



Ford T Tips



By Douglas Dachenbach

How Much Torque is Enough??

There are a myriad of fasteners in and on the Model T Ford. There are bolts, studs, nuts, washers and a few cotter pin we have to be concerned about in order to keep things from falling off as we drive. Awhile back, a friend and I were discussing tightening the pitman arm on the steering column and he asked, "How tight does it need to be?" The easy answer would be, "Tighter than I did mine, which got loose and caused the front wheels to wobble." The correct answer was that I didn't know.

Somewhere I heard that Henry Ford said, "A properly secured bolt is achieved by a normal, healthy man applying a comfortable amount of pressure with a wrench of the correct size." My dad in his prime on the farm had 19 inch biceps. In my prime or anytime for that matter, my biceps never approached anything like 19 inches. Dad's idea of a comfortable pressure and mine would probably have been 50% different. So what is the correct "pressure" or as we call it today, torque? What is torque? Well 10 Lbs. of pressure on a 6 inch wrench is 5 ft. Lbs. of torque. Luckily, today we have wrenches that measure torque. The torque wrench was invented in 1918 and Wikipedia lists eight different types of torque wrenches. Our discussion here is not how it works, but that it does. We can all do a better job of Model T assembly by giving serious thought to how tight that fastener can and should be.

A lot of factors affect applied torque. First and most important is what kind of steel is the fastener fabricated from and of equal importance, in the case of a stud, what is the receiving steel's hardness. Other factors include; is the fastener rusty, are the threads damaged, is it a coated bolt (zinc etc.) and is it dry or lubricated? Don't make assumptions when you choose which table you use. A dry bolt requires about a third more torque than a lubricated bolt to achieve the same degree of compression. More torque means you increase the risk of stripping the threads or breaking off a stud. A dry fastener may rust or seize and cause the use of profanity when you have to disassemble that part. Why risk any of these situations and the possible loss of skin from your knuckles when an easy answer is to use some oil, grease or anti-seize agent first. Table 2 shows both lubricated and dry values for a Grade 5 fastener, while Table 3 shows how different lubricants effect a dry fastener. The amount you can reduce torque is striking.

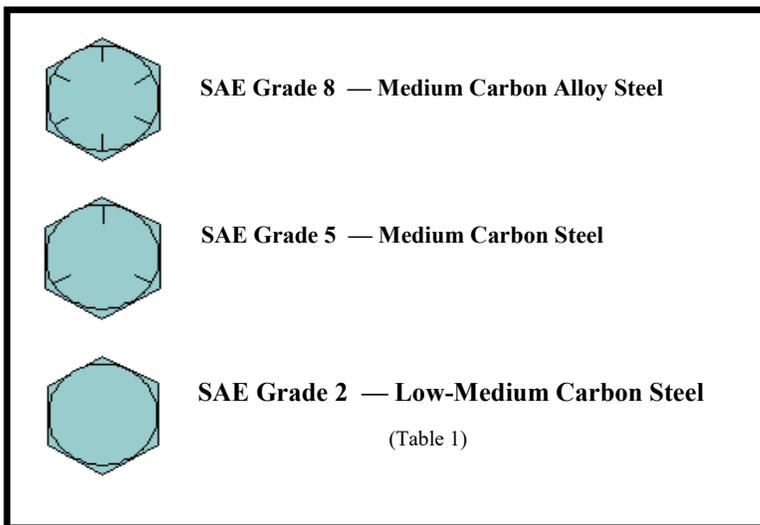
Here are some axioms to ponder before you pick up that torque wrench.

1. If you think Loctite® was used on the fastener or it may be seized or rusted, use some heat or penetrating oil first. (see article on "Best Penetrating Oil You Can't Buy")
2. When you are using a thread locking agent on studs, bolts or even nuts, consider whether you actually need it.
3. If you can't easily screw a nut and bolt together by hand, they shouldn't be used.
4. If the bolt only engages half the threads of a nut you have lost a lot of torque potential.
5. For accurate readings torque slowly and ease back and check it a couple of times.
6. Use a master gauge to periodically check your torque wrench.

Just because a table says you can torque a bolt to 320 ft. Lbs. doesn't mean you have to torque that much. It turns out that a bolt or stud needs to be stretched just a bit or you run the risk of fatigue, loss of torque or getting loose. Don't over torque, but don't under torque too much either.

Ford was usually ahead of contemporary manufacturers in metallurgy. Many of the bolts Ford used

were equivalent to a SAE Grade 5 bolt today. The standard marking on a Grade 5 bolt is three lines radiating from the center (see Table 1). A SAE Grade 5 bolt is a medium carbon steel, quenched and tempered. If you have full thread engagement, such as in the block, you can effectively use SAE Grade 8 to achieve a higher degree of safety. Remember that the block may be equal to Grade 5 so you can't use Grade 8 torque settings. The blocks that the Dodge brothers made up until the early teens were of lesser grade steel and hence were softer. Drop your torque settings a little. If you put too much oil in a stud hole, you will get a false reading from compressing the oil. If you bottom-out you will also get a false reading. *(Many torque values, thanks to American Bolt Corp.)*



Suggested Torque Values		
SAE Grade 5		
Diameter & Threads per Inch	Lub Ft Lb	Dry Ft Lb
1/4 - 20	6	8
1/4 - 28	7	10
5/16 - 18	13	17
5/16 - 24	14	19
3/8 - 16	23	30
3/8 - 24	25	35
7/16 - 14	35	50
7/16 - 20	40	55
1/2 - 13	55	75
1/2 - 20	65	85
9/16 - 12	80	110
9/16 - 18	90	120
5/8 - 11	110	150
5/8 - 18	130	170
3/4 - 10	200	260
3/4 - 16	220	300
7/8 - 8	320	430
7/8 - 14	350	470
1 - 8	480	640
1 - 14	530	710

(Table 2)

Effects of Lubricant on Torque

Lubricant	Torque Decrease (%)
No lube	0
Graphite	49%-55%
White Grease	35%-45%
SAE 30 oil	35%-45%
SAE 40 oil	31%-41%

(Table 3)

There are some rules-of-thumb that can be applied and these are only a guide. As I said earlier, if the threads are lubricated with oil, grease or anti-seize agent, the torque needed to get proper compression is less than that of threads that are dry. Check Table 3 to see how much different types of lubrication effects torque. Going from SAE Grade 5 to Grade 8 (which is a harder steel) allows an increase of the torque of about 40%. Remember that the steel you are engaging may still be equal to Grade 5 and may not stand that increased torque. Going from SAE Grade 5 to Grade 2 requires that you decrease the listed torque in Table 2 by about 33%. Fine threads can take more torque than coarse threads. The torque used for fine threads must

be decreased by about an 1/8 or 12% for coarse threads. Loose or damaged threads by cleaning with a die will markedly decrease the torque the fastener will tolerate before stripping. There are lots of opinion on the correct torque for the block, the mains and rod bolts and most guys don't say it but they are talking dry settings. Use Table 2 as a guide and you should be in the ballpark for our

Ts. See you down the road. Doug

