

CHAPTER 7

✓ DUAL CONTROL SYSTEM ASSEMBLY

SECTION 1 DUAL STICK ASSEMBLY

Dual Stick Assembly	7-1-3
Dual Stick Parts List	7-4
Figure DS-1	7-5
Figure DS-2	7-6
Figure DS-3	7-7
Figure DS-4	7-8

✓ CHAPTER 7

DUAL CONTROL SYSTEM ASSEMBLY

Section 1

Dual Stick Assembly

Figures DS-1, DS-2, DS-3 & DS-4

1. **Figure DS -1** **PREPARING THE DUAL STICK TORQUE TUBES**
Lay the dual stick torque tube (1) flat on a table with the longer end of the stick pivot tube pointing upward. Insert graphite delrin bushings (2) into the openings of the stick pivot tubes, by lightly tapping the bushings with a hammer. Turn the dual stick torque tube over and insert two other delrin bushings (2) into the openings of the shorter ends of the stick pivot tubes.

2. **Figure DS-2** **ATTACHING PUSH-PULL BRACKET TO DUAL STICK TORQUE TUBE**
Position the dual stick torque tube (1) as shown in Figure DS-2. Attach the push-pull attach bracket (3) to the dual stick torque tube (1) by placing washers (5) on each of two bolts (4). Insert through the dual stick torque tube. Place the push-pull attach bracket (3) onto the bolts. Add a second set of washers (5) and secure with locknuts (6).

3. **Figure DS -1** **ATTACHING DUAL STICKS TO TORQUE TUBE**
 - a) Insert control stick plug (7) into the bottom end of control stick (8), aligning the holes. Attach the control stick plug by placing washer (5) on bolt (4) and inserting through the holes. Add second washer (5) and secure with locknut (6). Repeat this procedure on the second control stick.

Note that the .010 thick Teflon shims (15) are for adjustment of the “backlash” on the stick, and are used only if necessary. This is determined after the drilling portion of assembly [see below] and / or by an excessive amount of fore and aft slop in the stick after continued use.

 - b) Slide nylon thrust washer (11) over the end of control stick (8). Insert the control stick into the flat end of the stick pivot tube on the dual stick torque tube (1).
 - c) Begin with the right side assembly. Slide a second nylon thrust washer (11) over the end of a control stick (8) as pictured. Orient the sleeve so that the hole is on the top. Fit the control stick sleeve onto the stick pivot tube. Lightly tap the control stick sleeve to seat the nylon thrust washers onto the welded stick.

Clamp the whole assembly, from control stick sleeve to control stick. Make certain to adjust the pressure for minimal resistance, so that the control stick (8) is able to pivot freely. There should be no excessive movement or binding.

✓ Chapter 7 SECTION 1 DUAL STICK ASSEMBLY

- d) Drill a hole through the existing hole on the control stick sleeve (12), and into the control stick (8). First use a center punch to mark drilling positions in the center of the top and bottom holes of the control stick sleeve.. Using a 1/8" drill, drill a pilot hole through the top hole of the sleeve and into the top of the control stick. Repeat with bottom hole. If the stick pivot is too short delete the outer nylon thrust washer.
 - e) Verify that the holes are correctly aligned and that the control stick assembly is correctly positioned. Use a 3/16" drill to enlarge the top hole. Temporarily place bolt (4) into hole to hold the sleeve / stick in place, and drill out bottom hole with 3/16" drill, also. Remove bolt.
 - f) Place washer (5) on bolt (13) and insert into the holes just drilled. Add a second washer (5), and secure with locknut (6). Remove clamp. Repeat entire procedure for other side.
 - g) If, at this point, any fore or aft slop is noted on the sticks, disassemble and add .010 thick Teflon shims as necessary. Pictured in Figure DS-1. Remember that shims may also be added after flying, should fore or aft slop develop.
4. Figure DS-2 ATTACHING THE BUSHING TO THE PIVOT PLATES
- a) Lightly tap the graphite delrin bushings (2) into each of the two pivot plates (14). Slide nylon thrust washers (11) onto each end of the dual stick torque tube.
 - b) Place washers (5) on bolts (9) and insert through pre-drilled holes on left side cage rail as shown. Repeat on right side.
5. Figure DS-2 ATTACHING THE TORQUE TUBE ASSEMBLY TO THE CAGE
- a) Slide the pivot plates with bushings (14)+(2) onto both ends of the dual stick torque tube (1). Attach the left side torque tube assembly to the cage by sliding the pivot plate onto the just-installed bolts (9). Add a second washer to each bolt and secure with locknuts (6). Repeat this procedure for the right side. **DO NOT OVERTIGHTEN THE BOLTS AND CRUSH THE SIDE RAIL TUBE.**

If there is side to side movement or slop in the Dual stick torque tube, remove one of the pivot plates and add a Telfon shim to adjust the torque tube.

Figure DS-3 ASSEMBLING DUAL STICK CONNECTOR ROD

- Assemble the dual stick connector rod (17) by threading the jam nuts (18) down on to each end. A drop of oil eases the threading. Thread the female rod ends (19) down to the jam nuts. Use a 3/8" wrench on the flat part to aid in threading. **NEVER** use a bolt in the ball / race. This can jam the rod end. The inside dimension from the jam nut to jam nut should be approximately 15 7/16".
- 6.

✓ Chapter 7 SECTION 1 DUAL STICK ASSEMBLY

7. Figure DS-3 ATTACHING CONNECTOR ROD ASSEMBLY TO CONTROL STICK
- a) Attach the connector rod assembly to the left side control stick, by first placing washer (21) on bolt (20). Insert through the hole of the control stick plug (7). Add a second washer (21) and the female rod end (19) as pictured in Figure DS-3. Add a third washer (21) and a finger tightened locknut (22). LEAVE THE LOCKNUT LOOSE FOR LATER ADJUSTMENT.
 - b) Attach the right side of the connector rod assembly to the right side control stick by first placing four washers (21) on bolt (23) and inserting it through the hole of the control plug (7). Add the right side female rod end (19), a final washer (21) and a finger tightened locknut (22). (NOTE: THE PUSH-PULL CABLE IS PICTURED IN FIGURES DS-3 & DS-4, BUT IS NOT ATTACHED UNTIL CHAPTER 14. LEAVING THE LOCKNUT LOOSE ALLOWS FOR LATER ATTACHMENT OF THE PUSH-PULL CABLE.)

THE CONTROL STICKS SHOULD BE VERTICAL AND SQUARE TO THE FRAME FOR PROPER ALIGNMENT. Make any necessary adjustments to the connector rod assembly to ensure that the control sticks are correctly positioned. If an adjustment is needed, remove the connector rod, turn the female rod ends (19) for whatever adjustment is necessary, and reattach the connector rod. Once correct alignment has been verified, tighten both jam nuts against the female rod ends.

8. Figure DS-1 INSERTING END CAPS & FOAM GRIPS ON CONTROL STICKS
- Insert the 1" end caps (10) into horizontal open ends of both control sticks. Insert the 7/8" end caps (24) into the top of the two control sticks. Finish by sliding the foam stick grips (25) onto each of the control sticks.

✓ Chapter 7 SECTION 1 DUAL STICK ASSEMBLY

Section 1
Dual Stick Parts List
Figures DS-1, thru DS-4

INDEX#	PART #	QTY	DESCRIPTION
1.	CS-215	1	DUAL STICK TORQUE TUBE
2.	CS-69	6	GRAPHITE DELRIN BUSHING
3.	CS-102	1	PUSH-PULL ATTACH BRACKET
4.	AN3-12A	4	3/16" BOLT
5.	AN960-10L	20	3/16" THIN WASHER
6.	AN365-1032	10	3/16" LOCKNUT
7.	CS-208	2	CONTROL STICK PLUG
8.	CS-268	2	CONTROL STICK
9.	AN3-22A	4	3/16" BOLT
10.	EC-1	2	1" END CAP
11.	CS-289	6	7/8" I.D. THRUST WASHER
12.	CS-274	2	CONTROL STICK SLEEVE
13.	AN3-13A	2	3/16" BOLT
14.	CS-272	2	PIVOT PLATE
15.	CS-68 (OPTIONAL)	4	.010 THICK TEFLON SHIM 7/8" I.D.
16.			
17.	CS-278	1	CONNECTOR ROD
18.	AN316-4R	2	1/4" JAM NUT
19.	CW-4	2	FEMALE ROD END
20.	AN4-11A	1	1/4" BOLT
21.	AN960-416	7	1/4" WASHER
22.	AN365-428	2	1/4" LOCKNUT
23.	AN4-15A	1	1/4" BOLT
24.	EC-7/8	2	7/8" END CAP
25.	CS-199	2	FOAM STICK GRIP

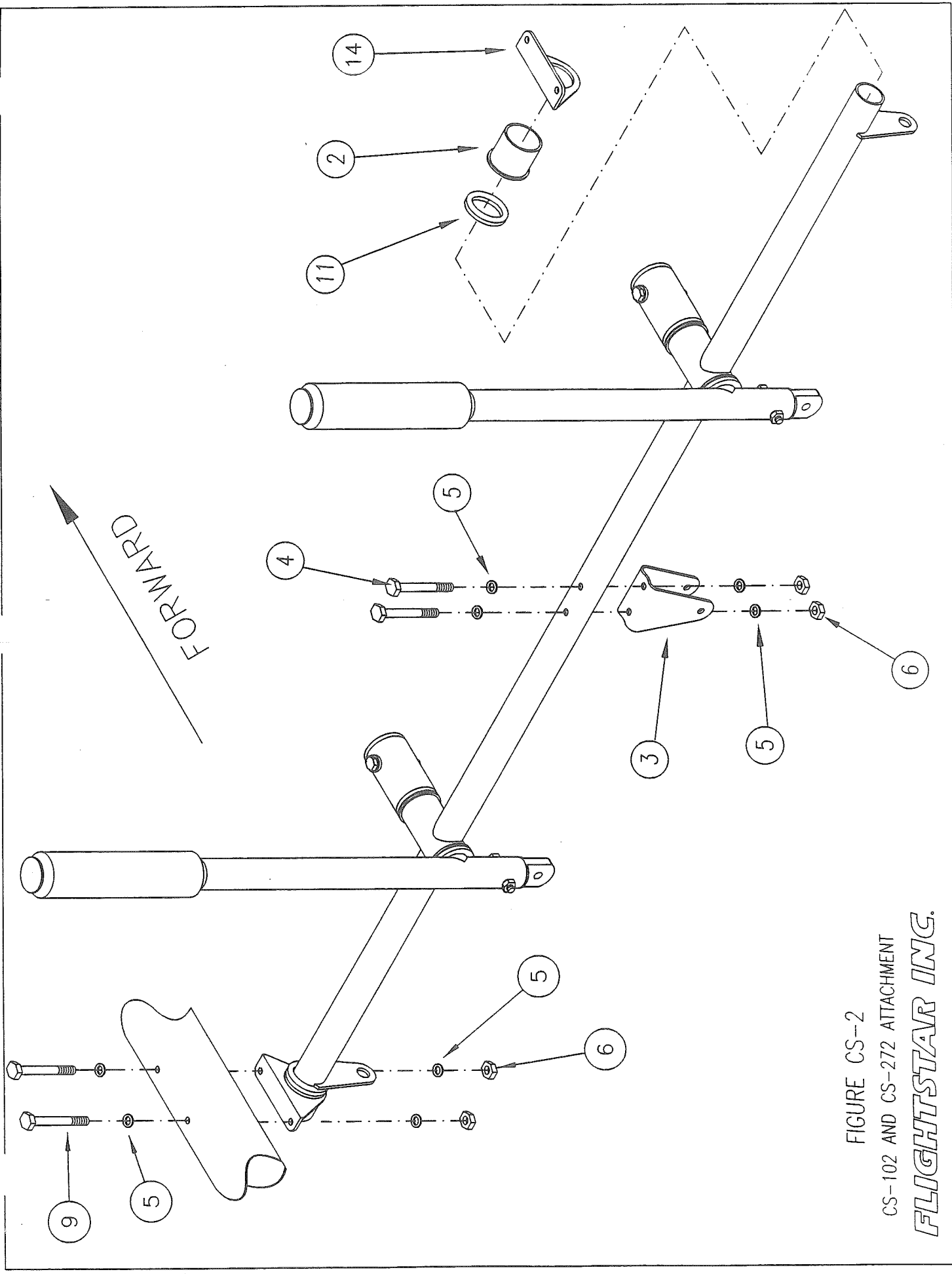


FIGURE CS-2
 CS-102 AND CS-272 ATTACHMENT
FLIGHTSTAR INC.

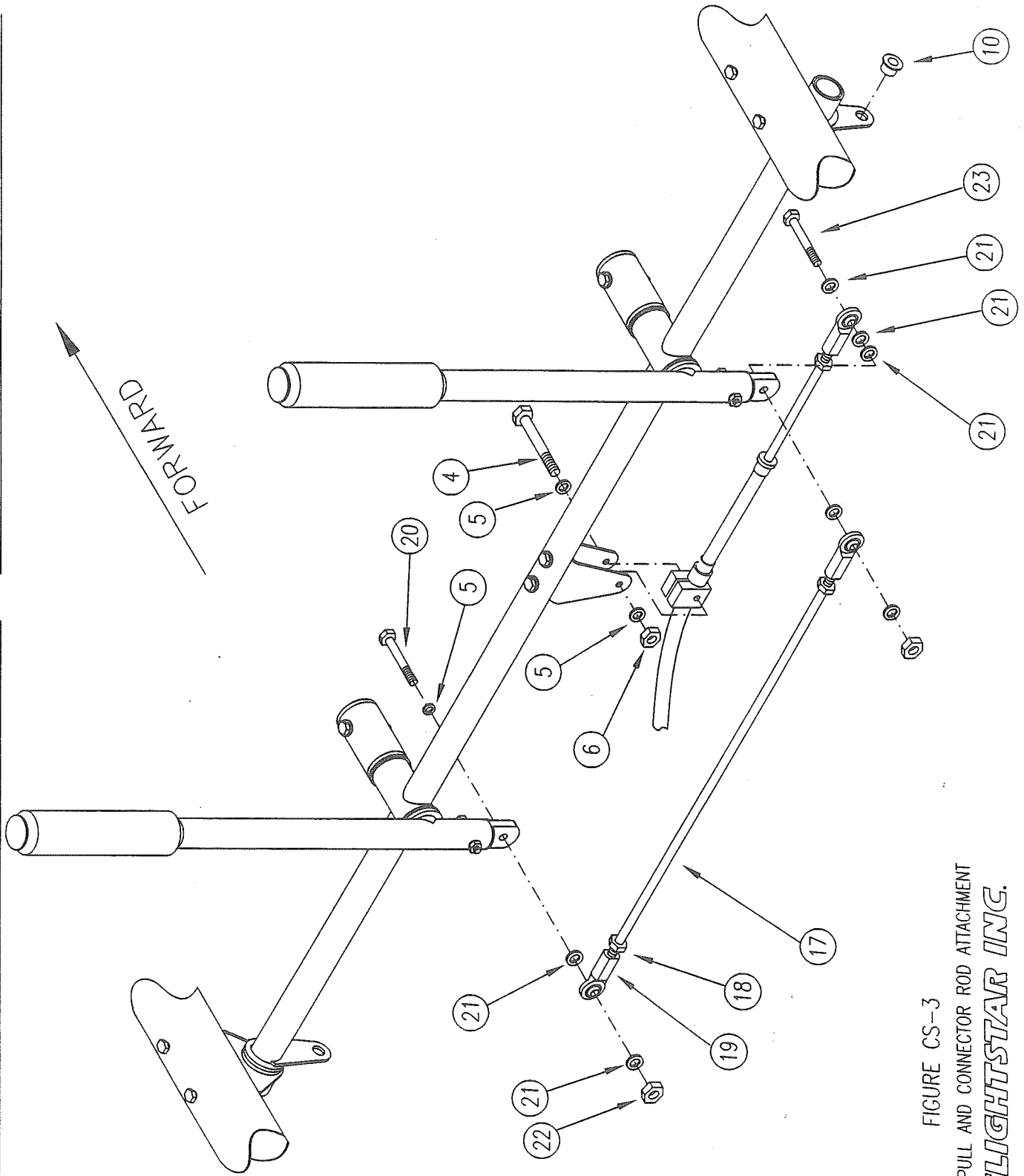


FIGURE CS-3
 PUSH-PULL AND CONNECTOR ROD ATTACHMENT
FLIGHTSTAR INC.

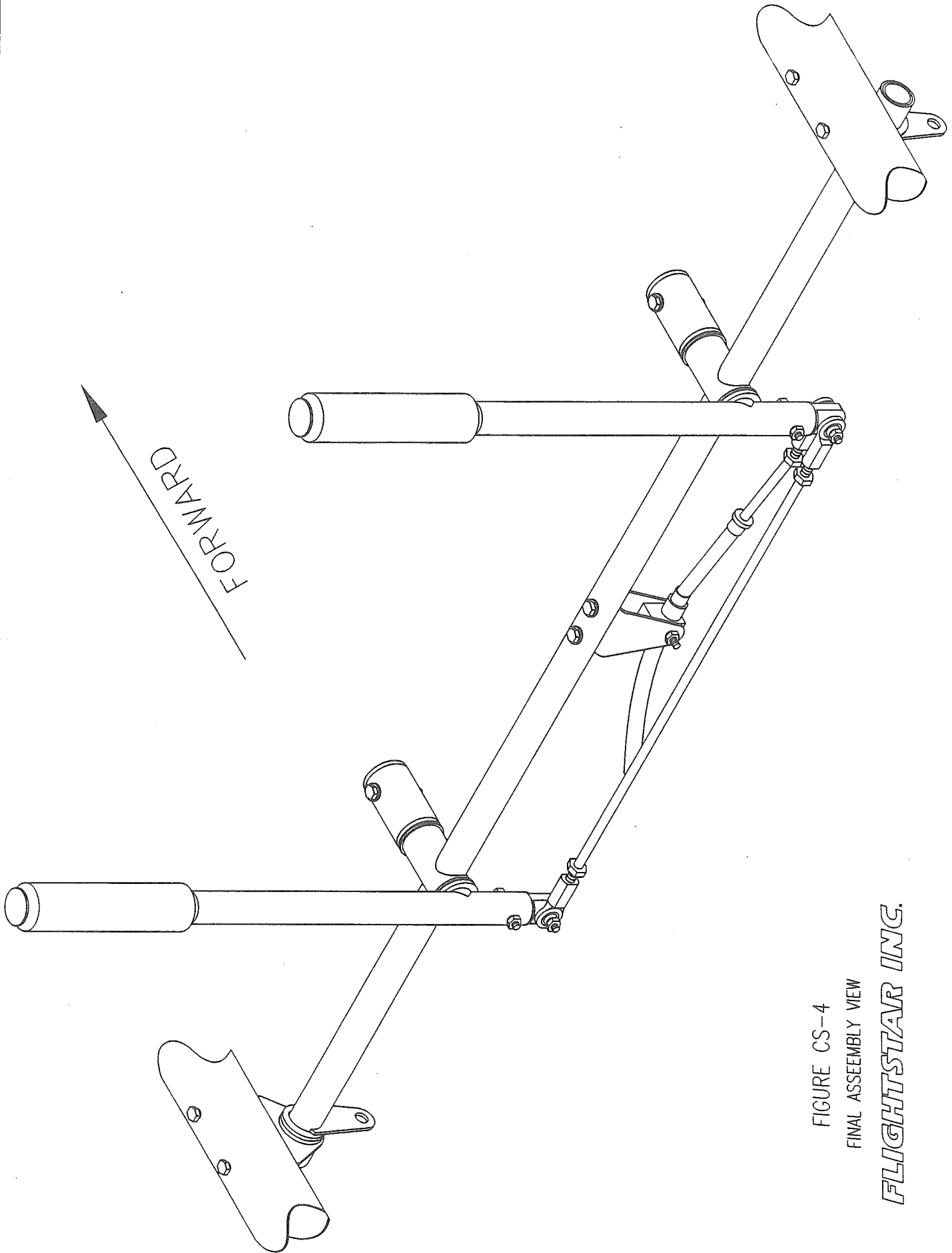


FIGURE CS-4
FINAL ASSEMBLY VIEW

FLIGHTSTAR INC.

