



# PANTHERS

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## *Maintenance Manual*

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Price 1/6

MODELS 65 and 75 RIGID FRAME  
1953 - 1954 - 1955 - 1956

MODELS 65 and 75 SPRING FRAME  
1953 - 1954 - 1955 - 1956





# PANTHERS

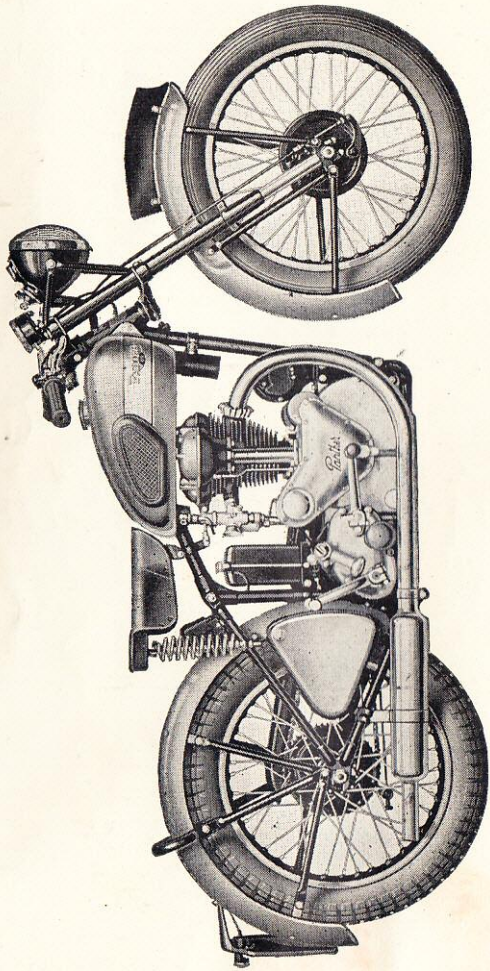
— Models 65 and 75 —

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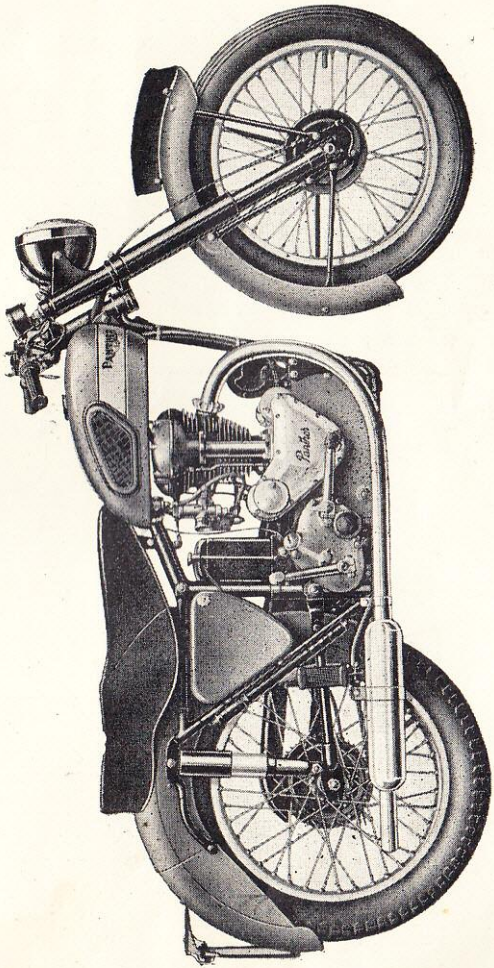
PHELON & MOORE LIMITED  
CLECKHEATON  
YORKS.

Telephone : Cleckheaton 970/1

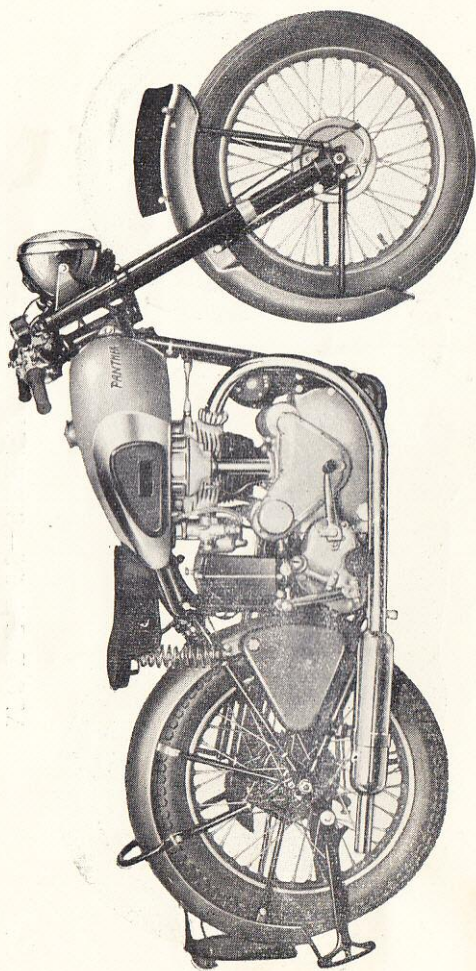
Telegrams : "Geared Cleckheaton"



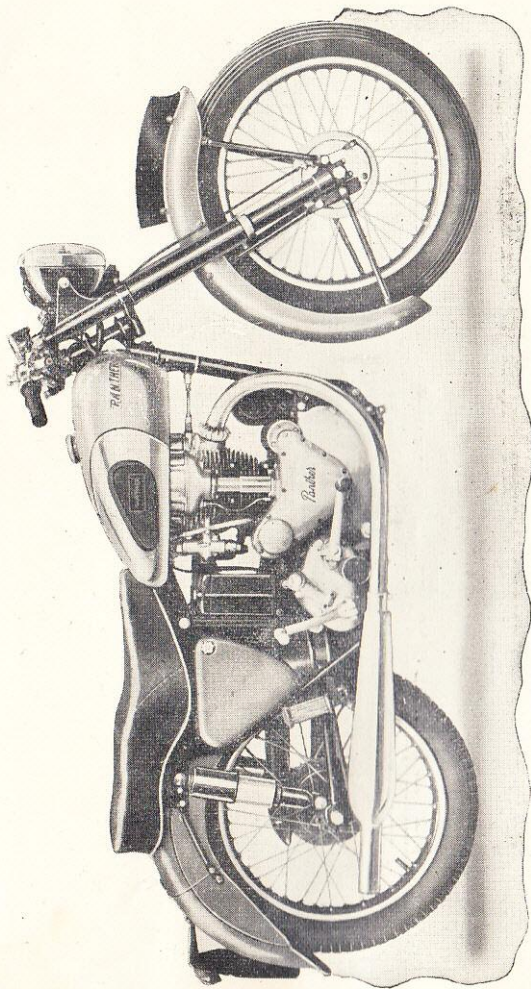
MODEL 65—RIGID



MODEL 65—SPRING FRAME



MODEL 75—RIGID



MODEL 75—SPRING FRAME





# INTRODUCTION

PANTHER MOTOR CYCLES are designed to give unfailing reliability and exceptionally long life. In operation they are as simple as it is possible for any high efficiency motor cycle to be, but, to obtain the full service of which they are capable, experience and understanding of the adjustments provided in their design are necessary.

Careful study of this booklet by both experienced rider and novice will repay them in the greater pleasure and longer life they will obtain from their machines by understanding them thoroughly.

Riders should not hesitate to write to us on any matter to enable them to obtain every satisfaction from their machines, and we are pleased at all times to give advice and assistance. Remember that in all correspondence it is essential always to quote engine number, which will be found stamped on the left hand side of the oil sump. It should be noted that only the engine number will enable us to identify the machine, registration numbers are useless for this purpose.

## INDEX

	Section	Page
Data	.. .. .	8
Taking Machine Over	.. .. .	9
Controls	.. .. .	10
Starting	.. .. .	10
Running In	.. .. .	11
Lubrication	.. .. .	14
Running Adjustments	.. .. .	18
Electrical Equipment	.. .. .	24
Forks	.. .. .	27
Decarbonization	.. .. .	33
Tracing Troubles	.. .. .	37

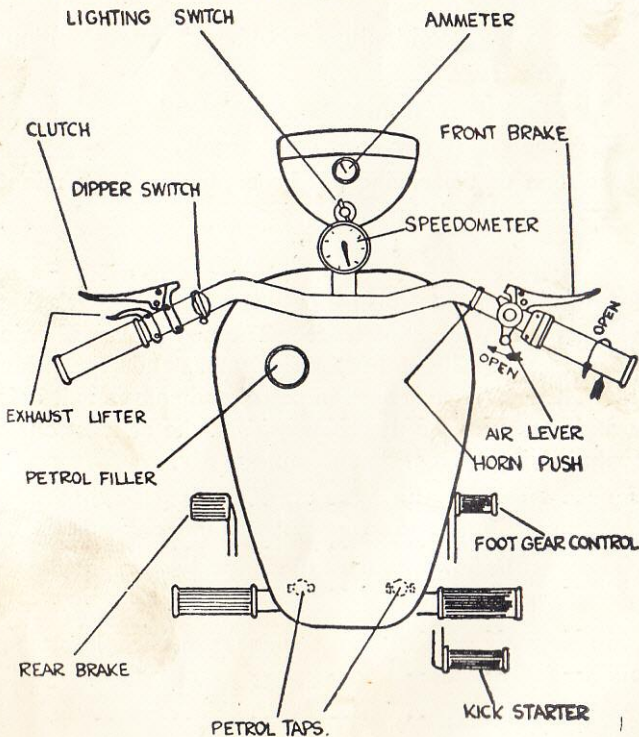
# DATA

MODEL .. .. .		65	75	75
Capacities	Petrol .. ..	1953-54 2 $\frac{7}{8}$ galls.	1953 2 $\frac{7}{8}$ galls.	1954 3 $\frac{1}{4}$ galls.
	Oil .. .. .	2 $\frac{1}{2}$ pts.	2 $\frac{1}{2}$ pts.	2 $\frac{1}{2}$ pts.
	Gear Box .. ..	8 ozs.	$\frac{3}{4}$ pts.	$\frac{3}{4}$ pts.
Tyres	Front .. ..	26" x 3.25"	26" x 3.25"	26" x 3.25"
	Rear .. .. .	26" x 3.25"	26" x 3.25"	26" x 3.25"
Rims	Front .. ..	19" x 2.50"	19" x 2.50"	19" x 2.50"
	Rear .. .. .	19" x 2.50"	19" x 2.50"	19" x 2.50"
Weight .. .. .		304	310	320
Chains Front	Pitch .. ..	$\frac{1}{2}$ " x .305"	$\frac{1}{2}$ " x .305"	$\frac{1}{2}$ " x .305"
	Links .. ..	64	68	68
Chains Rear	Pitch .. ..	$\frac{1}{2}$ " x .305"	$\frac{1}{2}$ " x .305"	$\frac{1}{2}$ " x .305"
	Links .. ..	108	108	108
Minimum Piston Ring Gap .. ..		.010-.015	.010-.015	.010-.015
Tappet .. .. .	Inlet .. ..	Nil Cold	Nil Cold	Nil Cold
Clearances .. ..	Exhaust .. ..	Nil Cold	Nil Cold	Nil Cold
	In. opens before T.D.C.	10°	10°	25°
Valve .. .. .	In. closes after B.D.C.	45°	45°	60°
	Ex. opens before B.D.C.	65°	65°	60°
Timing .. .. .	Ex. closes after T.D.C.	15°	15°	34°
	Ignition .. ..	Full advance before T.D.C	35°	35°
Carburettor .. ..	Jet .. .. .	90	110	160
	Slide .. ..	4/5	5/4	6/4
	Needle .. ..	in 3rd grve.	in 3rd grve.	in 3rd grve.
Engine Sprocket .. ..	Solo .. ..	17	19	19
Plug .. .. .		K.L.G.F.70	K.L.G.F.70	K.L.G.F.70
Tyre Pressure .. ..	Front .. ..	16 P.S.I.	20 P.S.I.	20 P.S.I.
	Rear .. .. .	18 P.S.I.	20 P.S.I.	20 P.S.I.

# TAKING MACHINE OVER

On taking the machine over, the rider should first look over it, in order to see that all nuts and screws are tight, and check that all attachments are securely in position.

The next step to take is to fill the tank with petrol and see that the sump is full up to the correct mark on the dip stick mounted inside oil filler cap. Then see that the H.T. lead is firmly secured to the plug terminal, and in the case of coil ignition machines, check that the battery is charged by trying the lights. The riding position should then be tried and the footrests and handlebars moved until the most comfortable position is found. This is quite simply done by unscrewing the nuts on the clamping bolts and securing them tightly when the correct position has been found. The gear change lever (which is mounted on a splined shaft) should then be moved to ensure that it can be used with the minimum movement of the foot from the right hand footrest.



CONTROL DIAGRAM

## Controls

The controls on the machine are shown in the control diagram as would be seen by a rider mounted on the saddle. There are also two petrol taps under the tank, either one of which may be used as a reserve, and a small "tickler" on the top of the carburettor float chamber. The sump filler cap is on the forward left hand side of the crankcase.

## Starting

The machine should first be checked over as per the instructions in chapter on "Taking the machine over."

1. Ensure gear is in neutral position.
2. Open petrol tap (open only one; use the other for a reserve supply).
3. Depress tickler on top of carburettor float chamber until petrol just starts to come out of the bottom of the carburettor body.
4. In the case of coil ignition machines, turn on ignition key.
5. Close air lever.
6. Open throttle twist grip about one eighth.
7. Kick the kickstarter lever down firmly.
8. As soon as the engine has been running for a minute or two open the air lever fully.

## NOTE

The setting of the controls for easy starting is a knack that will quickly be acquired with experience. The new rider will gain this experience more quickly if he clearly understands the principles involved. The engine must suck in petrol and compress it before it will fire and therefore the flywheels must make at least one complete revolution before it will run continuously.

As it is only possible to operate the kickstarter through less than half a circle, a considerable muscular effort is necessary to turn the engine. If, however, the following advice is noted, starting should present no difficulties.

If you have to support the machine, your whole strength is not available for the job. Therefore it is easier to start with the machine on the stand.

The more friction, the greater the effort and cold oil is an effective brake on the movement of the piston. Therefore,

especially in cold weather, flood the carburettor and close the air lever (to obtain maximum suction on the jet). Then hold the exhaust valve lifter open and turn the engine over two or three times.

Now for the actual starting—but not at once. Make sure that the petrol in the float chamber is at normal level and that dripping has stopped, before you set your levers for the start. An engine cannot run on petrol, it requires gas and that gas consists of fourteen times as much air as petrol.

Now for our worst enemy—compression.

We must kick against compression because if we raise the exhaust lifter, i.e., keep the exhaust valve open all the time, the engine will not run at all.

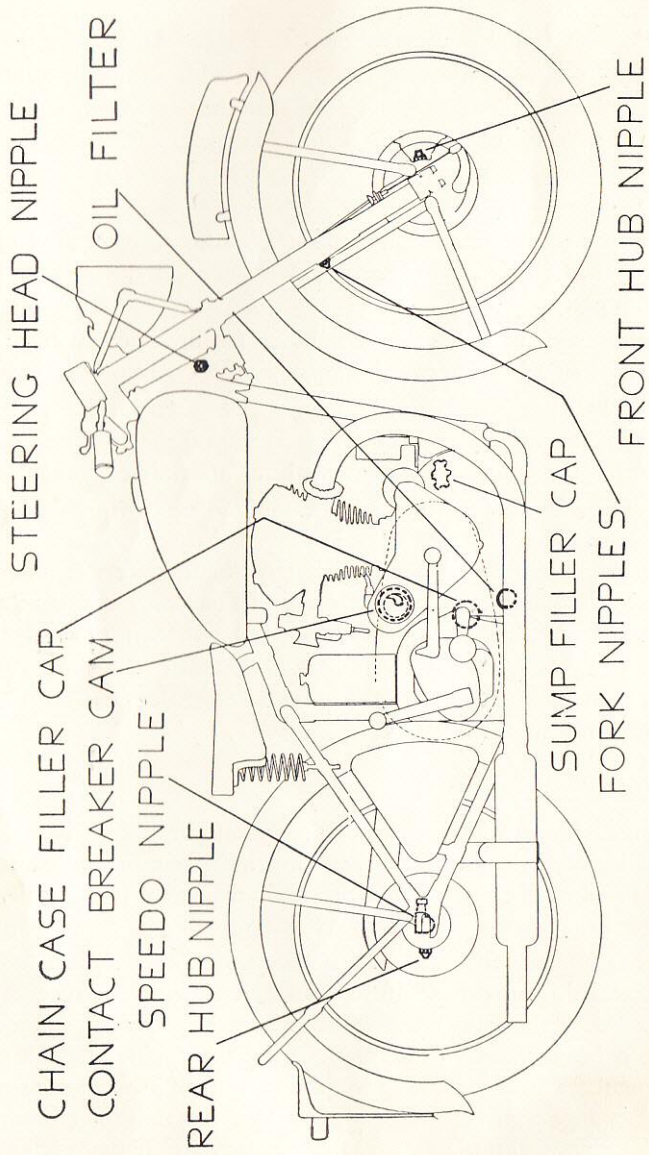
The only way to minimise the effort required to overcome compression is to admit the minimum amount of gas to the combustion chamber.

Now turn the engine with the kickstarter until the compression is felt, then lift the valve with the valve lifter and move the engine a fraction with the kickstarter. Release the valve lifter and then give the kickstarter a long swinging kick to start.

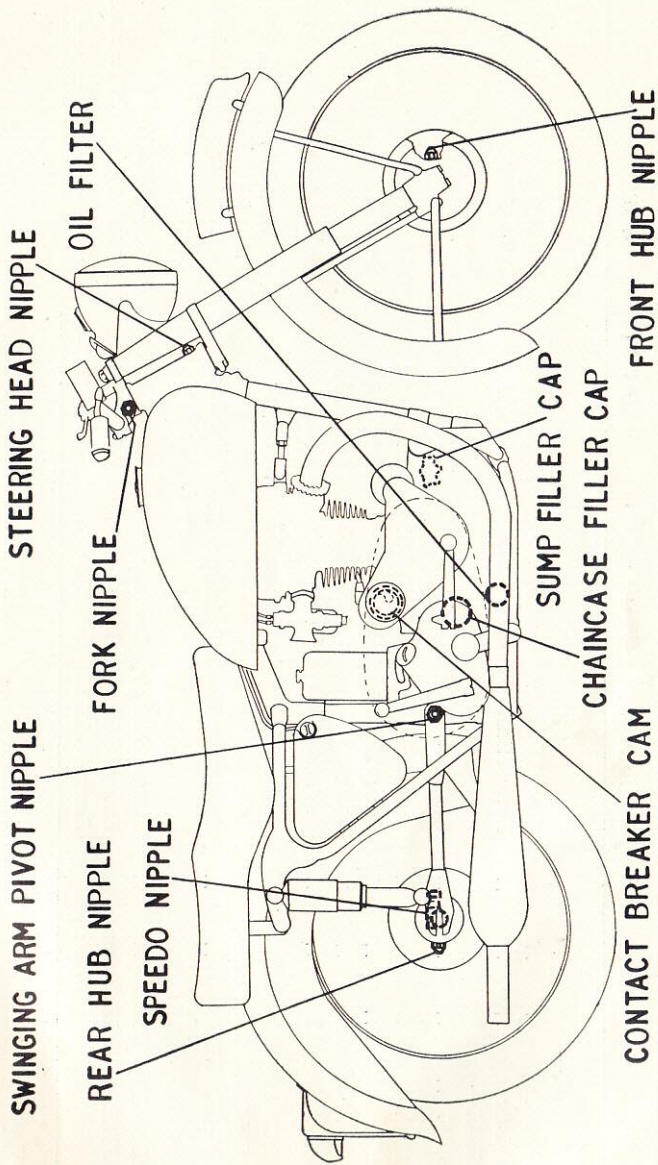
The greater the throttle opening the greater the effort required to start and it is therefore essential to learn (it can only be done by experience) the smallest throttle opening that will admit sufficient gas for quick and easy starting. A motor-cycle that is a consistently bad starter is in need of attention. The carburettor does not require flooding when the engine is warm.

## **Running in**

It is necessary to run the machine gently for the first few hundred miles in order to enable the working parts to bed down properly. Proper care during this period will greatly increase the length and satisfaction of the service you obtain from your machine. Do not exceed 30 m.p.h. or race the engine for the first 200 miles, and do not run at more than half throttle for the first 500 miles. After this short bursts of reasonable speeds may be used, these being increased in frequency until the engine feels quite free. Remember in the running-in period not to overload your engine, i.e., change gear before it starts to slog. See that the amount of work you give it to do is increased progressively. If there is any sign of “pulling up” (the first warning of seizure), declutch and close the throttle immediately.



LUBRICATION CHART (RIGID FRAME)



LUBRICATION CHART (SPRING FRAME)

# LUBRICATION

	B.P.	WAKEFIELD	VACUUM	SHELL	ESSO
ENGINE—U.K.—					
Summer .. .. .	Energol SAE 40	Castrol XXL	Mobiloil BB	X-100 40	Essolube 40
*Winter .. .. .	Energol SAE 30	Castrol XL	Mobiloil A	X-100 30	Essolube 30
OVERSEAS—					
Above 90°F. .. .. .	Energol SAE 50	Castrol Grand Prix	Mobiloil BB	X-100 50	Essolube 50
32°E. to 90 °F .. .. .	Energol SA 40	Castrol XXL	Mobiloil AF	X-100 40	Essolube 40
*Below 32°F. .. .. .	Energol SAE 30	Castrol XL	Mobiloil A	X-100 30	Essolube 30
GEARBOX—4 Speed .. .. .	Energol SAE 40	Castrol XXL	Mobiloil BB	X-100 40	Essolube 50
3 Speed .. .. .	Energol AO	Castrolase Medium	Mobilgrease No. 2	Retinax A or CD	Esso Grease
FRONT CHAIN & WHEEL HUBS	Engine Oil	Engine Oil	Engine Oil	Engine Oil	Engine Oil
REAR CHAIN, FORK SPINDLES					
& GREASE GUN .. .. .	Energol AO	Castrolase CL	Mobilgrease No. 2	Retinax A or CD	Esso Grease
DOWTY					
OLEOMATIC FORKS .. .. .	Energol SAE 20	Castrolite	Mobiloil Arctic	X-100 20/20W	Essolube 20
PANTHER FORKS (Summer)	Energol SAE 30	Castrol XL	Mobiloil A	X-100 30	Essolube 30
" " (Winter)	Energol SAE 20	Castrolite	Mobiloil Arctic	X-100 20/20W	Essolube 20
*For easy starting with MODEL 100 in cold weather—use .. .. .	Energol SAE 20	Castrolite	Mobiloil Arctic	X-100 20/20W	Essolube 20



If it is necessary to remove either upper or lower bearing, this may be done by unscrewing damper control bush—No. 10, when both bearings may be withdrawn. It will be observed on examination of the gland housing—No. 7, that there is a synthetic rubber sealing ring to prevent oil leakage, this is to restrain leakage of oil past the upper bearing and is not subject to high pressures, but it is advisable to replace this ring after disturbing. The cost is small and the rings are readily obtainable through our Spares Department or Agents. It is only necessary to insert a new ring in the gland housing prior to assembling lower tube, this ring is of circular section.

To reassemble, thoroughly clean the centre tube—No. 13, thread gland housing complete with sealing ring on tube, then upper bearing—No. 8, bottom bearing—No. 9, and finally control bush—No. 10, tightening this in position.

Thoroughly clean the inside of the bottom tube—No. 12, and pass over bearings, which should be smeared with oil, tighten gland housing outer tube, when doing this it will, of course, increase the friction on the centre tube, this should be tightened hard down, only push the tube backwards and forwards so as to free the gland rubber on tube. Insert felt washer in groove on gland housing and place copper washer—No. 6 on upper ends of centre tube, this can be fixed in position by smearing the washer with oil. Pass spring over centre tube, having thoroughly greased same. Insert leg through bottom spectacle into recess on top spectacle.

To facilitate assembly of the legs a draw bolt is available through our Spares Department. This should be passed through top spectacle, with nut screwed as far on the bolt as possible, the bottom end is then screwed into the top of centre tube. Then screw nut on draw bolt against top spectacle and draw the leg up against the facing, before removing the draw bolt, tighten pinch bolt—No. 5, to prevent the leg slipping back.

When both legs are in position with legs fully extended, pour  $\frac{1}{3}$  pint of clean engine oil S.A.E. 40 into each leg and insert filler plugs with copper and steel washer under head. Replace the wheel and brake anchor screw, remove the packing box from under the engine and bounce the forks with the wheel on the ground.

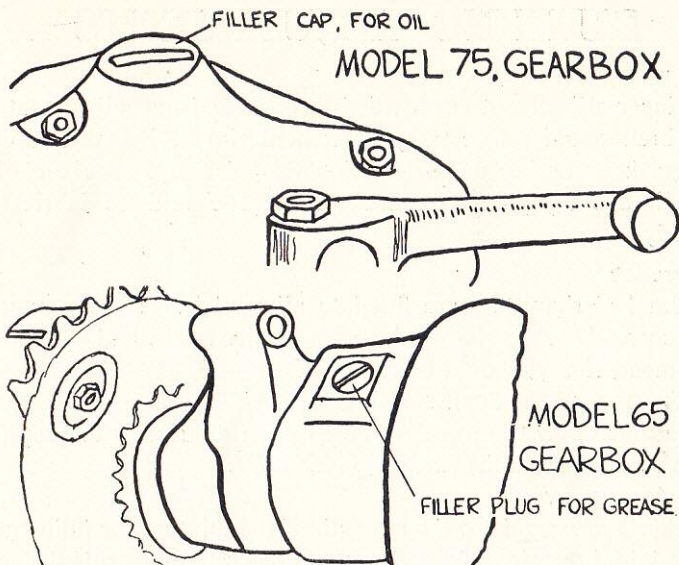
To replace the wheel screw up the nuts locating axle caps to finger tightness only. Tighten the axle nuts on the brake drum side so that the wheel is held tightly against the side of the axle fitting. Now tighten axle cap on this side only. Tighten near side axle cap, replace brake cable and adjust.

## PANTHER TELESCOPIC FORK

“ Panther ” forks employ normal type springs as their suspension medium and are oil damped on both compression and rebound to suppress undue oscillation, they are of robust and simple construction, requiring a minimum of maintenance. All forks are despatched from the works in roadworthy condition and should require no attention for several thousands of miles, although they may appear rather stiff at first: this is due to the bearing fits, but after approximately 5,000 miles they will be quite free. If, however, the stiffness still persists, then the oil should be drained by means of the drain plugs—No. 1, to be found at the bottom of each leg. Remove this and work the fork up and down until all the oil is drained. Place a box or bricks underneath the frame so as to lift the forks sufficiently high as to allow the wheel to clear the ground when the legs are fully extended. Remove the filler plug No. 2, situate at the top of each leg and pour in approximately  $\frac{1}{2}$  pint of engine oil S.A.E.40, replace copper washer and filler plug whilst legs are fully extended, remove box from underneath frame and work the forks up and down several times. Should the operation be too stiff then drain a small and equal amount of oil from each leg. This should only be done after covering say 100 miles, as if too little oil is in the legs undue bottoming of the forks will occur under extreme load.

### TO DISMANTLE FORKS

Prop machine up by means of a box or bricks under the frame, sufficiently high to lift the front wheel clear of the ground when legs are fully extended. Remove nuts—No. 3, and wheel spindle bearing caps—No. 4, to enable wheel to be taken away. Remove filler plug—No. 2 from top of each leg, slacken clinch bolts—No. 5, in bottom spectacle, the legs can then be withdrawn for inspection, care must be taken not to lose the copper washer—No. 6, fitting on top of each leg as well as under the filler plug. To inspect further, hold wheel spindle bearing and by means of tommy bar or special spanner, remove gland housing—No. 7, when the inner tube can then be withdrawn revealing upper and lower bearings—Nos. 8 and 9, along with damper control bush—No. 10. Damper control spindle—No. 11, will be retained in bottom tube—No. 12. It should never be necessary to remove or replace this component since no metal contact should occur. When it is necessary to carry out this inspection it will be observed there is a small bleed hole in the centre tube—No. 13, situate just above lower bearing and this should be clear.



Miles	Point	Type of Lubricant
Every 250	.. Check Sump .. ..	Engine oil
.. 500	.. Fork Nipples .. ..	Grease
.. 500	.. Spindle Pivot .. ..	Grease
.. 500	.. Suspension Units ..	Oil
.. 500	.. Check Chaincase Level .. ..	Engine oil and Paraffin
.. 1000	.. F. & R. Hubs .. ..	Engine oil (a few drops only)
.. 1500	.. Gearbox .. ..	3-speed—Grease 4-speed—Engine oil xxl.
.. 2000	.. Clean Filter and change engine oil .. ..	Engine oil
.. 3000	.. Disconnect speedo cable, grease and replace speedo gear-box .. ..	Grease
.. 3000	.. A small amount steering head nipples ..	Grease
.. 5000	.. Contact breaker cam	Smear Vaseline

# RUNNING ADJUSTMENTS

## Brakes

Finger adjustment is provided to back and nut adjustment to front brakes and unnecessary movement should be taken up in order to keep brakes up to their highest efficiency. Brake cables and all pivoting points on brake linkage should be lubricated regularly.

## Carburettor

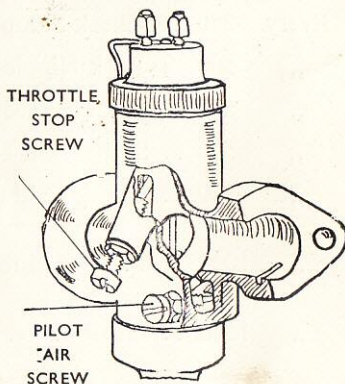
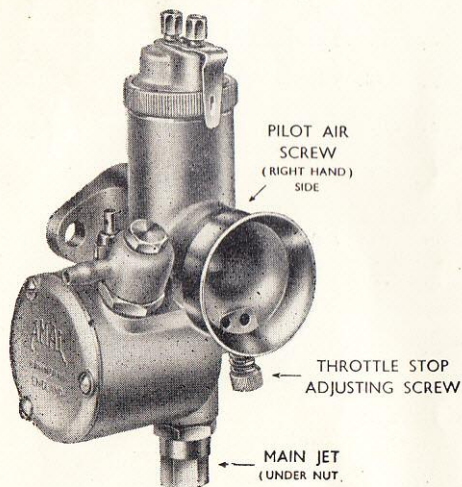
Amal Carburettors are fitted to all models. The instrument is set correctly when the machine leaves the works and very little adjustment, if any, should be required.

### THE THROTTLE STOP SCREW

Set this screw to prop the throttle open sufficiently to keep the engine running when the twist grip is shut off.

### PILOT AIR SCREW

This screw regulates the strength of the mixture for idling and for the initial opening of the throttle. The screw controls the suction on the pilot petrol jet by metering the amount of air that mixes with the petrol.



Full instructions for tuning the carburettor are contained in the leaflet published by Messrs. Amal.

## Air Filter

It is unnecessary to remove the complete VOKES air filter for servicing. The top cap should be unfastened and the 3-ply element removed and thoroughly washed in petrol or similar solvent. After

drying, immerse the cleaned element in thin, clean engine oil (of approximately SAE.20 grade) and allow to drain for about 15 minutes.

When reassembling, take particular care with the location of the felt sealing rings. At no point should the ends of the element overlap these rings on either the inner or outer periphery.

The air filter element should be cleaned after each 1,500-2,000 miles and replaced after every 10,000 miles.

### **Gear Box and Clutch**

A multi-plate clutch is fitted consisting of friction plates inserted with cork and interleaved with plain steel plates.

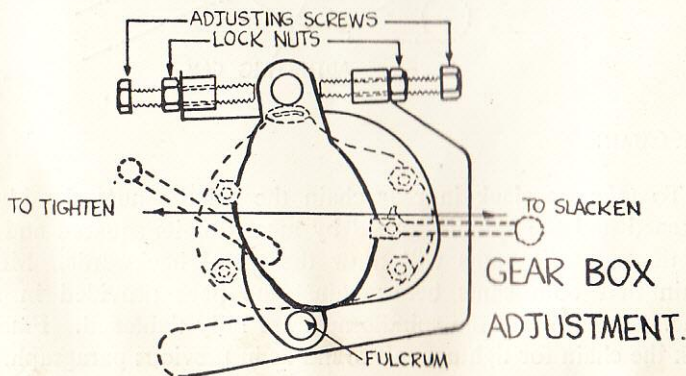
Clutch slip is usually due to mal-adjustment and it is important to see that the bowden Cable is free in its casing and that the clutch lever works freely.

In the process of running-in, the inserts in the plates bed down and the space between the plates is fractionally increased. It is therefore **MOST IMPORTANT THAT A CERTAIN AMOUNT OF SLACK MOVEMENT IS PROVIDED AND MAINTAINED ON THE HAND LEVER** to provide for this. If this is not done there will be a possibility of the clutch slipping, which will result in the inserts being burnt and requiring replacement.

The clutch springs should be adjusted so that the heads of the screws are just flush with the spring plate.

If the clutch does not free properly, this may be due to wear on the clutch rod, and adjustment of the cable should take care of this condition.

Full details of construction and overhaul of the Burman Gear-box can be obtained from the manufacturers. The three-speed box is type R.P., the four-speed box type C.P.

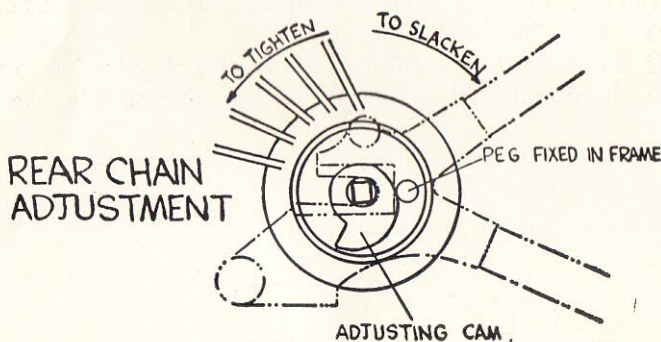


## Chains

### PRIMARY CHAIN

This is adjusted by pivoting the gear box on its bottom mounting. The procedure is to slacken the nuts on the bottom and top mounting bolts. Then unscrew the locking nuts on the two adjusting screws (on top of the gear box under the accumulator mounting). To tighten the chain the gear box is moved backwards and the rear screw is unscrewed a number of times. Then screw home the front screw until the correct chain tension has been obtained. Next screw in the rear screw to hold the box in its new position, and tighten up all the locking nuts. There should be a minimum of  $\frac{3}{8}$  in. up and down movement all round the chain. To do this turn engine on footstarter, checking every few inches. Minimum slack should be given at tightest point.

The inspection cap on the chain case should be removed every 500 miles and the chain examined to see if it is being properly lubricated. If it is running dry, pour oil ( $\frac{1}{4}$  pint) into the chain case to enable the bottom run on the chain to dip into it as it goes round.

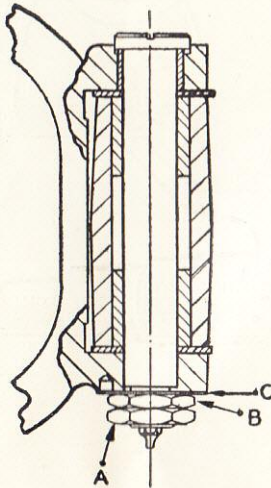


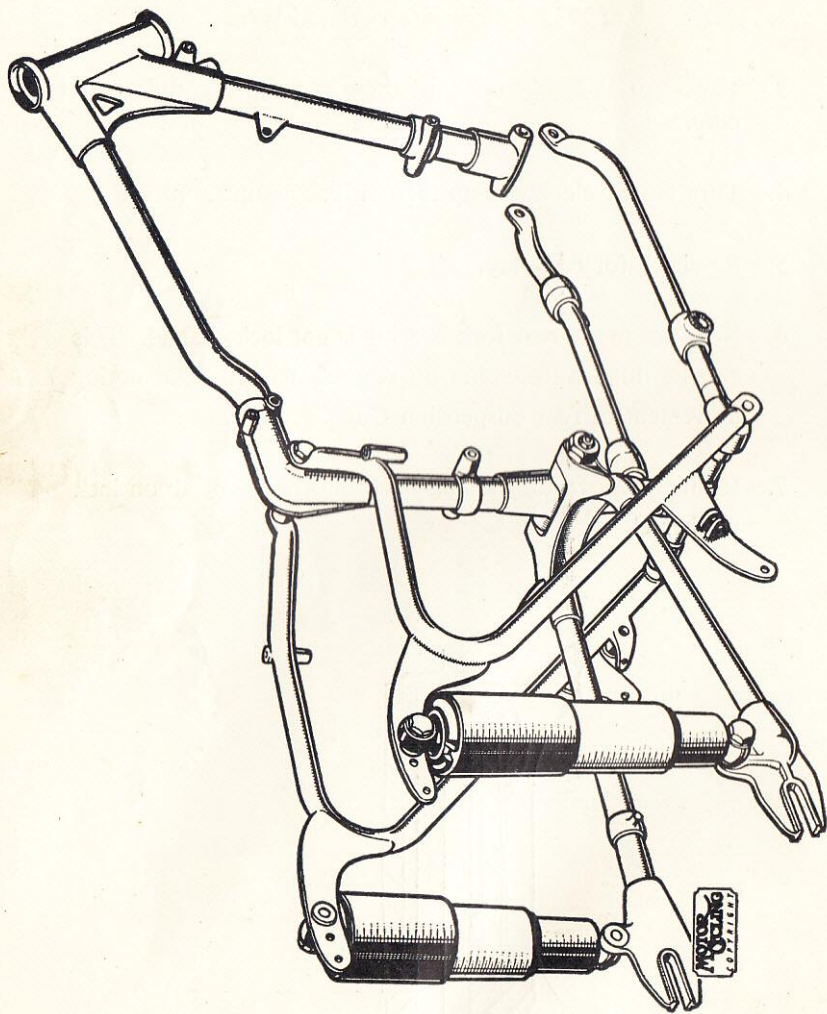
### REAR CHAIN

To take up slack in rear chain the spindle nuts should be slackened and the spindle turned by means of its squared end so that the eccentric cams will draw the wheel backwards. Make certain that both cams bear against the pegs provided in the frame. Be sure that the spindle nuts are fully tightened. Finally check the chain for tightness all round as in previous paragraph.

## To adjust Swinging Arm Bearing for Side-play

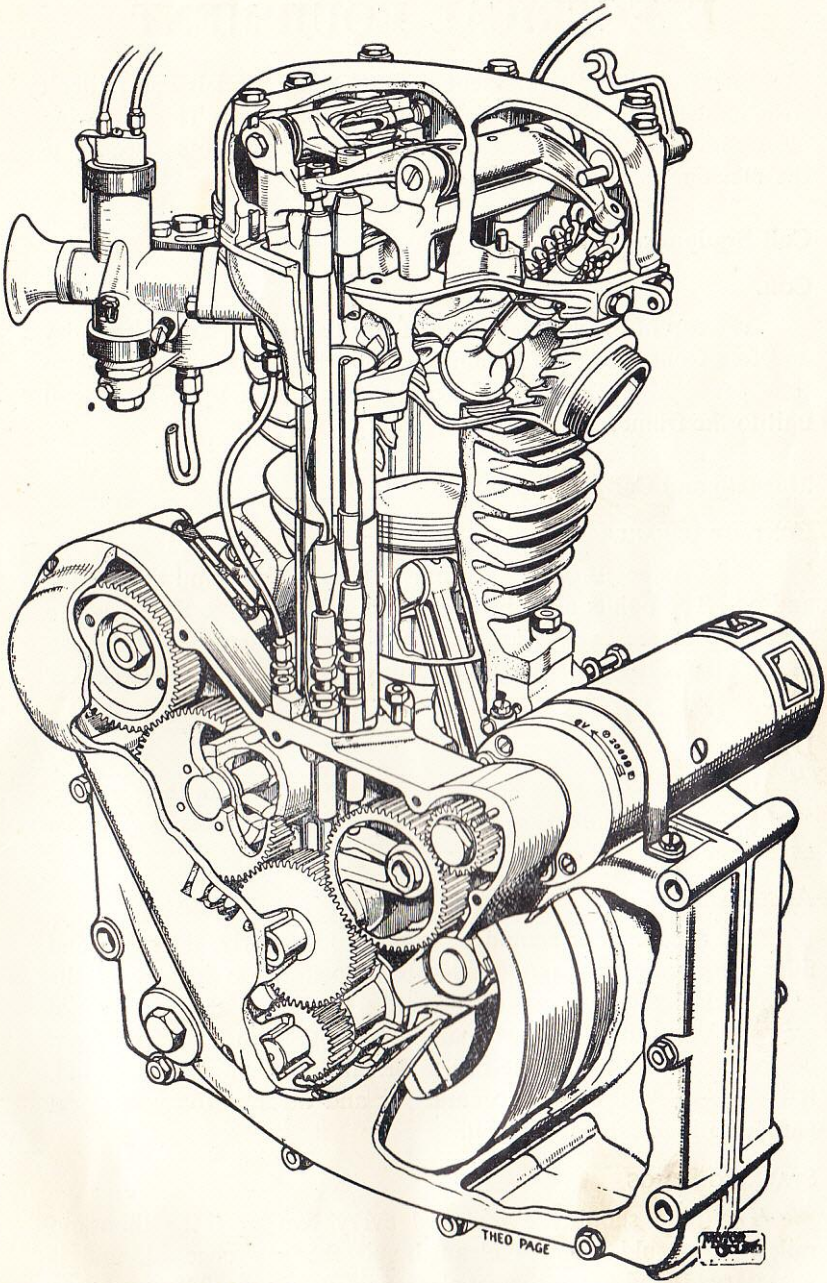
1. Knock down securing tab on lock washer C.
2. Release Nut A anti-clockwise one half turn.
3. Turn Nut B clockwise until there is no perceptible end-play.
4. Turn Nut A clockwise up to, and lock against, Nut B.
5. Re-check for end-play.
6. Now test to see rear fork bearing is not locked solid. This can be done by pressing on rear of machine and noting movement of rear Suspension Units.
7. If this is satisfactory knock back into position tab on lock washer C.





By courtesy of "MOTOR CYCLING"  
**MODEL 75 SPRING FRAME**





By courtesy of "MOTOR CYCLING"

**MODEL 75 350 c.c. ENGINE**

# ELECTRICAL EQUIPMENT

Lucas electrical equipment is fitted to all models and is dealt with in detail in booklets published by this firm. The following information is given to assist in carrying out routine service while the machine is on the road.

## **Coil Equipment Only**

### COIL

The cap of the coil and the H.T. lead should be kept clean, dry and free from oil. The terminals should be checked from time to time for tightness, as should be the clamp that secures the coil unit to the frame.

## **Magneto and Coil Equipment**

### CONTACT BREAKER

The Contact Breaker Cap must be kept clean and dry, inside and out. The points must be checked regularly to see that they are set at the correct gap. Care should be taken when lubricating the moving parts that no excess lubricant is left in the contact breaker head.

### DYNAMO

See that the brushes are clean and work freely in their guides. See that the commutator is kept clean and brushes bed down evenly on to it.

### ACCUMULATOR

The accumulator should be examined regularly, the cover and filler plugs removed and the levels topped up to just cover the plates, when this is necessary use only distilled water, and do not over-fill. See that the terminals are kept clean and free from corrosion. If your machine has to be laid up for any long period, it is best to remove the accumulator and arrange for your local garage to look after it for you.

### SPARKING PLUGS

The plug should be removed every two or three thousand miles. It should then be cleaned and the gap checked, and if necessary altered to the correct clearance, .018 in. or .025 in. when a suppressor is fitted.

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To reassemble, thoroughly clean the centre tube—No. 13, thread gland housing complete with sealing ring on tube, then upper bearing—No. 8, bottom bearing—No. 9, and finally control bush—No. 10, tightening this in position.

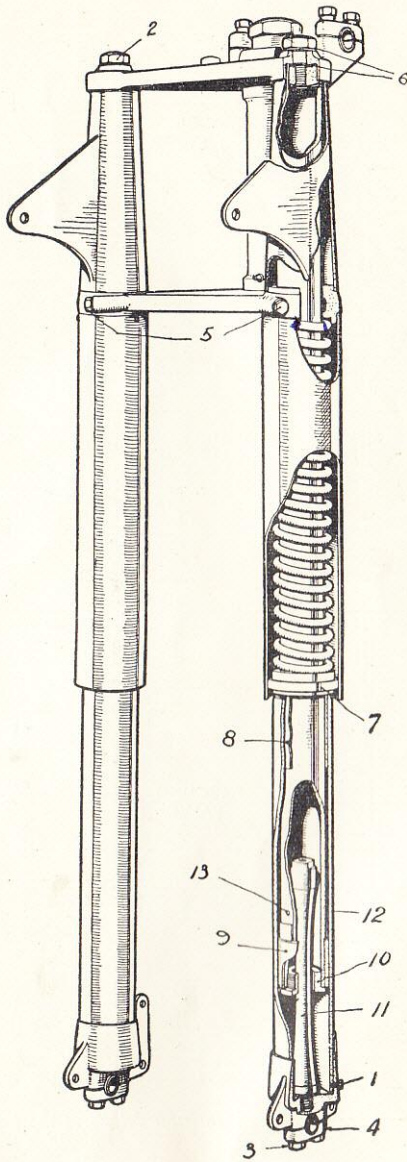
Thoroughly clean the inside of the bottom tube—No. 12, and pass over bearings, which should be smeared with oil, tighten gland housing outer tube, when doing this it will, of course, increase the friction on the centre tube, this should be tightened hard down, only push the tube backwards and forwards so as to free the gland rubber on tube. Insert felt washer in groove on gland housing and place copper washer—No. 6 on upper ends of centre tube, this can be fixed in position by smearing the washer with oil. Pass spring over centre tube, having thoroughly greased same. Insert leg through bottom spectacle into recess on top spectacle.

To facilitate assembly of the legs a draw bolt is available through our Spares Department. This should be passed through top spectacle, with nut screwed as far on the bolt as possible, the bottom end is then screwed into the top of centre tube. Then screw nut on draw bolt against top spectacle and draw the leg up against the facing, before removing the draw bolt, tighten pinch bolt—No. 5, to prevent the leg slipping back.

When both legs are in position with legs fully extended, pour  $\frac{1}{3}$  pint of clean engine oil S.A.E. 40 into each leg and insert filler plugs with copper and steel washer under head. Replace the wheel and brake anchor screw, remove the packing box from under the engine and bounce the forks with the wheel on the ground.

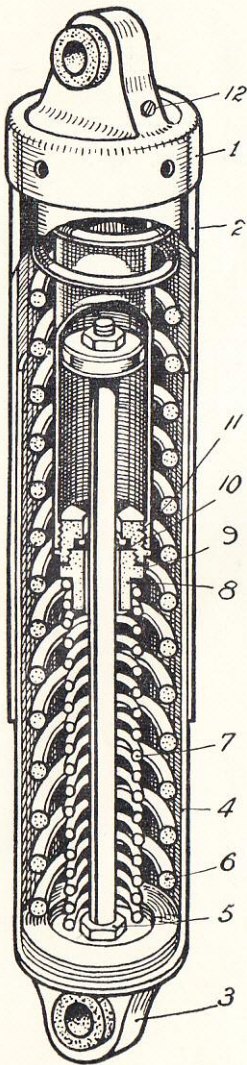
To replace the wheel screw up the nuts locating axle caps to finger tightness only. Tighten the axle nuts on the brake drum side so that the wheel is held tightly against the side of the axle fitting. Now tighten axle cap on this side only. Tighten near side axle cap, replace brake cable and adjust.

# PANTHER FORK

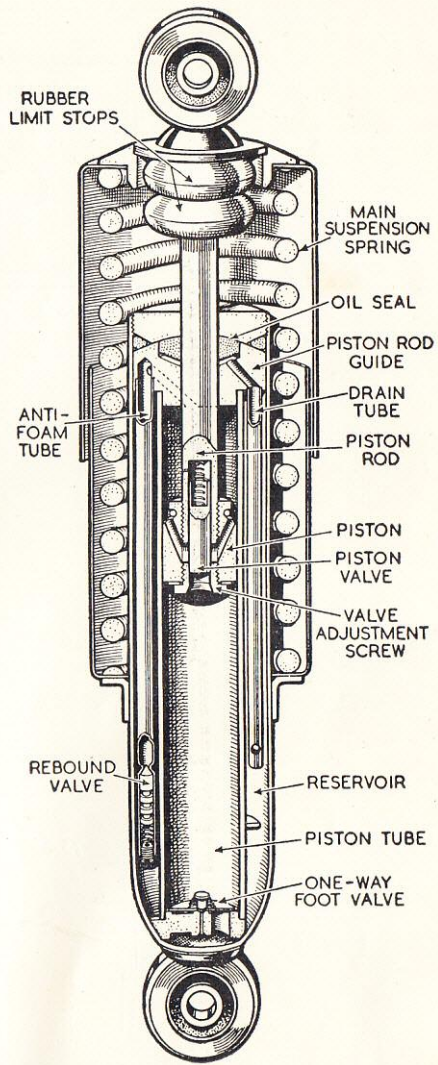


FRONT FORK

**P & M  
REAR SUSPENSION**



**ARMSTRONG  
REARSUSPENSION**



*Internal details of the new Armstrong suspension unit*

**REAR SUSPENSION UNITS**

## PANTHER REAR SUSPENSION UNITS

The rear suspension units, like the forks, employ normal type coil springs in compression as the suspension medium, and oil damping to control rebound surge. Each unit consists of an oil damping cylinder with piston and rod, and piston rod gland, top and bottom mounting lug and inner and outer cover tube. The complete assembly being very simple, with a minimum of contacting surfaces, thus reducing wear and ensuring long and trouble-free life.

The action is as follows:—

The fulcrum of the rear wheel fork is mounted on the saddle down tube of the frame, the appropriate boss having two lead bronze bushes pressed in position to carry the fulcrum shaft which passes through each end of the Swinging Arm Fulcrum Lug. The head of the shaft is machined to locate in the large end of the lug so as to ensure that the shaft and arm move as one unit, thus the bushes can be readily replaced should wear occur. Two springs are employed in each leg, the outer or main spring is in action all the time, the inner spring being inoperative until the rider is in position. When any obstruction on the road is encountered both springs are further compressed to the point of rebound and once the normal riding position is regained, the inner spring having spent its energy is inoperative, the remaining energy of the outer spring only requiring to be damped by means of the piston within the oil cylinder. This damping is due to the piston oscillating with the cylinder, forcing oil to one or the other side of same, the flow being controlled by the pre-determined piston clearance.

When the units leave the factory they are charged with oil and should be trouble free for a considerable mileage, it is recommended that these units are not touched for the first 500 miles, when, if they are too free, additional oil may be fed into the cylinder. This is easily done by removing both plugs in the top mounting lug and so raising the frame by means of a box, or bricks, as to extend the units. By means of an ordinary oil can, feed oil through either plug hole until it runs out of the other, replace both plugs and then remove the box or bricks from under the frame so as to return the machine to its normal position. Then work the frame up and down several times to balance the oil either side of the piston. Alternatively, if the suspension appears too hard then

the quantity of oil within the cylinder can be reduced by removing either of the plugs referred to, when, by applying weight to the rear of the frame, the suspension units will be depressed and oil forced out. Make sure that both plugs are tight before driving away.

The entire unit can be readily dismantled as follows:—

Remove from frame and unscrew top lug—No. 1, by means of “C” spanner, when outer tube—No. 2, can be slid over the bottom lug—No. 3. Hold bottom lug firmly in vice, by means of two short pieces of round bar, unscrew bottom tube—No. 4. The piston rod lock nut—No. 5, can then be slackened, permitting the bottom lug—No. 3, to be removed, thus permitting the removal of both the outer spring—No. 6, and inner spring—No. 7. The gland housing nut—No. 8, can then be removed, after having first bent back the tab on the locking washer—No. 9, this will reveal the gland packing washer—No. 10, if this is disturbed it will be advisable to renew same, these are cheap to replace and readily obtainable through your Agent or our Spares Department. Although it should be rarely necessary, the oil cylinder can be examined by removing the gland housing—No. 11, without disturbing the gland packing. To re-assemble carry out the above procedure in the reverse order, and when refilling the oil cylinder, remove both plugs—No. 12, fully extending units as outlined previously and thoroughly grease inner and outer springs. The correct oil for damper cylinder is 38 c.c. of S.A.E.40 engine oil in each leg.



# ARMSTRONG SUSPENSION UNIT

Oil to be used in this suspension unit is S.A.E.10 mineral oil containing additives which prevent it from clouding when the shock-absorber is operating at extremely low temperatures. The amount of oil used is, of course, determined by the stroke of the unit; for a 4-in stroke model, the amount would be 140 c.c. The oil has a flat viscosity curve; that is to say, there is a minimum variation in viscosity over a wide range of temperatures.

The shock-absorber is supplied complete with main suspension spring (coil type) and spring covers. Any strength of spring from 85 to 130 lb. can be specified; similarly, the hydraulic damper can be supplied with strokes varying from two to six inches. End-cap eyes are provided with either loose or bonded-rubber bushes, suitable to take any specified size of retaining bolt. Weight of the hydraulic damper unit (without the coil spring and spring covers) is slightly under 3 lb.

## TO ENSURE LONG LIFE

Construction of the shock-absorber is on fairly orthodox lines. Induction-brazed to the outside of the outer, or reservoir tube, 2 in. above the base, is an abutment which forms the spring seat support and also locates the inner, chromium-plated spring cover. A lip at the top end of the upper cover seats under the first coil of the spring and is held in position by a shouldered steel ring. Both covers are maintained in their correct positions by pre-compression of the suspension spring.

The lower end-cap is integral with the reservoir tube, which has an outside diameter of  $1\frac{3}{4}$  in. Inside the base of the reservoir tube a spring-loaded, one-way foot valve locates the inner (or piston) tube concentric with the reservoir tube. At the top end of the piston tube, which has a  $\frac{7}{8}$  in.-diameter bore, is the piston-rod guide. This is a die-casting in Mazak ( a zinc-base metal); spigotted into the piston tube, it both maintains the rod concentric with the tube and acts as a bearing. The rod itself,  $15/32$  in. in diameter, is hard chromium-plated to ensure long life. It is welded to the upper end-cap.

Fitted round the top end of the piston rod are two dome-section rubber washers to act as a limit stop, and to prevent metal-to-metal contact should full depression of the unit be attained. The piston-rod guide also acts as a housing for a synthetic-rubber oil

seal. Any oil penetrating past the bearing surface is directed by the seal into  $\frac{1}{8}$  in.-bore drain tube, which extends down into the annulus between the walls of the piston and reservoir tubes, with its outlet below the reservoir oil level. This arrangement reduces the possibility of aeration of the oil; a further precaution against aeration is a simple baffle plate formed round the outside of the piston tube, also well below the reservoir oil level.

Also extending down the annulus, but at the opposite side to the drain tube, is the rebound-valve tube, which has a  $\frac{7}{32}$  in.-diameter bore. The valve is at the lower end of the tube, and below the oil level in the reservoir; it is a one-way, spring-loaded plate-valve. The valve tube is directly connected to the upper part of the piston tube by means of two oil-ways drilled in the piston-rod guide block.

A sintered iron unit, the piston is screwed on to the end of the piston rod, and locked in place by a spring circlip. Piston fit in the tube is accurate to 0.002 in. Inside the lower end of the piston is a spring-loaded poppet relief valve which can pass oil into four oil-ways drilled at oblique angles in the piston and leading out of its upper face. In the lower face, or piston crown, is incorporated a valve adjustment screw; the screw has a hexagonal head and running through it is a  $\frac{1}{4}$  in. hole to permit the passage of oil to the poppet valve. The valve is adjusted on assembly to give predetermined characteristics to the damping according to the strength of main suspension spring fitted. Hence, the best possible co-ordination between the suspension spring and the hydraulic damper is obtained.

On the depression stroke (when the rear wheel is deflected upward), the piston tube moves upward about the piston causing an increase of pressure below the piston. This pressure opens the piston valve and oil is passed through the four ports from below to above the piston. Excess oil in the upper part of the cylinder—equal to the displacement of the piston rod—flows through the ports in the guide block, down the anti-foam valve tube, opens the rebound valve and passes into the oil reservoir in the annulus between the outer tube and the piston tube.

#### OIL FROM RESERVOIR

On recoil, with the unit extending, the piston tube moves downward relative to the piston. Oil pressure in the upper part of the piston tube builds up, and the piston valve is held shut; oil

again flows down the rebound tube, opens the valve and passes into the reservoir. At the same time the foot-valve plate is drawn off its seat, and oil from the reservoir, therefore, replenishes the lower part of the piston tube.

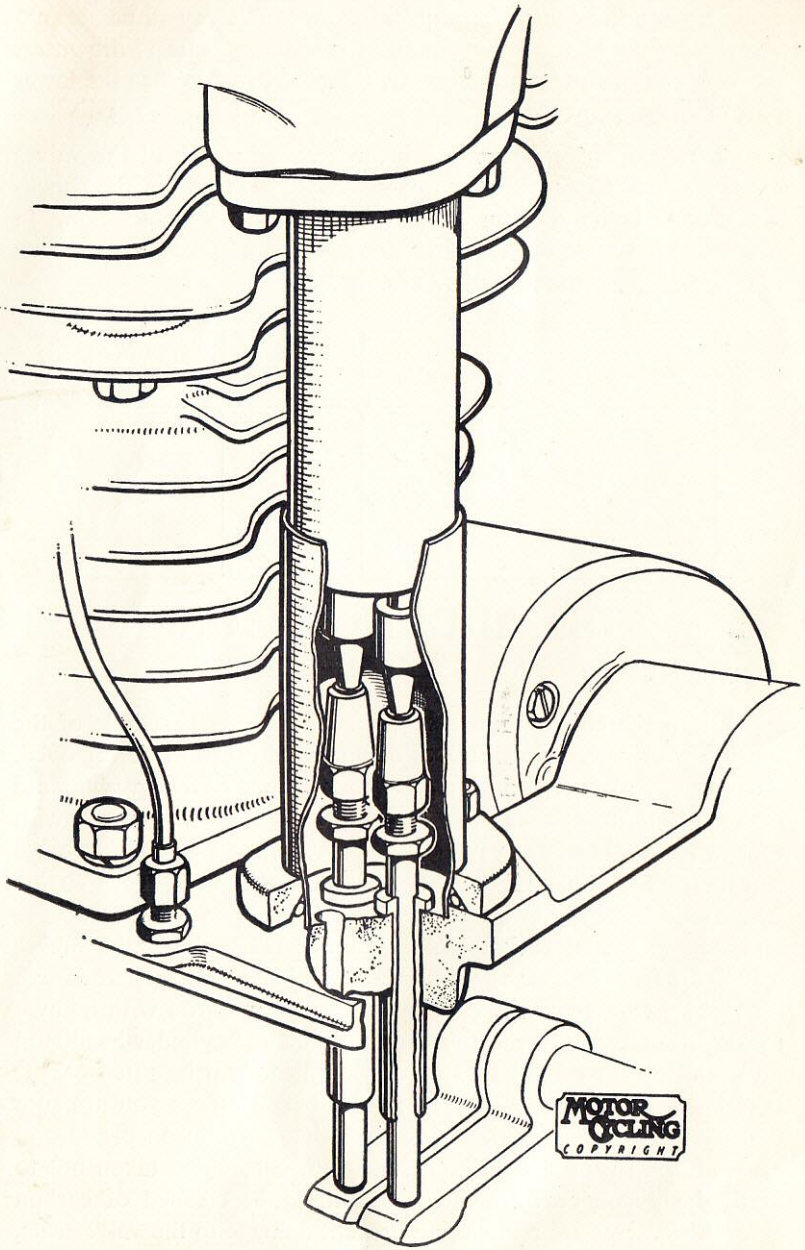
Self-cleaning bleed orifices incorporated in each of the valves allow the unit to provide low-resistance damping when the shock-absorber is in light operation around the static-load position. In other words, a limited oil flow is permitted at pressures too low to operate the spring-loaded valves.

Model	Panther Forks	Panther Units	Armstrong Units
65 1953-54	1/3 pts.	—	—
75 1953-54	1/3 pts.	—	—
65 1953 S.F.	1/3 pts.	$\frac{1}{2}$ pts.	—
75 1953 S.F.	1/3 pts.	$\frac{1}{2}$ pts.	—
65 1954 S.F.	1/3 pts.	—	Nil
75 1954 S.F.	1/3 pts.	—	Nil

## DECARBONIZATION

### All Models

Clean the engine thoroughly, washing down the whole of the outside with paraffin. All traces of mud and oil must be removed. Remove petrol tank, exhaust pipe, carburettor, sparking plug, and oil feed pipe, from crankcase to cylinder head. Turn engine with footstarter until exhaust valve is open; the exhaust valve lifter cable can then be unhooked from the lever on rocker box. Turn engine again until both valves are closed. Then unscrew rocker box cover and screws, lift off rocker box. Unscrew nuts holding the rocker spindles and withdraw the spindles. Rockers and push rods can then be withdrawn. Take care to keep each push rod with its own rocker. Remove push rod tube and unscrew the cylinder head stud nuts, and cylinder head stay bolts. The head can be lifted off. It is advisable not to disturb the cylinder barrel unless you are sure that the piston or rings need attention. The carbon on piston and cylinder head should then be scraped off, care being taken not to mark the piston crown. The head should be cleaned of carbon before the valves are removed to prevent damage to the valve seats. The valves can easily be removed from the head with the aid of the valve spring compressor we supply as an extra. Carbon should then be carefully removed from the ports and valves. Clean head



By courtesy of "MOTOR CYCLING"

### TAPPET ADJUSTMENT

thoroughly with petrol and grind in the valves on the seats (keeping each valve to its own seat). Do not grind the valves more than is absolutely necessary, just sufficient to get a clean face on the valves and valve seats in head. Clean head again carefully, and after oiling valve stems refit springs with the valve spring compressor, care being taken to see that the split cotters fit down properly in the valve spring washers. The valves can then be tested for sealing by fitting sparking plug and filling the head with petrol. Any leakage past the valve seats will show by the petrol leaking through into the ports. When the cylinder head is ready, the engine can be assembled. The copper head gasket should be cleaned (renew this gasket if it has been damaged at all), and fit the gasket on the cylinder face. Replace cylinder head and tighten nuts evenly. Put the push rod cover tubes in position, fit push rods in tappets, rockers and rocker spindles, lock the spindle nuts and oil the rockers, etc. The rocker cover can then be fitted (renewing packing washer if needed). Connect the rocker box, and oil feed pipes and valve lifter cable (turning engine round until the exhaust valve is open to enable the cable to be inserted easily). The cylinder head stay can then be fitted, great care being taken not to strain this to fit the bolts. If the bolt holes do not come opposite, adjust length of stay by slackening the lock nut and screwing fork until the bolts slide easily, then lock up tight. Clean the carburettor and fit back to the head. The exhaust pipe and petrol tank can then be replaced, care being taken to run the control wires through the tank tunnel without trapping them. Finally adjust the tappets.

## TAPPETS

First the two nuts holding down the bottom end of the telescopic push rod tube should be removed and this part of the tube pushed up as far as it will go. Then turn over engine on footstarter with plug removed and make sure that both valves are closed. Next the tappet lock nuts should be slackened off and the cup nuts screwed up to take up the play. The correct clearance is nil when the engine is cold, i.e., the push rods will revolve freely without any up and down movement. Then the lock nuts should be screwed up to the cup nuts and the cover tube replaced. Make sure the tube fits right down into the machined recess in timing chest.

### Wheel Bearings

Large journal bearings are fitted, and it is unlikely that these will require any attention for many thousands of miles.

# THE CRANKCASE RELEASE VALVE

## Models 65/75

The crankcase release valve limits the maximum crankcase pressure and its temporary failure to operate may cause over oiling and lead the rider incorrectly to cut down oil pressure, or assume there is something seriously wrong with the engine.

Its failure may be due to sticking of the Disc, or to dirt preventing its seating properly. After a considerable mileage, wear of the Disc may call for its replacement.

The 1938/55 pattern Valve is integral with the nut securing the Chain Sprocket to the Engine Shaft inside the Chain Case. The nut should be removed and washed in petrol to remove any sticky deposit, dirt etc. The Disc should be perfectly free to rattle when the nut is vigorously shaken. If it is difficult to remove the disc knock down the retaining pin.

### SPARE PARTS

**All spare parts and replacements should be purchased through ourselves or one of our officially appointed dealers. It is only in this way that you can be sure of obtaining parts suitable in design and quality for use on your machine.**

*Illustrated Spare Parts Lists are obtainable from:—*

**PHELON & MOORE, LTD.,  
CLECKHEATON,  
YORKS.**

## TRACING TROUBLES

If your engine will not start, or runs badly and stops while you are on the road, the following system of checking should enable you to isolate the trouble with the minimum of delay.

(a) Check petrol at carburettor float chamber. If this is empty examine.

- (i) Is there any petrol in tank.
- (ii) Is petrol passing freely through tap and pipe to float chamber. Check vent in filler cap on tank.

If petrol is reaching the float chamber and engine still will not start.

(b) Check spark at plug.

If there is a spark at plug points.

- (i) See that the air lever and throttle are set correctly for starting.
- (ii) See that the carburettor is not flooding.

If the engine still does not start.

- (i) See that the jets are not blocked.
- (ii) See that all carburettor fixing nuts are tight (i.e., that there are no air leaks).

If there is not a spark at the plug.

- (i) See that the plug is clean and dry.
- (ii) See that there are no shorts in the H.T. lead.
- (iii) See that the contact breaker arm is not sticking.
- (iv) See that the points are clean and dry and breaking to the correct gap.
- (v) In the case of coil ignition machines, check that the accumulator is charged.







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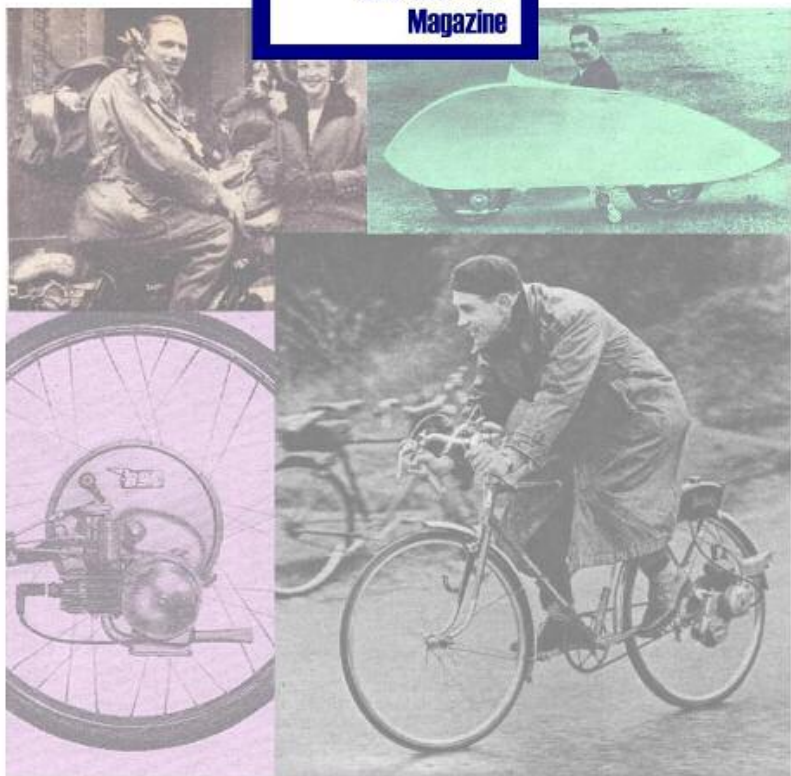
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