Aerolineas Argentinas

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CHAPTER 74 - IGNITION

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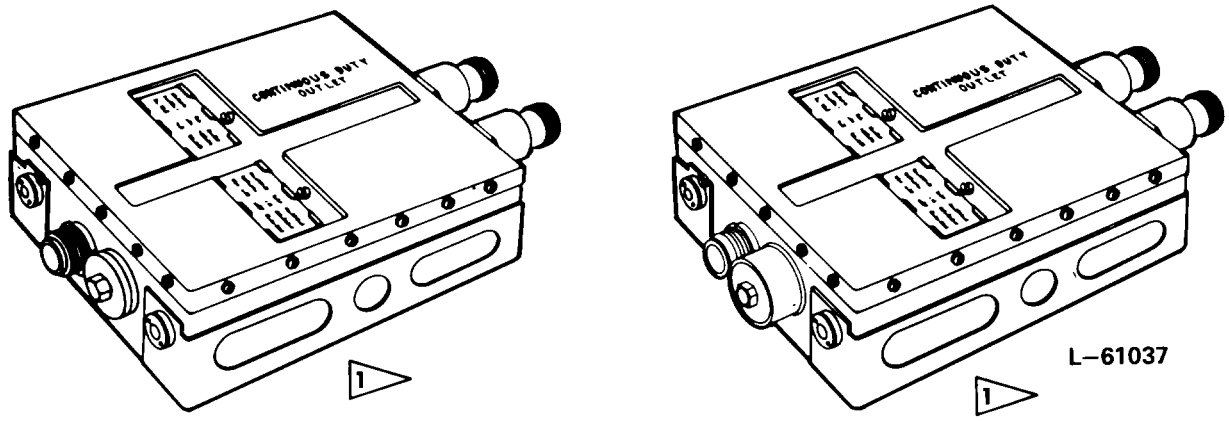
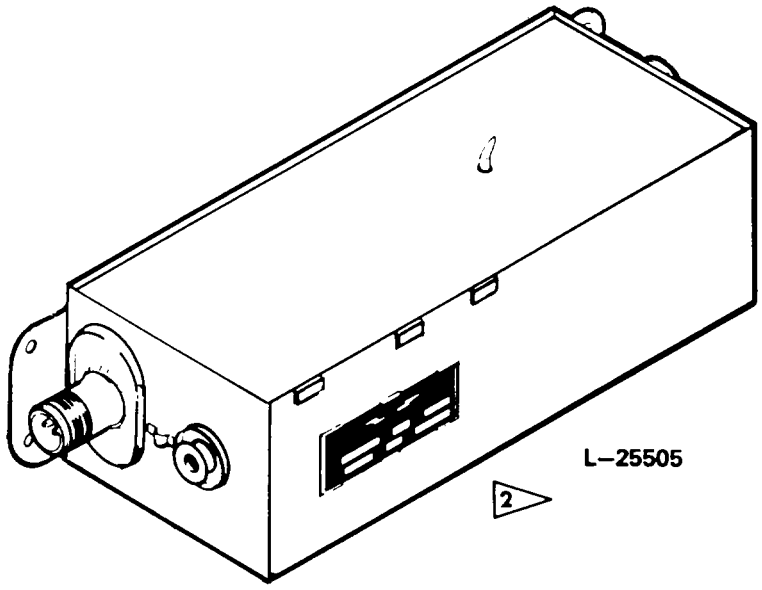
IGNITION SYSTEM – DESCRIPTION AND OPERATION

1. General
   A. The purpose of the engine ignition system is to provide a means of initiating or sustaining combustion of the fuel-air mixture in nine can-annular combustion chambers in the combustion section.
   B. There are two identical ignition systems, one for each engine consists of control switches, two ignition exciters, two high tension leads and two igniter plugs. Each ignition system shall be discussed in terms of electrical power supply, distribution and switching.
2. Electrical Power Supply
   A. Ignition Power Supply
      (1) The 20-4 Joule single pack continuous ignition system is powered by two input voltage at the ignition exciter, 28 VDC and 115 V, 400 Hertz. The single unit housing incorporates one power input connection and two output connectors. A dual pack system is also available. The dual pack system has two exciters with a power input connection for each exciter. The two output connections supply the high tension voltage through the exciter cables to the igniter plugs. P&W SB 5880 installs the optional dual pack system.
         (a) Ignition exciter
            1) The 20-4 ignition exciter is a capacitor discharge system designed to provide ignition for the JT8D Turbofan Engine. This ignition exciter serves the dual purpose of providing intermittent duty starting ignition and continuous duty ignition which are used as required after starting. Two different input voltages are required for the exciter. Both circuits of the ignition exciter are contained in one compact housing with one input power connection and two output connections. The dual pack system has two input power connections and two output power connections.
            2) See Fig. 1 for ignition exciter.
            3) See Fig. 2 for ignition exciter plug lead assembly.
            4) See Fig. 2, and Fig. 3 for ignition exciter wiring schematic.



1 AIRPLANES WITH 20–4 JOULE DC STARTING AND CONTINUOUS IGNITION SYSTEM

2 AIRPLANES WITH 20–4 JOULE AC TWIN PACK IGNITION SYSTEM



Ignition Exciter
Figure 1

Table of Leading Particulars		
	INTERMITTENT DUTY CIRCUIT	CONTINUOUS DUTY CIRCUIT
Input Connector Pin	"B" Positive, "A" Ground	"C" Positive, "D" Ground
Input Voltage	14 to 30 VDC	90 to 124 VAC 350 to 440 GPS
Input Current	5.1 A dc max.	2.5 A RMS max.
Duty Cycle *[1]	Intermittent	Continuous
Number of Plugs Fired	2	1
Stored Energy	20 Joules	4 Joules
Spark Rate	0.5 S/S minimum	0.7 S/S minimum
Ionizing Voltage	22-26 KV	22-26 KV
Ambient Temperature	-65°F to 275°F	
Operating Altitude	70,000 ft. max.	
*[1] The 20-4 Joule Dual Pack System does not have a duty cycle for either circuit.		

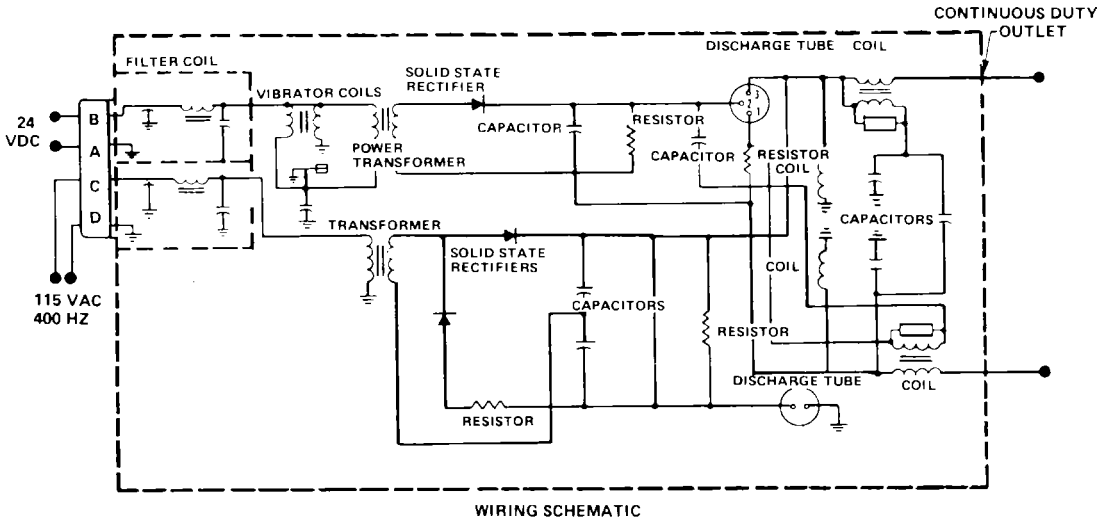
3. Distribution
   A. High tension distribution
      (1) The high tension distribution system delivers high voltage from the ignition exciter to the combustion chambers by means of high tension leads and igniter plugs. The high tension voltage from the exciter ionizes the gap at the plug and the result is a spark of very high energy capable of igniting fuel.
         (a) High tension leads (Fig. 2)
            1) The igniter plug lead assemblies are installed between the ignition exciter and the igniter plugs. The lead assemblies transfer high frequency, high voltage from the ignition exciter to the igniter plugs.
         (b) Igniter plugs (Fig. 3)
            1) There are two igniter plugs which are mounted on the lower front of the combustion chamber outer case. One projects into the number four combustion chamber and the other projects into the number seven combustion chamber.

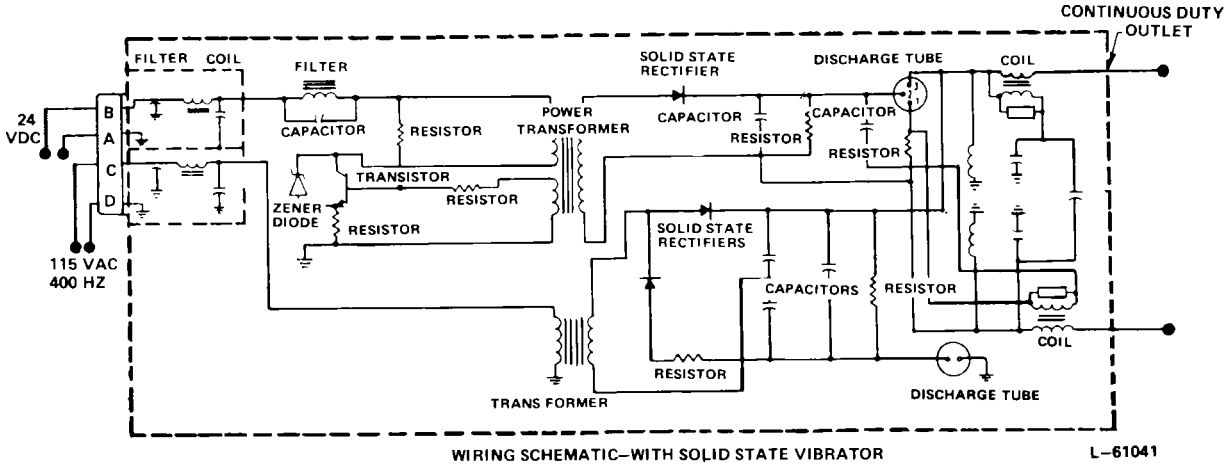
4. Switching (Ref 74-31-0 D&O)
5. Operation
   A. All ground starts or inflight airstarts should be made with the use of the 20-Joule DC exciter (firing both igniter plugs). For optimum life of ignition system components, the operating duty cycle is 2 minutes ON, 3 minutes OFF, 2 minutes ON, and 23 minutes OFF.

      NOTE: If the 20-4 Joule single pack exciter unit has been operated beyond the recommended duty cycle, the unit must be removed and checked per overhaul instructions. The integrity of components within the exciter may have been compromised due to overheating (Ref 74-11-11 R/I).
      The dual pack exciter installed by SB 5880 has continuous duty. This exciter has no duty cycle limits.

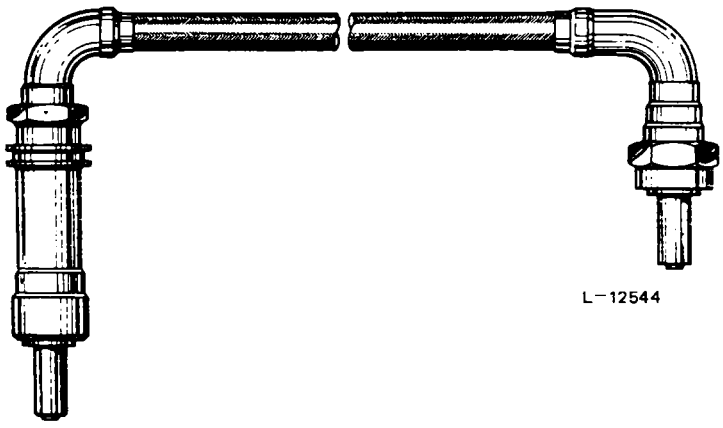
   B. For continuous operation, the 4-Joule system should be used in lieu of the 20-Joule DC system for protection against flameout during takeoff and prior to activating the engine inlet anti-icing system. The 4-Joule system, which can be operated continuously may also be used for protection against flameout of at any other time deemed advisable, such as during periods of moderate or severe turbulence. To conserve the life of the ignition system components, the 4-Joule ignition system should be turned OFF during normal flight conditions whenever engine operation is stable.
   C. The intermittent duty starting circuit requires an input of 28 VDC nominal while the continuous duty circuit requires an input of 115 VAC 400 Hertz. The intermittent duty starting circuit discharges through both outlets, firing two igniter plugs. The continuous duty circuit discharges only through the outlet marked CONTINUOUS DUTY OUTLET, firing one igniter plug. Spark gaps prevent current from following in one circuit when the other circuit is in operation.

      NOTE: The exciter is reparable using test equipment available in most airline overhaul shops. Positive hermetic seal is assured through use of a stainless steel case weldment. The exciter capability for continuous operation will assure conformance with potential airline ignition duty cycles. Maximum exciter service life can, however, be attained by ignition utilization per recommend engine/or airplane operational procedures.

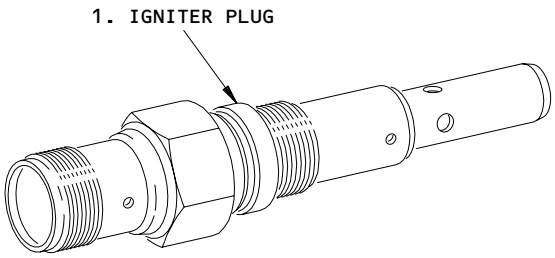




Ignition Exciter Wiring Schematic

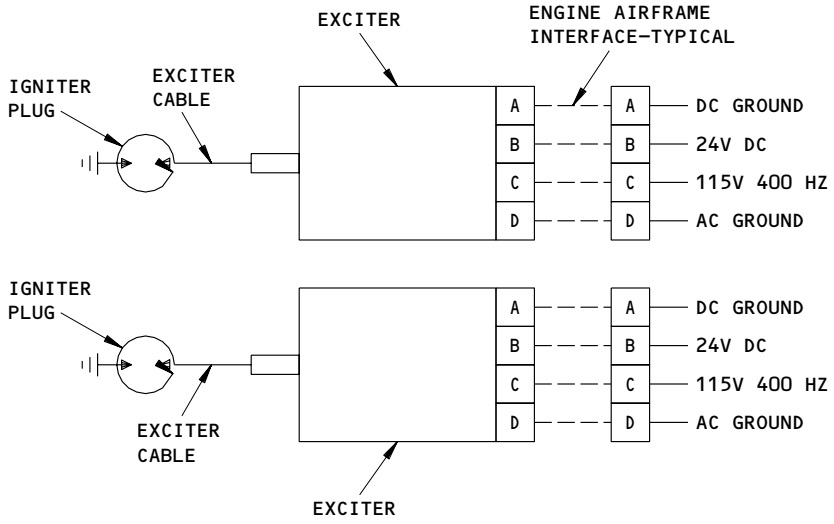


Ignition Plug Lead Assembly
Figure 2

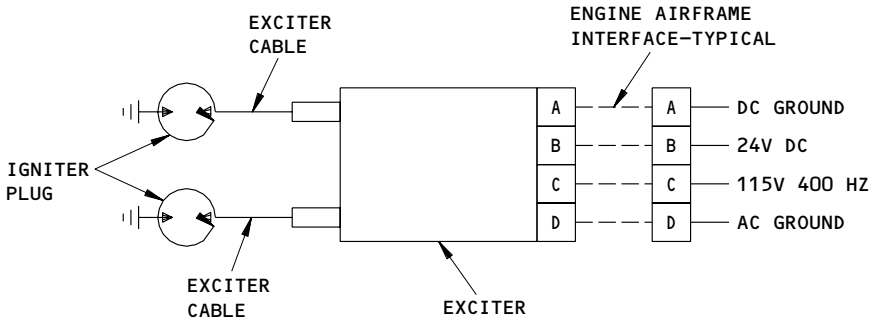


Igniter Plug

L-61051



AIRPLANES WITH 20-4 JOULE TWIN PACK IGNITION SYSTEM



AIRPLANES WITH 20-4 JOULE SINGLE PACK IGNITION SYSTEM

20-4 Joule DC Starting and Continuous Ignition System Schematic
Figure 3

D. The igniter plug provides a gap across which an electrical spark passes to ignite the fuel-air mixture. The igniter plug gap becomes ionized by very high voltage (22-26 KV) provided by a high tension transformer. Once the air gap becomes ionized, current stored in a storage capacitor discharges across the gap. This discharge results in a high temperature plasma arc which is capable of igniting the fuel-air mixture.

NOTE: Pratt and Whitney recommends the use of any igniter plug regardless of type, that meets the overhaul manual examination and testing requirements. However, each operator must concern himself with determining how long the igniter plug can be expected to continue meeting these requirements while exposed to engine use within his operation. The appropriate inspection/check, cleaning/painting interval can only be established by the individual operator on his experience.

IGNITION SYSTEM - TROUBLESHOOTING

1. General
   A. To find and correct ignition system troubles first study the symptoms carefully, then check each possible cause, beginning with the most probable, until the exact cause of the trouble is determined. Refer to AMM 72-00/101 (P&WA JT8D Maintenance Manual) for fault isolation procedures on ignition system.
   B. Before attempting to diagnose the trouble or work on the system which has been reported malfunctioning during flight, consult the pilots' flight report and all other pertinent data for information which might help in diagnosing the trouble.

WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY TO PERSONNEL.

WARNING: CHECK OF IGNITION SYSTEM MUST NOT BE PERFORMED WHEN AIRPLANE IS IN HANGAR, NEAR BUILDINGS AND/OR OTHER AIRPLANES THAT ARE WITHIN THE JET WAKE HAZARD AREA FOR GROUND IDLE (AMM 71-09-100/201), OR DURING AIRPLANE FUELING. MAKE SURE THAT NO PERSONNEL ARE IN THE JET WAKE HAZARD AREA FOR GROUND IDLE (AMM 71-09-100/201) OF APPLICABLE ENGINE DURING IGNITION SYSTEM CHECK.

WARNING: IGNITION VOLTAGE IS DEADLY. DO NOT TOUCH IGNITER PLUGS OR LIVE PORTION OF IGNITION EXCITER OR LEADS DURING OPERATION.

CAUTION: PRIOR TO PERFORMING IGNITION SYSTEM CHECK, DRY MOTOR ENGINE TO REMOVE UNBURNED FUEL (AMM 71-09-100/201) UNBURNED FUEL COULD RESULT IN ENGINE INTERNAL OR EXHAUST FIRE. DO NOT PERFORM IGNITION SYSTEM CHECK IF N2 IS ROTATING. WITH N2 ROTATION, FUEL ENTRY INTO COMBUSTION CHAMBER IS POSSIBLE WHEN START LEVER IS ADVANCED TO IDLE AND INADVERTENT LIGHTUP DURING IGNITION SYSTEM CHECK COULD RESULT.

2. Troubleshooting Chart

TROUBLE	PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
No spark at igniter plugs	Exciter inoperative	Disconnect electrical connector at exciter unit input and check for power and ground at connector. If power and ground exist, try substitute exciter known to be operative and perform aural check of igniter plugs (AMM 74-00/501). If substitute exciter sparks the igniter plugs, the exciter in question is inoperative.	Replace defective exciter
	Igniter plug defective	WARNING TAKE PRECAUTIONS TO AVOID PERSONAL INJURY WHILE CONDUCTING FUNCTIONAL CHECKS ON IGNITER PLUGS. MAKE SURE EXCITER ENERGY IS COMPLETELY DISCHARGED BEFORE HANDLING IGNITION LEADS AND CLEAR FUEL VAPOR FROM ENGINE. Activate ignition system from cockpit and listen for firing of igniter plugs (AMM 74-00/501), also make a visual inspection of igniter plug every time an aural check is performed (AMM 74-00/601).	Replace igniter plugs as necessary
	High tension lead defective	Disconnect high tension lead from exciter and igniter plug, check for continuity and perform High Tension Leads - Inspection/Check.	Replace high tension leads as necessary
	Switches, electrical connectors and/or wiring defective	Disconnect electrical connector at exciter input and check for power and ground. If power and ground do not exist, visually check all wiring and electrical connectors. Perform Start Lever Switch - Adjustment/Test, and check for power and ground at engine start control switches.	Replace faulty switch or repair electrical circuit as necessary

IGNITION SYSTEM - ADJUSTMENT/TEST

1. General
   A. The ignition system test consists of operating the engine ignition system and verifying operation of the igniter plugs.
   B. The test applies to either engine. Ensure sequence is applied to the engine being tested.
2. Equipment and Materials
   A. Tester - Igniter plug - JT8D. Model No. VTM 1015. Versa - Tool Manufacturing, 2225 River Hill Road, Irving, Texas 75061
3. Test Ignition System

   WARNING: DUE TO THE HIGH VOLTAGE GENERATED DURING THIS TEST, PERSONNEL OTHER THAN INDIVIDUAL STANDING IN CLOSE PROXIMITY TO ENGINE INLET FOR TEST REASONS SHOULD LEAVE THE IMMEDIATE VICINITY OF THE ENGINE BEING TESTED. CHECK OF IGNITION SYSTEM MUST NOT BE PERFORMED WHEN AIRPLANE IS IN HANGAR, NEAR BUILDINGS AND/OR OTHER AIRPLANES THAT ARE WITHIN THE JET WAKE HAZARD AREA FOR GROUND IDLE (REF 71-09-100 MP), OR DURING AIRPLANE FUELING. ENSURE THAT NO PERSONNEL ARE IN THE JET WAKE HAZARD AREA FOR GROUND IDLE (REF 71-09-100 MP) OF APPLICABLE ENGINE DURING IGNITION SYSTEM CHECK. IGNITION VOLTAGE IS DEADLY. DO NOT TOUCH IGNITER PLUGS OR LIVE PORTION OF IGNITION EXCITER OR LEADS DURING OPERATION.

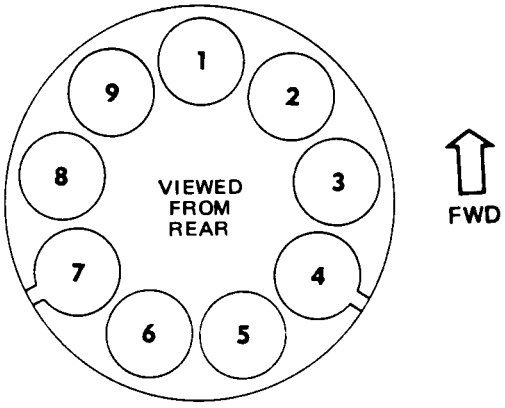
   CAUTION: PRIOR TO PERFORMING IGNITION SYSTEM CHECK, DRY MOTOR ENGINE TO REMOVE UNBURNED FUEL, (REF 71-09-100 MP) UNBURNED FUEL COULD RESULT IN ENGINE INTERNAL OR EXHAUST FIRE. DO NOT PERFORM IGNITION SYSTEM CHECK IF N2 IS ROTATING. WITH N2 ROTATION, FUEL ENTRY INTO COMBUSTION CHAMBER IS POSSIBLE WHEN START LEVER IS ADVANCED TO IDLE AND INADVERTENT LIGHTUP DURING IGNITION SYSTEM CHECK COULD RESULT.

   A. Provide ac and dc electrical power. Close the engine bleed valve for the engine to be tested.
   B. Close START IGNITION and LOW ENERGY IGNITION circuit breakers for the engine to be tested and ENGINE START VALVES circuit breaker on the P6-2 circuit breaker panel.

C. Check the high energy 20 joule system, by moving the start lever to the IDLE position and moving the associated start switch to the GRD position. (The start switch is held in the GRD position by a solenoid). With an individual stationed at inlet of engine to be tested, audibly check that both igniters operate (an omni-directional sound indicates both igniters are operating, a directional sound, i.e., LEFT side only, indicates igniter in #7 can is not operating, consequently, a sound emanating from RIGHT side only indicates igniter in #4 can is not operating). Open the ENGINE START VALVES circuit breaker and the start switch shall return to the OFF position automatically. Move the start switch to the FLT position. Verify operation of both igniters.

D. Check the low energy 4 joule ignition system by moving the start switch to the LOW IGN position and the associated start lever to the IDLE position. Verify operation of one igniter.

E. Return all switches and levers to the OFF position.



Engine Combustion Chamber Numbering (Burner Can)
Figure 501

IGNITION SYSTEM - INSPECTION/CHECK

1. General
   A. Engine ignition system examination encompasses the ignition system ignition exciter, high tension leads and igniter plugs.
2. Examine Ignition System (General)

   WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY TO PERSONNEL.

   A. Examine the completely assembled ignition system to assure that all wiring and connections are tight and in good condition.
   B. Assure that all openings are covered with external covers, not internal plugs, immediately upon removal or disassembly of parts.
   C. Examine all ignition wiring for chafing, breaks, wear and security.
   D. Check the entire engine compartment for cleanliness after completion of any work.
3. Examine Ignition Exciter
   A. Examine input connector for bent or damaged pins. Bent pins may be straightened using needlenose pliers. Damaged pins will require overhaul.
   B. Examine output receptacle well for damage or signs of arcing or flashover on contact button. Arcing is identified by pitting or discoloration on contact. Flashover is identified by carbon tracking. If any of these indications are evident, send exciter to overhaul facility.
   C. Examine the threads of each outlet. Minor repair to threads can be made by chasing with proper die. If threads are damaged beyond minor repair, ignition exciter will require overhaul.
   D. Examine case for cracks, dents or large abrasions.
4. Examine High Tension Leads
   A. Examine conduit for cuts, abrasion or other damage, and coupling nuts for worn or stripped threads.
   B. Examine high tension contact and cable.

      CAUTION: DO NOT BEND OR PULL HIGH TENSION CABLE CONDUCTOR WIRE, OR INSULATION WILL BE DAMAGED.

(1) During rubber bushing replacement, inspect for evidence of arcing or flashover on high tension electrical contact. Inspect exciter-to-igniter plug cables to ensure that excessive temperature has not affected insulation and grommets (Fig. 601). Arcing is identified by pitting and discoloration (Fig. 602). Flashover is identified by carbon tracking (Fig. 603). If either indication is evident, send assembly to repair facility.

(2) If conductor insulation is hard, brittle, or cracked, send assembly to repair facility.

(3) Examine for presence of oil, dirt, or conductive contaminants on exposed parts. Use cleaning procedures as required (Ref Cleaning/Painting).

5. Examine Igniter Plugs (Fig. 604)

A. Visually examine connector threads and shell threads of igniter. If damaged, chase threads using 1.000-20NS-3A for connector threads and 0.9375-16NS die for shell threads.

B. Examine ceramic for cracks on either end of plug. Any cracks in ceramic are cause for rejection on igniter plug. Internal ceramic breaks or cracks are detected by shaking plug and listening for rattle.

C. Examine wear of plug by using lighted magnifying glass looking through shell end annulus to determine if insulator supporting shoulder is worn through. Wear of Champion plug may be measured using service wear measuring tool CT-468 or CT-492.

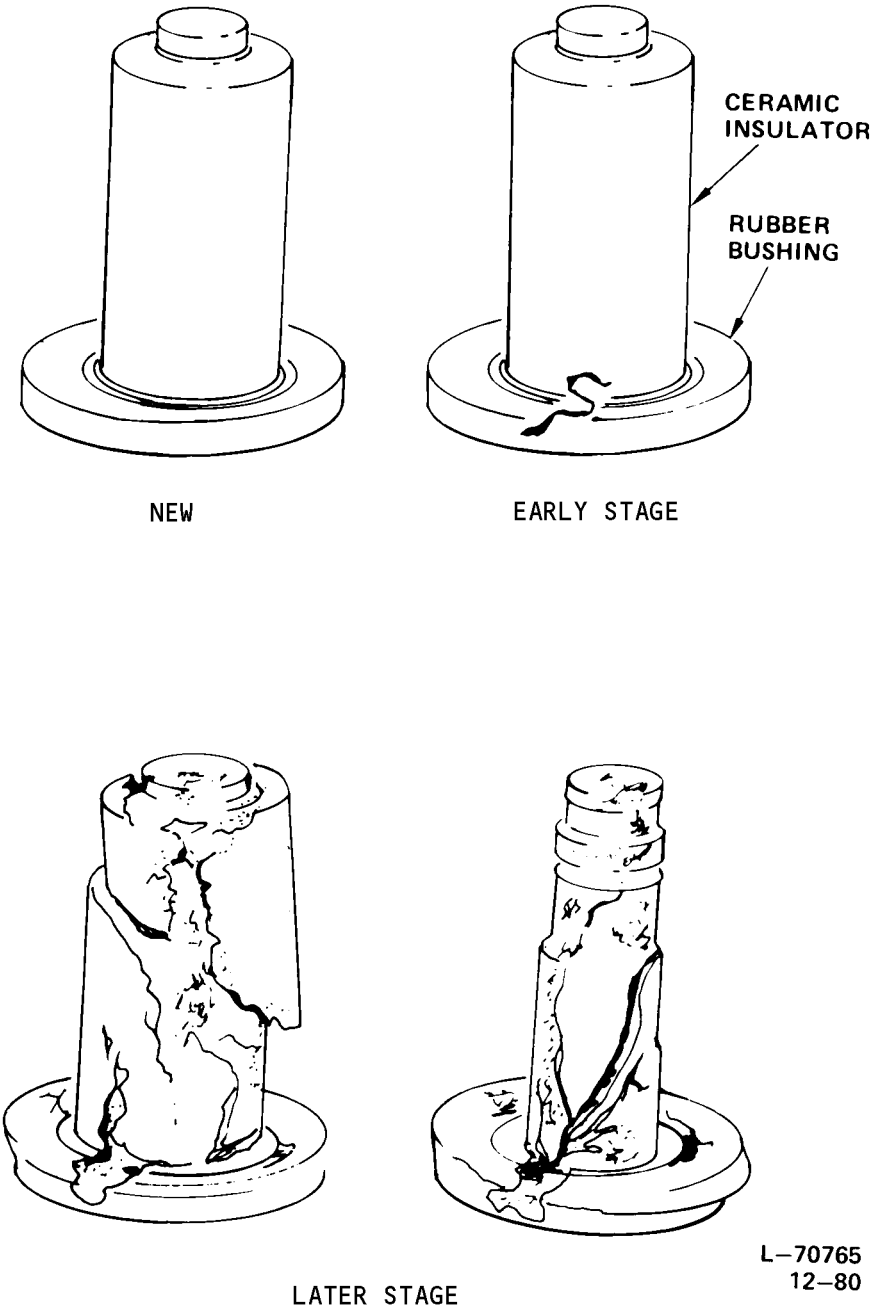
NOTE: Visual determination of excessive wear is presently only practical means of evaluating plug wear. Maximum outer shell ID erosion is a physical limit to prevent possible loss of ceramic support by the ground shell which can result in ceramic cracking and internal firing. When excessively eroded, the ceramic can be ingested by the turbine. Center electrode depth may be used to determine plug serviceability limit when preferred by individual operators.

Service wear measuring tool CT-468 or CT-492 may be purchased from: Champion Spark Plug Co, 900, Upton, Toledo, Ohio 43601 U.S.A.

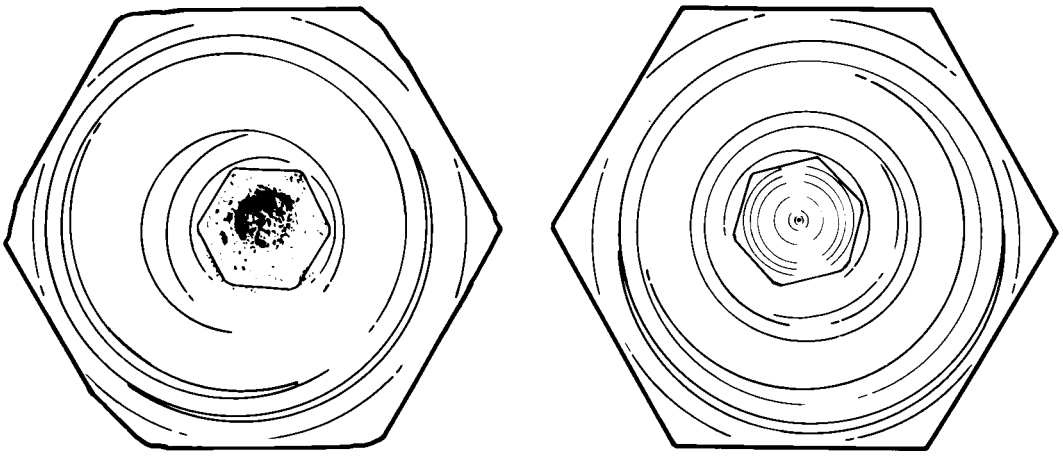
Although igniter plugs will continue to fire after exceeding erosion limits, the voltage required to discharge across the spark gap increases with increasing erosion and can stress other components, particularly the high tension parts.

D. Examine igniter plugs in areas shown for abrasion (Fig. 604). Reject plugs not meeting required abrasion wear limits caused by combustion chamber igniter plug guide.

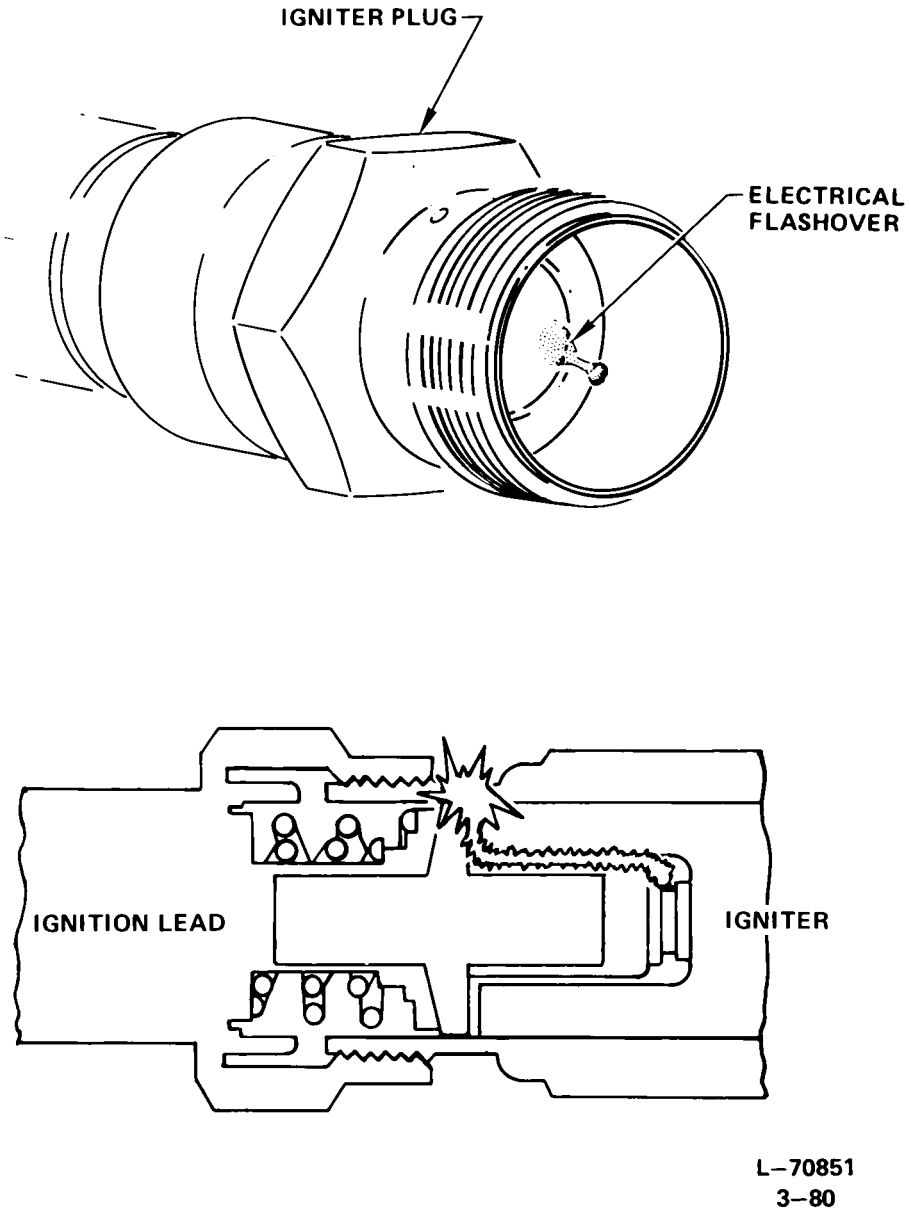
E. Whenever high tension lead is removed from igniter plug terminal, examine igniter plug terminal well.
   (1) Examine igniter plug terminal for evidence of arcing and flashover. Arcing is identified by pitting or discoloration on contact (Fig. 602). Flashover is identified by carbon tracking (Fig. 603). If any of these indications are evident, replace igniter plug.



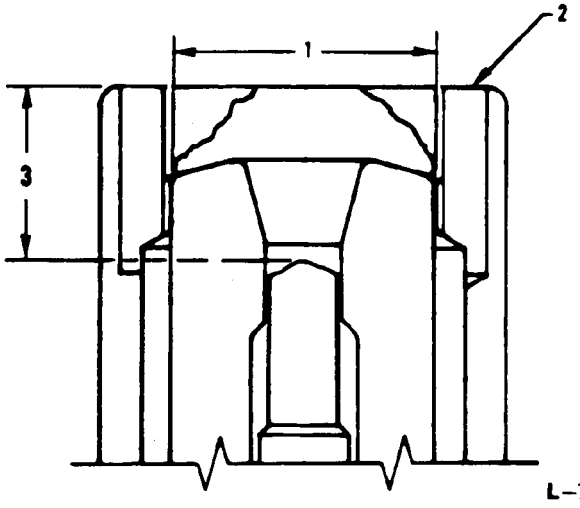
Distressed Ignition Lead Crommets
Figure 601



Electrical Arcing Condition
Figure 602



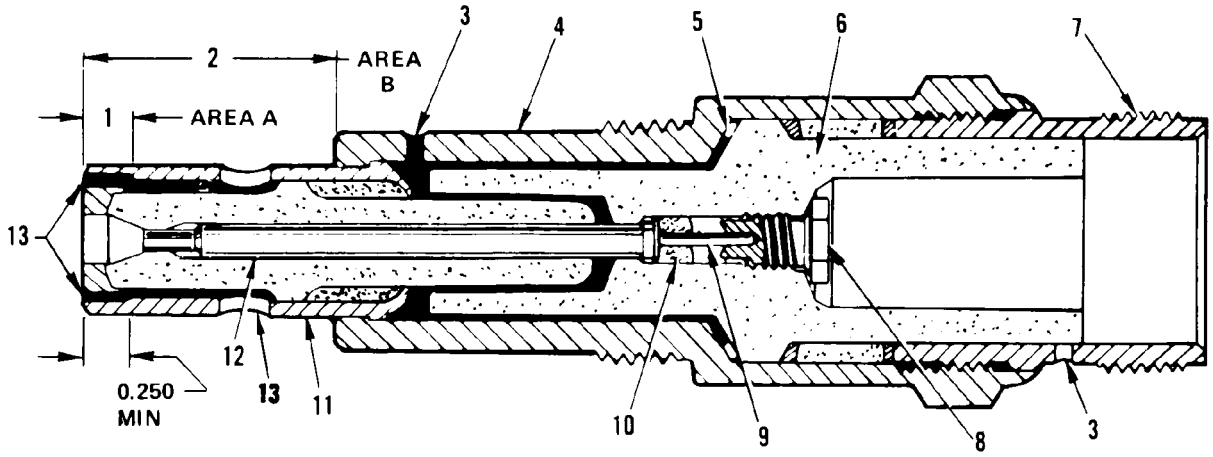
Electrical Flashover Condition
Figure 603



1. 0.325 Inch ID Maximum Outer Shell Erosion
2. Air Cooling Holes
3. Center Electrode Depth For New Igniter Plugs Only.
   0.221 ± 0.005 Inch For SLG Auburn Igniter Plug.
   0.240 ± 0.015 Inch For Champion Igniter Plug.

NOTE: When preferred by operators, depth may be used to determine serviceable limit based on individual operator experience.

Igniter Plug Erosion Limit
Figure 604



1. AREA A EXPOSURE OF ONE AIR COOLING PASSAGE OR 0.030 INCH WEAR DEPTH.
2. AREA B. 0.030 INCH MAXIMUM WEAR DEPTH.
3. CONDENSATION DRAIN HOLE
4. UPPER SHELL
5. GASKET
6. INSULATOR
7. COUPLING THREAD
8. TERMINAL SCREW
9. SEALING WIRE
10. CEMENT
11. LOWER SHELL
12. CENTER ELECTRODE
13. AIR COOLING HOLES, 0.250 INCH MIN. DEPTH.

Igniter Plug Abrasion Wear Limits
Figure 604

IGNITION – CLEANING/PAINTING

1. General
   A. Ignition system cleaning encompasses the igniter plug, high tension leads and ignition exciter.
2. Clean Igniter Plug
   A. Outer Shell

      WARNING: USE CLEANING SOLVENT IN WELL VENTILATED AREA, AVOID CONTACT WITH SKIN.

      WARNING: IGNITER PLUG MAY CONTAIN RESIDUE OF KRYTOX 240 AC GREASE. DO NOT CONTAMINATE SMOKING MATERIALS (CIGARETTES, CIGARS, ETC.) WITH KRYTOX 240 AC GREASE. COMBUSTION PRODUCTS OF KRYTOX 240 AC GREASE COULD BE HARMFUL IF INHALED. AVOID SKIN CONTACT. WASH HANDS IMMEDIATELY AFTER CONTACT WITH KRYTOX 240 AC GREASE. THIS GREASE IS NO LONGER USED ON THE IGNITION CABLES.

      NOTE: Cleaning solvent shall be acetone.

      NOTE: Cleaning of recessed center electrode cavity on firing end of igniter plug is not recommended.

      (1) Degrease igniter plug in cleaning solvent.
      (2) Clean outer shell of igniter plug using wire brush.
      (3) Using cleaning solvent and nonmetallic brush, remove deposits from external surface of firing end of igniter plug. It is not necessary to restore ceramic to cleanness of new ceramic surface.

   B. Contact Well

      NOTE: Compressed air shall be maintained at 30 psig maximum discharge pressure.

      NOTE: Dirt on contact surface will cause reduced output or arcing.

(1) Remove dirt or foreign matter from inside contact well with compressed air.

WARNING: USE CLEANING SOLVENT IN WELL VENTILATED AREA, AVOID CONTACT WITH SKIN.

NOTE: Cleaning solvent shall be acetone.

(2) Clean igniter plug contact well with long bristle, nonmetallic brush moistened with cleaning solvent. Dry with compressed air.
(3) Clean inner ceramic walls using circular felt bob, 1/2 inch in diameter and approximately 1-3/4 inches long, suitable for use with hand chuck. Moisten with cleaning solvent and clean using circular movement of hand.
(4) Clean end surface of ceramic at seat of grommet face using short bristle nonmetallic brush moistened with cleaning solvent. Dry with compressed air.

3. Clean High Tension Leads

WARNING: IGNITION CABLE RUBBER BUSHINGS AND ADJACENT PARTS MAY CONTAIN RESIDUE OF KRYTOX 240 AC GREASE. DO NOT CONTAMINATE SMOKING MATERIALS (CIGARETTES, CIGARS, ETC.) WITH KRYTOX 240 AC GREASE. COMBUSTION PRODUCTS OF KRYTOX 240 AC GREASE COULD BE HARMFUL IF INHALED. AVOID SKIN CONTACT. WASH HANDS IMMEDIATELY AFTER CONTACT WITH KRYTOX 240 AC GREASE. THIS GREASE IS NO LONGER USED ON THE IGNITION CABLES.

NOTE: Compressed air shall be maintained at 30 psig maximum discharge pressure.

A. Remove dirt or foreign matter from area inside spring with compressed air.

WARNING: USE CLEANING SOLVENT IN WELL VENTILATED AREA. AVOID CONTACT WITH SKIN.

NOTE: Cleaning solvent shall be acetone.

B. Wipe ceramic insulator clean using clean lint free cloth moistened with cleaning solvent. Dry with compressed air.
C. Wipe conduit assembly with clean lint free cloth moistened with cleaning solvent. Dry with compressed air.

D. Clean high tension contact as required with clean lint free cloth moistened with cleaning solvent. Dry with compressed air.

4. Clean Ignition Exciter

NOTE: Compressed air shall be maintained at 30 psig maximum discharge pressure.

Dirt on contact surface will cause reduced output or arcing.

A. Remove dirt or foreign matter from inside contact well with compressed air.

WARNING: USE CLEANING SOLVENT IN WELL VENTILATED AREA; AVOID CONTACT WITH SKIN.

NOTE: Cleaning solvent shall be acetone.

B. Clean ignition exciter outlet contact well with long bristle, nonmetallic brush moistened with cleaning solvent. Dry with compressed air.
C. Clean inner ceramic walls using circular felt bob, 1/2 inch in diameter and approximately 1 3/4 inches long, suitable for use with hand chuck. Moisten with cleaning solvent and clean using circular movement of hand. Dry with compressed air.
D. Clean end surface of ceramic at seat of grommet face using short bristle nonmetallic brush moistened with cleaning solvent. Dry with compressed air.

IGNITION EXCITER - REMOVAL/INSTALLATION

1. Remove Ignition Exciter (Single Pack, 20-4 Joule) (Fig. 401)

   WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY TO PERSONNEL.

   A. Disconnect coupling nuts that secure ignition cables to output connectors on rear of exciter.
   B. Install protective caps on coupling nuts of cables and on mating threaded output connectors on exciter.
   C. Disconnect coupling nut which secures (input) airframe cable to input connector on front of exciter and install protective covers on nut and connector.
   D. Cut lockwire and remove four bolts and washers securing ignition exciters to front and rear supports.
   E. Spread front and rear supports and remove ignition exciter, input (front) end first.

2. Install Ignition Exciter (Single Pack, 20-4 Joule) (Fig. 401)
   A. Spread front and rear ignition exciter supports and insert ignition exciter between supports, output (rear) end first.

      CAUTION: USE OF BOLTS LONGER THAN THOSE SPECIFIED FOR IGNITION EXCITER MOUNTING WILL RESULT IN DAMAGE TO IGNITION EXCITER HOUSING, WITH SUBSEQUENT LOSS OF HERMETIC SEALING AND RISK OF ELECTRICAL GROUNDING.

   B. Secure ignition exciter to supports with four bolts and washers. Tighten bolts and lockwire.

      CAUTION: ENSURE THAT OUTPUT (HIGH TENSION) LEADS ARE CORRECTLY INSTALLED. INSUFFICIENT TORQUE ON LEAD NUTS AT EXCITER AND IGNITER ENDS CAN CAUSE IGNITION RADIATED NOISE WHICH CAN BE PICKED UP BY AIRPLANE RADIO EQUIPMENT.

   C. Remove the caps and connect the coupling nuts for the output cables to the connectors on the rear of the exciter. Tighten the nuts with your fingers, then tighten them a maximum of 45 degrees more.

D. Remove protective cap and secure exciter coupling nut on air frame input cable to threaded connector on front of exciter. Tighten to recommended torque and lockwire.
E. Perform ignition system (audible) check (AMM 74-00/501).

3. Remove Ignition Exciter (Dual Pack 20-4 Joule) (Fig. 402)

WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY PERSONNEL.

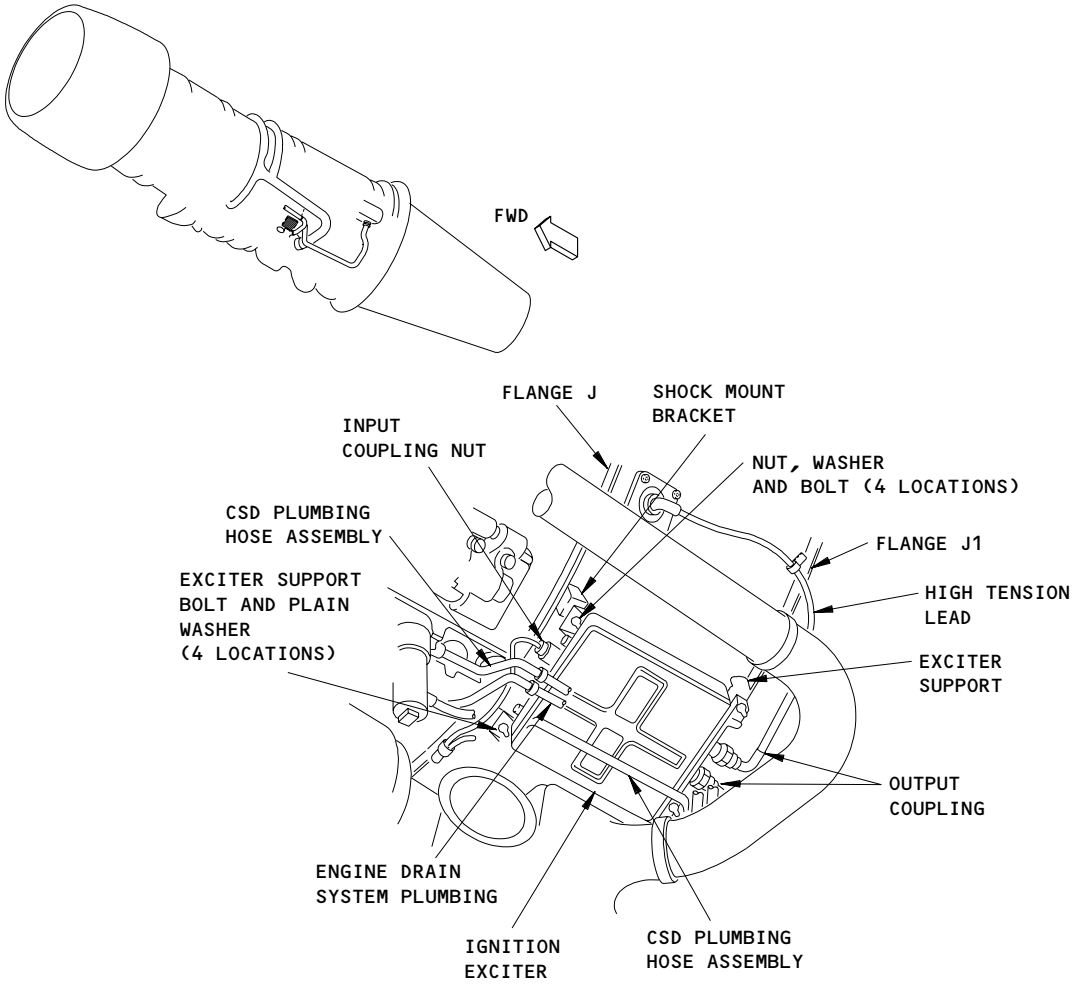
A. Disconnect coupling nuts that secure ignition cables to output connectors on rear of exciter.
B. Install protective caps on coupling nuts of cables and on mating threaded output connectors on exciter.
C. Disconnect coupling nuts on airframe cables from input connectors on front of exciter and install protective covers on nuts and on connectors.
D. Cut lockwire and remove four bolts and washers securing ignition exciters to front and rear supports.
E. Spread front and rear supports and remove ignition exciters, input (front) end first.
F. Remove bolts and locknuts securing exciters together.

4. Install Ignition Exciter (Dual Pack, 20-4 Joule) (Fig. 402)

A. Position exciters on bench with larger threaded (output) connectors at operator's right. Align four small holes in tabs at ends of both boxes and secure together with bolts and locknuts, boltheads against upper exciter (away from operator). Tighten bolts to recommended torque.
B. Spread front and rear ignition exciter supports and insert ignition exciters between supports, output (rear) end first.

CAUTION: USE OF BOLTS LONGER THAN THOSE SPECIFIED FOR IGNITION EXCITER MOUNTING WILL RESULT IN DAMAGE TO IGNITION EXCITER HOUSING, WITH SUBSEQUENT LOSS OF HERMETIC SEALING AND RISK OF ELECTRICAL GROUNDING.

C. Secure ignition exciters to supports with four bolts and washers. Tighten bolts and lockwire.



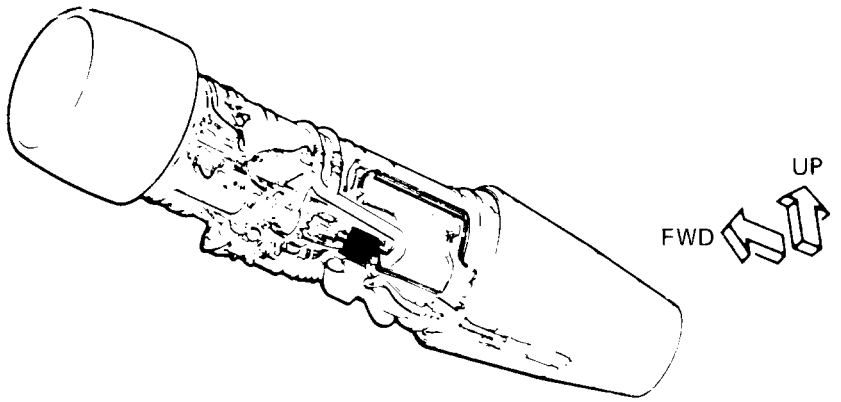
Ignition Exciter (Single Pack) Installation
Figure 401

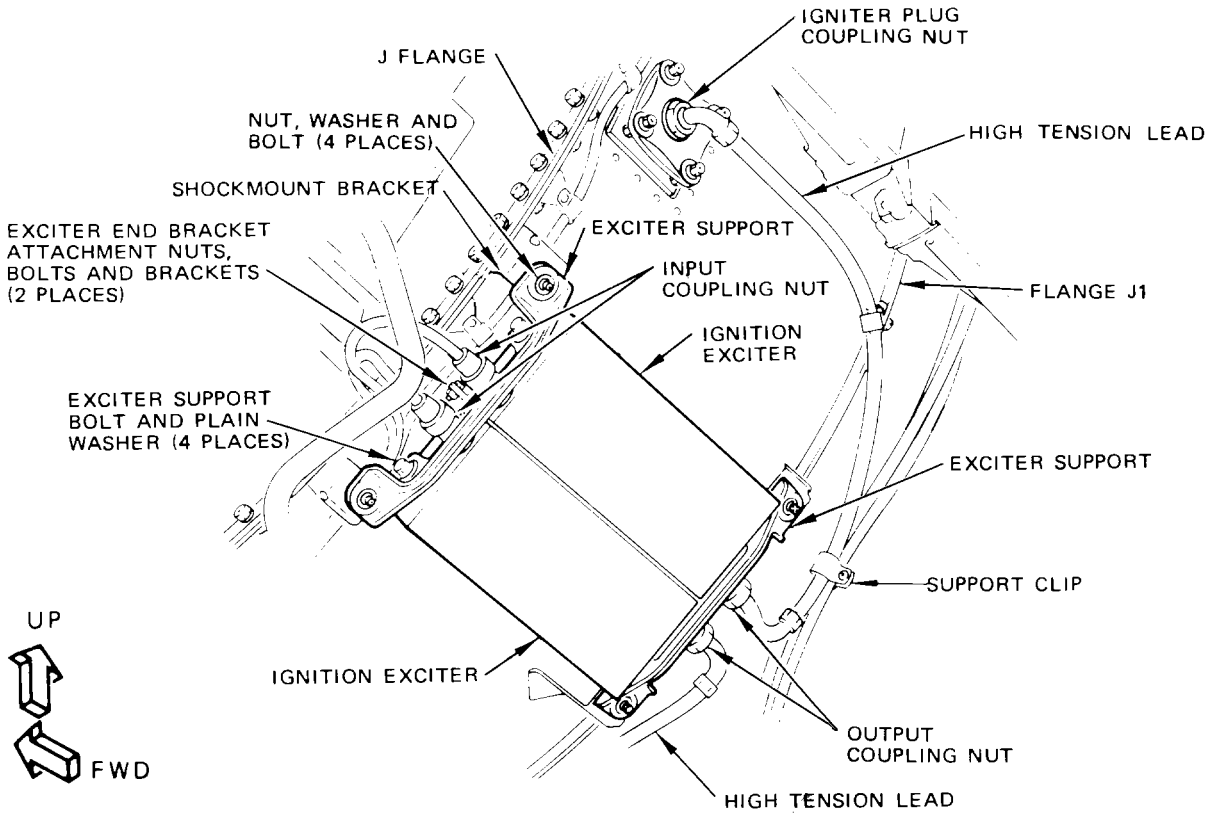
D. Bolt exciter to brackets using washers under boltheads and secure with self-locking nuts. Tighten bolts to recommended torque.

WARNING: IGNITION CABLE RUBBER BUSHINGS AND ADJACENT PARTS MAY CONTAIN RESIDUE OF KRYTOX 240 AC GREASE. DO NOT CONTAMINATE SMOKING MATERIALS (CIGARETTES, CIGARS, ETC.) WITH KRYTOX 240 AC GREASE. COMBUSTION PRODUCTS OF KRYTOX 240 AC GREASE COULD BE HARMFUL IF INHALED. AVOID SKIN CONTACT. WASH HANDS IMMEDIATELY AFTER CONTACT WITH KRYTOX 240 AC GREASE. THIS GREASE IS NO LONGER USED ON THE IGNITION CABLES.

CAUTION: ENSURE THAT OUTPUT (HIGH TENSION) LEADS ARE CORRECTLY INSTALLED. INSUFFICIENT TORQUE ON LEAD NUTS AT EXCITER AND IGNITER ENDS CAN CAUSE IGNITION RADIATED NOISE WHICH CAN BE PICKED UP BY AIRCRAFT RADIO EQUIPMENT.

E. Remove the caps and connect the coupling nuts for the output cables to the connectors on the rear of the exciter. Tighten the nuts with your fingers, then tighten them a maximum of 45 degrees more.
F. Remove protective caps and secure exciter coupling nuts on air frame input cables to threaded connectors on front of exciter. Tighten to recommended torque and lockwire.
G. Perform ignition system (audible) check (AMM 74-00/501).





Ignition Exciter (Dual Rack) Installation
Figure 402

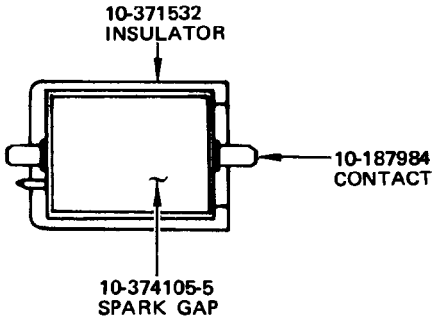
IGNITION EXCITER (20-4 JOULE) - APPROVED REPAIR

1. Approved Repair of Gap Assembly (Continuous Duty Exciter)
   A. General
      (1) There is a procedure for each of these exciters:
         (a) 10-353875-1 exciters
         (b) 10-353875-2 exciters
   B. 10-353875-1 Ignition Exciters
      (1) Do these steps:
         (a) Pull out (open) START IGNITION and LOW ENERGY IGNITION circuit breakers.

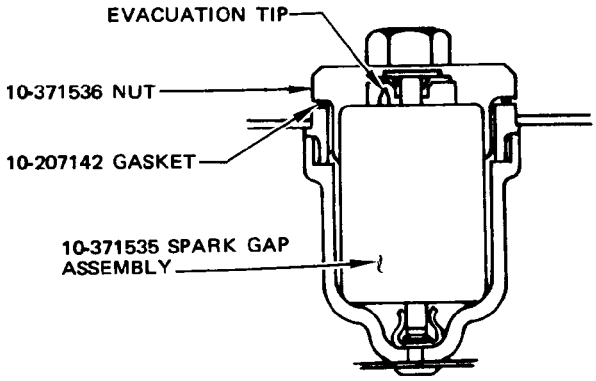
         WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY TO PERSONNEL.

         (b) Cut lockwire and remove nut, gasket and 10-371535 spark gap assembly from housing.
         (c) Remove 10-187984 contacts and 10-371532 insulator from old spark gap assembly.
         (d) Assemble 10-187984 contacts to each end of new 10-374105-5 spark gap and torque contacts to 4-6 pound-inches. Install insulator over gap as shown in Fig. 801.
         (e) Position evacuation tip end of the spark gap assembly into open end of 10-371536 nut. Press parts together to engage contact of gap with nut.
         (f) Position the 10-207142 gasket over threaded end of 10-371536 nut.
         (g) Screw assembled parts into gap well.
         (h) Torque nut to 96-120 pound-inches.
         (i) Lockwire nut to filter nut.

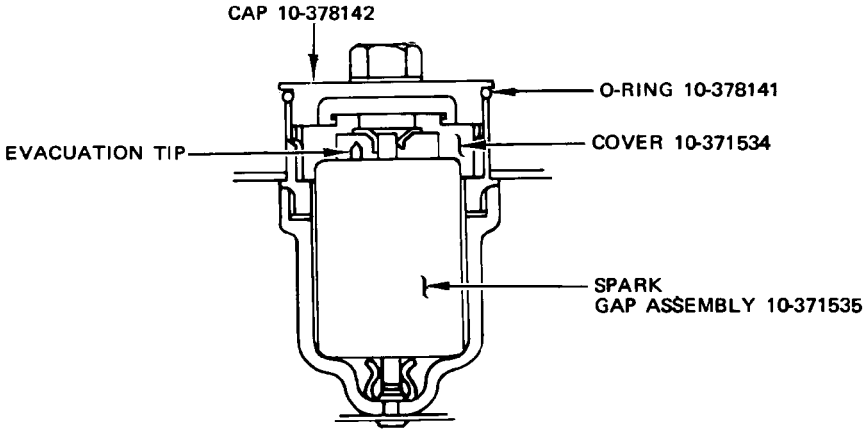
IGNITION EXCITER - APPROVED REPAIR



Ignition Exciter Spark Gap Assembly 10-371535



Ignition Exciter Spark Gap Assembly Installation
(10-353975-1 Ignition Exciters)



Ignition Exciter Spark Gap Assembly Installation
(10-353975-2 Ignition Exciters)

Ignition Exciter Spark Gap Assembly Installation
Figure 801

(j) Close the START IGNITION and LOW ENERGY IGNITION circuit breakers.

C. 10-353875-2 Ignition Exciters

(1) Do these steps:

(a) Pull out (open) START IGNITION and LOW ENERGY IGNITION circuit breakers.

WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY TO PERSONNEL.

(b) Cut lockwire and remove threaded cap with packing, 10-387969 shim ring (if installed), cover and 10-371535 spark gap assembly from housing.

(c) Remove 10-187984 contacts and 10-371532 insulator from old spark gap assembly.

(d) Assemble 10-187984 contacts to each end of 10-374105-5 spark gap. Torque contacts to 4-6 pound-inches. Install 10-371532 insulator over spark gap.

(e) Position 10-371534 cover over evacuation tip end of spark gap assembly. Press parts together to engage contact of gap with cover.

(f) Position assembled cover and gap assembly into well of exciter. Align slot on side of cover with locating pin in gap well and seat the assembly. Reinstall 10-387969 shim ring if removed in step (a).

(g) Screw threaded cap, previously removed from exciter, into gap well.

(h) Torque cap to 90-100 pound-inches.

(i) Lockwire cap to filter nut.

(j) Close the START IGNITION and LOW ENERGY IGNITION circuit breakers.

HIGH TENSION LEADS - REMOVAL/INSTALLATION

1. Equipment and Materials
   A. Lubricant, Molykote Type Z per MIL-M-7866
   B. Solvent - Acetone
   C. Bushing - Rubber, PN 10-319434, Bendix Corporation, Sidney, NY 13815 or Unison Industries, 7575 Baymeadows Way, P.O. Box 17880, Jacksonville, FL 32245
2. Remove High Tension Leads (Fig. 401)
   A. Pull out (open) START IGNITION and LOW ENERGY IGNITION circuit breakers.

   WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY TO PERSONNEL.

   B. Disconnect coupling nuts that secure ignition cables to output connectors on rear of exciter.

      WARNING: IGNITION CABLE RUBBER BUSHINGS (CHAMFER WASHERS) AND ADJACENT PARTS MAY CONTAIN RESIDUE OF KRYTOX 240 AC GREASE. DO NOT CONTAMINATE SMOKING MATERIALS (CIGARETTES, CIGARS, ETC.) WITH KRYTOX 240 AC GREASE. COMBUSTION PRODUCTS OF KRYTOX 240 AC GREASE COULD BE HARMFUL IF INHALED. AVOID SKIN CONTACT. WASH HANDS IMMEDIATELY AFTER CONTACT WITH KRYTOX 240 AC GREASE. THIS GREASE IS NO LONGER USED ON THE IGNITION CABLES.

   C. Disconnect coupling nuts that secure ignition cables to the left and right igniter plugs.
   D. Install protective caps on coupling nuts on both ends of cables, on mating threaded output connectors on exciter, and igniter plug openings in fan discharge duct caused by removal of the cables.
   E. Remove nuts and bolts securing single clip on left cable, and four clips on right, to brackets on flange J1 and remove cables and coupling nut assemblies.

      NOTE: Mark location of supporting clips to facilitate proper reinstallation.

3. Install High Tension Leads (Fig. 401 and 402)

CAUTION: CERAMIC INSULATOR MUST BE DRY. ENSURE THAT HIGH TENSION LEADS ARE CORRECTLY INSTALLED. INSUFFICIENT TORQUE ON LEAD NUTS AT IGNITION EXCITER AND IGNITER ENDS CAN CAUSE IGNITION RADIATED NOISE WHICH CAN BE PICKED UP BY AIRPLANE RADIO EQUIPMENT.

A. Remove protective caps from coupling nuts on left and right high tension leads.
B. Replace Bendix high tension lead rubber bushings (chamfer washers) as follows (Fig. 402):

NOTE: Bushing (chamfer washer) replacement procedure is not applicable for new cable assemblies. Perform inspection of cable during bushing (chamfer washer) replacement.

(1) Remove and discard rubber bushing (chamfer washer) at both ends of cable.

WARNING: DO NOT CONTAMINATE SMOKING MATERIALS (CIGARETTES, CIGARS, ETC.) WITH KRYTOX 240 AC GREASE. COMBUSTION PRODUCTS OF KRYTOX 240 AC GREASE COULD BE HARMFUL IF INHALED. AVOID SKIN CONTACT. WASH HANDS IMMEDIATELY AFTER APPLICATION OF KRYTOX 240 AC GREASE. THIS GREASE IS NO LONGER USED ON THE IGNITION CABLES.

(2) Clean new rubber bushing (chamfer washer) with clean lint-free cloth moistened with solvent.
(3) Slide new bushing (chamfer washer) in place on high tension insulator.

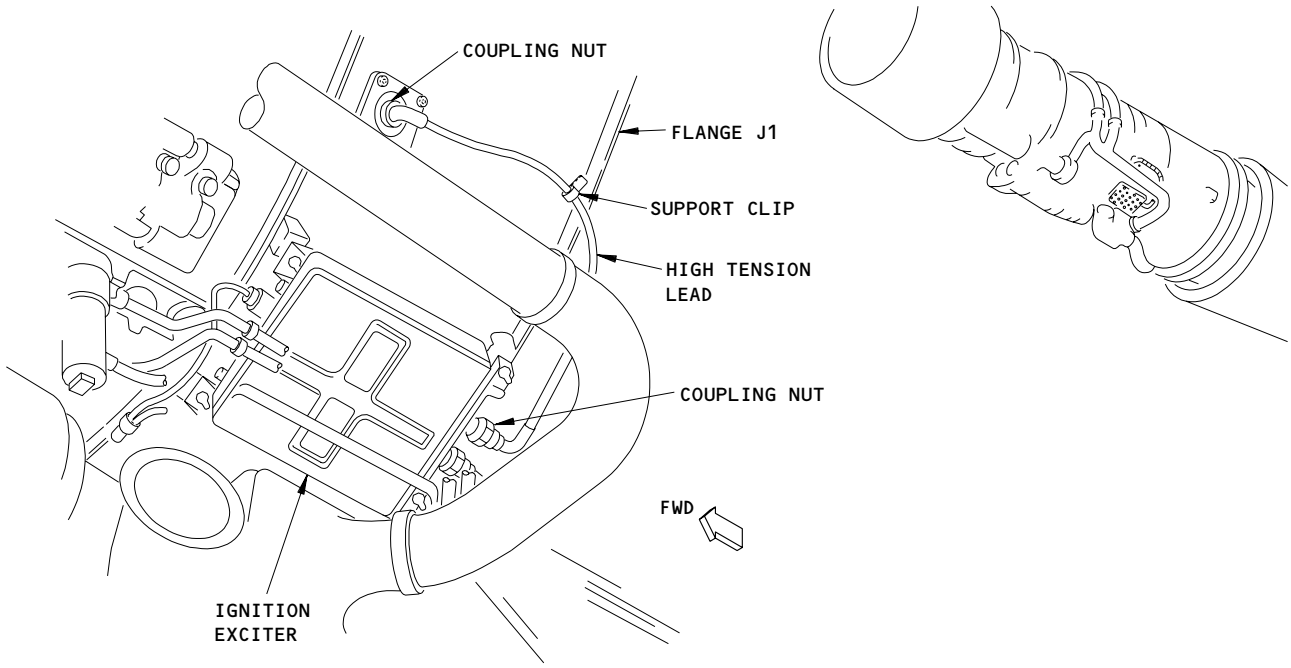
NOTE: No grease is allowed externally on insulator or other details of lead.

(4) Slide rubber bushing and existing high tension insulator on cable wire and secure in place with new retaining ring on high tension contact

CAUTION: DO NOT TWIST PLUG OF CABLE WHEN TURNING COUPLING NUT. DAMAGE TO CABLE COULD RESULT.

NOTE: No grease is allowed externally on insulator or other details of lead.

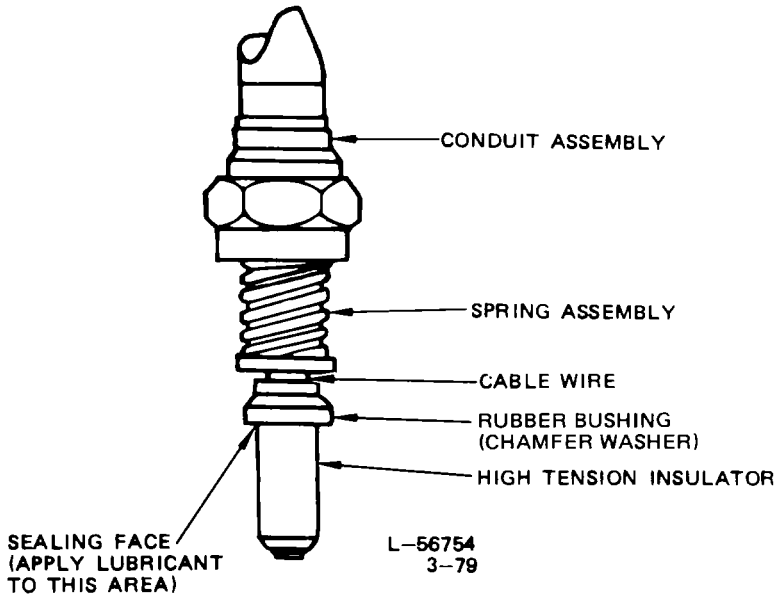
NOTE: Torque all plug-in type threaded connections fingertight plus 45 degree maximum turn.



BENDIX EXCITER (20-4 JOULE) INSTALLATION

High Tension Lead Installation
Figure 401

C. Insert new packing in groove in OD of igniter plug coupling nuts on left and right high tension leads.
D. Clean threads on ID of coupling nuts with petroleum solvent and apply Molykote, Type Z.
E. Carefully insert high tension leads into terminal well of igniter plugs, thread coupling nuts on plugs and tighten finger-tight plus 45-degree maximum turn.
F. Remove protective caps from exciter end of left and right high tension leads. Replace chamfered washer as described in step 3.B.
G. Secure exciter coupling nuts on left and right ignition high tension leads to two threaded connectors on rear of exciter(s). Tighten to recommended torque.
H. Secure single clip on left high tension lead, and four clips on right output cable to brackets on flange J1 with bolts and nuts. Tighten to recommended torque.
I. Remove protective cap on threaded input connector on front of exciter box. Secure airframe input cable to connector and tighten to recommended torque.
J. Perform ignition system (audible) check (Ref 74-00 A/T).



Bendix High Tension Lead Rubber Bushing Replacement
Figure 402

HIGH TENSION LEADS - ADJUSTMENT/TEST

1. General
   A. High tension leads adjustment/test consists of a cable and an insulation check.
      (1) When checking high tension leads cable for continuity, there must be continuity from terminal to terminal.
      (2) When checking high tension lead insulation, there must be no visual indication of insulation breakdown.
2. Equipment and Materials
   A. Multimeter (Ohmmeter) - Part No. AN/PSM6 (continuously)
3. Check High Tension Lead Cable

   WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY TO PERSONNEL.

   A. Disconnect high tension lead cable terminal ends.
   B. Check the high tension lead cable for continuity using an ohmmeter or other low voltage device. There must be continuity from terminal to terminal.
   C. Replace or connect (as applicable) high tension lead (AMM 74-21-11/401).
4. Check High Tension Lead Insulation
   A. Disconnect high tension lead cable terminal ends.
   B. Use an ohmmeter or other low voltage device between contact and conduit. No continuity shall be indicated.

      NOTE: Ohmmeter (low voltage continuity check) test will only identify major defects. If insulation breakdown under high voltage is suspected, return high tension leads to overhaul for further testing.

   C. Replace or connect (as applicable) high tension lead (Ref Removal/Installation).

IGNITER PLUGS - REMOVAL/INSTALLATION

1. General
   A. Two igniter plugs for each engine are mounted on the lower front of the combustion chamber outer case. One projects into the number four combustion chamber and the other projects into the number seven combustion chamber.
2. Equipment and Materials
   A. Igniter Plug Boss Tap - PWA 33647 (supersedes PWA 8597), Pratt and Whitney Aircraft, East Hartford, Connecticut.
   B. Combustion Chamber Igniter Plug Guide Aligning Tool - (local fabrication)
   C. Compound - Antiseize, EASE-OFF 990 or FEL-PRO C5-A
   D. Cleaning Solvent - BMS 3-2
   E. Lubricant - Molykote Type Z
   F. Compound - Antiseize, BG Mica Lube A-768
   G. Compound - Antiseize, Parker Treadlube, Fleet Supplies, Inc., Cleveland, Ohio
   H. Compound - Antiseize (PWA 36001), Silver Goop, Crawford Fitting Co., Solon, Ohio
3. Remove Igniter Plugs (Fig. 401)
   A. Pull out (open) START IGNITION and LOW ENERGY IGNITION circuit breakers.

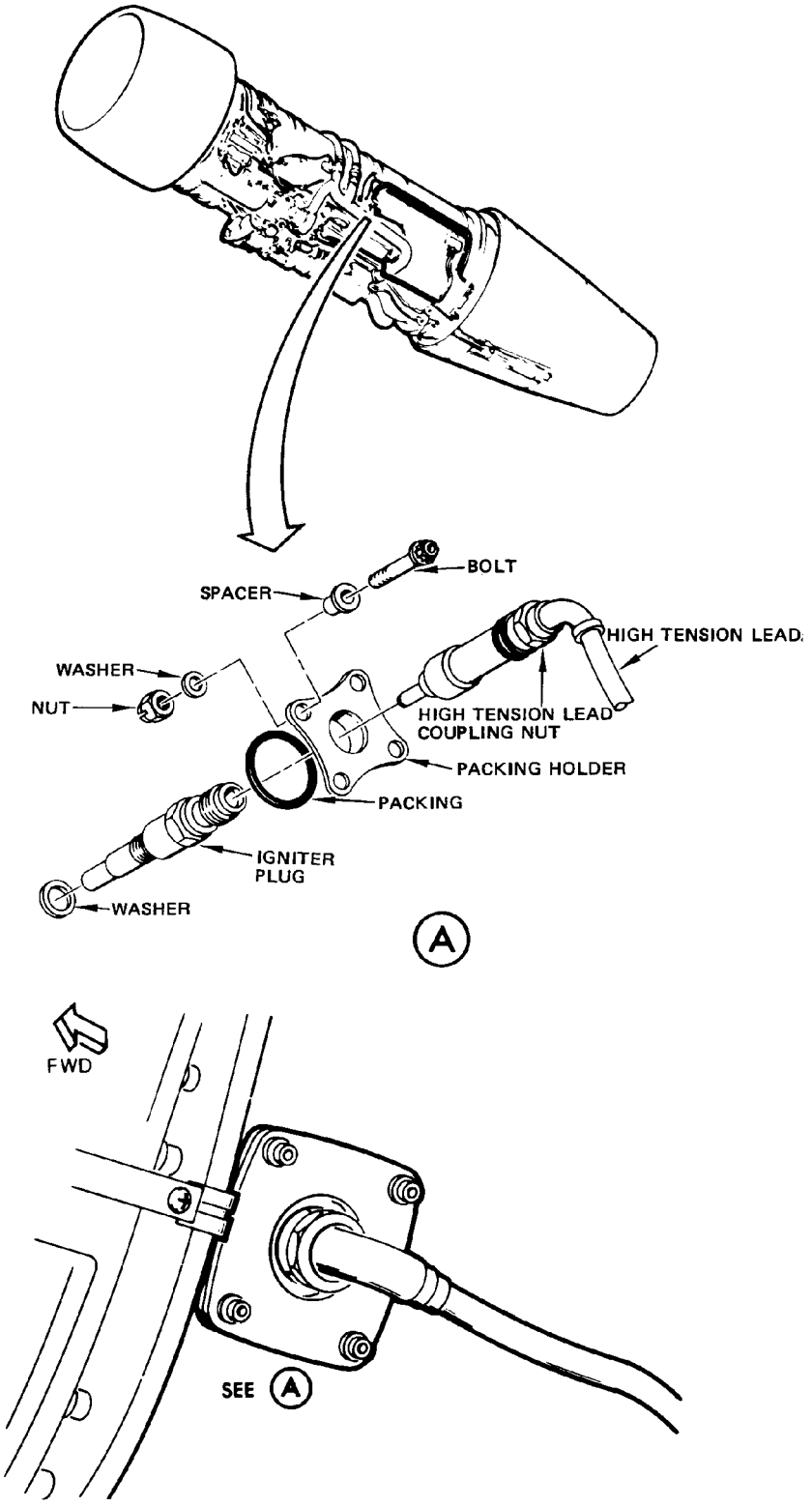
   WARNING: IGNITION SYSTEM VOLTAGE IS DANGEROUSLY HIGH. IGNITION SWITCH MUST BE IN "OFF" POSITION BEFORE REMOVAL OF ANY IGNITION COMPONENTS. ALLOW SEVERAL MINUTES TO ELAPSE BETWEEN OPERATION OF IGNITION SYSTEM AND REMOVAL OF IGNITION COMPONENTS. IMMEDIATELY UPON DETACHING IGNITER CABLE FROM IGNITER PLUG, DISCHARGE CURRENT BY GROUNDING IGNITER CABLE TERMINAL TO ENSURE COMPLETE DISSIPATION OF ENERGY FROM IGNITION SYSTEM. FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN SEVERE INJURY TO PERSONNEL.

   B. Disconnect coupling nuts that secure cables to left and right igniter plugs and install protective covers on coupling nuts.

      WARNING: FOR ADDITIONAL PROTECTION AGAINST ELECTRICAL HAZARD, AFTER DETACHING THE IGNITER PLUG COUPLING NUTS TOUCH THE CONNECTOR CONTACT TO THE IGNITER PLUG BODY SHIELD.

   C. Remove nuts, washers, bolts and spacer sleeves that secure packing holders to left and right igniter bosses on fan duct, and remove packing holders.

      CAUTION: IT WILL BE NECESSARY TO REPLACE THE IGNITER PLUG IF IT IS DROPPED.



Igniter Plug Removal/Installation
Figure 401 (Sheet 1)

D. Remove igniter plugs from combustion chamber outer case. If required for reference, identify location (left or right) from which the plugs were removed.

CAUTION: TO AVOID POSSIBILITY OF THE DISENGAGEMENT OF THE SOCKET FROM THE WRENCH EXTENSION DURING REMOVAL OF THE IGNITER PLUGS (WHICH COULD RESULT IN THE LOSS OF THE SOCKET BETWEEN THE FAN DUCT AND THE OUTER CASE) PERMANENTLY SECURE THE SOCKET TO THE EXTENSION BEFORE USING.

E. Individually wrap igniter plugs in wax paper and place in a suitable box.

4. Install Igniter Plugs

A. Check condition of igniter plug boss threads . Clean threads using Pratt and Whitney Aircraft P/N 33647 (formerly P/N 8597) tap if necessary.

B. Remove the protective covers from the igniter plugs. Clean the threads of the igniter plugs and combustion chamber case bosses with cleaning solvent. Apply a small quantity of antigalling or antiseize compound to the threads of the igniter plugs, case bosses and gasket faces.

CAUTION: DO NOT USE ANTISEIZE COMPOUND (SILVER GOOP) ON THE IGNITER OR BOSS THREADS IF A DIFFERENT COMPOUND WAS USED BEFORE. IF SILVER GOOP IS USED WHERE OTHER COMPOUNDS HAVE BEEN USED BEFORE, IT CAN BECOME HARD AFTER ENGINE OPERATION.

CAUTION: MAKE CERTAIN THAT SAME TYPE IGNITER PLUG IS INSTALLED AS WAS REMOVED. USE TWO GASKETS (PRATT AND WHITNEY AIRCRAFT, P/N 182888 OR 266315) WITH SHORT TYPE IGNITER PLUGS ONLY (REF P/N 464332). THE ABOVE LISTED IGNITER PLUGS MUST BE USED ONLY ON ENGINES INCORPORATING THE FOLLOWING CONFIGURATION OF PARTS.

COMBUSTION CHAMBER OUTER CASE P/N 490547.
ONE-PIECE DESIGN COMBUSTION CHAMBERS OF P/N 534XXX SERIES.

C. Before installing igniter plugs look through igniter plug bosses on combustion section fan duct at each igniter plug guide to be sure that guide is centrally located. If required, insert suitable tool through plug port and align guide to its approximate proper position.

NOTE: Locally fabricated tool may be used (Fig. 402).

D. Install new washer on each igniter plug and insert plugs through holes in fan duct igniter bosses and into mating threaded holes in combustion chamber outer case. Prevent excessive galling of igniter plug tip and lower shell by bottoming each plug by hand before torquing. This will ensure that igniter plug and burner can igniter plug swivel are properly aligned. See Fig. 401 for the necessary radial distance for a correctly installed igniter plug.

E. Tighten plugs to 300-360 pound-inches.

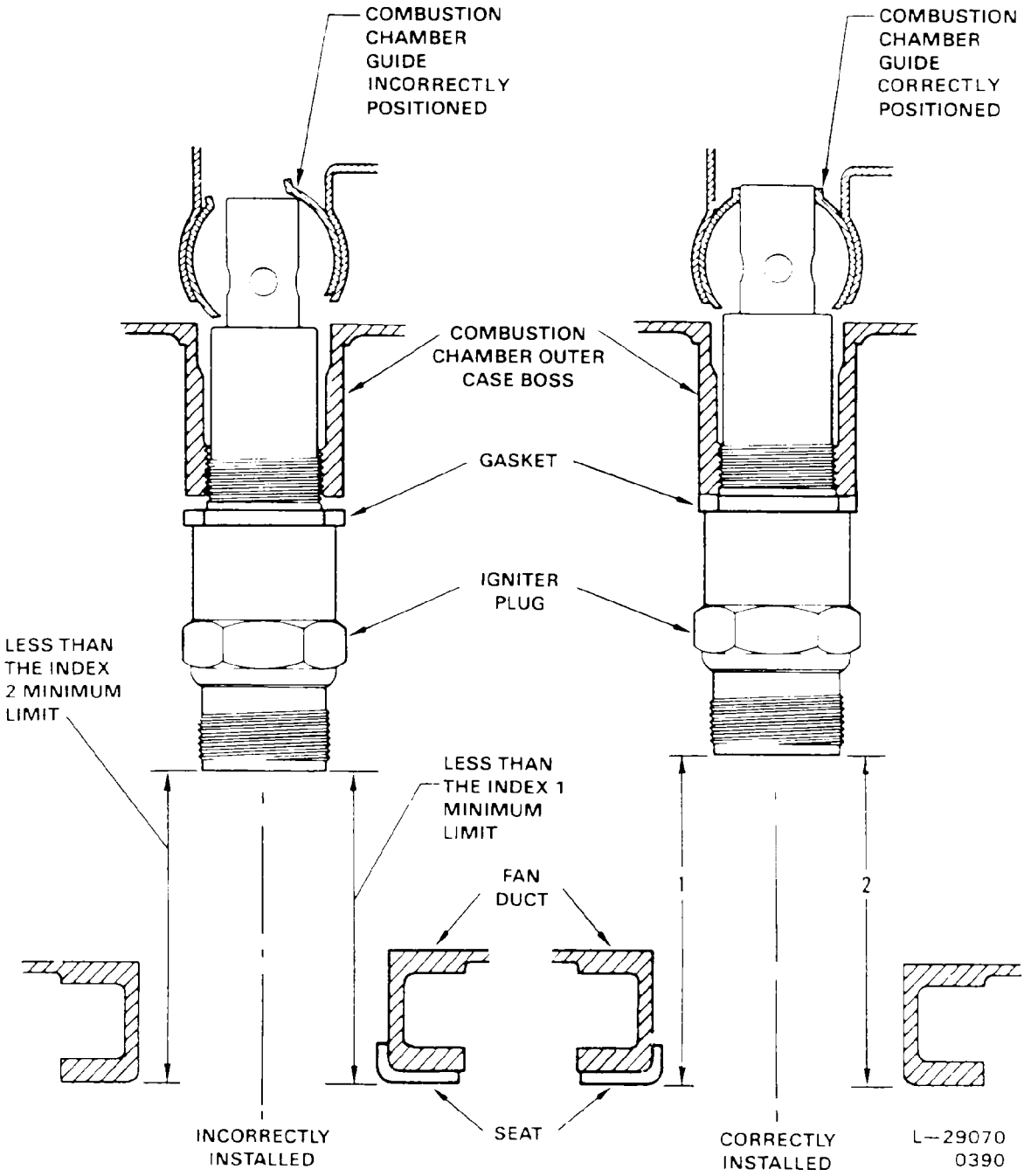
CAUTION: PERMANENTLY SECURE SOCKET TO EXTENSION BEFORE USING TO AVOID LOSS OF SOCKET BETWEEN FAN DUCT AND OUTER CASE.

F. Install a new packing on each holder and position holders on respective right and left fan duct igniter plug bosses. Position a spacer sleeve on each of four bolts. Insert these bolts through holes in holder and boss, position washers on bolts, and secure with self-locking nuts. Tighten bolts.

G. Remove protective caps and install a new packing in groove on OD of igniter plug coupling nuts on left and right output cable assemblies. Clean threads on ID of these nuts with a petroleum solvent and apply Molykote Type Z. Carefully insert lead into terminal well of igniter plug and thread coupling nut on plug. Tighten nut 140-160 pound-inches.

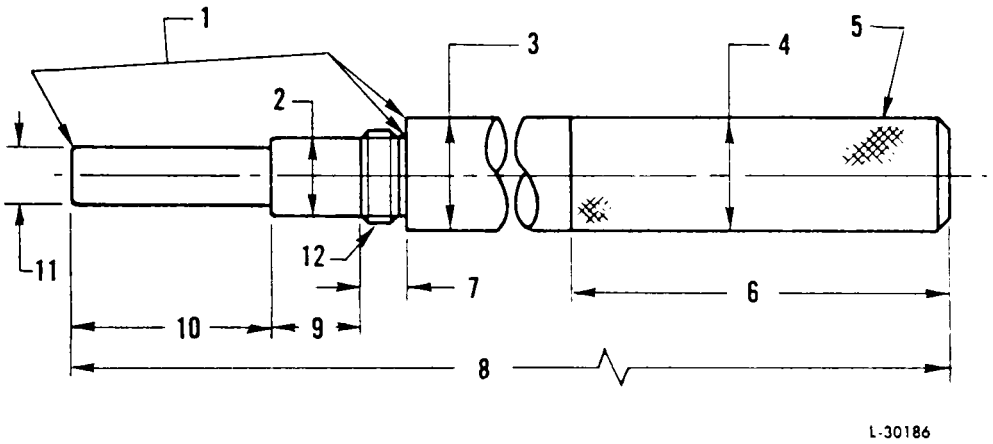
CAUTION: INSUFFICIENT TORQUE ON LEAD NUTS CAN CAUSE IGNITION RADIATED NOISE WHICH CAN BE PICKED UP BY AIRCRAFT RADIO EQUIPMENT.

H. Perform ignition system (audible) check (Ref 74-00 A/T).



1. 2.080 - 2.210 Inches (52.8 - 56.1 mm) For Correctly Installed Igniter Plug With Seat.
2. 2.025 - 2.145 Inches (51.4 - 54.5 mm) For Correctly Installed Igniter Plug Without Seat.

Igniter Plug Removal/Installation
Figure 401 (Sheet 2)

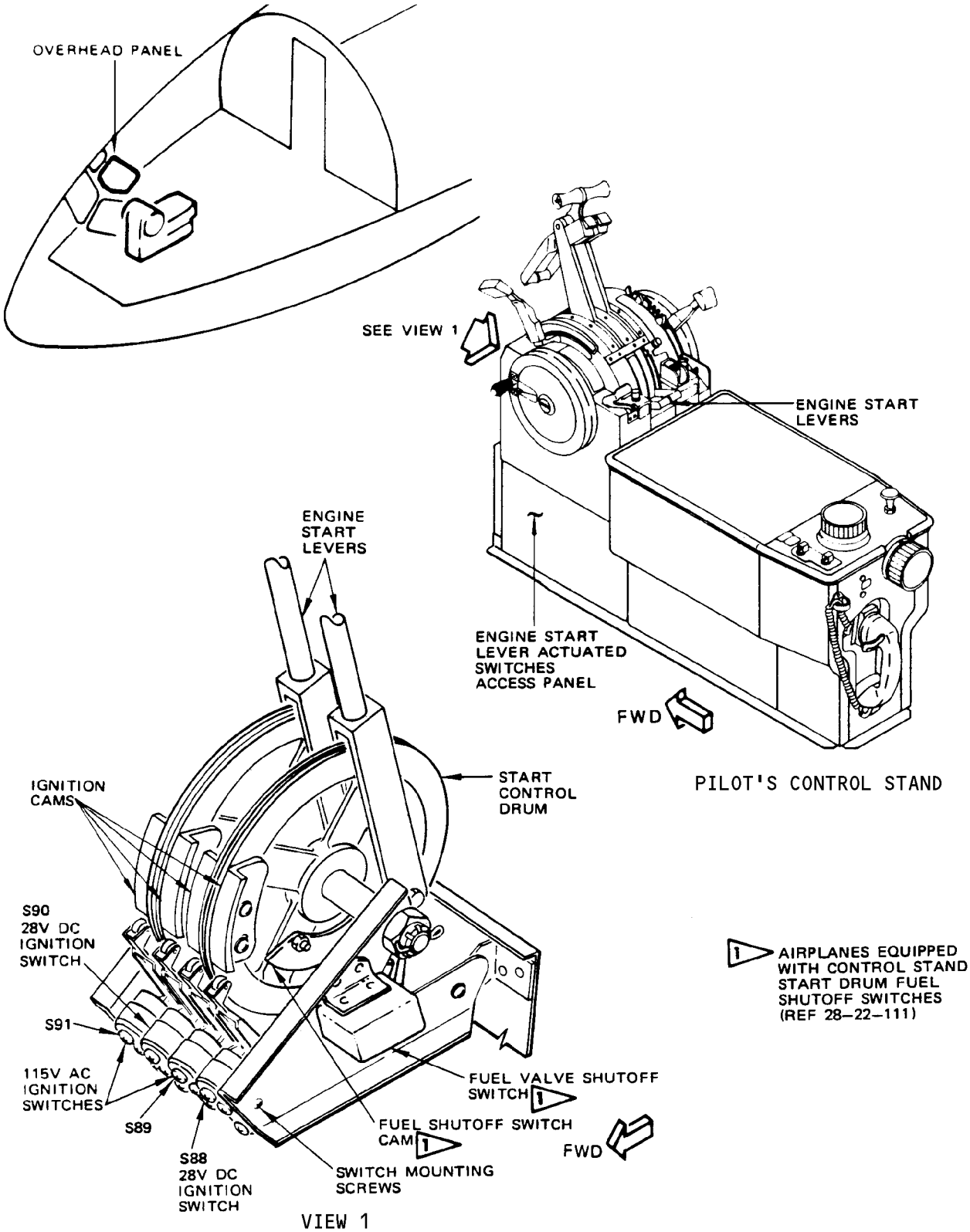


1. 1/32 Inch Radius
2. 0.808 - 0.820 Inch Diameter
3. 1.107 - 1.112 Inch Diameter
4. 1 1/8 Inch Diameter
5. Knurl
6. 3 3/4 - 4 1/4 Inches
7. 3/8 Inch
8. 13 3/8 Inches
9. 1.033 - 1.053 Inches
10. 1 7/8 - 2 Inches
11. 0.556 - 0.562 Inch Diameter
12. 0.9375 - 16NS; Pitch Diameter - 0.8903 - 0.8939 Inch
    Major Diameter - 0.9255 - 0.9345 Inch
    Minor Diameter - 0.8578 Inch Maximum

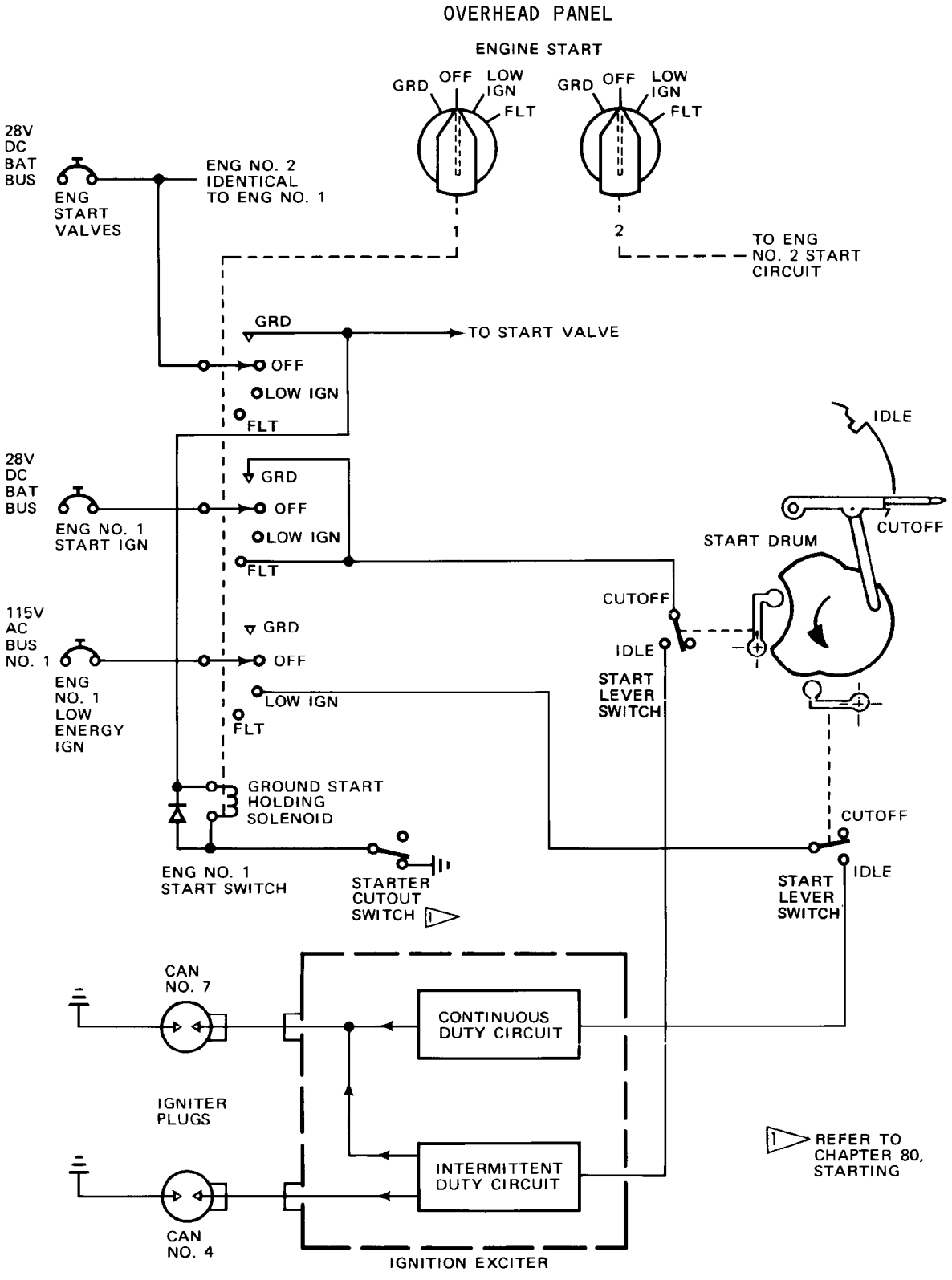
Combustion Chamber Igniter Plug
Figure 402

ENGINE IGNITION CONTROL - DESCRIPTION AND OPERATION

1. General
   A. The ignition system for each engine is energized through a start switch and start lever actuated switches. The start levers are located on the control stand (Fig. 1). The start lever actuated switches are below the control stand. The start switches are located on the forward overhead panel (Fig. 2). When the ignition system is energized the ignition exciter produces a high voltage pulsating current to the igniter plugs. The spark produced between the igniter plug electrodes vaporizes fuel droplets. The fuel-air mixture is brought to the proper temperature that is required for ignition.
   B. Ignition for each engine for a ground start is initiated by placing the start lever to the IDLE position and the start switch in the GRD position.
   C. Continuous ignition for each engine is accomplished by placing the start lever in the IDLE position and the start switch in the LOW IGN position.
   D. To initiate ignition for an inflight start of an engine which has been shut down, check that ignition circuit breakers are closed. The start lever is placed in IDLE detent and the start switch in FLT position.
2. Start Lever Actuated Switches
   A. There are two start lever actuated switches for each engine. The switches are mechanically actuated by the operation of the start levers. Two cams attached to a drum over which the start lever cable passes actuate the switches. As the cable is actuated by the start lever, the cam engages a follower on the switch actuating arm causing the switches to open or close.
   B. On airplanes equipped with control stand start drum fuel shutoff switches, one start lever actuated engine fuel shutoff valve switch is provided for each engine. A cam attached to the start drum engages the switch follower causing the switch to open or close (Fig. 1) (Ref 28-22-111).
3. Operation
   A. Ignition for a ground start of an engine is initiated by closing engine ignition circuit breaker on P6 circuit breaker panel, placing the engine start switch, located on the forward overhead panel, in the GRD position, and advancing the start lever, located on the pilots' control stand, to the IDLE detent. This procedure completes the circuit to the ignition exciter where the voltage is stepped up and directed to two igniter plugs, one each in combustion chambers number four and seven. (See figure 2.) When the starter cutout switch breaks the circuit through the starter relay the start switch will return to the OFF position.
   B. Continuous ignition for an engine is accomplished by placing the start lever in the IDLE detent and the start switch in the LOW IGN position. This configuration supplies low energy ignition and fires only the igniter plug located in combustion chamber number seven.



Ignition Control System Equipment Location
Figure 1



Engine Ignition Control System
Figure 2

C. Ignition for an inflight start of an engine that has been shut down is accomplished by first ascertaining that the ignition circuit breakers are closed. Then by placing the start lever in the IDLE detent and the start switch in FLT position, the circuit is completed to the ignition exciter where the voltage is stepped up and directed to two igniter plugs, one each in combustion chambers number four and seven. After the engine has started, the start switch can be moved to LOW IGN position to maintain continuous ignition.

START LEVER SWITCHES - REMOVAL/INSTALLATION

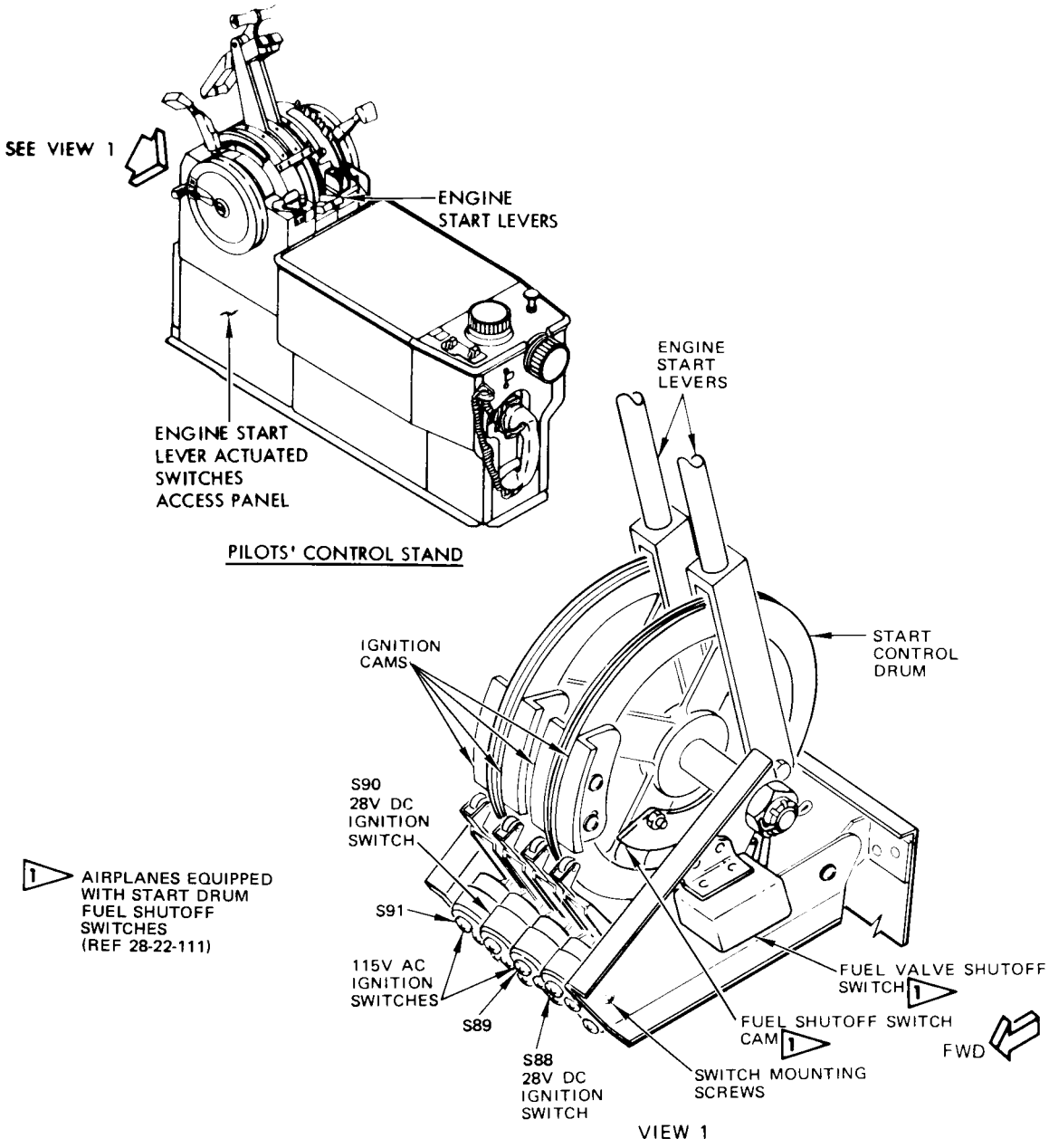
1. Prepare to Remove Start Lever Switches
   A. Open all START and LOW ENERGY ignition circuit breakers on the P6 circuit breaker panel.
   B. Remove lower forward panel (left side) from pilot's control stand. (See figure 401.)

      NOTE: The switches are mounted between two brackets in the pilot's control stand between the left and right lower forward panels. It may also be necessary to remove the right lower forward panel.

   C. Remove center brace located behind lower forward panel.
2. Remove Start Lever Switches
   A. Disconnect electrical leads from all switches. Identify leads to facilitate reassembly.
   B. Remove switch mounting screws and remove switches.
3. Install Start Lever Switches
   A. Position switches S88 and S89 (Fig. 401) in place inside left engine start switch bracket. Install one switch mounting screw into switches S88 and S89. Hold switch mounting screw in position.
   B. Install other switch mounting screw and secure screws.
   C. Connect electrical leads to all switches. Refer to Wiring Diagram Manual if necessary.

      NOTE: Switches S89 and S91 are 115-volt ac switches. Switches S88 and S90 are 28-volt dc switches.

4. Restore Airplane to Normal Configuration
   A. Install center brace in lower left forward part of pilot's control stand.
   B. Install lower forward panels on pilot's control stand.
   C. Close START and LOW ENERGY ignition circuit breakers on P6-2 circuit breaker panel.



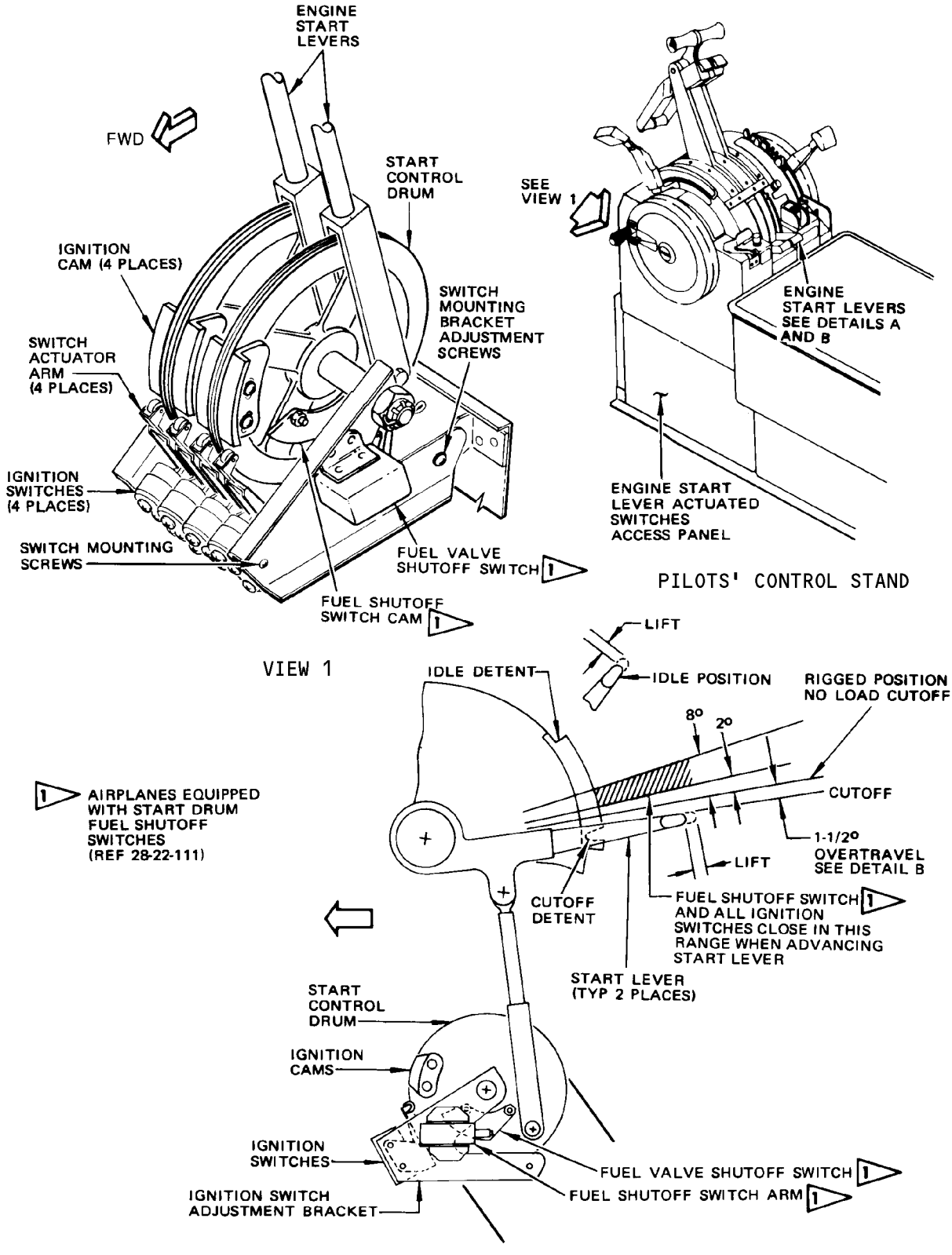
Start Lever Switches Installation
Figure 401

START LEVER SWITCH - ADJUSTMENT/TEST

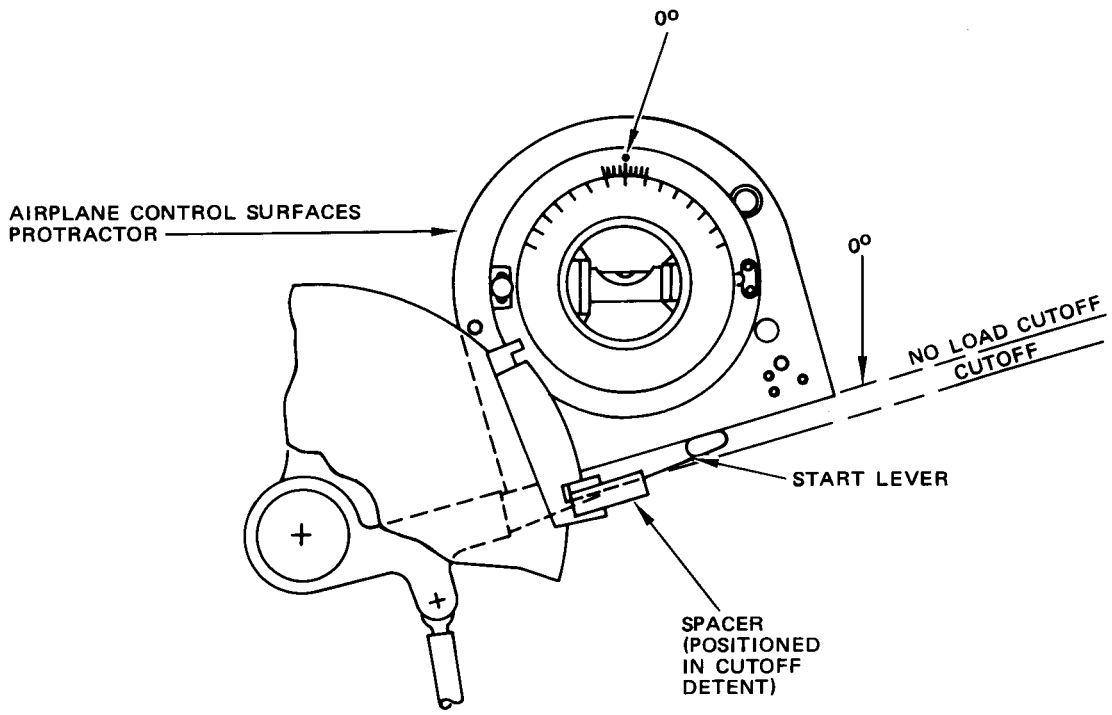
1. General
   A. The engine start levers must be properly rigged prior to switch adjustments to ensure synchronization of fuel and ignition system operations. Refer to Chapter 76 for engine start lever cable rigging procedures.
2. Equipment and Materials
   A. Ohmmeter or continuity tester
   B. Airplane Control Surfaces Protractor - F52485-500 or 4MIT65B80307-1
   C. Spacer - F80154-3 or equivalent, 0.16 ±0.01 inch thick
3. Prepare to Adjust Start Lever Switches (Fig. 501)
   A. Open START IGNITION and LOW ENERGY IGNITION circuit breakers for both engines on P6-2 circuit breaker panel.
   B. Check that start levers are in CUTOFF detent.
   C. Remove lower forward panels (both sides) from pilot's control stand.
4. Adjust Start Lever Switches (Fig. 501)

   NOTE: If slight adjustment is required, adjust cams on start drums and/or adjust the tabs on the actuator arms of the start lever switches.

   A. Loosen switch mounting bracket adjustment screws (both sides).
   B. Adjust switch mounting brackets so that all switches actuate when the start lever is positioned 2 to 8 degrees forward from the rigged cutoff (no load) position as determined by using spacer. The switches shall remain actuated when the start lever is moved to the IDLE detent. The switches shall be deactuated when the start lever is in the CUTOFF detent.
   C. Tighten switch mounting bracket adjustment screws (both sides).
   D. Test continuity of switches using an ohmmeter or continuity tester. There shall be continuity at the actuated position and no continuity at the deactuated position of the switches.
5. Restore Airplane to Normal Configuration
   A. Install lower forward panels on pilot's control stand.
   B. Position start lever in CUTOFF detent.
   C. Close START IGNITION and LOW ENERGY IGNITION circuit breakers for both engines on P6-2 circuit breaker panel.



Engine Start Lever Switch Adjustment
Figure 501 (Sheet 1)



DETAIL B

Engine Start Lever Switch Adjustment
Figure 501 (Sheet 2)

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