The care and maintenance of K·L·G SPARKING PLUGS

TYPE K42/1R

as fitted to

CIRRUS

MINOR

and

MAJOR

AERO ENGINES

A Product of

SMITHS AIRCRAFT INSTRUMENTS LTD.

The Aviation Division of

S. SMITH & SONS (ENGLAND) LIMITED

CRICKLEWOOD WORKS - LONDON - N.W.2

APPENDIX H AUGUST 1946

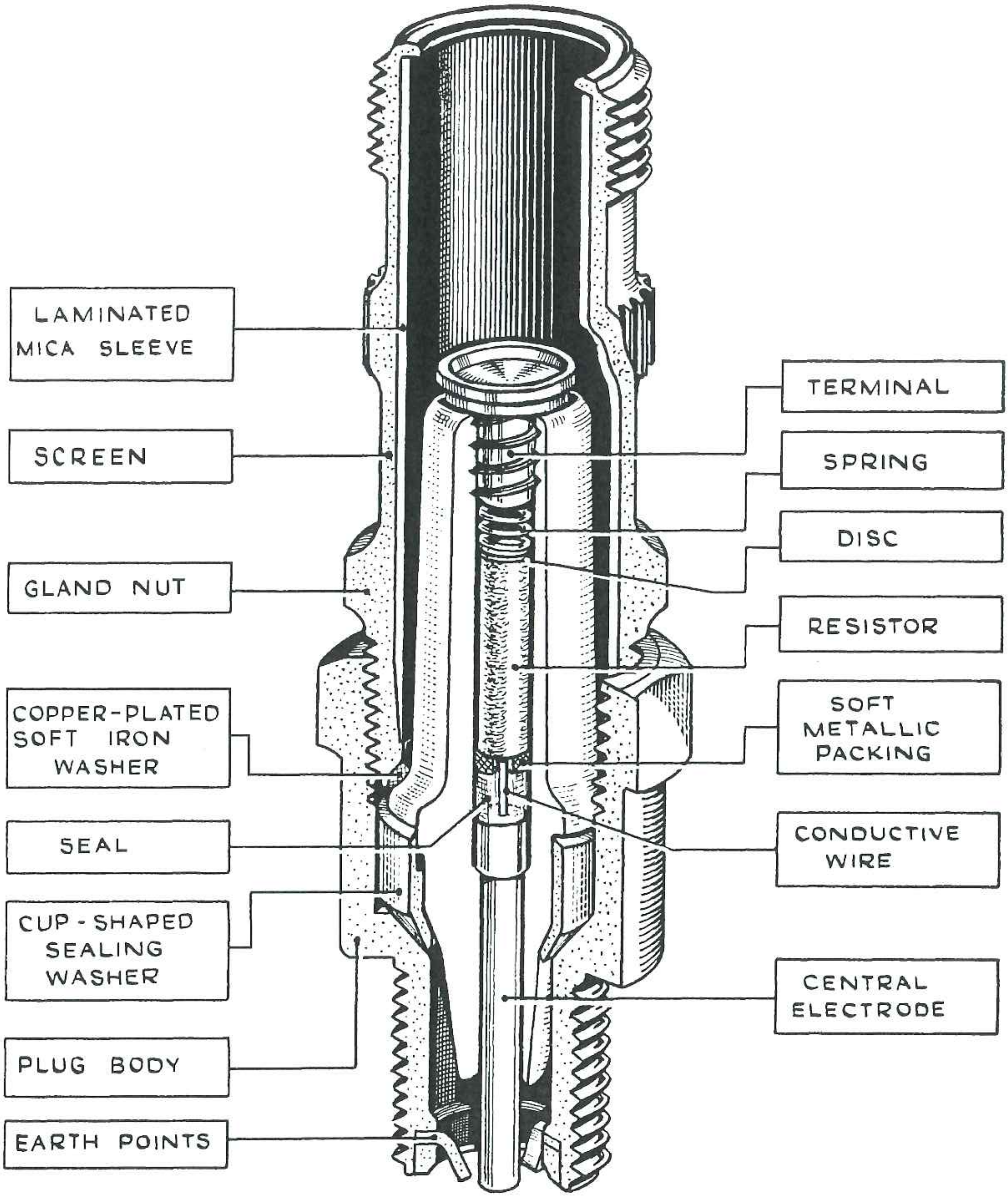

Fig. 1. Sectional View of K42/1R sparking plug.

K.L.G. SPARKING PLUGS
TYPE K42/1R

Cirrus Minor and Cirrus Major Aero Engines are now fitted with the same type of sparking plug—the K.L.G. TYPE K42/1R with 14mm. thread, shown in section on the opposite page. This plug has a " Corundite " insulator, a screen integral with the gland nut and a resistor is embodied in the insulator itself.

It will be appreciated that this particular type of plug has the characteristics best suited to Cirrus Minor and Major Aero Engines and is approved by the engine manufacturers. In no circumstances should sparking plugs other than types specified by the engine manufacturers be fitted, in view of the serious consequences which may result from the use of plugs not suited to the engine's requirements.

GENERAL DESCRIPTION

The central insulator is of " Corundite," a ceramic material possessing high thermal conductivity plus great mechanical strength. Into the bore of the insulator are sealed the central electrode, resistor and terminal assembly. A mild steel cup shaped washer is cemented to the conical face of the insulator and is thus integral with it. Nickel alloy is employed for the central electrode to one end of which a conductive wire is welded, the annular space between the conductive wire and the bore of the insulator being sealed with glass by a high-temperature process to provide a permanent, gas-tight seal.

The free end of the conductive wire is surrounded by a soft metallic packing in contact with which is the lower end of the carbon resistor. The assembly is completed by a pressure disc at the top end of the resistor, a spring and terminal, the latter sealed in position by a special vitreous cement.

Three earth points of nickel alloy are copper-brazed into the mouth of the body. This ensures maximum heat conductivity, thereby prolonging the plug's life by reducing the rate of erosion. The gland nut is of tubular construction, recessed at its lower end to receive a copper-plated soft iron seating washer and lined with laminated mica retained in position by rolling over the top of the tubular extension of the nut which forms the screen.

INSTALLATION

K.L.G. Sparking Plugs have the firing points adjusted to the correct gaps during manufacture and are fitted with moulded protectors screwed on to each end. Provided that plugs are taken direct from the maker's wrappings and are externally in good condition, no functional testing is necessary prior to assembly to the engine. After the moulded protectors have been removed from the ends each plug should be visually inspected to ensure that there is no foreign matter in the body or the tubular screen of the gland nut and that the mica lining is clean and in good condition.

The 14mm. thread should be lightly smeared with graphited grease prior to insertion and it is important that the appropriate washer, K.L.G. Part No. B.1859 is fitted between the shoulder on the plug body and the cylinder head. Full instructions for the assembly of plugs to the engine are given in Section **5** Part (iii) of this manual.

MAINTENANCE INSTRUCTIONS FOR K.L.G SPARKING PLUGS TYPE K42/1R

Provided that the engine is operating under normal conditions the K.L.G. Sparking Plugs may be relied upon for efficient service with no more than periodical inspection, cleaning and the maintenance of the correct gaps at the firing points. The manufacturers of Cirrus Minor and Major Aero Engines recommend that the sparking plugs should be removed from the engine every 50 flying hours using the appropriate spanner supplied in the flight kit. Care should be taken during the process not to damage the thread at the end of the screen. After removal, plugs should be dismantled, cleaned and inspected in accordance with the following instructions.

DISMANTLING

The tools required comprise a vice block (a hardened steel block to receive the hexagon on the body of the plug such as K.L.G. tool ref. SE/B14) and a double-handled spanner for the gland nut

(K.L.G. tool ref. SE/A.1418). The vice block should be held in the vice, the plug inserted and the gland nut unscrewed with the spanner. Removal of the gland nut will permit the withdrawal of the insulator assembly from the plug body, complete with the integral seating washer.

CLEANING AND INSPECTING

The plug body may be cleaned by the use of any standard degreasing process and a stiff wire brush should be employed to remove traces of carbon and graphite from the 14mm. thread. Heavy deposits may first be scraped from the interior of the body, using a blunt tool and it is then recommended that the body is screwed into an adaptor or held by the barrel in a collet and rotated in a lathe or similar machine between 2,000 and 3,000 r.p.m. The inside of the body can be cleaned by means of a piece of emery cloth such as Wellington No. 1 rolled on a small diameter stick which will enter the gas hole of the body. With the body rotating, this will remove all the deposit. It is very necessary to ensure that the earth points are not damaged in any way during this process.

The cleaning of the earth points and the mouth of the body may be done by sandblasting if available, but it will be necessary, of course, to insert a dummy or scrap centre into the body to protect the internal seating. Only a light sandblast operation should be performed, as too much will result in damage. If no sandblasting equipment is available, brush the earth points at the end of the body with a wire brush.

After cleaning, the plug body should be inspected for general condition with particular reference to the internal and external threads and the conical seating. The earth points should be examined and if they are eroded to any substantial degree the body should be scrapped since the correct gap will be unobtainable on re-assembly. If satisfactory, the plug body should be dipped in a standard rust-preventative or in thin oil.

The gland nut and screen should be cleaned externally by brushing lightly and wiped with petrol or a degreasing agent such as trichlorethylene, particular care being taken to clean out the threads. The laminated mica lining needs careful treatment and is best cleaned by drawing through the interior a small piece of clean rag damped in trichlorethylene or failing that, unleaded petrol or white spirit. Excess of solvent should be avoided as it is not desirable to allow it to penetrate the mica.

Inspect the mica lining all round the interior of the screen. Small flakes may be removed with a wooden stick. Any damage marks on the threads should be lightly dressed and the serrations on the body of the nut should be inspected to verify that they are not unduly worn by the spring locking device of the contact assembly. The copper-plated soft washer at the lower end of the gland nut is not likely to be damaged, provided the plug has been carefully treated but if torn should be removed from its recess and a replacement washer fitted.

Assuming that, after visual inspection, the gland nut and screen assembly is acceptable, it must be tested electrically to prove the insulating properties of the mica lining. The test equipment required is shown diagramatically in Fig. 2 and consists of a standard ball gap set to discharge at 12,000 volts (peak), a high tension supply and a standard contact assembly as used on the engine. The high tension leads are taken to the gland nut and the connector cable in parallel with the ball gap. On the application of current it must be observed that sparking occurs only at the ball gap and that there is no discharge from the end of the contact assembly within the screen; this may be verified by looking down the bore of the gland nut during the test.

To clean the insulator and central electrode assembly, wipe the glazed portion of the insulator and the terminal clean. The lower

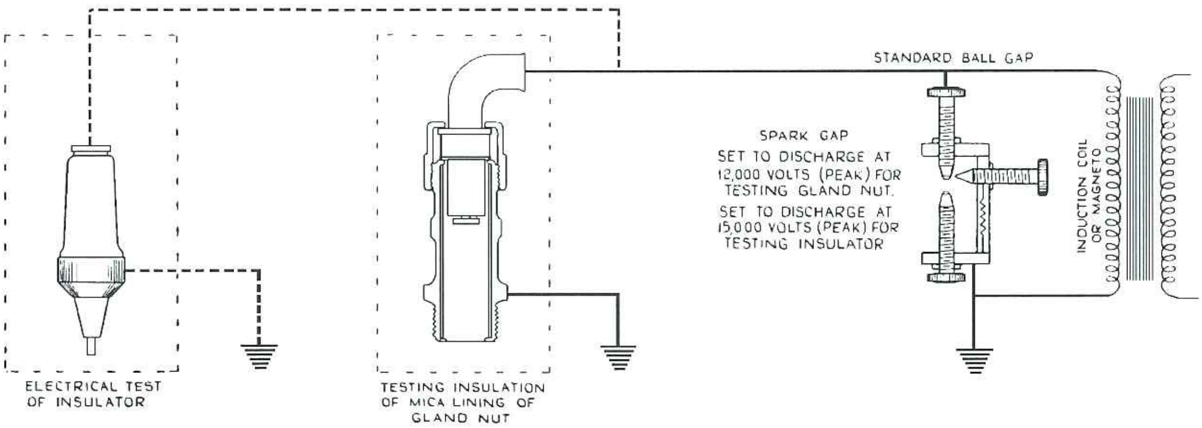

Fig. 2. Diagram of test equipment for gland nut and insulator.

insulation may be cleaned by lightly sandblasting if available but if not can be cleaned with fine sandpaper. If sandblasting is the method adopted, care should be taken to mask the metal seating of the integral cupped washer. Carefully remove any deposits from the electrode by means of emery cloth, taking care not to remove too much metal.

When clean, inspect the insulator assembly for general condition. There should be no signs of cracking of the lower " Corundite " insulator, the cupped washer must be in good condition, the central electrode projecting from the insulator must be of substantially cylindrical form and not unduly pitted in the vicinity of the firing points. After visual inspection the insulator assembly must be tested for insulation and the value of the resistor checked.

For the insulation test the high tension supply and ball gap shown in Fig. 2 are required, the latter set to discharge at 15,000 volts (peak). With the high tension lead applied to the terminal of the insulated centre and with the cupped washer earthed, sparking should occur at the ball gap if the insulator is electrically sound.

The correct value of the resistor contained within the insulator is between 1000 ohms and 3000 ohms. This value should be checked with any standard type of low voltage resistance meter such as the Avo-meter, the leads being taken to the terminal and the central electrode, care being exercised to ensure that efficient contact is made.

On the conclusion of these tests the cupped washer and steel terminal of the insulator assembly should be covered with light oil to protect the surfaces from corrosion.

RE-ASSEMBLY OF THE SPARKING PLUG

First see that all surfaces are free from dust, particularly the conical surface of the cupped washer on the insulator assembly and the internal seating in the body. Lightly lubricate all seating surfaces and verify that the copper-plated washer is in position in the recess of the gland nut. Assemble the insulator unit to the plug body and screw in the gland nut finger tight.

See that the central electrode is disposed approximately centrally in the plug body; if this is in order, tighten the gland nut in position by the application of a spanner torque of 30 lbs./ft. ±2 lbs/ft. It should be emphasized here that the correct degree of tightening of the gland nut is essential to secure a pressure-tight joint and the correct functioning of the plug in service. Excessive tightening may distort the components of the plug while too little pressure may cause leakage resulting in the passage of hot gasses, burning of the sealing surfaces and subsequent failure. After tightening, set the gaps between .015″ and .018″ by bending the earth points. In no circumstances should the central electrode be bent.

FINAL TESTING

Before it can be regarded as acceptable for service, each plug must be checked for sparking at the gap, at an applied voltage of 12,000 volts (peak), under conditions of air pressure at 100 lbs./sq. in. It must also be checked for leakage between the body and gland at the same pressure.

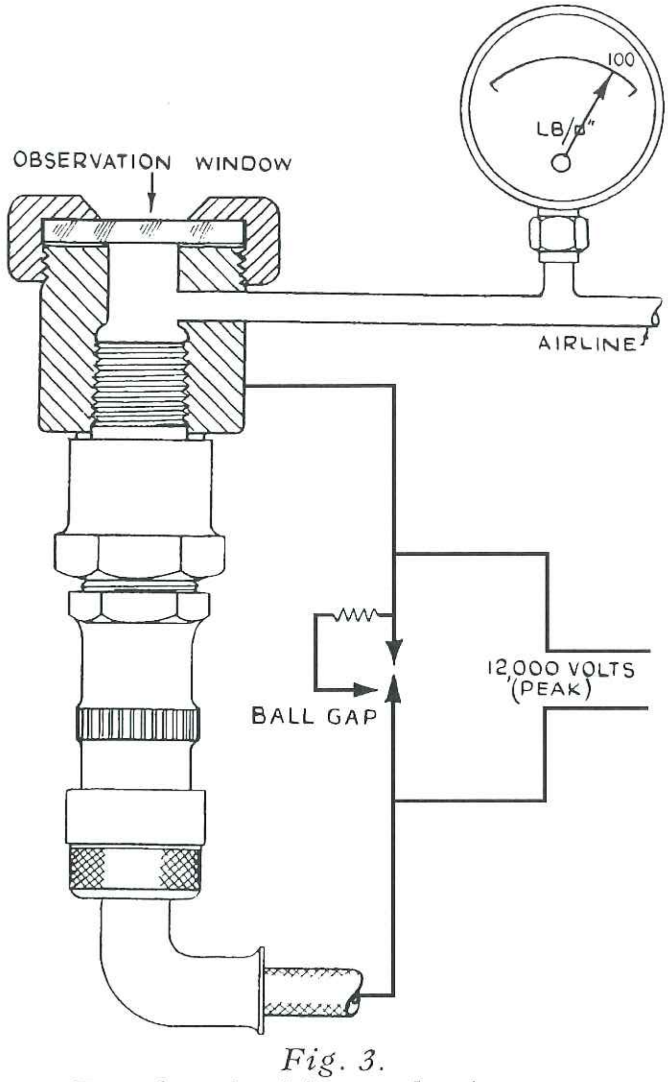

Fig. 3.
Test for sparking under pressure.

Several types of pressure test equipment are available, the equipment for testing regularity of sparking under pressure being shown diagramatically in Fig. 3. High tension current is taken to the centre terminal of the plug by a standard contact assembly and pressure is applied to the chamber until the gauge indicates 100 lbs./sq. in. On switching on the H.T. supply it must be verified, by observation through the window of the pressure chamber, that sparking occurs regularly at the sparking plug points for a minimum period of 10 secs. There must be no sparking at the ball gap in parallel with the plug.

The test for gas leakage between the plug body and gland nut should be carried out with the plug in position in the pressure test fixture but with the cable connector removed and replaced by a rubber plug having a small hole and glass tube through its centre. This prevents liquid entering the interior of the gland nut and affecting the mica. A pressure of 100 lbs./sq. in. is applied to the chamber and a beaker of white spirit held so that the gland nut and hexagon of the plug body are submerged as shown in Fig. 4. It must be verified that no more than a few small bubbles emerge from the gland nut thread or through the hole in the rubber plug.

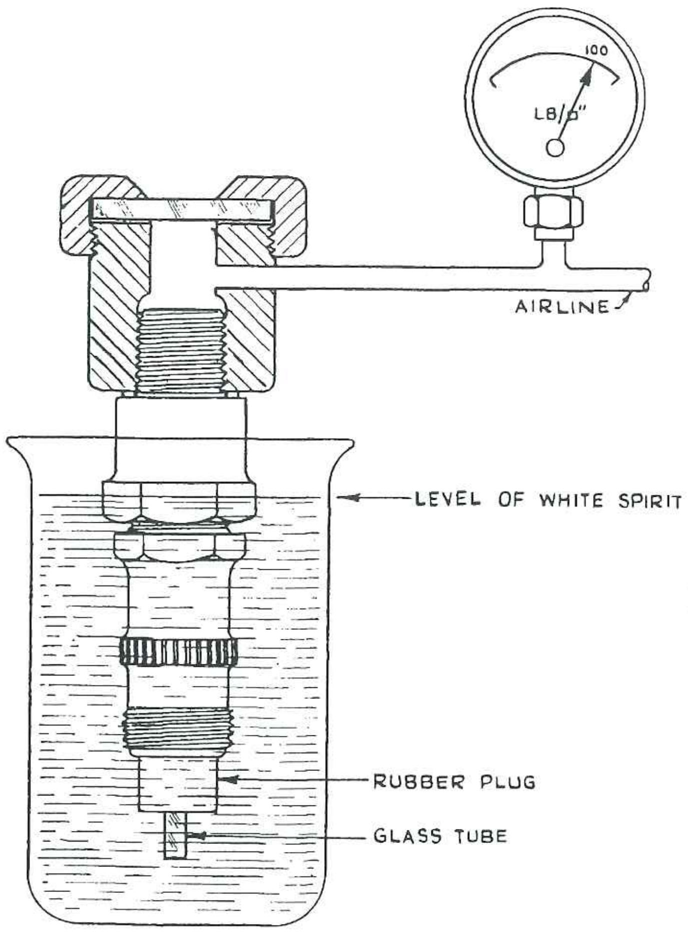

Fig. 4.
Pressure test of assembled plug.

On the completion of these tests the plug should be removed from the testing fixture and blown off dry with a light air blast. A new washer K.L.G. type B.1859 should be placed in position over the 14mm. thread and K.L.G. moulded protector caps screwed on the threads at either end pending assembly to the engine. After servicing, if the plugs are not required for immediate use in engines, they should be stored in a warm and dry place.

K.L.G. SERVICE.

In this publication the servicing and testing equipment required is but briefly described and diagramatically illustrated. Precise details of equipment will be provided free on request to K.L.G. Sparking Plugs Ltd., Putney Vale, London, S.W.15, to whom all service enquiries should be addressed.

KC