1710A

AVIATION SPARK PLUGS

Installation and Maintenance Manual

Technical Aspects
FAA Accepted

SCOPE
This manual provides details about the installation and maintenance of TEMPEST® Aviation Spark Plugs from Aero Accessories, Inc.

LOG OF REVISIONS

Revision	Description	Page Revised	Date
- O -	Initial Issue (Original)	N/A	03/31/2003
- A -	Added XL Premium Spark Plugs	All	01/15/2005
- B -	Edited to reflect Tempest and Aero Acquisition of product line, retyped and marketing information edited.	All	02/10/2010

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0.0 INTRODUCTION

0.1 Copyright Statement

0.2 NOTICES

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Use of non-approved repair parts and tools may result in unit malfunction and/or affect equipment safety, and may be considered a violation of FAA repair guidelines.

All reasonable attempts were made to make this manual as complete and accurate as possible. If you have any questions, comments, or corrections, or require clarification of any information contained herein, please write Aero Accessories, Inc. Customer service Department at:

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1240 Springwood Ave.
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Or call or email Aero Accessories, Inc. Product Support Department at:

Phone: (800) 822 - 3200
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0.3 HOW TO USE THIS MANUAL

This document contains all necessary information relating to the ownership of TEMPEST® Aviation Spark Plugs manufactured by Aero Accessories, Inc.

Section 1 describes the TEMPEST® Aviation Spark Plugs.

Section 2 includes detailed procedures for installation.

Section 3 and 4 describes operation and maintenance procedures respectively.

Section 5 describes the procedures used to preserve and store TEMPEST® Aviation Spark Plugs.

Section 6 describes the TEMPEST® Aviation Spark Plugs warranty and procedures.

0.4 RELEVANT PUBLICATIONS

Engine Manufacturers Service Manual
Consolidated Applications Data available on Tempest web site

0.5 MAGNETO IGNITION SYSTEM OVERVIEW

Aero Accessories, Inc. is an innovative leader in the design and manufacture of aircraft components and systems. Aero Accessories, Inc., not merely assembles, superior FAA-PMA approved products consistently specified by quality-conscious OEMs.

A. Worldwide Network

TEMPEST® Products are available through an international network of aircraft parts distributors that offer outstanding product support, prompt delivery, and friendly customer

service. See TEMPEST® Authorized Distributor List, or visit the TEMPEST® web site at www.tempestplus.com for a complete listing of the TEMPEST® distributor nearest you.

B. AOG and Emergency Orders

Authorized distributors of TEMPEST® Products are required to carry inventory sufficient to satisfy market requirements including AOG needs.

C. A Complete Offering of TEMPEST® Products

Are available in the following:

- Slick and Bendix magneto replacement parts and kits.

- TEMPEST® Aviation Spark Plugs: Aero Accessories manufactures massive electrode as well as fine wire plugs for almost every General Aviation aircraft and engine. TEMPEST® Aviation Spark Plugs can be conveniently purchased in boxes of 12, 4 or individually (check with a TEMPEST® distributor). TEMPEST® part numbering is easy. Part numbers for TEMPEST® Aviation Spark Plugs look similar to the part numbers that some aviation consumers have memorized due to a lack of choice. For TEMPEST® Aviation Spark Plugs, just add a "U" to the front of the competing brand's part number (for instance, one of Aero's most popular TEMPEST® Aviation Spark Plugs is UREM40E, which from a part number perspective looks very similar to REM40E, a competing part number). Refer to TEMPEST® consolidated Application Data publication for the approved TEMPEST® Aviation Spark Plugs part number for a particular application. All TEMPEST® Aviation Spark Plugs are FAA-PMA approved.

- Tools: To support all of the aforementioned products Aero Accessories also offers Aero designed, manufactured and marketed tools. To support Aero's new TEMPEST® Aviation Spark Plug line. For more information on tools and other Aero Accessories products visit the www.tempestplus.com web site.

0.6 Maintenance Personnel

Current FAA regulations allow qualified owners and operators of aircraft to perform certain types of preventative maintenance, including spark plug inspection, rotation and service. Consult the FAR's for details. In addition, if in doubt as to your qualifications an experienced aircraft technician with an A&P license is an excellent choice for conducting spark plug related maintenance.

1.0 Technical Reference

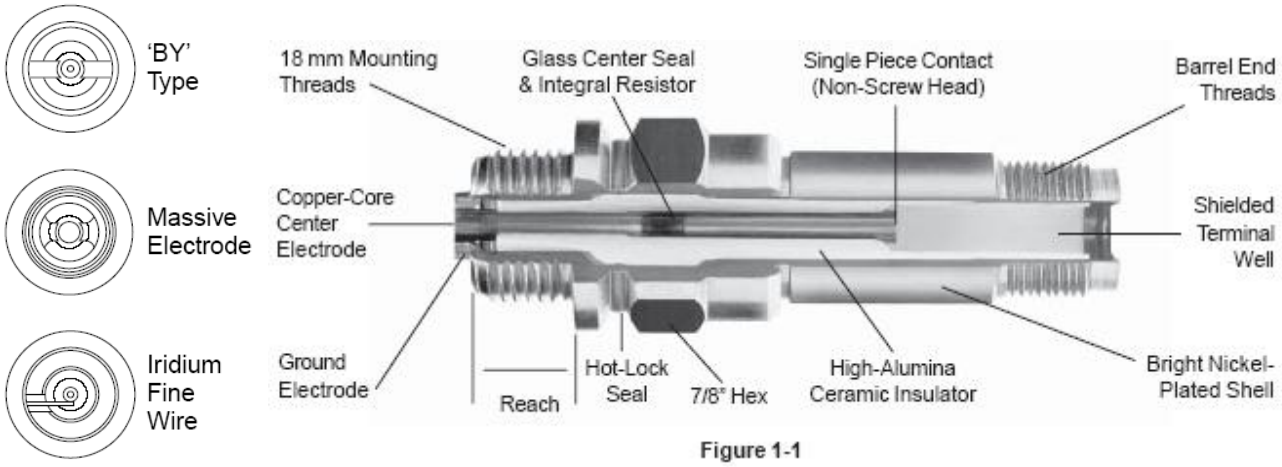


Figure 1-1

1.1 Description and Operation

The spark plug is the last component in the ignition circuit. It converts the magneto output voltage via the ignition harness and produces a high voltage spark that ignites the compressed air-fuel mixture within each cylinder of a GA piston engine.

TEMPEST® Aviation Spark Plugs, available in both massive electrode and fine wire designs, offer superior heat transfer and leakage protection, advanced reliability, long life, and maximum cost effectiveness with the following design features:

- High-conductivity copper core electrode – is co-extruded inside a special nickel alloy for optimum heat transfer and resistance to combustion gases.
- High-alumina ceramic insulator – is enhanced with a proprietary glaze material to ensure the high mechanical strength and superior dielectric quality needed to survive the severe engine environment.
- Iridium Fine Wire Electrode – made from a high performance precious metal. The center electrode is robotically placed and controlled to ensure extra long life and superior performance. When combined with the TEMPEST® proprietary resistor material, the TEMPEST® fine wire plugs easily achieve longer service life than any other brand.
- Vacuum-cemented center electrode (Massive Electrode Only) – protects the nickel alloy from corrosion and oxidation, provides consistent and evenly distributed heat dissipation from the center electrode to the insulator.
- Hot-lock assembly procedure – resists the high pressure of combustion gases, and creates a zero-leakage seal between the insulator and outer shell.

- Proprietary glass center seal and integral resistor – bonds the insulator, center electrode and terminal into a single, zero-leakage structure for maximum durability and improved spark gap life.

- Bright nickel plating – provides corrosion protection in the severe environments of GA. TEMPEST® fine wire plugs are also painted for additional protection.

- Non-screw head contact – offers a smooth and uninterrupted contact surface, more resistant to arcing and the resultant loss in energy transfer.

- Projected Gap Design – A projected gap design (massive electrode spark plug number UREM37BY and TEMPEST® fine wire Aviation Spark Plugs) and a large shell bore provide maximum circulation of combustion gases to scavenge lead deposits and burn off carbon deposits, resulting in better performance and longer life.

1.2 Specifications

TEMPEST® Part Number	Reach	Connector Thread	Electrode Type
URHB32E	13/16”	¾” - 20	Massive
URHB32S	13/16”	¾” - 20	Fine Wire
UREB36S	13/16”	5/8” - 24	Fine Wire
URHB36S	13/16”	¾” - 20	Fine Wire
UREB37E	13/16”	5/8” - 24	Massive
URHB37E	13/16”	¾” - 20	Massive
UREM37BY	½”	5/8” - 24	Massive
UREM38E	½”	5/8” - 24	Massive
URHM38E	½”	¾” - 20	Massive
UREM38S	½”	5/8” - 24	Fine Wire
URHM38S	½”	¾” - 20	Fine Wire
UREM40E	½”	5/8” - 24	Massive
URHM40E	½”	¾” - 20	Massive
UREM42E	½”	5/8” - 24	Massive
URHM42E	½”	¾” - 20	Massive
Note: All TEMPEST® Aviation Spark Plugs are available in an 18mm mounting thread size. The TEMPEST® massive electrode gap is .016” to .021”. TEMPEST® fine wire plug gaps are .017” to .021”.			

1.3 Selection Criteria

Spark plugs are available in different thread sizes and heat ranges. The various sizes and heat ranges are required to match engine requirements.

All TEMPEST® Aviation Spark Plugs meet the necessary requirements for military and commercial applications. All plugs are designed to meet specifications for heat rating, reach, thread size, terminal connectors and shielding.

For information on which TEMPEST® Aviation Spark Plug is designed for your needs, refer to:

Engine manufacturer's information.
TEMPEST® web site at www.tempestplus.com

1.3.1 Reach

The reach of a spark plug is measured from the shell gasket seat to the end of the threads. Correct reach is necessary to ensure the electrodes are positioned properly to ignite the fuel-air mixture and ensure consistent firings.

1.3.2 Heat Rating

The heat rating of a plug measures the ability of a spark plug to optimally transfer heat from the spark electrodes and insulator nose to the cylinder and engine cooling system, while resisting carbon fouling. TEMPEST® Aviation Spark Plugs are available in a range of heat ratings to meet all engine and operational requirements. The use of terms "hot" or "cold" in reference to spark plugs is often a source of confusion when selecting the proper spark plug for an application. For a given engine series, hot plugs are usually specified for the lower horsepower engines and cold plugs for the higher horsepower engines. The terms actually refer to the plug's ability to dissipate heat. By definition, a cold heat range plug dissipates heat more rapidly. Likewise, a hot heat range plug has a slower rate of heat dissipation. The primary factor in whether a plug is hot or cold is the length of the insulator assembly core nose. Hot plugs have relatively long insulator noses and therefore, a long heat transfer path. Cold plugs have relatively short noses and thus transfer heat more quickly. All other parts of a part number being equal, you can tell if an TEMPEST® Aviation Spark Plug is hotter or colder heat range by the numbers in the middle of the part number. For instance, comparing a UREM40E with a UREM38E, the UREM40E is a hotter plug because "40" is larger than "38".

1.3.3 Shielded Terminal Design

A shielded terminal design is used to prevent radio interference from the engine ignition system. TEMPEST® Aviation Spark Plugs are manufactured with either the ¾" – 20 thread design or the 5/8" – 24 thread design.

1.3.4 Plug Length

Aero Accessories has shortened the overall length of some TEMPEST® Aviation Spark Plugs to provide greater clearance between the spark plug terminal well and engine cowling (check with TEMPEST® Aviation Spark Plug distributors for part numbers available in the new shorter length). The new shorter design does not adversely impact spark plug performance. All TEMPEST® Aviation Spark Plugs not modified to the shorter configuration meet industry standards for length and are equivalent in length to competing brands.

1.4 Spark Plug Tools

Aero Accessories offers the following line of tools to support aviation spark plug maintenance activities:

Part Number	Description
T240	Spark Plug Tray
T245	Spark Plug Erosion Gage
T550-10	Spark Plug Cleaning Tool (bag of 10)
T551	Spark Plug Cleaning and Tester Unit (115 VAC)
T552	Spark Plug Cleaning and Tester Unit (220 VAC)
T554	Aircraft Spark Plug Feeler Gage
T555	Spark Plug Hole Thread Chaser
T556	Spark Plug Thread Lubricant (anti-seize)
T557	Spark Plug Deep-Socket (3/8” Drive) 7/8” Hex Socket, 3 ½” Overall Length, No Magnet
T557-1	Spark Plug Deep-Socket (3/8” Drive) 7/8” Hex Socket, 3 ½” Overall Length, With Magnet
T558	Spark Plug Deep-Socket (1/2” Drive) 7/8” Hex Socket, 3 ½” Overall Length, No Magnet
T559	Spark Plug Vibrator Cleaner
T560	Spark Plug Cleaner
T570	Spark Plug Tool Kit (contains T240, T245, T550-10, T554, T555, T557, T559, T560, at a discount)
T571	Time Rite Kit (18mm)
T572	Time Rite Kit (14mm)

1.5 Spark Plug Spare Parts

Aero Accessories currently offers copper mounting gaskets in bags of 100 (TEMPEST® part number P-1003-100) for TEMPEST® Aviation Spark Plugs or competing brands. Always use new spark plug gasket (P-1003) when installing a new plug or re-installing a reconditioned plug.

2.0 Installation Procedures

2.1 Preinstallation

CAUTION: Ensure that the spark plug being installed is approved for your engine application. Long reach plugs should only be installed in cylinders designed for long reach plugs. Short reach plugs should only be installed in cylinders designed for short reach plugs.

CAUTION: Never install a spark plug that has been dropped (even if there is no visible sign of damage). Dispose of the dropped spark plug and replace it with a new TEMPEST® Aviation Spark Plug.

NOTE: All TEMPEST® Aviation Spark Plugs have been pregapped at the factory. However, it is good practice to check gap settings.

Visually inspect all spark plugs prior to installation. Check firing and terminal ends for insulator cracks, deposits and contamination.

2.1.1 Copper Gaskets

Always install new TEMPEST® Aviation Spark Plug with a new copper mounting gasket (TEMPEST® part number P-1003). The gasket provides a seal between the spark plug and the engine mounting surface. Each new TEMPEST® Aviation Spark Plug comes with one copper mounting gasket.

NOTE: TEMPEST® recommends replacing the copper mounting gasket every time the spark plug is removed from the engine. Only one copper mounting gasket per spark plug should be installed. If a thermocouple gasket is used, do not install a copper mounting gasket.

2.1.2 Anti-Seize Compound

NOTE: A clean, dry connection is recommended. However, if the use of a lubricant is desired, use an anti-seize compound recommended by the engine manufacturer or spark plug manufacturer.

Apply a thin coating of TEMPEST® T556 or commercial equivalent compound such as Never - Seize® on the firing end threads, using care to keep the first thread free of lubricant. If the compound is on the first thread it may run to the electrodes and cause a short-circuit of the gap.

NEVER APPLY ANTI-SEIZE COMPOUND TO THE HARNESS CONNECTOR THREADS

2.2 Installation

2.2.1 Correct Tools

CAUTION: Use the proper tools for spark plug installation to prevent thread damage, cracked insulators and misfires.

A six point socket (TEMPEST® part number T557, T557-1 or T558) should be used for proper installation. A twelve point socket may contact the connector threads and cause damage.

2.2.2 Installation Procedures

NOTE: Make sure the spark plug and cylinder head threads are clean.

Hand – turn the spark plug to within one or two threads of the copper mounting gasket (TEMPEST® part number P-1003). If the plug doesn't turn easily, it may need to be cleaned. Use a T555 (or equivalent) spark plug thread cleaning tool to remove deposits from the cylinder head threads until hand tightening is possible to within one or two threads.

CAUTION: Make sure side-loads are not applied to the spark plug. Side loading can crack the spark plug insulator.

Use a T557, T557-1 or T558 (or equivalent) deep socket wrench with a torque indicator handle to tighten the plugs to the torque limits specified by the engine manufacturer.

Avoid over tightening.

NOTE: The table below applies to 18mm spark plugs and is provided as a general guideline only. Follow the engine manufacturer's recommendations for specific engine models.

Engine Manufacturer	Torque Reference		
	Foot Pounds	Inch Pounds	Newton Meters
Textron Lycoming	**30 -35**	**360 - 420**	**41 - 47**
TCM	**25 - 30**	**300 -360**	**34 - 41**
Pratt & Whitney	**25 - 30**	**300 -360**	**34 - 41**
Wright Aeronautical	**35 - 40**	**420 - 480**	**47 - 54**
Franklin Engine Company	**25 - 30**	**300 -360**	**34 - 41**

2.2.3 Spark Plug and Ignition Harness Connector Installation

NOTE: Keep all parts clean and dry. Always handle terminal sleeves with clean, dry hands.

Wipe the connector clean with a lint-free cloth moistened with a quick evaporating solution such as acetone, unleaded gasoline, wood alcohol or naphtha.

Inspect the terminal assembly and replace those with any signs of mechanical failure.

Visually inspect the inside of the spark shielding barrel. It should be clean and dry and no cracks should be evident.

CAUTION: Be careful not to touch the spark plug connector or harness spring with your fingers. Residual contamination could cause arcing in the terminal well and a resulting misfire.

Insert the harness assembly in a straight line with the spark plug and finger tighten the connector nut.

CAUTION: To avoid damaged threads or cracked barrels, avoid excessive side-loading and do not over tighten.

Use an open-end wrench to hold the small hex nut (do not allow to turn), while tightening the lead terminal nut. For proper torque, refer to the harness manufacturer's recommendations.

3.0 Operating Situations

3.1 Operating Period

One of the most economical ways to maintain an efficient engine and avoid wasting fuel is to change spark plugs at regular intervals. As spark plug electrodes wear, the voltage required to jump the gap increases. Under heavy loads, misfires can occur, resulting in higher fuel consumption. Also a rich fuel mixture or poor oil control can foul or coat the ceramic insulator on the spark plug tip. Fouling like excessive wear will promote misfires and can eventually cause the spark plug to stop functioning. Inspecting spark plug gaps and deposit conditions prevents engine misfires and ensures optimum performance. It is recommended that the internal resistance of the center electrode be checked during regular maintenance. If the resistance exceeds 5000 ohms, the spark plug should be replaced.

Since operating periods are dependent upon engine manufacturer's gap width recommendations, operating conditions and deterioration of magneto components and ignition harnesses, service intervals may vary. The individual operator should determine the inspection and service interval, based on past engine model experience, engine manufacturer guidelines and FAA requirements.

3.2 Preignition

Preignition is caused when the combustion charge is ignited prior to the normal, timed spark. This may be caused by a hot spot due to an overheated spark plug. Serious damage to the engine may result. Indicators include a rapid rise in the cylinder head temperature or engine roughness. If preignition is suspected, remove all spark plugs and inspect for damage (excessive wear, electrode crack or insulator nose irregularities). Follow the engine manufacturer's recommendations for correction procedures.

3.3 Detonation

Detonation is an explosion of the unburned combustion charge prior to the normal flame front. This condition may damage the spark plug electrodes or crack the insulator nose. Indications include a mildly rough engine, coupled with a knocking sound. If detonation is suspected, remove and inspect the spark plugs and follow the engine manufacturer's recommendations for correction procedures.

3.4 Connector Well Arcing and Flashover

When the terminal well of a spark plug becomes dirty with moisture or foreign matter, terminal arcing and flashover may occur. Flashover is the unintended arc of the ignition discharge along the dirty terminal well, or lead insulator to the shell. Flashover may lead to erratic misfiring, causing difficult engine starts.

The best practice to avoid flashover is preventive maintenance. Spark plugs with dirty terminal wells should be replaced with new or reconditioned spark plugs.

Also, clean and inspect ignition harness connector terminals and seal grommets to prevent moisture entry.

3.5 Improper Gaskets and Proper Selection of Spark Plugs

Copper mounting gaskets (TEMPEST® part number P-1003) are engineered to ensure proper sealing and firing tip location of a TEMPEST® Aviation Spark Plug. Aero Accessories recommends that a new copper gasket be used every time a spark plug is removed. Only one gasket should be used.

With correct installation, the firing end of the plug is flush with the combustion chamber wall. This prevents threads from being exposed to combustion gases and developing hot spots which may lead to preignition. To ensure the firing end of the spark plug is flush with the combustion chamber wall always install a long reach plug in a cylinder designed for long reach plugs and a short reach plug in a cylinder designed for short reach plugs.

A gas leak at the gasket interface may cause higher-than-normal operating temperatures, again possibly leading to preignition. Prevent this possibility by using a new copper mounting gasket each time the spark plug is removed.

4.0 Maintenance

Proper maintenance is essential to extending spark plug life. Careful reconditioning allows spark plugs to be reused at a far lower cost than replacement. Adhere to a scheduled service interval as recommended by the engine manufacturer, FAA requirements or more stringent intervals based on operating conditions and personal experience with the engine type.

NOTE: Spark plug gap and deposit conditions should be closely monitored for optimum performance.

4.1 Removal Procedures

Prior to removing spark plugs for inspection and servicing, examine the area surrounding each spark plug. Parts that are damaged or may be missing can deteriorate ignition leads and overheat the spark plugs. Repair or replace whatever parts need attention.

4.1.1 Terminal Connectors

Use an open-end wrench to hold the small hex nut (do not allow it to turn), while loosening the lead terminal nut with an appropriately sized open-end wrench.

To avoid twisting the lead, continue to use an open-end wrench to hold the small hex nut (do not allow it to turn), while unscrewing the lead terminal nut by hand.

Carefully pull the lead connector straight out. Avoid side pressure, which may damage the terminal sleeve or the barrel insulator.

Examine the terminal well insulator and replace if cracked, arc tracked or otherwise damaged. Also visually inspect the contact and ignition lead termination for evidence of arcing or other damage.

4.1.2 Spark Plug Handling

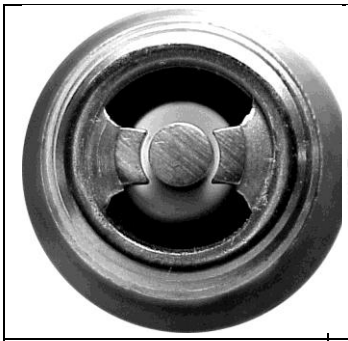
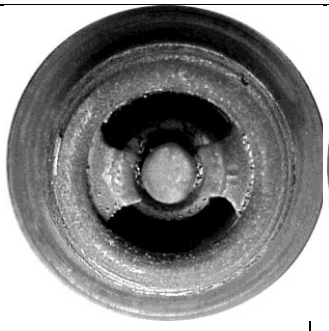
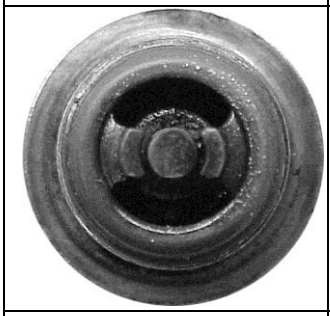
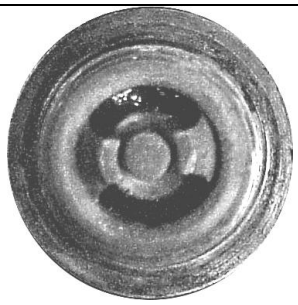
Remove each spark plug with an appropriately sized six point deep socket wrench (TEMPEST® part number T557, T557-1 or T558 or equivalent). Carefully seat the wrench securely on the plug to avoid damage to the threads or barrel. Be sure to remove the gasket with each spark plug.

Identify each spark plug by engine cylinder and position (top or bottom) and place in the spark plug tray (TEMPEST® part number T240). This pre-numbered system will make it easier to troubleshoot engine conditions when examining the firing ends of the plugs. This system will also assist with plug rotation if reinstalling.

4.2 Troubleshooting – Electrode Conditions

Poor engine performance may be due to worn rings or cylinders, improper fuel-air mixture, a worn ignition harness or a number of other conditions. The appearance of the firing end of a spark plug is a good indicator of conditions that may exist within the engine.

NOTE: The conditions shown below are representative of both massive electrode and fine wire plugs even though only the massive electrodes are shown.

			
New Condition	Normal Worn-Out Condition	Severe Worn-Out Condition	Carbon Fouled Condition
			
Oil Fouled Condition	Lead Fouled Condition	Bridged Electrode Gaps	Cracked Core Nose

4.2.1 Worn Electrodes

Normal

Indicated by a grey or brownish color on the firing end with few deposits. Electrodes are slightly worn, but not eroded or burned.

Clean, regap, test and reinstall plugs using a new copper mounting gasket (TEMPEST® part number P-1003).

Normally Worn-Out and Severe

Indicated by excessively worn electrodes.

Discard plugs that are worn to beyond service limits per Gap Setting Procedure in paragraph 4.3.8. Replace with new TEMPEST® Aviation Spark Plugs or proper part number for the application.

Besides normal operation, other conditions that can cause electrode erosion are constant magneto polarity firing and capacitance after-firing. By properly rotating spark plugs, these conditions can be prevented from causing severe erosion.

Constant polarity occurs with even-numbered cylinder magnetos. One plug fires with positive polarity causing excessive ground-electrode wear. Then the next plug fires with negative polarity causing excessive center-electrode wear.

Capacitance after-firing is caused by the stored energy in the ignition-shielded lead releasing after a normal-timed ignition.

To even out the wear, place spark plugs in the spark plug tray (TEMPEST® part number T240), identified by cylinder locations, then rotate according to Figure 4-1. Keep plugs in engine sets.

UREM37BY Electrode Wear

Due to their projected gap design, which helps prevent lead fouling, the TEMPEST® UREM37BY spark plug do not wear exactly the same as the other TEMPEST® Aviation Spark Plugs with “massive” type ground electrodes. A severally worn UREM37BY spark plug displays bottle-necking of the center electrode and knife-edged type erosion of the ground electrodes.

New UREM37BY

Worn UREM37BY

Fine Wire Electrode Wear

The outstanding wear characteristics of the TEMPEST® fine wire plugs will allow continued use long after other types of plugs have worn out. The main limitation of these spark plugs are the internal resistor condition. As long as the resistance through the center electrode is below 5000 ohms, the resistor is good. However, the electrode erodes so slowly that as long as there is at least half of the width of the ground electrode remaining, the spark plug is serviceable.

4.2.2 Carbon Fouling

Dry, fluffy, sooty deposits indicate the plug is operating too cold to burn off combustion deposits. Causes may be fuel related or ignition related.

Fuel related causes include rich fuel mixture, faulty carburetor adjustment, excessive idling or improper idle mixture.

Ignition related causes include a failed plug, a failed lead, improper magneto timing or improper plug type (too cold).

After eliminating the cause, replace the faulty plug with a new TEMPEST® Aviation Spark Plug. Complete a magneto check by slowly increasing engine power to magneto, check level and then idle for one minute before making the check. After a satisfactory check, idle the engine and check the idle mixture.

4.2.3 Oil Fouling

Indicated by oily, wet deposits and frequent misfires.

Causes include damaged pistons, worn or broken piston rings, worn valve guides, sticking valves, faulty ignition supply, or engine in break-in period.

Diagnose and repair engine problem. Clean, regap, test and reinstall plugs using a new copper mounting gasket (TEMPEST® part number P-1003).

4.2.4 Lead Fouling

Indicated by hard ash-type deposits of lead.

Causes include poor fuel vaporization due to cold operating temperature or high lead-content fuel.

Severely fouled plugs should be replaced with new TEMPEST® Aviation Spark Plugs. Lightly fouled plugs may be cleaned, regapped, tested and reinstalled using a new copper mounting gasket (TEMPEST® part number P-1003).

4.2.5 Bridged Electrode Gaps

Various deposits may bridge the gap between the electrodes of a plug causing misfires. These deposits may include carbon, lead or metallic particles.

Carbon particles may be cleared by slowly increasing engine power at idle speed until the misfiring stops. Plugs with lead deposits or metallic particles will need to be cleaned. Otherwise, replace with new TEMPEST® Aviation Spark Plugs.

4.2.6 Cracked Core Nose

A crack in the core nose may be caused by abnormal engine operation or improper cleaning or gapping procedures.

Replace with new TEMPEST® Aviation Spark Plugs.

4.3 Reconditioning Service

To be properly reconditioned a plug must be mechanically and electrically sound, have clean firing and terminal barrel ends, have sufficient electrode material remaining with proper contours and be properly gapped, tested and handled.

4.3.1 Preliminary Visual Inspection

Use a lighted magnifier (TEMPEST® part number T553) to visually inspect all plugs to be reconditioned. Dispose of all plugs with worn, damaged, or cracked parts such as shell hex, firing ends, shielding barrel, connector seat, threads, electrodes, terminals, insulators or terminal sleeves.

4.3.2 Degreasing

Degrease spark plugs by lightly wiping with solvents, such as Stoddard Solvent or Varsol. **Do not soak plugs in solvent and keep solvent out of the shielding barrel.**

Remove all traces of solvent with an air blast.

4.3.3 Cleaning the Firing and Barrel Ends

Clean the firing and barrel ends of plugs with standard abrasive blast cleaning (TEMPEST® part number T560) or equivalent.

To remove heavy deposits, use a vibrator/cleaner like (TEMPEST® part number T551, T552, T559 and T560) or equivalent following the tool manufacturer recommended instructions. TEMPEST® spark plug cleaning tool (T550) fits most commercial vibrator/cleaners and can be used on TEMPEST® Aviation Spark Plugs or competing brands.

4.3.4 Cleaning the Terminal Well

Clean the shielding barrel insulators, using a cotton swab dipped in cleaning solvent, such as Stoddard Solvent, wood alcohol or methylethylketone. Using a rotating motion, run the swab up and down the inside of the well to remove the stains.

If this method doesn't complete the cleaning, dip a clean swab in the solvent and then dip in a mild abrasive. Using a rotating motion, run the swab up and down the inside of the well to remove all stains.

Dip a second swab in solvent and completely clean out the abrasive residue.

4.3.5 Cleaning Connector Seats

Use solvent to remove dirt and deposits from the connector seat. This ensures a tight seal and proper bond with the ignition lead.

If additional cleaning is needed, use fine grained sand paper to remove all remaining dirt and deposits.

Clean with the plug held in an inverted position to avoid particles falling deep into the shielding barrel.

Use an air blast to remove all traces of particles from the barrel. Carefully examine the barrel for cracks and dispose of any cracked insulator plugs and replace with new TEMPEST® Aviation Spark Plugs.

4.3.6 Firing End Inspection

Use a lighted magnifier to thoroughly examine the firing end. Check for cleanliness, dryness and a clean terminal well.

4.3.7 Cleaning The Threads

Use a lighted magnifier to inspect the threads on the shell and the shielding barrel for condition and size. Dispose of plugs with heavily damaged threads.

CAUTION: Use care with a power driven brush. Do not use a wire exceeding 0.005" in diameter. Never brush the insulator or the electrodes.

Use a wire hand brush or power driven brush to thoroughly clean the threads.

Restore slightly damaged threads with a #2 three cornered file.

4.3.8 Gap Setting Procedures

CAUTION: Never bend the center electrode while setting the gap. Never apply pressure to the ground electrode with the feller wire gauge. This may fracture the ceramic insulator.

NOTE: Thoroughly clean plug before setting the gap.

Use a commercially available gap setting tool to set the gap following the tool manufacturer's instructions.

Use a GO and NO-GO round wire feeler gauge (TEMPEST® part number T554) to measure gap width. TEMPEST® recommends using the same gap setting as specified for new spark plugs.

For all massive spark plugs except UREM37BY, check for electrode erosion with the TEMPEST® T245 erosion gage. Gap the plug to 0.016". A properly gapped, but fully worn plug will enter the hole. If this happens, dispose of the plug and replace it with a new TEMPEST® Aviation Spark Plug.

UREM37BY can be gapped until the electrodes are worn to a point where it becomes difficult to properly adjust the gap.

Fine wire spark plugs should be gapped to 0.017” – 0.021” from the factory and the side wire itself should be flush with the top of the center electrode. If the gap exceeds this tolerance, the side wire can be gapped during regular maintenance. The Iridium material has outstanding resistance to electrical erosion, but is very brittle, Using small needle-nose pliers, grasp the side wire perpendicular to the face of the plug. Smoothly twist the pliers one time only to achieve the proper gap. There is very little spring back at the electrode when bending. Any additional adjustments <u>are not recommended</u> due to the brittle nature of the material. Broken side wires are not covered under warranty.

4.3.9 Rotating Spark Plugs

After placing spark plugs in the spark plug tray (TEMPEST® part number T240), exchange the long-lead plugs with the short-lead plugs as in Figure 4-1. This should be done at each inspection, cleaning, and gap setting interval to even out the wear caused by constant polarity and high lead capacitance.

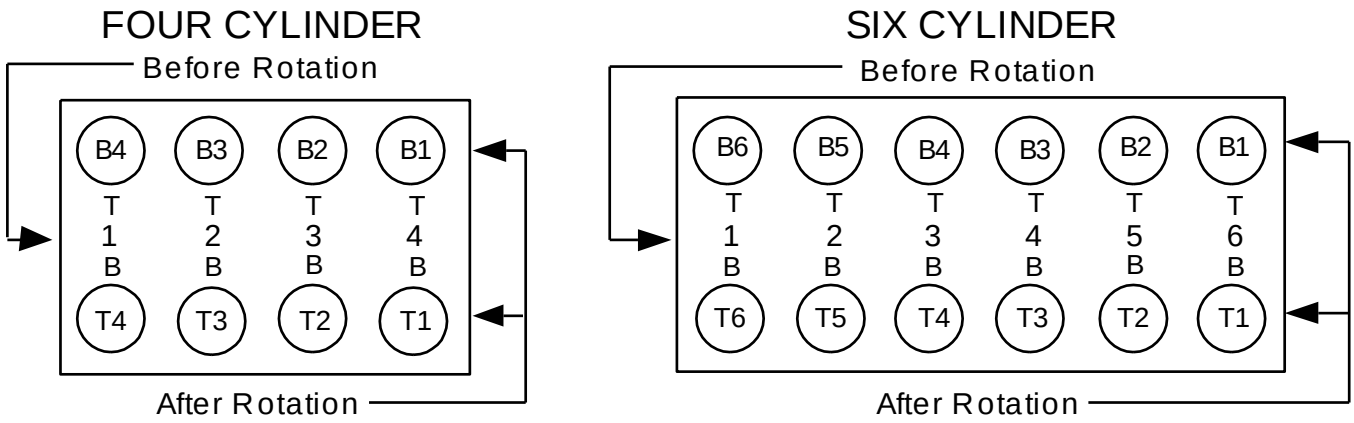


Figure 4-1

<u>NOTE:</u> It is not necessary to rotate plugs from cylinder to cylinder in a four cylinder engine equipped with single drive dual magneto or any engine equipped with the LASAR® system. However to minimize deposit buildup, rotate the plugs from top to bottom and from bottom to top.

4.3.10 Painting Spark Plugs

Occasionally, plugs that have been in service for an extended period of time require cleaning and painting to preserve their cosmetic appearance.

1. Remove loose corrosion or loose plating using a hand-held stainless steel brush.
2. Degrease part as described in paragraph 4.3.2 “Degreasing”.
3. Mask threads. Ensure that connector end and firing end are also masked.
4. Apply a light coat of paint.
5. Allow a 20-minute dry time for solvent flash off.
6. Apply a second coat of paint.

7. Dry according to paint manufacturer's instructions.

Recommended Paints:

• Plasti - Kote®	HOT PAINT	HP – 14 Aluminum
• RUST - OLEUM®	HIGH HEAT	7778 Black
• RUST - OLEUM®	HARD HAT	V2185 Zinc - Rich
• Randolph Products	TT – P - 28	Aluminum Aerosol High Heat

5.0 Preservation and Storage

All new TEMPEST® Aviation Spark Plugs come from the factory sealed in a plastic tube with one copper mounting gasket (P-1003).

To preserve reconditioned spark plugs, lightly brush a rust-proofing compound on the shielding barrel and shell threads.

CAUTION: Do not dip spark plugs in a corrosion preventive compound.

Carefully package the plugs using individual tubular cartons or individually wrap plugs in waxed paper and store in a suitable container.

For lengthy storage, use a ventilated storage cabinet heated with an ordinary light bulb. This is of particular importance in damp, humid climates or near salt water.

6.0 Warranty

6.1 Warranty Period

Refer to TEMPEST'S® Aviation Spark Plug Warranty Policy (Available at www.tempestplus.com)

6.2 Warranty Procedures

Request for warranty consideration must be made to Aero Accessories, Inc. within 30 days of the date the spark plug(s) became inoperative. The spark plug(s) and the completed information form must be returned to Aero Accessories, Inc. through a TEMPEST'S® distributor with transportation charges prepaid.