GM Locomotive Group.

MODERNIZATION RECOMMENDATION M.I. 9680

YAW DAMPER APPLICATION FOR GP AND F40PH LOCOMOTIVES WITH SINGLE SHOE BRAKE RIGGING

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PURPOSE: Yaw Damper Application for GP and F40PH Locomotives with single shoe brake rigging.

APPLICATION: The following information is applicable to the following locomotive models: GP60, GP59, GP50, GP40X, GP40-2, F40PH and F40PH-2

DISCUSSION: In recent years more awareness has been given to improving locomotive ride quality associated with the GP two axle trucks. With more railroads running trains at higher speeds, approximately 70 mph for freight locomotives, and up to 90 mph for passenger locomotives, it is essential that truck stability be maintained for not only safety reasons but also for crew comfort.

Truck yaw instability, more commonly known as truck hunting, has generally affected GP locomotives with worn wheels. Railroads in the past have corrected this condition by reprofiling wheels to a low effective conicity. Reprofiling wheels to temporarily alleviate truck hunting has become an expensive solution for the locomotive customer.

The first GP trucks to be fitted with yaw dampers were Via Rail F40PH-2 locomotives in 1986 and MBTA F40PH-2C units in 1987. Starting with Santa Fe in June, 1988 all GP60 locomotives have yaw dampers applied. For 70 mph service, one (1) yaw damper per GP truck is required, while for higher speed (80 to 90 mph) passenger service seen on F40PH-2's, two (2) yaw dampers per truck are necessary.

YAW DAMPER DESCRIPTION

Yaw dampers are shock absorbers especially designed to control small amplitude sinusoidal rotational movements (truck hunting) and thereby allow the locomotive to be operated at higher speeds without hunting than previously possible. In addition to increasing operating speeds, yaw damping will also reduce wear and the level of input forces to the suspension. Also, the need to reprofile wheels prior to FRA condemning limits due to truck hunting would be eliminated.

YAW DAMPER RETROFIT MATERIAL FOR GP LOCOMOTIVES

REFERENCE: Drawing P/N 40011433 (Figure 1 & 2) shows bracket and yaw damper application for a GP locomotive. The following list and quantities presented is the required material necessary for yaw damper retrofit application on one (1) GP truck. The material listed below can easily be ordered in kit form by one part number 40013196.

ITEM	P/N	DESCRIPTION	QUANTITY
1	40011430	TRUCK BRACKET	1
2	40011431	GUSSET	1
12	40027540	U/F BRACKET ASSEMBLY	1
6	40005424	SHOCK ABSORBER	1
7	271568	BOLT-5/8-11 HEX 3-1/2"	2
8	271570	BOLT-5/8-11 HEX 4"	2
9	8032747	NUT-5/8 SLFLKG	4
10	103345	WASHER-5/8 FLAT	4
11	40010925	WASHER-5/8 SPECIAL	4

YAW DAMPER RETROFIT MATERIAL FOR F40PH LOCOMOTIVES

REFERENCE: Drawing P/N 40015167 (figures 3 & 4) shows bracket and yaw damper application for a F40PH locomotive. The following list and quantities presented is the required material necessary for yaw damper retrofit application for one (1) F40PH truck. The material listed below can easily be ordered in kit form by one part number 40016579.

ITEM	P/N	DESCRIPTION	QUANTITY
1	40015166	TRUCK MOUNTED BRACKET ASM.	1
2	40015165	TRUCK MOUNTED BRACKET ASM.	1
3	40015160	U/F MOUNTED BRACKET ASM.	1
4	40015161	U/F MOUNTED BRACKET ASM.	1
5	40005424	SHOCK ABSORBER ASM.	2
6	272552	BOLT-5/8-11 HEX	8
7	9532904	WASHER-SPECIAL	16
8	8032747	NUT-5/8 SLFLKG	8
9*	40015325	CONDUIT BRACKET (OPTIONAL)	1

* NOT INCLUDED IN KIT BUT AVAILABLE UPON REQUEST

INSTALLATION INSTRUCTIONS FOR GP LOCOMOTIVES

In order to achieve a successful application and proper performance of the yaw damper, it is important to adhere to the following recommendations.

1. Prior to bracket application, grind truck frame and underframe smooth around the area where welding will be required. Preheat truck frame area to 150 - 200 degrees F.

2. IMPORTANT: follow given application dimensions and tolerances from figures 1 & 2. Note that the yaw dampers are applied on the right side of the locomotive for both the front and rear trucks.

3. See angle fixture shown in figure 8 to aid in properly locating the truck frame bracket. Bolt the angle fixture to truck frame holes used for the vertical shock bracket. Place the truck frame yaw damper bracket flush against the frame and line up the mounting holes with the slotted hole of the angle fixture. Use 5/8-11 bolts to secure the truck frame bracket to the angle fixture and tack weld the bracket to the truck frame.

4. Do not weld gusset (item 2) to the truck frame bracket prior to application on the truck frame. This will add difficulty to fitting the assembly up against the truck frame. Welding should be with AWS E7016 or E7018 welding rod.

5. Underframe clevis bracket must be in contact with chamfered section of bolster extension for welding purposes. To aid in obtaining the proper installation length, a yaw damper spacer bar could be utilized. See figure 5 for assembly of this fixture.

6. Initially tack welding the truck and underframe brackets will keep them from "pulling" to one side or the other prior to completing welding operation.

7. Use only SAE Grade 5 bolts torqued to 156 N·m (115 ft lbs) lubricated or 203 N·m (150 ft lbs) dry minimum.

8. Use mounting hardware called for on application figure 1 or equivalent. Do not omit any washers or use longer bolts. This could result in the bolt threads bottoming against the yaw damper reservoir/dust tube during truck swings.

9. Yaw damper (P/N 40005424) has an internal hydraulic draw which must be oriented downward for the damper to function properly. The reservoir side of the yaw damper is identified by a yellow label reading "THIS SIDE DOWN." This label must be oriented downward for proper operation. Similarly, the dust tube end has a yellow label reading "THIS SIDE UP."

10. The mounting bars on these yaw dampers are installed at a six (6) degree angle as shown on figure 7. The dampers must be installed per figures 1 & 2 so as to avoid bushing damage due to radial wind up. Proper orientation of labels will align yaw damper mounting bars to mounting bracket.

INSTALLATION INSTRUCTIONS FOR F40PH LOCOMOTIVES

In order to achieve a successful application and proper performance of the yaw damper, it is important to adhere to the following recommendations.

1. Prior to bracket application, grind truck frame and underframe smooth around the area where welding will be required. Preheat truck frame area to 150 - 200 degrees F.

2. IMPORTANT: follow given application dimensions and tolerances from figure 3 & 4. A yaw damper spacer bar could be used to aid in obtaining proper installation length of the yaw damper. See figure 6 for assembly of fixture.

3. Prior to applying the underframe mounted yaw damper bracket, verify that the speed recorder conduit bracket assembly is no more than 8.25 in. inboard from the end of the bolster extension (See View B-B, figure 4). If that dimension is greater the bracket must be removed and replaced with optional bracket assembly P/N 40015325 and applied to the specified dimension. This will prevent interference with the yaw damper.

4. Initially tack welding the truck and underframe brackets will keep them from "pulling" to one side or the other prior to completing welding operation.

5. Use only SAE Grade 5 bolts torqued to 156 N·m (115 ft lbs) lubricated or 203 N·m (150 ft lbs) dry minimum.

6. Use mounting hardware called for on application drawing or equivalent. Do not omit any washers or use longer bolts. This could result in the bolt threads bottoming against the yaw damper reservoir/dust tube during truck swings.

7. Yaw damper (P/N 40005424) has an internal hydraulic draw which must be oriented downward for the damper to function properly. The reservoir side of the yaw damper is identified by a yellow label reading "THIS SIDE DOWN." This label must be oriented downward for proper operation. Similarly, the dust tube end has a yellow label reading "THIS SIDE UP."

8. The mounting bars on these yaw dampers are installed at a six (6) degree angle as shown in figure 7. The dampers must be installed per figures 3 & 4 so as to avoid bushing damage due to radial wind up. Proper orientation of labels will align yaw damper mounting bars to mounting bracket.

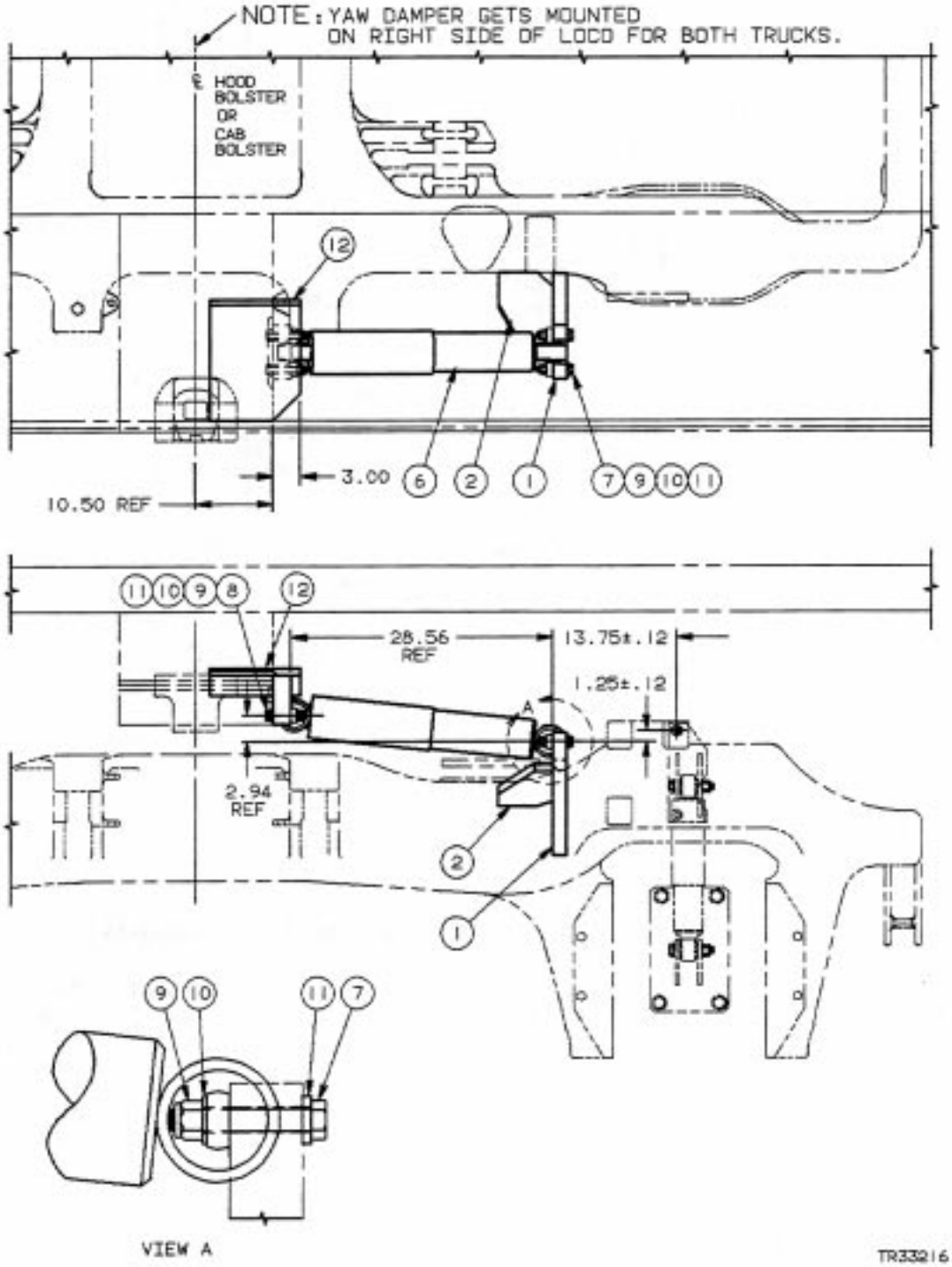

Figure 1 - Bracket And Yaw Damper Application - G.P. Locomotive

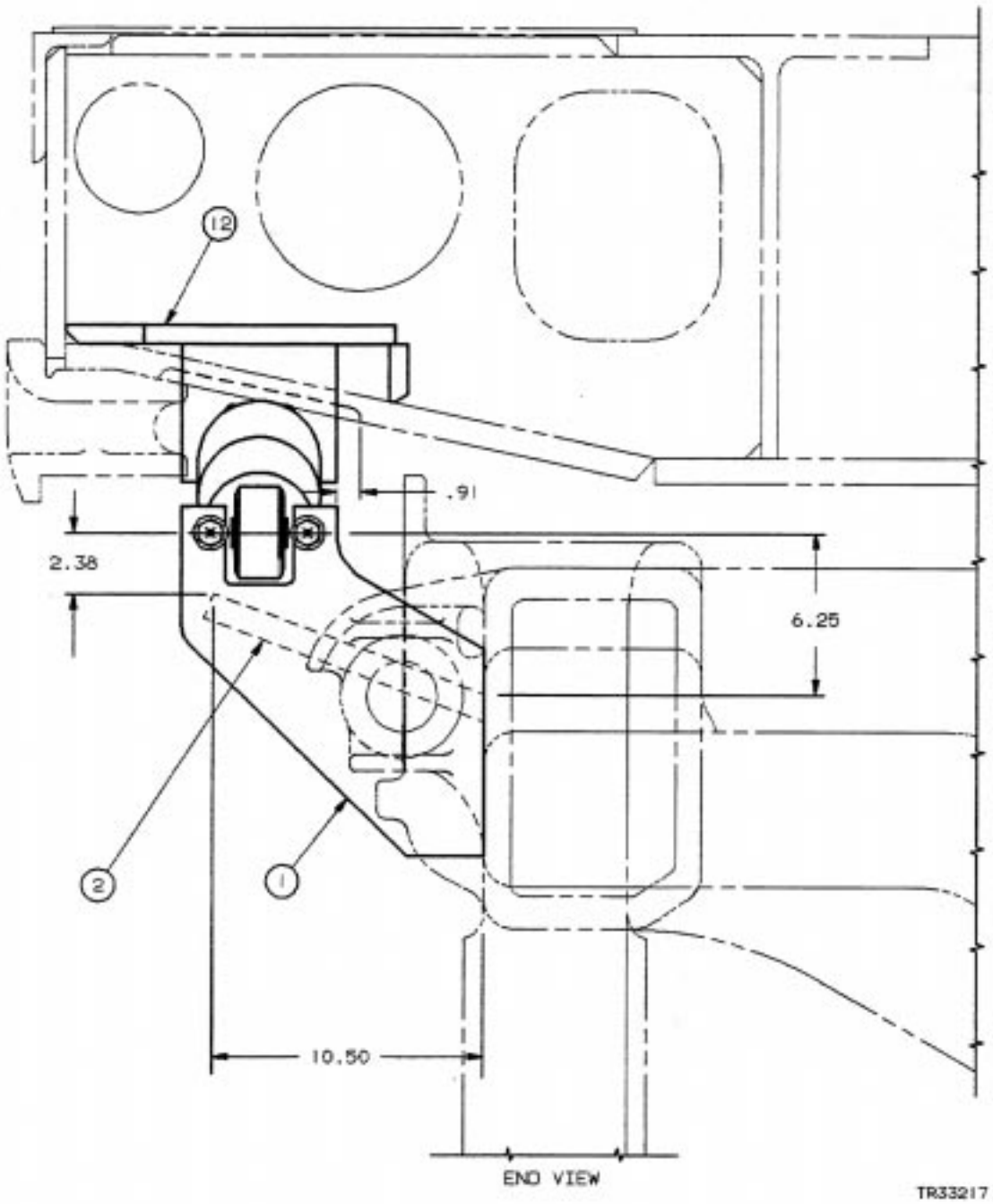

Figure 2 - Bracket And Yaw Damper Application - GP Locomotives

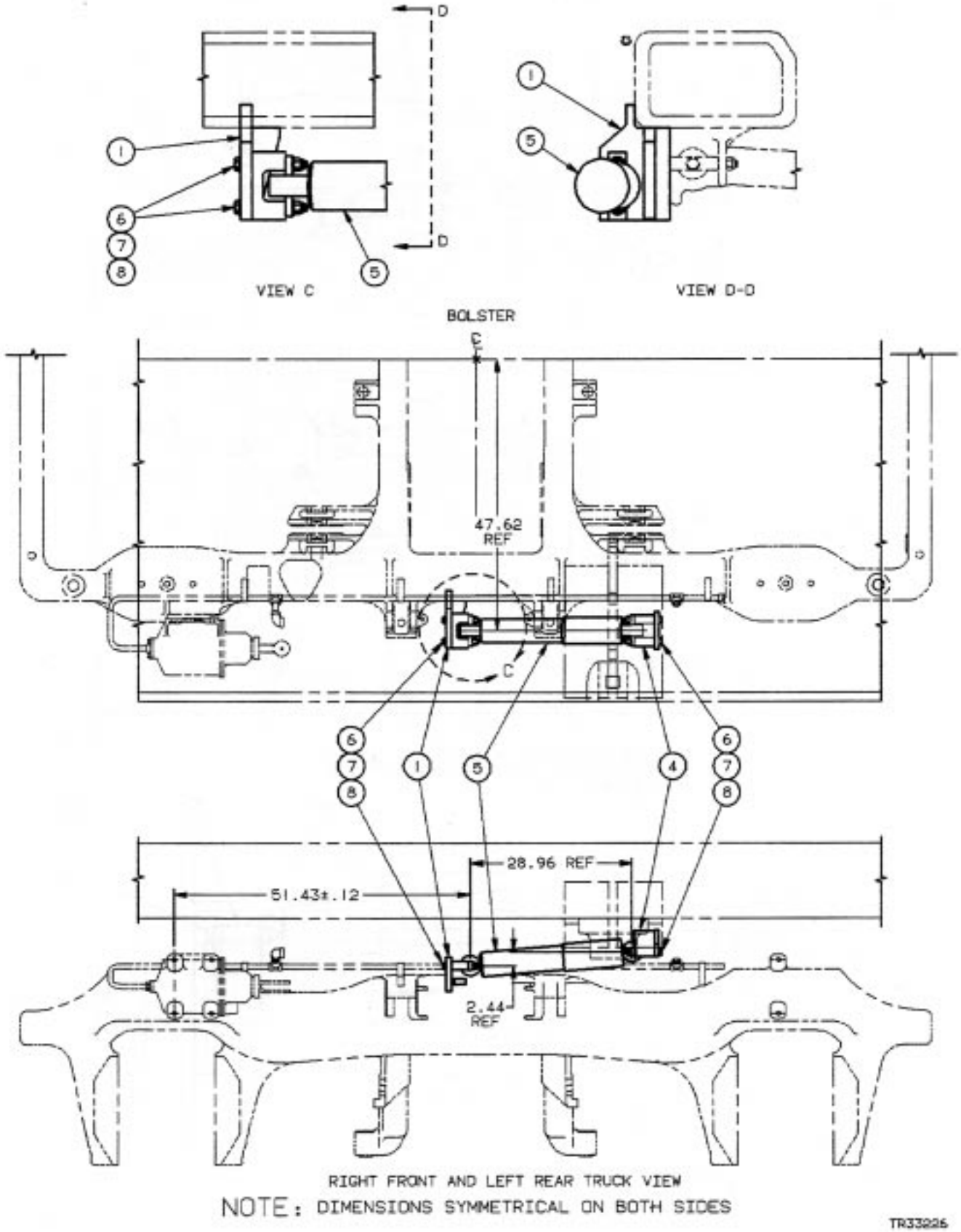

Figure 3 - Bracket And Yaw Damper Application - F40PH Locomotives

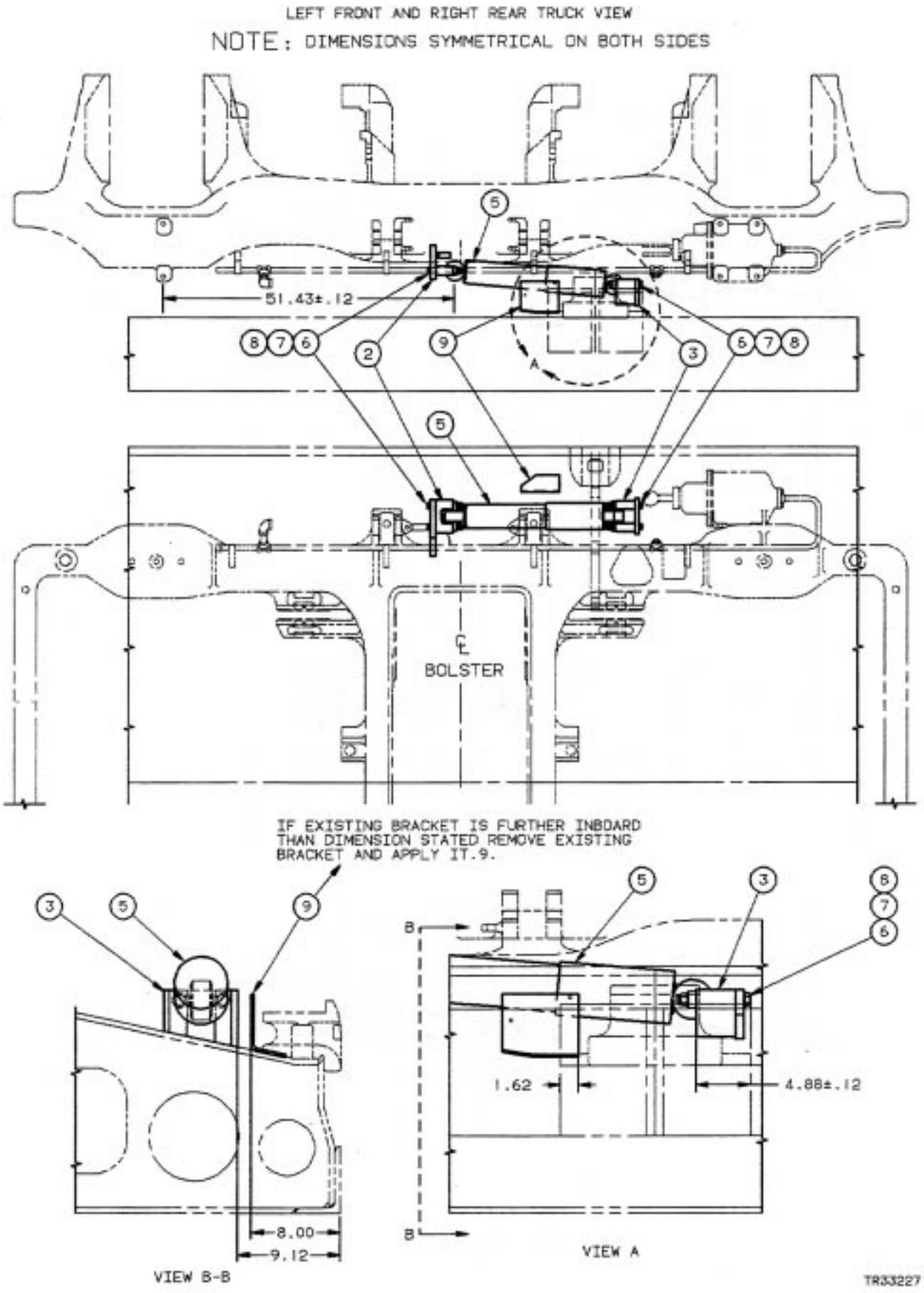

Figure 4 - Bracket And Yaw Damper Application - F40PH Locomotives

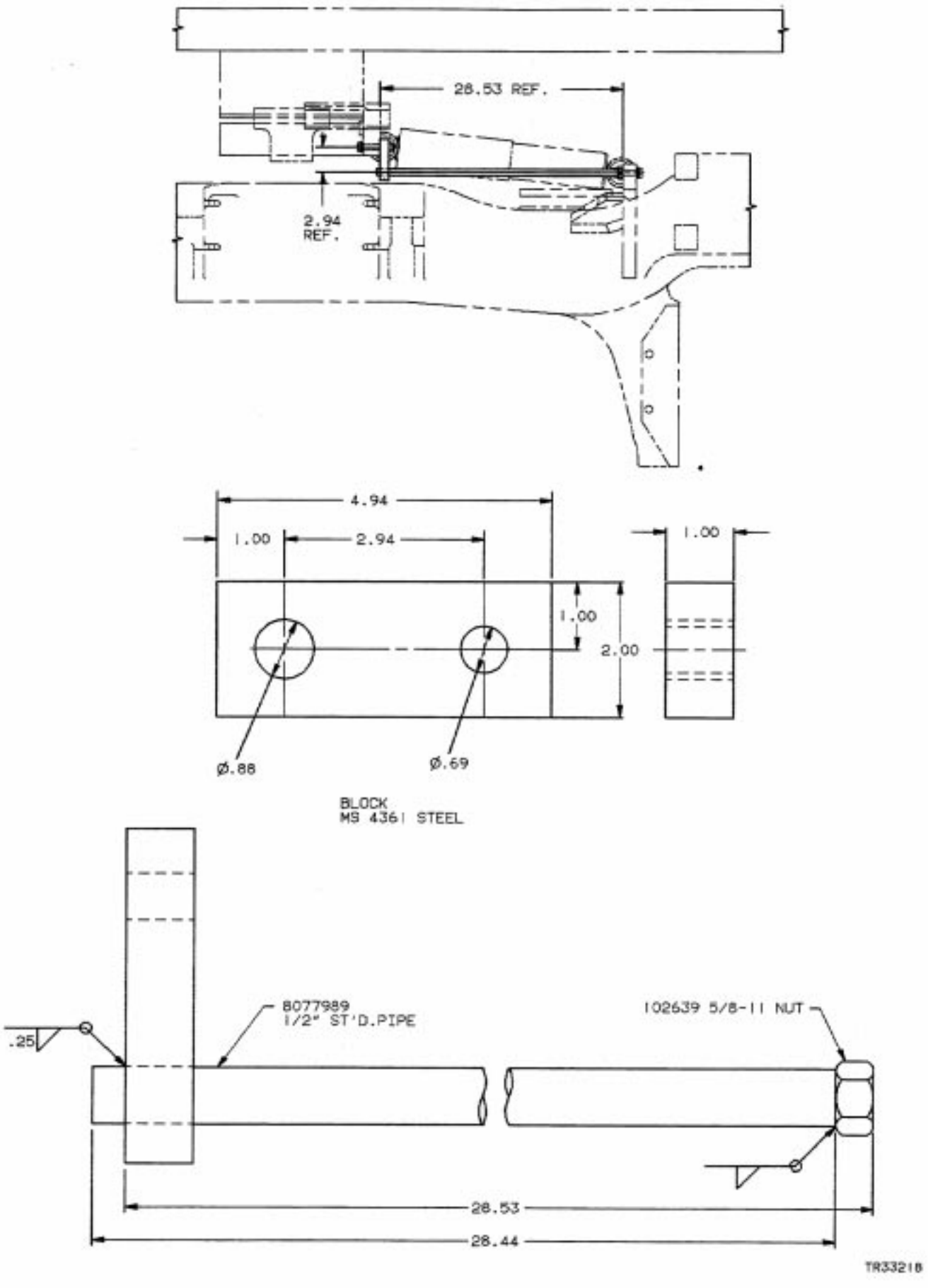

Figure 5 - Yaw Damper Spacer Bar

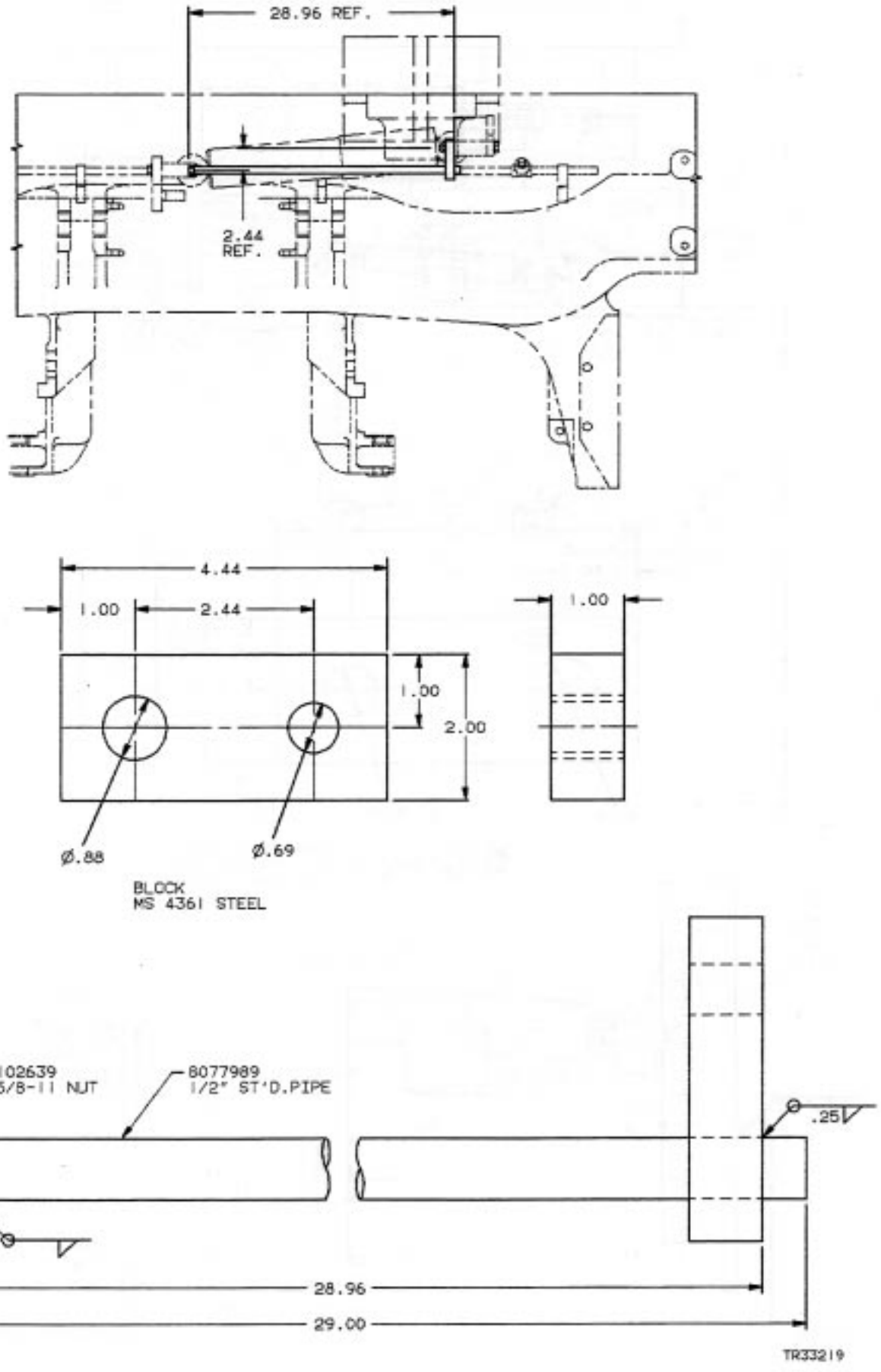

Figure 6 - Yaw Damper Spacer Bar

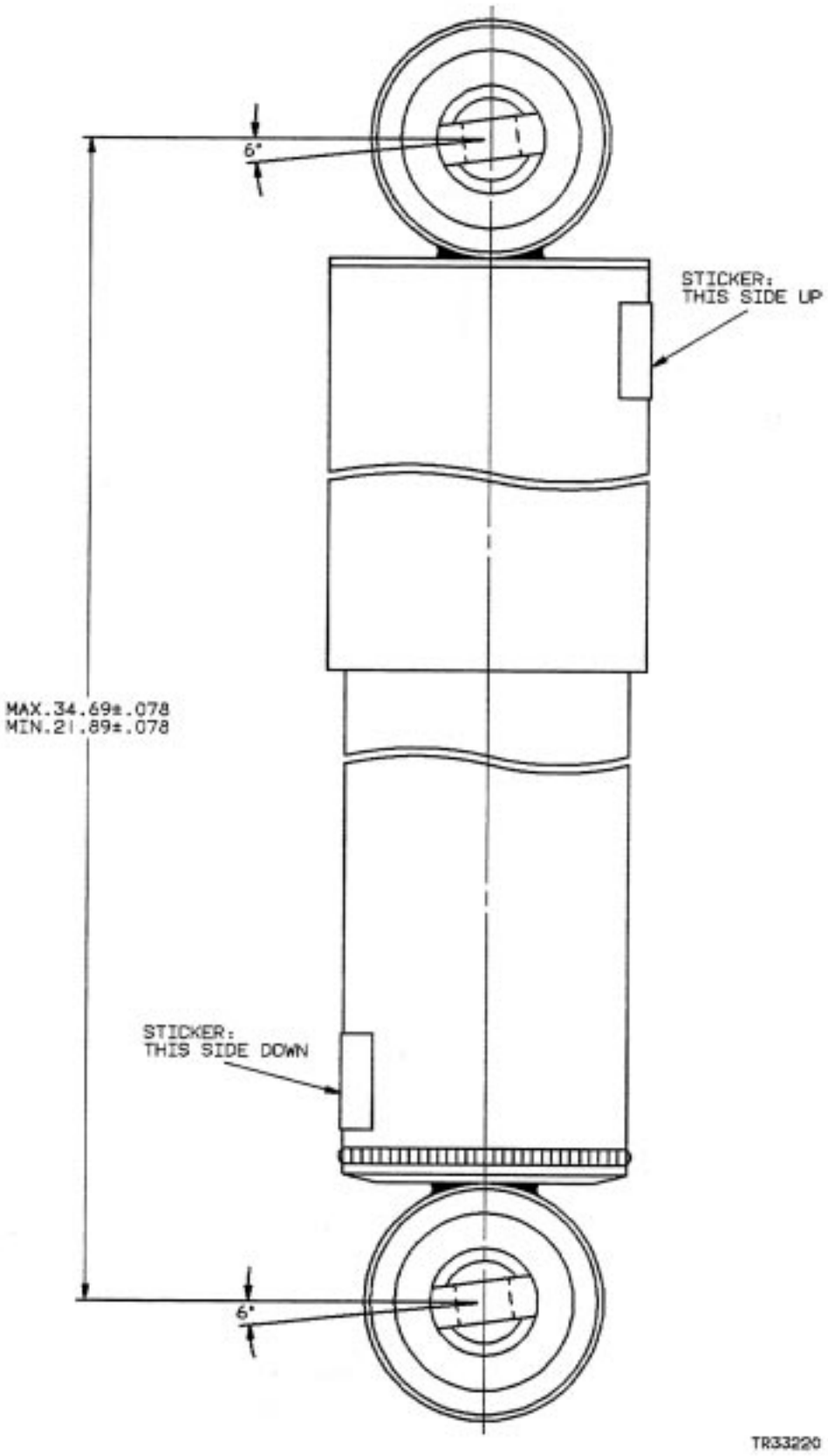

Figure 7 - Yaw Damper Mounting Bar Application

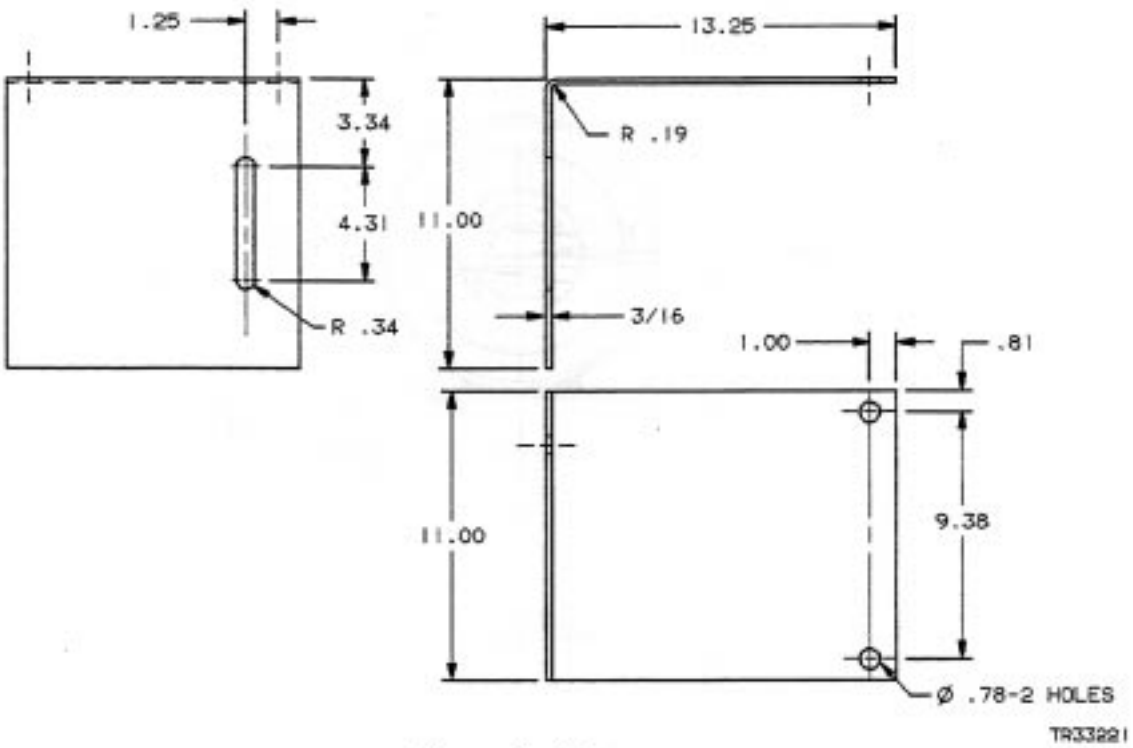

Figure 8 - Fixture

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