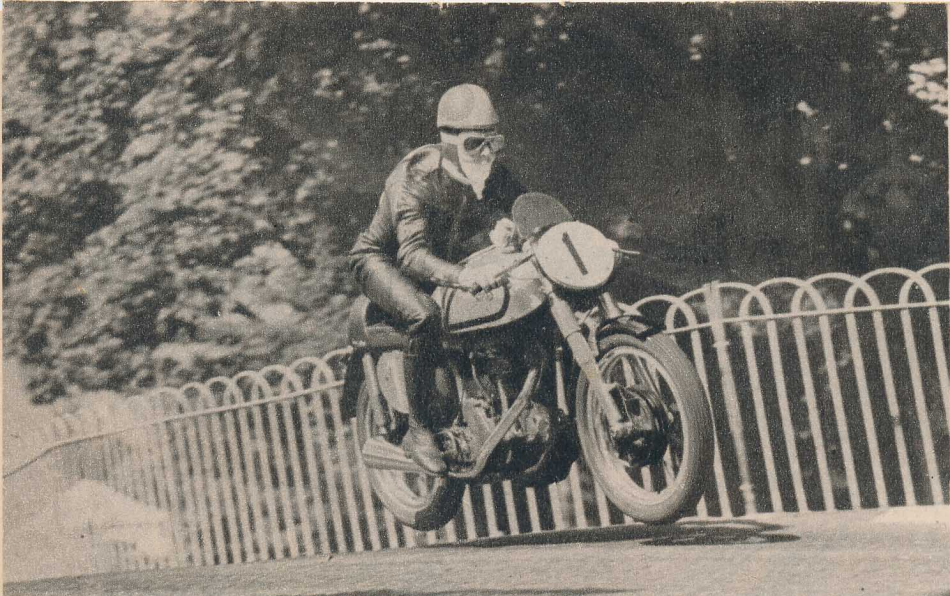
(Left) The oil tank filler cap is located in a recess in the racing seat.

(Left) By bonding the friction pads to the driven plates, the 1959 clutch avoids the use of inserts in the clutch sprocket.



A SPRING BINDER FOR YOUR  
"SPORTS MACHINE SOUVENIRS"  
Application form on page 331





Geoff Duke (Norton) leaps Ballaugh Bridge on his way to victory in the 1951 Senior T.T.

## Technique and Tactics with the "Manx"

*Continued*

are used, only comes about because of the inevitable increase in the "frenzy" applied to the riding of the machine. As proof of this, in 1950 I took part in a series of tests with "works" and "Manx" machines at the Motor Industries Research Association proving ground. In spite of the vastly different power characteristics of the then long-stroke "Manx" unit and the Craig motor, I was able to lap consistently faster, changing gear at a tachometer reading of some 300-400 r.p.m. below the point of maximum power on the test bench, than I could when using maximum revs. or over! This, of course, was on level going; uphill terrain, according to the severity of the gradient, requires 200-300 more r.p.m. Provided that, after completing a gear-change, the engine can still cover as much as 600 r.p.m. and remain within its maximum torque range, the best possible acceleration will be achieved.

I have always been a great believer in pre-practice inspection of a course—on foot. This, among other things, provides the opportunity of finding the correct line through a corner. For instance, to find the true "riding apex" of an irregular corner, stand at the outside of the corner and adjust your position until you can sight along both straight portions of the *inside* kerb or road

edge; the point at which your racing line should take you nearest to the inside of the curve is then approximately opposite to you if you face the track squarely.

The outstanding handling characteristics of the "Manx" Norton allow one to use to advantage a rather late "peeling off" point in the treatment of medium and low-speed corners. This requires maximum angle of lean initially, without the power being applied to the rear wheel, and then the rider is able to "drive" out of the corner at a shallow angle, with a progressively decreasing angle of lean and, consequently, less danger of a rear-wheel slide.

It is well known that one can often maintain contact with a machine of slightly superior performance by taking advantage of slipstream. This "tow" can be helpful even at a distance of 20 ft. or more at speeds in excess of 100 m.p.h., and may often provide the opportunity of snatching victory, if carefully timed on the run up to the finishing line. But, a word of warning—close slipstreaming at high speeds spells disaster should unexpected trouble, such as an engine seizure, stop or suddenly slow the leading machine when in full flight.

One final reminder: racing requires concentration to the nth degree—all the time. Not for one moment must the rider relax. Keep yourself perfectly fit and leave no screw unturned, no nut untouched, no matter how much trouble it may be, to ensure that you come up to the starting line with a perfect machine.