06-30104, Mity Max, Battery/Rectifier/Diode Unit

INSTRUCTIONS for AC-102 and AC-104 POWER CONTROL MODULES

The output of the Power Control Module (PCM) is -12 volts for British motorcycles, +12 for Japanese depending on which wire is grounded.

The output wire of the PCM should be connected to either the battery position on the ignition swich or the "hot" terminal of the battery (black to- for British, red to + for Japanese).

The case of the PCM does not require grounding, but should be bolted down tightly to some part of the motorcycle that is not free to vibrate (no fender mounts or flimsy sheet metal mounts).

The warranty (two years) covers only defects in material or worksmanship, PCM's which show wear marks or dents from beating or rubbing againist another component will not be covered under warranty.

The date stamp on the PCM is the month (first) and year (second) that the warranty expires.

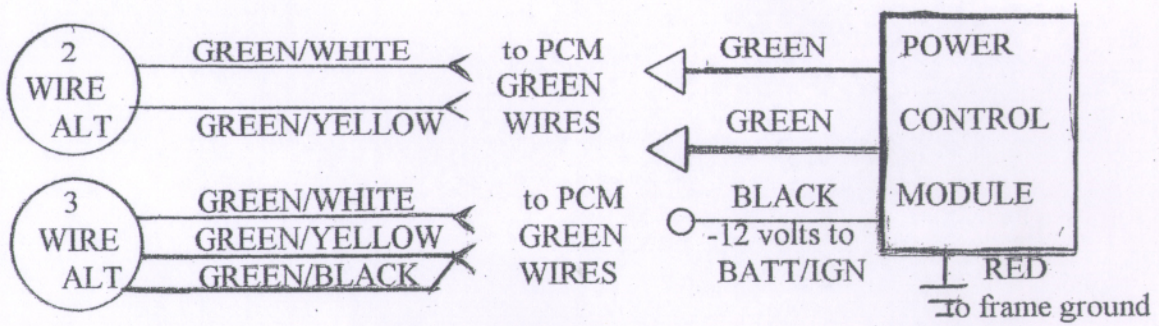
Return defective PCM's under warranty and $5.00 to ; ASH CREEK PRODUCTS
(or defective PCM's out of warranty and $30.00) 8521 ARTURO DRIVE
DALLAS, TEXAS 75228

TRIUMPH

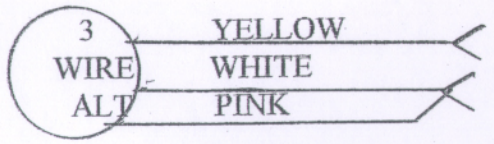
BSA

TOM

TON



HONDA



AS ABOVE EXCEPT
RED WIRE GOES TO
BATTERY/IGNITON
BLACK TO FRAME GROUND

TRIUMPH PART NUMBERS: In 1973 Triumph introduced a numerical part numbering system which superseded the old alphanumeric system. For these earlier models the following information will help you to find the new number in our price list. Prefix letters have been converted to numeric prefixes, as shown in the table below:

ALPHA-NUMERIC	CONVERTS TO	EXAMPLE
DXXXX	60-XXXX	D4250 to 60-4250
EXXXX (4-digits)	70-XXXX	E4576 to 70-4576
EXXXXX (5-digits)	71-XXXX	E12599 to 71-2599
FXXXX (4-digits)	82-XXXX	F9356 to 82-9356
FXXXXX (5-digits)	83-XXXX	F13245 to 83-3245
HXXXX	97-XXXX	H2091 to 97-2091
SXXXX	21-XXXX	S413 to 21-0413
TXXXX	57-XXXX	T1435 to 57-1435
WXXXX	37-XXXX	W354 to 37-0354

NORTON PART NUMBERS: The pre-Commando part number system can be tricky and it may be best to use the alphabetical section of the price list. Most Commando parts begin with either 06-XXXX or 04-XXXX & are then followed by a further 4 digits, e.g. 06-3371.

BSA PART NUMBERS: From the mid sixties onwards, BSA adopted a standard numbering sequence which follows the pattern of 2 digits, a dash, then followed by a further 4 digits, e.g. 71-2790. Prior to this, BSA used two other part number formats. The early system used less than six digits and requires zero's to added. The later system then preceded the original number with additional codes. With these numbers only the last six digits are used.

RECOMMENDED SPARK PLUGS						
	CHAMPION		KLG		NGK	
Model	Normal Street	High Speed Touring	Normal Street	High Speed Touring	Normal Street	High Speed Touring
T25	N-3	N-60	FE100	FE120	B9E	B10E
T100C	N-4	N-62	FE80	FE100	B8E	B9E
T100R	N-4	N-62	FE80	FE100	B8E	B9E
TR5T	N-3	N-60	FE100	FE220	B9E	B10E
TR6	N-3	N-60	FE100	FE220	B9E	B10E
T120	N-3	N-60	FE100	FE220	B9E	B10E
TR7RV	N-3	N-60	FE100	FE220	B9E	B10E
T140V*	N-3	N-60	FE100	FE220	B9E	B10E
T150V	N-3	N-60	FE100	FE220	B9E	B10E
TRX75	N-3	N-60	FE100	FE220	B9E	B10E

*(Later T140E models used champion N-5 ed.)

The performance of different spark plugs varies with different motors an how and individual uses the motor. Remember, when changing brands of plugs it is important to inspect the plug after a few miles of hard use.The spark plug is the only picture you get of what is happening inside the combustion chamber. Take some time to learn about your plugs and then inspect them.

Although the manufacture spark plugs comparison chart is a good place to start, the real test comes when it is installed in your motor. The manufactures recomendations are made for the typical rider. They may not be right for you, your particular motor, riding style or conditions.

TIRE SIZES AND FREQUENTLY ASKED QUESTIONS

This chart compiled by Pirelli will aid in the selection of comparable tires by cross-referencing metric, alpha and inch designations for most popular motorcycle street tire sizes.

FRONT TIRES

METRIC	ALPHA	INCH
80/90	MH90	2.50/2.75
90/90	MJ90	2.75/3.00
100/90	MM90	3.25/3.50
110/90	MN90	3.75/4.00
120/80		4.25/4.50
120/90	MR90	4.25/4.50
130/90	MT90	5.00/5.10

REAR TIRES

110/90	MP85	4.50/4.75
120/90	MR90	4.50/4.75
130/80		5.00/5.10
130/90	MT90	5.10/5.10
140/80		5.50/6.00
140/90	MU90	5.50/6.00
150/80	MV85	6.00/6.25
150/90	MV85	6.00/6.25

FREQUENTLY ASKED QUESTIONS

Q. What do speed ratings really mean?

A. While not recognized by the U.S. Government, speed rating designations indicate that high speed testing has been performed on the tire. The designation "S" refers to speeds up to 113 mph. "H" refers to speeds up to 130 mph and "V" refers to speeds up to 150 mph.

Q. What is the advantage to identical front and rear tread patterns?

A. Handling dynamics such as straight-on tracking and cornering are enhanced when the same tread configuration is applied to the road surface by both front and rear tires, provided the particular tread design is appropriate.

Fitting instructions for piston rings.
Instructions de montage pour jeu de segments.
Einbauanleitung für kolbenringe.
Instrucciones de montaje para anillos.

AE ENGINE PARTS
WORLDWIDE

1.

Thoroughly clean pistons and remove all traces of carbon from ring grooves. Remove carbon from oil drain holes, using twist drill held in tap wrench. Replace any pistons which are cracked or collapsed.

Bien nettoyer les pistons et enlever toutes traces de carbone des rainures du segment. Enlever le carbone des trous de vidange d'huile à l'aide d'une mèche hélicoïdale maintenue dans un tourne-à-gauche. Remplacer tout piston fissuré ou déformé.

Kolben grudlich reinigen und alle Ölkohlespuren aus den Ringnuten entfernen. Ölkohle mittels Spiralbohrer in Windeisen aus den Ölrücklaufbohrungen entfernen. Rissige oder eingefallene Kolben erneuern.

Limpie bien los pistones y todas las trazas de carbonilla en las acanaladuras para los segmentos. Limpie la carbonilla en los agujeros de drenaje de aceite, usando una broca salomonica sujeta en una llave giramachos. Cambie aquellos pistones que esten agrietados o aplastados.

2.

If 0.006"/0.15mm or more can be measured between a new parallel sided compression ring and its groove wall, the piston is extensively worn and should be replaced. (fig 1.)

Si un écartement de 0,006"/0,15mm ou plus peut être mesuré entre un nouveau segment de compression à côtés parallèles et la paroi de sa rainure, le piston est trop usé et devra être remplacé. (fig 1.)

Wenn zwischen einem neuen paralleiseitigen Kompressionsring und der zugehörigen Nutenwand ein Abstand von 0,006"/0,15mm oder mehr gemessen wird, ist der Kolben übermäßig verschlissen und muß erneuert werden. (fig 1.)

Si puede introducirse una galga de 0,15 mm 0,006" entre un segmento de compresion nuevo con costados paralelos y la pared de su acanaladura, el piston tiene excesivo desgaste y precisa cambiarse. (fig 1.)

3.

Fit rings to each piston in appropriate grooves, using the correct fitting tool. If rings are marked TOP or BTM (bottom) then fit TOP towards piston crown and BTM towards crankcase. (fig 2.)

Monter les segments de chaque piston dans les rainures appropriées à l'aide de l'outil de montage correct. Si les segments portent la mention TOP ou BTM, monter le TOP vers la tête du piston et le BTM vers le carter du moteur. (fig 2.)

Ringe mit dem richtigen Einbauwerkzeug in die entsprechenden Ringnuten einfugen. Mit TOP markierte Ringe auf der Seite des Kolbenbodes, mit BTM markierte Ringe auf der Seite des Kurbelgehauses einbauen. (fig 2.)

Instale los segmentos en las correspondientes acanaladuras de los pistones, usando la herramienta de colocacion correcta. Si los segmentos estan marcados TOP o BTM, coloque la parte marcada TOP hacia la corona del pistón y la parte marcada BTM hacia el carter. (fig 2.)

4.

Remove carbon deposits from cylinder bore. AE ring sets are suitable for normally worn bores without removal of the wear ridge. In case of doubt, the wear ridge should be removed. Remove glaze from cylinder working surface. (fig 3.)

Enlever les dépôts de carbone de l'alesage du cylindre. Les Jeux de segments AE conviennent à des alesages normalement uses sans pour cela deposer l'arête d'usure. Enlever le verni de la surface de travail du cylindre. (fig 3.)

Ölkohleruckstande aus der Zylinderbohrung entfernen. AE Ringsatze konnen bei normalem Bohrungsverschleiß ohne Entfernen des Verschleißgrates eingebaut werden. Im Zweifelsfall den Verschleißgrat entfernen. Glasur von den Arbeitsflachen des Zylinders entfernen (fig 3.)

Quite los sedimentos de carbonilla en el interior del cilindro. Los juegos de segmentos AE sirven para las animas de cilindros con desgaste normal sin necesidad de remover el reborde de desgaste. En caso de duda sera preferible remover el reborde de desgaste. Retire el vidriado en la superficie de trabajo del cilindro. (fig 3.)

5.

Do not remove coloured coatings from rings. Where ring has more than one segment ensure gaps are evenly spaced around the piston.
Chromium plated piston rings must not be fitted into chromium plated cylinder bores.

Ne pas enlever les couches de couleur des segments. Lorsque le segment se compose de plus d'une section s'assurer que les escartements sont uniformes tout autour du piston. Les segments de piston plaques chrome ne doivent pas être montes dans un cylindre plaque chrome.

Farbige Beschichtung nicht von den Ringen entfernen. Bei aus mehr als einem Segment bestehenden Ringen darauf achten, daß die Stoße gleichmaßig um den Kolbenumfang verteilt sind. Verchromte Kolbenringe durfen nicht in verchromte Zylinderbohrungen eingefugt werden

No debe retirarse el revestimiento de color en los segmentos. Cuando el segmento tiene mas de una seccion, cerciorese de que las aberturas quedan equidistantes alrededor del pistón. No deben instalarse segmentos cromados en cilindros cromados.

6.

After assembly ensure rings move in their grooves. Lubricate piston, pin and rings using clean oil. Fit piston assembly into cylinder using piston ring clamps of the appropriate size

Après le montage s'assurer que les segments se deplacent dans leurs rainures. Lubrifier le piston, la goupille et les segments avec de l'huile propre. Monter l'ensemble piston dans le cylindre à l'aide des contre-brides de tete de la dimension appropriee.

Nach dem Einbau sicherstellen, daß sich die Ringe in den Ringnuten bewegen. Kolben, Kolbenbolzen und Ringe mit reinem Öl schmieren. Kolbenbaugruppe mit Kolbenringspanner passender Große in den Zylinder einfugen.

Despues de colocarlos, cerciorese de que los segmentos se mueven en sus acanaladuras. Lubrique con aceite limpio el pistón, el bulon, y los segmentos. Instale el pistón en el cilindro usando mordazas de segmentos del tamano apropiado.

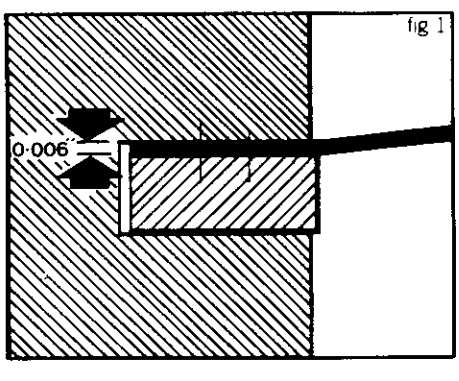


fig 1

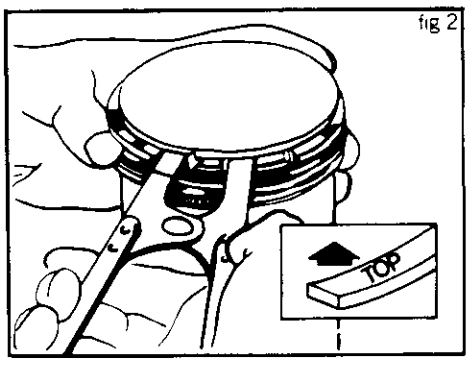


fig 2

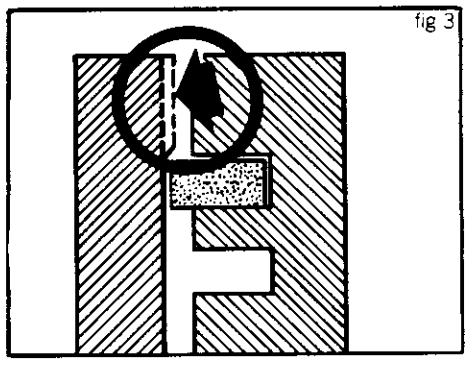


fig 3

LAMINATED STEEL RING (fig 4)
1. Do not try to spread the segments over the piston.
2. Fit one segment at a time by "winding" into piston groove.
3. The segments must be fitted with "cupped" faces alternatively upwards and downwards as shown.
4. Gaps should be set 90° to each other.

HELICOIL RING (fig 5)
1. Install the spiral ring into the appropriate piston groove fitting the tongue piece into the centre of the opposite end to form a continuous spring.
2. Fit the oil control ring into the same groove so that the spiral spring engages the internal groove in the ring.
3. Space the gaps of ring and spring approximately 180° apart.

STEEL SEGMENTAL OIL CONTROL RING (fig 6)
1. Fit the expander/spacer into the oil ring groove and ensure that the ends are butting 'A' at all times.
2. Fit one steel rail on each side of the expander/spacer. Failure to do this will render the ring inoperative. Arrange the gaps of the three components at 120° to each other.
3. Ensure that the groove has sufficient depth by passing the assembled ring to the back of the groove. The rails should not stand proud of the piston skirt.

DUAFLEX OIL CONTROL RING (fig 7)
1. Place the perforated expander spring into the piston oil control ring groove.
2. Wind the rails and separating spring into the groove in the correct order as illustrated.
3. Ensure the rail gaps are equally spaced around the piston.
NOTE: A four rail Duaflex ring has two rails each side of the separating spring.
A three rail Duaflex ring has two rails above and one below the separating ring.
A two rail Duaflex ring has one rail each side of its separating spring.

Chromium plated piston rings must not be fitted into chromium plated cylinder bores.

These fitting instructions must be complied with exactly. Any failure to do so is dangerous and could result in severe engine failure and extensive consequential loss. If any damage or injury results from not fitting this component as instructed, the seller will not be liable for such damage or injury.

SEGMENT EN ACIER LAMINE (fig 4)
1. Ne pas essayer d'etaler les segments sur le piston.
2. Monter un segment a la fois en le faisant penetrer par rotation dans la rainure du piston.
3. Les segments doivent être montes avec les faces convexes tournees de facon alternee vers le haut et vers le bas, tel qu'illustre.
4. Les écartements devront être de 90° par rapport l'un a l'autre.

SEGMENT HELICOIDAL (fig 5)
1. Placer le segment helicoidal dans la rainure de piston appropriée tout en montant la languette dans le centre de l'extremité opposee de facon a former un ressort continu.
2. Monter la bague de graissage dans la meme rainure de sorte que le ressort spirale s'engage dans la rainure interne du segment.
3. Les écartements du segment et du ressort devront être a environ 180° l'un de l'autre.

GETEILTE ÖLABSTREIFRINGE AUS STAHL (fig 6)
1. Monter le joint d'expansion/pièce intercalaire dans la rainure de graissage et s'assurer que les extremités aboutent toujours sur 'A'.
2. Monter un rail en acier sur chaque côté du joint d'expansion/pièce intercalaire. Le fait d'ignorer cette instruction rendra le segment non opérationnel. Disposer les écartements des trois composants a 120° l'un de l'autre.
3. S'assurer que la rainure est suffisamment profonde en faisant glisser le segment assemblé par l'arrière de la rainure. Les rails ne devraient pas dépasser la jupe du piston.

BAGUE DE GRAISSAGE DUAFLEX (fig 7)
1. Placer le ressort de joint d'expansion perforé dans la rainure de la bague de graissage du piston.
2. Faire pénétrer, en tournant, les rails et le ressort de séparation dans la rainure selon l'ordre correct, tel qu'illustré.
3. S'assurer que les écartements des rails sont uniformes tout autour du piston.
NOTEZ: Les segments DUAFLEX à quatre rails disposent de deux rails de chaque côté du ressort de séparation.
Les segments DUAFLEX à trois rails disposent de deux rails au-dessus et d'un rail au-dessous du ressort de séparation.
Les segments DUAFLEX à deux rails disposent d'un rail de chaque côte du ressort de separation.

Les segments de piston plaqués chrome ne doivent pas être montés dans un cylindre plaqué chrome.

Les présentes instructions de montage doivent être suivies à la lettre. Le fait de les ignorer est dangereux et pourrait résulter en une défaillance sérieuse du moteur et en des conséquences incalculables. Si des endommagements ou des blessures venaient a resulter du manquement a monter le-dit composant, tel que preconise, le vendeur se liberera de toute responsabilite.

RING AUS GESCHICHTETEM STAHL (fig 4)
1. Segmente nicht über den Kolben zu spreizen versuchen.
2. Segmente einzeln in die Ringnut "eindrehen".
3. Segmente wie gezeigt mit den "gehonten" Seiten abwechselnd nach oben und unten gekehrt einfugen.
4. Stoßen im Winkel von 90° zueinander anordnen.

HELICOIL-RING (fig 5)
1. Spiralring in die zugehorige Ringnut einfugen. Dabei zur Bildung einer kontinuierlichen Feder die Zunge in die Mitte des entgegengesetzten Endes stecken.
2. Olabstreifring so in die gleiche Nut setzen, daß die Schraubenfeder in die Innennut im Ring eingreift.
3. Ring- und Federstoße im Winkel von ungef 180° zueinander anordnen.

ANILLO RASCADOR DE ACEITE SEGMENTAL DE ACERO (fig 6)
1. Spreizer/Distanzstuck in die Olabstreifringnut einfugen; dabei darauf achten, daß die Enden immer bei "A" aneinanderstoßen.
2. An beiden Seiten des Spreizers/Distanzstucks je eine Stahlschiene anbringen. Ohne diese funktioniert der Ring nicht. Stoße der drei Teile im Winkel von 120° zueinander anordnen.
3. Durch Pressen des zusammengebauten Ringes in den Nutengrund sicherstellen, daß die Nut tief genug ist. Die Schienen durfen nicht aus dem Kolbenschaft herausstehen.

DUAFLEX ABSTREIFRING (fig 7)
1. Gelochte Spreizfeder in die Abstgreifringnut legen.
2. Schienen und Trennfeder wie unten gezeigt in der richtigen Reihenfolge in die Nut drehen.
3. Darauf achten, daß die Schienen gleichmaßig um den Kolben angeordnet sind.
ANMERKUNG: Bei einem Duaflex Ring mit vier Schienen sind auf jeder Seite der Trennfeder je zwei Schienen vorgesehen.
Bei einem Duaflex Ring mit drei Schienen befinden sich zwei Schienen oberhalb und eine unterhalb der Trennfeder.
Bei einem Duaflex Ring mit zwei Schienen ist auf jeder Seite der Trennfeder je eine Schiene vorgesehen.

Verchromte Kolbenringe durfen nicht in verchromte Zylinderbohrungen eingefugt werden.

Diese Montageanleitung muß genau befolgt werden. Nichtbeachtung ist gefahrlich und konnte zum volligen Versagen des Motors und zu Verlusten tunren. Der Verkaufer haftet nicht fur aus der Nichtbeachtung dieser Montageanleitung entstehende Schaden oder Verletzungen.

SEGMENTO DE ACERO LAMINADO (fig 4)
1. No trate de colocar las secciones del segmento pasandolas sobre el piston.
2. Instale una seccion de cada vez, insertandola directamente en la acanaladura del piston.
3. Las secciones deben colocarse con las caras "acopadas" alternadamente hacia arriba y hacia abajo, como se muestra.
4. Las aberturas deben espaciarse a 90°.

SEGMENTO HELICOIDAL (fig 5)
1. Instale el segmento helicoidal en la correspondiente acanaladura del piston, insertando la parte de lengueta en el extremo del lado opuesto para formar un resorte continuo.
2. Instale el segmento rascador de aceite en la misma acanaladura, de forma que el resorte helicoidal encaje con la ranura interna del segmento.
3. Las aberturas del segmento deben dejarse espaciadas a 180° con las aberturas del resorte.

SEGMENTS RACLEURS EN ACIER (fig 6)
1. Instale el expansor/espaciador en la acanaladura del segmento de aceite y cerciorese de que los extremos quedan a tope con 'A'.
2. Instale un anillo de acero a cada lado del expansor/espaciador. Si no se hiciera esto no tendra funcionamiento el segmento. Deje las aberturas de los tres componentes espaciadas a 120°.
3. Cerciórese de que la acanaladura tiene suficiente profundidad, presionando el segmento instalado contra el fondo de la acanaladura. Los anillos no deben sobresalir de la falda del piston.

SEGMENTO RASCADOR DE ACEITE "DUAFLEX" (fig 7)
1. Coloque el expansor perforado en la acanaladura para el segmento rascador de aceite en el piston.
2. Inserte en la acanaladura los anillos y el resorte espaciador, en el orden que se muestra mas abajo.
3. Cerciórese de que las aberturas de los anillos se dejan equidistantes alrededor del piston.
NOTA: Un segmento "Duaflex" de 4 anillos lleva 2 anillos a cada lado del resorte espaciador.
Un segmento "Duaflex" de 3 anillos lleve 2 anillos encima y uno debado del resorte espaciador.
Un segmento "Duaflex" de 2 anillos lleva un anillo a cada lado del resorte espaciador.

No deben instalarse segmentos cromados en cilindros cromados.

Deben seguirse estrictamente estas instrucciones de montaje. De no hacerlo asi podria resultar en averias graves del motor y extensas perdidas como resultado. El vendedor no se hace responsable de los danos o lesiones como resultado de no instalar los componentes conforme a las instrucciones dadas.

fig 4

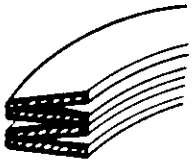


fig 5

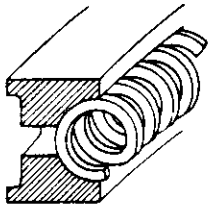


fig 6

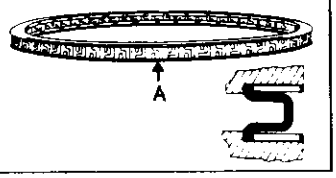
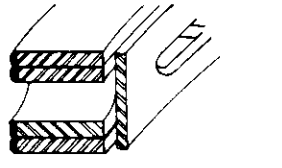


fig 7



PISTON & RING INSTRUCTIONS

RINGS:

Rings with bevel on inside of compression rings must be installed to face top of piston.

PISTON PIN:

Fit piston pins to .0005 – .0006 clearance figuring on a basis of .001 clearance to one inch of piston pin. This is important on all forged pistons.

CARBURATION TUNING:

When raising compression ratios motor heat also rises. Be sure to increase carburetor jet size. Install excessive size carburetor jets making mixture too rich. The motor will accelerate. However will not reach top R.P.M.'s Jet down until motor will wind up and smooths out. When tuning always tune from the rich mixture and go down on jets. Failure to tune properly causes piston seizure and burning.

PISTON CLEARANCE:

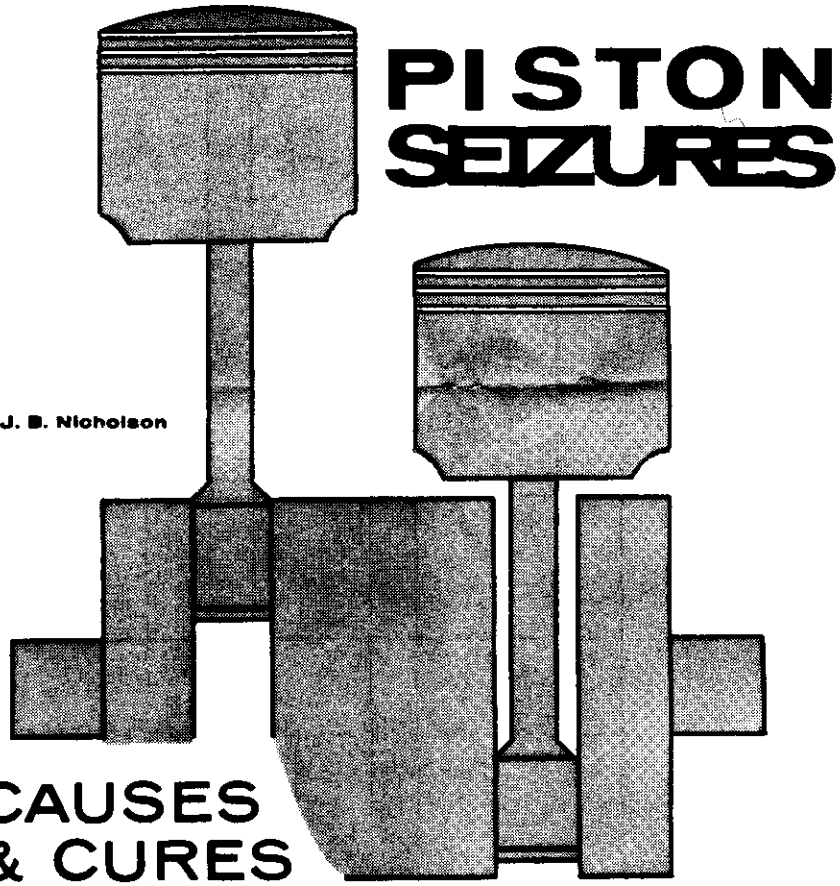
.003-.005 for breakin .006-.008 for racing

M. C. SUPPLY CO. LOS ANGELES 1, CALIF.

PISTON SEIZURES

CAUSES & CURES

By J. B. Nicholson



Piston seizures in automobile engines are quite rare compared to that same malfunction in motorcycle power plants. Here is a fairly typical letter received by CYCLE Magazine's technical department: "I have replaced three pistons in my 1964 twin because of seizure. The clearances were carefully checked and the motor was not overdriven. It seems to me that there is more piston trouble on large displacement motors that are seldom "opened up" than on small motors that are run full-throttle most of the time."

Unquestionably, water cooling with thermostatic control is what accounts for the freedom of piston trouble on automobile engines. Piston failures are invariably a result of excessive temperatures and a combination of factors can cause critical temperatures to be reached on a motorcycle engine quite unknown to the operator.

It is surprising that no manufacturer has yet fitted a temperature gauge to show cylinder head heat. Such a fitting would enable most piston failures to be avoided. Amongst the factors that influence operating temperatures are carburetor mixture, ignition timing, type of spark plug, piston and exhaust valve factors, as well as operating conditions.

The manufacturer of one well-known imported bike recently issued a bulletin after finally getting to the bottom of the piston problem. Recent models now come through with raised throttle needles and retarded ignition which reduce engine temperature and eliminate failures. Previously, piston seizure was experienced in the 70 mph range at not more than ⅓ throttle. Lab tests indicated too much heat under such conditions, thus the above corrections were instituted. (Initially, it was incorrectly suspected that the frequent piston seizures were due to an unsuitable "finishing form" and insufficient clearance. Correcting these features still did not clear up the trouble. Most seizures occurred on the left side piston because the right side obtains additional lubricant from oil sprayed from the pressure fed right side main bearing. An oil spray hole was introduced in the big end of the left hand side rod to balance cylinder lubrication.)

The view of course is commonly held that it is only necessary to have an adequately large main jet to ensure cool running. On large motors, with large bore carburetors, it must be appreciated that the needle position which controls the mixture until very nearly ¾ throttle, involves speeds as high as 85-90 still being on the needle. A weak needle setting probably has been the cause of piston failures on many engines because of the mistaken impression that the main jet size was the only factor to be considered. Generally, it has been assumed that setting the needle sufficiently high to avoid hesitation when accelerating provided a suitable mixture in the medium speed range. It is now evident that this is not thoroughly reliable. The Amal Monobloc carburetor does provide a slight momentary enriching of the mixture when the throttle is opened because of the small cross-bore hole in the needle jet that allows an extra fuel supply when the throttle is suddenly opened. Taking this into account, riders who do considerable cruising in the mid throttle range in particular, will be well advised to check on the needle setting and if in doubt raise needles a notch. There is no point of course in an excessively rich mixture which will be indicated by lumpy running, plug sooting, or heavy fuel consumption.

Spark plug pre-ignition is a common cause of overheating and piston failure. As a general rule the coolest running plug that can be used consistent with reasonably clean running should be fitted.

Some engines are more critical to ignition timing than others. Many manufacturers in their original instructions specify checking the timing at the static retarded setting whereas it is of course the running advanced setting that is critical. Equipment is now available for Triumph and B.S.A. twin models for using a stroboscopic light for timing setting and this equipment is highly recommended.

Timing should of course be checked on both cylinders. It is not uncommon to find an appreciable variation in setting between cylinders. On early magneto equipment models, this fault is usually in the magneto end plate due to lack of concentricity between the bearing race and the cam ring housing. On the later battery ignition models with twin sets of points, minor breaker plate irregularities account for timing variation and uniformity is achieved by varying the gap setting on the two sets of points as required. An exception to this arrangement is found on the Norton Electra where the mounting of one set of points is adjustable so that uniform timing can be achieved without alteration of point gap.

The question as to why many smaller motors seem to withstand full throttle operation without piston trouble is an interesting one. Small motors generally have a better cooling-area-to-displacement ratio than large motors and although a lot of full throttle work is done, on the average, there is not a great deal of sustained full throttle operation. Brief periods of full throttle followed by shutting down do not involve maximum sustained piston temperatures. **This type of operation simply does not result in as much piston trouble as steady cruising,** even at less than full throttle, where under certain conditions, temperatures will steadily climb to the danger point.

A factor not to be overlooked by riders who use their machines for long distance cruising is the matter of compression ratio. There is appreciably more likelihood of overheating and piston trouble with a 9:1 ratio than an 8 or 8½:1. And even greater with higher compressions.

Everything points to the desirability of temperature gauge equipment for motorcycles so that riders will be able to tell when to roll back the throttle and save a lot of piston grief. ◀

MORRIS
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Product Information
AMBESTA RUNNING IN OIL SAE 30

Description

Ambesta Running In Oil is speciality product that should be used for the running in of new or rebuilt petrol and diesel engines, where it promotes the quick and safe bedding in of mating surfaces. The use of Ambesta Running In Oil during the running in period helps remove the machining glaze from cylinder bores, assists the formation of important oil retaining surfaces, and therefore prevents the possibility of bore polishing. Careful running in using this product can prevent any problems during this period and can greatly extend engine life. Ambesta Running In Oil is blended from high quality mineral oils and a carefully balanced additive system.

Performance Levels

MIL-L-2104B

Physical Characteristics

SAE Classification	**30**
Density at 15°C	0.890
Kinematic Viscosity at 100°C	11.6
Kinematic Viscosity at 40°C	98
Viscosity Index	100
Flash Point (Open) °C	0.5
Pour Point, °C	-20
T.B.N. mg/KOH/g	4.0

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Product Information
ELITE 30, 40 & 50
MOTORCYCLE FOUR STROKE ENGINE OILS

Description
Elite Monograde Engine Oils are formulated with high quality mineral oils and are specifically designed for classic, veteran and vintage motorcycle engine designs.
Modern dispersant additives keep combustion chamber contamination suspended in the lubricant, allowing full flow cartridge filters to remove it. Early oil filtration, usually in the form of a mesh gauze or strainer, is not efficient enough to remove this suspended material. Elite Grades are low dispersant oils and allow the suspended matter to drop harmlessly into the sump. In additive these oils protect components from wear, rust and corrosion.

Application
Recommended for older petrol engines found in classic, veteran and vintage motorcycles, cars, commercial vehicles and agricultural machinery. Elite 50 is also suitable for most types of older motorcycle gearboxes, where an SAE 50 oil is needed.

Performance Levels
API CC, SD
MIL-L-2104B

Physical Characteristics

SAE Classification	**30**	**40**	**50**
Density at 15 °C	0.887	0.892	0.899
Kinematic Viscosity at 100 °C	11.6	15.0	19.0
Kinematic Viscosity at 40 °C	98	119	214
Viscosity Index	100	100	100
Flash Point (open) °C	238	250	250
Sulphated Ash, %Wt.	0.5	0.5	0.5
Pour Point °C	-20	-20	-20
T.B.N. mg/KOH/g	4.0	4.0	4.0

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MOTORCYCLE

FOUR STROKE ENGINE OILS

MLR 30, MLR 40 & MLR 50

Description

MLR 30 and MLR 40 are modern versions of the proven castor based engine oils. They are made from high quality first pressed castor oil. The performance has been booster by use of recently developed synthetic additives, which have helped eliminate the traditional problems of viscosity instability, and the deposits and lacquer usually associated with castor based oils.
All of the advantages of a castor based product have been retained, including a naturally higher and tougher film strength, tremendous load carrying capacity, better wetting properties, and reduced power loss due to friction.

MLR 30 and MLR 40 are recommended for four stroke grasstrack, and classic machines where castor based products are preferred. Also suitable for premix use in two stroke applications with both petrol and methanol as fuels.

For speedway use, where the virtues of CASTOR have been recognised for many years MLR 50 protects and lubricates engines primarily designed to run on these traditional oils. With the possibility of excess moisture being present when running on Methanol, MLR 50 contains corrosion inhibitors to help combat potential problems.

Important Note: These grades must not be mixed with any mineral oil product.

Physical Characteristics

SAE Classification	30	40	50
Density at 15 °C	0.950	0.955	0.961
Kinematic Viscosity at 100 °C (cSt)	11.3	14.9	18.8
Kinematic Viscosity at 40 °C (cSt)	96	160	-
Viscosity Index	100	95	-
Sulphated Ash	←	Ashless	→
Flash Point (°C)	220	240	280

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Technical Service Bulletin

Lubrication of Older Motorcycle Engines

Oils formulated for the modern engine are basically unsuitable for the older designs. There are many technical reasons for this. To start with, there is currently a strong move towards improving fuel economy, which is obviously an environmental consideration. The best way to achieve improved fuel performance is to move to thinner oils that offer reduced viscous drag on the moving parts of the engine. 10W/40s are a common equipment manufacturer's choice with 5W/40s, 5W/30s. 0W/30s and even 0W/20s starting to appear in handbooks. Thinner oils are also chosen because engines are fitted with smaller batteries and starter motors. These thinner multigrade engine oils work well in the confines of modern engines that have close tolerances and where oil films of 1 – 2 microns (0.00007") are normal. However, in older engines we are looking at poorer machining finishes with rougher surfaces, requiring an oil film thickness in the order of 6 – 7 microns (0.0003"). This type of lubrication regime is usually satisfied by SAE 30, 40 and 50 monogrades. The use of monogrades is paramount in such cases because of the way multigrades are formulated with polymers to achieve their wide operating temperature range. These polymers are long chained molecules that curl up into small bundles to allow the oil to flow at low temperatures, but at high temperatures unravel and tangle together to help the oil maintain its thickness. In the small space between the piston ring and liner, the scraping action of the ring aligns these molecules and the multigrade oil temporarily becomes thinner (regaining its thickness when it drops back into the sump). One of the functions of a lubricant is to provide a gas seal between ring and liner to aid compression and in modern engines, where machining tolerances are very small, this temporary drop in viscosity will have no affect. However, older engines do not have such tight tolerances and the temporarily thinned oil will find its way past the rings leading to high oil consumption and compression loss.

Modern oils also contain anti-wear additives that are designed to protect the valve train and gearing components. In new or re-built engines this type of additive can prevent the

satisfactory bedding in of the rings to the bores and can lead to a condition called glazing. Glazing leads to loss of compression and high oil consumption.

Increasing the power from an engine results in an increase in it average running temperature. One of the basic functions of a lubricant is to cool and therefore in hotter running engines, the oil temperature will also be higher. At these higher temperatures oils are susceptible to oxidation which causes them to thicken and loose their cooling and lubricating ability. The addition of powerful additives called anti-oxidants can prevent this and stop the formation of lacquers and varnishes that coat critical components reducing their operating efficiency.

This situation is worse in older vintage engines as combustion gases can easily blow by the piston rings and mix with the oil, cause further deterioration, thickening and poor circulation. Overheating often occurs along with rapid expansion of the engine components, often beyond their design limits, leading to increased friction and finally seizure.

To help keep the hotter parts of the engine clean, detergents are also included in the formulation to prevent carbonaceous oxidation byproducts from coating critical components, including: pistons, rings, valve stems and guides. Further additives called dispersants are added to keep these solid contaminants in suspension so that full flow filtration systems can remove the larger particles from the oil. The same additives also ensure that when the oil is drained at the service interval that all of the smaller particles leave the engine, leaving it clean for the fresh oil. However, older engine designs of the classic and vintage variety probably have little more filtration than a gauze, tank outlet strainer and a magnetic sump plug! In these types of engine it is extremely harmful to have solid contaminants continuously circulating. The viscosity will increase, the flow rate will decrease, oil galleries will become blocked, abrasive wear will take place leading in the worst case to catastrophic failure of engine components.

Acidic compounds, formed from the processes of oxidation and combustion, may reach a level where they will start to affect engine seals, hardening, cracking or even breaking up the older types of rubber compounds that were used originally. It is much better to

use modern replacements made from acrylates or fluorocarbons which are resistant to acidic attack.

Taking all of the above points into consideration, it is quite clear why modern multigrades should be avoided in older engines and the correct high quality lubricant is still far less expensive than replacement parts and time consuming rebuilds.

Morris Lubricants offer two ranges of oil specifically designed to satisfy these older types of engines: Supreme and Elite engine oils, both ranges available in SAE 30, 40 and 50 viscosity grades. These ranges are basically very similar in make up, the former being biased towards older car engines and the latter having better anti-foam performance for use in older bike engines and gearboxes.

So far we have considered the basic four stroke engine, but there are of course two stroke units and engines involved in highly stressed competition scenarios.

High stressed competition engines are usually based on humble road going varieties, but modified for increased power output and performance. Of course this also means that a suitable lubricant will also need to be selected to cope with these increased workloads. One option here is the use of castor based lubricants that have several features beneficial to this area of application. Castor based lubricants have very high natural film strengths, useful under high shock load conditions and are also very tenacious, offering a degree of seizure protection. In its natural form castor oil is very viscous, about a SAE 50, which provides good lubrication to roller bearings and gas tight seals where there may be wide tolerances between rings and liners of early engines.

Castor based products can also be improved with the addition of certain additives. Castor oxidises more rapidly than mineral oils and so has a greater tendency to form lacquers and deposits on rings, pistons, valves and ports. Oxidation is the chemical process which combines the byproducts of combustion (water vapour, acids, sulphur and nitrogen oxides) with lubricant at high temperatures leading to its deterioration. The oxidation process thickens the castor and reduces its ability to lubricate and cool. It is worth mentioning here that castor-based lubricants, two stroke or four stroke, do not mix with mineral oils. Failure to recognise and segregate lubricant types may lead to an expensive engine rebuild. A gel-like substance is formed which can circulate round the

engine, eventually blocking oil ways and galleries, pipes, strainers, etc., leading to oil starvation and serious damage.

Another problem found with castor is its inherent ability to absorb moisture. This not only reduces its shelf life, but combined with the substantial amount of water produced during combustion can lead to severe corrosion problems.

To cope with this, Morris Lubricants incorporate an anti-oxidant and a corrosion / rust inhibitor into their castor based MLR 30, MLR 40 and MLR 50 grades.

It has been proven that moisture can improve combustion, but the excess can find its way into the sump and be absorbed by the castor oil. The additive system will reject the excess water and dump it in the form of a sludge in the sump, hence the need for regular and frequent oil changes (competition engines usually every meeting).

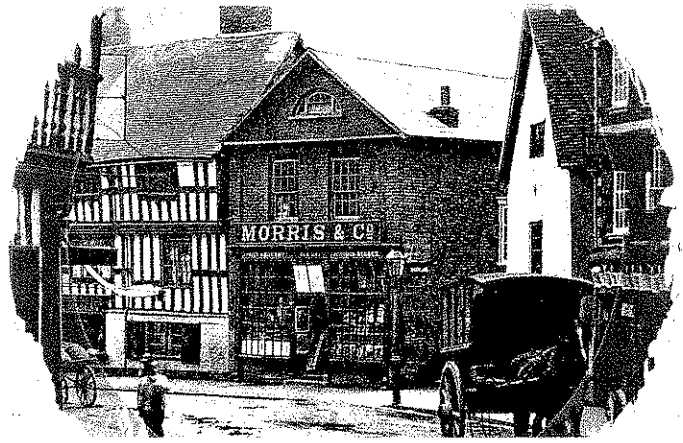
With two strokes care must also be taken when mixing castor oil with unleaded fuel, as an unbalancing of the additives can lead to sludging that can block fuel lines. Used with leaded fuel and methanol, castor mixes well, but the latter is highly flammable, so extreme care is needed when mixing and handling this fuel type. Also, as mentioned previously, water absorption limits shelf life and so it is good practice to mix only the amount required, as older mixtures can produce sludges and poor combustion.

Two strokes, by design, invariably have a higher power to weight ratio and with the oil acting as lubricant for possibly both engine and gearbox, as well as being burned off during combustion, a balance has to be struck between outright power, minimised wear, maximum reliability and environmental issues.

Taking into consideration previously mentioned factors relating to the crudity of older engines, thick monograde oils with no additive treatment were incapable of keeping engines clean, gave need for regular de-cokes and generally gave two stroke engines a bad reputation. The Morris Lubricants range of two stroke oils include pre-mixed products (fully and semi-synthetic, mineral and castor based) as well as injector system products (fully and semi-synthetic), all of which contain the necessary additives to enable maximum lubrication, even at today's incredibly lean mixtures.

As two stroke oils improved with the use of synthetic additives during the '70s and '80s, they became more viscous (thicker) allowing lean mixtures and decreases in working tolerances yet still maintained their high protection capabilities. A better understanding of heat transfer enables engines to run hotter and burn their fuel more efficiently, hence turning generated heat into energy. As exhaust emissions contain oxidised components of both fuel and oil, there is, because of environmental concerns, a trend towards lubricants that offer the least problems to the atmosphere and accordingly a tendency toward high fuel/oil ratios. If an oil has a tendency to foul plugs, block exhaust ports, cause ring sticking and leave plumes of white smoke, there is a good chance that the exhaust emissions are not particularly environmentally friendly. The two-stroke engine presently faces an uphill struggle for its survival.

Moving on from engine oils, the lubrication of transmissions is a little more straightforward. Most gearboxes in pre-1970 machines have simple gear designs not requiring high amounts of extreme pressure (EP) additives usually required for the protection of some of the latest transmission systems. If too much EP additive (i.e. API GL5 performance level) is present in a lubricant used in a syncromesh gearbox requiring an API GL4 performance level additive, it will eventually lead to notchy gear selection and increased noise. In earlier gearboxes and final drives EP performance may not be required at all (API GL1) and simple non-EP monograde gear oils will suffice. The Morris AG range of gear lubricants, AG90, AG140 and AG 250 are available to cover these applications. These 'straight' gear oils are also friendly to phosphor bronze components often employed in earlier designs.



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