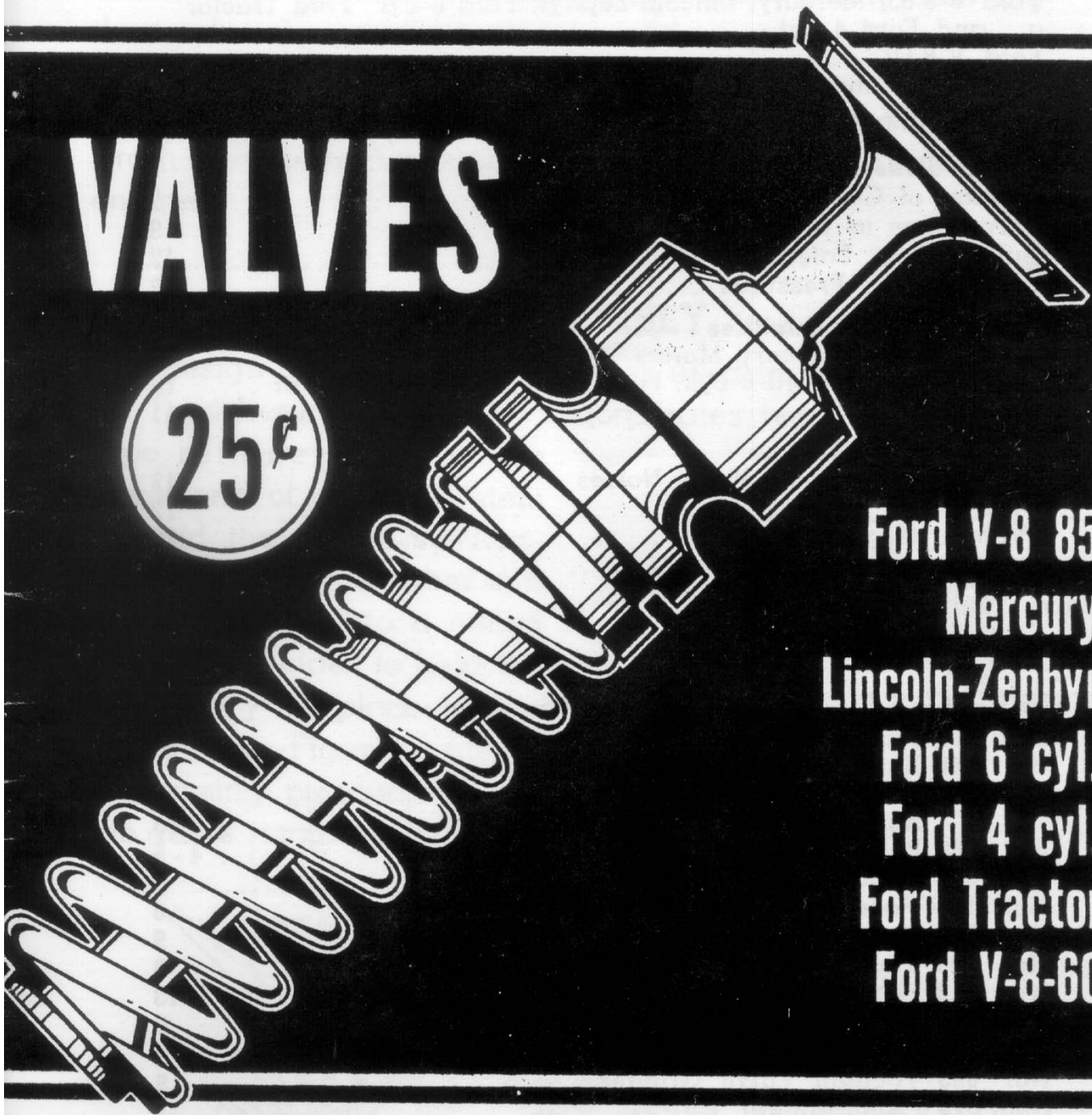

SERVICE BULLETIN

No. 542

VALVES

25¢



Ford V-8 85
Mercury
Lincoln-Zephyr
Ford 6 cyl.
Ford 4 cyl.
Ford Tractor
Ford V-8-60

Compiled by

K-D MANUFACTURING COMPANY

LANCASTER, PA., U. S. A. and HAMILTON, ONT., CAN.

DISMANTLING THE ENGINE

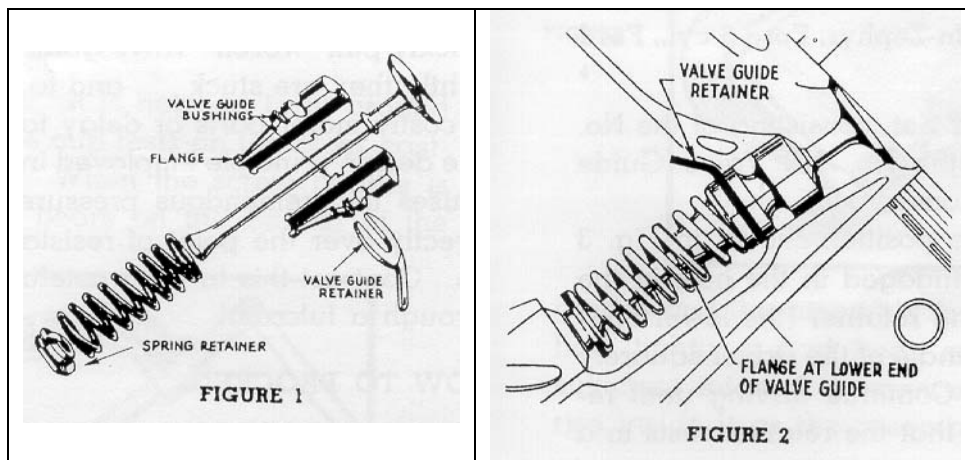
V-type Engines (Ford V-8-85, Mercury, Lincoln-Zephyr and Ford V-8-60).

After draining the radiator, disconnect the fuel pump. Remove the valley cover and with it the carburetor and generator. This assembly is lifted off as a unit without removing the carburetor or generator from the cover. Remove all cylinder head nuts and the cylinder heads.

In-line Engines (Ford 4 cyl., Ford 6 cyl., and Ford Tractor). Drain radiator and proceed as with any conventional in-line engine.

THE FORD VALVE ASSEMBLY

The design of the valve assemblies used in all motors built by Ford beginning in 1934 incorporates two "horse shoe" type retainers, one at the lower end of the valve stem to hold the valve-spring-guide assembly together and one which fits into a milled slot in the guides to hold the assembly in place in the guide bore. See Figures 1 and 2. The spring pressure causes the guide retainer (the upper one) to bear in a machined counterbore (about 1/16") in the block, thereby holding the assembly in place. The assembly is put together on the bench and dropped into the guide bore as a unit, after which the guides are pulled down and the retainer is put in place. The guides have a shoulder cast on them at the bottom to provide a hold for pulling the guides down for installing guide retainers. All this is explained in a later part of this book.



In late motors, intake valves are identified by the letter "R" on the head; exhaust valves by the letter "F". Valves marked "R" must not be used in exhaust ports.

REMOVING THE VALVE ASSEMBLIES

Even after normal use, nearly all valves in Ford motors are stuck tightly in their bores with a formation of hard carbon and motor gums. Because they are so "frozen" they are very difficult to pry either up or down with a conventional bar-type lifter without damage to motor parts or lifter.

K-D Valve Guide Puller Sets are scientifically designed to quickly pull "frozen" valve guide assemblies, no matter how tightly they are stuck ... and to do the job without damage to costly motor parts or delay to the mechanic.

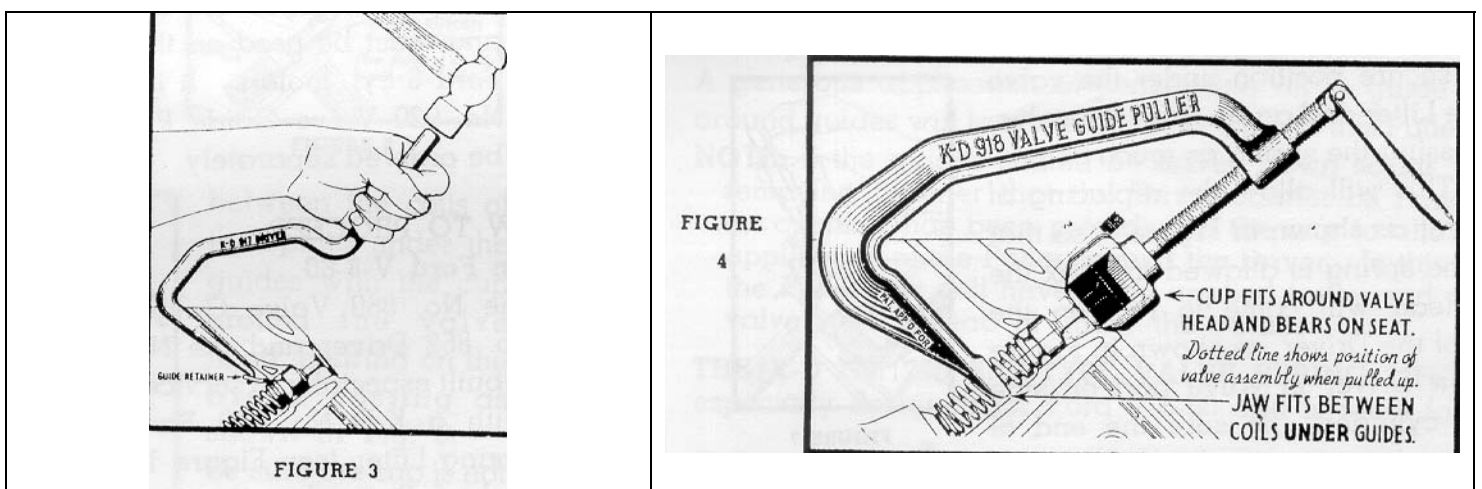
The design principle employed in the K-D Valve Guide Puller causes the tremendous pressure of a screw to be exerted directly over the point of resistance ... the pull is straight up. Contrast this to the wasteful action of a pry-bar acting through a fulcrum!

HOW TO PROCEED

On Ford V-8-85, Mercury, Lincoln-Zephyr, Ford 6 cyl., Ford Tractor and Ford 4 cyl.

The No. 920 Valve Guide Puller Set, consisting of the No. 917 Valve Guide Driver and the No. 918 Valve Guide Puller services all of these motors.

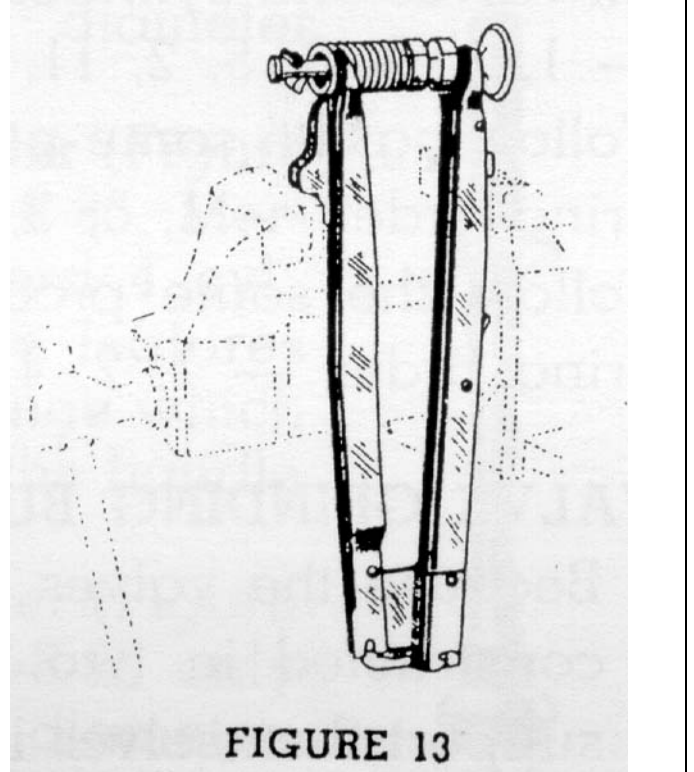
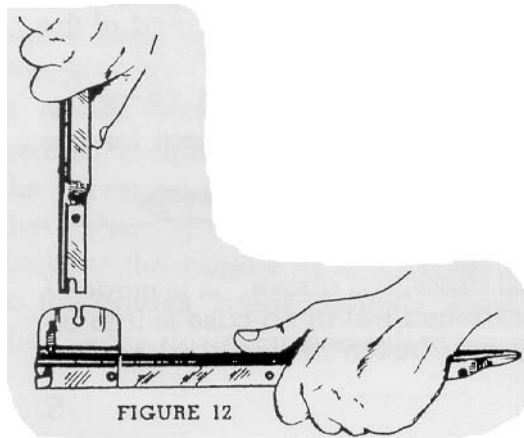
Place the No. 917 Driver in the position shown in Fig. 3 with the hook end of the tool engaged in the hole in the guide retainer. Allow the spring retainer (the lower one) to remain in place. Strike the handle of the Driver squarely and firmly but not too hard. Continue driving until retainer is removed. Remember that the retainer rests in a counterbore in the block and must be "forged" out slowly. If the guides are stuck tightly, damage to the guides may result if the first few hammer blows are too hard. (There is a vent hole through LINCOLN-ZEPHYR retainers and to avoid tearing the retainers, weakened by this hole, they must be handled with even more care than those in other Ford motors.) This method for removing retainers will damage the retainers but the time saved more than pays the small cost of new retainers. After the retainers are removed, place the Puller in the position shown in Fig. 4. The tempered steel jaw plate is placed between the coils of the spring, under the guides. It is notched to fit around the valve stem. The pressure cup rests on the block casting around the valve head. When the screw handle is turned down the jaw plate bears on the bottom of the guides and the assembly is pulled up and out, no matter how tightly it had been stuck. The pressure cup has sufficient internal clearance to allow the valve head to rise inside it as the assembly is pulled up.



DISMANTLING THE VALVE ASSEMBLY

Ford V-8-85, Mercury, Lincoln-Zephyr, Ford 6 cyl., Ford 4 cyl., and **Ford Tractor**.

When all the valve assemblies have been removed, the assemblies can be dismantled by using the K-D No. 240 Bar-type Valve Spring Lifter. The K-D No. 240 is made in two parts and for use as a dismantling tool the two parts are put together as shown in Figure 12. The No. 240 is set in the jaws of a bench vise and the valve assembly placed in the jaws as shown in Figure 13. The jaws of the vise are closed and the valve spring compressed, which permits the removal of the spring retainer. After the valves are ground as outlined below the valve assembly is put together again by the reverse of the procedure just described.



GRINDING VALVES

VALVE GRINDING BUSHINGS

Because the valves in Ford motors are constructed in two pieces and do not support themselves in the guide bore, it is expedient to use a valve grinding bushing in place of the guides when grinding valves and again when establishing valve-to-tappet clearances. **K-D Valve Grinding Bushings** are one piece, accurately machined tools, hinged to permit the insertion of the valve as shown in Figure 16. Jumper spring is attached. When inserting these bushings, the lug at the top of the bushing **must** be in the intake or exhaust part or the bushing will not seat properly.

The K-D No. 1118 Valve Grinding Bushing is for use in Ford V-8-85, Mercury, Lincoln-Zephyr, Ford 6 cyl., Ford 4 cyl., and **Ford Tractor** motors. Body diameter 1.029".

VACUUM CUP VALVE GRINDERS

The K-D No. 504 Valve Grinding Attachment (Figure 17) for Ford V-8-85, Mercury, Lincoln Zephyr, Ford 6 cyl., Ford 4 cyl., and **Ford Tractor** simplifies the job when using an oscillating type valve grinder, either manual or power driven. Since there is no slot in the Ford valve head, gripping the head is accomplished by a rubber vacuum cup. To keep the cup from slipping off the head while grinding, the 504 has a spring held metal retaining ring. No. 504, 1 3/8" diameter. May also be had **without** the metal retaining ring--No. 507, 1 1/8" diameter or No. 509, 1 3/8" diameter.

The K-D No. 503 Vacuum Valve Grinder (Figure 18) is for hand operation on Ford V-8-85, Mercury, Lincoln Zephyr, Ford 6 cyl., Ford 4 cyl., and **Ford Tractor**. In addition to the features of the 504, it incorporates a handle flange which keeps the hands from working down the handle while grinding., Cup diameter 1 3/8".

VALVE STEM TO TAPPET CLEARANCE

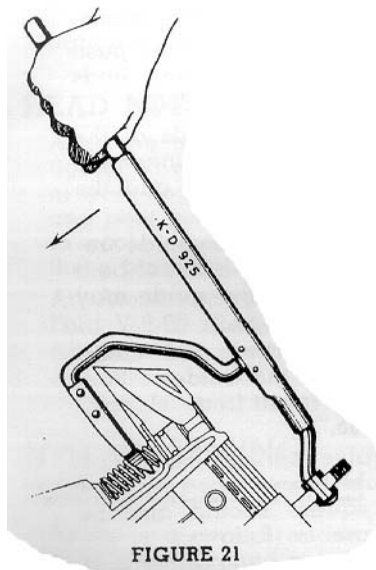
It is absolutely essential that these clearances be accurately established to turn out a smoothly idling motor. To establish them it will be necessary to grind off the end of the valve stem. For this purpose, the maker of your valve refacer can furnish the necessary micrometer depth gage and a grinding adaptor for your refacer. This equipment is necessary because stems must be ground square and parallel or valve noises will develop. The information on camshaft positions on page 7 will be found helpful.

REPLACING VALVE ASSEMBLIES

Lincoln-Zephyr, Ford 6 cyl., Ford 4 cyl., and Ford Tractor motors, because of their construction require a special tool for the installation of valve guide retainers. The tool is the K-D No. 925 Valve Guide Replacing Tool. It is strongly made for dependable service when used for **replacing** assemblies **only**. (It must not be used in an attempt to remove "frozen" assemblies and the manufacturer's guarantee is void if it is so used.)

After guide bores are clean, valves are ground and tappet clearances are established, reassemble valve, spring and guides (described on page 6) and drop assemblies into guide bores with split between guides running crosswise in the motor. This is important so that each half of the guides is gripped by the No. 925 when being pulled down for installation of guide retainer.

Engage link on the end of the tool on one of the head studs as shown in Figure 21 with the jaw between the coils of the spring engaged on the shoulder cast on the end of the guides. A downward pressure on the handle pulls the guides down, permitting the installation of the guide retainer. The handle on the No. 925 is short enough to service the Ford 6 cyl. and the Ford 4 cyl. motors conveniently and has a rod extension (shown in use) for extra leverage where working space permits.



REASSEMBLING THE ENGINE

ELIMINATING VALVE NOISES

Before starting to reassemble the engine, examine and correct any of the following. They may cause-noisy and inefficient valve action.

1. **ROUGH PUSH RODS.** After long service the cam end of the push rod may become worn and uneven. Be sure to examine **both** ends of the push rod and if wear is beyond repair, replace the rod.
2. **VALVE ENDS NOT GROUND SQUARE.** When the ends of the valves are not ground square in establishing tappet clearances the high side will cut through the oil film between the valve and the tappet and produce a "tap" on each lift.
3. **COCKED GUIDE RETAINER.** When inserting valve guide retainers (late models) be sure the retainer engages in the slot of both halves of the guides. If it does not, the one half of the guide may move up and down with the valve and produce noise.
4. **VALVE STEM TO GUIDE CLEARANCE.** No more than .004" clearance is permissible between the valve stem and the guides. Poor performance and excessive oil consumption will result from "sloppy" guides. Recommended clearance .0015" - .0035."
5. **COLLAPSED VALVE SPRINGS.** -When valve springs have collapsed more than 1/8" in service they should be replaced by new springs. Springs whose ends are out of square should also be replaced. Correct valve spring pressures are as follows:

Ford V-8-85, Mercury, Ford 6, Ford 4 and **Ford Tractor** motors, 37 to 40 lbs. at 2 1/8", 76 to 80 lbs. at 1 27/32".

GASKETS

Cylinder head gaskets must be installed with the end marked "Front" to the front of the motor. Both banks of cylinders use the same size and shape gasket in V-type motors.

CYLINDER HEAD NUTS

The correct order for tightening cylinder head nuts is an important step in reassembling the motor. Care must be taken or wrinkled gaskets and distorted heads will result.

First run the nuts down "against" and then retrace in proper order at least twice, each time drawing them down a little tighter. For best results the use of a pressure indicating wrench is recommended but even with this wrench, by all means do not run any nut down tight the first time around.

HEAD NUT PRESSURES

After the gaskets have compressed, cylinder head nuts should be tightened **again** . . . when engine is warm . . . to prevent distortion of wall, head and valve seats, failure of gaskets, loss of compression and poor performance. Check again after engine has been allowed to cool. Use a torque indicating wrench and tighten **exactly** to these pressures:

All Aluminum Heads (except Ford V-8-60) 40 ft. pounds
Ford V-8-60 Aluminum Heads 30 ft. pounds
All Cast Iron Heads 50 ft. pounds

VALVE TIMING

TIMING GEAR MARKS

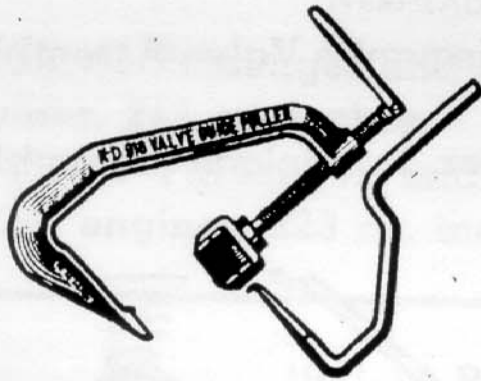
There is a straight mark on the camshaft gear which must line up with a small round punch mark on the crank-shaft gear. When these marks line up the timing gears will function correctly.

HOW TO CHECK VALVE TIMING

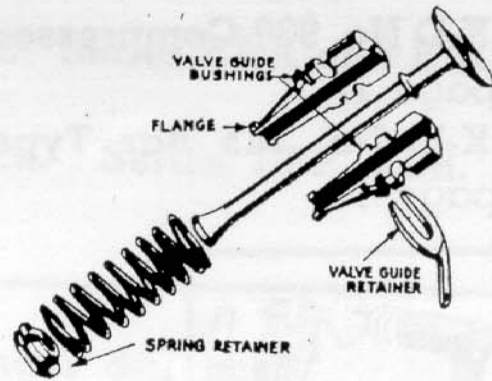
To check the timing gears with valve action, remove the starting motor and crank the engine until Piston No. 1 (see diagram page 7) is at top dead center of the exhaust stroke. Place a mark on the flywheel and a corresponding mark on the housing. Turn the flywheel counterclockwise until the intake valve is closed and then turn it slowly clockwise until the intake valve just starts to open. If the intake valve just starts to open approximately three flywheel teeth past your mark on the housing, you will know the gear timing is correct.

B

1939-48 Tractors and Trucks

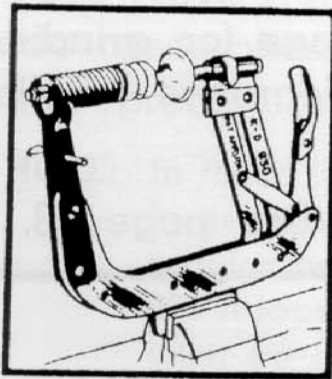


K-D No. 920
VALVE GUIDE PULLER SET

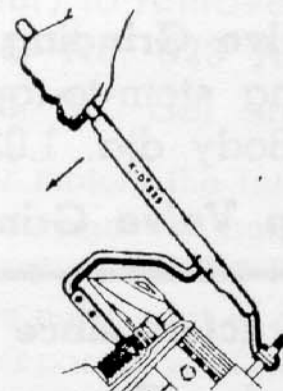


THE VALVE ASSEMBLY

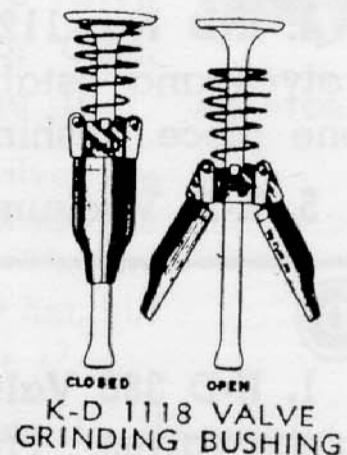
1. **K-D No. 920 Valve Guide Puller Set** to remove valve guide assemblies. Follow procedure outlined on page 16.
2. **K-D No. 930 Valve Spring Compressor** to dismantle valve assemblies. See page 17.
3. **K-D No. 925 Replacing Tool** to replace valve guide assemblies. Follow procedure outlined on page 18.
4. **K-D No. 1118 Valve Grinding Bushing** for grinding valves and establishing stem-to-tappet clearances. Body diam. 1.029".
5. **K-D Vacuum Cup Valve Grinders.** See page 18.



K-D 930
COMPRESSOR



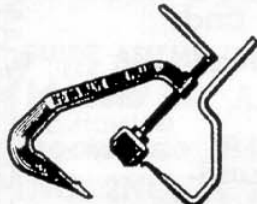
K-D 925
REPLACING TOOL



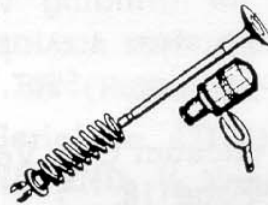
CLOSED OPEN
K-D 1118 VALVE
GRINDING BUSHING

(C)

1948-1952 Tractors

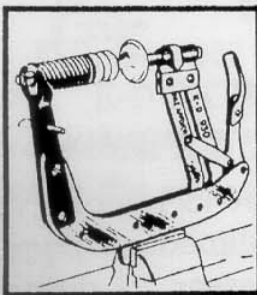


K-D No. 920
VALVE GUIDE PULLER SET

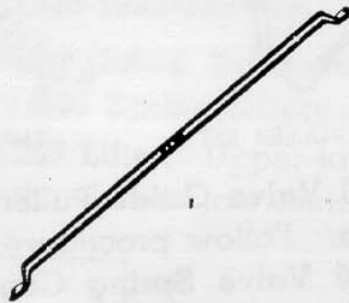


THE VALVE ASSEMBLY

1. **K-D No. 920 Valve Guide Puller Set** to remove assemblies. See page 16.
2. **K-D No. 930 Compressor** to dismantle Valve Assemblies. See page 17.
3. **K-D No. 245 Bar Type Lifter** to replace assemblies. See page 17.



K-D 930 COMPRESSOR



K-D 245 LIFTER



K-D 1120 BUSHING

- NOTE:**
- a. No. 925 Replacing Tool can also be used to replace assemblies. See page 18.
 - b. For optional service of individual valves without removing entire valve guide assembly use 930 Compressor, 608 Inserter, page 11.
 - c. Late models equipped with rotating free type exhaust valves, see page 13.

4. **K-D No. 1120 Valve Grinding Bushings** for grinding valves and establishing stem-to-tappet clearance. Solid, one piece bushing. Body dia. 1.030".
5. **K-D Vacuum Cup Valve Grinders.** See page 18.

(D)

Tractors since 1953

1. **K-D 380 Valve Spring Compressor** to remove and replace valves. Procedure same as 6 cylinder and V-8 cylinder overhead valve engines. See page 19.

THE CORRECT K-D TOOL COMBINATIONS

For removing and replacing valves in all Ford-built motors

MODELS	TO REMOVE	TO REPLACE	MISCELLANEOUS
4 CYLINDER (Pages 1 to 3)			
1928-32	307 Lifter (1) 502 Driver (1)	307 Lifter (1)	511 Bushing (2)
1939-48 Tractor & Truck	920 Set (2, 16)	925 Replacer (2, 18)	930 Compressor (2, 17) 1118 Bushing (2)
1948-52* Tractor	920 Set (3, 16)	245 Lifter (3, 17) or 925 Replacer (3, 18)	930 Compressor (3, 17) 1120 Bushing (3)
OHV Tractor	380 Compressor (3, 19)	380 Compressor (3, 19)	— — —

K-D 920 Valve Guide Puller Set

1. The K-D 920 Set consists of No. 917 Valve Retainer Driver and No. 918 Valve Guide Puller.

2. Place No. 917 Driver in the position shown in Fig. 1, with hook end of tool engaged in the hole in guide retainer. Allow lower spring retainer to remain in place. Strike the

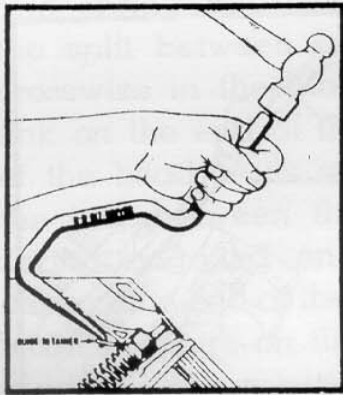


FIGURE 1

driver handle squarely and firmly, but not too hard until retainer is removed. Remember the retainer rests in a counterbore in the block and must be "forged" out slowly. If guides are tightly stuck, damage to the guides may result if the first few hammer blows are too hard. This method for removing retainers will damage the retainers, but the time saved more than pays the

small cost of new ones. See No. 922 Retainers, Page 20.

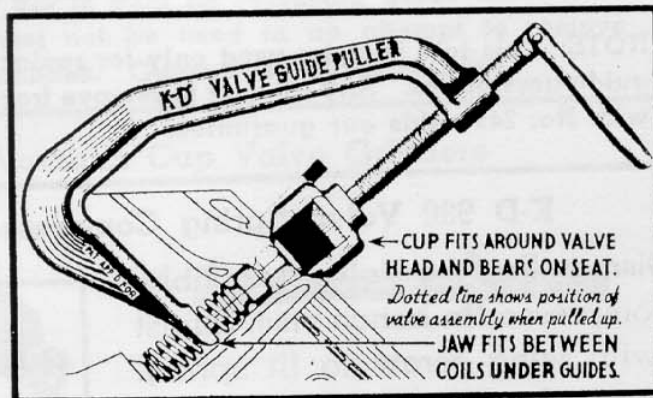


FIGURE 2

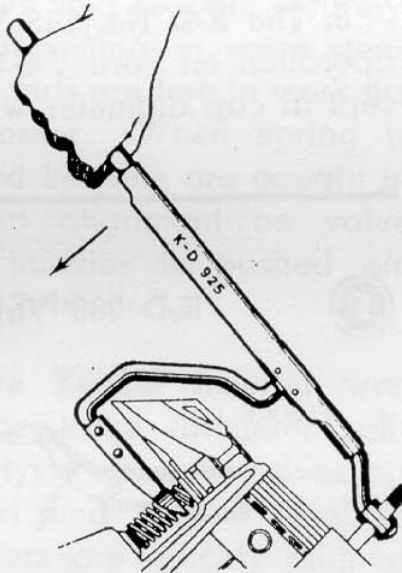
3. After retainers are removed, place No. 918 Puller in position shown. The tempered steel jaw plate is placed between the coils of the spring under the guides. It is notched to fit around the valve stem. The pressure cup rests on the block casting around the valve head. When the screw handle is turned down, the jaw plate bears on the bottom of the guides, and the assembly is pulled up and out no matter how tightly it had been stuck. The pressure cup has sufficient internal clearance to allow the valve head to rise inside it as the assembly is pulled up.

ers in later models). After valves are ground the valve assembly is put together again by reversing the procedure just described.

K-D 925 Valve Guide Replacing Tool

1. For replacing assemblies only.

Drop the reassembled valve, guide, and spring into guide bore with the split between guides running crosswise in the block. Place the link on the end of the tool on one of the head studs as shown, with the jaw between the coils of the spring engaged on the shoulder cast on the end of the guide. Downward pressure on the handle pulls guide down, permitting installation of the horseshoe retainer.



NOTE: No. 925 is built for replacing guide assemblies only. It must not be used in an attempt to remove frozen assemblies. Guarantee void if so used.

Vacuum Cup Valve Grinders



K-D 504



K-D 503, 865

1. **K-D 504 Valve Grinding Attachment** for all Ford Motors except V-8-60. Simplifies the job when using an oscillating type valve grinder, either manual or power driven. Since there is no slot in the Ford valve head, gripping the head is accomplished by a rubber vacuum cup. To keep the cup from slipping off the head while grinding, the 504 has a spring held metal retaining ring. No. 504, 1 $\frac{3}{8}$ " cup diameter. May also be had without the metal retaining ring in No. 507, 1 $\frac{1}{8}$ " diameter, or No. 509, 1 $\frac{3}{8}$ " diameter.

2. **K-D 503 Vacuum Valve Grinder** is for hand operation on all Ford Motors except V-8-60. In addition to the features of the No. 504, it incorporates a handle flange which keeps the hands from working down the handle while grinding. Cup diameter 1 $\frac{3}{8}$ ".

3. **The K-D No. 865 Vacuum Valve Grinder** is for hand operation on Ford V-8-60 only and is like the No. 503 except in cup diameter which is 1 $\frac{1}{16}$ ".

F

K-D 380 Valve Spring Compressor

FIGURE 1

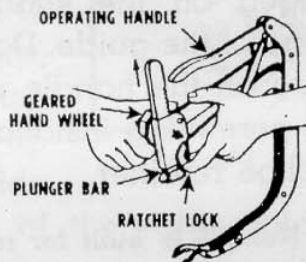
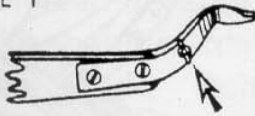


FIGURE 2

FIGURE 1. First adjust compressor jaws to fit valve spring.

FIGURE 2. Releases ratchet lock and turn Handwheel until Plunger Bar is raised as high as it will go.

FIGURE 3. Place compressor on valve with operating handle DOWN and raise first spring by turning hand wheel. When this spring is raised, the ratchet lock will be engaged and the depth adjustment will be set automatically for all the remaining springs. Raise operating handle to remove compressor. After the first spring, place compressor on valve with operating handle UP. Push down to raise spring. Repeat the operation when replacing keepers, using the operating handle only.

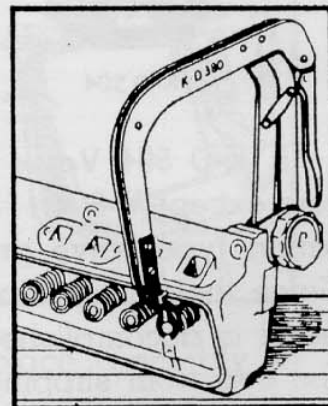


FIGURE 3

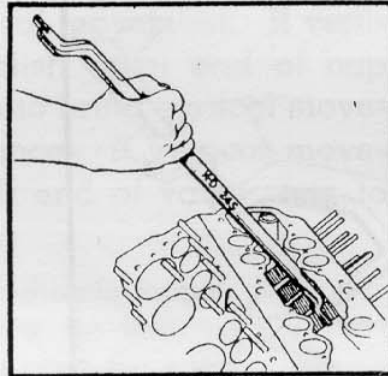


K-D 923
ADAPTOR

NOTE: In 6 cylinder motors the intake valves will not rise inside the pressure cup on the No. 918. No. 923 Adaptor must be used. No. 923 is not a part of 920 Set, but must be purchased separately.

K-D 245 Bar Type Valve Spring Lifter

1. This tool is used to replace valve guide assemblies. Drop assemblies into guide bores. On motors with split guides, be sure the split between the guides runs crosswise so that each half of the guides is gripped by the jaw of the No. 245 Bar Lifter. Insert jaw of the No. 245 Bar Lifter between the spring coils, engaging the shoulder cast on the bottom of the guide. Raising up on the handle will pull the guide down, permitting installation of the valve guide retainer.



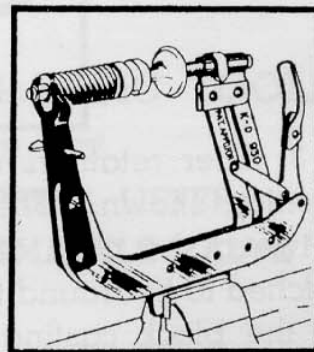
K-D 245 BAR LIFTER

NOTE: This tool is to be used only for replacing valve guide assemblies. Any attempt to remove frozen guides with No. 245 voids our guarantee.

K-D 930 Valve Spring Compressor

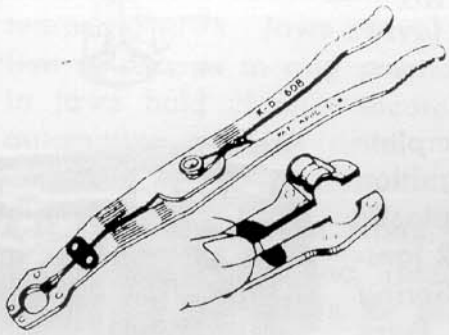
1. Dismantling the Valve Assembly.

Grip compressor in bench vise, adjust jaws with wing screw to fit spring. Next, turn plunger bar down as far as it will go. (Adjust plunger screw to line marked 100 h.p. for 1949 and later Ford and Mercury. On earlier models screw plunger bar down as far as it will go.) Tool now ready for use. Raise operating handle and place assembly in Compressor. Pushing operating handle down compresses spring, permitting removal of spring retainer (or split keep-



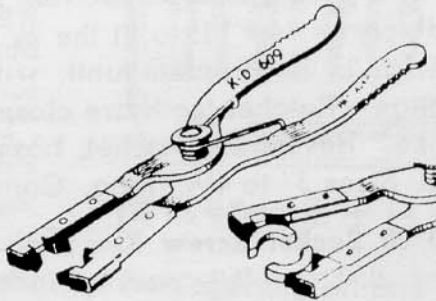
Valve Keeper Inserters

1. **K-D No. 608 Valve Keeper Inserter** is built to handle the small size split keepers used in later Ford-built motors.

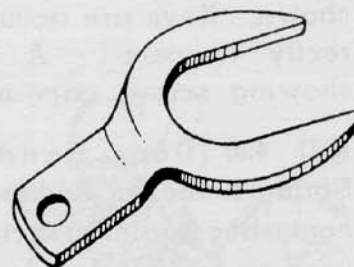


Special spring steel fingers on the jaws hold keepers securely. Self supporting on valve stem, both hands are free to work the compressor. When spring is lowered keepers are caught in correct alignment on valve stem; inserter is pushed off. Tool $8\frac{3}{16}$ " long.

2. **K-D No. 609 Magnetic Valve Keeper Inserter** was especially designed to handle the large diameter split collar type keepers used in free type exhaust valves on Ford V-8 (L-head), 6 cyl. L-head and Tractor engines after 1948. Only $4\frac{1}{2}$ " long, keepers are quickly aligned on the small jaw magnets. Self supporting on the valve stem. This tool is also very handy for picking out keepers that drop into the valley when lifting springs.



K-D Replacement Retainers: In removing retainers with the K-D 917 Valve Guide Driver, they are "forged" out and bent beyond salvaging. Time saved in this operation more than pays the small cost of new retainers. K-D No. 922 Replacement Valve Guide Retainers fit Ford V-8, Mercury, Ford 6 cyl., Ford 4 cyl. and Tractor. No. 921 fits Lincoln-Zephyr only.



K-D 922 RETAINER