

ANTI-COLLISION LIGHT SYSTEMS

INSTALLATION AND SERVICE MANUAL,

AUGUST 1, 1996

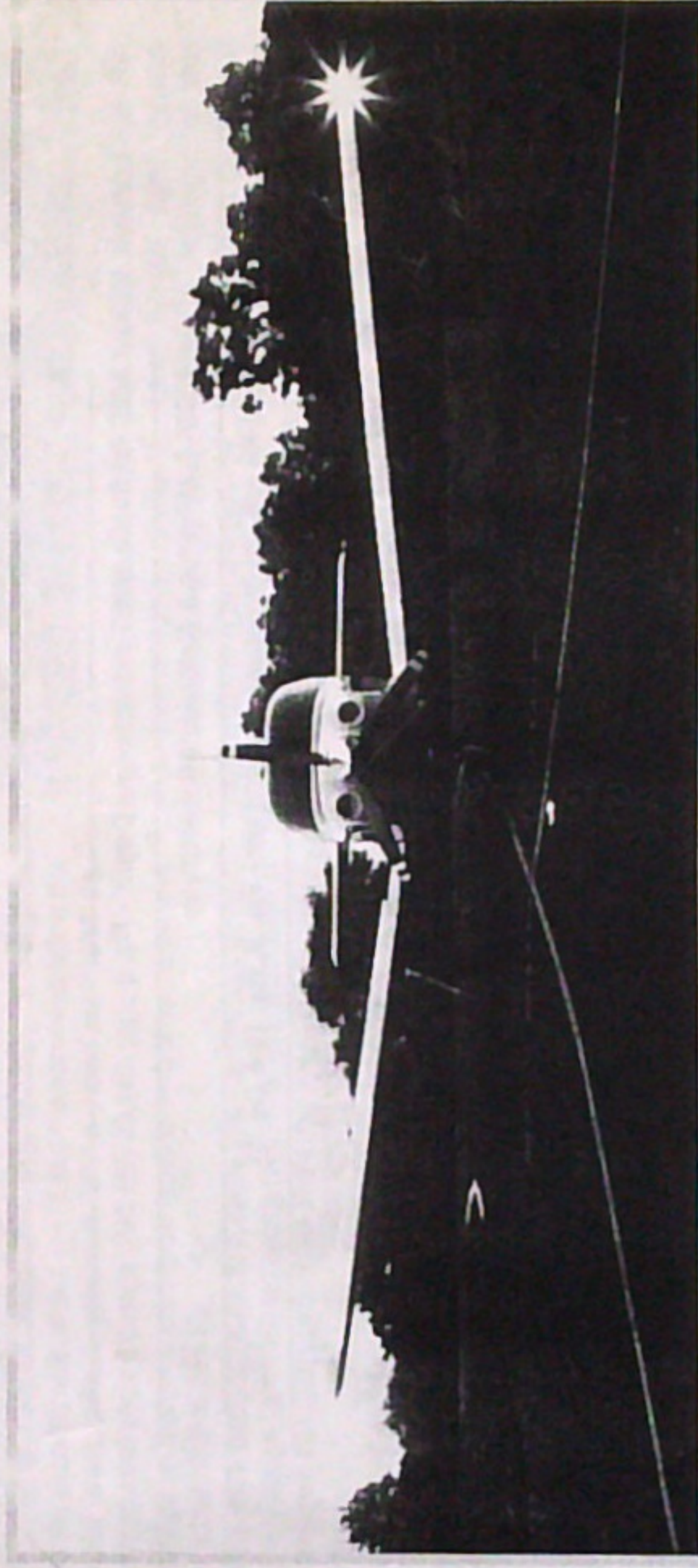
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STC SA6NE (Mar. 21, 1974)

STC SA21NE (Mar. 1, 1978)

STC SA615EA (July 16, 1991)

STC SA800EA (Nov. 22, 1993) PMA



WHELEN[®]

ENGINEERING COMPANY, INC.

ROUTE 145 CHESTER, CT 06412-0684

PHONE: (860) 526-9504 -6 -1

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2313

John

Jacking & Leveling $\frac{1}{2} W+B$

SECTION II

HANDLING & SERVICING

A. GENERAL

This section provides ground handling and servicing instructions.

B. ACCESS PROVISIONS

Figure 10-1 shows the location of the access panels and plates that provide access for purposes of service and maintenance.

C. GROUND HANDLING

The following instructions are recommended to avoid damage to the airplane during ground operations. If improperly handled, extensive damage to the airplane and its equipment may result. The airplane may be taxied as required for normal maneuvers. Brakes or rudder pedals may be used for turning. If a towbar is used, one man may move the airplane providing it is on a fairly smooth level surface. Points where pushing the airplane are permitted are leading edge of the wing, wing tips, and the inboard position of the propeller blades adjacent to the propeller hub.

1. Jacking

When it is desired to raise the airplane off the ground to check operation of the landing gear, the following jacking procedure is recommended. By using jack points provided outboard of each main gear (Figure 2-1), it is possible to use standard aircraft jacks to raise the main gear off the ground. A yoke-frame jack may be used under the propeller. Care must be taken not to damage the propeller or spinner. The nose may also be raised by anchoring the tail skid tie-down ring to a fixed point in the shop floor while jacking the aircraft at the wing hoist points.

2. Mooring

When mooring aircraft, the following method is recommended. Place chocks fore and aft of each main wheel. Stakes may then be driven in the ground outboard of each main gear, approximately three feet, and at the tail skid location. Tie down rings are provided, two feet outboard of each main gear, at the jack point. A tiedown ring is also provided at the tail skid location.

3. Towing

A suitable towbar is provided as standard equipment with each airplane. The lower bar of the towbar is placed through the gear spindle upper crossmember. Care must be exercised that the nose gear is not rotated past its normal swivel angles. Towing with a tractor or by other mechanical means is not recommended.

Note: See that parking brake is off before towing airplane.

**II MORROW**

• Apollo GX55

*Removed Loran '604**Installed Apollo GX55**8-30-99*

OUT WITH THE OLD, IN WITH THE NEW.

- High-resolution flat panel display provides a detailed moving map of airports, VORs, NDBs, intersections and all airspaces.
- Smart Keys let you declutter or add waypoints, or edit flight plans with the touch of a button.
- User-replaceable Jeppesen Flylibrary™ data card.
- Certified for terminal and enroute operations.



The new Apollo GX55 — the 'plug and play' replacement for all Il Morrow panel-mount LORAN and FlyBuddy GPS units — advanced GPS, high-resolution moving map, and TSO certified for enroute and terminal operations.

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situational awareness just got a whole lot clearer. The new Apollo GX55 features advanced GPS, certified performance and the best graphic moving map anywhere. The true high resolution flat panel display delivers an unprecedented all-angles/daylight-readable view of airports, VORs, NDBs, intersections and special use airspace — with significantly higher resolution and detail than other available units.

High resolution doesn't mean a high learning curve. The Smart Key interface lets you add or declut-

ter waypoints, change scales, edit flight plans and more, all at the touch of a button.

And if you're already an Apollo LORAN or FlyBuddy owner, the picture just keeps getting better — because the GX55 is pin-compatible with your old unit, making installation a breeze. Even the antenna covers the same footprint of top-mounted LORAN antennas.

So take the easy way out and slide in the new. See your Apollo dealer or call Il Morrow about compatibility and more information on the new Apollo GX55 at 1-800-525-6726.

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Apollo[®]

Model GX55 GPS

Installation Manual

II MORROW
VISIONARY THINKING TODAY



November, 1997

560-0960-01

Installation & Operating Instructions
ALCOR Exhaust Gas Temperature Indicator

ALCOR AVIATION INC.

5430 BANDERA ROAD • (AREA CODE 512) 684-0210
POST OFFICE BOX 28299 • ZIP CODE 78228
SAN ANTONIO, TEXAS



LOCATION		USED ON	FIGURE - SHEETS	D-O	BASIC	20 SECTIO	RIVETING WITH MOC	F	EFFECTIVITY	NOTE 5	NOTE 4	NOTE 2,3,4	NOTE 2,3	NOTE 2,3,4	NOTE 2
BB-MS2	BU-MS2	C-D, G	E, F, J												

SPARE PARTS

• PUMP, FITTINGS, & LINES AS SHOWN. TIGHTEN FASTENERS AND FITTINGS ONLY AFTER PUMP LINES HAVE BEEN POSITIONED FOR BEST FIT AND CLEARANCE. INSTALL ACCESS PANEL (DETAIL C) RESHAPE LOCALLY AS REQUIRED TO CLEAR PUMP AND COMPONENTS. IF RESHAPED PANEL IS NOT DESIRABLE, INSTALL REPLACEMENT PANEL 310213-1.

SERVICE PROCEDURE, NOTE 6, PAR. FOR ALL AIRCRAFT FIRST INSTRUCTION TO READ AS FOLLOWS:

MOONEY AIRCRAFT CORPORATION		DWC. TITLE		FUEL BOOST PUMP RETROFIT		DWC. NO. 940018	
DASH NO. MODEL EFFECTIVITY		DASH NO. MODEL EFFECTIVITY		PARTS MADE DISPOSITION		REL	
Not Read		EFFECTIVITY		USE		REV	
DRAWN GROUP		CHECK		REWORK		REC	
APPRD. DATE		STRUCT WTS		SCRAP		STOP	
HW HW		PROJ M & P		NONE		SUSPD	
8-9-85 8-9-85		8-9-85 8-9-85		8-9-85 8-9-85		9 5/6	
CHG. BOARD		COMPANY		OBS		CHG. BOARD	

NOTE	QTY	PART NUMBER	DESCRIPTION	DIA	THICK	WIDE	LG	MATERIAL OR VENDOR	MATERIAL SPECIFICATION	HEAT TREAT	FINISH	SEE NOTE	ZONE
2		800352-501	WIRE										
2,3,4		610288-501	SUPPORT										
2,3		610287-503	LINE										
4		610287-501	LINE										
2,3,4		610286-501	LINE										
		610266-1	FITTING										
OTE 5		610152-41	LINE										
		AN23-14A	CLEVIS BOLT										

LIST OF MATERIALS

MOONEY AIRCRAFT CORPORATION KERRVILLE, TEXA		FUEL BOOST PUMP RETROFIT		940018		SCALE NONE		SHEET 1 OF 1	
DRAWN B. CRAIG 9-28-82		DESIGN U.C.		CHECK		STR 22/24 10-11-82		GROUP B.M. 12/01/82	
MOONEY SPECIFICATION 20 IS		DO NOT SCALE PRINT		UNDIMENSIONED FEATURES: ±.03		DIMENSIONS ARE IN INCHES. TOLERANCES ARE:		X ±.1 XX ±.03 XXX ±.010	
REMOVE BURS AND SHARP EDGES, C BORE AND SPOTFACE CORNER RADIUS: .001 FOR DIA UP TO AND INCLUDING 1.25, .062 FOR DIA GREATER THAN 1.25, MACHINED CORNER RADIUS .001 MIN, MACH. SURFACE ROUGHNESS 125 RMS MAX		APPLICABLE		MOONEY SPECIFICATION 20 IS		RELEASE 2/24/83 12/01/82		LAST LETTER CHANGE INCORPORATED SEE E.O. 15T PROD	
INC. BY		APP.		SCALE NONE		SHEET 1 OF 1		940018	

**Service Letter**

Service letter Number	Issue Date	Revision	Revision Date
RASL-006	6/12/2009	-	-

Subject: Pneumatic pump vane inspection with S.M.A.R.T Caliper

Applicability:

This inspection procedure applies to all new FAA PMA approved pneumatic pumps manufactured by Rapco, Inc. that are equipped with a vane wear inspection port.

Inspection Compliance:

The inspection procedure listed below should be accomplished after 500 hours time in service on all 200 series pumps and after 200 hours time in service on all 400 series pumps. After the initial inspection, the pump should be re-inspected after 100 hours time in service or annually (which ever occurs first).

This inspection procedure is recommended to be accomplished in conjunction with a 100 hour or annual inspection.

NOTE: No other vane wear measuring devices are approved for use with this inspection procedure.

Procedure:

NOTE: Before accomplishing this inspection it is important to make sure that the Aircraft Engine Magnetas are in the off position.

1. Remove inspection port cap screw and lock washer.
2. Rotate Propeller by hand while looking into the inspection port with a flashlight.
3. Line up a vane slot with the inspection port. **NOTE:** If vane slot to inspection port alignment is incorrect it will result in an incorrect vane wear measurement.
4. Open S.M.A.R.T Caliper to 1" or greater.
5. Holding the body of the S.M.A.R.T caliper, push the tail of the S.M.A.R.T caliper into the inspection port slowly until the body of the S.M.A.R.T caliper comes into contact with the outside of the pneumatic pump. **NOTE:** The S.M.A.R.T caliper slider will slide on the S.M.A.R.T caliper body during this process.
6. Remove the S.M.A.R.T caliper from the inspection port.
7. Read the position of the S.M.A.R.T caliper slider relative to the S.M.A.R.T caliper body in accordance with the measurements on the caliper. (See figure 1 below) **Note:** The Maximum wear limit for the pneumatic pump is 11/16" (.6875"). Any pneumatic pump wear greater than that should be removed from service.
8. Determine if pump is within serviceable limits. (See figure 1 below)
9. If the pump is determined **not** to be within serviceable limits it should be **removed** from service. If pump is determined to be serviceable, it may be **returned to service** pending that the next inspection is accomplished after 100 hours time in service or at the next annual inspection.
10. Re-install cap screw and washer (MS35338-43) and torque to 14 inch lbs.

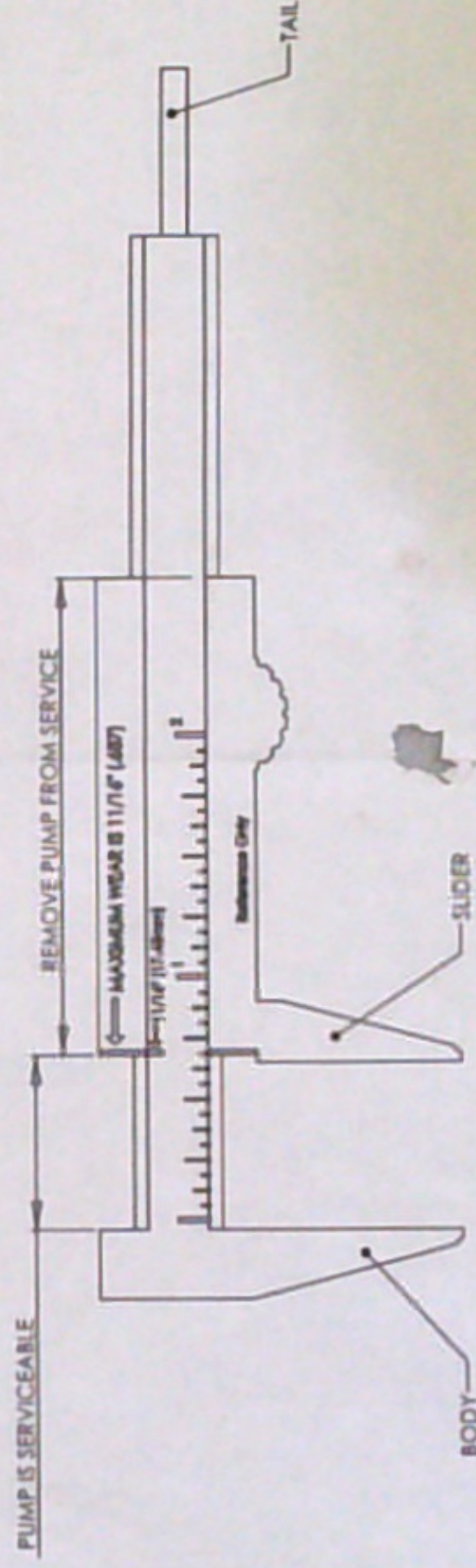


Figure 1

RAPCO, Inc.

REPLACEMENT AIRCRAFT PARTS CO.

445 Cardinal Lane

Hartland, WI 53029

(262) 367-2292

www.rapcoinc.com

MANDATORY REPLACEMENT INSTRUCTIONS FOR AIRBORNE AIR FILTER AND AIR FILTER ELEMENT

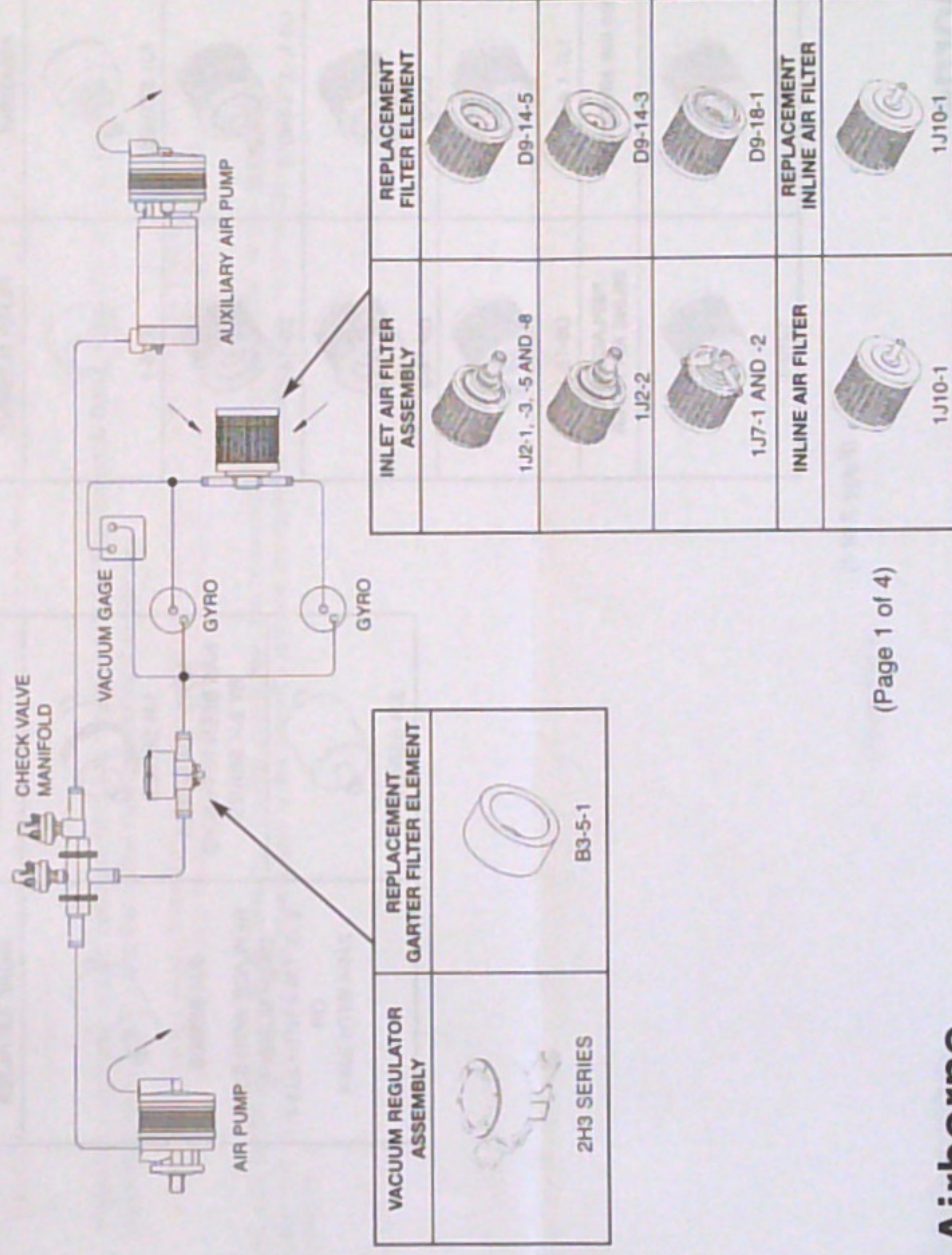
CONTENTS: Each Airborne Air Filter and Air Filter Element Kit consists of an air filter or air filter element, air filter change reminder label SI300-21, assembly fasteners (if required), **Mandatory** Replacement Instructions For Airborne Air Filters and Air Filter Elements SI300-10 and Summary of **Mandatory** Service Instructions for Airborne Pneumatic Components SI300-17

CAUTION: Consult the latest revision of Airborne Service Letter Number 59, **Mandatory** Replacement Times for Airborne Air Filters and Air Filter Elements in order to obtain the latest information regarding **mandatory** replacement times.

Consult the Airframe Manufacturer's maintenance publication and parts catalog for the specific part number(s) air filter(s) and/or air filter element(s) for your aircraft. Air filters are designed for specific functions and **must not** be interchanged.

Vacuum System Example:

A typical Airframe Manufacturer's vacuum instrument system incorporates two types of air filters. The inlet air filter assembly is used to protect the instruments (gyros) and the garter filter element for the vacuum regulator is used to protect the vacuum regulator valve seat and the air pump.



(Page 1 of 4)

Airborne

Air & Fuel Products

Airborne Division • Parker Hannifin Corporation
711 Taylor Street • Elyria, Ohio 44035 • 440 284-6215 • Fax: 440 284-6208
E-mail: techhelp@parker.com • Website: www.parker.com/ag/nad
SI300-10 (Rev. C) April, 2004, (Reprinted May, 2005)

Parker

SUMMARY OF MANDATORY SERVICE INSTRUCTIONS FOR AIRBORNE PNEUMATIC COMPONENTS

Airborne has published various Service Letters defining the **mandatory** inspection intervals and **mandatory** replacement times for its pneumatic components used in single-engine and multi-engine piston aircraft pneumatic gyro flight instrument systems and de-ice systems. The purpose of this document is to provide a summary reference for these **mandatory** service instructions and to identify the specific detailed Service Letter documents which (the latest revision of) can be printed from Airborne's website or ordered from Airborne.

Airborne Model Number	Mandatory Inspection Intervals*	Mandatory Replacement Times*	Service Letter No.
Engine-Driven Air Pumps			
• Any model no. beginning with 200 through 216	-	500 aircraft hrs. or 6 yrs. from date of manufacture, whichever comes first	58
• E211CC or E212CW	-	500 aircraft hrs. or 6 yrs. from date of manufacture, whichever comes first	58
• Any model no. beginning with 220 through 242	-	500 aircraft hrs. or 6 yrs. from date of manufacture, whichever comes first	58
• Any model no. beginning with 28C214 (clutch-operated)	Every 100 aircraft hrs. for 28C214CW-2	500 aircraft hrs. or 6 yrs. from date of manufacture, whichever comes first	54, 58
• Any model no. beginning with 28C444 (clutch-operated)	Every 50 aircraft hrs. for 28C444CW-4 and -6	500 aircraft hrs. or 6 yrs. from date of manufacture, whichever comes first	53, 58
• Any model no. beginning with 420 through 442	-	400 aircraft hrs. or 6 yrs. from date of manufacture, whichever comes first	58
• 832CW or 842CW	-	300 aircraft hrs. or 6 yrs. from date of manufacture, whichever comes first	58
• Any model subjected to sudden engine stoppage	-	Before next flight	38
• Any model (inspection for oil contamination)	100 aircraft hrs. or annually, whichever comes first	-	43
• Any model subjected to oil contamination	-	Before next flight	43
Auxiliary Motor-Driven Air Pumps and Elapsed Time Indicators			
• Any model no. beginning with 4A2 or 4A3	Check elapsed time indicator (ETI) at 100 aircraft hrs. or annually, whichever comes first	500 pump hrs. or 10 yrs. of service, whichever comes first	57, 58
Vacuum System Air Filters			
• B3-5-1 Garter Filter Element for Vacuum Regulator	-	100 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• D9-14-3 Air Filter Element	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• D9-14-5 Air Filter Element	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• D9-18-1 Air Filter Element	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• 1J10-1 Air Filter	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
Pressure System Air Filters			
• B3-5-1 Garter Filter Element for Inlet Filter	-	100 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• D9-14-3 Air Filter Element	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• D9-14-5 Air Filter Element	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• D9-18-1 Air Filter Element	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• 1J4-4 Inline Air Filter (Replaced by 2J4-4)	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• 1J4-6 Inline Air Filter (Replaced by 2J4-6)	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• 1J4-7 Inline Air Filter (Replaced by 2J4-7)	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• 2J4-4 Inline Air Filter	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• 2J4-6 Inline Air Filter	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
• 2J4-7 Inline Air Filter	-	500 aircraft hrs. or annually, whichever comes first, and each pump replacement	59
Check Valve Manifolds, Check Valves and Regulator Check Valve Manifolds			
• 1H5 series (all dash numbers)	5 yrs. from date of manufacture every 12 months hereafter until 10 yrs	10 yrs. from date of manufacture	39
• 1H24 series (all dash numbers) and 2H24-8	5 yrs. from date of manufacture every 12 months hereafter until 10 yrs	10 yrs. from date of manufacture	39
• 1H37 series (all dash numbers)	5 yrs. from date of manufacture every 12 months hereafter until 10 yrs	10 yrs. from date of manufacture	39
• 2H3-39 and 2H3-47	5 yrs. from date of manufacture every 12 months hereafter until 10 yrs	10 yrs. from date of manufacture	39
*NOTE The above components must not be operated beyond the Airframe Manufacturer's specification for mandatory inspection intervals or mandatory replacement times or Airborne's mandatory inspection intervals or mandatory replacement times, whichever comes first			

(Continued on reverse side)

Airborne

Air & Fuel Products

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711 Taylor Street • Elyria, Ohio 44035 • 440 284-6215 • Fax 440 284-6208
E-mail: techhelp@parker.com • Website: www.parker.com/ag/nad
SI300-17 (Rev. E, January, 2007)

Parker

The Importance of Checking Your Dukes or ITT Electric Gear Actuators

ALL ABOUT MOONEY SERVICE BULLETINS M20-190 AND M20-189A



Don Maxwell
Don Maxwell Aviation Services
Gladewater, Texas

Service Bulletin M20-190 (and AD 75-23-04)

This service bulletin (made mandatory by the AD) applies to early M20J and "pre-J" Mooneys equipped with Dukes electric gear actuators. Several recent inspections I have done show this AD and SB have not been complied with at all or have not been complied with properly. The reason could be that removal of the actuator may be a little intimidating for the mechanic the first time he tries. This is not a good situation. In my opinion, the Dukes actuator is barely adequate for the job and must have regular inspections and maintenance to be dependable and up to the task of lowering and raising the landing gear.

AD 75-23-04 refers to compliance with SB M20-190. The SB, dated 1-16-75, is divided into three parts. Part 1 requires that every 200 hours, the actuator be removed from the aircraft, partially disassembled and inspected for gear wear. In some cases, I have found that Part 1 of the SB/AD has not been fully complied with. In other cases the actuator may have been removed, but the most important part (the inspection) is not being completed.

The SB requires that all of the old grease be removed, that the housing be flushed clean with solvent and everything air-dried. The reason for this pro-



Figure 1

cedure is the gears wear in the middle and by looking at the end of the gear, no wear is apparent. The figure above is a photo of a worn ring gear as it would look as viewed from the end. Figure 2 shows the same ring gear viewed from the side showing the wear. Note that the gear appears normal from the end, but is nearly worn half way through in the side view. The figure below is of the ring gear, the worm gear it runs against and a quarter to give you an idea of the size of these parts. As you can see, it is very important that these inspections be performed as required.

Part 2 of the SB requires that the actuator be greased every 100 hours. To grease the actuator, the middle belly panel must be removed. Remove the top end cap bolt per Figure 4 and apply applicable grease with a hand grease gun through the lubrication fitting until it runs out of the top bolt hole. If the top end cap bolt is not removed, the grease seal on the worm gear shaft will be damaged or dislodged.

Part 3 of the service bulletin refers to the change in washer sizes used for shims on the ball end of the actuator.



Figure 2

ITT Actuators

Mooney Service Bulletin M20-189A allowed for the substitution of an actuator made by ITT to replace the Dukes actuator. The ITT actuator is almost a carbon copy of the Dukes actuator and if anything, I believe, not as good. The Dukes actuator has a grease fitting and the gears are supported on needle bearings. The ITT actuator does not have a grease fitting, and the gears are supported on bushings.

My concern is that both actuators have the same gears, but the ITT actuator is not addressed in the AD or SB M20-190.

Why not? I spoke with Bill Wheat at the factory about this and he said he was trying to have the ITT actuator gears added to SB M20-190 and the AD. Regardless, I inspect the ITT actuator just as I would a Dukes and have found several near failures that have never



Figure 3



By Don Maxwell
Don Maxwell Aviation

Cabin Door Handle Upgrade

Reference Mooney Service Instruction M20-39



One item I always suggest to the new owner of a pre "J" Mooney is a pair of vise grips and that they be kept in the cabin. Why? Well, our pre "J"s have a cabin door handle that is an aluminum casting (Fig. 1 of M20-39) This casting is attached to the door latch mechanism by a small steel roll pin. Over the years, and many cycles, the casting becomes worn and will let the roll pin fall out. When this happens, unless you can find the pin and reinstall it, you are locked in the cabin. Hopefully there are people around that will let you out. If not, you may have to attempt the dreaded hot start and fly to another airport to get someone to open the door.

So, you have two choices, keep the vise grips handy, or install the new style door handle (fig. 2 of M20-39). Mooney has provided the new door handle and necessary materials in a service kit. The kit is Mooney Service Instruction S120-039-000. Current cost of the kit is \$212.59. Labor to install is 3-5 hours. Check your cabin door handle. Does it feel snug? Do you feel any "play" or lost motion in operating the door handle? If so, I suggest you upgrade to a newer style handle or keep the vise grips handy. Check with your local Mooney Service Center to order.

Mooney Service Instruction M20-39

Date 12-2-76

SUBJECT: INTERIOR DOOR HANDLE REPLACEMENT

MODELS AFFECTED	Model	Serial Number Effectivity
	M20C	1976 thru 20-0009, 20011 thru 20-1156
	M20D	101 thru 260
	M20E	101 thru 21-1170
	M20F	660003 thru 22-1223
	M20G	680001 thru 700006

TIME OF COMPLIANCE: At Owner's discretion

INTRODUCTION: There have been instances where the roll pin retaining the interior cabin door handle has sheared, leaving egress from the aircraft to the ingenuity of the pilot. We, therefore, recommend the following modification and door handle replacement be accomplished.

INSTRUCTIONS

1. Remove cabin door inside handle and handle shaft assembly. (Note: Shaft removal is not absolutely necessary, but is

recommended)

Shaft Assy. Part No.
310115-1

Model	Serial No. Effectivity
M20C	1976 thru 2741, 2743 thru 2806
M20D	101 thru 251
M20E	101 thru 399, 401 thru 469
M20F	660003 and 600004 310211-000
M20C	2742, 2807 thru 690026
M20D	252 thru 260
M20E	400, 470 thru 690030
M20F	670001 thru 690037
M20G	680001 thru 690011 310211-501
M20C	690027 thru 20-0009, 20-0011, 20-1156
M20E	690031 thru 21-1170
M20F	690038 thru 22-1223
M20G	690012 thru 700006

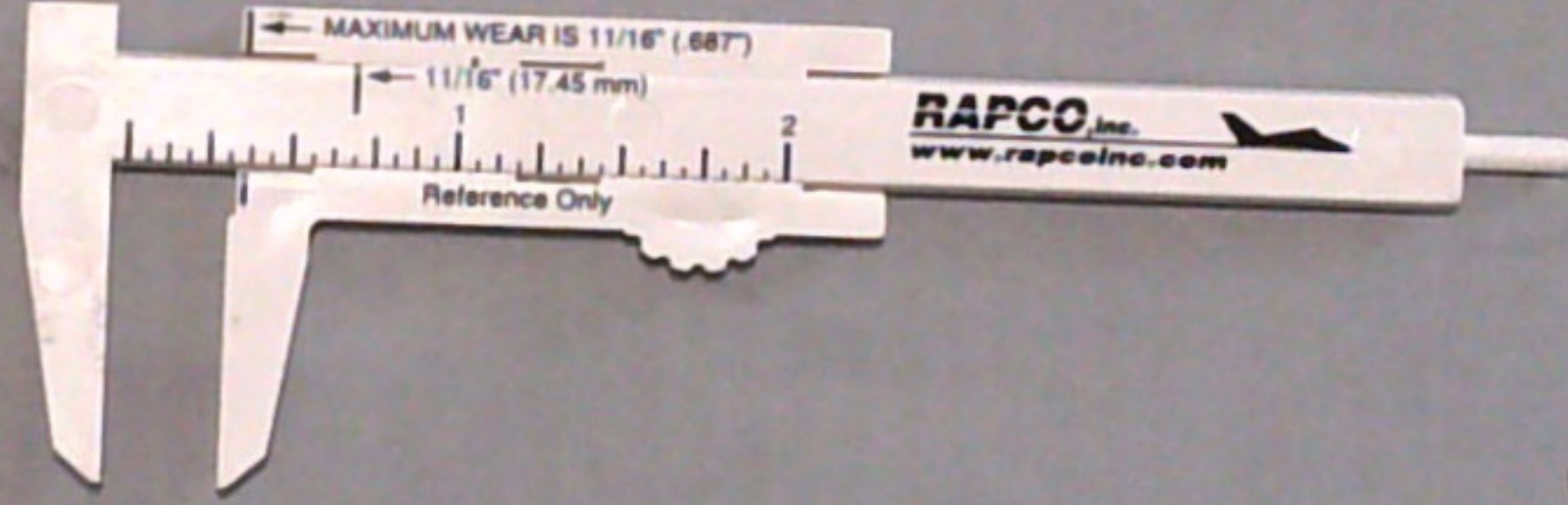
*My box #
3216*

2. Trim handle shaft .30+ .030 from center of roll pin hole. See Figure 1
3. Grind corners on 310298-7 insert as required to fit inside handle shaft. See Figure 2
4. Position 310298-7 insert in handle shaft with respect to levers as shown in Figure 3. Threaded end of insert to protrude .62 from end of shaft. Tunsten inert gas are weld to shaft.
NOTE: Handle in closed position will be 5 degrees above a horizontal plane. Owner option-Disregard insert angular position, position handle to satisfy individual taste.
5. Re-install shaft if removed. Install 130271-19 finish washer. Install 310299-1 handle using AN526-832R8 screw and AN960-8L washer.

Parts list for S.I. M20-38 Kit:

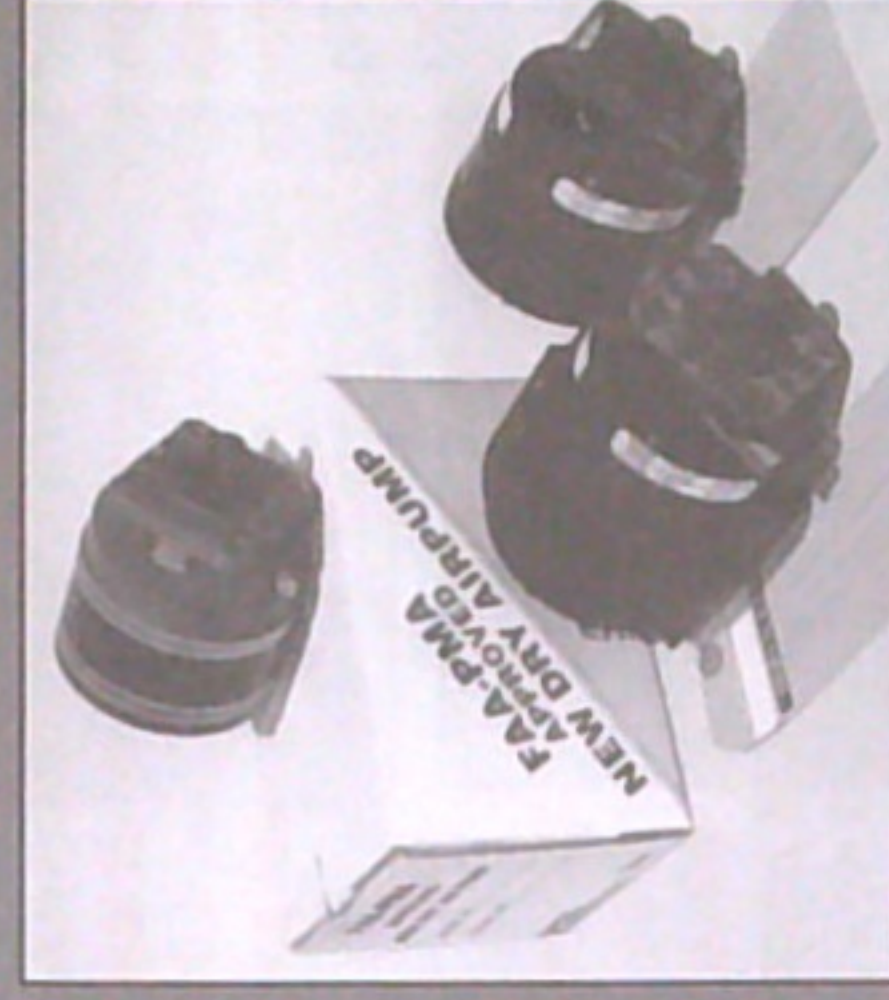
Part No.	Part Name	Quantity
310299-1	Cabin Door Interior Handle	1
310298-7	Insert	1
130271-19	Finish Washer	1
AN526-832R8	Screw	1
AN960-8L	Washer	1

DRY AIR PUMP REMOVAL & INSTALLATION INSTRUCTIONS AND TIPS



RAPCO_{inc.}
REPLACEMENT AIRCRAFT PARTS CO.

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Hartland, Wisconsin 53029 USA
(262) 367-2282 Phone
(262) 367-7158 Fax
www.rapcoinc.com



FAA-PMA Approved New FAA Approved Overhaul

This document shall be given to the aircraft owner after installation. You must enter the following in the logbook after installation:

"FAA-P-8740-52 safety warning given to aircraft owner"

This document is for reference only
Refer to OEM service instructions



WARNING: Flying IFR without an operating backup system for this pump may result in death, bodily injury or property damage.
Follow TC holders published safety warnings.

Aircraft Weight and Balance Revision

[illegible]

Weight and Balance

M-20C Ser. No. 3216 N5992Q

Engine Ser. No. L-3810-36A