GREATER MICHIGAN SOVIET OF LETTERS

Detroit Annex

Automotive Instruction Series

AUTOMOBILE DIAGNOSIS

Color Manual for the Examiner

Detroit Annex edition · 1968

Re-issued by the MidPacific Soviet of Letters

Period terminology and technical references retained.

Re-issue edition, 2026

A study and record manual. Apply the specifications and service procedure supplied for the car in hand.

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GREATER MICHIGAN SOVIET OF LETTERS

DETROIT ANNEX

AUTOMOBILE DIAGNOSIS

A Color Manual for the Examiner

MPSoL

1968

RE-ISSUE EDITION

RE-ISSUE RECORD

This re-issue retains the terminology and technical references of the Detroit Annex edition. The plates present general arrangements for study. They do not take the place of the wiring diagram, service instructions, or specifications supplied for the particular car under examination.

Color is used as a record of examination. Mark a part only after it has been observed or tested. A colored line without a recorded result is not a diagnosis.

BEFORE AN EXAMINATION

This manual concerns the conventional gasoline-engined car and the equipment shown. It supplies no authority to apply these arrangements to equipment of another kind. A test beyond the examiner’s training or equipment shall be referred to a competent mechanic.

Place the car on firm, level ground. Apply the parking brake and chock the wheels. Before cranking, place an automatic selector in Park or Neutral as specified, or a manual gearbox in neutral. Keep persons clear of the car’s path.

A jack is a lifting appliance, not a support. Use rated stands at the proper supporting points before going beneath a raised car. Do not work beneath a car supported by a jack alone.

Wear suitable eye protection. Remove rings and loose clothing. Keep hands, hair, tools, and instrument leads clear of moving parts. Stop the engine before making connections unless the prescribed test requires otherwise.

Battery gas may explode. Keep flame and sparks away, provide ventilation, and protect eyes and skin from acid. Identify the grounded terminal before disconnecting it; follow the maker’s sequence. Do not test a frozen, leaking, or damaged battery.

Fuel leakage, loss of oil pressure, overheating, or defective brakes or steering requires the examination to stop where continued operation would cause danger or damage. Record the reason for stopping.

CONTENTS

Directions to the examiner.....6

The color record.....7

Order of examination.....8

Plates 1–18 Systems and symptoms.....9–26

Case exercises.....27–29

Case record forms.....30–31

Names used in this manual.....32

Instruments and their record.....33

Plate 19 The automobile under examination.....34

Final examination record.....35

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DIRECTIONS TO THE EXAMINER

A reported condition is the beginning of an examination. It is not yet a diagnosis. The examiner shall observe the condition, select the system indicated, make one examination at a time, and enter the result before proceeding.

Do not color a part merely because it is near the fault. Color the path or part examined. Where an examination has not been made, leave the plate uncolored.

The diagrams show relations among principal parts. They are arranged for instruction and are not drawn to the construction of any one make of automobile. Where the construction differs, use the service diagram for the car in hand and make a corresponding record here.

A result which cannot be repeated shall be entered as such. Do not substitute an assumption for a test. A setting shall not be altered until the condition has been recorded.

Read the workshop precautions on page 4 before proceeding. The plates are study and record aids; no line on a plate authorizes an improvised connection or a hazardous trial.

THE COLOR RECORD

The colors below are a means of keeping the examination in view. A color has no meaning apart from the entry made in the case record.

RED Current or electrical supply path examined.

YELLOW Fuel or air path examined.

BLUE Water or cooling path examined.

GREEN Mechanical movement examined.

BLACK Condition found defective or interrupted.

NO COLOR Not examined, or result not established; state which in the record.

Where a part belongs to more than one examination, use separate pencil marks and identify them in the record. Fuel and air are both yellow; distinguish them by F and A. Mark a confirmed fault with a black cross beside the colored path, leaving the part name legible. These colors do not signify the colors of the wires on the car. Enter any change of key in the case record.

ORDER OF EXAMINATION

1. Hear the operator’s statement. Record the condition in the words used.

2. Observe the car before disturbing its present condition.

3. If it is safe to proceed, determine whether the engine turns, starts, idles, and runs under the reported condition.

4. Select the system indicated by the observation.

5. Make one examination at a time and record the instrument used.

6. Repeat an uncertain examination before reporting a fault.

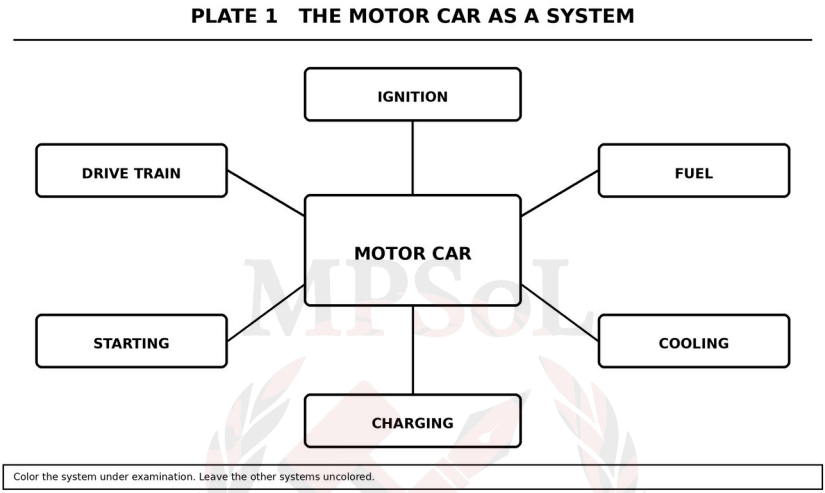
7. State what has been established and what remains to be examined.

The order of examination is more important than the speed of the report.

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PLATE 1 THE MOTOR CAR AS A SYSTEM

Begin with the system named by the reported condition. The motor car is shown as a group of related systems. Color one system at a time.



General relation only. The construction of the car in hand governs the examination.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

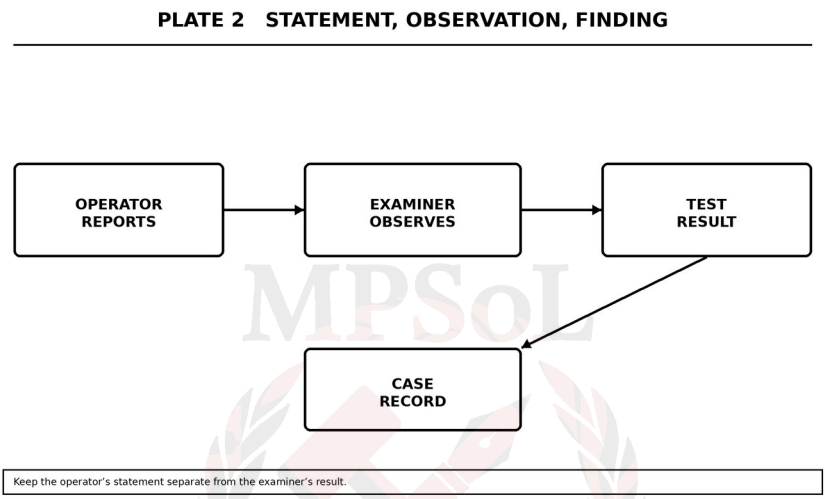
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 2 STATEMENT, OBSERVATION, FINDING

The operator's words, the examiner's observation, and the result of a test are separate entries. Do not revise one entry to agree with another.



The record shall show where the report ends and the examination begins.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

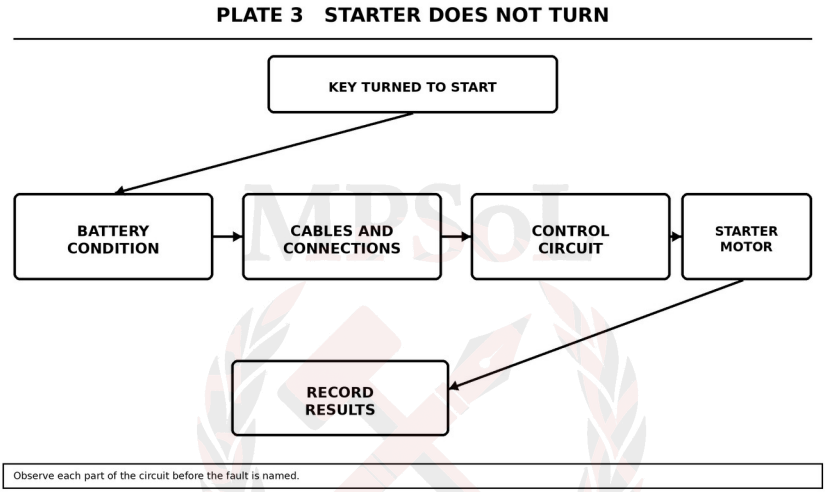
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 3 STARTER DOES NOT TURN

When the engine does not turn, examine battery condition, cables and connections including the return path, the control circuit, and the starter motor in order. Identify the selector or clutch interlock, where fitted. Do not bridge it.



The arrows give an order of examination, not a wiring circuit. Confirm that the engine can turn by the maker's procedure before condemning the starter. This plate supplies no test values.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

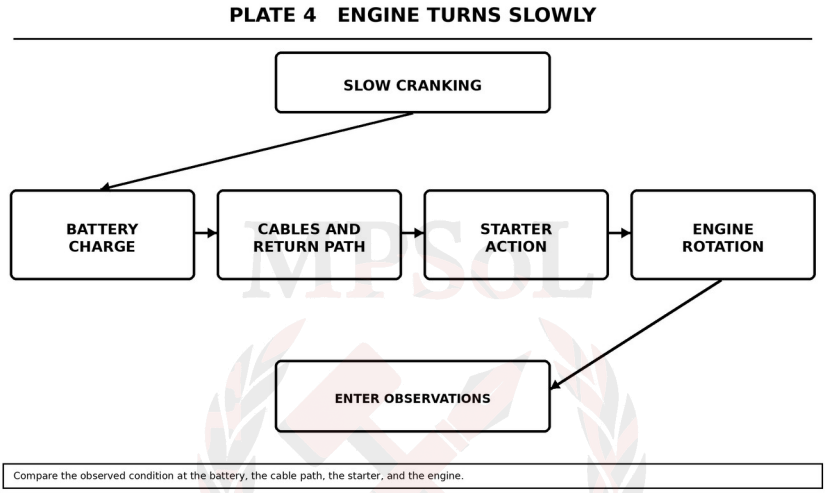
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 4 ENGINE TURNS SLOWLY

A slow turn may be reported with a weak battery, resistance in a connection, a starter condition, or an engine condition. Record each observation without assigning a cause in advance.



Compare readings with the vehicle specification under the stated test conditions. Observe the maker’s cranking and cooling intervals; prolonged cranking may damage the starter.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

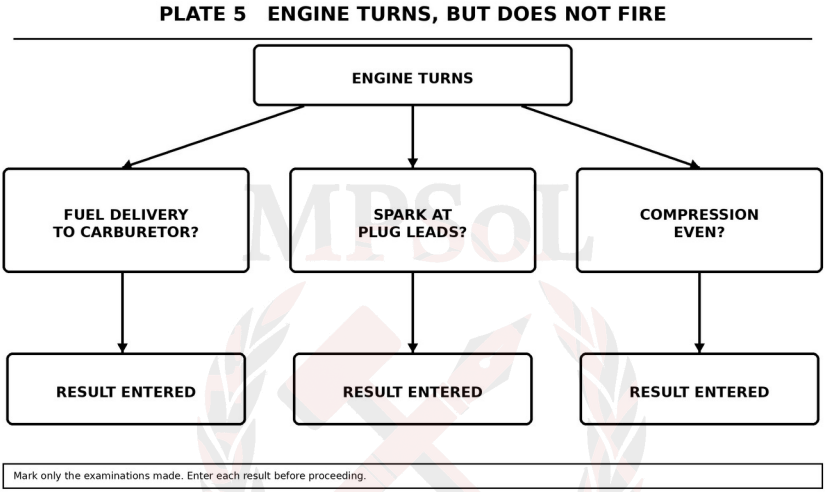
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 5 ENGINE TURNS, BUT DOES NOT FIRE

Examine fuel delivery, ignition, and compression separately by the maker’s procedure. Disable ignition and fuel delivery as prescribed for compression testing. Record each result; equal compression readings alone do not establish adequate compression.



Use an approved enclosed spark tester; do not hold a loose lead or make an exposed spark near fuel. Keep clear of moving parts while the engine is cranked.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

Part or path and test made: _____

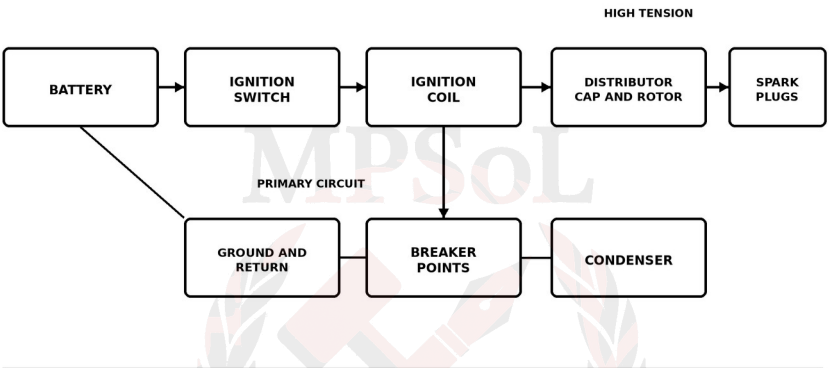
Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 6 IGNITION CIRCUIT

The plate identifies the principal parts of a breaker-point ignition system. Trace the primary circuit and the high-tension path separately with the wiring diagram for the car in hand.

PLATE 6 IGNITION CIRCUIT



The plate separates the low-tension circuit from the high-tension path to the plugs.

Component relations only, not terminal wiring. The condenser is connected across the breaker points, not in series with them. The points switch the coil primary return; the cap and rotor distribute the high tension. Identify polarity and any ballast resistance before testing.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

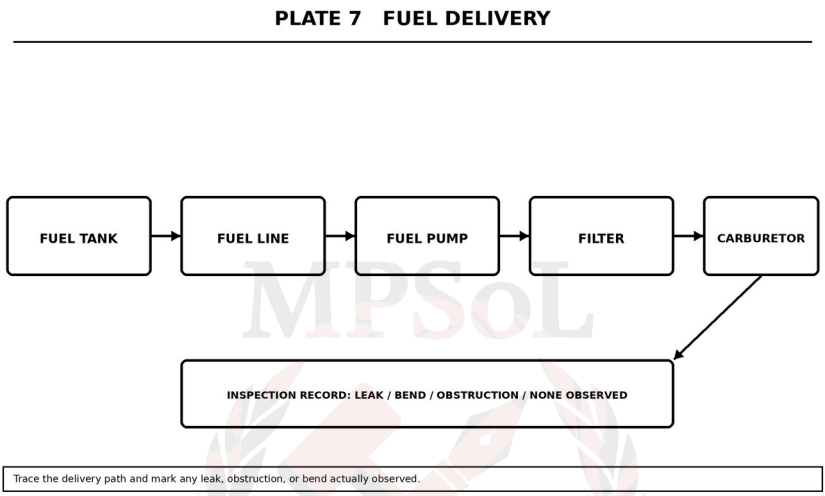
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 7 FUEL DELIVERY

Trace fuel from the tank through the line and pump to the carburetor. Mark a leak, bend, or obstruction only where it has been observed.



Stop the engine and let hot parts cool before opening a fuel line. Keep flame and sparks away; catch fuel in a suitable vessel. Do not draw fuel by mouth. The filter position varies with the car.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

Part or path and test made: _____

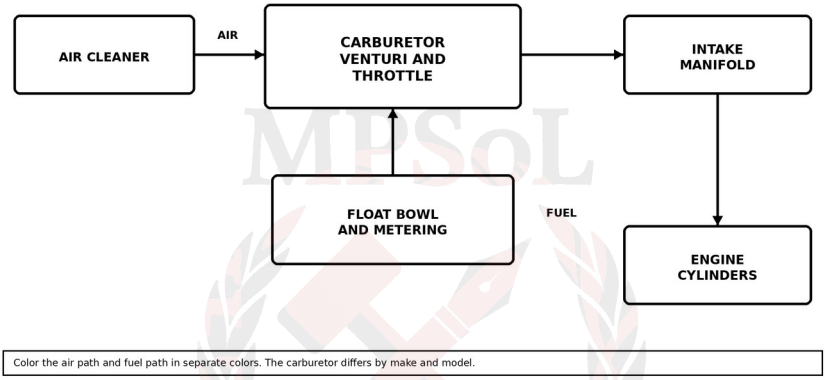
Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 8 AIR AND FUEL MEET

The carburetor meters fuel into the air stream and delivers a mixture to the intake manifold. Mark both paths yellow, adding A for air and F for fuel. The carburetor fitted to the car governs the details.

PLATE 8 AIR AND FUEL MEET



Use the page 7 key in place of the instruction for separate colors printed within the plate: yellow with A for air and F for fuel. The metering passages vary with throttle position. This is not an adjustment chart.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

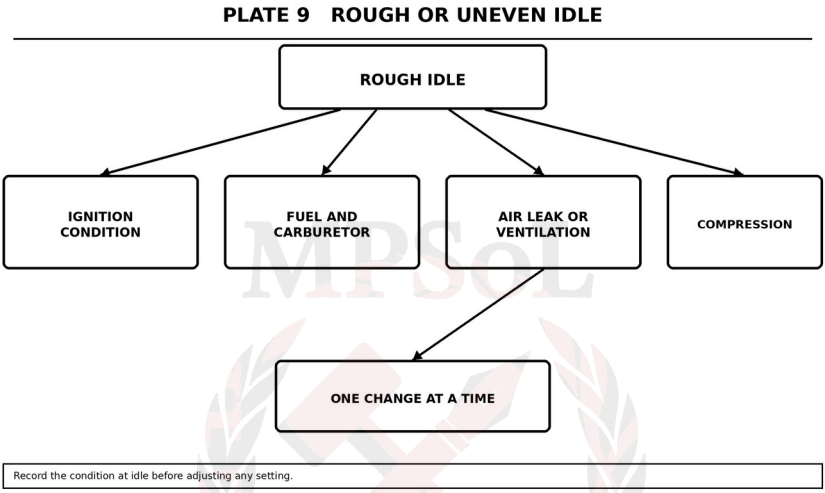
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 9 ROUGH OR UNEVEN IDLE

Record the condition at idle before altering a setting. Examine ignition, fuel delivery, air leakage, ventilation, and compression in an orderly manner.



When an adjustment is made, enter the prior setting and the resulting condition.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

Part or path and test made: _____

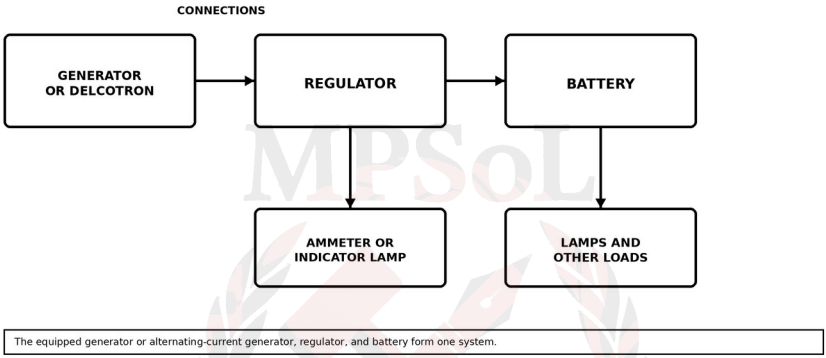
Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 10 CHARGING SYSTEM

The charging system includes the battery, generator or alternating-current generator, regulator, indicator, and connecting wires.

PLATE 10 CHARGING SYSTEM



The equipped generator or alternating-current generator, regulator, and battery form one system.

Component relations only, not a wiring circuit. Charging output is not ordinarily carried through the regulator as the row of boxes might suggest. Use the car's diagram. Do not bridge terminals or disconnect the battery with the engine running.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

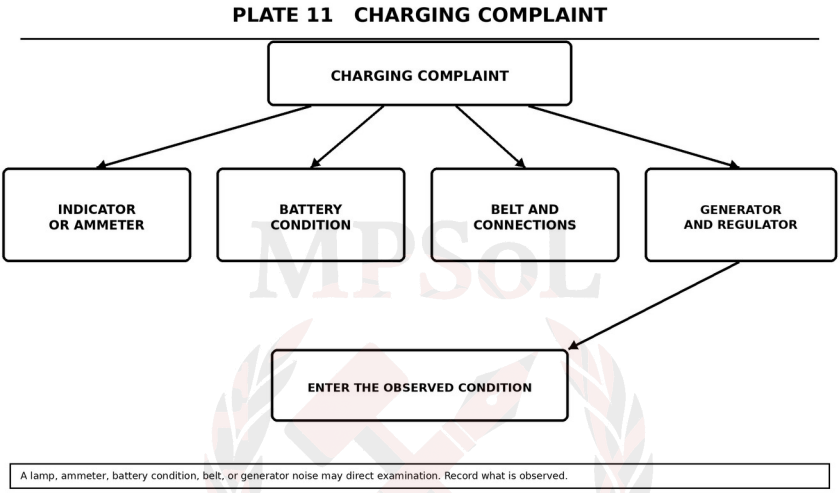
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 11 CHARGING COMPLAINT

A charging complaint may appear as an indicator lamp or ammeter condition, a battery condition, a loose belt, a connection fault, or noise at the generator.



Record the indication before disturbing a connection. Stop the engine before examining belt tension or touching the belt, fan, or pulley. An indicator lamp alone does not measure charging output.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

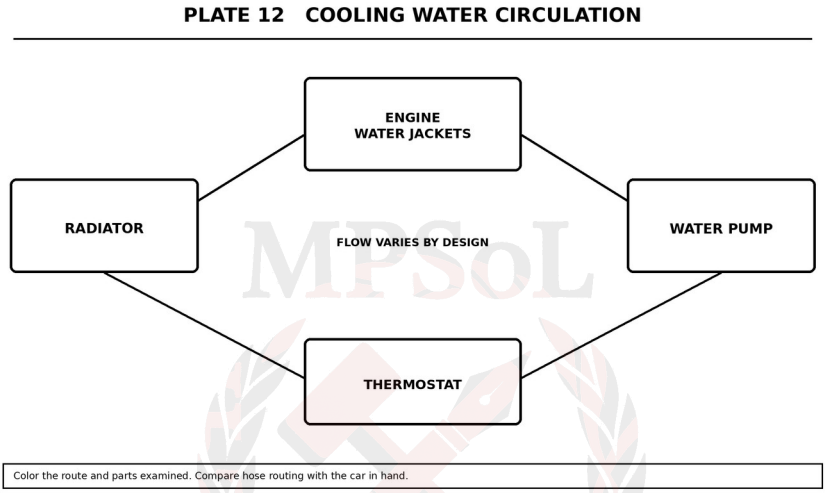
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 12 COOLING WATER CIRCULATION

Identify the radiator, pump, engine water jackets, thermostat, and hose routes on the car. This plate groups the parts; the connecting lines do not show the order or direction of circulation.



Trace actual flow from the maker’s diagram, including the by-pass and heater circuit where fitted. In a common arrangement the pump sends coolant through the engine and the thermostat controls its passage toward the radiator.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

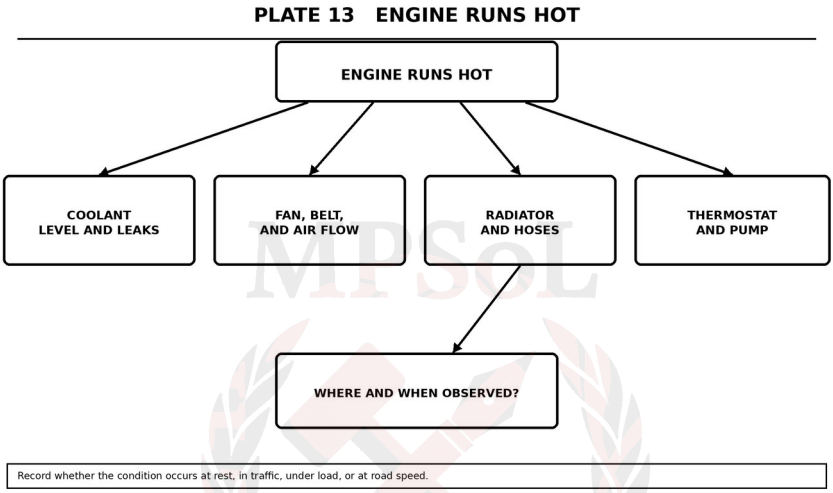
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 13 ENGINE RUNS HOT

Enter whether the condition occurs at rest, in traffic, under load, or at road speed. Record coolant loss, belt condition, air flow, and other observations separately.



Stop an overheating engine in a safe place. Do not remove any cooling-system pressure cap while hot. Let the system cool and follow the maker’s procedure before checking the level.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

Part or path and test made: _____

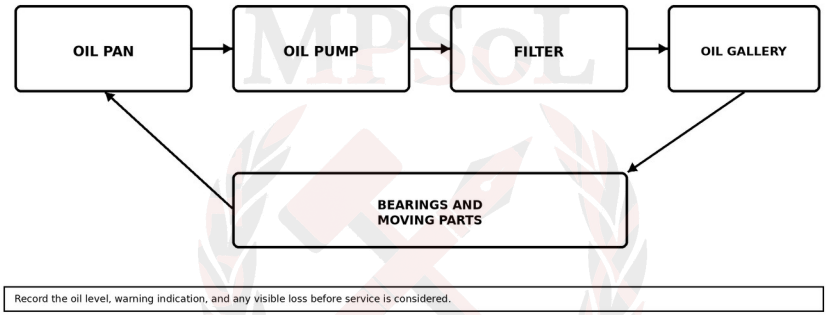
Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 14 LUBRICATING OIL PATH

The plate shows a common full-flow oil arrangement, from pan through pump and filter to galleries and moving parts, with return to the pan. By-pass filters and relief passages differ. Record level, warning indication, and visible loss.

PLATE 14 LUBRICATING OIL PATH



Read the level with the engine stopped, after the specified waiting interval, on level ground. Stop the engine if oil pressure is lost; do not continue running it to complete the record.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

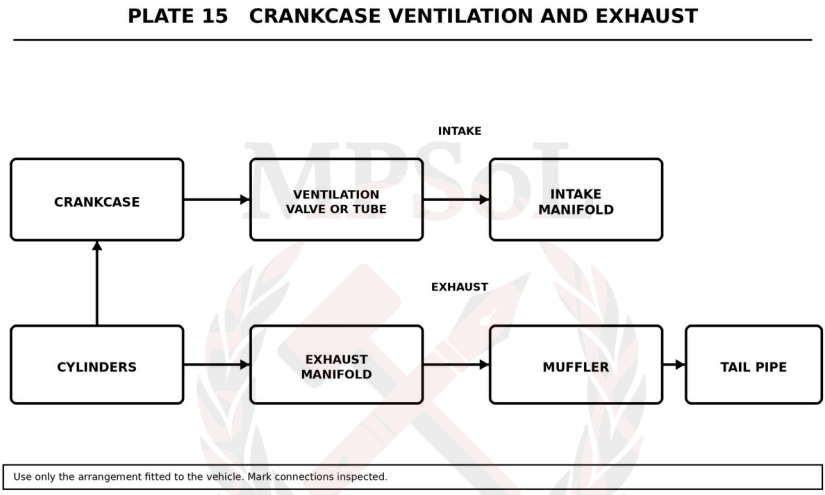
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 15 CRANKCASE VENTILATION AND EXHAUST

Mark only the ventilation and exhaust connections fitted to the car. The upper path represents a closed crankcase ventilation arrangement; some cars have a different outlet. The cylinder-to-crankcase arrow denotes blow-by, not normal exhaust flow.



Exhaust gas contains poisonous carbon monoxide. Do not run an engine in an enclosed place without effective exhaust extraction to the outside. Keep clear of hot pipes and manifolds.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

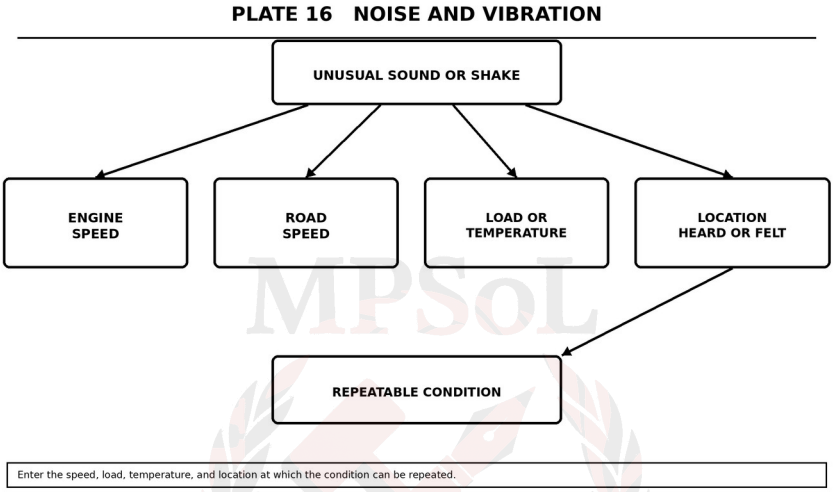
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 16 NOISE AND VIBRATION

Record the engine speed, road speed, load, temperature, and location at which the condition can be repeated. A name for a noise is not a finding.



Do not road-test an unsafe car or write while driving. Make belt, fan, and pulley examinations with the engine stopped. Do not approach rotating parts to locate a sound.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

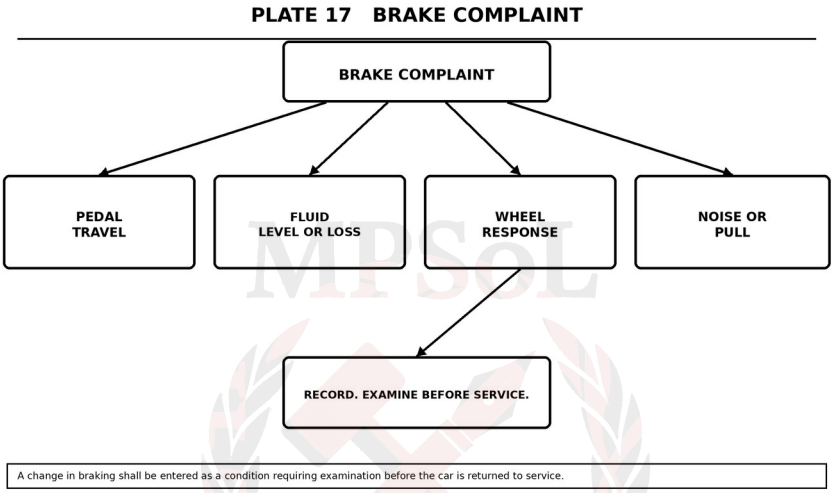
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 17 BRAKE COMPLAINT

A change in braking is a condition requiring examination before the car is returned to service. Record pedal travel, fluid loss, pull, noise, and wheel response.



Keep the car out of service if braking is impaired. Do not blow out or dry-brush brake dust; linings may contain asbestos. Brake examination and dust control shall follow approved workshop procedures.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

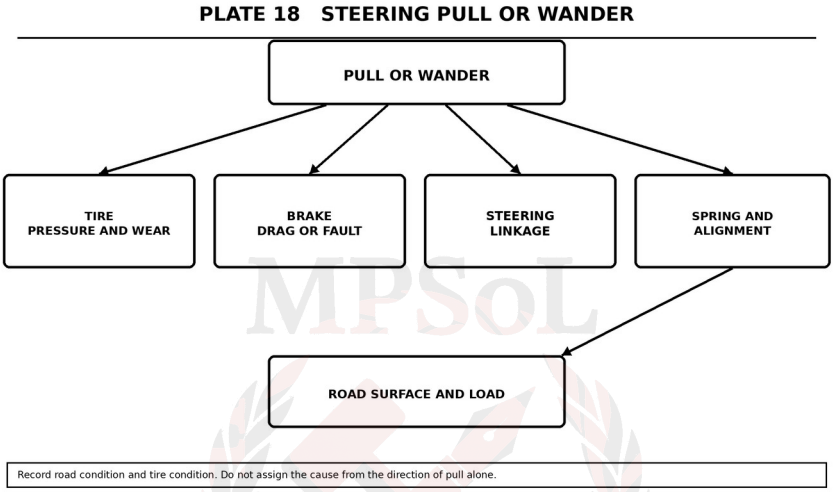
Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

PLATE 18 STEERING PULL OR WANDER

Record tire condition, road surface, load, brake condition, and steering response. Do not assign the cause from the direction of pull alone.



Do not road-test a car with loose or damaged steering, unsafe tires, or impaired brakes. Support a raised car on proper stands and examine the parts by the maker's procedure.

EXAMINATION RECORD

Case no. _____ Date _____ Order _____

Part or path and test made: _____

Reading, unit, and conditions: _____

Result and next examination: _____

CASE EXERCISE 1 NO CRANK

The operator reports: “The key turns, and nothing happens.” The examiner observes that the lamps are lighted before the key is turned. During the starting attempt, the examiner observes that the engine does not rotate.

Enter the statement separately from the observation. Select Plate 3. List the first three stages of examination, including the return path with the cable examination. Lighted lamps do not establish battery capacity under starting load. Leave test results blank until tests have been made.

What has been established? The engine did not turn during the reported attempt.

What has not been established? The condition of the battery, connections, control circuit, starter, and return path.

_____

_____

_____

_____

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CASE EXERCISE 2 ENGINE RUNS HOT

The operator reports that the temperature indication rises during a long wait in traffic and falls after the car is moving. The examiner observes that the condition can be repeated at rest.

Enter the place and condition of occurrence. Select Plate 13. Identify the air-flow and cooling-system observations that can be made without disturbing the system.

Do not enter a defective part merely because the indication changes with road speed. Enter each test and its result.

What has been established? The operator reports a rise at rest and a fall in motion. The examiner has repeated the rise at rest; the fall in motion remains an operator's report.

What has not been established? The coolant level, circulation, belt, and air flow, and whether the indication itself is true.

_____

_____

_____

_____

CASE EXERCISE 3 UNEVEN IDLE

The operator reports an uneven idle after the engine has warmed. The examiner records the idle condition before changing the carburetor setting. The condition is present with the car standing and is not reported at road speed.

Select Plate 9. Enter the systems to be examined and the instrument, if any, used at each step. If an adjustment is made, preserve the original setting in the record.

The finding shall state what changed after the test. “Carburetor trouble” is not a sufficient entry without an examination supporting it.

What has been established? The examiner has observed uneven idle with the warm engine and the car standing. Its absence at road speed has not been established by examination.

What has not been established? The condition of the ignition, fuel delivery, air leakage, ventilation, and compression.

CASE RECORD 1

Case no. _____ Car make, model, year, and engine: _____

Operator’s statement: _____

Condition observed: _____

Conditions of occurrence: _____

System examined: _____

Test, instrument, connection, and conditions: _____

Result, unit, and specification used: _____

Part or path examined and plate marks used: _____

Adjustment, prior setting, and result: _____

Further examination required: _____

Examiner and date: _____

Enter observations in the order made. Leave no result implied.

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CASE RECORD 2

Case no. _____ Car make, model, year, and engine: _____

Operator’s statement: _____

Condition observed: _____

Conditions of occurrence: _____

System examined: _____

Test, instrument, connection, and conditions: _____

Result, unit, and specification used: _____

Part or path examined and plate marks used: _____

Adjustment, prior setting, and result: _____

Further examination required: _____

Examiner and date: _____

Enter observations in the order made. Leave no result implied.

MPSoL

NAMES USED IN THIS MANUAL

Alternating-current generator. A charging generator producing alternating current, rectified for the car's electrical system. Delcotron is a General Motors trade name for such equipment.

Breaker points. Contacts in the distributor which open and close the primary ignition circuit.

Carburetor. The instrument which meters fuel and air for delivery to the engine.

Compression. The pressure produced in a cylinder as the piston travels upward with the valves closed.

Condenser. A capacitor connected across the breaker points to limit arcing and assist the rapid collapse of the coil's magnetic field.

Distributor. The assembly which interrupts the primary circuit and directs high tension to the proper spark plug.

Regulator. The unit which governs the charging-system output.

Return path. The conducting path by which current returns to its source.

Starter solenoid. An electromagnet which operates a heavy-current switch and, on some arrangements, engages the starter drive.

Thermostat. A temperature-controlled valve in the cooling system.

INSTRUMENTS AND THEIR RECORD

An instrument reading is useful only when the instrument is connected and used in the manner prescribed for the particular test. Enter the instrument, connection point, and result. Do not copy a reading without its unit or condition.

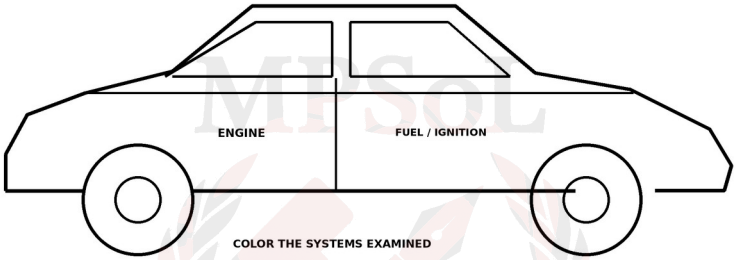
- Voltmeter: record the points between which the reading was taken.
- Ammeter: record the range, circuit, and direction indicated. Never connect a series ammeter across the battery. Use an instrument and connection suited to the current.
- Hydrometer: use only on a serviceable flooded battery; record the cell, specific gravity, and temperature correction required by the instrument. Protect eyes and skin from acid.
- Compression gauge: record cylinder, pressure and unit, engine temperature, throttle position, and cranking conditions. Compare with the maker’s limits.
- Timing light: record the timing reference, engine speed, and vacuum-advance connection as specified. Secure leads clear of fan, belts, and hot parts.
- Vacuum gauge: record the point of connection and the engine condition.
- Test lamp: record the circuit and whether the lamp lighted. Use only where its voltage rating and current draw suit the circuit.

Follow the instructions supplied with each instrument. Some tests require the engine to turn or run. Use the precautions specified by the car maker and instrument maker.

PLATE 19 THE AUTOMOBILE UNDER EXAMINATION

This outline represents no particular make. Its marked areas are record spaces, not the positions of parts. Use the adjoining list to identify each system examined and enter the order on the final record.

PLATE 19 FINAL SYSTEM MAP



Color only the systems examined. Enter the order in the case record.

Plate 19 is the final system map. Color records an examination, not a certificate of condition.

SYSTEMS ENTERED ON THE MAP

System _____ Order _____ Case record _____

System _____ Order _____ Case record _____

System _____ Order _____ Case record _____

FINAL EXAMINATION RECORD

The report shall state the condition presented, the examinations made, the results obtained, and the work remaining. Distinguish a suspected cause from a cause established by examination.

Condition presented:

_____

Systems examined, in order:

_____

Findings established:

_____

Parts adjusted or replaced and prior settings:

_____

Condition after work and means of verification:

_____

Work remaining:

_____

Examiner, date, and report made to:

_____

The examination ends where the evidence ends.

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Other MPSoL titles:

Related works selected from the SCAD archive filters.

Same SCAD vector (F1:C2:K2)

- Crossing Protocol Alpha Manual (1951) [F1:C2:K2]

Same Function (F1)

- The Murder Mystery Manual [F1:C5:K2]
- GFA-FR · Atlas de Formules GodSet [F1:C9:K2]
- GFA-EN/ES · GodSet Formula Atlas [F1:C9:K2]
- GFA-ES · Atlas de Fórmulas GodSet [F1:C9:K2]

Same Charge (C2)

- The Family Field Manual [F2:C2:K2]
- My Account [F9:C2:K2]
- MN-11 · Manual of Non-Cruelty [F2:C2:K2]
- Classical Foundations of Containment [F12:C2:K1]

Same Containment (K2)

- GFA-01 · The GodSet Formula Atlas [F1:C9:K2]
- GFA-JP · GodSet Formula Atlas (JP) [F1:C9:K2]
- T12-AST-01 · The Fire of the Word [F1:C4:K2]
- Madness 311 [F9:C5:K2]