

TIME LIMITS/MAINTENANCE CHECKS - GENERAL

1. Airworthiness Limitations Statement

There are no additional Airworthiness Limitations as defined in 14CFR 23, Appendix G, G23.4 for the Bonanza airplanes. The Airworthiness Limitations section is FAA approved and specifies maintenance required under Section 43.16 and Section 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA Approved.

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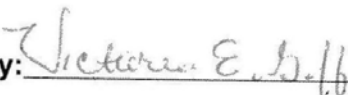
FAA Approved by: 
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DOA-230339-CE

Figure 1

TIME LIMITS - INSPECTION/CHECK**1. Overhaul and Replacement Schedule - Inspection/Check**

The first overhaul or replacement must be performed not later than the recommended period. The condition of the item at the end of the first period can be used as a criterion for determining subsequent periods applicable to the individual airplane or fleet operation, provided the operator has an approved monitoring system.

The time periods for inspections noted in this manual are based on average usage and average environmental conditions.

A new requirement added to the Overhaul and Replacement Schedule need not be complied with until one year from the date the new requirement was published, unless otherwise stated.

NOTE: The recommended periods do not constitute a guarantee the item will reach the period without malfunction as the aforementioned factors cannot be controlled by the manufacturer.

A. Special Conditions Cautionary Notice

WARNING: Prior to performing maintenance on an engine or the airframe, always pull the starter control circuit breakers and the landing gear circuit breaker. This will remove power to the starter control as well as the igniter power relay and landing gear control relay.

Airplanes operated for Air Taxi, or other than normal operation, and airplanes operated in humid tropics, or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas, periodic inspections should be performed until the operator can set his own inspection periods based on experience.

NOTE: The date noted on the STANDARD AIRWORTHINESS CERTIFICATE, FAA Form No. 8100-2, which is issued with each new airplane, is to be used as the basis for all TBO or replacement components listed in the following schedule.

An engine cycle is defined as the period of time from the initial start to shutdown of the engine. This encompasses start-up, increase to full or partial power (as required during a flight regime) and back to complete engine shutdown. Normal operation results in the number of landings being equivalent to engine cycles.

Table 1. Overhaul and Replacement Schedule

Item	Overhaul or Replace
NOTE: All items not listed are to be overhauled or replaced on condition. On condition items are to be overhauled or replaced if inspection reveals a potentially unsafe or unserviceable condition, if they are worn, inoperative, inaccurate, intermittent and not repairable through normal maintenance. Primarily items that are calendar, cycle or hour limited are included in the following list.	
LANDING GEAR	
Main Gear Assembly	On condition. (Leaking or collapsed struts that cannot be corrected by seal replacement will constitute the on condition requirement. Any pitting, corrosion, cracking, distortion or visible wear noted during the seal replacement will also constitute the requirement for an overhaul).
Nose Gear Assembly	On condition. (Leaking or collapsed struts that cannot be corrected by seal replacement will constitute the on condition requirement. Any pitting, corrosion, cracking, distortion or visible wear noted during the seal replacement will also constitute the requirement for an overhaul).
Nose Gear Retract Rod-Ends (All)	2,000 hours.
Actuator	4,000 hours.
Retract Motor	2,000 hours.
Retract Motor Brushes	500 hours or On Condition.
Shimmy Damper	On condition.
Wheels and Tires	On condition.
Brake Assembly	On condition.

Brake Lining	On condition.
Master Cylinder	On condition.
Shuttle Valve Assembly	On condition.
Parking Brake Valve	On condition.
All Hoses	On condition.
POWER PLANT	
NOTE: A TBO (time between overhaul) recommendation is in no way to be construed as a warranty or engine life proration basis. The TBO recommendation is based on the projected time for most advantageous initial overhaul. The individual operator's experience may indicate a departure in either direction from the recommended TBO for the particular operation.	
Cabin Heater Muff	On condition.
Engine	Refer to Teledyne Continental Service Information Letter SIL 98-9A, Rev A or subsequent, for detailed overhaul period instructions.
Engine Controls	On condition.
Engine Vibration Isolator Mounts	Engine overhaul or On Condition.
Exhaust System	On condition.
Starter	Inspect at engine overhaul, overhaul or replace On Condition.
Standby Generator	1,500 hours.
Standby Generator Brushes	500 hours.
Alternator / Standby Alternator	At engine overhaul or On condition, but not to exceed 1,800 hours.
Oil Cooler	On condition, replace if contaminated.
Propeller (McCauley)	Refer to McCauley Service Bulletin 137B or subsequent.
Propeller (Hartzell)	Refer to the latest revision of Hartzell Service Letter 61 for TBO.
Propeller Controls	On condition.
Propeller Governor (McCauley)	At engine overhaul or On condition but not to exceed 1,800 hours.
Propeller Governor (Woodward)	At engine overhaul or On condition. Refer to the latest revision of Woodward Service Bulletin 33580 or subsequent.
Air Pressure Pump	Airborne Pumps - Refer to Airborne Replacement Schedule SI 300-17 or subsequent. See Supplier Data CAUTION at the end of this Chapter.*Aero Accessories Pump, Part Number AA442CW, Replace at 500 hours time-of-operation.Aero Accessories Pumps, Part Number AA216CW or AA3216CW, - Replace at 1,200 hours time-of-operation.
POWER PLANT (Continued)	
Standby Air Pressure Pump	Airborne Pumps - Refer to Airborne Replacement Schedule SI 300-17 or subsequent except hours are to be pump operation time. See Supplier Data CAUTION at the end of this Chapter.*Aero Accessories Pumps, Part Number AA216CW or AA3216CW, - Replace at 1,200 hours time-of-operation.

All Hoses	Hoses carrying flammable liquids at engine overhaul or every 5 years, whichever occurs first since the last replacement or delivery date of the airplane from the factory; all other hoses On Condition.
Induction Air Filter	Replace air filter after 3 years, five cleanings or 500 flight hours; whichever occurs first. New filter must be FAA approved for airplane installation (Refer to . AD 84-26-02, Amendment 39-4966).
Engine Baffle Seals	Replace as necessary or every 10 years of service.
Magneto (Bendix & Teledyne Continental Motors (TCM)	Engine overhaul or every four years, whichever comes first. Refer to TCM Service Bulletin 643.
Slick Magnetos (Unison Industries)	Refer to Slick Aircraft Products Maintenance Manual (P/N L-1363) and Slick Service Bulletin SB2-80C.
Turbocharger	Overhaul or replace as required in conjunction with the Engine requirements list above.
FLAPS AND FLIGHT CONTROLS	
Aileron Trim and Linkage	On condition.
Flight Controls	On condition.
Elevator Tab Actuator	On condition.
Flap Motor and Gearbox	Replace On Condition.
Flap Actuators	2,000 hours.
Flap Flexible Shaft	2,000 hours.
FUEL SYSTEM	
Fuel Cells	On condition.
Wing Fuel Quantity Transmitters	On condition.
Fuel Cell Drain Valve	On condition.
Fuel System Check Valves	On condition.
Fuel Selector Valve	Replace every 10 years.
FUEL SYSTEM (Continued)	
Fuel Boost Pump	Overhaul every 10 years.
All Hoses	Hoses carrying flammable liquids at engine overhaul or every 5 years, whichever occurs first since the last replacement or delivery of the airplane from the factory; all other hoses On Condition.
Fuel Cell Reservoir Kit (If installed)	Replace foam insert every 10 years.
Fuel Cell Flapper Valve	Perform the FUEL CELL FLAPPER VALVE INSPECTION procedure every 36 months (Refer to Chapter 28-10-00).
INSTRUMENTS	
Turn Coordinator	On condition.
Altimeter	Every 24 months per FAA directive (inspect and calibrate).
Directional Gyro	On condition.

Gyro Horizon	On condition.
Gyro Pressure Gage	On condition.
Engine Gage Units	On condition.
Airspeed Indicator	On condition.
Rate-Of-Climb	On condition.
Fuel Flow/Manifold Pressure Indicator	On condition.
Tachometer	On condition.
Clock	On condition.
Flap Position Indicator	On condition.
Free Air Temperature Indicator	On condition.
Pressure System Filter (In-line and Intake)	Refer to Parker-Hannifin Airborne Service Letter 59 or subsequent. See Supplier Data CAUTION at the end of this Chapter.*
Standby Pressure System Filters (In-line and Intake)	Refer to Parker-Hannifin Airborne Service Letter 59 or subsequent except hours are to be pump operation time. See Supplier Data CAUTION at the end of this Chapter.*
Air Pressure Regulator Valve	On condition.
All Hoses	On condition.
Standby Air Pressure System Check Valve	Replace every 10 years.
ELECTRICAL SYSTEM	
Battery Master Relay	On condition.
All Other Relays	On condition.
Voltage Regulator	On condition.
Starter Relay	On condition.
Battery (Emergency Locator Transmitter)	Replace at 50% of useful life (as stated on the battery) or any time transmitter is used more than one cumulative hour.
Switches P/N 35-380132-103 and 35-380132-105	Replace every 6,000 cycles. For airplanes over 6,000 cycles, replace within 15 months of the release date of this revision.
NOTE: Approximately one cycle per airplane per flight hour in normal operation. For airplanes operated for training or other than normal operations, increase the cycle count to 2 cycles per hour.	
MISCELLANEOUS	
Hand Fire Extinguisher	Inspect every 12 months, recharge as necessary.
Cabin Heating and Ventilating Ducts	Inspect every 12 months or On Condition.
Oxygen Regulator	On condition.
Air Conditioner Filter	On condition.
Air Conditioner Compressor	On condition.
Seat Belts or Shoulder Harnesses	Inspect every 12 months or On Condition.
Oxygen Cylinder (Lightweight 3HT Type)	Hydrostatically test every 3 years. Replace every 24 years or 4,380 refills (ICC regulation), whichever occurs first.
Oxygen Cylinder (Standard Weight 3AA Type)	Hydrostatically test every 5 years.

WINGS	
Wing-Attach Bolts	Replace 10 years after initial inspection or On Condition. Refer to Chapter 57.
CAUTION: After removing wing attach nuts for any reason, always install new wing attach nuts. Do not reuse existing nuts. CAUTION: *Supplier Data on this item may change without notice. Users of this manual should Refer to the Parker Hannifin website (www.parker.com/airborne) for the latest information.	

SCHEDULED MAINTENANCE CHECKS - INSPECTION/CHECK

1. Scheduled Maintenance Checks - Inspection/Check

A. Electric Propeller Deicer (50 Hour Guide)

The various components of the propeller deicer system should be inspected every 50 hours for the appearance of defects. The following inspections may provide means for detecting and correcting such defects before they render the deicer system inoperative:

- (1) Lock the brakes and operate the engine at near takeoff power. Turn the deicer systems switch ON and observe the ammeter for at least 3 minutes. If the ammeter needle does not indicate amperage (Refer to [Chapter 30-60-00, ELECTRIC PROPELLER DEICING](#), for proper amperage) for 90 seconds at 90 second intervals, refer to the troubleshooting table for the probable sources of trouble.

WARNING: Before moving propeller, make sure that ignition switch is OFF and that engine has cooled completely. There is always some danger of a cylinder firing when propeller is moved.

CAUTION: While following the instructions of Step (2), move the propeller back and forth to prevent arcing between the brushes and slip ring.

- (2) With the engine shut off, turn the deicer switch ON and feel the deicer boots on the propeller for the proper sequence of heater operation. The presence of local hot spots indicates service damage to the deicer heaters, which should be repaired before more serious damage develops.
- (3) Remove the spinner and open all access doors pertaining to the wiring and components of the deicer system. Turn the deicer switch ON and station an assistant in the cockpit to observe the system ammeter. Flex all accessible wiring, particularly the lead straps, leads from the slip ring assembly, and the firewall electrical connectors and their wiring. Any movement of the ammeter, other than the cycling flicker that occurs at 90 second intervals, indicates a short or open circuit that must be located and corrected.
- (4) To extend the life of the lead strap between the hub clamp and clip, reposition the bend in the strap at a point at least 1/2 inch from the existing location of the bend.
- (5) Check for damaged brush rods or springs and for worn or damaged brushes.

B. Electric Propeller Deicer (100 Hour Guide)

- (1) Check for radio noise or radio compass interference by operating the engine at near takeoff power with the radio gear turned on. If, under these conditions, noise or interference occurs when the deicer switch is ON and disappears when the switch is OFF, refer to the troubleshooting table for the probable source of trouble.

WARNING: Before moving propeller, make sure that ignition switch is OFF and that engine has cooled completely. There is always some danger of a cylinder firing when a propeller is moved.

- (2) Check all clamps, clips, mountings, electrical connections and connectors for tightness and electrical soundness. Check also for loose, broken or missing lockwire.
- (3) Closely check the deicer boots for wrinkles, loose or torn areas, particularly around the outboard end and at the point where the strap passes under the hub clamp. Look for abrasion or cuts along the leading edge of the flat or thrust face. If the heater wires are exposed in damaged areas or if the rubber is found to be tacky, swollen or deteriorated (as from contact with oil or solvent fluids), replace the damaged deicer boot.
- (4) Check that the hub clamps are tight. Inspect for cracks or other damage. Check to see that the cushioning material is not missing or damaged in the area under the hub clamp or on the edge of the spinner dome. Manually operate the propeller from "high pitch" to "low pitch" while checking that the deicer lead straps do not come under tension.
- (5) Check the slip rings for gouges, roughened surfaces, cracks, burned or discolored areas, and for deposits of oil, grease or dirt. Clean greasy or contaminated slip rings with solvent ([23, Table 1, 91-00-00](#)). After such a cleaning, allow a run-in time of 5 hours of engine operation before turning on the deicer system.
- (6) If uneven wear or wobble is detected, check the alignment of the slip rings to the prop shaft with a dial indicator. While turning the prop to check the slip ring alignment, push in on the prop to eliminate play in the propeller thrust bearing. If the run out over 360° of rotation is over 0.005 inch or if over any 4-inch arc it exceeds 0.002 inch, refer to the paragraph on SLIP RING ALIGNMENT in [Chapter 30-60-00](#).
- (7) Examine the brush mounting bracket and housing for cracks, deformation, or other indications of damage. Make sure that connections are tight and that the leads are not chafed or binding.
- (8) Check to see that each brush rides fully on its slip ring over 360° of rotation. If the brush is not properly aligned, add shims

under the brush block or elongate the holes in the mounting bracket to raise or lower the brush block to the proper position. If the brushes ride BOTH high and low with respect to the slip rings in 360° of rotation, the slip ring assembly is eccentrically mounted and the spinner bulkhead must be replaced. For the correct angular location of the brushes to the slip ring, refer to the illustrations in [Chapter 30-60-00](#).

- (9) Check for proper spacing between the brush block and slip rings as indicated in [Chapter 30-60-00](#), DEICER BRUSH REPLACEMENT. If this distance is not within the specified limits, loosen the mounting screws and reposition them in the elongated holes until the block is properly positioned. If necessary, add shims between the thrust bearing plate and mounting bracket until the brush block is properly located.
- (10) Estimate the contact angle of the brush block in relation to the slip rings. If this angle is not approximately 2°, as indicated in [Chapter 30-60-00](#), DEICER BRUSH REPLACEMENT, loosen the mounting screws and reposition the brush block until the proper angle exists between the brush block and slip rings. The spacing established in [Chapter 30-60-00](#), [Figure 203](#) must also be maintained after the proper contact angle is established.

CAUTION: While following the instructions of Step (11), move the propeller back and forth to prevent arcing between the brushes and slip ring.

- (11) With the deicer system operating and a man in the cockpit observing the ammeter, visually inspect and physically flex the wiring from the brush blocks to each component of the deicer system and to the airplane power supply. Movement of the ammeter needle (other than the cycling that occurs when the timer switches at 90-second intervals) indicate loose or broken wiring in the area under examination at the moment. In such instances, continue to flex the wiring in the area that first indicated trouble while checking the continuity through the individual wires of the affected harness until the source of trouble is located. Use the wiring diagram to trace the circuitry of the deicer system.

C. Turbocharger (EA-11 and After)

- (1) 25 Hours
 - (a) Visually inspect oil leaks, exhaust system leaks and general condition.
- (2) 50 Hours
 - (a) Visually inspect oil leaks, exhaust system leaks and general condition.
- (3) 100 Hours

Inspect turbocharger system per the following method:

NOTE: On airplane serials EA-11 thru EA-241 without Kit No. 36-9006-1 installed there is a control system sump tank in the turbocharger oil system. On airplane serials EA-11 thru EA-241 with Kit No. 36-9006-1, and EA-242 and After, this sump tank has been removed (Refer to [Chapter 81-00-00](#)).

- (a) Remove compressor inlet duct assembly. Inspect the compressor wheel for nicks, cracks or broken blades. Turn wheel by hand and feel for excess bearing drag or wheel rubbing against housing. Reinstall air inlet duct.
- (b) Check the oil inlet and outlet ports in center housing for leaks, and the turbine heat blanket for condition and security.
- (c) Check for any interference with linkage between the bypass valve (wastegate) and actuator, its general condition and security.
- (d) Inspect all exhaust system components for worn or damaged areas, loose clamps, cracks and leaks.
- (e) Inspect lubrication system components for worn or damaged areas, loose clamps and leaks. Special attention should be given to the ducts downstream (pressure side) of the compressor.
- (f) Inspect the fuel injection nozzle pressure reference manifold, for deteriorated hose, loose connections, leaks or obstructions.
- (g) All fluid power lines should be checked for leaks and security.
- (h) The compressor discharge reference line from the throttle air valve to the controller should be opened and inspected for oil leakage from the controller. Any leakage is cause for replacement of the controller.

D. E33C, F33C Spin inspection (Acrobatic Category)

This inspection is required on all E33C and F33C (CJ-1 and After) airplanes which are being acrobatically spun (even if the spin time is only a small part of total time). This inspection is NOT required if an airplane is performing acrobatic maneuvers other than spins (no spins at all). The regular 100-Hour Inspection (P/N 98-32227G or subsequent), Intermediate 100-Hour Inspection (P/N 98-38999 or subsequent) or Continuing Care Inspection Guide (P/N 98-36711D or subsequent) MUST also be complied with.

Table 1. E33C, F33C Spin Inspection (Acrobatic Category)

	Frequency	Part	Inspection	Corrective Action	Mech	Insp
1.	50 Hours	Rudder pedal bellcrank support assembly	Check for cracks.	If cracks are found, contact the Technical Support Department of Textron Aviation Inc.		
2.	50 Hours	Elevator to Elevator torque fitting casting joint	Check screw holes (4 per elevator) for proper hole diameter.	If hole diameter is more than 0.194 inch, ream hole to 0.208 ± 0.002 inch diameter and install NAS 2903-4 or NAS 6203-4X oversize bolt. If hole diameter exceeds 0.210 inch for oversize bolts, contact the Technical Support Department of Textron Aviation Inc. Torque bolt or screw between 30 to 40 inch-pounds.		
			Check hole size in elevator inboard hinge mount hole in center of elevator torque fitting.	If hole diameter is greater than 0.251 inch, replace elevator torque fitting.		
			Check elevator rod end mounting hole in the elevator torque fitting for proper diameter.	If hole diameter is greater than 0.379 inch, ream to 0.436 ± 0.001 inch and install one BS 105740-X-XC-0500 bushing.		
3.	50 Hours	Horizontal and vertical stabilizer attachment bolt holes (stabilizer spars and bulkheads)	Horizontal stabilizer forward spar: Check diameter of 4 outboard bolt holes on each side (2 upper and 2 lower). Horizontal stabilizer rear spar: Check diameter of 2 outboard bolt holes on each side (1 upper and 1 lower). If any of these holes are oversize, check all other horizontal stabilizer holes and vertical stabilizer bolt holes for correct diameter.	If bolt holes are more than 0.253 inch in diameter or elongated, ream the bushings to 0.270 ± 0.002 inch diameter and install NAS 2904-14 oversize bolts. If hole diameter exceeds 0.272 inch for oversize bolts, contact the Technical Support Department of Textron Aviation Inc. Torque the nuts between 85 to 100 inch-pounds.		
4.	50 Hours		Check torque on all nuts.	Torque the nuts between 85 to 100 inch-pounds.		

		Inboard elevator hinge bolts	Check for straightness and wear.	Replace if bent or worn.		
		Elevator pushrods to elevator torque fitting bolt	Check for straightness and wear.	Replace if bent or worn smaller than 0.370 inch diameter.		
5.	50 Hours	Upper and middle rudder hinges	Inspect for cracks, corrosion and excessive wear.	Replace if any of noted conditions exist.		
		Lower rudder hinge	Inspect for cracks, corrosion and excessive wear.	Replace if any of noted conditions exist.		
6.	50 Hours	Elevator hinge joint	Check bearing for looseness and bearing bracket for cracks, corrosion and excessive wear.	Replace if noted conditions exist.		
			Check bushing diameters.	If I.D. is greater than 0.191 inch or O.D. is under 0.310 inch, replace bushings. Replace if noted conditions exist.		
			Check elevator hinge brackets hole diameter.	If greater than 0.200 inch, replace bracket.		
			Check elevator hinge bracket for cracks, corrosion and excessive wear.	Replace if noted conditions exist.		
			Check bolts for wear.	Replace if plating is worn or corroded.		
			Check reassembled joint for looseness.	Install new parts as required.		
7.	50 Hours	Elevator pushrods	Check for straightness, and cracks.	Replace pushrod if bent or cracked.		
			Check rod end bearing for excessive free play.	Replace rod end bearing if excessive free play is noted.		
			Check rod end mounting hole diameter.	If greater than 0.378 inch in diameter, replace rod end.		
8.	50 Hours	Trim Tab	Check for cracks.	Replace if noted conditions exist.		

			Check free play as indicated in Chapter 27-30-00 .	Replace tab bushing and/or trim tab pushrod ends and/or trim tab actuator shaft and/or trim tab hinge if excessive free play is noted.		
9.	50 Hours	Elevator	Check for cracks, especially between outboard hinge and elevator balance horn.	If cracks are found, contact the Technical Support Department of Textron Aviation Inc for repair.		
10.	50 Hours	Trim tab pushrod assemblies	Check straightness.	Replace if bent.		
11.	50 Hours	Trim tab actuator	Check output shaft for straightness.	Replace if bent.		
			Check actuator installation for looseness.	Check attach bolts for proper torque.		
12.	50 Hours	Elevator bellcrank	Check pushrod mounting hole for proper diameter.	If more than 0.379 inch, press out existing bushing and press in one BS105740X-XC0968 bushing and drill 0.377 ± 0.002 inch diameter hole through bushing.		
13.	50 Hours	Bolt (elevator pushrod to bellcrank)	Check for straightness and wear.	Replace if bent or worn smaller than 0.370 inch.		
14.	50 Hours	Inboard elevator hinge casting	Check for cracks. Check hinge bearings for looseness.	Replace if noted condition exists.		

E. 100-Hour or Annual Inspection Guide

The owner or operator is responsible for maintaining the airplane in an airworthy condition, including compliance with all applicable Airworthiness Directives as specified in Part 39 of Title 14 Code of Federal Regulations (14 CFR). It is further the responsibility of the owner or operator to make sure the airplane is inspected in conformity with the requirements covered in 14 CFR Parts 43 and 91. These 14 CFR Parts cover the requirements concerning the Inspection Guide. This Inspection Guide is not intended to be all inclusive, for no such guide can replace the good judgement of a certified airframe and power plant mechanic in the performance of his duties. As the one primarily responsible for the airworthiness of the airplane, the owner or operator should select only qualified personnel to maintain the airplane.

F. Maintenance Inspection Program (Models A36 and B36TC)

The Textron Aviation Inc. approved inspection program contained in this chapter, and within the Textron Aviation Inc. factory maintenance inspection program contained in this chapter is specifically for Model A36/B36TC series airplanes. Any variation to the inspection program must be approved in writing by the FAA Flight Standards District Office (FSDO), or Airworthiness Authority. The Maintenance Inspection Program meets the requirement of both 14 CFR 91 and 14 CFR 135.

G. Special Conditions Cautionary Notice

The time periods for the inspections noted in this schedule are based on normal usage under average environmental conditions. Airplanes operated in humid tropics, or in cold, damp climates, etc., may need more frequent inspections for wear, corrosion, lubrication, and/or lack of maintenance. Under these adverse conditions, perform periodic inspections in compliance

with this guide at more frequent intervals until the owner or operator can set his own inspection periods based on the contingencies of field experience.

NOTE: The required periods do not constitute a guarantee that the item will reach the period without malfunction, as the aforementioned factors cannot be controlled by the manufacturer. This inspection program, in accordance with 14 CFR Parts 43 and 91, consists of, but is not limited to, inspection items listed in this Inspection Guide, any applicable Airworthiness Directives issued against the airframe or any equipment installed therein and conformity to Type Certificate Data Sheet as applicable.

Material contained in this guide, including the inspection intervals, may be changed at any time by the owner/operator, with prior notification and approval of the local FAA General Aviation District Office, when warranted by service experience or engineering recommendations. Information contained herein is applicable to all Bonanza series airplanes covered in this maintenance manual except where differences are indicated by serial effectivity. While the Inspection Guide may be used as an outline, detailed information of the many systems and components in the airplane will be found in the various sections of this maintenance manual and the pertinent supplier publications. It is also recommended that reference be made to the applicable maintenance handbooks, service instructions, Textron Aviation Inc service bulletins, applicable FAA regulations and publications, and supplier bulletins and specifications for torque values, clearances, settings, tolerances, and other requirements. In the final analysis, it is the responsibility of the owner/operator to make sure the airframe and power plant mechanic inspecting the airplane has access to the previously noted documents as well as to this Inspection Guide.

NOTE: Any time an airplane is repainted or touched up, inspect all placards and decals to make sure that they are not covered with paint, are easily readable, and are securely attached. Replace any placards that have been inadvertently defaced or removed. In addition to the inspections prescribed by this schedule, the altimeter system and all ATC transponders **MUST** be tested and inspected at 24-month intervals in compliance with the requirements specified in 14 CFR Parts 91.411, and 91.413.

A complete inspection of the airplane must be accomplished within each 12-month period for compliance with the Title 14 Code of Federal Regulations. The time periods for inspections stated in this inspection guide should NEVER be exceeded by more than 10 hours, and then only if the additional time is required to reach a place where the inspection can be satisfactorily accomplished. However, the additional time used must be deducted from the next inspection time. If 10 hours were used to reach the inspection facility, the next inspection would be due in 90 hours for the next 100-hour inspection with no extension allowed.

An airplane must receive a complete (100-hour, annual, or complete continuing care inspection) inspection every 12 months regardless of the hours flown. The inspections completed during a 12-month period can be deleted from the items to be inspected. Rubber goods such as fuel lines are recommended to be changed at five year periods regardless of airplane time.

NOTE: All electrical systems operational inspections are to be made using an external power source capable of delivering and maintaining 28.25 ± 0.25 vdc.

Textron Aviation Inc Corporation issues service information for the benefit of owners and operators in the form of two classes of Service Bulletins. MANDATORY (Red Border) Service Bulletins are changes, inspections or modifications that could affect safety. The factory considers compliance with these Service Bulletins mandatory. OPTIONAL (No Border) Service Bulletins cover changes, modifications, improvements or inspections which may benefit the owner. Due to the wide range of information covered by the OPTIONAL Service Bulletin, each owner or operator is responsible for conducting a thorough review of each OPTIONAL Service Bulletin to determine if compliance is required based on the applicability of the OPTIONAL Service Bulletin to his particular set of operating conditions. It is the responsibility of the owner or operator to make sure all Textron Aviation Inc Service Bulletins which are pertinent to his particular operation are complied with.

WARNING: During the performance of this inspection the airplane will be placed on three-point jacks. Make sure the landing gear is down and locked before removing the airplane from the jacks.

NOTE: Model E33C and F33C airplanes being spun **MUST** also have the AEROBATIC INSPECTION at 50 hours.

2. 100-Hour or Annual Inspection

A. Operational Inspection

		Mech	Insp

1.	STARTER Check for proper operation, unusual noise and dragging. Check starter energized light (if installed) and/or load meter to make sure starter disengages when starter switch is released.		
2.	FUEL FLOW Check for proper fuel pressure limits and fluctuations. Refer to Chapter 71-00-00 for fuel system setup.		
3.	CYLINDER HEAD TEMPERATURE Check for proper operation, temperature and fluctuations.		
4.	ALTERNATOR Check for proper output and unusual noises.		
5.	STANDBY ALTERNATOR/GENERATOR Check for proper operation in test mode. Perform a functional test as outlined in the Bonanza Series Maintenance Manual Chapter 24-31-00 , or subsequent). Check wiring for security and condition.		
6.	INSTRUMENT AIR SYSTEM Check for proper operation and output pressure.		
7.	STANDBY INSTRUMENT AIR (IF INSTALLED) Check for proper operation. Check plumbing and wiring for security and condition. Refer to AFM Supplement 36-590006-23.		
8.	PROPELLER OPERATION Cycle propeller and check for proper rpm drop and smoothness of operation.		
9.	TACHOMETER ACCURACY CHECK Effectivity - All airplanes with Hartzell Single-Acting Propellers. Refer to Hartzell Propeller Inc. Service Letter HC-SL-61-185, Revision 1 or subsequent.		
10.	PROPELLER DEICER Check for proper operation and amperage drawn on ammeter.		
11.	OIL PRESSURE AND TEMPERATURE Check for proper pressure, temperature limits and unusual fluctuations.		
12.	MAGNETOS Check the performance of the magneto as outlined under the heading NORMAL PROCEDURES in the appropriate Pilot's Operating Handbook.		
13.	POWER CHECK Refer to NORMAL PROCEDURES in the appropriate Pilot's Operating Handbook.		
14.	AMMETER Check for proper indication and unusual fluctuations.		
15.	HEATING AND VENTILATING SYSTEM Check for proper operation, heat and airflow output. Check controls for freedom of movement.		
16.	FIREWALL SHUTOFF VALVE Check for proper operation and freedom of movement.		
17.	IDLE RPM AND MIXTURE SETTINGS Check for both proper rpm and mixture settings. Check controls for freedom of operation.		
18.	IDLE CUT-OFF Check for proper operation and freedom of movement.		

19.	IGNITION SWITCH Rotate the ignition switch through the OFF position to the extreme limit of switch travel; if the engine stops firing, the switch is normal. If the engine continues to run with the switch held against the OFF stop, it is an indication that one magneto is still hot or ungrounded. When the switch is released, it should automatically return to OFF and the engine should stop running. However, any ignition switch exhibiting this abnormal condition should be replaced.		
20	ALL ENGINE CONTROLS With the engine running, check for proper operational limits, engine response and rigging. Check friction locks for proper operation.		
21.	FUEL QUANTITY GAGES Check for proper operation and unusual fluctuations.		
22.	AUXILIARY FUEL PUMP Check pump for proper operation, unusual noise and fluctuations.		
23.	FUEL TANK SELECTOR Check for proper placarding, proper operation and feel for positive detent.		
24.	ALL LIGHTS Check for condition, attachment, cracked or broken lenses. Check switches, knobs and circuit breakers for looseness and operation.		
25.	STALL WARNING SYSTEM Check for proper operation and heating of the unit.		
26.	RADIO OPERATION Check for proper operation, security of switches and knobs.		
27.	FLAPS Check for noisy operation, full travel and proper indication.		
28.	PITOT HEAT Check for amperage drawn on ammeter and for proper heating of the unit.		
29.	FLIGHT INSTRUMENTS Check for condition and proper operation.		
30.	BRAKES Check for condition and wear, ease of operation and proper release of the parking brake. Check for unusual brake chatter.		
31.	EMERGENCY LOCATOR TRANSMITTER (a) (E-1 thru E-3880 except airplanes modified by Kit 36-3049) - Check for proper operation. Tune radio to 121.5 MHz on VHF or 243 MHz on UHF, then turn ELT switch to ON and monitor for one signal. Turn ELT switch OFF, then place in ARM position. (b) (E-3881 and After and airplanes modified by Kit 36-3049) - Check for proper operation. Tune radio to 121.5 MHz on VHF or 406 MHz on UHF, then turn ELT switch to ON for about one second, then back to the ARM position. The receiver should voice about three audio sweeps.		
32.	AIR-CONDITIONER Operate the air conditioner and make sure that the retractable condenser moves to the ground extended position when turned on and returns to the retracted position when turned off. Check for proper operation and unusual noise.		
33.	OXYGEN SYSTEM Functionally check the oxygen system for proper operation. Check the oxygen bottle shutoff valve for proper operation.		

34.	SWITCHES, CIRCUIT BREAKERS Check for proper operation.		
35.	FLIGHT CONTROLS, TRIM CONTROLS AND TRIM INDICATOR Check freedom of movement and proper operation through full travel with and without flaps extended. Check electric trim controls for operation.		

B. Power Plant

		Mech	Insp
1.	NACELLE SKIN Check for deformation and obvious damage or cracks. Check for loose or missing rivets.		
2.	NACELLE STRUCTURE Check for cracks and deformation. Check for loose or missing rivets and concealed damage.		
3.	COWLING Check for condition, security and adjustment of latches. Open the upper cowl and clean. Inspect for cracks.		
4.	COWL FLAPS Check for travel, deformation and security. Inspect for cracks.		
5.	SPARK PLUGS Clean, inspect, adjust gap, test, and replace as necessary. Tighten spark plugs to proper torque and check ignition harness condition and for proper attachment.		
6.	COMPRESSION Perform differential compression test.		
7.	BATTERY Inspect for clean, tight connections and add distilled water to maintain level of 3/8 inch above top of separators. Inspect the vents and overflow tube for obstructions. Check for security and proper attachment. Check for corrosion. Make sure the battery is clean. Water or dirt on battery surface can cause the battery to discharge.		
8.	PLUMBING Inspect plumbing and associated accessories for condition (such as cracks and fraying) and attachment. Check plumbing clearance and secure against possible chafing.		
9.	BRAKE FLUID RESERVOIR Check reservoir for security, open vent, proper fluid level and for leaks.		
10.	ENGINE OIL TANK OR SUMP Check for cracks, leaks, proper fluid level, deformation and security.		
11.	CRANKCASE Check security of crankcase thru-bolts. Inspect the dipstick tabs for security and that the tabs are not bent.		
12.	OIL SUMP DRAINS AND SCREENS Clean screens, check for holes in the screens and for obstructions. Check for metal particles or foreign matter on screens and filters. Check for proper torque after installation.		
13.	OIL COOLER Check oil cooler, lines and fittings for condition, security, chafing and leaks.		

14.	PROPELLER AND MOUNTING BOLTS Check for condition and security. Check the tip of the blades for evidence of lightning strikes. If there is evidence of lightning strikes, consult the propeller manufacturer, the engine manufacturer and Textron Aviation Inc. Inspect the blades for cracks, dents, nicks, scratches, erosion, corrosion, security and movement in the hub.		
15.	PROPELLER SPINNER Check for deformation, security and cracks.		
16.	PROPELLER HUB Check for cracks, excessively leaking seals and condition.		
17.	ALTERNATOR Check for condition and attachment. Check wiring for proper attachment and possible chafing. Check for unusual noise.		
18.	ALTERNATOR (PRESTOLITE OR DELCO REMY ONLY) Remove and disassemble the alternator as necessary to inspect the rotor shaft bearings for condition and replace if necessary. Refer to Service Instructions No. 0546-359, Rev II or subsequent.		
19.	STARTER Check for condition, attachment and chafed or loose wires.		
20.	STANDBY GENERATOR/ALTERNATOR Check for condition, attachment, security of wires and for chafing.		
21.	MAGNETOS Check contact points for proper clearance. Points with deep pits or excessively burned areas must be discarded. Inspect the cam follower felt pad for proper lubrication and clean the compartment with a clean, dry cloth. Check ignition harness for proper connection, security and fraying. Check timing. Refer to the applicable magneto manufacturer's manual.		
22.	MAGNETO PRESSURIZATION FILTER Check for condition, cleanliness and security.		
23.	CYLINDERS AND BAFFLES Check cylinders and exhaust manifold for obvious leaks, security and cracks, check baffles for cracks and security. Check cylinders for broken cooling fins and loose or missing base nuts.		
24.	EXHAUST SYSTEM Check for deformation, security, cracks, leaks, loose or missing nuts and clamps. Check for thin wall condition which may occur due to normal internal erosion on stacks which have long service time.		
25.	FIREWALL Check for wrinkles, damage or cracks. Check all electrical and control access holes for proper sealing.		
26.	HOSE AND DUCTS Check all fuel, oil and air hose or duct for leakage, cracks, deterioration and damage. Check fittings for security.		
27.	ENGINE ACCESSORIES Check for condition, security and leaks. Check wiring, hoses and tubes for chafing, security and leaks.		
28.	ENGINE MOUNTS Check for cracks, corrosion and security. Inspect rubber cushions, mount bolts and nuts, and grounding straps for condition and security.		

29.	CABIN HEATER SYSTEM Check for cracks, distortion, corrosion, leaks and obstructions per Chapter 21-40-00 .		
30.	PROPELLER GOVERNOR Check for leaks and corrosion and control arm for security.		
31.	ENGINE CONTROLS Check controls and associated equipment for condition, attachment, alignment and rigging. Remove cable connection bolts and check for wear each 300 hours. Refer to TCM Service Bulletin SB95-2 for engine locations and procedures.		
32.	IGNITION HARNESS Inspect for fraying and attachment.		
33.	ELECTRICAL WIRING AND EQUIPMENT Check for condition, security and signs of chafing (Refer to Chapter 20-10-00 , ELECTRICAL WIRING - ROUTINE INSPECTIONS).		
34.	ALL DRAINS AND PLUGS Check for condition, security and obstructions. Check for leaks and correct tightness.		
35.	PRESSURE PUMP INTAKE FILTER Refer to Parker-Hannifin Airborne Service Letter 59 or subsequent (Refer to Chapter 05-10-00 for additional information).		
36.	AIR-CONDITIONER COMPRESSOR Check for security and attachment. Check refrigerant level and for oil leaks. Refer to Chapter 12 and Chapter 21 . Check belt for tension and worn or frayed condition. Check compressor drive belt pulleys for security, tightness, rotational smoothness and freedom of movement.		
37.	INDUCTION AIR FILTER Check for condition, cleanliness and security. Replace filter after 3 years, five cleanings or 500 flight hours; whichever occurs first (Refer to Chapter 12-20-00 , 201). Replace with a new filter that is FAA approved for the airplane installation (Refer to AD 84-26-02, Amendment 39-4966).		
38.	INDUCTION SYSTEM AND ALTERNATE AIR Check hot and cold flexible air ducts for delamination of the inner lining. Check the alternate air valve for blockage, security, cracks, operation and wear.		
39.	FUEL INJECTION CONTROL VALVE Clean the screen and check for damage. Install screen and check for leaks.		
40.	FUEL INJECTION SYSTEM Inspect all fuel injection components, lines and fittings for evidence of fuel leaks, fraying and cracking. Procedure as referenced in TCM SB95-7.		
41.	FUEL RETURN LINE (EA-11 THRU EA-439) Check for chafing against the wastegate seal drain line, particularly in the area approximately six inches from the fire wall bulkhead fitting of the fuel return line.		

42.	ELECTRIC PROPELLER DEICER (a) Check for service damage to the deicer heaters, brush rods, springs and brushes. Check for attachment and security. (b) Check the lead strap and all other clamps, connectors and wiring for electrical soundness, security and attachment. (c) Check the slip rings for roughness, cracks, burned or discolored areas and for deposits of oil, grease or dirt. Check for security and attachment of all components. (d) Check deicer boots for wrinkles, loose or torn areas.		
43.	TURBOCHARGER SYSTEM (a) Inspect the system for oil leaks, exhaust system leaks, cracks and attachment. (b) Inspect the compressor wheel for nicks, cracks or broken blades and freedom of movement. (c) Inspect the bypass valve (wastegate) for proper operation and inspect all linkage for interference, condition, security and attachment. (d) Inspect all exhaust system components for worn or damaged areas, loose clamps, cracks and leaks. (e) Inspect lubrication system components for worn or damaged areas, loose clamps, cracks and leaks. (f) Inspect the upper deck pressure reference lines and the fuel injection reference manifold for loose connections, leaks and possible chafing. (g) Check and calibrate the turbine inlet temperature indicator (Refer to Chapter 77-00-00). (h) Check manifold pressure controller linkage for wear.		
44.	ENGINE BAFFLE SEALS Inspect for security and condition at each 100-hour or annual inspection. Replace as necessary or every 10 years of service.		
45.	FILTERS Inspect pressure system in-line filter for condition, cleanliness and security. Refer to Parker-Hannifin Airborne Service Letter 59 or subsequent (Refer to Chapter 05-10-00 for additional information).		
46.	PRESSURE PUMP (AIRBORNE) Inspect as required by Parker - Hannifin Service Letter 43A or subsequent (Refer to Chapter 05-10-00 for additional information).		
47.	PRESSURE PUMP (AERO ACCESSORIES PUMPS, P/N AA216CW OR AA3216CW) Initially inspect at 600 hours time-in-service in accordance with Aero Accessories Service Letter No. 004 and thereafter as directed by the Service Letter (Refer to Chapter 05-10-00 for additional information).		
48.	TUBING, HOSES AND FITTINGS Check the condition, attachment method and security of tubing and hoses. Make sure there is adequate clearance between tubing, hoses and other components and structures (Refer to 20-06-00, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).		
49.	OUTSIDE AIR TEMPERATURE (OAT) SENSOR (E-4102 AND AFTER) Check the OAT sensor for security (Refer to Chapter 21-50-00, 001). Check the wiring for chafing, security and condition (Refer to Chapter 20-10-00, 001, ELECTRICAL WIRING - ROUTINE INSPECTIONS).		

50.	REFRIGERANT HOSES (E-4102 AND AFTER) Check refrigerant hoses for chafing, leaks and security (Refer to Chapter 21-50-00, 001) (Refer to 20-06-00, 001, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).		
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C. Cabin and Baggage Compartments

		Mech	Insp
1.	SKIN Inspect skins for deformation, cracks and loose or missing rivets. If damage is found, check adjacent structure.		
2.	STRUCTURE Check for cracks and deformation. Check for loose or missing rivets and concealed damage.		
3.	CABLES, PULLEYS AND TURNBUCKLES Check the flight control components, cables and pulleys. Replace control system components (pushrods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance and proper operation. Replace cables that have more than 3 broken strands in any 3 foot length of cable or evidence of corrosion. Check cables for proper tension. NOTE: It is important to operate controls through their full range so that the cables move away from pulleys and all portions of the cables are exposed for inspection.		
4.	LANDING GEAR GEARBOX AND ACTUATING LINKAGE Check for leakage, wear, condition and attachment. Check for unusual noise. Remove the oil filler plug and check oil level by engaging and turning the emergency hand crank 1/2 turn to determine that oil is being picked up on the worm gear. The oil level should be maintained no more than necessary to cover 1/2 of the diameter of the worm gear. Install oil filler plug.		
5.	FLAP MOTOR AND SHAFTS Check for condition, security and wear at all points. Check drive shaft housing for security and check jam nuts for tightness.		
6.	AUXILIARY FUEL PUMP AND FUEL LINES Check for condition, security and leaks. Check lines for signs of chafing or cracks.		
7.	BRAKE MASTER CYLINDER AND PARKING BRAKE VALVE Check for condition, security and leaks. Check lines for signs of chafing or cracks.		
8.	RUDDER PEDALS Check for freedom of movement. Check cables, push/pull rods, bellcranks, pulleys, turnbuckles and fair leads for proper routing, condition and security. Check rudder pedal fore and aft positions for wear. Check locks and pins to make sure of a positive lock. NOTE: It is important to operate controls through their full range so that the cables move away from pulleys and all portions of the cables are exposed for inspection.		

9.	CONTROL COLUMN, TRIM CONTROL AND INDICATOR (ELECTRIC AND MANUAL) Check for freedom of movement. Inspect pulleys, sprockets, bearings, actuators, chains and turnbuckles for condition, security and operation. Check trim indicator for proper indication.		
10.	ENGINE CONTROLS Check for ease of operation through full travel. Check friction locks for proper operation.		
11.	ELECTRICAL WIRING AND EQUIPMENT Check for condition, security and signs of chafing (Refer to Chapter 20-10-00, ELECTRICAL WIRING - ROUTINE INSPECTIONS).		
12.	PLUMBING Check all plumbing and connections for security, leakage and general condition.		
13.	WINDOWS AND DOORS Inspect windows for scratches, crazing and general condition. Inspect doors for security of attachment. Check latching mechanism for proper engagement and ease of operation. Check that rotation of the interior door handle without depressing the handle lock release button does not unlatch the door.		
14.	INSTRUMENTS AND INSTRUMENT PANEL Inspect instrument panel, sub panels, placards and instruments for condition and attachment. Check all knobs for security. Inspect shock mounts and ground straps for cracks and security.		
15.	SEATS, SEAT BELTS AND SHOULDER HARNESSSES Inspect cabin seats, seat belts and shoulder harnesses for proper operation, condition and security of attachment. Inspect floorboards for condition and seat attachment. Check for operation of the seat stops.		
16.	OXYGEN SYSTEM Check condition of the oxygen system and check the oxygen masks for cleanliness and stowage.		
17.	VENTILATING SYSTEM Check all fresh air and heat outlet vents for proper movement and operation.		
18.	FUEL SELECTOR VALVE Inspect for leakage, security, freedom of movement, proper detent feel and condition. Clean strainer and check for condition. Check for proper placarding.		
19.	EMERGENCY EXIT HATCH Check emergency release handle and latch assembly for proper operation. Check that the hatch moves out freely. Check the complete latch assembly for condition and all moving parts for proper operation. With the hatch installed, check for proper latching and seal. Safety the emergency exit with 0.020 inch diameter copper wire after opening.		
20.	STATIC SYSTEM Check and drain water from the static lines.		
21.	CABIN AIR BLOWER Check for condition, mounting security and wear at all points.		

22.	FUEL STRAINER Drain and clean. On fuel cells with foam inserts, check for brown foam material. Refer to Safety Communique No. 67 and Service Bulletin No. 2109.		
23.	CONTROL COLUMN (E-1946, E-2104, E-2111 AND AFTER; EA-320, EA-389 AND AFTER) Inspect the control column U-joint roll pins and make sure they are not backing out.		
24.	TUBING, HOSES AND FITTINGS Check the condition, attachment method and security of tubing and hoses. Make sure there is adequate clearance between tubing, hoses and other components and structures (Refer to 20-06-00, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).		
25.	AIR DUCTS AND VENTS (E-4102 AND AFTER) Check the intake and outlets for obstruction and damage (Refer to Chapter 21-50-00, 001).		
26.	REFRIGERANT HOSES (E-4102 AND AFTER) Check refrigerant hoses for chafing, leaks and security (Refer to Chapter 21-50-00, 001) (Refer to 20-06-00, 001, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).		
27.	ELECTRONIC CONTROL UNIT (ECU) (E-4102 AND AFTER) Check the ECU for security. (Refer to Chapter 21-50-00, 001). Check the wiring for chafing, security and condition (Refer to Chapter 20-10-00, 001, ELECTRICAL WIRING - ROUTINE INSPECTIONS).		

D. Wings and Carry-Through Structure

		Mech		Insp
		LH	RH	
1.	SKIN Check for deformation and obvious damage. Check for cracks, loose or missing rivets. If damage is found, check adjacent structure. Check for indications of hard landing or excessive flight loading.			
2.	STRUCTURE Check for cracks, deformation and concealed damage. Check for loose or missing rivets. Refer to Chapter 53-10-00 of this Maintenance Manual for inspections for fuselage web cracks at the fuselage/wing spar carry through area.			
3.	ACCESS DOORS AND PANELS Inspect for cracks, proper fit and attachment.			

4.	CABLES, PULLEYS, AND TURNBUCKLES Check the flight control components, cables and pulleys. Replace control system components (pushrods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance and proper operation. Replace cables that have more than 3 broken strands in any 3 foot length of cable or evidence of corrosion. Check cables for proper tension. NOTE: It is important to operate controls through their full range so that the cables move away from pulleys and all portions of the cables are exposed for inspection.			
5.	AILERONS Check for condition and security. Check for cracks, loose or missing rivets and freedom of movement. Check hinge bearings and brackets for condition, push/pull rods for security and rod ends for corrosion.			
6.	FUEL CELLS, CAPS AND VENTS Inspect fuel cells, caps and vent lines (Refer to Chapter 28-00-00) and Service Instruction Number 0632-280.			
7.	FUEL FILLER CAP AND FUEL FILLER CAP ADAPTER Inspect the visible fuel filler cap 'O' ring for splits, cracks and flexibility. Inspect the fuel filler cap adapter, paying particular attention to the rivets attaching the Full Tab Plate to the filler adapter (Refer to Chapter 28-10-00, Fuel Filler Cap and Fuel Filler Cap Adapter Inspection).			
8.	PLUMBING Check for leakage, chafing, condition and security.			
9.	ELECTRICAL WIRING AND EQUIPMENT Inspect for condition, security and signs of chafing (Refer to Chapter 20-10-00, ELECTRICAL WIRING - ROUTINE INSPECTIONS).			
10.	FLAP LIMIT SWITCHES Check for condition, security and freedom of operation.			
11.	FLAPS AND ACTUATORS Check for condition, security, binding or chafing of actuator drive shafts. Check flap skin and structure for cracks, loose or missing rivets. Check flap actuator attachment bracket and rib for cracks. Check roller bearings and tracks for condition. Check stop area for condition and damage.			
12.	FLAP POSITION TRANSMITTER Check for security and operation.			
13.	DRAIN HOLES Check the drain holes in the upper wing attach fittings to make sure they are open and free of obstruction.			
14.	WING SPAR CAP Inspect the wing spar cap for corrosion (Refer to Chapter 57-00-00, GENERAL - MAINTENANCE PRACTICES).			

15.	WING BOLTS Check wing bolts for proper torque at the first 100 hour inspection and at the first 100 hour inspection after each reinstallation of the wing attach bolts. Refer to Chapter 57-00-00, GENERAL - MAINTENANCE PRACTICES of this maintenance manual, Table 201 for wing bolt, nut and fitting inspection criterion and frequency.			
16.	RADAR ANTENNA COVER Check the fiberglass for security, attachment and cracks.			
17.	FUEL VENTS AND AIR INLETS, PITOT TUBE, AND STALL WARNING VANE Check for condition and obstruction.			
18.	(DELETED) Fuel Cell Flapper Valve Inspection Moved to Chapter 05-10-00 .			
19.	FUEL CELLS Inspection of condition of fuel cells and possible seepage of fuel. Perform the FUEL CELL INSPECTION procedure (Refer to Chapter 28-10-00).			
20.	TUBING, HOSES AND FITTINGS Check the condition, attachment method and security of tubing and hoses. Make sure there is adequate clearance between tubing, hoses and other components and structures (Refer to 20-06-00, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).			

E. Nose Gear

		Mech	Insp
1.	WHEEL AND TIRE Check wheel for cracks and tire for wear, damage and proper inflation. Check wheel bearings for condition and wear.		
2.	LANDING GEAR STRUT Inspect the shock strut and components for cracks, attachment, proper inflation and evidence of leakage.		
3.	ACTUATING LINKAGE Check for wear at attach points. Check for cracks and security.		
4.	GEAR DOORS AND LINKAGE Check doors for damage and cracks to the structure and skins. Check linkage for wear and cracks at the attach points. Check for condition and security.		
5.	NOSE GEAR STEERING LINKAGE Inspect linkage for tightness, condition and security. Inspect linkage boots for condition.		
6.	SHIMMY DAMPER Check for condition and attachment. Check attach points for cracks. Check fluid level per Chapter 12-20-00 .		
7.	STRUT FLUID LEVEL Check and maintain the proper fluid level in the strut as outlined in Chapter 12-20-00 .		
8.	STRUT AND A-FRAME HINGE BOLTS Inspect for corrosion and security of attachment.		

9.	STATIC CABLE (IF INSTALLED) Inspect for condition, proper clearances and attachment.		
10.	VISUAL INDICATOR Check for condition.		
11.	NOSE LANDING GEAR DRAG BRACE (P/N 002-820016-31, P/N 002-820018-3, OR WITH KIT 35-4012-1 INSTALLED) Check that the two drag brace bracket attachment bolts (Item 29, Figure 205, 32-30-00) are secure. Check bonding of inboard and outboard arms to brace. Check drag brace assembly for shear stress, wear and corrosion. At 2,000 hours, remove and inspect the two bracket attachment bolts. Replace all hardware with evidence of shear stress, wear and/or corrosion.		
12.	NOSE LANDING GEAR RETRACT ROD ENDS Check the retract rod ends for signs of cracking, sheer stress, wear and corrosion.		
13.	TUBING, HOSES AND FITTINGS Check the condition, attachment method and security of tubing and hoses. Make sure there is adequate clearance between tubing, hoses and other components and structures (Refer to 20-06-00, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).		
14.	ELECTRICAL WIRING AND EQUIPMENT Inspect for condition, security and signs of chafing (Refer to Chapter 20-10-00, ELECTRICAL WIRING - ROUTINE INSPECTIONS).		

F. Main Gear and Brakes

		Mech		Insp
		LH	RH	
1.	BRAKES, LINES, LINING AND DISCS Check for condition, wear and security. Check lines for chafing and signs of leakage or cracks. Check discs for wear or warping. Check brake discs for cracks.			
2.	WHEELS AND TIRES Check wheels for cracks and tires for wear, damage, condition and proper inflation. Check wheel bearings for condition and wear.			
3.	ACTUATOR GEARBOX, MOTOR AND SWITCHES Check for leakage, condition and security.			
4.	LANDING GEAR STRUTS Inspect the shock struts and components for cracks, attachment, corrosion, proper inflation and evidence of leakage.			
5.	ACTUATING LINKAGE Check for wear and cracks at attach points. Check for condition and security.			
6.	GEAR DOORS AND LINKAGE Check doors for damage and cracks to the structure and skins. Check linkage for wear and cracks at the attach points. Check for condition and security. Determine that all clevis retaining pins are in place and secured with cotter pins.			

7.	STRUT FLUID LEVEL Check and maintain the proper hydraulic fluid level in the struts as outlined in Chapter 12-20-00 .			
8.	STRUT AND A-FRAME HINGE BOLTS Inspect for corrosion and security of attachment.			
9.	TUBING, HOSES AND FITTINGS Check the condition, attachment method and security of tubing and hoses. Make sure there is adequate clearance between tubing, hoses and other components and structures (Refer to 20-06-00, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).			
10.	ELECTRICAL WIRING AND EQUIPMENT Inspect for condition, security and signs of chafing (Refer to Chapter 20-10-00, ELECTRICAL WIRING - ROUTINE INSPECTIONS).			

G. Main Gear Operation

		Mech		Insp
		LH	RH	
	WARNING: Under no circumstances should the landing gear be operated electrically while the hand crank is engaged. In the event of such an operation, a tear down and magnetic inspection should be performed to determine damage to the engagement slot in the worm shaft. CAUTION: Since the battery voltage is not sufficient to properly cycle the landing gear for this inspection, use only an external power source capable of delivering and maintaining 28.25 ± 0.25 vdc to the airplane's electrical system throughout the extension and retraction cycles when performing the landing gear retraction inspection. Refer to Chapter 32 for more specific information on the following items.			
1.	DOORS Check operation, fit and fair. Check for unusual noise.			
2.	POSITION LIGHTS Check for security, adjustment and wiring for breaks, condition of insulation, loose connections and proper indication.			
3.	WARNING HORN Check for proper operation.			
4.	UPLOCK CABLE TENSION Check uplock cable mechanism for condition and security. Check uplock cable for proper tension and for possible fraying.			
5.	EMERGENCY EXTENSION Check system for freedom of operation. Check for unusual noise. With the spar cover installed, check for proper engagement of the emergency extension handle and proper system operation.			

6.	DOWNLOCK TENSION Check for proper deflection force on the main gear knee joints.			
7.	UPLOCK ROLLERS Check condition and clearance of uplock rollers and lubricate (Refer to Chapter 12-20-00). Check for binding.			
8.	LIMIT SWITCH RIGGING Check for security and proper adjustment of the limit switches (Refer to Chapter 32-00-00 , RIGGING THE LANDING GEAR) in this maintenance manual for correct landing gear gearbox internal clearance.			
9.	SAFETY SWITCH Check for security, proper rigging and operation.			
10.	GENERAL OPERATION Place the airplane on jacks and cycle the landing gear while checking to make sure that the position light switches operate in conjunction with the landing gear position. Check the condition and operation of the complete landing gear system.			
11.	DYNAMIC BRAKING ACTION Make sure of proper operation of dynamic brake relay.			
12.	ASSIST STEP (IF INSTALLED) Inspect the retractable step for cable and safety link condition, proper adjustment and operation. Check fixed link condition, proper adjustment and operation. Check fixed steps for security.			

H. Nose Gear Operation

		Mech	Insp
	WARNING: Under no circumstances should the landing gear be operated electrically while the hand crank is engaged. In the event of such an operation, a tear down and magnetic inspection should be performed to determine damage to the engagement slot in the worm shaft. CAUTION: Since the battery voltage is not sufficient to properly cycle the landing gear for this inspection, use only an external power source capable of delivering and maintaining 28.25 ± 0.25 vdc to the airplane's electrical system throughout the extension and retraction cycles when performing the landing gear retraction inspection. Refer to Chapter 32 for more specific information on the following items.		
1.	DOORS Check operation, fit and fair. Check for unusual noise.		
2.	NOSE GEAR UP TENSION Check the up tension on the nose gear (Refer to Chapter 32-00-00 , RIGGING THE LANDING GEAR).		
3.	DOWNLOCK TENSION Check the downlock tension on the nose gear (Refer to Chapter 32-00-00 , RIGGING THE LANDING GEAR).		

4.	GENERAL OPERATION Place the airplane on jacks and cycle the landing gear while checking to make sure that the position light switches operate in conjunction with the landing gear position. Check the condition and operation of the complete landing gear system.		
5.	VISUAL INDICATOR Inspect for proper adjustment and operation.		
6.	NOSE GEAR STEERING Check for condition and security.		

I. Rear Fuselage and Empennage

		Mech	Insp
1.	SKIN Check for deformation, cracks and obvious damage. Check for loose or missing rivets. If damage is found, check adjacent structure.		
2.	INTERNAL FUSELAGE STRUCTURE Check for cracks and deformation. Check for loose or missing rivets. Check bulkheads, door posts, stringers and doublers for corrosion, cracks and buckles.		
3.	STRUCTURE Inspect the two most aft bulkheads for cracks, distortion, loose rivets or other obvious damage.		
4.	CABLES, PULLEYS, AND TURNBUCKLES Check the flight control components, cables and pulleys. Replace control system components (pushrods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance and proper operation. Replace cables that have more than 3 broken strands in any 3 foot length of cable or evidence of corrosion. Check cables for proper tension. NOTE: It is important to operate controls through their full range so that the cables move away from pulleys and all portions of the cables are exposed for inspection.		
5.	CONTROL SURFACES Check for deformation, cracks and security. Check for loose or missing rivets. Check for freedom of movement. Check for security of hinges and bond cables. Check the inboard elevator hinge casting (on the aft bulkhead) for cracks in mounting bolt holes.		
6..	TRIM TABS AND ACTUATORS Check for security and wear. Check free play (Refer to Chapter 27-11-00). Check hinges and trim tab actuators for security and wear. Check trim tabs for cracks and control rods for attachment. Lubricate trim tab hinges (Refer to Chapter 12-20-00).		
7.	STATIC PORTS Check for obstruction and clean as necessary.		
8.	PLUMBING Check for leakage, cracks, chafing, condition and security.		

9.	ELECTRICAL WIRING AND EQUIPMENT Inspect for condition, security and signs of chafing (Refer to Chapter 20-10-00, 001, ELECTRICAL WIRING - ROUTINE INSPECTIONS).		
10.	STATIC LINES Check condition of static lines and drain.		
11.	ANTENNAS Check for condition and security.		
12.	ELEVATOR/RUDDER (RUDDERVATORS) (a) Check that the drain holes are open and clean. (b) Check that the ruddervator trim tab and hinge pin are correctly mated (Refer to ELEVATOR TRIM TAB INSTALLATION, Chapter 27-21-00). (c) Check for cracks on the trim tab hinge support channel. (d) Check the stabilizer front and rear spar attach points for cracks and looseness.		
13.	RUDDER FORWARD SPAR (CE-748, CE-772 THRU CE-1425; CJ-149 THRU CJ-179; E-1111, E-1241 THRU E-2518; EA-11 THRU EA-500 AND AIRPLANES THAT HAVE NOT INSTALLED KIT 33-6001-1) Refer to Service Bulletin No. 2333 every 500 flight hours or annually.		
14.	RUDDER FORWARD SPAR (CE-1426 AND AFTER; CJ-180 AND AFTER; E-2519 AND AFTER; EA-501 AND AFTER AND AIRPLANES THAT HAVE INSTALLED KIT 33-6001-1) Open inspection covers adjacent to the upper and center hinges. Inspect ribs, spar, hinges and all rudder components in area of the hinges for attachment security, cracks and general condition using a flashlight and mirror. Install covers.		
15.	TUBING, HOSES AND FITTINGS Check the condition, attachment method and security of tubing and hoses. Make sure there is adequate clearance between tubing, hoses and other components and structures (Refer to 20-06-00, 001, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).		
16.	EVAPORATOR (E-4102 AND AFTER) Check attaching structure and hardware for condition and security (Refer to Chapter 21-50-00, 001).		
17.	EVAPORATOR DRAIN TUBE (E-4102 AND AFTER) Check for kinks, cracks and security (Refer to Chapter 21-50-00, 001) (Refer to 20-06-00, 001, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).		
18.	CONDENSER (E-4102 AND AFTER) Check attaching structure and hardware for condition and security(Refer to Chapter 21-50-00, 001).		
19.	CONDENSER EXHAUST (E-4102 AND AFTER) Check exhaust louvers and screen for obstruction and security. Check plenum for obstruction and security (Refer to Chapter 21-50-00, 001).		
20.	CONDENSER AIR INTAKE (E-4102 AND AFTER) Check intake louvers for obstruction and security (Refer to Chapter 21-50-00, 001).		

21.	RECEIVER/DRYER (E-4102 AND AFTER) Check receiver/dryer for security. Check the wiring for chafing, security and condition (Refer to Chapter 21-50-00, 001).		
22.	AIR DUCTS (E-4102 AND AFTER) Check the air duct connection (station 190) for condition and security (Refer to Chapter 21-50-00, 001).		
23.	REFRIGERANT HOSES (E-4102 AND AFTER) Check refrigerant hoses for chafing, leaks and security (Refer to Chapter 21-50-00, 001) (Refer to 20-06-00, 001, TUBING, HOSES AND FITTINGS - INSPECTION/CHECK).		

J. General

		Mech	Insp
1.	Airplane cleaned and serviced.		
2.	Airplane lubricated, after cleaning (Refer to Chapter 12-20-00).		
3.	Inspect all placards to make sure they are easily readable and securely attached.		
4.	Make sure all Airworthiness Directives, Textron Aviation Inc Service Bulletins and previously issued Service Instructions are reviewed and complied with as required.		
5.	For a complete or annual inspection of the airplane, all items on the airplane that are noted in this guide should be inspected.		

UNSCHEDULED MAINTENANCE CHECKS - INSPECTION/CHECK

1. Unscheduled Maintenance Checks - Inspection/Check

- A. This subchapter is assembled in table form to allow a technician to perform checks for damage after operating the airplane in conditions which could require unscheduled maintenance. Specific conditions, such as lightning strikes, turbulent air penetration or hard landings, etc., are included. Inspection instructions are included for each of the conditions listed.

WARNING: During the performance of these inspections the airplane could be placed on three-point jacks. Make sure the landing gear is down and locked before removing the airplane from the jacks.

2. Operation After Sudden Stoppage Incidents

Item	Inspection Requirement	Inspection Interval
Engine	Inspect as instructed in the engine manufacturer's manuals.	After sudden engine stoppage.
Propeller Governor	The propeller governors should be overhauled or replaced as instructed in the manufacturer's manuals.	
Propeller	Overhaul or replace propeller.	
Fuselage and Empennage Skin - Aft of the Aft Pressure Bulkhead	Inspect skin panels for wrinkles, cracks, deformities and bond separations.	

3. When Operating in Areas of High Dust Content

Item	Inspection Requirement	Inspection Interval
Nose Landing Gear Shock Strut	Clean off and wipe dry exposed polished surfaces.	Routine.
Instrument Air Filters	Replace instrument line supply filters at or before 100 hours under extremely dusty conditions.	As noted.
Alternate Air Door	Make sure door is sealed around all edges and there is adequate spring tension on the door.	Routine.
CAUTION: To avoid damaging the barometric sensor, disconnect the autopilot sensor line prior to applying reverse air pressure to the pitot and static lines.		
Pitot and Static Lines	Check for obstructions by applying reverse air pressure (not to exceed 20 psi) to the ends of the pitot and static lines with them disconnected from the instruments.	200 hours or as required.

4. When Operating in Areas of High Humidity

Item	Inspection Requirement	Inspection Interval
Floor Structure	Check structure under the floor for corrosion by removing a floor panel and inspection the structure, especially the channel sections.	At a scheduled inspection.
Aft Cabin	Remove aft cabin access covers and inspect for corrosion, especially aft of bulkhead points.	
Wing	Remove wing and center section access covers and check for corrosion.	
Empennage	Remove all fuselage access covers and check for corrosion.	

5. After Receipt of Airplane

Item	Inspection Requirement	Inspection Interval
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Wing	Check torque of the wing attach bolts.	After the first 100 hours and at the first 100 hours after adjustment of the wing.
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6. Operating from Very Soft or Unusual Terrain

Item	Inspection Requirement	Inspection Interval
Landing Gear		
Tires	Visually check for cuts, wear, deterioration and inflation.	Routine.
Main Landing Gear	Check strut inflation.	
a. Wheels	1. Check for obvious damage.	Routine.
	2. Remove and clean; inspect for abrasions, cracks and chipped rims, bearing for wear, corrosion, fretting and bluing; check seals for distortion, deterioration, and proper fit and security.	Every 100 hours and/or annually.
b. Brake Units	1. Check cylinders and associated lines for damage and leaks.	Routine.
	2. Check for evidence of overheating.	Every 100 hours and/or annually.
	3. Check discs for scoring, distortion, damaged plating and evidence of overheating	Every 100 hours and/or annually.
c. Shock Absorber	Check surfaces for cleanliness, free from oil or grease deterioration.	Every 100 hours and/or annually.
d. Wheel Wells	Clean foreign material (dirt, etc.) from wheel wells. Inspect supports between main and aft spars in upper wheel well and the lift leg attach bracket at the main spar for deformation, cracks, etc.	As required.
Nose Landing Gear		
a. Wheel	1. Visually check for obvious damage.	Routine.
	2. Remove and clean. Inspect for abrasions, cracks and chipped rims, bearings for wear, corrosion, fretting and bluing; check seals for distortion, deterioration, proper fit and security.	Every 100 hours.
b. Shock Strut	1. Check for obvious damage and leaks. Clean exposed surface of shock strut piston with clean cloth moistened with hydraulic fluid.	Routine.
	2. Check for correct extension.	Every 100 hours.
	3. Thoroughly clean and inspect for leaks, damage and security; service as necessary.	Every 100 hours.
c. Fork Assembly	Check for cleanliness and obvious damage.	Routine.
d. Nose Wheel Steering	Check for obvious damage, associated rods and connections for damage and security; steering and pulleys for wear and security.	Every 100 hours.
e. Actuator Linkage	Check for excessive play, safety and security.	Every 100 hours.
f. Shimmy Damper	Inspect for condition and attachment.	Every 100 hours.

7. Inspection After Hard Landing

WARNING: Even though wrinkles in the wing or fuselage skin surface may be slight enough to be considered as negligible, a close inspection of the internal supporting structure may reveal serious damage.

NOTE: This inspection should be carried out after a hard landing and before the airplane is certified as ready for further flight. The inspections are conducted at two levels. The first level consists of determining if any external damage has occurred and looking for evidence of internal structural failure. The second level is concerned with a more detailed inspection of any damaged areas which were indicated in the findings of the first level inspection. If it is determined by the first level inspection that there is no damage to the airplane, it is not necessary to proceed to the second level inspection.

A. First Level Inspection

Item	Inspection Requirement	Inspection Interval
General Appearance	Determine that the airframe components (wings, fuselage and empennage) are in their normal configuration.	Prior to next flight.
Landing Gear	1. Inspect tires for excessive wear, splits in the tread, bottoming out or folding over the sidewalls. 2. Check the wheels (rims) for flat spots or cracked castings. 3. Check shock struts and attachment lugs for cracks. 4. Inspect hydraulic brake lines for leaks. 5. Inspect nose drag legs and gear door retract linkage for damage. 6. Inspect landing gear lift leg attach bracket at the main spar for deformation, cracks, etc. 7. Inspect area around landing gear attach points.	Prior to next flight.
Nose Structure	1. Inspect external skin surfaces for distortion, loose or missing rivets. 2. Check cowling attachment for alignment or damage. 3. Inspect engine control cables for smooth operation and check plumbing and wiring for security and attachment. 4. Inspect engine support fittings for cracks or structural failure. 5. Check tips of propeller for damage.	Prior to next flight.
Nose Structure (Continued)	6. Check propeller spinner and backplate for evidence of interference with cowling. 7. Inspect wheel well structure for damage or cracks. Check area surrounding the landing gear attachment points.	Prior to next flight.
Wing Carry-Thru Structure	1. Check wing attachment fittings for cracks. Perform a Dye Penetrant inspection. 2. Inspect plumbing, wiring and actuator for damage and security of attachment. 3. Check keel, front and rear spar on the lower side of fuselage for damage and alignment.	Prior to next flight.
Wings	1. Inspect external wing surface skin for cracks, abnormal wrinkles and loose or missing rivets.	Prior to next flight.

	2. Check wing attachment fittings for cracks. Perform a Dye Penetrant inspection.	
	3. Inspect internal structure.	
	4. Inspect plumbing and wiring for security of attachment.	
Fuselage, Center Section	1. Inspect external skin surface for cracks, abnormal wrinkles and loose or missing rivets.	Prior to next flight.
	2. Inspect around cabin windows for structural cracks.	
Fuselage, Aft	1. Check external skin surface the entire length for cracks, abnormal wrinkles and loose or missing rivets.	Prior to next flight.
	2. Inspect empennage and control surfaces for freedom of movement.	

B. Second Level Inspection

NOTE: Because shock loading may be transmitted along one structural member to another, carefully inspect the surrounding and supporting structure in any damaged area found in the first level inspection.

Item	Inspection Requirement	Inspection Interval
Landing Gear	1. Place airplane on jacks and check shock strut for free up and down movement.	As required.
	2. Remove tires and inspect internally for cuts or broken areas.	
	3. Disassemble and examine wheels (rims) for cracks or distortion.	
	4. Visually inspect axle with 10-power glass. If suspect, dye check or magnaflux.	
	5. Remove and replace or magnaflux the landing gear attach bolts, check bolt holes for cracks or elongation.	
	6. Remove and replace or magnaflux drag link bolts and supports.	
	7. Perform landing gear retraction test.	
Nose Structure	1. If tips of propeller have been damaged, refer to the applicable Engine Maintenance Manual for engine inspection procedure.	As required.
	2. Inspect areas surrounding the engine support fittings.	
	3. Check the internal structure of the wheel well for cracks or damage.	
	4. Test plumbing and wiring for proper operation.	
	5. Inspect wheel well structure and surrounding areas for signs of structural failure.	
Wing Carry-Thru Structure	1. Dye check wing attachment fittings; examine (magnaflux or replace) attachment bolts and check bolt holes for alignment and correct dimensions.	As required.

	2. Remove floorboards and access plates and inspect the front and rear spar, and keel structure for evidence of deformation or structural failure.	
Wing Carry-Thru Structure (Continued)	3. Test plumbing, wiring, flaps, control cables, pulley mounts, and any other system found in this area for proper operation.	As required.
Wings	1. Dye check wing attachment fittings; examine (magnaflux or replace) attachment bolts and check bolt holes for alignment and correct dimensions.	As required.
	2. Test plumbing and wiring for proper operation.	
Fuselage, Center and Aft Section	1. Examine stringers, frames and sidewalls for deformation structural failure.	
	2. Test plumbing and wiring for proper operation.	
	3. Inspect heating and air-conditioning ducts for damage.	
	4. Examine the control cables and pulley mountings and check for clearance from structure at pass-through locations. Make sure operation is smooth.	
REPAIR OF DAMAGE		
Due to the variety and degree of structural damage which may be involved, the best repair or replacement procedure must be based on the findings of the individual airplane. If the hard landing inspection indicates that serious structural damage has occurred, contact Textron Aviation Technical Support, Textron Aviation Inc., Wichita, KS 67201 for assistance.		
LOG BOOK ENTRY		
Following a hard landing inspection, an entry covering the extent of inspection, the damage and the repair (if applicable) must be noted in the airplane permanent records.		

8. Inspection After Encountering Turbulent Air

NOTE: This inspection should be carried out after the airplane has been subjected to high G loading while flying through turbulent air and before the airplane is returned to service. The inspection is conducted on two levels. The first level consists of determining if any external damage has occurred and looking for evidence of internal structural failure. The second level is concerned with a more detailed inspection of damaged areas which were indicated in the findings of the first level inspection. If it is determined by the first inspection that there is no damage to the airplane, it is not necessary to proceed to the second level inspection.

A. First Level Inspection

WARNING: Even though wrinkles in the wing or fuselage skin surface may be slight enough to be considered as negligible, a close inspection of the internal supporting structure may reveal serious damage.

Item	Inspection Requirement	Inspection Interval
General Appearance	Determine that the airframe components (wings, fuselage and empennage) are in their normal configuration.	Prior to next flight.
Wing Carry-Thru Structure	1. Inspect the external skin surface for cracks, abnormal stress wrinkles and loose or missing rivets.	Prior to next flight.
	2. Check wing attachment fittings for cracks.	
	3. Inspect plumbing and wiring for damage and security of attachment.	

	4. Check the keel and the front and rear spar on the lower side of the fuselage for damage and alignment.	
Nose Structure	1. Inspect the external skin surfaces for wrinkles and loose or missing rivets.	Prior to next flight.
	2. Check cowl attachment for alignment or damage.	
	3. Inspect the engine support fittings for cracks or deformation or structural failure.	
	4. Inspect engine control cables for smooth operation and check plumbing and wiring for security and attachment.	
	5. Inspect structure in wheel well for damage or cracks.	
Wings	1. Inspect the top and bottom wing surface for cracks, wrinkles and loose or missing rivets.	Prior to next flight.
	2. Inspect wing attachment fittings for cracks.	
Wings (Continued)	3. Inspect aileron, aileron tab and flaps for wrinkles or cracks.	
	4. Inspect internal structure and fuel cells through access panels.	
	5. Inspect plumbing and wiring for security of attachment.	
Nose Structure	1. Check external skin surface for cracks, wrinkles and loose or missing rivets.	Prior to next flight.
	2. Inspect area forward of windshield for evidence of structural deformation or failure.	
Fuselage, Center Section	Inspect external skin surface for cracks, abnormal wrinkles and loose or missing rivets.	Prior to next flight.
Fuselage, Aft	1. Inspect the entire length of the external skin surface for cracks, stress wrinkles and loose or missing rivets.	Prior to next flight.
	2. Check the empennage surfaces for damage and free movement.	
	3. Inspect for skin wrinkles at the juncture of the fuselage and empennage.	

B. Second Level Inspection

NOTE: Because G loading may be transmitted along one structural member to another, carefully inspect the surrounding and supporting structure in any damaged area found in the first level inspection.

Item	Inspection Requirement	Inspection Interval
Wing Carry-Thru Structure	1. Dye check wing attachment fittings, examine (magnaflux or replace) attachment bolts and check bolt holes for alignment and correct dimension.	As required.
	2. Remove floorboards and access plates and inspect the front and rear spar and keel structure for evidence of deformation or structural failure.	

	3. Operational test plumbing, wiring, flaps, control cables, pulley mounts and any other system found in this area.	
Nose Structure	1. Inspect areas surrounding the engine support fittings.	As required.
	2. Inspect internal structure for cracks or damage.	
	3. Operational test plumbing and wiring.	
Wings	1. Dye check wing attachment fittings, examine (magnaflux or replace) attachment bolts.	As required.
	2. If there is evidence of damage to the fuel cells or fuel lines, remove the cells and inspect the fuel cell liners and liner support structure.	
	3. Operational test the plumbing and wiring, flap actuator, aileron and tab control cables and pulley mounting.	
Fuselage, Center Section	1. Examine stringers, frames and sidewalls for deformation or structural failure.	As required.
	2. Examine heating and air-conditioning ducts for damage.	
	3. Operational test plumbing and wiring.	
	4. Examine the control cables, pulley mountings and the cable clearance at areas the cables pass through the structure. Make sure operation smooth and normal.	
Empennage	1. Inspect elevator pushrods, torque tubes and bellcrank for damage.	As required.
	2. Inspect the attachment of the vertical stabilizer spars to the top of the fuselage for evidence of damage.	
	3. Inspect skin surfaces for condition and loose or missing rivets.	
	4. Check structure for cracks, loose rivets and/or concealed damage.	
	5. Check rudder for freedom of movement and attachment.	
	6. Check elevator for freedom of movement and attachment.	
	7. Check trim tab actuators for smoothness of operation and attachment. Check the wiring of the electrical trim tab actuator for connection, security of attachment and condition. Check the electrical trim tab actuator for full travel and security of attachment.	
REPAIR OF DAMAGE		
Due to the variety and degree of structural damage which may be involved, the best repair or replacement procedure must be based on the inspection findings of the individual airplane. If the turbulent air inspection indicates that serious structural damage has occurred, contact Textron Aviation Technical Support, Textron Aviation Inc., Wichita, KS 67201, for assistance.		
LOG BOOK ENTRY		

Following a turbulent air inspection, an entry covering the extent of inspection, the damage and the repair (if applicable) must be noted in the permanent records.

9. Inspection After Lightning Strike

CAUTION: Propellers must be inspected and/or replaced utilizing the data provided in the manufacturers manuals prior to returning the airplane to service following any lightning strikes or other impact damage.

Item	Inspection Requirement	Inspection Interval
Propeller	1. At times the difficulty is not in inspecting the airplane, but in determining if a strike has occurred. Most times, an exit location will indicate possible damage to the components. The entry point is most often the propeller. A darkened area in the propeller tip may be noticeable after a lightning strike. A 3- to 5-power magnifier will show slag at the bottom of a nick in the propeller blade. If a strike is suspected, inspect deep nicks in the blade. Damage after a lightning strike should be corrected utilizing the procedure specified by the manufacturer. 2. Blade overhaul must be accomplished by a mechanic certified by propeller manufacturer. Damage beyond the limits specified by the propeller manufacturer may require the blade to be returned to the factory or to a designated repair facility for evaluation.	Prior to next flight.
Engine	Inspect as instructed in the appropriate Engine Maintenance Manual.	Prior to next flight.
Fuselage	1. Carefully inspect the exterior of the airplane. Evidence of a strike will usually appear as a burned hole or as a series of burned holes in metallic surfaces. Plastic parts may be delaminated and/or deformed due to high internal pressures. Normally two or more points will be found, the entry and the exit points. Antennas are frequently an entry point of lightning and should be carefully inspected for evidence of arcing, sooting or pitting.	Prior to next flight.
Fuselage (Continued)	2. From the point of entry, the strike usually spreads aft in a series of small holes or burn marks. After the points of entry and exit are found, the structure between these points should be carefully inspected. Attention should be given to hinges and hinge pins for possible pitting. Cables, pulleys, bearings, bolts and all bonding jumpers in the area should be inspected for possible damage. Antennas, electrical and electronic equipment should be visually checked for damage and functionally checked for operation. If the strike was near the fuel vent, all plumbing should be carefully inspected for damage. Steel components may exhibit magnetism and require degaussing so as not to affect compass systems.	

10. Operations in or Around Volcanic Ash

Flight operations in or exposure to volcanic ash may cause airframe damage and/or systems degradation. Volcanic ash is highly corrosive and airborne ash particles can be abrasive to exterior components and coatings. Additionally, ash can contaminate and even obstruct airframe systems and components such as heat exchangers, environment cooling turbines, water separator socks, and pitot-static system plumbing.

Engine components and filter may become contaminated with volcanic ash.

If an airplane has been operated in or exposed to volcanic ashes, including ash cloud fallout, perform an ash encounter survey to determine the level of contamination or damage and formulate a maintenance plan to maintain continued airworthiness.

A. Ash Encounter Survey

In most cases, an initial indicator of volcanic ash encounter will be noted on a post flight or preflight inspection. In more extreme cases, the crew may actually experience an in-flight engine or airframe system performance degradation. A dusting or fogging of the cockpit and/or cabin interior and furnishings may also be noted as volcanic ash is circulated by the airplanes air distribution system. If the pilot determines a more in depth ash encounter survey is necessary, guidelines for this survey and recommended maintenance actions are provided in the following.

If an airplane has been operated in or exposed to volcanic ashes, taxied on airfields subjected to volcanic ash fallout, or exposed to blowing ash, this survey will require gaining access to the avionics area, wing flap cove areas, landing gear wheel wells, engine compartment and fuselage area.

This survey should be conducted by personnel familiar with airframe configuration and systems of the airplane involved. As a general rule, the Airplane Flight Manual (AFM), Preflight Inspection; EXTERIOR INSPECTION, will provide a logical path through the areas of exterior evaluation. While conducting this inspection, particular attention should be given to airframe and engine leading edge surfaces, engine air inlet and exhaust areas, external lights and lenses, and fuselage air inlet and exhaust openings and drains (including the pitot-static system) for abrasion or contamination. Wing flap, airframe cavities, low points or other semi protected areas may harbor ash deposits as well. For the interior of the airplane, attention should be given to air distribution ducts and/or air outlets and cockpit and cabin furnishings for evidence of ash deposits.

Pilot reports of in-flight ash encounter and any associated airplane performance issues should also be considered during this survey. This information, along with any inspection findings, should be reviewed to determine the volcanic ash exposure.

(1) Volcanic Ash Exposure Survey

If airplane survey findings and/or pilot reports indicate any of the following, do the related maintenance action(s).

- Acrid odor (e.g. smell of sulfur gas or a hot electrical smell) noted in the cockpit or cabin area.
- Electrostatic discharge (St. Elmo's fire) on windshield, nose or engine cowlings.
- Engine exhaust gas temperature (EGT) fluctuations with return to normal values.
- Light, moderate or heavy painted surface erosion on nose cone, vertical stabilizer leading edge and elevator horns.
- Ash deposits accumulated in the landing gear wheel wells and/or wing flap cove areas.
- Ash deposits noted from pitot-static system drains.
- Obstruction or plugging of pitot tubes and/or static ports resulting in erroneous instrument readings.
- Visible airborne particles or contaminants, or similar report of air quality, in the cockpit or cabin area during flight.
- Ash deposits present in the air distribution system components.
- Ash deposits in the engine cowling.
- Engine damage.
- Vibration, surging of engine.
- Uncommanded In-flight engine shutdown.
- Frosting or chipping of cockpit windshields, landing and navigation lights and lenses due to impact of ash.

B. Maintenance Action (Before Next Flight)

WARNING: Do not spray water on electrical or avionics components.

NOTE: In addition to the tasks listed below, refer to the Teledyne Continental Motors (TCM) Service Information Directive (SID) 10-4 or subsequent revision thereof.

After an airplane has encountered low volcanic ash concentrations in flight, perform a visual inspection (to include, but not limited to) the following areas for signs of abrasion or ash contamination during pre/post-flight walk around (reference appropriate Flight Manual):

Volcanic ash deposits should be completely removed from all airframe and engine surfaces, including all wing and flight control enclosures, landing gear wheel well areas and nacelles. If the surface accumulation of ash deposits is greater than 1/4 inch (6 mm), initial removal should be accomplished with the hand brushes or vacuum equipment. Ash deposits which collect in close tolerance areas or moving surface hinge points may cause sticky or binding operation. Personal Protective Equipment (PPE) should be worn, when applicable, when removing volcanic ash.

Perform a clear, fresh water rinse of the airplanes exterior structure, including all wing and flight control enclosures and landing gear wheel well areas (Refer to Airplane Finish Care in section 20-08-00 in your airplane's maintenance manual). Rinse all areas thoroughly with water. No ash deposits should remain. Avoid spraying water directly on electrical components.

Following a clear, fresh water rinse, inspect airframe and engine cavities and low points for standing water. Remove any

standing water to prevent corrosion formation.

Item	Maintenance Actions
1. Nose Landing Gear Shock Strut	Clean off and wipe dry exposed polished surfaces.
2. Main Landing Gear Shock Struts	Clean off and wipe dry exposed polished surfaces.
3. Instrument Air Filters	Replace instrument line supply filters if volcanic ash found on filter element.
4. Alternate Air Door	Make sure door is sealed around all edges and there is adequate spring tension on the door.
CAUTION: To avoid damaging the barometric sensor; disconnect the autopilot sensor line prior to applying reverse air pressure to the pitot and static lines.	
5. Pitot and Static Lines System	Visually inspect the pitot and static system for ash contamination: CAUTION: Before blowing the lines through or applying reverse air pressure to the pitot and static lines, disconnect all instruments using pitot and/or static inputs. - If the lines and/or drain valves are contaminated, blow the system through with dry air until contamination is cleared. - If lines are obstructed, apply reverse air pressure (not to exceed 20 psi) to the ends of the pitot and static line until obstruction is cleared. - If the pitot head is contaminated - clean. If the pitot head cannot be sufficiently cleaned - replace.
6. Avionics Equipment	Inspect for presence of volcanic ash. Refer to avionics equipment manufacturer documentation for specific servicing and repair information.
7. Windshield	Visually inspect windshield for condition, erosion and obstruction.
8. Wing Leading Edges	Visually inspect wing leading edges for condition, erosion and obstruction.
9. Flaps and Flap Coves	Visually inspect flaps and flap coves for condition, erosion and obstruction.
10. All Flight Controls	Visually inspect all flights edges for condition, erosion and obstruction.
11. Horizontal and Vertical Stabilizers	Visually inspect horizontal and vertical stabilizers for condition, erosion and obstruction.
12. Air Intakes	Visually inspect air intakes for condition, erosion and obstruction.
13. Engine and Cowling	Visually inspect the engine and cowling for condition, erosion and obstruction.
14. Engine Oil Filters	Visually inspect the engine oil filters. Replace if necessary.
NOTE: Follow specific engine manufacturer's recommendations for possible volcanic ash encounters.	
15. Propeller	Visually inspect the propeller for condition, erosion and obstruction. Refer to appropriate propeller manufacture's documentation for maintenance instructions.
16. All protruding structures/components (OAT probes, antennas, pitot tubes, etc.)	Visually inspect all protruding structures/components for condition, erosion and obstruction.

After completing the above inspection, HBC recommends completing the lubrication requirements found in Figure 202 Lubrication Schedule, in Chapter 12-20-00 in the current model appropriate Airplane Maintenance Manual.

DAMAGE REPAIR

Due to the variety and degree of structural and/or component damage which may be involved, the best repair or replacement procedure must be based on the inspection findings of the individual airplane. If the contact with volcanic ash inspection indicates that serious corrosive or abrasion damage has occurred, contact Textron Aviation Technical Support, Textron Aviation Inc., Wichita, KS 67201, for assistance.

DIMENSIONS AND AREAS - DESCRIPTION AND OPERATION - GENERAL

1. Dimensions and Areas - Description and Operation

A. Airplane General Dimensions

- Model F33A: Airplane Serials (CE-748, CE-772 and After) [Figure 1](#)
- Model F33C: Airplane Serials (CJ-149 through CJ-155 without Kit No. 33-4002-1) [Figure 1](#)
- Model F33C: Airplane Serials (CJ-149 through CJ-155 with Kit No. 33-4002-1 and CJ-156 and After) [Figure 2](#)
- Model V35B: Airplane Serials (D-10097, D-10120 and After) [Figure 3](#)
- Model A36: Airplane Serials (E-1111, E-1241 through E-3635 except E-3630) [Figure 4](#)
- Model A36TC: Airplane Serials (EA-11 through EA-272 except EA-242) [Figure 5](#)
- Model B36TC: Airplane Serials (EA-242, EA-273 and After) [Figure 6](#)
- Model G36: Airplane Serials (E-3630, E-3636 and After) [Figure 7](#)

B. Airplane Station Diagrams

- Model F33A: Airplane Serials (CE-748, CE-772 and After) [Figure 8](#)
- Models F33A and F33C: Airplane Serials (CJ-149 and After) [Figure 8](#)
- Model V35B: Airplane Serials (D-10097, D-10120 and After) [Figure 9](#)
- Model A36: Airplane Serials (E-1111, E-1241 through E-3635 except E-3630) [Figure 10](#)
- Model A36TC: Airplane Serials (EA-11 through EA-272 except EA-242) [Figure 10](#)
- Model B36TC: Airplane Serials (EA-242, EA-273 and After) [Figure 11](#)
- Model G36: Airplane Serials (E-3630, E-3636 and After) [Figure 12](#)

Figure 1 : Sheet 1 : Airplane General Dimensions (CE-748, CE-772 and After; CJ-149 thru CJ-155 without Kit 33-4002-1)

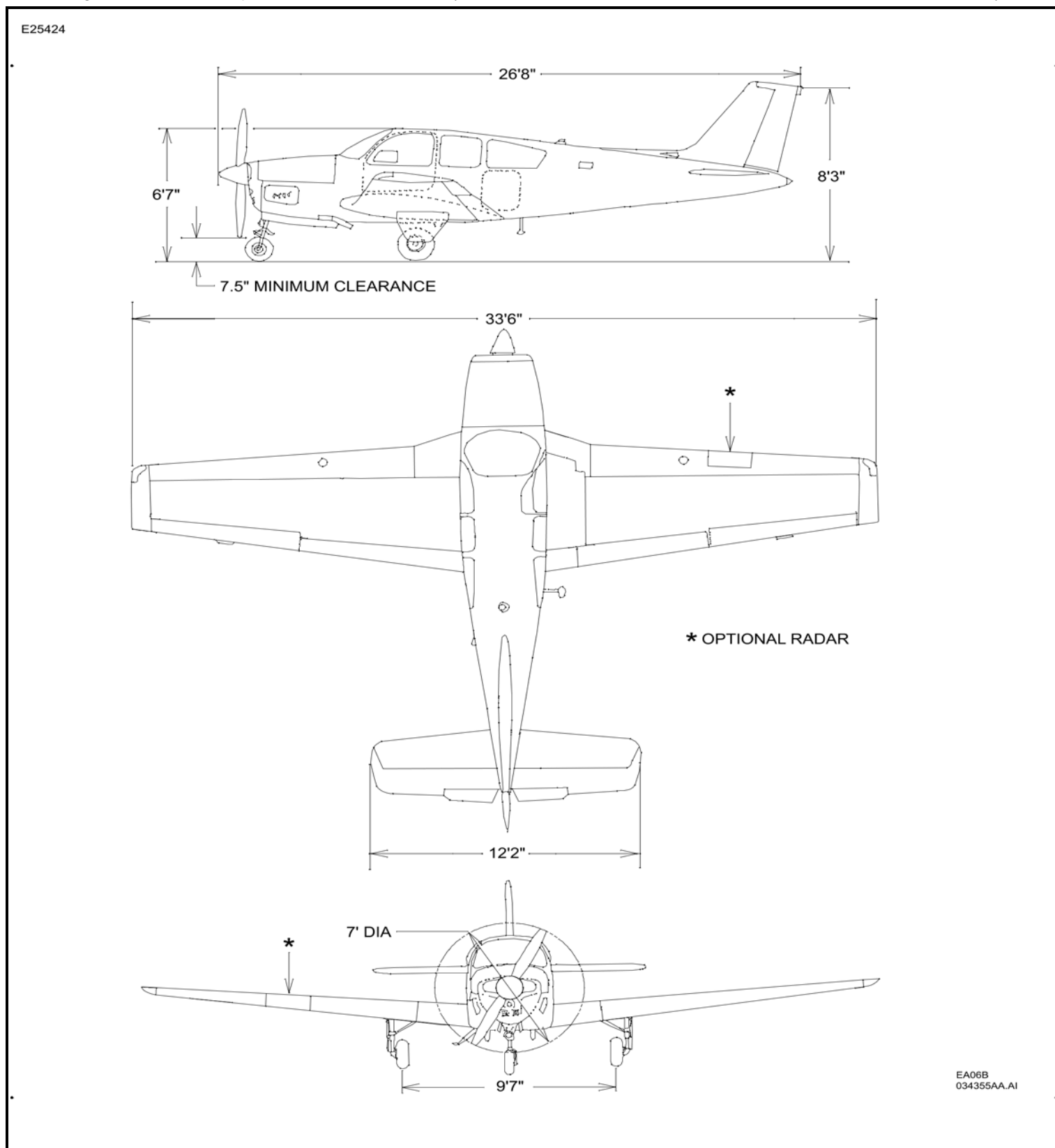


Figure 2 : Sheet 1 : Airplane General Dimensions (CJ-149 thru CJ-155 with Kit 33-4002-1 and CJ-156 and After)

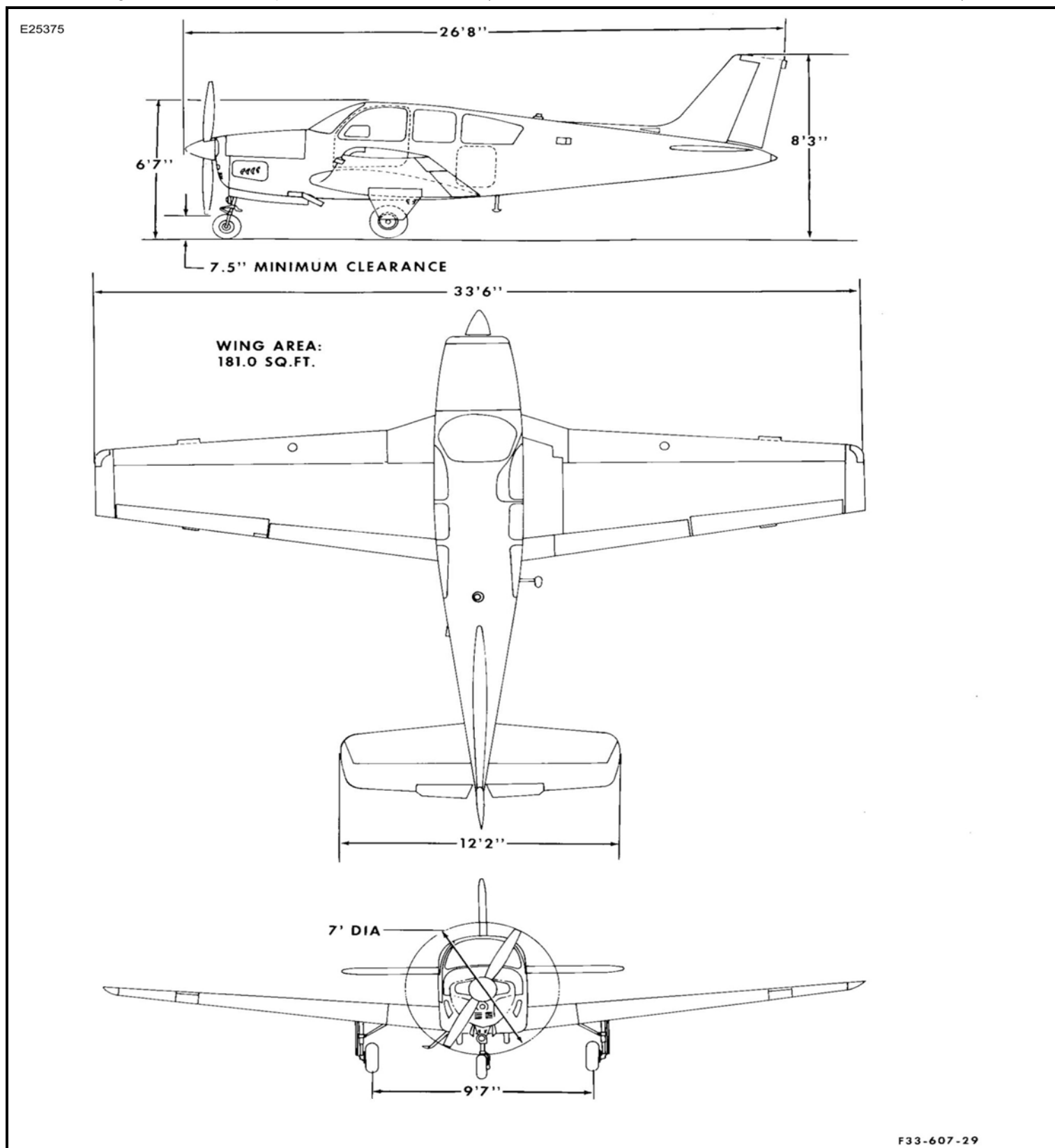


Figure 3 : Sheet 1 : Airplane General Dimensions (D-10097, D-10120 and After)

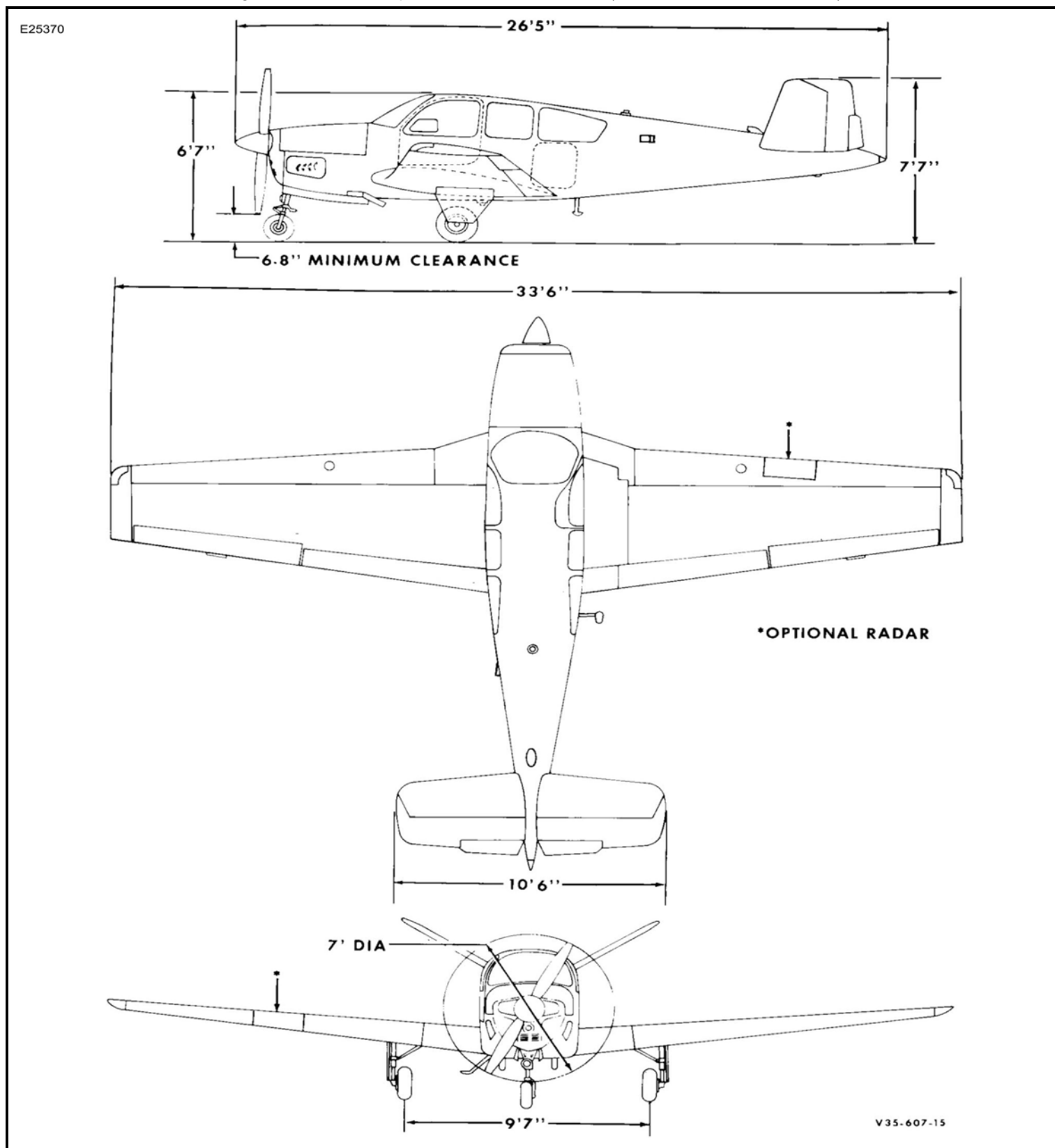


Figure 4 : Sheet 1 : Airplane General Dimensions (E-1111, E-1241 thru E-E3635 except E-3630)



Figure 5 : Sheet 1 : Airplane General Dimensions (EA-11 thru EA-272 except EA-242)

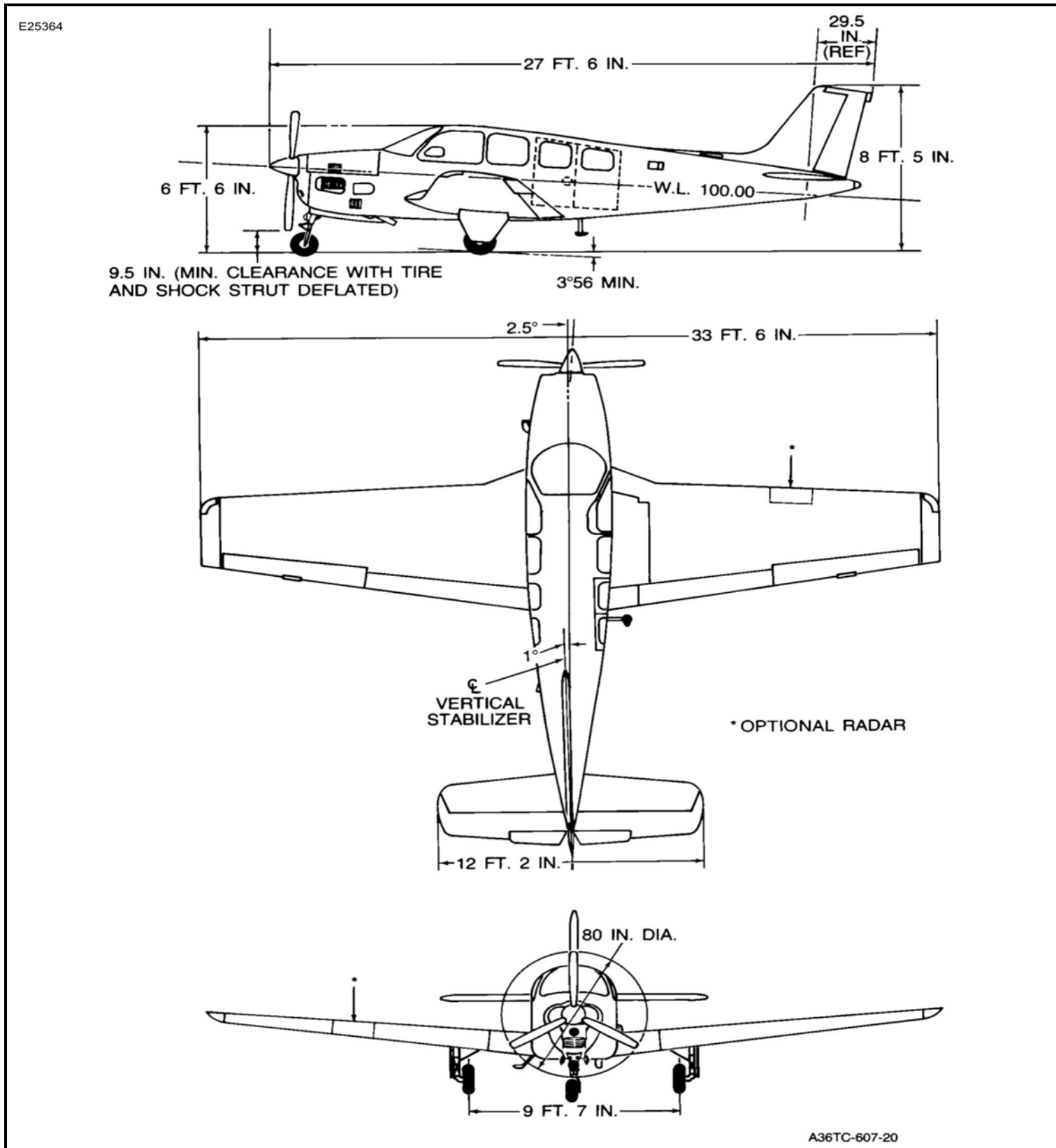


Figure 6 : Sheet 1 : Airplane General Dimensions (EA-242, EA-273 and After)

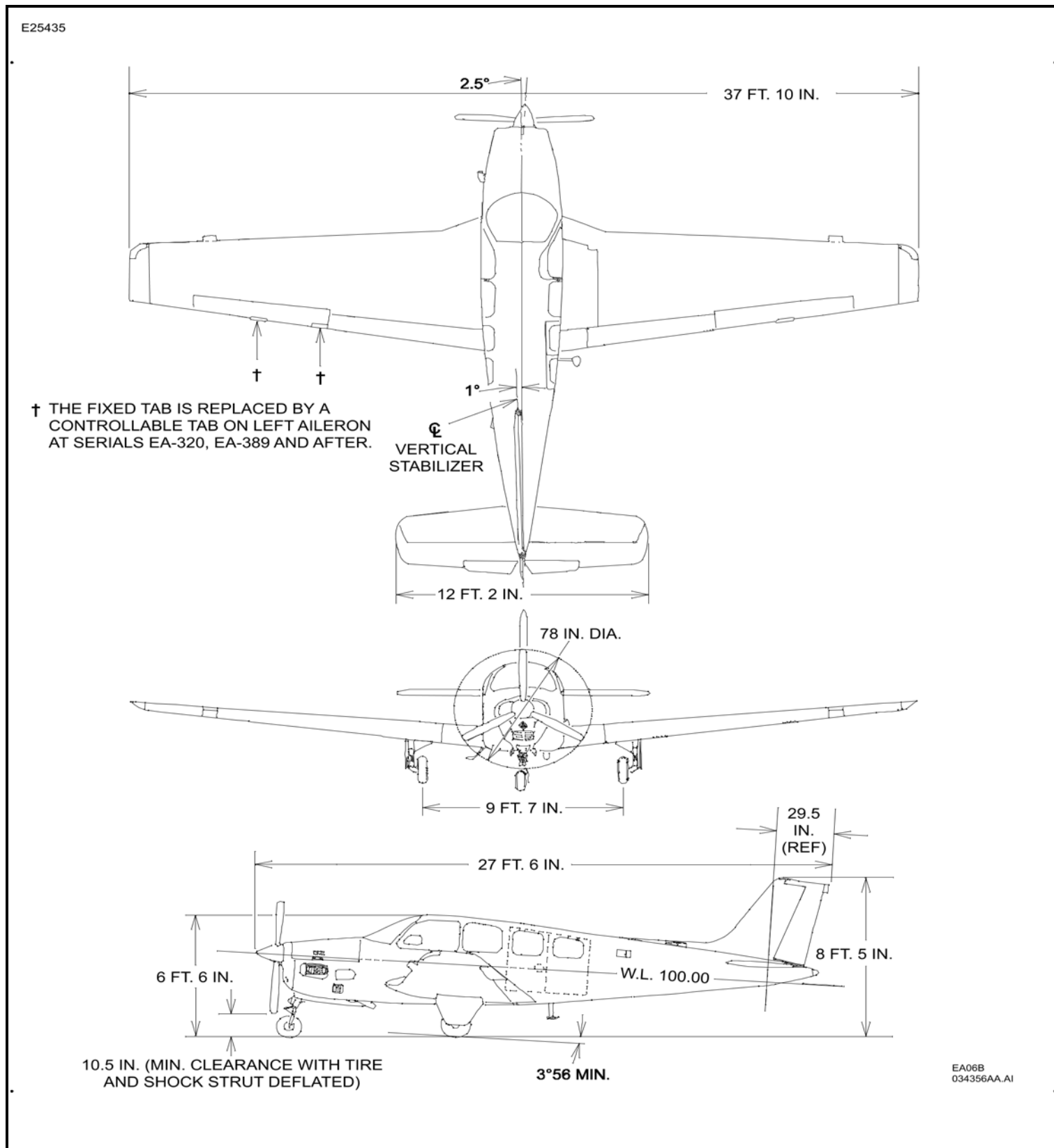
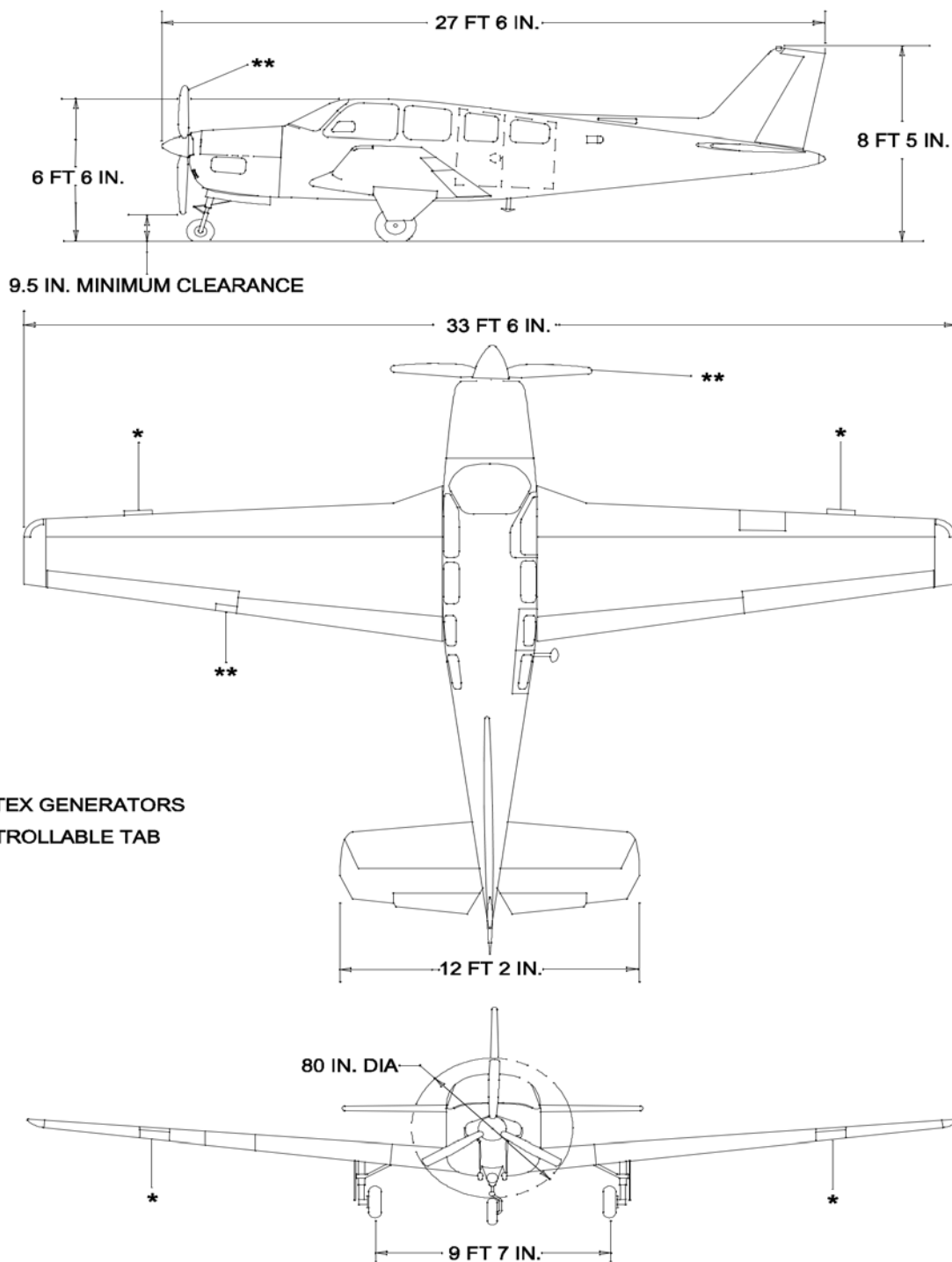


Figure 7 : Sheet 1 : Airplane General Dimensions (E-3630, E-3636 and After)

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Figure 8 : Sheet 1 : Airplane Stations Diagram (CE-748, CE-772 and After; CJ-149 and After)

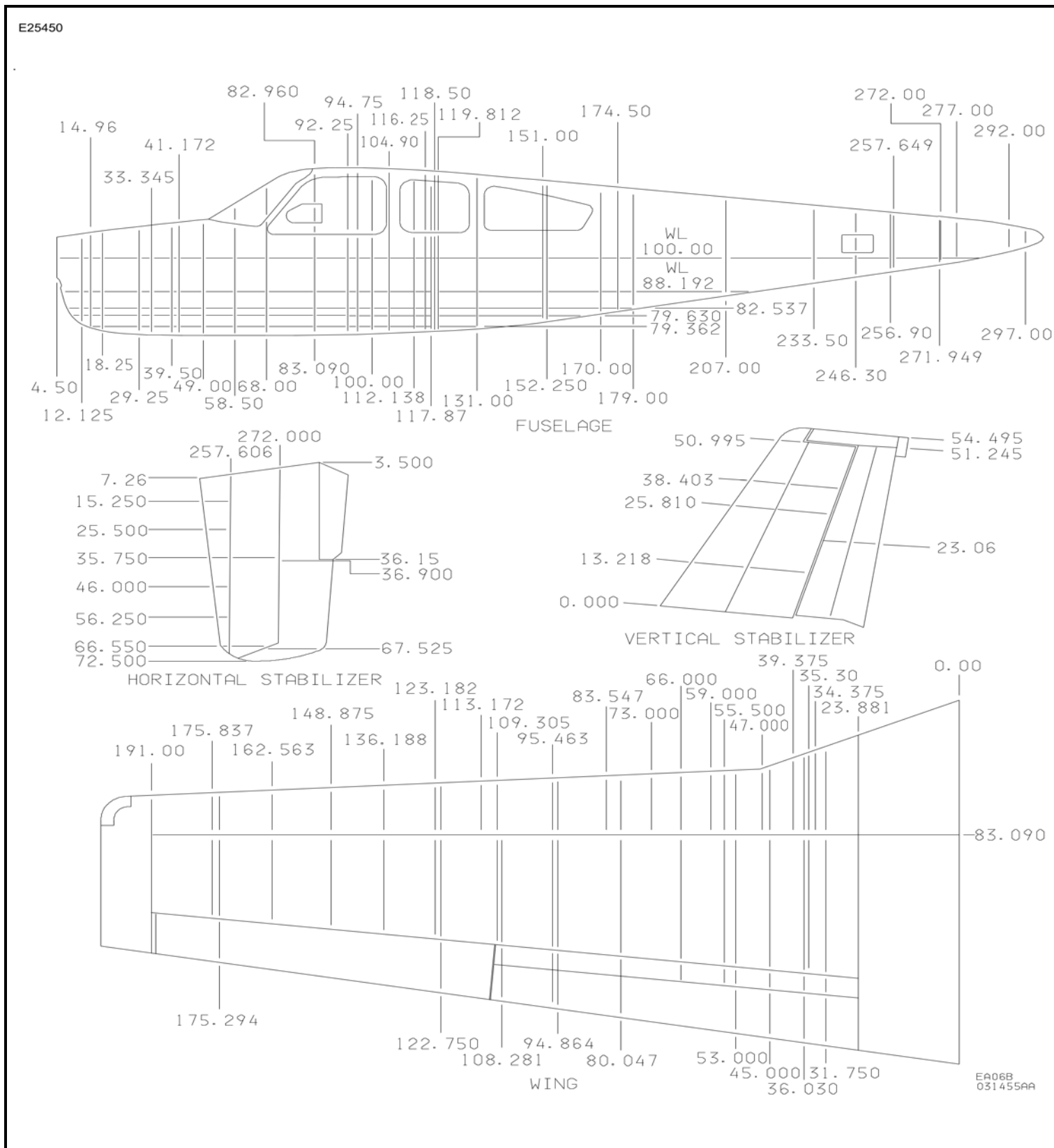


Figure 9 : Sheet 1 : Airplane Stations Diagram (D-10097, D-10120 and After)

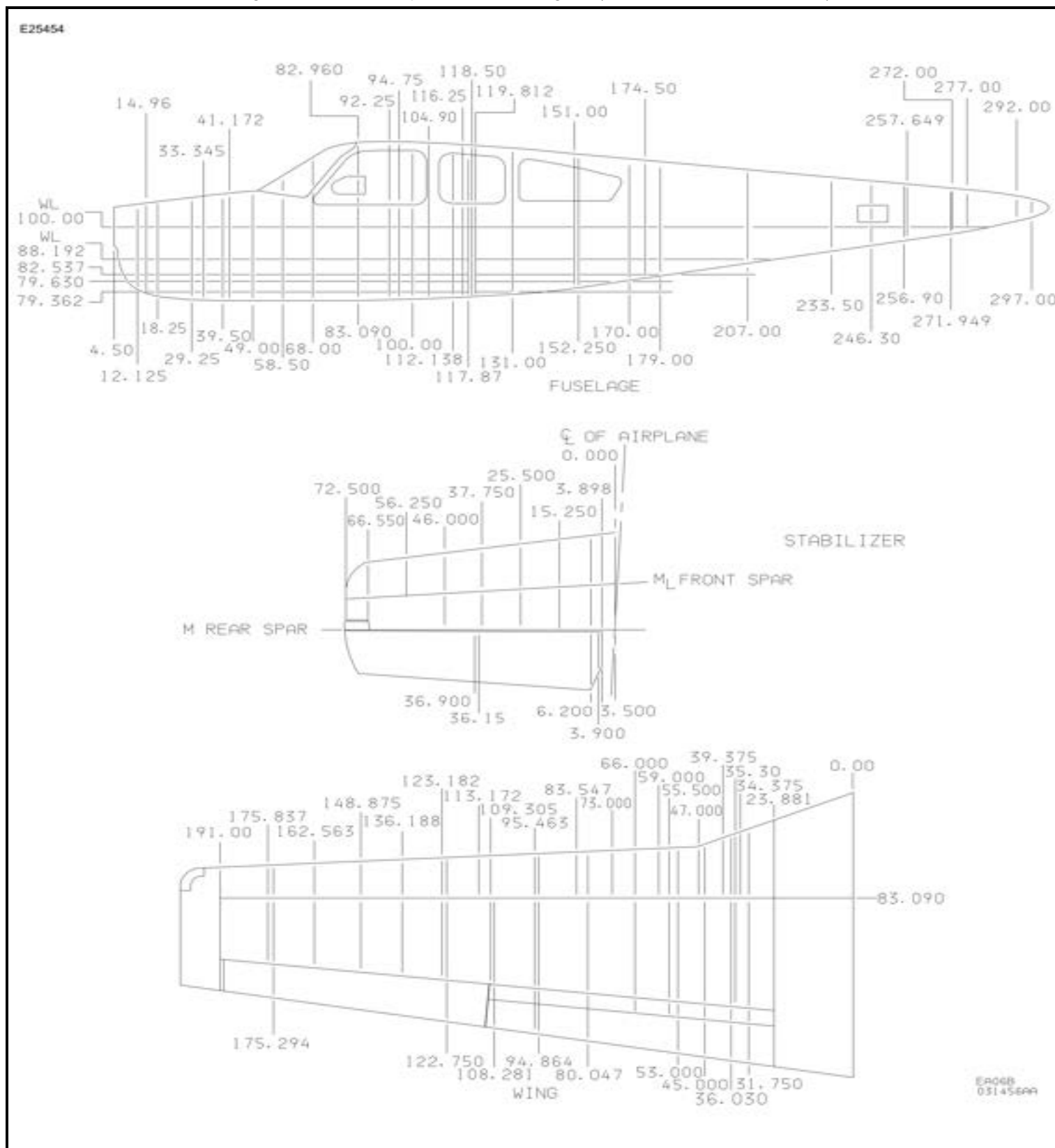


Figure 10 : Sheet 1 : Airplane Stations Diagram (E-1111, E-1241 thru E-3635 except E-3630; EA-11 thru EA-272 except EA-242)

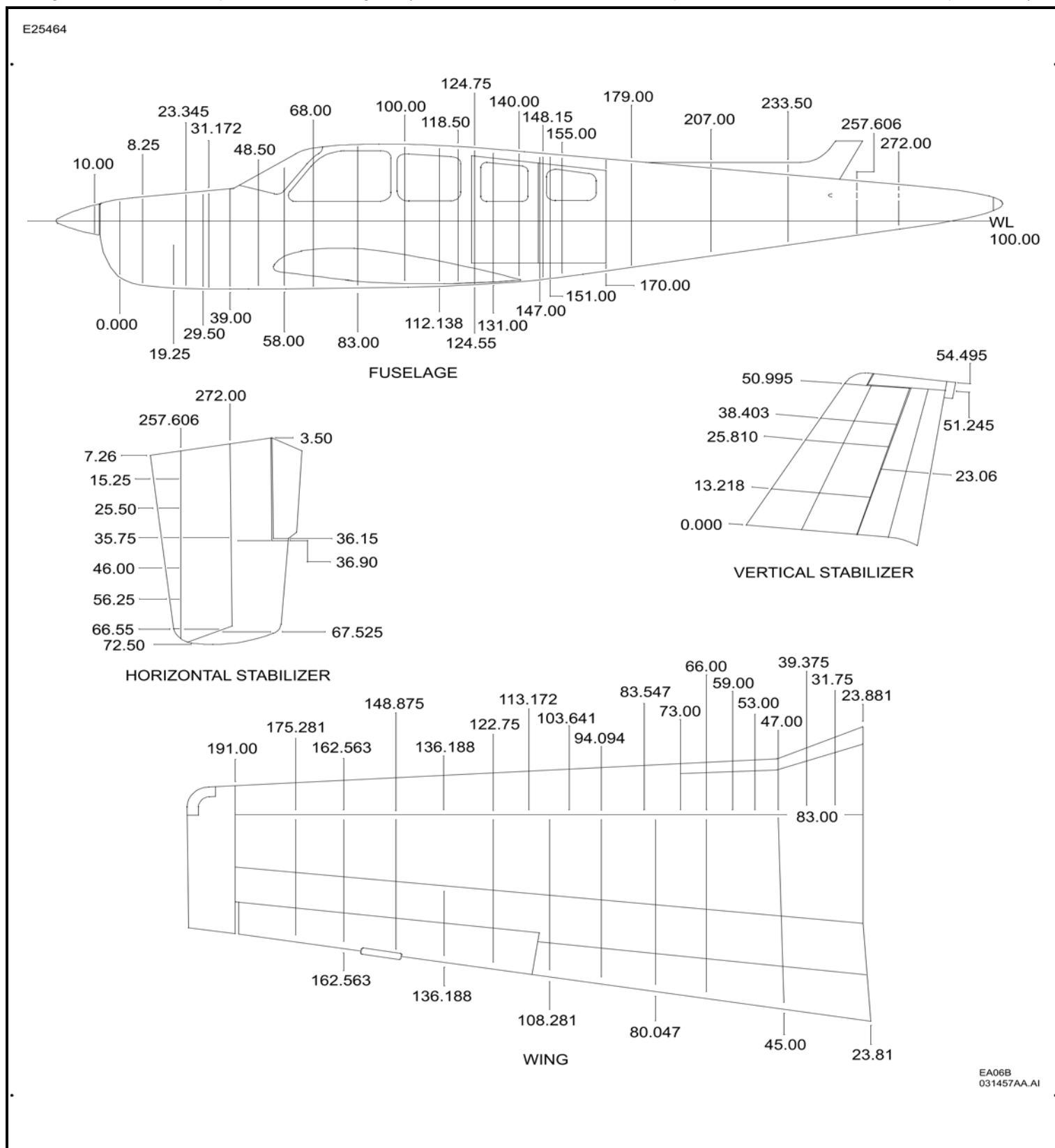


Figure 11 : Sheet 1 : Airplane Stations Diagram (EA-242, EA-273 and After)

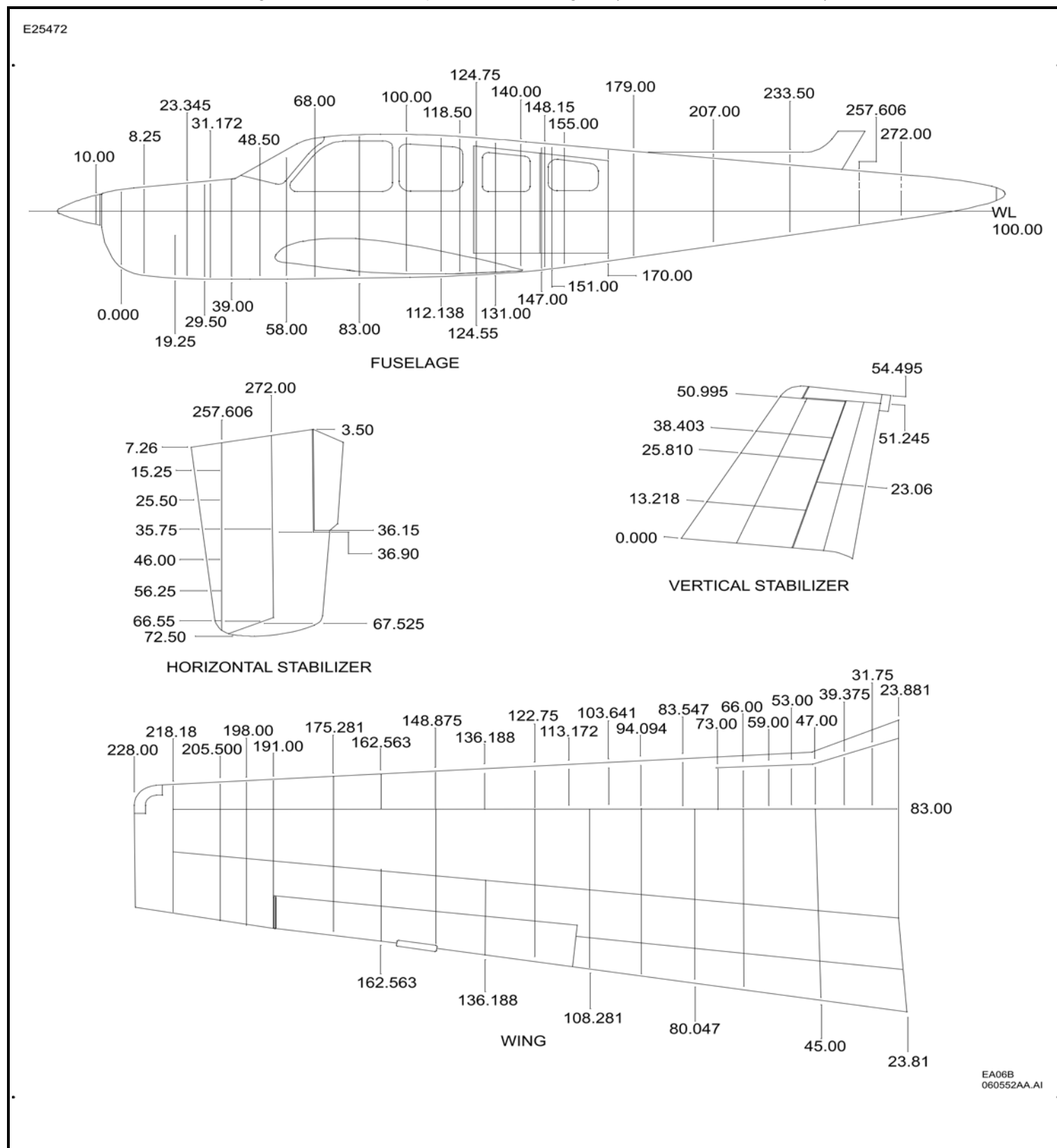
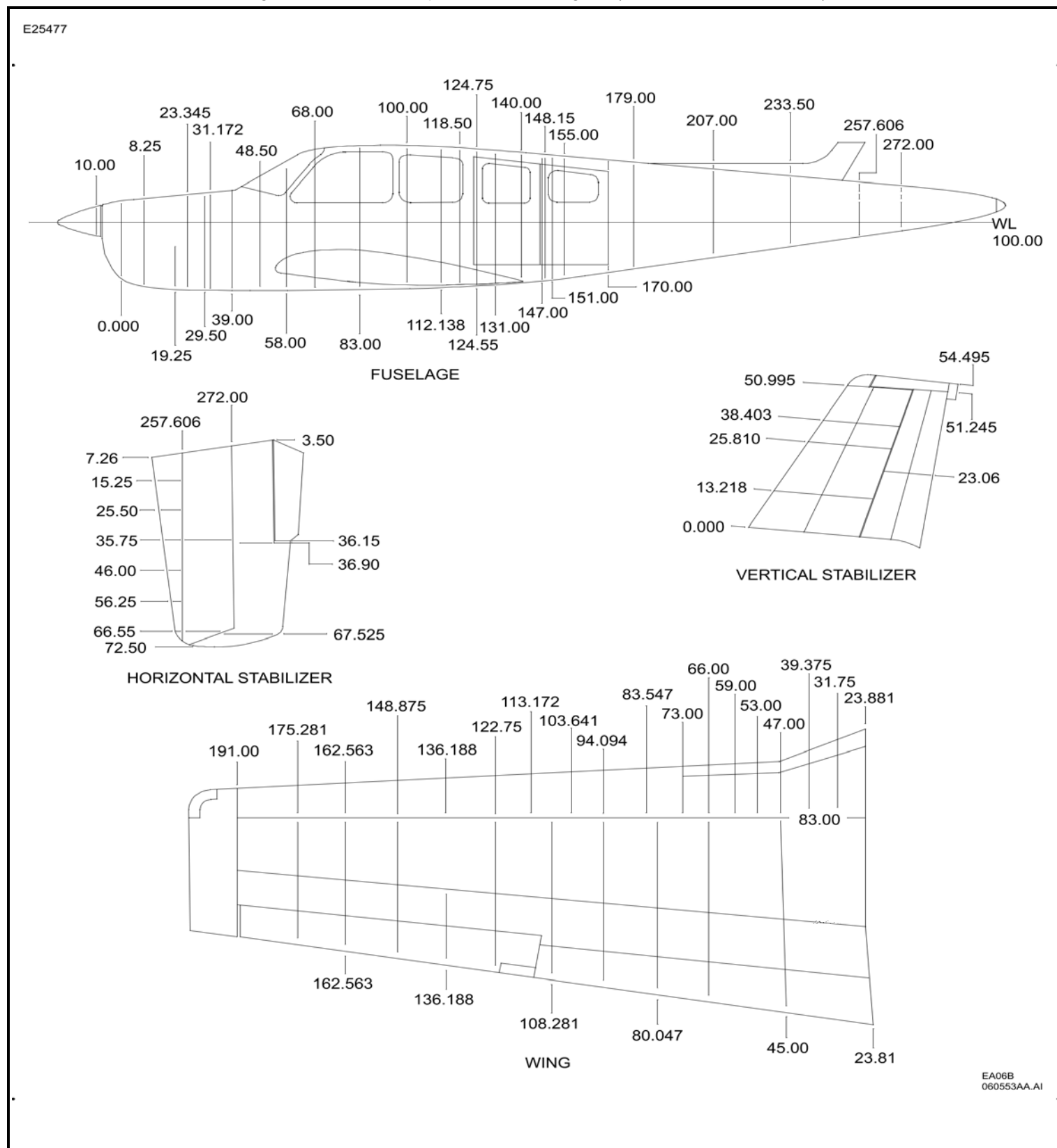


Figure 12 : Sheet 1 : Airplane Stations Diagram (E-3630, E-3636 and After)



LIFTING AND SHORING - MAINTENANCE PRACTICES

1. Lifting and Shoring - Maintenance Practices

A. Jacking

WARNING: The landing gear struts do not incorporate internal stops. When the airplane is on jacks, do not attempt to remove the torque knees, the torque knee pins or the bolt connecting the torque knees without first deflating the shock absorber assembly and supporting the gear. The torque knees provide the extension stop for the lower shock absorber assembly. When they are disconnected, the cylinder is free to slide out of the upper assembly.

CAUTION: Jacking the landing gear should only be accomplished within an enclosed building or hangar. Should it become necessary to jack the airplane in the open, no more than one jack point should be utilized at a time. For safety of personnel and the airplane, wind velocity in any direction must be considered prior to jacking the airplane.

A three point jack is used to lift the airplane off the ground (Refer to [Figure 1](#)). Each jack pad is identified and located on the underside of the fuselage. One jack pad is located on each of the lower wing-to-fuselage attachment fittings along the front spar. The rear jack fitting consists of an eye bolt that is screwed completely into the airplane.

WARNING: Be sure the rear jack point safety is in place and secured to prevent the airplane from nosing over. As an additional precaution against nosing over, attach, but not suspend, a weight of approximately 200 pounds to the aft tie-down lug.

When one wing is to be removed, a stand should be placed under the opposite wing and the tail to counteract the resulting unbalanced condition of the airplane.

B. Main Wheel Jacking

CAUTION: Do not walk on the wing walk with the airplane on the main wheel jack.

The main wheel jack adapter P/N 35-590006, is supplied as optional equipment (Refer to [Figure 2](#)). Before raising the airplane, be sure the shock strut is properly inflated to the correct height. If the strut is not inflated to the recommended height, it will be impossible to insert the jack adapter into the main wheel axle. A scissor type jack is recommended for individual wheel jacking.

CAUTION: When lowering the airplane, caution should be exercised to prevent the shock strut from becoming compressed and forcing the landing gear door against the jack adapter.

C. Hoisting

The airplane may be hoisted for maintenance or parts replacement as follows:

- (1) Install the hoisting sling fitting, P/N 35-590067, at each upper forward wing attach bolt location using bolts of the proper length with 5/8-18UNF threads.
- (2) Attach the hoisting sling assembly, P/N 35-590064-1, to the hoisting sling fittings (Refer to [Figure 3](#)).
- (3) Install the strap assembly around the propeller blade shanks.
- (4) Hoist the airplane smoothly.

NOTE: Adjust the strap assembly to keep the airplane in a level or slightly nose down attitude.

- (5) As an added precaution, a stand may be installed under the tail of the airplane.

CAUTION: A spreader must be used above the cabin to prevent damaging the door moulding and window frame.

If the airplane must be hoisted and the hoisting sling assembly, P/N 35-590064-1, is not available, remove the cabin door, the left front window and the front seats. Attach a sling to the front wing spar in the fuselage and a line to the hoist fitting on the engine.

Figure 201 : Sheet 1 : Model 300 Service Jack

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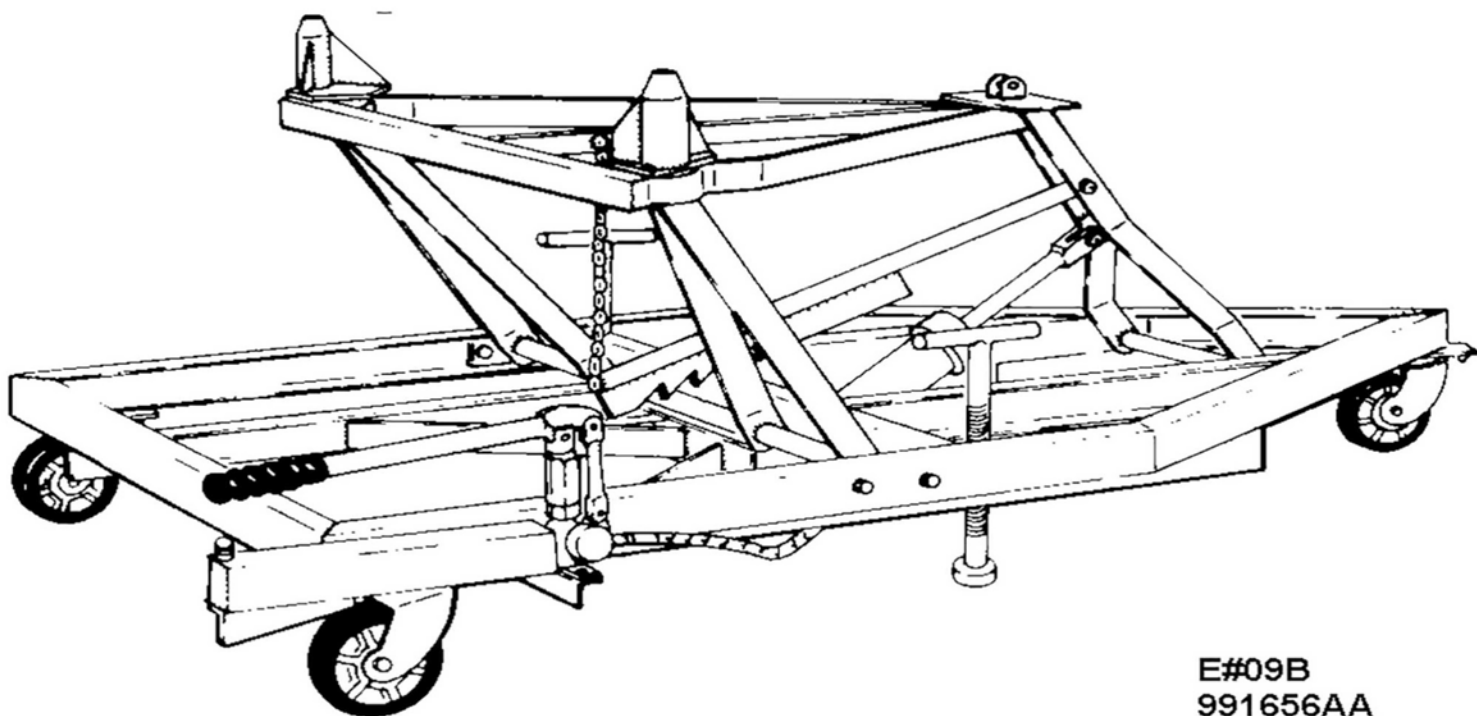
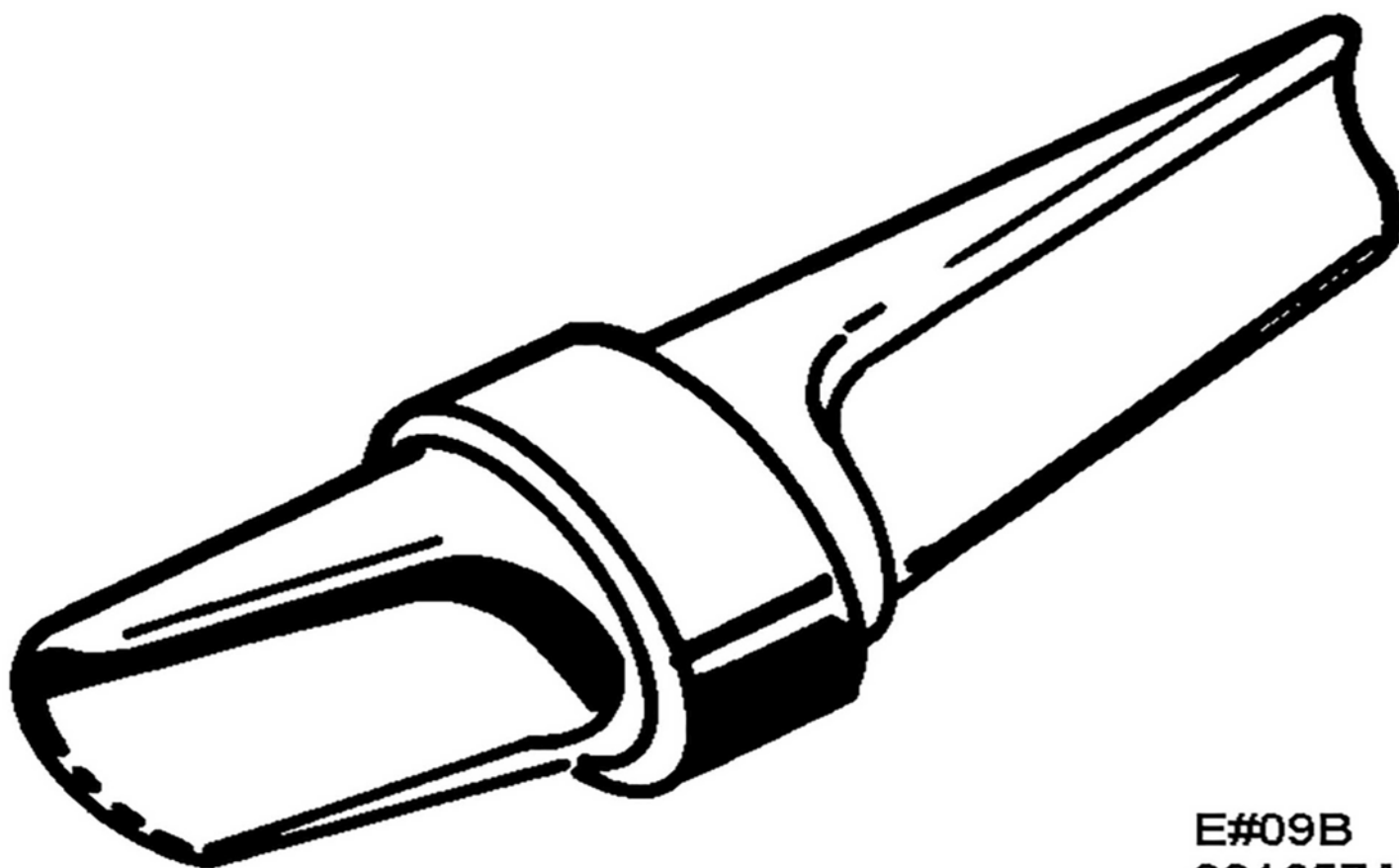


Figure 202 : Sheet 1 : Main Wheel Jack Adapter (P/N 35-590006)

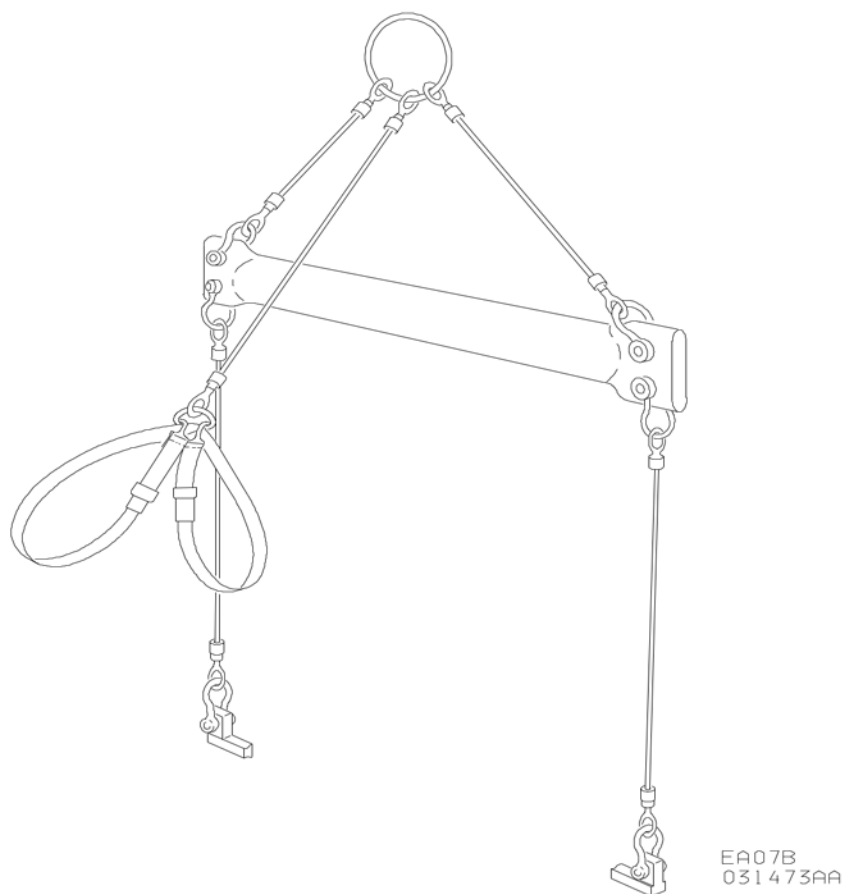
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Figure 203 : Sheet 1 : Hoisting Sling Assembly P/N 35-590064-1

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LEVELING - MAINTENANCE PRACTICES

1. Leveling - Maintenance Practices

To level the airplane longitudinally, attach a cord and plum bob to the phillips head screw, located beneath the rear window on the left side of the airplane. Inflate or deflate the nose gear shock strut as necessary to pass the cord through the center of the second phillips head screw directly below. Suspending the plum bob in a can of light engine oil will assist in stabilizing it.

Lateral levelling is accomplished by removing the front seat(s) and placing a bubble level on the spar carry thru structure. Deflate the tire or strut on the high side of the airplane to center the bubble.

TOWING AND TAXIING - MAINTENANCE PRACTICES

1. General - Maintenance Practices

A. Towing

WARNING: If it is necessary to move the propeller to attach the tow bar and the engine is warm, stand clear of the area of rotation and move the propeller against the normal direction of rotation. Make certain the magneto switch is off. When the engine is warm, residual fuel in the intake ports and injectors may ignite and cause the engine to kick.

CAUTION: When an airplane is being towed, a qualified person must be in the pilot's seat to operate the brakes in case of an emergency. When the airplane is being moved backwards, do not apply the brakes abruptly. Tow the airplane slowly, avoiding sudden stops. Never tow or taxi the airplane with a flat strut. Even brief towing or taxiing with a deflated strut can cause severe damage to the strut.

CAUTION: The top of the cabin door should not be used as a handhold while entering or leaving the cabin. Always open the storm window to relieve internal pressure when closing the door. Never leave the door open on the ramp as wind gusts may damage the door.

(1) One Person Towing

CAUTION: The hand tow bar shall not be used with a tow vehicle. After moving the airplane, remove the hand tow bar. Never turn the propeller with the hand tow bar attached to the nose landing gear as the propeller could hit the hand tow bar.

One person can move the airplane easily on a smooth and level surface with the hand tow bar (P/N 36-590015) furnished with the airplane (Refer to [Figure 201](#)). Attach the hand tow bar to the tow pins on the nose landing gear (NLG) lower torque knee and push or pull gently to move the airplane. Remove the hand tow bar when towing has been completed.

(2) Towing with a Tractor or Tug

CAUTION: Maximum turn limits when towing are reached when either of the red lower turn limit marks (located on the attach lugs of the NLG barrel) aligns with the red upper turn limit mark (located on the center line of the NLG brace (Refer to [Figure 202](#)).

CAUTION: Do not attempt to tow the airplane backward by the fitting in the tail skid. The tail skid was designed only to provide attachment for the tail tie-down and to protect the tail in the tail low landing.

To tow the airplane with a tractor or tug, attach the tow bar (P/N 45-590075) to the tow pins on the NLG lower torque knee. Always observe the turn limits of the NLG when making turns (Refer to [Figure 202](#)). Turns greater than these limits can cause extensive damage to the NLG and shimmy damper. Also, exercise care when removing the tow bar from the NLG lower torque knee in order to prevent damage to the lubrication fittings on the torque knee.

B. Taxiing

CAUTION: Never taxi or tow the airplane with a flat strut. Even brief taxiing or towing with a deflated strut can cause severe damage to the strut. The top of the cabin door should not be used as a handhold while entering or leaving the cabin. Always open the storm window to relieve internal pressure when closing the door. Never leave the door open on the ramp as wind gusts may damage the door.

The airplane shall be taxied with the wing flaps up and the engine cowl flaps open. Turning of the airplane while taxiing is accomplished by the use of the airplane's NLG steering mechanism.

Figure 201 : Sheet 1 : Hand Tow Bar

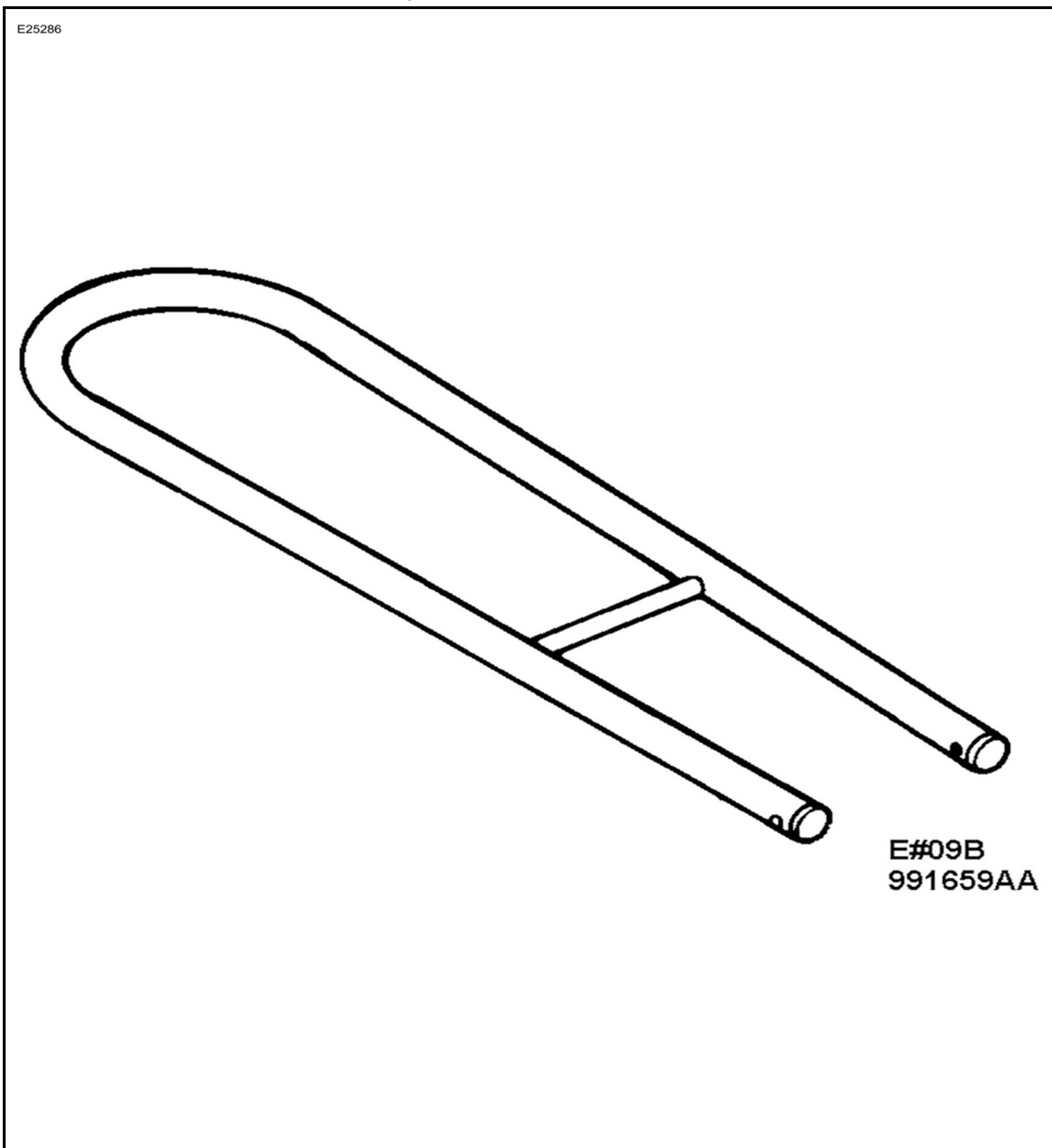
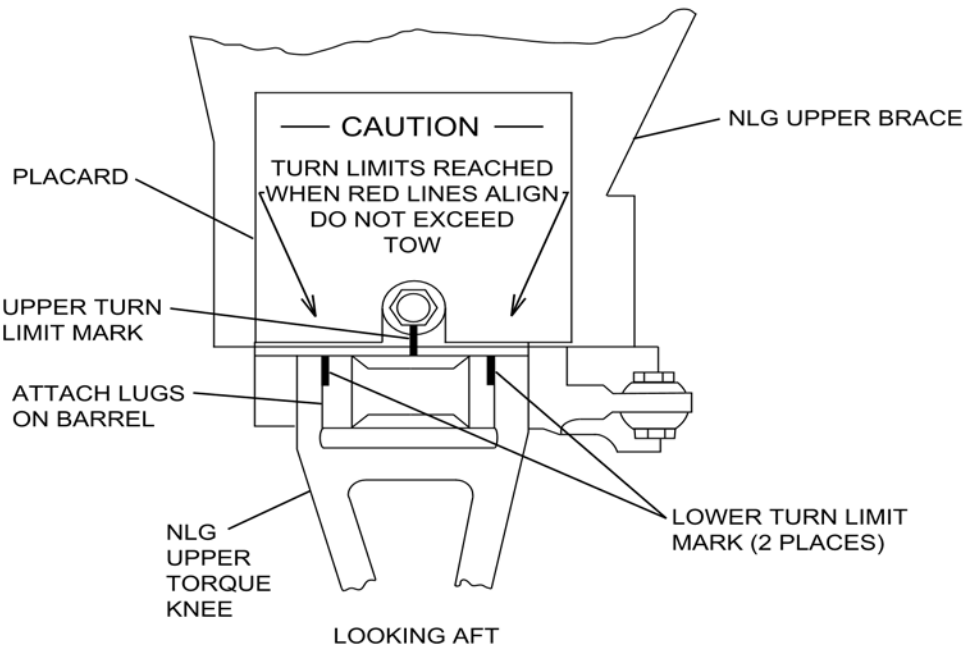


Figure 202 : Sheet 1 : Nose Landing Gear Tow Limits

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PARKING, MOORING, STORAGE AND RETURN TO SERVICE - MAINTENANCE PRACTICES**1. Maintenance Practices****A. Parking**

The brakes are set for parking by pulling out the parking brake control, then pressing the pilot's brake pedals until firm. Do not attempt to lock the parking brake by applying force to the parking brake handle; it controls a valve only and cannot apply pressure to the brake master cylinders.

CAUTION: Do not set the parking brake control when the brakes are hot from severe use or during low temperature when an accumulation of moisture may cause the brakes to freeze. An increase in outside air temperature can build up excessive pressure in the system. In addition, the parking brake should be left OFF and wheel chocks installed if the airplane is to be left unattended.

B. Mooring

This section is designed to provide guidelines which can be followed when mooring and securing Bonanza series airplanes. Mooring procedures for normal tie-down operations as well as mooring for extended storage and high wind conditions follow:

(1) Normal Tie-Down

On Bonanza series airplanes, a tie-down lug is installed on each wing, and on the aft fuselage. The tie-downs should be nylon or dacron ropes or chains with sufficient strength to restrain the airplane in high or gusty winds. Manila or hemp ropes should never be used. The tie-downs should allow very little or no movement when tightened, too much slack will allow the airplane to jerk against the tie-downs. When securing the tail section of the airplane, the tie-down should have a slight slack so that the nose of the airplane will not be raised off the ground. In a strong headwind, a tail tie-down that is too tight will increase the angle between the wing and the oncoming air. This creates an additional lifting force, which causes more pressure to be placed on the wing tie-down ropes and anchors. Adequate anti-slip knots such as bowlines or square knots should be used when securing the lines.

Securing operations should be planned so the airplane is tied down facing the prevailing wind, if the ground attachment permits. Once the airplane has been positioned into the wind, the wheels should be chocked fore and aft. The flight control surfaces must then be secured to prevent banging against the stops. The controls should be secured in position with control locks that are installed in the control column. When mooring, make sure all doors and windows are properly fastened. Pitot-static tubes should be covered.

(2) Extended Storage and High Wind

When mooring the Bonanza, the following method is recommended:

- Place chocks fore and aft of each main wheel.
- Position a tail stand under the tail skid, adjusting the height of the stand to slightly compress the nose gear shock strut.
- Run a line through each wing mooring lug, fastening each end to a ground point, one forward and one aft of the wing.
- Run a line through the hole in the tail skid and anchor at the sides of the airplane approximately 5 feet from the base of the stand.
- If a storm is anticipated, two lines may be secured to each main landing gear strut barrel near the V-brace and also a line may be attached around the nose gear strut near the lower torque knee.
- It is recommended that the airplane be tied down headed into the wind, with the control lock installed.

C. Control Lock

A control column lock pin is provided for the control column and the aileron control wheel. The lock pin secures both the aileron control wheel and the elevator control. A cover is provided on the control lock to cover the throttle control, boost pump, and the propeller control. Install the control lock assembly in the following sequence:

- (1) Rotate the control wheel to the right and move the column forward so the hole in the bracket and the column align to accept the pin.
- (2) Push the control column lock pin through the hole provided in the control column guide and into the control column.
- (3) Make sure of positive retention of the lock pin by placing the cover assembly over the throttle control, boost pump, and the propeller control.

WARNING: Always completely remove the control lock assembly before engine start, taxiing, and flight.

D. Storage

The storage procedures listed are intended to protect the airplane from deterioration while it is not in use. The primary objectives of these measures are to prevent corrosion and damage from exposure to the elements. Three types of storage are considered:

- (1) FLYABLE STORAGE- 7 to 30 days.
- (2) TEMPORARY STORAGE- up to 90 days.
- (3) INDEFINITE STORAGE.

(a) Flyable Storage - 7 to 30 Days

- 1 MOORING- If the airplane cannot be placed in a hangar, install the control lock and tie the airplane down securely at the three points provided. Do not use hemp or manila rope. It is recommended a tail support be used to compress the nose strut and reduce the angle of attack of the wings. Attach a line to the nose gear.
- 2 ENGINE PREPARATION FOR STORAGE - Engines in airplanes that are flown only occasionally tend to exhibit cylinder wall corrosion much more than engines that are flown frequently.
 - (a) Check for correct oil level and add oil if necessary to bring level to full mark
 - (b) Run engine at least five minutes at 1,200 to 1,500 rpm with oil and cylinder head temperatures in the normal operating range.

WARNING: Before rotation of propeller blades, ascertain magneto switch is OFF, throttle in CLOSED position and mixture control is in the IDLE CUT-OFF position. Always stand in the clear while turning propeller.

- 3 DURING FLYABLE STORAGE - Each seven days during flyable storage, the propeller shall be rotated by hand. After rotating the engine six revolutions, stop the propeller 60° to 120° from the position it was in.
 - (a) If at the end of 30 days, the airplane will not be removed from storage, the engine should be started and run. The preferred method is to fly the airplane for 30 minutes in order to keep the internal parts of the engine lubricated. Ground running of the engine will not provide proper heating of the oil without possible damage to other engine compartment components due to lack of air flow, and will result in condensation of moisture in the oil supply, increasing the possibility of cylinder/crankshaft rust.
- 4 FUEL CELLS - Fill to capacity to minimize fuel vapor and protect cell inner liners.
- 5 FLIGHT CONTROL SURFACES- Lock with internal and external locks.
- 6 GROUNDING - Static ground airplane securely and effectively.
- 7 PITOT TUBE - Install cover.
- 8 WINDSHIELD AND WINDOWS - Close all windows and window vents. It is recommended that covers be installed over windshield and windows.
- 9 PREPARATION FOR SERVICE - Remove all covers and tape, clean the airplane and give it a thorough inspection, particularly wheel wells, flaps, and control openings.
 - (a) If the engine has a total time of more than 25 hours and the oil consumption has stabilized, drain the break-in oil after a ground warm-up and install oil per Teledyne Continental Motors Specification MHS-24C.
 - (b) Preflight the airplane.

(b) Temporary Storage - 30 to 90 Days

- 1 MOORING - See FLYABLE STORAGE.
- 2 ENGINE PREPARATION FOR STORAGE
 - (a) Drain the oil supply from the engine sump (Refer to OIL SYSTEM, 12-10-00).
 - (b) Replace the oil filter (Refer to OIL SYSTEM, 12-10-00).
 - (c) Fill the engine sump to the full mark on the dipstick gage with corrosion preventive compound (3, Table 1, 91-00-00).
 - (d) Perform a ground run-up; then perform a pre-flight inspection and correct any discrepancies.
 - (e) Fly the airplane for 1 hour at normal operating temperatures.

WARNING: To prevent the possibility of serious bodily injury or death, before moving the propeller, accomplish the following:

- Disconnect all spark plug leads.

- **Make sure that the magneto switches are connected to magnetos, are in the off position and the "P" leads are grounded.**
- **Make sure that the throttle is in the "CLOSED" position.**
- **Make sure that the mixture control is in the "IDLE_CUT_OFF" position.**
- **Make sure that the brakes are set and the airplane wheels are blocked. Make sure the airplane tie-downs are installed and the cabin door latch is open.**
- **Make sure that no personnel stand within the arc of the propeller blades while turning the propeller.**

- (f) Remove all spark plug leads and remove the top spark plugs. Protect the ignition lead ends with AN-4060 protectors.
- (g) Spray atomized preservative oil (4, Table 1, 91-00-00) at room temperature, through the upper spark plug hole of each cylinder with the piston at the bottom dead center position. Rotate the crankshaft as opposite cylinders are sprayed. Stop the crankshaft with none of the pistons at top dead center.
- (h) Respray each cylinder. To thoroughly cover all surfaces of the cylinder interior, move the nozzle or spray gun from the top to the bottom of the cylinder.
- (i) Install the top spark plugs but do not install the spark plug leads.
- (j) Seal all engine openings exposed to the atmosphere using suitable plugs and covers. Attach a red "REMOVE BEFORE FLIGHT" streamer at each location.
- (k) Tag the propeller in a conspicuous place with the following notation "DO NOT TURN PROPELLER - ENGINE PRESERVED - PRESERVATION DATE _____".

NOTE: If the engine is not returned to flyable status on or before the 90-day expiration, the engine must be preserved in accordance with paragraph (c) Indefinite Storage procedure.

- 3 FUEL CELLS - Fill to capacity to minimize fuel vapor and protect cell inner liners.
 - 4 FLIGHT CONTROL SURFACES - Lock with internal and external locks.
 - 5 GROUNDING - Static ground airplane securely and effectively.
 - 6 PITOT TUBE - Install cover.
 - 7 WINDSHIELD AND WINDOWS - Close all windows and window vents. It is recommended cover be installed over windshield and windows.
 - 8 BATTERY - Remove and store according to standard practices.
 - 9 PREPARATION FOR SERVICE - Remove all covers, tape, and tags. Clean the airplane and give it a thorough inspection, particularly wheel wells, flaps, and control openings. With bottom spark plugs removed, hand turn propeller several revolutions to clear excess preservative oil, then reinstall plugs. Preflight the airplane and flight test.
- (c) Indefinite Storage
- 1 MOORING - See FLYABLE STORAGE.
 - 2 ENGINE PREPARATION FOR STORAGE
 - (a) Drain the oil supply from the engine sump (Refer to OIL SYSTEM, 12-10-00).
 - (b) Replace the oil filter (Refer to OIL SYSTEM, 12-10-00).
 - (c) Fill the engine sump to the full mark on the dipstick gage with corrosion preventive compound (3, Table 1, 91-00-00).
 - (d) Perform a ground run-up; then perform a pre-flight inspection and correct any discrepancies.
 - (e) Fly the airplane for 1 hour at normal operating temperatures.

WARNING: To prevent the possibility of serious bodily injury or death, before moving the propeller, accomplish the following:

- **Disconnect all spark plug leads.**
- **Make sure that the magneto switches are connected to magnetos, are in the off position and the "P" leads are grounded.**
- **Make sure that the throttle is in the "CLOSED" position.**
- **Make sure that the mixture control is in the "IDLE_CUT_OFF" position.**
- **Make sure that the brakes are set and the airplane wheels are blocked. Make sure the airplane tie-downs are installed and the cabin door latch is open.**

- **Make sure that no personnel stand within the arc of the propeller blades while turning the propeller.**

- (f) Remove all spark plug leads and remove the spark plugs. Protect the ignition lead ends with AN-4060 protectors. Install protective plugs, part number 22671, in the bottom spark plug holes.
- (g) Spray atomized preservative oil (4, Table 1, 91-00-00) at room temperature, through the upper spark plug hole of each cylinder, with the piston at the bottom dead center position. Rotate the crankshaft as opposite cylinders are sprayed. Stop the crankshaft with none of the pistons at top dead center.
- (h) Respray each cylinder. To thoroughly cover all surfaces of the cylinder interior, move the nozzle or spray gun from the top to the bottom of the cylinder.
- (i) Install dehydrator plugs MS27215-1 or -2 in each of the top spark plug holes. Make sure each plug is blue in color when installed.
- (j) Attach a red "REMOVE BEFORE FLIGHT" streamer to each bag of desiccant. Place a bag of desiccant in the exhaust pipes and seal the openings.
- (k) Seal all engine openings exposed to the atmosphere using suitable plugs and covers. Attach a red "REMOVE BEFORE FLIGHT" streamer at each location.
- (l) Tag the propeller in a conspicuous place with the following notation "DO NOT TURN PROPELLER - ENGINE PRESERVED - PRESERVATION DATE _____".

3 DURING INDEFINITE STORAGE

- (a) Visually inspect the cylinder dehydrator plugs every 15 days. The plugs must be changed as soon as they indicate other than a dark blue color. If the dehydrator plugs have changed color in one-half or more of the cylinders, all desiccant material on the engine must be replaced.
- (b) The cylinder bores must be re-sprayed with corrosion preventive compound (3, Table 1, 91-00-00) every 90 days.

4 PROPELLER - Coat blades with preservative oil and wrap with moisture proof material and tape. If propeller has been removed, coat all parts with protective material to exclude dust, and then tape.

5 FUEL CELLS - Drain fuel cells.

- (a) Flush, spray, or rub a thin coating of light engine oil on the inner liners of all fuel cells which have contained gasoline.
- (b) After 24 hours, remove cells and store according to standard practices. Do not remove or handle fuel cells until 24 hours after oil has been applied.

6 FLIGHT CONTROL SURFACES - Lubricate all flight control surface hinge pins, bearings, bellcranks, chains, control rods and quadrants and coat lightly with corrosion preventive compound (5, Table 1, 91-00-00).

- (a) Lock with internal and external control locks.

7 GROUNDING - Static ground airplane securely and effectively.

8 PITOT TUBE - Apply a thin coating of grease (6, Table 1, 91-00-00), and install cover.

9 WINDSHIELD AND WINDOWS - Close all windows and window vents and install covers over windshield and windows.

10 LANDING GEAR - Coat the extended portion of the shock struts with light weight oil.

11 TIRES - Install covers. Check air pressure periodically. Inflate as necessary.

12 WING FLAP TRACKS AND ROLLERS - Coat with corrosion preventive compound. Place flaps in retracted position.

13 BATTERY - Remove and store according to standard practices.

14 INSTRUMENT PANEL - Cover with barrier material and secure with tape.

15 SEATS - Install protective covers.

16 LANDING LIGHTS - Cover with barrier material and secure with tape.

17 STALL WARNING UNIT - Remove and store according to standard practices. Tape connections.

18 LOOSE TOOLS AND EQUIPMENT - Remove and store in a dry temperate room.

19 AIRFRAME - Cover static ports and all openings with barrier material and secure with tape to exclude rain, sun, and foreign matter.

(d) Preparation for Service

- 1 Remove all covers, tape, and tags from the airplane.
- 2 Remove all cylinder plugs and all paper, tape, and dehydrating agent used to preserve engine.
- 3 Drain corrosion preventive oil and reservice with recommended lubricating oil, per Teledyne Continental Motors MHS-24C.
- 4 Reinstall the propeller if it was removed. Rotate propeller to clear excess preservative oil from the cylinders.
- 5 Install the spark plugs, battery, and rotate propeller by hand through all compressions of the engine to check for liquid lock. Reinstall cowl and start engine in the normal manner.
- 6 Give the airplane a thorough cleaning, visual inspection and test fly the airplane.

PLACARDS AND MARKINGS

1. General - Description

A. FAA Required Placards and Markings

This chapter covers all placards and markings that are FAA required. Exterior placards and markings are listed and shown in Chapter [11-20-00](#). Interior placards and markings are covered in Chapter [11-30-00](#).

NOTE: Any time an airplane is repainted, inspect all placards and markings to make sure they are not covered with paint, are easily readable, and are securely attached.

B. Model Designation Placards

Model Designation Placards are exterior placards that identify the airplane by its model number and serial number (Refer to [Figure 1](#)). Should a question arise concerning the care of this airplane it is important to include the airplane serial number in any correspondence to Textron Aviation Inc.

On airplane **(model)** serials: **(F33A)** CE-748, CE-772 through CE-1200; **(F33C)** CJ-149 and After; **(V35B)** D-10097, D-10120 and After; **(A36)** E-1111, E-1241 through E-2399; **(A36TC)** EA-11 through EA-272 except EA-242; and **(B36TC)** EA-242, EA-273 through EA-472, the model designation placard is located on the right side of the fuselage adjacent to the inboard end of the flap.

On airplane **(model)** serials: **(F33A)** CE-1201 and After; **(A36)** E-2400 through E-3635 except E-3630; **(G36)** E-3630, E-3636 and After; and **(B36TC)** EA-473 and After, the model designation placard is located on the right side of the fuselage under the leading edge of the horizontal stabilizer. The placard is mounted 0.50 inch below the skin lap and 12 inches forward of the tail cone.

Figure 1 : Sheet 1 : (Revised) - Model Designation Placards

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BEECH AIRCRAFT
CORPORATION

SERIALMODEL

T.C.P.C. B

EFFECTIVITY: E-1 THRU E-3009
EA-1 THRU EA-0586

Raytheon

MANUFACTURED BY
RAYTHEON AIRCRAFT
COMPANY
WICHITA, KS. USA

Raytheon Aircraft

SERIAL NO.

MODEL NO.

TYPE CERTIFICATE

PRODUCTION CERTIFICATE 8132540-1

EFFECTIVITY: E-3234 THRU E-3768
EA-0636 AND AFTER

MANUFACTURED BY
RAYTHEON AIRCRAFT COMPANY
WICHITA, KS. USA

SERIAL NO.

SERIAL NO.

T.C.

P.C. 8

EFFECTIVITY: E-3010 THRU E-3233
EA-0587 THRU EA-0653

Hawker Beechcraft

MANUFACTURED BY
HAWKER BEECHCRAFT
CORPORATION
WICHITA, KS. USA

SERIAL NO.

MODEL NO.

TYPE CERTIFICATE

PRODUCTION CERTIFICATE 8132766-1

EFFECTIVITY: E-3769 THRU E-3995 EXCEPT E-3954

Beechcraft

MANUFACTURED BY
BEECHCRAFT CORPORATION
WICHITA, KS. USA

SERIAL NO.

MODEL NO.

TYPE CERTIFICATE

PRODUCTION CERTIFICATE 8132766-16

EFFECTIVITY: E-3954, E-3996 AND AFTER

EA11B
073752AB.AI

EXTERIOR PLACARDS AND MARKINGS

1. Exterior Placards and Markings - Description

This Chapter lists and shows the exterior placards and markings that are essential for good maintenance practices (Refer to [Figure 1](#)). An illustration of each exterior placard with its location is provided. The exterior placards are shown for location only and may or may not bear identical information to the actual placards installed on the various individual models. Note the specific information on the placards installed on each model to determine current information for that model.

NOTE: Any time an airplane is repainted, inspect all placards and markings to make sure they are not covered with paint, are easily readable, and are securely attached.

Figure 1 : Sheet 1 : Exterior Placards and Markings

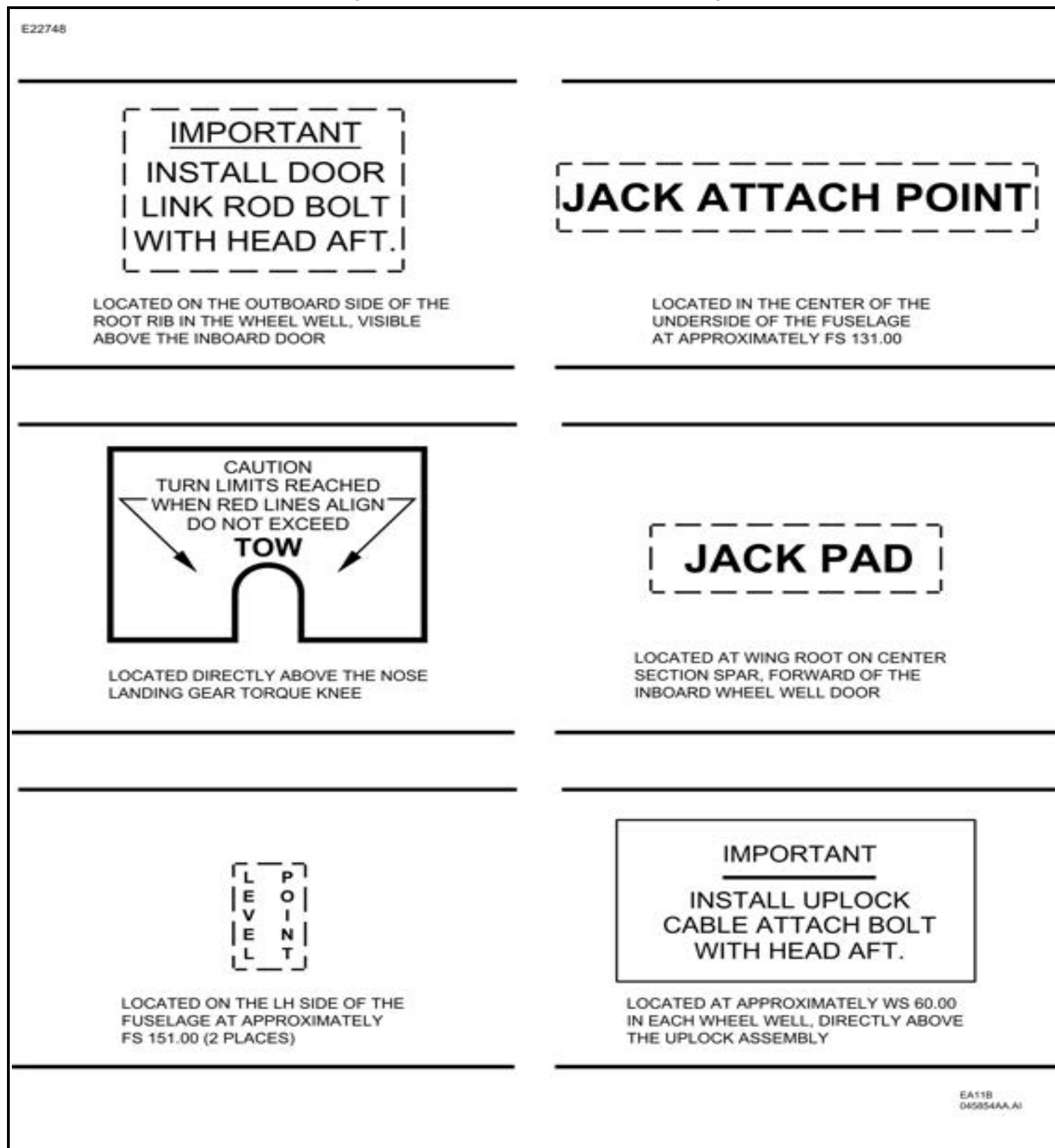


Figure 1 : Sheet 2 : Exterior Placards and Markings

E25496

Beechcraft
OIL AIR STRUT
PART NO. 35-825195
BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS, USA

INSTRUCTIONS
TO CHECK FLUID AND FILL
REMOVE VALVE CAP, DEPRESS VALVE CORE AND ALLOW STRUT TO FULLY COMPRESS. THEN RAISE AND BLOCK STRUT ¼ INCH FROM COMPRESSED POSITION. REMOVE VALVE BODY ASSEMBLY AND FILL WITH HYDRAULIC OIL CONFORMING TO INSTRUCTION MANUAL SPECIFICATIONS. SLOWLY EXTEND STRUT FROM BLOCKED POSITION AND REPLACE VALVE BODY ASSEMBLY. DEPRESS VALVE CORE AND COMPLETELY COMPRESS STRUT TO RELEASE EXCESS AIR AND OIL. WITH AIRPLANE EMPTY EXCEPT FOR FULL FUEL AND OIL KEEP STRUT INFLATED TO 3½ INCHES OF PISTON SHOWING.

WARNING
RELEASE AIR IN STRUT BEFORE DISASSEMBLING

BUILT UNDER ONE OR MORE OF THE FOLLOWING BEECH PATENTS: 2368137, 2412885, OR 2470616, OTHER PATENTS PENDING.

CE-748 THRU CE-979;
CJ-143 THRU CJ-155;
E-1111, E-1241 THRU E-1969;
D-10097, D-10120 THRU D-10396;
EA-11 THRU EA-272.
LOCATED ON THE NOSE
LANDING GEAR STRUT

Beechcraft
OIL AIR STRUT
PART NO. 36-820020
BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS, USA

INSTRUCTIONS
TO CHECK FLUID AND FILL
REMOVE VALVE CAP, DEPRESS VALVE CORE AND ALLOW STRUT TO FULLY COMPRESS. THEN RAISE AND BLOCK STRUT ¼ INCH FROM COMPRESSED POSITION. REMOVE VALVE BODY ASSEMBLY AND FILL WITH HYDRAULIC OIL CONFORMING TO INSTRUCTION MANUAL SPECIFICATIONS. SLOWLY CYCLE STRUT TO DISPLACE TRAPPED AIR. REPEAT UNTIL ADDITIONAL OIL CANNOT BE ADDED. WITH STRUT EXTENDED REPLACE VALVE BODY ASSY DEPRESS VALVE CORE AND COMPLETELY COMPRESS STRUT TO RELEASE EXCESS AIR AND OIL.

WITH AIRPLANE EMPTY EXCEPT FOR FULL FUEL AND OIL KEEP STRUT INFLATED TO 5 INCHES OF PISTON SHOWING.

WARNING
RELEASE AIR IN STRUT BEFORE DISASSEMBLING

D-10397 AND AFTER;
CJ-156 AND AFTER;
E-1970 AND AFTER;
CE-980 AND AFTER;
EA-273 AND AFTER;
LOCATED ON THE NOSE
LANDING GEAR STRUT

SEE CHAPTER 12 OR 32
FOR CORRECT EXTENSION

Beechcraft
OIL AIR STRUT
PART NO 35-815247-27
BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS USA

INSTRUCTIONS
TO CHECK FLUID AND FILL
REMOVE VALVE CAP DEPRESS VALVE CORE AND ALLOW STRUT TO FULLY COMPRESS THEN RAISE AND BLOCK STRUT ¼ INCH FROM COMPRESSED POSITION. REMOVE VALVE BODY ASSEMBLY AND FILL WITH HYDRAULIC OIL CONFORMING TO INSTRUCTION MANUAL SPECIFICATIONS. SLOWLY EXTEND STRUT FROM BLOCKED POSITION AND REPLACE VALVE BODY ASSEMBLY. DEPRESS VALVE CORE AND COMPLETELY COMPRESS STRUT TO RELEASE EXCESS AIR AND OIL. WITH AIRPLANE EMPTY, EXCEPT FOR FULL FUEL AND OIL KEEP STRUT INFLATED TO 3 INCHES OF PISTON SHOWING.

WARNING
RELEASE AIR IN STRUT BEFORE DISASSEMBLING

LOCATED ON THE LEFT MAIN
LANDING GEAR STRUT

Beechcraft
OIL AIR STRUT
PART NO 35-815247-28
BEECH AIRCRAFT CORPORATION
WICHITA, KANSAS USA

INSTRUCTIONS
TO CHECK FLUID AND FILL
REMOVE VALVE CAP DEPRESS VALVE CORE AND ALLOW STRUT TO FULLY COMPRESS THEN RAISE AND BLOCK STRUT ¼ INCH FROM COMPRESSED POSITION. REMOVE VALVE BODY ASSEMBLY AND FILL WITH HYDRAULIC OIL CONFORMING TO INSTRUCTION MANUAL SPECIFICATIONS. SLOWLY EXTEND STRUT FROM BLOCKED POSITION AND REPLACE VALVE BODY ASSEMBLY. DEPRESS VALVE CORE AND COMPLETELY COMPRESS STRUT TO RELEASE EXCESS AIR AND OIL. WITH AIRPLANE EMPTY, EXCEPT FOR FULL FUEL AND OIL KEEP STRUT INFLATED TO 3 INCHES OF PISTON SHOWING.

WARNING
RELEASE AIR IN STRUT BEFORE DISASSEMBLING

LOCATED ON THE RIGHT MAIN
LANDING GEAR STRUT

EA11B
045136AA.AI

Figure 1 : Sheet 3 : Exterior Placards and Markings

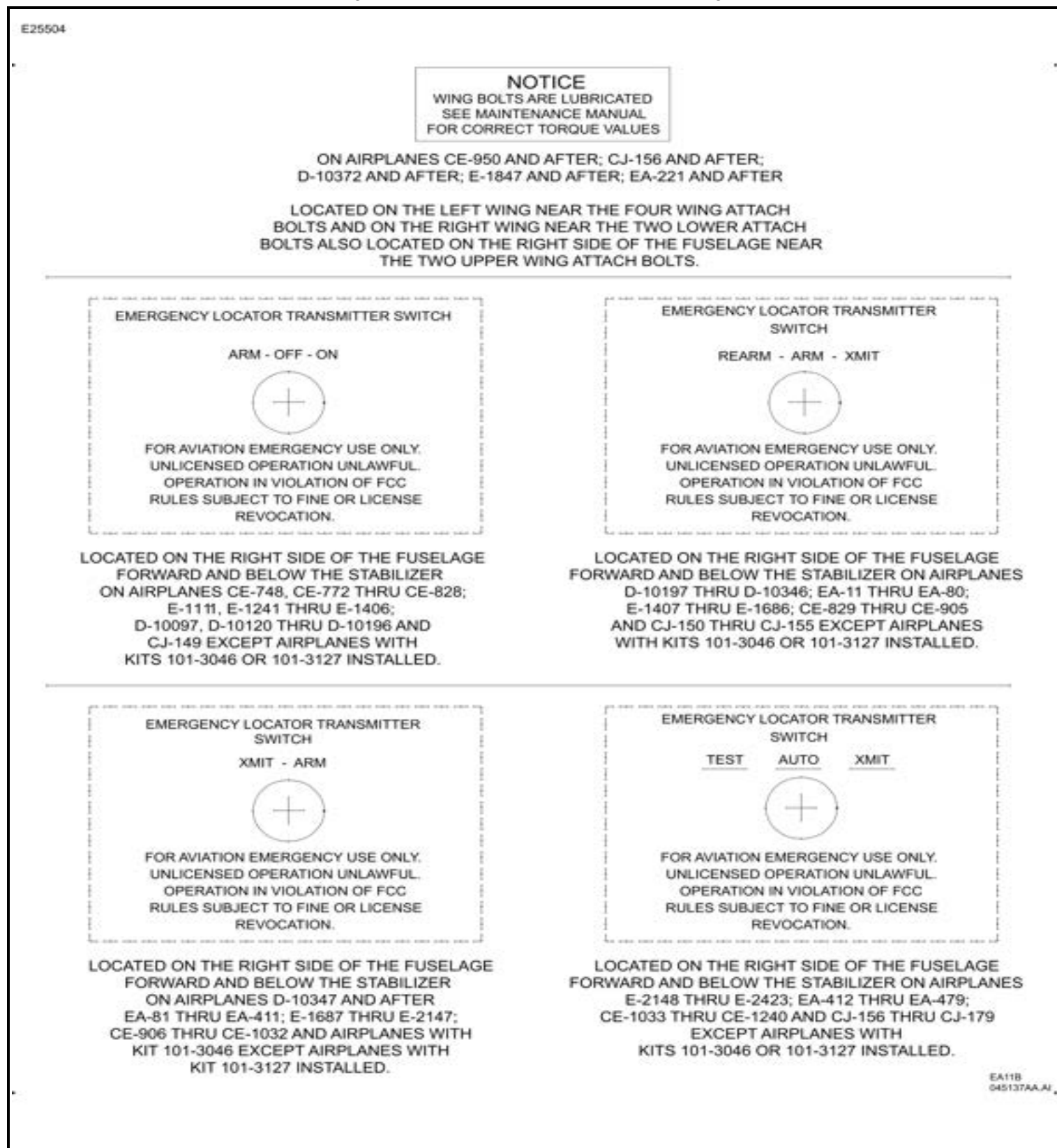
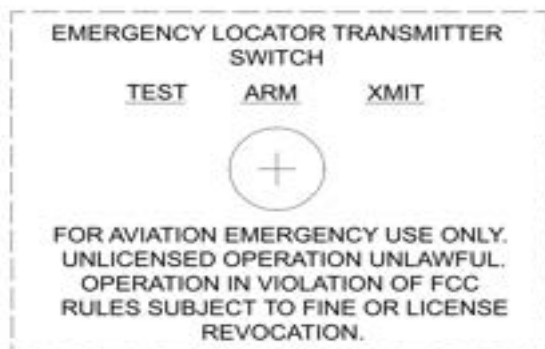


Figure 1 : Sheet 4 : Exterior Placards and Markings

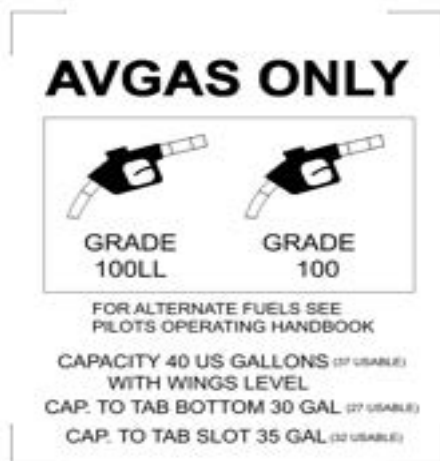
E25511



LOCATED ON THE RIGHT SIDE OF THE FUSELAGE FORWARD AND BELOW THE STABILIZER ON AIRPLANES CE-1241 THRU CE-1646; E-2424 THRU E-2693 AND EA-480 THRU EA-530 EXCEPT AIRPLANES WITH KIT 101-3127 INSTALLED.

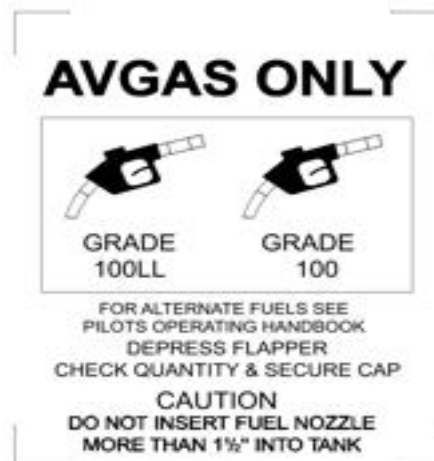


LOCATED ON THE RIGHT SIDE OF THE FUSELAGE FORWARD AND BELOW THE STABILIZER ON AIRPLANES CE-1647 AND AFTER; E-2694 THRU E-2955 WITHOUT KIT 36-3020; EA-531 THRU EA-579 AND AIRPLANES WITH KIT 101-3127 INSTALLED.



CAUTION
DO NOT INSERT
FUEL NOZZLE
MORE THAN 3"
INTO TANK

80 GALLON FUEL SYSTEM
ON AIRPLANES D-10303 AND AFTER;
EA-33 THRU EA-272 EXCEPT EA-242;
CE-884 AND AFTER;
CJ-156 AND AFTER; AND
E-1594 AND AFTER



PLACE INBOARD OF FILLER CAP

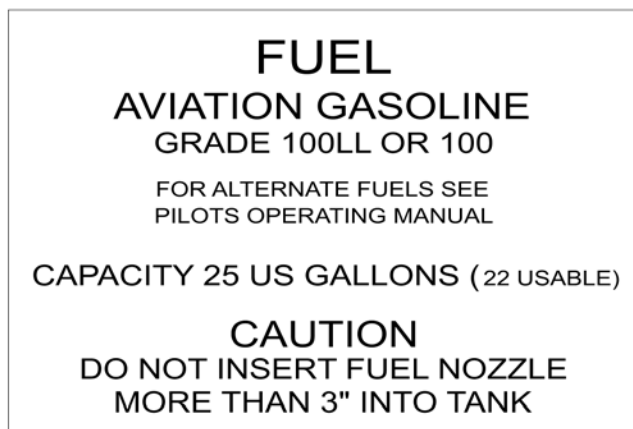
FUEL
54 US GAL CAPACITY
(51 US GAL USABLE)

PLACE DECAL AFT OF FILLER CAP
108 GALLON FUEL SYSTEM
ON AIRPLANES EA-242,
EA-273 AND AFTER

EA11B
045952AA.AJ

Figure 1 : Sheet 5 : Exterior Placards and Markings

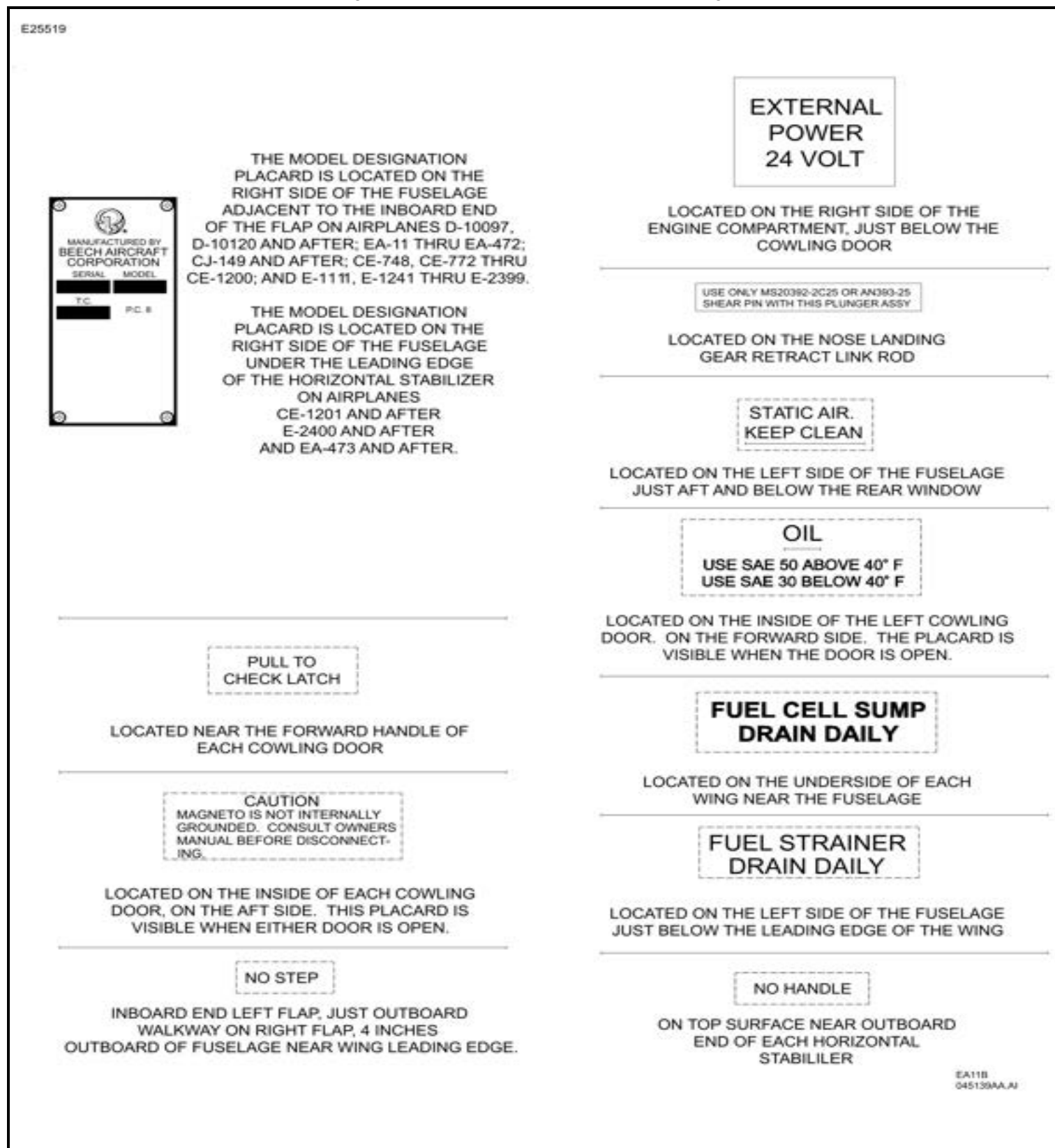
E25515



50 GALLON FUEL SYSTEM
ON AIRPLANES D-10097, D-10120 THRU D-10302;
EA-11 THRU EA-32;
CE-748, CE-772 THRU CE-883;
CJ-149 THRU CJ-155; AND
E-1111, E-1241 THRU E-1593

EA11B
045138AA.AI

Figure 1 : Sheet 6 : Exterior Placards and Markings



INTERIOR PLACARDS AND MARKINGS

1. Interior Placards and Markings - Description

The required interior placards and markings for these airplanes are listed and shown in the Limitations section (Section II) of the applicable Pilot's Operating Handbook And FAA Approved Airplane Flight Manual. For the acrobatic Bonanza, airplane serials CJ-149 and After, also refer to the Log of Supplements in the applicable Pilot's Operating Handbook And FAA Approved Airplane Flight Manual.

NOTE: Any time an airplane is repainted, inspect all placards and markings to make sure they are not covered with paint, are easily readable, and are securely attached.

SERVICING - GENERAL

1. General - Description

The information contained within this chapter pertains to the general servicing procedures and maintenance practices used when servicing the various systems of the airplane.

Detailed maintenance information pertaining to these systems will be found in the applicable chapters. Overhaul information for components of several systems will be contained within this manual. For electrical wiring diagrams refer to the BONANZA F33A, F33C, V35B and A36 Wiring Diagram Manual, P/N 35-590102-9.

REPLENISHING - MAINTENANCE PRACTICES

1. Replenishing

A. Filling the Fuel Cells

CAUTION: Any time the fuel system is drained or a fuel cell is empty for any reason, air may enter the system. If the possibility that air has entered the system does exist, start and operate the engine on the ground until all air is removed from the system. Operate the engine for several minutes on each tank until proper engine operation is assured. Refer to the Pilot's Operating Handbook and Airplane Flight Manual before starting and operating the engine.

Either the 44 gallon usable (50 gallon capacity) standard fuel system or the 74 gallon usable (80 gallon capacity) optional fuel system is available for all Bonanzas except EA-242, EA-273 and After. At serials EA-242, EA-273 and After, (B36TC) a 102 gallon usable (108 gallon capacity) fuel system is standard. The fuel system consists of rubber cells in the leading edge of the wings. A visual measuring tab in each cell (except EA-242, EA-273 and After) is attached to the filler neck of the 44 gallon system. The bottom of the tab indicates 27 gallons of usable fuel and the detent indicates 32 gallons of usable fuel in the tanks. At serials EA-242, EA-273 and After, a float-type sight gage is installed in the fuel system. This gage will indicate a partial load of 25, 30 or 35 gallons of fuel in its respective wing. When the gage is indicating in the black zone, do not use the gage. On all airplanes except CJ-149 and After, each wing contains a baffled main fuel cell which provides an uninterrupted flow of fuel to the engine.

When filling the airplane fuel cells, always observe the following:

- (1) The airplane is designed for operation on Grade 100LL (Blue) aviation gasoline, or Grade 100/130 (Green) aviation gasoline. If these fuels are not available, Grade 115/145 (Purple) aviation gasoline may be used. Only for airplane serials E-3630, E-3636 and After, Grade No. 95 (RH-95/130) or grade No. 100 (RH-100/130) aviation gasoline may also be used (1, Table 1, 91-00-00).
- (2) Make sure the airplane is statically grounded to the servicing unit.
- (3) Do not fill fuel cells near open flame or within 100 feet of any open energized electrical equipment capable of producing sparks.

NOTE: Care should be exercised while filling the fuel cell to prevent scratching, denting, or otherwise damaging the surface or leading edge of the wing. Do not allow the fuel nozzle to contact the rubber fuel cell.

B. Draining the Fuel System

The three snap-type drains should be opened daily to purge any condensed water vapor from the system. (EA-242, EA-273 and After have push-type drains which require the preflight drain tool. Refer to Chapter 12-20-00, SPECIAL TOOLS.) Each fuel cell drain is located on the bottom of the wing, just outboard of the root. The system low spot drain at the bottom of the fuel selector valve is accessible through a door inboard of the left wing root.

CAUTION: After defueling or fuel cell replacement, operate the engine on each fuel tank with the airplane on the ground to make sure all air has been purged from the fuel cells and the fuel lines to the engine.

C. Fuel Cell Reservoir (CJ-149 And After)

A non collapsible, sponge-filled reservoir is incorporated into some of the fuel cells of acrobatic airplanes to provide an uninterrupted supply of fuel to the engine during slow rolls, uncoordinated maneuvers, fast turns, slips, etc. in either the 25 gal. (22 gal. usable) or 40 gal. (37 gal. usable) fuel cells. An extra long tube extends into the sponge area to allow use of the fuel contained in the sponge-filled reservoir.

D. Engine Fuel Filters and Screens

Most fuel injection system malfunctions can be attributed to contaminated fuel. Inspecting and cleaning the fuel strainers should be considered to be of the utmost importance as a regular part of preventive maintenance.

Normally the fuel strainers should be inspected and cleaned every 100 hours. However, the strainers should be inspected and cleaned at more frequent intervals in response to severe conditions of service, unknown fuel handling practices, and operation in areas of excessive sand or dust.

E. Oil System

The airplane is equipped with a wet sump oil system with a capacity of 12 quarts of oil. The oil filler cap is accessible through an access door in the left engine cowl.

To drain the engine sump, remove the right hand access plate and unscrew the sump drain plug in the lower right hand side of the engine crankcase. An oil drain trough, furnished with each airplane is used to convey the oil through the bottom of the engine cowl prior to D-10364; CE-922; CJ-156; E-1752 and EA-129. At D-10364 and After; CE-922 and After; CJ-156 and After; E-

1752 and After and EA-129 and After, a quick attach, snap-type fuel/oil drain adapter and approximately 18 inches of hose will be used to drain the oil sump. Refer to [Chapter 12-20-00](#), SPECIAL TOOLS.

Under normal operating conditions, the recommended number of operating hours between oil changes is 100 hours. The oil filter should be removed and replaced at each oil change. When operating under adverse weather conditions or continuous high power settings, the oil should be changed more frequently. Before draining the oil, run up the engine until the oil reaches operating temperature to assure complete draining of the oil. Oil grades, ([2, Chart 1, 91-00-00](#)) are general recommendations only, and will vary with individual circumstances. Check oil inlet temperature during flight in determining use of the correct grade of oil. Inlet temperatures consistently near the maximum allowable indicates a heavier oil is needed. The new airplane is delivered with corrosion preventative compound ([3, Chart 1, 91-00-00](#)) in the engine. This is a corrosion-preventive oil and should be removed at 20 hours of operation, but no later than 25 hours of operation. If the corrosion preventative compound is not removed at the proper time, varnish may form in the engine. Oil conforming to mineral oil may be added to the corrosion preventative compound as necessary. After removing the corrosion preventative compound, refill with mineral oil, which should be used until oil consumption has stabilized (until after engine break-in). After the break-in period, use an ashless dispersant (AD) aviation grade oil in the heaviest weight that will give satisfactory starting. Above 40°F (4.4°C), SAE 50 viscosity should be used; below 40°F (4.4°C), SAE 30 is recommended. Any aviation grade engine oil which meets Continental Motors Corporation Specification MHS-24B is acceptable for use.

CAUTION: If metal contamination of the oil system is detected and the cause is corrected, the oil cooler should be replaced. In addition, flush out the system through the interconnected oil system plumbing and replace or clean any other accessories that will remain with the engine.

- (1) Oil Filter Removal
 - (a) Gain access to the engine oil filter by opening the LH engine cowl access door.
 - (b) Remove the engine oil filter safety wire.
 - (c) Loosen the spin-off filter and remove filter.
- (2) Oil Filter Installation
 - (a) Clean and lubricate the new filter gasket with engine oil.
 - (b) Position the new filter on the engine mounting adapter and tighten the filter to a torque of 16 to 18 ft-lbs. If a torque wrench is not available, tighten the filter with a suitable wrench for three quarters to one full turn after gasket contact.
 - (c) Safety wire the filter to the engine adapter.
 - (d) Secure the left engine cowl access door.

F. Air-conditioning System(Serials Prior to E-4102)

Servicing the air-conditioning system consists of periodically checking the refrigerant level, checking compressor oil level, checking the compressor belt tension, and changing the system air filter. Recharge the system as outlined under [CHARGING THE AIR CONDITIONING SYSTEM - USING R-12 REFRIGERANT](#) or [CHARGING THE AIR CONDITIONING SYSTEM - USING R-134a REFRIGERANT](#) whenever the refrigerant level is low, air has entered the system, or components carrying refrigerant are replaced. Refrigerant leaks may be detected by inspection with a flameless leak detector. When working on a refrigerant air cooling system, observe the following special servicing precautions:

WARNING: Due to the air quality control regulations enacted in the United States, R-12 and R-134a refrigerant cannot be vented into the atmosphere. When performing maintenance on the air conditioning system where R-12 or R-134a can escape from the system, evacuate the system with a recovery or recycle servicing unit that will salvage the refrigerant.

WARNING: The air conditioning system is a high pressure system. Before disconnecting a refrigerant line, the system must be discharged with a recycle/recovery servicing unit (Refer to [EVACUATING THE AIR CONDITIONING SYSTEM](#)).

WARNING: A face shield must be worn when performing maintenance on the lines because refrigerant coming in contact with the eyes can cause loss of sight.

WARNING: Do not smoke when servicing the system with R-12 or R-134a because it converts to a highly toxic gas when exposed to an open flame.

WARNING: Do not inhale high concentrations of R-134a refrigerant.

WARNING: Keep hands clear of moving components (blowers, motors, belts, etc.) while operating the system. Make sure other personnel working in the area are kept clear of moving equipment, intakes, and exhaust ducts.

- CAUTION:** All personnel doing this procedure **MUST** be familiar with the operation and maintenance of refrigerant systems.
- CAUTION:** Make sure nothing is obstructing the airflow through the condenser and condenser blower. All shrouds that control airflow through the condenser must be installed before operating the system.
- CAUTION:** Refrigerant is hygroscopic. To prevent contamination of the cooling system, it is essential that plugs and caps be installed on all components and refrigerant lines as soon as the lines are disconnected to prevent moisture from entering the system.

(1) Evacuating The Air Conditioning System

WARNING: A face shield should be worn when performing maintenance on the lines because refrigerant coming in contact with the eyes can cause loss of sight.

WARNING: Do not smoke when servicing the system with refrigerant because it converts to a highly toxic gas when exposed to an open flame.

The servicing points for discharging the system are located under the copilot's seat. The recycle/recovery servicing unit must be capable of obtaining an absolute pressure of 125 microns.

- (a) Connect a recycle/recovery servicing unit that recycles the refrigerant to the service valves and open the low pressure valve.

NOTE: The recycle/recovery servicing unit must be operated as long as is required to obtain the 125 micron level. If the system is leak tight and the servicing unit is operating correctly, evacuation should require no more than four hours.

- (b) After the system is depressurized, perform the [CHECKING COMPRESSOR OIL LEVEL](#) procedures.

(2) Purging The Air Conditioning System

NOTE: Purging the system is only necessary after a repair such as replacing an internally damaged compressor or any other component that might leave debris in the system or if the system has been over serviced with oil (R-12 or R-134a).

Using a flushing fluid ([86 Table 1, 91-00-00](#)), purge the air conditioning system. When purging is complete, evacuate the system (Refer to [EVACUATING THE AIR CONDITIONING SYSTEM](#)) then Charge the system (Refer to [CHARGING THE AIR CONDITIONING SYSTEM - USING R-12 REFRIGERANT](#) or [CHARGING THE AIR CONDITIONING SYSTEM - USING R-134a REFRIGERANT](#)).

(3) Charging The Air Conditioning System - Using R-12 Refrigerant Applicable to Airplane Serials prior to CE-1792; E-2945 and EA-579.

If the air conditioning system only requires 'topping off', do [ADDING REFRIGERANT TO A PARTIALLY FILLED SYSTEM \(TOPPING OFF\)](#).

WARNING: A face shield should be worn when performing maintenance on the lines because refrigerant coming in contact with the eyes can cause loss of sight.

The servicing points for charging the system are located under the copilot's seat.

WARNING: Do not smoke when servicing the system with refrigerant because it converts to a highly toxic gas when exposed to an open flame.

CAUTION: For airplanes prior to CE-1792; E-2945 and EA-579 use refrigerant R-12 (7, Chart 1, 91-00-00). Other refrigerants, particularly those containing methyl chloride, will cause rapid deterioration of the aluminum compressor components.

- (a) System Recharging - The system is ready for charging following the completion of the evacuation procedure (Refer to [EVACUATING THE AIR CONDITIONING SYSTEM](#)).

CAUTION: The refrigerant charging equipment must be connected to the air conditioning system so that it is not possible to induce air or moisture into the system when the system is being charged.

- (b) Connect the recycle/recovery servicing unit to the air conditioning system service ports located under the copilot's seat.

- (c) Start the engine in accordance with the applicable Pilot's Operating Handbook and run the air conditioning system.

CAUTION: Never add liquid refrigerant to the air conditioning system while the compressor is running. Refrigerant added while the compressor is operating must be in vapor form to prevent liquid slugging, which might damage the compressor.

CAUTION: Do not over charge the air conditioning system. A full charge is 2.4 pounds of refrigerant. Failure to comply could result in damage to the air-conditioning system.

NOTE: Charging the air conditioning system through observation of the sight glass (bubbles disappearing) requires the temperature to be above 75°F (23.9°C). Charging the air conditioning system, through observation of the sight glass, is not recommended at ambient temperatures below 75°F (23.9°C). At temperatures below 75°F (23.9°C) the refrigerant should be measured into the air conditioning system.

- (d) If the ambient temperature is below 75°F (23.9°C), add an initial charge of 1 pound of refrigerant to the air conditioning system.
- (e) If the ambient temperature is above 75°F (23.9°C), slowly add vapor refrigerant into the air conditioning system until the sight glass is clear (no bubbles). If the ambient temperature is below 75°F (23.9°C), measure 1.4 pounds of vapor refrigerant into the system making the total charge 2.4 pounds.

1 Adding Refrigerant to a Partially Filled System (Topping OFF) - R-12 Refrigerant Only Applicable to Airplane Serials Prior to CE-1792; E-2945 and EA-579.

- a** Perform the compressor oil level check procedures to determine if additional refrigerant oil is required (Refer to [CHECKING COMPRESSOR OIL LEVEL](#)).
- b** Check Air conditioning system for leaks (Refer to [REFRIGERANT LEAK DETECTION](#)).
- c** Connect the recycle/recovery servicing unit to the air conditioning system service ports located under the copilot's seat.

CAUTION: Do not over charge the air conditioning system. Failure to comply could result in damage to the air-conditioning system.

- d** Start the engine in accordance with the applicable Pilot's Operating Handbook and run the air conditioning system.

CAUTION: Never add liquid refrigerant to the air conditioning system while the compressor is running. Refrigerant added while the compressor is operating must be in vapor form.

NOTE: Charging the air conditioning system through observation of the sight glass (bubbles disappearing) requires the temperature to be above 75°F (23.9°C). Charging the air conditioning system, through observation of the sight glass, is not recommended at ambient temperatures below 75 °F (23.9°C). At temperatures below 75°F (23.9°C) the refrigerant should be measured into the air conditioning system.

- e** If the ambient temperature is above 75°F (23.9°C), slowly add vapor refrigerant into the air conditioning system until the sight glass is clear (no bubbles). If the ambient temperature is below 75°F (23.9°C), measure the required amount of vapor refrigerant into the system making the total charge 2.4 pounds.
- (4) Charging The Air Conditioning System - Using R-134a Refrigerant Applicable to Airplane Serials CE-1792 and After; E-2945 and After; and EA-579 and After.

WARNING: A face shield should be worn when performing maintenance on the lines because refrigerant coming in contact with the eyes can cause loss of sight.

WARNING: Do not smoke when servicing the system with refrigerant because it converts to a highly toxic gas when exposed to an open flame.

WARNING: Air conditioning systems using R-134a refrigerant must not be 'topped off'.

The servicing points for charging the system are located under the copilot's seat.

CAUTION: For airplane serials CE-1792 and After; E-2945 and After; and EA-579 and After, use refrigerant R-134a (64, Chart 1, 91-00-00). Other refrigerants, particularly those containing methyl chloride, will cause rapid deterioration of the aluminum compressor components.

- (a) System Recharging - The system is ready for charging following the completion of the evacuation procedure (Refer to [EVACUATING THE AIR CONDITIONING SYSTEM](#)).

CAUTION: The refrigerant charging equipment must be connected to the air conditioning system so that it is not possible to induce air or moisture into the system when the system is being charged. The charging equipment should ideally include a heated refrigerant measuring cylinder to provide the capability for charging the system without operating the compressor.

- (b) Connect the recycle/recovery servicing unit to the air conditioning system service ports located under the copilot's seat.

CAUTION: All precautions in the charging equipment operating instruction must be complied with.

CAUTION: Do not over charge the air conditioning system. A full charge is 2.4 pounds of refrigerant. Failure to comply could result in damage to the air-conditioning system.

CAUTION: If a heated refrigerant cylinder is not available, the system may be charged by allowing the refrigerant to flow into the system until equilibrium pressure is approached without operating the compressor after which the compressor must be operated and refrigerant vapor added to the suction side of the compressor unit until the total 2.4 pounds has been added. Refrigerant added while the compressor is operating must be in vapor form to prevent possible compressor damage.

- (c) Add refrigerant R-134a to the system. The refrigerant should be added with the compressor at rest by heating the refrigerant cylinder to create a pressure high enough to force liquid into the system.

(5) Checking Compressor Oil Level

The air conditioner compressor oil level should be checked by a qualified air conditioner service man if the refrigerant charge is lost (evidenced by oil loss). For airplane serials prior to CE-1792; E-2945 and EA-579, the air conditioner system requires a total of 12 ounces of 500 viscosity oil (8, [Chart 1, 91-00-00](#)). For airplane serials CE-1792 and After; E-2945 and After and EA-579 and After, the air conditioner system requires a total of 12 ounces of Ester Oil (65, [Chart 1, 91-00-00](#)).

Check the compressor oil level as follows:

- (a) Fabricate a dipstick by bending a wire to a 90° angle so that 1 1/2 inches of the wire will insert into the compressor.
- (b) Paint the dipstick with a flat black paint. Allow sufficient time for the paint to dry.
- (c) Start the engine in accordance with the applicable Pilot's Operating Handbook and run the air-conditioning system for 15 minutes with the engine running at low rpm to allow oil to accumulate in the compressor. Observe the engine operating limitations as noted in the applicable Pilot's Operating Handbook. Shut down the engine in accordance with the applicable Pilot's Operating Handbook.
- (d) Relieve the air conditioner system pressure by evacuating the system with a recycle servicing unit (Refer to [EVACUATING THE AIR CONDITIONING SYSTEM](#)).
- (e) After the system pressure is relieved, remove the oil filler plug.
- (f) Insert the dipstick through the oil filler port, slowly rotate the clutch shaft until the dipstick will insert to the bottom of the compressor.
- (g) Withdraw the dipstick; oil should register on the dipstick at 5/8 inch below the filler port. Add oil as necessary to maintain this measurement.
- (h) Install the oil filler plug with preformed packing and secure plug.
NOTE: Make sure that the preformed packing is not twisted and that dirt or particles are NOT ON the preformed packing seat. The plug should be snug. Do not overtighten the plug.
- (i) Charge the air conditioning system ([CHARGING THE AIR CONDITIONING SYSTEM - USING R-12 REFRIGERANT](#) or [CHARGING THE AIR CONDITIONING SYSTEM - USING R-134a REFRIGERANT](#)).
- (j) Check the area around the filler plug for leaks. If leaks exist, do not overtighten the filler plug. Remove the plug as noted in Step (e) and install a new preformed packing after evacuating the system with a recycle/recovery servicing unit (Refer to [EVACUATING THE AIR CONDITIONING SYSTEM](#)). Secure the plug and recharge the system as noted in Step (h) and Step (i).

(6) REFRIGERANT LEAK DETECTION

All refrigerant connections, both Hawker Beechcraft and vendor fabricated (including compressor gaskets and shaft seals), should be checked for leaks.

The system should be checked for leaks as follows:

- (a) Connect the leak detector to the servicing points for charging the system which are located under the copilot's seat. Other hook-ups may be used provided they meet the requirements of this section.
- (b) Check for leaks using any commercially available leak detector that is capable of sensing leaks down to 1/2 ounce per year. All fittings and components must be reworked or replaced if the detector indicates any leakage. Minor

leakage (less than two ounces per year) is permissible at the compressor shaft seal.

NOTE: The desiccant bottle should be removed and capped during rework, or replaced before evacuating and charging.

If rework is required reclaim the refrigerant (Refer to [EVACUATING THE AIR CONDITIONING SYSTEM](#)), do the rework and then recharge the system ([CHARGING THE AIR CONDITIONING SYSTEM - USING R-12 REFRIGERANT](#) or [CHARGING THE AIR CONDITIONING SYSTEM - USING R-134a REFRIGERANT](#)).

G. Air-conditioning System Servicing(Serials E-4102 and After)

Servicing the air-conditioning system consists of periodically checking the compressor belt tension, checking the evaporator intake and the condenser air intake and exhaust for obstructions. If the air-conditioning system is open to the atmosphere at the time of servicing, make sure to evacuate and charge the system. Moisture and air mixed with refrigerant will raise the compressor head pressure above acceptable operating levels, reducing the system performance and potentially cause internal system corrosion resulting in severe damage. Moisture will also boil at near room temperature when exposed to sufficient vacuum.

While performing air-conditioning system servicing, observe the following special precautions:

WARNING: Avoid breathing R-134a air-conditioner refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose, and throat. Wear eye protection while Servicing the air-conditioning refrigerant system. Serious eye injury can result from eye contact with refrigerant. If eye contact is made, seek medical attention immediately.

WARNING: If accidental system discharge occurs, ventilate the work area before resuming service. Large amounts of R-134a refrigerant will displace oxygen and cause suffocation. Work only in well-ventilated areas.

WARNING: Do not heat refrigerant containers above 125°F or expose refrigerant to open Flame. Do not use open flame to heat refrigerant containers.

WARNING: Do not intentionally drop, puncture or incinerate refrigerant containers.

WARNING: The evaporation rate of R-134a refrigerant at average temperature and altitude is extremely high. As a result, anything that comes in contact with the refrigerant will freeze. Always protect skin or delicate objects from direct contact with refrigerant. For personal protection, goggles and protective gloves should be worn and clean cloth wrapped around fittings, valves and connections when doing work that includes opening the refrigerant system.

WARNING: If R-134a refrigerant comes in contact with any part of the body, severe frostbite and personal injury can result. Flush exposed zone immediately with cold water and obtain prompt medical assistance.

WARNING: R-134a service equipment or aircraft air-conditioning system should not be pressure tested or leak tested with compressed shop air. Though R-134a is considered non-flammable, some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures are potentially dangerous and may result in fire or explosion causing injury or property damage.

WARNING: Never add R-134a refrigerant to a system that has not been evacuated to 29 in. Hg vacuum pressure.

(1) Evacuating The Air-Conditioning System

To evacuate the refrigerant system use the following procedure:

NOTE: For system evacuation, use an R-134a refrigerant Recovery/Recycling Station that meets SAE standard J2210.

Any change in vacuum pressure, or failure to achieve a system pressure between 25 to 29 in. Hg vacuum indicates the presence of a leak. Locate and fix all leaks.

- (a) Perform the [AIR-CONDITIONING SYSTEM LEAK CHECK](#) procedure.
- (b) Access the service ports by removing the evaporator trim cover and the service panel from the FS 190 lower closeout panel located in the baggage compartment.
- (c) Remove the service port caps from the evaporator assembly.
- (d) Make sure both valves of the charging manifold are closed.
- (e) Connect the charging manifold to the service ports.
- (f) Connect charging manifold (yellow) hose to vacuum pump. Turn ON the vacuum pump.
- (g) Open both valves of the charging manifold gage set.
- (h) Open both valves of charging hose quick connect fittings.

- (i) Observe charging manifold gages to check the vacuum.
 - (j) Evacuate the system for a minimum of 45 minutes. Final system vacuum should be between 25 and 29 in. Hg. Close the charging manifold valves and turn OFF the vacuum pump.
 - (k) Observe the vacuum level for 5 minutes to check for any leaks in the refrigeration system. If the vacuum level is not maintained, locate and repair the system leak.
 - (l) Disconnect the charging manifold service hose from vacuum pump. The system is ready for refrigerant charging.
- (2) Charging The Air-Conditioning System

CAUTION: Use only R-134a refrigerant. Other refrigerants will damage the system.

CAUTION: Do not overcharge the air-conditioning system. Overcharging of the system will result in reduced performance, reduced service life and/or damage to the system components, excessive compressor head pressure, loss of cooling, noise and system failure.

NOTE: System charge is 24 ounces (680 grams) of R-134a. Use a R-134a refrigerant Recovery/Recycling Station that meets SAE standard J2210.
If a refrigerant recovery/recycle unit is used, refer to applicable equipment manufacturer instructions for VCS servicing.
When a recovery/recycle unit is not used, it is necessary to run the engine to finalize the complete refrigerant charge.

- (a) Perform the **EVACUATING THE AIR-CONDITIONING SYSTEM** procedure.
- (b) Connect the manifold charging (yellow) hose to R-134a cylinder. Open the manifold valve.
- (c) Slowly open the charging hose fitting at manifold gage set and vent the air from hose until refrigerant is evidently escaping.
- (d) Place the refrigerant container on a 0 to 50 pound (0-25 kg) scale. Record the refrigerant container weight.
- (e) Open both manifold gage set valves and add refrigerant to the system until pressure stabilizes.
- (f) Close the manifold valves and make sure that the system pressure is 50 psig (3.4 bar) or greater.

NOTE: System's pressure should be above 50 psig (3.4 bar) to close the low pressure cutoff switch. Otherwise the compressor will not turn ON.

WARNING: Do not use open flame to warm refrigerant container.

WARNING: Do not heat the refrigerant container above 125°F (51°C).

- (g) If required, warm the refrigerant container by immersing it in warm water.
- (h) Start the engine as per the applicable Pilot's Operating Handbook.
- (i) Select "AUTO" on Automatic Climate Control Switch panel and set the temperature to 55°F (13°C). Idle the engine at 1200 to 1800 rpm.

WARNING: Do not open high pressure (RED) valve on manifold gage set.

- (j) Observe the system discharge and suction pressures.
- (k) With the R-134a cylinder connected to the charging hose, Open the charging container shutoff valve and hose purged of air, slowly open the suction (BLUE) manifold valve. The suction pressure will increase between 60 to 70 psig (4.1 to 4.8 bar).

NOTE: As the refrigerant enters the compressor, the compressor discharge pressure will slightly increase.

- (l) Continue to add refrigerant until 24oz. (680 grams) of refrigerant have been added.
- (m) Close the suction manifold valve (BLUE) and let the system operate for 5 to 10 minutes to evaluate performance.

NOTE: Wait until the expansion valve stabilizes the system pressure.

- (n) With the system fully charged and operating, observe the suction and discharge pressures. Typical values at various ambient temperatures, with hot cabins, are shown in the table below.

NOTE: The pressure values listed in the table below may vary according to environmental factors and are to be used as a guideline for further troubleshooting, not as a sole source.

Ambient Temperature	21°C(70°F)	27°C(80°F)	32°C(90°F)	38°C(100°F)	43°C(110°F)
Air Temperature at Evaporator Outlet	7 to 9°C(45 to 48°F)	8 to 13°C(46 to 55°F)	11 to 16°C(52 to 61°F)	14 to 20°C(57 to 68°F)	17 to 25°C(63 to 77°F)
Low Side Service Port Pressure (psi)	18	20	22	25	26
	30	35	39	43	47
High Side Service Port Pressure (psi)	150	160	220	250	280
	220	235	310	320	340

- (o) Allow system to operate for 10 minutes then shutdown.

NOTE: After shutdown, both suction and discharge pressures will begin to equalize.

- (p) Close the refrigerant container shutoff valve. Record the refrigerant container final weight and calculate the system refrigerant charge.

CHARGE (lb.) = W initial (lb.) - W final (lb.)

- (q) Close both valves of charging hose quick connect fittings and disconnect hoses from service ports.

- (r) Remove the charging hose (yellow) and store manifold gage set from the refrigerant container.

- (s) Install the service port caps on the evaporator assembly.

- (t) Install the service panel onto the FS 190 lower closeout panel and replace the evaporator trim cover.

(3) Air-Conditioning System Leak Test

To detect a leak in the system, perform the following procedures.

- (a) Position the airplane in a wind free work area. The absence of wind will aid in the detection of small leaks.

- (b) Perform the ELECTRICAL POWER CONNECT procedure (Refer to 24-30-00, 201).

- (c) Start the engine as per the applicable Pilot's Operating Handbook. Switch on the Automatic Climate Control System on the switch panel. Allow the system for 5 to 10 minutes to achieve the operating temperature and pressures.

- (d) Shut-down the engine as per the applicable Pilot's Operating Handbook.

- (e) Remove engine cowling, evaporator trim cover and the FS 190 upper and lower closeout panels located in the baggage compartment prior to leak test to dissipate any accumulated refrigerant. Airplane cabin doors must be left open during the test.

- (f) Use an R-134a Electronic Leak Detector and search for leaks. Move probe slowly along the bottom side of lines and fittings.

NOTE: R-134a is heavier than air. Fittings, lines, or components that appear to be oily usually indicate a refrigerant leak.

- (g) Inspect the evaporator core for leaks,

1 Set the Automatic Climate Control temperature to 55°F (13°C), select "LO" for the blower speed and check for leaks in the air-conditioning outlet vents.

2 Inspect the evaporator drain tube outlet for the presence of refrigerant oil.

- (h) Close the evaporator housing cover, receiver/dryer access panel, condenser access panel and the engine cowling.

- (i) Perform the ELECTRICAL POWER DISCONNECT procedure (Refer to 24-30-00, 201).

(4) Refrigerant Oil

It is important to have the correct amount of oil in the air conditioning system. This will ensure proper lubrication of the compressor. Too little oil will result in damage to the compressor. Too much oil will reduce the cooling capacity of the system.

The oil used in the compressor is a Polyolester synthetic oil. Approved oils are Castrol Icematic SW100 and Emkarate 100H. Do NOT use any other oil! The oil container should be kept tightly capped until it is ready for use and then capped after use to prevent contamination. Refrigerant oil will quickly absorb any moisture it comes in contact with.

When an air conditioning system is assembled at the factory all components except the compressor are refrigerant oil free.

After the system has been charged and operated, the oil in the compressor is dispersed through the system. The evaporator, condenser, receiver-dryer, and compressor will retain a significant amount of oil.

It will not be necessary to check the oil level in the compressor or to add oil unless there has been an oil loss. This may be due to a rupture or leak from a line, shaft seal, evaporator, or condenser. Oil loss at a leak point will be evident by the presence of a wet shiny surface around the leak.

When a component is replaced, the specified amount of refrigerant oil must be added. When the compressor is replaced, the new compressor is factory filled with the correct amount of oil for a new system. For replacement on an existing system, drain and measure all the oil from the old compressor. Drain and discard all of the oil from the new compressor. Add back into the new compressor the same amount of new oil that was drained out of the old compressor.

NOTE: Add an additional 1 fluid oz. (29 cc) of compressor oil to the system when a receiver-dryer, condenser or evaporator core is replaced. This oil can be added into the component being replaced.

H. Brake System

The hydraulic brakes are self-compensating and require no adjustment. Linings should be checked for small nicks or sharp edges which could damage the brake discs. Worn, dished or distorted brake discs should be replaced. The brake fluid is supplied to the brake system from the reservoir tank located in the engine accessory section and is accessible by raising the right side of the engine cowl. The reservoir should be filled to within 1 1/2 inches of the top and a visible fluid level maintained on the dipstick at all times. Use only hydraulic fluid (9, Chart 1, 91-00-00) in the brake system. Make sure no dirt or foreign matter is allowed to enter the brake system.

I. Charging the Oxygen System

In general, the oxygen system on the Bonanzas may be serviced in accordance with FAA AC43.13-1A.

WARNING: Keep fire and sparks away and never smoke in the proximity of oxygen. Tools, equipment and hands must also be kept clean when servicing the oxygen system, since deposits of oil or other hydrocarbons are highly flammable when exposed to high concentrations of oxygen. Furthermore, the presence of other foreign particles in the oxygen lines may result in leaks that will both exhaust the oxygen supply and present a fire hazard. As an additional safety precaution, use only the antiseize compounds and leak-testing soaps recommended for breathing oxygen systems.

NOTE: Use only Aviator's Breathing Oxygen (10, Chart 1, 91-00-00) when recharging the oxygen bottle.

The following procedures should be followed prior to, and during the oxygen servicing operation:

- (a) Make sure all airplane electrical power is off. Do not operate electrical switches, or connect or disconnect ground power generators during the oxygen charging operation.
- (b) Make sure that no fueling or other flammable fluid servicing is in process when servicing the oxygen system.
- (c) Ground the servicing equipment and the system to be serviced before connecting the filler adapter.

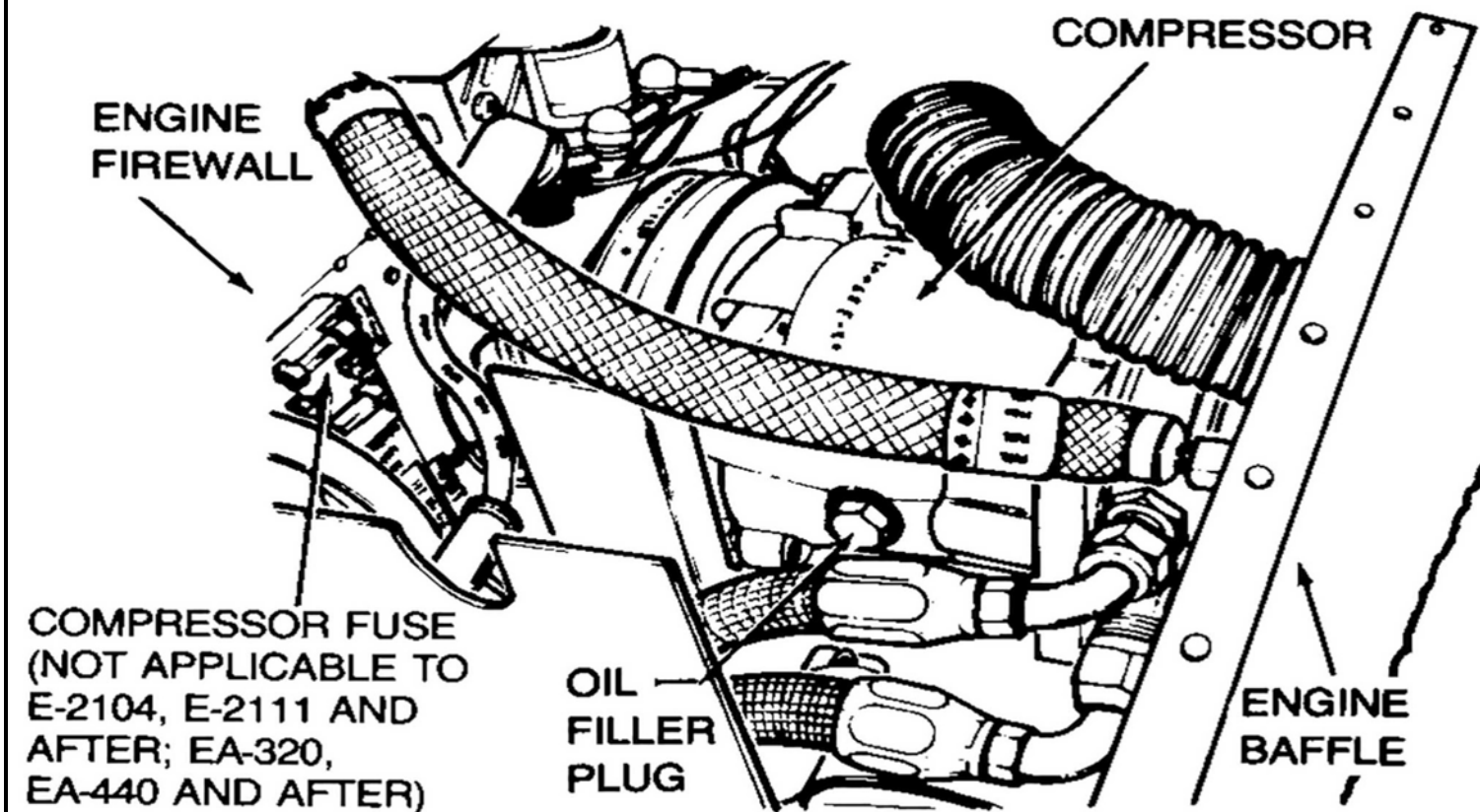
WARNING: Do not use oxygen intended for medical purposes, or such industrial uses as welding. Such oxygen may contain excessive moisture that could freeze up the valves and lines of the oxygen system.

- (d) Open the cylinder shutoff valve and slowly fill the system to $1,850 \pm 50$ psi at 70°F (21.1°C), ambient temperature. This pressure may be increased an additional 3.5 psi for each degree of increase in temperature; similarly, for each degree of drop in temperature, reduce the pressure for the cylinder by 3.5 psi.
- (e) Close the shutoff valve, disconnect the supply cylinder, and replace the filler valve cap.
- (1) Oxygen System Servicing (All Airplanes except E-1946, E-2104, E-2111 and After; EA-320, EA-389 and After)
Observe the guidelines under the heading **CHARGING THE OXYGEN SYSTEM** and service the system as follows:
 - (a) Remove the access opening over the oxygen cylinder shutoff valve and check that the valve is off.
 - (b) Slide the copilot's seat to the rear until the filler valve is clear, then remove the cap from the filler valve and connect the supply cylinder to the filler valve.
 - (c) Open the valve on the airplane oxygen cylinder.
 - (d) Open the valve on the charging cylinder and slowly fill the airplane cylinder.
 - (e) Close the valve on the airplane oxygen cylinder.
 - (f) Close the valve on the charging cylinder.
 - (g) Disconnect the supply cylinder and replace the filler valve cap.
 - (h) Replace the access panel.

- (i) Slide the copilot's seat forward to its normal position.
- (2) Oxygen System Servicing (E-1946, E-2104, E-2111 and After; EA-389 thru EA-439)
Observe the guidelines under the heading [CHARGING THE OXYGEN SYSTEM](#) and service the system as follows:
 - (a) Check that the oxygen system is turned off. (Check the push-pull knob.)
 - (b) Slide the copilot's seat to the rear until the filler valve is accessible.
 - (c) Remove the filler valve cap and connect the supply cylinder.
 - (d) Open the valve on the supply cylinder and slowly fill the system.
 - (e) Close the valve on the supply cylinder and disconnect the supply cylinder.
 - (f) Install the filler valve cap.
 - (g) Slide the copilot's seat to its normal position.
- (3) Oxygen System Servicing (EA-320, EA-440 and After) . Refer to [Figure 1](#).
Observe the guidelines under the heading [CHARGING THE OXYGEN SYSTEM](#) and service the system as follows:
 - (a) Locate and remove the access panel on the top of the left wing, outboard of WS 66, and aft of the front spar.
 - (b) Remove the cap from the filler opening and connect the supply cylinder to the filler opening.
 - (c) Open the charging cylinder valve and slowly fill the airplane cylinder(s).
 - (d) After filling the airplane cylinder(s), close the supply cylinder shutoff valve, disconnect the supply cylinder, and replace the filler valve cap.
 - (e) Install the access cover.

Figure 201 : Sheet 1 : Servicing Compressor

E25281



35-425-1

SCHEDULED SERVICING - MAINTENANCE PRACTICES

1. Scheduled Servicing - Maintenance Practices

Refer to [Table 201](#) for servicing intervals. Refer to [Figure 202](#) for lubrication schedule. Refer to [Figure 203](#) for special tools.

A. Tires

CAUTION: Textron Aviation Inc cannot recommend the use of recapped tires. Recapped tires have a tendency to swell as a result of the increased temperature generated during takeoff. Increased tire size can jeopardize proper function of the landing gear retract system, with the possibility of damage to the landing gear doors and retract mechanism.

The nose wheel tire is a 5.00 x 5, four-ply tire. The main wheel tires are 7.00 x 6, six-ply tires. Inflate the nose wheel tires to 31 psi unloaded, 40 psi loaded. Inflate the main wheel tires to 33 to 40 psi. Maintaining proper tire inflation will minimize tread wear and aid in preventing tire rupture caused from running over sharp stones and ruts. When inflating tires, visually inspect for cuts, cracks, breaks, and tread wear. The pressure of a serviceable tire that is fully inflated should not drop more than 4 percent over a 24-hour period.

NOTE: Oil and other hydrocarbons spilled on tires not only weaken the rubber but may cause it to swell. Avoid spilling oil, fuel or solvents on tires and clean off any accidental spillage as soon as possible.

B. External Power

An external power unit with a negative ground may be used to supply power for ground checks, starting and battery charging. The power unit may be connected directly to the battery or to an optional external power receptacle, located on the lower engine cowl. The receptacle is designed for use with a standard AN type plug.

The optional external power circuit is equipped with a relay and a diode to protect the airplane electrical system against damage from an external power source with reversed polarity.

Observe the following precautions when using an external power source:

CAUTION: The battery may be damaged if exposed to voltages higher than 30 volts.

- (1) Before connecting an external power unit, turn OFF all electrical equipment switches, all radio equipment, and the alternator switch. The battery switch in the airplane should be ON.
- (2) To prevent arcing, make certain no power is being applied by the external power unit when the connection is made.
- (3) Leave the battery ON during the entire external power operation.

C. Battery

A 24-volt, 10-amp/hour lead acid battery is provided for operation of the electrical system.

The battery is located on the right side of the engine compartment, just forward of the firewall. The battery is accessible for servicing by raising the right engine cowl door and removing the battery box cover.

CAUTION: Do not overfill the battery. When the battery cells are overfilled, water and acid will spill on the lower portions of the engine accessory section and lower fuselage. Do not allow the fluid level to drop below the top of the plates.

The fluid level of the battery should be checked every 25 hours and when fully charged, should barely touch or be slightly short of the eyelet at the bottom of the vent well. Add only distilled water to maintain the specific gravity of between 1.275 and 1.295.

For further servicing information, detailed instructions are furnished with each battery from Teledyne Battery Products.

D. Propeller Deice Boots

CAUTION: Because the deicer boots are made of soft flexible stock, care must be exercised against dragging gasoline hoses over them or resting ladders or platforms against the surface of the boots.

The surface of the deice boots should be checked for engine oil after servicing the airplane and at the end of each flight. Any oil found on the surface of the boots should be removed. Removal of oil can be accomplished by the use of a neutral soap and water solution. Special care should be used on electric deice boots, while cleaning, to avoid damaging the special conductive surfacing.

E. Shock Struts

To check the fluid level and fill the strut, jack the airplane, remove the valve cap and depress the valve core to release the air pressure from the strut.

WARNING: The strut should be deflated before removal of the valve body or excessive pressure may result in personal injury or property damage.

Compress and block the strut 1/4 inch from the fully compressed position. Remove the valve body assembly and fill with hydraulic fluid (9, [Table 1](#), 91-00-00). After filling the strut, slowly extend the strut from the blocked position and install the valve

body assembly. Completely compress the strut to release excess air and oil, then reinstall the valve core.

CAUTION: Do not inflate the struts with the airplane on jacks since sudden extension or overinflation of the strut may cause internal damage to the strut.

NOSE GEAR STRUT - With the airplane resting on the ground and the fuel cells full, inflate the nose gear strut with dry air or nitrogen until 3 1/2 inches of piston is exposed. On airplane serials CE-980 and After; CJ-156 and After; D-10397 and After; E-1970 and After; and EA-273 and After, inflate the nose gear strut until 5 inches of the piston strut is exposed. Rock the airplane gently to prevent possible binding of the piston in the barrel when inflating.

MAIN GEAR STRUTS - With the airplane resting on the ground and the fuel cells full, inflate the main gear struts with dry air or nitrogen until 3 inches of piston is exposed per the applicable Pilot's Operating Handbook and FAA approved Airplane Flight Manual. Rock the airplane gently to prevent possible binding of the piston in the barrel when inflating.

CAUTION: If a bottle containing compressed air or nitrogen under extremely high pressure is used, care should be taken not to overinflate the strut. A pressure regulator must be used with high pressure bottled air or nitrogen.

Remove all foreign material from the exposed piston area of the shock struts with a cloth moistened with hydraulic fluid.

F. Shimmy Damper

To check the fluid level in the shimmy damper, insert a wire of with a diameter of approximately 1/16 inch through the hole in the disc at the end of the piston rod until it touches the bottom of the hole in the floating piston. Mark the wire, remove and measure the depth of insertion. Inserting the wire in the hole of the floating piston, rather than letting it rest against the face of the piston, will give a more accurate check.

NOTE: To determine if the wire is inserted in the hole of the floating piston, insert the wire several times, noting each insertion depth. When the wire is correctly inserted, the length will be approximately 1/4 inch greater.

When the shimmy damper is full, the insertion depth is 2 3/16 inch. The empty reading is 3 1/16 inch. If the wire enters the piston rod over 2 3/8 inch, hydraulic fluid should be added. When the shimmy damper is full, the insertion depth is 2 3/16 inch. When hydraulic fluid is needed, remove the shimmy damper and add hydraulic fluid (9, Table 1, 91-00-00) as follows:

- (1) Secure the shimmy damper in a fixed position with the clevis end down.
- (2) Remove the cotter pin, washer, and spring, from the piston rod. Remove with care as the spring is compressed.
- (3) Remove the internal snap ring, scraper ring and the end seal from the aft end of the barrel (opposite the clevis end).
- (4) Insert a 6-32 threaded rod into the floating piston and remove the piston.
- (5) Push the piston rod to the clevis end and fill the barrel with hydraulic fluid (9, Table 1, 91-00-00).
- (6) Slowly actuate the piston rod, allowing the fluid to flow into the clevis end chamber, then return the piston to the clevis end of the barrel.
- (7) Refill the displaced fluid and replace the end seal, scraper ring and internal snap ring.
- (8) Fill the piston rod with fluid.
- (9) Install the floating piston, spring washer and cotter pin. Spread the cotter pin to allow clearance for the measuring wire.
- (10) Release the 6-32 rod and remove it from the floating piston.
- (11) Install the shimmy damper.

G. Propeller Blade Maintenance

Due to the high stresses to which propeller blades are subjected, their careful maintenance is vitally important, particularly on the leading edge of each blade from the tip inboard to just beyond the 33-inch station. All nicks and scratches must be repaired before the airplane is flown. Nicks and scratches set up concentrations of stress which can exceed the strength of the blade material; the result will be a crack and premature failure of the blade. The method and limits for this type of repair, as outlined in the applicable Propeller Handbook, should be followed carefully.

H. Induction Air Filter

Replace the induction air filter after three years, five cleanings or 500 flight hours; whichever occurs first (Refer to Chapter 05-20-00, 001).

The air filters can be cleaned either by compressed air or washing in a solution of detergent (any general purpose detergent may be used) and water. The compressed air cleaning method is recommended when the air filter has only dust on it. Washing is recommended when the air filter contains a combination of dust and oil or carbon.

- (1) Compressed Air Cleaning

- (a) To prevent damage to the air filter, use compressed air less than 10 psi, and keep the nozzle at least one inch away from the filter.
- (b) Blow the compressed air through the filter in the direction opposite the normal airflow (opposite the airflow arrow).
- (c) Blow air through the filter until no more dust is being removed. The filter is ready for inspection.
- (2) Detergent and Water Cleaning
 - (a) Remove loose dust by running water through the filter in the opposite direction of the normal airflow. Use a gentle water stream of less than 40 psi.
 - (b) Mix 1 ounce of detergent per 2 gallons of water, warm or cold, soft or hard (one cup per 16 gallons). Soak the filter in the solution for 15 minutes. Do not soak more than 24 hours. Swish the filter element around in the solution to help remove the dirt.
 - (c) Rinse the filter opposite the airflow with a gentle stream of water (less than 40 psi) to remove all suds and dirt. If the clean side has been contaminated with dirty water during the soak cycle, rinsing from both sides will be necessary.
 - (d) Dry the filter thoroughly before reuse. Warm air of less than 160°F must be circulated. Do not use a light bulb to dry the filter. The filter is now ready for inspection.
- (3) Inspection
 - (a) Look through the filter toward a bright light. Inspect the filter thoroughly from all sides for holes and tears in the filter media.
 - (b) Check the filter for damaged metal parts. DO NOT reuse damaged filters.
 - (c) If your filter contains a gasket, inspect the gasket for damage. If it is not smooth and flat, replace the gasket, because the seal may not be air tight. If your filter does not contain gaskets, make sure the sealing surface is smooth and flat.
- (4) Installation
 - (a) Inspect the housing surface on which the filter seals. It must have a clean, smooth and flat surface.
 - (b) Reinstall the filter. Make sure it is mounted securely and there are no dust leaks past the edge of the filter and gasket.
 - (c) This is a dry-type filter - DO NOT apply oil to the filter.

I. Spark Plugs

For the proper spark plug and spark plug gap, Refer to Teledyne Continental Motors (TCM) SIL 03-2B. The spark plugs should be installed with no lubrication and torqued to 300 to 360 in.-lbs (25 to 30 ft.-lbs).

J. Roton Locks

Usually, Roton locks will not need service. If there is a grinding and binding in the lock as the seat reclines or if the return action becomes jerky, a small amount of grease properly applied as follows should improve the operation.

CAUTION: Use Grease sparingly and only in designated areas when lubricating the Roton lock. Too much grease or grease in the wrong parts of the lock can cause improper operation of the lock (Refer to Figure 201).

- (1) Use grease (11, Table 1, 91-00-00) on the threads (Refer to Figure 201).
- (2) Compress the spring guide and counterbalance spring approximately one inch.
- (3) Remove the retaining ring.
- (4) Relax pressure on the spring guide and counterbalance spring slowly until the spring is fully extended.
- (5) Remove the lock from the fixture and remove the spring guide, counterbalance spring and spring guide tube.
- (6) Apply a small quantity of grease to the completely extended thrust screw.
- (7) Reassemble the lock. For service other than lubrication, return the Roton lock to the manufacturer.

K. Cleaning And Waxing The Airplane Finish

Prior to cleaning the exterior, cover the wheels, making certain the brake discs are covered; attach pitot cover securely; install plugs in or mask off all other openings. Be particularly careful to mask off both static air buttons before washing or waxing. The urethane paint finish cleans easily with a sponge and mild detergent solution. Rinse with clear water. A clean white cloth saturated with solvent (19 or 31, Table 1, 91-00-00) may be used to remove accumulations of oil or grease, and dried insects. Flush the surface with plenty of cool water to remove all traces of soap and dry with a chamois to prevent water marks.

CAUTION: When washing the airplane with mild soap and water, use special care to avoid washing away grease for any lubricated area. After washing with solvent in the wheel well areas, lubricate all lubrication points. Premature wear of lubricated surfaces may result if the above precautions are not taken.

For better protection, a non-abrasive wax may be used on airplanes exposed to corrosive atmospheres with moisture condensation.

Wax application procedures are important and will vary in accordance with the type being used. For best results, follow the wax manufacturer's specifications. A build-up of several coats of wax may give the finish a yellowed appearance. The old wax should be removed before a new coat is applied.

Airplanes with aluminum skin surfaces may be polished to a high gloss with any warranted aluminum polish. Soft clean cloths or a chamois should be used to prevent scratching the aluminum when cleaning and polishing.

L. Cleaning Plastic Windows

WARNING: Do not use thinner or aromatic abrasive cleaners to clean the windows; they will damage the surface of the plastic. Aliphatic naphtha and similar solvents are highly flammable, and extreme care must be taken when using them.

CAUTION: Do not use an ice scraper to remove ice from windows because this practice may cause scratches to the window surface. To avoid scratches, any cleaning of the windows should be done with care.

A commercial cleaning compound made specifically for acrylic plastic windows may be used. When using a commercial cleaner, follow the instructions on the container. If a commercial cleaner is not available, the following instructions should be followed:

Cleaning of the acrylic plastic windows should never be attempted when dry. The window should first be flushed with water or a mild soap solution, then rubbed lightly with a grit-free cloth, chamois or sponge. Stubborn grease or oil deposits are readily removed with aliphatic naphtha or hexane. Rinse with clear water.

M. Cleaning Interior Cabin Trim

CAUTION: The interior cabin trim can be easily contaminated if cleaned with any of the following solvents and thinners: MPK, Naphtha, Mufti, Standard Solvent, Gasoline, Lacquer Thinner, and other types of Thinners. Sharp edges or cuts on the edge of the interior cabin trim material may cause it to crack.

Proper care and cleaning of the interior cabin trim (Noryl and Kydex plastics) is of primary importance to maintain a desirable appearance. Clean the interior cabin trim with a detergent soap and water, and scrubbing with a soft bristle brush will dislodge most dirt. Wet wipe with clean water and wipe dry. Alcohol may be used to remove foreign material that is alcohol soluble.

N. Engine Cleaning

The engine may be cleaned with solvent or any standard neutral solvent recommended for cleaning engines. The cleaner may be sprayed or brushed on the engine. Compressed air may be used to speed up drying time.

O. Lubrication

Lubrication diagrams within this section contain information that ensure the proper operation and preservation of the airplane. Location, interval, and type of lubricant required are given (Refer to [Figure 202](#)). Avoid excessive application of lubricants.

P. Lubrication Of Landing Gear Uplock Rollers

The uplock roller bearings should be lubricated with grease ([11, Table 1, 91-00-00](#)) every 100 hours or any time after cleaning the wheel well the bearings are subjected to degreasing with solvent under pressure. Using a pressure gun, the uplock bearing is lubricated through a grease fitting installed in the uplock bearing bolt.

NOTE: The grease fitting on the drag leg, directly above the uplock roller bearing, does not supply lubrication for the uplock roller bearing.

In Table 201, () Denotes quantity of servicing points.

Table 201. Servicing

Item	Location	Service With	Interval
Check			
Engine Oil Level	Access door on upper cowl (1)	Refer to Table 1, 91-00-00	Preflight.
Battery Water	RH rear side of engine compartment (1)	Distilled Water	25 hrs.
Air Conditioner Compressor Oil Level	See Chapter 21 for location and special instructions	Suniso No. 5GS or Texaco WF 100 500 Viscosity Oil	As required.

Air Conditioner Refrigerant	See Chapter 21 for location and special instructions	Refrigerant R-12 (For airplane serials prior to CE-1792, E-2945 and EA-579). Refrigerant R-134a (For airplane serials CE-1792 and After, E-2945 and After and EA-579 and After).	As required.
Magneto Pressurization Air Filter	Between Magnetos		50 hrs.
Induction Air Filter	Fuselage nose section grill (1)		Preflight.
Change			
Engine Oil	Lower rear side of engine (1)	Refer to Table 1, 91-00-00	100 hrs.
Engine Oil Filter	Left rear side of engine (1)		100 hrs.
Clean			
Induction Air Filter	Fuselage nose section grill (1)	Refer to INDUCTION AIR FILTER	Remove and clean filter only if excessive dust or other contaminants are visible.
Fuel Injection Control Valve Screen	Fuel injection control valve on the lower side of the engine (1)	Clean with solvent and blow dry with air pressure	100 hrs.
Fuel Selector Valve Strainer	Fuel selector valve inboard left wing root (1)	Clean with solvent and blow dry with air pressure	100 hrs.
Pressure Pump Intake Filter	Rear engine baffle (1)	Replace	300 hrs or On Condition.
Drain			
Fuel Sump Drain	Inboard left wing root (1)		Preflight.
Fuel Cell Drains	Under both wings (2)		Preflight.
Static Drain	Behind lower fuselage fuel selector door.	Remove drain plug and drain moisture from plastic line.	100 hrs.
Replace			
Induction Air Filter	Fuselage nose section grill (1)	Refer to INDUCTION AIR FILTER	After three years, five cleanings or 500 flight hours; whichever occurs first.
Pressure System Inline Filter	Between pressure regulator and instruments (1)		300 hrs or On Condition.
Service			
Brake Fluid Reservoir	Upper forward side of the firewall (1)	MIL-H-5606 hydraulic fluid	As required.
Oxygen Cylinder(s)(Optional)	All equipped aircraft except airplane serials: EA-320, EA-440 and After, location of the cylinder (1) is under front seats. All equipped aircraft airplane serials: EA-320, EA-440 and After, location of the cylinders (2) are in the left and right wings.	MIL-O-27210 aviator's breathing oxygen	As required.
Main and Nose Landing Gear Struts	Top of each strut (3)	MIL-H-5606 hydraulic fluid and dry compressed air	As required or annually.

Shimmy Damper	Nose landing gear (1)	MIL-H-5606 hydraulic fluid	As required or annually.
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Figure 201 : Sheet 1 : Roton Lock

E25269

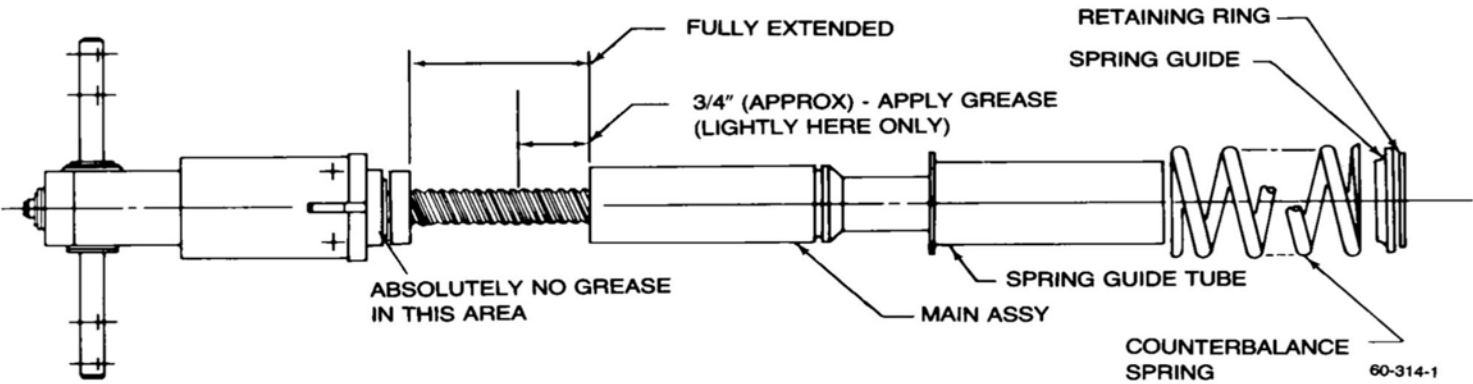
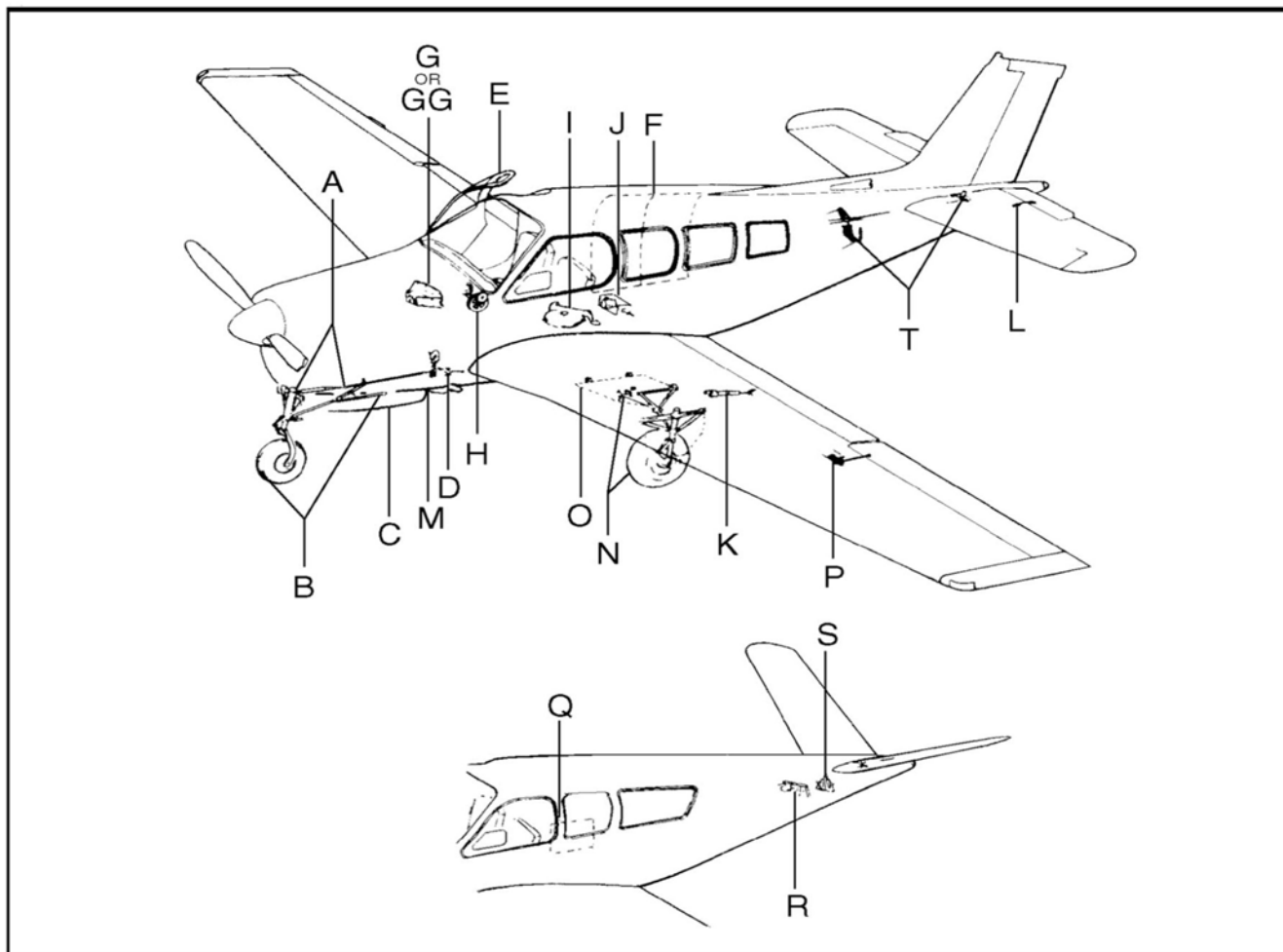


Figure 202 : Sheet 1 : Lubrication Schedule

E25263



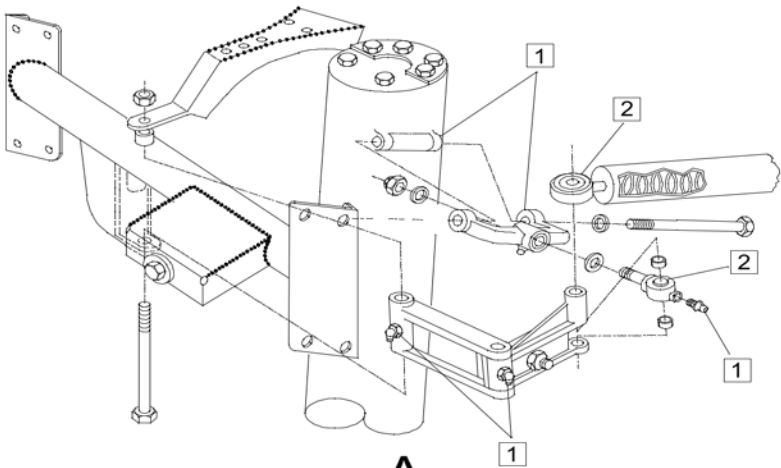
1. THE FOLLOWING DETAILS, (A THRU T) CONSTITUTE A LUBRICATION SERVICING SCHEDULE. MAJOR DIFFERENCES BETWEEN MODEL TYPES RELATIVE TO LUBRICATION POINTS ARE THE V-TAIL CONFIGURATION, EXCLUSIVELY FOR THE V35B, AND THE CARGO DOOR PROVIDED ONLY ON THE MODEL A36, A36TC, & B36TC.
2. ENVIRONMENTAL CONDITIONS AND OPERATIONAL APPLICATION MAY DICTATE MORE FREQUENT SERVICING.
3. LANDING GEAR COMPONENTS MAY REQUIRE LUBRICATION EVERY 25 OR 50 HOURS, DEPENDING ON OPERATION.
4. MIL-G-81322 GREASE MAY BE USED IN PLACE OF MIL-G-23827 GREASE IN WARM CLIMATES. HOWEVER, IN EXTREMELY COLD CLIMATES MIL-G-23827 GREASE SHOULD BE USED.
5. CARE SHOULD BE TAKEN WHEN USING GREASES MIL-G-81322 AND MIL-G-23827, SINCE THEY CONTAIN SYNTHETIC LUBRICANTS WHICH WILL DISCOLOR PAINTED SURFACES, AND WILL SOFTEN RUBBER PRODUCTS.

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Figure 202 : Sheet 2 : Lubrication Schedule

E25529

INDEX	LOCATION	POINTS()	LUBRICANT	INTERVAL
1	NOSE WHEEL WELL	(5)	MIL-G-81322	100 HRS
2	ROD END BEARING	(2)	SAE 20	AS REQUIRED

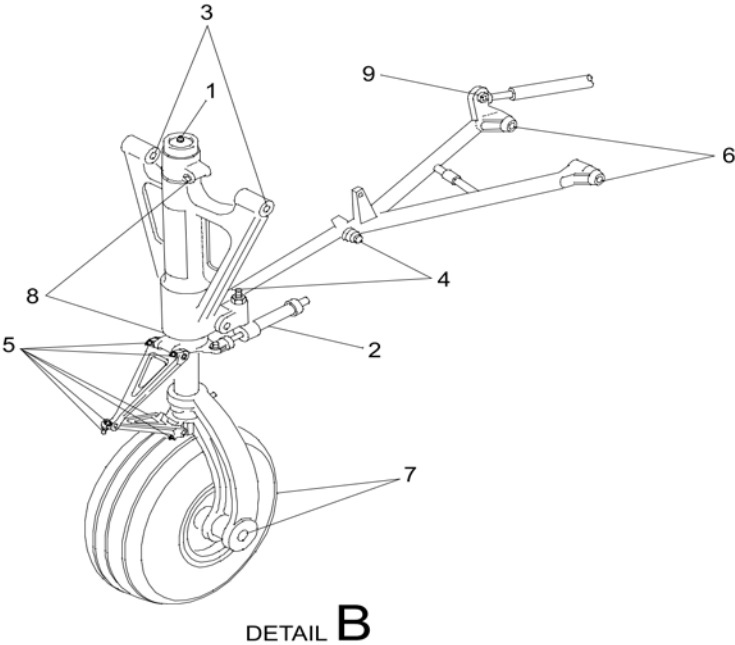


DETAIL A

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Figure 202 : Sheet 3 : Lubrication Schedule

E25535

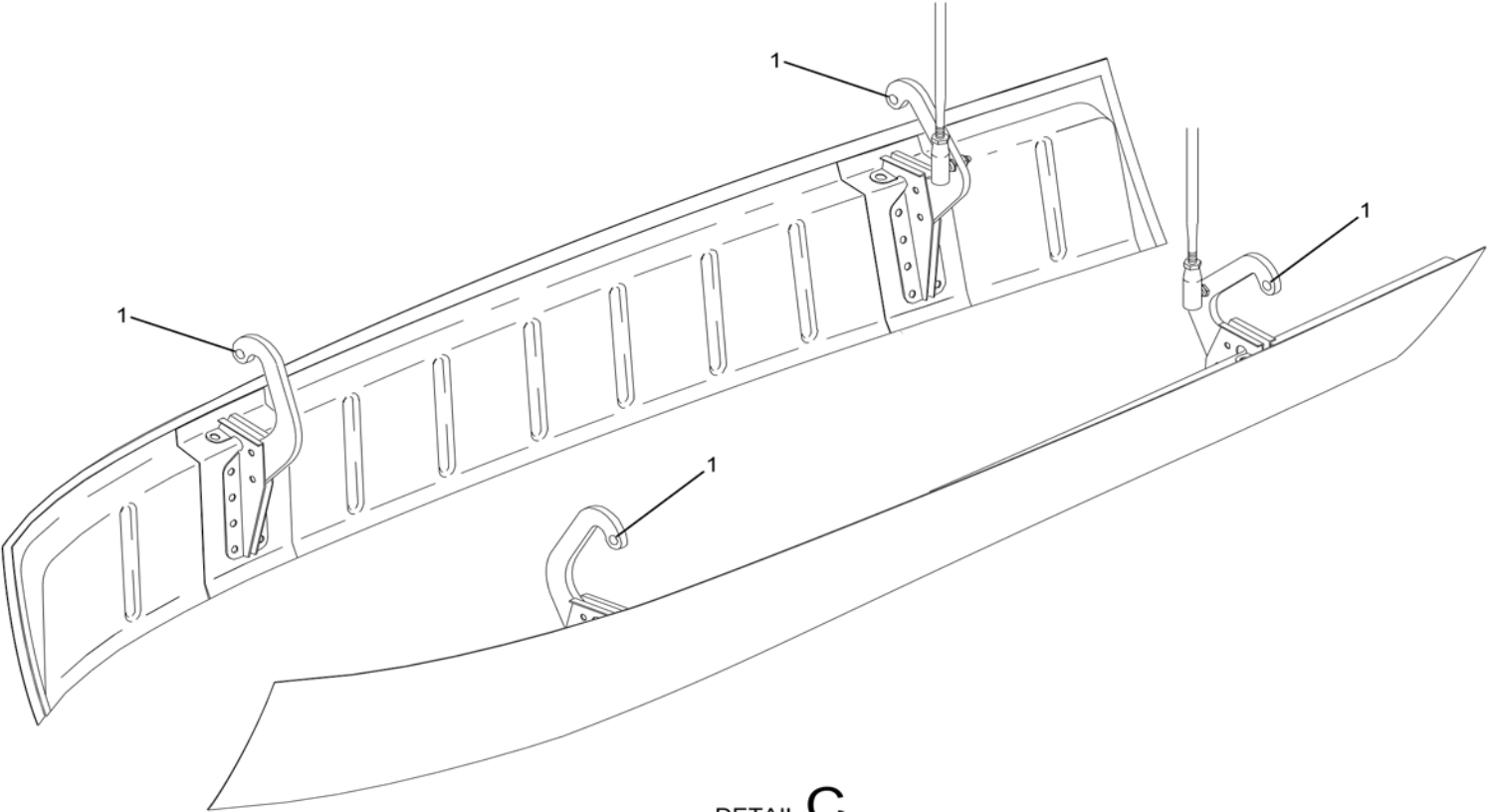


INDEX	LOCATION NOSE LANDING GEAR	POINTS ()	LUBRICANT	INTERVAL
1	NOSE SHOCK STRUT	(1)	MIL-H-5606	AR
2	SHIMMY DAMPER	(1)	MIL-H-5606	AR
3	NOSE GEAR HINGE POINTS	(2)	MIL-G-81322	100 HRS
4	NOSE GEAR LINKAGE	(2)	MIL-G-81322	100 HRS
5	NOSE GEAR TORQUE KNEES	(6)	MIL-G-81322	100 HRS
6	"A" FRAME PIVOT POINTS	(2)	MIL-G-81322	100 HRS
7	NOSE WHEEL BEARINGS	(2)	AEROSHELL 5 (PREFERRED) OR MOBIL AVIATION GREASE SHC100	100 HRS
8	NOSE GEAR SWIVEL	(2)	MIL-G-81322	100 HRS
9	ROD END FITTING	(1)	MIL-G-81322	100 HRS

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050050AA.AI

Figure 202 : Sheet 4 : Lubrication Schedule

E22756

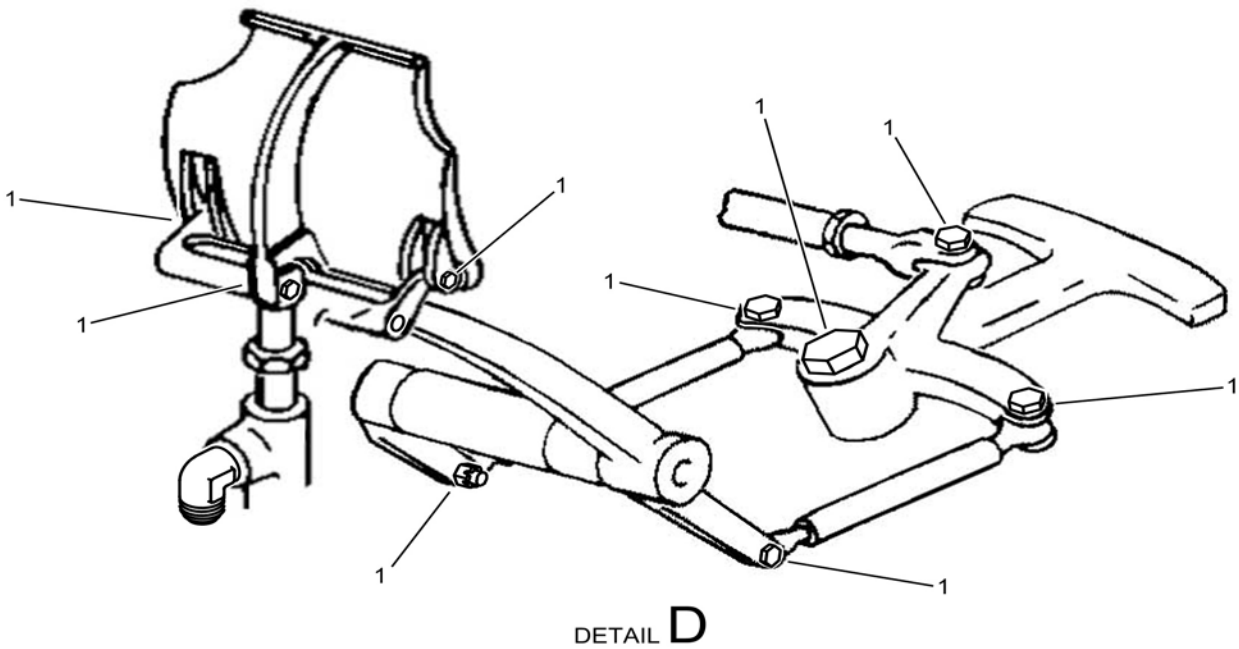


INDEX	LOCATION NOSE GEAR DOORS	POINTS()	LUBRICANT	INTERVAL
1	NOSE WHEEL DOOR HINGES	(4)	SAE 20 OR SAE 10W30	100 HRS

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Figure 202 : Sheet 5 : Lubrication Schedule

E22791

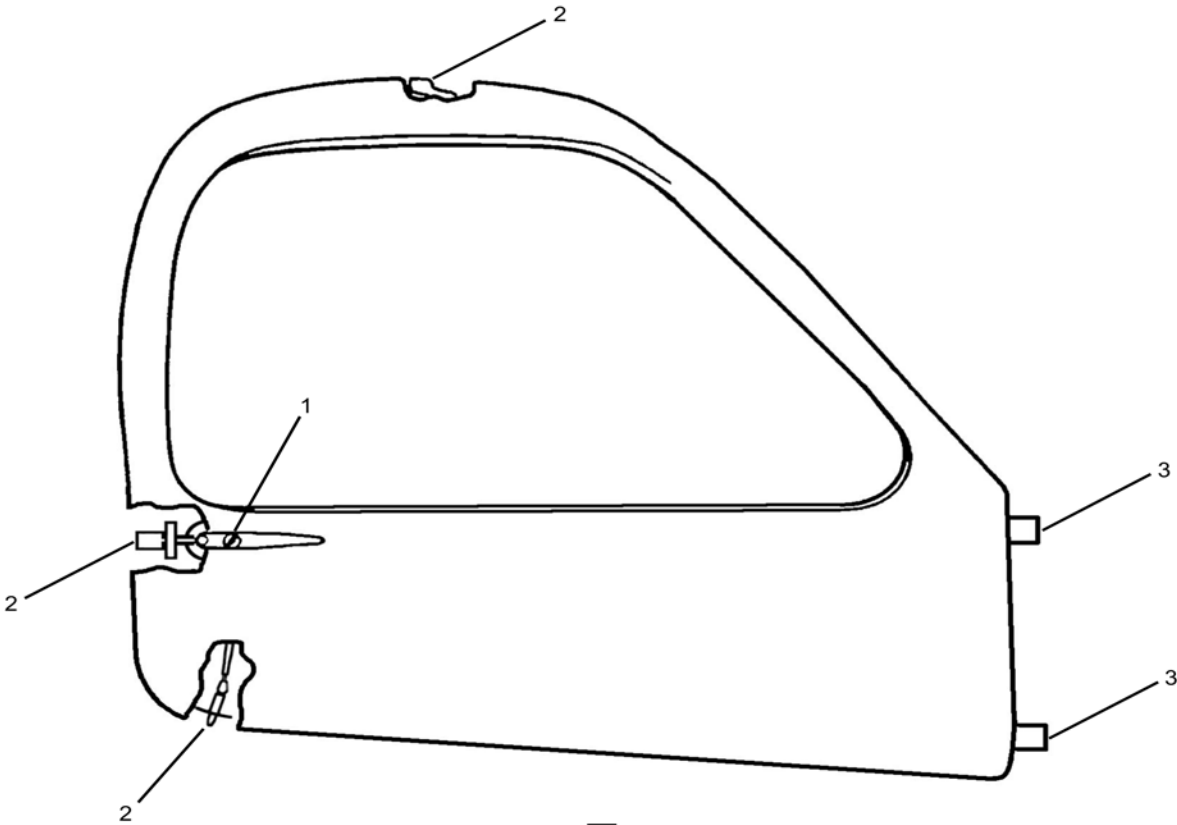


INDEX	LOCATION RUDDER PEDALS	POINTS()	LUBRICANT	INTERVAL
1	RUDDER PEDAL LINKAGE	(18)	SAE 20 OR SAE 10W30	100 HRS

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Figure 202 : Sheet 6 : Lubrication Schedule

E22801



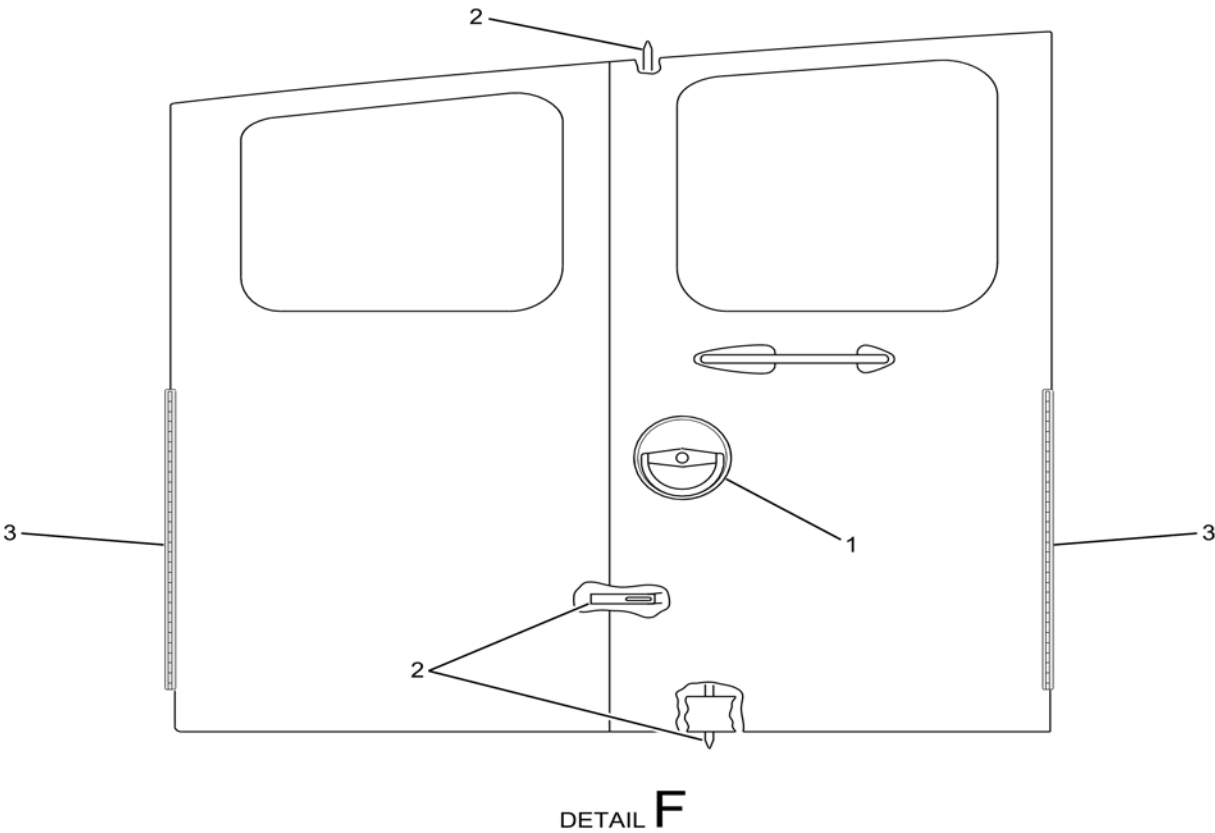
DETAIL E

INDEX	LOCATION FORWARD CABIN DOOR	POINTS ()	LUBRICANT	INTERVAL
1	FORWARD CABIN DOOR HANDLE	(1)	SAE 20 OR SAE 10W30	100 HRS
2	FORWARD CABINDOOR LATCH	(3)	SAE 20 OR SAE 10W30	100 HRS
3	FORWARD CABIN DOOR HINGES	(2)	SAE 20 OR SAE 10W30	100 HRS

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Figure 202 : Sheet 7 : Lubrication Schedule

E22810



DETAIL F APPLIES ONLY
TO SERIALS E-1111,
E-1241 AND AFTER;
EA-1 AND AFTER.

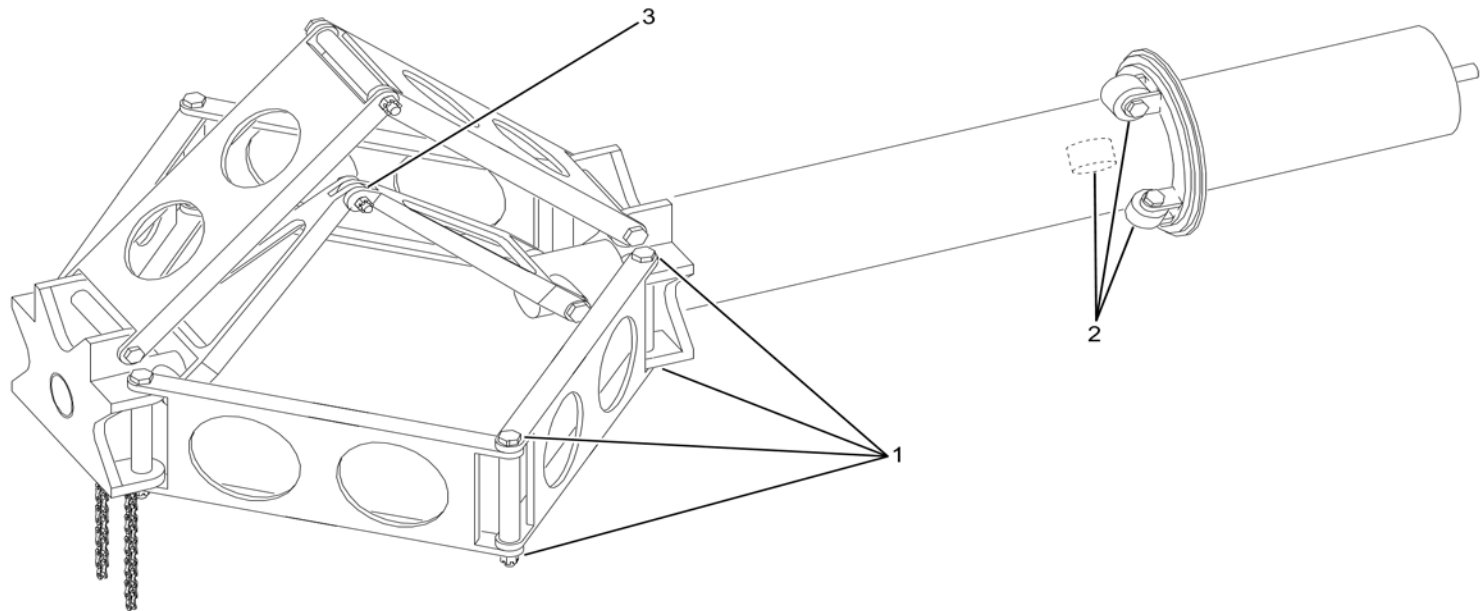
NOTE
LUBRICATE ALL INTERNAL
MOVING PARTS OF THE
LATCHING MECHANISM
WITH AEROSHELL 17,
AS REQUIRED.

INDEX	LOCATION	POINTS ()	LUBRICANT	INTERVAL
	AFT CABIN DOOR			
1	AFT CABIN DOOR HANDLE	(1)	AEROSHELL 17	100 HRS
2	AFT CABIN DOOR LATCH	(3)	AEROSHELL 17	100 HRS
3	*AFT CABIN DOOR HINGES	(2)	MIL-M-7866	AR
*MIX MIL-M-7866 WITH NAPHTHA AND APPLY WITH A BRUSH.				

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Figure 202 : Sheet 8 : Lubrication Schedule

E22816



PRIOR TO D-10404, CE-1037, E-2111 EXCEPT E-1946 AND E-2104, EA-389 EXCEPT EA-320

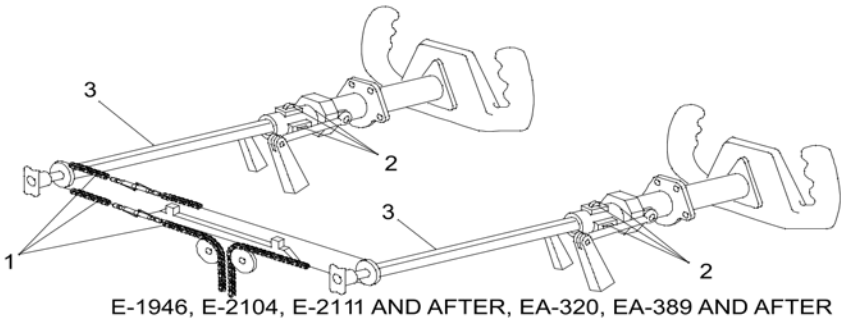
DETAIL G

INDEX	LOCATION CONTROL COLUMN	POINTS ()	LUBRICANT	INTERVAL
1	CONTROL COLUMN LINKAGE	(18)	SAE 20 OR SAE 10W30	100 HRS
2	CONTROL COLUMN HEAD	(3)	SAE 20 OR SAE 10W30	100 HRS
3	CONTROL COLUMN TORQUE KNEES	(6)	SAE 20 OR SAE 10W30	100 HRS

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130304AA, AI

Figure 202 : Sheet 9 : Lubrication Schedule

E25539



E-1946, E-2104, E-2111 AND AFTER, EA-320, EA-389 AND AFTER

DETAIL **G-G**

INDEX	LOCATION CONTROL COLUMN	POINTS	LUBRICANT	INTERVAL
1	CONTROL COLUMN CHAINS	(4)	SAE 20 OR 10W30 OIL	100 HRS.
2 **	BALL BEARINGS (WITHOUT SEALS)	(10)	MIL-L-7870 OIL	100 HRS. OR 1 YEAR, WHICHEVER OCCURS FIRST
3 *	TORQUE SHAFTS	(2)	MPK SOLVENT	100 HRS.

* WIPE FULL LENGTH OF SQUARE SHAFTS WITH MPK. THESE SURFACES TO REMAIN DRY AND FREE OF OIL.

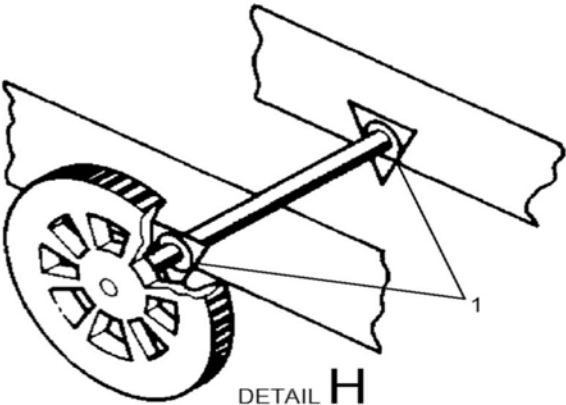
** REMOVE ONE OF THE NONADJUSTABLE ROLLERS (27-00-00). IF IT IS A SEALED ROLLER WITH THE SEALS INTACT, REINSTALL THE ROLLER AND MAKE A MAINTENANCE RECORD THAT THE ROLLERS ARE SEALED AND DO NOT NEED LUBRICATION. IF THE ROLLERS ARE NOT SEALED, OR THE SEALS ARE NOT INTACT, THEY MAY BE REPLACED WITH SEALED ROLLERS AND A MAINTENANCE RECORD MADE THAT THE ROLLERS DO NOT NEED LUBRICATION. IF THE ADJUSTABLE ROLLERS ARE REMOVED FOR LUBRICATION OR REPLACEMENT, REFER TO CHAPTER 27-00-00 FOR ADJUSTMENT.

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Figure 202 : Sheet 10 : Lubrication Schedule

E25257

NOTE:
AT SERIES D-10380 AND AFTER, CJ-156 AND AFTER, CE-960 AND AFTER,
E-1886 AND AFTER, EA-249 AND AFTER, SEALED BEARINGS WERE INSTALLED
AND NO LUBRICATION IS REQUIRED.



INDEX	LOCATION	POINTS ()	LUBRICANT	INTERVAL	
1	TRIM TAB CONTROL ELEVATOR TRIM CONTROL	(2)	SAE 20 OR SAE 10W30	100 HRS	EA12B 050053AA AI

Figure 202 : Sheet 11 : Lubrication Schedule

E25245

****THE NOSE GEAR RETRACT ARM IS LOCATED BENEATH THE GEAR BOX.**

The diagram shows a side view of the nose gear actuator assembly. Callout 1 points to the top of the actuator housing. Callout 2 points to a bolt on the side of the housing. Callout 3 points to the retract arms extending from the bottom of the gear box.

***CHECK OIL LEVEL BY ENGAGING AND TURNING THE EMERGENCY HAND CRANK 1/2 TURN TO DETERMINE THAT OIL IS BEING PICKED UP ON THE WORM GEAR. THE OIL LEVEL SHOULD BE MAINTAINED NO MORE THAN NECESSARY TO COVER 1/2 OF THE DIAMETER OF THE WORM GEAR.**

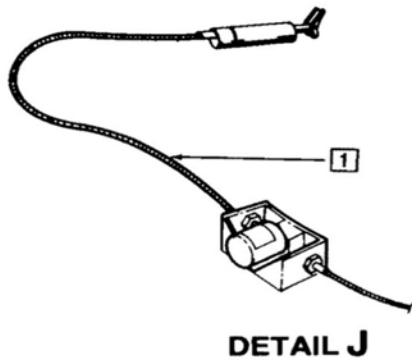
DETAIL I

INDEX	LOCATION	POINTS ()	LUBRICANT	INTERVAL
1	LANDING GEAR ACTUATOR LANDING GEAR MOTOR GEAR BOX	(1)	MIL-G-81322	600 HRS
2	*LANDING GEAR ACTUATOR GEAR BOX	(1)	MIL-PRF-2105 OR MOBIL DELVAC 75W90 (HBC P/N 101-380016-1)	300 HRS
3	**LANDING GEAR SYSTEM RETRACT ARMS	(5)	SAE 20 OR SAE 10W30	100 HRS

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Figure 202 : Sheet 12 : Lubrication Schedule

E25233

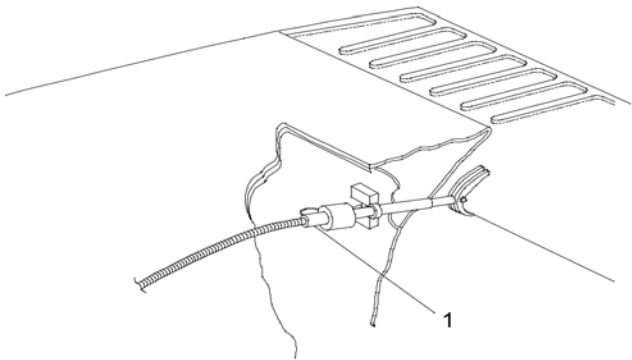


INDEX	LOCATION FLAP MOTOR	POINTS()	LUBRICANT	INTERVAL	
1	Flap flexible drive shaft (inside of cable housing)	(1)	MIL-G-23827	900 hrs	35-604-48

Figure 202 : Sheet 13 : Lubrication Schedule

E25543

INDEX	LOCATION FLAP ACTUATOR	POINTS ()	LUBRICANT	INTERVAL
1	FLAP ACTUATOR	(2)	MIL-L-10324A OR MIL-L-2105C 75W OR 101-380016-1	1,000 HRS

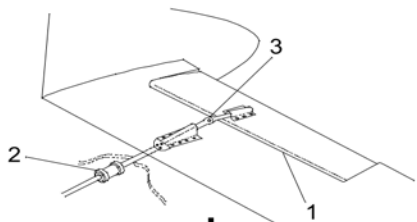


DETAIL K

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050055AA.AI

Figure 202 : Sheet 14 : Lubrication Schedule

E25548



DETAIL L

DETAIL L DEPICTS THE BONANZA 33 AND 36 SERIES AIRPLANES.
THE BONANZA 35 SERIES DOES NOT INCORPORATE INDEX 2.

INDEX	LOCATION ELEVATOR TRIM	POINTS ()	LUBRICANT	INTERVAL
1	*ELEVATOR TRIM TAB HINGE	(2)	BRAYCO 300 OR EQUIVALENT	100 HRS
2	**ELEVATOR TRIM TAB ACTUATOR	(2)	MIL-G-23827	AR
3	† TAB CONTROL HORN PIVOT	(†)	SAE 20 OR SAE 10W30	AR

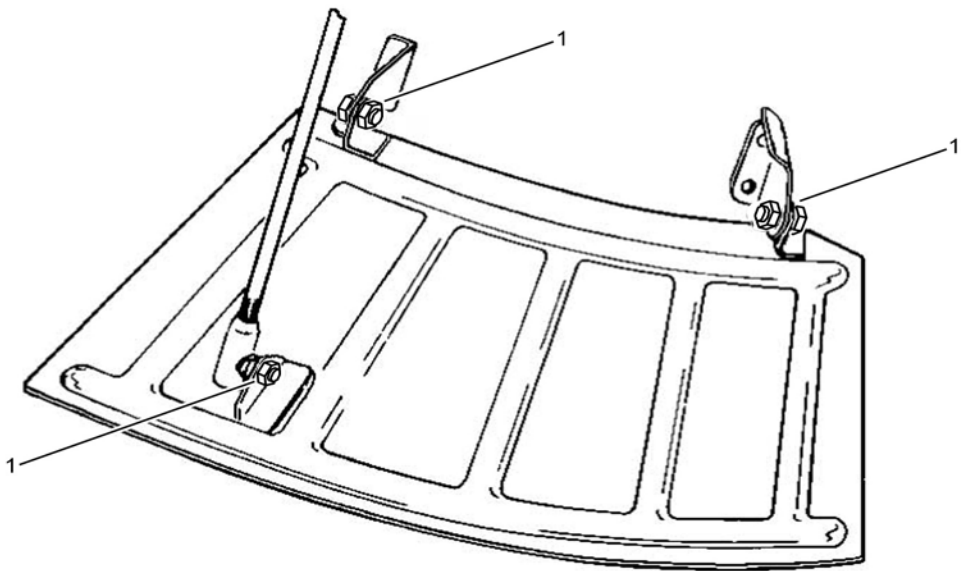
* MIX MIL-M-7866 WITH NAPHTHA AND APPLY WITH A BRUSH.
** THE ACTUATOR IS NOT USED ON THE BONANZA 35 SERIES AIRPLANES.
† ON THE BONANZA 35 SERIES, LUBRICATE BOTH THE UPPER AND LOWER TAB CONTROL HORN
PIVOTS (INDEX 3). ON THE BONANZA 33 AND 36 SERIES AIRPLANES, ONLY THE UPPER TAB
CONTROL HORN PIVOT LUBRICATION IS REQUIRED.

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050056AA.AI

Figure 202 : Sheet 15 : Lubrication Schedule

E22826

INDEX	LOCATION COWL FLAPS	POINTS()	LUBRICANT	INTERVAL
1	COWL FLAP HINGES	(6)	SAE 20 OR SAE 10W30	100 HRS

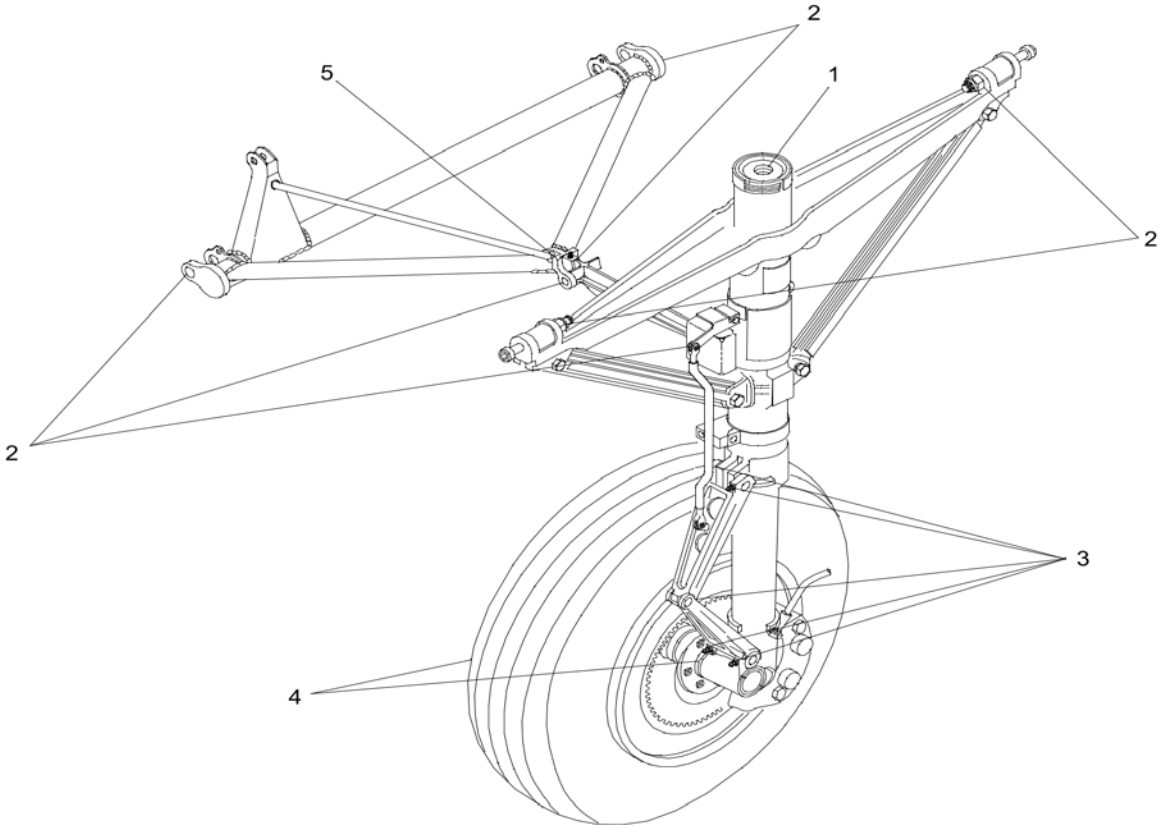


DETAIL M

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130155AA.AI

Figure 202 : Sheet 16 : Lubrication Schedule

E25551



DETAIL N

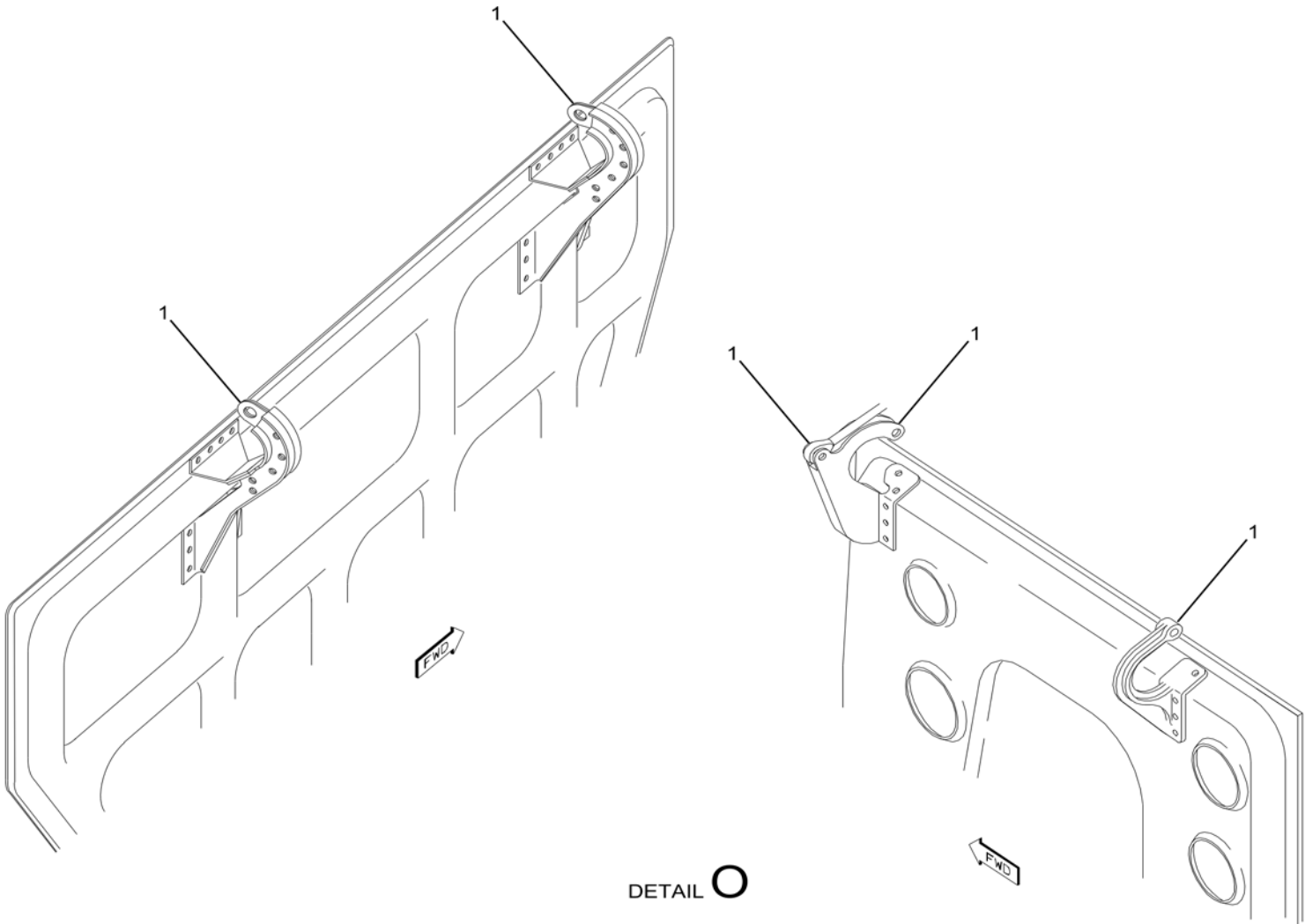
INDEX	LOCATION MAIN LANDING GEAR	POINTS ()	LUBRICANT	INTERVAL
1	MAIN SHOCK STRUTS	(2)	MIL-H-5606	AR
2	HINGE POINTS AND RETRACT LINKS	(14)	MIL-G-81322	100 HRS
3	MAIN GEAR TORQUE KNEES	(10)	MIL-G-81322	100 HRS
4	MAIN WHEEL BEARINGS	(4)	AEROSHELL 5 (PREFERRED) OR MOBIL AVIATION GREASE SHC100	100 HRS
5	LANDING GEAR UPLOCK ROLLERS	(2)	MIL-G-23827 SEE LUBRICATION OF LANDING GEAR UPLOCK ROLLERS IN THIS CHAPTER.	

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Figure 202 : Sheet 17 : Lubrication Schedule

E22834

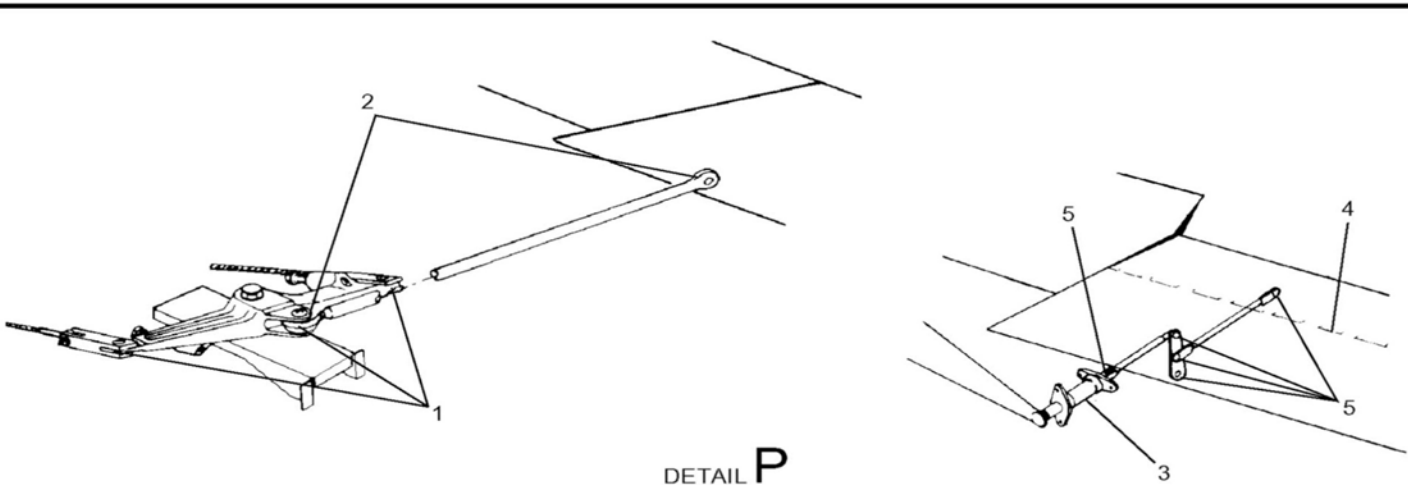
INDEX	LOCATION	POINTS()	LUBRICANT	INTERVAL
	MAIN LANDING GEAR DOORS			
1	LANDING GEAR DOOR HINGES	(10)	SAE 20 OR SAE 10W30	100 HRS



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Figure 202 : Sheet 18 : Lubrication Schedule

E25228



* LUBRICATE THE AILERON PUSH/PULL ROD ENDS (IN PLACE) AT 100 HR INTERVALS USING SAE 20 OR 10W30 OIL, OR REMOVE THE AILERON PUSH/PULL ROD ASSEMBLY AND CLEAN & LUBRICATE ROD ENDS USING MIL-G-23827 GREASE. ROTATE THE ROD END EYE BALLS TO ASSURE ADEQUATE LUBRICATION COVERAGE. CHECK AILERON RIGGING AFTER REINSTALLATION OF THE ROD END ASSEMBLY.

INDEX	LOCATION AILERON	POINTS ()	LUBRICANT	INTERVAL
1	AILERON CONTROL LINKAGE	(6)	SAE 20 OR SAE 10W30	100 HRS
2	* AILERON PUSH PULL RODS ENDS	(4)	MIL-G-23827 OR SAE 20 OR SAE 10W30	100 HRS
3†	AILERON TRIM TAB ACTUATOR	(1)	MIL-G-23827	AR
4†	AILERON TRIM TAB HINGE	(1)	VV-L-800 (PREFERRED), LPS-1, CRC 3-36, WD-40	100 HRS
5†	AILERON TRIM TAB PUSH/PULL LINKAGE	(5)	VV-L-800 (PREFERRED), LPS-1, CRC 3-36, WD-40	100 HRS

† EFFECTIVE E-1946, E-2104, E-2111 AND AFTER; EA-320, EA-389 AND AFTER.

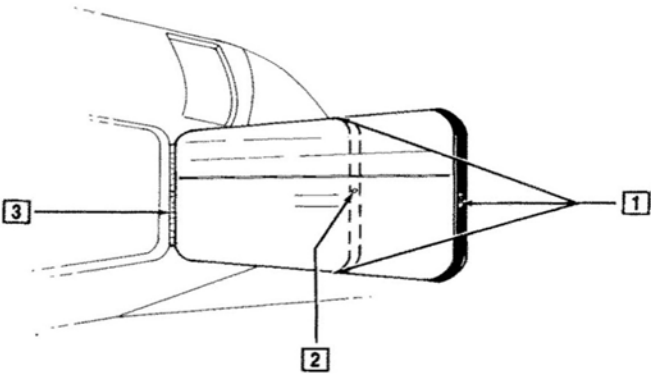
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Figure 202 : Sheet 19 : Lubrication Schedule

E25221

INDEX	LOCATION BAGGAGE DOOR	POINTS()	LUBRICANT	INTERVAL
1	Large door latch mechanism	(3)	SAE 20 or SAE 10W30	100 hrs
2	Small door latch mechanism	(1)	SAE 20 or SAE 10W30	100 hrs
3	*Door hinge	(1)	MIL-M-7866	AR

*Mix MIL-M-7866 with naphtha and apply with a brush.



DETAIL Q

Detail Q includes serials CE-748, CE-772 and after;
CJ-149 and after; and D-10097, D-10120 and after.

35-604-55

Figure 202 : Sheet 20 : Lubrication Schedule

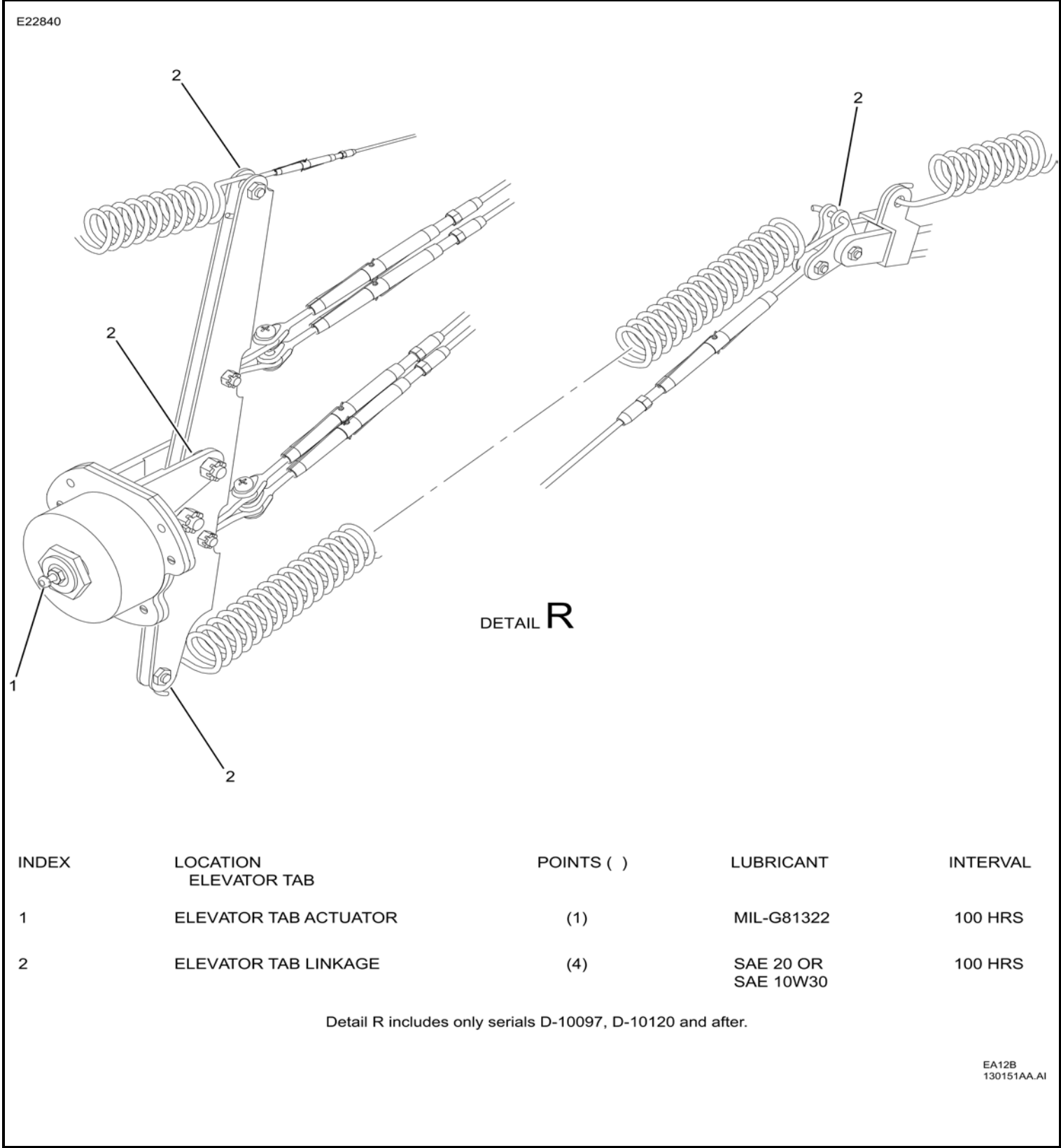
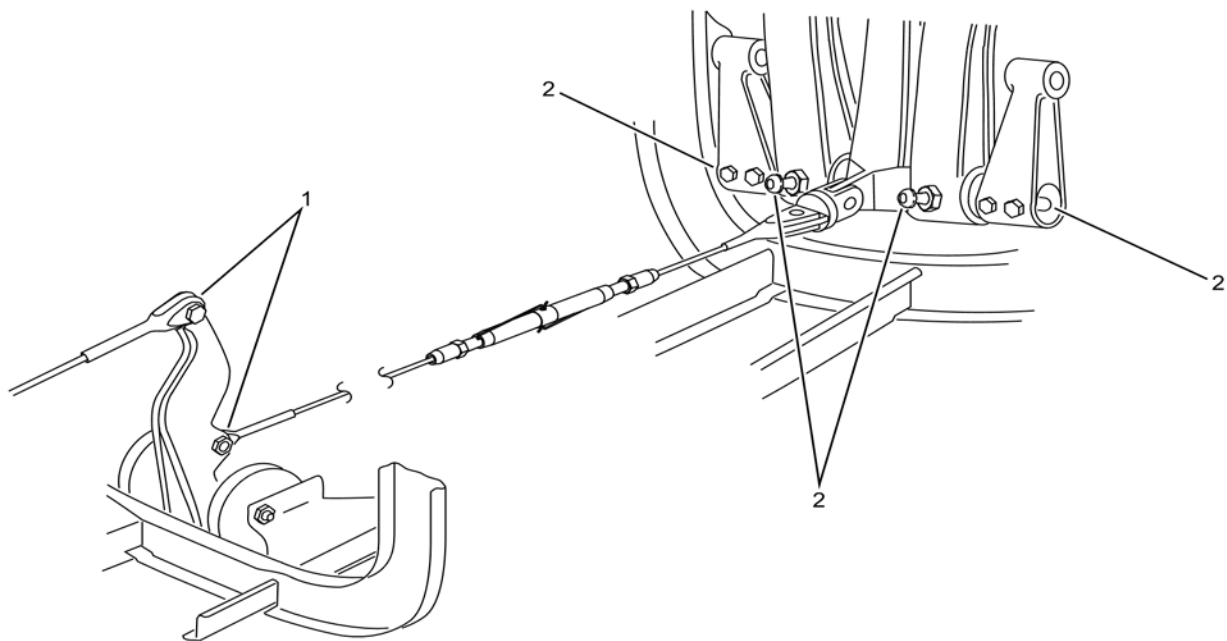


Figure 202 : Sheet 21 : Lubrication Schedule

E22850

INDEX	LOCATION	POINTS()	LUBRICANT	INTERVAL
	DIFFERENTIAL CONTROL			
1	ELEVATOR CABLE REDUCTION ARM	(2)	SAE 20 OR SAE 10W30	100 HRS
2	DIFFERENTIAL CONTROL ASSY	(4)	MIL-G-81322	100 HRS



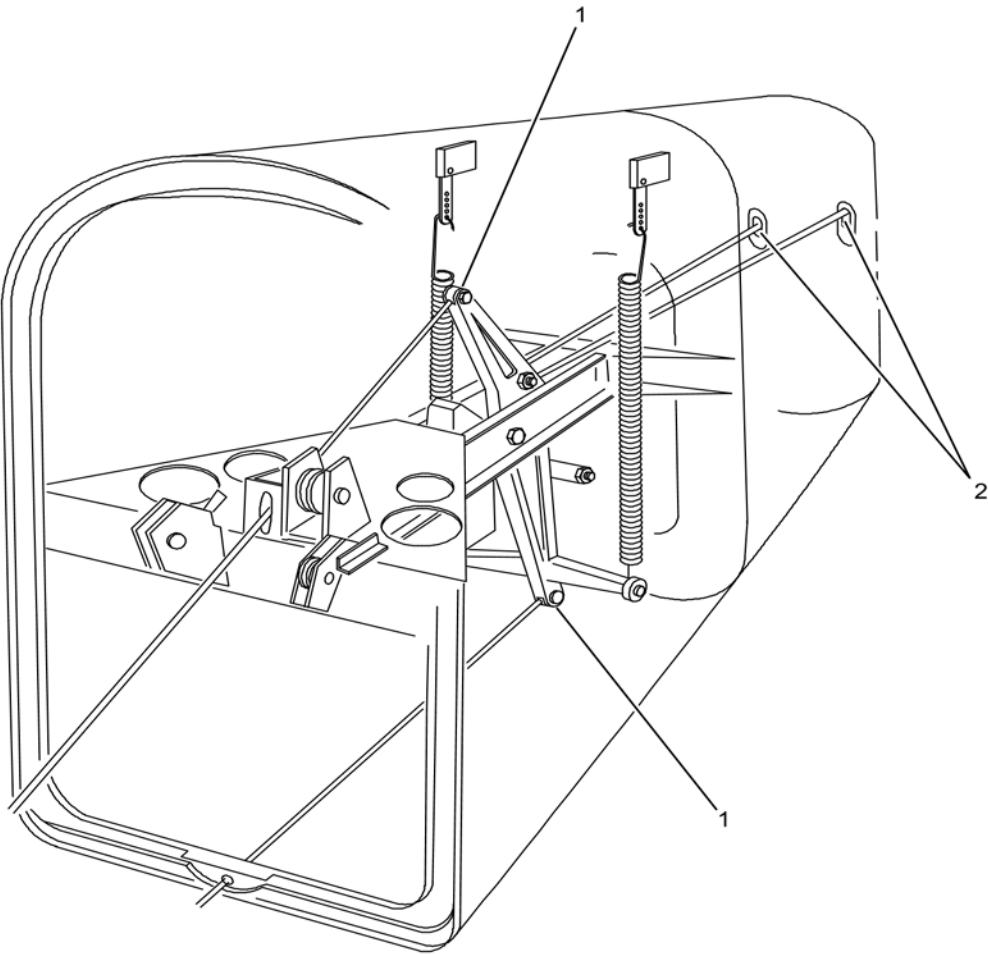
DETAIL **S**

Detail S includes only Bonanza 35 series airplanes.

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Figure 202 : Sheet 22 : Lubrication Schedule

E22862



DETAIL T

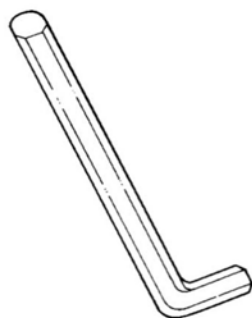
INDEX	LOCATION ELEVATOR CONTROL	POINTS()	LUBRICANT	INTERVAL
1	ELEVATOR BELL CRANK	(2)	SAE 20 OR SAE 10W30	100 HRS
2	ELEVATOR CONTROL PUSH PULL	(2)	SAE 20 OR SAE 10W30	100 HRS

Detail T includes only serials CE-748, CE-772 and after;
CJ-149 and after; E-1111, E-1241 and after; and EA-1 and after.

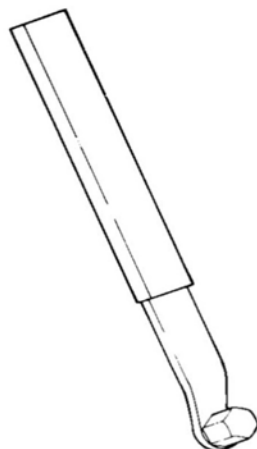
EA12B
130152AA.AI

Figure 203 : Sheet 1 : Special Tools

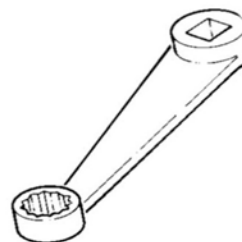
E25210



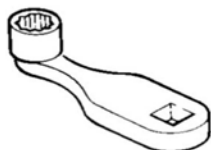
TS1222-5
50-590012



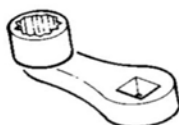
TS1222-3
TS1222-4
TS1222-8



50-590014



TS1171-10



TS1176-10



50-590013
TS1171-1
TS1171-2
TS1176-1
TS1176-2

UPPER FORWARD WING BOLT WRENCHES:

TS1222-3	(FOR NAS152-37 BOLTS)
TS1222-5	(FOR MS20012-20 AND 131790-1 BOLTS)
50-590012	(FOR MS20012-20 AND 131790-1 BOLTS)
TS1222-4	(FOR MS20012-20 AND 131790-1 BOLTS)
TS1222-8	(FOR MS20012-20 AND 131790-1 BOLTS)

UPPER FORWARD WING NUT TORQUE WRENCH ADAPTERS:

TS1171-2	(PRIOR TO CE-928, CJ-156, D-10353, E-1758 AND EA-150)
TS1176-2	(PRIOR TO CE-928, CJ-156, D-13053, E-1758, AND EA-150)
TS1176-10	(CE-928 AND AFTER, CJ-156 AND AFTER, D-10353 AND AFTER, E-1758 AND AFTER, EA-150 AND AFTER)
TS1171-10	(CE-928 AND AFTER, CJ-156 AND AFTER, D-10353 AND AFTER, E-1758 AND AFTER, EA-150 AND AFTER)

LOWER FORWARD WING BOLT WRENCHES:

TS1222-5	(CE-748, CE-772 AND AFTER; CJ-149 AND AFTER; E-1111, E-1241 AND AFTER; D-10097, D-10120 AND AFTER; EA-1 THRU EA-272 EXCEPT EA-242)
50-590012	(CE-748, CE-772 AND AFTER; CJ-149 AND AFTER; E-1111, E-1241 AND AFTER; D-10097, D-10120 AND AFTER; EA-1 THRU EA-272 EXCEPT EA-242)
TS1222-4	(CE-748, CE-772 AND AFTER; CJ-149 AND AFTER; E-1111, E-1241 AND AFTER; D-10097, D-10120 AND AFTER; EA-1 THRU EA-272 EXCEPT EA-242)
TS1222-8	(CE-748, CE-772 AND AFTER; CJ-149 AND AFTER; E-1111, E-1241 AND AFTER; D-10097, D-10120 AND AFTER; EA-1 THRU EA-272 EXCEPT EA-242)
TS1222-3	(EA-242, EA-273 AND AFTER)

36-17-15

Figure 203 : Sheet 2 : Special Tools

E25206

LOWER FORWARD WING NUT TORQUE WRENCH ADAPTERS:

TS1171-2 (PRIOR TO CE-928, CJ-156, E-1758, D-10353, AND EA-150)
TS1176-2 (PRIOR TO CE-928, CJ-156, E-1758, D-10353, AND EA-150)
TS1176-10 (CE-928 AND AFTER, CJ-156 AND AFTER, E-1758 AND AFTER,
D-10353 AND AFTER, EA-150 THRU EA-272 EXCEPT EA-242)
50-590014 (EA-242, EA-273 AND AFTER)

UPPER AFT WING BOLT WRENCHES:

50-590012
TS1222-5
TS1222-4
TS1222-8

UPPER AFT WING NUT TORQUE WRENCH ADAPTERS:

50-590013
TS1171-1
TS1176-1

LOWER AFT WING BOLT WRENCHES:

50-590012
TS1222-5
TS1222-4
TS1222-8

LOWER AFT WING NUT TORQUE WRENCHES:

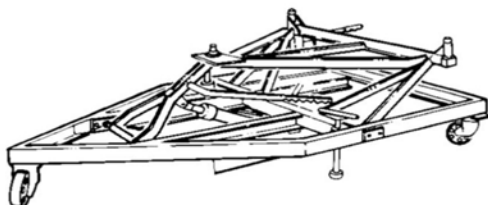
TS1171-1
TS1176-1
50-590013



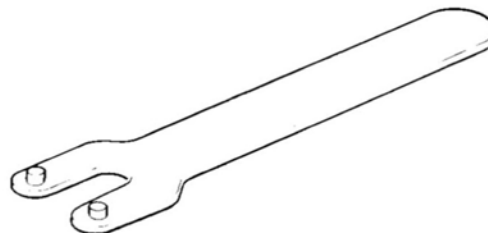
35-590006
MAIN WHEEL JACK ADAPTER



35-590064-1
HOISTING SLING ASSEMBLY



MODEL 300
SERVICE JACK
MAX. CAPACITY 5000 LBS



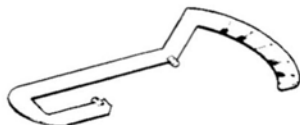
35-590009
THROTTLE RETAINING NUT WRENCH

36-17-22

Figure 203 : Sheet 3 : Special Tools

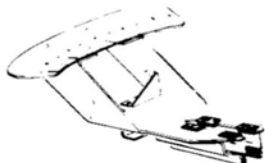
E25199

SPECIAL TOOLS

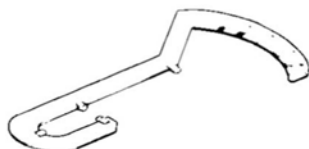


810-5 35660040 LH
810-5 35660040-1 RH
ELEVATOR CHECK FIXTURE
USED ON MODEL SERIALS D-10097,
D-10120 AND AFTER

810-3 35660040 LH
810-3 35660040-1 RH
ELEVATOR CHECK FIXTURE
USED ON MODEL SERIALS CE-748, CE-772
AND AFTER; CJ-149 AND AFTER; E-1111,
E-1241 AND AFTER; AND EA-1 AND AFTER



810 35660043-2
TRIM TAB JIG

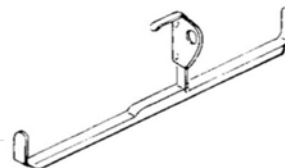


810 33524000
RUDDER CHECK FIXTURE

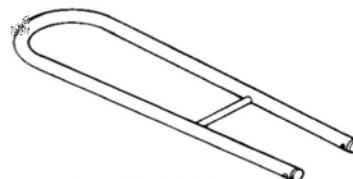


810-1 50590091
AILERON TRAVEL GAGE

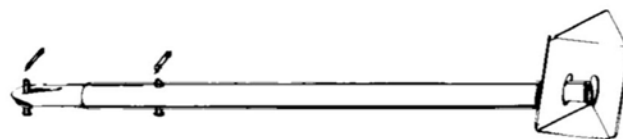
35-590087
DIFFERENTIAL MECHANISM
USED ON THE BONANZA 35 SERIES AIRPLANES
ONLY



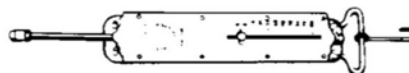
35-590087-9 STOP
USED WITH 35-590087 ASSEMBLY WHEN
RIGGING THE MODEL SERIALS D-10097,
D-10120 AND AFTER



36-590015-1
TOW BAR



35-590021
TAIL TIE-DOWN SUPPORT ASSEMBLY

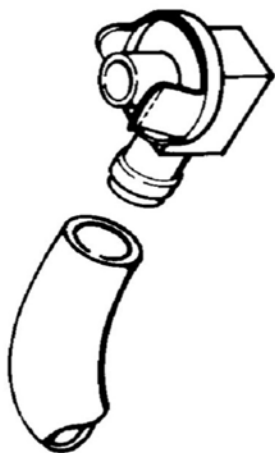


45-590074-7
LANDING GEAR TENSION GAGE

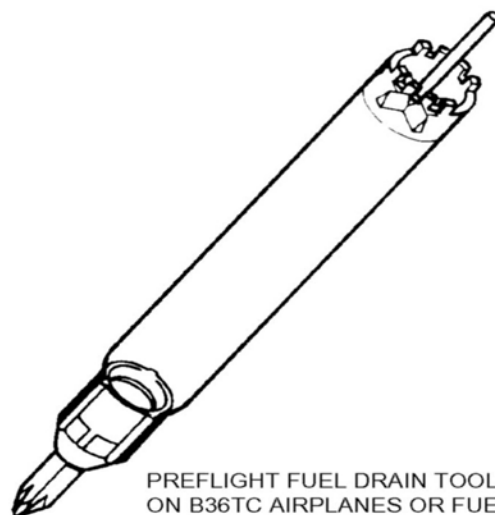
36-17-16

Figure 203 : Sheet 4 : Special Tools

E25275



B36TC
FUEL/OIL DRAIN ADAPTER
P/N107B



PREFLIGHT FUEL DRAIN TOOL
ON B36TC AIRPLANES OR FUEL
SELECTOR VALVE DRAIN TOOL
ON A36TC AIRPLANES WITH KIT
NO. 36-9008-15 INSTALLED.

EA12B
050059AA.AI

SPEECH COMMUNICATION - DESCRIPTION AND OPERATION

1. Speech Communication - Description and Operation

A. Ground Communication(E-2104, E-2111 and After; EA-320, EA-389 and After)

The airplane may be equipped with an optional ground communication system. This system allows radio communications while other electrical equipment is turned off. The switch for this system is a push-on, push-off switch located near the top of the instrument panel to the right of center. The systems two 5 amp circuit breakers are located below the battery box. On airplane serials CE-1037 and after, this optional equipment is available on the Model F33A; however, there are no standard locations for the equipment.

STATIC DISCHARGING - DESCRIPTION AND OPERATION

1. Static Discharging - Description and Operation

A static electrical charge may build up in the surface of the airplane while it is in flight. This electrical charge, if retained, can cause interference in radio and avionics equipment operation. Therefore, static wicks are installed on the trailing edges of the flight surfaces to aid in the dissipation of the electrical charge.

2. Static Discharging - Maintenance Practices

On serials prior to D-10383; CJ-156; CE-978; E-1932, and EA-273, the static wicks are installed with one on each elevator, one on each aileron and one on the rudder. These five (four on model 35) static wicks are removed and installed in the same manner. On serials D-10383; CJ-156; CE-978; E-1932; EA-273 and After, the static wicks are installed with one (three on the B36TC) on each wing tip, two (none on the B36TC) on each aileron, three on each elevator and three on the rudder. These fifteen (twelve on the V35B) static wicks are removed and installed in the same manner. The base of the later static wicks is riveted to the flight surface and need not be removed in normal service.

A. Static Wick Removal(Prior to D-10383; CJ-156; CE-978; E-1932; EA-273)

- (1) Remove the two screws and lock washers securing the wick to the surface.
- (2) Remove the wick from the surface.

B. Static Wick Installation(Prior to D-10383; CJ-156; CE-978; E-1932; EA-273)

Clean around the static wick area by:

- (1) Removing all grease, oil, paints, metal finishes or other high resistance properties with Minnesota 3M No. 600 grit sandpaper, or equivalent. The mating surfaces must be smooth and contoured so that the maximum surface area is in actual contact. Alodine treatment for aluminum or Dow treatment of magnesium is a suitable corrosion preventative to use between the static wick base and the airplane surface.

NOTE: Dissimilar materials are not to be used in intimate contact unless suitably protected against electrolytic corrosion. Whenever it is necessary that any combination of such metals be assembled, an interposing material compatible to each should be used.

- (2) Install the wick, using the two screws and lock washers.

NOTE: Check the continuity between the static wick base and the surface to which it is attached. There should be a resistance of 2.5 milliohms or less.

- (3) Refinish the surface area around the wick attachment point.

C. Static Wick Removal (D-10383; CJ-156; CE-978; E-1932; EA-273 and After)

- (1) Unscrew the static wick from the base.
- (2) Remove the static wick and the lock washer.

D. Static Wick Installation(D-10383; CJ-156; CE-978; E-1932; EA-273 and After)

The threads must be clean and free from grease, oil and paint.

- (1) Install the static wick and lock washer.
- (2) Torque the static wick to 4.7 in.-lbs.

E. Static Wick Inspection

Static wicks are inspected to ensure correct discharge capabilities. Use a megohmmeter with a minimum test voltage of 500 volts to measure the resistance of the static wicks.

NOTE: All static wicks on the airplane must be the same type and manufacturer.

Use the following procedure to check the static wicks.

CAUTION: Refer to the megohmmeter manufacturers operating data to correctly use the megohmmeter and prevent electric shock.

- (1) Connect a test lead from the megohmmeter to the tip of the static wick.
- (2) Connect the other test lead of the megohmmeter to the base of the static wick.
- (3) Set the switch on the megohmmeter to ON and read the meter:
 - (a) If static wicks part number 35-5010-3 are installed, the meter reading must be 470 kilohms $\pm$ 20%.
 - (b) For other static wicks the reading must be between 1 and 100 megohms.
- (4) Replace static wicks that are outside the ranges given in Step (3) above.

- (5) Set the switch on the megohmmeter to OFF and disconnect the test leads from the static wick.

DC GENERATION - DESCRIPTION AND OPERATION

1. DC Generation - Description and Operation

A. Electrical System

The airplane electrical system includes a 28-volt, 50-amp (prior to CJ-156; CE-929; D-10354 EA-159; E-1766) or 60-amp (CJ-156 and After; CE-929 and After; D-10354 and After; EA-159 and After; E-1766 and After) alternator. A 100-amp alternator is optional. The alternator and one 11.0-ampere-hour lead acid battery supply all the dc power to the airplane. The battery supplies power for the airplane starter system and electrical system when the engine is not operating. The alternator provides the dc voltage to the electrical system during engine operation.

The alternator output is controlled by a combined transistorized voltage regulator/overvoltage relay. Current to excite the alternator field is normally derived from the airplane bus through a 10 amp switch/circuit breaker and the voltage regulator/overvoltage relay. The self excited alternator is designed to have a small amount of residual magnetism. In the event the battery is discharged to the extent that it will not excite the alternator field, the residual magnetism is strong enough to excite the alternator field if all the load is removed from the airplane electrical system until the bus is brought up to proper voltage. When attempting to excite the alternator and develop output without battery power, turn off all electrical load and operate the engine at near cruise speed. In the event the alternator is not producing electrical power, the alternator sensor will illuminate an annunciator light.

Electrical system repair methods used must be made in accordance with the Federal Aviation Agency's Aircraft Inspection and Repair manual AC 43.13-1A and/or the Aircraft Alterations manual AC 43.13-2. Any components replaced and any wire, cable, or terminals used in the maintenance of the electrical system must be of airplane quality. Any solderless terminals or splices used must be applied with tooling specified by the vendor.

DC GENERATION - TROUBLESHOOTING**1. DC Generation - Troubleshooting**

Troubleshooting procedures in this section apply to a 50-amp (prior to CJ-156; CE-929; D-10354; EA-159; E-1766), 60-amp (CJ-156 and After; CE-929 and After; D-10354 and After; EA-159 and After; E-1766 and After) or optional 100-amp alternator and may be accomplished without special test equipment. All supporting systems or equipment must be operating. All circuit breakers, switches, etc. must be in the position required for proper operation before troubleshooting begins.

The following troubleshooting tables are general in nature. Refer to the appropriate subchapter for further information.

Table 101. Troubleshooting Alternator System

Trouble	Probable Cause	Remarks
1. No ammeter indication.	a. Loose connection.	a. Check connections throughout system.
	b. No alternator output.	b. Check alternator output.
	c. Defective voltage regulator.	c. Replace regulator.
	d. Overvoltage relay tripped.	d. Check regulator/overvoltage relay for proper output.
	e. Defective ammeter.	e. Replace ammeter.
2. No alternator output.	a. Circuit breaker tripped.	a. Reset.
	b. Open circuit.	b. Check continuity of circuit.
	c. Defective control switch.	c. Replace switch.
	d. Brushes worn out.	d. Replace brushes.
	e. Dirty slip rings.	e. With alternator running, clean slip rings with No. 400 or finer sandpaper. Use air jet to remove grit.
	f. Brushes not contacting slip rings.	f. Clean brushes and holders with a clean, lint-free, dry cloth. Replace weak springs.
	g. Open or shorted circuit in rotor.	g. Test resistance of rotor. Replace if defective.
	h. Open or shorted circuit in stator.	h. Test resistance of stator. Replace if defective.
	i. Defective voltage regulator.	i. Replace regulator.
3. Alternator output low.	a. Defective rectifier diode.	a. Replace diode.

Table 102. Troubleshooting Battery System

Trouble	Probable Cause	Remarks
1. No power indicated with battery master switch ON.	a. Battery discharged or defective.	a. Test.
	b. Open circuit between battery and master switch.	b. Check continuity.
	c. Master switch defective.	c. Check switch for operation. Replace if necessary.
	d. Defective relay.	d. Check relay for operation. Replace if necessary.
2. Power on with master switch in OFF position.	a. Master switch defective.	a. Check switch for operation. Replace if necessary.
	b. Relay contacts stuck.	b. Replace relay.
3. Complete failure to operate.	a. Loose or broken lead.	a. Secure lead.

	b. Loose or disengaged terminals in battery.	b. Secure terminals.
	c. Battery not charged.	c. Charge battery.
4. Excessive spewage (crystalline deposits on outside of battery).	a. Excessive charge rate.	a. Clean the battery and adjust the electrolyte level.
	b. Excessive ambient temperature during charge.	b. Clean the battery and adjust the electrolyte level.

Table 103. Troubleshooting Voltage Regulator System

Trouble	Probable Cause	Remarks
1. No Output.	a. Output voltage adjustment set too low.	a. Readjust output voltage.
	b. Field circuit fuse open.	b. Replace fuse.
	c. Overvoltage protection circuit tripped.	c. Reset overvoltage protection circuit.
	d. Defective voltage regulator.	d. Replace regulator.
2. Output is normal when engine is started but ceases after a short time.	a. Overvoltage circuit set too low.	a. Readjust overvoltage circuit.
	b. Output voltage set too high.	b. Readjust output voltages.
3. Overvoltage circuit inoperative at any voltage.	a. External pin connections not properly made.	a. Check external pin connections.
	b. Defective voltage regulator.	b. Replace regulator.
4. Continuous high output.	a. Output voltage adjustment set too high.	a. Readjust output voltage.
	b. Defective voltage regulator.	b. Replace regulator.
5. Indicator lamp fails to light.	a. Lamp burned out.	a. Replace lamp.
	b. Relay contacts dirty.	b. Clean relay contacts.
	c. Bad ground connection at indicator lamp.	c. Check ground connection.

DC GENERATION - MAINTENANCE PRACTICES

1. Alternator

A. Removal

CAUTION: The output terminal of the alternator is connected directly to the battery. Make sure any external power unit is disconnected, the battery switch is OFF, and the battery is disconnected before removing the wires at the alternator or serious damage to the wiring harness and alternator may result from accidental grounding of the output stud.

- (1) Disconnect the battery (Refer to [ELECTRICAL POWER - Disconnect](#)).
- (2) Access to the alternator is gained through the right cowl door and through the forward opening of the cowl.
- (3) Disconnect the electrical wiring harness from the alternator.
- (4) Remove the four attaching bolts. Remove the alternator.

B. Installation

CAUTION: Do not force the alternator into position or damage to the alternator or drive gears could result. Care must be taken to assure that the alternator pilot enters the crankcase bore squarely, and the alternator is resting flat on the engine pad.

- (1) Install a new gasket on the alternator flange.
- (2) Position the alternator on the mounting pad.
- (3) Install the attaching nuts and washers bringing to a snug condition. Torque the nuts to 150 to 180 in-lb in diagonally opposite pairs.

CAUTION: Never connect an external power supply or turn the battery switch ON until all wiring harness connections have been made and properly tightened or serious damage to the wiring harness and alternator may result from accidental grounding.

- (4) Connect the electrical wiring to the alternator.
- (5) Connect the battery (Refer to [ELECTRICAL POWER - Connect](#)).
- (6) Start the engine and check for oil seepage and proper operation.

NOTE: If a new alternator is to be installed, refer to [DRIVE GEAR AND COUPLING INSTALLATION ON NEW ALTERNATORS](#) to change the drive gear and coupling to the new alternator.

2. Drive Gear and Coupling on New Alternators

A. Installation

The new alternator may be received with or without a new drive gear and coupling. The drive gear and coupling from the old alternator may need to be installed on the new alternator. The drive and coupling may be changed by following the procedures as follows:

- (1) Remove the shipping spacer and washer (if installed) from the replacement alternator.
- (2) Install the woodruff key (if not already installed), coupling assembly and thrust washer. Ensure the bearing surface (copper color) of the thrust washer is installed toward the alternator.
- (3) Install the nut and tighten to a torque of 300 in-lb. If the slots of the castellated nut do not align with the cotter pin hole in the shaft, the nut should be tightened further, but not to exceed 450 in-lb. Do not back off the nut to align holes.
- (4) Install an MS24665-302 cotter pin carefully to ensure clearance when the alternator is installed in the engine.

NOTE: Do not clamp the alternator body or mounting flange in a vise. The cotter pin must be installed and then trimmed. The portion bent toward the alternator housing must NOT touch the thrust washer when bent over the nut. The portion bent away from the alternator housing must NOT reach beyond the threads on the end of the shaft.

3. Voltage Regulator

A. Removal

- (1) Ensure that the battery switch is OFF, the battery is disconnected, and the external power source is disconnected (Refer to [ELECTRICAL POWER - Disconnect](#)).
- (2) Locate the voltage regulator installed on the right aft side of the firewall in the flight compartment.
- (3) Remove the electrical connector from the voltage regulator.

- (4) Remove the voltage regulator attaching screws and remove the voltage regulator.

B. Installation

- (1) Ensure that the battery switch is OFF, the battery is disconnected, and the external power source is disconnected.
- (2) Place the voltage regulator in position and secure with attaching screws.
- (3) Install the electrical connector on the voltage regulator.
- (4) Connect the battery (Refer to [ELECTRICAL POWER - Connect](#)).
- (5) Operate the engine and confirm the voltage regulator setting under various loads.

C. Adjustments

CAUTION: Observe engine operating limitations.

NOTE: The voltage regulator is set and sealed at the factory. Breaking the seal prior to the warranty limitations voids the warranty. Should it become necessary to adjust the voltage regulator, adjustments may be made in the following manner.

- (1) Connect a precision voltmeter to the circuit breaker bus.
- (2) Operate the engine at cruise rpm (2,500 rpm) with the alternator ON, and the electrical load reduced to a minimum.
- (3) Check the bus voltage. If it is not 28.50 ± 0.25 vdc, adjustment should be made as indicated in the following Step.
- (4) Remove the plastic plug labeled REG from the corner of the regulator and adjust the regulator by turning the potentiometer clockwise to increase the voltage and counterclockwise to decrease the voltage. Make any adjustments in small increments and allow a few seconds operation time for the system to stabilize between adjustments.
- (5) For final check and adjustment, the engine should be operated at cruise rpm (2,500 rpm) with the alternator ON and carrying approximately 50% load.

4. Battery

A. Removal

- (1) Make sure the BAT switch and ALT switch are selected to OFF and make sure the external power unit is disconnected.
- (2) Open the right engine cowling.
- (3) Locate the battery in the engine compartment on the upper right hand side of the firewall.

WARNING: Always remove the ground cable (negative) from the battery before removing the power cable (positive) from the battery in order to prevent accidental short circuits. If the positive battery terminal is not marked (+), POS, or painted red and/or the negative battery terminal is not marked (-), NEG, or painted black, use a voltmeter to determine the battery polarity before disconnecting the battery.

- (4) Remove the negative battery cable from the battery.
- (5) Disconnect the positive cable from the battery and position it so it will not interfere with the removal of the battery.
- (6) Remove the battery box from the firewall.
- (7) Remove the battery box together with battery from the airplane.

B. Installation

- (1) Make sure the BAT switch and ALT switch are in the OFF position and ensure the external ground power unit is disconnected.
- (2) Position the battery in the battery box.
- (3) Install the battery box at the firewall.

WARNING: Always connect the battery power cable (positive) to the battery before connecting the battery ground cable (negative) to the battery in order to prevent accidental short circuits. If the positive battery terminal is not marked (+), POS, or painted red and/or the negative battery terminal is not marked (-), NEG, or painted black, use a voltmeter to determine the battery polarity before disconnecting. Connecting the battery cables to the wrong terminals will cause reverse polarity that will destroy the diodes and other electronic components in the electrical system.

- (4) Coat the battery terminals and cable terminal with a light coat of petroleum jelly.
- (5) Position the positive cable on the battery and secure.

- (6) Position the negative cable on the battery and secure.
- (7) Remove any excess petroleum jelly from the terminals.
- (8) Position the battery box lid on the battery box and secure.
- (9) Close the right engine cowl.

C. Cleaning

- (1) Remove the battery. Refer to [BATTERY REMOVAL](#) procedure.

CAUTION: Never use a wire brush or brush with a metal construction for this purpose as short circuiting or other damage may result.

- (2) Ensure that the battery cell filler caps are in place and tight. Brush dirt off with a stiff bristle brush.

CAUTION: Entrance of ammonia or soda solution into a battery cell will neutralize the cell electrolyte. Never use solvents to clean the battery, for these may damage the battery case.

- (3) Scrub the battery with a solution of ammonia or bicarbonate of soda (one part of soda to a gallon of water). This will neutralize any electrolyte sprayed or spilled out.
- (4) Rinse the battery with clear water, then sponge off the excess water. Allow the battery to air-dry.
- (5) Wash the battery filler caps with clean hot water and no soap, then examine the vent holes in the battery filler caps to make sure they are clear.
- (6) Inspect the battery for cracks, holes, or burn spots. Replace if necessary.
- (7) Make sure that all battery hardware is clean and in good mechanical condition.

NOTE: If additional cleaning of the battery terminals and cable terminal is required, use a battery terminal cleaning tool and brighten up the terminals to ensure a good electrical connections.

D. Servicing

The battery should be maintained in a fully charged state at all times and the electrolyte level checked at regular intervals. A clean fully charged battery will provide peak performance. Never add anything but distilled water when adjusting the electrolyte level of the battery. If electrolyte is added each time the level in the battery is low, a high concentration of electrolyte may cause dissolution of the plates. Under high temperature conditions, this may be indicated by the presence of black particles in the electrolyte of the affected cells.

NOTE: Do not over fill the battery. Only lead-acid equipment should be used when servicing lead-acid type batteries.

E. Maintenance Program

The battery is accessible for servicing by raising the right engine cowl and removing the battery box cover. A systematic battery maintenance program should be established as follows:

- (1) A log in the services performed on the battery should be maintained.
- (2) The battery should be removed from the airplane and serviced after 100 flight hours or 30 days, whichever occurs first. If the ambient temperatures are above 90°F or the time between engine starts averages less than 30 minutes, the time between servicing may be reduced.
- (3) The fluid level of the battery should be checked every 25 hours and when fully charged, should barely touch or be slightly short of the eyelet at the bottom of the vent well. If the fluid level is low, add distilled water to fill. Recheck the battery after charging for a proper specific gravity.

NOTE: Do not overfill the battery. When the battery cells are overfilled, water and acid will spill on the lower portions of the engine accessory section and lower fuselage. Neutralize the acid spillage immediately with a water solution of sodium bicarbonate (baking soda).
Do not allow the fluid level to drop below the top of the plates.

- (4) During periods when the ambient temperature is below 32°F, the battery should be maintained in a fully charged state to prevent freezing. When distilled water is added, the battery should be charged sufficiently to thoroughly mix the water with the electrolyte as a precaution against freezing.

CAUTION: Excessive spewage may result if the cell vents are not kept clean and open.

- (5) For peak performance, the battery must be kept clean and dry. If foreign materials are present in sufficient quantities, the resultant deposits may form conductive paths that permit a rapid self discharge of the battery. To prevent the collection of such deposits, the battery should be cleaned after each 100 hours of service or every 30 days, whichever occurs first.

- (6) The log of battery service performed should be evaluated to determine the need to service the battery at the above recommended intervals or to extend the intervals if justified. Accurate water consumption data is a valid barometer to use for adjustment of the servicing intervals. For further servicing, information instructions are furnished with each battery.

5. Battery Box Cleaning

The battery box is vented overboard to dispose of electrolyte and hydrogen gas fumes discharged during normal charging operation. To ensure the disposal of these fumes, the vent hose connections at the battery box should be checked frequently for obstructions. The battery box should be washed out thoroughly and dried each time the battery is removed and cleaned.

6. Electrical Power

A. Disconnect

To disconnect electrical power from the airplane perform the following:

- (1) Place the BAT switch in the OFF position.
- (2) Make sure the ALT switch is in the OFF position.
- (3) Make sure the external power supply is not connected to the airplane's external power receptacle.
- (4) Disconnect the Battery:
 - (a) Open the right engine cowling.
 - (b) Locate the battery storage box (installed at the upper, aft right corner of the engine compartment).
 - (c) Open the battery storage box.

WARNING: Always remove the ground cable (negative) from the battery before removing the power cable (positive) from the battery in order to prevent accidental short circuits. If the positive battery terminal is not marked (+), POS, or painted red and/or the negative battery terminal is not marked (-), NEG, or painted black, use a voltmeter to determine the battery polarity before disconnecting the battery.
 - (d) Tag and disconnect the battery ground cable (negative) from the battery and position the wire so that it can not come in contact with the battery terminal.
 - (e) Tag and disconnect the battery power cable (positive) from the battery and position the wire so that it can not come in contact with the battery terminal.

B. Connect

To connect electrical power to the airplane do the following:

- (1) Make sure the BAT switch is in the OFF position.
- (2) Make sure the ALT switch is in the OFF position.
- (3) Make sure the external power supply is not connected to the airplane's external power receptacle.
- (4) Connect the Battery as follows:
 - (a) Clean the battery terminals and cable terminals.

WARNING: Always connect the battery power cable (positive) to the battery before connecting the battery ground cable (negative) to the battery in order to prevent accidental short circuits. If the positive battery terminal is not marked (+), POS, or painted red and/or the negative battery terminal is not marked (-), NEG, or painted black, use a voltmeter to determine the battery polarity before disconnecting. Connecting the battery cables to the wrong terminals will cause reverse polarity that will destroy the diodes and other electronic components in the electrical system.
 - (b) Connect the battery power cable (positive) to the positive terminal on the battery.
 - (c) Connect the battery ground cable (negative) to the negative terminal on the battery.
 - (d) Coat the battery terminals and cable terminals with a light coat of petroleum jelly, remove any excess petroleum jelly. Remove the identification tags from the battery cables.
 - (e) Place the battery storage box lid on the battery storage box and secure.
 - (f) Make sure all wires and tubes from the battery storage box are properly routed.
 - (g) Close the right engine cowling.
- (5) Connect external power if required.

STANDBY GENERATOR - DESCRIPTION AND OPERATION

1. Standby Generator - Description and Operation (Prior to E-3306; Prior to EA-652)

An optional standby generator system is provided to power essential equipment in the event of loss of electrical power on the main system.

The optional standby generator system is an independent electrical system incorporated into the main system in such a manner as to furnish power only to essential engine instruments, fuel quantity, certain lights, turn coordinator and navigation and communication system. A diode in the circuit from the battery to the standby generator system prevents the generator from furnishing any power to the battery, but allows the battery (if serviceable) to supply power to the essential equipment in the event of inadequate output or failure of the standby generator.

NOTE: For airplanes with 12 vdc battery, the circuits from the battery to the standby generator system and the battery to the stall warning system are always alive, even though the battery switch may be in the OFF position.

The optional standby generator system should only be used when there is a loss of electrical power on the main electrical system. As soon as loss of electrical power is evident, turn the alternator and battery switches OFF (this is to prevent possible damage to the main system if a short exists therein, and to save battery power for lowering the flaps and gear if the problem is determined to be only a faulty alternator). After turning the switches OFF, turn the standby generator on. This optional generator is mounted aft of the right magneto aft of the engine baffle and is cooled by air that is picked up from the engine baffle.

The switch and voltmeter are located on the right side of the instrument panel prior to E-2111 (except E-1946 and E-2104), and EA-389 (except EA-320). At the noted serials the switch is moved to the left subpanel and the standard voltmeter near the pedestal is used. The switch is placarded OFF-ON-GEN/RESET. The voltage regulator/overvoltage relay is mounted aft of the firewall and controls the generator output.

The standby generator is self-exciting and requires no external electrical power for it to function, although it does require 2,925 to 4,050 rpm (engine rpm is 1,950 to 2,700) to function properly. At a minimum engine speed of 1,950 rpm, the generator will produce a continuous 6.5 amps at 28 volts or for intermittent (1 minute on 2 minutes off) operation 11 amps at 24 volts.

The standby generator system is controlled and protected by a voltage regulator/overvoltage relay. The regulator will control the voltage at 28.50 ± 0.50 volts. The overvoltage relay will remove the standby generator from the circuit should the voltage reach 32.0 ± 0.5 volts. The overvoltage relay is not sensitive to small voltage spikes (at 33 volts it will not trip for 50 milliseconds). Should a transient voltage spike cause the overvoltage relay to trip removing the generator from the system, it may be reset in flight by moving the switch momentarily to the GEN/RESET position.

2. Standby Generator - Maintenance Practices

A. Standby Generator Functional Test

- (1) Turn the generator switch OFF.
- (2) Turn the battery switch OFF.
- (3) Turn the standby generator switch ON (do not contact the GEN/RESET position).
- (4) The volt meter should register approximately 24 volts.
- (5) Place the switch momentarily in the GEN/RESET position.
- (6) The volt meter should register approximately 28 volts, with the engine operating at 1,950 rpm.

STANDBY ALTERNATOR - DESCRIPTION AND OPERATION

1. Standby Alternator - Description and Operation (E-3306 and After; EA-652 and After)

The standby alternator is mounted on the aft side of the engine, behind the right magneto, aft of the engine baffle.

The standby alternator system is an independent electrical source that is connected to the main busing system and will supply power to any components in the airplane up to its load limitation of 20 amps.

When the STBY ALT switch is set to ON, the standby alternator will be regulated to approximately 26.0 volts with overvoltage trip off set at 32 volts. The standby alternator will then automatically power the airplane bus in the event the primary alternator fails and/or the airplane bus voltage drops below 26 volts. System activation is controlled by the standby alternator voltage regulator which monitors the airplane bus voltage. The automatic switching from the primary alternator to the standby alternator is indicated by the illumination of the amber STBY ALT ON annunciator. The primary alternator switch should be placed to the OFF position when the standby alternator is operating. If the existing electrical load is small, such as may occur during the preflight check, automatic switching of the standby alternator may be delayed until the bus voltage drops below 26 volts. Increasing the load, such as turning on the taxi or landing lights, will facilitate the lowering of the bus voltage allowing the standby alternator to power the battery bus more quickly. The standby alternator is not self exciting and requires that the battery master switch be left in the ON position.

In normal operation, the standby alternator switch is turned on at the same time as the primary alternator switch. The standby alternator switch should remain in the ON position for the duration of the flight.

If the LOW BUS VOLT annunciator illuminates during the operation of the standby alternator, engine speed may be too slow for the alternator load or the load may exceed 20 amps. Annunciator illumination is a function of engine speed, load on the standby alternator and ambient conditions within the standby alternator. Maintaining an engine speed of 2,300 rpm or more and a standby alternator load of 20 amps or less, will keep the annunciator extinguished.

The standby alternator load may be monitored by placing the loadmeter switch to STANDBY from PRIMARY. On airplanes equipped with a 100 amp primary alternator, the maximum output of 20 amps will be indicated as 100% on the loadmeter. On airplanes equipped with a 60 amp primary alternator, the output of the standby alternator may be read in amps directly from the loadmeter, i.e. a 20 amp output will indicate 20 on the loadmeter.

Output voltage of the standby alternator will be indicated on the BUS VOLTS meter and will indicate approximately 26.0 volts with the engine at 2,300 rpm or above. If voltage drops below 25 volts, the electrical load should be checked and reduced if above the 20 amp limit. The standby alternator is capable of outputs greater than 20 amps for up to 5 minutes. Extended operation above 20 amps may cause immediate or premature alternator failure and depletion of the battery reserve.

On early versions of the voltage regulator used in the standby alternator system, the STBY ALT ON annunciator light will flash (light may go solid if left flashing for a period of time) if the STBY ALT switch is not selected ON with power on the bus of the airplane. This is an indication to the pilot that the standby alternator is not activated. The STBY ALT ON light should illuminate whenever the airplane bus voltage is 26 volts or below and the standby alternator switch is ON.

On later versions of the voltage regulator, if the standby alternator switch is OFF, the STBY ALT ON light is extinguished.

With the standby alternator switch ON, the standby alternator light will be illuminated whenever the airplane bus voltage is 26 volts or below and extinguished anytime the bus voltage is above 26 vdc.

During standby alternator operation, if the electrical load is over 20 amps, the STBY ALT ON annunciator light will flash. After reducing the electrical load to less than 20 amps the annunciator light will be on steady.

Procedures for proper operation of the standby alternator system can be found in the supplement section of the Pilots Operating Hand Book.

STANDBY ALTERNATOR - MAINTENANCE PRACTICES

1. Standby Alternator - Maintenance Practices(E-3306 and After; EA-652 and After)

A. Standby Alternator Function Test

- (1) Set the throttle to 2,300 rpm.
- (2) Set primary alternator switch to OFF.
 - (a) The STBY ALT ON annunciator will illuminate.
 - (b) The loadmeter reads no load.

NOTE: Depending upon the battery bus voltage, the electrical load may need to be increased (such as turning on the landing and/or taxi lights) to activate the standby alternator.

- (3) Set the loadmeter switch to STANDBY.
- (4) Check the loadmeter reading (greater than 0, less than 100% or 20 amps).
- (5) Check the voltmeter reading (26.0 volts).
- (6) Set the throttle between 1,000 and 1,200 rpm (LOW BUS VOLT annunciator light should illuminate) .
- (7) Set the standby alternator switch to:
 - (a) OFF - the STBY ALT ON annunciator light will extinguish.
 - (b) ON - the STBY ALT ON annunciator light will illuminate.
- (8) Set primary alternator switch to ON.
 - (a) STBY ALT ON annunciator light will extinguish.
 - (b) LOW BUS VOLT annunciator light will extinguish.
- (9) Set the loadmeter switch to PRIMARY.
- (10) Verify a normal indication for the primary alternator load.

B. Standby Alternator Removal

- (1) Gain access to the alternator through the right cowl door.
- (2) Disconnect the electrical wiring harness from the alternator.
- (3) Remove the four attaching bolts. Remove the alternator.

C. Standby Alternator Installation

- (1) Install a new gasket on the alternator flange.

CAUTION: Do not force the alternator into position or damage to the alternator or drive gears could result. Care must be taken to assure that the alternator pilot enters the accessory case bore squarely, and the alternator is resting flat on the engine pad.

- (2) Position the alternator on the mounting pad.
- (3) Install the attaching nuts and washers to a snug condition.
- (4) Torque the nuts to 90 to 110 in.-lb in diagonally opposite pairs.
- (5) Connect the electrical wiring to the alternator.
- (6) Start the engine and check for oil seepage and proper operation.

EXTERNAL POWER - MAINTENANCE PRACTICES

1. **External Power - Maintenance Practices(CE-1024 and After; CJ-156 and After; E-2111 and After; EA-339 and After)(CE-748, CE-772 thru CE-1023; CJ-149 thru CJ-154; D-10097, D-10120 and After; E-1111, E-1241 thru E-2110; EA-11 thru EA-338; Airplanes Modified by Factory Work Order or Airplanes with Kit 33-3008 Installed)**
 - A. The airplane electrical system is protected against damage from reverse polarity by a relay and diodes in the external power circuit. The external power receptacle is located on the right side of the fuselage and just aft of the engine. The receptacle is designed for a standard AN type plug. To supply power for ground checks and for ground power unit assisted engine starts, a ground power unit capable of supplying a continuous load of 300 amperes at 24 to 30 volts is required. Use of an inadequate ground power unit can cause a voltage drop below the drop-out voltage of the starter relay, resulting in relay chatter and welded contacts. By the same token, a maximum continuous load in excess of 350 amperes will damage the external power relay and power cables of the airplane.
 - B. Observe the following precautions when using an external power source:
 - (1) Use only an auxiliary power source that is negatively grounded. If the polarity of the power source is unknown, determine the polarity with a voltmeter before connecting the unit to the airplane.
 - (2) Before connecting the external power unit, turn OFF all radio equipment and alternator switches, but leave the battery master switch on to protect transistorized equipment against transient voltage spikes.

CAUTION: When the battery switch is turned off for extended ground power operation, place an external battery in parallel with the output of the external power unit before operating any transistorized avionic equipment.
 - (3) If the ground power unit does not have a standard AN plug, check the polarity of the plug. The positive lead from the ground power unit must connect to the center post, the negative lead must connect to the front post and a positive voltage of 24 to 28 vdc must be applied to the small polarizing pin of the airplane's external power receptacle. The power output of the external power receptacle must be capable of maintaining 28.5 ± 0.25 vdc and should be checked periodically with a voltmeter of known accuracy.

ELECTRICAL LOAD DISTRIBUTION - MAINTENANCE PRACTICES**1. Electrical Load Distribution - Maintenance Practices****A. Electrical Utilization Table**

The following specifies the electrical load for each piece of equipment, either standard or optional, available on the airplane. Based on this information, the total electrical load for the airplane may be determined.

The electrical loads have been divided into 4 categories as follows:

- (1) Continuous Load (Standard Equipment). Refer to [Table 201](#).
- (2) Continuous Load (Optional Equipment). Refer to [Table 202](#).
- (3) Intermittent Load (Standard Equipment). Refer to [Table 203](#).
- (4) Intermittent Load (Optional Equipment). Refer to [Table 204](#).

Intermittent loads are defined as those items which will be operated for two minutes or less. Intermittent items should not be figured into the total figure since the short duration of their usage will not significantly alter the standard load. Under no condition shall the total continuous electrical load be more than 80% of the total alternator capacity. Total continuous load consists of loads listed continuous and the avionics receiving loads. Transient loads are intermittent loads.

NOTE: The loads listed as continuous loads are for equipment which will be operated for periods of 15 minutes or longer; however, the intermittent loads and avionics transmitting loads should be considered for determining possible overloading during shorter periods of time, i.e., takeoff and landing.

Table 201. Continuous Load (Standard Equipment)

Equipment	Number Per Airplane	Each Amps	Total Amps
Flap Indicator System	1	0.06	0.06
Fuel Indicator System	2	0.02	0.04
Inverter, Electroluminescent	1	0.50	0.50
Instruments, Engine	1	0.32	0.32
Clock, Panel	1	0.01	0.01
Clock, Digital	1	0.20	0.20
Potentiometer, Light Dim	4	0.03	0.12
Relay, Annunciator Dim	1	0.04	0.04
Relay, Battery Master	1	0.50	0.50
Sensor, Alternator Out	1	0.04	0.04
Turn Coordinator	1	0.40	0.40
Voltage Regulator	1	3.33	3.33
Flight Hour Meter	1	0.01	0.01
Power Supply, Strobe	1	5.00	5.00
Heater, Pitot	1	4.60	4.60
Lighting			
3rd & 4th Passenger Reading	2	0.30	0.60
5th & 6th Seat Reading	2	0.30	0.60
Cabin Light	2	0.17	0.34
Map	2	0.30	0.60
Instrument, Wedge Light (Single)	14	0.024	0.67
Compass	1	0.04	0.04

Elevator Tab	1	0.04	0.04
Flap Position	1	0.04	0.04
Fuel Select	2	0.04	0.08
Glareshield Flood	12	0.17	2.04
OAT	1	0.04	0.04
Tail Position	1	1.02	1.02
Rotating Beacon, Lower	1	3.22	3.22
Rotating Beacon, Upper	1	3.22	3.22
Tail Nav/Strobe	1	1.02	1.02
Wing Tip Nav/Light	2	0.93	1.86

Table 202. Continuous Load (Optional Equipment)

Equipment	Number Per Airplane	Each Amps	Total Amps
Air Conditioning			
Compressor Clutch	1	1.70	1.70
Evaporator Blower	1	13.50	13.50
Electrothermal Prop Anti-ice			
(2 Blade)	1	10.00	10.00
(3 Blade)	1	15.00	15.00
Ammeter	1	0.01	0.01
Timer	1	0.10	0.10
Lighting			
Clock, Control Wheel 8-day	1	0.04	0.04
Instrument, Post Light (Single)	26	0.04	1.04
Instrument, Post Light (Dual)	37	0.04	1.48
Instrument, Wedge Light (Dual)	16	0.024	0.77

Table 203. Intermittent Load (Standard Equipment)

Equipment	Number Per Airplane	Each Amps	Total Amps
Cigarette Lighter	1	6.00	6.00
Flap Motor	1	11.00	11.00
Elevator Trim			
Actuator	1	0.85	0.85
Resistor, Shunt	1	0.37	0.37
Flasher, Gear Warning	1	0.04	0.04
Horn, Gear Warning	1	0.20	0.20
Horn, Stall Warning	1	0.20	0.20
Landing Gear Motor	1	40.00	40.00**
Relay, Ldg Gear Latch	1	0.08	0.08

Pump, Auxiliary Fuel	1	3.00	3.00*
Pump, Auxiliary Fuel	1	3.00	3.00***
Pump, Auxiliary Fuel	1	4.00	4.00****
Relay, Dynamic Brake	1	1.25	1.25
Relay, Starter	1	3.30	3.30
Starter, Engine	1	100.00	100.00
Starter Vibrator	1	2.00	2.00****
Lighting			
Alternator Out	1	0.04	0.04
Courtesy Light	2	0.17	0.34
Door Ajar	2	0.024	0.048
Landing Gear Indicator	3	0.04	0.12
Landing Light	1	8.93	8.93
Taxi Light	1	8.93	8.93
NOTES:			
* Used only on models A36, V35B, F33A and F33C.			
** Peak current after initial start-up load.			
*** Used only on Model F33C.			
**** Used only on Models A36TC and B36TC.			

Table 204. Intermittent Load (Optional Equipment)

Equipment	Number Per Airplane	Each Amps	Total Amps
Air Conditioning			
Actuator, Condenser Door	1	0.77	0.77
Lighting			
Condenser Door Open	2	0.024	0.048

FLIGHT AND PASSENGER COMPARTMENTS - GENERAL

1. Flight and Passenger Compartments - Description and Operation

A. Flight Compartment and Passenger Seating

On all serials except CJ-149 and After, the pilot and copilot seat backs fold forward to facilitate passengers entering and leaving the airplane. Airplane serials CJ-149 and After have locking seat backs on the pilot and copilot seats which can be folded forward by rotating the seat back release lever, located on the lower inboard side of each seat. An additional lever located behind copilot's seat on the upper right corner is also used to fold the copilot's seat forward for access to the passenger seats.

The passenger seat backs can be folded forward by rotating the seat back release lever located on the lower inboard side of each seat. All passenger seats have locking backs.

To adjust the pilot, copilot, and passenger seats forward or aft, an adjustment lever, located beneath the front of the seats, must be pulled up. The seat can then be slid to the desired position.

A seat back adjustment lever, located on the lower inboard side of the pilot, copilot, passenger, and on the fifth and sixth seats (A36 Series), enables the seat back to be adjusted to several positions. It is controlled by a mechanical, three position cam lock. An optional seat installation is available whereby the adjustment of the copilot and passenger seat backs are controlled by a Roton lock lever located on the forward inboard side of the seat bottom.

Airplane serials E-2104, E-2111 and After, and EA-389 and After are equipped with vertically adjusting seats in the flight compartment (copilot's seat is optional). The seat is raised and lowered by gas springs mounted underneath the seat. The seat is adjustable through a range of 1.3 inches for improved visibility and crew comfort. The raising and lowering action is initiated by pulling up on a release lever located on the front RH side of the seat. When the release lever is raised, two ratchet type camlocks are disengaged from sector gears attached to the gas springs mounted on each side underneath the seat, allowing the gas spring piston rods to extend or retract to raise or lower the seat. To raise the seat the pilot's weight must be shifted forward. To lower the seat the weight must be shifted to the rear to overcome the gas spring tension.

2. Flight and Passenger Compartments - Maintenance Practices

A. Pilot and Copilot Seat Removal

- (1) Remove the seat stops at the aft end of the mounting tracks.
- (2) Pull up on the fore and aft adjustment lever located beneath the front of each seat, and slide the seat off the mounting tracks.

B. Pilot and Copilot Seat Installation

NOTE: If shims were installed in the seat support, they should be reinstalled in the same location from which they were removed to achieve proper seat locking engagement with the seat track.

- (1) Align the seat guide with the seat track. If shims were installed in the front seat guide, they should be reinstalled in the same location as that from which they were removed.
- (2) Pull up on the fore and aft adjustment lever and slide the seat onto the seat track. Release the adjustment lever and ensure that the seat is securely in place. Refer to [Figure 1](#).
- (3) If the lock pin does not align with the holes in the center seat track, it will be necessary to reposition the guides with shims. Use shims as needed to center the locking pin with the holes in the seat track.

NOTE: Shims (three inches long x 0.3 inch wide) may be fabricated from 0.016, 6061-T6 Sheet aluminum. The shims are placed inside the seat guide and formed around the guide (Refer to [Figure 2](#)).

- (4) Pull up on the fore and aft adjustment lever and slide the seat through the full travel of seat adjustment. Ensure that the locking pin has positive engagement in all holes of the seat track.
- (5) Install the seat stops at the aft end of the seat track.

NOTE: When airplane serials CJ-149 and After are used for aerobatics and parachutes are worn, the headrests for the pilot and copilot seats must be removed and the seat back cushions rotated over the seat backs and reattached to the bottom of the seat backs. The headrest can then be reinstalled.

C. Passenger Seat Removal

- (1) When airplane serials CJ-149 and After are being operated in the aerobatics category, the passenger seats may need to be removed in order to meet the center of gravity requirements.
- (2) Remove the seat stops at the aft end of the seat tracks.

- (3) Pull up on the fore and aft adjustment lever, located beneath the front of each seat, and slide the seat off the mounting track.

D. Passenger Seat Installation

- (1) Align the seat guides with the slots in the mounting tracks.
- (2) Pull up on the fore and aft adjustment lever and slide the seat onto the mounting tracks. Release the lever and ensure that the seat is securely in place.
- (3) Reinstall the seat stops at the aft end of the mounting tracks.

E. Fifth Seat Removal(CE-748, CE-772 and After; D-10097, D-10120 and After)

- (1) Remove the two bolts at the lower aft portion of the seat bottom.
- (2) Remove the seat by removing the extrusion at the forward top side of the hat shelf. Reinstall the extrusion on the hat shelf.

F. Fifth Seat Installation(CE-748, CE-772 and After; D-10097, D-10120 and After)

- (1) Remove the extrusion from the hat shelf.
- (2) Install the extrusion along with the seat back retaining strap on the hat shelf.
- (3) Install the seat bottom, seat belts, and the two securing bolts.

G. Fifth Seat Stowage(CE-748, CE-772 and After; D-10097, D-10120 and After)

- (1) Pull forward on the lower portion of the seat back until the seat back is in a horizontal position. Lift up on the forward side on the seat bottom, rotate the seat bottom to a vertical position, and position the seat bottom legs parallel with the seat bottom.
- (2) Lower the seat back into a vertical position and snap the retaining strap into position.

H. Fifth and Sixth Seat Removal(E-1111, E-1241 and After; EA-11 and After)

- (1) Fold the bottom of the seat up to a vertical position and fold the seat support in the retract position.
- (2) Remove the seat attach pins.

I. Fifth and Sixth Seat Installation(E-1111, E-1241 and After; EA-11 and After)

- (1) Position the seats.
- (2) Install the seat attach pins.
- (3) Fold the seat bottom and seat support down and snap the support into the floor base.

J. Fifth and Sixth Seat Stowage(E-1111, E-1241 and After; EA-11 and After)

The fifth and sixth seats may be folded either in a horizontal or vertical position to provide additional cargo space. This may be accomplished as follows:

(1) Vertical Position

- (a) Fold the seat bottom up to a vertical position.
- (b) Fold the seat support into the retract position.
- (c) Position the seat against the rear bulkhead in a vertical position.

(2) Horizontal Position

- (a) Fold the seat support into retract position and position the seat bottom on the floorboard.
- (b) Fold the seat back forward and position on top of the seat bottom.

NOTE: A club seating arrangement is available (A36, A36TC, and B36TC series only) that enables the third and fourth passenger seats to be turned facing aft. On A36 serials prior to E-1371, when this arrangement is used, the fifth and sixth seats must be moved four (4) inches aft to maintain proper weight and balance. If the seats are returned to a standard seating arrangement (facing forward), the fifth and sixth seats **MUST** be moved back to their original position. Holes are located in the floorboard under the carpeting to facilitate installation of the side mounting brackets and the seat support base. It is recommended that both the third and fourth passenger seats face the same direction at all times.

K. Headliner Removal(CE-919, CE-923, CE-925, CE-927, CE-929 and After; CJ-156 and After; D-10348, D-10353 and After; E-1422, E-1551, E-1569, E-1594 and After; EA-21, EA-28, EA-33 and After)

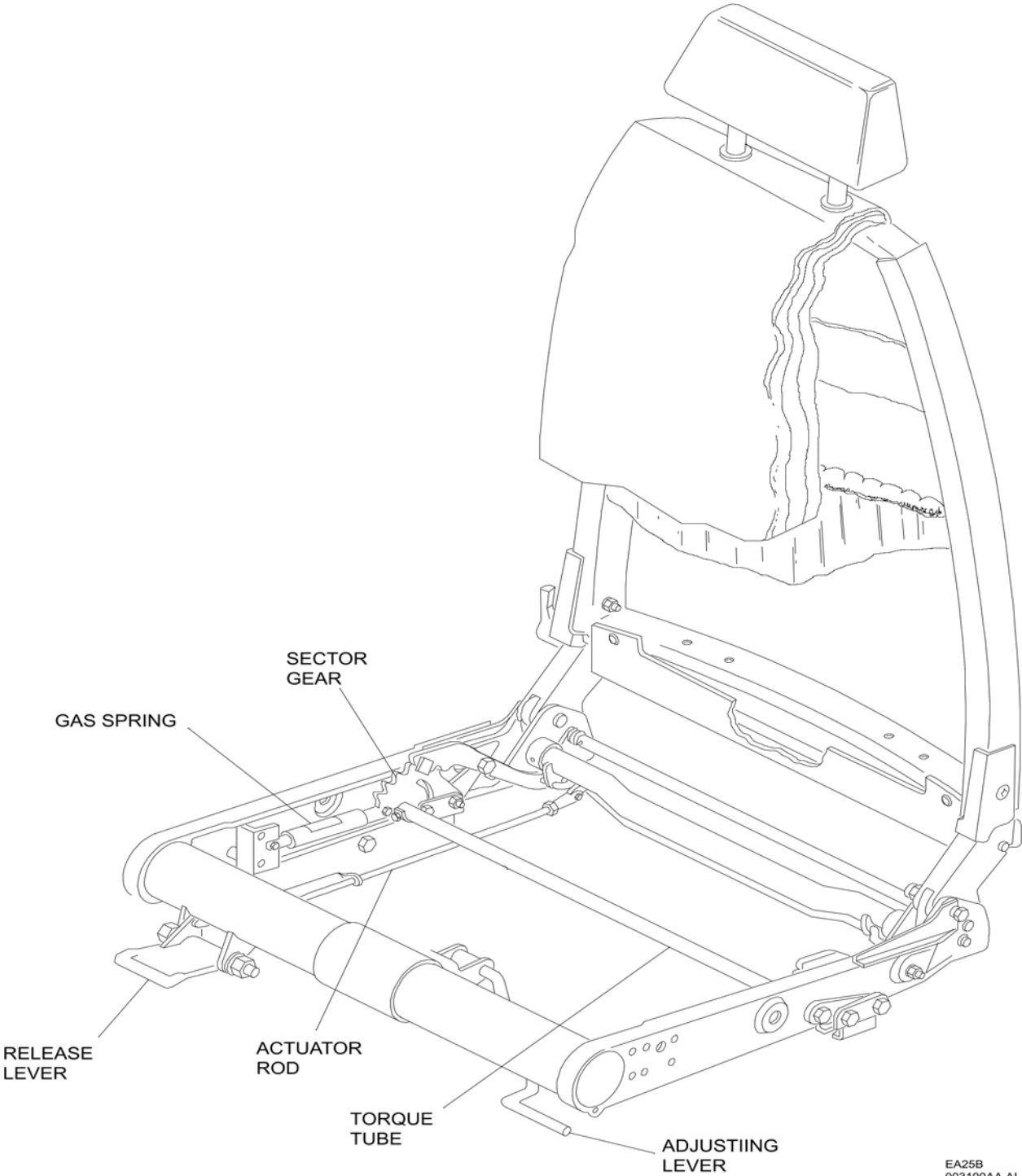
- (1) Perform the FIFTH SEAT REMOVAL and the FIFTH AND SIXTH SEAT REMOVAL procedures.

- (2) Remove the aft bulkhead closure.
 - (3) Working through the aft bulkhead, remove the tape from around the air ducts that connects the air duct to the headliner duct.
 - (4) Remove the screws which hold the overhead console in place.
 - (5) Disconnect the wires to the light and remove the console.
 - (6) Remove the window moldings.
 - (7) Remove the door trim.
 - (8) Perform the GLARESHIELD REMOVAL procedure in Chapter [39-10-00](#).
 - (9) Remove the windshield trim.
 - (10) Remove the garment hanger.
 - (11) Gently pull on the headliner to disconnect the fabric hook and loop fasteners. These hook and loop fasteners are located wherever the airplane frame and headliner come together.
 - (12) Separate the forward air ducts from the air duct in the headliner. A spatula or similar tool may be used to work between the ducts to work the sealer loose.
 - (13) Disconnect the electrical wiring to the headliner lights. (This connector is located near the center of the headliner toward the front, or aft of the pilot's side window.)
 - (14) Remove the headliner through the door.
- L. Headliner Installation(CE-919, CE-923, CE-925, CE-927, CE-929 and After; CJ-156 and After; D-10348, D-10353 and After; E-1422, E-1551, E-1569, E-1594 and After; EA-21, EA-28, EA-33 and After)
- (1) Place the headliner in the airplane.
 - (2) Connect the electrical wiring to the headliner lights.
 - (3) Connect the forward ventilation ducts. Seal ducts with adhesive ([54, Table 1, 91-00-00](#)).
 - (4) Engage the hook and loop fasteners to hold headliner in place.
 - (5) Install the garment hanger.
 - (6) Install the windshield trim.
 - (7) Perform the GLARESHIELD INSTALLATION procedure in Chapter [39-10-00](#).
 - (8) Install the door moldings.
 - (9) Install the window molding.
 - (10) Connect the wires to the console light and install the console.
 - (11) Connect the duct aft of the rear bulkhead closure. Tape the joint with two-inch wide tape ([55, Table 1, 91-00-00](#)).
 - (12) Install the bulkhead closure.
 - (13) Perform the FIFTH SEAT INSTALLATION and the FIFTH AND SIXTH SEAT INSTALLATION procedures.
- M. Forward Carry-Through Spar Cover Removal
- (1) Perform the PILOT AND COPILOT SEAT REMOVAL procedures.
 - (2) Remove emergency landing gear crank cover from spar cover.
 - (3) On aft side of spar cover, pull back carpet and remove screws from spar cover.
 - (4) On forward side of spar cover, pull back carpet and remove screws from spar cover.
 - (5) Remove RH access cover.
 - (6) From inside of RH access cover, loosen clamp and remove air duct from plenum and grill assembly.
 - (7) Lift spar cover and remove from forward spar.
- N. Forward Carry-Through Spar Cover Installation
- CAUTION: Improper installation of the forward carry-through spar cover may interfere with the landing gear emergency hand crank operation. Ensure the landing gear hand crank will engage and rotate without interference with the spar cover.**
- (1) Center spar cover on the forward spar.
 - (2) From inside of RH access cover, install air duct on plenum and grill assembly and tighten clamp.

- (3) Install RH access cover assembly.
- (4) On forward side of spar cover, install screws to secure forward end of spar cover and install carpet.
- (5) On aft side of spar cover, install screws to secure aft end of spar cover and install carpet.
- (6) Check the emergency landing gear hand crank to ensure handle will engage and rotate without interference with the forward carry-through spar cover.
- (7) Install emergency landing gear crank cover to spar cover.
- (8) Perform the PILOT AND COPILOT SEAT INSTALLATION procedures.

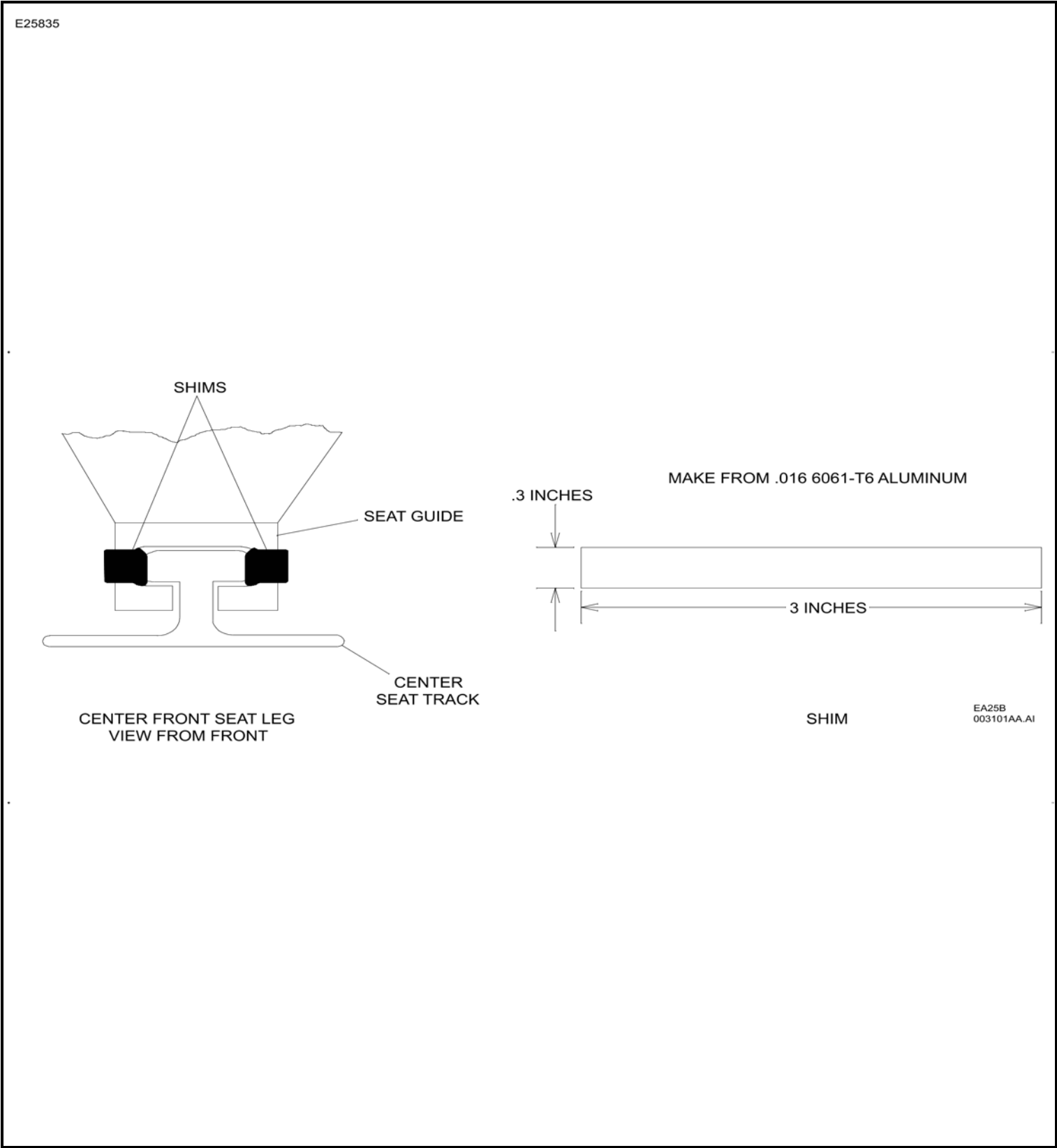
Figure 1 : Sheet 1 : Vertically Adjusting Seat

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Figure 2 : Sheet 1 : Seat Track Shims



EMERGENCY - DESCRIPTION AND OPERATION

1. Emergency - Description and Operation

A. Emergency Locator Transmitter

The airplane is equipped with an automatically actuated Emergency Locator Transmitter (ELT) to assist in the tracking and recovery of the airplane and crew in the event of a crash or emergency landing. The ELT system consists of a battery-powered ELT transmitter, an antenna, and a switch that is accessible through a spring-loaded door in the right side of the aft fuselage adjacent to the ELT (depending on the model and serial of the airplane, this switch may be installed in the instrument panel). The output frequencies of the ELT are 121.5 and 243.0 MHz, simultaneously. Range is approximately "line of sight". The ELT is mounted near the right side of the aft fuselage, at approximately Fuselage Station (FS) 230.00. There are five different brands (six different models) of ELT that are installed on the various Bonanza models and aircraft serials. Refer to [Table 1](#) for the specific brand and model that was installed on each airplane model and serial. The antenna for the ELT is installed in one of two places:

- On airplane serials: CE-748, CE-772 through CE-1032; CJ-149 through CJ-155; D-10097, D-10120 and After; E-1111, E-1241 through E-2147; and EA-11 through EA-411, the antenna is installed on top of the fuselage at FS 195.00.
- On airplane serials: CJ-156 and After; CE-1033 and After; E-2148 and After; and EA-412 and After, the antenna is installed under the dorsal fin just forward of the vertical stabilizer.

(1) Communications Components Corporation ELT (Models TR70-13 and TR70-17)

There are two ELT models by Communications Component Corporation being used (Refer to [Chapter 25, Emergency, Figure 201](#)).

- The model TR70-17 ELT was installed on airplane serials: CE-748, CE-772 through CE-828; CJ-149; D-10097, D-10120 through D-10196; and E-1111, E-1241 through E-1406.

The model TR70-13 ELT was installed on airplane serials: CE-829 through CE-905; CJ-150 through CJ-155; D-10197 through D-10346; E-1407 through E-1686; and EA-11 through EA-80.

The model TR70-17 ELT is installed in the aft fuselage of the airplane so that its control switch is accessible through a small door in the right side of the aft fuselage. The control switch positions are placarded ARM-OFF-ON. The OFF position prevents operation of the ELT. The ON position is momentary and is used to test the operation of the ELT. The ARM position arms an impact switch which will actuate the ELT automatically upon impact of the airplane.

The model TR70-13 ELT is also installed in the aft fuselage of the airplane. It does not have a control switch which is accessible from the outside of the airplane. It does have a remote switch that is accessible through a small door in the right side of the aft fuselage.

- The control switch positions are placarded OFF-ON-ARM. The OFF position prevents operation of the ELT. The ON position can be used for manual operation of the ELT. The ARM position arms an impact switch which will actuate the ELT automatically upon impact of the airplane.
- The remote switch positions are placarded REARM-ARM-XMIT. The XMIT position is momentary and is used to test the operation of the ELT. The ARM position is used to arm the impact switch for automatic actuation upon impact of the airplane. The REARM position is used to reset the impact switch after testing the ELT.

The model TR70-17 ELT and model TR70-13 ELT's can be replaced with either the Narco ELT-10, the ARTEX ELT 110-4 or the ARTEX ELT ME406. Replacing with the Narco ELT-10 requires Kit No. 101-3046-1. Replacing with the ARTEX ELT 110-4 requires Kit No. 101-3127-1. Replacing with the ARTEX ELT ME406 requires Kit No. 36-3049.

Table 1. Original ELT Installation by Airplane Serial

Airplane Serials	ELT Originally Installed
Model F33A	
CE-748, CE-772 thru CE-828	Communications Components Corporation ELT, Model TR70-17
CE-829 thru CE-905	Communications Components Corporation ELT, Model TR70-13
CE-906 thru CE-1032	Narco ELT-10
CE-1033 thru CE-1240	Dorne and Margolin ELT
CE-1241 thru CE-1646	Narco ELT-10

CE-1647 and After	ARTEX ELT 110-4
Model F33C	
CJ-149	Communications Components Corporation ELT, Model TR70-17
CJ-150 thru CJ-155	Communications Components Corporation ELT, Model TR70-13
CJ-156 and After	Dorne and Margolin ELT
Model V35B	
D-10097, D-10120 thru D-10196	Communications Components Corporation ELT, Model TR70-17
D-10197 thru D-10346	Communications Components Corporation ELT, Model TR70-13
D-10347 and After	Narco ELT-10
Model A36 and G36	
E-1111, E-1241 thru E-1406	Communications Components Corporation ELT, Model TR70-17
E-1407 thru E-1686	Communications Components Corporation ELT, Model TR70-13
E-1687 thru E-2147	Narco ELT-10
E-2148 thru E-2423	Dorne and Margolin ELT
E-2424 thru E-2693	Narco ELT-10
E-2694 thru E-3880	ARTEX ELT 110-4
E-3881 and After	ARTEX ELT ME406
Model A36TC and B36TC	
EA-11 thru EA-80	Communications Components Corporation ELT, Model TR70-13
EA-81 thru EA-411	Narco ELT 10
EA-412 thru EA-479	Dorne and Margolin ELT
EA-480 thru EA-530	Narco ELT-10
EA-531 and After	ARTEX ELT 110-4

(2) Narco ELT-10

The Narco ELT-10 is installed in the aft fuselage of the airplane and is equipped with a three-position control switch on the ELT. In addition to the control switch, a two-position or three-position remote switch is also provided (Refer to [25-60-00-201, Figure 202](#)). The Narco ELT-10 can also be removed from the airplane and used as a portable unit. The Narco ELT-10 was installed on airplane serials: CE-906 through CE-1032, CE-1241 through CE-1646; D-10347 and After; E-1687 through E-2147, E-2424 through E-2693; and EA-81 through EA-411, EA-480 through EA-530.

The control switch is located on the ELT and is a three-position type switch. The control switch positions are placarded ON-OFF-ARM. Placing the control switch in the OFF position prevents operation of the ELT. Placing the control switch in the ARM position is used to arm the impact switch for automatic actuation upon impact of the airplane. When the Narco ELT 10 is removed from the airplane and used as a portable unit, the control switch is placed in the ON position which allows the ELT to operate and transmit continuously.

The remote switches are installed in the aft fuselage and are accessible through a small switch access door in the right side of the aft fuselage.

- The Narco ELT-10 (with a two-position remote switch) is installed on airplane serials: CE-906 through CE-1032; D-10347 and After; E-1687 through E-2147; and EA-81 through EA-411. The two-position remote switch positions are placarded XMIT-ARM. The remote switch is placed in the XMIT position to test the ELT or in the ARM position

for automatic operation upon impact of the airplane.

- The Narco ELT-10 (with a three-position remote switch) is installed on airplane serials: CE-1241 through CE-1646; E-2424 through E-2693; and EA-480 through EA-530. The three-position remote switch positions are placarded TEST-ARM-XMIT. The TEST and XMIT position are used for testing the ELT. The ARM position is used for automatic operation upon impact of the airplane.

The Narco ELT-10 can be replaced with the ARTEX ELT ME406. Kit No. 36-3049 is required for the installation.

(3) Dorne and Margolin ELT

The Dorne and Margolin ELT is installed in the aft fuselage and is equipped with a three-position control switch and a three-position remote switch (Refer to [25-60-00-201, Figure 203](#)). The Dorne and Margolin ELT was installed on airplane serials: CE-1033 thru CE-1240; CJ-156 and After; E-2148 through E-2423; and EA-412 through EA-479.

The three-position control switch is located on the ELT and is placarded AUTO-OFF-ON. When the control switch is placed on the ON position, the ELT will transmit for testing or manual operation. Placing the control switch in the AUTO position arms an impact switch which will actuate the ELT automatically upon impact of the airplane. The OFF position prevents operation of the ELT.

The three-position remote switch is installed in the aft fuselage and is accessible through a small switch access door in the right side of the fuselage. The remote switch is used for testing and manual actuation of the ELT. The remote switch is placarded TEST-AUTO-XMIT. The TEST position is a momentary switch which will cause the ELT to transmit. The XMIT position turns the unit on for manual operation and the AUTO position arms the unit to operate when the impact switch is actuated upon impact of the airplane.

The Dorne and Margolin ELT can be replaced with the ARTEX ME406. Kit No. 36-3049 is required for the installation.

(4) Artex ELT 110-4

The ARTEX ELT 110-4 is installed in the aft fuselage and is equipped with a two-position control switch and a two-position remote switch. The ELT also has an internal impact switch that will actuate the ELT automatically upon impact of the airplane (Refer to [25-60-00-201, Figure 204](#)). The ARTEX ELT 110-4 is installed on airplane serials: CE-1647 and After; E-2694 and After; and EA-531 thru EA-3880.

The two-position control switch is located on the ELT and is placarded ON-OFF. When the control switch is in the ON position, the ELT will transmit for testing or manual operation. Placing the control switch in the OFF position stops the transmission. The two-position remote switch is installed in the instrument panel and is placarded ARMED/RESET-ON. Depending on the model and serial of airplane, the two-position remote switch is located in either the aft fuselage, accessible through a small switch access door in the right side of the fuselage or is located in the instrument panel. The remote switch is placarded ARMED/RESET-ON. The remote switch is used to either arm or manually actuate the ELT. When the remote switch is placed in the ON position, the ELT will transmit. Placing the remote switch in the ARMED/RESET position, arms the ELT and allows it to operate automatically upon impact of the airplane.

The remote switch is installed in the aft fuselage on airplane serials: CE-1647 and After; E-2694 through E-2955 except E-2679, E-2682, E-2687, E-2689, E-2721, E-2724, E-2726, E-2729, E-2732, E-2734, E-2742, E-2745, E-2748, E-2750, E-2751, E-2753, E-2754, E-2757, E-2758, E-2760, E-2826, and E-2827; and EA-531 through EA-578.

The remote switch is installed in the instrument panel on airplane serials: E-2679, E-2682, E-2687, E-2689, E-2721, E-2724, E-2726, E-2729, E-2732, E-2734, E-2742, E-2745, E-2748, E-2750, E-2751, E-2753, E-2754, E-2757, E-2758, E-2760, E-2826, and E-2827 (all by Kit No. 36-3020), and E-2956 and After; and EA-579 and After.

To reset the ARTEX ELT 110-4, move the control switch to the ON position and then to the OFF position. Next move the remote switch to the ON position and then to the ARMED/RESET position.

The ARTEX ELT 110-4 can be replaced with the ARTEX ME406. Kit No. 36-3049 is required for the installation.

(5) Artex ELT ME406

The ARTEX ELT ME406 is installed in the aft fuselage and is equipped with a two-position control switch and a two-position remote switch. The ELT also has an internal impact switch that will actuate the ELT automatically upon impact of the airplane (Refer to [25-60-00-201, Figure 205](#)). The ARTEX ELT ME406 is installed on airplane serials E-3881 and After and prior aircraft with Kit 36-3049 installed.

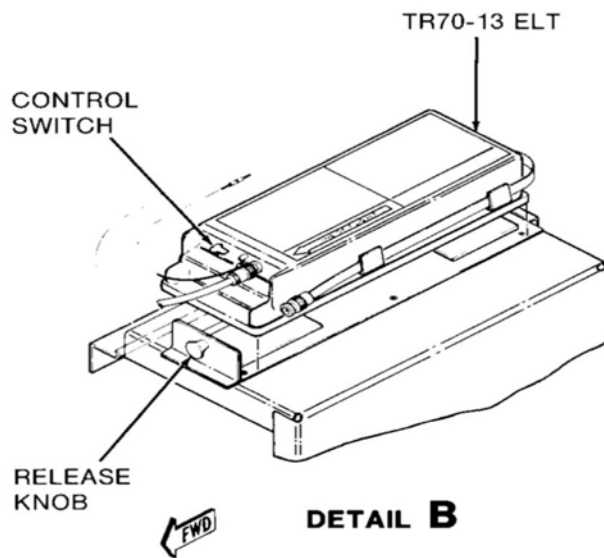
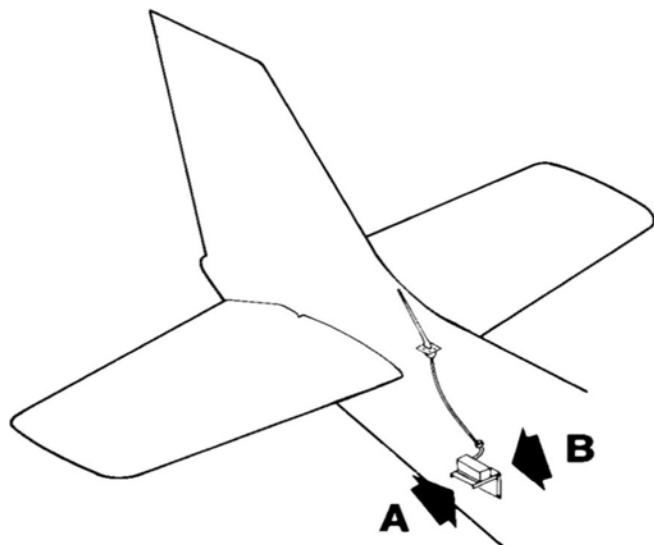
A two-position control switch is located on the ELT and is placarded ON and ARM. When the control switch is in the ON position, the ELT will transmit for testing or manual operation. Placing the control switch in the ARM position stops the transmission. A red indicator light, placarded XMT, flashes to indicate that the ELT is transmitting. A remote two-position switch is installed in the instrument panel and is placarded ON and ARM. The ON position is used to test the function of the ELT. The ARM position is the normal in-flight position which allows the ELT to operate automatically upon impact of the airplane. To deactivate the ELT, set either switch to the ON position and then back to the ARM position.

The ARTEX ELT ME406 can replace the Communication Components Corporation ELT's, models TR70-17 and TR70-

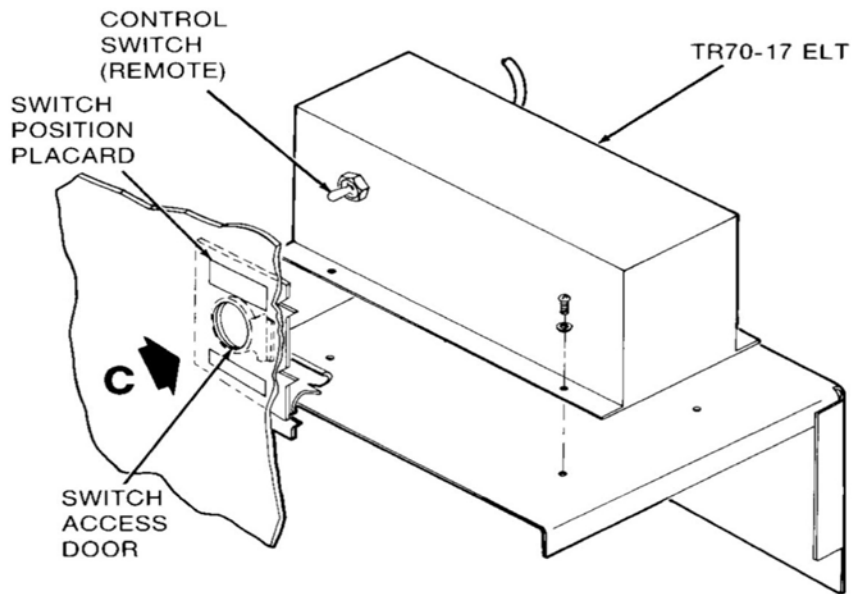
13; the Narco ELT-10; the Dorne and Margolin ELT; and the ARTEX ELT 110-4. Kit No. 36-3049 is required for all installations.

Figure 201 : Sheet 1 : Communications Components Corporation ELT Installation (Models TR70-13 and TR70-17)

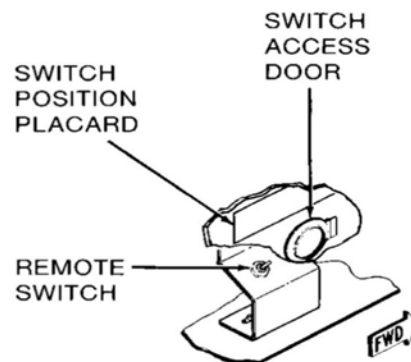
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DETAIL B



DETAIL A



REMOTE SWITCH FOR TR70-13 ELT

DETAIL C

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EMERGENCY - MAINTENANCE PRACTICES

1. Emergency

A. Emergency Locator Transmitter Maintenance

Maintenance on the ELT is normally limited to the replacing the ELT battery. Information on ELT battery life and its replacement is included in the information furnished with each ELT and is usually placarded on the ELT battery. Replacement ELT batteries should be obtained only from the ELT, the aircraft manufacturers, or other acceptable suppliers since the condition and useful life of over-the-counter batteries, such as those sold for flashlights, portable radios, etc., are not usually known. The following is a list of the various conditions which require ELT battery replacement:

CAUTION: On airplanes prior to E-3881 not modified by Kit 36-3049, the ELT control switch shall be placed in and kept in the OFF position anytime the ELT is not connected to its associated antenna or to a 50-ohm dummy load. Moving the control switch to the ON, ARM, or AUTO positions without the antenna or a 50-ohm dummy load being connected, can cause damage to the ELT.

CAUTION: On airplanes E-3881 and After and prior airplanes equipped with Kit 36-3049, the ELT does not have an OFF position. The ELT control switch shall be placed and kept in the ARM position anytime the ELT is not connected to its associated antenna or to a 50-ohm dummy load. A jumper between two pins on the connector located on the front of the ELT must be in place for the G-switch to activate the unit. When the mating connector is installed, the beacon is armed. This allows the beacon to be handled or shipped without nuisance activation.

CAUTION: Avoid storing the ELT batteries at temperatures in excess of 130° F (55° C).

- (1)
 - Visual inspection shows signs of leakage, corrosion or unsecured leads.
 - Elapsed replacement date noted on the battery case (this date represents 50% of the useful life of the battery).
- NOTE:** The useful life of the ELT battery is the length of time which the battery may be stored without losing its ability to continuously operate the ELT for 48 hours.
- After any emergency use.
 - After one cumulative hour of use.
 - After operation of unknown duration.

If the transmitter is stored in an area where the temperature is normally above 100°F (38°C), the battery life will be shortened.

B. Communications Components Corporation ELT Battery Replacement (Models TR70-13 and TR70-17)

The following procedures provide the necessary instructions required to replace the battery of the Communications Components Corporation ELT, models TR70-17 and TR70-13. If the model TR70-17 or TR70-13 ELT has been replaced with the Narco ELT-10 (Kit 101-3046-1 required), refer to NARCO ELT-10 BATTERY REPLACEMENT for instructions on replacement of the battery. If the model TR70-17 or TR70-13 ELT has been replaced with the ARTEX ELT 110-4 (Kit 101-3127-1 required), refer to ARTEX ELT 110-4 BATTERY REPLACEMENT for instructions on replacement of the battery.

- (1) Remove the cabin aft upholstery panel to gain access to the aft fuselage.

CAUTION: The ELT control switch shall be placed in and kept in the OFF position anytime the ELT is not connected to its associated antenna or to a 50-ohm dummy load. Moving the control switch to the ON, ARM, or AUTO positions without the antenna or a 50-ohm dummy load being connected, can cause damage to the ELT.

- (2) Place the control switch on the ELT (placarded ARM-OFF-ON) in the OFF position (Refer to [Figure 201](#)).
 - (3) Disconnect the antenna cable from the ELT.
 - (4) On the model TR70-13 ELT disconnect the remote switch wiring from the ELT.
 - (5) Unsecure the ELT from the mounting bracket. On the model TR70-17 ELT, remove four screws attaching the ELT to the mounting bracket. On the Model TR70-13 ELT, rotate the release knob on the mounting bracket to release the ELT.
 - (6) Remove the ELT from the airplane.
 - (7) Remove the screws that secure the base on the ELT and remove the base.
- WARNING:** DO NOT discard the ELT battery in a fire.
- (8) Remove the old battery from the ELT and disconnect the ELT electrical connector from the battery. Properly dispose of the battery.
 - (9) Inspect for and properly treat any corrosion that may be indicated in the area where the battery was installed.

- (10) Obtain a new battery and connect to the ELT electrical connector.
- (11) Install The battery in the ELT.
- (12) Replace the base and install the screws.
- (13) Position the ELT on the mounting bracket and secure with screws (model TR70-17) or release knobs (model TR70-13) as is applicable.
- (14) On model TR70-13, connect the remote switch wiring to the ELT.
- (15) Connect the antenna cable to the ELT.
- (16) Mark the new replacement date on the ELT in a visible area. This will aid in future inspections of the ELT. This date is 50% of the useful life of the battery as defined by the battery manufacturer.
- (17) Test the ELT in accordance with TESTING THE EMERGENCY LOCATOR TRANSMITTER.
- (18) Install the cabin aft upholstery panel.

C. Narco ELT-10 Battery Replacement

The following procedures provide the necessary instructions required to replace the battery of the Narco ELT-10. These instructions also apply to ELT units that have been replaced with the Narco ELT-10 (Kit 101-3046-1 required). If the Narco ELT-10 has been replaced with the ARTEX ELT 110-4 (Kit 101-3127-1 required), refer to ARTEX ELT 110-4 BATTERY REPLACEMENT for instructions on replacement of the battery.

- (1) Remove the cabin aft upholstery panel to gain access to the aft fuselage.
CAUTION: The ELT control switch shall be placed in and kept in the OFF position anytime the ELT is not connected to its associated antenna or to a 50-ohm dummy load. Moving the control switch to the ON, ARM, or AUTO positions without the antenna or a 50-ohm dummy load being connected, can cause damage to the ELT.
- (2) Place the control switch on the ELT (placarded ARM-OFF-ON) in the OFF position (Refer to [Figure 202](#)).
- (3) Disconnect the antenna cable from the ELT.
- (4) Disconnect the remote switch wiring from the terminals on the ELT.
- (5) Unlatch the mounting strap and remove the ELT from the airplane.
CAUTION: To avoid damage to the antenna or the plastic tab on the upper end, care must be exercised in extending the portable antenna and handling the control head.
- (6) Extend the portable antenna.
CAUTION: Do not remove the sealant on the inside lip of the battery pack or a watertight seal will not be made when the ELT unit is reassembled.
- (7) Remove the four screws attaching the control head to the battery casing and slide the control head and battery case apart. The battery connection leads are approximately 3-inches long.
WARNING: DO NOT discard the ELT battery in a fire.
- (8) Disconnect the old battery by unsnapping the battery terminals from the bottom of the ELT PC board. Properly dispose of the ELT battery.
- (9) Inspect the ELT for and properly treat any corrosion that may be indicated in the area where the battery was installed.
- (10) Connect the terminals of the new battery to the bottom of the ELT PC board.
- (11) Using a spatula, apply a bead of sealant (supplied with each battery pack) around the area of the control head which is joined with the battery case when reassembled. The sealant provides a watertight seal when the unit is assembled.
- (12) Insert the control head section into the battery case, being careful not to pinch the wires and install the four attaching screws. Wipe any excess sealant from the outside of the unit. If the four screw holes do not line up, rotate the battery case 180° and reinsert.
CAUTION: Exercise extreme care in order to avoid damage to the antenna.
- (13) Stow the portable antenna.
- (14) Install the ELT in the airplane and secure with the mounting strap.
CAUTION: Exercise extreme care in order to avoid damage to the antenna or the plastic tab on the upper end.
- (15) Connect the fixed antenna cable to the ELT. Ensure that the contact (plastic tab) separator is inserted between the portable antenna contact and the portable antenna as shown in [Figure 202](#).

NOTE: If the contact separator is not positioned as shown, a very weak signal may be transmitted. This signal is strong enough for a functional test but too weak for emergency use.

- (16) Connect the remote switch wiring to the terminals on the ELT.
- (17) Press the RESET button on the ELT.
- (18) Place the control switch (placarded ARM-OFF-ON) in the ARM position.
- (19) Mark the new replacement date on the ELT in a visible area. This will aid in future inspections of the ELT. This date is 50% of the useful life of the battery as defined by the battery manufacturer.
- (20) Test the ELT in accordance with TESTING THE EMERGENCY LOCATOR TRANSMITTER.
- (21) Install the cabin aft upholstery panel.

D. Dorne and Margolin ELT Battery Replacement

The following procedures provide the necessary instructions required to replace the battery of the Dorne and Margolin ELT. If the Dorne and Margolin ELT has been replaced with the Narco ELT 10 (Kit 101-3046-1 required), refer to NARCO ELT-10 BATTERY REPLACEMENT for instructions on replacement of the battery. If the Dorne and Margolin ELT has been replaced with the ARTEX ELT 110-4 (Kit 101-3127-1 required), refer to ARTEX ELT 110-4 BATTERY REPLACEMENT for instructions on replacement of the battery.

- (1) Remove the cabin aft upholstery panel to gain access to the aft fuselage.

CAUTION: The ELT control switch shall be placed in and kept in the OFF position anytime the ELT is not connected to its associated antenna or to a 50-ohm dummy load. Moving the control switch to the ON, ARM, or AUTO positions without the antenna or a 50-ohm dummy load being connected, can cause damage to the ELT.

- (2) Place the control switch on the ELT (placarded ARM-ON-OFF) in the OFF position (Refer to [Figure 203](#)).
- (3) Disconnect the antenna cable from the ELT.
- (4) Disconnect the remote switch wiring from the ELT.
- (5) Remove the screws securing the ELT and remove the ELT from the airplane.
- (6) Remove the screws from the bottom of the ELT and remove the bottom.
WARNING: DO NOT discard the battery in a fire.
- (7) Disconnect the old battery from the ELT and properly dispose of the battery.
- (8) Inspect the ELT battery compartment for corrosion. Properly treat the areas if corrosion is found.
- (9) Connect and install the new battery.
- (10) Install the ELT bottom on the ELT and secure with the screws.
- (11) Install the ELT in the airplane and secure with the screws.
- (12) Connect the remote switch wiring to the ELT.
- (13) Connect the antenna cable to the ELT.
- (14) Mark the battery replacement date on the ELT in a visible area. This will aid in future inspections of the ELT. This date is 50% of the useful life of the battery as defined by the battery manufacturer.
- (15) Test the ELT in accordance with TESTING THE EMERGENCY LOCATOR TRANSMITTER.
- (16) Install the cabin aft upholstery cabin panel.

E. Artex ELT 110-4 Battery Pack Replacement

The following procedures provide the necessary instructions required to replace the battery of the ARTEX ELT 110-4. These instructions also apply to ELT units that have been replaced with the ARTEX ELT 110-4 (Kit No. 101-3127-1 is required).

- (1) Remove the cabin aft upholstery panel to gain access to the aft fuselage.

CAUTION: The ELT control switch shall be place in the OFF position anytime the ELT is not connected to its associated antenna or to a 50-ohm dummy load (Refer to [Figure 204](#)). Moving the control switch to the ON position without the antenna or a 50-ohm dummy load being connected, can cause damage to the ELT.

- (2) Place the control switch on the ELT (placarded ON-OFF) in the OFF position (Refer to [Figure 204](#)).
- (3) Loosen the two thumb screws securing the mounting frame cap to the mounting frame base.

- (4) Disconnect the antenna cable from the ELT.
- (5) Disconnect the remote switch harness from the ELT.
- (6) Remove the ELT from the mounting base.
- (7) Disconnect the battery pack connector from the ELT.
WARNING: DO NOT discard battery pack in a fire.
- (8) Remove the screws securing the old battery pack to the ELT, remove the battery pack from the ELT, and properly dispose of the old battery pack.
- (9) Inspect the ELT battery compartment for corrosion. Properly treat the affect areas if corrosion is found.
- (10) Obtain a new battery pack and connect the battery pack connector to the new battery pack.
- (11) Make sure that all gaskets are properly aligned and in good condition.
- (12) Position the new battery pack to the ELT and secure with screws.
- (13) Make sure the antenna cable and the remote switch harness are inserted through the mounting frame cap in the applicable openings as shown in [Figure 204](#).
- (14) Connect the antenna cable to the ELT.
- (15) Connect the remote switch harness to the ELT.
- (16) Position the ELT in the mounting frame base so that the arrow on the top of the ELT is pointed in the direction of the flight.
- (17) Secure the ELT in the mounting frame base.
- (18) Install the mounting frame cap onto the mounting frame base and secure with the thumb screws.
- (19) Mark the replacement date of the new battery pack on the ELT in a visible area. This will aid in future inspections of the ELT. The replacement date is 50% of the useful life of the battery as defined by the battery manufacturer.
- (20) Test the ELT in accordance with TESTING THE EMERGENCY LOCATOR TRANSMITTER.
- (21) Install the cabin aft upholstery panel.

F. Artex ELT ME406 Battery Pack Replacement(E-3881 and After and Prior Airplanes Equipped With Kit 36-3049)

NOTE: If the ELT is moved to a different aircraft than it was originally registered with, the ELT must be re-registered and the product label remarked to indicate the new programming and/or new aircraft of registry. Refer to [Figure 205](#).

- (1) Remove the aft upholstery panel.
- (2) Make certain that the ELT is turned off.
- (3) Disconnect the ELT antenna coax connector from the ELT.
- (4) Disconnect the remote switch electrical connector from the ELT.
- (5) Unlatch the hook-and-loop strap securing the ELT to the mounting tray and remove the ELT.
- (6) Remove the screws securing the ELT cover.
CAUTION: Do not pull on the flexible portion of the cable. Use the rigid section of the flex circuit at the connector as a handle.
- (7) Carefully lift the battery cover away from the ELT and unplug the flex-cable connected to the battery pack.
- (8) Remove the ELT battery pack.
NOTE: Inspect for and properly treat any corrosion that may be indicated in the area when the battery is replaced.
- (9) Lay the battery pack on a work surface with the batteries facing up.
- (10) Install a replacement seal in the slot along the perimeter of the ELT housing cover.
- (11) Leaving the battery as it is, position the ELT cover over the battery pack with one hand and plug the flex-cable connector into the battery assembly using the other hand.
- (12) Install the ELT housing cover on the ELT housing and secure with screws. Torque screws 10 to 12 inch-lbs.
- (13) Install ELT on the mount tray and secure in place with hook-and-loop strap.
NOTE: Make sure that the switch end of the ELT is facing forward.
- (14) Connect the ELT antenna coax connector to the ELT.

- (15) Connect the remote switch electrical connector to the ELT.
- (16) Place the ELT master switch to the ARM position.
- (17) Perform the ELT operational check (Refer to [Chapter 25-60-00](#)).
- (18) Install the aft upholstery panel.

G. Testing the Emergency Locator Transmitter

Any time maintenance is performed on the ELT, an operation test must be performed. The FAA/DOT allows free space transmission tests from the airplane anytime within five minutes after each hour. The test time is generally three sweeps of the warble tone, or approximately a one-second test. The control tower should be notified that a test is about to be performed. Improper testing of the ELT could trigger false alerts and create frequency jamming of real emergency transmissions. Be certain that all procedures are closely followed and that monitoring of frequencies occurs to ensure the ELT switches are placed in the proper positions after testing is complete. If the test is performed with the ELT removed from the airplane, Federal Communications Commission (FCC) regulations require the testing be done in a screened or shielded test room, or in a test enclosure that will hold the self-contained ELT and an antenna.

Testing of installed ELT's shall be accomplished by using one of the following applicable procedures:

CAUTION: The ELT control switch shall be placed in the OFF position anytime the ELT is not connected to its associated antenna or to a 50-ohm dummy load. Moving the control switch to the ON or (ARM or AUTO, depending on the brand) positions without the antenna or a 50-ohm dummy load being connected to the ELT, can cause damage to the ELT.

NOTE: Test should not be longer than three audio sweeps. One audio sweep may be defined as amplitude modulating the carrier with an audio frequency sweeping downward over a range of not less than 700 Hz, within the range 1,600 to 300 Hz, and a sweep repetition rate between 2 and 4 Hz. Tests should be conducted only in the first five minutes of any hour. If the operational tests must be made at a time not included within the first five minutes after the hour, the tests should be coordinated with the nearest FAA tower or flight service station.

(1) Testing the Communications Components Corporation ELT (Models TR70-13 and TR70-17)

- (a) Turn on the airplane's COMM-1 and tune it to 121.5 MHz.
- (b) Turn the COMM-1 audio switch to the SPEAKER position and place the volume control in the center of its range.

NOTE: Monitor a frequency on COMM 1 to be certain the radio is operating.

- (c) Place the TR70-17 ELT switch to ON or the TR70-13 ELT remote switch to XMIT for approximately one second and monitor the ELT signal. (Refer to [Figure 201](#))

NOTE: A distinctive downward sweeping tone should have been heard from the monitoring receiver during the test. If the tone was heard, the ELT is functioning properly. If there was no audible tone (assuming that the VHF transceiver is operating properly), the battery is probably disconnected, outdated or discharged.

- (d) After the test, place the TR70-17 ELT switch to the OFF position or the TR70-13 ELT remote switch to the REARM position. The audio signal should disappear completely.
- (e) Place the ELT switch in the ARM position. There should be no audible signal present.
- (f) If the ELT continues to operate, check that the remote switch is in the ARM position.
- (g) On the TR70-17 ELT, place the control switch to ON, then place it firmly in the ARM position. On the TR70-13 ELT, gain access to the ELT control switch and place it in the OFF position. The audio signal should stop. Reset the TR70-13 ELT to the ARM position.

(2) Testing the Narco ELT-10

- (a) Turn on the airplane's COMM-1 and tune it to 121.5 MHz.
- (b) Turn the COMM-1 audio switch to the SPEAKER position and place the volume control in the center of its range.

NOTE: Monitor a frequency on COMM 1 to be certain the radio is operating.

- (c) Place the ELT remote switch (3-position switch: TEST-AUTO-XMIT) or (2-position switch: XMIT-ARM) to the XMIT position for approximately one second and monitor the ELT signal.

NOTE: A distinctive downward sweeping tone should have been heard from the monitoring receiver during the test. If the tone was heard, the ELT is functioning properly. If there was no audible tone (assuming that the VHF transceiver is operating properly), the battery is probably

disconnected, outdated or discharged.

- (d) After the test, place the remote TEST-AUTO-XMIT switch to the AUTO position or the remote XMIT-ARM switch to the ARM position. The audio signal should disappear completely.
 - (e) If the ELT continues to operate, check that the remote XMIT-ARM switch is in the ARM position or the remote TEST-AUTO-XMIT switch is in the AUTO position.
 - (f) If the ELT continues to send a signal, gain access to the ELT and firmly press the reset switch on the front of the ELT and listen to ensure that the audio signal disappears from the COMM 1. The ELT's control switch must be in the ARM position when completing the test procedure.
- (3) Testing the Dorne and Margolin ELT
- (a) Turn on the airplane's COMM 1 and tune it to 121.5 MHz.
 - (b) Turn the COMM-1 audio switch to the SPEAKER position and place the volume control in the center of its range.
NOTE: Monitor a frequency on COMM 1 to be certain the radio is operating.
 - (c) Place the remote TEST-AUTO-XMIT switch in the TEST position and hold the switch for approximately one second. (Refer to [Figure 203](#))
NOTE: A distinctive downward sweeping tone should have been heard from the monitoring receiver during the test. If the tone was heard, the ELT is functioning properly. If there was no audible tone (assuming that the VHF transceiver is operating properly), the battery is probably disconnected, outdated or discharged.
 - (d) After the test, place the remote TEST-AUTO-XMIT switch in the AUTO position.
 - (e) Monitor the emergency channel to ensure the ELT has discontinued operation.
 - (f) If the ELT continues to operate, be certain the remote switch is in the AUTO position. Gain access to the control switch is in the AUTO position also.
 - (g) If the ELT still continues to send a signal, cycle the control switch on the ELT to the ON position and then to the AUTO position to reset the ELT impact switch.
- (4) Testing the Artex ELT 110-4
- (a) Turn on the airplane's COMM 1 and tune it to 121.5 MHz.
 - (b) Turn the COMM-1 audio switch to the SPEAKER position and place the volume control in the center of its range.
NOTE: Monitor a frequency on COMM 1 to be certain the radio is operating.
 - (c) Place the remote ARMED/RESET-ON switch in the ON position for approximately one second. (Refer to [Figure 203](#))
NOTE: A distinctive downward sweeping tone should have been heard from the monitoring receiver during the test. If the tone was heard, the ELT is functioning properly. If there was no audible tone (assuming that the VHF transceiver is operating properly), the battery is probably disconnected, outdated or discharged.
 - (d) After the test, place the remote ARMED/RESET-ON switch in the ARMED/RESET position.
 - (e) Monitor the emergency channel to ensure the ELT has discontinued operation.
 - (f) If the ELT continues to operate, be certain the remote switch is in the ARMED/RESET position. Gain access to the ELT and check that the control switch is in the OFF position also.
 - (g) If the ELT still continues to send a signal, cycle the control switch on the ELT to the ON and then OFF position and the remote switch to the ON and then ARMED/RESET position to reset the ELT impact switch.
- (5) Testing the Artex ELT ME406(E3881 and After and Prior Airplanes Equipped with Kit 36-3049)
- Do not allow test duration to exceed five seconds. Any time the ELT is activated, it is transmitting a 121.5 MHz distress signal. If the unit operates for approximately fifty seconds, a "live" 406.03 MHz distress signal is transmitted and is considered valid by the satellite system. Any time the ELT is cycled from ARM to ON and then back to ARM, a 406.03 MHz signal is transmitted. However, it is specially coded as a self test signal that is ignored by the COSPAS-SARSAT satellites. If the ELT is left activated for approximately 50 seconds or greater, a distress signal is generated that is accepted by one or more COSPAS-SARSAT satellites.
- The ELT should be tested every twelve months, as follows:
- NOTE: If the ELT should be inadvertently activated by the G-switch, the transmit light next to the switch will blink. The ELT can be deactivated by momentarily placing the remote switch ON and then back**

to ARM.

- (a) Perform tests between the times of on-the-hour until 5 minutes after the hour.
- (b) Notify any nearby control towers prior to the ELT operational check.
- (c) Provide power to an airplane VHF radio and tune it to 121.5 MHz.
- (d) Verify that the ELT master switch, located on the ELT, and the ELT remote switch, located on the far right side of the instrument panel, are set to ARM.

CAUTION: Do not allow test duration to exceed 5 seconds. Premature battery wear may result.

NOTE: Two personnel may be required to perform the operational check. One person to perform actions in the cockpit and one person to view the ELT indicator in the aircraft tail section.

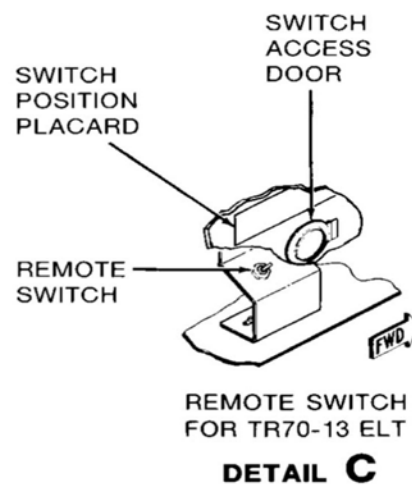
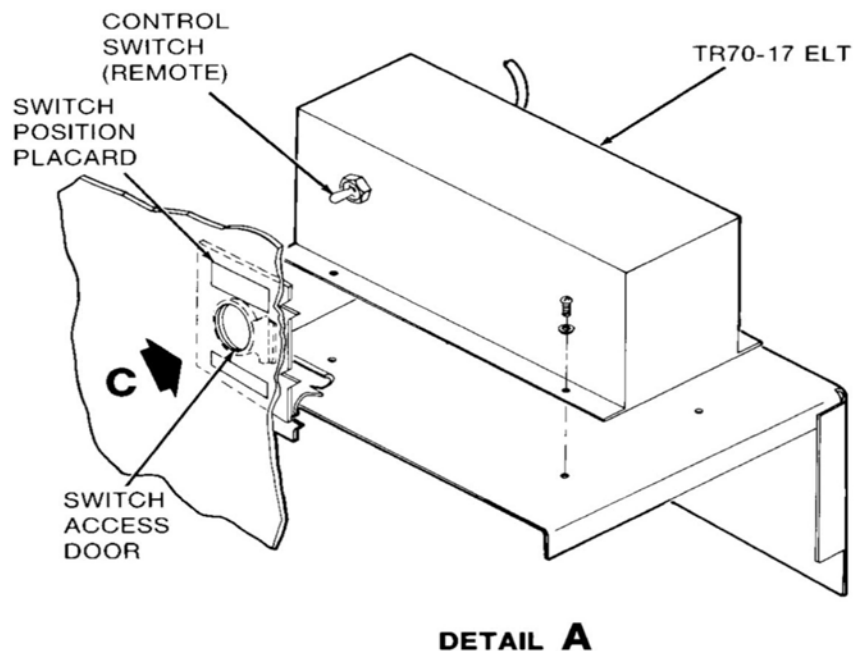
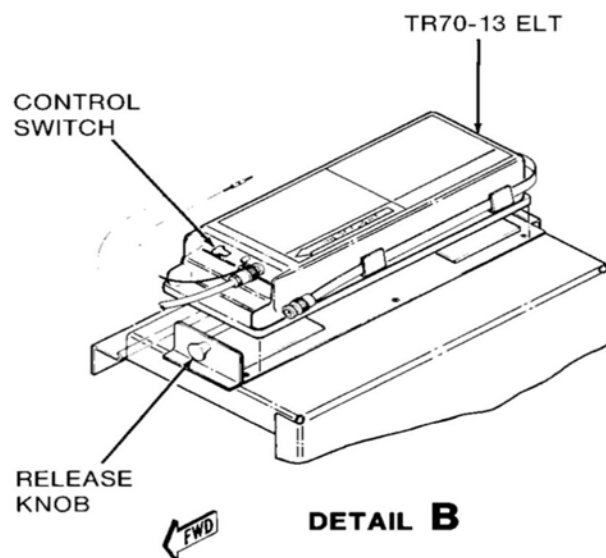
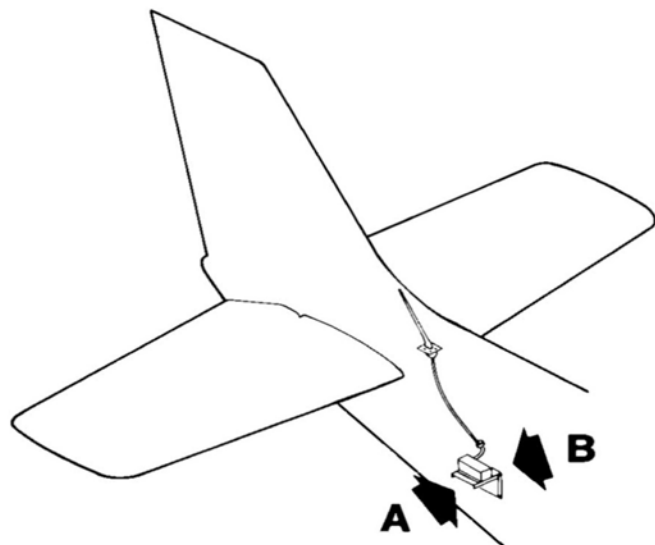
- (e) Place the ELT remote switch to ON for about 1 second, then back to the ARM position. The airplane radio should voice about 3 audio sweeping tones.
- (f) When the ELT aircraft panel switch is placed in the ARM position, the panel LED and buzzer should present 1 flash. If more flashes are displayed, determine the problem from Table 201 .
- (g) Remove electrical power from the aircraft.

Table 201. ELT Codes

Code	Problem
One Flash	Indicates that the system is operational and that no error conditions were found.
Three Flashes	Bad load detected. Detects open or short condition on the antenna output or cable.
Four Flashes	Low power detected. Occurs if the output power is below about 33 dBm (2 watts) for the 406.03 signal or 17 dBm (50 mW) for the 121.5 MHz output. Also may indicate that the 406.03 signal is off frequency. For this error code, the ELT must be returned to an authorized repair center. (a) Check that the RF cable is connected and in good condition. Perform a continuity check of the center conductor and shield. Check for a shorted cable. (b) Check for intermittent connection in the RF cable. (c) If this error code persists, there may be a problem with the antenna installation. This can be checked with a VSWR meter. Check the antenna for open connections, shorts, or resistive ground plane connection.
Five Flashes	Indicates that the ELT has not been programmed. Does not indicate erroneous or corrupted programmed data.
Six Flashes	Indicates that the G-switch loop between pins 5 and 12 at the D-subconnector is not installed. The ELT will not activate during a crash. (a) Check that the harness D-sub jumper is installed by verifying less than one ohm of resistance between pins 5 and 12.
Seven Flashes	Indicates that the ELT battery has too much accumulated operation time (greater than one hour). Battery may still power the ELT, however, it must be replaced to meet FAA specifications. May also indicate damage to the battery circuit.

Figure 201 : Sheet 1 : Communications Components Corporation ELT Installation (Models TR70-13 and TR70-17)

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Figure 202 : Sheet 1 : Narco ELT-10 Installation

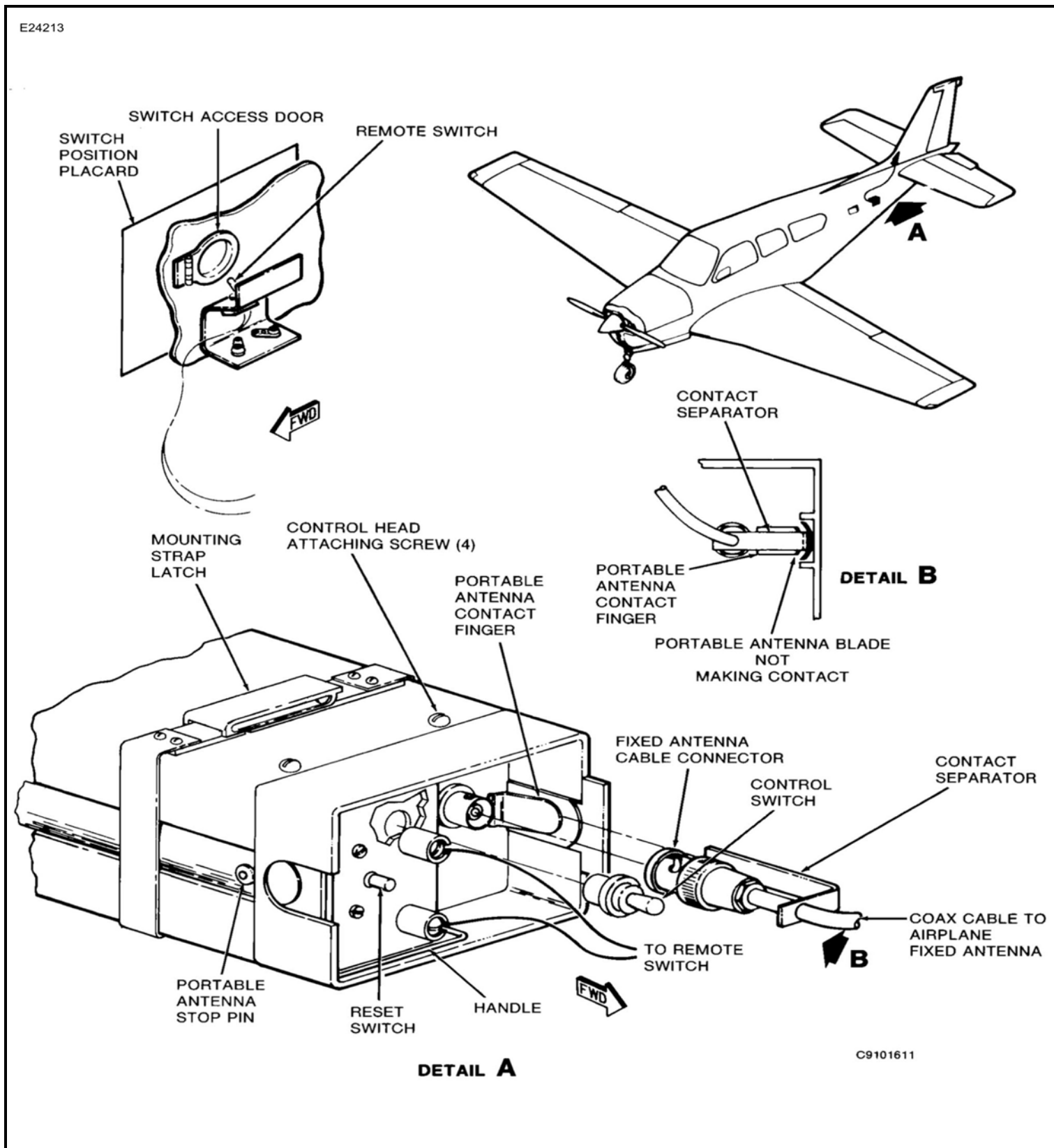


Figure 203 : Sheet 1 : Dorne and Margolin ELT Installation

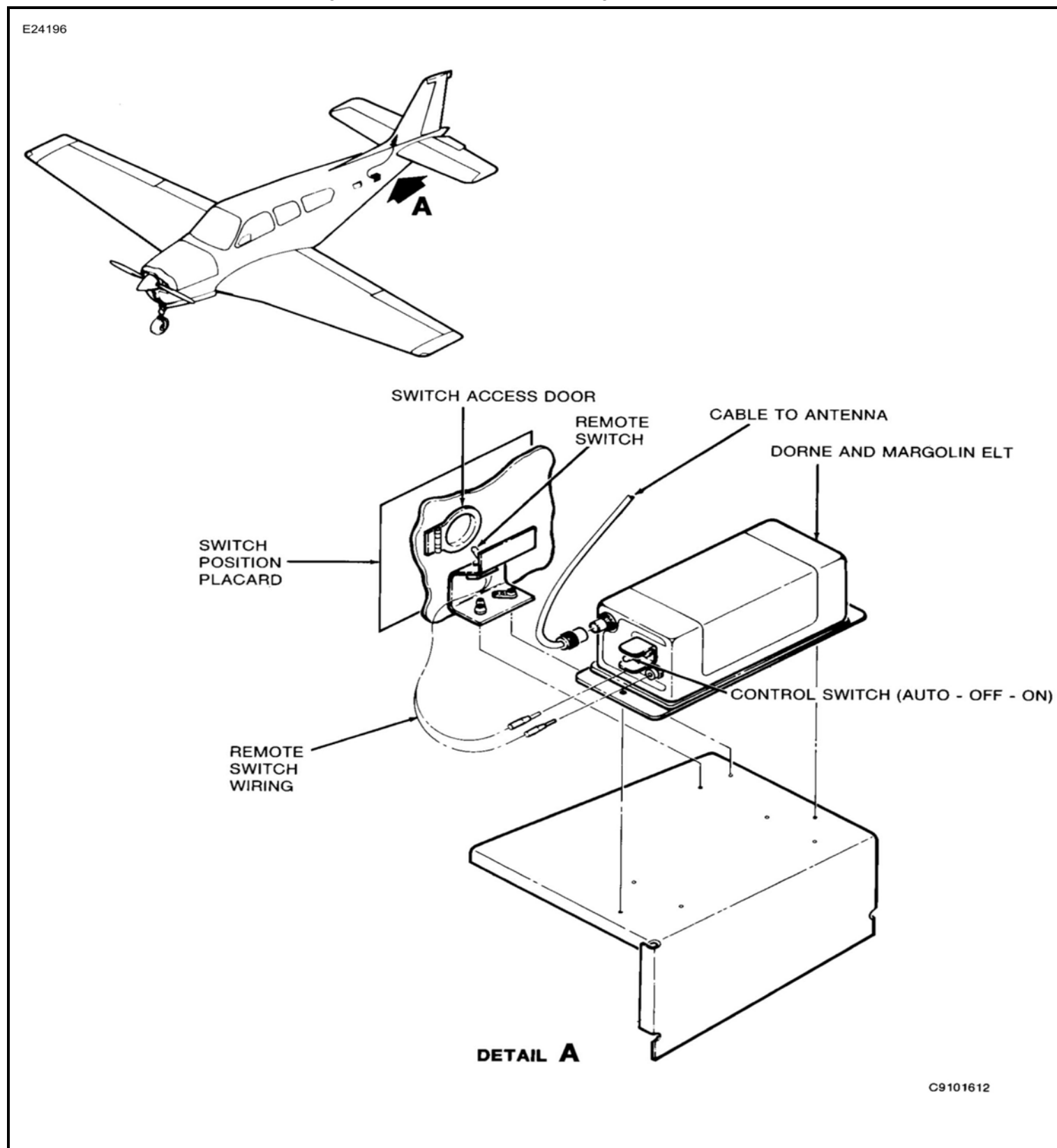


Figure 204 : Sheet 1 : ARTEX ELT 110-4 Installation

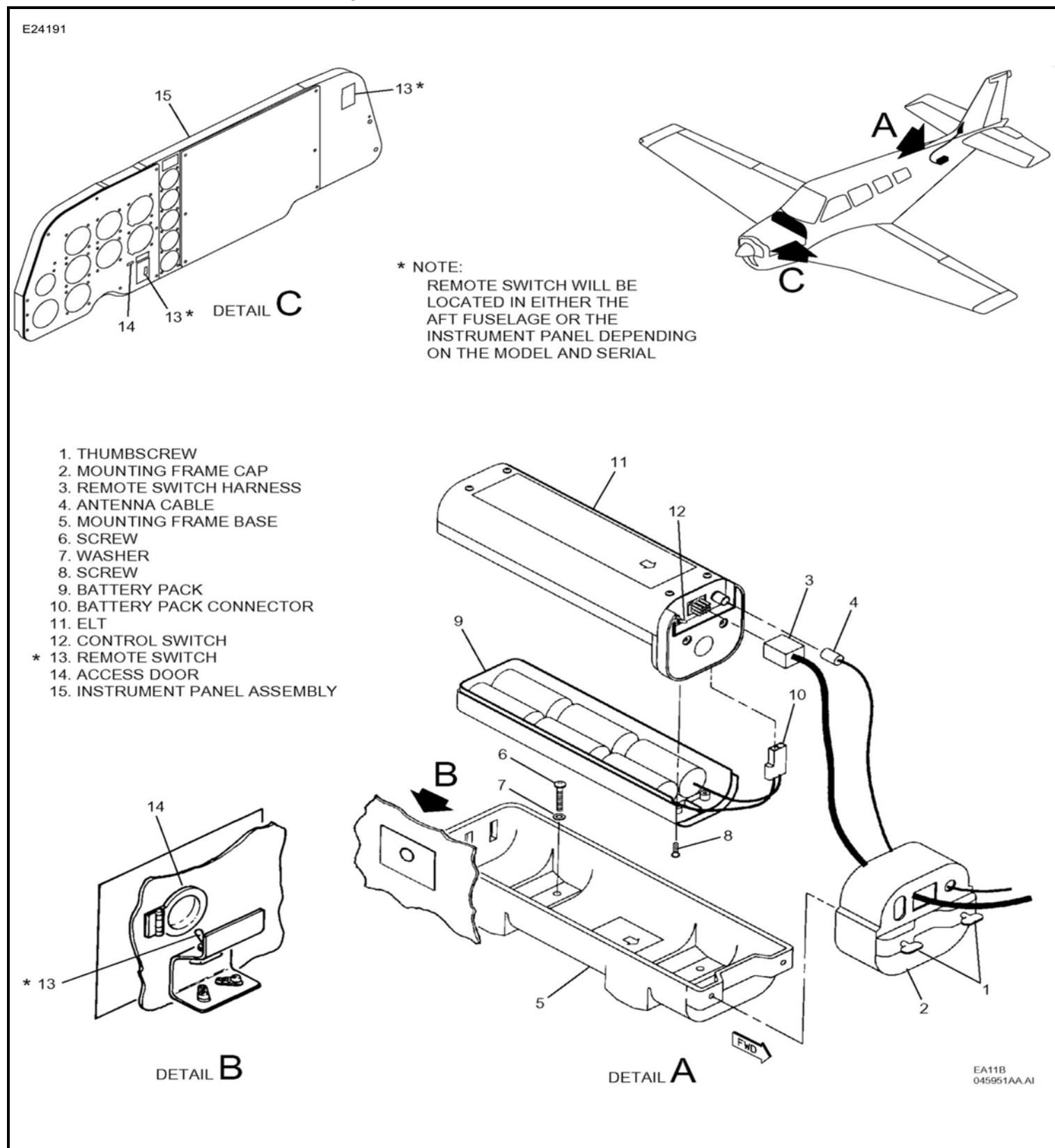
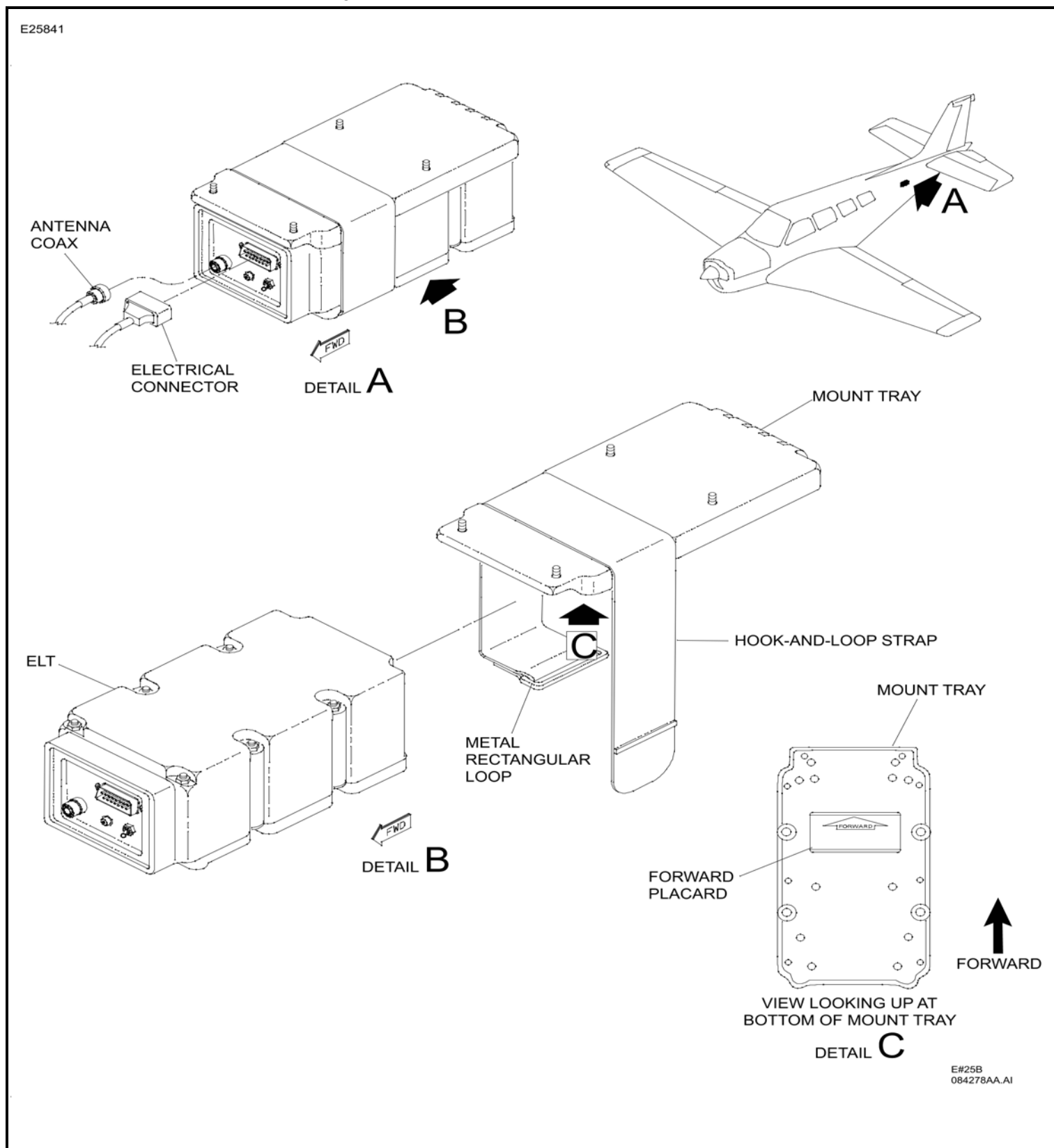


Figure 205 : Sheet 1 : ARTEX ME406 ELT Installation



EMERGENCY - MAINTENANCE PRACTICES

1. Emergency Locator Transmitter - Maintenance Practices (E-3881 and After and Prior Airplanes Equipped with Kit 36-3049)

A. Emergency Locator Transmitter

(1) Removal

- (a) Remove the aft upholstery panel.
- (b) Make certain that the ELT is turned off.
- (c) Disconnect the ELT antenna coax connector from the ELT (Refer to [Figure 201](#)).
- (d) Disconnect the remote switch electrical connector from the ELT.
- (e) Unlatch the hook-and-loop strap securing the ELT to the mounting tray and remove the ELT.

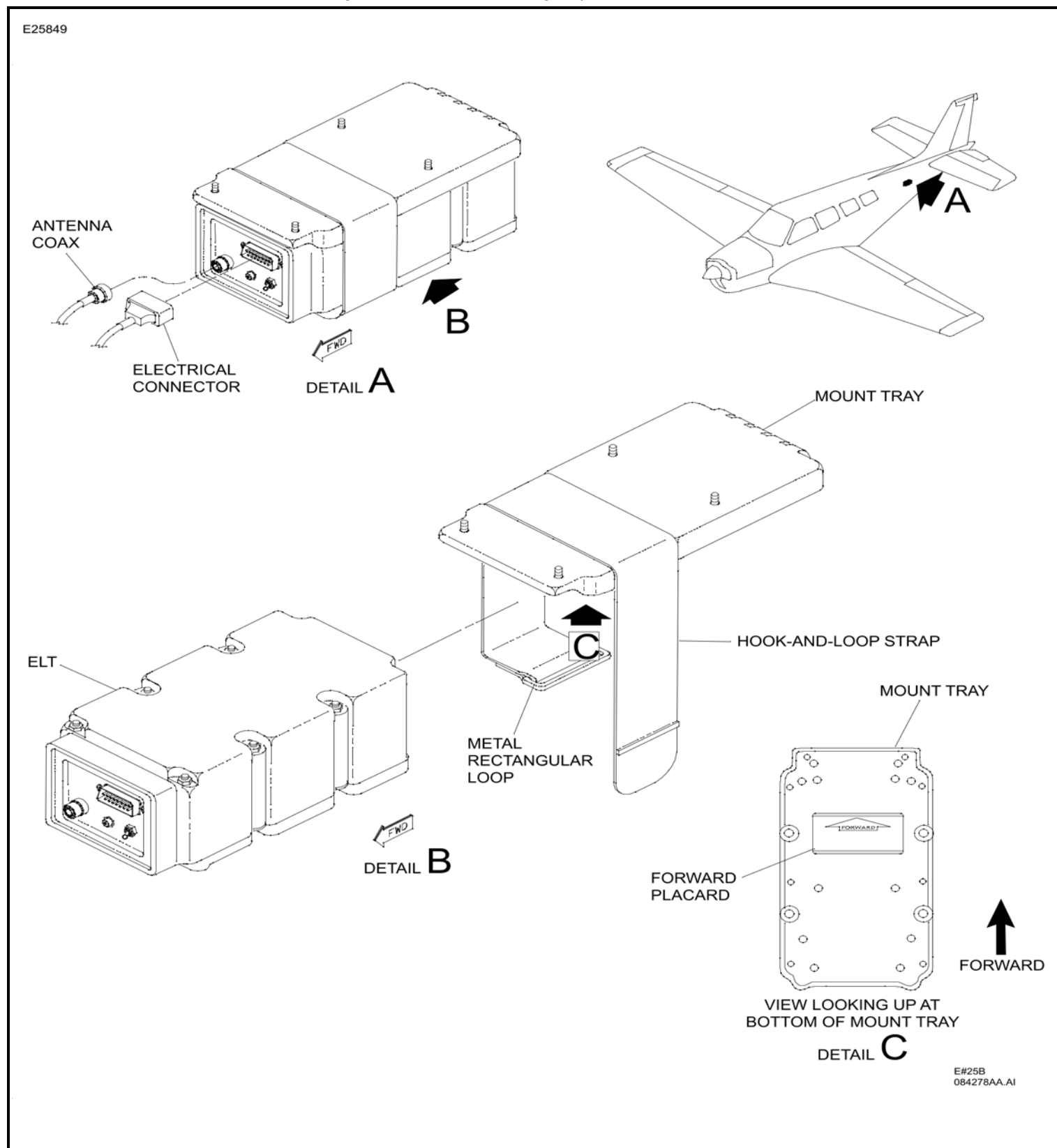
(2) Installation

- (a) Install ELT on the mount tray and secure in place with hook-and-loop strap (Refer to [Figure 201](#)).

NOTE: Make sure that the switch end of the ELT is facing forward.

- (b) Connect the ELT antenna coax connector to the ELT.
- (c) Connect the remote switch electrical connector to the ELT.
- (d) Place the ELT master switch to the ARM position.
- (e) Perform the ELT operational check (Refer to [Chapter 25-60-00](#)).
- (f) Install the aft upholstery panel.

Figure 201 : Sheet 1 : Emergency Locator Transmitter



EMERGENCY - MAINTENANCE PRACTICES

1. Emergency Locator Transmitter Antenna - Maintenance Practices (E-3881 and After and Prior Airplanes Equipped with Kit 36-3049)

A. Emergency Locator Transmitter Antenna

(1) Removal

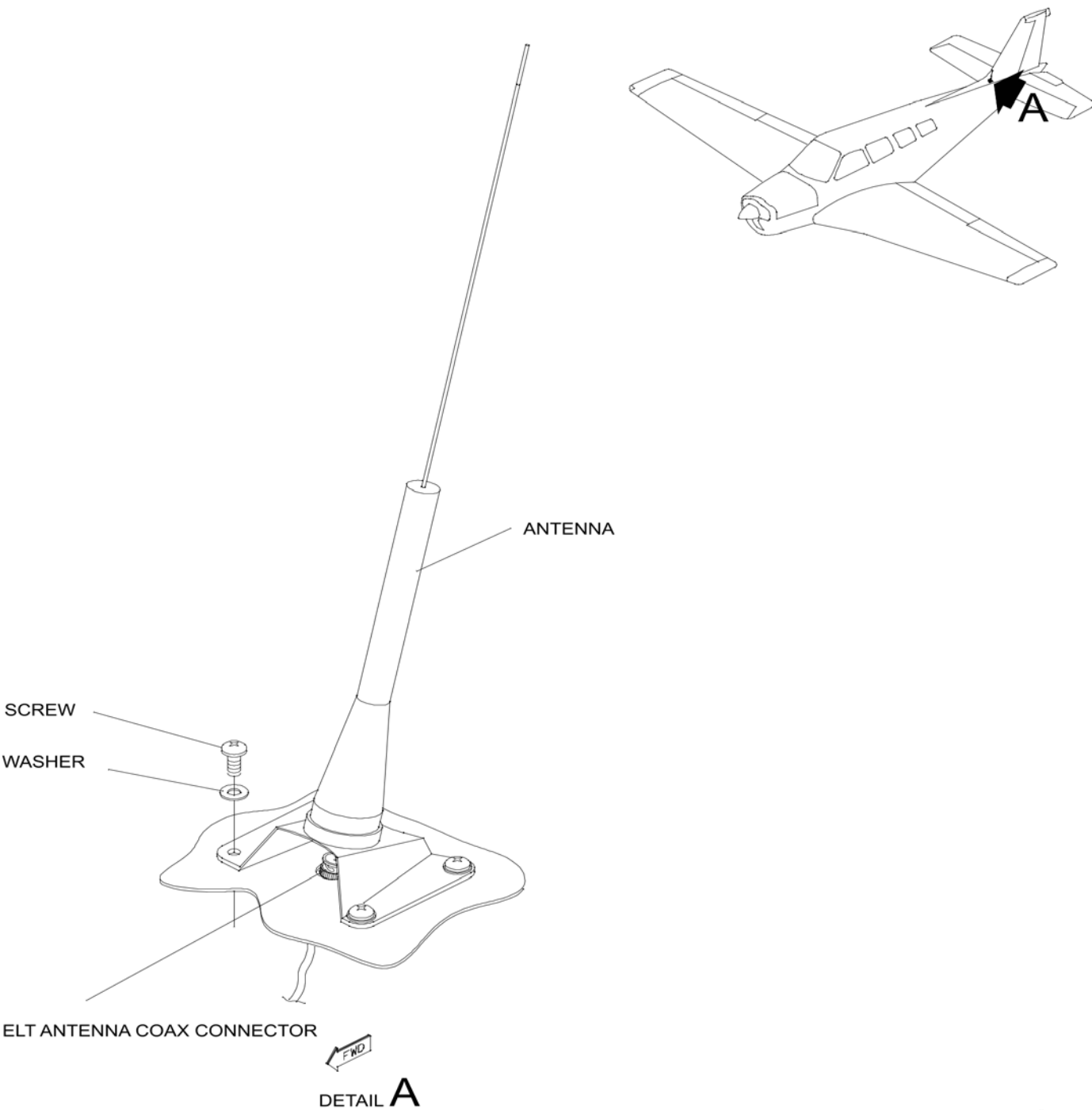
- (a) Remove the aft upholstery panel.
- (b) Disconnect the ELT antenna coax connector from the base of the ELT antenna (Refer to [Figure 201](#)).
- (c) Remove screws and washers attaching the bracket to the aft fuselage skin.
- (d) Remove the nut securing the ELT antenna to the bracket to and remove the ELT antenna.

(2) Installation

- (a) Prepare surfaces for electrical bonding (Refer to [Chapter 20-03-00](#)).
- (b) Position the ELT antenna in the bracket and install the nut securing the ELT antenna to the bracket.
- (c) Position the ELT antenna and bracket up through the aft fuselage skin and secure the bracket with screws and washers.
- (d) Perform an electrical bonding check (Refer to [Chapter 20-03-00](#)).
- (e) Connect the ELT antenna coax connector to the base of the ELT antenna.
- (f) Perform the ELT operational check (Refer to [Chapter 25-60-00](#)).
- (g) Install the aft upholstery panel.

Figure 201 : Sheet 1 : Emergency Locator Transmitter Antenna

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UNIVERSAL TRAVEL BOARD - CALIBRATION - GENERAL

1. General - Description and Operation

A. Control Surfaces

All Model F33A, F33C, V35B and A36TC airplanes and earlier Model A36 and B36TC airplanes are equipped with either a single throw-over or dual T control column. At serials E-1946, E-2104, E-2111 and After; EA-320, EA-389 and After, dual control columns were installed as standard equipment. The flight controls are cable operated conventional surfaces which require no power assistance for normal control by the pilot or copilot. The flaps and optional electric elevator trim are electrically driven.

All primary flight control surfaces are manually controlled through cable bell crank systems. Each system incorporates surface travel stops and linkage adjustments. The ailerons, elevators and rudder may be secured with control locks (gust locks) in the flight compartment. When these locks are installed, the elevator is at approximately 11° down and the control wheel is approximately 12° to the right. The rudder pedals are interconnected by a linkage below the flight compartment floor. The rudder pedals are adjustable to two positions by pressing the spring-loaded lever on the side of the pedal. If brakes are not installed on the copilot's pedals, this same lever may be used to place the copilot's pedals against the floor.

One flap installed on each wing is operated by an electric motor-driven gearbox on the rear side of the front spar at the centerline of the airplane. The gearbox drives two flexible drive shafts, each connected to an acme thread type jackscrew at each flap. The flaps are controlled by a lever in the subpanel, and their position indicated by an instrument to the left of the control column. The lever (switch) must be pulled out of a detent to change positions. On airplane serials CJ-149; CE-748, CE-772 thru CE-815; D-10097, D-10120 thru D-10178; E-1111, E-1241 thru E-1370, the flaps may be stopped at any desired position by moving the flap switch to the OFF position when the flaps are at the desired position. The switch is placarded UP, OFF and DOWN. The markings on this position indicator will be 10°, 20°, and DN.

NOTE: On serials E-1946, E-2104, E-2111 and after, the approach position is 12°.

On airplane serials CJ-150 and After; CE-816 and After; D-10179 and After; E-1371 thru E-2110 except E-1946 and E-2104; EA-1 and After, the flaps have three positions: UP (0°), APPROACH (15°) and DOWN (30°). The switch is placarded UP, APPROACH and DOWN. There is no way to stop the flaps in other positions without using the circuit breaker. The flap position transmitter (if installed) is located near the left flap actuator.

On airplane serials E-1946, E-2104, E-2111 and After; EA-320, EA-389 and After, the position of the flaps is indicated by three lights, located near the flap control handle, in the subpanel. The lights will indicate down, approach and in-transit positions. All lights are out when the flaps are up.

Trim tabs are installed on each elevator. The tabs are manually controlled by the pilot through drum-cable systems using jackscrew actuators. Tab position indicators are provided on the tab controls. The optional electric elevator trim tab is operated by a control switch on the outboard handle of the pilot's control wheel. A down spring and bob weight are incorporated into the elevator control system for improved stability.

On earlier serials, aileron trimming was performed by bendable tabs on each aileron and a spring tension trimmer in the control column. The bendable tabs were adjustable only on the ground. The spring tension trimmer was adjustable in flight. The spring tension trimmer and left bendable tab were replaced by an inflight adjustable trim tab at serials E-2111 and After, except E-1946 and E-2104, and on serials EA-320, EA-389 and After. This system is a cable control system with a jackscrew actuator and a trim wheel in the pedestal.

Positive stops on the primary flight control surfaces limit their travel, and traveling stops secured to the cables limit trim tab movement. Because the cables are connected at turnbuckles, each cable has one left hand and one right hand threaded cable end. Proper routing of the cables as shown in the applicable sub-chapter will aid against crossing the cables, and causing improper movement after the cables have been removed and reinstalled.

Refer to the applicable rigging procedures for details regarding chain and cable tension, control wheel movement and force, and down spring force and system friction.

B. Effect of Temperature on Cable Tension

Graphs specifying the correct maximum and minimum cable tension permissible for the various controls appear on the individual control system illustrations. The graphs provide rigging limits at temperatures varying from 0° to 110° F. The horizontal scale on the graphs designates the temperature in degrees Fahrenheit at which the control cables may be rigged, and the vertical scale designates the correct tension in pounds for each temperature reading.

C. Taper Pins

Refer to the applicable rigging procedures for details regarding chain and cable tension, control wheel movement and force, and system friction. Any time the control column has been removed and disassembled, the following precautions should be observed:

CAUTION: The taper pin may crack the torque tube if driven excessively.

- (1) When taper pins are to be installed, use a light weight rawhide or nylon mallet to set the pin. The small end of the tapered shank should be flush with, or extend no more than 0.06 inch over the surface.

WARNING: On airplane serials E-1946, E-2104, E-2111 and After; EA-320, E-389 and After, observe the color on all parts when replacing or reinstalling control cables, bellcranks and/or other control system components. DO NOT connect coded parts of one color to coded parts of different color.

UNIVERSAL TRAVEL BOARD - CALIBRATION - ADJUSTMENT/TEST

1. CALIBRATION

A. Universal Travel Board Calibration

NOTE: Universal Travel Board (P/N TE-100TB) must be calibrated prior to each use.

- (1) Check for condition, such as proper attachment of the scales, damage to the legs, straightness of the stabilizer bar, horizontal beam, vertical beam and proper attachment of all components should be accomplished (Figures 501 and 502).

Detailed requirements are as follows:

- Verify A1 (9) leg length (including nylon slide and end) is 5.225 ± 0.015 inch.
- Verify A2 (10) leg length (including nylon slide and end) is 5.650 ± 0.015 inch.
- Verify horizontal beam (5) straightness is true within 0.050 inch over the length of the beam.
- Verify vertical beam (11) straightness is perpendicular to horizontal beam (5) within 2° .
- The graduation marks on the A1 (9) scale should be 21 ± 0.1 inches from the equivalent graduation marks on the A2 (10) scale.
- The middle of the scale (6 inch graduation) on the vertical beam (11) should be 8.25 ± 0.015 inches from the bottom of the horizontal beam (5).

Figure 501 : Sheet 1 : (Revised) - Universal Travel Board (Typical Installation)

E70421

1. STABILIZER BAR
2. STABILIZER PADS (2 EACH)
3. SPRINGS (2 EACH)
4. NUTS (2 EACH)
5. HORIZONTAL BEAM
6. BOLT
7. WASHERS (2 EACH)
8. WINGNUT
9. A1 LEG
10. A2 LEG
11. VERTICAL BEAM
12. KNURLED BOLT
13. WASHER
14. KNURLED BOLT
15. WASHER
16. A3 PIN

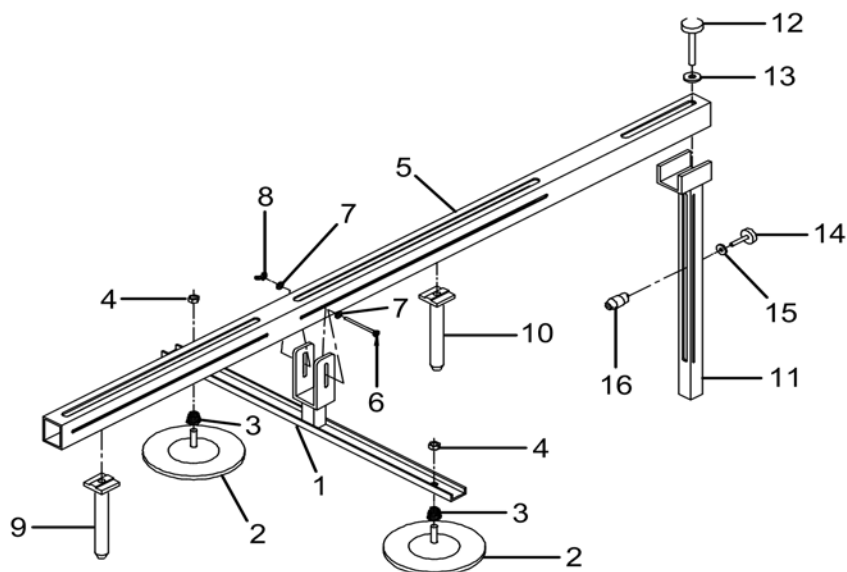


Figure 502 : Sheet 1 : (Revised) - Universal Travel Board A1 and A2 legs, measurement

E70122



AILERON AND TAB - MAINTENANCE PRACTICES**1. Aileron and Tab - Maintenance Practices (D-10097, D-10120 and After; CE-748, CE-772 and After; CJ-149 and After; E-1111, E-1241 thru E-2110, Except E-1946 and E-2104; E-11 thru EA-388, Except EA-320)****A. Single Throw-Over Control Column****(1) Control Column Arm Removal**

- (a) Remove four screws that secure the retainer collar assembly to the control column housing (Refer to [Figure 201](#)).
- (b) Disconnect any electrical wiring.
- (c) Remove the aileron trimmer. Perform the [AILERON CONTROL TRIMMER REMOVAL](#) procedure.
- (d) Pull the T handle located on the forward side of the control arm.
- (e) Rotate the control column arm to the nearly vertical position and slide the control column arm off the housing.

(2) Control Column Arm Installation

- (a) Position the control column arm vertical (Refer to [Figure 201](#)). Make sure that the slot in the lower sprocket is approximately parallel to the sides of the arm and that the turnbuckles between the long and short chains are opposite each other near the access opening.
- (b) The ailerons **MUST** be in the neutral position.
- (c) Pull the T handle located on the forward side of the control arm.
- (d) Slide the control column arm on the control column housing.
- (e) Connect all electrical wiring.
- (f) Install the retainer collar and attach it with the four screws.
- (g) Install the aileron trimmer. Perform the [AILERON CONTROL TRIMMER INSTALLATION](#) procedure.
- (h) Check the control column for full movement and the control surfaces for proper direction of movement.

(3) Rigging the Control Arm Chain

- (a) Position the control arm, control wheel and sprockets (Refer to [Figure 201](#)). The long and short chains must be centered on the sprockets within one link. The turnbuckles must be near the access opening. The slot in the lower sprocket should be approximately parallel to the sides of the arm.
- (b) Remove the safety wire from the turnbuckles and loosen or tighten the chain as necessary.
NOTE: **Tighten the chain until friction or binding is felt on the control wheel, then loosen the chain just enough to remove the binding or friction from the control wheel.**
- (c) Check the control wheel and control surfaces for proper operation and freedom of movement.
- (d) After the adjustments are complete, check that the location of the control wheel, sprockets and turnbuckles are as shown (Refer to [Figure 201](#)).
- (e) Safety wire the turnbuckles.

B. Dual Control Arm**(1) Removal**

- (a) Remove four screws that secure the retainer collar assembly to the control column housing (Refer to [Figure 202](#)).

NOTE: **Some installations may have a T handle on the right forward side of the control arm. Pull the T handle and omit the following Step.**

- (b) Remove the screw and washer retaining the pin assembly on the right forward side of hub of the control arm.
- (c) Disconnect all electrical wiring.
- (d) Slide the control arm off the installation.

(2) Installation

- (a) Position the control arm as shown (Refer to [Figure 202](#)).
- (b) Make sure the slot in the center sprocket is approximately vertical and the turnbuckles between the long chains and the short chains are opposite each other near the access openings.
- (c) The ailerons **MUST** be positioned at neutral.

NOTE: **Some installations may have a T handle on the right forward side of the control arm. Pull the T**

handle.

- (d) Slide the control column arm on the control column housing.

NOTE: On installations with a T handle, omit the next Step.

- (e) Install the pin assembly on the right side of the control arm hub.
- (f) Install the retainer collar and attach it with the four screws.
- (g) Check for full control movement and for proper direction of movement.

(3) Rigging the Dual Control Arm Chain

- (a) Position the control arm, control wheel and sprocket as shown (Refer to Figure 202).
- (b) Center the long and short chains on their sprockets within one link.
- (c) The slot in the center sprocket must be approximately vertical as shown.
- (d) Remove the safety wire from the turnbuckles.
- (e) Adjust the chains as necessary.

NOTE: The chains are properly adjusted by tightening the chains until binding is noticed on the control wheel; then loosen the chains just enough to remove the binding or friction from the control wheel.

- (f) After the adjustments are complete, check that the location of the control arm, control wheels, sprockets and turnbuckles are as shown.
- (g) Safety wire the turnbuckles.
- (h) Check the controls for freedom of movement and the control surfaces for proper direction of movement.

C. Aileron

(1) Removal

- (a) Disconnect the lower aileron tab push-pull rod (left aileron only).
- NOTE:** Lowering the flaps will aid in disconnecting the aileron tab push-pull rod.
- (b) Support the aileron and remove the two attaching screws from the top and bottom of each hinge bracket.
 - (c) Pull the aileron straight away from the wing to avoid damage to the attaching areas and gain access to the bonding cable screws.
 - (d) Remove the screws attaching the bonding cable to the aileron.

(2) Installation

WARNING: Failure to follow the correct procedure for AILERON INSTALLATION could result in partial/complete loss of the aileron resulting in degradation of flying qualities and or loss of control of the aircraft.

- (a) Lubricate the tab hinge with lubricant (92, or 69, Table 1, 91-00-00), if the aileron tab has been removed and reinstalled, or a new tab installed.
- (b) Attach the bonding cable to the aileron.
- (c) Align the hinges of the aileron in the proper location on the aileron spar, then loosely install two hinge bracket screws (one screw in the top and one in the bottom) through each hinge into the nut on the aileron spar.
- (d) Pull on the aileron to confirm that the screws are properly installed. If there is any movement of the aileron, recheck the position of all hinge brackets.
- (e) Install and secure remaining upper and lower hinge bracket screws.

NOTE: With the flaps fully retracted and the aileron in the neutral position, the clearances noted must be maintained. The gap between the aileron and both the wing tip and flap should be constant 0.38 +0.12/ -0.25 inch from the leading edge to the trailing edge.

- (f) Connect the aileron tab push-pull rod and install the cotter pin (left aileron only).

NOTE: Lowering the flaps will aid in connecting the aileron tab push-pull rod.

D. Rigging the Aileron Control System

NOTE: Textron Aviation Inc. recommends the use of the aileron travel gage (Refer to 12-20-00, 201, SPECIAL TOOLS, Figure 203. The front of the travel board should be located over the leading edge skin splice with the aft portion over the number 8 wing rib (just outboard of the inboard aileron hinge).

- (1) Aileron and flap surfaces must align with the upper and lower surfaces of the wing within 1/16 inch.
- (2) Adjust the aileron downstops in the wing until the bellcrank just clears the gusset on the wing rib. Set the aileron upstop in the wing so that the aileron bellcrank just misses the aileron pushrod (Refer to [Figure 203](#)).
- (3) Adjust the link connecting the aileron to the bellcrank to allow full travel of the aileron surface between the upstop and downstop.
NOTE: The aileron is in neutral when the aileron trailing edge aligns with the trailing edge of the wing, and its inboard end is parallel with the outboard end of the flap.
- (4) Adjust the cables from the wing to the control column cables. The turnbuckles are in the wheel wells.
- (5) Secure the control column wheel in neutral by securing a bar across the top of the control wheel and leveling the control wheel with a bubble level. (With the control locks installed, the control wheel is rotated 12° to the right). Adjust the tension as shown on the aileron temperature cable tension graph (Refer to [Figure 203](#)).
NOTE: The control wheel must be level in relation to the airplane. If the airplane is not level, make a corresponding change to the position of the control wheel using a spirit level protractor. Take the cable reading in the wheel well where the control column cables attach to the wing cables.
- (6) Rotate the control wheel to ascertain by feel that the wing bellcranks reach their stops before the control column reaches its stops.
- (7) If there is less travel of the control wheel in one direction than in the other direction, loosen one turnbuckle on the lower cable and tighten the opposite lower cable turnbuckle, depending on which way the travel is off. Maintain the correct cable tension.
- (8) Secure the control wheel in neutral after the correct travel of the wheel is obtained. Adjust the link connecting the aileron to the wing bellcrank to obtain the aileron in neutral. Neutral position of the aileron is determined by aligning the inboard end of the aileron with the outboard end of the flap with the flap in the up position.
- (9) Set the bellcrank stops to give a deflection of $20 \pm 2^\circ$ up and/or down (Refer to [Figure 203](#)).
NOTE: The aileron bellcrank stops should make contact 1/16 inch before the control column stops are reached.
- (10) Be sure each aileron bellcrank contacts its upstop at the same time as the bellcrank in the opposite wing contacts its downstop.
- (11) Check the control stop (secondary stop) in the control column for 1/16 inch clearance in each direction. If the clearance is not correct, recheck the entire aileron control system for correct chain and cable rigging.
NOTE: The control stop clearance provides a slight movement of the control wheel (a cushion) after the travel stops and the aileron bellcranks make contact.
- (12) Recheck cable tension and safety wire the turnbuckles.
- (13) Tighten all jam nuts.

WARNING: Check the ailerons for correct direction of movement. When the control wheel is moved to the left, the left aileron must move up and the right aileron must move down. When the control wheel is moved to the right, the right aileron must move up and the left aileron must move down.

WARNING: Check to make sure that cabin floorboards, floorboard insulation and other interior parts do not contact the control cables.

E. Aileron Control Trimmer (Single Control Column Airplanes)

The aileron control system is equipped with an aileron control trimmer which functions by applying tension on the aileron control cables to level the wings as needed. The holding pressure exerted by the aileron control trimmer can be easily overridden at the discretion of the pilot. The trimmer does not change the system rigging but should be removed before checking the cable tension.

- (1) Trimmer Removal
 - (a) Unscrew the two body halves by holding the clutch body housing (outer half) and turning the clutch body nut (inner half) counterclockwise (Refer to [Figure 204](#)).
 - (b) Separate the two body halves by pulling out on the clutch body housing.
- (2) Trimmer Installation
 - (a) Carefully insert the shaft through the felt seal into the hub bearing, being careful not to shear the felt seal.

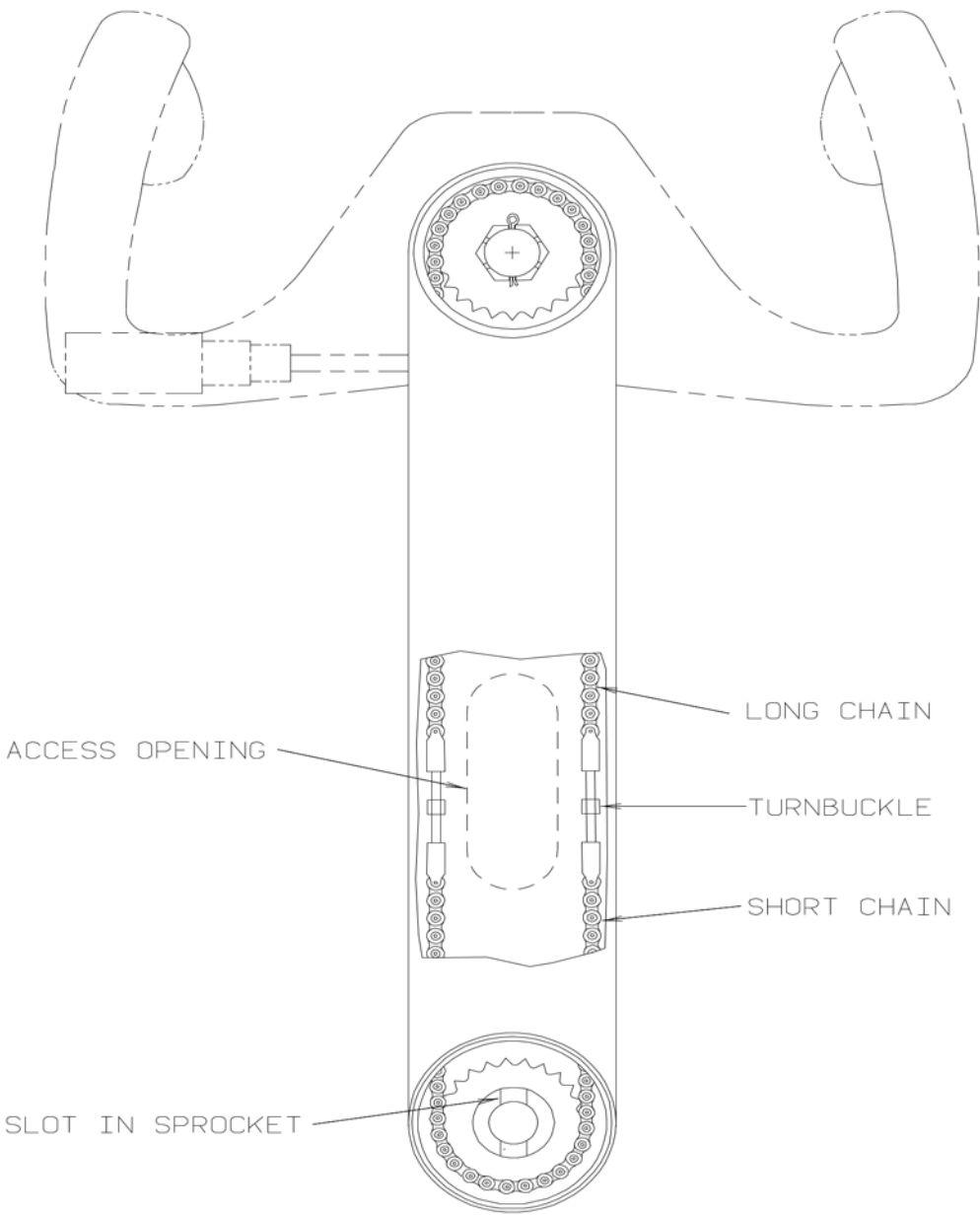
- (b) Screw the two halves of the unit together by holding the clutch body and turning the clutch body nut. Hand tightening the two halves should be sufficient.
- (c) Check that the tangs of the drive shaft engage properly with the sprocket as the unit is being tightened by hand. Also note that the position indicator on the face of the unit is right side up as the shaft engages with the sprocket (Refer to [Figure 204](#)).

F. Aileron Tabs

The ailerons are equipped with sheet metal tabs which may be adjusted while the airplane is on the ground. The tabs are adjusted by bending them in opposite directions to each other. Bend the tabs only a small amount each time and check the setting by flight test.

Figure 201 : Sheet 1 : Single Throw-Over Control Column

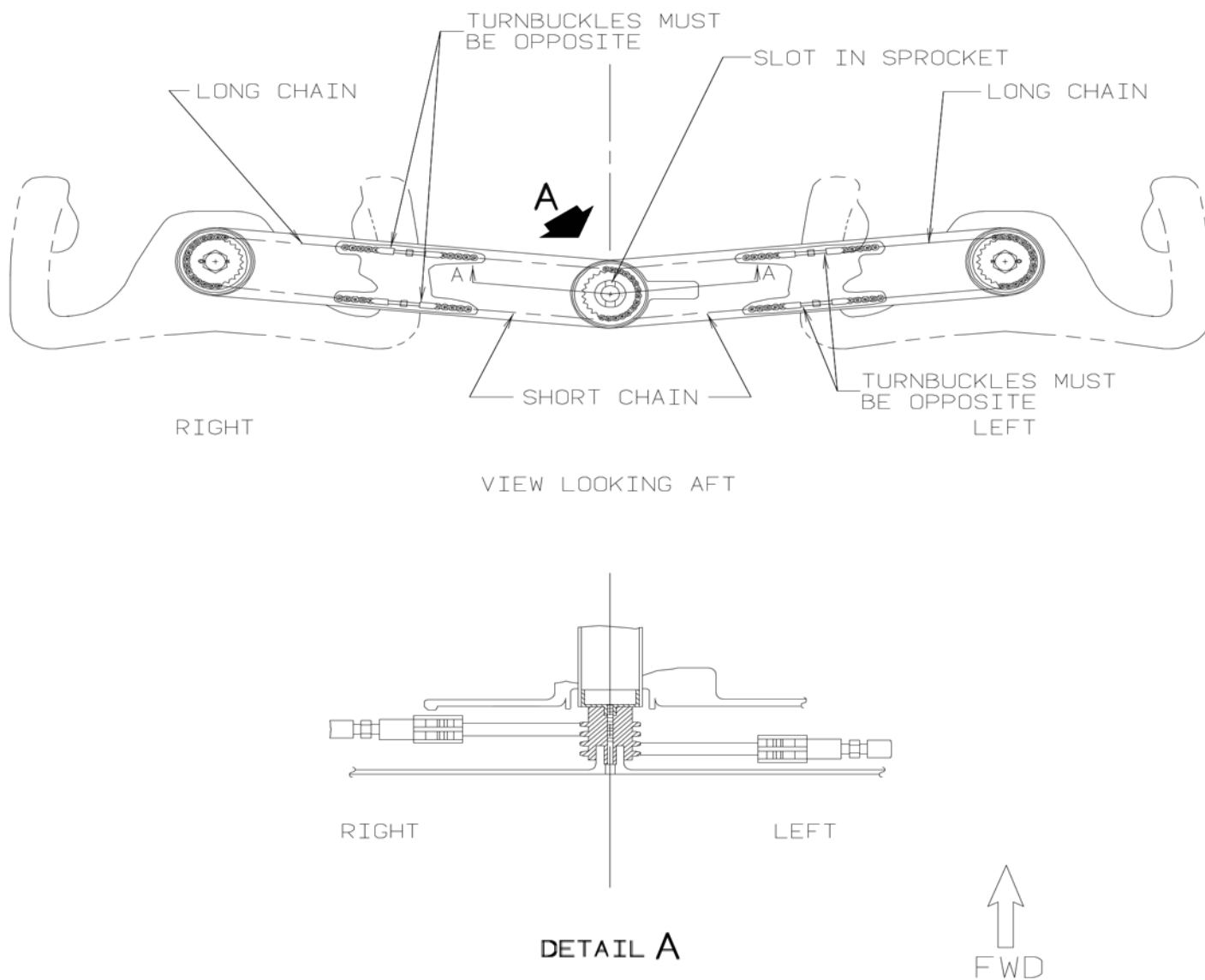
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Figure 202 : Sheet 1 : Dual Control With Single Control Column

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Figure 203 : Sheet 1 : Rigging the Aileron Control System

E24183

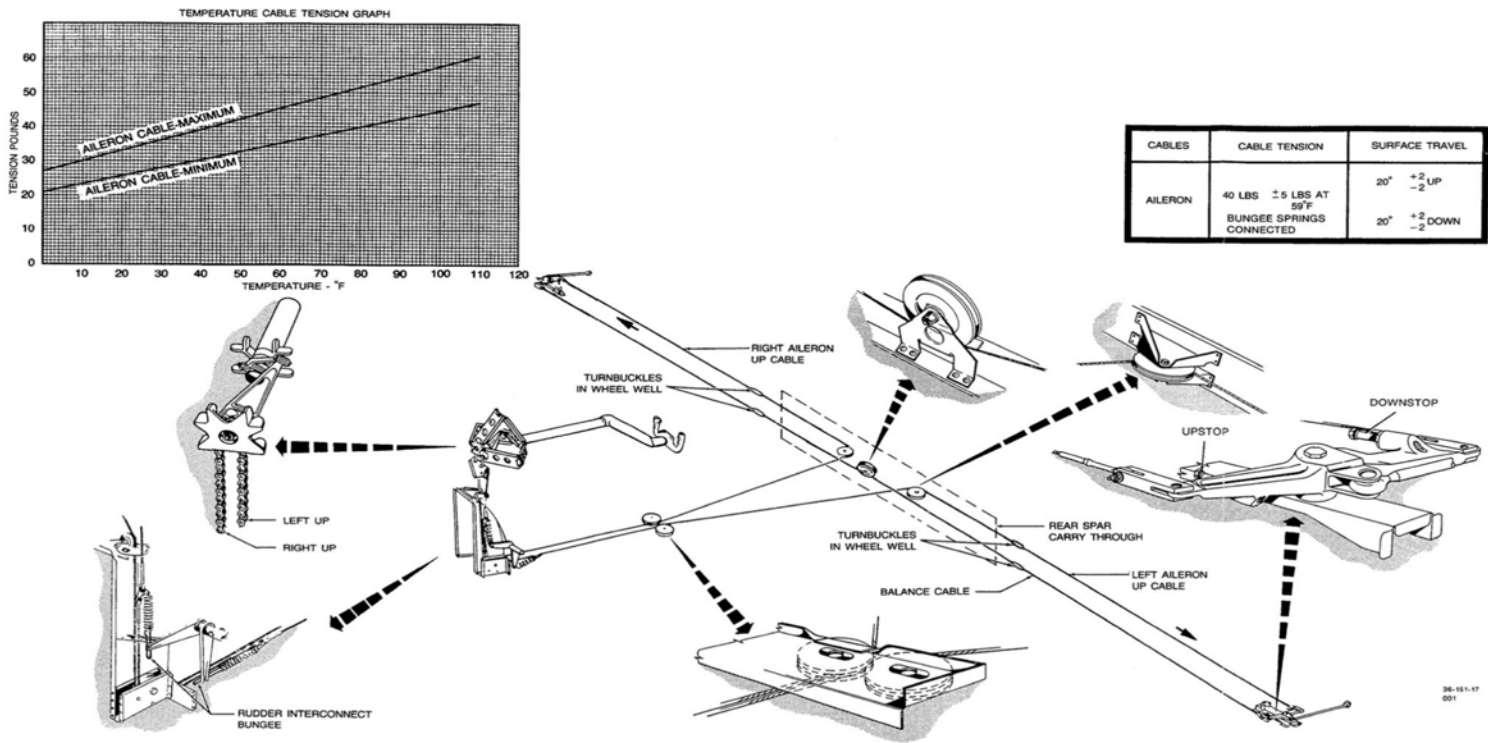
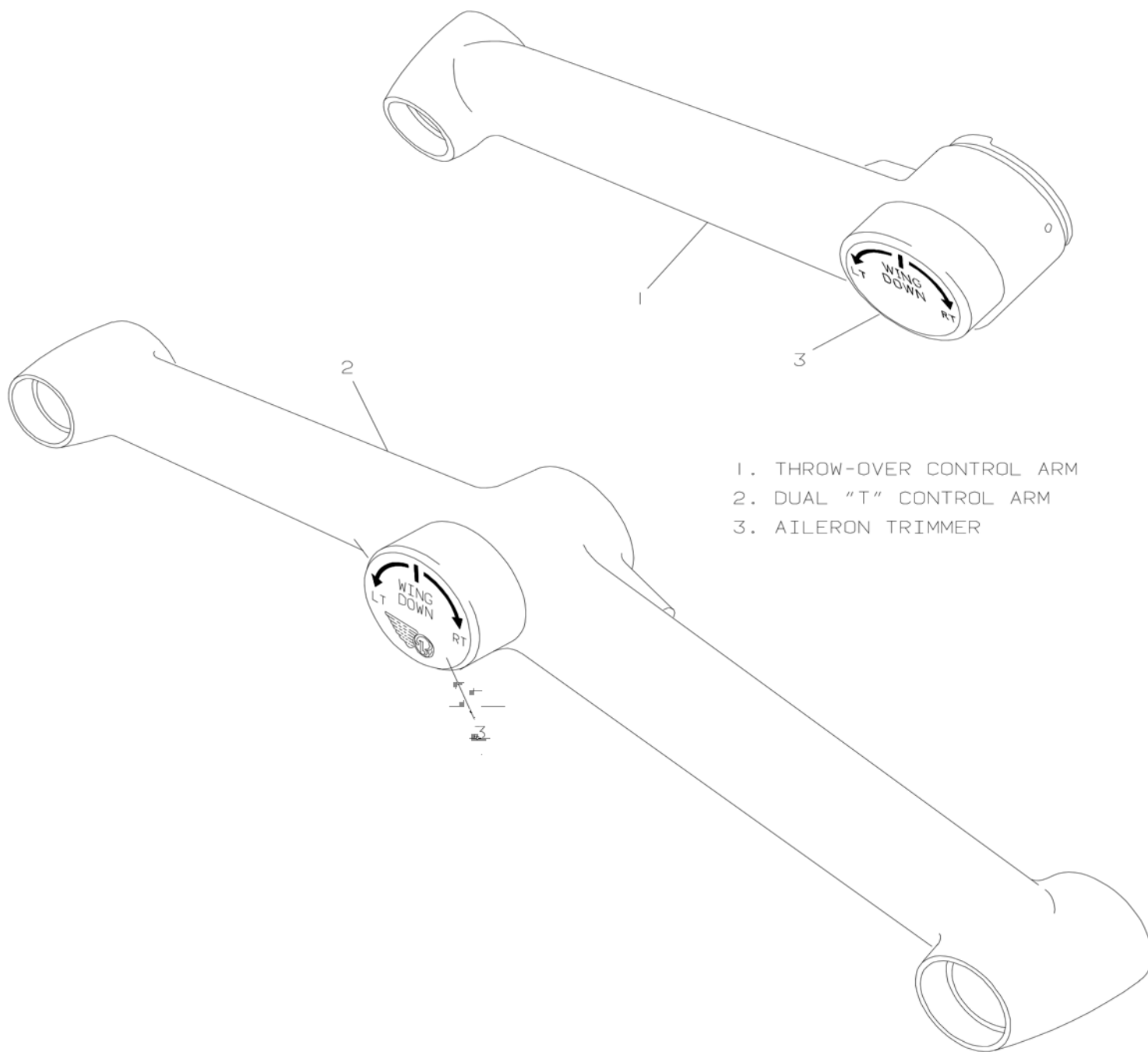


Figure 204 : Sheet 1 : Aileron Trimmer (Single Control Column)

E25885



- 1. THROW-OVER CONTROL ARM
- 2. DUAL "T" CONTROL ARM
- 3. AILERON TRIMMER

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UNIVERSAL TRAVEL BOARD- ALTERNATE METHOD - ADJUSTMENT/TEST

1. Information

- WARNING:** Before attempting to adjust, rig or remove any major flight control component, set all control surfaces to neutral.
- WARNING:** Do not operate the flight control system while rig pins are installed. Damage and/or personal injury may occur.
- WARNING:** All control rig pins are designed to be inserted and removed without binding. If any pin is forced into position or binds when removed from rig pin hole, that system is not properly rigged.
- WARNING:** Before performing any maintenance on the flight control system, display a caution tag in the cockpit area prohibiting movement of control surfaces.
- WARNING:** Make sure all personnel and equipment are clear of the control surface area prior to movement or testing.
- WARNING:** Whenever any part of flight control system is dismantled, adjusted, repaired or replaced, a detail investigation must be made upon completion. Make sure the distortion, tools, rags or any other loose articles or foreign matter that could impede the free movement and safe operation of the system are not present. Check the security of locking devices, movement in proper direction and that the system and installation in the work area are clean prior to returning the airplane to service.
- WARNING:** If any component is removed that could be installed more than one way, mark or identify the component clearly before removal.

Table 501. Equipment/Material

Equipment/Material	Part/Item No.
Digital Protractor	KS6005 or equivalent
Universal Travel Board	TE-100TB

2. Universal Travel Board

A. Setup

The Universal Travel Board is an adjustable tool designed to locate neutral position of various control surfaces. Once neutral has been located, a digital protector (Table 501) (P/N KS6005 or equivalent) is used to measure surface deflection (Refer, Figure 503).

NOTE: The Universal Travel Board must be calibrated prior to each use (Refer to 27-00-00, 501). The locations given for the Universal Travel Board are selected to avoid measuring the aileron on a fixed or moveable trim tab. For this reason, some of the locations given may not match the location shown in the applicable Maintenance Manual. When the location given differ from the location in the applicable maintenance manual, use the locations listed in Table 502. When the Universal Travel Board is properly assembled the A3 ruler will not be on the same side as A1 and A2 rulers. Unless instructed, do not disassembled the tool to put the scales on the same side, as this will affect measurement accuracy. On some models the A1 (9) and A2 (10) can not both be placed on spars. These instances will have "N" in the SPAR column with the location in the corresponding COMMENT column. When A1 (9) and A2 (10) legs land on a Universal head fastener (protruding), move A1 (9) and A2 (10) legs inboard or outboard to clear.

- (1) Adjust A1 (9), A2 (10) and A3 (16) to the applicable setting listed in Table 502.
- (2) Assemble the Universal Travel Board per Figure 501 and place it on the control surface at the location indicated in Table 502

NOTE: Do not move the flight controls with the A3 pin (16) in contact with the aileron or elevator. The stabilizer assembly may be attached at any convenient point and make sure legs, A1 (9) and A2 (10), remain in contact with the surface.

- (1) Slide the vertical assembly forward. The notch in A3 pin (16) will capture the surface in the neutral position (0°) (Refer to Figure 502).

NOTE: Tip of legs A1 (9) and A2 (10) must be in complete contact with airplane control surface at all times during 0° check. The tips of legs A1 (9) and A2 (10) must be centered over the spars when required by Table 502. Refer to Figure 504.

Make sure A1 (9) and A2 (10) legs are sitting on surface skin and not on rivet head or other surrounding structure, A1 (9) and A2 (10) legs must be on airplane skin to achieve accurate measurement. Always follow rigging procedures in the applicable Maintenance Manual, utilizing the Universal Travel Board to determine the neutral position (0°). Both left and right surfaces must be rigged to neutral position and symmetrical prior to checking and adjusting control surface travel.

B. Check and Rigging of Travel

NOTE: Make sure the digital protractor is used in accordance with the manufacturer's instructions when checking surface travel.

- (1) After the neutral position has been verified, place the digital protractor on the control surface to be checked at a right angle to the hinge line and zero the instrument. Move the vertical beam (11) away from the trailing edge of the surface being measured.
- (2) Move the surface as required by the Maintenance Manual to check the required range of motion of the left hand and right hand control surfaces. If necessary, use the adjustment procedures as outlined in the applicable Maintenance Manual.
- (3) The digital protractor may be used to measure the deflection of other horizontal surfaces as long as neutral can be accurately established in accordance with the applicable Maintenance Manual.
- (4) When finished, remove all tools and equipment. Check the flight control surfaces for freedom of motion and direction of travel as outlined in the applicable Maintenance Manual.

C. Digital Protractor Calibration

Refer to manufacturer's recommendations for digital protractor calibration (P/N KS6005 or equivalent).

Table 502. Universal Travel Board Placement

Surface	Location	Spars	Settings (Inches)			Comments
			A1	A2	A3	
Aileron	#8 wing rib, just outboard of inboard aileron hinge	Y	7 1/4	12 7/16	4 7/8	

Figure 501 : Sheet 1 : (Revised) - Universal Travel Board (Typical Installation)

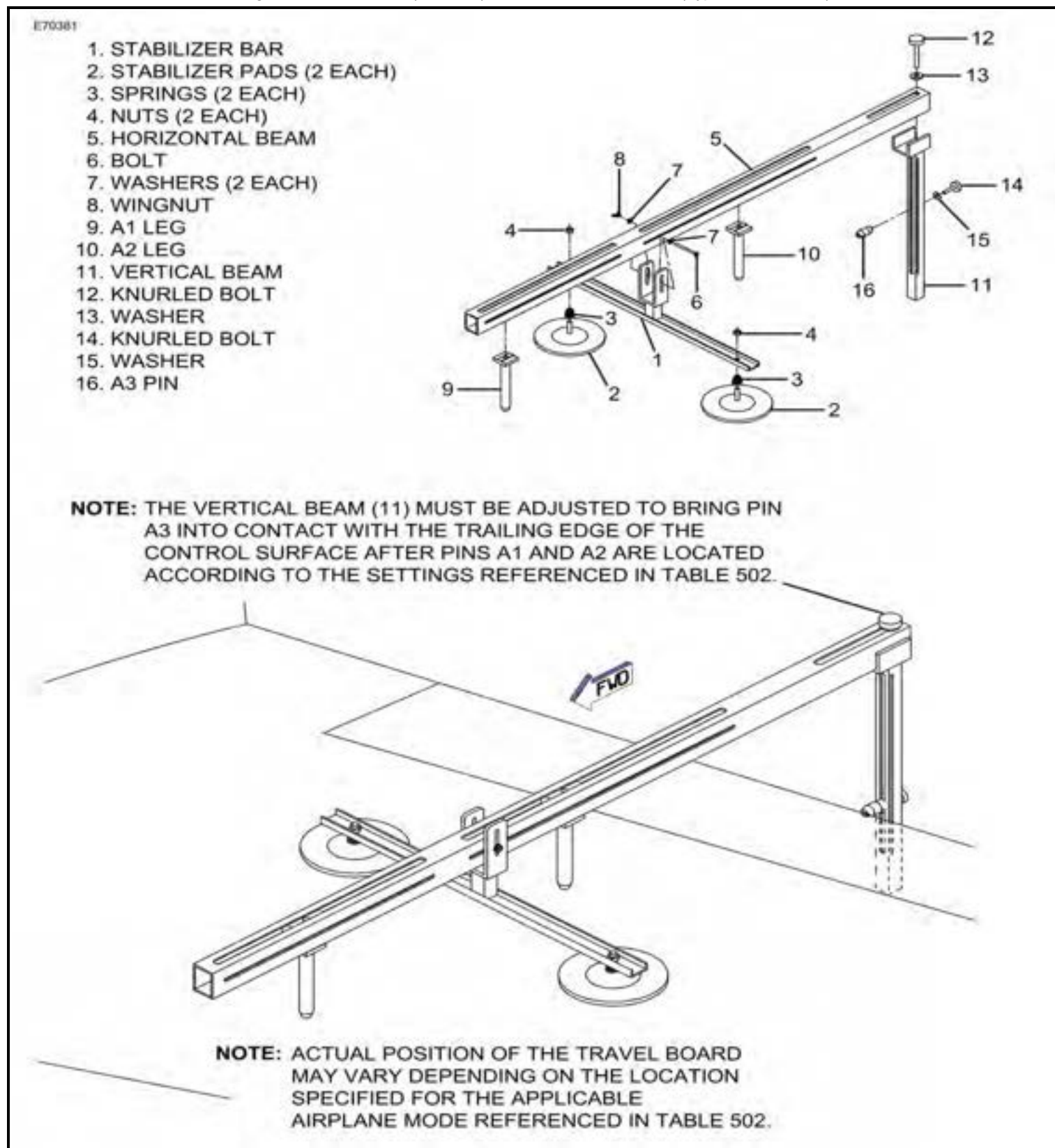


Figure 502 : Sheet 1 : (Revised) - Typical View of A3 at Trailing Edge

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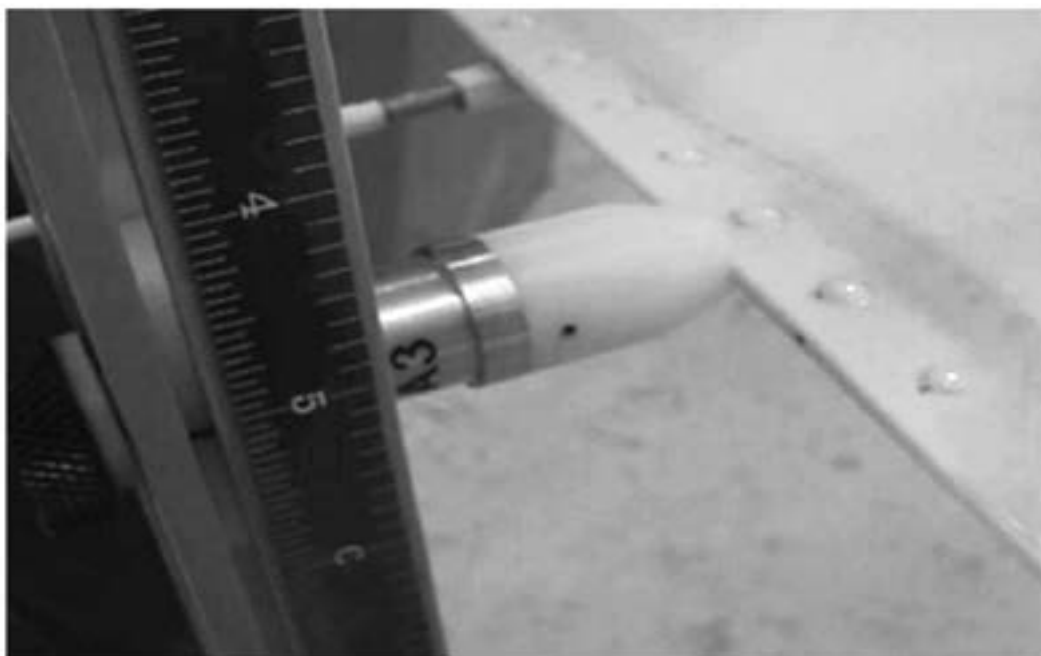


Figure 503 : Sheet 1 : (Revised) - Typical View of Kell-Strom Digital Protractor (Shown with Attitude Adapter Installed)

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Figure 504 : Sheet 1 : (Revised) - Universal Travel Board A1 and A2 Legs, Measurement



AILERON AND TAB - MAINTENANCE PRACTICES

1. Aileron and Tab - Maintenance Practices (-1946, E-2104, E-2111 and After; EA-320, EA-389 and After)

WARNING: Make certain that insulation, tie wraps, etc. do not interfere with control components such as cables, chains, etc.

A. Dual Control Column

WARNING: On airplane serials E-1946, E-2104, E-2111 and After; EA-320, EA-389 and After, observe the color coding on all parts when replacing or installing control cables, bellcranks and/or other control system components. DO NOT connect parts of one color to coded parts of a different color.

(1) Dual Column Chain Removal

- Paint one tooth of each control column's sprocket and its corresponding chain link to ensure proper alignment of the control wheels at installation (Refer to [Figure 201](#)).
- Loosen the turnbuckles of the control column chain and the aileron turnbuckles in the wheel well.
- Remove the safety wire from the four bolts (two on each end), and remove the six bolts from the channel between the control columns.
- Remove the channel from the airplane.
- Disconnect the turnbuckles from the chain of the control column.
- Remove the four connector links from the stop link assembly, then remove the stop link assembly.

NOTE: It may be necessary to remove the stop block before removing the stop link assembly.

- Slide the sprocket support assembly aft over the joint then remove the chains from the control columns.

(2) Control Column Chain Installation

- Install the chains over the control column sprockets (Refer to [Figure 201](#)).
- Install the stop link assembly. The outboard holes are used with the control column chain.
- Install the aileron cable chains. The inboard holes of the stop link assembly are used with the aileron cable chains.

NOTE: Make certain the connector links are properly installed.

- Install the stop block if removed.
- Connect the turnbuckles (do not tighten).
- Slide the sprocket support assemblies forward and install the six bolts to the channel between the control columns. Safety wire the four bolts.
- Tighten the control column chains. Refer to the CONTROL COLUMN CHAIN RIGGING procedures.

WARNING: Check the ailerons for proper motion. When the control column is turned to the right, the left aileron should move down and the right aileron move up.

(3) Control Column Chain Rigging

Rigging of the control column chain may be accomplished by the following:

- Rig neutral on the control wheels by placing a straightedge across the top of the control wheels. One of the grips may be ± 0.06 inch off the straightedge (Refer to [Figure 201](#)).
- Ensure that the ends of the control column chain around the right sprocket are within one link of equidistance from the centerline of the sprocket.
- If the stop link assembly is not centered within ± 0.02 inch with respect to its stop, adjust the turnbuckles to center the link.
- Place a vertical load of two pounds on the top chain near the airplane centerline. The chain should deflect 0.25 ± 0.06 inches. Adjust the turnbuckles as necessary to obtain this deflection.
- After rigging the control column chain, refer to RIGGING THE AILERON CONTROL SYSTEM and make certain the ailerons are properly rigged.

B. Control Column Roller Adjustment

(1) Forward Outer Tube Rollers (Roll on the Inner Square Shaft)

There are four rollers on the forward end of each control column which transmit torque to the square inner shaft. Two of the rollers of each control column are installed with eccentric bolts which allow for adjustment of roller clearance. These two

bolts may be identified by their 10-32 threads. Refer to [Figure 202](#) and adjust the rollers as follows:

- (a) Wipe the shafts clean and dry.
 - (b) Hold one of the nonadjustable rollers firmly against the shaft.
 - (c) The roller on the opposite side of the shaft should turn freely while having no more than 0.002 inch clearance.
 - (d) If the conditions of Step (c) are not met, loosen the nut on the roller which has the bolt with 10-32 threads.
 - (e) Turn the bolt until the conditions of Step (c) are complied with.
 - (f) Tighten the nut, then recheck the roller clearance in accordance with Steps (b) and (c).
 - (g) Check the other pair of rollers as indicated in Steps (b) and (c).
 - (h) If the adjustment is needed, follow Steps (d), (e) and (f) for the second set of rollers.
 - (i) Repeat this procedure for the other control column.
- (2) Control Column Support Roller Adjustment (Attached to the Instrument Subpanel)
- The top two rollers (22) of each control column support are installed with eccentric bolts which may be used for adjustment as follows (Refer to [Figure 203](#)):
- Pull the control column fore and aft until the position of least clearance between the control column and support rollers is located. Keep the control column in this position while checking and/or adjusting the clearance. Each control column will probably have its own position of least clearance.
- (a) Hold the control column firmly against the two top rollers.
 - (b) The clearance between the control column tube and the lower roller should be 0.005 ± 0.002 inch.
 - (c) If the correct clearance is not indicated, loosen the nuts on the two top rollers.
 - (d) Rotate the bolts to obtain the proper clearance.
 - (e) Tighten the nuts.
 - (f) Recheck for proper clearance - step (b).
 - (g) Repeat for the other control column.

C. Aileron

(1) Removal

- (a) Lower the flaps and disconnect the push-pull rod to the aileron tab.
- (b) Support the aileron and remove the two attaching screws from the top and bottom of each hinge bracket.
- (c) Pull the aileron straight away from the wing to avoid damage to the attaching areas.
- (d) Remove the screws attaching the bonding cables to the aileron.

(2) Installation

- (a) Attach the bonding cables to the aileron.
- (b) Place the aileron in position on the hinge brackets. Be sure the hinge bracket is in the proper place between the aileron skin and the reinforcing structure.
- (c) Install the upper and lower hinge bracket screws.
- (d) Pull on the aileron in a direction straight away from the wing to assure that the hinge brackets are properly positioned. If any movement of the aileron is noted, recheck the position of all hinge brackets.
- (e) Lower the flap and connect the aileron tab push-pull rod and install the cotter pin.

D. Aileron Control Cable

(1) Removal

- (a) Remove the pilot's and copilot's seat, and the floorboards in the pilot's compartment.
- (b) Remove the forward passenger seats and the floorboards between the main and rear spars.
- (c) Remove the access plates as necessary to gain access to the aileron cables and pulley brackets on the lower trailing edge of the wings.
- (d) Remove all necessary cable retaining pins from the cable pulley brackets.
- (e) Disconnect the forward aileron cables from the chain and cable assembly at the connector link below the control column. Install lead lines to both aileron cables (Refer to [Figure 204](#)).

- (f) Disconnect the forward aileron cables and the forward outboard wing cable at the turnbuckles in each wing. Connect a lead line to one end of the cable and remove the cable.
- (g) Disconnect the balance cable at the turnbuckle in each wing. Connect a lead line to one end of the cable and remove the cable.
- (h) Disconnect the forward outboard and the aft outboard cables at the bellcrank in each wing. Identify and remove the cables.
- (2) Installation
 - (a) Connect the forward outboard and the aft outboard cables to the bellcrank in each wing. Route the cables inboard and disconnect the lead lines (Refer to [Figure 204](#)).
 - (b) Route the balance cable through one wing, the fuselage, then through the opposite wing. Disconnect the lead line and connect the balance cable and the aft outboard cables to the turnbuckles in each wing.
 - (c) Route one end of the aileron cables outboard in each wing, and the other end forward to the control column. Connect the cables to the turnbuckles at the forward outboard cable in each wing.
 - (d) Connect the chain and cable assembly to both aileron cables at the connector link below the control column.
 - (e) Install all retaining pins in the pulley brackets.
 - (f) Rig the aileron control system.
 - (g) Install the access plates on the lower trailing edge of the wings.
 - (h) Install the floorboards and the forward passenger seats.
 - (i) Install the floorboards and the pilot's and copilot's seats.

WARNING: Make certain that insulation, tie wraps, etc. do not interfere with control components such as cables, chains, etc.

WARNING: Check for correct direction of movement by moving the control wheel. When the control wheel is moved to the left, the left aileron should move up and the right aileron move down. When the control wheel is turned to the right, the right aileron should move up and the left aileron down.

WARNING: Check to make sure that cabin floorboards, floorboard insulation and other interior parts do not contact the control cables.

E. Rigging the Aileron Control System

NOTE: **Textron Aviation Inc. recommends the use of the aileron travel gage. Refer to Chapter 12-20-00, 201, SPECIAL TOOLS, Figure 203. The front of the travel gage should be located over the leading edge skin splice with the aft portion over the number 8 wing rib (just outboard of the inboard aileron hinge). Alternate rigging with TE-100TB Universal Travel Board and KS6005 Digital Protractor is acceptable.**

- (1) Aileron and tab surfaces must align with the upper and lower surfaces of the wing within 1/16 inch.
- (2) Place the aft arm of both aileron bellcranks parallel to the adjacent wing rib. If the aileron is not in neutral, loosen the locknuts on both ends of the push-pull tube and adjust the push-pull tube until the aileron is in neutral.
- (3) Tighten the locknuts.
- (4) Rig neutral on the control wheels by placing a straightedge across the top of the two control wheels. One grip may be ± 0.06 inch off of the straightedge.
- (5) Assure that the ends of the chain around the right control column are within one link of equidistance from the centerline of the sprocket.
- (6) If the link stop assembly is not centered with respect to its stop, adjust the turnbuckles to center the link.
- (7) Place a vertical load of two pounds on the top chain near the airplane centerline. The chain should deflect 0.25 ± 0.06 inch. Adjust the turnbuckles as necessary to obtain this deflection.
- (8) Connect the bungee springs.
- (9) With a straight rig pin installed between the pilot's rudder pedals and with a simulated (10 lbs.) cable tension, adjust the turnbuckle above the forward aileron bungee spring until both bungee springs are extended equally ± 0.06 inch.
- (10) Adjust the turnbuckles in the wheel wells to bring the ailerons to neutral (0°).
- (11) Remove the straightedge from the control wheels.
- (12) Adjust the aileron bellcrank stops (primary stops) for a deflection of $20 \pm 2^\circ$ up, and $20 \pm 2^\circ$ down from neutral.

- (13) Tighten the locknuts on the bellcrank stop bolts.
- (14) Rig the aileron cables to the tension indicated in [Figure 204](#). Use the turnbuckles in the wheel wells.
- (15) Be sure each bellcrank contacts its upstop at the same time the bellcrank in the opposite wing contacts its downstop.
- (16) Set the secondary stop bolts (the stop link at the forward end of the control column) to maintain 0.06 to 0.12 inch clearance from the stop with the ailerons at full travel (both right and left).
- (17) With a straight rig pin installed between the pilot's rudder pedals, the control wheels should center within 5° of neutral. If necessary, readjust the vertical turnbuckle above the forward bungee spring and the aft turnbuckle in the wheel well as required to center the control wheels.
- (18) Recheck cable tension and safety the turnbuckles. Make certain all locknuts are tight.
- (19) With the ailerons fully rigged (bungee springs disconnected), the torque required to move either control wheel 10° right or left of neutral shall not exceed 15 inch-pounds.
- (20) Connect the bungee springs.

WARNING: Check for correct direction of movement by moving the control wheel. When the control wheel is moved to the left, the left aileron should move up and the right aileron move down. When the control wheel is turned to the right, the right aileron should move up and the left aileron down.

- (21) Remove all rigging pins.

F. Aileron Tab

A trim tab has been installed in the left aileron which is controllable from inside the airplane while in flight. The aileron tab is controlled through normal cable and chain linkage to a control wheel located in the pedestal with the indicator.

(1) Aileron Trim Tab Removal

- (a) Remove the pilot's seat and the left floorboard.
- (b) Remove the lower forward upholstery panel on the left side of the pedestal.
- (c) Remove the forward left passenger seat and the floorboard.
- (d) Remove necessary access plates to gain access to the trim tab cables, actuator, and cable pulley brackets.
- (e) Remove the cable retaining pins at the pulley brackets.
- (f) Disconnect the tab cables at the turnbuckles in the left wing. Identify and connect lead lines on the cable ends.
- (g) Remove the cable stops at WS 43.375.
- (h) Remove the outboard cable from the actuator sprocket. Remove the cable through the actuator access opening.
- (i) Remove chain master link at the sprocket on the pedestal. Remove cable through the actuator access opening.

(2) Aileron Trim Tab Cable Installation

- (a) Position the chain of the forward tab cable around the pedestal sprocket and install the chain master link.
- (b) Route the cable ends aft in the fuselage and outboard into the left wing and disconnect the lead lines.
- (c) Position the chain of the outboard cable around the actuator sprocket and route the cable ends inboard.
- (d) Install the cable stops at WS 43.375 and connect the cables at the turnbuckles in the wing.
- (e) Install the cable retaining pins in the pulley brackets.
- (f) Rig the aileron trim tab control system, refer to AILERON TRIM TAB RIGGING procedure.
- (g) Install all access plates in the left wing.
- (h) Install the floorboard and the left forward passenger seat.
- (i) Install the floorboard and the pilot's seat.
- (j) Install the upholstery panel on the left side of the pedestal.

WARNING: Make certain that insulation, tie wraps, etc. do not interfere with control components such as cables, chains, etc.

WARNING: The aileron tab should stay in the same plane with respect to the aileron when the aileron is moved. When the tab control wheel is turned to indicate left wing up, the aileron tab should move up. If the aileron and aileron tab do not move in the proper direction, recheck rigging.

(3) Aileron Trim Tab Rigging

NOTE: Place the aileron in neutral.

- (a) Place the aileron trim tab control in neutral position.
- (b) Place the aileron in neutral position and connect the trim tab to the tab actuator.
- (c) By turning the sprocket on the actuator, adjust the trim tab to both extremes of travel; measure both settings and return the tab to the midpoint of the two extremes of travel. This will place the actuator in the neutral position.
- (d) If the trim tab is not in the neutral position upon completion of Step (c), adjust the pushrod to place the tab in neutral position.
- (e) Center the chain on the sprocket and tighten the cable.
- (f) Set the aileron tab stop (at WS 43.375) to obtain a surface deflection of $9^{\circ} + 0^{\circ} - 1^{\circ}$ up and down. Torque the stops to 40 to 60 inch pounds.
- (g) Rig cable tension and adjust travel (Refer to [Figure 204](#)).
- (h) Check trim tab travel, safety all turnbuckles and stops.

WARNING: After rigging the aileron and aileron tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. The aileron tab should stay in the same plane with respect to the aileron when the aileron is moved. When the tab control wheel is turned to indicate left wing up, the aileron tab should move up. If the aileron and aileron tab do not move in the proper direction, recheck the rigging.

(4) Aileron Trim Tab Actuator Removal

- (a) Remove the access plates at the actuator.
- (b) Disconnect the outboard cable at the turnbuckles in the wing.
- (c) Remove the outboard cable from the actuator sprocket.
- (d) Disconnect the actuator from the trim tab linkage.
- (e) Remove the bolts attaching the actuator to the wing structure. Remove the actuator.

(5) Aileron Trim Tab Actuator Installation

- (a) Position the actuator against the wing structure and install the attaching bolts.
- (b) Connect the actuator to the tab linkage.
- (c) Install the outboard cable on the actuator sprocket.
- (d) Connect the cables at the turnbuckles in the wing.
- (e) Rig the aileron trim tab control system.
- (f) Install the access plates at the actuator.

(6) Aileron Trim Tab Actuator Disassembly

- (a) Remove the pins from the nut assembly (5) and sprocket (1) and remove the sprocket from the actuator assembly (Refer to [Figure 205](#)).
- (b) Remove the snap ring (10) from the actuator housing (6), and pull the nut assembly (5) out of the housing.
- (c) Remove the actuator screw (8) from the nut assembly (5).
- (d) Remove the pins from the actuator screw (8) and the actuator rod end (11) and remove the actuator rod end from the actuator screw. The bearing (4) and the bushing (9) can now be removed from the actuator screw.
- (e) Remove the check nut (2), and screw out the adjusting bushing (3) with a spanner wrench.
- (f) Remove the bearing (4) from the nut assembly (5).

E25620

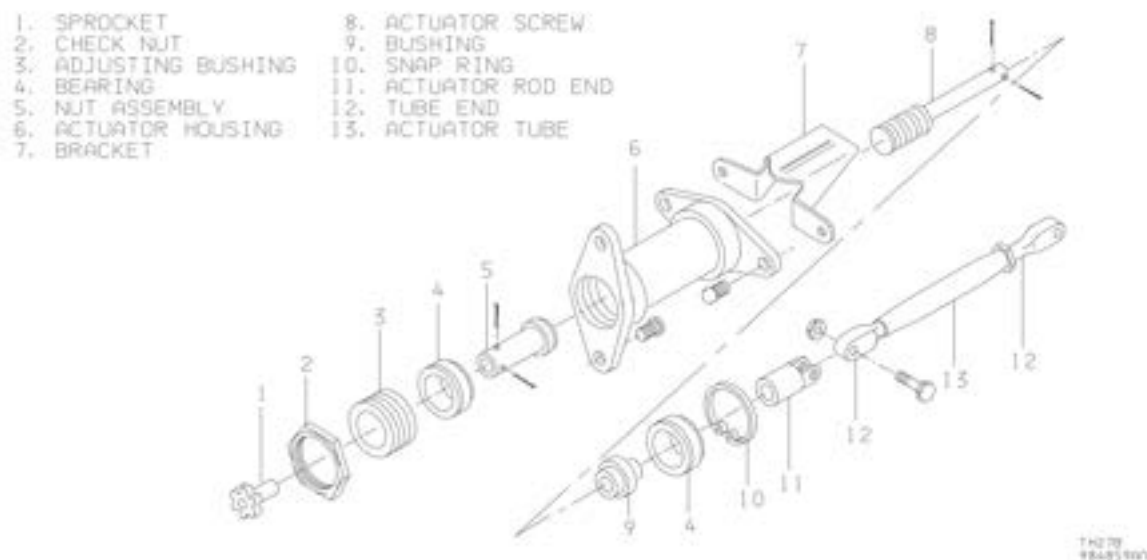


Figure 205

(7) Aileron Trim Tab Actuator Assembly

NOTE: During assembly lubricate all moving parts with grease (11, Table 1, 91-00-00).

- (a) Install the bearing (4) on the nut assembly (5).
- (b) Install the other bearing (4) and bushing (9) on the actuator screw (8).
- (c) Install the actuator screw (8) in the nut assembly (5).
- (d) Push the nut assembly (5) into the actuator housing (6), and install the snap ring (10) in the actuator housing (6).
- (e) Use a spanner wrench to install the adjusting bushing (3) into the actuator housing (6) until the end play between the

screw housing and nut assembly (5) is less than 0.025 inch. If the end play cannot be reduced to within limits, replace the actuator.

- (f) Install the check nut (2) on the adjusting bushing (3).
 - (g) Install the actuator rod end (11) on the actuator screw (8).
 - (h) Align the holes in the actuator screw (8) with those of the actuator rod end (11) and install the two pins.
 - (i) Install the sprocket (1) on the actuator assembly.
 - (j) Align the holes in the sprocket (1) with those in the nut assembly (5) and install the two pins.
- (8) Checking Aileron Trim Tab Free Play
- Visually inspect the aileron trim tab for damage, security of hinge attach points, and for tightness of the actuating system. Inconsistencies must be corrected before checking the free play of the tab.
- A check fixture (P/N 45-135030-9/810) or equivalent, a dial indicator, and a push-pull scale for applying accurate loading to the tab are required for making the inspection for tab free play (Refer to [Figure 206](#)).
- (a) Securely lock the control surfaces to prevent movement of the ailerons. Set the aileron trim tab in neutral.
 - (b) Use shot bags to hold the dial indicator check fixture so that the point of the dial indicator is 2.0 inches aft of the tab hinge line and on the outboard edge of the aileron tab.
 - (c) Apply a small piece of masking tape (for paint protection) 4.0 inches aft of the tab hinge line and along the centerline of the tab actuator. This is the point of pressure against the tab by the push-pull scale.
 - (d) Apply another piece of masking tape in the corresponding location on the bottom surface of the tab.
 - (e) Set the dial indicator at zero. Do not reset the dial indicator during the checking procedure.
 - (f) With the push-pull scale on the masking tape, apply a 3.0 pound downward load. Record the dial reading as A.
 - (g) Release half of the load to obtain a 1.5 pound downward load. Record the dial reading as B.
 - (h) On the masking tape on the bottom surface, apply a 3.0 pound upward load. Record the dial reading as C.
 - (i) Release half of the load to obtain a 1.5 pound upward load. Record the reading as D.
 - (j) Enter the recorded readings on a copy of [Table 201](#) and proceed as follows:
 - 1 Subtract A from 2B and record as X.
 - 2 Multiply B by 2 and record as 2B.
 - 3 Multiply D by 2 and record as 2D.
 - 4 Subtract C from 2D and record as Y.

NOTE: X and Y can be negative numbers.

 - 5 Add X and Y and record as E.
- (k) (E = 0.094 INCH MAXIMUM)
- (l) If the free play is over the maximum specified in [Table 201](#), inspect all components of the tab actuator system to determine the cause. All worn parts must be replaced.
- (9) Aileron Trim Tab Free Play Inspection
- This check should be performed at least once a year to ensure that the trim tab free play falls within the prescribed limits. A check fixture (P/N 45-135030-9/810) or equivalent, a dial indicator, and a push-pull scale for applying accurate loading to the tab are required for making the inspection for free play of the tab (Refer to [Figure 206](#)).
- (a) Securely lock the control surfaces to prevent movement of the ailerons. Set the aileron tab in the neutral position.
 - (b) Using shot bags, affix the dial indicator check fixture so that the dial indicator point is 2.00 inches aft of the tab hinge line and on the outboard edge of the aileron tab.
 - (c) Apply a small piece of masking tape (for paint protection) 4.00 inches aft of the tab hinge line and along the centerline of the tab actuator. This will be the point of pressure against the tab by the push-pull scale.
 - (d) Apply another piece of masking tape in the corresponding position on the bottom surface of the tab for the same purpose.
 - (e) Zero the dial indicator at no load initially. Do not reset during the checking procedure.
 - (f) With the push-pull scale at the point of masking tape, apply a full 3-pound downward load. Record the dial reading as A.

- (g) Release half the load until a 1.5 pound downward load is obtained. Record the dial reading as B.
- (h) Apply a full 3 pound upward load at the masking tape on the bottom surface. Record the dial reading as C.
- (i) Release half the load until a 1.5 pound upward load is obtained. Record the dial reading as D.
- (j) Enter the recorded values on a copy of [Table 201](#) and proceed as follows:

- 1 Multiply B by 2 and record as 2B.
- 2 Subtract A from 2B and record as X.
- 3 Multiply D by 2 and record as 2D.
- 4 Subtract C from 2D and record as Y.

NOTE: The results of X and Y can be negative numbers.

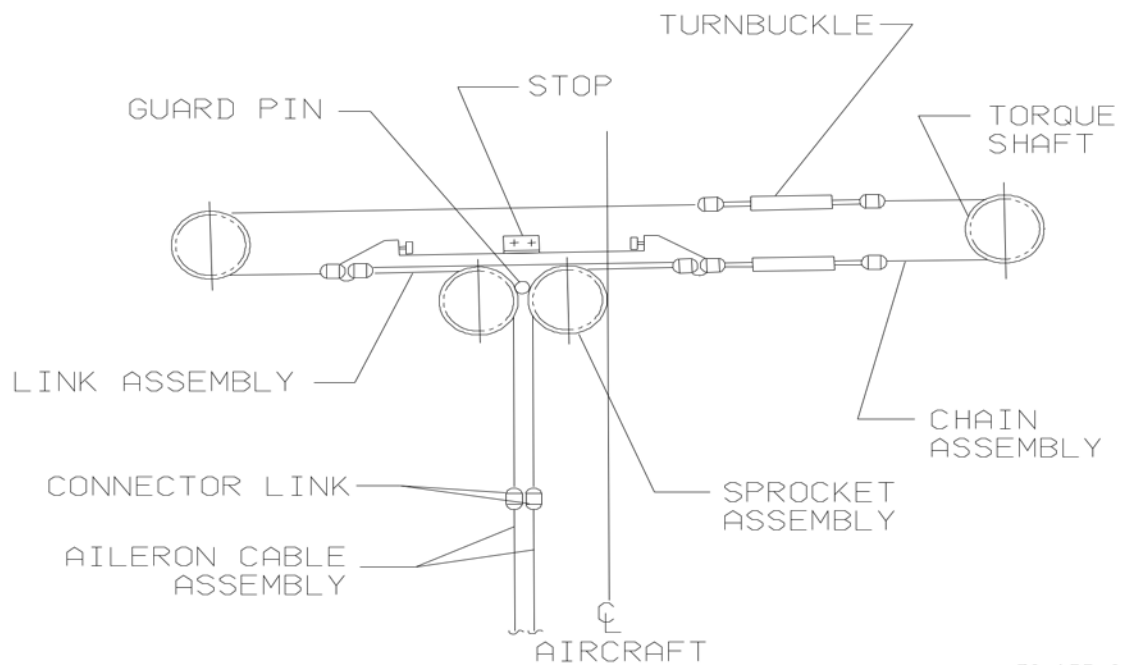
- 5 Add X and Y and record as E.
- (k) If the free play exceeds 0.094 inch, inspect all components of the tab actuator system to determine the cause. All worn parts should be replaced.

Table 201. Aileron Tab Free Play Limits

1.5 Pound Reading	3 Pound Reading	
B_____		
2B_____	-A_____	=X_____
D_____		
2D_____	-C_____	=Y_____
X_____	+Y_____	=E_____
(E = 0.094 inch maximum)		

Figure 201 : Sheet 1 : Dual Control Column Chain Adjustment

E25890



36-155-6

Figure 202 : Sheet 1 : Forward Control Column Rollers

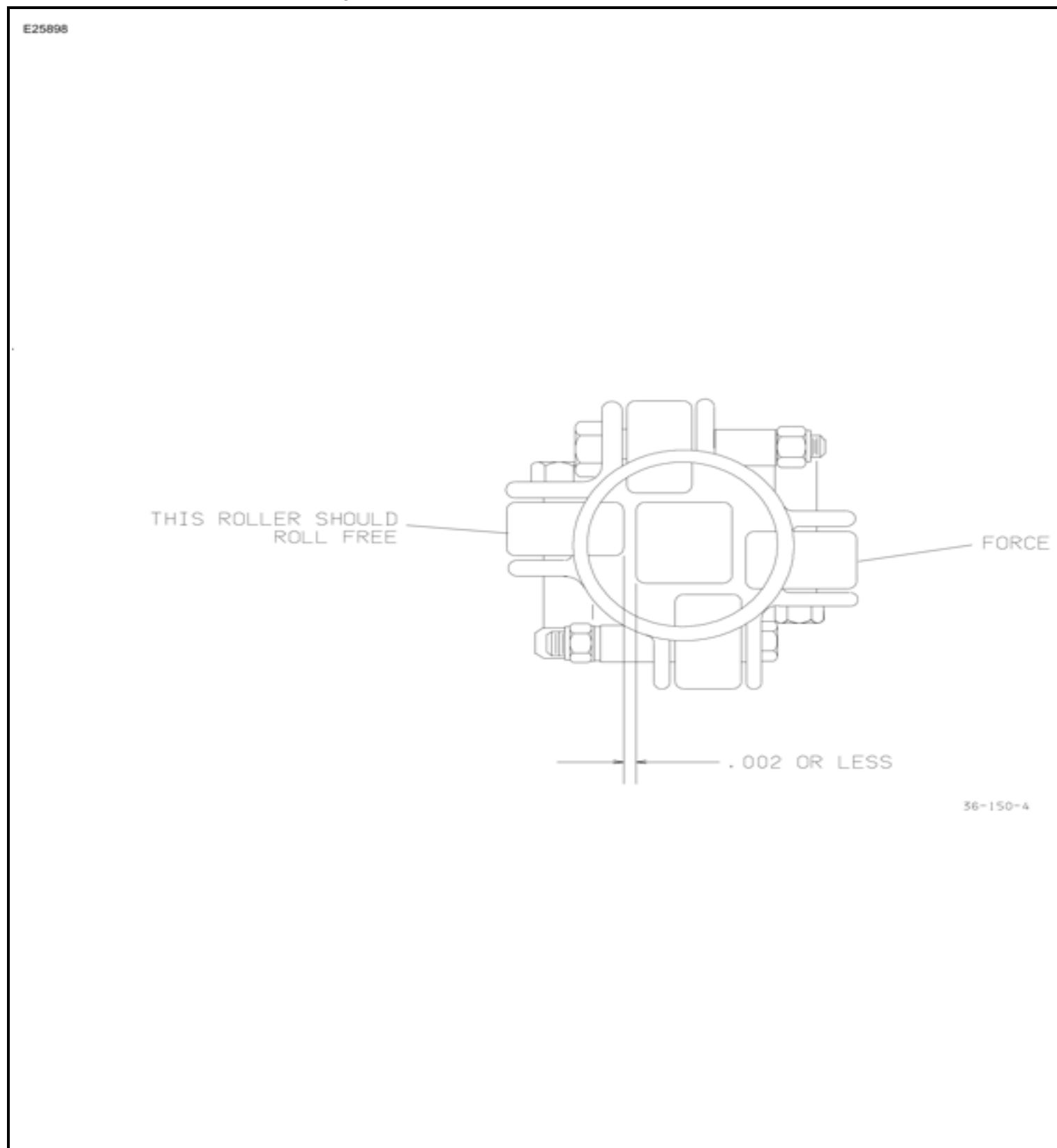
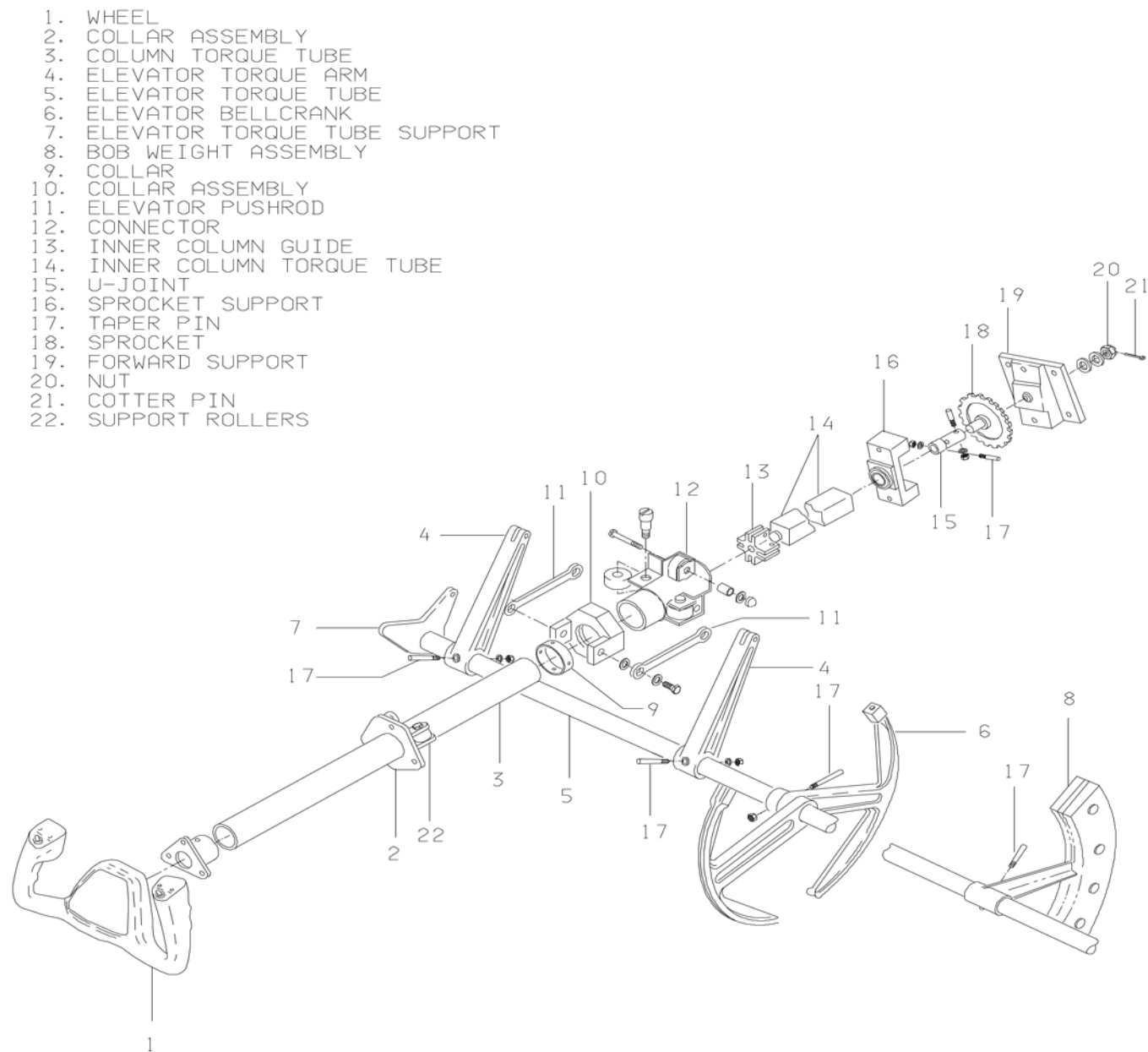


Figure 203 : Sheet 1 : Control Column

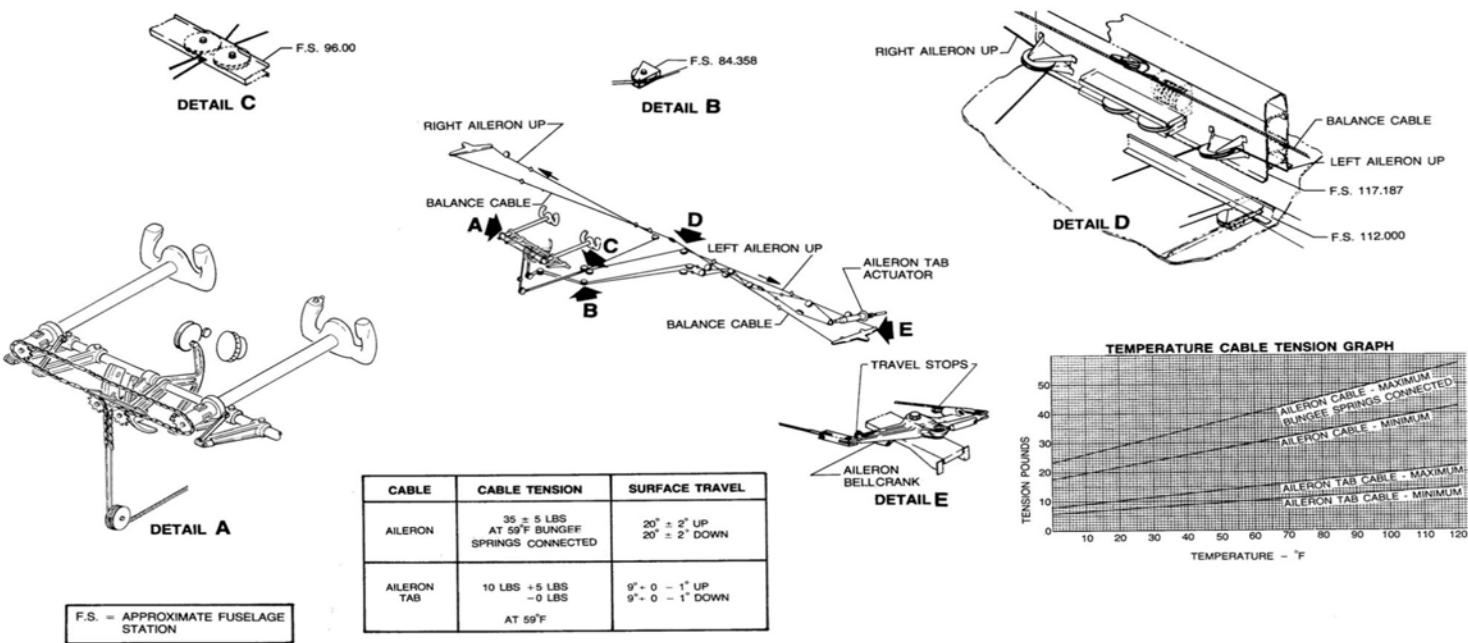
E25908



36-155-14

Figure 204 : Sheet 1 : Aileron System (E-1946, E-2104, E-2111 and After; EA-320, EA-389 and After)

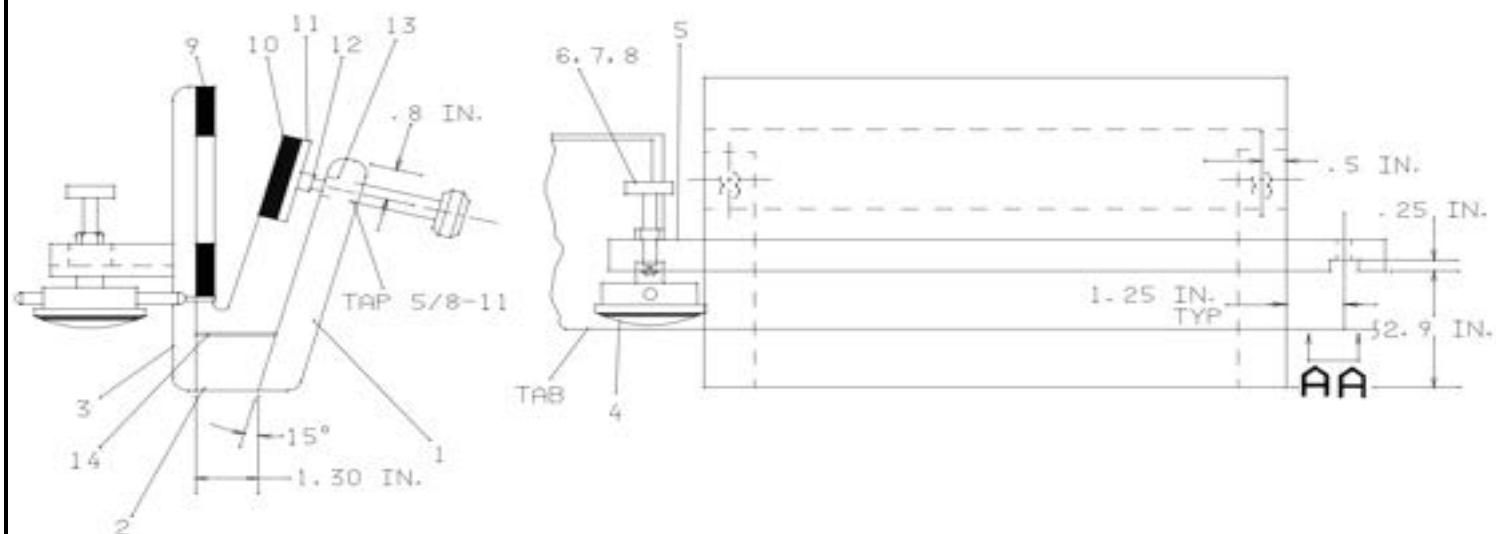
E24164



36-151-18

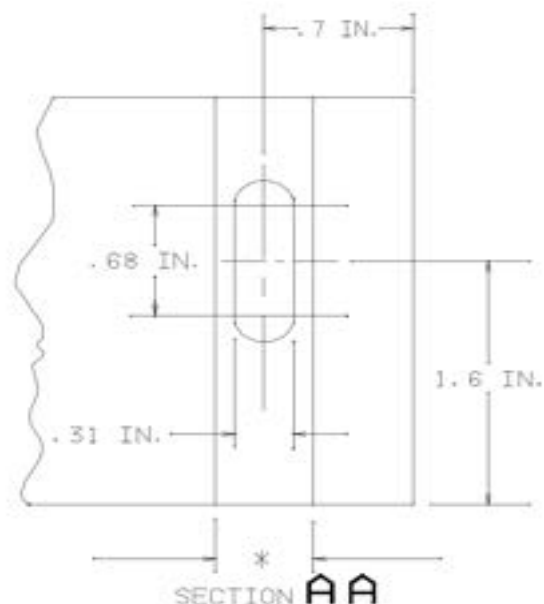
Figure 206 : Sheet 1 : Fabricating Clamp for Tab Deflection

E25932



ITEM NO.	QUANT.	DESCRIPTION
1	2	3/4 X 1 X 6 ALUMINUM OR EQUIV.
2	2	1 X 1 3/8 X 1 3/4 ALUMINUM OR EQUIV.
3	1	1/2 X 7 1/2 X 10 ALUMINUM OR EQUIV.
4	1	C810 INDICATOR **
5	1	3/4 X 2 1/2 X 14 ALUMINUM EQUIV.
6	1	1/4 DIA. X 2 CORROSION RES. STL.
7	1	1/4 DIA. X 1 CORROSION RES. STL.
8	1	1/4-28 NUT
9	1	3/8 X 5 X 10 RUBBER
10	1	3/8 X 2 X 10 RUBBER
11	1	1/4 X 2 X 10 CORROSION RES. STL.
12	2	1/2 X 13 X 3 VLIER TORQUE SCREW
13	2	KN813 KEENSERT OR TAP 1/2-13
14	2	1/8 X 1 X 3/4 RUBBER

**P/N OF FEDERAL PRODUCTS CORP., PROVIDENCE, R.I.



* THIS GROOVE TO BE A SNUG FIT TO THE SCREW BRACKET ON THE DIAL INDICATOR

100-135-8

RUDDER AND TAB - MAINTENANCE PRACTICES

1. Rudder and Tab - Maintenance Practices

A. Rudder (F33A, F33C, A36 and B36TC)

WARNING: On airplane serials CE-1566 and after; E-1946, E-2104, E-2111 and after; EA-320, EA-389 and after, observe the color coding on all parts when replacing or installing control cables, bellcranks and /or other control system components. DO NOT connect parts of one color to coded parts of a different color.

(1) Rudder Removal

- (a) Detach the tail cone, disconnect the tail navigation light wire and remove the tail cone.
- (b) Remove the tail section access doors on the left hand side of the aft fuselage.
- (c) Remove the four attach bolts from the rudder bellcrank.
- (d) Disconnect the rudder hinges and rudder bonding cable.
- (e) Remove the rudder.

(2) Rudder Installation

- (a) Place the rudder in position.
- (b) Connect the rudder hinges and bonding cable.
- (c) Install the rudder bellcrank attach bolts (torque to 50 to 70 inch-pounds).
- (d) Install the access doors.
- (e) Connect the navigation light wires.
- (f) Install the tail cone.

(3) Rigging the Rudder Control System (Figure 202 and Figure 203)

NOTE: To facilitate rigging of the rudder pedals a rigging tool may be fabricated from a steel block 1/2 inch X 1 inch X 2 inches; and two 3/8-inch- x 2-1/8-inch-long pins. The rig pins are located parallel and forward of the block, one on each side, and welded. The rig pins should be spaced as noted in Figure 201.

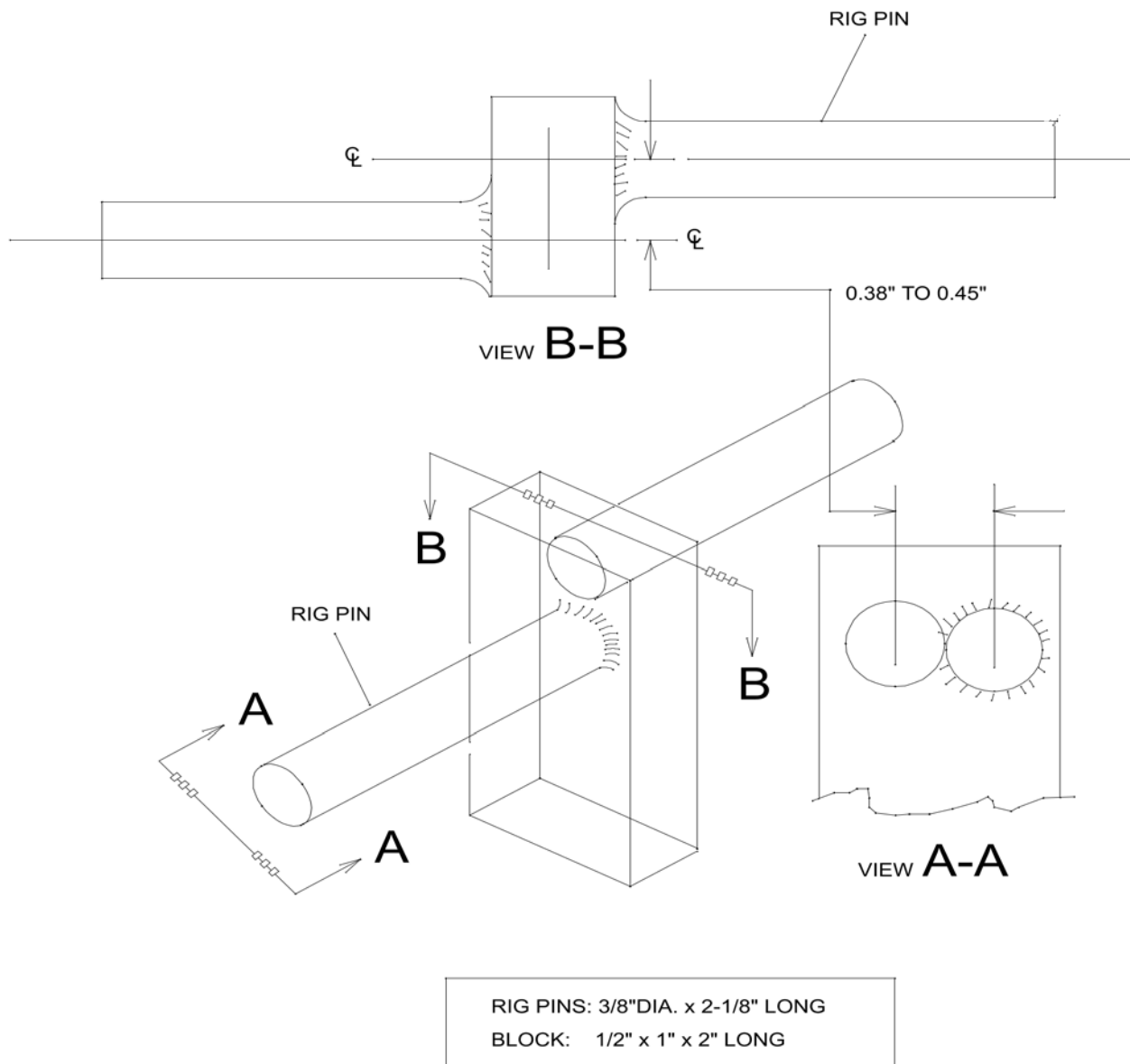
- (a) Place the rudder pedals in the aft position.
- (b) Install a rig tool in the holes provided in the pilot's rudder pedals.
- (c) With the bellcrank in the neutral position, rig the cables to the tension shown on the temperature cable tension graph in Figure 203, then remove the rig pin.

NOTE: Installation of the rig pin in the pilot's rudder pedals will bring the copilot's pedals to the same adjustment as the pilot's pedals.
The right hand rudder pedals are rigged 0.38 - 0.45 inch forward of the neutral position.

- (d) Adjust the rudder travel at the rudder bellcrank stops as indicated in Figure 202.
- (e) Adjust the rudder pedal travel at the rudder pedal stops so that contact with the rudder bellcrank stops occurs immediately prior to contact with the rudder pedal stops.
- (f) Make sure that the rudder movement corresponds to the movement of the rudder pedals.

Figure 201 : Sheet 1 : Rudder Pedal Rig Tool

E25949



55-154-5.AI

Figure 202 : Sheet 1 : Rigging the Rudder Control System

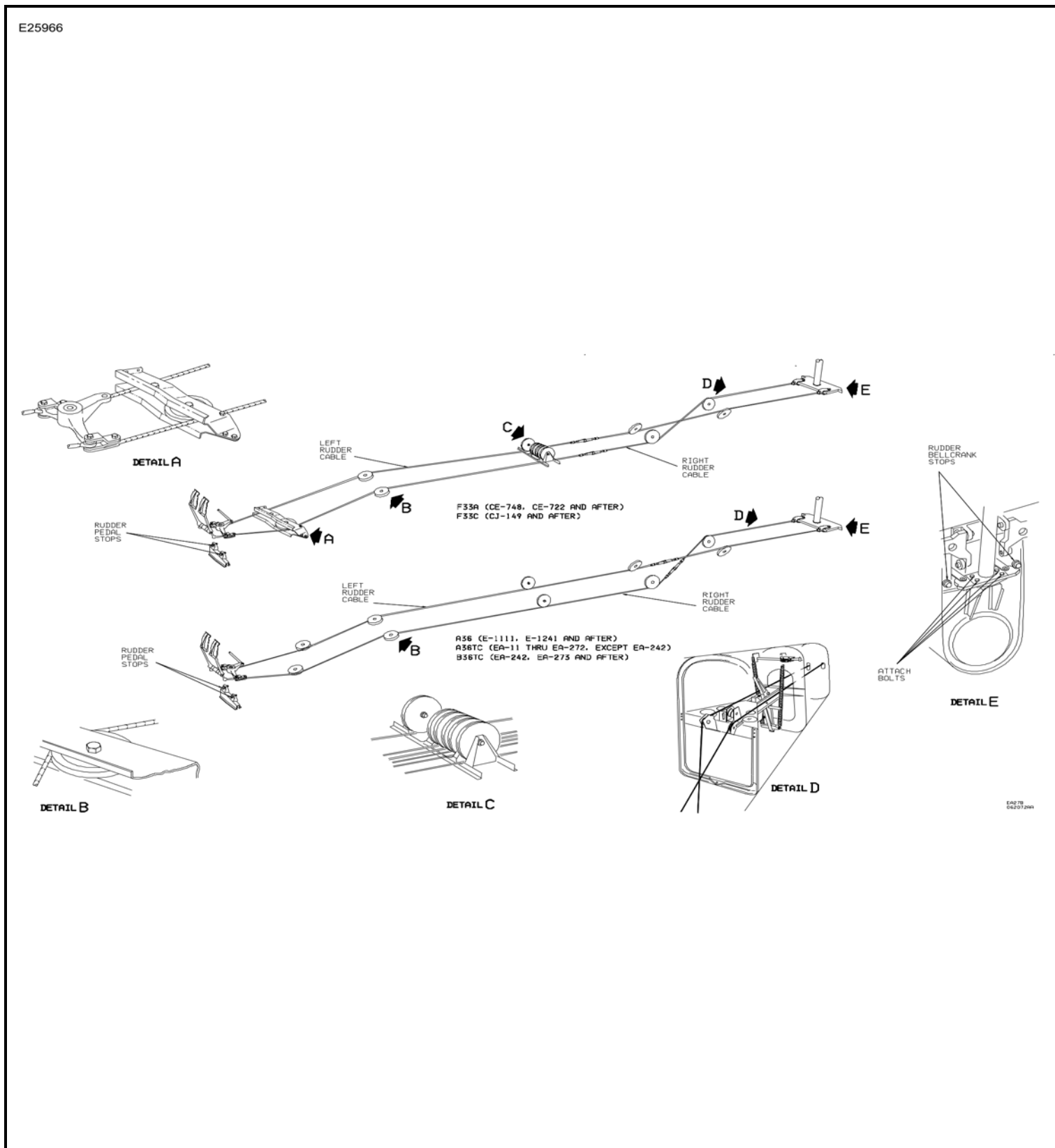
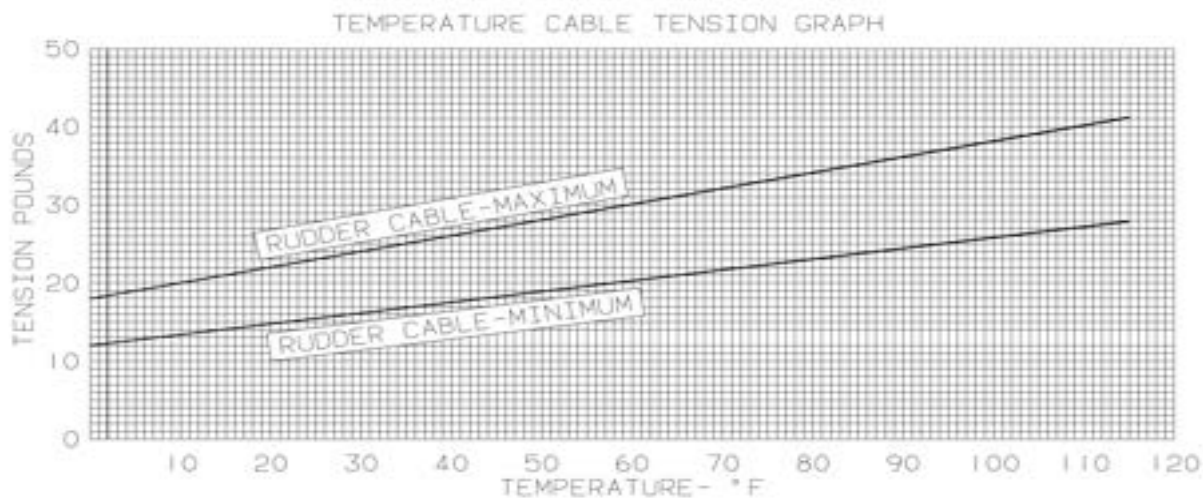


Figure 203 : Sheet 1 : Rudder Cable Tension and Surface Travel Data

E25981

CABLES	CABLE TENSION	SURFACE TRAVEL	
RUDDER	25 LBS $\pm$ 5 LBS AT 59° F	25 $\pm$ 1 LEFT AND RIGHT	ALL F33A AND A36TC, F33C PRIOR TO CJ-156 WITHOUT KIT 33-4002-1, A36 PRIOR TO E-2111 EXCEPT E-1946 AND E-2104
		20 $\pm$ 0 -1 LEFT AND RIGHT	B36TC
		25 $\pm$ 1 LEFT 20 $\pm$ 0 -1 RIGHT	F33C, CJ-156 AND AFTER, AND EARLIER F33C'S WITH KIT 33-4002-1
		23 $\pm$ 0 -1 LEFT AND RIGHT OF NEUTRAL	E-1946, E-2104 AND E-2111 AND AFTER



EA27B
984801AA

RUDDERVATOR AND TAB - MAINTENANCE PRACTICES

1. Ruddervator and Tab - Maintenance Practices

A. Rudder (V35B)

(1) Rudder Rigging Procedure

NOTE: All rudder rigging should be accompanied with a travel board installed. A bubble protractor should not be used for any rudder rigging procedure.

The rudder system and elevator system are separate systems forward of the empennage. The control surfaces for both the rudder and elevator are the same parts. The rudder and elevator control surfaces will be referred to as ruddervator.

- (a) Adjust the stops on the aft fuselage bulkhead to permit a maximum combined ruddervator travel as shown on the overall travel tables (Refer to [Figure 201](#)).
- (b) With the adjusting link at the rudder quadrant, located just aft of the rudder pedals, lengthen or shorten as necessary to align the copilot's pedals with the pilot's pedals. When aligning the pedals, be sure both sets of pedals are in the same position.
- (c) Straighten the nose wheel and position the rudder pedals in the neutral position with an aligning (rig) tool in the pedals (Refer to [27-20-00, Figure 201](#)).

NOTE: The left rudder pedal is rigged 0.38 to 0.45 inches aft of the neutral position. To facilitate the rigging of the pedals to these dimensions, a rigging tool may be fabricated from a steel block $1\frac{1}{2} \times 1.0 \times 2.0$ inches, and two $\frac{3}{8} \times 2\frac{1}{8}$ -inch-long rig pins (Refer to [27-20-00, Figure 201](#)). The rig pins are located parallel and forward on the block, one on each side, and welded. Rig pins are spaced per [27-20-00, Figure 201](#).

- (d) Position the control column in the neutral position with $4\frac{1}{2}$ inches ($4\frac{3}{4}$ inches on D-10359 and After) between the collar on the instrument panel and the split collar on the control column. This can be done by cutting a block $4\frac{1}{2}$ (or $4\frac{3}{4}$ for D-10359 and After) inches long and taping it to the control column.
- (e) Install the differential mechanism jig assembly (Refer to [Figure 201](#), Detail E) to position the differential mechanism in the neutral position. The jig assembly will position the differential mechanism of the right tail control arm aft of the differential mechanism for the left tail control arm with the elevator and rudder system in neutral.

NOTE: The 35-590087 differential mechanism jig assembly is to be used with the 35-590087-9 stop installed.

With the rudder, elevator and tab systems correctly adjusted and in neutral, the differential mechanism tail control (rudder) arms are lightly contacting the aft side of the 35-590087 differential mechanism jig assembly and the outboard ends (legs) of the jig assembly are lightly contacting the forward side of the fuselage station 256.9 bulkhead. The nut on the differential mechanism elevator control (center) arm is to be positioned inside the hole in the jig assembly.

The elevator and rudder system are in neutral when the differential mechanism jig assembly, the rudder rig tool and the control column block are installed with the ruddervators in the 0° position with the cable tensions set to the temperature cable tension graph. The trim tab system is in neutral when the cockpit indicator is at 0° , the cable tensions are set to the temperature cable tension graph and the tabs are at 0° or symmetrically split. The tabs are at 0° when their trailing edges align with the trailing edges of the ruddervators.

- (f) Adjust the short, lower elevator cable to a total length of 23.62 ± 0.06 inches as measured from the center of its attachment points at the reduction bellcrank and differential mechanism (Refer to [Figure 205](#)). No threads on the turnbuckle should be visible outside of the barrel after adjustment. Safety the turnbuckle. No further adjustment of this cable is required.
- (g) Adjust the main rudder cable tensions to the tension shown on the temperature cable tension graph (Refer to [Figure 201](#)). (The cables can be adjusted simultaneously with the rudder balance cable). The balance cable is adjusted by adding or removing washers behind the swivel bolt on the balance cable pulley bracket. The differential mechanism, control column and rudder pedals are still to be in their neutral positions after cable tensions are adjusted.
- (h) Set the ruddervators in the neutral position (0°) by adjusting the length of the control push-pull rods. Make sure the rod ends remain screwed the required length into the push-pull tubes. They should extend past the inspection hole, i.e. a

wire should not pass through the inspection hole.

- (i) Remove the differential mechanism jig assembly and remove the rudder pedal rig tool. Leave the control column $4\frac{1}{2}$ (or $4\frac{3}{4}$ for D-10359 and After) inch-long block in place to prevent elevator system influence on rudder rigging.
- (j) Set the rudder travel by adjusting the stop bolts (Refer to [Figure 201](#), Detail A) just aft of the pilot's rudder pedals. Refer to [Figure 201](#) for the applicable table of travels and appropriate ruddervator travel values. Steps (b) through (h) should result in the ruddervator travel being correct or nearly correct. Make any final minor adjustments by lengthening or shortening the control push-pull tubes. Make sure the rod ends remain screwed the required length into the push-pull tubes. They should extend past the inspection hole, i.e. wire should not pass through the inspection hole.
- (k) When the ruddervator travels are correct, tighten the rod end jamnuts, the rudder stop jamnuts, safety the turnbuckles, safety the nut on the swivel bolt on the pulley bracket of the balance cable and recheck travel. Remove the elevator column $4\frac{1}{2}$ (or $4\frac{3}{4}$ for D-10359 and After) inch-long block.
- (l) Changing the rudder rigging may change the elevator rigging. Check the elevator rigging after changing the rudder rigging.

WARNING: Check the ruddervator for the correct direction of movement by working the rudder pedals. When the left rudder pedal is depressed, the left ruddervator should move down and the right ruddervator should move up. When the right rudder pedal is depressed, the left ruddervator should move up, and right ruddervator should move down.

B. Ruddervator

(1) Removal

Refer to [Figure 202](#)

NOTE: The rudder system and elevator system are separate systems forward of the empennage. The control surfaces for both the rudder and elevator are the same parts. The rudder and elevator control surfaces will be referred to as ruddervator. Before disassembly, check the ruddervator for movement perpendicular to the hinge line. If any movement exists, find the cause of the looseness. If any hinge bolt, bearing or bushing shows signs of wear, they must be replaced.

- (a) Remove the screws holding the tail cone in position.
- (b) Remove the tail cone and disconnect the navigation light wire.
- (c) Remove the aft fuselage side and bottom panels.
- (d) Remove the $\frac{5}{16}$ inch bolt from the push-pull tube.
- (e) Working inside the open left side inspection hole, release the tab cable tension, then fasten the ruddervator tab cables so that no slack in the cables will be transmitted beyond the affected tab.

NOTE: Identify the cables so that they may be reinstalled in the proper location.

- (f) Disconnect the elevator tab cables at the tab.
- (g) Remove the guide lock located on the tab cable at the front of the ruddervator.
- (h) Remove the cotter pins from the hinge bolts.
- (i) Remove the nuts from the three hinge bolts.

NOTE: Support the ruddervator so that it will not fall or twist when the hinge bolts are removed. Note the position of the washers in each hinge assembly. Tag each hinge assembly as to the location of the washers (Refer to [Figure 202](#)).

- (j) Remove the bolts from the hinges.
- (k) Remove the two bonding jumpers which are attached near the hinges.
- (l) Remove the ruddervator.

(2) Installation

Refer to [Figure 202](#).

WARNING: Airframe vibration may be caused by worn elevator hinges, misthreaded trim tab hinges, loose stabilizer attachment or any improper installation which will allow free play.

NOTE: The elevator/rudder control surfaces will be referred to as ruddervator.

- (a) Support the ruddervator in its proper position. Make sure the hinge bushings are installed in the hinge halves on the stabilizer.

NOTE: Any hinge bolt, bearing or bushing showing signs of wear must be replaced. The maximum wear for the inboard bearing is 0.001-inch radial and 0.025-inch axial.

- (b) Install the bond jumpers at the center and outboard hinges (two 105090D032-1D washers go between the screw head and skin).
- (c) Using the notes made during removal (Refer to [Figure 202](#)), install the proper washers and bolts in the hinges as follows:

NOTE: Install the bolts with the nuts toward the fuselage.

- 1 The inboard hinge requires two AN960-416L and one AN960-416 washers. Install one AN960-416L washer under the bolt head and one between the torque fitting and the ruddervator inboard hinge support. One AN960-416 washer should be installed under the nut.
- 2 Torque the nut to 30 to 40 inch-pounds, it may be tightened up to 70 inch-pounds to align the cotter pin holes.

- (d) Install the nuts on the center and outboard hinge bolts.

NOTE: The center and outboard hinge bolt each require two AN960-10 washers under the nut. If the bolt grip length is too long, one additional washer may be added under the nut.

- (e) Torque the nuts to 20 to 25 inch-pounds; they may be tightened up to 40 inch-pounds to align the cotter pin holes.
- (f) Install the cotter pins in the hinge bolts.
- (g) Install the guide block for the tab cable at the front of the ruddervator.
- (h) Connect the tab cables to their respective tab horn.

NOTE: The bolt connecting the cable to the tab horn should be tight enough to prevent rattle, but loose enough to swivel. If the bolt is too tight, the tab control system will bind.

- (i) Remove the fasteners which were installed to prevent cable slack from being transmitted to the rest of the tab system.
- (j) Install the $\frac{5}{16}$ inch push-pull tube bolt.
- (k) Install the aft fuselage inspection panels.
- (l) Connect the tail light wire and install the tail cone.

NOTE: Check for proper ruddervator and trim tab travel after installation is complete. When the control column is pulled back, the correct ruddervator movement is up. When the elevator trim tab control is moved toward the nose-up position, the trim tab should move DOWN. When the elevator trim tab control is moved toward the nose-down position, the trim tab should move UP.

C. Elevator Trim Tab

(1) Removal

Refer to [Figure 203](#).

- (a) Remove the screws from the tail cone.
- (b) Disconnect the electrical wires and remove the tail cone.
- (c) Remove the cotter pin from the control cable clevises and trim tab.
- (d) Remove the nuts, washers and bolts from the control cable clevises.
- (e) Support the trim tab so that it will not fall or twist when the hinge pin is removed.
- (f) Remove the safety wire from the trim tab hinge pin.
- (g) Unclip the hinge pin.
- (h) Pull the hinge pin out and remove the elevator trim tab.

(2) Installation

- (a) Support the elevator trim tab in position on the ruddervator.
- (b) Install the trim tab hinge pin (Refer to [Figure 203](#)).
- (c) Clip the hinge pin in position and safety wire.
- (d) Connect the control cable clevises to the trim tab with bolts, washers and nuts.

NOTE: The clevises should be tight enough that they will not rattle but loose enough so that they will swivel. If the clevises are too tight, binding may occur.

- (e) Install the cotter pins in the clevis bolts.
- (f) Connect the electrical wires and install the tail cone.

NOTE: Check the trim tab moves in the correct direction as indicated by the movement of the controls.

D. Elevator and Tab (V35B)

NOTE: The rudder system and elevator system are separate systems forward of the empennage. The control surfaces for both the rudder and elevator are the same parts. The rudder and elevator control surfaces will be referred to as ruddervator.

(1) Elevator Rigging Procedure

NOTE: All rudder rigging should be accompanied with a travel board installed. A bubble protractor should not be used for any elevator rigging procedure.

- (a) Adjust the stops on the aft fuselage bulkhead to permit a maximum combined elevator/rudder (ruddervator) travel as shown in the table of travels under OVERALL TRAVEL (Refer to [Figure 204](#)).
- (b) Position the control column in the neutral position with $4\frac{1}{2}$ inches ($4\frac{3}{4}$ inches on D-10359 and After) between the collar on the instrument panel and the split collar on the control column. This can be done by cutting a block $4\frac{1}{2}$ (or $4\frac{3}{4}$ for D-10359 and After) inches long as applicable and taping it to the control column.
- (c) Straighten the nose wheel and adjust the pilot's rudder pedals (fore and aft) to the same position. Install the rudder pedal rig tool in the pilot's rudder pedals to place them in the neutral position and to prevent rudder system influence on elevator rigging. The left rudder pedal is aft of the right rudder pedal with the system in neutral. Use an offset rig tool as shown in [Chapter 27-20-00, Figure 201](#).
- (d) Install the differential mechanism jig assembly to position the differential mechanism in the neutral position. This is done with the 35-590087 differential mechanism jig assembly with the 35-590087-9 stop (Refer to [Figure 201](#), Detail E) installed. This will position the right tail control arm of the differential mechanism aft of the left tail control arm with the elevator system and rudder system in neutral.
- (e) Adjust the short, lower elevator cable to a total length of 23.62 ± 0.06 inches as measured from the center of its attachment points at the reduction bellcrank and the differential mechanism (Refer to [Figure 205](#)). No threads on the turnbuckle ends should be visible outside of the barrel after adjustment. Safety the turnbuckle. No further adjustment of this cable is required.
- (f) Adjust the upper and lower (forward of the reduction bellcrank) elevator cable turnbuckles simultaneously until cable tensions are as shown on the temperature cable tension graph in [Figure 204](#). The differential mechanism, the control column and rudder pedals are still to be in their neutral positions after cable tensions are adjusted.

NOTE: With the rudder, elevator and tab cable systems correctly adjusted and in neutral, the differential mechanism is in its neutral position when its tail control (rudder arms) are lightly contacting the aft side of the 35-390087 differential mechanism jig assembly (with -9 stop installed) and the outboard ends (legs) of the jig assembly are lightly contacting the forward side of the fuselage station 256.9 bulkhead. The nut on the differential mechanism elevator (center) control arm is to be positioned inside the hole in the jig assembly. The elevator and rudder system is in neutral when the differential mechanism jig assembly, the rudder rig tool and the control column block are installed with the ruddervators in the 0° position and the cable tensions set to the temperature cable tension graph (Refer to [Figure 204](#)). The trim tab system is in neutral when the cockpit indicator is at 0° , the cable tensions are set to the temperature cable tension graph and the tabs are at 0° or symmetrically split to correct for yaw. The tabs are at 0° when their trailing edges align with the trailing edges of the ruddervators.

- (g) Set the ruddervators in the neutral position (0°) by adjusting the control push-pull tube lengths. Make sure the rod ends remain screwed the required length into the push-pull tubes. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.
- (h) Remove the differential jig assemblies and remove the $4\frac{1}{2}$ inch-long block ($4\frac{3}{4}$ inch-long on D-10359 and After) on

the control column. Recheck (reset if necessary) the elevator cable tensions. The elevator trim system may be repositioned to minimize the downspring/bobweight effect on the elevator arm and elevator cable tensions. After the downspring effect is minimized, the up-and-down cable tension average must fall within the maximum and minimum values designated by the temperature cable tension graph (Refer to [Figure 204](#)).

- (i) Check the elevators for correct up-and-down travel limits: $22\frac{1}{2}$ degrees $+0 -1$ degree up and $19 +2 -1$ degrees down. The stops are nonadjustable stops forward of the instrument panel and underneath the control column. Steps (b) through (h) should result in the ruddervator travel being correct or close to correct. Make any final minor adjustments by lengthening or shortening the ruddervator push-pull tubes, but make sure the rod ends remain screwed the required length into the push-pull tubes. They should extend past the inspection hole, i.e. a wire should not pass through the inspection hole.
- (j) Adjust the elevator downspring cable turnbuckle with the ruddervators 9° up and the tabs 20° down (nose up) to remove all slack from this cable system; then check the force on the elevator control column. With the trim tabs set at neutral (0°), a force of 19 ± 3 pounds applied on the control column is required to move the ruddervators through neutral. If necessary, adjust the elevator downspring cable turnbuckle to obtain the value.
- (k) When the elevator travels and forces are correct, tighten the rod-end jam nuts, safety the turnbuckles and recheck the travels. Remove the rudder rig tool.
- (l) Changing elevator rigging may change the rudder rigging. Check the rudder rigging after changing the elevator rigging.

WARNING: Check for correct direction of ruddervator travel by moving the control column. When the control column is pushed forward, the correct ruddervator movement is down. When the control column is pulled back, the correct ruddervator movement is up. When the elevator trim tab control is moved toward the nose-up position, the trim tab should move DOWN. When the elevator trim tab control is moved toward the nose-down position, the trim tab should move UP.

(2) Inspection of Elevator Tabs

NOTE: The trim tabs have an upper contoured surface.

- (a) Check the up and down travel of the elevator tabs. The travel should be $5\frac{1}{2}^\circ +1\frac{1}{2}^\circ -1.0^\circ$ up and $23^\circ +2.0^\circ -0^\circ$ down.
- (b) Check the main and the aft tab cables for proper tension as shown on the temperature cable tension graph (Refer to [Figure 204](#)). The same number of terminal threads should be visible on each end of the turnbuckle barrels (a maximum of three threads may be visible).

(3) Electric Elevator Trim (Optional)

For the Model F33A, F33C, A36, A36TC and B36TC electric trim system (Refer to [27-30-00, 201](#)).

(4) Elevator Tab Rigging

NOTE: The use of a bubble protractor is not adequate to set the ruddervator travels. A travel board must be used for this. However, with the ruddervator set at neutral, a tab travel board or a bubble protractor may be used to set elevator tab travel. Elevator tabs should be rigged with the travel board or bubble protractor perpendicular to the chord plane of the stabilizer or tab respectively.

- (a) Install a $4\frac{1}{2}$ inch-long block (or $4\frac{3}{4}$ inch-long on D-10359 and After) on the control column and install the rudder pedal rig tool ([27-20-00](#), Figure 201) to maintain the ruddervators in neutral. Rotate the elevator tab wheel in the cabin so the indicator dial is set on zero.

NOTE: Both elevator trim tabs should be at neutral (tab trailing edge aligned with ruddervator trailing edge) (Refer to [RIGGING ELEVATOR TRIM TABS TO CORRECT FOR YAW](#)). Trim tab actuator stops on the cables should be moved away from the stops in the fuselage.

- (b) Rotate the elevator trim tab control wheel to full nose up on the indicator (tabs down). Check the tab actuator at F.S. 233.5 for a distance of 0.38 to 0.50 inch between the face of the actuator and the centerline of the bolt in the clevis end of the actuator screw as shown in [Figure 206](#).
- (c) Adjust the length of the actuator screw by disconnecting the bellcrank at the actuator bolt and turning the screw to the dimension shown in [Figure 206](#). Reconnect the bellcrank to the tab actuator.
- (d) Adjust the four trim tab cables aft of the bellcrank to obtain $23^\circ +2.0^\circ -0^\circ$ tab down position, and establish the initial

trim tab cable tension per the temperature cable tension graph on [Figure 204](#). Loosen the tab cable stop if necessary. The same number of terminal threads should be visible on each end of the turnbuckle barrel (a maximum of three threads).

- (e) Move the tab control wheel to fully nose down on the indicator (tabs up). The trim tab up-position should be $5\frac{1}{2}^{\circ} + 1\frac{1}{2}^{\circ} - 1.0^{\circ}$ without altering the tab cable adjustment. Loosen the tab cable stop, if necessary, to obtain these dimensions. The preceding procedure has established the capability of the elevator tab actuator to move through its maximum available range and has correctly oriented the tab indicator, the tab actuator and trim tabs to one another.
- (f) Move the tab system to neutral (0°) position. Check and readjust cable tension per the temperature cable tension graph in [Figure 204](#) if necessary.
- (g) Move the tab control wheel toward nose-down and establish trim tab up-travel per the table on [Figure 204](#). Move the trim tab cable adjustable upstop against the fixed stop in the fuselage.
- (h) Check the clevis bolts which attach the tab cables to the tab horn. The clevis bolts should be free of corrosion and dirt and be loose enough to allow free movement of the horn without binding the tab cables.
- (i) Move the trim tab wheel toward nose-up and establish the trim tab down-travel per the table on [Figure 204](#), and move the trim tab cable adjustable down stop against the fixed stop in the fuselage. Move the tab control wheel to neutral (0°) on the indicator. The trailing edge of the trim tabs should align with the trailing edge of the ruddervators.
- (j) Reinspect and safety all turnbuckles, nuts, bolts and cable stops affected during this procedure. The tab cable stops are to be tightened to 20 +5.0 -0 inch-pounds of torque and safetied.

WARNING: After rigging the ruddervator and elevator trim tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. When the control column is moved forward, the ruddervators should move DOWN. When the control column is moved aft, the ruddervators should move UP. When the elevator trim tab control is moved toward the nose up position, the trim tab should move DOWN. When the elevator trim tab control is moved toward the nose down position, the trim tab should move UP.

- (k) Close all inspection panels and test fly the airplane.
 - (l) If yawing occurs in level flight with the ailerons in neutral, adjust the tabs per the instructions under RIGGING ELEVATOR TRIM TABS TO CORRECT FOR YAW.
- (5) Rigging the Elevator Trim Tabs to Correct for Yaw
The elevator tabs can be rigged to function as a rudder tab by making minor adjustments up and down from the neutral position.
- (6) For Right Yaw (Nose of Airplane Tends to Move to Right with Wings Level)
- (a) Adjust the right elevator tab down approximately 1.0° by lengthening the upper right trim tab cable and shortening the lower right trim tab cable.
 - (b) Adjust the left elevator tab up approximately 1.0° by shortening the upper left trim tab cable and lengthening the lower left cable.
 - (c) Set cable tensions to the graph specifications on [Figure 204](#).
 - (d) Safety the two turnbuckles, close the inspection panels and test fly the airplane.
- (7) For Left Yaw (Nose of Airplane Tends to Move to Left with Wings Level)
- (a) Adjust the right elevator tab up approximately 1.0° by lengthening the lower right tab cable and shortening the upper right tab cable.
 - (b) Adjust the left elevator tab down approximately 1.0° by lengthening the upper left cable and shortening the lower left cable.
 - (c) Set cable tensions to the graph specifications on [Figure 204](#).
 - (d) Safety the two turnbuckles, close the inspection panels and test fly the airplane.

NOTE: In the event the above procedure results in over correcting, partial readjustment to reduce the rudder effect can be accomplished on one tab only. The maximum allowable amount of split between trim tabs is 6.0° . The average degree of tab travel at fully up or down cannot exceed the limit of travel.

- (8) Elevator Tab Indicator Cable Replacement

- (a) Place the proper tension on the trim cables in the neutral position. Both turnbuckles aft of F.S. 185 should be approximately even (Refer to [Figure 207](#)).
- (b) To install the dial indicator cable, thread the cable through the hole in the head of the cotter pin and out through the holes in the indicator drum.
- (c) With the dial at 0 degrees, slip the cable so that both ends of the cable are of equal length.
- (d) Wrap the cable around the drum one full turn in each direction. The end that wraps to the right will be wrapped clockwise around the drum and the end that wraps to the left will be wrapped counterclockwise, as viewed from the left side.
- (e) Route the cable over the appropriate idler pulley down to the shaft of the tab control wheel.
- (f) With the dial still in the 0 degrees position, take the cable coming off the top of the elevator tab dial sheave and bring it down to the forward side of the tab wheel shaft to the left of the small hole.
- (g) Wrap the cable (counterclockwise) around the shaft toward the hole three turns. Insert the cable through the hole. Wrap the surplus cable around the shaft.
- (h) With the dial set at 0 degrees, take the cable coming off the bottom of the trim tab dial sheave and bring it down to the aft side of the tab wheel shaft, to the right hole in the shaft, and wrap the cable (clockwise as viewed from the left end of the shaft) three turns toward the hole in the shaft.
- (i) Insert the cable through the hole in the shaft and wrap it around the shaft.
- (j) Twist the cables together and solder them. Use only rosin core solder.
- (k) Check the tab dial to see that it will roll from one stop to another.
- (l) Set the tab dial at 0 degrees. Place tension on the tab cables in the tail section to hold the tabs in line with the ruddervators.

NOTE: With the ruddervators set in the neutral position, the elevator tab should be set at $2.0^{\circ} \pm 1.0^{\circ}$ above neutral ruddervator position. The right elevator tab should be set at $0^{\circ} \pm 1.0^{\circ}$ ruddervator position.

- (m) Safety the turnbuckles and set the stops on the fuselage cables to maintain proper travel in accordance with the travel table in [Figure 204](#).

WARNING: After rigging the elevator and elevator trim tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. When the elevator trim tab control wheel is moved toward the NOSE-DOWN position, the elevator trim tab should move UP.

E. Inspection of Tab Hinges

Improper cable tensions, either above or below the recommended limits, will cause excessive wear on the tab hinges. If excessive wear is noted on the ruddervator half of the hinge, it should be replaced.

The bolt securing the cable to the elevator tab horn should swivel in the horn at all times, if the bolt binds, it will cause cracks to develop in the tab horn. The bolt should be just tight enough to prevent rattle, but not tight enough to cause binding in the horn.

F. Trim Tab Actuator (V35B)

(1) Removal

- (a) Using the trim tab control in the flight compartment, move the trim control to the fully nose-up position as noted on the elevator trim tab indicator.
- (b) Remove the access panel on the left side of the fuselage, just forward of the ruddervator.
- (c) Install identification tags on the cables and disconnect the cables which are routed aft of the elevator trim tabs.
- (d) Install identification tags to the cables on each side of the first turnbuckle and disconnect the actuator cables routed forward to the flight compartment. Secure the cables so they do not come off the forward pulleys. Secure the cables to the actuator so the actuator screw position can be maintained.

CAUTION: Do not damage, kink or put bends in the cables.

- (e) Identify the cables on the actuator being removed so that the cables on the replacement actuator are reconnected correctly.
- (f) Remove the three bolts securing the actuator to the bracket and remove the actuator and attached bellcrank from the airplane.

NOTE: It may be necessary to remove the two tab cable pulleys located directly below the actuator, in order to provide clearance for the cable ends on the actuator cables through the pulley bracket.

(2) Installation

- (a) Position the actuator assembly in the bracket and install the three attaching bolts.
- (b) Using the cable at the forward side of the actuator drum, be certain the cable is at the end of its actuator drum travel.
- (c) Rotate the actuator drum upward until the pin securing the cable to the drum is no longer visible through the actuator cable opening.

NOTE: If the bellcrank-to-actuator screw linkage is disconnected, install the actuator bolt, washers, nut and cotter pin to attach the bellcrank to the actuator.

- (d) With the actuator bolt connecting the bellcrank to the actuator screw linkage installed, position the trim tab actuator screw by rotating the actuator drum to obtain the actuator bolt-centerline-to actuator-face distance of 0.38 to 0.50 as shown in [Figure 206](#).
- (e) Connect the actuator cables to the cables routed aft from the flight compartment.
- (f) If the two tab cable pulleys, located directly below the actuators, were removed to provide clearance for the ends of the actuator cable, install the two pulleys at this time.

CAUTION: Do not damage, kink or put bends in the cables.

- (g) Connect the bellcrank cables routed aft to the elevator trim tabs.
- (h) The elevator trim tab indicator on the pilot's instrument panel should indicate the fully nose-up position in degrees as noted in [Figure 204](#).

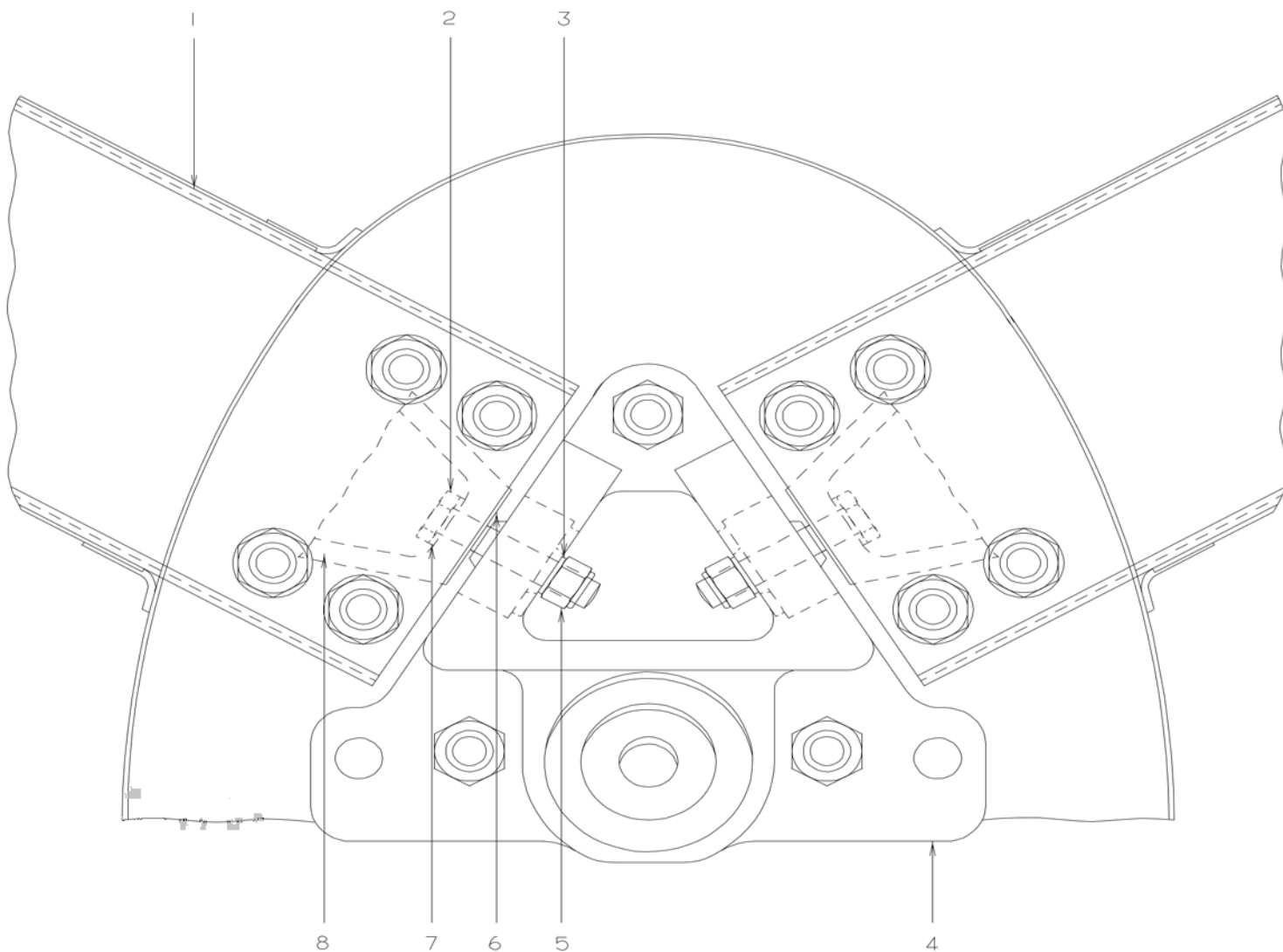
CAUTION: Make sure all cables are hooked up correctly. Operate the elevator system through the full travel to ensure complete and proper degrees of travel of the trim tabs. Check for proper direction of travel. For a nose-up condition on the airplane, the trim tab should down. For a full nose-down condition, the trim tab should move up.

- (i) Install the access panel on the left side of the fuselage, just forward of the ruddervator.

Figure 202 : Sheet 1 : Ruddervator Installation

E25991

- 1 STABILIZER
- 2 BOLT
- 3 WASHER
- 4 ELEVATOR (RUDDERVATOR) INBOARD HINGE SUPPORT
- 5 NUT
- 6 WASHER
- 7 WASHER
- 8 TORQUE FITTING



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Figure 203 : Sheet 1 : Elevator Trim Tab Installation

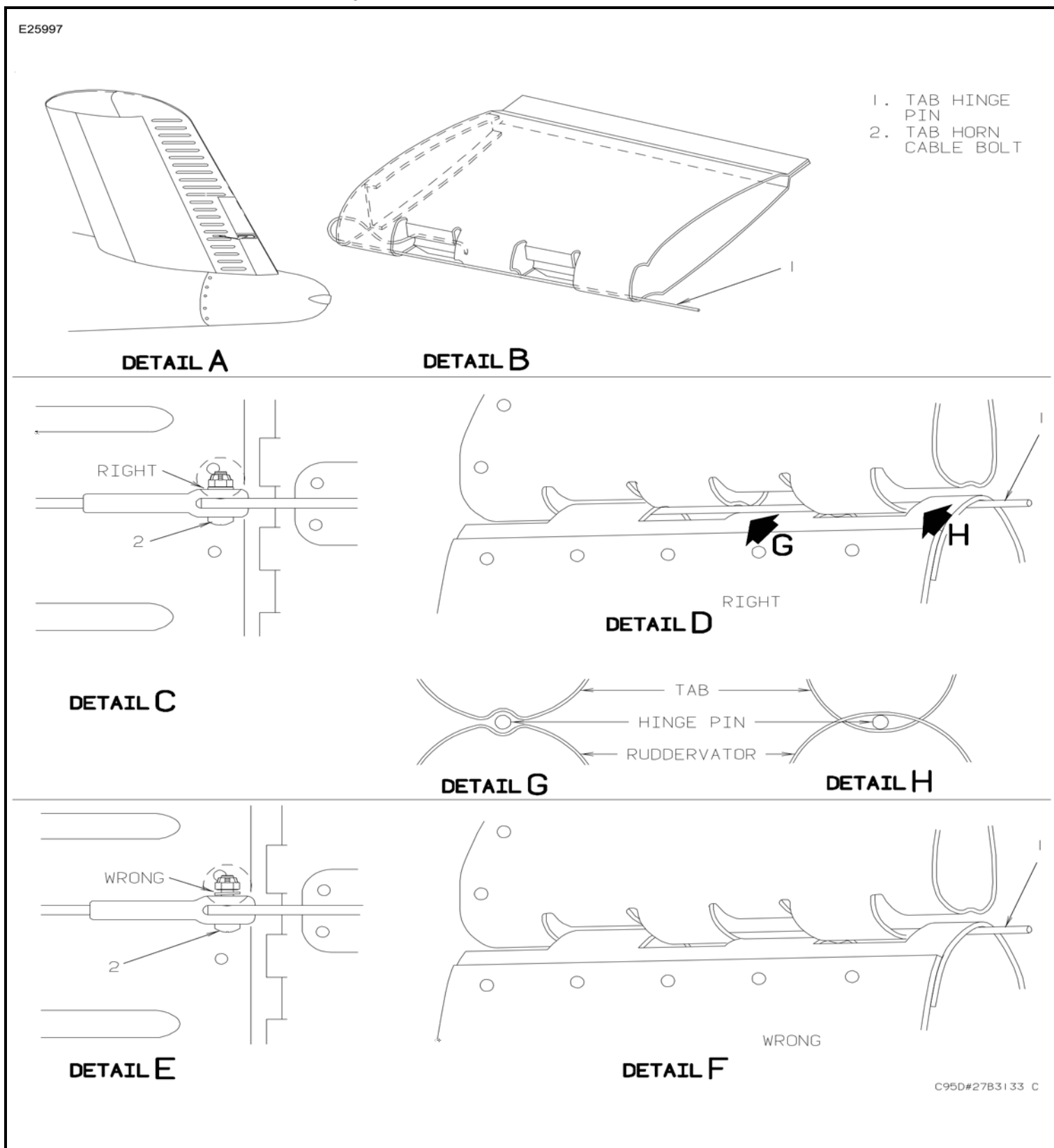


Figure 204 : Sheet 1 : Elevator System (V35B)

E26016

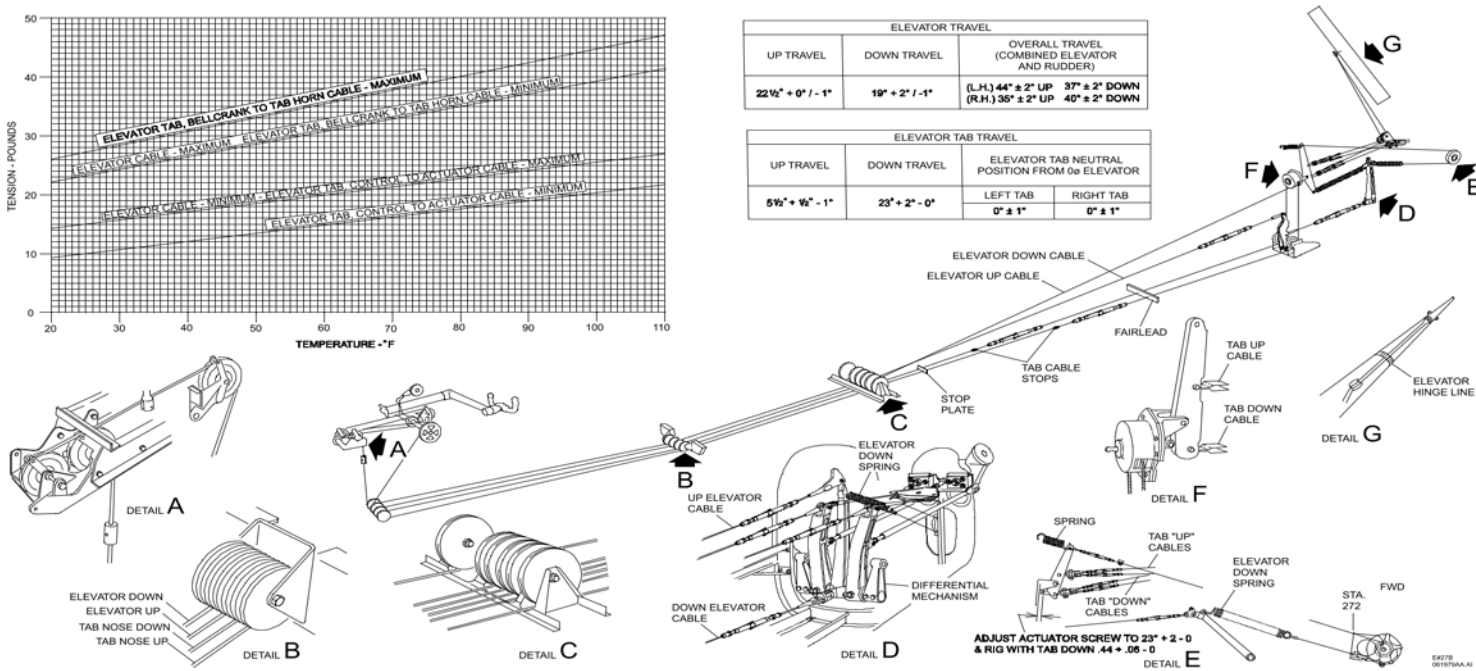
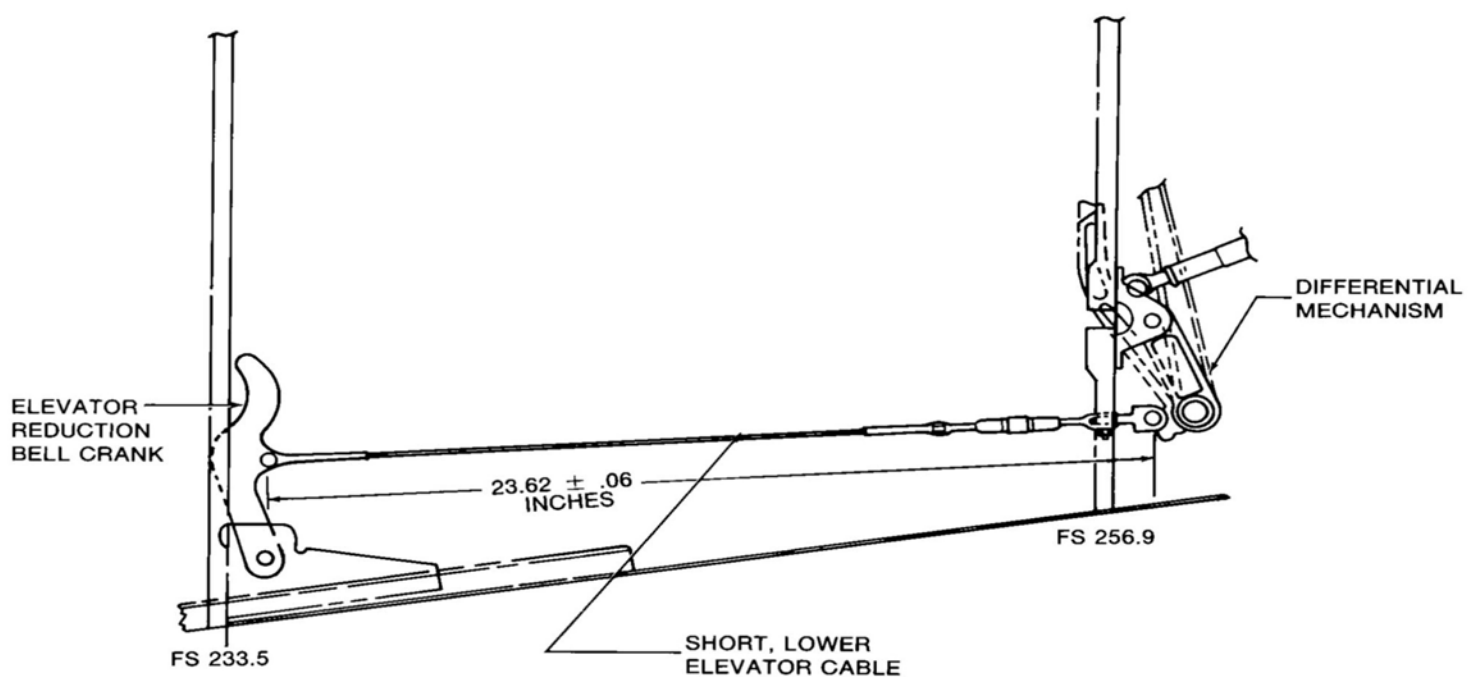


Figure 205 : Sheet 1 : Elevator Short Lower Cable Adjustment

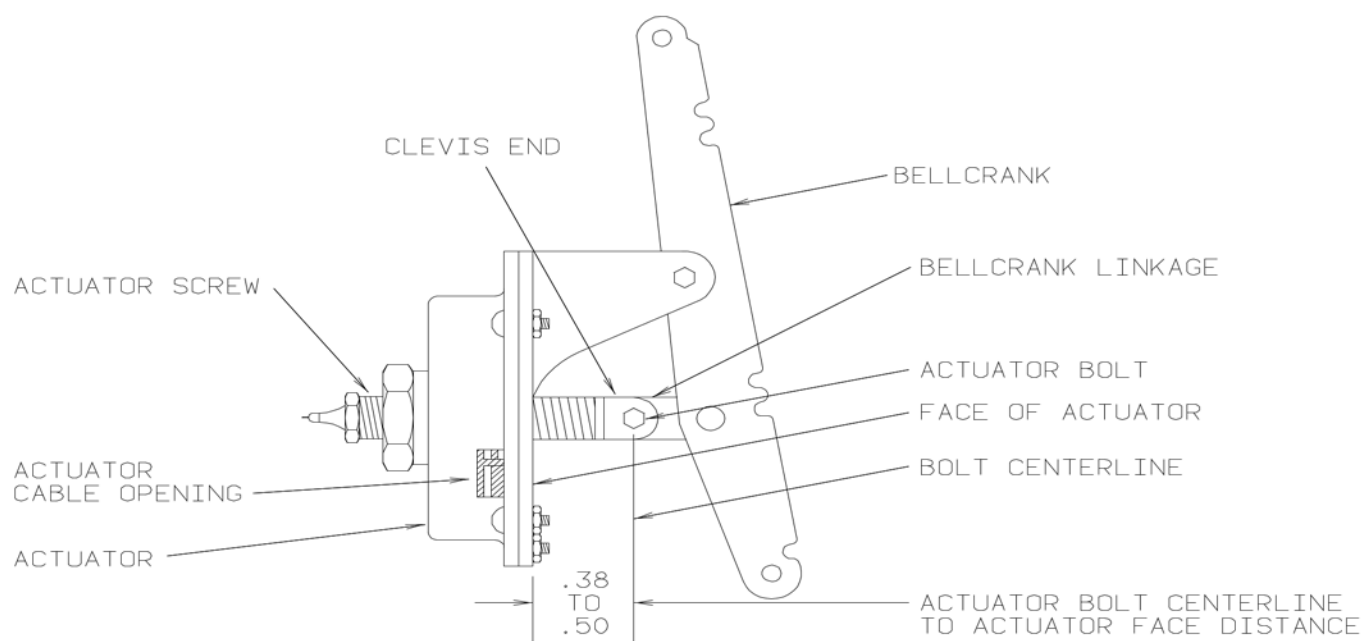
E24141



35-152-41

Figure 206 : Sheet 1 : Trim Tab Actuator and Bellcrank (V35B)

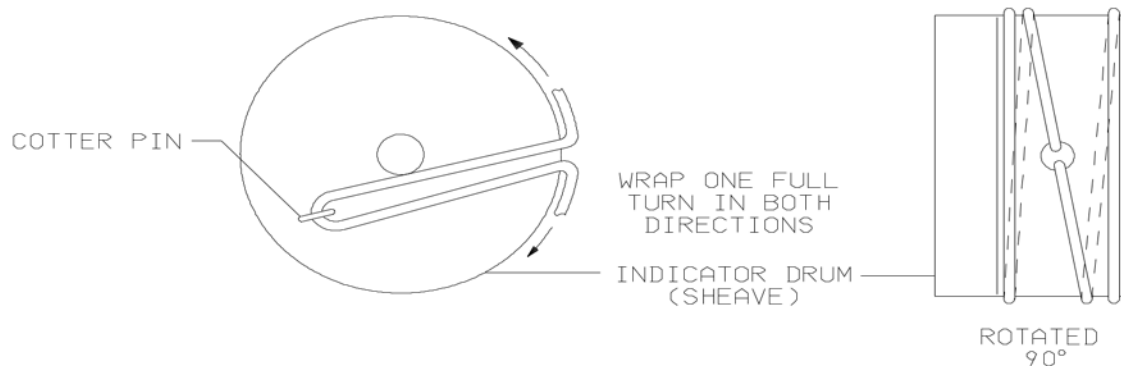
E26031



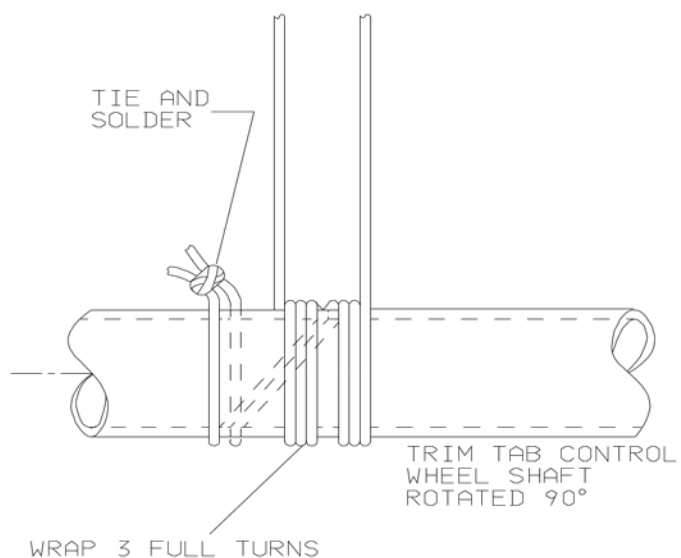
35-152-040 C

Figure 207 : Sheet 1 : Elevator Trim Tab Indicator Cable Replacement

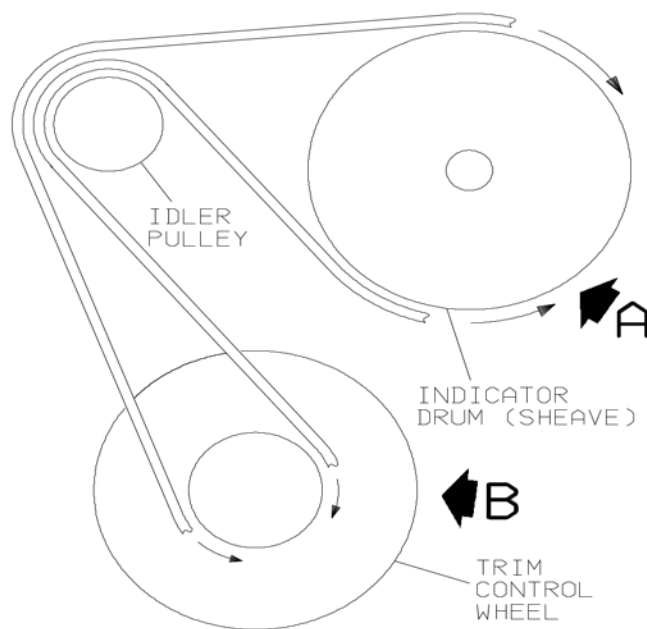
E26040



DETAIL A



DETAIL B



36-152-39

ELEVATOR AND TAB - MAINTENANCE PRACTICES

1. Elevator and Tab - Maintenance Practices (F33A, F33C, A36, A36TC, B36TC and G36)

WARNING: On airplane serials CE-1566 and After; E-1946, E-2104, E-2111 and After; EA-242, EA-273 and After, observe the color coding on all parts when replacing or installing control cables, bellcranks and/or other control system components. DO NOT connect parts of one color to coded parts of a different color.

WARNING: On the preceding airplane serials and earlier airplanes in compliance with Service Bulletin 2399, the elevator tab actuators are color coded. The actuators may have colored stripes or may be a solid color. The left actuator will be coded with a blue color. The right actuator will be coded with black or red.

NOTE: Unless otherwise noted, references to the A36 include G36 serials.

A. Elevator Removal

- (1) Detach the tailcone, disconnect the tail navigation light and remove the tailcone.
- (2) Remove the tail section access doors on the left side of the aft fuselage.
- (3) Disconnect the elevator push-pull tubes from the torque tube fittings of the elevator.
- (4) Disconnect the actuator rod at the actuator for the elevator trim tab.
- (5) Remove the hinge bolts.
- (6) Disconnect the elevator bonding cable and remove the elevator.

B. Elevator Installation

- (1) Connect the elevator bonding cable and position the elevator on the stabilizer, install the hinge bolts and nuts then tighten and lock with lockwire.
- (2) Connect the rod to the trim tab actuator on the elevator.
- (3) Install the attaching nut at the inboard point for the elevator and torque between 50 to 70 inch-pounds.
- (4) Connect the push-pull tubes at the torque tube fitting for the elevator.
- (5) Connect the tail light wires and install the tail cone.
- (6) Install the access doors.

C. Rigging the Elevator Control System (CE-748, CE-772 and After; CJ-149 and After, Prior to E-2111 except E-1946 and E-2104, and Prior to EA-273 except EA-242)

- (1) Set the downstop bolt so the aft side of the bellcrank just touches a straightedge held vertically against the back of the bulkhead (or is 0.62 ± 0.05 inch forward of the straightedge on F33A).
- (2) Adjust the elevator push-pull rod for a downward deflection of $15^\circ \pm 1^\circ$ on F33A, $20^\circ \pm 1^\circ$ on A36, or $25^\circ \pm 1^\circ$ on A36TC.
- (3) Adjust the elevator upstop bolt for a deflection of $23^\circ \pm 1^\circ$ up ($25^\circ \pm 1^\circ$ on F33A).
- (4) Disconnect the elevator downspring.
- (5) Rig neutral elevators on the control column by positioning the control column so the gust lock hole is 2.00 ± 0.03 inches aft of the hole in the control column support.
- (6) With the column fastened at neutral adjust the turnbuckles to obtain neutral elevators with a cable tension as indicated in [Figure 201, Sheet 2](#).
- (7) Connect the elevator downsprings.
- (8) With the elevators fully rigged on A36 and A36TC only, the control column should have a cushion of 1/16 to 1/8 inch when in the full forward position.
- (9) Employing a hand held force gage on the control wheel, adjust the elevator downsprings as follows:
 - (a) A36 and A36TC:
 1. 23 maximum pounds of breakout force at 20° DOWN elevator.
 2. 25 to 26 pounds of force through NEUTRAL elevator.
 3. 23 to 24 pounds of force as 23° UP elevator is reached.
 - (b) F33A and F33C:
 1. 17 to 18 pounds of force through NEUTRAL elevator.
 2. 15 to 16 pounds of force as 25° fully UP elevator is reached.

- (10) The gage reading at NEUTRAL elevator and 23° (A36 and A36TC) or 25° (F33A, F33C) UP elevator (0.6 inch off fully upstop) must be taken while the control wheel is in motion.
- (11) Adjust each spring by transferring the upper end to a spring attaching hole providing increased or decreased tension, as applicable. The elevator system should have sufficient freedom to allow free return of the elevator from fully UP to fully DOWN.

NOTE: After rigging the elevator and elevator trim tab control system, check for correct movement of the control surfaces with respect to movement of the controls.

Table 201. Elevator System(CE-748, CE-772 and After; CJ-149 and After; Prior to E-2111, except E-1946 and E-2104; prior to EA-273, except EA-242)

Cables	Cable Tension	Surface Travel	Model
ELEVATOR	22 ± 5 pounds TOP CABLE(DOWN ELEVATOR) at 59° F 23 ± 5 pounds LOWER CABLE(UP ELEVATOR) at 59° F	25° ± 1° UP 15° ± 1° DOWN	F33A F33C
	25 ± 5 pounds TOP CABLE(DOWN ELEVATOR) at 59° F 25 ± 5 pounds LOWER CABLE(UP ELEVATOR) at 59° F	23° ± 1° UP 20° ± 1° DOWN	A36 G36 A36TC
ELEVATOR TABS	15 +5/-0 pounds at 59° F	10° ± 1° UP 27° ± 1° DOWN	F33A A36 G36 A36TC
	15 +5/-0 pounds at 59° F	10° ± 1° UP 21° ± 1° DOWN	F33C

D. Rigging the Elevator Control System(E-1946, E-2104, E-2111 and After, EA-242, EA-273 and After)

- (1) Set the downstop bolt so that the center of the hole in the bellcrank is 0.38 inch ± 0.5 inch forward of a straightedge held against the back of the bulkhead at FS 257.606.
- (2) Adjust the elevator push-pull rod for an elevator deflection of 20° ± 1° down (on B36TC 25° ± 1°).
- (3) Adjust the elevator upstop bolt for a deflection of 25° +1°/-0° on A36 and 23° ± 1° up on B36TC.
- (4) Disconnect the elevator downsprings.
- (5) Rig neutral elevators on the control column by positioning the pilot's control column so the gust lock hole is 2.5 ± 0.3 (on B36TC 3.45 ± 0.3) inches aft of the hole in the control column support and install rig tool (Figure 202, Sheet 1).

NOTE: The short end of the tool is inserted into the control column support and the long end is inserted into the control column. The weight of the control column will hold the tool in place.

- (6) Adjust the turnbuckles to obtain neutral elevators with a cable tension as indicated in Figure 202, Sheet 2.
- (7) Remove the rig tool.
- (8) Connect the elevator downsprings.
- (9) With the elevators fully rigged (including autopilot and electric trim if installed), the force required to pull the control wheel aft through neutral must be 25 to 29 pounds. The force required to return the wheel through neutral shall be 20 to 24 pounds. The difference (friction of the system) between the two readings shall never exceed 9 pounds (7 pounds is desired) nor be less than 4 pounds.
- (10) Maintain a minimum clearance of 0.6 inch between the control wheel adapter and the inner control column guide assembly (both the pilots and copilots) at fully down elevator on the A36 and B36TC.

NOTE: After rigging the elevator and trim tab system, check for correct movement of the control surfaces with respect to the movement of the controls. When the trim tab control wheel is moved toward the NOSE DOWN position, the trim tab should move UP.

Table 202. Elevator System(EA-1946, E-2104, E2111 and After; EA-242, EA-273 and After)

Cables	Cable Tension	Surface Travel	Model
ELEVATOR	25 ± 5 pounds TOP CABLE(DOWN ELEVATOR) at 59°F 25 ± 5 pounds LOWER CABLE(UP ELEVATOR) at 59° F	25° +1°/-0° UP 20° ± 1° DOWN	A36 G36
	25 ± 5 pounds TOP CABLE(DOWN ELEVATOR) at 59°F 15 ± 5 pounds LOWER CABLE(UP ELEVATOR) at 59° F	23° ± 1° UP 25° ± 1° DOWN	B36TC
ELEVATOR TABS	15 +5/-0 pounds at 59° F	25° ± 1° DOWN RH 27° ± 1° DOWN LH 10° ± 1° UP RH 8° ± 1° UP LH	A36 G36 B36TC

- E. Elevator Tab Indicator Cable Replacement (CE-748, CE-772 and After; CJ-149 and After, Prior to E-2111 except E-1946 and E-2104, and Prior to EA-273 except EA-242)
- Place the proper tension on the trim cables in neutral position.
 - To install the dial indicator cable, thread the cable through the hole in the head of the cotter pin and out through the holes in the indicator drum.
 - With the Dial at 0°, slip the cable so that both ends of the cable are of equal length.
 - Wrap the cable around the drum one full turn in each direction. The end that wraps to the right will be wrapped clockwise around the drum, and the end that wraps to the left will be wrapped counterclockwise, as viewed from the left side.
 - Route the cable over the appropriate idler pulley down to the shaft of the tab control wheel.
 - With the dial still in 0° position, take the cable coming off the top of the elevator tab dial sheave and bring it down to the forward side of the tab wheel shaft to the left of the small hole.
 - Wrap the cable (counterclockwise) around the shaft toward the hole three turns. Insert the cable through the hole. Wrap the surplus cable around the shaft.
 - With the dial set at 0°, take the cable coming off the bottom of the trim tab dial sheave and bring it down to the aft side of the tab wheel shaft to the right of the hole in the shaft, and wrap the cable (clockwise as viewed from the left end of the shaft) three turns toward the hole in the shaft.
 - Insert the cable through the hole in the shaft and wrap it around the shaft.
 - Twist the cables together and solder them. Use only Rosin cored solder.
 - Check the tab dial to see that it will roll from one stop to the other.
 - Set the tab dial at 0°. Place tension on the tab cables in the tail section to hold the tabs in line with the elevators.

NOTE: With the elevators set in the neutral position, the left elevator tab should be set at 2° ± 1° above neutral elevator position. The right elevator tab should be set at 0° ± 1° elevator position.
 - Safety the turnbuckles and set the stops on the fuselage cables to maintain proper travel in accordance with the travel table.

NOTE: After rigging the elevator and elevator trim tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. When the elevator trim tab control wheel is moved toward the NOSE DOWN position, the elevator trim tab should move UP.
- F. Elevator Trim Tab Forward Cable Replacement(E-1946, E-2104, E-2111 and After, EA-242, EA-273 and After)
- Remove the fifth and sixth seats (if installed) as shown in FIFTH AND SIXTH SEAT REMOVAL in Chapter 25-00-00.
 - Remove the screws from the baggage area floor and remove floor.
 - Remove the upholstery panel from the back of the baggage area.
 - After identifying and tagging the cables for reinstallation, disconnect the forward trim tab cables at the turnbuckles in the aft

fuselage.

- (5) Tie nylon strings to each of the cable ends. Use a small knot.
- (6) Remove the access panel (actuator door) which is located under the pulleys below the pedestal.
- (7) Remove the panel on the left side of the pedestal.
- (8) Remove the autopilot panel (if installed) below the engine and propeller controls.

NOTE: Station a man in the aft fuselage to keep a small amount of tension on the strings as they are pulled through the fuselage.

- (9) Place the elevator tab control in neutral and mark the neutral position on the sprocket and chain.
- (10) Count the number of chain links on each side of the mark and note the number for later reference.
- (11) Pull the cables and strings from the fuselage out through the pedestal.

NOTE: Note which color (blue and black) goes over the top, forward side of the sprocket.

- (12) Tie the new cable to the strings.

NOTE: The shorter (color coded blue) cable goes over the top forward side of the sprocket.

- (13) Pull the strings and cables back through the fuselage.

NOTE: Make sure the trim tab cables do not interfere with the engine and propeller controls located adjacent to them.

- (14) Check the pulleys below the pedestal to determine that the cables are properly installed.
- (15) Make sure that the correct number of chain links are on each side of the mark on the sprocket.
- (16) Connect the turnbuckles in the aft fuselage.
- (17) Tension the cables per Figure 202, Sheet 2.
- (18) Check for proper elevator tab travel.
- (19) Set the tab travel as indicated in Figure 202, Sheet 1.
- (20) Install the aft upholstery panel.
- (21) Install the baggage floor panel.
- (22) Install the back seats. See FIFTH AND SIXTH SEAT INSTALLATION in Chapter 25-00-00.
- (23) Install the access panel (actuator door) below the pedestal.
- (24) Install the access panel(s) on the pedestal.

WARNING: Make sure that insulation, tiewraps, etc. do not interfere with control components such as cables, chains etc.

WARNING: After rigging the elevator and elevator tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. When the elevator tab control is moved toward the 'NOSE DOWN' position, the tab should move up.

G. Rigging the Elevator Trim Tab

- (1) Place the elevator tab indicator in the neutral position.
- (2) Rig the cables to the tension shown on the elevator temperature cable tension graph in Figure 201, Sheet 2 or Figure 202, Sheet 2, as applicable.
- (3) Place the elevator in neutral position and adjust the trim tab pushrod to bring the tab into the neutral position.

NOTE: To improve the elevator centering, the LH and RH trim tabs are rigged to a different setting in the neutral position on serials E-1946, E-2104, E-2111 and After; EA-242, EA-273 and After. Rig these airplanes as per steps (a) through (d).

- (a) Rig neutral tab surfaces with LH down $1^\circ \pm 0.5^\circ$ and RH up $1^\circ \pm 0.5^\circ$ with indicator at 0° .
 - (b) The normal total difference between the tab surfaces is to be $2^\circ \pm 0.5^\circ$ for all positions.
 - (c) Set the cable stops to provide $8^\circ \pm 1^\circ$ up on LH tab and $10^\circ \pm 1^\circ$ up on RH tab, and $27^\circ \pm 1^\circ$ down on LH tab and $25^\circ \pm 1^\circ$ down on RH tab as indicated in Figure 202, Sheet 1.
 - (d) The cockpit indicator is to read $9^\circ \pm 2^\circ$ up and $26^\circ \pm 2^\circ$ down.
- (4) Adjust the stops on the cables to allow surface travel as shown in Figure 201, Sheet 1 except on airplanes with the serials

listed in the preceding note.

- (5) Torque the stop bolts between 40 to 60 inch-pounds.

NOTE: After rigging the elevator and elevator tab control systems, check for correct movement of the control surfaces with respect to the movement of the controls. When the elevator tab control is moved toward the 'NOSE DOWN' position, the tab should move up.

H. Elevator Trim Tab Actuator

- (1) Elevator Trim Tab Actuator Disassembly(F33A, B36TC, A36TC and A36, except E-1111, F33C Prior to CJ-156 except Those Airplanes With Kit 33-4002-1 Installed, G36)

(a) Remove the snap ring (6) from the actuator housing and pull the nut assembly (10) out of the housing (Refer to [Figure 203](#)).

(b) Remove the actuator screw (9) from the nut assembly.

CAUTION: Do not damage the rod end when drilling out rivets.

(c) Remove the Nut (2), washer (3) and shoulder pin (5) then drill out rivet (1). Remove actuator rod end (4) from the screw. The bearing (7) and the bushing (8) can now be removed from the screw.

(d) Remove check nut (15) and screw out the end adjusting bushing (14) with appropriate spanner wrench.

(e) Remove the packing (13).

(f) Remove the bearing (12) from the housing (11).

- (2) Elevator Trim Tab Actuator Assembly(F33A, B36TC, A36TC and A36, except E-1111, F33C Prior to CJ-156 except Those Airplanes With Kit 33-4002-1 Installed, G36)

Clean all parts in solvent ([16, Table 1, 91-00-00](#)) and inspect for cracks, corrosion and distortion. Replace bushings and any parts showing evidence of deterioration. Lubricate all parts with grease ([11, Table 1, 91-00-00](#)) prior to assembly.

(a) Install bearing (12) into housing (11) (Refer to [Figure 203](#)).

(b) Install packing (13) into adjusting bushing (14).

(c) Install adjusting bushing (14) and check nut (15) (do not tighten).

(d) Install bushing (8) bearing (7) and snap ring (6) on actuator screw (9).

(e) Install actuator rod end (4) on actuator screw (9) and secure with rivet (1) and shoulder pin (5), washer (3) and nut (2).

NOTE: Lubricate all parts except packing with grease ([11, Table 1, 91-00-00](#)) prior to assembly. Lubricate the packing with silicone compound ([50, Table 1, 91-00-00](#)).

(f) Install screw (9) into nut (10).

WARNING: The trim tab actuator that will be installed on the left horizontal stabilizer shall have threads on its actuator screw (9) that will rotate clockwise when screwed into the nut assembly (10).

WARNING: The trim tab actuator that will be installed on the right horizontal stabilizer shall have threads on the actuator screw (9) that rotate counterclockwise when screwed into the nut assembly (10).

(g) Install nut assembly (10) into housing (11); secure with snap ring.

(h) Screw adjusting bushing (14) into housing (11) until the end play has been removed from the nut assembly and tighten the check nut (15). An end play of 0.003 inch is permissible.

- (3) Elevator Trim Tab Actuator Disassembly (E-1111 Only)

(a) Remove the retainer ring (2) from the housing (5) and pull the nut assembly (6) out of the housing (Refer to [Figure 204](#)).

(b) Remove the actuator screw (4) from the nut assembly (6).

(c) Drill out rivet (12).

(d) Remove nut (10), washer (11), and shoulder pin (9). The collar (3) can now be removed.

(e) Remove check nut (8) and screw out bushing (7) with the appropriate spanner wrench.

Clean all parts with solvent ([16, Table 1, 91-00-00](#)) and replace all parts that are cracked, corroded and distorted. Lubricate all parts with grease ([11, Table 1, 91-00-00](#)) prior to assembly.

- (4) Elevator Trim Tab Actuator Assembly (E-1111 Only)

(a) Place collar (3) and retaining ring (2) on actuator screw (4) (Refer to [Figure 204](#)).

- (b) Install actuator rod end (1) on actuator screw (4) being careful to align the holes.
- (c) Install shoulder pin (9) washer (11) and nut (10).
- (d) Install rivet (12) P/N MS20613-3C10.

NOTE: Lubricate all parts with grease (11, Table 1, 91-00-00) prior to assembly.

- (e) Install actuator screw (4) into nut assembly (6).

WARNING: The trim tab actuator that will be installed on the left horizontal stabilizer shall have threads on its actuator screw (4) that will rotate clockwise when screwed into the nut assembly (6).

WARNING: The trim tab actuator that will be installed on the right horizontal stabilizer shall have threads on the actuator screw (4) that rotate counterclockwise when screwed into the nut assembly (6).

- (f) Install nut assembly (6) into housing (5) and secure with retainer ring (2).
- (g) Install bushing (7) and secure with check nut (8).

NOTE: When assembling the actuator, screw the threaded bushing (7) into the assembly (5) until end play of the nut assembly (6) has been removed, then lock in place by tightening the check nut (8). The nut assembly (6) must be free to rotate and provide smooth operation through its full travel with a maximum end play of 0.0015 inch.

- (5) Elevator Trim Tab Actuator Disassembly (Model F33C (CJ-156 and After, and Earlier Airplanes Incorporating Kit 33-4002-1))

- (a) Remove the snap ring (4) from the actuator housing and pull the nut assembly (7) out of the housing (Refer to Figure 205).

- (b) Remove the actuator screw (6) from the nut assembly.

CAUTION: Do not damage rod end when drilling out rivet.

- (c) Remove nut (1), washer (2) and shoulder pin (3). The bushing (5) can now be removed from the screw.
- (d) Remove check nut (12) and screw out the end adjusting bushing (11) with appropriate spanner wrench.
- (e) Remove packing (10).
- (f) Remove the bearing (9) from housing (8).

Clean all parts in solvent (16, Table 1, 91-00-00) and inspect for cracks, corrosion and distortion. Replace bushings and any parts showing evidence of deterioration. Lubricate all parts with grease (11, Table 1, 91-00-00) prior to assembly.

- (6) Elevator Trim Tab Actuator Assembly (Model F33C (CJ-156 and After, and Earlier Airplanes Incorporating Kit 33-4002-1))
Clean all parts in solvent (16, Table 1, 91-00-00) and inspect for cracks, corrosion and distortion. Replace bushings and any parts showing evidence of deterioration. Lubricate all parts with grease (11, Table 1, 91-00-00) prior to assembly.

- (a) Install bearing (9) into housing (8) (Refer to Figure 205).
- (b) Install packing (10) into adjusting bushing (11).
- (c) Install adjusting bushing (11) and check nut (12) (do not tighten).
- (d) Install bearing (5) and snap ring (4) on actuator screw (6).
- (e) Install shoulder pin (3), washer (2) and nut (1) on actuator screw (6).
- (f) Install screw (6) into nut (7).

WARNING: The trim tab actuator that will be installed on the left horizontal stabilizer shall have threads on the actuator screw (6) that rotate clockwise when screwed into the nut assembly (7).

WARNING: The trim tab actuator that will be installed on the right horizontal stabilizer shall have threads on the actuator screw (6) that rotate counterclockwise when screwed into the nut assembly (7).

- (g) Install nut assembly (7) into housing (8), secure with snap ring (4).

NOTE: Lubricate all parts except the packing with grease prior to assembly. Lubricate the packing with silicone (50, Table 1, 91-00-00).

- (h) Screw adjusting bushing (11) into housing (8) until the end play has been removed from the nut assembly, and tighten the check nut (12). An end play of 0.003 inch is permissible.

- (7) Checking Elevator Tab Free Play(CE-748, CE-772 and After; E-1111, E-1241 and After; CJ-149 and After; EA-11 and After)
- Visually inspect the elevator tabs for any damage, security of hinge attach points, and for tightness of the actuating systems. Inconsistencies should be corrected prior to checking the free play of the tabs.
A check fixture (P/N 810 45-135030-9) or equivalent, a dial indicator, and a push-pull scale for applying accurate loading to the tabs are required for making the inspection for free play of the tabs.
- Lock the control surface to prevent movement of the elevators. Set the elevator tabs in the neutral position.
 - Using shot bags and tape, affix the dial indicator check fixture (Refer to [Figure 206](#)) so that the dial indicator point is positioned on the outboard edge of the elevator tab at a point 3.3 inches aft of the hinge line as measured along the top of the tab.
 - Apply a small piece of masking tape to the upper surface (for paint protection) 4.5 inches aft of the tab hinge line and along the centerline of the tab actuator. This will be the point of pressure against the tab by the push-pull scale.
 - Apply another piece of masking tape in the corresponding position on the bottom surface of the tab for the same purpose.
 - Zero the dial indicator at no load initially. Do not reset during the checking procedure.
 - With the push-pull scale at the point of the masking tape, apply a 3 pound downward load. Record the dial reading as "A".
 - Release half the load until a 1.5 pound downward load is obtained. Record the dial reading as "B".
 - Apply a full 3 pound upward load at the masking tape on the bottom surface. Record the dial reading as "C".
 - Release half the load until a 1.5 pound upward load is obtained. Record the dial reading as "D".
 - Enter the recorded values on a copy of [Table 203](#) and proceed as follows:
 - Multiply "B" by 2 and record as "2B".
 - Subtract "A" from "2B" and record as "X".
 - Multiply "D" by 2 and record as "2D".
 - Subtract "C" from "2D" and record as "Y".
 - Add "X" and "Y" and record as "E".

NOTE: The results of "X" and "Y" can be negative numbers.
 - Repeat steps (b) through (j) on the opposite elevator tab.

Table 203. Elevator Tab Free Play Limits

1.5 Pound Reading	3 Pound Reading	Calculate	Result
B =			
2B =	A =	$2B - A = X$	X =
D =			
2D =	C =	$2D - C = Y$	Y =
X =	Y =	$X + Y = E$	E =
(E = 0.05 inch maximum)			

- (8) Elevator Trim Tab Actuator Removal(F33A, F33C, A36, A36TC and B36TC)
- Remove the access panel near the trailing edge of the horizontal stabilizer to gain access to the elevator trim tab actuator.
 - Detach the tail cone, disconnect the tail navigation light wire and remove the tail cone.
 - Remove the access panel on the left side of the fuselage just forward of the horizontal stabilizer.
 - Remove the access panel near the leading edge of the horizontal stabilizer to gain access to the elevator trim tab actuator sprocket.
 - Remove the elevator as outlined under the heading [ELEVATOR REMOVAL](#).
 - Disconnect the elevator trim tab cables at the turnbuckles in the aft fuselage. Secure the forward elevator trim tab cables to prevent them from unwinding at the universal.

CAUTION: Do not damage the cables. Use a material such as phenolic to protect the cables.

- (g) Remove the chain and cable assembly from the elevator trim tab actuator sprocket.
- (h) Remove the hardware attaching the elevator trim tab actuator to the horizontal stabilizer. Remove the actuator from the airplane.

(9) Elevator Trim Tab Actuator Installation(F33A, F33C, A36, A36TC and B36TC)

WARNING: The elevator trim tab actuators must not be interchanged between the right and left horizontal stabilizers when they are reinstalled after removal. Reversing the actuators reverses the direction, and plane nose up trim would actually result in an inadvertent nose down trim condition that could result in an uncontrollable airplane attitude. Refer to ELEVATOR TRIM TAB ACTUATOR COLOR CODING to reduce the probability of unintentionally switching the actuators upon installation.

- (a) Position the elevator trim tab actuator in the horizontal stabilizer and install the attaching hardware.
- (b) Position the chain and cable assembly on the actuator sprocket so that the ends of the chain are equidistant within $\pm$ 0.2 inch at the sprocket centerline.
- (c) Install the elevator as outlined under the heading **INSTALLATION OF THE ELEVATOR**.
- (d) Connect the elevator trim tab cables to the turnbuckles in the aft fuselage.
- (e) Remove material used to protect the cables.
- (f) Rig the elevator trim tab control system as outlined under the heading **RIGGING THE ELEVATOR TRIM TAB**.

NOTE: After rigging the elevator and elevator trim tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. When the elevator trim tab control wheel is moved toward the NOSE DOWN position, the elevator trim tab should move UP.

- (g) Install the access panel located near the leading edge of the horizontal stabilizer.
- (h) Install the access panel located near the trailing edge of the horizontal stabilizer.
- (i) Install the access panel on the left side of the fuselage just forward of the horizontal stabilizer.
- (j) Connect the tail navigation light wire and install the tail cone.

(10) Elevator Trim Tab Actuator Color Coding(F33A, F33C, A36, A36TC and B36TC)

On airplanes serials CE-1566 and after, CJ-180 and after, E-2111 and after, and EA-389 and after, elevator trim tab actuator have been color coded LH blue and RH black. Actuators may be inspected for proper installation by removing the actuator inspection hole cover and visually inspecting that the appropriate color coded actuator is installed (LH blue and RH black).

On earlier airplanes, elevator trim tab actuators were not color coded. Color coding of the elevator trim tab actuators can be accomplished with the actuators installed or before installation. This will reduce the probability of unintentionally switching the actuators. Use Beechcraft Mandatory Service Bulletin No. 2399 for painting instructions on how to color code elevator trim tab actuators.

WARNING: Do not install a blue color coded actuator on a black color coded stabilizer or a black color coded actuator on a blue color coded stabilizer.

(11) Electric Elevator Trim (Optional)

The optional electric trim system offered on the Bonanza airplanes allows the pilot to correct the elevator trim without removing his hands from the control wheel. The switch requires two actions before it will actuate the system: first depressed (enable switch), then moved forward (down trim) or rearward (up trim). On the control wheel left hand grip is a quick interrupt switch (placarded TRIM INTER) which opens the circuit to the servo and stops the action of the electric trim system. The PITCH TRIM OFF-ON switch is located in the lower left corner of the floating instrument panel and the circuit breaker (placarded TRIM) is located in the electroluminescent circuit breaker panel below the instrument panel.

(12) Electric Elevator Trim Tab Servo Removal(Model A36, A36TC and B36TC)

- (a) Gain access to the servo by removing the fifth and (if installed) sixth seat (refer to Chapter 25-00-00 under FIFTH AND SIXTH SEAT REMOVAL AND INSTALLATION) and the partition between the baggage compartment and aft section of the airplane.
- (b) Unsafety the turnbuckle on the left trim cable and loosen the cable.
- (c) Remove the cable (make a note and diagram of the cable routing for reinstallation) from the pulleys and capstan.

- (d) Remove the four bolts, nuts and eight washers which secure the servo to the brackets in the airplane.
 - (e) Remove the servo (note on which side of the brackets the servo is mounted) from the airplane.
- (13) Electric Elevator Trim Tab Servo Installation (Model A36, A36TC and B36TC)
- (a) Place the servo in position and install the four bolts, eight washers and four nuts (make sure the servo is installed in the same position from which it was removed).
 - (b) Install the cables on the servo. The left (outboard) trim cable should be routed forward around the outside groove of the capstan and back to the aft pulley, then forward to the other pulley; wrap around the forward pulley and aft around the inside groove of the capstan and forward to the turnbuckle.
 - (c) Install the right (inboard) elevator trim cable to the pulley as indicated in step (b).
 - (d) Adjust the capstan cable guard to within 1/32 inch of the capstan and secure with the attaching screws. Tighten the attaching bolts of the two idler pulleys.
 - (e) Adjust the cable tension per RIGGING THE ELEVATOR CONTROL SYSTEM and [Figure 201](#).
 - (f) Operate the elevator trim system through its complete range of travel to check for any binding or restrictions.
- (14) Electric Elevator Trim Ground Checks (Airplanes Without Autopilot)
- (a) After inspection of the electric trim installation for loose wires, obstructions, safetied cables etc. turn "ON" airplane master switch.
 - (b) Turn ON the trim master switch and engage the "TRIM" system circuit breaker.
 - (c) Simultaneously press the enable switch and move the pilots control wheel switch forward. Note that the trim wheel moves towards toward the "DOWN" trim position.
 - (d) With pilots control wheel switch still engaged, grasp the manual trim wheel and check for manual override capability; the clutch will slip.
 - (e) Simultaneously press the enable switch and move pilots control wheel switch rearward. Note that the trim wheel moves toward the "UP" trim position.
 - (f) With pilots control wheel switch still engaged, grasp the trim wheel and check for manual override capability; the clutch will slip.
 - (g) Press the enable switch only; trim system must not run.
 - (h) Move the trim switch fore and aft only; trim system must not run.
 - (i) The control wheel mounting includes an electric trim interrupt switch. This switch has the primary purpose of stopping all trim action by interrupting both the trim A + and ground. The interrupt switch is a momentary type push button, which may be checked as follows:
 - 1 With the trim system still turned on, actuate the trim switch to drive the trim system. While system is being driven, push the interrupt switch and note that the trim system stops running while the switch is depressed.
 - 2 If the trim system operates while the interrupt switch is depressed, the trouble should be located and corrected before flying the airplane.
 - (j) If the circuit breaker trips or the trim runs without both the enable switch and the direction switch actuated, pull the trim circuit breaker, turn the trim master switch OFF and leave disconnected until the trouble is located. If the trim runs with the circuit breaker out, do not fly the airplane.
 - (k) After the electric trim system checkout, the airplane manual trim system should be free of excessive friction and should function normally.
- (15) Electric Trim Tab Actuator Removal (Model F33A, F33C and V35B)
- (a) Remove the access door on the fuselage just below the leading edge of the L.H. stabilizer.
 - (b) Disconnect the actuator wire harness at the disconnect splices.
 - (c) Disconnect the actuator cable at the turnbuckle. Tape the cable to the actuator to prevent unwinding of the cable.
 - (d) Remove the three bolts securing the actuator to the bracket. Removed the actuator from the airplane.
- (16) Electric Trim Tab Actuator Installation (Model F33A, F33C and V35B)
- (a) Place the actuator in its mounting position.
 - (b) Install the bolts securing the actuator in place.

- (c) Connect the cables at the turnbuckles.
 - (d) Connect the wire harness.
- (17) New Tab Cable Installation
Note the position of the old cable in relation to the cable drum and forward end cable fittings. Install the new cable in the same positions.
- (18) Magnetic Clutch Removal
- (a) Remove the cover from the clutch housing (Refer to [Figure 207](#)).
 - (b) Loosen the set screw in the clutch rotor and armature hubs.
 - (c) Remove the motor from the clutch housing.
 - (d) Slide the cable drum and shaft assembly from the clutch housing.
 - (e) Remove the clutch from the clutch housing.
- (19) Magnetic Clutch Installation
- (a) Install the clutch in the clutch housing (Refer to [Figure 207](#)).
 - (b) Slide the cable drum and shaft assembly into the clutch housing.
 - (c) Tighten the clutch armature set screws until there is no visible end play in the cable drum shaft. Slide the clutch rotor on the motor shaft to obtain 0.01 to 0.15 inch clearance between the friction surfaces of the clutch before tightening the set screws. Stake both set screws.
 - (d) Reinstall the cover.
- CAUTION: With no visible end play in the cable drum shaft, the clutch faces must not make contact while the clutch is de-energized or damage to the clutch will result.**
- (20) Electric Trim Tab Actuator Brush Replacement Schedule
Replace the brushes at intervals of 2000 flight hours.
- (21) Magnetic Clutch Torque Test
The following check should be performed any time the magnetic clutch is replaced.
- (a) Using a 28 vdc power source, connect the red lead of the magnetic clutch to ground and the white lead to the power source. Using a torque wrench, check that the clutch holds with 30 inch-pounds of torque applied at the actuator shaft.
 - (b) If the static torque of the clutch is less than 30 inch-pounds, burn the clutch as follows:
 - 1 Find a metal plate of sufficient thickness for rigidity and large enough to fit in a vise with the actuator assembly attached. Anchor the plate in a vise and drill three holes in the plate to match the actuator mounting holes. Bolt the actuator to the plate.
 - 2 Locate a blade type screwdriver or similar tool that will fit the shaft on which the cable drum is mounted.
 - 3 Remove the handle from the screwdriver or fabricate a similar tool so that a low speed (approximately 450 rpm) 1/2 inch drill motor may be attached to the screwdriver or similar tool.
 - 4 Secure the screwdriver in the 1/2 inch drill motor.
 - 5 Remove the access plate from the clutch housing and blow the housing and clutch clean with clean, dry air.
 - 6 Using a regulated power source set at 14 to 16 vdc, connect the red electrical lead of the clutch to ground and the white lead to the power source with alligator clips.
CAUTION: Exceeding the 15 second burn in periods may overheat and damage the magnetic clutch.
 - 7 With the screwdriver in the slot in the drum shaft turn the drill motor on and run for 15 seconds. Turn the drill off and unclip the leads to the clutch.
 - 8 Let the clutch cool for approximately one minute before reattaching the lead for another 15 second interval. Repeat the foregoing sequence until the clutch will hold with 30 inch-pounds of torque as indicated in step (a), then blow the clutch and housing clean with clean dry compressed air. Install the access plate on the clutch housing.

Figure 201 : Sheet 1 : (Revised) - Elevator System (CE-748, CE-772 and After; CJ-149 and After; Prior to E-2111, except E-1946 and E-2104; prior to EA-273, except EA-242)

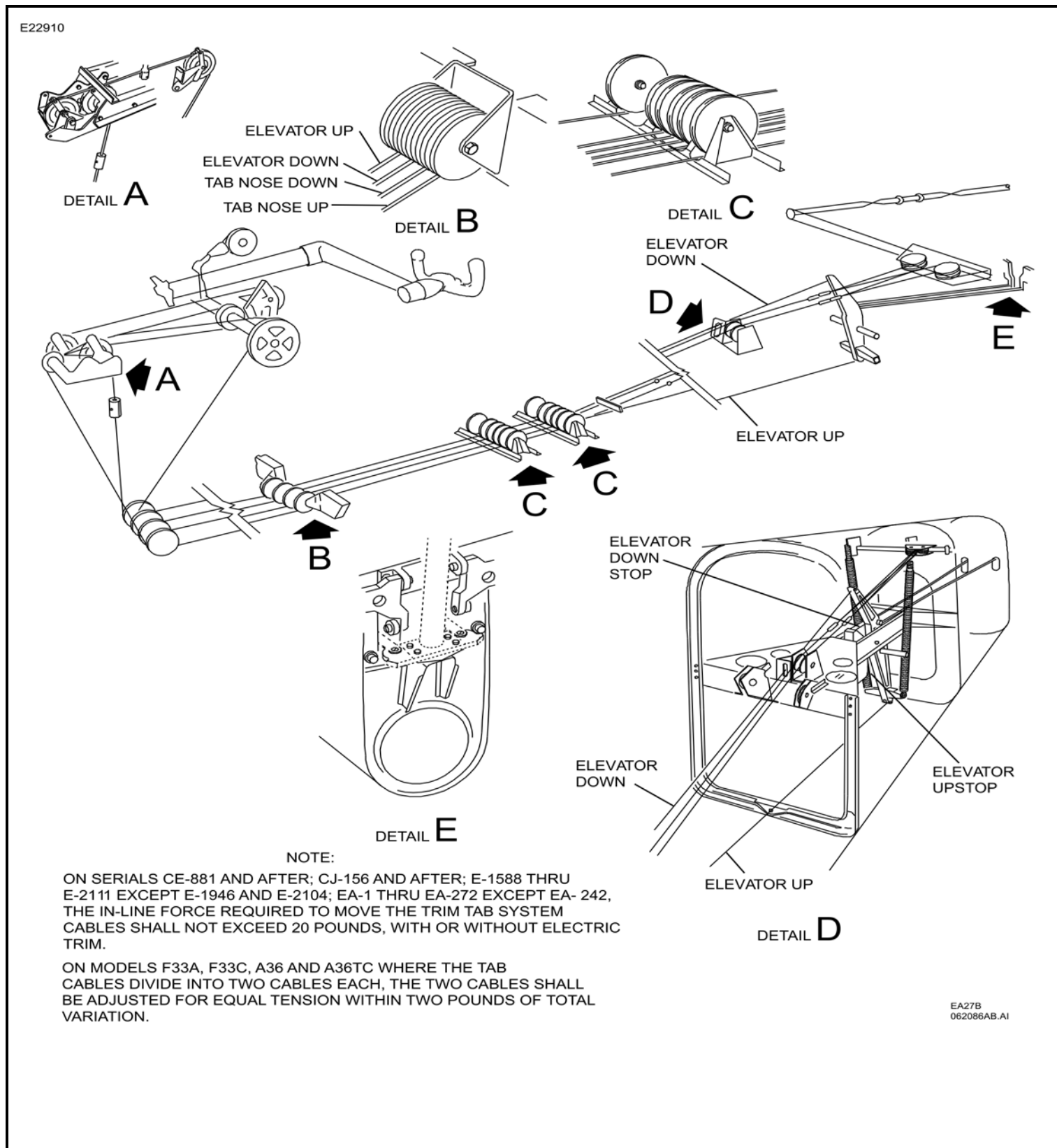


Figure 201 : Sheet 2 : (Revised) - Elevator System (CE-748, CE-772 and After; CJ-149 and After; Prior to E-2111, except E-1946 and E-2104; prior to EA-273, except EA-242)

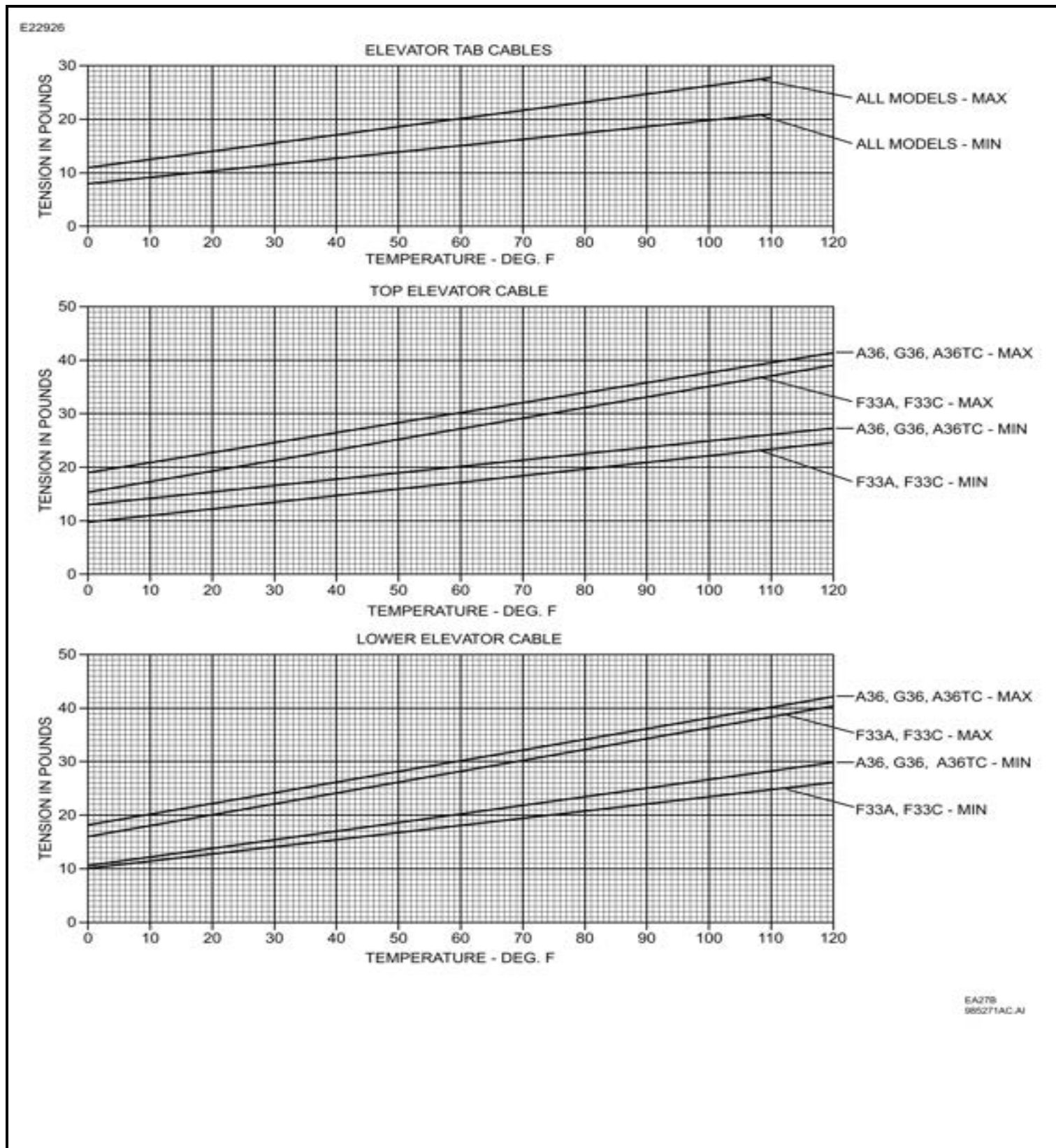


Figure 202 : Sheet 1 : (Revised) - Elevator System(E-1946, E-2104, E-2111 and After; EA-242, EA-273 and After)

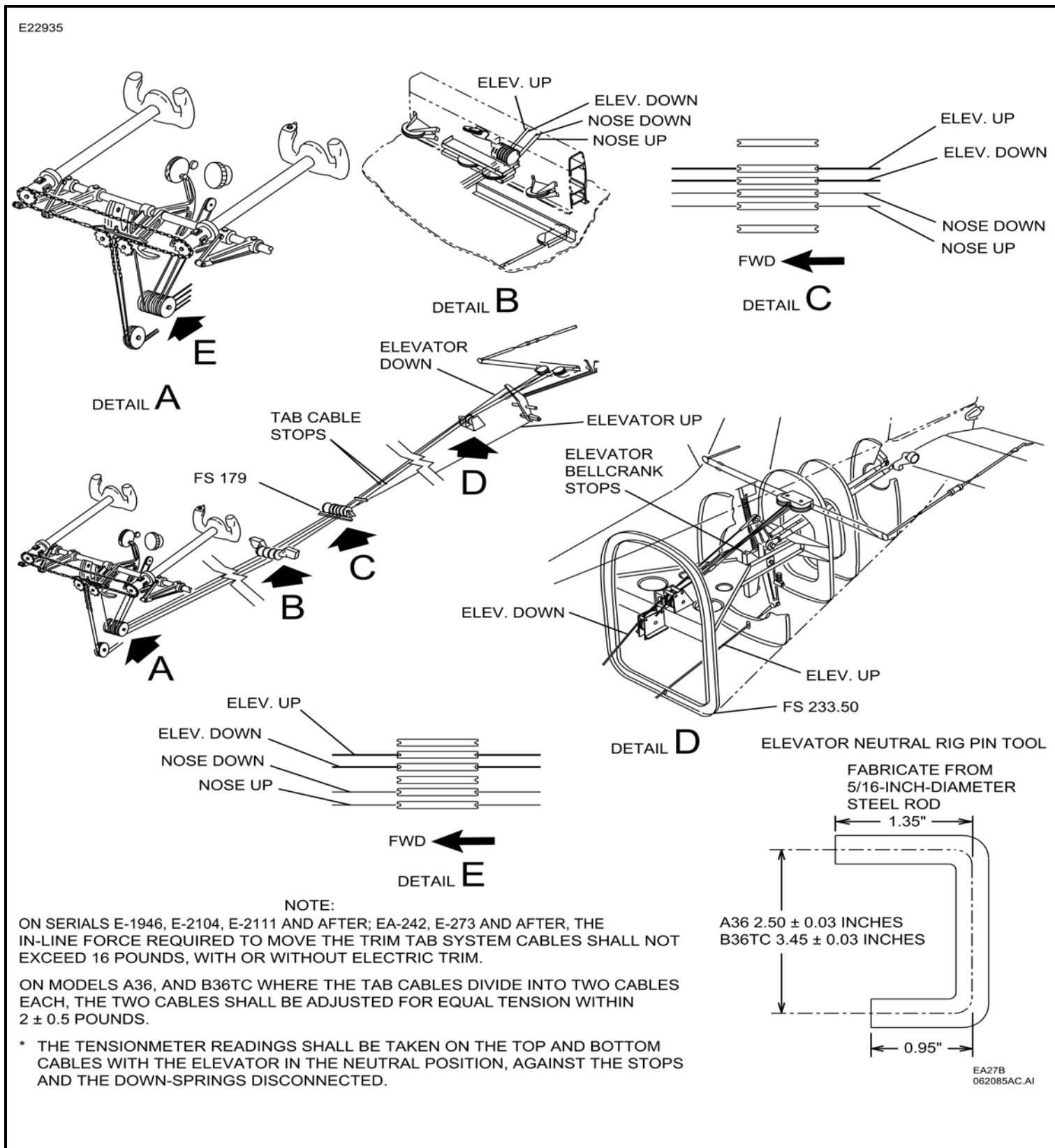


Figure 202 : Sheet 2 : (Revised) - Elevator System(E-1946, E-2104, E-2111 and After; EA-242, EA-273 and After)

