

General Shop Knowledge, Tools and Safety

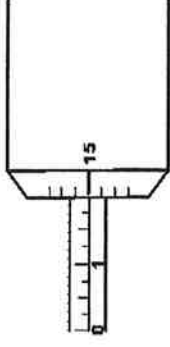
This test consists of multiple choice questions to help measure your level of knowledge. Circle the letter of your answer for each question.

- 1) The head of the bolt shown below indicates:



- A) the bolt is metric.
 B) the bolt is Grade 3.
 C) the bolt was made in the U.S.
 D) the bolt is Grade 5.
 E) only six point sockets are to be use on this bolt.
- 2) The equipment shop term "Flat Rate" means:
 A) that a customer is billed at a specified cost per hour, regardless of how long a job requires.
 B) that the manufacturer is reimbursing the dealer for warranty work performed.
 C) a discounted hourly shop rate for preferred customers.
 D) that the customer's equipment has to be repaired by a specific time.
 E) a specified, predetermined time that a particular job is supposed to require to complete.
- 3) A fire involving flammable liquids such as diesel fuel:
 A) should be put out with water.
 B) requires a Type A extinguisher.
 C) requires a Type BC extinguisher.
- 4) Used engine oil:
 A) must be recycled or disposed of as a hazardous material.
 B) is a very effective dust suppressant for gravel driveways.
 C) is generally disposed of through the sanitary sewer system.
 D) should be filtered and reused in an engine.
 E) must be returned to the customer along with any used parts.
- 5) The proper tool to correctly tighten bolts on a cylinder head would be a:
 A) breaker bar and six-point socket.
 B) pneumatic impact wrench.
 C) combination wrench.
 D) torque wrench.
 E) ratchet and 12-point socket.

- 6) A 0 - 1" micrometer is used to take a measurement on a wrist pin for wear. The micrometer appears as shown. The pin diameter is:



- A) 0.115"
 B) 1.115"
 C) 0.015"
 D) 0.215"
 E) 0.190"
- 7) MSDS sheets:
 A) are generally not required in an equipment shop.
 B) are required to be given to a customer when a machine is returned.
 C) are useful in troubleshooting electrical problems.
 D) should be returned to the manufacturer when a new piece of equipment is sold.
 E) describe proper safety and handling techniques of various chemicals and fluids.
- 8) Which answer best describes the advantage/purpose of a brass hammer?
 A) The hammer is heavier and therefore more effective.
 B) Eye protection is not required for its use.
 C) The hammer face is softer and less likely to damage parts.
 D) It is used for metal working and machine shop activities only.
 E) There is no advantage to using a brass hammer.
- 9) A metric bolt can be identified by the fact that:
 A) it has a class number as opposed to grade marks on the head.
 B) it says "metric" right on the bolt.
 C) only non-U.S. manufacturers utilize metric fasteners.
 D) the heads always have 12 points as opposed to 6 points.
 E) there is no "class" or "grade" marking on the head.
- 10) Which of the following applies to metal welding and cutting operations?
 A) One must be certified to weld.
 B) Aluminum can be cut effectively with an Oxy-Acetylene torch.
 C) Cast iron is easier to weld than steel.
 D) Appropriate shaded eye protection is required.
 E) Welding does not create metal distortion, but brazing does.

OSE Service Technician Skills/Knowledge Test Engine Troubleshooting/Tune-Up

This test consists of multiple choice questions to help measure your level of knowledge. Circle the letter of your answer for each question.

- 1) A four-stroke cycle engine that does not use battery ignition fails to start. Listed below are five items that could be checked. Select the answer that best describes the appropriate sequence you would follow in the five checks. This engine recently ran fine.
- 1) Compression
 - 2) Fuel supply
 - 3) Spark
 - 4) Electrical wiring on the engine.
 - 5) Air filter
- A) 1, 2, 3, 4, then 5
B) 3, 2, 1, 5, then 4
C) 2, 3, 4, 1, then 5
D) 5, 1, 4, 2, then 3
E) 5, 4, 3, 2, then 1
- 2) A push lawn mower that utilizes breaker point ignition was run into a rock and the engine was abruptly stalled by the rock. The engine will not start. After confirming that the crankshaft is not bent or broken, the appropriate check to try to identify the problem is:
- A) Flywheel key
 - B) Fuel supply
 - C) Air filter
 - D) Engine oil level
 - E) Valve Timing
- 3) When adjusting carburetors on single cylinder engines:
- A) always adjust the idle speed first.
 - B) always adjust the idle mixture first.
 - C) always adjust the high speed mixture first.
 - D) the order doesn't matter.
 - E) carburetors are never adjustable on these engines.
- 4) A clogged air filter will cause the:
- A) air-fuel mixture to be too lean.
 - B) air-fuel mixture to be too rich.
 - C) engine to run too fast.
 - D) connecting rod to fail.
 - E) both B and C are correct.
- 5) Gasoline left in an engine that has not run for an extended period of time:
- A) is not a problem.
 - B) should be diluted with fresh gasoline before starting.
 - C) will not burn.
 - D) can deteriorate spark plugs.
 - E) may cause varnish build up which plugs carburetor passages.
- 6) An appropriate check or inspection to perform on an engine which runs hot is:
- A) clogged cooling fins.
 - B) broken flywheel key.
 - C) incorrect spark plug.
 - D) clogged air filter.
 - E) loose muffler.
- 7) When draining used engine oil from a four-stroke cycle engine, it is best to:
- A) drain the oil with the engine cold so that all the oil is in the bottom of the crankcase.
 - B) drain the oil after running the engine so the oil holds contaminants in suspension.
 - C) only drain part of the oil so the crankcase never goes completely dry.
 - D) make sure the piston is on top dead center.
 - E) drain the oil either hot or cold.
- 8) Electronic ignition systems:
- A) do not utilize breaker points.
 - B) do not utilize coils.
 - C) can be adjusted to vary engine horsepower.
 - D) require a battery for a power supply.
 - E) are not used on single cylinder engines.
- 9) The "kill" wire shorts out to ground on a magneto ignition engine. This engine will:
- A) stop if it is running.
 - B) not start.
 - C) not be able to be shut off.
 - D) start if it is shut off.
 - E) both A and B.
- 10) An engine has spark, but will not start when turned over. Below is a list of possible problems. Select the answer which lists the most possible correct choices.
- 1) No fuel
 - 2) Clogged fuel filter
 - 3) Improper timing
 - 4) Dead battery
 - 5) Clogged air filter
- A) 1, 2, and 5.
B) 1, 3, and 4.
C) 1, 2, and 4.
D) 2, 4, and 5.
E) 1, 2, 3, and 4.

OPE Service Technician Skills/Knowledge Test
Electrical Principles

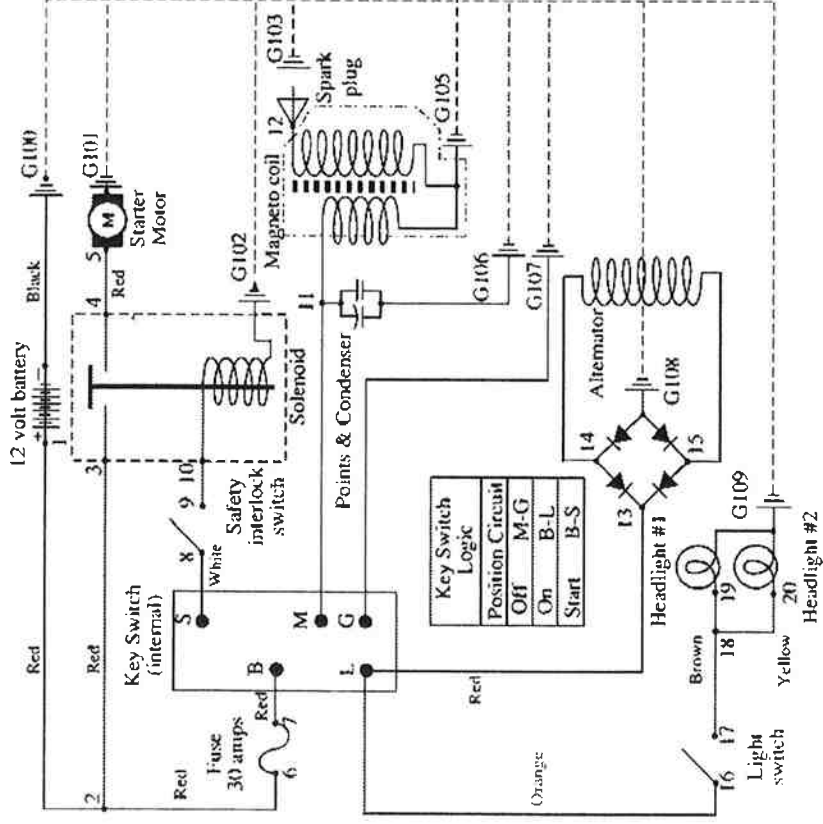
This test consists of multiple choice questions to help measure your level of knowledge. Circle the letter of your answer for each question.

- 1) An ammeter is used to test a charging circuit. It should be connected:
- A) in series in the wire from the charging system.
 - B) in series in the battery ground wire.
 - C) in parallel with the key switch.
 - D) in parallel with the wire from the charging system.
 - E) between both battery terminals.
- 2) A continuity test is done to check for:
- A) voltage.
 - B) a defective battery.
 - C) current flow in a wire.
 - D) an open circuit.
 - E) condition of the starter.
- 3) A lighting circuit has two headlights wired in parallel. The rating of the fuse used to protect the circuit is unknown. The headlights each have a resistance of 2 ohms. The unit has a 12-volt battery. The correct fuse would be:
- A) 1 amp
 - B) 2 amps
 - C) 3 amps
 - D) 6 amps
 - E) 12 amps
- 4) If both the lighting circuit and the electric clutch fail to operate when switched on, the proper part of the circuit to check first would be:
- A) the starter switch.
 - B) a fuse in the wire from the battery to the key switch.
 - C) the alternator.
 - D) the light switch.
 - E) the clutch switch.
- 5) A voltmeter is connected:
- A) in series with the circuit.
 - B) in parallel with the circuit.
 - C) from the battery ground terminal to a ground on the machine.
 - D) from the hot battery terminal to the charging circuit.
 - E) only in the ignition system circuit.
- 6) Which device is used to indicate the rate of charge to a battery?
- A) Voltmeter.
 - B) Continuity tester.
 - C) Ohmmeter.
 - D) Ammeter.
 - E) Hydrometer.
- 7) When current flows in both directions in a conductor, this is called:
- A) direct current.
 - B) alternating current.
 - C) either direct or alternating current.
 - D) an open circuit.
 - E) a short circuit.
- 8) Diodes are used as:
- A) an electrical fuse.
 - B) an electrical stop for current flow in both directions.
 - C) an electrical stop for current flow in one direction.
 - D) relays for controlling large current loads.
 - E) resistors.
- 9) The resistance of a switch increases due to corrosion of the contacts. If voltage remains constant, the current flow through the switch will:
- A) decrease.
 - B) increase.
 - C) remain the same.
 - D) stop completely.
 - E) create a short circuit.
- 10) A key switch from a 12-volt system is being tested with an ohmmeter. The switch is checked in the "off" position, then in the "on" position. If the switch is good, the appropriate resistance readings for these two tests would be:
- A) 12 ohms off, 0 ohms on.
 - B) 0 ohms off, 12 ohms on.
 - C) 0 ohms off, 0 ohms on.
 - D) infinite ohms off, infinite ohms on.
 - E) infinite ohms off, 0 ohms on.

OPE Service Technician Skills/Knowledge Test Electrical Circuits and Schematics

This test consists of multiple choice questions to help measure your level of knowledge. Circle the letter of your answer for each question.

The following diagram is used for questions 1 through 5:



- 1) What would happen if there were continuity between the "B" and "M" terminals on the key switch?
 - A) The starter would be running.
 - B) The lights would come on.
 - C) The battery would short circuit to ground.
 - D) The ignition system would be live.
 - E) The started solenoid would be clicking.

- 2) A 12 volt test lamp does not illuminate when connected between the negative terminal on the battery and the "B" terminal on the key switch. The battery is good. Which of the following is true?
 - A) The lights will be on.
 - B) The fuse is burned out.
 - C) This part of the circuit is OK.
 - D) The alternator is charging the battery.
 - E) The ignition system is live.

- 3) The battery tests OK. The tractor's lights work. But the starter will not turn the engine when the key switch is moved to the "start" position. Which of the following are possible causes?
 - A) The safety interlock switch is not closed.
 - B) The key switch is defective.
 - C) The starter solenoid is defective.
 - D) The starter motor is defective.
 - E) All of the above.

- 4) A safety interlock switch shown is actually installed as a seat switch. A second safety interlock is to be installed on the clutch linkage to prevent starting unless the clutch is depressed. This switch should be connected:
 - A) between the fuse and the "B" terminal of the key switch.
 - B) between connection points 9 and 10.
 - C) between connection points 4 and 5.
 - D) between the "M" terminal on the switch and connection point 11.
 - E) between the "L" terminal on the switch and connection point 13.

- 5) An electrical test is to be performed to test the function of the alternator. Which of the following would be a proper test?
 - A) Install an ammeter in series in the wire from connection point 13 to the "L" terminal.
 - B) Connect an ammeter in parallel with the wire from connection point 13 to the "L" terminal.
 - C) Connect a voltmeter in parallel with the wire from connection point 13 to the "L" terminal.
 - D) Install a voltmeter in series in the wire from connection point 13 to the "L" terminal.
 - E) None of these connections will test the alternator.

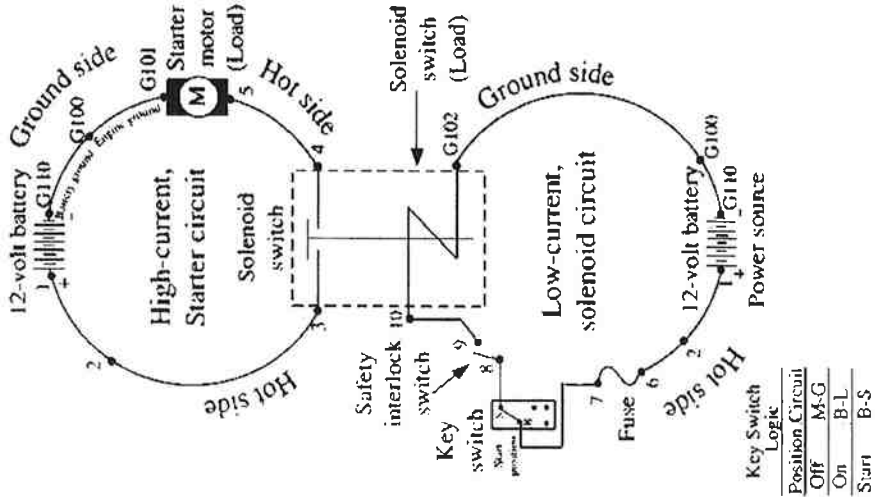
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OPE Service Technician Skills/Knowledge Test Electrical Circuits and Schematics (continued)

This test consists of multiple choice questions to help measure your level of knowledge. Circle the letter of your answer for each question.

For Questions 6 and 7: A starter will not turn over on the tractor with the following electrical circuit when the key is turned to the "Start" position and the safety interlock switch closes. The battery is tested and shows 12.6 volts. A battery load test indicates the battery is good. When a jumper wire is connected from point 1 to point 10, the starter spins the engine. With the key held in the start position, the following test light results are obtained.

The following diagram is used for questions 6 and 7:



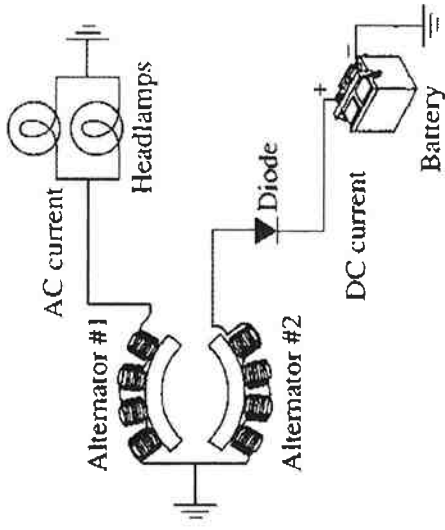
6) The fault in the circuit is the:

- A) fuse.
- B) safety interlock switch.
- C) key switch.
- D) solenoid.
- E) not enough information to determine the fault area.

7) The next test to determine/verify the location for the problem would be to:

- A) connect a jumper wire from "B" to "S" on the switch.
- B) replace the fuse.
- C) replace the safety interlock switch.
- D) connect a jumper wire from point 8 to point 9.
- E) replace the solenoid.

8) An engine is equipped with the following dual circuit alternator as shown. The customer complaint is that the lights will not work unless the engine is running. What is the most likely problem?



- A) The headlights do not have a good ground connection.
- B) The battery is dead.
- C) The battery terminals are corroded.
- D) The alternator is defective.
- E) This is a normal situation, not a problem.

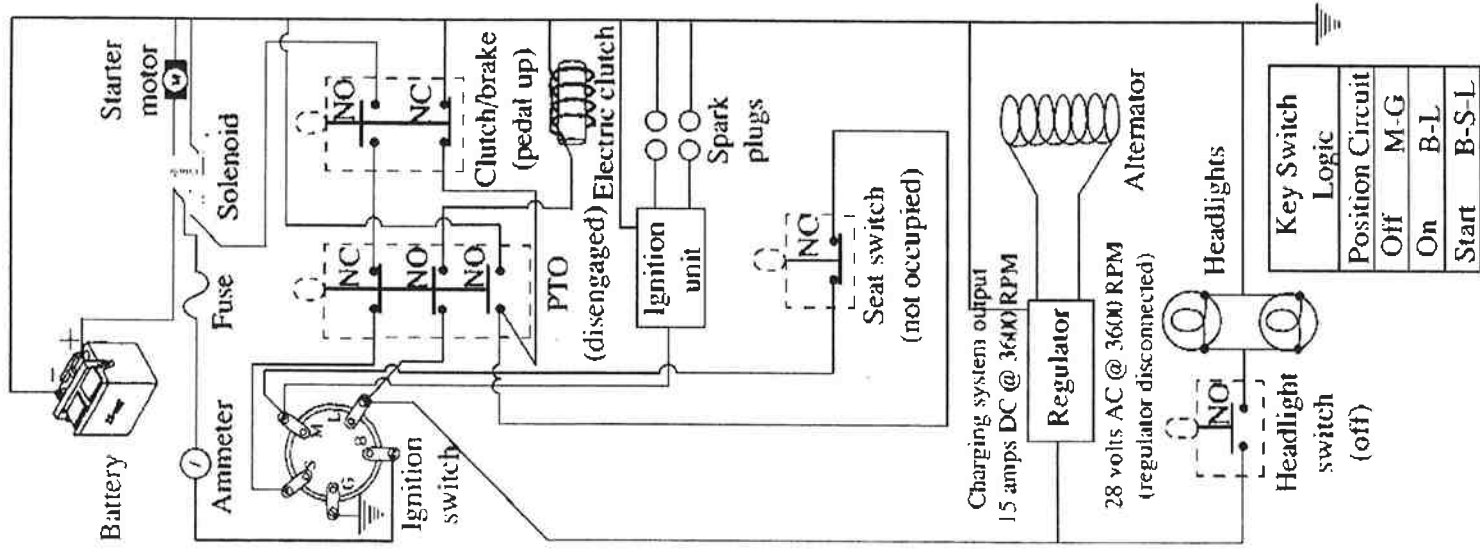
Probe T=test connection	Test light results (bright/dim/off)
Point 1 - Point G110	Bright
Point 2 - Point G110	Bright
Point 6 - Point G110	Bright
Point 7 - Point G110	Bright
Point B - Point G110	Bright
Point S - Point G110	Off
Point 8 - Point G110	Off
Point 9 - Point G110	Off
Point 10 - Point G110	Off

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OPE Service Technician Skills/Knowledge Test
Electrical Circuits and Schematics (continued)

This test consists of multiple choice questions to help measure your level of knowledge. Circle the letter of your answer for each question.

The following diagram is used for questions 9 and 10:



9) Regarding the safety interlock switches, which of the following is true?

- A) The seat switch, PTO switch and clutch/brake switch are all involved in the starting circuit.
- B) When the seat switch, PTO switch and clutch/brake switch are closed, the starter is running.
- C) When the key is in the "start" position, the PTO is engaged and the clutch/brake pedal is depressed, the solenoid will engage if the operator is in the seat.
- D) When the key is in the "start" position, the PTO is off and the clutch/brake pedal is depressed, the solenoid will engage if the operator is in the seat.
- E) When the key is in the "start" position, the PTO is off and the clutch/brake pedal is depressed, the solenoid will engage regardless of whether the operator is in the seat.

10) This engine does not have spark when turned over with the starter. Which of the following is a possible cause?

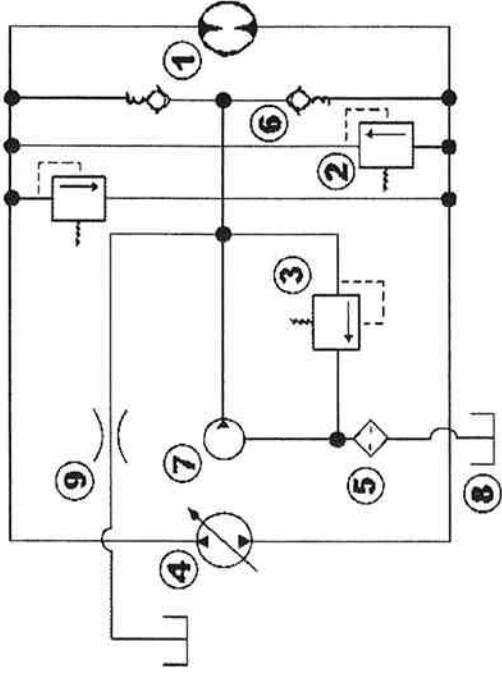
- A) Fuse is blown.
- B) Clutch/brake switch is defective.
- C) Alternator/regulator circuit is not functioning correctly.
- D) Key switch is defective.
- E) PTO switch is defective.

OPE Service Technician Skills/Knowledge Test Hydraulics

This test consists of multiple choice questions to help measure your level of knowledge. Circle the letter of your answer for each question.

- 1) The minimum bend radius of a hydraulic hose is:
- one half the outside diameter of the hose.
 - the dimension to which a fitting has to be crimped when making a new hose.
 - half the diameter of the inside of the hose.
 - the angle of the fitting on the end of the hose.
 - the smallest radius of a bend when the hose is installed.
- 2) What spool position allows oil to freely flow in and out of a connected cylinder in either direction?
- Raise
 - Lower
 - Neutral
 - Power beyond
 - Float

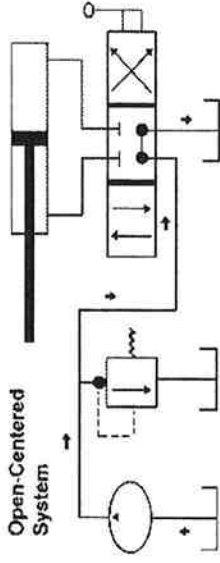
The following diagram is used for questions 3 and 4:



- 3) Which number indicates a fixed displacement motor?
- 1
 - 4
 - 6
 - 7
 - 9
- 4) Which number indicates a variable displacement pump?
- 1
 - 4
 - 6
 - 7
 - 9

- 5) In which type of system does the pump flow continuously circulate through the directional control valve and return to the reserve when no hydraulic functions are being utilized?
- Closed Center
 - Open Center
 - Load Sensing
 - Parallel
 - Hydrostatic

- 6) In the diagram shown below, the valve immediately to the right of the pump is a _____ valve.



- check
 - flow control
 - pressure relief
 - filter bypass
 - low divider
- 7) How much horsepower would be required to pump 20 gpm at 1500 psi? Hydraulic horsepower = $P \text{ (psi)} \times Q \text{ (gpm)} / 1714$.
- 12.8
 - 15.3
 - 16.8
 - 17.5
 - 20.0
- 8) The force a hydraulic cylinder can develop is determined by:
- the pressure in the system.
 - the flow rate in the system.
 - the size of the cylinder.
 - temperature of the oil.
 - both A and C.

- 9) The micron rating of a filter refers to:
- the dirt holding capacity of the filter.
 - the filter change interval.
 - the flow rate of oil that can pass through the filter.
 - the size of particles that will be caught.
 - the number of layers of filter media used.
- 10) The purpose of a system relief valve is to:
- control cylinder speeds.
 - prevent over-pressure in the system.
 - maintain the desired flow rate.
 - prevent operation if the filter becomes plugged.
 - keep the oil cool.