

Norton

Riders Manual

for
COMMANDO

850 **MK. III**
motor cycles

from
Engine No. 325001
Frame No. F125001

This handbook is designed to enable the owner to get the best out of his NORTON motorcycle. Your nearest Norton dealer will be ready to help with service and advice.



500 MILE (800 Km)

FREE SERVICE COUPON

This Coupon is valid only for Norton Motorcycle

Engine/Frame number.....

Registration (Licence) number.....

Model..... Date of Purchase.....

Owners Name.....

Address.....

.....

.....

.....

SERVICE VOUCHER BOOKLET NUMBER.....

Selling Dealers Name (or Trading Title)

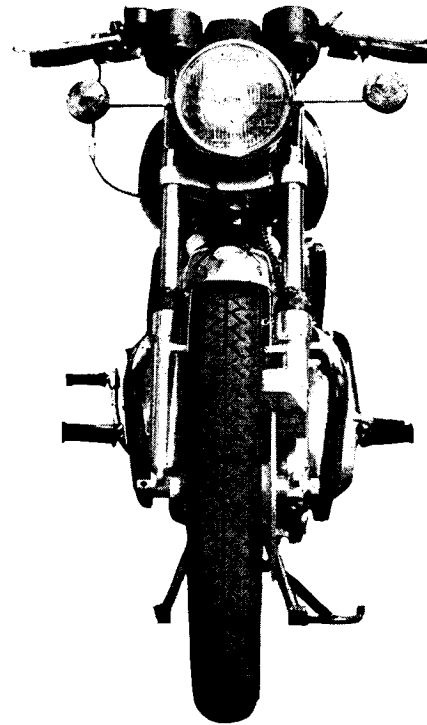
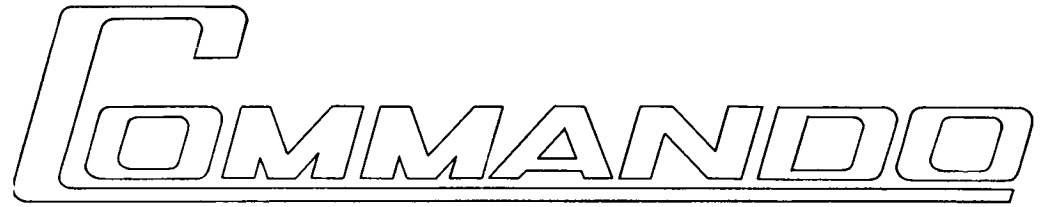
Address (Stamp)

.....
.....
.....
.....
.....

CUSTOMER TO NOTE

The above details must be fully completed by the Selling Dealer at the time of original sale of the motorcycle to validate this voucher certificate.

The dealer undertaking the 500 mile (800 Km) service must complete the details requested overleaf, detach and return to the distributor for registration and appropriate action.



**Norton
Riders manual**

**850 MK. III
models**

© copyright, 1975
Norton Triumph International Ltd.
Mackadown Lane,
Kitts Green, Birmingham B33 0LF
England.

Printed in England
Part Number 066240

Free Service Coupon

CERTIFICATE OF COMPLETION

To be returned to the distributor by the Norton franchised dealer undertaking the 500 mile (800 Km) service.

I certify that I have carried out the inspection and 500 mile (800 Km) service in respect of the machine detailed overleaf, free of charge to the owner, and in accordance with the factory laid down schedules.

Note:— Oils, grease and materials used are chargeable to the customer.

Name (or Trading Title) of Dealer carrying out service
Address (or stamp)

.....
.....
.....
.....

Signature of Dealer.....
Date of Completion of Service.....
Recorded Speedometer mileage.....

CERTIFICATE

The inspection under the 500 mile (800 Km) free service coupon terms has been carried out to my satisfaction

Owners Signature.....
Date.....

DEALER TO NOTE:

This certificate when completed is valid for any franchised Norton Dealer (worldwide) — not making the original sale — in respect of reimbursement for labour in accordance with the laid down schedules (agreed 2 hours for this service) when duly completed and certified as required, and submitted to the distributor.

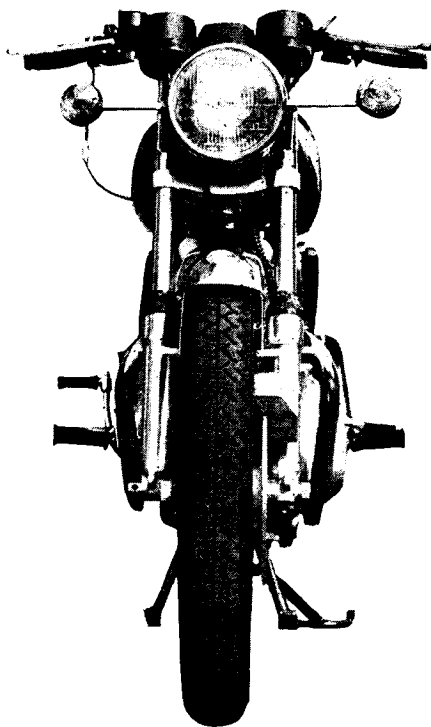
Validity and submission of this certificate duly completed to the distributor is also required where the 500 mile (800 Km) service is completed by the original selling dealer, to validate and confirm the warranty cover on the motorcycle, and to initiate dealer credit in territories where such arrangements form part of the franchise agreements

To avoid delays please do not attempt to communicate with either distributor or factory without quoting engine number

CAUTION

Modification of the frame, steering mechanism, suspension system or wheels on a Norton motorcycle may alter its handling characteristics and render it unsafe in normal use.

COMMANDO



Norton Riders manual

**850 MK. III
models**

© copyright, 1975
Norton Triumph International Ltd.
Mackadown Lane,
Kitts Green, Birmingham B33 0LF
England.

Printed in England
Part Number 066240

INDEX

INTRODUCTION AND TECHNICAL DATA	3/4/5
PUTTING YOUR NEW MOTORCYCLE INTO SERVICE	
Breaking In	15
Controls and Instruments—Description	12/13/14
Controls and Instruments—Layout	8
Driving Hints	14
Taking Over a New Motorcycle	9
MAINTENANCE, SERVICE, AND WARRANTY INFORMATION	
Free Service	16
Routine Maintenance	17/18
Warranty Information	16
LUBRICATION	
Checking Oil Levels	9/10
Engine Oil Changing	18
Gearbox and Primary Chaincase Oil Changing	19
Lubrication Chart	7
Lubricants Recommended	6
Oil Filters	19
Rear Chain Lubrication	20
POWER UNIT	
Carburetor Adjustment	29
Clutch Adjustment	28
Engine and Ignition System	21/24
Primary Chain Adjustment	26
SUSPENSION	
Front Forks	20/27
Rear Suspension	27
WHEELS AND BRAKES	
Brake Adjustment	33
Disc Brake	11/33-34
Wheel Removal	31/32
ELECTRICAL DATA	
Battery	10
Electrical Equipment	35/36
Light Bulbs	37
TRACING TROUBLES	
Rectification Charts	38/39

INTRODUCTION

The Norton Commando 850 is designed and built to offer the modern knowledgeable rider a unique experience in safe, high-performance motor-cycling. Its designed-in virtues of high torque and smooth power delivery, stable precise handling and powerful fade-free braking combine to give a level of performance unmatched by any other high-speed roadster or sports tourer.

This motorcycle has been designed with robust, modern features and components. Along with materials chosen for their quality and suitability, this ensures a built-in ruggedness that, with care, will result in a long and useful service life. The well-proven Norton parallel twin engine and the revolutionary Iso-elastic power unit suspension system combine to offer this unequalled performance while retaining the advantages of smooth engine response with complete freedom from vibration.

To take full advantage of the performance offered by this motorcycle, it is essential that certain routine maintenance be performed to keep all parts in peak condition. Greatest effort has been put into ensuring that this maintenance is minimal, simple, and well within the capabilities of the owner.

This Handbook provides general details

Norton Villiers Triumph reserves the right to vary the specification of all motorcycles and spare parts without notice and this information does not therefore constitute a term of any sale. All descriptions and claims are given and made in good faith but are intended to apply generally and variations in performance and construction of individual machines may occur. In particular, performance will be affected by conditions circumstances and the rider.

for operating and maintaining the motorcycle, and these instructions should be followed carefully to allow the rider to get the best service from the motorcycle. For additional information about use or service, consult your Norton dealer.

This Handbook is intentionally simple to provide a handy week-to-week guide. More detailed information on dismantling or major overhauls will be found in the Norton Commando 850 Workshop Manual, available through your dealer.

Use only genuine Norton replacement parts (parts manufactured or approved by Norton Villiers Triumph Limited) when parts are needed.

When ordering parts or requesting service information from your dealer or distributor, always quote your engine number to ensure correct identification.

Technical Data

Engine number: Stamped on crankcase.
Gearbox number: Stamped on gearbox shell.

Frame number: Stamped on frame head lug.

Engine

Bore: 3.03 in. (77 mm).
Stroke: 3.50 in. (89 mm).
Capacity: 50.5 cu. in. (828 cc).
Compression Ratio: 8.5 : 1.
Peak Power RPM: 5800.

Rocker clearances (cold).
Inlet: 0.006 in. (0.15 mm).
Exhaust: 0.008 in. (0.2 mm).
WARNING:
DO NOT EXCEED 7,000 RPM.

Electrical

Ignition timing BTDC:
Fully advanced: 28°
Contact breaker points gap:
0.014/0.016 in. (0.35/0.4 mm).

Spark plug: Champion N7Y
Spark plug gap:
0.023-0.028 in. (0.59-0.72 mm).

Gear ratios

Engine sprocket: 26 teeth.
Clutch sprocket: 57 teeth.
Primary ratio: 2.19 : 1.
Gearbox sprocket: 20T USA/Canada
22T except USA/Canada
Rear wheel sprocket: 42 teeth.

Overall gear ratios	22T	20T
Top:	4.185:1	4.60
Third:	5.10:1	5.57
Second:	6.84:1	7.83
First:	10.71:1	11.79

Chain sizes

Primary: $\frac{3}{8}$ in. Triple row (92 pitches).

Rear: $\frac{5}{8}$ in. by $\frac{3}{8}$ in. (100 Pitches.)
(99 pitches with 20 tooth sprocket)

Capacities

Oil tank: 5 Imp (6 US) pints 2.8 litres
Gearbox: 7.5 Imp (9 US) pints 4.2 litres
Front Forks: 150 cc. (5 fl. oz.) each leg
Primary Chaincase: 200 cc. (7 fl. oz.)

Fuel tank:
Roadster 2.50 Imp (3 US) gallons 11 litres
Interstate 5.25 Imp (6.3 US) gallons 23.87 litres
Interpol 4 Imp (4.8 US) gallons 18.16 litres
Hi-Rider 2 Imp (2.3 US) gallons 9.1 litres

Carburetors

Type: Amal 932 (dual). 32 mm.
Main jet: 230.
Throttle valve: 3 $\frac{1}{2}$.
Choke tube: 928/107.

Needle jet: 106.
Needle: 928/104.
Needle position: Lowest notch.

Dimensions

Overall length: 87 $\frac{1}{2}$ in. (221 cm).
Overall width: 26 in. (65 cm).
Ground clearance: 6 in. (15 cm).
Weight: 415-430 lb (189-196 Kg).
dependent on specification.

Wheelbase: 56 $\frac{3}{4}$ in. (144 cm).
Seat height (rider seated):
31 in. (78 cm).

Tires

Front: 4.10 x 19 Dunlop "TT 100" or Avon GP. or 3.50 x 19 Dunlop Ribbed
Rear: 4.10 by 19in. Dunlop "TT 100" or Avon GP.
Wheel rims: WM 2 by 19 in.
Tire pressures: (Nominal).
Front: 24 psi. (1.7 Kg/cm) both tire sizes.
Rear: 26 psi. (1.8 Kg/cm).
For alternative load/pressure figures, see your Norton dealer.

Note

Do not fit tires other than the stated types and sizes or the handling of the machine may be adversely affected.

Larger section tires may also foul the mudguards (fenders) and stays.

Efficient lubrication is of vital importance and it is false economy to use cheap grades of oil. When buying oils or grease it is advisable to specify the brand as well as the grade and, as an additional precaution, to buy from sealed containers.

Lubricants Recommended

UNIT	ENGINE	PRIMARY CHAINCASE	GEARBOX	HUBS AND FRAME PARTS	FRONT FORKS	REAR CHAIN	EASING RUSTED PARTS
Castrol	Castrol HD40 Castrol GTX or Castrol GTX	Castrol GTX	Castrol Hypo	Castrol LM Grease	Castrolite 10W/30	Castrol Graphited Grease	Castrol Penetrating Oil
Mobil	Mobiloil 40 or Mobil Super Mobiloil 20W/50	Mobil Super Mobiloil 20W/50	Mobilube HD90	Mobilgrease MP or Mobilgrease Super	Mobiloil Super	Mobilgrease MP or Mobilgrease Super	Mobil Spring Oil or Mobil Handy Oil
Esso	Unifilo or Esso Extra Motor Oil 20W/50	Esso Unifilo	Esso Gear Oil GX90/140	Esso Multipurpose Grease H	Esso Unifilo	Esso MP Grease Moly	Esso Penetrating Oil
Texaco	Havoline SAE40 or Havoline 20W/50	Havoline Motor Oil 20W/50	Multigrar Lubricant EP90	Marfak All-Purpose Grease	Havoline Motor Oil 10 w / 30	Marfak All-Purpose Grease	Graphited Penetrating Oil
Duckhams	Flectol HDX40 or Duckhams Q20/50	Duckhams Q20/50	Duckhams Hypoid 90	Duckhams LB10 Grease	Duckhams Q5500	Duckhams Changuard	Duckhams Appenal Penetrating Oil
Filtrate	Filtrate Racing 40 or Filtrate Super 20W/50	Filtrate Super 20W/50	Filtrate EP90	Filtrate Super Lithium Grease	Filtrate AT Fluid F	Filtrate Linklyte	Filtrate P00
Gulf	Gulf Formula G40 or Gulf Multi-G 20W/50	Gulf Multi-G 20W/50	Gulf Multi-purpose Gear Lubricant 90	Gulfcrown Grease No. 2 or Gulflex A	Gulf Multi-G 10W/30	Gulflex Moly	Gulf Penetrating Oil
BP	BP Super Visco-Static 20W/50	BP Super Visco-Static 20W/50	BP Gear Oil SAE 90 EP	BP Energrease L2	BP Super Visco-Static 10W/40	BP Energrease AG	BP Penetrating Oil
Shell	Shell Super Motor Oil	Shell Super Motor Oil	Shell Spirax 90 EP	Shell-Relimax A or CG	Shell Super Motor Oil	Shell-Relimax A or CD	Shell Easing Oil

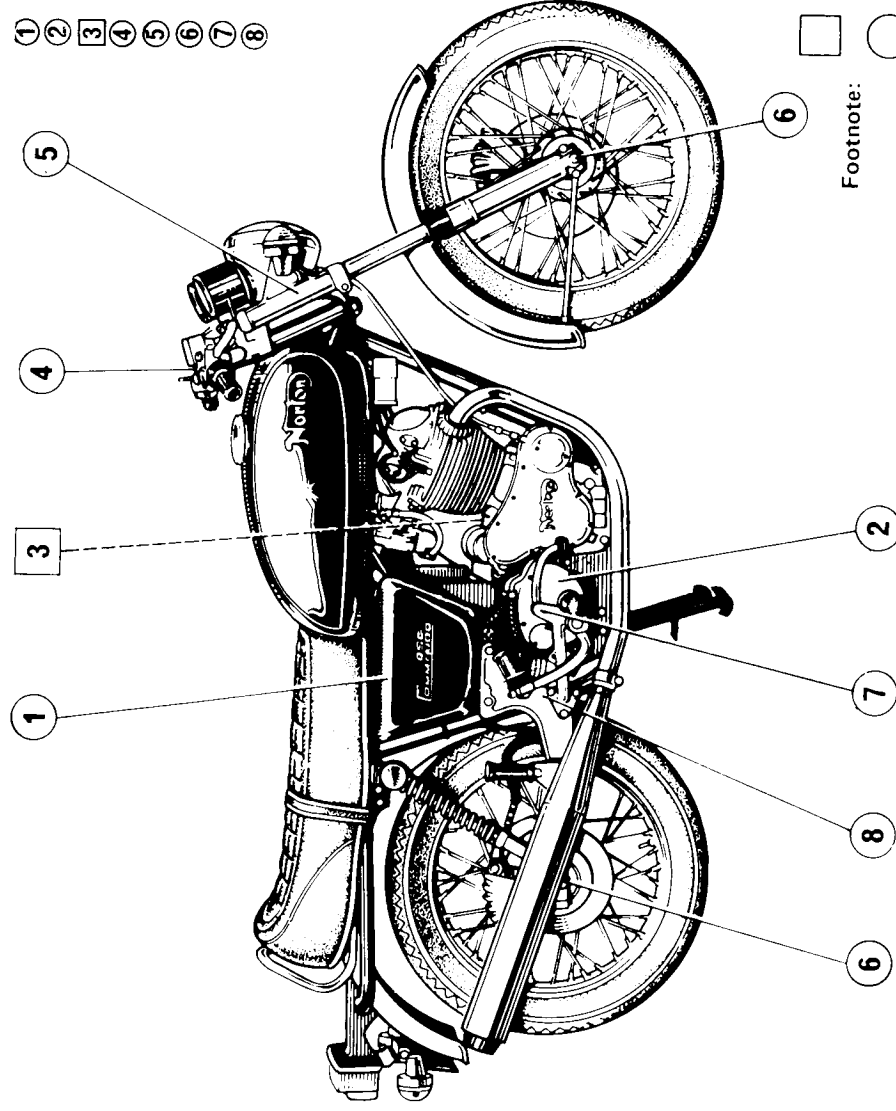
LUBRICANTS RECOMMENDED

The engine lubricants recommended above are suitable for all operating temperatures above 0°C (32°F). For ambient temperatures above 32°C (90°F) HD50 monograde engine oils are recommended. Approval is given to companies other than those listed, provided they have similar grade characteristics and meet API service SD/SE performance.

* NO SUITABLE MONOGRADE AVAILABLE

Lubrication chart

- 1 ENGINE OIL TANK
- 2 GEARBOX
- 3 PRIMARY CHAINCASE
- 4 CONTROL CABLES
- 5 TELESCOPIC FORK
- 6 WHEEL HUBS
- 7 BRAKE PEDAL PIVOT
- 8 OIL FILTER



□ DENOTES LUBE POINTS ON LEFT SIDE OF MOTORCYCLE

○ DENOTES LUBE POINTS ON RIGHT SIDE OF MOTORCYCLE

Footnote:

ILLUSTRATION 1

Controls

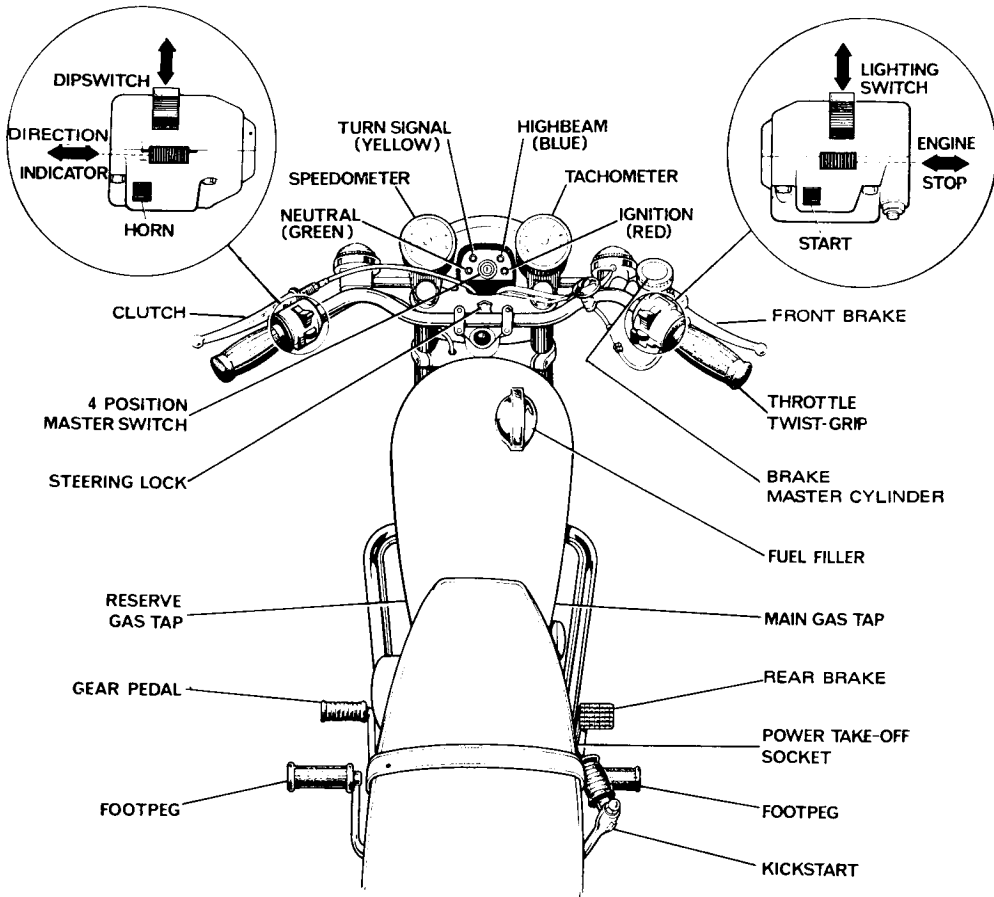


ILLUSTRATION 2

Taking over a new motorcycle

Before running the engine, spend a few minutes going over the layout of the controls and instruments. Sit astride the motorcycle and adjust the control levers and handlebars to give the most comfortable riding position. Make sure that the oil tank, gearbox and primary chaincase are filled to the correct levels and that the battery is topped up. Check the disc brake master cylinder reservoir levels and top up, if necessary, using Lockheed series 329 brake fluid to USA DOT 3 specification.

Normally these preparations will be carried out by the dealer. The manner in which the various levels are indicated is described below.

Engine oil tank

The oil tank content is indicated on a dip stick incorporated in the tank filler cap which is removed by turning the cap anti-clockwise.

Access to the oil tank filler cap is gained by releasing the right side seat knob and seat lock and raising the seat on its hinge.

Before filling fresh oil, run the engine for three to four minutes to return excess oil from the crankcase, observing the oil circulating through the oil tank filler orifice.

Allow the oil to settle in the tank, then fill sufficient oil of a recommended grade until the correct oil level is shown on the dipstick. It is important that the oil is kept at the correct level. If the level falls below the "L" mark, serious engine damage will occur; if the oil is above the "H" mark, oil may pass into the airbox and foul the air filter.

Gearbox

An oil level plug is fitted in the gearbox cover. (*Illustration 3*).

To check level, remove plug (*Illustration 3 item B*) whereupon oil should seep gently out if level is correct. If topping up is necessary, remove the filler cap (*Illustration 3, item C*) and replenish with correct grade of oil until the oil begins to seep from the level plug orifice. Replace the filler cap and the level plug.

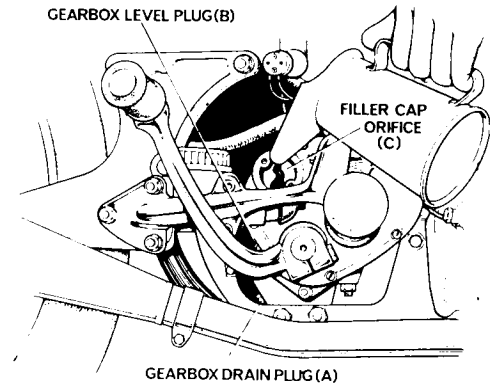


ILLUSTRATION 3

Primary chaincase

An oil level plug is fitted in the primary chaincase outer cover. (Illustration 4, item B).

To check level, remove plug (Illustration 4, item B) whereupon oil should seep gently out if level is correct. If topping up is necessary, remove the filler cap (Illustration 4, item A) and replenish with correct grade of oil until the oil begins to seep from the level plug orifice. Replace the filler cap and the level plug.

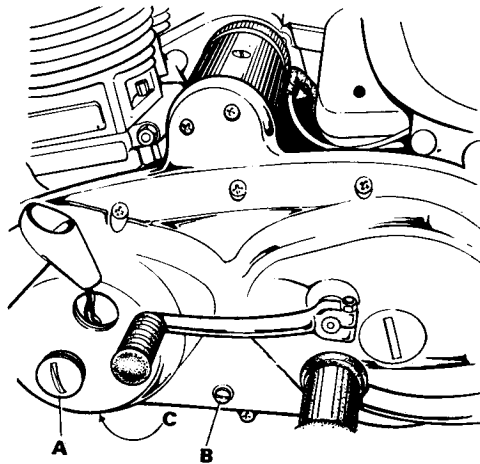


ILLUSTRATION 4

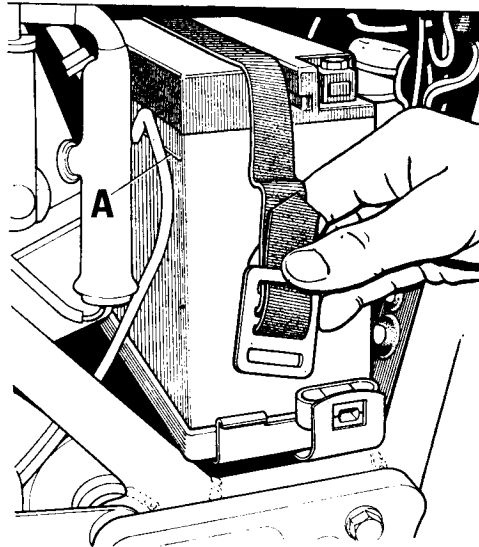


ILLUSTRATION 5

Battery

For access to the battery, remove the left side cover by giving one half turn on the slotted fastener at the bottom of the left side cover using a coin or similar object, lifting the seat on its hinge then removing the panel up and forwards clear of the locating pegs.

To remove the battery, pull down on the battery strap buckle to disengage it from the battery carrier hook. (Illustration 5). Disconnect the heavy duty starter lead and red lead from the "+" terminal and the brown/Blue lead from the "-" terminal on the battery. Slide the vent pipe clear. Lift out the battery, taking care not to spill acid.

When refitting, turn the battery so that the terminals are towards the rear of the motorcycle. If the tension on the battery strap is insufficient, the strap can be tightened through the buckle before the buckle is hooked on to the battery tray. The electrolyte level can be seen embossed on the battery casing without removal. Fill to between the upper and lower level marks.



ILLUSTRATION 6

Disc brakes

The disc brakes are hydraulically operated. Before taking the motorcycle on the road for the first time ensure that the master cylinder reservoir contains the correct amount of fluid.

Each master cylinder contains a flexible diaphragm seal which fits into the reservoir over the fluid. DO NOT FILL THIS. Lift the diaphragm seal out (Illustration 7) and lay on the upturned cap so that dirt does not adhere. Check that the fluid is to a level of $\frac{1}{2}$ in. from the top of the reservoir and if necessary, correct the level using the recommended hydraulic fluid. Where the plain wall type of seal illustrated is fitted, collapse the diaphragm seal as shown (Illustration 6), replace the seal closed end downwards then refit the cap tightly. Where the seal is of the "bellows" configuration it is unnecessary to collapse this when fitting but the cap must still be refitted tightly.

Hydraulic brake fluid absorbs moisture and it is most important to keep the cap on tight and also to store the fluid only in sealed containers. The breather hole in the cap must be kept clear and no dirt or foreign matter must be allowed to enter the system.

Important

Hydraulic brake fluid must be handled with care as it will attack paintwork, certain types of rubber, and plastic.

When "topping up" or refilling the master cylinder reservoirs, use only fluid to U.S. DOT 3 specification, such as Lockheed Series 329 Fluid for Disc Brakes obtainable under Norton part number 063111.

Tire pressures

The recommended tire pressures of:
24 psi. (1.7 Kg/cm) front
26 psi. (1.8 Kg/cm) rear
may be increased to cope with maximum capacity load as below:
28 psi. (2 Kg/cm) front
32 psi. (2.25 Kg/cm) rear.

It is important to maintain correct tire pressures at no more than 3 psi. pressure variation from the above recommendation.

Important

Use of a sidecar

The Commando is not suitable for use with a sidecar, and there is no provision for fitting one.

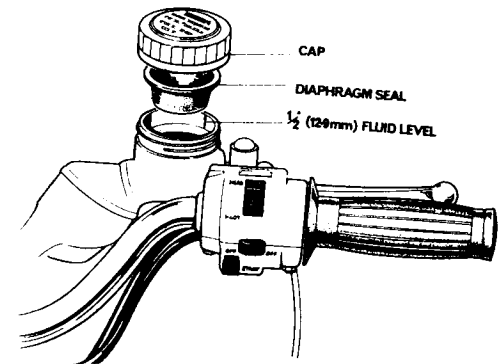


ILLUSTRATION 7

Controls and instruments

(Illustration 2)

Throttle (twistgrip) control.

A spring loaded friction adjusting screw is located in the twistgrip body for use only in markets where a self closing throttle is not required by law.

Carburetor air (choke) control

Mounted on the right handlebar this controls the carburetor air slides. For cold starting, the control can be closed to provide a rich mixture by moving the lever towards the rider (to the slack wire position) but must be fully open for normal running, with the engine at its normal working temperature.

Front brake lever.

The front brake lever is integral with the master cylinder and located on the right handlebar. The disc brake is self adjusting.

High beam dip switch.

Turn signal switch.

All these controls are mounted in the switch cluster on the left handlebar, and are marked to indicate their function. The dip switch moves to 'HI' for high beam, to 'LO' for low beam, whilst the direction indicator switch moves horizontally, 'L' for left or 'R' for right. The horn is operated by pressing the bottom button. Lifting the horn button operates the headlamp flash facility.

Light selection switch.

Engine stop switch.

All these controls are mounted in the switch cluster on the right handlebar. The light switch selects "head" position by an upward movement and "pilot" position by a downward movement. Models for Canada only are equipped in such a way that the head-lamp is illuminated automatically as the engine is started. The engine "stop" switch is an emergency 3 position switch - move left or right to stop the engine and return to the central position before attempting to restart.

Normally use the ignition switch to stop the engine.

Press the bottom button in bursts to operate the electrical starter.

Fuel taps.

These are beneath the fuel tank on each side. The left side tap provides the reserve supply and operates "up" for reserve, "forward" for off. The right tap operates "down" for main supply and "forward" for off. Both taps must be turned off whenever the motorcycle is parked to avoid flooding and possible resultant damage.

Steering lock.

This is fitted from below into the fork top yoke and operated by a detachable key. The lock can be engaged only with the handlebars turned to left or right - not in the straight ahead position. To apply the lock, turn the handlebars fully either to left or right and, using the key, press and turn the key to the left, moving the handlebars fractionally until the lock engages with the frame lug. Still pressing the lock down, turn the key right to lock and withdraw the key.

WARNING Always ensure the steering is unlocked before starting the engine.

Ignition and lighting switch

The four-position switch with waterproof cover is located in the warning light console and is operated by a key which can only be withdrawn when the ignition is switched either to the "Parking with lights" position or to the "Lights and Ignition off" position. The switch positions, starting from the anti-clockwise position are:

- (1) Parking with lights (ignition off).
 - (2) Lights and Ignition off.
 - (3) Ignition only.
(Ignition and Lights Canadian models)
 - (4) Ignition and lights. (All markets)
- (Illustration 8).

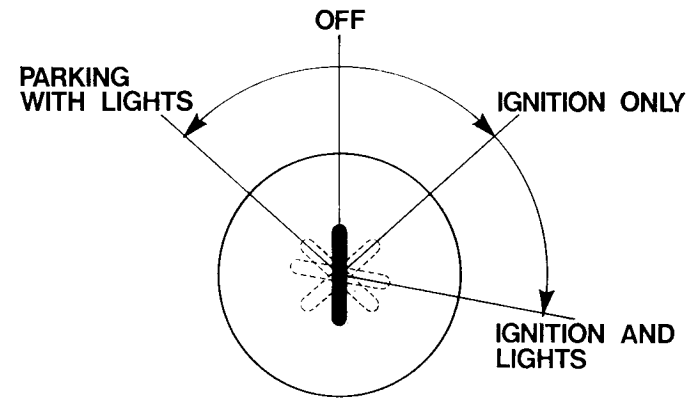


ILLUSTRATION 8

Gearshift lever

The lever is on the left side of the machine and operates the positive-stop mechanism which returns the lever to a central position when foot pressure is released after each gear change. The neutral position is between first and second gears, and is indicated by the green light in the console. Upward movement of the lever selects the higher gears, downward movement selects the lower gears. (Illustration 9)

The lever is attached to the spindle on splines and can be repositioned to suit individual requirements.

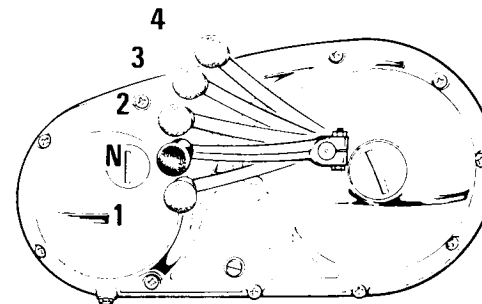


ILLUSTRATION 9

Kickstarter pedal.

This is on the right side of the motorcycle and can be used as an alternative to the electric starter. Before the first start of the day and especially during extremely cold weather the kick starter should be used either to turn over the engine and break down the oil film prior to using the starter or to supplement the electric starter. See "Driving" P. 14

Rear brake pedal

The rear brake pedal is on the right side footrest and can be adjusted for height to suit the rider. The brake is self adjusting.

Stop lamp switches.

Both the front and rear stop lamp switches are of the non-adjustable type, fitted into the hydraulic system and operated by fluid pressure. The front brake switch is located in the master cylinder and the rear switch at the "T" piece in the pressure line.

Speedometer

The speedometer records road speed in miles or kilometres per hour, and the odometer records the total mileage in miles or kilometres. On certain models, a trip odometer is fitted.

Tachometer

Driven by cable from the camshaft, the tachometer records engine speed in revolutions per minute.

Tools

The tool kit issued with each new machine is located in a vacuum moulded plastic tool trap beneath the seat, access to which is gained merely by unlocking the seat, slackening the right side seat knob and lifting the seat on its hinge.

“Lights on” feature – Canada only

The head and tail lamps illuminate automatically as the engine starts and the

Driving

This motorcycle incorporates the revolutionary Norton Isolastic frame and engine mounting system to provide an exceptionally smooth ride. However, some vibration will still be experienced at lower rpm and can be eliminated immediately by a change of speed or gear.

Starting the engine

Ensure the gear lever is in the neutral position (at which point the neutral indicator light will be illuminated) and that the stop switch on the right handlebar is at the “run” position. Do not use the starter with the motorcycle in gear or headlamp on. Switch on the ignition, turn on the right fuel tap.

If the engine is cold, depress the carburetor ticklers to flood the carburetors for enriched starting mixture. Do not overflood or starting will be difficult and do not jab the ticklers sharply up and down as this will eventually damage the floats. Close the air control (choke) lever to the slack wire position.

Open the throttle a little and press the starter button where the engine should fire. If the engine does not fire, do not hold the button in. Use the starter button in bursts only. After the engine has started, open the air lever as soon as the engine temperature permits.

When restarting with the engine at working temperature it should not be necessary to close the air lever or flood the carburetors.

For the first start of the day and particularly during very cold weather, it may be

red warning light dims. Once under way, move the light switch to “Head” to feed from the main lighting circuit.

Power take off socket

A plug and socket, mounted on the right hand side of the battery tray, provides 12v at a maximum of 17½ amps for accessories, such as a radio or shaver, or may be used for battery charging. When appropriate, ensure that the plug is wired with the correct polarity. On this motorcycle, the positive, indicated by a red wire, is earthed (grounded).

necessary to turn over the engine several times using the kickstart pedal to break the oil film before using the electric starter. Alternatively, the electric starter can be supplemented by the kickstarter. To use this method depress the kickstart without exertion at the same time as the starter button is pressed.

If starting is difficult owing to excess flooding switch off the ignition and turn off the fuel tap. Operate the starter a few times with the air and throttle controls open to clear excess fuel from the combustion chambers. Allow any split fuel to dry out before attempting to restart. Switch on the ignition, turn the fuel tap on and start in the normal manner.

Gear changing

To move away from rest, pull the clutch lever and engage first gear by pressing down the gear lever as far as possible. When the gear is felt to engage, allow the gear lever to return to its normal position. Gently and smoothly release the clutch lever and at the same time open the throttle slightly to give the power necessary to move off.

To change to a higher gear, accelerate gently then close the throttle, pull the clutch lever to the handlebar and lift the gear lever upwards to select the next gear. Release the gear lever and the clutch lever and open the throttle. Select the gears in this manner until top gear is reached.

To change to a lower gear, close the throttle, pull the clutch lever to the handlebar, simultaneously open the throttle momentarily to increase engine speed whilst pressing the gear pedal down to select the next lower gear. Quickly and progressively re-engage the clutch and carry on driving.

Use of the gearbox

The gearbox should be used intelligently to keep the engine running smoothly with

Breaking in

In the process of manufacture the most suitable materials are used and all machined parts are finished to a very high standard but it is still necessary to allow the moving parts to ‘bed in’ before subjecting the engine to maximum stresses. The future performance and reliability of the engine depends on the care and restraint exercised during its early life.

For the first 500 miles throttle openings should be limited to about one third of twist grip movement and the cruising speed should be varied as much as possible within this limit. Provided the engine is not allowed to labour, the actual road speed is relatively unimportant, but throttle control should be smooth and the gearbox used to the full to enable the engine to cope with the prevailing conditions without undue stress. This will also assist to ‘break-in’ the gearbox components. At all times avoid violent acceleration.

After the 500 mile service the amount of throttle opening can be increased progressively but the cruising speed should still be varied. Full throttle should not be used until the machine has covered at least 1,000 miles and even then only for short bursts until 1,500 miles has been covered, whereupon maximum performance may be sought whenever desired.

During the ‘break-in’ period, a certain amount of adjustment will be necessary as the components bed in. Attention should be given to valve rocker adjustment, rear chain tension and contact breaker points gap all of which

the least possible stress. The gear ratios are carefully chosen to meet the characteristics of the engine. The rider should at all times select the most suitable gear for the prevailing conditions.

Do not slip the clutch to control road speed. The neutral position must be located and the clutch control released whenever the motorcycle is stationary for any period.

tend to settle down. (*Routine Maintenance, Page 17*).

Do not allow the engine oil level in the tank to fall below the “L” mark because a reduced amount of oil in circulation will become overheated.

It is most essential to avoid glazing of the friction surfaces of the disc brakes during the first few miles of use. During the first 50 miles only it is necessary to apply the disc brakes gently to mate the friction surfaces. After 50 miles of use, the brake will be fully bedded down and ready for maximum application.

The following information is in accordance with the requirements of the US National Highway Traffic Safety Administration, Department of Transportation. Part 575 Consumer Information.

Brakes should be bedded in progressively during the first 300 miles. This is achieved by gradually increasing brake lever pressure during the period, and braking from progressively increasing speeds.

For guidance refer to the table below. The deceleration in ft/sec² is converted to the equivalent braking time/distance.

Stage	1	2	3
Speed of commencement of stage (mph)	30	50	70
Speed at end of stage (mph)	0	30	30
Deceleration (ft/s ²)	12.5	12.5	12.5
Distance travelled (ft)	77	135	344
Time taken (sec)	3.5	2.3	4.7

Stage 1

A minimum of 20 stops using the front and rear brakes together. Decelerate from 30 mph to rest using the distance travelled or time taken to obtain the required deceleration.

Stage 2

A minimum of 50 decelerations from 50 to 30 mph using front and rear brakes together.

Stage 3

A minimum of 30 decelerations from 70 to 30 mph using front and rear brakes together.

The distance between brake applications should not be less than 1/4 mile in each case. Disengage the clutch when carrying out the procedure to ensure that the brakes receive the full braking load. The use of the above procedure, subject to traffic conditions will ensure that any

high spots on the brake linings are not hardened, resulting in reduced brake efficiency. Correct burnishing will give an approximate minimum lining contact area of 50% which qualifies the published brake performance figures.

Fuels

This motorcycle is designed to operate on fuels of at least 94 octane rating (UK 3-Star or USA premium).

Always ensure that the fuel used is clean and free from water. Do not allow foreign matter or water to enter the fuel tank at any time.

Any engine that shows a tendency to overheat or detonate (ping) under hard use when ignition system and carburetors are in proper order may be cured by switching brands of fuel or using fuel of a higher octane rating.

Free Service Check

All owners of new Commando motorcycles are entitled to a FREE SERVICE CHECK at 500 miles (800 km) or, at latest, three months after taking delivery.

This service should preferably be undertaken by the supplying dealer but can be undertaken by any Norton franchised dealer.

- 1 Check and adjust, if necessary:
 - (a) Valve clearances.
 - (b) Contact breaker. Set gap.
 - (c) Ignition timing. Strobe each cylinder.
 - (d) Spark plugs. Check heat range and gap.
 - (e) Clutch operation and cable adjustment.
 - (f) Check fluid level for both brakes
 - (g) Adjust and inspect rear chain
 - (h) Wheels. Check for freedom of rotation, bearing looseness, and spoke tension.
 - (i) Wheel alignment. Check and adjust rear wheel if necessary.

- (j) Check tire pressures.
- (k) Isolastic mountings. Check for clearance and adjust.
- 2 Drain oil tank and sump, clean gauze strainer and tank, and replace cartridge oil filter and refill with correct grade of oil.
- 3 Drain and refill primary chaincase.
- 4 Top up gearbox.
- 5 Top up battery.
- 6 Check all electrical equipment.
- 7 Drain and clean carburetors.
- 8 Adjust and oil all control cables.
- 9 Grease rear brake pedal nipple
- 10 Tighten all external nuts and bolts. Retorque cylinder head and base nuts.
- 11 Drain and refill front forks.
- 12 Start the engine and check for:
 - (a) Oil leaks.
 - (b) Oil return to tank and feed to rockers.
 - (c) Alternator charging battery.

13 Road test the machine. If no other rectification is necessary; set carburetor idling adjustment. While engine is hot, tighten exhaust lockrings fully. Ensure that tabbed lockwashers are properly located. Check for any signs of oil or fuel leakage.

The owner must pay for all replacement materials but labor and time are free of charge.

It is essential for the FREE SERVICE card to be completed, detached from inside the front cover of this manual and handed to the dealer who has carried out this service for return by him to the main distributor

The warranty applies only to the first owner. There is no transfer of warranty under any circumstances.

Routine maintenance

To obtain the best possible service from your Commando, a regular sequence of maintenance is essential. This is divided into simple checks by the rider at frequent intervals, supplemented by dealer services at set mileages. Full details of such services are given both as follows and in the service voucher booklet which you will receive automatically.

21,000 (35,000)	A
24,000 (40,000)	C
27,000 (45,000)	A
30,000 (50,000)	B
33,000 (55,000)	A
36,000 (60,000)	C
39,000 (65,000)	A
42,000 (70,000)	B
45,000 (75,000)	A
48,000 (80,000)	C

Regular check procedures by the owner

Weekly

Check tire pressure and wheel alignment. Use Chainspray to lubricate rear chain.

Every two weeks

Check battery electrolyte level.

Every 250 miles (400 Km)

Check engine oil tank level.

Every 500 miles (800 Km)

Check, adjust and spray lubricate rear chain.

Every 1000 miles (1600 Km)

Check primary chaincase oil level. Oil all control cables.

Check disc brake fluid levels, front and rear. Examine front and rear disc brake pads for wear.

Service voucher chargeable by franchised Norton dealer

Mileage (Km)	Type of service
3,000 (5,000)	A
6,000 (10,000)	B
9,000 (15,000)	A
12,000 (20,000)	C
15,000 (25,000)	A
18,000 (30,000)	B

Service A

Check spark timing and adjust contact breaker points.
Clean spark plugs and set gaps.
Change primary chaincase oil.
Check clutch adjustment.
Change engine oil and cartridge filters.
Relubricate and adjust rear chain.
Check transmission (gearbox) oil level.
Grease rear brake pedal pivot.
Check front and rear Isolastic mountings for excessive free play.
Check and adjust valve rocker clearances.
Clean and re-oil air filter element.

Service B

Includes 'A' Service—plus the following:
Change transmission (gearbox) oil.
Change oil in forks.
Check and adjust camshaft chain.
Clean contact breaker points.
Lubricate contact breaker cam felt and auto advance unit.
Clean and re-oil air filter element.
Check swinging arm bushes for wear.
Check loose or unequal spoke tension—front and rear wheels.
Rebalance wheels where necessary.

Check front and rear wheel spindle clamp nut tightness.
Check on front and rear tire tread condition and wear pattern. Rebalance wheels where necessary.

Examine and if necessary replace the rear wheel shock absorbing rubbers.

Service C

Includes 'B' Service—plus the following: Repack wheel bearings with grease.

Dismantle and clean both carburetors and check for wear.

Adjust rear chain.

Check steering head bearings.

Check head steady and head steady mounting rubbers. Also suspensory spring

Check and tighten all front and rear engine mounting bolts.

Check swinging arm spindle.

Change hydraulic brake fluid, check flexible pipes, unions, seals.

Changing engine oil

(Illustrations 10 & 11)

Release the seat lock, slacken the right seat knob and lift the seat on its hinge. Take out the two cover top fixing bolts and lift the cover clear at the rubber mounting. Place a funnel or piece of stiff cardboard under the drain plug to catch the oil into a container and remove the oil drain plug (Illustration, 10 item A). This should be

done when the oil is warm and flowing freely. Place a drain tray under the engine and remove the crankcase drain plug (illustration 11 item A) to drain the small amount of oil in the sump.

Also remove and clean the crankcase gauze strainer plug (Illustration 11 item B) and oil tank filter (Illustration 10).

Replace the oil tank and crankcase drain plugs. Fill the tank to the dip stick level with fresh oil and run the engine at a steady speed to check the oil circulation. The oil level should not exceed the "H" mark or fall below the "L" on the dipstick. Finally refit the side panel.

Removing oil tank

Release the seat lock and lift the seat on its hinges. Take out the two side cover top fixing bolts and lift the cover clear at the bottom rubber mounting. Drain the oil as described before under the heading "Changing engine oil". Remove the fuel tank after releasing the front and rear fixings and disconnecting the fuel lines from the taps.

Slide the rubber oil pipes off the stubs on top of the oil tank breather space and filler neck. Remove the large filter bolt at the banjo at the rear end of the oil tank and collect the two large washers for re-

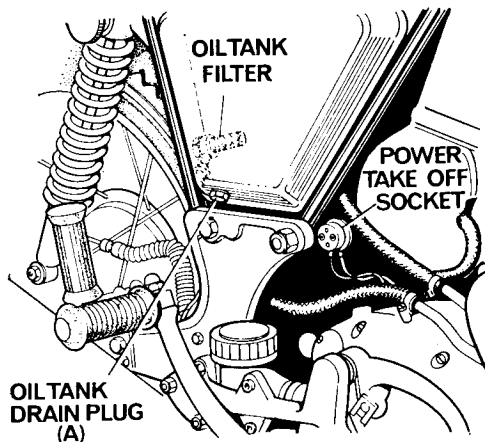


ILLUSTRATION 10

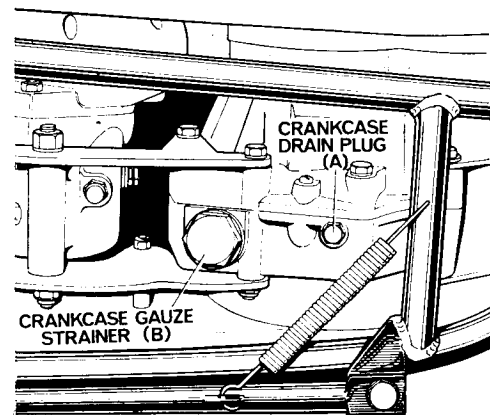


ILLUSTRATION 11

use. Slacken the clip and pull the return oil pipe clear of the oil tank metal pipe.

Oil tank filter

(Illustration 10)

A coarse mesh metal filter is incorporated with the oil feed pipe fixing bolt, which should be cleaned at 3,000 miles intervals when the oil is changed.

Cartridge type oil filter

(Illustration 13)

After the first 500 mile service, this filter must be changed at every 3000 miles interval. The filter (shaded area) is located behind the gearbox, between the Isolastic mounting plates. To change, remove screw clamp, place oil drip-tray under filter and unscrew. Remove filter and old sealing ring. Moisten new sealing ring with oil and install new filter hand-tight only. Replace screw clamp.

Changing gearbox oil

(Illustration 3 on page 9)

The gearbox oil should be changed after a run so that the warm oil flows more freely. Remove the filler cap (C) and drain plug (A). Drain the oil into a suitable container. Replace the drain plug and fill the gearbox through the filler cap orifice (C). Allow time for oil to pass through the inner cover into the shell. When the level plug is removed and oil runs from the level plug hole (B) allow the surplus oil to drain off and replace the level plug and filler cap.

Changing oil in the primary chaincase

(Illustration 4 on page 10)

Place a drain tray beneath the forward end of the chaincase. Remove the drain plug (Illustration 4 item C) and allow the case to drain completely. Remove the filler cap and pour in 7 fl. oz. (200cc) of fresh oil. Be careful not to overfill.

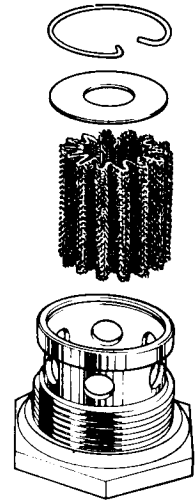


ILLUSTRATION 12

Oil separator

The oil separator (seen in illustration 5) is fitted to the rear left side of the airbox and requires no routine attention other than a periodic check that the connection to the airbox is not disengaged. Only after considerable mileages have been covered need the separator be cleaned to prevent blockage, unless the motorcycle is continually used on very short trips where "sludging" may occur.

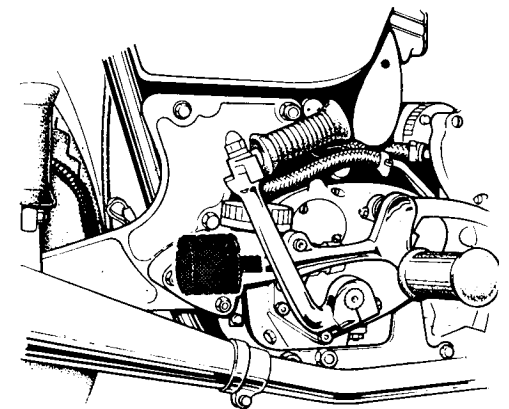


ILLUSTRATION 13

Rear chain lubrication

No chain oiler is fitted to the Commando. Instead, an aerosol can of "Chainspray" is provided in the toolkit. To use, support the motorcycle to allow rotation of the rear wheel. Using the extended spray tube of the can, apply lubricant to the exposed areas of the chain, rotating the wheel to gain access to all parts of the chain. The Chainspray should be used at least every week of each 500 mile interval to maintain adequate lubrication.

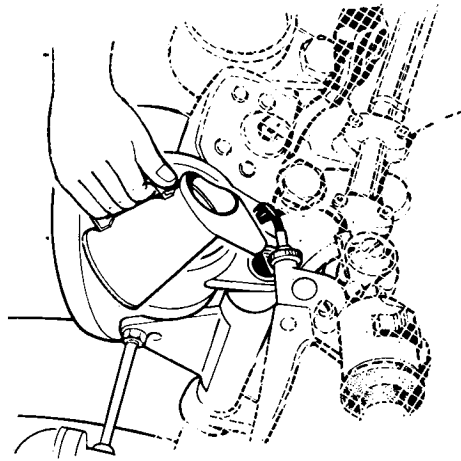


ILLUSTRATION 14

Changing oil in the front forks

(Illustrations 14 & 21)

Under normal conditions the front forks will require no servicing other than an occasional change of oil. Should the oil level become low it will be indicated by excess movement of the forks, but only after considerable mileage.

Each fork leg is provided with a drain screw and each leg should be treated separately. Remove the drain screw, take care not to lose the small fibre sealing washer. Take the machine off the stand, apply the front brake and move the forks up and down to expel the oil. Allow a few minutes for draining and repeat the operation with the other leg. Whilst draining the right fork leg, the forks should be turned on full right lock. Conversely for draining the left fork leg.

Refit the drain screws, place the machine on the centre stand. Remove handlebars to improve accessibility.

Unscrew the large filler plug at the top of each leg, remove the speedometer and tachometer in their nacelles and lift the front wheel to expose the springs.

Support the wheel with a block of wood to hold the springs clear. Using two spanners, unscrew the filler plugs from the damper rods.

Remove the wooden block and allow the forks to extend fully. Pour in a measured 150 cc (5 fl. oz.) of oil into each leg. Because of the springs inside the main tubes the oil will be slow to run down.

Expose the springs again and before refitting the filler plugs to the damper rods ensure that their locknuts are screwed down to the bottom end of the thread on the rod. Lock the filler plugs and locknuts together then screw in and tighten the filler plugs.

Engine and ignition system

Rocker clearances

The rocker clearances are measured by feeler gauges inserted between the end of the valve stem and the rocker adjusting screw.

To gain access for adjustment, release the right side seat knob and seat lock and raise the seat on its hinge. Remove the fuel tank. This is attached to the frame by two nuts at the front and two bolts and a cross strap at the rear. The fuel pipe must be disconnected from both taps.

Remove the spark plugs and the three rocker covers on the cylinder head.

By means of the kick-starter pedal, rotate the engine until the left side inlet valve is fully open. With a 0.006 in. (0.15 mm) feeler gauge, check the rocker clearance of the right side inlet valve. If adjustment is necessary, slacken the right side rocker adjusting screw locknut (A) and screw the adjuster (B) out a couple of turns. Place the feeler gauge between the adjuster and the end of the valve stem and screw the adjuster in until it just nips the feeler gauge. Tighten the locknut and withdraw the gauge. It should not be tightly gripped but should slide easily through the gap.

Rotate the engine until the right side inlet valve is fully open and adjust the left side inlet valve in the same way.

Adjust the exhaust valve rocker clearances in the same sequence but using a 0.008 in. (0.2 mm) feeler gauge.

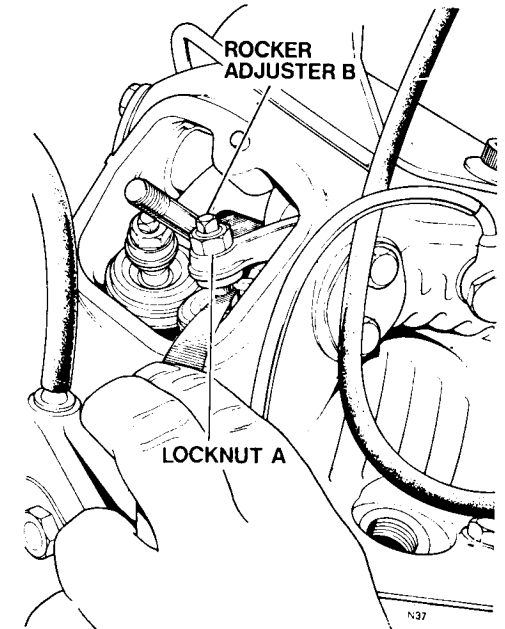


ILLUSTRATION 15

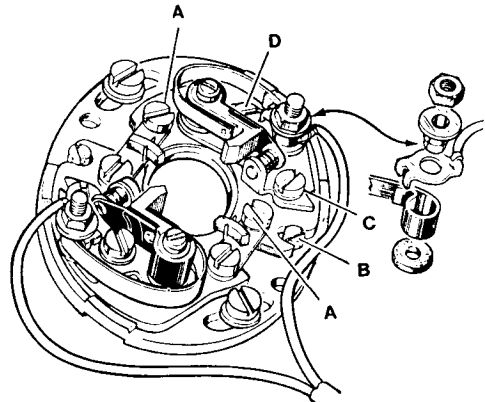
Contact breaker points

(Illustration 16)

The Lucas contact breaker contains a separate contact set for each cylinder. Each contact set has its own mounting plate held to the circular base plate by two screws (A), each mounting plate being provided with a slot into which an eccentric headed adjusting screw (B) is fitted. When the securing screws are slackened, rotation of the eccentric screw moves the mounting plate in relation to the ignition cam. This permits a very accurate setting of ignition timing for each cylinder.

Screws (C) and (D) are contact plate fixing screws. They fit into slots in the plate that allow the plate to be moved to adjust the contact points.

The baseplate is secured by two screws in elongated holes. To advance the timing



DATUM POINT FOR ADJUSTING CONTACT BREAKER POINTS GAP

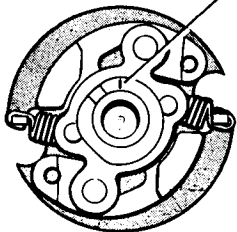


ILLUSTRATION 16

move the baseplate clockwise. To retard, move the baseplate anti-clockwise.

Adjusting the contact breaker points gap

Remove the spark plugs so that the engine can be rotated easily by means of the kick start pedal. An examination of the cam will reveal a small mark adjacent to the slot. This mark assists in obtaining a uniform gap for each cylinder.

Rotate the engine until the nylon heel of the moving contact registers with this mark and the points will be in the fully open position. Using a 0.015 in. (0.38 mm) feeler gauge check the gap. If the adjustment is correct, the gauge will be an easy sliding fit. When adjustment is necessary, release the fixed contact plate locking screws (C) and (D), and slide the plate along the slots until the correct gap is obtained. Tighten the locking screws. Adjust the other contact set in a similar manner.

Maintenance

Every 5,000 miles the contact breaker points should be examined to determine their condition. Remove the nut securing the contact breaker spring to the anchor post and lift off the spring heel, together with the terminals, insulating bush and the insulating washer. Remove the fixed contact plate locking screw and take off the fixed contact plate.

Points which are slightly burnt or pitted can be smoothed with a fine carborundum stone and afterwards cleaned with a brush moistened in petrol or white spirit; if they are badly affected they should be renewed.

Before reassembly, smear the contact breaker pivot post and the cam very sparingly with Retinax 'A' grease and add three drops of engine oil to each lubricating felt. When reassembling ensure that the insulating washer, contact breaker spring, terminal and insulating bush are fitted in the order shown in *illustration 16* and that the terminal tags are inside the curve of the spring.

Auto advance unit

The auto advance unit automatically and progressively advances the ignition timing as the engine speed increases and returns it to the fully retarded or static position when the engine stops.

To expose the mechanism, it is necessary to remove the contact breaker plate complete, but before doing so mark the exact position of the plate so that when it is refitted the timing is not disturbed.

Remove the contact breaker plate fixing screws and take off the plate complete with the contact sets. Ensure that the springs of the auto advance unit are intact with the taper loops attached to the pins. Check the automatic action by turning the cam by hand to the fully advanced position in which the bob weights will be fully extended. When the cam is released, the springs should return the bob weights to the static position.

Lubricate the mechanism sparingly at the point where the cam turns on the base plate. Do not over lubricate as an excess of oil may reach the contact breaker points. If the contact breaker plate has been removed from its original position without being marked, the ignition timing should be checked and reset when the plate has been refitted.

Engine camshaft chain tension

To check tension an inspection plug is provided in the timing cover. The permissible amount of free up and down movement at the centre run of the chain must not exceed $\frac{3}{16}$ in. If play is excessive, adjust as described in the following section.

Engine camshaft chain adjustment

(Illustrations 17 & 18)

Have available timing cover gasket 06.1092.

To adjust camshaft chain, the timing cover must be removed by:- Disconnect oil union for rocker box oil pipe from timing cover.

Remove cap covering contact breaker cover (two screws).

Remove contact breaker base plate - with wires attached (two hexagon bolts).

Remove auto advance unit - use extractor bolt 06.4298.

Remove 12 screws securing cover. Tap lightly the joint face to break seal, withdraw the cover.

When the cover is removed oil will seep from drilling in crankcase. Blank off drilling. (Illustration 17).

The camshaft chain (Illustration 18) is provided with a slipper tensioning device (A). To adjust the chain, release the two nuts (B) securing the slipper, and move as required. The permissible amount of free up and down movement measured in the centre run of this chain is $\frac{3}{16}$ in.

Check chain tension in more than one position.

Retighten the two tensioner nuts when the correct adjustment has been made.

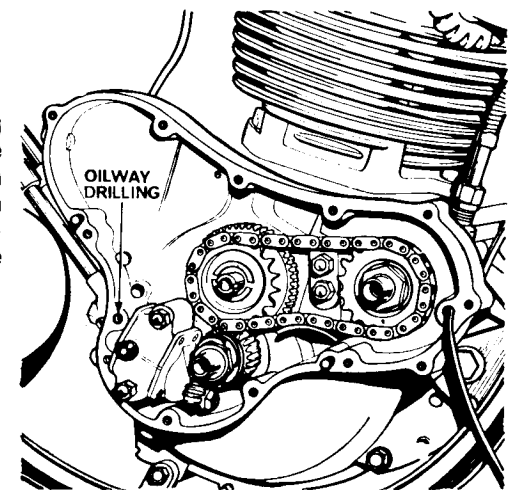


ILLUSTRATION 17

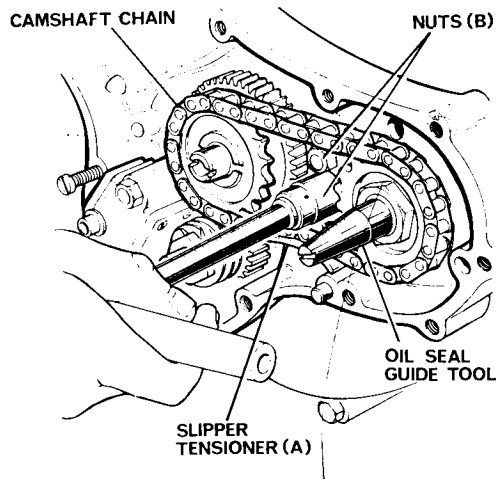


ILLUSTRATION 18

Fit the contact breaker base plate – yellow and black lead is for the drive side cylinder.

Reset ignition timing as described on page 25. Ensure the oilway is unplugged before refitting cover.

When the timing cover has been refitted, pour a little oil into the timing case, through the inspection plug thus providing initial lubrication for the timing gear until oil accumulates normally when running.

Spark plug

It is most important to use the correct grade of spark plug, as a spark plug with a low heat factor can cause pre-ignition and subsequent damage to the engine (*Technical data on page 4*).

To avoid damage to the insulator, use the plug spanner provided in the tool kit to remove and refit the spark plug, which should be firmly tightened to ensure a gas tight joint.

To adjust or reset the spark plug gap, bend the side wire which is ductile.

Before refitting the plugs, see that the sealing washers are sound. Clean the threads of the spark plug body.

A smear of graphite grease applied to the threads of the plug will assist in subsequent removal.

Refitting the timing cover

Use a new gasket to guard against oil leakage. Screw oil seal guide (supplied in tool kit) into camshaft. Put back the timing cover, firmly tighten the 12 screws.

Remove inspection cap on primary chain case to expose indicator plate.

Position the engine on the drive side cylinder with the piston at top dead centre on the firing stroke (both valves closed) until the machined mark on the rotor registers with 28° on indicator plate.

Insert the auto unit with the rivets for the bob weights in line with the two screw holes for the contact breaker cover – the slot in the cam face should be at approximately 9 o'clock.

Ignition timing

(Illustration 19)

To check or reset the ignition timing, a timing indicator plate is attached to the outer position of the primary chaincase, with a corresponding mark on the rotor for the alternator, which is exposed by removing the screwed cap adjacent to the indicator plate. Timing can be checked with the engine stationary, or preferably by your dealer with the engine running using a Stroboscope.

ENGINE STATIONARY

Remove both spark plugs.

Remove inspection cap on chaincase.

Remove contact breaker cover – check and adjust contact breaker points as described on page 22.

Temporarily lock auto advance unit in the full advanced position by:

Removing the central fixing bolt.

Take off the washer for this bolt, replace it with one with a hole large enough to clear the central portion of the unit to bear on the cam when the central bolt is tightened.

Replace the central bolt with washer – hold the auto unit in the full advanced position – tighten the bolt.

Rotate the engine until the machined mark on the rotor registers with the 28° on the indicator plate. If the timing is correct – the contact points should commence to separate.

The exact point of separation can be determined by inserting a strip of very thin paper between the points. The points will grip the paper when closed – by moving the engine slowly, a light pull on the paper will indicate the exact point of separation. Safeguard against a shred of the paper being trapped between the points.

As an alternative, use a low wattage bulb and holder with a short length of wire soldered to the bulb body with a second length of wire attached to the bulb connection, with crocodile clips attached to the ends of both wires.

Connect one wire to the contact breaker spring of the points that are being checked the second wire should be attached to a suitable earth point on the engine.

Switch on the ignition and by moving the engine the bulb will light immediately the contact points separate.

To adjust the timing, refer to sub heading 'Contact Breaker Points' (page 22).

Remove central fixing bolt – discard washer temporarily used – fit the bolt with its original washer and tighten.

ENGINE RUNNING

To check the timing with a Stroboscope see instructions in the Workshop Manual.

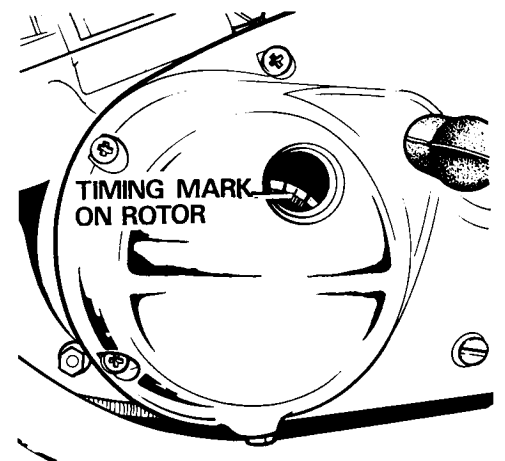


ILLUSTRATION 19

NOTE: A special service washer 06-0949 is available to lock temporarily the auto advance unit whilst the ignition timing is being checked.

Transmission

Adjustment of primary chain

The primary chain is equipped with a hydraulic tensioner which maintains correct tension. The gearbox cannot be moved relative to the engine unit.

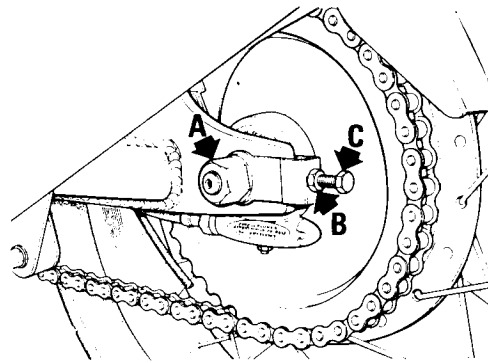


ILLUSTRATION 20

Adjustment of rear chain

(Illustration 20).

Slacken the rear wheel spindle nuts "A" and release the chain adjuster locknuts "B". Pull downward on the bottom run of the chain to bring the spindle hard up against the chain adjuster bolts "C". Move each adjuster an equal amount until, with the rider seated, there is a total up and down movement, measured in the centre of the chain run, of $\frac{3}{4}$ to 1 inch (19 to 25 mm). Ensure the spindle nuts are tightened thoroughly, tighten the chain adjuster locknuts.

Before riding the motorcycle, apply the brake several times to restore full hydraulic pressure.

If the chain has covered a considerable mileage it may have worn unevenly; the adjustment should be checked at the tightest part of the chain run.

Front forks and rear suspension

The front forks are of the spring controlled, oil damped, variety. The only routine attention required is a periodic oil change as detailed on page 20.

The steering head bearings are of the ball journal type, pre-packed and sealed for life. These bearings require no adjustment at all, though a periodic check must be made for excess play. The fork stem is fixed to the top yoke, the stem nut being fitted below the lower yoke.

The rear swinging arm is mounted on a prelubricated and sealed pivot which is sealed for life.

The Girling rear suspension units are sealed units filled with oil on assembly. They should require no further attention.

A cam-ring adjuster is provided to raise the base of the springs into three alternative positions to suit varying loads. The 'soft' or normal solo position is when the adjuster is rotated as far as possible in an anti-clockwise direction when viewed from above.

Caution

If fitting a rear carrier, ensure that the carrier is completely clear and free of the rear suspension units top fixing bolts to avoid the possibility of the carrier bearing on the damper spring top collars with the consequent risk of fracturing the suspension units.

At all times the mounting ferrules at the top and bottom of the suspension units must be free to pivot on the bonded rubbers/metal bushes to avoid damage to the suspension units.

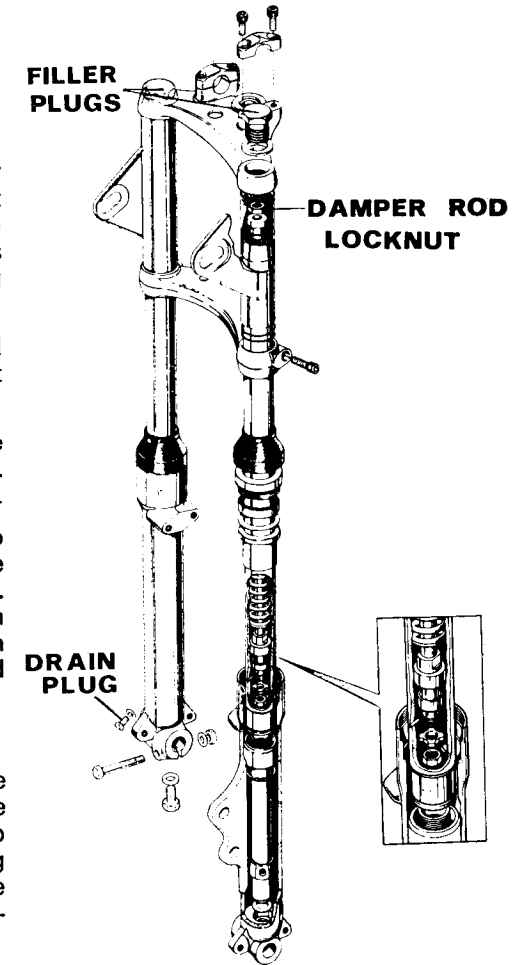


ILLUSTRATION 21

Clutch

(Illustrations 3 & 22).

The diaphragm spring clutch is mounted on the gearbox mainshaft and operated by a push rod which passes through the hollow mainshaft.

The clutch operating lever is controlled by the handlebar lever. Movement imparted to the push rod by the operating lever causes the clutch plates to separate.

The clutch plates are compressed by a circular diaphragm spring, thereby ensuring an even distribution of spring pressure.

To enable the clutch to operate satisfactorily, there must be a little free movement between the operating lever to which the clutch cable is attached and the push rod, in addition to the $\frac{3}{16}$ in. to $\frac{1}{2}$ in. of free play in the clutch cable itself.

If this free play is absorbed by the friction plates settling down, clutch slip will develop. Conversely, if the free play is excessive, the clutch plates will not separate, causing clutch drag.

To ensure that this free movement exists, slacken off the clutch cable adjuster at the handlebar end as far as possible and then take off the filler cap (Illustration 3, item C) on the gearbox outer cover.

With the index finger, move the operating lever to which the clutch cable is connected inside the kick starter case to and fro, which will indicate whether there is a slight movement or otherwise.

If no movement exists, remove the clutch inspection cap on chaincase (Illustration 22) and release nut (B) on the gearbox mainshaft, then turn the screw (C) gently in an anti-clockwise direction until movement is felt on the operating lever. Then turn screw (C) in a clockwise direction until it is felt that the screw just touches the push rod.

Now unscrew the screw (C) one full turn and holding it in this position, retighten the lock nut (B). This will ensure that there is the specified amount of movement between the clutch operating mechanism and the push rod.

Finally, unscrew the clutch cable adjuster at the handlebar end leaving a minimum of $\frac{1}{8}$ in. free movement between the cable outer casing and the adjuster.

WARNING: Do not attempt to dismantle the Diaphragm Spring Clutch without the proper tools as serious personal injury could result. (Refer to the *Workshop Manual*).

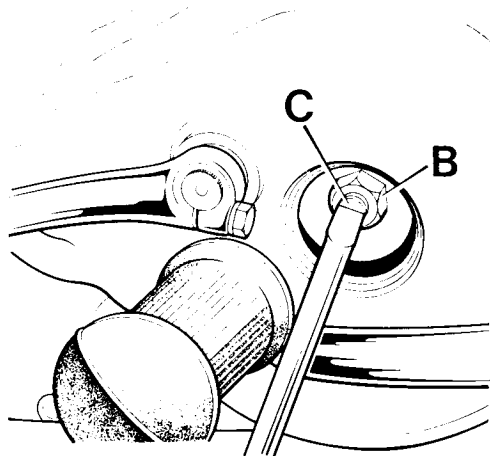


ILLUSTRATION 22

Carburetors

The Commando is fitted with twin Amal concentric carburetors series 900.

The carburetor settings and jet sizes shown in the technical data have been determined after long tests to obtain maximum performance consistent with good petrol consumption.

It should not be necessary to alter the carburetor settings unless the machine is operating at altitudes over 3,000 feet above sea level.

The workshop manual describes the function of the carburetors and the method of tuning.

Synchronising the twin carburetors

It is most important that both throttle slides should operate simultaneously. To ensure this, slacken the throttle stop screws and adjust the throttle cables until there is a minimum of backlash but on initial movement of the twistgrip, both throttle slides begin to lift simultaneously. Make sure the throttle cable adjuster lock-nuts are tightened securely. Start the engine and adjust slow-running only when the engine is warm. Now detach one spark plug lead. Adjust the pilot air screw and throttle stop screw to gain satisfactory idling. Refit this spark plug lead. Remove the other and adjust idling on the second cylinder. When this plug lead is replaced and the engine is again running on two cylinders, idling speed may be too fast, in which case the throttle stop screws should be unscrewed slightly until idling is correct.

Cleaning the carburetors

(Illustration 23)

The float bowl on each carburetor incorporates a drain plug "A" which is both slotted and knurled for ease of removal. The plugs enable the float bowls to be cleaned without removal.

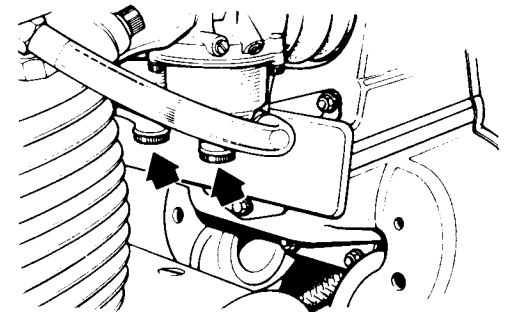


ILLUSTRATION 23

Air filter

(Illustration 24)

This filter fulfills the dual roles of air cleaner and air silencer. It incorporates a micro-cellular plastic foam element which must be oil-wetted. Access to the filter element is gained by removing three bolts and the front cover plate. The foam element is wire reinforced and may be withdrawn easily with the fingers. Take care not to tear the foam when drawing this past the carburetor float bowl drain plugs.

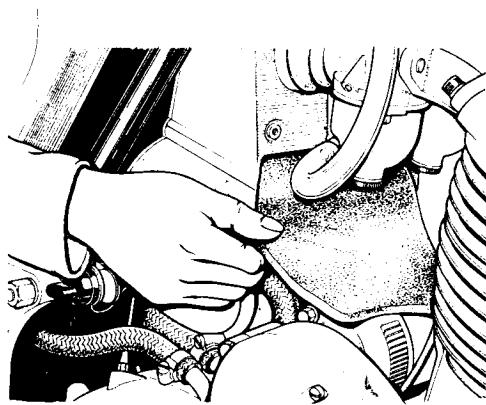


ILLUSTRATION 24

Every 3,000 miles (4,800 km) or less in extremely dusty conditions, wash the foam element thoroughly in clean petrol to expel dirt, then squeeze out to dry. Next immerse the element in clean engine oil, squeeze out the surplus and the element is ready to refit.

Wheels

Removal of rear wheel.

(Illustration 25)

The rear wheel is removed by detaching it from the rear wheel sprocket, leaving the sprocket and chain undisturbed. The brake caliper is lifted clear with hose still attached thus avoiding the need for draining the hydraulic system.

Support the motorcycle on the centre stand and for additional support extend the propstand. On rough ground, tie the centre stand to the bottom frame cross tube beneath the power unit so that the motorcycle cannot roll forward off the stand. Engage 1st or 2nd gear to facilitate refitting of the wheel. Slacken the lower right side suspension unit nut and pull back as far as the locating circlip. Unscrew and remove the axle from the right side. Ease the wheel over to the left and pull away the right chain tensioner. Ease the caliper and mounting plate upwards but only so far that the friction pads are not completely clear of the disc. With the

finger and thumb pinch the displaced chain tensioner together and insert between the pads to prevent the pads falling out. The caliper and mounting plate still attached to the hydraulic hose must be inverted and hung by the mounting plate boss from the rear frame loop (see illustration 25) either by the use of string or wire or, on later models, from the hook provided on the frame. Lean the motorcycle to the left on the centre stand foot and extract the wheel from the right hand rear.

Whilst the wheel is removed, check that the shock absorbing pads seen in illustration 26 are sound and showing no signs of granulation.

Refitting rear wheel.

(Illustration 26)

Tilt the motorcycle to the left whilst inserting the wheel, with the disc at the right side, between the swinging arms. Locate the wheel to the shock absorber

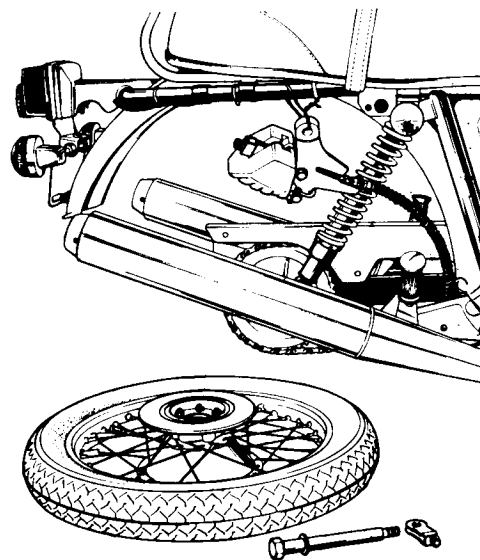


ILLUSTRATION 25

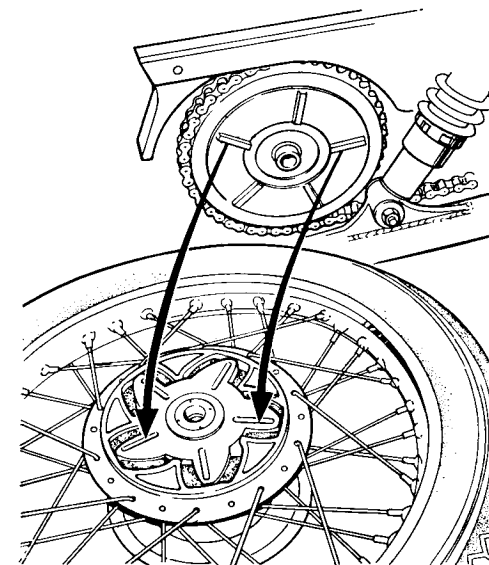


ILLUSTRATION 26

paddles (as in illustration 26). It may be found easiest to locate the axle loosely through the wheel whilst the wheel is held to the left side and the paddles engaged. With the axle still loose in position, taking care to untwist the hose, untie and move the caliper down so that the mounting plate engages to the bottom suspension unit bolt. Holding the caliper where it rests, pull out the rear axle and also the chain tensioner used to keep the brake pads in position. Guide the caliper and pads carefully over the disc and the plate boss between the wheel and swing arm. Refit the right side chain tensioner, line up the holes and insert the axle and thick washer from the right. Ensure that the tensioner abuts to the swinging arm and tighten both the wheel axle and suspension unit nut. Apply the brake pedal to restore full pressure before the brake is returned to service. Do not forget to fold both stands before riding.

CAUTION:

If for any reason a pad should drop out, ensure that it is refitted correctly so that the friction material faces the disc. Position the caliper over the disc with the pads located correctly at each side of the disc and the pad "ears" in the caliper slots. Locate the caliper plate slot on the suspension unit bottom bolt and line the boss up with the hub. Hold the chain tensioner in position then insert the wheel axle and thick washer and secure. Tighten the suspension unit bottom nut and fold the side stand. It is essential to apply the brakes several times to restore full pressure before the brake is returned to service.

Removal of front wheel.

(Illustration 27 and 28)

The brake disc is removed with the wheel whilst the caliper remains fixed to the left fork leg and it is not necessary to disturb the hydraulic system.

Support the motorcycle on the centre-stand with extra support beneath the crankcase to lift the front wheel clear of the ground.

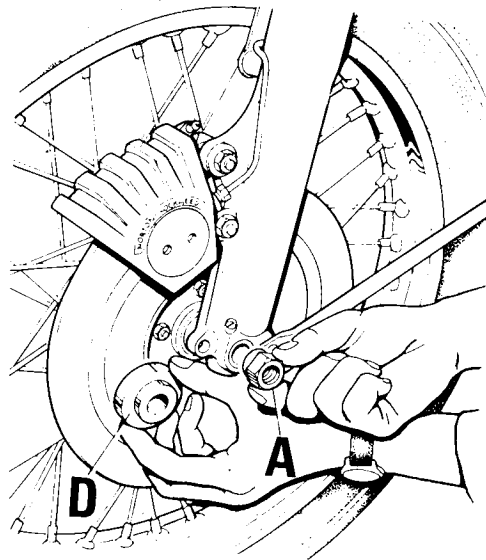


ILLUSTRATION 27

Remove the axle nut (A) from the left (disc) fork leg and slacken the pinch bolt (B) at the right fork leg. Support the wheel and, using a tommy bar or similar tool in the hole provided, remove the axle from the right side. Lift the wheel forward clear of the brake caliper and fork legs. Collect the left and right dust cover/spacers C and D

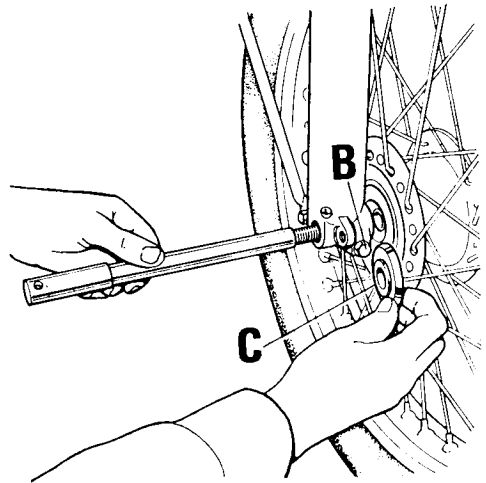


ILLUSTRATION 28

noting that the left one (D) has an additional spacing boss. To prevent unintentional displacement of the pads, insert a $\frac{1}{4}$ in. (7 mm) thick spacer of clean wood or plastic between the pads.

Refitting front wheel.

(Illustrations 27 and 28)

Remove the brake pad wedge or spacer from the caliper, place the wheel in position from the front and guide the disc between the brake pads. Replace the wider bright plated spacer and dust cover at the disc side and the other

spacer and dust cover at the right side. Line up the wheel with the fork members, grease and slide the axle in from right to left. Fit the large axle nut (plain end inboard) and secure. Note: there is no washer at this point. At this stage the motorcycle should be taken off the stand and the forks compressed several times to centralise the axle. Tighten the pinch bolt on the right fork leg, taking care not to overtighten as there is a risk of fracturing the lug.

It is essential to apply the brake several times to restore full pressure before the brake is returned to service.

Brakes

Disc brake maintenance

The disc brakes function by the pressure of friction pads against the disc attached to the front wheel hub. As the brake is applied, brake fluid from the master cylinder reservoir is forced through the brake line to the caliper to force the frictionpads against the disc.

The brake requires no adjustment since wear on the pads is compensated for by extra brake fluid passing from the master cylinder reservoir into the system.

Caution

Replace the friction pads when the lining material is worn to a minimum thickness of $\frac{1}{16}$ in. (1.5 mm).

Should the brake become "spongy" in operation or have excessive lever travel, the brake hydraulic system should be examined and rectified by your Norton dealer.

Rear brake pedal adjustment.

(Illustration 29)

Adjustment of pedal height is made on the rear master cylinder piston rod.

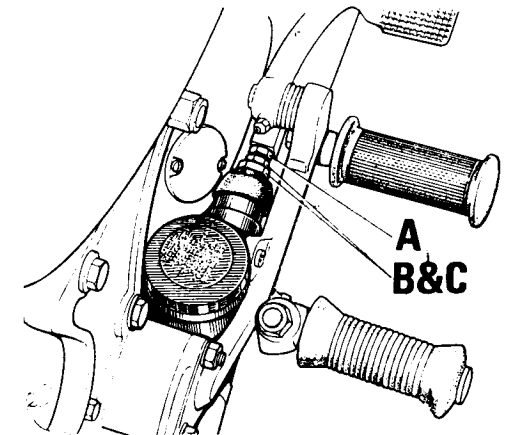


ILLUSTRATION 29

Slacken the locknut (A) and adjust as required using nuts B & C which are locked together during manufacture and which must not, under any circumstances, be turned in relation to each other. Disturbing this relationship will alter piston stroke and may render the brake inoperative. After adjustment retighten the locknut.

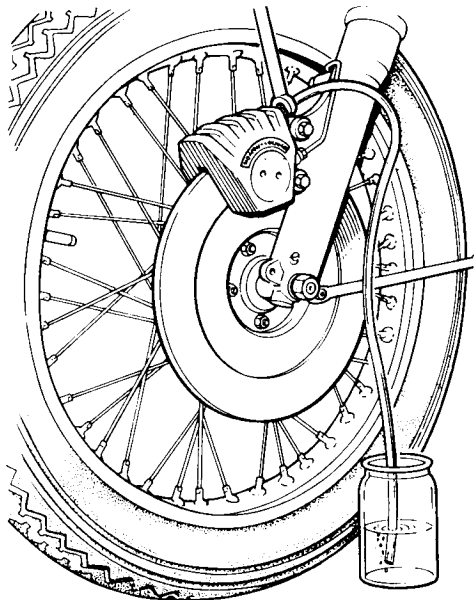


ILLUSTRATION 30

Disc brake—bleeding and flushing

Bleeding procedure

Purging of air from a hydraulic system, commonly known as 'bleeding', should only be necessary when some part of the system has been disconnected, or after the fluid has been drained off and renewed. However, in normal service, should the presence of air in the system be indicated by a 'spongy' brake effect, the cause should be traced and rectified.

Warning

Fill the master cylinder supply tank using only brake fluid to USA DOT 3 specification, (Lockheed Series 329 brake fluid Norton Part No. 063111) and keep topped up throughout the operation, otherwise air may be drawn into the system, necessitating a fresh start.

Attach a suitable length of clean rubber or plastic tubing to the bleeder screw of the hydraulic unit, and allow the other end of the tube to be submerged in a small quantity of new fluid contained in a glass jar. Open the bleeder screw half

a complete turn (*Illustration 30*). The procedure is the same for both front and rear brakes.

Apply the brake slowly, allowing it to return unassisted. Repeat the pumping action, with a slight pause between each stroke. When stopping the pumping action such as for refilling the master cylinder or when clear fluid, free of air bubbles, emerges from the tube, tighten the bleeder screw whilst the brake lever is fully pulled to the handlebar or in the case of the rear brake, the pedal is fully depressed.

Verify that the master cylinder supply tank is replenished to the correct level. **FLUID BLED FROM THE SYSTEM MUST BE DISCARDED.**

The above procedure applies equally to front and rear brakes.

Flushing procedure

Every eighteen months, or after every 24 000 miles, whichever occurs first, the fluid in the hydraulic system should be renewed with the Lockheed series 329 brake fluid, Norton part number 063111.

Brake fluid, particularly disc brake fluid, absorbs water from the atmosphere; accordingly, fluid must only be exposed during the time taken to fill the system. It is also most important that the greatest care is taken to prevent dirt from entering the system during the filling operation.

Follow the 'bleeding' procedure until new clean fluid emerges from the flexible tube, thus establishing complete renewal of the fluid.

If the fluid in the system is contaminated by mineral oil (engine oil) or other spurious fluid, the complete hydraulic system must be stripped. Hydraulic assemblies must be renewed or overhauled as detailed in the workshop manual, and flexible hoses replaced. Furthermore, ensure that all metal fluid pipes are cleaned thoroughly before reassembling.

Electrical equipment

Ignition system

The Commando is equipped with a 12 volt electrical system but uses 6 volt ignition coils with a ballast resistor so that an adequate spark is available even under the most adverse conditions.

Should the battery fail completely the electrolytic capacitor will provide starting, running and direct lighting, supplementary accessories such as parking lights being excepted.

Capacitor (Lucas 2MC)

The capacitor is an electrolytic polarised type spring mounted to the rear of the battery and it is important that the correct wiring connections are made. The connections are dissimilar in size, the $\frac{3}{8}$ in. (4 mm) connector being the positive ground terminal with the connection rivet marked in red. The $\frac{1}{4}$ in. (6 mm) double terminal is the negative. The capacitor must always be fitted with the terminals downwards and the battery should be disconnected and the lead insulated when used.

A faulty capacitor may not be apparent when the battery is connected in circuit and it is advisable to check periodically that it is serviceable by disconnecting the battery. The machine should start in the usual manner and full lights should be available with engine running.

Alternator (Lucas RM23)

The alternator consists of a rotor and stator, the rotor being driven from the drive end of the crankshaft. The whole assembly is housed within the primary chaincase. The stator windings are in bonded resin and need no attention except to check the snap connectors.

Rectifier (Lucas type 2DB406)

The half wave rectifier converts the alternating current generated by the alternator into direct current for charging the battery. It requires no attention except to ensure that the fixing nut is tight. The nuts holding the plates together must on no account be interfered with as their tension has been carefully set during manufacture to give the best possible rectifier performance. The rectifier is attached to the rear of the frame and is accessible when the seat is lifted.

Ballast resistor

The ballast resistor is located across the front of the ignition coil mounting. Its function is to protect the 6 volt ignition coils from damage by an otherwise 12 volt system.

The resistor requires no maintenance other than an occasional check on the security and cleanliness of the terminals.

Battery (Part No. 063300)

The 12 volt positive-earthed battery has a capacity of 14 ampere/hours. At two week intervals, more frequently in hot climates, the level A of the electrolyte should be checked. If necessary, add distilled water to maintain the level indicated on the side of the transparent battery case. Do not use tap water as this may contain impurities harmful to the battery. Never use a naked light when examining the cells. (*Illustrations 5, page 10*)

If the machine is to be out of use for a lengthy period, have the battery fully charged and give it a short refreshing charge at 1 ampere about every two weeks. This will suffice to keep the battery in serviceable condition. When the battery is fully charged, the specific gravity of the electrolyte should be 1.270/1.290

at 60°F (16°C).

The battery terminals (red positive earth: brown/blue live) must never be reversed otherwise the equipment will be damaged.

Norton Villiers Triumph Limited and its distributors cannot accept responsibility for damage to parts caused by overfilling with acid.

The vent pipe must be kept connected to the battery.

Running with battery disconnected

Before running the machine with the battery disconnected, the battery negative lead must be insulated to prevent it shorting to earth on any part of the machine.

Fuses

A 35 amp. fuse is fitted in the negative battery lead close to the battery terminal.

Zener diodes

(Located on footrest plates). When the battery is in a low stage of charge, the zener diodes allow current from the alternator to reach the battery until it becomes fully charged, when the current is diverted to the zener diodes.

If an electrical load such as the lighting system is switched on, a reduced amount of current flows through the diodes, the balance being diverted to feed the load. If the load is heavy enough, the diodes will become virtually non-conductive and the whole of the current generated by the alternator will go to meet the demands of the battery and equipment.

If either zener diode is disturbed it is important that the fixing nut is tightened to a torque loading of not more than 28 in/lb and not less than 24 in/lb. In addition the seating face must be true and free from burrs. It is most important that the earth lead is not fitted between the face of the zener diode and the footrest plate.

When refitting the zener diode, a thin smear of silicone compound of the type used in the radio/electrical trade should be applied to the mating surfaces of the diode and footrest plate.

Direction indicator set

(All models as market requirement or at customer's option.)

Flashing direction indicators are provided front and rear, operated by the switch on the right handlebar control cluster.

The flasher unit (Lucas type 8FL) is located in the headlamp. The flasher unit requires no maintenance, being a sealed unit.

Capacitor pack

The two condensers are mounted in a pack (Lucas type 2CP) which is mounted behind the ballast resistor on the coil cluster bracket. The rubber cover can be removed easily to gain access to the individual condensers.

Charge warning light assmilorator

The assmilorator is rectangular in form and is mounted behind the left side panel. The unit is sealed and requires no attention though whenever the tank is removed or the throttle or clutch cables are changed, the security of the spade terminals should be checked. For markets requiring lights on whenever the engine is tuning, this unit provides the facility.

Starter

Keep the cable connections clean and tight. Periodic lubrication is not required. When the engine is dismantled for general overhaul, the starter motor should also be overhauled (see Workshop Manual). Occasionally check security of the mounting bolts.

Neutral indicator switch

Fitted beneath the gearbox inner cover, this switch is pre-set on assembly and should not be re-adjusted. The only maintenance required is to ensure good electrical connections.

Light Bulbs

Headlamp (SS700P or MCH 66)

The type of bulb fitted may be varied to suit the lighting regulations of different countries.

Bulbs:

Conventional filament bulbs:
UK, USA, Canada: Type 370.
Continental (not France): Type 410.
France only: Type 411.
Quartz-Halogen type bulbs:
UK, USA, Canada: Type 463.
Continental: Type 472.

CAUTION: Using quartz-halogen bulbs without the special light unit will give impaired lighting. See your Norton dealer for conversion details.

To gain access to the bulb, unscrew the front headlamp rim fixing screw at the top of the rim. Take off the front rim and light unit, removing the upper part first. Remove the adaptor by pressing inward and turning to the left. The bulb can now be taken out. On quartz-halogen and Continental headlamps, pull the adaptor free of the bulb and release the bulb retaining clip to remove the bulb.

Parking light

Lucas 12 volt 6 watt No. 989.

Remove the light unit assembly as described above. The bulb holder is a push fit in the reflector.

Indicator repeater light, Ignition warning light, Hi-beam warning light, Neutral indicator-light

Each warning light has integral bulb unit which is not intended to be renewed separately. If a warning light should fail, fit a new coloured unit complete with bulb. Access can be gained simply from beneath the console. To replace, detach the two spade terminals and prise the holding clip free of the light body. When fitting the new light, ensure the clip is fitted to the body so that it is a tight fit to the console and can not rattle.

Stop/tail lamp

Bulb Lucas 12 volt 6/21 watts No. 380.
Remove the lens by unscrewing the two retaining screws. The bulb has offset securing pins to ensure correct location in the bulb holder. To remove the bulb, press in and turn.

Speedometer bulb

12 volt 2.2 watts No. 643.

After pulling down the PVC instrument case bottom cover, the bulb holder is merely a push-in fit to the bottom of the instrument and the bulb a bayonet fitting into the holder.

Tachometer bulb

12 volt 2.2 watts No. 643.

Bulb removal is similar to that for the speedometer.

Direction indicator bulb

Lucas 12 volt 21 watts.

Care must be taken when refitting the lenses that the screws are not over-tightened, resulting in splitting.

Tracing trouble

Engine fails to start, or is difficult to start, may be due to :

Ignition not switched on.
Electrical short.
Water on high-tension coils or contact breaker.
Moisture on spark plugs.
Oiled up, or fouled, spark plugs.
Throttle opening too large.
Carburetor pilot jet choked.
Air lever in open position or bad air leak at carburetor joints.
Lack of fuel because of insufficient flooding.
Lack of fuel because pipe, or tap, obstructed.
Excessive flooding of carburetor (with hot engine only).
Valve not seating properly.
Contacts points dirty.
Incorrect contact point gap.
Kill switch at "off" position.

Engine misfire may be due to :

Defective or oiled spark plugs.
Defective engine-to-frame earth wire.
Defective spark plug wire.
Incorrect contact point gap.
Contact breaker points loose.
Oil on contact breaker points.
Rocker adjustment incorrect.
Water in carburetor.
Air filter clogged.
Broken wire shorting on frame.
Partially obstructed petrol supply.
Disconnected carburetor balance pipe.

Loss of power may be due to :

Faulty spark plugs.
Lack of oil in tank.
No rocker clearance, or too much clearance.
Weak or broken valve spring.
Sticky valve system.
Valve not seating properly.
Brakes adjusted too closely.
Badly fitting or broken piston rings.
Punctured carburetor float

Engine carbonised.
Retarded ignition.
Clogged air filter.
Unsuitable fuel.

Engine overheats may be due to :

Lack of proper lubrication. (Quality or quantity of oil).
Faulty spark plugs.
Air control to carburetor out of order.
Punctured carburetor float.
Engine carbonised.
Weak valve springs.
Pitted valve seats.
Worn piston rings.
Ignition setting incorrect.
Automatic timing control faulty.
Low octane fuel.

Engine stops suddenly may be due to :

Water on high tension coils or spark plugs.
Loose coil connections
No petrol in tank, or choked petrol supply. Vent hole in petrol tank filler cap choked.
Choked main jet.
Water in carburetor float chamber.
Oiled up or fouled spark plugs.

Electric starter does not function may be due to:

Badly discharged battery.
Bad electrical connections.
Excessive engine oil viscosity.

Excessive petrol consumption

Excessive petrol consumption may be due to :

Leaks in the petrol feed system. (Damaged fibre washers, loose union nuts on piping, defective float needle action).
Incorrect ignition setting. (Ignition not advanced sufficiently).

Steering unsatisfactory

Wheels out of alignment.
Front and/or rear tire tread not correctly manipulated to run true with wheel (causes handlebar oscillation at low road speed).
Tire treads worn flat.
Excessive luggage mounted too high or too far back.
Wheels out of balance.
Loose front or rear wheel spindle or wheel bearings.
Slackness of steering head bearings and swing arm spindle bushes.
Unequal suspension action caused by incorrect quantity or grade of oil in fork or dissimilar rear suspension unit settings.
Loose spokes — front and rear wheels.
Loose engine bolts.
Loose or broken engine head steady.
Isolastic mounting clearances in excess of 0.010 in. (0.254 m.m.)

Disc brake "spongy"

Air in brake hydraulic system.
Brake requires bleeding.

Abnormal tire wear

Abnormal tire wear may be due to :

Incorrect tire pressure.
Wheels not in alignment.
Harsh driving methods. (Misuse of acceleration and braking).

