

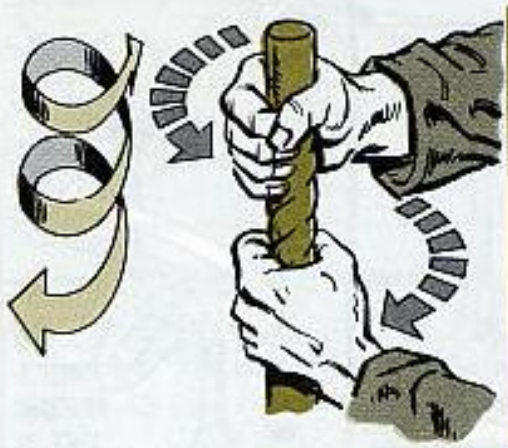
SO WHAT'S TORQUING ABOUT?

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Torque equals force times distance. It's based on the law of the lever. Torque is not tension, which has to do with pull.



TORQUE (TWIST) IS NOT TENSION (PULL)

YOU TORQUE BECAUSE . . .

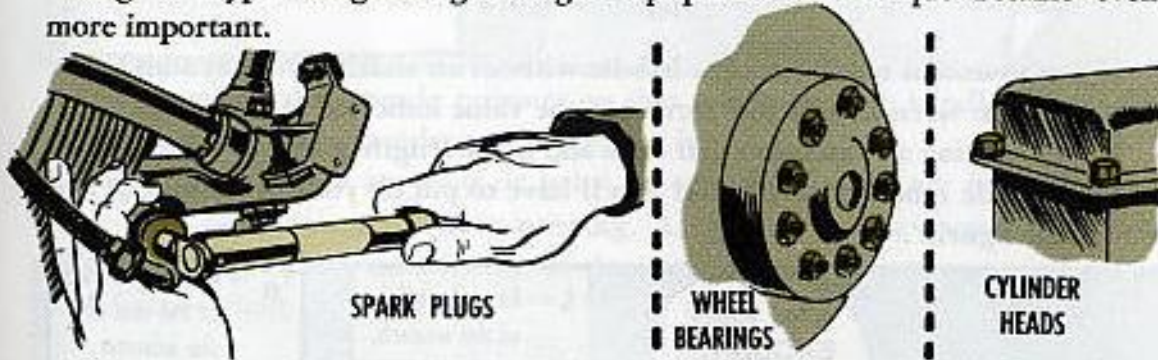
Long ago, engineers found that machinery put together with bolts and nuts had to be tightened just right in certain places to give maximum service. To just snug down or tighten a nut or bolt wouldn't hack it!

They found out, for instance, that spark plugs and bearings had to be torqued just so to get the right performance.



They discovered that engine cylinder head clearances could be lost by over-tightening head bolts. The result — loss of compression, wear and tear on the valves and valve guides, poor fuel economy and (ugh!) early engine failure.

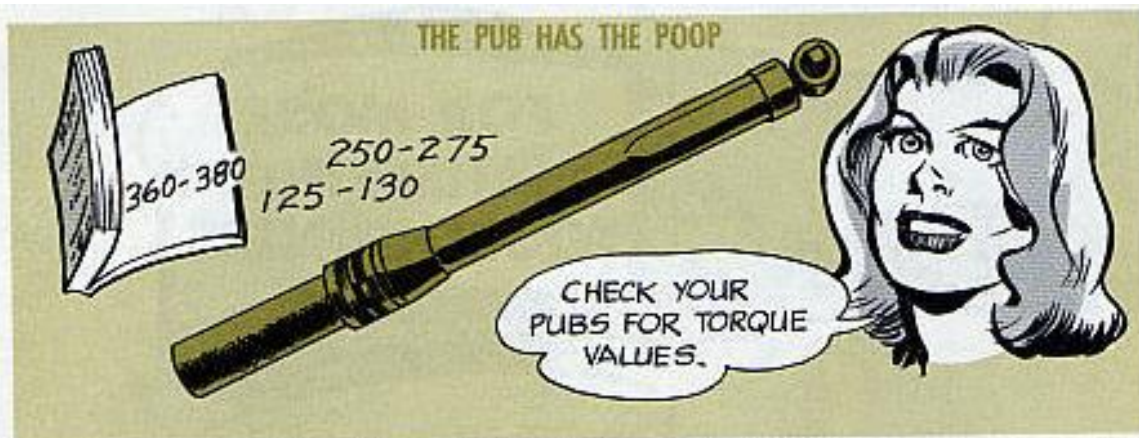
Engineer types designed light-weight equipment and torque became even more important.



Take some applications. A bolt may be stronger than the parts it holds together. If these parts happen to be aluminium or magnesium, over-tightening can produce real headaches. Light-weight metals can be squeezed out of shape and distorted. If they're in the form of a casting, they can be cracked, or the threads in 'em can be stripped. Then you'll find yourself drillin' and tappin' for sure.



THE PUB HAS THE POOP



Not only did the engineers find out that special twistin' is a must — they noted torque values as they designed the machines, and they passed these on to you in the pub that goes along with your equipment.

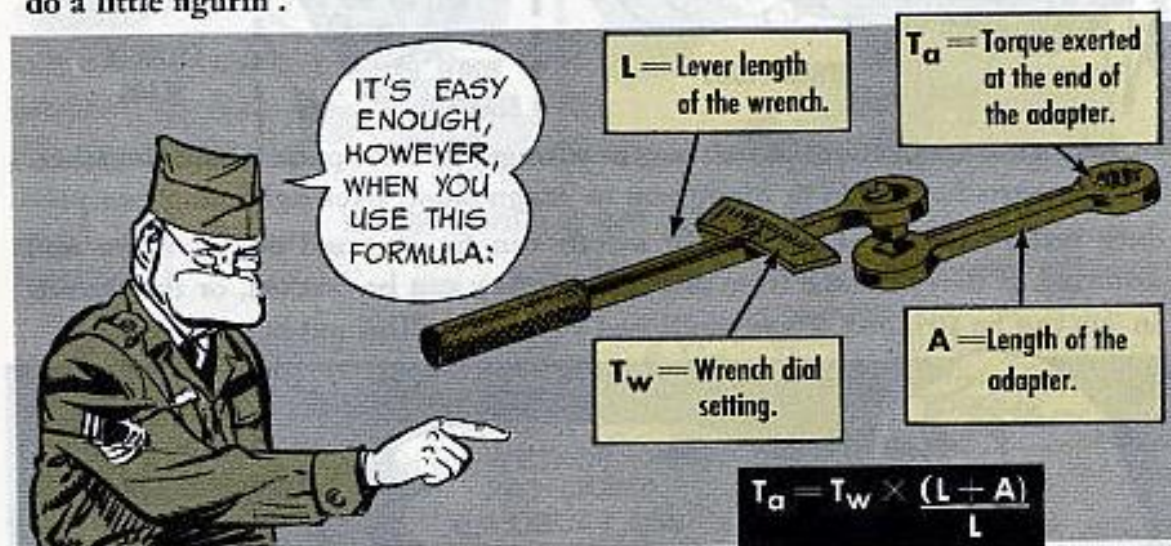
The organizational maintenance pub may have a table with the standard torque values, and special torque values may be called out in the text.

No mechanic worth his salt would tackle a job without his torque wrench and the know-how of using it.

EXTENSION MATH

If you're usin' a regular torque handle without an attachment that adds to the length of the wrench, you just torque to the value indicated in your pubs.

If you're using an extension that **does** add to the length of the wrench, though, there's a little more involved, and you'll have to put on your thinking cap and do a little figurin'.



Now just suppose that you're wrappin' up a job on your equipment, and you come to a nut or a bolt that has to be torqued, but you can't get at it with a regular socket. Let's say it requires a 6-in adapter on that torque wrench to reach it. The pub says the nut is supposed to be torqued down to 65 foot-pounds. Fine!

HERE'S HOW YOU FIGURE IT:

FORMULA SYMBOLS

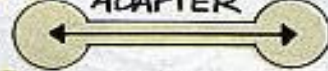
T_A = TORQUE AT END OF ADAPTER



T_w = DIAL SETTING



A = LENGTH OF ADAPTER



L = LEVER LENGTH OF WRENCH



NON W

65

DIVIDED BY 1.5 FT.

43.3 FT-LBS. IS TW

43.3 WILL GIVE YOU TA 65

TO BE SURE:
MULTIPLY 43.3 X 1.5 AND DIVIDE BY 1 FT:
$$\frac{(T_w \times L + A)}{L} = \frac{43.3 \times 1.5}{1} = 64.95$$

OR APPROX. 65 FT. LBS

1 FT + .5 FT = 1.5 FT.
65 FT-LBS. = 43.3
1 FT

So you apply slow steady pressure on that torque wrench handle till the dial reads about 43 foot-pounds, and you've got it.

Before you torque any nuts or bolts, be sure the threads are in good shape. Nuts and bolts have to be free running. A little oil on the threads will help (when a torque table calls for it). If they aren't free running, you can't get an accurate reading.

USE THE RIGHT WRENCH

There're many different torque wrenches available. Just be sure you use the one that has the right torque range for the job you have at hand.

The most common types are the bar or cam-type, and the flexible beam type.

You set the torque you want on the handle of the bar type, and tighten until the wrench slips or "breaks". That's the signal that tells you that you've got the right twist and to ease off on her.

The flexible beam types usually have a dial or a scale right on the handle, and you tighten until the dial indicates the torque you want.

Some torque wrenches are designed for special jobs, like the T-shaped, pre-set torque wrench in the aircraft general mechanic's tool kit. It's intended for tightening hose clamps.

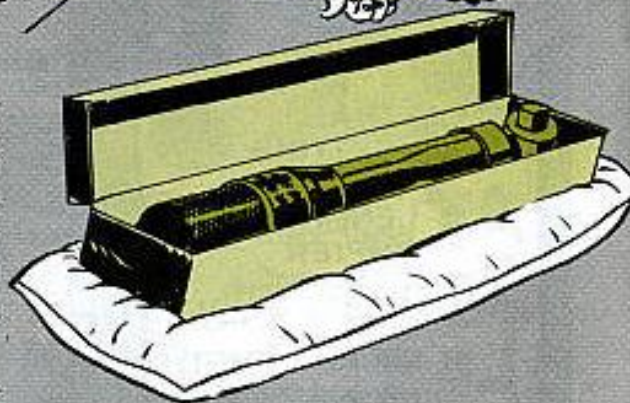




TREAT 'EM TENDERLY

Torque wrenches may be made of steel, but you've got to give 'em the kid-glove treatment if you expect 'em to put out like they're supposed to. They won't stand for bangin' around, and you'll be the one to suffer if you drop 'em on the floor or the tool bench.

You want to be mighty particular where you lay 'em, too. They usually come in a special box, under special wraps. That's where they belong when you're not using 'em, not in the tool box



along with the rest of your tools where they'll get scratched or dented. It doesn't take much more than a scratch to throw a reading off.



KEEP THAT DATE—TO CALIBRATE



Your torque wrenches need regular servicing. TB's published will show you the torque wrenches requiring calibration, and give you the time interval and level of certification.

For example, TB 750-93-10/1 (Nov 64) says to take 'em in for calibration

every 90 days — or more often if need be. Like — if you should drop one accidentally, it should be calibrated before you use it again.

If it's not one of the wrenches that have to be sent back to the factory (like the TCI-750), the TB's also tell your direct support unit how to do the calibratin'.

When a torque wrench is calibrated, the man who does the job fills out a DA Label 80 and puts it on the wrench. This label tells you at a glance the date the check was made, and the date the next calibration is due.

Remember now, tightening tasks won't be guessin' games when you tackle 'em with a torque wrench that's in shape.