CHAPTER 7

SYSTEMS

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Introduction

1. The illustrations and key tables given in this chapter constitute a list of all the components, piping, connections, and end-fittings used in the various systems. Further details of the individual items are given in the appropriate section of the A.P.101B-0400 series - 3A.

Fuel system

2. The fuel system is described in A.P.101B-0400-1 series, Sect.4, Chap.2, reference to which will show that various tanks are of the flexible type. General information and repair instructions for these flexible tanks are given in A.P.4117A, Volume 1 and Volume 6. Rigid tanks are to be repaired in accordance with the skin and structure repairs appropriate to them in Part 1, Chap.2 and 3 of this Volume. Repair to tanks sealing is covered in Part 1, Chap.3, and various specific repairs are given in Part 2, Group C repair leaflets.

Piping

3. Only insertion repairs are permitted, the joint being made with standard couplings.

Flying control rods

4. Whenever an end-fitting of a flying control rod becomes loose the securing rivets must be drilled out and the rivet holes reamed 13/64 in. dia., to ◀accept Chobert rivets Part No.1313/0609, closed with 5/32 in. dia. break head Tucker mandrels Part No.AGS.2052/19-27,▶ and sealing pins Part No.EEAS.41/2. File the rivet heads flush with the tube after closing.

Wear limits, control covers at pressure bulkhead

5. The maximum permissible clearance,

between the control lever housing internal diameter and the external diameter of the sealing rings, to which the control levers are attached, must not exceed 0.020 in.

Hydraulic system pipe installation

6. To ensure the integrity of the system and freedom from unserviceability, i.e. chafing, cracking, denting, broken clips, cracked unions and malalignment, the following recommendations should be observed when replacing the system pipes, but local discretion should be used as necessary.

Clearances

(1) Pipes supported by a fairlead or bracket attached to the structure, should have a minimum clearance of 0.1 in. between pipe and adjacent airframe structure, for a distance of 0.5 in. either side of the fairlead or bracket.

(2) At all other positions a minimum clearance of 0.25 in. is desirable, but the clearance should never be less than 1/16 in.

(3) Where lack of space prevents the application of a 0.25 in. clearance, an increased number of supports should be provided to maintain a minimum clearance of 1/16 in.

(4) Where pipes are adjacent to control cables or other flexible moving parts a clearance of 2.0 in. minimum should be maintained.

(5) Where pipes are adjacent to control tubes or other components a clearance of 0.5 in. should be maintained.

Manipulation of rigid pipes (fig.13)

(1) A pipe should not be bent to a centre line radius of less than five times the outside diameter of the pipe, i.e. a 1/2 in. O/D pipe is bent to a minimum centre line radius of 2.5 in.

(2) Where a pipe has more than one bend, the minimum length of straight pipe between the commencement of each bend should not be less than 2½ times the outside diameter of the pipe.

(3) Where a pipe is connected by an A.G.S. type coupling, a distance of 1¼ in. should be allowed from the end of the pipe to the commencement of the bend.

Pipe support (Table 1) (fig.13)

(1) The desirable maximum distance between supports is detailed in Table 1.

(2) Where brackets of fairleads support fittings, i.e. couplings, tees, etc., the distance between the supports should be 20 per cent less than the figures detailed in Table 1.

(3) Existing attachment positions for clips, brackets and fairleads should be adhered to at all times.

(4) Bolt or rivet holes for pipe support attachment should always be drilled in frame webs, never in the flanges.

Rigid pipe damage

Pipes having negligible damage should be carefully examined at the proof pressure of the system if any doubts exist in regard to serviceability. Pipes beyond this category should be rejected.

Flexible pipe damage

(1) Pipes should be examined for cracks, hardening of the rubber, and softening due to contact with extraneous fluids.

(2) New replacement pipes should be checked for date of manufacture and shelf life, if they are lifed items.

Electrical cable core termination

7. Unused cores in electrical cable assemblies must be terminated and insulated at their free ends by one of two methods:-

Heat shrinkable end caps

Binding sleeves.

(1) *Heat shrinkable end caps*

These are plastic end caps of diameter appropriate to the cable core which are pushed on to the end of the core and shrunk on by the application of heat from a suitable tool.

(2) *Binding sleeve method*

(a) Cut back the cable core conductor flush with the core insulation.

(b) Slide a 1.0 in. long binding sleeve Ref.No.5K/- of the appropriate diameter over the cable end and position it 0.5 in. away from the cut end.

(c) Apply a thin coat of adhesive, Ref.No.33H/2245288 to the cable core insulation and allow to become tacky.

◀ (d) Push the binding sleeve along the cable towards the cable core cut end to extend 0.5 in. beyond the termination.

(e) Bend back the protruding end of the sleeve to lie on the cable core and secure it in position by sliding over a 1.0 in. long sleeve of the appropriate diameter.

Fairey roller guides, rectification

8. The rollers in the Fairey roller guides of the flying control system are supported by tubular rivets which act as spindles. Any rivet which becomes loose must be replaced by the following procedure:-

(1) Very carefully drill off the head of the rivet supporting the roller.

Note...

Damage to the supporting bracket must be avoided during this operation.

(2) Support the bracket against the action of punching out the rivet.

(3) Carefully punch out the rivet. Retain the roller and spacing shims.

(4) Assemble the roller in position with a spacing shim each side, and locate with a shear pin, Part No.SP.113E/6½ assembled with a washer, Part No. SP.13/E beneath the head.

(5) Fit a retaining collar, Part No. SP.121E and lock with a split pin Part No.SP.90/C6.

Replacement of a Fairey roller guide-assembly support bracket

9. Due to the poor access for riveting and the possibility of fracturing the support bracket, it is permissible to use 4 B.A. bolts, washers and stiffnuts in lieu of rivets for the attachment of the support bracket.

CAUTION

Overtightning of the stiffnuts must be avoided to prevent fracture of the magnesium alloy support bracket. ▶

TABLE 1

Support spacing for hydraulic system pipes

Outside Diameter of Tube	Spacing	
	Aluminium Alloy	Tungum and Steel
In.	In.	In.
3/16	12	14
1/4	13 1/2	16
5/16	15	18
3/8	16 1/2	20
1/2	19	23
5/8	22	25 1/2
3/4	24	27 1/2
1	26 1/2	30

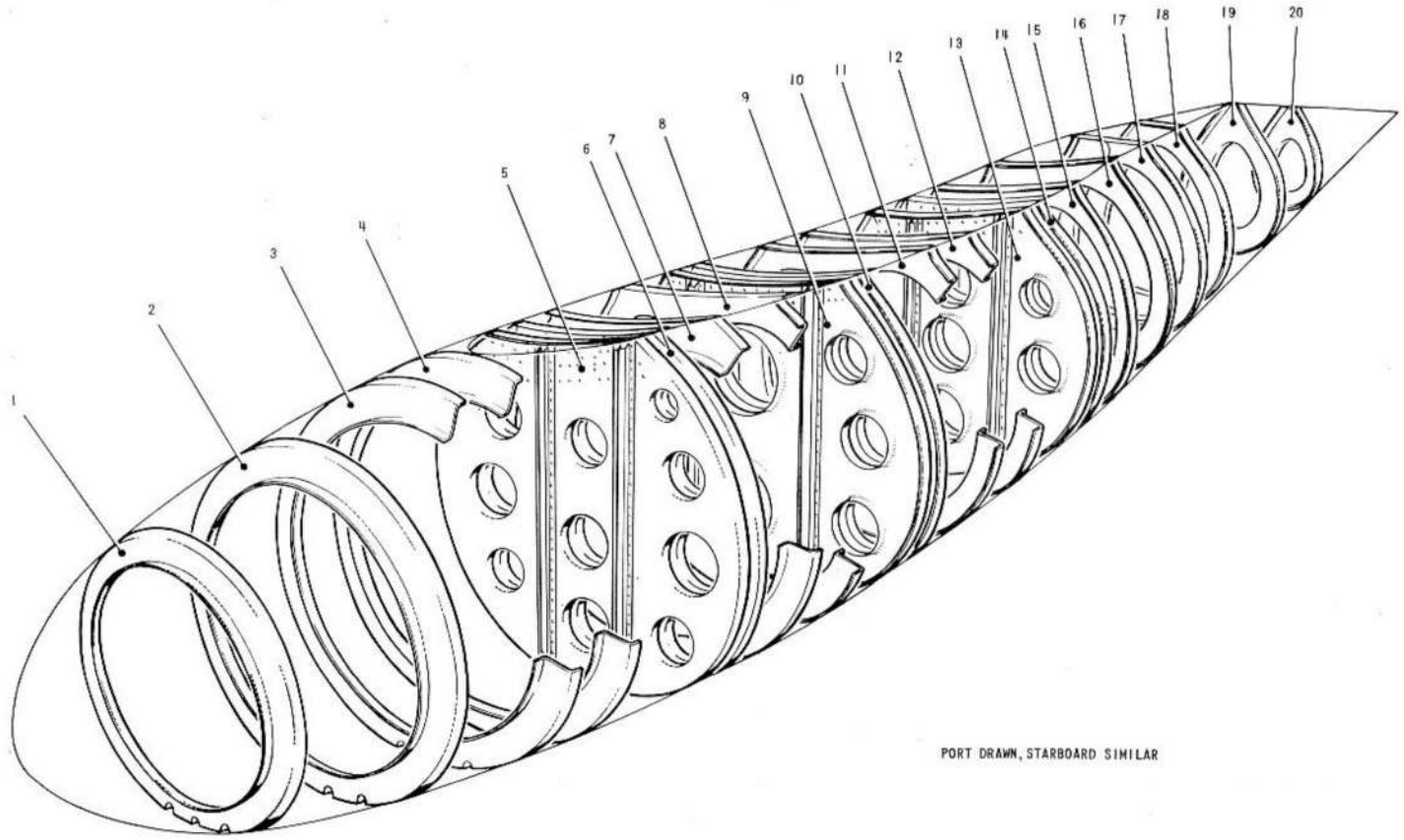

FIG. 1. WING-TIP TANK STRUCTURE

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KEY TO FIG.1 (WING-TIP TANK STRUCTURE)

Item	Material Spec.	Material S.W.G.	Part No.	Description	Negligible damage: Dents Max. depth	Dents Min. dia.	Scratches Depth	Scratches Spacing	Holes Max. dia.	Holes Pitch ratio	Repair fig.No.
1		18	EA2.62.63	Former A	0.050	1.000	0.005	2.000	-	-	
2		18	EA2.62.3	Former B	0.050	1.000	0.005	2.000	-	-	
3		18	EA2.62.5	Former C	0.050	1.000	0.005	2.000	-	-	
4		18	EA2.62.7	Former D	0.050	1.000	0.005	2.000	-	-	
5		18	EA2.62.155	Diaphragm No.1	0.050	1.000	0.005	2.000			
6		18	EA2.62.179	Diaphragm No.2	0.050	1.000	0.005	2.000			
7		18	EA2.62.9	Former E	0.050	1.000	0.005	2.000			
8		18	EA2.62.11	Former F	0.050	1.000	0.005	2.000			
9		18	EA2.62.149	Diaphragm No.3	0.050	1.000	0.005	2.000			
10		18	EA2.62.161	Diaphragm No.4	0.050	1.000	0.005	2.000			
11	L.72	18	EA2.62.13	Former G	0.050	1.000	0.005	2.000			
12		18	EA2.62.15	Former H	0.050	1.000	0.005	2.000			
13		20	EA2.62.167	Diaphragm No.5	0.048	1.000	0.004	2.000			
14		20	EA2.62.173	Diaphragm No.6	0.048	1.000	0.004	2.000			
15		18	EA2.62.17	Former J	0.050	1.000	0.005	2.000			
16		18	EA3.62.19	Former K	0.050	1.000	0.005	2.000			
17		18	EA2.62.21	Former L	0.050	1.000	0.005	2.000	-	-	
18		18	EA3.62.23	Former M	0.050	1.000	0.005	2.000	-	-	
19		18	EA3.62.25	Former N	0.050	1.000	0.005	2.000	-	-	
20		18	EA3.62.103	Former P	0.050	1.000	0.005	2.000	-	-	

Note:- All dimensions are in inches

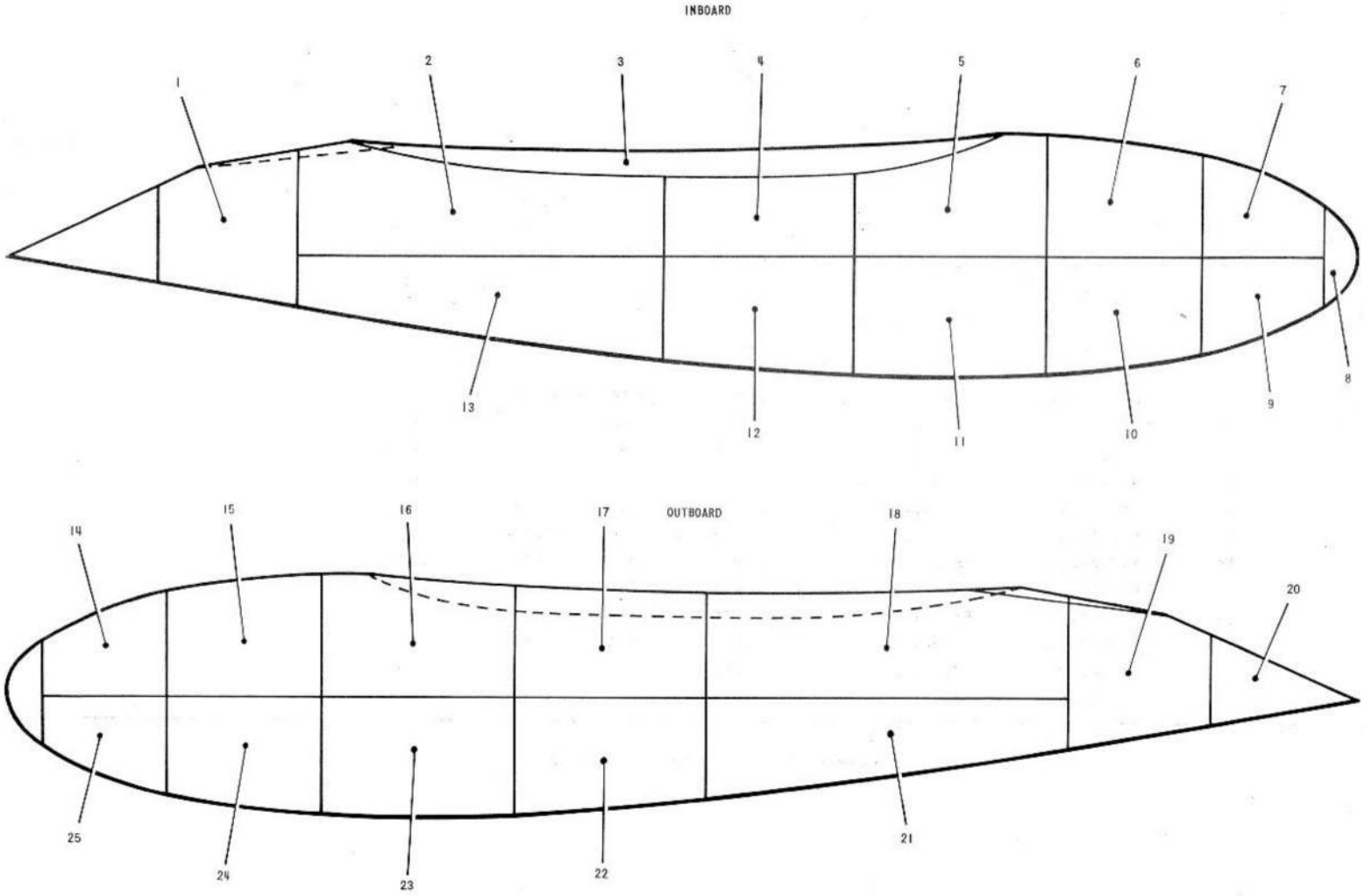

FIG. 2. WING-TIP TANK SKINNING

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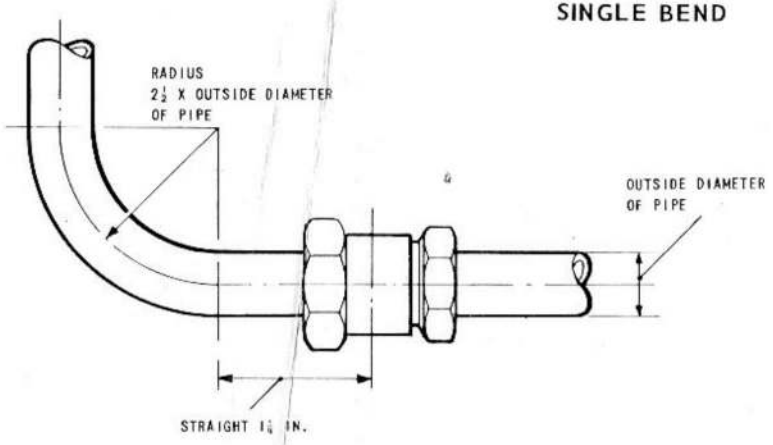
KEY TO FIG. 2 (WING-TIP TANK SKINNING)

Item	Material Spec.	Material S.W.G.	Part No.	Description	Negligible damage: Dents Max. depth	Dents Min. dia.	Scratches Depth	Scratches Spacing	Holes Max. dia.	Holes Pitch ratio	Repair fig.No.
1		18	EA3.62.17	Skin, inboard rear	0.055	0.700	0.005	1.000			
2		16	EA3.62.15	Skin, centre top, inboard rear	0.060	0.750	0.006	1.000	-	-	
3		16	EA3.62.81	Cover, upper	0.060	0.750	0.006	1.000	-	-	
4		16	EA3.62.57	Skin, inboard top	0.060	0.750	0.006	1.000	-	-	
5		16	EA3.62.9	Skin, forward centre	0.060	0.750	0.006	1.000	-	-	
6		18	EA3.62.41	Skin, forward	0.055	0.700	0.005	1.000	-	-	
7		18	EA3.62.75	Skin, nose upper	0.055	0.700	0.005	1.000	-	-	
8		18	EA3.62.3	Skinning, nose	0.055	0.700	0.005	1.000	-	-	
9		18	EA3.62.73	Skin, nose lower	0.055	0.700	0.005	1.000	-	-	
10		18	EA3.62.41	Skin, forward	0.055	0.700	0.005	1.000	-	-	
11		16	EA3.62.6	Skin, forward centre lower	0.060	0.750	0.006	1.000	-	-	
12		16	EA3.62.60	Skin, centre lower	0.060	0.750	0.006	1.000	-	-	
13	L.59	16	EA3.62.12	Skin, centre rear	0.060	0.750	0.006	1.000	-	-	
14		18	EA3.62.187	Skin, forward	0.055	0.700	0.005	1.000	-	-	
15		16	EA3.62.7	Skin, top forward	0.060	0.750	0.006	1.000	-	-	
16		16	EA3.62.49	Skin, centre top outboard	0.060	0.750	0.006	1.000	-	-	
17		16	EA3.62.13	Skin, centre rear outboard	0.060	0.750	0.006	1.000	-	-	
18		16	EA3.62.61	Skin, upper rear	0.060	0.750	0.006	1.000	-	-	
19		18	EA3.62.6	Skin, upper tail	0.055	0.700	0.005	1.000	-	-	
20		18	EA3.62.21	Skin, rear, tail	0.055	0.700	0.005	1.000	-	-	
21		18	EA3.62.19	Skin, rear outboard	0.055	0.700	0.005	1.000	-	-	
22		16	EA3.62.11	Skin, lower centre rear	0.060	0.750	0.000	1.000	-	-	
23		16	EA3.62.59	Skin, centre lower	0.060	0.750	0.006	1.000	-	-	
24		16	EA3.62.5	Skin, centre lower	0.060	0.750	0.006	1.000	-	-	
25		18	EA3.62.41	Skin, forward	0.055	0.500	0.005	1.000	-	-	

Note:- All dimensions are in inches

PIPE MANIPULATION

SINGLE BEND



MULTIPLE BEND

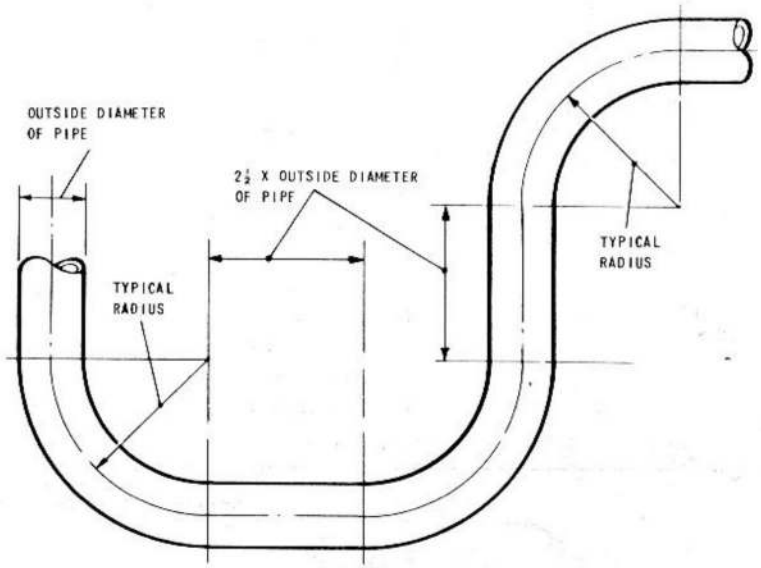


FIG. 3. HYDRAULIC SYSTEM - PIPE INSTALLATION

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