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LUCAS IGNITION SYSTEM
OPUS 3 (MK11)
FITTED TO E TYPE SERIES 111

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LUCAS 'OPUS' 3 (MK II) ELECTRONIC IGNITION SYSTEM

(Fitted to Jaguar "E" Type Series III)

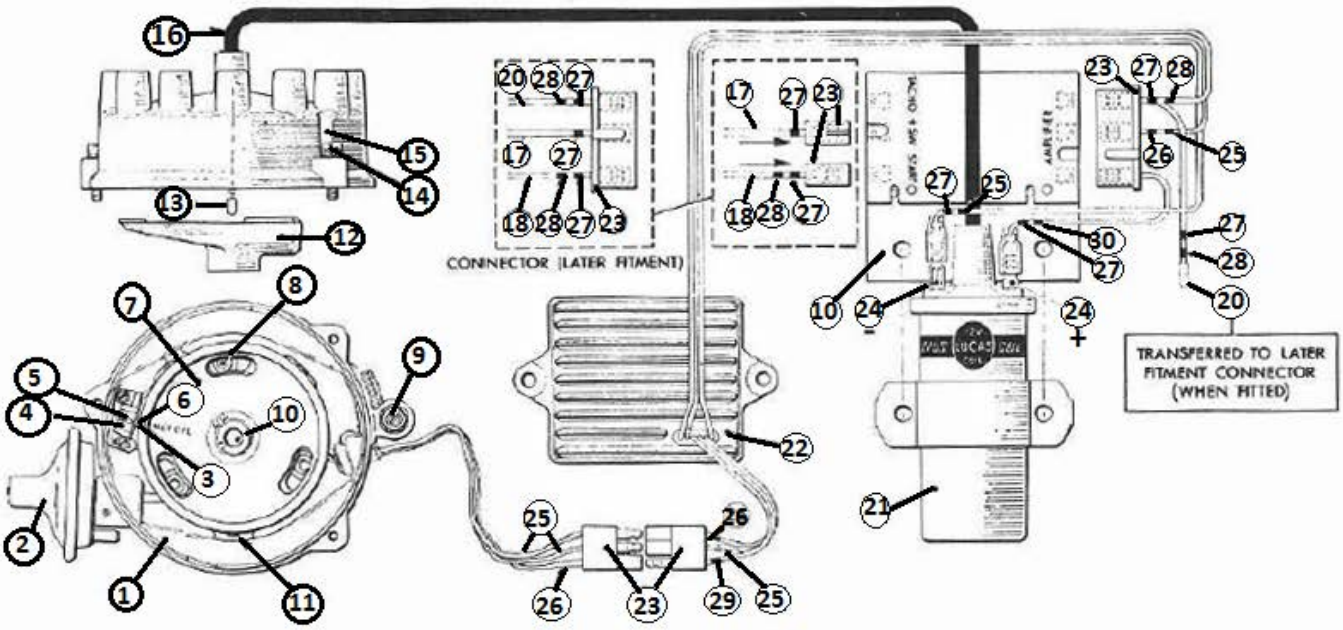

Fig. 1 Lucas 'Opus' 3 (Mk. II) electronic ignition system

1 Distributor (model 36DE12)
2 Vacuum unit (retard-type)
3 Timing mark No. 1 cylinder
4 Pick-up module
5 Timing mark groove
6 Air gap
7 Timing rotor
8 Allen screw(s) (static ignition timing and distributor fixing)
9 Vernier timing control screw
10 Felt lubrication pad in top of distributor shaft
11 Screw(s) (micro-housing fixing and tensioning)
12 H.T. rotor arm
13 Brush and spring
14 Screw(s), washers (spring and plain)
15 Moulded cover
16 Centre high-tension (H.T.) cable
17 Ignition switch feed
18 Ballast ignition supply voltage, via relay contacts when ignition switch is in 'start position'
19 Ballast resistance unit (model 9BR)
20 Tachometer connection
21 Ignition coil (model 13C12)
22 Amplifier unit (model AB3)
23 Inhibited (non-reversible) moulded connector(s)
24 Inhibited (non-reversible) 'lucar' connector(s)

Cable identification

25 Black
26 Red
27 White
28 Blue
29 Yellow
30 Green

1. DESCRIPTION

The 'Opus' electronic ignition system comprises: Distributor model 36DE12, Amplifier Unit model AB3, Ballast Resistance Unit model 9BR, and a conventional high-performance Ignition Coil model 13C12 (see Fig. 1).

The Distributor: In addition to the usual conventional centrifugal auto-advance mechanism, retard-type vacuum unit and high-tension (H.T.) rotor arm, the distributor also incorporates an electronic timing rotor and a pick-up module assembly (see Fig. 2). The timing rotor and pick-up module (in conjunction with a separate amplifier unit) replaces the conventional contact breaker and cam.

The timing rotor is a glass-filled nylon disc with small ferrite rods embedded in its outer edge and the number of ferrite rods, and the spacing of the rods, corresponds with the number of cylinders and firing angles of the engine. The timing rotor and the H.T. rotor arm rotate together, with an air-gap (adjustable to specified limits) existing between the outside edge of the timing rotor and the ferrite core of the stationary pick-up module.

The pick-up module assembly comprises a specially manufactured magnetically-balanced small transformer, with primary (input) and secondary (output) windings. Specialised magnetic balancing of the pick-up module 'E' shaped ferrite core is carried out at the factory by adjusting a small ferrite screw near the bottom limb of the core. **NOTE: Magnetic balancing of the pick-up module cannot alter in service and the ferrite adjusting screw must not be disturbed.**

Automatic control of retard-ignition timing is provided by the vacuum unit which varies the static timing position of the pick-up module in relation to the position of a ferrite rod in the timing rotor. This operates as part of the emission control system that prevents air pollution by eliminating obnoxious fumes from the engine during idling and over-run conditions.

Lucas 'Opus' 3 (Mk II) Electronic Ignition System

(fitted to Jaguar "E" Type Series Ill)

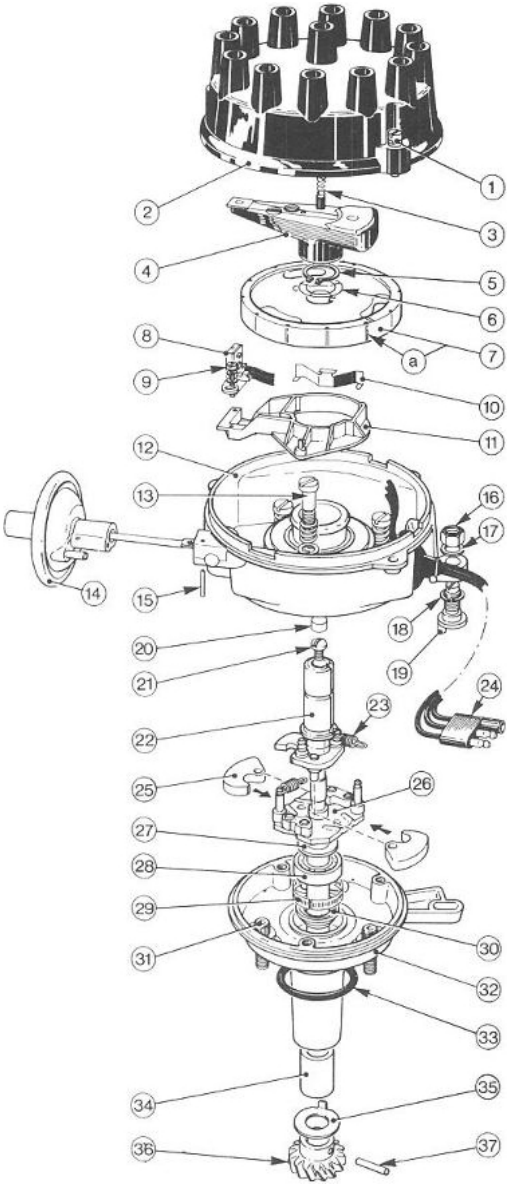

Fig. 2 Distributor model 36DE12

1 Cover fixing screw(s)
2 Moulded cover
3 Brush and spring
4 H.T. rotor arm
5 Circlip
6 Corrugated spring washer
7 Timing rotor, (a) ferrite rod(s)
I Pick-up module
9 Fixing screw(s)
10 Bearing spring
11 Pick-up arm
12 Micro-housing
13 Screw(s) (micro-housing fixing and tensioning)
14 Vacuum unit (retard-type)
15 Roll pin
16 Locknut
17 Plain washer
18 Spring washer
19 Vernier timing control screw
20 Felt lubrication pad
21 Rotor carrier fixing screw
22 Rotor carrier assembly
23 Auto-advance spring(s)
24 Inhibited connector (distributor to amplifier)
25 Auto-advance welght(s)
26 Action plate
27 Distance collar
28 Ball bearing
29 Retaining ring
30 Oil seal
31 Allen screw(s) (static ignition timing and distributor fixing)
32 Distributor body
33 "0" ring oil seal
34 Bearing bush
35 Thrust washer
36 Driving gear
37 Driving gear pin

The distributor timing rotor and pick-up module generate an electronic timing signal, which activates the amplifier unit via exteroal cables of a specified type and length. NOTE: The length of this triple-core extruded type cable must not be altered and the cables must not be separated or replaced by loose individual cables.

Amplifier Unit: This is a die-cast aluminium heat sink with cooling fins. Inside a compartment at the back of the heat sink (enclosed by a cover secured by four

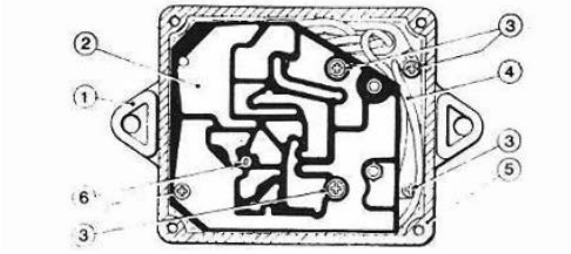

Fig. 3(a) Amplifier unit with cover removed

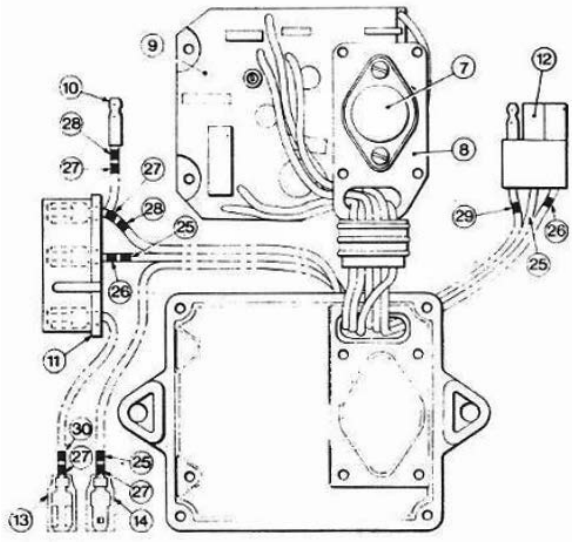

Fig. 3(b) Amplifier unit with printed circuit wiring board assembly partially removed

1 Amplifier unit body (heat sink)
2 Printed circuit wiring board assembly
3 Printed circuit wiring beard assembly fixm~ screws (must not be disturbed)
4 Earth cable
5 Sealing gasket
6 Oscillator adjusting screw (must not be disturbed)
7 Power transistor
8 Power transistor fixing plate
9 Encapsulated area covering components
10 Tachometer connection (!ransferred to later f~tmenl connect~r, when fitted, on 'SW' side of ballast resistance unit see Fig. 1
11 Connection to ballast resistance unit
12 Connection to distributor pick-up module
13 Connection to coll L.T. "+" terminal
14 Connection to coll L.T. '—' terminal

Cable Identification

25 Black 26 Red 27 White
28 Blue 29 Yellow 30 Green

Lucas 'Opus' 3 (Mk II) Electronic Ignition System

(fitted to Jaguar "E" Type Series Ill)

screws) is a printed circuit wiring board assembly, comprising four transistors, a diode and other associated electronic components (see Fig. 3). One transistor is an oscillator, two are amplifiers, and one is a power transistor which functions as an electronic switch to control the primary circuit of the ignition coil. NOTE: A small ferrite trimmer screw (oscillator adjusting) is visible in the printed circuit wiring board when the heat sink cover is removed (see Fig. 3a, item 6). This trimmer screw tunes the coupling transformer of the oscillator transistor circuit and the original setting of the trimmer screw must not be disturbed. Also, do not disturb the printed circuit wiring board assembly fixing screws (refer para. (b), page 7).

The amplifier unit interprets the electronic timing signals from the distributor and the power transistor in the amplifier unit then functions as an electronic switch in the primary circuit of the ignition coil.

The amplifier unit is connected to the ignition coil via a separate ballast resistance unit and external connecting cables.

Ballast Resistance Unit: An encapsulated assembly comprising resistors and 'Lucar' terminal connectors is a fixed part inside an aluminium heat-sink fixing

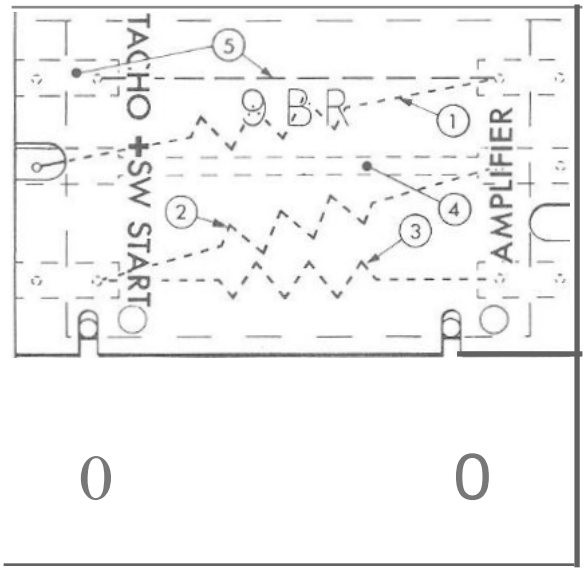

Fig. 4 Internal connections of ballast resistance unit

1	Amplifier unit drive resistor	7.6 –9.2 ohms
2	Ballast ignition resistor (shorted during starting period only)	0.72--0.80 ohms
3	Ballast ignition resistor	0.9 -1.0 ohms
4	Straight-through internal connection	
5	Tachometer terminal and straight-through internal connection (incorporated in later units. marked 47227)	

*47227 is superseded by 47229 whichhas a tachometer internal connection resistance 100 ohms.

Note: External cable connections are shown in Fig. 1

bracket (see Fig. 4). If the ballast resistance unit develops a fault, it cannot be repaired and must therefore be renewed.

External wiring connects two resistors (items 2 & 3, Fig. 4) in series with the ignition coil primary winding, this comprising a ballast ignition system which ensures that a satisfactory voltage is applied to the primary winding of the coil at all times, particularly during the period of starting motor operation when the battery terminal voltage is temporarily lowered below normal. At such times, an additional set of contacts inside the starting motor operating-solenoid (small 'Lucar' terminal marked 'IGN') automatically short-circuits one of the two series-connected resistors and this ensures that a satisfactory operating voltage is applied to the ignition coil primary winding '+' terminal during the period of starting motor operation.

Note: Ballast ignition is _particularJv beneficial during cold weather conditions, when adverse engine-starting conditions prevail.

A third resistor in the ballast resistance unit (item I, Fig. 4) is also connected by external wiring to the amplifier unit. this resistor being associated with the function of one of the transistors.

Ignition Coil: This is a specially designed fluid-cooled high-performance ballast-ignition type ignition coil, for use only with the 'Opus' ignition system to which it is particularly suited. NOTE: Other ballast-ignition type H.T. coils are not suitable as a service replacement for the original unit. This is due to the very high ratio of turns between primary and secondary windings and low primary winding resistance of the 'Opus' ignition coil (0.8-1.0 ohms at 20°C) which is matched to the electronic amplifier unit.

The ignition coil primary winding low-tension (L.T.) 'Lucar' terminal connections are marked '+' and '—' and, in addition to these polarity markings, each terminal is a different type, which prevents incorrect fitting of the external connecting cables.

It is recommended that a satisfactory earth connection is made between the umition coil fixing bracket and the vehicle frame. This will ensure that the coil metal casing 'fails safe', in the unlikely event of an insulation breakdown causing a leakage of H.T. voltage to the coil casing.

NOTE: Performance testing of the ignition coil must only be carried out in conjunction with the ballast resistance unit normally used with the coil in the 'Opus' ignition system, or alternatively by using a suitable resistance of equal value to the total of the two series-connected resistors in the 'Opus' 9BR ballast-resistance unit, which is 1.62-1.80 ohms.

Operation of the 'Opus' Ignition System

Normally, when the engine is stationary, prior to starting, the distributor timing rotor will be in a position where none of its ferrite rods is in close proximity with the ferrite core of the distributor pick-up module.

When the ignition is switched on, to start, a power transistor in the amplifier unit is in a conductive state and the ignition coil primary winding circuit is completed via the emitter/collector electrodes of the power transistor. At the same time, a sinusoidal (pulsating a.c.) voltage is applied by the amplifier unit to the distributor pick-up

*

Amendment to previous issue

module primary (input) windings and a small residual a.c. voltage is produced at the secondary (output) winding terminals of the pick-up module, which at this stage is 'magnetically balanced'. The voltage *at* the pick-up module output terminals is applied to the amplifier unit, but the residual voltage at this stage is insufficient to have any effect on transistor circuits which control the switching off of the power transistor in the output stage of the amplifier unit.

When the engine is cranked, to start, one of the ferrite rods in the distributor timing rotor being brought into close proximity with the ferrite core of the distributor pick-up module causes 'magnetic unbalancing' of the pick-up module core and this results in an increase in the voltage at the pick-up module output terminals. When the timing rotor ferrite rod traverses and magneticaJJy bridges the faces of the centre and upper limbs of the pick-up module 'E'-shaped core, maximum magnetic unbalancing of the core of the pick-up module occurs and this results in a maximum voltage being developed at the pick-up module output terminals. Maximum a.c. voltage at the pick-up module output terminals is applied to the amplifier unit, where it is first rectified, and then the resulting direct (d.c.) current is used to operate the transistor circuits which control the switching off of the power transistor in the output stage of the amplifier unit. When the power transistor is switched off, its emitter/ coJJectorelectrodes cease to conduct and the ignition coil primary winding circuit is disconnected. Disconnecting the ignition coil primary winding circuit causes a rapid collapse of the primary winding magnetic field through the secondary windings of the ignition coil and this results in a high-tension (H.T.) voltage being produced at the H.T. terminal of the ignition coil.

2. ROUTINE MAINTENANCE

No routine maintenance is necessary, but occasionally remove the distributor moulded cover and H.T. rotor arm and then add a few drops of machine oil to the felt lubricating pad in the top of the distributor shaft. At the same time inspect the H.T. carbon brush-and-spring inside the moulded cover and if necessary wipe clean the inside of the cover.

3. TECHNICAL DATA

(i)	Firing angles	0°, -30", ~. etc. ±ldeg
(ii)	Nominal voltage	12V (negative earth)
(iii)	Stall current (measured with ammeter in series with 'SW' terminal of ballast resistance unit)	5.0-6.5A
(iv)	Ignition coil primary winding resistance (measured between L.T. terminals marked '+' and'—',	0.8-1.0 ohm at 20"C
(v)	Ballast resistance unit	Refer Fig. 4
(vi)	Distributor pickup module: Primary (input) winding resistance (measured between centre terminal ruid outer terminal with red cable)	2.5 ohms nominal at 20"C
	Secondary (output) winding resistance (measured between centre terminal and outer terminal with black cable)	0.9 ohm nominal at 20°C
	Gap between pick-up module 'E' core faces and timing rotor outer edge	0.020.-0.022"' (0.5—.55 mm)

(vii) Centrifugal auto-advance details:
(Distributor reference number 41321A-B)
Kun up to 100 distributor rev/min and set gauge to read zero degrees. Check at the following increasing speeds:

Distributor rev/min	*Distributor advance degrees*
350	No advance
550	LO- 3.5
750	*5.5*- 7.5
950	6.0- 8.0
1750	8.0-10.0
2900	11.0-13.0
3500	11.5-13.5

(viii) Vacuum retard details:
(Vacuum marking 2-7-8R part number 54422166)

	Distributor retard degrees
With rising vacuum	
At 7 in. Hg and up to 13 in. Hg	7-9
With falling vacuum	
At 1 in. Hg	No retard

4• SERVICING

(a) Testing in Situ

(i) Check the Battery Terminal Voltage and Battery Earth Connection

Connect a moving-coil voltmeter (e.g. 0-20V range) between the battery terminals. 12V or more should be registered.

Connect the voltmeter between the earth terminal of the battery and a good earth point on the vehicle frame and disconnect the ignition coil L.T. terminal marked'—' to prevent the engine from starting. Operate the starting motor. Not more than 0.SV should be registered. *H* so, refit cable to ignition coil L.T. terminal and proceed to next test (para. ii).

H the test was unsatisfactory, rectify faulty connection between battery and frame.

(ii) Check Voltage Applied to Ignition Coll Primary Winding

Connect the voltmeter between the coil L.T. terminal(s) marked '+' and a good earth point on

the vehicle frame (do not disconnect the cable). Switch on the ignition. 4-6V should be registered. If so, proceed to next test (para. iii).

(I) If the test is unsatisfactory due to a low voltage being registered, check the ignition switch supply voltage to the ballast resistance unit. Connect the voltmeter between the 'SW' terminal of the ballast resistance unit and a good earth point on the vehicle frame (partially withdraw the cable connector, sufficient only to enable an insulated test prod to make contact with the 'SW' terminal blade). With the ignition switched on, battery voltage should be registered if the ignition switch and associated wiring are satisfactory.

ff so, switch off the ignition and extend the test by checking the resistance of each of the resistors in the ballast resistance unit (use a good quality battery-operated ohmmeter and refer to Fig. 4). If necessary, renew the ballast resistance unit.

(2) If the test is unsatisfactory due to a high voltage being registered, remove the distributor moulded cover and check the position of the timing rotor.

If a ferrite rod in the timing rotor is in close proximity with the core of the pick-up module, triggering (unbalancing) of the pick-up module could occur and this would cause the primary winding circuit to be switched off by the power transistor in the amplifier unit, in which case it would be normal for a high voltage to be registered during the test. If this is the case, crank the engine and position the timing rotor so that two of the ferrite rods are an equal distance either side of the pick-up module core, then repeat the original test.

If it is found that the timing rotor has come to rest in a normal position with none of its ferrite rods in close proximity with the core of the pick-up module, then the previously unsatisfactory test result could be due to a fault associated with one of the following:

Ignition Coil: Check with the ohmmeter, the continuity and resistance of the primary winding (refer 3 iv).

Ballast Resistance Unit: Check with the ohmmeter, the resistance of each of the resistors (refer Fig. 4).

Amplifier Unit: Satisfactory working of the amplifier unit is confirmed if the next two tests (para's iii and iv) are both satisfactory.

(III) Check Voltage Drop on E4'rth Side (or Amplifier Unit Side) of Ignition Coil

Connect the voltmeter between the coil L.T. terminal marked '-' and a good earth point on the vehicle frame (do not disconnect the cable). With the ignition switched on, a voltmeter reading between zero and 2V should be obtained. If so, leave the ignition switched on and the voltmeter connected and proceed to the next test (para. iv).

If the test is unsatisfactory (more than 2V registered), a faulty amplifier unit is indicated and the complete unit must be renewed.

(iv) Check the Switching Action of the Amplifier Unit

In reference to the previous test (para. iii), remove the distributor moulded cover and then crank the engine until one of the ferrite rods in the timing rotor is bridging the two limbs of the pick-up module core (ferrite rod in line with the timing mark groove on the top of the pick-up module). The voltmeter reading obtained in the previous test (para. iii), should now be greatly increased to approximately 12V, indicating that the ignition coil primary winding circuit has been switched 'OFF'. If so, proceed to performance testing (para. v).

If the test is unsatisfactory (voltmeter reading is unchanged from that obtained in the previous test (para. iii), a fault is indicated in either the amplifier unit or the distributor pick-up module and both these units must now be checked (refer 'Note' under the heading 'dwell angle' in the following para. v).

(v) Check the Running Performance of the Ignition System

Note: If 'Crypton' or similar type test equipment is not available (or if the engine will not start) proceed direct to para. vi.

Run the engine at charging speed (approximately 3,000 rev/min) and check the battery terminal voltage. This should be 13.5-14.SV, if the charging system is satisfactory, in which case proceed to check the following:

Primary traces — These are similar to conventional ignition systems.
Dwell angle — 22°-27°.

If the dwell angle exceeds 27°, a faulty distributor timing rotor is indicated and this should be checked by substitution. If the dwell angle is less than 22°, check the gap between the distributor pick-up module and timing rotor (refer 3 vi). If the gap is correct, suspect the amplifier unit and the distributor pick-up module. NOTE: Check the amplifier unit and pick-up module by substitution, checking first the amplifier unit and then the pick-up module. (If this sequence of proving the units is not maintained, the substitute pick-up module may be damaged if a fault exists in the original amplifier unit.)

If substitute amplifier and pick-up module units are not available for testing purposes, check the original unit as follows:

To check the amplifier unit: First. check the position of the distributor timing rotor. If a ferrite

rod in the timing rotor is in close proximity with the core of the pick-up module, for the purpose of the following test, it will be necessary to crank the engine and reposition the timing rotor so that two of the ferrite rods are approximately an equal distance either side of the pick-up module core. Disconnect the cable from the 'SW' terminal of the ballast resistance unit (alternatively, disconnect the later fitment three-terminal moulded connector from the 'SW' side of the ballast resistance unit) and connect a moving-coil ammeter (e.g. 0-20A range) in series with the 'SW' cable and the 'SW' terminal of the ballast resistance unit. Note: Due to close proximity of the 'SW' terminal blade to the frame of the ballast resistance unit, take care to avoid short-circuiting the ammeter connection to the frame. Switch on the ignition. 5–6.SA should be registered. If so, extend the test by separating the two moulded connectors between the distributor and amplifier units, then connect both the outside terminals of the amplifier connector alternately to the centre terminal. The ammeter reading should remain unchanged from the previous test. If the ammeter reading increases by more than 0.5A the amplifier unit is faulty and must be renewed.

To check the pick-up module: Connect one lead of the ohnuneter to the centre terminal of the pick-up module moulded connector and connect the other lead of the ohmmeter alternately to each of the outside terminals of the same connector. Continuity of the primary and secondary windings of the pick-up module will be indicated by a reading on the ohmmeter, which in each case should conform to the resistance values given in (3 vi). If the pick-up module winding test is satisfactory, inspect the ferrite adjusting screw near the bottom limb of the pick-up module 'E'-shaped core. If the original factory adjustment of this screw shows signs of having previously been interfered with (indicated by a broken seal around the screw) the pickup module should be renewed.

Secondary traces	These are similar to conventional ignition systems.
Sparking plug kv	8–11 (If unsatisfactory, check coil H.T. kv and if this is satisfactory, suspect H.T. cables).
Ignition coil H.T. kv	18–20.
Distributor H.T. rotor arrn kv	6.
Ignition timing	Refer vehicle specification.
Centrifugal auto-advance	Refer 3 (vii).
Vacuum retard	Refer 3 {viii).

Note: The following tests (para's vi and vii) only apply if testing in this paragraph has not been carried out.

(vi) Check Whether a High-Tension (H.T.) Spark is Available at the Centre Terminal of the Distributor

When continuing testing direct from para. iv, the distributor moulded cover will already be removed and a ferrite rod in the timing rotor will be bridging the core of the pick-up module. (Ferrite rod in line with the timing mark groove on top of the pick-up module). This position of the timing rotor is necessary to carry out the following test.

Remove the H.T. cable from the centre terminal of the cover and position the cable-end conductor about *tk"* (0.187" or 4.76 nun) from a clean and unpainted part of the engine (well clear of the carburetter and ~etrol pipes).

Switch on the ignition, then grasp the edge of the timing rotor and rock the rotor a few times in the direction of rotation (which is towards the vacuum unit). A spark should regularly occur, according to the number of times the timing rotor .is moved. If so, proceed to the next test (para. vii).

If the test is unsatisfactory (no spark), inspect the ignition coil H.T. cable and terminal connection at the coil. If the H.T. cable and terminal connection are found to be satisfactory, the *coil* should either be individually 'performance tested' or proved by substitution.

(vii) Check for Satisfactory Distribution of the High-Tension (H.T.) Voltage from Ignition Coil to Sparking Plugs

Check the Distributor H. T. Rotor Arm

Providing a satisfactory spark is known to be available at the centre terminal of the distributor (previous testing para. v refers), the ignition coil H.T. voltage can be utilised for testing the insulation of the H.T. rotor arm electrode. Carry 01,lt the same test as detailed in the previous para. (vi), but this time position the cable-end conductor near to the rotor arm electrode. Only a very faint trace of a spark, or no spark, should occur.

Check the Distributor Moulded Cover

The inside and outside of the distributor moulded cover should be clean, dry, and free from contamination by oil. Closely inspect the inside of the cover. 'Tracking' of the H.T. spark will be indicated by a thin greyish-white line or, sometimes more obviously, by signs of charring of the moulding. In such cases the fault can normally be rectified only by renewing the moulded cover. Check the carbon brush and spring for freedom of movement in the moulding. Check whether the spring is making electrical contact with the bottom of the brush-and-spring housing. Check whether the brush needs renewing. The norm.al amount of brush protruding from the moulding when the brush-and-spring

assembly is in an unloaded condition, should be approximately ,.&" (0.156" or 4 mm). The original brush-and-spring should not normally require renew- ing, but if the brush dimension previously referred to becomes worn to ~" (0.093"' or 2 mm) the brush-and- spring assembly should be renewed. Should this become necessary, the cause of premature failure of the brush should be ascertained. Check that the top of the rotor arm electrode where it contacts the brush is highly polished. Look for scoring of the electrode, which may previously have been caused by incorrectly using rough glass-paper or emery cloth to clean the electrode. (It is sufficient to wipe clean the rotor arm with a petrol-moistened cloth). If the centre of the moulding around the brush-and-spring housing shows signs of damage, check that the rotor arm is fully-located on the distributor shaft.

Check the High-Tension Cables

The general condition of the H.T. cables can be considered satisfactory if the cables are clean and dry, free from contamination by oil, and the insula- tion shows no signs of cracks.

If the engine fails to start, or misfires, the H.T. cables may previously have been rerneved and then accidentally refitted to the sparking plugs in the incorrect firing order. If this is not the cause of the fault, check whether a satisfactory spark occurs at the sparking plug end of each of the H.T. cables.

First prevent the engine from starting by dis-connecting the H.T. cables from the sparking plugs. 'Connect to each of the H.T. cable connectors in turn, a sparking plug known to be good. With sparking plug resting on engine, switch on the ignition and crank the engine. A spark should regularly occur.

If the test is satisfactory, the fault must be due to one of the following causes:- sparking plugs, carburation (or fuel supply), or an engine fault.

If the test is unsatisfactory,

(1) If there is no sparking at the test plug, check the centre tennioal connection in the distributor cover.

(2) If a weak spark occurs, check the coonec-tions in the distributor cover.

(3) If there is no spark from one or more H.T. cable(s), check the conoection of the faulty cable(s) in the distributor cover.

(b) Servicing the Amplifier Unit

The printed circuit wiring board assembly com-prises all working parts of the amplifier unit. It is not a practical or economical proposition to carry out repairs to the printed circuit wiring board assembly. If the amplifier unit has failed, it must be renewed complete.

During production of the amplifier unit, a special test is carried out at Vie factory to determine whether the body (collector) of the power transistor is short-circuiting to the frame of the amplifier unit. Depending on the result of this power transistor insulation test, it is sometimes necessary to re-position the printed circuit wiring board assembly in a satisfactory position before finally tightening the fixing screws. For this reason, the printed circuit wiring board assembly 'fixing screws' should not be disturbed. Fig. 3 (b) shows the printed circuit wiring board assembly partially removed from the amplifier unit and the purpose of this illustration is to show the enclosed side of the printed circuit wiring board assembly, so making it unnecessary to disturb its original position.

(c) Servicing and Dismantling the Distributor

Note: If the distributor is in need of a major repair or overhaul, remove the unit from the vehicle. In such cases the following information can be used as a general guide to complete dismantling, in which case disregard para. (ii).

(i) Remove the moulded cover and the H.T. rotor arm.

(ii) Check the pick-up module gap, by placing a feeler gauge 0.020-0.022* (0.50-0.55 mm) between the core of the pick-up module and the timing rotor (see Fig. 1, item 6). If necessary, adjust the gap by alter- ing the position of the pick-up module assembly.

Inspect the timing rotor, paying particular attention to the ferrite rods. (Removing the timing rotor is dealt with in para. iii).

Check the pick-up module pick-up arm for satisfactory automatic vacuum-retard movement. The bearing surfaces of the pick-up arm, and the peg on the pick-up arm which actuates the vacuum operating rod, should be lubricated sparingly with 'Rocol' grease No. 30863 or,. alternatively, 'Mobil- grease' No. 2. (If it is necessary to apply more grease to the bearing surfaces of the pick-up arm, push the pick-up arm sideways against the pressure of the bearing spring whilst applying the grease).

Inspect the centrifugal auto-advance mechan-ism. To do this it will be necessary to remove the timing rotor and separate the micro-housing from the distributor body (see para. iii and vi). The auto-advaoce mechanism should be lubricated with a liberal quantity of the same grease previously specified for the pick-up arm. If necessary, apply a fresh application of grease.

Finally, apply a few drops of clean engine oil (e.g, S.A.E. 30 grade) to the felt pad in the top of the rotor carrier shaft, until the pad is sufficiently soaked.

(III) Removing the Timing Rotor

Remove the circlip from the groove in the rotor carrier shaft, then remove the corrugated spring washer and the timing rotor from the shaft.

Lucas 'Opus' 3 (Mk II) Electronic Ignition System

(Fitted to Jaguar E Type Series Ill)

(iv) Removing the Pick-up Module Assembly

After removing the timing rotor (para. iii), removing the pick-up module (and also reassembly of the pick-up module) is facilitated if the pick-up arm is removed complete with the pick-up module, the pick-up module fixing screws are then more accessible for removal and refitting.

To removethe pick-up module-and-pick-up arm assembly: Lift the vacuum operating rod from the peg on the pick-up arm, remove the pick-up arm bearing spring and then slide the pick-up arm sideways to disengage it from its bearing in the micro-housing. It is now a simple matter to separate the pick-up module from the pick-up arm.

The pick-up module cable-assembly grommet should be removed from its location in the micro-housing by gripping the cables and pushing free the top part of the grommet into the micro-housing first, the retaining lip at the bottom of the grommet can then be freed from the bottom of the hole in the micro-housing. (During reassembly, the retaining lip at the bottom of the grommet should be located in the hole first and the top part of the grommet should then be pushed fully-home).

(v) Removing the Vacuum Unit

After removing the timing rotor (para. iii), or when proceeding with dismantling from the previous para. (iv), remove the vacuum unit as follows:- Use a pin-punch 0.073" (1.85 mm) to tap out the roll pin which secures the vacuum unit in the micro-housing. After the roll pin has been removed, the vacuum unit can be removed after its operating rod has been lifted from the peg on the pick-up arm.

(vi) Centrifugal Auto-Advance Mechanism

After removing the timing rotor (para. iii), or when continuing with dismantling from the previous para. (v), access to the auto-advance mechanism can be obtained by separating the micro-housing from the distributor body and this is achieved by removing the three spring-loaded fixing screws from inside the micro-housing.

The control springs can now be removed from their fixing posts and if necessary the springs renewed.

The centrifugal weights can also be removed, and if necessary renewed, after the rotor carrier has been removed from the distributor shaft and this is achieved by removing the screw located beneath the felt lubricating pad in the top of the rotor carrier.

The auto-advance mechanism should be lubricated with 'Rocol' grease No. 30863 or, alternatively, 'Mobilgrease' No. 2 (same as specified for the bearing surfaces of the pick-up arm). Prior to reassembly of the auto-advance mechanism, grease should be applied to either the pivot holes in the weights or the pivot posts of the rotor carrier before it is fitted to the distributor shaft. When the auto-advance mechanism is in a completely assembled state, the whole of the mechanism should be smeared with the grease previously specified. Finally, the rotor carrier shaft should be initially lubricated, by applying a few drops of clean engine oil (e.g, S.A.E. 30 grade) inside the top of the rotor carrier shaft before replacing the felt lubricating pad in the top of the shaft. After the felt pad has been fitted, soak the pad with a few drops of the oil previously specified.

(vii) The Distributor Body Assembly

In the unlikely event of premature failure of any part comprising the distributor body assembly (shaft-and-action plate assembly, ball-race bearing, bearing bush, thrust washer and driving gear), the distributor must be serviced by renewing the body assembly complete.

Note: This is due to the fact that special tooling would be required to carry out repairs to the distributor body assembly. One type of tool being necessary to carry out nail-punch riveting of both ends of the driving gear fixing pin and another tool to critically position the driving gear on the shaft of a new shaft-and-plate assembly, while the driving gear fixing pin hole is drilled through the shaft.

(viii) Reassembling the Distributor

Reassembling the distributor is simply a reversal of the dismantling procedure.

Do not forget to locate the 'Allen screws' and flat washers in the elongated holes of the body before fitting the micro-housing to the body, otherwise the micro-housing will again have to be removed (see Fig. 2, item 31).