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TECHNICAL DATA

TITLE

OPERATION AND MAINTENANCE MANUAL
WITH PARTS LIST FOR B767, C-17,
DC-10, KC-10, L1011, & MD-11 TOWBARS
P/N 102028

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1.0 INTRODUCTION

This manual provides operation and maintenance instructions and parts list for the P/N 102028 Towbar manufactured by Stanley Aviation Corporation. The towbar is a unit of ground support equipment for the B767, C-17, DC-10, KC-10, L1011, and MD-11 Aircraft used in towing and steering of the aircraft.

2.0 DESCRIPTION

The complete assembly consists of the following components:

A. Towbar Head

The head assembly is a positive-locking clamp with shear pin protection independently in axial and side loading directions. Shear pins are replaceable in the field to restore the towbar to service.

B. Towbar Body

The body is a one piece weldment for P/N 102028-11, -17, -901, and -967, and a two piece weldment for P/N 102028-1, -2, -503, -767 and -1067. Two piece towbars may be disassembled for more compact storage and shipment, although this is not recommended in normal use. Optional cable cradles support the ground power cable when connected.

C. Undercarriage

The undercarriage allows the towbar to be towed independently of an aircraft. It provides demountable pneumatic tires with a spring suspension, and raises the towbar with a hydraulic pump and cylinder. Wheels are retracted during towing operations with a spring and cable retraction system.



2.0 DESCRIPTION (Continued)

D. Application

Table I shows specific towbar applications and features.

TABLE I, P/N 102028 TOWBAR APPLICATIONS AND FEATURES

TOWBAR	APPLICATION	LENGTH	BODY
-1	C-17, DC-10, KC-10, L1011, MD-11	125"	2 PIECE
-2	C-17, DC-10, KC-10, L1011, MD-11	125"	2 PIECE
-11	C-17, DC-10, KC-10, L1011, MD-11	125"	1 PIECE
-17	DC-10, MD-11	172"	1 PIECE
-503	C-17, DC-10, KC-10, L1011, MD-11	103"	2 PIECE
-767	B767	125"	2 PIECE
-901	DC-10, MD-11	125"	1 PIECE
-967	B767	125"	1 PIECE
-1067	DC-10, B767, MD-11	125"	1 PIECE

3.0 OPERATION

Functionally, the P/N 102028 Towbar Assemblies are identical and will be treated identically for this and maintenance sections. Two piece towbars are assumed to be assembled for this purpose. If disassembled, insert the forward section into the aft section aligning the sections and inserting bolts (items 47 and 50). Secure bolts with washers and nuts (items 48, 49, 51 and 52). Refer to Figure 3 for item locations.

3.1 Engagement

- A. Move valve lever on hand pump (item 17) to **RAISE** position. The legend **RAISE** will be seen on the lever when viewed from ahead.
- B. Disconnect the towbar from the tow tractor hitch.

3.1 Engagement (Continued)

- C. Position the towbar ahead of the aircraft nose landing gear (NLG), aligning the towbar head assembly with the towing pin on the NLG.
- D. Operate the pump (item 17) to raise the head assembly to the towing pin. If necessary, lower the head by moving valve selector lever toward the LOWER position momentarily, then back to RAISE to hold.
- E. Open the jaws on the head by moving the latch plate (item 77) aside and lifting the handle (item 82) fully upwards.
- F. Align the guides (item 80) with the NLG and push the towbar back capturing the towing pin between the guides and lower jaw (item 73).
- G. Elevate the towbar head until the lower jaw (item 73) contacts the towing pin and lock the head onto the pin by lowering the handle (item 82) fully to the latch block (item 134). The latch plate (item 77) will automatically lock the handle down when this step is complete.
- H. Raise or lower the towbar using the hand pump (item 17) and appropriate valve selection to align the lunette eye (item 1) with the tractor hitch.
- I. Connect the tractor hitch to the towbar lunette eye (item 1).

CAUTION

WHEEL ASSEMBLY MUST BE RETRACTED DURING TOWING OPERATIONS TO AVOID POSSIBLE DAMAGE TO THE AIRCRAFT AND TOWBAR.

- J. Retract the towbar wheels (item 98) by moving the valve lever on the pump (item 17) to LOWER. The bogie retraction system will raise the wheels off of the ground.
- K. Do not allow power cable or other objects to lay on or over shear pin failure indicator (item 71). This could result in damage to the aircraft and towbar if operator is unaware of shear pin failure.



3.1 Engagement (Continued)

- L. Tow the aircraft smoothly, observing turn angle restrictions and the maximum towing speed of 5 MPH.

NOTE

THE TOWBAR HEAD ASSEMBLY IS FITTED WITH SHEAR PINS TO PROTECT THE NLG AGAINST EXCESS AXIAL AND SIDE LOADING. SHEAR PIN FAILURE WILL BE INDICATED BY A TAB PROJECTING FROM THE TOP OF THE TOWBAR BODY NEAR THE HEAD ASSEMBLY AND BY A JERK AS THE LOAD PATH IS SEVERED.

IF SHEAR PIN FAILURE IS INDICATED OR SUSPECTED, DECLUTCH THE TOW TRACTOR. DISCONNECT THE TOWBAR FROM THE AIRCRAFT PER PARAGRAPH 3.2. INSPECT AND REPAIR THE SHEAR PIN ASSEMBLY PER PARAGRAPH 4.5 BEFORE USING THE TOWBAR AGAIN.

3.2 Disengagement

- A. Move valve lever on hand pump (item 17) to RAISE position. The legend RAISE will be seen on the lever when viewed from ahead.
- B. Operate the hand pump (item 17) to lower the wheels to the ground until they just take the weight of the towbar.
- C. Disconnect the lunette eye (item 1) from the tractor hitch and pull the tractor forward away from the towbar.
- D. Release the jaws from the aircraft NLG by moving latch plate (item 77) aside and raising handle (item 82) all the way.
- E. Move the towbar forward by lifting slightly and pulling forward at the lunette eye (item 1).
- F. Close the jaws by pushing handle (item 82) down fully engaging the latch plate (item 77) over the handle.
- G. Connect the towbar to the tractor hitch and bring the towbar to a level attitude for trailing by operating the hand pump (item 17) as required. Maximum trailing speed is 15 MPH.



4.0 MAINTENANCE

To ensure efficient operation and trouble-free service, it is recommended that the following inspection procedure be performed at regularly scheduled intervals of six (6) months, or more often in cases of unusually heavy service or extreme weather conditions.

4.1 Cleaning

To facilitate inspection, first clean the towbar assembly as described below:

- A. Clean metal parts using a clean cloth moistened with solvent. Small parts can be immersed in solvent. Observe appropriate precautions when using flammable solvents.
- B. Clean hydraulic hose with a mild detergent solution followed by a clean water rinse.
- C. Dry all parts using clean, lint free cloth or low pressure compressed air.

4.2 Inspection

Before inspecting the towbar assembly, clean per paragraph 4.1 above.

- A. Check hydraulic pump and cylinder for proper operation by pumping towbar all the way up. Cylinder stroke is 2.50 inches.
- B. Inspect all parts for signs of wear or damage.
 1. Check hoses for leaks, cuts and abrasion.
 2. Check clevis pin, cotter pins and lock ring on hydraulic cylinder for proper installation and signs of wear.
- C. Check retraction spring for operation as follows:
 1. Turn hand pump selector valve to **RAISE** and elevate towbar fully.
 2. Block towbar head assembly and lunette eye securely at maximum height.
 3. Retract wheels by turning hand pump selector valve to **LOWER**. Blocks will support towbar as retraction spring raises wheels to minimum height position.



4.2 Inspection (Continued)

- D. Check wheel bearings for free-running operation. Adjust as required to eliminate play in bearings.
- E. Check tires for proper inflation of 50-60 psi.
- F. Inspect all bolted parts for looseness and retighten as required.
- G. Inspect entire assembly for nicks or chips in paint and plating and repair as required per paragraph 4.4.
- H. Check jaw clamping force using special tools described in 4.7A. Jaws should lock onto pin with 25-35 lb. handle force. Adjust as follows:
 - 1. Open jaw and install special pin into opening.
 - 2. Clamp jaw over pin while measuring the force required at the handgrip.
 - 3. If force is below 25 lbs., lengthen rod end. If force is above 35 lbs., shorten rod end.
 - a. **ALL EXCEPT -2 ASSEMBLY** - loosen lock nuts from either side of coupling (wrench size: 15/16") and adjust as required. Tighten lock nuts firmly against coupling.
 - b. **-2 ASSEMBLY ONLY** - release lock nut from coupling (wrench size: 1" on both item 87 coupling and item 89 nut). Adjust as required, then tighten lock nut firmly against coupling.
 - 4. Check clamping force after adjustment, repeating Steps 2 and 3 as required.

4.3 Lubrication

- A. Parts requiring lubrication are wheel bearings, bogie axle bearings and pivot shafts in head assembly. Grease fittings are provided on pivot shafts and bogie axle bearings. Lubrication should be performed at least every six (6) months with a good grade of grease equal to Chevron Moly Grease, Grade 2.
- B. Disassemble, clean and repack each of the wheel bearings. The procedure is the same as that used for automotive front wheels.
- C. When assembling, tighten axle nut firmly, spin wheel to seat bearings and distribute grease, then loosen nut. Retighten to remove play without preloading bearings. Install cotter pin and replace dust cap.



4.4 Repair

- A. Replace all parts that do not meet inspection requirements and cannot be economically repaired.
- B. Repair minor corrosion and other surface blemishes using crocus cloth.
- C. Repair worn or damaged painted surfaces using crocus cloth and phosphate ester-resistant paint.

4.5 Shear Pin Replacement

Shear pin failure, indicating axial or side (turning) force overload, will be detected physically by a jerking movement as the force is applied through the towbar and visually by the deployment of the shear pin failure indicator (warning flag). A snapping sound may or may not be heard depending on background noise level. Refer to figure 1 and Table II for shear pin installation and applications.

A. Axial Load Shear Pin

1. After axial shear failure, a special pipe (see paragraph 4.7A.3) is needed to realign shear bar (item 54) with towbar body.
2. Remove two cap covers (item 70) shown in Figure 1.
3. Insert pipe into aft opening and fit end over cap screw head (item 68).
4. Press down the indicator assembly (item 71) and hold.
5. Using the pipe, move the shear bar (item 54) until the shear pin is aligned with the hole for complete push out. Alignment can be accomplished two ways:
 - a. Sight into the forward observation hole and note when center drill on axial restraint pin (item 64) is in the center of the access hole in the towbar body.
 - b. Look on the underside of the towbar and note when the head of axial restraint pin (item 64) is approximately centered in the restraining slot of the towbar body. See view A-A in Figure 1.

When this is accomplished, the indicator assembly (item 71) will be locked in place and can be released.

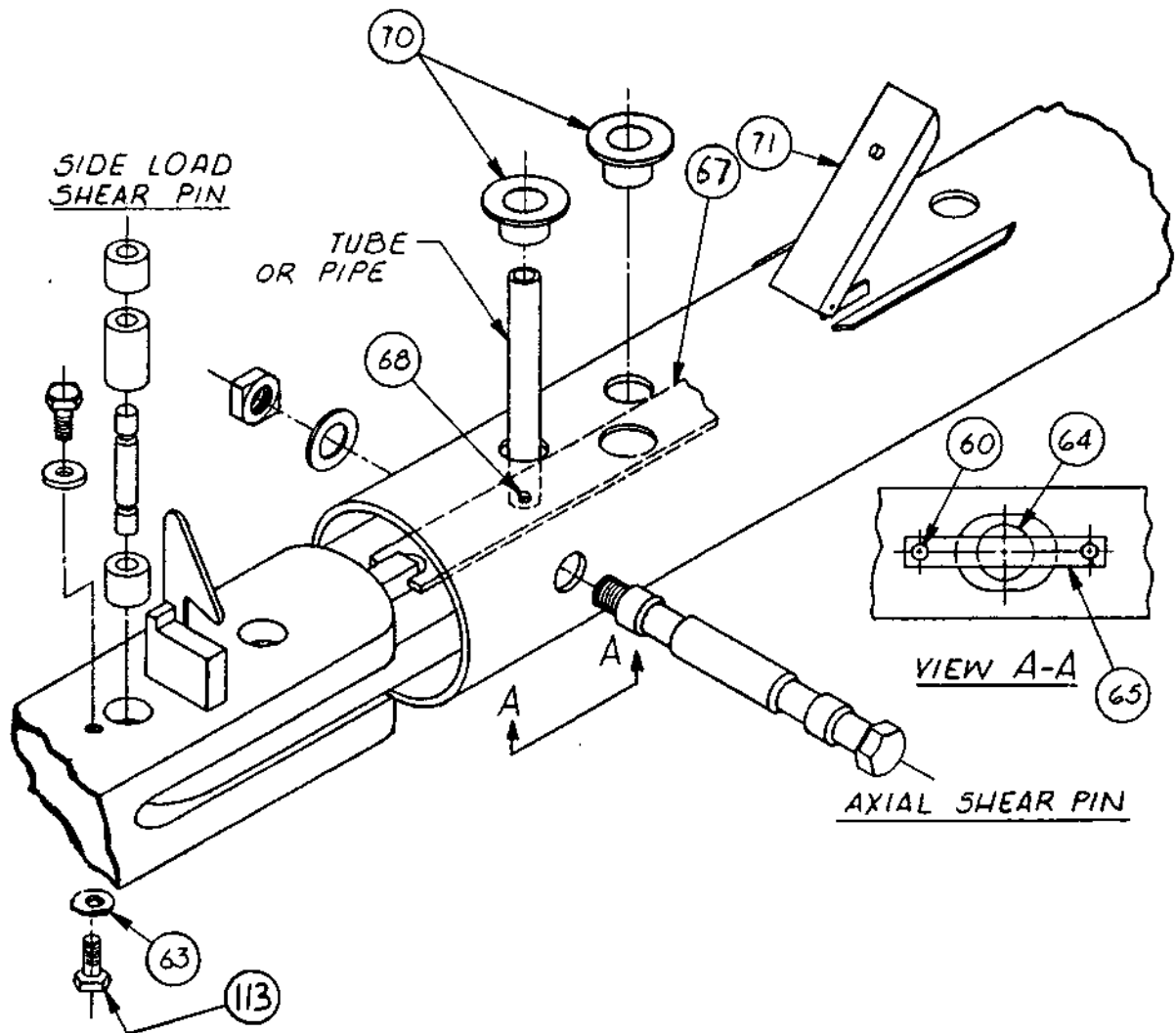


FIGURE 1, P/N 102028, TOWBAR SHEAR PIN INSTALLATION

TABLE II, P/N 102028 TOWBAR-SHEAR PIN APPLICATIONS

TOWBAR	AXIAL SHEAR PIN	SIDE SHEAR PIN
102028-1	102546-1	102600-10
102028-2	102546-1	102600-10
102028-11	102546-1	102600-10
102028-17	111029-1	102600-10
102028-503	102546-1	102600-10
102028-767	102546-1	102600-767
102028-901	111029-1	102600-10
102028-967	111028-1	102600-767
102028-1067	102546-1	102600-1067

A. Axial Load Shear Pin (Continued)

6. Using a 1.0"+.000/-.010 diameter solid round bar or equivalent, gently tap out the shear pin being careful not to burr the bushing edge.
7. When the first sheared piece of pin falls out, stop the pin push-out.
8. You can now see inside the shear pin housing hole to determine the exact misalignment of the broken pin with the hole. Correct the alignment as necessary.
9. Push out the remaining parts of the broken shear pin and bushing.
10. Replace with a new shear pin kit (found in storage box (item 16) near the lunette end).
11. Insert the bushing and the pin assembly into towbar and reinstall cap covers (item 70).
12. The towbar is now ready for operation.

B. Side Load Shear Pin

If a side direction overload condition occurs, replace the sheared pin as follows:

1. Remove forward cap cover (item 70).
2. Remove bolt (item 113) and washer (item 63) from top and bottom.
3. Swing the towbar head to extreme left or right side of the towbar centerline to allow full access to upper and lower pieces of sheared pin. Using a 3/8" solid round bar or equivalent, gently tap out the upper and lower pieces of the shear pin and bushings from the towbar head.
4. Return towbar head to center line being sure to place actuator stud (item 66) in the cutout in the indicator assembly (item 71).
5. Press down indicator assembly (item 71) and hold. The warning flag release bar has a line-up hole in it which can be seen by looking down the forward cover (item 70) hole. This hole should be centered with a screwdriver or other long bar.



B. Side Load Shear Pin (Continued)

6. Indicator assembly (item 71) is now locked in place and can be released.
7. Push out the remaining parts of the broken shear pin and bushing with the holes aligned.
8. Reinstall bottom washer (item 63) and bolt (item 113).
9. Refer to Figure 1 for installation. (Hardware is found in box (item 16) near the lunette eye.)
10. Insert the assembly until it seats in the shear pin hole.
11. Reinstall top washer (item 63) and bolt (item 113).
12. The towbar is now ready for operation.

4.6 Hydraulic System

A. Fluid Level

Check fluid level with towbar level and lowered (cylinder extended) by opening fill port on top of reservoir. Level should be 1.0 to 1.5 inches (reference) below bottom of fill port opening. Top off as required using hydraulic fluid per MIL-H-5606.

CAUTION

DO NOT USE AVIATION GRADE HYDRAULIC FLUID IN PUMP. DAMAGE TO SEALS AND PUMP FAILURE COULD RESULT.

B. Pump Overhaul

Pump overhaul kits are available from Stanley Aviation as P/N 110460-4. Replacement reservoir kits are available as P/N 110460-5.

When replacing pump complete on early towbars (Serial Number 001 through 720), P/N 110442-1 Pump Adapter Bracket must also be ordered to mount new pump. Early pumps use 0.50" diameter mounting holes.



4.7 Towbar Overhaul

A. Special Tools

1. To facilitate adjustment of the tow fitting jaw opening, a pin, $2.255 \pm .001$ " diameter x $8.0 \pm .25$ " long should be used.
2. To replace the spring (item 37) or cable (item 38), a lightweight 500 lb. hoist ("come-along") should be used.
3. After axial shear failure, a 14" long piece of 3/4" (nominal) steel pipe is used to align shear bar (item 54) with its mating hole in body. This should be externally and internally deburred on both ends.
4. To manipulate and tension retract spring (item 37), a .375" dia. steel rod, 48" long is needed. A 90° hook, 2.8" long should be formed on one end and a 2.5" dia. eye bent on the other.
5. To drive out the shear pin, 1" and 3/8" diameter round bars are used.

B. Disassembly

The following paragraphs assume the towbar to be fully assembled and provide instructions for complete dismantling and disassembly. However, in normal practice, total disassembly will not be required. Disassemble the unit only to the extent necessary to effect required repairs or parts replacement. Refer to Figures 2 and 3.

1. Remove fasteners (items 47, 48, 49, 50, 51 and 52) from 2 piece towbar only. Separate the towbar into its two sections.

NOTE

THIS MAY BE DONE WHEN DESIRED FOR
COMPACT SHIPPING OR STORAGE.

**B. Disassembly Continued**

2. Restrain the lunette eye to a convenient stanchion. Using a light chain or cable hoist (see paragraph 4.7A.2) attached to the spring with the special tool (paragraph 4.7A.4) unload the spring assembly and the cable assembly (items 37 and 38) and remove both parts from the forward end of the towbar body.

CAUTION

RETRACT SPRING PRE-LOAD EXCEEDS 200 LBS. USE SUITABLE PRECAUTIONS DURING DISASSEMBLY.

3. Remove the pulley bracket (item 31) by removing bolts, washers and nuts (items 34, 14 and 35) and sliding the assembly out of the towbar body. Disassemble by removing the pulley axle, sheave and washers (items 33, 32 and 36).

NOTE

SHEAVE BEARING IS MADE OF OIL-IMPREGNATED BRONZE AND REQUIRES NO LUBRICATION.

4. Remove drawbar (item 1) by removing eight bolts and nuts (items 8 and 10) and slide the assembly out of the towbar body. Press on pin (item 2) and remove loose parts: flange, two elastomeric discs, two washers, collar and steel discs (items 7, 3, 4, 5 and 6).
5. Unless absolutely required, the hydraulic system should not be disassembled but should be removed complete as it is a closed system. With the wheel bogie securely restrained, remove pump (item 17) by removing two socket head cap screws (item 18). Remove hydraulic cylinder (item 25) by removing the cotter pin (item 14), clevis pin (item 138) and lock ring (item 26).
6. Remove power cable cradles (item 12), if present, by removing two clamps (item 19) on each cable cradle.

**B. Disassembly (Continued)**

7. Remove the wheel bogie by removing four bolts, nuts and washers (items 20, 21 and 22). Separate the bearing (item 28) by removing the integral bolts.
8. Remove covers (item 46) and remove suspension springs (item 42) by removing nuts and washers (item 45 and 44). Apply slight force to the spring housing to relieve load on the nuts.

CAUTION

SUSPENSION SPRING PRELOAD EXCEEDS 300 LBS. EACH.
USE SUITABLE PRECAUTIONS DURING DISASSEMBLY.

9. Remove hub and wheel assembly by removing dust cap, cotter pin, nut and washer. Pushout bearings and seal and remove spacer. Wheel and tire may be separated by removing three (3) lug nuts.

NOTE

DURING REASSEMBLY, REPACK BEARINGS IN ACCORDANCE
WITH PARAGRAPH 4.3, LUBRICATION.

10. Unlock shear failure indicator assembly (item 71) by removing covers (item 70), socket head cap screw (item 68) and Belleville spring (item 69). Slide actuator rod (item 67) forward to disengage from shear failure indicator assembly (item 71).

CAUTION

SHEAR FAILURE INDICATOR ASSEMBLY IS UNDER SLIGHT
PRELOAD FROM TORSION SPRING. USE SUITABLE
PRECAUTIONS DURING DISASSEMBLY.

Remove shear failure indicator assembly (item 71) by removing two socket head cap screws (item 72). Do NOT disassemble shear failure indicator assembly further. Replace as an assembly.

B. Disassembly (Continued)

11. Separate the towbar head from aft body section as follows:
 - a. Remove two cap plugs (item 70) and disassemble the shear pin kit.
 - b. Remove socket head cap screws and strap (items 60 and 65) and push out axial restraint pin (item 64). Separate the sections by sliding the towbar head out of the aft body section taking care not to damage actuator rod (item 67).
12. Remove wear plate (item 78) by removing two socket head cap screws (item 79).
13. Remove two guides (item 80) by removing four socket head cap screws (item 81).
14. Remove toggle assembly (item 82) by removing four set screws (item 85) and pushing out two pins (item 84). Remove the upper jaw (item 90) by removing bolt and nut (items 91 and 10). Remove the rod end by loosening nut (item 89) and unscrewing rod end (item 88 or item 97 for -2 assembly only). Separate rod end coupling (item 87) by removing lock ring (item 26) and sliding it out of adjustment pin (item 86). After removal of two lock rings (item 119), the adjustment pin will slide out of the toggle assembly.
15. Remove latch block (item 75) by removing two socket head cap screws (item 76). Remove latch assembly (item 77) and spring (item 121).
16. Separate the shear bar and tow head as follows:
 - a. Remove two hex head cap screws and washers (items 113 and 63) and push out the shear pin kit.
 - b. Remove pin (item 131) by removing cotter pin and washer (items 105 and 48). For -2 assemblies, remove nut and washer (items 51 and 52) and push out pivot pin (item 74). Separate by sliding shear bar (item 54) out of towbar head.

B. Disassembly (Continued)

17. Remove actuator stud (Item 66) by grasping it firmly with a suitable tool and turning it counter-clockwise until the stud is free of the towbar head.

NOTE

USE SUITABLE PRECAUTIONS TO PROTECT THE SURFACE OF THE ACTUATOR STUD FROM BEING DAMAGED, NICKED, SCRAPED OR DENTED.

C. Assembly

Assembly of the P/N 102028 Towbar is the reverse of disassembly, paragraph 4.7B. Detailed instructions for shear pin installation are found in paragraph 4.5.

5.0 PARTS LIST

5.1 How to use Parts List

Turn to the assembly and identify the part by appearance. Note the item number assigned to the illustrated part. Locate the item number in the appropriate parts list. The line entry for that item number provides the quantity required, part number and description.

5.2 Units per Assembly

Quantities specified in the quantity column are the total number of each part required for the entire towbar assembly.



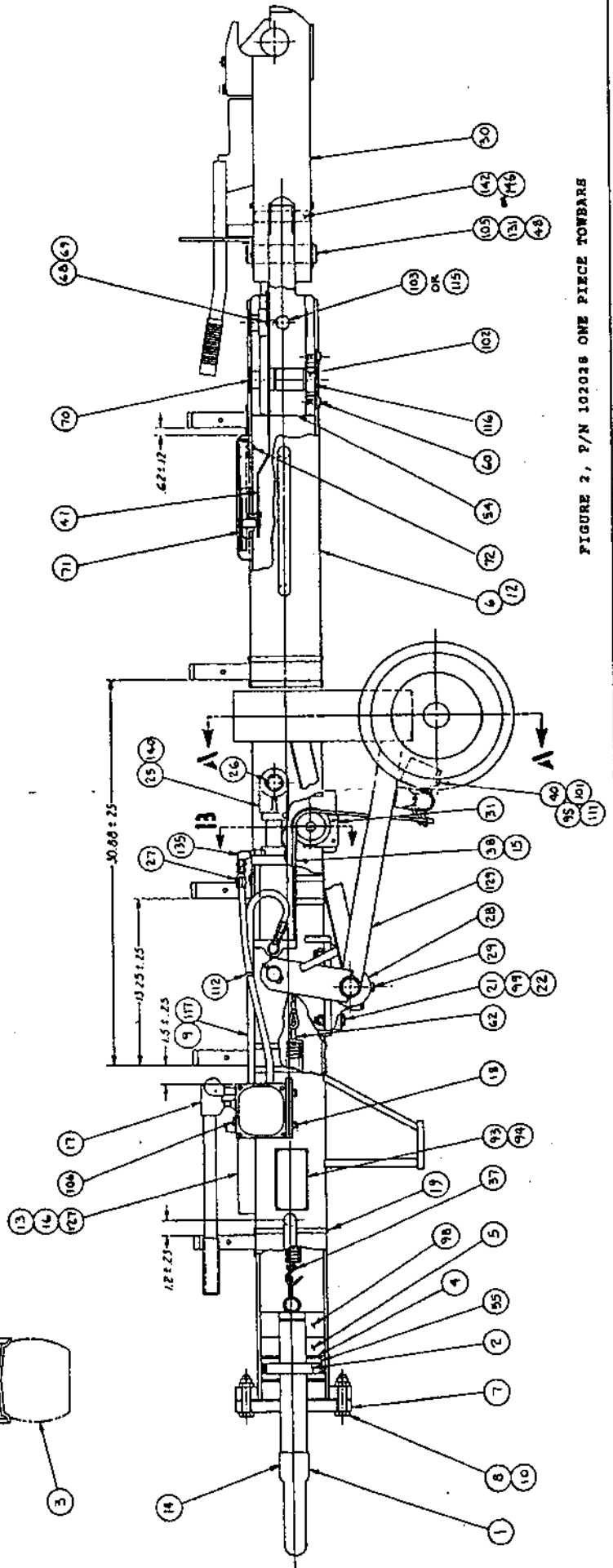
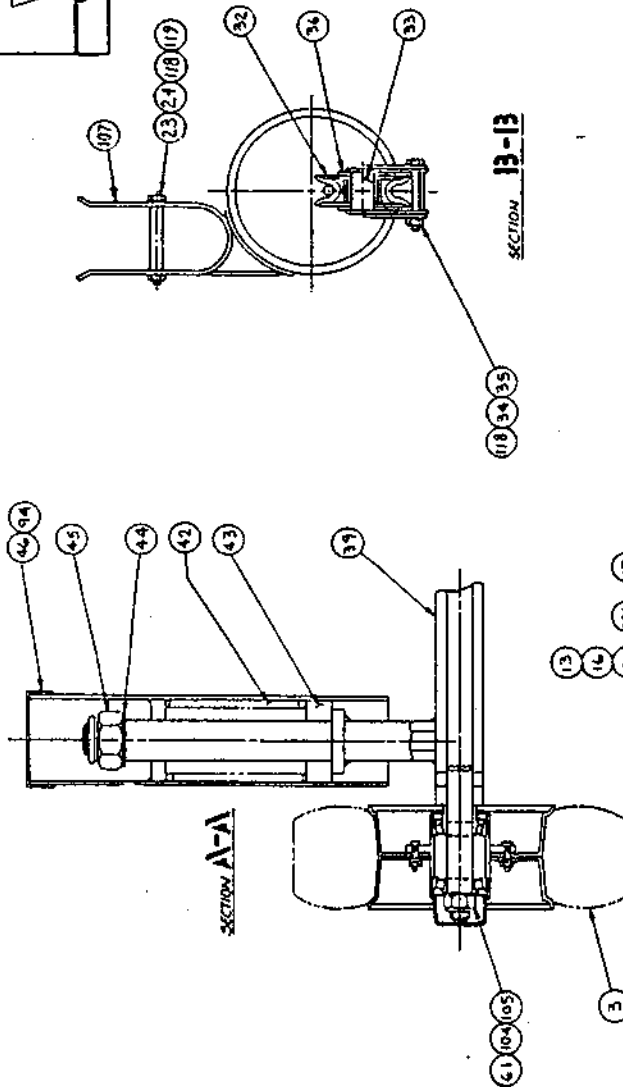
5.3 How to Order Replacement Parts

Replacement parts and/or spare parts listed in this manual may be ordered by first specifying the correct assembly then the item number, part number and description and quantity required.

EXAMPLE:

ASSEMBLY NO.	ITEM NO.	QUANTITY	PART NO.	DESCRIPTION
102028-767	10	4	101876-62	Nut, Flexloc

STANLEY AVIATION CORPORATION
2501 DALLAS STREET
AURORA, CO 80010
303/364-6411
TELEX NO. 910/932-0166
FACSIMILE NO. 303/360-8965



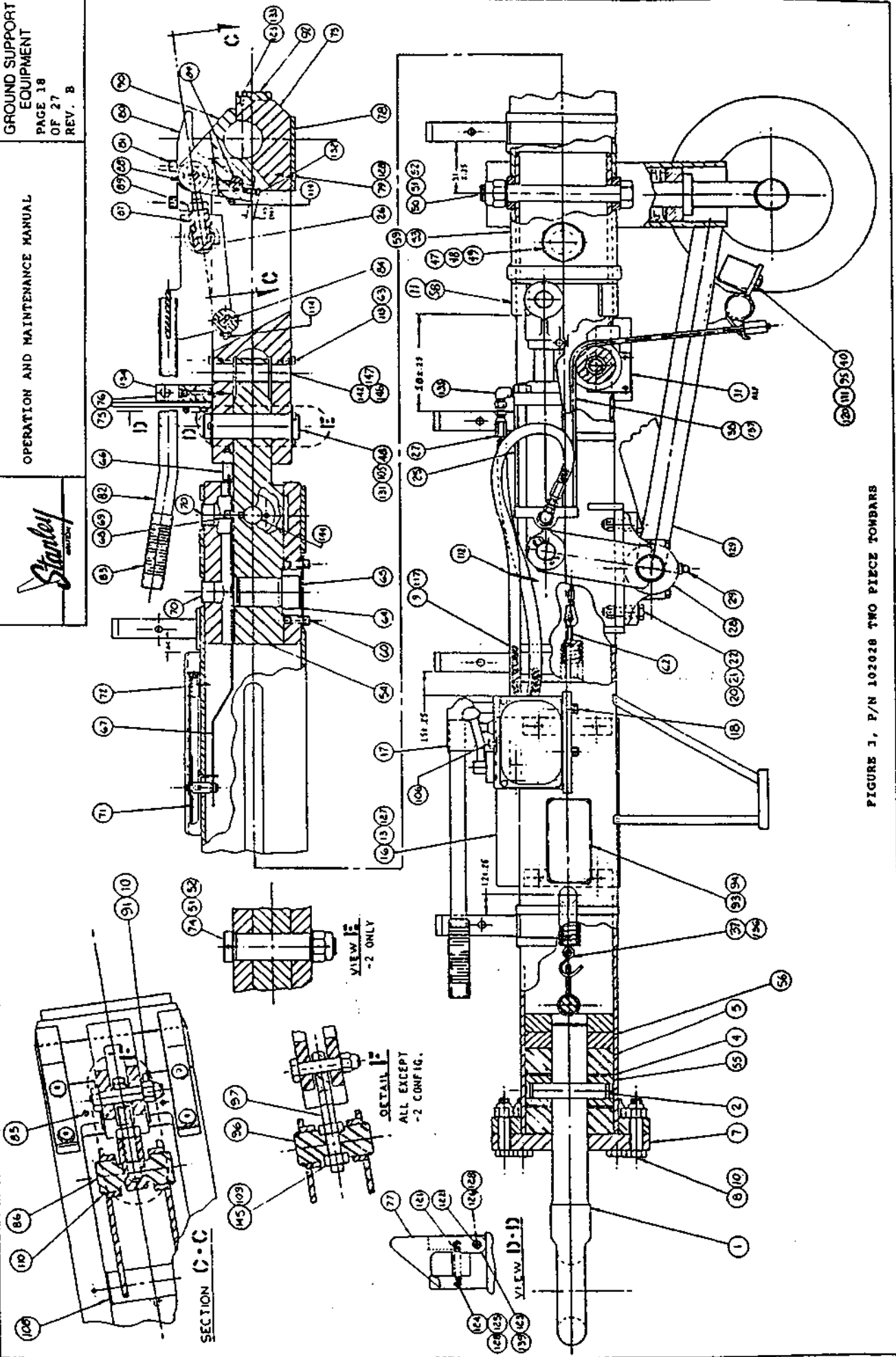


FIGURE 1, P/N 102028 TWO PIECE TOMBARS



PART LIST, P/N 102028 TOWBAR

ITEM	QUANTITY										PART NUMBER	DESCRIPTION	
	-1	-2	-11	-17	-503	-767	-901	-967	-1067				
1	1	1	1	-	1	1	1	1	1	1	102080-1	Drawbar	
2	1	1	1	1	1	1	1	1	1	1	102084-1	Pin	
3	2	2	2	2	2	2	2	2	2	2	102410-1	Wheel Assembly	
4	QUANTITY AS REQUIRED											102082-1	Washer
5	2	2	2	2	2	2	2	2	2	2	102081-1	Disc, Elastomeric	
6	-	-	1	-	-	1	1	1	1	-	111010-1	Body Weldment	
7	1	1	1	-	1	1	1	1	1	1	102085-1	Flange	
8	8	8	8	8	8	8	8	8	8	8	101897-300	Bolt	
9	1	1	1	1	1	1	1	1	1	1	101880-10	Hose Assembly	
10	9	9	9	9	9	9	9	9	9	9	101876-62	Nut, Flexloc	
11	1	1	-	-	1	-	-	-	-	1	102093-10	Body Wldmt, Fwd.	
12	-	-	-	1	-	-	-	-	-	-	111010-17	Body Weldment	
13	4	4	4	4	4	4	4	4	4	4	102144-50	Nyloc Screw	
14	-	-	-	1	-	-	-	-	-	-	111429-1	Drawbar Weldment	
15	-	-	-	1	-	-	-	-	-	-	102170-17	Cable Assembly	
16	1	1	1	1	1	1	1	1	1	1	101444-2	Box, Stowage	
17	1	1	1	1	1	1	1	1	1	1	110460-1*	Pump (See Note)	
18	2	2	2	2	2	2	2	2	2	2	102136-100	Nyloc Screw	

NOTE: On towbars with S/N 001 through 720, order P/N 110422-1 Pump Adapter Bracket. Replace P/N 102217-1 Pump with P/N 110460-1 Pump and Bracket.



OPERATION AND MAINTENANCE MANUAL

GROUND SUPPORT EQUIPMENT

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REV. B

P/N 102028

PART LIST, P/N 102028 TOWBAR (CONT'D)

ITEM	QUANTITY										PART NUMBER	DESCRIPTION
	-1	-2	-11	-17	-503	-767	-901	-967	-1067			
19	4	4	4	4	4	4	4	4	4	4	102106-1	Clamp
20	4	4	4	-	4	-	4	-	4	4	102496-200	Bolt
21	4	4	4	4	4	4	4	4	4	4	101715-56	Washer
22	4	4	4	4	4	4	4	4	4	4	101874-56	Nut, Flexloc, Thin
23	5	5	5	8	4	5	5	5	5	5	101302-1	Spacer
24	5	5	5	8	4	5	5	5	5	5	101228-1	Bolt
25	1	1	1	1	1	1	1	1	1	1	102119-7	Actuator, Hyd.
26	1	1	1	1	1	1	1	1	-	1	100452-4	Spirolox Ring
27	1	1	1	1	1	1	1	1	1	1	101880-9	Hose Assembly
28	2	2	2	2	2	2	2	2	2	2	102097-1	Bearing
29	2	2	2	2	2	2	2	2	2	2	100112-9	Grease Fitting
30	-	-	-	1	-	-	1	1	1	-	102029-11	Towbar Head Assy.
31	1	1	1	1	1	1	1	1	1	1	102157-1	Bracket, Pulley
32	1	1	1	1	1	1	1	1	1	1	101786-2	Sheave
33	1	1	1	1	1	1	1	1	1	1	102616-1	Axle, Pulley
34	2	2	2	2	1	2	2	2	2	2	101891-250	Bolt
35	2	2	2	2	1	2	2	2	2	2	101876-25	Nut, Flexlock
36	2	2	2	2	2	2	2	2	2	2	100064-28	Washer



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PART LIST, P/N 102028 TOWBAR (CONT'D)

ITEM	QUANTITY											PART NUMBER	DESCRIPTION	
	-1	-2	-11	-17	-503	-767	-901	-967	-1067					
37	1	1	1	1	-	1	1	1	1	1	1	1	102229-1	Spring Assembly
38	1	1	1	-	-	1	1	1	1	1	1	1	102170-1	Cable Assembly
39	1	1	1	1	1	1	1	1	1	1	1	1	102152-1	AXle Weldment
40	2	2	2	2	2	2	2	2	2	2	2	2	101876-38	Nut, Flexloc
41	-	-	-	1	-	-	1	1	1	1	-	-	111014-1	Actuator
42	2	2	2	2	2	2	2	2	2	2	2	2	102205-1	Spring Assembly
43	2	2	2	2	2	2	2	2	2	2	2	2	102121-3	Stop Ring
44	2	2	2	2	2	2	2	2	2	2	2	2	101715-125	Washer
45	2	2	2	2	2	2	2	2	2	2	2	2	101875-125	Nut, Flexloc
46	2	2	2	2	2	2	2	2	2	2	2	2	102487-1	Cover
47	1	1	-	-	-	1	-	-	-	-	-	1	101904-850	Bolt
48	3	1	2	2	2	2	2	2	2	2	2	2	101715-150	Washer
49	1	1	-	-	-	1	-	-	-	-	-	1	101876-150	Nut, Flexloc
50	1	2	-	-	-	1	-	-	-	-	-	1	101900-800	Bolt
51	1	2	-	-	-	1	-	-	-	-	-	1	101715-100	Washer
52	1	2	-	-	-	1	-	-	-	-	-	1	101876-100	Nut, Flexloc
53	1	1	-	-	-	1	-	-	-	-	-	1	102101-1	Body Weldment, Aft
54	1	1	1	1	1	1	1	1	1	1	1	1	102074-1	Bar, Shear
55	1	1	1	1	1	1	1	1	1	1	1	1	102083-2	Collar



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PART LIST, P/N 102028 TOWBAR (CONT'D)

ITEM	QUANTITY											PART NUMBER	DESCRIPTION
	-1	-2	-11	-17	-503	-767	-901	-967	-1067				
56	2	2	2	-	2	2	-	-	2	-	2	102079-75	Disc
58	-	-	-	-	1	-	-	-	-	-	-	102093-501	Body Wldmnt., Fwd.
59	-	-	-	-	1	-	-	-	-	-	-	102101-501	Body Weldment, Aft
60	2	2	2	2	2	2	2	2	2	2	2	102136-75	Nyloc Screw
61	2	2	2	2	2	2	2	2	2	2	2	101715-75	Washer
62	1	1	1	1	1	1	1	1	1	1	1	102230-2	Lap Link
63	2	2	2	-	2	2	-	-	2	-	2	100064-3	Washer
64	1	1	1	-	1	1	-	-	1	-	1	101262-1	Pin, Axial Restraint
65	1	1	1	-	1	1	-	-	1	-	1	101334-1	Strap
66	1	1	1	-	1	1	-	-	1	-	1	102109-1	Stud, Actuator
67	1	1	1	1	1	1	-	-	1	-	1	102108-1	Actuator
68	1	1	1	1	1	1	1	1	1	1	1	102146-50	Nyloc Screw
69	1	1	1	1	1	1	1	1	1	1	1	102169-1	Spring, Belleville
70	2	2	2	2	2	2	2	2	2	2	2	101219-2	Plug
71	1	1	1	1	1	1	1	1	1	1	1	101415-1	Indicator Assembly
72	2	2	2	2	2	2	2	2	2	2	2	102133-38	Nyloc Screw
73	1	1	1	-	1	1	-	-	1	-	1	102049-1	Jaw, Lower
74	1	-	-	-	-	-	-	-	-	-	-	101263-1	Pin-Side Load Restraint



PART LIST, P/N 102028 TOWBAR (CONT'D)

ITEM	QUANTITY										PART NUMBER	DESCRIPTION
	-1	-2	-11	-17	-503	-767	-901	-967	-1067			
75	1	-	-	-	-	-	-	-	-	-	102088-1	Block, Latch
76	2	2	2	-	2	-	-	-	-	2	102134-200	Nyloc HD Cap
77	1	1	1	-	1	-	-	-	-	1	110488-1	Latch Assembly
78	1	1	1	-	1	-	-	-	-	1	102091-1	Plate, Wear
79	2	2	2	-	2	-	-	-	-	2	AN-505-416-10	Screw, Flat Head
80	2	2	2	-	2	-	-	-	-	2	102090-1	Guide
81	4	4	4	-	4	-	-	-	-	4	102138-275	Nyloc Screw
82	1	1	1	-	1	-	-	-	-	1	102078-1	Toggle Weldment
83	1	1	1	-	1	-	-	-	-	1	100256-2	Grip, Hand
84	2	2	2	-	2	-	-	-	-	2	102163-1	Bar, Axle
85	4	4	4	-	4	-	-	-	-	4	100067-3	Nyloc Set Screw
86	-	1	-	-	-	-	-	-	-	-	102075-1	Pin, Adjustment
87	-	1	-	-	-	-	-	-	-	-	102060-1	Coupling, Rod End
88	-	1	-	-	-	-	-	-	-	-	100032-8	Rod End
89	-	1	-	-	-	-	-	-	-	-	AN315R-10	Nut
90	1	1	1	-	1	-	-	-	-	1	102076-1	Jaw, Upper
91	1	1	1	-	1	-	-	-	-	1	NAS1310-32	Bolt



PART LIST, P/N 102028 TOWBAR (CONT'D)

ITEM	QUANTITY											PART NUMBER	DESCRIPTION	
	-1	-2	-11	-17	-503	-767	-901	-967	-1067					
92	1	1	1	-	1	1	-	-	1	1	1	102165-1	Bumper	
93	1	1	1	1	1	1	1	1	1	1	1	102001-1	Name Plate	
94	8	4	8	8	8	8	8	8	8	8	8	102489-2	Drive Screw	
95	1	1	1	1	1	1	1	1	1	1	1	103848-1	Bumper	
96	-	1	1	-	1	1	-	-	1	1	1	102617-1	Pin	
97	-	1	1	-	1	1	-	-	1	1	1	102619-2	Rod End	
98	-	-	-	1	-	-	1	1	-	-	-	102079-150	Disc	
99	-	-	-	4	-	-	4	4	-	-	-	101896-200	Bolt	
101	-	-	-	2	-	-	2	2	-	-	-	101715-38	Washer	
102	-	-	-	1	-	-	1	1	-	-	-	111013-1	Pin, Axial Restraint	
103	-	-	-	-	-	-	-	2	-	-	-	111028-1	Shear Pin Kit, Axial Load	
104	2	2	2	2	2	2	2	2	2	2	2	101872-75	Nut, Castle	
105	4	4	4	4	4	4	4	4	4	4	4	102543-08200	Cotter Pin	
106	QUANTITY AS REQUIRED												102184-1	Oil, Hydraulic
107	5	5	5	8	4	5	5	5	5	5	5	102092-1	Cradle, Cable	
108	4	4	4	-	4	4	-	-	4	4	4	102206-1	Washer, Nylon	
109	-	2	2	-	2	2	-	-	2	2	2	100037-15	Washer, Internal Toothed	



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PART LIST, P/N 102028 TOWBAR (CONT'D)

ITEM	QUANTITY										PART NUMBER	DESCRIPTION
	-1	-2	-11	-17	-503	-767	-901	-967	-1067			
110	2	2	2	-	2	2	-	-	2	2	100452-5	Spirolox Ring
111	2	2	2	2	2	2	2	2	2	2	102493-275	Bolt
112	2	2	2	2	2	2	2	2	2	2	102213-1	Cable Tie
113	2	2	2	-	2	2	-	-	2	2	102210-1	Nyloc Screw
114	2	2	2	-	2	2	-	-	2	2	100112-2	Grease Fitting
115	-	-	-	2	-	-	2	-	-	-	111029-1	Shear Pin Kit, Axial Load
116	-	-	-	1	-	-	1	1	-	-	111012-1	Strap
117	2	2	2	2	2	2	2	2	2	2	101822-31	Fitting
118	7	7	7	10	5	7	7	7	7	7	AN960-416	Washer
119	5	5	5	8	4	5	5	5	5	5	101874-25	Nut, Flexloc
120	2	2	2	-	2	2	-	-	2	2	AN960-716L	Washer
121	1	1	1	-	1	1	-	-	1	1	100028-4	Spring
122	2	2	2	-	2	2	-	-	2	2	AN960C416	Washer
123	4	4	4	-	4	4	-	-	4	4	AN960-416L	Washer
124	1	1	1	-	1	1	-	-	1	1	AN960-8L	Washer
125	1	1	1	-	1	1	-	-	1	1	102526-1	Screw
126	1	1	1	-	1	1	-	-	1	1	102527-1	Nyloc Screw
127	4	4	4	4	4	4	4	4	4	4	AN935-416L	Lockwasher



PART LIST, P/N 102028 TOWBAR (CONT'D)

ITEM	QUANTITY AS REQUIRED										PART NUMBER	DESCRIPTION
	-1	-2	-11	-17	-503	-767	-901	-967	-1067			
128											101579-2	Resin (Loctite)
129	1	-	1	1	1	1	1	1	1	1	102530-1	Bogie Weldment
131	1	-	1	1	1	1	1	1	1	1	102439-1	Pin, Side Load Restraint
132	1	1	1	-	1	1	-	-	-	1	102472-62	Bolt
133	3	3	3	-	3	3	-	-	-	3	AN515-416-8	Screw
134	1	-	1	-	1	1	-	-	-	1	102595-1	Block, Latch
135	2	2	2	2	2	2	2	2	2	2	101822-52	Fitting, Adapter
136	-	-	-	-	1	-	-	-	-	-	102229-501	Spring Assembly
137	-	-	-	-	1	-	-	-	-	-	102170-501	Cable Assembly
139	1	1	1	-	1	1	-	-	-	1	110863-1	Bushing
142	2	2	2	2	2	-	2	-	-	-	102600-10	Shear Pin Kit, Side Load
144	2	2	2	-	2	2	-	-	-	2	102546-1	Shear Pin Kit, Axial Load
145	2	-	2	-	2	2	-	-	-	2	102961-7	Nut
146	-	-	-	-	-	2	-	2	-	-	102600-767	Shear Pin Kit, Side Load
147	-	-	-	-	-	-	-	-	-	2	102600-1067	Shear Pin Kit, Side Load



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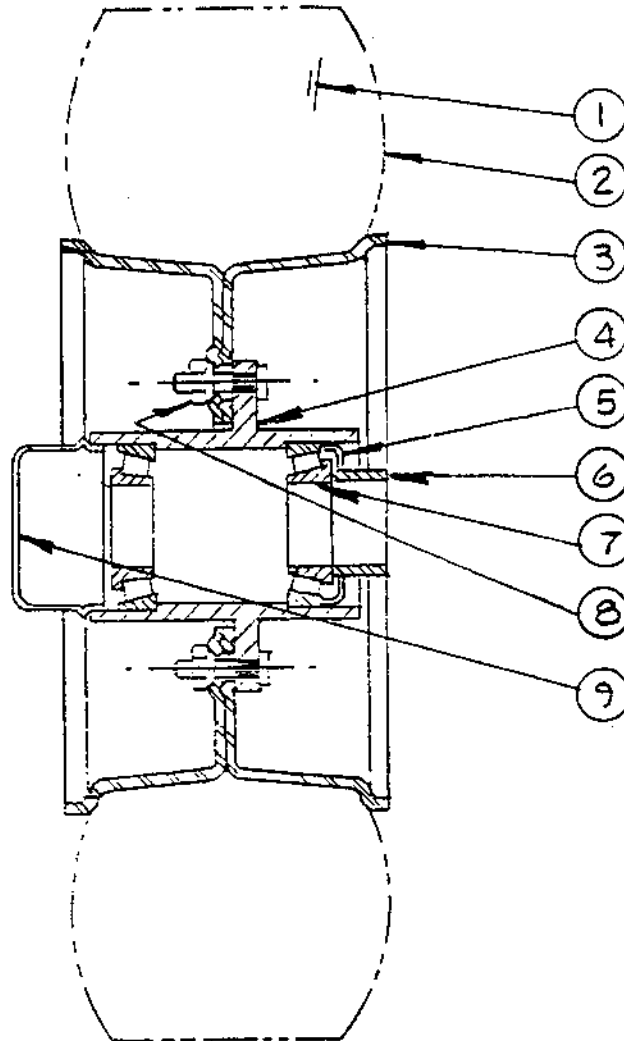


FIGURE 4 AND PARTS LIST, P/N 102410-1 WHEEL ASSEMBLY

ITEM	QUANTITY	PART NO.	DESCRIPTION
1	1	102172-4	Tube
2	1	102172-3	Tire
3	1	102410-2	Wheel
4	1	102410-3	Hub
5	1	102172-6	Seal, Grease
6	1	102174-1	Spacer
7	2	102172-5	Bearing
8	3	102410-4	Nut, Lug
9	1	102172-7	Dust Cap