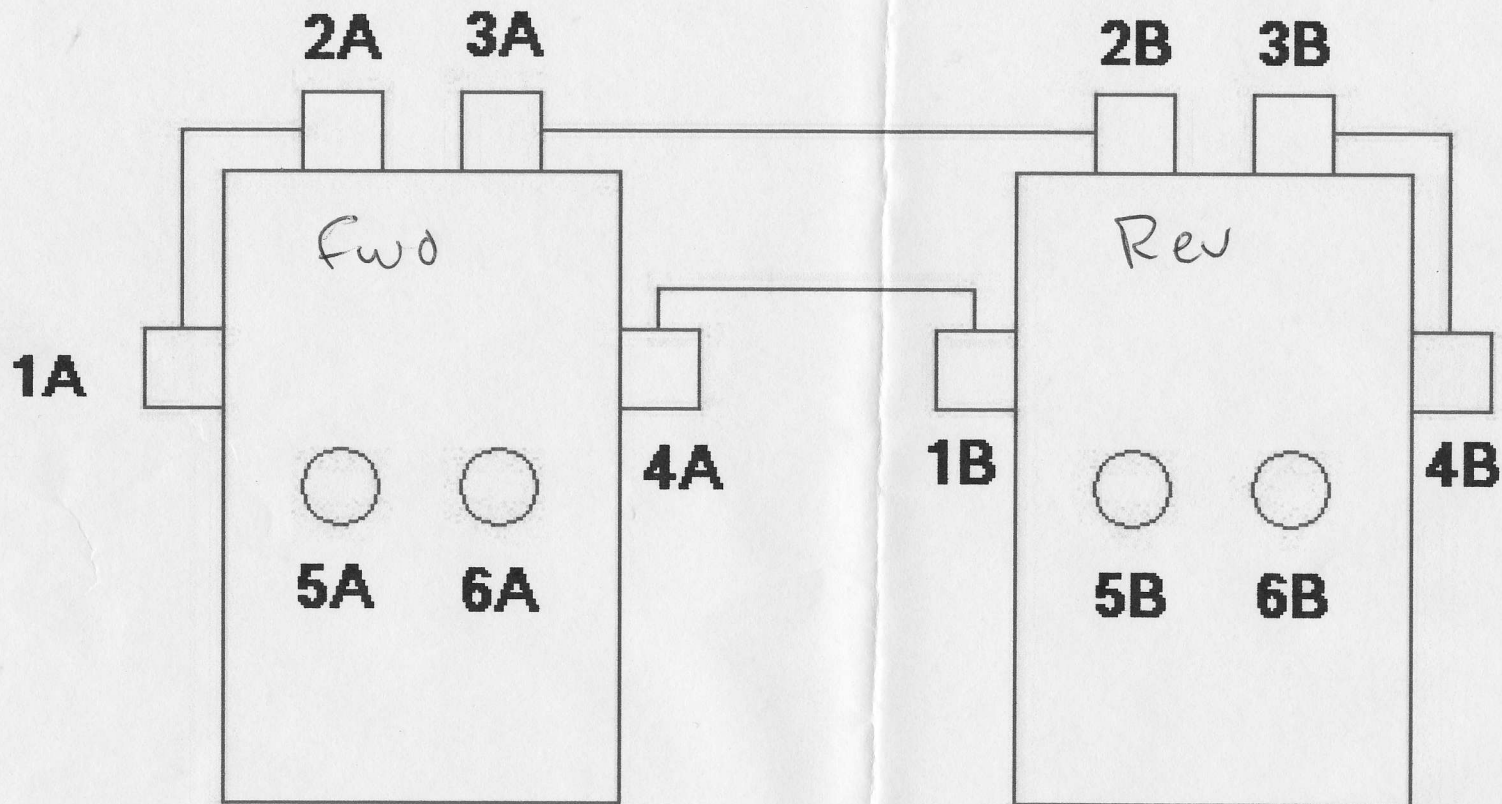
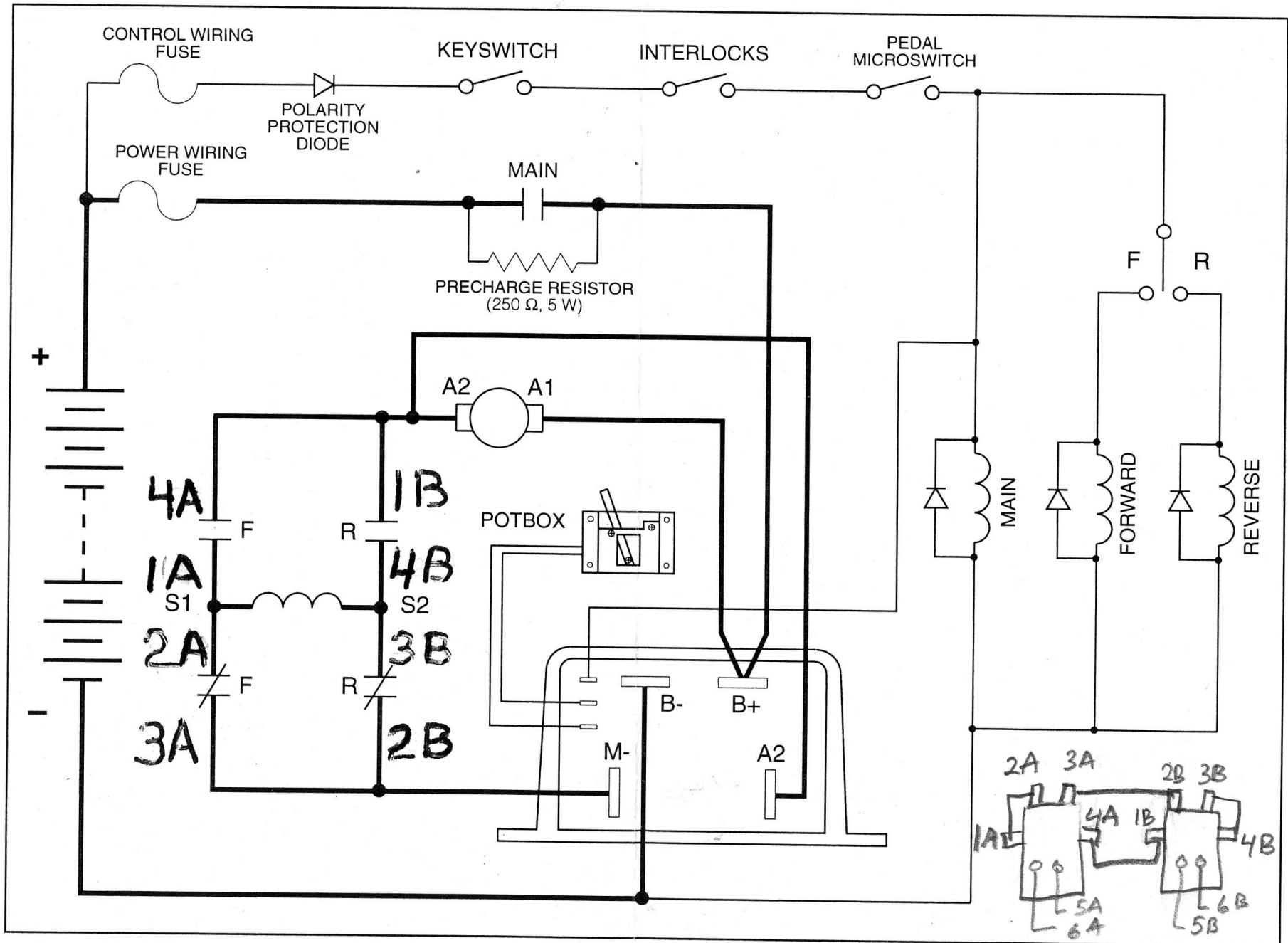


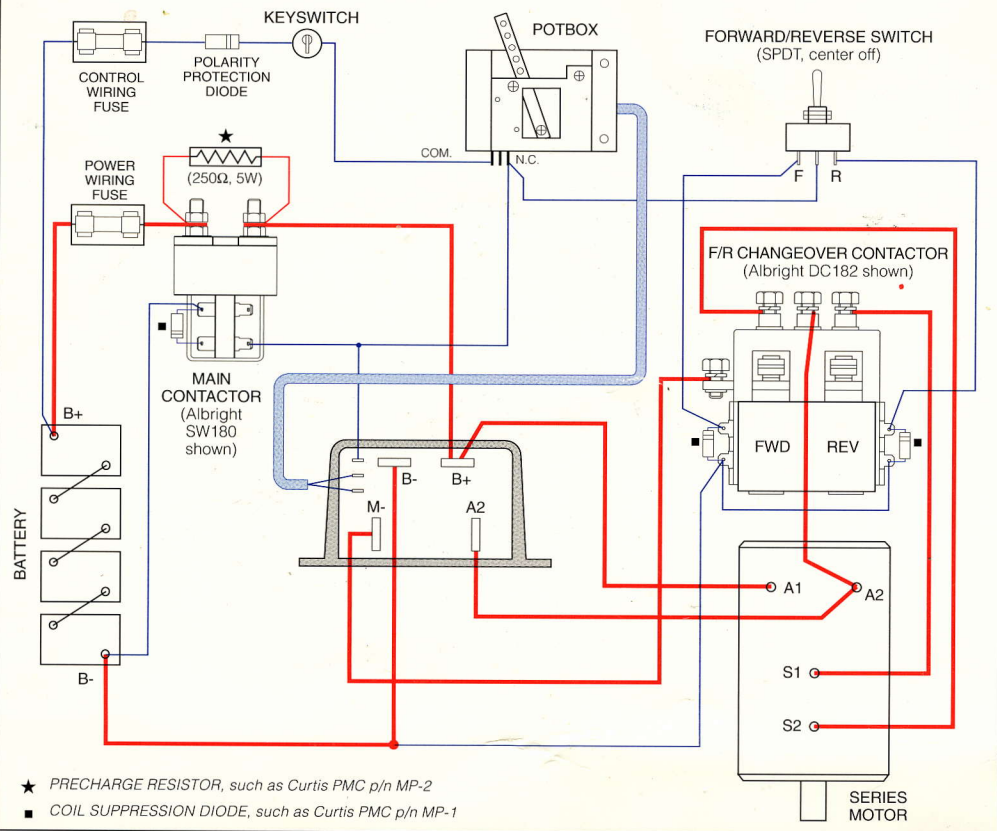
+



WIRING



Recommended wire gauges: — 0.75 mm² (#18 AWG) vinyl insulated, stranded — 25 mm² (#4 AWG)



- ★ PRECHARGE RESISTOR, such as Curtis PMC p/n MP-2
- COIL SUPPRESSION DIODE, such as Curtis PMC p/n MP-1

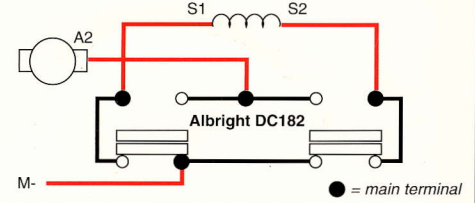
CONTACTOR GUIDE

Albright contactors are available from Curtis.

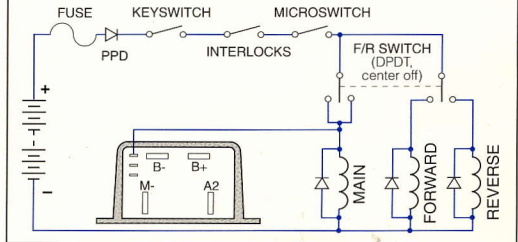
For the **main contactor**, an **Albright SW80** or **SW180** is recommended. It is a good idea to add a precharge resistor (such as Curtis PMC p/n MP-2), as shown in the basic wiring diagram at the left.

All contactors should be protected by coil suppression diodes (such as Curtis PMC p/n MP-1).

For **forward/reverse**, a paired single-pole, double-throw (2xSPDT) contactor, such as an **Albright DC88** or **DC182**, is recommended.



With the control wiring (blue lines) shown at the left, the vehicle will **plug brake**. If the controller has the optional HPD feature, the F/R control circuit can be wired to inhibit plug braking and thus allow **freewheeling**. A DPDT center-off "hesitation switch" is recommended.



In all configurations using the 1204/1205 controller it is essential that the field be reversed and that the armature be connected directly to the controller's B+ and A2 terminals, because the plug diode inside is connected to these terminals.

CAUTION Working on electric vehicles is potentially dangerous. Always follow sound safety practices.

Read the manual before wiring your controller, to determine the best configuration for your application. Mount the controller in a clean and dry location. Use double-wrench technique when connecting cables to controller bus bars.

INSTALLATION CHECKOUT

Carefully complete this checkout procedure before operating the vehicle. If a step does not test correctly, use the troubleshooting guide (Section 5 of the 1204/1205 manual) to identify the problem.

★ Follow good safety practices: get the vehicle drive wheels off the ground, wear safety glasses, and use insulated tools. Don't let anyone stand in front of or behind the vehicle. Make sure the keyswitch is off and the vehicle is in neutral before beginning.

- A. Connect the battery. Use a voltmeter to verify that the proper voltage and polarity appears at the battery B+ and B- terminals.
- B. Check the voltage at the controller B+ and B- bus bars. If your system has a precharge resistor in parallel with the main contactor, you should see approximately 90% of the full battery voltage. If your system does not have a resistor, temporarily connect one (100 to 200 ohms, 5 watts, or a 100 watt light bulb). The voltage at the controller should rise to approximately 90% of the full battery voltage.
- C. If "A" and "B" do not check out, troubleshoot the wiring connections. Do not turn on the keyswitch until the trouble is corrected and "A" and "B" check out.
- D. With the forward/reverse switch in neutral, turn on the keyswitch. If the motor runs without the throttle being applied, turn the keyswitch off and recheck the wiring. If the motor does not run without the throttle applied, proceed with the checkout. Select a direction and slowly apply the throttle; the motor should now respond.
- E. Look to see which direction the wheels are turning. If the wheels are going the wrong way, turn everything off and interchange the motor field connections.
- F. If you have HPD (high pedal disable), check it next. Turn off the keyswitch and direction switch. Apply the throttle, turn the keyswitch on, and then select a direction. The motor should not run. Release the throttle and re-apply it — the motor should now run. If the motor runs before you release the throttle, recheck the wiring.
- G. Take the vehicle down off the blocks and drive it in a clear area. It should have smooth acceleration and good top speed.
- H. On vehicles that are intended to plug brake, test the plug braking by driving forward at moderate speed and shifting into reverse without letting up on the throttle. The vehicle should smoothly brake to a stop and accelerate in reverse.
- I. On vehicles that are intended to have plug braking inhibited, verify that the maneuver in "H" produces freewheel coasting.

MAINTENANCE

Curtis 1204/1205 controllers and potboxes require only minimal maintenance if properly installed. NOTE: The controllers are sealed and thus are not field serviceable.

Perform the following two steps occasionally.

★ Before starting, remove power by disconnecting the battery, and discharge the capacitors in the controller (with a light bulb or a 2-10 ohm, 25 watt resistor connected for a few seconds across B+, B-). Follow good safety practices: get the vehicle drive wheels off the ground, wear safety glasses, and use insulated tools.

1. Make sure the electrical connections to the controller (and to the motor, contactors, etc.) are tight. When checking the controller bus bar connections, use two opposing wrenches. This double-wrench technique will help avoid putting stress on the bus bars, which could crack the seals. **Always use insulated wrenches.**
2. Inspect all seals at the front and back of the controller. If necessary, use a moist rag to wipe these areas clean enough so that you can see the seals. Look for cracks and other signs of seal damage.
 If the seals are intact, clean the controller thoroughly either by washing it off or by wiping it clean with a moist rag. **Power must not be reapplied until the controller terminal area is completely dry.**
 If the seals have been damaged, there are several possible causes. Perhaps the double-wrench technique was not used when the cables were installed. Perhaps the vehicle's environment requires that the controller be better protected: either by mounting it in a different location, or by installing a protective cover.
Damaged seals can lead to faulty operation. We strongly recommend replacing controllers that have faulty seals.

Potbox maintenance is similar to controller maintenance: inspect for integrity of connections and mounting, and clean (with a moist rag) as required.

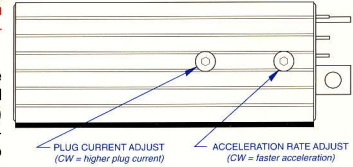
Refer to the 1204/1205 manual for more information about your controller. If you have questions, contact the Curtis office nearest you.

ADJUSTMENT

On some 1204/1205 models, the plug current limit and acceleration rate settings are adjustable. The pots are located as indicated:

★ The keyswitch should be off during adjustment.

1. Remove the socket head screw (1/8" Allen) for the adjustment you want to make.



2. Adjust the internal potentiometer using a small insulated screwdriver (available from Curtis).
3. Replace the socket head screw and nylon seal washer. To prevent stripping, be careful not to over-tighten.

Curtis PMC potboxes are factory set and rarely require user attention. To test and adjust, connect an ohmmeter to the potbox wires and use this procedure:

1. With the spring holding the lever arm against the return stop, the resistance should be less than 50 ohms. Slowly move the lever. If the resistance abruptly starts to increase when the lever is 3 mm (1/8") from the stop [1.5 mm (1/16") for potboxes without the microswitch], no adjustment is needed.
2. If adjustment is required, loosen the screw holding the lever on the pot shaft. Use a screwdriver to rotate the pot shaft slightly with respect to the lever. Recheck the point at which the resistance starts to increase and continue making adjustments until the increase occurs at 3 mm (1/8") [at 1.5 mm (1/16") for potboxes without the microswitch]. When adjustment is correct, tighten the screw holding the lever on the pot shaft, then recheck to see that this action did not disturb the adjustment. Make sure that the lever is still seated down on the pot shaft below the slight bevel on the end of the shaft.
3. Check the resistance with the lever pushed all the way to the other stop. It should be between 4500 and 5500 ohms. If it is outside this range, the potbox is faulty and should be replaced.
4. For potboxes equipped with a microswitch, check for correct switch operation. Use an ohmmeter, or simply listen for the slight click the switch makes. It should operate when the lever is 1.5 mm (1/16") from the return stop. If it does not, adjust by loosening the two screws holding the slotted microswitch mounting plate to the stop spacers and moving the plate. Recheck the switch operating point after tightening the screws.

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