

## NATIONAL PNEUMATIC END DOOR OPERATOR

**DESCRIPTION OF EQUIPMENT:** The equipment consists of an air-operated engine, pressure and exhaust electromagnetic valves, time delay relay, door reversing switch, door reversing cut-out switch, emergency door closing cylinder, door latch switch, and porter's door switch.

The door is attached to two short shafts, one at the top and one at the bottom. The bottom shaft is pivoted in a bearing and it merely guides the door. The top shaft by which the door is hung extends into the compartment above the door. The engine is connected to the top shaft through gear segments and the movement of the engine piston rotates the door through an arc of about 90° to open and close.

**SETTING UP THE DOOR FOR AUTOMATIC OPERATION:** With the porter's switch in the "Automatic" position, a circuit is completed to the coil of the pressure magnet valve, which valves air pressure to and through the exhaust magnet valve into the end port of the engine to the center port of the engine and to the emergency cylinder, making the equipment operative. The door is closed and the piston of the emergency cylinder is held inward where it does not effect the automatic operation of the door.

## HOW IT OPERATES

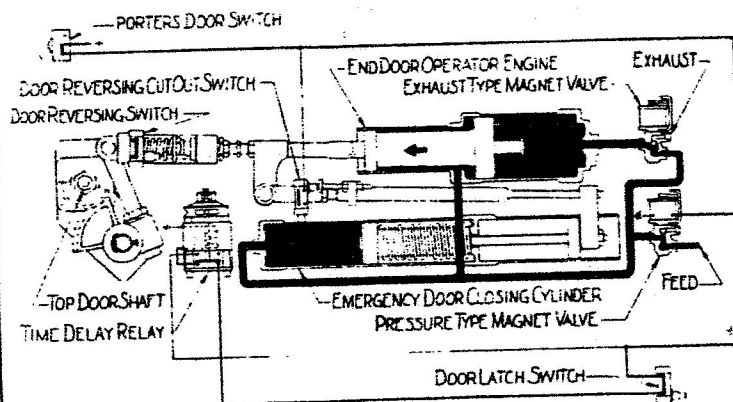
SEAL 1/2 3EO-A2

3EG-A2

2 1/4"

■ — indicates air pressure

■ — indicates exhausting air

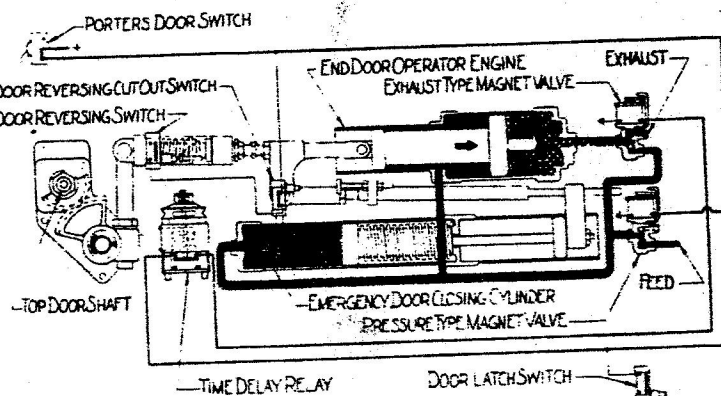


**Figure 1 — DOOR LATCH ACTUATED**

The switch of the time delay relay is a double pole, double throw toggle switch, which is normally in the position shown in figure 1. When the door handle or push bar is actuated to withdraw the latch, the micro switch in the door lock momentarily completes a circuit to the coil of the time delay relay across its lower set of contacts. The toggle switch of the relay then opens its lower contacts and closes its upper contacts, as shown in figure 2.

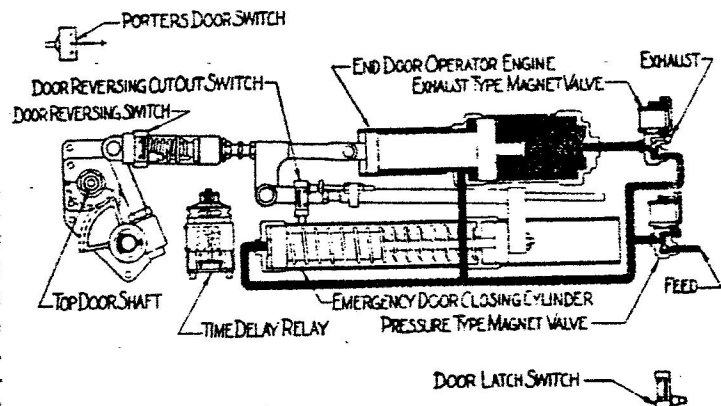
**Figure 2 — DOOR OPENING**

With the time delay relay contacts in the position shown in figure 2, the circuit to the relay coil has been opened and a circuit is completed across the upper set of relay contacts to the coil of the exhaust type magnet valve. The time delay starts when the relay coil is de-energized, and it is usually set to hold the exhaust type magnet valve energized for about four seconds. While the exhaust type magnet valve is energized, it exhausts the air pressure from the end port of the end door operator engine and the pressure entering the center port moves the operator piston inward in the door opening direction.



**Figure 7 — MANUAL OPERATION**

Placing the porter's door switch in the "manual" position, de-energizes the coil of the pressure type magnet valve, which then shuts off air pressure to the door operating equipment and exhausts the pressure from it. The spring in the emergency door closing cylinder then moves its piston inward, pushing the crosshead of the emergency door closing cylinder against the shoulder of the connecting rod and moving the piston of the end door operator engine to the door closed position. In order to open the door, it is then necessary to push it against the pressure of the spring in the emergency door closing cylinder. When the door is released, the spring in the cylinder closes the door. The action under this condition is similar to that of the ordinary door check.



### OPERATION WITHOUT ELECTRIC POWER

If a failure of electric power occurs, the coil of the pressure type magnet valve is de-energized and the operation of the door is the same as when the porter's door switch is placed in the "manual" position.

### OPERATION WITHOUT AIR PRESSURE

In the event of a failure of air pressure, the piston in the emergency door closing cylinder moves to the door closed position and the operation of the door is the same as when the porter's door switch is placed in the "manual" position.

### ADJUSTMENT, DOOR OPERATOR, CHECK LIST

If door binds at top or bottom, follow instructions under adjustment "A".

If, with the porter's door switch in "remain open" position, the fully open door does not touch the door stop, follow instructions under adjustment "B-1".

If, with the porter's door switch in "remain open" position, and door open against door stop, a slight air leak is not heard at the exhaust-type magnet valve, follow instructions under adjustment "B". Any readjustments made in accordance with instructions under adjustment "B" will make it necessary to reset the Micro-Switch Striker as explained under adjustment "D".

If, with the porter's door switch in "manual" position, the door does not close completely, check the door latch, the door seals and the door for binding. If these are in good order, follow instructions under adjustment "C". Any readjustments made in accordance with instructions under adjustment "C" will make it necessary to reset the Micro-Switch Striker as explained under adjustment "D".

If, with the porter's door switch in "automatic" position, the door reverses at the door jam, check the latch for sticking or interference and check the weather seals and door for binding. If these are in good order, follow instructions under adjustment "D".

If, with the porter's door switch in "automatic" position, the door does not open promptly when latch is actuated, check position of latch and keeper and make adjustments in accordance with lock instructions, which can be obtained from the lock manufacturer.

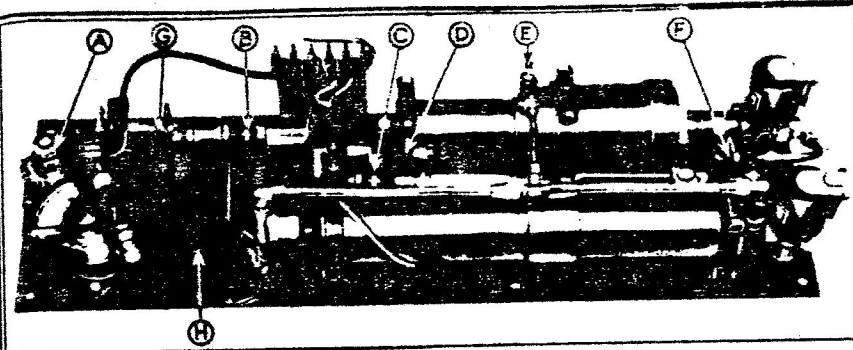
If door opens too quickly or too slowly, follow instructions under adjustment "E".

If door closes too quickly or too slowly, follow instructions under adjustment "F".

If door reverses without coming against an obstruction, check the door for binding. If door is free, follow instructions under adjustment "G". This condition can also be caused by the door closing too quickly which can be corrected by following instructions under adjustment "F-1".

If obstructed door fails to reverse, follow instructions under adjustment "D" and "G".

If timing of the door from release of latch to start of closing is incorrect, follow instructions under adjustment "H".



## Adjustment Instructions

**A** The two jam nuts at the top of the top door shaft must be adjusted to raise or lower the door until there is adequate clearance at both the top and bottom of the door, after which the jam nuts must be pulled tight to maintain the adjustment.

**B** With air on and the porter's door switch in the "remain open" position the door must touch the door stop. If the door touches the stop, increase the length of the operator connecting rod with the turnbuckle "B" until the door just starts to move away from the stop. Then shorten the rod by two full turns of the turnbuckle "B" and lock turnbuckle in position with the two jam nuts.

**B-1** If the door does not touch the door stop, shorten the operator connecting rod with the turnbuckle "B" until it does touch the stop and then follow instructions under adjustment "B".

**C** With the door closed and the porter's door switch in the "manual" position, adjust turnbuckle "C" so the clevis pin bears firmly against the end of the clevis slot. After this adjustment is obtained, do not shorten the connecting rod by more than one additional full turn of turnbuckle "C".

**D** Screw the striker toward the micro switch until the switch plunger is compressed about  $1/8"$ . Then block the door  $1"$  from its fully closed position. With air on and the porter's door switch in the "automatic" position, back the striker slowly away from the micro switch until the door reverses. Then lock the striker in position with the jam nuts.

**E** With the door closed and latched, place the porter's door switch in the "remain open" position. After about five seconds, release the door latch. If the door has a tendency to slam open, loosen the jam nut and turn the adjusting screw into the door opening control fitting. If the door opens too slowly, back the adjusting screw out of the fitting until the proper speed is obtained. Then lock the adjusting screw in position with the jam nuts.

**F** Place the porter's door switch in the "remain open" position. Allow the door to remain open for about five seconds, and then quickly place the porter's switch in the "automatic" position. If the door has a tendency to slam closed, loosen the jam nut and turn the adjusting screw into the door closing fitting. If the door closes too slowly, back the adjusting screw out of the fitting until the proper speed is obtained. Then lock the adjusting screw in position with the jam nut.

**F-1** If the unobstructed door reverses and the door is free of binds, turn the adjusting screw into the door closing fitting until condition is corrected.

**G** Adjust the switch striker so that with the door in the closed position and the porter's door switch in the "manual" position, there is  $1/16"$  clearance between the switch striker and the micro switch plunger.

**H** Loosen the two cover screws and slide the cover upward which exposes the adjusting screw. Rotate the screw clockwise to increase the delay and counterclockwise to decrease the delay. The usual setting is five seconds from the time the latch is actuated until the door starts to close.

As the adjustment of the Door Opening and Door Closing Control Fittings is interdependent, the door opening fitting should always be adjusted before attempting to adjust the door closing fitting, and all adjustments must be made with 100 pounds air pressure.

DIAGRAM SHOWING DOOR  
IN CLOSED POSITION

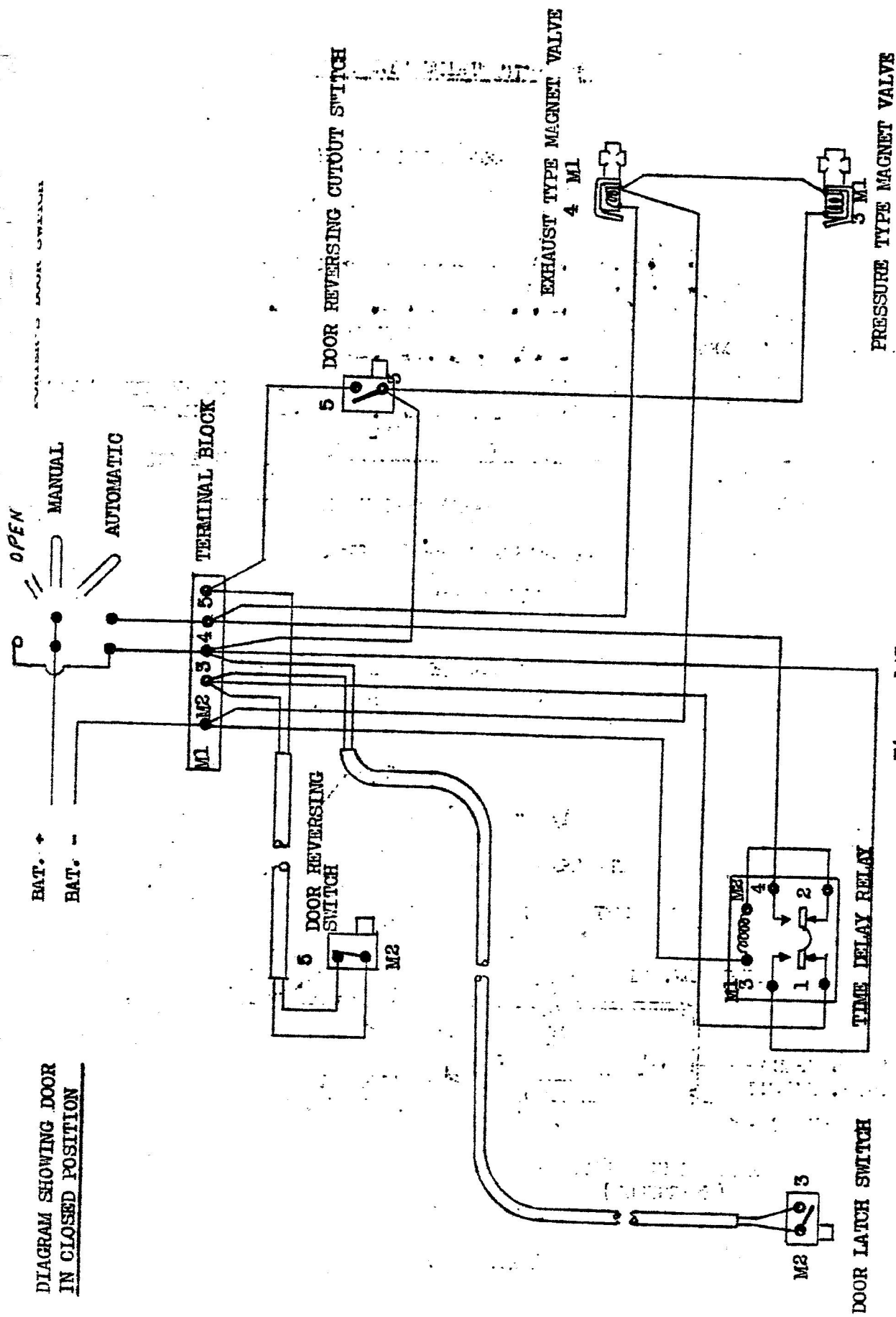


Figure 145

# SCHEMATIC WIRING DIAGRAM

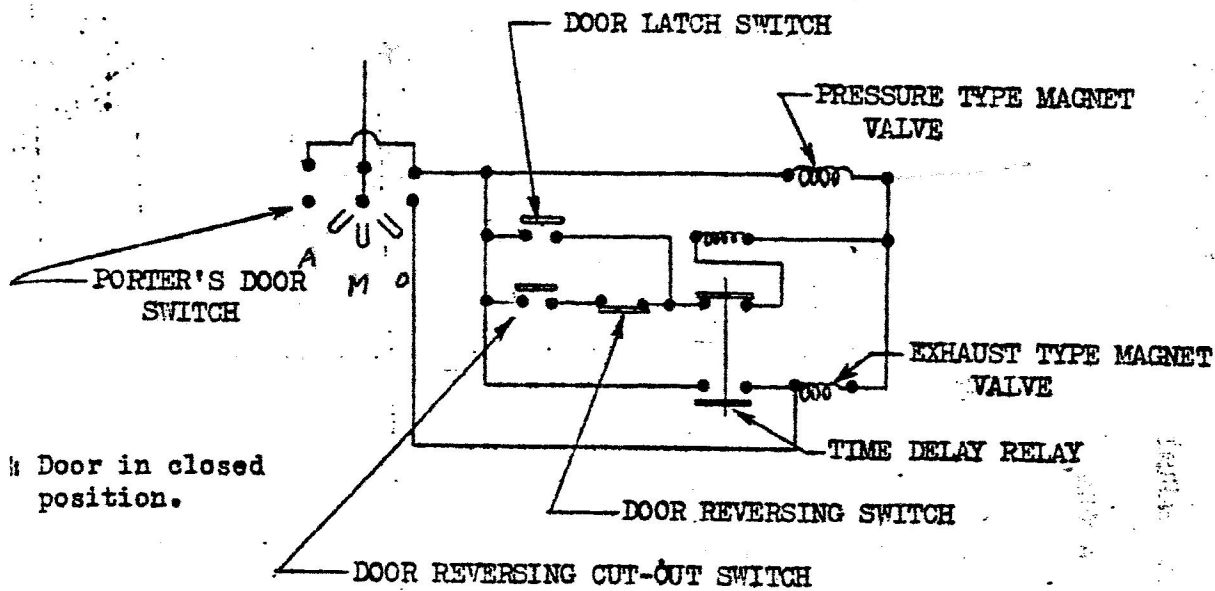


Figure 146

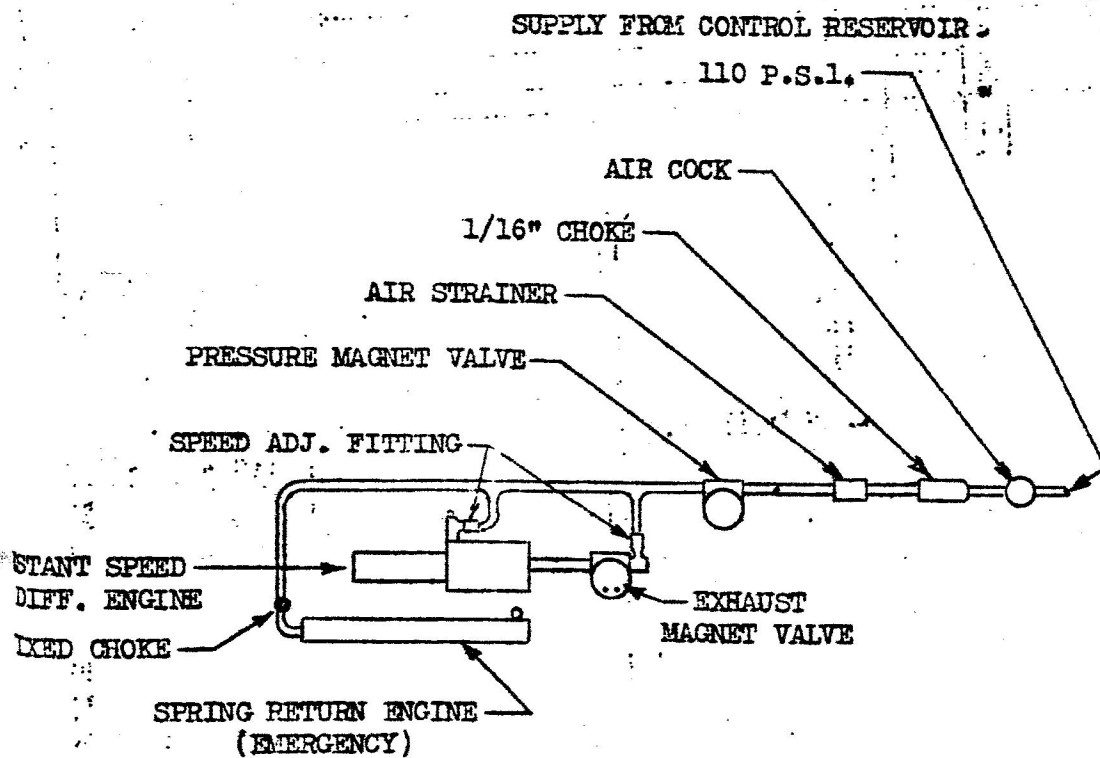


FIGURE 147

# PIPING DIAGRAM