TUNE-UP

ENGINE IDENTIFICATION

Engine can be identified by fourth digit of engine Build Date Code number, located on a tag attached to right bank cylinder head cover. The same identification code is used as seventh digit of the Vehicle Identification Number.

VIN Engine Codes

Application	Code Letter
304" (5.0L) 2-Bbl.	H
360" (6.0L) 2-Bbl.	N

MODEL IDENTIFICATION

VEHICLE IDENTIFICATION NUMBER

A 13 digit Vehicle Identification Number is stamped on a metal plate attached to left hand side of firewall under hood.

TUNE-UP NOTES

CAUTION – *IDLE SPEED ADJUSTMENT: Procedures and specifications for idle speed adjustment must be followed exactly as outlined. See "Hot (Slow) Idle RPM" under Tune-Up.*

NOTE – *For other items affecting Tune-Up, see FUEL SYSTEMS Section or EMISSION CONTROL Section.*

NOTE – *Due to production changes, always refer to Engine Tune-Up Decal in engine compartment before attempting tune-up. In the event of a conflict between specifications given in this manual and decal specifications, use the decal specifications.*

CAUTION – *When performing tune-up on vehicles equipped with a catalytic converter, do not allow or create a condition of engine misfire in one or more cylinders for an extended period of time. Damage to converter from overheating may occur due to loading with unburned fuel.*

ENGINE COMPRESSION

Compression Ratio	
304"	8.4:1
360"	8.25:1
Recommended Fuel	
All Models	Unleaded (87 AKI Minimum)
Compression Pressure (Minimum)	120-140 psi
Maximum Pressure Variation	30 psi

Measure compression pressure with engine at normal operating temperature, spark plugs removed, throttle and choke valves wide open and engine at cranking speed.

VALVE TAPPET CLEARANCE

Hydraulic Lifters ..... Zero Lash

VALVE ARRANGEMENT

E-I-I-E-E-I-I-E (both banks, front to rear).

SPARK PLUGS

Gap	.033-.037"
Torque	22-33 Ft. Lbs.

Spark Plug Type

Application	Champion No.
All	N-12Y or RN-12Y

HIGH TENSION WIRE RESISTANCE

Do not puncture spark plug wires with any type of probe. Remove spark plug wire and check resistance using an ohmmeter.

Resistance Ohms

Wire Length	Minimum	Maximum
0-15	3000	10,000
15-25	4000	15,000
25-35"	6000	20,000
Over 35"	8000	25,000

DISTRIBUTOR

All models are equipped with Solid State Ignition (S.S.I.) systems and no adjustments are required.

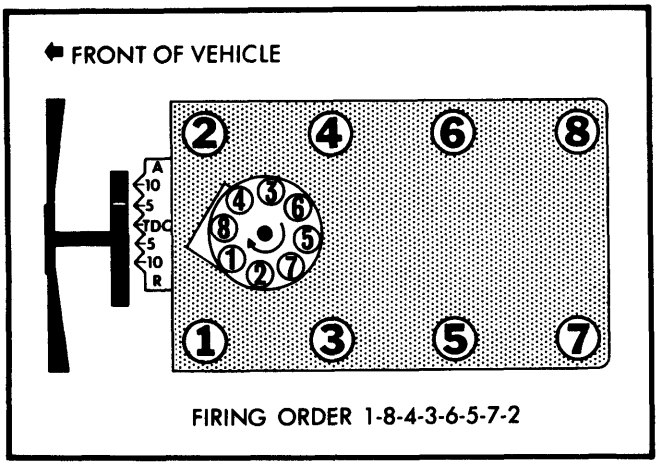

Fig. 1 304" & 360" Firing Order & Timing Mark Identification

IGNITION TIMING

NOTE – *Engines are equipped with a receptacle for a magnetic probe timing light, located 9.5°ATDC. Do not use this location for timing with a conventional light.*

1) Timing is set by lining up a milled notch in vibration dampener with a graduated degree scale located on timing case cover.

TUNE-UP (Cont.)

2) Disconnect and plug vacuum hose at distributor. Connect a tachometer and ignition timing light. If light has an advance control feature, turn control to "OFF" position.

3) Start engine and allow to idle. Adjust timing to specifications by loosening distributor hold down clamp and turning distributor. Recheck timing after clamp bolt is tightened.

Ignition Timing Specifications (Degrees BTDC@RPM)

Application	Man. Trans.	Auto. Trans.
304" (CJ Models)		
Federal	8@700	10@600
Calif.	5@700	5@600
360" (Cherokee, Wagoneer & Truck)	8@800	8@600

HOT (SLOW) IDLE RPM

1) Set parking brake and block drive wheels. Warm engine to operating temperature and place in neutral (manual) or "D" (automatic).

2) On carburetors without solenoid, turn curb idle adjusting screw to obtain specified curb idle speed. On carburetors with solenoid, turn hex screw on solenoid carriage to obtain specified speed. Tighten lock nut if equipped. Then disconnect solenoid wire and adjust curb idle screw to obtain 500 RPM idle speed. Reconnect solenoid wire.

Idle Speed RPM

Application	Man. Trans.	Auto. Trans.
304" (CJ Models)		
Federal	600-800	550-750
Calif.	600-800	500-700
360" (Cherokee, Wagoneer & Truck)	750-950	500-700

IDLE MIXTURE

NOTE – *Be sure idle speed and timing are set before performing idle mixture adjustment. If mixture setting takes more than 3 minutes, run engine at 2000 RPM in neutral for one minute, then resume adjustment.*

TACHOMETER (LEAN DROP) PROCEDURE

1) Warm engine to normal operating temperature. Turn idle mixture screws to full counterclockwise position, note position of screw slot, and remove limiter caps. If screw moved during cap removal, adjust to prior position.

2) Start engine and run in neutral (manual) or "D" (automatic). Turn mixture screw clockwise (leaner) until engine speed begins to drop. Then turn screw counterclockwise (richer) until highest RPM reading is obtained. This is lean best idle. Finally, turn screw clockwise until specified "Lean Drop" is obtained.

NOTE – *If final RPM differs more than 30 RPM from specified curb idle speed, reset curb idle and repeat mixture adjustment.*

3) Carefully install new limiter caps with tabs positioned against full rich stop. Press caps fully into place.

Lean Drop RPM

Application	Man. Trans.	Auto. Trans.
304" (CJ Models)		
Federal	20	40
Calif.	100	100
360" (Cherokee, Wagoneer & Truck)	50	20

COLD (FAST) IDLE RPM

Disconnect EGR vacuum line and plug carburetor ports. Disconnect TCS solenoid. With vacuum hoses disconnected and plugged at distributor, set curb idle speed. With engine running at normal operating temperature, place fast idle screw on second step of fast idle cam and against shoulder of high step. Adjust screw to obtain specified fast idle speed.

Fast Idle Speed RPM

Application	Man. Trans.	Auto. Trans.
All Models	1400-1600	1500-1700

AUTOMATIC CHOKE SETTING

To adjust automatic choke, loosen cover retaining screws and rotate cover in direction indicated by arrow on face of cover. Adjust to specified setting.

Automatic Choke Setting

Application	Man. Trans.	Auto. Trans.
304" (CJ Models)		
Federal	2NR	1NR
Calif.	2NR	2NR
360" (Cherokee, Wagoneer & Truck)	2NR	2NR

FUEL PUMP PRESSURE & VOLUME

Pressure (at Idle)	5.0-6.5 psi
Volume (at Idle)	1 pint in 30 seconds
Vacuum (at Idle)	10 In. Hg (Minimum)

EMISSION CONTROL

See appropriate article in EMISSION CONTROL Section.

GENERAL SERVICING

IGNITION

DISTRIBUTOR

Motorcraft ..... Breakerless Solid State

Other Data & Specifications – *See Tune-Up & Motorcraft Distributors in ELECTRICAL Section.*

IGNITION COIL

Resistance

Primary ..... 1.13-1.23 ohms
Secondary ..... 7700-9300 ohms

Coil Output ..... 24 KV min.

FUEL SYSTEMS

CARBURETORS

Application	Model
304"	Motorcraft 2100 2-Bbl.
360"	Motorcraft 2150 2-Bbl.

Other Data & Specifications – *See Tune-Up and Motorcraft Carburetors in FUEL SYSTEMS Section.*

ELECTRICAL

BATTERY

12 Volt – Negative Ground.

Application	Reserve Capacity	Cranking Amps
Green Code	75 minutes	380
Red Code	90 minutes	450

STARTER

Motorcraft ..... **Positive Engagement**

Free Speed Voltage 12
Free Speed Amperage 77
Free Speed RPM Range 8900-9600

Other Data & Specifications – *See Motorcraft Starters in ELECTRICAL Section.*

ALTERNATORS

Delco ..... Solid State, Integral Regulator

Application	Amp. Output
Standard	37
Optional	63

Other Data & Specifications – *See Delco Alternators in ELECTRICAL Section.*

ALTERNATOR REGULATORS

Delco ..... Solid State, Integral With Alternator (Non-Adjustable)

Other Data & Specifications – *See Delco Alternators in ELECTRICAL Section.*

ENGINE

INTAKE MANIFOLD TIGHTENING

Tighten intake manifold bolts evenly to 37-47 ft. lbs.

BELT ADJUSTMENT

Tension (Lbs.) Using Strand Tension Gauge

Application	New Belt	Used Belt
All Belts	125-155	90-115

FILTERS & CLEANERS

Filter or Cleaner	Service Intervals (Miles) Regular Use	Severe Use①
Oil Filter	5000	3000
Air Filter	30,000	15,000
Fuel Filter	15,000	15,000
Auto. Trans. Filter	30,000	10,000
PCV Valve	30,000	30,000
Oil Filler Cap	30,000	30,000
Fuel Vapor Canister Filter	30,000	30,000

① – Severe use includes 30% or more of time on off road or dusty conditions, commercial hauling, snow plowing, towing trailers in excess of 2000 pounds, and extended idling.

CAPACITIES

Application	Quantity
Cooling System (Includes Heater)	
304"	13.0 qts.
360"	14.0 qts.
Crankcase (Includes Filter)	5 qts.
Man. Trans. (SAE 85W-90)	
CJ5	3.5 pts.
All Others①	3.0 pts.
Auto. Trans. (Dexron)	
Refill	8.5 pts.
Overhaul Fill	17.0 pts.
Transfer Case	
CJ Series (SAE 85W-90)	4.0 pts.
Quadra-Trac (SAE 10W-30)	4.0 pts.
All Others (SAE 10W-30)	6.0 pts.
Drive Axles	Fill to bottom of filler plug hole
Fuel Tank	
CJ Series	14.8 gals.
Cherokee & Wagoneer	20.3 gals.
Truck	19.0 gals.

① – J20 Models with T-18 use 6.5 pts.