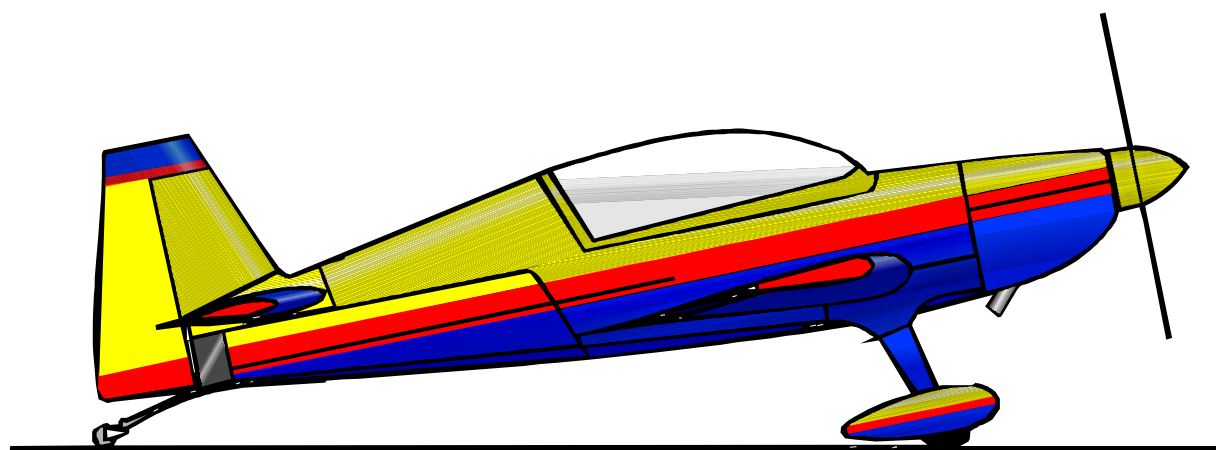


SERVICE MANUAL

EXTRA 200

Doc. No: EA-07702



EXTRA
FLUGZEUGPRODUKTIONS-
UND VERTRIEBS-GMBH

Schwarze Heide 21
D-46569 Hünxe, Germany
Tel: 49-28 58-91 37-0
Fax: 49-28 58-91 37-30

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	Cover sheet	1. July 1996		16	1. July 1996		6	1. July 1996
	A	15. December 1999		17	1. July 1996		7	1. July 1996
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	C	15. December 1999		19	1. July 1996		9	1. June 1997
	D	1. July 1996		20	1. July 1996		10	1. July 1996
	E	1. July 1996		21	1. July 1996		11	1. July 1996
	F	1. July 1996		22	1. July 1996		12	1. July 1996
	G	1. July 1996		23	1. July 1996		13	1. July 1996
	H	1. July 1996		24	15. December 1999		14	1. July 1996
	I	1. June 1997		25	1. July 1996		15	1. July 1996
01	1	1. July 1996		26	1. July 1996		16	1. July 1996
	2	1. July 1996		27	15. December 1999	20	1	1. July 1996
	3	1. July 1996		28	1. July 1996		2	1. July 1996
	4	1. July 1996		29	1. July 1996		3	1. July 1996
	5	1. July 1996		30	1. July 1996		4	1. July 1996
	6	1. July 1996		31	1. July 1996		5	1. July 1996
02	1	1. July 1996		32	1. July 1996		6	1. July 1996
	2	1. July 1996		33	1. July 1996		7	1. July 1996
	3	1. July 1996		34	1. July 1996		8	1. July 1996
	4	1. July 1996		35	1. July 1996		9	1. July 1996
	5	1. July 1996	06	1	1. July 1996		10	15. December 1999
	6	1. July 1996		2	1. July 1996		11	15. December 1999
	7	1. June 1997		3	1. July 1996		12	1. July 1996
	8	1. June 1997		4	1. July 1996		13	1. July 1996
03	1	1. July 1996		5	1. July 1996		14	1. July 1996
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	3	1. July 1996	07	1	1. July 1996		2	1. July 1996
	4	1. July 1996		2	1. July 1996		3	1. July 1996
	5	1. July 1996		3	1. July 1996		4	1. July 1996
	6	1. July 1996		4	1. July 1996		5	1. July 1996
	7	1. July 1996		5	1. July 1996		6	1. July 1996
04	1	1. July 1996	08	1	1. July 1996		7	1. July 1996
	2	1. July 1996		2	1. July 1996		8	1. July 1996
	3	1. July 1996		3	1. July 1996		9	1. July 1996
	4	1. July 1996		4	1. July 1996		10	1. July 1996
	5	1. July 1996		5	1. July 1996	25	1	1. July 1996
	6	1. July 1996		6	1. July 1996		2	1. July 1996
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	3	1. July 1996		3	1. July 1996		6	15. December 1999
	4	1. July 1996		4	1. July 1996	27	1	1. July 1996
	5	1. June 1997	10	1	1. July 1996		2	1. July 1996
	6	1. July 1996		2	1. July 1996		3	1. July 1996
	7	1. July 1996		3	1. July 1996		4	1. July 1996
	8	1. July 1996		4	1. July 1996		5	1. July 1996
	9	1. July 1996		5	1. July 1996		6	1. July 1996
	10	1. July 1996		6	1. July 1996		7	1. July 1996
	11	1. July 1996	12	1	1. July 1996		8	1. July 1996
	12	15. December 1999		2	1. July 1996		9	1. July 1996
	13	1. July 1996		3	1. July 1996		10	1. July 1996
	14	1. July 1996		4	1. July 1996		11	1. July 1996
	15	1. July 1996		5	1. July 1996		12	1. July 1996

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	14	1. July 1996		9	1. July 1996		24	1. July 1996	
	15	1. July 1996		10	1. July 1996		25	1. July 1996	
	16	1. July 1996		1	1. July 1996		26	1. July 1996	
	17	1. July 1996		2	1. July 1996		27	1. July 1996	
	18	1. July 1996		3	1. July 1996		28	1. July 1996	
	19	1. July 1996		4	1. July 1996		29	1. July 1996	
	20	1. July 1996		5	1. July 1996		30	1. July 1996	
	21	1. July 1996		6	1. July 1996		31	1. July 1996	
	22	1. July 1996		7	1. July 1996		32	1. July 1996	
	23	1. July 1996		8	15. December 1999		33	1. July 1996	
	24	15. December 1999		9	15. December 1999		34	1. July 1996	
	25	1. July 1996		9A	15. December 1999		1	1. July 1996	
	26	15. December 1999		10	1. July 1996		2	1. July 1996	
	27	1. July 1996	33	11	15. December 1999	3	1. July 1996		
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	2	1. July 1996		3	1. July 1996	6	1. July 1996		
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	7	1. July 1996		34	1	1. July 1996	55	1	1. July 1996
	8	1. July 1996			2	1. July 1996		2	1. July 1996
	9	1. July 1996	3		1. July 1996	3		1. July 1996	
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17	1. July 1996		3	1. July 1996	57	1	1. July 1996		
18	1. July 1996		4	1. July 1996		2	1. June 1997		
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21	1. July 1996		7	1. July 1996		5	15. December 1999		
21A	1. July 1996		8	1. July 1996		5A	15. December 1999		
21B	1. July 1996		9	1. July 1996		6	15. December 1999		
22	1. July 1996		10	1. July 1996		7	15. December 1999		
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24	1. July 1996	12	1. July 1996	9		1. July 1996			
25	1. July 1996	13	1. July 1996	10	1. July 1996				
26	1. July 1996	14	1. July 1996	11	1. June 1997				
27	1. July 1996	15	1. July 1996	12	1. June 1997				
31	1	1. July 1996	16	1. July 1996	61	1	1. July 1996		
	2	1. July 1996	17	1. July 1996		2	1. July 1996		
	3	1. July 1996	18	1. July 1996		3	1. July 1996		
	4	1. July 1996	19	1. July 1996		72	1	1. July 1996	
	5	1. July 1996	20	1. July 1996			2	1. July 1996	
	6	1. July 1996	21	1. July 1996			3	1. July 1996	
	7	1. July 1996	22	1. July 1996			4	1. July 1996	

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	3	1. July 1996						
	4	1. July 1996						
	5	1. July 1996						
	6	1. July 1996						
91	1	1. July 1996						
	2	1. July 1996						
	3	1. July 1996						
	4	1. July 1996						
95	1	1. July 1996						
	2	1. July 1996						

Record of Revisions							
Rev. No.	Issue Date	Date inserted	by	Rev. No.	Issue Date	Date inserted	by
1	1. June 1997	1. June 1997	Extra				
2	15. December 1999	15. December 1999	Extra				

List of Service Bulletins				
S.B. N°	Issue Date	Subject	Serial N° affected	German AD (LTA)
SB-300-1-97	11.06.1997	Front seat belt safety cover installation	01 thr. 15	97-203

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Title	Page
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How to Use the Service Manual	02

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FAX MESSAGE

From: **Date:**

Address:

.....

Tel. N°: **Fax N°:**

To: EXTRA-FLUGZEUGBAU GmbH **Fax N°:** (49)-2858-913730

Aircraft Description:

Type: **Serial No:** Standard Engine
Flight hours: **Landings:** other (please specify)

.....

Equipment installed:

- | | |
|--|--|
| <input type="radio"/> GOMOLZIG endpipe silencer | <input type="radio"/> Smoke System |
| <input type="radio"/> Electrical actuated rudder pedal adjust. | <input type="radio"/> P-1000 digital RPM indicator |
| <input type="radio"/> Accelerometer DSA 12 | <input type="radio"/> External power supply |
| <input type="radio"/> ELT Pointer 3000 | <input type="radio"/> Heating system |
| <input type="radio"/> Fire extinguisher | <input type="radio"/> other (please specify) |
| <input type="radio"/> Air tow release | |
| <input type="radio"/> Long range tank | |

Detailed Description of Damage or Problem

FAX MESSAGE

From: **Date:**

Address:

.....

Tel. N°: **Fax N°:**

To: EXTRA-FLUGZEUGBAU GmbH **Fax N°:**(49)-2858-913730

Aircraft Description:

Type: **Serial No:** Standard Engine
Flight hours: **Landings:** other (please specify)

Equipment installed:

- | | |
|---|--|
| <input type="radio"/> GOMOLZIG endpipe silencer | <input type="radio"/> P-1000 digital RPM indicator |
| <input type="radio"/> MTV-12-B-C/C183-17e 3-blade propeller | <input type="radio"/> External power supply |
| <input type="radio"/> Accelerometer DSA 12 | <input type="radio"/> Heating system |
| <input type="radio"/> ELT Pointer 3000 | <input type="radio"/> other (please specify) |
| <input type="radio"/> Fire extinguisher | |

Existing Technical Documentation:

Flight Manual incl. Revisions up to N°

Language:

Description of optional equipment (see section 9):

- Accelerometer DSA 12
- ELT Pointer 3000
- P-1000 digital RPM indicator
- External power supply

Service Manual incl. Revisions up to N°

and Service Bulletins up to S.B. N°

Maintenance instructions concerning optional equipment (see CH. 95):

- GOMOLZIG endpipe silencer
- ELT Pointer 3000
- P-1000 digital RPM indicator
- External power supply
- Heating system

Notice:

Chapter 01

Introduction

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01-00-00

GENERAL

According to the regulations of the FAR part 23, this service manual provides educated maintenance staff with information necessary for servicing, maintaining and repair of the EXTRA 200. This manual contains a detailed description of systems including time limits for the particular components, troubleshooting and instructions for the performance of inspection and maintenance work. The instructions, that are necessary for disassembly, check, repair, maintenance or overhaul of vendor equipment are not incorporated in this manual. The modification instructions ("Umrüstanweisungen") of installed optional equipment shall be collected in Chapter 95.

Use the following documents in connection with this service manual:

Aircraft:

- Pilot's Operating Handbook and Airplane Flight Manual
- Parts Catalogue
- Service Bulletins
- Aircraft Record
- Airplane Log Book and Engine Log Book

NOTE

Check the following Airplane Log Book documents are up-to-date and in accordance with current LBA regulations. Since the regulations of other nations may require other documents and data, owner of exported airplanes should check with their own aviation officials to determine their individual requirements.

Carried in the airplane:

- Aircraft Airworthiness Certificate
- Aircraft Registration Certificate
- Aircraft Radio Station Licence
- Certificate of Insurance
- Weight and Balance Data Sheet and associated papers
- Equipment list

Engine: Lycoming AEIO-360-A1E

- Operator's Manual (P/N:60297-21)
- Service Letters, Bulletins and Instructions INDEX
- Service Letters, Bulletins and Instructions

Manufacturer: TEXTRONLYCOMING
Williamsport Division, 652 Oliver
Street, Plant 17 701, USA

Propeller: MTV-12-B-C/C 183-17e (3-blade)

- Operation- and Installation Manual E-124
- Overhaul Manual and Parts List E-220
- Service Bulletins

Manufacturer: MT-Propeller Entwicklung GmbH,
Airport Straubing, 94348 Atting,
Germany

Magneto: SLICK No. 4370 and 4372

- Magneto Maintenance and Overhaul Manual
- Service Bulletins (refer to Lycoming Service Letters,
Bulletins and Instructions INDEX)

Manufacturer: SLICKELECTRO
530 Blackhawk Part Avenue
Rockford, IL 61101 , USA

Inverted Oil System: CHRISTEN 801 Series (mod.)

- Product Manual (P/N 03800.33)
- Service Bulletins

Manufacturer: CHRISTEN INDUSTRIES, INC.
1048 Santa Ana Valley Road
Hollister, California 95023, USA

Cleveland Wheels & Brakes

- Maintenance Manual
- Service Bulletins

Manufacturer: Parker Hannifin Corporation
 1160 Center Road
 Avon, Ohio 44011, USA

Other Vendor Equipment

(Vendor publication should be obtained directly from the vendor.)

- Operation- and Installation Manuals
- Service Bulletins

01-00-01

Trade Marks

Even when the ware or brand names used in this manual are not marked as registered trademarks, this does not mean, that these names are free in the sense of trademark legislation.

01-10-00

SAFETY

To keep the security risks during the execution of the inspection and maintenance work as low as possible, observe the following points:

- Inspection and maintenance work has to be carried out only by qualified and authorized personnel.
- The execution has to be in accordance with the respective national safety requirements.
- Before beginning any work, this service manual has to be read and understood. In case of doubt or lack of information the manufacturer has to be contacted for advice.
- The safety notes given in this manual are to be observed unconditionally.

Refer to Chapter 02-10-06 for information concerning safety notes.

Chapter 02

How to Use the Service Manual

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02-00-00

GENERAL

The set-up of the manual, the chapters and the handling correspond to the regulations of the Air Transport Association of America, ATA Specification No. 100. Only the numbering of the pages and the layout have been changed to make working with this manual easier.

02-10-00

MANUAL DESCRIPTION

02-10-01

Manual Set-Up

The manual consists of groups, which are subdivided in chapters. Additionally there are preceding pages, which contain the List of Effective Pages, the Lists of Service Bulletins and the Record of Revisions. In the list of chapters the groups are marked by capital characters.

02-10-02

Chapter Set-Up

The chapter numbering system used in this manual represents the chapter set-up. It is a conventional dash-number breakdown. The number is composed of three elements which consist of two digits each:

02-10-02

chapter - section - subject

The first element shows the chapter (here: "How to Use the Service Manual"). The second element shows the first subdivision, which is called "section" (here: "MANUAL DESCRIPTION"). The third element shows the "subject", which is handled within the respective section (here: "Chapter Set-Up"). The first three digits refer to the definitions of the ATA Specification 100, where they exist; the other digits are defined by the manufacturer. If a more detailed

breakdown is necessary, bold faced headlines like the following are used:

Powerplant

02-10-03

Page Numbering

The page numbering begins at the coversheet of each chapter with "Page 1". In contrast to the ATA Specification 100, the particular sections and subjects don't start with a new numbering.

02-10-04

Figure Numbering

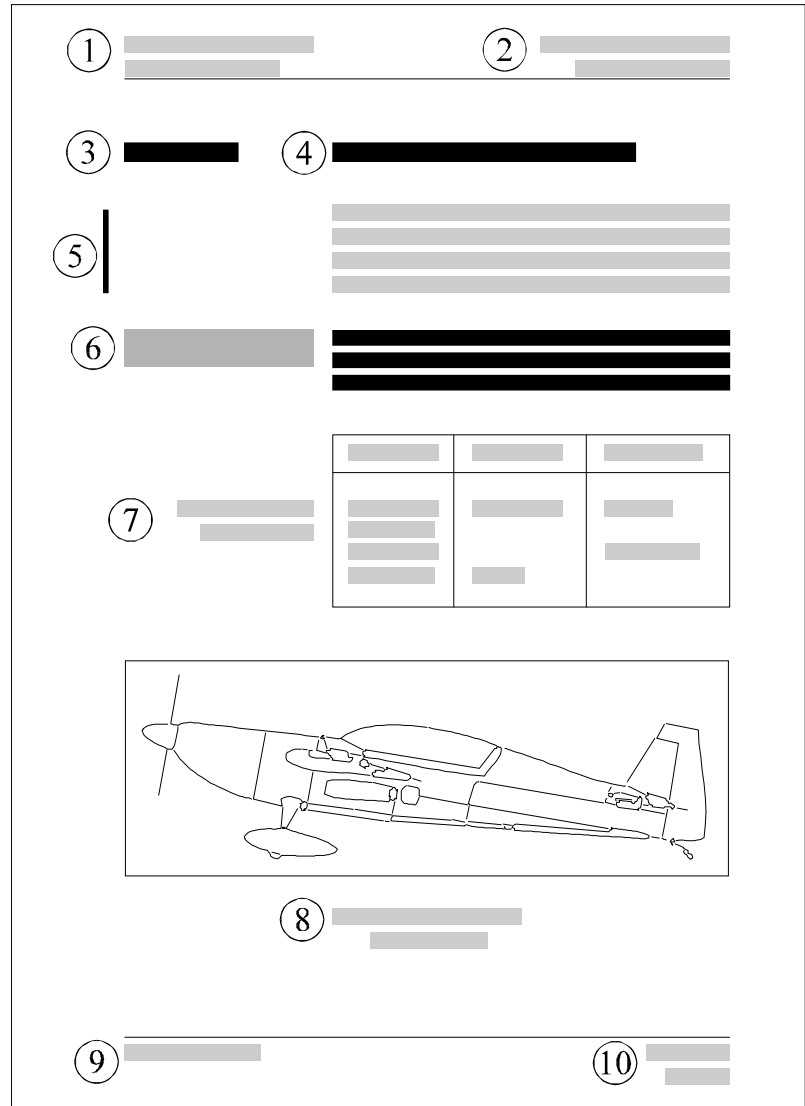
The figures are numbered in such a way that the first figure in each chapter starts at "*Figure 1*".

02-10-05

Layout

Apart from the headers and footers the layout consists of two columns. The right column contains text, titles, tables, schedules and figures (figures also can fill the whole page); the left column contains the chapter numbering, boxed textmarkers for notes and safety notes as well as explanations. The following figure 1 shows more details:

- ① *manufacturer's masthead and manual title*
- ② *section and subject titles*
- ③ *chapter numbering*
- ④ *title*
- ⑤ *bar marking revised parts*
- ⑥ *boxed textmarker for notes and safety notes*
- ⑦ *explanations e.g. to tables*
- ⑧ *figure title and number*
- ⑨ *date of first issue resp. last revision*
- ⑩ *chapter and page numbers*



**Layout
 Figure 1**

02-10-06

Notes/Safety Notes

Safety notes in this manual are marked by a boxed textmarker in the margin column and written in semi-bold characters. This manual distinguishes three warning levels:

DANGER

Represents a threatening danger for the personnel. The non-observation of this safety note will result in death or serious injuries.

WARNING

Represents a possibly dangerous situation for the personnel. The non-observation of this safety note may result in injuries.

CAUTION

Represents a danger to equipment. The non-observation of this safety note results in destruction of equipment. This safety note does not exclude a possible danger for the personnel.

Additional information given in this manual are also marked by boxed textmarkers in the left column and are written in semi-bold characters:

IMPORTANT

Represents an important hint. Often used when the non-observation could endanger pilot or passengers during flight.

NOTE

Represents an useful or remarkable hint.

02-20-00

HANDLING

02-20-01

Revisions

On receipt of a Service Manual the owner automatically participates on the revision service for the current revision period (The revision periods start each 1. January and take one year). Further revisions will only be sent to individuals that return the Registration Card they receive at the end of the free revision period. If the owner has changed or revisions (and documentation) are missing, the fax-format on page "I" can be used to initiate the revision service.

NOTE

Pages of this SERVICE MANUAL may not be exchanged and no alterations of or additions to the approved contents may be made without the EXTRA Flugzeugbau GmbH/LBA approval.

If revision of pages is necessary, observe the following steps:

NOTE

Change revised pages immediately upon receipt.

- 1 Take out the old pages and destroy them.
- 2 Insert the new pages following the chapter and page numbers.
- 3 Replace the old pages "A-C = List of Effective Pages".
- 4 Enter the date on page "D = Record of Revision" and on page "2 = Record of Revision" of Ch. 04 if necessary.

Each revised page is marked at the bottom by the date of revision; revised parts of the new page are marked by a bar on the left margin.

02-20-02

Service Bulletin

The Service Bulletins describe *which* procedures and *how* and *when* they are to be carried out. Enter the receipt of each Service Bulletin in the Service Bulletin List (page E).

N O T E

The owner is responsible for incorporating Service Bulletins to the above mentioned Service Bulletins List (page E).

02-20-03

Checklists

Observe the following steps when working with checklists:

- 1 Copy the respective check list for performing a check.
- 2 Enter the date at the top of the table.

<div style="display: flex; justify-content: space-around;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">as specified</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">each 50 hours</div> <div style="writing-mode: vertical-rl; transform: rotate(180deg);">each 100 hours</div> </div>			Date:		Inspector:	
			Serial No.:		Mechanic:	
			Inspections			
O ¹	O	O	Text			

- 3 Select the items to be worked out. The "O" at the beginning of the line is written in the column which indicates the point of time when an item has to be worked out. Specification for the first column are given by footnotes.
- 4 Work out the particular items and sign after execution (responsible mechanic and inspector) using the respective boxes behind the item.
- 5 After completion of the inspection check file the list with entries in the Aircraft Records.
- 6 Certify the completion of check in the Aircraft Log Book.

02-20-04

Fax-Formats

When contacting the EXTRA-FLUGZEUGBAU GmbH is advisable in case of questions and/or problems during maintenance of aircraft copy and use on of the Fax-formats You find on the preceding pages ("H-I") for correct identification of aircraft, equipment and existing technical instructions. The data we request there are helpful for us to provide You with the information You need.

Chapter 03

General Description

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03-10-03	Brake System	5
03-10-04	Power Plant	5
03-10-05	Fuel System	6
03-10-06	Electrical System	6
03-10-07	Instruments	7

03-00-00

GENERAL

This chapter shows a short survey of the particular systems. A more detailed description of the systems you find in the respective chapters (see: CONTENTS).

The Extra 200 (refer to Figure 1) is designed as a light weight, single-engine, two seat, low-wing monoplane using composite and steel materials. It has a fixed main landing gear and a tail wheel unit with full-swivel capability.



*View EXTRA 200
Figure 1*

03-10

DESCRIPTION

03-10-01

Construction

Manufacturer: EXTRA-FLUGZEUGBAU GmbH
Flugplatz Dinslaken
D-46569 Hünxe, Germany

Fuselage: steel tube design, covered with fabric, composite material, single piece canopy side hinged

Wing: fibre composite design

Stabilizers : fibre composite design

Landing gear: 2 main wheels, 1 tail wheel, fibre composite strut design

Seats

Rear Seat: Seat to pedal distance, seat angle and seat back rest adjustable, 5 piece harness

Front seat: non variable position, 5 piece harness

03-10-02

Flight Control System

Pitch control: push-pull rods

Roll control: push-pull rods

Yaw control: cable system

Pitch trim: trim tab on the right elevator, bowden cable

03-10-03

Brake System

Main wheels: hydraulically operated disc brakes,
hydraulic cylinders actuated by
brake pedals

Tail wheel: no brake

03-10-04

Powerplant

Engine

Manufacturer: TEXTRON LYCOMING
Williamsport Division
652 Oliver Street
Williamsport Plant 17 701
USA

Type: AEIO-360-A1E
(4 cyl. air cooled, fuel injection,
independent magneto ignition
system, inverted flight oil system)

Rated horsepower: 200 hp at 2700 rpm

Propeller

Manufacturer: MT Propeller Entwicklung GmbH
& Co. KG
Airport Straubing
D-94348 Atting, Germany

Type: MTV-15-B-C/C193-34
(2-blade wood composite,
hydraulic variable pitch with con-
stant speed regulator,
Propeller diameter: 193 cm)

Optional: MTV-12-B-C/C180-17
(3-blade, wood composite,
hydraulic variable pitch with con-
stant speed regulator,
Propeller diameter: 180 cm)

03-10-05

Fuel System

Tanks: 2 integral wing tanks, 1 center and 1 acro tank behind the firewall (cockpit side)

Fuel supply: mechanical engine driven pump, additional electrically operated boost pump,

03-10-06

Electrical system

Power supply: engine driven 12 V alternator, integrated DV converter, 28 Ah starter battery, master switch

Circuits: equipped with automatic circuit breakers

Ignition: magneto system, independent from electrical power supply

03-10-07**Instruments**

Standard (minimal) equipment installed (X):

Instrument Panel	rear	front
Air Speed Indicator	X	X
Altimeter	X	X
Magnetic Compass	X	
Compass Correction Card	X	
Tachometer	X	
Oil Pressure Indicator	X	
Oil Temperature Indicator	X	
Fuel Pressure Indicator	X	
Manifold Pressure Indicator	X	
CHT/EGT Indicator	X	
Ammeter	X	
Fuel Quantity Indicator (Center tank)	X	
Fuel Quantity Indicator (Wing tank)	X	
Acceleration Indicator (G-Meter)	X	
Radio	X	

Chapter 04

Airworthiness Limitations

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04-00-00

GENERAL

For each inspection listed here, refer to the applicable Chapter in this manual.

IMPORTANT

It is the operator's responsibility to make sure that time limits or life limits for items in this chapter are not exceeded.

The airworthiness limitations items include mandatory replacement times and structural inspection intervals which may only be changed with permission of the applicable airworthiness authority.

This airworthiness limitation section is approved by the regulatory authority and specifies maintenance required under paragraphs 43.16 and 91.403 of the Federal Aviation Regulations, unless an alternative program has been approved by the regulatory authority.

04-00-01

Temperature Limit

Composite structure is qualified up to 72°C (162°F). Structure temperatures above this limit are not approved. Not to exceed this temperature limit, only appropriate colour specification for composite structure as given by the manufacturer document EA-03205.19 must be used when finish restoration is required.

In case of doubt regarding to the classification of colour, contact EXTRA-FLUGZEUGBAU GmbH.

04-00-02

Operating Time

Only the airframe and components as listed in Chapter 04-10-00 are subject to a permissible operating time; concerning all other components recommended replacement times are given in Chapter 05-10-03.

The reliability of the composite primary parts has been convincingly demonstrated by fatigue testing (Two times design life $2 \times 6000 = 12000$ hrs).

I M P O R T A N T

Every 1000 flight hours the "Significant Items Inspection" contained in Chapter 05-30-00 of this manual must be performed. This 1000 hours inspection releases the aircraft for further 1000 hours operation, up to max. of 6000 hours.

I M P O R T A N T

Prior to 6000 flight hours the "Major Inspection" contained in Chapter 04-20-00 must be performed. This inspection may release the aircraft for further operation, subject to approval of the regulatory authority.

04-10-00

LIFE LIMITED COMPONENTS

04-10-01

General

The replacement time of the life limited components listed in Ch. 04-10-02 must be accomplished not later than the specified period of operation for that component or in accordance with the manufacturer's service data or airworthiness directives.

04-10-02

Replacement Time

Items shown here must be replaced during the regular maintenance periods.

Item	Replace
Wing	6000 h
Aileron	6000 h
Vertical Stabilizer	6000 h
Rudder	6000 h
Horizontal Stabilizer	6000 h
Elevator	6000 h
Landing Gear Spring	6000 h

04-10-03

Service Life Limited Components

The service life of the EXTRA 200 composite structure as listed in section 04-10-02 has been set to 6000 flight hours. A "Major Inspection" on reaching 6000 flight hours may provide the necessary clearance for further flight. This "Major Inspection" is contained in Chapter 04-20-00.

04-20-00

MAJOR INSPECTION

The EXTRA 200 has been manufactured utilizing the latest knowledge of composite construction and requires new experience about those parts subject to wear. Until now insufficient experience about this point has been acquired. When such information is available it will be accommodated in later revisions of this manual and will include a major inspection procedure.

Chapter 05

Time Limits/Maintenance Checks

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05-00-00

GENERAL

This chapter contains charts for time limits, scheduled maintenance and unscheduled maintenance, and enables licensed personnel to carry out correct inspections on the EXTRA 200. The periodic inspections and checks described and their recommended time intervals are minimum requirements for maintaining the aircraft in an airworthy condition. Further information will be given by the information service (Service Bulletins, Service Letters, etc.).

If operation of aircraft requires more frequent servicing, the check intervals may be shortened. However the check intervals must not be exceeded without explicit permission from the regulatory authority. Additional checks as well as changes must also be agreed by the regulatory authority.

In general this Manual does not give any information about vendor equipment. Such information can be taken from the vendor equipment maintenance instructions (refer to Chapter 01). However for practicability reason most of the applicable vendor equipment inspections are incorporated in the following checklists. But it has to be noted that the latest editions of inspections given by the vendors remain decisive. So, before beginning an inspection, the inspections of vendor equipment presented here must be compared with the originals referenced under the respective headlines of the checklists, and, in case of doubt (e.g. if originals have changed before changes could be transferred to this Manual by the Revision Service), contact EXTRA-FLUGZEUGBAU GmbH for advice. The maintenance instructions referenced in the checklists are also valid if further inspection of vendor equipment is necessary.

NOTE

For working with checklists refer to Chapter 02-20-03.

DANGER

Do not rotate the propeller nor allow any person to stay in the propeller operating area when performing an inspection or check with the master switch "ON" and the battery connected. The engine may be started unintentionally and may cause serious injuries or death.

05-10-00

TIME LIMIT COMPONENTS

05-10-01

General

All components not listed herein should be inspected as detailed in Chapter 05-20 „Maintenance Checks“ and repaired, overhauled as required. It is recommended that overhaul or replacement of components should be accomplished not later than the specified period of operation for that component or in accordance with the manufactures service data or airworthiness directives.

05-10-02

Overhaul Schedule

It is recommended to overhaul the items shown here at the times indicated. The times may be modified by the respective national authorities.

** refer to latest issue of
Manufacturer's Service Bulletin*

Item	Overhaul
Engine (Textron Lycoming)	*
Engine accessories	together with engine
Magneto (Slick)	*
Propeller (MT-Propeller)	*
Governor (Woodward)	*
All other components	on Condition

05-10-03**Replacement Schedule**

It is recommended to replace the items shown in the following schedule at the times indicated. The times may be modified by the respective national authorities.

*** on the recommendation
of the manufacturer*

Item	Replace
Battery (Sonnenschein)	2 years **
Batteries of the ELT (Pointer)	2 years **
Wheels (Cleveland, Parker)	on Condition
Tires	on Condition
Fuel, oil & brake hoses (Aeroquip)	after first 7 years, then 5 years
Seat belts (Hooker)	6 years **
Brake and Brake Assembly (Cleveland, Parker)	on Condition
Rudder control cable	on Condition
Fairleads	on Condition
Shock mounts (Lord Kinematics, Barry Controls)	on Condition
Bolts and Nuts	on Condition ***

**** if not stated otherwise*

05-20-00

SCHEDULED MAINTENANCE CHECKS

05-20-01

General

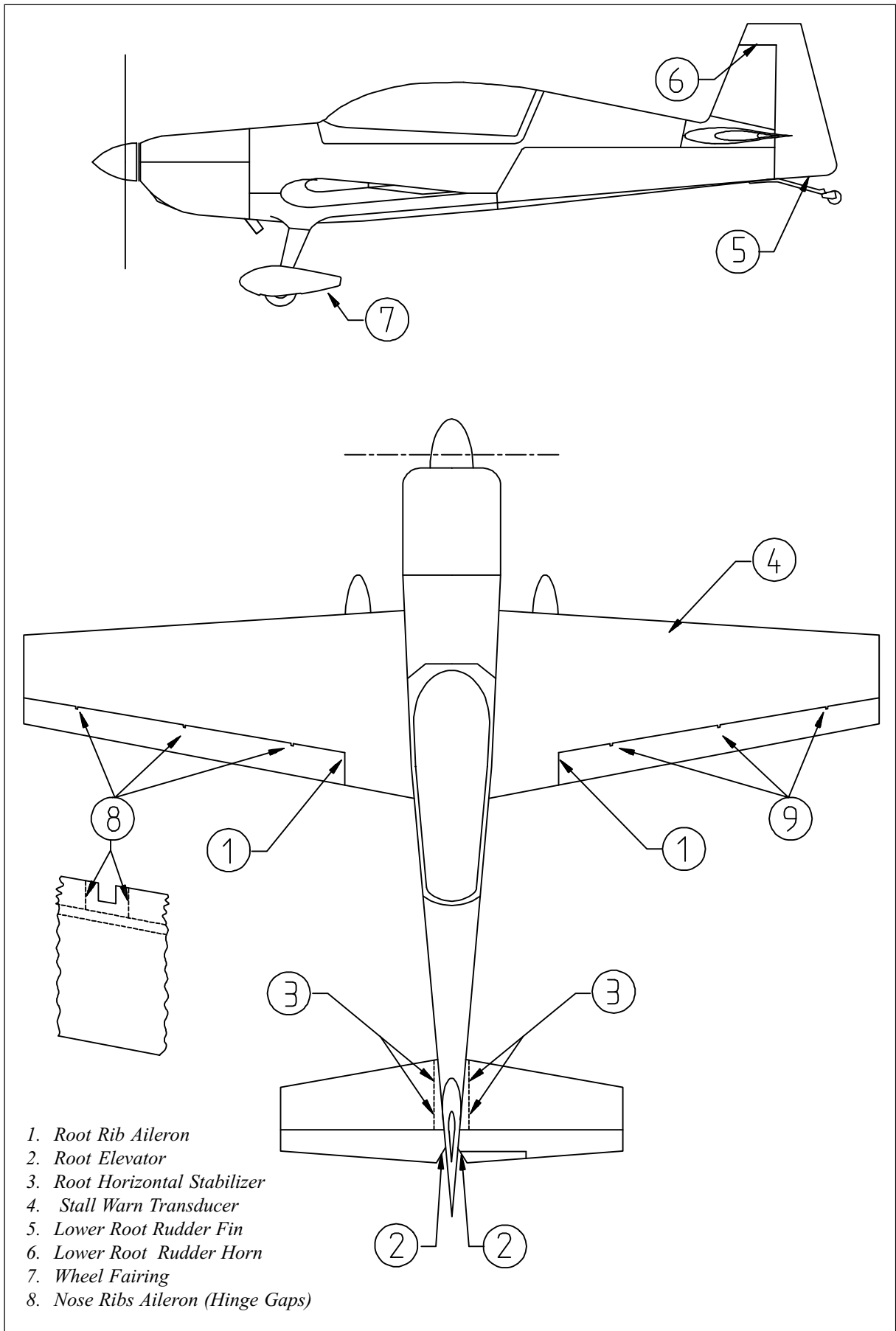
Scheduled maintenance checks or tasks must be carried out at 50, 100, 200, 300, 400, 500 and 1000 hour intervals. In addition an annual inspection equal to the 100 hour inspection has to be performed.

The following pages show a drain hole chart (Figure 1) and lubrication charts (Figures 2 - 3) which can be used in connection with the checklists.

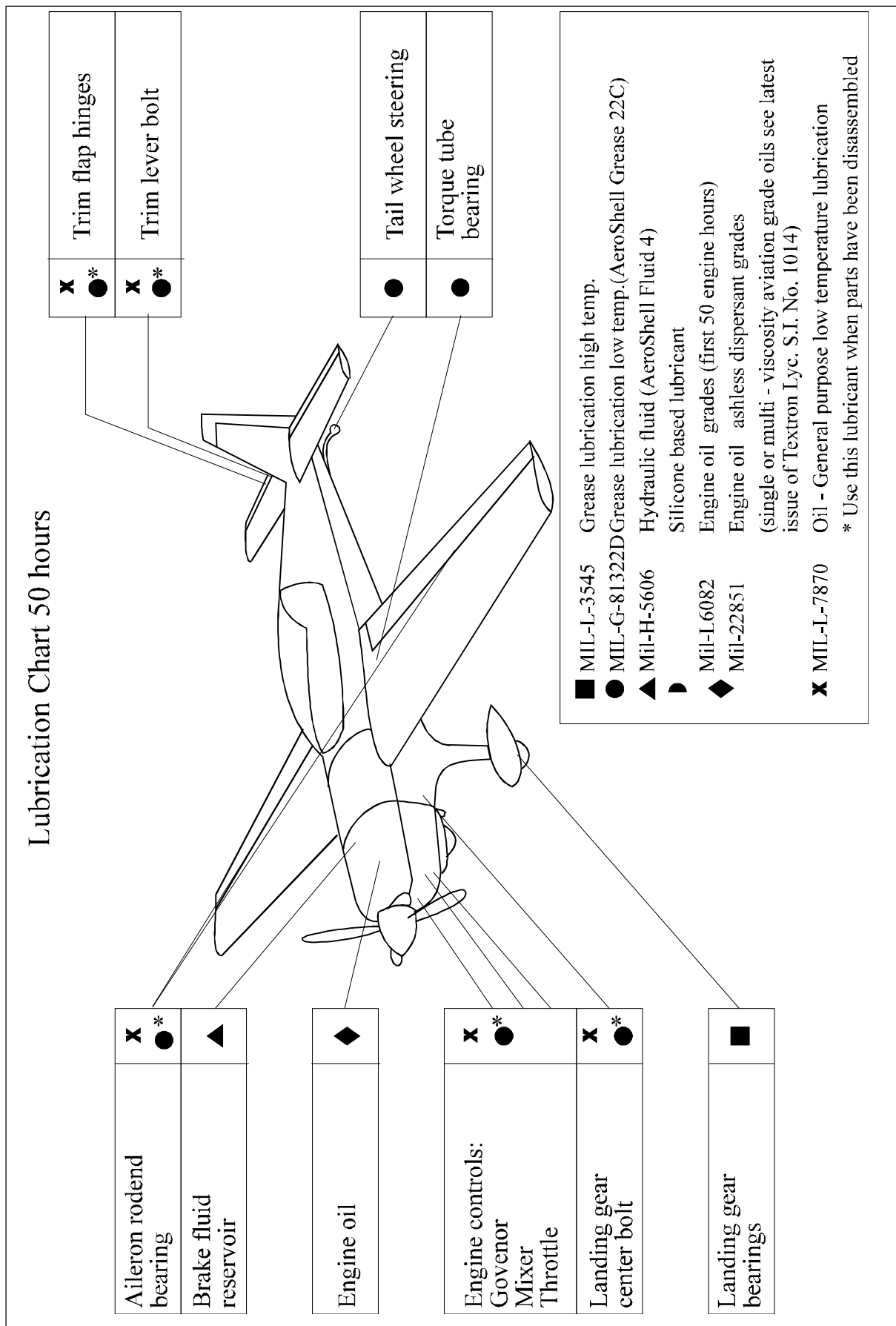
05-20-02

25 Hour Inspection - Aircraft

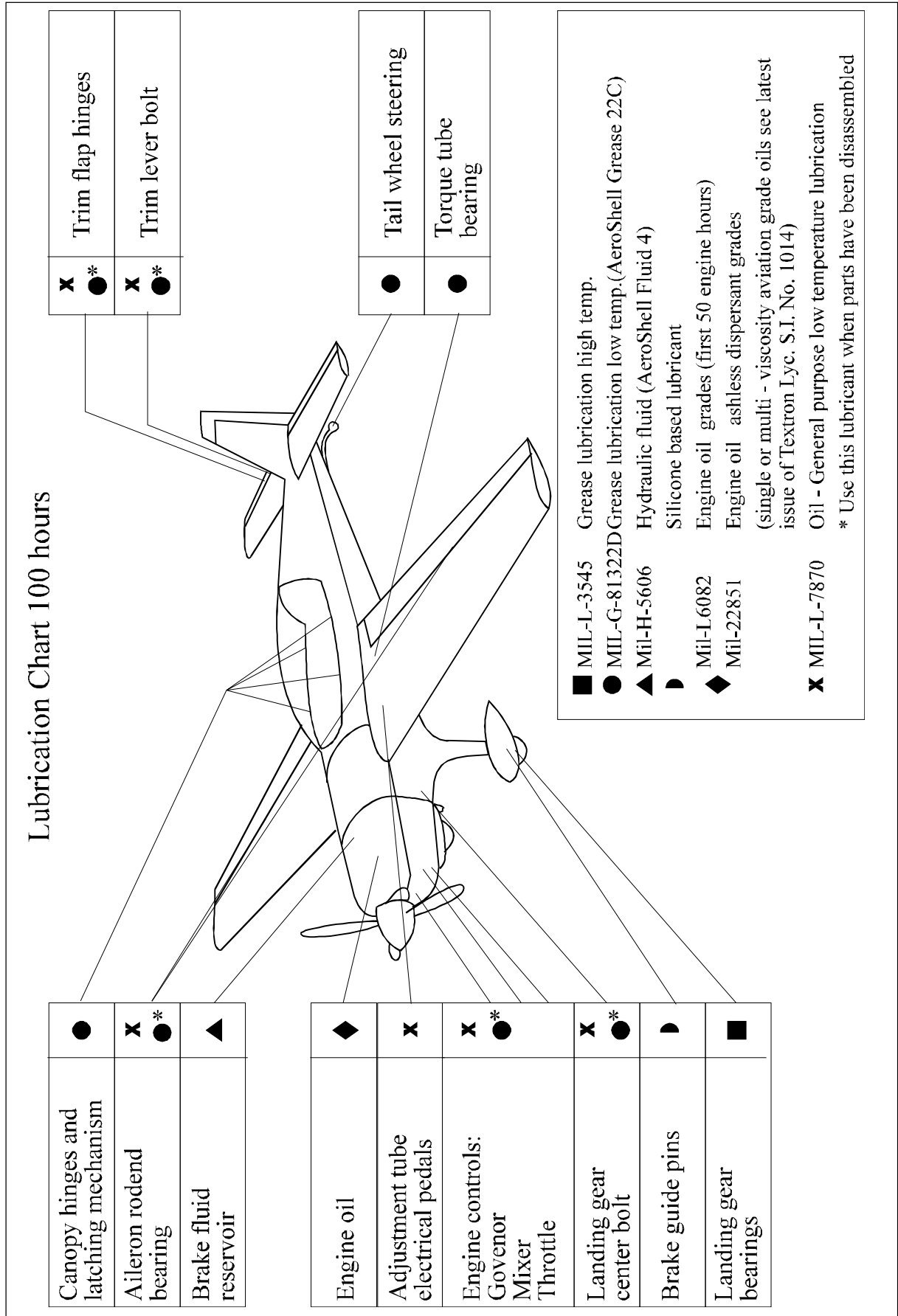
After the first 25 hours, a check equal to the 100-hour maintenance check has to be performed. Refer to Chapter 05-20-03.



Drain and Vent Holes
Figure 1



Lubrication Chart 50 hours
 Figure 2



Lubrication Chart 100 hours
 Figure 3

05-20-03

Maintenance Checks Schedule

The maintenance checks described in this Chapter include all the scheduled checks which must be performed. Use the following schedule and the lubrication charts (Figures 2-3).

			Date:	Inspector:
			Serial No.:	Mechanic:
			Inspections	
			Operational Checks	
	O	O	1 Start engine (in accordance with the Pilot's Operating Handbook)	
	O	O	2 Check the fuel quantity indication.	
	O	O	3 Check oil pressure and temperature.	
	O	O	4 Check generator output.	
	O	O	5 Check magneto RPM-drop at 1800 RPM. (Allowed drop is 175 RPM and no greater diff. between L + R from 50 RPM)	
	O	O	6 Check ignition OFF function at 1000 RPM for a short moment.	
	O	O	7 Check response of the engine by power setting changes.	
	O	O	8 Check the Propeller response at 1800 RPM when changing pitch.	
	O	O	9 Check idle speed is between 650 and 750 RPM.	
	O	O	10 Check the fuel flow and manifold pressure indicator.	
	O	O	11 Check the EGT and CHT indicator.	
	O	O	12 Check mixer function per CHT/EGT indication.	
	O	O	13 Check idle mixture.	
	O	O	14 Check the function of the fuel selector valve.	
	O	O	15 Check the radio and the other electronic equipment.	
	O	O	16 Shut down engine using mixture lever. Check the alternator warning light or ammeter.	

as specified each 50 hours each 100 hours		Date:	Inspector:
		Serial No.:	Mechanic:
Inspections			
	O	O	17 Check the optional electronic g-meter for the maximum g-loading. If extreme value exceeds ± 10 G, contact EXTRA-Flugzeugbau GmbH. Correct date and time of the g-meter (refer to DSA-12 Manual).
	O	O	18 Ignition OFF, main switch OFF, remove ignition key.
	O	O	19 Check if ignition key is removable in OFF-position only, and if key functions in accordance with the requirements of the Teledyne Continental Service Bulletin No. 636.
Propeller			
(refer to latest edition of MT-Propeller Operation and Installation Manual E-124 and Service Bulletins)			
DANGER		Ground magneto primary circuit before working on propeller	
		O	1 Remove spinner and check for cracks.
	O	O	2 Check blade shake, max. 3 mm or 1/8 inch.
	O	O	3 Check blade angle play, max. 2°.
		O	4 Inspect outside condition of the hub and parts for cracks, corrosion, deterioration.
		O	5 Inspect check nut for high pitch stop for tightness.
	O	O	6 Check all safety means to be intact.
	O	O	7 Check flange bolts or stopnuts for tightness.
		O	8 Check front and rear spinner plate for cracks and fixing.
	O	O	9 Inspect blade root and hub for oil- and grease leaks.
		O	10 Check position and condition of counterweights.
	O	O	11 Check blades for cracks in the fibreglass-cover and blade erosion sheet. No cracks allowed. Refer to MT-Propeller SB No. 8
O ¹			12 Overhaul propeller or perform a tear-down inspection.

1 refer to MT-Propeller Service Bulletin No. 1

Date:			Inspector:		
Serial No.:			Mechanic:		
as specified	each 50 hours	each 100 hours	Inspections		
			Engine compartment		
			(Refer to latest edition of Textron Lycoming Operator's Manual and SB's, of Christen Product Manual 801 Series and SB's and of Slick Magneto Maintenance and Overhaul Manual and SB's)		
			DANGER Ground magneto primary circuit before working on engine		
	O	O	1	Remove engine cowling.	
	O	O	2	Inspect cowling and air inlet screen for damage, cracks, distortion, overheated areas and loose or missing blind nuts and secure attachment of oil level access plate.	
	O	O	3	After this inspection clean cowling.	
	O	O	4	Check fire protection paint. If necessary repaint the fire protection paint ("WIEDOFLUGAT" Brandschutzfarbe N 56582 / T508).	
	O ¹	O	5	Drain oil sump in accordance with Chapter 12-10-04 "Engine Oil Replenishing"	
	O ¹	O	6	Clean and inspect oil screen filter	
	O ¹	O	7	Clean suction oil strainer at oil change (check strainer for foreign particles).	
	O ²	O	8	Change full flow (cartridge type, AEIO-360-A1E type engine) oil filter element (check element for foreign particles).	
		O	9	Inspect oil temperature sender unit for leaks and security.	
	O	O	10	Inspect flexible oil lines, oil return lines and fittings for leaks, security, chafing, dents, and cracks (ref: FAA AC 43.13-1A). Replace flexible oil lines at engine TBO per Lyc. SB 240. Check condition of fire sleeves.	
		O	11	Clean and inspect oil radiator and attachment.	
	O ³		12	Remove and flush oil radiator.	

- 1 at 10 and 25 hours and then each 25 hours
- 2 at 10 and 25 hours
- 3 each 500 hours

as specified each 50 hours each 100 hours			Date:	Inspector:
			Serial No.:	Mechanic:
Inspections				
	O	O	Inspect Christen Inverted Oil System for general condition, leaks, secure mounting and tight connections.	
O ¹			13 Clean and flush the Inverted Oil System with a suitable petroleum solvent, such as varsol according to Lycoming Operator's Manual.	
	O	O	14 Service engine with recommended lubricating oil in accordance with Chapter 12-10-04.	
	O	O	15 Inspect condition of spark plugs (Clean and adjust gap as required, adjust per Lycoming Service Instruction 1042). If fouling of spark plugs has been apparent, rotate bottom plugs to upper plugs and vice versa.	
	O	O	16 Inspect spark plug cable leads and ceramics for corrosion and deposits.	
	O	O	17 Perform a hot engine differential compression check in accordance with FAA AC 43.13-1A.	
		O	18 Inspect cylinders for cracked or broken fins.	
	O	O	19 Check cylinders for evidence of excessive heat which is indicated by discoloration.	
		O	20 Check fuel injector nozzles for looseness. Tighten to 60 inch pounds torque. Check fuel lines for fuel stains which are indicative for fuel leaks.	
	O	O	21 Inspect rocker box covers for evidence of oil leaks. If found, replace gasket; torque cover screws 50 Inch-pounds.	
O ²			22 Remove rocker box covers and check for freedom of valve rockers when valves are closed. Look for evidence of abnormal wear or broken parts in the area of valve tips, valve keeper, springs and spring seats.	
		O	23 Inspect ignition harness for general condition, free from fraying or chafing and insulators for high tension leakage and continuity.	

1 each 300 hours
 2 each 400 hours

		Date:	Inspector:		
			Mechanic:		
as specified each 50 hours each 100 hours		Serial No.:		Inspections	
			O		
	O	25	Inspect wiring connections, vent holes and P-lead attachment, refer to Slick Magneto Maintenance and Overhaul Manual.		
O ¹		26	Clean magnetos.		
O ¹		27	Inspect ball bearing assembly, impulse coupling, coil, contact points, condenser and carbon brush.		
O ²		28	Replace ball bearings.		
O ¹		29	Lubricate magnetos.		
O ³		30	Overhaul or replace magnetos.		
	O	31	Check fuel injector for general condition, clean fuel inlet screen.		
	O O	32	Inspect intake seals and O-rings for leaks and clamps for tightness.		
	O O	33	Inspect flexible fuel lines, fuel injection lines and fittings for leaks, security, chafing, dents, and cracks (refer to Lycoming SB 342 each 100h; replace or overhaul as required or at engine overhaul). Check condition of fire sleeves.		
	O O	34	Check fuel system for leaks.		
O ⁴	O O	35	Remove, clean and inspect gascolator screen and fuel filter bowl.		
	O O	36	Inspect throttle, mixture, and propeller governor controls for security, travel, and operating conditions.		
	O O	37	Inspect exhaust stacks, connections and gaskets (replace gaskets as required).		
	O O	38	Inspect exhaust slip joints for general condition.		

- 1 each 500 hours
- 2 each 1000 hours
- 3 together with engine
- 4 clean at least every 90 days

as specified each 50 hours each 100 hours			Date:	Inspector:
			Serial No.:	Mechanic:
Inspections				
O	O	39	Inspect exhaust system attachment.	
		O	40 Inspect crankcase for cracks, leaks, and security of seam bolts.	
O	O	41	Check engine mounted accessories such as pumps, temperature and pressure sensing units for leaks, secure mounting and tight connections.	
O	O	42	Inspect all air inlet duct hoses (replace as required)	
O	O	43	Inspect engine mount for cracks and loose mountings.	
O	O	44	Inspect engine baffles free from cracks and fraying.	
		O	45 Inspect all wiring connected to the engine or accessories	
O	O	46	Inspect engine shock mounts for deterioration (replace as required).	
		O	47 Check PRC PR-812 firewall sealant at all firewall penetrations (bowden cables, around firewall fittings etc.). Refer to PRC product information if replacement is necessary.)	
		O	48 Inspect alternator, cable connections and accessories.	
		O	49 Inspect condition and tension of alternator drive belt	
		O	50 Inspect security of alternator mounting	
		O	51 Inspect starter and starter drive	
		O	52 Lubricate starter drive	
O	O	53	Check brake fluid level (fill as required).	
O	O	54	Clean engine if necessary.	
O	O	55	Lubricate all controls per lubrication chart.	
O ¹		56	Overhaul or replace propeller governor as required.	
O ²		56	Complete overhaul of engine or replace with factory rebuilt	

1 refer to Woodward Service Bulletin No. 33580

2 refer to Lycoming Service Instruction No. 1009

Date:			Inspector:		
Serial No.:			Mechanic:		
Inspections					
as specified	each 50 hours	each 100 hours	Fuselage		
O	O	1	Remove tail fairing, tail side skins, main fuselage cover and landing gear cuffs per Chapter 51.		
	O	2	Remove bottom fuselage cover including exhaust area covering sheet per Chapter 51.		
O	O	3	Inspect main fuselage cover, bottom fuselage cover including exhaust area covering sheet, tail fairing, tail side skins and landing gear cuffs for general condition, dents, cracks and loose screws.		
O	O	4	Check installed parts for general condition and security of attachment.		
O	O	5	Inspect fuselage for foreign matters.		
	O	6	Inspect steel tube construction for general condition, corrosion and cracks, above all in areas of load stress (e.g. wing, stabilizer, engine and seat attachments).		
O	O	7	Inspect fabric cover for general condition.		
	O	8	Inspect wooden longerons for damage.		
	O	9	Clean and lubricate canopy hinge and latching mechanism.		
O	O	10	Inspect seats and seat belts for security, attachment, proper operation, and condition. Control the time limit of the seat belts. Refer to Chapter 05-10-02 "Overhaul Schedule".		
	O	11	Inspect breather line for obstructions and security.		
	O	12	Inspect main and auxiliary wing spar connector for general condition.		

as specified each 50 hours each 100 hours			Date:	Inspector:
			Serial No.:	Mechanic:
Inspections				
Fuel system				
	O	O	1	Inspect the fuel lines for leaks, security, chafing, dents and cracks. Replace fuel lines as required.
	O	O	2	Inspect fuel selector valve for operation and proper pointer indication
	O	O	3	Drain fuel system
	O	O	4	Check acro- and center tank attachment
	O	O	5	Check acro-, center- and both wing tanks for leaks
	O	O	6	Check boost pump
	O	O	7	Check fuel filler caps for security and proper operation
	O	O	8	Check proper seat and condition of sealing lip
Flight controls				
	O	O	1	Remove wing access panels.
	O	O	2	Inspect control surfaces for security of attachment, free movement, dents, delaminations and cracks.
	O	O	3	Inspect elevator trim system for proper operation and rigging.
	O	O	4	Inspect hinges for condition, cracks and security; hinge bolts, hinge bearings, self-locking nuts.
	O	O	5	Check free play in control system: torque tube, control surfaces, control sticks, rod end bearing, deflector limiter.
		O	6	Lubricate rear torque tube bearing. Remove bolt for greasing.
	O	O	7	Lubricate aileron rodend bearings, trim flap hinges and trim lever bolt.
		O	8	Lubricate adjustment tube of electrical pedal adjustment.
	O	O	9	Check rudder cable system including sleeves, fairleads, pulleys and cable retracting springs per FAA-AC 43.13-1A.

		Date:		Inspector:				
						Serial No.:		Mechanic:
as specified each 50 hours each 100 hours		Inspections						
			O	10	Check for minimum 3.5 mm (1/8") clearance of rudder pedal versus safety stop when fully deflected for rudder cables having 50 h flight time minimum. On newly installed rudder cables the minimum spacing is 6 mm (1/4"). Refer to Figure 4. This check is to be performed with zero loading on the rudder pedals.			
	O	11	Rough check of safety stop clearance. With a force of approx. 90 kg (200 lbs) acting on the fully deflected rudder pedal the safety stop shall not be reached. If the stop is reached the control system indicates a too high flexibility which needs to be traced. In this case contact EXTRA for advice.					
	O	O	12	Inspect all flight control ventilation holes for obstruction.				
		O	13	Inspect elevator balance weight for looseness and condition.				
		O	14	Inspect push rods.				
		Landing gear						
	O	O	1	Check landing gear for general condition.				
	O	O	2	Check landing gear spring for dents and cracks.				
	O	O	3	Inspect landing gear spring mounting clamps and bolts for security.				
		O	4	Lubricate landing gear center bolt and landing gear bearings.				
		O	5	Check wheel rake ($10^\circ \pm 0.5^\circ$) and toe-in ($1.5^\circ \pm 0.5^\circ$) per Chapter 32.				
		Fairings:						
	O	O	1	Disassemble fairings.				
	O	O	2	Check fairings for dents and cracks.				
	O	O	3	Check fairing ventilation hole for obstruction.				

Date:			Inspector:		
Serial No.:			Mechanic:		
Inspections					
as specified	each 50 hours	each 100 hours	Wheels		
			(refer to on-aircraft inspections presented in the latest edition of Cleveland Wheels & Brakes Maintenance Manual and Service Bulletins for wheel, tire and brake inspections)		
O	O		1	Visually inspect the wheels for corrosion, cracks, or other visible damage.	
O	O		2	Check wheel nuts to be sure they are properly installed and have not worked loose. Bolt threads should be flush to 1-1/2 threads extending beyond the nut. Nuts should be on the side of wheel opposite the brake disc (outboard side of wheel).	
O	O		3	Inspect the brake disc for rust, excessive grooves, large cracks, coning or other visible damage. Check if disc thickness is more than 0.325in/8.255mm. Coning of disc in excess of 0.015 in /0.381 mm is cause for replacement (see Fig. 5).	
	O		4	Remove wheels and wheel bearings. Inspect wheel bearing grease for contamination and solidification.	
	O		5	Inspect snap rings and grease seals for distortion or wear. Replace grease seal felts if they are hard or contaminated. Lightly saturate grease seals should be replaced if cracked, dried out, or distorted.	
	O		6	Inspect wheel bearings for excessive wear or damage. Replace on condition.	
	O		7	Repack bearings with AEROSHELL 22C (per MIL-G-81322), or equivalent. Reinstall wheels and safety.	
O	O		8	Check wheel bearing clearance and wheels for free rotation.	
			Tires		
O	O		1	Visually inspect tires for cuts, flat spots, and tread or side wall damage. If changing of tires is necessary follow the instructions, including off-aircraft inspection of wheels, presented in the Cleveland Wheels & Brakes Component Maintenance Manual.	
O	O		2	Check inflation pressure (2.6 bar/38 psi). Proper inflation will provide maximum tire and wheel life.	

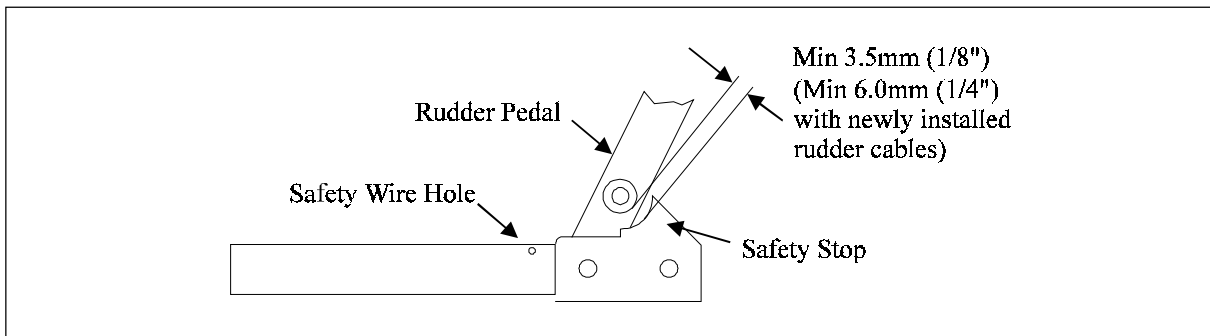
as specified each 50 hours each 100 hours			Date:	Inspector:
			Serial No.:	Mechanic:
Inspections				
Brake system				
	O	O	1	Inspect brake assemblies for general condition.
	O	O	2	Inspect master cylinders for leaks.
		O	3	Inspect brake system plumbing for leaks and hoses for bulges and deterioration.
		O	4	Lubricate brake guide pins using Silicone-base lubricant.
	O	O	5	Visually inspect the brakes for corrosion, cracks, or other visible damage. Check inlet fitting bosses and anchor bolt lugs for cracks. Check inlet flares on aircraft side of rigid hydraulic tubing for fatigue cracks.
	O	O	6	Check back plate attachment bolts to insure they are properly torqued and have not worked loose. Gaps between the back plate and cylinder would be evidence of this.
	O	O	7	Check fit of brake cylinder anchor bolts in torque plate bushings for sloppiness. This can be accomplished by grasping the cylinder and moving it; slight movement is normal. Excessive movement is cause for removal and detailed inspection.
	O	O	8	Linings should be visually checked for extreme chipping on the edges. Lining worn to a minimum thickness of 0.100 inch (2.54 mm) must be replaced.
	O	O	9	Visually check torque plate for corrosion, cracks, loose anchor bolt bushings, or other visible damage. Anchor bolt bushings must be flat against torque plate surface.
	O	O	10	Check for any brake fluid leaks.
	O	O	11	Check brake fluid level.
Tail-wheel landing gear				
	O	O	1	Check tail-wheel landing gear for general condition.
	O	O	2	Check tail-wheel landing gear spring for dents, cracks, and delaminations.
	O	O	3	Check tail-wheel rubber tire condition.

as specified each 50 hours each 100 hours			Date:	Inspector:
			Serial No.:	Mechanic:
Inspections				
<input type="checkbox"/>	<input type="checkbox"/>	4	Inspect tail-wheel spring and swivel arm mounting bolts for security.	
<input type="checkbox"/>	<input type="checkbox"/>	5	Check for general condition and function. Pay attention to the free movement of the rudder.	
<input type="checkbox"/>	<input type="checkbox"/>	6	Check the connector springs for light precompression.	
<input type="checkbox"/>	<input type="checkbox"/>	7	Check the wheelfork for free rotation and steering function, damage, dents, cracks and corrosion.	
<input type="checkbox"/>	<input type="checkbox"/>	8	Inspect wheelfork for damage, dents, cracks and corrosion.	
<input type="checkbox"/>	<input type="checkbox"/>	9	Inspect the axle bolt and nut for fretting, wear, damage, and stretch.	
<input type="checkbox"/>	<input type="checkbox"/>	10	Lubricate tail wheel steering.	
Wing				
<input type="checkbox"/>	<input type="checkbox"/>	1	Check wing for dents, cracks, and delaminations.	
	<input type="checkbox"/>	2	Inspect wing spar main bolts for looseness and security.	
	<input type="checkbox"/>	3	Check the safety wire and the safety screw of the wing main spar bolt.	
	<input type="checkbox"/>	4	Inspect wing spar main sleeves for looseness and bearing load.	
	<input type="checkbox"/>	5	Inspect wing auxiliary spar attachment.	
	<input type="checkbox"/>	6	Inspect wing ventilation holes for obstruction.	
<input type="checkbox"/>	<input type="checkbox"/>	7	Check inside wing structure in the area of access panels.	
Stabilizer				
<input type="checkbox"/>	<input type="checkbox"/>	1	Check stabilizer for dents, cracks; stone nicks and delaminations.	
<input type="checkbox"/>	<input type="checkbox"/>	2	Inspect stabilizer spars main bolts for looseness and security.	
<input type="checkbox"/>	<input type="checkbox"/>	3	Inspect stabilizer auxiliary spars attachment.	
	<input type="checkbox"/>	4	Inspect stabilizer ventilation holes for obstruction.	

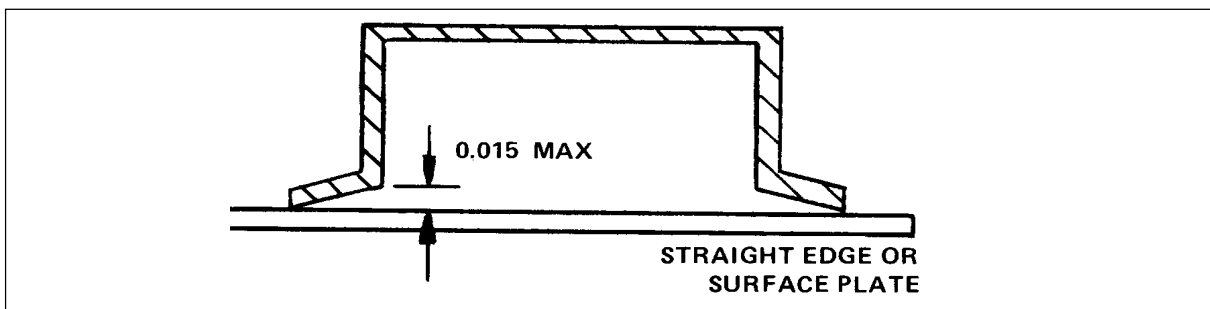
as specified each 50 hours each 100 hours			Date:	Inspector:
			Serial No.:	Mechanic:
Inspections				
Instruments				
		O	1 Check front and rear panel mounting for security and safety. Check shock mounts for general condition.	
		O	2 Check operation, mounting, and wiring of switches for condition and safety.	
		O	3 Check automatic circuit breaker mounting and wiring for condition and safety.	
		O	4 Inspect stall warner system for condition and security of installation, perform operational check.	
	O	O	5 Check wing tip position/strobe lights or single strobe light for security and operation.	
	O	O	6 Inspect compass and compass deviation card for proper indication and compensation.	
O ¹			7 Magnetic compass compensation.	
		O	8 Check pitot/static air pressure lines for condition and leaks, perform operational check.	
Electrical system				
	O	O	1 Check engine bonding	
	O	O	2 Check tank bonding (wing- and center tank)	
		O	3 Check system wiring free from fraying or cracks	
		O	4 Inspect battery and attachment	
	O	O	5 Charge battery	

1 Annual, each twelve calendar month

as specified each 50 hours each 100 hours			Date:	Inspector:
			Serial No.:	Mechanic:
Inspections				
General				
O ¹	O	O	1	Perform checks given for special equipment installed (refer to Chapter 95).
O ¹	O	O	2	Reinstall access panels per Ch. 51.
O ¹	O	O	3	Aircraft conforms to Specifications of respective Authority
O ¹	O	O	4	All required airworthiness directives complied with.
O ¹	O	O	5	All EXTRA mandatory Service Bulletins complied with.
O ¹	O	O	6	All vendor Service Bulletins and Service Letters complied with.
O ¹	O	O	7	Check for proper flight manual.
O ¹	O	O	8	Aircraft papers in proper order.



*Minimum Clearance Check
 Figure 4*



*Coning Check
 Figure 5*

1 as required

05-20-04

Significant Items Inspection

Every **1000 flight** hours the "Significant Items Inspection" must be performed **in addition** to the 100-hour inspection.

1000 hours	Date:	Inspector:
	Serial No.:	Mechanic:
Inspections EXTRA 200		
Wing		
<i>Leading edge</i>		
O 1	Detailed visual inspection on the surface for erosion, scratches, stone nicks and impact damages.	
O 2	Detailed visual inspection on the bonding top/bottom for dents, cracks and delaminations.	
O 3	Inspect grounding rivets visually.	
<i>Main spar section</i>		
O 4	Check bonding skin/spar for delaminations by coin tapping (Refer to Chapter 20-10-05).	
O 5	Detailed visual inspection on the sparweb for dents, cracks and delaminations by visual inspection through wing access holes using a boroscope.	
<i>Auxiliary spar section</i>		
O 6	Check bonding skin/spar for delamination by coin tapping .	
O 7	Detailed visual inspection on the aux. spar web for dents, cracks and delaminations. Pay particular attention to the cutout for aileron cantilever.	
O 8	Inspect attachment fitting for damage, corrosion and link bolts security.	
<i>Spar carry-through</i>		
O 9	Remove spar cap paint by a solvent. Perform visual inspection for dents and cracks. Check for delaminations by coin tapping. Restore finish in accordance with Chapter 51-70-05.	
O 10	Remove spar web paint by a solvent. Perform visual inspection for dents and cracks. Check for delaminations by coin tapping. Restore finish in accordance with Chapter 51-70-05.	

1000 hours	Date:	Inspector:
	Serial No.:	Mechanic:
Inspections		
O 11	Check main bolt sleeves for secure bonding to the spar.	
	<i>Wing trailing edge</i>	
O 12	Check bonding top/bottom for cracks and delaminations by coin tapping (Refer to Chapter 20-10-05).	
	<i>Root and Tip</i>	
O 13	Check root rib for cracks, delaminations and secure bonding to skin and spars by coin tapping (Refer to Chapter 20-10-05).	
O 14	Inspect tip rib visually for general condition.	
O 15	Check metall fittings (power supply support) for secure bonding to the carbon laminate	
	Aileron	
O 1	Check root and tip rib bonding to the skin laminate by coin tapping.	
O 2	Check bonding skin/spar for delaminations by coin tapping.	
O 3	Check bonding top/bottom for cracks and delaminations by coin tapping (Refer to Chapter 20-10-05).	
O 4	Check hinge points (mounting brackets) and actuator for damages and cracks. Ensure proper attachment.	
O 5	Inspect spades visually for general condition. Check spade support for corrosion, cracks and deformations. Ensure proper attachment to aileron.	
O 6	Inspect ventilation holes for obstruction.	
	Surface general	
O 1	Check painting visually for general condition (blisters etc.).	
O 2	Check laminate for erosion, scratches and nicks.	
	Control system	
O 1	Inspect bell cranks for damage, corrosion, security of mounting and link bolts through wing access holes.	
O 2	Inspect control rods for corrosion.	
O 3	Check Rod end bearing for free movement and cleanliness.	

1000 hours	Date:	Inspector:	
	Serial No.:	Mechanic:	
Inspections			
	Vertical Stabilizer		
	<i>Leading edge</i>		
O	1	Check surface for erosion, scratches, stone nicks and impact damages.	
O	2	Check bonding left/right for dents, cracks and delamination.	
	<i>Front spar section</i>		
O	3	Check bonding skin/spar for delamination by coin tapping (Refer to Chapter 20-10-05).	
O	4	Detailed visual sheet metal attachment fitting for damage, corrosion and link bolts security.	
	<i>Rear spar section</i>		
O	5	Check bonding skin/spar for delamination by coin tapping .	
O	6	Detailed visual rear spar web for dents, cracks and delamination. Pay particular attention to the cut out for rudder cantilever.	
O	7	Check steel sleeve for secure bonding to the spar.	
O	8	Replace attachment bolts and stop nuts. Check for proper torque in accordance with Chapter 20-10-02.	
	<i>Root and Tip</i>		
O	9	Check root rib for cracks, delamination and secure bonding to skin and spars by coin tapping.	
O	10	Inspect tip rib visually for general condition.	
	Rudder		
O	1	Check tip rib bonding to the skin laminate by coin tapping.	
O	2	Check bonding skin/spar for delamination by coin tapping.	
O	3	Check bonding trailing edge for cracks and delaminations by coin tapping.	
O	4	Detailed visual of mounting brackets for damages and cracks. Ensure proper attachment. Replace bolts and stop nuts for new ones in any case. Check for proper torque in accordance with Chapter 20-10-02.	
O	5	Check actuator lever for damage, cracks and proper attachment.	
O	6	Inspect ventilation holes visually for obstruction. Refer to Chapter 05-20-01, Figure 2 "Drain and Vent Holes".	

1000 hours	Date:	Inspector:
	Serial No.:	Mechanic:
Inspections		
O	7 Check painting visually for general condition (blisters etc.).	
O	8 Check laminate for erosion, scratches and stone nicks.	
	Horizontal Stabilizer	
	<i>Leading edge</i>	
O	1 Check surface for erosion, scratches, stone nicks and impact damage.	
O	2 Check bonding top/bottom for dents, cracks and delamination.	
	<i>Front spar section</i>	
O	3 Check bonding skin/spar for delamination by coin tapping.	
	<i>Rear spar section</i>	
O	4 Check bonding skin/spar for delamination by coin tapping.	
	<i>Spar carry-through</i>	
O	5 Remove spar cap paint by a solvent. Perform visual inspection for dents and cracks. Check for delamination by coin tapping. Restore finish in accordance with Chapter 51-70-05.	
O	6 Remove Spar web paint by a solvent. Perform visual inspection for dents and cracks. Check for delaminations by coin tapping. Restore finish in accordance with Chapter 51-70-05.	
O	7 Replace attachment bolts and stop nuts. Check for proper torque in accordance with Chapter 20-10-02.	
O	8 Check steel sleeves for secure bonding to the spar.	
	<i>Root and Tip</i>	
O	9 Check root rib for cracks, delamination and secure bonding to skin and spars by coin tapping.	
O	10 Inspect tip rib visually for general condition.	
	Elevator	
O	1 Check tip rib bonding to the skin laminate by coin tapping.	
O	2 Check bonding skin/spar for delaminations by coin tapping.	
O	3 Check bonding trailing edge for cracks and delamination by coin tapping.	
O	4 Detailed visual inspection of mounting brackets for damage, cracks and proper attachment. Replace bolts and stop nuts. Check for proper torque in accordance with Chapter 20-10-02.	

1000 hours	Date:	Inspector:
	Serial No.:	Mechanic:
Inspections		
O	5 Check center section for delamination by coin tapping.	
O	6 Detailed visual of actuator lever for damage, cracks and proper attachment.	
O	7 Detailed visual of mass balance attachment and mounting boom for deformation, corrosion and cracks.	
O	8 Detailed visual of trim tab hinges, actuator lever for damage, cracks, excessive wear and proper bonding to the laminate. Detailed visual for delamination.	
O	9 Inspect ventilation holes for obstruction.	
	<i>Surface general</i>	
O	10 Check painting for general condition (blisters etc.).	
O	11 Check laminate for erosion, scratches, stone nicks and impact damages.	
	Fuselage	
O	1 Inspect tubular steel frame visually for corrosion, scratches and damages.	
O	2 Check wing main spar attachment for damage and corrosion. Inspect for dents and cracks.	
O	3 Detailed visual of the sheet metal of the wing auxiliary spar attachment for damage, corrosion. Inspect the sheet metal supports using a fluorescent dye penetrant to insure no cracks are evident.	
O	4 Detailed visual of cockpit frame visually for dents, cracks and delaminations.	
O	5 Inspect main fuselage cover visually for dents, cracks and delamination.	
	Flight controls	
O	1 Detailed visual of torque tube for damages, cracks, free-play and stop adjustments.	
O	2 Detailed visual of bell cranks for damage, cracks, corrosion, security of mounting and link bolts.	
O	3 Inspect control rods for loose or popped rivets and general condition.	
O	4 Inspect sticks (rear & front) for full travel, proper rigging, free-play, security of mounting and direction of control surface movement with relation to stick movement.	

1000 hours	Date:	Inspector:	
	Serial No.:	Mechanic:	
Inspections			
O	5 Check rod end bearings for free movement and cleanliness.		
O	6 Detailed visual of trim actuator lever for damages and cracks. Ensure proper attachment and condition of friction.		
Main landing gear			
O	1 Inspect landing gear spring visually for dents, cracks and delaminations, especially at the axle attachment and the center bushing for wear and looseness.		
O	2 Check mounting clamp for damage and corrosion. Inspect for dents and cracks.		
O	3 Inspect mounting clamp bolts and nuts for fretting, wear, damage, stretch and proper torque (refer to Chapter 20-10-03).		
O	4 Check brakes discs for warping and wear. Inspect wheel brake cylinder mounting bracket for wear.		
O	5 Inspect brake lines for leakage, dents, cracks, chaffing, kinks and security of anchorage.		
O	6 Inspect axle attachment bolts and nuts for fretting, wear, damage, and stretch.		
O	7 Check tires for general condition.		
Tail-wheel landing gear			
O	1 Inspect glass fibre spring visually for dents, cracks and delaminations.		
O	2 Inspect mounting bolts and nuts for fretting, wear, damage, stretch and proper torque.		
Steerable tail-wheel			
O	1 Disassemble tail wheel per Ch. 32. Inspect for signs of wear and damage. Check general condition and proper function.		
O	2 Check connector springs for signs of wear and light precompression. Pay attention to the free movement of the rudder.		
O	3 Inspect wheelfork visually for damage, dents, cracks and corrosion.		
O	4 Inspect axle bolt and nut for fretting, wear, damage, and stretch.		
O	5 Check rubber tire for general condition.		

Date:		Inspector:		
Serial No.:		Mechanic:		
Inspections				
1000 hours	Engine compartment			
O	1	Check firewall for dents, cracks and deformation. Visual inspection of PR 812 sealant for porosity and general condition.		
O	2	Inspect tubular engine mount for dents, cracks and corrosion. Check all bolts for security and condition.		
O	3	Visual inspection of rubber mounts (shock mounts) for porosity and general condition.		
O	4	Inspect flexible hoses for damage and leakage.		
O	5	Visual inspection of fire sleeves for chaffing and general condition.		
O	6	Check electric wiring for proper connection.		
O	7	Check grounding straps for proper connection.		
O	8	Visual inspection of inverted oil system for general condition according to CHRISTEN 801 instruction. Refer to CHRISTEN Product Manual P/N: 70047-001 or to TEXTRON LYCOMING Operator's Manual P/N: 60297-21.		
O	9	Carry out general engine check as instructed by TEXTRON LYCOMING Operator's Manual P/N: 60297-21.		
O	10	Visual inspection of cowling for dents, cracks, delamination and smoke marks.		
	Hardware			
O	1	Magnaflux or fluorescent dye-check of the wing main spar bolts by authorized personnel is required. (Remove only one bolt at a time). Inspect for security of the spar bolts and safety-screws.		
O	2	Check harness attachment fittings for cracks, deformations and corrosion.		
O	3	Check bolts and nuts in critical areas for fretting, wear, damage, stretch, proper torque and safety.		
O	4	Visual inspection of center tank fastening straps for cracks, damage and corrosion.		
O	5	Visual inspection of battery fastening straps for cracks, damage and corrosion.		
O	6	Check the "quick pins" of the seat adjustment for cracks, deformations and corrosion. Inspect wear and proper function.		

<i>1000 hours</i>	Date:		Inspector:	
	Serial No.:		Mechanic:	
Inspections				
O	7	Visual inspection of rudder pedal mounting to the attachment fittings. Check bolts for security.		
Surface general				
O		Visual check of painting for deteriorated paint.		

05-50-00

UNSCHEDULED MAINTENANCE CHECKS

Unscheduled checks are only performed after abnormal events, which could possibly have caused damage to the aircraft or impaired the airworthiness.

I M P O R T A N T

In case of abnormal events or any exceedance of given limitations (load factor, never exceed speed, etc.) the manufacturer has to be contacted to find appropriate maintenance procedures. Therefore the procedures described in the following could be subjected to changes. In case of doubt or visible damage perform a 100 hour check per Chapter 05-20-03 in addition to the checks presented below.

05-50-01

Violent Stopping of the Engine (Propeller Strike)

In a case where the propeller has struck the ground or the engine has been stopped violently (shock loading), the complete engine has to be disassembled and checked by an authorized company. The crankshaft might be damaged. Also refer to the latest issue of the Lycoming SB 201. The propeller has to be checked and repaired by an authorized company according to MT-propeller instruction. Refer to MT-propeller "Operation- and Installation Manual E-124".

05-50-02

Hard Landing

After an extremely hard landing or other unusual loads on the landing gear, perform a check as described in the following, even when there are no obvious signs of damage: If there are indications that structural parts are damaged, the manufacturer has to be consulted for possible and suitable repair methods.

Date:		Inspector:	
Serial No.:		Mechanic:	
Inspections			
Landing gear			
O	1	Examine landing gear mounting clamps for defects (e.g. cracks and deformed areas)	
O	2	Check clamp bolts of the landing gear for cracks, replace when necessary	
O	3	Examine wheel track and wheel base and check if measurement correspond to the value given in Chapter 06-10-01.	
O	4	Remove and check the fairings for delamination, deformations and cracks	
O	5	Check the landing gear spring for delamination, deformations and cracks, especially in the area of the axle attachment	
O	6	Check fuselage structure in the area of landing gear attachment for deformation and cracks	
O	7	Check tires for cuts in the side wall	
O	8	Check wheel halves and brake discs for impacts, cracks and distortion according to CLEVELAND instruction.	
O	9	Check tail wheel for deformation and cracks, especially in the area of the axle attachment	
O	10	Check fuselage structure in the area of the tail wheel for deformation and cracks	
Control surfaces			
O	1	Check control surfaces for proper operation	
O	2	Check control surface hinges for cracks, security and free movement	
O	3	Check the balance weights of the elevator for security of attachment	
O	4	Check the spades for security of attachment	
Engine			
O	1	Check engine mount	

05-50-03

Engine Fire

After an engine fire, perform a check as described in the following:

For damage evaluation consult the manufacturer, before the aircraft is put back into service.

Date:		Inspector:	
Serial No.:		Mechanic:	
Inspections			
O	1 Check all cables and hoses, replace when necessary		
O	2 Check engine according to the Lycoming Manual		
O	3 Check fire wall and engine cowling for damage by high temperatures (e.g. signs of blister on the protective paint) If necessary repaint the fire protection paint ("WIEDOFLUGAT" Brandschutzfarbe N 56582 / T508) .		

05-50-04

Lightning Strike

In the event of a lightning strike in flight or on ground check the following:

Date:		Inspector:	
Serial No.:		Mechanic:	
Inspections			
O	1 Check engine according to Lycoming Service Bulletin 401.		
O	2 Check the skin of the strike area for burns and melting		
O	3 Inspect bolts, fasteners, bearings and ground bonding leads for burns and melting .		
O	4 Check the electrical system, with running engine, for correct operation.		
O	5 Check the avionic and antenna for correct operation.		
O	6 Check the magnetic compass for correct readings.		

05-50-05

Flightline Inspections

These checks include pre-flight and postflight checks, as they are described in Sections 3 and 4 ("EMERGENCY PROCEDURES" and "NORMAL PROCEDURES") of the PILOT'S OPERATING HANDBOOK. When the aircraft is in operation, perform these checks daily.

Chapter 06

Dimensions and Areas

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06-00-00

GENERAL

The for measuring and weighing the aircraft relevant reference planes are the following:

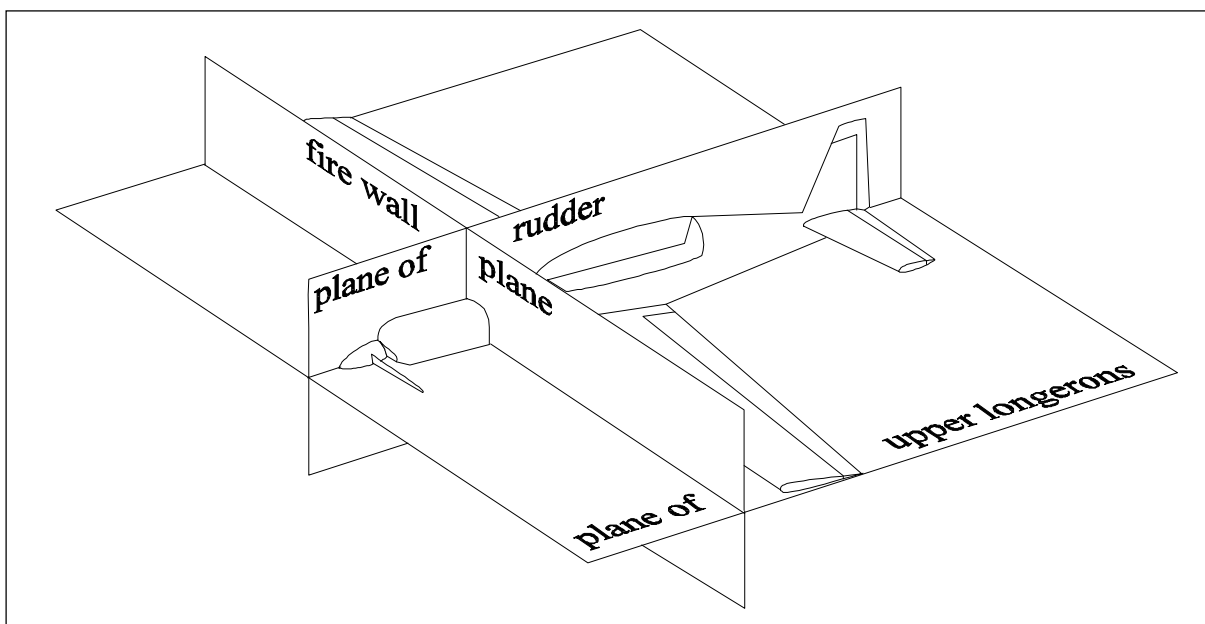
Reference Planes

Plane of upper longerons (horizontal plane)

Plane of rudder (Vertical/symmetry plane)

Fire wall plane (Vertical plane)

The following figure 1 shows the aircraft planes :



Axes and Planes
Figure 1

Unless otherwise stated, all measurements given in this manual are in metric (additional in feet) and are measured parallel to the corresponding reference planes.

06-10-00

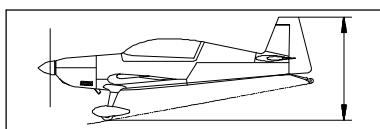
MAIN DATA

06-10-01

Main Dimensions

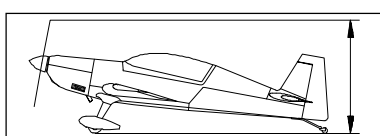
(Refer to Figure 2 on page 6)

Length: 6.51 m (21.36 ft)



Height 1

Height 1: 2.62 m (8.60 ft)



Height 2

Height 2: 2.51 m (8.23 ft)

Wheelbase: 4.62 m (15.16 ft)

Wheel-track: 1.80 m (5.91 ft)

MTOW: Normal category 840 kg
Acro (1 seat) 700 kg
Acro (2 seats) 800 kg

06-10-02

Wing

Span: 7.50 m (24.61 ft)

Area: 10.44 m² (112.38 ft²)

Airfoil: Root: MA 15 S. Tip: MA 12 S

Chord: Root: 1.85 m. Tip: 0.93 m

MAC: 1.44 m (4.72 ft)

Aileron area: 2 x 0.830 m² (2 x 8.94 ft²)

06-10-03

Horizontal Tail

Span:	3.20 m (10.50 ft)
Area:	2.56 m ² (27.56 ft ²)
Airfoil:	Wortmann FX 71-L-150/30

06-10-04

Elevator

Area:	0.77 m ² (8.29 ft ²)
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06-10-05

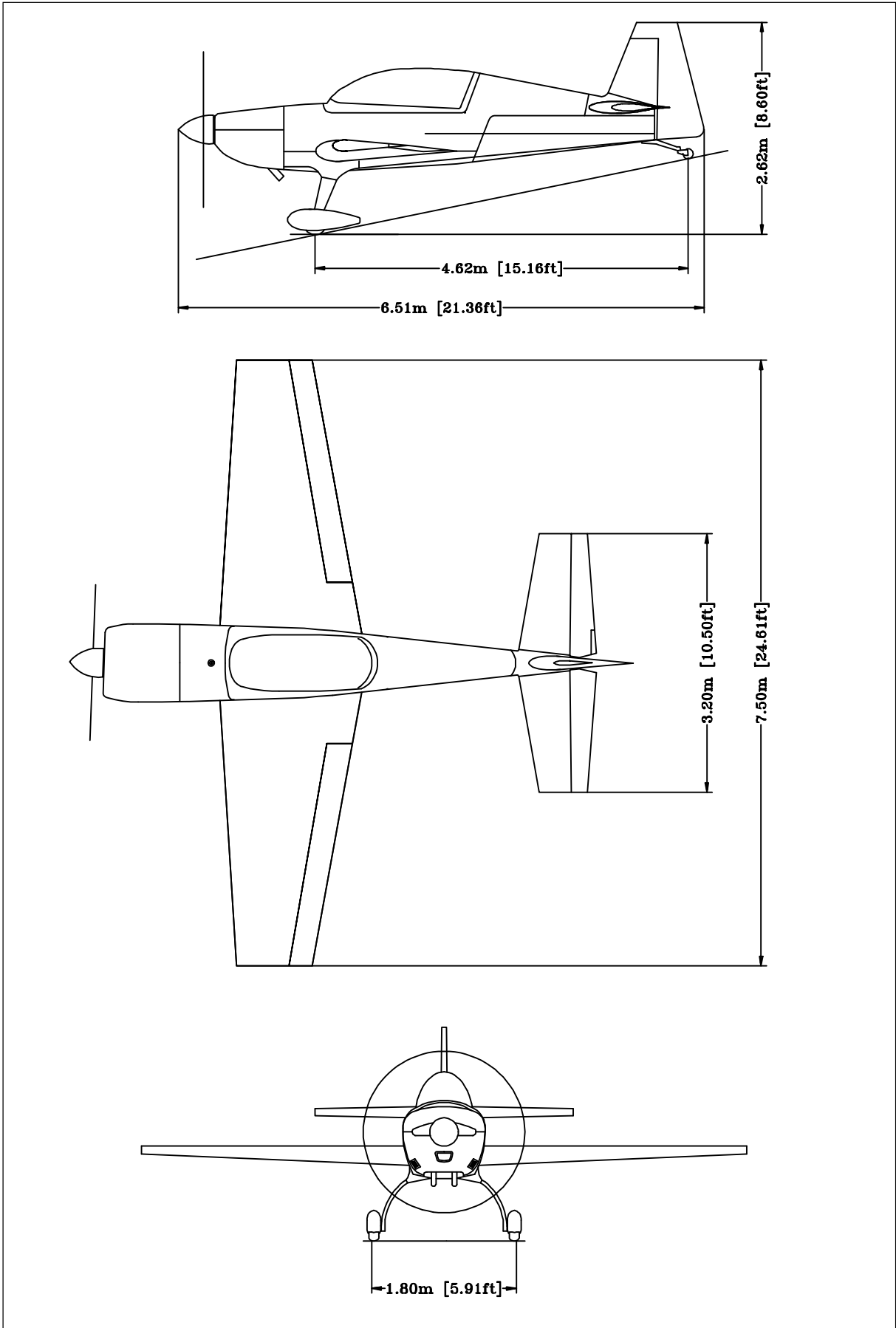
Vertical Tail

Area:	1.39 m ² (14.96 ft ²)
Airfoil:	Wortmann FX 71-L-150/30

06-10-06

Rudder

Area:	0.51 m ² (5.49 ft ²)
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Three-View EXTRA 200
Figure 2

Chapter 07

Lifting and Shoring

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07-10-00

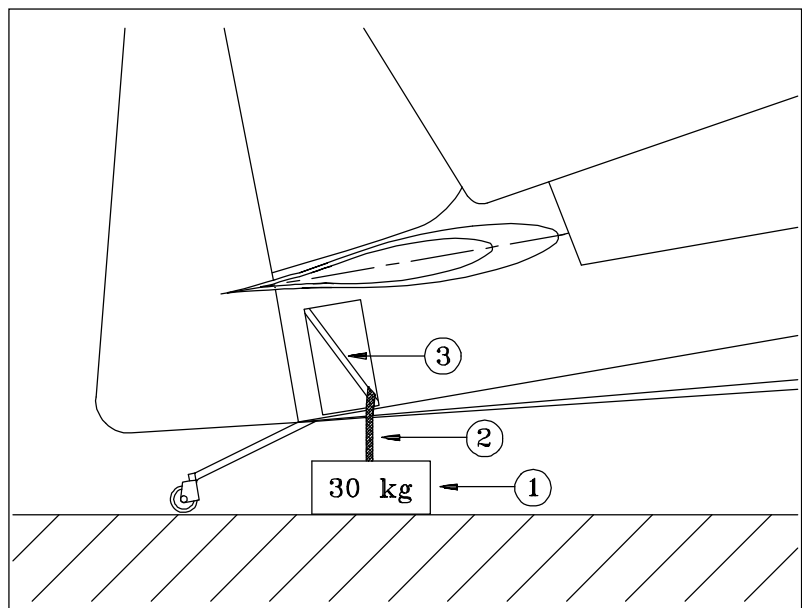
JACKING

07-10-01

Balance Weight

Prior to the removal of the horizontal and/or vertical stabilizer(s) or prior to shoring the aircraft as described in Chapter 07-20-00 it is necessary to weight the tail to prevent aircraft from tilting onto the nose. In this case follow the steps described below (refer to Figure 1):

- 1 Put a weight (1) of min. 30 kg under the tail.
- 2 Remove the RH tail side skin and the tail cone access panel per Chapter 51.
- 3 Connect the weight with the now accessible steel tube (3) by means of a strap (2). Prevent damage of paint and control cables.



*Balance Weight
Figure 1*

07-20-00

SHORING

Shoring the Extra 200 is necessary, when the main landing gear or the tail wheel has to be removed or installed.

07-20-01

Shoring the Front

- 1 Remove the fore access panels up to aft the main landing gear as per Chapter 51-00-01.
- 2 Install a balance weight (3, Figure 2) at the tail as per Chapter 07-10-01.
- 3 Hoist the aircraft at the upper steel tube of the motor bearer (1) using a strap.

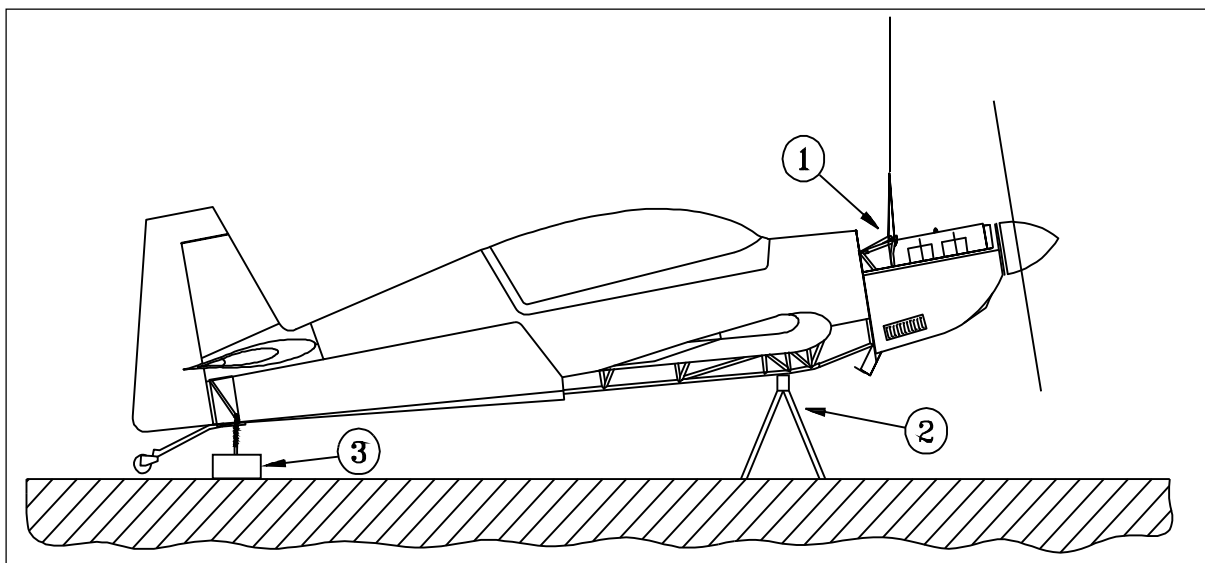
CAUTION

Prevent damage of ventilation tubing, brake lines and drains, when shoring the aircraft.

- 4 Shore the aircraft by means of two supports (2), which are to put under the left and right bottom longeron each in the area behind the landing gear as shown in Figure 2. This is possible also, when the landing gear is installed.

WARNING

Maintain hoisting strap as a security device to prevent nose over of the aircraft during maintenance work.



*Shoring the Front
Figure 2*

07-20-02

Shoring the Tail

Refer to Figure 3.

- 1 Secure the main wheels with wheel chocks.
- 2 Make available two ca. 2.5 feet high, ca. 1 foot wide and ca. 3 feet long supports.
- 3 Cushion the supports.

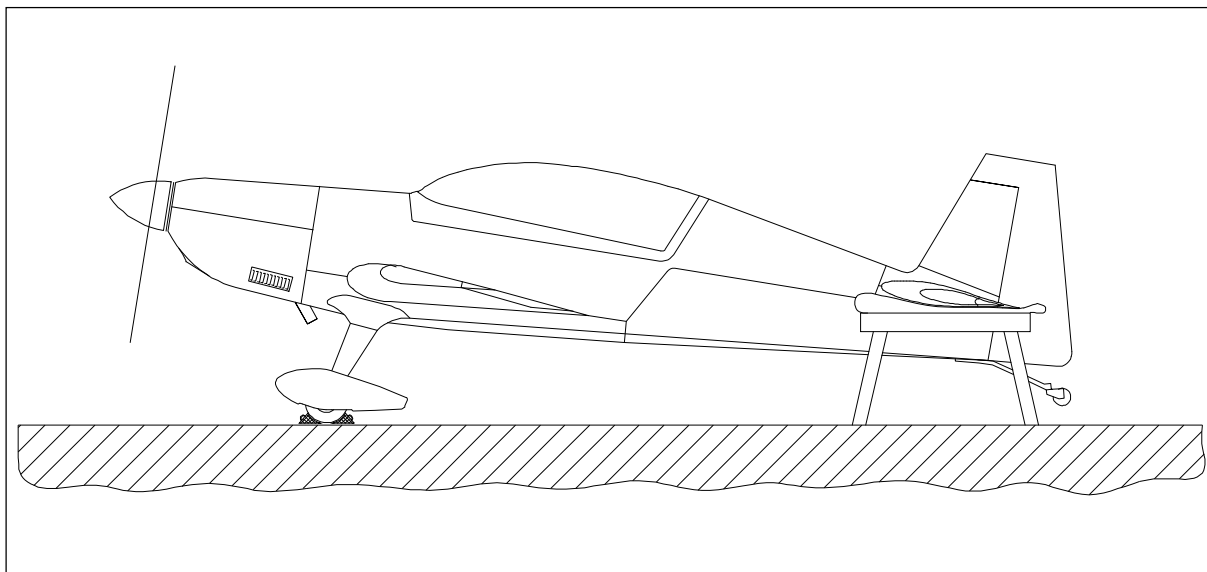
CAUTION

Don't handle the elevator when lifting the tail.

WARNING

Do not lift the tail higher than necessary for supporting. The aircraft may tilt onto the nose.

- 4 Lift the tail some centimeters by handling carefully the horizontal fins and put the cushioned supports under each side of the horizontal stabilizer.



Shoring the Tail
Figure 3

Chapter 08

Leveling and Weighing

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Chapter	Title	
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08-00-00

GENERAL

This chapter contains all information and procedures that are necessary for weighing and leveling the EXTRA 200 and for determining the Center of Gravity.

Weigh the aircraft and determine the Center of Gravity each 5 years, after installation of additional equipment or after repairs.

I M P O R T A N T

Weigh, read the scales and calculate with carefulness. Incorrect weighing or determination of Center of Gravity endanger the pilot and the aircraft.

08-10-00

WEIGHING AND CALCULATION OF C OF G

N O T E

Weigh the aircraft only on even floor and in closed halls (wind protected). Use three identical scales.

- 1 Ensure that the aircraft is fully equipped with equipment in locations according to the equipment list (PILOT'S OPERATING HANDBOOK & FLIGHT MANUAL (POH&FM), Section 6).
- 2 Defuel the aircraft (wing tanks, center and acro tank) to the unusable fuel level.
- 3 Replenish engine oil to the minimum sump capacity for acrobatic flight (refer to POH&FM Section 1)
- 4 Remove foreign objects (e.g. tools, luggage).
- 5 Clean and dry the aircraft.
- 6 Put the rear seat to middle position and close canopy.
- 7 Weigh two of those wheel chocks that will be used for securing the main wheels. Enter the weight below in Page 5 "Tare weight scale 1/2 (chocks)".
- 8 Weigh the jack that will be used for jacking the tail wheel. Enter the weight below in Page 5 "Tare weight scale 3 (jack)".
- 9 Roll the main wheels onto the scales 1 and 2.
- 10 Level the aircraft as per ch. 08-20-00.
- 11 Put the control surfaces to neutral position.
- 12 Drop perpendiculars from the underside of the fire wall, the centers of the main wheels and the tail wheel and mark on the floor to get the arms X_1 and X_2 (see Page 6).
- 13 Enter the arms on page 6.
- 14 Read the scales and enter the weights below. Calculate the net weights and transfer the values to Page 6.

15 Calculate C of G using the formula given below
(Page 6).

Gross weight scale 1 kg

Tare weight scale 1 (chocks) -. kg

Net weight scale 1 (W_1) kg

Gross weight scale 2 kg

Tare weight scale 2 (chocks) -. kg

Net weight scale 2 (W_2) kg

Gross weight scale 3 kg

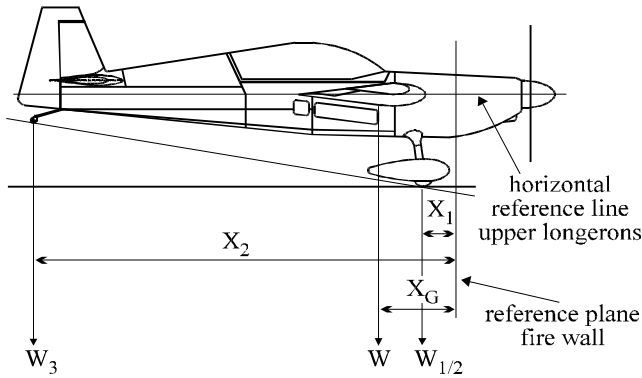
Tare weight scale 3 (jack) -. kg

Net weight scale 3 (W_3) kg

Empty Weight and Center of Gravity Position EXTRA 200

Data according to "TC Data-Sheet" and "Pilot's Operating Handbook and LBA approved Airplane Flight Manual" Doc.-No.: EA - 07701

Equipment according to Equipment List dated:



Legend:

- X_1 = Arm: fire wall - main wheels
- X_2 = Arm: fire wall - tail wheel
- X_G = Arm: fire wall - Center of Gravity
- W_1 = Net weight main wheel LH
- W_2 = Net weight main wheel RH
- W_3 = Net weight tail wheel
- W = Empty weight

$$X_G = \frac{W_1 \cdot X_1 + W_2 \cdot X_1 + W_3 \cdot X_2}{W}$$

$$W = W_1 + W_2 + W_3$$

Item	Weight	Arm	Moment
Main wheel LH	(W_1) kg	(X_1) cm	= kgcm
Main wheel RH	(W_2) kg	(X_1) cm	= kgcm
Tail wheel	(W_3) kg	(X_2) cm	= kgcm
Empty weight	(W) kg	Total moment	kgcm

$$\frac{\text{Total moment}}{\text{Empty weight}} = X_G$$

Empty weight is (W) kg*.

- W_{\min} : 545kg
- W_{\max} : 606kg (acro II)
- W_{\max} : 591kg (acro I)
- W_{\max} : 646kg (Normal Cat.)

Center of Gravity is (X_G) cm aft fire wall.

Weighing performed by:

Aircraft Inspector:

Sign:

* If value exceeds the given tolerances, contact the manufacturer.

08-20-00

LEVELING

NOTE

Level the aircraft only on even floor and in closed halls (wind protected).

- 1 Secure each main wheel with two wheel chocks.

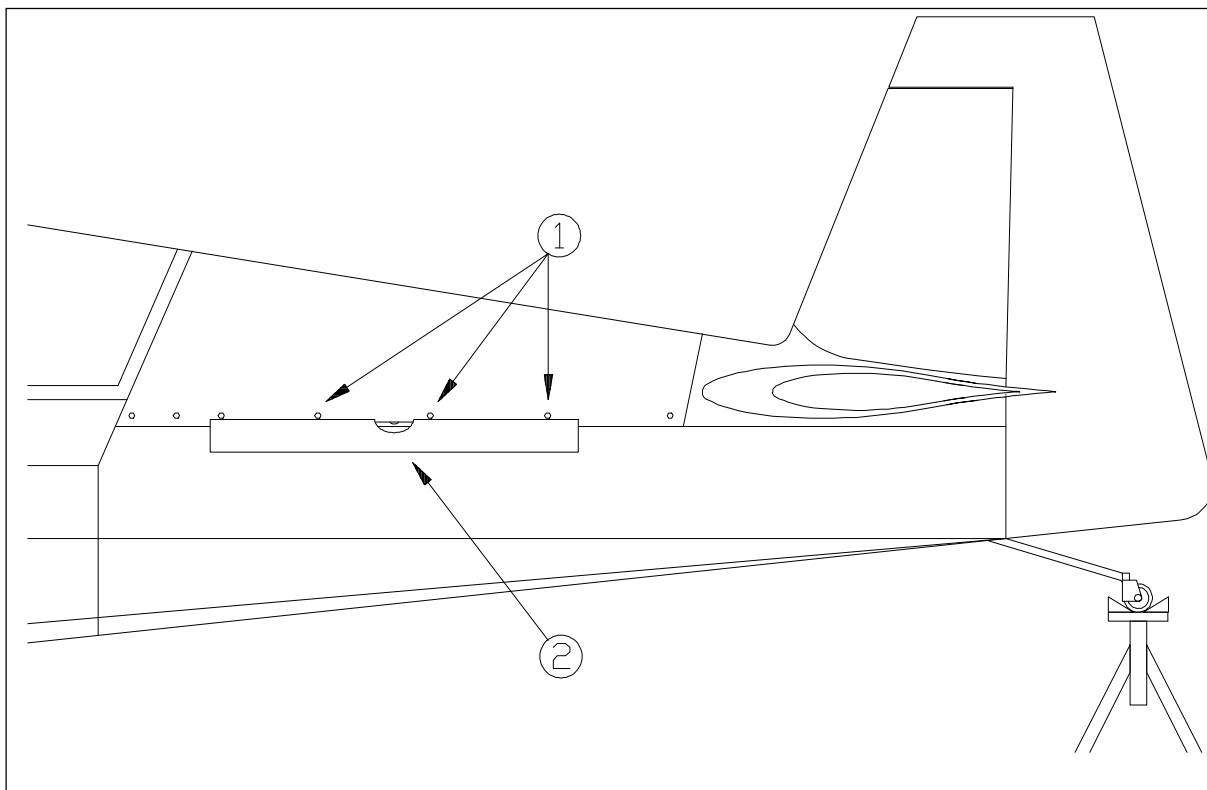
WARNING

Do not lift tail wheel higher than necessary for leveling. The aircraft may tilt onto the nose.

CAUTION

Prior to levelling, ensure aircraft is clear of obstructions.

- 2 Lift tail and put the jack (height: ~90 cm (~3 ft)) under the tail wheel, which has to be in the rearmost position.
- 3 Level the aircraft to its horizontal reference line using a spirit level (2), which is to put under the bolts of the rear main fuselage cover (1, Figure 1). Adjust pitch by changing the jack height.



*Leveling
Figure 1*

Chapter 09

Towing and Taxiing

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09-00-00

GENERAL

This chapter describes the procedures and precautions necessary for proper ground handling of the EXTRA 200.

09-10-00

TOWING

DANGER

When preparing for ground handling operation ensure that the ignition switch is off.

The aircraft should be moved on the ground by hand without using a towing vehicle or tow bar. For moving the aircraft on the ground, push by hand the wing leading edges or pull at the inboard portion of the propeller blades.

09-20-00

TAXING

Before attempting to warmup or taxi the aircraft, ground personnel should be checked by qualified pilots or other responsible personnel. All taxiing should be done at slow speed, and the controls should be positioned such that the effects of gusty wind are minimized.

CAUTION

Taxiing over loose gravel or cinders should be done at low engine speed to minimize damage to the airframe surfaces due to stone damage.

The aircraft is taxiing as follows:

- 1 Start and warm engine up in accordance with the Pilot's Operating Handbook, Section 4 "Starting Procedures".

CAUTION

Only operate with the propeller at minimum blade angle (High RPM).

- 2 Taxi forward a few feet and check brake effectiveness.

- 3 While taxiing, make shallow turns to test the brakes and the steerable tail wheel if installed.
- 4 Keep the Mixture in "FULL RICH" position.

Chapter 10

Parking, Mooring, Storage and Return to Service

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10-00-00

GENERAL

This chapter provides the procedures recommended to park or to moor the aircraft so that the likelihood of ground damage is minimized.

10-10-00

PARKING / STORAGE

When parking the aircraft, set the nose in the wind. Additionally both main wheels must be chocked fore and aft to prevent movement of the aircraft.

CAUTION

When chocking the wheels, ensure that the chocks used are not too large to come in contact with the wheel farings. The use of chocks that are too large may damage the farings.

NOTE

For maximum protection, hangar the aircraft during severe weather and strong winds.

The outdoor storage requires adequate mooring and tie-down facilities. The following precautionary measures are recommended for keeping the aircraft serviceable and ready-to-fly.

1. Refer to Chapter 10-20-00 "Mooring" for mooring instructions.

DANGER

Do not rotate the propeller with the master switch on and the battery connected. The engine could start unintentionally and may cause serious injuries or death.

2. Maintain an oil film on internal engine parts, frequently pull the propeller through. Run the engine for 15 minutes at 1500 RPM (or until oil temperature normalizes) once every two weeks.
3. After the engine run, pressurize the fuel system, push the mixture control to RICH, and open throttle half way to fill the fuel injector with fuel.
4. Install protective covers over pitot tube, engine cowling openings, canopy, etc.
5. Maintain a good wax finish on all exterior surfaces.

10-20-00

MOORING

This section provides the procedures recommended for a normal tie-down of the aircraft.

Proper tie-down procedure is the best precaution against damage to the aircraft by gusty or strong winds. To tie-down the aircraft securely, proceed as follows:

1. Head the aircraft into the wind
2. Place chocks fore and aft of each main wheel.

CAUTION

When chocking the wheels, ensure that the chocks used are not too large to come in contact with the wheel fairings. The use of chocks that are too large may damage the fairings.

3. Drive stakes into the ground approximately three feet outboard of each wing tip and to either side of tail wheel.
4. Install one tie-down ring in each wing tip rib.
5. Tie a sufficiently strong rope to each wing tie-down ring and anchor to the ground stakes. Allow a little slack in each tiedown rope.
6. Tie the center of the rope to the tail wheel fork and anchor the rope ends to the ground stakes at either side of the tail wheel.
7. Ensure that the canopy is closed waterproof and locked.

10-30-00

RETURN TO SERVICE

If the aircraft has been storage for an extended period of time, it is advisable to perform a 50-hour periodic inspection. Refer to Chapter "05-20-04 Scheduled Maintenance Checks".

Chapter 12

Servicing

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12-00-00

GENERAL

This chapter describes the procedures and precautions necessary for proper servicing of the EXTRA 200. The specified intervals (refer to Chapter 05) are considered adequate to meet average requirements under normal operating conditions.

It is advisable, however, to shorten service and maintenance intervals when operating under abnormal conditions, such as extreme temperature ranges, dusty atmospheric conditions, high humidity and moisture, unimproved airport facilities, or unusual operating requirements.

12-10-00

REPLENISHING

The replenishing procedures contained in this section provide the proper methods for replenishing consumed fuel, engine oil and brake fluid. Also included are methods for inflation of tires.

12-10-01

Refueling

Refueling is accomplished by pumping or pouring fuel into the two wing tanks and the center tank through their respective filler caps. When fueling the aircraft, the following safety precautions must be followed:

DANGER

- * **Never refuel the aircraft with the engine running.**
- * **Always ensure that the aircraft is grounded before refueling.**
- * **Ensure that no one is smoking within 100 feet of the aircraft.**
- * **Ensure that all aircraft electrical systems are deenergized while refueling.**
- * **Ensure that no aircraft radar or powerful transmitters are operating within 100 feet of the aircraft during fueling.**
- * **If fuel is spilled, ensure that the area of spillage is thoroughly flushed with water and that all residual fuel and vapor have dissipated or neutralized prior to starting the aircraft engine.**

Fuel Grade and Limitations

The recommended minimum aviation grade fuel for the AEIO-360-A1E engine is AVGAS 100 or 100LL.

IMPORTANT

Under no circumstances should fuel of lower octane rating or automotive fuel (regardless of octane rating) be used. It is recommended that personnel be familiar with Service Instruction No.1070 regarding specified fuel for Lycoming engines.

Fuel System Capacities

The EXTRA 200 fuel system capacities are as follows:

Wing tank LH	43 l	(11.3 US Gallons)
Wing tank RH	43 l	(11.3 US Gallons)
Center and acro tank	36 l	(9.5 US Gallons)
Total fuel capacity	122 l	(32.1 US Gallons)

The usable fuel capacities are as follows.

Wing tank LH	42,5 l	(11.2 US Gallons)
Wing tank RH	42,5 l	(11.2 US Gallons)
Center and acro tank	32 l	(8.5 US Gallons)
Total fuel capacity	117 l	(30.8 US Gallons)

IMPORTANT

After refueling, it has to be ensured that both fuel tank caps are securely installed prior to flight.

Additionally one has to wait at least five minutes for moisture and sediment to settle before draining and checking the fuel drain valves.

12-10-02**Defueling****DANGER**

During the aircraft defueling observe the safety precautions specified in section "12-10-01 Refueling".

Using appropriate containers, defuel the aircraft by pumping or by siphoning off fuel through the filler ports (only for the wing tanks) and by opening the gascolator and center tank drain valves.

12-10-03

Fuel Drains

The EXTRA 200 has three fuel drain valves to provide for drainage of moisture and sediment. Two fuel drain valves are located under the fuselage in the area of the landing gear; the third fuel drain which is interconnected to the fuel gascolator is located in the lowest point at the right side of the firewall.

DANGER

Do not drain the fuel system when the engine or the exhaust is hot or while the wind is strong.

A quantity of fuel must be drained prior to the first flight of the day and at least five min. after refueling to inspect for water and/or contamination. Continue draining until free of water or contamination.

IMPORTANT

After draining, you have to be sure that the fuel drain valve is returned to the closed position and the valve is not leaking outside the aircraft.

12-10-04

Replenishment of Engine Oil

The engine oil replenishment is accomplishment by pouring oil into the oil filler spout. The oil quantity can be conveniently checked by use of the dipstick attached to the oil filler spout cap.

Oil quantity

The oil quantity is checked as follows:

- 1 Check oil level after engine has been stopped long enough for oil to drain back into sump.
- 2 Open the hatch on the upper part of the cowling.
- 3 Unscrew oil filler cap and dipstick from engine oil filler spout.
- 4 Remove cap and dipstick from engine and wipe oil from dipstick with a clean cloth or paper towel.

- 5 Return dipstick into filler spout and tighten finger tight.
- 6 Unscrew and remove dipstick. Check oil level on dipstick versus the markings stamped on the dipstick.
- 7 If replenishment is required see "Replenishment of Engine Oil" below.
- 8 Return dipstick into filler spout and tighten cap finger tight.

CAUTION

When tightening the filler spout cap ensure that is secure. But do not overtighten, as this may damage the "O" ring seal in the cap.

- 9 Close the hatch on the upper part of the cowling.

Replenish engine oil

Replenish engine oil using oil of the following specification:

Aviation Grade Straight Mineral oil

MIL-L-6082 or SAE J1966 Aviation Grade Straight Mineral oil shall be used to replenish oil supply during the first 25 hours of operation and at the first 25-hour oil change. Continue to use this grade of oil the first 50 hours of operation or until oil consumption has stabilized. The aircraft is delivered from EXTRA-Flugzeubau with proper break-in oil (MIL-L-6082 Aviation Grade Straight Mineral oil).

Ashless Dispersant Oil

MIL-L-22851 or SAE J1899 Ashless Dispersant Oil shall be used after the first 50 hours of the engine operation.

Additive Oil

If an engine has been operating on straight mineral oil for several hundred hours, a change to additive oil should be undertaken with caution. If the engine is in an extremely

dirty condition, the switch to additive oil should be deferred until after engine has been overhauled.

When changing from straight mineral oil to additive oil take the following precautionary steps:

IMPORTANT

- 1 Do not mix additive oil and straight mineral oil. Drain straight mineral oil from engine and fill with additive oil.**
- 2 Do not operate engine longer than five hours before again changing oil.**
- 3 Check oil screen for evidence of sludge.**

Change oil and clean oil screen element every 10 hours if sludge is evident. Resume normal oil drain periods after sludge conditions improve.

Recommended Viscosity of Engine Oil:

Average Ambient Temperature	Air	MIL-L-6082 or SAE J1966 Spec. Mineral Grades	MIL-L-22851 or SAE J1899 Spec. Ashless Dispersant Grades
All Temperature		-----	SAE 15W50 or SAE 20W50
Above 27°C (80°F)		SAE 60	SAE 60
Above 16°C (60°F)		SAE 50	SAE 40 or SAE 50
-1°C (30°F) to 32°C (90°F)		SAE 40	SAE 40
-18°C (0°F) to 21°C (70°F)		SAE 30	SAE 30, SAE 40 or SAE 20W40
-18°C (0°F) to 32°C (90°F)		SAE 20W50	SAE 20W50 or SAE 15W50
Below -12°C (10°F)		SAE 20	SAE 30 or SAE 20W30

NOTE

Refer to latest revision of Lycoming Service Instruction No. 1014 for further information.

Replenish engine oil as follows:

- 1 Open the hatch on the upper part of the cowling and unscrew oil filler cap.
- 2 Using a clean paper towel wipe any oil foreign material from the edges of the filler spout opening. Also wipe oil from the dipstick.
- 3 Pour oil of proper specification and viscosity into filler spout to achieve desired oil level.
- 4 Replace oil filler spout cap/ dipstick and tighten finger tight. Close the hatch on the upper part of the cowling and secure engine cowling.

Oil System Capacities:

	U.S. Quarts	Liters	Imp. Quarts
Total Engine Capacity	8	7,6	6,7
Minimum Safe Quantity Acrobatic:	6	5,7	5
Minimum Safe Quantity Normal:	4	3,8	3,3

12-10-05

Oil Change

The engine oil must be changed after the first 25 hours of operation and then after intervals of 50 hours. It should be refilled in accordance with section "12-10-04 Engine Oil Replenishing" and the latest revision of Lycoming Service Instruction No. 1014.

Change engine oil as follows:

- 1 Remove the cowlings of the aircraft.
- 2 Cut the safety wire securing the oil drain plug and remove.
- 3 Place a suitable container under the oil drain.

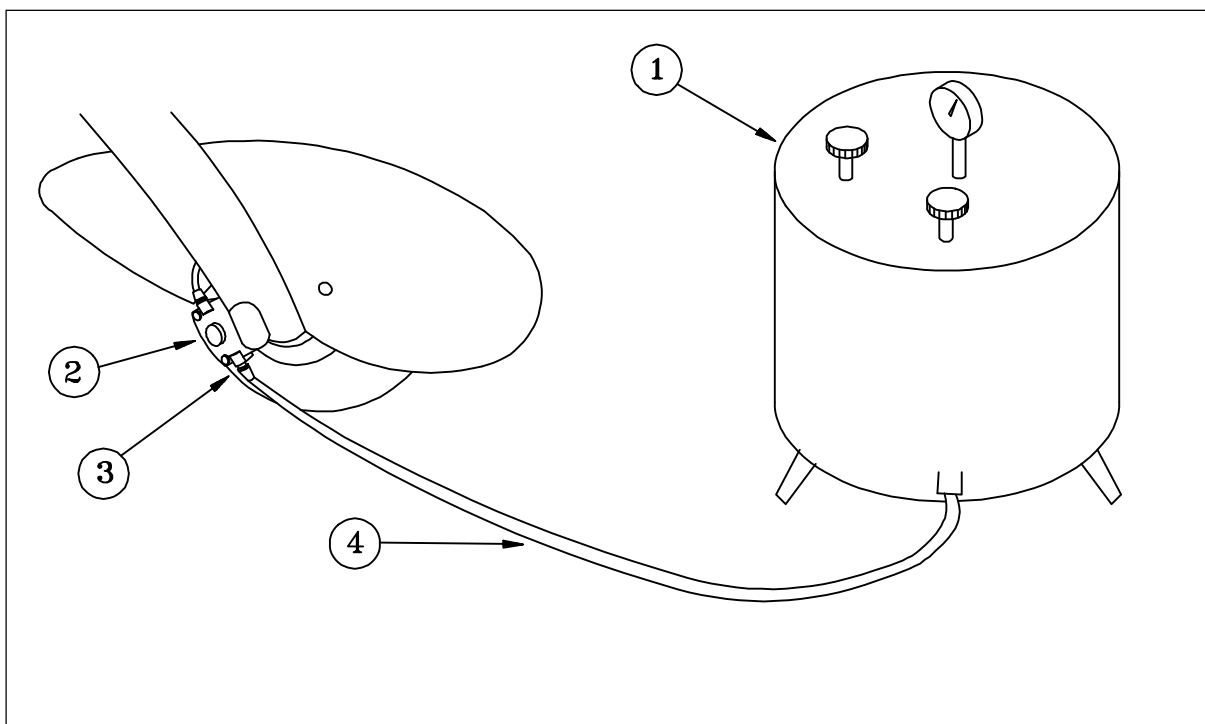
- 4 Unscrew engine oil drain plug and allow the oil to drain thoroughly.
- 5 Using a clean rag or paper towel, wipe drain plug clean and area on engine around oil drain.
- 6 Reinstall drain plug and safety wire.
- 7 Remove and inspect oil filter for metal particles and install new oil filter in accordance with Lycoming Operating Manual.
- 8 Replenish engine oil as per Chapter 12-10-04.
- 9 Reinstall and secure engine cowlings.

12-10-06

Replenishment of Brake Fluid

In order to assure proper brake action, it is necessary to have positive transfer of hydraulic pressure through the system. Any air trapped in the system must be removed. Follow the procedure described below using a bleed tank (1, Figure 1):

- 1 Remove engine cowlings as per Chapter 51-00-01.
- 2 Remove fluid reservoir filler plug and screw a clear plastic hose with appropriate fitting into the filler hole at the top of the fluid reservoir.
- 3 Remove bleeder fitting cap (3) of the wheel brake assembly (2).
- 4 Be certain that the bleeding equipment to be used is absolutely clean and is filled with brake fluid that conforms to Specification MIL-H-5606, (refer to Chapter 05-20 Lubrication Charts) and is uncontaminated.
- 5 Maintain an adequate supply of fluid during the entire operation. A low fluid supply will allow air to be drawn into the system.



Replenishment of Brake Fluid
Figure 1

- 6 Ensure master cylinders are in neutral position.
- 7 Attach the connector hose (4) to the bleeder fitting.
- 8 Turn the bleeder fitting 1/2 rotation to the left for opening.
- 9 Slowly pump clean hydraulic fluid in the system. Bleeding should continue until no more air bubbles are expelled from the system (observe the immersed end of the clear hose), and a firm brake pedal is obtained (fill each side of the system with min. 0.33 ltr (0.1 U.S Gallons) for complete change).
- 10 Fill the fluid reservoir up to full reservoir capacity.
- 11 Reinstall fluid reservoir filler plug.
- 12 Close bleeder fitting.
- 13 Disconnect the connector hose.
- 14 Reinstall bleeder fitting cap.
- 15 Check the brake operation.

12-10-07

Tire Inflation

For the EXTRA 200 the required tire pressure is 2.6 bar (38 Psi) for both main wheels. When inflating tires, it has to be used regulated air pressure through valve stems.

12-20-00

SCHEDULED SERVICING

12-20-01

Exterior Cleaning

The painted surface of the aircraft have a long lasting, all-weather finish and should require no buffing or rubbing out in normal conditions. However, it is desirable to wash and polish it to preserve the outstanding exterior. Cleaning is best accomplished with cool water, mixed with a mild aircraft detergent, if required.

CAUTION

Do not use so called "mild" household detergents to wash aircraft exterior. Such detergents may damage finish and corrode aluminum components.

In order to remove especially heavy dirt from the wing leading edges due to insect splatter and the like, it is good practice to undertaken cleaning immediately after the flight, since deposits of this kind are more difficult to remove when dry. All lubricated components are to be covered before cleaning.

Roughly twice a year, the complete surface should be treated with a non-silicone car polish and repolished to high gloss. But do not apply wax or use pre-wax cleaners during initial paint curing period. Use only mild aircraft detergent and cool water when washing exterior during the first 90 days after repainting.

CAUTION

Never use cleaning agents containing silicone!

In order to maintain good visibility at all times, the canopy Plexiglas should be given good care and kept clean at all times. Techniques and materials used to clean glass should be avoided since Plexiglas is softer than glass and subject to damage by solvents and abrasive glass cleaning agents.

Therefore it should be pay particular attention to using ample water applied with clean sponges and leather, otherwise even the smallest dust particles will tend to scratch the glazing.

CAUTION

Never polish plexiglass dry!

Dull or scratched canopy sections can be returned to their transparent state by treating with especially formulated plexiglass cleaning agents.

12-20-02

Interior Cleaning

Prior to the first acrobatic flight of the day it is recommended to clean the interior with a vacuum cleaner to remove dust and loose dirt. If liquid is spilled on the cockpit floor, blot it up promptly with cleansing tissue or rags. Continue blotting until no more liquid is taken up.

CAUTION

Never use gasoline, benzine, alcohol, acetone, carbon tetrachloride, fire extinguisher fluid, anti-ice fluid, lacquer thinner, or glass cleaner to clean the canopy. These materials will damage the canopy and may cause severe crazing.

12-20-03

Engine Cleaning

Accumulation of dirt and oil within the engine compartment creates a fire hazard and hampers inspection. All cleaning operations have to be performed in well ventilated work areas, and it is ensure that adequate fire-fighting and safety equipment is available.

The engine is cleaning as follows:

1 Allow the engine after running to cool before cleaning.

CAUTION

2 The magnetos, alternator, starter, the air inlets and the engine cowling (the inside of the engine cowling is covered with water soluble fire protection paint) must be protected against cleaning agents.

3 Wash down engine compartment using a nonflammable engine cleaning agent.

- 4 Thoroughly rinse with clean, warm water to remove all traces of cleaning agents.
- 5 It is very important not to start the engine before the cleaning agent has been completely removed or has evaporated.

12-30-00

UNSCHEDULED SERVICING

12-30-01

Removal of Snow and Ice

After snowfall, the snow should be removed immediately from surface of the aircraft. Otherwise the water formed from melted snow will freeze on the surface or in slots and gaps of fairings.

CAUTION

Do not use sharp tools for removing the snow.

If the aircraft shows sign of ice formation, it is recommended to defrost in a room. Remove as much snow as possible with a soft bristle boom, make sure the wheels and brakes are clear, and tow the aircraft into a room with elevated temperature. This method is particularly desirable, since it will melt any undetected ice and snow that could constitute a flight hazard.

Chapter 20

Standard practices - Airframe

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20-00-00

GENERAL

The design of the airframe is according to standard procedures and requires no special tools or procedures for maintenance. For that reason, only the bolts used in the Extra 200 with relevant torque values and measuring techniques are described in the following.

20-10-00

STANDARD PRACTICES AIRFRAME

20-10-01

Type of Bolts

For the Extra 200, LN-bolts (LN="Luftfahrt Norm"), AN-bolts (AN="Army/Navy") and DIN-bolts (DIN="Deutsche Industrie Norm") are used. The type of bolt can be identified by the designation on bolt head and by the surface treatment.

LN-Bolts

Hex head LN 9037, LN 9038 K and LN 9355 aircraft bolts are made of high-strength type 1.7220.5 alloy steel. The bolts are centerless ground, threaded after heat treatment and cadmium plated per specification LN 9368-3000.2.

Bolts according LN 9037 are standard aircraft bolts with undrilled shank. The specification LN 9355 indicates bolts with shank drilled for cotter pin. The specification LN 9038 K indicates bolts with drilled head for safety wire and a shank up to the head.

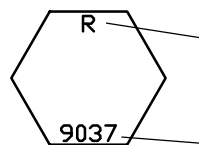
The adding numbers after the dash of bolt spec. indicates the dimensions of the bolt. These numbers are not marked on the head of the LN bolt. Measure the diameter and length to specify the type dimension of the LN bolt. The length of LN aircraft bolt is measured from under the head to the end of the shank.

Example: **LN 9037-08042**

Bolt Head Identification

Metric thread size (M8=8mm)
and Length (042=42mm/
1.65 inch)

Bolt Head:



Letter (R,L,P,H = Identification of
Manufacturer)

LN Specification

AN-Bolts

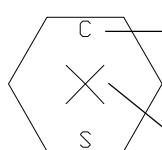
Hex head AN aircraft bolts are made of high-strength type 4037 or 8740 alloy steel. The bolts are centerless ground, threaded after heat treatment and cadmium plated per specification QQ-P-416A, Type II, Class 3.

For the Extra 200 bolts with shank drilled for cotter pin or drilled head for safety wire are used. The adding letter "A" after the dash number specifies bolts with undrilled shank. For bolts with drilled head a letter "H" is added after the AN number. The length of AN aircraft bolts is measured from under the head to the end of the shank.

Example: AN 3 - 5A

Bolt Head Identification
 Diameter $\frac{3}{16}$ " (4.8 mm)

AN hex head bolt
 Length $\frac{5}{8}$ " (15.9 mm)
 Undrilled shank



Letter (Identification of Manufacturer, not always given.)

Cross (Alloy Steel)

Letter (also adjected)

DIN-Bolts

Hex head DIN 931, DIN 933 and hex socket head DIN 912 bolts are standard bolts made of steel with undrilled shank. The surface treatment is chromatinized yellow.

Unlike the DIN 931 and DIN 912 the shank of a DIN 933 bolt goes up to the head. The numerical code shown on the head of a DIN bolt specifies the strength type. Also, most bolts will bear a wide variety of finitals or symbols which identify the manufacturer. Measure the diameter and length to specify the type dimension of the DIN bolt. The length of DIN bolt is measured from under the head to the end of the shank.

Example: DIN 931, M10 x 80 - 8.8

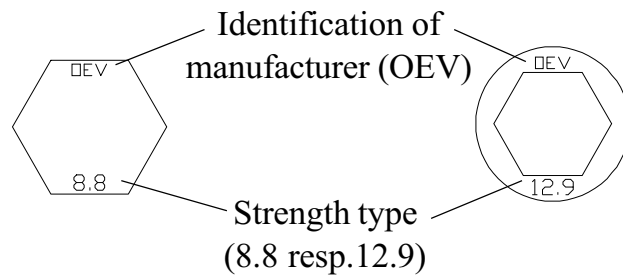
Bolt Head Identification

Standard hex head bolt
 Metric thread size M10
 Length 80mm (3.15")
 Strength type 8.8

Bolt Head:

DIN 931:

DIN 933:



20-10-02

Width Across Flats for Metric Bolts

Thread diameter	Width across flats
M4	7 mm
M5	8 mm
M6	10 mm
M8	13 mm
M10	17 mm
M12	19 mm
M16	24 mm
M20	30 mm
M24	36mm

20-10-03**Torque Values**

Nuts, except of counter nuts are mainly stop nuts according to LN 9348 or self-locking nuts according to AN 363.

a) Standard torque values allowed for bolts and nuts according to DIN and LN must be adhered to as follows:

Metric thread size	Torque value	
	(Nm)	(in.lbs)
M4	1,8	16
M5	3.9-4.3	35-38
M6	6.2-6.8	55-60
M8	15.2-16.8	144-148
M10	29.5-32.5	261-287
M12x1.5	51-57	452-504

b) Standard torque values allowed for bolts and nuts according to AN and MS must be adhered to as follows:

Inch thread size	Torque value	
	(in.lbs)	(Nm)
1/4 -28	3,5-4,5	30-40
5/16 -24	6,7-9,5	60-85
3/8 -24	10,7-12,5	95-110
7/16 -20	30,5-33,9	270-300
1/2 -20	32,8-46,3	290-410
9/16 -18	88,1-67,8	480-600

IMPORTANT

On all bolt connections, the specified torque and locking method must be observed. Do not reuse stop nuts if they can be run up finger tight!

20-10-04**Special Torque Values**

Special torque values for the following items must be adhered to:

Item	Torque value	
	(Nm)	(in.lbs)
Engine Mounting (Bolts AN7-36A / Metal Stop Nut NAS 363C-720)	55	480
Engine Mount to Fuselage (Bolt Din 912, M12x160-12.9 Stop Nut DIN 985, M12-8-B2C)	80	720
Longeron Cutout Bridge (Upper Bolts DIN 912 M8x180-8.8 Stop Nut LN 9348-08) (Lower Bolt DIN 912 M10x230-8.8 Stop Nut LN 9348-10)	18	160
	33	292
Horizontal Stabilizer Front Spar Bolts (Bolt LN 9037-10054 Stop Nut LN 9348-10)	33	292
Horizontal Stabilizer Rear Spar Bolts (Bolt LN 9037-10042 Stop Nut LN 9348-08)	14	124
Vertical Stabilizer Rear Spar Bolt (Bolt LN 9037-10042 Stop Nut LN 9348-10)	38	336
Wing Main Spar Safety-Bolts (Bolt LN 9038 K-08020)	15	133
Brake Back Plate Bolts (Cleveland)	Refer to Cleveland Maintenance Manual	
Wheel Assembly Bolts (Cleveland)		
Torque for Engine	Refer to Lycoming Overhaul Manual	
Torque for Propeller	See MT-propeller Installation Manual E-124	

IMPORTANT

On all bolt connections, the specified torque and locking method must be observed. Do not reuse stop nuts!

20-10-05

Measuring Techniques

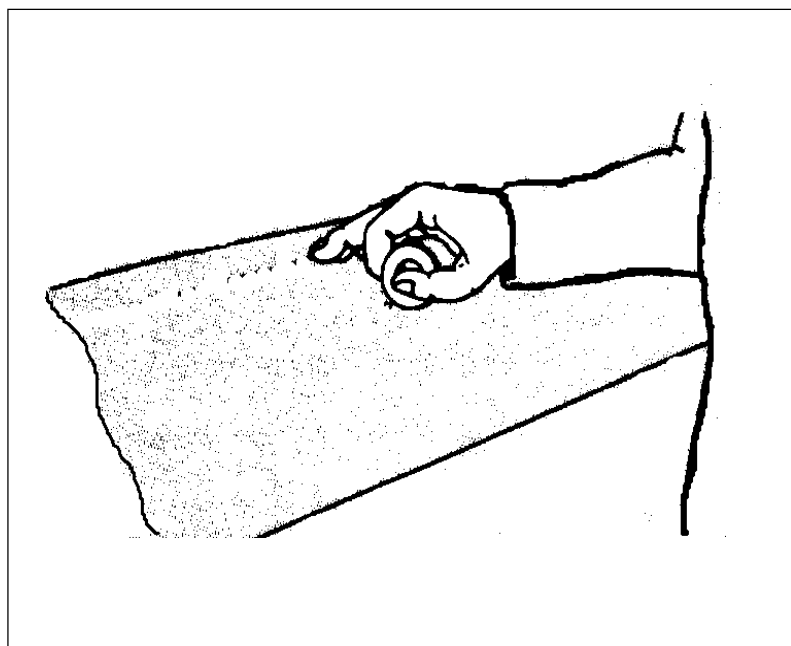
When using stop nuts, the safety torque (friction torque or braking torque) should be added to the table standard values. This value is indicated on the dial of the torquemeter, before the nut contacts the attachment surface.

Always torque nuts for fastening, if possible. When bolts are torqued there might be an additional torque value due to shaft friction. This torque can be determined by a torquemeter before the bolt head contacts the attachment surface and should be added to the table value.

20-10-06

Coin Tapping

Inspection for damage is more critical for composite structure than for conventional structures. A large washer or similar object is a valuable tool for detecting debonds in the airframe surface. When a large washer is lightly bounced against a solid structure, a clear metallic ring should be heard. If delamination is present, a dull thud will be heard. This procedure is shown in the following Figure 1:



Coin Tapping
Figure 1

20-10-07

Flexible Hose

The EXTRA 200 is equipped for the oil, fuel, and brake lines with "AEROQUIP-hoses Aerospace Division". From Serial No. 3 equivalent "STRATOFLEX-hoses Aerospace Connectors Division" are used. Later, from Serial No. 22 KNAPP hoses are used for the brake system in the cockpit area and for the flight instruments. Maintenance work or overhaul of these hoses requires the attention of the manufacturer informations and bulletins. For the replacement of hose and hose assemblies the EXTRA-Flugzeugbau GmbH should be contacted.

Replacement of Flexible Hose

Hose and hose assemblies should be checked for deterioration at each inspection period. Leakage, separation of the cover or braid from the inner tube, cracks, hardening, lack of flexibility, and excessive "cold flow" are apparent sign of deterioration and reason for replacement. The term "cold flow" describes the deep, permanent impressions in the hose produced by pressure of hose clamps or supports.

The entire assembly must be replaced, if failure occurs in a flexible hose before the time limit (refer to Chapter 05-10-02 *Overhaul Schedule*) of the hose is achieved. Obtain a new hose assembly of the correct size and length, complete with factory-installed end fittings.

Installation of Flexible Hose Assemblies

The flexible hose must not be twisted on installation, since this reduces the life of the hose considerably and may loosen the fittings. Twisting of the hose can be determined from the identification stripe running along its length.

The minimum bend radius for flexible hose varies according to size and construction of the hose and the pressure under which the hose is to operate. Bends that are too sharp will reduce the bursting pressure of flexible hose considerably below its rated value.

The flexible hose should be installed so that it will be subject to a minimum of flexing during operation.

The AEROQUIP- hoses inside the engine compartment are to be covered with AEROQUIP AE102 fire sleeves. The correct size of fire sleeves can be taken from the following table:

NOTE

The STRATOFLEX-hoses used in the engine department are factory equipped with fire sleeves.

Hose	Fire sleeve
AE303-4	AE102-10
AE303-6	AE102-12
AE303-8	AE102-16
AE303-10	AE102-18

20-10-08**Fittings**

Generally AN-fittings are used in the Extra 200 for the oil lubrication, the fuel system, and the brake system (the latter up to Ser. No. 21). All these fittings are made of aluminium alloy and are colored blue for identification purposes. The dash number following the AN number indicates the size of the hose for which the fitting is made, in 16ths of an inch. This size measures the inner diameter (I.D.) of hose. The material code letter (Aluminum alloy: code D) follows the dash number.

Example: Elbow AN 822-8D

NOTE

Apply Loctite 577 on all National Pipe Threads (NPT) before installation.

20-20-00

ASSEMBLY INSTRUCTION

20-20-01

General

N O T E

Make appropriate logbook entry of compliance with this Assembly Instruction after Container Shipping.

In case of the aircraft is delivered in a container it has to be assembled on arrival.

For assembly of aircraft main components follow the instructions as outlined in the Chapter 20-20-02.

These instructions can not replace the skill, craftsmanship and sound technical knowledge of qualified personnel. In case of doubt or lack of information, the manufacturer of the respective component should be contacted for advice.

Unless otherwise specified all bolts and connections should be torqued as listed in Chapter 20-10-03. At some locations special torque values considered necessary. Refer to Chapter 20-10-04. The stated direction "Front" and "Rear" are to be considered in respect of pilot's seating direction.

20-20-02

Assembly Instruction after Container Shipping

Complete each step of the assembly procedure in the order shown below.

- 1 Check the condition of fastening of the aircraft components in the container. Note any damage.
- 2 Remove the fuselage/engine assembly from the container. Prevent the aircraft from nosing over by keeping down the tail.
- 3 Weight the tail per Chapter 07.
- 4 Remove the aircraft components out of the container. Small parts, hardware, spinner dome and the wheel fairings You find in the cockpit.

- 5 Inspect all removed items for damage prior to assembly. Damaged items have to be replaced or if possible repaired according to Chapter 51.

CAUTION

In order to prevent the aircraft from nosing over the assembly has always to start with the empennage.

- 6 Prior to assembly remove engine cowlings, canopy, main fuselage cover including the rear support angle per Chapters 51 and 53.

NOTE

In contrast to the instructions given in the respective Chapters don't reinstall these items before completion of the whole assembly.

- 7 Remove provisional attached rudder and vertical stabilizer per Chapters 27 and 55.
- 8 Install horizontal stabilizer with elevator per Chapter 55. The procedure described there is also applicable to the installation of the complete horizontal tail. Consider to connect the ground bonding lead of the elevator too.
- 9 Connect elevator push pull rod actuator lever per Chapter 27-01-01.
- 10 Connect trim wire to the tab actuator lever using fitted clamp.
- 11 Inspect for full travel and elevator deflection in relation to stick movement.
- 12 Inspect for full travel and trim tab deflection in relation to trim handle movement.
- 13 Install the vertical stabilizer per Chapter 55.
- 14 Reinstall rudder to the vertical stabilizer per Chapter 27-21-01.
- 15 Inspect for full travel and rudder deflection in relation to rudder pedal movement.
- 16 Install the wing per Chapter 57.
- 17 Install navigation/strobe lights per Chapter 33-41-01.

- 18 Install propeller in accordance with MT-Propeller installation instructions E-124 latest revision.
- 19 Remove tail weight.
- 20 Check if all switches are in Off-position and connect battery.
- 21 Perform operational check of electrical equipment. Shut-off master switch after completion.
- 22 Perform operational check and rigging of control system.
- 23 Inspect fluid filled lines for leaks.
- 24 Check security of main spar bolts.
- 25 Install wheel fairings, main fuselage cover and rear support angle, canopy, engine cowlings, and access panels (Refer to Chapter 51-00-01 and 53).
- 26 Check all control surfaces for freedom of movement and security.
- 27 Perform a compass compensation according to „Aircraft Inspection and Repair FAA AC 43.13“.
- 28 Check correct servicing of aircraft.
- 29 Perform an engine run up. Refer to Chapter "05-20-04 Scheduled Maintenance Checks". Start the engine in accordance with the Pilot's Operating Handbook and Airplane Flight Manual (POH).
- 30 Inspect aircraft for foreign objects.
- 31 Final inspection by licensed aircraft inspector.

IMPORTANT

After first flight check fuselage interior/exterior for fuel leaks. Check all bolts on fairings and cover sheets for tight fit.

Chapter 24

Electrical Power

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24-00-00

GENERAL

This Chapter describes the electrical power system and its operation. This covers the battery system and the alternator system.

The battery system consists of the dryfit A200G (A212/24G) battery (Sonnenschein GmbH, Büdingen, Germany), the master relay and the associated wiring. The battery is located at the left engine side of the firewall; the master relay at the left cockpit side of the firewall.

The alternator system consists of the alternator (ALX8421, Electrosystems) with integrated DC converter and the B-00371-25 Lamar alternator control box which contains an voltage regulator adjusted to 13.8 Volts and an overvoltage trip cutting the circuit at 16 volts. The alternator is mounted at the right front of the engine. The alternator control box is located at the upper left of the firewall (engine side).

24-30-00

DC-GENERATION

(Refer to Chapter 91) Power for the electrical system is provided by an alternator and/or the battery. The alternator serves as the main component to power the electrical system and charge the battery during normal conditions. The battery is used for starting the engine and powering the electrical system when alternator power is not available (engine not running). The battery also powers the electrical system in case of alternator failure.

A rocker type master switch is used for energizing the master relay, which connects power to the electrical system.

The voltage regulator, receiving power from the battery via the master switch in combination with the field circuit breaker/switch, energizes the alternator field. With the alternator field energized, the operating alternator will produce an output to the electrical system. The voltage regulator varies the output voltage of the alternator to meet the requirements of the electrical system loads. An ammeter is installed into the system to provide an indication of current flow from or to the battery.

The negative side of the battery is connected to the aircraft steel tube design (negative ground). This provides a ground for the system through use of the steel tube design. The positive side of the battery is connected to the coil of the master relay. This relay remains in relaxed state until the master switch is placed to the ON-position. Placing the master switch in the ON-position provides a ground for the master relay energizing this relay. With the master relay energized, a circuit exists from the battery through an ammeter to the bus bar.

The bus bar powers the electrical equipment and accessories furnished on the aircraft. The energized master relay will also allow power from the battery to the starter relay.

Placing the 5 amp field circuit breaker/switch to the ON-position likewise will provide a circuit from the bus bar through a 40 amp alternator circuit breaker to the voltage regulator. The voltage regulator will supply and regulate voltage to the alternator field and protects circuit against

overvoltage. With the alternator operating (engine running) and the field energized, the alternator will develop electrical power. The alternator supplies power to the bus bar through the 40 amp alternator circuit breaker. With the alternator power available, the battery will be charged from the bus bar. The ammeter, which is in series with the battery and the bus bar will indicate the current flow to the battery. When the battery reaches a state of full charge, the ammeter will show an indication near "0".

24-31-00

MAINTENANCE PRACTICES

IMPORTANT

If replacement of wiring passing the firewall is necessary, renew the sealing of the bushing grooves and gaps at the engine side of the firewall. Use PRC-812 (Products Research & Chemical Corporation, USA) firewall sealant.

24-31-01

Battery

Removal/Installation

CAUTION

Ensure the master switch is in Off-position.

- 1 Remove the engine cowlings as per Chapter 51-00-01.
- 2 Disconnect the electrical wiring.
- 3 Remove the 4 attachment nuts (LN9348-06) and the top attachment frame.
- 4 Lift the battery out of its bottom frame and then remove.
- 5 Install in reverse sequence of removal.

24-31-02

Master Relay

Removal/Installation

CAUTION

Ensure the master switch is in Off-position.

- 1 Remove the upper engine cowling and main fuselage cover as per Chapter 51-00-01.
- 2 Disconnect electrical wiring.
- 3 Remove the DIN933 M5x12 attachment bolts, the DIN9021 M5x20 washers and the LN9348-05 stopnuts.

- 4 Remove the master relay.
- 5 Install in reverse sequence of removal.

24-60-00

DC ELECTRICAL LOAD DISTRIBUTION

(Refer to Chapter 91) From the main bus the electrical load is distributed through switches, circuit breakers and combined switch/circuit breakers.

The switches and / or circuit breakers are located at the rear instrument panel so as the lever switches. Subminiature pushbutton switches are mounted on the control sticks and the throttle controls.

24-61-00

MAINTENANCE PRACTICES

IMPORTANT

If replacement of wiring passing the firewall is necessary, renew the sealing of the bushing grooves and gaps at the engine side of the firewall. Use PRC-812 (Products Research & Chemical Corporation, USA) firewall sealant.

24-61-01

Combined Switch and Circuit Breaker

Removal/Installation

CAUTION

Disconnect battery

- 1 Remove the instrument panel cover per Ch. 31.
- 2 Disconnect the tubings from the resp. instruments.
- 3 Remove the instrument panel attachment screws.
- 4 Turn down the panel.
- 5 Loosen the bus bar attachment screws and remove bus bar if necessary.
- 6 Disconnect wiring.
- 7 Remove the attachment nut at the front side of the instrument panel.
- 8 Remove the combined switch and circuit breaker.
- 9 Install in reverse sequence of removal.

24-61-02

Lever Switch

Removal/Installation

CAUTION

Disconnect battery

- 1 Remove the instrument panel cover per Ch. 31.
- 2 Disconnect the tubings from the resp. instruments.
- 3 Remove the instrument panel attachment screws.
- 4 Turn down the panel.
- 5 Disconnect wiring.
- 6 Remove the attachment nut at the front side of the instrument panel.
- 7 Remove the combined switch and circuit breaker.
- 8 Install in reverse sequence of removal.

24-61-03

Subminiature Pushbotton Switch

Removal/Installation

CAUTION

Disconnect battery

- 1 Remove the attachment nut.
- 2 Tie out the switch some centimeters.
- 3 Loosen the soldered connections.
- 4 Remove the switch.
- 5 Install in reverse sequence of removal

Chapter 25

Equipment and Furnishings

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25-10-00

FLIGHT COMPARTMENTS

The EXTRA 200 is standard equipped with a pilot and a co-pilot seat including special aerobatic seat belt / shoulder harnesses for both seats. An aircraft document bag is installed in the rear cockpit.

25-10-01

Front Seat

The front seat is a nonadjustable one-piece composite design. It is connected to the fuselage by four screws at the top of the backrest and by two screws at the bottom of the seat.

25-10-02

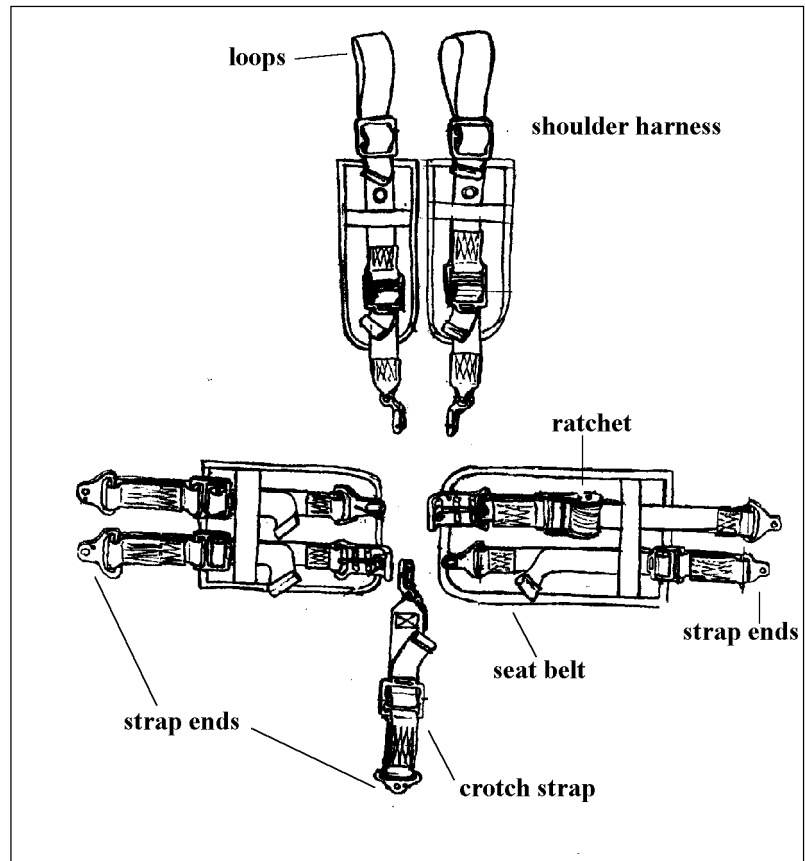
Rear Seat

The rear seat assembly consists of two composite parts. The backrest is connected to the seat and to the fuselage by means of quickpins. Multihole tubes allow adjustment. Up to Ser. No. 9 the seat is connected to the fuselage by bolts. From Ser. No. 10 the seat is in front attached to the steel tube by bolts and in the rear via a multihole rod and quickpins allowing adjustment of height.

25-10-03

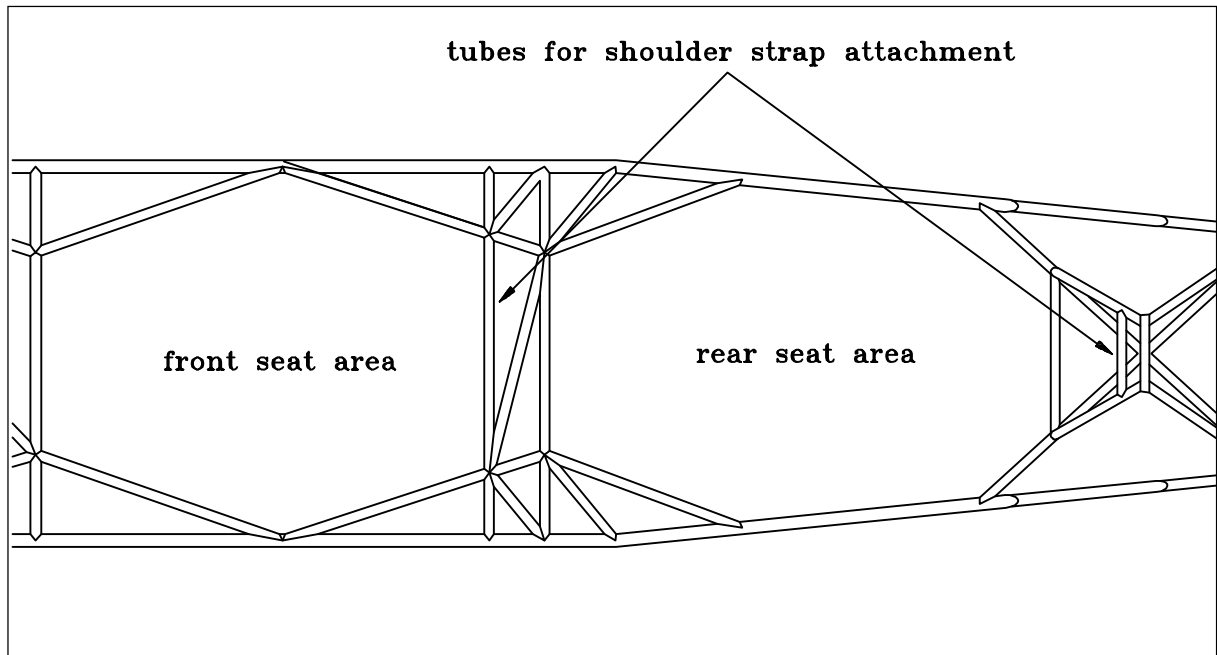
Seat Belts

(Refer to Figure 1) Each seat is equipped with a special aerobatic seat belt / shoulder harnesses from the manufacturer "Hooker custom Harness". Such an assembly of straps consists of a right and left shoulder harness, two right and two left seat belts and a crotch strap.



*Strap Assembly
Figure 1*

Up to Ser. No. 15 each strap end is fitted with LN 9037-0820 bolts, LN9348-08 stop nuts and DIN 125 M8 washers to its own fitting at the steel frame resp. at the underside of the seat. From Ser. No. 16 the crotch strap ends are attached by means of AN4 bolts, washers and nuts. The shoulder strap loops of the front and rear seat are attached to horizontal steel tubes as shown in Figure 2.



Shoulder Strap Attachment
Figure 2

25-10-04

Aircraft Document Bag

The rear cockpit of the EXTRA 200 is furnished with an aircraft document bag. This aircraft document bag is mounted on the right inside of the cockpit frame.

25-15-00

MAINTENANCE PRACTICES

25-15-01

Front Seat

Removal/Installation

- 1 Remove front seat attachment screws.
- 2 Remove front seat.
- 3 Disconnect crotch strap from seat if necessary.
- 4 Install in reverse sequence of removal.

25-15-02

Rear Seat

Removal/Installation

- 1 Remove quickpins of the backrest.
- 2 Remove rear seat backrest.
- 3 Disconnect backrest from the steel tubes if necessary by removing the resp. bolts.
- 4 Remove the seat attachment bolts and quickpins (from Ser. No. 10).
- 5 Remove the seat.
- 6 Assemble and install in reverse sequence of disassembly resp. removal. From Ser. No. 10: Grease the front attachment bolts before installation and fasten them only hand tight. Check movableness of the seat and reduce tightness of attachment bolts as far as necessary.

Chapter 27

Flight Controls

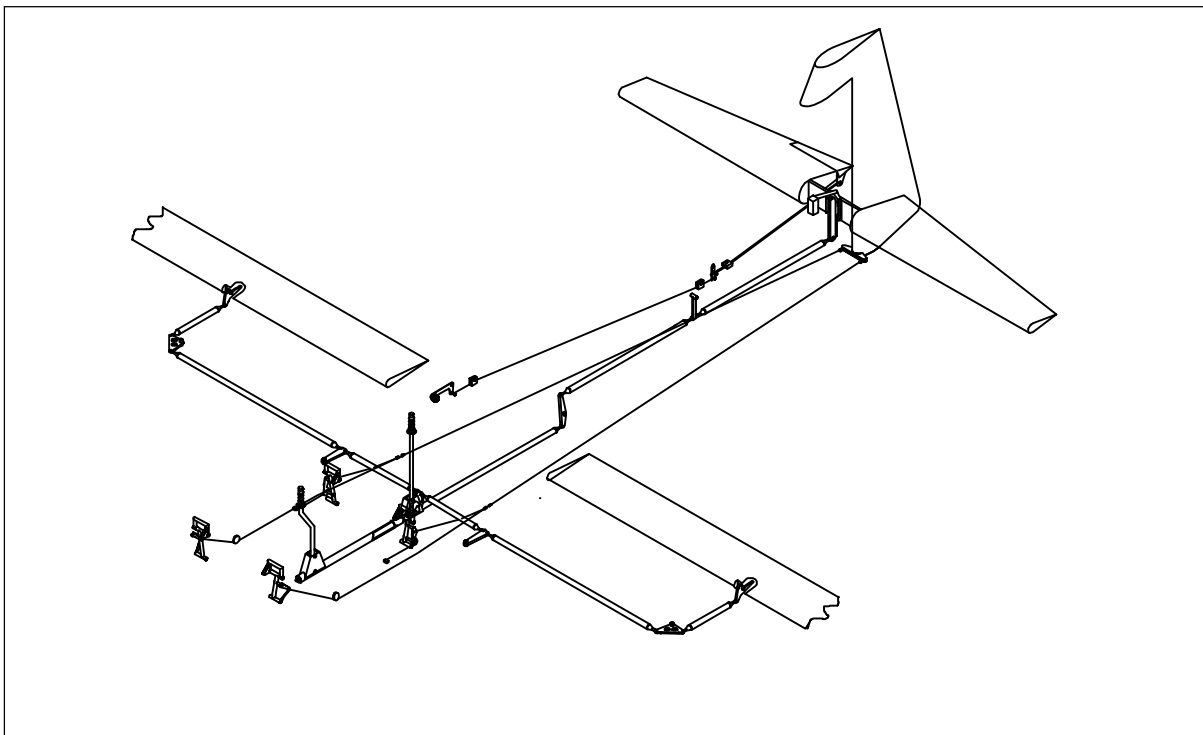
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27-00-00

GENERAL

(Refer to Figure 1) The EXTRA 200 is standard equipped with full dual primary flight controls including conventional control sticks and adjustable rudder pedals. The control surfaces are operated by a direct mechanical linkage. The control surface deflections are shown in Figure 2.



*Controls
Figure 1*

27-00-01

Free Play in the Control System

With controls (stick and rudder pedals) locked, the free play measured at the control surfaces must not exceed the values listed:

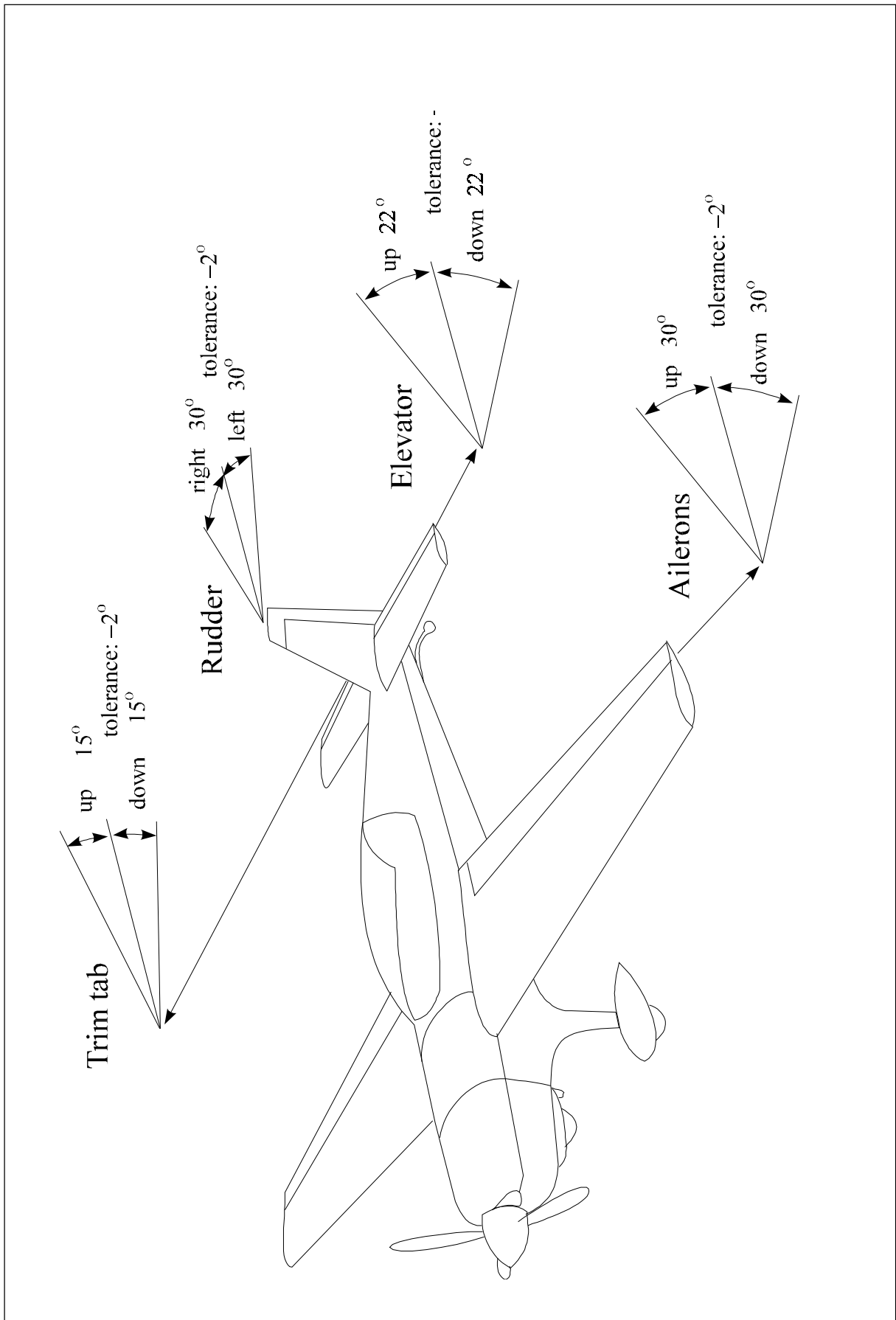
Aileron: $\pm 1 \text{ mm}^*$

Elevator: $\pm 1 \text{ mm}^*$

Trim tab: $\pm 2 \text{ mm}^*$

** measured at the trailing edge
and max. chord*

The rudder has a direct cable connection with retracting springs and is therefore always under tension.

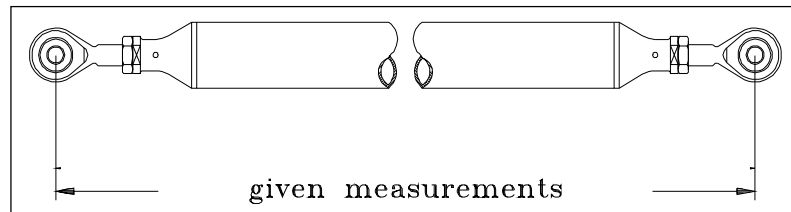


Control Surface Deflections
Figure 2

27-00-02

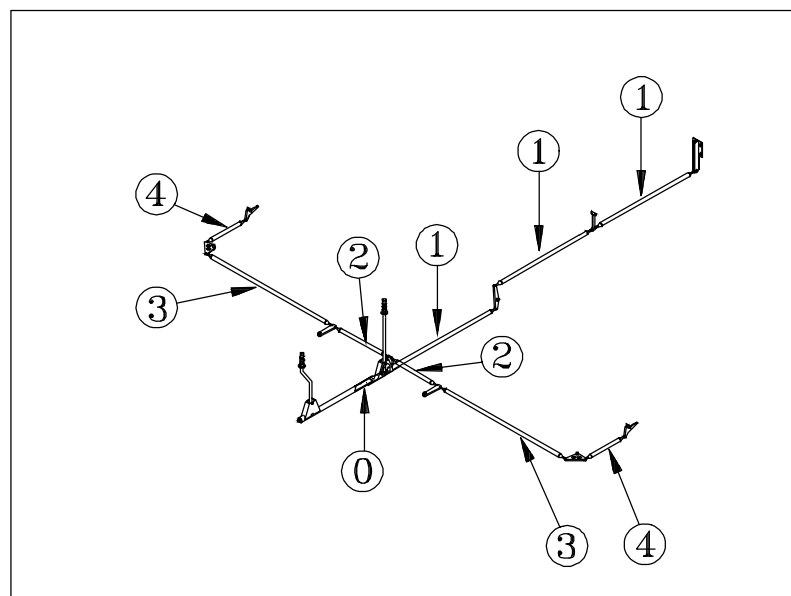
Control Rod Lengths

The measurements given in this chapter refer to the distances between the centers of the rod end bearings resp. of the clevis head (see Figure 3).



Control Rod Measurement
 Figure 3

Refer to the following Figure 4 for identification of the control rods.



Control Rod Identification
 Figure 4

* *clevis head at the rear control stick*

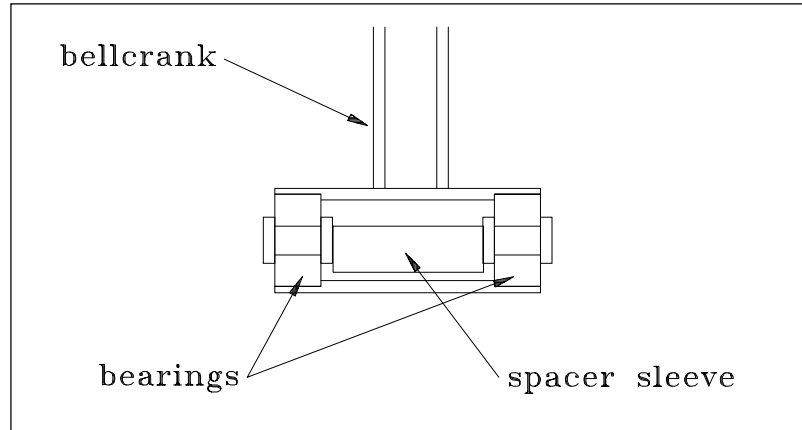
Control rod	Measurements
0*	801 mm
1	932 mm
2	520 mm
3	1884 mm
4	420 mm

27-01-00

MAINTENANCE PRACTICES

NOTE

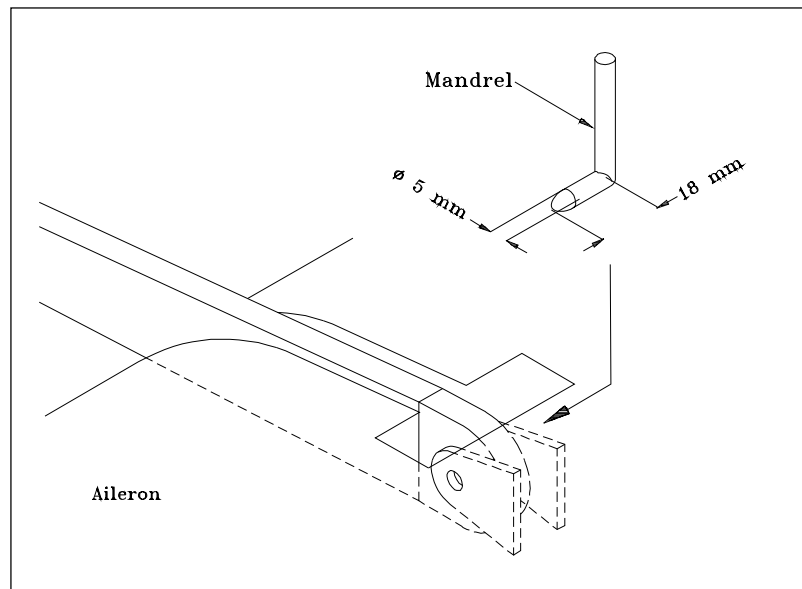
When installing a bellcrank or control stick the spacer sleeve inside the bearing could be displaced as shown in Figure 5. Use a mandrel to adjust the spacer sleeve.



*Spacer Sleeve Displaced
Figure 5*

NOTE

When installing a control surface use mandrels as shown in the following Figure 6 to preset the control surface. Then press out each mandrel by pushing a bolt into the bearing.



*Control Surface Mounting Aid
Figure 6*

27-01-01

Control Rod Removal/Installation

Refer to Figure 7. All control rods are attached to the control levers in the same way with AN bolts, washers and self-locking nuts. The control rods inside the wing are interconnected by ground bonding leads fastened to the rod ends by additional nuts. So the rod ends have to be disassembled, when the ground bonding leads shall be disconnected. In this case also refer to Chapter 27-01-06.

1 Remove the respective access panels.

NOTE

In case of removal of the control rod connecting the control sticks also observe the instructions given in the Chapters 27-01-03 and -04.

2 Remove the M6 attachment bolts (1).

3 Remove the control rod.

4 Reverse procedure to install the control rod. Replace the selflocking nuts.

27-01-02

Bellcrank Removal/Installation

Refer to Figure 7

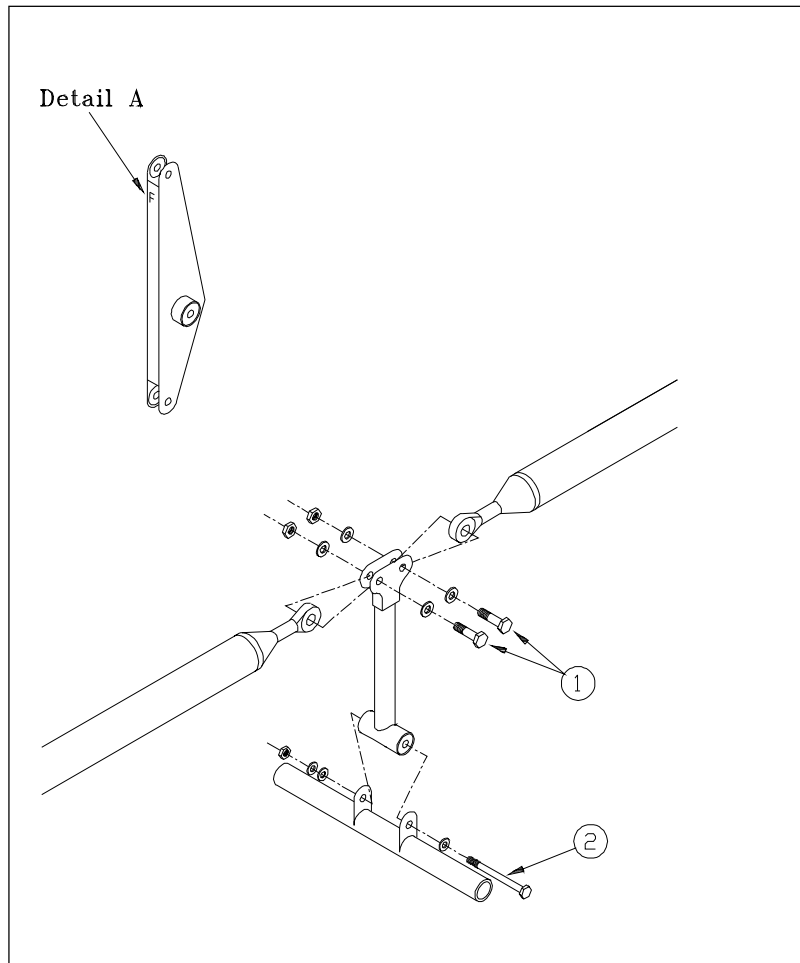
1 Remove the respective access panels.

2 Remove the adjacent control rods per Chapter 27-01-01.

3 Remove the M5 attachment bolt (2).

4 Remove the bellcrank.

5 Reverse procedure to install the bellcrank using sufficient washers (min. 2) at the nut side of the bolt to cover the shank (except the rocker type bellcrank: use only one washer on each side). Replace the selflocking nuts. Observe the first Note of Chapter 27-01-00. To ensure installation of the elevator rocker type bellcrank in correct direction this bellcrank is marked by an "F" which indicates the front side (refer to Detail A of Figure 7).



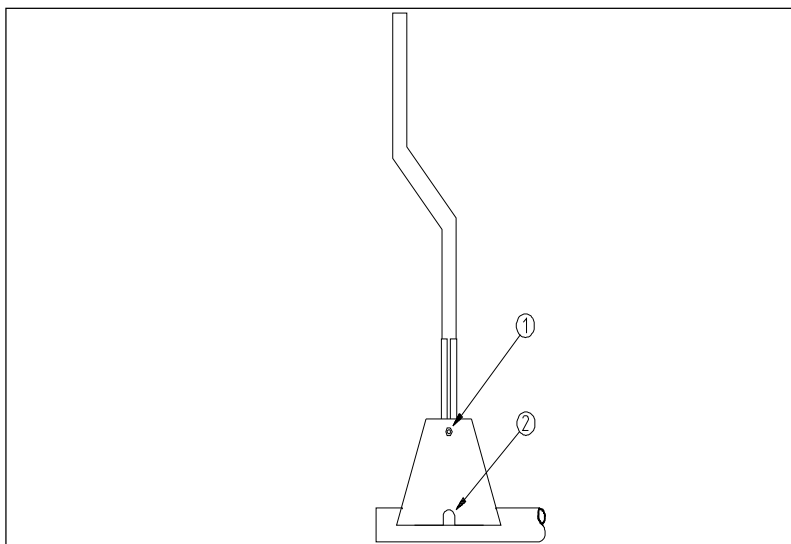
*Control Levers and Rods Removal/Installation
Figure 7*

27-01-03

Front Control Stick Removal/Installation

Refer to Figure 8.

- 1 Remove front seat per Chapter 25-15-01.
- 2 Disconnect the electrical wiring.
- 3 Remove the control stick attachment bolt (1).
- 4 Disconnect the control stick from the control rod per Chapter 27-01-01. Use the control stick to move the control rod attachment bolt within the mounting hole area (2).



Front Control Stick Removal/Installation
Figure 8

- 5 Remove the control stick.
- 6 Reverse procedure to install the control stick. Replace the selflocking nuts. Observe the first Note of Chapter 27-01-00.
- 7 Check for potential chafing of the wiring after installation.

27-01-04

Rear Control Stick Removal/Installation

- 1 Remove rear seat per Chapter 25-15-02.
- 2 Disconnect the electrical wiring.
- 3 Remove the control stick attachment bolt.
- 4 Use the control stick to move the control rod attachment bolt within the mounting hole area (2, Figure 8) and disconnect the stick from the control rods per Chapter 27-01-01.
- 5 Remove the control stick.
- 6 Reverse procedure to install the control stick. Replace the selflocking nuts. Observe the first Note of Chapter 27-01-00.
- 7 Check for potential chafing of the wiring after installation.

27-01-05

Torque Tube Removal/Installation

- 1 Remove the respective access panels.
- 2 Remove the control sticks and rods from the torque tube per Chapters 27-01-01 and 27-01-03/04.
- 3 Remove the bolt of the rear torque tube bearing.
- 4 Push torque tube some centimeters to the rear to remove pin from the front bearing and remove the torque tube.
- 5 Reverse procedure to install the torque tube. Consider to secure the castle nut of the rear torque tube bearing. Lubricate the bearings with Aeroshell grease 22C or equivalent (MIL-G-81322D).

27-01-06

Control Rod Length Adjustment

The standard measurements are given in Chapter 27-00-02

- 1 Remove the respective access panels.
- 2 Disconnect one rod end from the respective bellcrank.
- 3 Loosen the check nut.

NOTE

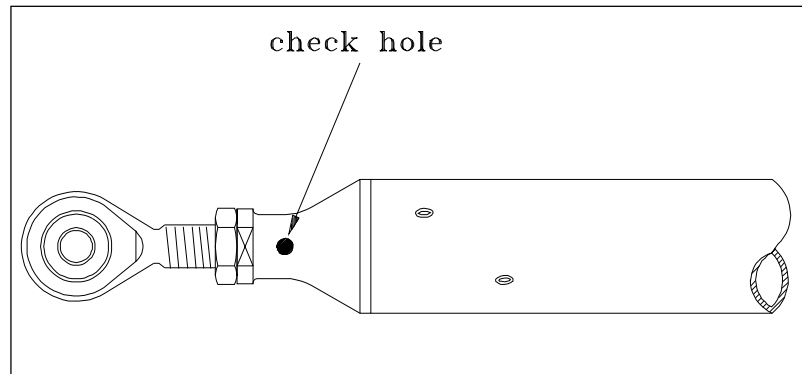
It might be necessary to adjust both rod ends to get the correct length. In this case the free thread of both rod ends should have the same length.

IMPORTANT

Observe that the rod ends joined to the rocker type bellcrank should be adjusted long enough not to obstruct the travel.

IMPORTANT

Ensure that the threaded rod is visible in the check hole (Figure 9) in any case.



Control Rod Check Hole
Figure 9

- 4 Turn the rod end in the desired direction to change the length.
- 5 Ensure that the rod end is in proper alignment with the respective control lever and tighten the check nut.
- 6 Reinstall the control rod per Chapter 27-01-01.
- 7 Ensure that the control rods don't jam when the control sticks are moved between the extreme positions.

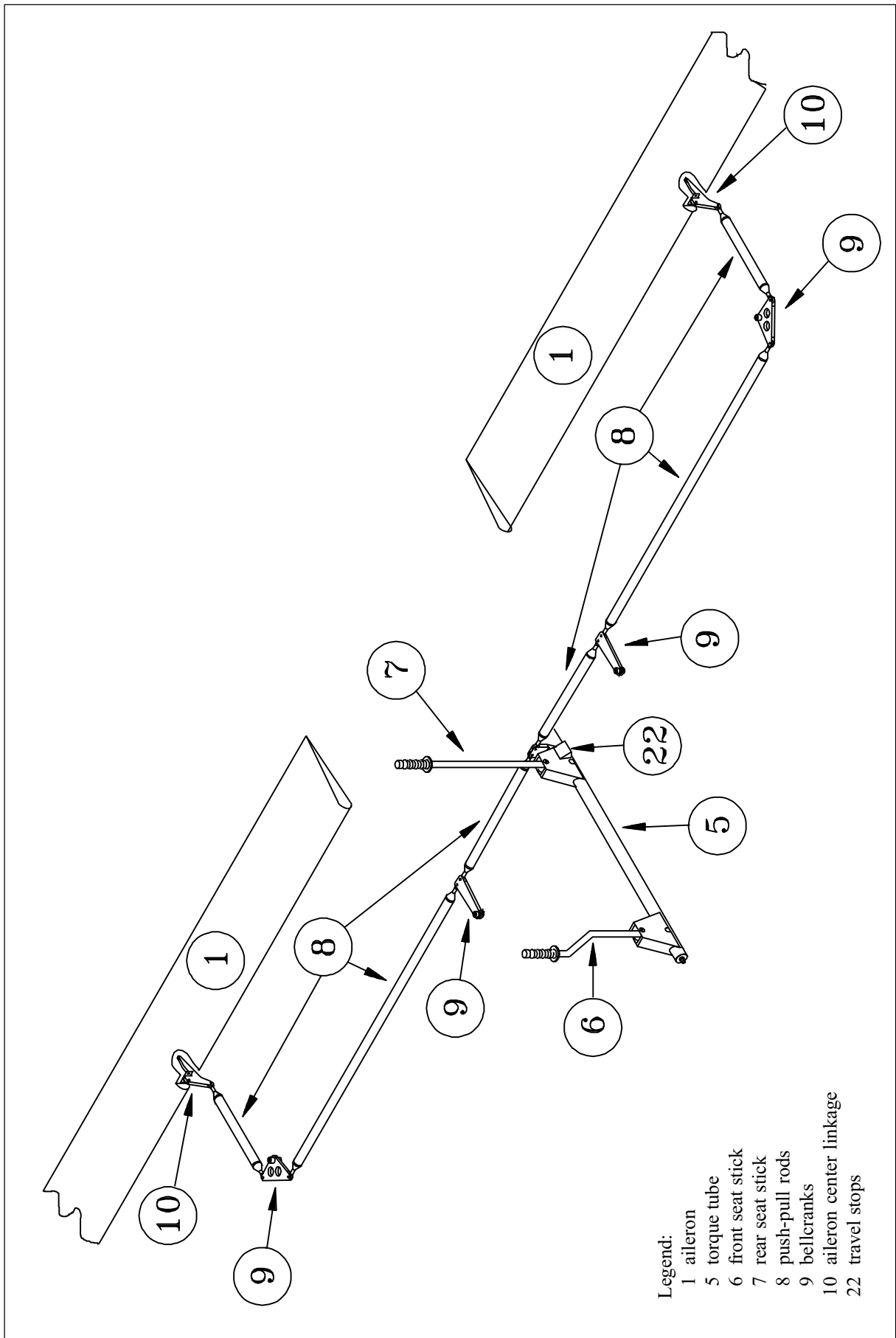
27-10-00

AILERONS

(Refer to Figure 10) The aileron (1) is direct mechanical linked to the control sticks (6, 7) by the aileron center linkage (10) with spade arm, push-pull rods (8), bellcranks (9) and the torque tube (5). The bell cranks have two sealed ball bearings. Each aileron is mounted at three points in spherical bearings pressed into aluminium hinge arms. For lightning protection reason each hinge arm is grounded to the corresponding attachment bracket at the aileron by bonding leads. The rod end bearings of the push-pull rods located in the wing are also interconnected by bonding leads. The travel stops (22) are located at the torque tube next to the rear control stick (7).

To reduce pilot's hand forces the hinge line of the ailerons is positioned at 20 - 25% of the aileron chord. Furthermore, the ailerons are equipped with spades. To prevent flutter the ailerons are mass balanced in the overhanging leading edge.

Two access panels are located at the bottom surface of each side of the wing.



Aileron Control
Figure 10

27-11-00

MAINTENANCE PRACTICES

27-11-01

Aileron Removal/Installation

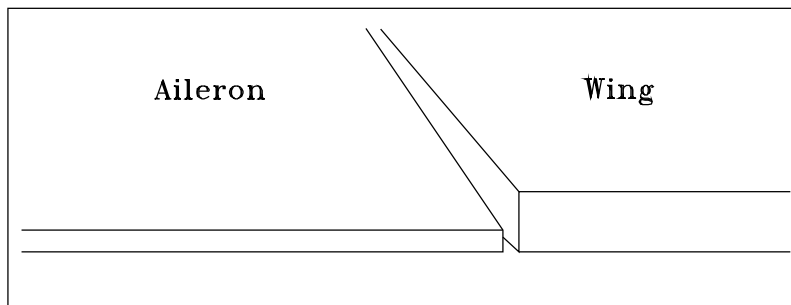
- 1 Disconnect the actuator rod from the aileron center linkage.
- 2 Disassemble the spade if necessary observing the quantity and location of washers.
- 3 Loosen the hinge bolts and the ground bonding leads and remove the bolts.
- 4 Install in reverse sequence of removal. Ensure that the spade is installed with the same quantity and location of washers (refer to Figure 12). Observe the second Note of Chapter 27-01-00.

27-11-02

Aileron Rigging

Before beginning any adjustments inspect control rods, levers and hinges for signs of wear or damage, check if the control rod lengths correspond with the measurements given in Chapter 27-00-02. If necessary replace parts and correct lengths per Chapter 27-01-06.

- 1 Secure the control stick in the neutral position.
- 2 Check if the control rods connecting the torque tube and the inner wing bellcranks have the correct length (Refer to Chapter 27-00-02).
- 3 Adjust length if necessary per Chapter 27-01-06.
- 4 Check if the ailerons are in 0°-position (The trailing edge bottom of the aileron is in alignment with the trailing edge bottom of the wing as shown in Figure 11).



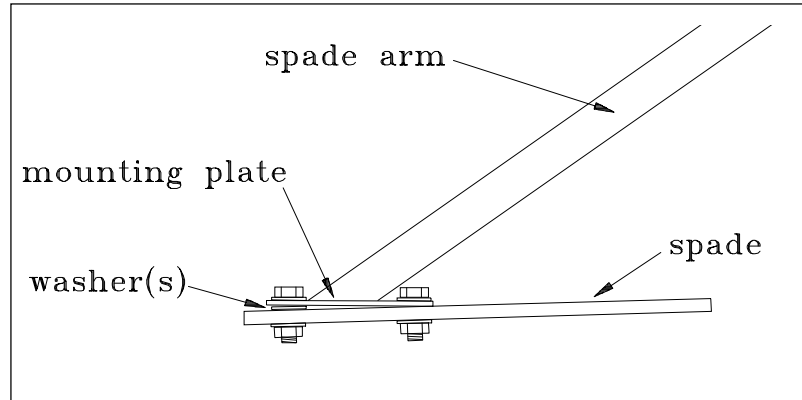
Trailing Edge Alignment
Figure 11

- 5 If necessary adjust the length of the control rods connecting the aileron center linkage to the outer wing bellcrank per Chapter 27-01-06.
- 6 Check if the left aileron travel is within the given tolerances. Use a conventional protractor.
- 7 Adjust the travel stops if necessary.
- 8 Follow step 6 for the right aileron.
- 9 If the travel of the right aileron exceeds the given tolerances, contact the manufacturer.
- 10 Check if the movement of the control sticks is free over the whole travel range and check if the rear control stick travel is symmetrically to each side. If it is not contact the manufacturer.

27-11-03

Spade Rigging

For roll trim the spade rigging angle of incidence has to be changed. Insert washer(s) between the spade and the mounting plate (refer to Figure 12). For example: When the aircraft rolls to the left, insert washer(s) at the front attachment bolt of the right spade.



Spade Rigging
Figure 12

27-20-00

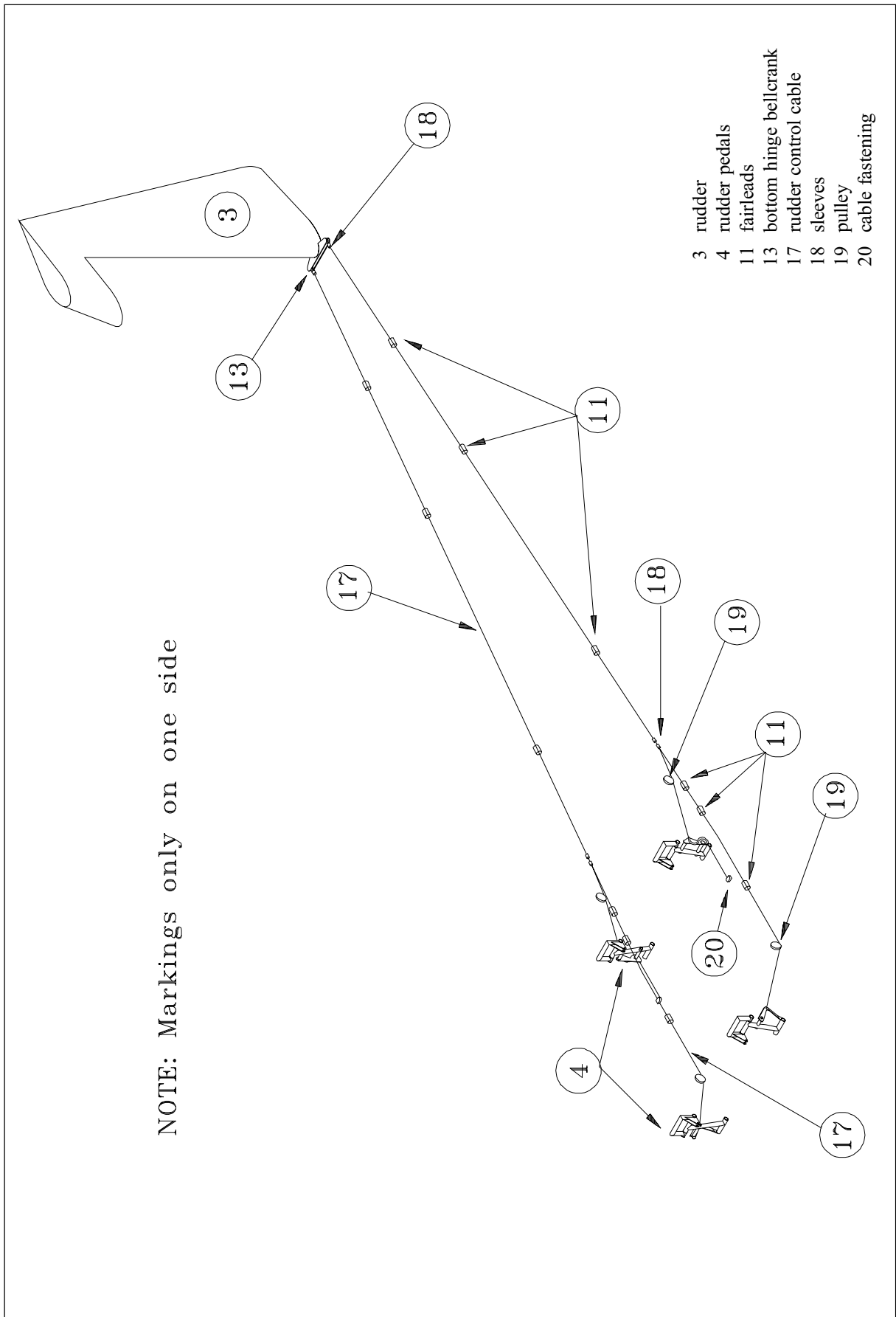
RUDDER

(Refer to Figure 13) The rudder pedals (4) are connected via a cable system (17) to the bottom hinge bellcrank (13). The cables are guided by fairleads (11). Springs keep the cables under tension when they are not operated. Adjustment of the rear pedals is made via multihole rod. The rudder (3) is mounted at three points in spherical bearings pressed into a aluminium hinge resp. into aluminium hinge arms. For lightning protection reason each hinge (arm) is grounded to the corresponding attachment bracket at the rudder by bonding leads. A travel stop plate is located at the bottom hinge bracket. A second safety stop is located at the rudder pedal bearing having the only purpose of protecting the lower brake system fitting in case of rudder cable failure.

IMPORTANT

This second stop must not be reached under normal operation conditions. Missalignment or excessive elongation of the rudder cables will result in misuse of this second stop and a subsequent overload of the rudder bearing. A subsequent inflight failure of the footrest could occur.

To prevent flutter the rudder is mass balanced. The mass balance weight of the rudder is installed in the rudder horn.



*Rudder Control
 Figure 13*

27-21-00

MAINTENANCE PRACTICES

I M P O R T A N T

Perform checks 10-11 of "Flight Controls" presented in Chapter 05-20-04 after each maintenance work affecting the rudder control cables.

27-21-01

Rudder Removal/Installation

- 1 Disconnect the rudder control cables from the bottom hinge bellcrank.
- 2 Loosen the hinge bolts and the ground bonding leads and remove the bolts.
- 3 Install in reverse sequence of removal. Observe the second Note of Chapter 27-01-00.

27-21-02

Bottom Hinge Bracket Removal/Installation

- 1 Remove the rudder per Chapter 27-21-01.
- 2 Loosen the attachment bolts.
- 3 Remove the bottom hinge bracket with the travel stop plate.
- 4 Install in reverse sequence of removal.

27-21-03

Bottom Hinge Bellcranks Removal/Installation

- 1 Remove the rudder per Chapter 27-21-01.
- 2 Loosen the attachment bolts.
- 3 Remove the bottom hinge bellcranks.
- 4 Install in reverse sequence of removal.

27-21-04

Control Cable Removal

- 1 Remove the respective access panels
- 2 Remove the cable to fuselage attachment bolts.
- 3 Remove the cable to rudder bellcrank attachment bolts.
- 4 Cut the control cables behind the front shrinking sleeves and behind the cable to cable connection.
- 5 Remove the control cable parts by pulling out to the back.

27-21-05

Control Cable Installation

Use only control cables manufactured by EXTRA FLUGZEUGBAU GmbH. Those cables are prepared for simply installation.

- 1 Remove the respective access panels per Chapter 51.
- 2 Secure the rudder (3, Figure 13) in 0°-position.
- 3 Mount the pre-assembled shackle of the longer control cable to the LH cable fastening (20).
- 4 Slip 800 mm teflon protective hose on the control cable.
- 5 Thread the cable through the "S"-shaped tube at the pedal and the pulley (19).
- 6 Adjust rear rudder pedals (4) in rearmost position.
- 7 Let the front end of the protective hose extend to 10 mm in front of the pedal "S"-tube and cut the rear end 10 mm in front of the pulley.
- 8 Slip 2 NICOPRESS (National Telephone Supply Co., Cleveland Ohio) 18-3-M sleeves (18) and a 771095 shrinking sleeve on the control cable.
- 9 Thread the free end of the control cable through the rear fairleads (11) and the hole in the fabric to the tail.

- 10 Slip 600 mm teflon protective hose on the control cable end. The protective hose should extend to the first fairlead inside the fuselage.
- 11 Adjust rear pedals in middle position.
- 12 Fix rear pedals in vertical position (90° relative to the footrest).
- 13 Pre-install the LN9355-06-20 bolt, the DIN 125 M6 washers (2 washers outside, 3 washers inside), the spring clip, the LN 9348 M6 stop nut and the thimble to the bottom hinge bellcrank (also see item 9 on Fig. 3 of Chapter 32).
- 14 Slip the 771095 shrinking sleeve and a NICOPRESS 18-3-M sleeve on the cable end.
- 15 Move the cable around the thimble and stretch the control cable with a force that is equivalent to the tractive effort of the rear pedal retracting spring.

IMPORTANT

Clamping has to be performed in accordance with the Service Bulletin 300-1-93 and the Instruction No. 32 of the National Telephone Supply Co., Cleveland Ohio.

- 16 Consider to let a distance of 1 mm between the thimble and the sleeve and clamp the sleeve.
- 17 Cut the free end of the cable 20 mm in front of the sleeve.
- 18 Slip the shrinking sleeve on the cable end and heat up with a heat gun.
- 19 Remove the pedal securing device.
- 20 Mount the pre-assembled shackle of the shorter control cable to the front pedal.
- 21 Thread the free end of the control cable through the pulley, the front fairleads and the pre-installed NICOPRESS 18-3-M sleeves.
- 22 Fix the front pedal in vertical position (parallel to the firewall).
- 23 Stretch the shorter control cable with a force that is equivalent to the tractive effort of the front pedal retracting spring.

I M P O R T A N T

Clamping has to be performed in accordance with the Service Bulletin 300-1-93 and the Instruction No. 32 of the National Telephone Supply Co., Cleveland Ohio.

I M P O R T A N T

To prevent twisting the cables clamp the sleeves in the same plane.

- 24 Consider that the clamping area shall be 30 cm aft the rear pulley and clamp the sleeves.
- 25 Cut the free end of the cable (20 mm behind the sleeve).
- 26 Slip the shrinking sleeve on the rear sleeve and heat up with a heat gun (The front sleeve can be left free for visual control of the cable-to-cable connection).
- 27 Remove the front pedal securing device.
- 28 Follow the steps 3 to 27 for the RH control cable.
- 29 Remove rudder securing devices.
- 30 Check free travel of rudder.

27-21-06

Fairlead Removal/Installation

- 1 Remove the fairlead retaining clip.
- 2 Pull the fairlead halves out of the sleeve.
- 3 Reverse procedure to install the fairlead.

27-21-07

Rudder Rigging

N O T E

Inspect the control cables, the pulleys, the fairleads and the bottom hinge assembly (with the travel stop plate) for signs of wear or damage before beginning any adjustments. Replace parts if necessary.

- 1 Secure the rudder pedals in neutral position.
- 2 Check if the rudder is in 0°-position. (Rudder horn leading edge in alignment with the leading edge of the vertical stabilizer.)

- 3 Replace the control cables and adjust the length per Chapter 27-21-05 if necessary.
- 4 Check if the rudder travel is within the given tolerances.
- 5 If the rudder travel is out of limits, contact the manufacturer for advice.

27-30-00

ELEVATOR AND TAB

Refer to Figure 14. The two control sticks (6, 7) are connected by a push-pull rod (8) inside the torque tube (5). The control movements are transferred from the rear control stick (7) to the elevator (2) by push-pull rods (8) and bellcranks (9, 9a). The bellcranks have two sealed ball bearings. The elevator is mounted at five points in spherical bearings pressed into aluminium hinge arms. For lightning protection reason each hinge arm is grounded to the corresponding attachment bracket at the elevator by bonding leads. The travel stops (22) are located at the torque tube.

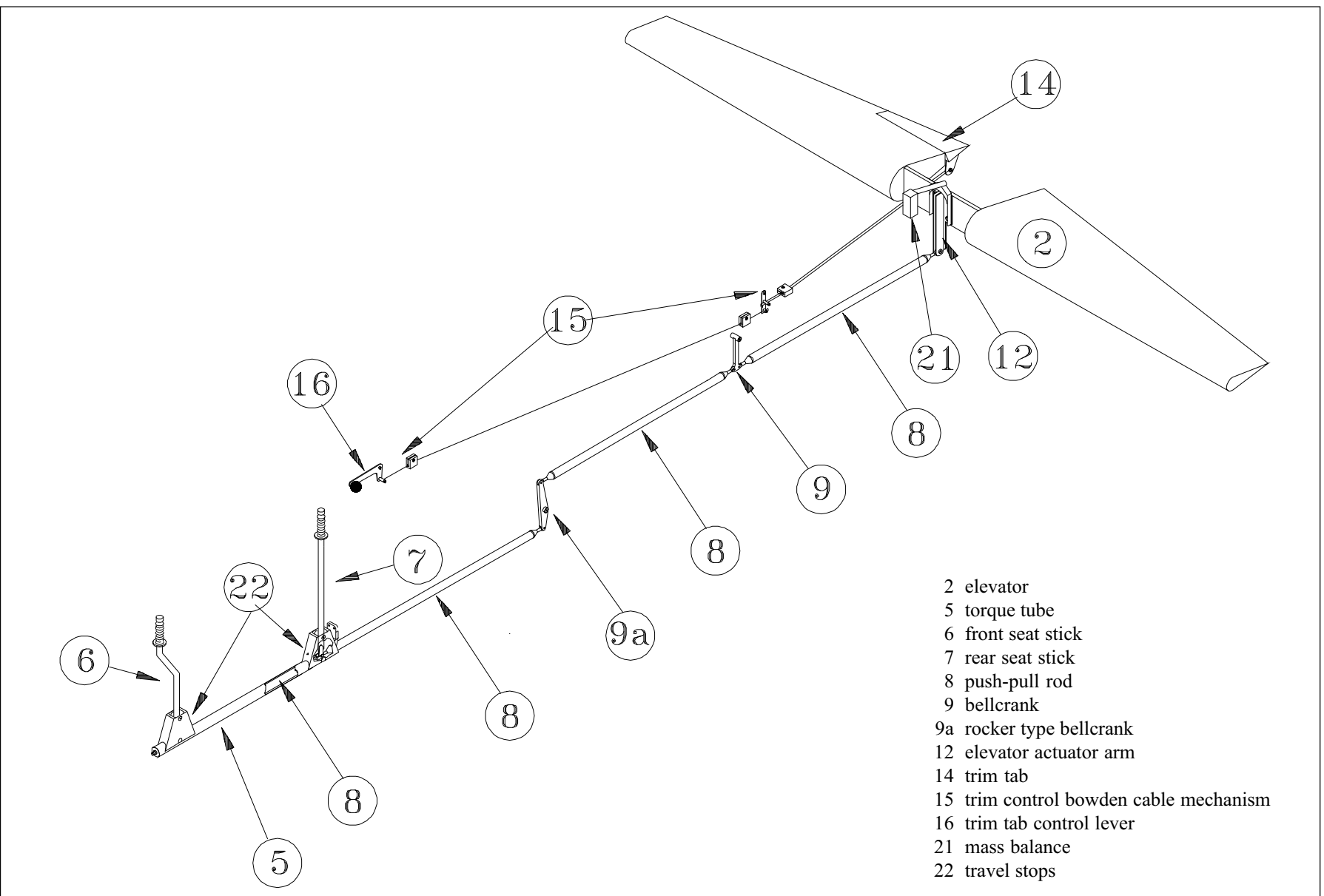
The mass balance weight (21) is mounted on the center bracket of the elevator extending into the fuselage.

An access panel is located at the right side of the rear fuselage.

Trim Tab

The elevator trim control lever (16) is located at the right side in the rear cockpit. Pitch trim is done by means of the trim tab (14) on the right elevator trailing edge operated by a bowden cable mechanism (15). The trim tab is mounted by a piano hinge.

The trim tab is not mass balanced.



*Elevator and Trim Tab Control
Figure 14*

27-31-00

MAINTENANCE PRACTICES

27-31-01

Elevator Removal/Installation

Before the removal of the elevator, the vertical stabilizer has to be disassembled.

- 1 Remove the respective access panels.
- 2 Remove the rudder per Chapter 27-21-01
- 3 Remove the vertical stabilizer per Chapter 55-21-01.
- 4 Loosen the bowden cables from the trim tab. If a replacement is necessary order new cable.
- 5 Disconnect the elevator actuator arm from the push-pull rod.
- 6 Loosen the hinge bolts and the ground bonding leads and remove the bolts.
- 7 Install in reverse sequence of removal. Observe the second Note of Chapter 27-01-00.

27-31-02

Trim Tab Removal/Installation

- 1 Loosen bowden cables. If a replacement is necessary order new cable.
- 2 Disconnect the safety cotter pin and remove the hinge pin.
- 3 Install in reverse sequence of removal and use a new cotter pin.

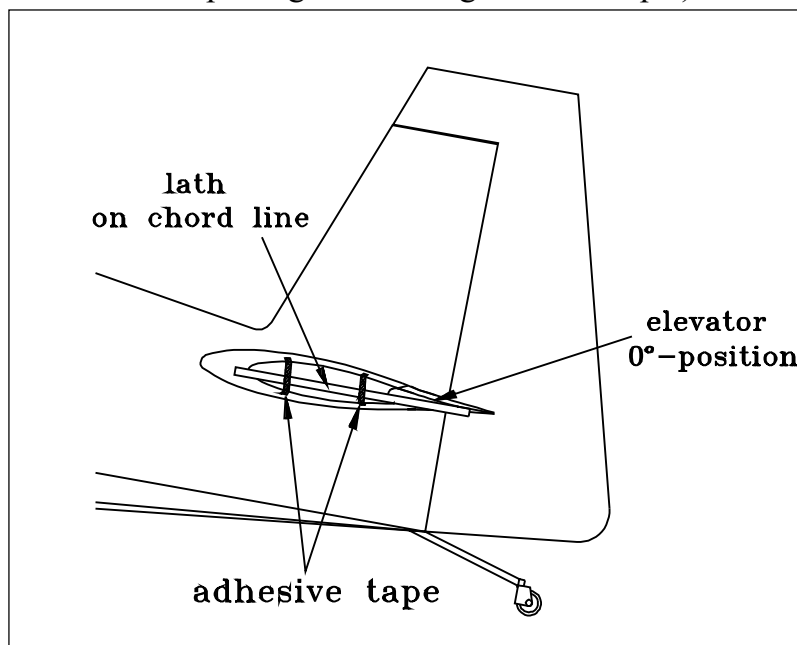
27-31-03

Elevator Rigging

IMPORTANT

Before beginning any adjustments, inspect control rods, levers and hinges for signs of wear or damage and check if control rod lengths correspond with the measurements given in Chapter 27-00-02. Replace parts and correct lengths if necessary per Chapter 27-01-06.

- 1 Remove the canopy and the main fuselage cover per Chapter 51 and the seats per Chapter 25.
- 2 Secure the rear control stick in the neutral position. (Control stick parallel to the vertical steel tube carrying the trim tab control lever resp. perpendicular to the upper longerons).
- 3 Check if the elevator is in 0°-position. (Trailing edge on chord line. Fasten a lath to the tip rib of the horizontal tail per Figure 15 using adhesive tape.)



*Lath on Chord Line
Figure 15*

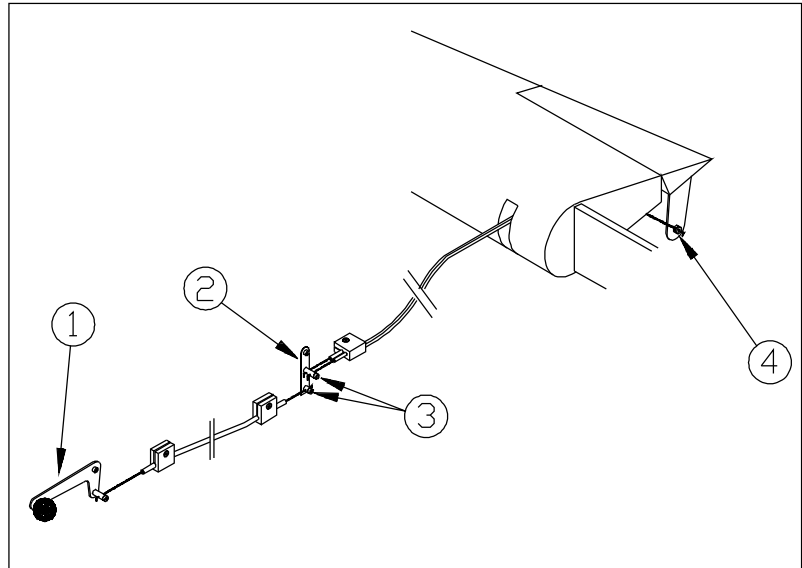
- 4 If necessary adjust the length of the rearmost tail control rod per Chapter 27-01-06.
- 5 Check if the elevator travel is within the given tolerances. Use a conventional protractor.
- 6 Adjust the travel stops if necessary.
- 7 Check full travel of control sticks in each direction.
- 8 Check if the rear control stick travel is symmetrically.
- 9 If it is not, contact the manufacturer.

27-31-04

Trim Tab Rigging

Refer to Figure 16.

- 1 Secure the rear control stick in normal position.
- 2 Secure the trim control lever (1) in horizontal position.
- 3 Adjust the fuselage bellcrank (2) in middle position. Use new selflocking nuts (3).



Trim Tab Rigging
Figure 16

- 4 Bring the trim tab in 0°-position. Use new selflocking nuts (4).
- 5 Bring the trim lever in extreme positions and check if trim tab travel is within given tolerances. If it is not, check free travel of the trim levers, fuselage bellcrank and bowden cables.

Chapter 28

Fuel

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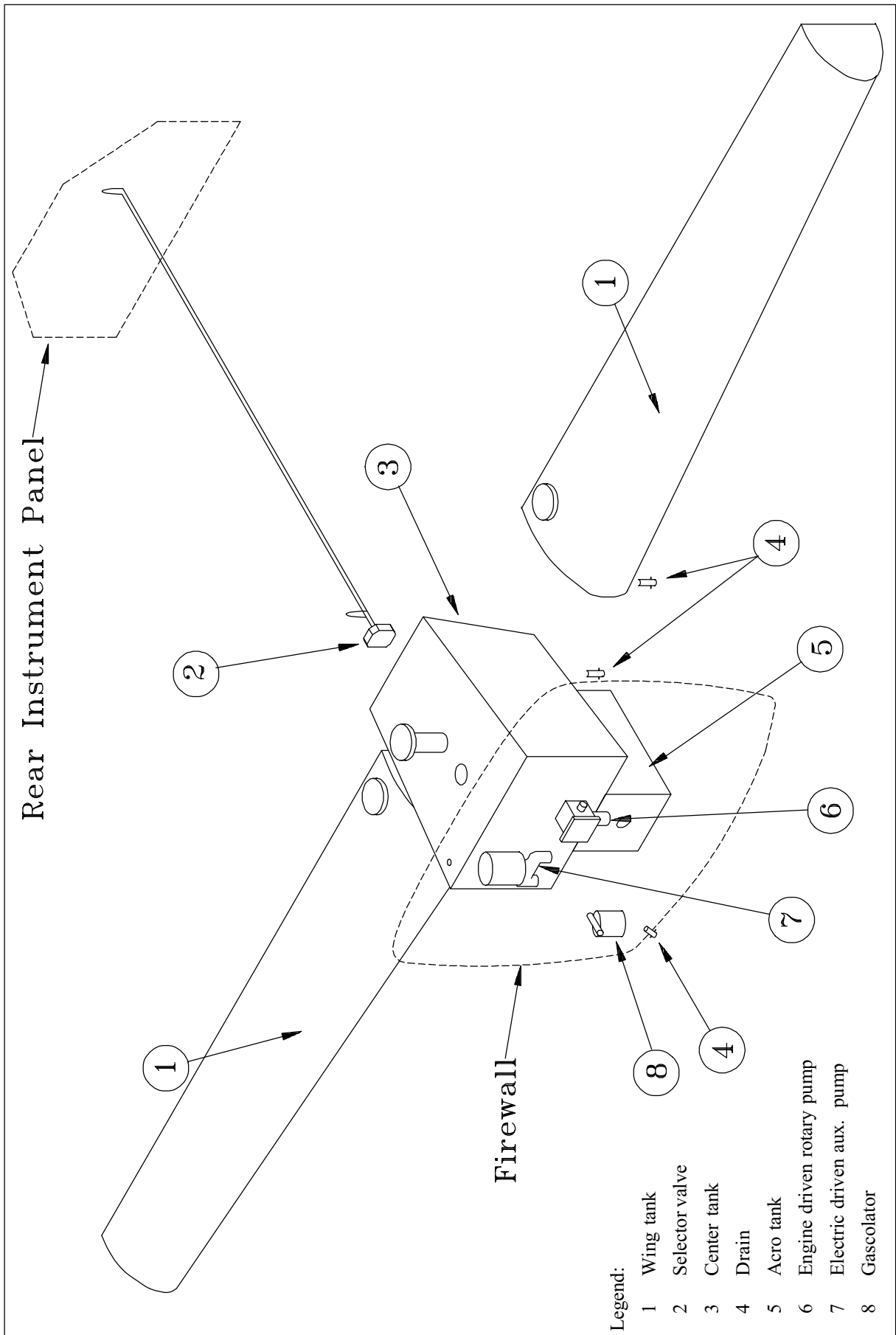
28-00-00

GENERAL

The fuel system (refer to Figure 1) consists of a center tank (3) with acro tank (5), two wing tanks (1), a fuel selector valve (2), a gascolator (8), an electrically driven auxiliary pump (7) and an engine driven rotary pump (6). Concerning the fuel drains (4) also refer to Chapter 12-10-03.

On the rear instrument panel one fuel quantity indicator for the center tank and one for the wing tanks, the switch/circuit breaker for the boost pump and the circuit breaker for the indication are installed.

For fuel tank capacities refer to Chapter 12-10-01.



Fuel System
 Figure 1

28-01-00

MAINTENANCE PRACTICES

28-01-01

Refueling/Defueling

Refer to Chapter 12 for detailed refueling/defueling procedures.

28-01-02

Reduction of Fuel Tank Vapor Hazards

General Precautions

During all ventilation or maintenance procedures involving the fuel system, observe the following general precautions.

- 1 Defueling should be outdoors with the aircraft at least 100 feet from hangars or other aircraft.
- 2 No smoking should be allowed within 100 feet of the aircraft.
- 3 Suitable fire fighting equipment should be available. Foam or soda type extinguishing agents are recommended.
- 4 Ground the aircraft to prevent static electricity from causing sparks. If a ramp ground is available it should be connected to exhaust stack. If a ramp ground is not provided, a temporary ground can be obtained by driving a metal rod into the ground and attaching a ground wire between the rod and the aircraft exhaust stack.
- 5 Flame and spark producing equipment should not be operated within 100 feet of the aircraft.
- 6 The aircraft should have its battery removed.
- 7 Only personnel working on the aircraft should be allowed in the immediate area, and no other maintenance should be performed while the tanks are being worked on.
- 8 When a fuel tank is opened for repair, air ventilation (refer to following Page) should be started immediately to reduce vapor concentrations.

- 9 When draining fuel, ensure that suitable containers are available and that drained fuel is stored safely. Do not allow fuel to drip to the ground and form pools.
- 10 If it is necessary to ventilate a tank when the aircraft is in hangar, ensure that vapors do not accumulate to explosive or toxic levels in the hangar.

WARNING

When fuel is being drained, there is little control over the release of fuel vapor. This vapor should be dissipated as quickly as possible. Compressed air or explosion-proof blowers may be used for the purpose.

Air Ventilation

- 1 Completely drain the fuel system per Chapter 12-10-02.
- 2 Remove inspection doors (refer to Chapter 28-11-03) and tank caps.
- 3 Use compressed air or an explosion-proof blower to blow air into the tank until tank interior is dry and free of vapor.
- 4 Continue ventilation whenever tank is open and being worked on.

WARNING

If flammable vapors from cleaning solvents are allowed in the tank increase air circulation to dissipate them.

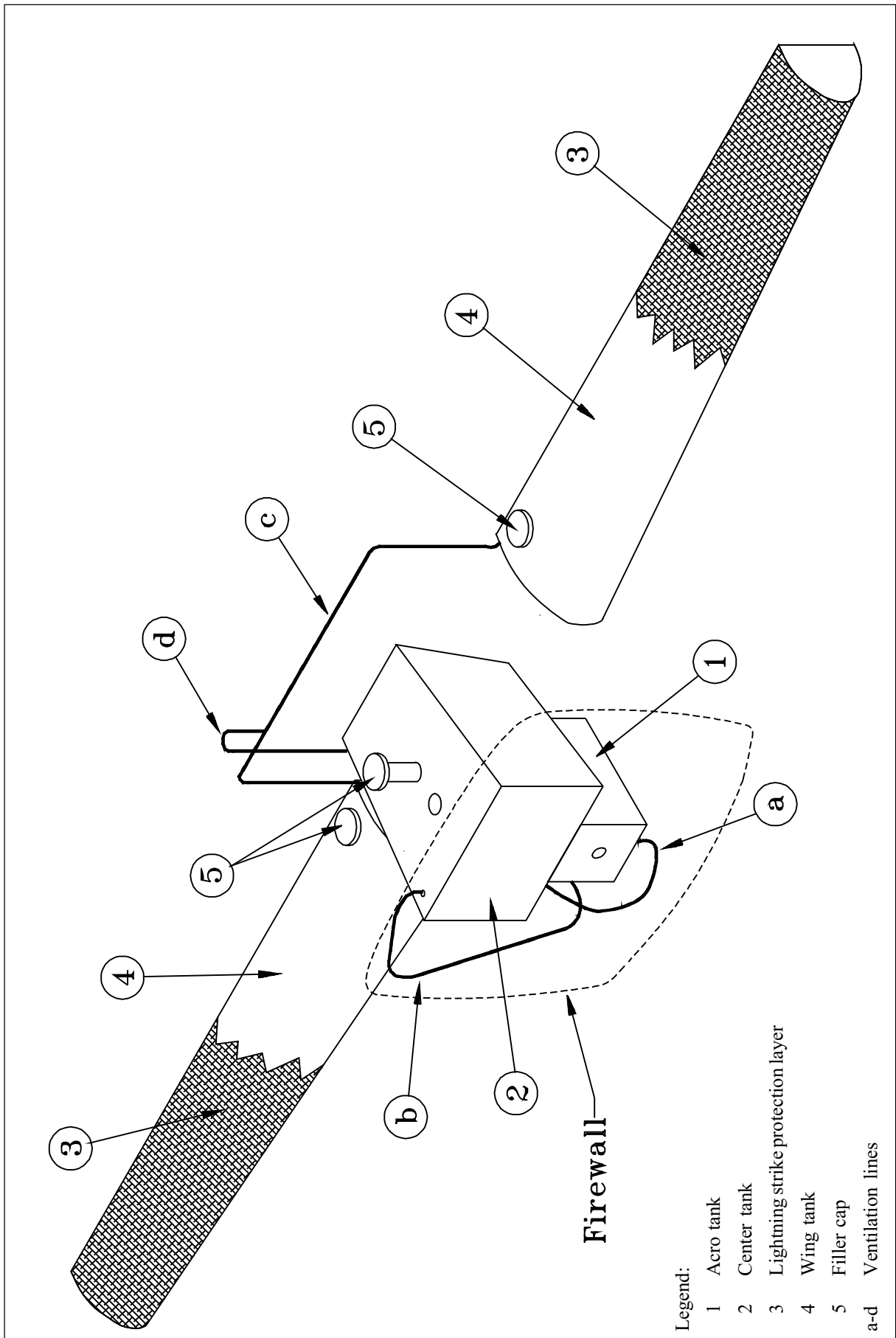
28-10-00

STORAGE

The EXTRA 200 is equipped with two independent fuel systems: The center- and acro tank system and the wing tank system.

The acro tank (1, Figure 2) incorporating an inverted flight fuel supply system is connected to the center tank (2) which is mounted in front of the main spar. Fueling the center and acro tank is by means of the fuselage 2" diameter filler cap (5). For leak detection the center and acro tank are furnished with a GRP tank shell. In case of leakage blue colored fuel is shining through. The center/acro tank is grounded. The center and acro tank deaerate by ventilation tubes (a-b) ending at the right side of the main landing gear spring.

The root section of each wing – in front of the main spars – forms an integral fuel tank of approximately 100 cm (39") length (4). Each wing tank has a 2" diameter filler cap (5) for gravity fueling. Sealing lips are installed at the filler necks inside the wingtank. For sealing 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) has been applied to the inside of the wing tanks. For lightning protection reason the shell in the area of the wing tank has an outer layer of carbon fiber with incorporated aluminium thread (3). The wing tanks are grounded. Each tank is provided with an alu ventilation tube (c) for adequate venting. The ventilation tubes are interconnected to a main tube (d), ending outside of the fuselage at the right side of the main landing gear spring.



*Storage
 Figure 2*

28-11-00

MAINTENANCE PRACTICES

28-11-01

Center and Acro Tank Removal/Installation

- 1 Remove the main fuselage cover (refer to Chapter 51).
- 2 Drain the fuel system per Chapter 12-10-02.
- 3 Loosen the electrical facilities and remove hose fixtures.
- 4 Loosen and remove the metal attachment belts with the rubber stripes.
- 5 Remove the center/acro tank to the top.
- 6 Install in reverse sequence of removal.

28-11-02

Acro Tank Flop Tube Removal/Installation

- 1 Drain the fuel system per Chapter 12-10-02.
- 2 Disconnect the hose (5, Figure 3) and the elbow fitting (4).
- 3 Loosen the flop tube fitting (3) and take the flop tube assembly (2) out of the acro tank (1).

WARNING

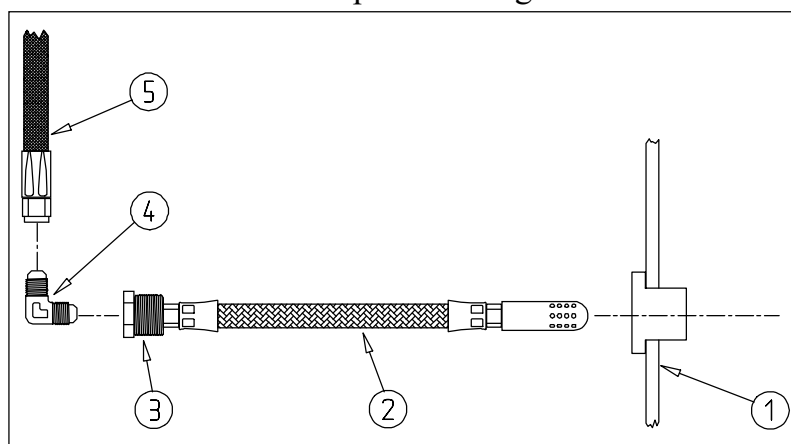
Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

- 4 Clean the sealing surfaces mechanically and with Acetone.

NOTE

If the flop tube assembly has to be replaced install a complete new assembly.

- 5 Install in reverse sequence of removal after applying Loctite 577 to the flop tube fitting thread.



Flop Tube Removal/Installation
Figure 3

28-11-03

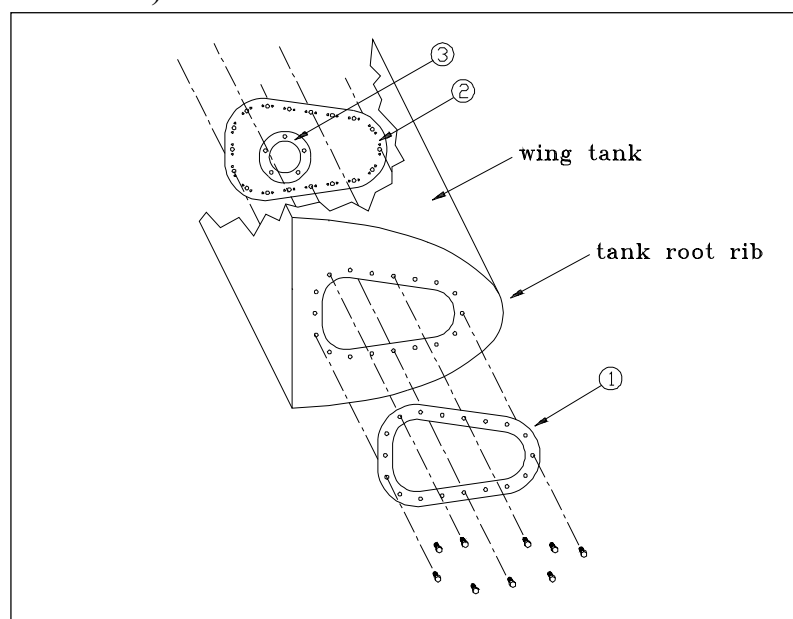
Wing Tank Inspection Door Removal/Installation

- 1 Drain the fuel system per Chapter 12-10-02.
- 2 Disconnect the ground bonding leads and if necessary (LH wing tank) the electrical wiring of the lever-type tank unit (3, Figure 4).
- 3 Remove the inspection door bolts.
- 4 Remove the inspection door flange (1).
- 5 Push the inspection door (2) into the tank, then turn and remove.

WARNING

Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

- 6 Clean the sealing surfaces mechanically and with Acetone.
- 7 Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) to the sealing surfaces (inspection door and tank root rib).



*Inspection Door Removal/Installation
Figure 4*

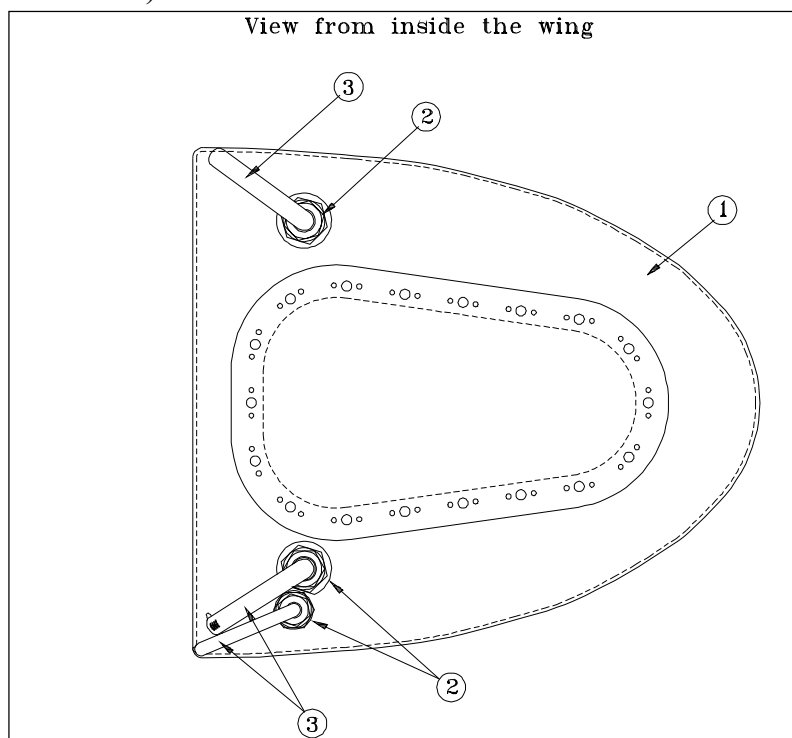
28-11-04**Wing Tank Outlets Removal/Installation**

- 1 Remove the inspection door (1) (refer to Figure 5) per Chapter 28-11-04.
- 2 Remove the union nuts (2) and the elbow tubes (3).
- 3 Remove AN 924 nut and washers and remove AN 832 fitting.

WARNING

Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

- 4 Clean sealing surfaces mechanically and with Acetone.
- 5 Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) to the sealing surfaces (fitting to tank root rib). Ensure that the outlet end positions are in the upper-resp. undermost edge of the wing tank (see Figure 7 below).



Wing Tank Outlets Removal/Installation
Figure 5

28-11-05

Center Tank Filler Neck Removal/Installation

- 1 Remove the main fuselage cover per Chapter 51.
- 2 Completely drain the fuel system per Chapter 12.
- 3 Loosen the lower hose clip.
- 4 Remove the filler neck.
- 5 Install in reverse sequence of removal.

28-11-06

Wing Tank Filler Neck Removal/Installation

- 1 Completely drain the fuel system per Chapter 12.
- 2 Remove wing tank inspection door per Chapter 28-11-03.
- 3 Unscrew filler neck lock ring (4, Figure 6) with sealing lip (5) using a tool as shown in Figure 6.
- 4 Remove filler neck (3) with filler cap (1) and O-ring (2).

WARNING

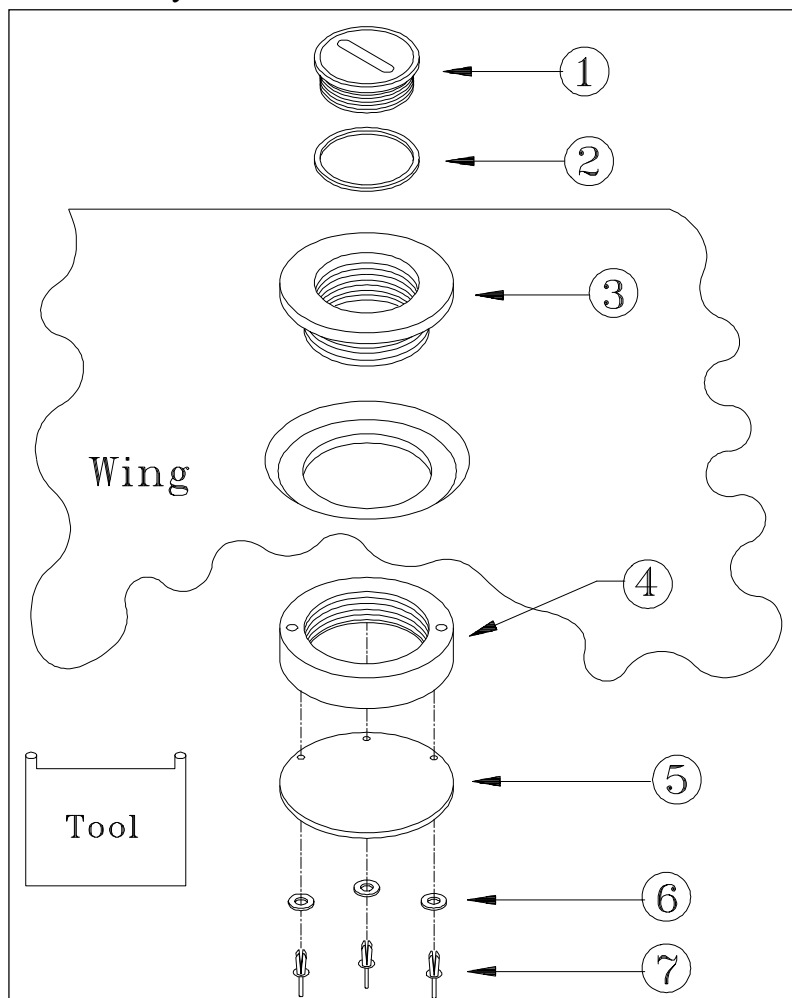
Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

- 5 Clean all sealing surfaces with Acetone.
- 6 Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) to the sealing surfaces (wing/filler neck).

28-11-07

Filler Neck Sealing Lip Replacement

- 1 Carefully drill out the body-bound rivets (7, Figure 6).
- 2 Install the new sealing lip driving in new washers (6) and body-bound rivets.



*Filler Neck and Sealing Lip Removal/Installation
Figure 6*

28-11-08

Ventilation Line Replacement

Refer to Figure 6A. Small letters (a-c) refer to the marks of Figure 2.

General information concerning hoses and fittings you find in Chapter 20.

NOTE

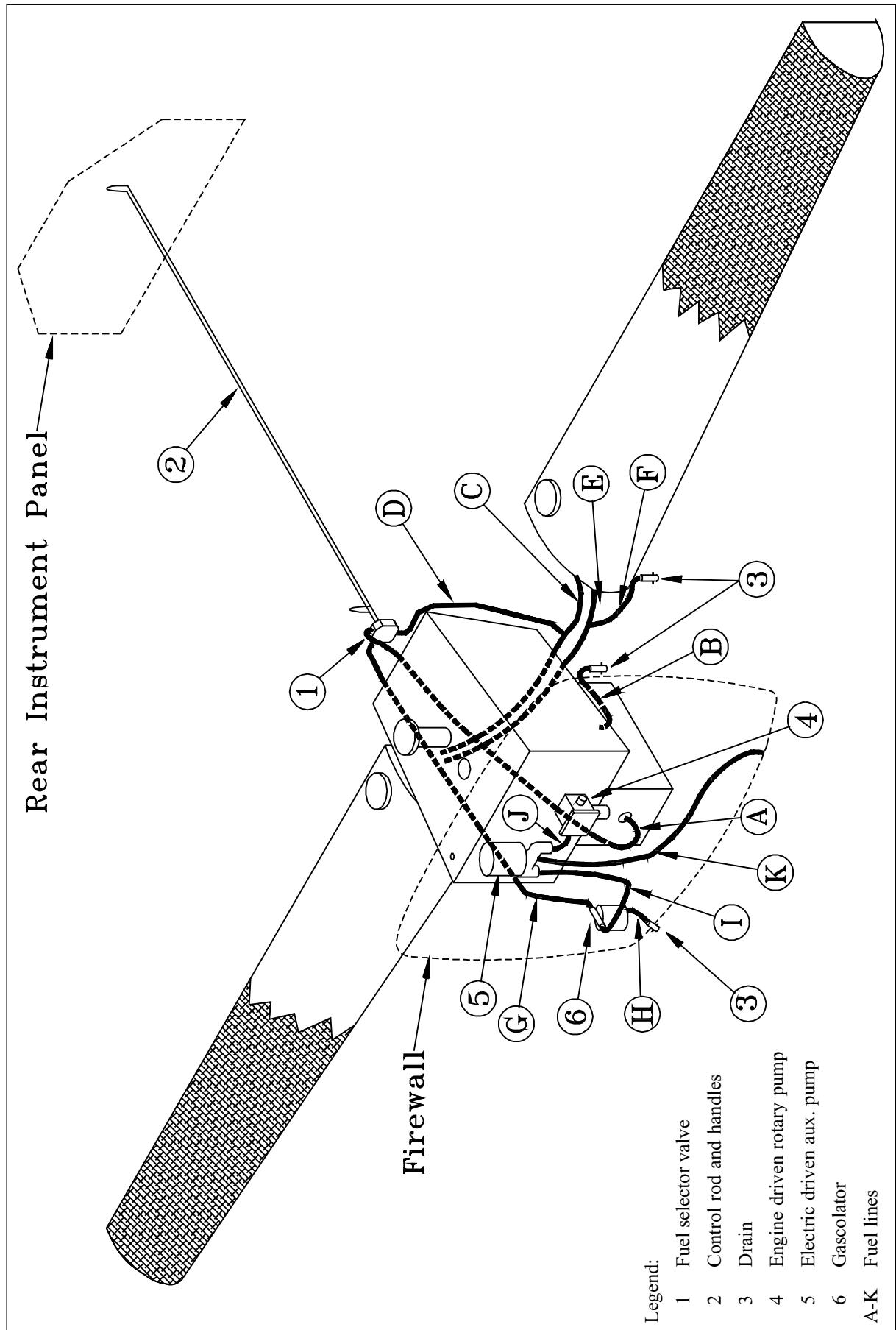
Use only, tubes and fittings as listed in the following.

28-20-00

DISTRIBUTION

(Refer to Figure 7) Flexible hoses and aluminium tubes (A-J) connect the particular components of the fuel system. From Serial No. 25 the drain line "K" has been added. In addition to the engine driven fuel pump (4), an electrically driven auxiliary pump (5) having sufficient capacity to feed the engine at take-off power is fitted as a safety device against failure of the engine driven pump. The auxiliary pump switch/circuit breaker is located on the rear instrument panel. A gascolator (6) is installed between the fuel selector valve and the auxiliary fuel pump at the firewall (engine side). A fuel selector valve of an Allen 6S122 type (1) is located at the right side of the front cockpit behind the main spar on a separate support. A control rod connects the selector valve to the control handles (2). The fuel selector valve is marked by the letters "WT" (Wing Tank), "E" (Engine), and "CT" (Center Tank) to ensure correct installation of fuel lines (Refer to "Detail A" of Figure 8).

The two tank systems are equipped with separate drain lines. Drains (3) are located at the gascolator and the left and right side of the bottom fuselage.



Distribution
 Figure 7

28-21-00

MAINTENANCE PRACTICES

28-21-01

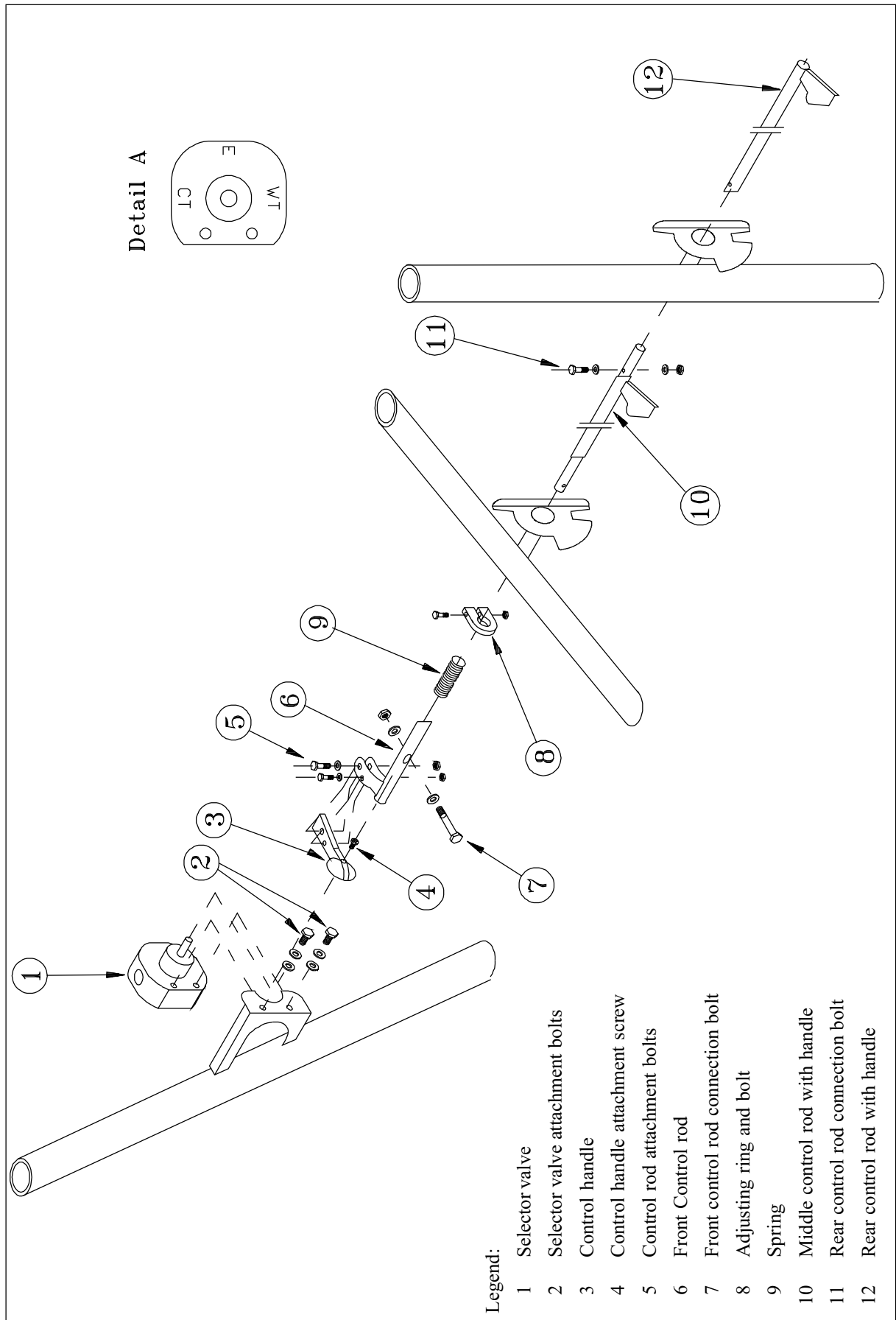
Fuel Selector Valve Removal/Installation

- 1 Drain the fuel system per Chapter 12-10-02.
- 2 Disconnect the fuel lines on the selector valve.
- 3 Remove the control rod attachment bolts (5, Figure 8).
- 4 Remove the selector valve attachment bolts (2).
- 5 Remove the selector valve (1).
- 6 Install in reverse sequence of removal. Use LOCTITE when installing the selector valve attachment bolts.

28-21-02

Fuel Selector Valve Control Rod Removal/Installation

- 1 Remove the rear control rod connection bolt (11, Figure 8).
- 2 Remove the rear control rod (12) to the rear.
- 3 Loosen the bolt of the adjusting ring (8).
- 4 Remove the front control rod connection bolt (7).
- 5 Remove the middle control rod (10), the adjusting ring (8) and the spring (9) to the rear.
- 6 Remove the control rod attachment bolts (5).
- 7 Remove the front control rod (6) .
- 8 Install in reverse sequence of removal. Consider that the position of the adjusting ring shall give the spring enough tension to move the control rod into the foremost position after having tied back.

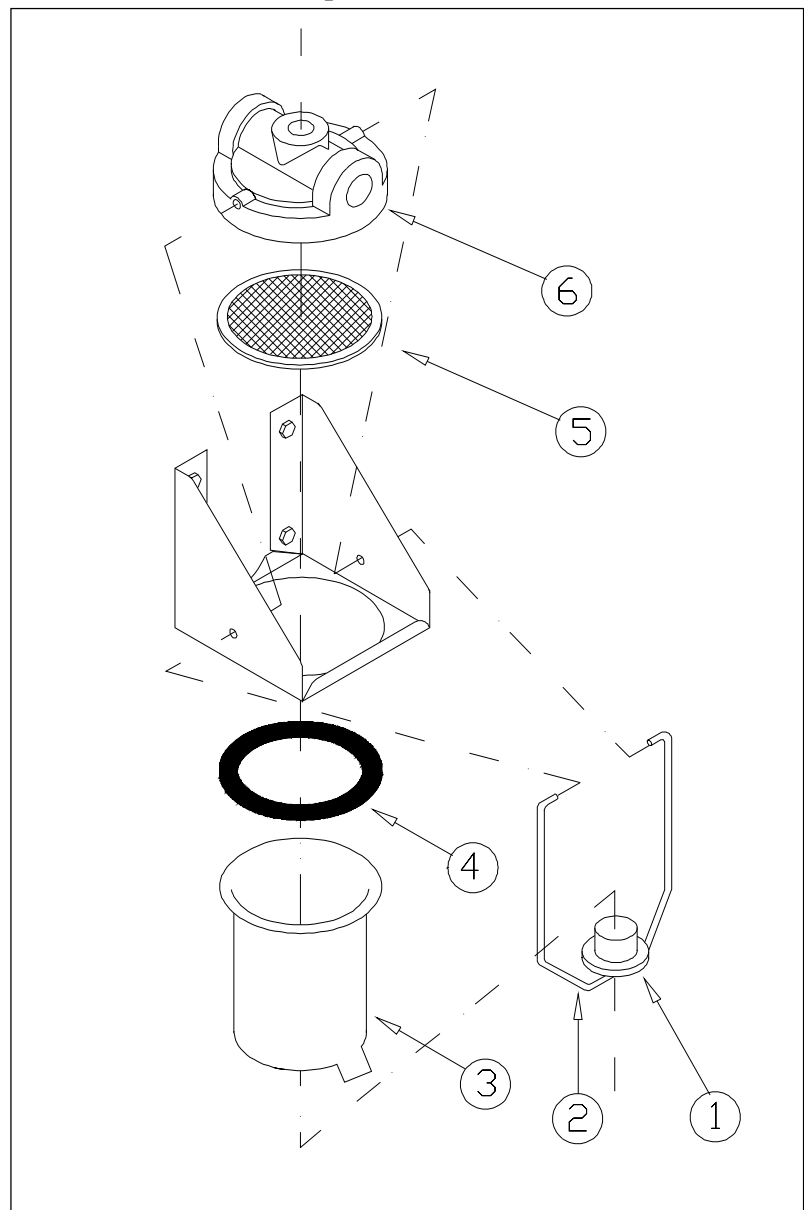


Fuel Selector Valve and Control Rod
Figure 8

28-21-03

Gascolator Removal/Installation

- 1 Drain the fuel system per Chapter 12-10-02.
- 2 Disconnect the fuel lines on the gascolator.
- 3 Loosen the knurled nut (1, Figure 9).
- 4 Remove the mounting bracket (2).
- 5 Remove the fuel reservoir (3) and the sealing ring (4).
- 6 Remove the strainer (5) and the gascolator cover (6).
- 7 Install in reverse sequence of removal.

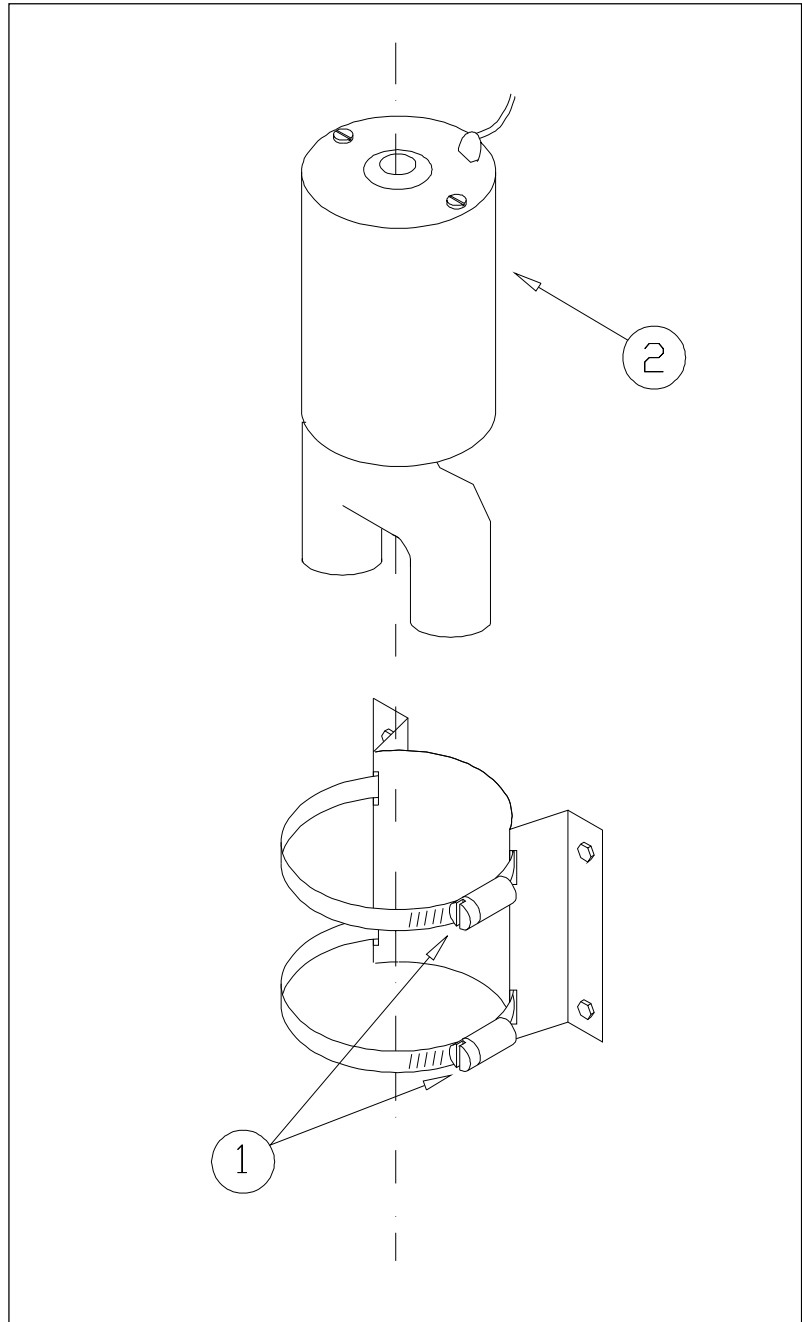


*Gascolator Removal/Installation
Figure 9*

28-21-04

Electrical Boost Pump Removal/Installation

- 1 Drain the fuel system per Chapter 12-10-02.
- 2 Disconnect the plug and the fuel lines on the boost pump.
- 3 Loosen the clamping device screws (1, Figure 10).
- 4 Remove the boost pump (2).
- 5 Install in reverse sequence of removal.



Boost Pump Removal/Installation
Figure 10

28-21-05

Fuel Line Replacement

Refer to Figure 10A. The letters (A-J) refer to the markings of Figure 7.

General information concerning hoses and fittings you find in Chapter 20.

I M P O R T A N T

If replacement of fuel lines passing the firewall is necessary, renew the sealing of the rubber grommet grooves and gaps at the engine side of the firewall. Use PRC-812 (Products Research & Chemical Corporation, USA) firewall sealant. Cover the fuel lines of the engine department with AEROQUIP AE102 fire sleeves as per Chapter 20-10-07.

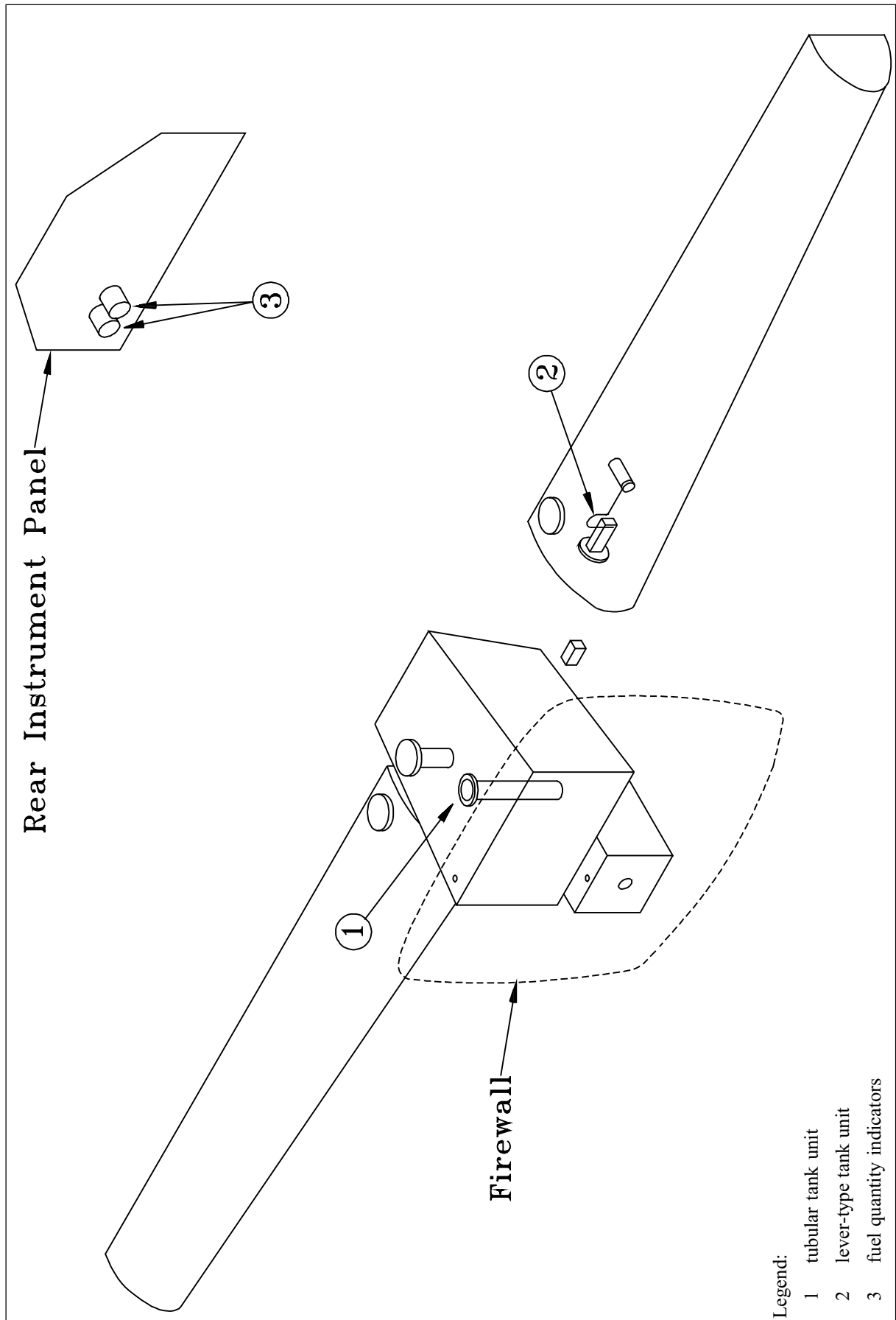
N O T E

Use only, tubes and fittings as listed in the following.

28-40-00

INDICATING

(Refer to Figure 11) For fuel contents indicating the center tank is equipped with a tubular tank unit (1) and the left wing tank with a lever-type tank unit (2). They transmit the fuel levels to the respective fuel quantity indicators at the instrument panel (3). In contrast to the fuel quantity indicator of the center tank the one in the wing tank is not adjustable. If the indication is inexact the float wire of the tank unit has to be adjusted (refer to Chapter 28-41-05).



*Indicating
Figure 11*

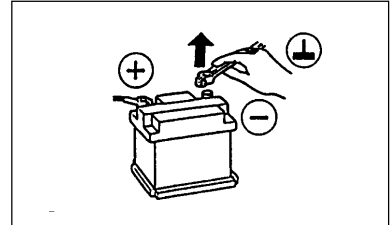
28-41-00

MAINTENANCE PRACTICES

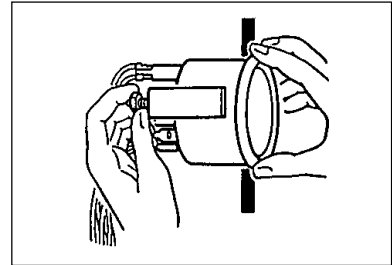
28-41-01

Fuel Quantity Indicator Removal/Installation

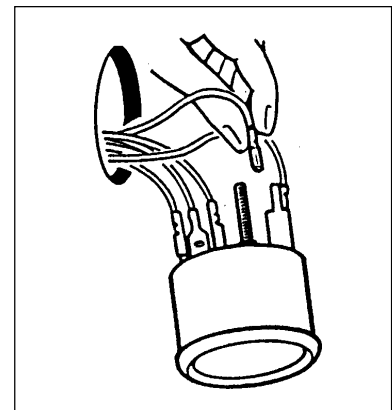
- 1 Disconnect battery.



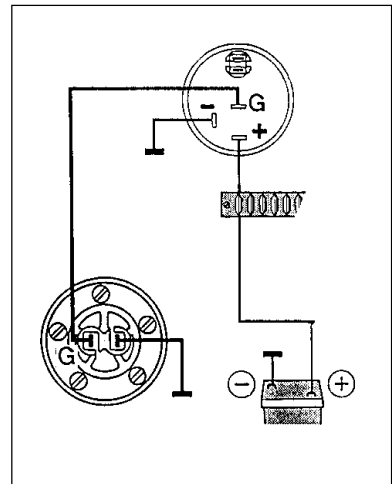
- 2 Loosen the nuts, remove the mounting bracket and remove the fuel quantity indicator.



- 3 Disconnect the wiring (the lamp is not used).



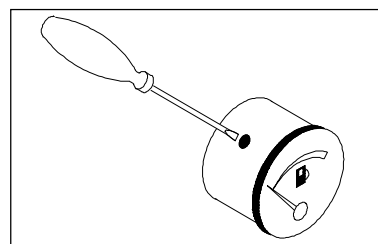
- 4 Install in reverse sequence of removal observing the wiring diagram.



28-41-02

Fuel Quantity Indicator Calibration (Center Tank)

- 1 Drain the fuel system (refer to Chapter 12-10-02).
- 2 Remove the fuel quantity indicator following step 2 of Chapter 28-41-01.
- 3 Bring indicator to „0“-position by turning the adjustment screw.

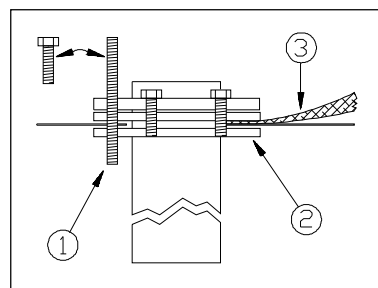


- 4 Reinstall the fuel quantity indicator.

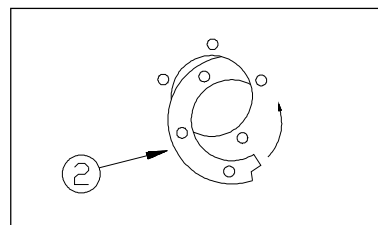
28-41-03

Tubular Tank Unit (Center Tank) Removal/Installation

- 1 Drain the fuel system per Chapter 12-10-02.
- 2 Loosen one bolt and replace by a M5 threaded rod (1) for securing the slotted retainer ring (2).
- 3 Remove the other bolts and the ground bonding lead (3).



- 4 Lift tubular tank unit and sealing ring over the threaded rod.
- 5 Remove the threaded rod and turn out the slotted retainer ring (2).



WARNING

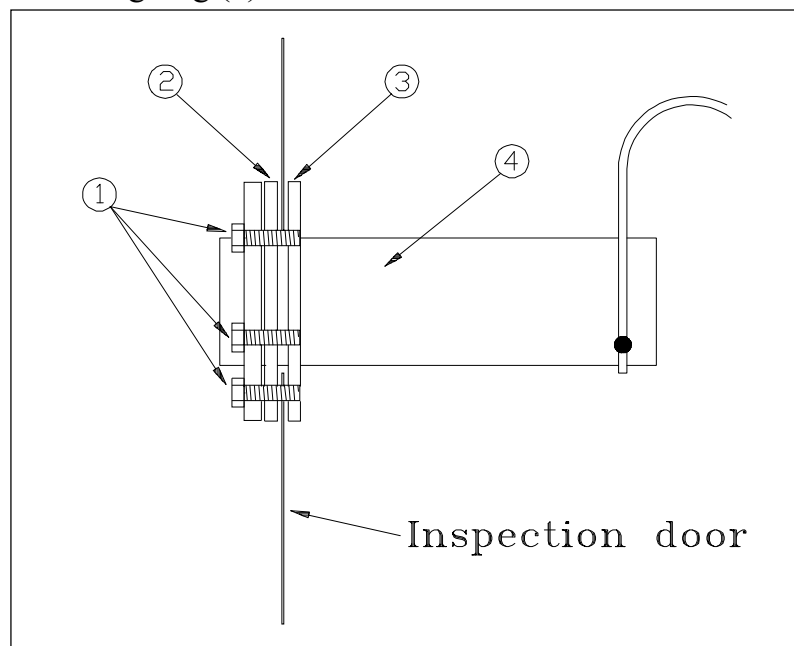
Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

- 6 Clean sealing surfaces mechanically and with Acetone.
- 7 Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) for sealing to both sides of the sealing ring.

28-41-04

Lever-type Tank Unit (Wing Tank) Removal/Installation

- 1 Disconnect the electrical wiring.
- 2 Remove LH inspection door (refer to Chapter 28-11-03)
- 3 Remove tank unit bolts (1, Figure 12).
- 4 Remove the retainer ring (3) the tank unit (4) and the sealing ring (2).



*Lever-type Tank Unit (Wing Tank) Removal/Installation
Figure 12*

WARNING

Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

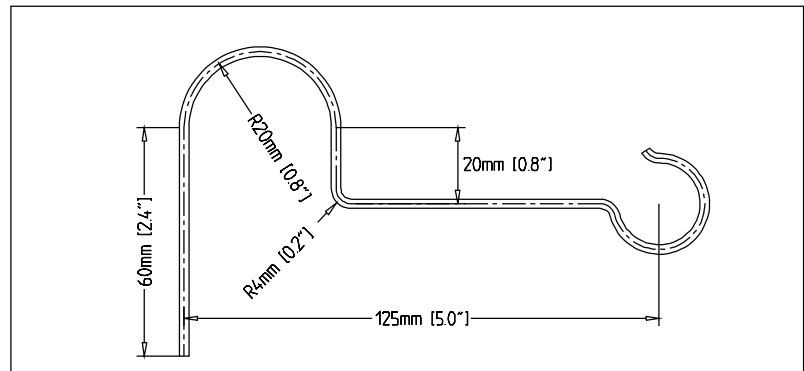
- 5 Clean sealing surfaces mechanically and with Acetone.
- 6 Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA)

USA) for sealing to both sides of the sealing ring and the grooves inside the tank..

28-41-05

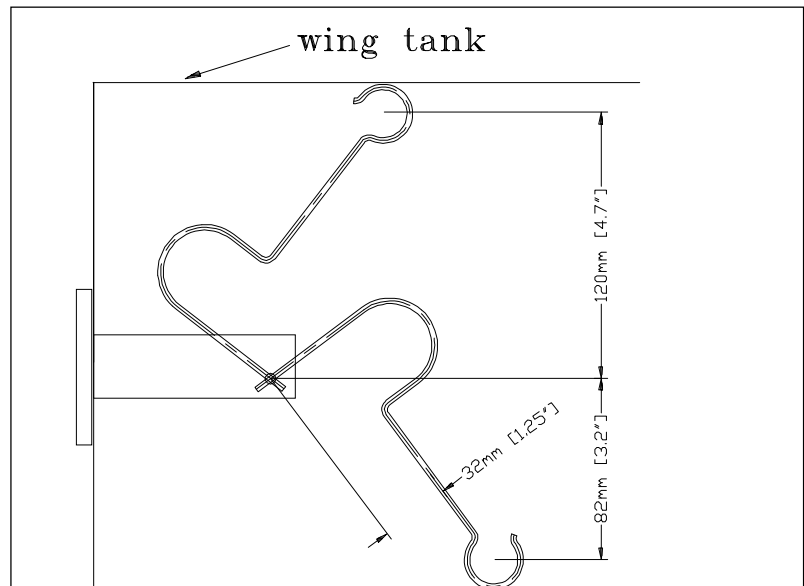
Float Wire Adjustment

- 1 Remove the lever-type tank unit per Chapter 28-41-04.
- 2 Remove the float wire and bend it in form like shown in the following Figure 13:



*Float Wire Adjustment
 Figure 13*

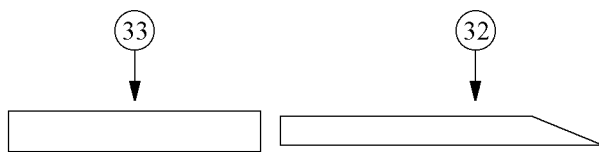
- 3 Reinstall the float wire observing the distances shown in Figure 14, pay attention to a proper alignment and tighten well the attachment bolt.



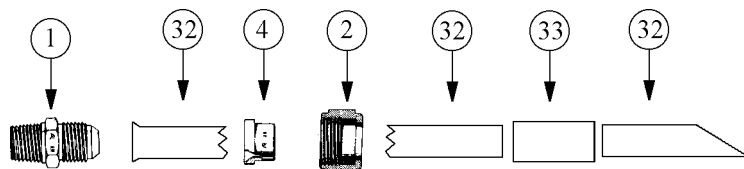
*Float Wire Installation
 Figure 14*

- 4 Reinstall the lever-type tank unit per Chapter 28-41-04.

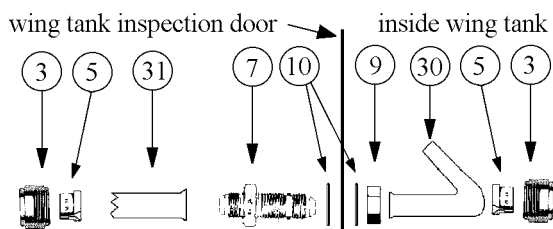
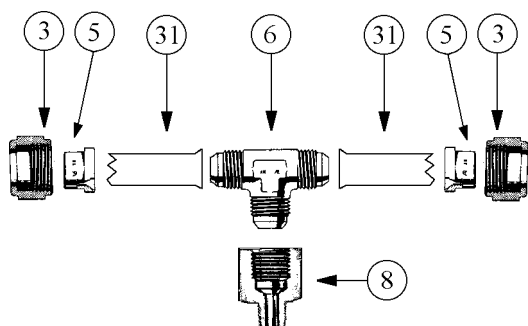
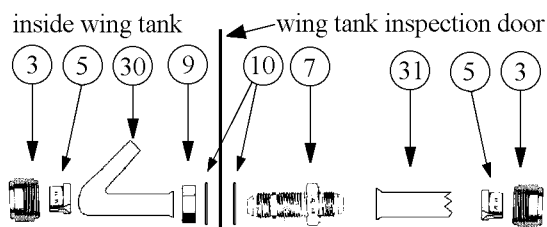
Acro tank to main landing gear spring connection (a)



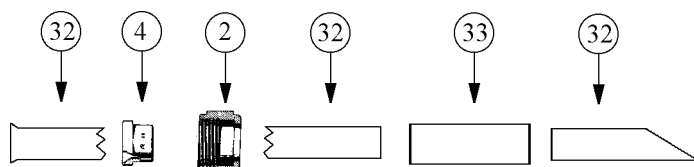
Center tank to main landing gear spring connection (b)



Wing tank to wing tank connection (c)



Tee-fitting to main landing gear spring connection (d)



Fittings and washers

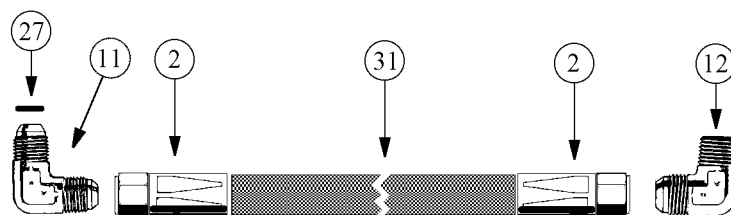
- 1 AN816-4D
PN: PC-00159
- 2 AN818-4D
PN: PC-00161
- 3 AN818-6D
PN: PC-00160
- 4 AN819-4D
PN: PC-00860
- 5 AN819-6D
PN: PC-00162
- 6 AN824-6D
PN: PC-00168
- 7 AN832-6D
PN: PC-00170
- 8 AN894-6-4D
PN: PC-00154
- 9 AN924-6D
PN: PC-00177
- 10 AN960-C916
PN: PC-01852
- 11 AN822-4D
PN: PC-00155

Tubes

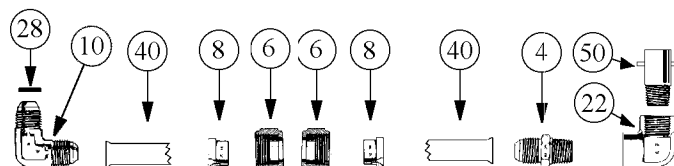
- 30 strainer tube
PN: PC-63202.2
- 31 alu tube 5052-0, Ø3/8 inch
PN: PC-00122
- 32 alu tube 5052-0, Ø1/4 inch
PN: PC-00123
- 33 vinyl tubing
PN: PC-01607

*Ventilation lines
 Figure 6A*

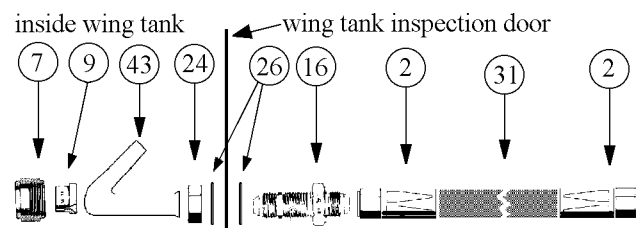
Acro tank to selector valve connection (A)



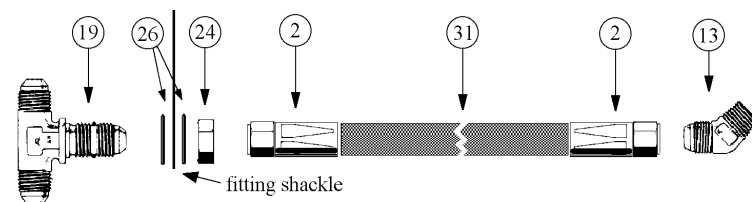
Acro/center tank drain (B)



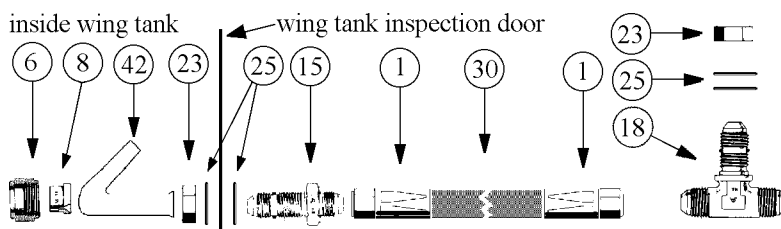
Wing tank to Tee-fitting connection (C)



Tee-fitting to selector valve connection (D)



Wing tank to Tee fitting connection (drain line) (E)



* Refer to Ch. 20-10-07

Fittings and washers

- 1 AN491-4D
PN: PC-00149
- 2 AN491-6D
PN: PC-00150
- 4 AN816-4D
PN: PC-00159
- 6 AN818-4D
PN: PC-00161
- 7 AN818-6D
PN: PC-00160
- 8 AN819-4D
PN: PC-00860
- 9 AN819-6D
PN: PC-00162
- 10 AN821-4D
PN: PC-02630
- 11 AN821-6D
PN: PC-02631
- 12 AN822-6D
PN: PC-00164
- 13 AN823-6D
PN: PC-00166
- 15 AN832-4D
PN: PC-00171
- 16 AN832-6D
PN: PC-00170
- 18 AN834-4D
PN: PC-01644
- 19 AN834-6D
PN: PC-00991
- 22 AN916-1D
PN: PC-00180
- 23 AN924-4D
PN: PC-00178
- 24 AN924-6D
PN: PC-00177
- 25 AN960C-716
PN: PC-00810
- 26 AN960-C916
PN: PC-01852
- 27 O-ring MS29512-06
PN: PC-01270
- 28 O-ring MS29512-04
PN: PC-02632

Hoses*

- 30 AEROQUIP 303-4
PN: PC-00402
- 31 AEROQUIP 303-6
PN: PC-00403

Tubes

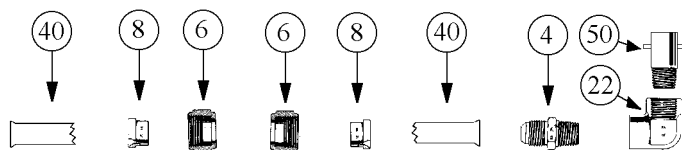
- 40 alu tube 5052-0, Ø1/4 inch
PN: PC-00123
- 42 strainer tube
PN: PC-64202.4
- 43 strainer tube
PN: PC-64202.2

Valves

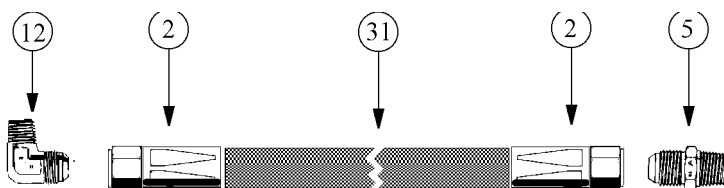
- 50 drain valve
PN: PC-01211

Fuel Lines Airframe Department
 Figure 10A, Sheet 1

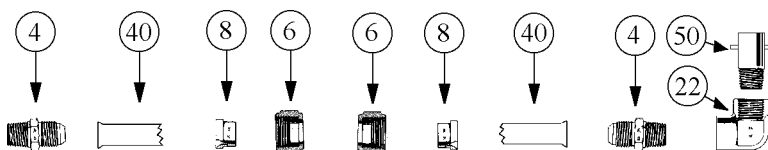
Wing tank drain assembly (drain line) (F)



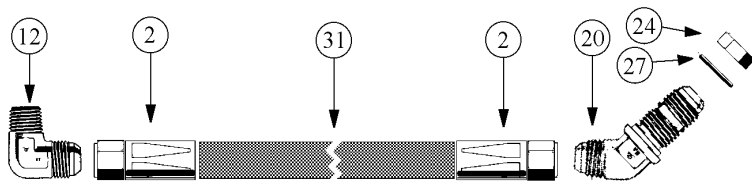
Selector valve to gascolator (G)



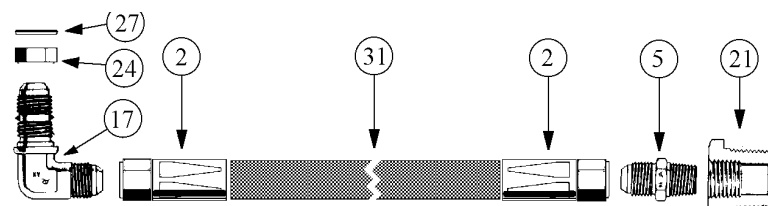
Gascolator drain assembly (H)



Gascolator to boost pump connection (I)



Boost pump to engine driven fuel pump connection (J)



Fittings and washers

- 2 AN491-6D
PN: PC-00150
- 4 AN816-4D
PN: PC-00159
- 5 AN816-6D
PN: PC-00158
- 6 AN818-4D
PN: PC-00161
- 8 AN819-4D
PN: PC-00860
- 11 AN822-6D
PN: PC-00164
- 12 AN822-6D
PN: PC-00164
- 17 AN833-6D
PN: PC-00172
- 20 AN837-6D
PN: PC-02858
- 21 AN912-9D
PN: PC-00176
- 22 AN916-1D
PN: PC-00180
- 24 AN924-6D
PN: PC-00177
- 27 O-ring MS29512-06
PN: PC-01270

Hoses *

- 31 AEROQUIP 303-6
PN: PC-00403

Tubes

- 40 alu tube 5052-0, Ø1/4 inch
PN: PC-00123

Valves

- 50 drain valve
PN: PC-01211

* Refer to Ch. 20-10-07

*Fuel Lines Airframe Department
 Figure 10A, Sheet 2*

Chapter 31

Indication \ Recording System

TABLE OF CONTENTS

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31-10-02	Front Instrument Panel	6
31-15-00	MAINTENANCE PRACTICES	7
31-15-01	Rear Instrument Cover	7
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31-00-00

GENERAL

The Extra 200 is equipped with flight instruments in both cockpits. Instruments and placards can be provided with markings in either metric or English units (refer to Chapter 1 "Placards and Markings"). The colour markings in instruments follow US-FAR, part 23 recommendation.

31-10-00

INSTRUMENT AND CONTROL PANELS

31-10-01

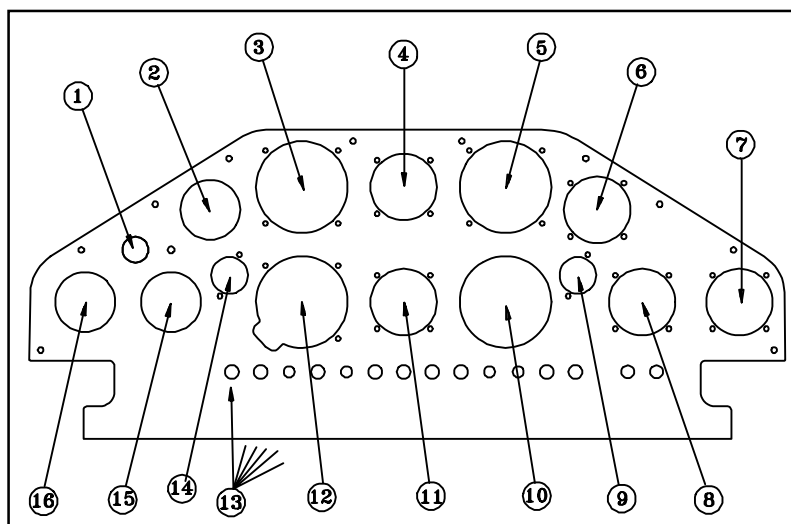
Rear Instrument Panel

The instrument panel of the rear cockpit carries the instruments, control switches and circuit breakers and is covered by a composite part. The panel and the cover are mounted on the steel frame with AN 526 C 1032 R8 bolts.

For panel arrangement of the rear cockpit refer to Figure 1 and the adjacent chart.

N O T E

The chart may be modified by the minimum equipment requirements of individual certifying authorities.



*Rear Instrument Panel
 Figure 1*

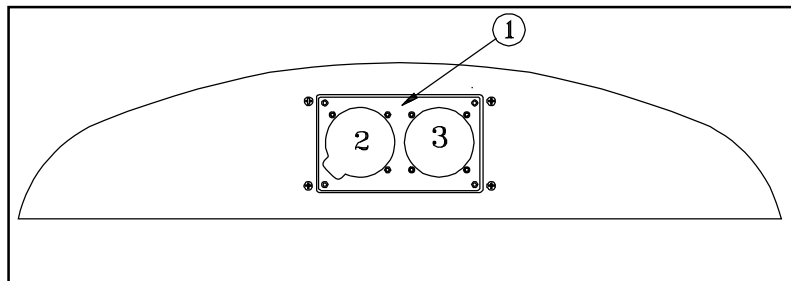
Pos.	Item
1	Starter
2	Ammeter
3	Air Speed Indicator
4	Magnetic Compass
5	Acceleration Indicator (G-Meter) *
6	CHT/EGT Indicator *
7	Radio *
8	Oil Temperature Indicator
9	Oil Pressure Indicator
10	Tachometer
11	Manifold Pressure Indicator
12	Altimeter
13	Switches/Circuit Breakers
14	Fuel Pressure Indicator
15	Fuel Quantity Indicator (Center tank)
16	Fuel Quantity Indicator (Wing tank)

* Option

31-10-02

Front Instrument Panel

The front instrument panel (1, Figure 2) incorporates shock mounts and carries an altimeter (2) and an air speed indicator (3).



Front Instrument Panel
Figure 2

31-15-00

MAINTENANCE PRACTICES

IMPORTANT

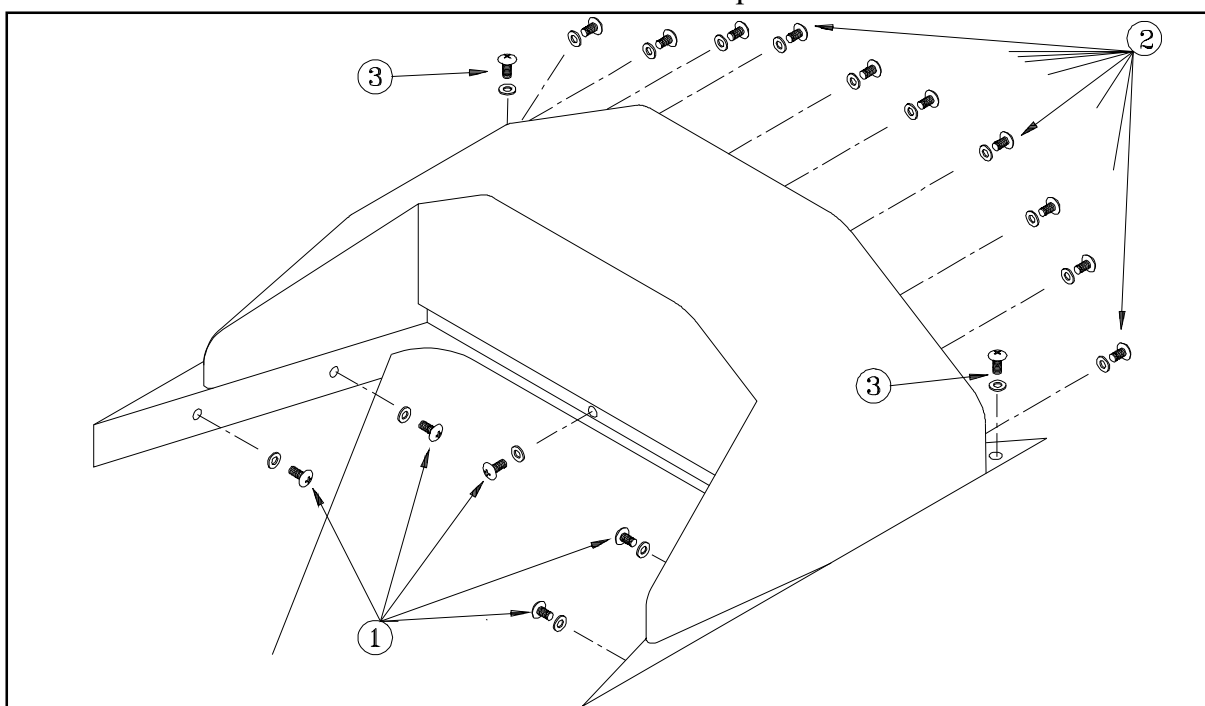
If replacement of the manifold, fuel, and oil pressure lines inside the engine department is necessary, cover the pressure lines with AEROQUIP AE102 fire sleeves as per Chapter 20-10-07 in case of AEROQUIP hoses are used.

31-15-01

Rear Instrument Cover

Removal/Installation

- 1 Remove the screws located at the top of the front seat back rest (1, Figure 3).
- 2 Remove the outer screws (2) of the rear instrument panel (The two inner screws connect the panel to the steel-frame).
- 3 Remove the cockpit corner cover screws (3).
- 4 Remove the instrument and the cockpit corner covers.
- 5 Install in reverse sequence of removal.



*Instrument Cover Removal/Installation
Figure 3*

31-15-02

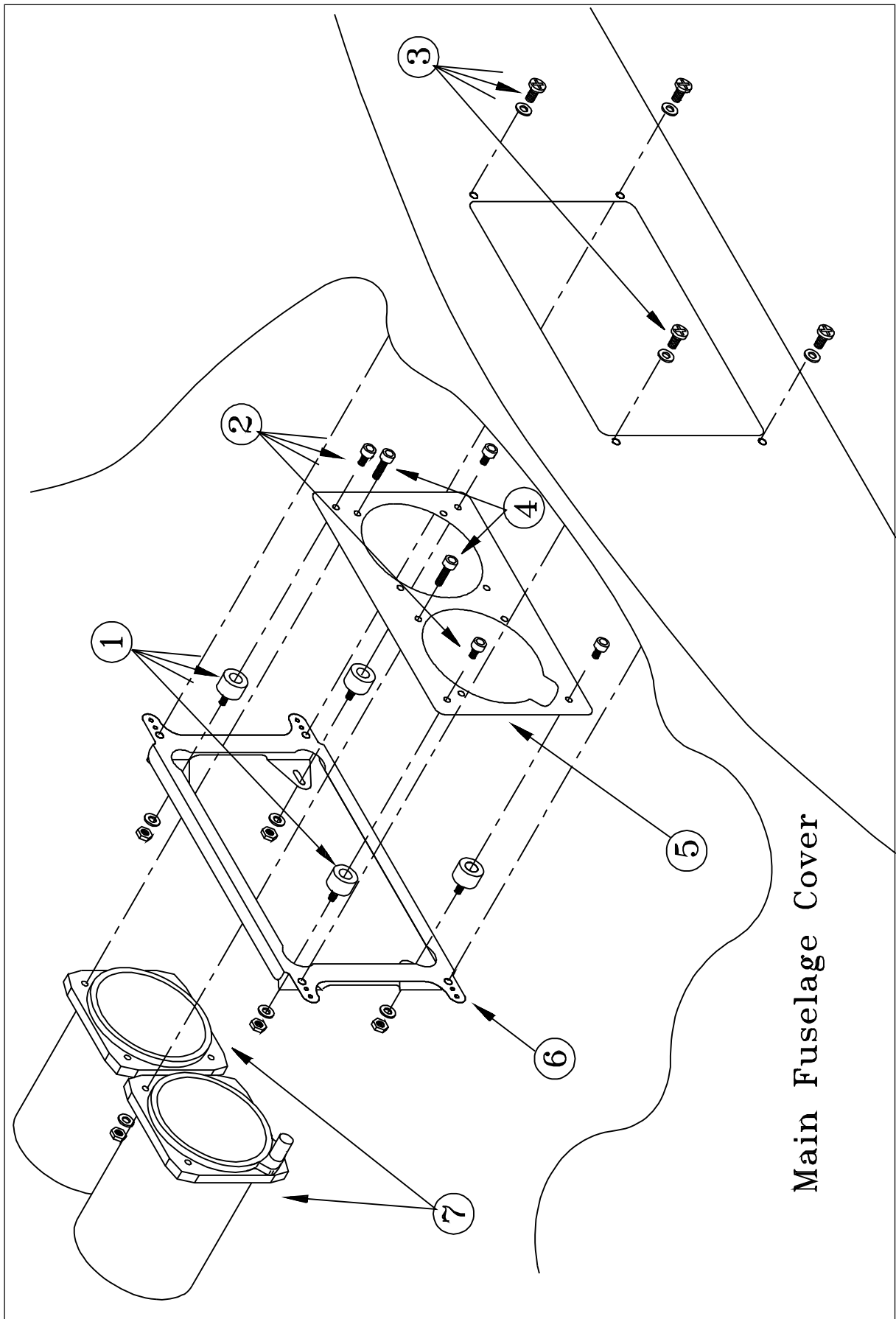
Front Instrument Panel

Removal/Installation

CAUTION

Hold instruments and panel by hand to prevent from falling down when removing the instrument panel attachment screws.

- 1 Remove the AN526 C-1032-R6 instrument panel attachment screws (3, Figure 4).
- 2 Disconnect the pitot resp. static lines from the instruments (7). Mark lines for later identification.
- 3 Remove instrument panel (5) and frame (6).
- 4 Remove DIN 912 M4x20 screws (4) if removal of instruments is necessary.
- 5 Remove DIN 912 M4x5 bolts (2) and shock mounts (1) with LN 9348 M4 stop nuts for disassembly of instrument panel and frame.
- 6 Reverse procedure for assembly/installation.



Front Instrument Panel Removal/Installation
Figure 4

31-50-00

CENTRAL WARNING SYSTEMS

31-50-01

Stall Warning System

The EXTRA 200 is equipped with a stall warning system as standard. This system is designed to warn the pilot by an audible alarm horn, which is fitted in the back of the front seat. The stall warning switch is located at the RH wing leading edge. The electrical circuit of the stall warner is independently secured with an automatic 1 ampere circuit breaker in the rear instrument panel.

The stall warning switch has been adjusted at the factory after a test flight. It is set to trigger the warning approx. 5-10 knots prior to stalling in normal flight. The switch should require no adjustment in normal service.

Chapter 32

Landing gear

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32-11-03	Tail spring	5
32-11-04	Tail Wheel Fork Assembly	6
32-11-05	Tail Wheel	6
32-40-00	WHEELS AND BRAKES	8
32-40-01	General	8
32-41-00	MAINTENANCE PRACTICES	11
32-41-01	Master Cylinder	11

32-10-00

LANDING GEAR

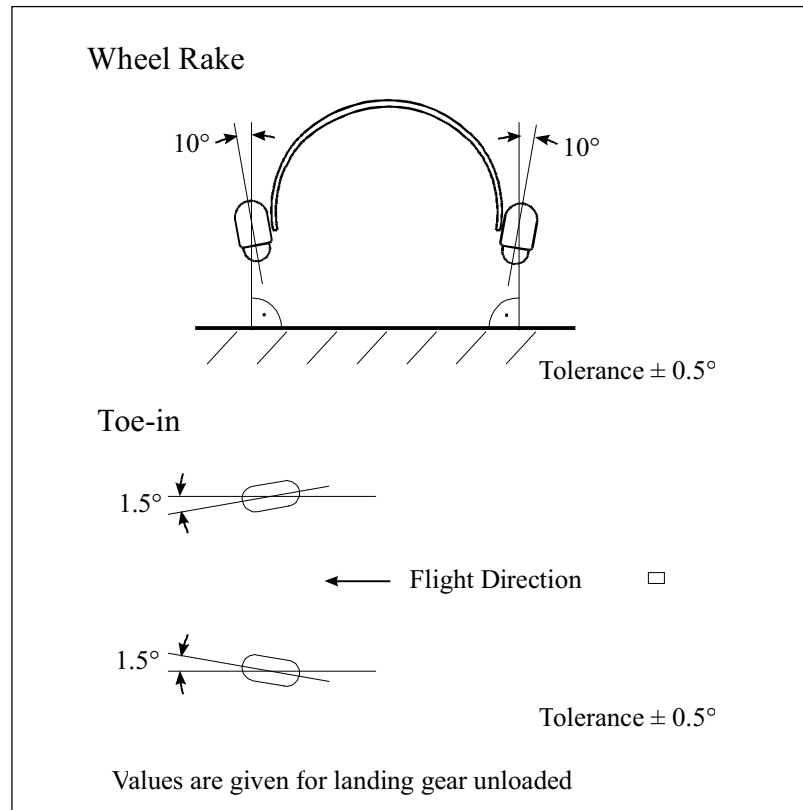
The EXTRA 200 is designed as a conventional tail wheel airplane, with an unretractable landing gear.

The landing gear consists of a 2 wheel main landing gear and a tail wheel.

The main wheels are interconnected and attached to the fuselage by means of an U-shaped carrier. This carrier is of integral glasfibre design and incorporates wheel alignment, spring and dampening action.

The tail wheel is self steering with full swivel capability.

The values for wheel rake and toe-in of main landing gear are given in Figure 1.



Wheel Rake and Toe-in
Figure 1

32-11-00

MAINTENANCE PRACTICES

32-11-01

Main Landing Gear

Removal/Installation

Refer to Figure 2

- 1 Remove the engine cowling, the landing gear cuffs and the bottom covering sheet as per chapter 51-00-01.
- 2 Shore the aircraft as per Chapter 07-20-00
- 3 Drain brake system.
- 4 Unfasten the ventilation tubings and brake lines, and disconnect the brake lines from the brake assembly.
- 5 Remove the four landing gear attachment stop nuts (LN9348-8) (1) and the DIN 125 M8 washers.
- 6 Remove the bottom halves of the mounting clamps (2), the anti abrasion strips (3) and the landing gear (4).
- 7 Install in reverse sequence of removal using new stop nuts. For correct position of landing gear the mandrel, which is located at the bottom of the fuselage, is to put into the respective sleeve at the top of the landing gear spring. Replenish brake fluid.

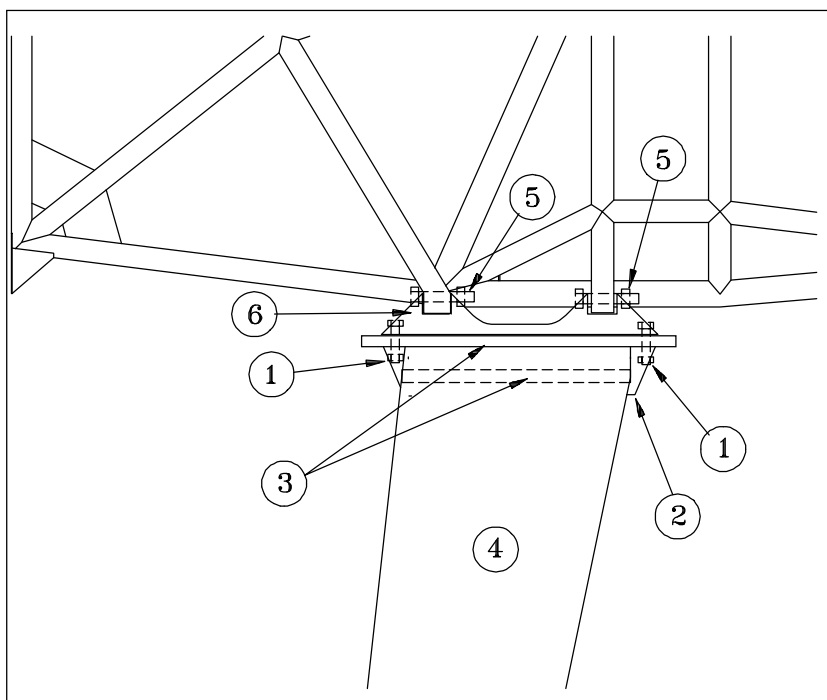
32-11-02

Top Half of the Mounting Clamp

Removal/Installation

Refer to Figure 2

- 1 Remove the main landing gear as per Chapter 32-11-01.
- 2 Remove the LN9348-10 stop nuts, the DIN125 M10 washers and the LN9037-10054 bolts (5).
- 3 Remove the top half of the mounting clamp (6).
- 4 Reverse procedure for installation.



*Main Landing Gear Mounting
Figure 2*

32-11-03

Tail spring

Removal/Installation

- 1 Shore the tail as per Chapter 07-20-02.
- 2 Remove the tail cone access panel per Ch. 51-00-01.
- 3 Disconnect connector spring kit (7, Figure 3) from the rudder bottom hinge bellcrank by removing the attachment bolts (8).
- 4 Remove the tail spring attachment bolts (1-3).
- 5 Remove the tail spring (4).
- 6 Disconnect the tail spring cuff (5) from the tail spring by removing the bolts (12) and remove grease nipple if necessary.
- 7 Reverse procedure for installation; consider to fasten the breather line using the MS21919-DG12 clamp (6). Install the lighter spring of the connector spring kit at the left side.

32-11-04

Tail Wheel Fork Assembly

Removal/Installation

- 1 Shore the tail as per Chapter 07-20-02.
- 2 Disconnect the connector spring kit (7, Figure 3) from the rudder bottom hinge bellcrank by removing the attachment bolts (8).
- 3 Remove the attachment stopnut (10) with washer and steering arm (11) with the connector spring kit.
- 4 Turn wheel fork (15) to 90°-position to press pin (14) inside.

WARNING

Prevent pin (14) from shooting out when appearing at the bottom of the tail spring cuff (5) during removal of the wheel fork by pressing it inside by finger.

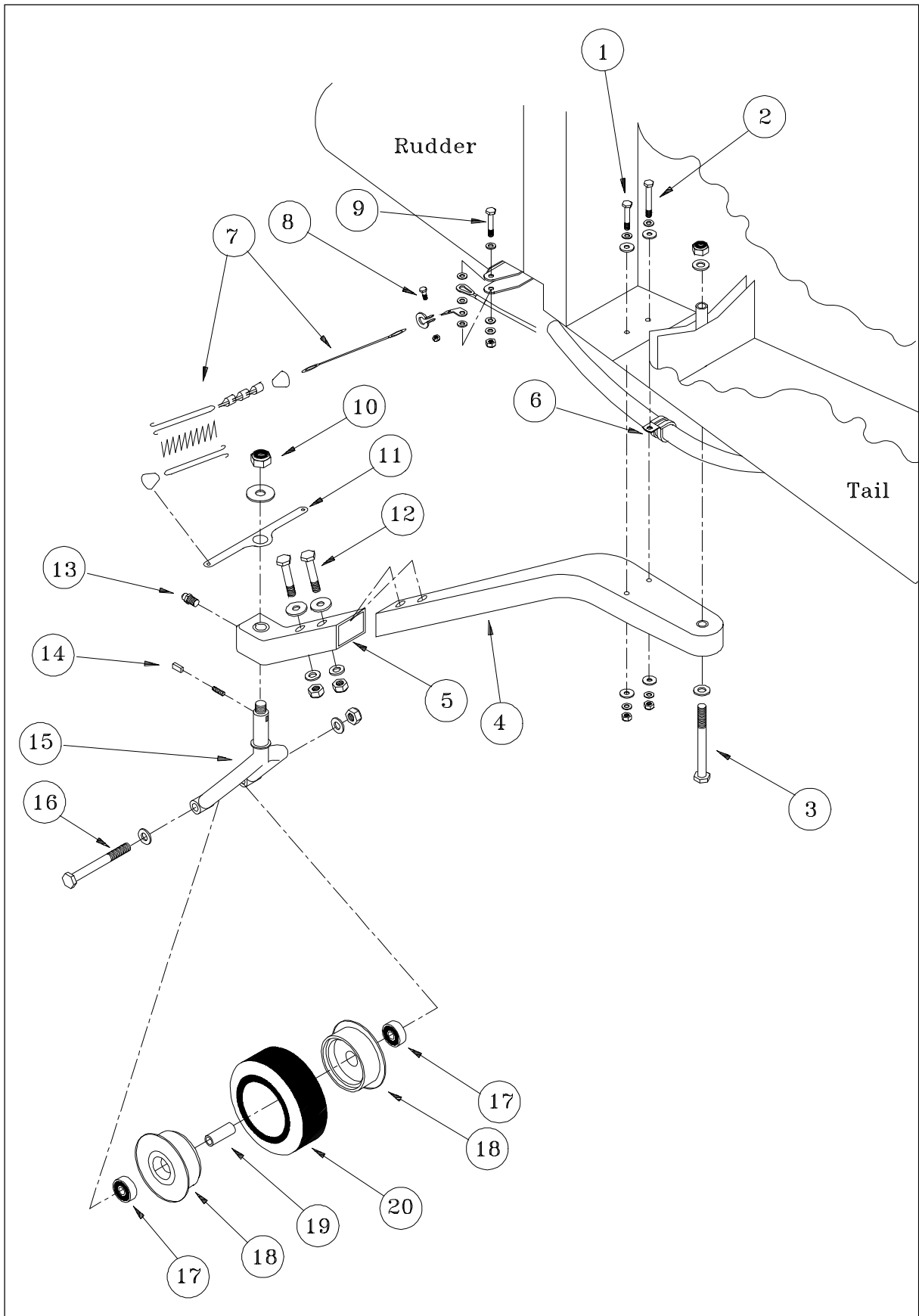
- 5 Remove wheel fork with pin and spring (14).
- 6 Reverse procedure for assembly. Install the lighter spring of the connector spring kit at the left side.

32-11-05

Tail Wheel

Disassembly/Assembly

- 1 Shore the tail as per Chapter 07-20-02.
- 2 Remove the attachment bolt (16, Figure 3), washers, and stopnut.
- 3 Remove the tailwheel.
- 4 Disassemble the bearings (17), the wheel halves (18), the spacer sleeve (19), and the solid rubber tire (20).
- 5 Reverse procedure for assembly.



*Tail Wheel, Fork and Spring
Figure 3*

32-40-00

WHEELS AND BRAKES

32-40-01

General

The main wheels have standard brand 500x5 rims, six-ply rated 5.00-5-tyres with tubes, according to FAA Standard TSO-C62. Cleveland 40-151 wheels with 30-164 brake assemblies are used. The main wheels are covered with glass fibre designed fairings of which Figure 4 shows the layer sequence.

The tailwheel consists of a 5 inch tire and an aluminium rim.

The Cleveland design features an external brake in which the disc is external to the wheel with the brake caliper floating over the disc.

The brake system (refer to Figure 5) consists of a brake assembly located at the inner side of the wheel, a master cylinder (1) at the rear rudder pedals each, and a brake fluid reservoir (2) mounted at the engine side of the firewall. The particular parts of the brake system are interconnected by brake lines consisting of aluminium tubes and flexible hoses (A-F). However from Serial No. 22 the brake lines in the cockpit area are replaced by a KNAPP hose system.

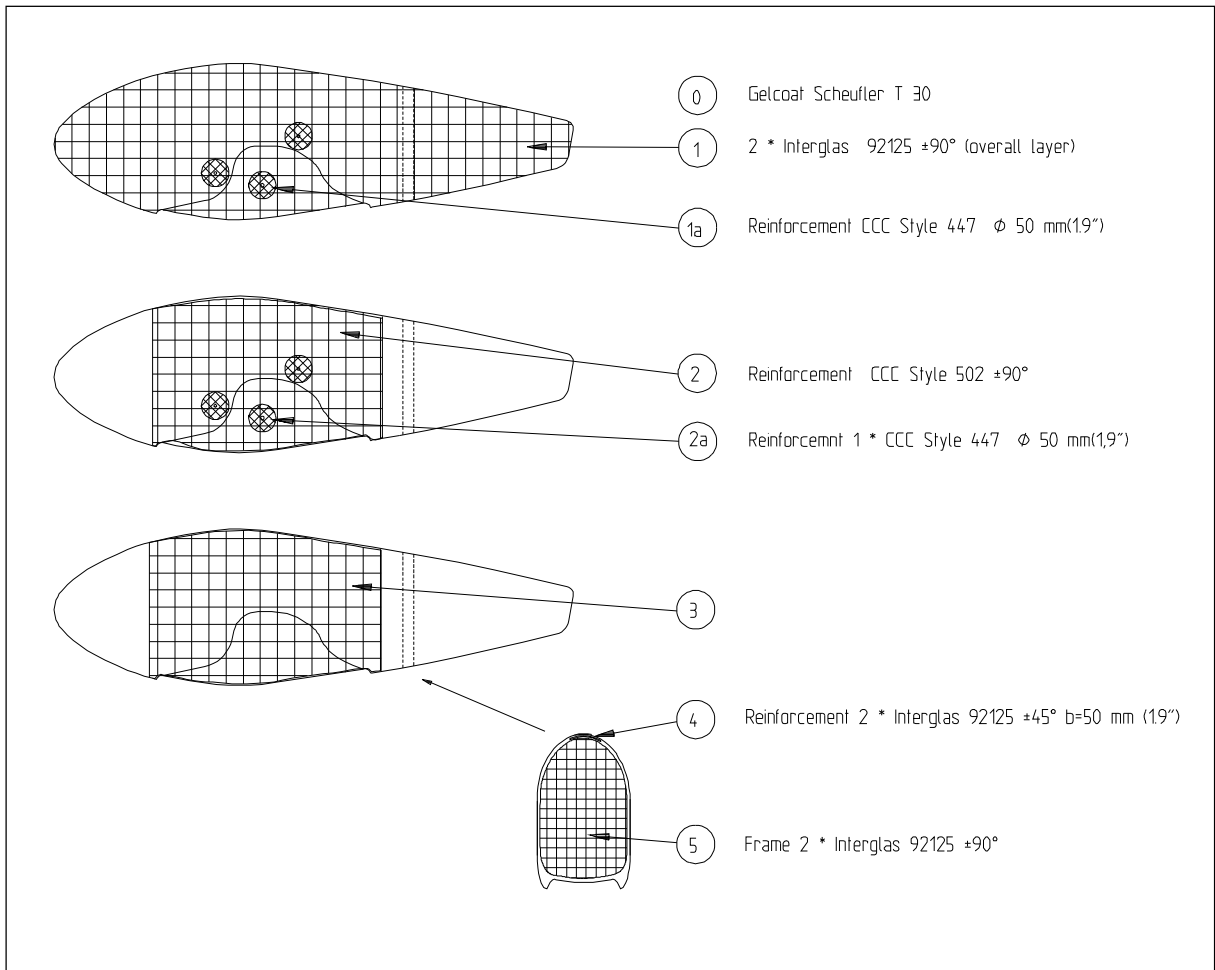
The tail wheel has no brake.

IMPORTANT

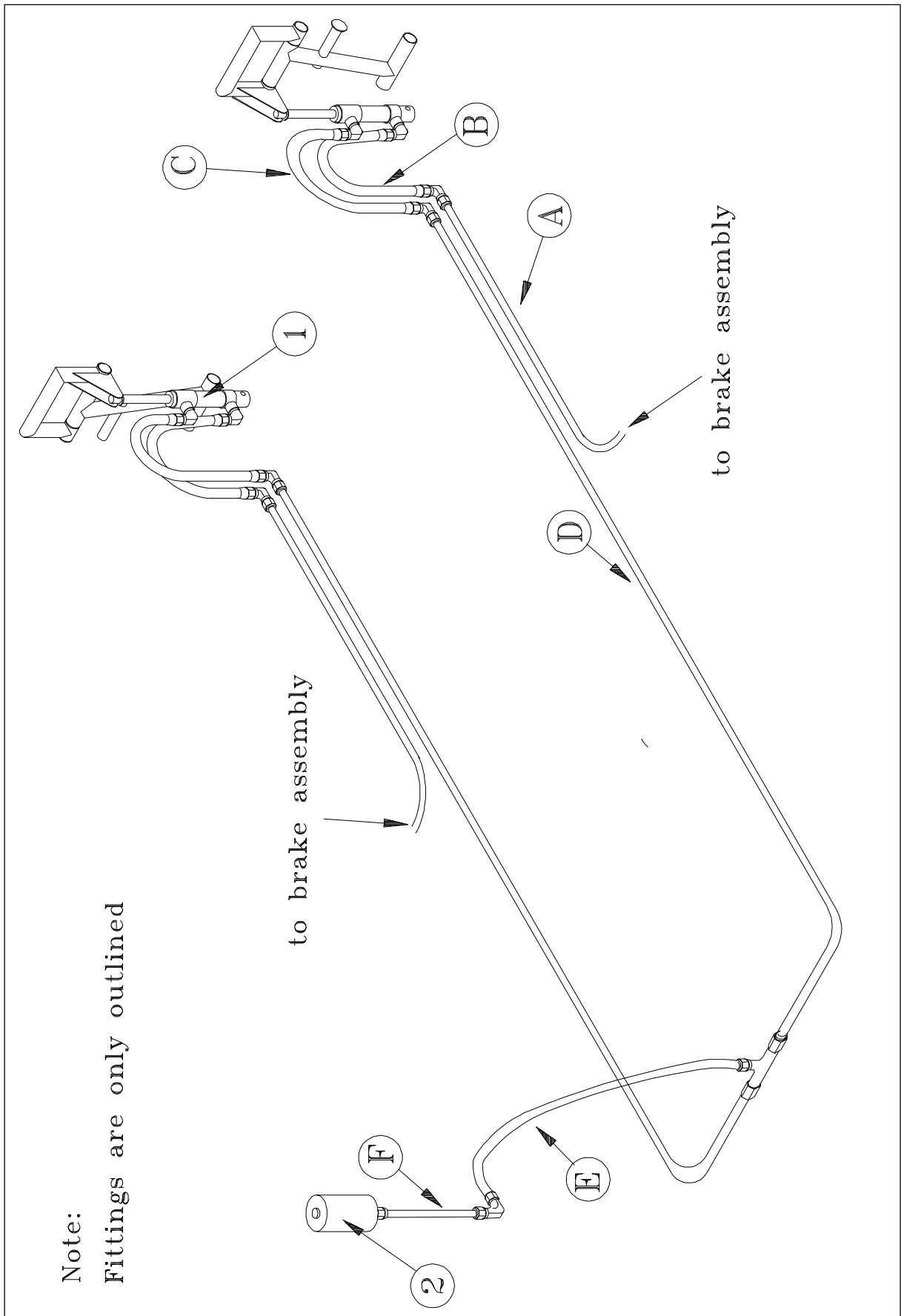
Test brakes after maintaining the brake system. Actuated brakes shall keep the aircraft standing with engine running at 1800 rpm and maximum propeller angle of attack. With applied brakes and powersetting above 1800 rpm the wheels may slide on grass.

NOTE

For further information concerning main wheels and brakes refer to Cleveland Wheels and Brakes Maintenance Manual.



Layer Sequence Wheel Fairing up to Ser. No. 16
Figure 4



Note:
Fittings are only outlined

Brake System
Figure 5

32-41-00

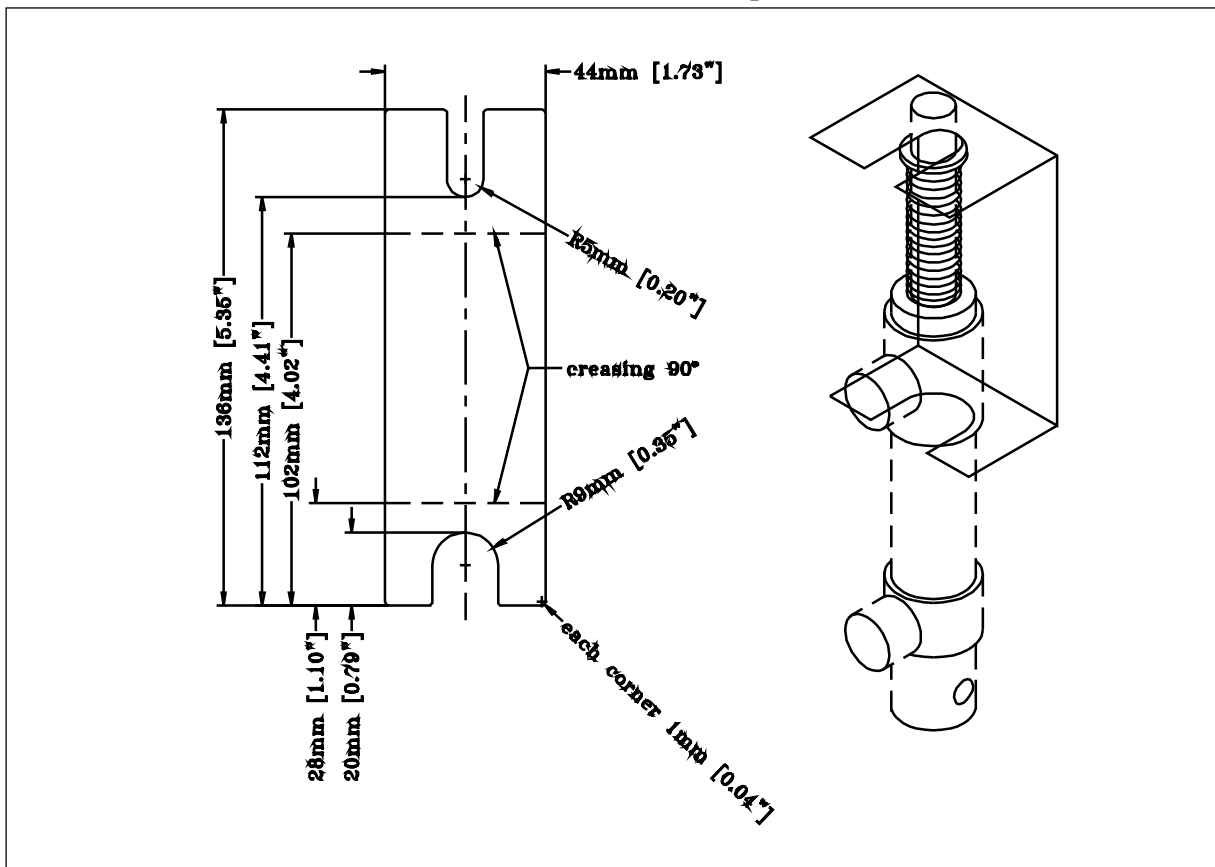
MAINTENANCE PRACTICES

32-41-01

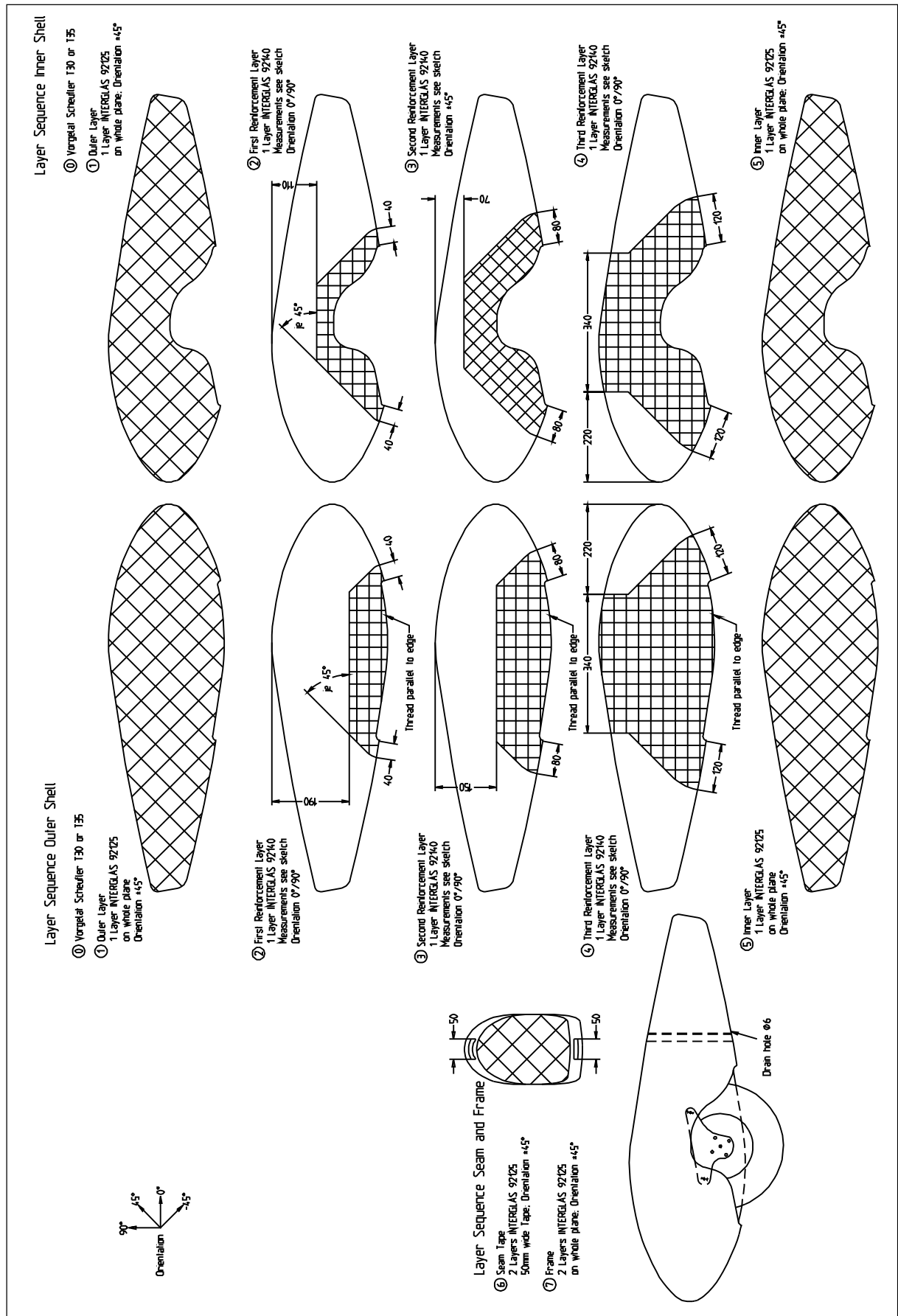
Master Cylinder

Removal/Installation

- 1 Drain the brake system.
- 2 Disconnect the fuel lines.
- 3 Fix the master cylinder spring using a mounting aid as shown in Figure 6 (Cleveland master cylinder only).
- 4 Remove the attachment bolts.
- 5 Remove the master cylinder.
- 7 Remove mounting aid (Cleveland only).
- 6 Install in reverse sequence of removal.



*Master Cylinder Mounting Aid
 Figure 6*



Layer Sequence Wheel Fairing from Ser. No. 17
 Figure 3, Sheet 2

Chapter 33

Lights

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33-40-00	EXTERIOR	4
33-41-00	MAINTENANCE PRACTICES	5
33-41-01	Navigation/Strobe Lights	5
33-41-02	Strobe Light Power Supply (Dual System)	5

33-10-00

FLIGHT COMPARTMENT

For controlling the generator function a low voltage monitor is optionally installed at the rear instrument panel. The indicator is dimmable and has a built-in bulb testing device („press to test“).

The electrical wiring is panel internal.

33-40-00

EXTERIOR

A single strobe light system is installed as standard in the Extra 200 consisting of a strobe light positioned at the top of the main fuselage cover just behind the canopy and a power supply which is mounted in the fuselage behind the back seat at three points.

From the rear instrument panel the wiring follows the respective steel tubes of the fuselage.

As an option the Extra 200 is equipped with a dual strobe light combined with a navigation light system. The lighting units (1, Figure 1) installed at the wing tips incorporate the red or green navigation lights on the forward section, a strobe light in the center and a clear tail position light on the aft section. They are mounted at the wing tip panel (2). The strobe light power supplies (10) are mounted on special attachment plates (11) inside the wing.

The wiring is routed through an aluminium tube inside the wing and along the left resp. right upper longeron to the rear instrument panel. Ground bonding leads are installed between the fuselage, the aluminium tube, the pitot tube mount (LH wing only), the strobe light power supply and the wing tip panels.

The switches and circuit breakers are located at the rear instrument panel.

33-41-00

MAINTENANCE PRACTICES

33-41-01

Navigation/Strobe Lights

Removal/Installation

WARNING

High Voltage! Wait 5 minutes after shutting off before starting any work on the strobe light system.

1 Disconnect the battery and wait 5 minutes.

NOTE

To change a navigation light bulb or glass the removal of the AN 526 C Phillips screws (6, Fig. 1) is sufficient for access.

2 Remove the lighting unit (1) in combination with the wing tip panel (2) per Chapter 57.

3 Remove the lighting cover Phillips screws (6).

4 Remove the lighting cover and pull out the strobe light (7) some centimetres.

5 Remove the lighting unit attachment bolts M4x12/20 (8).

6 Remove the lighting unit.

7 Install in reverse sequence of removal after applying Silicon between the wing tip panel and the lighting unit.

33-41-02

Strobe Light Power Supply (Dual System)

Removal/Installation

WARNING

High Voltage! Wait 5 minutes after shutting off before starting any work on the strobe light system.

1 Remove the wing tip attachment plate with the lighting unit per Chapter 33-41-01 following the steps 1 to 5.

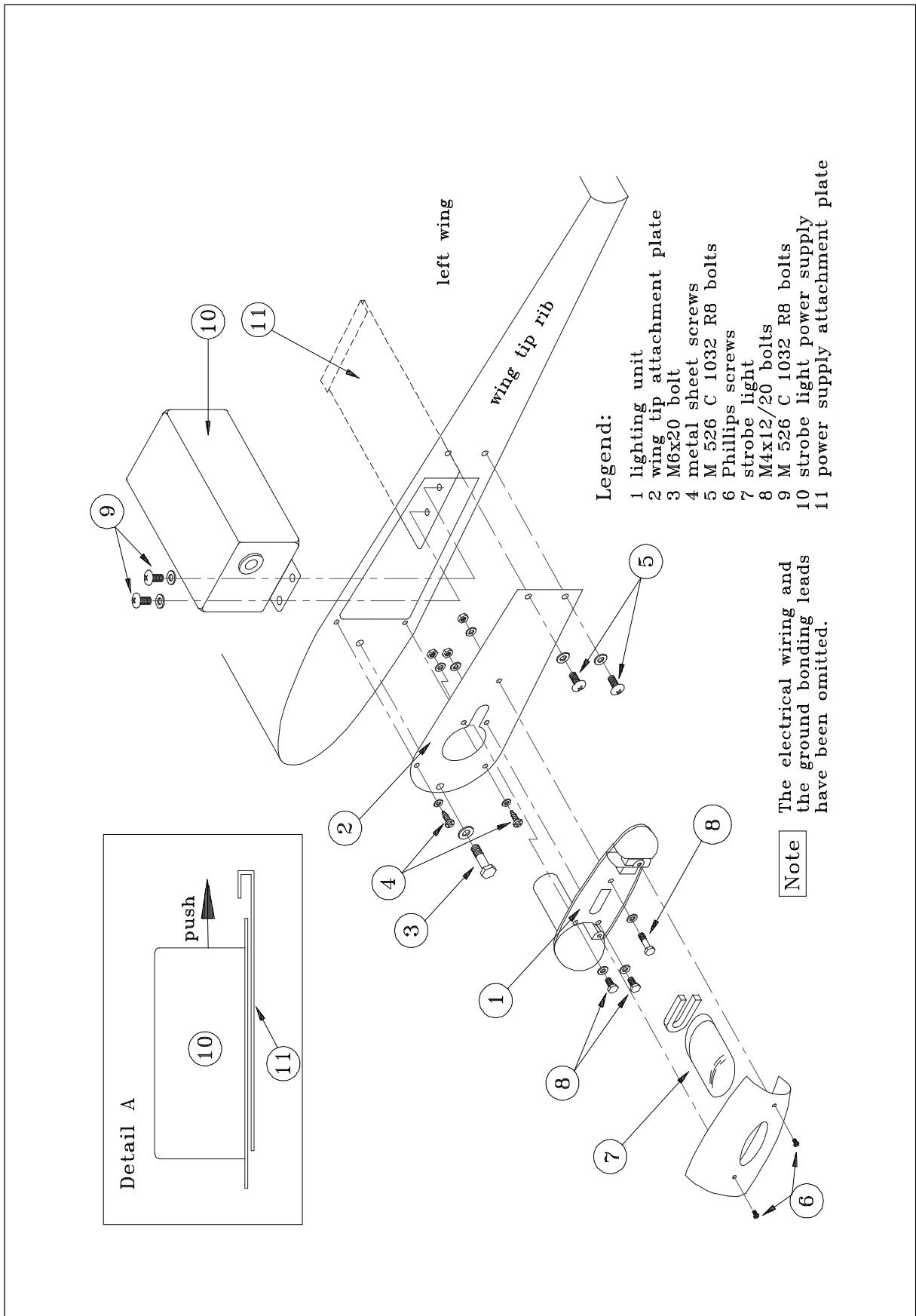
2 Disconnect the electrical wiring of the power supply.

- 3 Remove the AN 526 C 1032 R8 bolts (9, Figure 1) and disconnect the ground bonding lead.
- 4 Pull out the power supply (10) 2 centimetres and remove.

CAUTION

DC units are polarity sensitive. Black lead is negative.

- 5 Install in reverse sequence of removal observing Detail A of Figure 1 when attaching the power supply on the attachment plate (11).



Navigation/Strobe Lights Removal/Installation
Figure 1

Chapter 34

Navigation

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34-00-00

GENERAL

The Extra 200 is equipped with an altimeter, an airspeed indicator and a magnetic compass in the rear cockpit. Optional a turn and bank indicator is obtainable; in the front cockpit additionally a second airspeed indicator and altimeter can be installed as an option. The colour markings in instruments follow US-FAR, part 23 recommendation.

To get the pitot and static pressure a pitot/static head is installed at the LH wing leading edge.

34-10-00

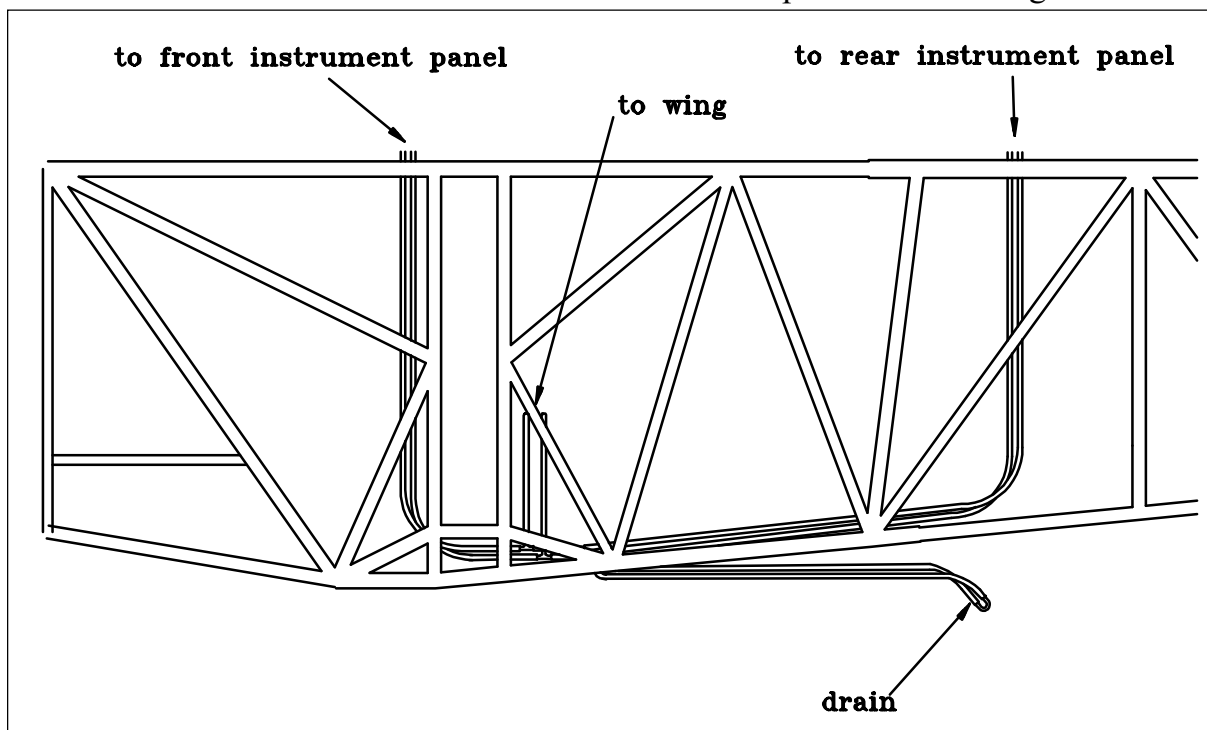
FLIGHT ENVIRONMENT DATA

This Section describes that portion of the system which senses the environmental conditions and uses the data to influence navigation.

34-10-01

Pitot/Static System

The pitot/static tube is designed to pick up pitot pressure and static pressure. It is screwed through the L.H. outboard leading edge into an attachment block located at the rear web of the main spar. From there the pressures are transmitted by means of a vinyl tubing which is routed through an aluminium tube inside the wing to the left side of the fuselage and further to the instrument panels. The ends of each vinyl tube are marked with the letters "P" or "S" for pitot resp. static pressure line. The pitot/static system can be drained by means of an U-shaped drain which is located at the left side of the cockpit as shown in Figure 1.



*Pitot/Static Drain
Figure 1*

34-10-02**Altimeter**

The altimeter is designed to measure pressure changes of the atmosphere by means of an aneroid capsule, the pressure changes corresponding to changes in altitude. In this instrument the shaft of pinion drives via gearwheels the pointer shaft of the large pointer. Further gearwheels are used to move the small pointer. The altimeter has a scale marked in feet (ft.). Three pointers provide an indication of the altitude; each full turn of the large pointer reads 1,000 feet, each full turn of the middle pointer 10,000 feet. By turning the knob at the bottom left of the instrument, the barometric pressure reading is set in millibars.

Barometric range: 946 thru 1050 millibars
Reading range: -1,000 thru 20,000 feet
Temperature range: -55°C thru +70°C

34-10-03**Airspeed Indicator**

The airspeed indicator shows the speed of the aircraft relative to the atmosphere. The pitot airspeed indicator measures the difference between pitot pressure and static pressure, the former being picked up by the pitot head at the pitot location of the air flow and applied to the airspeed indicator via tubing, the latter also being picked up by the pitot head. The sensing element of the airspeed indicator is an open diaphragm which senses internally the pitot pressure and externally the static pressure, the difference between the two increasing with increasing speed. This difference produces distortion of the diaphragm which is translated to the pointer via a system of levers and gearwheels.

The reading of the airspeed indicator is in knots.

Max. operation altitude: 12,000 m
Operating temperature range: -30°C thru +50°C

34-15-00

MAINTENANCE PRACTICES

34-15-01

Pressure Head Removal/Installation

The pressure head consists of an inner steel tube, an outer aluminium tube and a top cap which are screwed.

- 1 Unscrew the top cap.
- 2 Unscrew the outer aluminium tube.
- 3 Unscrew the inner steel tube.
- 4 Install in reverse sequence of removal applying silicone in the gap between the outer aluminium tube and the hole of the wing leading edge.

34-15-02

Pitot Head Attachment Block Removal/Installation

- 1 Remove the Pitot head per Chapter 34-15-01.
- 2 Remove the wing tip attachment plate with the lighting unit (if installed) per Chapter 57.
- 3 Disconnect the vinyl tubing.
- 4 Remove the LN9348-05 stop nuts and the DIN125 M5 washers.
- 5 Disconnect the ground bonding leads.
- 6 Remove the attachment block.
- 7 Install in reverse sequence of removal. Use new stop nuts.

34-15-03

Altimeter Removal/Installation

NOTE

For removal/installation of the front altimeter refer to Chapter 31.

- 1 Remove the instrument cover per Chapter 31 (rear altimeter only).
- 2 Remove the vinyl tube and the tube-to-pipe adapter if necessary.
- 3 Remove the attachment bolts and nuts.
- 4 Remove the altimeter.
- 5 Install in reverse sequence of removal.
- 6 Perform an operation test.

34-15-04

Airspeed Indicator Removal/Installation

NOTE

For removal/installation of the front airspeed indicator refer to Chapter 31.

- 1 Remove the instrument cover per Chapter 31 (rear airspeed indicator only).
- 2 Remove the vinyl tubing.
- 3 Remove the attachment bolts.
- 4 Remove the airspeed indicator.
- 5 Install in reverse sequence of removal. Observe correct installation of vinyl tubing: "Stat. Druck" = static pressure, "Meßdruck" = Pitot pressure.
- 6 Perform an operation test.

34-20-00

ATTITUDE AND DIRECTION

This Section describes that portion of the system which uses magnetic or inertia forces to sense and display the direction or attitude of the aircraft.

34-20-01

Magnetic Compass

The magnetic compass shows the course of the aircraft in relation to magnetic north. Its measuring range is 360° in increments of 5°. Its case is filled with silicone oil to dampen the movements. The compass correction card is located as shown in Chapter 31.

The magnetic compass must be inspected whenever the engine, magnetizable metals or parts of the electrical resp. ignition system has been replaced, changed or added, otherwise per Chapter 05.

34-20-02

Turn and Bank Indicator

The turn and bank indicator indicates the turning rate of the aircraft about its vertical axis. This instrument comprises an electrically driven gyro, suspended in a gimbal system and whose spin axis is parallel to the lateral axis of the aircraft. The gimbal is connected to the bar pointer of the indicator by a lever system. This bar pointer also indicates the rate at which the aircraft is turning.

In addition, the front of the instrument houses a sphere located in a globe filled with a damping fluid. The change in this indication shows the pilot whether the aircraft is slipping.

34-25-00

MAINTENANCE PRACTICES

34-25-01

Magnetic Compass Removal/Installation

- 1 Remove the instrument cover per Chapter 31.
- 2 Remove the compass attachment bolts and nuts.
- 3 Remove the magnetic compass.
- 4 Install in reverse sequence of removal.
- 5 Perform a compass compensation and replace the compass correction card.

34-25-02

Turn and Bank Indicator Removal/Installation

- 1 Remove the instrument cover per Chapter 31.
- 2 Remove the indicator attachment bolts and nuts.
- 3 Disconnect the electrical wiring.
- 4 Remove the turn and bank indicator.
- 5 Install in reverse sequence of removal.
- 6 Perform an operation test.

Chapter 51

Standard Practices and Structures - General

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51-00-00

GENERAL

51-00-01

Access Panel Identification

For the Extra 200 all removable covers and fairings are defined as access panels (refer to Figure 1 and the adjacent chart). If maintenance or repair is not restricted to a small area it is advisable to remove all access panels before beginning work or checks.

NOTE

Access panels partly overlap. Remove the front panels first.

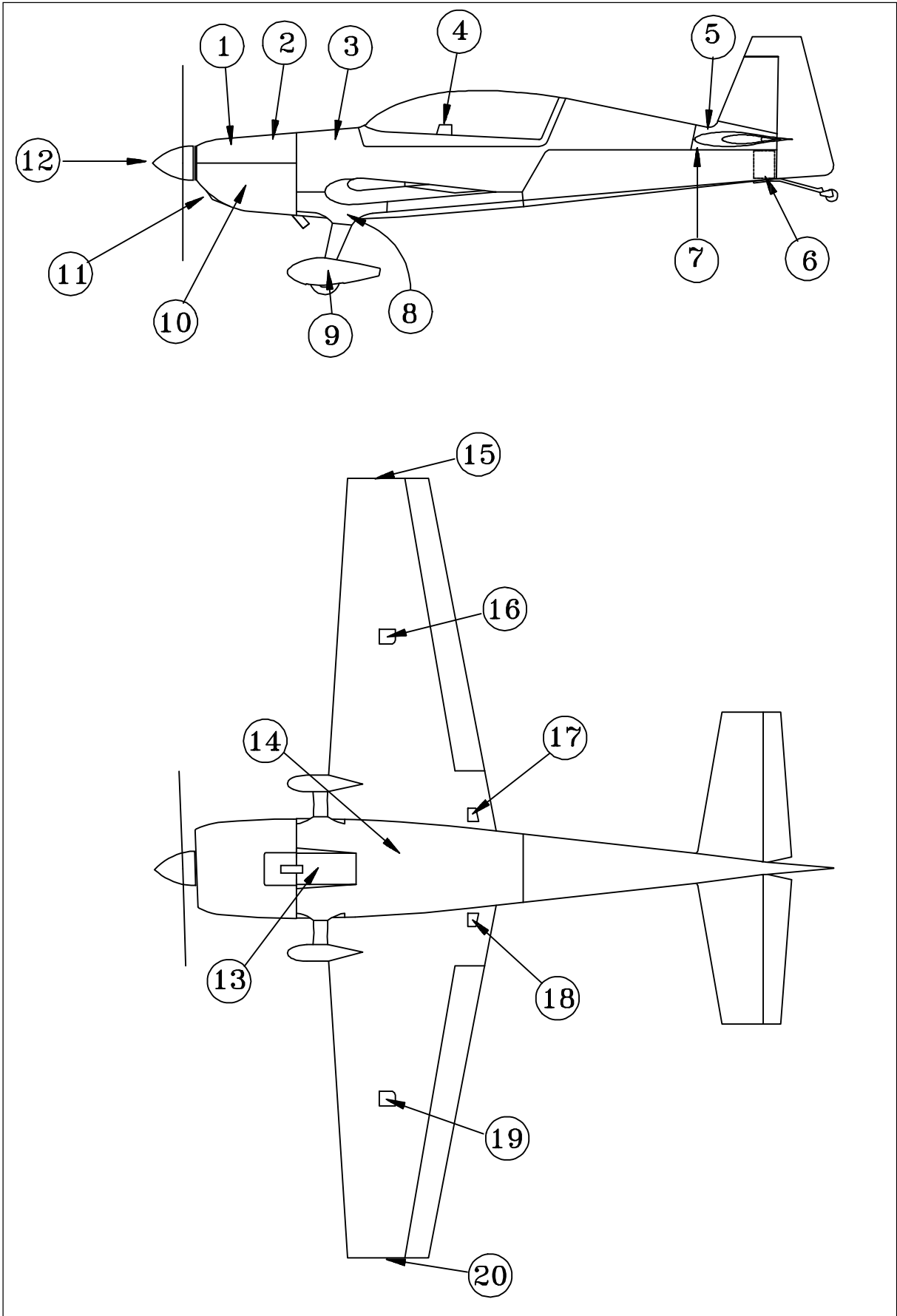
All panels are screwed.

For the removal/installation of the wing tip panels refer to Chapter 57.

Prior to unscrewing of the air inlet screen remove bottom half of the engine cowling not to lose the attachment stopnuts and washers.

Main Fuselage Cover Removal/Installation

- 1 Remove the canopy per Chapter 53.
- 2 Remove the front instrument panel per Chapter 31 (if installed).
- 3 Remove the rear instrument cover per Chapter 31.
- 4 Disconnect the electrical wiring from the single strobe light.
- 5 Remove the rear canopy hinge.
- 6 Remove the center tank filler neck attachment screws.
- 7 Remove engine cowling attachment screws and remove engine cowlings.
- 8 Remove the main fuselage cover attachment screws and remove the main fuselage cover.
- 9 Install in reverse sequence of removal.



Access Panel Identification
Figure 1

Position	Item
1	Top half of the engine cowling
2	Oil filler access door (non-removable)
3	Main fuselage cover
4	Instrument cover
5	Tail fairing
6	Tail cone access panel (RH)
7	Tail side skin (LH/RH)
8	Cuff (LH/RH)
9	Wheel speed fairing (LH/RH)
10	Bottom half of the engine cowling
11	Air inlet screen
12	Spinner
13	Exhaust area covering sheet
14	Bottom fuselage cover
15	LH wing tip panel
16	LH outboard access panel
17	LH inboard access panel
18	RH inboard access panel
19	RH outboard access panel
20	RH wing tip panel

From Ser. No 27 item 13 is
attached to item 14 by rivets

51-10-00

INVESTIGATION

51-10-01

Damage Classification

WARNING

All damage of composite parts must first be classified by qualified personnel. In case of doubt with regard to the classification of damage, if a clear definition of the extent of damage is not possible, or if a repair of damage in spite of the valid manufacturer documentation is doubtful, contact EXTRA-FLUGZEUGBAU GmbH.

WARNING

Only the Damages Classes 2, 3 and 4 may be repaired by qualified personnel. In case of Damage Class 1 it has to be contacted EXTRA-FLUGZEUGBAU GmbH.

According to the Luftfahrt-Bundesamt (Federal German Aviation Authority) four damage classes are defined:

Damage Class 1:

Large scale destruction requiring a partial reconstruction of the component or large scale repair. Each destruction over 300 mm diameter and each damage of a spar is a large scale destruction. EXTRA-FLUGZEUGBAU GmbH has to be contacted prior to repair.

Damage Class 2:

Damage to primary structures and to secondary structures to the following extent: Holes and fractures extending through a sandwich component and a scale under 300 mm diameter.

Damage Class 3:

Damage to primary structures and to secondary structures to the following extent: Small holes or fractures in the external covering layers, if not accompanied by damage to supporting layers or internal covering layers.

Damage Class 4:

Erosion, scratches or nicks not accompanied by fractures or breakages. Damage to fairings belong to this class.

51-10-02

Repair Criteria and Limits

IMPORTANT

All damage of composite parts must first be classified prior to repair. Refer to Chapter "51-10-01 Damage Classification".

IMPORTANT

Only the Damages Classes 2, 3 and 4 may be repaired by qualified personnel. In case of Damage Class 1 it has to be contacted EXTRA-FLUGZEUGBAU GmbH.

The decision whether to repair or replace a major unit of structure will be influenced by factors such as time and labor available, and by comparison of labor costs with the price of replacement assemblies. Past experience indicates that replacement, in many cases, is less costly than major repair. Certainly, when the aircraft must be restored to its airworthy condition within limited time, replacement is preferable.

51-30-00

MATERIALS

This Section describes metallic and non-metallic materials used in the repair of the Extra 200 and gives the sources of supply (manufacturers and supplier).

51-30-01

Composite Parts

IMPORTANT

Only approved materials have to be used for the repair of composite parts.

Epoxy-system

Manufacturer: RÜTGERS,BAKELITE
Aktiengesellschaft,Varzinerstr. 49,
D-47138 Duisburg 12, Germany

Resin: Rütapox L20

Hardener: Rütapox SL

Ratio of comp.: 100 parts *L20* / 34 parts *SL* (weight ratio)

Glass fibre fabrics

Manufacturer: INTERGLAS, Interglas AG
Söflinger Straße 246, Postfach 3820,
D-89077 Ulm, Germany

Style	WLB-No.* LN 9169	US-style	weave patterns	weigh g/m ²
90070	8.4505.60	1610	plain	80
92110	8454860	none	twill 2/2	163
92125	8455160	none	twill 2/2	280
92140	8455160	none	twill 2/2	390

*All glass fabric is made of alkali-free E glass with Volan-A finish or with finish I 550.

Carbon fibre fabrics

Manufacturer: CCC, C. Cramer GmbH & Co. KG
 Postfach 209,
 D-48619 Heek-Nienborg, Germany

Style	CCC	WLB-No.* DIN 65147	US-style	weave patterns	weight g/m ²
447		8,3507;80	none	plain	160
452		8,3520;80	none	twill 2/2	204
459		-	none	cross-twil	220

*WLB: Werkstoff Leistungsblatt, according to German standard DIN-WL

Glass rovings:

Manufacturer: GEVETEX Textilglas-GmbH
 Postfach 426,
 D-5100 Aachen, Germany

Supplier: Lange & Ritter GmbH
 Postfach 100321,
 D-7016 Gerlingen, Germany

Type: Vetrotex EC14 - 2400-P185

Carbon rovings:

Manufacturer: Tenax Fibers GmbH & Co. KG
 Kasinostr. 19-21
 D-42103 Wuppertal

Supplier: Tenax Fibers GmbH & Co. KG
 Kasinostr. 19-21
 D-42103 Wuppertal

Type: TENAX JHTA 5131 1600tex f24000 t 0
 (WLB: 8.3614.85)

Core material

a) PVC Foam:

Manufacturer: DIAB
Divinell International GmbH
Max-von-Laue-Straße 7
D-30966 Hemmingen, Germany

Supplier: see above

Type: Divinycell HT 50

b) Honeycomb:

Manufacturer: EUROCOMPOSITES S.A:
B.P.95, Zone Industrielle,
L-6401 Echternach / Luxembourg

Type: ECA-I-R 4.8-29-R

Filler material for resin:

Manufacturer: EBERHARD Chemie GmbH
Olpener Straße 405,
D-51109 Köln 91 (Merheim), Germany

Type: - Cotton flakes
- Microballoons BJO - 0930

Paint:

Manufacturer: GLASURIT GmbH
Max-Winkelmannstr. 80,
D-48165 Münster/Hiltrup, Germany

Supplier: WESSELSAG
Pagenstecherstraße 121,
D-49090 Osnabrück, Germany

Type:

285-100	Glassodur-Rapidfüller AC 85-0100
929-73	Glassodur-MS-Härter SC 29-0173
352-91	Glassodur-Einstellzusatz SV 41-0391

1006-202/3	Glassit Spritzfüller SP 60-7023
948-36	Glassit Härterpaste, rot SB 48-3360
21-	Glassodur-PUR-Acryl-Lack AD/AE 2
929-73	Glassodur-MS-Härter SC 29-0173
352-91	Glassodur-Einstellzusatz SV 41-0391

51-30-02

Metal Components

IMPORTANT

Only approved materials have to be used for the repair of metal components.

Steel tubing:

Manufacturer: Pacific Tube Company
5710 Smithway Street
Los Angeles, California 90040, USA

Supplier: Wicks Aircraft Supply, Co.
410 Pine Street
Highland, Illinois 62249, USA

Type: AISI 4130 N (MIL-T-6736 Normalized)
2" x 0.049", 1 1/8" x 0.058", 1" x 0.058"
7/8" x 0.058", 7/8" x 0.035",
3/4" x 0.035", 5/8" x 0.035"

Steel sheet metal :

Manufacturer: Cold Metal Products, Inc.
2301 So. Holt Road
Indianapolis, In. 46241, USA

Supplier: Wicks Aircraft Supply, Co.
410 Pine Street
Highland, Illinois 62249, USA

Type: AISI 4130 N (MIL-S-18729 G Normalized)
0.04", 0.063", 0.08", 0.1", 0.125"

Paint:

Manufacturer: GLASURIT GmbH
Max-Winkelmannstr. 80,
D-48165 Münster / Hilstrup, Germany

Supplier: WESSELSAG
Pagenstecherstraße 121,
D-49090 Osnabrück, Germany

Type:

801-1552	Glassofix Grundfüller-EP	AC 01-1492
965-32/2	Glassofix Härter-EP	SC 65-0322
21-	Glassodur-PUR-Acryl-Lack	AD/AE 2
1929-73	Glassodur-MS-Härter	SC 29-0173
352-91	Glassodur-Einstellzusatz	SV 41-0391

51-30-03

Aluminium Components

Aluminium sheet metal:

Manufacturer: Kaiser Aluminium & Chem. Corp.
Spokane, Washington

Supplier: Westdeutscher Metallhandel
Postfach 104245
45141 Essen

Type: WLB 3.1364. T3511 or 2024 T3
0.6mm; 0.8mm; 1.2mm

Control rod tubings:

Manufacturer: Aluminium AG
CH-5737 Menziken

Supplier: Karstens & Knauer GmbH & Co
D-28865 Lilienthal

Type: WLB 3.1354. T3
ø 25x1mm

Paint:

Manufacturer: GLASURIT GmbH
Max-Winkelmannstr. 80,
D-48165 Münster / Hilstrup, Germany

Supplier: WESSELSAG
Pagenstecherstraße 121,
D-49090 Osnabrück, Germany

Type:

Primer:

283-150 Glassofix-Grundfüller AB83-1150

352-228 Glassofix-Zusatzlösung SC12-0228

Lacquer:

21- Glassodur-PUR-Acryl-Lack AD/AE 2

1929-73 Glassodur-MS-Härter SC 29-0173

352-91 Glassodur-Einstellzusatz SV 41-0391

**Aluminium hardware metal (brackets, pedestals,
castings, etc.):**

Paint:

Manufacturer: Parker & Anchem, Ambler, PA 19002

Supplier: Aircraft Spruce

Chem. coating: Alodine No. 1201 (MIL-C-5541)

Lacquer: see above

51-60-00

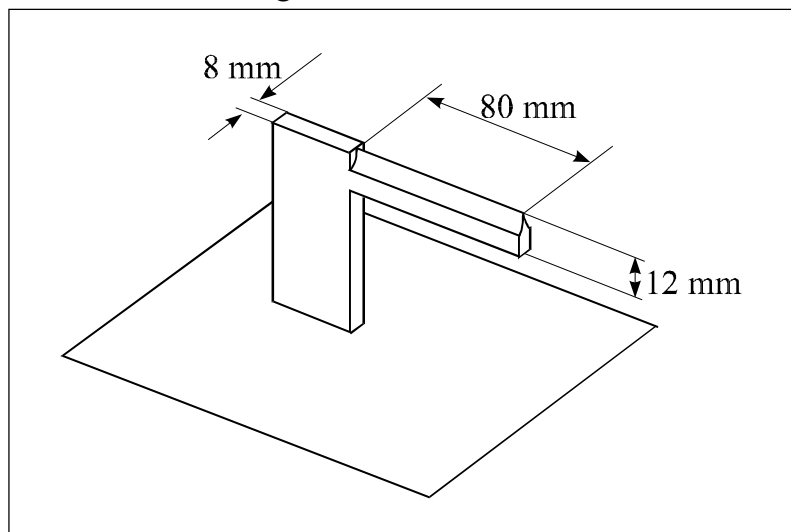
CONTROL SURFACE BALANCING

51-60-01

Weighing and Determination of Control Surface Moments

All weighing of control surfaces is performed with surface removed from aircraft. Weighing and determination of control surfaces moments is necessary after repairs or painting. Weigh the control surfaces including the mass balances in disassembled condition. The aileron weight includes the spade. Copy page 31, enter the values (W, m, r) there and check whether the surface weights or moments are within the given tolerances. If they are not, contact the manufacturer for advice.

For the determination of control surface moments follow the steps as described below and use two balancing mandrels like shown in the Figure 2:



*Balancing Mandrels
Figure 2*

Procedure

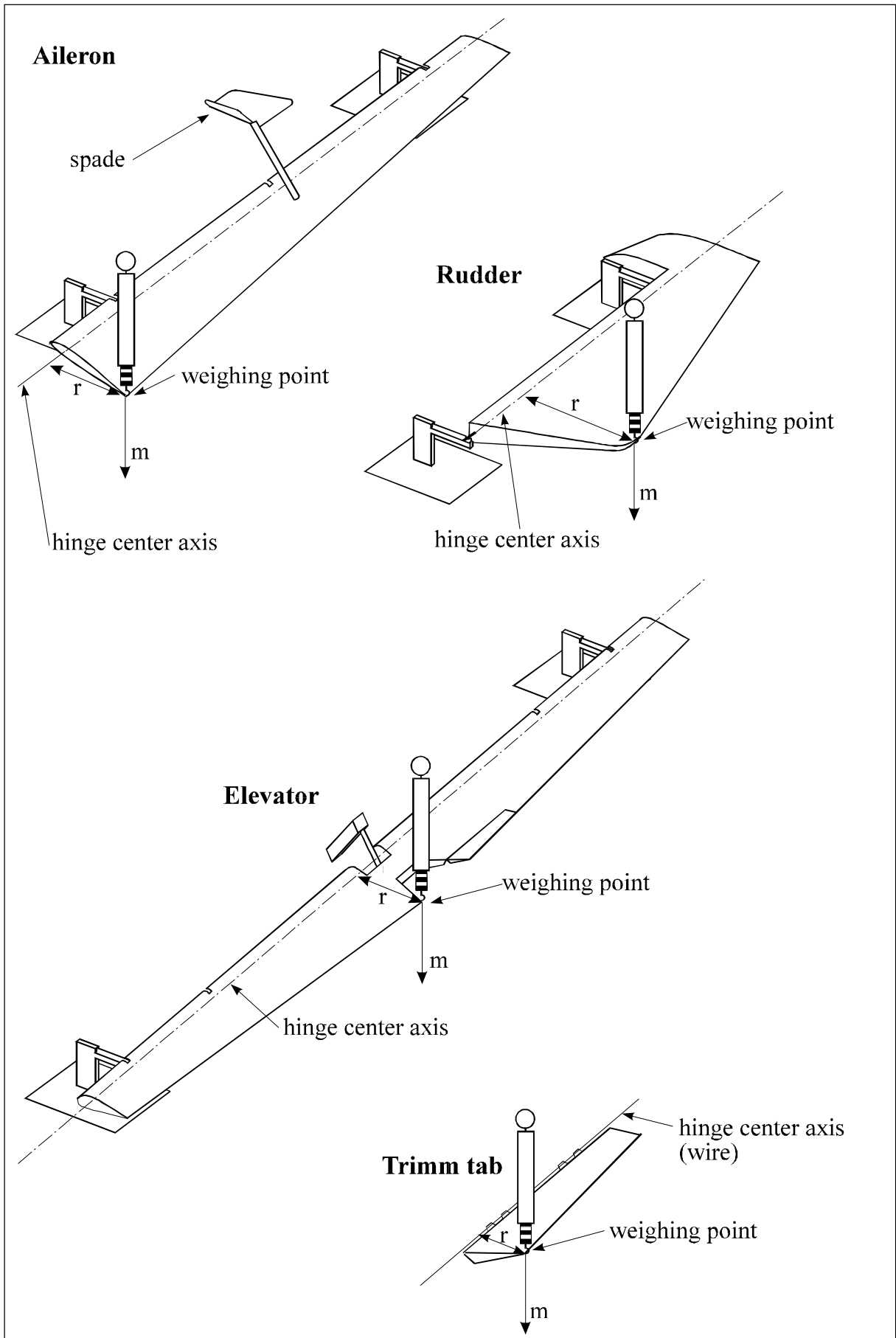
- 1 Remove the control surface (refer to chapter 27).
- 2 Reinstall the bolts in two brackets.

- 3 Put the control surfaces on the balancing mandrels (use a wire for the trim tab).
- 4 Weigh by means of a conventional spring balance (kg/g-indication) at the given weighing points (Figure 3) and enter the weight (m) in Figure 4.
- 5 Measure distance of hinge center line to weighing point (r) and enter the value in Figure 4.
- 6 Calculate the control surface moment (M) in Figure 4.

IMPORTANT

If values exceed the given tolerances in Figure 4 contact the manufacturer before beginning any changes of control surfaces.

- 7 Reinstall the control surfaces.



*Determination of Control Surface Moments
Figure 3*

EA 200		
Item	Permissible Weight (W) kg from / to	Permissible Moment (M) Ncm from / to
Aileron (incl. mass balance and spade)	5.4 / 6.55	0 / 68
Rudder (incl. mass balance)	4.5 / 6.55	45 / 135
Elevator (incl. mass balance and trim tab)	6.2 / 7.2	140 / 225
Trim tab	0.16 / 0.21	5.0 / 5.6

Weights

Aileron LH: (W) kg

Aileron RH: (W) kg

Rudder: (W) kg

Elevator: (W) kg

Trim Tab: (W) kg

Moments

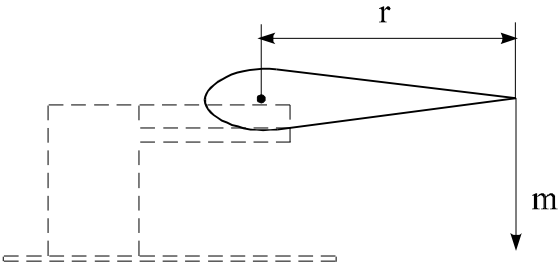
Aileron LH: (m) kg · 9.81^{m/s²} · (r:) cm = (M:) Ncm

Aileron RH: (m) kg · 9.81^{m/s²} · (r:) cm = (M:) Ncm

Rudder: (m) kg · 9.81^{m/s²} · (r:) cm = (M:) Ncm

Elevator: (m) kg · 9.81^{m/s²} · (r:) cm = (M:) Ncm

Trim Tab: (m) kg · 9.81^{m/s²} · (r:) cm = (M:) Ncm



$$M \text{ (Ncm)} = m \text{ (kg)} \cdot g \text{ (m/s}^2\text{)} \cdot r \text{ (cm)}$$

Control Surface Weights and Moments
 Figure 4

51-70-00

REPAIRS

51-70-01

Repair of Reinforced Glass and Carbon Fibre Components

IMPORTANT

Repair of composite parts has to be carried out only by qualified and authorized personnel.

If the aircraft is damaged, proceed as follows. First conduct a careful visual inspection of the surface and the damaged area. Frequently, the damage extends to further components, sometimes a fracture will continue invisible beneath the surface.

Perform the repair work with utmost care. The external shell of the wing and empennage is stressed; a failure of this bonded structure can lead to an aircraft crash. In order to eliminate dangerous stress concentrations, avoid changes in cross-sectional areas.

IMPORTANT

The resin-hardener mixture ratio must be precisely maintained (+0.5%). Clean cups and tools must be used. The weight ratio of glass fabric to resin mixture should be approximately 50:50.

Immediately prior to applying the wet laminate, sand and vacuum clean the repair area, so that no dirt and dust is involved which could prevent a secure adhesion.

WARNING

Sanding carbon and glass fibre laminates gives off a fine dust that may cause skin and/or respiratory irritation unless suitable skin and respiration protection is used.

WARNING

Carbon-tetrachloride or Acetone used for cleaning repair areas are flammable liquids and should be used with proper ventilation and safety equipment.

IMPORTANT

As with plywood grain, the direction of the various fibres (longitudinal or diagonal) is of great importance for the stability.

The number of layers required to restore the stability in the damaged area can be taken from the layer sequence/place-ment plan. (Refer to the respective Chapters)

It is necessary to know the number and direction of layers in the damaged area, in order to be able to replace them with the original number. In all cases, the thickness of the laminate has to be measured with a vernier calliper for the exact determination of the laminate thickness.

One technique to learn about the number of layers is to burn a small piece taken from the damaged area. The resin will burn off, leaving the glass and/or carbon fabric to be in-spected for the number of layers and the type of fabric.

Creating a scarfed overlap takes time. Sand away as much of the old material, that the new fabric patches do not project beyond the contour.

In order to shorten the curing time, a heater can be used to increase the ambient temperature.

CAUTION

Too high temperature will cause large air bubbles in the laminate. Local overtemperature can be prevented by using a foil tent which leads the hot air stream.

The curing cycle must be maintained as stated. Use a thermometer to monitor the temperature.

IMPORTANT

After repair of control surfaces, check for proper bal-ance (refer to chapter 27, Flight Controls).

It is recommended to prepare test specimens at the same time as the actual repair is accomplished. These can then be subject to a material test to establish the quality of the laminate in the repaired part. To make this determination valid, the specimens must be assembled with the same style of fabric and resin mixture. Subsequently the specimens must be subject to the curing pressure, temperature and time identical with those in the actual repair.

51-70-02**Repair of Sandwich Material**

Two types of core materials are used for sandwich on the EXTRA 200:

- PVC hard foam
- Honeycomb

both with glass or carbon fibre shells

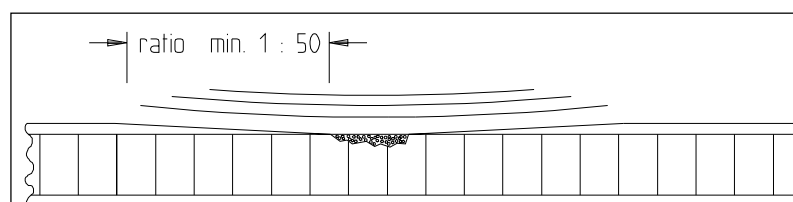
The following section describes the repair of both types of sandwich. Different processing techniques for these materials, if necessary, are also described.

a) Minor surface damage

Around a visible crack, the laminate may be separated from the core material. Determine the extent of this area by coin tapping. Remove the separated laminate carefully using a sanding disk, sanding block or a sharp knife. Prepare a scarfed overlap of the laminate around the damaged area. Overlap length per fabric layer min. 20 mm;

IMPORTANT

Ratio (laminate thickness : overlay length) min. 1: 50 (refer to Figure 5).



*Minor surface damage
Figure 5*

After preparing the scarfed overlap, clean the repair area thoroughly as follows:

- Remove the sanding dust with a pneumatic vacuum cleaner
- Clean the scarfed overlaps with carbon-tetrachloride or acetone in case of dirt or grease was introduced during the preparation.

Damaged core material has to be refilled with a mixture of resin and microballoons (weight ratio 100:15). Apply resin mixture

to the repair area and lay on fabric in accordance to the layer sequence plans. Ensure to use correct style and direction of fabric.

IMPORTANT

Repair area must be clean of dirt, dust and grease!

Lay out the required number and size of fabric pieces on a piece of colored plastic foil and soak (wet) them with resin mixture, subsequently position them on the repair area.

IMPORTANT

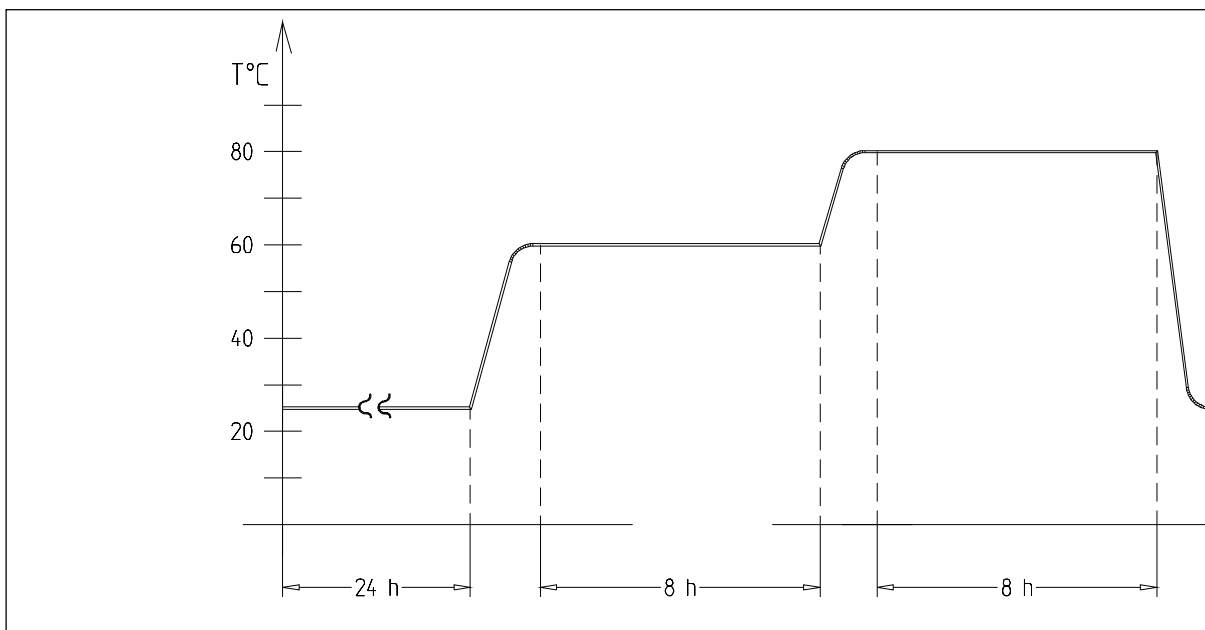
Remove the plastic foil after each positioning process.

For a repair of honeycomb sandwich parts you have to observe the following: The repair area has to be cured under condition of vacuum bagging.

For vacuum bagging, proceed as follows:

- Apply peel nylon fabric on the last repair fabric layer
- Perforate a clean, thin plastic foil with a thick needle (max. spacing of holes: 20mm x 20mm) - mainly in the area of the honeycomb - and lay it on the repair area.
- Lay a jute cloth (weave) or equivalent bleeder cloth on this perforated plastic foil.
- Lay an air tight plastic foil upon the jute weave and seal their edges to the surrounding surface using an adhesive tape.
- Apply suction with a vacuum pump (pressure approx. 0.7 bar/ 10 psi)
- Apply the thermal curing cycle. (Refer to Figure 3)
- Following the curing cycle remove vacuum bagging material and peel nylon fabric.

After the pre-curing period at room temperature, the repaired area has to be cured according the temperature cycle as shown on Figure 6.

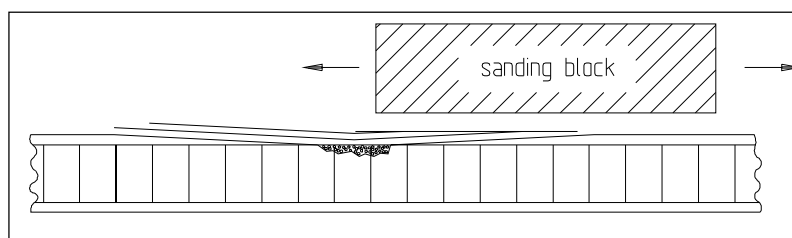


Curing cycle resin L20/SL
Figure 6

After the curing process is completed, the repair area can be sand level to the surrounding area.

CAUTION

Sand only the edge thickness of repair laminate (refer to Figure 7)!



Level Sanding of Surrounding Area
Figure 7

NOTE

For painting of the repair area refer to Chapter 51-70-06.

b) Damage of complete sandwich

If the inner laminate is also damaged, first remove the upper laminate within the area, where no secure bond connection to the core material is suspected. Trim out the complete damaged portion of core material to a circular or elliptical shape.

The damaged area of the inner laminate has to be taken out as well. Make sure not to increase the disbond area by preparing the hole. Preferably use a hand held milling machine. In case of cutting with a saw, the pulsation stress may peel of the inner laminate (secondary damage). If the extent of the disbonded area on the inner laminate exceeds the prepared cut out, increase the cut out of material and upper laminate.

Prepare a scarfed overlap of laminate around the circular cut out. Overlap length of inner laminate should not be less than 20 mm.

IMPORTANT

Overlap length of the upper laminate should not be less than 1/50; (ratio: laminate thickness / overlap length).

Prepare a replacement block of core material (foam or honeycomb) with equivalent diameter and thickness. Cut it to fit snugly in the trimmed hole. In case of foam core, coat one side with a mixture of resin and microballoons (ratio 100:15). Apply pre-laminated fabric layers required for the inner laminate on this side of the core filler block. Ensure correct style and direction of fabric. After precuring the laminate at elevated room temperature (30°C), scarf the overlap and sand the upper overlapping core material down, up to the surrounding core material.

Subsequently clean the repair area thoroughly as follows:

- Remove the sanding dust with a pneumatic vacuum cleaner
- Clean the scarfed overlaps with carbon-tetrachloride or acetone in case of dirt or grease was introduced during the preparation.

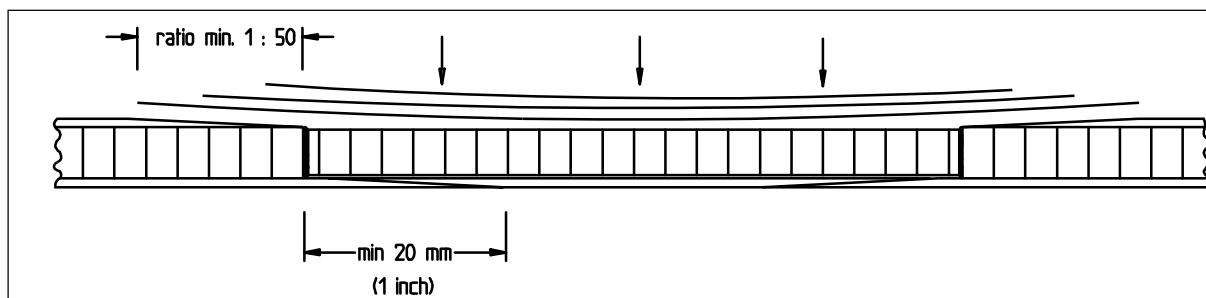
WARNING

Carbon-tetrachloride or Acetone used for cleaning repair areas are flammable liquids and should be used with proper ventilation and safety equipment.

IMPORTANT

Repair area must be free of dirt and grease.

Wet all surfaces of the backing plate and the scarfed area with resin mixture. Lay on pre-laminated fabric layer in accordance to the layer sequence plan. Ensure correct style and direction of fabric.



*Damage of Complete Sandwich
Figure 8*

Lay out the required number and size of fabric pieces on a piece of plastic foil and wet them with resin mixture. Subsequently position them on the repair area.

IMPORTANT

Remove the plastic foil after each positioning process.

The repair area has to be cured under condition of vacuum bagging. Proceed as follows:

- Apply peel nylon fabric on the last repair fabric layer
- Perforate a clean, thin plastic foil with a thick needle (max. spacing of holes: 20mm x 20mm) - mainly in the area of the honeycomb - and lay it on the repair area.
- Lay a jute cloth or equivalent bleeder cloth on this perforated plastic foil
- Lay a second plastic foil upon the jute weave and seal their edges to the surrounding surface using an adhesive tape.
- Apply suction with a vacuum pump (pressure approx. 0.7bar / 10psi)
- Apply the thermal curing cycle
- Following the curing cycle carefully remove vacuum bagging material and peel nylon fabric.

NOTE

After the pre-curing period at room temperature, the repaired area has to be cured according the temperature cycle as shown on Figure 6.

After the curing process is completed, the repair area can be sand level to the surrounding area.

IMPORTANT

Sand only the edge thickness of repair laminate!

For painting of the repair area proceed like mentioned in Chapter 51-70-06.

51-70-03

Repair of Laminates

a) Minor damage

Scarf the edges of the minor damage area with sandpaper. Minimum length of scarf per fabric layer approx. 20 mm; ratio (**laminat thickness : scarf length**) approx. **1: 50**.

Following the scarf procedure, clean the repair area thoroughly:

- Remove the sanding dust with a pneumatic vacuum cleaner
- Clean the scarfed overlaps with carbon-tetrachloride or acetone in case of dirt or grease was introduced during the preparation.

CAUTION

Repair area must be free of dirt, dust and grease.

Wet the prepared scarfed areas with resin mixture. Lay on pre-laminated fabric layer in accordance to the layer sequence plan. Ensure correct style and direction of fabric. Apply peel nylon fabric on the last repair fabric layer.

NOTE

Lay out the required number and size of fabric pieces on a piece of colored plastic foil and wet them with resin mixture. Subsequently position them on the repair area.

IMPORTANT

Remove the plastic foil after each positioning process.

After the curing process is completed, remove the peel nylon fabric. The repair area can be sand level with the surrounding area.

CAUTION

Sand only the edge thickness of repair laminate!

Refinish the surface according chapter 51-70-05 Painting.

If the extent of the damaged area exceed 10 cm (4 inches) a large damage repair is required.

Carefully trim out the damaged portion to a circular or oval shape.

Pre-laminate a backing plate from two layers of glass fibre fabric and resin mixture, which must be approx. 20 mm larger than the damaged area. Apply peel nylon fabric as external layer. Sandwich the resin wetted layers between two sheets of plastic foil.

Work the excess resin out and allow the plate to cure at elevated room temperature for 8 hours on a flat surface or a plasticfoil-covered surface of the proper curvature near the damaged area, or the same location on a comparable undamaged part.

Following the curing cycle remove plastic foil and peel nylon fabric. Bond the backing plate to the inside using a mixture of resin and cotton flocks, and adapt to the contour. Cure the bonding at elevated room temperature for 8 hours.

Subsequently scarf the edges of the damaged portion with sandpaper. Minimum length of scarf per fabric layer approx. 20 mm;

IMPORTANT

Ratio (laminat thickness : scarf length) approx. 1: 50.

Following the scarf procedure, clean the repair area thoroughly:

- Remove the sanding dust with a pneumatic vacuum cleaner
- Clean the scarfed overlaps with carbon-tetrachloride or acetone in case of dirt or grease was introduced during the preparation of the overlap.

IMPORTANT

Repair area must be free of dirt, dust and grease.

Wet all surfaces of the backing plate and the scarfed area with resin mixture. Lay on pre-laminated fabric layer in accordance to the layer sequence plan. Ensure correct style and direction of fabric.

NOTE

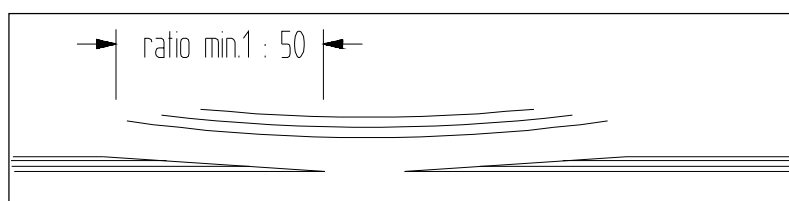
Lay out the required number and size of fabric pieces on a piece of colored plastic foil and wet them with resin mixture. Subsequently position them on the repair area.

IMPORTANT

Remove the plastic foil after each positioning process.

The repair area has to be cured under condition of vacuum bagging. Proceed as follows:

- Apply peel nylon fabric on the last repair fabric layer
- Perforate a clean, thin plastic foil with a thick needle (max. spacing of holes: 20mm x 20mm) - mainly in the area of the honeycomb - and lay it on the repair area.



*Repair of minor damage
Figure 9*

b) Large damage

If the extent of the damaged area exceed 10 cm (4 inches) a large damage repair is required.

Carefully trim out the damaged portion to a circular or oval shape.

Pre-laminate a backing plate from two layers of glass fibre fabric and resin mixture, which must be approx. 20 mm larger than the damaged area. Apply peel nylon fabric as external layer. Sandwich the resin wetted layers between two sheets of plastic foil. Work the excess resin out and allow the plate to cure at elevated room temperature for 8 hours on a flat surface or a plasticfoil-covered surface of the proper curvature near the damaged area, or the same location on a comparable undamaged part.

Following the curing cycle remove plastic foil and peel nylon fabric. Bond the backing plate to the inside using a mixture of resin and cotton flocks, and adapt to the contour. Cure the bonding at elevated room temperature for 8 hours.

Subsequently scarf the edges of the damaged portion with sandpaper. Minimum length of scarf per fabric layer approx. 20 mm;

IMPORTANT

ratio (laminate thickness : scarf length) approx. 1: 50.

Following the scarf procedure, clean the repair area thoroughly:

- Remove the sanding dust with a pneumatic vacuum cleaner
- Clean the scarfed overlaps with carbon-tetrachloride or acetone in case of dirt or grease was introduced during the preparation of the overlap.

IMPORTANT

Repair area must be free of dirt, dust and grease.

Wet all surfaces of the backing plate and the scarfed area with resin mixture. Lay on pre-laminated fabric layer in accordance to the layer sequence plan. Ensure correct style and direction of fabric.

NOTE

Lay out the required number and size of fabric pieces on a piece of colored plastic foil and wet them with resin mixture. Subsequently position them on the repair area.

IMPORTANT

Remove the plastic foil after each positioning process.

The repair area has to be cured under condition of vacuum bagging. Proceed as follows:

- Apply peel nylon fabric on the last repair fabric layer.

- Perforate a clean, thin plastic foil with a coarse needle (max. spacing of holes: 20mm x 20mm) - mainly in the area of the honeycomb - and lay it on to the repair area.
- Lay a jute cloth or equivalent bleeder cloth on this perforated plastic foil.
- Lay an air tight plastic foil upon the jute weave and seal their edges to the surrounding surface using an adhesive tape.
- Apply suction with a vacuum pump (pressure difference approx. 0.7bar / 10psi)
- Curing cycle
- Following the curing cycle carefully remove vacuum bagging material and peel nylon fabric.

After the pre-curing period at room temperature, the repaired area has to be cured according the temperature cycle as shown on *Figure 3*.

After the curing process is completed, the repair area can be sand level to the surrounding area.

CAUTION

Sand only the edge thickness of repair laminate!

Refinish the surface according chapter: 51-10-09 Painting.

51-70-04

Repair of Spars

The spars consists of carbon roving caps, glass or carbon fibre webs and PVC foam cores.

IMPORTANT

The spars are highly stressed; a failure of this bonded structure can result in loss of the aircraft! In all cases, the repair of a spar must be considered as a large-scale repair with a Damage Class 1 (Refer to Chapter 51-10-01 Damage Classification"). EXTRA-FLUGZEUGBAU GmbH has to be contacted prior to repair!

51-70-05

Structural Repair of Steel Components

Restoration of a damaged fuselage to its original design strength, shape and alignment involves careful evaluation of the damage, followed by exacting workmanship in performing the repairs.

IMPORTANT

Should structural repairs practicable on the aircraft be necessary, refer to "Aircraft Inspection and Repair FAA AC 43.13-1A" and "Aircraft Alterations Acceptable Methods, Techniques and Practices FAA AC 43.13-2A".

IMPORTANT

Alterations or repair of the airplane must be accomplished by *licensed* personnel. Consult EXTRA-FLUGZEUGBAU GmbH in case of doubt about a repair not specifically mentioned there.

NOTE

If welding work must be performed, use only the TIG procedure (Tungsten Inert Gas). Use steel welding wire 1.7324, 1.7734.2, or equivalent for welding additive.

51-70-06

Painting of Composite Parts

WARNING

Coating materials may cause sensitization by inhalation and skin contact. Hardeners and coating materials ready for use can have an irritant and sensitizing effect upon the skin and respiratory tracts and cause allergic reactions.

WARNING

Provide for a continuous supply of fresh air during and also after the application, do not inhale the vapours and wear a breathing mask during the spray application of these materials. Persons suffering from an allergy or being prone to diseases of the respiratory tracts must not get in contact with coating materials.

Refer to the manufacturer technical information sheet!!

After curing cycle the surface of repaired area can be sanded with sandpaper (80 grade). Indentations are filled with white polyester filler. Subsequently achieve a surface as uniformly rough as possible using a finer dry sandpaper (150 or 320 grade). Prior to paint application, the surface of the repair area must be cleaned thoroughly of all sanding dust, separation compounds and other foreign materials. Subsequently apply Glassodur Rapid Filler with a spray gun.

NOTE

The Rapid Filler must be completely dry before the covering paint can be applied.

For the final sanding, use 400 grade wet sandpaper to achieve a smooth clean surface. Allow surface to dry. Paint application of Glassodur-Pur-Acryl-Lack AD/AE 21 two component acryl paint is performed with a spray gun.

Paint can be mixed with small quantities of reducer. After completion of the painting, polish the repair area.

51-70-07

Aluminium and Steel Components Refinishing

Complete procedure necessary to remove existing paint from aluminium and steel components and then to repaint them as described in the following paragraphs.

Degreasing

WARNING

Cleaning solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

CAUTION

Before stripping parts, remove all fittings, O-rings, nuts, bolts, washers, pistons, bearing cups, etc.

- 1 Clean all metal parts by immersing in a clean degreasing solution. An alkaline based solution is recommended for aluminium and magnesium parts.
- 2 Hardened dirt or grease may be removed with soft bristle brush, or by soaking in cleaning solution.
- 3 Where necessary clean bearing cones carefully in a separate container of clean solvent.

CAUTION

Do not spin bearing cones with compressed air.

- 4 After cleaning, thoroughly dry all metal parts with filtered, dry compressed air.
- 5 It is recommended that all O-rings, backup rings, and wipers be replaced at each overhaul. However, if necessary, O-rings may be reused, but should be put back into position from which removed.
- 6 Wipe down O-rings, backup rings, wipers, or other rubber parts with a clean dry cloth. Lubricate with a suitable O-ring lubricant prior to installation.

Paint Removal

Disassemble components to the level required for repainting, then proceed as follows.

WARNING

Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

CAUTION

Before stripping parts, remove all fittings, O-rings, nuts, bolts, washers, pistons, bearing cups, etc. Parts must be totally immersed in solvent, to maximize cleaning.

- 1 Degrease part per degreasing paragraph.
- 2 Totally immerse part in paint removing solvent. Portions not totally covered by solvent will begin to corrode.

NOTE

Stripping agents are commercially available for removing topcoat and primer. Follow manufacturer's recommendations for use and disposal of stripping solutions.

- 3 Remove part from solvent and rinse thoroughly with water heated to 160° to 180°F (71° to 82° C). Flush solvent from all cavities and threaded holes where entrapment might occur
- 4 Thoroughly dry part with filtered, dry compressed air.
- 5 Where applicable refer to inspections procedures given in the respective chapters for specific parts to locate possible defects.

NOTE

Refinishing should be completed as soon as possible; unprotected parts will begin to corrode.

Repainting

Paint all surfaces except those which are subjected to friction (bearing surfaces, anchor bolt bores, etc.). Proceed as follows:

- 1 Parts to be repainted should be cleaned and stripped per instruction in degreasing and paint removal paragraphs.
- 2 Aluminium parts should have a protective barrier between the topcoat and base metal. It is recommended they be treated with solutions listed in Chapter 51-30.
- 3 Apply solution liberally and evenly. Allow it to set from 1 to 5 minutes. The solution must completely wet the surface and overlap onto the adjoining anodize.
- 4 Remove excess coating by flushing with clean water.
- 5 Paint parts with one coat of wash primer. Allow to dry thoroughly.
- 6 Paint parts with one coat of lacquer listed in Chapter 51-30. Allow to dry thoroughly before reassembly.

Chapter 53

Fuselage

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53-00-00

GENERAL

The fuselage structure of the EXTRA 200 consists of a TIG-welded steel tube construction integrating the wing and empennage connections (refer to Figure 1).

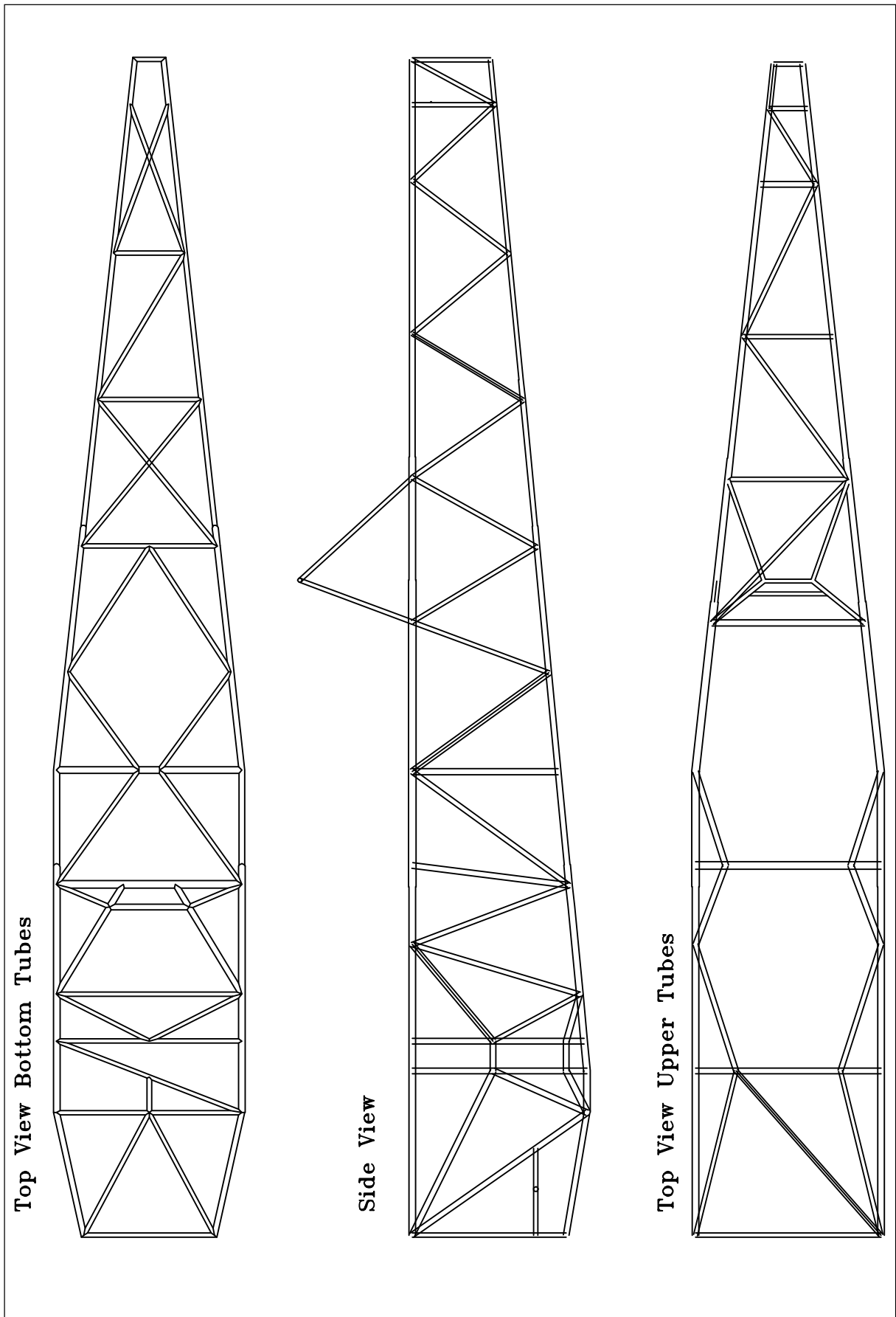
The firewall consisting of stainless steel separates the fuselage from the engine compartment. All firewall penetrations (bowden cables, fuel lines etc.) are sealed with PRC-PR 812 firewall sealant.

The particular areas of the fuselage are covered with different materials (also refer to Chapter 51-00-01 "Access Panel Identification"): Both halves of the engine cowling consist of glass fibre laminate and honeycomb. They are coated inside with a fire protection paint ("WIEDO-FLUGAT" N 56582/T508).

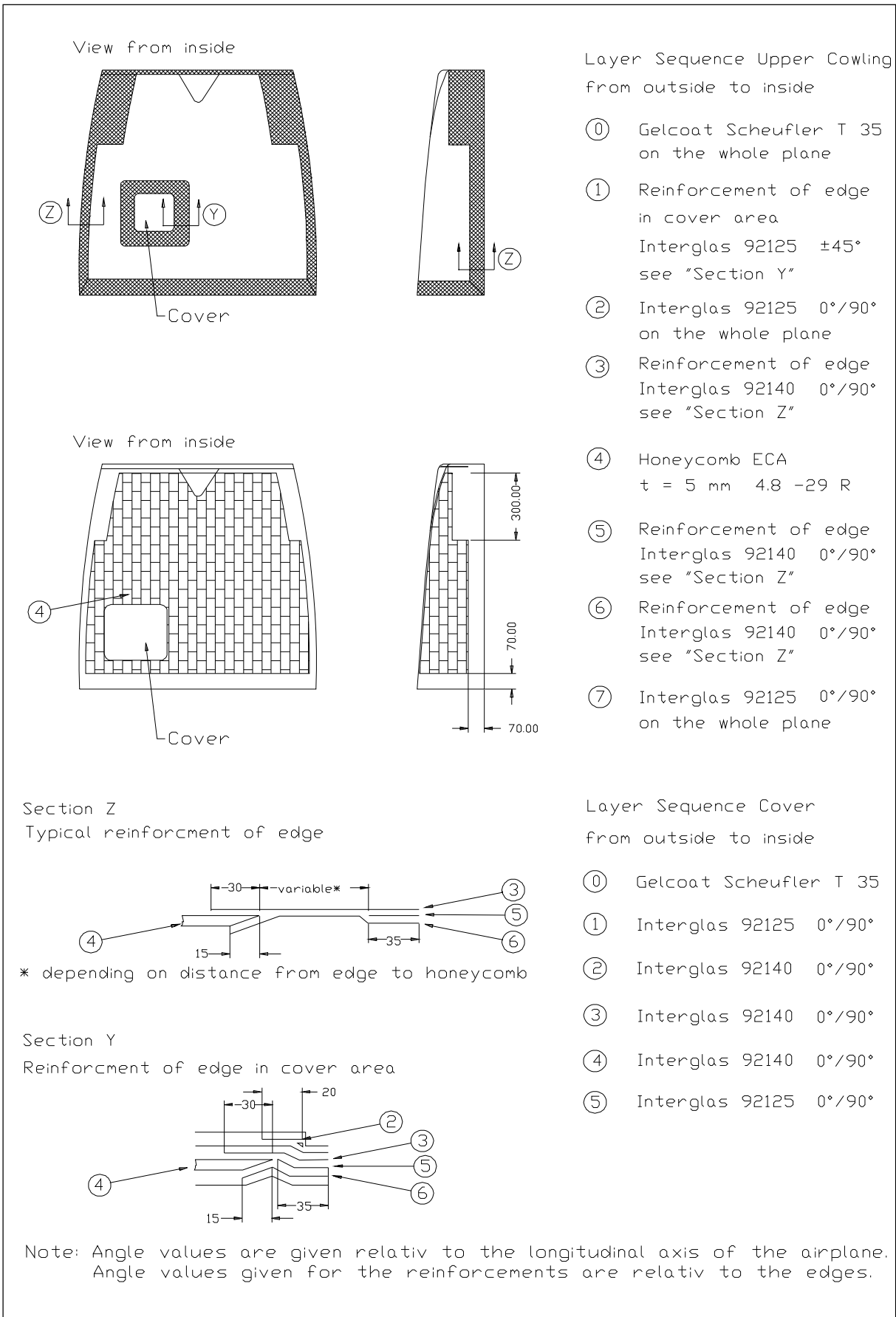
The main fuselage cover consists of glass fibre, carbon fibre and aramid laminate. The bottom fuselage cover is made of carbon fibre and aramid fibre laminate, the cuffs of carbon fibre laminate. The lower rear part of the fuselage is covered with fabric. The window portion is of acrylic glass. The tail fairing consists of glass fibre laminate and the tail side skins are made of aluminium sheet metal. The layer sequences of the composite parts are shown in Figures 2-6.

All composite parts, as protection against moisture and UV radiation, are coated with an unsaturated polyester gel-coat, an acrylic filler and finally with an acrylic paint.

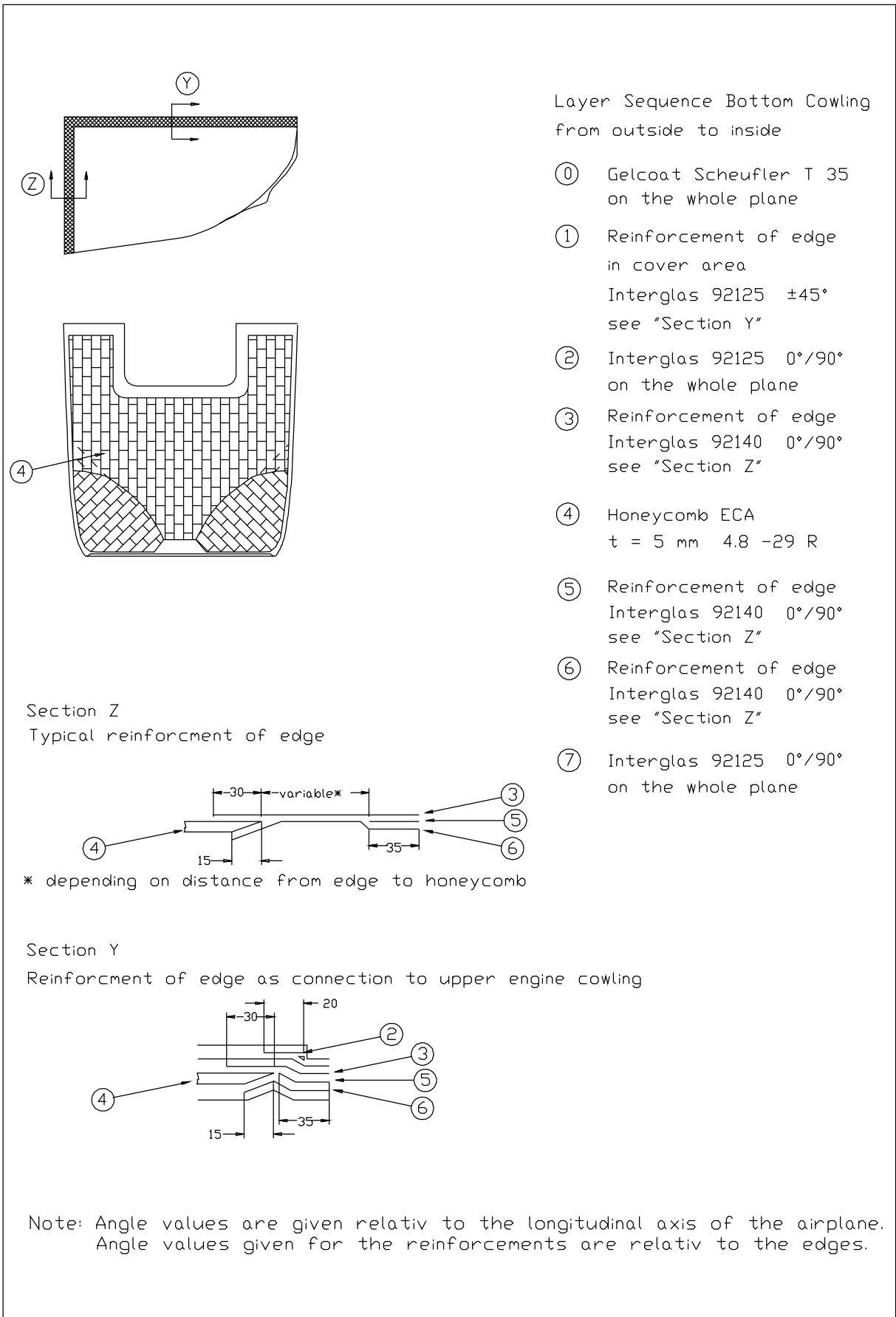
For repair of composite parts and steel components refer to Chapter 51. The repair of fabric has to be executed in accordance to the FAA AC 43.13-1A.



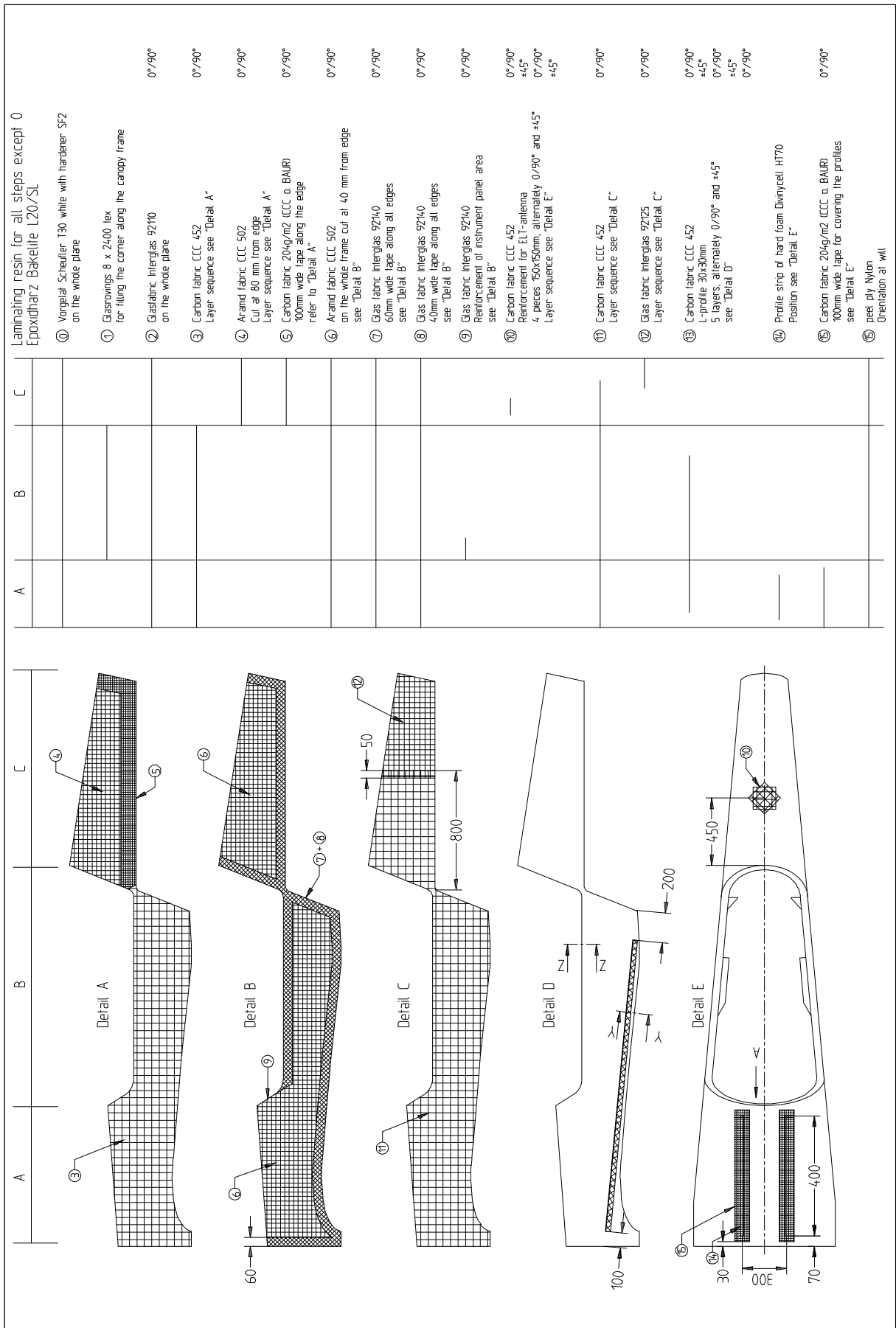
*Fuselage Steel Tube Design
Figure 1*



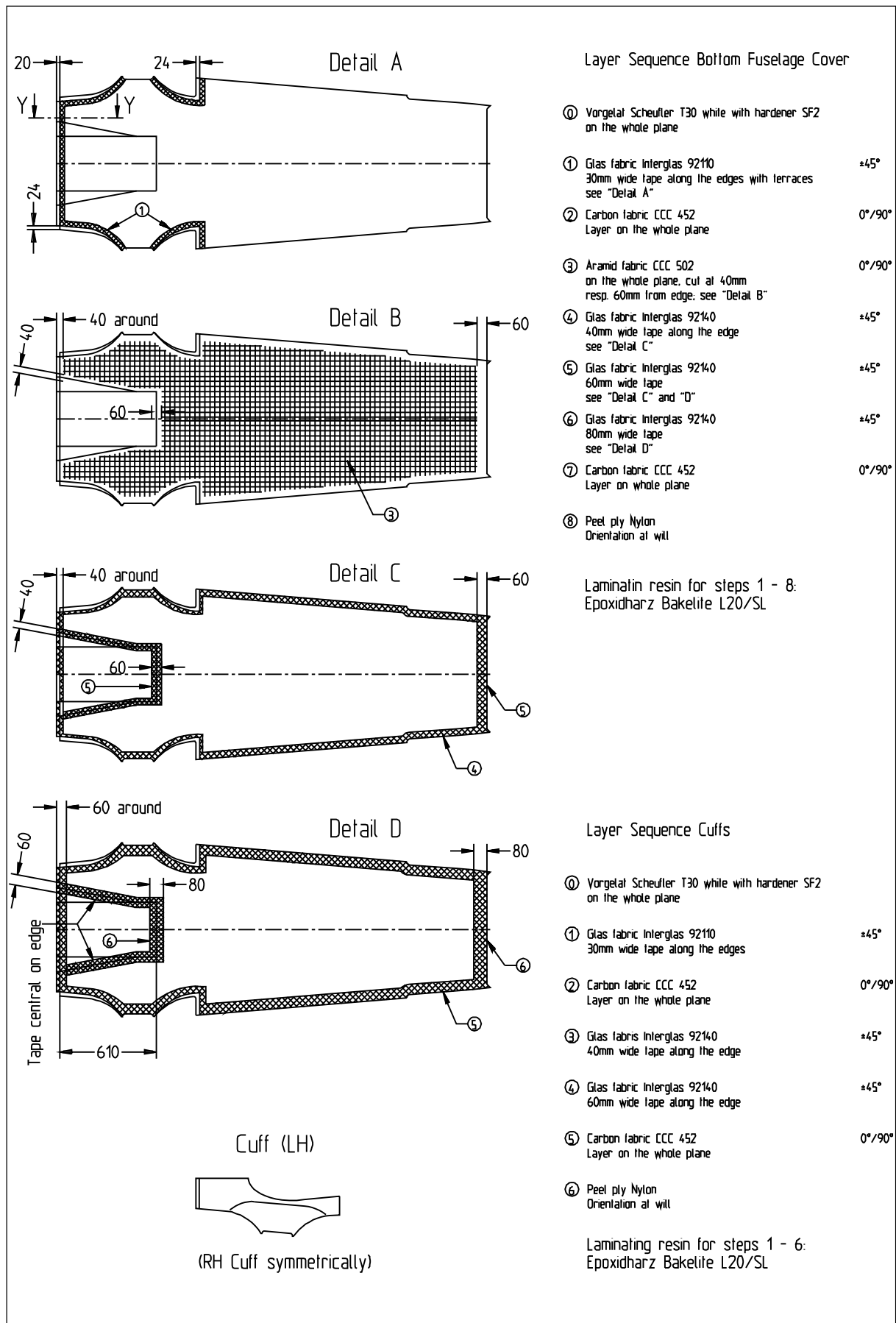
Layer Sequence Top Half of the Engine Cowling
Figure 2



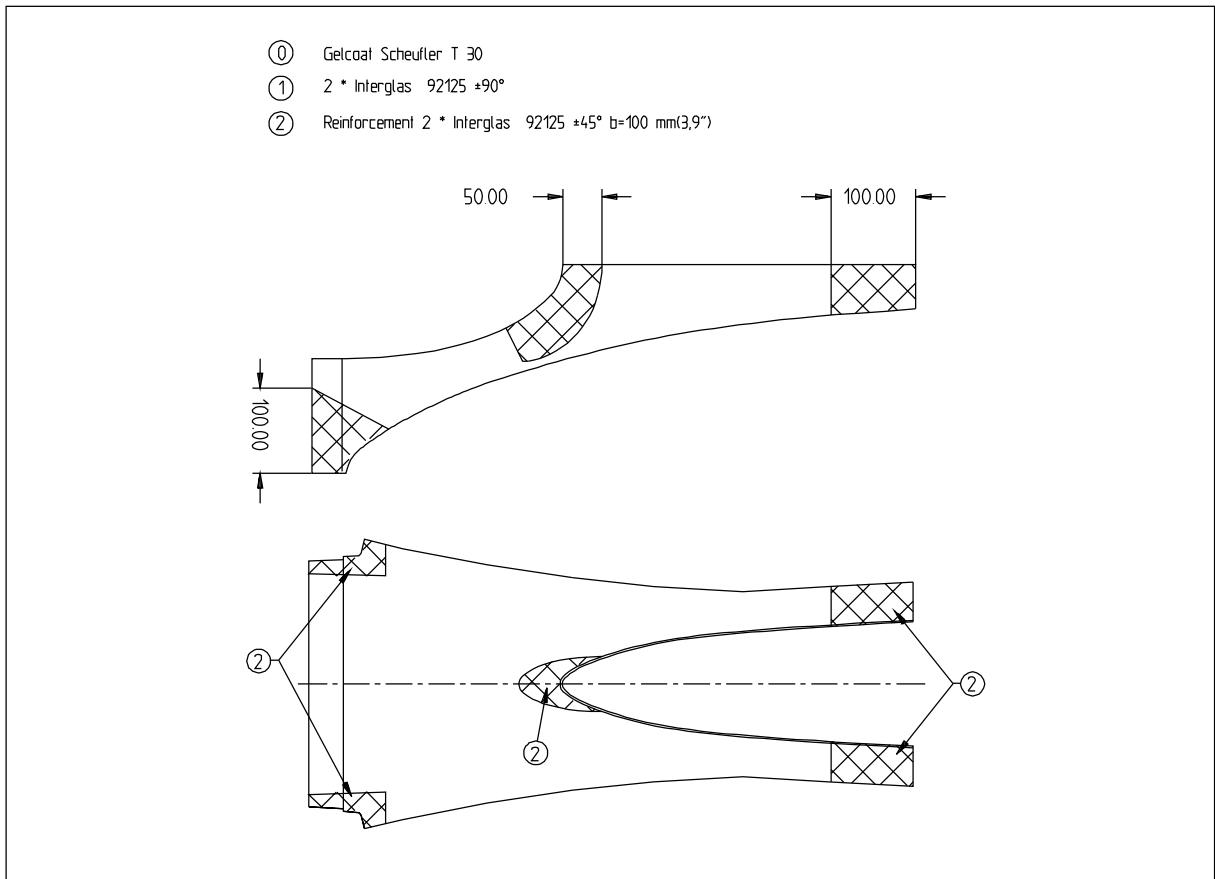
Layer Sequence Bottom Half of the Engine Cowling
Figure 3



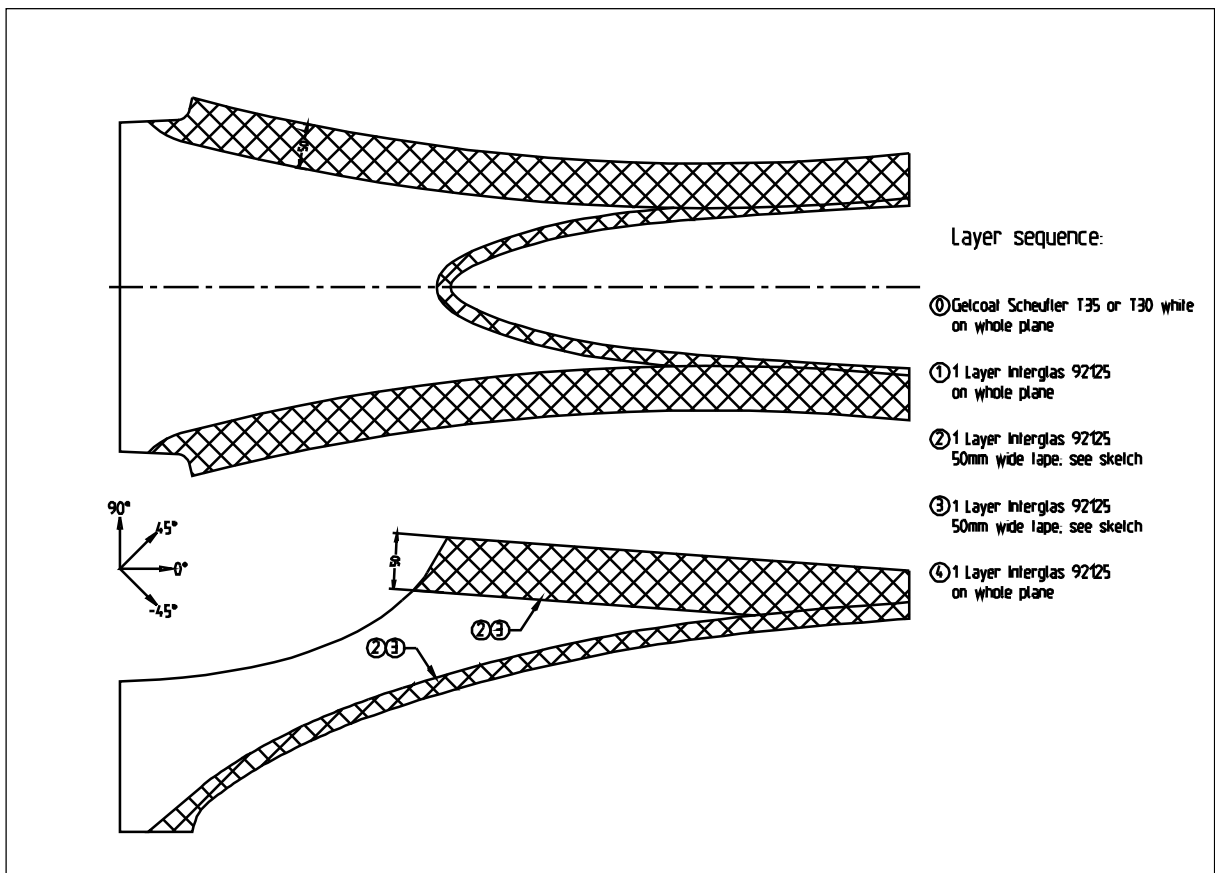
Layer Sequence Main Fuselage Cover
Figure 4



Layer Sequence Bottom Fuselage Cover and Cuffs
 Figure 5



Layer Sequence Tail Fairing up to Ser. No. 20
 Figure 6, Sheet 1



Layer Sequence Tail Fairing from Ser. No. 21
 Figure 6, Sheet 2

53-01-00

MAINTENANCE PRACTICES

53-01-01

Canopy

Removal/Installation

- 1 Open canopy.

CAUTION

Support the canopy by hand before disconnecting the opening limiter strap.

- 2 Remove the attachment bolt of the opening limiter strap.
- 3 Push canopy to front and remove.
- 4 Install in reverse sequence of removal.

Chapter 55

Stabilizers

Table of Contents

Chapter	Title	
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55-21-00	MAINTENANCE PRACTICES	8
55-21-01	Horizontal Stabilizer	8
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55-00-00

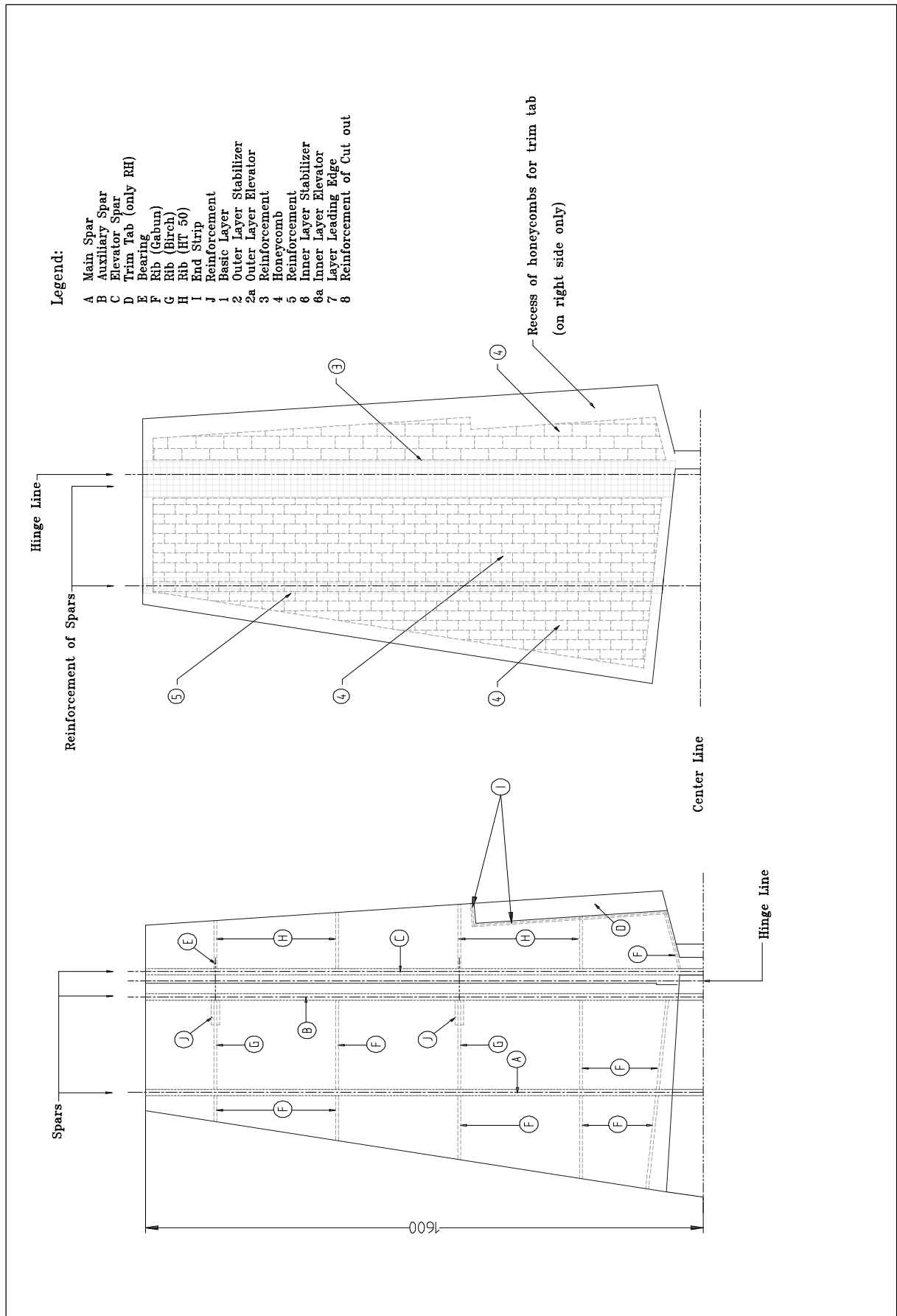
GENERAL

The EXTRA 200 has a conventional empennage with stabilizers and moveable control surfaces. The spars consist of carbon roving caps, carbon fibre webs and PVC foam cores. The shells are built of honeycomb sandwich with glass fibre or optional carbon fibre laminate. Also buckling is prevented by plywood ribs. Deviating from this, the elevator is constructed in the same manner as the ailerons (refer to Chapter 57). On the R/H elevator half a trim tab is fitted with a piano hinge.

The layer sequences of the stabilizers, the elevator and the rudder are shown in Figures 1-2.

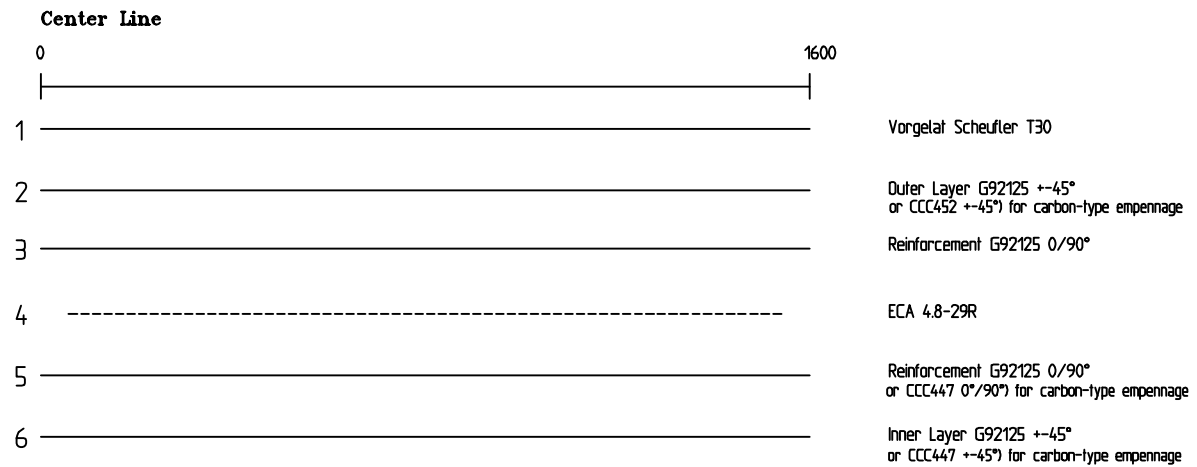
All composite parts, as protection against moisture and UV radiation, are coated with an unsaturated polyester gel-coat, an acrylic filler and finally with an acrylic paint.

For repair of composite parts refer to Chapter 51.

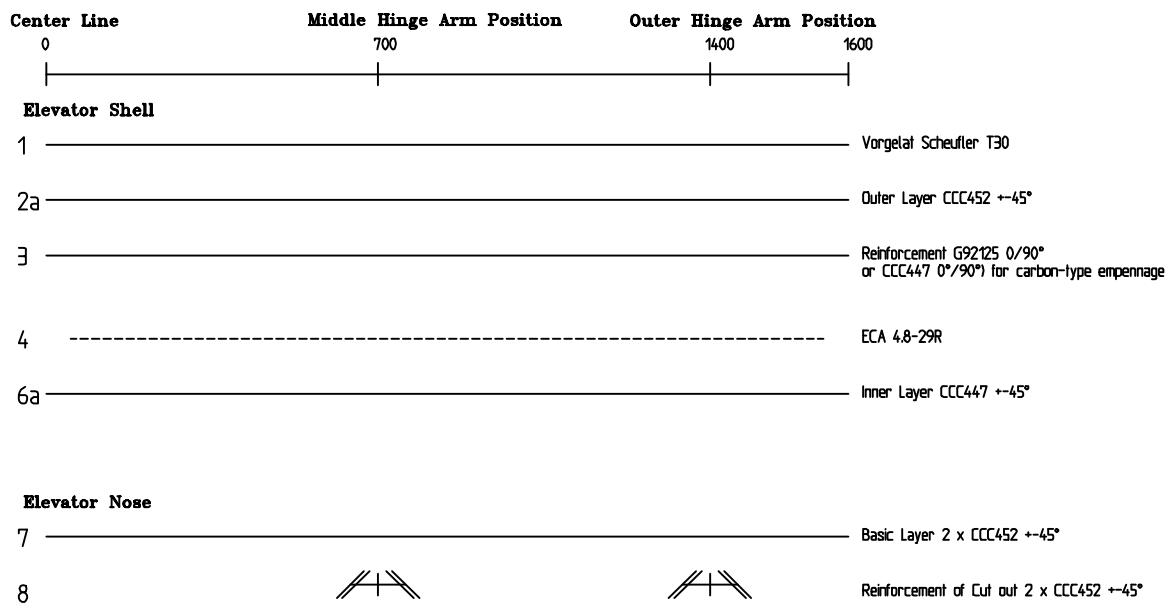


Layer Sequence Horizontal Tail
Figure 1, Sheet 1

Layer Sequence Horizontal Stabilizer

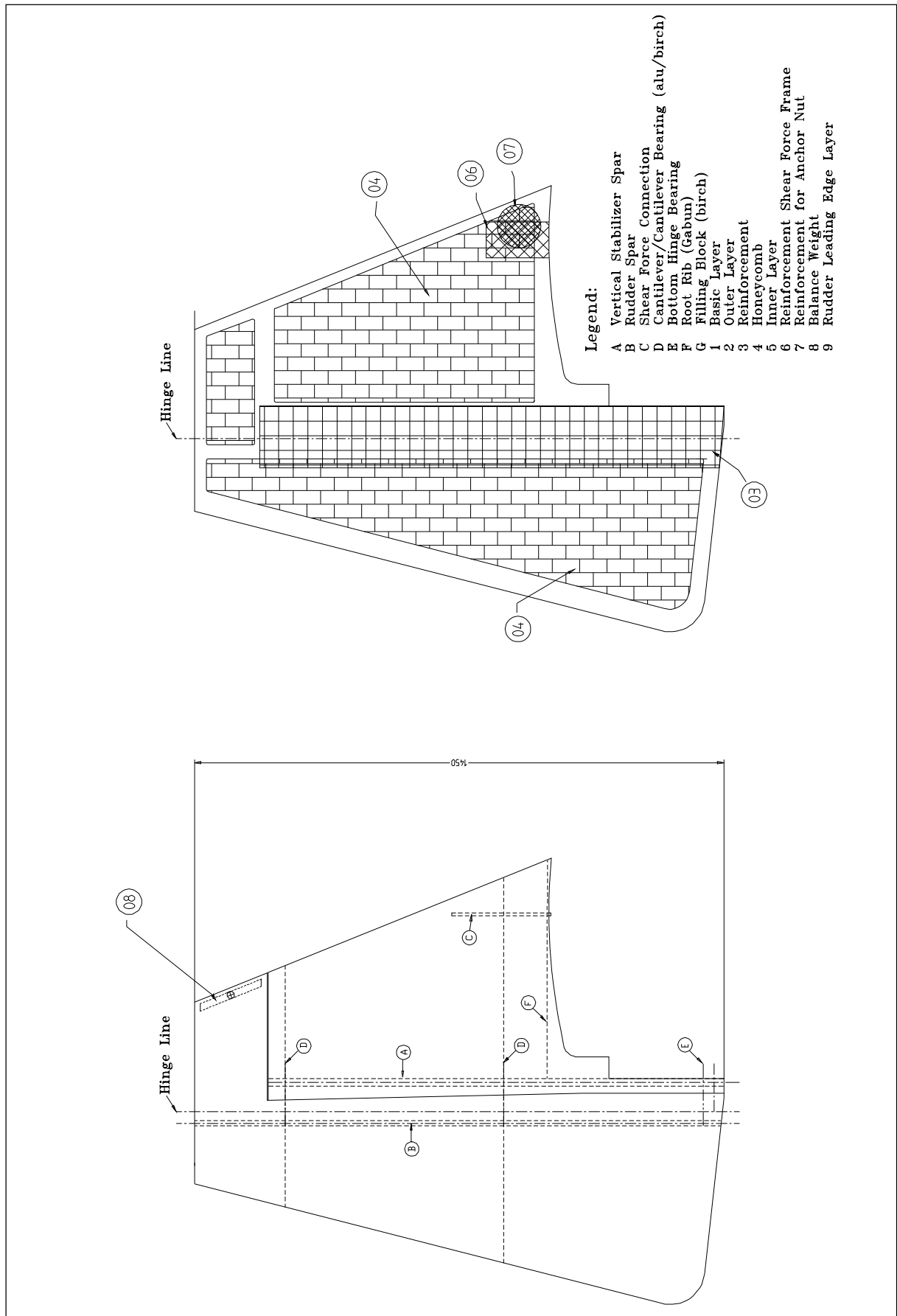


Layer Sequence Elevator



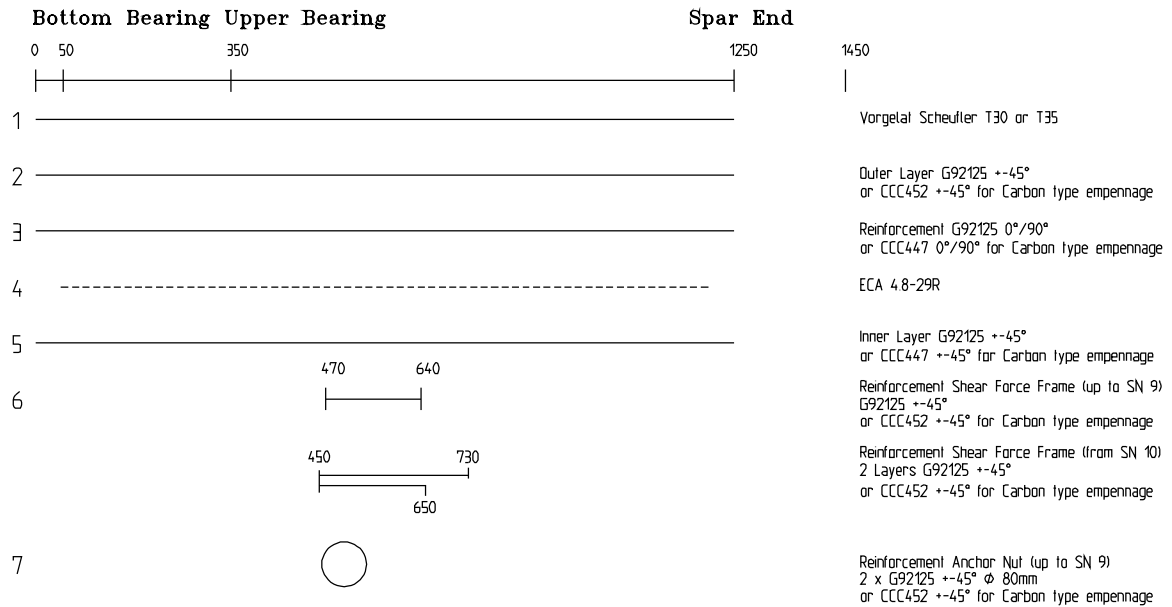
Note: Markings refer to the legend of sheet 1 of this Figure.

*Layer Sequence Horizontal Tail
 Figure 1, Sheet 2*

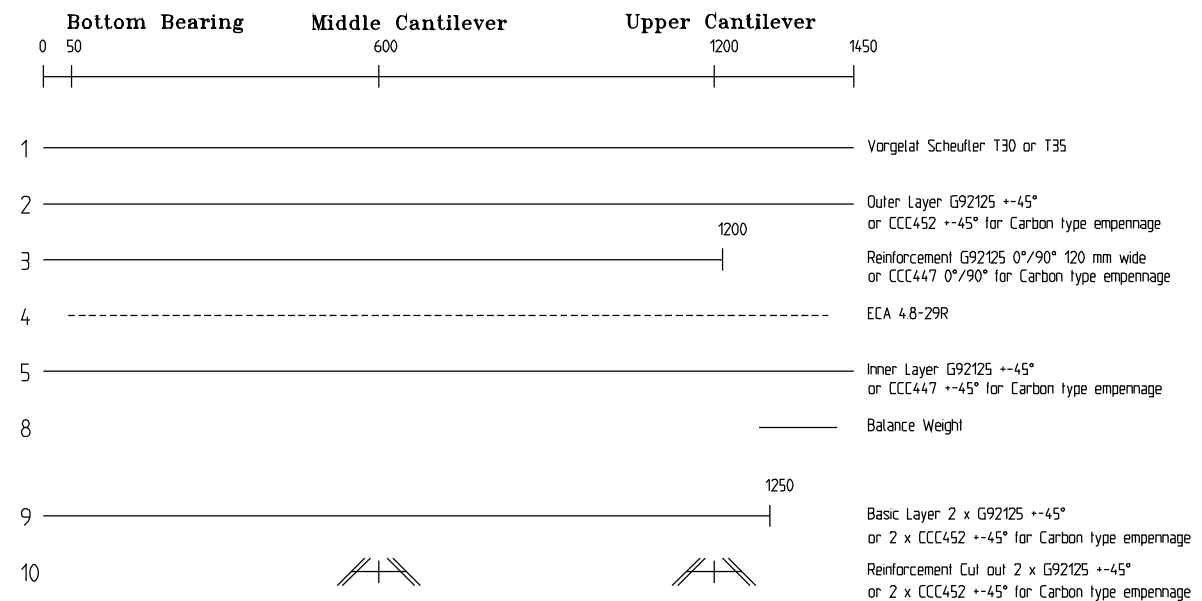


*Layer Sequence Vertical Tail
 Figure 2, Sheet 1*

Layer Sequence Vertical Stabilizer



Layer Sequence Rudder



Note: Markings refer to the legend of Sheet 1 of this Figure

*Layer Sequence Vertical Tail
 Figure 2, Sheet 2*

55-21-00

MAINTENANCE PRACTICES

55-21-01

Horizontal Stabilizer

Removal

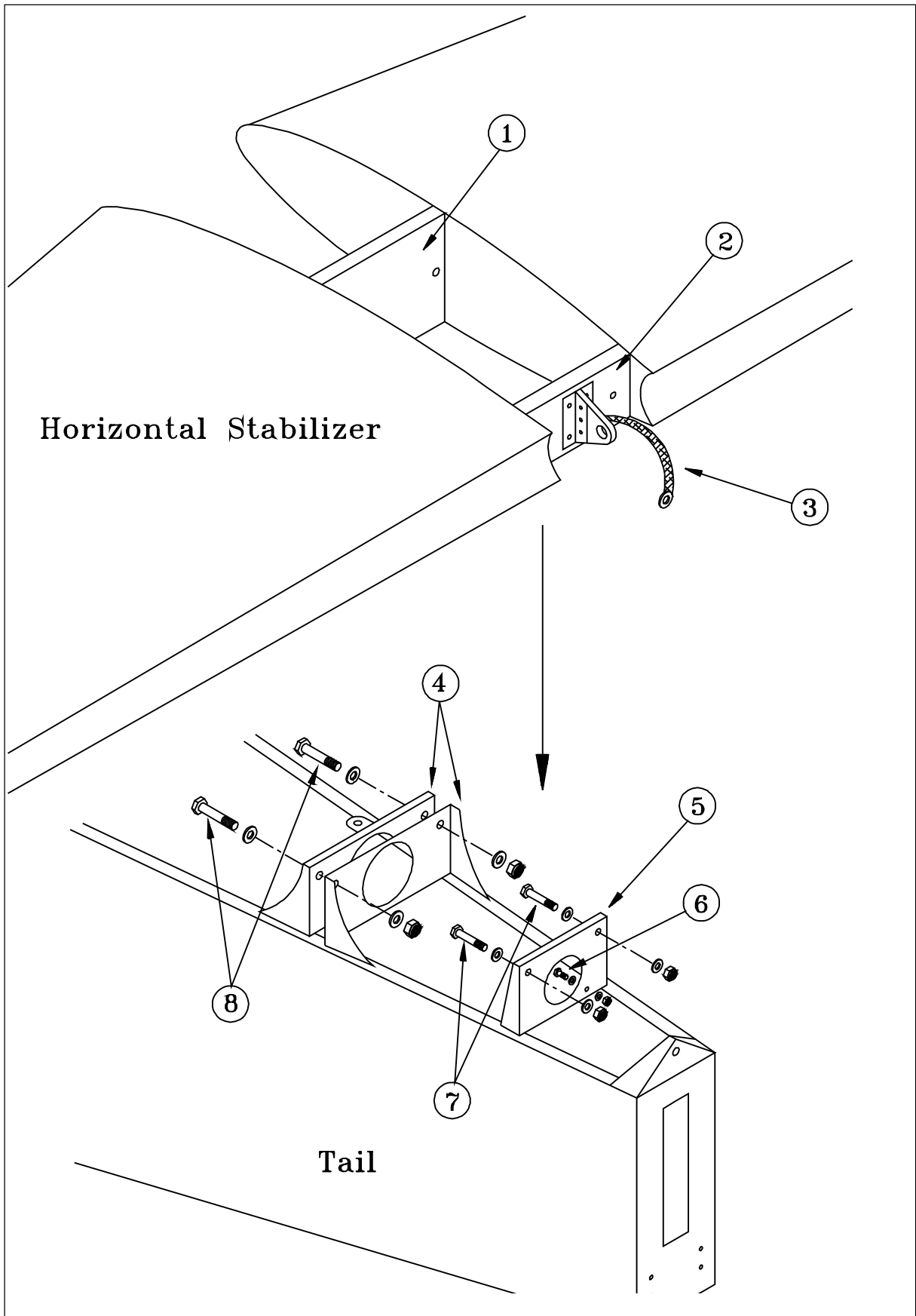
Remove elevator and rudder per Chapter 27-31-01, remove the vertical stabilizer per Chapter 55-21-02 and then reverse procedure of installation.

Installation

CAUTION

Make shure that the trim bowden cable will not be damaged when installing the horizontal stabilizer.

- 1 Slide the horizontal stabilizer with its front spar (1, Figure 3) into the attach brackets (4) on fuselage. The rear spar (2) is situated behind the rear attachment bracket (5). (Trim tab is on the right side.)
- 2 Slide in LN 9037-10054 front spar attachment bolts (8) with an additional DIN 125 M10 washer under bolt head from the front to the rear. These bolts are also used for the vertical stabilizer attachment. So do not apply stop nuts before the vertical stabilizer is fitted to the fuselage.
- 3 Slide in the rear spar attachment bolts (7) from front to rear. Use LN 9037-10042 bolts in connection with LN 9348-10 stop nuts and DIN 125 M10 washers. Torque nuts for fastening.
- 4 Fasten the ground bonding lead (3) by means of the DIN 933 M5x12 bolt (6), the DIN 125 M5 washers and the LN 9348-05 stop nuts.
- 5 Follow the procedure of Vertical Stabilizer Installation (refer to Chapter 55-21-02).



Horizontal Stabilizer Removal/Installation
Figure 3

55-21-02

Vertical Stabilizer

Removal

- 1 Remove the tail fairing and the tail cone access panel per Chapter 51-00-01.
- 2 Remove the rudder per Chapter 27-21-01.
- 3 Remove the bottom hinge bracket assembly per Chapter 27-21-02.
- 4 Remove the two LN 9348-10 stop nuts (2, Figure 4) and DIN 125 M10 washers of the front main bolts.
- 5 Remove the rear LN 9037-10042 main bolt (3) with the DIN 125 M10 washers and the LN 9348-10 stop nut.

CAUTION

Do not put the fin too far backward, the antenna could be damaged.

- 6 Put the fin backward and lift the fin over the antenna.

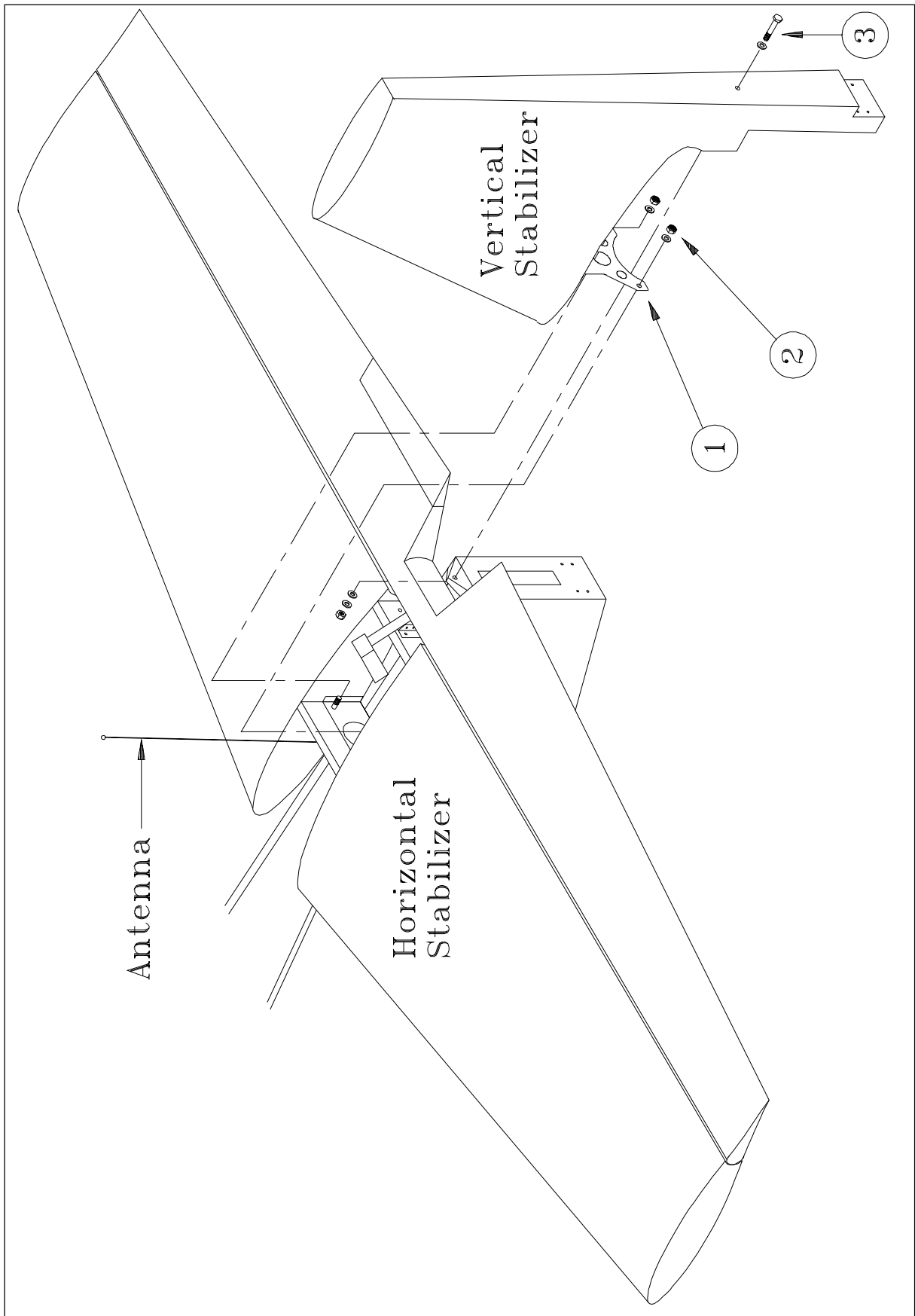
Installation

- 1 Put the vertical stabilizer leading edge over the antenna.

CAUTION

Do not put the fin too far backward, the antenna could be damaged.

- 2 Slide the auxiliary spar attachment sheet (1, Figure 6) of the vertical stabilizer from the rear over the preinstalled horizontal stabilizer front spar bolts and install the DIN 125 M10 washers and LN 9348-10 stop nuts (2).
- 3 Insert the LN 9037-10042 bolt (3) to the main spar from rear to front. Use LN 9348-10 stop nuts and DIN 125 M10 washers.
- 4 Install the bottom hinge bracket to the tail per Chapter 27-21-02.
- 5 Reinstall the tail fairing, the tail side skins and the tail cone access panel per Chapter 51-00-01.



Vertical Stabilizer Removal/Installation
Figure 4

Chapter 57

Wings

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57-00-00

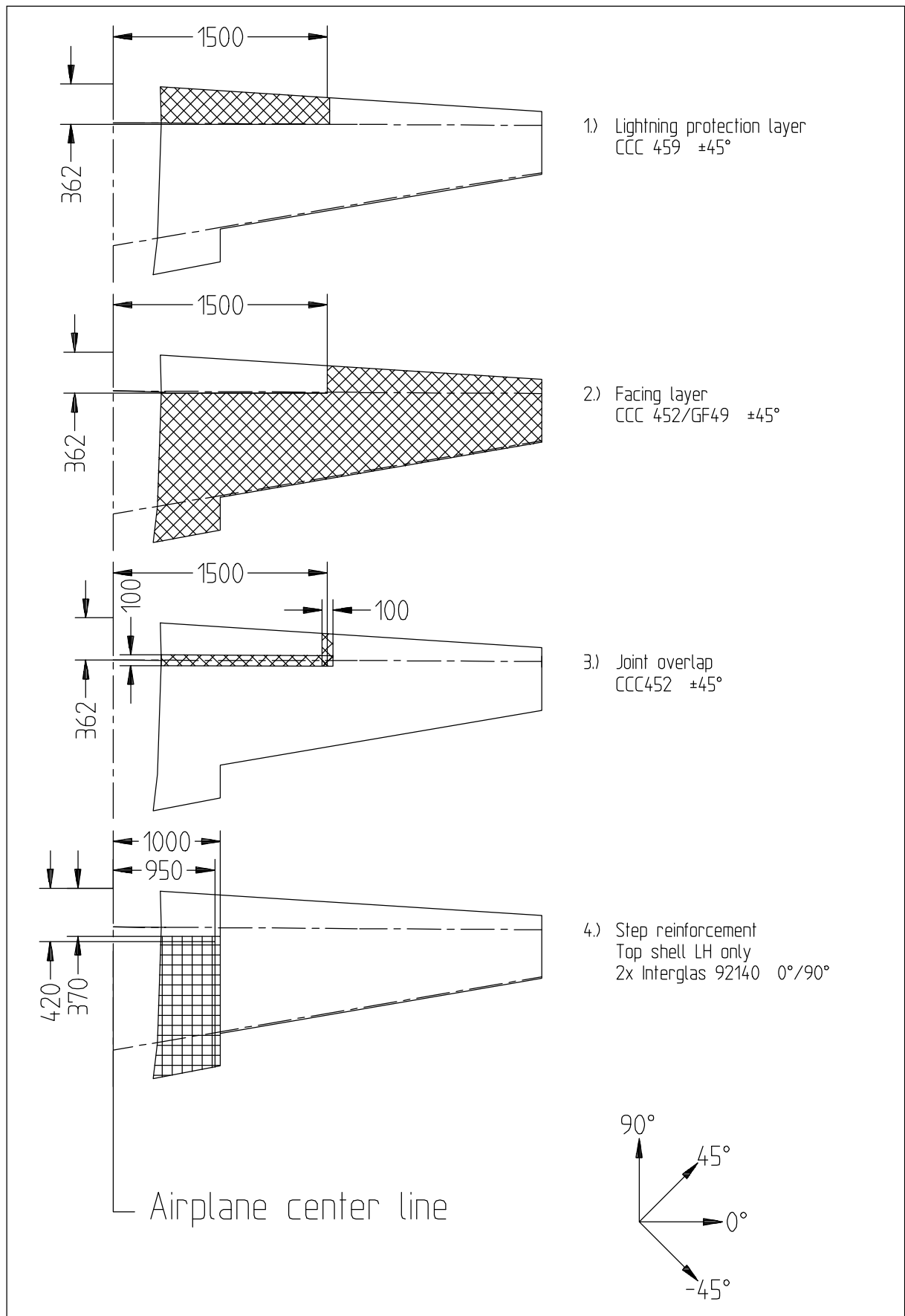
GENERAL

The wing consists of a one-piece, dual chamber main spar with carbon fibre roving caps and carbon fibre webs. For the spar core PVC foam is used. The wing shells are a honeycomb sandwich construction with carbon fibre laminates. To prevent buckling of the shells, plywood ribs are used.

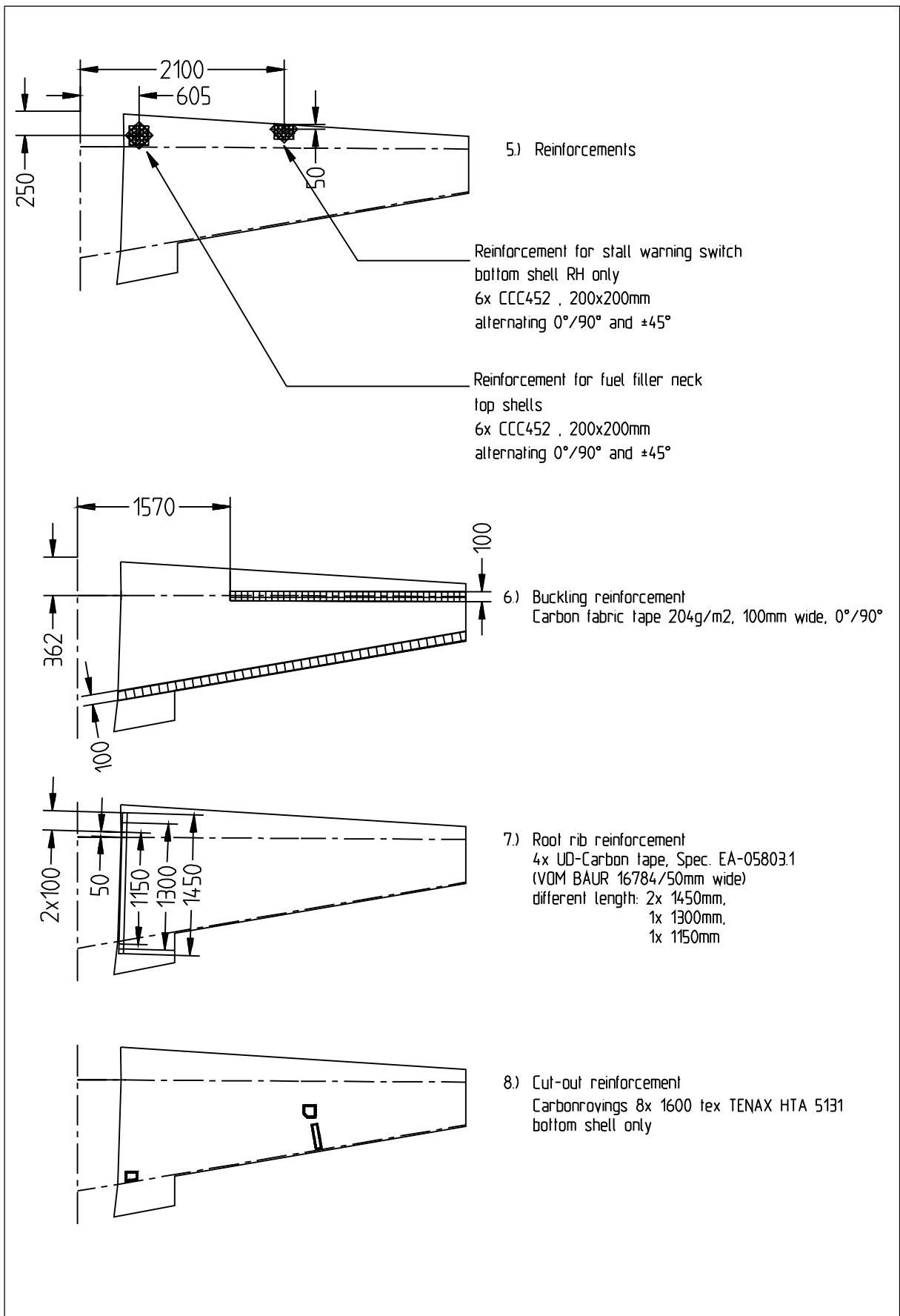
The layer sequence of the wing is shown in Figure 1.

All composite parts, as protection against moisture and UV radiation, are coated with an unsaturated polyester gel-coat, an acrylic filler and finally with an acrylic paint.

For repair of composite parts refer to Chapter 51.



Layer Sequence Wing
Figure 1, Sheet 1



*Layer Sequence Wing
 Figure 1, Sheet 2*

57-05-00

MAINTENANCE PRACTICES

57-05-01

Wing

Removal

Reverse procedure of installation omitting step 19.

Installation

- 1 Remove the canopy per Chapter 53, the engine cowlings and the main fuselage cover per Chapter 51.
- 2 Remove the right front canopy hinge.
- 3 Loosen the breather line clamps located at the engine side of the firewall and in the main spar area, push the front part of the breather line some centimeters to the front until it is disconnected from the connecting hose (10, Figure 3) and remove the breather line (5) by pulling it to the rear.
- 4 Remove the fuel selector valve control rod per Chapter 28.
- 5 Remove the prop. vernier control handle and tie-wraps fastening the cable in the cockpit area and lay vernier control and cable forward over the engine.
- 6 Fix throttle lever and control sticks in rearmost position.

CAUTION

Ensure that areas in which the wing shall be slided are clear of obstructions.

CAUTION

Prevent cables and pitot/static lines from damage. Keep them at the rear of the main spar and outside of the upper longerons.

CAUTION

Pay attention to the front canopy hinge and the throttle, when sliding down the wing. These parts and the wing could be damaged.

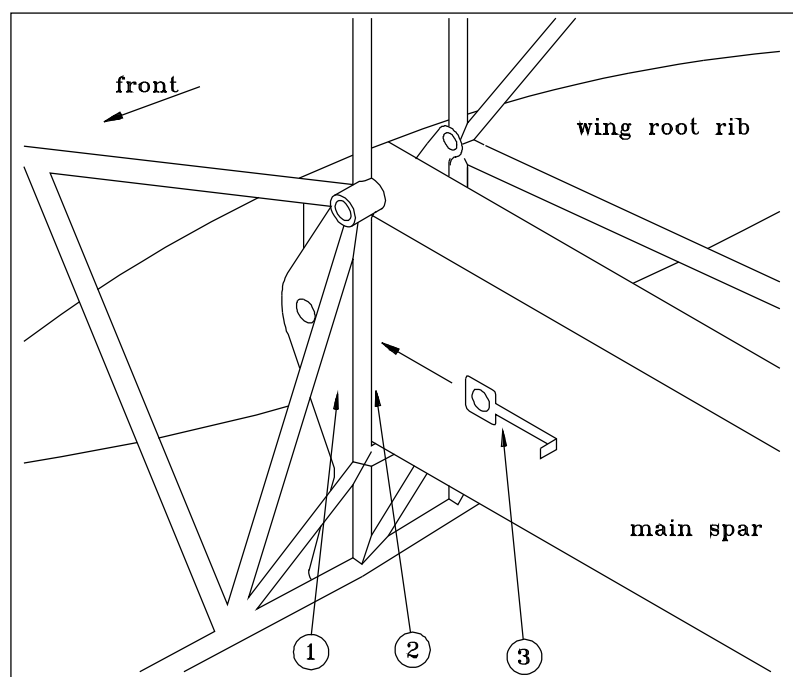
WARNING

Beware not to get jammed between wing and fuselage.

- 7 Slide wing down into fuselage attachment brackets (3).
- 8 Preinstall LN 9037-08042 auxiliary spar attachment bolts (1) from front to rear. Use two DIN 125-M8 washers at each side and LN 9348-08 nuts. Fasten only finger tight.
- 9 Install upper longeron cutout bridges (7) using at each side 3x DIN912 M8 x 180, 3x DIN125 M8 washers and 3x LN9348-08 stop nuts at the top and 1x DIN912 M10 x 230 bolt, DIN125 M10 washer and LN9348-10 stop nut at the bottom (6). Check cutout bridges for RH and LH marking. Install the bolts from front (fire-wall) to rear (aircraft tail). Torque stop nuts for fastening.
- 10 Install the shear connectors (8). Use two DIN 912 M12x220 bolts and safety wire.

IMPORTANT

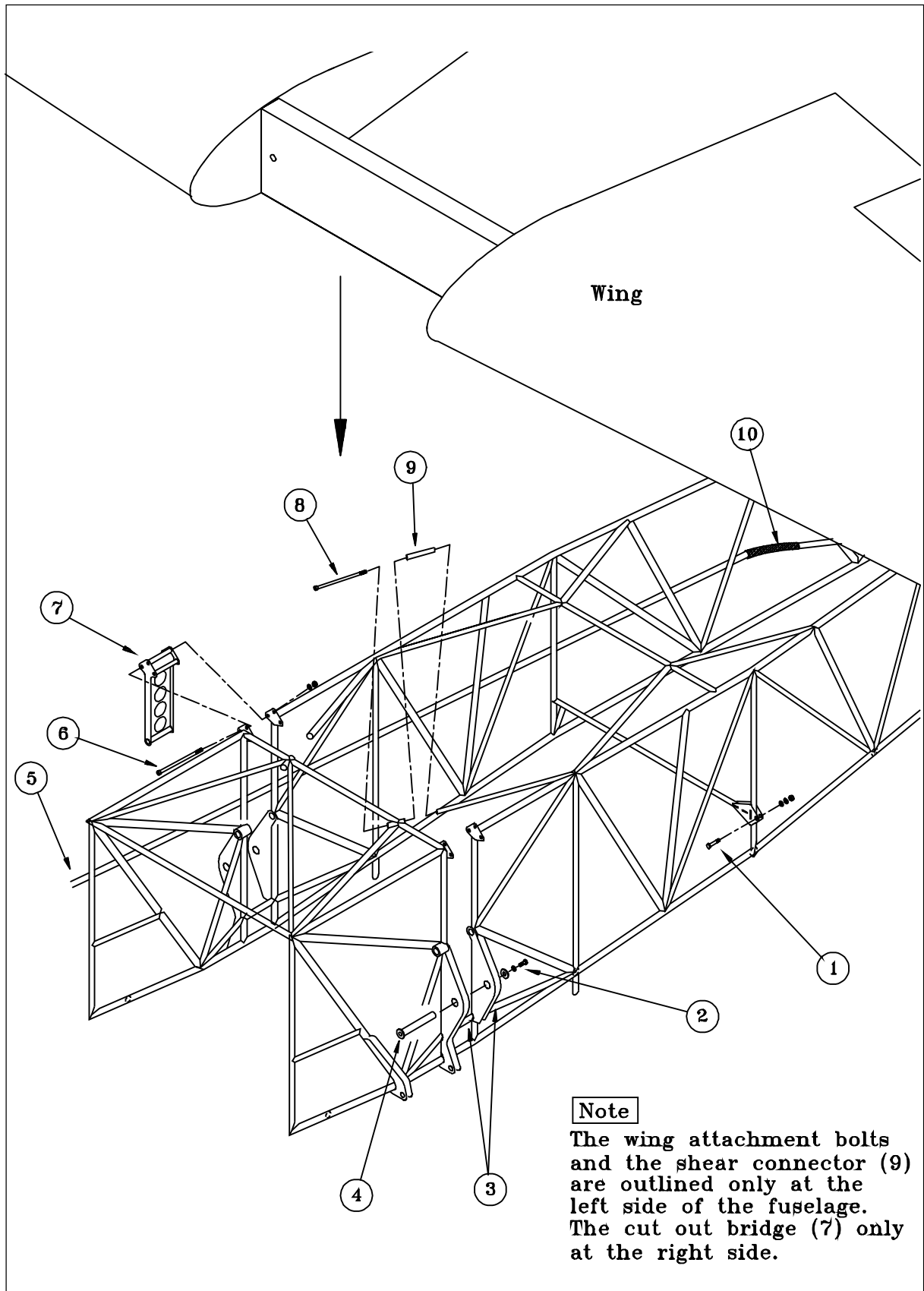
If there is clearance between the main spar and the attachment brackets (1, Figure 2), use shims (3) like shown below which are to be slid in the front gaps (2).



*Shims Installation
 Figure 2*

- 11 Slide in shims if necessary and install the main spar tubular bolts (4, Figure 3) from front to rear.

- 12 Secure main spar tubular bolts with LN 9038-08020K bolts (2), DIN912 M8 and aluminum 30x11x4 washers. Torque security bolts for fastening and subsequently safety wire.
- 13 Fasten auxiliary spar attachment bolts.
- 14 Reinstall the right front canopy hinge.
- 15 Reinstall the fuel selector valve control rod per Chapter 28.
- 16 Reinstall prop vernier control handle and tie-raps for fastening the cable.
- 17 Unfix throttle lever and control sticks.
- 18 Install short aileron push pull rods per Ch. 27-01-01.
- 19 Perform an aileron rigging per Chapter 27-11-02.
- 20 Connect fuel system (tubes and vent lines), pitot/static system, stall warner, navigation/strobe light wires (if installed), ground bonding leads and fuel indicator wires with prefitted plugs per respective Chapters.
- 21 Reinstall breather line, engine cowlings, main fuselage cover and canopy.



Wing Removal/Installation
Figure 3

57-35-00

MAINTENANCE PRACTICES

57-35-01

Wing Tip Panel

Removal/Installation (if dual strobe light and navigation light system is installed) .

Refer to Figure 1 of Chapter 33.

W A R N I N G

High Voltage! Wait 5 minutes after shutting off before starting any work on the strobe light system.

- 1 Disconnect the battery and wait 5 minutes.
- 2 Remove the DIN 933 M6x20 bolt, the metal sheet screws, the AN 526 C 1032 R8 bolts and the washers.
- 3 Tie out the wing tip panel with the lighting unit some centimetres (Consider that the panel is sealed to the wing tip with silicone).
- 4 Disconnect the electrical wiring and the ground bonding lead by loosening the central M4 nut of the lighting unit attachment.
- 5 Remove the wing tip panel.
- 6 Clean sealing surfaces mechanically and with Acetone.
- 7 Install in reverse sequence of removal after applying Silicone to the sealing surfaces.

57-60-00

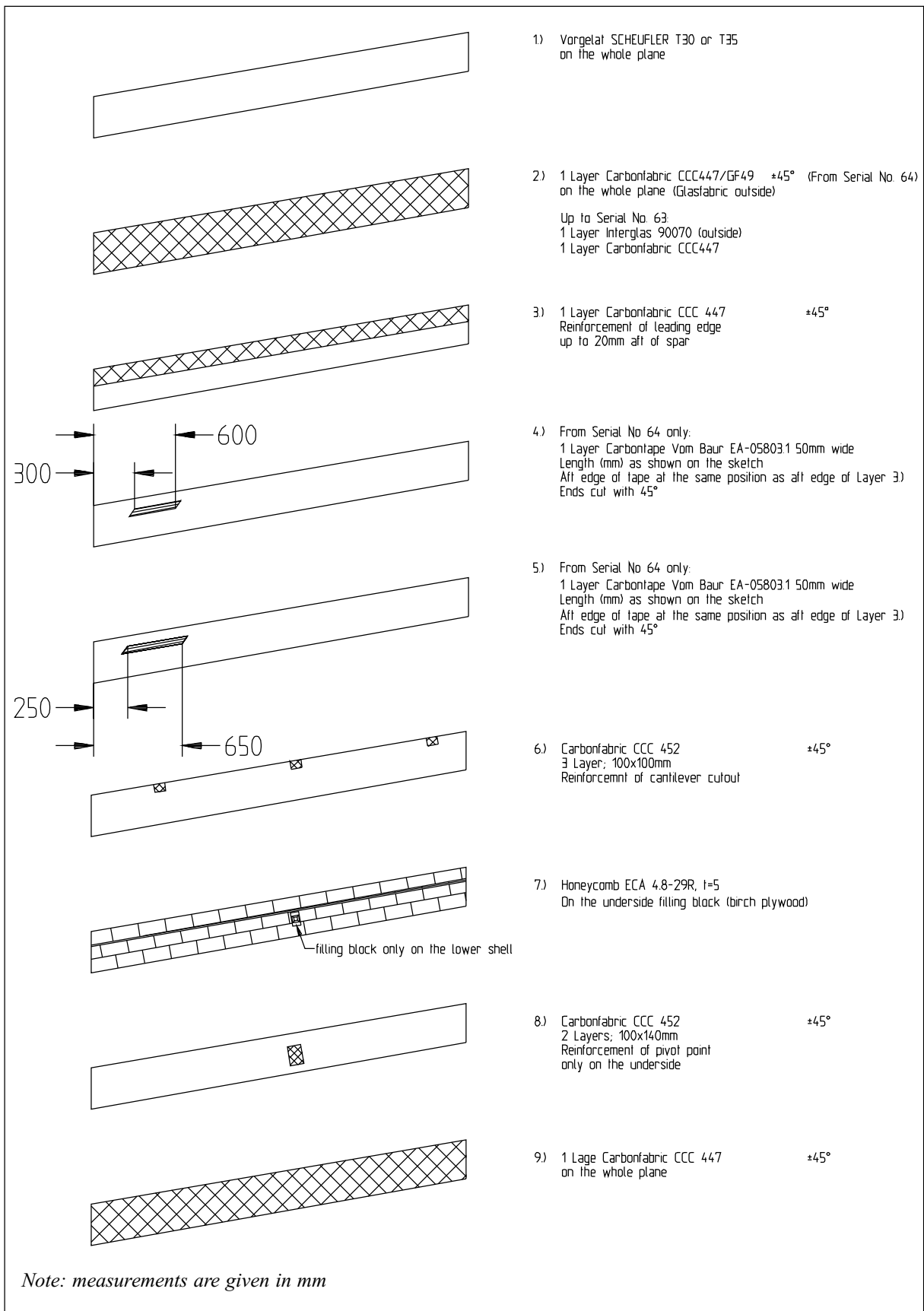
AILERONS

The ailerons are constructed in the same manner as the wing but with single chamber spar. They are supported at three points in spherical bearings pressed into aluminium brackets. Furthermore the ailerons are equipped with "glass fibre laminate spades" to decrease pilots forces.

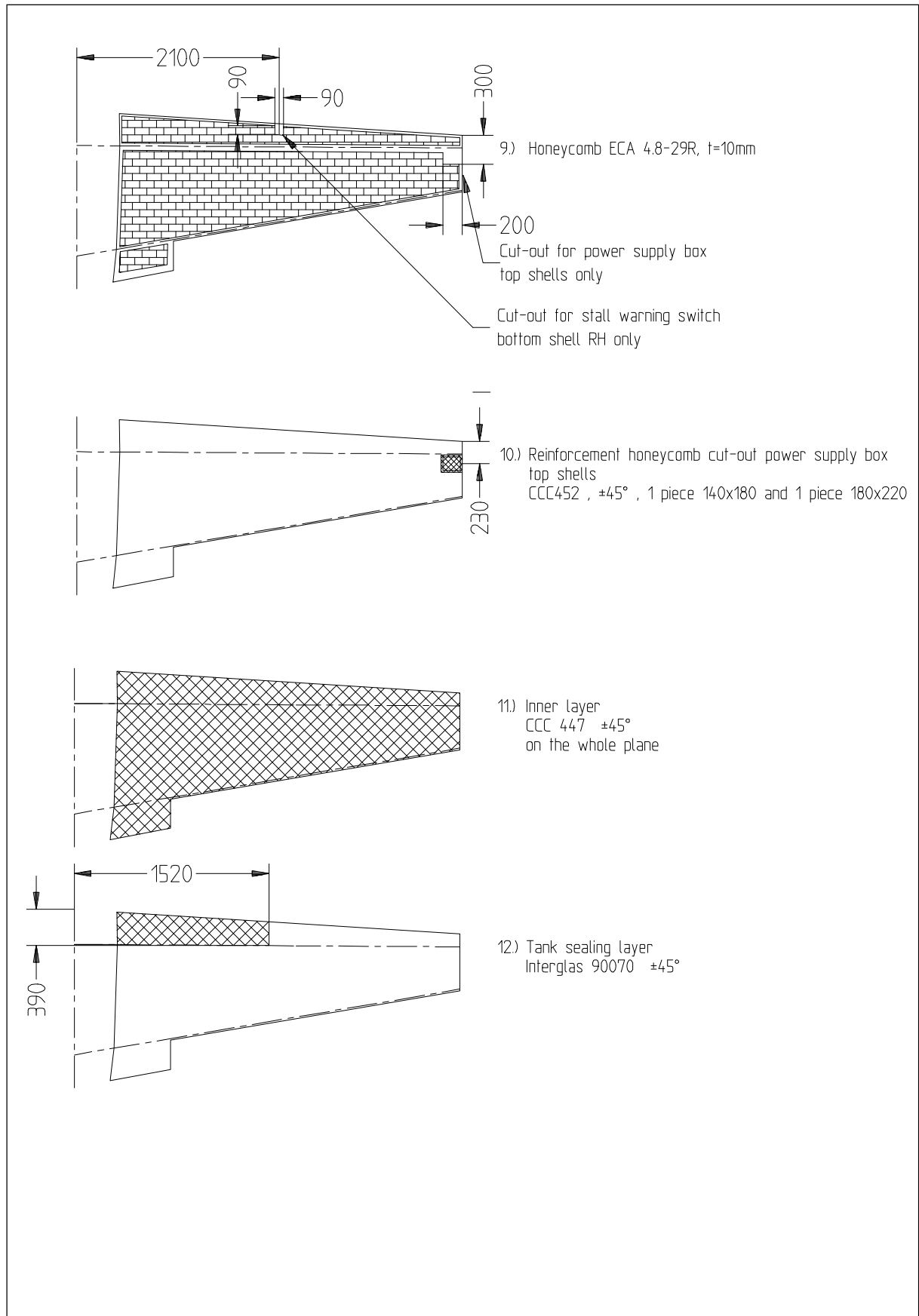
The layer sequence of the ailerons is shown in Figure 4.

All composite parts, as protection against moisture and UV radiation, are coated with an unsaturated polyester gel-coat, an acrylic filler and finally with an acrylic paint.

For repair of composite parts refer to Chapter 51.



Layer Sequence Ailerons
Figure 4



Layer Sequence Wing
Figure 1, Sheet 3

Chapter 61

Propeller

TABLE OF CONTENTS

Chapter	Title	
61-00-00	GENERAL	3
61-10-00	PROPELLER	3

61-00-00

GENERAL

The EXTRA 200 is equipped with a MTV-12-B-C/C 183-17e propeller. Maintenance work or overhaul of the propeller requires consultation of the propeller manufacturer MT-Propeller (refer to Chapter 01).

61-10-00

PROPELLER

The MTV-Propellers are made of laminated wood encased in glass-fiber reinforced plastic, which is painted to make it waterproof.

The pitch change is conducted by a propeller governor. Once an engine rotational speed is selected it will be held constant at variations of airspeed and power.

Mechanical stops for low pitch and high pitch limit the pitch change level. In case of the oil pressure of the governor to be lost, the blades automatically return to high pitch, if the counterweights are installed. The oil pressure is single acting.

IMPORTANT

If replacement of the propeller governor control cable is necessary, renew the sealing of the bushing grooves and gaps at the engine side of the firewall. Use PRC-812 (Products Research & Chemical Corporation, USA) firewall sealant.

Chapter 72

Engine

TABLE OF CONTENTS

Chapter	Title	
72-00-00	GENERAL	3
72-10-00	ENGINE	4

72-00-00

GENERAL

This chapter describes the engine installed in the EXTRA 200 aircraft, together with its fitted assemblies. Operation and maintenance work of the engine requires consultation of the Lycoming Operator's Manual (P/N 60297-21).

Proper control, operation and troubleshooting of the engine is also described in the Lycoming Operator's Manual (P/N 60297-21) of the manufacturer.

I M P O R T A N T

If replacement of the engine control cables is necessary, renew the sealing of the bushing grooves and gaps at the engine side of the firewall. Use PRC-812 (Products Research & Chemical Corporation, USA) firewall sealant. Cover the control cables with AEROQUIP AE102-6 Fire sleeves inside the engine department.

72-10-00

ENGINE

The engine installed is a Textron-Lycoming air cooled, direct drive, fuel injection, horizontally opposed four-cylinder engine with inverted oil system. The rated power at Take Off is 200 HP at 2700 RPM. The maximum continuous RPM is 2500 (185 HP).

The engine specification is Textron-Lycoming AEIO-360-A1E.

The following accessories are included in the powerplant installation:

Fuel injector:	Bendix
Magnetos:	Slick
Alternator:	Electrosystems (Prestolite)
Starterm (Standard):	Lycoming
Fuel pump:	Gates Lear
Shielded ignition system	
Propellor governor:	Woodward

The engine is operated by the following manual controls:

Throttle control

RPM control

Fuel mixture control

The propeller governor monitors the RPM automatically and prevents overspeeding. If oil pressure is lost, the propeller is automatically adjusted to coarse pitch to prevent overspeeding.

The engine is air cooled. Baffles are provided to build up a pressure and force the air through the cylinder fins. The cooling air flow is dependent on engine speed and dynamic air pressure.

The engine is lubricated by means of an engine driven oil pump. For acrobatic maneuvers, lubrication is assured via a CHRISTEN 801 Inverted Oil System (refer to Chapter 79).

The complete power plant is attached to the fuselage structure using 4 mounting points and rubber vibration absorbers.

Chapter 79

Oil System

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79-00-00	GENERAL	3
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79-20-00	OIL COOLER	6
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79-30-02	Flexible Hoses	10
79-40-00	MAINTENANCE	12
79-40-01	Reseating Valve Balls	12
79-40-02	Cleaning Inverted Oil System	12

79-00-00

GENERAL

The EXTRA 200 is equipped with a modification of a Christen Inverted Oil System (CHRISTEN 801 series). The need for modification of the standard Christen 801 Inverted Oil System results from installation requirements for different system components of the Lycoming AEIO-360-A1E engine. Maintenance work or overhaul of the oil system requires consultation of the manufacturer. (see Chapter 01).

The lubrication system of the EXTRA 200 is equipped with an oil cooler (SW 8406 R) which is produced by the STEWART WARNER SOUTH WIND Corporation.

IMPORTANT

Before making installations and repairs to the aircraft plumbing, it is important to make accurate identification of plumbing materials. Refer to the respective Figures in this Chapter.

General information concerning flexible hoses, fire sleeves, and fittings used in the Extra 200 oil system you find in Chapter 20.

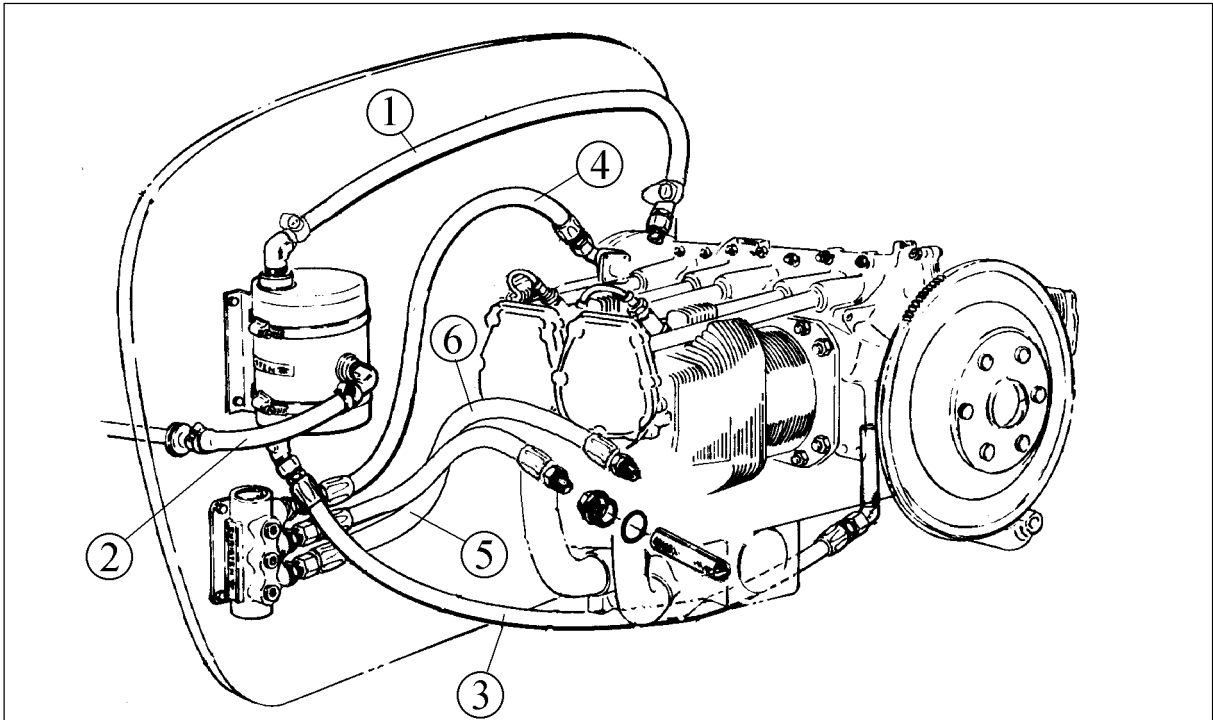
IMPORTANT

If replacement of oil lines is necessary, cover the oil lines of the engine department with AEROQUIP AE102 fire sleeves as per Chapter 20-10-07 in case of AEROQUIP-hoses are used (except the AEROQUIP 637/MIL-H 6000 hoses).

79-10-00

INVERTED OIL SYSTEM

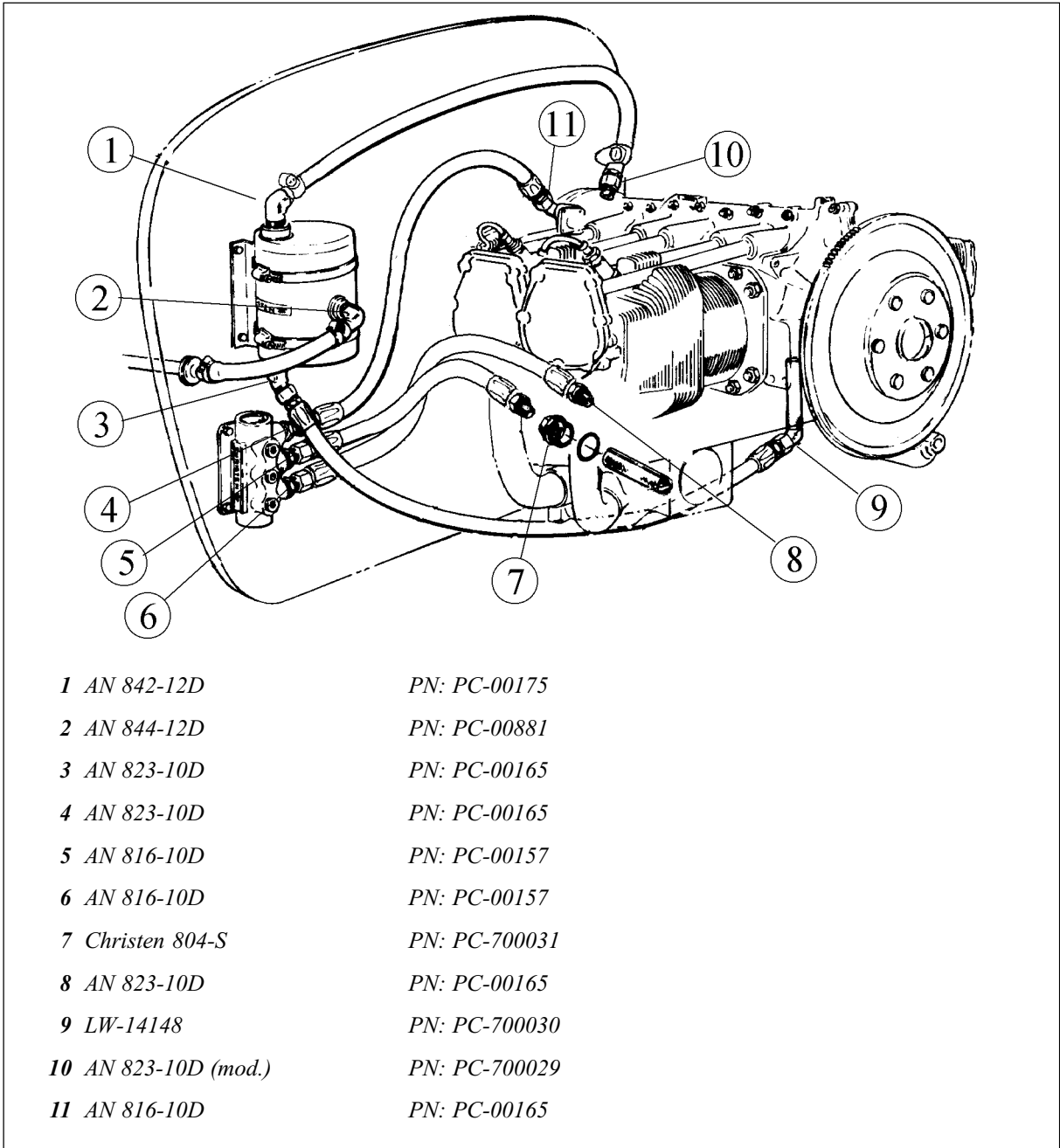
The hose and fitting installation is modified to the standard Christen Inverted Oil System. For identification of hoses and fittings refer to Figures 1-2.



1	AEROQUIP 637/ MIL-H 6000+	Hose clips	PN: PC-67207A1	hose lenght: 520mm
2	AEROQUIP 637/ MIL-H 6000+	Hose clips	PN: PC-67207A2	hose lenght: 350mm
3	AEROQUIP* 303-10 +	Hose Fittings 491-10D	PN: PC-67207A3	hose lenght: 720mm
4	AEROQUIP* 303-10 +	Hose Fittings 491-10D	PN: PC-67207A4	hose lenght: 530mm
5	AEROQUIP* 303-10 +	Hose Fittings 491-10D	PN: PC-67207A5	hose lenght: 320mm
6	AEROQUIP* 303-10 +	Hose Fittings 491-10D	PN: PC-67207A6	hose lenght: 400mm

* Refer to Ch. 20-10-07

*Hoses of Inverted Oil System
 Figure 1*



Fittings of Inverted Oil System
Figure 2

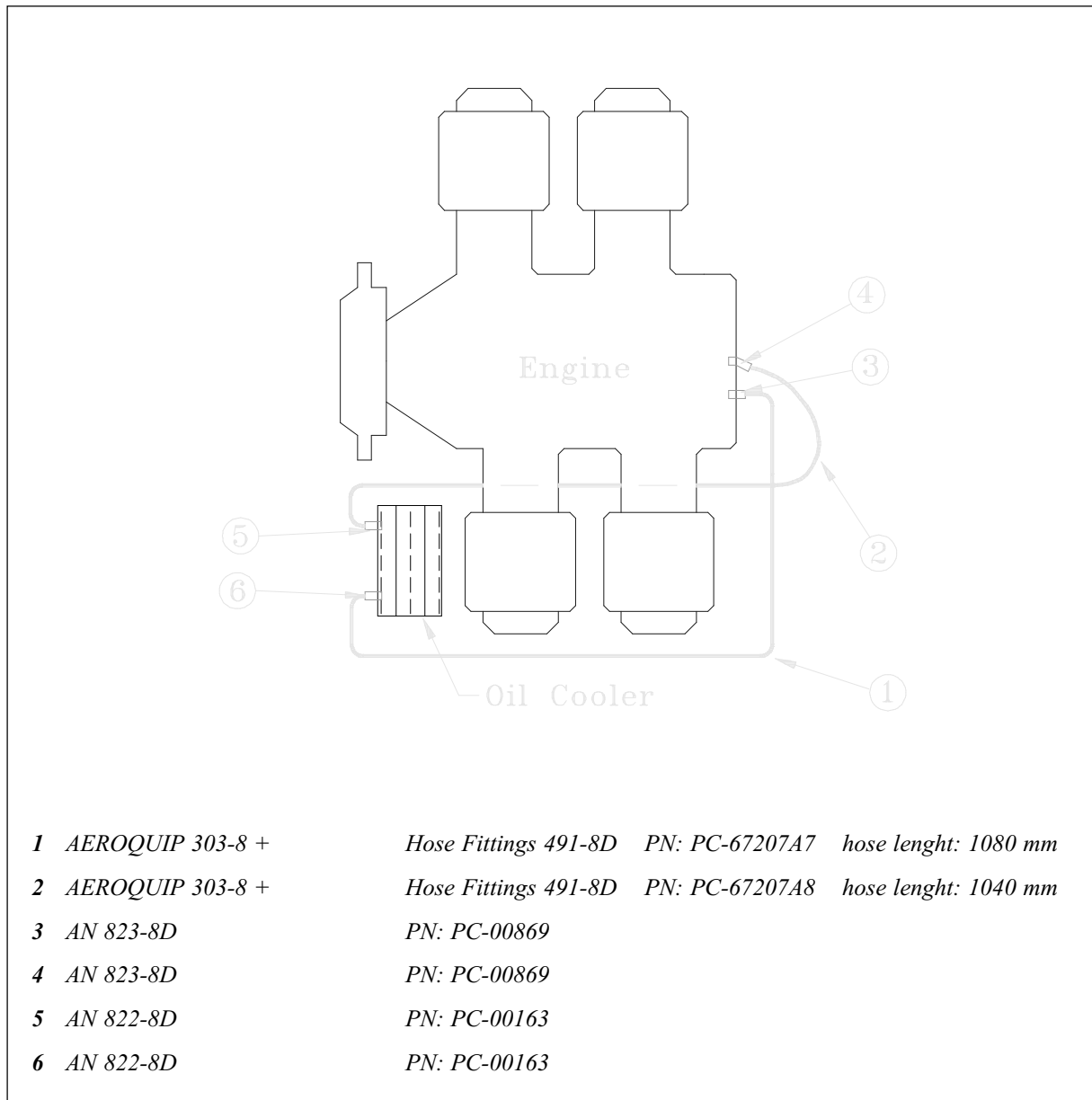
79-20-00

OIL COOLER

The oil cooler which is mounted on the left engine front and is connected to the engine by flexible hoses.

In operation the hot lubricating oil leaving the engine is pumped by an engine-driven pump via the flexible hoses to the oil cooler and then back to the engine.

The flexible hoses of the oil cooling system are connected by AN Standard fittings with equal size (8D), but different connection angle. For identification of hoses and fittings refer to Figure 3.



*Hoses and Fittings of Oil Cooling System
Figure 3*

Chapter 91

Charts

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91-10-00	ELECTRICAL WIRING DIAGRAMS	4
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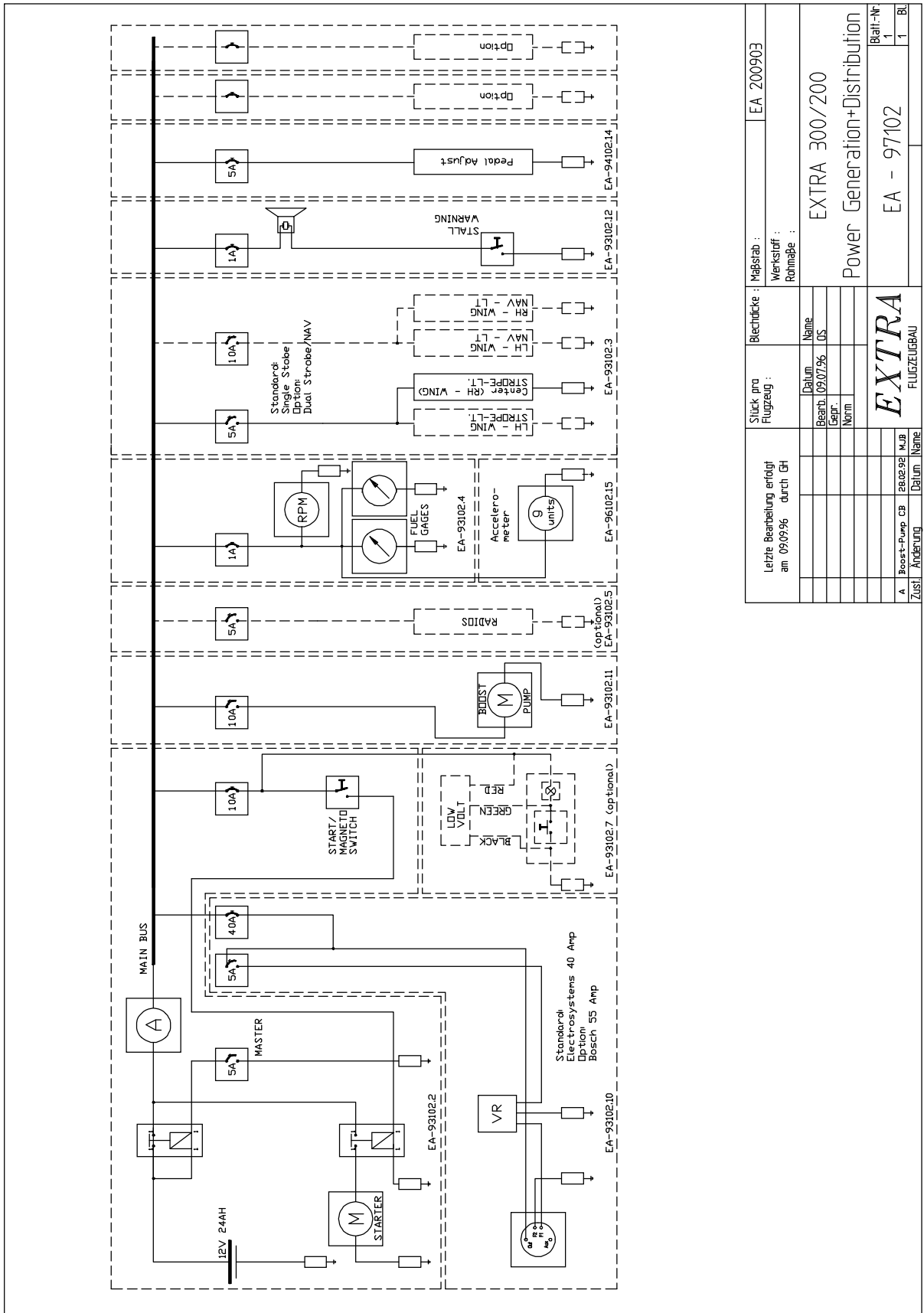
91-00-00

GENERAL

This chapter provides an electrical wiring diagram necessary to maintain the aircraft electrical power system.

91-10-00

ELECTRICAL WIRING DIAGRAMS



Wire Table
 Figure 1

Chapter 95

Special Equipment

TABLE OF CONTENTS

Existing	Title
O	EXHAUST ENDPipe SILENCER
O	STEERABLE TAIL WHEEL
O	ELECTRICAL ACTUATED RUDDER PEDAL ADJUSTMENT
O	ELT POINTER 3000
O	P-1000 DIGITAL RPM INDICATOR
O	EXTERNAL POWER SUPPLY
O	HEATING SYSTEM
O	AIR TOW RELEASE
O	LONGE RANGE TANK