M-10 ACE

Basic Function

When the handle bar switch is pushed to adjust the suspension to FIRM, the WHT/RED wire is connected to ground. When the button is pushed to adjust the suspension to SOFT, the WHT/BLK wire is connected to ground.

The controller at the ACE unit reads the signal from the switch. If the command from the switch is FIRM, the controller supplies a 12 volt signal for the ACE motor to move clockwise. If the command is SOFT, the controller supplies a 12 volt signal for the ACE motor to move counterclockwise.

As the ACE motor moves the shock, it also turns the potentiometer. The resistance between the BLACK and WHITE leads of the potentiometer increases (from approximately 120 ohms @ full soft) and the resistance between the ORANGE and WHITE leads decreased (from approximately 880 ohms at full soft). The resistance between the ORANGE and BLACK should always be 1000 ohms. The resistance of the potentiometer reports the ABSOLUTE position of the shock module for the controller.

The controller reads the position of the potentiometer and supplies a proportionate voltage to the gauge. Full SOFT is 0 volts and full FIRM is around 5.5 volts. The entire system will function with out a gauge, but if the gauge is operational, most likely the potentiometer is also good.

See page7.26 for diagram of components

Troubleshooting

Below are a few examples of some possible failure situations, and explains what to troubleshoot on the ACE system.

1. Nothing happens when the switch is pushed, but the gauge (may or may not) display position.

NOTE: The gauge light is a separate circuit and if the light is not on it does not mean that the gauge is malfunctioning.

- The engine RPM is not high enough for the controller to respond. Engine RPM must me higher than 3500.
- Faulty switch (test)
- Faulty motor (test)
- Faulty controller or rectifier (test)
- Faulty potentiometer (test)

2. Suspension moves in and out, but the gauge does not work.
   - Gauge may be mounted too tight in the hood. (Slightly loosen gauge holding nuts and test)
   - Faulty gauge
   - Damaged or shorted wires
3. Gauge “wiggles” when the switched is pushed
   - Faulty motor (test, check)
   - Shorted or damaged wires
4. The system works using a jumper harness to power up from a battery charger, but does not work using the engine electrical power.
   - Faulty Rectifier
   - Short in main wire harness
5. The motor turns on for a short period when the switch is depressed, but stops in early travel.
   - Faulty potentiometer
   - Damaged or loose gears in the ACE system
   - Shorted or damaged wires

How to check components (see page7.26 for diagram of components)

When checking the function if all ACE components, use the service tool PN PA-46355. The power supply must be able to supply at least 13.1 volts and 5 amps (battery charger), most batteries will not work. To use this harness, disconnect the rectifier (just below the controller) from the main harness and connect the harness. This will allow FULL ACE functionality without the snowmobile engine running. The additional little jumpers will allow the charger to be connected directly to the module motor.

Suspension Module

1. Check that the motor is operational by disconnecting the BLUE and GREEN wires from the controller and apply 12 volts across these wires. The motor should move either in or out. Change the polarity and the direction should change. If the motor does not move, check wire continuity to the motor. If the continuity is good, replace motor.
2. Check the potentiometer resistances.
   - Between the BLACK and ORANGE wires should be 1000 ohms.
   - Between the BLACK and WHITE wires should be 120-880 ohms. This should increase from 120 ohms as the unit moves toward the FIRM position.
   - Between the ORANGE and WHITE wires should be 120-880 ohms. This should decrease from 880 ohms as the unit moves toward FIRM.
   - Jog the motor with 12 volts to make the potentiometer change resistances. If these resistances are not to specification and/or they do not change as the motor moves, replace the potentiometer.

Left Hand Switch

- Check continuity between ground and the WHITE/RED wire should only exists when the switch is depressed in the FIRM direction. The same is true for the WHITE/BLACK wire when the switch is depressed in the SOFT direction.

Gauge

- Apply 2.5 - 3 volts (a small battery will work) to the WHITE and ORANGE wires at the gauge. The needle should move close to the middle position. If not, check to see if the gauge mounting nuts are not too tight. Loosen the mounting nuts and check again. If the needle still does not move toward the center you may need to replace the gauge.

Controller

1. The controller is the most difficult component to diagnose. All the following must be checked and with in specification before the controller is replaced.
   - With the system powered up using the jumper tool (PN PA-46355), measure the voltage across the BLUE and GREEN wires (ACE motor wires). A voltage of -13 to 13 volts should be present when the switch is depressed.
   - A voltage of 0-6 volts should be measured between the ORANGE and BROWN gauge wires when the system is powered up. This voltage should change accordingly when the system is adjusted (near 6 volts at FIRM, and near 0 volts ar SOFT).
   - 5 volts (+/- 1 volt) should be measured between the ORANGE and BLACK module leads when the system is powered up.

Rectifier

- With the system powered up by the snowmobile engine, measure the voltage between the RED and BROWN rectifier leads. Acceptable voltage is 9-14 volts at idle, and above 13 volts above 3500 RPM. Replace rectifier if voltage is too low or too high.

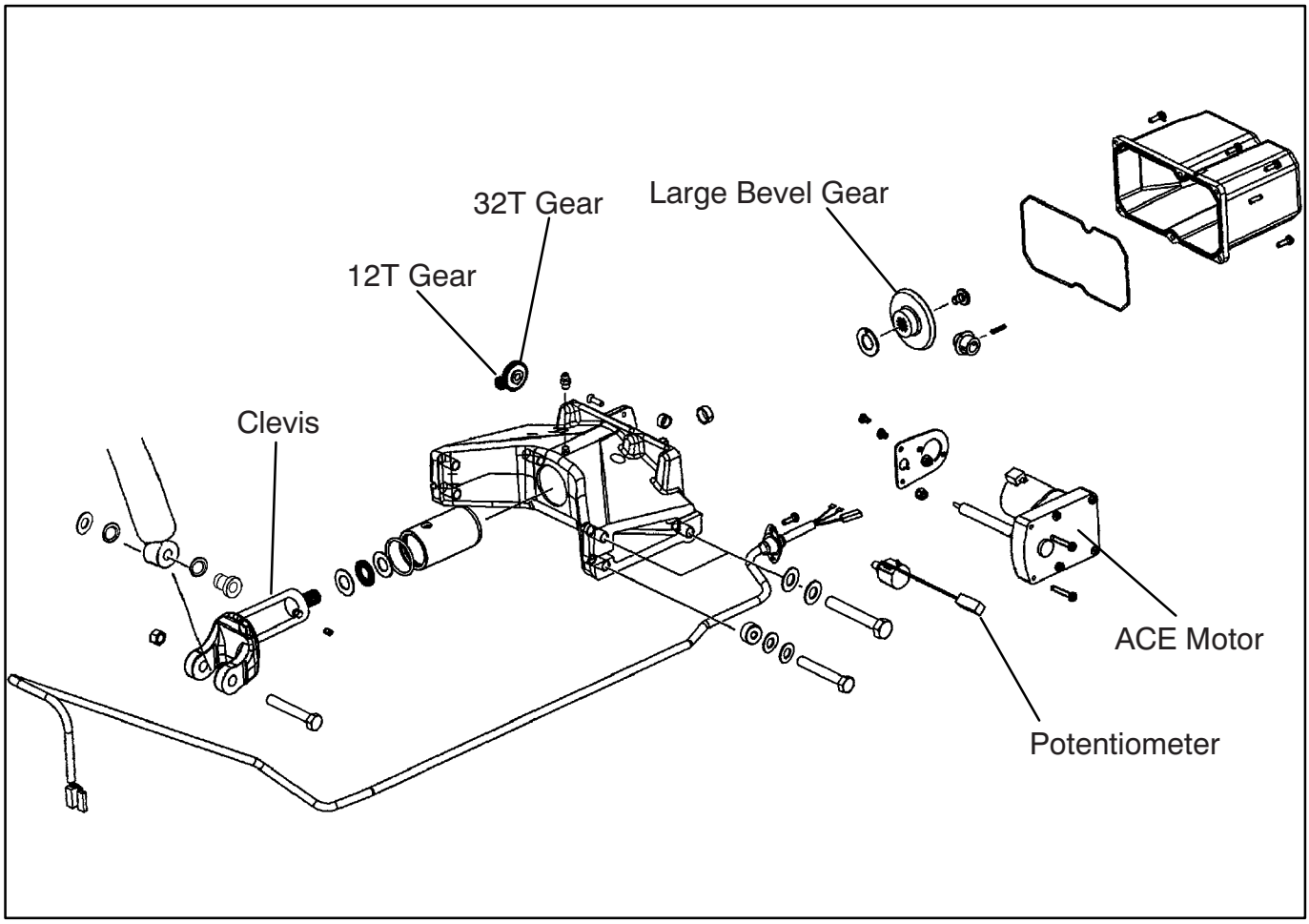
Potentiometer Timing

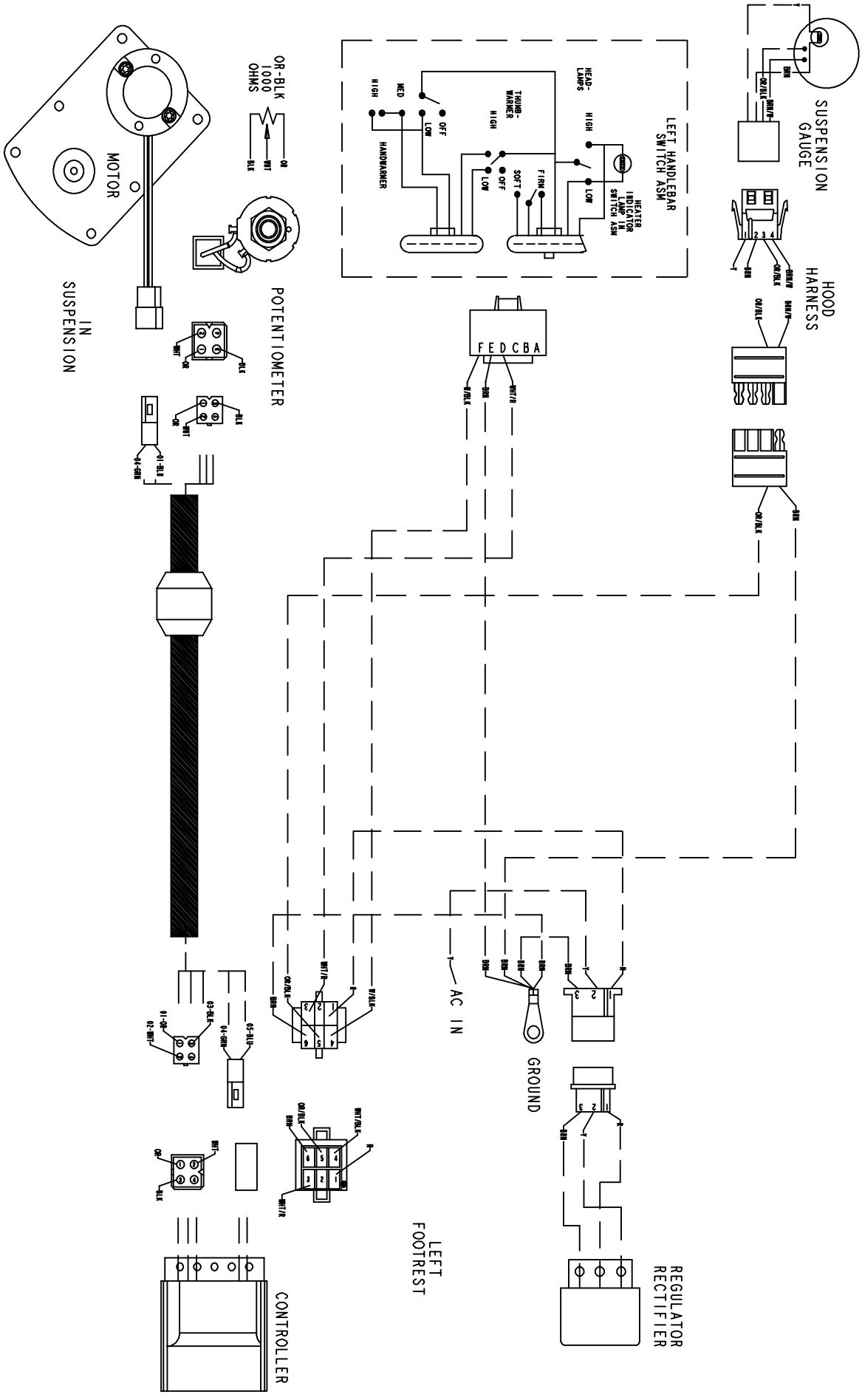
Anytime that the ACE module is serviced, the potentiometer must be timed with the main clevis.

1. Turn the large bevel gear clockwise until the screw shaft is fully seated in the clevis (fully SOFT position). Make sure that the clevis is oriented in the normal position (not tilted to one side or the other).
2. Assemble the motor to the housing at this time to keep the gear and clevis from moving. If the motor is already installed, jog the motor with 12 volts until it is in the fully SOFT position.
3. Turn the potentiometer until the resistance between the WHITE and BLACK wires is at 107 (+/-5 ohms).
4. Install the small plastic gear and allow time for the wire Harness Loctite 480 to dry before operating.

Important Notes

- If any axial play is found on the potentiometer gear it must be replaced. A modified battery post puller is required to pull the gear on the potentiometer.
- Loctite 480 is required when replacing either of the plastic gears in the ACE module.
- After the Loctite 480 is installed it must be allowed to fully dry before operating.
- Make sure to NOT get any Loctite 480 on the teeth of the gears.




SUSPENSION GAUGE
HOOD HARNESS
LEFT HANDLEBAR SWITCH ASM
HEAD-LAMPS
HIGH
LOW
HEATER INDICATOR LAMP IN SWITCH ASM
THUMB-WARMER
HIGH
OFF
LOW
HAND WARMER
HIGH
MED
LOW
OFF
SOFT
FIRM
F E D C B A
OR-BLK 1000 OHMS
MOTOR
IN SUSPENSION
POTENTIOMETER
AC IN
GROUND
REGULATOR RECTIFIER
LEFT FOOTREST
CONTROLLER