CHAPTER 7

SYSTEMS

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LIST OF ILLUSTRATIONS

General

1. There are nine fuel tanks fitted in the aircraft with two extra wing-tip drop tanks and the option of two further pylon drop-tanks under the wings. Four interconnected, flexible bag tanks in each wing feed fuel to the metal fuselage tank. This tank is located between Bulkhead No. 3 and No. 4 and is secured in position by steel straps.

2. The hydraulic installation is a high-pressure system, operating the alighting gear, flaps, dive-brakes and, on Mk.3 and 4 aircraft, the ailerons. The power supply is derived from two engine-driven pumps, the suction lines of which draw fluid from a tank located in the canopy fairing. An alternative method of supplying pressure is made by the use of a hand pump located on the cockpit floor.

3. The air reservoir for the pneumatic system is situated under the cockpit floor, forward of Bulkhead No. 2 and the two oxygen bottles for the oxygen system are positioned between Bulkhead No. 2 and No. 3. The fire extinguisher bottle is mounted on a bracket on the port side of the engine.

4. The details of pipe runs in all systems are given in the appropriate chapter of the relevant Vol. 1. For details of the oil system refer to the relevant engine publication.

Repairs to tanks

5. The information on metal tank repairs given in the illustrations in this chapter should be used in conjunction with the instructions in A.P.4117A. Particular attention should be paid to the instructions for venting of tanks before commencing repairs. Repairs to flexible tanks are fully covered in A.P.4117A, Section 3. The tanks may be either Flexelite, D.T.D.1123, or Hycatrol, D.T.D.1125; the relevant specification number is stamped on the side of each tank.

Pressure testing of tanks after repair

6. After repair, tanks must be subjected to a pressure test in accordance with A.P.4117A, Sections 1 and 3, before being refitted to an aircraft. The following pressures should be used:—

◀ Main fuel tank—*Mk.*1, 2 *and* 4, 4·11 *lb. per sq. in., Mk.*3, 5·3 *lb. per sq. in., with* 42·0 *in. depth of kerosene in tank.* ▶

Wing-tip tank —11·0 *lb. per sq. in. with tank filled to normal level with kerosene.*

Flexible tank —0·25 *lb. per sq. in.*

Pylon tank —9·0 *lb. per sq. in. with tank filled to normal level with kerosene.*

Hydraulic tank—2·25 *lb. per sq. in.*

Repairs to tank straps

7. Negligible damage consists of dents not greater than 0·25 inches in diameter, free from cracks. Any damage in excess of this will necessitate replacement of the strap. New end fittings should be used when a strap is changed since it is essential for the rivets to be a good fit in strap and end fitting.

Pipes

8. Metal and flexible pipes are used in the fuel system in the fuselage and main planes. Both light alloy and tungum pipes are fitted in the fuselage but all the metal pipes in the main planes are of light alloy. All hydraulic pipes both in fuselage and main planes are of tungum to Specification D.T.D.323, except for isolated flexible pipes. All pipes in the pneumatic, vacuum and fire extinguisher systems are of aluminium alloy. In the oxygen system both copper and aluminium alloy pipes are used.

Negligible damage to metal pipes

9. Damage to all pipes (with the exception of flexible pipes) consisting of isolated,

smooth dents, not deeper than 0·02 inches and free from cracks, may be treated as negligible.

Repairable damage to metal pipes (*fig.* 7/11)

10. Repairable damage to metal pipes consists of:—

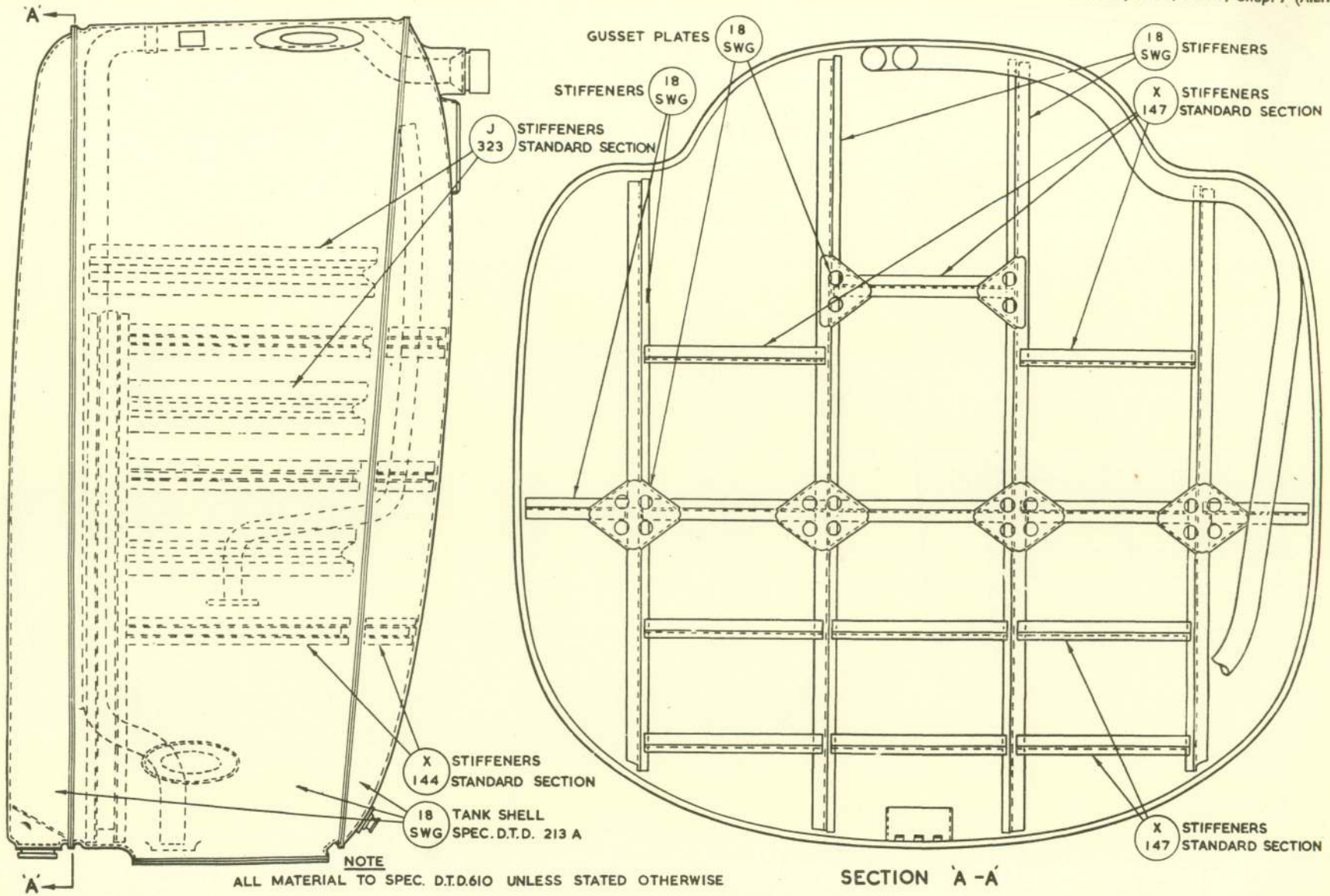
(1) localised damage to pipes up to $\frac{1}{2}$ inch o.d., repairable by insertion of a double ended union joint in the existing pipe. This is permissible if the resulting ends can be satisfactorily belled to house the union after the damaged portion of pipe has been cut out and if the joint can be correctly tightened and locked without straining the pipes;

(2) damage necessitating insertion of a new portion of pipe, but not affecting the end fittings of the existing pipe. Cut out the damaged length and insert a new length with unions as quoted on fig. 7/11;

(3) damage repairable by replacement of a complete pipe or a section of pipe including the existing end fitting. End joints must be made up with items identical to those originally fitted. New lengths of pipe should be bent to conform exactly to the original run and should be clamped or supported in the same positions. All new or replaced joints must be correctly locked.

Damage to flexible pipes

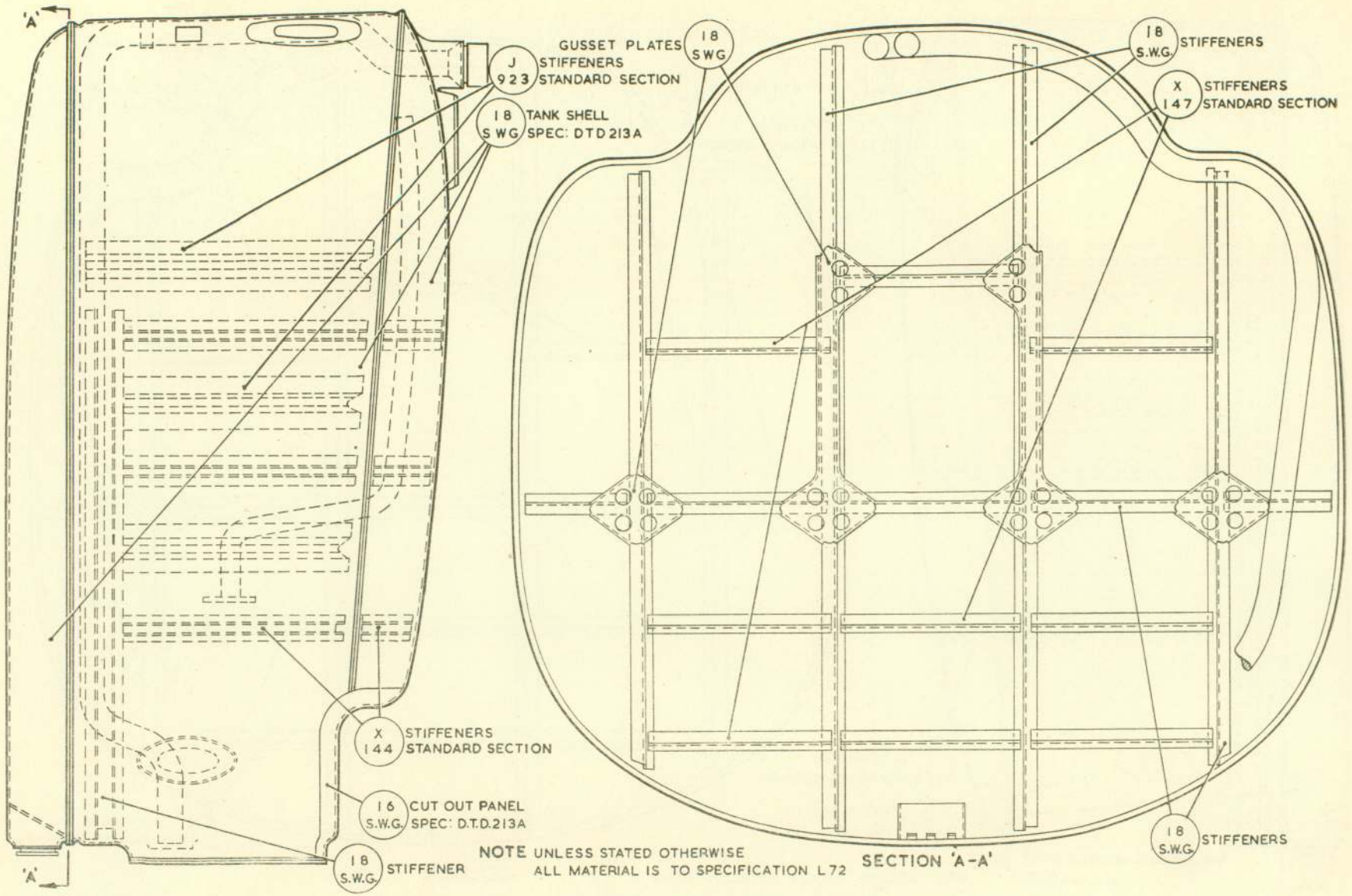
11. No damage to flexible pipes may be classified as negligible. Any damage to a flexible pipe will necessitate replacement of the pipe.



Definitions of negligible and repairable damage

Item	Negligible damage—dents (inches)			Repairable damage (inches)	Repair fig.
	Max. depth	Min. dia.	Min. spacing		
TANK SHELL	0·05	0·5	6·0	Up to 4·0 dia., 18·0 spacing	7/9
STIFFENERS	0·05	0·5	9·0	Exceeding negligible	S.A.

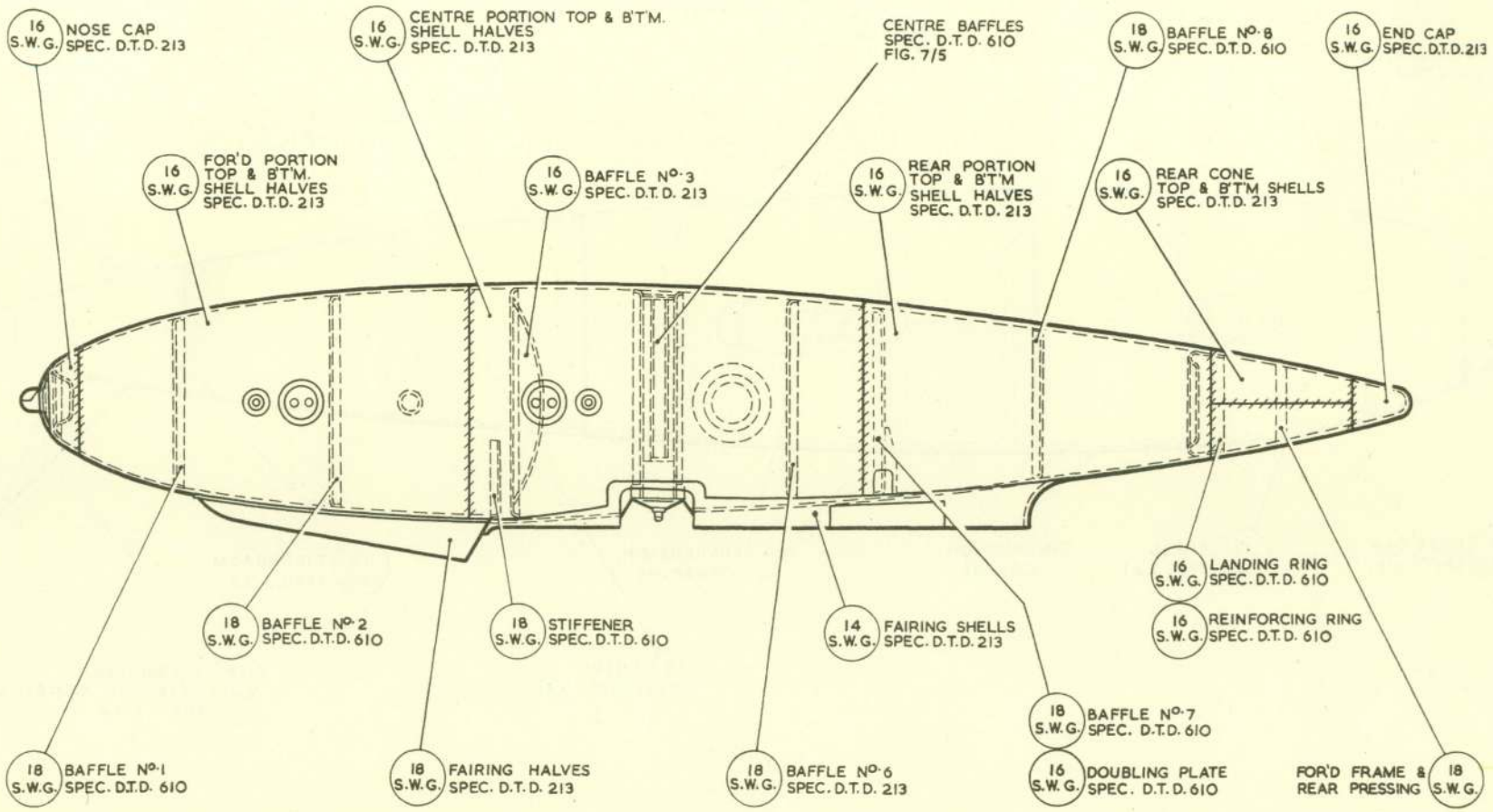
Fig. 7/1. Fuselage tank, Mk.1, 2 and 4



Definitions of negligible and repairable damage

Item	Negligible damage—dents (inches)			Repairable damage (inches)	Repair fig.
	Max. depth	Min. dia.	Min. spacing		
TANK SHELL	0·05	0·5	6·0	Up to 4·0 dia., 18·0 spacing	7/9
STIFFENERS	0·05	0·5	9·0	Exceeding negligible	S.A.

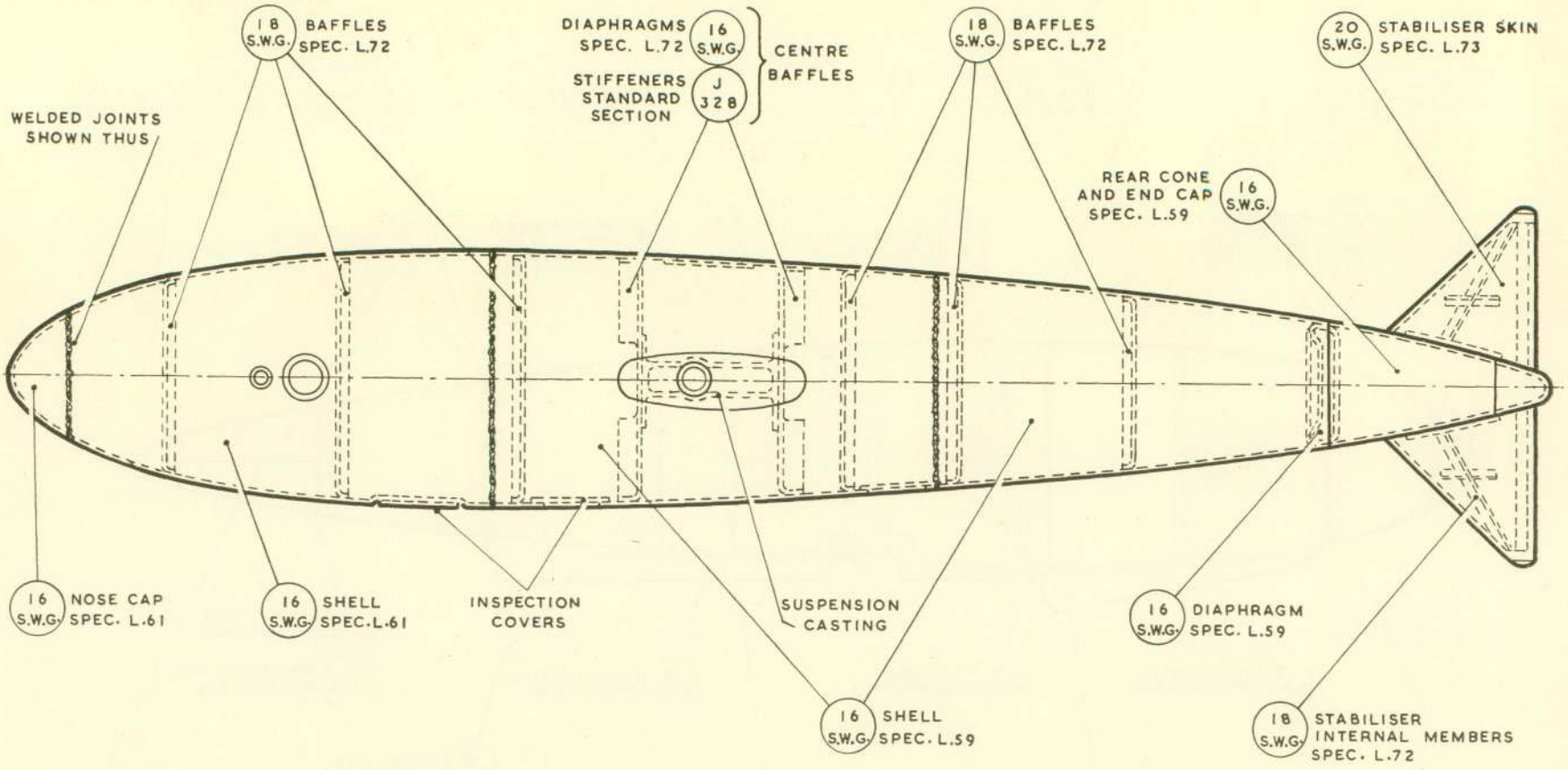
Fig. 7/2. Fuselage tank, Mk.3



Definitions of negligible and repairable damage

Item	Negligible damage—dents (inches)			Repairable damage (inches)	Repair fig.
	Max. depth	Min. dia.	Min. spacing		
TANK SHELL	0·03	0·5	6·0	Up to 3·2 dia., 18·0 spacing and 12·0 from any existing hole Welded panel repairs	7/10 7/10
BAFFLE No. 1, 2, 3, 6, 7 and 8	0·03	0·5	6·0	Exceeding negligible	S.A.

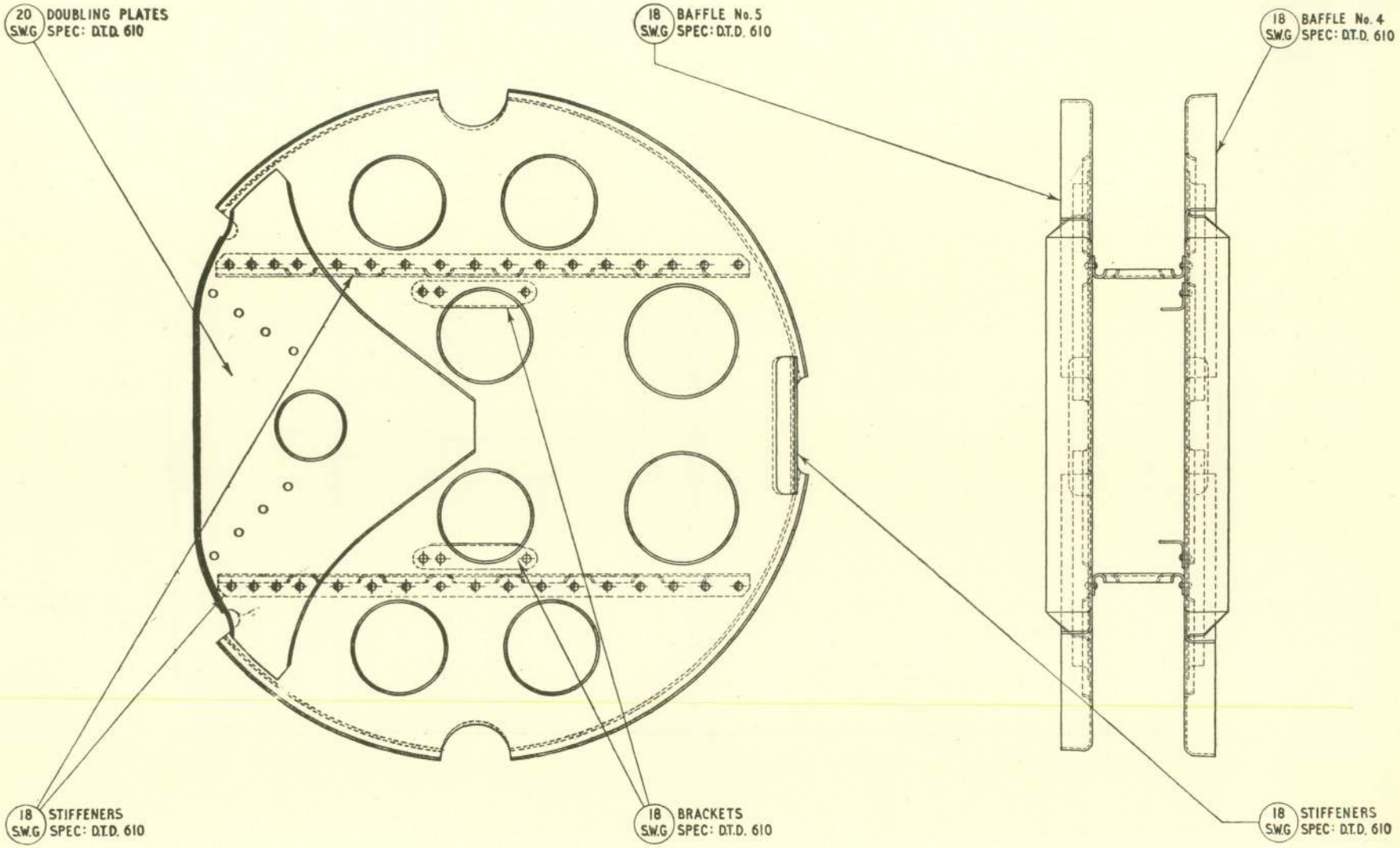
Fig. 7/3. Wing-tip tank, all Marks



Definitions of negligible and repairable damage

Item	Negligible damage—dents (inches)			Repairable damage (inches)	Repair fig.
	Max. depth	Min. dia.	Min. spacing		
TANK SHELL	0·03	0·5	6·0	Up to 3·2 dia., 18·0 spacing and 12·0 from any existing hole Welded panel repairs	7/10 7/10
BAFFLES	0·03	0·5	6·0	Exceeding negligible	S.A.

Fig. 7/4. Pylon drop tank, all Marks

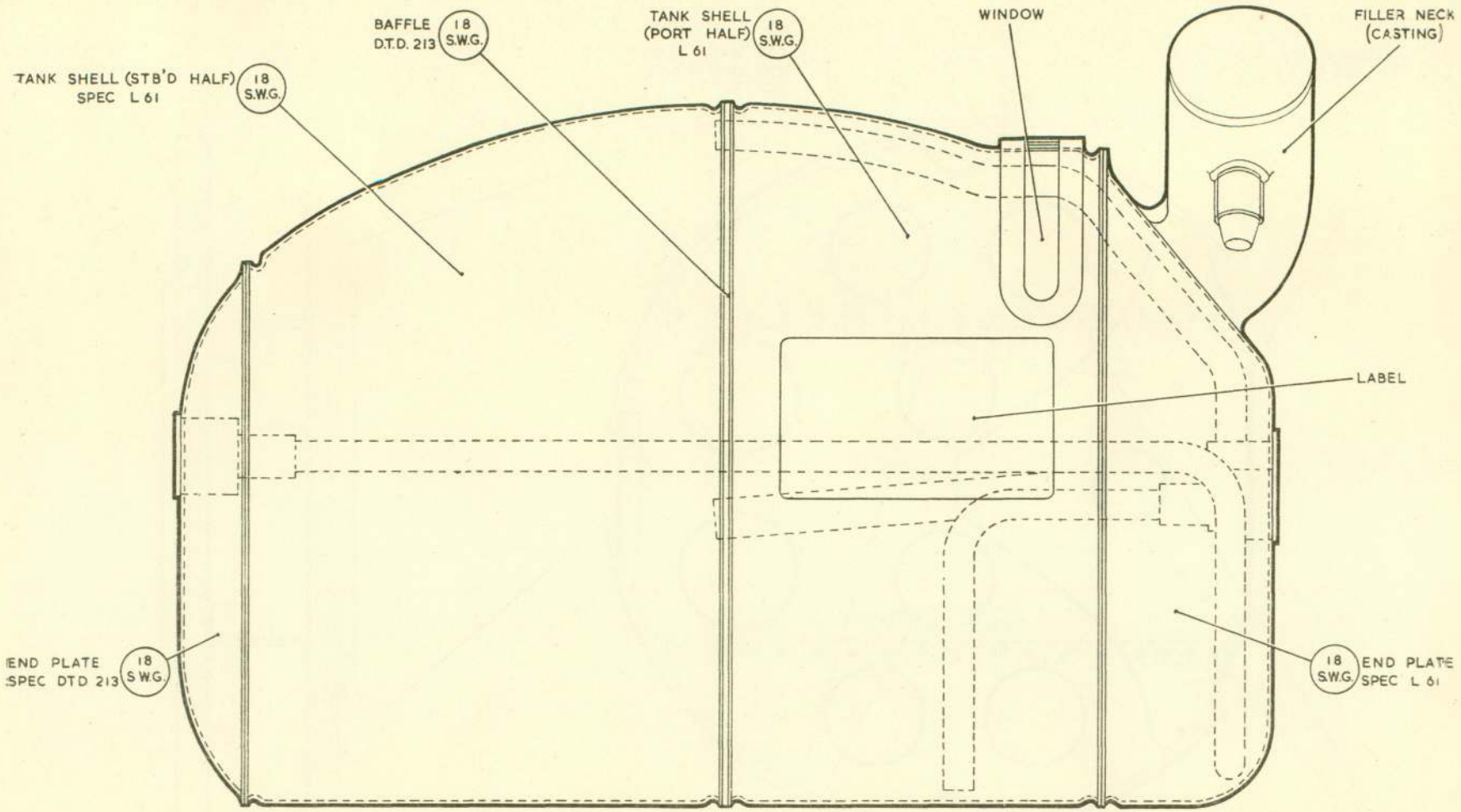


Definitions of negligible and repairable damage

Item	Negligible damage—dents (inches)			Repairable damage (inches)	Repair fig.
	Max. depth	Min. dia.	Min. spacing		
BAFFLE No. 4 & 5	0·03	0·5	6·0	Exceeding negligible	S.A.
STIFFENERS	0·05	0·5	9·0		

Fig. 7/5. Centre baffles, wing-tip tank

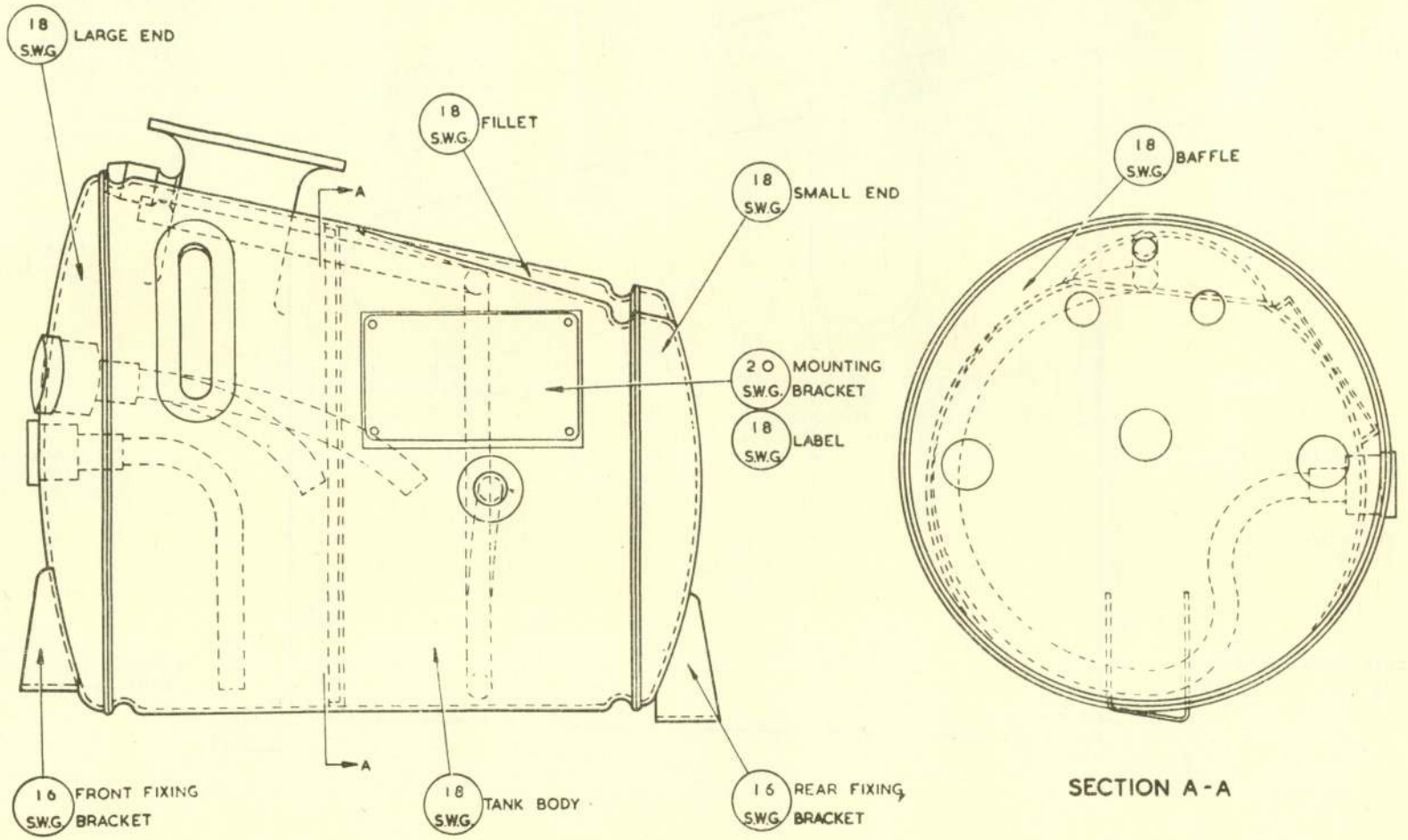
RESTRICTED



Definitions of negligible and repairable damage

Item	Negligible damage—dents (inches)			Repairable damage (inches)	Repair fig.
	Max. depth	Min. dia.	Min. spacing		
TANK SHELL	0·05	0·5	0·6	Up to 4·0 dia., one only	7/9
BAFFLE	0·05	0·5	6·0	Exceeding negligible	S.A.

Fig. 7/6. Hydraulic tank, Mk.1 and 4

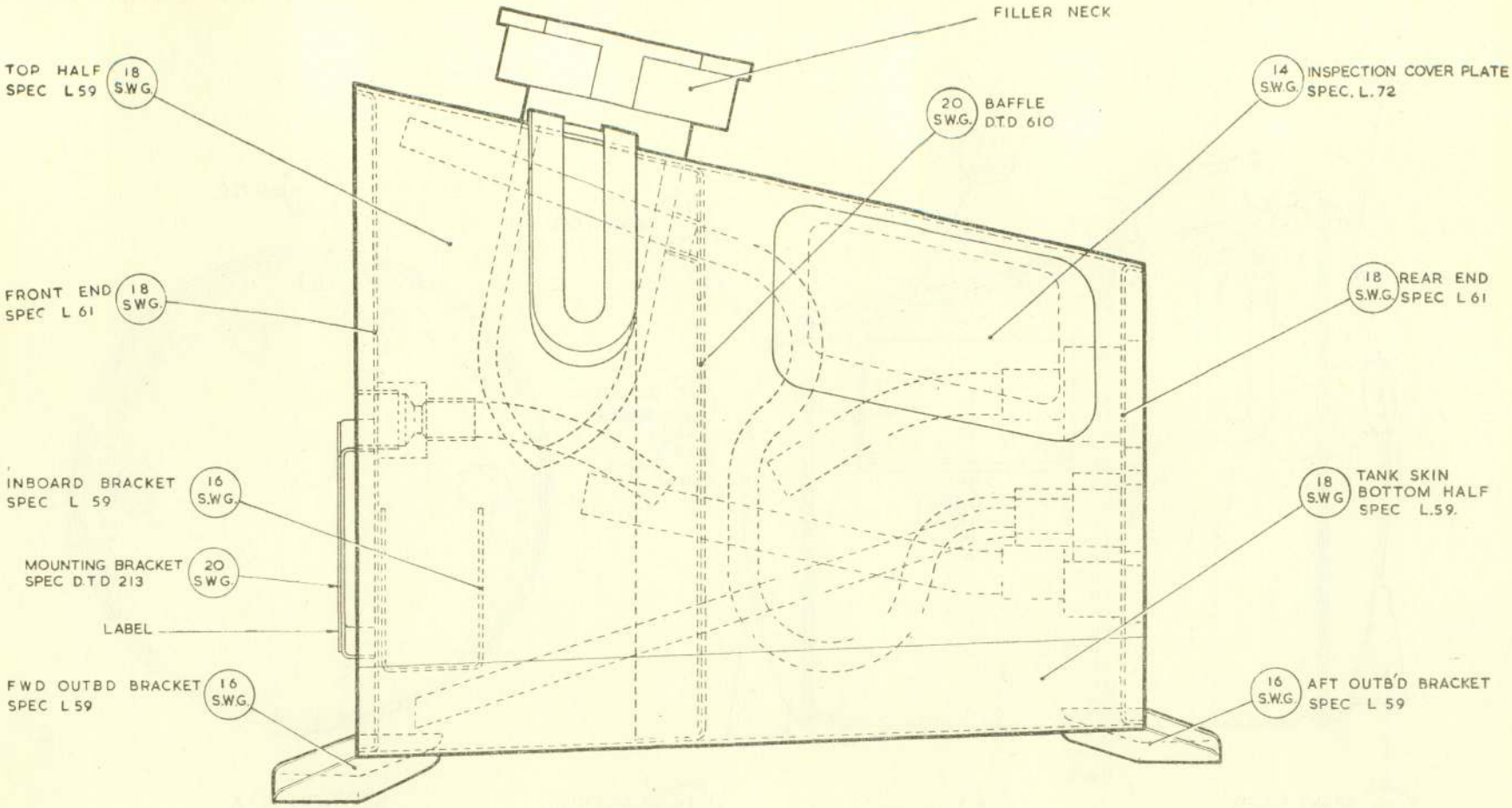


NOTE, ALL SPECIFICATIONS ARE D.T.D.213

Definitions of negligible and repairable damage

Item	Negligible damage—dents (inches)			Repairable damage (inches)	Repair fig.
	Max. depth	Min. dia.	Min. spacing		
TANK SHELL	0·05	0·5	0·6	Up to 4·0 dia., one only	7/9
BAFFLE	0·05	0·5	6·0	Exceeding negligible	S.A.

Fig. 7/7. Hydraulic tank, Mk.2



Definitions of negligible and repairable damage

Item	Negligible damage—dents (inches)			Repairable damage (inches)	Repair fig.
	Max. depth	Min. dia.	Min. spacing		
TANK SHELL	0·05	0·5	0·6	Up to 4·0 dia., one only	7/9
BAFFLE	0·05	0·5	6·0	Exceeding negligible	

Fig. 7/8. Hydraulic tank, Mk.3

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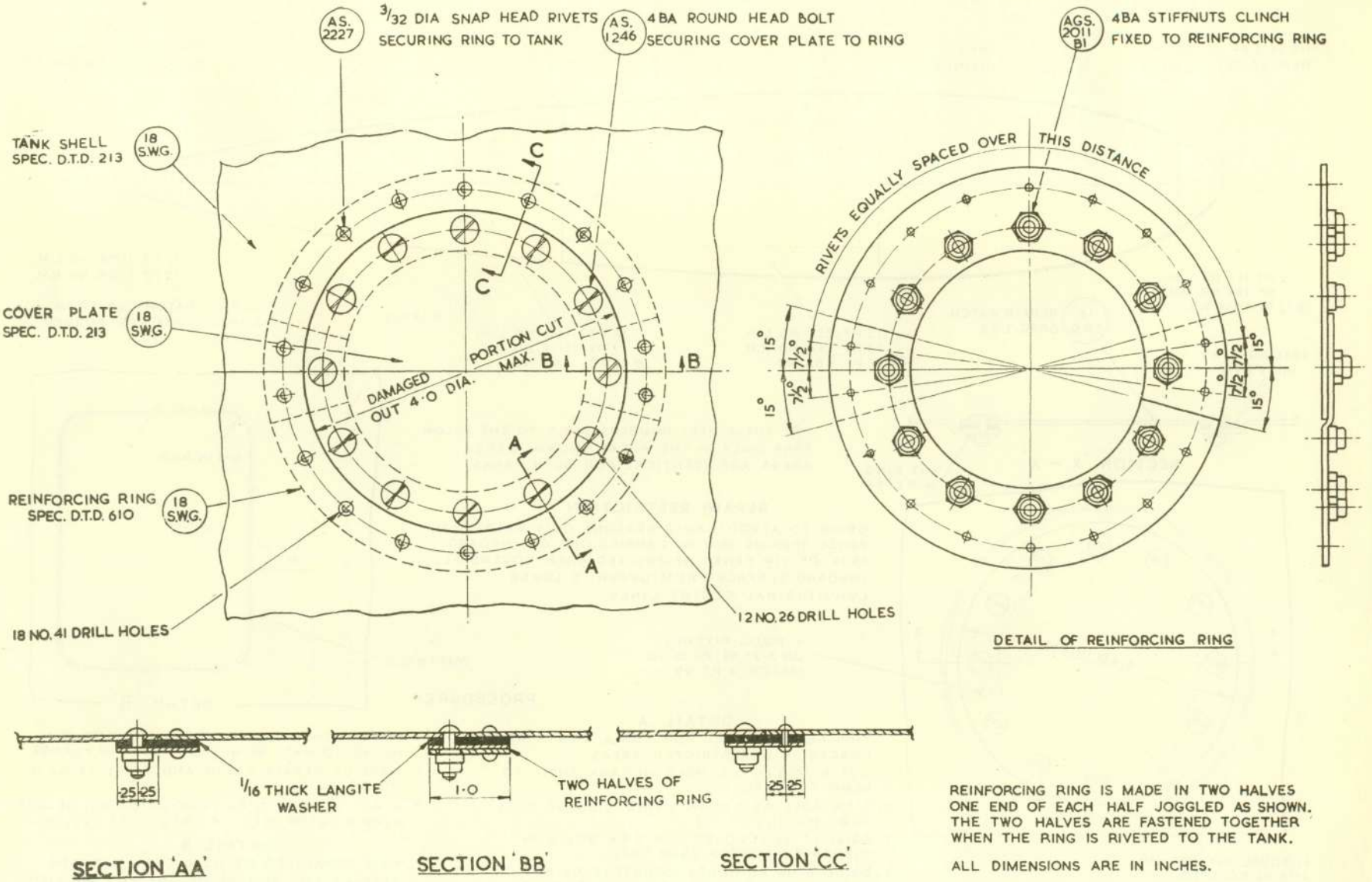
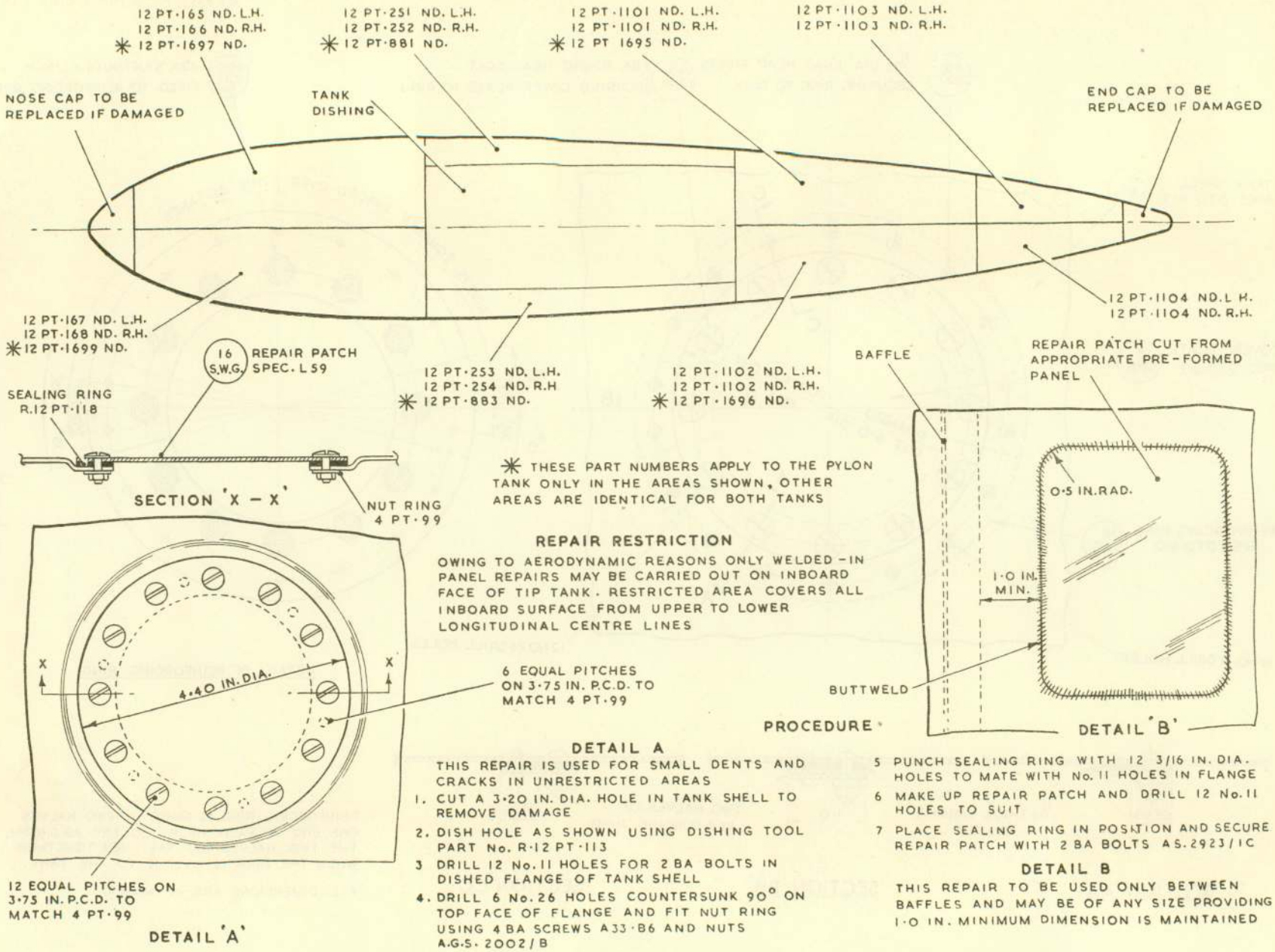


Fig. 7/9. Patch repair, metal tanks



DETAIL A

THIS REPAIR IS USED FOR SMALL DENTS AND CRACKS IN UNRESTRICTED AREAS

1. CUT A 3·20 IN. DIA. HOLE IN TANK SHELL TO REMOVE DAMAGE
2. DISH HOLE AS SHOWN USING DISHING TOOL PART No. R·12 PT·113
3. DRILL 12 No. 11 HOLES FOR 2 BA BOLTS IN DISHED FLANGE OF TANK SHELL
4. DRILL 6 No. 26 HOLES COUNTERSUNK 90° ON TOP FACE OF FLANGE AND FIT NUT RING USING 4 BA SCREWS A33·86 AND NUTS A.G.S. 2002/B

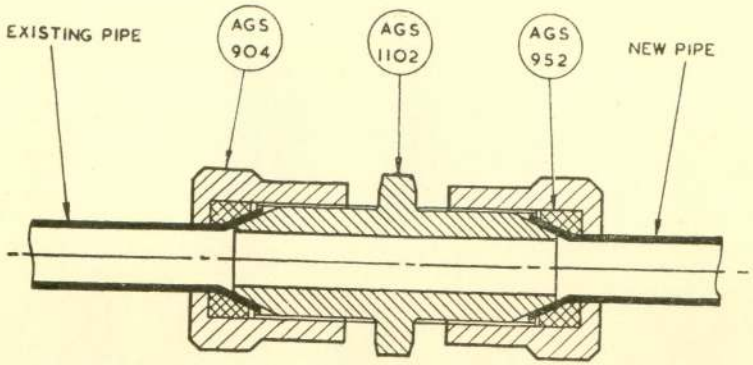
PROCEDURE

5. PUNCH SEALING RING WITH 12 3/16 IN. DIA. HOLES TO MATE WITH No. 11 HOLES IN FLANGE
6. MAKE UP REPAIR PATCH AND DRILL 12 No. 11 HOLES TO SUIT
7. PLACE SEALING RING IN POSITION AND SECURE REPAIR PATCH WITH 2 BA BOLTS A.S. 2923/1C

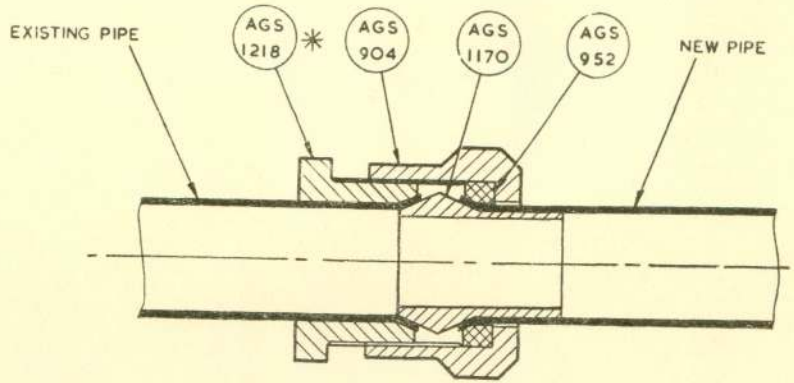
DETAIL B

THIS REPAIR TO BE USED ONLY BETWEEN BAFFLES AND MAY BE OF ANY SIZE PROVIDING 1·0 IN. MINIMUM DIMENSION IS MAINTAINED

Fig. 7/10. Skin repairs, wing-tip and pylon tanks



REPAIR TO PIPES UP TO $\frac{1}{2}$ O.D.



REPAIR TO PIPES OVER $\frac{1}{2}$ O.D.

NOTES

REPAIR TO PIPES OVER 1/2 O.D. MAY BE USED ON 3/16 - 1/2 O.D. PIPES IF LACK OF SPACE PRECLUDES USE OF EXISTING REPAIR SCHEME

WHEN CALLING UP A.G.S PARTS USE SUFFIX LETTER

'A' FOR 3/16 O.D PIPES
'B' FOR 1/4 O.D. PIPES
'BB' FOR 5/16 O.D. PIPES
'C' FOR 3/8 O.D. PIPES
'CC' FOR 7/16 O.D. PIPES
'D' FOR 1/2 O.D. PIPES
'E' FOR 5/8 O.D. PIPES
'F' FOR 3/4 O.D. PIPES
'G' FOR 7/8 O.D. PIPES
'H' FOR 1 O.D. PIPES
'J' FOR 1-1/4 O.D. PIPES
'K' FOR 1-1/2 O.D. PIPES

ALL DIMENSIONS ARE IN INCHES

EXAMPLES

A SET OF PARTS TO REPAIR A 1/4 O.D. PIPE LINE WOULD CONSIST OF

A.G.S.1102/B	DOUBLE ENDED CONE UNION	1 OFF
A.G.S. 904/B	UNION NUT	2 OFF
A.G.S. 952/B	COLLAR	2 OFF

A SET OF PARTS TO REPAIR A 3/4 O.D. PIPE LINE WOULD CONSIST OF

A.G.S.1218/F	INNER SLEEVE	1 OFF
A.G.S. 904/F	UNION NUT	1 OFF
A.G.S. 952/F	COLLAR	1 OFF
A.G.S.1170/F	NIPPLE	1 OFF

* INNER SLEEVES FOR 7/8 O.D. PIPES AND OVER ARE A.G.S.905 NOT A.G.S.1218

Fig. 7/11. Repairs to pipes

F.S./7
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