SHOP TIPS

Motorcraft

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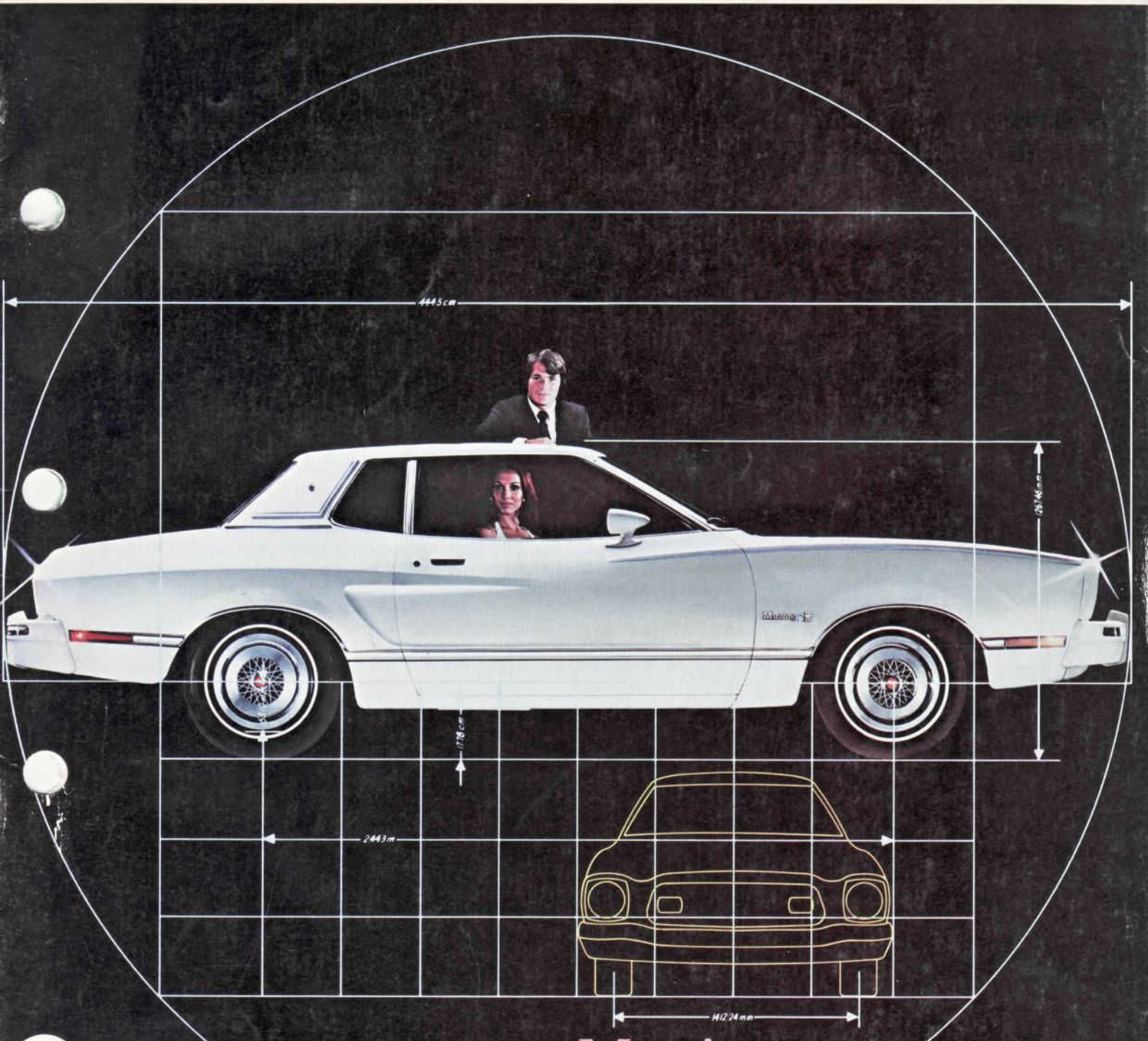

Metrics and Ford's New Metric Engine... 2.3 Liters

METRICS AND FORD'S

Technical parts and service information published by the Ford Parts Division and distributed by Ford and Lincoln-Mercury Dealers to assist servicemen in Service Stations, Independent Garages and Fleets.

IN THIS ISSUE

Be sure to file this and future issues for ready reference. If you have any suggestions for articles that you would like to see included in this publication, please write to: Ford Parts Division, Merchandising Services Dept., P.O. Box 3000, Livonia, Michigan 48151.

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Motorcraft Ford

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VOL. 74 MSD 23 LITHO IN U.S.A.

METRICS . . . ITS TIME HAS COME

France happens to be the country that first developed the Metric System during the last part of the 18th Century. Following the lead of most European countries, Central and South America adopted the system for commercial use during the middle and last half of the 19th Century. Both the Soviet Union and China made the Metric System mandatory right after World War II. India and Japan followed the trend in the 1950's, while Britain began a ten-year conversion to the Metric System in 1965. Within the last few years, the remaining major nations of the British Commonwealth, Australia, Canada and New Zealand, have also made commitments to go the Metric way. Only the United States has lagged behind the rest of the world. But, that is changing and changing rapidly!

A major step forward towards the U.S. entering full scale into the Metric System occurred with Ford's decision to "go metric" when they designed and manufactured their all-new 2.3 Liter, 4-cylinder engine that is the standard powerplant in 1974 Mustang II models. Ford's positive action should help to spur enactment of Senate Bill 2.2483 by the House of Representatives sometime within the next 12-14 months. This bill would establish a timetable for the conversion to a "Metric America"; probably over a 10-year period! With that in mind, this issue could be called a forerunner in the advancement and understanding of the Metric System . . . especially as it applies now (and for the future) to men in the automotive service field.

NEW METRIC ENGINE

LET'S BEGIN AT THE BEGINNING

You have to give the Romans credit. They were the ones who had standards for weights and measures which they kept dry and secure in a temple in Rome. And, in keeping with Roman law, men in all parts of the Roman Empire had to use weights and measures exactly like the standards. Men used the same ounce, the same foot, the same pound and the same mile in their calculations . . . whether they were in Britain or Egypt, Spain or Syria. Yet, when the Roman Empire fell, about 1500 years ago, these standards were lost.

As a result, the Middle Ages became a confusing time for weighing and measuring things. Almost every town and every guild in that town had its own system. To illustrate the problems, we have only to look at a few examples.

On the proper method to do surveying, an early German treatise instructed the surveyor to establish the length of the "Rood" by getting 16 men (after they had left church services) and having them put their left foot, one behind the other. The length thus obtained was then the lawful "Rood" with which to measure and survey the land, and the 16th part of it was to be considered the lawful foot measurement.

NOTE: The "Rood" is felt to be today's "Rod" which is 16½ feet.

Many of today's other units of measurement indicate the crude method from which they originated. A Mile is from the Latin milia passuum, which means 1,000 paces, with each pace being about 5 feet . . . in other words, a double step.

Inch is from the Latin *uncia*, meaning a 12th part. The English yard was established by Henry I as the distance from the point of his nose to the end of his thumb. If he happened to have had a long nose or very short arms, our yard as we know it today could well have been only 33 inches!

An inch in the year 1324 was indicated by the length of three dry barleycorns (grains of barley) that were laid end to end.

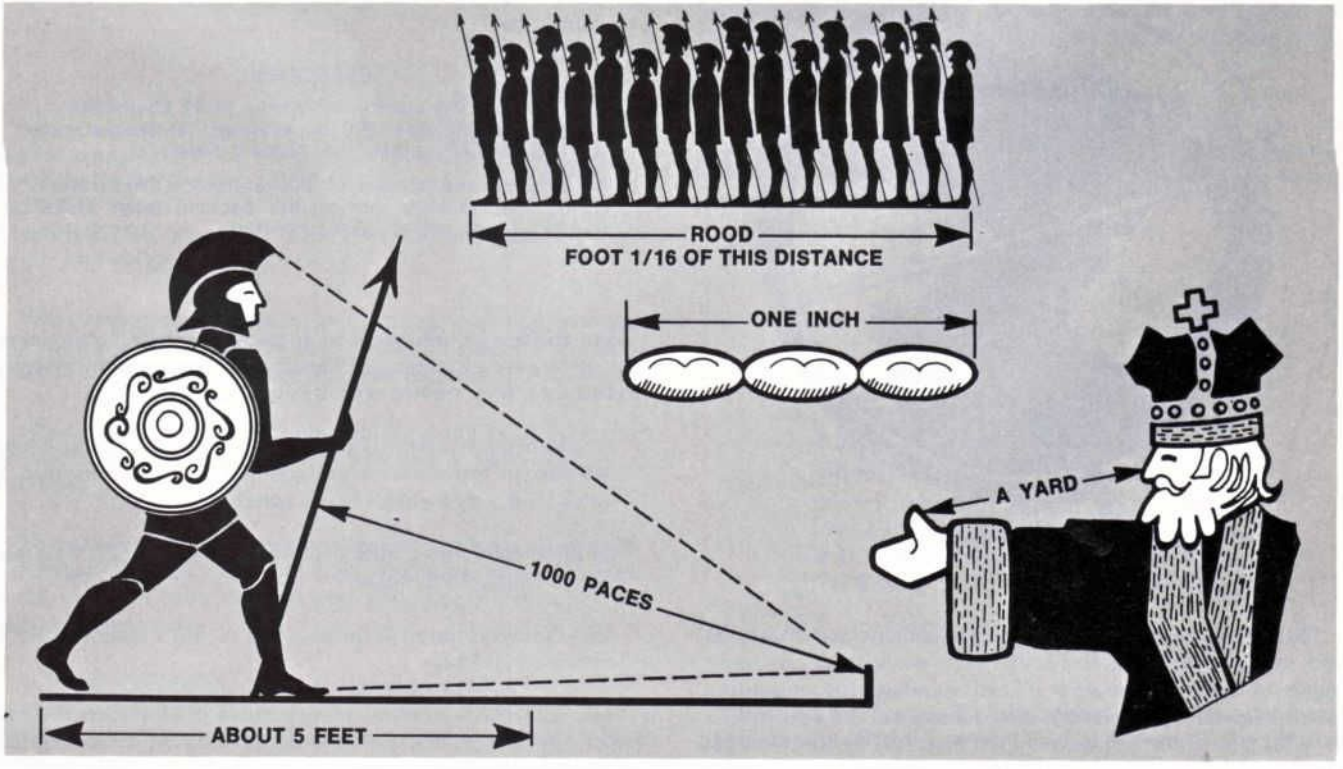
NOTE: The "barleycorn" is still used today as a unit of length in shoe sizes which are numbered in thirds of an inch, or "barleycorns" in a system of 13's.

The pound, which is roughly the same as the old Roman *libra* (we get the abbreviation "Lb" from that), was long defined as the weight of 7,680 grains of wheat.

Therefore, the "grain" is still the smallest unit of weight in today's common systems.

Now, all this worked for a few hundred years and was accepted even with the irregularities it contained. Yet, when international trade developed, a "master" standard was sorely needed. Scientific men the world over banded together in the use of a common system, one that left no doubt in its values. This is the decimal system for weights and measures, and today it is called the Metric System.

NOTE: The Metric System is named after the Greek word *metron*, meaning measure.



METRICS AND FORD'S

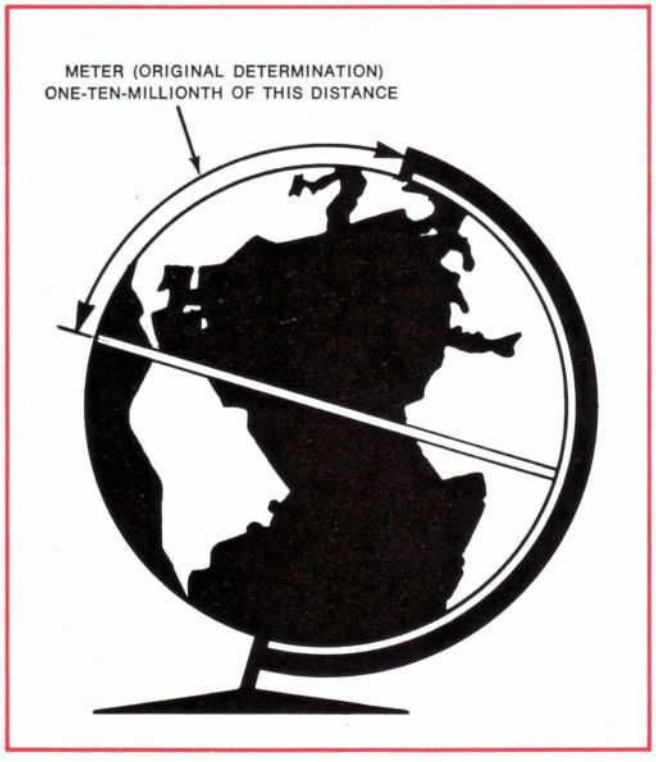
UNDERSTANDING THE LOGIC OF THE METRIC SYSTEM

To most Americans, the International Metric System is much like a foreign language. In fact, in one recent survey, only 40 per cent of those interviewed could name a single metric unit!

Some of those interviewed believed that a *meter* is only what a swimmer swims or the distance that an athlete runs, or that a *cc* (cubic centimeter) is the type of medicine a doctor uses for an injection.

Gradually, this kind of thinking will change. There is no doubt that the International Metric System (technically the Système International d'Unités . . . or SI . . . is the measurement language of almost every country in the world and inevitably . . . that of the United States of America.

The logic of the metric system starts with the basic unit of length . . . the meter. Originally defined as one-ten-millionth of the distance on the earth's surface between the North Pole and the Equator, a new, more accurate standard of length was introduced in 1960.



Through a General Conference on Weights and Measures held in Paris in 1960, the conference established one wave length of light as the new official standard for measuring length in meters. One meter is now defined as . . . 1,650,763.73 wave lengths of the orange-red light given off by Krypton 86. This is a rare gas found in the earth's atmosphere.

In the metric system, the basic unit is the *meter*. This unit of length is a little more than a yard long (39.37 inches or approximately 3.3 feet).

Dividing the *meter* by 10 or 100 or 1000 gives the smaller units that are distinguished by the Latin prefixes: *deci* (10) . . . *centi* (100) . . . *milli* (1,000). *Multiplying* the same numbers gives the larger units that are distinguished by the Greek prefixes: *deka* (10) . . . *hekto* (100) . . . *kilo* (1,000).

NOTE: In the metric system, the simplicity and logic remain unchanged. It has only SIX basic units.

The unit of length is the *meter*. The unit of mass is the *kilogram*. The unit of temperature is the degree *Kelvin* . . . commonly called the degree Celsius (formerly centigrade).

The unit of time is the *second*, the unit of electric current is the *ampere*, while the unit of light intensity is the *candela*.

With these six units it is possible to derive all other measurements in the International Metric System (SI). Its decimal base is another important part of the metric system. Units of any given measurement are always related in multiple numbers of 10 . . . as discussed earlier.

In other words, there are 10 millimeters in a *centimeter;* 100 centimeters in a *meter;* and 1,000 meters in a *kilometer*.

EXAMPLES:

To calculate the number of meters in 42 kilometers . . . simply multiply by 1,000 by moving the decimal point THREE PLACES to the right—42000.0 meters.

To calculate the number of kilometers in 4,289.0 meters, divide by 1,000 by moving the decimal point THREE PLACES to the left—4.289.0 kilometers.

For those who only want to do some rough reckoning here are some easy to remember details for your memory system. Remember, they are not exact by any means.

- A kilometer is about equal to 5/8 of a mile. You could use this to translate, as an example, 8 kilometers into 5 miles (5/8 x 8/1 equals 40/8 equals 5 miles).
- 25 kilometers into a little over 15 miles (5/8 x 25/1 equals 125/8 equals 15.6 miles).
- 40 kilometers into 25 miles (5/8 x 40/1 equals 200/8 equals 25 miles).

The formula to convert temperatures is more demanding. Especially if you see an outdoor reading of Zero degrees Centigrade which is 32 degrees Fahrenheit.

NEW METRIC ENGINE *Continued*

The formula to convert Fahrenheit to Centigrade (when you know what the F. temperature is) is to subtract 32 from the degrees F. Then multiply this number by the number 5. Then divide this figure by the number 9.

FORMULA:

$$\text{CENTRIGRADE} \quad \frac{(\text{Degrees Fahr.} - 32) \times 5}{9}$$

EXAMPLE:

$$\frac{110 \text{ degrees F.} - 32}{9} = \frac{78}{9} \times 5 = \frac{390}{9} = 43.3 \text{ degrees C.}$$

To convert Centigrade to Fahrenheit (when you know what the C. temperature is) is to multiply the degree C. by the number 9. Then divide this figure by the number 5 and add 32.

FORMULA:

$$\text{FAHRENHEIT} \quad \frac{9 \times (\text{Degrees Cent.})}{5} + 32$$

EXAMPLE:

$$\frac{9 \times 38 \text{ C.}}{5} \quad \frac{342}{5} = 68.4 + 32 = 100.4 \text{ degrees F.}$$

When the United States adopts the metric system, life will still be complex for the average American. We will have to buy land by the *hectare* which is 2.471 acres . . . buy cloth by the *meter* which is 39.37 inches . . . buy meat by the kilo which is 2.2046 pounds . . . and milk (oil and gasoline, too) by the liter which is 1.056 quarts.

What about the people who shop at a supermarket who are confronted with a package that states the contents are 475 grams . . . (that's a little more than one pound).

What about the guy who already has a big head and who goes to a hatter and he tells him he needs a size 57 (that's a 7⅛ size).

There'll be confusion and dual labels needed at first until a number of years pass and the population of the United States becomes fully familiar and fully acquainted with the SI . . . metric system.

NOTE: On the centigrade scale, 100 degrees C. is the boiling point of water, while 0 degrees C. is the freezing point. Normal body temperature is 37 degrees C. and a comfortable room temperature is about 23 degrees C.

TEMPERATURE

	CENTIGRADE		FAHRENHEIT
Degrees			
	−40	=	−40
	−17.7	=	0
	0	=	+32
	+37	=	+98.6
	+100	=	+212

Another example of the simplicity and also the usefulness of the metric system can be noted in the following numerical figures:

If you had a figure of 8765432 mm, here is how it can be converted simply into other metric units:

8765432 mm equals 876543.2 cm	(centimeter)
876543.2 cm equals 87654.32 dm	(decimeter)
87654.32 dm equals 8765.432 m	(meter)
8765.432 m equals 876.5432 da	(decameter)
876.5432 da equals 87.65432 hm	(hectometer)
87.65432 hm equals 8.765432 km	(kilometer)

As you have noted, the conversion to differing frames of reference can be made simply by moving the decimal point as shown.

NOTE: Calculations where fractions are concerned are also laborious under the present U.S. system. Here is another example of the simplicity of the Metric System when adding feet and fractions of a foot:

U.S. CUSTOMARY	METRIC
2 ft. 10½ in.	876 mm
7 ft. 7 13/16 in.	2332 mm
5 ft. 6 in.	1676 mm
3 ft. 9⅝ in.	1159 mm
17 ft. + 32 in. + 31/16 in.	6043 mm
= 17 ft. + 2 ft. + (9 in. + 15/16 in.)	604.3 cm
= 19 ft. 9 15/16 in.	6.043 m

Refer to the Inches To Millimeters Chart and the Fractional Inches To Millimeters Chart on pages 7 & 8 of this issue.

METRICS AND FORD'S

CONVERSION CHARTS FOR HANDY REFERENCE

You will find the three charts on pages 6, 7 and 8 extremely useful in becoming better acquainted with the Metric System. The Chart covering Millimeters to Decimal Inches on this page, and the Chart covering Decimal Inches to Millimeters on the facing page should be kept handy so that you can refer to them when the need arises. Also, you can use these charts to practice or "noodle" with the metric system until at some later date you become comfortable with how it all works. And, in your servicing of metric engines such as the new 2.3 Liter engine produced by Ford in the Lima, Ohio manufacturing plant (also Ford's 2000 cc and the 2800 cc engines which are import power plants), you will be able to do a more professional job.

CONVERTING MILLIMETERS TO INCHES

The inch values in this chart are rounded to the nearest value in the last digit shown.

Example: Convert 105.23 mm to inches:

100.00 mm = 3.937008 in.
5.00 mm = 0.196850 in. (rounded to six decimal places)
0.23 mm = 0.009055 in. (rounded to six decimal places)
105.23 mm = 4.142913 in.
105.23 mm = 4.1429 in. (rounded to four decimal places)

MILLIMETERS	INCHES	MILLIMETERS	INCHES	MILLIMETERS	INCHES
1	0.039 370 08	36	1.417 322 8	71	2.795 275 6
2	0.078 740 16	37	1.456 692 9	72	2.834 645 7
3	0.118 110 24	38	1.496 063 0	73	2.874 015 7
4	0.157 480 31	39	1.535 433 1	74	2.913 385 8
5	0.196 850 39	40	1.574 803 1	75	2.952 755 9
6	0.236 220 47	41	1.614 173 2	76	2.992 126 0
7	0.275 590 55	42	1.653 543 3	77	3.031 496 1
8	0.314 960 63	43	1.692 913 4	78	3.070 866 1
9	0.354 330 71	44	1.732 283 5	79	3.110 236 2
10	0.393 700 8	45	1.771 653 5	80	3.149 606 3
11	0.433 070 9	46	1.811 023 6	81	3.188 976 4
12	0.472 440 9	47	1.850 393 7	82	3.228 346 5
13	0.511 811 0	48	1.889 763 8	83	3.267 716 5
14	0.551 181 1	49	1.929 133 9	84	3.307 086 6
15	0.590 551 2	50	1.968 503 9	85	3.346 456 7
16	0.629 921 3	51	2.007 874 0	86	3.385 826 8
17	0.669 291 3	52	2.047 244 1	87	3.425 196 9
18	0.708 661 4	53	2.086 614 2	88	3.464 566 9
19	0.748 031 5	54	2.125 984 3	89	3.503 937 0
20	0.787 401 6	55	2.165 354 3	90	3.543 307 1
21	0.826 771 7	56	2.204 724 4	91	3.582 677 2
22	0.866 141 7	57	2.244 094 5	92	3.622 047 2
23	0.905 511 8	58	2.283 464 6	93	3.661 417 3
24	0.944 881 9	59	2.322 834 6	94	3.700 787 4
25	0.984 252 0	60	2.362 204 7	95	3.740 157 5
26	1.023 622 0	61	2.401 574 8	96	3.779 527 6
27	1.062 922 1	62	2.440 944 9	97	3.818 897 6
28	1.102 362 2	63	2.480 315 0	98	3.858 267 7
29	1.141 732 3	64	2.519 685 0	99	3.897 637 8
30	1.181 102 4	65	2.559 055 1	100	3.937 008 0
31	1.220 472 4	66	2.598 425 2		
32	1.259 842 5	67	2.637 795 3		
33	1.299 212 6	68	2.677 165 4		
34	1.338 582 7	69	2.716 535 4		
35	1.377 952 8	70	2.755 905 5		

NEW METRIC ENGINE *Continued*

CONVERTING DECIMAL INCHES TO MILLIMETERS

NOTE: All values in this chart are EXACT.

Example: Convert 2.4637 in. to millimeters:

2.0000 in. = 50.80000 mm exactly
0.4600 in. = 11.68400 mm exactly
0.0037 in. = 0.09398 mm exactly

2.4637 in. = 62.57798 mm
2.4637 in. = 62.578 mm (rounded to three decimal places)

INCHES	MILLIMETERS	INCHES	MILLIMETERS	INCHES	MILLIMETERS
0.001	0.025 4	0.01	0.254	0.1	2.54
0.002	0.050 8	0.02	0.508	0.2	5.08
0.003	0.076 2	0.03	0.762	0.3	7.62
0.004	0.101 6	0.04	1.016	0.4	10.16
0.005	0.127 0	0.05	1.270	0.5	12.70
0.006	0.152 4	0.06	1.524	0.6	15.24
0.007	0.177 8	0.07	1.778	0.7	17.78
0.008	0.203 2	0.08	2.032	0.8	20.32
0.009	0.228 6	0.09	2.286	0.9	22.86

INCHES	MILLIMETERS	INCHES	MILLIMETERS	INCHES	MILLIMETERS
1	25.4	36	914.4	71	1 803.4
2	50.8	37	939.8	72	1 828.8
3	76.2	38	965.2	73	1 854.2
4	101.6	39	990.6	74	1 879.6
5	127.0	40	1 016.0	75	1 905.0
6	152.4	41	1 041.4	76	1 930.4
7	177.8	42	1 066.8	77	1 955.8
8	203.2	43	1 092.2	78	1 981.2
9	228.6	44	1 117.6	79	2 006.6
10	254.0	45	1 143.0	80	2 032.0
11	279.4	46	1 168.4	81	2 057.4
12	304.8	47	1 193.8	82	2 082.8
13	330.2	48	1 219.2	83	2 108.2
14	355.6	49	1 244.6	84	2 133.6
15	381.0	50	1 270.0	85	2 159.0
16	406.4	51	1 295.4	86	2 184.4
17	431.8	52	1 320.8	87	2 209.8
18	457.2	53	1 346.2	88	2 235.2
19	482.6	54	1 371.6	89	2 260.6
20	508.0	55	1 397.0	90	2 286.0
21	533.4	56	1 422.4	91	2 311.4
22	558.8	57	1 447.8	92	2 336.8
23	584.2	58	1 473.2	93	2 362.2
24	609.6	59	1 498.6	94	2 387.6
25	635.0	60	1 524.0	95	2 413.0
26	660.4	61	1 549.4	96	2 438.4
27	685.8	62	1 574.8	97	2 463.8
28	711.2	63	1 600.2	98	2 489.2
29	736.6	64	1 625.6	99	2 514.6
30	762.0	65	1 651.0	100	2 540.0
31	787.4	66	1 676.4		
32	812.8	67	1 701.8		
33	838.2	68	1 727.2		
34	863.6	69	1 752.6		
35	889.0	70	1 778.0		

CONVERTING FRACTIONS TO MILLIMETERS

(With Decimal Equivalent)

NOTE: All values in this chart are EXACT.

INCHES	DECIMAL	MILLIMETERS
1/64	0.015 625	0.396 875
1/32	0.031 250	0.793 750
3/64	0.046 875	1.190 625
1/16	0.062 500	1.587 500
5/64	0.078 125	1.984 375
3/32	0.093 750	2.381 250
7/64	0.109 375	2.778 125
1/8	0.125 000	3.175 000
9/64	0.140 625	3.571 875
5/32	0.156 250	3.968 750
11/64	0.171 875	4.365 625
3/16	0.187 500	4.762 500
13/64	0.203 125	5.159 375
7/32	0.218 750	5.556 250
15/64	0.234 375	5.953 125
1/4	0.250 000	6.350 000
17/64	0.265 625	6.746 875
9/32	0.281 250	7.143 750
19/64	0.296 875	7.540 625
5/16	0.312 500	7.937 500
21/64	0.328 125	8.334 375
11/32	0.343 750	8.731 250
23/64	0.359 375	9.128 125
3/8	0.375 000	9.525 000
25/64	0.390 625	9.921 875
13/32	0.406 250	10.318 750
27/64	0.421 875	10.715 625
7/16	0.437 500	11.112 500
29/64	0.453 125	11.509 375
15/32	0.468 750	11.906 250
31/64	0.484 375	12.303 125
1/2	0.500 000	12.700 000

INCHES	DECIMAL	MILLIMETERS
33/64	0.515 625	13.096 875
17/32	0.531 250	13.493 750
35/64	0.546 875	13.890 625
9/16	0.562 500	14.287 500
37/64	0.578 125	14.684 375
19/32	0.593 750	15.081 250
39/64	0.609 375	15.478 125
5/8	0.625 000	15.875 000
41/64	0.640 625	16.271 875
21/32	0.656 250	16.668 750
43/64	0.671 875	17.065 625
11/16	0.687 500	17.462 500
45/64	0.703 125	17.859 375
23/32	0.718 750	18.256 250
47/64	0.734 375	18.653 125
3/4	0.750 000	19.050 000
49/64	0.765 625	19.446 875
25/32	0.781 250	19.843 750
51/64	0.796 875	20.240 625
13/16	0.812 500	20.637 500
53/64	0.828 125	21.034 375
27/32	0.843 750	21.431 250
55/64	0.859 375	21.828 125
7/8	0.875 000	22.225 000
57/64	0.890 625	22.621 875
29/32	0.906 250	23.018 750
59/64	0.921 875	23.415 625
15/16	0.937 500	23.812 500
61/64	0.953 125	24.209 375
31/32	0.968 750	24.606 250
63/64	0.984 375	25.003 125
1	1.000 000	25.400 000

NEW METRIC ENGINE *Continued*

FORD'S NEW 2.3 LITER ENGINE

Although the new four-cylinder engine is of metric design and dimensioning, it is not a new type of engine with Ford. However, it is the first four-cylinder passenger-type that Ford has built in the United States in some 40 years.

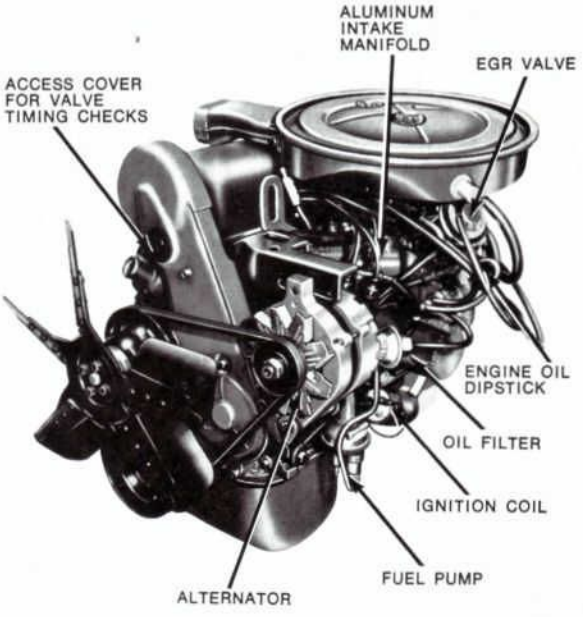
As some of you may recall, both the Model "T" and the Model "A" also had four-cylinder engines; yet the Model "A" engine with a 200 cubic inch displacement produced only 40 horsepower. In comparison, Ford's new 2.3 Liter engine for 1974 (2300 cc) gets more horsepower out of a smaller displacement of only 140 cubic inches. With only 2/3rds the displacement of the Model "A," and using modern technology and engineering, it produces TWO AND ONE-HALF TIMES the horsepower!

This new engine offered many challenges to the design and basic engineering groups because of the uniqueness of its overhead cam and the introduction of metric dimensions . . . a "first" in the United States.

Cylinder bore grades are classified in the increments of 1/100 of a millimeter so as to match more precisely the pistons with the engine block bores.

And, each piston is measured and graded in 1/100 of a millimeter for more precise bore matching. Noteworthy too, from a service standpoint: the Mustang II manual transmission is also metric and manufactured in the U.S.

When it comes to fasteners, about 50 different ones are used with the Mustang II engine with 95% of them metric, including all threaded parts except the pipe plugs. It is interesting to note that inch pipe threads are already a world standard and are not expected to be subject to metric conversion!



1

GENERAL SPECIFICATIONS—1974 2.3 LITER ENGINE

	METRIC	ENGLISH
Engine Weight (Dry)	144.5 Kilograms	318.6 Lb.
Engine Displacement	2300 Cubic Centimeters	140 Cubic Inches
Firing Order	1-3-4-2	—
Cylinder Bore	96.00 MM	3.781
Piston Stroke	79.400 MM	3.126
Bore/Stroke Ratio	1.20	—
Cylinder Bore Spacing	106.00 MM	4.173
Compression Ratio	8.40:1	—
Net Horsepower at RPM		102 @ 5200
Net Torque at RPM		122 @ 3200
Carburetor: Venturi Diameter	Pri.-26 MM; Sec.-27 MM	Pri.-1.023; Sec.-1.063
Throttle Bore Diameter	Pri.-32 MM; Sec.-36 MM	Pri.-1.26; Sec.-1.417
Crankshaft Main Bearings: Material—Copper—Lead Alloy on Steel Back		
Number of Counter Weights	4	—
Main Bearing Diameter	60.935 MM	2.399
Crankpin Bearing Diameter	52.00 MM	2.0172
Piston Pin Diameter	23.165 MM	.9120
Connecting Rod: Material—Forged Steel (SAE-1041-H)		
Length—Centerline to Centerline	132.20 MM	5.2047

	METRIC	ENGLISH
Valve Lifters	Hydraulic	—
Valve Rocker Arm Ratio	1.64:1 max.	—
Valve Lift:		
Intake	10.160	.400
Exhaust	10.160	.400
Valve Timing:		
Intake Opens, Degrees BTC	22°	—
Intake Closes, Degrees ABC	66°	—
Exhaust Opens, Degrees, BBC	64°	—
Exhaust Closes, Degrees ATC	24°	—
Valve Spring Loading:		
Valve Closed	32.2-35.8 KG	71-79 Lb.
Valve Open	81.2-89.8 KG	179-198 Lb.
Oil Capacity, including Filter	—	5 Quarts
Oil Pump Pressure, Capacity at RPM	—	50 PSI @ 2000
Fuel Pump Pressure Range	—	3.5-4.5 PSI

MAINTENANCE & SERVICE ON THE 2.3 LITER ENGINE

Service mechanics will have to acquire a set of metric wrenches to service this new 2.3 Liter engine from Ford. However, those of you who have worked on 1600 cc and 2000 cc engines in the Pinto models (beginning with 1971), no doubt have already purchased metric sockets and/or hand wrenches.

Attempting to use the customary type of wrench on a metric bolt head, nut or other metric fasteners can only result in disaster. Metric wrenches (and sockets) are also valuable when servicing the other metric engines in the Ford line-up . . . the Pinto, Capri and Pantera.

CAMSHAFT TIMING

There is an access plug provided in the cam drive belt cover so that camshaft timing can be checked without removal of the cover or any other parts.

To make this check (if you suspect it is incorrect) first remove the access plug from the cam drive belt cover. See Figure 2.

- Set the crankshaft to TDC by aligning the timing pointer on the belt cover with the 0 (zero) mark on the crankshaft damper.

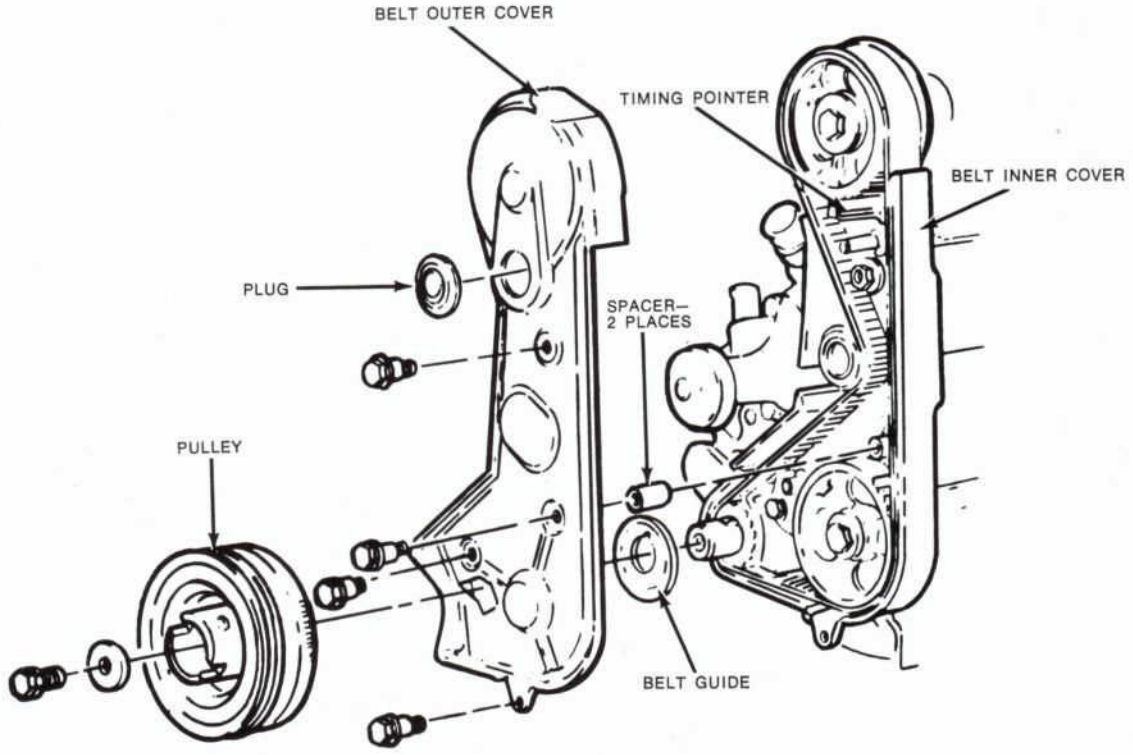
CAUTION: Always turn the engine in the direction of normal rotation. Turning the engine backward may cause the timing belt to "JUMP TIME" due to the arrangement of the belt tensioner.

- Look through the access hole in the belt cover to be sure that the timing mark on the cam drive sprocket (see Figure 2) is lined up with the pointer on the inner belt cover.
- Remove the distributor cap and check that the distributor rotor is FACING NO. 1 POSITION on the distributor cap.
- Install the distributor cap and install the belt cover access plug.

NOTE: If you find the pointer is NOT IN LINE WITH THE TIMING MARK ON THE CAM DRIVE SPROCKET, proceed to set the camshaft timing as follows:

ADJUSTING CAMSHAFT TIMING

Remove the timing belt outer cover. See Figures 2 and 3. Loosen the belt tensioner adjustment screw. See Figure 4. Now, you will need a *special tool* to release the belt tension spring. Tighten the adjustment screw to hold the tensioner in the released position. Remove the crankshaft damper and the belt guide. Refer to Figure 3.



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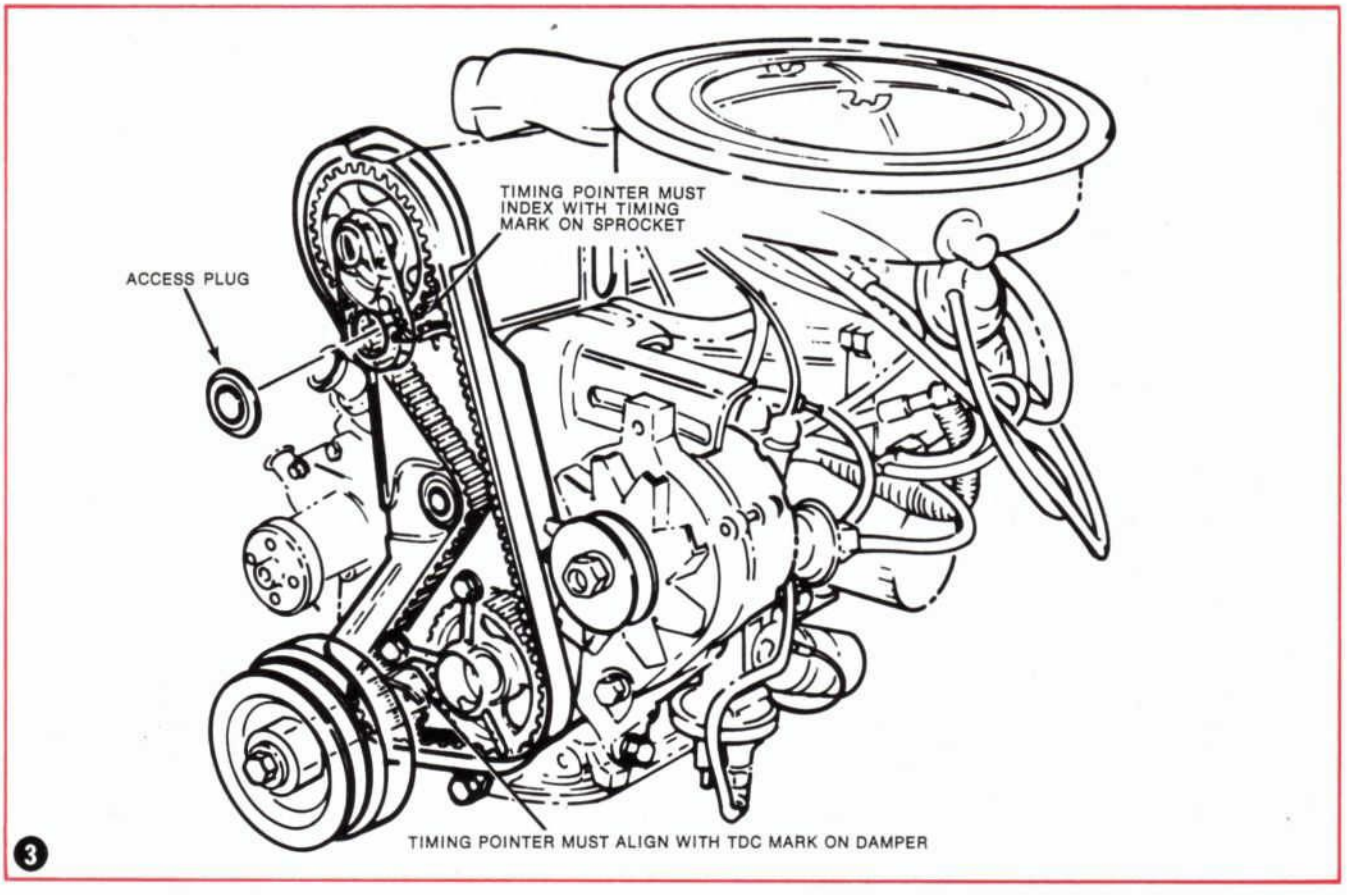


Now, remove the drive belt and inspect it for wear or visible damage. Replace if necessary. Position the crankshaft sprocket, the camshaft sprocket and the auxiliary shaft sprocket as shown in Figure 3.

NOTE: The crankshaft and the camshaft MUST BE AT TDC with the No. 1 cylinder firing.

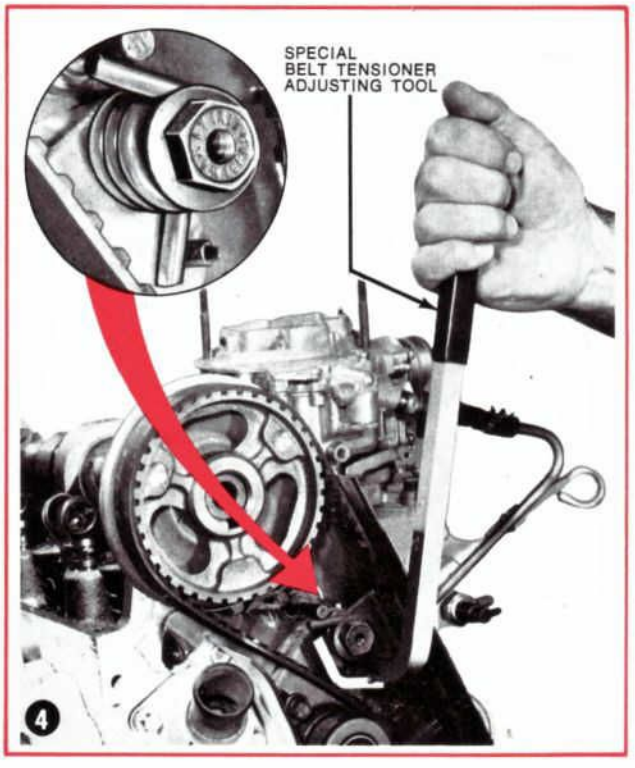
Install the timing belt over the crankshaft sprocket and then counterclockwise over the auxiliary and camshaft sprockets. Make sure the belt is aligned fore and aft on all sprockets.

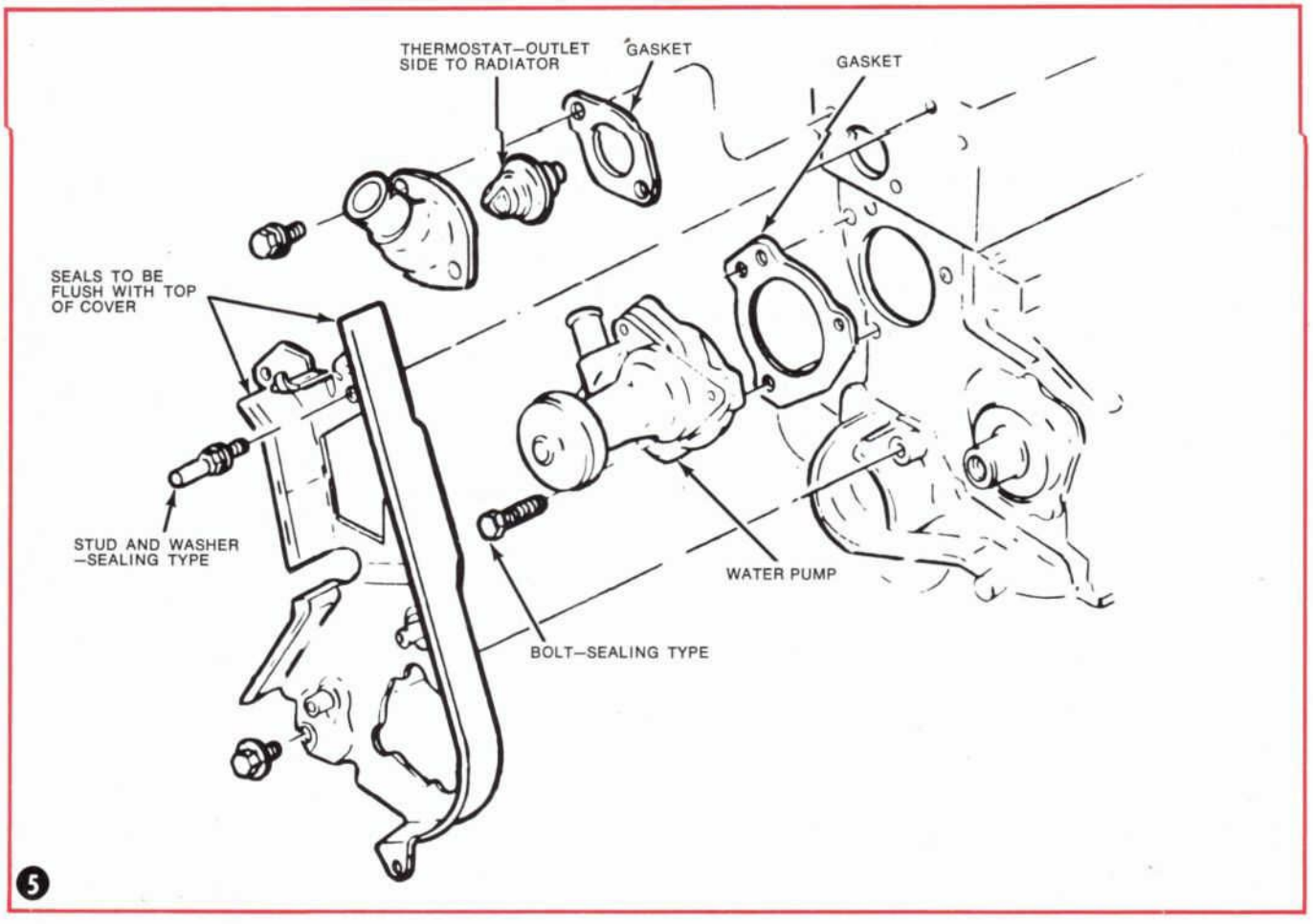
Next, loosen the tensioner adjustment bolt to allow the tensioner to move against the belt.

CAUTION: At this time, remove the spark plugs so that the belt will not "jump time" when you rotate the engine in the following service procedure:

Rotate the crankshaft TWO COMPLETE REVOLUTIONS in the direction of normal engine rotation so as to remove the slack from the belt.

Tighten the tensioner adjustment and pivot bolts. Recheck the alignment of the timing marks. See Figure 3. Install the crankshaft damper and belt guide, then the timing belt outer cover. Install the spark plugs.





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REMOVAL AND INSTALLATION OF THE WATER PUMP

Figure 5—Whenever it is necessary to remove and install the water pump on Ford's 2.3 Liter engine for 1974, provisions have been made for wrench clearances in the timing belt inner cover. As a result, only the outer cover must be removed in order to replace the water pump.

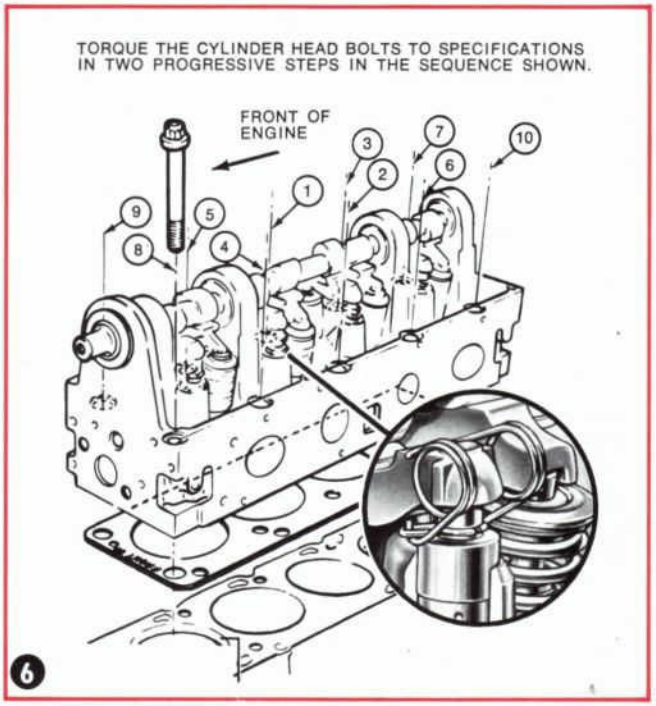
The thermostat is also designed so that it cannot be installed incorrectly. And, for ease of installation, the thermostat *locks* into the thermostat housing by a simple twist. Dimples on the thermostat lock into flats in the housing.

NOTE: On some early production thermostats, the cam-lock feature may not be incorporated. However, installation procedures are essentially the same.

REMOVAL AND INSTALLATION OF THE CYLINDER HEAD

Figure 6—Service repairs are basically the same as those for the 2000 cc engine. Cylinder head bolts are torqued in the same sequence and in TWO progressive steps.

Rifle-drilled oil galleries in the cylinder head should always be checked and cleaned thoroughly to maintain full lubrica-



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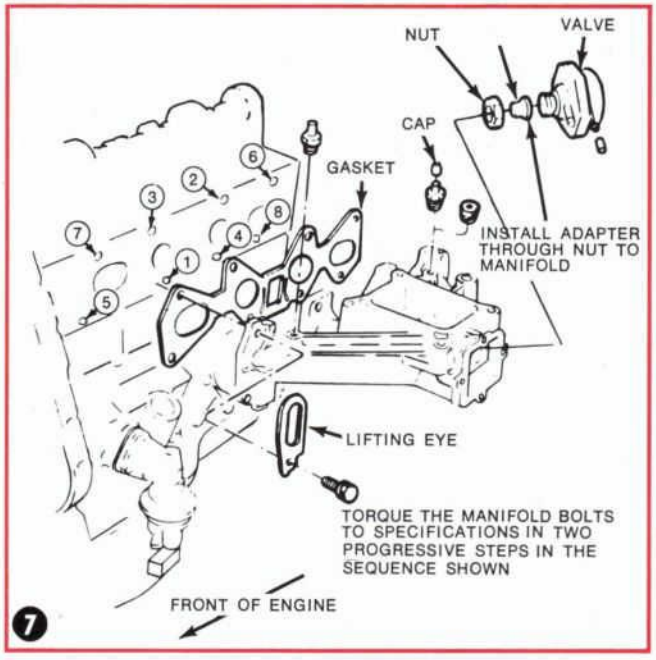
tion to the lash adjuster, cam lobes and the camshaft and bearings. Replacement head gaskets are imprinted with the necessary instructions to insure correct installation.

An important note to remember whenever you install the cylinder head as an assembly is to position the camshaft as shown in the illustration. This is critical in order to protect the valves protruding underneath the cylinder head.

Positioning the camshaft as shown minimizes the amount the valves stick out from the cylinder head and protects them from damage.



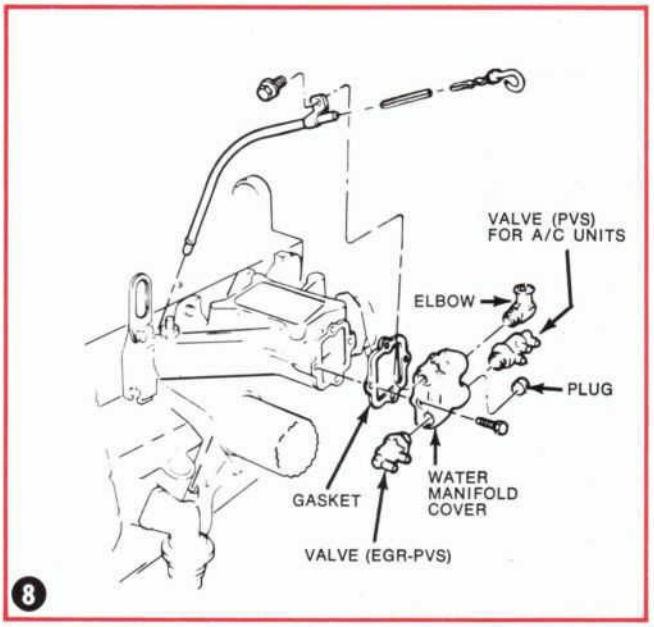
INSTALLING THE INTAKE MANIFOLD

One of the few die-cast aluminum intake manifolds is part of the 2.3 Liter engine. Therefore, it cannot be over-emphasized that *torque specifications must be strictly followed* when tightening the attaching screws and bolts. A cracked manifold or stripped threads may result if you fail to adhere to this service procedure. Note in the illustration, Figure 7, that there is also a specified torque sequence (in a stagger arrangement) to perform the torque action.

NOTE: Two progressive steps are necessary in order to prevent manifold damage and to insure a snug fit with no metal distortion.

A cover (see Figure 8) is used to pick up coolant temperature for the PVS valve. The two-ported PVS valve is for the EGR system while the three-ported PVS valve is for distributor control when air conditioning is installed.

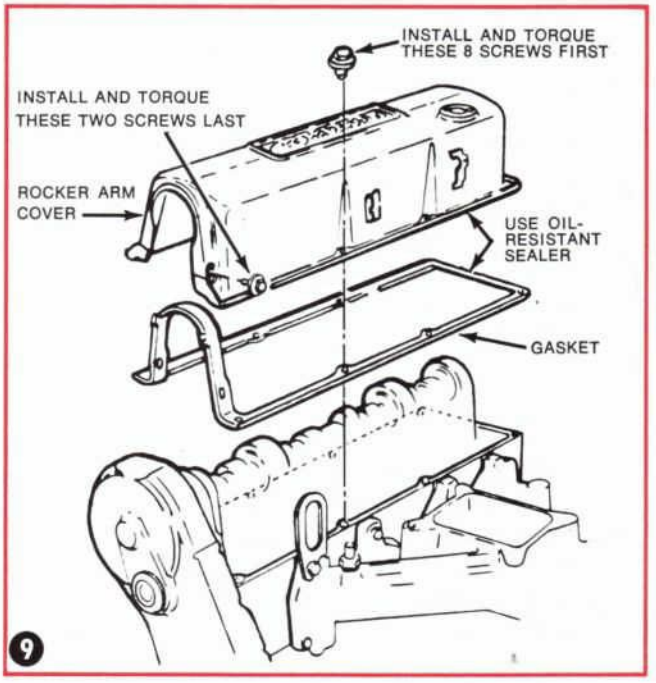
Coolant from the cylinder head enters through a port under the intake manifold in order to provide a "heat stove" for better control of the fuel-air mixture temperature. And, to assist in the heat transfer to the fuel-air mixture charge entering the cylinders, engineers have incorporated a corrugated "floor" in the internal casting surfaces of this intake manifold.

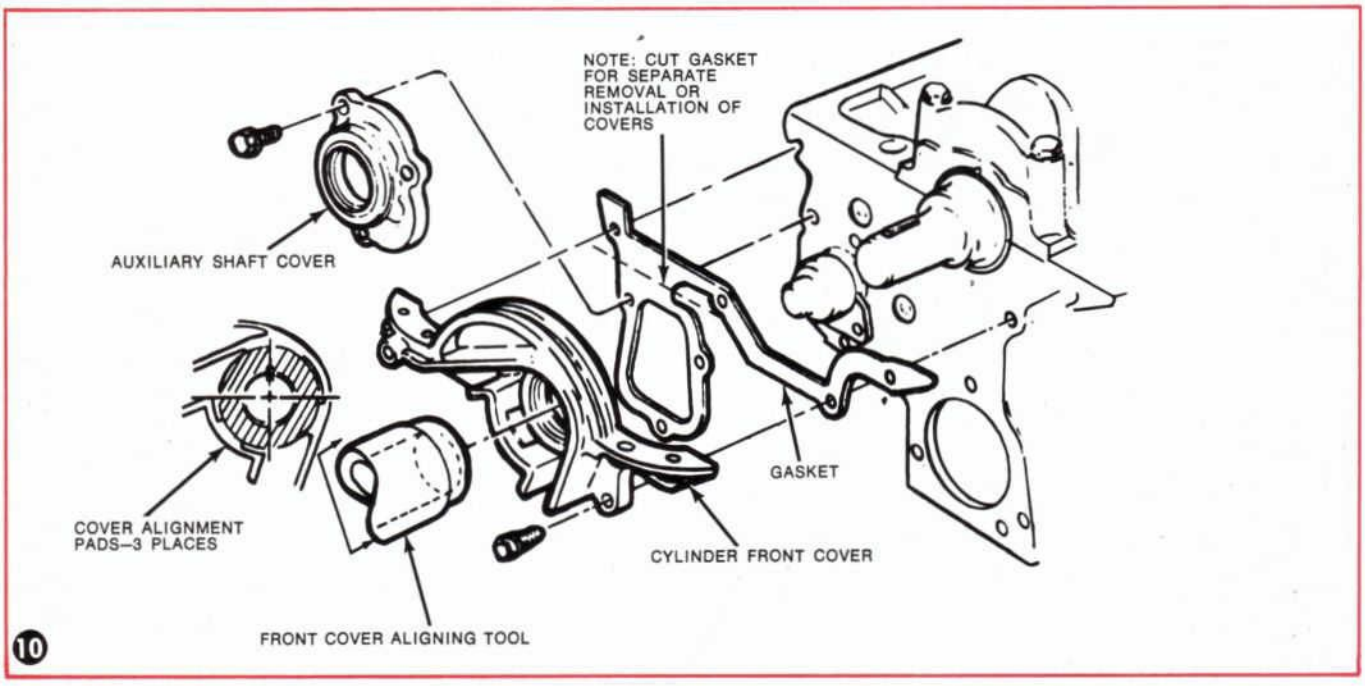


INSTALLING THE ROCKER ARM COVER

Replacement procedures and also sealant recommendations are the same for the 2.3 Liter engine as they are for the 2000 cc engine. However, to insure proper sealing between the cylinder head and the rocker cover, always install and torque the EIGHT vertical screws first. Then . . . install and torque the TWO "angled" screws into the front pedestal that supports the front of the camshaft.

NOTE: An oil-resistant sealer should be applied to both surfaces of the cover gasket and to the mating surface of the rocker cover.





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SERVICING THE AUXILIARY SHAFT COVER AND CYLINDER FRONT COVER

Whenever it becomes necessary to perform a service operation on the auxiliary shaft cover or the cylinder block front cover, note these important details:

■ Either one of these two covers can be removed and installed separately by cutting the one-piece gasket as shown in Figure 10.

Cut a new gasket in the same manner and carefully fit it to the cylinder block and cover. Doing so eliminates the need to remove the cover not affected by the repair or service operation being performed. The result of using this method is a savings in both labor and time.

■ For proper installation of the front cover, an alignment tool is necessary. This aligner positions on the crankshaft and bears against the alignment pads in the cover. It must be left in place as the cover attaching bolts are torqued. Then remove the aligner.

THE 2.3 LITER DISTRIBUTOR

The distributor for the 2.3 Liter engine is located on the left front side of the engine. It is equipped with a dual diaphragm vacuum advance and a centrifugal advance mechanism. Rotation is CLOCKWISE as you look at it from the rotor end.

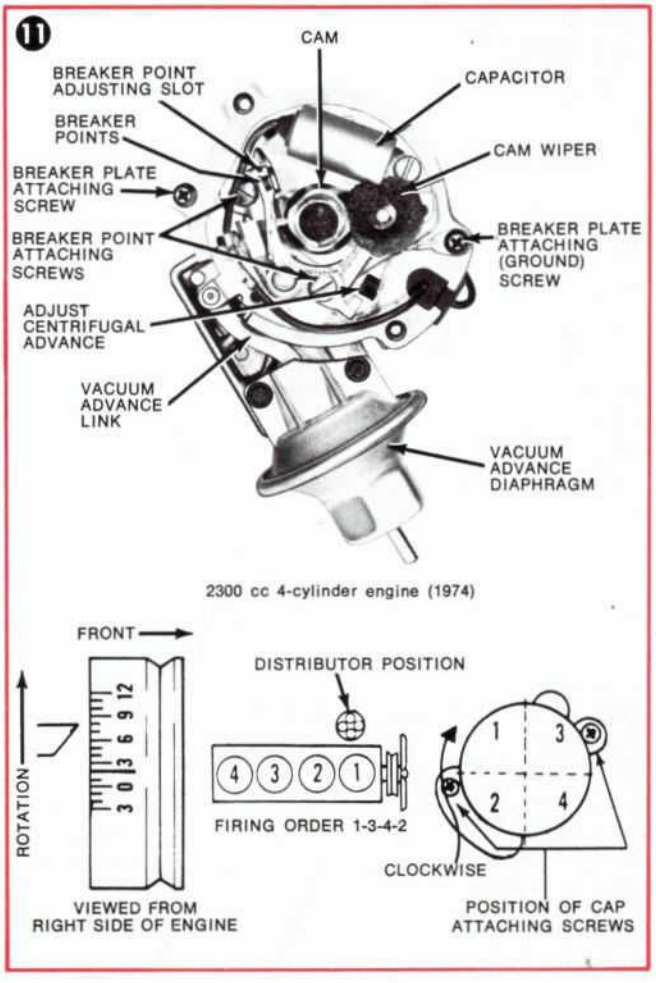
Distributor point installation is simple and needs no special instructions. See Figure 11.

However, during point set replacement, the distributor cam lubricator must also be replaced.

Distributor firing order and timing are shown in the Chart.

CAUTION: It is imperative that you *always* check the engine *decal* for up-to-date tune-up specifications.

In the event of any conflict on specifications the decal information should be considered correct.



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