

EO 15-5C-2

ROYAL CANADIAN AIR FORCE



**DESCRIPTION AND MAINTENANCE
INSTRUCTIONS
SPARK PLUG
SERVICE INSTRUCTIONS
SPARK PLUG
GENERAL**

(This EO replaces EO 15-5C-2 dated 10 Apr 57, and all revisions issued thereto)

ISSUED ON AUTHORITY OF THE CHIEF OF THE AIR STAFF

31 JUL 64

LIST OF RCAF REVISIONS

DATE

PAGE NO

DATE

PAGE NO

INTRODUCTION

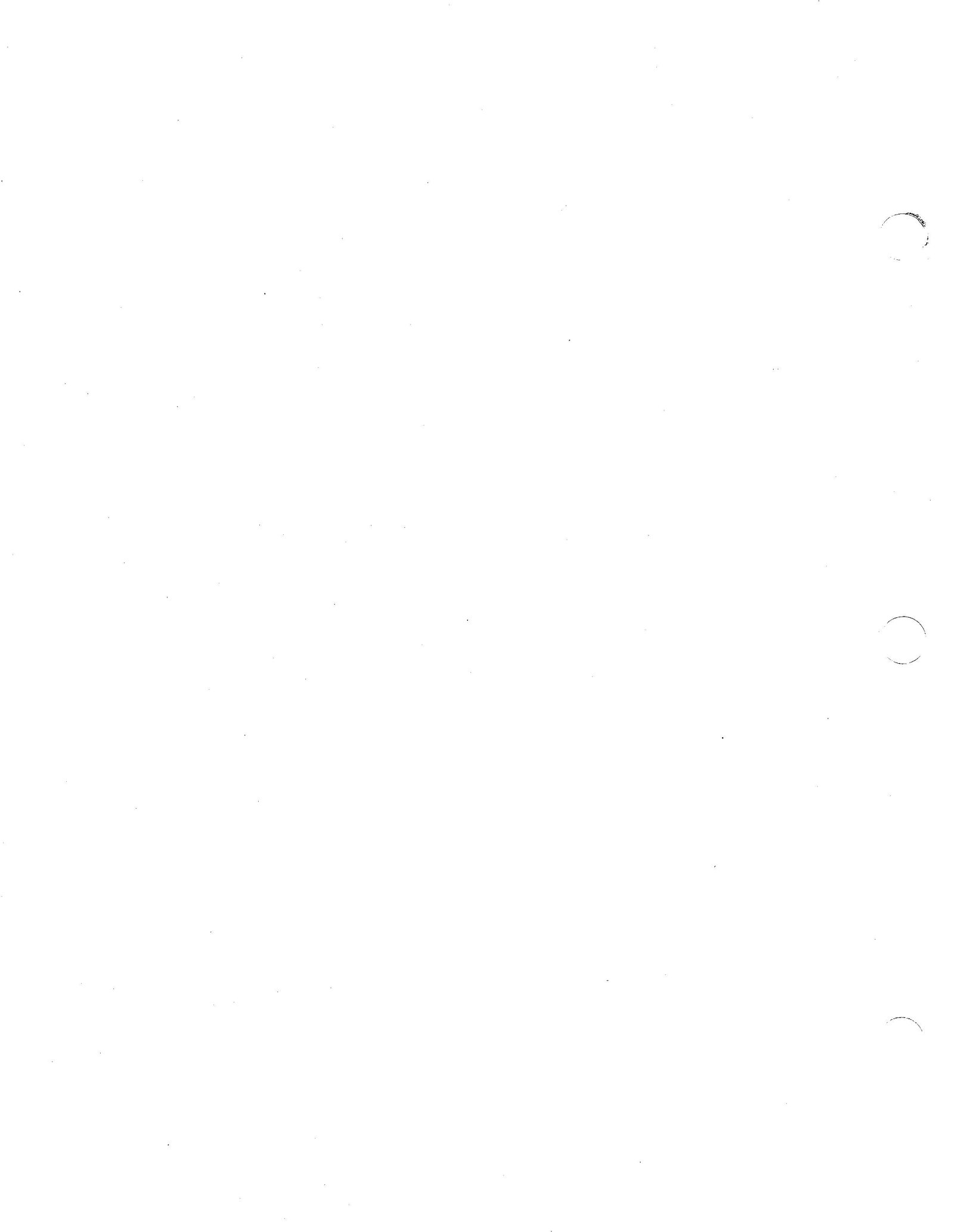
The proper handling of aircraft spark plugs will result in better operation and longer life. This Engineering Order has been prepared to better acquaint personnel with the spark plugs as used by the RCAF and also assist in the installation, removal and servicing.

TABLE OF CONTENTS

PART	SECTION	PAGE
1	GENERAL	1
	1 DESCRIPTION	1
	2 SPARK PLUG EQUIPMENT GENERAL	9 9
2	SERVICING INSTRUCTIONS	11
	1 HANDLING OF SPARK PLUGS	11
	GENERAL	11
	REMOVAL PRECAUTIONS	12
	PRE-INSTALLATION INSPECTION	12
	INSTALLATION PROCEDURE	13
	TORQUING PROCEDURE	13
	2 SERVICING PROCEDURES IN SPARK PLUG SHOP	15
	GENERAL	15
	SPARK PLUG SHOP OPERATION	15
	DEGREASING OPERATIONS	16
	VAPOUR METHOD CLEANING	16
	SOLVENT METHOD CLEANING	16
	CLEANING THE SHIELDING BARREL INSULATOR CERAMIC	18 18
	CLEANING THE FIRING END CAVITY (ABRASIVE BLAST UNIT)	18 19
	GAP SETTING TOOL	19
	GAP SETTING FOR (PLATINUM) FINE WIRE SPARK PLUGS	20 20
	CLEANING THE THREADS PROCEDURE	20
	ELECTRICAL TESTING PROCEDURES	21
	USE OF SPARK PLUG MODELS	22
	FINAL INSPECTION	22
	PRESERVATION	23
3	PACKAGING, SHIPPING AND STORAGE	27
	GENERAL	27
	LIST OF MATERIALS REQUIRED	27

LIST OF ILLUSTRATIONS

FIGURE	TITLE	PAGE
1-1	Typical Construction of AC Spark Plug	2
1-2	Sectional View of Lodge Type Spark Plug	3
1-3	Sectional View of Lodge Type RS19/2RS Spark Plug	4
1-4	Sectional View of Champion Spark Plug C26S	5
1-5	Sectional View of Champion Spark Plug Type REB37N	6
1-6	Sectional View of KLG Spark Plug	7
1-7	BG M678 Gap Setting Tool	8
1-8	Gauge Feeler Wire AC AV14-1	8
2-1	Damage to Shielding Barrel Insulator	13
2-2	Spark Plug Distortion From Excess Torque	14
2-3	Damaged Ceramic Insulation	16
2-4	Erosion Stages - Fine Wire Electrode	17
2-5	Erosion Stages - Massive Electrode	18
2-6	Damaged Steel Hexes	19
2-7	Bent Shielding Barrel	19
2-8		20
2-9		21
2-10	Barrel Cleaning Tool AV17-1	22
2-11	Spark Plug Servicing Unit, AC AV11-1	22
2-12	Vibrator Cleaning Tool Assembly	23
2-13	Gap Setting Tool AC AV15-1	23
2-14	Gap Setting Tool (Fine Wire)	24
2-15		24
2-16	Electric Testing Unit - AC AV11-1	25
2-17	Viewer PM-1	26



PART 1

GENERAL

SECTION 1

DESCRIPTION

1 The main parts of a spark plug consist of the following:

- (a) The core insulator.
- (b) The shell.
- (c) The shielding barrel.

NOTE

Champion and AC plugs are manufactured with the shell and barrel as one piece.

2 The core insulator consists of a body of non-conducting material such as ceramic, containing the centre electrode, and a sealing to prevent leakage around the centre electrode. The upper end of the electrode is in contact with the high tension current through the contact button, the lower end forms one side of the spark gap.

3 The shell, at its lower end, carries the threads for attachment to the cylinder head and includes the hexagonal section for application of the spark plug wrench. The ground electrodes are attached to the lower end of the shell and form the other side of the spark gap being connected to ground of the electrical circuit through the shell threads. The shell supports the core insulator and a seal is provided to prevent any leakage between the insulator and shell. The shell

threads and the engine seat gasket provide the best path for carrying the combustion heat out of the insulator and into the cylinder head.

4 The shielding barrel provides protection from radio interference which would be present if any portion of the high tension cable lead or the centre electrode was not protected by a grounded, metallic shield. The barrel contains an insulating sleeve to insulate it from the centre electrode side of the spark gap. The upper end of the barrel is threaded for the attachment of the high-tension cable elbow. In some cases the barrel and the shell are one piece. An example of this is the Champion and AC spark plugs.

5 There are four various types of spark plugs used in the RCAF at the present time, Champion, AC, KLG, and Lodge and the following are characteristic to all plugs.

- (a) Insulator - ceramic or mica.
- (b) Threads - long reach, short reach.
- (c) Thread diameter - 18 mm, 14 mm, 12 mm.
- (d) Radio shielding - shielded.
- (e) Ground electrode - two prong electrode (fine wire) and massive electrode.

6 Spark plugs - approved for use by the RCAF are listed in EO 15-5C-2A.

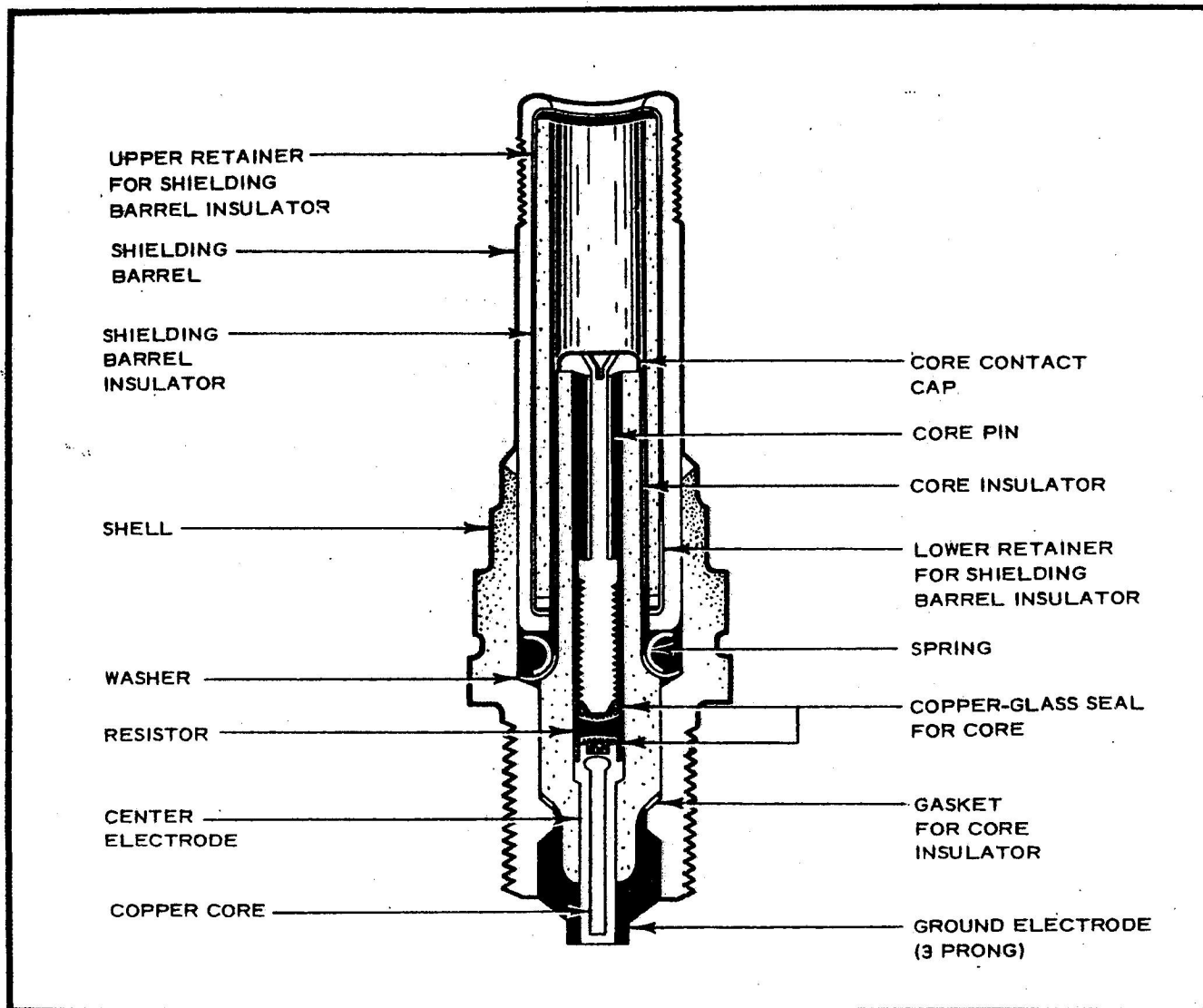


Figure 1-1 Typical Construction of AC Spark Plug

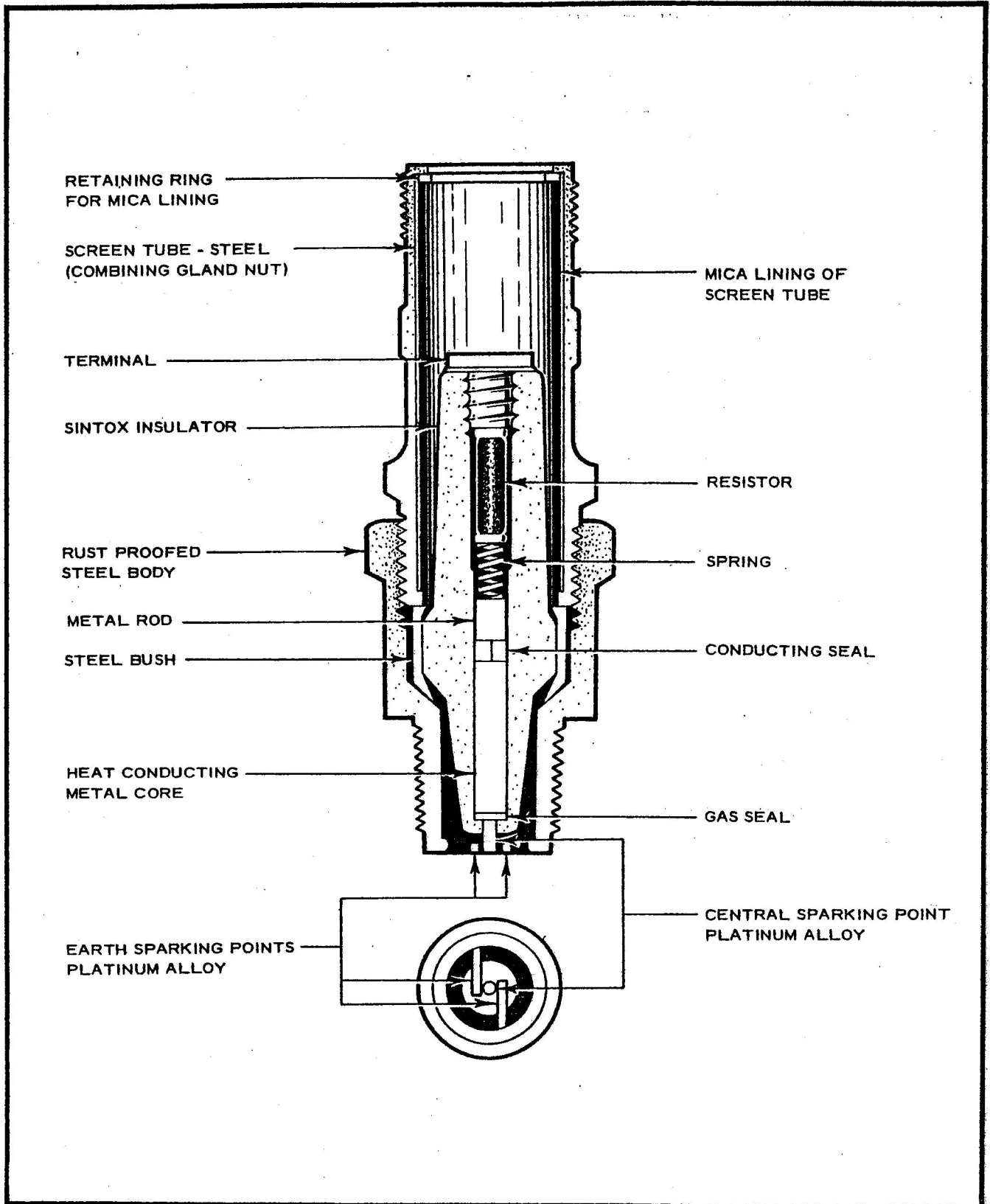


Figure 1-2 Sectional View of Lodge Type Spark Plug

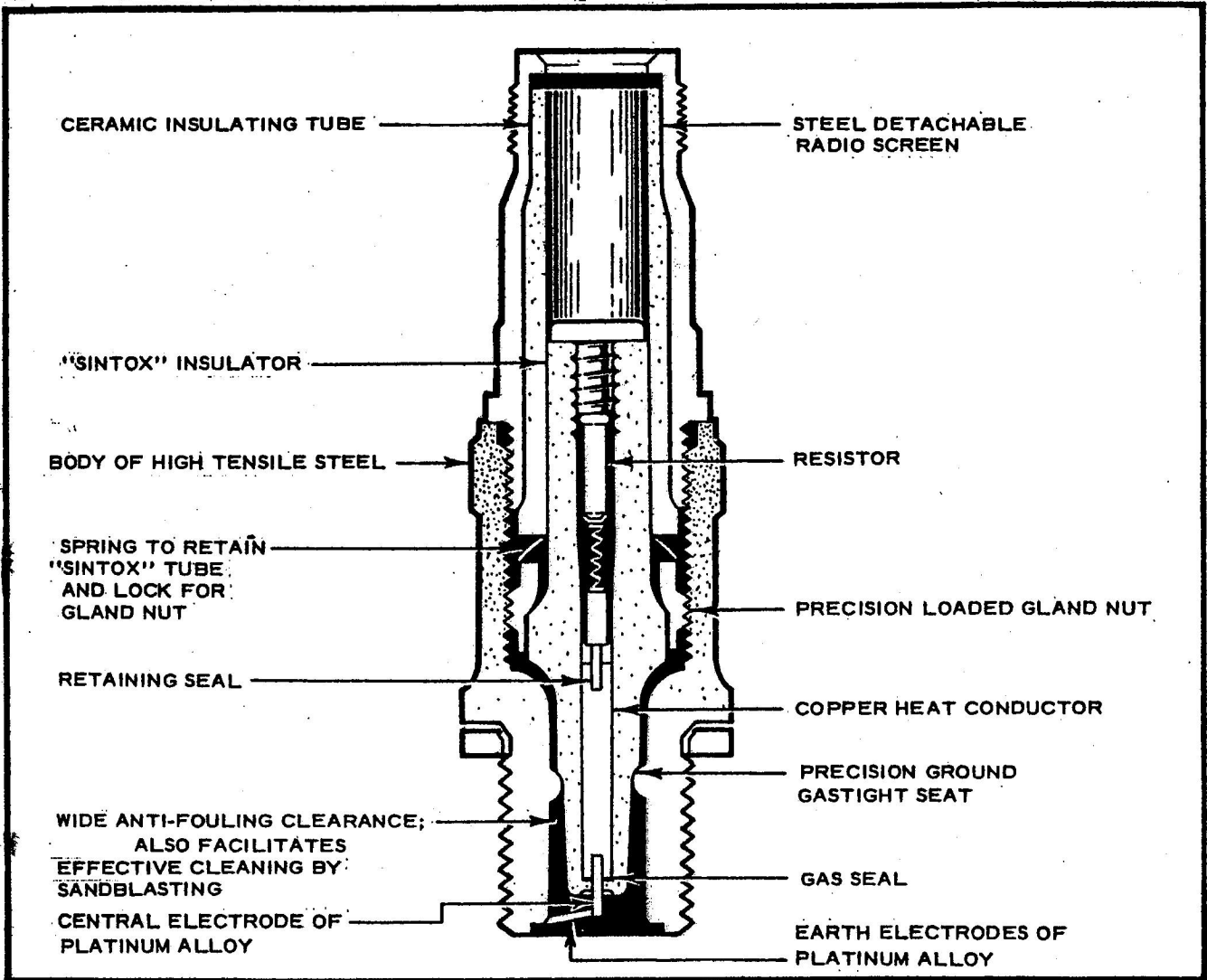


Figure 1-3 Sectional View of Lodge Type RS19/2RS Spark Plug

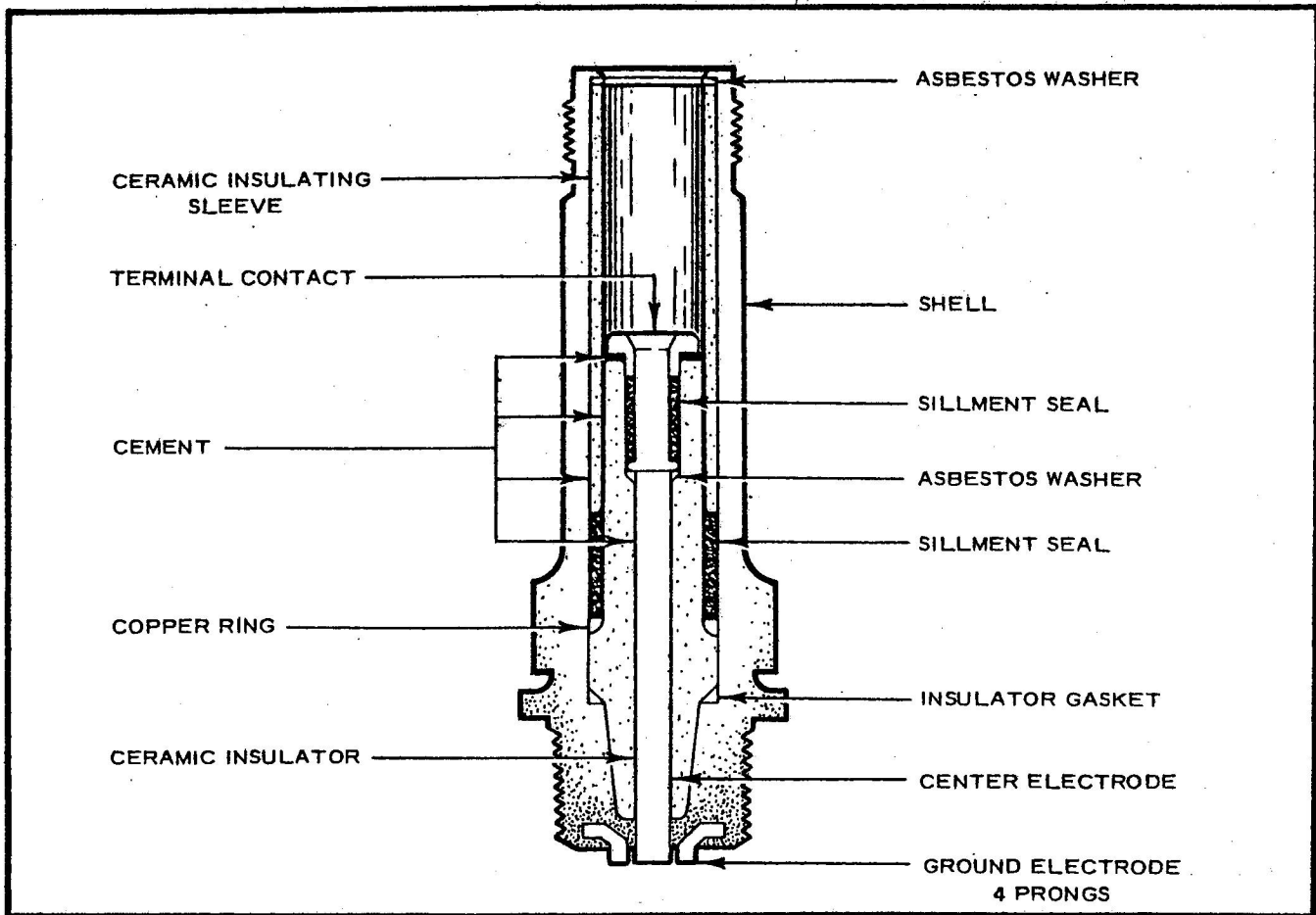


Figure 1-4 Sectional View of Champion Spark Plug C26S

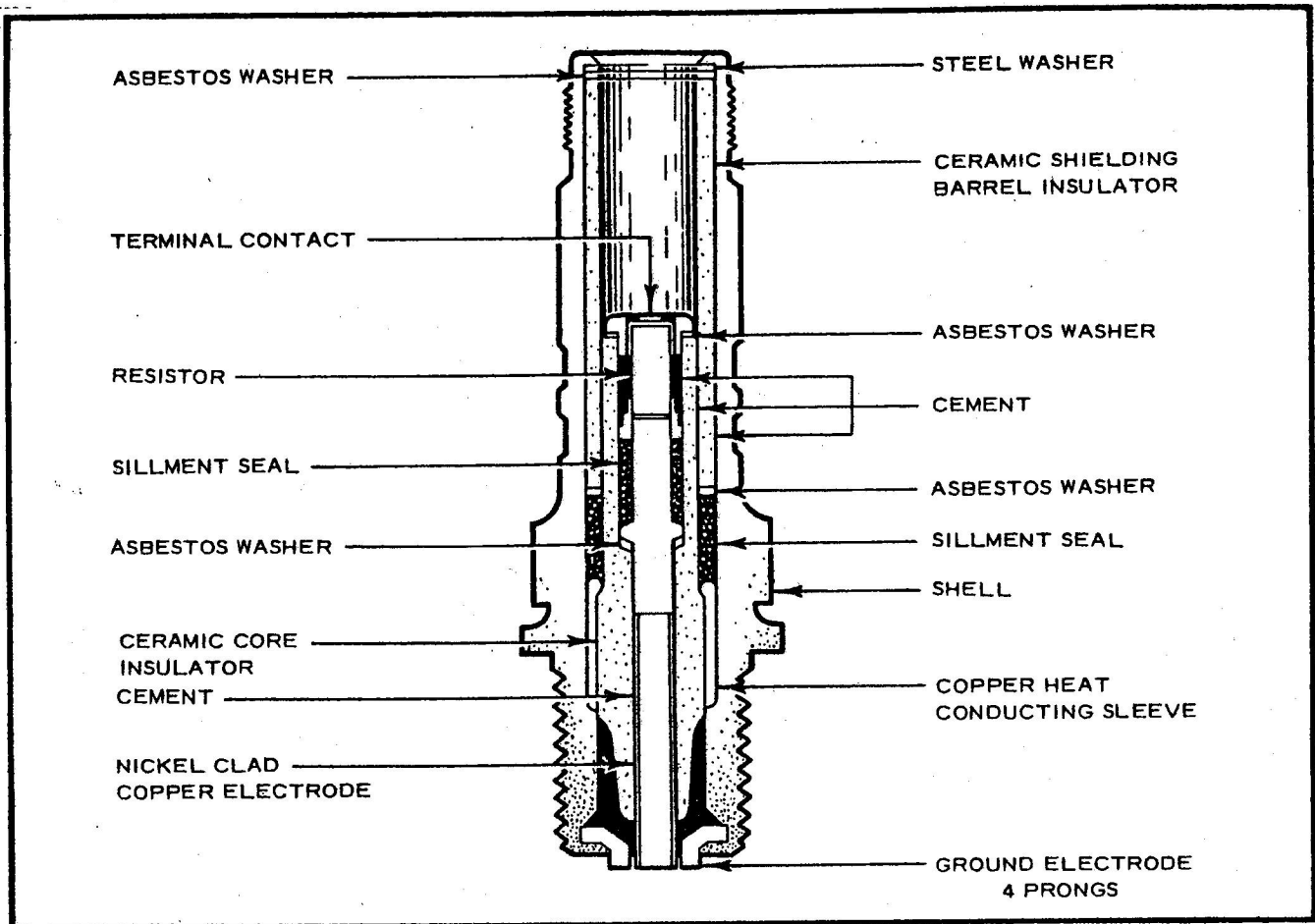


Figure 1-5 Sectional View of Champion Spark Plug Type REB37N

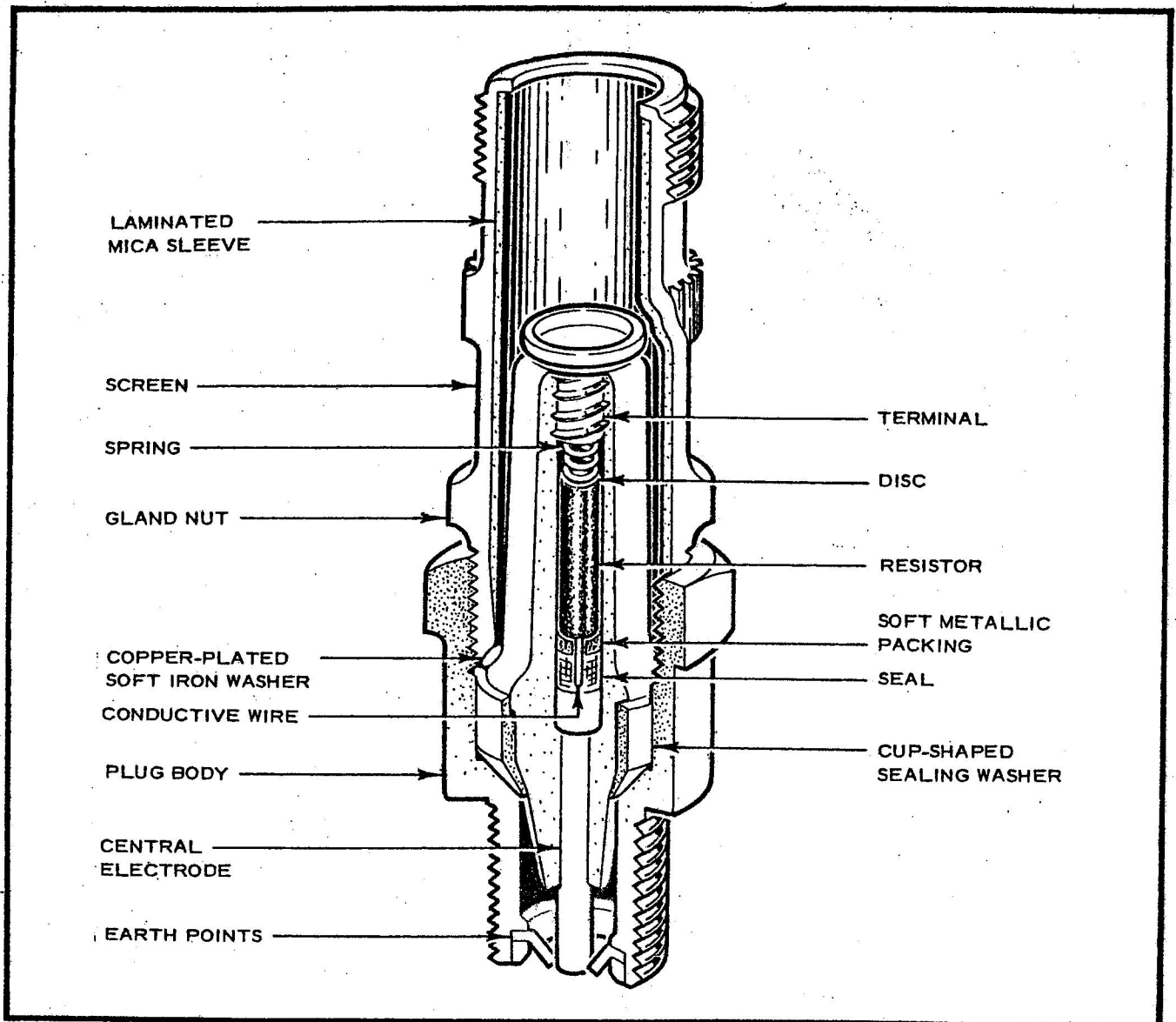


Figure 1-6 Sectional View of KLG Spark Plug

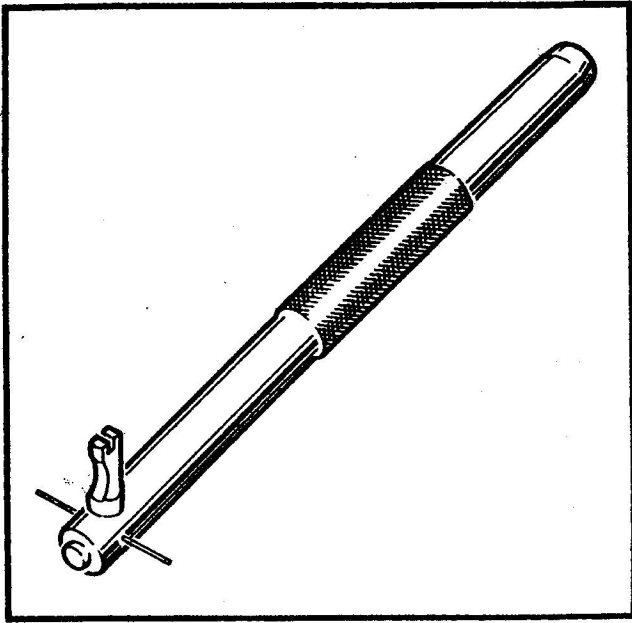


Figure 1-7 BG M678 Gap Setting Tool

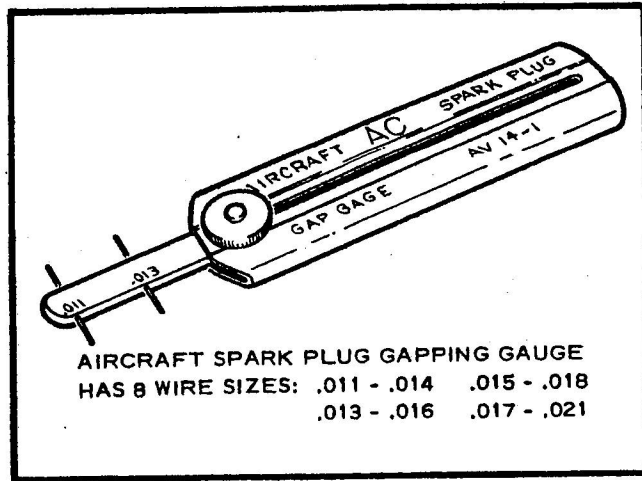


Figure 1-8 Gauge Feeler Wire AC AV14-1

SECTION 2

SPARK PLUG EQUIPMENT

GENERAL

1 At present there are numerous types of equipment in use by unit spark plug shops. Current methods are to standardize this equip-

ment so that only the necessary items will be scaled.

2 The following types of equipment are approved for use in the RCAF.

RCAF REF OR STOCK NO.	PART	DESCRIPTION
4910-21-809-1797	AV11-1	Aircraft Spark Plug Servicing Unit
6680-21-802-7626	806-1165	Regulator
4910-21-809-1801	CL-235	Contacto
4910-21-809-1802	CL-238	Contacto
4910-21-802-6848	CL-73	Rubber Nozzle
29/1844	CL-3	Cleaning Compound
4910-21-801-6541	CL-107	Water Trap
4910-21-809-1798	AV15-1	Gap Setting Tool
4910-21-809-1804	CL-252	Gapping Die (4 prong)
4910-21-809-1805	CL-257	Adapter Bushing (14 mm)
4910-21-809-1806	CL-287	Spacer 0.019-0.021 (3 prong)
4910-21-809-1807	CL-253	Spacer 0.013-0.016 (4 prong)
4910-21-809-1808	CL-254	Spacer 0.015-0.018 (4 prong)
4910-21-809-1809	CL-288	Spacer 0.019-0.021 (4 prong)
4910-21-809-1800	AV17-1	Insulator Cleaning Tool
SECTION 29	AV7-1	Insulator Cleaning Compound
4910-21-809-1811	CL-241	Rubber Replacement Tip
4910-21-809-1799	AV19-3	Vibrator Cleaning Tool
4910-21-809-1812	CL-248	Fine Wire Cleaning Tool Blade
4910-21-809-1813	CL-251	Fine Wire Cleaning Tool Blade
4910-21-809-1814	CL-273	Massive Electrode Blade (LH)
4910-21-809-1815	CL-274	Massive Electrode Blade (RH)
4910-21-809-1816	CL-275	Massive Electrode Blade (LH)
4910-21-809-1817	CL-276	Massive Electrode Blade (RH)
4920-21-802-7260	M-678	Gapping Tool and Gauge
4920-00-214-5864	M-678-12	Wire 0.011-0.014
4920-21-802-7263	M-678-15	Wire 0.014-0.017
4920-21-802-7266	M-678-18	Wire 0.017-0.20
5210-21-801-0831	AV14-1	Gapping Gauge
6650-21-801-9445	PM-1	Viewer, Spark Plug

3 Other equipment considered essential to spark plug care and maintenance are as follows:

SEC/REF

DESCRIPTION

SEC/REF	DESCRIPTION
1T/8020-21-554-0452	Paint Brush, 1/2"
2T/0/1725	Brush, Wire Wheel 0.005" gauge

2T/0/1731

Adapter, Arbor Hole
1/2"

2T/4920-21-802-1480

Heating Cabinet
(metal)2T/4920-21-571-5651
5A/0/230Gun, Air Blast
Motor, 110 volt, 60
cycle, 1/4 HB

22G/0/3439

Goggles, Eye
Protection

PART 2
SERVICING INSTRUCTIONS
SECTION 1
HANDLING OF SPARK PLUGS

GENERAL

1 Aircraft spark plugs, though of sufficiently sturdy construction to meet the demands for which they are designed, are nevertheless extremely susceptible to damage from careless handling. Spark plugs are to be handled individually and are never to be thrown together as though they were scrap material but are to be kept in separate cartons or drilled trays.

2 A spark plug which has been dropped on a floor or other hard surface is not to be installed in an engine even though visual inspection may indicate that no damage has been done. The shock of impact in such cases frequently fractures the insulator. Such plugs are unsafe for use until tested for electrical soundness and are to be included among those to be serviced.

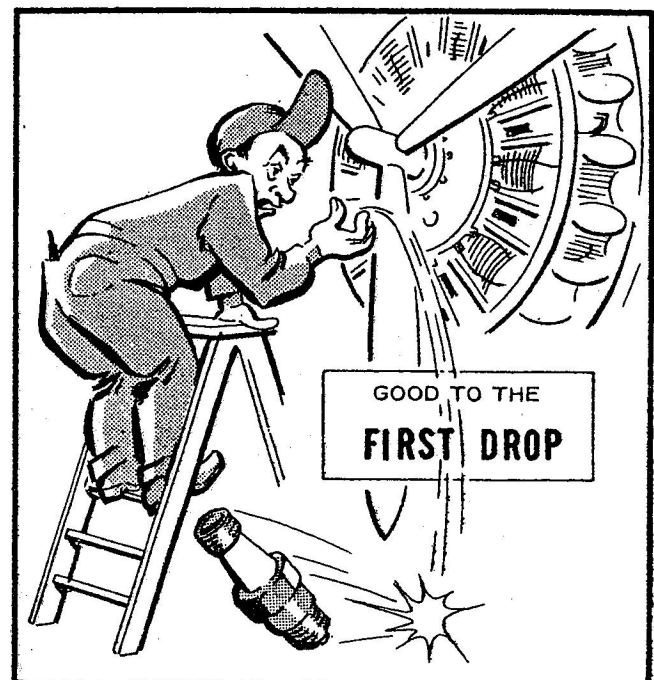
3 It is absolutely necessary that correct tools be used when installing and removing

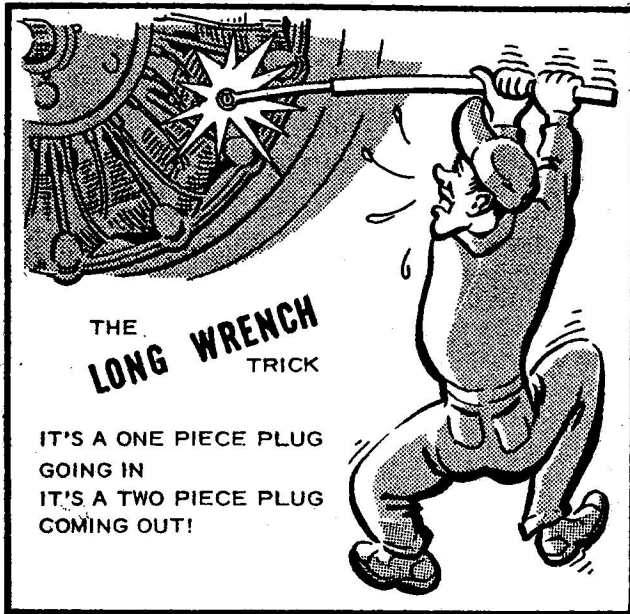
spark plugs. The wrench hex size must fit the spark plug hex. Constant torque fixtures or socket wrenches with torque indicating handles are to be used if available, the wrench handle should be approximately 8" long.

NOTE

Under no circumstances are chisels, punches, misfitting or oversized wrenches, pipe wrenches, pliers, etc., to be used for this purpose.

4 Care is to be exercised when installing or removing spark plugs to prevent the wrench from tilting or cocking to one side. Precautions against tilting are particularly necessary when the universal joint is used. In the case of shielded plugs, improper use of wrenches will damage the barrel insulator and threads. Proper handling of tools when installing or removing spark plugs and spark plug elbows, cannot be over-emphasized.





REMOVAL PRECAUTIONS

5 When withdrawing the ignition cable lead connection from the plug, care must be taken to pull the lead straight out and in line with the centre line of the plug barrel, otherwise a side load will be applied, which frequently results in damage to the barrel insulator and connector, see Figure 2-1. Neoprene collars, when fitted, may stick to the barrel insulator and this contact may be broken with a rotary twisting of the collar. Avoid undue distortion of the collar and possible side loading of the barrel insulator.

6 In the course of engine operation, carbon and other combustion products will be deposited on the end of the spark plug and will penetrate the lower threads to some degree. As a result, greater torque frequently is required for removing a plug than for its installation.

7 Because of the higher torque required for plug removal, precautions against tilting and slipping of the wrench are of increased importance. The torque indicating handle should not be used for spark plug removal because of the greater torque requirement.

PRE-INSTALLATION INSPECTION

8 All spark plugs are to be inspected prior to installation. If any of the following conditions exist they are to be corrected or the

spark plug returned in exchange for a serviceable plug:

(a) Normally only one type of spark plug is to be used on any one engine. For approved types refer to EO 15-5C-2A.

(b) Carton lint or foreign matter at any of the gaps or lodged in the firing chamber must be removed with air blast.

(c) Evidence of rust preventive compound on core insulator is to be removed by dipping in cleaner fluid (Spec 31-GP-213 trichloroethane Ref. 33C/774) dry with air blast.

(d) Presence of badly nicked or damaged threads and electrodes or rusted condition.

(e) Presence of foreign matter in shielding barrel which may prevent cable connector from making good contact with core contact button. Remove with air blast.

(f) Presence of steel fibres in terminal well, resulting from cleaning terminal threads with wire brush. (Remove with air blast or by other non-metallic means).

(g) Incorrect gap setting. (Reset gaps). See EO 15-5C-2A.

(h) Unsatisfactory condition of gasket. A copper gasket which has been excessively flattened, scored, dented, or distorted by previous use is not to be used.

(j) Visible cracks in centre electrode insulator or shielding barrel insulator.

(k) Crack in spark plug shell at the root of the last thread below the gasket seat.

9 Prior to the installation of a spark plug in a cylinder, it is necessary that spark plug insert or bushing gasket surface and spark plug gasket surface be cleaned with a hand wire brush to ensure the installation of the spark plug with the use of the fingers only. Inspect also for loose inserts. Do not use a tap for cleaning the insert threads. Precaution is to be taken that no bristles or foreign matter fall into the combustion chamber.

10 If cleaning of the insert threads is necessary so that it is possible to screw the plug into the adapter with fingers until it is seated

against the gasket, the following procedure is to be used:

- (a) Select a rejected spark plug which has good shell threads.
- (b) Cut four 1/16" slots in the shell from the firing end up to or near the shell shoulder which seats on the cylinder gasket.
- (c) Dress the threads next to the slots with a file to remove any rough edges caused by the cutting of the slots.
- (d) Without a cylinder gasket, insert the modified plug (which is now similar to a tap) into the spark plug inserts to the full length of its threads. One passage of this modified plug should remove any baked accumulations of combustion products or anti-seize compounds without increasing the depths of insert threads which would result if a regular tap were used improperly.

INSTALLATION PROCEDURE

11 Spark plugs are not to be installed in hot engines as thread seizure may result with subsequent damage to the plug shell and cylinder bushing. The rust-preventive compound on the shell threads is to be removed with cleaner fluid (Spec 31-GP-213 trichloroethane, Ref. 33C/774), dry threads with air blast. The plug shell threads are to be lightly lubricated with anti-seize compound (Spec 3-GP-802, Ref. 34A/58) excepting the spark plugs used in R3350 engines of which the threads are to be lubricated with the anti-seize compound Ref. 34A/246, Fel Proc 5. Any of the compound which may have been deposited on the electrodes during the thread lubrication is to be completely removed before the plug is installed.

12 New or annealed solid copper gaskets are to be used between the plug and the cylinder head. These gaskets are to be returned with plugs sent in for servicing or overhaul. Rolled steel gasket RCAF Stock No. 5330-21-802-6411 is to be used for all Merlin engines. The rolled steel gasket is to be fitted to the plug with the small lip or flange toward the plug body. Install a folded steel gasket RCAF Stock No. 5330-21-801-3279 on all spark plugs used on Wright R3350 engines. Although faces of this gasket are dissimilar in appearance, installation may be made with either

face to the plug. To obtain the full effect of sealing characteristics of this gasket, the gaskets must be replaced with a new one when plug is removed for any reason. Where a thermocouple gasket is used, no additional gasket is required.

TORQUING PROCEDURE

13 When installing the plug in the insert of an aircraft engine, the pull applied at the end of the wrench accomplishes two results:

- (a) It overcomes friction between threads of the plugs and those of the insert in which the plug is being installed.
- (b) The portion remaining, after overcoming thread friction, compresses the gasket

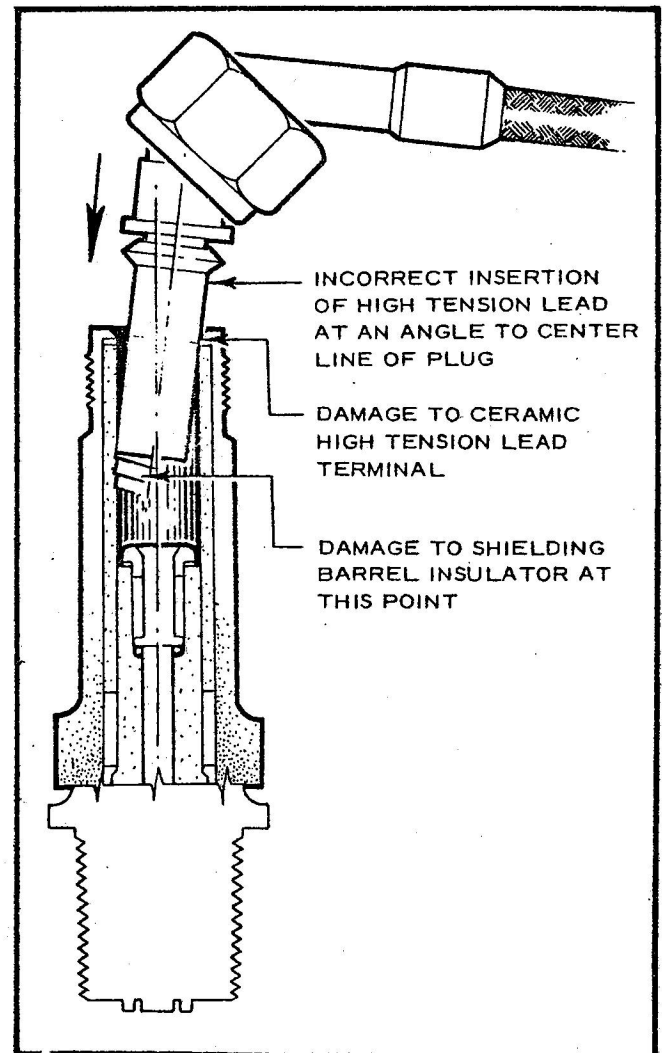


Figure 2-1 Damage to Shielding Barrel Insulator

positioned between the plug seat and bushing.

14 Ensure that the gasket is compressed enough to make a gas-tight seal. Compression of the gasket beyond the amount necessary to accomplish this seal will impose an overload on that section of the plug immediately below the plug gasket seat, that is, at the top one or two threads of the plug. This overload stretches the threads and results in a dangerous loosening of the plugs component parts, see Figure 2-2.

15 Important points to be understood and remembered, regarding the proper installation of spark plugs are:-

(a) **INSERTION** - This refers to screwing the plug into the bushing with the fingers until it contacts the gasket. If the plug can be inserted with comparative ease, using the fingers, it indicates a good thread. In this case a small additional tightening with the proper torque wrench will suffice to compress the gasket to produce a good seal. If high torque is necessary to insert and tighten a

plug, it is evident that bad threads exist either in the inserts or on the plugs. This excessive pressure might compress the gasket out of shape and distort or stretch the plug shell to a degree where breakage of the shell would result when the plug was subsequently removed or installed. Furthermore, the plug shell might be distorted to such an extent as to render the plug unserviceable because of loss of gas tightness or injury to the core insulator.

(b) **TIGHTENING** - This refers to the action of compressing the gasket.

(c) **FITMENT** - This is the combined procedure of insertion and tightening.

16 If the threads have not been nicked, corroded, burred or cross-threaded, the thread friction is low, and the plug always can be inserted all the way into the bushing with the fingers (without the use of a wrench) until it seats firmly against the gasket. After this insertion, not more than the recommended

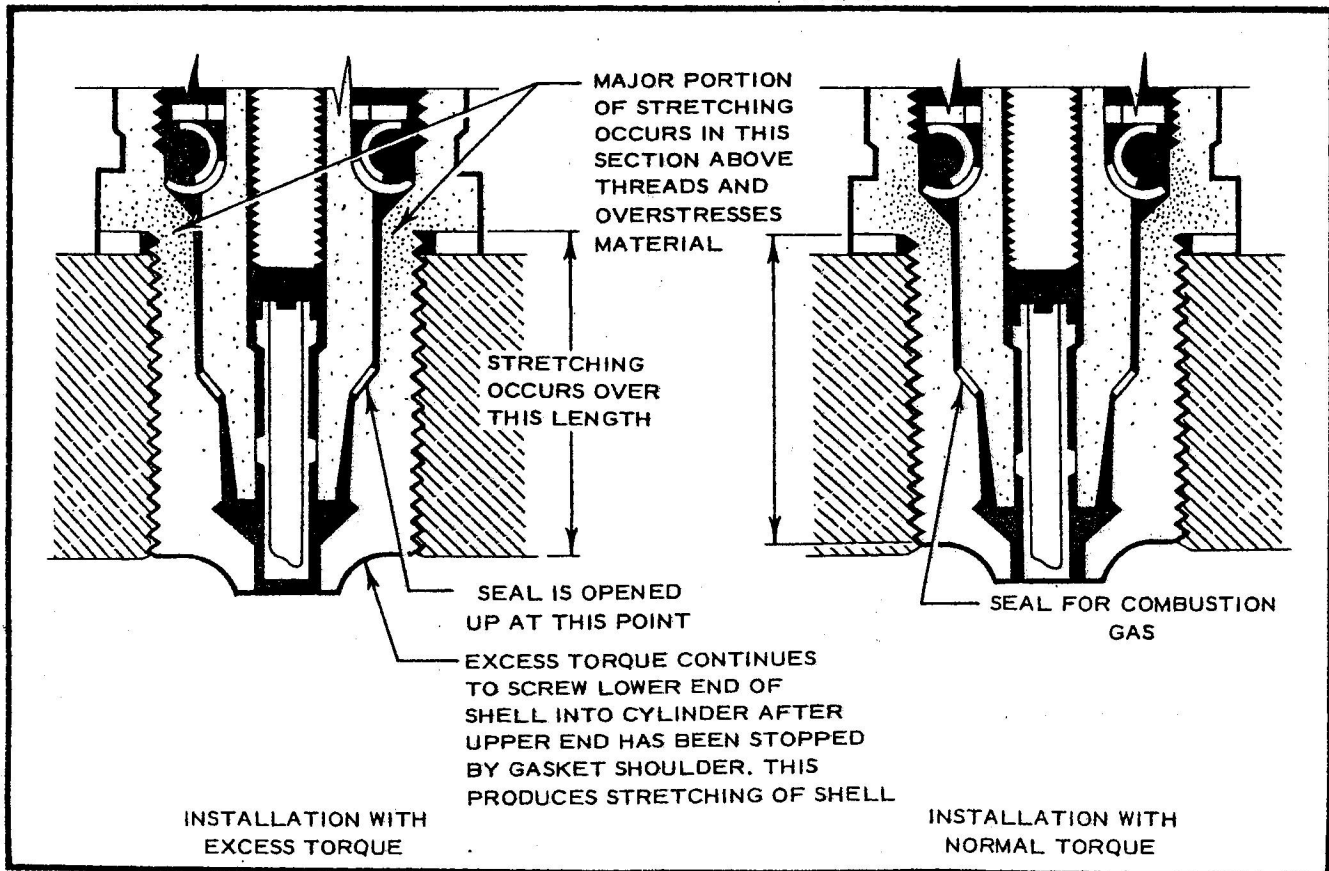


Figure 2-2 Spark Plug Distortion From Excess Torque

torque is necessary to ensure a gas-tight seal between the plug and cylinder head.

NOTE

EOs for the engine in which the plugs are to be installed are to be consulted for the proper torque values.

17 Before inserting the high tension lead in

the spark plug barrel, clean the high tension lead terminal sleeve contact and integral seal with a cloth moistened with cleaner fluid Spec. 31-GP-213 trichloroethane Ref. 33C/774, to remove any trace of dirt and grease that may be present. Replace cracked terminal sleeves.

18 After installation of spark plugs is completed, run up the engine and accomplish ignition check.

SECTION 2

SERVICING PROCEDURES IN SPARK PLUG SHOP

GENERAL

1 All aircraft spark plugs (excepting RCAF Stock Nos. 2925-21-801-8296 and 2925-21-801-8297) must be cleaned, gapped and tested at unit level, entitled to the equipment as detailed in Part 1, Section 2. Spark plugs RCAF Stock No. 2925-21-801-8296 are prone to mica flaking inside of the barrel end, resulting in a rough running engine. To reduce this problem the contractor has been bake (yellow) enamelling the mica on the inside of the barrel. If this model plug is found not enamelled then they are to be returned to the contractor for servicing and enamelling. Spark plugs RCAF Stock No. 2925-21-801-8297 are prone to cracking of the nose core ceramic, resulting in rough running and back-firing of engine. To reduce this problem the contractor has been replacing the nose core 100% during servicing of this model spark plug. On removal of this model plug as detailed in the aircraft -7A EO, plugs are to be returned to the contractor for servicing and replacement of the nose core ceramic.

(a) Fine wire and massive electrode spark plugs that are eroded beyond permissible limits, (see Figures 2-4 and 2-5) do not test serviceable or cannot be made serviceable at unit level are to be returned to Supply Sections for disposal in accordance with CAP 16, Vol 1, Chap 13.1.

(b) Massive Electrode Plugs

C26S	RED39N	REB37N
RC26S	REA37N	
	RHA29N	RHB32N
R103	RHA32N	RHB37N
R111	RHA37N	
R115		AC275F
	SR87	RV12/3
	REM39N	REM40E

Fine Wire Plugs

AC285
RS192RS
RS5/7
LR3R
RS35R

SPARK PLUG SHOP OPERATION

2 A preliminary inspection will prevent unnecessary work on plugs that are obviously unfit for further service. The following points should be checked and if any of the conditions listed below are in evidence, the plug is to be rejected and a 1/4" band (RED) painted on the shell hex:

(a) All spark plugs with ceramic insulation throughout, such as Lodge RS192RS and Champion REB37N are to be inspected at both ends of the spark plug for damage to the ceramic insulator, see Figure 2-3.

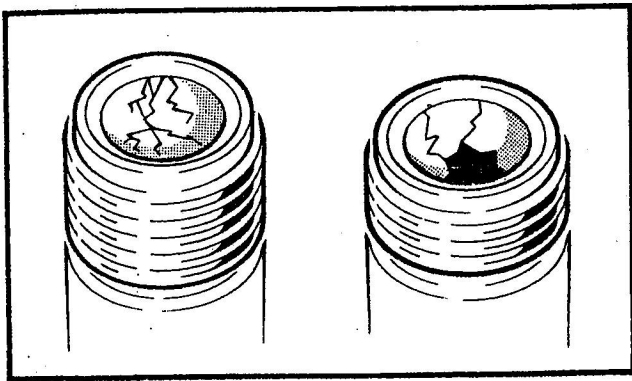


Figure 2-3 Damaged Ceramic Insulation

(b) Spark plugs with the ceramic insulation in the firing base and mica in the shielding barrel, such as Lodge LR3R are to be inspected for damage to the ceramic insulation at the firing end of the plug and damage to the mica insulation in the shielding barrel.

(c) Electrodes damaged or too badly eroded to permit satisfactory re-adjustment, see Figures 2-4 and 2-5.

(d) Inspect thread conditions for badly crossed or nicked threads.

(e) Inspect for badly damaged shell hexes, see Figure 2-6.

(f) Inspect for bent or dented shielding barrel, see Figure 2-7.

DEGREASING OPERATIONS

3 Equipment required is as follows:

(a) Trays and racks - RCAF assembly drawings 31615 and 31606 (and all the applicable detail drawings).

(b) Vapour cleaning chamber, see Figure 2-8 or;

(c) Solvent cleaning chamber, see Figure 2-9.

NOTE

(b) and (c) are to be locally manufactured as detailed in Figures 2-8 and 2-9, or to the shops own requirements.

(d) Cleaning fluid for the vapour method

is to be of a trichloroethane solution (Spec. 31-GP-213) (33C/774).

(e) Cleaning fluid for the solvent method should be same as above. (This solvent is slightly toxic and should be vented to atmosphere by the use of a metal hood situated above the tank proper).

(f) Paint brush, 1/2".

(g) Protector caps for shielding barrel threads to prevent vapour fumes from entering shielding barrel.

VAPOUR METHOD CLEANING

4 Proceed as follows:

(a) Place the spark plugs into an appropriate type metal tray, electrode ends down. (Ensure protector caps are fitted to shielding barrel threads).

(b) Lower the tray full of spark plugs onto the heavy gauge screen in the vapour cleaning tank for about 15 minutes. During this time oil and grease deposits will be dissolved by the hot rising trichloroethane fumes.

(c) Remove tray of plugs and allow them to drain for about one minute. Invert each plug in the tray to minimize condensation in the shielding barrels while cooling sufficiently to handle.

(d) If retreatment is necessary, the plugs should be allowed to cool for about 20 minutes before returning to the vapour tank (electrode ends down). Exceptionally dirty plugs should be lowered directly into the trichloroethane for one minute, then removed and allowed to cool before returning to the vapour cleaning position in the tank.

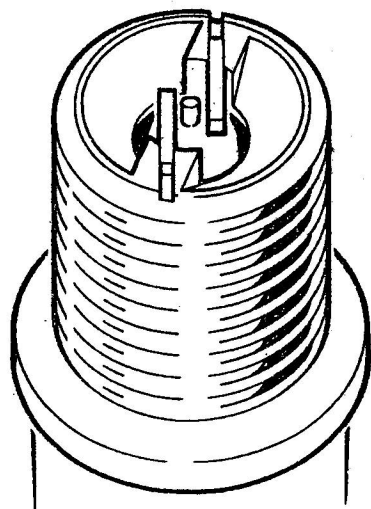
CAUTION

Trichloroethane vapours are toxic and should be vented to atmosphere by an air conditioning hood.

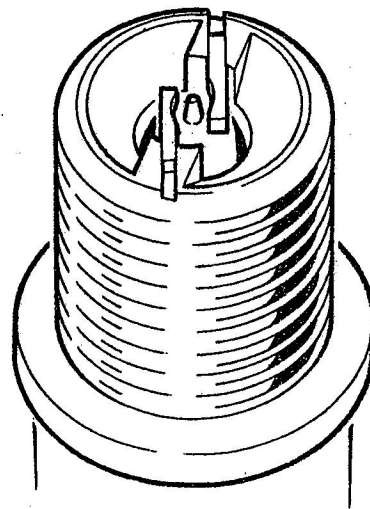
SOLVENT METHOD CLEANING

5 Proceed as follows:

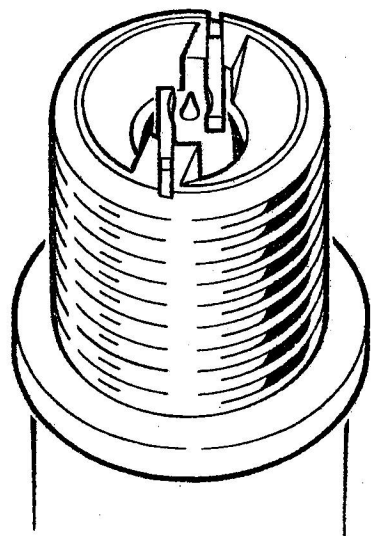
(a) Place the spark plugs in an appro-



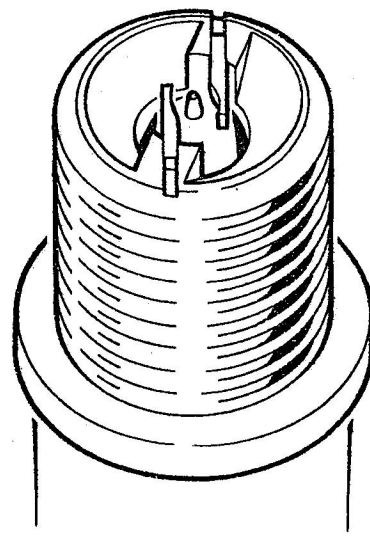
NEW SPARK PLUG.



A TYPICAL STAGE OF NORMAL ELECTRODE
EROSION.
THIS SPARK PLUG IS STILL SERVICEABLE.



CENTER ELECTRODE SEVERELY ERODED.
THIS IS CAUSED BY THE GROUND ELECTRODES
HAVING BEEN SET TOO HIGH. THE
TOP OF THE SIDE ELECTRODES SHOULD
BE SET SLIGHTLY BELOW THE TOP OF
THE CENTER ELECTRODE. THIS SPARK
PLUG SHOULD BE REJECTED.



GROUND ELECTRODES WORN BEYOND THE
USABLE LIMIT.
THIS SPARK PLUG SHOULD BE REJECTED.

Figure 2-4 Erosion Stages - Fine Wire Electrode

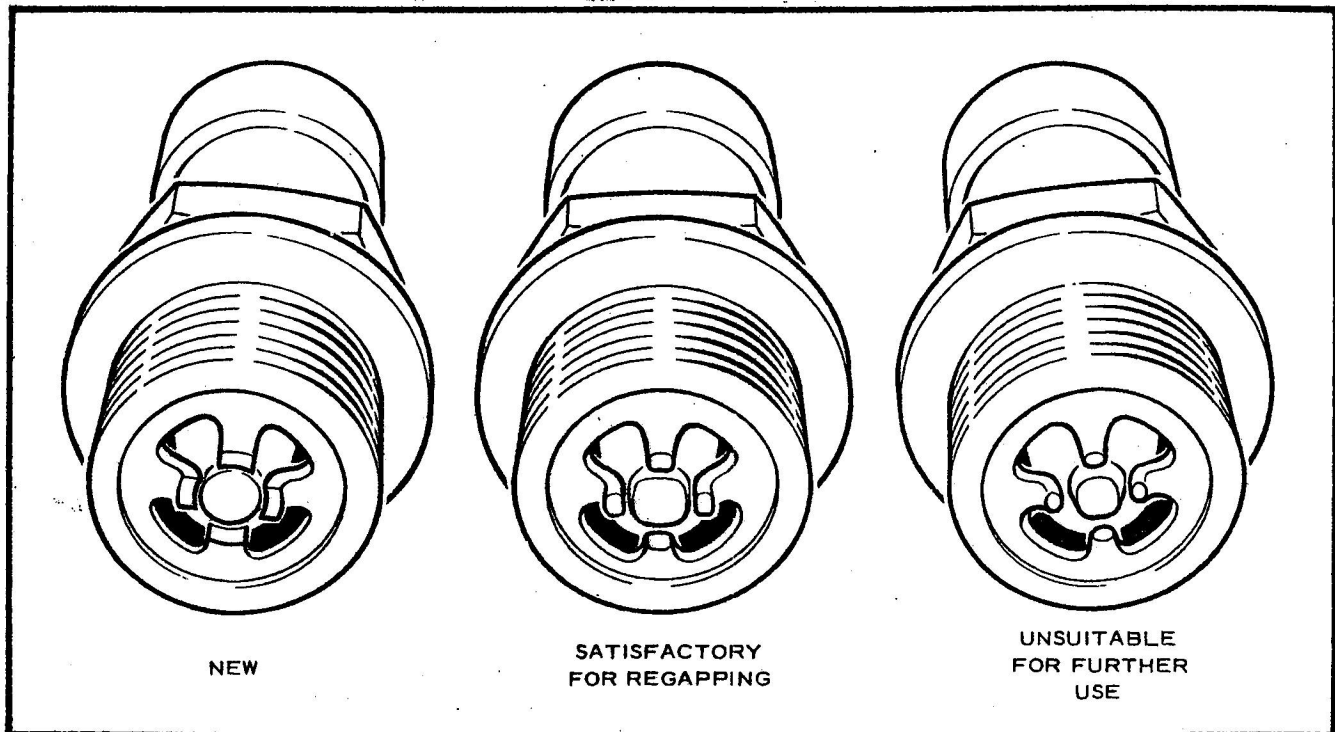


Figure 2-5 Erosion Stages - Massive Electrode

appropriate type metal tray, (electrode ends down).

(b) Immerse tray of spark plugs into the solvent cleaning chamber, ensuring that the plug is immersed only 2/3 of its over-all length.

(c) Let tray of plugs soak for 20 to 30 minutes, after which remove and allow to drain for one minute.

(d) Thoroughly dry each plug by air blast. A moist or damp firing end cavity will result in the accumulation of cleaning compound between the shell and ceramic insulator during the abrasive blast operation.

(e) The proper solvent for this operation is trichloroethane solution, (Spec. 31-GP-213) (33C/774).

NOTE

Do not use carbon tetrachloride.

**CLEANING THE SHIELDING
BARREL INSULATOR CERAMIC**

6 The spark plug shielding cap is to be

removed and the shielding barrel cleaned, using barrel cleaning tool AC AV17-1, Figure 2-10. Install tool in 3/8" chuck and using cleaning agent AC AV7-1, clean interior of plug barrel. Wash out the AV7-1 cleaning agent with a stream of warm water 49-66 °C (120-150 °F). A convenient method is to arrange a hot water tube with outlet turned upwards, so the plug can be inverted above the tube, and all the escaping water will wash downward and out of the shielding interior. Dry spark plugs for 30 minutes in a heating oven, 107 °C (225 °F).

NOTE

Recommended speeds: 1000 to 1725 RPM.

**CLEANING THE FIRING END CAVITY
(ABRASIVE BLAST UNIT)**

7 Using spark plug servicing unit AC AV11-1 Figure 2-11, the following operations will apply. (Cleaning compound AC CL-3 is to be used in this unit).

(a) Select the proper adapter and install with retainer into cleaner unit blast opening.

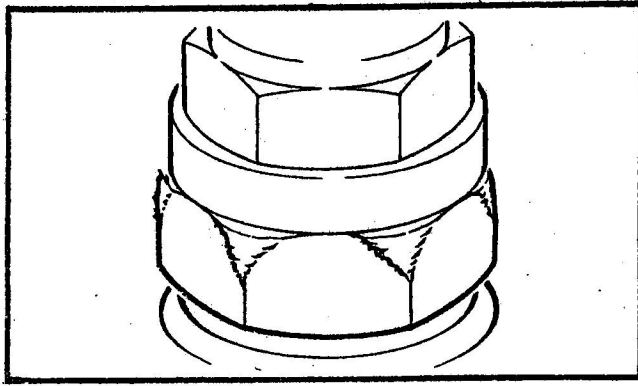


Figure 2-6 Damaged Steel Hexes

(b) Insert a dry degreased spark plug into the adapter. No electrode protector is required for fine wire plugs if the operator follows the recommended cleaning cycle.

(c) Fully depress the compound blast lever, at the same time slowly wobble the terminal or shielded end of the spark plug in approximately a 1" circle. (Cleaning cycle not to exceed 3 to 4 seconds).

(d) Release compound blast lever and depress air blast lever to clean out any loose abrasive dust particles that may remain in the firing end cavity. Wobble the spark plug as described in paragraph (c).

(e) Examine the spark plug firing end cavity. If unsatisfactory, repeat the above cleaning procedures, ensuring that the operation does not exceed the recommended cleaning cycle, (3 to 4 seconds maximum).

8 If excessive lead or combined combustion deposits cannot be readily removed from the firing end cavity of fine wire (Platinum) type spark plugs or massive electrode plugs with abrasive blast units, an additional cleaning operation can be performed with the specially designed vibrator type cleaning unit, see Figure 2-12.

(a) Select the proper cleaning tool to suit each type of spark plug to be cleaned.

(b) Position firing end of plug so that ground electrodes will permit the bayonet points of cleaning tool to enter firing end cavity.

(c) To produce vibrating action on AV 19-3

type vibrator-depress starter button located on topside of unit and gently press the plug against the vibrating tool, at the same time semi-rotate the plug slowly.

(d) After the above operations, each spark plug should be rerun through the conventional cleaning procedure.

(e) Utility requirements: 110-120 volt, 60 cycle power supply.

GAP SETTING TOOL

9 For massive electrodes use AC AV15-1 gap setting tool, see Figure 2-13.

(a) Securely mount gap setting tool on work bench or table.

(b) Select the proper gap spacer as listed in Part 1, Section 2.

(c) Position gap spacer on the spark plug center electrode, so that the spacer slots are in line with the ground electrode openings.

(d) Place the plug into the retaining adapter, electrode end up. When gapping 14 mm shielded plug a type CL-257 adapter bushing should be inserted into the retaining adapter.

(e) Position the gapping tool over the spacer and onto the ground electrode prongs so that the gapping tool retaining pin is in line with the ground electrode openings.

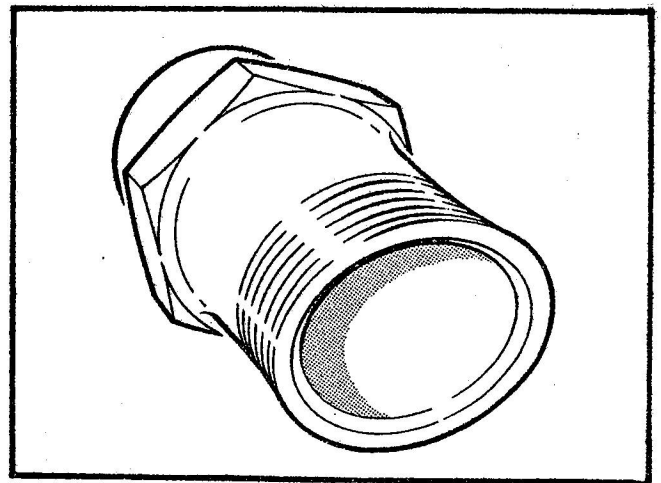


Figure 2-7 Bent Shielding Barrel

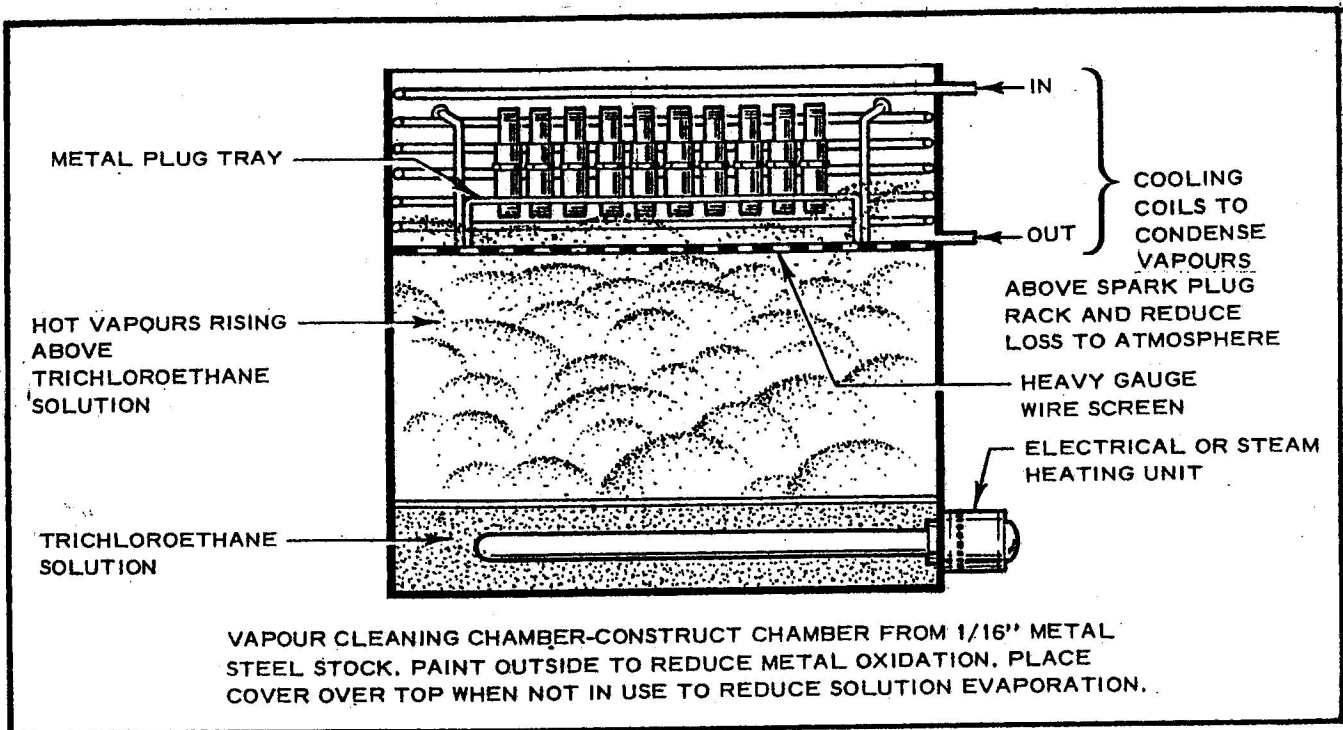


Figure 2-8

(f) Lower the ram with handle onto the gapping tool and depress to pre-set collar stop on ram.

(g) Remove the plug with gap spacer from fixture.

(h) Remove gap spacer with spacer removing slot, located in the base of the gap setting tool.

GAP SETTING FOR (PLATINUM) FINE WIRE SPARK PLUGS

10 Equipment required:

(a) Gap setting tool M678 model (Figure 2-14).

11 Operational procedure:

(a) Hold the plug firmly and adjust the gap by applying pressure to the earth electrodes using the prong of the gap setting tool. This type of gap can be opened or closed as desired, ensuring that no pressure is being applied to the centre electrode. Measure the clearance between the electrodes by means of the round wire type gauge. Hold the wire gauge in line with the centre electrode when checking the

gap clearance. Do not hold wire gauge at any other angle, see Figure 2-15.

(b) Pressure is not to be applied to the centre electrode, as this may cause fracture or cracking of the centre electrode insulator, see Figure 2-15.

(c) Earth electrodes should be slightly below flush with end of the centre electrode so that erosion will be uniform (refer to EO 15-5C-2A for gap settings).

CLEANING THE THREADS PROCEDURE

12 Equipment required:

(a) Wire cleaning wheel: 0.005" gauge for mounting on electric motor, 1/4 HP.

(b) File: three squared 6-1/2", smooth with double cut.

13 Operations:

(a) Clean and smooth the spark plug shell and shielding barrel threads with the fine wire wheel brush. Any nicks or burrs that are visible should be very carefully removed with the three squared file, ensuring that as little

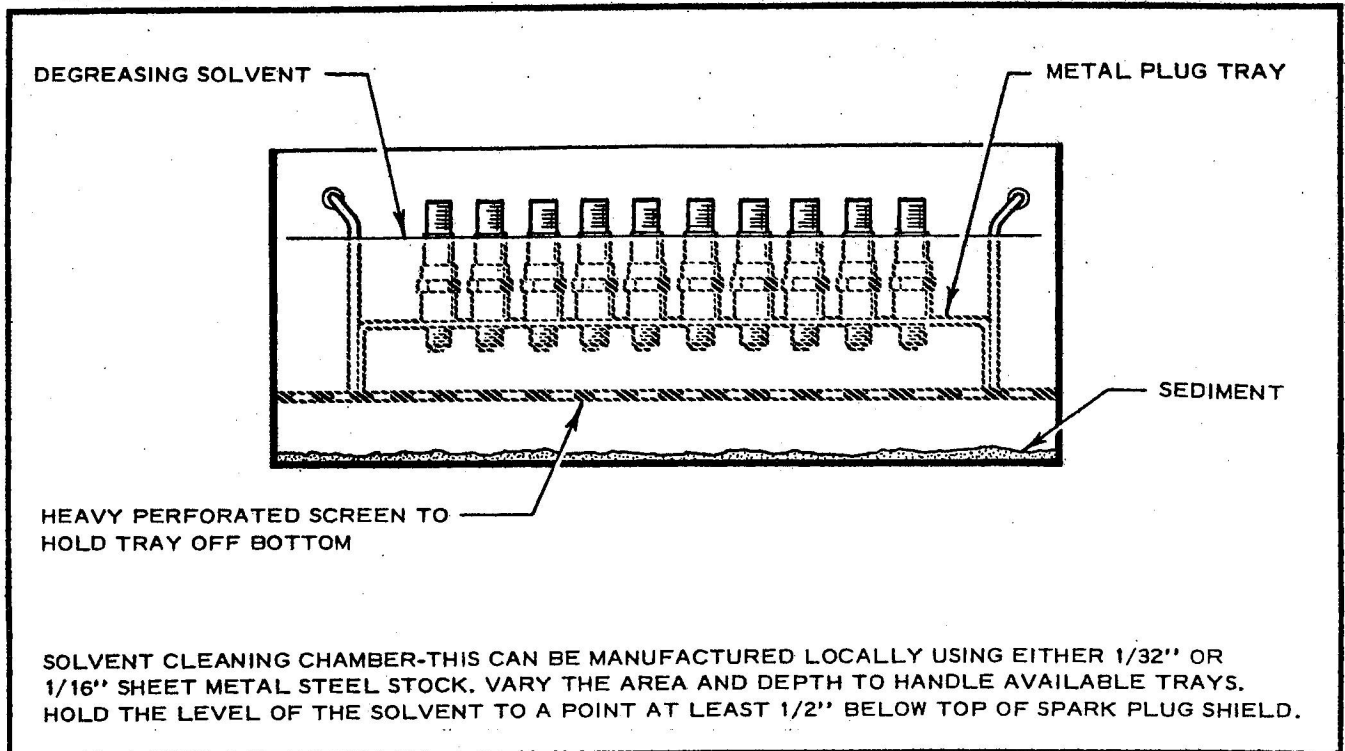


Figure 2-9

metal as possible is removed from the thread pitch. Clean entire plug with the air blast, so as to remove any foreign material that may collect during the above operations. Use protective goggles during these operations.

ELECTRICAL TESTING PROCEDURES

14 Utility requirements and operational data:

(a) AV11-1 spark plug servicing unit, see Figure 2-16. (Single phase 110-120 volts, 60 cycle).

(b) Ensure 150 psi compressed air line is attached to unit with water trap.

(c) Select and install two (2) corresponding sized adapters into the dual bomb chambers of unit.

(d) Install spark plugs into the adapters, finger tight only. A slight leakage of air is necessary to exhaust "Ionized" air from the bomb chambers.

(e) Insert specified size contactors into each plug. Type CL-238 for high altitude spark

plugs with 3/4" diameter shielding barrel and type CL-235 for low altitude spark plugs with 5/8" diameter shielding barrels.

(f) Place the high voltage contacting arm on the exposed contactor terminal or terminal end of spark plug if of the unshielded type.

(g) Press H. T. voltage button and slowly open air controlled needle valve until the most intense gap sparking is observed in the reflector mirror.

(h) If the electrode gap sparking of the plug is bright and continuous, with gauge pointer in the green OK zone, then the spark plug insulator is dielectrically sound.

(j) If the electrode sparking of the plug is weak or quenches out while the gauge pointer is in the red zone, then the insulator is not dielectrically sound.

(k) Repeat testing on second plug as outlined in paragraphs (d), (e) and (f).

(m) After testing both plugs, close air control needle valve and remove plugs.

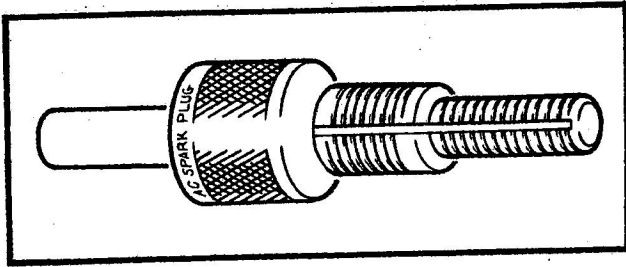


Figure 2-10 Barrel Cleaning Tool AV17-1

(n) If spark plugs test serviceable, visually inspect each plug with the viewing light for the following:

- (1) Fine hairline cracks or chipped ceramic shielding barrels.
- (2) Cracked or broken ceramic firing end tips.

USE OF SPARK PLUG MODELS

15 In any one engine all spark plugs installed are to be of the same make, but do not need to be of the same model. The inter-

mixing of spark plug models, i.e., AC275E and AC275F or Champion REA37N and REB37N etc., is allowed providing they are identical to heat range and spark gap. This intermixing of spark plug models enables the user units to exhaust small quantities (less a complete engine set) of spark plugs. See EO 15-5C-2A for the make, model and spark plug gap. See EO 15-5CA-2A for heat range of Champion plugs and EO 15-5CA-2C for heat range of AC plugs.

FINAL INSPECTION

16 Each plug should be inspected for the following unsatisfactory conditions. Use spark plug viewer light RCAF Stock No. 6650-21-801-9445.

- (a) Improper gap setting.
- (b) Badly eroded or damaged electrodes.
- (c) Broken or cracked insulator nose.
- (d) Dirty insulator nose or electrodes.

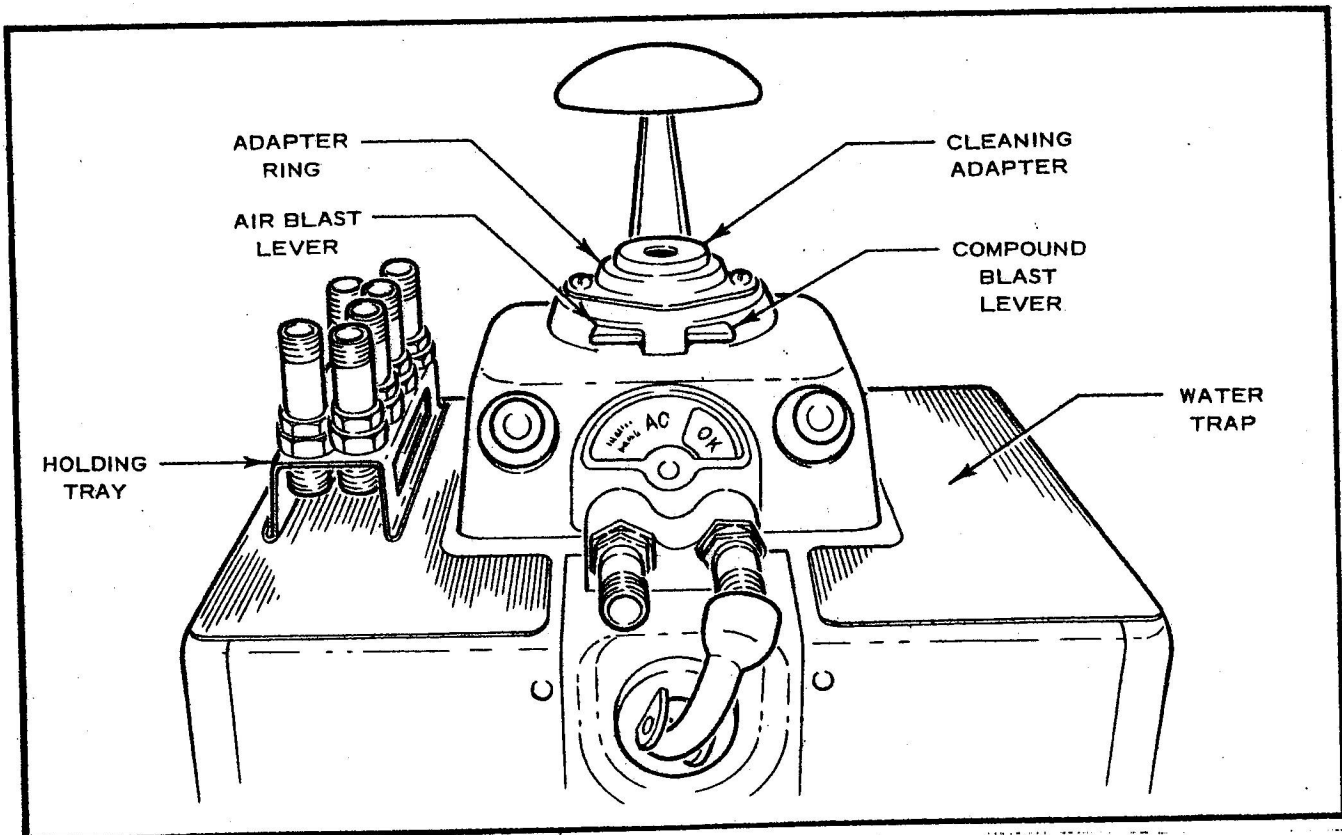


Figure 2-11 Spark Plug Servicing Unit, AC AV11-1

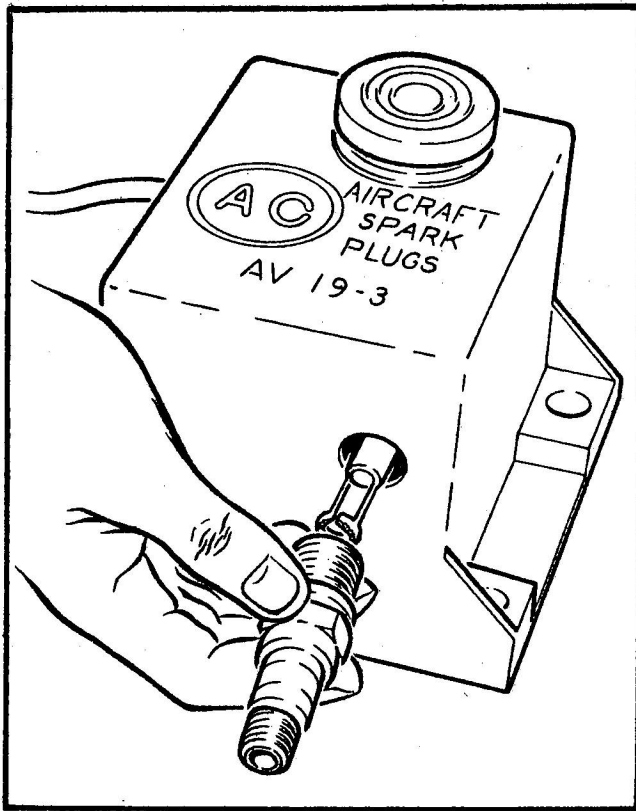


Figure 2-12 Vibrator Cleaning Tool Assembly

- (e) Badly nicked or damaged threads.
- (f) Battered or damaged shell hexes.
- (g) Cracked or unclean shielding barrel insulator.
- (h) On completion of this inspection spark plugs are to be stored in a heated (metal) cabinet until required for use.

PRESERVATION

17 If spark plugs are being stored for an indefinite period, inhibit the shell and shielding barrel threads with Ref. 34A/233 anti-

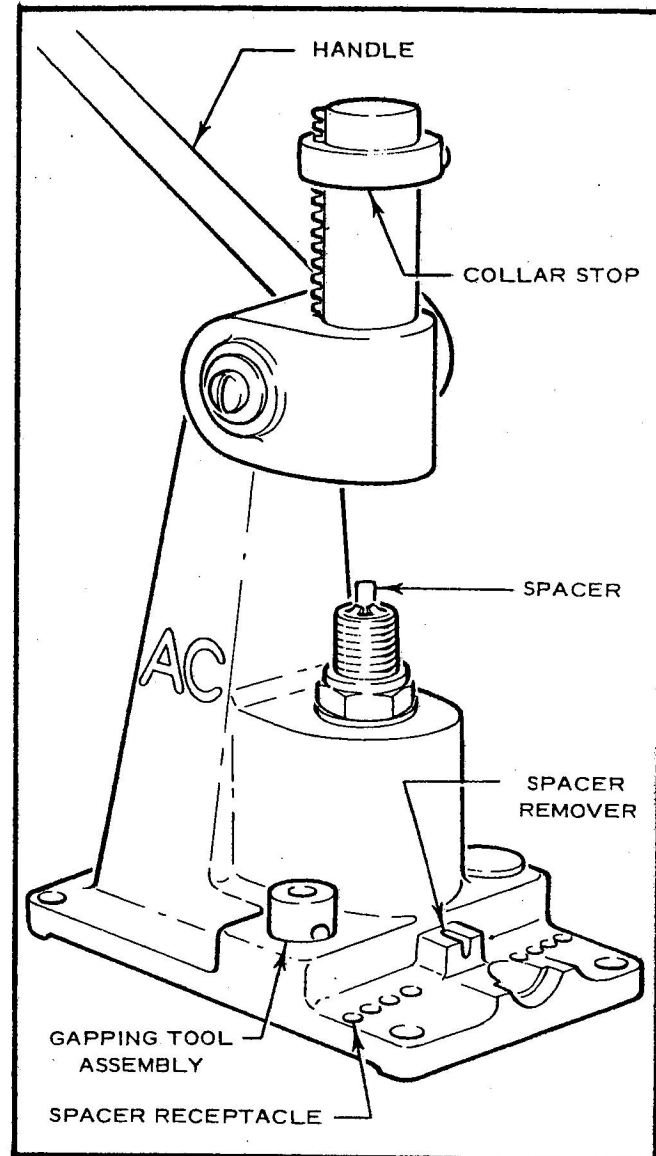


Figure 2-13 Gap Setting Tool AC AV15-1

corrosive oil with a light coating ensuring that electrodes and shielding barrel insulator are kept free of anti-corrosive material. Apply enamel (heat resistant) Ref. 33A/449 (MIL-E-5557) to outer shell and shielding barrel. Do not allow any of the enamel to come in contact with either of the threads.

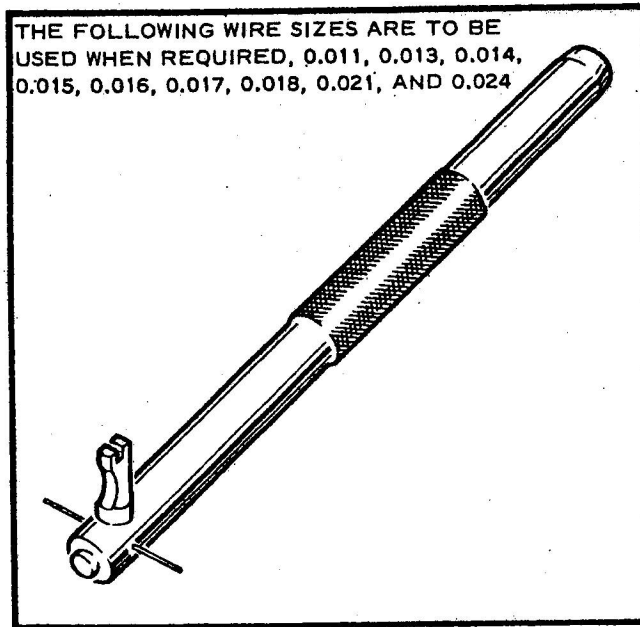


Figure 2-14 Gap Setting Tool (Fine Wire)

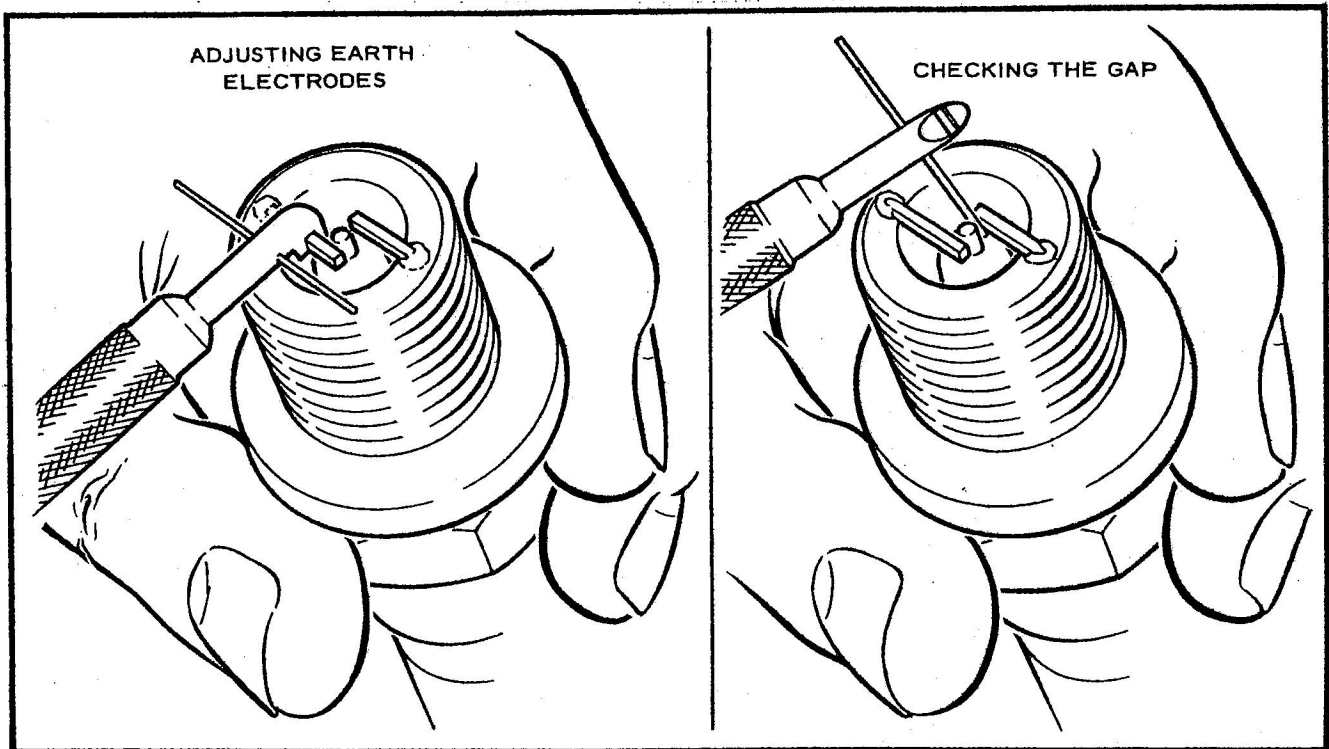


Figure 2-15

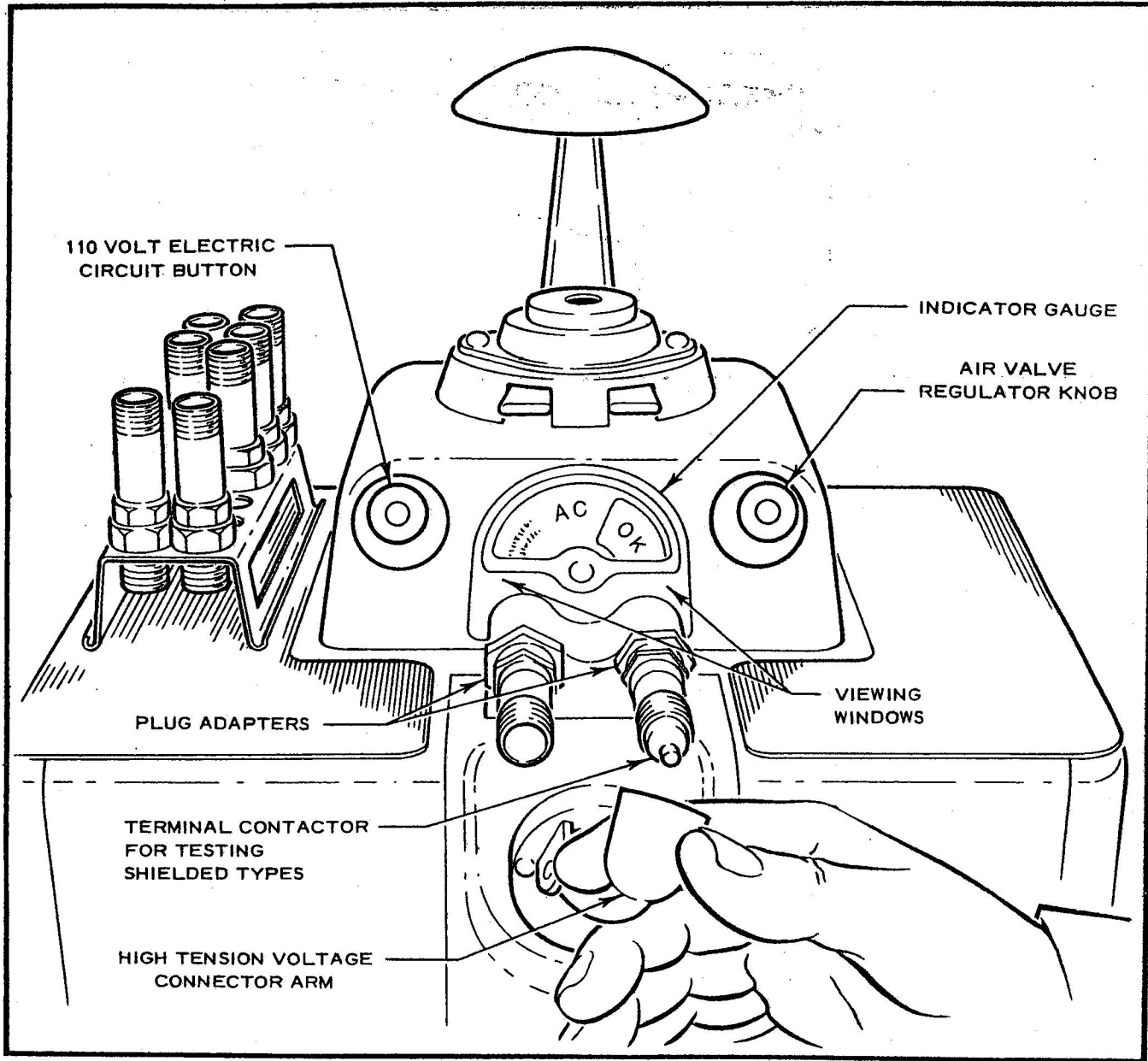


Figure 2-16 Electric Testing Unit - AC AV11-1

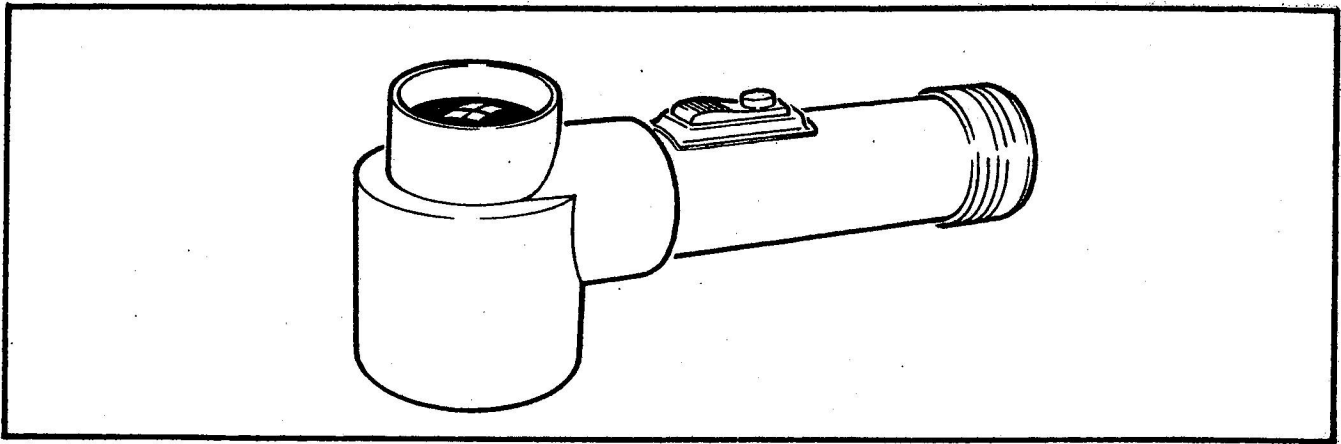


Figure 2-17 Viewer PM-1

PART 3

PACKAGING, SHIPPING AND STORAGE

GENERAL

1 There are currently four types of spark plugs used in the RCAF.

- (a) Champion.
- (b) AC.
- (c) Lodge.
- (d) KLG.

2 These spark plugs are broken down into two groups as follows:

(a) The first group consists of Champion and AC models of spark plugs. These are a one piece plug and although they have no repair factor, are to be reconditioned i.e. cleaned, regapped tested and marked by units entitled to servicing equipment, see EO 15-5C-2A paragraph 5.

(b) The second group consists of the Lodge and KLG models of spark plugs which will be dismantled for overhaul by contractors, see Part 2, Section 2, paragraph 1, therefore having a repair factor.

(c) All spark plug models Champion, AC, Lodge and KLG are to be changed at periods as detailed in relevant aircraft maintenance schedules, and to reach the minimum desired hours of service life, see EO 15-5C-2A.

3 Units and depots will continue to receive new spark plugs commercially packaged. Spark plugs overhauled by contractors, shipped by operating units or detached operators are to be preserved and packaged in accordance with the following instructions.

- (a) Inhibit the shell and shielding barrel

threads and paint the shell and barrel, see Part 2, Section 2, paragraph 17.

- (b) Seal both ends with Ca plugs.

(c) Used spark plugs requiring shipment by the operators are to be wrapped in Grade "A" kraft paper. Plugs overhauled by contractors are to be placed individually in a polyethylene bag and sealed. Plugs are then to be packed in a re-usable metal container conforming to Spec. MIL-C-6055, Part AN8029-2, Ref. 40D/245.

(d) Rubberized hair to Spec 43-GP-12P Type 2, 1" thick Ref. 40D/628 is to be used for padding around the spark plugs to prevent damage.

LIST OF MATERIALS REQUIRED

4 The following materials are required:

Thread Sizes	Ca Plug Size Sec/Ref.	Metal Con- tainer Sec/ Ref.
12 mm	#5 40D/836	40D/245
14 mm	#6X 40D/838	40D/245
18 mm	#9 40D/840	40D/245
5/8"	#7 40D/874	40D/245
3/4"	#9 40D/840	40D/245
1 1/16"	#8 40D/839	40D/245

5 All spark plugs are to be prepared for storage or shipment as follows:

(a) All stocks of spark plugs are to be stored in existing heating cabinets or in sealed metal containers.

(b) Spark plugs are to be packed and shipped as outlined in paragraph 3.

