WELCOME TO RANS

CONGRATULATIONS on your purchase of the **S-7 Courier**! Whether you bought a kit or a ready to fly plane, you have made a good choice!

We like to keep in touch with all **S-7 Courier** owners. Below you will find a form which we ask that you fill out and return to us. In doing so you will be put on our mailing list and in turn receive all updates as to improvements and/or recommended modifications for the **S-7 Courier** and the optional kits available for these changes.

Keeping up with the latest information on the how-to's and all the new developments with regard to the **S-7 Courier** assures you that you are taking the best care of your recent investment. We are always here at the factory to help you with any questions you may have and to visit about your ideas. We encourage you to let us know what you think. These "newsletters" often serve the purpose of passing on information between lots of **S-7 Courier** owners who live in varied locations and many different climates.

NAME: _____

ADDRESS: _____

CITY: _____ **STATE:** _____ **ZIP:** _____

DATE PURCHASED: _____ **DEALERSHIP:** _____

SERIAL #: _____ **PHONE NO:** _____

PLEASE RETURN TO:
RANS, INC.
4600 HWY 183 ALTERNATE
HAYS, KS 67601
785-625-6346 785-625-2795 FAX

WELCOME TO RANS

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NAME: _____

ADDRESS: _____

CITY: _____ **STATE:** _____ **ZIP:** _____

DATE PURCHASED: _____ **DEALERSHIP:** _____

SERIAL #: _____ **PHONE NO:** _____

SHIRT SIZE: **L** _____ **XL** _____

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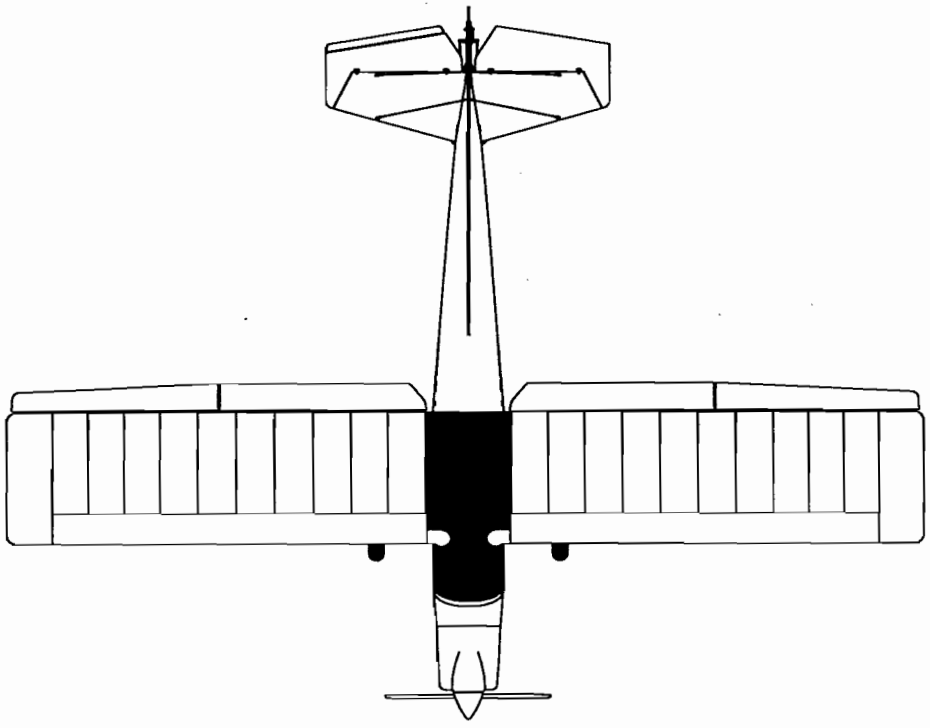
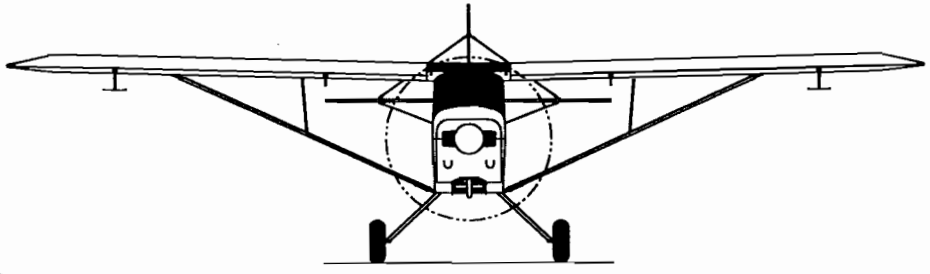
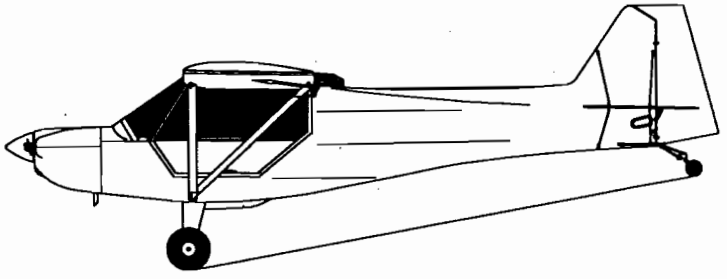
4600 HWY 183 ALTERNATE
HAYS, KS 67601

785-625-6346
785-625-2795 FAX

RANS S-7 COURIER







RANS
4600 Highway 183 Alternate
Hays, KS 67601
(785) 625-6346

DESIGNED BY:
RANDY SCHLITTER

RANS, Inc.

4600 Highway 183 Alternate
Hays, KS 67601

Technical Support
(785)625-0069

Parts Department
(785)625-6346

When calling Technical Support or the Parts Department please have the following ready:

- Aircraft Model
- Serial Number
- Engine Model
- Parts Number Needed (Parts Department Only)
- Your Aircraft Assembly Manual

Note: Please make your questions precise and to the point so that we may assist as many customers as possible.

RANS, INC.
AIRCRAFT TOOL LIST

The following is a list of tools that will be helpful when assembling your RANS aircraft.

HAND TOOLS

Pliers
Needle Nose Pliers
Side Cutters
Aviation Snips
Hammer
Rubber Mallet*
Center Punch
Drift Pin & Punch Set
Several Small Clamps (Stanley quick clamps work well)
Wrench Set SAE & Metric
Ruler & Tape Measure
Adjustable Fly Cutter*
Set of Drill Bits (sizes listed below)
Hack Saw
Safety Wire Pliers
Linesman Pliers
Electrical Wire Stripers
Pop Rivet Tool
Click Punch
Ball Peen Hammer
Scratch Awl
Screwdriver Set
Safety Glasses
Socket Set SAE & Metric
2 or 4 ft. Level
Utility Knife
Hole Saw*
Files

POWER TOOLS

Electric Hand Drill
Dremel*
Soldering Gun/Hot Knife
CD Player*
Small Electric Grinder
Bench Disk Sander*
Heat Gun*

LUBRICANTS & ADHESIVES

Small Can Lithium Grease
Contact Cement
Super Glue
Clear Silicone
WD40
Lubricating oil

DRILL BIT SIZES

A full set of fractional drill bits ranging from 3/32" to 5/8" is strongly recommended. In addition to these the following number and letter bits will be required to assemble your S-7 Courier.

NUMBERED BITS	LETTERED BITS	FRACTIONAL BITS
#40	"D"	1/4"
#30		5/16"
#11		3/8"
#28		1/2"
#21 & 10 - 32 TAP		7/8"

*Not a necessary tool but helpful

RANS S-7 COURIER
ASSEMBLY SEQUENCE

Fuselage

Inspection

Fuselage Stringers

Fwd. & Aft Floorboard Pre-fit

Rudder Pedal Pre-fit

Radiator Scoop Assembly & Pre-fit

Door Assembly & Pre-fit

Flap Lever Assembly & Pre-fit

SPEEDY ASSEMBLY

A quick study of this assembly sequence reveals a primary time saver. The Aircraft is already covered and clear coated prior to final assembly.

Tail Group

Rudder System Installation & Pre-fit

Horizontal Stabilizer Assembly & Pre-fit

Elevator Assembly & Pre-fit

Wings

Wing Assembly

Flap & Aileron Assembly

Covering

Painting

Final Assembly & Installation of all Parts & Components

MD3624

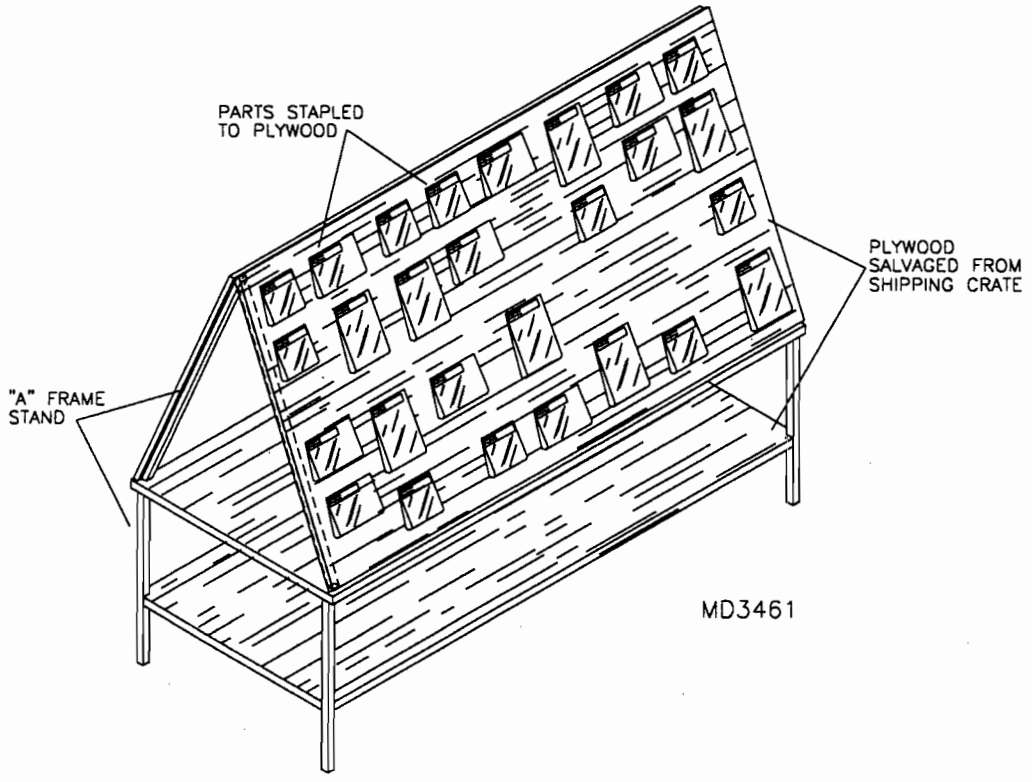
S-7 COURIER INTRODUCTION

As the builder of the S-7 COURIER kit you are considered the manufacturer by law. The rules state that you must build 51% of the total. In essence we are your parts supplier. You have the final say in regard to every single item that goes into your project. The responsibility of making a safe aircraft is on your shoulders. It is by your hand this box of parts becomes an aircraft. Set up your quality assurance and construction activity according to the level of risk you are willing to take. The manual provided is to be thought of as a suggested guide book. Use the book, but learn to think things through. This will minimize errors and reduce build time.

S-7 COURIER GENERAL INFORMATION

BEFORE BEGINNING ASSEMBLY

TAKE INVENTORY: You must complete an inventory within 60 days of receiving your kit. We check and re-check and are 99.9% certain that if we say we shipped it, we did. The first task in building your kit is to inventory the parts using the packing list provided. It's your job to keep all parts organized and accounted for. We can not provide missing parts cost free after 60 days. Use the supplied pack list to verify that everything that we packed is in the box. The fast way to inventory, is to use the Priority Number that appears on the Part Number labels, these will match the pack list in numeric order. Go through the list item by item. If anything is not there that should be, please contact our parts department immediately. ***HINT:*** *Use sections of plywood from the packing crate to fabricate a part inventory board. As each part is inventoried and checked off on the pack list, staple the bag to the board. This allows for quick identification and part selection during assembly. We fabricate "A" Frame stands to support the plywood. Refer to the figure below. Plywood can also be attached to shop wall.*



PLEASE READ: We highly recommend that you completely read the manuel cover to cover before beginning assembly of your aircraft. This will help to eliminate costly mistakes and considerably speed up your build time. As you read through the Assembly Manual, follow along in the Parts Manual. Study each and every parts drawing. The Assembly and Parts manuals will parallel each other; however, at times the assembly manual will use parts from two or more pages of the Parts manual. **PLEASE NOTE:** Unless otherwise noted, all figure and exploded view drawings are **NOT** to scale.

GET ORGANIZED! Prepare your workshop; be certain that what comes in the door will be able to go out!

KEEP IT CLEAN: Wash your hands, tools, and work tables. You will notice most of the parts are labeled with part numbers. These labels are easily removed with a cloth dampened with acetone or lacquer thinner. **CAUTION**: Do no allow acetone, lacquer thinner, Loctite or fuel to come in contact with the lexan glazing. These and some other solvents will destroy the lexan.

STEEL PREPARATION: Even though every care is taken to assure a safe arrival of your aircraft, thoroughly inspect the fuselage as well as all other parts for the following: unclosed welds, nicks, and dents. If you locate any suspect areas with excessive dents or scratches call our Tech-Staff for information on damage tolerance. All Welded steel parts will require primer and top coating. We recommend a good two part epoxy primer. Be sure the primer and paint you choose will not be affected by the urethane adhesive used to bond the fabric to the airframe. Final painting of certain components will be done after trial assembly. Include these components when designing your paint scheme. If you assemble the aircraft in a humid environment it is best to prime everything first. This may be added work if the parts get scratched during trial assembly but it will stop the onset of rust.

ASSEMBLY SEQUENCING: We have tried to format the manual in a step by step order as to how to assemble your aircraft. However, there is truly no "one" order in which to follow, as long as the check lists in the covering section are met prior to covering. If you should choose to build your wings first rather then the fuselage, it is acceptable to do so. Refer to the assembly sequence flow chart.

DEBURRING: Many parts will need to be deburred. This is an IMPORTANT step and must be performed. Assembly of parts with burrs can cause stress risers and eventual part failure. Various tools can be used. A deburring tool is nice but a 1/2" drill bit can do a good job on most holes. Radius and smooth sharp corners with files or fine grit sanders and grinders. Edges of certain parts also need deburring...a good file works here.

CLECOS: Included in your kit is a supply of clecos (you may wish to purchase more). These are temporary fasteners that will be used to hold things together while fitting and drilling. A pair of pliers is also included to install and remove the clecos. The cleco's are color coded as to hole size.

Silver	#40
Copper	#30
Gold	#11

To use, simply set cleco in the special pliers, squeeze closed, insert into the hole and release. (Reverse for removal). You'll find the clecos to be extremely useful throughout assembly.

ROD ENDS: When installing rod ends and similar hardware, be certain at least ten threads are engaged, unless directed otherwise within the text.

RIVETS: Your kit is supplied with various sizes of aluminum and stainless steel pop rivets. Even though we are careful, there is always the chance of the packages being mis-labeled. So before riveting, be sure to double check that you have the correct aluminum or stainless steel pop rivet for the particular section you are working on.

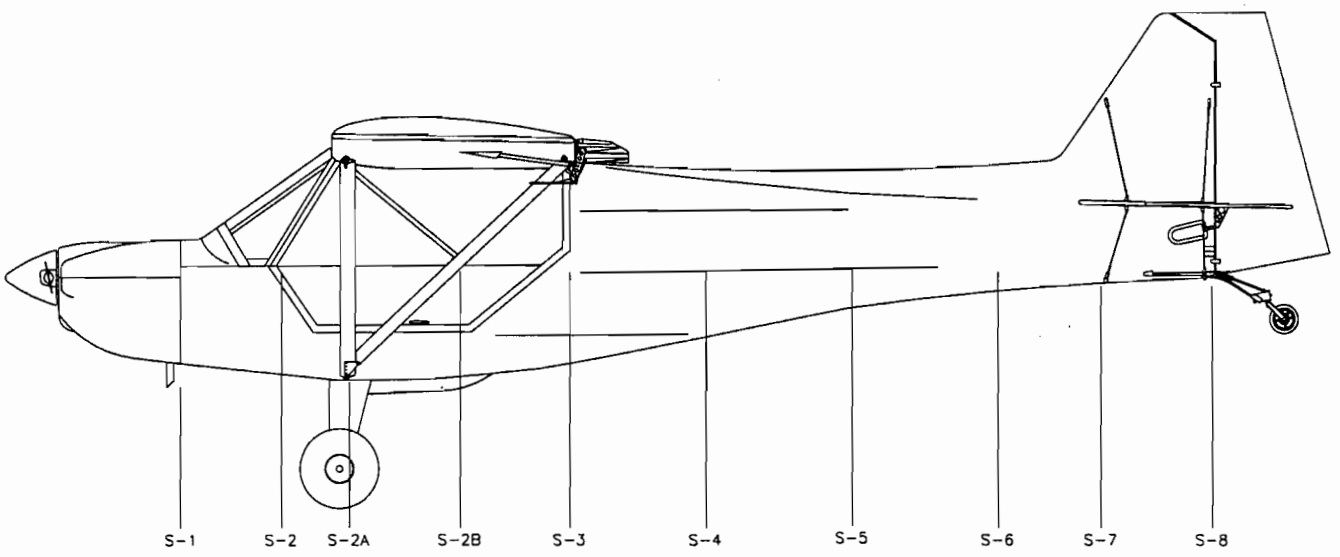
MARKERS: Throughout the manual you are instructed to mark on various parts. Use flairs or any type of felt tip marker. Avoid using pencils. The graphite in the lead will cause the aluminum to corrode.

ENGINE WARRANTY: Rotax engines have a six month warranty from the time of first use. There are however time constraints on this warranty. Please read the following pages on warranty extensions very closely. If there are any questions on engine warranty, please contact the factory.

AN & RIVET CHARTS: All bolts and rivets furnished with the kit are labeled as to their size. In the event they become mixed or you question the size or length of a particular bolt or rivet, we have included an AN bolt chart and a rivet chart.

ORIENTATION

Throughout the Manual you will be asked to refer to specific stations of the fuselage. Station One (S-1) is the first structural member starting at the nose of the plane. Progressing towards the tail we pass all stations. Refer to the drawing below.



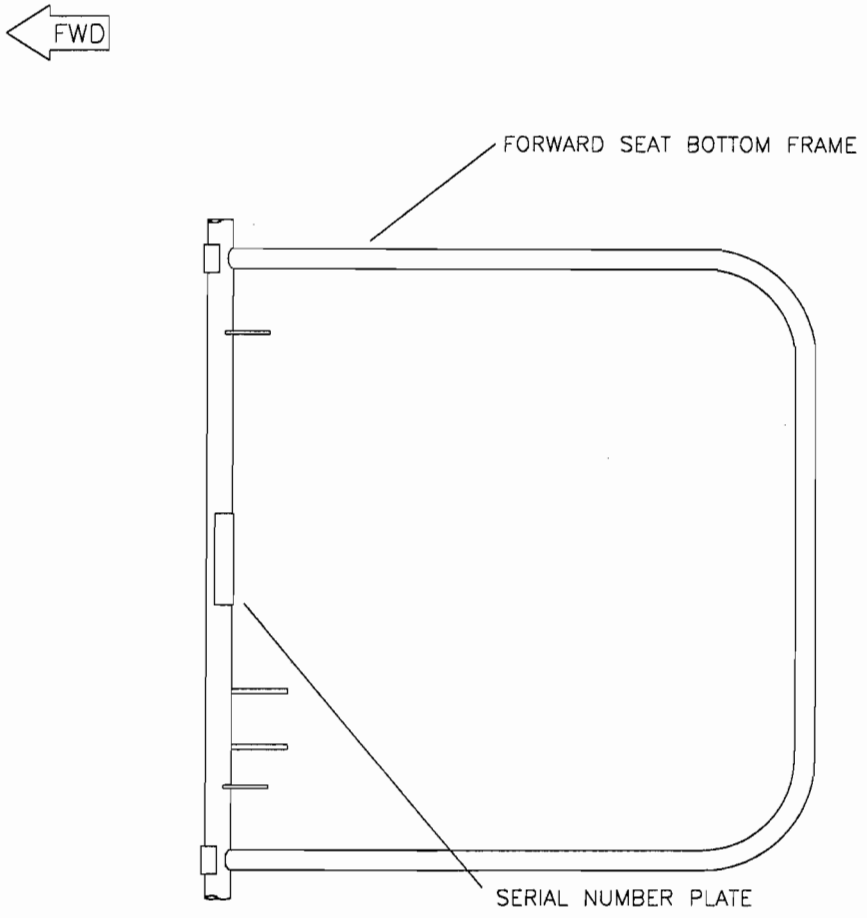
M03793

When a left hand side part is called out, this means the plane's left or your left if you were sitting in the cockpit looking forward.

SERIAL NUMBER: Refer to the following drawing for the serial number location. Please record your serial number and have it handy when ever you call into the factory for assistance.

HAVE FUN: A RANS aircraft is almost as much fun to build as it is to fly and with a little care and planning, your ship could be a show stopper...Send us and the magazine's pictures of your work in progress or your finished plane.
Send your completion photos to EAA Sport Planes, Experimenter, or Kit Planes. They love to see completed kit planes,... don't be shy, SHOW IT OFF!!

AS ALWAYS, WE'RE HERE TO HELP SO GIVE US A CALL IF YOU RUN INTO A PROBLEM



S-7 SERIAL PLATE LOCATION

MD3794

KODIAK RESEARCH, INC.
P.O. BOX N7113
MARLBOROUGH HOUSE
CUMBERLAND ST.
NASSAU, N.P. BAHAMAS

PH: (809)356-5377
FAX: (305)776-9908

Attn: O.E.M.'s

Date: October 31, 1991

Subject: Warranty Extension Requests

Dear Customer,

1) In order for your customers to receive their six month full warranty from time of first use, you must submit for extension on the enclosed form (please add your letterhead to this form). If no request is received warranty will begin from the date invoice was sent to your customer.

2) Extension will be required, for any warranty outside the original six month period. This must be submitted prior to any claim or failure and cannot be applied retro-actively.

3) Supply a copy of original customer request and reason for same as per guideline, submit with your verification on request form.

4) All request must be submitted by manufacturer only. Any request for extensions from retain customers direct will be forwarded to the O.E.M. to process in the above format.

If you have any problem understanding this policy please call for clarification.

KODIAK RESEARCH, INC.
P.O. BOX N7113
MARLBOROUGH HOUSE
CUMBERLAND ST.
NASSAU, N.P. BAHAMAS

CALCULATING WARRANTY

"When does the warranty start?"

1. The final owner should have a six (6) month period of operation to find any proven defective part in his engine or Rotax assembly.

2. There is, however, a one (1) year limit which starts on our invoice date to you. If we sold you an engine today, unless we hear from you, the warranty will end one year from today's date regardless of whether the engine was delivered to a customer of yours or not.

EXAMPLE A: We invoice an engine to you today and two (2) weeks later the engine is sold to your customer and put into service. Six (6) months from date of sale to customer the warranty period is finished. (The customer had owned the engine for six (6) months.)

EXAMPLE B: Engine is invoiced to you today but not put into service (not sold by you) for 3, 4, 5, or up to 6 months later. Your customer still has 6 months warranty as it still falls in the one period to you.

EXAMPLE C: Engine is invoiced to you today, but for some legitimate reason, either at your end or at your customer's end, the engine cannot be put into service until 7 months or up to a maximum of 12 months after the invoice date to you. Then, before the 12 months from invoice date to you are up, you advise us that the engine still has not been used and ask us for a one time, 6 month extension together with a valid reason. We ask permission from Rotax for a 6 month extension of that particular engine. To this date, we have not been refused a **legitimate** request for extension. In this case, warranty period will elapse 18 months from our invoice date to you.

3. As you can see, it is important to properly rotate your engine stock. Never send out a newly arrived engine if you still have older engines in house.

FAA PROCEDURES

--Obtaining an "N" Number

--Registration

--Obtaining An Airworthiness Certificate

OBTAINING AN "N" NUMBER

In order to register your plane, it will be necessary to obtain an identification number for the plane. This is referred to as an "N" number.

If any number is acceptable to you, write to the FAA Aircraft Registry, Dept. of Transportation, P.O. Box 25504, Oklahoma City, OK 73125 and ask them to assign you a free U.S. identification number of their choice.

If you prefer a number of your own choosing or a smaller number, you may be able to obtain the exact number you want by asking the FAA registry to assign you a specific number of your choice.

NOTE: U.S. identification numbers do not exceed 5 symbols in addition to the prefix "N". These symbols may be all numbers (N55555), one to four numbers and a suffix letter (N5555A or N5A), or one to three numbers and two suffix letters (N555AB).

If you request a special "N" number it would be best to list at least five choices in case your first choice is not available. A special number of your own choosing will cost $10.00 and you should enclose that fee with your letter.

When To Obtain Your "N" Number

If you plan to complete your kit within a very short time, it is recommended that you obtain your "N" number right away. If your project will be fairly lengthy, you will not need to obtain your number until the last several months of construction. Keep in mind that if you request a special "N" number it can be reserved for no longer than one year. If this number has not been affixed to the fuselage within this time and the registration completed, it will be necessary to pay an additional $10.00 to reserve that number for another year.

AFFIDAVIT OF OWNERSHIP FORM

Enclosed you will find an Affidavit of Ownership Form. This form should accompany your letter requesting the assignment of an "N" number.

This form must be notarized as it establishes your ownership to the airplane even though you know you did build it. It will be used by the FAA to create a file on your aircraft and will serve as a legal document and a **substitute for the Bill of Sale** (AC Form 8050-2) that a buyer gets when he buys any existing airplane.

REGISTERING YOUR AIRCRAFT

After you have written the Aircraft Registry requesting an "N" number, you will receive a form letter giving your number assignment. You will also receive a blank Aircraft Registration Form. (Sample Enclosed.) Complete the Application for Aircraft Registration (Form 8050-1) and return it to the Aircraft Registry along with the $5.00 registration fee.

Retain the **PINK** copy of the Registration and mail both the **WHITE** original and the **GREEN** copy. Your **PINK** copy is your authority to operate the aircraft, **when carried in the aircraft with an appropriate and current airworthiness certificate**.

RECEIVING AUTHORITY TO FLY YOUR AIRCRAFT

Registration alone does not authorize you to fly your aircraft. The aircraft must, after it has been properly registered, also obtain an Airworthiness Inspection by an inspector of the FAA, at which time the necessary Airworthiness Certificate may be issued. Then, and only then, is your aircraft ready for flight.

WHAT IS THE PROCEDURE FOR OBTAINING AN AIRWORTHINESS CERTIFICATE

Since the final step in obtaining an Airworthiness Certificate is to obtain an inspection of your airplane by an official of the FAA, it is a good idea to make an early contact with the FAA inspector's office nearest your home. Members of the local EAA chapter or a local flying service may be able to help direct you to this office. The purpose of such an early contact would be to discuss with the FAA representative, your proposed home built project and to generally familiarize yourself with the procedures established by the FAA for home built projects. At this time you can establish a tentative plan for inspection of the aircraft upon completion. The typical FAA inspector is interested in your project and wants to help you do a good job.

The FAA requires that everyone building an airplane must maintain a construction log of the work he does on his airplane. You can use a notebook of conventional size and keep a daily diary of the work done on your aircraft. Since all our planes come with assembly manuals, it is a good idea to also make notes in the manual as well as listing dates when certain procedures were done. It is a very good idea to take photographs of work on your plane in various stages. This helps to document that you, the builder, actually completed 51% of this kit. (Advisory Circular 20-27C available from the FAA or EAA describes the procedure used so that your logbook will be a verification of having complete at least 51% of the aircraft yourself.)

MY AIRCRAFT IS COMPLETED, ALL MARKING AND PLACARDS ARE IN PLACE. WHAT ELSE MUST I DO TO MY AIRCRAFT BEFORE I AM READY FOR MY PRE-CERTIFICATION INSPECTION?

Included in your manual is a weight and balance sheet. This will need to be completed before the inspection.

You will need to purchase a logbook for the aircraft, engine and propeller. These can be separate books or just one.

Have handy a copy of your Sales Invoice from us.

I FEEL I AM READY FOR INSPECTION BY THE FAA INSPECTOR, WHAT DO I DO?

If you have had prior contact with your FAA inspector, you will probably be familiar with the procedures used by that office. Different offices have slightly different procedures. Some inspectors will help you fill out the paperwork at the time of inspection. Others require that you submit the paperwork prior to inspection. If you are not sure and there are no other builders in your area to ask, you could call and ask the local office. Or you can submit the following to the Inspector's Office.

1. A letter requesting a final inspection.
2. Form 8130-12 Eligibility Statement (sample follows).
3. Form 8130-6 Application for Airworthiness Certificate (sample follows).
4. A 3-view drawing of the aircraft or photos of topside and front view. Include with this the following:

Horsepower rating of engine and type of prop.
Empty weight and maximum weight at which the aircraft will be operated.
Number of seats and their arrangement (tandem, side by side).
Whether single or dual controlled.
Fuel capacity.
Maximum speed at which you expect to operate the aircraft.

5. Estimated time or number of flights required. (Usually 25 hours for aircraft equipped with certified aircraft engine and prop combinations and 40 hours for those with non-aircraft engine propeller combinations.)

6. The area over which you will be testing. (Request an area encompassing a 25 mile radius for day VFR operations. Exclude congested areas and airways, but try to include nearby airports even if a few miles beyond the 25 mile radius.

Upon satisfactory completion of the necessary final FAA inspection of the aircraft and whatever ground tests may be required, the FAA Inspector will issue your amateur-built "Experimental" Airworthiness Certificate. Along with the certificate you will be given certain **"OPERATING LIMITATIONS"** under which you must operate the aircraft.

AIRCRAFT INSTRUMENT MARKINGS & COCKPIT PLACARDS

Your reference is FAR Part 91.31 Civil Aircraft Operating Limitations and Marking Requirements.

8-1 GENERAL

To insure that each person operating an aircraft does so within the operating limitations prescribed for it, the FAA requires that there is available in it a current Flight Manual, appropriate instrument marking and placards, **or any combination there of.**

The purpose of the flight manual, markings and placards is to detail for the operator of the aircraft, the operational limitations prescribed for the aircraft.

In lieu of a flight manual most amateur builders prefer to mark their instruments and to affix the necessary placards to the instrument panel as the primary means for complying with these requirements.

8-2 MARKINGS AND PLACARDS

The markings and placards necessary for the safe operation and handling of the aircraft should be displayed in a conspicuous place and may not be easily erased, disfigured or obscured. Such placards and markings should include but not necessarily be limited to the following criteria: special emphasis on fuel system markings are very important; such as fuel valves-on-off fuel octane quantity, unusable fuel, minimum fuel for take-off, minimum fuel for inverted flight, etc.

8-3 POWER PLANT INSTRUMENT MARKINGS

Each required POWER PLANT instrument should be marked to indicate the maximum and, if applicable, minimum safe operating limit with a red radial line.

Each normal operating range is to be marked with a green arc not extending beyond the maximum and minimum continuous safe operating limits.

Each engine speed range that is restricted because of excessive vibration should be marked with a red arc.

8-4 AIRSPEED INSTRUMENT MARKINGS

The airspeed indicator should be marked with a **radial red line** to establish the never-exceed speed (Vne).

The takeoff and any precautionary range should be marked with a **yellow arc.** The normal range is marked with a **green arc.** The flap actuation range is marked with a **white arc.**

8-5 AIRSPEED PLACARDS

There should be an airspeed placard in clear view of the pilot and as close as practicable to the airspeed indicator listing:

The design maneuvering speed.
The maximum landing gear operating speed (if applicable).
The maximum flap extension operating speed (if applicable).

8-6 LANDING GEARS

If a retractable landing gear is used, an indicator should be marked so that the pilot can, at any time, ascertain that the wheels are secured in their extreme positions.

Each emergency control should be **red** and must be marked as to method of operation and identity.

8-7 CONTROL MARKINGS

Each fuel tank selector should be marked to indicate the position corresponding to each tank and to existing cross feed position.

If safe operation requires the use of any tanks in a specific sequence, that sequence must be identified.

8-8 POWER PLANT FUEL CONTROLS

Each fuel tank selector should be marked to indicate the position corresponding to each tank and to existing cross feed position.

If safe operation requires the use of any tanks in a specific sequence, that sequence must be identified.

8-9 FLIGHT MANEUVER PLACARD

For non-acrobatic category airplanes, there should be a placard in front of and in clear view of the pilot stating: "No acrobatic maneuvers, including spins, approved."

For acrobatic category airplanes, there should be a placard in clear view of the pilot listing the approved acrobatic maneuvers and the recommended entry airspeed for each. If inverted flight maneuvers are not approved, the placard must have a notation to this effect.

8-10 BAGGAGE PLACARD

The maximum baggage load permitted should be displayed in a conspicuous place adjacent to the baggage area.

8-11 PASSENGER WARNING PLACARD

A placard must be affixed to the aircraft so that it is readily seen in the cockpit. It will state: "Passenger Warning-This aircraft is amateur built and does not comply with the Federal Safety Regulations for "Standard Aircraft". This placard is part of a set available from EAA. See Section 10-5.

OPERATING LIMITATIONS

13-1 MANDATORY TEST FLIGHT PROVING PHASE

All amateur-built sport aircraft as well as standard aircraft have federally imposed operating limitations.

Upon satisfactory completion of the necessary final FAA Inspection of the aircraft and whatever ground tests may be required, the FAA Inspector will issue your amateur-built "Experimental" Airworthiness Certificate.

He will also issue a form letter establishing the operating limitations applicable to your aircraft during its mandatory flight proving period. These Special Airworthiness Experimental Operating Limitations must be displayed in the aircraft at all times. (See sample Operating Limitations, Figure 13-1).

The operating limitations imposed on the aircraft during its flight proving period will be more stringent than those issued later after the mandatory flight testing phase has been completed.

This phase may begin with the issuance of the aircraft's initial airworthiness certificate and the original operating limitations. At this time the FAA Inspector will acquaint you with the requirement for a mandatory flight test and proving period. This flying will be confined to an assigned flight area approved by the FAA Inspector.

The presence of the FAA Inspector is not required, by regulation, at the initial flight of the experimental amateur-built aircraft. If time permits, however, it is not unusual for him to attend.

If he deems necessary, the inspector could issue a permit for a single flight within the boundaries of the airport and, upon witnessing the safe completion of the test, issue a further permit for more extended flights within the permissible area.

A tremendous responsibility for the safe operation of the experimental aircraft rests on the FAA Inspector. If the plane has any new and unusual features he will naturally tend to treat its first flights with care. Also pilot qualification and skill is a consideration.

13-2 PURPOSE OF THE FLIGHT TEST PERIOD

A flight test period is necessary to show to the FAA that the aircraft is controllable throughout its normal range of speeds and throughout all the maneuvers to be executed. It will also serve to prove that the aircraft has no hazardous operating characteristics or design features.

13-3 DURATION OF MANDATORY FLIGHT TEST PERIOD

For standard aircraft type engines: When an FAA approved aircraft engine/propeller combination is installed the flight test period is usually limited to 25 hours of flight time.

For non-aircraft type or automotive engines: An aircraft equipped with such an engine is required to be flown for a longer test period, usually at least 40 hours, to prove its reliability.

NOTE: It should be understood that the local FAA Inspector has the prime responsibility in determining the extent of the flight test period to be required for your aircraft. He is permitted to exercise considerable discretion in extending or in reducing the number of hours required to be flown during this period.

13-4 FLIGHT TEST AREA

The FAA Inspector will authorize the flight tests to be carried out in a designated and limited test area, usually, within a 25 mile radius of the aircraft's base of operations.

He will insure that the area selected is not over densely populated areas or in a congested airway.

In assigning the flight test area the FAA Inspector may modify the size and shape of the area to suit the best purposes of the flight test program. In some locations, particularly around bigger cities where air traffic is heavy, a flight test area may not be practical. The builder must be prepared to except that an approved flight test area may not be the one chosen to him as the most convenient.

13-5 OTHER LIMITATIONS DURING THE FLIGHT TEST PERIOD

As a rule, the carrying of passengers or other crew members will not be permitted unless necessary to the safe operation of that aircraft.

13-6 AIRCRAFT FLIGHT LOG

During the flight test period, the pilot should record the aircraft flight history in an appropriate log book. This should be in addition to any engine tachometer or engine hour meter that may be installed in the aircraft.

Specifically, the duration of each individual flight should be recorded including the number of landings made.

A full description of any mishaps, however minor, or any experiences not entirely normal that occur during the flight experience period should also be duly recorded.

Although not required, it is strongly recommended that all operating data be recorded flight by flight. Such information as airspeeds, cylinder head temperatures, etc., will be very valuable and may be used to determine or establish the various performance figures and operating characteristics of the aircraft.

Although the FAA Inspector is required by law to apply certain basic restrictions permanently to the amateur-built aircraft he is certificating, he can apply whatever other limitations he deems necessary at his own discretion. Unfortunately, nothing in the regulations states that the initial restrictions are required to be removed after successful completion of the test period...they only may be modified.

After the mandatory flight test period...then what?

REPAIRMAN'S CERTIFICATION

The Repairman's Certificate is applied for using the application from 8610-2, available from the local FAA offices. You should ask for this when you apply for your final inspection on your aircraft. You should also be familiar with the Appendix D of FAR part 43. (Items included in the Annual Condition Inspection.)

The Repairman's Certificate is only available to those who have built 51% or more of the specific aircraft they are having inspected.

Every twelve calendar months a condition inspection is performed in accordance with Appendix D of FAR part 43. The repairman has to include the aircraft total time in service, the name, the signature and the certificate type number of the repairman or A & P, who does the examination.

A & P mechanics must do the Annual Condition Inspection for those who are non-builders who own an amateur-built aircraft. On those aircraft where the builder has a Repairman's Certificate, it is recommended that from time to time the Annual Condition Inspection of those aircraft be done by an A & P simply as a check on the builder/repairman's work. One legal representative recommends that every other Annual Condition Inspection for a builder holding a repairman's certificate be done by an A & P mechanic.

AFFIDAVIT OF OWNERSHIP FOR AMATEUR-BUILT AIRCRAFT

U.S. Identification Number: _____

Builder's Name: _____

Model: _____ Serial Number: _____

Class (airplane, rotor craft, glider, etc.): _____

Type of Engines Installed (reciprocating, turbo propeller, etc.):

_____

Number of Engines Installed: _____

Manufacturer, Model, and Serial Number of each Engine Installed: _____

_____

Built for Land or Water Operation: _____

Number of Seats: _____

The above-described aircraft was built from parts by the undersigned and I am the owner.

_____
(Signature of Owner-Builder)

State Of: _____

County Of: _____

Subscribed and sworn to before me this _____day of _____, 19_____
.

My commission expires _____ .

_____
(Signature of Notary Public)

AC Form 8050-88 (9-75) (0052-00-559-0002) Supersedes previous edition

APPENDIX 1. SAMPLE CHECKLIST FOR A CONDITION INSPECTION

AIRCRAFT IDENTIFICATION:

TYPE/SN. _____ ENGINE MODEL/SN. _____

N NUMBER _____ PROPELLER MODEL/SN. _____

A/F TOTAL TIME _____ ENGINE TOTAL TIME _____

OWNER _____ PROPELLER TOTAL TIME _____

GENERAL:

	Builder/inspector			
	Sat	Unsat	Sat	Unsat
REGISTRATION/AIRWORTHINESS/OPERATING LIMITATIONS				
AIRCRAFT IDENTIFICATION PLATES INSTALLED				
EXPERIMENTAL PLACARD INSTALLED				
WEIGHT AND BALANCE/EQUIPMENT LIST				
WINGS:				
REMOVE INSPECTION PLATES/FAIRINGS				
GENERAL INSPECTION OF THE EXTERIOR/INTERIOR WING				
FLIGHT CONTROLS BALANCE WEIGHTS FOR SECURITY				
FLIGHT CONTROLS PROPER ATTACHMENT (NO SLOP)				
FLIGHT CONTROL HINGES/ROD END BEARINGS SERVICEABILITY				
FLIGHT CONTROLS PROPERLY RIGGED/PROPER TENSION				
INSPECT ALL CONTROL STOPS FOR SECURITY				
TRIM CONTROL PROPERLY RIGGED				
TRIM CONTROL SURFACES/HINGES/ROD END BEARINGS SERV.				
FRAYED CABLES OR CRACKED/FROZEN PULLEYS				
SKIN PANELS DELAMINATE/VOIDS (COIN TEST)				
POPPED RIVETS/CRACKED/DEFORMED SKIN				
FABRIC/RIB STITCHING/TAPE CONDITION				
LUBRICATION				
WING ATTACH POINTS				
FLYING/LANDING WIRES/STRUTS FOR SECURITY				
CORROSION				
FLIGHT CONTROL PLACARDS				
_____				
_____				
_____				
_____				
_____				
_____				

APPENDIX 1—CONTINUED

	Builder/inspector			
	Sat	Unsat	Sat	Unsat
INSPECT FIREWALL FOR DISTORTION AND CRACKS				
INSPECT RUDDER PEDDLES AND BRAKES FOR OPERATION AND SECURITY				
INSPECT BEHIND FIREWALL FOR LOOSE WIRES AND CHAFFING LINES				
CHECK CONTROL STICK/YOKE FOR FREEDOM OF MOVEMENT				
CHECK FLAP CONTROL OPERATION				
CHECK CABLE AND PULLEYS FOR ATTACHMENT AND OPERATION				
PERFORM FLOODLIGHT CARBON MONOXIDE TEST				
ENSURE THE COCKPIT INSTRUMENTS ARE PROPERLY MARKED				
INSPECT INSTRUMENTS, LINES, FOR SECURITY CHECK/CLEAN/ REPLACE INSTRUMENT FILTER				
INSPECT COCKPIT FRESH AIR VENTS/HEATER VENTS FOR OPERATION AND SECURITY				
INSPECT SEATS, SEATBELTS/SHOULDER HARNESS FOR SECURITY AND ATTACHMENT				
CORROSION				
_____				
_____				
_____				
_____				
_____				
EMPENNAGE/CANARD:				
REMOVE INSPECTION PLATES AND FAIRINGS				
INSPECT CANARD ATTACH POINTS FOR SECURITY				
INSPECT VERTICAL FIN ATTACH POINTS				
INSPECT ELEVATOR/STABILIZER ATTACH POINTS				
INSPECT HINGES/TRIM TABS/ROD ENDS FOR ATTACHMENT AND FREE PLAY (SLOP)				
INSPECT EMPENNAGE/CANARD SKIN FOR DAMAGE/CORROSION				
INSPECT ALL CONTROL CABLES, HINGES AND PULLEYS				
INSPECT ALL CONTROL STOPS				
_____				
_____				
_____				
_____				
_____				
ENGINE:				
PERFORM COMPRESSION TEST #1_____ #2_____ #3_____ #4_____ #5_____ #6_____				
CHANGE OIL AND FILTER (CHECK FOR METAL)				
INSPECT IGNITION HARNESS FOR CONDITION AND CONTINUITY				
CHECK IGNITION LEAD CIGARETTES FOR CONDITION/CRACKS				
CLEAN AND GAP SPARKPLUGS				
CHECK MAGNETO TIMING/POINTS/OIL SEAL/DISTRIBUTOR				
INSPECT ENGINE MOUNT/BUSHINGS				

APPENDIX 1—CONTINUED

	Builder/inspector			
	Sat	Unsat	Sat	Unsat
CHECK LANDING LIGHT OPERATION				
CHECK POSITION LIGHTS OPERATION				
CHECK ANTI-COLLISION LIGHT FOR OPERATION				
INSPECT ALL ANTENNA MOUNTS AND WIRING FOR SECURITY				
CHECK ALL GROUNDING WIRES (ENGINE TO AIRFRAME, WING TO AILERON/FLAP, ETC)				
INSPECT RADIOS/LEADS/WIRES FOR ATTACHMENT & SECURITY				
INSPECT CIRCUIT BREAKERS/FUSES PANELS FOR CONDITION				
_____				
_____				
_____				
_____				
_____				
_____				
OPERATIONAL INSPECTION:				
VISUAL INSPECTION OF THE ENGINE/PROPELLER				
ALL INSPECTION PANELS AND FAIRINGS SECURE				
PERSONNEL WITH FIRE BOTTLE STANDING BY				
BRAKE SYSTEM CHECK				
PROPER FUEL IN TANKS				
ENGINE START PROCEDURES				
OIL PRESSURE/OIL TEMPERATURE WITHIN LIMITS				
VACUUM GAUGE CHECK				
MAGNETO CHECK/HOT MAG CHECK				
IDLE RPM/MIXTURE CHECK				
STATIC RPM CHECK				
ELECTRICAL SYSTEM CHECK				
COOL DOWN PERIOD/ENGINE SHUT DOWN				
PERFORM OIL, HYDRAULIC, AND FUEL LEAK CHECK				
PAPERWORK:				
AIRWORTHINESS DIRECTIVES				
RECORD FINDINGS AND SIGN OFF INSPECTION AND MAINTENANCE IN AIRCRAFT LOGBOOKS				

O.M.B. No. 2120-0018

US Department of Transportation
Federal Aviation Administration

APPLICATION FOR AIRWORTHINESS CERTIFICATE

INSTRUCTIONS — Print or type. Do not write in shaded areas, these are for FAA use only. Submit original only to an authorized FAA Representative. If additional space is required, use an attachment. For special flight permits complete Sections II and VI or VII as applicable.

I. AIRCR. DESCRIP.

1. REGISTRATION MARK	2. AIRCRAFT BUILDER'S NAME (Make)	3. AIRCRAFT MODEL DESIGNATION	4. YR. MFR	FAA CODING
N1234Y	John Q. Amateur	RANS S-9	88	
5. AIRCRAFT SERIAL NO	**6. ENGINE BUILDER'S NAME (Make)**	**7. ENGINE MODEL DESIGNATION**		
1288054	Rotax	503		
8. NUMBER OF ENGINES	**9. PROPELLER BUILDER'S NAME (Make)**	**10. PROPELLER MODEL DESIGNATION**	**11. AIRCRAFT IS (Check if applicable)**	
1	Sterba	Wood 64 X 44	IMPORT	

II. CERTIFICATION REQUESTED

APPLICATION IS HEREBY MADE FOR: (Check applicable items)

A	1		STANDARD AIRWORTHINESS CERTIFICATE (Indicate category)		NORMAL		UTILITY		ACROBATIC		TRANSPORT		GLIDER		BALLOON
B		X	SPECIAL AIRWORTHINESS CERTIFICATE (Check appropriate items)												
	2		LIMITED												
	5		PROVISIONAL (Indicate class)	1		CLASS I									
				2		CLASS II									
	3		RESTRICTED (Indicate operations) to be conducted	1		AGRICULTURE AND PEST CONTROL	2		AERIAL SURVEYING	3		AERIAL ADVERTISING			
				4		FOREST (Wildlife conservation)	5		PATROLLING	6		WEATHER CONTROL			
				7		CARRIAGE OF CARGO	0		OTHER (Specify)						
	4	X	EXPERIMENTAL (Indicate operations) to be conducted	1		RESEARCH AND DEVELOPMENT	2	X	AMATEUR BUILT	3		EXHIBITION			
				4		RACING	5		CREW TRAINING			MKT SURVEY			
				0		TO SHOW COMPLIANCE WITH FAR									
	8		SPECIAL FLIGHT PERMIT (Indicate operation to be conducted then complete Section VI or VII as applicable on reverse side)	1		FERRY FLIGHT FOR REPAIRS, ALTERATIONS, MAINTENANCE OR STORAGE									
				2		EVACUATE FROM AREA OF IMPENDING DANGER									
				3		OPERATION IN EXCESS OF MAXIMUM CERTIFICATED TAKE-OFF WEIGHT									
				4		DELIVERING OR EXPORT	5		PRODUCTION FLIGHT TESTING						
				6		CUSTOMER DEMONSTRATION FLIGHTS									
C	6		MULTIPLE AIRWORTHINESS CERTIFICATE (Check ABOVE Restricted Operation and Standard or Limited as applicable)												

III. OWNER'S CERTIFICATION

A. REGISTERED OWNER (As shown on certificate of aircraft registration) — IF DEALER, CHECK HERE →

NAME	ADDRESS
John Q. Amateur	#1 Build-it Road Anytown, KS 67601

B. AIRCRAFT CERTIFICATION BASIS (Check applicable blocks and complete items as indicated)

AIRCRAFT SPECIFICATION OR TYPE CERTIFICATE DATA SHEET (Give No. and Revision No.)	AIRWORTHINESS DIRECTIVES (Check if all applicable AD's complied with and give latest AD No.)
AIRCRAFT LISTING (Give page numbers)	SUPPLEMENTAL TYPE CERTIFICATE (List number of each STC incorporated)

C. AIRCRAFT OPERATION AND MAINTENANCE RECORDS

CHECK IF RECORDS IN COMPLIANCE WITH FAR 91.173.	TOTAL AIRFRAME HOURS	3	EXPERIMENTAL ONLY (Enter hours flown since last certificate issued or renewed)
			0

D. CERTIFICATION — I hereby certify that I am the registered owner (or his agent) of the aircraft described above; that the aircraft is registered with the Federal Aviation Administration in accordance with Section 501 of the Federal Aviation Act of 1958 and applicable Federal Aviation Regulations; and that the aircraft has been inspected and is airworthy and eligible for the airworthiness certificate requested.

DATE OF APPLICATION	NAME AND TITLE (Print or type)	SIGNATURE
3/16/88	John Q. Amateur	John Q. Amateur

IV. INSPECTION AGENCY VERIFICATION

A. THE AIRCRAFT DESCRIBED ABOVE HAS BEEN INSPECTED AND FOUND AIRWORTHY BY (Complete this section only if FAR 21.183(d) applies)

2	FAR PART 121 OR 127 CERTIFICATE HOLDER (Give Certificate No.)	3	CERTIFICATED MECHANIC (Give Certificate No.)
6	CERTIFICATED REPAIR STATION (Give Certificate No.)	5	AIRCRAFT MANUFACTURER (Give name of firm)

DATE	TITLE	SIGNATURE

FAA SENTATIVE CERTIFICATION

(Check ALL applicable blocks in items A and B)

A. I find that the aircraft described in Section I or VII meets requirements for: THE CERTIFICATE REQUESTED; 4 AMENDMENT OR MODIFICATION OF CURRENT AIRWORTHINESS CERTIFICATE

B. Inspection for a special flight permit under Section VII was conducted by: FAA INSPECTOR; FAA DESIGNEE; CERTIFICATE HOLDER UNDER; FAR 65; FAR 121, 127 or 135; FAR 145

DATE	DISTRICT OFFICE	4	DESIGNEE'S SIGNATURE AND NO.	1	FAA INSPECTOR'S SIGNATURE

THIS PAGE IS ONLY A SAMPLE

Form Approved
O.M.B. NO. 2120-0018

US Department of Transportation
Federal Aviation Administration

ELIGIBILITY STATEMENT AMATEUR-BUILT AIRCRAFT

Instructions: Print or type all information except signature. Submit original to an authorized FAA representative. Applicant completes Section I thru III. Notary Public Completes Section IV.

I. REGISTERED OWNER INFORMATION

Name(s): John Q. Amateur

Address(es): #1 Build-it Road (No. & Street) | Anytown (City) | KS (State) | 67601 (Zip)

Telephone No.(s): (913) 888-8888 (Residence) | ( ) (Business)

II. AIRCRAFT INFORMATION

Model: Rans S-9

Engine(s) Make: Rotax 503

Assigned Serial No.: 1288054

Engine(s) Serial No.(s): 3572333

Registration No.: N1234Y

Prop./Rotor(s) Make: Sterba

Aircraft Fabricated: Plan ☐ Kit ☒

Prop./Rotor(s) Serial No.(s):

III. MAJOR PORTION ELIGIBILITY STATMENT OF APPLICANT

I certify the aircraft identified in Section II above was fabricated and assembled by John Q. Amateur
(Name of Person(s) (Please Print))
for my (their) education or recreation. I (we) have records to support this statement and will make them available to the FAA upon request.

— NOTICE —

Whoever in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals or covers up by any trick, scheme, or device a material fact, or who makes any false, fictitious or fraudulent statements or representations, or makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years, or both (U.S. Code, Title 18, Sec. 1001.)

APPLICANT'S DECLARATION

I hereby certify that all statements and answers provided by me in this statement form are complete and true to the best of my knowledge, and I agree that they are to be considered part of the basis for issuance of any FAA certificate to me. I have also read and understand the Privacy Act statement that accompanies this form.

Signature of Applicant *(In Ink)*: John Q. Amateur

Date: 3/16/88

IV. NOTARIZATION STATEMENT

THIS MUST BE NOTARIZED!

THIS PAGE IS ONLY A SAMPLE

FAA Form 8130-12 (4-89)

FORM APPROVED
OMB No. 2120-0042

UNITED STATES OF AMERICA DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION-MIKE MONRONEY AERONAUTICAL CENTER
AIRCRAFT REGISTRATION APPLICATION

CERT. ISSUE DATE

UNITED STATES REGISTRATION NUMBER N 1234Y

AIRCRAFT MANUFACTURER & MODEL
RANS S-9

AIRCRAFT SERIAL No.
1288054

FOR FAA USE ONLY

TYPE OF REGISTRATION (Check one box)

☒ 1. Individual ☐ 2. Partnership ☐ 3. Corporation ☐ 4. Co-owner ☐ 5. Gov't. ☐ 8. Non-Citizen Corporation

NAME OF APPLICANT (Person(s) shown on evidence of ownership. If individual, give last name, first name, and middle initial.)

John Q. Amateur

TELEPHONE NUMBER: (913) 888-8888

ADDRESS (Permanent mailing address for first applicant listed.)

Number and street: #1 Build-it Road

Rural Route: P.O. Box:

CITY	STATE	ZIP CODE
Anytown	KS	67601

☐ **CHECK HERE IF YOU ARE ONLY REPORTING A CHANGE OF ADDRESS**

ATTENTION! Read the following statement before signing this application. This portion MUST be completed.

A false or dishonest answer to any question in this application may be grounds for punishment by fine and / or imprisonment (U.S. Code, Title 18, Sec. 1001).

CERTIFICATION

I/WE CERTIFY:

(1) That the above aircraft is owned by the undersigned applicant, who is a citizen (including corporations) of the United States.

(For voting trust, give name of trustee: _____), or:

CHECK ONE AS APPROPRIATE:

a. ☐ A resident alien, with alien registration (Form 1-151 or Form 1-551) No. _____

b. ☐ A non-citizen corporation organized and doing business under the laws of (state) _____ and said aircraft is based and primarily used in the United States. Records or flight hours are available for inspection at _____

(2) That the aircraft is not registered under the laws of any foreign country; and

(3) That legal evidence of ownership is attached or has been filed with the Federal Aviation Administration.

NOTE: If executed for co-ownership all applicants must sign. Use reverse side if necessary.

TYPE OR PRINT NAME BELOW SIGNATURE

EACH PART OF THIS APPLICATION MUST BE SIGNED IN INK.

SIGNATURE	TITLE	DATE
John Q. Amateur	Builder/Owner	3/16/88
John Q. Amateur		

NOTE Pending receipt of the Certificate of Aircraft Registration, the aircraft may be operated for a period not in excess of 90 days, during which time the PINK copy of this application must be carried in the aircraft.

AC Form 8050-1 (12/90) (0052-00-628-9007) Supersedes Previous Edition

AC FORM 8050-1 IS A 3-PART FORM

THIS PAGE IS ONLY A SAMPLE

EAA Safety Check List

Spend some time with your plane and this check list before those first flights. Thirty minutes with a pencil here may be worth the rest of your life.

	Yes	No
PROPELLER		
1. Blades		
Laminations not separated?		
Breaks, scratches, nicks tipping?		
Loose rivets in tipping?		
Drain holes in tip clear?		
2. Hub		
Any cracks or corrosion?		
Hub properly seated and safetied?		
3. Control Mechanism		
Oil leaks?		
Worn bearings?		
Secure?		
4. Attachment		
All bolt & nut threads undamaged?		
All bolts & nuts secured & safetied?		
5. Spinner		
Cracks?		
Properly secured?		
Is spinner chafing into prop?		
ENGINE & ENGINE COMPARTMENT		
1. Fuel System		
All lines of approved type?		
All strainers clean?		
All lines secured against vibration?		
Gascolator bowl at low point in system when aircraft is in normal ground position?		
Fuel drains operative?		
All connections properly tightened?		
2. Oil System		
All lines of approved type?		
All lines secured against vibration?		
Oil tank has no cracks or leaks?		
Tank properly secured & safetied?		
All plugs & strainers cleaned & safetied?		
3. Ignition-Electrical System		
All wiring proper type and gauge?		
All fastenings secured & safetied?		
Magnetos properly grounded?		
Spark plugs cleaned & undamaged?		
Spark plugs properly torqued?		
Engine grounded to airframe?		
Starter/generator secured?		
4. Exhaust Manifold		
Secured and safetied?		
All gaskets in good condition?		

	Yes	No
ENGINE & ENGINE COMPARTMENT		
All stacks in good condition-no cracks or rusted-out areas?		
Carb heat and cabin heat muffs removed and manifold inspected?		
5. Controls		
All secured and safetied?		
No excessive play in any linkages?		
No interference between any control and the structure throughout the full operating range?		
Carb heater gate open & close fully?		
6. Mount		
Secured and safetied?		
All joints inspected for cracks?		
Any bends in mount tubes?		
Bushings in good condition?		
7. Cowlings		
Secured and/or safetied?		
All latches or fastenings working properly?		
Any cracks properly checked or reinforced?		
Cowlings clean?		
8. Power Plant in General		
All necessary safeties, palnuts, locknuts, etc. in place?		
No fuel or oil leaks?		
All accessories secured & safetied?		
FUSELAGE-HULL		
1. Structure		
All welds sound?		
All tubing straight and uncracked?		
No rust or corrosion?		
All attach fittings sound, no cracks, elongation of holes or worn threads?		
All rivets properly installed?		
Inspection openings for all vital areas?		
Fuselage properly drained, that is, no built-in moisture traps?		
Firewall of proper fireproof material?		
2. Cover		
Properly attached?		
No tears, distortions, or abrasions?		
Any breaks or ruptures properly repaired?		
3. Control System		
Properly secured and safetied?		
Controls stops provided & adjusted?		
All fittings of proper thread & size?		

	Yes	No
FUSELAGE-HULL		
All pulleys of proper diameter for bends, proper size for cable, and guarded?		
All cable of proper size (1/8" min) and condition?		
Any parts in system subject to rotation for any reason properly secured and safetied?		
Return springs on rudder pedals?		
No interference between any control part (cable, tube or linkage) and any other part of the structure throughout full control movement?		
Adequate room for full control throw when aircraft is occupied?		
Controls arranged to minimize danger of blocking by foreign objects?		
Grip properly secured to control stick or wheel?		
4. Electrical System		
All grommets, particularly in firewall, snug fitting and in good condition?		
All wires of proper gauge, insulated, and secured?		
Wires do not rest on abrasive surfaces?		
Battery installation of sufficient strength?		
Battery properly ventilated and drained?		
No corrosion at or around battery or its vents?		
Fuses of adequate amperage?		
5. Fuel System-Tanks		
Drains properly located to discharge clear of aircraft?		
All outlets properly screened?		
Breather inlets clear?		
Fuel shut-off valve installed?		
Fuel shut-off valve easily reached by pilot?		
All fuel lines of proper approved type?		
All fuel lines secured against vibration?		
Is tank located so that sufficient head is available in maximum climb with minimum fuel? Placard if necessary?		
Has tank sufficient expansion area?		
Any tank overflow discharge clear of hazardous areas on aircraft?		
Is tank support sufficient to meet strength requirements?		
Does tank clear surrounding structure?		
Do tank supports minimize strain and chafing?		

To insure its safe construction and operation, and to further emphasize the vital necessity for thorough consideration of every item which goes into your airplane, the following working check-list should be used, and it is suggested that it be made a part of the aircraft records.

	Yes	No
EXITS		
1. Can aircraft be cleared rapidly in case of emergency?		
Are special precautions available during test period, such as jettisonable doors or canopy?		
If parachute is to worn, does it clear all controls?		
Baggage Compartment		
1. Are walls and floors of sufficient strength to withstand flight loads?		
Can anything escape from baggage compartment by accident?		
Cabin-Cockpit		
1. Instruments		
Are all instruments functioning and accurate?		
Are all instruments marked, max pressures, temperatures, speeds?		
Are all vital instruments easily visible to pilot?		
2. Flight-Engine Controls		
Are all engine controls marked or easily identifiable?		
Are all engine controls smooth in operation, without excessive resistance, and easily available to pilot?		
Are all flight controls arranged so that jamming by dropped gloves, etc. is impossible?		
3. Fuel Systems		
Are all gas valves easily reached by pilot?		
Are all gas valves marked ON, OFF, LEFT, RIGHT?		
Are all gas valves in such a position that accidental operation is impossible or guarded in such a way that accidental operation is impossible?		
4. Seats		
Are seats of sufficient strength for maximum flight loads contemplated?		
Does seat "flex" enough at any time to interfere with flight controls?		
5. Safety Belts and Shoulder Harness		
Is installation and attachments of sufficient strength to meet 9G forward load minimum?		
Does attachment connect directly to primary structure?		
Are belts and harness in top condition?		
Is belt of correct size, that is, no long over-tongue?		
Is a separate belt and shoulder harness supplied for each occupant?		

	Yes	No
6. Heating-Ventilation		
Is cabin or cockpit in negative pressure area and liable to suck in exhaust fumes?		
Is any provision made for ventilating cabin other than normal leakage?		
7. Windshield-Windows		
Are windshield and windows of recognized aeronautical materials?		
Is windshield braced against positive or negative pressures in flight, either by design or extra bracing?		
WING-TAIL SURFACES		
Fixed Surfaces		
Are all interior fastenings secured and/or safetied?		
Is interior properly weatherproofed?		
Have any mice been inside lately?		
Movable Surfaces		
Are stops provided, either at wing or somewhere else in the control system?		
Are all hinges and brackets sound?		
Are all hinge pins secured and safetied?		
Is there any excessive play in hinges?		
Is there any excessive play in control cables or tubes?		
External Bracing		
Is the interior of all struts weather protected?		
Are all adjustable fittings locked, secured, and safetied?		
Are struts undamaged by bends or dents?		
Are all wires serviceable with proper end fittings?		
Attach Fittings		
Are bolts of proper size installed?		
Are all bolts secured and safetied?		
Have all bolts been examined for wear?		
Flight Control Mechanism		
All cables and tubes unbroken or unbent & with proper end fittings?		
All control attachments secured and safetied?		
All pulleys free from interference and guarded?		
All torque tubes and bell cranks in good condition?		
No interference with fuselage or wing structure throughout full control travel?		
Fuel Tanks		
(See Fuselage Section Also)		
Are drains supplied at low point in tank when aircraft is in normal ground position?		

	Yes	No
Fuel overflow drains clear of aircraft - no tendency for overflow to soak into aircraft structure?		
LANDING GEAR		
Properly lubricated?		
Proper oleo inflation?		
Shock cords or springs in good condition?		
All attach fittings uncracked and sound?		
All bolt holes not elongated?		
All attach bolts secured and safetied?		
Brake lines in good condition?		
Brakes operating properly?		
Correct hydraulic fluid in lines?		
Wheels uncracked?		
Tires unworn & properly inflated?		
Excessive side play in wheel bearings?		

GENERAL

ALL BOLTS WHEREVER POSSIBLE, HEAD UP AND FORWARD.

All exterior fastenings visible from cockpit or cabin should have safetied end toward pilot, wherever possible.

A complete walkaround inspection of the aircraft should be accomplished to check that every bolt visible on the exterior is secured and safetied. That there is no visible structural damage. That all inspection panels and covers are in place and attached. That all parts of the aircraft are in proper alignment.

DON'T FORGET TO PUT IN ENOUGH GAS PRIOR TO THAT FIRST FLIGHT - GROUND RUNNING AND TAXI TESTS CAN USE UP A LOT MORE THAN YOU THINK!

OK - Kick the tires, add another coat of paint and AWAY WE GO!

RIVETS CROSS REFERENCE LIST

DIA.	RANS	POP RIVET				CHERRY Q			
	NO.	NO.	SHER.	TNSL.	GRIP	NO.	SHER.	TNSL.	GRIP
3/32 (#41)	40APR1/8	AD32ABS	85	135	.031-.125	--	--	--	--
3/32 (#41)	40APR1/4	AD34ABS	85	135	.126-.250	--	--	--	--
3/32 (#41)	40APR3/8	AD36ABS	85	135	.251-.375	--	--	--	--
1/8 (#30)	30APR1/16	--	--	--	--	AAPQ-41	225	250	.0-.062
1/8 (#30)	30APR1/8	AD42ABS	155	235	.063-.125	AAPQ-42	225	250	.063-.125
1/8 (#30)	30APR1/4	AD44ABS	155	235	.188-.250	AAPQ-44	225	250	.126-.250
1/8 (#30)	30APR3/8	AD46ABS	155	235	.313-.375	AAPQ-46	225	250	.251-.375
1/8 (#30)	30SSPR1/16	--	--	--	--	CCPQ-41	700	600	0-.062
1/8 (#30)	30SSPR1/8	SSD42SSBS	550	700	.031-.125	CCPQ-42	700	600	.063-.125
1/8 (#30)	30SSPR1/4	SSD44SSBS	550	700	.188-.250	CCPQ-45	700	600	.188-.312
1/8 (#30)	30SSPR3/8	SSD46SSBS	550	700	.251-.375	CCPQ-46	700	600	.251-.375
3/16 (#11)	12APR1/8	AD62ABS	315	500	.063-.125	AAPQ-62	500	450	.062-.125
3/16 (#11)	12APR1/4	AD64ABS	315	500	.126-.250	AAPQ-64	500	450	.126-.250
3/16 (#11)	12APR3/8	--	--	--	--	AAPQ-66	500	450	.251-.375
3/16 (#11)	12APR1/2	AD68ABS	315	500	.375-.500	AAPQ-68	500	450	.376-.500
3/16 (#11)	12SSPR1/8	--	--	--	--	CCPQ-62	1650	1300	.062-.125
3/16 (#11)	12SSPR1/4	SSD64SSBS	1000	1375	.126-.250	CCPQ-64	1650	1300	.126-.250
3/16 (#11)	12SSPR3/8	SSD66SSBS	1000	1375	.251-.375	CCPQ-66	1650	1300	.251-.375
3/16 (#11)	--	--	--	--	--	SSPQ-68	1050	825	.376-.50
3/16 (#11)	--	--	--	--	--	SSPQ-610	1050	825	.501-.562
1/8"	--	--	--	--	--	CCPQ-44	700	600	.126-.250
						AVEX RIVET			
1/8 (#30)	--	--	--	--	--	1691-0410	165	230	.031-.187

AN3 - AN8 AIRFRAME BOLTS

AN3-AN8 CADMIUM-PLATED STEEL BOLTS (DRILLED AND UNDRILLED)

A non-corrosion-resistant steel machine bolt which conforms to Specification MIL-B-6812. Cadmium-plated to Specification QQ-P-416.

Available with or without single hole through shank and/or single hole through head. Examples of part members for a cadmium plated steel bolt having a diameter of 1/4" and nominal length of 1".

AN4-6	For drilled shank
AN4-6A	Designates undrilled shank
AN4H-6	Drilled head, drilled shank
AN4H-6A	Drilled head, undrilled shank

NUT AND COTTER PIN SIZES

AN NUMBER	DIAMETER	PLAIN NUT AN NUMBER	CASTLE NUT AN NUMBER	COTTER PIN MS NUMBER
AN3	3/16	AN315-3R	AN310-3	MS24665-132
AN4	1/4	AN315-4R	AN310-4	MS24665-132
AN5	5/16	AN315-5R	AN310-5	MS24665-132
AN6	3/8	AN315-6R	AN310-6	MS24665-283
AN7	7/16	AN315-7R	AN310-7	MS24665-283
AN8	1/2	AN315-8R	AN310-8	MS24665-283

HOW TO DETERMINE GRIP

For Steel and Aluminum Aircraft Bolts
(Subtract Fractions Shown Below From Length of Bolt)

AN 3 to AN 8	AN NUMBER, Diameter, and Threads per Inch	AN3 10 -32	AN4 1/4 -28	AN5 5/16 -24	AN6 3/8 -24	AN7 7/16 -20	AN8 ½ -20
	Grip = Length Less	13/32	15/32*	17/32	41/64	21/32	25/32

*Formula does not apply for AN4-3. Grip for AN4-3 is 1/16.

DASH NUMBER -- NOMINAL LENGTH

-3 . . . 3/8	-6 . . . 3/4	-11 . . . 1 ⅛	-14 . . . 1 ½	-17 . . . 1 7/8	-22 . . . 2 1/4	-25 . . . 2 5/8
-4 . . . ½	-7 . . . 7/8	-12 . . . 1 1/4	-15 . . . 1 5/8	-20 . . . 2	-23 . . . 2 3/8	-26 . . . 2 3/4
-5 . . . 5/8	-10 . . . 1	-13 . . . 1 3/8	-16 . . . 1 3/4	-21 . . . 2 1/8	-24 . . . 2 ½	-27 . . . 2 7/8
						-30 . . . 3

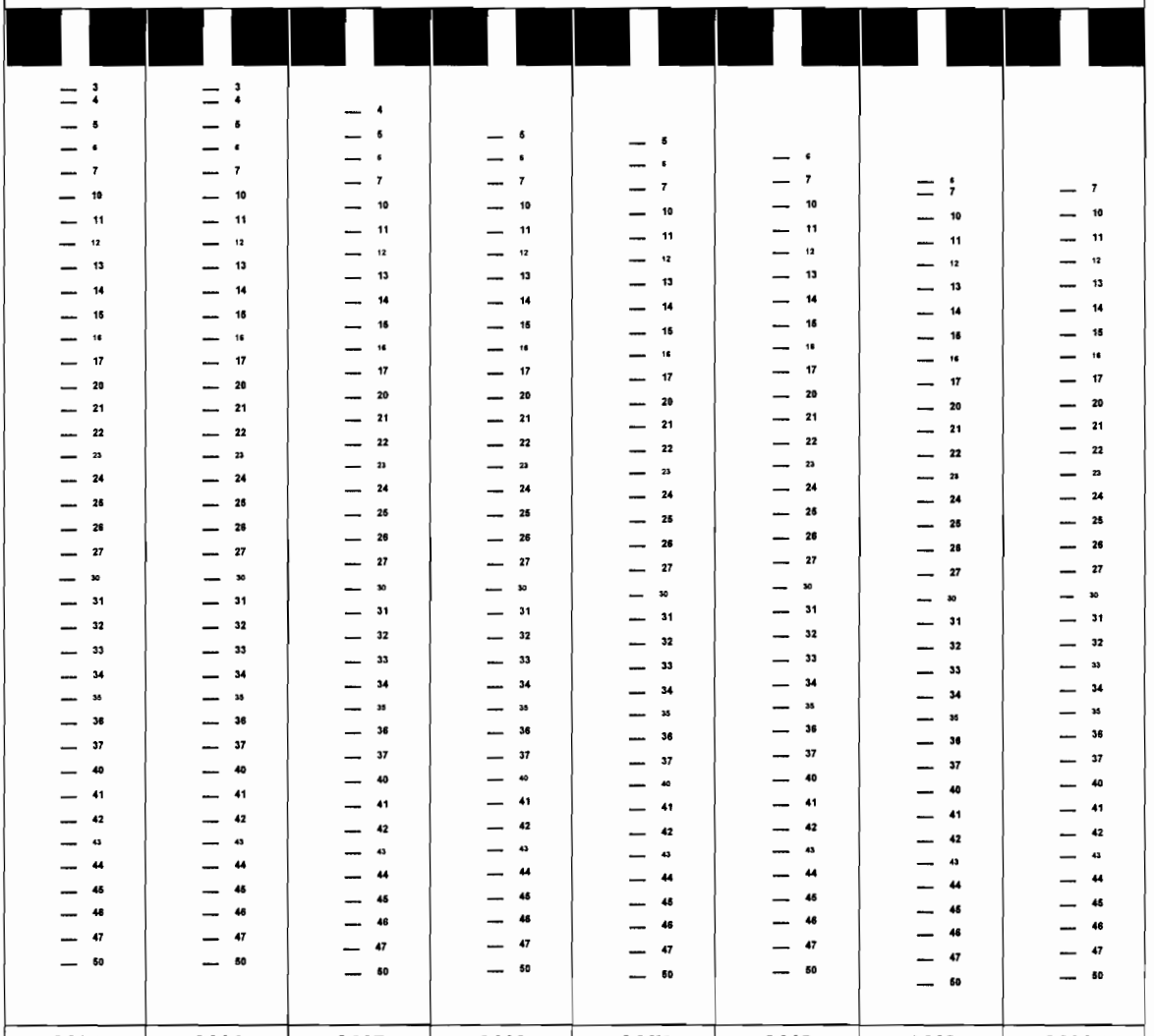
PART IDENTIFICATION

Use the above chart to determine lengths of bolts. Diameters are as follows:

AN3 = 3/16" AN4 = 1/4" AN5 = 5/16" AN6 = 3/8"

Use the parts manual for other part identification. The drawings depict a fairly accurate likeness of the real thing. Other parts are labeled by part number. Again, reference the parts manual to confirm part identity.

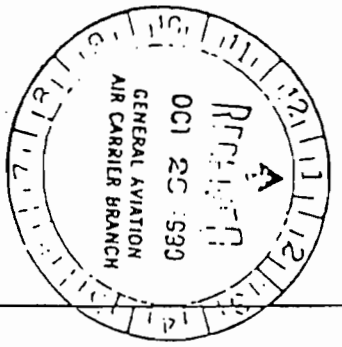
AN Bolt Gauge



AN3	AN4	AN5	AN6	AN7	AN8	AN9	AN10
3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8

EF-116

US Department of Transportation
Federal Aviation Administration



Memorandum

Subject: ACTION: Revised Listing of Eligible Amateur-built Aircraft Kits

Date: OCT - 5 1990

From: Manager, Aircraft Manufacturing Division, AIR-200

Reply to Attn of: Henley, X77993

To: All Aircraft Certification Directorates
All Regional Flight Standards Divisions

The following amateur-built aircraft kits have been evaluated and found to be eligible in meeting the requirements of Federal Aviation Regulations 21.191(g) (major portion):

KIT PRODUCER	MODEL EVALUATED	DATE FOUND ELIGIBLE
Advanced Aviation 323 N. Ivey Ln. P.O. Box 16716 Orlando, FL 32861	King Cobra - Parts List Dated 11/01/83	11/01/83
Aero-Composites Technl, Inc. RD 3, Box 107B Somerset, PA 15501	Sea Hawker - Parts List Dated 03/09/84	03/09/84
Aero-Designs, Inc. 635 Blakely San Antonio, TX 78209	Pulsar - Parts List Dated 10/01/89	10/20/89
Air Command Mfg. 20600 210 Highway Liberty, MO 64068	Models 447,503,532 Parts List Dated 01/17/90	01/17/90
American Aircraft 3090 Airport Way Long Beach, CA 9[illegible]	Falcon - Parts List Dated 06/27/84	07/17/85
Avid Aircraft P.O. Box 728 Caldwell, ID 83606	Avid Flyer - Parts List Dated 06/30/83	05/ .0/83

Carlson Acft Inc. 50643 S.R. 14 P.O. Box 88 East Palestine, OH 44413	Sparrow II - Parts List Dated 01/24/90	01/24/90
C.G.S. Aviation P.O. Box 41007 Brecksville, OH 44141	Hawk Model A - Parts List Dated 07/15/82	07/15/82
Christen Ind. P.O. Box 547 Afton, WY 83110	Eagle II - Parts List Dated - 05/16/86	04/05/78
Denny Aircraft Co. 100 N. Kings Rd. Nampa, ID 83687	Kitfox I - Parts List Dated 03/04/85 Kitfox II - Parts List Dated 04/05/90	07/03/85 04/16/90
Fisher Flying Prod. P.O. Box 468 Edgely, ND 58433	FP-202 - Parts List Dated 11/07/83 Super Koala - Parts List Dated 03/06/85	11/07/83 03/06/85
Flightworks Corp. 4211-C Todd Lane Austin, TX 78744	FW2TR (Capella XS) FW2TD (Capella XS) FW1TR (Capella) FW1TD (Capella) Parts Lists Dated 08/12/89	02/08/90 02/08/90 02/08/90 02/08/90
Grinvalds Germain, France	Orion G-802 Parts List Dated 10/21/83	11/04/83
Hipps Superbirds P.O. Box 266 Saluda, NC 28773	The Kitten The Sportster The Super Kitten Parts Lists Dated 07/12/85	07/12/85 07/12/85 07/12/85
The Kolb Co. RD. 3, Box 38 Phoenixville, PA 19460	Firestar Twinstar Parts Lists Dated 04/21/86	04/21/86 04/21/86

MacAir Industries Box 1000 Baldwin, Ontario LOE 1AO Canada	Merlin Sport 65 Parts List Dated 02/28/89	02/28/89
Maxair Acft. Corp. 1101 West Savannah Valdosta, GA 31603	ARV-277 ARV-377 ARV-503 ARV-582A ARV-582 Parts Lists Dated 01/90	01/15/85 01/15/85 01/15/85 06/17/86 06/17/86
Mosler Inc. 140 Ashwood Rd. Hendersonville, NC 28739	N3-PUP - Parts List Dated 7/84 N3-Super PUP- Parts List Dated 2/86	01/11/85 01/11/85
Neico Aviation 403 S. Ojai St. Santa Paula, CA 93060	Lancair 320 Lancair 320FB Parts Lists Dated 11/15/89	11/15/89 11/15/89
Phantom Sport P.O. Box 145 Southern Pines, NC 28387	Phantom I - Parts List Dated 04/17/85	04/17/85
Protech Aircraft 24215 FM 1093 Richmond, TX 77469	PT-2 - Parts list Dated 10/20/89	12/21/89
Quad City Aircraft Corp. 3610 Coaltown Rd. Moline, IL 61265	Challenger Challenger II Parts Lists Dated 4/90	07/14/86 07/14/86
Questair Inc. P.O. Box 18946 Greensboro, NC 27419	Venture - Parts List Dated 03/21/90	03/21/90
Quicksilver Ind. P.O. Box 1572 Temecula, CA 923.	Quicksilver Mx II Parts List Dated 03/04/82 Quicksilver MX Super Parts List Dated 01/05/84 Quicksilver MXL II Parts List Dated 06/28/84 Quicksilver GT Parts List Dated 06/20/84	05/19/82 01/30/85 01/30/85 01/30/85

Rans Company 1104 E. Hwy 40 Bypass, Hays, KS 67601	S-7 Courier - Parts List Dated 6/90 S-9 Chaos - Parts List Dated 8/90 S-10 Sakota - Parts List Dated 6/90	12/09/85 10/17/88 10/17/88
Rotary Air Force Ponoka Airport Box 1205 Panoka, Alberta TOC 2HO Canada	RAF-1000 RAF-2000 Parts Lists Dated 07/27/89	07/27/89 07/27/89
RotorWay, Intl. 300 S. 25th Ave. Phoenix, AZ 85009	Executive - Parts List Dated 10/21/81	01/11/82
Sorrell Acft. Co. 16525 Tilley Rd. Tenino, WA 98589	Hiper SNS-7 Parts List Dated 08/25/75 Hiper Light SNS-8 Parts List Dated 07/24/84	08/25/75 07/24/84
Stoddard Hamilton 18701 58th Ave. NE Arlington, WA 98223	SH-2TD (Glassair II) Parts List Dated 09/07/89 SH-2F (Glassair II) Parts List Dated 07/10/89 SH-2R (Glassair II) Parts List Dated 07/24/89 SH-3R (Glassair III) Parts List Dated 08/09/89 Rev.20	01/20/89 01/20/89 01/20/89 01/20/89
Swick Aircraft Rt. 1, Box 203 Mckinney, TX 75070	Swick T - Parts list Dated 06/20/85	06/27/85
Team, Inc. Rt. 1, Box 338C Bradyville, TN 37026	Mini-Max - Parts List Dated 04/03/90	04/04/90
Terratorn Aircraft 1604 South Shore Clear Lake, IA 50428	Tierra II - Parts List Dated 10/18/84	10/18/84

Ultravia Aero, Inc. 795 l'Assomption Repentigny, Quebec J6A 5H5 Canada	Pelican Club - Parts List Dated 04/16/86	04/16/86
Vans Aircraft, Inc. P.O. Box 160 North Plains, OR 97133	RV-3 - Parts List Dated 5/90	02/01/84
	RV-4 - Parts List Dated 6/90	02/01/84
	RV-6 - Parts List Dated 6/90	09/14/89
	RV-6A - Parts List Dated 8/90	09/14/89
Velocity Aircraft 200 West Arpt. Dr. Sebastian, FL 32958	Velocity - Parts List Dated 11/07/89	02/06/90
Wag-Aero, Inc. 1216 North Rd. Lyons, WI 53148	Sport-Trainer I	04/12/83
	Sport-Trainer II	04/12/83
	Acro-Sport I	04/12/83
	Acro-Sport II	04/12/83
	Super-Sport	04/12/83
	Wag-A-Bond Classic	04/12/83
	Wag-A-Bond Traveler	04/12/83
	Sportsman 2 & 2 Parts Lists Dated 04/12/83	04/12/83
Zenair Ltd. Huronia Airport Midland, Ontario L4K 4K8 Canada	CH-200 - Parts List Dated 10/29/79	10/29/79
	CH-300 - Parts List Dated 01/01/89	01/13/89
	CH-701 - Parts List Dated 01/01/89	01/13/89

This listing cancels and supersedes the listing issued on November 22, 1989 and all supplements thereto. This listing will be updated on a semi-annual basis.

Please disseminate this information to all offices having responsibility for the airworthiness certification of amateur-built aircraft.

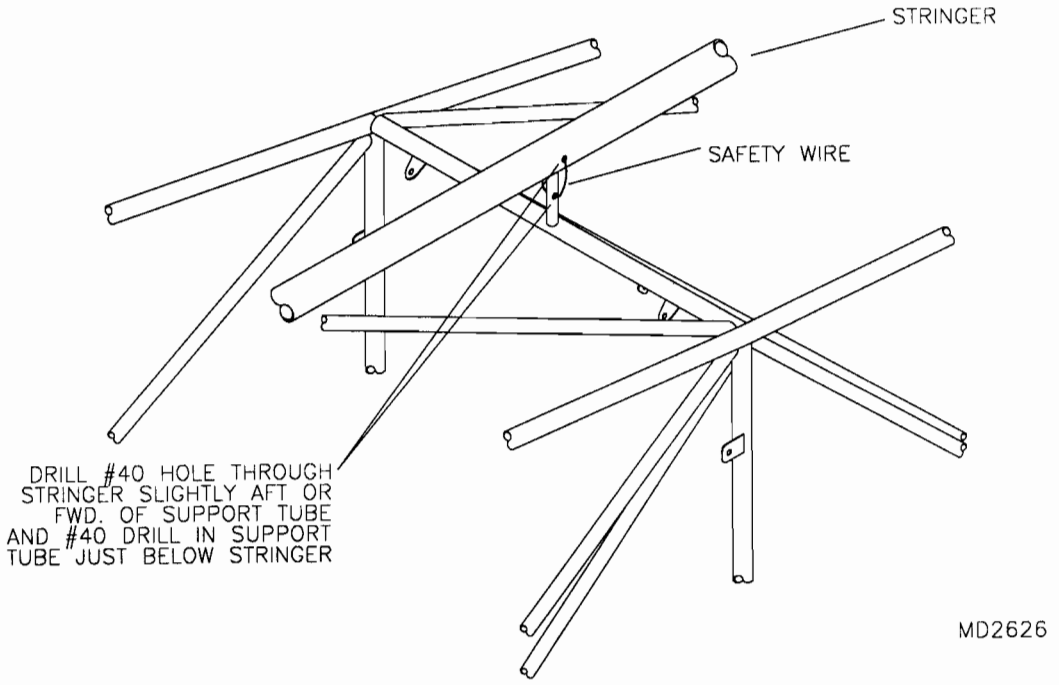
Ronald T. Wojnar

S-7 FUSELAGE STRINGER ASSEMBLY

(REFER TO PARTS PAGE # 001-02 FOR PARTS SELECTION)

1. Install the vertical stabilizer stringer onto the fuselage by slipping one end of the stringer over the doubler extending from the vertical stabilizer. With a friend's help bow the stringer and slip the other end onto the stub located on the aft side of station three. Bow the stringer downward to touch the vertical attach tubes on station four and five. Mark the location of the attach tubes where they contact the stringer. Remove the stringer and drill a 1/4" hole at these locations through the bottom side of the stringer only. Reinstall the stringer, the support tubes will slide into the stringer and bottom out against the top wall. It may be necessary to slightly bend the support tubes into alignment. Locate and drill a #40 hole through the support tube just below the stringer. Locate and drill another #40 hole through the stringer just forward or aft of the support tube. Hold the stringer tight against the support tubes and safety wire through the two holes to retain in position. See **FIGURE 01-01.**

FIGURE 01-01



2. Refer to **FIGURE 01-02** & **FIGURE 01-02A** for the proper location of each side stringer. Determine the length of each stringer and fabricate from the raw stock provided in your kit. Note that there are two different diameters of stringers. The 1/4" diameter stringers are retained by a set of stubs that the stringers will slip over. With the 1/4" stringers cut to length, slightly bow the stringer to allow it to slide over the retaining stubs. The 1/4" stringers are held in place by compression fit only, therefore, it is important that the stringers be accurately cut to length. See **FIGURE 01-02.** The 1/2" diameter stringers are retained by riveting them to a series of tabs welded to the fuselage. Clamp each 1/2" stringer in place. Using the attach tab as a guide, transfer drill with a #30 drill bit into the stringer on centerline and rivet in place. See **FIGURE 01-02A.**

FIGURE 01-02

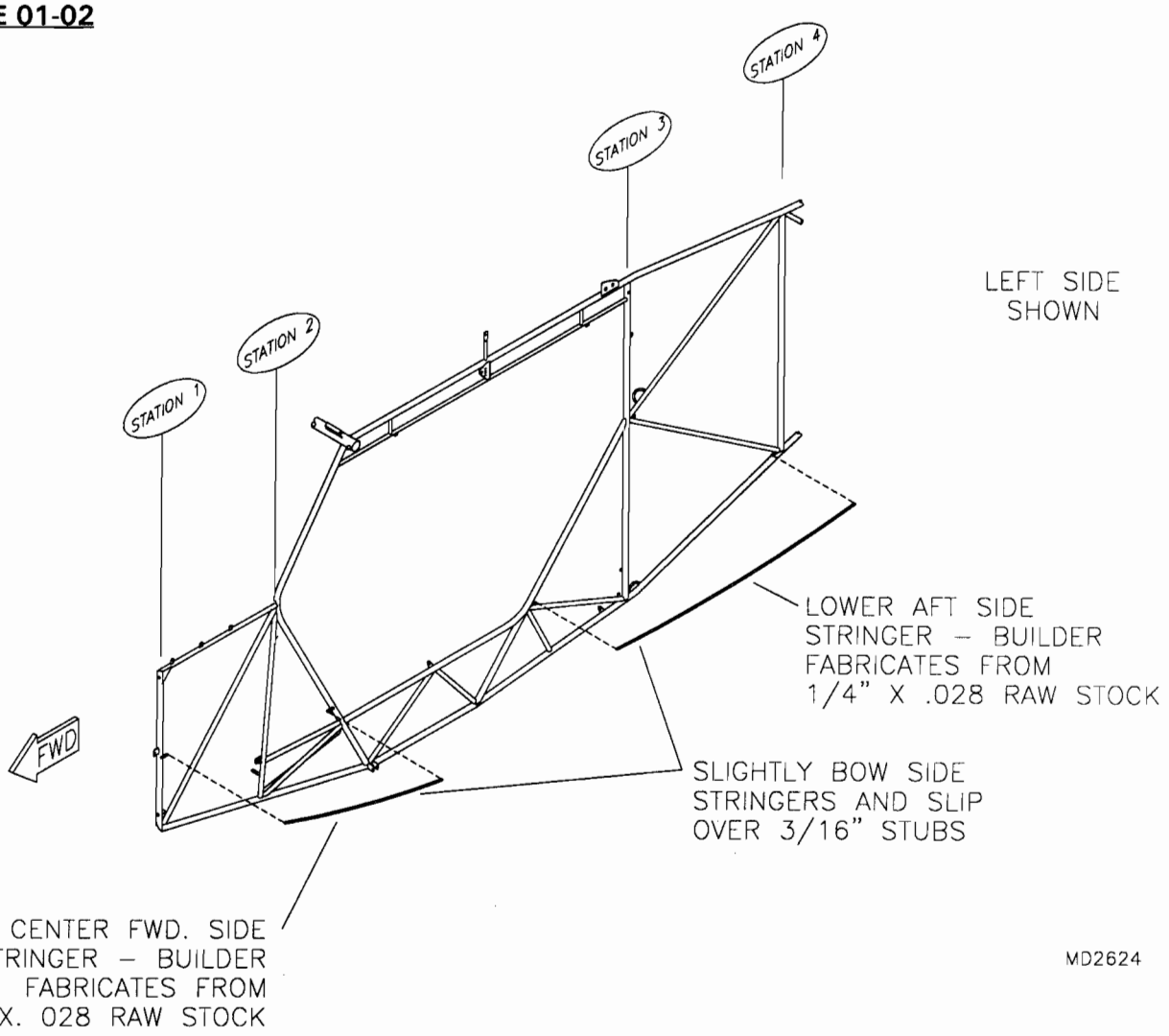
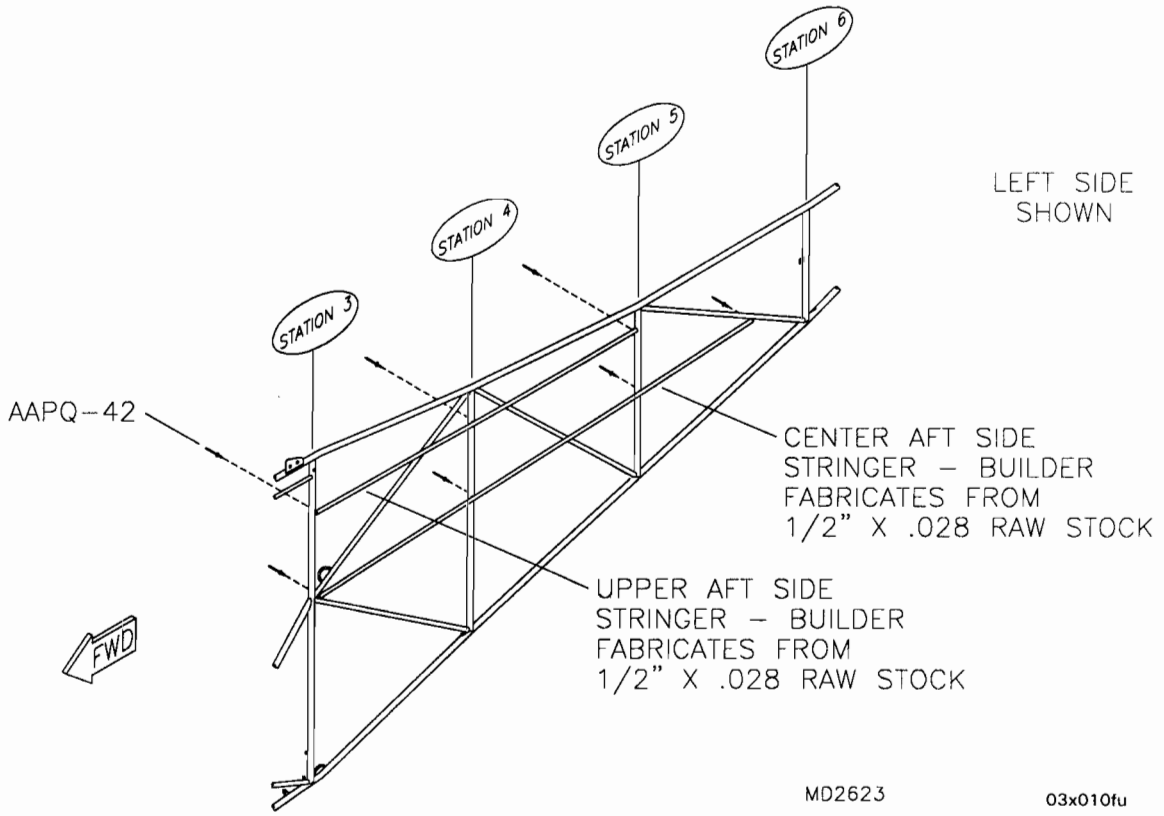
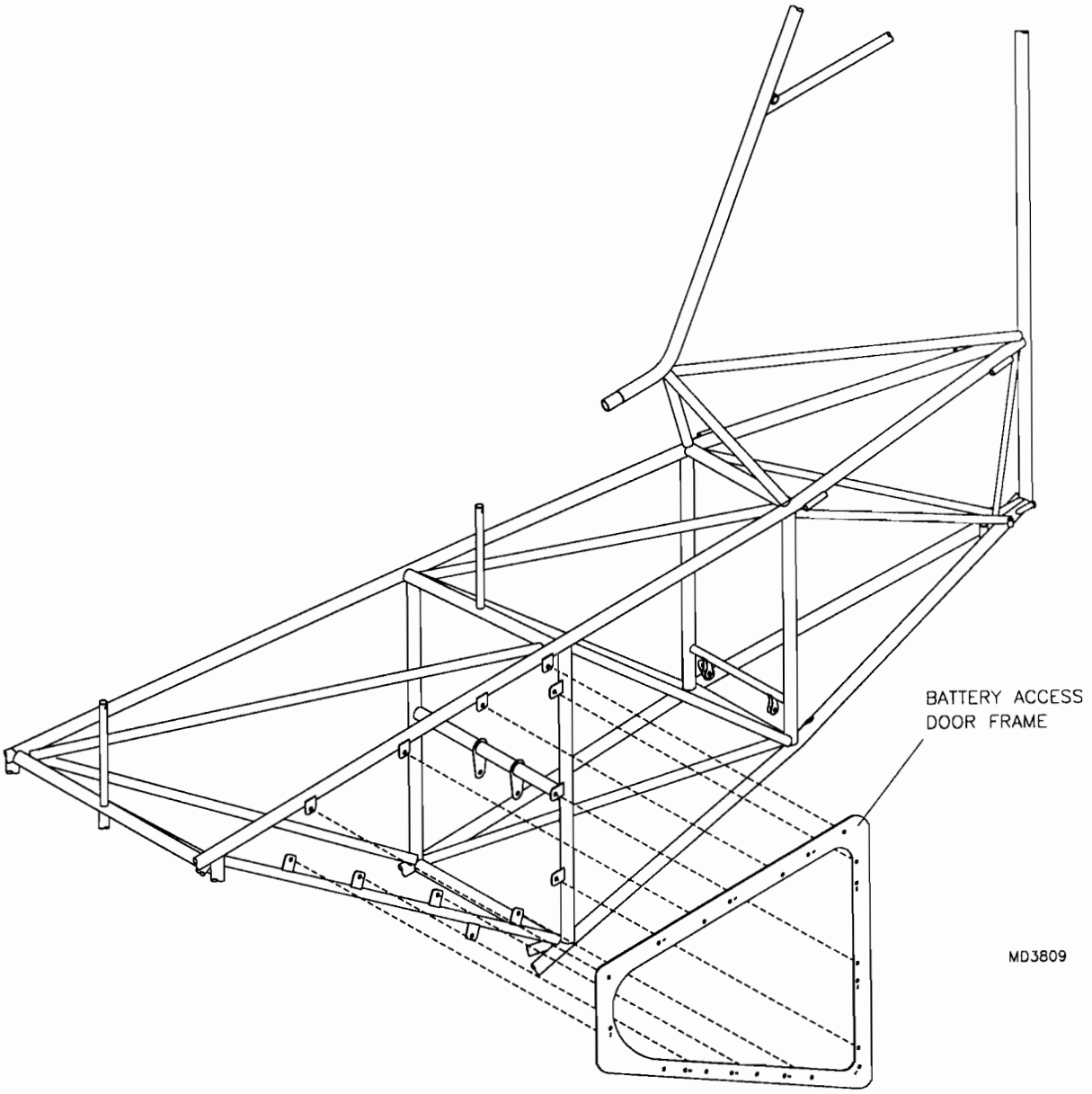


FIGURE 01-02A



3. Rivet tinnerman plates to the inside of the battery access door frame. Position and rivet the door frame to the tabs on the fuselage located at station 6, see **FIGURE 01-03**. The door can be trial fitted, by drilling out screw holes to final size and screwing to the tinnermans. Door only requires de-burring and painting. For best results: paint apart from fuselage. Refer to covering section in the special notes on covering in this area.

FIGURE 01-03

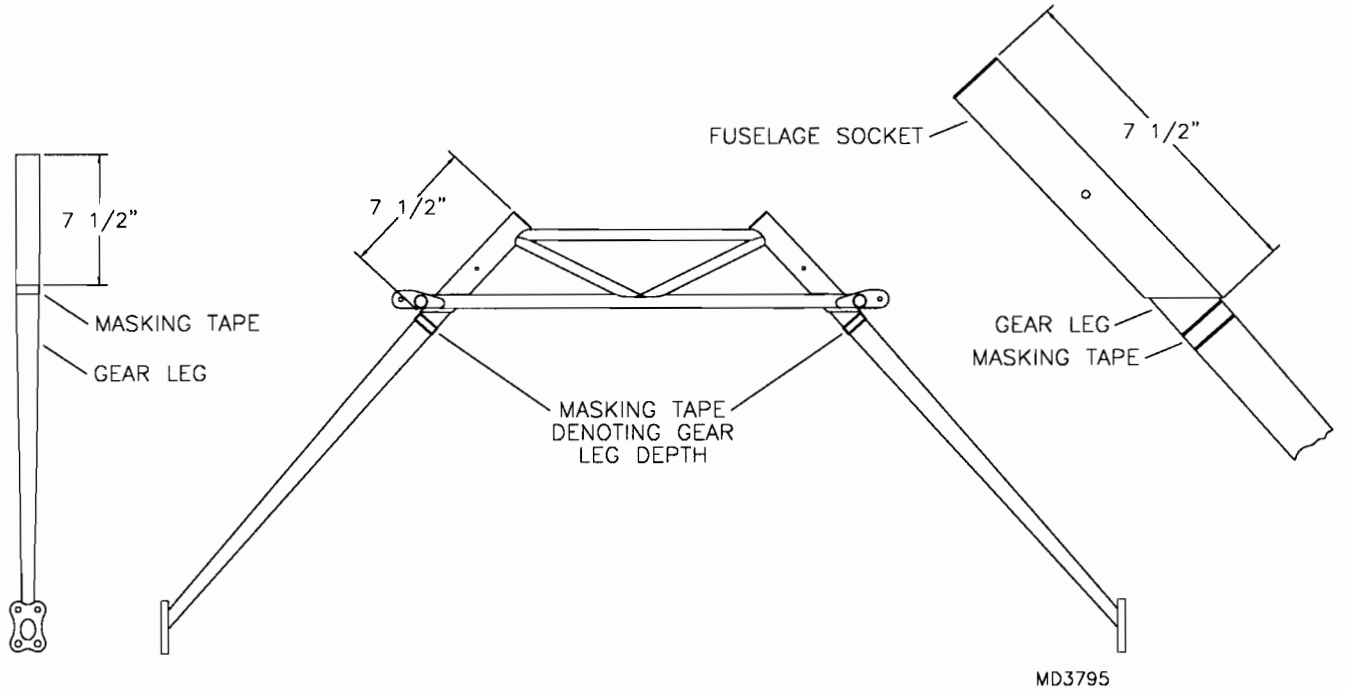


S-7 COURIER MAIN GEAR ASSEMBLY AND INSTALLATION

(REFER TO PARTS PAGE # 001-04 FOR PARTS SELECTION)

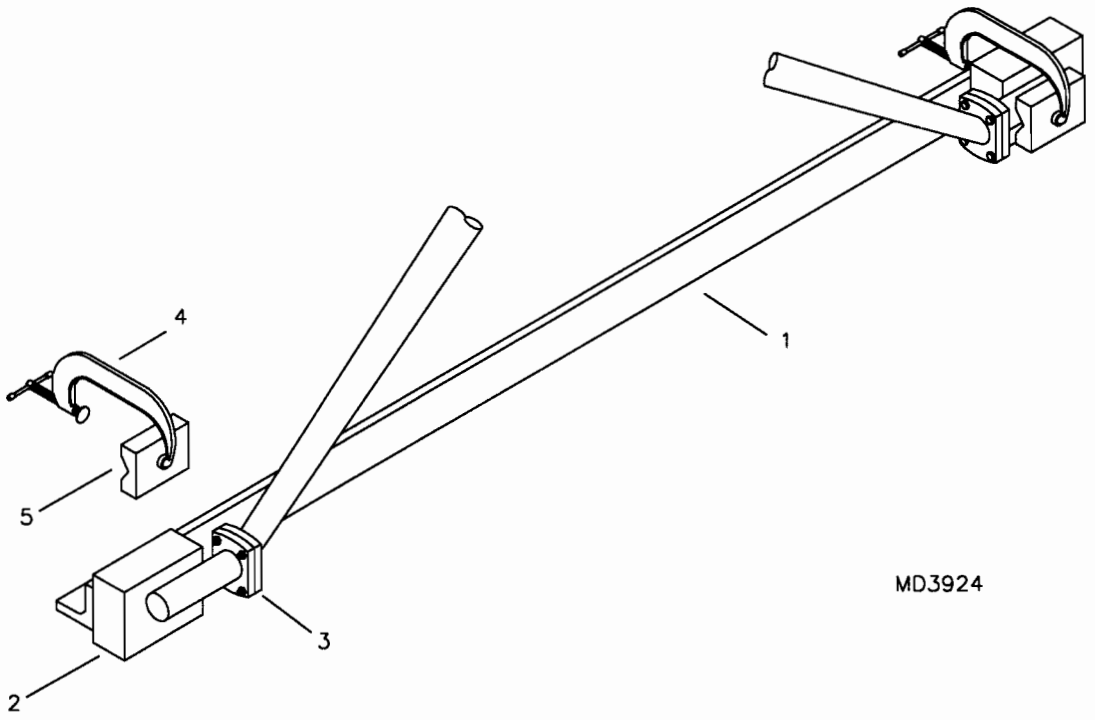
1. Place the fuselage on a set of saw horses, or other suitable work surface. Measure the depth of each gear leg socket in the fuselage. Transfer this measurement to the top of each gear leg and mark with a piece of masking tape. Install the gear legs with the fuselage in its upright position. Slide each gear leg into the sockets on the fuselage until the tape on the gear leg is flush with the socket. **IMPORTANT:** The gear legs must be completely bottomed in there socket. It may be necessary to slightly ream the inside of the socket to allow the gear leg to fully insert. Its also acceptable to lightly sand the upper portion of the gear leg (spinning the end of the gear leg over a disk sander works well). Both gear legs should measure equal length from a common point on the fuselage. See **FIGURE 01A-01**. If adjustments need to be made to gear leg length, remove material from the top of the longer gear leg.

FIGURE 01A-01



2. With gear legs properly inserted, set axles straight by fabricating the alignment jig shown in **FIGURE 01A-02**.

FIGURE 01A-02



1. STRAIGHT ANGLE OR BOARD (MAKE SURE IT IS STRAIGHT!)
2. SPACER BLOCK
3. BOLT AXLES TO GEAR LEGS
4. CLAMPS
5. VEE–BLOCK FOR CLAMPING AXLE

3. With the gear legs properly set, use the pre-drilled hole in the fuselage socket as a drill guide. Drill with #11 from each side to mark gear leg (DO NOT drill thru). A 90° drill attachment will be required on the forward side. Remove the gear leg and finish drilling from each side in a drill press. After drilling thru #11, drill out to ¼". Insert the gear leg back into the fuselage socket and align the holes. Drill through the socket and the gear leg from the aft side with a 5/16" drill bit. Install the gear legs using the hardware called out in the parts drawing. The wheel axles should be 90° to the aircraft center line. If not, it is possible to shim under the (4) attach bolts to correct alignment. Bolt caliper mount and fairing mount bracket to the gear leg axle assembly, as per the parts drawing.

4. To install wheel assembly, the outer brake pad removes via the ¼" retainer bolts. Once final assembled, be sure these bolts are safety wired.

5. Clean and pack the tapered wheel bearings. The tapered roller bearings are oiled from the factory for rust prevention, but not greased. The roller bearings should be cleaned, dried and then packed with a suitable grease. Packing grease without first removing the oil will dilute the wheel grease, causing it to run out past the seal and not lubricate properly.

Slip the bearings and wheel/ tire assembly back onto the axle. Install the brake disc and safety wire the bolts. Install the castle nut and cotter pin. Do not over tighten the castle nut or bearing failure may result.

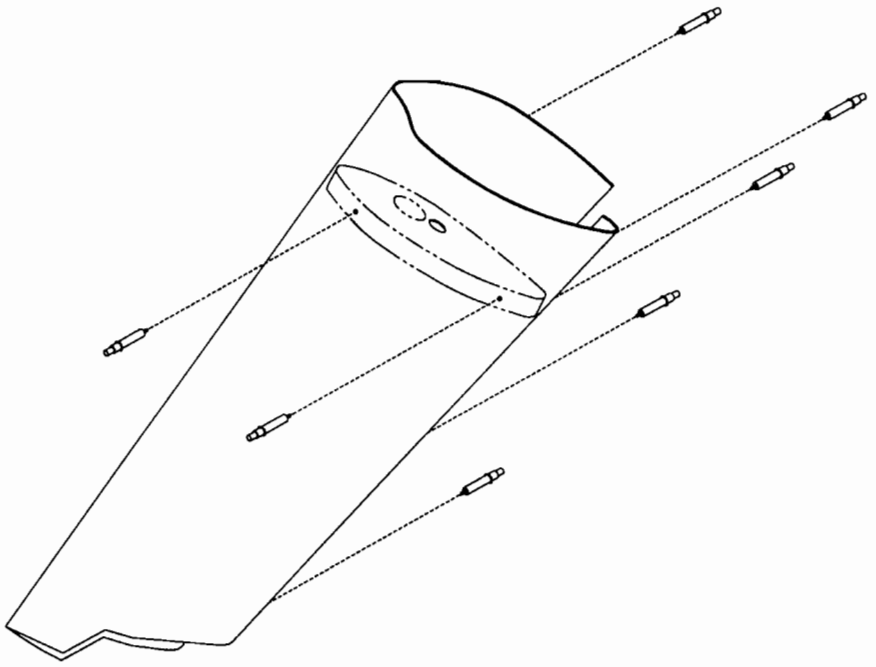
6. Wrap teflon tape on the threads of the fitting and install the fitting into the caliper.

S-7 GEAR LEG FAIRING ASSEMBLY

(REFER TO PARTS PAGE 001-04 FOR PARTS SELECTION)

1. The gear leg fairing comes with holes pre-drilled for the rib. Locate the fairing rib, drill and cleco it in place, as per **FIGURE 01B-01**. Mark ribs LH & RH. Drill and cleco the trailing edge.

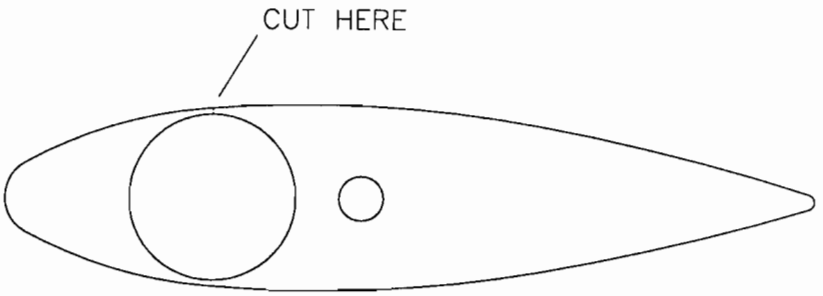
FIGURE 01B-01



MD3797

2. Remove and cut the fairing ribs as shown in **FIGURE 01B-02**. Gently twist the fairing rib to open and slip over the gear leg with the flange pointing down and the rib nose forward.

FIGURE 01B-02



3. Place the fairing over the gear leg and rib, drill and cleco together. Trim and align with belly of plane and slip stream. Drill and cleco the fairing to the bracket on the axle. Some trimming against the belly may be required.

4. Remove for painting.

FINAL ASSEMBLY

5. Cut the rubber edging to length and super glue it to the top opening.

6. Insert the brake line through the aft hole in the plastic rib. Install the gear leg/fairing onto the fuselage and final rivet and attach to lower bracket.

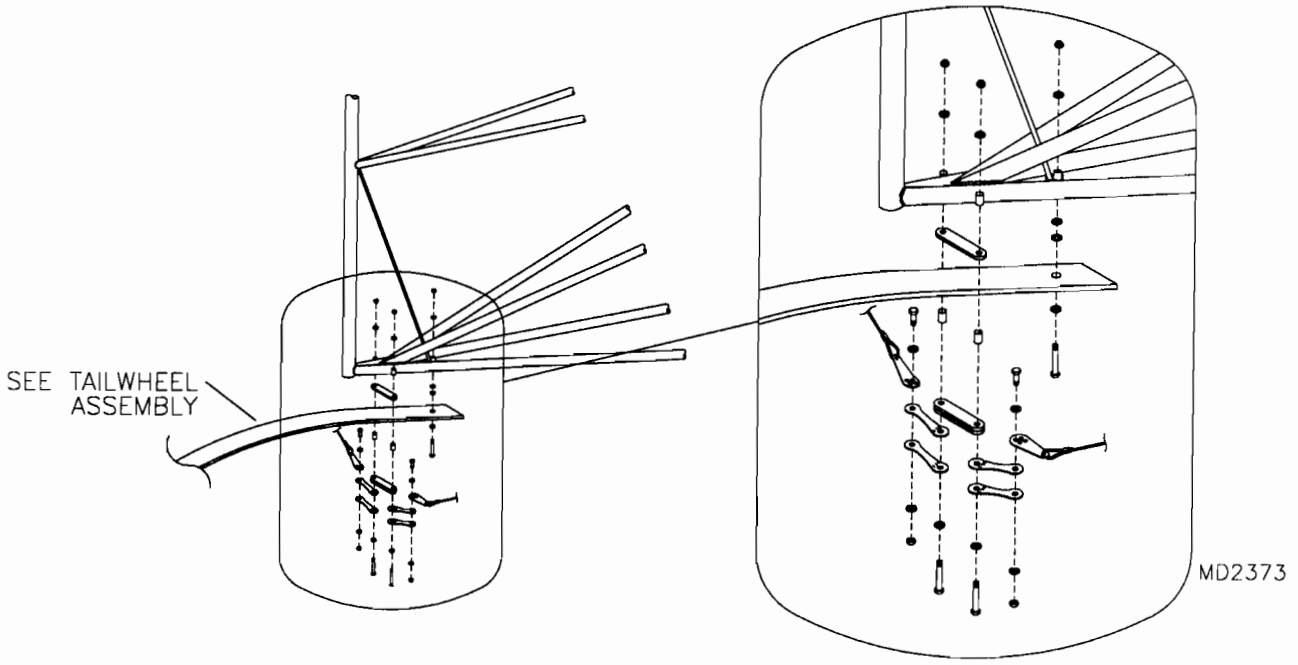
S-7 COURIER TAILWHEEL ASSEMBLY

(REFER TO PARTS PAGE # 001-06 FOR PARTS SELECTION)

1. Bolt the tail spring to the tailwheel assembly. Refer to the parts drawing. **NOTE:** It may be necessary to lightly file or grind the tailspring to fit within the spring mount channel. **DO NOT** file the channel to obtain the proper fit. Rotation of the tailwheel swivel block may occur, producing poor directional control.

2. Bolt the tailspring/ tailwheel assembly to the fuselage as per the parts drawing and **FIGURE 01C-02.**

FIGURE 01C-02



3. During final assembly it is important that all bolts retaining the tailspring are tight. Check the tightness of these bolts after the first ten hours of flying. There must also be a minimum clearance of 1/4" between the tail spring and the bottom edge of the rudder spar. Refer to the rudder system installation section for instructions on installing the rudder. If there is not sufficient clearance, space the tail spring away until the minimum clearance is obtained. This is done by the addition of an aluminum plate,⅛" or ¼" thick between the tail spring and the fuselage. Longer bolts may be required to do this.

4. The S-7's tailwheel is full swivel. This allows pivot turns using brakes or full rudder deflection. A cam mechanism allows it to engage for steering. If the tailwheel leans, shim the tailwheel to run vertical. The full swivel tailwheel takes little pressure to go to full swivel. Taxi test slowly and in an open area to get the feel of it.

5. Install the control linkage as per the exploded view drawing. The linkage will be attached to only the tailwheel at this time. Refer to the rudder system installation for final assembly and adjustment of the linkage.

S-7 TAIL GROUP ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 001-08 FOR PARTS SELECTION)

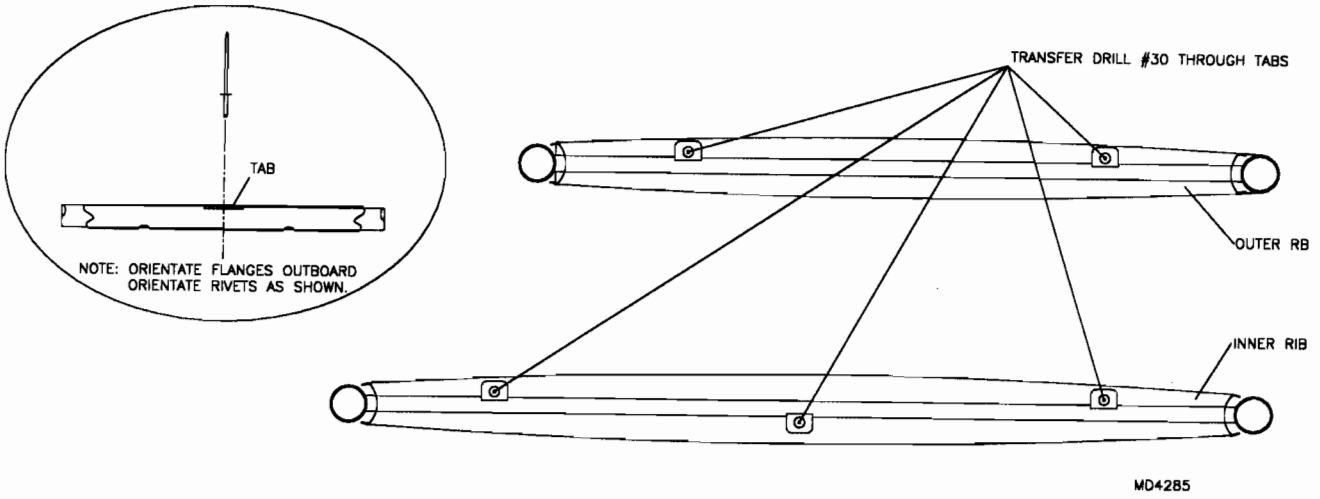
1. Each horizontal stabilizer receives two ribs formed from aluminum sheet to support the fabric. The vertical stabilizer has one rib. The forming process leaves the ribs slightly bowed. Use fluting pliers and crimp the rib flanges slightly between the holes at the notch locations to straighten ribs.

2. The ribs are riveted to the frame thru welded tabs. Refer to **FIGURE 01D-02**.

NOTE: *The ribs are symmetrical. There is no front or aft.*

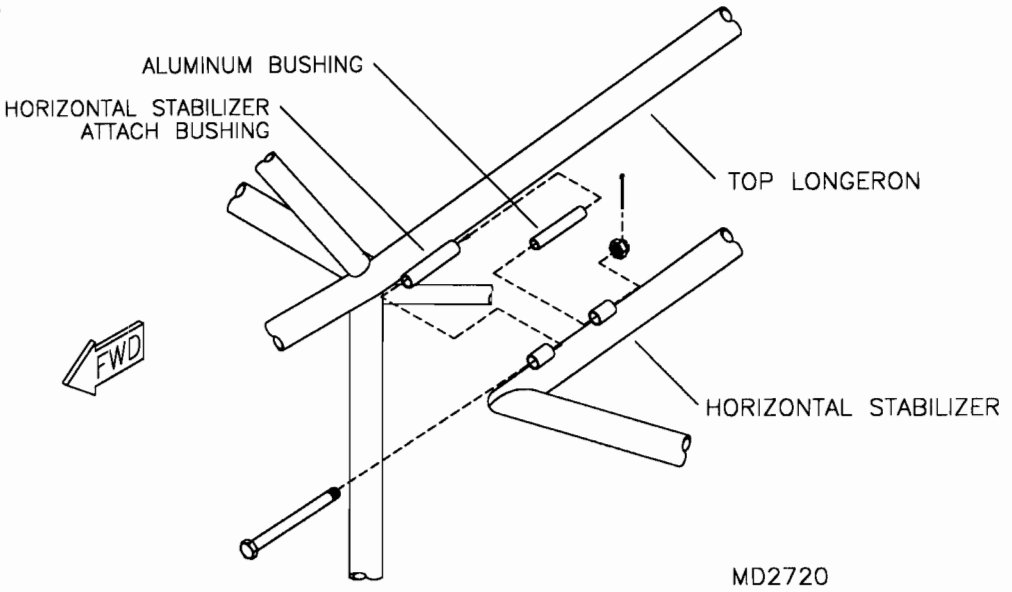
Deburr ribs, orientate as per **FIGURE 01D-02**, transfer drill through tabs and rivet in place. Trim ribs slightly as needed for a perfect fit around the stabilizer spars. The vertical stabilizer rib mounts with the flanges down.

FIGURE 01D-02



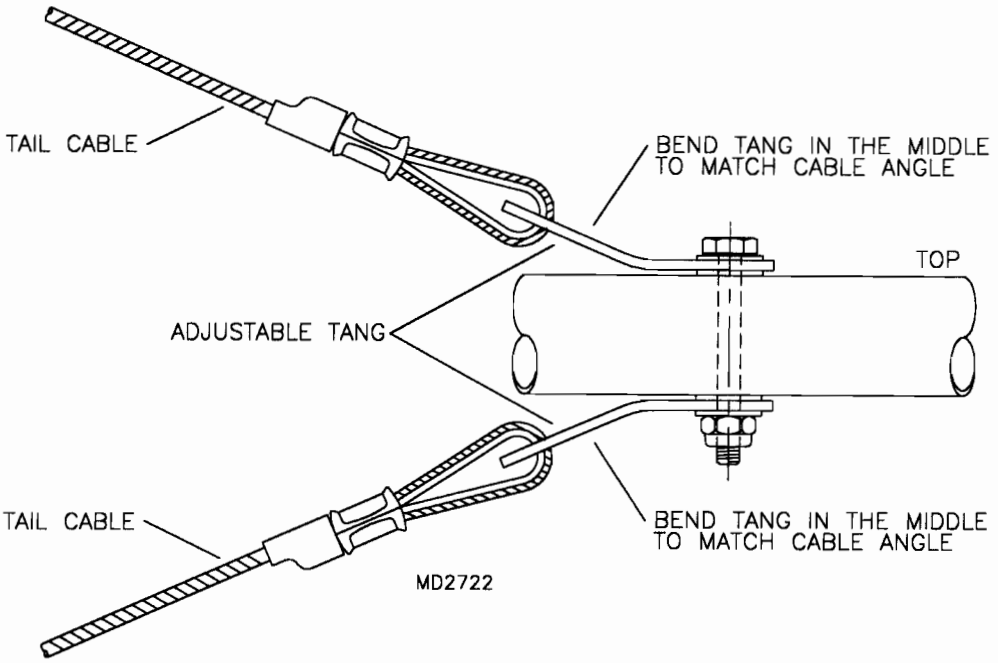
3. Install the aluminum bushings into the horizontal stabilizer attach bushings on the fuselage top longerons. See **FIGURE 01D-03**. Attach the stabilizers to the fuselage using the hardware shown in the parts drawing. It may be necessary to lightly file the bushings to obtain the proper fit. It may also be necessary to hold the stabilizer in a vertical position to obtain hole alignment. It is not necessary to install the cotter pins until final assembly.

FIGURE 01D-03



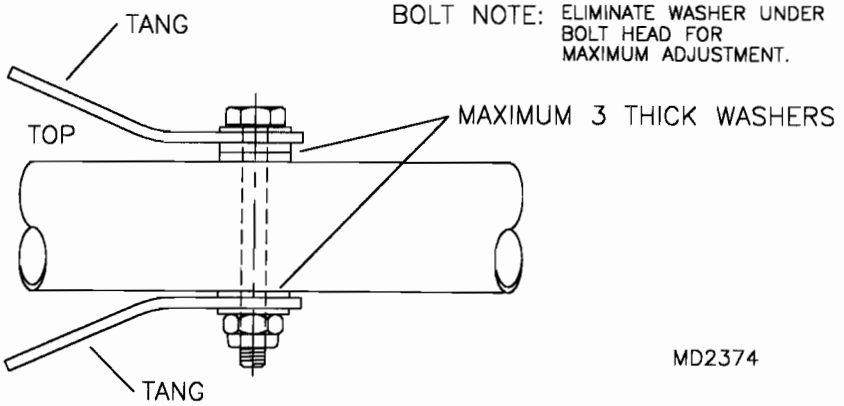
4. The S-7 tail cables utilize a multi-hole cable tang for horizontal stabilizer adjustment and cable tensioning. Before the tail cables can be set and tensioned, the tangs must be bent in the middle to the same angle as the cables. See **FIGURE 01D-04**. Do so by placing them in a **padded vise** (use either small wood strips, or pads can be purchased at local hardware stores) and bending just past the last adjustment hole. Leave enough room for the bolt head in the event that the last hole must be used. ***HINT:*** *An adjustable wrench with tape on the "jaws" works well to bend tangs without damaging the surface of the tang.*

FIGURE 01D-04



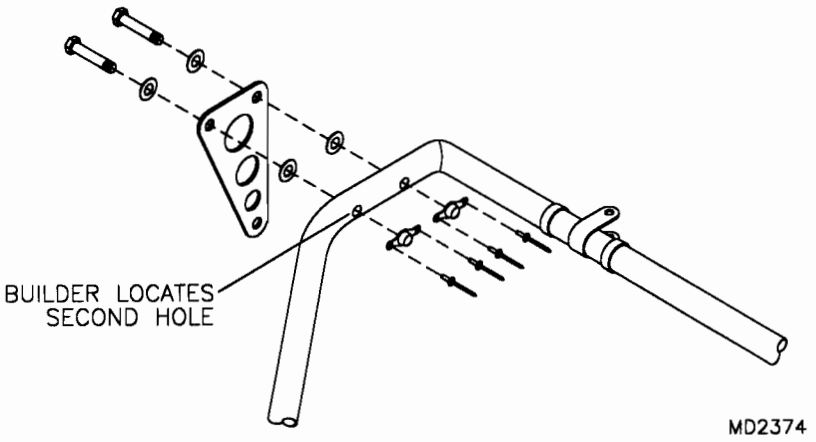
5. Bolt the cables on the tail group. Only finger tighten the nuts at this time. Make adjustments once all cables are in position. Adjust the cable tension and tail rigging by selecting the correct hole in the multi-hole tang. Acceptable settings of the horizontal stabilizers are level to 1/2" dihedral at the tip. If more adjustment than what the tangs allow is required, try using more washers and the next length of bolt. See **FIGURE 01D-05**. The cable tension should be set so that the cables have a nice ring to them when strummed. Obtain this by applying downward pressure to the horizontal stabilizers at there cable attach points and connecting the lower cable tang of the lower cable to the fuselage. As much as 100 pounds of pressure can be applied to the horizontal stabilizers **at their cable attach points.** The tail is in rig when the cables are tight, the horizontal stabilizers are level, and the vertical stabilizer is "vertical". ***IMPORTANT:*** *Make sure that the cable rigging has not induced any twist or offset to either the horizontal stabilizers or the vertical stabilizer.* When removing the tail to cover, label the cables and the hole locations for ease of reassembly during final assembly.

FIGURE 01D-05



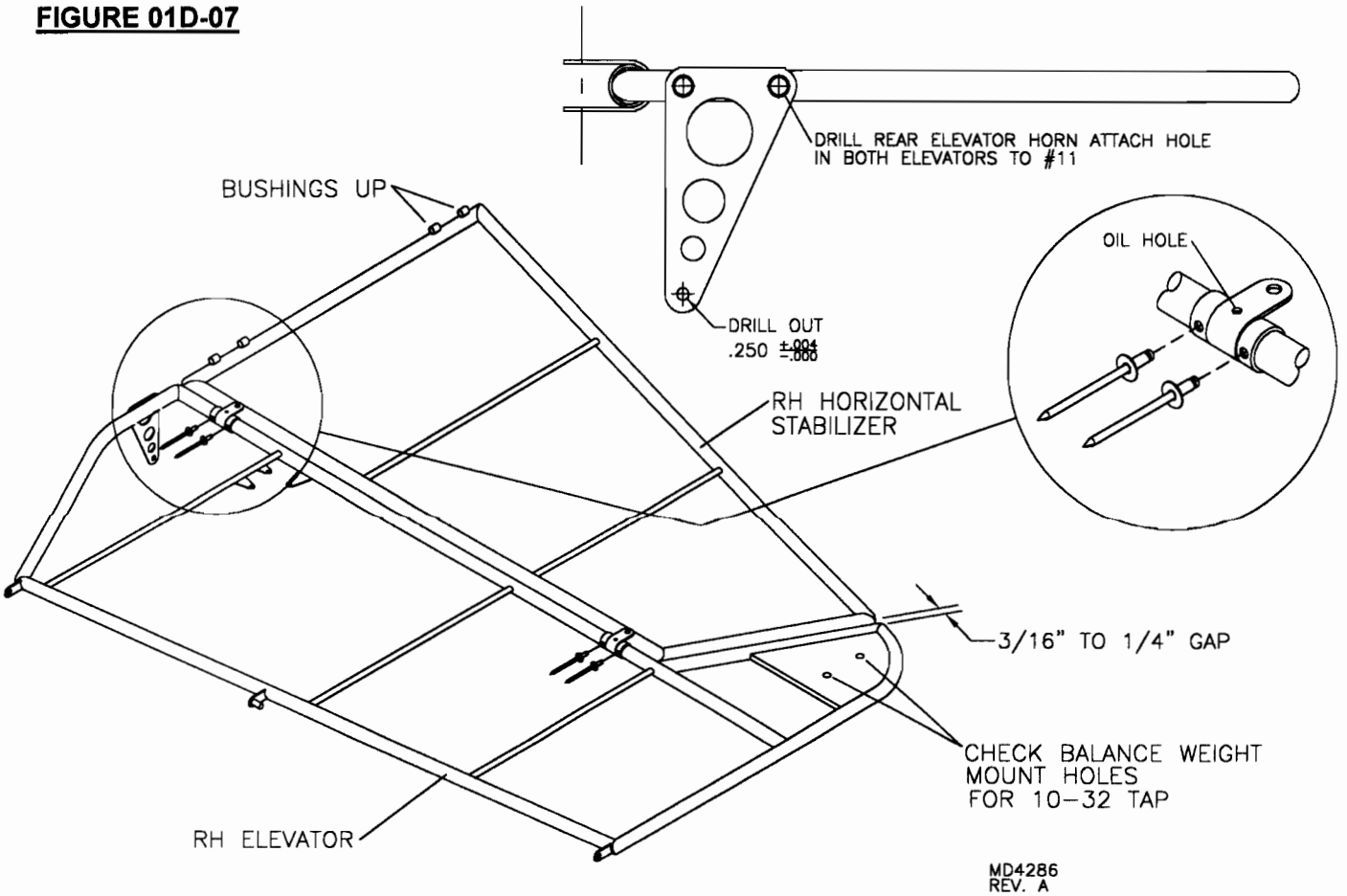
6. Install the nut plate to the pre-drilled hole in the root end of each elevator. Refer to **FIGURE 01D-06**. and **FIGURE 01D-07**. Bolt the elevator horn in position so that the aft hole in the control horn is on centerline of the elevator frame. Mark and drill #11 the aft hole for the elevator control horn. Use the control horn to only mark the aft hole location. Using the aluminum control horn as a drill guide could elongate the hole in the horn. Attach the elevator horns to each elevator using the hardware called out in the parts drawing.

FIGURE 01D-06



7. Bolt the elevators to the horizontal stabilizers using the hardware shown on the parts drawing. Adjust the elevator left or right to create a 3/16" to 1/4" gap between the tip of the horizontal stabilizer and the overhang of the elevator. See **FIGURE 01D-07**. With the elevators correctly positioned, slide each retaining collar against the hinges. Position the retaining collars to allow the hinge to pivot freely with no end play. Locate and drill a #30 hole on the interior side of each retaining collar through the leading edge spar of the elevator. Rivet the retaining collars in position as shown in **FIGURE 01D-07**. Drill the elevator horns out to 1/4" for the yoke attach bolts. Check balance weight mount holes for 10-32 thread tapping. Refer to rigging section.

FIGURE 01D-07

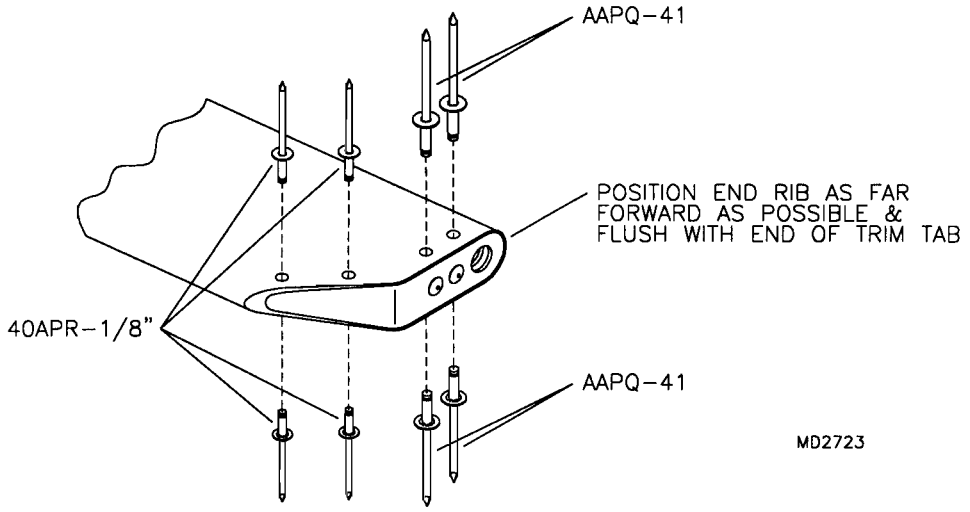


S-7 TRIM TAB ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 001-10 FOR PARTS SELECTION)

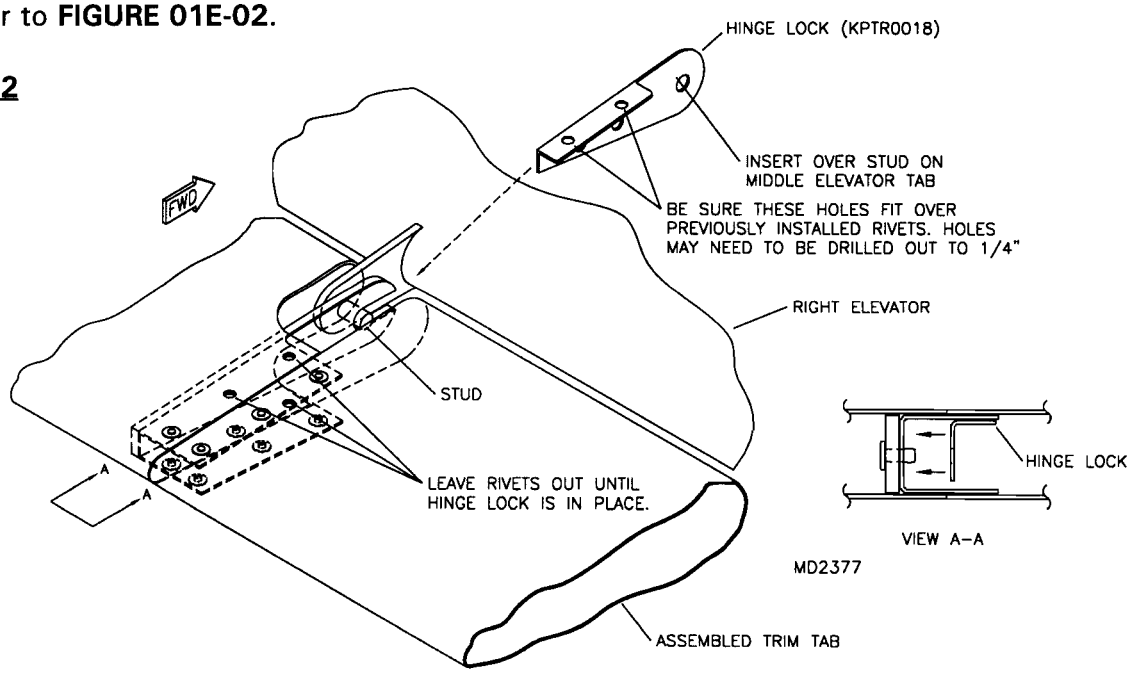
1. Rivet each half of the trim tab together along the leading edge seam. The overlap seam should be in the down position when the full trim tab is orientated correctly. Rivet the single ear nut plates to both end ribs. Install the end ribs into each trim tab half with the end ribs as far forward in the tab as possible and flush with the end of the tab. Prior to drilling note that there are two sizes of rivets used in each end rib. Refer to the parts drawing. Using the correct size drill bit, and using the predrilled holes in the tab as a guide, transfer drill through the tab and into the rib. Rivet the end ribs in place. Refer to **FIGURE 01E-01.**

FIGURE 01E-01



2. Rivet the center rib doubler to the center rib. Install the center rib and doubler into the left trim tab half, lining up predrilled holes in the center rib bottom with the with the pre-drilled holes in the bottom side of the trim tab half. Double check the center rib orientation and rivet in place through the middle and aft holes only. Using the top holes in the tab as a guide, transfer drill through the tab and into the rib. Rivet only the top aft hole at this time. Slide the right hand trim tab half in place. Make sure the two halves line up evenly and are flush. Transfer drill through the six holes in the tab into the rib and rivet. **NOTE:** The three rivets that have been omitted will be installed in final assembly, after the hinge lock is in place. Refer to **FIGURE 01E-02.**

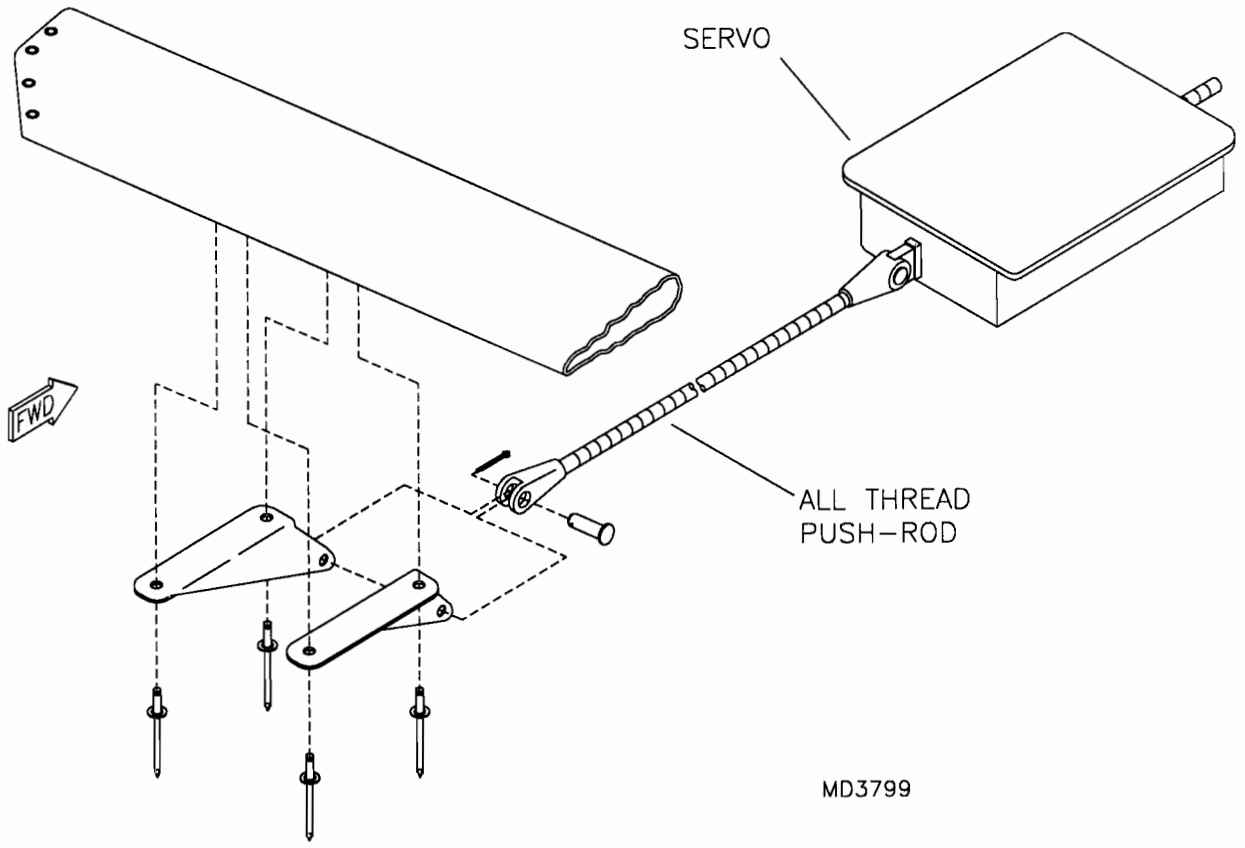
FIGURE 01E-02



3. Attach the trim tab to the right hand elevator as per the parts drawing. Loctite the attach bolts during final assembly only. Drill the two pre drilled holes in the hinge lock to a #11. This allows the hinge lock to sit flat against the center rib wall. Refer back to view A-A in **FIGURE 01E-02**. Install the hinge lock into the trim tab and slide over the center pivot stub. Hold the hinge lock tight into position and transfer drill through the top two holes in the trim tab and into the hinge lock. Rivet the hinge lock into place **DURING FINAL ASSEMBLY ONLY**. Install the bottom rivet previously omitted.

4. Screw the fork/clevis to the servo push/pull shaft. With the trim tab in a neutral position, and the servo push pull rod half extended, place the control horns against the bottom side of the tab parallel to the slip stream. Adjust fork/clevis, so horns are well placed on the trim tabs bottom surface with plenty of edge distance. Using the holes in the flanges as a guide, transfer drill through the horns into the tab. Rivet the control horns in place. Refer to **FIGURE 01E-04**. Adjustment of the trim tab will be performed during final assembly. Refer to the rigging section.

FIGURE 01E-04



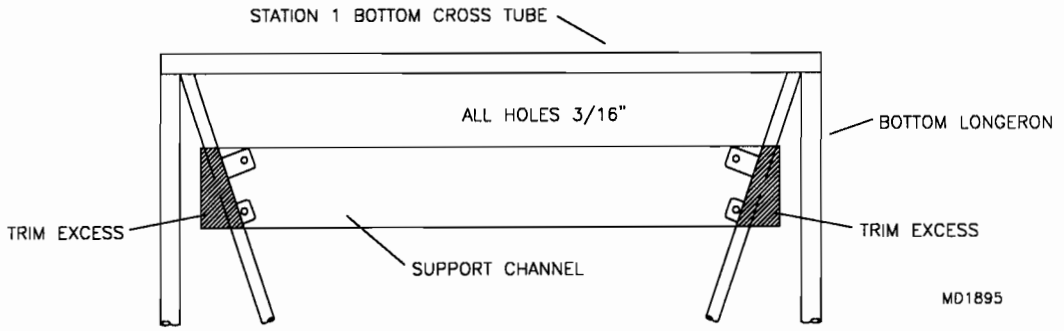
S-7 COURIER FLOORBOARD INSTALLATION

(REFER TO PARTS PAGE # 001-12 FOR PARTS SELECTION)

NOTE: The floorboards provided are unfinished. We recommend to sand, stain and varnish them prior to working with them. This will avoid smudges and stains that are practically impossible to sand out later. However, if you are installing the optional rudder cable guard, it is best to pre-fit the guard prior to staining the floorboards.

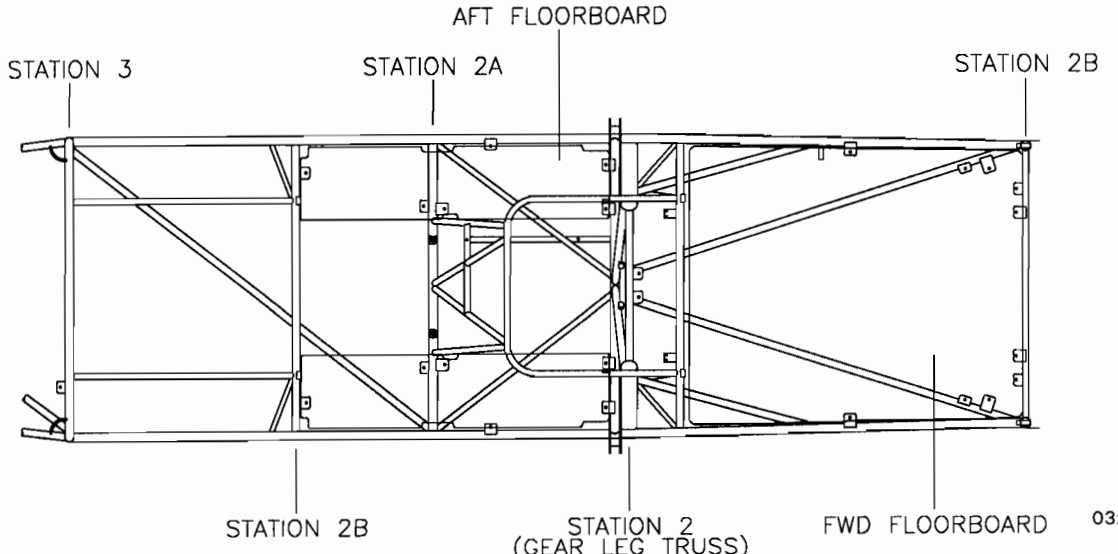
1. Trim the forward floorboard support channel to allow the channel to set with flanges down, on the tabs between the "V" bracing just aft of station 1. See **FIGURE 01F-01**. Using the rudder pedal attach tabs as guides transfer drill through the support channel. **HINT**: Place a bolt through each hole, before drilling the next, to keep the support channel correctly positioned. **NOTE:** The support channel is retained to the fuselage by the rudder pedal attach bolts installed later.

FIGURE 01F-01



2. With the support channel in position, install the forward floorboard so that the forward edge of the floorboard is flush with the forward side of the station 1 bottom cross tube and is centered from side to side. Refer to **FIGURE 01F-02.** Clamp the floorboard in position. Using the attach tabs as guides, transfer drill through the tabs and through the floorboard. **NOTE:** To prevent splintering of the floorboards surface, use a small wood block pressed tightly to the floorboard over the hole while drilling through. Also transfer drill through the rudder pedal attach tabs, through the floorboard. Remove the floorboard and support channel and Install the 3/16" nut plates to all tabs.

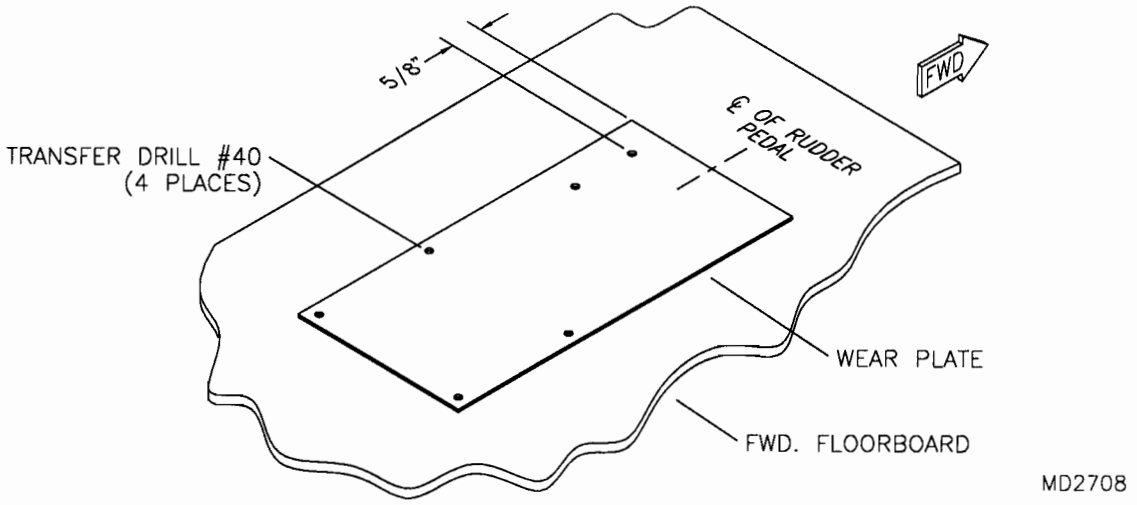
FIGURE 01F-02



3. The forward floorboard wear plates are positioned under the rudder pedals. Measure 5/8" forward from the center of the forward rudder pedal mount hole and mark this location on the floorboard. Temporarily bolt the forward rudder pedal to the floorboard by the outboard pillow block. Refer to the rudder pedal installation section. Determine the center of each rudder pedal and mark this location on the floorboard. Position the wear plate so that the forward edge of the wear plate is at the 5/8" mark and so that the center of the wear plate is on the center mark of the rudder pedal. See **FIGURE 01F-03.** Clamp the wear plate in position. Using the wear plate as a drill guide, transfer drill through the pre drilled holes in the wear plate into the floorboard using a #40 drill bit. Secure the wear plate to the floorboard with the screws called out.

Using a #11 bit and using the floorboard as a drill guide, drill through the outboard rudder pedal attach holes, through the wear plate. Temporarily bolt the forward floorboard and support channel into the fuselage. **NOTE:** the floorboard will be removed for rudder pedal installation and covering.

FIGURE 01F-03



4. Insert the aft floorboards into the fuselage. Refer back to **FIGURE 01F-02.** The forward edge of the aft floorboard should be nearly flush with the forward radius of the station 2 bottom cross tube. Make adjustments as necessary. Clamp in position. Using the attach tabs as drill guides, transfer drill through the tab and through the floorboard using a wood block to prevent splintering. Remove the floorboards and nut plate all tabs. Temporarily bolt the aft floorboards into the fuselage. **NOTE:** The aft floorboards are removed for rudder pedal installation and covering.

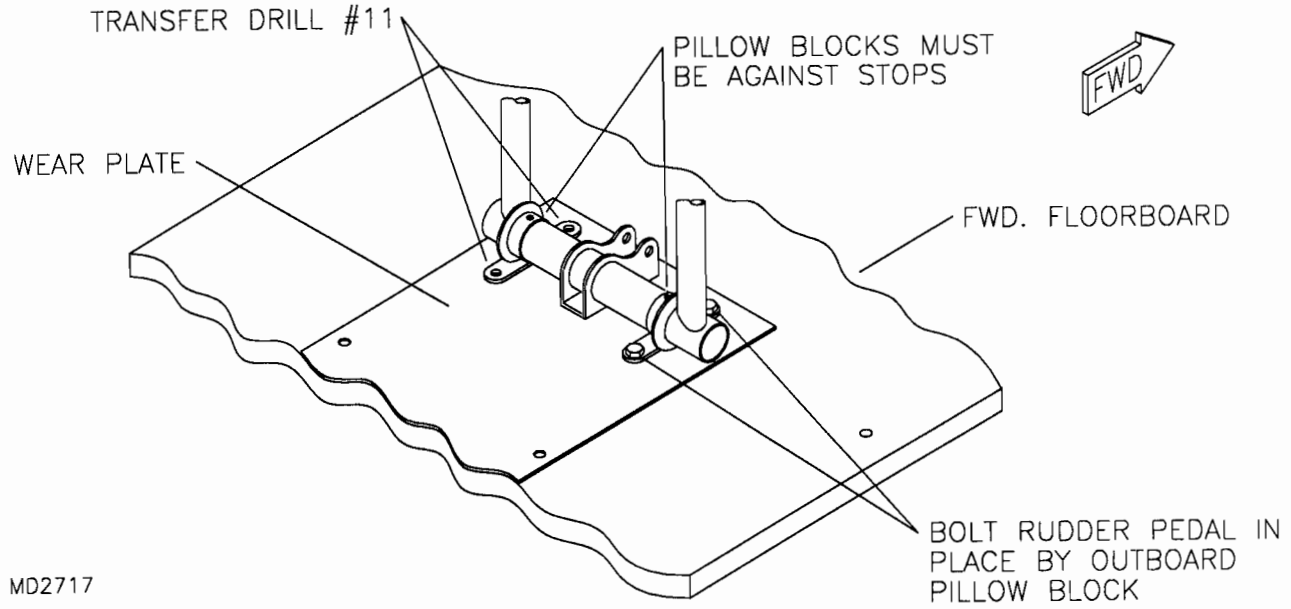
If you are installing the optional rudder cable guard, refer to the options section of the manual and pre-fit the guard at this time (prior to staining).

S-7 RUDDER PEDAL INSTALLATION

(REFER TO PARTS PAGE # 001-14 FOR PARTS SELECTION)

1. With the support channel and forward floorboard in place, temporarily install the forward rudder pedals by bolting through the outboard pillow blocks into the rudder pedal attach tabs. Slide the pillow blocks against each stop on the rudder pedal. Using the holes in the inboard pillow block as a guide, transfer drill through the wear plate, floorboard and support channel. See **FIGURE 01G-01.** Remove the rudder pedals and floorboard and install the nut plates to the bottom side of the support channel as shown in the parts drawing. Install all parts. Lubricate the pillow blocks and brake pedals with a drop of oil.

FIGURE 01G-01



2. Install the aft rudder pedals by bolting through the forward holes of each pillow block into the tabs welded to the fuselage. Using the aft holes in the pillow blocks as a guide, transfer drill through the floorboard. Remove the rudder pedals and floorboards. Using the hardware shown in the parts drawing bolt the rudder pedals to the floorboards through the aft holes only. Install the floorboard/rudder pedal assembly with the appropriate hardware. **NOTE:** Remove aft floorboard and pedals for covering.

3. Install the rudder pedal push-pull tubes per the parts drawing. **NOTE:** The push pull tubes attach to the interior side of the aft rudder pedal and to the exterior side of the forward rudder pedal. Refer to the parts drawing.

4. Install the brake push-pull tubes as per the parts drawing. **NOTE:** The brake push-pull tubes are installed on the inside of the rudder pedal brake tangs (Front and rear). Refer to the parts drawing.

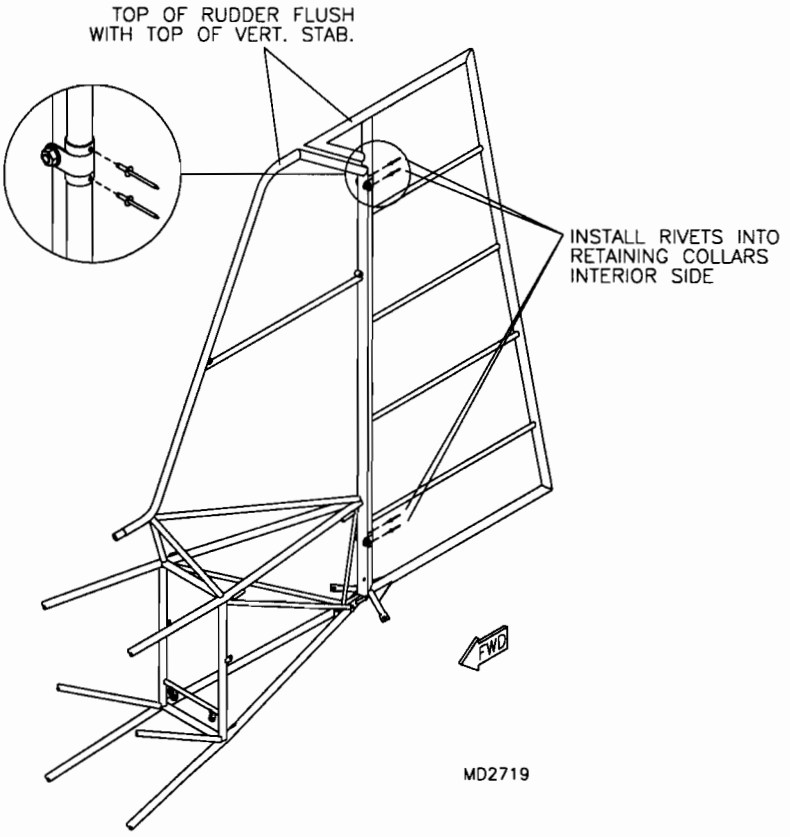
5. The rudder return bungee will be installed during the rudder system assembly and installation.

S-7 RUDDER SYSTEM ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 001-16 FOR PARTS SELECTION)

1. Bolt the rudder to the fuselage. Adjust the rudder vertically so that the top of the rudder is flush with the top of the vertical stabilizer. Clamp the rudder in position and check for tailspring clearance. Refer to the tailwheel installation section. Slide the rudder hinge retaining collars against the hinges. The collars should be positioned to allow free hinge movement with no end play. Locate and drill a #30 hole through the hinge collar and into the leading edge spar of the rudder on the interior centerline. Rivet the collars in place. See **FIGURE 01H-01**. During final assembly lubricate the hinges with oil. Install the rudder stop bolts and jam nuts. Refer to the parts drawing. **NOTE:** Adjustment of stops will be set during rigging. Refer to the rigging section.

FIGURE 01H-01



2. Bolt the rudder cables to aft rudder pedals as shown in the parts drawing and **Figure 01H-02.** **NOTE:** The forward end of the rudder cable is distinguished by a multi hole tang used to establish the neutral position of the rudder pedals. Final adjustments will be made during the rigging process. Refer to the rigging section.

Attach rudder return springs to the forward seat frame. See **FIGURE 01H-02A.**

FIGURE 01H-02

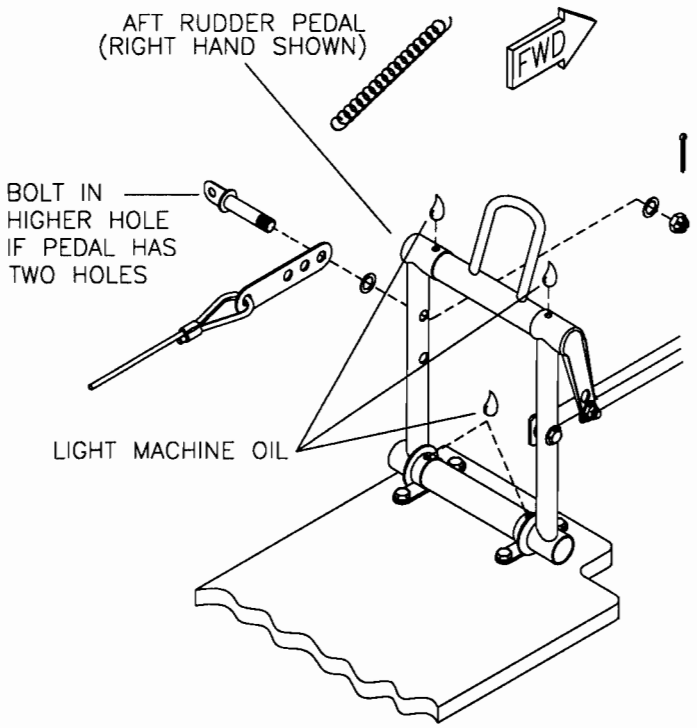
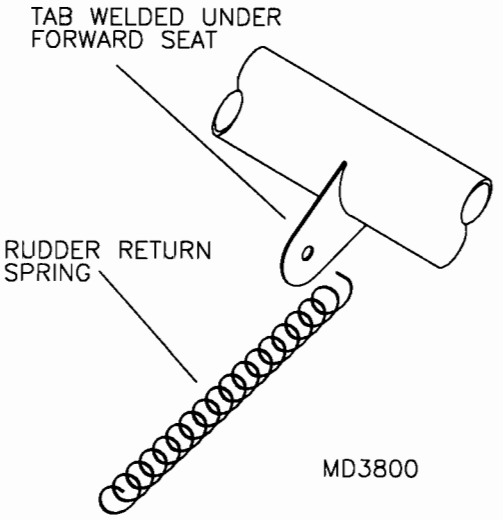


FIGURE 01H-02A



3. Route the rudder cables down the center of the fuselage, exiting it just aft of station six. Bolt the pulleys into the tabs located on the bottom cross tube at station 2A and just above the bottom cross tube at station 6. The rudder cables will route under the pulleys at station 2A and over the pulleys at station 6. See **FIGURE 01H-03**. Bolt the cable guides to the tabs located on the diagonals just above the station 3 bottom cross tube and insert the cables into the guides. See **FIGURE 01H-03A**.

FIGURE 01H-03

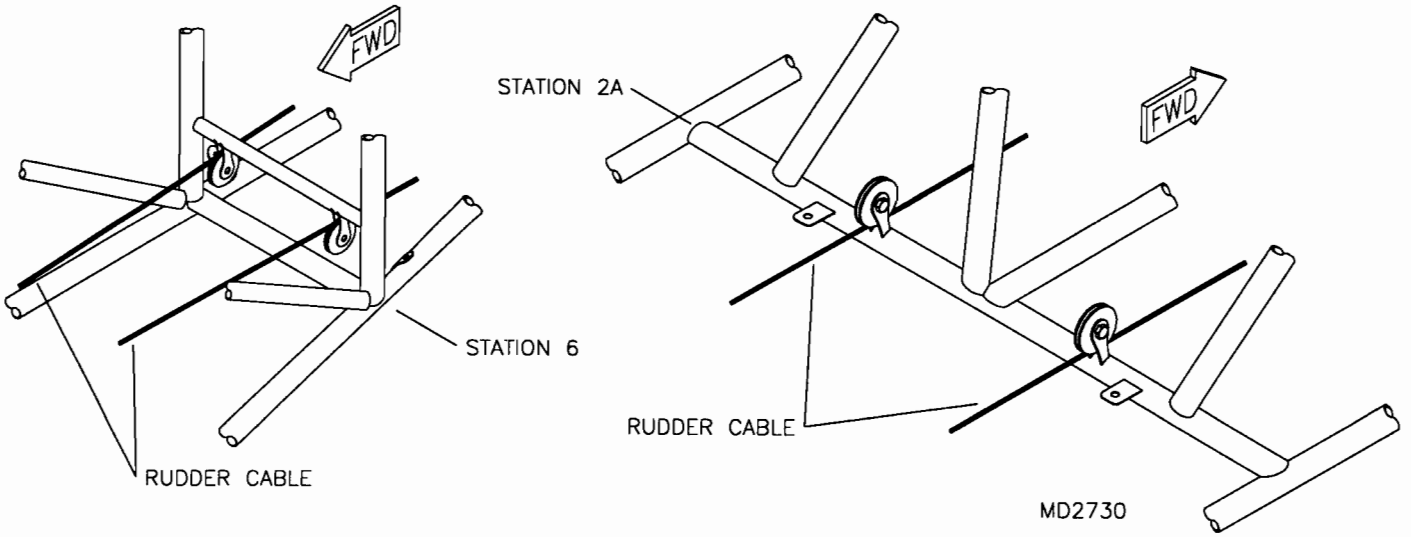
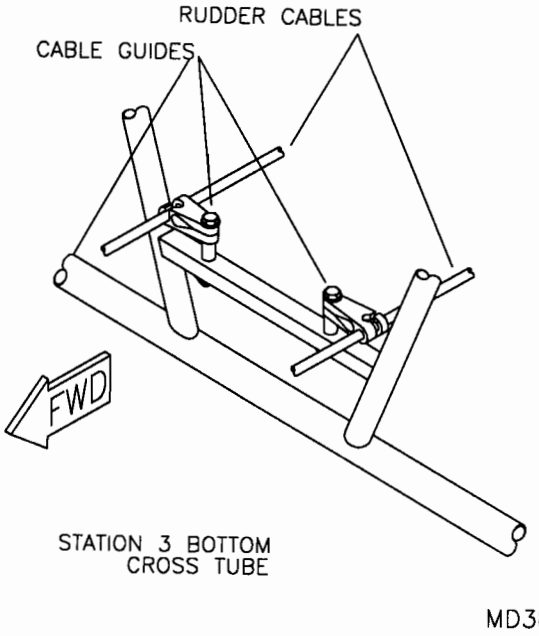
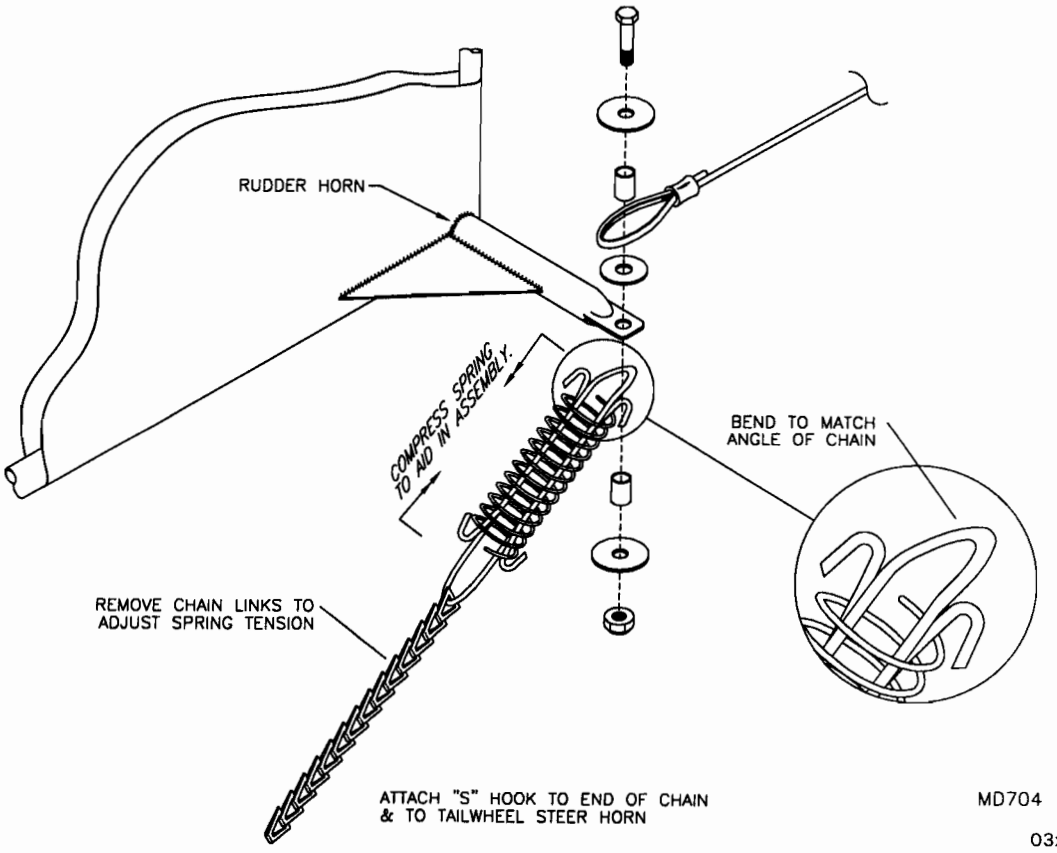


FIGURE 01H-03A



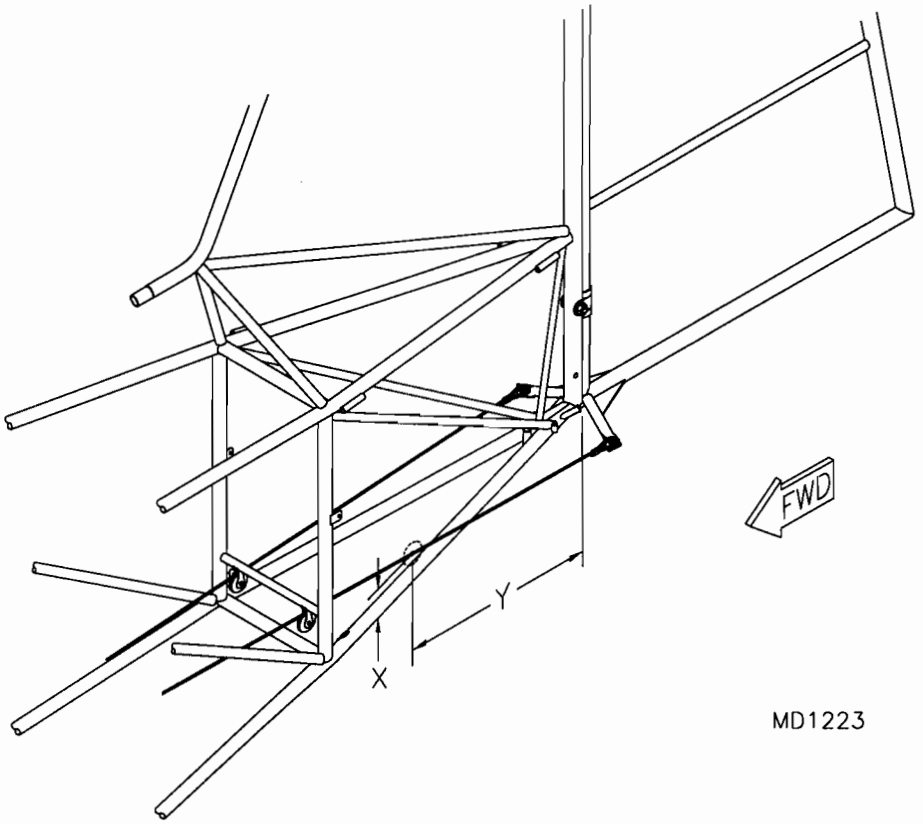
4. Attach the rudder cables to the rudder as shown in the parts drawing and in **FIGURE 01H-04**. Steering is provided by tensioning springs and link chains. Spring tension should be tight with the springs compressed about half of the full amount. Adjust spring tension by removing chain links. Loose steer springs will cause for very soft and indefinite steering. Bend the upper inner hook of the steer spring to match the angle of the steer chain linkage, and attach the steer springs and chain to the rudder. Refer to the tailwheel installation section and to **FIGURE 01H-04**.

FIGURE 01H-04



5. Measure the exit location of the rudder cables. Record these dimensions on **FIGURE 01H-05.** Refer to these dimensions when locating the rudder cable exit fairings during covering.

FIGURE 01H-05

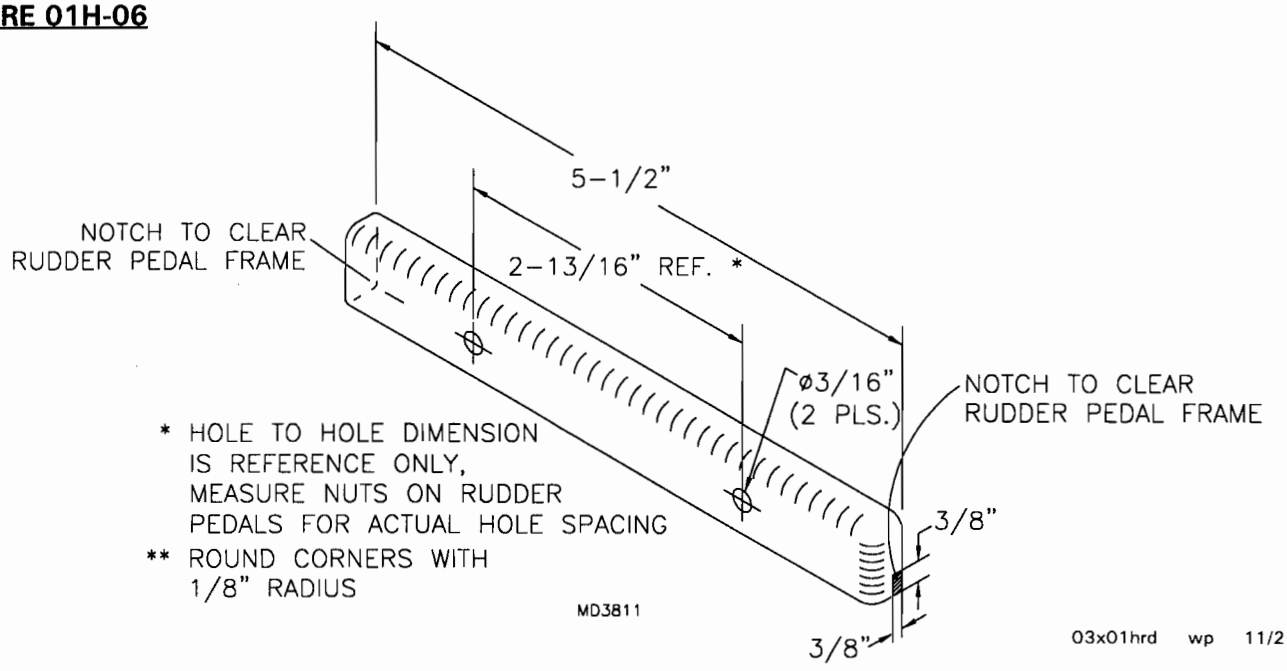


Y = Aft radius of vertical stabilizer to cable exit. =_____

X = Bottom radius of bottom longeron to cable exit. =_____

6. Fabricate two foot rests as per **FIGURE 01H-06.** Note: For the best fit, check the distance between threaded inserts. Radius the edges and finish as desired, recommend a brush finish using steel wool.

FIGURE 01H-06

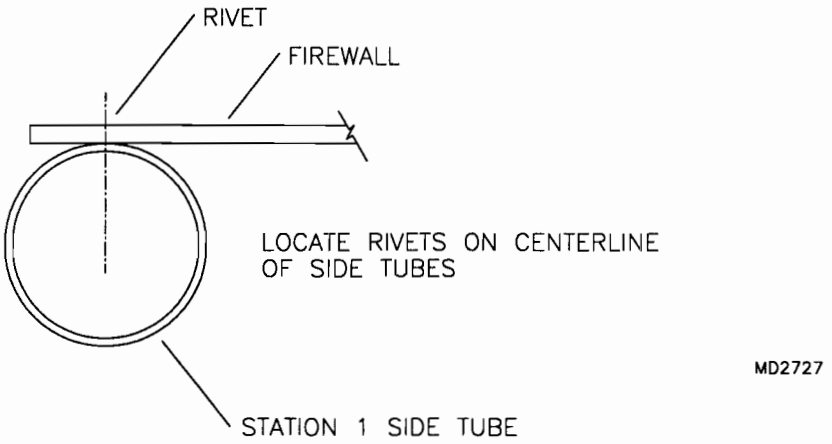


S-7 FIREWALL INSTALLATION

(REFER TO PARTS PAGE # 001-18 FOR PARTS SELECTION)

1. **NOTE:** Position the firewall on the forward side of station 1 so that the bottom edge of the firewall is flush with the bottom of the station 1 bottom cross tube and so that the firewall is centered from side to side. Clamp the firewall in position. Measure and layout the rivet hole pattern on each side of the firewall. Locate the holes so that they are on centerline of the fuselage side tubes. See **FIGURE 01I-01.** Refer to **FIGURE 01I-02** for spacing. Using a #30 drill bit, drill through the firewall and into the station 1 side tubes and cleco in place. **IMPORTANT:** There are no rivets in the bottom cross tube.

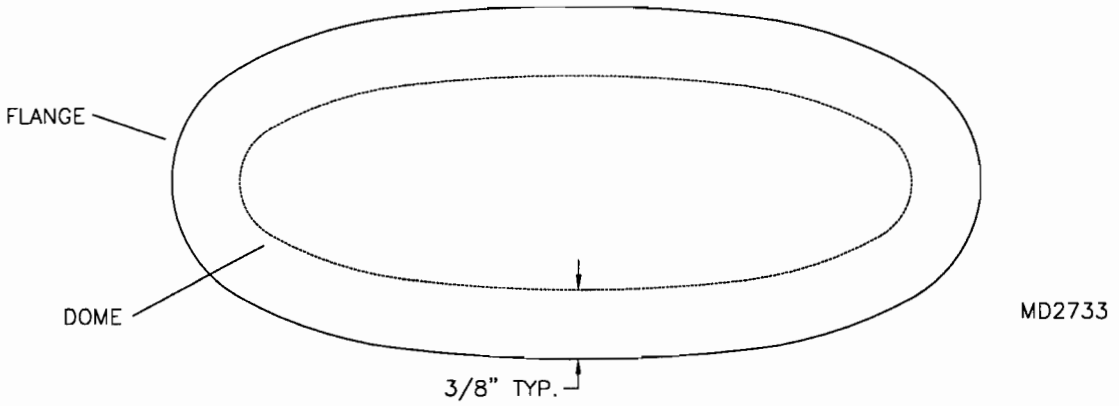
FIGURE 01I-01



2. Layout all locations on the firewall using the dimensions shown in **FIGURE 01I-02** as a reference. **NOTE:** Refer to the hydraulic brake installation section for more firewall hole locations. Verify that all locations miss the fuselage framework. Remove the firewall and drill all locations.

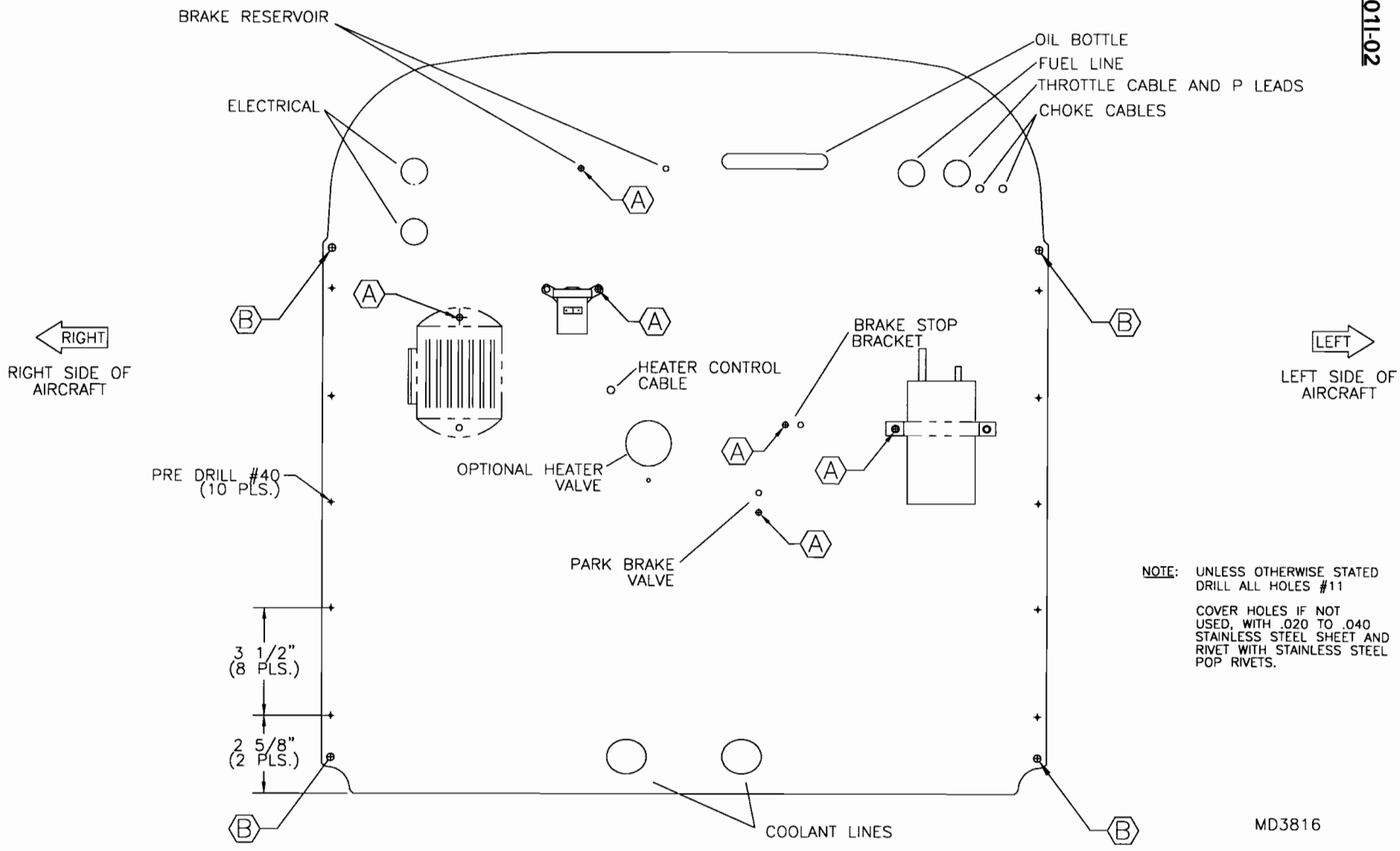
3. Secure the firewall soundproofing to the **AFT** side of the firewall. Contact cement works well for installing soundproofing. Rough up and clean the aft side of the firewall. Follow the manufacturers instructions for bonding. Using a hot knife, burn through the soundproofing through all hole locations. Trim the firewall cover plate as shown in **FIGURE 01I-03** and attach to the aft side of the firewall after the soundproofing has been installed refer to the parts drawing. Install the firewall with clecos to continue trial assembly. **NOTE:** The firewall must be removed to cover the fuselage. Rivet the firewall in place during final assembly only.

FIGURE 01I-03



Ⓐ = LOCATE SECOND HOLE AFTER PART HAS BEEN POSITIONED.

Ⓑ = LOCATE ENGINE MOUNT HOLES AFTER FIRE WALL HAS BEEN INSTALLED.



NOTE: UNLESS OTHERWISE STATED DRILL ALL HOLES #11

COVER HOLES IF NOT USED, WITH .020 TO .040 STAINLESS STEEL SHEET AND RIVET WITH STAINLESS STEEL POP RIVETS.

MD3816

912 FIREWALL

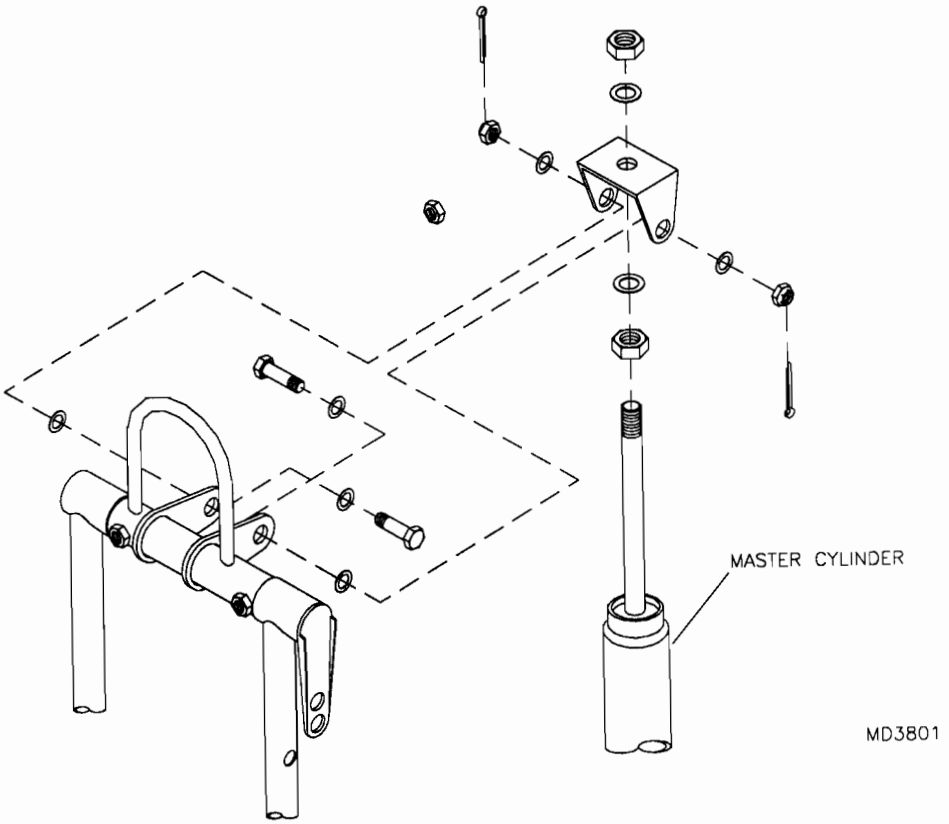
(FWD SIDE OF FIREWALL SHOWN)

S-7 HYDRAULIC BRAKE INSTALLATION

(REFER TO PARTS PAGE # 001-20 FOR PARTS SELECTION)

1. Wrap the threads of the 90 degree fittings with teflon tape and Install into the master cylinders. Remove the shackle from the piston rod of the master cylinder and discard. Install the master cylinders into the forward rudder pedals. The fittings should point inboard. Refer to the parts drawing and **FIGURE 01J-01**. Leave the jam nut that was supplied with the cylinders in place. Use a needle nose vice grips (or similar tool) with tape on the jaws clamped just below the threads of the piston rod to hold it in place while adjusting the 5/16" shear nut. **NOTE:** This nut is used to adjust the angle of the brake pedal to the rudder pedal. Final adjustment to your liking will be made during taxi test. With the lower end of the master cylinder temporarily bolted in place, mark onto the floorboard the location of the screw that retains the lower mount of the cylinder to the floorboard. Swing the lower end of the cylinder out of the way and install the screw. Bolt the cylinder in place.

FIGURE 01J-01



2. If you did not do so in the previous section, mark and drill all firewall hole locations. Refer to the firewall section for dimensions. See **FIGURE 01J-02**. Hold the park brake backing plate to the firewall and mark the hole locations onto the backing plate. Remove the backing plate and drill. Mark and pre drill the corners of the backing plate. See **FIGURE 01J-02A**. Drill the hole in the park brake control arm to ¼" to allow for insertion of the wire swivel stop. Teflon tape fittings and install into the park brake valve. See parts drawing. To determine the open and closed arm position, blow through one of the fittings while moving the control arm. Record the position of the control arm at its opened and closed points. With the backing plate in place, install the park brake valve to the firewall using the hardware called out in the parts drawing. Rivet the cable housing swivel stop bracket to the firewall. **NOTE:** The cable housing swivel stop bracket also locates within the backing plate. Install the cable housing swivel stop into the bracket as per the parts drawing.

FIGURE 01J-02

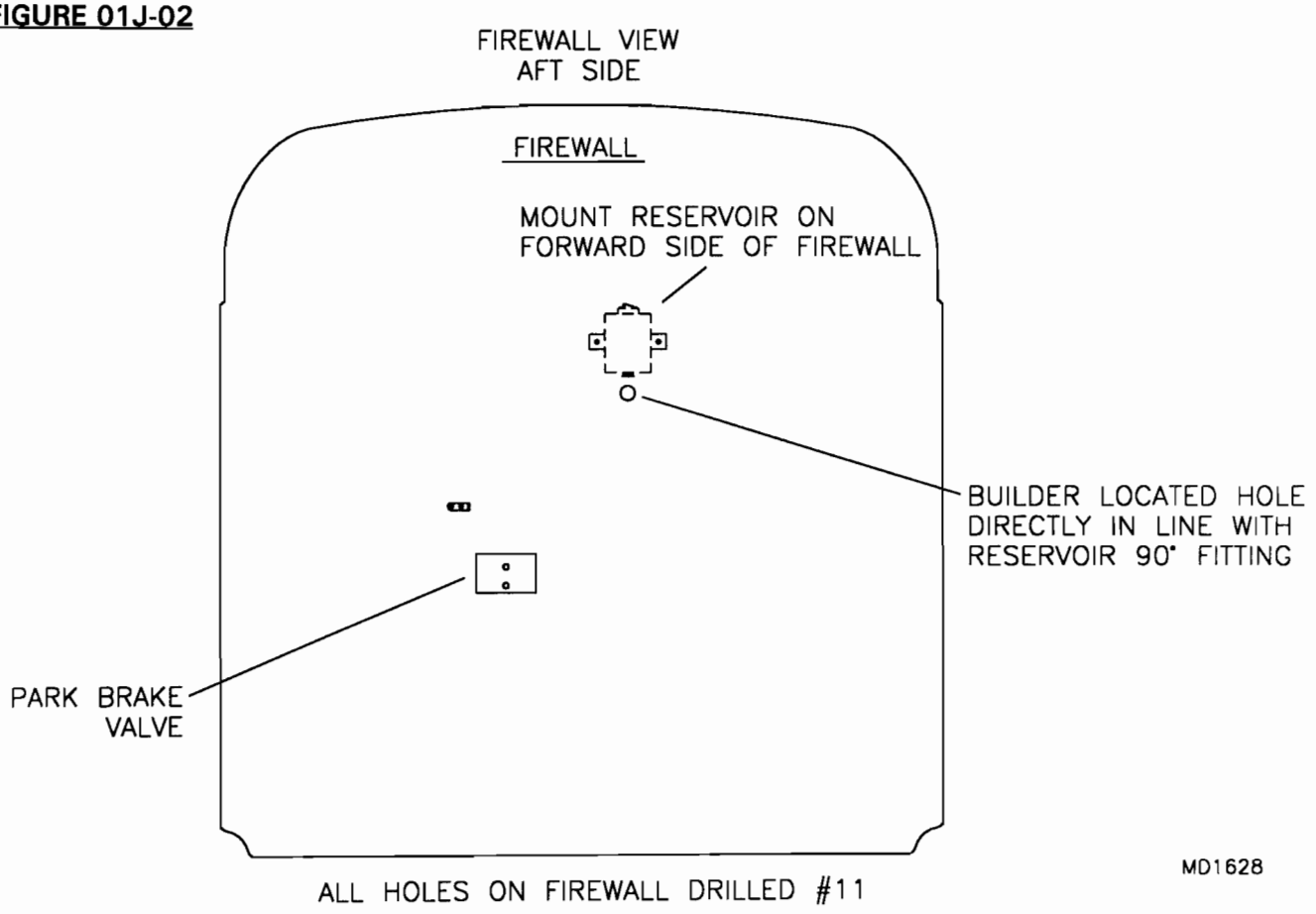
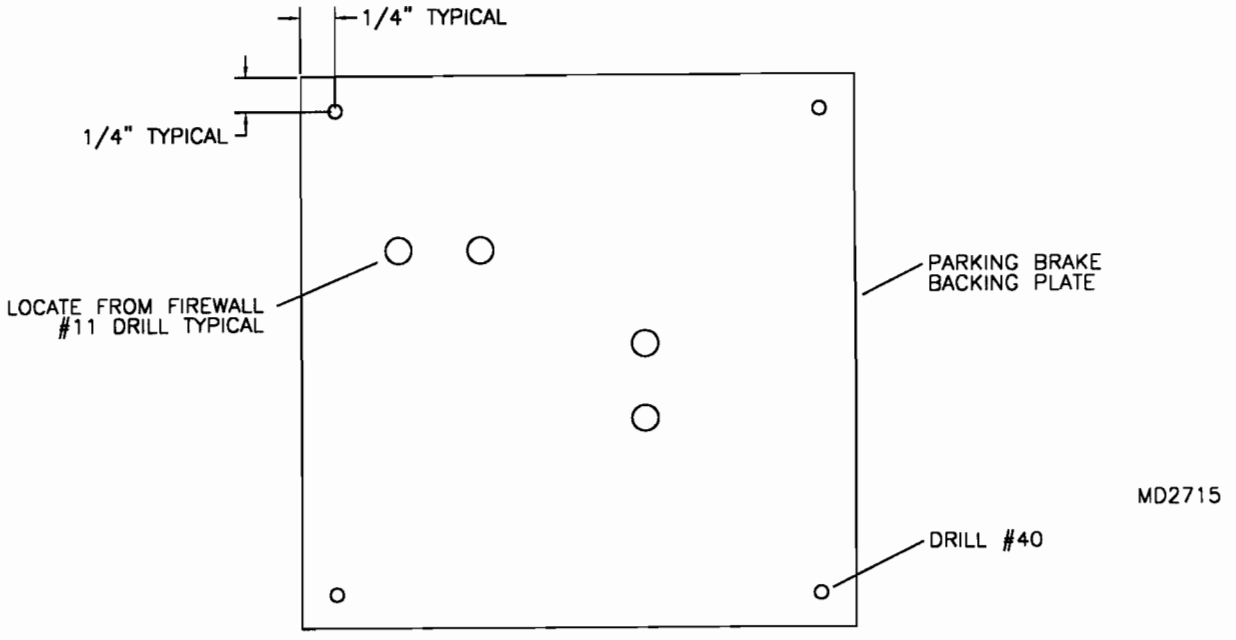
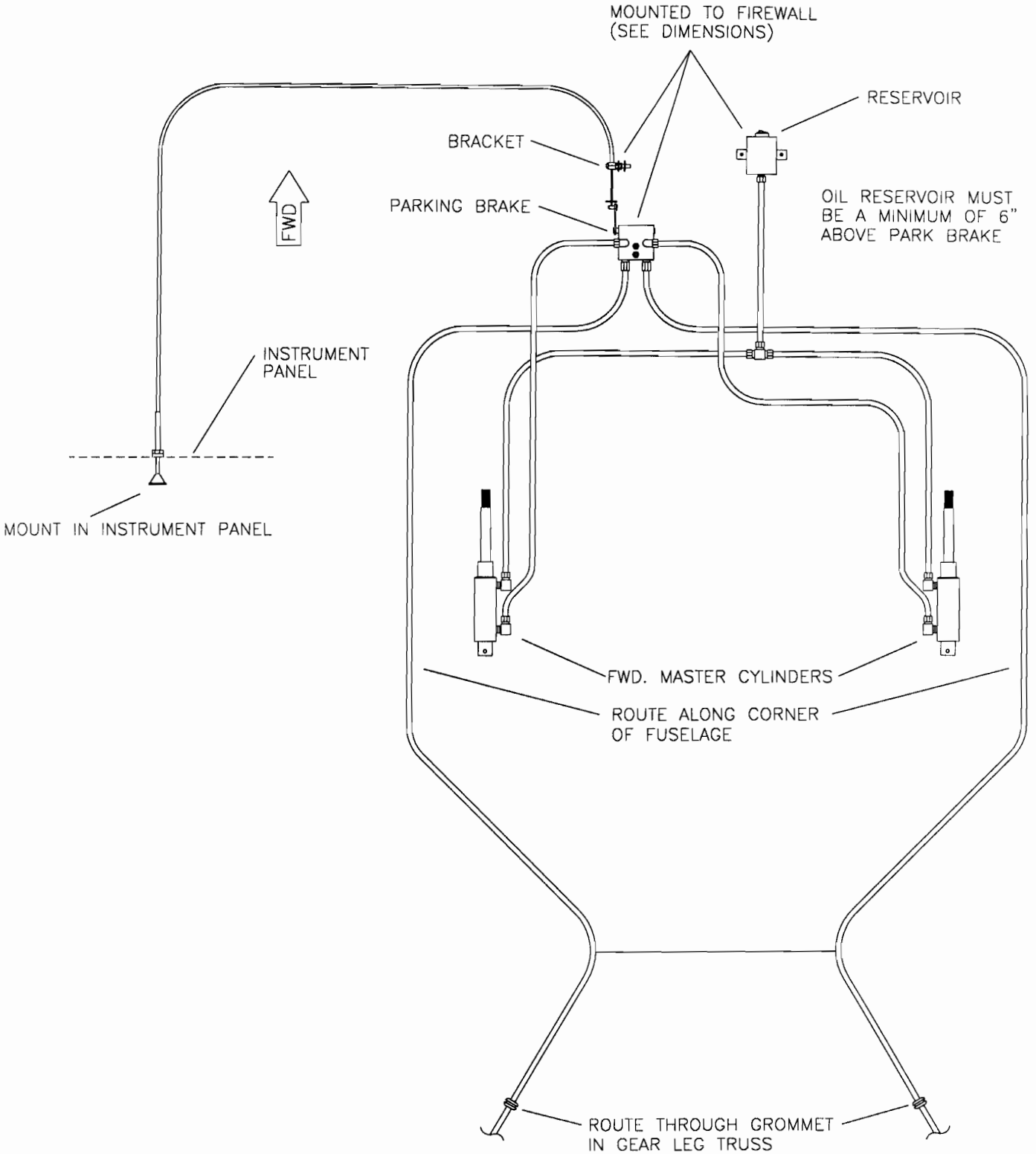


FIGURE 01J-02A



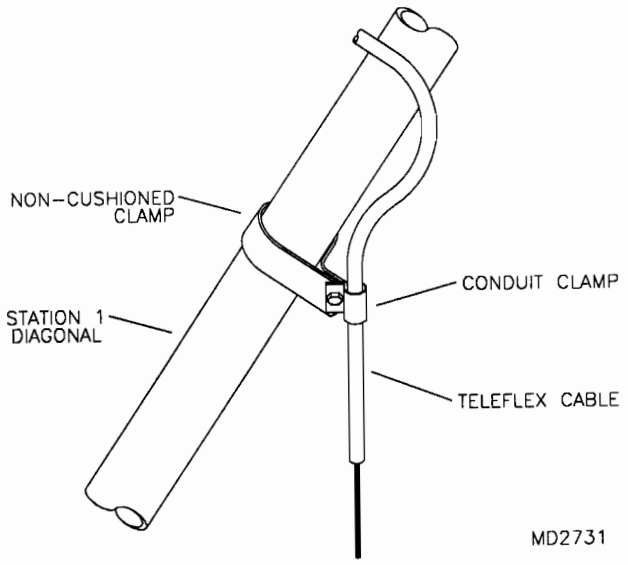
3. Teflon tape and install the 90 degree fitting into bottom of the hydraulic reservoir. Mount the reservoir on the firewall as shown in the parts drawing and in **FIGURE 01J-02** with the mount strap near the top of the reservoir. Point the 90 degree fitting to and drill through the firewall. Install the reservoir expansion cap. Install the rubber grommet. Cut a short piece of brake line and insert through the grommet and into the fitting in the reservoir. The brake line should be fully inserted into the ferrule fittings. Since the ferrules can be fully tightened only once, we recommend cutting and fitting all brake lines and hand tightening during trial assembly. Fully tighten during final assembly. Install the tee fitting to the reservoir line on the aft side of the firewall. Cut the brake line to length and route according to the schematic in **FIGURE 01J-03**. **NOTE:** Brake line length and routing is left to the discretion of the builder. The brake line should be long enough to allow full travel of the rudder pedals without kinking the line. The brake line will exit the fuselage through the landing gear gusset. Drill a 7/16" hole through the gusset and install the rubber grommets. If you are installing gear leg fairings, the brake line will route through the fairing on the aft side of the gear leg.

FIGURE 01J-03



4. The park brake control cable mounts into the instrument panel. Mounting location is left to the builders preference. Refer to the instrument panel installation section. Install the non cushioned and conduit clamp to the station 1 diagonal. See **FIGURE 01J-04**. Route the control cable through the conduit clamp and into the cable housing swivel stop. Determine the correct length of cable and cable housing needed and cut both to length. The cable can be completely removed from the cable housing to cut to length. Leave the cable a little long at this time for adjustment, the cable can be trimmed to final length during final assembly. Route the cable through the cable housing swivel stop and through the wire swivel stop in the control arm of the park brake. Adjust the control arm and cable to allow full open with the control knob pushed in, and closed with the control knob pulled out. During final assembly loctite the screw in the wire swivel stop.

FIGURE 01J-04



FILLING THE HYDRAULIC BRAKE SYSTEM

NOTE: The following steps should be performed during final assembly. **IMPORTANT:** Use Only aircraft grade brake fluid. Automotive brake fluid will destroy the seals in the system.

1. Fill the system from the bottom through the bleed valves in the caliper cylinders. **HINT:** A small hand held oil pump can with a short piece of small diameter hose attached works well. With the oil pump full of hydraulic oil, slide the hose on the oil pump over the lower left bleed valve. Remove the reservoir cap and open the bleed valve. Fill the left side of the system until the fluid level is just above the "T". Close the bleed valve and remove the oil pump. Refill the oil pump and attach it to the right hand bleed valve and follow the same procedure. Continue to fill the system and alternate sides until the system is free of all air bubbles and the reservoir is approximately ¼ full.

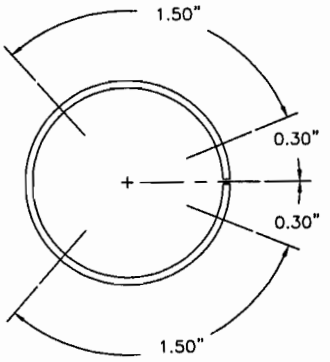
2. Fill the reservoir to approximately ¾ full by pouring directly into the reservoir. Bleed the brakes by depressing pedals individually while opening the respective bleeder valve at the caliper. Close bleeder valve before releasing pedal. Repeat until brakes are solid. **HINT:** Place a pan under bleeder valve to catch fluid. Replenish fluid in reservoir as required. Replace the reservoir cap.

S-7 CONTROL STICK ASSEMBLY
(REFER TO PARTS PAGE 002-02 FOR PARTS SELECTION)

NOTE: The torque tube must be trial fitted and pillow blocks positioned prior to painting it.

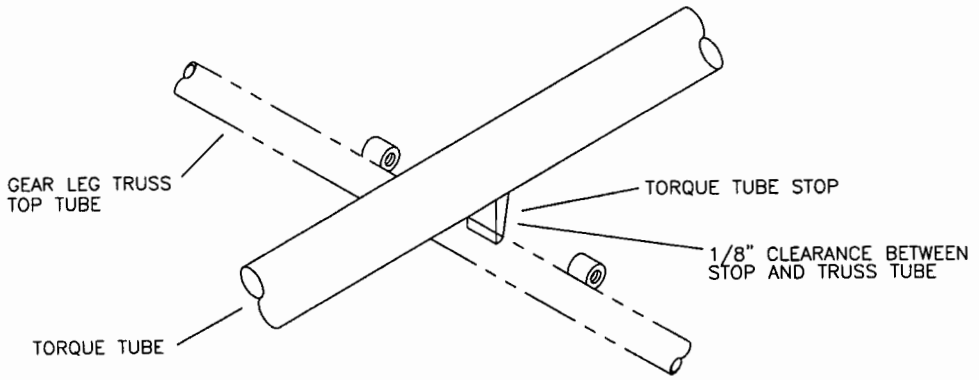
1. Install the torque tube stop bolts and jam nuts to the bosses welded to the aft side of the gear leg truss top tube; refer to the parts drawing. Drill out the pillow blocks with a 1/4" diameter bit to allow installation of bolts. Drill the two (2) Stop Rings per **FIGURE 02-01**. Slide one Pillow Block on to the aft end of the Torque Tube. Slide a Stop Ring, Pillow Block and Stop Ring on the fwd end of the Torque Tube. Tighten Pillow Blocks until free of excessive play. Both Pillow Blocks should still turn freely on the Torque Tube. Refer to the parts drawing for parts orientation. Install the torque tube to the fuselage by bolting the forward pillow block to the two tabs welded at station 2. Position the middle pillow block against the aft side of the square tube just below the forward seat frame at station 2A. Slide the aft pillow block so the pillow block strap is centered on the square mounting tube at station 3. Transfer-drill through the pillow block strap and mounting tube; bolt in place. Check the torque tube for alignment and freedom of movement. ***IMPORTANT:*** *Incorrect alignment will cause the torque tube to bind.* Using the pillow block as a guide, transfer-drill through the tube and bolt in place, per the parts drawing. Adjust the fore/aft position of the torque tube so the torque tube stop is centered between the stop bolts; see **FIGURE 02-01A**. Slide fwd and aft stops in place, tight against the fwd pillow block. ***NOTE:*** *Position the split in the Stop Ring to the bottom.* Locate, transfer drill #30 and Cleco. ***NOTE:*** *Final rivet with 4 Stainless Steel rivets in each stop ring after painting the torque tube.* For the middle pillow block, lightly tighten until free of play but still turns freely. Drill (2) #11 holes thru ½" x ½" square tube to bolt pillow block to frame. ***NOTE:*** *Adjust vertical position using slots in mount plate.* Tighten until free of play but still turns freely. The torque tube should rotate freely with no end play. Take your time at this step. Alignment and free movement of the control stick assembly is very important. Friction in your control system will have negative influence of the flying qualities of your aircraft. Mark the location of the middle and aft Pillow Block all the way around the Torque Tube. Remove the Torque Tube, Stop Rings and Pillow Blocks for painting. Cover the bearing area of all 3 Pillow Blocks and the marked bearing areas on the Torque Tube with masking tape. This will save time-consuming paint removal in these areas. Install after the fuselage is covered and painted.

FIGURE 02-01



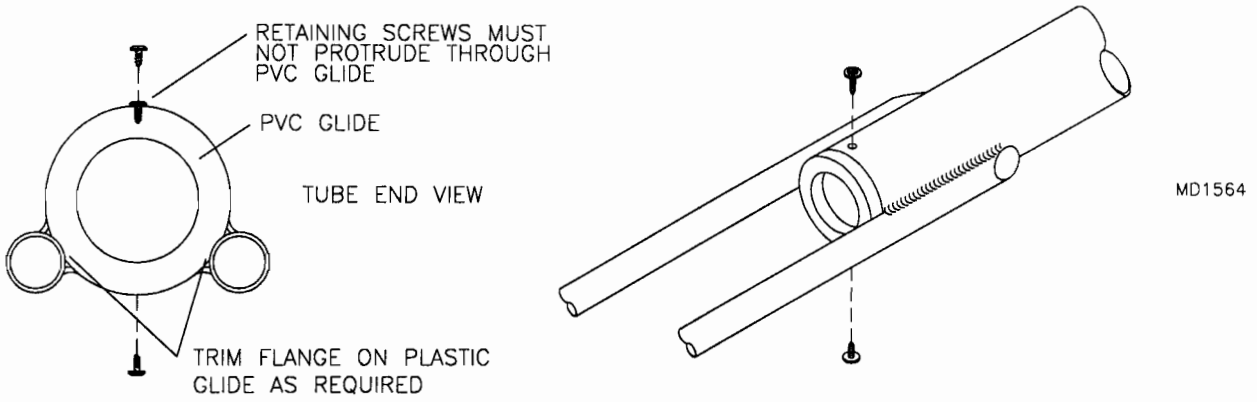
DRILL 4 #40 HOLES ON CENTERLINE OF RING.
TRANSFER DRILL #30 AT TIME OF ASSEMBLY AND RIVET CCPQ-42

FIGURE 02-01A



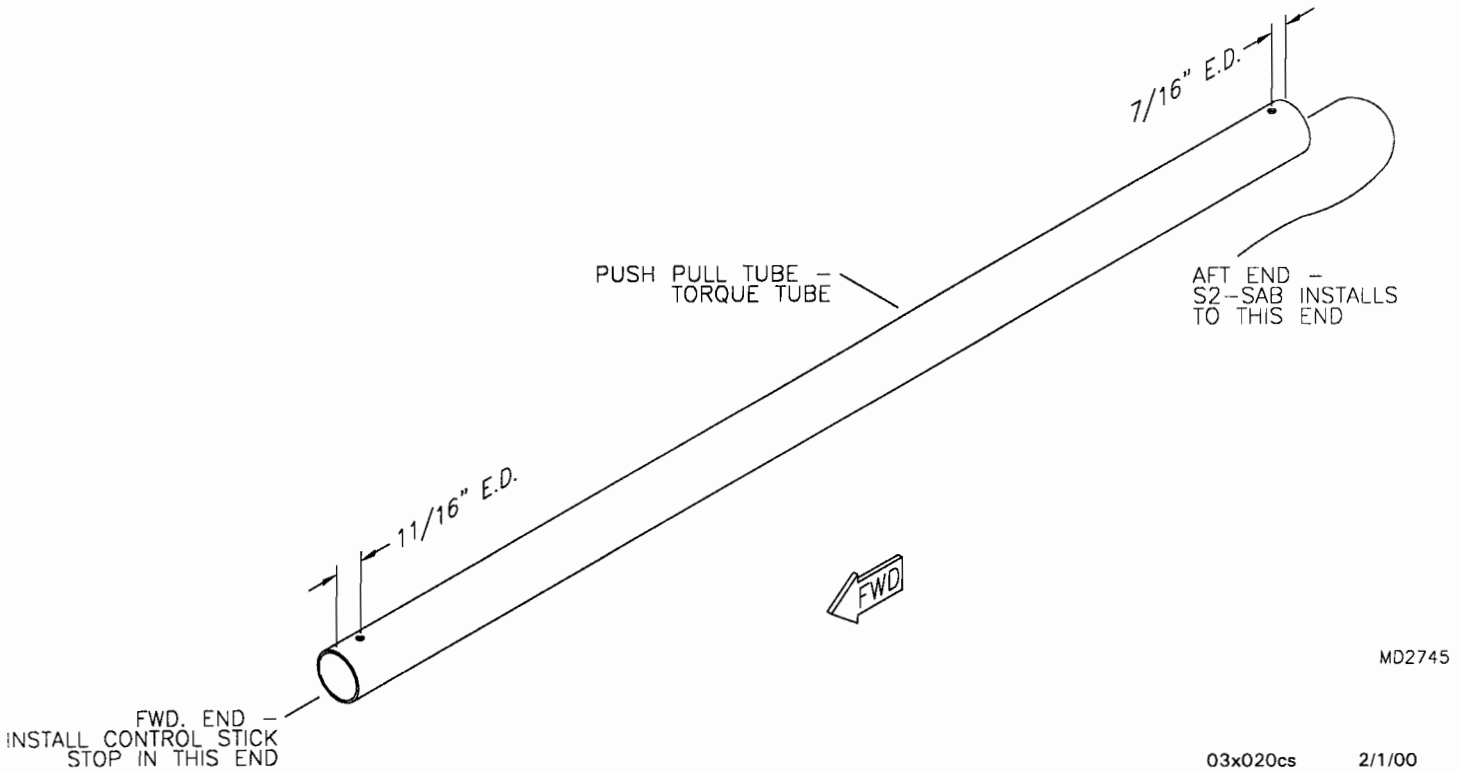
2. Install the gray PVC glides into the ends of the aft section of the torque tube. **NOTE:** The aft pillow block must be in place prior to installing the glides. The forward glide will need to be filed to clear the ⅝" tubes on each side of the insertion point. See **FIGURE 02-02**. Install the retaining screws into the glides as per the parts drawing. **DANGER:** The retaining screws must not penetrate the interior portion of the glide.

FIGURE 02-02



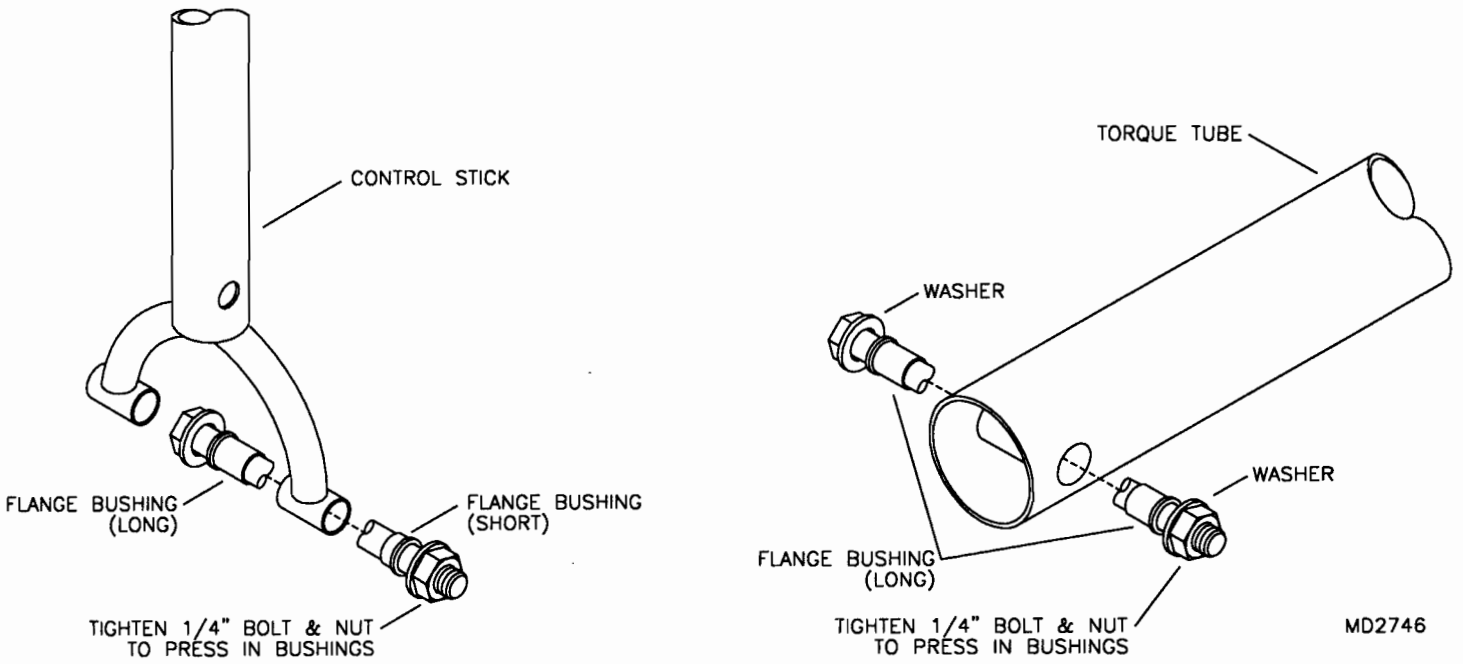
3. Slip the 1" push pull tube into the torque tube through the glides from the rear. Note that there is a forward and aft end to the push pull tube. See **FIGURE 02-03**. The push pull tube must slide freely within the glides. Remove the push pull tube and file the glides as needed. Install the control stick stop into the forward end of the push pull tube and transfer drill through the push pull tube through the control stick stop and install the eyebolt as shown in the parts drawing.

FIGURE 02-03



4. Press the flange bushings into the torque tube and control sticks. **HINT:** Use a ¼" bolt and nut of the correct length as a press to install the flange bushings. See **FIGURE 02-04. NOTE:** There are long and short bushings, check for proper placement. Refer to the parts drawing. Install the torque tube into the fuselage. Attach the control sticks to the torque tube using the hardware shown in the parts manual. Note that there is a forward and aft control stick. The FWD control stick has a hole drilled at the base for the electric pitch trim. **Take care when installing the trim wires, that they do not bind, chafe or inhibit the control system.**

FIGURE 02-04



5. Bolt the control stick push pull tube between the FWD and AFT control sticks. Refer to the parts drawing.

6. Install the eyebolt in the aft control stick per the parts drawing. Install the linkage to the eyebolt in the aft control stick and the eyebolt in the 1" push pull tube. **IMPORTANT**: These bolts must be tight enough to eliminate play and yet still allow free movement. **WARNING:** Check for proper cotter pin installation in these bolts prior to flight.

S-7 ELEVATOR PUSH PULL TUBE ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 002-04 & 002-06 FOR PARTS SELECTION)

NOTE: The elevator push pull tube and idler assembly will be trial assembled then removed for painting/priming of frame. Install idler assembly before covering.

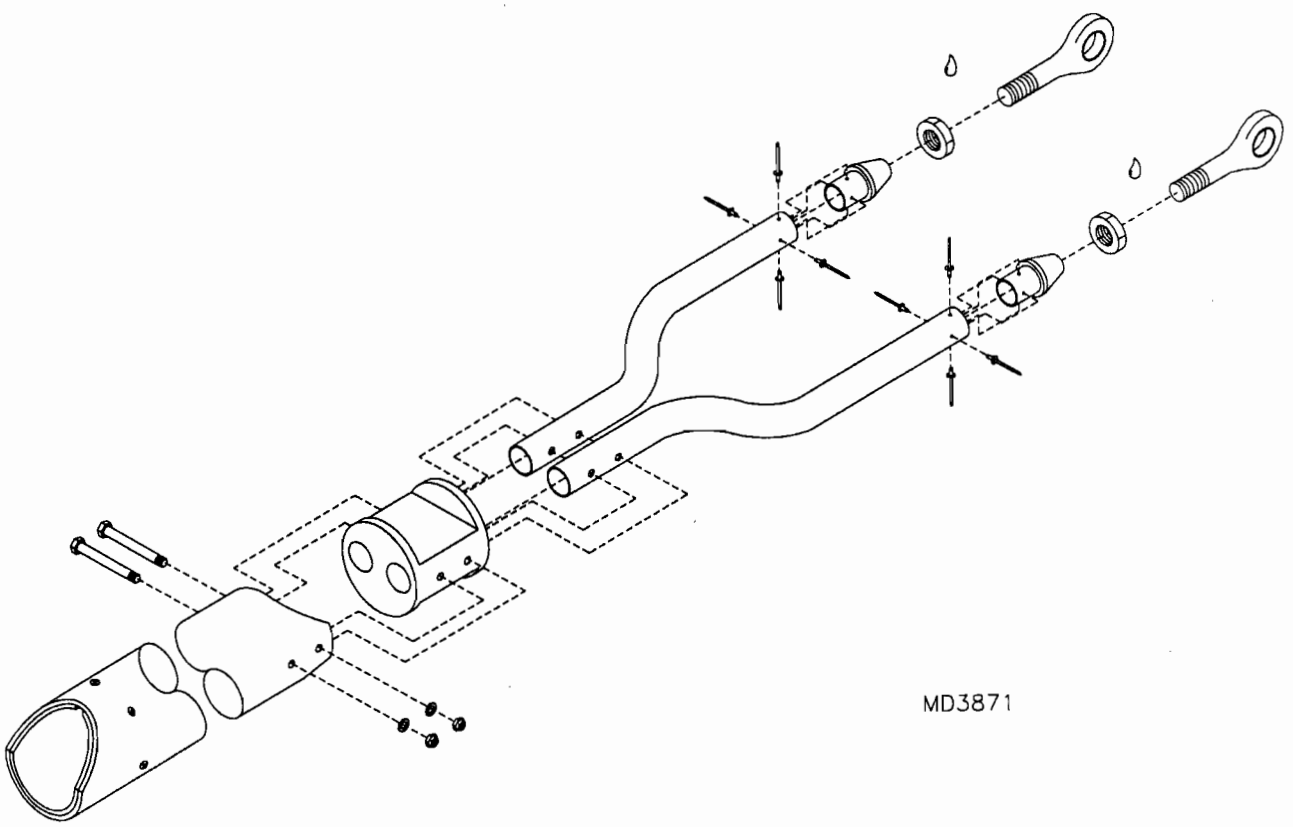
1. Bolt the two U-bracket's of the swivel joint together with the two plastic washers in between as shown in the parts drawing. The ¼" bolt should be tight enough to eliminate any end play and yet still allow the brackets to rotate freely. **IMPORTANT:** Check for proper installation of the cotter pin. Omission or improper cotter pin installation will result in loss of pitch control.

2. Attach the swivel joint to the 1" push-pull tube's aft end as shown in the parts drawing.

3. Insert arms into fitting. Place arms on smooth wood block, keep arms flat. Align #30 holes of arms with #11 holes of fitting. This is a critical fit. Do not oblongate holes, #30 holes in yoke arms match, drill to #11 holes in yoke fitting. Transfer drill from each side. Pin each hole with 3/16" bolt before drilling the next hole. Assemble arms, fitting and push pull tube. Double check alignment and make sure of tight fit on holes.

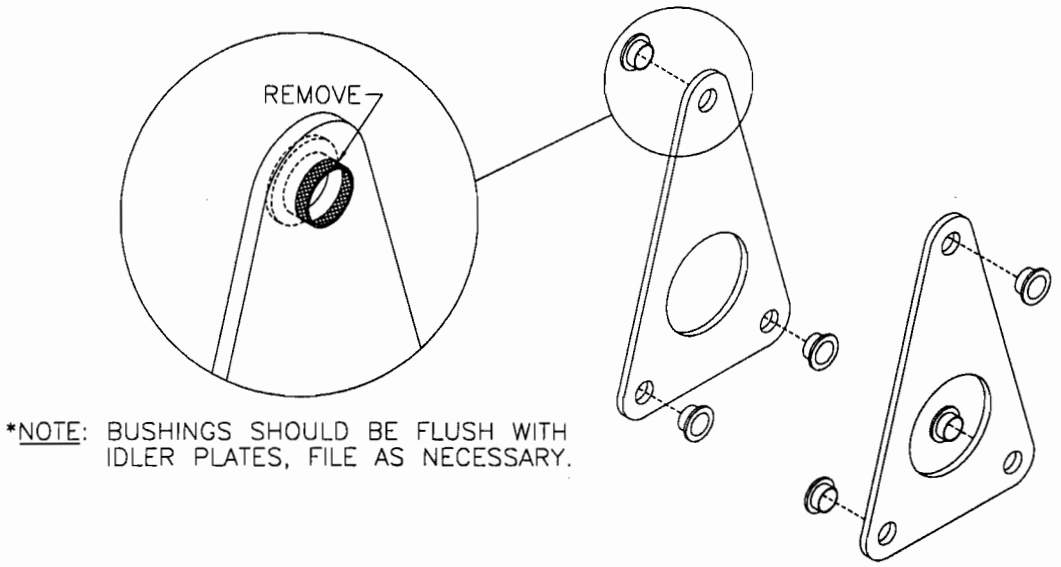
4. Assembly the elevator yoke as per **FIGURE 02A-04.** Rivet rod end fittings into each ⅝" tube with (4) ⅛" Stainless Steel Pop Rivets. Screw in rods with ¼" plain loc nut.

FIGURE 02A-04



5. IMPORTANT: Install idler assembly permanently before covering. Press flange bushing into idler plate as per **FIGURE 02A-05** and bolt to tabs on fuselage.

FIGURE 02A-05



6. Bolt the elevator push pull tubes in place as per parts drawing. Have an assistant hold yoke to check the system for clearance and proper motion. Smooth obstructions, free operation should occur. Remove system for priming & painting fuselage frame. Install idler after priming & painting fuselage frame.

S-7 AILERON CABLE SYSTEM

(REFER TO PARTS PAGE # 002-08 FOR PARTS SELECTION)

1. Assemble the pulley shackles as shown in the parts drawing and **FIGURE 02B-01**. The shackle bolts should be tight enough to eliminate any play and yet still allow free rotational movement. **NOTE:** The shackles will only rotate a few degrees each direction prior to catching on the bolt head. Attach the lower shackle assemblies to the bushings welded to the lower side tubes of station 3. See **FIGURE 02B-01**. Temporarily bolt the lower aileron cables to the lowest hole in the arm of the torque tube. Refer to the parts drawing and to **FIGURE 02B-01A**. Route the lower cables to each side of the fuselage and install the lower pulleys into each shackle assembly. Attach the turnbuckles to the lower aileron cables.

FIGURE 02B-01

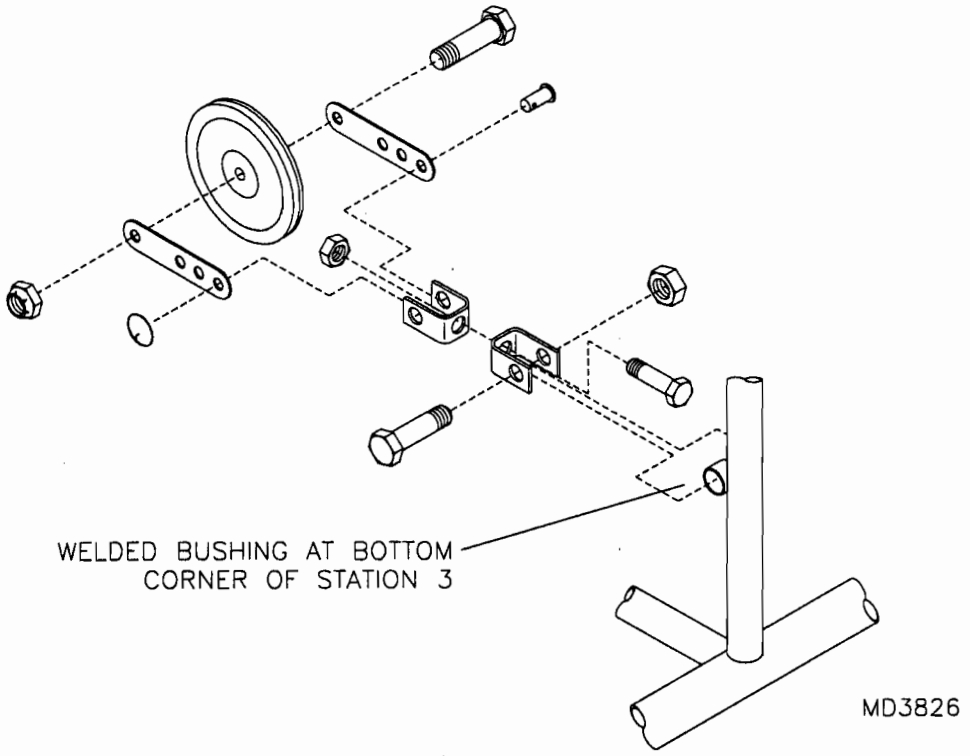
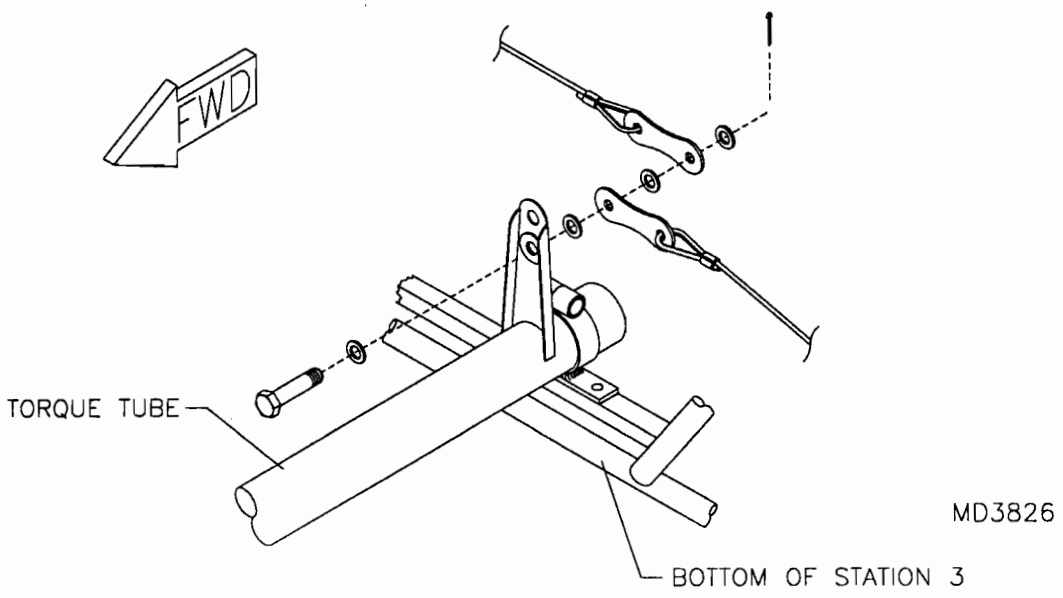
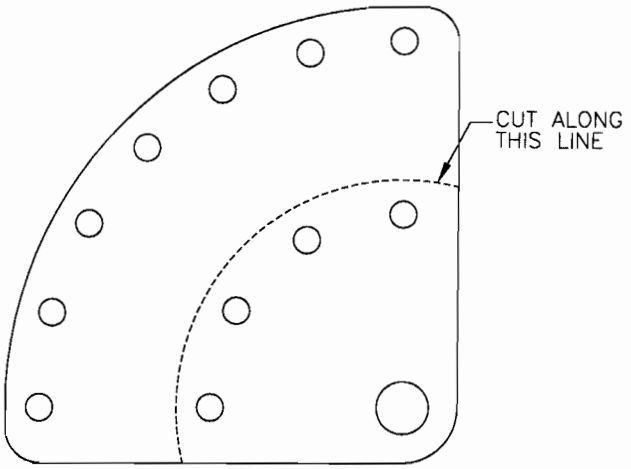


FIGURE 02B-01A



2. Trim the cable keepers as shown in **FIGURE 02B-02**. Install the upper set of pulley shackles, cable keepers, small pulleys and cushioned clamps to the pulley mounts located on the top cross tube of station 3 as shown in the parts drawing. Position the cable keepers straight down. **NOTE:** The cushioned clamps will be utilized in a later section to retain the flap teleflex cables. Do not install the cotter pins in the cable keepers at this time.

FIGURE 02B-02



POST WING INSTALLATION

3. Route both sets of aileron cables into the fuselage between the top longeron and the upper door frame tube of the fuselage. Route the aft cables under the small pulleys and to the center of the aircraft. See **FIGURE 02B-03**. Rivet the inner and outer cable tensioner together as shown in **FIGURE 02B-03A** and attach to both aft cables, using the plastic washers to center the cables. Do not close the cable tensioner until the forward cables have been attached.

FIGURE 02B-03

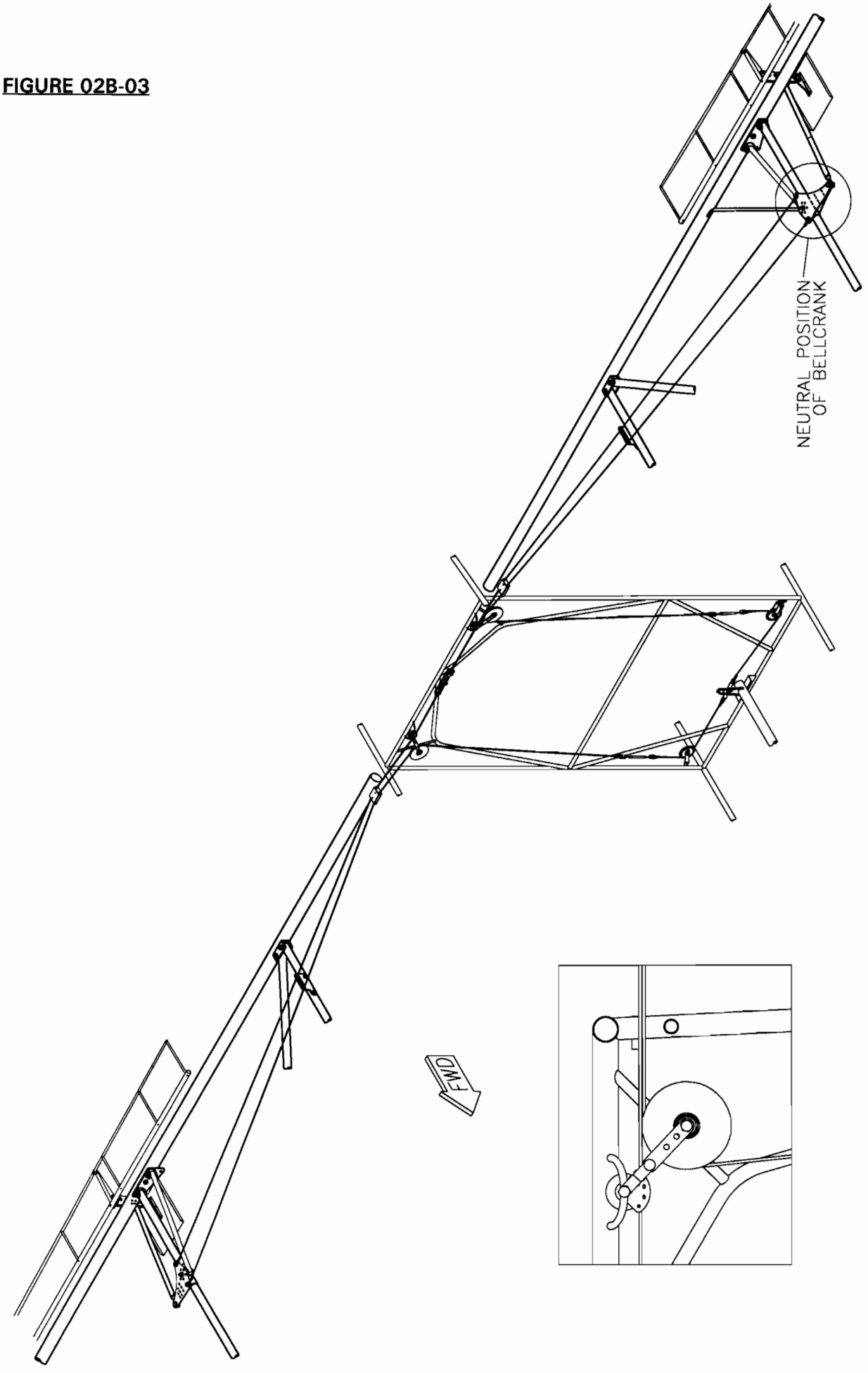
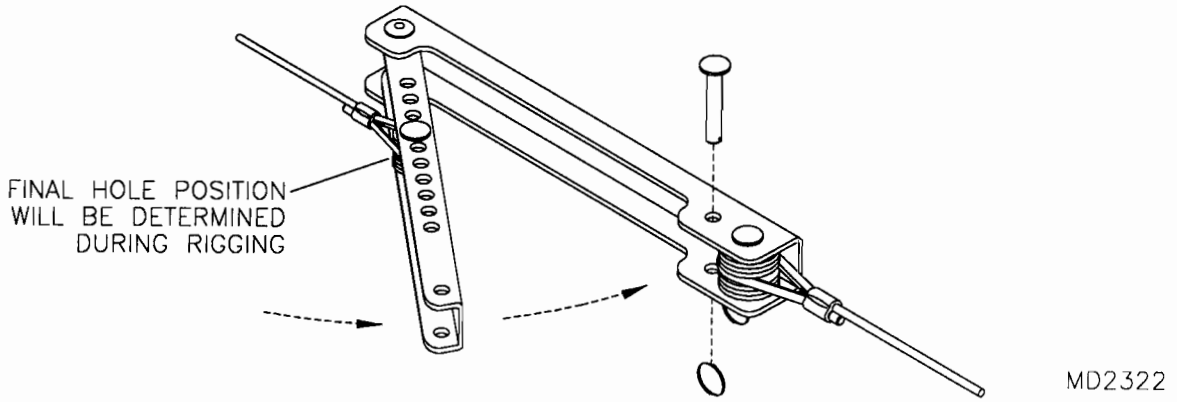


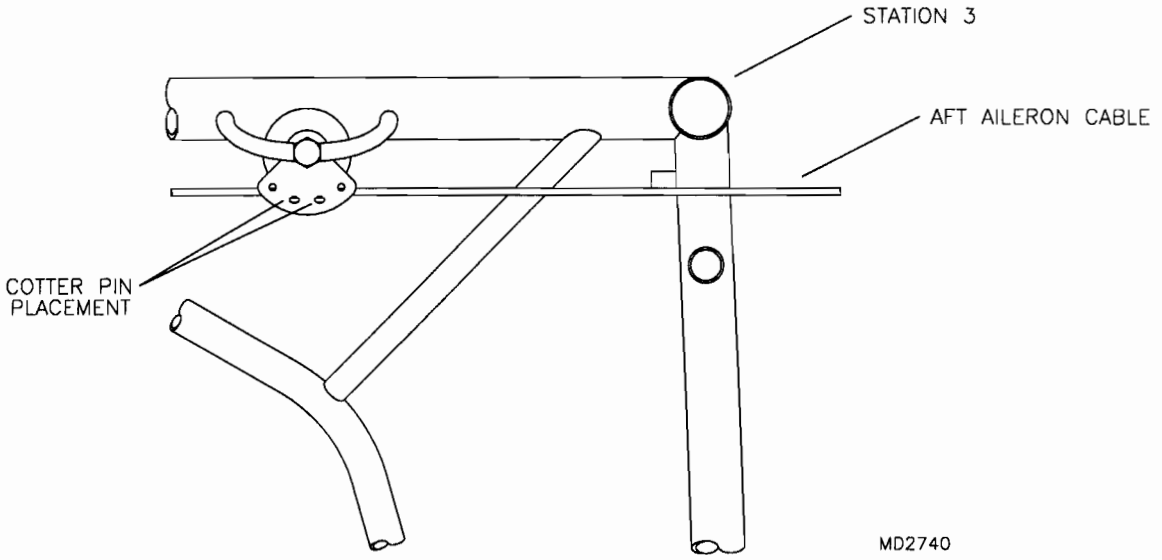
FIGURE 02B-03A



4. Route the forward cables through the large pulleys and tangs and install into the shackles. Refer to the parts drawing and to **FIGURE 02B-03**. Attach the forward cables to the turnbuckles. Close the cable tensioner and pin. Proper cable tension, turnbuckle adjustment and hole positioning in the cable tensioner will be determined during rigging. Refer to the rigging section. Safety wire the turnbuckles after rigging the ailerons.

5. Install the cotter pins into the cable keepers as shown in **FIGURE 02B-05**. **CAUTION:** The cotter pins must not rub on the cables and should not be used to retain the keepers in position. The keepers are retained in position by the tightening of the bolt.

FIGURE 02B-05



S-7 FLAP HANDLE INSTALLATION

(REFER TO PARTS PAGE # 002-10 FOR PARTS SELECTION)

1. Refer to parts drawing for assembly of flap lever.

2. Place end caps into each end of the flap trip release tube.

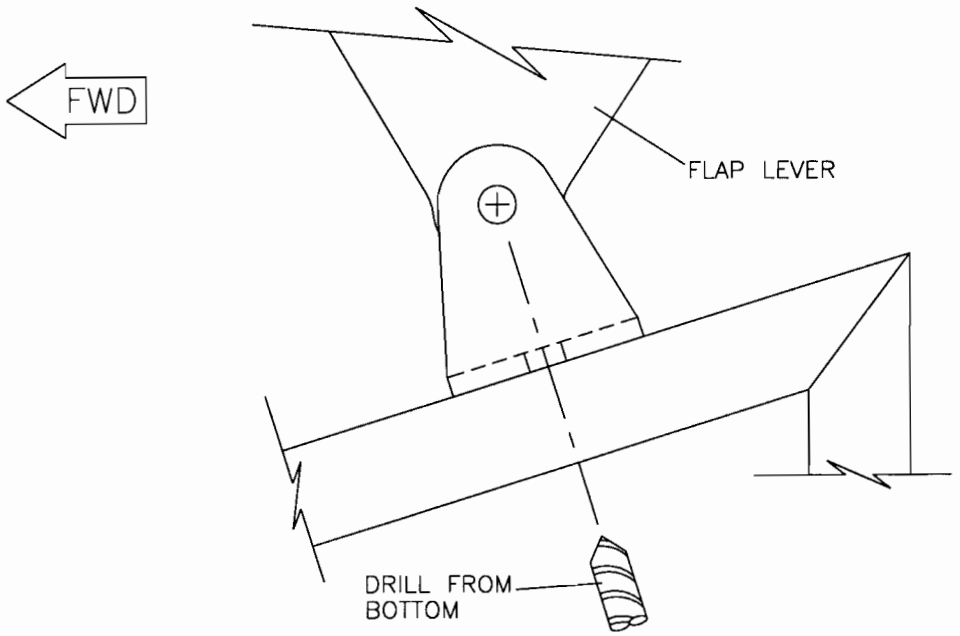
3. Bolt side plate together using bolts and bushings shown. **Note: Do not bolt the teleflex retainer brackets until installing the teleflex cables. Do not tighten top fwd bolt, since it attaches to fuselage tabs.** With side plates assembled and attached to fuselage tabs with U-bracket bolted in place on side plates, mark & drill hole location on ½" square tube to attach U-bracket.

4. Slip spring and trip tube into lever and install roller/spacer bushing and bolt.

5. Check operation by depressing release tube. The roller/spacer bushing should click into each notch in the side plates. File or sand as required, to effect smooth operations.

6. Install lever assembly to fuselage, drill thru ½" square tube and into bracket as per **FIGURE 02C-06**. The new hole will not line up with the existing hole in the U-bracket. If the new hole overlaps with the existing hole it is OK, a washer under the bolt head is used to clamp the bracket. If lever contacts seat crossing tube, preventing access to full flap position in flight, stack washers under U-bracket as shown on parts page. Remove lever for covering, re-install post covering & painting.

FIGURE 02C-06



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7. When removing wings, remove bolts that retain the brackets and the rod ends to the lever.

S-7 THROTTLE INSTALLATION

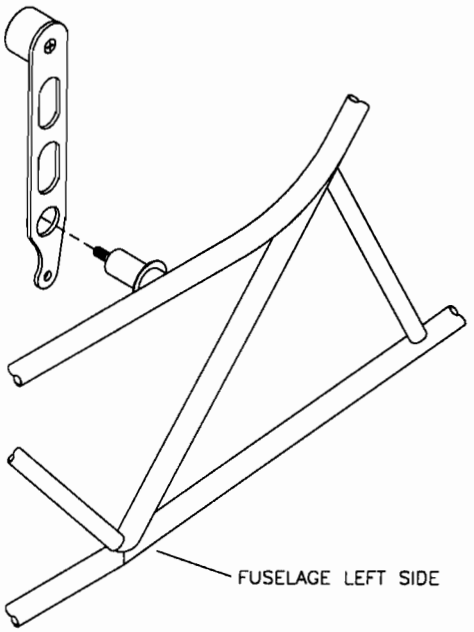
(REFER TO PARTS PAGE # 002-12 FOR PARTS SELECTION)

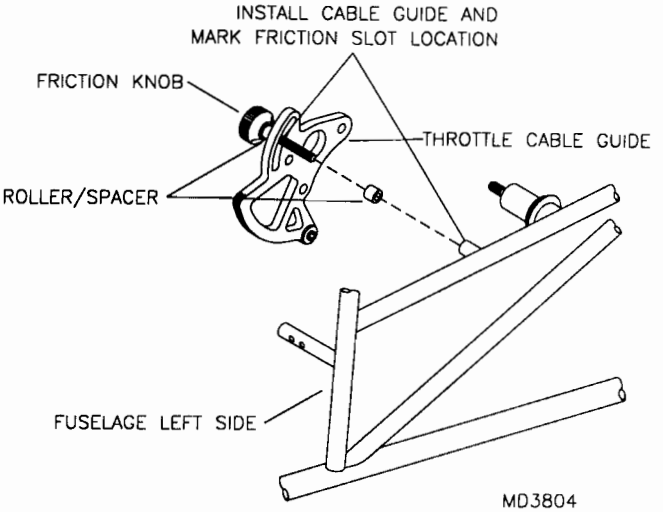
1. Assemble the forward throttle lever to the throttle cable guide as shown in the parts drawing. Assemble the throttle lever knobs to each lever. Refer to the parts drawing.

2. Locate the throttle lever mount lugs on the left side of the fuselage. Clean off any paint that may have accumulated and apply a light film of grease on the lugs. Temporarily slide the lever and the throttle cable guide on their respective mount lugs.

Install the first set of washers as shown in the parts drawing. Slide the forward throttle lever assembly onto the forward mount lug and the aft throttle lever assembly on the aft lug. The lever assemblies should rotate freely without excessive play. Note the proper orientation of each lever. Slide the second set of washers onto the lugs. Install and tighten the retaining nuts and check for end play within each set of levers. The levers should feel solid and snug and rotate with just slight resistance. If any play or looseness exists, additional plastic washers may be added to achieve the correct adjustment.

FIGURE 02D-02





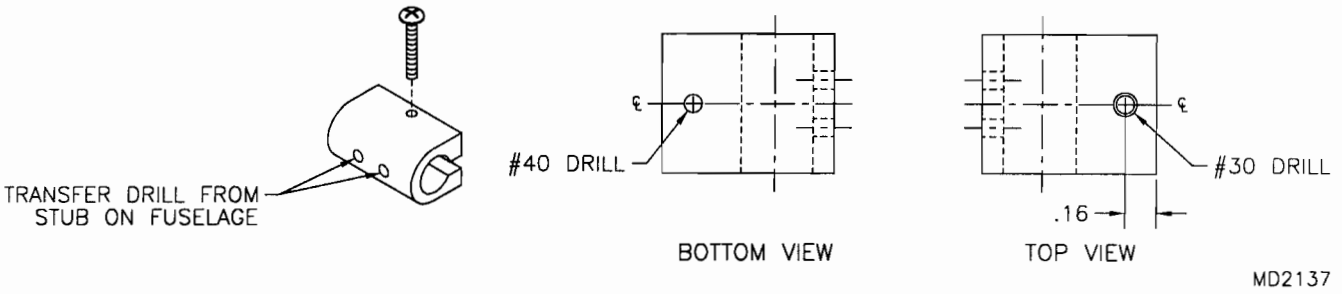
3. Install the throttle linkage tube as shown in the parts drawing. **IMPORTANT:** Note the orientation of the linkage tube as well as the orientation of each bolt. Operate both the throttle levers. Check for linkage and bolt clearance. Adjust washer combinations to obtain bolt clearance. It may be necessary to slightly "tweak" the linkage tube to gain clearance from the fuselage and skin.

4. Install the roller spacers, washers and friction knob through the slots in the forward throttle lever as shown in the parts drawing and **FIGURE 02D-02**. It may be necessary to trim some of the length off of the friction knob threads. Add or delete 3/16" washers as necessary for proper adjustment.

5. Slide the throttle cable housing retention block on the cable housing stub located just forward of the forward throttle lever. Transfer drill through the stub and through the retention block centerline. See **FIGURE 02D-05**. Remove the retention block and locate the center hole on the top side of the block. Drill completely through the throttle retention block from top to bottom with a #40 drill bit. Drill only the top half of the retention block to #30. Refer to **FIGURE 02D-05**. The machine screw will self tap into

the bottom. Drill the **FORWARD** holes in the stub to #11 to accept the cable housing. **IMPORTANT:** The holes in the aft side of the stub must remain #40. Slide the retention block onto the stub so that the open end of the block is pointing forward.

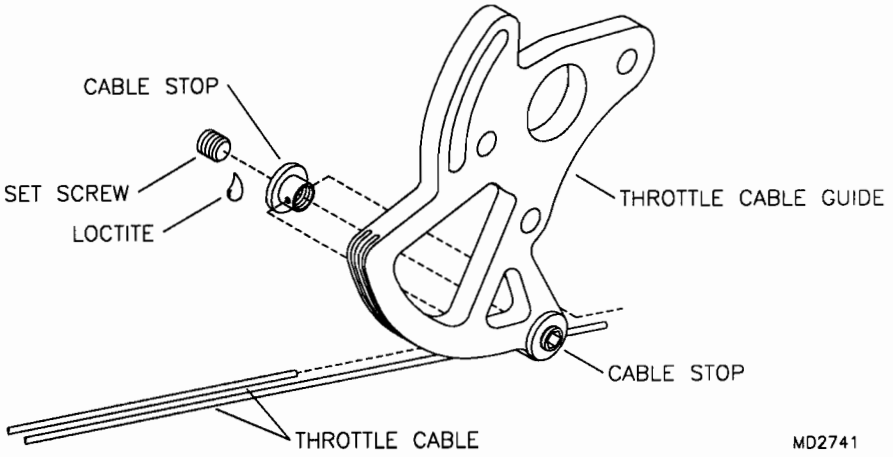
FIGURE 02D-05



6. Determine the routing of cable housing and cut to length. **NOTE:** Cable housing routing is left to the discretion of the builder. Slide the throttle cable housing into the slot in the retention block from the forward side. The housing should enter the forward side of the stub and bottom against the interior side of the aft wall. Route the housing along the left side of the fuselage towards the top of the firewall, exiting the firewall just below the station 1 top cross tube. Refer to the firewall section. Zip tie the cable housing to the diagonal between station 1 and station 2. For carburetor hookup refer to the engine section. Tighten the screw in the retention block to retain the housings into the stub. **CAUTION:** Over tightening the screw could result in a crushed housing or stripping the threads in the retention block.

7. The throttle cable has a swagged stop on each end, cut the larger of the two ends off. Feed the throttle cable through the housing from the carburetor side. Refer to the carburetor section. The cable will exit the aft side of the stub through the retention block. Route the cable through the grooves in the cable guide of the forward throttle lever and install the cable stops and set screws. See **FIGURE 02D-07**. Pull the excess cable through until the swagged stop bottoms against the throttle lever on the carburetor. Refer to the carburetor hook up in the appropriate engine section. Cut off excess cable length at the throttle lever end, leaving enough for adjustment. Loctite the cable stop set screws when final adjustment has been made.

FIGURE 02D-07



8. Check for proper installation of cotter pins in all retaining nuts throughout the trim and throttle lever installation.

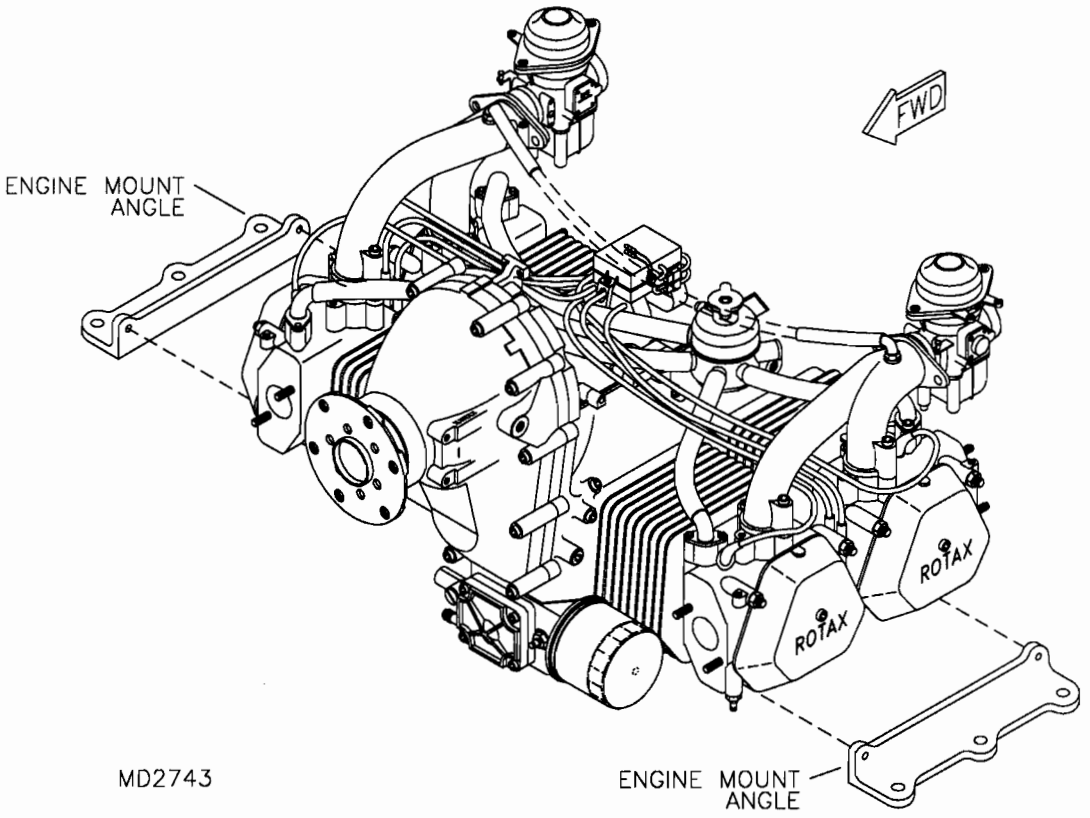
S-7 912 ENGINE MOUNT ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 003-02 FOR PARTS SELECTION)

1. Bolt the engine mount to the fuselage as shown in the parts drawing. During final assembly it is important that the engine mount bolts are tight. **NOTE:** It may be necessary to have to place washers between the left hand engine mount legs and the fuselage to obtain the correct engine offset. This will be determined after the engine has been installed.

2. Apply loctite to the bolts and attach the engine mount angles to the engine. See **FIGURE 03-02**. Check bolts for tightness after the first several hours of operation. **NOTE:** The forward cylinder head coolant hoses will have to be removed and replaced with the preformed hose supplied with the kit to obtain clearance from the aft barry mount. Refer to the 912 cooling system.

FIGURE 03-02



3. With the mount angles attached to the engine, insert the barry mounts and aluminum bushings into the angles as shown in the parts drawing. **HINT:** Use a small amount of soapy water on the barry mounts to aid in inserting them into the angles. Place the aluminum washers on top of the barry mounts and slide the mount bolts through the washers and barry mounts. Note that the forward bolt on each side is shorter. Place the lower aluminum washers over each hole on the bed of the engine mount. With the help of a friend install the engine to the mount. Check for proper installation of the bolts, aluminum washers and aluminum bushings. Refer to the parts drawing. Install the high heat tensile nuts and tighten until the aluminum washers have bottomed against the aluminum bushings. Check bolts for tightness after the first several hours of operation.

4. Clamp a straight edge to the prop flange and level horizontally. Measure from the center of the straight edge out both directions 18" and mark. Measure from the aft side of the mark to the lift strut attach bracket on the fuselage. The left hand side should measure ¼" greater than the right. Place washers between the engine mount and the fuselage as necessary to achieve this.

S-7 912 ENGINE

(REFER TO PARTS PAGE # 003-04 FOR PARTS SELECTION)

1. Rotax supplies an operators manual, a parts manual and an installation manual with the 912 engine. Refer to these manuals for specific questions, problems and data on the 912 engine. Rotax also supplies a number of the accessories with the 912 engine. Refer to the following list and inventory these parts. Notify the factory or dealer about missing parts.

ROTAX 912 ENGINE ACCESSORIES

(supplied with the Rotax engine)

(1) OIL BOTTLE
(2) OIL BOTTLE FITTINGS
(1) OIL LINE
(1) STARTER SOLENOID
(1) REGULATOR/RECTIFIER
(1) REGULATOR/RECTIFIER WIRE HARNESS CLIP
(2) MAG WIRE BULLET CONNECTORS & RUBBER BOOTS
(2) TACH WIRE SPADE CONNECTORS
(1) TACH WIRE PLASTIC PLUG
(1) STARTER SOLENOID SPADE CONNECTOR & PLASTIC PROTECTOR
(1) PROP CRUSH PLATE
(1) TOOL KIT
SEVERAL FEMALE SPADE CONNECTORS & HOSE CLAMPS

2. Install the air filters onto the carburetors as shown in the parts drawing. Orientate so that the safety wire tabs on the filters are pointing up. Tighten the hose clamps and safety wire the filters to the carburetors. A small hole is drilled on the aft side of the carburetors to accept the safety wire.

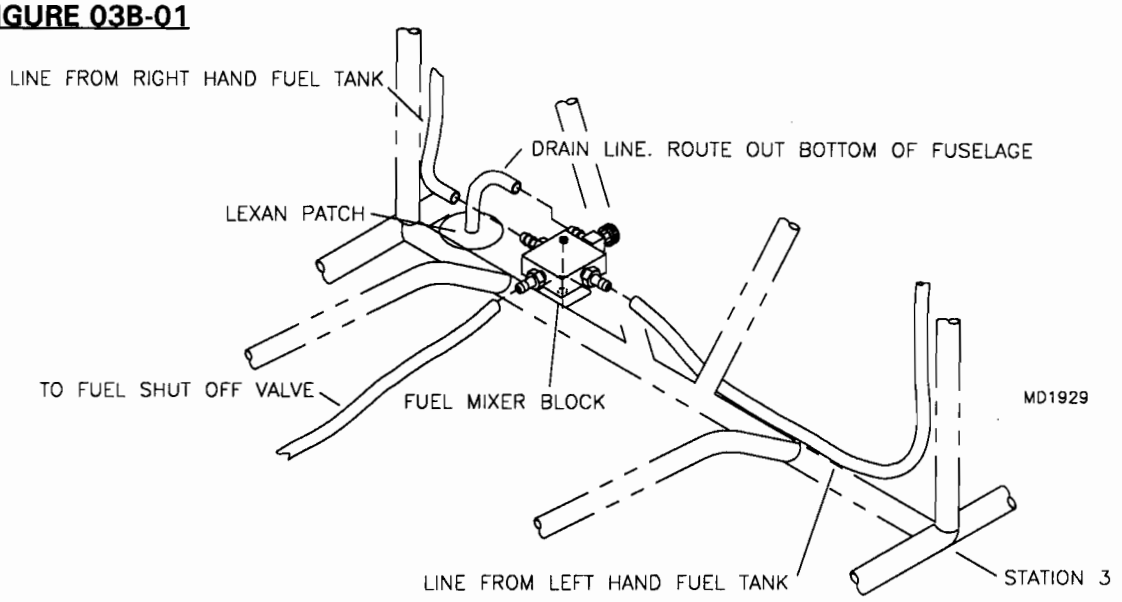
S-7 912 FUEL SYSTEM - PART 1

(REFER TO PARTS PAGE # 003-06 FOR PARTS SELECTION)

NOTE: It is not necessary to trial fit the fuel system. Install the fuel system during final assembly, after the fuselage has been covered and painted.

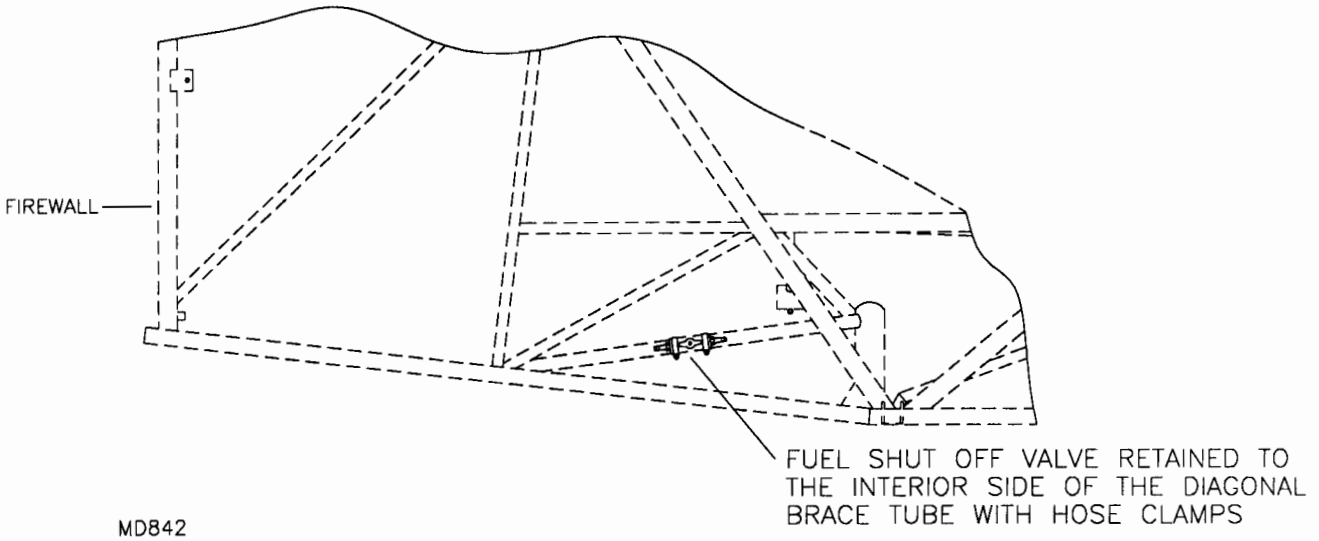
1. Apply loctite to the threads and assemble the fittings into the sump drain/fuel mixer block as shown in the parts drawing. Attach the sump drain to the tab welded on the right hand side of the station 3 bottom cross tube. See **FIGURE 03B-01**. Cut to length and route the sump valve drain line out the bottom of the fuselage through the lexan patch. Refer to the covering section.

FIGURE 03B-01



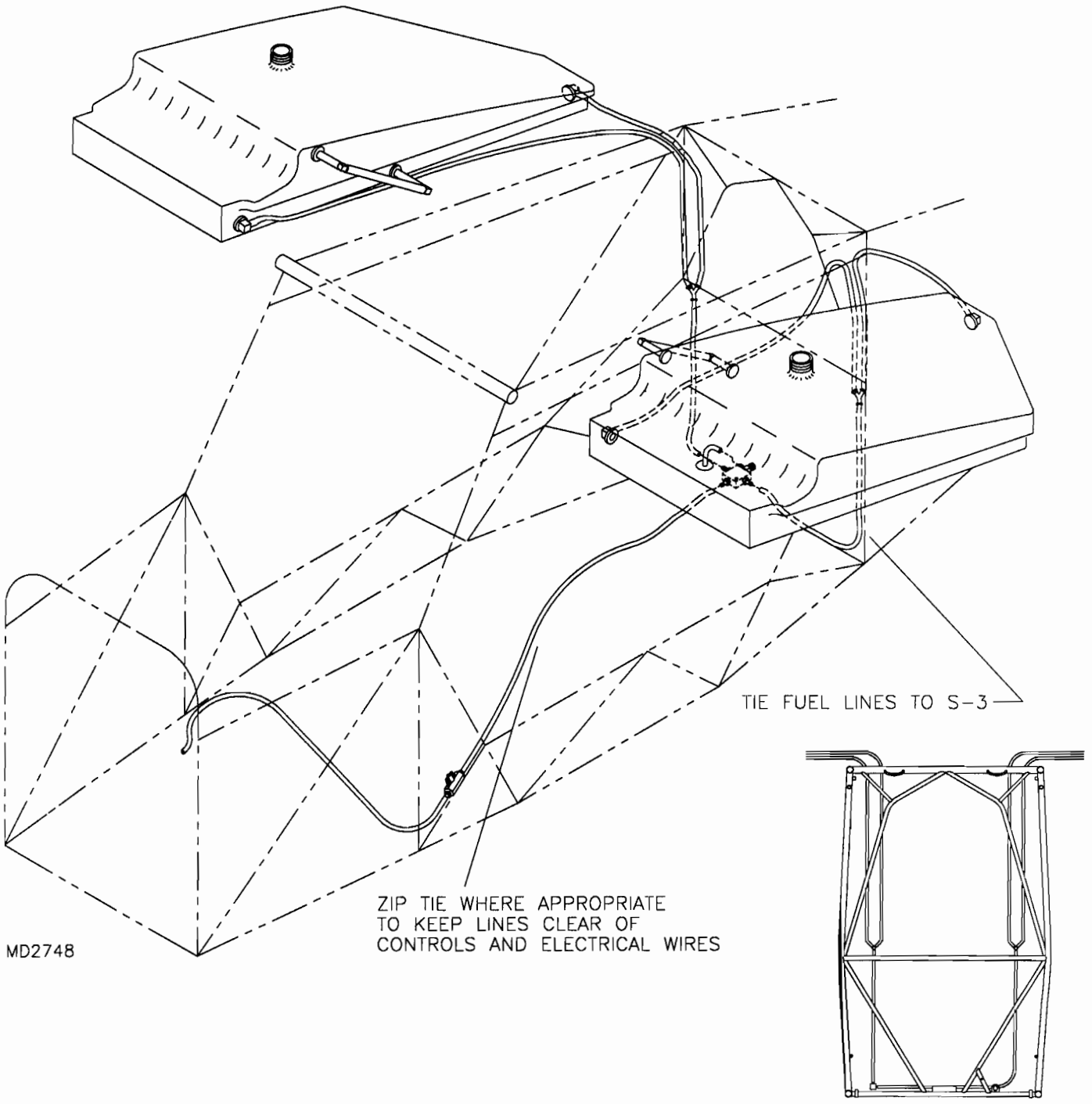
2. Apply loctite to the threads and install the fuel fittings into the fuel shut off valve. Use the hose clamps shown in the parts drawing to attach the fuel shut off valve to the diagonal brace tube extending forward from the left hand gear leg socket. Position the valve within easy reach. See **FIGURE 03B-02**. **WARNING:** Be careful of pant legs or other loose clothing catching on the fuel valve. Accidental fuel shut off can occur. Check the fuel shut off valve during each preflight.

FIGURE 03B-02



3. Position the fuel line "Y" on each side of the fuselage just above the station 3 mid cross tube. Starting at the "Y" cut to length each segment of fuel line and install. Refer to **FIGURE 03B-03** for fuel line routing. The segments of fuel line from the wing tanks to the "Y" will be installed on the fuel tanks during the wing assembly. Refer to the wing section. Install all hose clamps. Secure the fuel lines to the air frame using nylon zip ties. **CAUTION:** Do not pinch or restrict the fuel lines when using the ties to secure. **NOTE:** Fuel lines should not be routed with electrical wiring and should be clear of all moving controls. Use the spiral loom anti chafe material around the fuel line in any areas where rubbing or chaffing may occur.

FIGURE 03B-03



OPERATIONAL NOTES

The Courier's fuel system has only one fuel shut off valve. NO switching of tanks is required. This system will typically feed from the right tank first then the left. Because of line length and head pressure the left tank keeps air from entering from the empty RH tank. Feeding out of one side at a time is great for monitoring fuel flow, and does not result in wing heaviness.

FUEL CAP/VENT ASSEMBLY

1. Remove the rubber gasket and plastic baffle from the fuel cap. The plastic baffle will "snap" out of the fuel cap. A screw driver works well for the removal.

Locate and drill a ¼" hole in the center of the fuel cap as shown in **FIGURE 03B-01**. Install the conduit adjuster ferrule into the fuel cap. Apply a small drop of loctite and install the ¼" plain nut and tighten to secure the ferrule into the cap. See **FIGURE 03B-01A.**

FIGURE 03B-01

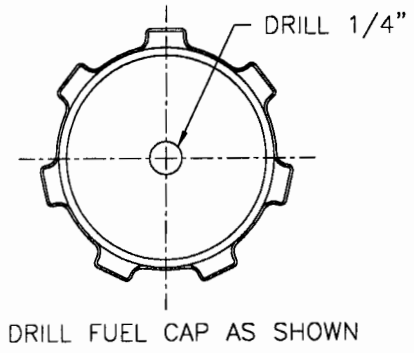
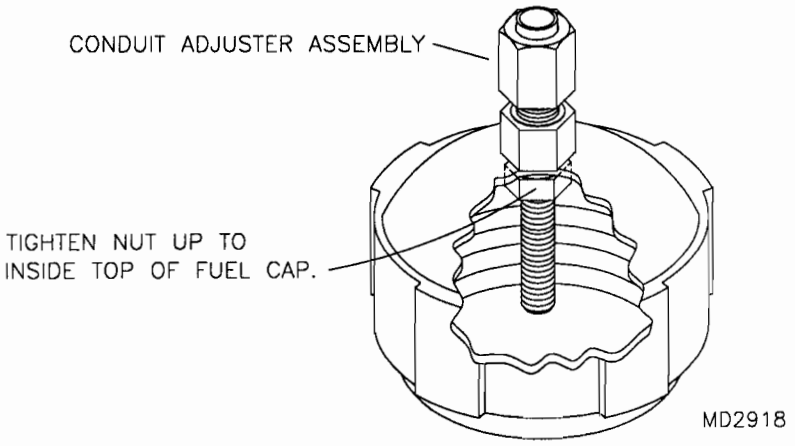


FIGURE 03B-01A



2. With a side cutters or file remove the attach nipples from the plastic baffle. See **FIGURE 03B-02**. Drill a ¼" hole in the center of the plastic baffle and install into the fuel cap over the adjuster ferrule stem. Drill a ¼" hole in the center of the rubber gasket and install into the cap. Note the orientation of the rubber gasket.

Drill the ¼" large wood washer as shown in **FIGURE 03B-02A**. Assemble the bead chain to the bead chain retainer sleeve. Install the bead chain and retainer sleeve into the #30 hole in the large wood washer. Install the washer and bead chain into the fuel cap. Install the ¼" shear nut on the adjuster ferrule stem and tighten.

FIGURE 03B-02

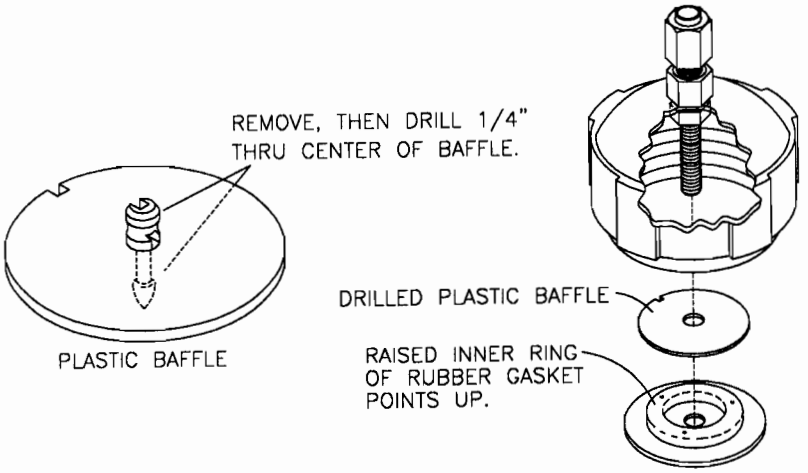
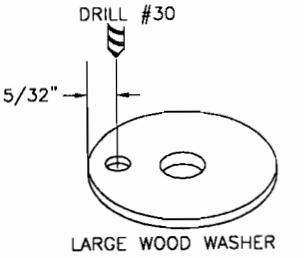


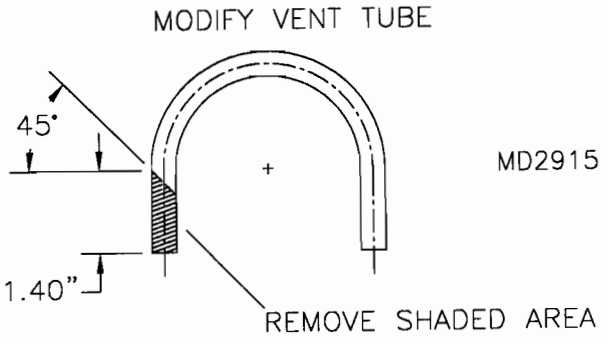
FIGURE 03B-02A



3. Install the bead chain end coupling onto the bead chain. Find the center of the plastic retainer and drill a #30 hole. Using the brass backing washer, rivet the plastic retainer to the bead chain. Refer to the parts drawing.

4. Modify the vent tube as shown in **FIGURE 03B-04.** Install the vent tube into the adjuster ferrule. Install the fuel cap assembly onto the tank and tighten. Position the vent tube so that the 45 degree angle is pointing forward (into the slipstream) and tighten the ferrule cap to secure the vent tube.

FIGURE 03B-04



S-7 912 FUEL SYSTEM - PART 2

(REFER TO PARTS PAGE # 003-08 FOR PARTS SELECTION)

NOTE: As with part one of the fuel system, it is not necessary to trial fit this portion of the 912 fuel system.

1. Install the fuel filter just forward of the firewall to the upper left hand engine mount leg. Stand offs made from short segments of fuel line and zip ties work well for attaching the fuel filter. See **FIGURE 03C-01**. Cut to length and install the segment of fuel line from the shut off valve to the filter and from the filter to the **INLET** port on the fuel pump. See **FIGURE 03C-01A**. Note that the fuel line and the hose clamps used from the shut off valve forward are different then those used in part one of the fuel system.

FIGURE 03C-01

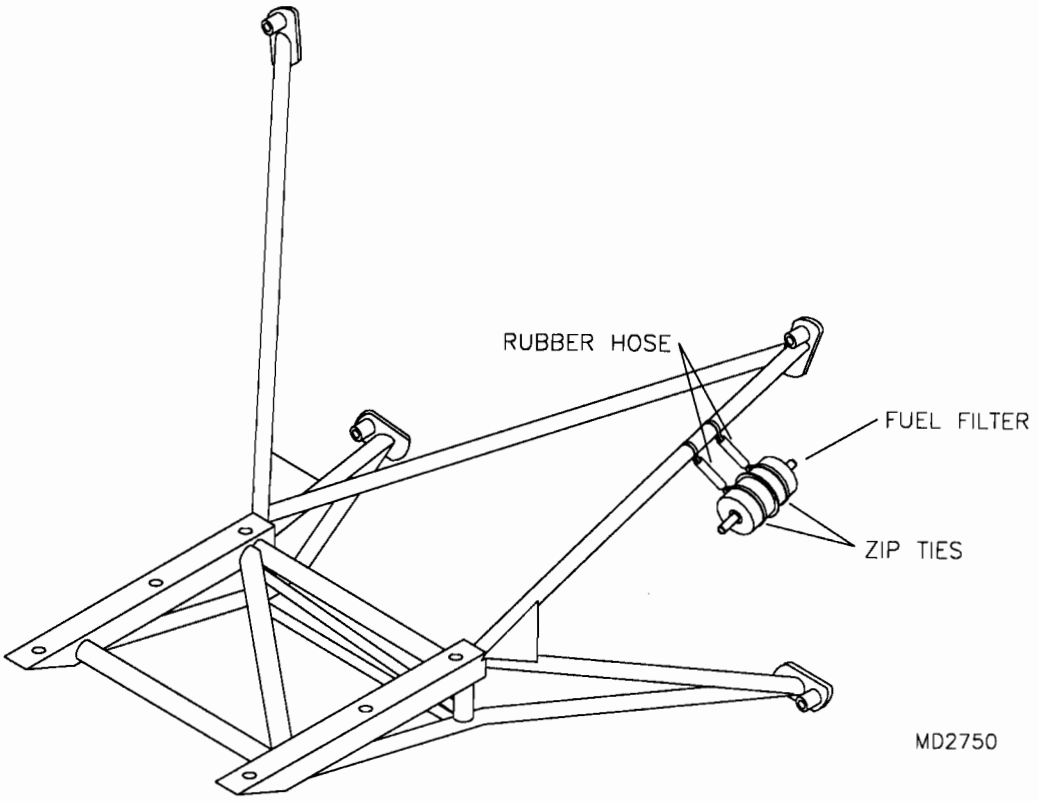
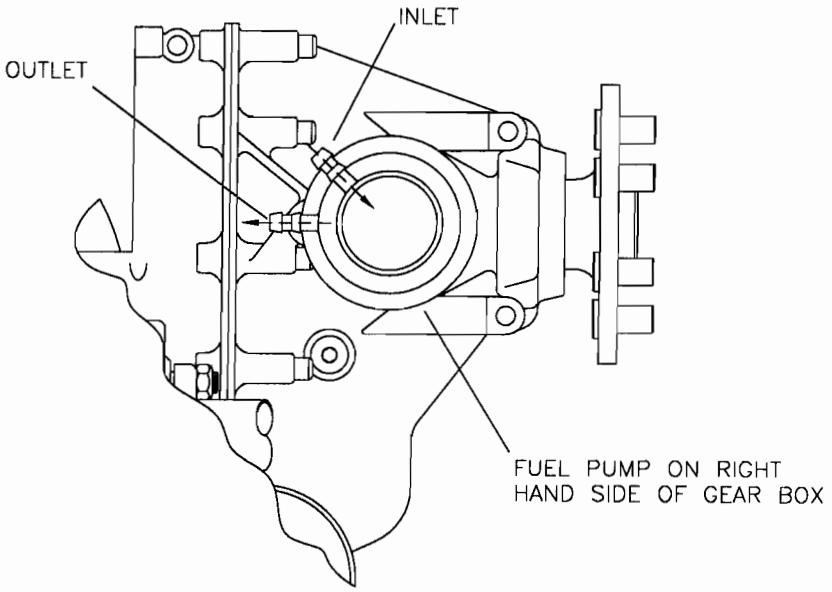


FIGURE 03C-01A



2. Apply loctite or thread sealant to the threads of the fittings and install the fittings into the brass tee as shown in the parts drawing. Install the tee assembly on top of the engine between the carburetors. Stand offs work well for installing the tee. **CAUTION:** Install the tee and fuel lines with an air gap between them and the engine to prevent a vapor lock. Cut to length and install the fuel lines and hose clamps from the fuel pump to the tee and from the tee to each carburetor. It is acceptable to rotate the carburetor banjo fittings for best fuel line routing. Secure all fuel lines and apply anti chafe where necessary.

S-7 912 THROTTLE HOOKUP - CARBURETOR SIDE

(REFER TO PARTS PAGE # 003-10 FOR PARTS SELECTION)

1. Remove the choke cable guide and brass throttle cable housing retainer plate from the top side of each carburetor. Note that there is a left and right throttle cable mount supplied with the kit. Install the respective throttle cable mount to each carburetor. See **FIGURE 03D-01. IMPORTANT:** Install the washers between the throttle cable mount and the carburetor. Remove the throttle housing adjuster ferrule from the brass cable housing mount and install it into the cable mount on the carburetor. Set the adjuster ferrule at midpoint to allow for equal adjustment both directions. Remove the jam nut from the choke cable guide, apply loctite to the threads and reinstall. Reverse the throttle lever spring position as shown in **FIGURE 03D-01A.**

FIGURE 03D-01

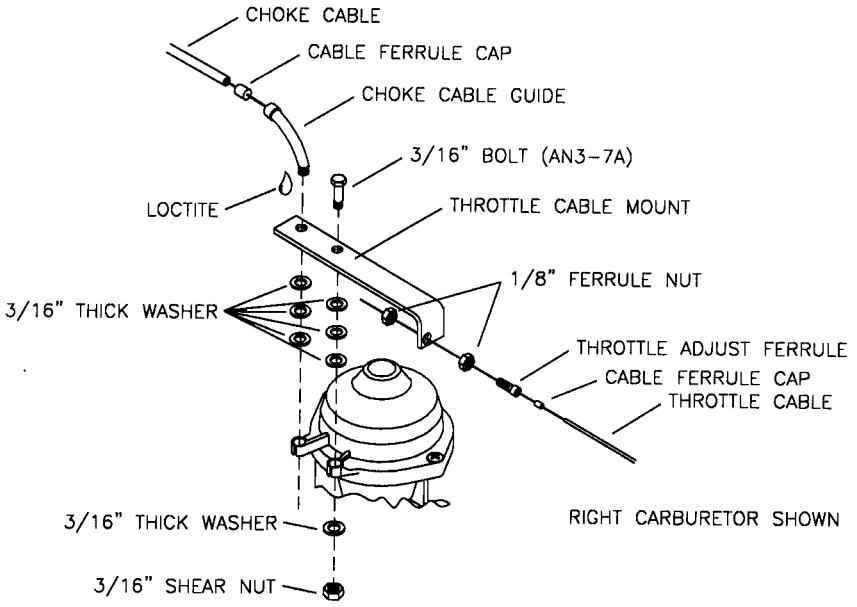
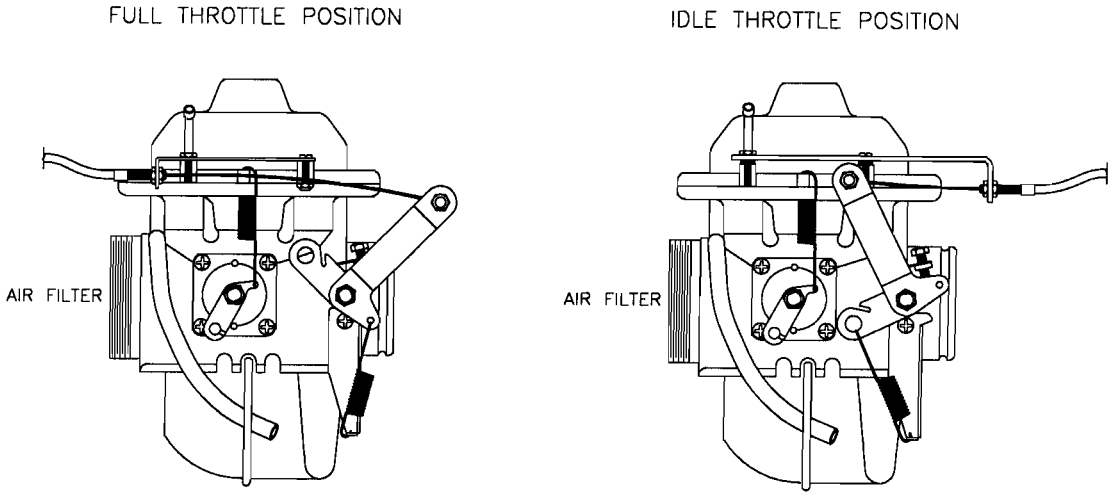


FIGURE 03D-01A



FACTORY SPRING AND CABLE SETTING
(RIGHT HAND CARBURETOR SHOWN)

RADIUS SPRING AND CABLE SETTING
(RIGHT HAND CARBURETOR SHOWN)

2. Refer to the trim and throttle lever installation section for throttle cable housing and throttle cable call out and initial cable housing routing. Refer to the firewall section for the exit location of the throttle cables. Install the grommets into the firewall and slide the cable housing through the grommets. With a large radius, route the housing to each carburetor. Install the cable ferrule caps onto the end of the housings and insert them into the adjuster ferrules on the carburetors. Refer to the parts drawing.

Cut the larger of the two swagged ends off of the throttle cable. Loosen the cable retaining screw in the carburetor throttle arm. Refer to Rotax installation and parts manuals. Slide the cut end of the cable through the retaining screw and through the throttle cable housing. Refer to the trim and throttle lever installation for hookup on the lever end. Pull excess length through until the swagged cable end bottoms against the retaining screw in the carburetor throttle lever and tighten the retaining screw. With the fuselage throttle levers in idle position and the carburetor lever in idle position, synchronize both cables. Safety wire the throttle cable housing to the adjuster ferrule.

S-7 912 CHOKE SYSTEM

(REFER TO PARTS PAGE # 003-12 FOR PARTS SELECTION)

NOTE: As with the throttle installation, it is not necessary to trial fit the choke system prior to covering and painting.

1. Locate and drill the choke exit holes in the firewall. Refer to the firewall section for hole locations. Install the plastic washers and adjustable ferrules into the firewall as shown in the parts drawing. Set the firewall ferrules and the ferrules in the choke cable guides on the carburetor at there midpoint position. Cut to length and route the choke cable housing as shown in the parts drawing.

Operate the choke lever to verify free movement. It is important that the choke operate smoothly and completely return to its run position. If any drag is noticed or if the choke lever does not return completely, remove the choke lever and arm and apply a light film of grease to the arm. Consult the Rotax parts manual for a break down of the choke system.

Cut the "T" shaped swagged end off of each choke cable. **CAUTION:** The barrel end must remain in place for attachment to the choke lever on the carburetor. See **FIGURE 03E-01**. Install the barreled end of the choke cables into the choke lever on the carburetor. It may be necessary to lightly file the barrel in order to insert it into the choke lever. The barrel should rotate within the lever. See **FIGURE 03E-01A**.

FIGURE 03E-01

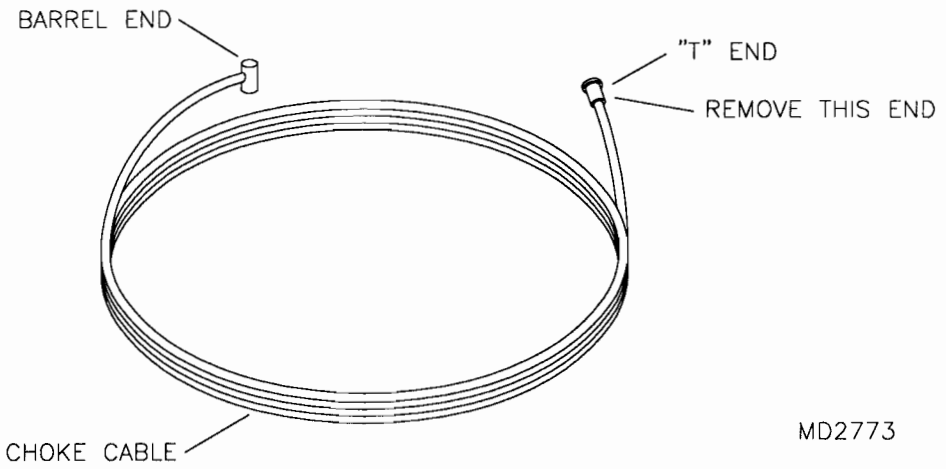
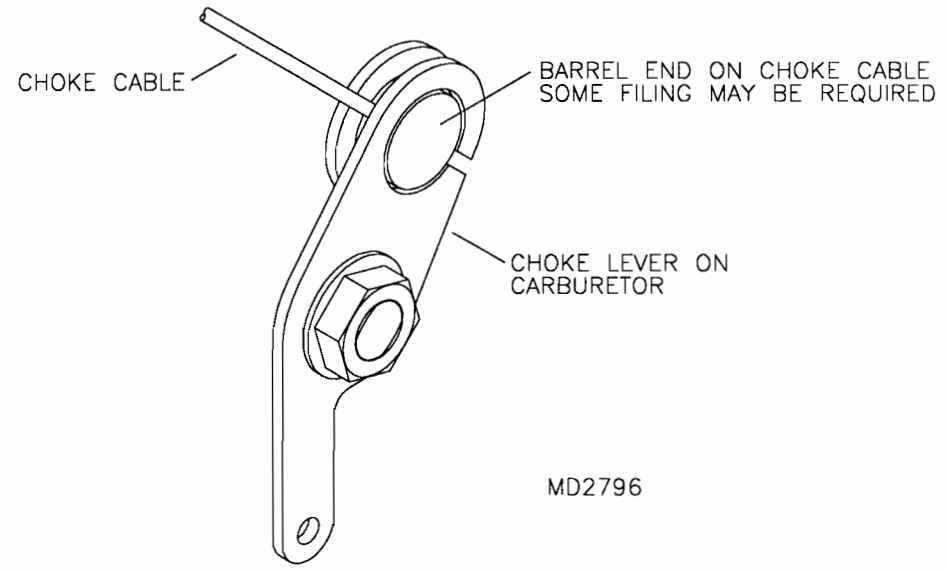


FIGURE 03E-01A

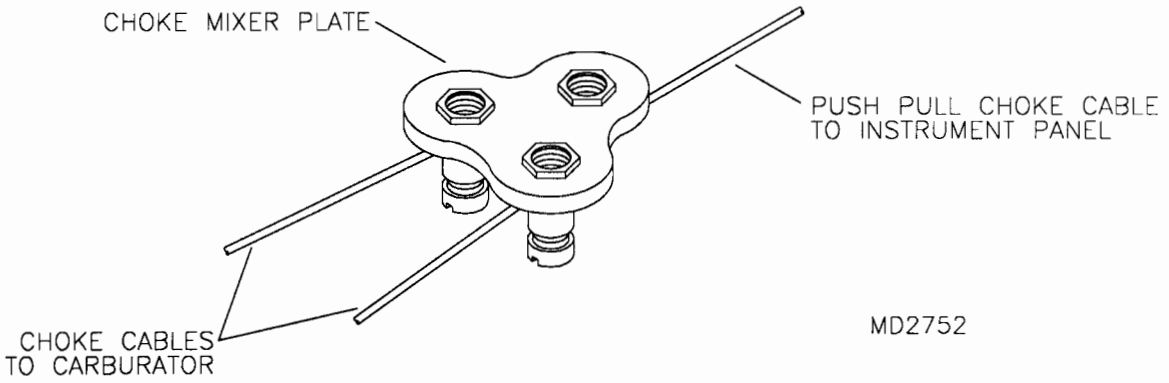


2. With the barrel installed in the choke lever, feed the cable through the choke cable guide and cable housing. Pull all slack out of the cable where it exits the aft side of the firewall.

POST INSTRUMENT PANEL INSTALLATION

3. Refer to the instrument panel installation section for instructions on installing the instrument panel. Install the push pull choke cable into the instrument panel. The location of the push pull choke cable is left to the builders preference. The choke mixer plate should be located approximately 1 1/2" aft of the firewall. Cut the choke cables from the carburetors to length and attach them to the mixer plate using the wire swivel stops. Leave plenty of cable length for adjustment. Remove the inner cable from the push pull choke cable housing and cut the housing to length. The housing should be cut short enough to allow full travel of the mixer plate. Install the push pull cable and cut to length. Leave plenty of length for adjustment. Attach the push pull cable to the mixer plate. With the push pull knob completely in, adjust all slack out of the cables at the choke mixer plate. Loctite the set screws in the wire swivel stops. See **FIGURE 03E-03**. Safety wire the cable housings into the adjustable ferrules. Secure all cable housings and install anti chafe loom where necessary.

FIGURE 03E-03

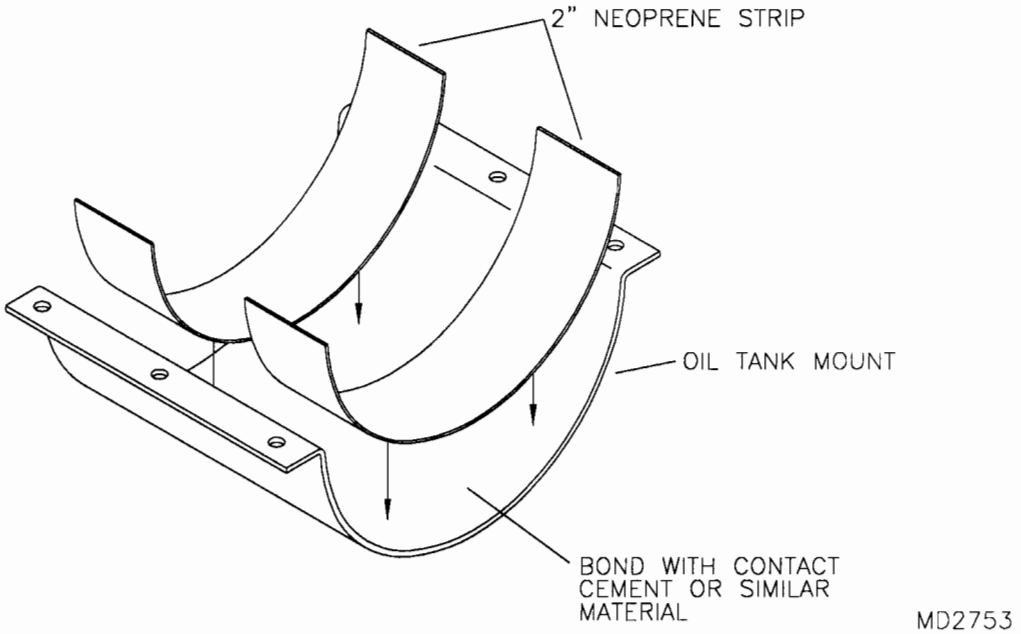


S-7 912 OIL COOLER ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 003-14 FOR PARTS SELECTION)

1. If you have not already done so, refer to the firewall section and locate and cut the slot for the oil bottle and install the firewall cover plate. Remove the top from the bottle and inspect the interior for any debris or foreign material. Verify the tightness of the oil drain plug and safety wire. Cut the 2" wide neoprene rubber into two strips to fit inside the oil tank mount. Using contact cement, bond the strips to each end of the oil tank mount bracket. See **FIGURE 03F-01.** Position the oil bottle on the firewall with the flange recessed into the slot. The oil tank mount is positioned high enough to support the oil bottle flange. With the oil tank mount in position, transfer drill into the firewall. Rivet the bracket to the firewall with the appropriate rivets and backing washers. Refer to the parts drawing.

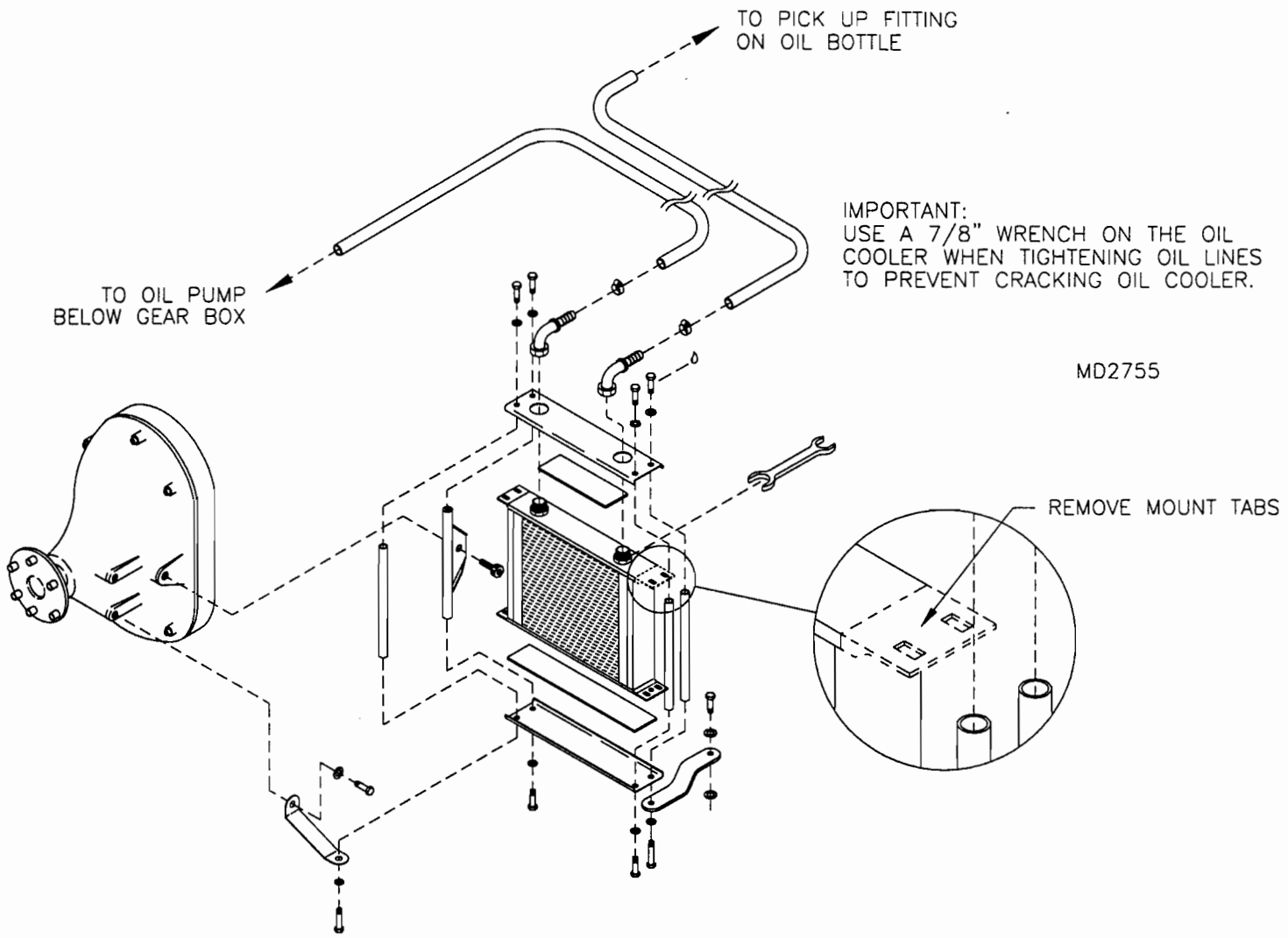
FIGURE 03F-01



2. **NOTE:** When working with the oil cooler take care not to induce stress or over tighten fittings or bolts. Damage to the cooler may result.

With a bandsaw or hacksaw, remove the mount tabs from the oil cooler leaving a 1/16" lip. Cut to length and install the self adhesive foam to the upper and lower oil cooler mounts as shown in the parts drawing. Apply loctite to bolts and assembly the upper and lower mounts to the cooler using the threaded bushings. Bolt the oil cooler mount to the left side of the gear box as shown in the parts drawing. Attach the bent oil cooler mount to the boss on the forward left hand cylinder head. Refer to the parts drawing. Attach the oil cooler and mount assembly to the gear box and engine. See **FIGURE 03F-02.**

FIGURE 03F-02



3. **IMPORTANT:**The pickup fitting is the straight fitting on the oil bottle and **MUST** route to the left hand fitting on the oil cooler. The return fitting is the angled fitting on the oil bottle and **MUST** route to the fitting on the bottom of the engine. Failure to route the oil lines properly will result in engine failure. Install the 90 degree fittings onto the oil bottle and cooler. Use a back up wrench on the cooler and bottle when tightening the fittings.

Refer to the parts manual for oil line routing. Note that there are two types of oil line used. It is important to use the correct line in the correct location to prevent oil pump drive pin damage. Cut the oil line to the length required and install with hose clamps.

Apply anti chafe where necessary and secure all lines.

4. Fabricate the aluminum overflow tube as indicated on the parts page. Refer to the firewall section for the location of the overflow tube. Attach the overflow tube to the firewall with two conduit clamps. Cut to length and install the segment of overflow line from the oil bottle filler neck to the aluminum overflow tube. Secure ends with safety wire or hose clamps.

PRE ENGINE START UP

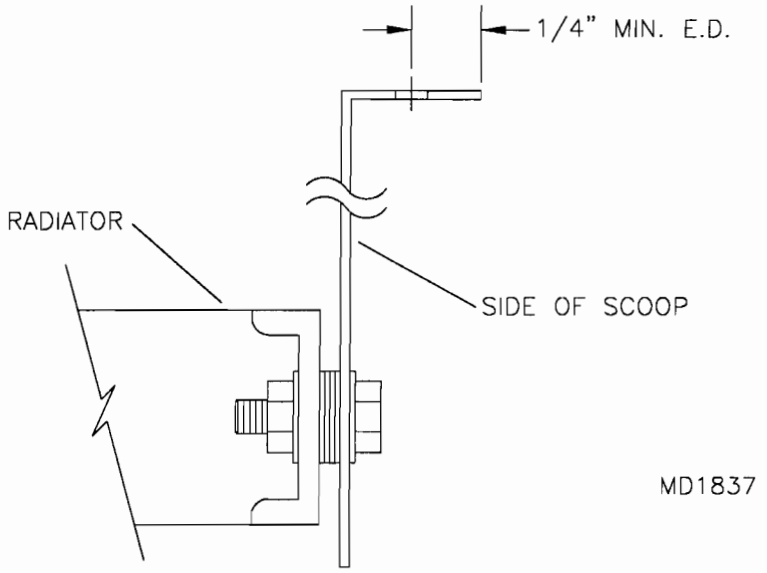
5. Prior to starting the engine for the first time, install a new oil filter and fill the oil bottle to the full line on the dip stick. Refer to the Rotax manuals for oil specifications. Remove the top spark plugs on all four cylinders. Verify the mag switch positions to **OFF** (mags grounded). Turn the prop through several revolutions by hand. With the spark plugs out and from the pilots seat, turn the key switch to the start position and crank the engine for several seconds. Check for an oil pressure indication on the gauge. If after several seconds there is no sign of oil pressure, stop cranking the engine. Remove the oil pick up line at the oil bottle. Using a funnel prime the oil line and oil cooler to the pump. Attach the pick up line to the oil bottle and crank the engine. When an oil pressure indication is achieved, stop cranking. Install the spark plugs and start the engine. Watch the oil pressure gauge as the engine starts. At the moment the engine starts, allow 10 seconds for oil pressure to come up. If there is no pressure indication within 10 seconds shut the engine off and repeat the previous procedures. The engine will change sound (quieter) as the oil starts pumping. After running the engine for a few minutes, check the oil level and check for any leaks in the system.

S-7 912 COOLING SYSTEM ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 003-16 FOR PARTS SELECTION)

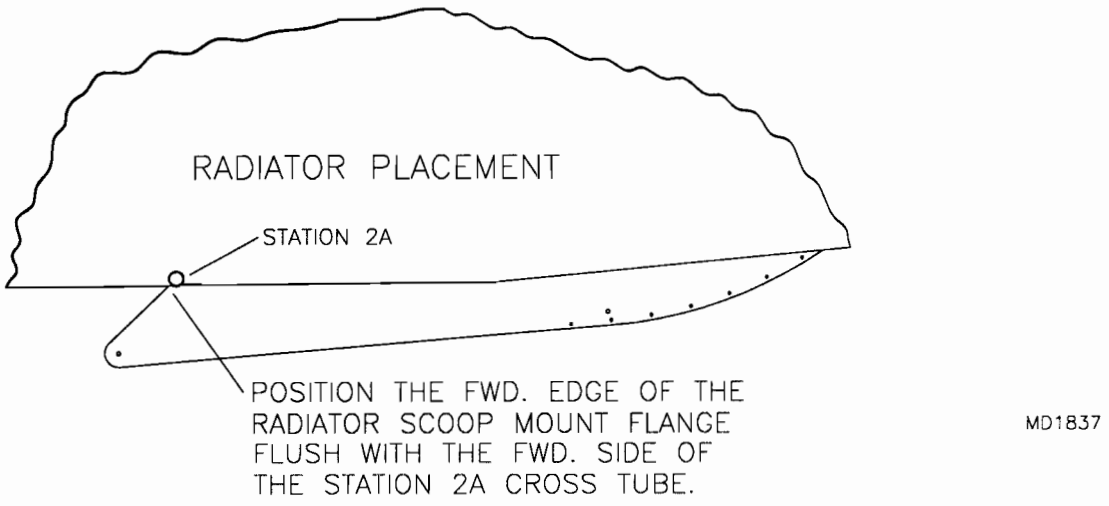
1. Rivet radiator scoop side plates to radiator scoop bottom. Remove stubs on radiator and bolt radiator into scoop, per parts drawing. See **FIGURE 03G-01.**

FIGURE 03G-01



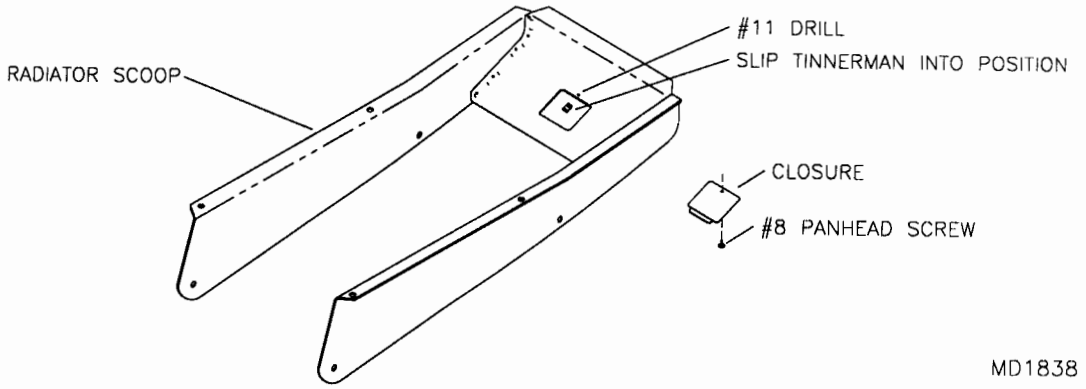
2. Clamp the radiator scoop to the tabs on the belly of the fuselage between station 2A and station 2B. The forward edge of the radiator scoop mount flange should be flush with the forward side of the station 2A cross tube. See **FIGURE 03G-02.** Center and square the scoop with the fuselage. With a #11 drill bit, transfer drill through the mount tabs and into the flange on the radiator scoop. **NOTE:** It may be necessary to spread or compress the side walls of the radiator scoop to match the holes in the tabs to maintain a ¼" flange E.D. See **FIGURE 03G-01.**

FIGURE 03G-02



3. Remove the radiator scoop and nut plate the mount tabs. Bolt the radiator and scoop to the fuselage and install the short segments of 1 ¼" radiator hose. Measure and record where the hoses will pass thru the skin for doubler patches. Remove the scoop assembly from the fuselage and the radiator from the scoop for painting. Drill the #30 hole for the drain closure to #11 and install the tinnerman and drain closure. See **FIGURE 03G-03.**

FIGURE 03G-03



FINAL ASSEMBLY

4. Install the radiator into the scoop. Attach the foam tape to the top side of the scoop flange. Attach the scoop/radiator assembly to the fuselage. Locate and cut the holes in the skin for the inlet lines. Install the 1 ¼" radiator lines and hose clamps. Refer to the floorboard and firewall sections and install both the floorboard and firewall. Install the anti chafe to the inside of the coolant line exit holes in the firewall. See **FIGURE 03G-04.** Install the left and right hand coolant lines and hose clamps. Refer to the parts drawing and **FIGURE 03G-04A.**

FIGURE 03G-04

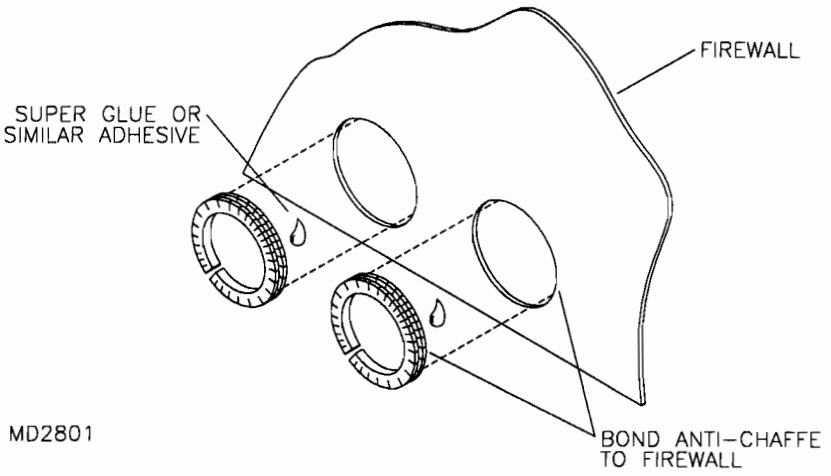
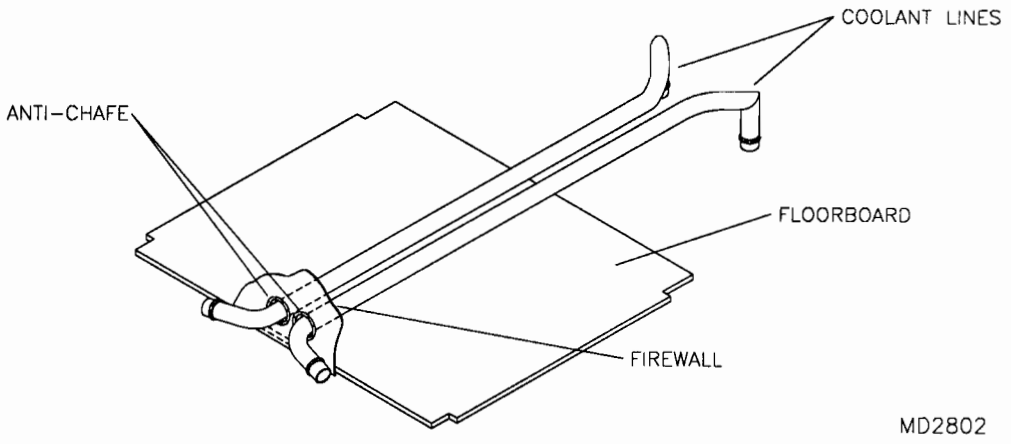


FIGURE 03G-04A



5. Locate and drill the flanges of the coolant line cap as shown in **FIGURE 03G-05.** Install the cap over the coolant lines as shown in the parts drawing and in **FIGURE 03G-05A.**

FIGURE 03G-05

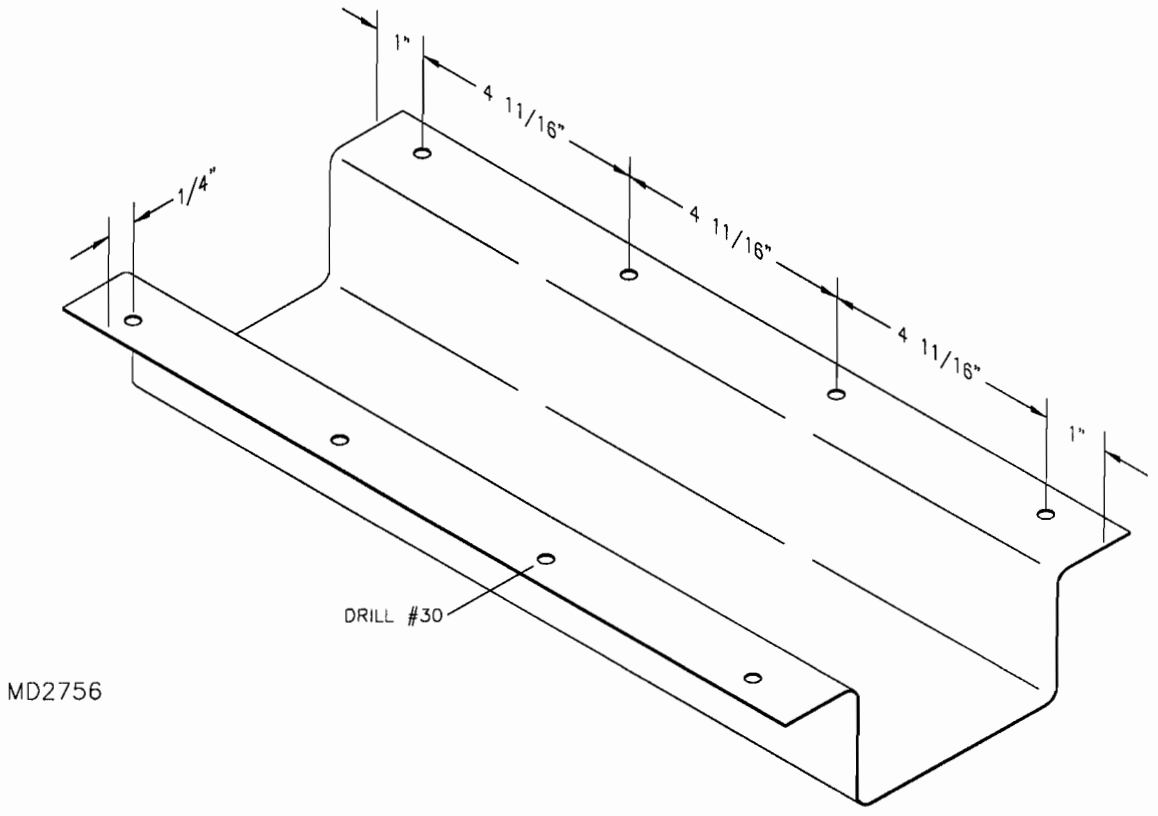
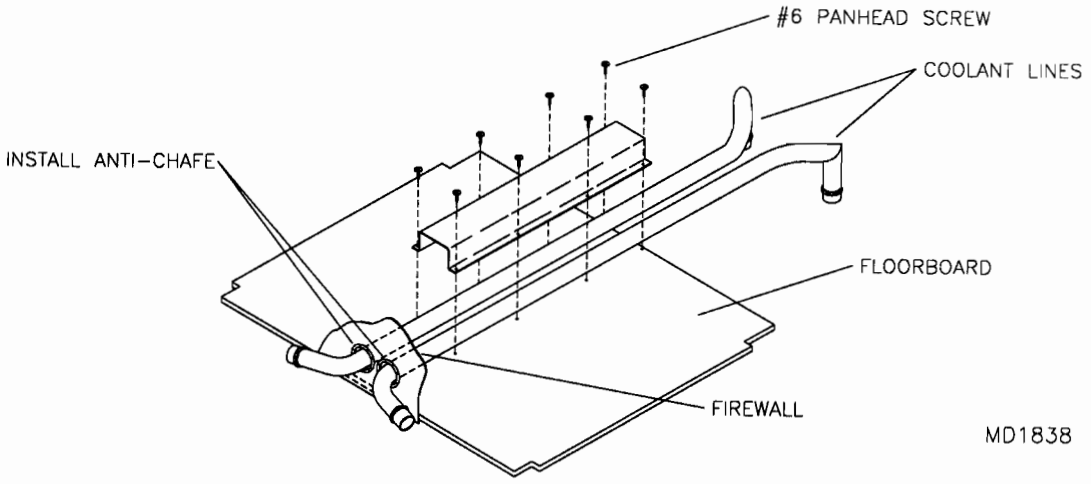


FIGURE 03G-05A



6. Refer to **FIGURE 03G-06** and cut the 1" pre formed coolant hose as shown. Route segment #1 from the lower right hand aluminum coolant line to the aluminum 90 degree fitting. Segment #2 routes from the 90 degree fitting to the inlet on the water pump. Refer to the parts drawing. Install all hose clamps. **NOTE:** The water pump fitting can be rotated for best positioning. Refer to the Rotax manual.

Refer to **FIGURE 03G-06A** and cut the left pre formed coolant hose as shown. Slide the hose spring into the coolant hose and install from the filler cap/expansion chamber to the left hand aluminum coolant line extending through the firewall. Apply anti chafe where necessary and secure all hoses.

FIGURE 03G-06

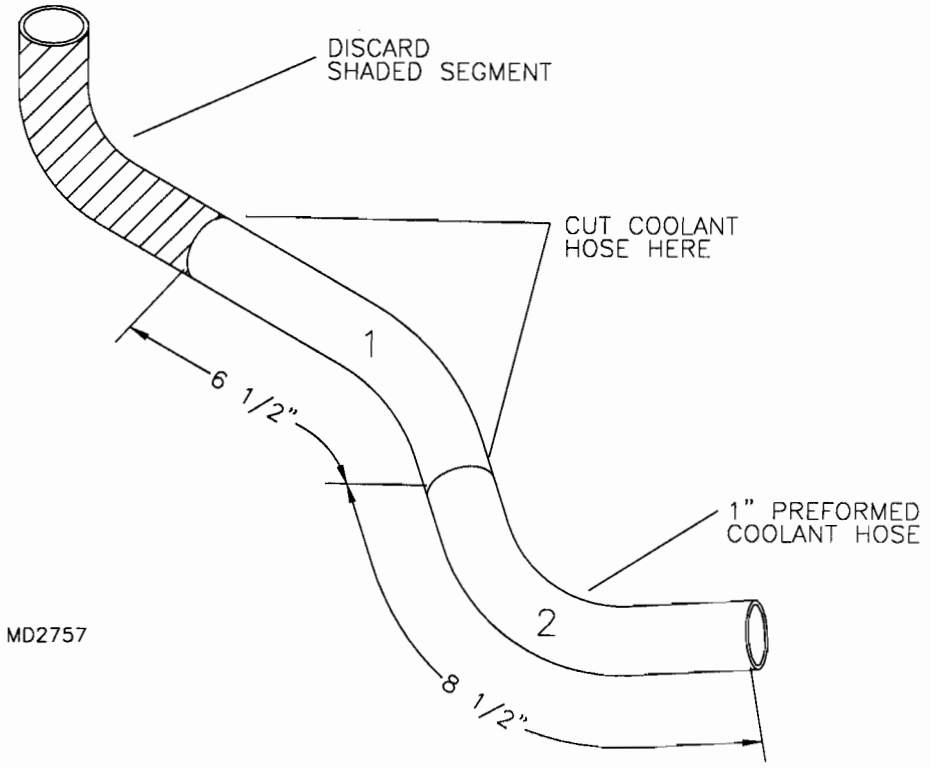
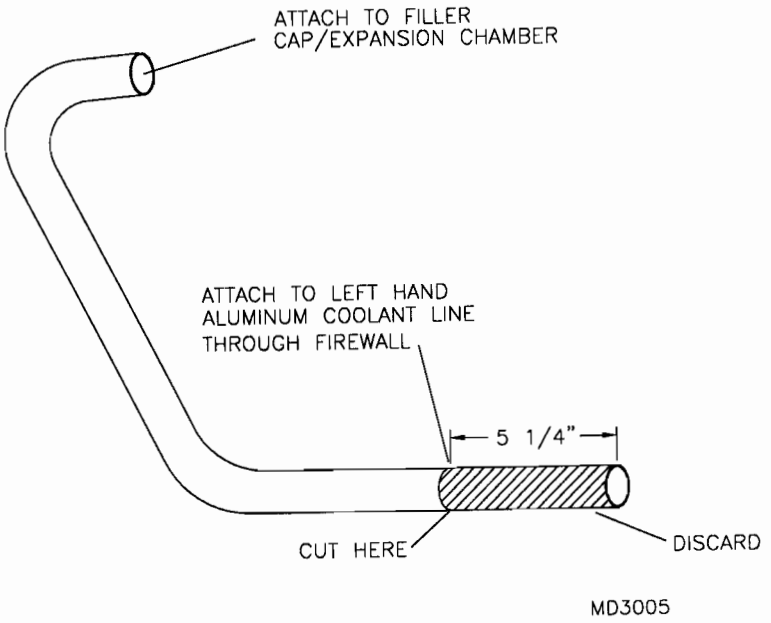


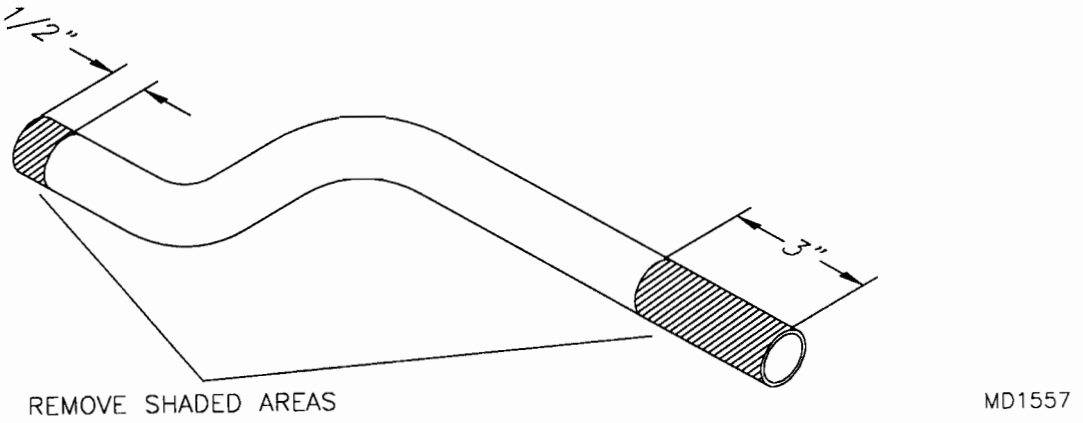
FIGURE 03G-06A



7. Refer to the firewall section and determine the placement of the coolant recovery bottle and the aluminum overflow tube. Fabricate the overflow tube to the dimensions specified on the parts page and attach both the recovery bottle and tube to the firewall. **NOTE:** Cut a 45 degree angle on the lower end of the overflow tube and orientate so that the opening is forward. Extend the overflow tube below the cowling by approximately ⅜". Install the appropriate overflow lines and hose clamps.

8. Refer to **FIGURE 03G-08** and cut the two pre formed "S" shaped hoses as shown. The hoses route from the lower fitting on the forward cylinder head of the engine to the water pump to gain clearance between the hose and the engine mount.

FIGURE 03G-08



S-7 912 MUFFLER ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 003-18 FOR PARTS SELECTION)

NOTE: If you are installing the optional 912 muffler heater system, refer to the options section and install the heater wrap prior to installing the muffler system.

1. Cut two segments, each 1 ⅜" long from the 1 ¼" O.D. rubber hose provided in the 912 muffler raw stock kit. Locate the center of each segment lengthwise and drill or punch a ¼" hole through the top and bottom wall. Install the 6mm bolts and formed washers from the inside of each segment. Refer to the parts drawing and **FIGURE 03H-01**. Cut two segments, each 1 ⅜" long from the ¾" O.D. rubber hose. Insert the smaller diameter segments between the bolt heads in the isolator assembly until flush on each end. Safety wire the inner hose in place as shown in **FIGURE 03H-01A. NOTE:** In order to tighten the bolts, it may be necessary to wait with installing the inner segments and safety wire until after the isolators have been insstalled on both the muffler and egine mount.

FIGURE 03H-01

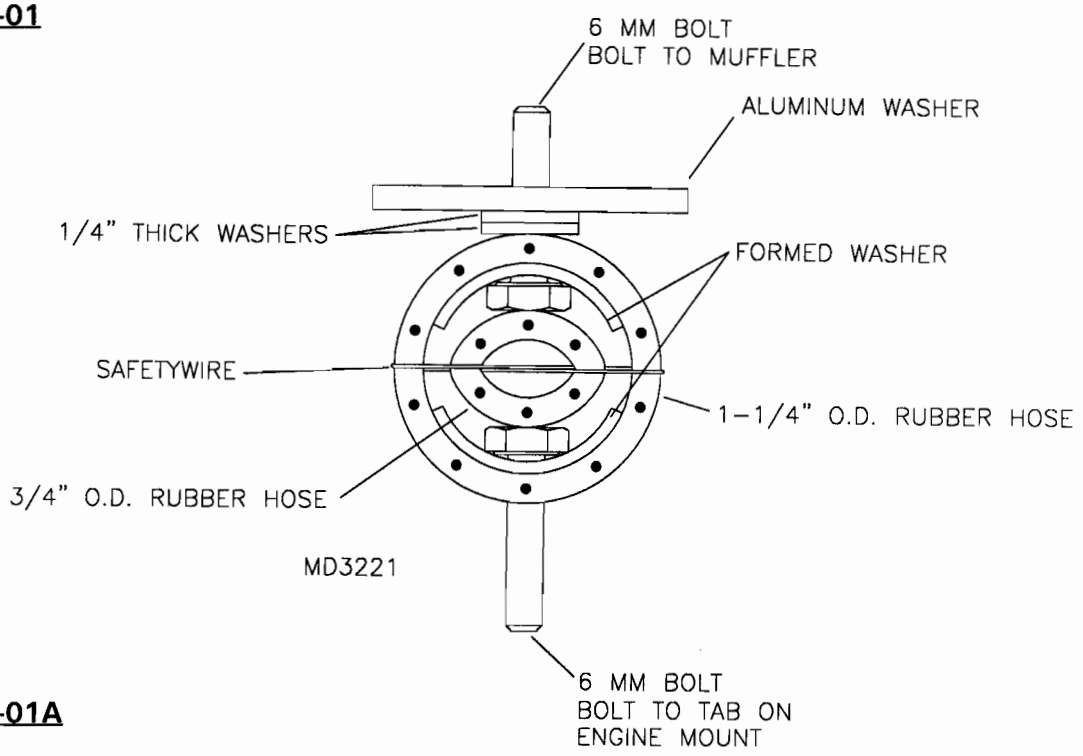
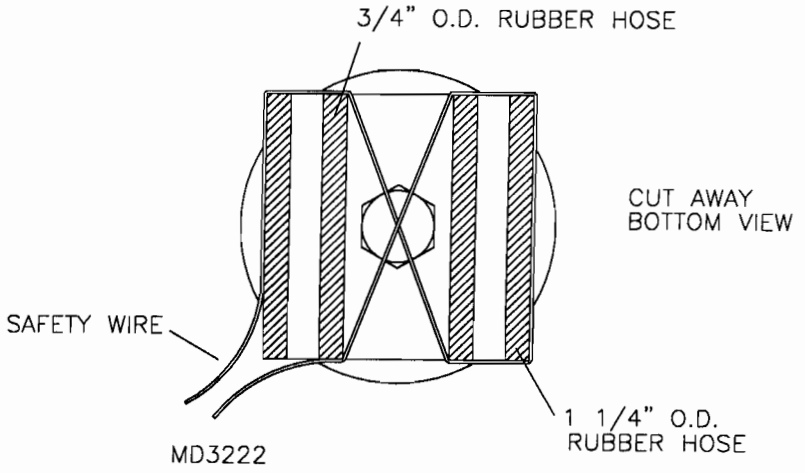


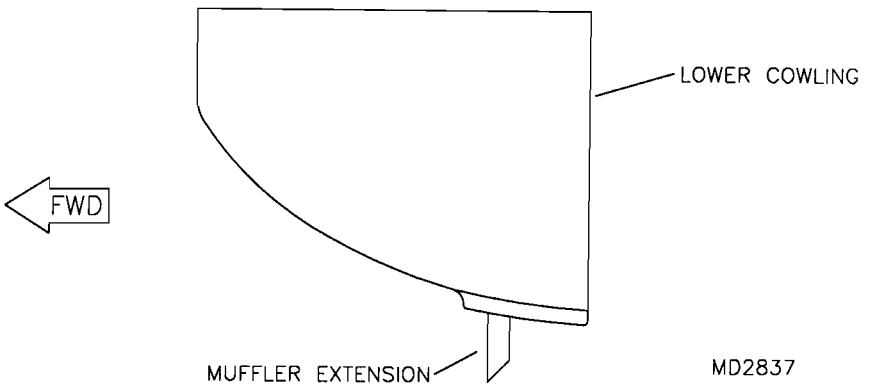
FIGURE 03H-01A



2. Apply loctite to the threads of the top bolt and attach the rubber isolators, aluminum washers and thick washers to the muffler as shown in the parts drawing. Install the muffler/isolator assembly to the two tabs on the lower legs of the engine mount. Attach the forward sections of the forward and aft manifolds to the engine. Finger tighten the nuts at this time to allow for adjustment of the manifolds. Slip the aft sections of the forward and aft manifolds into place and install all retaining springs. Leave the manifold nuts loose until the cowling has been installed and proper positioning has been verified.

3. Slide the muffler extension over the exhaust port on the muffler until bottomed. Position so that the opening is pointing aft. See **FIGURE 03H-03**. Locate a #11 hole through the top flange of the muffler extension and through the flange on the muffler. Locate and drill a #30 hole in the hose clamp and install the stainless steel rivet. Install the hose clamp on the muffler extension with the pop rivet extending into the #11 hole in the extension and muffler and tighten.

FIGURE 03H-03



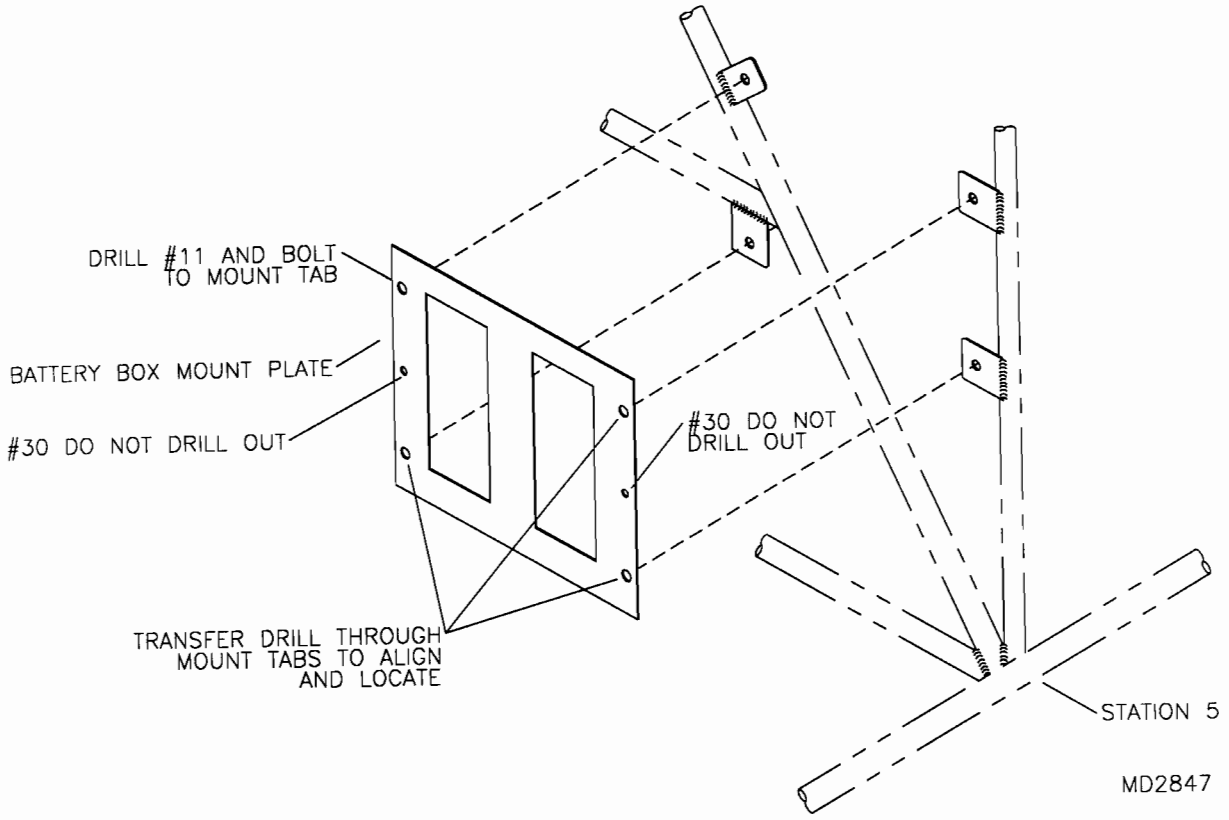
S-7 912 BATTERY BOX ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 004-02 FOR PARTS SELECTION)

1. Drill out one corner hole in the battery box mount plate to #11. Temporarily bolt the mount plate to the aft side of the corresponding tab at station 5. Using the remaining tabs as a drill guide, transfer drill through the tabs into the mount plate. **NOTE:** The center two holes remain #30. See **FIGURE 04-01.**

Rivet the support angles to the side plate. Refer to the parts drawing. Set the battery into the side plate with it resting on the support angles. Pull the sides of the side plate tight to the battery. Place the battery box mount plate in position. Transfer drill through the holes in the mount plate into the flanges of the side plate. Rivet the mount plate to the side plate through the center two corner holes only. Remove the battery.

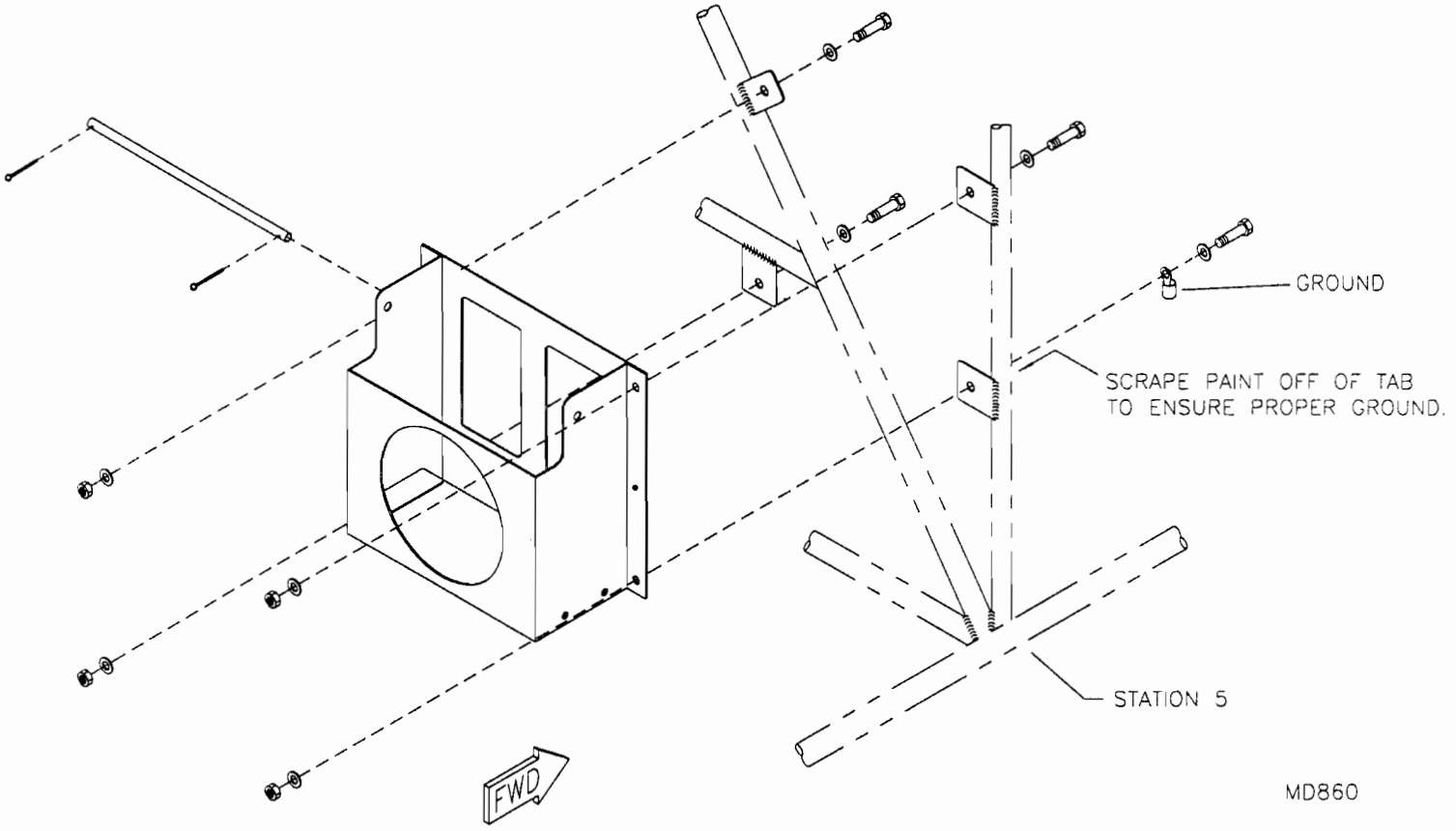
FIGURE 04-01



2. Refer to the instrument section and make up the battery ground cable. Bolt the battery box and ground cable to the airframe. Refer to the parts drawing and **FIGURE 04-02.** The ground cable must make bare metal contact, remove the paint from the forward side of one mount tab to ensure a proper ground. Install the battery and battery bar. Install the cotter pins in the battery bar.

Refer to the instrument section for battery cable and routing.

FIGURE 04-02


GROUND
SCRAPE PAINT OFF OF TAB
TO ENSURE PROPER GROUND.
STATION 5
FWD
MD860

S-7 912 INSTRUMENTS & ELECTRICAL

(REFER TO PARTS PAGE # 004-04 & 004-05 FOR PARTS SELECTION)

1. Mount the regulator/rectifier and solenoid to the firewall. Refer to the firewall section for locations. Cut the positive battery cable to length and crimp the cable lugs on each end. Install the positive cable into the fuselage and attach to the positive battery terminal. Attach the forward end to one pole on the solenoid. Route the cable down the right side of the fuselage using zip ties to retain it to the frame. Do not install ties or route the cable where they may come in contact with the fabric.

Cut the ground cable to length and install the lugs. Bolt the ground cable to one of the battery box mount tabs. Refer to the battery box section. Attach the other end of the cable to the negative terminal on the battery. **NOTE:** Do not attach the ground cable to the battery until all wiring is complete and you are ready to start the engine.

Cut the engine ground cable and the starter cable to length and install the lugs. Bolt the starter cable to the second pole on the salient and to the pole on the starter. Bolt the engine ground cable to the 6mm boss on the aft right hand cylinder head. Attach the other end to the bolt retaining the engine mount to the fuselage.

2. Install the instruments and switches into the instrument panel. **IMPORTANT:** Note the position of the ignition (mag) switches. With the switch up (on) the contacts must be open. With the switch down (off) the contacts must be closed.

Set the instrument panel in the fuselage. Refer to the wiring schematic and Rotax manuels and wire all instruments and switches. **NOTE:** The tachometer leads are color coded. The Tach is not affected by switching these leads. However, it is important that the lead that attaches to the (-) terminal also be grounded.

3. Install the static and pitot lines as shown in the schematic. Route the lines to exit the fuselage on the left hand side of the station 3 top cross tube.

S-7 WING - UNIVERSAL HINGE ASSEMBLY

(REFER TO PARTS PAGE # 005-02 FOR PARTS SELECTION)

1. Select the components depicted on the parts page for the universal hinge. Just the assembly of the trailing edge spar root fitting and hinge cube is required at this time. The stainless steel "U" bracket and its hardware will be installed on the fuselage post covering and painting.

2. From the raw stock provided with your kit, fabricate the four aluminum bushings to the dimensions called out on the parts page. Insert these bushings into the trailing edge spar root fitting as shown on the parts drawing. Bolt the hinge cube to the root fitting using the hardware called out on the parts drawing. **PLEASE NOTE:** The hinge cube should move, but not freely. Also during wing attachment to the fuselage it may be necessary to move the ¼" thin washers between the hinge cube and the root fitting to properly align the hinge cube with the stainless steel "U" bracket on the fuselage.

3. Trial fit the hinge assembly into the root end of the trailing edge spar. It may be necessary to contour the bushings on the root fitting to match the inside radius of the spar. This may be done by using a grinder or file to profile the top and bottom edges of the bushings. Be careful not to shorten the overall length of the bushings. The hinge assembly should fit snug within the spar.

4. This completes the universal hinge assembly. Continue on to the assembly of the "WING-MAIN STRUCTURE". The universal hinge will be installed during this assembly.

S-7 WING - MAIN STRUCTURE ASSEMBLY

(REFER TO PARTS PAGE # 005-04 & 005-05 FOR PARTS SELECTION)

PLEASE NOTE: Wings are mirror assemblies, repeat the procedures described for one to both unless otherwise specified. Prior to the assembly of the spars, it is important to familiarize yourself with the orientation of the spars. Locate the root and tip end of both the leading and trailing spars, refer to the parts drawing for proper **END** orientation. You must also determine the interior and exterior side to each spar spanwise. The predrilled holes for retaining the wing ribs will be drilled through one side of the spar only, and they indicate the **INTERIOR SIDE** of the leading and trailing spars. **BE WIDE AWAKE AND DOUBLE CHECK AT THIS TIME THAT YOU HAVE THE SPARS CORRECTLY ORIENTATED.** Also be aware that there is a right and left hand **LEADING** edge spar. The left hand spar is determined by an additional two holes located approximately 8 and 10 inches inboard from the tip end. Be sure to build a left and right hand set of spars, this is determined by the orientation of the lift strut attach plates. We have also found that when working with long tubing such as leading and trailing spars, sawhorses provide an ideal work bench.

1. Verify that the leading edge spar root doublers have been installed. There will be a single 3/16" stainless steel rivet on the forward side of the spar, 1 7/8" from the end, retaining the doubler.

By step drilling, open the #40 hole in the forward side, of the root end of the leading edge spar to 3/8". Drill through the forward side of the spar **ONLY**. This is the wing attach hole, and will be drilled through the spar in a later step.

2. Working with only the leading edge spars, find the pilot holes located approximately 47" & 50" outboard from the **ROOT** end of the spar. These holes are drilled in the interior side of the spar only. Chase drill one hole to #11 and cleco the long wing channel in place. Note the orientation of the channel. Line the channel on the spar centerline so the holes in the channel match the pre-drilled holes in the spar. Transfer drill through the channel into the spar using a #11 bit and cleco. Transfer drill through the center hole in the channel through the spar. Remove the channel from the spar.

Drill out the center hole in the leading edge spar doubler to #11. Tape the doubler onto one end of one of the drag braces in such a manner that the drag brace can be pulled off of the doubler after it is inserted into the spar. See **FIGURE 05A-02**. Using the drag brace as a handle, insert the doubler into the spar from the root end until the center hole in the doubler is in line with the channels center hole in the spar. Using the center hole, cleco the doubler and channel to the spar. Refer to **FIGURE 05A-02A**. Pull the drag brace loose from the doubler, making sure that the doubler remains in alignment with the spar. Using a #11 bit, transfer drill through the outboard holes in the channel and spar through the doubler. Drill one hole at a time and cleco. Remove one cleco at a time and rivet. Refer to the parts drawing. **NOTE:** This doubler is only installed in the leading edge spar and at this location.

FIGURE 05A-02

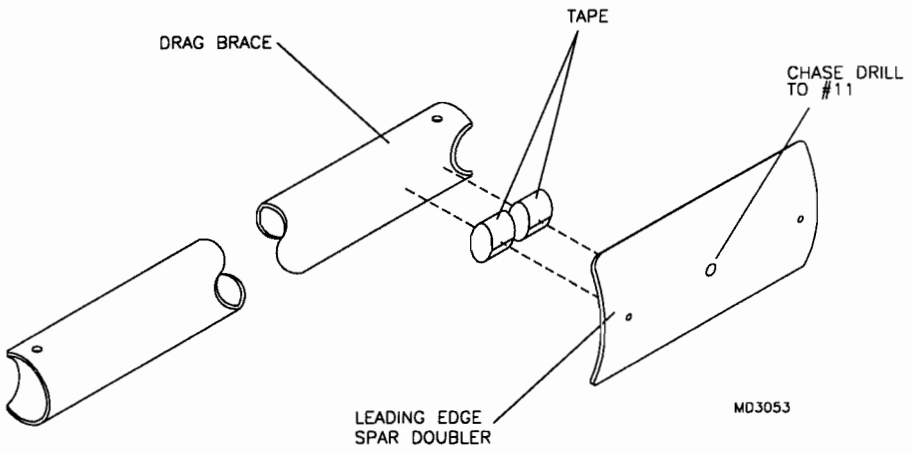
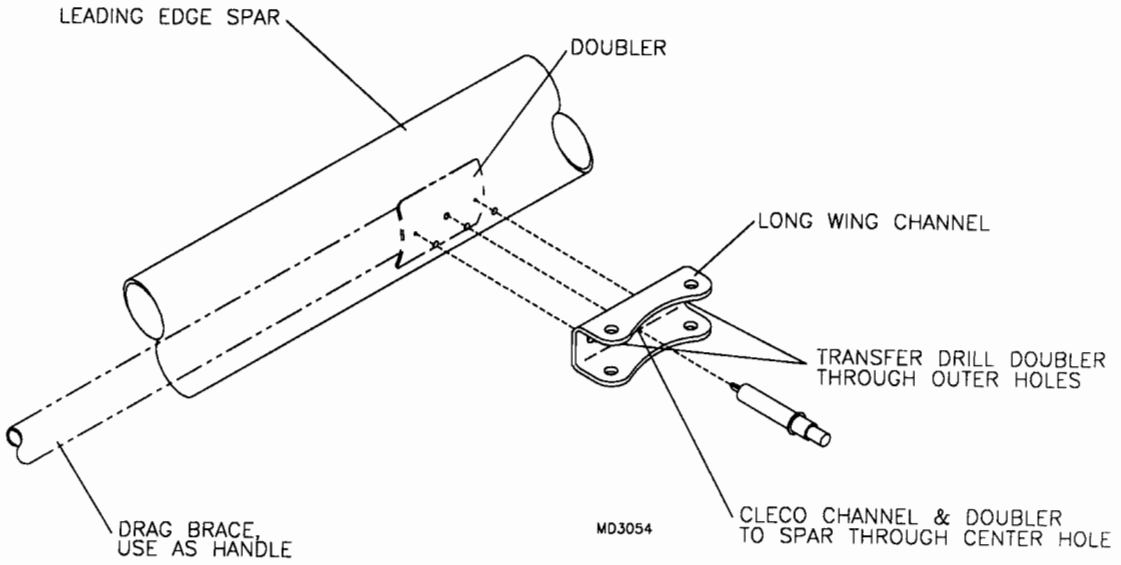


FIGURE 05A-02A



3. Assemble all components to each spar as shown in the parts drawing, also refer to **FIGURES 05A-03**, and **05A-03A** for detailed drawings and instructions. The long wing channels are retained on each spar with three #11 stainless steel pop rivets, with the exception of the long wing channel at the strut attach plate on the leading edge spar. The two outer holes of the long wing channels are pre-drilled into each spar. Pick up the middle hole by transfer drilling through the long wing channel hole. No middle rivet is needed in the long wing channel at the strut attach plate. When assembling the long wing channel to the root end of the trailing edge spar, be sure to install the trailing edge spar root fitting at the same time. See **FIGURE 05A-3A**.

FIGURE 05A-03

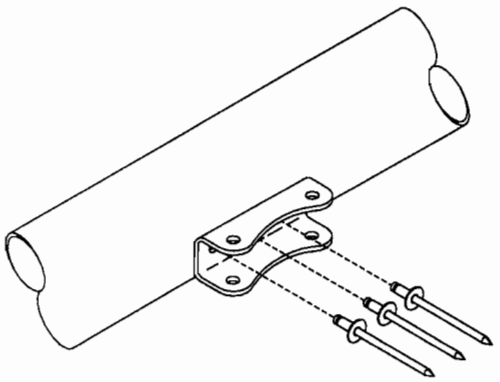
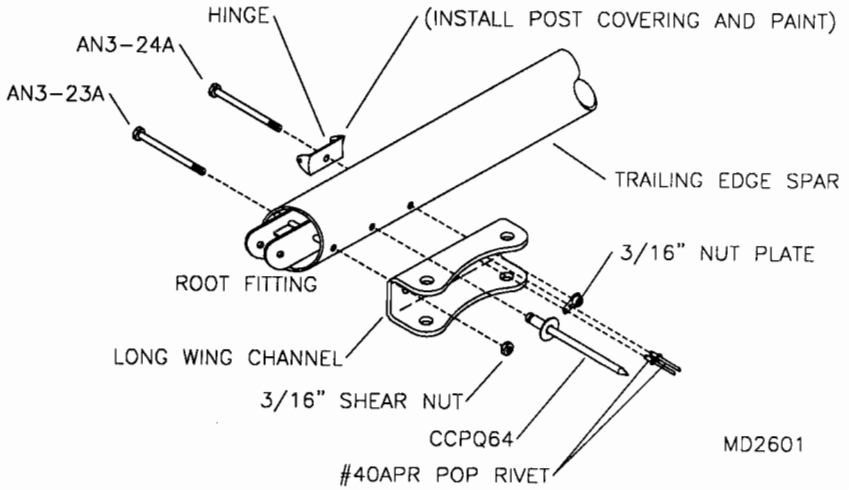


FIGURE 05A-03A



4. Prior to attaching the lift strut attach plates it will be necessary to drill the lower single hole in the plate to a 5/16" diameter. Again, double check and make sure that you are drilling the correct hole. Refer to **FIGURE 05A-04**. When attaching the strut attach plates to the spar, it will be necessary to drill out the spars to 3/8" diameter. The most accurate way to drill the ⅜" holes is to first drill and bolt one end of the lift strut plate to the spar with a ¼" bolt. Drill and bolt a second ¼" hole using the strut plate as a guide. Drill the third hole then remove the strut plate and drill all three holes to ⅜". **REMINDER:** When drilling through tubing drill from each side. Deburr and insert the bushings. Bolt the strut attach plate and long wing channel (leading edge spar), or the S2-SAB (trailing edge spar), to there respective spar. When installing the anti crush bushings into the spars, each bushing should be flush with the outside surface of the spar. See **FIGURE 05A-04A** and **FIGURE 05A-04B.**

FIGURE 05A-04

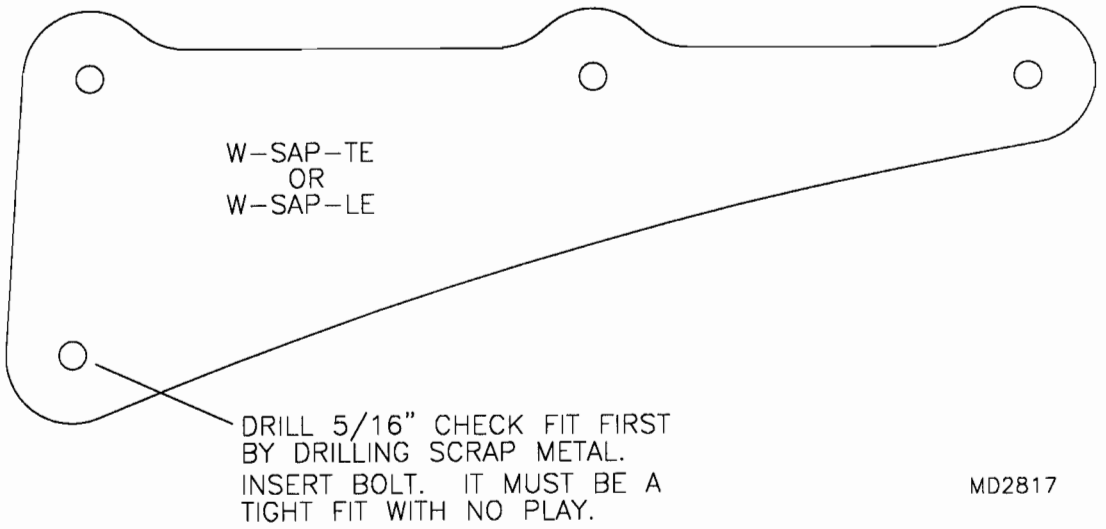


FIGURE 05A-04A

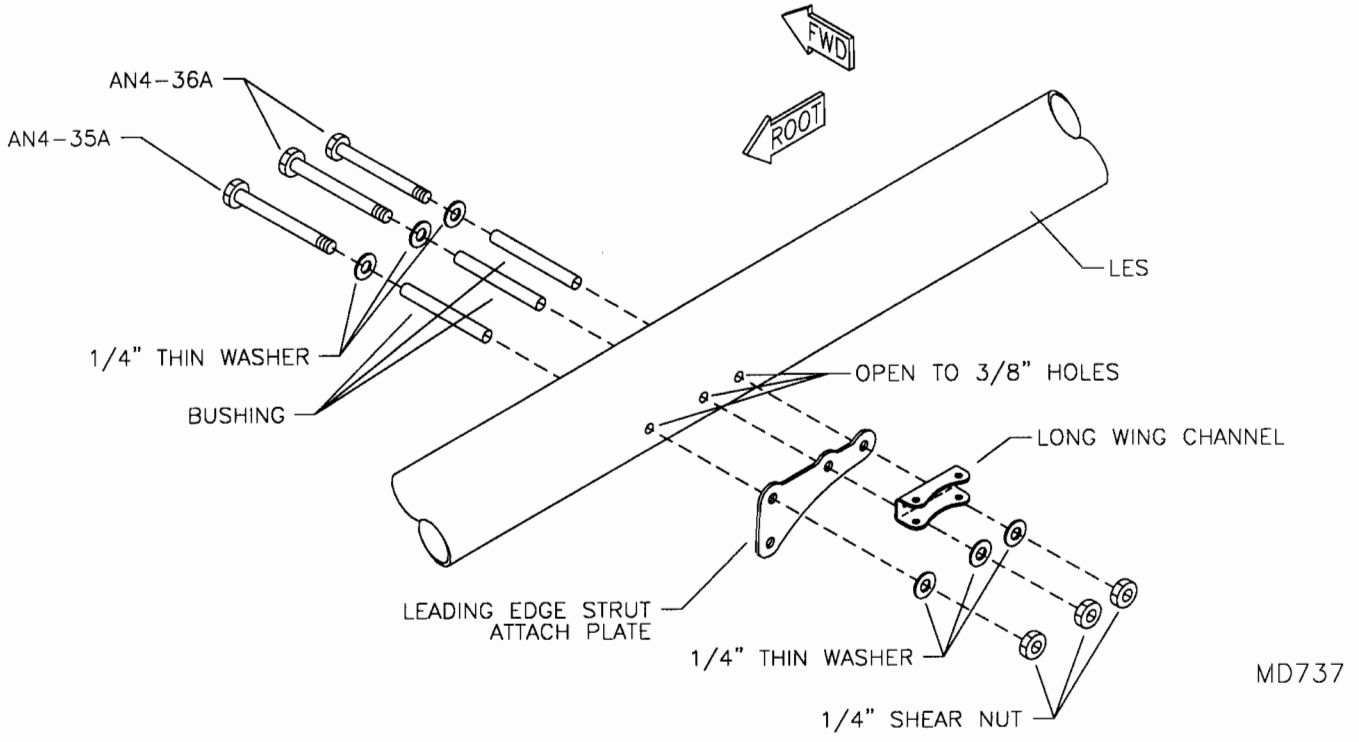
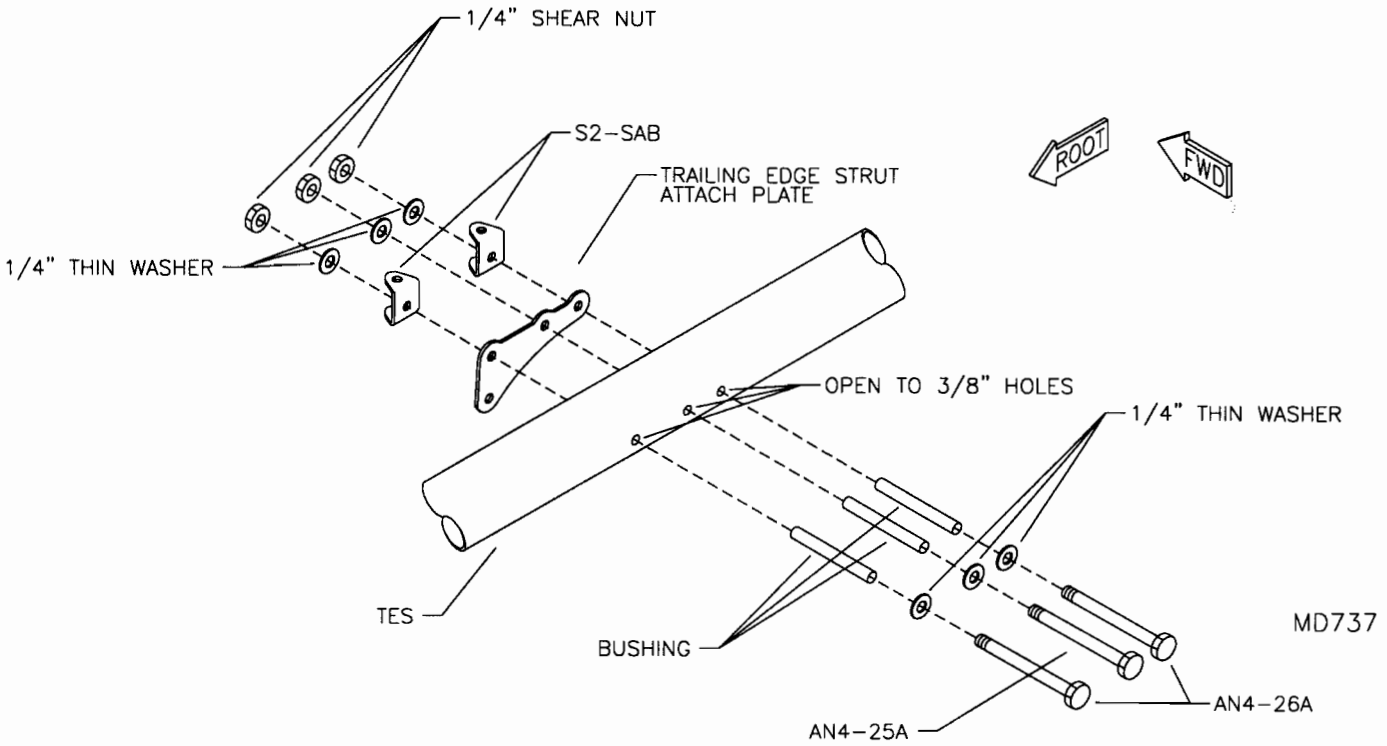
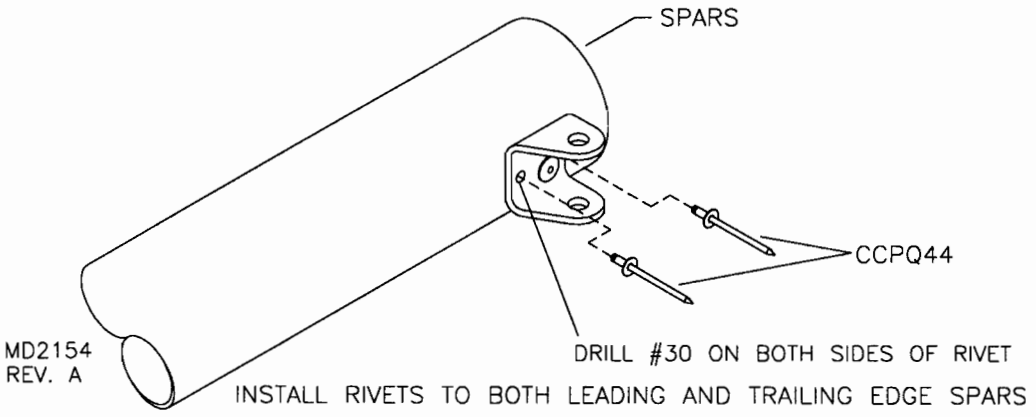


FIGURE 05A-04B



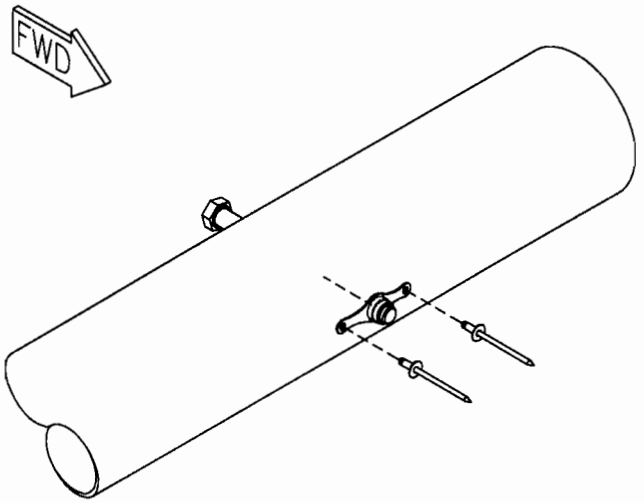
5. Assemble the outboard S2-SABs to the leading edge spars. The bolt holes in the S2-SAB should be vertical before installing the fixing rivet. See **FIGURE 05A-05.**

FIGURE 05A-05



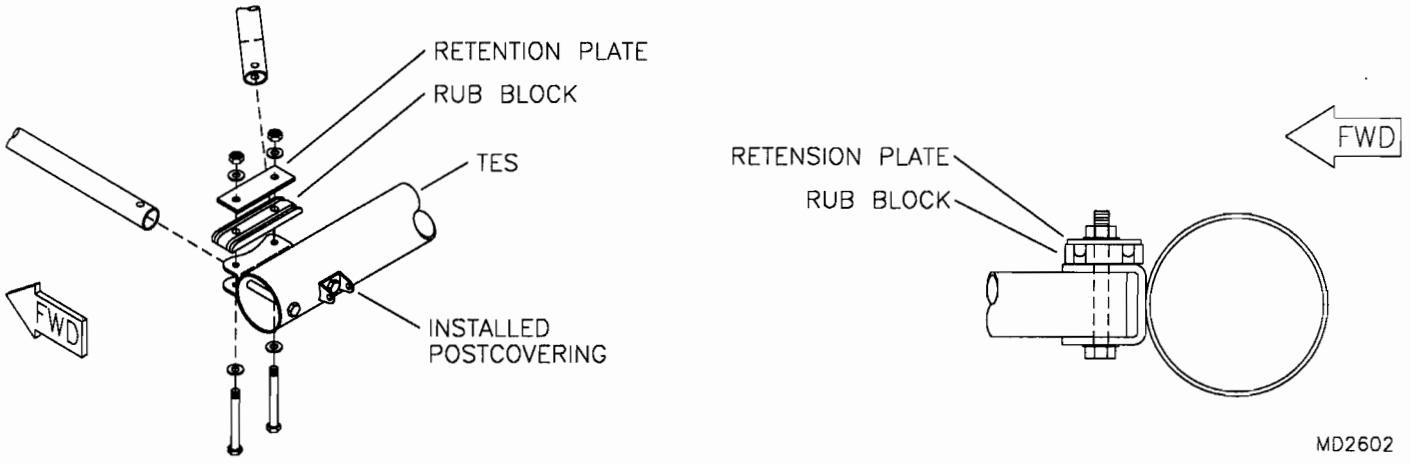
6. Install the 3/16" nut plates to all hinge locations on the trailing edge spar. Place the nut plates on the forward side of the spar and secure with #40 aluminum pop rivets. **HINT:** use a bolt to hold the nut plate in place. Position rivets horizontally. See **FIGURE 05A-06.**

FIGURE 05A-06



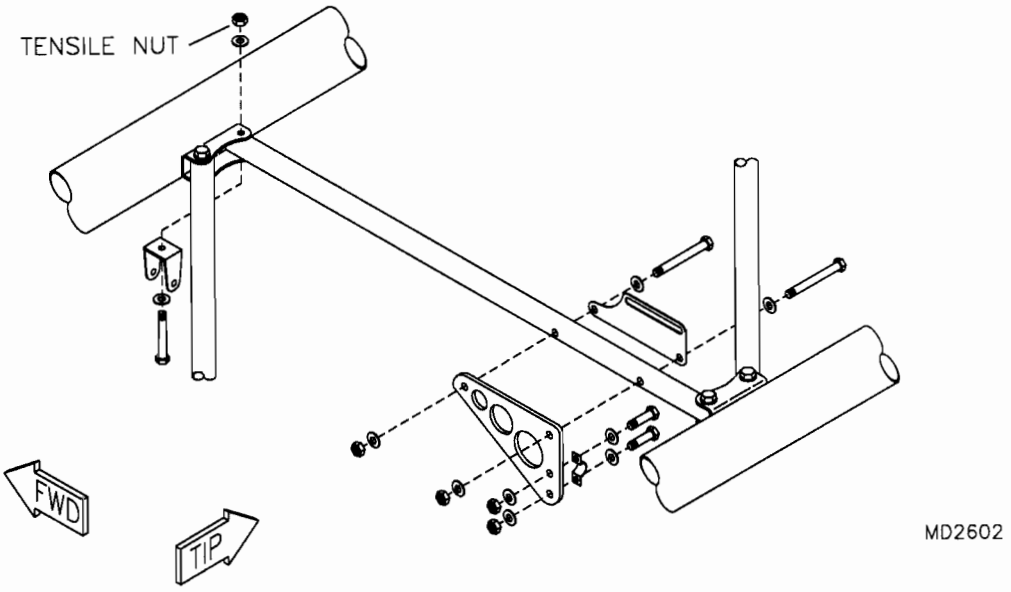
7. Select either a right or left hand set of leading and trailing edge spars. Bolt in both inner and outer compression tubes. When bolting in the root compression tube at the trailing edge spar, be sure to install the aileron cable rub block and the aileron cable retention plate. Only finger tighten the nuts on these bolts at this time. Refer to **FIGURE 05A-07**.

FIGURE 05A-07



8. Slide the 1 ⅛" compression tube doubler over the bellcrank compression tube and install both the flap and bellcrank compression tubes into the wing frame. Refer to the parts drawing for orientation of each compression tube. Install the jury strut bracket to the forward bolt retaining the flap compression tube. Assemble the elevator horn and the outer cable guide to the flap compression tube as per **FIGURE 05A-08**. Bolt the teleflex retainer to the elevator horn and locate the second hole for the retainer. Maintain a ¼" edge distance on the upper hole. For ease of covering, do not install the teleflex retainer until after the wings are covered and painted.

FIGURE 05A-08



NOTE: If you are installing the optional bubble lexan in the doors, a special door upcatch is required. Refer to the options section of the manual now for the parts call out and instructions before continuing.

9. Using a #40 bit pre-drill the door up catch socket as shown in **FIGURE 05A-09**. Slide the door up catch socket onto the root drag brace (W-DB-1) prior to installing them into each wing. Orientate the socket so that the #40 hole in the socket points to the tip of the wing. Refer to the wing section for the installation of the drag braces. Upon completion of the drag brace installation and prior to installing the wing ribs, position the socket on the drag brace so that the center of the socket is located 21 7/8" from the center of the leading edge bolt retaining the drag brace. Position the socket so that the hexagon leg is pointing straight down. Using a #30 bit, transfer drill through the #40 hole into the drag brace and rivet. Refer to the parts drawing and to **FIGURE 05A-09A**. Ensure that the socket does not slip while drilling. Placement is critical.

FIGURE 05A-09

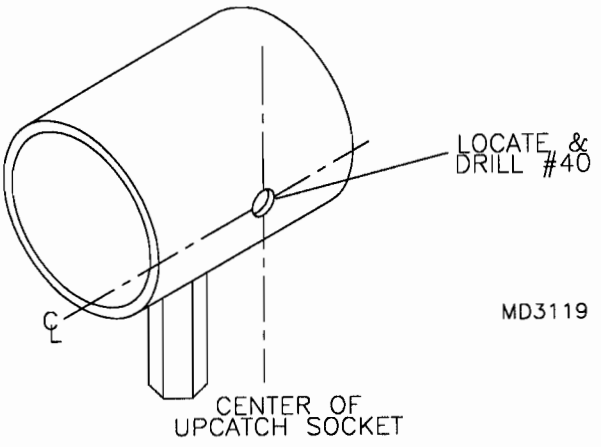
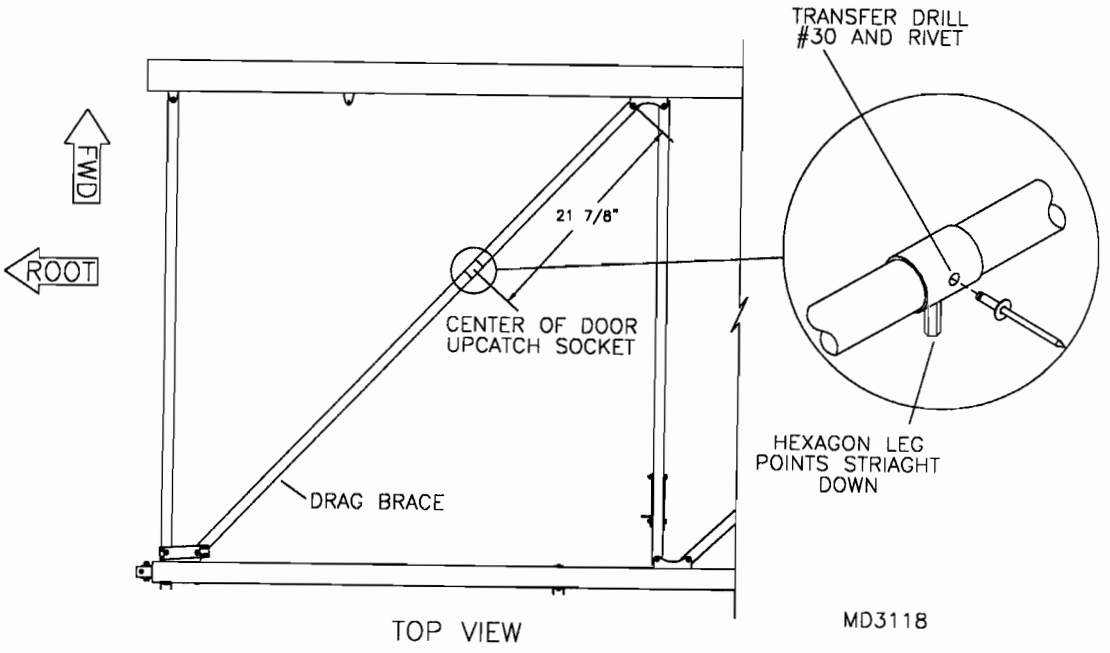
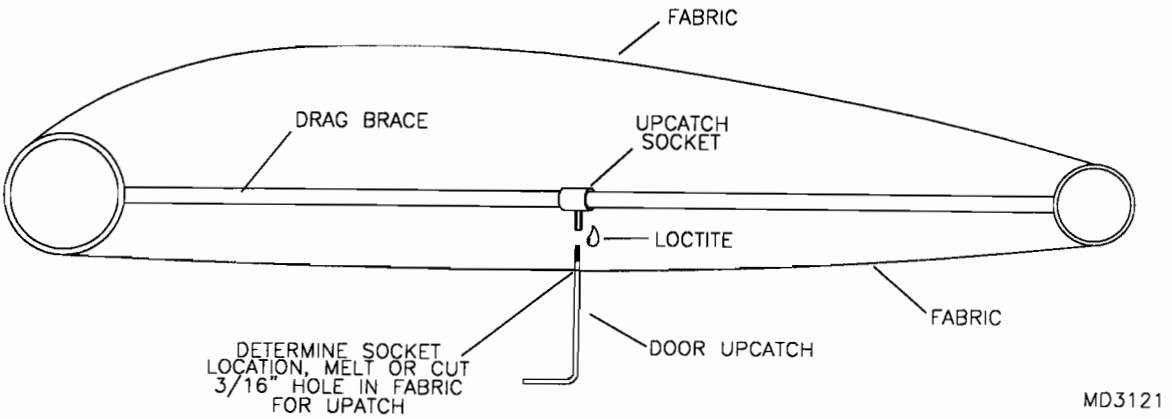


FIGURE 05A-09A



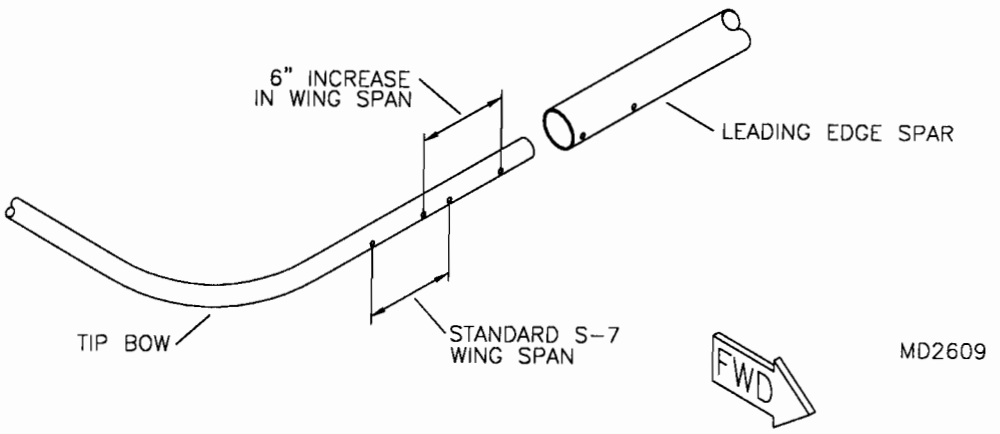
10. During final assembly, after the aircraft has been covered and painted, locate the hexagon leg of the door up catch socket by depressing the skin on the bottom of the wing. Melt or cut a 3/16" hole at this location directly in line with the hole in the leg of the socket. Apply loctite to the threads of the door up catch and install through the bottom skin and into the socket. Tighten the up catch so that it is pointing forward. The outside door handle will latch over the up catch, retaining the door open near the bottom of the wing. Refer to **FIGURE 05A-10.**

FIGURE 05A-10



11. Close inspection of the tip bow reveals two sets of attach holes. For the normal S-7 wing span use the outboard set of attach holes. If you want an additional 6" increase in wing span use the attach holes that are closest to the root end of the tip bow. The 6" extra span is recommended if your field elevation is 5,000 ft. or above or if you are trying to make a wing loading rule. (Canada and Japan have such rules). If you use the normal span you can cut off the extra 3" of tube for a small weight savings. Be careful when cutting the tip bow so as not to cut off the inboard most attach hole. Rivet the tip bow to both the leading and trailing edge spars with 3/16" stainless steel rivets. See **FIGURE 05A-11**. **NOTE:** The tip bow is purposely under bent. This forces a curve into the tip when installed. Once the fabric is installed this curve will straighten.

FIGURE 05A-11



NOTE: With the main wing structure complete, we recommend assembling the lift struts, installing the wings on the fuselage and setting the wash out prior to installing the fuel tank and sheet metal. Refer to the appropriate sections.

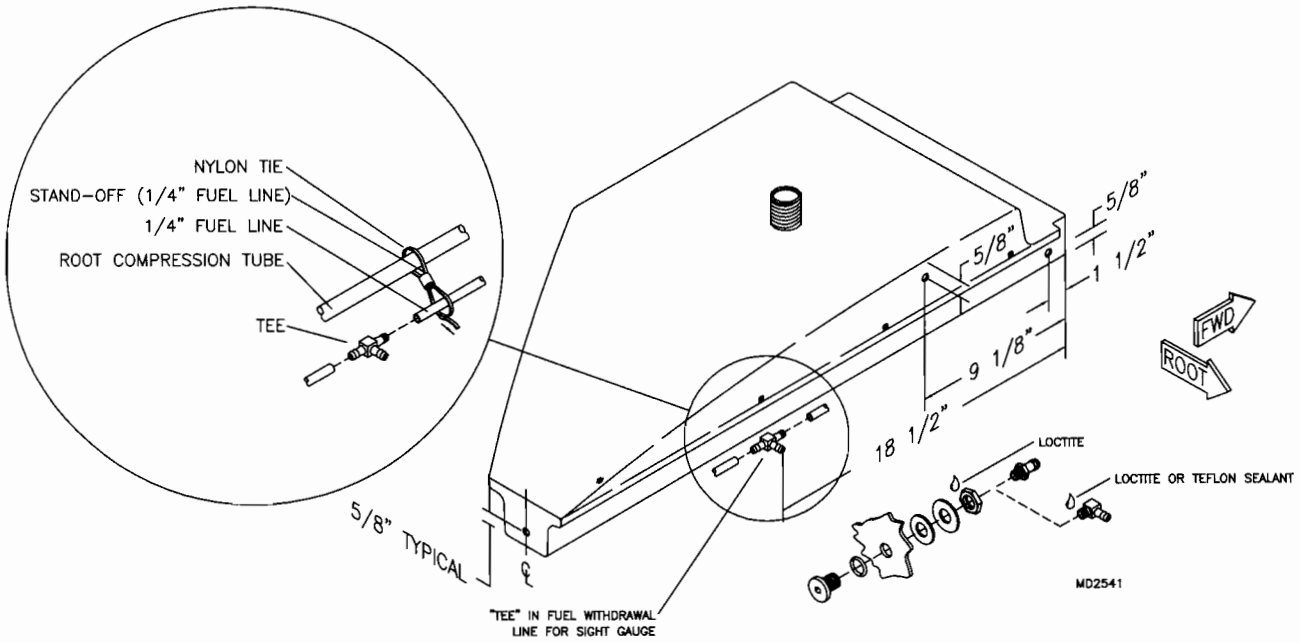
S-7 WING - FUEL TANK INSTALLATION

(REFER TO PARTS PAGE # 005-07 FOR PARTS SELECTION)

1. Each fuel tank is pressure tested from the supplier and guaranteed leak proof. RANS also performs a pressure test on each fuel tank before they are packed into the kits. After you have installed the fuel fittings, it is advisable to perform a final leak test. You may do so by capping off all fittings and pressurizing the tank to 1 PSI and let set for a period of time. While the tank is pressurized, check for any leaks by spraying a sudsy, soap/water mixture onto the tanks and around the fittings. To cap off the fittings use a 1" segment of fuel line with a 1/4" dia. bolt inserted, and fuel line clamps. An alternate test is to fill the tank with water and let it sit for approximately 48 hours.

Locate and drill three 1/2" diameter holes for the fuel withdrawal fittings and upper sight gauge fitting at the locations shown in **FIGURE 05B-01.** The forward withdrawal fitting and sight gauge fitting are located on the inboard or root side of the wing tank. **DOUBLE CHECK YOUR HOLE LOCATIONS BEFORE DRILLING ANY HOLES**. For drilling the holes, we have found that a 1/2" UNI-BIT works the best. A 1/2" body hole cutter or regular twist drill bit may be used. If using a drill bit, start with a small diameter bit and step drill up to 1/2". Debur all holes. ***NOTE:*** *Mark on the tank the position for the 1/4" Tee (lower sight gauge attachment). Secure the withdrawal line and Tee to the Root Compression Tube when installing the tank in the wing.* Thoroughly clean each tank several times by rinsing with water. After confirmation that all foreign material has been removed, let tanks dry prior to installing fittings.

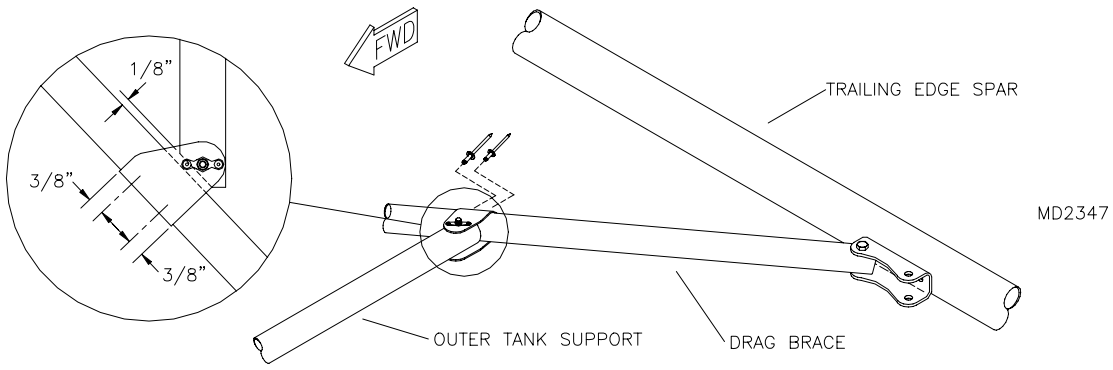
FIGURE 05B-01



2. In order to install the fuel fittings into the tank, you will need to obtain a piece of rigid wire approximately 40" in length (an undone coat hanger works well). Insert this wire through one of the fitting holes in the tank and up through the filler neck. Install an O-Ring onto one of the tank withdrawal fittings and slide this assembly over the wire extending from the filler neck. Bend a loop in this end of the wire to keep the fitting and O-Ring from falling off. Pull the fitting through the hole. Slide a flat rubber washer, 1/2" thick washer, and a retaining nut over the wire and onto the fitting. Apply Loctite to threads and then thread the nut on before removing the wire. Use a ¼" Allen wrench inserted into the tank fitting to hold the fitting while tightening the retaining nut. ***HINT:*** *Hold the metal washer with needle-nose Vise Grip to prevent rotation while tightening the nut.* ***IMPORTANT:*** *Do not allow the fitting to rotate while tightening or leaks may occur.* Apply Loctite or thread sealant to the 90 degree or straight fittings and install into the tank fitting. Again, allow no rotation of the tank fitting. Refer back to **FIGURE 05B-01**.

3. Mark the leading edge spar's centerline from the S2-SAB retaining the inner compression tube to about twenty inches outboard. Locate the wing tank to the wing frame, its forward side1/8" from the spar and its inboard side 1/8" from the inner compression tube. Locate, transfer-drill and rivet an S2-SAB on the spar centerline, 1/8" from the outboard side of the tank. ***NOTE: When locating the S2-SAB, check that the tank withdrawal fittings will clear the inner compression tube once the tank is in position.*** If necessary, the S2-SAB may be moved slightly outboard, allowing the tank to be positioned farther from the compression tube; if doing so, ensure that the tank remains properly supported by the compression tube. Drill and rivet a single-ear nut plate the top of the S2-SAB; refer to the parts drawing. Bolt the forward end of the outer tank support tube to this S2-SAB. With the fuel tank in position, resting on both the root compression tube and the outer tank support tube, pull the outer tank support in place against the tank. Mark and cut the outer tank support tube diagonally using the drag brace as a guide. Maximum gap between the outer tank support tube and the drag brace should be no more then 1/8". See **FIGURE 05B-03**. Slip the U-Bracket over the drag brace. Using the U-Bracket as a guide, mark the hole location on the outer tank support, remove and drill to a #11. Bolt the U-Bracket to the support tube. Fasten the U-Bracket to the drag brace by locating and drilling two #30 holes in the U-Bracket on centerline. Rivet with two stainless steel rivets. Install the 3/16" nut plate to the top side of the U-Bracket. See **FIGURE 05B-03**. Also refer to the parts drawing for additional information.

FIGURE 05B-03



4. With fuel tank in position, with 1/8" gap in front and between compression tubes, bolt the wing tank mount brackets to the fuel tank with the hardware shown in the parts drawing. ***NOTE:*** *When installing the fuel tank for the final time, apply Loctite to the bolts' threads.* Include the thick washers between the tank and the mount brackets on the root side of the tank; refer to the parts drawing. Notice that the bent bracket bolts to the aft of the fuel tank on the inboard side. Clamp the tank to the support tubes with light pressure, making sure that the tank is seated flat and contacting the support tubes through the length of the tank. Using the tank mount brackets as a guide, transfer drill with a #30 drill bit through the brackets and into the support tubes. These holes should fall on centerline of each support tube. Rivet the tank mount brackets in place with the correct rivets.

Install the fuel line to the withdrawal fittings. Both withdrawal lines will exit the wing at the trailing edge. Cut both lengths of line so that you have approximately 24" of line extending beyond the root of the wing. The forward fuel line can either be zip tied or taped to the bottom side of the root compression tube. If using zip ties, be careful to not crush or restrict the fuel line. Install fuel line clamps on all fittings. Install a short piece of clear fuel line to the lower sight gauge fitting only. The sight gauge will be completed after the root close outs are installed. This completes the installation of the fuel tank.

S-7 WING - BELLCRANK ASSEMBLY

(REFER TO PARTS PAGE # 005-09 FOR PARTS SELECTION)

1. Refer to bellcrank parts pages and select all hardware needed.

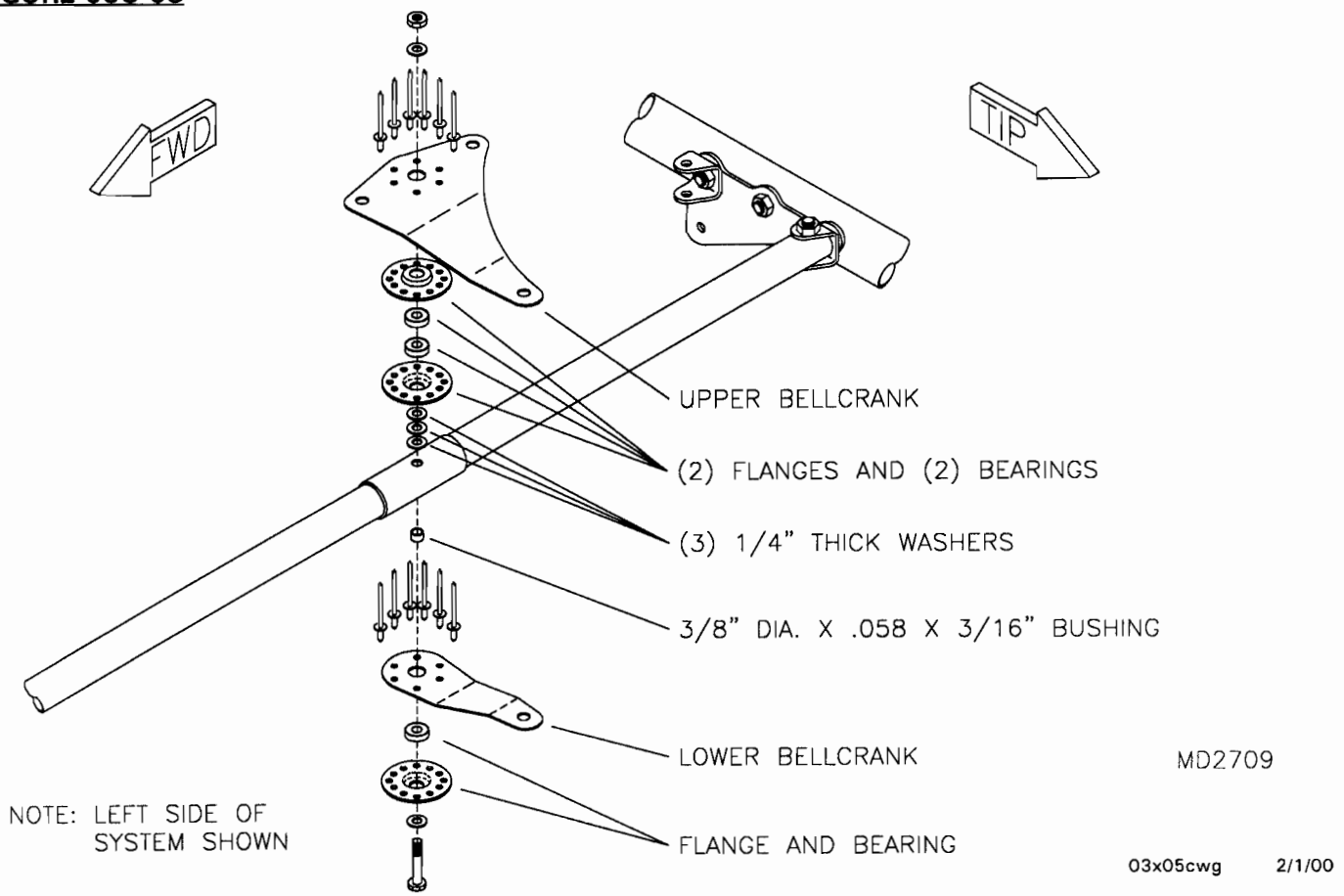
2. The bellcrank compression tube and doubler should already be installed into the wing. Double check to make sure that the interior vertical hole in the compression tube is located toward the trailing edge spar. Line up the predrilled #11 holes in the 1 ⅛" doubler and the compression tube, transfer drill with a ¼" drill bit through both the doubler and the compression tube.

3. **NOTE:** Due to slight variations in bearings from one supplier to the next, it is possible for excessive vertical play to exist in the flange bearing assembly. Cleco together the flange bearing and check for play prior to assembly to the bellcrank. Shim with a single thin ¼" washer if required. Place washer between bearings

Locate the upper bellcrank and bevel the ⅞" hole on the underside only. **DOUBLE CHECK**, your orientation, make sure that you are beveling the correct side. Trial fit a bearing flange into the beveled hole. The bearing flange should sit flat against the bellcrank, if not, remove the bearing flange and continue to bevel the edges of the hole. With the flange properly seated into the bellcrank and using the bearing flange as a drill guide, drill every other hole (six total) through the bellcrank with a #30 drill bit. Install two bearings into the bearing flanges and rivet this assembly to the upper bellcrank using the correct rivet length. Refer to the parts drawing.

Locate the pivot end of the lower bellcrank and drill the #30 pilot hole out to ¼". Use a ¼" bolt and bearing inserted into this hole to align and center the bearing flange. Again using the bearing flange as a drill guide, repeat the procedure as performed on the upper bellcrank for drilling the six perimeter holes. After the bearing flange holes have been drilled, drill the ¼" hole to it's final size of ½" and rivet the bearing and flange to the lower bellcrank. Note that the rivets used in the lower bellcrank are a different length than those used in the upper bellcrank. Refer to the parts drawing and **FIGURE 05C-03**.

FIGURE 05C-03



4. Bolt the upper and lower bellcrank assemblies into the wing as per the parts drawing and **FIGURE 05C-03**, with the correct number and location of the washers and spacers.

5. With both the upper and lower bellcranks installed, use a needle nose vise grip or similar tool to clamp the upper and lower bell crank arms together. Transfer drill with a ¼" drill bit through the #11 predrilled hole in the top bellcrank arm through the #30 hole in the lower bellcrank arm. Install the male rod end using the hardware called out in the parts drawing.

6. Bolt one end of the 1" brace tube into the S2-SAB located on the inboard bolt of the lift strut attach plate. Slip the bolt through the other end with the 1" U-bracket, but do not nut. **NOTE:** The 1" U-bracket must be fabricated from a long wing channel. See **FIGURE 05C-06**. Pull the brace tube and bracket to the bellcrank compression tube so that the 1" U-bracket is resting flat against the compression tube and on centerline. Using the U-bracket as a guide, transfer drill with a #11 drill bit through the compression tube and rivet the exposed hole. Remove the bolt and tilt the tube clear. Drill and rivet the second hole in the U-bracket. See **FIGURE 05C-06A**.

FIGURE 05C-06

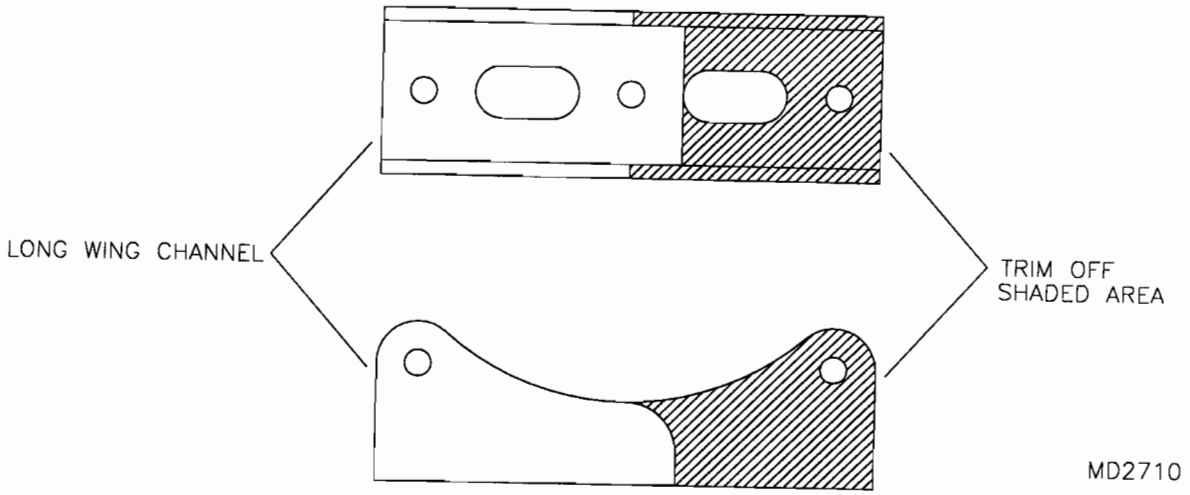
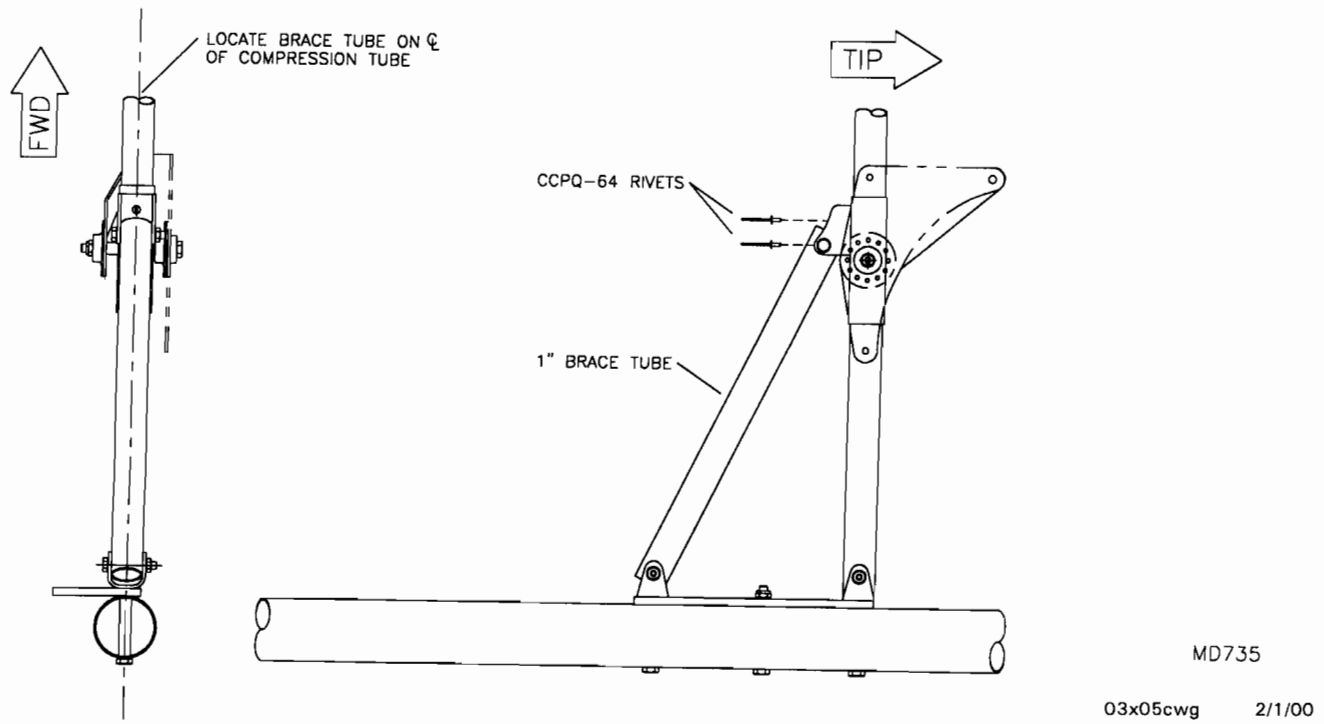


FIGURE 05C-06A



7. Upon close examination of the aileron cables, you will notice that there is a pivot bushing in the thimble of one end of each cable. Bolt this end of each cable to the aileron bellcrank using the hardware called out in the parts drawing. Remember to fabricate and install the ¼" X .028 X ¼" stainless steel bushing into the pivot bushing of each aileron cable. Also note that the cables bolt on the top side of the upper bellcrank. Grease the pivot bushing and the stainless steel bushing to prevent excessive wear. At this time, coil and tape the aileron cables to the bellcrank or compression tube. The cables will be fed through each guide after the wing ribs are installed. This completes the aileron bellcrank assembly and installation.

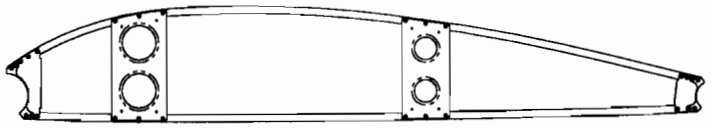
The aileron push pull tube may be assembled at this time and set aside. While it is important to have the male rod end installed on the bellcrank, do not install the push pull tube until after covering during final assembly of the aircraft.

S-7 WING - RIB ASSEMBLY AND INSTALLATION

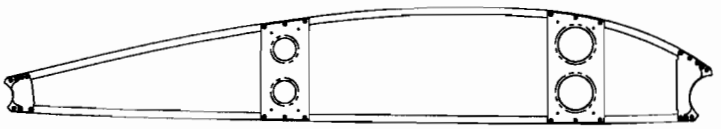
(REFER TO PARTS PAGE # 005-11 FOR PARTS SELECTION)

BEGINNING NOTE: The design of our wing rib is such that it will be necessary to assemble both left and right hand ribs as well as several special ribs. All of these ribs can be assembled in the same rib jig simply by reversing the jig backing plate and inner jig. The special ribs are distinguished by either the location, or the design of the compression plates and will also be right and left hand. Study the exploded view drawing now and familiarize yourself with the wing ribs. Take special note of the root rib compression plate orientation. Refer to the chart below for quantities of each.

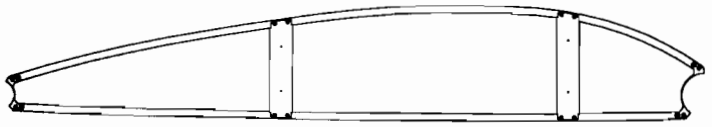
S-7 WING RIB CHART



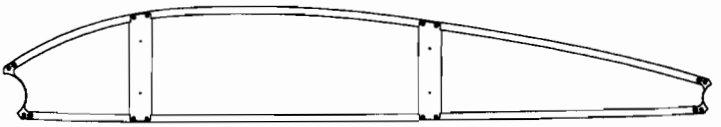
MAIN RIB, LEFT HAND – (9) REQ'D.
(2 USED IN THE LEFT HAND WING, POSITION #6 & 11. 6 USED IN THE RIGHT HAND WING POSITION #3,4,5,7,9 & 10)



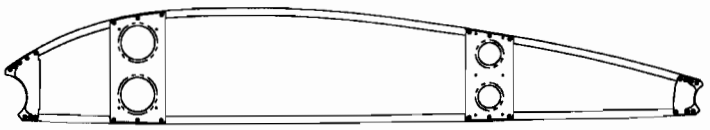
MAIN RIB, RIGHT HAND – (9) REQ'D.
(2 USED IN THE RIGHT HAND WING, POSITION #6 & 11. 6 USED IN THE LEFT HAND WING POSITION #3,4,5,7,9 & 10)



ROOT RIB, LEFT HAND – (1) REQ'D.



ROOT RIB, RIGHT HAND – (1) REQ'D.



#2 RIB, LEFT HAND – (1) REQ'D.

#2 RIB, RIGHT HAND – (1) REQ'D.

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1. Prior to assembling the ribs, it will be necessary to assemble the rib jig. Gather all parts for the rib jig as per the parts drawing. You will note that some of the parts in the jig will have to be fabricated from the plywood removed from your shipping crate. Begin the jig assembly by cutting the jig backing plate out of the plywood from your shipping crate to the same dimensions as the outer jig. See **FIGURE 05D-01**. Verify the dimensional accuracy of the jig cord by measuring the jig and comparing it to the assembled wing frame. Correct any variations by lightly sanding or adding shims to the jig at the rib clip locations. Screw the outer jig board to the backing plate. Dry assemble one complete rib, with the exception of the rib compression plates. Take note, that while the bottom rib does look almost symmetrical, there is a forward and aft end. The forward end will be designated with a black mark on the rib. Also note that there is a top and bottom to both the forward and aft rib clips. See **FIGURE 05D-01B**. Do not drill any holes or pop any rivets into the rib assembly at this time. **NOTE:** Make sure that the bottom rib is positioned with equal edge distance to the hole in the rib clip on each end. Place the assembled rib on the plywood backing plate within the outer jig board. Insert the inner plywood jig into the rib. The inner piece should lock into its correct position by compressing against the rib and the outer jig board. Some minor sanding to the jig may be required to obtain the proper fit. If so, sand only the outer jig. **NOTE:** there should be a small gap between the inner jig and the forward and aft rib clip. Use a tapered wood dowel pressed between the inner jig and the aft and forward rib clips to retain the clips in there correct position. See **FIGURE 05D-01A**.

FIGURE 05D-01

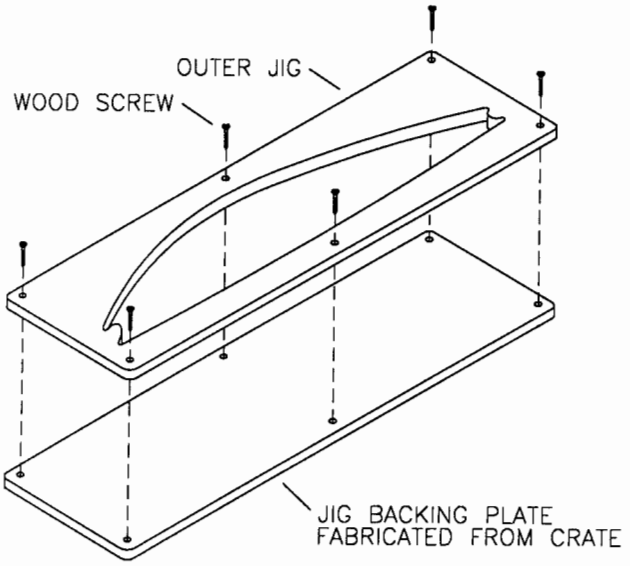


FIGURE 05D-01A

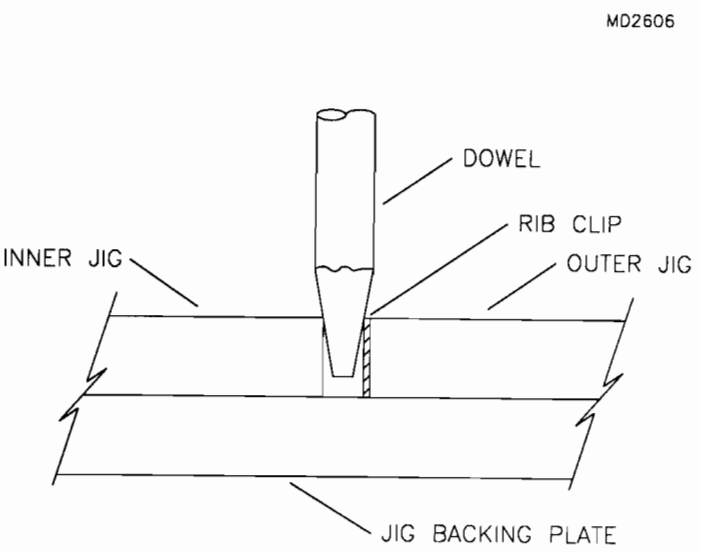
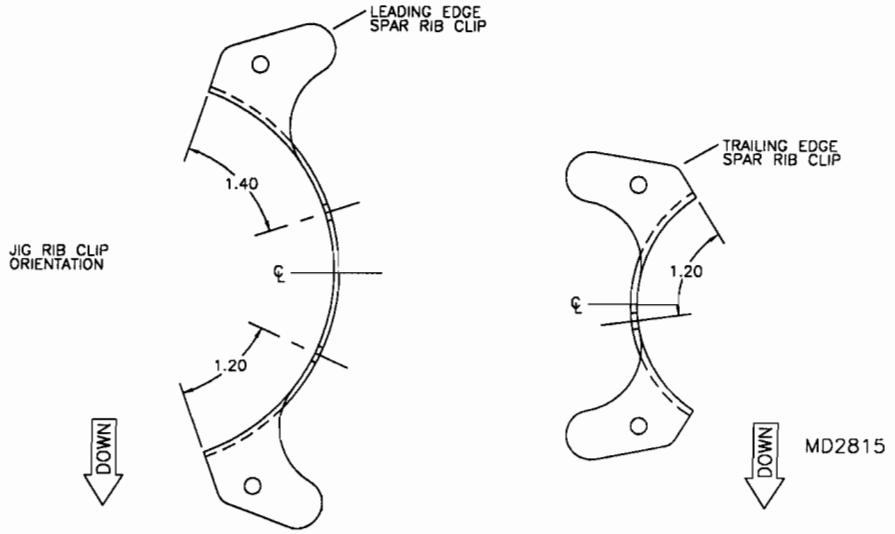


FIGURE 05-01B



2. Position the forward and aft rib compression plates on the jig so that the top and bottom rivet holes are on centerline of the rib. There will be four predrilled holes in the inner jig at this location to pick up the tooling holes in the compression plates. The side flanges of the plates should be in the up position. Once satisfied with the position of the compression plates, from the 1/8" stainless rod provided cut twelve pins 5/8" long. Round the ends and press them into the tooling holes through the plates and into the predrilled holes in the jig. This will lock the plates into there correct position. The pins should be driven in as straight as possible to allow removal of the compression plates. See **FIGURE 05D-02.** After installing the eight pins, screw the inner jig in place and remove the forward and aft compression plates.

Locate the forward and aft compression plates for the root rib and follow the same procedure as before for locating the 1/8" pins. The root rib compression plates will only have two pin locations.

Remove the root compression plates and follow the same procedure for locating the second and the eighth rib compression plates. See **FIGURE 05D-02A.**

FIGURE 05D-02

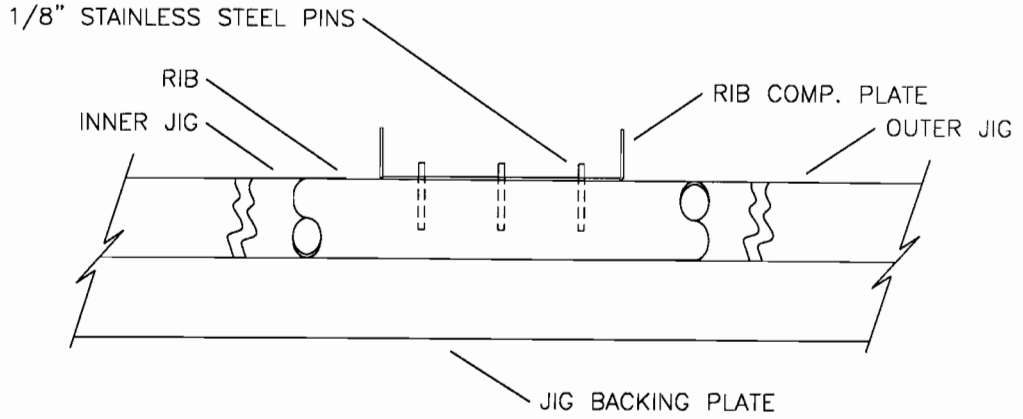
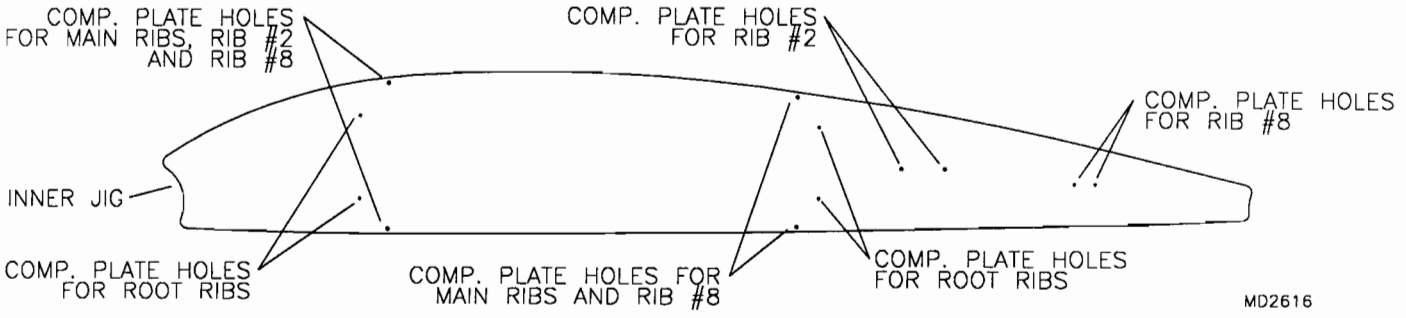


FIGURE 05D-02A



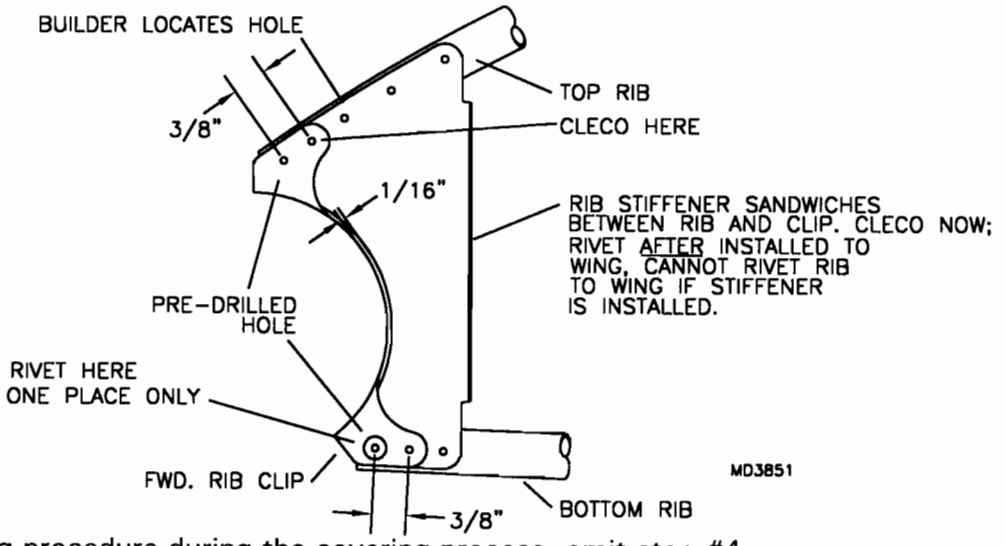
3. With the jig completely assembled and one complete set of rib components in place, transfer drill with a #30 bit through the predrilled hole in each rib clip, through the rib stiffener. **Do not rivet the side of rib with rib stiffener. These will be installed later.** If stiffener is installed prior to being installed in wing, it will not be possible to rivet rib to spars, rivet only on oposite side of stiffener. Locate the second hole ⅜" center-to-center from the first, on the centerline of the rib, click punch, drill and rivet. Transfer the remaining holes of the rib stiffeners to the ribs and rivet. See **FIGURE 05D-03**. Drill and cleco in place both the forward and aft stiffener plates. **NOTE: DO NOT rivet stiffener in place at this time. ONLY clecos. The stiffener is riveted <u>after</u> the rib is installed to the spars.** Remove the rib assembly from the jig. Drill and rivet the opposite side rib clips, following the same procedure used on the first side. Verify the rib fit by installing it into the assembled wing frame. The fit should be snug without bowing the rib assembly. Make any necessary adjustments before continuing. Assemble all ribs for this side of the jig (right or left hand for a total of 11 ribs). *Note that the root rib requires special compression plates and receives no stiffeners; the eighth rib outboard requires an additional gusset plate, see special instructions when in this section; the second rib outboard requires the aft plate in a different location. See rib chart and refer to the parts drawing.*

Remove the jig backing plate and install on the other side of the inner and outer jig. Be sure to maintain top and bottom and end orientation of jig. Assemble another set of 11 ribs on this side of the jig following the same procedure as before.

SPECIAL INSTRUCTIONS: when assembling the two root ribs, drill, but do not rivet the compression plates into place. After riveting the forward and aft rib clips into place, remove the rib from the jig and rivet the opposite side of the rib clips. Rivet the left hand compression plates to the right hand rib and the right hand compression plates to the left hand rib. This will orientate the plates so that the flanges of the plate are pointed to the tipboard side of the rib. Refer to the parts drawing and the rib chart.

Lay the root ribs on a flat work surface, position the root rib close outs on the **ROOT SIDE** of the root rib. The close outs will, for the most part, position themselves. Once the root close outs are correctly positioned, transfer drill with a #30 drill bit through the predrilled holes in the close outs and into the top and bottom ribs. Use clecos to retain the close outs in position. After all hole locations have been drilled, remove the close outs. The close outs will be installed after the close outs are painted, and the wings are covered and painted.

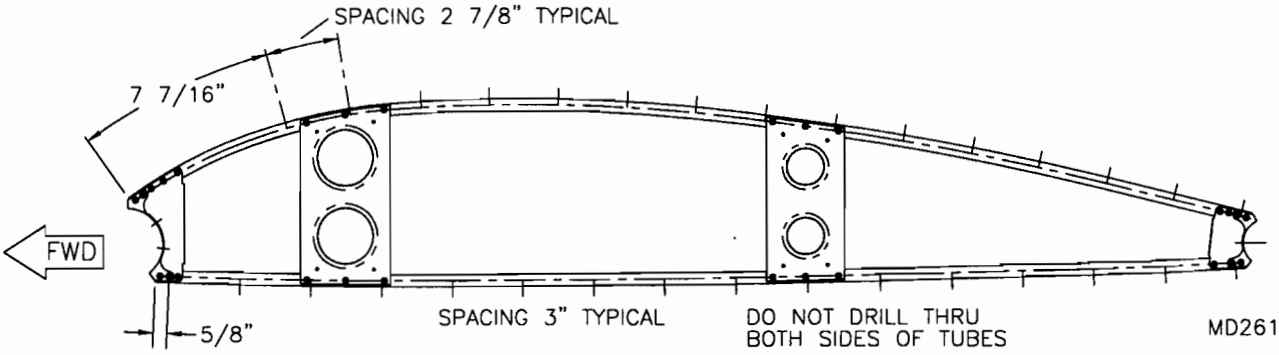
<u>FIGURE 05D-03</u>



NOTE: If using the rib lacing procedure during the covering process, omit step #4.

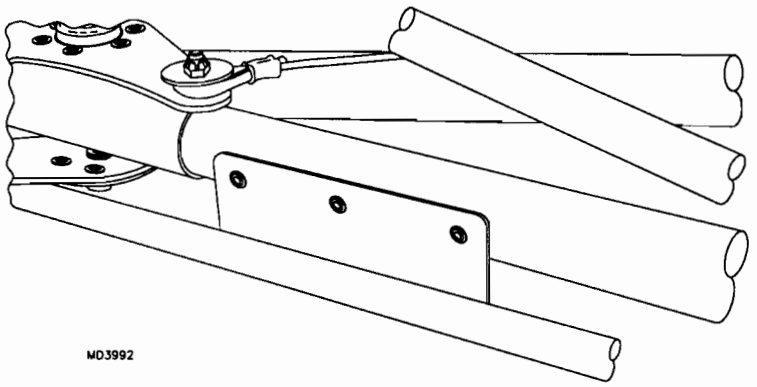
4. If you have purchased the optional Lexan strips in place of rib lacing it will be necessary to pre drill the top and bottom ribs. **DO NOT** drill the root or second rib. Both of these ribs will be drilled during the installation of the top and bottom root skins. Lay out and mark the hole pattern onto each rib as shown in **FIGURE 05D-04**. It is important that these holes be on top centerline of the top rib, and on bottom centerline of the bottom rib. After marking the hole locations, click punch and drill to a #30 <u>through one side of the tube only.</u>

FIGURE 05D-04



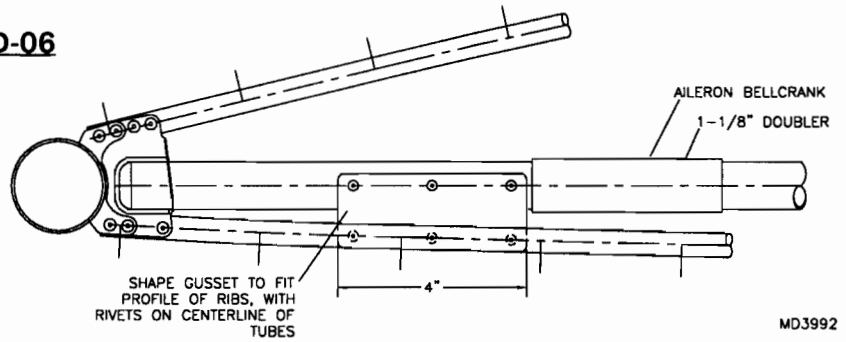
5. After assembling two complete sets of ribs, begin installing the ribs into the wing, using only clecos to retain them at this time. Refer to the parts drawing for the proper location of each rib and **FIGURE 05D-05** for locations from root to tip. It will be necessary to remove one end of each drag brace to allow the ribs to be installed to there correct position and to allow room for a rivet gun. It may also be necessary to remove the bolt from the aft end of the outer tank support tube to obtain enough movement in the root drag brace. When satisfied that the correct ribs are in there respective position, uncleco the top of each rib stiffener, fwd and aft, and "swing" down and out of the way., the rivet in place, see **FIGURE 05D-05A**. Be aware that some ribs use a different rivet length due to an internal doubler within the spars. Also note that the root leading edge rib clip is retained with stainless steel rivets. This is to further retain the leading edge spar root doubler. After all ribs have been riveted, swing rib stiffeners back into place and rivet. Bolt and tighten both drag braces in place. Cleco the root close outs in place and mark the location of the fuel sight gauge fittings on the close outs. Drill the sight gauge holes to ⅝". This completes the rib assembly and installation.

FIGURE 05D-05A



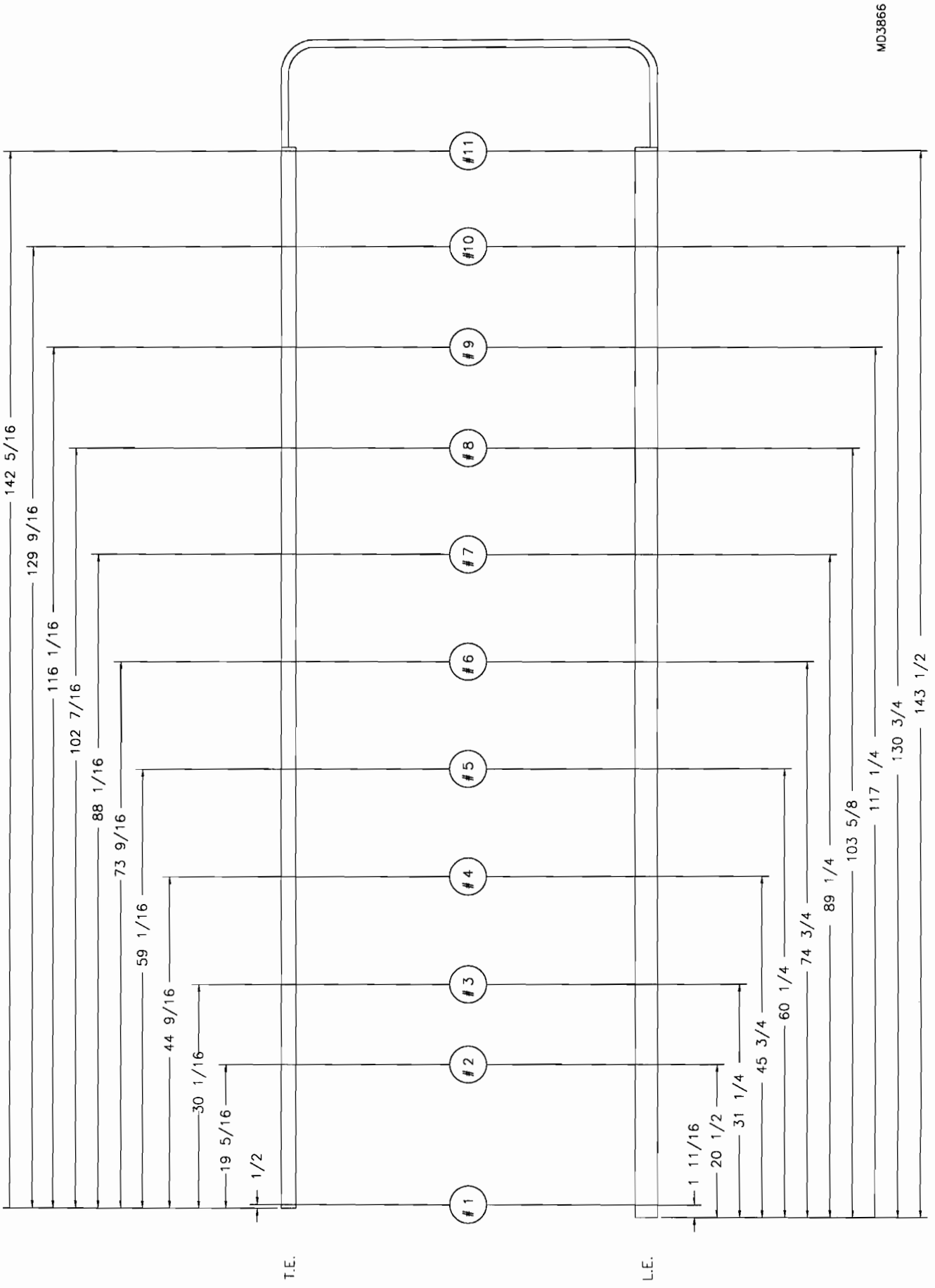
6. Using the 2" x .040 x 8" aluminum strip cut in half and make (2) 4" gussets, as per **FIGURE 05D-06**. Rivet in place as shown, see **FIGURE 05D-05A**. **IMPORTANT:** *Gusset is used to prevent rib from contacting the aileron bellcrank. Make sure rib clears the bellcrank with fitting and riveting gusset.*

FIGURE 05D-06



7. Uncoil the aileron cables and feed them through each rib and the two cable guides. Make sure that the aileron cable retention plate is in place on the root guide and tighten the two bolts.

FIGURE 05D-05

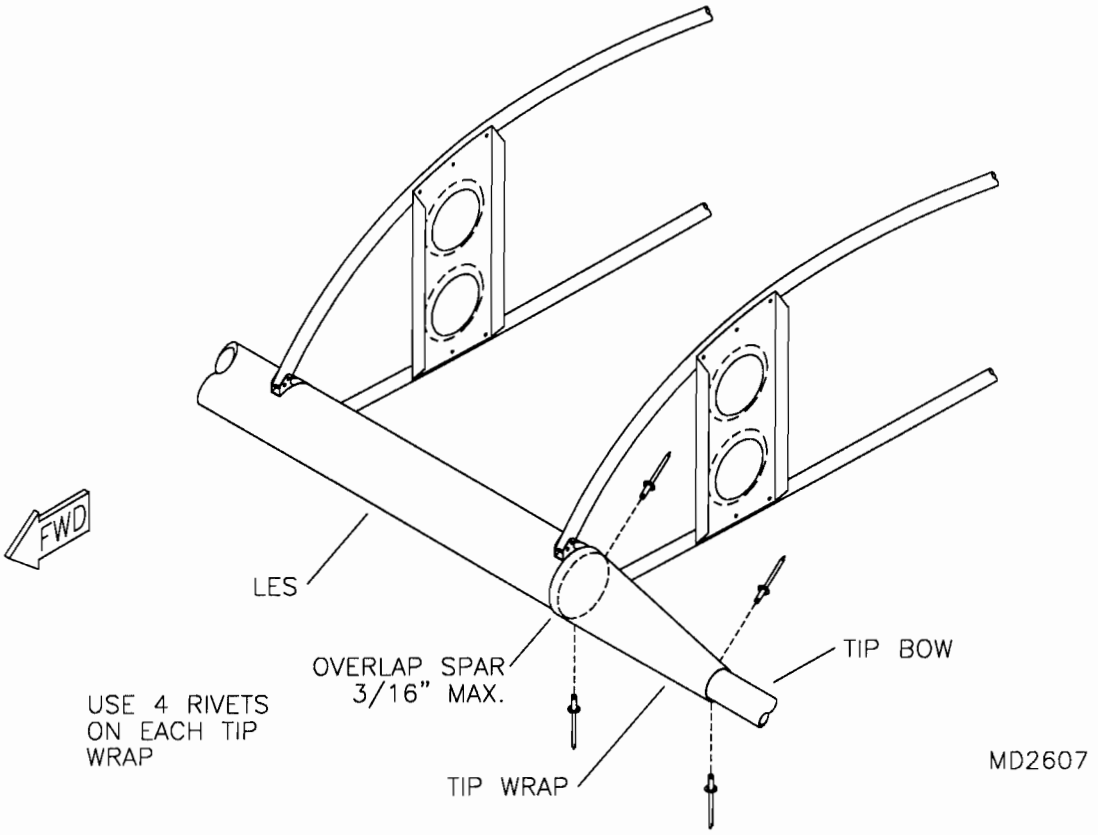


S-7 WING - SHEET METAL INSTALLATION

(REFER TO PARTS PAGE # 005-13 FOR PARTS SELECTION)

1. Install the tip wrap prior to the installation of the leading edge wrap. By using the 1" tubing of the tip bow form each wrap into a tapered conical shape. Each wrap should fit snug around both the very tip of the leading edge spar and the tip bow. Position the wrap around the spar and tip bow as shown in **FIGURE 05E-01**. Mark the hole locations on to the tip wrap, remove the tip wrap, pre drill with a #40 drill bit and cleco the tip wrap in place. Remove the clecos one at a time and transfer drill with a #30 drill bit through the spar and tip bow and rivet with aluminum pop rivets.

FIGURE 05E-01



2. The top and bottom root skins are pre drilled at the factory. **NOTE:** There is a left and right hand as well as a top and bottom side to the top and bottom root skins.

To assemble the stiffeners to the top root skin, cleco the stiffeners to the **BOTTOM SIDE** of the root skin top. Transfer drill using a #30 drill bit through both the root skin top and the stiffener. Remove the stiffeners Debur and rivet them to the skin using the specified rivets. Refer to the parts drawing.

Position the top root skin so that the rivet holes are on centerline of the ribs. The root skin should extend past the top centerline of the trailing edge spar by ⅛". The fuel tank filler neck should be nearly centered in the hole. Transfer drill using a #30 drill bit through the root skin top into each rib, use clecos to retain the skin.

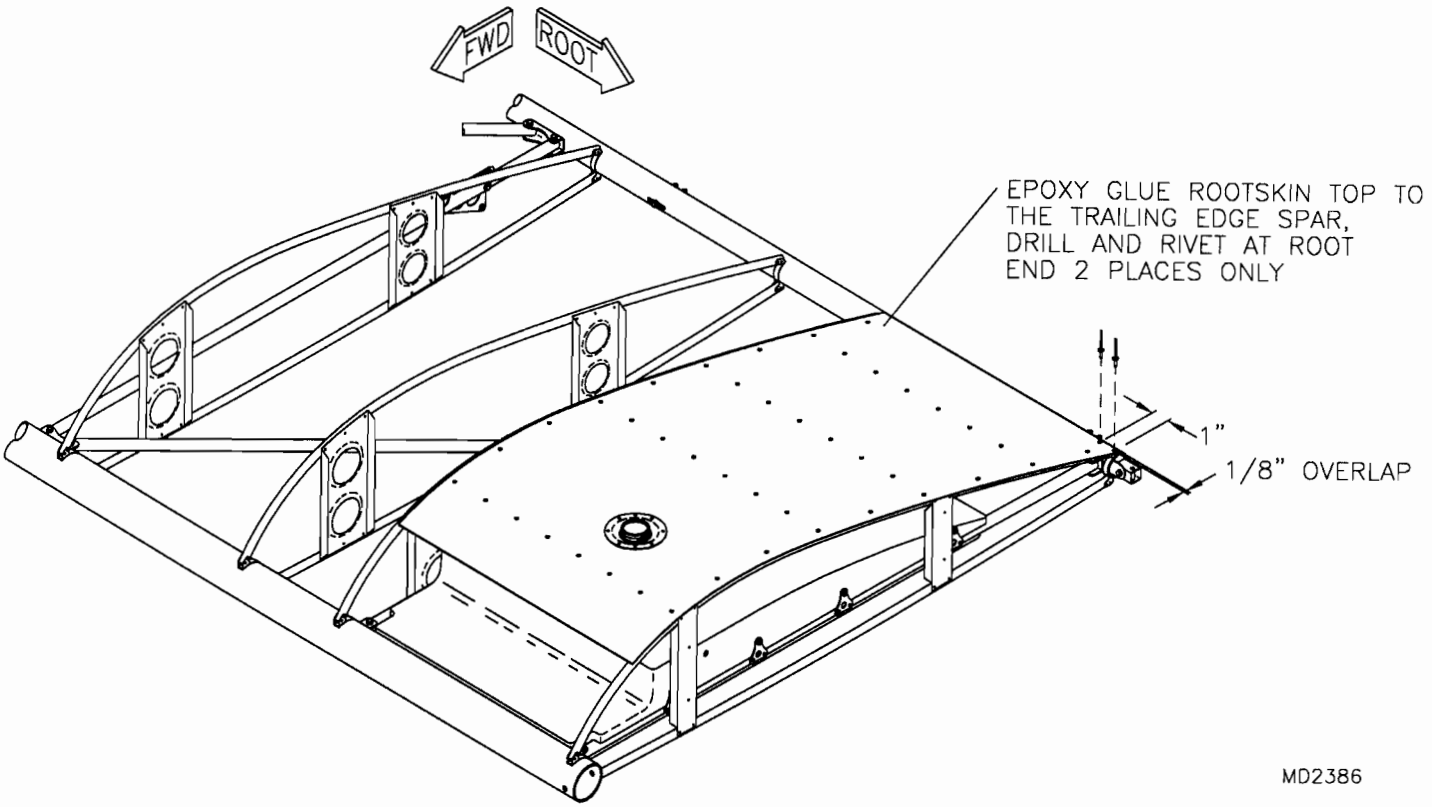
It is important to note that only two holes are drilled in the root of the trailing edge spar. **DO NOT** locate or drill any other holes in the spar, structural damage to the spar will result.

Using the aft edge of the root skin as a guide, mark a line on the trailing edge spar. After all holes have been drilled, remove the root skin, Debur and remove all shavings. Remove the anodizing on the trailing edge spar in the contact area **ONLY**. Rough up the ⅛" contact area of the root skin. **NOTE:** if you have opted to pop rivet in place of rib lacing, prior to riveting the root skin in place, apply double stick tape to the top of the second rib. When riveting the skin in place, only rivet to the root rib. The rivets

in the second rib will be installed after the wing is covered. Rivet the root skin top everywhere but the last 3 rivets in each rib near the trailing edge. These rivets will be installed after the aft edge is bonded to the spar.

With the root skin riveted in place, position the scupper so that it is centered around the fuel filler neck. With a #30 drill bit transfer drill through the perimeter holes in the scupper into the root skin. **CAUTION:** When drilling the scupper, use a drill stop to prevent drilling into the fuel tank. Cleco in place only, at this time. The painted scupper will be installed final, after the wings are covered and painted. See **FIGURE 05E-02**.

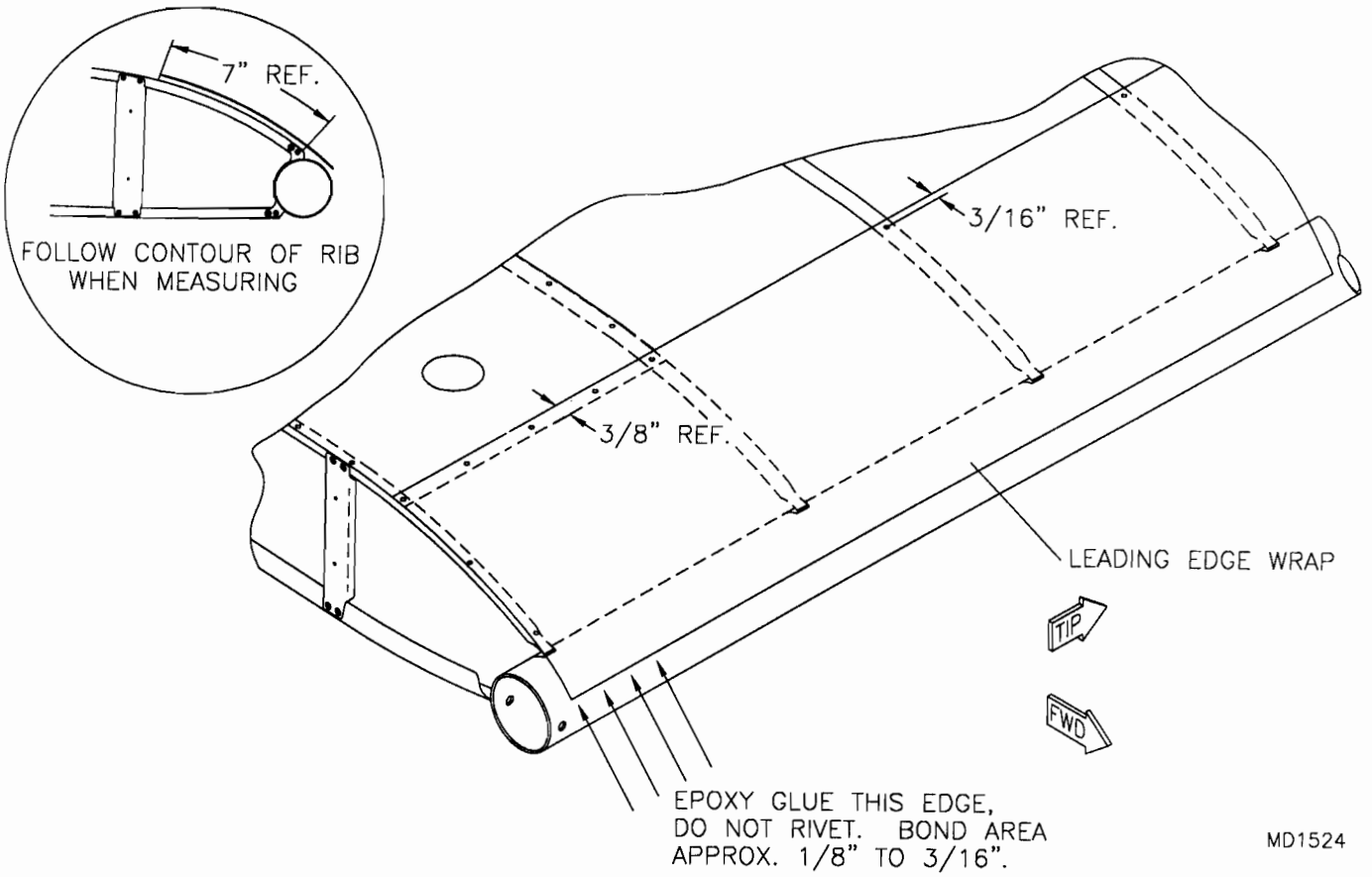
FIGURE 05E-02



3. Install the bottom root skin following the same procedure for the top. **NOTE:** The bottom root skin does not have stiffeners. Again, if you are using the optional pop rivets to retain the covering, do not rivet the skin to the second rib until after covering. Bond the top and bottom root skins to the trailing edge spar at this time, or bond them with the leading edge wrap. Refer to paragraph 7 for bonding instructions.

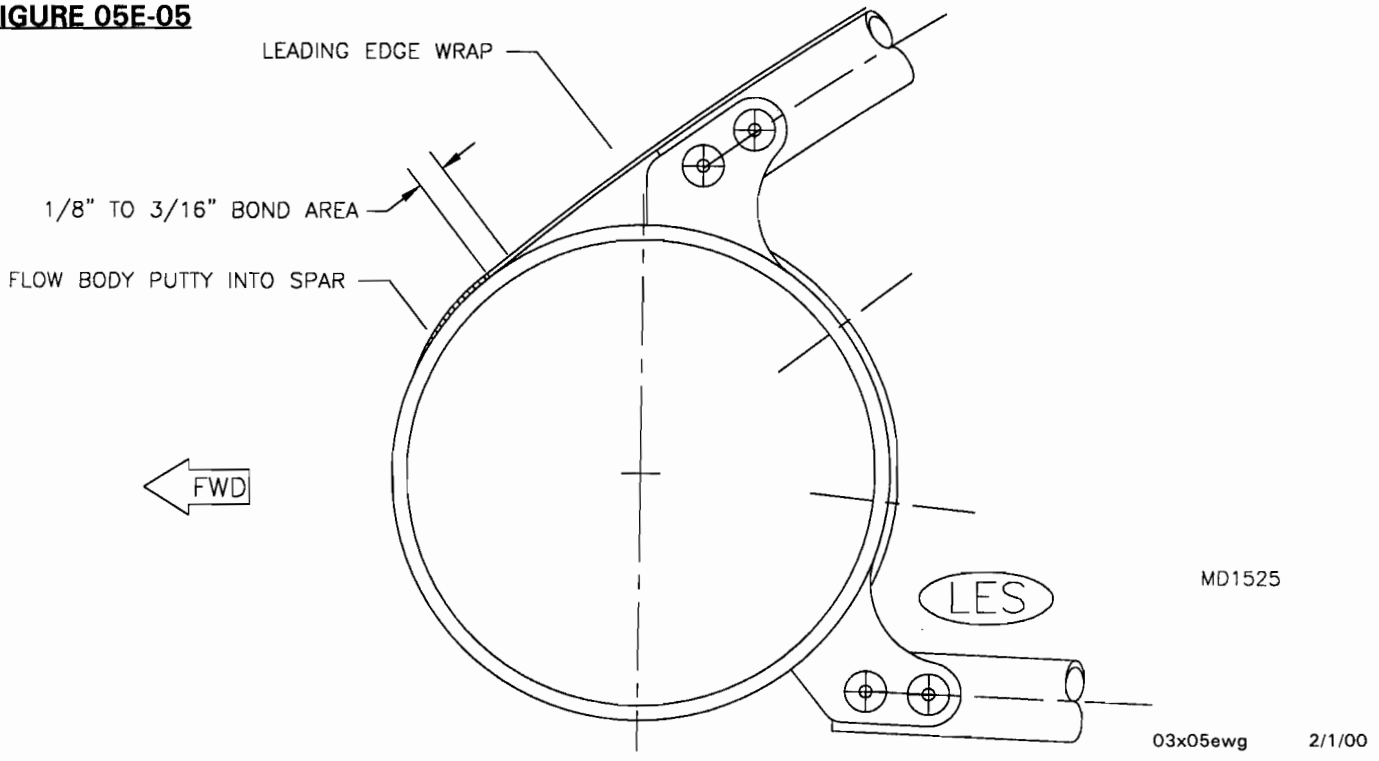
4. Unroll each leading edge wrap and lay it carefully in the position illustrated in **FIGURE 05E-04.** Fit the wrap so that it is flush with the outer radius of the root rib. Mark and trim off any excess length at the tip. The tip end should also be flush with the outer radius of the tip rib.

FIGURE 05E-04



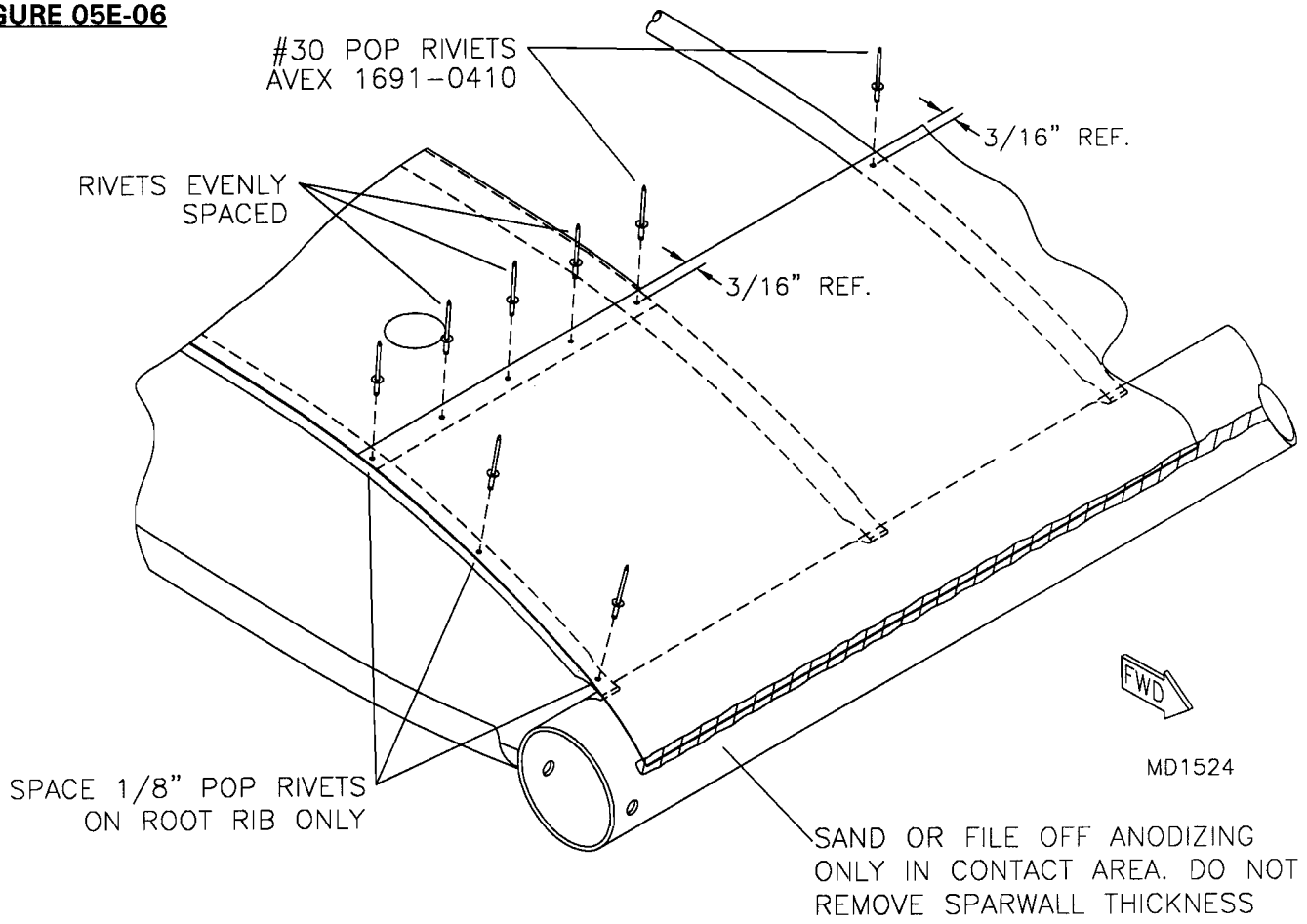
5. Take special note of the forward and aft position of the leading edge wrap. The 7" measurement is a reference measurement from the forward end of the top rib, and is measured following the top centerline contour of the rib. The wrap should overlap the root skin top approximately ⅜". In its correct position, the leading edge wrap should flow into the leading edge spar and contact it with only an ⅛" bond area. See **FIGURE 05E-05.**

FIGURE 05E-05



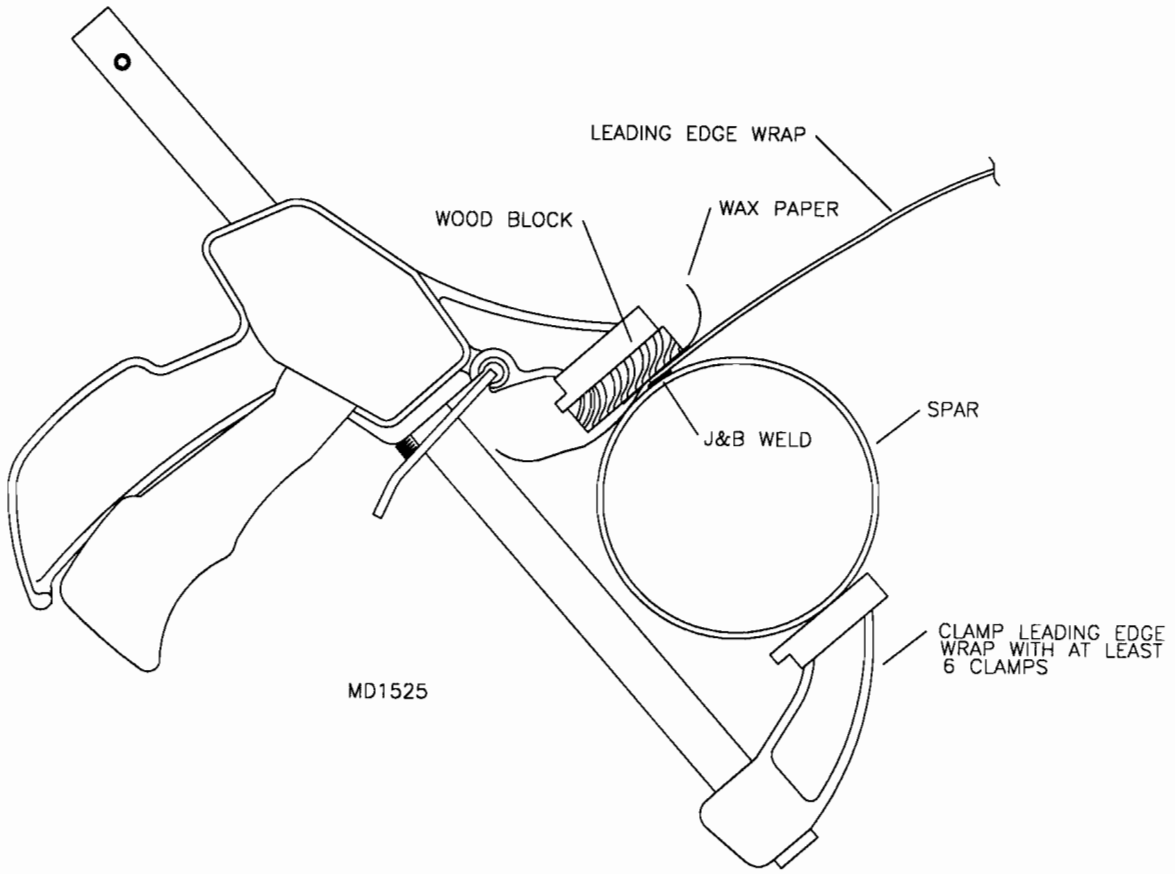
6. With the leading edge wrap correctly positioned, locate and drill a #30 hole through the leading edge wrap aft edge and into each rib on centerline. Maintain a 3/16" edge distance. Refer to **FIGURE 05E-06**. With the leading edge wrap clecoed in position to the top ribs, pull the wrap down tight against the ribs. Using the wrap as a guide, mark a line along the length of the spar. Remove the wrap, carefully file away the anodizing in the area that the wrap bonds to the spar **ONLY**. Use 80 grit sandpaper to rough up the bond area on the leading edge wrap. See **FIGURE 05E-06**.

FIGURE 05E-06



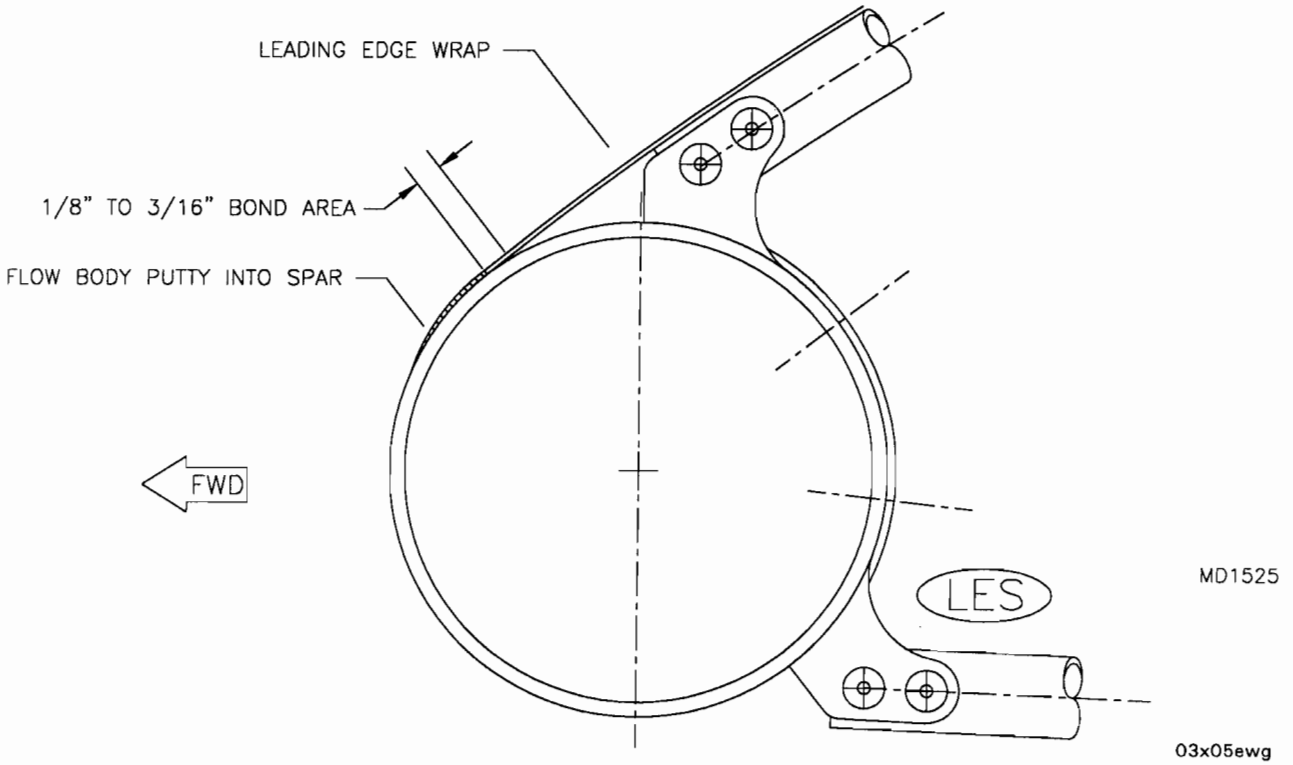
7. Cleco the leading edge wrap in place on the wing. Use the J&B Epoxy to bond the wrap to the spar. **IMPORTANT:** the wrap is retained to the spar with **ONLY** the epoxy, it is important that you make a good bond between the wrap and the spar. **DO NOT** drill or install any rivets into the spar. **HINT:** an easy method for applying the J&B Epoxy to the spar is to mix a sufficient amount of epoxy and put into a small plastic bag. Cut a small hole in the plastic bag and squeeze out a small bead of epoxy for the length of the spar in the bond area. Use a long straight board (1x2x144") and several (6 min.) "C" clamps (or similar devices, we prefer stanley cushioned quick clamps) to retain the wrap in position until the epoxy cures. A piece of wax paper between the board and the wrap will prevent the board from being bonded to the wrap. Placement of the board and clamps on the wrap when clamping is critical so as not to deform the wrap. Clamp only to the bonded area. See **FIGURE 05E-07**.

FIGURE 05E-07



8. After the epoxy has cured, remove the clamps and board. Clean off any excess epoxy from the wrap and spar. Remove the clecos retaining the leading edge wrap to the ribs and rivet with the correct rivets. Use a small amount of body putty to form a smooth transition from the wrap to the spar. See **FIGURE 05E-08**. Rivet the wrap to each rib.

FIGURE 05E-08



9. With the wings bottom side up, measure forward 3 ¾" from the aft edge of the leading edge wrap and mark on the under side of each rib. Starting with the second rib from the root measure the distance between each rib. Cut the raw stock tubing (½"x.028) to fit between each rib. Position each piece of tubing centered on the marks. Locate each gusset as shown in **FIGURE 05E-09**. Transfer drill through the gusset into each rib and rivet the gussets to the ribs. Holding each support tube in place, transfer drill through the gussets into each support tube and rivet in place. See **FIGURE 05E-09A**. **NOTE:** Fabricate the end gussets as shown in **FIGURE 05E-09B**.

FIGURE 05E-09

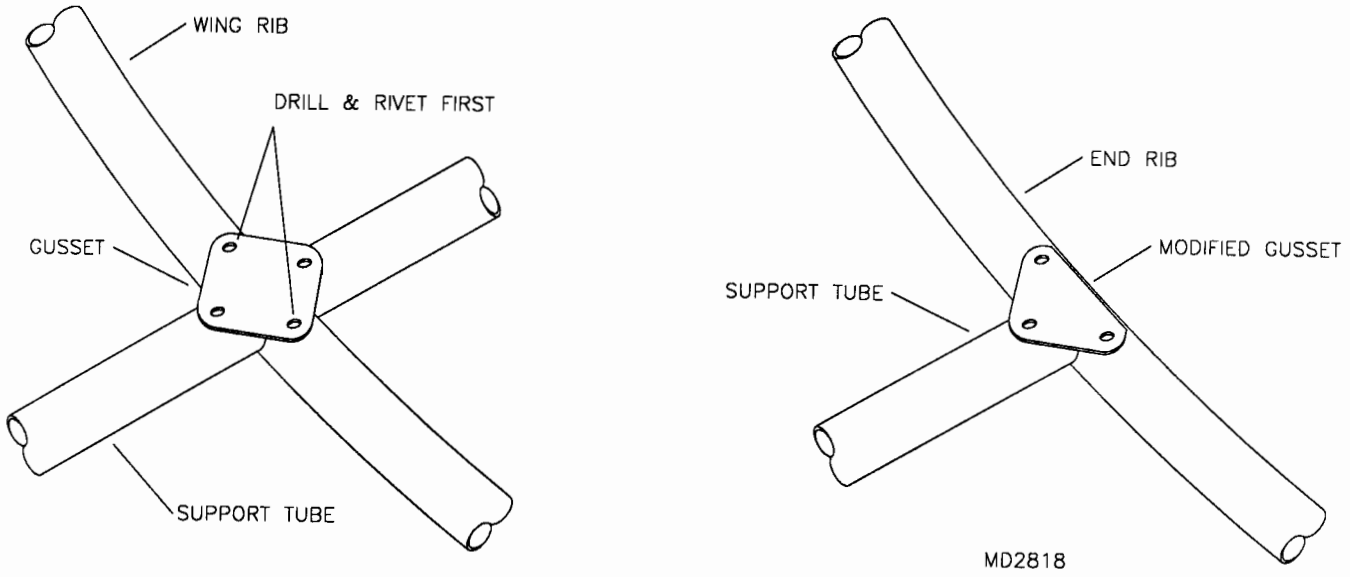


FIGURE 05E-09A

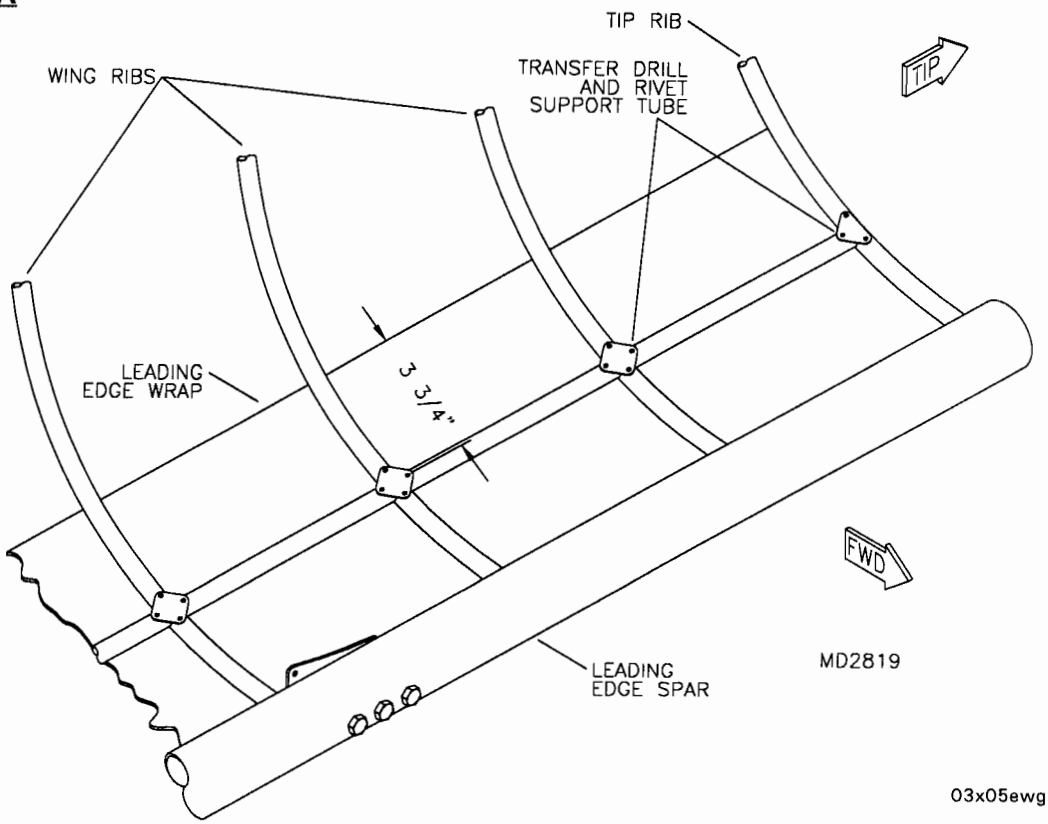
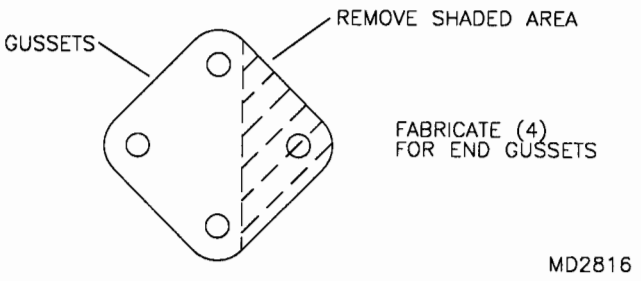
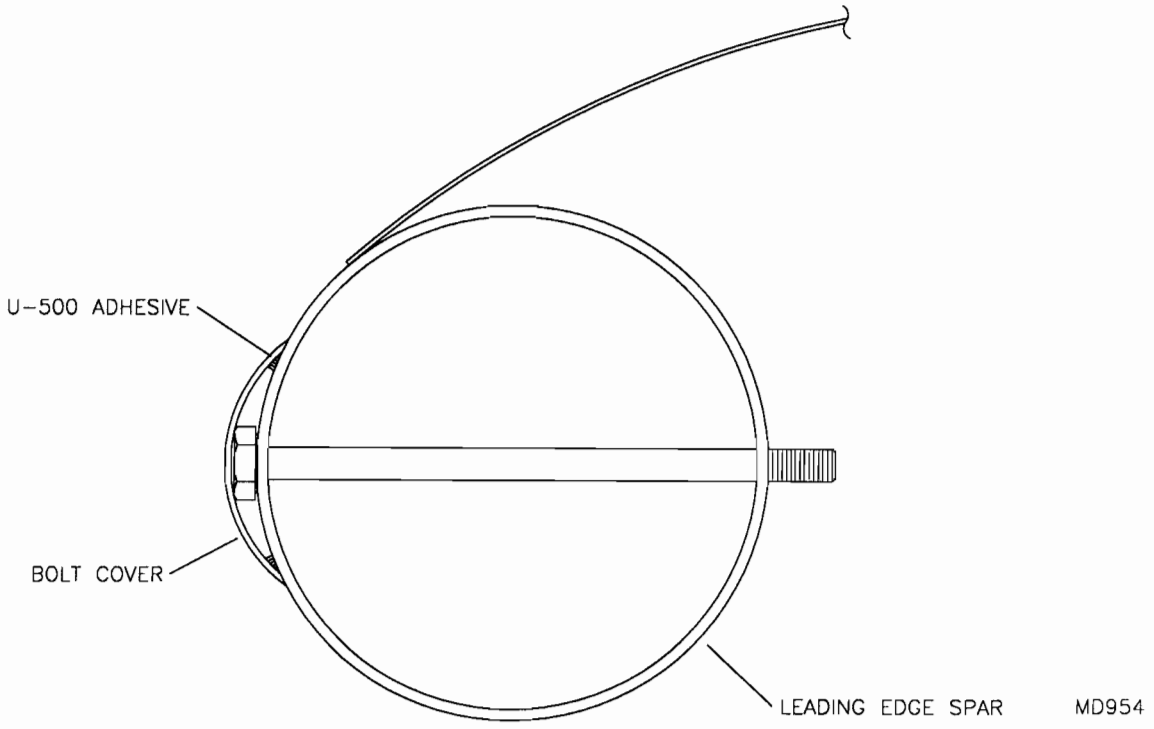


FIGURE 05E-09B



10. Trim the bolt cover as shown in **FIGURE 05E-10**. Use the U-500 adhesive provided in your kit to bond the cover to the spar. If you prefer, rather then mixing up a small quantity of glue at this time, install the bolt cover when covering the wings.

FIGURE 05E-10



S-7 WING - PITOT/ STATIC AND FLAP TELEFLEX INSTALLATION

(REFER TO PARTS PAGE # 005-04 & 005-13 FOR PARTS SELECTION)

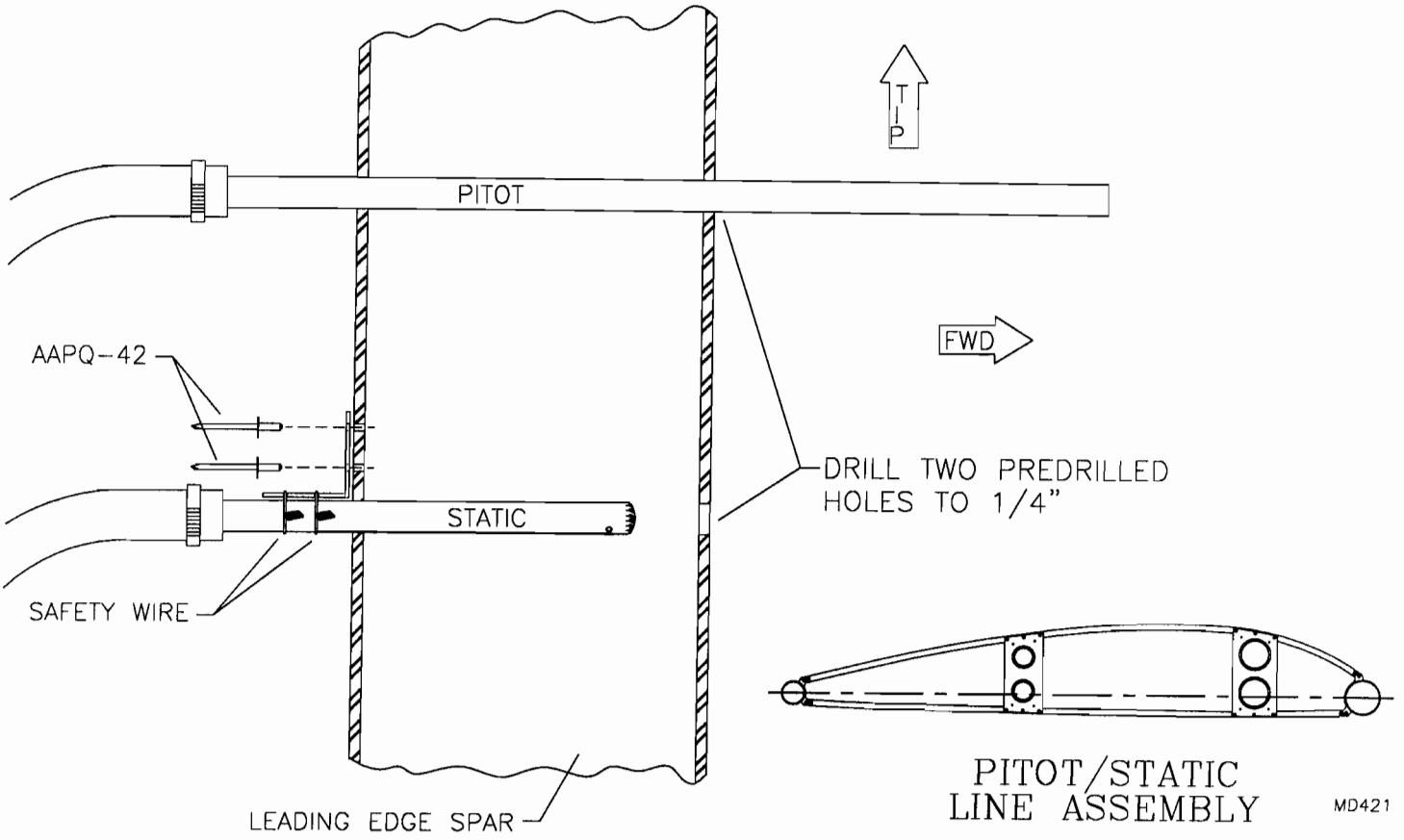
1. Locate the two predrilled #40 holes for the pitot and static tubes approximately 8" and 10" in from the tip end of the **LEFT HAND** leading edge spar and drill out both holes to ¼".

From the sealed domed end of the static tube, measure 4" and cut the excess length off. Insert the static tube into the inboard most hole so that it extends into the leading edge spar 1 ½" . Position the aluminum L bracket next to the static tube as shown in **FIGURE 05F-01**. With a #30 drill bit, transfer drill through the L bracket into the spar and rivet in place. Safety wire the static tube to the L bracket.

Install the pitot tube completely through the outboard most hole. Attach the static and pitot line to both the static and pitot tubes in the spar. Route both lines as shown in the parts drawing. Both lines should rest on top of the internal compression tubes and exit the wing at the trailing edge with approximately 18 to 24 inches extending beyond the root of the wing. Using zip ties, loosely tie the lines to the compression tubes in 2 or 3 locations. Be very careful to not pinch or restrict these lines with the ties.

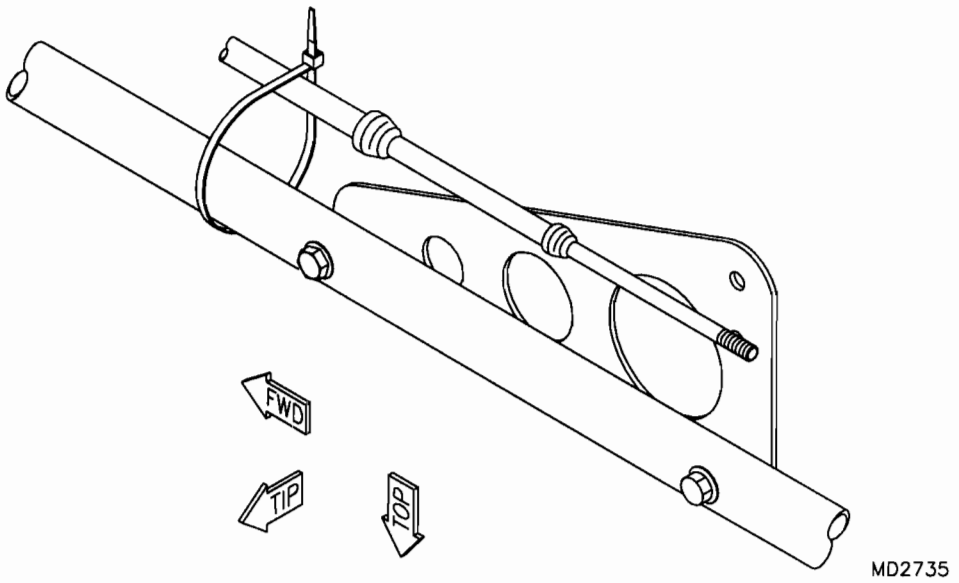
IMPORTANT: For accurate airspeed readings the static probe must be set inside of the spar tube. The airspeed should be checked against a timed mile flown in no wind. Pitot tube must extend out of spar at least 8". When folding wings, pitot tube can be pushed into wing with 1" extended. Return to the 8" mark before flight.

FIGURE 05F-01



2. Locate both flap teleflex cables. Install and route both teleflexes as per the parts drawing. Do not bolt the teleflexes into there retainers at this time. Instead, loosely zip tie the end of the teleflex to the flap compression tube to allow for covering of the wing. See **FIGURE 05F-02.** The teleflex will be pulled through the bottom of the wing after the wing is covered and painted. Do not secure the teleflex in any other manner.

FIGURE 05F-02



3. This completes the assembly of the wings. Please inspect your work closely prior to covering. Be sure to complete the pre cover check list located at the beginning of the covering section. **NOTE:** if you have purchased the optional strobes and nav lights, you must install the wiring and mount plates prior to covering. See the options section of this manual.

S-7 WING - AILERON & FLAP FRAME ASSEMBLY

(REFER TO PAGE # 005-15 & 005-17 FOR PARTS SELECTION)

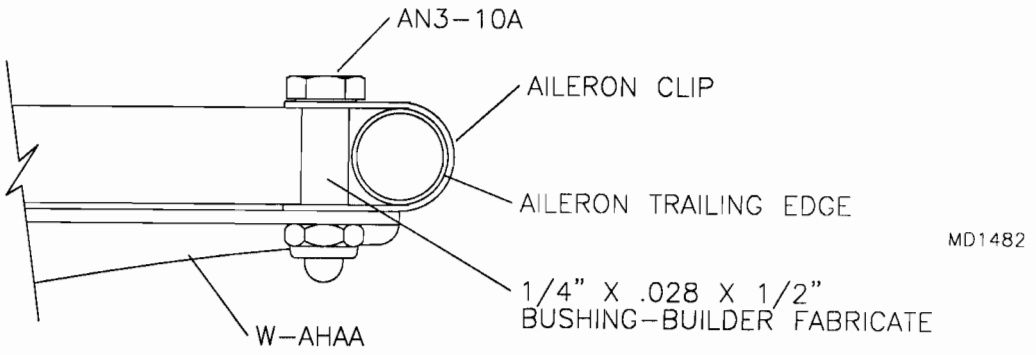
PRE-COVERING ASSEMBLY

1. All hinge and control horn hole locations are predrilled in the leading edge spar of each flap and aileron frame. Prior to covering the ailerons and flaps, drill all holes to a #11. Install the 3 nut plates to the interior side of the leading edge spar as shown in the parts drawing. Retain the trailing edge spar into the compression tubes with masking tape wrapped around the trailing edge spar and onto the compression tube. The flaps and ailerons are now ready to cover. After covering and painting, refer to this section for final assembly and installation of the flaps and ailerons.

AILERON & FLAP FINAL ASSEMBLY AND INSTALLATION

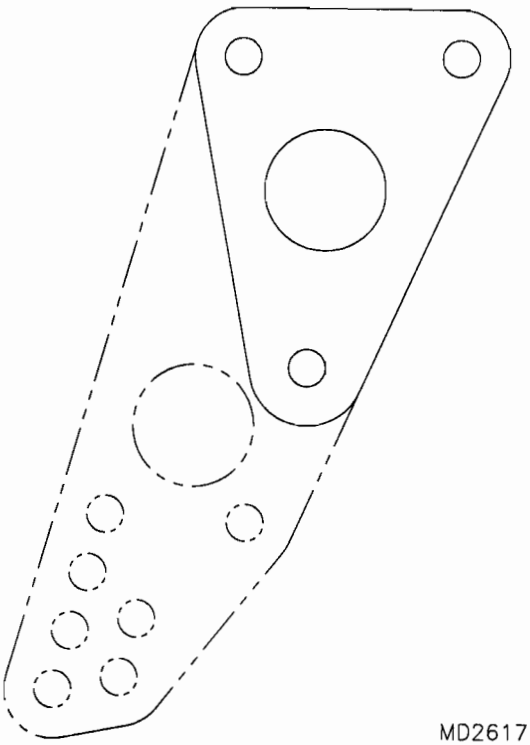
2. Assemble the control horn attach angles to the ailerons and flaps. The vertical flange of each angle should be toward the tip end. Locate the aileron clip and ¼" X ½" bushing on the trailing edge spar 90 degrees to the leading edge spar and straight in line with the vertical forward attach hole. See **FIGURE 05G-02.**

FIGURE 05G-02



3. The unihorn must be modified prior to its installation. Locate the flap unihorns and modify as shown in **FIGURE 05G-03**. Assemble the unihorns to the flap horn attach angle.

FIGURE 05G-03



4. Install the hinges onto the wings, flaps and ailerons and attach the flaps and ailerons to the wings using the hardware called out in the parts drawing. The flaps and ailerons may be shifted to either side of the hinges to achieve the best spacing. Place a small drop of light machine oil on each hinge. Ailerons and flaps must hinge freely, do not over tighten the hinge bolts. Prior to connecting controls, test the aileron and flap by holding the surface up by the trailing edge and letting go. The aileron and flap should swing freely.

GAP SEAL INSTALLATION

5. Install the flap and aileron gap seal prior to attaching the teleflex and push pull tube. The PVC gap seal material can be used in it's natural white color or painted. Use the same paint and primer as used on the fabric. If you plan on painting the gap seals, use small self tapping screws to pre fit the gap seal prior to painting. The screws may be used in place of the rivets for permanent assembly. If you want to use rivets for final assembly, be sure to use a screw smaller in diameter than the rivet during fit up of the gap seal.

Use several pieces of masking tape to retain the flap and aileron out of the way. See **FIGURE 05G-05**. Measure the distance between the hinges and cut the gap seal to length with 45 degree miters on each end. See **FIGURE 05G-05A**.

FIGURE 05G-05

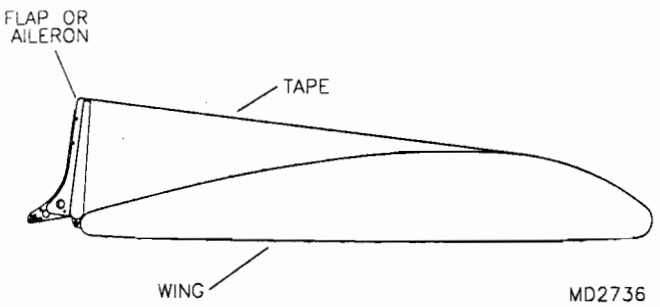
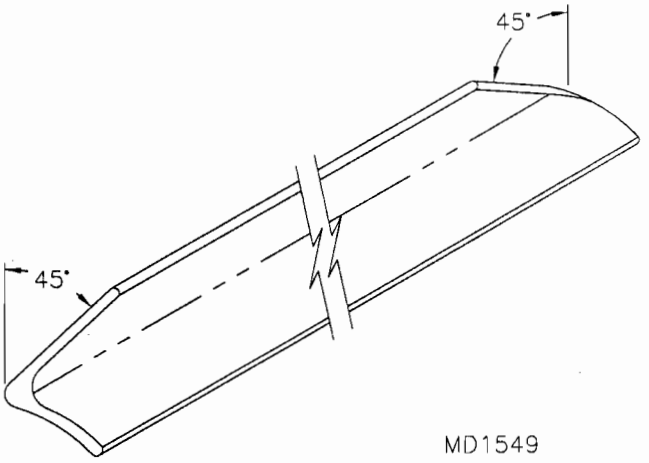
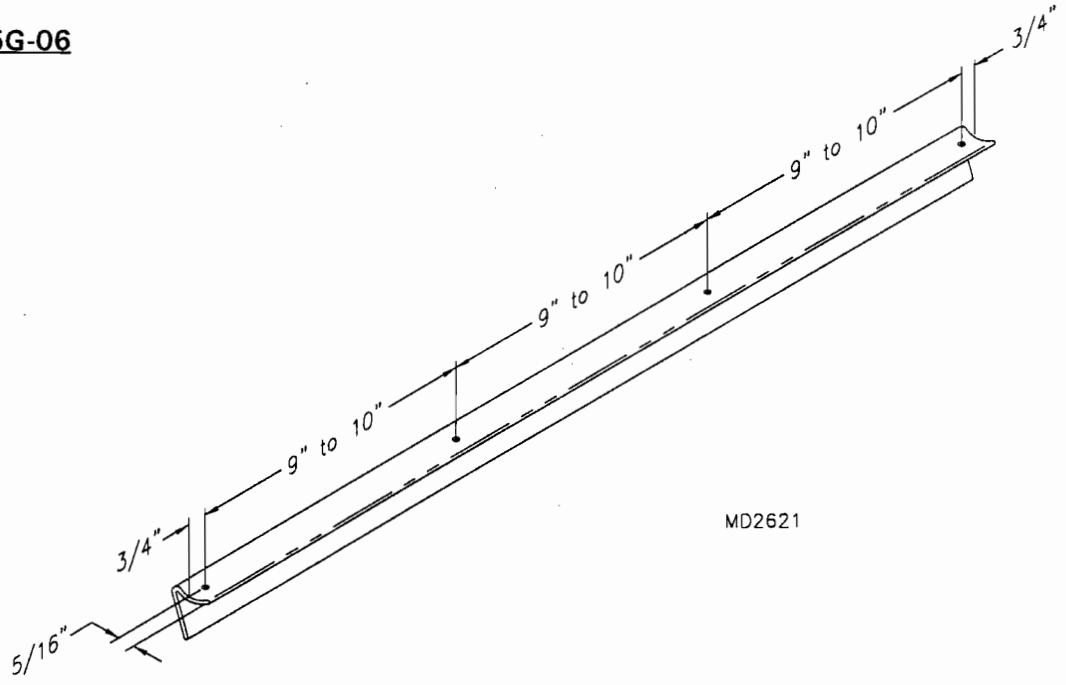


FIGURE 05G-05A



6. With a #40 drill bit, pre-drill each piece of gap seal as shown in **FIGURE 05G-06**. Hole and rivet locations for each piece of gap seal will vary according to length. Maintain a ¾" edge distance on each end and a 9 to 10 inch rivet spacing thereafter. A 5/16" edge distance should be maintained to allow for riveting.

FIGURE 05G-06



7. Position the gap seal so that it is centered between the hinges and lined up with the hinge line. See **FIGURE 05G-07**. **HINT:** Use two way tape to hold seals in position. In areas where bolt heads will not allow the gap seal to rest flat against the trailing edge spar, either cut away the concaved side of the gap seal or drill a ⅝" hole to allow clearance of the bolt head. See **FIGURE 05G-07A**.

FIGURE 05G-07

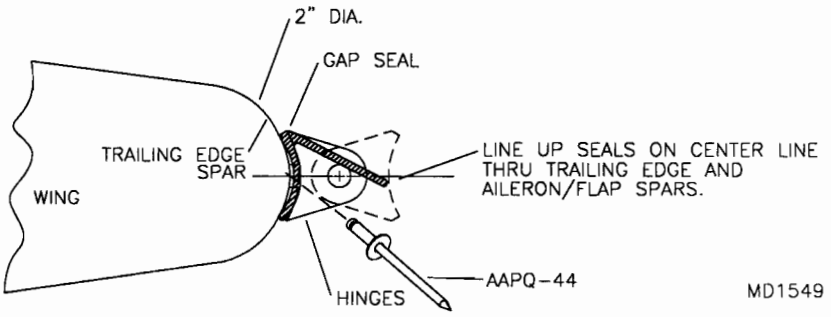
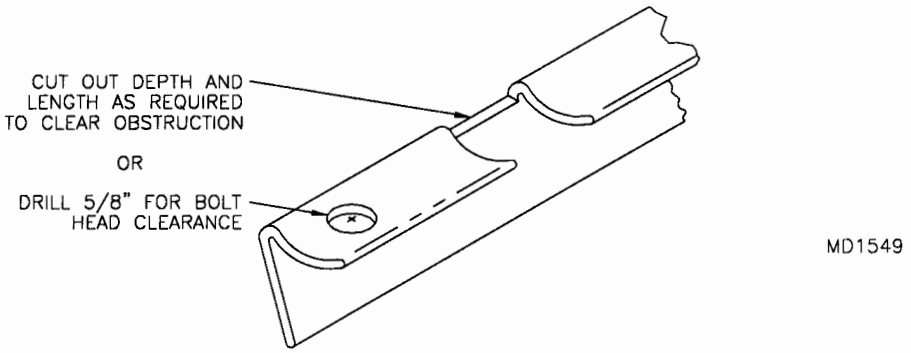


FIGURE 05G-07A



8. With a #30 drill bit, transfer drill through the gap seal and into the trailing edge spar and cleco in place. When all holes have been drilled, remove the gap seal, debur and remove all shavings. If you have chosen to paint your gap seal screw the gap seal in place, otherwise, install rivets.

For best performance install the gap seal even in the short segments at the wing root and tip.

9. The flaps and ailerons must move freely without rubbing on the gap seals. Final fit the gap seal by filing, sanding, or planeing until proper clearance is obtained. A miniature wood plane works great to shave off excess material. If painting the seals, after proper clearance is achieved, unscrew and scratch or stamp a number into each seal, in order from the left hand tip to the right hand tip. This will help when re-installing to place the seals in the correct locations.

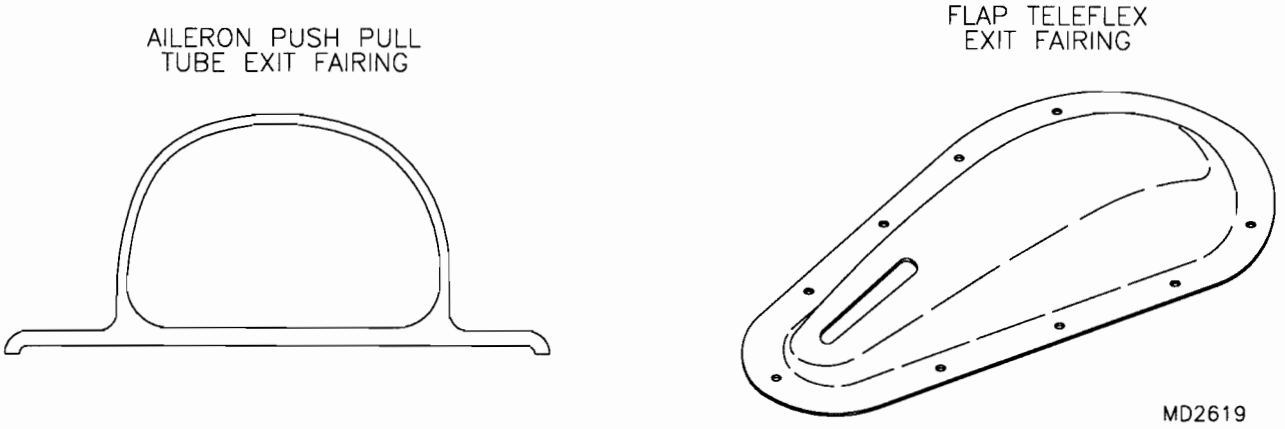
CONNECTING THE FLAPS/AILERONS & SPADE ASSEMBLIES

10. With a sharp razor blade, cut out the openings for both the flap teleflex and the aileron push pull tube on the bottom side of the wing. Use the inside edge of the lexan rings as a trim guide.

Working through the flap teleflex opening, pull the teleflex cable through the opening and install the teleflex retainer bracket. Refer back to the wing-main structure parts drawing for hardware call out.

Position the flap teleflex exit fairing over the lexan ring on the wing. Refer to the covering section for details on trimming the exit fairing. Determine where the teleflex cable will exit the fairing and cut a small slot in the fairing at this location. Refer to **FIGURE 05G-10.** Slide the fairing over the teleflex and fasten to the ring using the #4 X ¼" screws called out in the parts drawing. Install the female rod end on the teleflex and attach to the flap horn.

FIGURE 05G-10



11. Assemble the aileron horn spade assembly as per **Figure 05G-11.** Attach the spade assembly to the aileron using the hardware called out in the parts drawing. The spade is designed to allow a ± 3° angle adjustment. The spade will be adjusted during initial flight tests.

12. Locate and drill (2) #11 holes for the lead weight as per **Figure 05G-12.**

FIGURE 05G-11

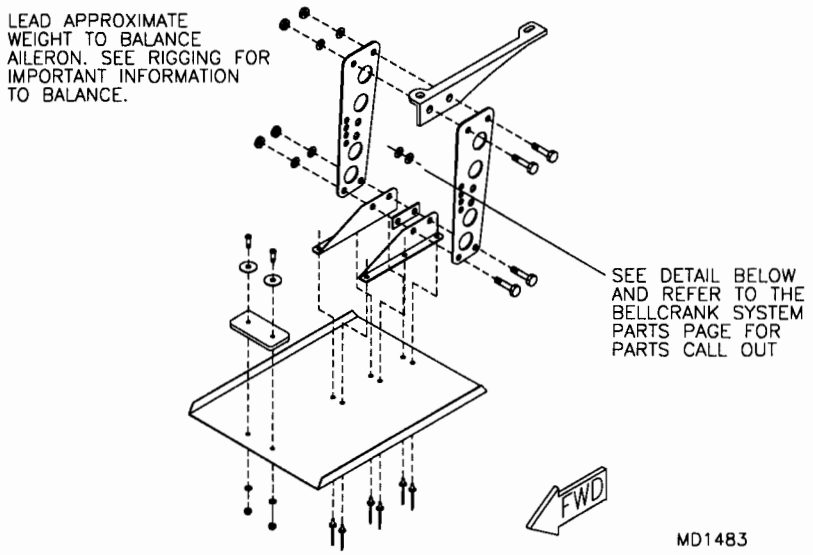
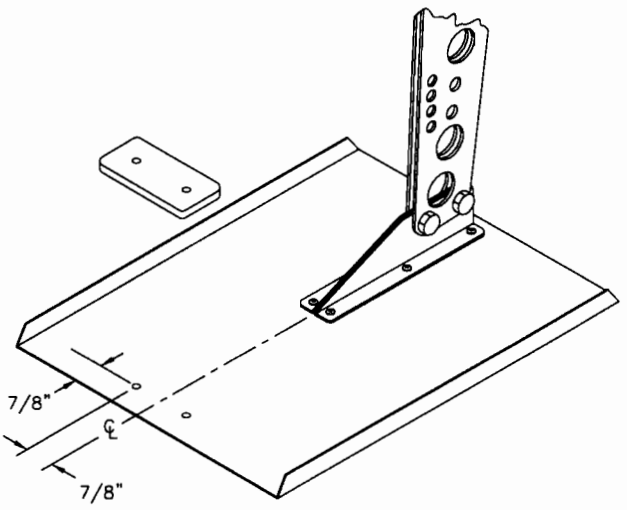


FIGURE 05G-12

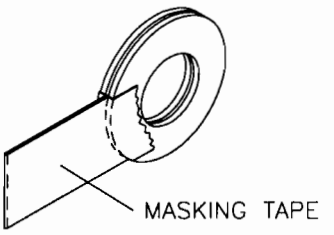


13. If you have not already assembled the aileron push pull tube, do so at this time. Refer to the bellcrank system section for parts call out and instructions. Thread the push pull tube onto the male rod end on the bellcrank.

Slide the aileron push pull tube exit fairing over the push pull tube and fasten to the wing using the same procedure as for the flap teleflex exit fairing. Refer to the covering section for trimming instructions.

Thread the male rod end and jam nut onto the end of the push pull tube. Attach the push pull tube to the aileron control horn. Remember to install the 2 plastic washers between the control horns. Refer to the bellcrank systems for part call out. **HINT:** tape the washers to a piece of masking tape to allow easy insertion between the horns. See **FIGURE 05G-13**.

FIGURE 05G-13



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14. Rigging of the ailerons and flaps will be done once the wings are attached to the fuselage and the cables connected. The aileron horn features 4 holes for attaching the push pull tube. By selecting the lowest hole you lighten the stick pressure but lessen the aileron displacement. This in turn slows the roll rate. To start, use the second hole from the top. You may want to experiment with the "feel" during flight test.

S-7 LIFT STRUTS ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 005-19 FOR PARTS SELECTION)

INSPECTION OF THE AIRFOIL LIFT STRUT

RANS airfoil lift struts are made of extruded aluminum. Extrusions of this nature are sensitive to deformation. Cracks and splits can occur along the length of the strut if the ends are compressed beyond the material limits. Over-tightened bolts can cause cracking. A compression bushing or fitting large enough to equal the struts inside diameter should be used. Remove any burrs on the bushings.

Each piece of strut material is inspected twice before shipment to assure you of a quality product. However, we are not infallible, therefore, we encourage you to inspect your struts for any deformation or surface imperfection. Deeply grooved struts should not be used and returned to the factory for replacement. The surface should look and feel smooth.

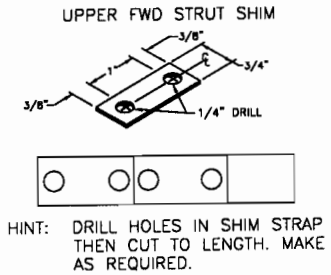
Dents and nicks can occur during shipping. The strut material is very thick skinned and resistant to dents. If dents are present they will usually be large enough to require rejection of the material.

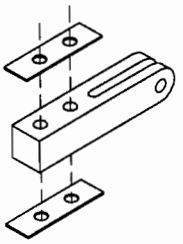
Minor nicks and scratches can and should be sanded out with 250, 350, and finally 400 grit wet or dry sandpaper. Sanding out such defects is an effective way of restoring the strut to a safe full strength status. Any nicks or scratches that require more than light sanding are cause for rejection.

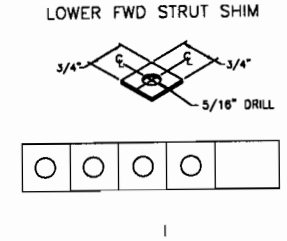
Once the struts are in service, continued inspection is the only required maintenance. Anodized strut material is resistant to corrosion and needs little care. The inside of the strut can be protected by pouring a quantity of paint inside the strut and rotating to cover the entire surface.

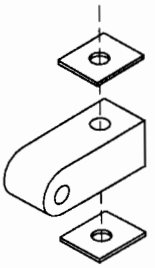
Include strut inspection in your pre-flight.

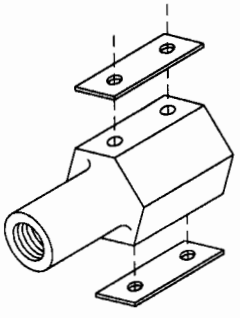
NOTE: Due to dimensional variation in extruded material it may be necessary to shim the strut fittings. No gap should exist between the fittings and the struts. If a gap exists, **IT SHOULD NOT BE ELIMINATED BY TIGHTENING DOWN THE BOLTS.** This action may crack the struts. Instead, fabricate and use the .020 shim material between the fitting and the strut. Refer to the following drawing.

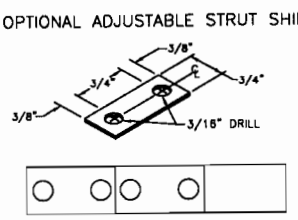












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S-7 STRUT ASSEMBLY

NOTE: The lift struts are cut to length at the factory. Do not alter the length of the lift struts unless you are installing an adjustable lift strut kit, in which case the **AFT** lift strut only will need to be cut to the specified length.

1. Locate and mark the upper and lower fitting holes on the **FORWARD** lift struts as shown in **FIGURE 05H-01**. Use the template provided to mark the chordwise location of each hole. See **FIGURE 05H-01A**. Use the same leg of the template to mark both the upper and lower holes. Make a mark approximately 6" long when marking the lower end. See **FIGURE 05H-01B**. Carefully drill each hole to the diameter called out in **FIGURE 05H-01**. **HINT:** Use the step drill method or a brad bit to ensure tight hole tolerances. Bolt the upper fitting into the lift strut. Refer to the parts drawing. Drill out the lower hole in the gussets to 5/16" and bolt the gussets and lower fitting onto the lift strut as shown in **FIGURE 05H-01C**. Note the correct orientation of the gussets. Position the gussets so that the chordwise mark falls in the center of the three #30 holes. Transfer drill through the holes in the gussets and rivet.

FIGURE 05H-01

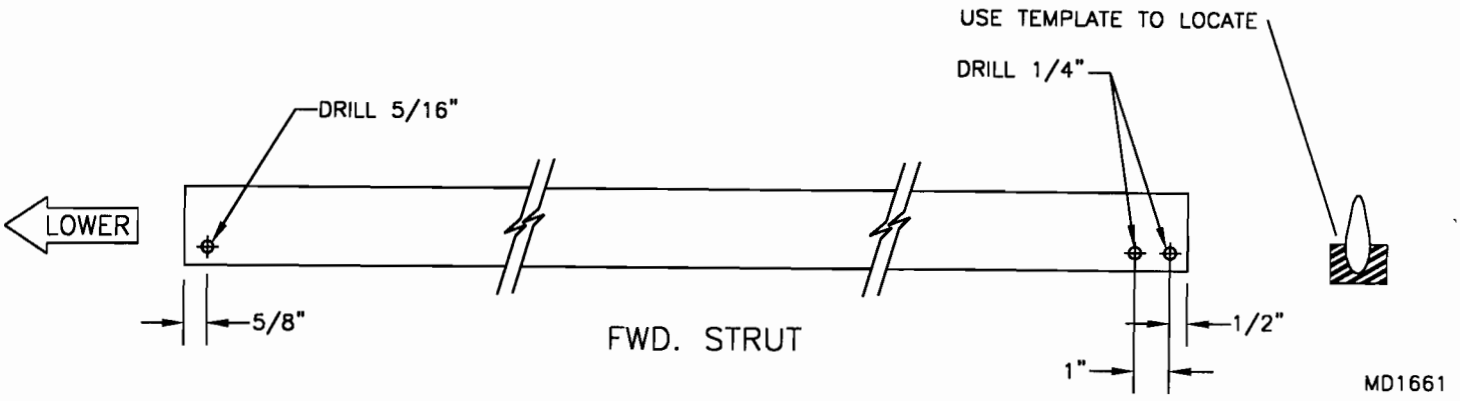


FIGURE 05H-01A

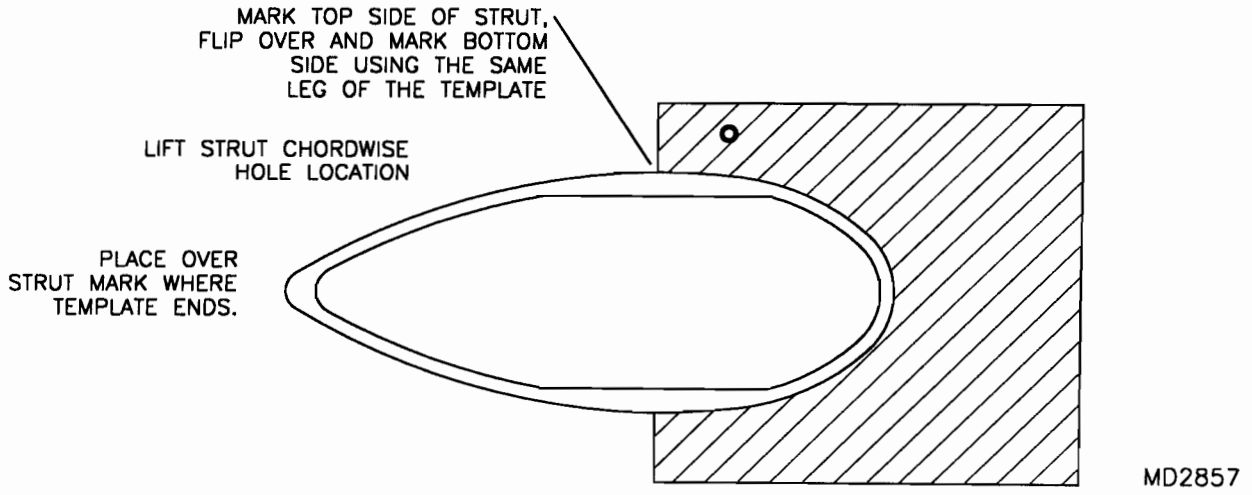


FIGURE 05H-01B

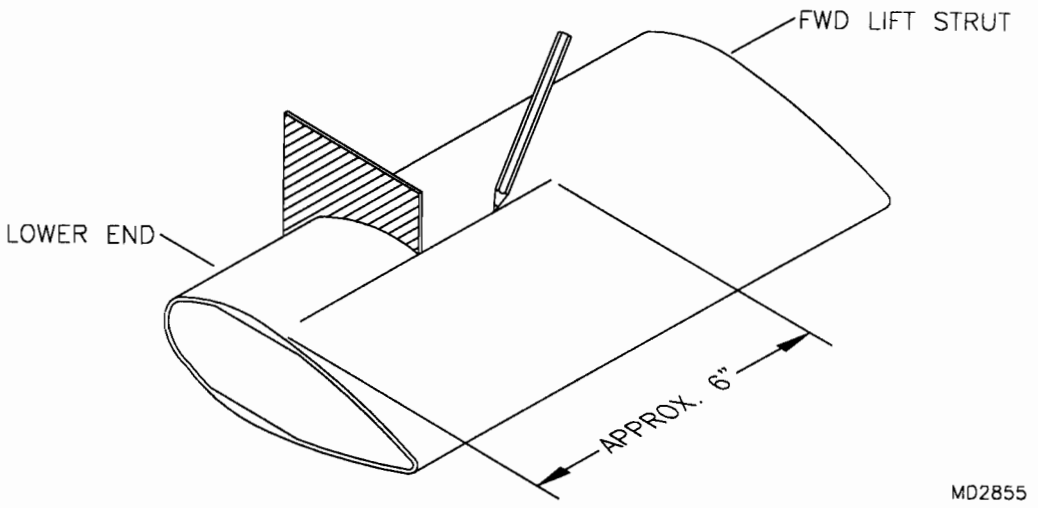
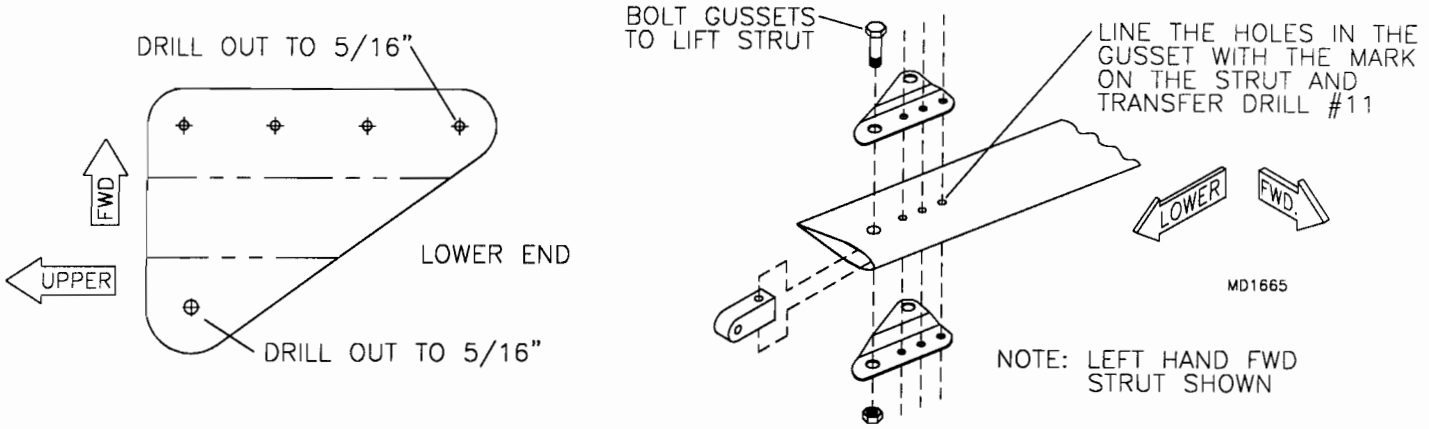


FIGURE 05H-01C



AFT LIFT STRUT ASSEMBLY

2. Cut the aft lift strut to the length shown in **FIGURE 05H-02**. Locate and drill the upper and lower fitting holes as shown in **FIGURE 05H-02A**. Use the chordwise template to locate the holes. Install the fittings as shown in the parts drawing. Install the rod end with jam nut into the adjuster fitting. Refer to the rigging section for the installation and adjustment of the aft lift strut. Refer to the jury strut section for the installation of the jury struts.

FIGURE 05H-02

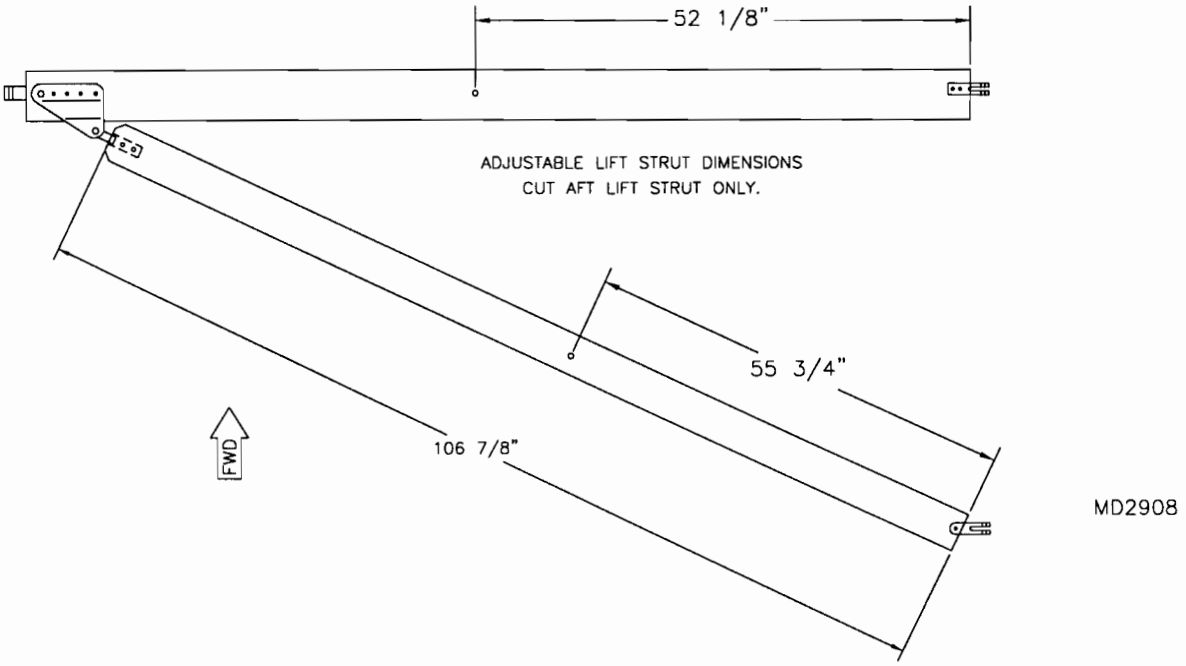
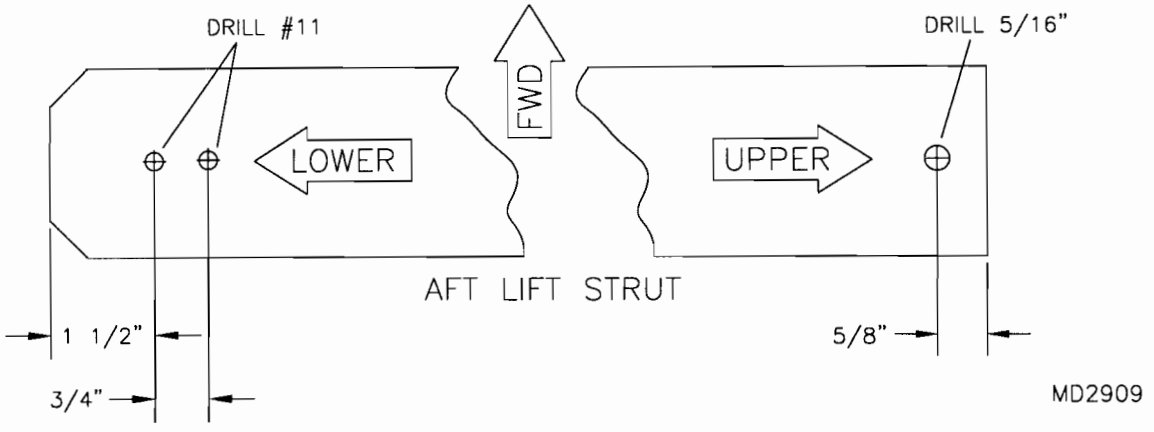
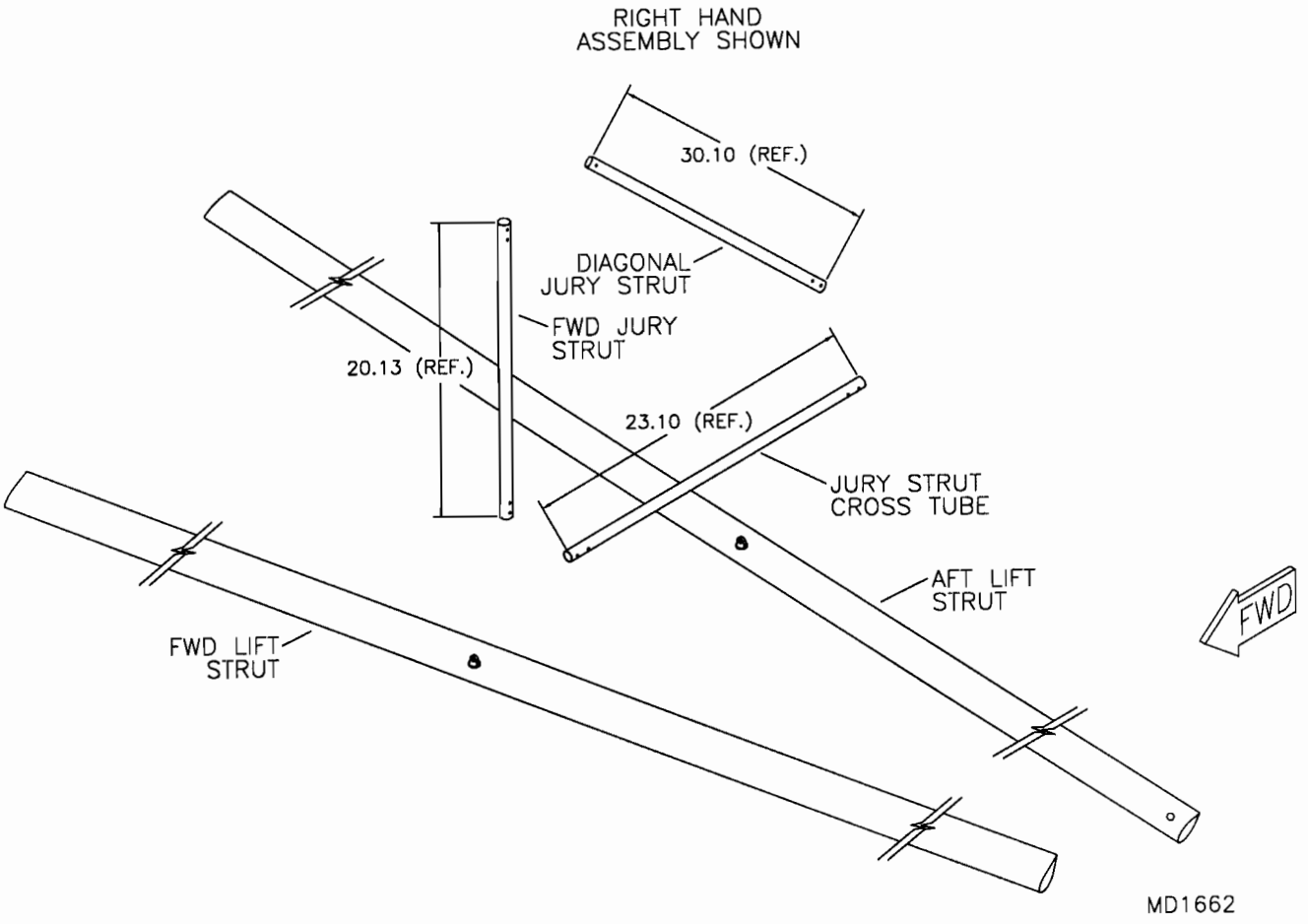


FIGURE 05H-02A



3. Attach the cross tube assembly to the eyebolts using the clevis and cotter pins as shown in the parts drawing. **NOTE:** If you are installing the optional jury strut fairings, refer to the options section before continuing. Using the quick pins provided, install the top jury strut gusset into the bracket on the wing. Measure and cut to length the forward vertical jury strut tube. Refer to **FIGURE 05I-03**. Note that the dimensions given are reference dimensions only. Actual measurements should be taken and the jury strut tubes cut to fit. Install the forward jury strut into the upper and lower gussets. Position so that the pre drilled #30 holes fall on center line of the tube. Using the gussets as a guide, transfer drill into the tube and rivet (cleco if installing the jury strut fairing material). Measure and cut to length the diagonal jury strut tube and install following the same procedure.

FIGURE 05I-03

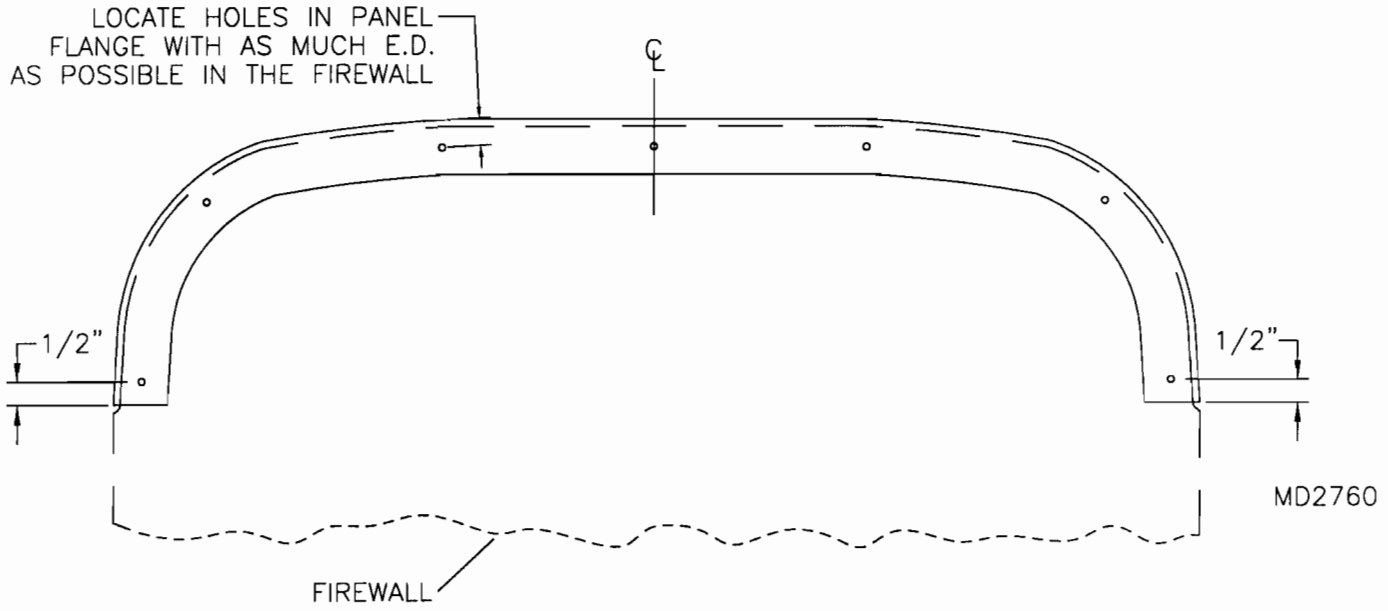


S-7 DECK & INSTRUMENT PANEL INSTALLATION

(REFER TO PARTS PAGE # 006-02 FOR PARTS SELECTION)

1. Trim the panel housing to the scribe lines leaving a 1" flange on the forward side and a little extra material on each side. Fit the housing on the fuselage by spreading the housing over the mount tabs located between station 1 and station 2. The firewall must be installed prior to installing the housing and must slip under the forward flange of the housing. The panel housing should be parallel to the top longeron and level from side to side. Temporarily set the instrument panel in place to verify the aft panel housing height. Clamp the housing in position and transfer drill from the inside through the side tabs and through the housing. Cleco the housing in position. Layout and drill the hole locations in the forward flange and through the firewall as shown in **FIGURE 06-01**. All rivets should be placed with as much edge distance as possible in the firewall.

FIGURE 06-01

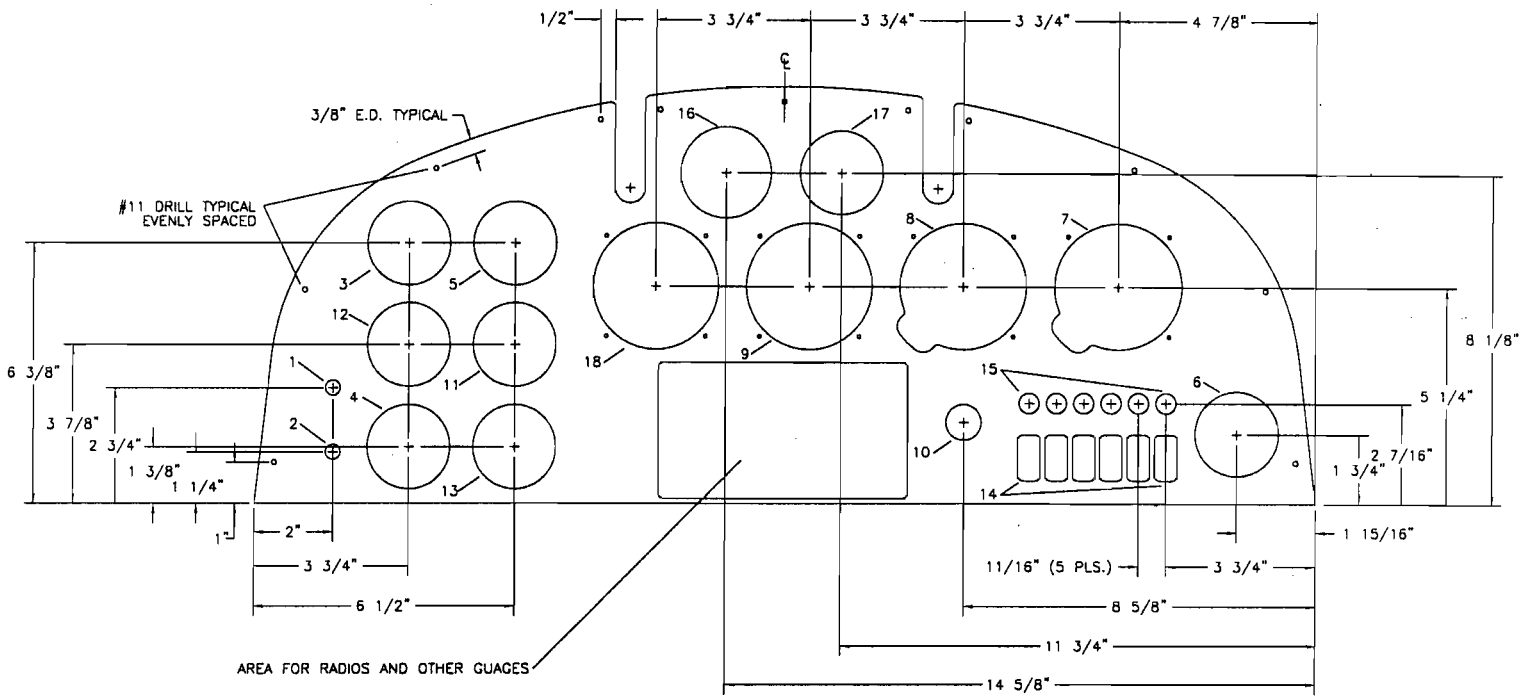


2. A blank instrument panel is provided with the kit. The builder may design and cut his own panel or contact the factory for a custom cut panel. Contact our parts department for further information.

If you are cutting your own panel, layout and drill the perimeter holes as shown in **FIGURE 06-03**. With the panel housing clecoed in place, position the instrument panel against the face of the panel housing. Some filing of the panel and panel housing may be required. The panel should sit flat against the panel housing and should be elevated off of the top longerons and diagonal bracing by 3/32" maximum. In this position the instrument panel should follow the top contour of the panel housing. Trim as required. Holding the panel in position, transfer drill through the mount holes in the panel and through the housing. Remove the panel and install the nut plates to the inside of the housing flange. **NOTE:** When installing the nut plates, drill both nut plate mount holes and countersink the aft side of the housing to allow the rivet heads to sit flush with the face of the housing.

3. Cut and finish the instrument panel and set aside until final assembly. Refer to **FIGURE 06-03** and **FIGURE 06-03A** for suggestions on instrument layout. Refer to the instrument and electrical section for instrument installation and wiring. During final assembly install all instruments and complete all wiring prior to riveting the panel housing in place. The panel housing will need to remain in place until the windshield has been fit, at which time the housing may be removed and painted and set aside until final assembly.

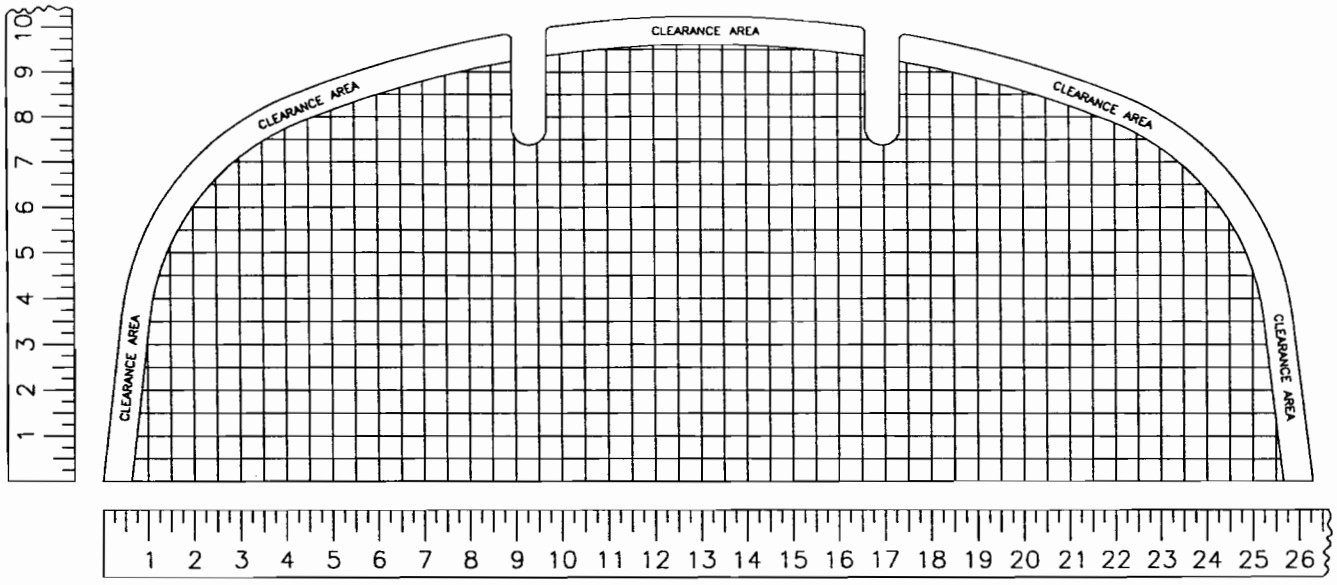
FIGURE 06-03

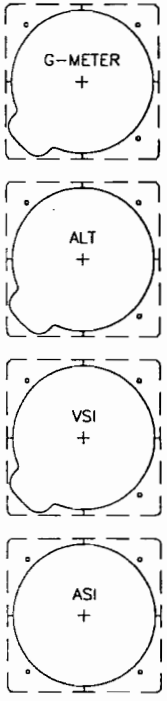


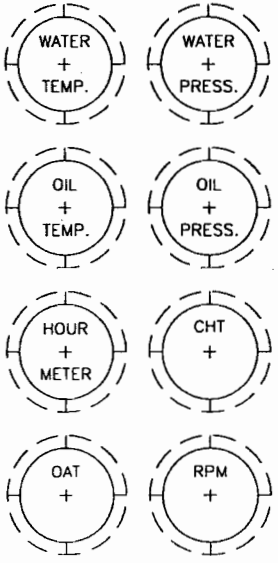
S-7 COURIER (WITH 912 ENGINE) RECOMMENDED INSTRUMENT PANEL LAYOUT *		
1	HEATER	5/16 DIA.
2	CHOKE	5/16 DIA.
3	CHT (RECOMMENDED)	2 1/16 DIA.
4	WATER TEMP.	2 1/16 DIA.
5	RPM	2 1/16 DIA.
6	HOUR METER	2 1/16 DIA.
7	VSI	3 1/8 DIA.
8	ALT	3 1/8 DIA.
9	ASI	3 1/8 DIA.
10	MAG/KEYSWITCH	7/8 DIA.
11	OIL PRESS.	2 1/16 DIA.
12	OIL TEMP.	2 1/16 DIA.
13	WATER PRESS.	2 1/16 DIA.
14	SWITCH (STROBE/NAV./INST./LAND./AUX./MASTER)	1/2 X 1 1/8
15	BREAKER SWITCH	1/2 DIA.
16	TURN/BANK INDICATOR	2 1/4 DIA.
17	OAT	2 1/16 DIA.
18	G METER	3 1/8 DIA.

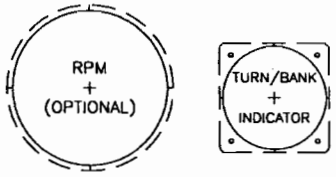
MD1672

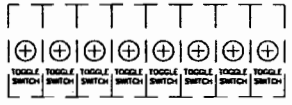
* THIS PANEL CAN BE ORDERED PRE-CUT OR WE CAN CUSTOM CUT YOUR DESIGN. PLEASE CALL OUR PARTS DEPT.

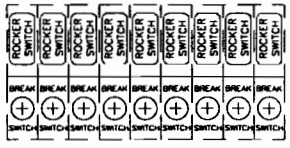


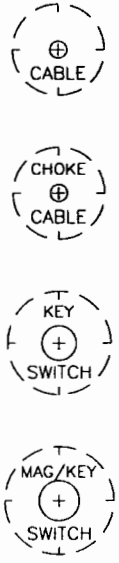






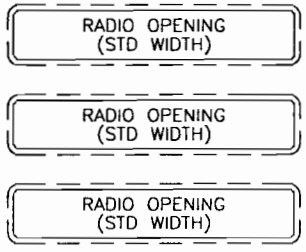






INSTRUMENT PANEL LAYOUT PROCEDURE

1. MAKE A COPY OF TEMPLATE
2. CUT OUT TEMPLATES ON DOTTED LINES (THIS ALLOWS CLEARANCE FOR SURROUNDING INSTRUMENTS)
3. ARRANGE PAPER TEMPLATES ON INSTRUMENT PANEL IN DESIRED CONFIGURATION (NOTE PANEL CLEARANCE AREA)
4. USE CENTER MARKS ON INSTRUMENTS TO LOCATE ON INSTRUMENT PANEL
5. NOTE: THE STANDARD RADIO WIDTH OPENING (HEIGHT VARIES WITH TYPE RADIO USED)



MD1242

S-7 WINDSHIELD ASSEMBLY & INSTALLATION

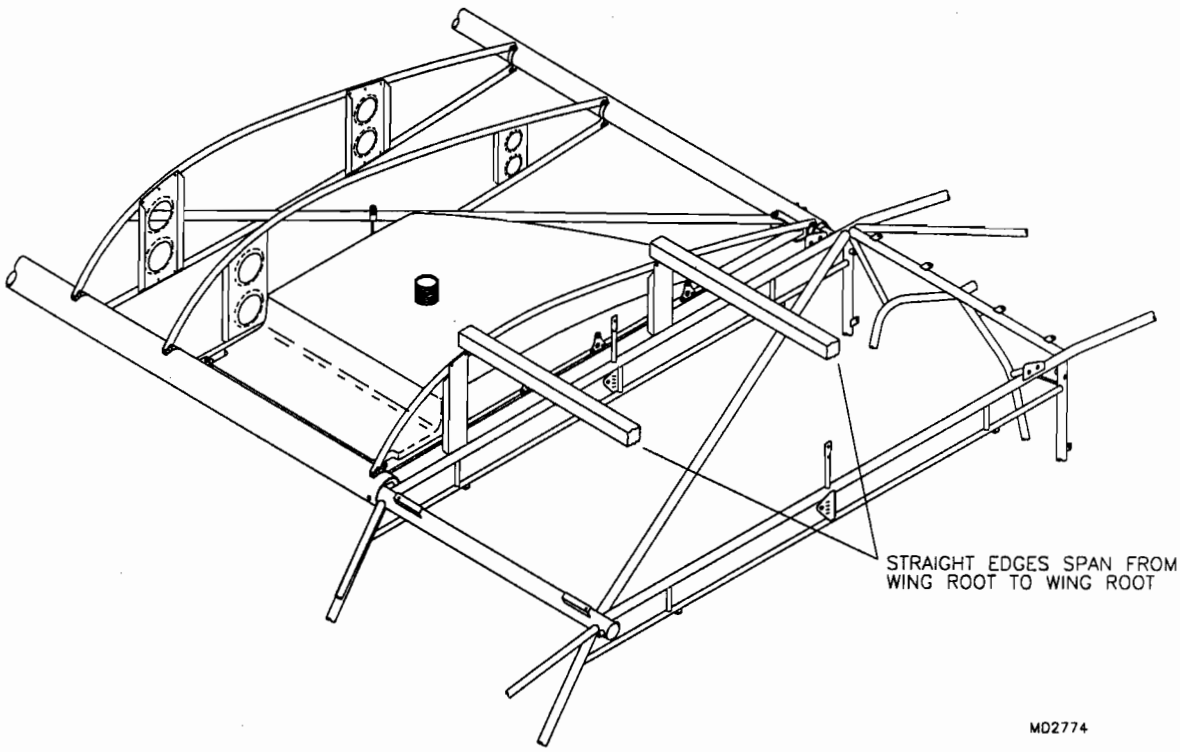
(REFER TO PARTS PAGE # 006-04 FOR PARTS SELECTION)

NOTE: The wing structures must be complete (can be covered and painted) and attached to the fuselage prior to installing the windshield. Refer to the wing attachment section.

Extra care should be taken when working with lexan. Lexan scratches easily and as much as possible of the protective plastic should be left in place until the aircraft is ready to be flown. The windshield will require some minor trimming. Lexan can be easily trimmed with aviation snips or by scoring and snapping off the piece to be trimmed. A sanding block with 80 grit paper works well for dressing up trimmed lexan.

1. With the wings attached to the fuselage, position two straight edges from wing root to wing root as shown in **FIGURE 06A-01**.

FIGURE 06A-01



2. Drill the windshield tabs located on the leading edge spar carry through. See **FIGURE 06A-02**. The skylight ribs mount to the underside of each tab through the outboard hole. Slip each rib into position and bring them up to contact the straight edges. Mark and trim the aft end of each rib as shown in **FIGURE 06A-02A** and reposition. Transfer drill through the carry through tab into the rib and cleco in place. With the rib contacting the straight edges transfer drill through the vertical support into the rib centerline and rivet. Transfer drill through the pre drilled holes in the aft mount tab into the rib and rivet. Refer to the parts drawing. **NOTE:** Do not rivet the forward end until the windshield has been installed. Locate and drill the holes on top centerline of the rib as shown in **FIGURE 06A-02A**. Do not drill completely through the ribs.

FIGURE 06A-02

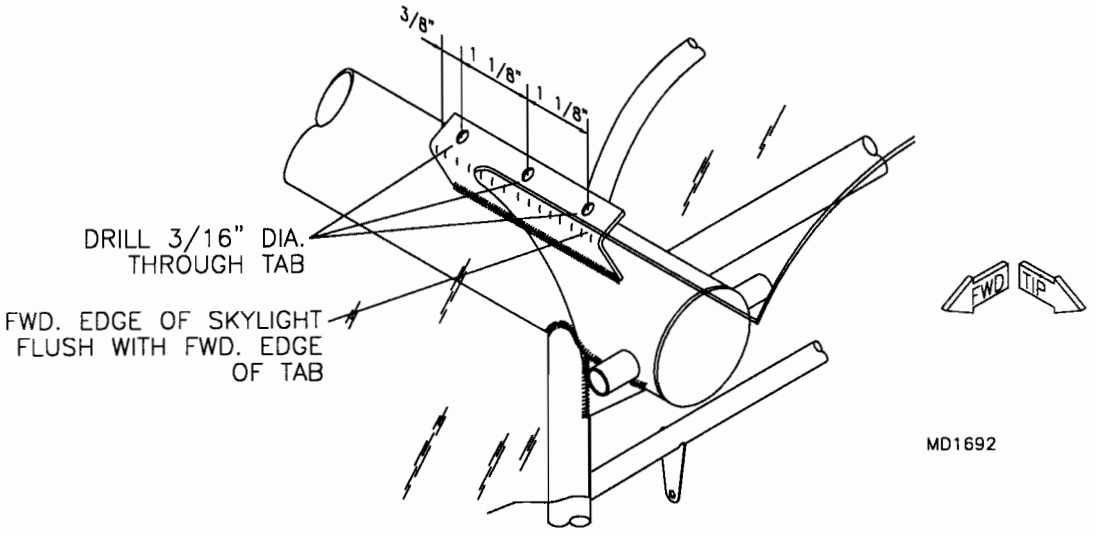
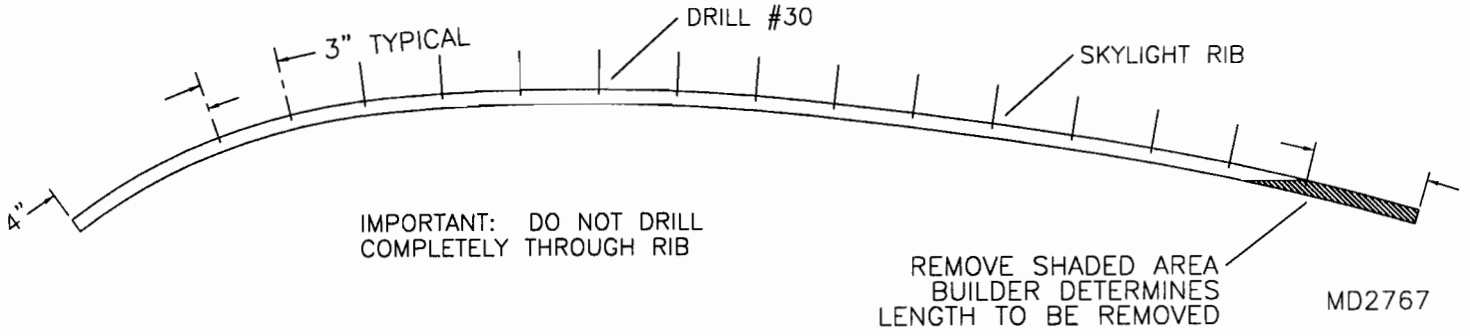
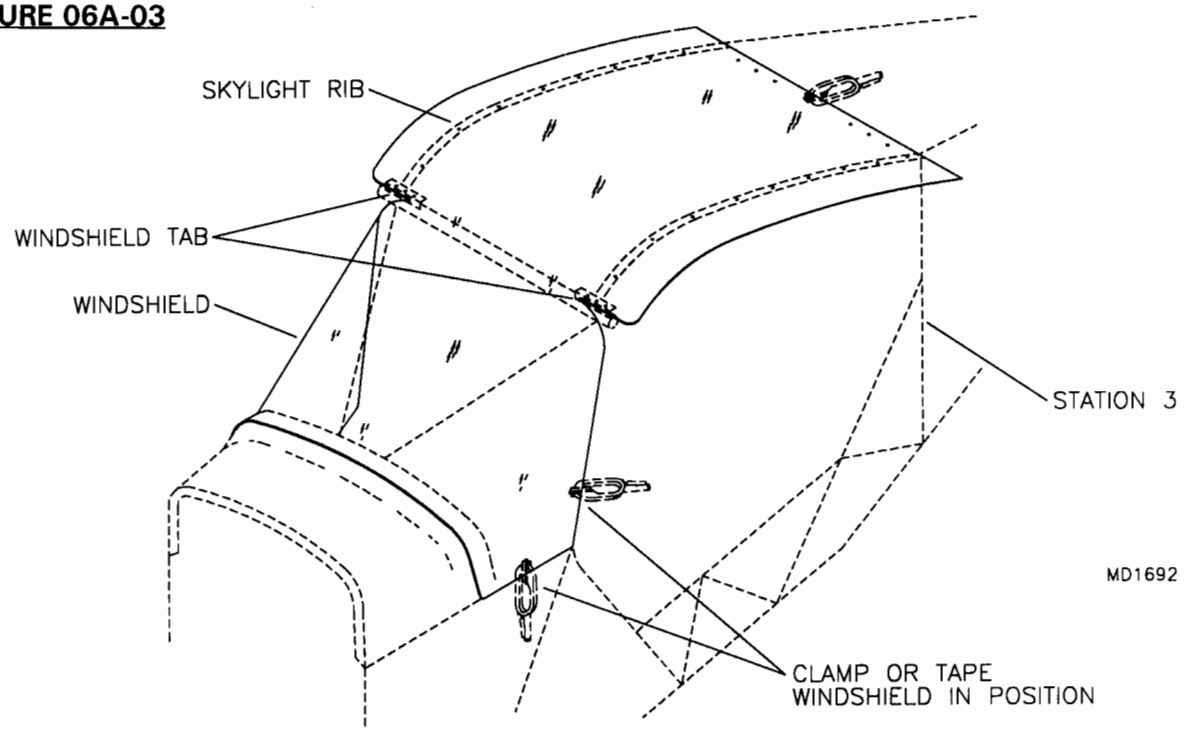


FIGURE 06A-02A



3. With the instrument panel housing installed, lay the windshield/skylight in position. The skylight should be centered on the fuselage from side to side and the forward edge of the skylight should be flush with the forward side of the windshield tabs. Refer to **FIGURE 06A-02**. Peel back a small area of the protective plastic around the windshield tab. With the skylight centered, drill through the windshield into the outboard hole in each tab and cleco in place. Pull each side of the windshield down tight against the windshield deck and fuselage side tubes and clamp or tape in position. See **FIGURE 06A-03**. It may be necessary to trim the forward edge of the windshield to achieve the proper fit into the joggle of the panel housing.

FIGURE 06A-03



4. Note that there is a forward and aft side to the windshield hold down strip. Layout and drill the hole pattern in the **FORWARD** side of the windshield hold down strip as shown in **FIGURE 06A-04**. Mark but do not drill the last two holes in each end of the strip.

Find the center of the instrument panel housing and mark. With the windshield tight in the joggle of the panel housing, position the hold down strip so that the aft edge of the hold down strip is flush with the instrument panel. The strip should lay flat against the windshield and the panel housing with no puckers. See **FIGURE 06A-04A**. **NOTE:** The hold down strip is retained to the panel housing only. Do not locate rivets in windshield. Position the center hole in the hold down strip on the center line of the housing and transfer drill through the strip into the housing and cleco in place. Pull the hold down strip tight to the windshield and housing. Using a #30 drill bit transfer drill through the holes in the strip through the housing. Drill from the center out alternating from side to side. Cleco as you go. See **FIGURE 06A-04B**. With all holes but the last two on each side drilled and clecoed, mark and trim the hold down strip flush with the lower edge of the instrument panel housing and windshield. See **FIGURE 06A-04C**. Locate the lower two holes after the lower trim strip has been installed.

During final assembly apply a small bead of silicon in the joggle of the panel housing prior to installing the windshield and apply a small bead of silicon under the windshield hold down strip prior to riveting.

FIGURE 06A-04

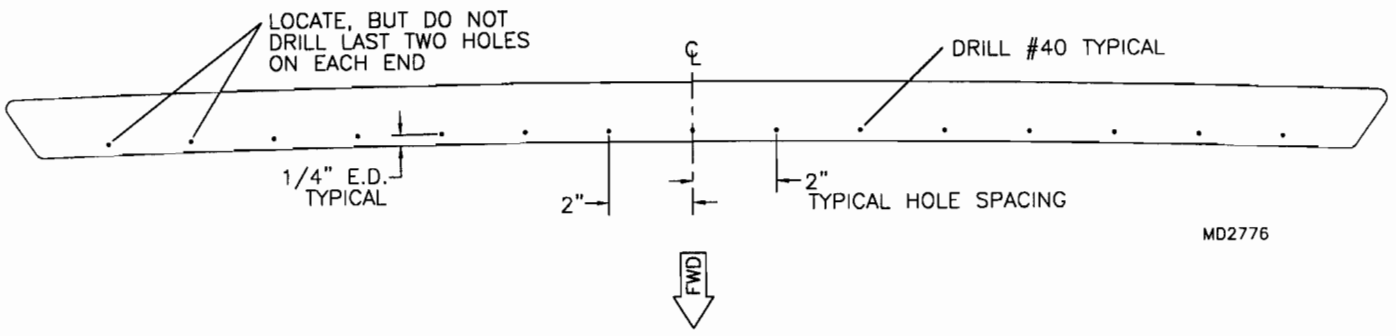


FIGURE 06A-04A

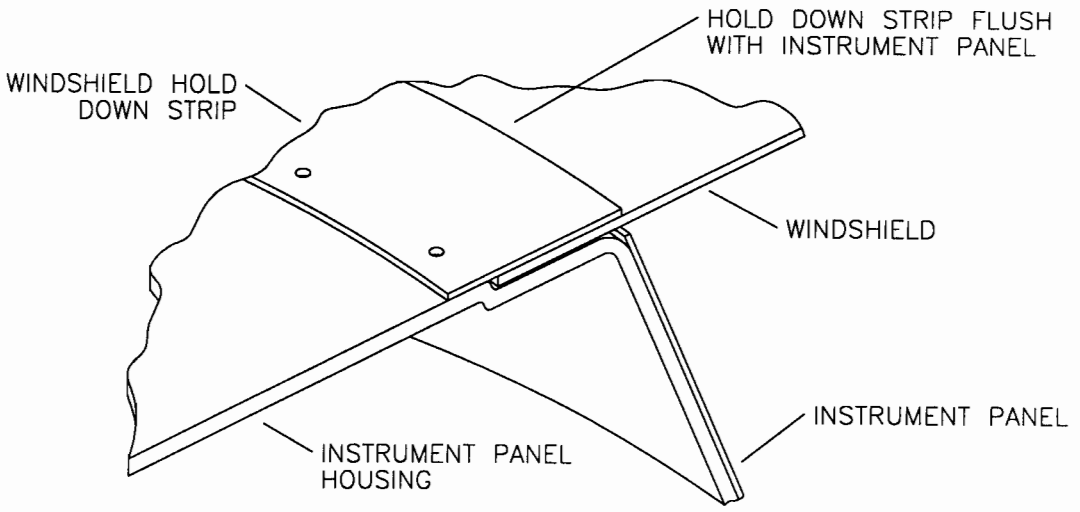


FIGURE 06A-04B

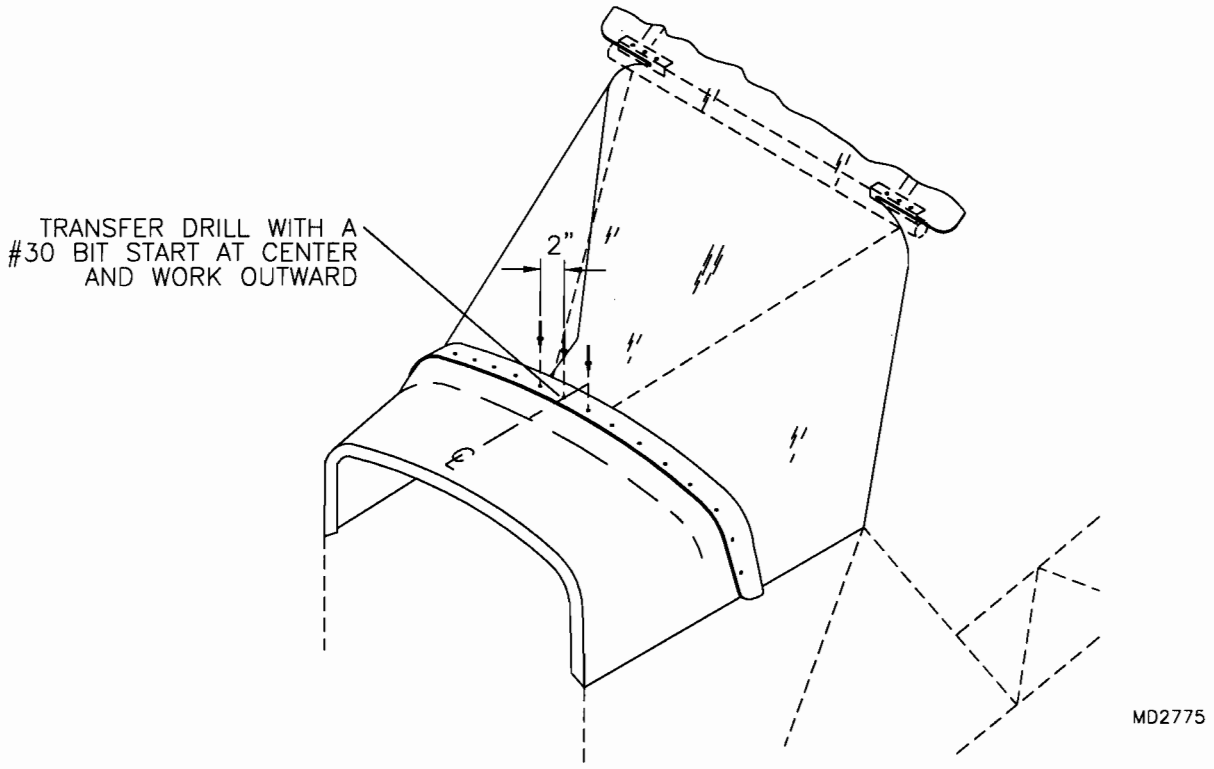
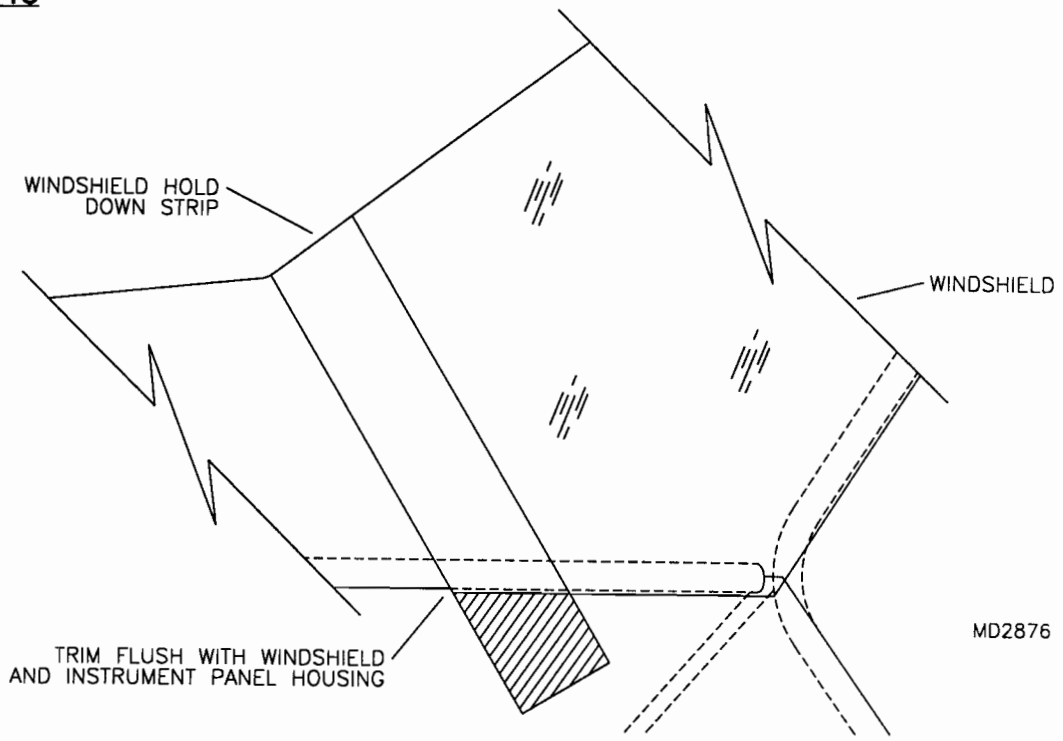


FIGURE 06A-04C



5. **NOTE:**The windshield sides are held in position by "Z" strips riveted to the windshield. **DO NOT** drill or rivet into the fuselage structure.

Layout and drill the hole pattern in the flanges of the "Z" strips as shown in **FIGURE 06A-05**. Cut away a small portion of the protective plastic coating from the perimeter of the windshield. Position the long "Z" strip to the upper fuselage door frame tube on the inside of the fuselage so that the drilled flange is flat against the windshield and the cupped portion is capturing the tube. See **FIGURE 06A-05A**. Holding the windshield and "Z" strip tight against the fuselage frame transfer drill through the "Z" strip through the windshield and cleco. Install the 4" "Z" strip following the same procedure. Some trimming of the lower "Z" strip may be required. Mark and trim the lower sides of the windshield flush with the lower edge of the instrument panel housing. Mark and trim the door frame edge of the windshield so that the edge of the windshield is 1/32" forward of the centerline of the door frame tube. See **FIGURE 06A-05B**. Using a duck billed vice grips or similar tool form the upper portion of the windshield door edge to lay flat against the door frame tube. See **FIGURE 06A-05C**.

During final assembly, attach the foam tape to the "Z" strips at the tube contact points as shown in **FIGURE 06A-05A**.

FIGURE 06A-05

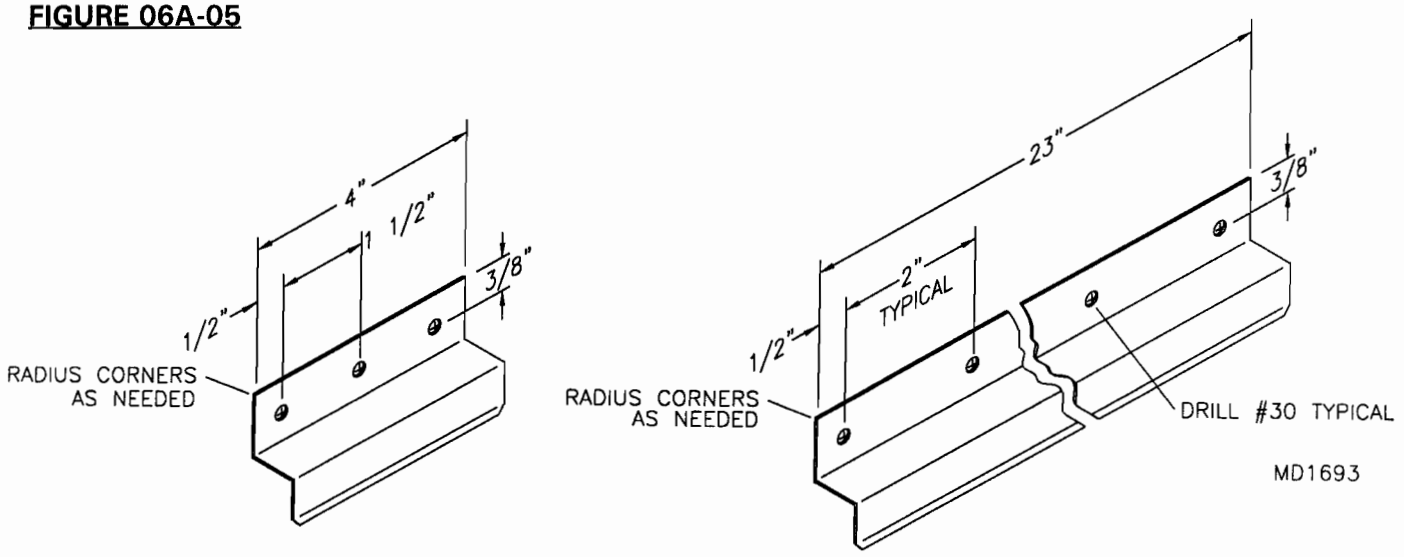


FIGURE 06A-05A

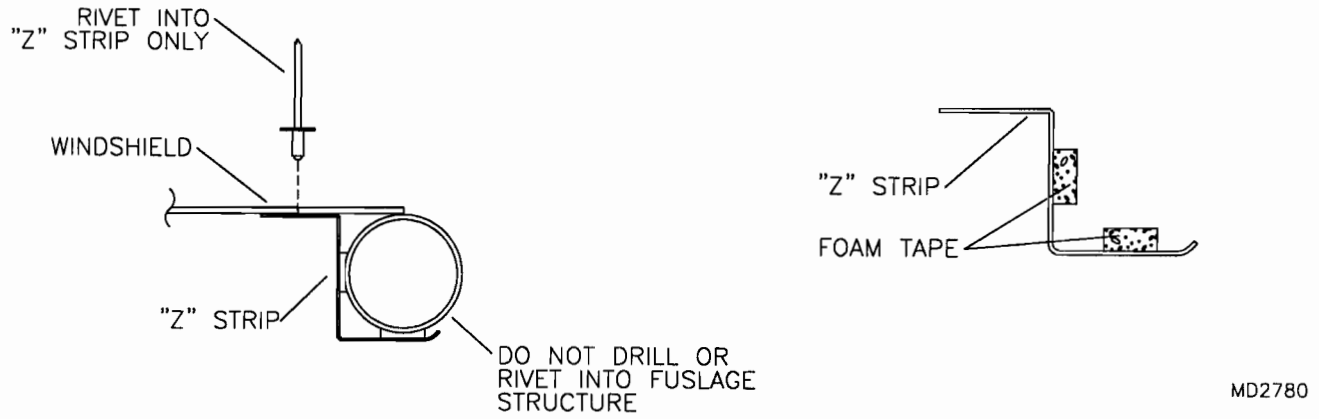


FIGURE 06A-05B

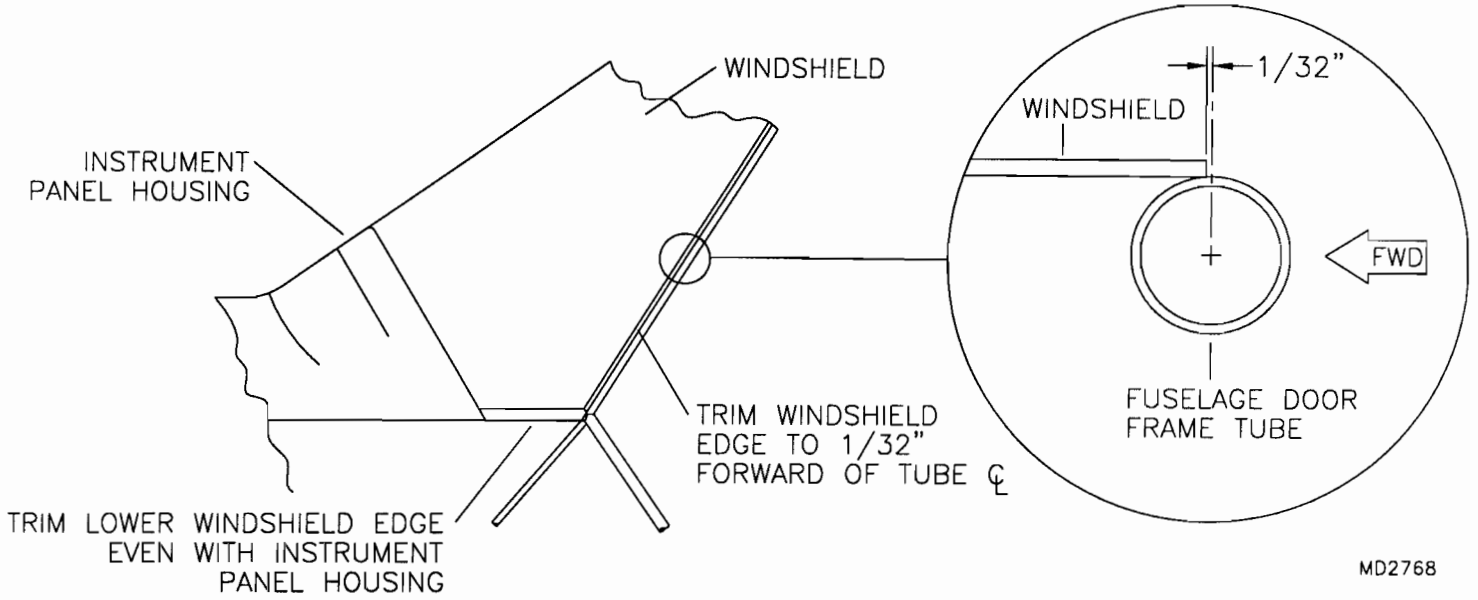
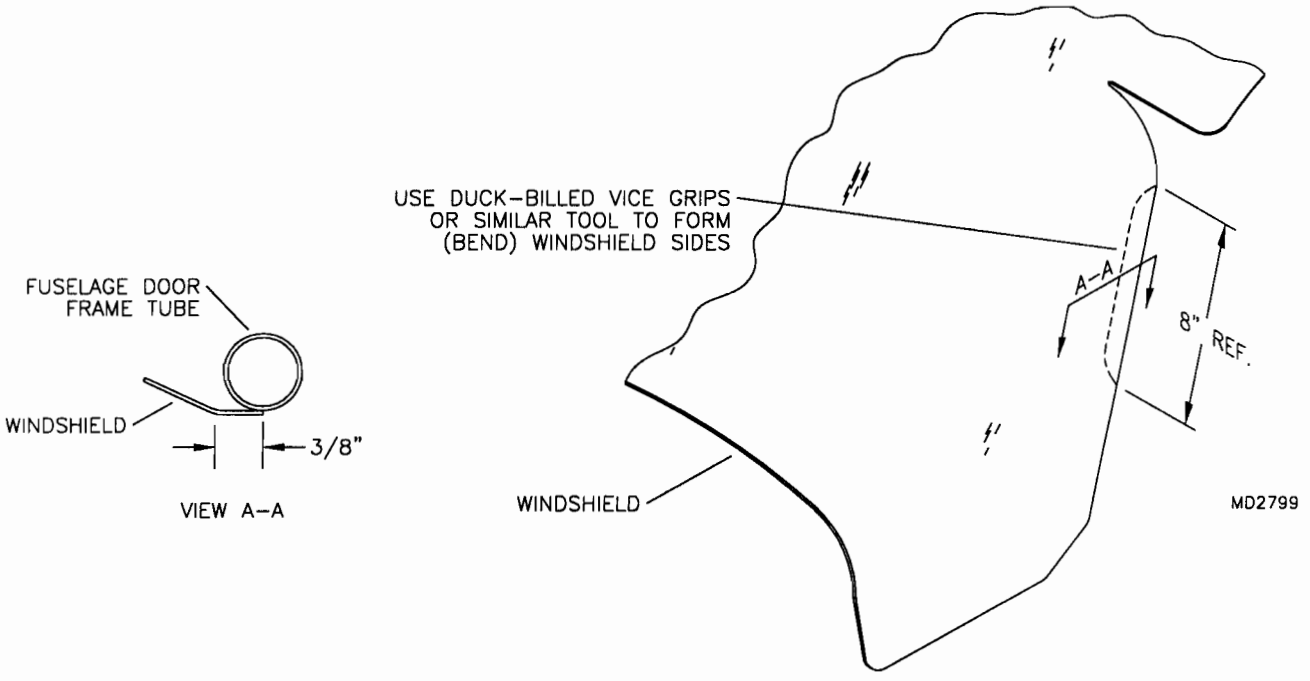


FIGURE 06A-05C



6. Remove the "Z" strips. Place the lower trim strip on the windshield so that the lower edge of the trim strip is flush with the lower edge of the windshield and clamp in position. Leave enough material extending forward to be placed under the windshield hold down strip and enough material extending to the aft so that the lower trim strip can be trimmed flush with the aft edge of the long trim strip. Transfer drill through the windshield through the trim strip. See **FIGURE 06A-06**. Cleco the trim strip, windshield and "Z" strip to the fuselage. Install the long trim strip following the same procedure. Form the upper aft edge of each long trim strip following the same procedure used to form the windshield sides. See **FIGURE 06A-06A**. Place the lower trim strip under the windshield hold down strip and trim accordingly. Trim the aft edge of the lower trim strip flush with the aft edge of the long trim strip. Place the long trim strip under the lower trim strip. Trim the lower end of the long trim strip flush with the lower edge of the lower trim strip. See **FIGURE 06A-06B**. Locate and drill the two lower holes in the windshield hold down strip as shown in **FIGURE 06A-06C**. The trim strips, windshield hold down strips and "Z" strips are now ready to be painted.

FIGURE 06A-06

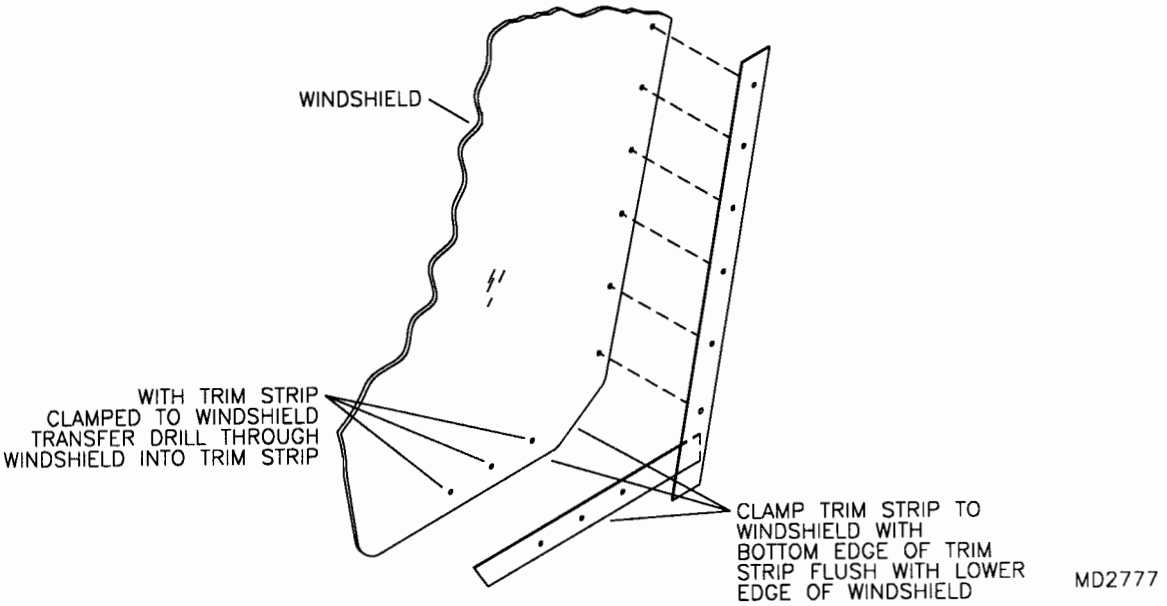


FIGURE 06A-06A

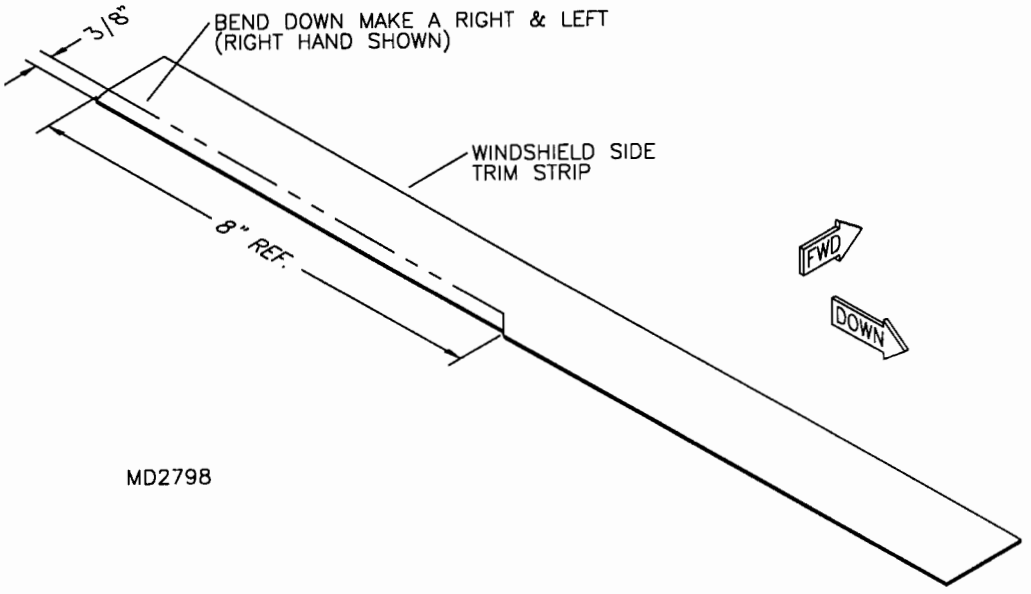


FIGURE 06A-06B

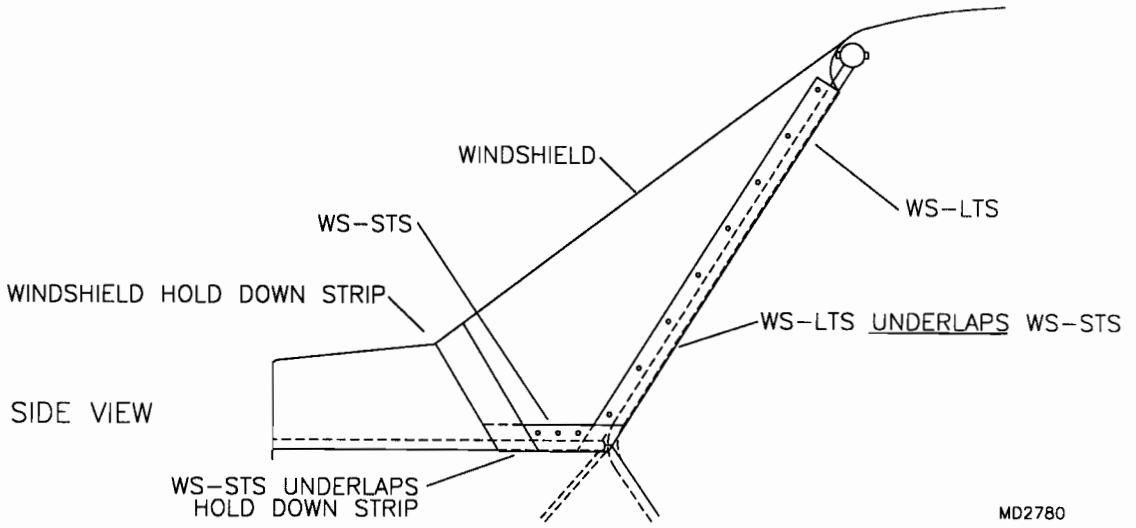
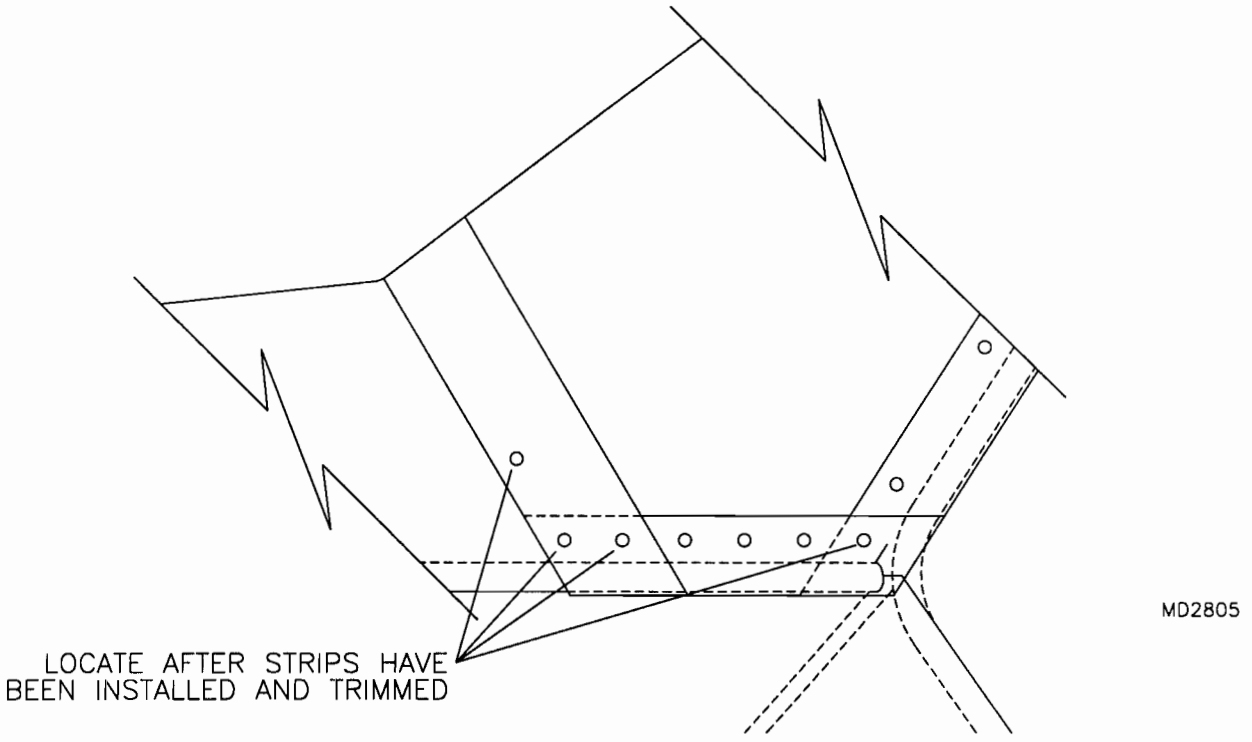


FIGURE 06A-06C



7. Mark and remove the protective plastic along each skylight rib. Starting at the forward hole, working your way aft and alternating from side to side, drill through the skylight into each hole in the ribs. Cleco as you go. See **FIGURE 06A-07**.

Transfer drill through the aft skylight tabs on the station 3 top cross tube through the skylight. See **FIGURE 06A-07A**. Lay the skylight aft trim strip on top of the skylight so that the tab holes are in the center of the trim strip. Center the trim strip from side to side. Transfer drill through the tabs and skylight through the trim strip. Cleco in place.

FIGURE 06A-07

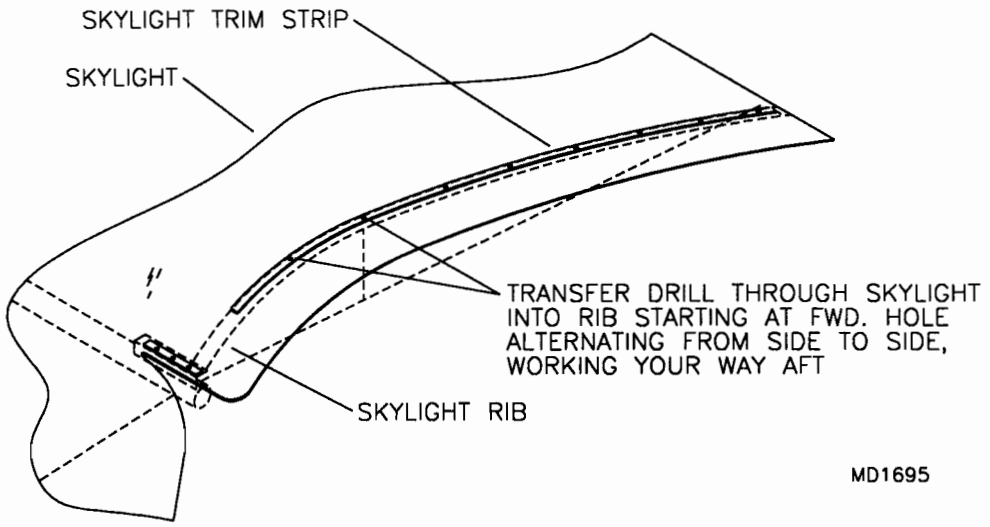
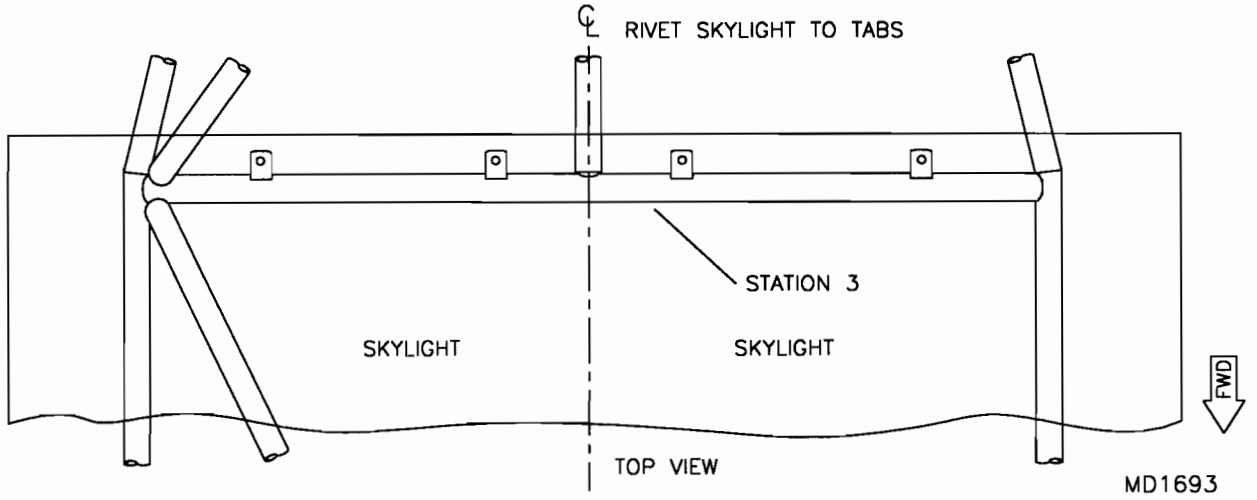


FIGURE 06A-07A



8. Drill additional two holes through windshield in windshield tabs. Trim wing cuffs as in **FIGURE 06A-08**. Remove cleco and hold cuffs on windshield and leading edge spar. Find lowest mount hole location and mark; this should be as far toward bottom of cuff as possible while still in windshield. Layout and drill hole pattern, per **FIGURE 06A-08**. Don't drill outboard top and bottom mount holes yet. Temporarily tape cuffs in place. Make fitting and alignment adjustments as necessary. When satisfied, transfer drill #30 through cuffs, into windshield; cleco. Trim cuffs flush with edge of skylight. Drill top and bottom outboard holes through cuff, into sheet metal, carefully avoiding fuel tanks. Sheet metal screws retain cuff to wing. Remove cuff and place ¾" masking tape on leading edge spar, extending outboard from wing attach pin. Top edge of tape should be in-line with pin's centerline. Reinstall cuff and mark edge of cuff on tape. Mark top edge of tape on cuff. Remove cuff and measure distance between mark on tape and pin's center; transfer measurement to cuff and drill ⅝" hole in cuff, per **FIGURE 06A-08A**. Cuffs now are ready to paint. During final assembly, apply a bead of silicon under cuffs when attaching to windshield. Use ⅛" brass washers on underside of windshield when riveting.

FIGURE 06A-08

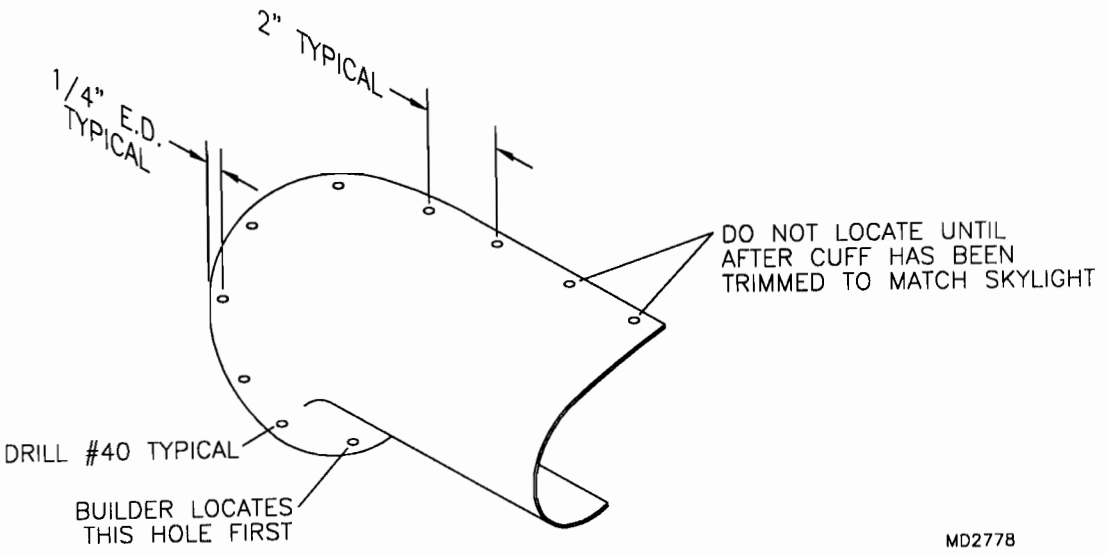
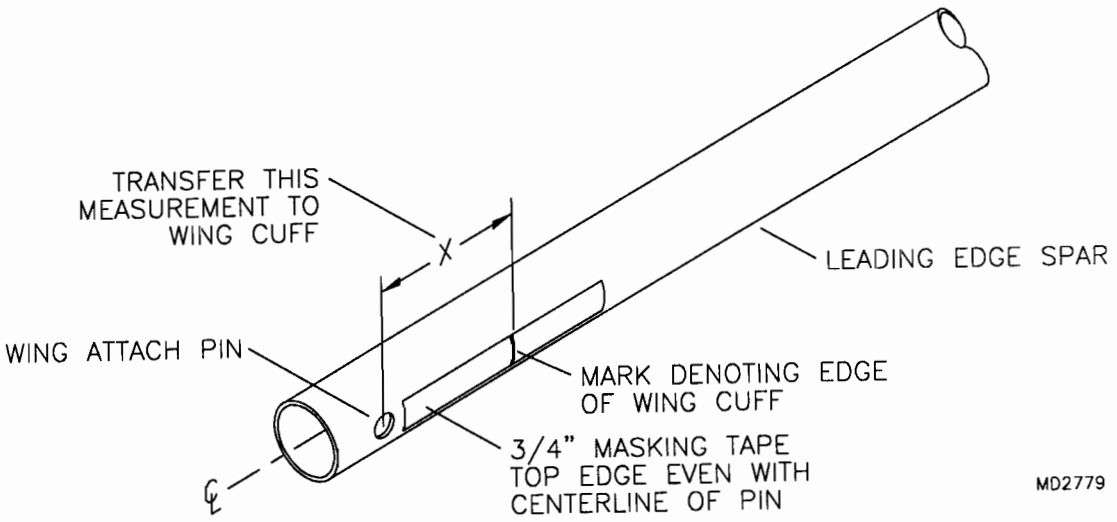


FIGURE 06A-08A



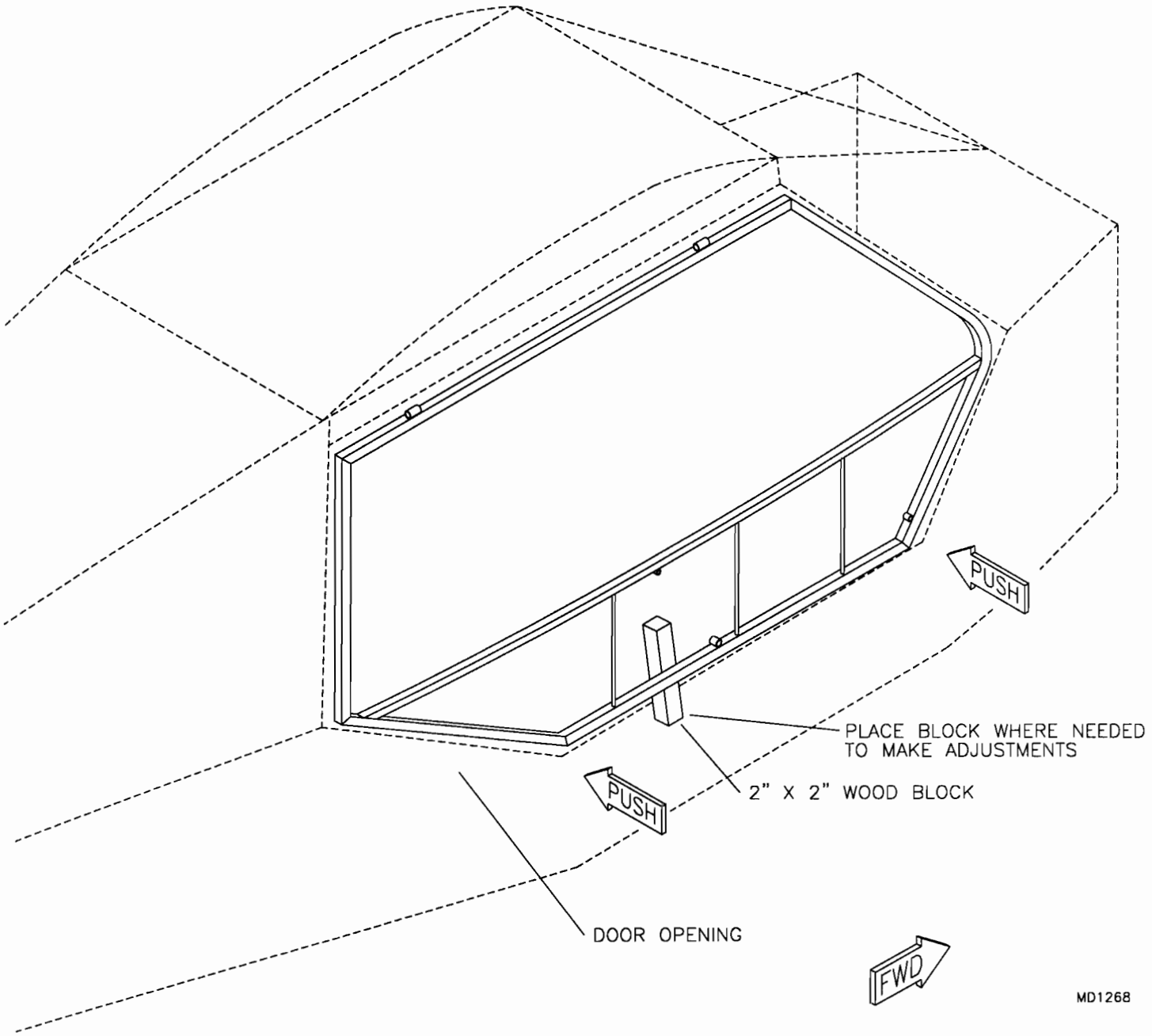
9. Lay the skylight trim strips in position and cut to length. Each strip will run forward from the aft hole on the skylight rib. Cut strips to length and place beside skylight ribs to mark hole locations on strips; allow ½" between end of strip and first hole. Remove the strips and with a #30 drill bit drill the strips on center line. Cleco the strips in position to check for fit. Remove all strips and paint.
Remove the windshield and drill all #30 holes to #28. Deburr all holes. Attach the foam tape to the underside of the skylight flush with the outside edge to provide a seal to the wings. During final assembly rivet the windshield and all trim and "Z" strips in place with the appropriate rivets called out in the parts drawing.

S-7 DOOR ASSEMBLY-LEXAN & TRIM

(REFER TO PARTS PAGE # 006-06 FOR PARTS SELECTION)

1. Prior to door assembly, attach the doors to the fuselage and check for alignment with the fuselage. The doors should be centered within the fuselage opening and the outside of the door frame should be flush with the fuselage frame throughout the perimeter. Tweak the door frame until this is achieved. A wood block placed between the door frame and the fuselage can help in adjusting the door frame. See **FIGURE 06B-01**.

FIGURE 06B-01



2. Clamp the perimeter trim strips to the door frame as shown in **FIGURE 06B-02**. The inside edge of the trim strips should be flush with the inside of the door frame tube. Note the sequencing of the overlaps. Mark and trim the excess material from each trim strip. See **FIGURE 06B-02**, **FIGURE 06B-02A**, **FIGURE 06B-02B**, **FIGURE 06B-02C**, **FIGURE 06B-02D**, and **FIGURE 06B-02E**.

FIGURE 06B-02

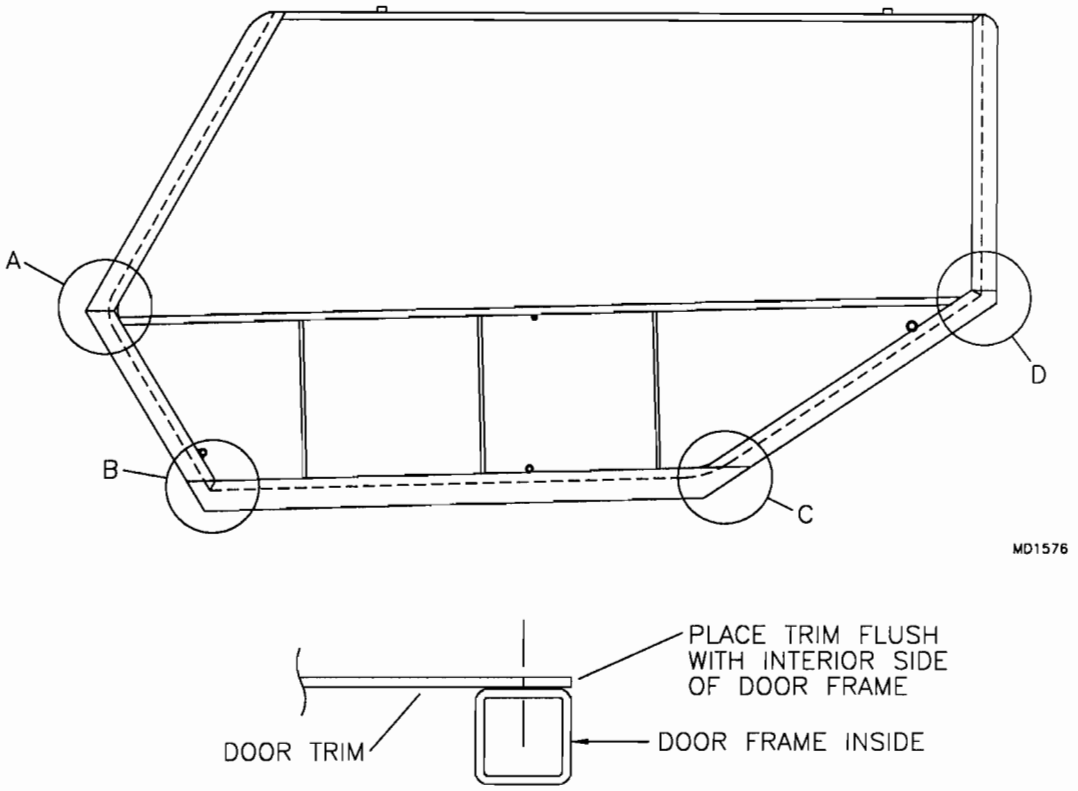


FIGURE 06B-02A

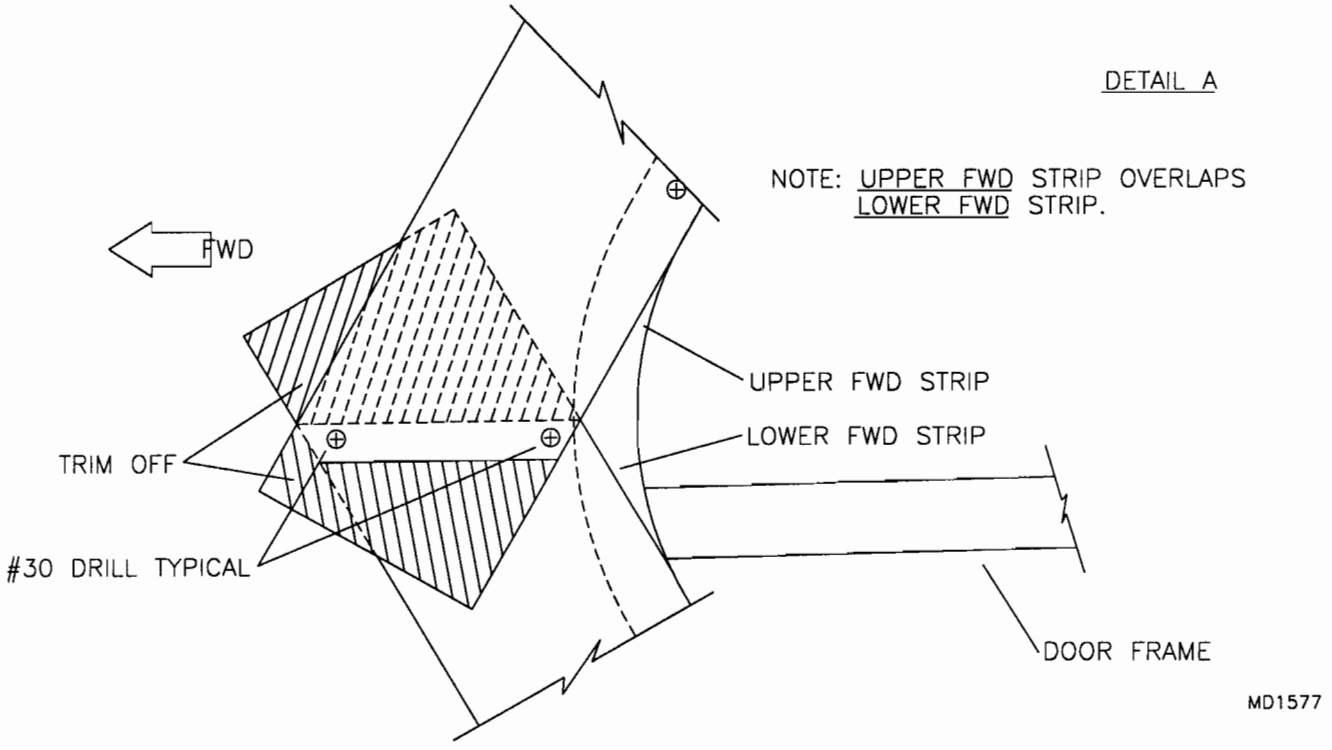


FIGURE 06B-02B

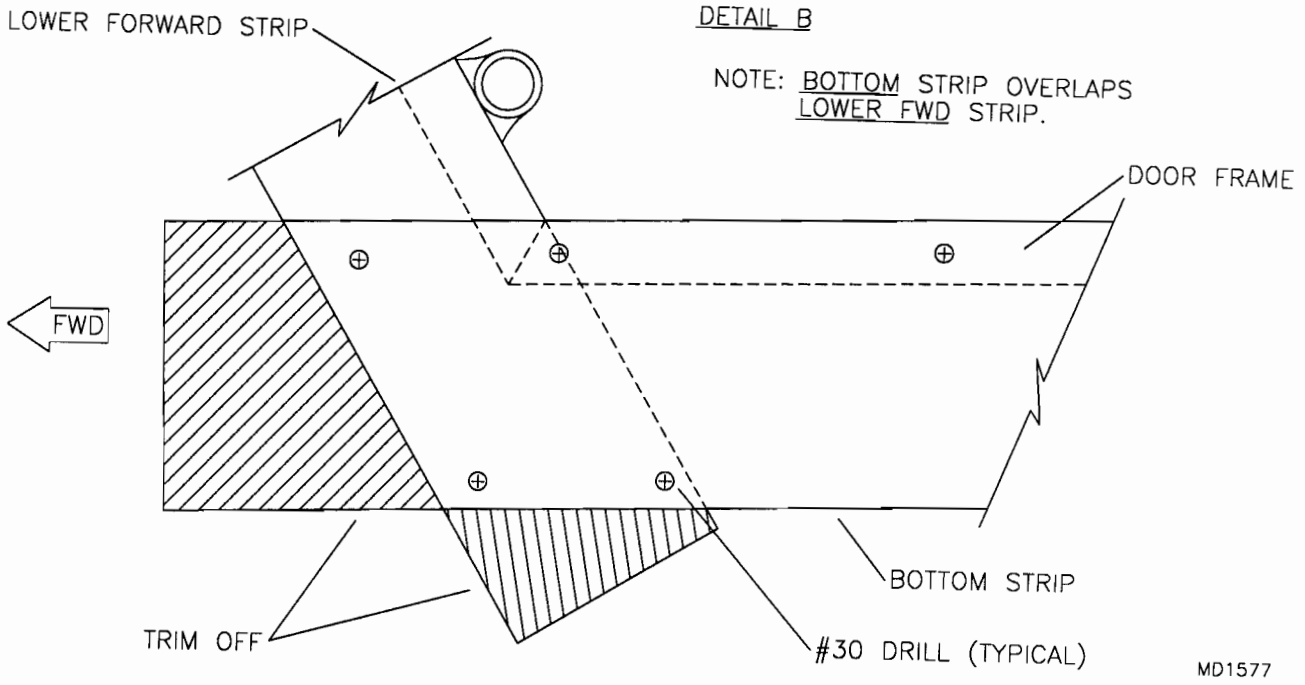


FIGURE 06B-02C

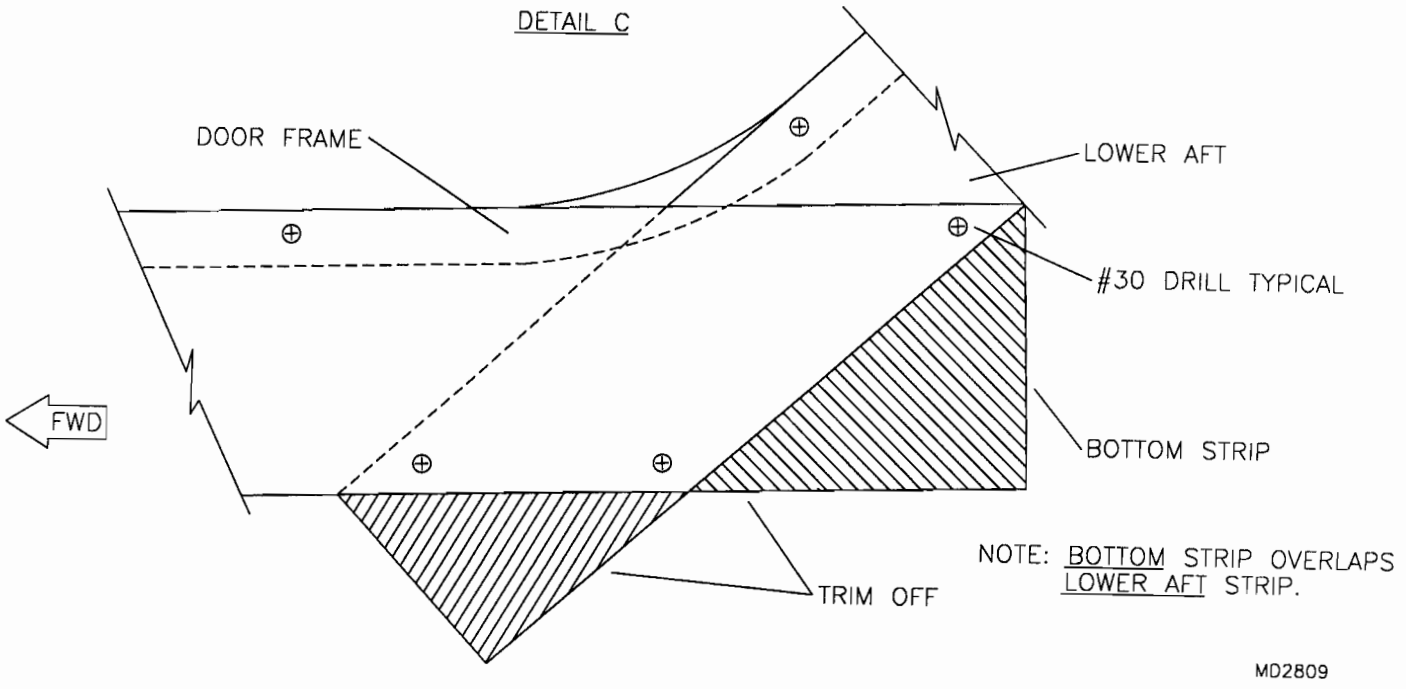


FIGURE 06B-02D

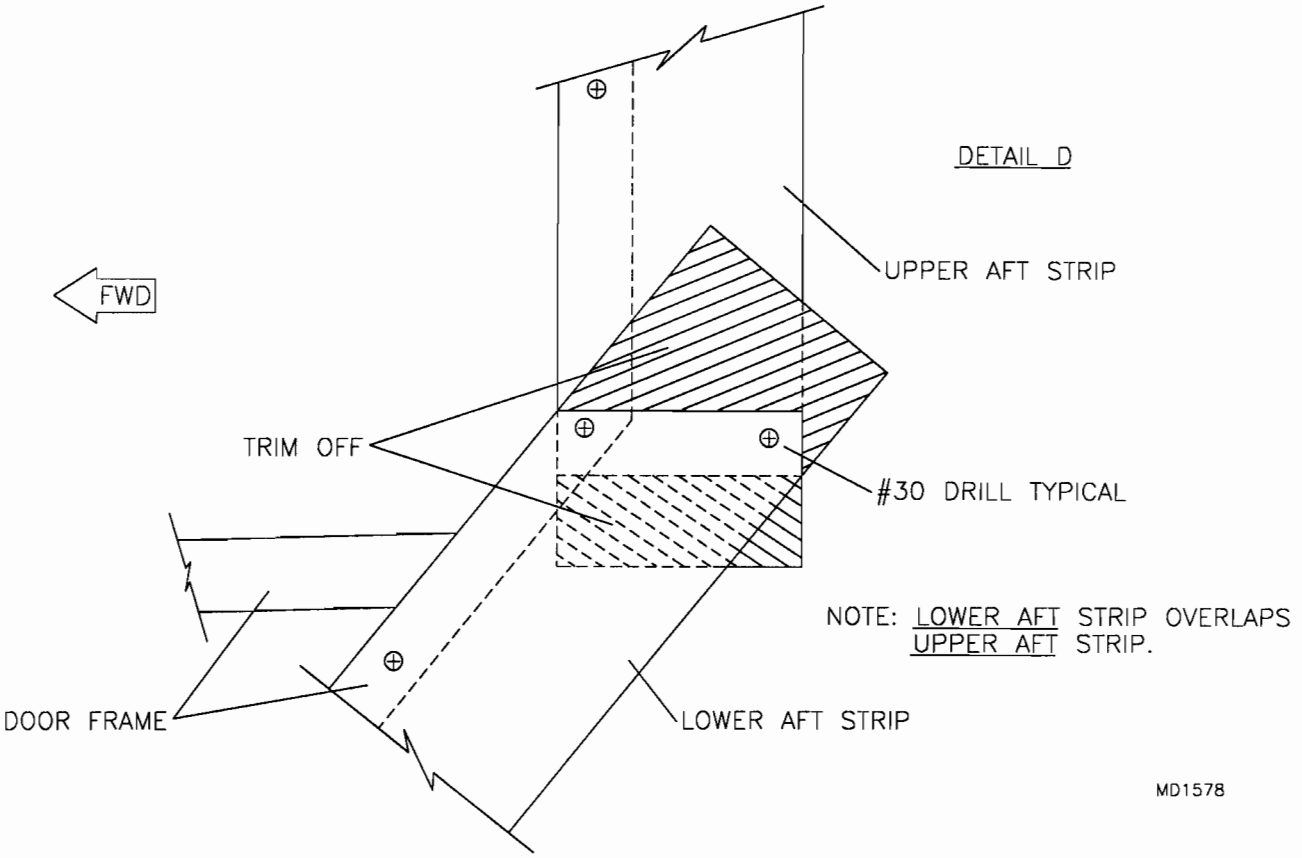
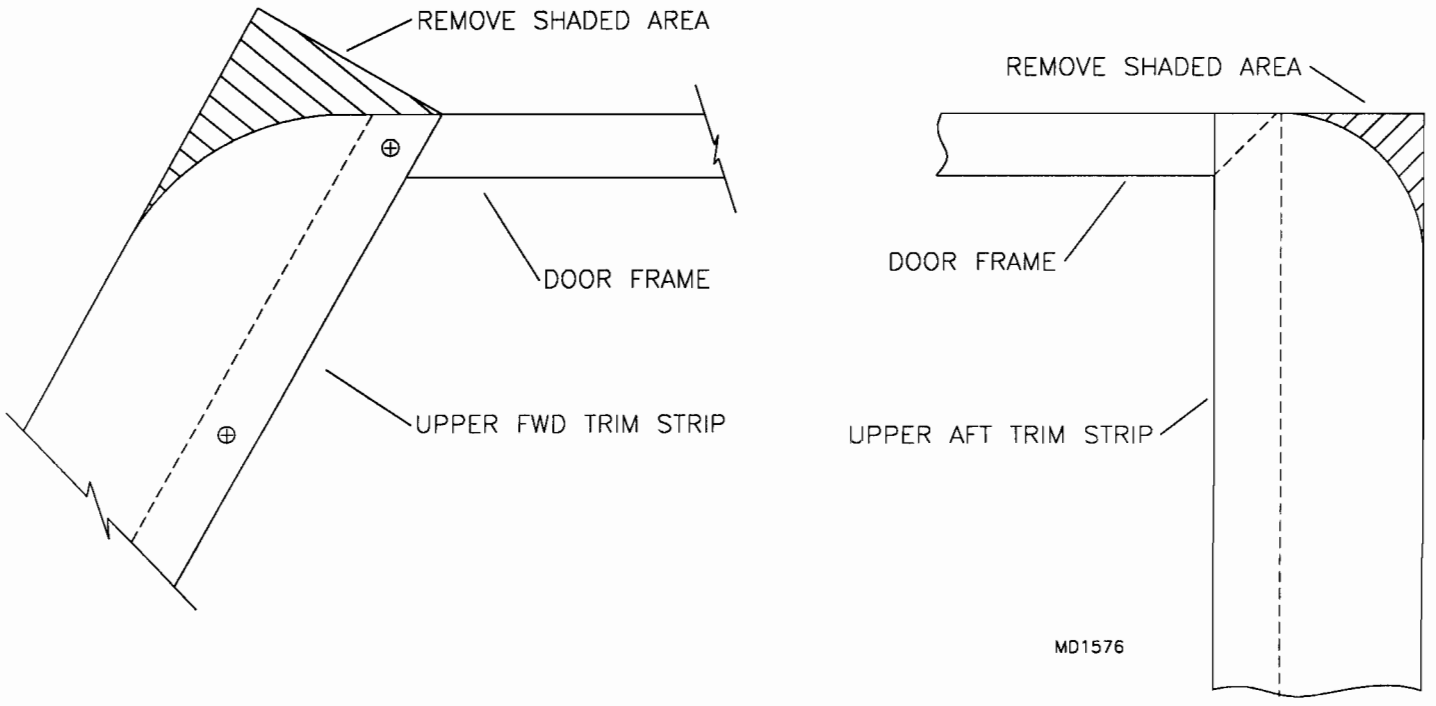


FIGURE 06B-02E



3. Layout and mark the hole pattern in each strip as shown in **FIGURE 06B-03**. Using a #30 drill bit and starting with the center hole, alternating from side to side drill through the trim strips and door frame. Cleco as you go. Locate and drill the #30 holes where the trim strips overlap. Refer back to the previous figures for hole positioning.

With all trim strips clecoed to the door frame, lay the upper and lower window trim strips in position as shown in **FIGURE 06B-03A**. Mark and trim each strip to allow it to fit between the perimeter trim strips. With the window trim strips cut to length mark and drill the strips as shown in **FIGURE 06B-03B**. Position the trim strips on the door frame. Starting at the center hole and alternating from side to side, transfer drill through the trim strips into the door frame. Cleco as you go. Remove all trim strips and debur all holes.

FIGURE 06B-03

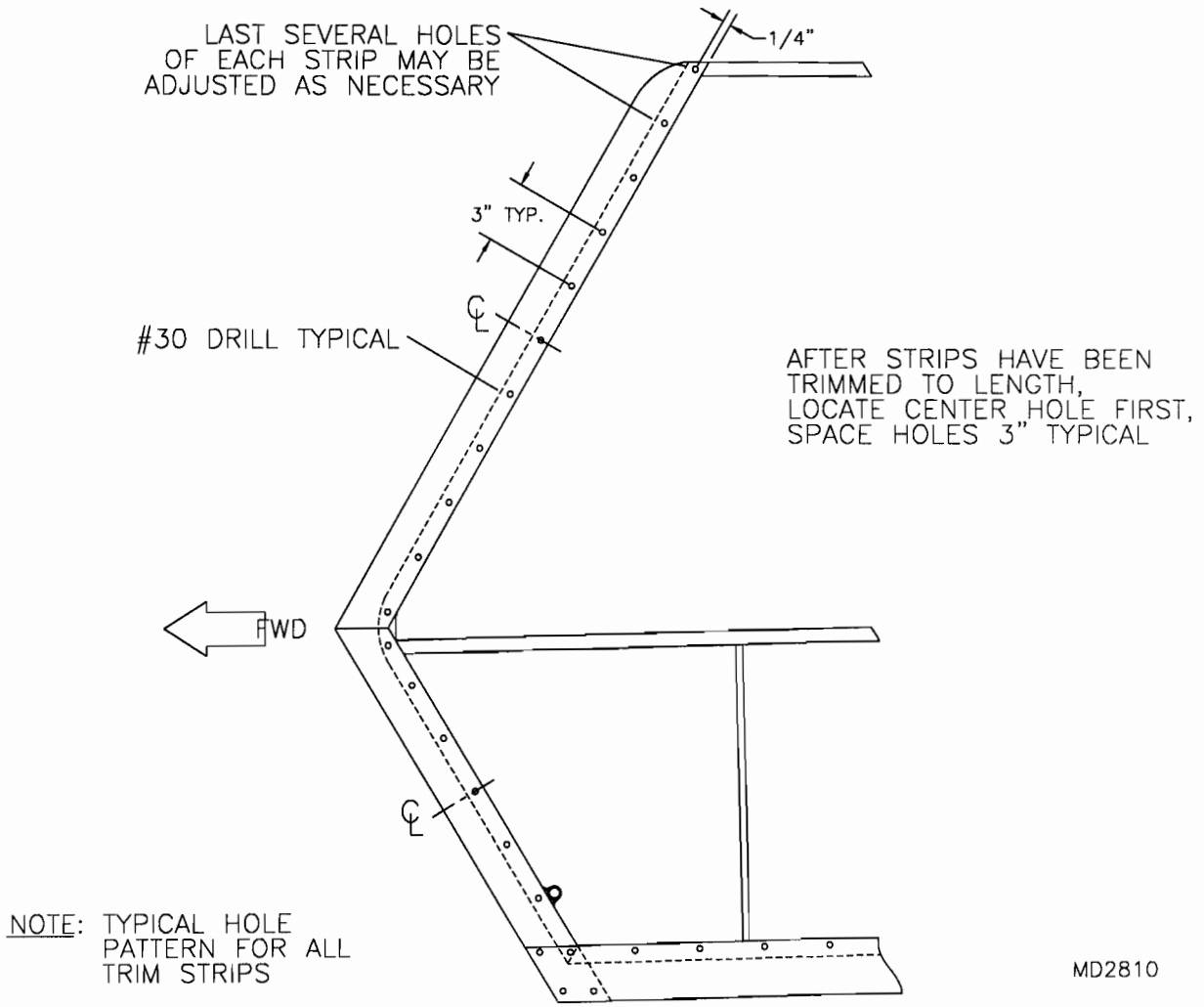


FIGURE 06B-03A

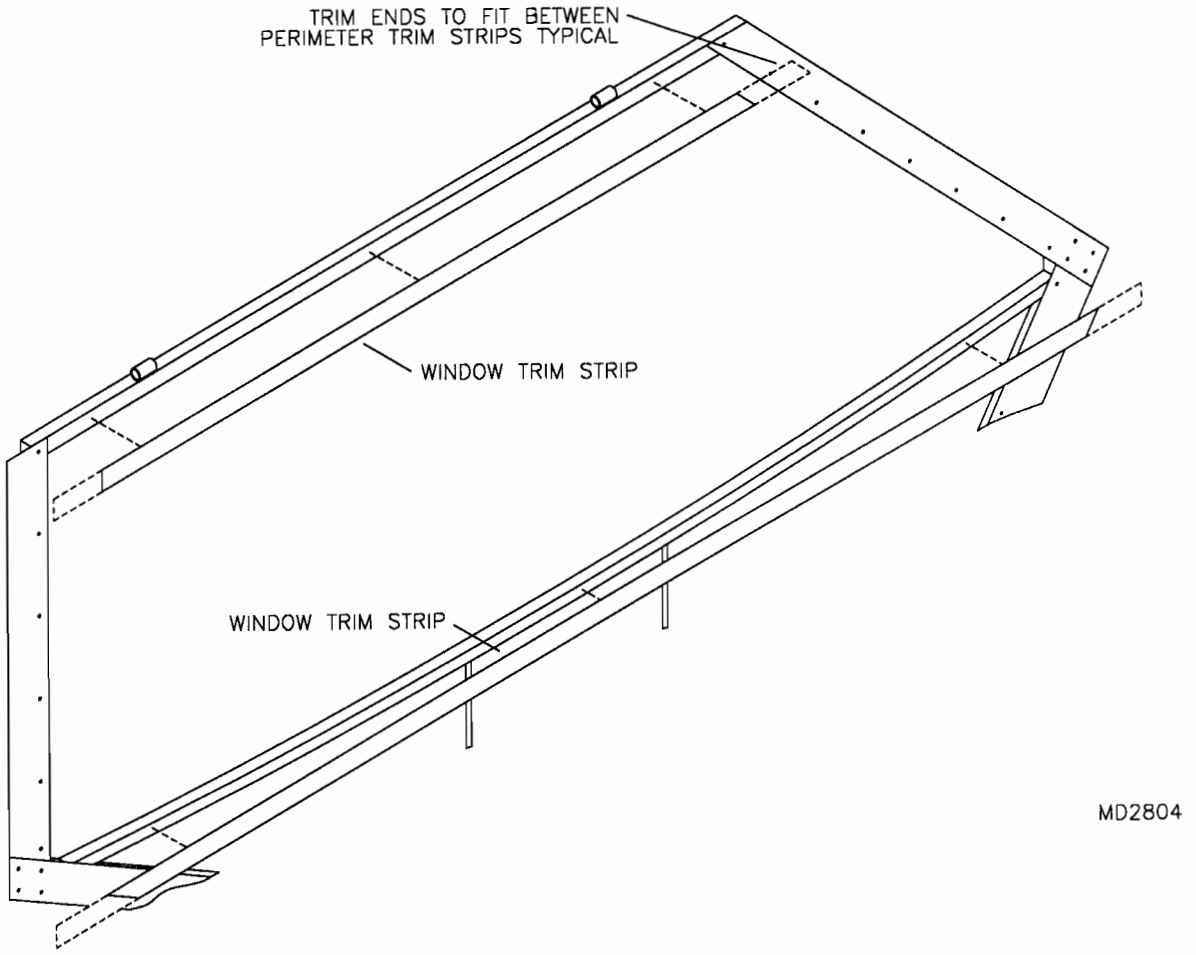
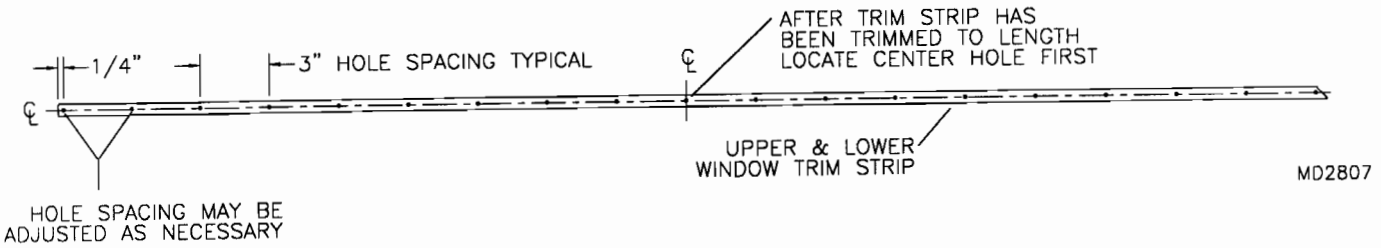
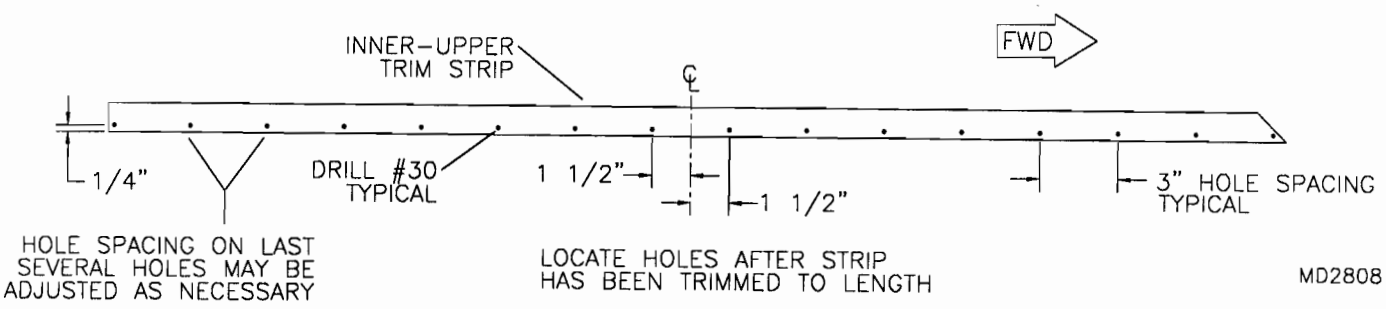


FIGURE 06B-03B



4. Position the inner upper trim strip to the inside of the upper door frame so that the lower edge of the trim strip is flush with the inside of the door frame tube. Slide the trim strip forward until the lower forward corner of the trim strip is flush with the forward side of the door frame tube. Trim the strip to follow the same angle as the forward door frame. Mark and drill the trim strip as shown in **FIGURE 06B-04.** Reposition the trim strip on the door frame and transfer drill through the strip into the frame following the same procedure used to drill the previous trim strips.

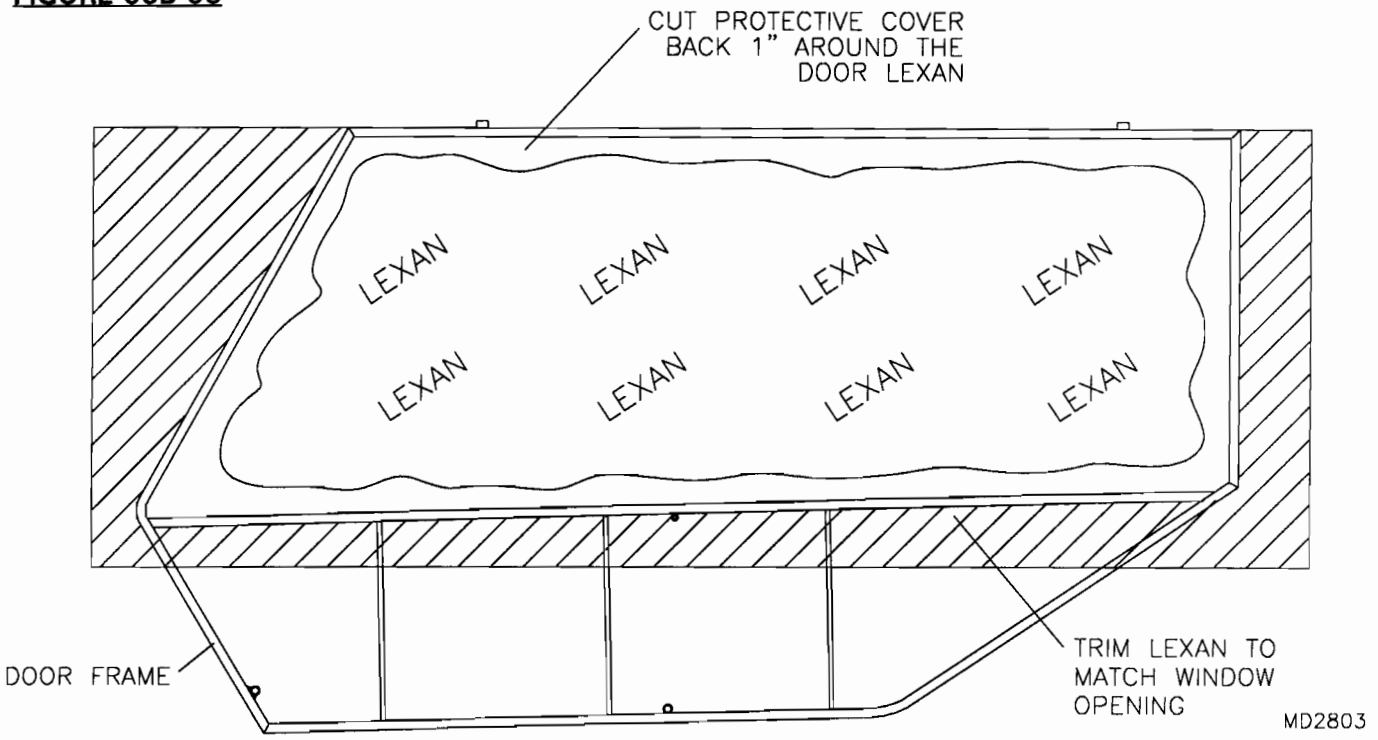
FIGURE 06B-04



NOTE: If you are installing the optional bubble lexan, refer to that section in options portion of the manual now. Omit step #5 below. Upon completion of the of the pre-fit of the bubble lexan, refer back to this section and continue with step #6 and the remaining steps.

5. Cut the windows from the large piece of lexan provided. Find the center of the lexan sheet and cut in half. Position one half of the lexan on the upper part of the door frame so that the top edge is flush with the top of the door frame. Mark and trim the lexan so that it is flush with the outer edge of the window frame. See **FIGURE 06B-05**. With the lexan trimmed, cut back approximately 1" of the protective plastic around the perimeter of the lexan. Reposition the lexan on the door frame and clamp in place. Starting at the top and bottom center, transfer drill through the lexan into the pre drilled holes in the door frame. Cleco as you go. Remove the lexan and chase drill all holes in the lexan only to #28. This will allow for rivet expansion without inducing undue stress into the lexan. Reposition the lexan on the door frame and cleco all trim strips to the lexan and door frame.

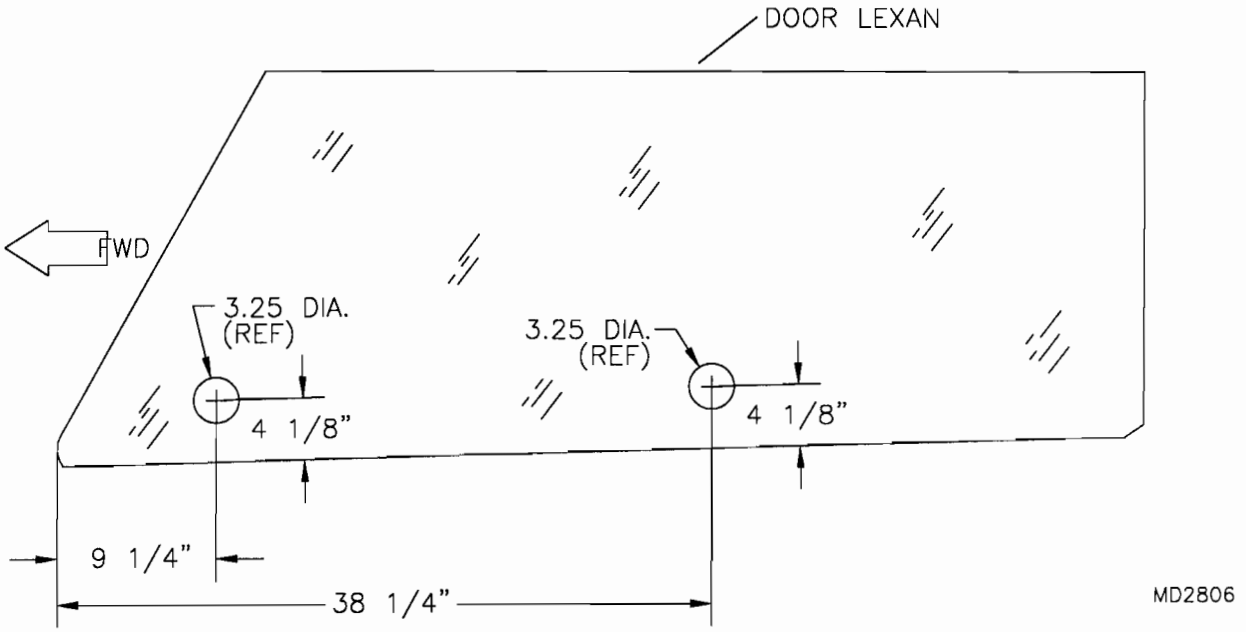
FIGURE 06B-05



6. With the windshield installed on the fuselage, install the door assemblies. Trim the upper forward door trim strip so that there is 1/16" gap between the trim strip and the edge of the windshield. **NOTE:** There should be a smooth (flush) transition between the windshield and the door trim strip. The door trim strip does not overlap onto the windshield. The inner upper trim strip should be on centerline of the upper fuselage door frame tube. Trim accordingly. Remove the doors and remove all trim strips and lexan. Label all trim strips for ease of reassembly.

7. Layout and mark the vent locations in the door lexan as shown in **FIGURE 06B-07**. **HINT:** We have found that a fly wheel cutter works best for cutting the vent holes. Use the 3.25 dimension as reference only. It is recommended to drill several test holes in the scrap lexan and test fit to ensure a tight hole tolerance to reduce vent vibration. Snap each vent into place.

FIGURE 06B-07



8. The lower portion of the door can now be covered and painted along with all trim strips. **NOTE:** We recommend trial fitting the door latch mechanism prior to covering and painting. Refer to the door latch section. During final assembly install all trim strips and lexan using the rivets called out in the parts drawing. Bond the rubber edging onto the top edge of the inner upper trim strip. Install the foam seal to the inside edge of the perimeter trim strips to seal against the fuselage when the door is closed.

S-7 DOOR ASSEMBLY & INSTALLATION - LATCH MECHANISM

(REFER TO PARTS PAGE # 006-08 FOR PARTS SELECTION)

1. Bolt the trim lever knob to the door handle. Note that there is a left and right hand door handle and a forward and aft orientation to each. Refer to the parts drawing. Fabricate the aluminum bushings as per the parts page and bolt the door handle assembly to the door frame.

2. Install the door pivot bushings into the forward and aft bushings welded to the door frame. Washers may be added or removed later to adjust the tightness of the door seal. Install the forward and aft door latch rods and bolt to the appropriate hole location in the door handle. Refer to the parts drawing. Operate the door handle through its full range of movement. If the door latch rods have a tendency to bind in the pivot bushings, remove the latch rods and with a drift punch inserted into the pivot bushing, tweak accordingly.

3. Install the bottom latch as shown in the parts drawing. Note that the bottom latch is retained by the outer handle. Adjustments may have to be made to both the bottom latch and to the outer handle. Do not secure them at this time. Bolt the door connect rod to the door handle and the bottom latch. The flattened ends on the door connect rod may need to be bent slightly for proper alignment and a smooth operation. Washer combinations may be altered to gain needed clearance.

4. Pin the door in place on the fuselage. Mark the contact locations of the latch rods onto the fuselage frame. Using the acrylic foam tape, attach the door latch striker plates to the fuselage frame so that the entire contact area is protected by the striker plate.

Pre drill the rub block as shown in **FIGURE 06C-04**. Fully close the door handle. Position the rub block between the latch and the fuselage frame so that the latch is centered on the block and the holes in the block are on the centerline of the fuselage frame. See **FIGURE 06C-04A**. Note that when the door latch mechanism is fully closed the bottom latch is slightly angled to the aft. Mark the rub block hole locations onto the frame. Remove the block and drill the mount holes to #30. Rivet the block in place. **NOTE:** The holes in the rub block can be counter sunk to allow the heads of the rivets to sit flush with the block.

Determine the number of washers, if any, needed on the shank of the bottom latch to achieve a proper seal between the door and fuselage. The door can be drawn in tighter by removing the 3/8" washers between the bottom latch and door frame. Adding washers will space the door out. With the proper adjustments made, position the outer door handle parallel to the slip stream with the door latch mechanism fully closed. Measure the distance between the door frame bushing and the outer handle shank and fabricate the aluminum spacer bushings. Refer to the parts page and **FIGURE 06C-04B**. **IMPORTANT:** Note the orientation of the outer handle. Improper orientation will result in loss of use of the door upcatch. Clamp the outer handle and the inner latch tight together, with the aluminum bushing between them. Using a #40 drill bit, pilot drill vertically through the shank of the outer handle and bottom latch. Drill out the lower hole in the outer handle and bottom latch to 3/16" and install the flange nut. Drill the top hole to #30, install the button head screw and tighten. See **FIGURE 06C-02C**.

FIGURE 06C-04

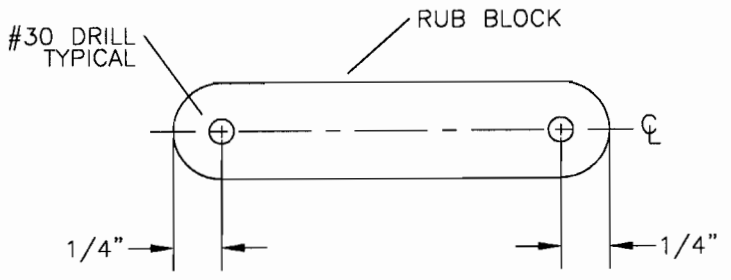


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FIGURE 06C-04A

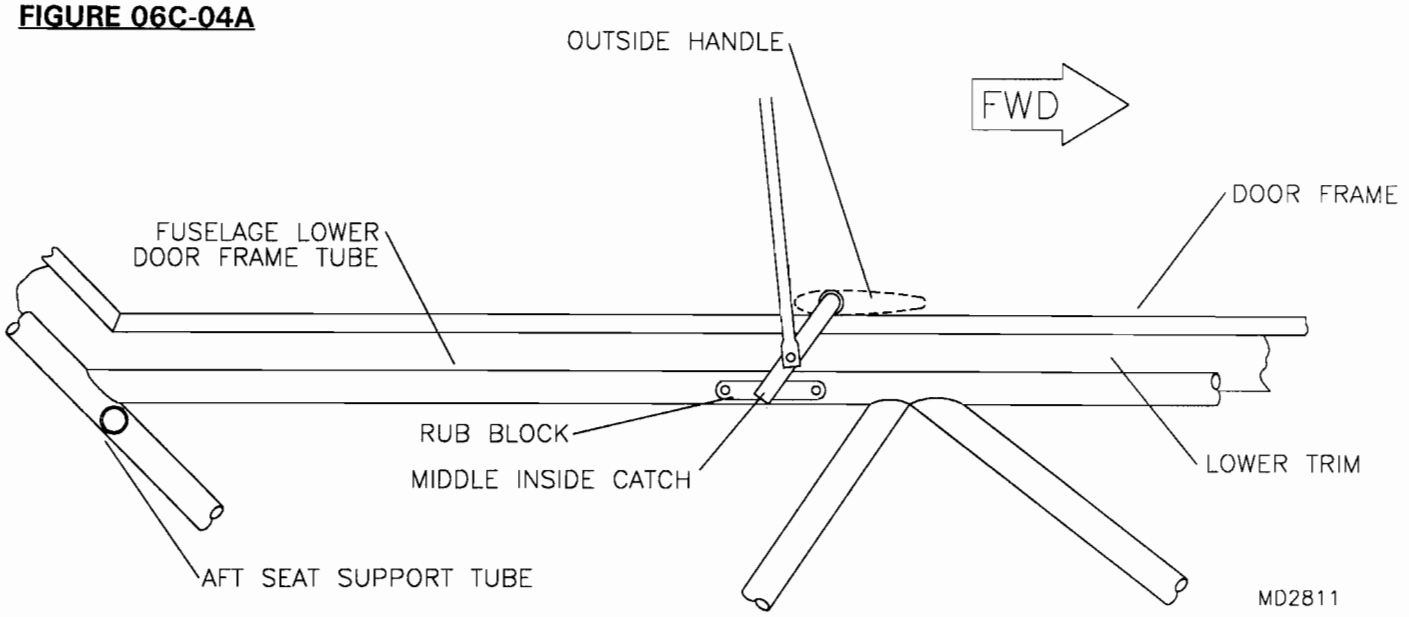


FIGURE 06C-02B

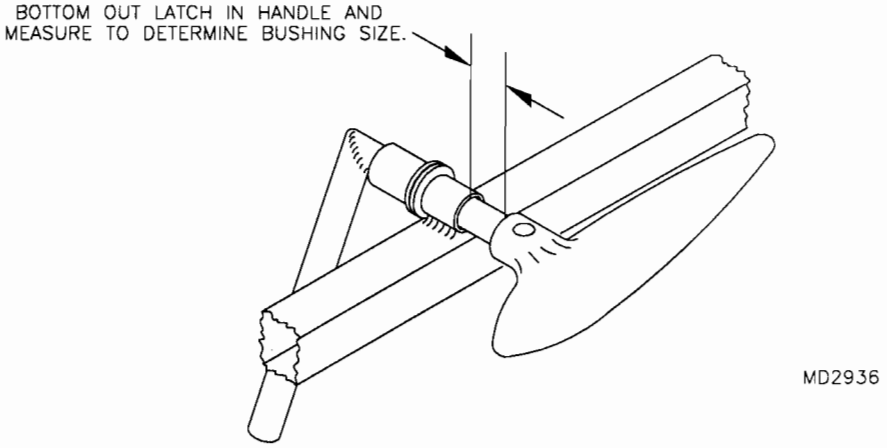
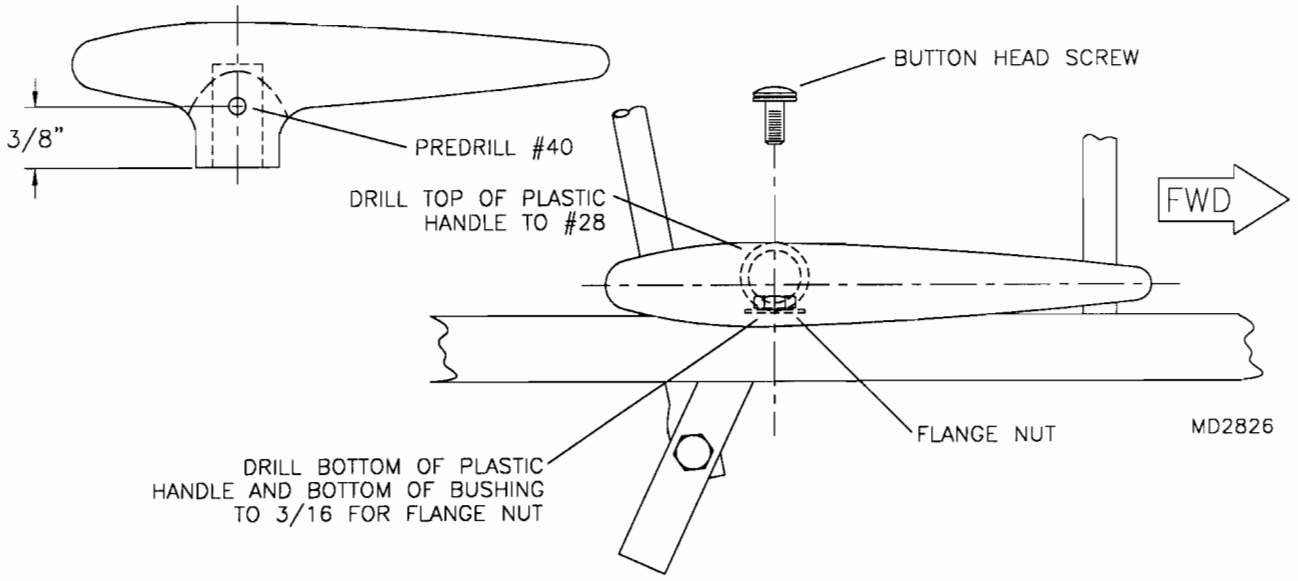


FIGURE 06C-04C



3. Remove the latch assembly and all trim strips. Cover and paint the doors. Paint all individual parts and final assemble.

S-7 12" SPINNER ASSEMBLY

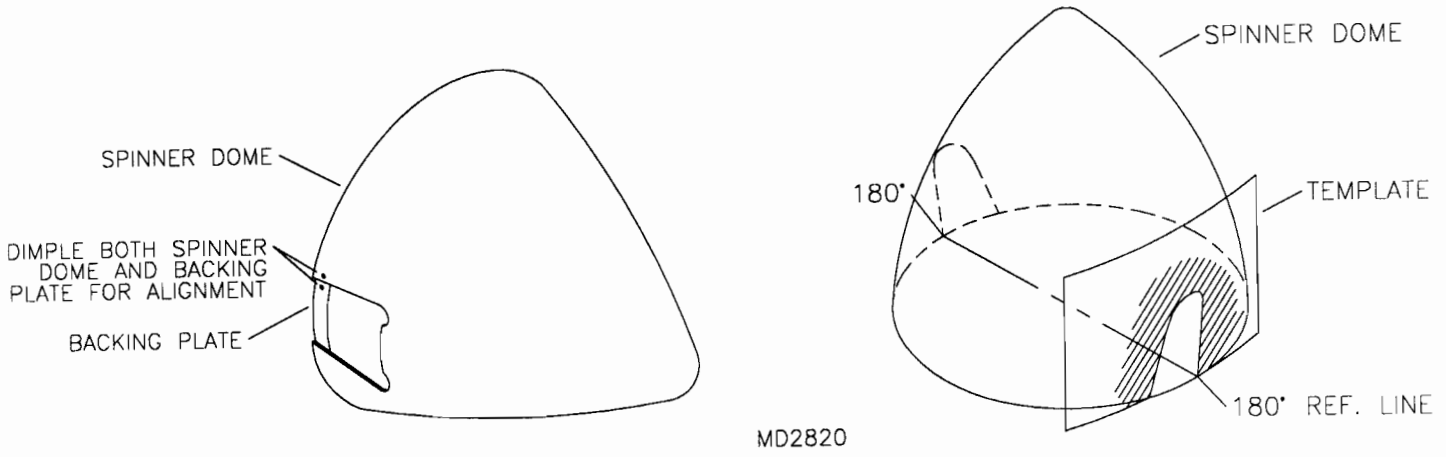
(REFER TO PARTS PAGE # 006-10 FOR PARTS SELECTION)

1. The spinner and backing plate supplied have been end trimmed at the factory and should not require any additional trimming.

2. With the backing plate setting on a smooth flat surface, insert a short piece of 1 ⅞" diameter tube into the center hole. Place the prop onto the tubing with the prop setting flat against the backing plate. **NOTE:** The slight dip in the plate is used to "pre load" the plate against the prop. Using the prop as a drill guide, **CAREFULLY** drill through the mount holes in the prop hub into the backing plate with an 8mm drill bit. **HINT:** After drilling the first hole insert a bolt through the prop and backing plate to prevent shifting while drilling the other holes.

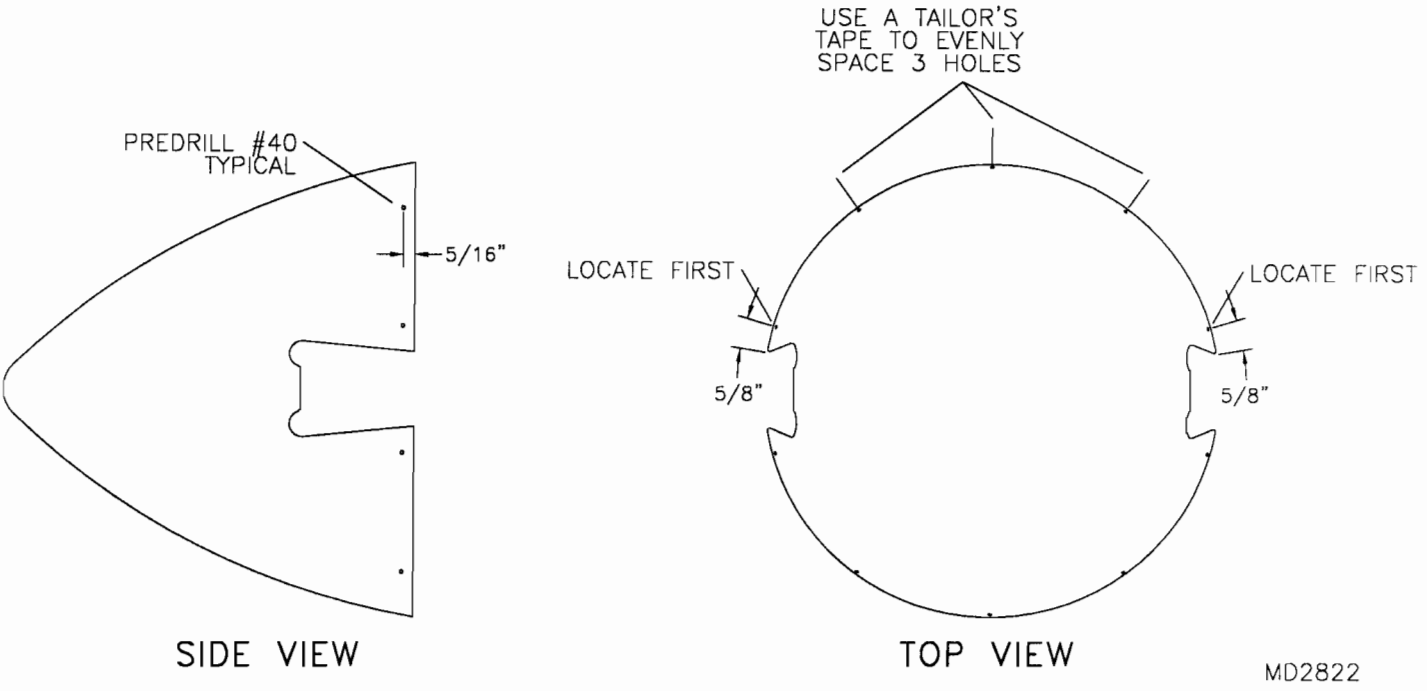
3. Bolt the prop to the backing plate. Sit the spinner dome on top of the prop and determine the locations of the cut outs for the prop blades. See **FIGURE 06D-03**. Using the correct template from the following pages mark and cut out the openings. **NOTE:** Cut the opening slightly smaller and sand the opening to the exact fit. Cut the openings deep enough to allow the dome to fit over the backing plate so that the edge of the dome sits flush with edge of the backing plate flange. **NOTE:** The spinner dome will not fit over the backing plate until the blade openings have been cut. With the openings cut, dimple the spinner dome near one opening and dimple the backing plate corresponding to that opening for alignment markings. Assemble the dome and backing plate each time with the dimples in line. See **FIGURE 06D-03.**

FIGURE 06D-03

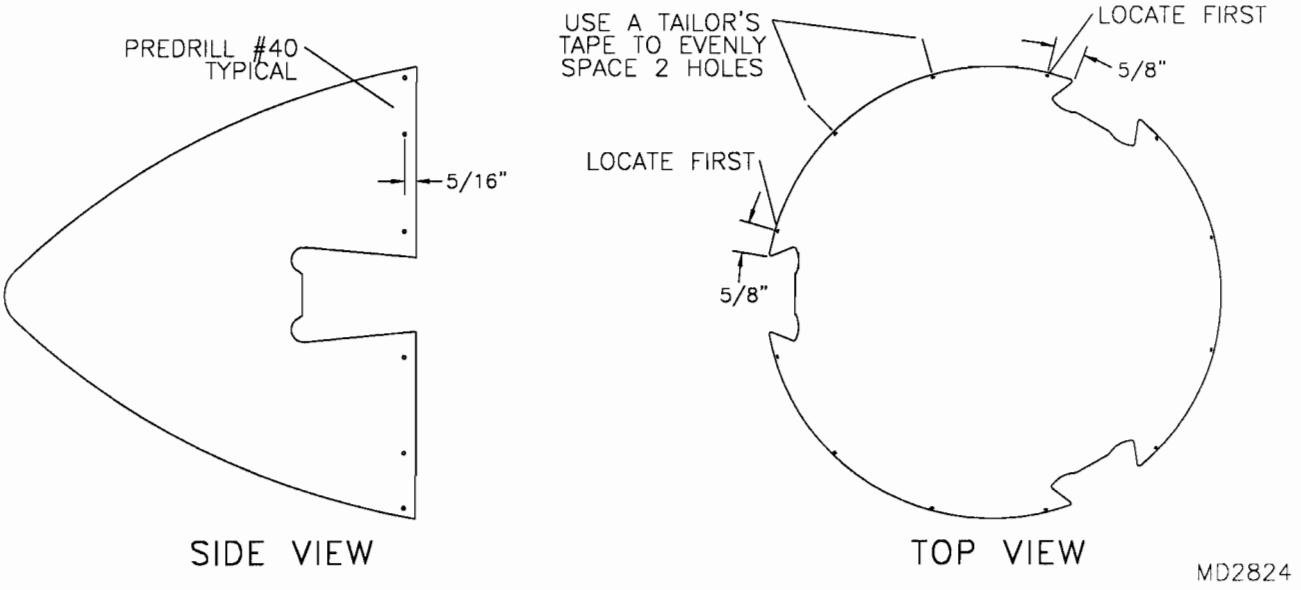


4. Layout and mark the hole pattern on the dome as shown in **FIGURE 07D-04**. Drill all holes to #40. With the backing plate and prop sitting on a flat surface, place the spinner dome in position. Press the dome tight to the surface to ensure that the dome and backing plate are flush. Using a #30 drill bit transfer drill through the dome into the backing plate flange. Cleco as you go. Chase drill using a #11 drill bit and clecos. The dome and backing plate must remain tight against the surface as you drill. Remove the dome and the prop from the backing plate and install the nut plates. **NOTE:** Counter sink the #40 holes to allow the heads of the rivets to sit flush with the backing plate flange. See **FIGURE 06D-04A**. "Set" the rivets by resting the head of the rivet against a vise and tapping the driven end with a small hammer. Check for tightness. The nut plates must be snug. Drill the prop bolt holes in the backing plate out to 33/64"

FIGURE 06D-04

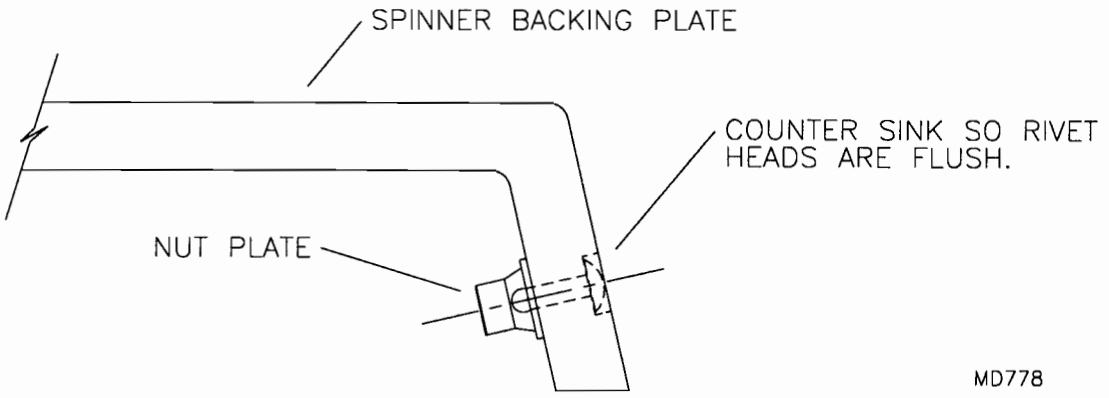


TWO BLADE PROP HOLE SPACING



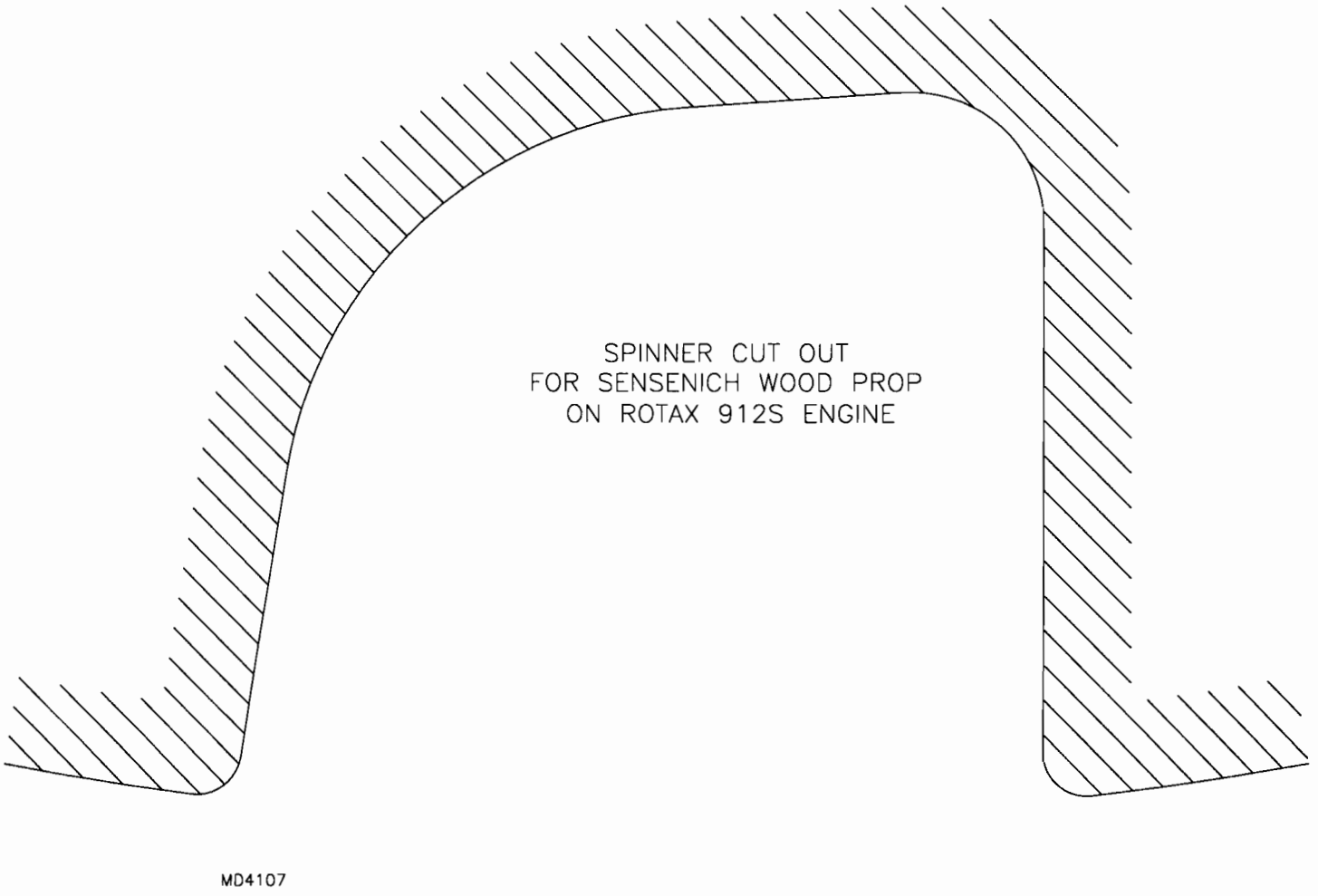
THREE BLADE PROP HOLE SPACING

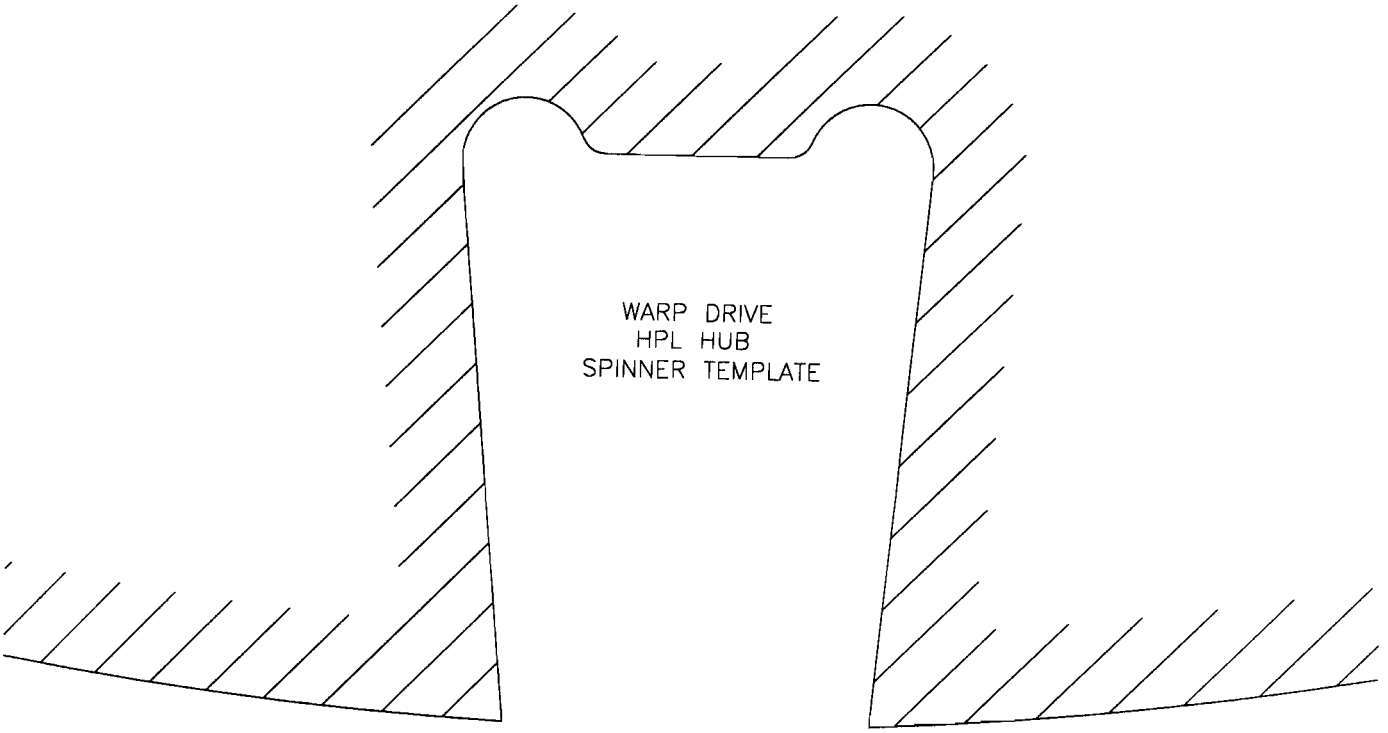
FIGURE 06D-04A



5. During final assembly install the backing plate on the engine prop flange. Install the prop (refer to the prop installation section) and bolt the spinner dome in place.

The spinner and prop should be balanced and no adjustment required. However, the ultimate test is in the running. If you experience a lot of vibration it could be caused by out of balance or misalignment. Use a good prop balancer. Check both the prop and spinner assembly, if the misalignment is not correctable then a new spinner may be required. Misalignment occurs through improper alignment of the parts. A slight amount of "wobble" is acceptable and may disappear at higher RPM's. Always pre-flight your spinner.





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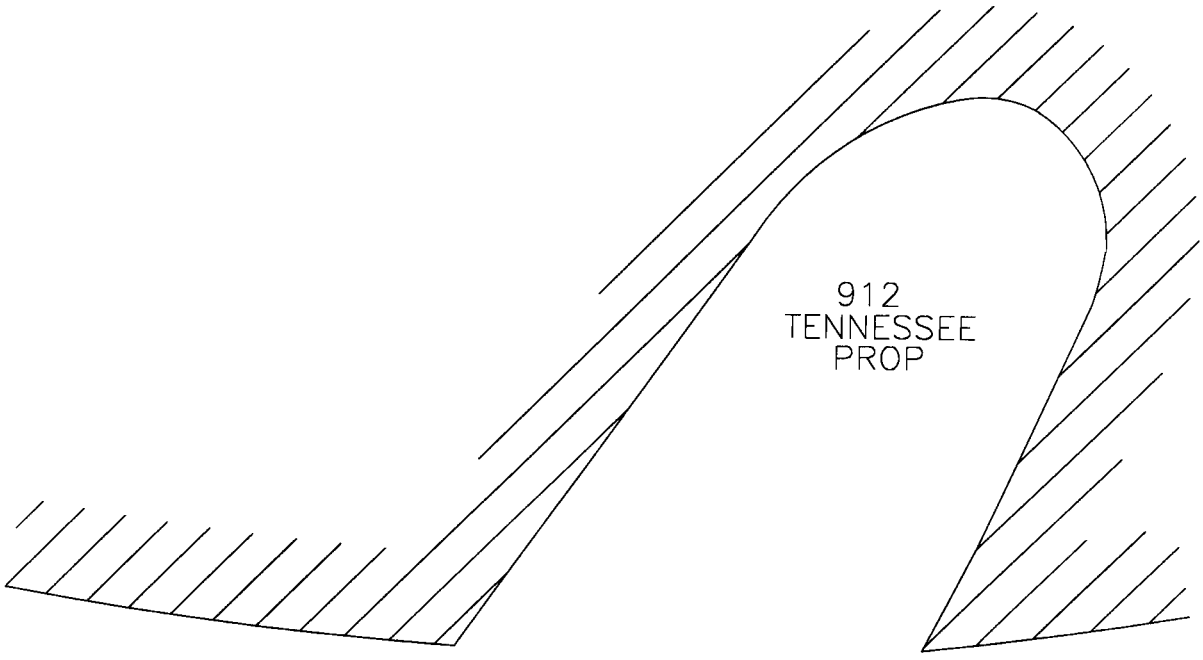

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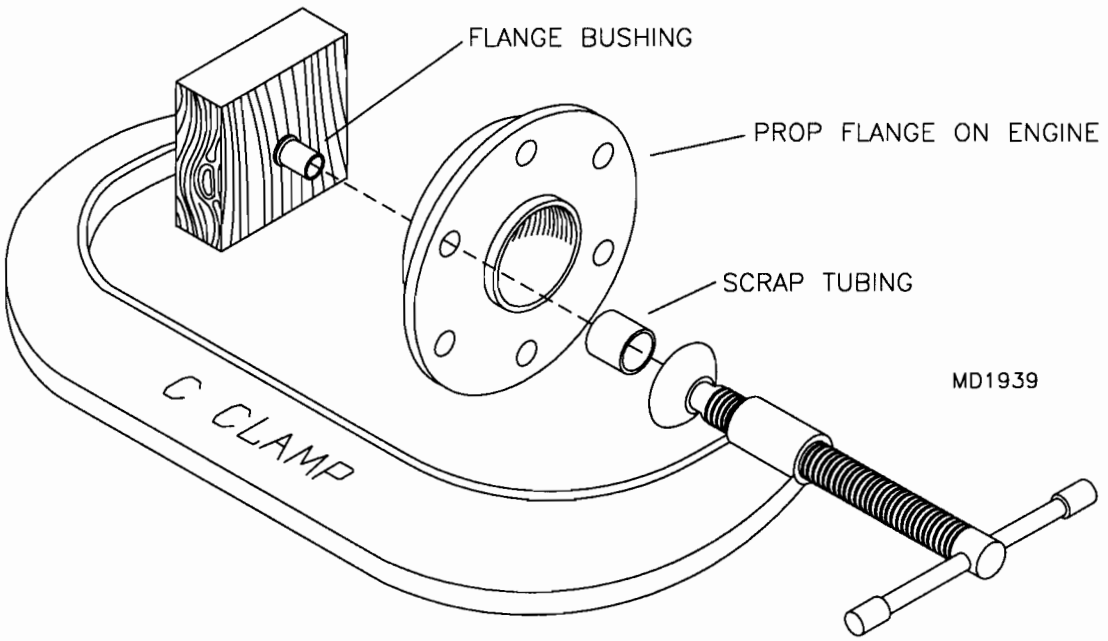
S-7 912/912S PROP INSTALLATION

(REFER TO PARTS PAGE # 006-12 FOR PARTS SELECTION)

1. Install the flange bushings into the prop flange on the engine from the aft side. Use a "C" clamp to completely seat the bushings into the flange. Place a small wood block between the pad of the clamp and the aluminum bushing to protect them from being damaged. Use a piece of tubing approximately 1" long over the flange bushings to allow them to seat as the "C" clamp is tightened. See **FIGURE 06E-01**.

FIGURE 06E-01



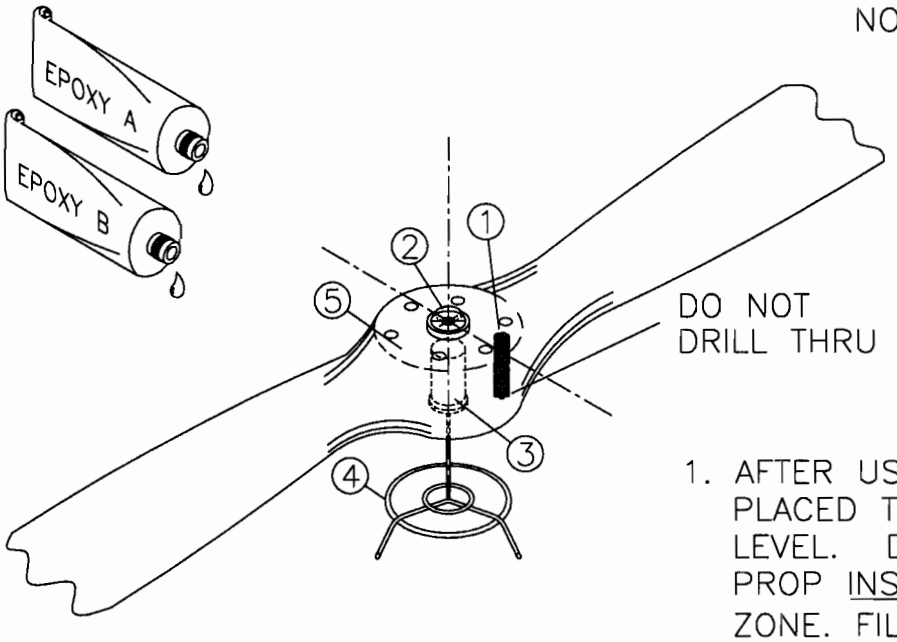
2. Inspect the prop provided for any nicks, crack or dings. The propeller comes from the factory balanced and ready to bolt on, however depending on conditions and how the prop has been stored, it may not be in balance at the time of install. To balance the prop it is best to use a two-axis balancer. These are available from several Aircraft Supply stores. Place the prop on the balancer and follow method to correct balance in **FIGURE 06E-02**.

3. Mount the propeller, as per parts drawing, using the bolts provided. Note the length of the bolts is critical. Use washers to be certain the bolts are not bottomed out on the threads. **DANGER:** If bolts are bottomed out on the threads, the prop is not properly torqued, separation from the aircraft during operation may occur and cause injury or death. Torque the bolt from 175 to 200 inch pounds in the pattern shown in **FIGURE 06E-02**. Re-torque bolts after 5 hours of flight.

4. Check prop for tracking by turning blade into a vertical position and placing an object at the tip. Spin the prop to the next blade and check position. If the position is the same the prop is in track. If not, loosen prop bolts and re-torque until proper tracking is achieved. **HINT:** Start torquing pattern on the blade that is out of track. See **FIGURE 06E-03**. **DANGER:** Track prop with ignition **OFF**!!

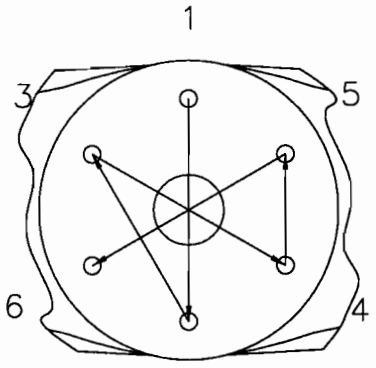
5. Bolt the spinner dome to the backing plate. Refer to the spinner section.

FIGURE 06E-02



NOTE: BALANCE PROP INDOORS OUT OF WIND

1. AFTER USING COINS PLACED TO CENTER BUBBLE LEVEL. DRILL A HOLE INTO PROP INSIDE OF CRUSH PLATE ZONE. FILL WITH LEAD "BB'S" SEAL WITH EPOXY.
2. CENTER LEVEL
3. DUAL AXIS PROP BALANCER INSERT SPECIFY PROP INSIDE DIAMETER WHEN ORDERING.
4. STAND FOR INSERT
5. CRUSH PLATE ZONE

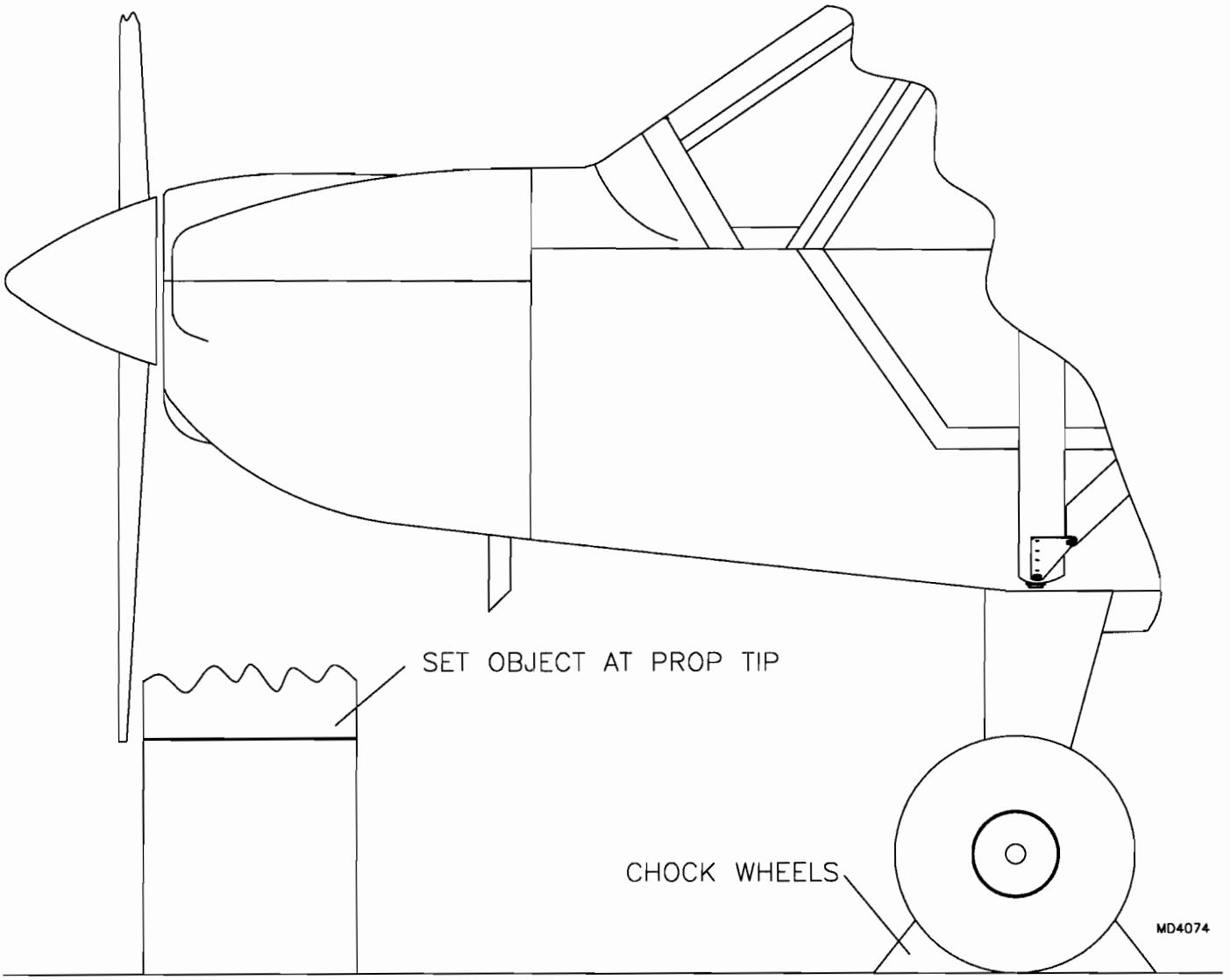


MD4039

2

RE-TORQUE BOLTS AFTER 5 HRS. OF FLIGHT

FIGURE 06E-03



TRACK PROP IN CALM CONDITIONS

IMPORTANT!!

Check propellers torque every 50 hours or after large changes in climate.
Wood props will shrink and expand with humidity.
If you live in a climate with large changes in humidity or fly to a different climate, prop torque may change more often.
Failure to maintain proper torque may result in separation of the propeller from the aircraft and may cause injury or death.

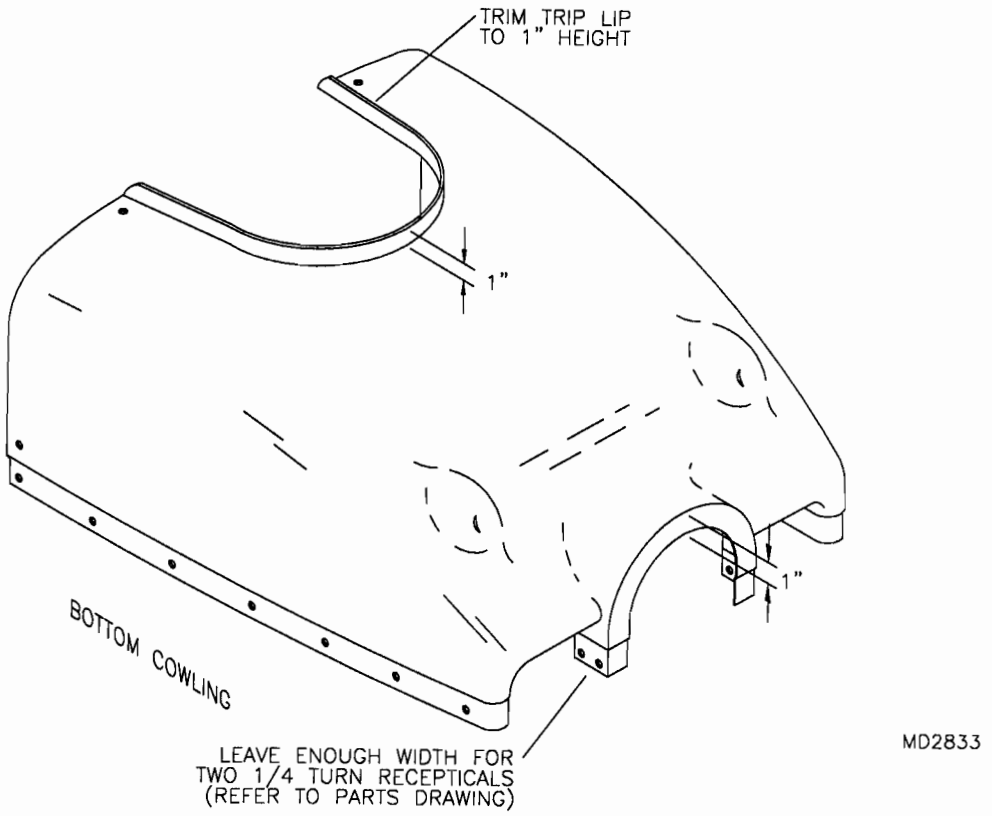
S-7 912 COWLING ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 006-14 FOR PARTS SELECTION)

NOTE: The instrument panel housing, engine and spinner backing plate must be installed prior to fitting the cowling.

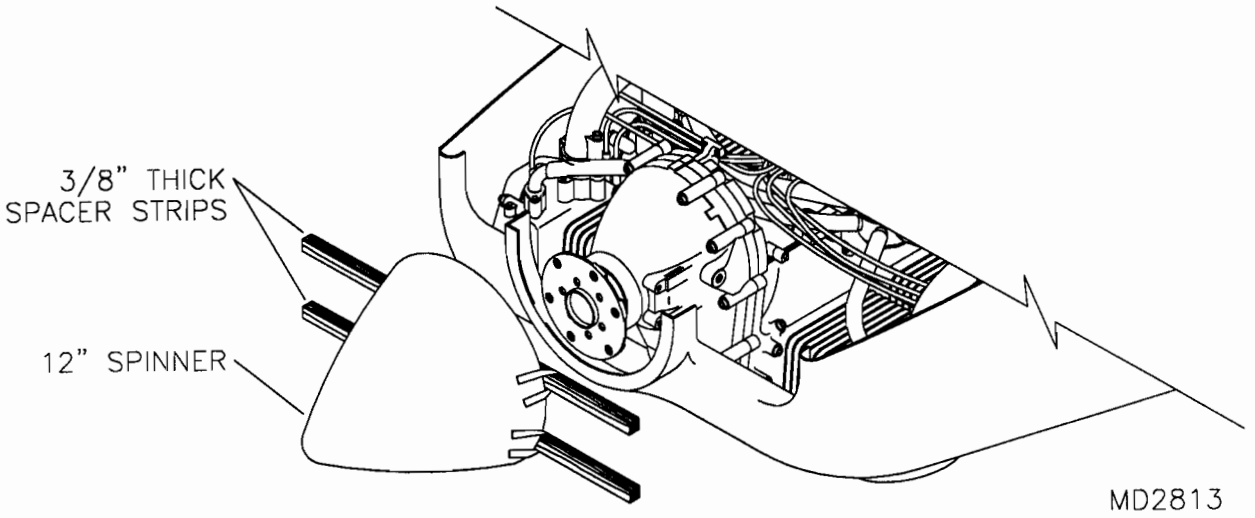
1. Trim the bottom cowling to the scribe lines on all edges except the firewall (aft) edge. **HINT:** Aviation snips, drum sanders and sanding blocks work well to trim the cowlings. Trim the bottom trip lip and the prop opening flange to 1". Be careful to not trim to much off of the ram air port flanges to allow for two quarter turn receptacles to be installed side by side. See **FIGURE 06F-01.**

FIGURE 06F-01



2. Tape two ⅜" thick wood strips (or similar material) to the aft side of the spinner backing plate as shown in **FIGURE 06F-02.** Clamp or tape the lower cowling in place with the forward side touching the ⅜" spacers. The cowl should fit tight around station 1 and be centered around the spinner. Using the two side mount tabs as guides mark the side mount holes onto the cowl. With a #11 bit drill both side mount holes in the cowling, nut plate the mount tabs and bolt the cowling to the fuselage. Check for proper position and alignment. Do not drill the lower mount holes at this time.

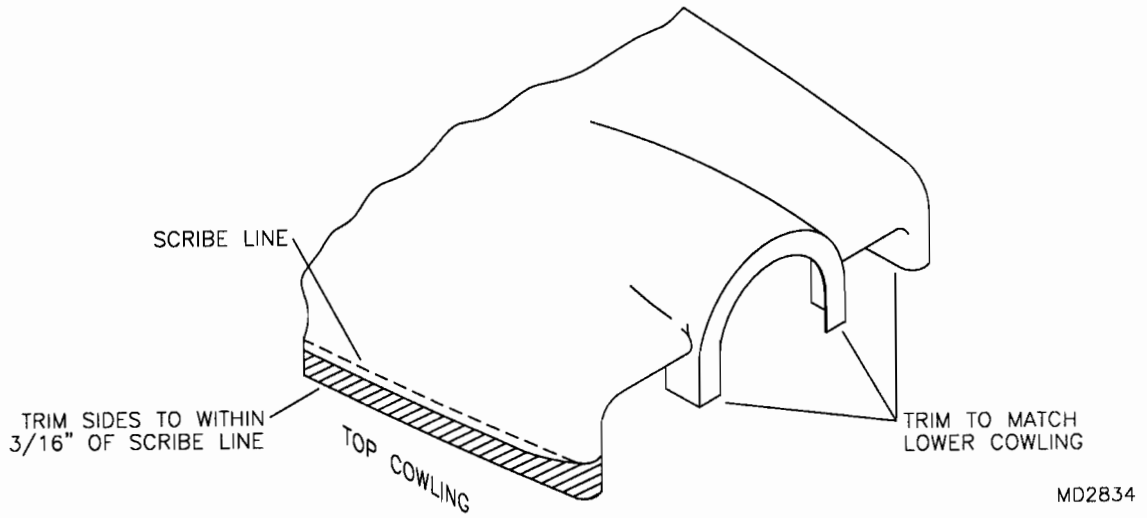
FIGURE 06F-02



3. Trim the forward side of the top cowling to match the bottom. Trim both sides of the top cowling to within 3/16" of the scribe lines. Do not trim the aft edge at this time. See **FIGURE 06F-03**.

With the lower cowling on the fuselage, place the top cowling on the aircraft. It should fit tight over the instrument panel housing when the lower side edges are fit into the joggle of the lower cowling. Trim the top cowling as required to gain the best fit. When the cowl halves are fit together, and centered around the spinner backing plate the split line will be level with the aircraft. When satisfied with the fit, locate and drill the bottom cowling lower mount holes. Nut plate the lower tabs and bolt the cowling in place.

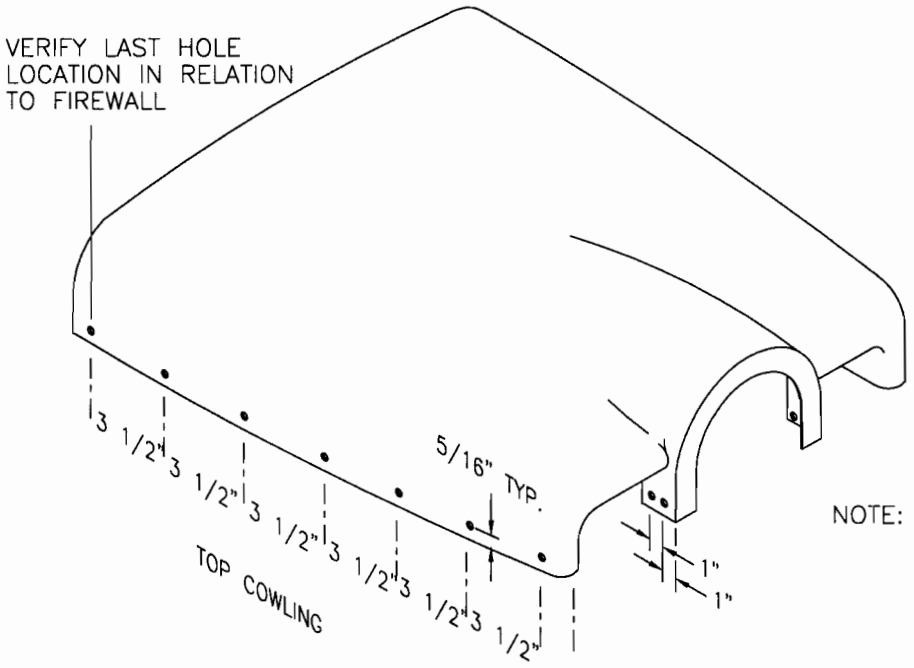
FIGURE 06F-03



4. Remove the top cowling and layout the hole pattern as shown in **FIGURE 06F-04** and predrill to #30.

Install the top cowling. Using a #11 drill bit, transfer drill through the #30 holes in the top cowl into the bottom cowl. Cleco as you go. Remove both cowlings and cleco the quarter turn receptacles to the bottom cowl. Using a #40 drill bit, drill both mount holes for the receptacles. Remove the receptacles and drill the quarter turn hole out to 5/16". Countersink the #40 rivet holes to allow the rivet heads to sit flush. Install the quarter turn receptacles. Drill the quarter turn holes in the top cowling out to ¼6". See **FIGURE 07F-04A**.

FIGURE 06F-04



NOTE: PREDRILL ALL COWLING HOLES TO #30.

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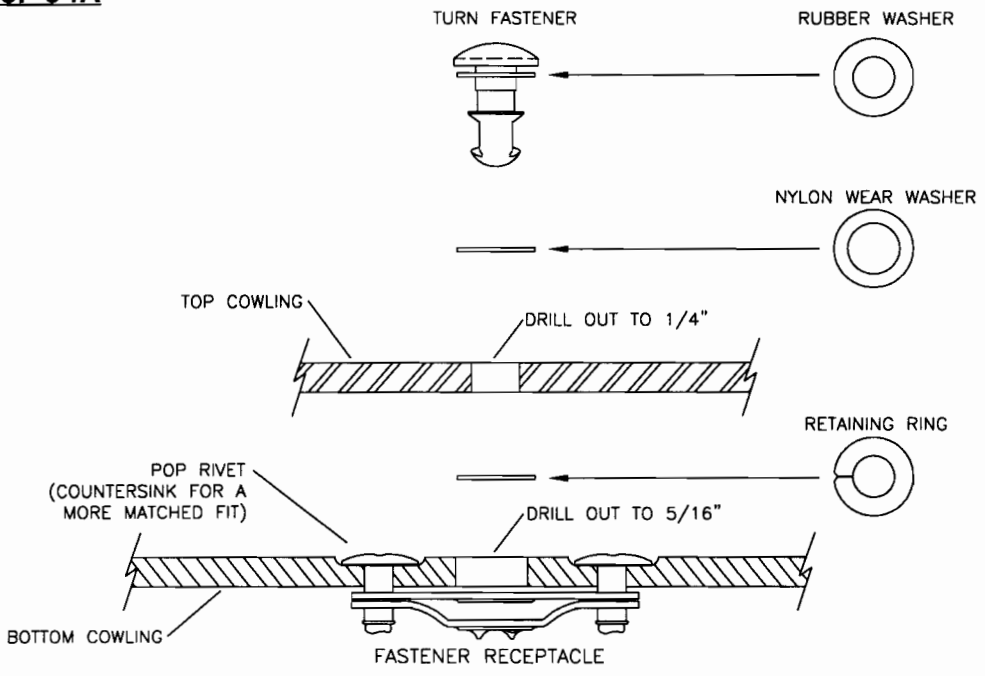
FIGURE 06F-04A



MD1430

5. Install both cowlings on the fuselage. Install several quarter turn studs to hold the cowling in position. Mark a trim line on the aft edge of the cowlings. The top cowl should overlap the instrument panel housing by a minimum of 1". See **FIGURE 06F-05. HINT:** ¾" masking tape works well for marking a trim line completely around the perimeter of both cowlings. Remove the cowlings and trim. Install the cowlings. Mark and drill the top aft two quarter turn locations. See **FIGURE 06F-05.** Install the quarter turn receptacles to the under side of the instrument panel housing following the same procedure as before.

With the bottom cowling on the fuselage mark the muffler canister location on each side of the cowling. Pre drill the cowling heat shields as shown in **FIGURE 06F-05A.** Remove the bottom cowling and position the heat shield for the best coverage of the muffler canister. See **FIGURE 06F-05B.** Transfer drill through the heat shield into the cowling. Rivet the heat shield in place using the small brass washers as stand offs between the shield and the cowling. Refer to the parts drawing.

FIGURE 06F-05

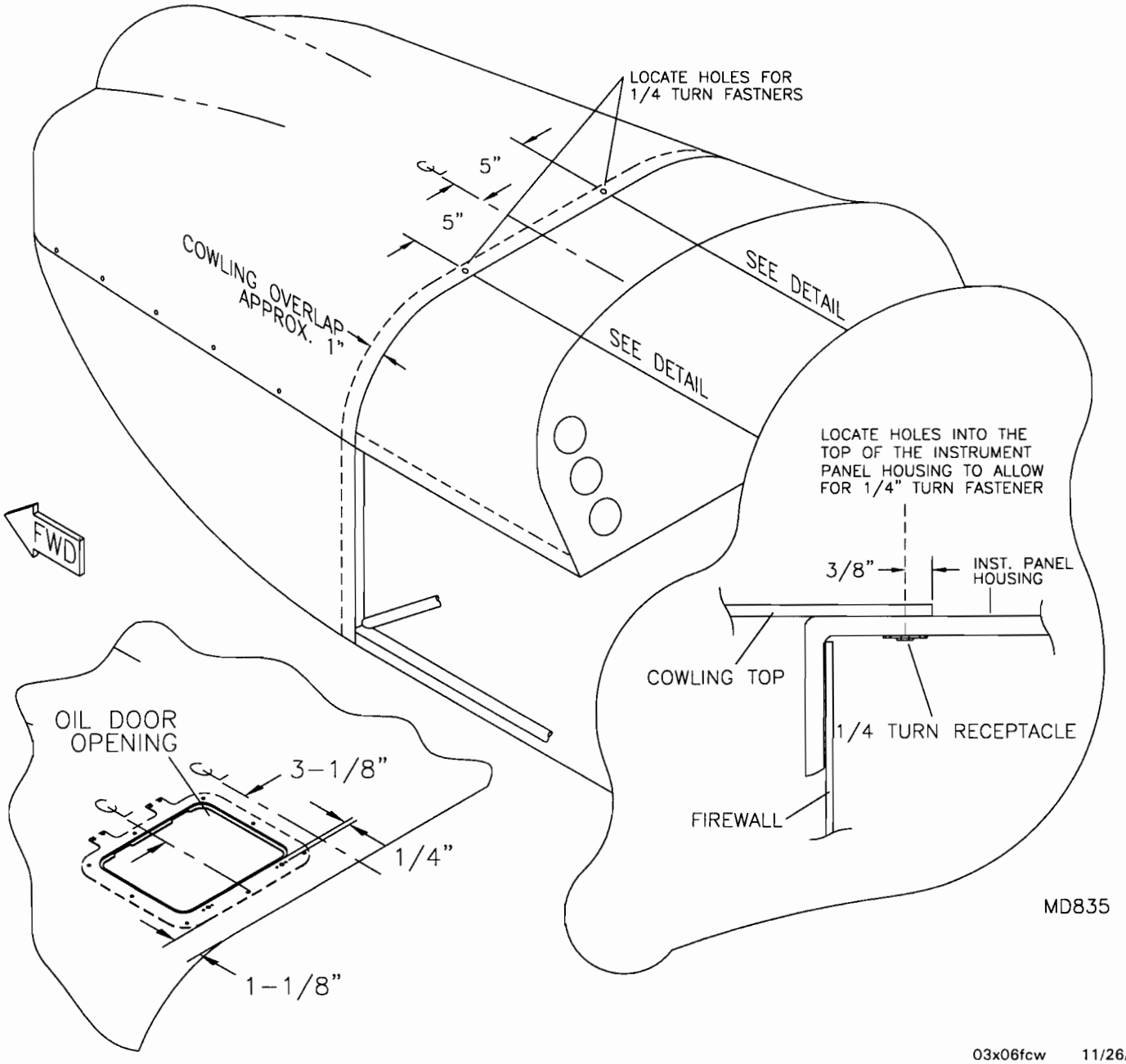


FIGURE 06F-05A

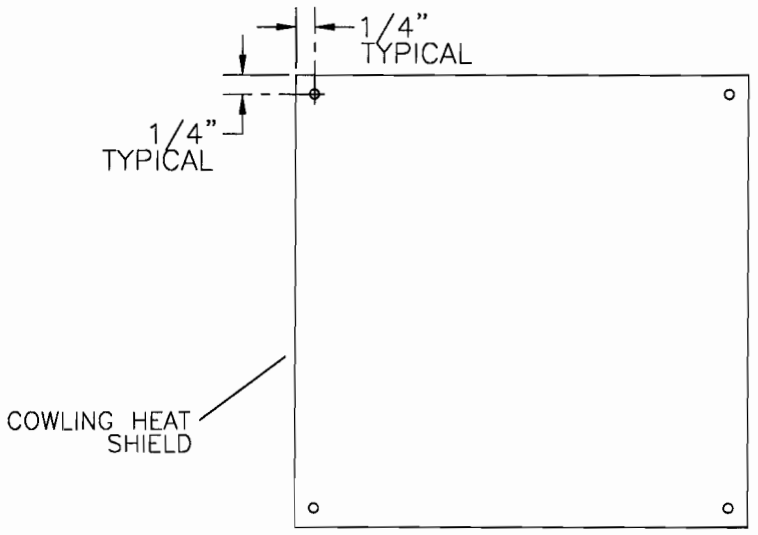


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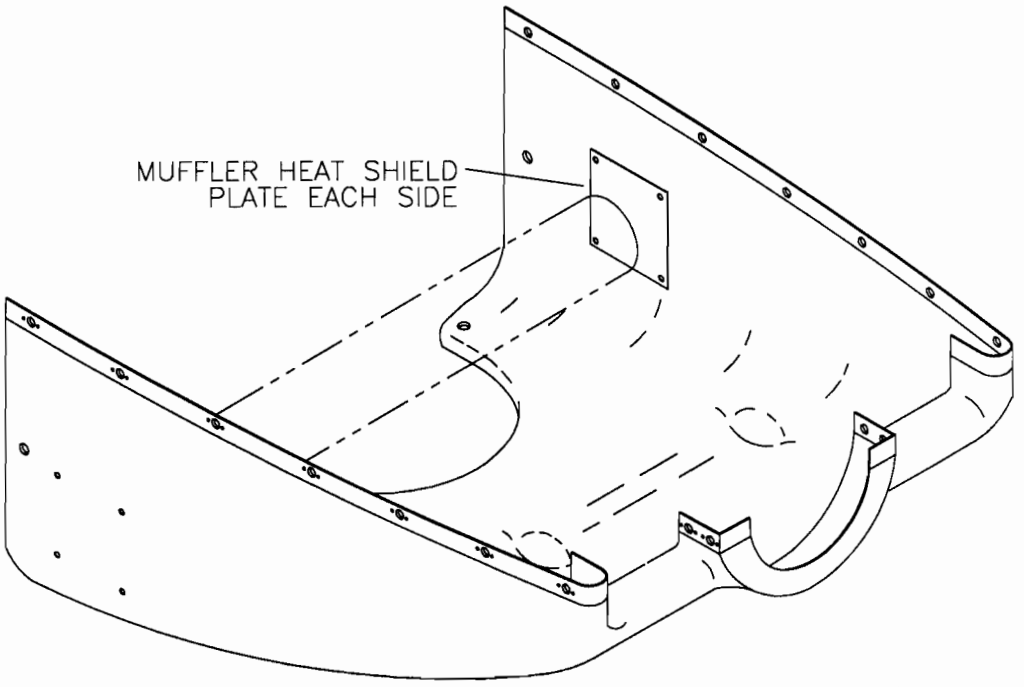
FIGURE 06F-05B



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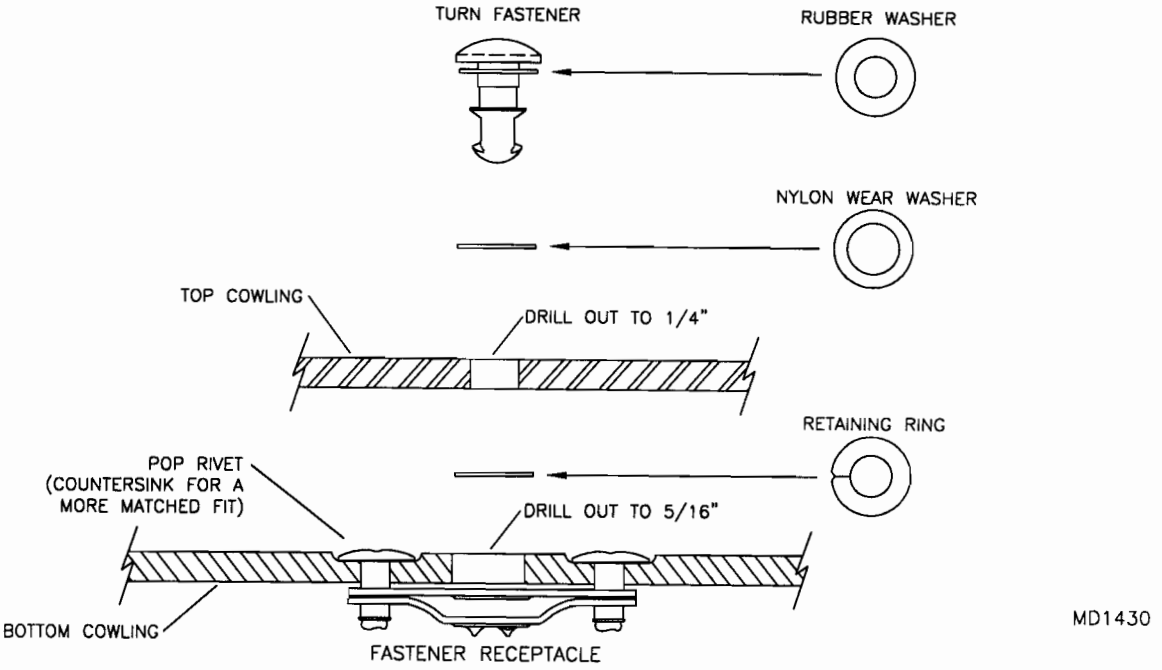
6. After painting, install the quarter turn studs into the top cowl. See **FIGURE 06F-06**. To ease cowling removal, do not install the retaining rings on the forward set of quarter turns.

FIGURE 06F-06



S-7 COVERING

(REFER TO PARTS PAGE # 007-02 FOR PARTS SELECTION)

GENERAL

ADDITIONAL SUPPLIES REQUIRED TO COVER THE S-7

Pinking Sheers
Regular Scissors
Razor Blades
2" Brushes
Containers for Glue and Solvents
Saw Horses or "A" frame pivot stands
Methyl Ethyl Ketone (MEK)

Neatness and cleanliness during the covering process will reflect in the finished product. Adequate ventilation is a must. A supplementary covering manual has been supplied in your kit. Read this manual completely prior covering your aircraft. This manual explains the basics of covering.

Throughout this section we will be referring to sizing material. Sizing material is U-500 adhesive thinned to water like consistency. Keep a container of sizing material handy and apply it to the fabric where ever a straight cut is to be made. Allow the sizing material to dry before making the cut. This will keep the fabric from fraying.

NOTE: The use of U-500 is recommended to be applied to the large sheel metal areas, such as wing leading edge wrap and root section. This under layer of material will prevent pinholing of the finish typical in these areas. However this is left to the discretion of the builder.

WINGS

NOTE: Prior to covering the wings, review the following check list making sure that everything is in place prior to covering.

WING PRE COVER CHECKLIST

_____ Sheet Metal area coated with thinned U-500
_____ Aileron Cables Installed
_____ Flap Teleflex Cables Installed
_____ Static & Pitot Lines Installed
_____ Fuel Lines Installed & Clamped
_____ All Nut Plates Installed
_____ Jury Strut Bracket Installed
_____ Door Upcatch Installed
_____ Strobe Mount Plates Installed (optional)
_____ Strobe Wiring Installed (optional)
_____ Hole Drilled In Tip Bow For Pivot Stand (optional)
_____ Remove All Marks & Clean Entire Wing
_____ Top & Bottom ribs drilled (optional)

1. Position the wing top side up on saw horses or other suitable work surface. **HINT:** We use two "A" frame stands with pivots so the wing can rotate and be locked in any position. You may consider purchasing or building such a device. Contact the factory for information. If you are using such a stand, it is acceptable to drill a ¼" diameter hole through the tip bow for a pivot pin.

2. Scotch brite all sheet metal surfaces and clean with acetone. Apply one coat of thinned U-500 to the sheet metal, let dry. The thinned U-500 applied to the metal under surfaces prevents pinholing in the paint finish. With the wing top side up and level, roll out and cut the top layer of fabric so that it extends approximately 6" on each end of the wing. Pull as much of the fabric to the trailing edge of the wing as possible leaving enough fabric on the leading edge to wrap around the spar. Trim off the excess fabric. Save these scraps, they will be used to cover smaller parts.

Refer to the supplementary covering manual and mix up a quantity adhesive. Bond the fabric to the trailing edge spar and trim as shown in **FIGURE 07-02**. Bond the fabric to the leading edge spar pulling light tension into the fabric as you go. Refer to **FIGURE 07-02**. Bond the fabric to the tip bow and the upper root rib pulling in light tension. Trim fabric as shown in **FIGURE 07-02A**. With the perimeter attached to the wing structure iron out any wrinkles or puckers in the bond area. Pre tension the top skin. Refer to the supplementary covering manual. **CAUTION:** Do not bring the top skin to final tension until the bottom skin has been pre tensioned. Apply sizing material around the filler neck. Using a razor blade cut the opening for the filler neck.

FIGURE 07-02

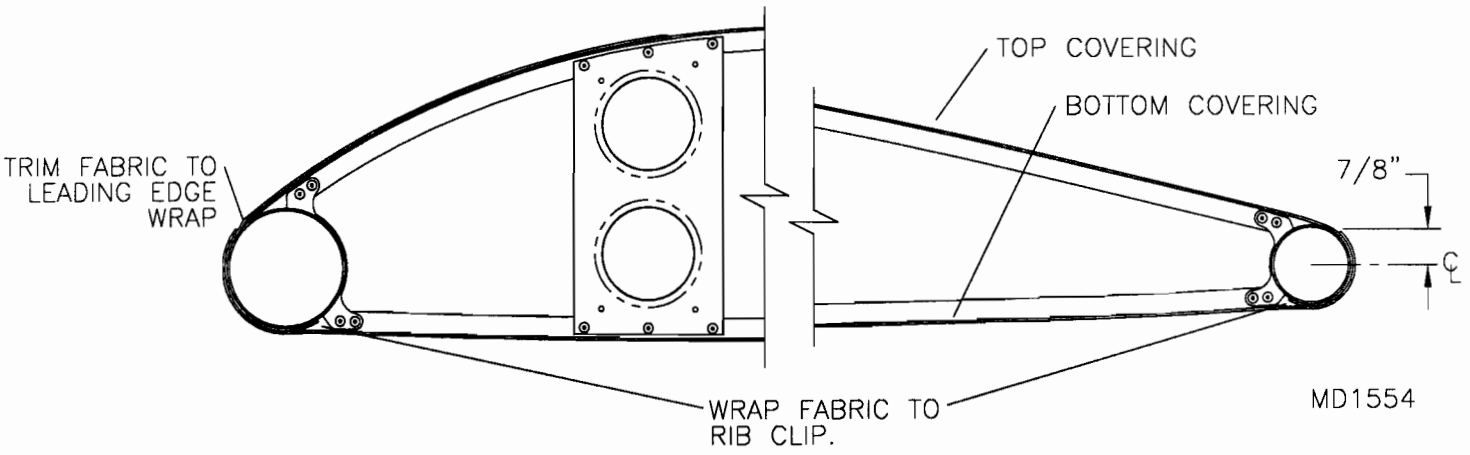
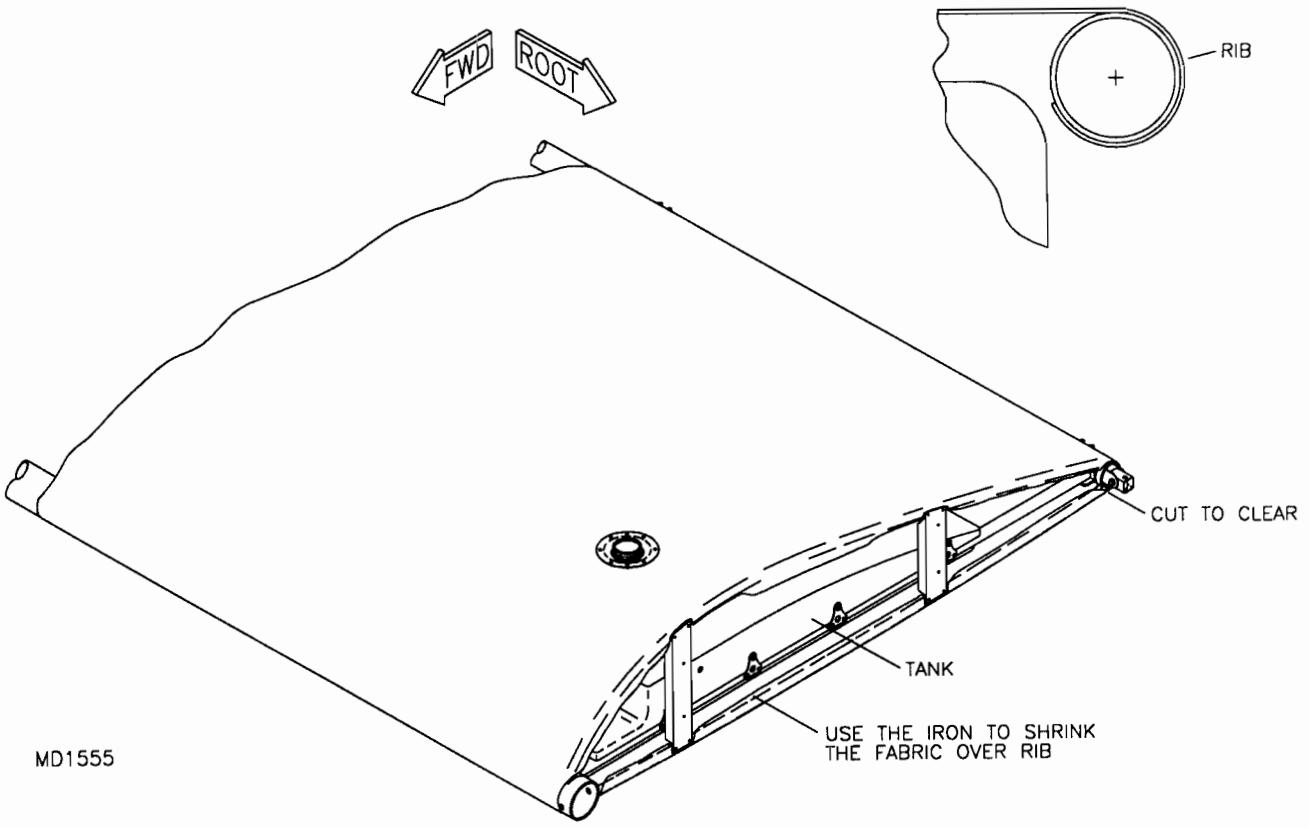


FIGURE 07-02A



3. With the top fabric pre tensioned, position the wing bottom side up. Roll out and cut the bottom layer of fabric. Following the same procedure as before, bond the bottom fabric to the wing frame and pre tension. Refer to **FIGURE 07-02** for trimming the lower fabric. Size and cut the fabric around the lift strut attach plates, jury strut bracket and door upcatch. Final tension the top and bottom fabric.

NOTE: If you have purchased the optional riveting method skip the next step and refer to the options section.

4. Install the rib tape on centerline of each rib as shown in **FIGURE 07-04**. Layout and mark the rib stitch pattern for each rib. See **FIGURE 07-04A**. Fabricate a rib stitching needle as shown in **FIGURE 07-04B**. Cut a length of rib lacing long enough to stitch one rib. Thread one end in the needle. Refer to **FIGURE 07-04C** and starting at the leading edge insert the needle at point A. Cross under the rib and exit the fabric at point B. Insert the needle back in point B and exit at point C. Pull the length of lacing through point C leaving a small tail. Tie a knot pulling the lacing tight around the rib. See **FIGURE 07-04D**. Cut the tail to approximately 1". Inserting the needle at point C, reverse the above procedure until the needle exits at the starting point, point A. Rotate the knot to the interior of the wing by gently pulling on the lacing at point A. With the knot tied, begin lacing the rib. Insert the needle at point B. Cross under the rib and exit at the next location. Continue this spiral stitch pattern throughout the length of the rib. Pull a moderate amount of tension into the lacing and tie off at the aft edge following the same procedure used before.

FIGURE 07-04

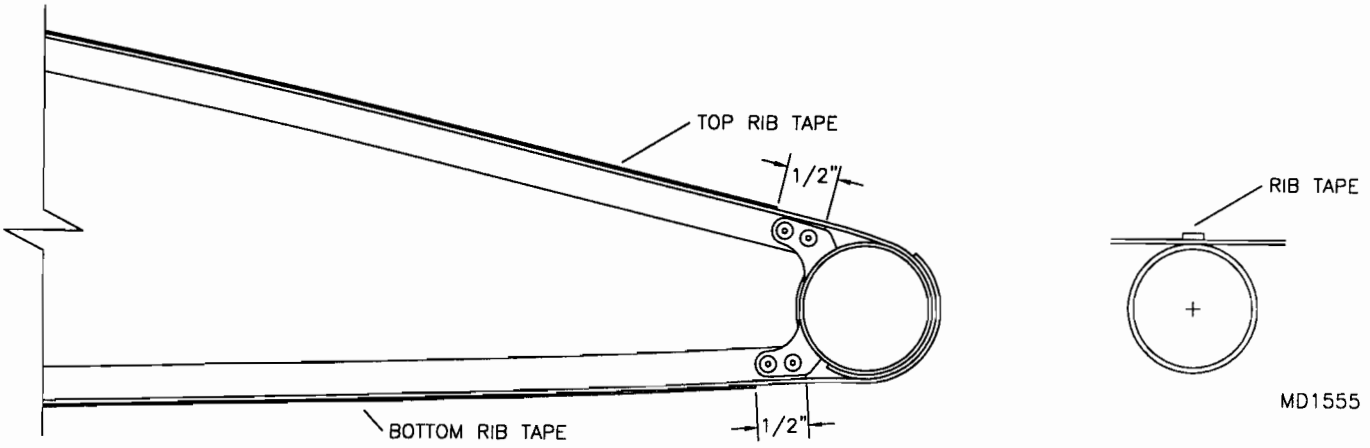


FIGURE 07-04A

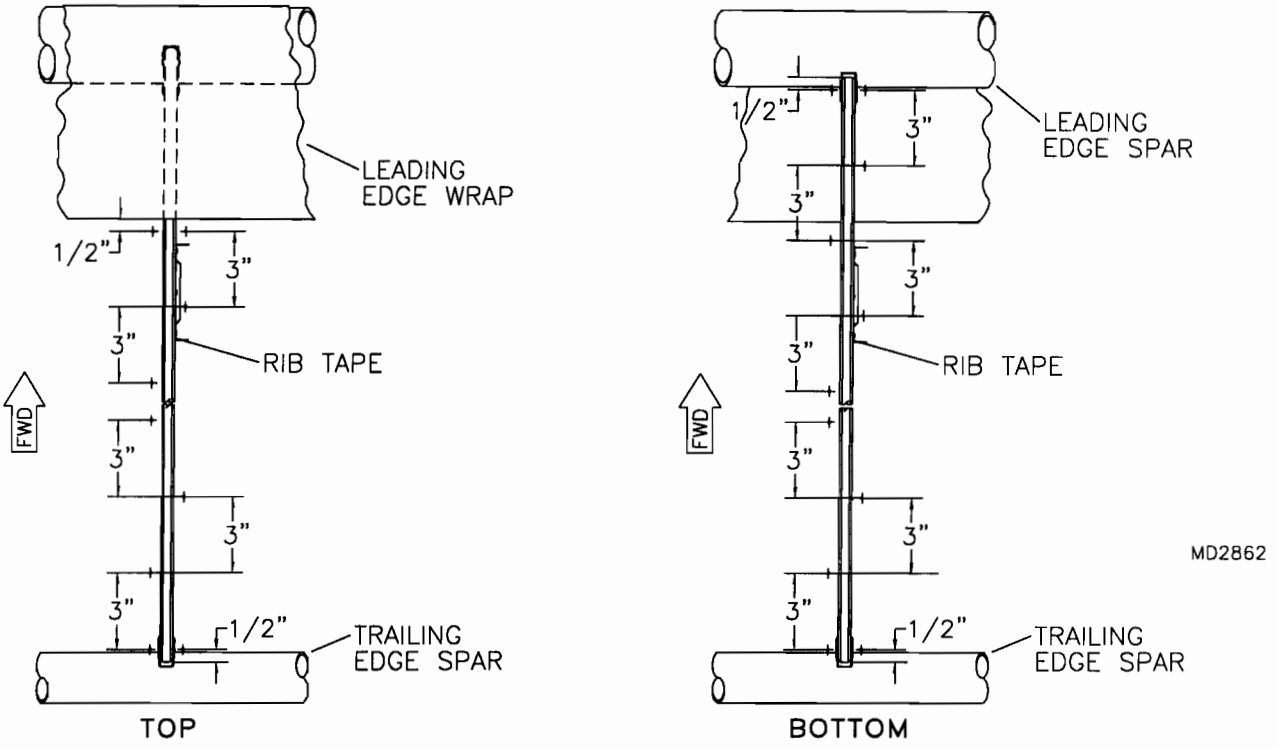


FIGURE 07-04B

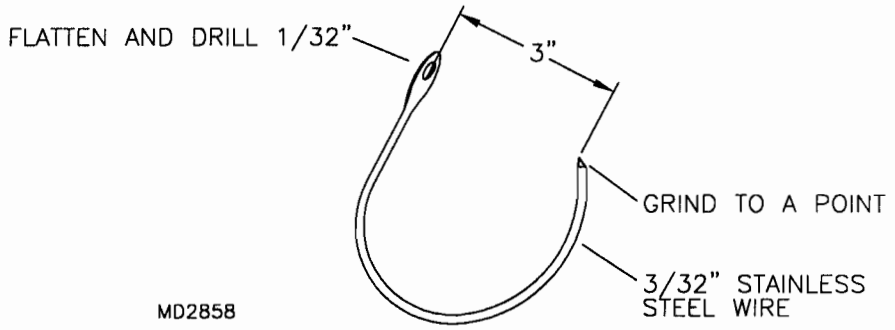


FIGURE 07-04C

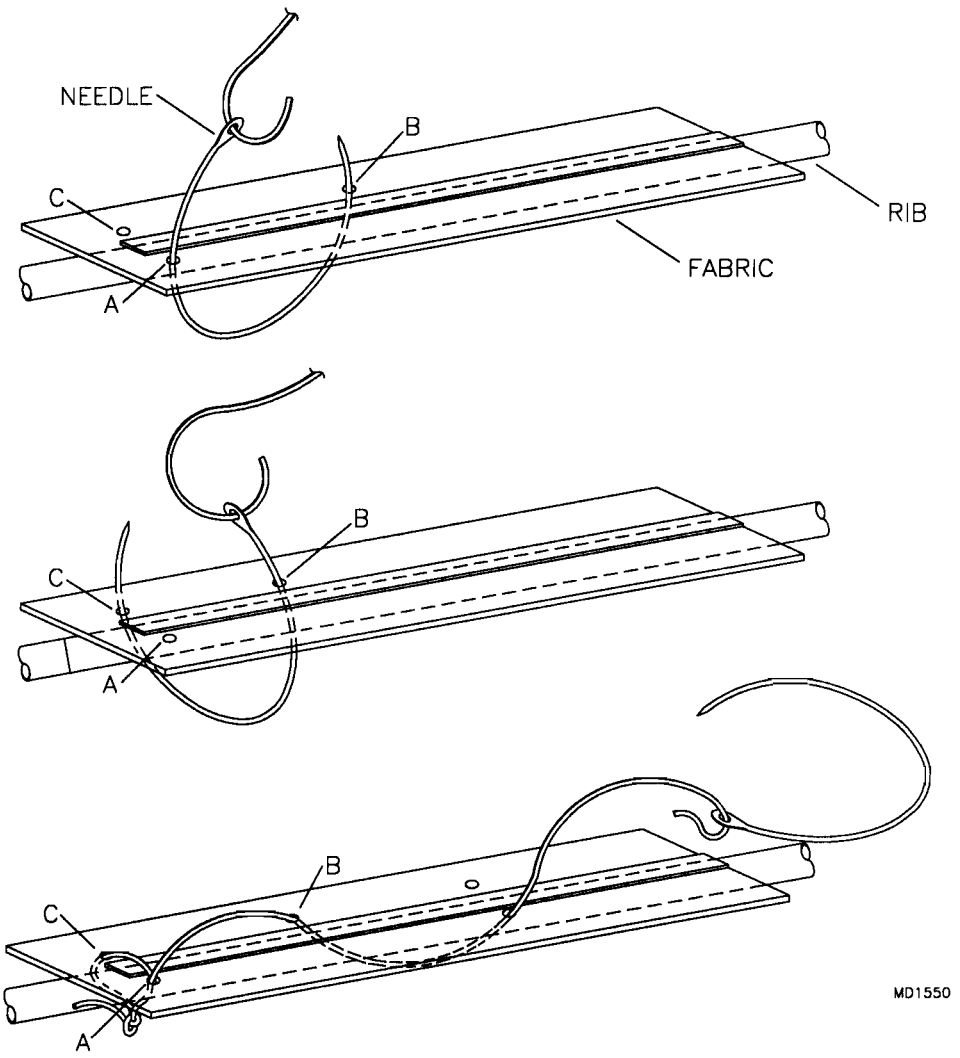
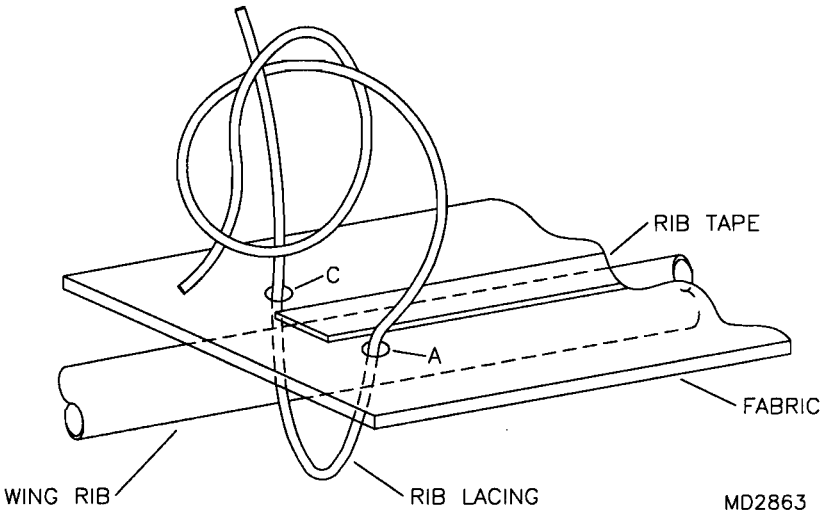


FIGURE 07-04D



5. Cut plates from .020 Lexan by tracing templates below; bond to fabric with U-500 adhesive. Cut two-inch pinked surface tape to length and bond over Lexan. See **FIGURE 07-05.**

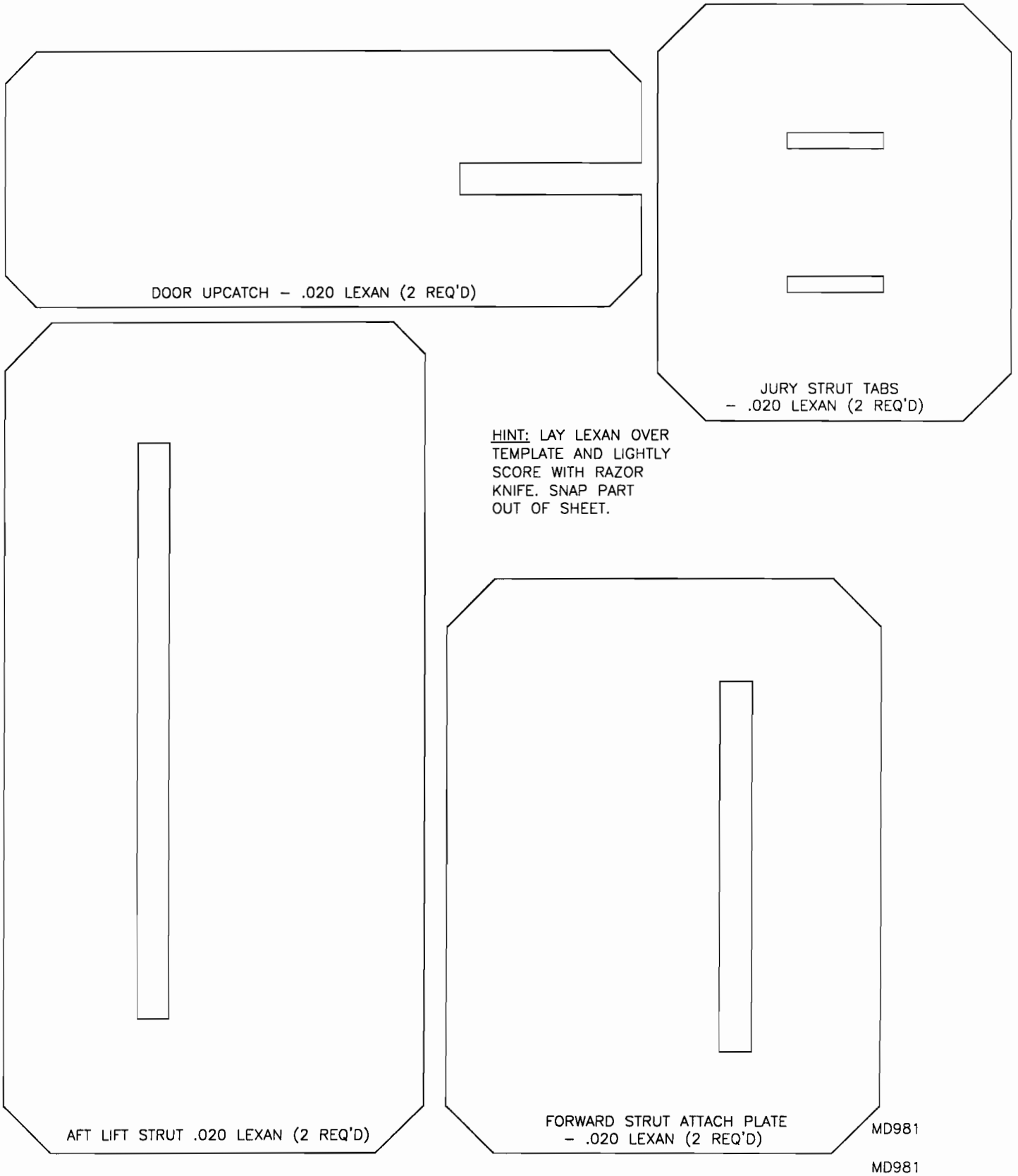


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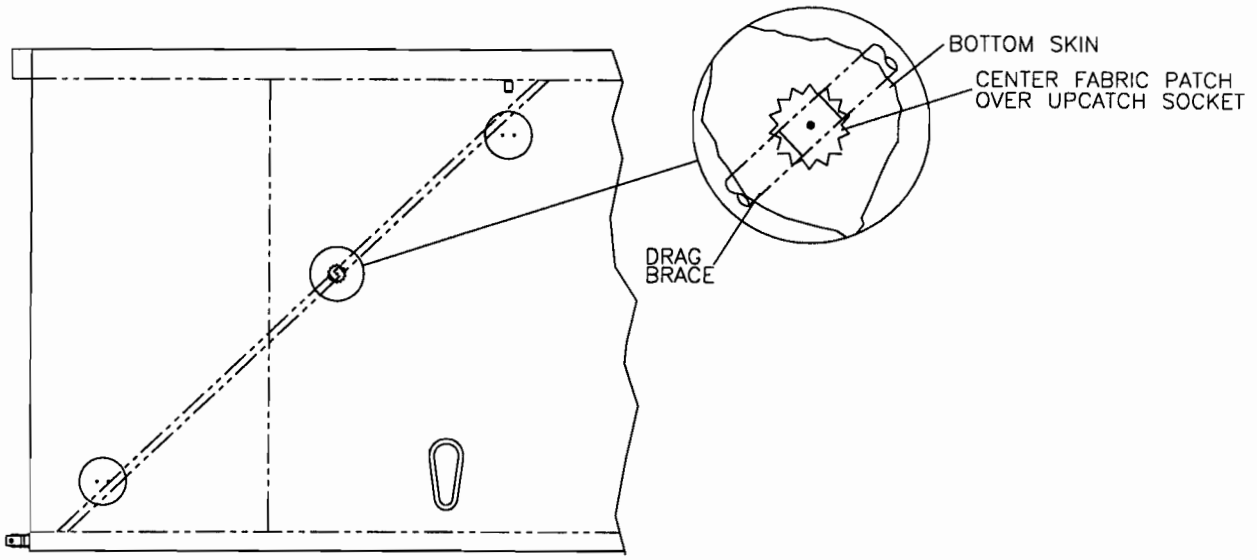
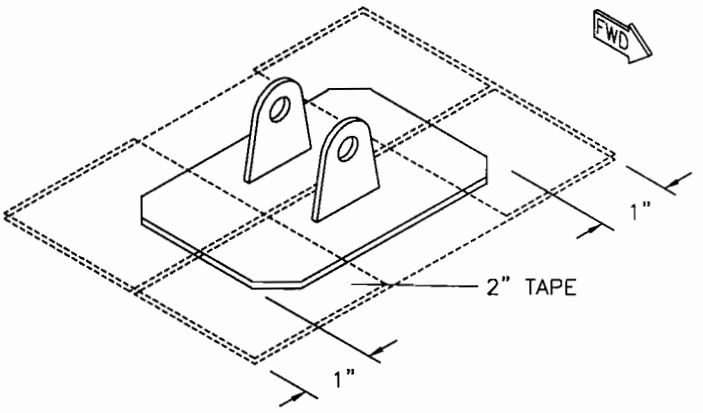
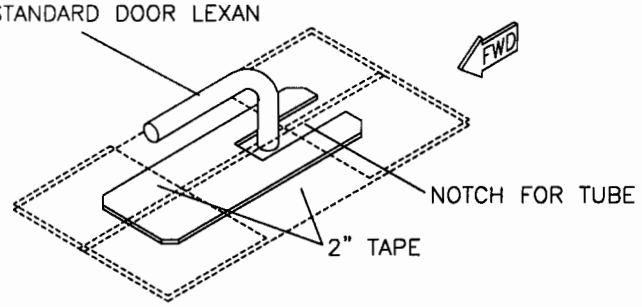
FIGURE 07-05

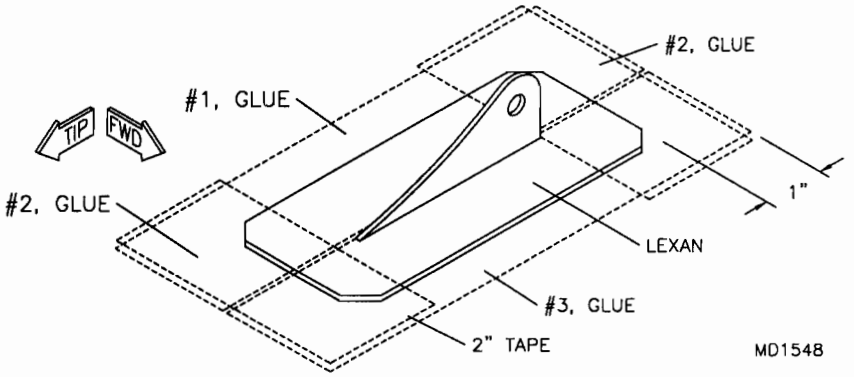


DOOR UPCATCH PATCH FOR
OPTIONAL BUBBLE LEXAN
IN DOOR



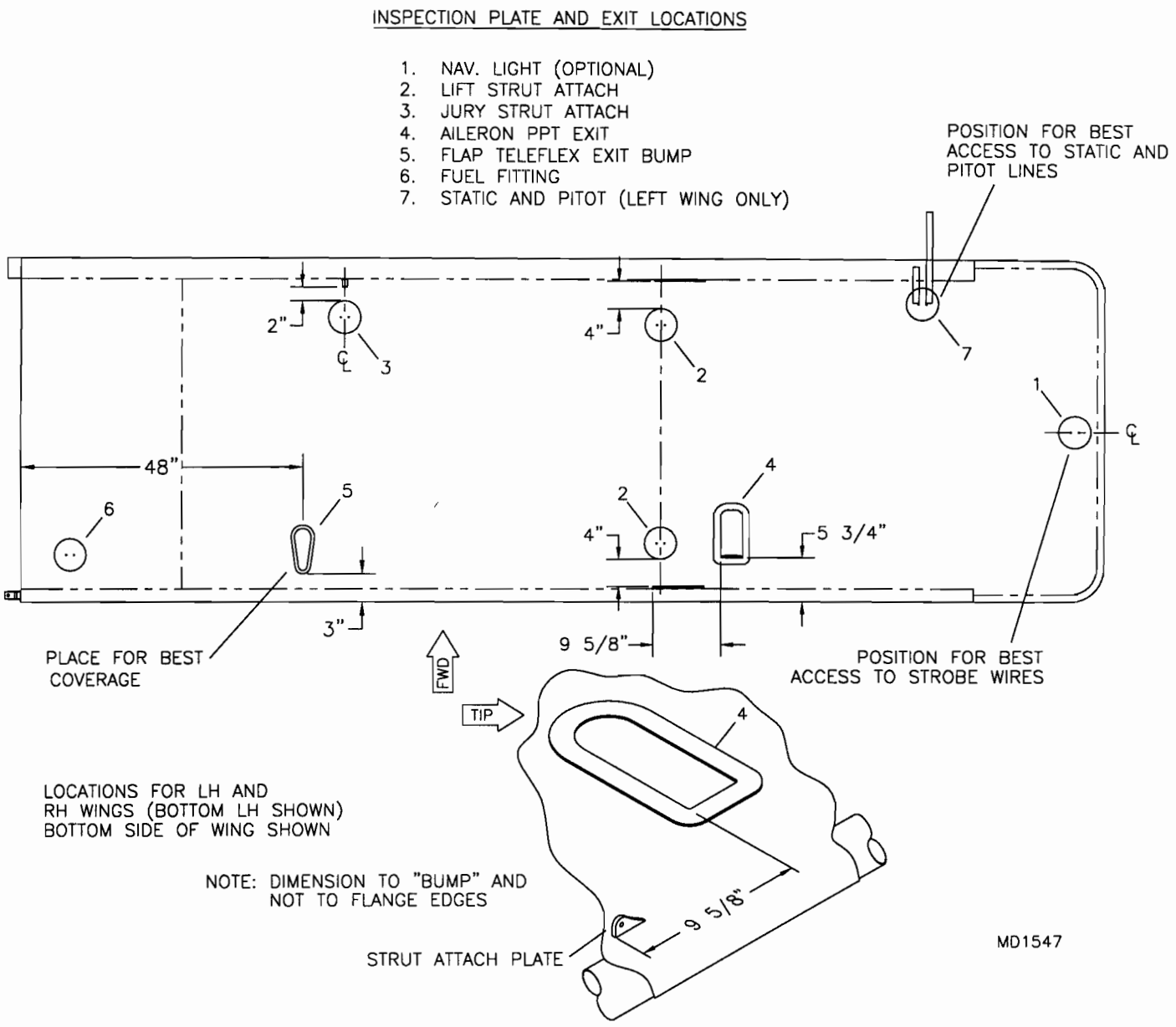
DOOR UPCATCH
FOR STANDARD DOOR LEXAN





6. Layout and mark the inspection ring, flap teleflex exit and the aileron push pull tube exit locations as shown in **FIGURE 07-06**. Using a pinking shears, cut out fabric patches 1" larger then the flap teleflex exit fairing ring, aileron push pull tube exit fairing ring and inspection rings. Bond the inspection and exit rings to the fabric in there respective locations. Glue the patches over the rings.

FIGURE 07-06



7. Cut to length and glue the 2" and 4" surface tape in place. Refer to **FIGURE 07-07** and the following text.

TOP RIBS - 2" tape - centered on each rib starting flush with the aft edge of the leading edge wrap and ending on aft centerline of the trailing edge spar.

BOTTOM RIBS - 2" tape - centered on each rib starting at the forward centerline of the leading edge spar and ending on aft centerline of the trailing edge spar flush with the top rib tape.

LEADING EDGE WRAP - 2" tape - glue spanwise from root rib to tip rib centered on the aft edge of the leading edge wrap.

TOP & BOTTOM ROOT RIB - 2" tape - centered on rib wrapping around to the interior side starting at the forward centerline of the leading edge spar and ending on aft centerline of the trailing edge spar.

TOP & BOTTOM TIP RIB - 2" tape - centered on rib starting at centerline of leading edge spar and ending on centerline of the trailing edge spar.

TRAILING EDGE SPAR & TIP BOW - 2" tape - centered on aft centerline of the trailing edge spar over lapping the lower fabric seam by 1/8" to 1/4" starting flush with the root end of the spar and ending at the tip wrap on the leading edge of the tip bow.

LEADING EDGE SPAR - 4" tape - centered on the forward centerline of the leading edge spar starting flush with the root end and ending by tapering the tape down to 2" through the tip wrap flush with the 2" tip bow tape. See **FIGURE 07-07A**.

FIGURE 07-07

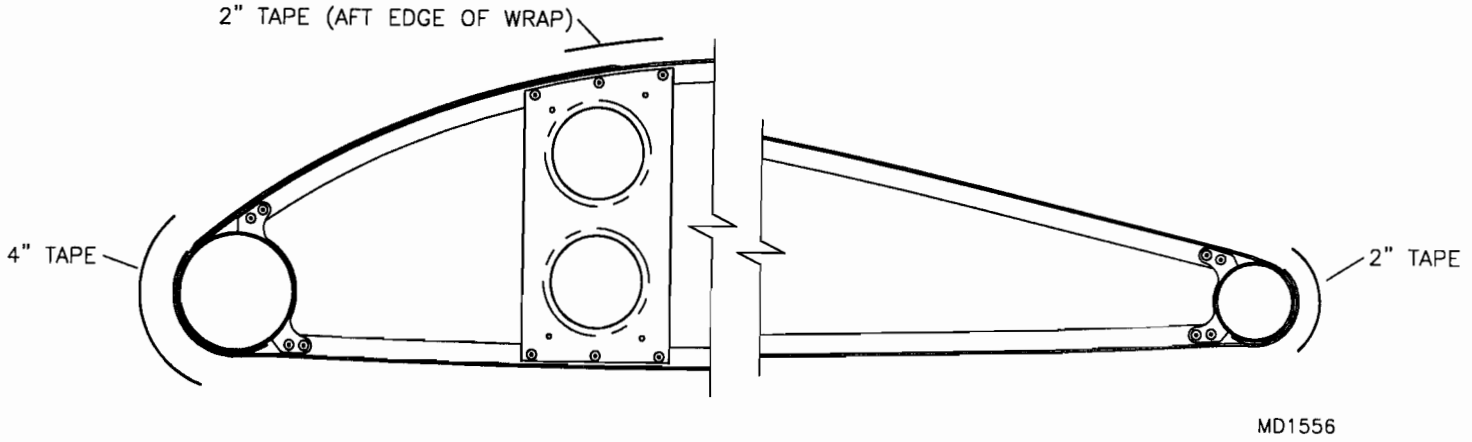
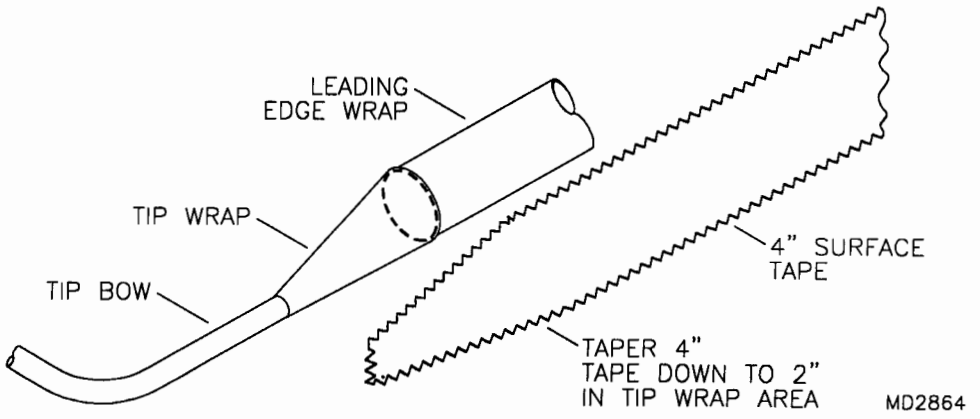


FIGURE 07-07A



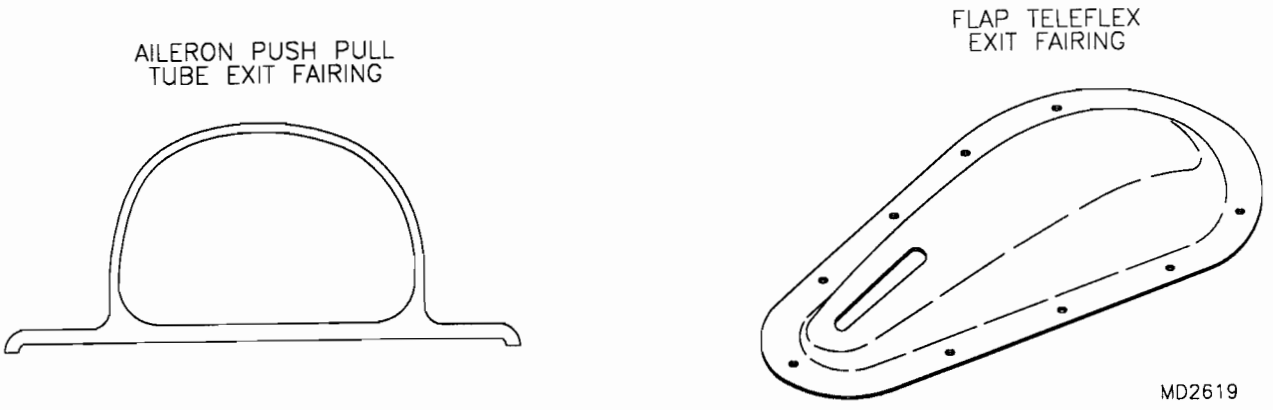
8. Use an iron to shrink out any wrinkles or puckers in the surface tape and patches. **NOTE:** Do not apply heat to the full width of the tape. Tape distortion will occur. Heat the edges or the center allowing one to cool before heating the other. Use the iron to smooth and bond all pinked edges on the tape and patches.

9. Coat all surface tape and patches with thinned U-500 adhesive, concentrating on dry spots and flowing the glue into the pinked edges. Do not apply glue beyond the pinked edges. The edge of the glue will be seen after painting.

10. Apply 2 coats of thinned U-500 over all areas where there is sheet metal. Avoid runs and drips developing on the inside of the fabric.

11. Trim the aileron push pull tube exit fairing and the flap teleflex exit fairing as shown in **FIGURE 07-11**. Using #40 drill bit, pre drill the attach holes in the outer flange of the fairings. The hole locations are distinguished by a small recessed dimple. Position the fairings over the lexan rings on the wing. Trim the outer perimeter of the fairings to match the rings. With the fairings positioned correctly, transfer drill through the fairings and into the rings with a #40 drill bit. Remove the fairings and drill only the holes in the fairings to #30. Paint the fairings as per the rest of the aircraft. Refer to the flap and aileron section for final installation.

FIGURE 07-11



FUSELAGE

PRE COVER CHECK LIST

_____ Vertical Stabilizer Rib Installed
_____ Anti-Chafe Tape applied to sharp edges of Rib
_____ Upper Aft Side Formers Installed
_____ Center Aft Side Formers Installed
_____ Lower Aft Side Formers Installed
_____ Center Forward Side Formers Installed
_____ Floorboards Fit and Drilled (Remove Floorboards after fitting)
_____ Nut Plate Floorboard Attach Tabs
_____ Nut Plate Rudder Pedal Mount Tabs
_____ Rudder Cables Installed
(Place in plastic bag, coiled up at aft pulleys)
_____ Control Stick Torque Tube Pillow Blocks Positioned
(Remove after fitting)
_____ Radiator Scoop Fit, Drilled & removed
_____ Nut Plate Radiator Scoop Attach Tabs
_____ Battery Box Assembled & Installed
_____ Battery Access Door,
Riveted Frame in place with Nut Plates riveted in place
_____ Battery Cable Installed, Bag end at S-3,
Zip Tie to frame members, not stringers, to avoid surface bumps
_____ Nut Plate Cowling Attach Tabs, be sure nutplates are on the <u>inside</u>
_____ Seat Belt Attach Tabs Drilled to 1/4"
_____ Aft Shoulder Belt mount bolt Installed
_____ ELT Mount Tray Installed (optional)
_____ ELT Antenna Mount Plate Installed (optional)
_____ Comm. Antenna Grounding Plane Installed (optional)
_____ Baggage Compartment Installed
_____ Fuselage Clean and All Marks Removed
_____ Elevator Trim Servo Wire in place

12. Position the fuselage bottom side up. Roll out and cut a piece of fabric long enough to cover the bottom of the fuselage. Slide the fabric to one side of the fuselage and trim off the excess material. Leave approximately 5" of material on all sides. Bond one side of the fabric to the bottom longeron from station 1 to station 7. Apply adhesive to the longeron in the bond area only to prevent dips or puckers in the fabric. See **FIGURE 07-12**. Bond the opposite side to the bottom longeron. Bond the fabric at station 1 to the bottom cross tube. Wrap and glue all fabric to the interior side of the fuselage and trim. See **FIGURE 07-12A**. Iron out all wrinkles and puckers in the bond area. Pre tension the bottom fabric. Do Not fully shrink at this time.

FIGURE 07-12

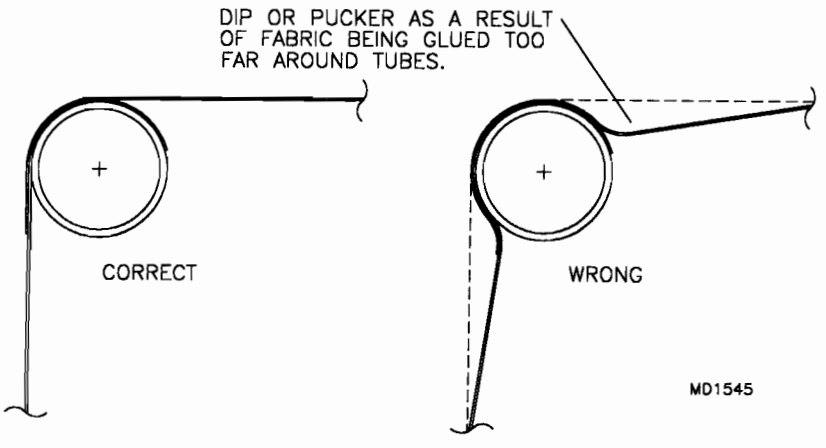
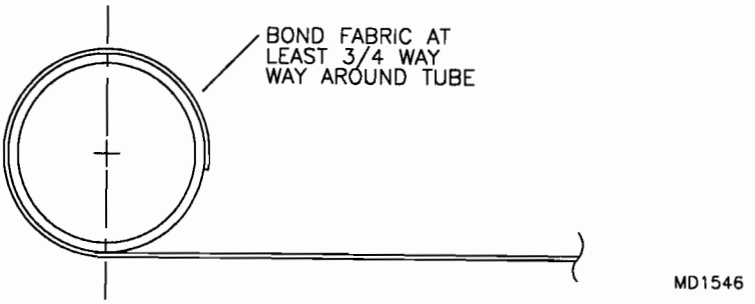


FIGURE 07-12A



13. Position the fuselage so that the left side is up. Do not cover right side first, it will make trimming excess fabric off the battery door opening harder to do! Roll out and cut the fabric to length. Trim off the excess fabric. Bond the fabric to the bottom longeron. Trim the fabric as shown in **FIGURE 07-13**. Cover right over the battery access door opening. Special instructions to follow on how to finish this area. Bond the remaining perimeter of the fabric to the fuselage and trim. Iron out all wrinkles in the bond area. Pre tension the fabric, only enough to remove bagginess. **CAUTION:** Use care when pre tensioning, it is possible to pull the vertical stabilizer and top stringer out of alignment. Cut the fabric in the battery access door as shown in **FIGURE 07-13A** and glue flaps to edges of the door opening as per **FIGURE 07-13B**. Rotate the fuselage to the opposite side and cover following the same procedure. When covering the second side of the fuselage it will be necessary to use a 1 ⅞" flat lap joint along the vertical stabilizer stringer from station 3 to station 6. See **FIGURE 07-13C**. Final tension the bottom and both sides evenly. Use care when applying heat to the flat lap joint area as heat will soften the adhesive and the bond will separate.

FIGURE 07-13

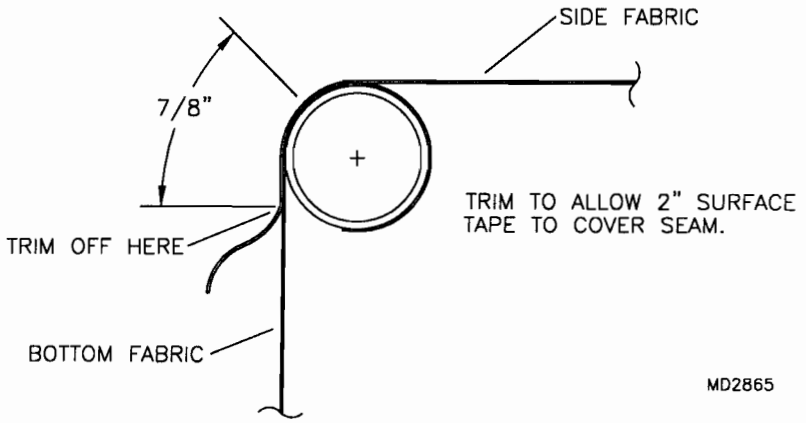


FIGURE 07-13A

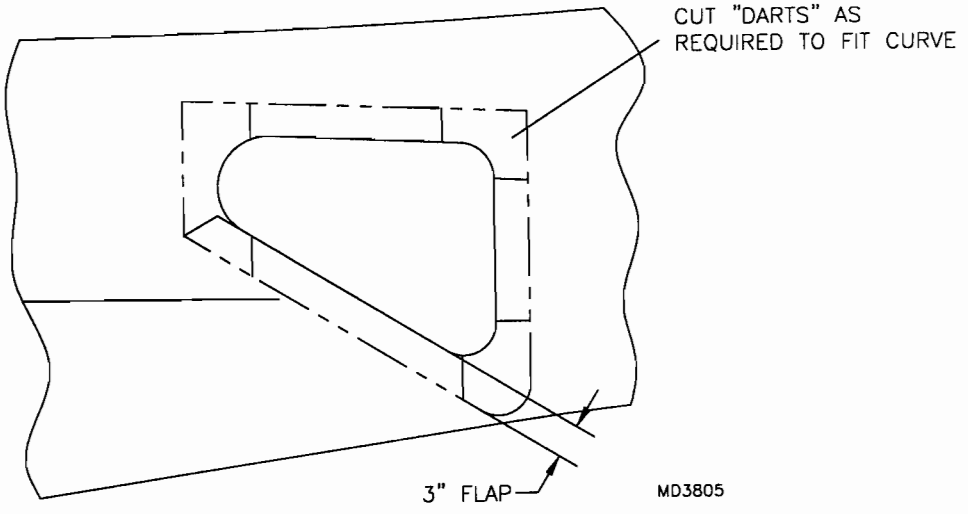


FIGURE 07-13B

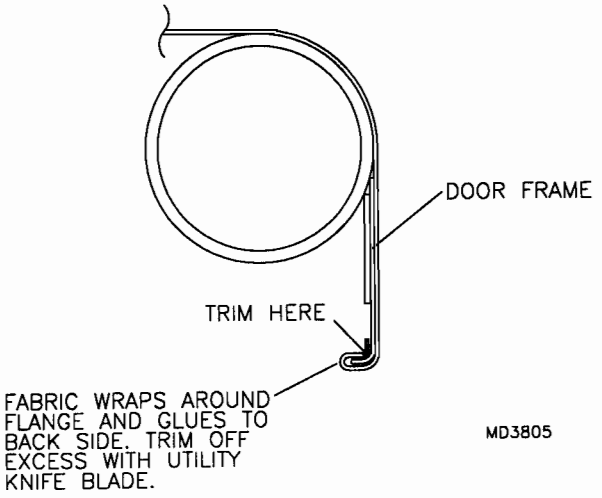
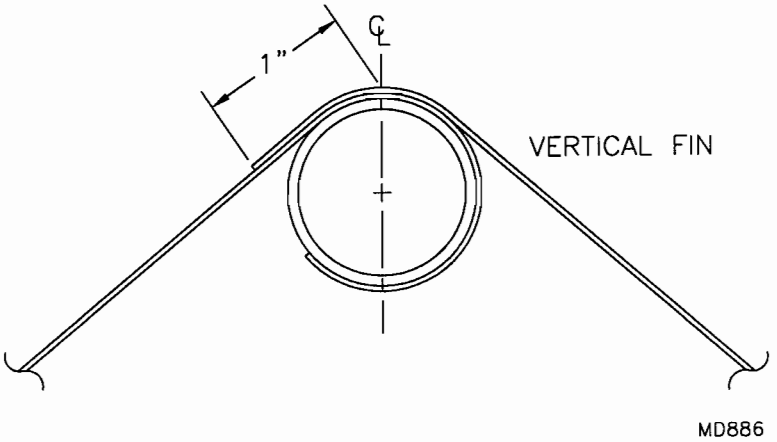


FIGURE 07-13C



14. With the fuselage covered and tensioned, bond all of the exit rings, inspection rings and patches in place. Note: Cut sump drain and elevator trim wire exit patches from .020 Lexan. Refer to **FIGURE 07-14**, **FIGURE 07-14A**, **FIGURE 07-14B** and **FIGURE 07-14C.**

FIGURE 07-14

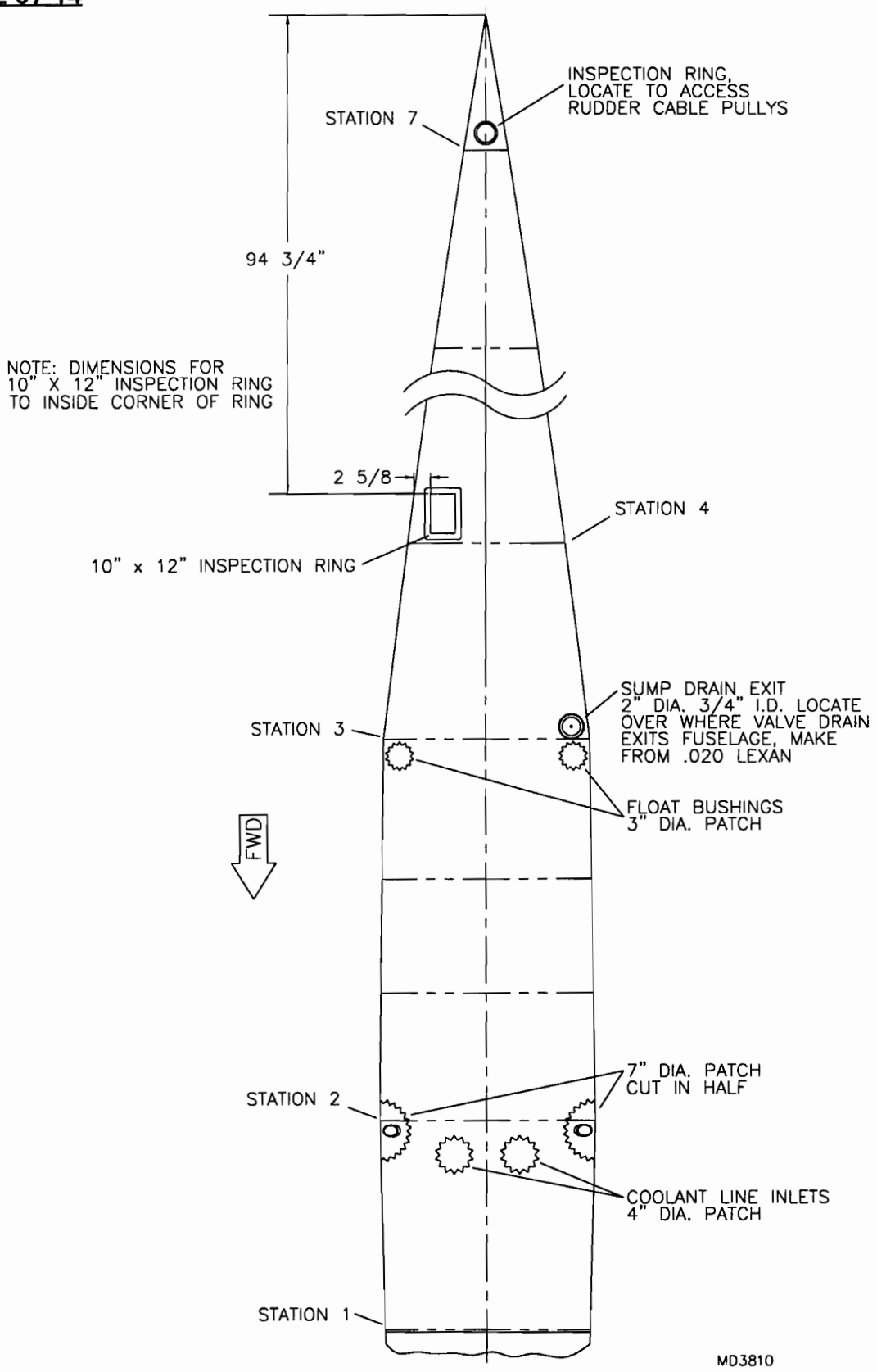
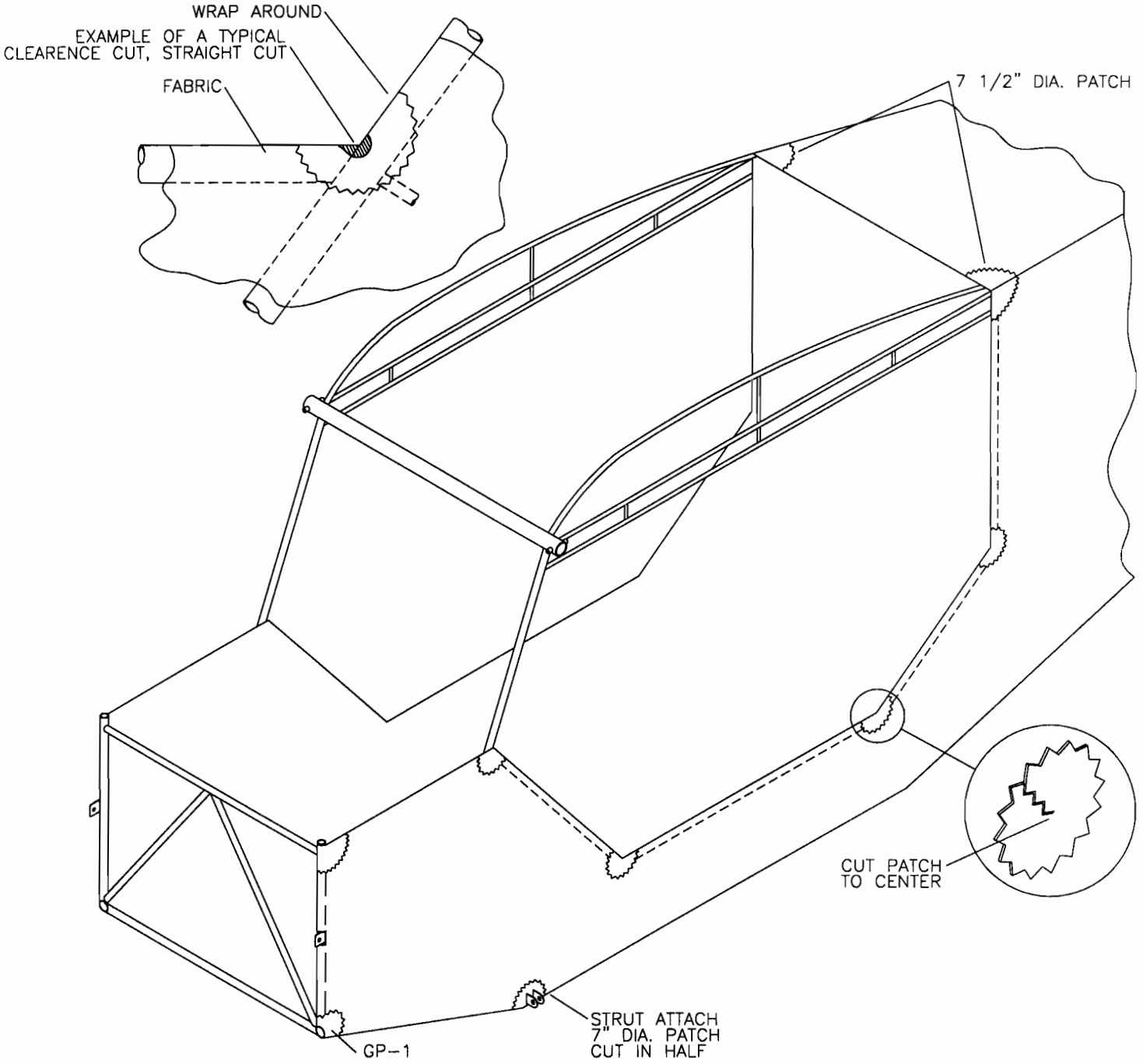


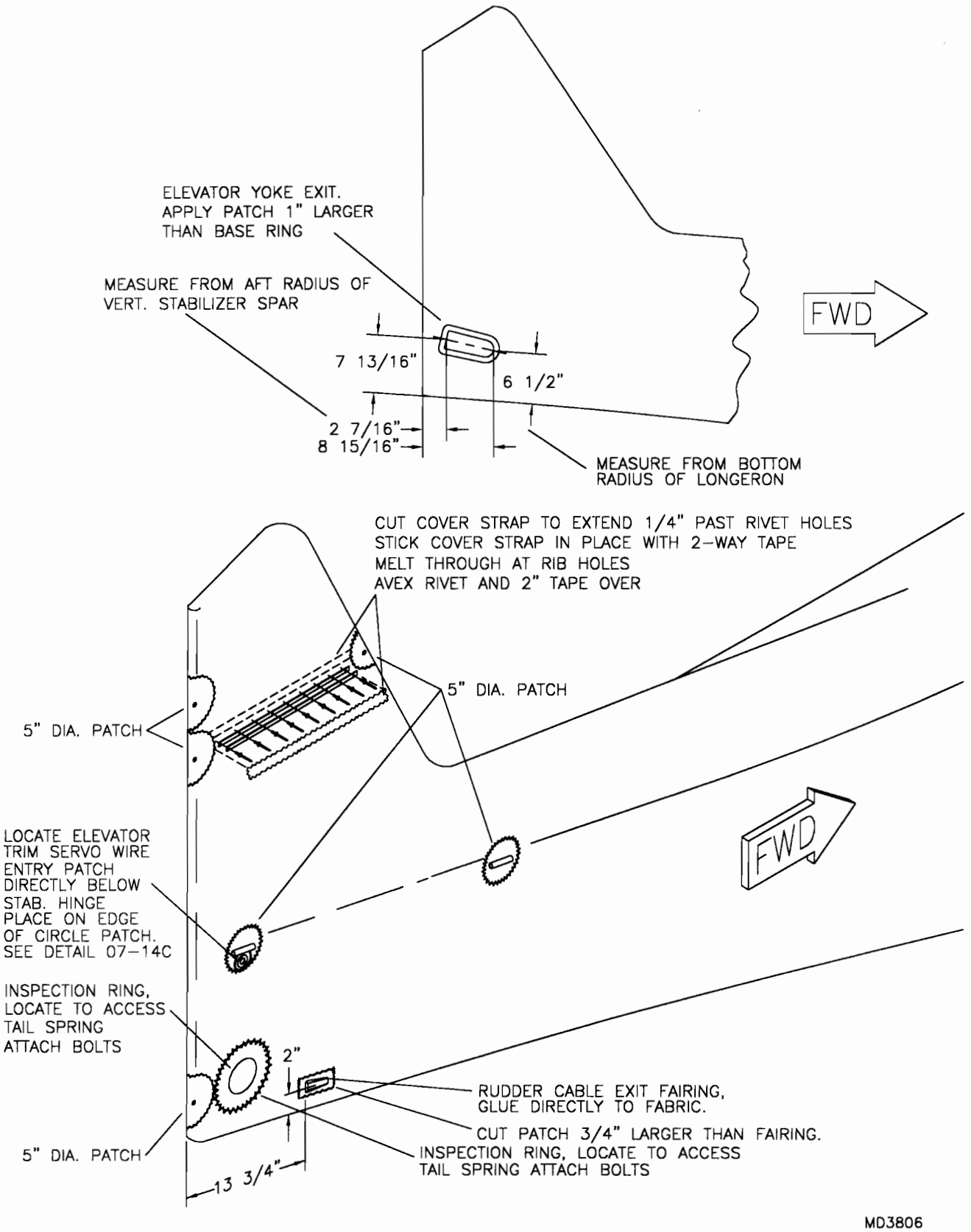
FIGURE 07-14A



UNLESS OTHERWISE NOTED ALL PATCHES 3 1/2" DIA.

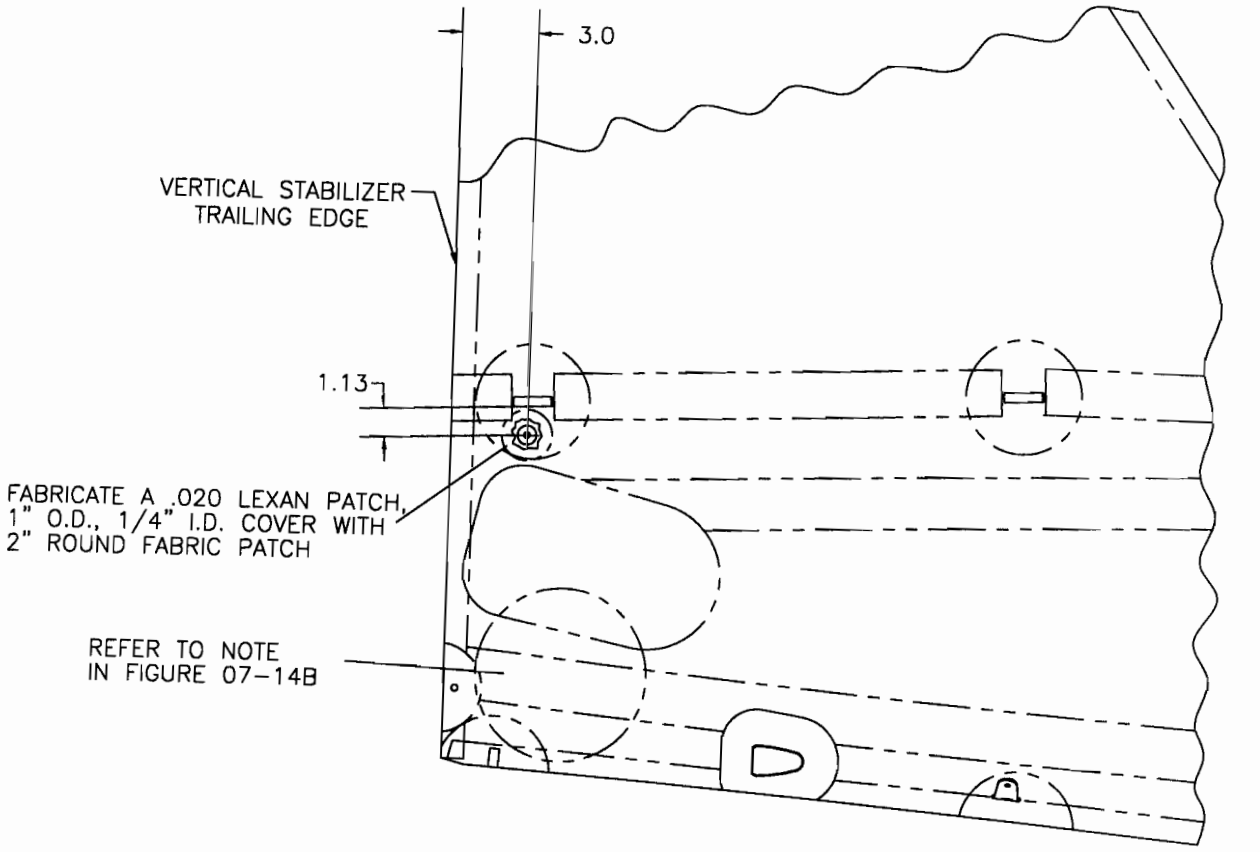
APPLY PATCHES TO BOTH SIDES OF FUSELAGE

FIGURE 07-14B



TAIL PATCH LOCATIONS AND SIZES

FIGURE 07-14C



15. Refer to the following text and bond all 2" and 4" surface tape in place.

TRAILING EDGE OF VERT. STAB. - 2" tape - centered on the vertical stabilizer trailing edge spar starting at the bottom and ending at the top.

VERT. STAB. LEADING EDGE - 2" tape - centered on the leading edge of the vertical stabilizer starting at the top trailing edge and ending at the stringer attach point. See **FIGURE 07-15**.

VERT. STAB. STRINGER - 4" tape - centered on the vertical stabilizer stringer starting at the vertical stabilizer and ending at the station 3 top cross tube.

TOP & BOTTOM LONGERONS - 2" tape - centered on the longerons, See **FIGURE 07-15A** starting at the aft end of each longeron and ending at the forward most point of each longeron.

SIDE STRINGERS - 2" tape - centered on each stringer, starting at the door frame and ending at the aft edge of each stringer.

STATION 3 TOP CROSS TUBE - 2" tape - positioned to cover the skylight attach tabs extending from top longeron to top longeron.

DOOR OPENING - 2" tape - centered on the fuselage door frame tubing.

STATION 2 TO STATION 1 TOP LONGERON - 2" tape - centered on the top tube notching out for the instrument panel housing mount tabs, extending from the door opening (station 2) to station 1.

STATION 1 VERTICAL SIDE TUBES - 2" tape - centered on tube, extending from top to bottom.

STATION 1 BOTTOM CROSS TUBE - 2" tape - centered on the square tube, extending from bottom longeron to bottom longeron.

FIGURE 07-15

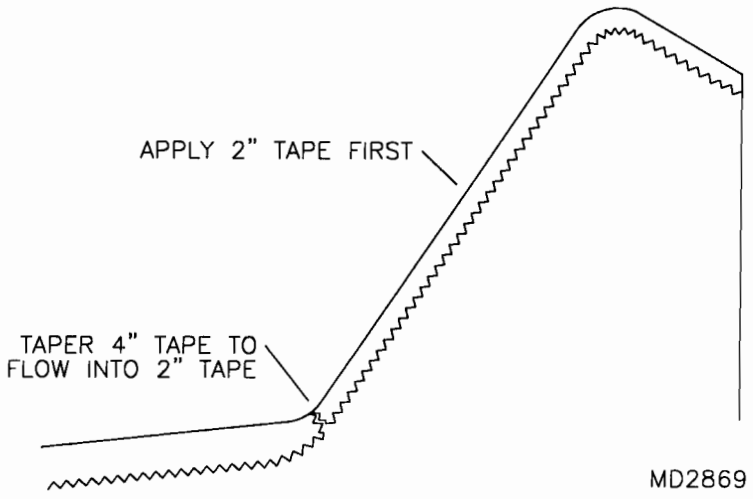
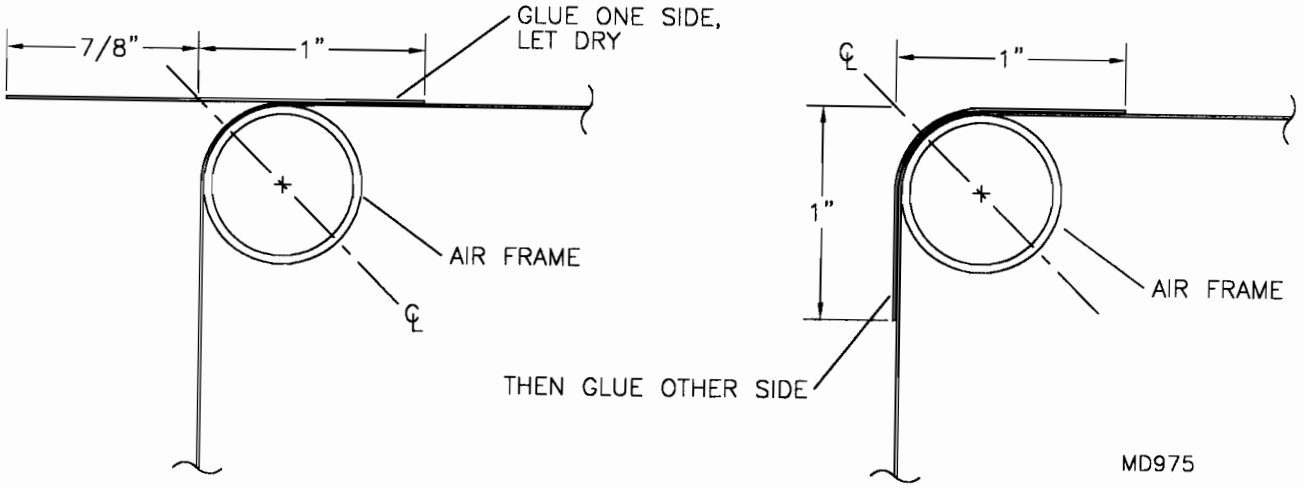


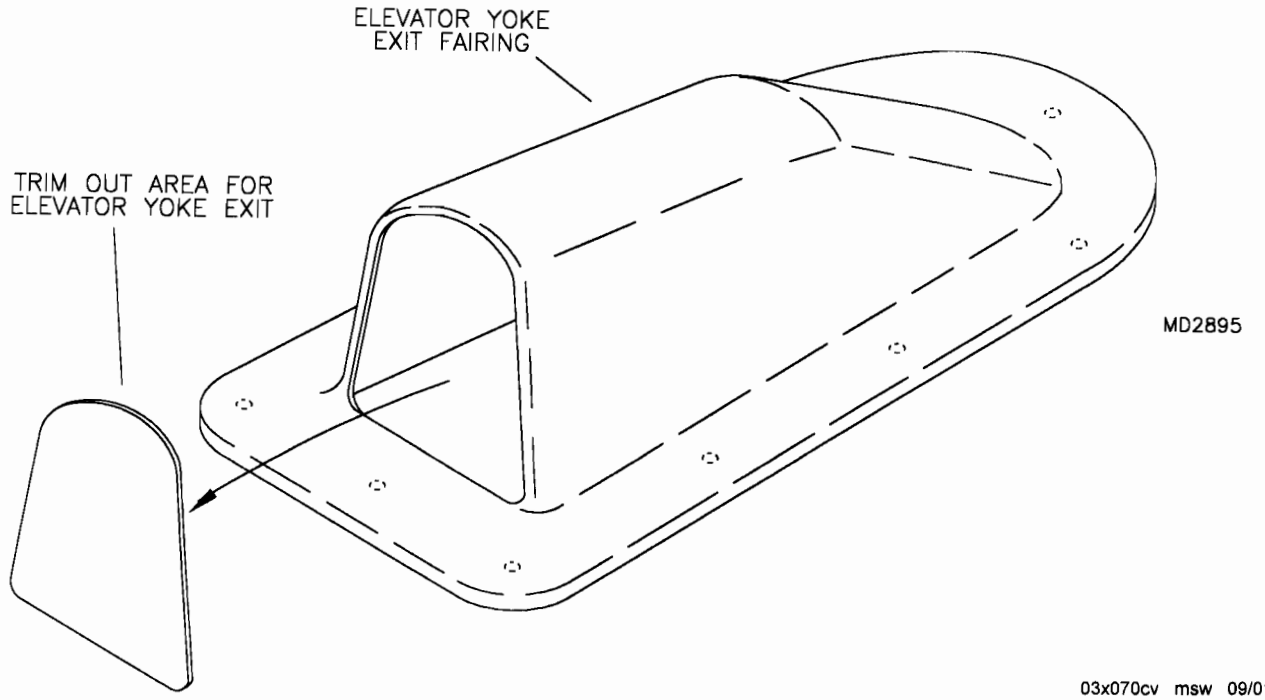
FIGURE 07-15A



16. Iron all surface tape and patches, concentrating on the pinked edges. Use care to not distort the tape or patches. Apply one coat of thinned U-500 to all patches and surface tape. Concentrate on dry spots and flowing the glue into the pinked edges. Do **NOT** apply glue beyond the pinked edges. The edge of the glue will be seen after painting.

17. Trim the elevator exit fairing as shown in **FIGURE 07-17**. Using a #40 drill bit, pre drill the attach holes in the flange of the fairing. Position the fairing on the base ring attached to the fuselage. Transfer drill through the fairing and into the ring with a #40 drill bit. Remove the fairing and drill only the holes in the fairing to #30. Paint as per the rest of the aircraft. Refer to the elevator section for final installation.

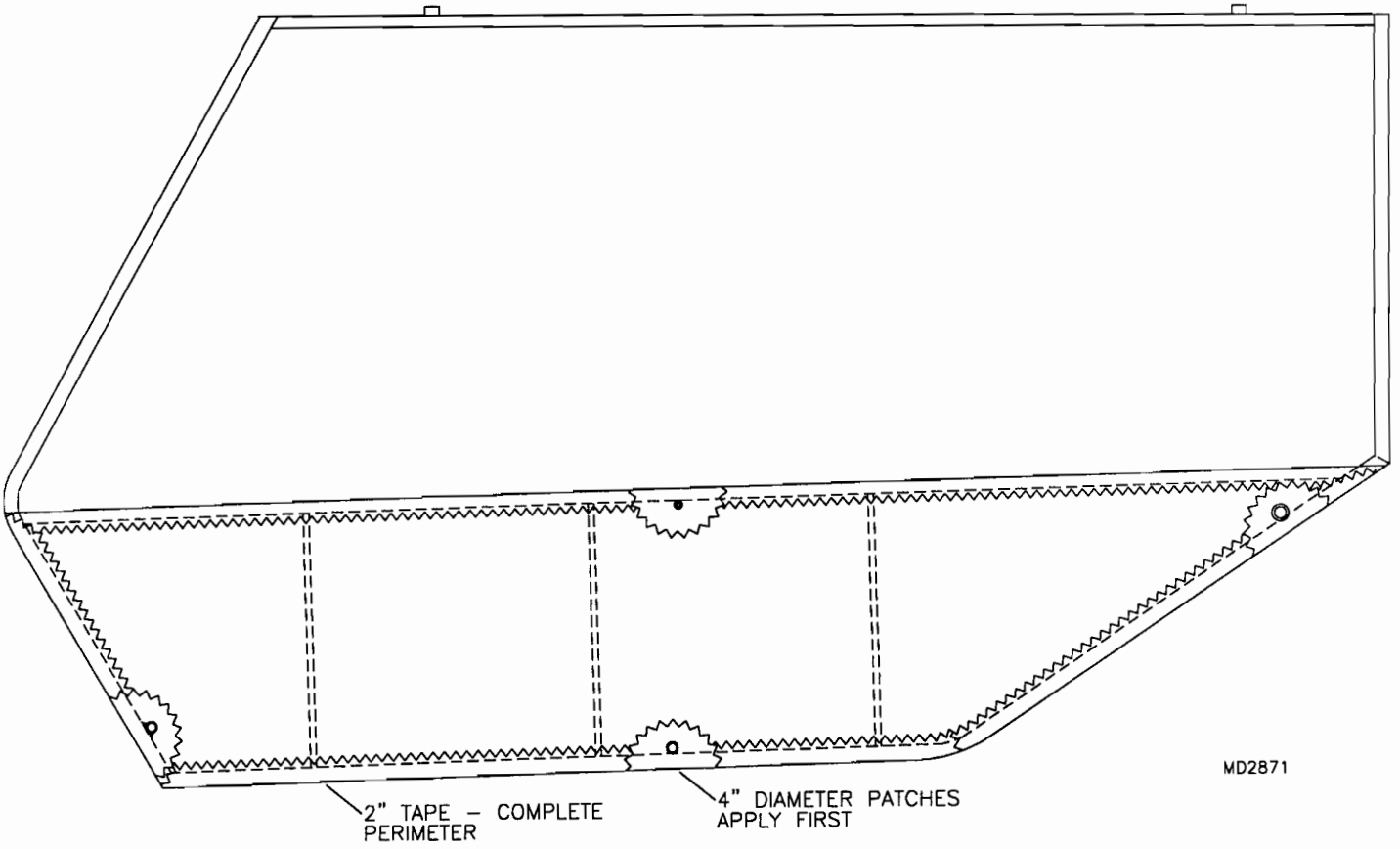
FIGURE 07-17



DOORS

18. Cover the lower half of the doors, following the same procedures used to cover the fuselage and wings. Refer to **FIGURE 07-18** for patch locations and surface tape.

FIGURE 07-18



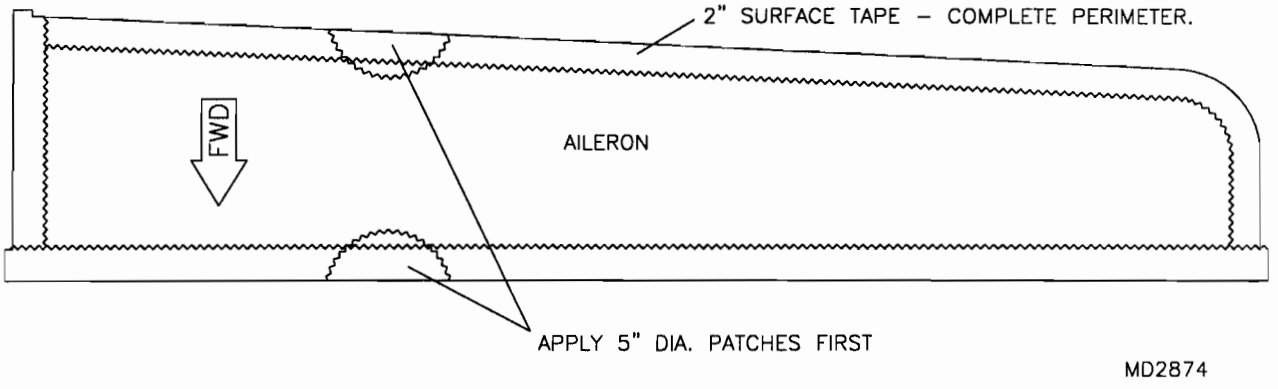
FLAPS & AILERONS

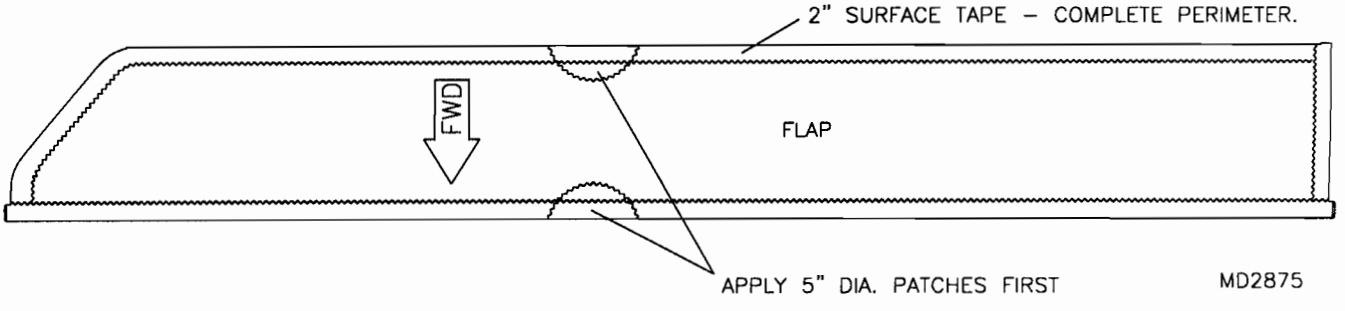
PRE COVER CHECK LIST

_____ Hinge Holes Drilled To #11
_____ Control Horn Holes Drilled To #11
_____ Nut Plates Installed

19. Cover the flaps and ailerons following the same procedures used previously. Refer to **FIGURE 07-19** for patch locations and surface tape.

FIGURE 07-19





TAIL GROUP

PRE COVER CHECK LIST

_____ Hinge Stop Collars Set and Riveted
_____ Inner and Outer Ribs Installed in Horiz. Stab.
_____ Anti-Chafe Tape applied to sharp edges of Ribs
_____ Second Control Horn Hole Drilled in Elevator
_____ Control Horn Nut Plates Installed
_____ Trim Tab Nut Plates Installed
_____ Balance Mount Holes Drilled and Tapped in Elevators

20. Cover the Horizontal Stabilizer following the same procedures as before. Cut the Lexan Cover Straps to extend 1/4" past the first and last holes in the ribs. Apply a strip of 2-way tape over the rib holes and trim to match the cover strap. Stick the cover strap to the 2-way tape. Melt through the cover strap at the rib holes with a soldering iron. Trim holes with a razor blade. Rivet through the cover strap, tape, skin, and rib. See **FIGURE 07-20**. Apply patches, grommets and 2" tape. Refer to **FIGURE 07-20A**.

FIGURE 07-20

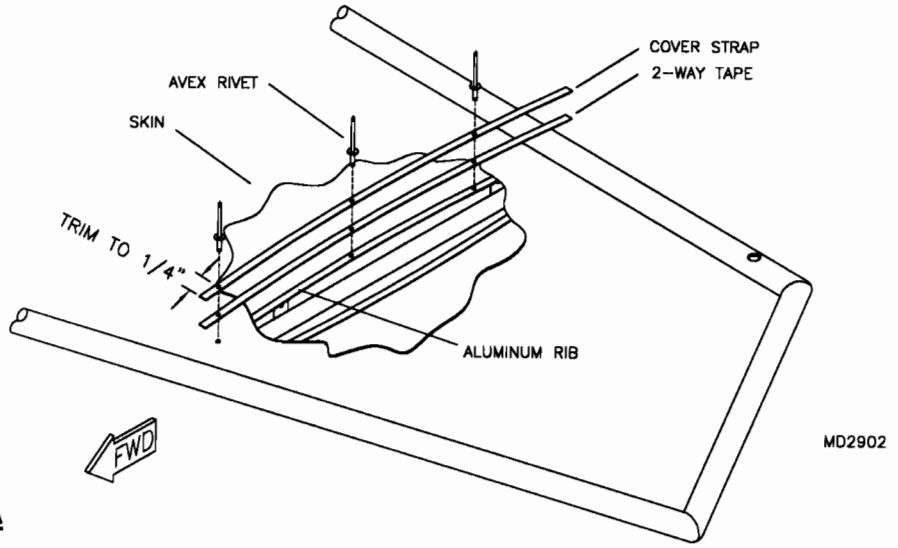
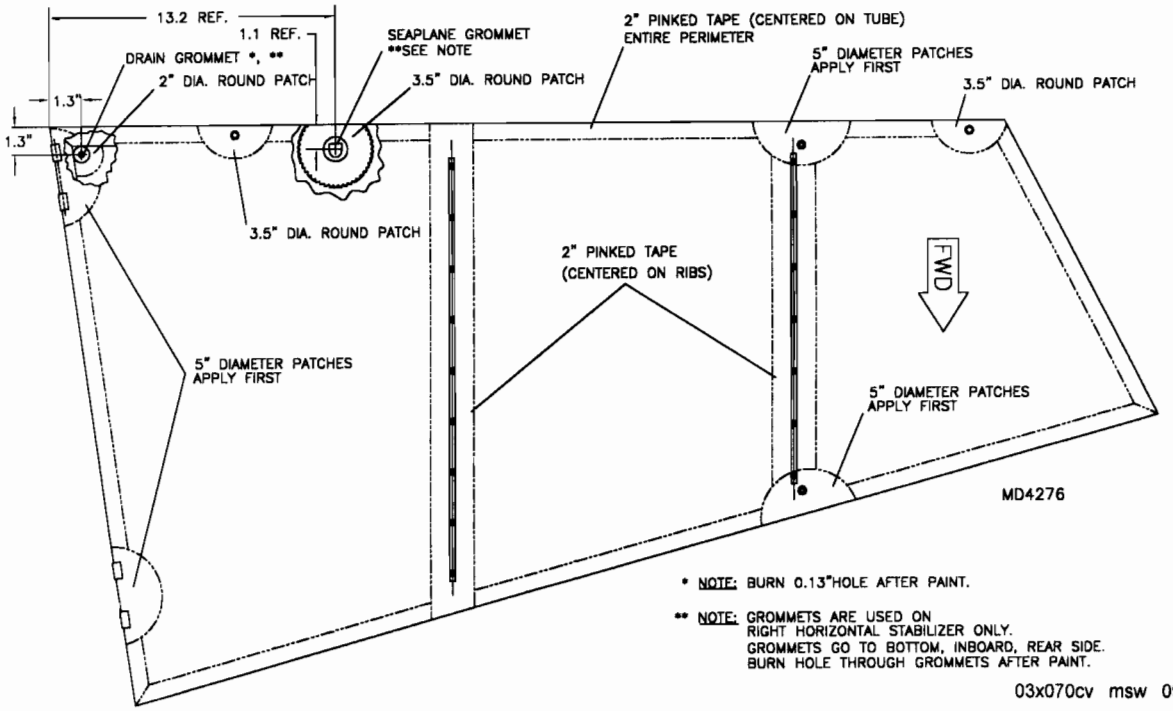


FIGURE 07-20A



21. Cover the Elevators and Rudder following the same procedures as before. Stitch the Elevators and Rudder prior to placing any patches or surface tape. Find the center of each compression tube in each surface. Place a small piece of rib tape on the fabric at this point. Stitch through both layers of fabric completely around the compression tube. Tie a knot and rotate the knot to the interior side. Place a diamond patch over the stitch on each side. See **FIGURE 07-21**. Refer to **FIGURE 07-21A** for all other patches and tape.

FIGURE 07-21

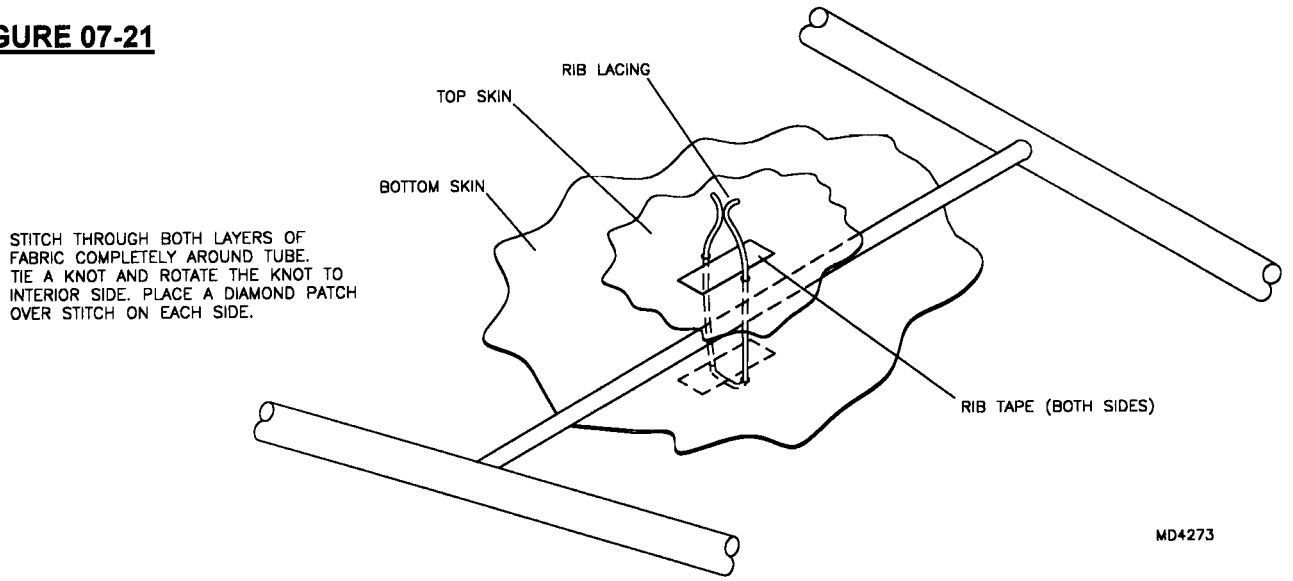
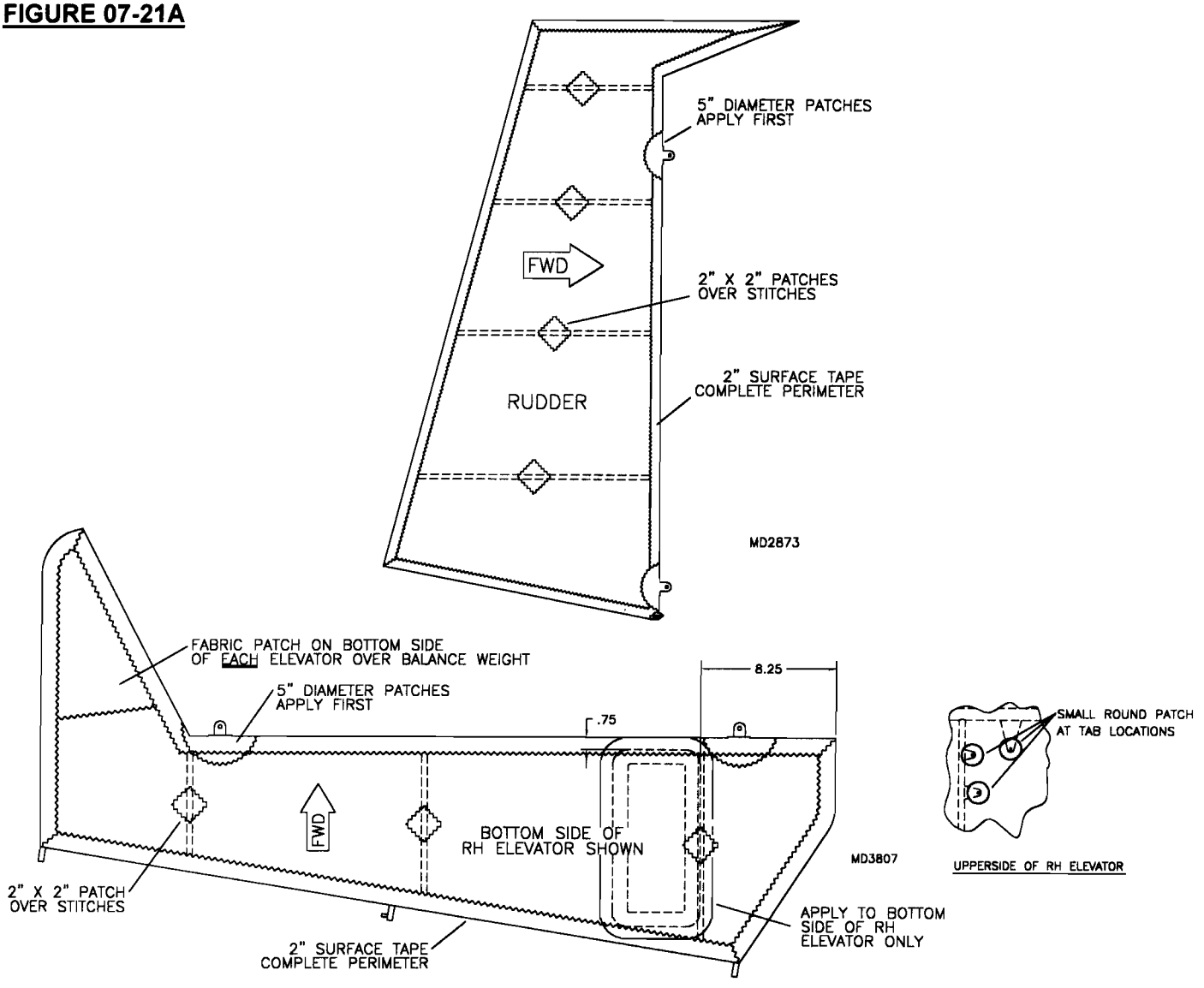


FIGURE 07-21A

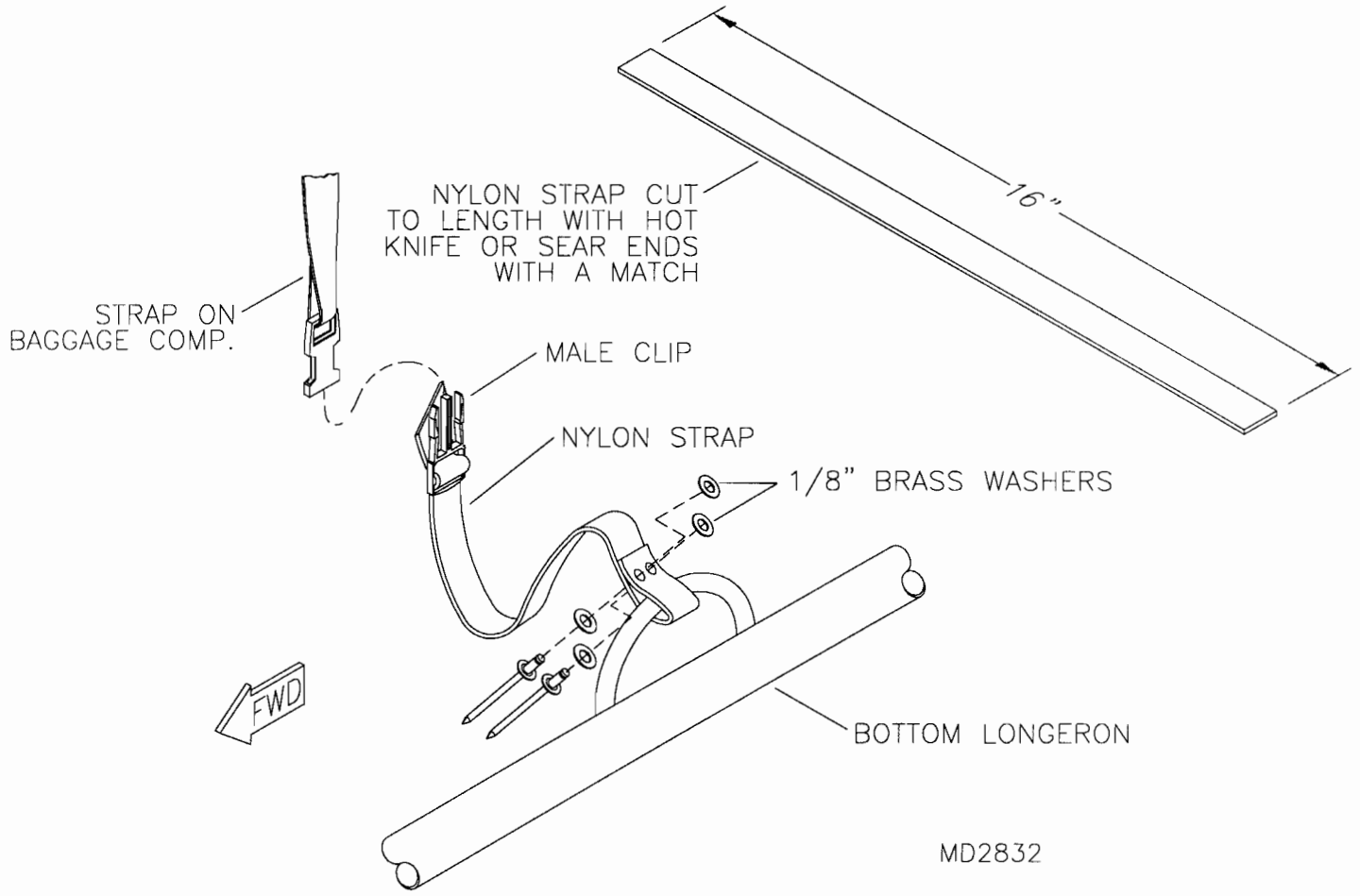


S-7 BAGGAGE COMPARTMENT ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 008-02 FOR PARTS SELECTION)

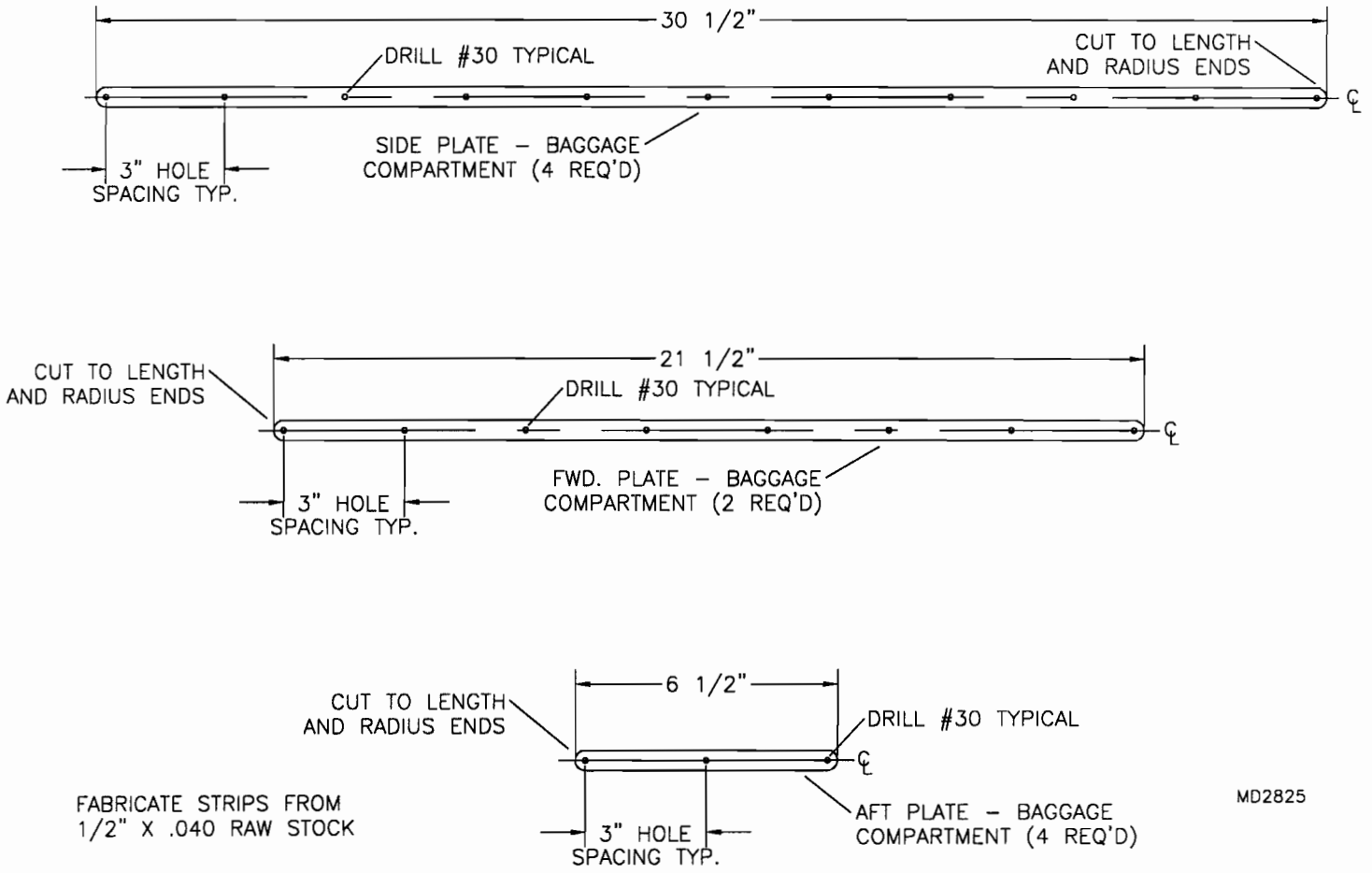
1. Prior to covering the fuselage, cut the nylon strap material provided into four pieces and attach to the four loops located in the bottom of the fuselage at station 3 & 4. See **FIGURE 08-01**. Remove the male clips from the tabler buckles attached to the baggage compartment and install them onto the nylon straps.

FIGURE 08-01



2. Using the raw stock provided, fabricate the aft, fwd and side baggage compartment plates to the dimensions called out on the parts page and in **FIGURE 08-02**. Pre drill the plates as shown in **FIGURE 08-02**. Insert the plates into the baggage compartment mount flaps as shown in the parts drawing. Position the plates so that the holes are in line with the holes in the corresponding plate. Using a hot knife or soldering iron melt through the baggage compartment fabric at each hole location. Fold the flaps over and cleco together after melting the first hole to maintain plate alignment. See **FIGURE 08-03A**.

FIGURE 08-02



3. Install the baggage compartment into the fuselage, wrapping the mount flaps and plates around the fuselage framework as shown in **FIGURE 08-03**. Rivet the flaps and plates together. See **FIGURE 08-03A**.

Clip the tensioning straps to the baggage compartment and pull tight.

FIGURE 08-03

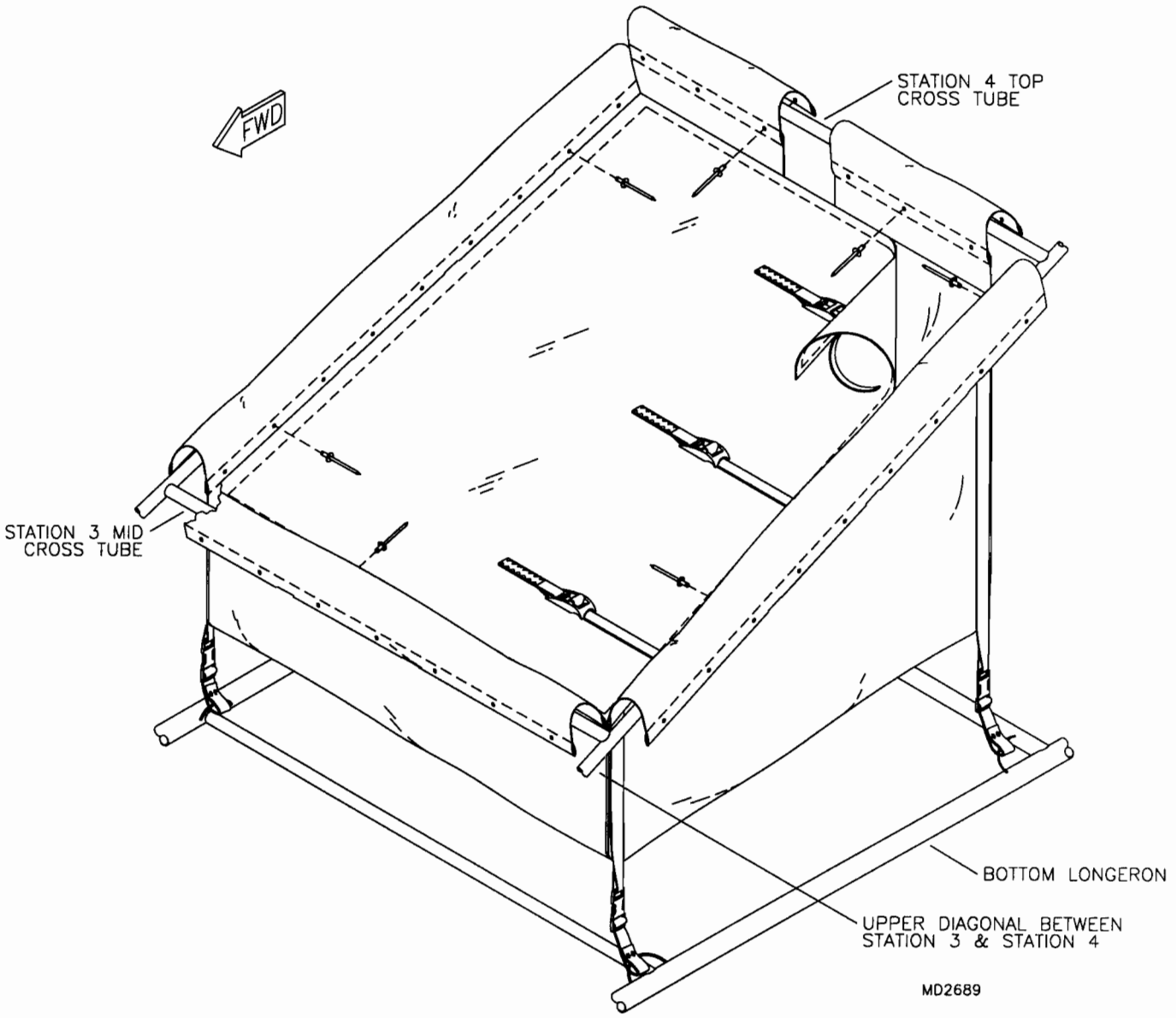
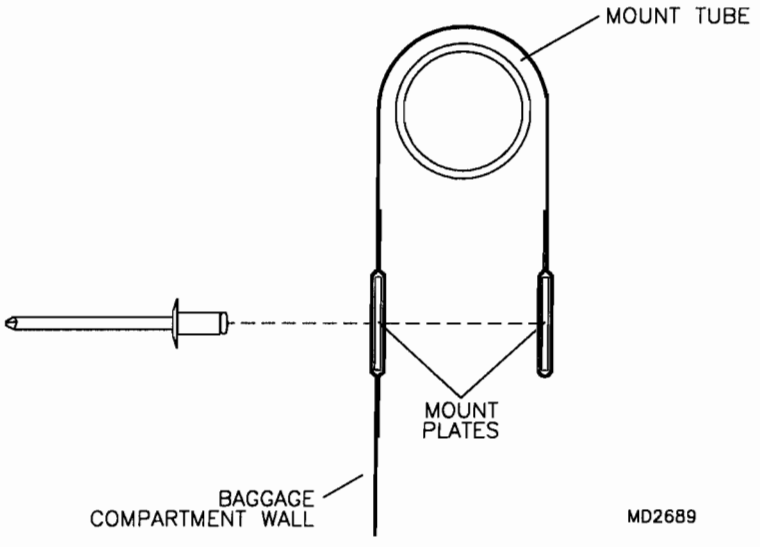


FIGURE 08-03A

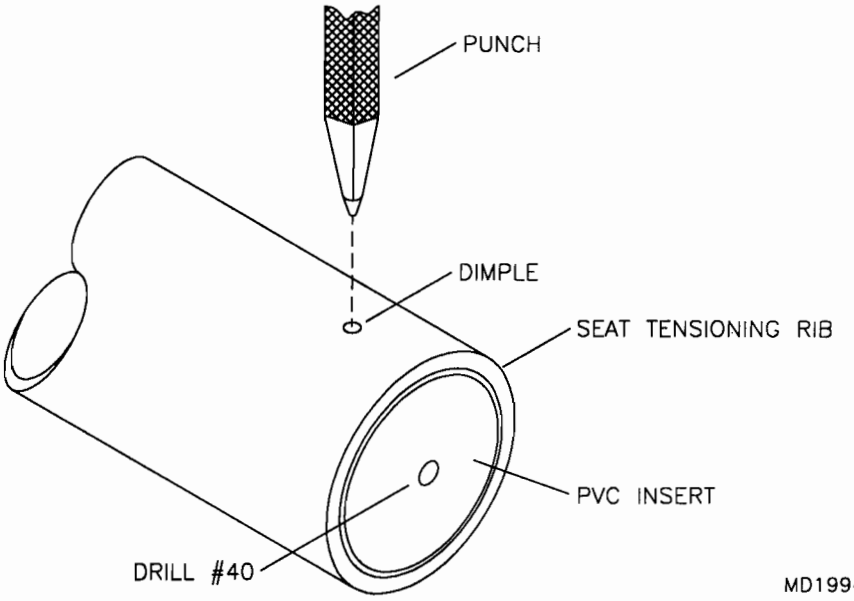


S-7 SEAT FRAMES & UPHOLSTERY

(REFER TO PARTS PAGE # 008-04 FOR PARTS SELECTION)

1. Using a #40 bit, drill through the center of the PVC inserts. Install the inserts into the seat tensioning rib flush with the end of the rib. Using a center punch, dimple the rib near the end to secure the inserts. See **FIGURE 08A-01**. Install the seat tensioning rib into the seat tensioning bracket using the screws shown in the parts drawing.

FIGURE 08A-01



2. Pre drill the side tubes of the seat tensioning bracket as shown in **FIGURE 08A-02**. Cleco the seat corner brace to the tensioning bracket and using the corner brace as a guide, mark the second hole location onto the tensioning bracket. Remove the corner brace and drill the second hole. Slip the tensioning bracket onto the lower legs of the seat side frames. Note the orientation of the tensioning bracket. Refer to the parts drawing. Install the seat top tubes into the side frames as shown in the parts drawing. **NOTE:** The top tube will be retained by the seat back cover. Position the seat tensioning bracket as shown in **FIGURE 08A-02A**. Transfer drill through the pre drilled holes in the tensioning bracket into the side frames. Rivet the seat corner brace to the tensioning bracket and side tubes. Using the corner brace as a guide, drill through the upper aft holes into the seat back side frame and rivet.

FIGURE 08A-02

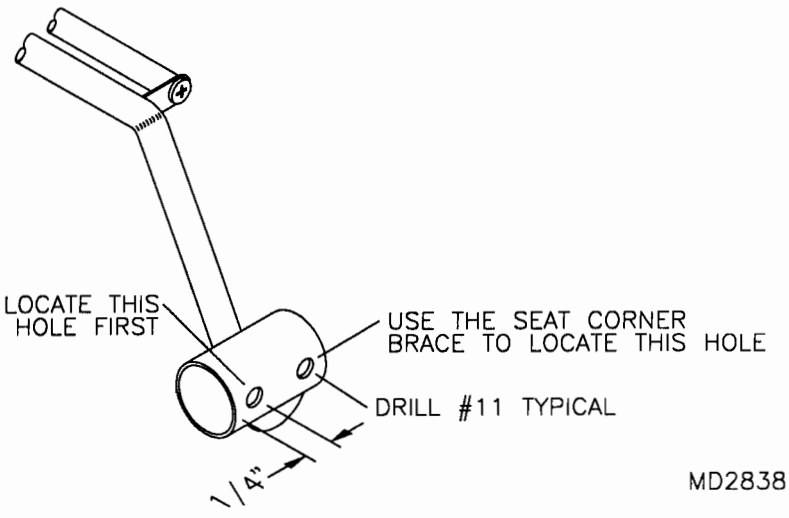
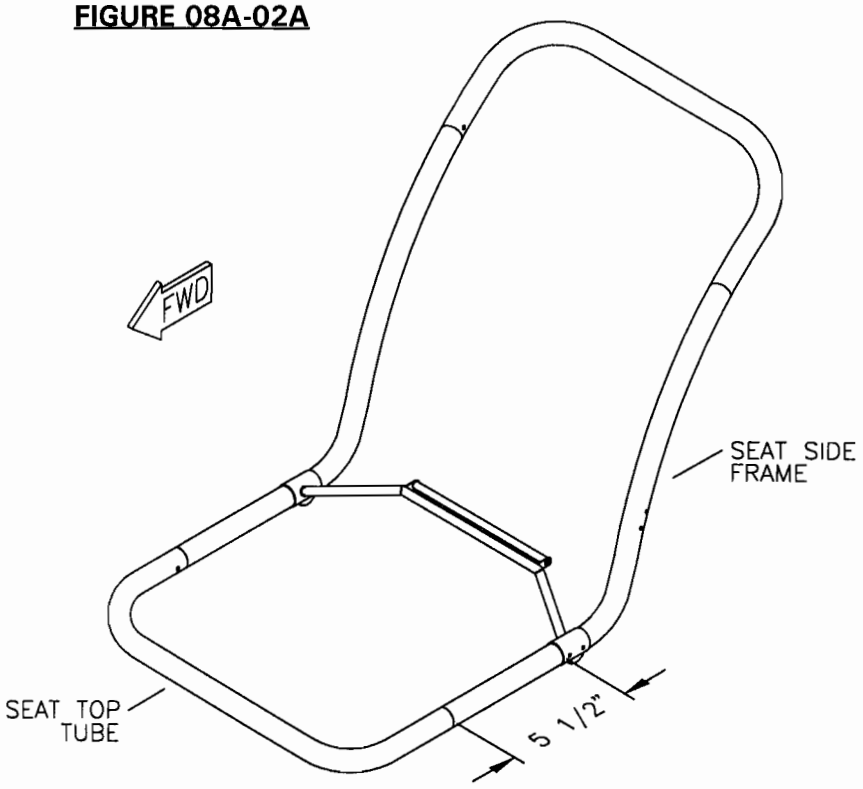
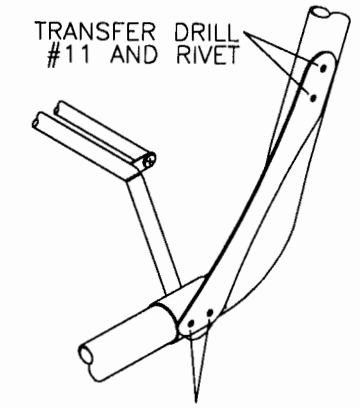


FIGURE 08A-02A



SEAT TENSIONING RIB LOCATION

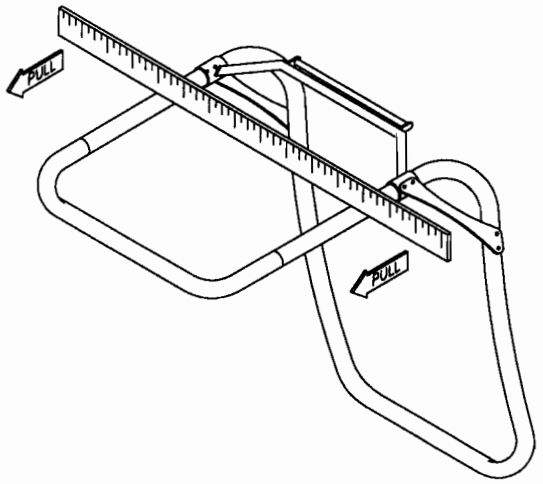


RIVET IN PLACE AND LOCATE AFT HOLES ON CENTERLINE OF TUBE

MD1995

3. With the seat bottom side up, mark the bottom centerline on the side tubes. **HINT**: Pull a straight edge along the bottom of both tubes to mark a centerline on the tubes. See **FIGURE 08A-03**. Tape a straight edge to the forward side of the seat as shown in **FIGURE 08A-03A**. Position the seat attach channels on centerline of each bottom tube, touching the straight edge and transfer drill through the channels into the seat frame. **NOTE:** It is important to locate the channels on the centerline to ensure that the seats slide freely. Cleco the channels only at this time. The bottom seat cover must be installed prior to riveting the channels in place.

FIGURE 08A-03



DRAG STRAIGHT EDGE LIGHTLY ALONG FRAME TO MARK CENTERLINE.

FIGURE 08A-03A

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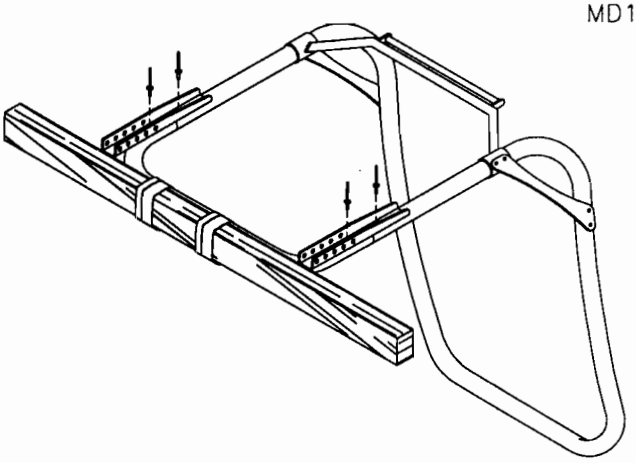


TAPE A STRAIGHT EDGE IN POSITION TO LOCATE SEAT CHANNELS FLUSH WITH FRONT OF SEAT TUBE.

4. Cut to length and insert the stainless steel wires into the pockets in the seat covers. Bend a hook on each end of the wire to retain in position. See **FIGURE 08A-04**. Lay out and mark the hole pattern as shown in **FIGURE 08A-04A**. Using a hot knife or soldering iron, melt a small hole at each location just above the wire. Remove the seat attach channels and slip the covers onto the seat frames. Thread the seat cover tongues between the seat tensioning rib and the seat tensioning bracket. Insert the zip ties and tension evenly. When tensioning the bottom cover, tension the aft (longitudinal) ties first and then the side to side ties. With the seat covers properly tensioned, melt through the seat attach channel mount holes and rivet the channels in place.

FIGURE 08A-04

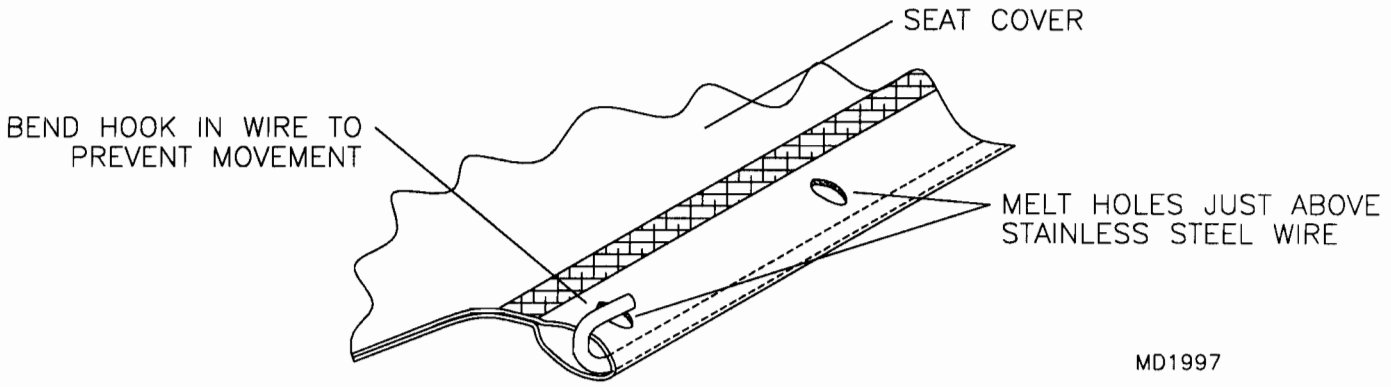
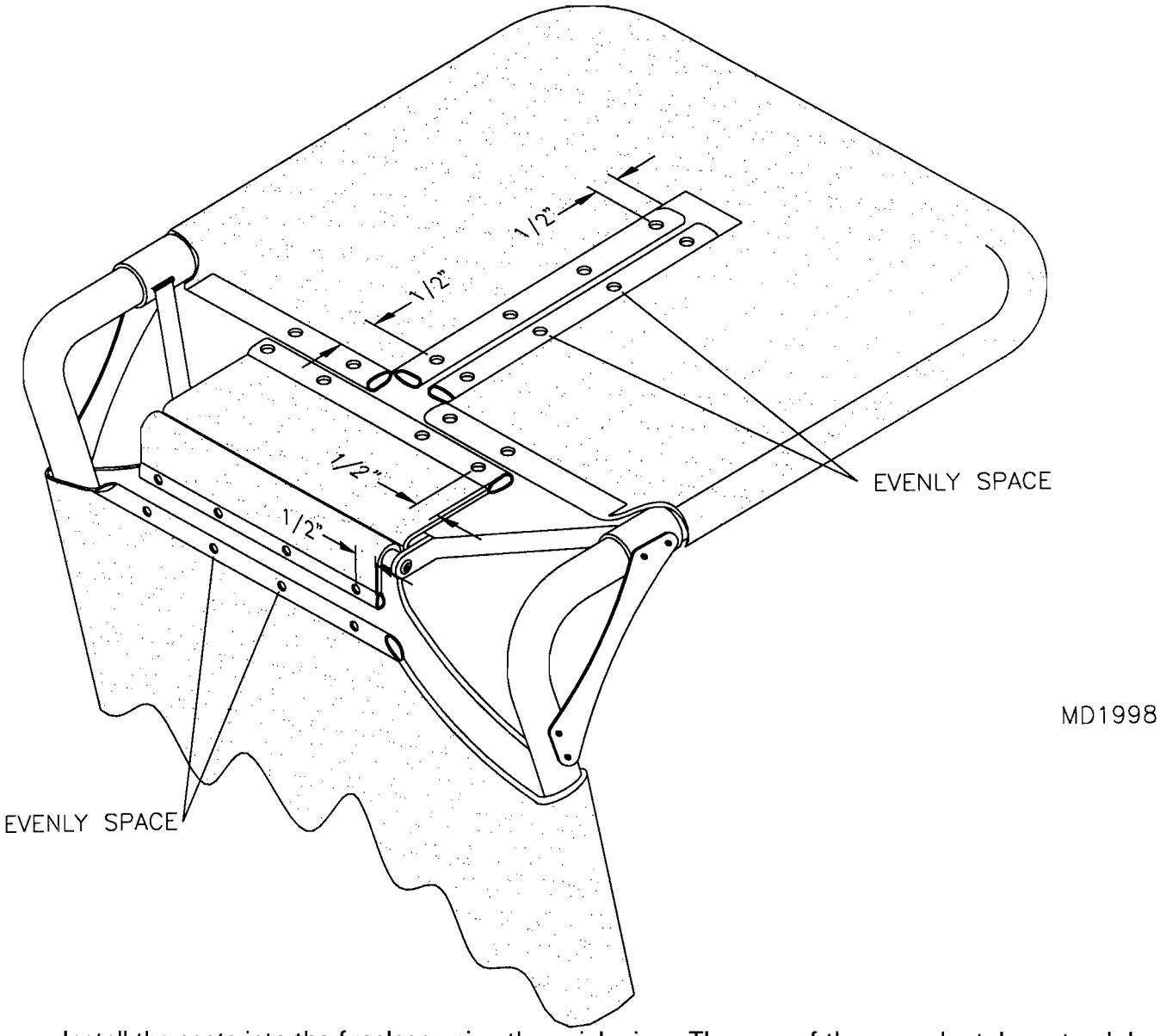
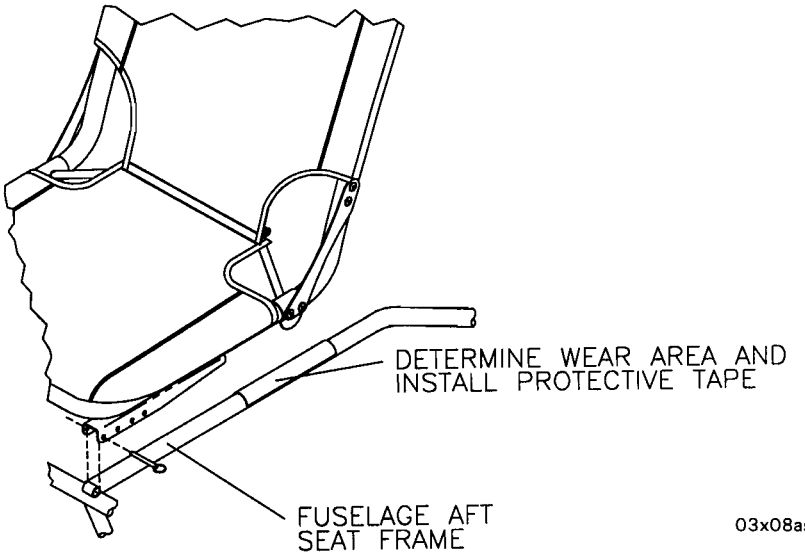


FIGURE 08A-04A



5. Install the seats into the fuselage using the quick pins. The ears of the spreader tube extend down the outboard side of each rail. Slide the seat through its full range of adjustment. Determine and mark the wear area on the fuselage seat rails. Refer to **FIGURE 08A-05**. Remove the seats and install wear tape in this area.

FIGURE 08A-05



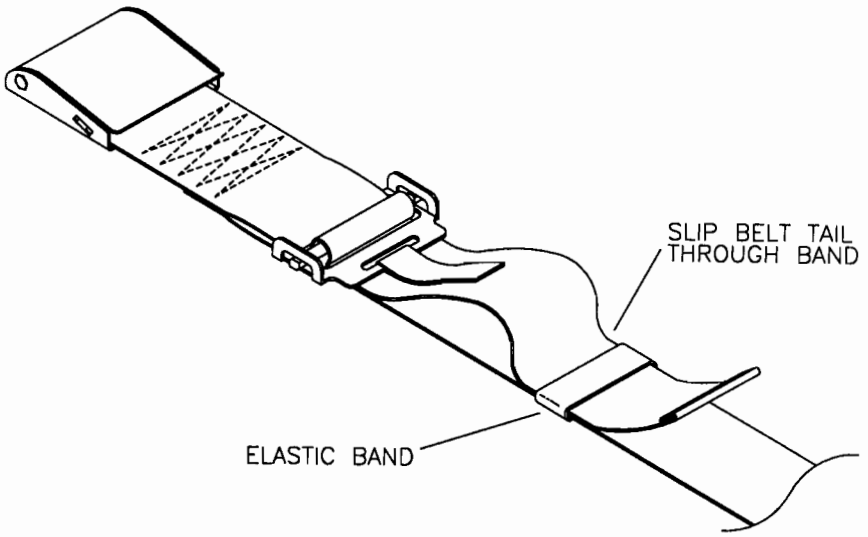
S-7 SEAT BELT ASSEMBLY & INSTALLATION

(REFER TO PARTS PAGE # 008-06 FOR PARTS SELECTION)

1. Prior to covering drill the fuselage lap belt mount tabs out to ¼". Refer to the parts drawing for the mount tab locations. Install the aft shoulder belt mount bolt into the bushing and temporarily finger tighten the nut onto the bolt. This bolt must be in place prior to covering.

2. After the fuselage has been covered and painted bolt each belt to there respective mount as shown in the parts drawing. Note that the forward and aft seats share the same seat belt combination. Use the elastic bands on the lap belts and lower shoulder belts to hold the tail of the belts after adjustment has been made. Refer to **FIGURE 08B-02.**

FIGURE 08B-02



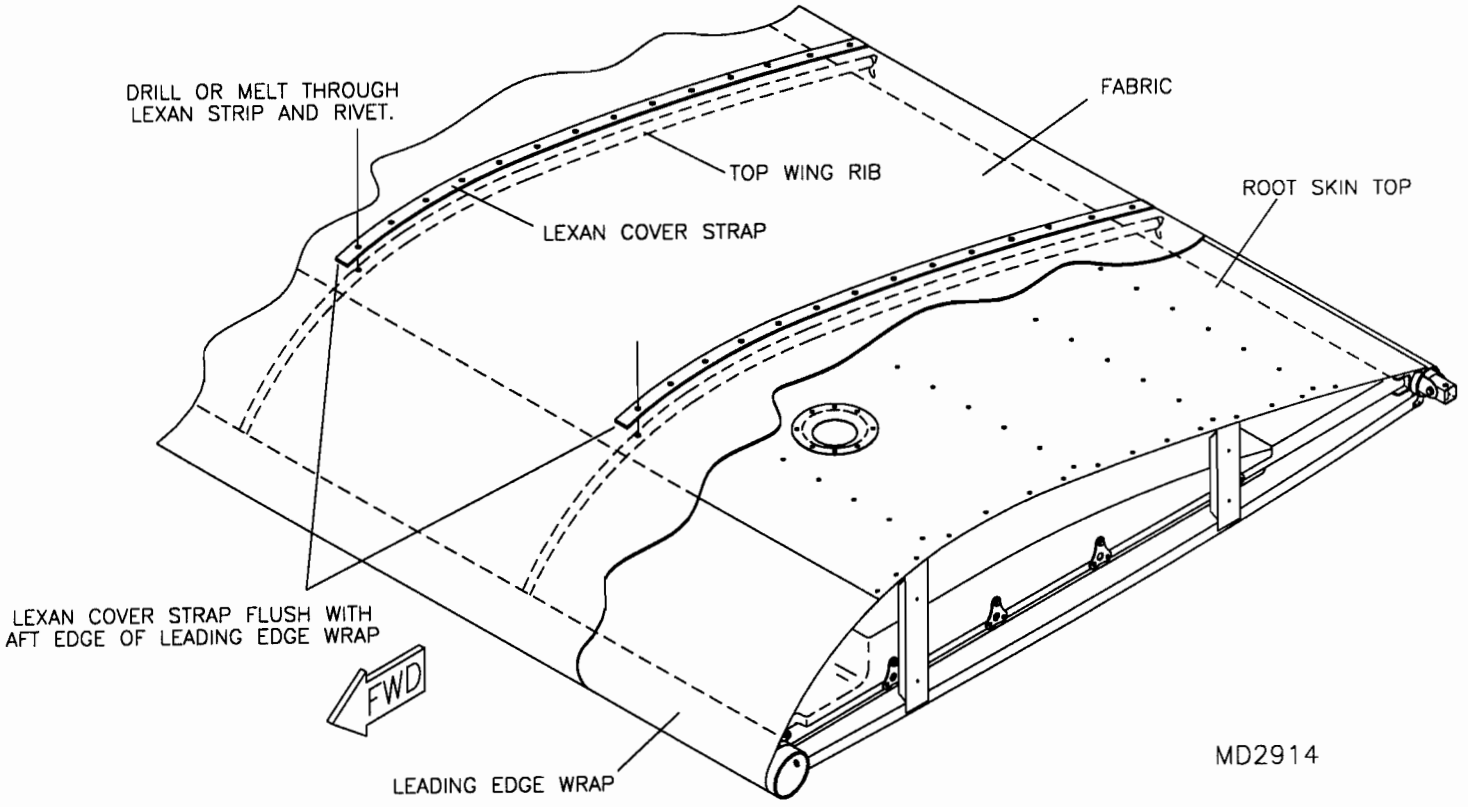
S-7 OPTIONAL RIVETING METHOD (REPLACING RIB STITCHING)

(REFER TO PARTS PAGE # 009-02 FOR PARTS SELECTION)

NOTE: The wing must be covered prior to installing the lexan cover straps.

1. Position the wing top side up. Place the top cover strap so that the forward end is flush with the aft edge of the leading edge wrap and centered on the rib. Using a hot knife with a pointed tip or soldering iron melt through the cover strap and fabric into the first hole in the rib and rivet. Pull light tension into the strap, melt through the second hole and rivet. Continue this pattern for the length of the rib. See **FIGURE 09-01**. Rotate the wing to the bottom side and follow the same procedure for installing the bottom cover straps. The bottom cover straps cover the full length of the rib. Refer to the covering section for completion of the surface tapes and patches.

FIGURE 09-01

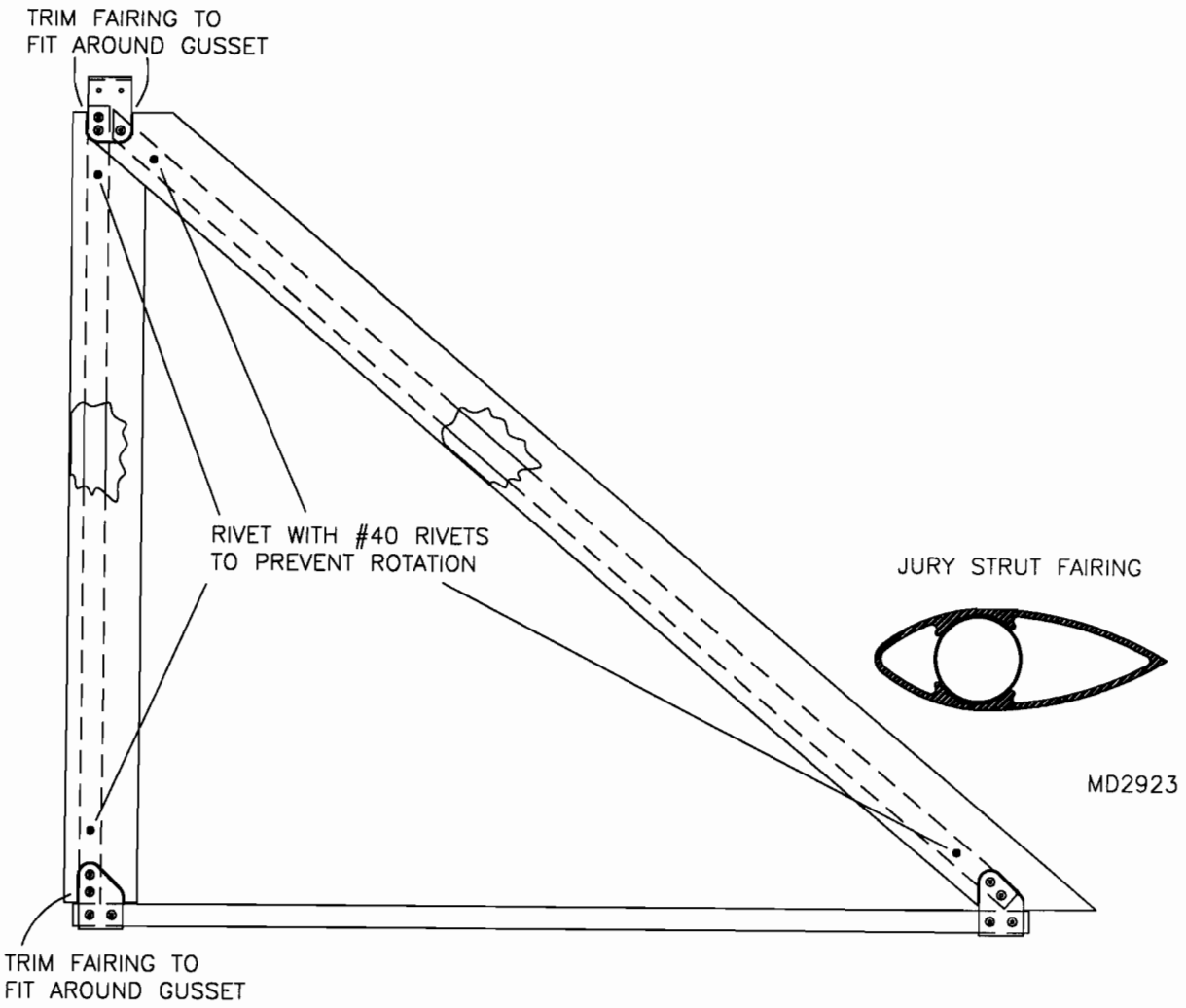


S-7 OPTIONAL JURY STRUT FAIRINGS

(REFER TO PARTS PAGE # 009-04 FOR PARTS SELECTION)

1. Cut the fairings to length and trim to fit as shown in **FIGURE 09-01**. Align the fairings to the slip stream and rivet in place as shown. It is only necessary to rivet on the inboard side.

FIGURE 09-01



S-7 OPTIONAL 912 WARP DRIVE PROP ASSEMBLY

(REFER TO PARTS PAGE # 009-06 FOR PARTS SELECTION)

1. Assemble the prop as per the manufacturers instructions. Refer to the standard Tennessee prop installation section and install the flange bushings as described. Install the spinner backing plate. Bolt the prop and squash plate to the prop flange and backing plate. Set the blade pitch as per the manufacturers instructions. Final pitch settings can only be determined by running the engine. In a static run up of the engine to full throttle the engine should turn between 5200 and 5400 RPM's. Adjust the prop pitch accordingly. Using a criss cross tightening pattern, torque the 5/16" prop bolts to 15 ft. pounds.

2. Refer to the Tennessee prop section and follow the instructions for checking the prop tracking.

3. Bolt the spinner dome to the backing plate. Refer to the spinner section.

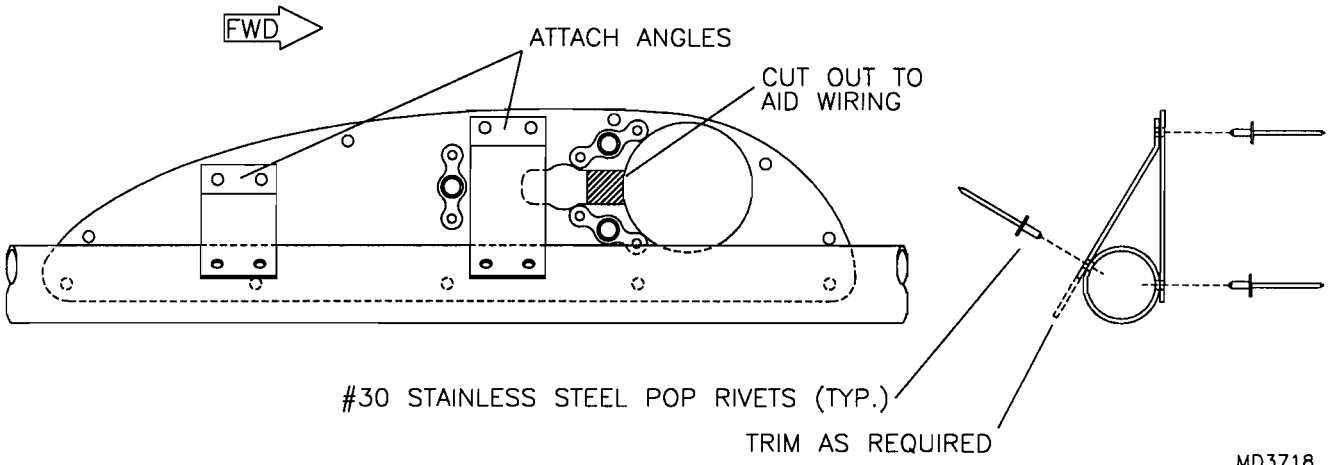
S-7 COURIER WHELEN STROBE/POSITION LIGHT INSTALLATION

(REFER TO PARTS PAGE # 009-10 FOR PARTS SELECTION)

1. Drill and rivet three nut plates to the light mount plate, per parts drawing and **Figure 09D-01**. The light will be screwed to the mount plate after covering. Drill three #11 holes in the back plate of the light and test fit against the mount plate.

2. Locate the mount plate to the tip bow, 13" from the leading edge; drill and rivet in place. Rivet the attach angles in place to reinforce; trim the angles as required to join the plate and bow properly. Refer to parts drawing and **Figure 09D-01**.

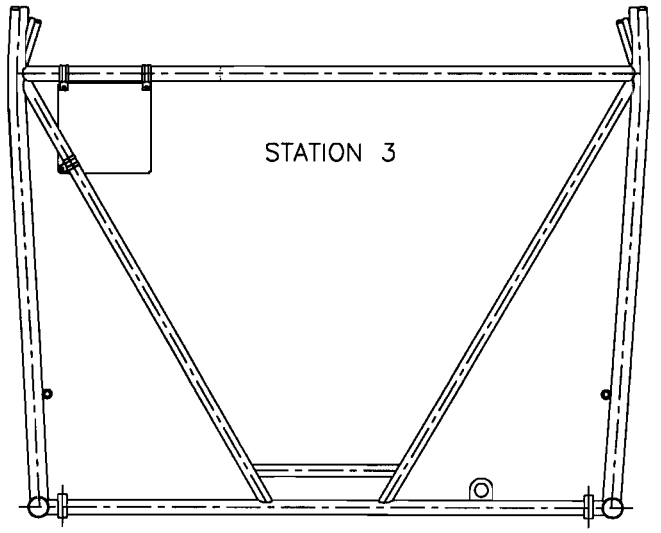
FIGURE 09D-01



3. Unroll the gray strobe wire and cut it in half. Cut two 20' segments of 14 gauge yellow wire. Run the gray and yellow wire through the trailing edge spar to the mount plate. Tape wires to the inside edge of the wing tip to secure while covering; be certain to leave enough to work with while wiring.

4. Mount the strobe power box to the Station 3 crossing tube and diagonals with three tube clamps; the box should be mounted with connections pointing down. See **Figure 09D-04**. *The strobe box has high voltage and should be kept clear of fuel lines.*

FIGURE 09D-04



S-7 COURIER OPTIONAL BUBBLE LEXAN (DOOR ASSEMBLY)

(REFER TO PARTS PAGE # 009-12 FOR PARTS SELECTION)

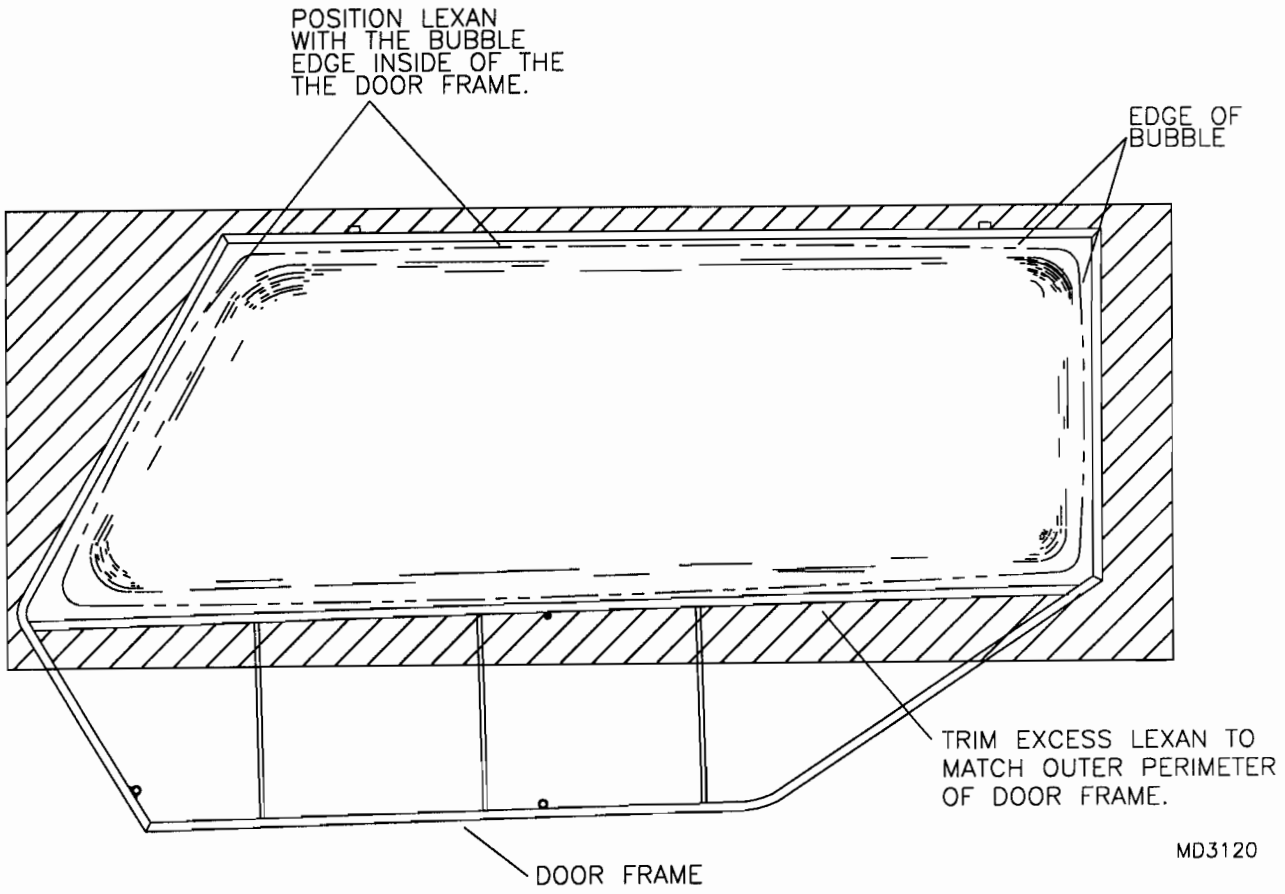
1. To complete this step, it will be necessary to refer to and follow all steps and procedures in the "Door Assembly-Lexan and Trim" section in this manual with the exception of step #5. The pre-formed bubble lexan is used in the place of the standard flat lexan. Follow the instructions below.

Note that there is a right and left hand bubble lexan. Install accordingly. Position the lexan on the door frame so that the bubble is centered and equally spaced within the door frame. **NOTE:** There is no exact location or one position for the bubble. It is left to the builder to best position to their satisfaction. When satisfied with the position of the bubble lexan, trim off the excess lexan so that it is flush with the outer perimeter of the door frame. Refer to **FIGURE 09E-02**.

After trimming, position the lexan back on the door frame and clamp in place. Starting at the top and bottom center and working out, alternating from side to side, transfer drill through the lexan into the previously drilled holes in the door frame with a #30 bit. Cleco as you go. With all holes drilled, remove the lexan and chase drill all holes in the lexan only to #28. This allows for rivet expansion without putting undue stress into the lexan.

Refer back to the standard section and continue with step #6 and the remaining steps as well as your established assembly sequence. After the aircraft has been covered and during final assembly, refer back to this section and step #3.

FIGURE 09E-02



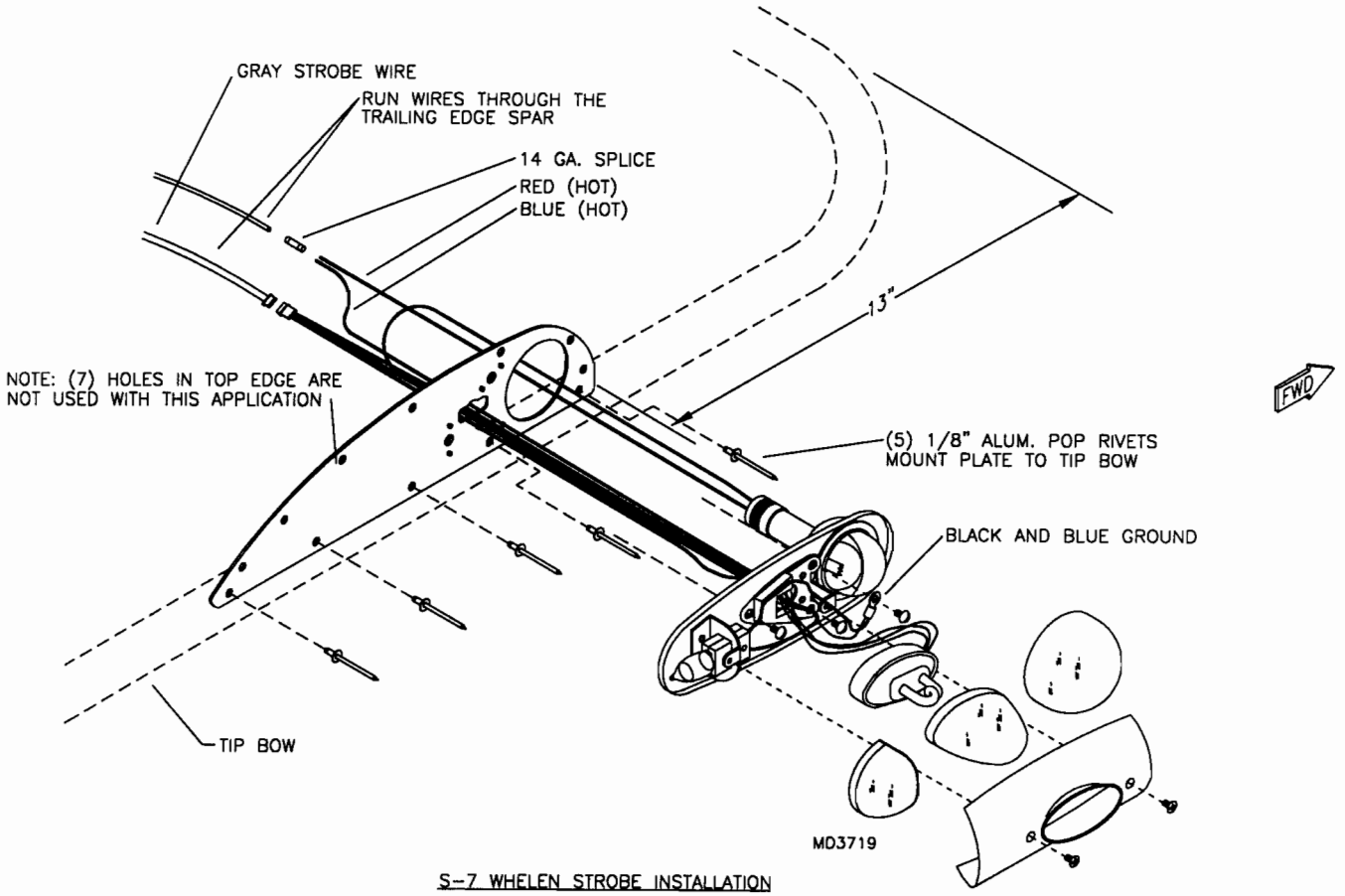
5. Run a 14 gauge yellow wire from the nav. switch to the strobe box; connect a brass "Y" connector to end of the wire. The yellow wire from each wing will connect to the "Y" connector. Run a 14 gauge red wire from the strobe switch back to the strobe box, then connect it to the red wire from the box. Run the black wire from the box to ground. Refer to parts drawing.

6. Connect the ends (provided in strobe kit) to the three wires coming out of the gray wire. The kit has instructions on how they go into the connector. The unprotected wires are run to a brass "Y" connector, then connected to ground using a short segment of 14 gauge black wire.

7. With the wings finished, cut out the two large holes and the three nut plate holes in the strobe mount. Connect the wires on the strobe light to those in the wing. Connect one of the blue wires and the black wire to ground using a single "I" connector placed under one of the mount screws. Connect the other blue wire and the red wire to the yellow wire in the wing with a 14 gauge butt connector. Connect the two plastic connectors. Wrap the two wing connections with electrical tape to prevent disconnection due to vibration. See **Figure 09D-07**.

8. Attach the strobe to the mount plate and reassemble the strobe. Check all connections and test the lights.

FIGURE 09D-07



S-7 WHELEN STROBE INSTALLATION

S-7 COURIER OPTIONAL RUDDER CABLE GUARD

(REFER TO PARTS PAGE # 009-14 FOR PARTS SELECTION)

1. Locate, drill and rivet support tube to rudder cable guard, approximately 1 ½" AFT of front edge (front is curved edge). Secure with at least 4 rivets.

2. Locate screw holes along guard edges in 3 places.

3. Center guard over the cables, parallel to edge of floorboard and evenly overlapping side to side.

4. Remove guard to paint or cover in fabric to match seats or center guard.

5. To install use small screws and self tap into floorboard.

S-7 COURIER OPTIONAL AFT CONTROL STICK COVER

(REFER TO PARTS PAGE # 0010-16 FOR PARTS SELECTION)

NOTE: The aft control stick cover should be installed during final assembly after final inspection has been made on the control stick/torque tube assembly and installation.

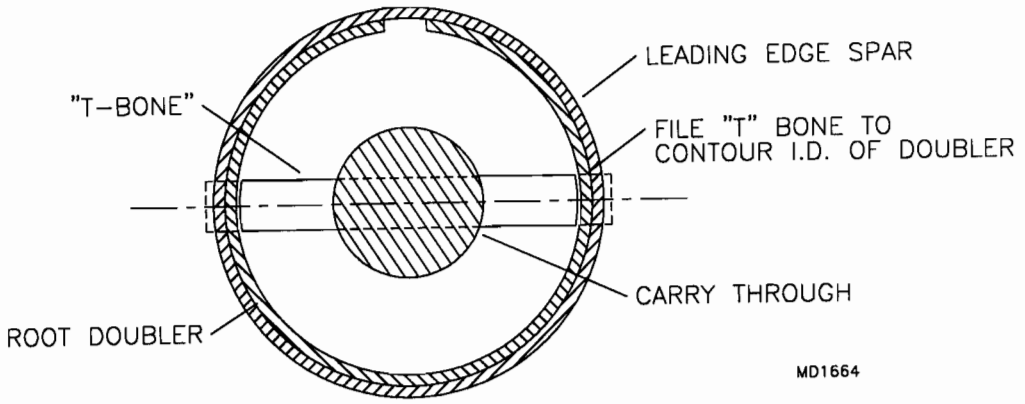
1. Note that there is a forward and aft end to the control stick cover. Install accordingly. Refer to the parts drawing. Pull open the forward and bottom velcro flaps. Slide the cover over the top of the aft control stick. Position the cover so that it is resting on the top of the torque tube and so that the control stick push pull tube exits the forward end of the cover through the hole provided just above the velcro flaps. Close the velcro flaps under the push pull tube (top side of torque tube) and the bottom side of the torque tube. The cover will for the most part self locate its forward and aft position. When satisfied with the fit of the cover, slide the nylon ties through the two loops located on the top aft end and the top forward end of the cover. Route the ties around the torque tube and pull snug. Draw the elastic in the top of the control stick boot tight around the control stick and tie.

S-7 WING ATTACHMENT

(REFER TO PARTS PAGE # 005-04, 005-05, & 005-19 FOR PARTS SELECTION)

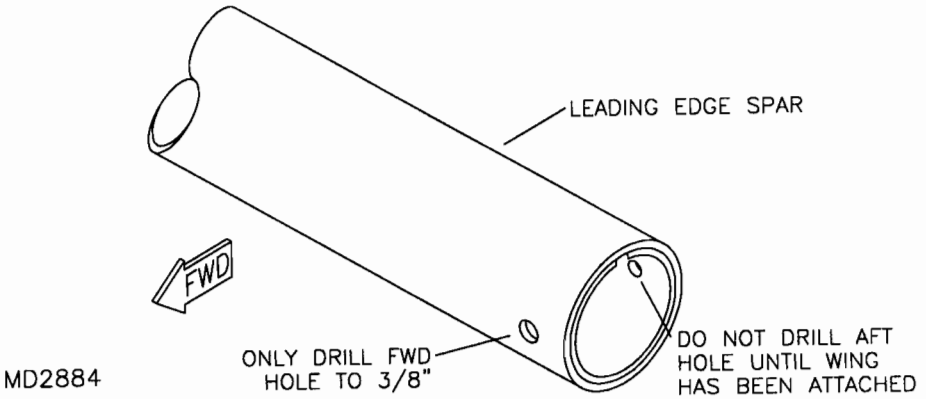
1. File the forward carry-thru "T-Bone" on the fuselage to fit the contour of the I.D. of the leading edge spars root end. See **FIGURE 10-01**.

FIGURE 10-01



2. Drill out the pre drilled wing attach hole in the **FORWARD** wall of the leading edge spar to ⅜". Do not drill through the aft wall of the spar. See **FIGURE 10-02**. With a helper attach the wing to the fuselage using the appropriate hardware. Refer to the parts drawing. Slide the leading edge attach pin through the forward side of the spar until it bottoms against the aft wall. With the tip supported, attach the forward lift strut to the attach plate on the wing. Raise the tip of the wing and attach the lower end of the lift strut to the fuselage. With a helper holding the tip stationary, remove the leading edge spar attach pin and using the "T-Bone" as a guide, transfer drill through the aft wall of the spar. **NOTE:** It is important that the wing be held completely stationary while drilling the aft hole, hole elongation will result. Install the attach pin and lock ring. Feed all control cables and fuel lines into the fuselage. Refer to the individual sections for routing and hookup. Refer to the rigging section for the aft lift strut installation and setting the wing wash out. Refer to the jury strut section and assemble and install the jury struts.

FIGURE 10-02



3. Position the wing root gap seal on the under side of the wing so that the flange is tight against the fuselage frame. Mark the centerline location of the bottom root rib on the forward and aft end of the gap seal. See **FIGURE 10-03**. Remove the gap seal and draw a straight line between these marks. Layout and pre drill the hole pattern using a #40 bit as shown in **FIGURE 10-03A**. Locate the forward and aft end holes with the gap seal on the wing. The forward end of the gap seal will be positioned under the wing cuff and the attach screw will be located through the wing cuff and gap seal. Locate the aft hole just forward of the trailing edge spar in the root rib. Position the gap seal and transfer drill through the gap seal into the bottom root rib. Remove the gap seal and paint. During final assembly attach the gap seal to the wing with the screws provided.

FIGURE 10-03

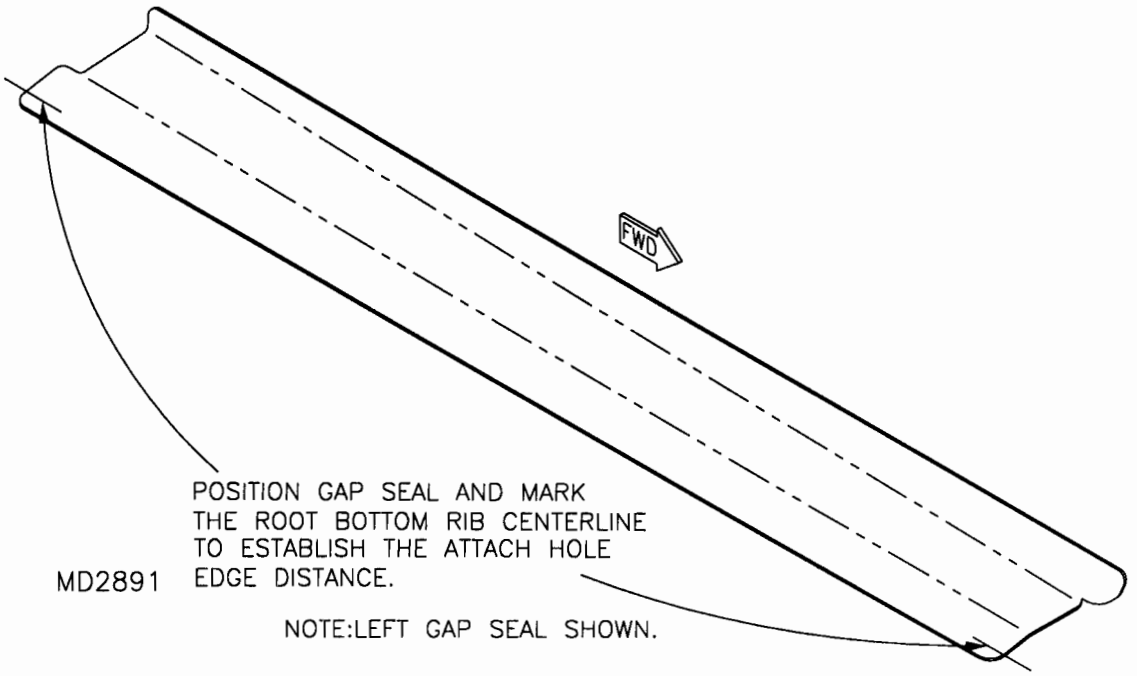
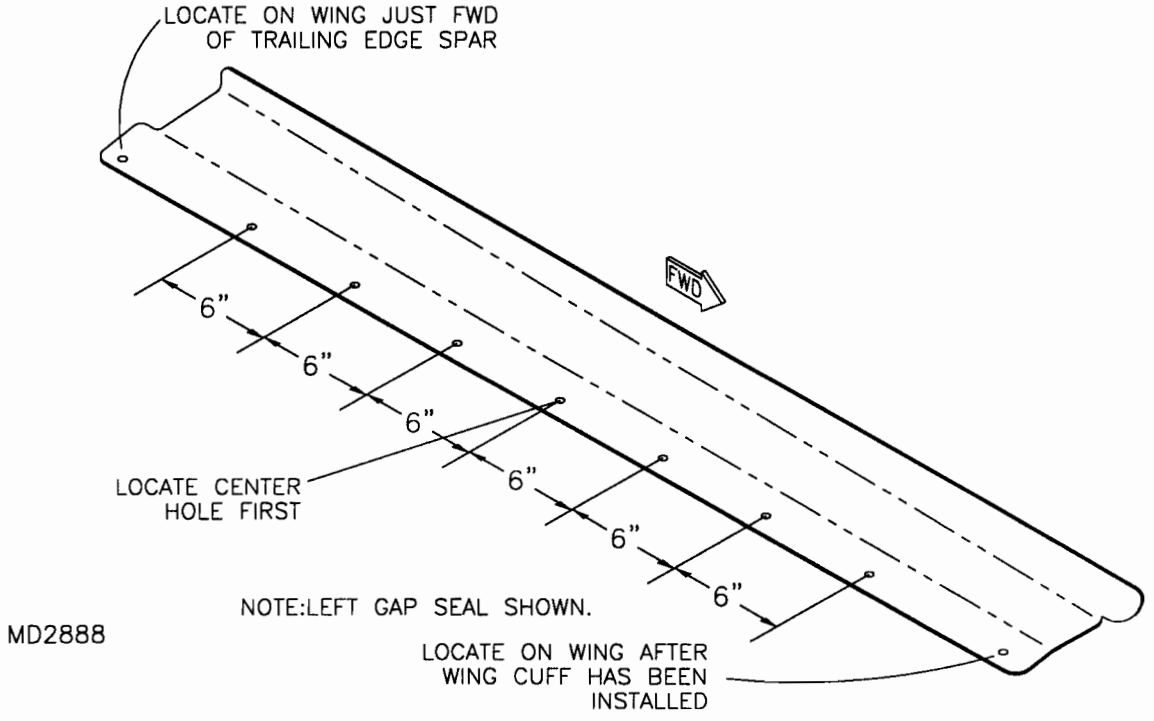


FIGURE 10-03A



STATIC BALANCE OF THE S-7

IMPORTANT!

It is very important that the control surface being balanced is ready for flight and not lacking in completeness. Be certain that the control surface is complete, all bolts, fittings, fairings, hardware, push rods, and hinges are installed.

In balancing a control surface a minor change in weight can have grave results. If the control surface is ever damaged and repaired or re-painted, it must be balanced again. Failure to do so may excite flutter and the destruction of the aircraft.

DANGER

Wear rubber gloves and a particle mask when working with lead. Lead is a heavy metal and can poison you blood stream through the skin and lungs if breathed in. Take care when working with the lead to clean up all shavings and to store lead products out of the reach of children.

STATIC BALANCING OF THE AILERONS

1. Drill #11 holes into the spade as per **FIGURE 11A-01**. If not supplied with the kit, obtain 1/4" lead plate and cut into two weights as shown in **FIGURE 11A-01A**. Attach the weight to the spades using 3/16" aircraft bolts and large washers.

FIGURE 11A-01

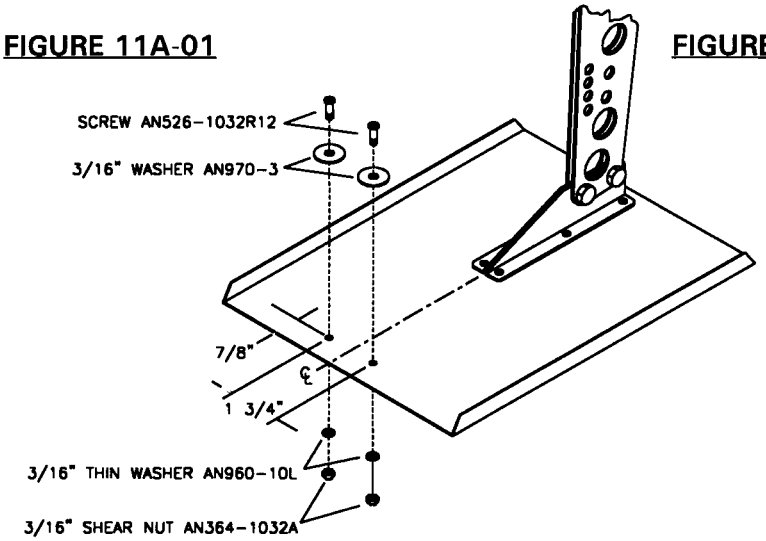
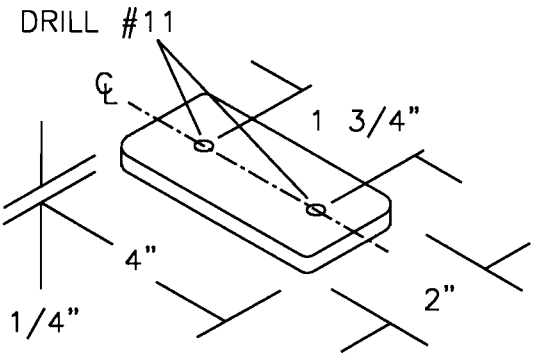
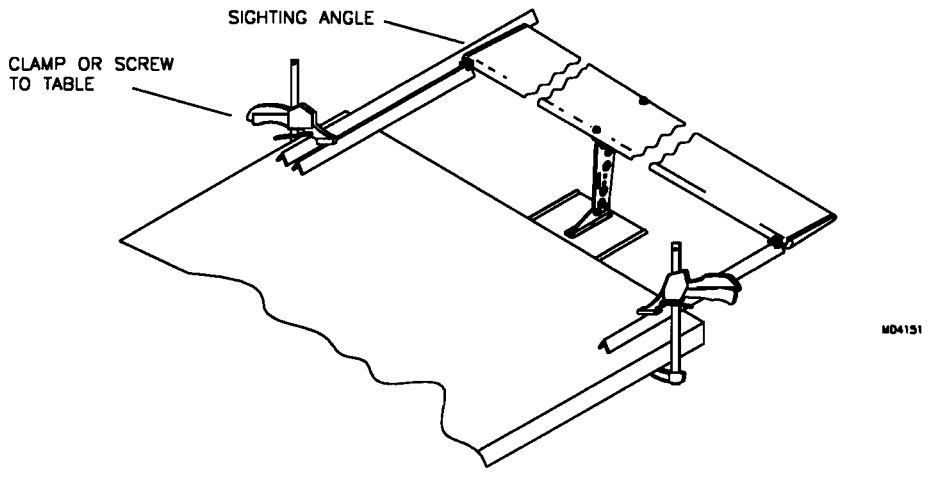


FIGURE 11A-01A



2. The aileron must be fully assembled. If installed on the aircraft, remove the aileron and place it on a fixture as shown in **FIGURE 11A-02**. Use the edge of a flat and **level** table, and clamp or weight down the angles to support the weight of the aileron.

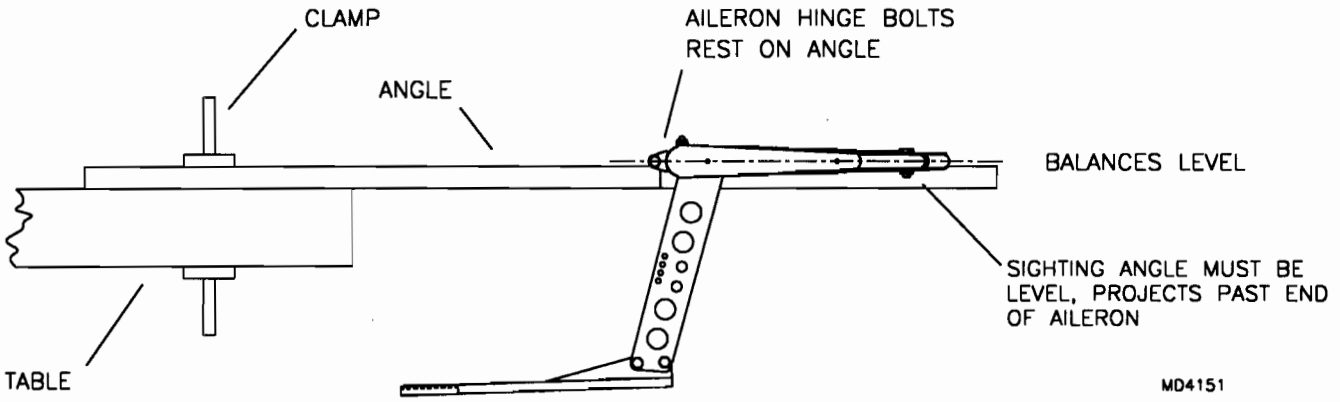
FIGURE 11A-02



3. Set the aileron on the angles, balancing them on the hinge bolts. **Important:** The aileron must pivot freely on the bolts, position angles to effect this.

4. The aileron is properly balanced when level through the center of the leading and trailing edge tubes. Use a level sight gauge as shown in **FIGURE 11A-04**. Adjust by adding or removing weight as required.

FIGURE 11A-04



5. After ailerons are balanced attach them to the wing, being sure not to over-tighten the hinge bolts and to install the cotter pins. Refer to rigging section as to how to set the spades to the correct angle.

BALANCING THE ELEVATORS

1. The elevators must be removed from the plane and completely assembled and painted, ready to fly. See important note at the beginning of this section. Specifically the elevator horn, trim tab, servo-including push rod, wires and protective cover with screws must be installed.

2. Using a flat and level table and two angles, lay the elevator on the table as shown in **FIGURE 11A-02**. With only the weights in the nose of the overhangs the elevator most likely will not balance. Fabricate a lead weight as per **FIGURE 11A-02A**. Drill and tap holes into the nose weight as per **FIGURE 11A-02B**; if this step was not already performed prior to covering. Bolt the weight in place and check the balance. The elevator is balanced when the trailing edge is no longer touching the angle with at least a 1/16" to 1/8" gap, see **FIGURE 11A-02C**. Repeat for the other elevator. The trim tab equipped elevator will take almost twice as much additional lead weight to balance.

FIGURE 11A-02

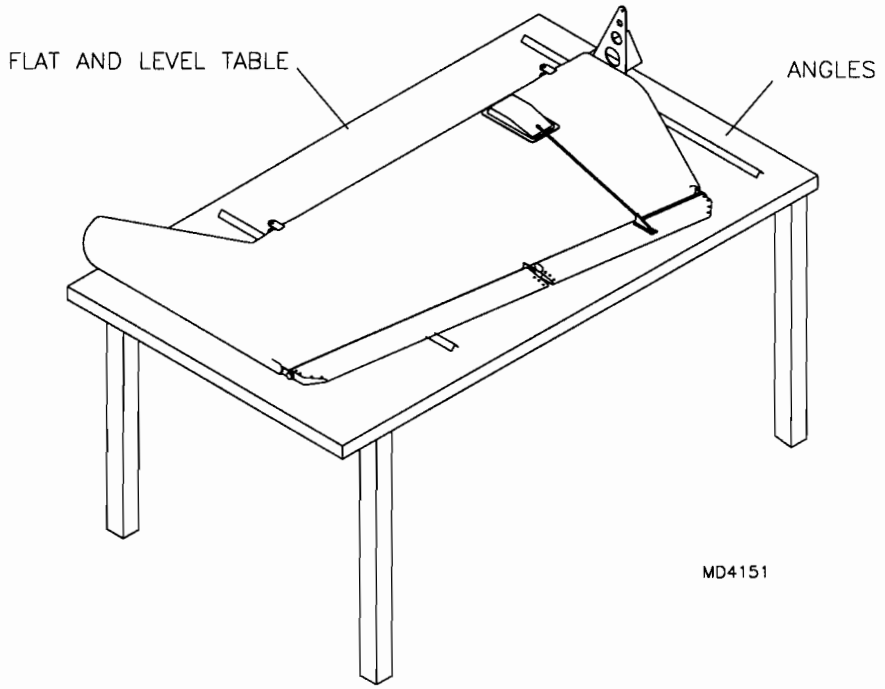


FIGURE 11A-02A

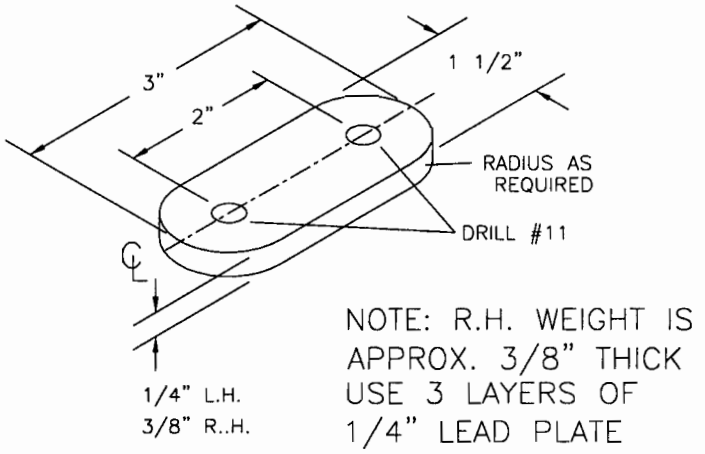
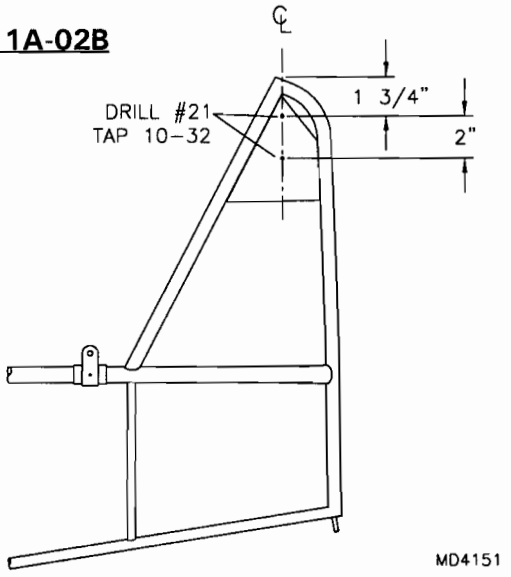


FIGURE 11A-02B

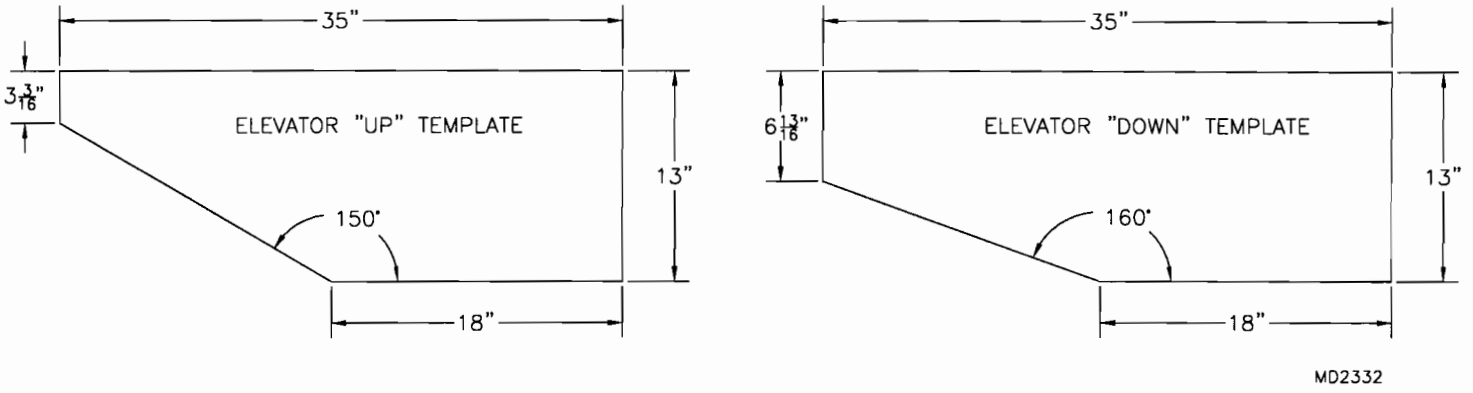


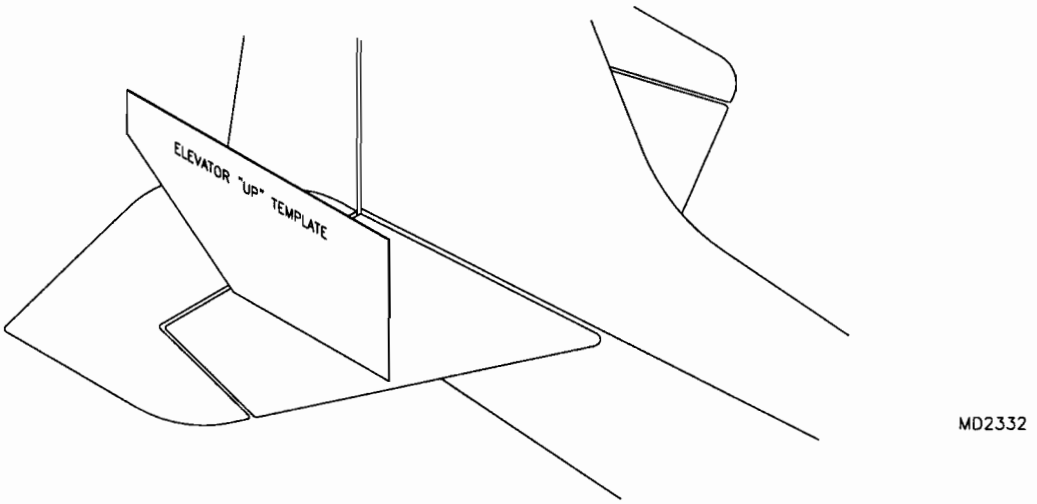
S-7 RIGGING

ELEVATOR RIGGING

1. Secure the control sticks in there neutral position. Adjust the male rod ends in the elevator yoke to set the elevators neutral. **IMPORTANT:** The rod ends must be turned into the yoke at least ten full turns. The elevators will travel approximately twenty seven degrees up and twenty degrees down. Refer to **FIGURE 11B-01** and fabricate the templates as shown. Use the templates to verify the travel of the elevators as shown.

FIGURE 11B-01





TRIM TAB RIGGING

2. Secure the trim levers in there neutral position. Adjust the trim tab to its neutral position by adjusting the female rod ends on each end of the teleflex cable. Maintain the ten full turn minimum rule. Tighten the jam nuts.

RUDDER & RUDDER PEDAL RIGGING

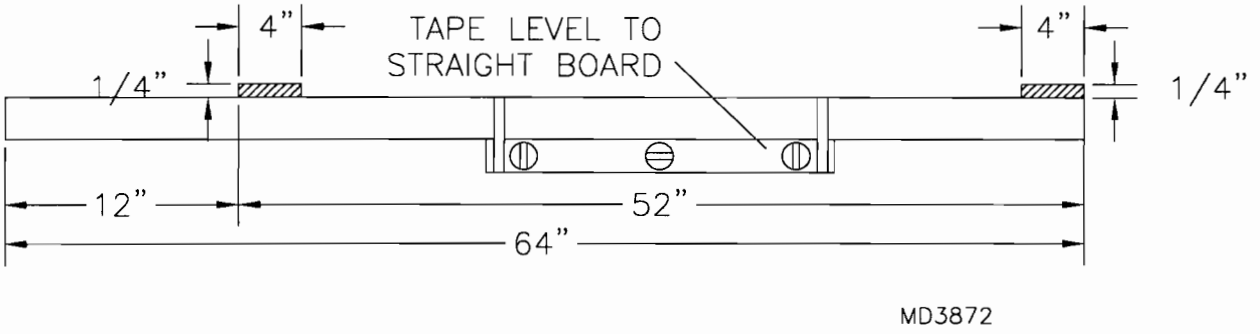
3. Secure the rudder in its neutral position. Set the tailwheel neutral with the rudder by adjusting the steer link chains. With the rudder and tailwheel neutral the rudder pedals should be approximately ten degrees to the aft in relation to the floorboards. Make adjustments using the multi hole tang on the forward end of the rudder cables. Set the rudder stops to allow approximately thirty degrees right and thirty degrees left travel. At full rudder deflection there should be a ½" minimum clearance through the full range of elevator travel.

WING WASHOUT SETTING

4. With wings and struts installed on the fuselage, set the brakes and place the tailwheel on a sawhorse of a height so the bottom of the wing is approximately level at the wings root.

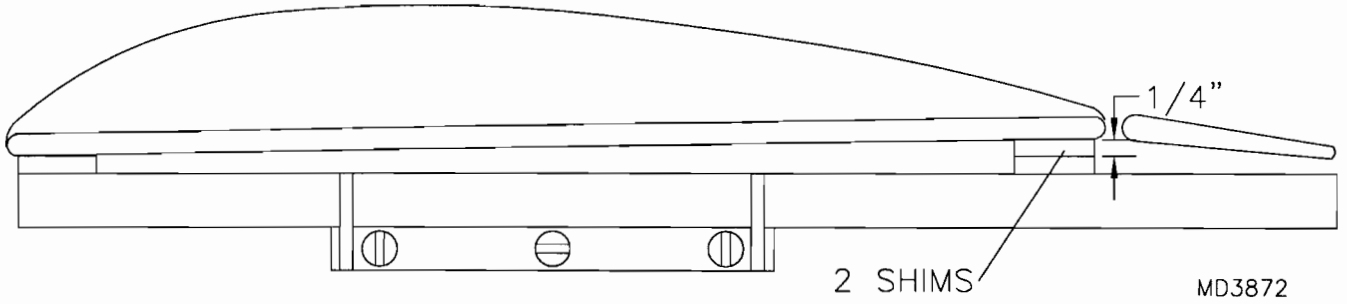
5. Fabricate a rigging level as per **FIGURE 11B-05**.

FIGURE 11B-05



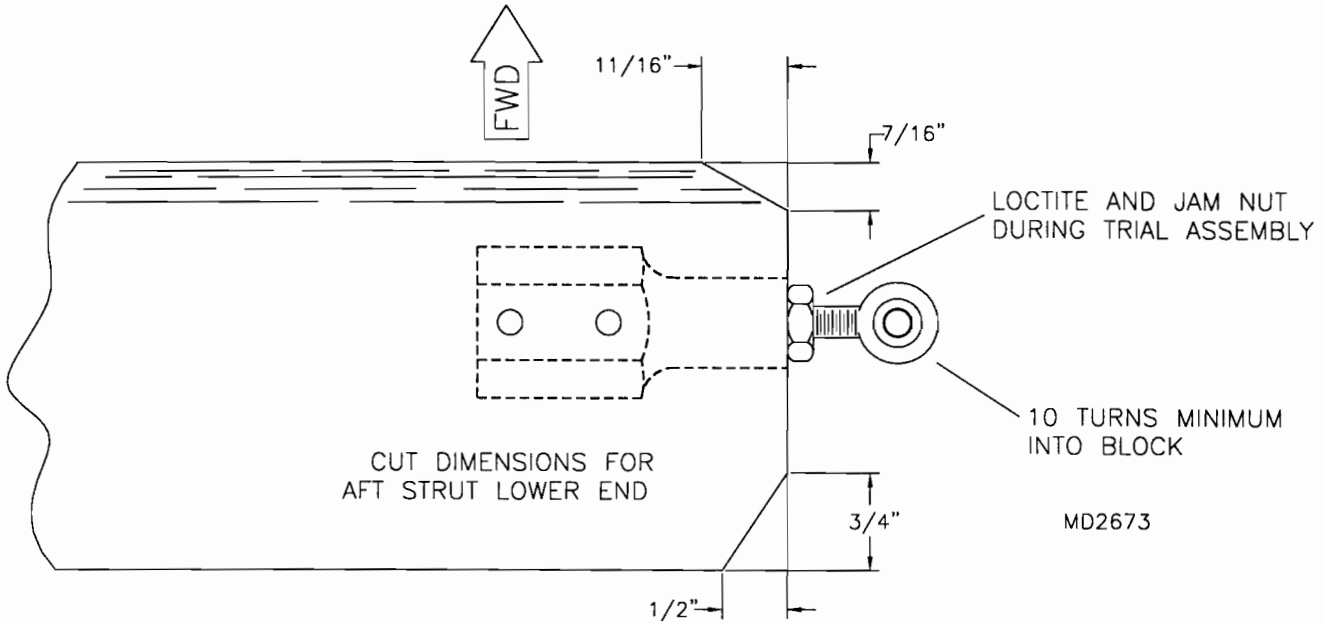
6. Adjust the tail height until level reading. Place level just out board of the lift strut with an additional 1/4" shim, see **FIGURE 11B-06**. Adjust aft lift strut until level reading. **IMPORTANT:** Apply Loctite to the rod-end threads before installing into the adjustor end. **CAUTION: The rod end must be screwed into the strut fitting a minimum of 10 turns.** Final bolt the rod-end and lock with the jam-nut.

FIGURE 11B-06



7. Trim end of aft lift strut as per **FIGURE 11B-07**, if contact with fwd strut results.

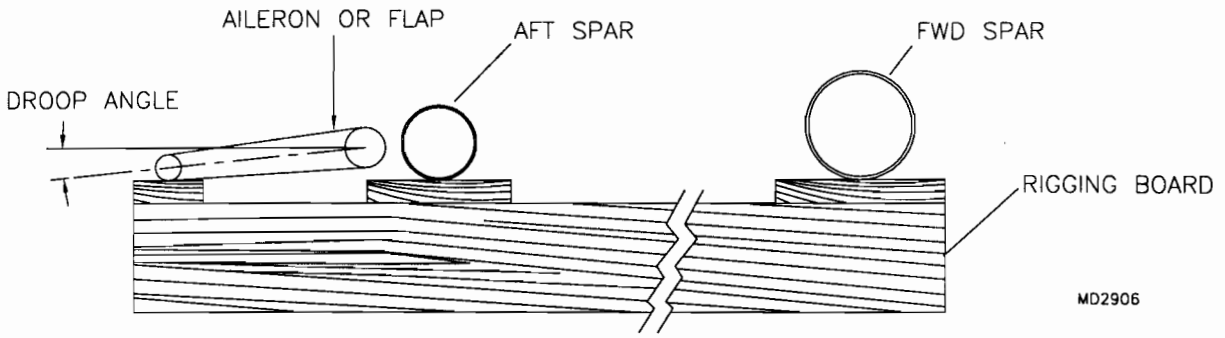
FIGURE 11B-07



FLAP RIGGING

8. Using the wing wash out rigging board as shown in **FIGURE 11B-08**. Hold the rigging board so that it is contacting the bottom side of the leading edge spar and the bottom side of the trailing edge spar. The trailing edge of the flap should rest on the straight edge.

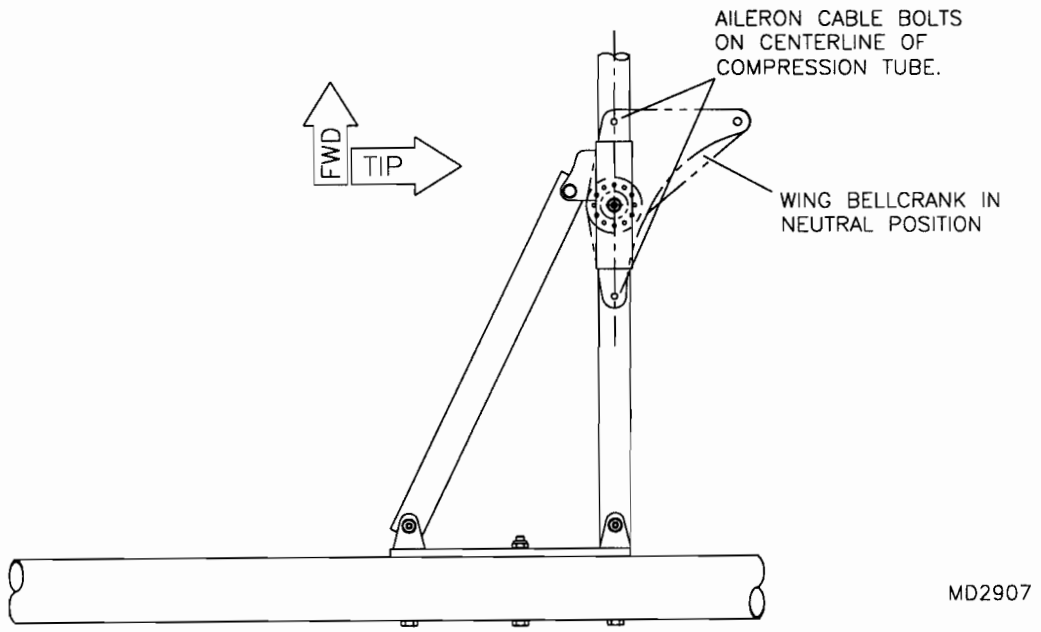
FIGURE 11B-08



AILERON RIGGING

9. Secure the control sticks in there neutral position. By adjusting the turnbuckles and the cable tensioner set the wing bellcranks to there neutral position. See **FIGURE 11B-09**. With the control sticks and bellcranks neutral, the cables should be tight. Without a cable tension meter adjusting cables will have to be an educated guess. The correct cable tension does not overload or "drag" the system, nor will the cables feel spongy. With the control sticks and bellcranks neutral install the aileron push pull tube. Using the rigging board adjust the ailerons to there neutral position following the same procedure used to set the flaps. **IMPORTANT:** The rod ends must be turned into the push pull tube at least ten full turns.

FIGURE 11B-09

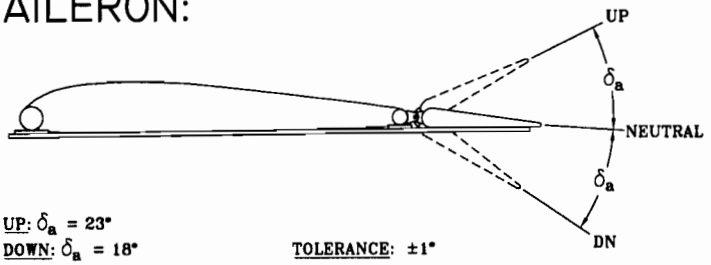


10. Adjust spades to be parallel to bottom door frame. Final adjust in-flight to be parallel to horizon in level cruise flight.

11. This completes the rigging of the aircraft. Make necessary adjustments during initial flight tests.

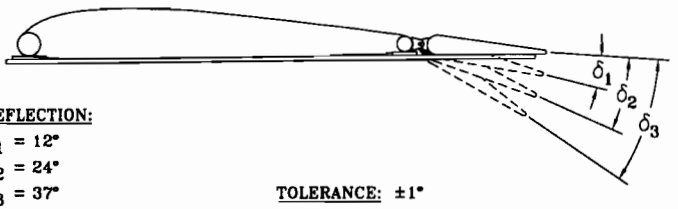
S-7 COURIER

AILERON:



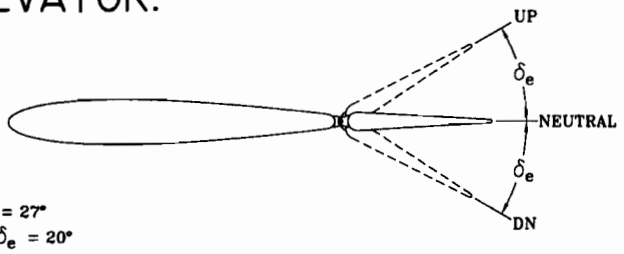
UP: δ_a = 23°
DOWN: δ_a = 18°
TOLERANCE: ±1°

FLAP:



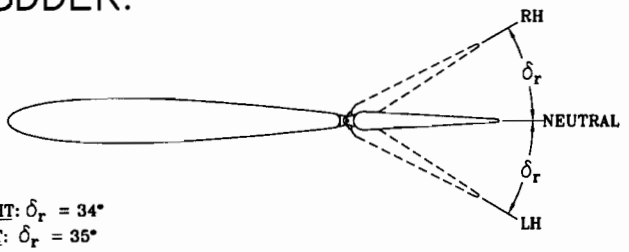
DEFLECTION:
δ_1 = 12°
δ_2 = 24°
δ_3 = 37°
TOLERANCE: ±1°

ELEVATOR:



UP: δ_e = 27°
DOWN: δ_e = 20°

RUDDER:

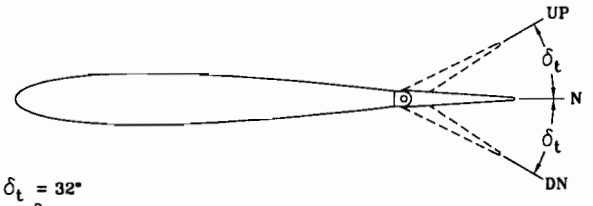


RIGHT: δ_r = 34°
LEFT: δ_r = 35°

WING INCIDENCE:

i: = 1°

TRIM TAB:

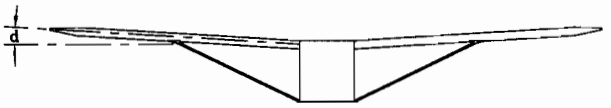


UP: δ_t = 32°
DOWN: δ_t = 36°

TAIL INCIDENCE:

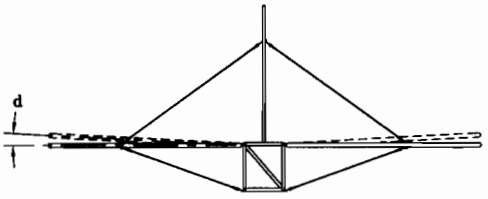
i: = −1°

WING DIHEDRAL:



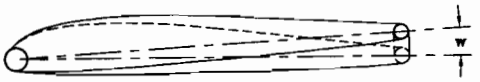
d: = 1.5°

TAIL DIHEDRAL:



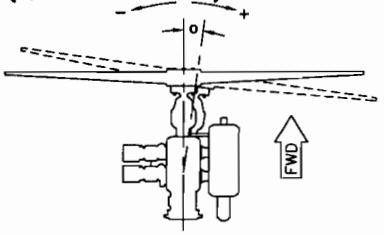
d: = 0°

WING WASH-OUT:



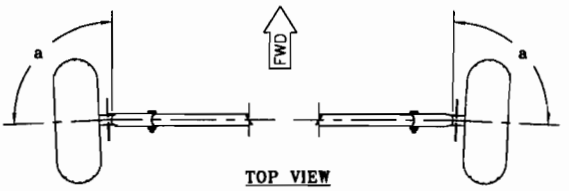
w: = 0.3°

ENGINE (TRACTOR):



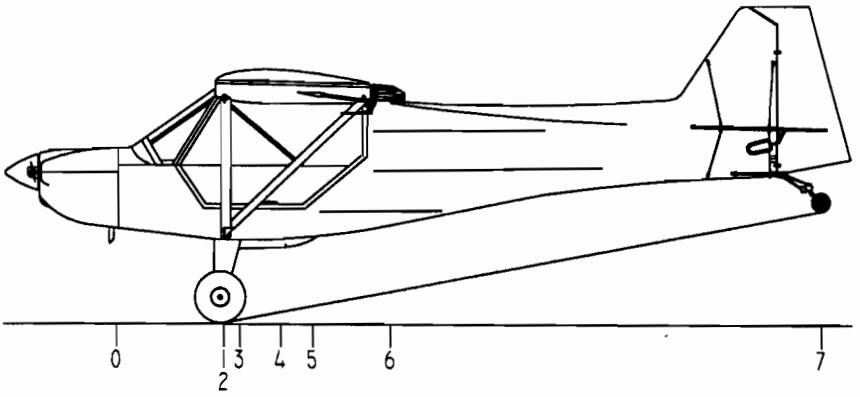
o: = +0.5° (912)

LANDING GEAR TOW-OUT:



a: = 90.5°

EF-43B



N_____	
DATE WEIGHED	
ENGINE TYPE	
C.G. CONDITION	
EMPTY WEIGHT	
GROSS WT.	1200 LBS.

RANS S-7 2000 COURIER
WEIGHT AND BALANCE

ACCEPTABLE C.G. 46" TO 50.25" FROM DATUM 0.
DATUM = FRONT OF FIREWALL; AIRCRAFT IN LEVEL ATTITUDE. (LEVEL REFERENCE TO DOOR LOWER LONGERON)

#	ITEM	WEIGHT	ARM	MOMENT
1	MAIN RH	313	34	10,642
2	MAIN LH	317	34	10,778
3	PILOT	190	34.9	6,631
4	FUEL	108	52.3	5,648
5	PASSENGER	170	68	11,560
6	BAGGAGE	20	92.5	1,850
7	TAILWHEEL	47	228	10,716
	TOTAL=	1,165	TOTAL=	57,825

$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{C.G.} \qquad \frac{57,825}{1,165} = 49.6$$

#	ITEM	WEIGHT	ARM	MOMENT
1	MAIN RH		34	
2	MAIN LH		34	
3	PILOT		34.9	
4	FUEL		52.3	
5	PASSENGER		68	
6	BAGGAGE		92.5	
7	TAILWHEEL		228	
	TOTAL=		TOTAL=	

$$\frac{\text{TOTAL MOMENTS}}{\text{TOTAL WEIGHT}} = \text{C.G.} \qquad \text{_____} =$$

MD3808

* 50 LBS. MAXIMUM BAGGAGE

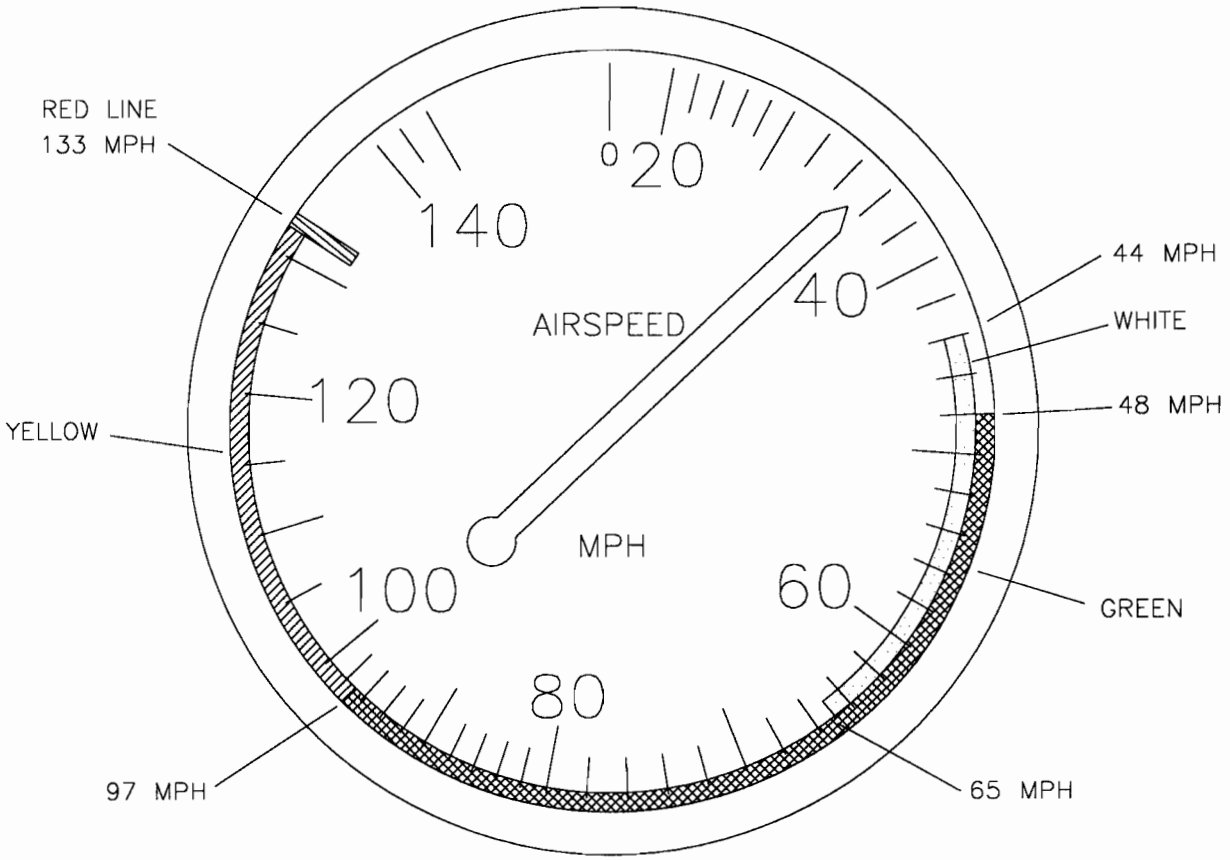
S-7 CHECKLISTS AND PROCEDURES

These checklists and procedures are provided as general reference; amend as necessary to suit conditions imposed by builder, owner and operator.

Speeds may vary according to conditions imposed by builder, owner and operator.

80 HP Rotax 912UL & 100 HP Rotax 912ULS

V_s:	Stall, Flaps Retracted	$V_{L/D}$:	Best Glide
V_{sf}:	Stall, Flaps Extended	V_{fe}:	Maximum, Flaps Extended
V_y:	Best Climb Rate	V_a:	Maximum, Maneuvering
V_x:	Best Climb Angle	V_{ne}:	Never Exceed



MD3815

CHECKLIST

Pg 1

Make:_____

Model:_____

Aircraft:_____

V-SPEEDS (MPH)

V_{sf}	44 at gross with flaps 48 without flaps
VSI	42
V_s	40
V_x	55
V_y	65
Cruise Climb	70
V_{fe}	65
V_a	97
V_{ne}	133
$V_{L/D}$	65

POWER PLANT DATA

ENGINE	Rotax 912
OUTPUT	80 HP
PROPELLER	Warp Drive/2 blade ground adjustable
REDUCTION	Gear
FUEL TYPE	Premium Auto Fuel
FUEL CONSUMPTION (75%)	at least 4 gal/hr

PERFORMANCE

MAXIMUM GROSS WEIGHT	1200 lbs
EMPTY WEIGHT	680 lbs
USEFUL LOAD	520 lbs
CRUISE AIRSPEED	approximate 110 mph
FUEL CAPACITY (useable)	18 gal
FUEL CONSUMPTION	4.5 gal/hr
ENDURANCE	4 hrs
SERVICE CEILING	13,500 ft

APPROACH SPEEDS

FLAPS UP	65 mph
FLAPS DOWN	55 mph

Experimental Aircraft will vary in performance, weights and handling characteristics.
Use this checklist to verify your Aircraft and modify your checklist accordingly.

This is sized to be cut out and laminated for Check-List cards in your Aircraft.

CHECKLIST - CONTINUED - Pg 2

PRE-FLIGHT INSPECTION

COCKPIT CHECK

MASTER SWITCH	OFF
MAGNETOS	OFF
FUEL QUANTITY	CHECK
FLAPS	DOWN
CONTROL STICK	FREE / CORRECT

EXTERIOR INSPECTION

PROPELLER (blade,hub,sninner,nicks,dents,etc.)	OK
ENGINE COMPARTMENT (oil qty,wires,cable,coolant,leaks,hoses)	OK
COWLING (openings,fasteners)	OK
LEFT MAIN GEAR (nuts,bolts,tire,strut,brake line)	OK
LEFT WING (cond,fuel qty,fuel cap,drain sump,strut,aileron,flap,pitot-tube)	OK
LEFT FUSELAGE (condition)	OK
TAIL SECTION (rudder,elevator,cables,trim tab,condition)	OK
TAILWHEEL (tire,strut,cables, springs,bolts)	OK
RIGHT FUSELAGE (condition)	OK
RIGHT WING (cond,fuel qty,fuel cap,drain sump,strut,aileron,flap)	OK
RIGHT MAIN GEAR (nuts,bolts,tire,strut,brake line)	OK

ENGINE STARTING

BRAKES	APPLY
DOOR	CLOSED/LOCKED
FUEL VALVE	ON
THROTTLE	¼ inch OPEN
ELECTRICAL EQUIP.	OFF
MASTER	ON
MAGNETOS	ON
CHOKE	OPEN (if required)
AREA	CLEAR
STARTER	ENGAGE
CHOKE	CLOSED
THROTTLE	ADJUST/IDLE
OIL PRESSURE	INDICATING

BEFORE TAXI

SEAT/SEATBELTS	ON/SECURE
FLAPS	UP
BRAKES	CHECK

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Cut out and laminate.
Put in your Aircraft.

CHECKLIST - CONTINUED - Pg 3

BEFORE TAKEOFF

BRAKES	APPLY
DOORS/WINDOWS	CLOSED/LOCKED
SEATBELTS (both Seats)	CLOSED
SEATBELT ENDS	INSIDE CABIN
FUEL VALVE	ON
CONTROLS	MOVE FREE & CORRECT
TRIM	SET for Take Off
THROTTLE	Approximately 3,800 RPM
MAGNETOS	LEFT/BOTH/RIGHT CHECK (Maximum drop 300 RPM)
THROTTLE	IDLE
ENGINE INSTRUMENTS	INDICATING
FLIGHT INSTRUMENTS	SET
RADIOS	SET
CLEAR TRAFFIC	CHECK

NORMAL TAKEOFF

FLAPS	AS REQUIRED
THROTTLE	FULL
ROTATE	40 mph
CLIMB SPEED *(to 500 agl)*	60 mph
(above 500 agl)	70 mph

SHORT FIELD TAKE-OFF

FLAPS	2 NOTCHES
BRAKES	APPLY
THROTTLE	MAX POWER
INSTRUMENTS	CHECK
BRAKES	RELEASE
ROTATE	*40 mph*
CLIMB SPEED (Vx)	55 mph
(until all obstacles are clear)	
FLAPS	RETRACT

CRUISE

POWER	AS REQUIRED
TRIM	AS REQUIRED
TRAFFIC	CHECK
ALTITUDE	CHECK

DESCENT

POWER	AS REQUIRED
TRIM	AS REQUIRED

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CHECKLIST - CONTINUED - Pg 4

BEFORE LANDING

GAS	CHECK
POWER	CHECK
SWITCHES	CHECK

NORMAL LANDING

APPROACH SPEED	*(FLAPS UP)* 65 mph
APPROACH SPEED	*(FULL FLAPS)* 55 mph

SHORT FIELD LANDING

APPROACH SPEED	*(FULL FLAPS)* 50 mph
THROTTLE	IDLE
(after clearing all obstacles)	
TOUCHDOWN	MINIMUM SPEED
BRAKES	FIRM
FLAPS	RETRACT

BALKED LANDING

THROTTLE	FULL
POSITIVE RATE OF CLIMB	CHECK
CLIMB SPEED	60 to 70 mph
FLAPS	RETRACT SLOWLY
POSITIVE RATE OF CLIMB	CHECK

AFTER LANDING CHECKLIST

CLEAR OF RUNWAY	THEN
FLAPS	UP

SHUTDOWN CHECKLIST

ELECTRICAL	OFF
RADIOS	OFF
MAGNETOS	OFF
TIME	LOGGED
AIRCRAFT	SECURE

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Put in your Aircraft.

CHECKLIST - CONTINUED - Pg 5

EMERGENCY PROCEDURES!

ENGINE FAILURE TAKE-OFF ROLL

THROTTLE	IDLE
BRAKES	APPLY
FLAPS	UP
MAGNETOS	OFF
MASTER SWITCH	OFF

ENGINE FAILURE AT TAKE-OFF
(NOTE: Try Re-Start ONLY if sufficient altitude. Check FUEL ON)

AIRSPEED	65 mph
MAGNETOS	OFF
MASTER SWITCH	OFF
FUEL VALVE	OFF
FLAPS	AS REQUIRED

**IF A BANK IS NECESSARY, EXECUTE AS SHALLOW AS POSSIBLE, SINCE STALL SPEED INCREASES WITH BANK ANGLE.*

****ALWAYS BE PREPARED FOR AN ENGINE FAILURE!***

Experimental Aircraft will vary in performance, weights and handling characteristics.
Use this checklist to verify your Aircraft and modify your checklist accordingly.

Cut out and laminate.
Put in your Aircraft.

CHECKLIST - CONTINUED - Pg 6

EMERGENCY PROCEDURES!

ENGINE FAILURE IN FLIGHT
(NOTE: Try Re-Start ONLY if sufficient altitude, Check FUEL ON)

TRIM FOR BEST GLIDE	65 mph
**PICK LANDING SITE*	
MAGNETOS	CHECK
**IF NO RESTART OR AN OFF AIRPORT LANDING:*	
RADIO	121.5/MAYDAY
ELECTRICAL	OFF
MAGNETOS	OFF
FUEL VALVE	OFF
SEATS/SEATBELTS	SECURE
FLAPS	AS REQUIRED
AIRSPEED	CHECK

ENGINE FIRE DURING START-UP

CRANKING	CONTINUE
IF ENGINE STARTS:	
THROTTLE	2000 RPM
ENGINE	SHUTDOWN
ENGINE	INSPECT
IF ENGINE FAILS TO START:	
FUEL	OFF
THROTTLE	FULL
FIRE EXTINGUISHER	OBTAIN
ENGINE	SECURE
MAGNETOS	OFF
MASTER	OFF

ENGINE FIRE IN FLIGHT

FUEL	OFF
MASTER	OFF
CABIN HEAT/VENTS	OFF/SHUT
IF ADEQUATE ALTITUDE EXISTS:	
AIRSPEED	130 mph

EMERGENCY FREQUENCIES

TRANSPONDER:	
HIJACK	7500
LOST COMM.	7600
EMERGENCY	7700
VHF:	
EMERGENCY	121.5 (anywhere)

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Use this checklist to verify your Aircraft and modify your checklist accordingly.

Cut out and laminate.
Put in your Aircraft.

CHECKING STATIC RPM

Prior to the first flight, determine the engine's static RPM; this is the speed it develops when stationary and fully throttled. An acceptable static RPM indicates that the engine is operating at or near full potential and should not over-speed during the first flight.

First, calibrate the engine tachometer to make certain it's accurate. Determine the propeller's RPM with a *light tach* (a hand-held device which measures propeller rotation with infrared pulses) and compare the reading to the tachometer's, taking into account the engine's gear reduction ratio. The tachometer supplied with your RANS kit is equipped with a calibration knob; refer to the manufacturer's instructions.

Once satisfied with the tachometer, run the engine with the throttle fully open; be certain the tail is tied down and the main gear is chocked. For the four-stroke 912, acceptable static RPM is usually 5000 to 5200. (A number of factors influence this, including the number of propeller blades, their length and pitch.) Ideal static RPM would render an *in-flight* RPM just below red line with the throttle fully open at sea level.

A high static RPM may indicate that the propeller is pitched too finely (the blades take too small a bite of air). This prevents the propeller from performing most efficiently and may allow the engine speed to exceed red line in flight. If the blades are adjustable, increase pitch; refer to the manufacturer's instructions. If the blades are fixed, contact the manufacturer.

A low static RPM may indicate that the propeller is pitched too coarsely (the blades take too large a bite). This also prevents the propeller from performing most efficiently and induces excessive load on the engine. If the blades are adjustable, decrease pitch; if fixed, contact the manufacturer. If finer pitch does not raise maximum engine speed to an acceptable RPM, another problem may be indicated.

WARNING: Attempting flight with too much or too little propeller pitch may have severe consequences. Conduct flights only with sufficient power output!

Knowing the ideal static RPM allows you to check the health of the engine during a full-throttle run-up prior to takeoff. Once you've become familiar with the in-flight performance of the engine and have adjusted the propeller, you'll know better what the tachometer should indicate during run-up.

CREATING A PILOT OPERATING HANDBOOK

Most pilots are accustomed to flying light planes with comprehensive pilot operating handbooks. This is a result of the standardization required by FAA certification, the fruit of which is fleets of identical aircraft for which specific checklists, procedures and performance figures may be published.

This section includes much information on the operation, limitations and performance of RANS aircraft; however, the nature of kit-built aircraft makes it impossible to publish *specific* checklists and procedures applicable to *all* examples of a particular model. This is because the builder, as manufacturer of the aircraft, has the freedom to assemble, equip and modify his machine as he wishes. The result is fleets of aircraft that share the same name and designation, but vary somewhat in operation and performance.

The builder should consider carefully all aspects of the engine, airframe and equipment when developing checklists and procedures for his plane. For example, he might begin the preflight inspection by opening the cabin and checking that the magnetos are off; this would ensure the engine cannot start if the propeller were moved. With the cabin open, he also might drain fuel from the sump, allowing any water trapped in the system to escape. He then might begin a walk-around, moving about the ship in a logical, straightforward manner, checking the presence, security and condition of hardware and components.

The same care should go into development of a pre-takeoff checklist. Of particular importance is a proper engine run-up to check the health of the power plant. An essential checklist item often given short shrift is that of free and correct movement of control surfaces; this is particularly important for aircraft that fold or disassemble.

Considerable forethought should be given to potential emergencies. What steps should be taken to deal with balked landings, engine failures or fires? How might these steps vary according to the phase and conditions of flight? Consideration of contingencies now is likely to mean faster, more appropriate reaction to urgent or emergency situations, should they arise.

Since each kit-built aircraft is unique, each builder should expect his aircraft's performance to be unique. The prudent builder will determine carefully the weight and balance parameters of his plane before its first flight. He'll familiarize himself with its flying characteristics during the flight test phase, cautiously exploring its capabilities and limitations while heeding the designer's words of advice. The U. S. Government, the Experimental Aircraft Association and other publishers offer a wealth of information on flight preparation and testing. As a first step, the builder might refer to the FAA's AC-90-89A, "Amateur-Built Aircraft Flight Testing Handbook."

By applying suitable checklists and procedures to his plane and operating it within reasonable limits, the builder helps ensure his safety as well as the reliability and longevity of his airframe, power plant and components.

CORROSION and WASHING YOUR PLANE

Using the garden hose to wash the outside of your plane may seem like a great idea, however this is a practice avoided at the factory. We simply never let the plane get to the point it needs hosing. Instead, the exterior of the plane is cleaned using a product called Brilliance. This mild cleaner works great on all surfaces including the Lexan. For the oil or exhaust stains, we use 409 or Fantastic. These clean very effectively without apparent damage to the paint.

If your plane is open air like an Airaile or Stinger and you do use a hose to wash it down, you may be causing a future corrosion problem. In the case of any open cockpit plane with the tail sitting low, it is possible for water to collect inside the elevator push pull tube. This will rust away the elevator yoke and corrode the push pull tube also.

Even leaving the plane in the rain can allow moisture to collect in the elevator yoke. Please avoid the practice of spraying water into the cockpit area of your plane, open cockpit or not, this is a practice that will lead to corrosion problems and part replacement.

If you suspect your aircraft of corrosion problems, inspect all areas where water may collect, such as the elevator yoke area.