

DOR-O-MATIC

INVISIBLE DOR-MAN

SERVICE MANUAL

FOR

1510, 1520, 1530,

POWER UNITS

AND

653, 663, 6533, 6633

DOOR OPERATORS

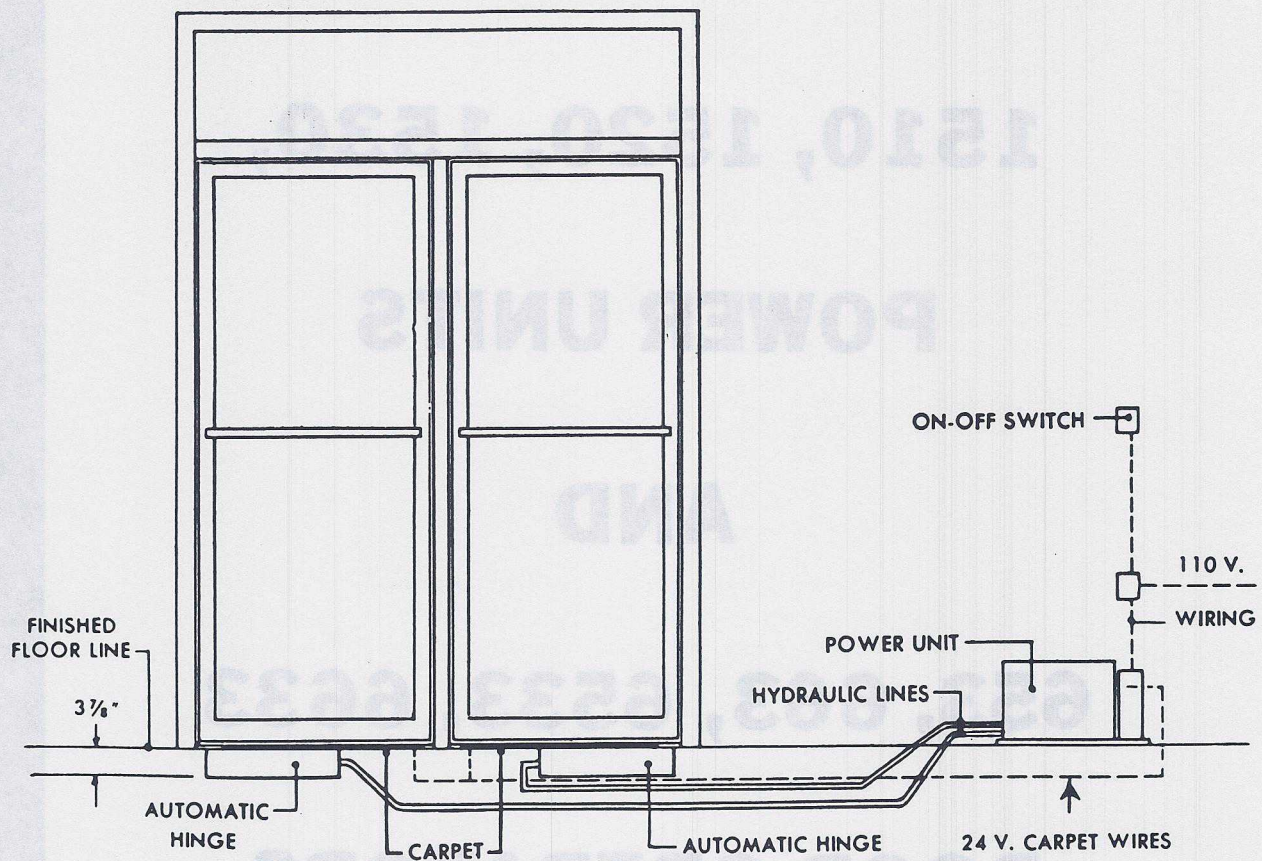


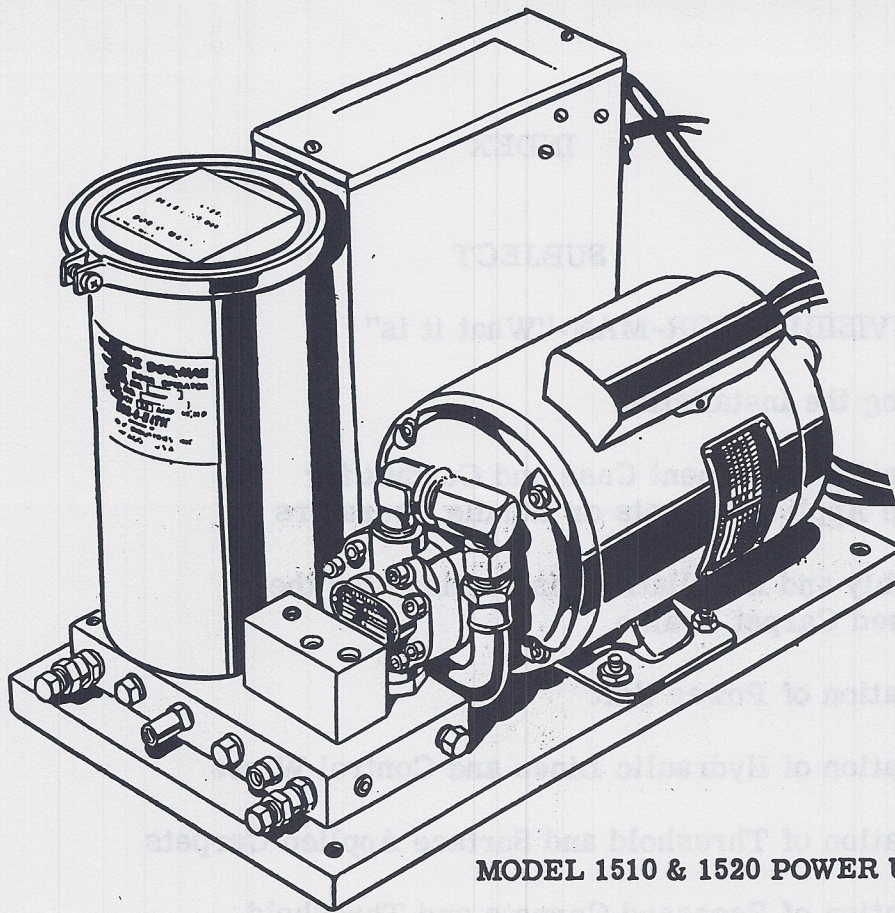
DOR-O-MATIC

DIVISION OF REPUBLIC INDUSTRIES, INC. CHICAGO, ILLINOIS

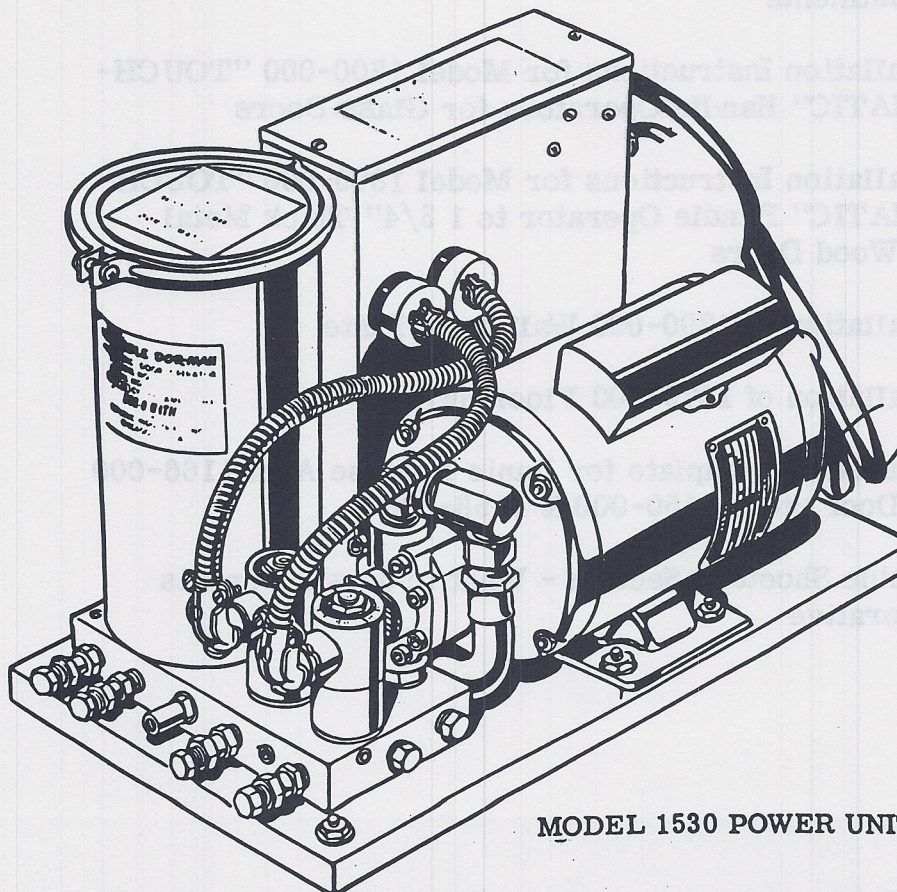
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TYPICAL IN AND OUT TWO DOOR INSTALLATION WITH TWO DOOR POWER UNIT





MODEL 1510 & 1520 POWER UNITS



MODEL 1530 POWER UNIT

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CHAPTER I

THE INVISIBLE DOR-MAN---WHAT IT IS

The INVISIBLE DOR-MAN is an electrically powered, electrically controlled, hydraulic automatic door operator designed for convenient, rapid, and safe door operation. It is important for you to think of it in these terms in order to develop a good understanding of the equipment.

The complete set of equipment consists of four basic components which we list and describe in general terms as follows:

1. THE AUTOMATIC HINGE.

The automatic hinge consists of a spindle and cam mounted in ball and roller bearings, a combination operating and checking cylinder, a closing spring and a deceleration cylinder, commonly called the "back check". When hydraulic oil at adequate pressure is admitted to the operating cylinder, a small poppet valve closes the exhaust ports of this cylinder and the piston exerts force against one lobe of the cam through a hardened roller, causing the cam and spindle to rotate, opening the door. The other lobe of the cam acting against a hardened roller and through a slide block, rod and piston, compresses the door closing spring and displaces oil from the back check cylinder.

When the door reaches a position of approximately 75° open, the escape of oil from the back check cylinder is gradually retarded, causing a pressure rise in this cylinder and gently slowing the door to a stop at the 90° open position. As long as the pressure supply to the operating cylinder is maintained, the door will remain in the 90° open position. When pressure is no longer present in the line supplying oil to this cylinder, the poppet valve opens the exhaust ports and this cylinder becomes a checking cylinder during the closing swing of the door.

When the door has closed to a point approximately 15° open, a small valve plunger in the center of the piston closes off one of the escape passages from the cylinder, thus retarding the escape of oil and causing the door to complete its closing swing with a very gentle action but with full closing power.

2. THE HYDRAULIC POWER UNIT.

It is necessary that we consider the hydraulic power unit in its various models:

#1510 for the operation of a single door.

#1520 for the operation of two doors simultaneously.

#1530 for the operation of two doors independently.

The hydraulic power unit consists of an electric motor directly coupled to a positive displacement (gear type) oil pump, a reservoir with filter, a manifold to provide passages for the distribution and return of the oil, and mounting for the necessary valves, a check valve and hydraulically operated poppet valve (model #1530), a pressure relief valve which maintains the proper pressure level and permits surplus oil to be bypassed to the reservoir. Although the electrical control box is assembled as a part of the power unit, we will consider it and its functions in a separate paragraph.

We will review the functions of the components of the power unit in sequence through one complete operating cycle of the automatic hinge.

Let us first consider the models #1510 and #1520 and assume that the door is carpet controlled. When there is no demand for door operation and the power unit is not energized, the high pressure line to the automatic hinge is connected to a return passage in the manifold through the hydraulically operated poppet valve. When the demand for door operation is signalled by the activating carpet, the motor starts, pumping oil into the manifold under pressure. A slight pressure rise in the manifold (50 to 70 p. s. i.) causes the poppet valve to close off the return passage and the check valve to open, supplying oil under pressure to the hinge. The door opens and while opening, approximately three cubic inches of oil is exhausted from the automatic hinge through the return line back to the reservoir.

When the carpets are clear and the time delay period has expired, the motor is de-energized and the oil pressure drops to zero in the high pressure side of the manifold. Oil trapped under pressure in the line between the hinge and the power unit cannot flow back through the pump and cannot hold the poppet valve closed because of the check valve. As soon as the pressure drops below 30 p. s. i. in the high pressure side of the manifold, the poppet valve opens the return oil passage, bleeding off the oil that is trapped under pressure in the line, permitting the automatic hinge to start its closing swing. The functions of the power unit are now completed for this operating cycle of the automatic hinge.

Now let us review the same sequence of functions for a model #1530 power unit where we have two solenoid operated valves. When the power unit is not energized, the high pressure lines to the hinges are connected to a return passage in the manifold through passages in the solenoid valves. When the activating carpet signals a demand for door operation, the motor is started and the proper solenoid valve is energized. When the solenoid valve is energized the pressure supply line is disconnected from the return passage in the manifold, and connected to the pressure passage, thus supplying oil under pressure to the automatic hinge. The door opens and while opening approximately three cubic inches of oil is exhausted from the automatic hinge, through the return line back to the reservoir.

When the carpets are clear and the time delay period has expired, the solenoid valve is de-energized, disconnecting the pressure supply line from the pressure passage in the manifold, and reconnecting it to the return passage, bleeding off the oil that remains under pressure in the supply line and permitting the automatic hinge

to start its closing swing. While this is occurring, if there has been no demand for operation on the other door served by the power unit, the motor will be de-energized at the same time that the solenoid valve is de-energized. The functions of the power unit are now complete for one operating cycle of the automatic hinge.

3. THE ELECTRICAL CONTROL UNIT.

The electrical control units are produced in two different types, and for single and double door operators in each type. They are designated 9101-090 and 9102-090 for carpet controlled doors, and 9105-090 and 9106-090 for handle switch controlled doors. The model #1520 power unit (for simultaneous operation of two doors) is not recommended for use with handle switch controlled doors. Its control requirements are the same as those for a single door operator and is always equipped with the type 9101-090 electrical control unit.

The two slightly different types of electrical control units are necessary because with carpet controlled doors the safety circuit must become a holding circuit as soon as the door has started to operate, and must continue to function as a holding circuit throughout the remainder of that operating cycle. In other words, it must conform to the pattern of traffic across the carpet. With handle switch controlled doors the safety is provided by the reverse action of either the push or pull handle. In order to have the maximum degree of safety, it is necessary that the safety circuit be capable of over-riding both the activating and the operating circuits, not only before the door starts to operate, but also at any point in its operating cycle. Detailed definition and description of the various components used in the electrical unit can be found in the service section covering it, but we will describe here, in proper sequence, the basic functions of the unit. Normally open contacts will be designated N. O. and normally closed, N. C.

In the type 9101/9102 unit, the activating carpet is connected to the coil of activating relay. N. O. contacts on the activating relay are connected to the coil of the operating relay through N. C. contacts on the safety relay and will energize the operating relay if the safety relay is not energized. When the coil of the operating relay is energized, N. O. contacts on this relay, (1) set up a holding circuit which keeps the coil energized, (2) energize the motor-starting relay, (3) (in the case of the 9102-090 unit) energize the corresponding solenoid valve. Thus, the power unit is caused to function and the automatic hinge operates.

Electric current is supplied to the coil of the time delay relay through N. C. contacts on the activating relay and safety relay connected in series; therefore, this circuit cannot be completed until both of these relays are de-energized (carpets clear). When this circuit is completed the time delay period starts, and when the time delay period has expired, the N. C. contacts on the time delay relay break the holding circuit to the operating relay coil, thus ending the operating cycle. This completes the functions of the electrical control unit for one operating cycle of the automatic hinge.

In the type 9105/9106 control unit, the activating switch is connected to the coil of the activating relay. N. O. contacts on the activating relay are connected to the coil of the operating relay through N. C. contacts on the safety relay and energize the operating relay if the safety relay is not energized. N. O. contacts of the operating relay energize the motor-starting relay, and (in the case of the 9106-090 unit) the corresponding solenoid valve. Thus, the power unit is caused to function and the automatic hinge operates. In the type 9105/9106 unit the holding circuit to the operating relay coil is connected through N. C. contacts on the safety relay in series with the N. C. contacts on the time delay relay. Therefore, closing the safety circuit and energizing the safety relay will end the operating cycle at any time.

Electric current is supplied to the time delay relay coil from N. O. contacts on the operating relay through N. C. contacts on the activating relay only. With this arrangement, the time delay period starts whenever the switch handle is released. This necessitates the use of time delay relays with longer timing periods (usually 5 seconds) or motor-driven timers adjustable from 3 to 59 seconds. When the time delay period has expired, the N. C. contacts on the time delay relay break the holding circuit to the operating relay coil, ending the operating cycle of the power unit. This completes the functions of the control unit for one operating cycle of the automatic hinge.

Type 9105/9106 control units are commonly applied with wall push plates, or other switching devices that are manually operated.

4. CONTROL SWITCH DEVICES.

We use the above title because any arrangement that provides two normally open switches can be used to operate the INVISIBLE DOR-MAN. Carpets are functionally just a normally open switch, as are any of the other standard control devices that are offered with the INVISIBLE DOR-MAN. It should also be pointed out that any number of normally open switching devices that best serve the traffic requirements of a particular installation, connected in parallel, can be used in either the activating or safety circuit of the INVISIBLE DOR-MAN.

CHAPTER II

PLANNING THE INSTALLATION

Planning is the key to good, profitable automatic door operator installations. It must be done in two phases. The first phase, "Preliminary Planning", must be done when the order is being solicited. The second phase, "Installation Planning," prepares for the installation of the equipment and must be timed closely with the construction work.

In the following paragraphs the most important points of each phase are set forth.

PRELIMINARY PLANNING

The INVISIBLE DOR-MAN automatic door operator will provide fast, smooth, silent door operation. In some cases wind pressure, forced air heating, air conditioning, or pressurized buildings may cause the unit to operate less efficiently. Study the building plans to determine if any extreme adverse conditions exist. If they do, consult the factory for recommendations.

1. TRAFFIC PATTERN, DOOR CONTROL DEVICES, AND SAFETY ACCESSORIES

Proper layout of the automatic doors is essential to provide convenient, rapid, and safe traffic flow. Consider the traffic pattern carefully to determine if it is awkward or hazardous. Make certain the hand of the doors (left or right swing) is correct to provide an effective traffic pattern.

Carpets are the most widely approved actuating device especially for supermarket and restaurant installations and provide the highest degree of safety to the user. They will accommodate the largest volume of traffic and are recommended for use wherever possible.

Vestibules that are too short to permit use of two standard length carpets are not recommended. They do not permit the outer door to close before the inner door is activated and thereby lose their effectiveness as a weather barrier. The short vestibule requires special length carpets and adds unnecessary expense to the installation.

Some automatic door layouts will not permit the use of carpets as actuating devices because of cross traffic, etc. For these conditions, other actuating switches are available.

Handle switches for metal and wood or glass doors are particularly suitable for certain hospital, institutional, and specialty store entrances and provide safe two direction traffic.

Wall push plates and floor switches are popular actuating devices for hospital surgery and recovery rooms. They can be combined with carpets and handle operators to provide complete control and safety on all automatic door installations. If push plates or floor switches are specified, the predominant traffic pattern determines where the switches are located. This point should never be overlooked and must be emphasized to the architect.

Overhead pull chain switches are an excellent actuating device on industrial applications for either pedestrian or fork truck traffic.

Guard rails provide control over the direction of traffic and prevent undesirable side approach to the carpets.

Barrier ropes protect the "danger area" by preventing traffic from entering the space over which the door swings during its opening cycle. Panic release barrier ropes are also available.

Panic release arms and door stops are recommended where in-swinging center pivoted doors are required to swing out in event of panic, fire, etc. Many state and local building codes and fire safety regulations make this requirement mandatory.

Dor-Gards are an excellent safety device which prevents careless fingers from being jammed between the door and pivot side jamb. They are adaptable to wood or metal doors and enhance the appearance of any entrance.

Refer to the "INVISIBLE DOR-MAN" catalog for sizes of carpets, models of guard rails, lengths of barrier ropes and sizes of Dor-Gards available for your particular needs.

2. DOORS

If doors to be used are larger than 3'6" wide, 7'6" high, or heavier than 350 pounds total weight, consult the factory for recommendations.

Determine if the plans specify center pivoted or offset pivoted doors. Offset pivoted doors are generally considered to offer greater weather sealing around the edges of the door. However, center pivoted doors can be equipped with panic release arms and door stops to permit inswinging doors to swing outward in event of fire, etc.

If the doors to be installed are new, there will be no problem adapting them to the automatic hinge. If they are previously installed doors, especially butt hung, careful consideration must be given to what will be required to adapt the doors to the automatic hinge and to replacing the butts with pivots.

3. FLOOR AND STRUCTURAL CONDITIONS

Check the building plans carefully for structural members and make sure they do not interfere with the installation of the cement cases for the automatic hinges.

Check for possible differences of floor level on each side of the door which will cause difficulty in the installation of the carpets and threshold. Slight slope or ramp conditions are allowable provided they do not hamper the operation of the door. Convex or concave surfaces over which the carpets will be laid must be avoided as they will shorten the life of the carpets considerably. Installation of exterior carpets over an expansion joint in the concrete is not recommended. The exterior concrete slab might raise due to frost and damage the carpet, causing malfunction of the unit.

4. LOCATION OF HYDRAULIC POWER UNIT

The power unit is to be located as close to the door as possible for practical purposes, but may be up to 100 feet from the door if necessary and up to 30 feet above or below the level of the hinges. When an installation requirement exceeds these distances, consult the factory for recommendations.

The preferred location of the power unit is an open area with reasonably free air circulation. All electric power consumed by the motor that is not utilized in operating the doors is given off as heat.

Pit installations are occasionally desirable in "slab" construction buildings where no storage space or other suitable location for the power unit is available within reasonable proximity of the doors. These installations of power units can be very satisfactory in properly constructed and ventilated pits. Fig. A on page 12 shows dimensions and construction details of a recommended pit that will accommodate one or two power units.

Do not install power units in a small non-ventilated pit. With heavy traffic conditions through the automatic doors, the temperature in the pit may rise sufficiently to cause the thermal overload switch to stop the operation of the doors.

5. POWER SUPPLY FOR THE POWER UNIT

The electrical contractor must provide a separately fused 115V grounded convenience outlet within 3'0" of the location of the power unit with an on-off switch positioned in an easily accessible location. (For the electrical contractors information, the power unit pulls a 16 amp starting load and a 5.6 amp running load.)

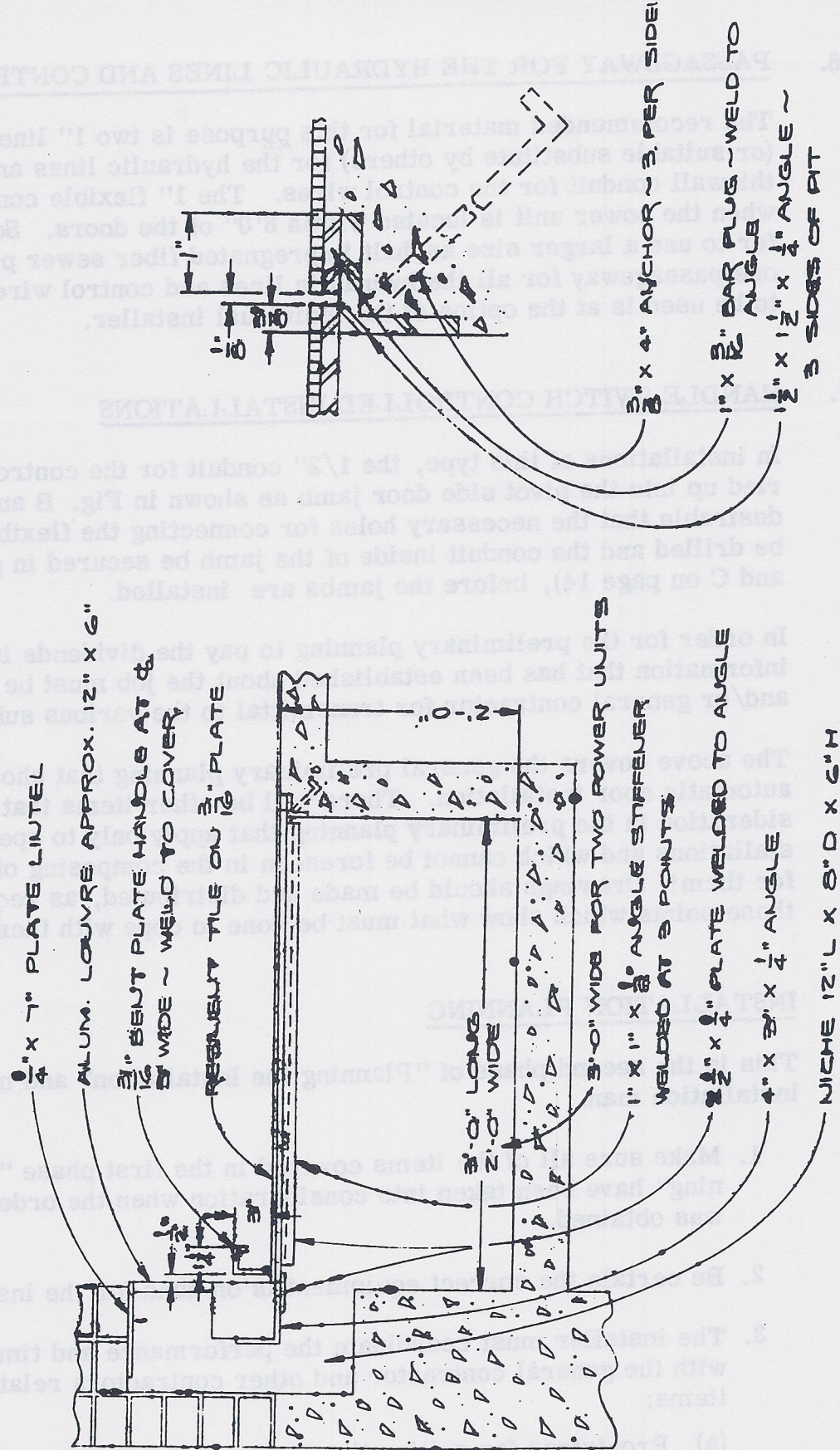


Figure A

PIT DETAIL

6. PASSAGEWAY FOR THE HYDRAULIC LINES AND CONTROL WIRES

The recommended material for this purpose is two 1" lines of thinwall conduit (or suitable substitute by others) for the hydraulic lines and a separate 1/2" thinwall conduit for the control wires. The 1" flexible conduit is permissible when the power unit is located within 8'0" of the doors. Some distributors prefer to use a larger size asphalt impregnated fiber sewer pipe and provide only one passageway for all the hydraulic lines and control wires. The type material to be used is at the option of the individual installer.

7. HANDLE SWITCH CONTROLLED INSTALLATIONS

In installations of this type, the 1/2" conduit for the control wires must be carried up into the pivot side door jamb as shown in Fig. B and C on page 14. It is desirable that the necessary holes for connecting the flexible cable to the jamb be drilled and the conduit inside of the jamb be secured in place. (See Fig. B and C on page 14), before the jambs are installed.

In order for the preliminary planning to pay the dividends it should, all of the information that has been established about the job must be given to the architect and/or general contractor for transmittal to the various sub-contractors involved.

The above covers the general preliminary planning that should be done with every automatic door installation. There will be other items that should receive consideration in the preliminary planning that apply only to specific individual installations and which cannot be foreseen in the composing of this manual. Watch for them! Drawings should be made and distributed, as required, covering these points which show what must be done to cope with them.

8. INSTALLATION PLANNING

This is the second phase of "Planning the Installation" and must be done by the installation man.

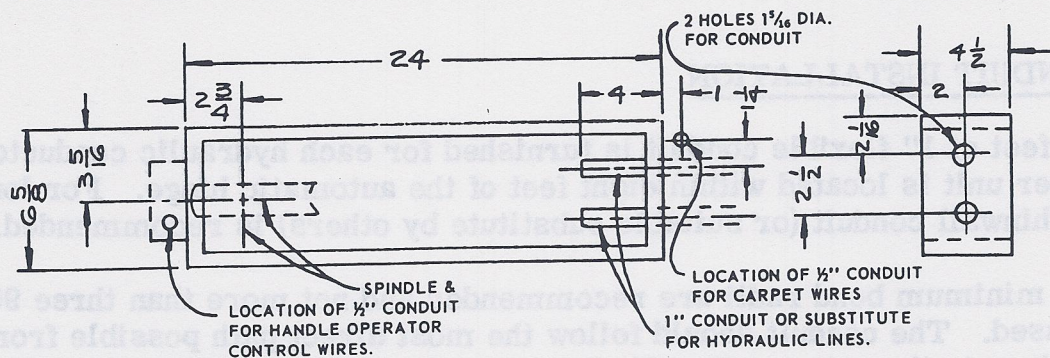
1. Make sure all of the items covered in the first phase "Preliminary Planning" have been taken into consideration when the order for the equipment was obtained.
2. Be certain the correct equipment is on hand for the installation.
3. The installer must coordinate the performance and timing of his work with the general contractor and other contractors relative to the following items:
 - (a) Provisions for setting the cement cases for the automatic hinges and the installation of the conduit for the hydraulic lines and control wires.

- (b) Provisions for installation of carpets when surface applied. In cases of recessed carpets, this item is necessarily a part of (a) above.
- (c) In cases of handle switch controlled doors, provision for conduit to get the control wires in to the connecting point on the pivot side jamb.
- (d) Provision for space for the hydraulic power unit and electrical power supply to same.
- (e) Coordination time-wise, of connecting the hydraulic lines and control wires and placing the equipment in operation with other construction work.

WARNING!

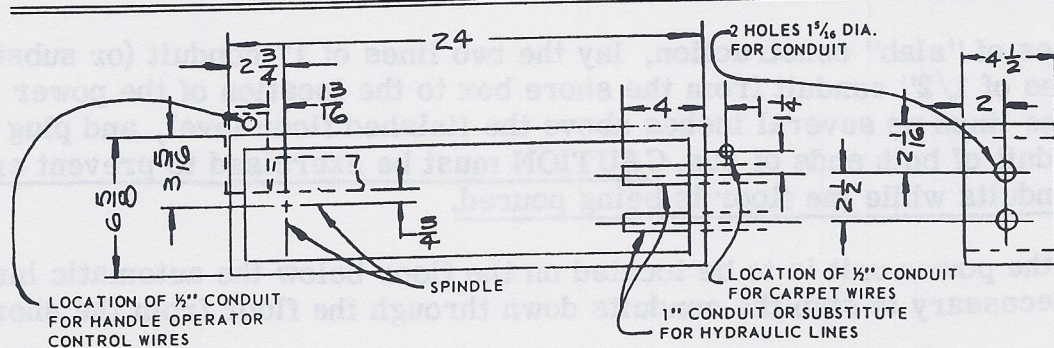
Do not install carpets and threshold in any building where construction work is going on and where trucks or heavy equipment may be moved across the carpets. This will result in carpets being damaged beyond usability. If circumstances of a particular project seem to make this necessary, request a letter from the general contractor stating he will assume responsibility for damage to carpets and threshold. Such damage can easily be avoided by protecting the carpets with planking when a heavy object is to be moved across them.

SHORE BOX DIMENSIONS & LOCATION OF CONDUIT



CENTER PIVOTED DOORS

FIG. B



OFFSET PIVOTED DOORS (RIGHT HAND SHOWN)

FIG. C

CHAPTER III

INSTALLATION OF CEMENT CASE & CONDUIT FOR SURFACE APPLIED CARPETS OR HANDLE OPERATORS

SHORE BOX INSTALLATION

It is recommended that a shore box be used to core an adequate size opening in the concrete floor to permit setting of the cement case for the automatic hinge in exact relation to the door jambs after they have been installed by the door contractor. (Refer to Fig. B or C on page 14 for shore box dimensions.)

It is also necessary to install the conduit for the hydraulic lines and electrical conductors for the carpets or handle switches at this time.

For center pivoted doors, install the shore box as shown in Fig. B on page 14. For offset pivoted doors, install the shore box as shown in Fig. C on page 14. Have the general contractor establish the finished floor height and set the shore box at this level.

Note the recommended shore box is 6 5/8" wide and the cement case is 6 1/8" wide. Therefore, it is very important the shore box be positioned within 1/8" of correct location. It is also important that the cored opening have a minimum depth of 4" below finished floor level as the cement case is 3 7/8" deep.

CONDUIT INSTALLATION

Six feet of 1" flexible conduit is furnished for each hydraulic conductor when the power unit is located within eight feet of the automatic hinge. For longer distances, 1" thinwall conduit (or suitable substitute by others) is recommended.

18" minimum bend radii are recommended and not more than three 90° bends can be used. The conduit should follow the most direct path possible from the automatic hinge to the power unit. The large bend radius simplifies the pulling through of the hose or copper tube hydraulic conductors.

In cases of "slab" construction, lay the two lines of 1" conduit (or substitute) and one line of 1/2" conduit from the shore box to the location of the power unit and stub the lines up several inches above the finished floor level, and plug open ends of conduit of both ends of run. CAUTION must be exercised to prevent crushing of the conduits while the floor is being poured.

When the power unit is to be located on the floor below the automatic hinge, it is only necessary to stub the conduits down through the floor from the shore box.

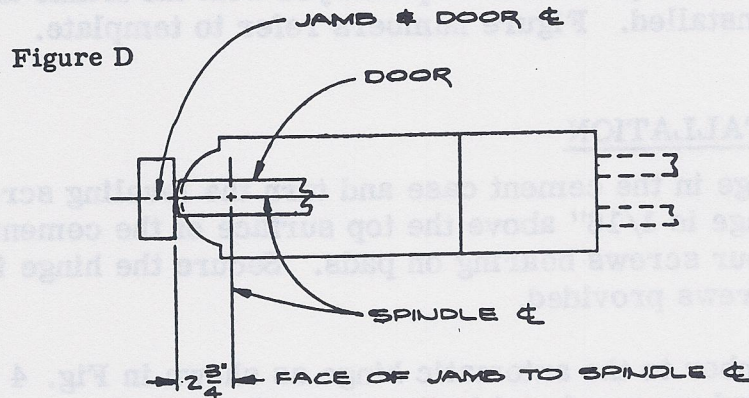
If the installation is for a handle operator, the 1/2" conduit must be located to

extend up into the pivot side jamb. (Refer to Fig. B on page 14 for center pivoted doors or to Fig. C on page 14 for offset pivoted doors.)

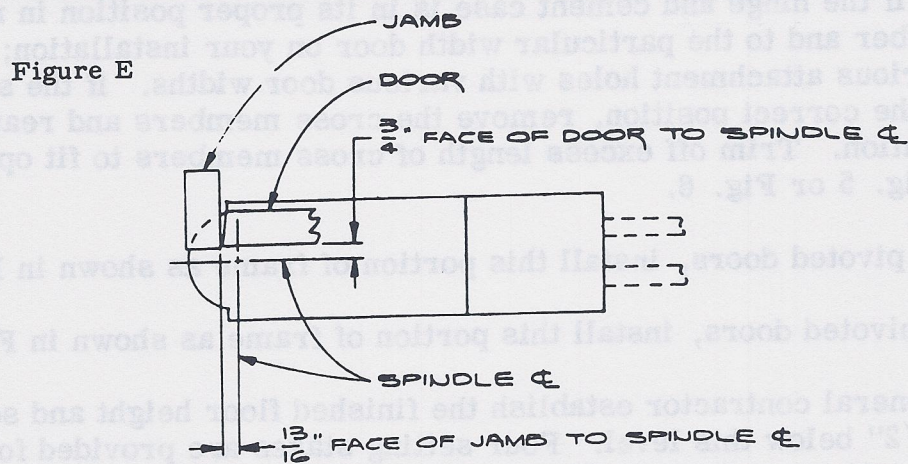
CEMENT CASE INSTALLATION

After the floor has been poured and has set, the shore box can be removed. The door contractor should install the door jambs at this time.

Set the automatic hinge in the cement case and turn the leveling screws until the top surface of the hinge is $1/16"$ above the top surface of the cement case. Secure the hinge in the cement case with the four screws provided. Attach the setting strap and place unit in the cored hole so the top surface of hinge is flush with the finished floor. Locate the spindle in its proper position to the jamb and be certain the hinge and cement case are level, plumb, and square. (Refer to Fig. D on page 16 for center pivoted doors or to Fig. E for offset pivoted doors.) Be sure the two lines of 1" conduit engage in the holes provided in the end of the cement case. The cement case is now to be grouted in its permanent position.



SPINDLE LOCATION ~ CENTER PIVOTED DOORS



SPINDLE LOCATION ~ OFFSET PIVOTED DOORS LEFT HAND SHOWN

CHAPTER IV

ASSEMBLY AND INSTALLATION INSTRUCTIONS FOR THE RECESSED CARPET FRAME

IMPORTANT - The recessed carpet frame must be installed before the floor is poured and after the jambs have been installed.

The recessed carpet frame assembly is available in four sizes to accommodate standard or short length, and standard width or wide carpets. Refer to INVISIBLE DOR-MAN catalog (Sweets file) for dimensions and assembly part numbers when ordering. All frames will accommodate doors up to 3'8" wide.

This description of assembly and installation procedure is closely followed by the assembly template which appears on pages 19 through 22, and which is also packed in the recessed carpet frames shipping container.

Study this template carefully. It will acquaint you with the frame and give you an idea as to how it is installed. Figure numbers refer to template.

CEMENT CASE INSTALLATION

Set the automatic hinge in the cement case and turn the leveling screws until the top surface of the hinge is 1/16" above the top surface of the cement case. Adjust carefully to get all four screws bearing on pads. Secure the hinge in the cement case with the four screws provided.

Attach the cross member to the automatic hinge as shown in Fig. 4 with four #10-32 X 3/8" flat head screws found in the screw bag.

Determine if the hinge and cement case is in its proper position in relation to the cross member and to the particular width door on your installation; Fig. 4 identifies the various attachment holes with various door widths. If the setting straps are not in the correct position, remove the cross members and reattach them in proper location. Trim off excess length of cross members to fit opening width as shown in Fig. 5 or Fig. 6.

For center pivoted doors, install this portion of frame as shown in Fig. 5.

For offset pivoted doors, install this portion of frame as shown in Fig. 6.

Have the general contractor establish the finished floor height and set the top of the hinge 1/2" below this level. Four setting stakes are provided for supporting the frame section as shown in Fig. 3. The stakes must be driven into the gravel or dirt to provide maximum support for this frame portion.

Make certain the threshold screw-down tie bar attached to the cross member on the end opposite the spindle is exactly 4" from the jamb. Relocate bar if necessary.

CONDUIT INSTALLATION

Six feet of 1" flexible conduit is furnished for each hydraulic conductor when the power unit is located within eight feet of the automatic hinge. For longer distances, 1" thinwall conduit (or suitable substitute by others) is recommended. 18" minimum bend radii are recommended and not more than three 90° bends can be used.

The conduit should follow the most direct path possible from the cement case to the power unit. The large bend radius simplifies the pulling through of the hose or copper tube hydraulic conductors.

In cases of "slab" construction, lay the two lines of 1" conduit (or substitute) and one line of 1/2" conduit from the cement case to the location of the power unit, stub the lines up several inches above the finished floor level and plug open ends of conduit at both ends of run.

When the power unit is to be located on the floor below the automatic hinge, it is only necessary to stub the conduit down through the floor from the cement case.

INSTALLATION OF CARPET FRAMES TO CROSS MEMBER

Assemble the side frames for the carpets and attach to cross member as shown in Fig. 3. Suspend each carpet frame section with setting stakes provided, elevate to proper level and fasten securely.

FINAL POSITIONING CHECK AND GROUTING INSTRUCTIONS

Make certain the frame is installed at its proper height, is level and square, plumb with top pivot, and straight between the jambs, the spindle is in its proper location with pivot side jamb as shown in Fig. 5 or Fig. 6.

Trim the wood spacers to fit your installation and place them in position as shown in Fig. 5 or Fig. 6. Make certain the narrow plastic fillers are in place in the carpet edge frame sections as shown in Fig. 7. The cement case and frame is now to be grouted in place as shown in Fig. 2, and this must have sufficient time to set before floor is poured. When the floor is poured, the cement inside of the carpet frame must be trowelled flat, smooth, and flush with top of lower flange.

If floor is tile, the cement contractor should finish the cement flush with the top edge of the rib on the outside of the carpet frame. This rib is 3/16" below the top surface of the frame.

Refer to Fig. 7 for this phase of installation.

It is your responsibility as the installation man to provide the cement contractor with these instructions and to answer all questions concerning his part of the installation.

DOR-O-MATIC

INVISIBLE DOR-MAN[®]

RECESSED CARPET FRAME

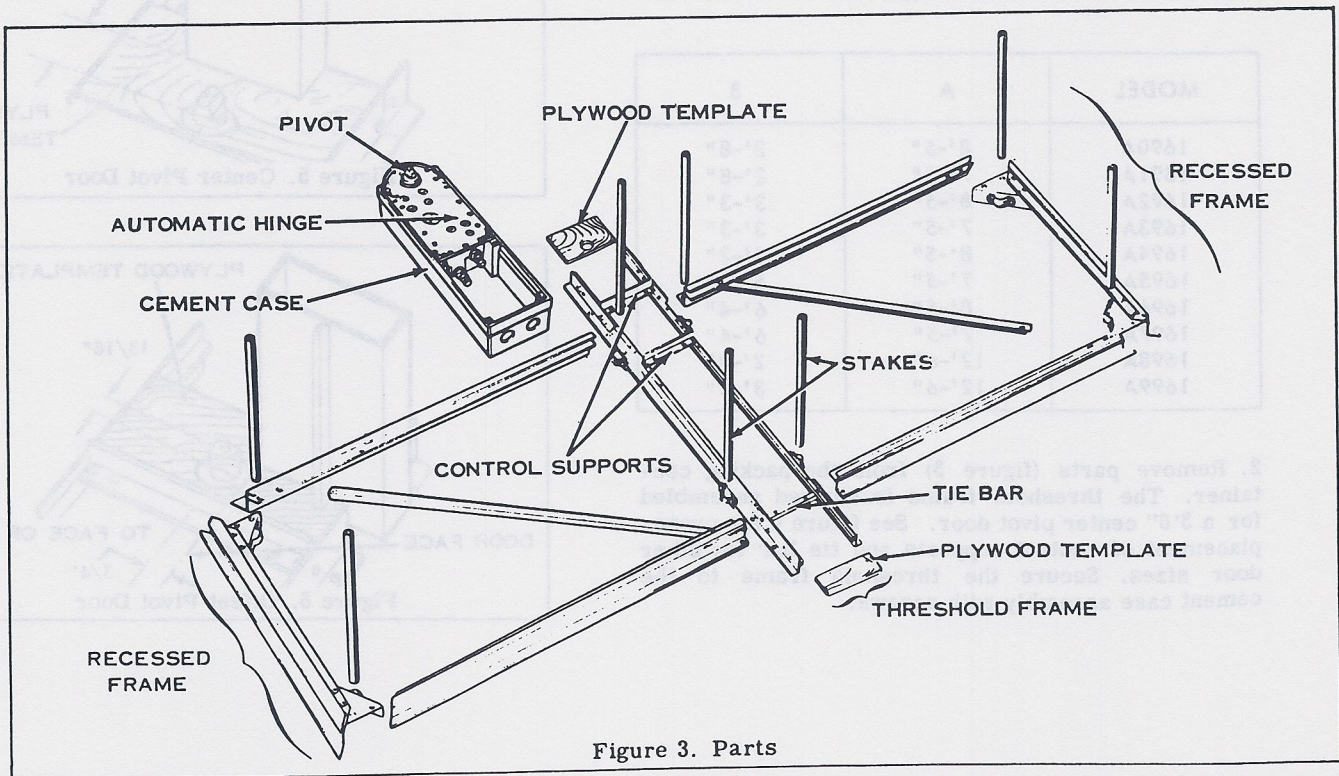
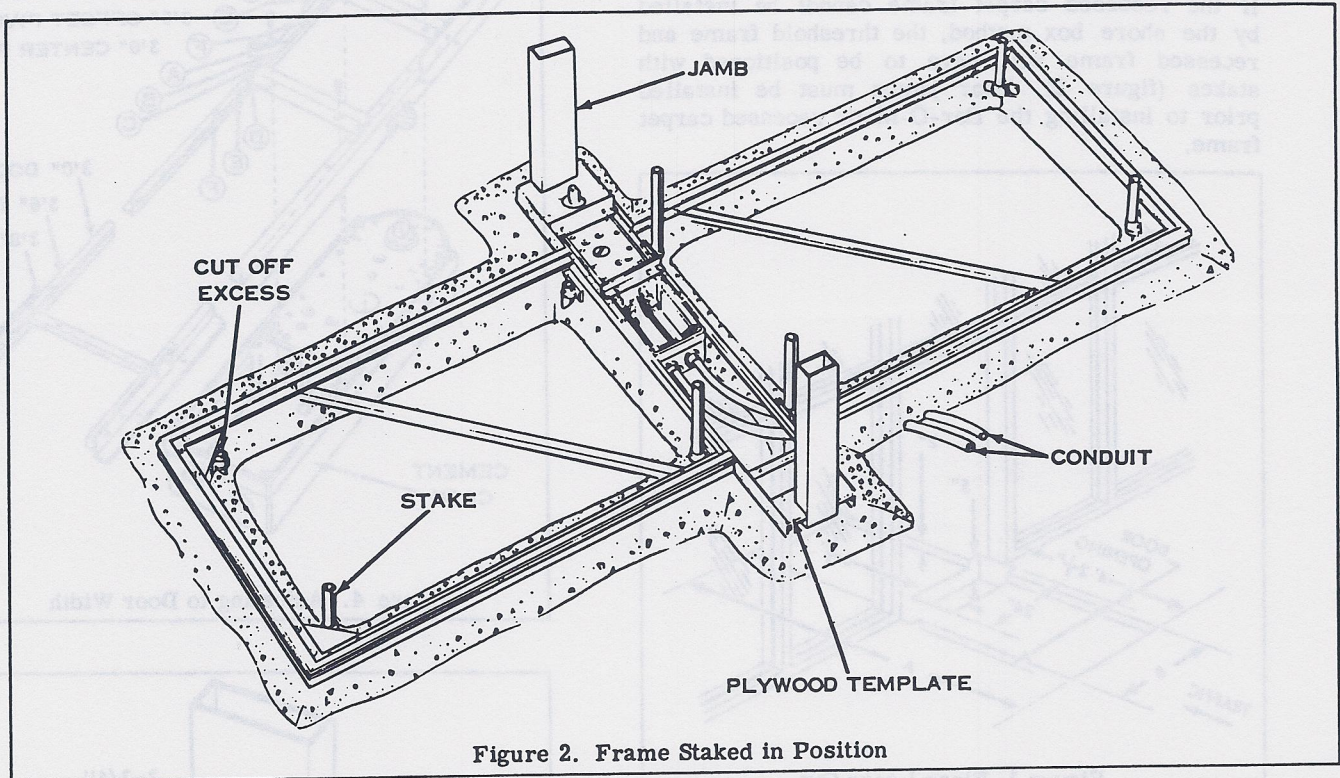


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INSTALLATION INSTRUCTIONS

DOR-O-MATIC DIVISION OF REPUBLIC INDUSTRIES, INC.

INSTALLATION OF THE RECESSED CARPET FRAME



1. It is recommended that the concrete floor be poured first with a floor leave-out (Figure 1) cast in the proper position. A shore box slightly larger than the recessed frame assembly can be constructed and staked into position before pouring the floor. If the recessed carpet frame cannot be installed by the shore box method, the threshold frame and recessed frame will have to be positioned with stakes (figure 2). Door jambs must be installed prior to installing the Dor-O-Matic recessed carpet frame.

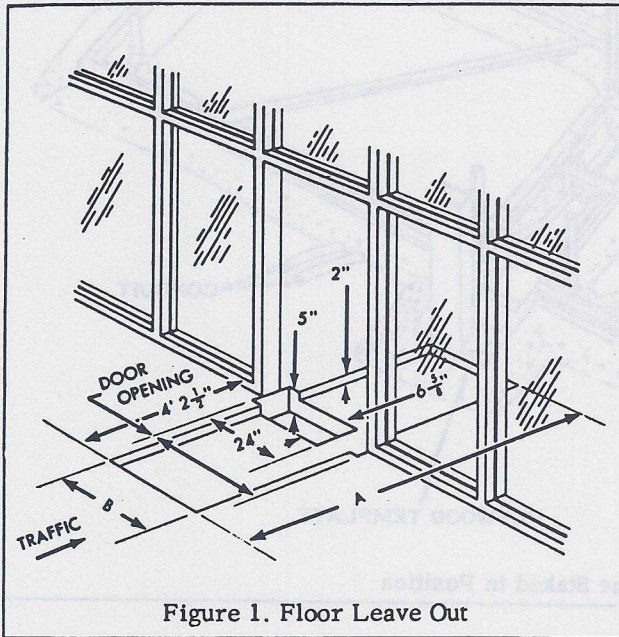


Figure 1. Floor Leave Out

| MODEL | A | B |
|-------|--------|-------|
| 1690A | 8'-5" | 2'-8" |
| 1691A | 7'-5" | 2'-8" |
| 1692A | 8'-5" | 3'-3" |
| 1693A | 7'-5" | 3'-3" |
| 1694A | 8'-5" | 5'-2" |
| 1695A | 7'-5" | 5'-2" |
| 1696A | 8'-5" | 6'-4" |
| 1697A | 7'-5" | 6'-4" |
| 1698A | 12'-6" | 2'-8" |
| 1699A | 12'-6" | 3'-3" |

2. Remove parts (figure 3) from the packing container. The threshold frame is shipped assembled for a 3'6" center pivot door. See figure 4 for proper placement of control supports and tie bar for other door sizes. Secure the threshold frame to the cement case assembly with screws.

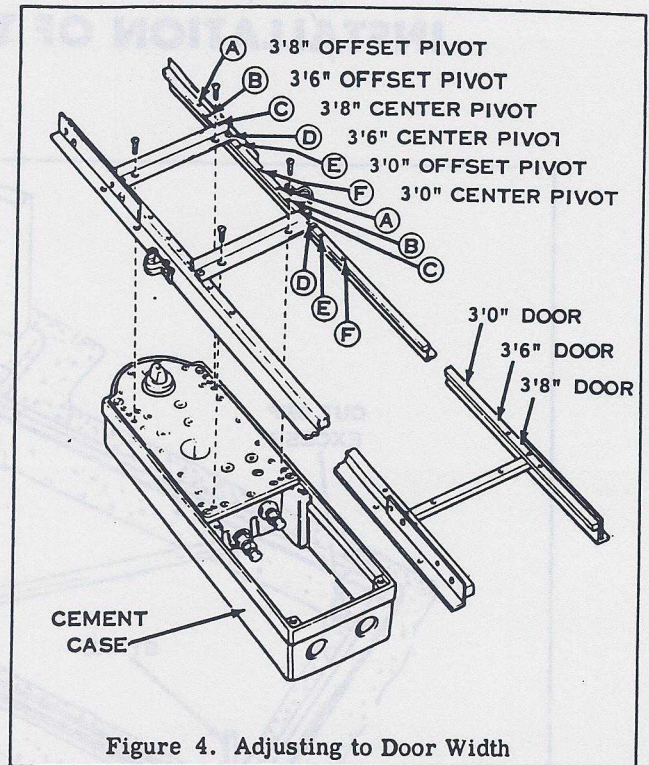


Figure 4. Adjusting to Door Width

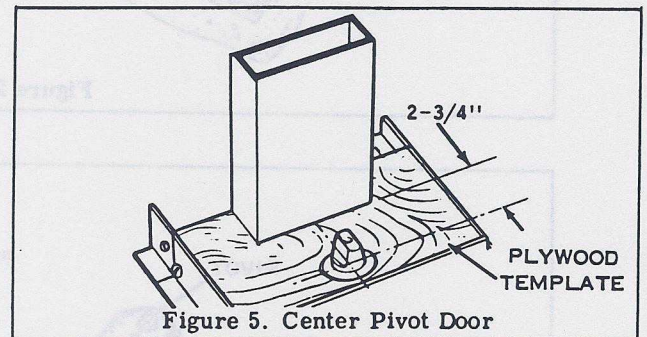


Figure 5. Center Pivot Door

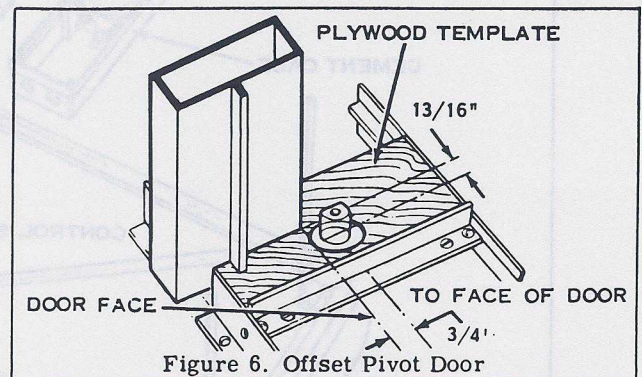


Figure 6. Offset Pivot Door

3. Position the threshold frame and cement case assembly between the door jams. Cut notches in plywood templates and position as shown in figures 5 and 6. These templates will help to secure the threshold frame and cement case assembly in position and will provide a pattern when the aluminum threshold ends are cut to fit the jamb. It is recommended that the assembly be positioned in a bed of concrete to insure a firm set. If unable to position in concrete, set stakes may be used. These stakes may be driven into the ground and the excess cut off the top flush with the conduit clamp. Positioning dimensions for center pivoted doors are indicated in figure 5. Positioning dimension for offset pivoted doors are located in figure 6. Plum, square, and level the assembly.

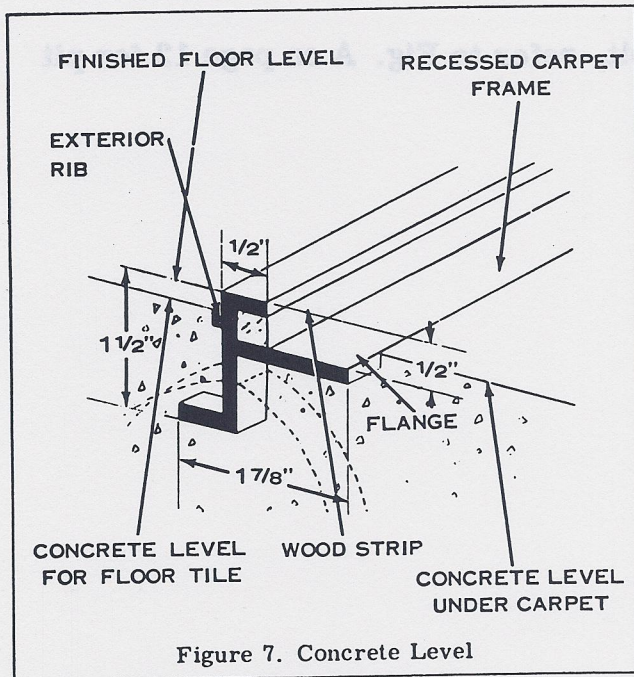


Figure 7. Concrete Level

4. Install the protective conduit for the hydraulic lines and carpet wires from the cement case to the power unit location. For practical purposes the power unit should be located as close to the door as possible. It can be placed up to 100 feet from the door at floor level, above or below floor level. The area in which the power unit is located should be properly ventilated.

5. Before securing the recessed frame assemblies to the threshold frame, make sure the threshold frame and cement case is rigidly positioned and level in both directions. Adjust the ends of the recessed frame assemblies to the level of the floor. When installing the frame in a floor that will be tiled, the surface of the floor should be level with the exterior rib shown in figure 7. When installing the frame in a floor that will not be tiled, the surface of the floor should be level with the top surface of the recessed frame.

SM FORM NO. 1, O. RCF

6. After the threshold frame assembly and cement case have been positioned, the conduit connected, and the recessed frame assemblies leveled, pour concrete in the floor leave out around the frame assembly. The masonry surface inside the recessed frame assemblies over which the carpets will be placed, must be flat, smooth, and free of irregularities. The surface must be level with the flange shown in figure 7.

7. After the concrete has hardened thoroughly, remove the wood strips from the recessed frame assembly. Lubricate the edges of the recessed frame with liquid soap or electricians pull-through compound. Bow the carpet over a 1" wood strip or broom handle as shown in figure 8. Use care in handling the carpets. If bent to extremes during installation, the electrical contact plates may be distorted permanently. Remove the wood strip and seat the carpet in the side of the frame. Drive the carpet about 1/8" into the end of the frame using a 9" length of 2 x 4 as shown in figure 9. Keep the block at least 3" from either side of the wire leads.

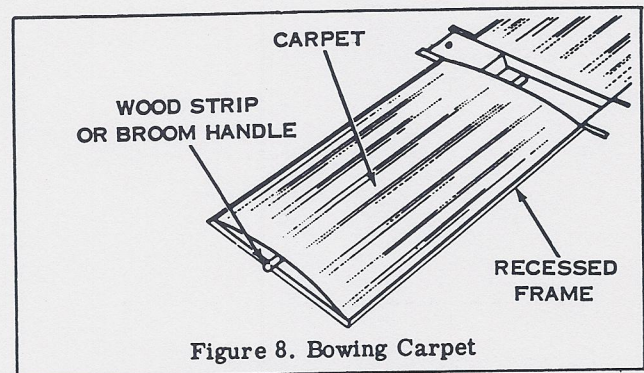


Figure 8. Bowing Carpet

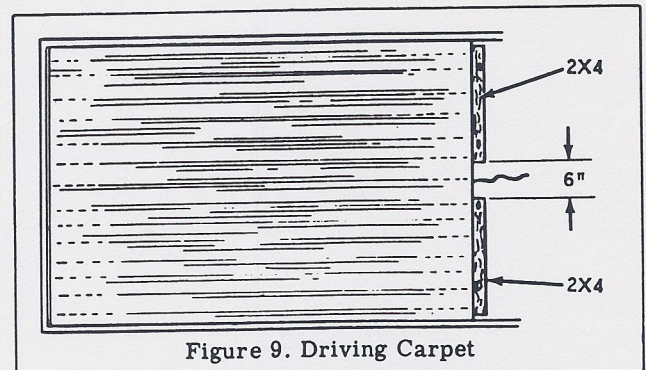


Figure 9. Driving Carpet

8. Connect the carpet wires to the power unit. Refer to the installation manual for further instructions. Cut the two threshold ends.

DOR-O-MATIC

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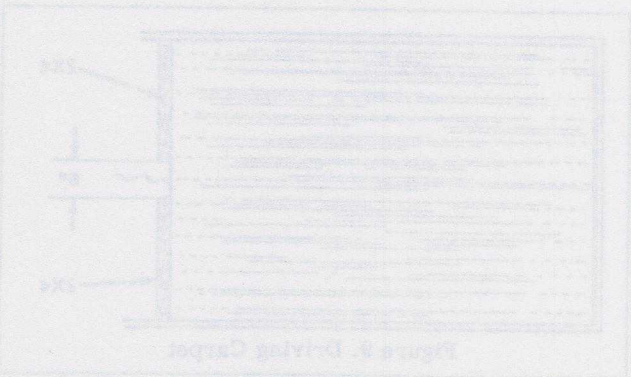
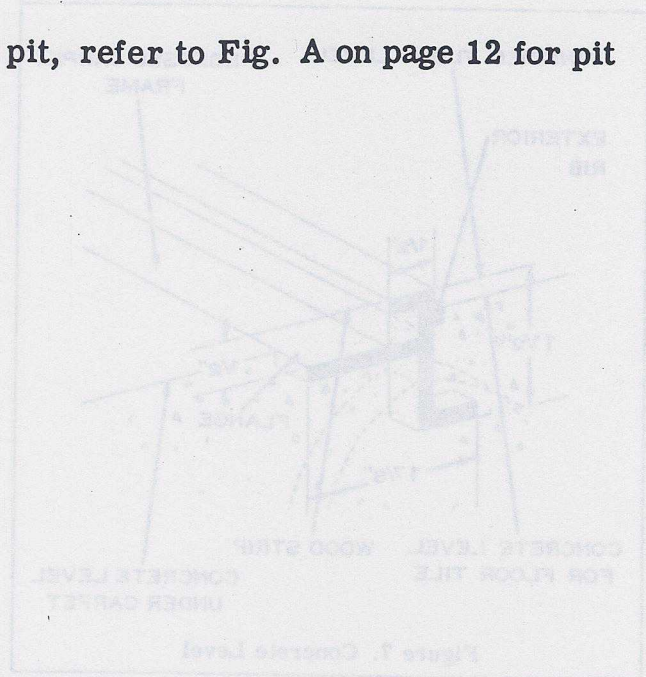
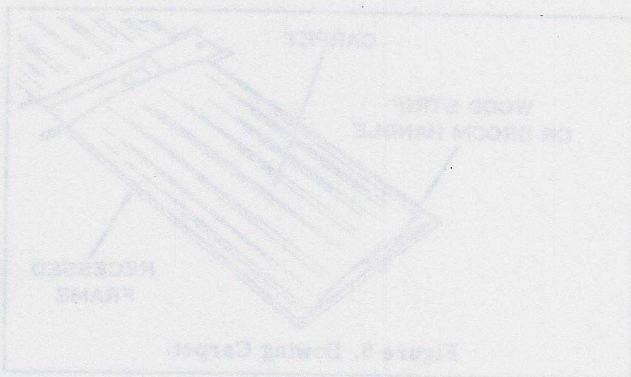
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CHAPTER V

INSTALLATION OF POWER UNIT

Unpack the power unit from its shipping carton and remove the two wood packing boards from its base. Set the power unit in the position which it will permanently occupy on the rubber grommets installed in its base. The grommets are resilient and are essential to quiet operation of the power unit. Do not plug power unit electric supply line into convenient outlet at this time.

If the power unit is to be installed in a pit, refer to Fig. A on page 12 for pit details and dimensions.



1. Install the protective conduit for the hydraulic lines and carrier wires from the carrier case to the power unit location. For practical purposes the power unit should be located as close to the door as possible. It can be placed up to 100 feet from the door at floor level, above or below floor level. The area in which the power unit is located should be properly ventilated.

2. Before securing the recessed frame assembly in the threshold frame, make sure the threshold frame and carrier case is properly positioned and level in both directions. Adjust the ends of the recessed frame assembly to the level of the floor. When installing the frame in a floor that will be tiled the surface of the floor should be level with the exterior as shown in figure 1. When installing the frame in a floor that will not be tiled, the surface of the floor should be level with the top surface of the recessed frame.

CHAPTER VI

INSTALLATION OF HYDRAULIC LINES AND CONTROL WIRES

Dor-O-Matic one wire braid neoprene hose, 11,000 psi burst test, for high pressure and one rayon braid neoprene hose, 800 psi burst test, for low pressure are recommended for installations where power unit is located up to 30'0" from the automatic hinges.

For longer distances, 5/16" O.D. X .030" wall, 5400 psi average burst strength copper tubing is recommended. Dor-O-Matic 18" flexible couplings must be used at the ends of the copper tubing to provide a flexible connection between the tubing, the power unit, and the automatic hinge.

Tube to tube connections are to be made only in accessible areas. Burying connections in conduit will necessitate pulling the entire tube out to make repairs if one of these connections should leak. This could be time consuming and costly.

WARNING! Do not allow dirt to enter the hydraulic lines while they are being installed. Make certain both ends are plugged securely.

1. INSTALLATION OF HYDRAULIC LINES-HOSE

Push a fish tape thru the run of conduit. Attach service tool ST-127 to the hose to be pulled thru and secure the fish tape to it. Pull the hose thru the conduit carefully. Have someone uncoil and guide the hose into the conduit to prevent the hose from being cut by the end of the conduit. Service tool ST-127 is a 1/4" steel pipe cap with a 1/2" eyelet secured to it and is available from Dor-O-Matic.

2. INSTALLATION OF HYDRAULIC LINES-COPPER TUBE

Push a fish tape thru the run of conduit. Attach service tool ST-126 to the tube to be pulled thru and secure the fish tape to it. Pull the tube thru the conduit carefully. Have someone uncoil and guide the tube into the conduit while it is being pulled. Straighten the tube as much as possible before it enters the conduit and the installation will be considerably easier.

Service tool ST-126 is a Klemmens J-25 pulling grip and is available from Dor-O-Matic and many electrical supply houses.

3. CONNECTING THE HYDRAULIC LINES

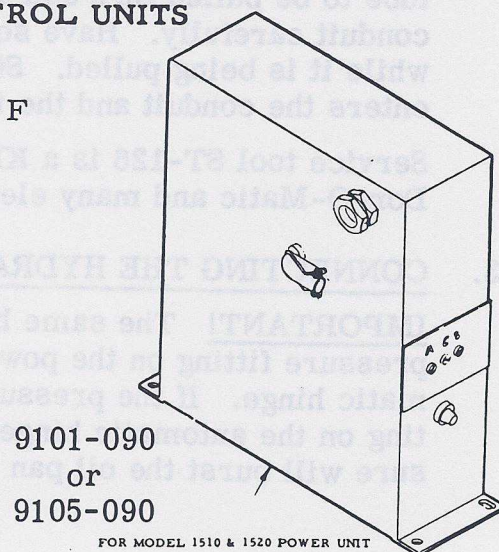
IMPORTANT! The same hydraulic conductor must be connected to the red pressure fitting on the power unit and to the red pressure fitting on the automatic hinge. If the pressure line is erroneously connected to the return fitting on the automatic hinge, the hinge will not operate and the hydraulic pressure will burst the oil pan and the oil will run out into the cement case.

Another method of cleaning the lines is to connect the pressure line to the return line with a 1/4" pipe union. On the control box, attach a jumper across the "A" and "C" terminals related to that pair of lines and run the power unit for 5 minutes. Any dirt in the lines will be flushed back to the reservoir and trapped by the filter. Flush one pair of lines at a time so maximum flow velocity of the oil is achieved.

If your installation is copper tube, make certain you have a good clean flare. Occasionally a tube will split while being flared. This is caused by work hardening of the tube while it is being cut off, and can be remedied by annealing the cut off end with an inexpensive can type propane torch available at all hardware stores. Again make sure the lines are clean before making final connections.

The control wires to be pulled thru the 1/2" conduit are to be three conductor cable (black, red, and white) #20 ga. stranded wire with .020" individual plastic insulation and plastic sheathing. Heavier conductors may be substituted if necessary. DO NOT USE 3-WIRE THERMOSTAT CABLE.

The control wires may now be connected to the terminal strip on the control box on the power unit. Strip 3/4" insulation off the three wires and solder the ends to prevent fraying. Connect the red wire to the "A" terminal (activating) the black wire to the "C" terminal (common), and the white wire to the "S" terminal (safety). Make certain a wire from one terminal is not touching another terminal.



CHAPTER VII

INSTALLATION OF THRESHOLD AND SURFACE APPLIED CARPETS

1. THRESHOLD AND CARPETS

Unpack the carpets from their shipping cartons and lay in place. Trim the spindle portion of the threshold to fit your jamb and secure in place. If the door has been installed it must be removed to install this section. Secure the threshold portion that covers the automatic hinge in place. Trim the last section of threshold to fit the opposite jamb and secure it in place with the two screws that enter the end of the cement case. Make sure the carpet is engaged in the interlock groove with the threshold. Using the threshold as a template drill two 5/16" holes, 1 1/4" deep in the floor with a carbide masonry drill. Remove this end section of threshold and install #9960-600 anchors. Replace threshold and secure it to the cement case and anchors with the screws furnished. Make certain the control wires are not pinched when the threshold is installed.

The center portion of the threshold will have to be removed later to connect the control wires and make final adjustments, but to insure proper carpet location in relation to the threshold, it is imperative the threshold be fastened securely in place at this time.

2. CARPET MOLDINGS

Lay the carpet moldings in place and using the molding as a template, drill as many 1/2" holes, 1 1/8" deep as are required by the moldings with a carbide masonry drill. Remove moldings and install #9950-600 anchors, replace moldings, and secure them in place with the stainless steel screws provided.

CHAPTER VIII

INSTALLATION OF RECESSED CARPETS AND THRESHOLD

1. RECESSED CARPET

Remove the fillers and spacers from the previously installed carpet frame. Remove the setting straps from the automatic hinge and cross frame.

Lay a four foot dowel (about broom stick size) lengthwise in the center of the carpet recess. Lay the carpet in the recess over the dowel and start the side edges of the carpet under the protruding edge of the carpet frame. Pull out the dowel from the threshold end of the carpet and do not raise it away from the floor as it is pulled out. Slide the carpet away from the automatic hinge until outer edge is engaged under the end section of the carpet frame.

2. THRESHOLD

Trim the spindle portion of the threshold to fit your jamb and recessed carpet frame and secure in place. If door has been installed, it must be removed to install this portion. Secure the threshold portion that covers the automatic hinge in place. Make sure the carpet is engaged in the interlock groove in the threshold. Trim the last section of threshold to fit the opposite jamb and frame and secure it to the cement case and frame with the screws provided. Make certain the control wires are not pinched when the threshold is installed.

The center portion of the threshold will have to be removed later to connect the control wires and make final adjustments, but to insure proper threshold location, the center portion must be fastened securely in place at this time.

CHAPTER IX

CONNECTING THE CONTROL WIRES AND MAKING FINAL ADJUSTMENTS

1. CONNECTING CONTROL WIRES TO CARPETS

Remove center section of previously installed threshold. Cut off excess length of wires to be spliced. Strip 3/4" insulation off the carpet and control wires. Connect one wire from each carpet to the black (common) control wire, twist together, and solder. Connect the other activating carpet wire to the red (activating) control wire, twist together, and solder, and connect the remaining safety carpet wire to the white (safety) control wire, twist together, and solder.

Tape each splice with splicing compound, stretching it as it is being wrapped around the wire. Make sure wires are all covered and not exposed. Work splicing compound with fingers to bond together. Splicing compound is available in rolls at any hardware store and makes a fine waterproof protective cover. Wrap over splicing compound with plastic electrical tape.

2. CONNECTING CONTROL WIRES TO HANDLE OPERATIONS

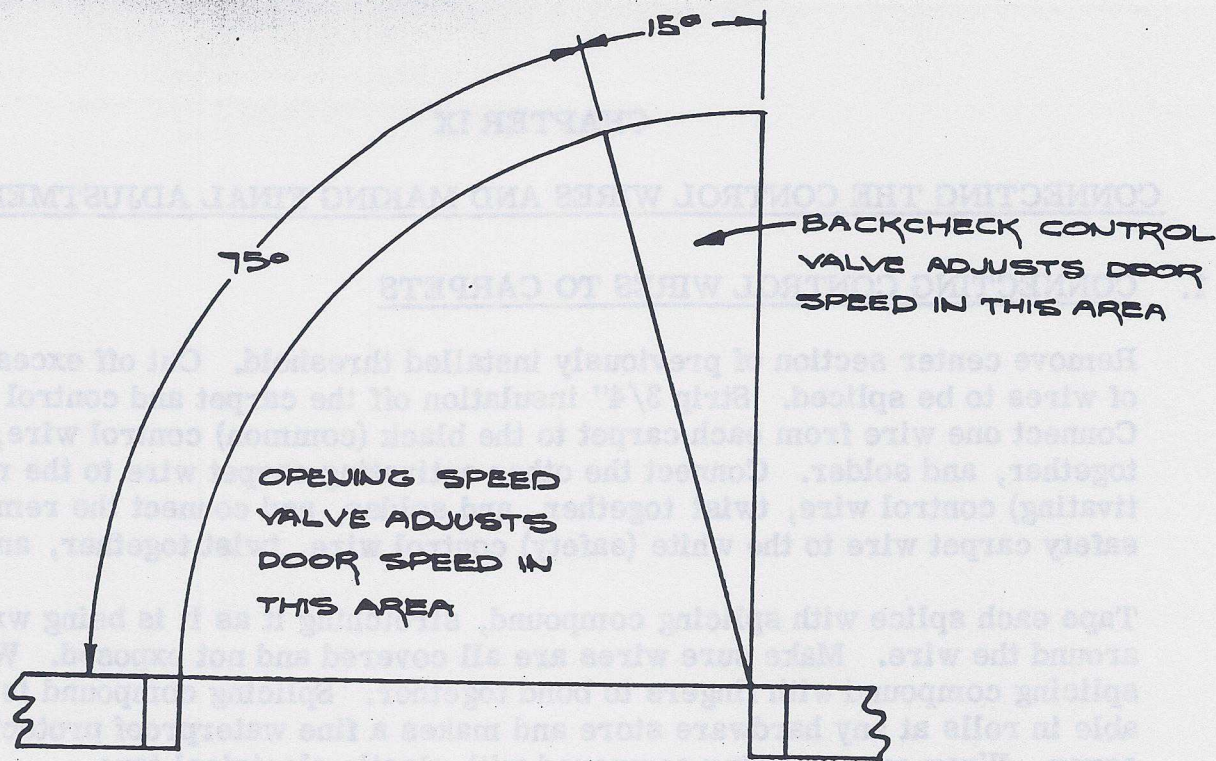
Connect control wires with switch wires by using a flexible connector between the jamb and door. Directions are given in Chapter X and XI for glass, metal, and wood doors.

3. MAKING FINAL ADJUSTMENTS

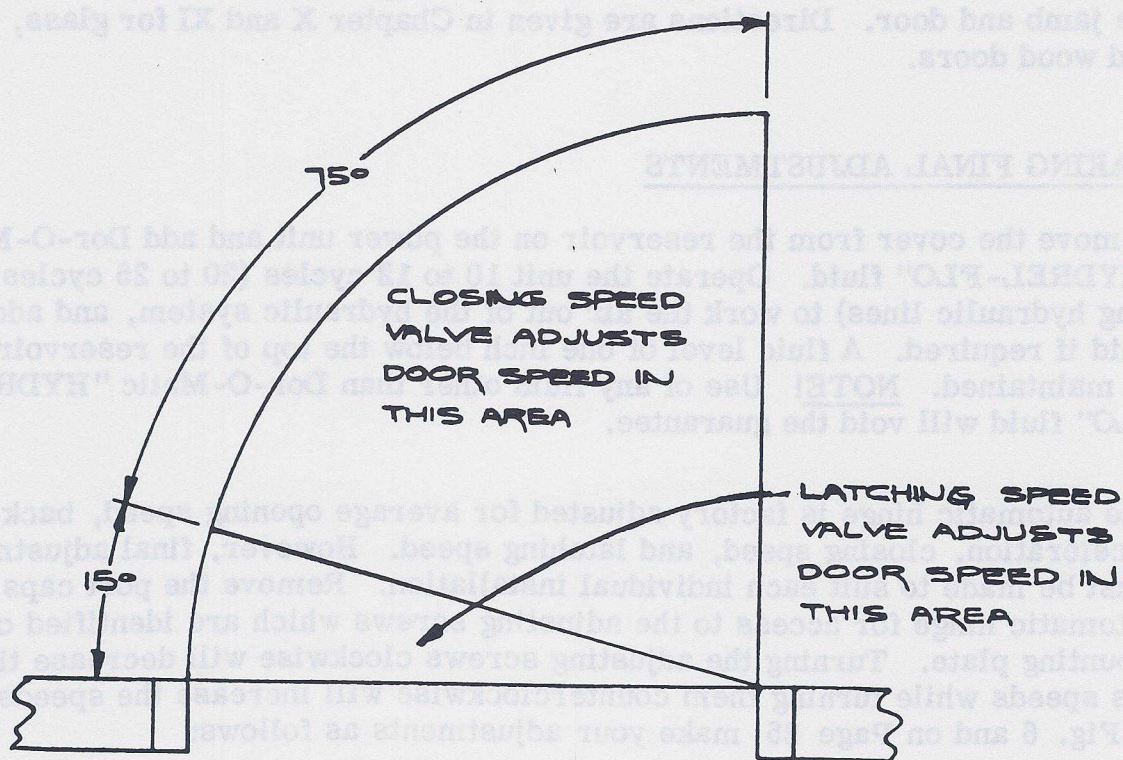
Remove the cover from the reservoir on the power unit and add Dor-O-Matic "HYDREL-FLO" fluid. Operate the unit 10 to 12 cycles (20 to 25 cycles for long hydraulic lines) to work the air out of the hydraulic system, and add more fluid if required. A fluid level of one inch below the top of the reservoir is to be maintained. NOTE! Use of any fluid other than Dor-O-Matic "HYDREL-FLO" fluid will void the guarantee.

The automatic hinge is factory adjusted for average opening speed, back-check deceleration, closing speed, and latching speed. However, final adjustments must be made to suit each individual installation. Remove the port caps on the automatic hinge for access to the adjusting screws which are identified on the mounting plate. Turning the adjusting screws clockwise will decrease the various speeds while turning them counterclockwise will increase the speeds. Refer to Fig. 6 and on Page 25 make your adjustments as follows:

- (a) Opening Speed - Turn adjusting screw from 1/2 to 1 turn open or until desired opening speed is reached.



OPENING CYCLE



CLOSING CYCLE

Figure G

(b) **Backcheck** - Turn adjusting screw from 1 1/4 to 1 3/4 turns open. Door must reach 90° open position and must not bang positive stop but with a very gentle action.

(c) **Latching Speed** - Turn adjusting screw from 1/4 to 3/8 turn open. Adjust so door does not bang door stop but closes with a steady gentle speed.

(d) **Closing Speed** - Turn adjusting screw from 3/8 to 1/2 turn open or until desired closing speed is reached.

Replace the threshold section making certain the carpet control wires are not pinched. Be sure all threshold and molding retaining screws are tightened securely. Check the oil level in the reservoir once more to make sure the unit is full and replace the cover and tighten. The installation is now complete.

IMPORTANT: In cases of handle controlled door installations, reverse movement of the handle switch provides the safety which stops the door in any position of its opening swing and permits the door to close. For most convenient and safest operation of handle controlled doors, the opening speed must be adjusted considerably slower than carpet controlled doors.

CHAPTER X

INSTALLATION INSTRUCTIONS FOR MODEL 1700-000 "TOUCH-O-MATIC"

HANDLE OPERATOR FOR GLASS DOORS

Model 1700-000 Touch-O-Matic handle operator is designed for application to both Pittsburgh Plate Glass and Libby-Owens-Ford tempered glass doors, either 1/2" or 3/4" thick. The door manufacturer must provide one 7/8" diameter hole plus 3/32" minus 0, 42" up from the bottom edge of the lower rail and 5" in from the front edge of the door. The lock must be located in the top rail. The Touch-O-Matic handle operator is shipped from the factory assembled and mounted on a wood frame which simulates a glass door.

1. TOOLS REQUIRED FOR INSTALLATION

- 1 - 1/2" drive ratchet handle
- 1 - 1/2" drive 6" length extension
- 1 - 7/16" hex socket for above
- 1 - #2 Phillips screw driver
- 1 - screw driver (standard)
- 2 - 7/32" Allen wrenches
- 1 - 3/8" open end wrench
- 1 - 7/16" open end wrench
- 1 - 1/16" Allen wrench
- 2 - 1 1/8" hex sockets
- 1 - bar type socket wrench handle, 1/2" drive
- 1 - large adjustable wrench
- 1 - 1/2" electric hand drill
- 1 - 1/2" drill
- 1 - #25 (.1495") drill
- 1 - #10-24 tap
- 1 - tap wrench
- 1 - measuring tape
- 1 - soldering gun (or iron) and solder

These instructions refer to the parts as shown on drawing #1700-000 which is packed with every #1700-000 "TOUCH-O-MATIC" handle operator. Follow these instructions and drawing closely while making your installation.

2. PREPARATION OF THE DOOR

Remove the door from the frame and lay it horizontally across two saw horses; measure down 41 1/8" from the center of the 7/8" diameter hole provided by the door manufacturer. Measure in 5" from the edge of the door. Where these two measurements intersect, drill one 1/2" diameter hole through both sides of the

bottom rail. These holes are for the tube connectors. Drill one 1/2" diameter hole and tap two #10-24 holes, located as shown on drawing #1700-000, through one side of the bottom rail. These holes are for the flexible cable assembly #1780-000. It is preferred to have this cable installed on the side of the door that is common with the direction of the swing of the door.

3. DISASSEMBLY OF THE TOUCH-O-MATIC FROM ITS SHIPPING FRAME

Assemble the ratchet handle, 6" extension, and 7/16" hex socket, insert in the opening in the lower end of the handle and remove the two 1/4" - 20 lock nuts (item 7 on drawing #1700-000 on each handle. Remove retaining bolt (item 22) at the lower end of each handle and the handles can then be lifted off of their brackets. Remove the lock nut from the shoulder bolt (item 31) and withdraw the bolt. Pull the rectangular tube slightly outward away from the switch and pull up gently. The tubes may not be removed, exercising caution when pulling the wires out. Remove the "O" ring (item 11). Remove the switches (item 19) by removing two #6-32 X 7/8" machine screws (item 16).

Using the two 7/32" Allen wrenches, remove one of the 5/16" - 18 socket head cap screws (item 13) which also retains the tube connector bracket (item 14). Remove both flat springs (item 9) by removing two #10-24 X 1/4" binding head screws (item 4) from each spring. The connector (part 1708-1 for 1/2" glass doors or part 1708-2 for 3/4" glass doors) with one tube connector bracket, spring and bolt on one end, can now be withdrawn. With the 1 1/8" hex sockets, remove the connector housing (part 1706-1 for 1/2" glass door or part 1706-2 for 3/4" glass doors). The housing shields (item 3) can be removed. On the bottom of the frame remove the two 1/2" - 20 nuts (item 25). The two tube connectors (item 27) with the rubber grommets (item 26) may now be withdrawn.

4. INSTALLATION OF THE TOUCH-O-MATIC ON THE DOOR

Install the tube connectors, rubber grommets, and retaining nuts in the bottom rail of the door in the same manner that they were installed on the shipping frame. Make sure the nuts are tight.

Install the housing shields, connector housing and connector housing nut making sure the fibre washer (item 2) is in place in between the housing shields and the glass. Align the edge of the housing shields parallel with the edge of the door and tighten securely.

Insert the connector through the connector housing and install the two flat springs with the #10-24 X 1/4" binding head screws. Now replace the tube connector bracket that was removed inserting the 5/16 - 18 X 3/4" socket head screw through the tube connector bracket and the flat spring, screwing it into the connector snug but not tight. Replace the switches, making certain that the switch with the black and red wires is installed on the side of the door which is to be the push handle

side, and push the wires down through the tube. Insert the wires through the hole in the tube connector (item 27) into the inside of the bottom rail. Pull the wires gently while engaging the notch on the bottom end of the tube with the groove in the rubber grommet. Place the "O" ring over the heads of the 5/16"-18 cap screws before placing the tubes in the "U" shaped tube connector brackets. Install the shoulder bolt through the connector bracket and tube and run the lock nut on tight. Now insert the two 7/32" Allen wrenches through the tubes into the heads of the 5/16"-18 socket head cap screws and tighten these securely.

Place the handles on their brackets, being sure the "PUSH" Handle is on the "PUSH" side of the door, and insert the two 1/4" - 20 X 1" flat head screws in each handle. Now run the 1/4" - 20 lock nuts on through the opening in the under side of the handle and run them up just snug, not tight. Install the retaining bolt (item 22) and tighten. Now tighten the two 1/4" - 20 lock nuts in each handle.

After the handles have been installed on both sides of the door, take the cable assembly (item 30) and strip the insulation from the ends of the three wires that are now equipped with the "shur-plugs". Attach the cable assembly to the lower rail with the two #10-24 X 1/2" flat head screws furnished. Strip the ends of the four wires coming from the handles. Splice the two black wires to the black wire on the cable assembly. This is the common wire. Splice the red wire from the switch to the red wire in the cable assembly (activating wire) and splice the white wire from the switch to the white wire (safety wire) in the cable assembly. Solder all splices and tape thoroughly. Secure the wires in the top of the bottom rail with the three wire retainers (item 29), making certain that none of the wires hang down below the bottom edge of the rail.

5. PREPARATION OF THE JAMB AND INSTALLATION OF THE DOOR

Drill and tape the door jamb shown and located on drawing 1700-000. Using a "fish" tape, pull the three conductor stranded cable through the conduit "stubbed up" inside of the jamb, and out through the 1/2" drilled hole in the jamb.

Strip the ends of the conductors of this cable and splice on to it the short cable that is furnished and which has "shur-plugs" on the other end. Make this splice color to color, solder the connections and tape thoroughly.

You are now ready to install the door in the frame securing it in place with the top pivot in the usual manner.

6. ADJUSTMENT OF SWITCHES AND CONNECTING TO POWER UNIT

Connect an ohmmeter to the black and red wires coming out of the bottom rail of the door. Insert the 1/16" Allen wrench in the small hole in the face of the push handle. The wrench will engage a #6-32 X 3/8" set screw. Turn the set screw

in or out and adjust until a 5 lb. force exerted against the push handle actuates the switch. To measure the force an ordinary kitchen scale may be used to push against the face of the handle. A pull type "fish" scale may be used by pulling on the handle on the other side of the door.

Adjust the other handle in the same manner with the ohmmeter connected to the black and white wires coming out of the bottom rail of the door. Now connect the wires coming out of the jamb by inserting "shur-plugs" in the insulated receptacle tubes furnished for this purpose. Make these connections color to color. Work the spliced joints on the cable extending out of the jamb and the connecting receptacles back through the 1/2" hole in the jamb and secure the cable assembly to the jamb with the two #10-24 X 1/2" flat head screws provided.

At the power unit, connect the red wire to the "A" terminal, the black wire to the "C" terminal, and the white wire to the "S" terminal. These terminals in the order described above are the activating terminal, common terminal, and the safety terminal. Check the power unit installation instructions to make certain that the hydraulic lines are properly connected and thoroughly tightened. Plug the power cord from the power unit control box into the 115V. service outlet and turn on the line switch. The Touch-O-Matic is now ready to operate.

The Touch-O-Matic handle operator for glass doors is designed for long and trouble free service. Emphasis is placed on following these instructions closely and tightening securely all screws, bolts and nuts. A loose nut may cause the Touch-O-Matic to malfunction which could result in a costly service call.

INSTALLING THE TOUCH-O-MATIC HANDLE OPERATOR ON THE DOOR

CHAPTER XI

INSTALLATION INSTRUCTIONS FOR MODEL 1800-000 "TOUCH-O-MATIC"

HANDLE OPERATOR TO 1 3/4" THICK METAL AND WOOD DOORS

Model 1800-900 Touch-O-Matic handle operator is designed for application to most stock 1 3/4" thick metal or wood doors. The door manufacturer is not required to provide any special holes in the door. Standard length handles are manufactured for 36" and 42" wide doors. Dor-O-Matic will furnish special length handles at slight extra cost for odd width doors.

These instructions refer to the parts as shown on drawing #1800-900 which is packed with every 1800-000 "TOUCH-O-MATIC" handle operator. Follow these instructions and drawing closely while making your installation.

PREPARATION OF THE DOOR

Remove the door from the frame and lay it horizontally across two saw horses with the side which is to be the "PULL" side up. Measure up 42" from the bottom of the lower rail along both stiles and scribe a light horizontal line. Measure in 1 3/16" from the front edge of the door and scribe a light vertical line. Measure the distance between the two holes in the back side of the handle bar. Now transfer this dimension to the door and scribe a light vertical line on the pivot stile. Where these points intersect, drill a 3/16" diameter hole completely thru both stiles. CAUTION! MAKE SURE THE HOLE IS PERPENDICULAR TO BOTH THE HORIZONTAL AND VERTICAL PLANE OF THE DOOR. Increase the drill size until both holes are 3/4" in diameter. Drill the "PULL" side stile, front edge only, out to 7/8" diameter. (Refer to drawing 1800-900).

Drill and tap the holes required for the cable assembly (1780-000 for center pivoted doors and offset pivoted doors) on the "PULL" side of the door.

INSTALLING THE TOUCH-O-MATIC HANDLE OPERATOR ON THE DOOR

Remove the chrome plated hubs (item 4), the rubber springs (item 14), the spring shims (item 23), and the retaining nut (item 6) from the switch. The remainder of the switch assembly cannot be further disassembled.

Insert the three conductor wire which is soldered to the switch thru the 7/8" hole on the "PULL" side of the door, down into the hollow stile. Pull gently on the wire as it comes out the bottom of the door to take up the slack. Insert the threaded end of the switch into the 7/8" hole and push it gently thru the stile until it comes out the 3/4" hole on the other side. CAUTION! THERE IS NOT AN EXCESS OF CLEARANCE BETWEEN THE 7/8" HOLE AND THIS SWITCH. BE CAREFUL NOT TO DAMAGE THE WIRES

When the switch is in place, turn it clockwise 360° (so the wire is wound around the switch and, the weight of the wire is removed from the soldered joints) and turn on the retaining nut (item 6). The switch housing is nylon and resilient to a degree. Do not tighten the retaining nut too tightly.

Take the cable assembly (item 19 for center pivoted door or item 20 for offset pivoted doors) and strip the installation off the three wires that do not have the shur-plugs crimped on them. Attach the cable assembly to the lower rail with the two (2) #10-24 X 1/2 flat head screws furnished. Splice the black wire to the black wire in the cable assembly. This is the common wire. Splice the red to red which is the activating wire and splice white to white which is the safety wire. Solder all splices and tape thoroughly. Secure the wires in the top of the bottom rail with the three (3) wire retainers (item 22) making certain none of the wires hang down below the bottom of the rail.

PREPARING TO HANG THE DOOR

Drill and tap the door jamb as shown and located on drawing 1800-900. Using a fish tape, pull the three (3) conductor stranded cable thru the conduit "stubbed up" inside the jamb. Splice on the short cable with shur-plugs on the opposite end. Solder all splices and tape thoroughly. Install the door in the jamb.

Attach a short wire loop thru the holes in the hubs (item 14) on each side of the door. Connect an ohmmeter to the red and white wires, the other to the black wire.

By using a pull type "fish" scale hooked thru the wire loop and pulling on one hub, the spring tension on the opposite hub can be determined by what the scale reads when the contact of the switch is made which shows on the ohmmeter. The spring tension should be 6 lbs. to 8 lbs. on each side. It is very important the switch be balanced, that is, have equal tension on each side to provide positive returning of the switch to its neutral position.

The spring tension can be increased or decreased by installing or removing the spring shims (item 23) from in between the rubber springs (item 14) and the hubs (item 4).

After the switch has been adjusted for proper spring tension insert a 3/32" diameter rod in each hub and tighten until the two rods are parallel with each other.

CAUTION! THE HUBS MUST BE TURNED ON SNUGLY. DO NOT OVERTIGHTEN. IF LEFT LOOSE, THE THREADS MAY STRIP AND THE HANDLE BAR WILL FALL OFF.

Place the "O" ring (item 3) in the groove on the hub on the "PULL" side and install the "PULL" handle bar by placing it over the hub. Insert the pin (item 2) into the threaded hole in the bottom side of the handle bar, thru the hole in the hub and tighten securely with a screw driver.

Insert the retaining stud thru the 3/4" hole on the pivot stile and hold the place with the two (2) rubber bushings (item 17.) Attach the handle bar in the same manner as described in the previous paragraph. Install the "PUSH" handle on the opposite side of the door similarly.

Connect the plugs on the cable assembly with the receptacles and the lead wire from the power unit, color to color. Be certain the insulating sleeve covers the ends of the shur-plugs. Push the receptacles into the jamb and secure the cable assembly to the jamb with the two (2) #10-24 X 1/2" flat head screws provided.

At the power unit, connect the red wire to the "A" activating terminal, connect the black wire to the "C" common terminal, and the white wire to the "S" safety terminal. Check the power unit installation instructions to make certain the hydraulic lines are properly connected and tightened. Plug the power cord from the control box into the 115V. service outlet and turn on the switch. The Touch-O-Matic is now ready to operate.

The Touch-O-Matic handle operator is designed for long and trouble free service. Emphasis is placed on following these instructions closely. Location and straightness of the holes required for this type handle operator is of the utmost importance. A cautious and thorough installation will inevitably save a costly service call later.

CHAPTER XII

INSTALLATION OF 1290-000 WALL PUSH PLATES

Wall push plate actuators for the "INVISIBLE DOR-MAN" are particularly suitable for certain hospital, institutional and restaurant applications. Used as activating devices alone, they do not provide any safety features but when installed with a door handle actuator and used as a secondary activating device, the door handle provides the safety.

The ideal push plate installation is where the power unit is equipped with a 9105-090 (9106-090 for two door operators) control box and a push plate on each side of the door. When either push plate is depressed, the door opens and remains open until a one-minute maximum time period passes.

These instructions refer to the parts as shown on drawing #1290-900 which is packed with every push plate. Follow these instructions and drawing closely while making your installation.

The 1290-000 wall push plate is designed for application on a 4" X 4" X 1-1/2" outlet box (Universal Key #52121) with a raised cover or plaster ring (Universal Key #52-C-17) that has been installed flush with the finished wall surface.

The control wires to be pulled thru the 1/2" conduit from the power unit to the wall push plate are to be two conductor cables (red and black) #20 ga. stranded wire with .020" individual plastic insulation and plastic sheathing. Heavier conductors may be substituted if necessary. DO NOT USE 2 WIRE THERMOSTAT CABLE.

Trim off any excess length of wire from the outlet box and strip 3/4" insulation from the wires and solder the ends to prevent fraying. Connect the black wire to the common screw terminal on the switch of the push plate. Connect the red wire to the normally open screw terminal.

Remove the aluminum push plate cover from the assembly by raising the latch behind the plate with a screwdriver and turning the cover counter-clockwise about 10° and pulling outward. Attach the assembly to the raised cover on the outlet box with the four #6-32 X 1/2" screws (91552-600) provided and tighten securely. Replace the aluminum push plate in the same manner it was removed.

The push plate assembly has been factory adjusted to activate the switch when any area of the push plate is depressed. If required, the switch may be further adjusted by loosening the locknuts and turning them in or out on the threaded housing of the switch. When the desired adjustment is reached, make sure the locknuts are re-tightened.

At the power unit, strip 3/4" insulation from the wires and solder the ends to prevent fraying. Connect the black wire (common) to the "C" terminal on the control box and the red wire (activating) to the "A" terminal. Make certain a wire from one terminal is not touching another terminal.

CHAPTER XIII

INSTALLATION OF 1275-000 FLOOR SWITCH

Floor switches for the "INVISIBLE DOR-MAN" are particularly suitable for certain hospital, institutional and restaurant applications where specific traffic patterns, prohibit the use of standard carpets. They can also be used in conjunction with a safety carpet or wall push plates, or handle operators.

These directions refer to the parts as shown on drawing #1275-900 which is packed with every floor switch. Follow these instructions and drawing closely while making your installation.

The floor switch cement case (item 2) must be set flush with the finished floor. It may be set in concrete or screwed to a wood floor. A 1/2" line of conduit must be provided from the floor switch cement case, thru the floor, to the location of the power unit.

The control wires to be pulled thru the 1/2" conduit from the power unit to the floor switch are to be two conductor cables (red and black) #20 ga. stranded wire with .020" individual plastic insulation and plastic sheathing. DO NOT USE 2-WIRE THERMOSTAT CABLE.

Trim off any excess length from the floor switch wires and control wires and strip 3/4" insulation from them. Connect one of the floor switch wires to the black control wire, twist together, and solder. Connect the other floor switch wire to the red control wire in the same manner.

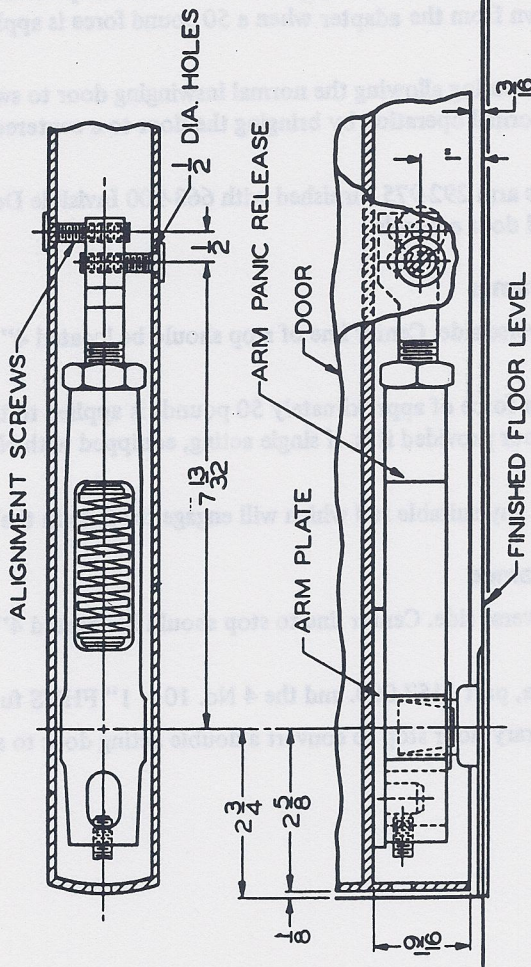
Tape each splice with splicing compound, stretching it as it is being wrapped around the wire. Make sure wires are all covered and not exposed. Work splicing compound with fingers to bond together. Splicing compound is available in rolls at any hardware store and makes a fine waterproof protective. Wrap over splicing compound with plastic electrical tape.

Make sure the floor switch cement case is clean and set the floor switch in place and rotate until it is in the desired position. Install dress ring (item 3) with the six #10-24 X 1/2" (item 4) screw provided.

At the power unit, strip 3/4" insulation from the wires and solder the ends to prevent fraying. Connect the black wire (common) to the "C" terminal on the control box and the red wire (activating) to the "A" terminal.

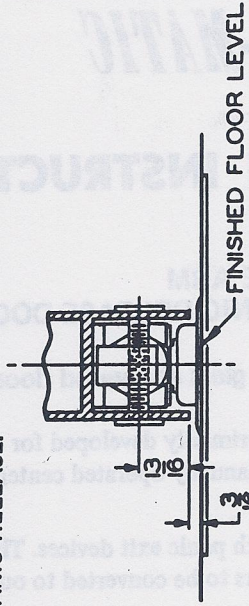
Make certain a wire from one terminal is not touching another terminal.

1166-000 PANIC RELEASE ARM

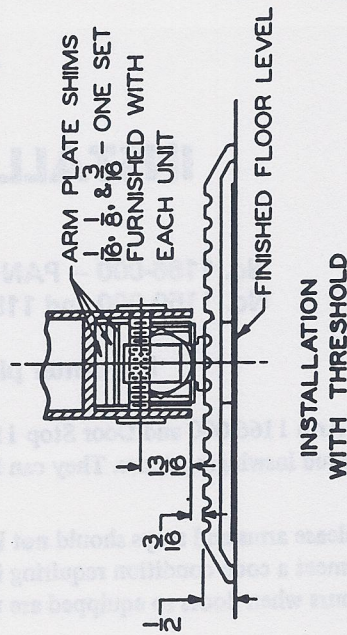


INSTALLATION NOTES:

1. PANIC RELEASE ARM REPLACES THE 292-975 ARM AND IS ADAPTABLE TO 210-900, 260-900 AND 660-900 SERIES.
2. PANIC RELEASE ASSEMBLIES ARE ADJUSTED TO RELEASE 50 LBS. FORCE IS APPLIED TO THE LOCK STILE OF A 3'-0" DOOR.
3. PANIC RELEASE DOOR STOP IS LOCATED IN THE OVER-HEAD JAMB PORTION 4" TO 5" FROM THE LOCK RAIL.
4. USE FURNISHED TOOL NO. 129 TO RESET DOOR STOP PANIC RELEASE.



INSTALLATION WITH DRESS PLATE



INSTALLATION WITH THRESHOLD

ARM PLATE SHIMS
1 1/2" 3/8" - ONE SET
FURNISHED WITH
EACH UNIT

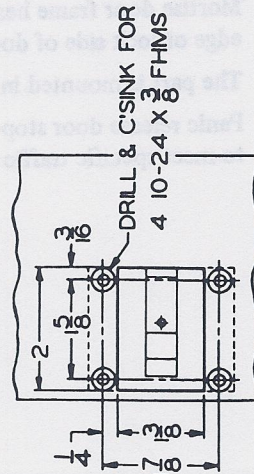
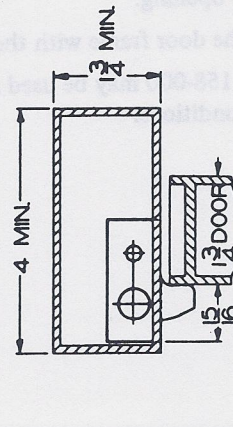
PANIC RELEASE ARM AND DOOR STOP
For Installing Invisible DOR-MAN Operated Doors
INSTALLATION TEMPLATE

PANIC RELEASE ARM 1166-000
PANIC RELEASE DOOR STOP 1150-000 and 1158-000

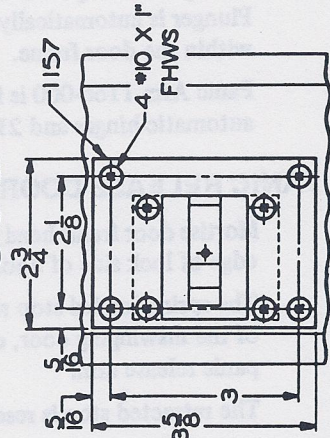
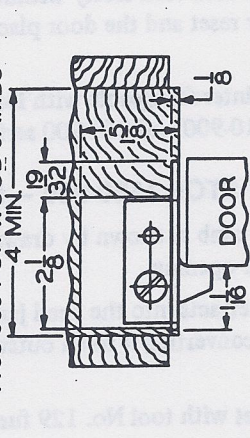
INSTALLATION TEMPLATE • DO NOT SCALE

PANIC RELEASE DOOR STOP

1150-000 FOR METAL JAMBS



1158-000 FOR WOOD JAMBS



DOR-O-MATIC

DIVISION OF REPUBLIC INDUSTRIES, INC. • CHICAGO, ILLINOIS

DOR-O-MATIC OF CANADA • TORONTO • ONTARIO

DOR-O-MATIC

INSTALLATION INSTRUCTIONS

No. 1166-000 — PANIC RELEASE ARM

No. 1150-000 and 1158-000 — PANIC RELEASE DOOR STOP

For center pivoted metal, glass and wood doors

Panic Release Arm 1166-000 and Door Stop 1150-000 were primarily developed for center pivoted single acting Invisible Dor-Man operated inswinging doors. They can be used with manually operated center pivoted doors if suitable for a specific condition.

These panic release arms and stops should not be confused with panic exit devices. The sole purpose of the panic release arm and stop is to meet a code condition requiring inswinging doors to be converted to outswinging, should a panic condition arise during hours when doors so equipped are unlocked.

PANIC RELEASE ARM 1166-000

This special purpose arm is equipped with a spring loaded plunger which engages a detent in an adapter which in turn engages the spindle of the hinge. The plunger is withdrawn from the adapter when a 50 pound force is applied against the door in the direction opposite its normal swing.

The spindle adapter will then turn freely within the arm housing allowing the normal inswinging door to swing out. The Plunger is automatically reset and the door placed into normal operation by bringing the door to a centered position within the door frame.

Panic Arm 1166-000 is interchangeable with Dor-O-Matic arm 292-975 furnished with 663-900 Invisible Dor-Man automatic hinges and 210-900 and 260-900 series manual door controls.

PANIC RELEASE DOOR STOP 1150-000 — Metal Frames

Mortise door frame head jamb as shown by drawing on reverse side. Center line of stop should be located 4" to 5" from edge of lock side of door opening.

The spring loaded stop retracts into the head jamb when a force of approximately 50 pounds is applied to the lock rail of the inswinging door, converting it to an outswinging door provided it is, if single acting, equipped with No. 1166-000 panic release arm.

The retracted stop is reset with tool No. 129 furnished or any suitable rod which will engage the hole in the stop.

PANIC RELEASE DOOR STOP 1158-000 — Wood Frames

Mortise door frame head jamb as shown by drawing on reverse side. Center line to stop should be located 4" to 5" from edge of lock side of door opening.

The part is mounted in the door frame with the dress plate, part 1157-000. and the 4 No. 10 — 1" FHWS furnished.

Panic release door stop 1158-000 may be used as a temporary door stop to convert a double acting door to single acting to meet specific traffic conditions.

CHAPTER XV

PROBLEM I-- DOOR FAILS TO OPEN FROM TRAFFIC ON ACTIVATING CARPET BECAUSE:

Cause A. Activating carpet fails to complete activating circuit in control box because:

1. Activating carpet fails to make contact or,
2. Safety carpet shorted maintaining contact or,
3. Control wires are broken or shorted.

Determination of Cause - Remove control wires from terminal strip on control box. Block off doors to traffic and short "A" and "C" terminals. If power unit operates and doors open, quickly short "C" and "S" terminals and power unit should continue to run keeping doors open. Permit power unit to stop. Short "C" and "S" terminals first, and at the same time, short "A" and "C" terminals. Power unit should not operate. If power unit behaves as described above, the control box is functioning properly, and the trouble is in the control wires or carpets. If power unit does not operate when the above tests are made, the control box is defective. Remove the threshold and disconnect the carpet wires from the control wires. Check each carpet and the control wires for shorts with an ohmmeter to determine where the trouble lies.

Remedy - Replace activating or safety carpet or control wires, whichever is found to be defective. NOTE. In many cases, a shorted safety carpet can be made to work properly by loosening the carpet moldings, allowing the carpet to expand, and re-tightening them. This might occur when a carpet is originally installed in cold weather and then during the summer, the carpet expands due to the temperature increase and if confined by very tight moldings, will buckle and maintain contact causing the safety circuit to be activated, over-riding the activating circuit.

Cause B. Motor does not run because:

1. Time delay relay in control box is defective.

Determination of Cause - Remove top cover from control box and check time delay relay for open contacts (which are normally closed) or excessively dirty or broken contact.

Remedy - Remove the time delay relay and inspect carefully. If contacts are open, they can be bent to make a good contact. If dirty, they can be cleaned by running non abrasive paper between the contacts (a dollar bill works well). If contacts are broken, replace the time delay relay.

2. Activating circuit in control box is defective.

Determination of cause - Remove covers from control box and check activating circuit for broken relays, broken relay contacts, or loose solder connections. Check relays for burned out coils with ohmmeter.

3. Motor starting relay in control box is defective.

Determination of Cause - Connect a voltmeter to the 115V terminals on the motor starting relay and operate the unit. If nothing happens, check the coil to determine if the coil is burned out.

Remedy - Replace if necessary.

4. Motor is overheating.

Determination of Cause - The motor is equipped with a thermal overload switch which shuts the motor off if overheated. When it cools sufficiently, the motor will again operate. This protective device prevents the motor from damage by overheating.

Remedy - Provide sufficient ventilation to dissipate heat generated by motor and hydraulic pump.

5. Motor is defective.

Determination of Cause - Connect a 115V. line direct to the motor terminals in the control box. If the motor does not run, the motor is defective.

Remedy - Replace the motor.

Cause C. Solenoid valve (#1530 power units) is not opening because:

1. Solenoid valve is not plugged in to receptacle on control box.

Determination of Cause - Visual inspection.

Remedy - Plug it in!!

2. Solenoid valve coil circuit is open.

Determination of Cause - Pull out solenoid valve plug from control box receptacle and check with ohmmeter. Ohmmeter should show a closed circuit with approximately 125 ohms resistance for 115V. valve coils. (45 ohms resistance for 24V. valve coils on some older models.)

Remedy - Replace solenoid coil if necessary.

Cause D. Power Unit is not producing sufficient pressure because:

1. Relief valve is defective.

Determination of Cause - Late model power units are equipped with pressure gauges. For earlier power units, install 91630-600 service

gauge in pressure line at power unit. Run power unit and with screw driver, turn relief valve adjusting screw counter-clockwise until "O" pressure is shown on gauge. See yellow instruction tag, Part #91618-689 regarding lowering of pressure on late model 1510, 1520 and 1530 power units. Run power unit for three minutes. This will permit foreign matter in the relief valve to be flushed back to the reservoir and be trapped by the filter. Turn relief valve clockwise until 550 psi (600 psi on early power units) is attained. If desired pressure cannot be reached, the relief valve is defective or foreign material is lodged between ball and seat.

Remedy - Remove relief valve from manifold with service tool ST-118 and inspect for foreign material lodged between ball and seat. Back out adjustment screw until end is two threads out of valves body. Ball will now be free in cavity and valve can be flushed with solvent or blown out with compressed air. Inspect external "O" ring and replace if damaged or imperfect and re-install relief valve. **DO NOT OVER-TIGHTEN: THIS WILL TWIST VALVE BODY.** **NOTE** - Older model 1500 units also have an "O" ring in manifold counterbore to seal inner end of relief valve assembly. This "O" ring should be replaced when reinstalling relief valve or installing new relief valve.

2. The pump is worn out.

Determination of Cause - Check relief valve as described above. If desired pressure still cannot be reached, turn relief valve all the way in (clockwise) and check delivery of pump as follows:

Disconnect one pressure line at manifold and attach a short hose. Fill oil reservoir completely. Hold end of short hose over a clean one-quart container. Energize power unit through terminals corresponding to the manifold connection used.

Model 1510, 1520 and 1530 power units should fill quart container in twelve seconds. Model 1500 power units should fill quart container in fifteen seconds. If pump runs less than 3/4 quart in these time periods, it is worn beyond practical usability. (Average life of pump is five years under heavy traffic).

Remedy - Replace pump.

3. Pump drive is broken.

Determination of Cause - Check relief valve as described above. Remove cover from reservoir and run power unit continuously. Oil returning to reservoir can be seen by movement of oil. If no return flow of oil is observed after power unit has run continuously for more than five seconds, it indicates that the pump is not functioning.

Remedy - Replace pump.

Cause E. Automatic hinge is not functioning properly because:

1. Offset arm is loose or broken.

Determination of Cause - Door may not open under power but will flop without any checking action when pushed open manually.

Remedy - Remove arm dress cap and arm lock screw. If end of screw is mushroomed, replace lock screw and tighten securely. If arm is broken, replace and tighten securely in door.

2. Cam has broken loose from spindle.

Determination of Cause - Door will not open under power but will flop without any checking action when pushed open manually.

Remedy - Replace automatic hinge.

3. Hydraulic pressure is not reaching hinge.

Determination of Cause - Install 91630-600 service gauge in pressure line of automatic hinge to determine if the pressure line is open and run power unit. If 550 psi is shown on gauge, line is open. If no pressure is shown on gauge, remove gauge and reconnect line to hinge. Install service gauge on pressure line at power unit. If 550 psi is shown on gauge, line is open. If no pressure is shown on gauge, remove gauge and reconnect line to hinge. Install service gauge on pressure line at power unit. If 550 psi is shown on gauge, the pressure line has a stoppage in it. If no pressure is shown on gauge, check out solenoid valve, (#1530 power unit), relief valve and pump as previously described.

Remedy - Replace necessary parts.

PROBLEM II -- DOOR OPENS BUT FAILS TO CLOSE BECAUSE:

Cause A. Activating circuit fails to release and motor continues to operate because:

1. Activating or safety carpet is maintaining contact.

Determination of Cause - Remove control wires from control box and check control box, control wires and carpets as previously described.

Remedy - Replace activating or safety carpet or control wires, whichever is found to be defective.

2. Open coil on time delay relay.

Determination of Cause - Check time delay relay for open coil as described previously.

Remedy - Replace time delay relay.

3. Dirt on contacts of activating or safety relay.

Determination of Cause - Dirt on these contacts will prevent current from reaching the time delay relay coil and will, therefore, hold the door open.

Remedy - Clean between contacts on activating and safety relays with a non-abrasive paper.

4. Motor starting relay stuck in activated position.

Determination of Cause - Activate the activating circuit and watch the time delay relay. If it breaks contact but the motor continues to operate, the motor starting relay is stuck or the spring inside of it is broken.

Remedy - Replace time delay relay.

5. Low line voltage will not pull in time delay relay and permit door to close.

Determination of Cause - Check line voltage.

Remedy - A separately fused 115V line is required.

Cause B. Activating circuit releases, time delay ends, motor stops, but door does not close because:

1. The closing spring in the automatic hinge is broken.

Determination of Cause - The door may close part way or just stand open. It may not be able to be closed manually, and it may "crunch" when worked manually.

Remedy - Replace automatic hinge.

PROBLEM III -- DOOR CLOSES BEFORE TRAFFIC CLEARS SAFETY CARPET BECAUSE:

Cause A. Safety circuit fails to hold because:

1. Safety carpet fails to make contact or
2. Control wires are broken.

Determination of Cause - Refer to I, Cause A.

Remedy - Replace safety carpet or control wires, whichever is found to be defective.

Cause B. Safety circuit in control box not being energized because:

1. Left hand contact finger on safety relay is broken.

Determination of Cause - Visual inspection of operating action.

Remedy - Replace bank of relays.

2. Plunger inside of time delay relay is stuck.

Determination of Cause - Visual inspection will show the time delay to break contact immediately after the activating carpet is cleared.

Remedy - Replace time delay relay.

PROBLEMS IV - DOOR OPENS WHEN ACTIVATING CARPET IS STEPPED ON WHILE SOMEONE IS STANDING ON SAFETY CARPET BECAUSE:

Cause A. Safety circuit fails to over-ride activating carpet because:

1. Safety carpet fails to make contact.
2. Control wires are broken.

Determination of Cause - Refer to Problem I - Cause A.

Remedy - Replace safety carpet or control wires.

Cause B. Safety circuit in control box not being energized because:

1. Left hand contact finger on safety relay is broken.

Determination of Cause - Refer to Problem III, Cause B 1.

2. Plunger inside of time delay relay is stuck.

Determination of Cause - Refer to Problem III, Cause B 2.

PROBLEM V - DOOR DOES NOT OPERATE AT SATISFACTORY OPENING SPEED BECAUSE:

Cause A. Operating speed is insufficient because:

1. Hinge speed controls are improperly adjusted.

Determination of Cause - Refer to Chapter IX of Installation Instructions.

Remedy - Adjust accordingly.

2. Relief valve is defective or
3. Relief valve "O" ring seals are cut or
4. Pump is worn out.

Determination of Cause - Refer to Problem I, Causes D2 or D3.

Remedy - Replace necessary parts.

5. Screen in high pressure fitting at hinge is clogged.

Determination of Cause - Remove high pressure fitting from hinge and inspect for residue.

Remedy - Clean screen and replace.

6. Hinge is defective.

Determination of Cause - If none of the above remedies correct the trouble, the hinge is defective.

Remedy - Replace hinge.

PROBLEM VI. DOOR CLOSING SPEED IS TOO SLOW BECAUSE:

- Cause A. Automatic hinge is improperly adjusted.

Determination of Cause - Refer to Chapter IX of Installation Instructions.

Remedy - Adjust accordingly.

PROBLEM VII. DOOR CLOSING SPEED IS TOO FAST BECAUSE:

- Cause A. Automatic hinge speed controls are improperly adjusted.

Determination of Cause - Refer to Chapter IX of Installation Instructions.

Remedy - Adjust accordingly.

- Cause B. If no adjustment can be achieved, hinge is defective.

Determination of Cause - Refer to Chapter IX of Installation Instructions.

Remedy - Replace hinge.

PROBLEM VIII. MOVEMENT OF DOOR IS NOT SMOOTH - "JERKY" AT BEGINNING AND/ OR END OF OPENING SWING--MAY BE NOISY, AND MAY NOT OPEN OR CLOSE FULLY BECAUSE:

- Cause A. Arm is loose:

Remedy - Tighten arm as described in Problem I, Cause E 1.

1. Automatic hinge is defective.

Remedy - Replace hinge.

**PROBLEM IX. TRAFFIC ON ONE ACTIVATING CARPET OPENS BOTH DOORS.
(THIS PROBLEM WOULD ONLY OCCUR ON #1530 POWER UNITS.)**

Cause A. Solenoid valve is stuck in the open position.

Determination of Cause - Remove one pressure line from power unit and plug manifold--operate door relating to removed pressure line. If other door opens, valve for the other door is not closing.

Remedy - Remove valve, disassemble, clean in solvent and reassemble, making sure no residue or lint from rags enter valve. Reinstall valve. If valve still sticks, replace valve.

PROBLEM X. EXCESSIVE NOISE WHEN POWER UNIT OPERATES BECAUSE:

Cause A. Low oil level will make pump scream.

Determination of Cause - Check oil level and inspect system for leaks.

Remedy - Add Dor-O-Matic "HYDREL-FLO" fluid only.

Cause B. Noisy Relief valve.

Determination of Cause - Noise can be eliminated by reducing or increasing pressure.

Remedy - Adjust or replace relief valve.

Cause C. Broken connector between pump and motor.

Determination of Cause - Remove motor and inspect connector.

Remedy - Replace connector.

PROBLEM XI. DOOR CLOSES BUT PUMP AND MOTOR CONTINUE TO RUN WITH NO DEMAND FOR DOOR OPERATION. (THIS PROBLEM WOULD ONLY HAPPEN TO #1530 POWER UNITS.)

Cause A. Motor starting relay not breaking contact.

Remedy - Replace motor starting relay.

PROBLEM XII. POWER UNIT OVERHEATING BECAUSE:

Cause A. Operating pressure too high.

Determination of Cause - Check pressure with gauge.

Remedy - Adjust to 540 psi (600 psi on older units).

Cause B. No Ventilation.

Determination of Cause - Visual inspection.

Remedy - Provide adequate ventilation.

1530 - POWER UNIT ASSEMBLY

| Qty. | Assembly No. | Part No. | Name and Description |
|------|----------------------|------------|-----------------------------|
| 1 | 1558-000 | | Manifold Assembly (1530) |
| 1 | 1505-000 | | Motor and Pump Assembly |
| 1 | 1506-000 | | Oil Reservoir Assembly |
| 1 | 9102-090 or 9106-090 | | Control Box Assembly |
| 1 | | 15091-700 | Mounting Base |
| 1 | | 1512-000 | Wood Shipping Base |
| 4 | | 9944-600 | Rubber Bumpers |
| 4 | | 91535-600 | Carriage Bolts |
| 4 | | 915351-600 | Nuts |
| 4 | | 9823-600 | 1/4-20 x 3/8 R. H. M. S. |
| 12 | | 91523-600 | Steel washer |
| 4 | | 91521-600 | 5/16 - 18 Jamb Nut |
| 6 | | 918-600 | 5/16 - 18 x 3/4 H. H. C. S. |

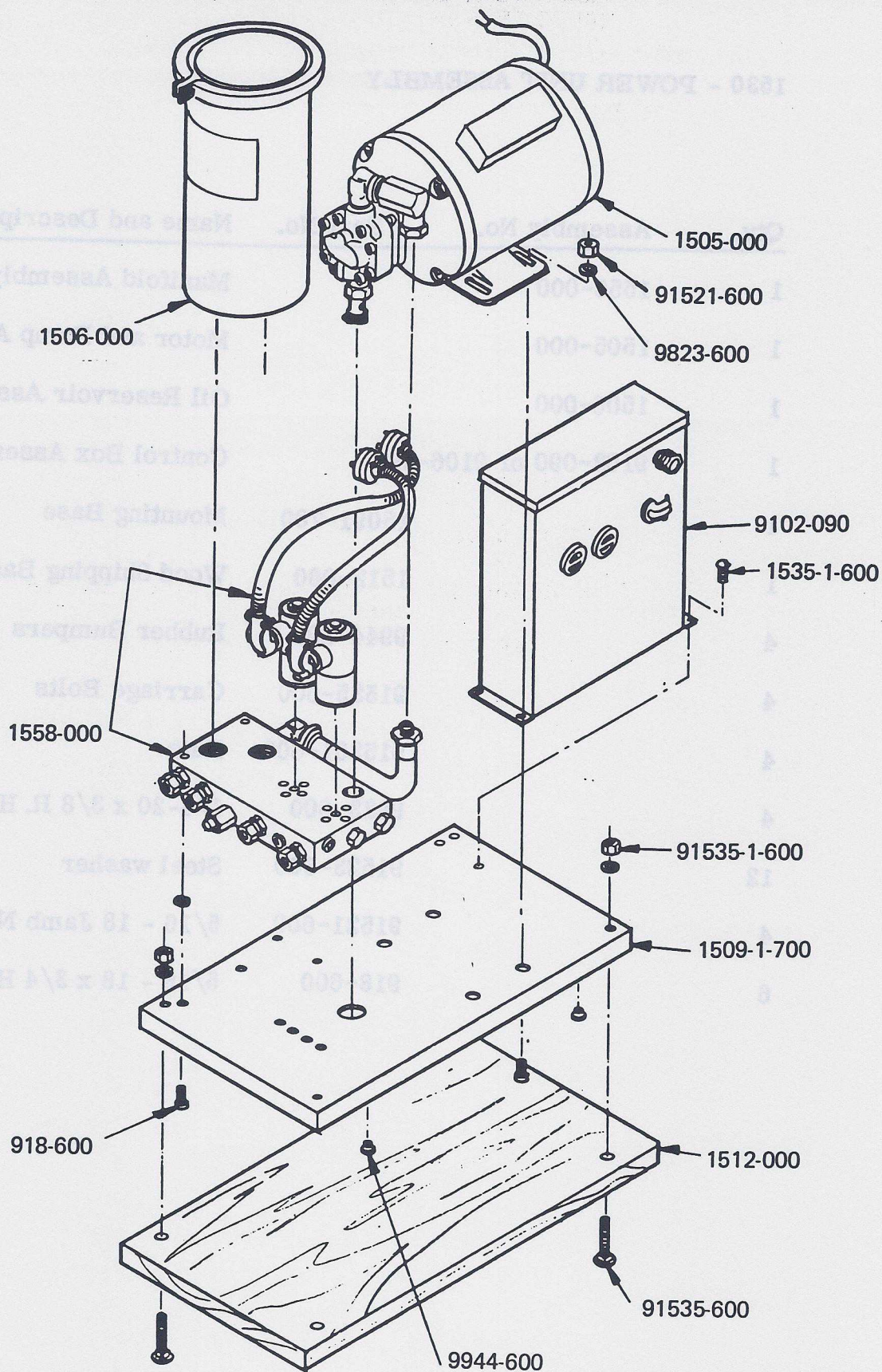


Figure H

1530 POWER UNIT ASSEMBLY

1558-000 - MANIFOLD ASSEMBLY (1530)

| Qty. | Assembly No. | Part No. | Name and Description |
|------|--------------|-----------|----------------------------------|
| 1 | 1549-000 | | Pressure Relief Valve Assembly |
| 2 | 8187-000 | | Solenoid Valve and Coil Assembly |
| 1 | | 1554-000 | Manifold Block |
| 3 | | 1588-600 | 1/8 Pipe Plug Soc. Head |
| 6 | | 1536-600 | 1/4 Pipe Plug Hex Head |
| 4 | | 91504-600 | 1/4 to 1/4 Swivel Adapter |
| 1 | | 91607-600 | 1/2" Street Elbow |
| 1 | | 91627-600 | 1/2" x 10" L. Hose |
| 4 | | 9261-600 | 10-32 x 1 1/4 S. H. C. S. |

NOTE: — 8187-000 SOLENOID VALVE ASSEMBLIES
NOT FURNISHED AS PART OF 1558-000
MANIFOLD ASSEMBLY FOR SERVICE PARTS
ORDER SEPARATELY.

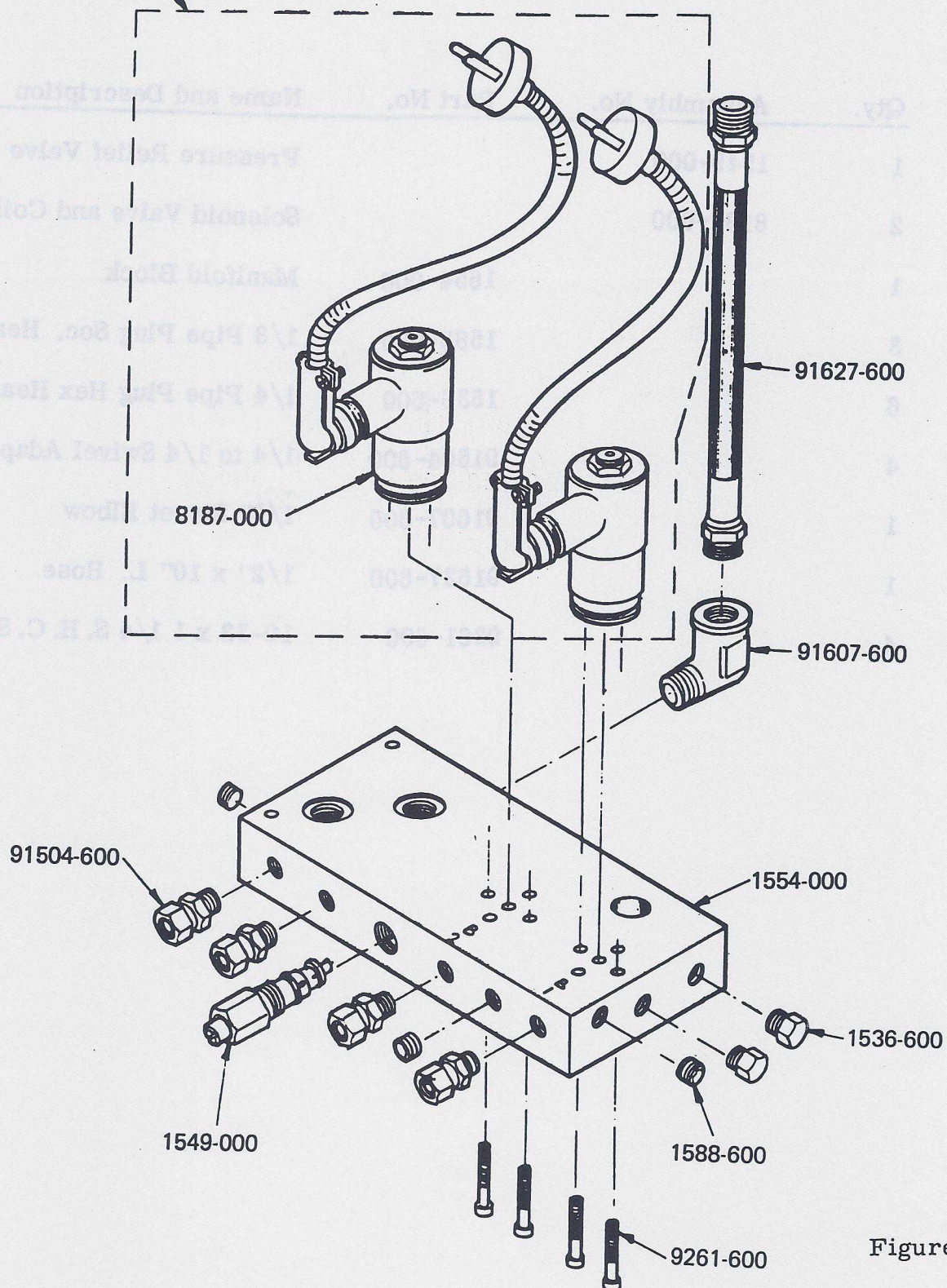


Figure J

1558-000 MANIFOLD ASSEMBLY (1530)

8187-000 - SOLENOID VALVE & COIL ASSEMBLY (1530)

| Qty. | Assembly No. | Part No. | Name and Description |
|------|--------------|-----------|--|
| 1 | 8185-700 | | Solenoid Valve Body w/nut |
| | | 8185-700 | Solenoid Valve Body w/nut only |
| | | 91605-600 | "O" Ring |
| | | 91589-600 | "O" Ring |
| 1 | 8186-000 | | Solenoid Valve Coil & Housing Assembly |
| | | 91609-600 | Coil Housing |
| | | 91520-600 | 90° B. X. Connector |
| | | 91611-800 | Solenoid Coil 115V. 60 Cy. A. C. |
| | | 91608-600 | Fiber Wrapper |
| | | 1579-700 | 14" Greenfield Conduit |
| | | 8223-600 | Anti-Short Bushing |
| | | 8117-600 | Plug 115V. |
| | | 91613-700 | Identification Disk 115V. |

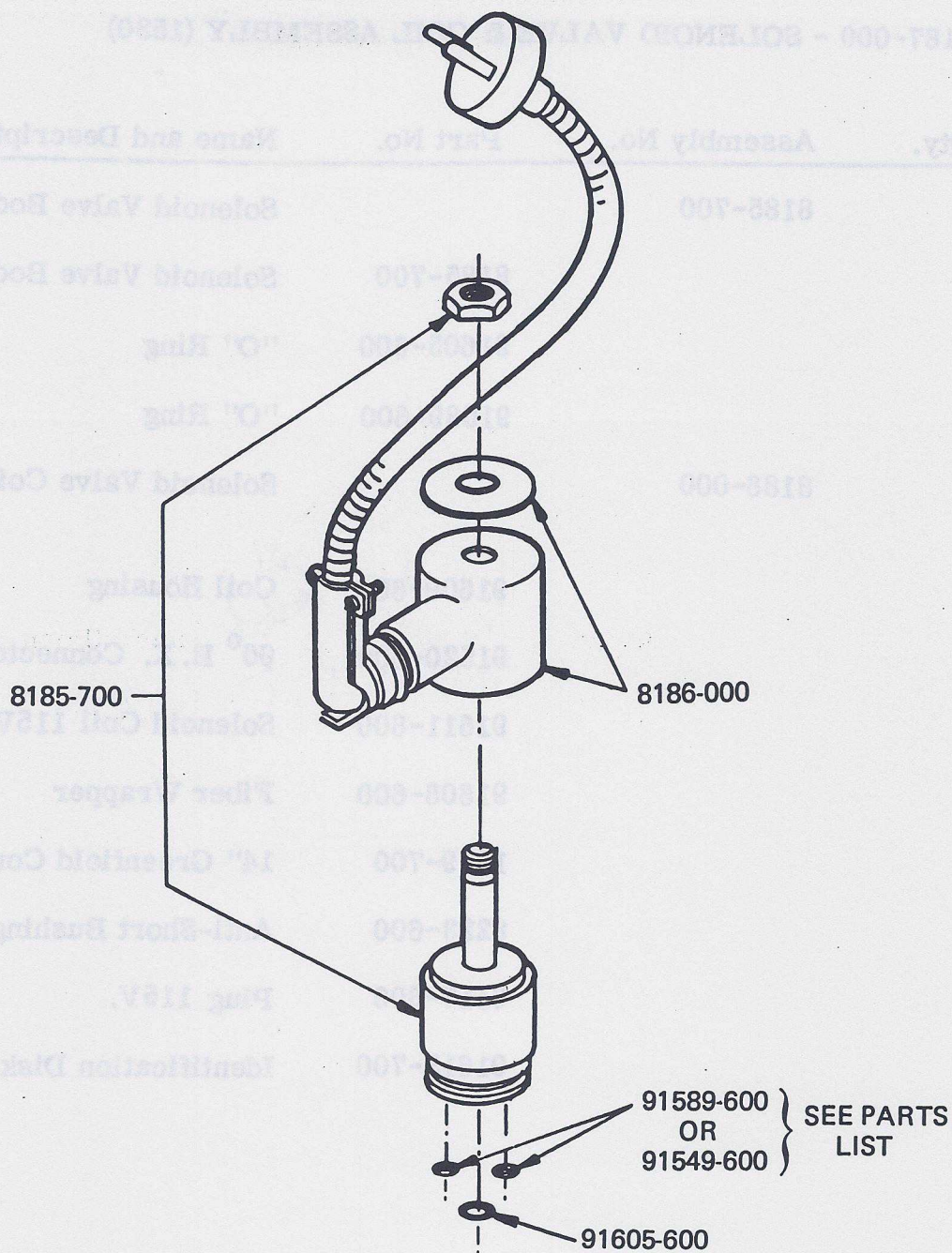


Figure K

8187-000 SOLENOID VALVE & COIL ASSEMBLY (1530)

1505-000 - MOTOR AND PUMP ASSEMBLY (All Models)

| Qty. | Assembly No. | Part No. | Name and Description |
|------|--------------|-----------|-------------------------------------|
| 1 | 1667-000 | | Connector Assembly |
| 1 | | 1503-690 | Motor 1/2 H. P. - 115V 60 Cy. A. C. |
| 1 | | 1659-600 | Hydraulic Pump |
| 1 | | 91636-600 | Pump Gasket |
| 1 | | 91635-600 | Coupling |
| 1 | | 91607-600 | 1/2" Street Elbow |
| 1 | | 91628-600 | 1/2" to 1/2" Adopter Union |
| 4 | | 91637-600 | 5/16 - 18 x 3/4 HH CS w/washers |
| 1 | | 91520-600 | 90° BX Connector |
| 1 | | 1579-700 | 6" Greenfield Conduit |

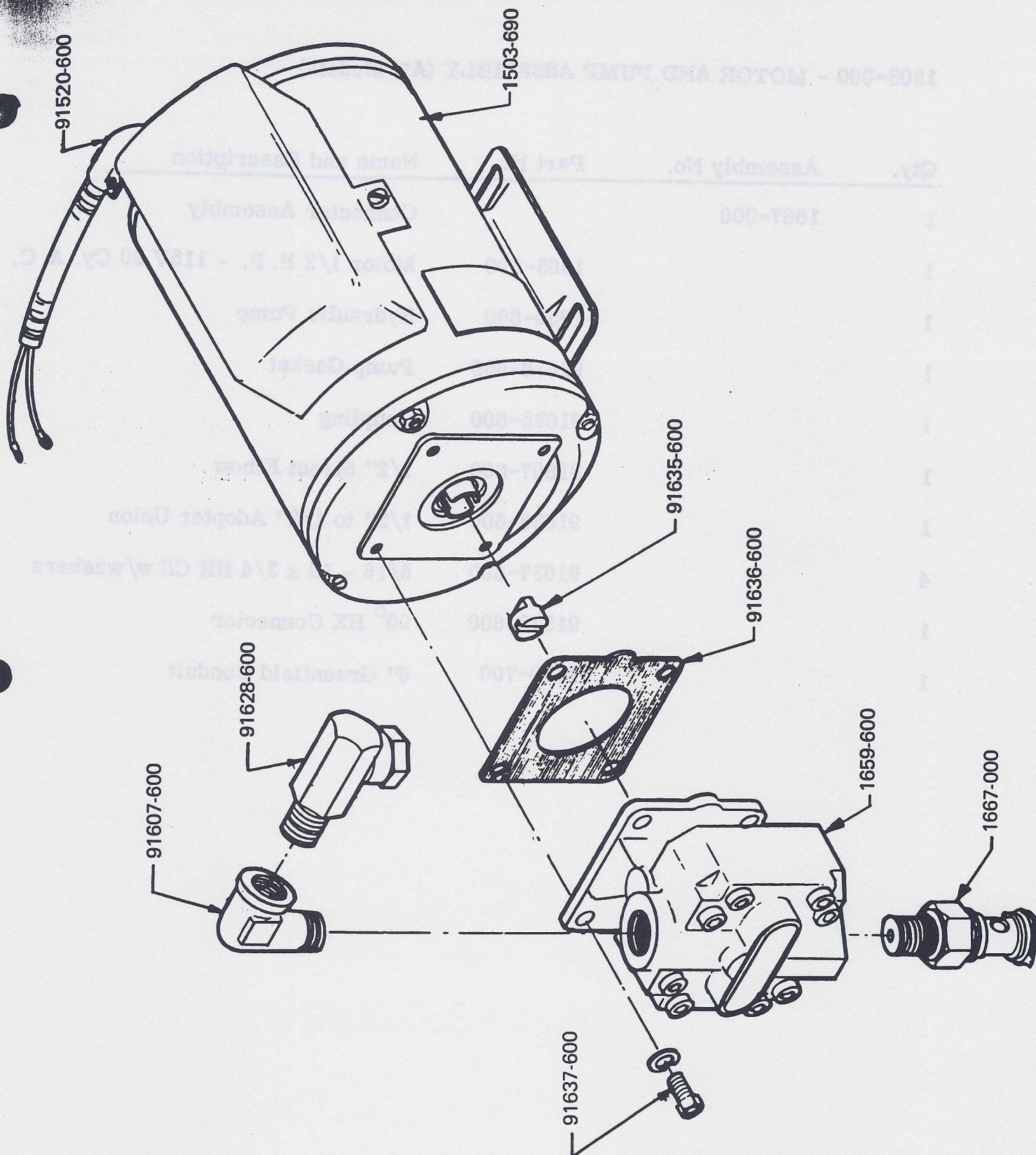


Figure L

1505-000 PUMP & MOTOR ASSEMBLY (ALL MODELS)
 SPECIFY VOLTAGE, PHASE & FREQUENCY OF MOTOR

1667-000 - CONNECTOR ASSEMBLY (All Models)

| Quantity | Part No. | Name and Description |
|----------|-----------|-----------------------------|
| 1 | 1667-100 | Connector |
| 1 | 1556-100 | Choke |
| 1 | 1599-600 | Washer |
| 2 | 91620-600 | "O" Ring (Seal to Manifold) |
| 1 | 91617-600 | "O" Ring (Seal to Pump) |
| 1 | 91615-600 | Retaining Ring |

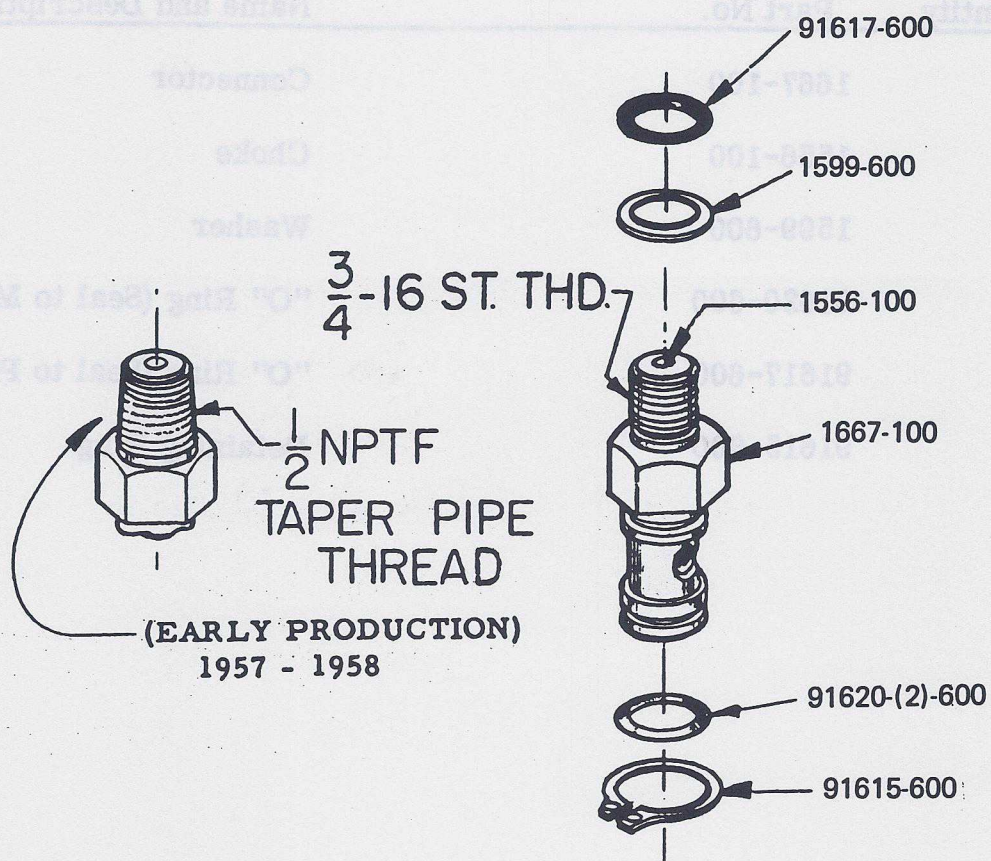


Figure M

1667-000 CONNECTOR ASSEMBLY (ALL MODELS)
SPECIFY THREAD SIZE

1506-000 - OIL RESERVOIR ASSEMBLY (All Models)

| Qty. | Assembly No. | Part No. | Name and Description |
|------|--------------|-----------|-------------------------|
| 1 | 1516-000 | | Return Check Valve |
| 1 | 1525-000 | | Retaining Stud Assembly |
| 1 | 1534-000 | | Reservoir Cover |
| 1 | | 1523-000 | Reservoir |
| 1 | | 1522-000 | Dual Washer |
| 1 | | 1507-000 | Oil Filter |
| 1 | | 1508-600 | Upper Element Support |
| 1 | | 1515-600 | Clamp Ring |
| 1 | | 91098-600 | Clamp Ring Screw |
| 1 | | 1594-600 | Serial No. Tag |
| 2 | | 91570-600 | "O" Ring |

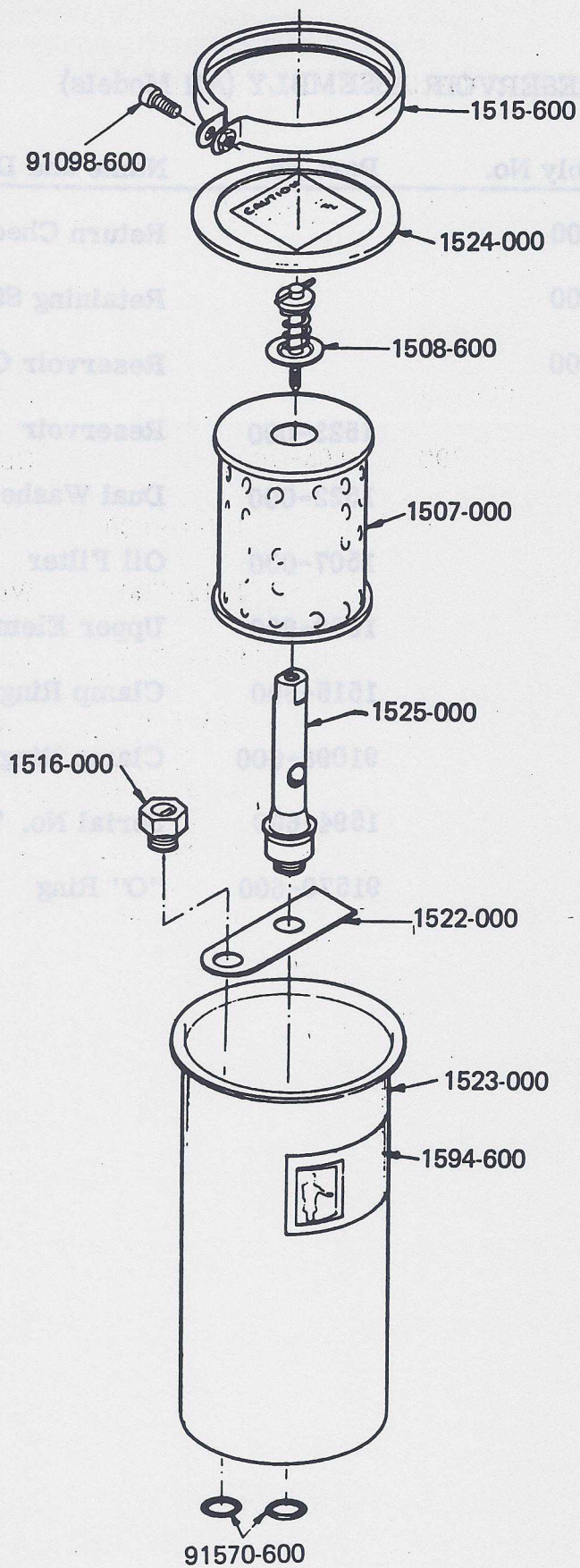


Figure N

1506-000 OIL RESERVOIR ASSEMBLY (ALL MODELS)

1510 & 1520 - POWER UNIT ASSEMBLY

| Qty | Assembly No. | Part No. | Name and Description |
|-----|----------------------|------------|---------------------------|
| 1 | 1522-000 | | Manifold Assembly, (1520) |
| 1 | 1505-000 | | Motor and Pump Assembly |
| 1 | 1506-000 | | Oil Reservoir Assembly |
| 1 | 9101-090 or 9105-090 | | Control Box Assembly |
| 1 | | 15091-900 | Mounting Base |
| 1 | | 1512-700 | Wood Shipping Base |
| 4 | | 9944-600 | Rubber Bumper |
| 4 | | 91535-600 | Carriage Bolts |
| 4 | | 915351-600 | Nuts |
| 4 | | 9823-600 | 1/4-20 x 3/8 R. H. M. S. |
| 12 | | 91523-600 | Steel Washers |
| 4 | | 91521-600 | 5/16-18 Jamb Nut |
| 6 | | 918-600 | 5/16-18 x 3/4 H. H. C. S. |

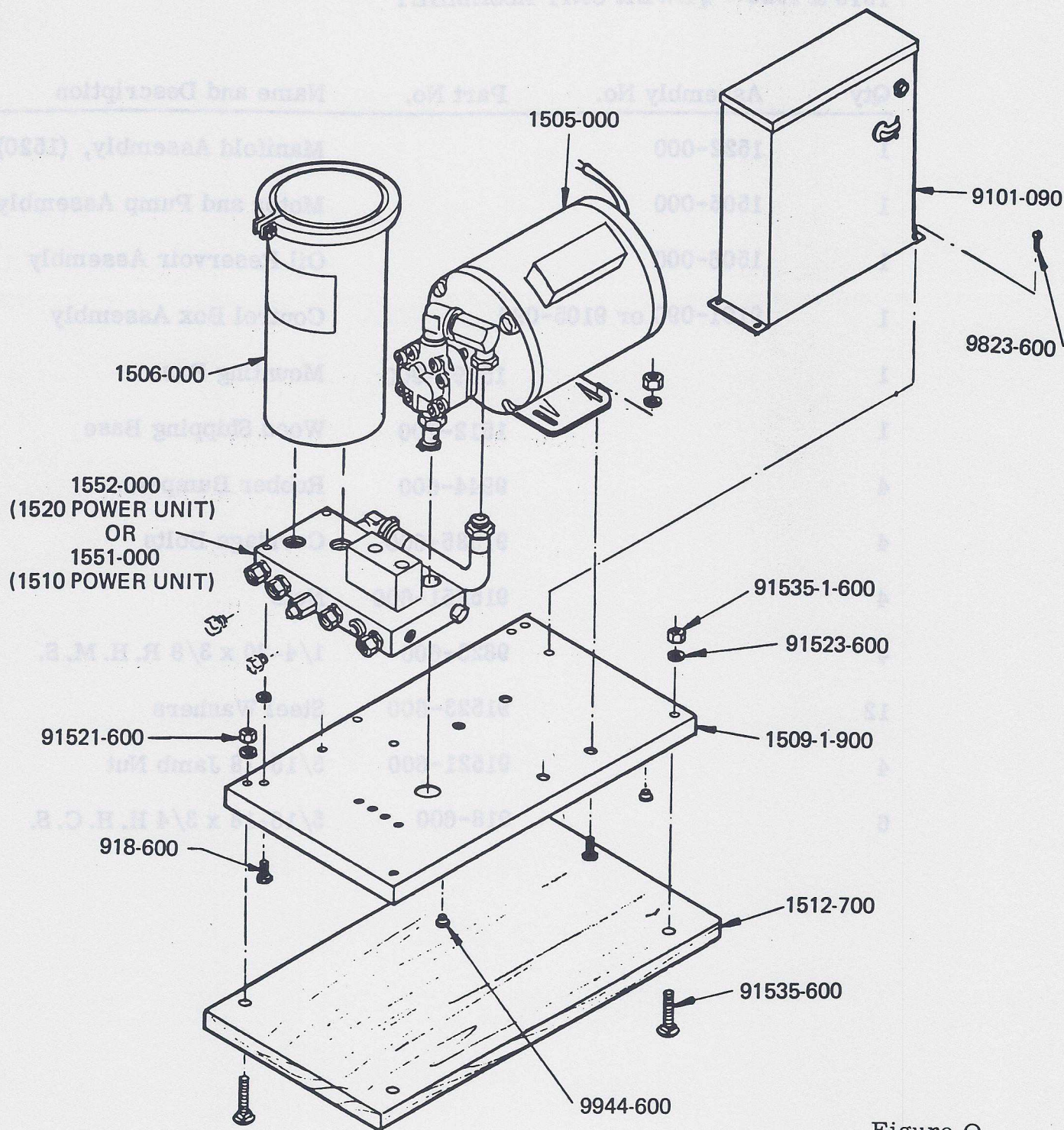
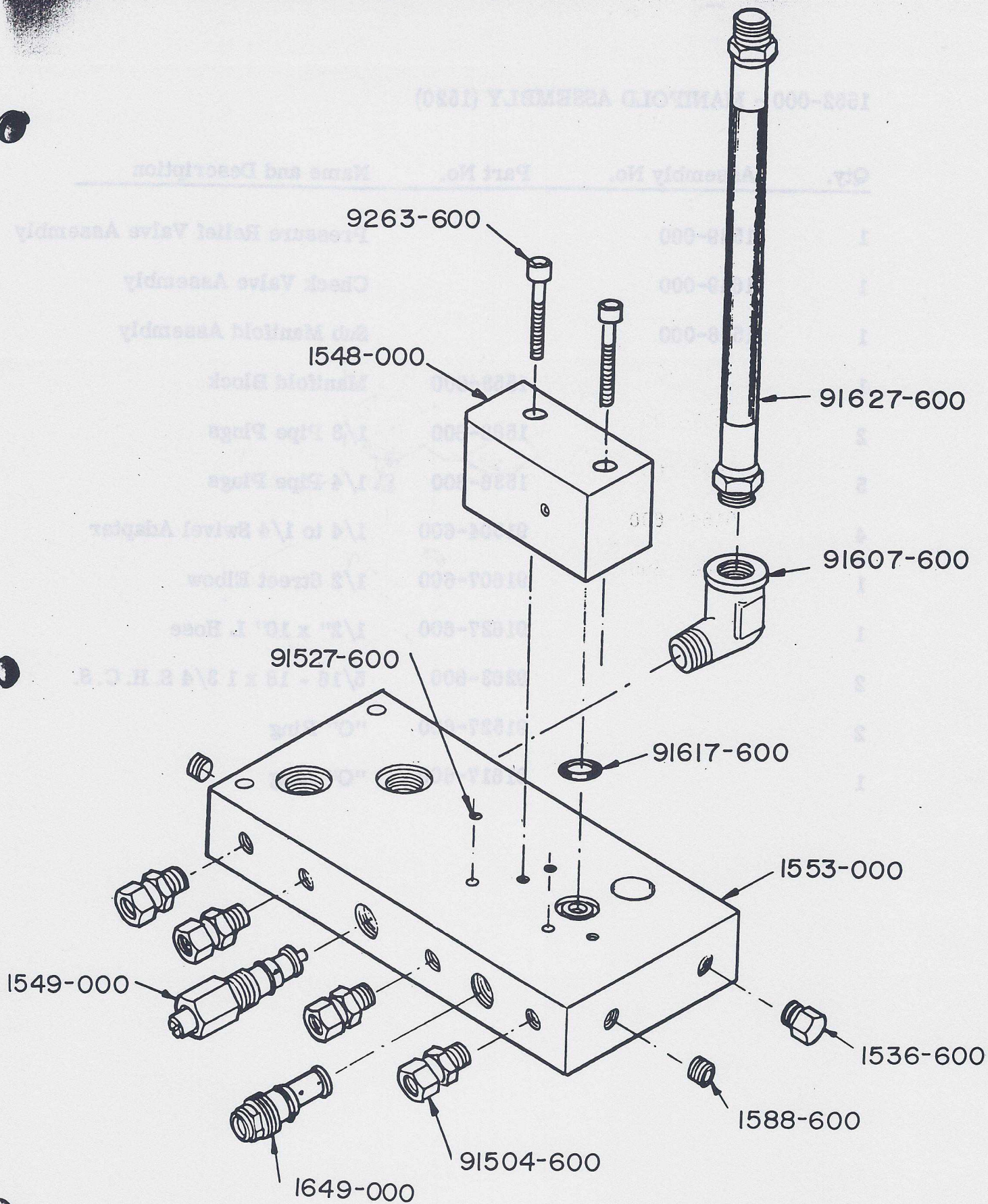


Figure O

MODEL 1510 & 1520 POWER UNIT ASSEMBLY

1552-000 - MANIFOLD ASSEMBLY (1520)

| Qty. | Assembly No. | Part No. | Name and Description |
|------|--------------|-----------|--------------------------------|
| 1 | 1549-000 | | Pressure Relief Valve Assembly |
| 1 | 1649-000 | | Check Valve Assembly |
| 1 | 1548-000 | | Sub Manifold Assembly |
| 1 | | 1553-000 | Manifold Block |
| 2 | | 1588-600 | 1/8 Pipe Plugs |
| 5 | | 1536-600 | 1/4 Pipe Plugs |
| 4 | | 91504-600 | 1/4 to 1/4 Swivel Adapter |
| 1 | | 91607-600 | 1/2 Street Elbow |
| 1 | | 91627-600 | 1/2" x 10" L Hose |
| 2 | | 9263-600 | 5/16 - 18 x 1 3/4 S. H. C. S. |
| 2 | | 91527-600 | "O" Ring |
| 1 | | 91617-600 | "O" Ring |



1552A MANIFOLD ASSEMBLY (1520)

Figure P

1548-000 - SUB MANIFOLD ASSEMBLY (1510 & 1520)

| Qty. | Part No. | Name and Description |
|------|-----------|----------------------|
| 1 | 1548-100 | Manifold Block |
| 1 | 1648-100 | Valve Seat |
| 3 | 9949-700 | 1/8" Steel Balls |
| 1 | 1647-100 | Valve |
| 1 | 1645-100 | Valve Spring |
| 1 | 91642-600 | Quad Ring |
| 1 | 91643-600 | Quad Ring |

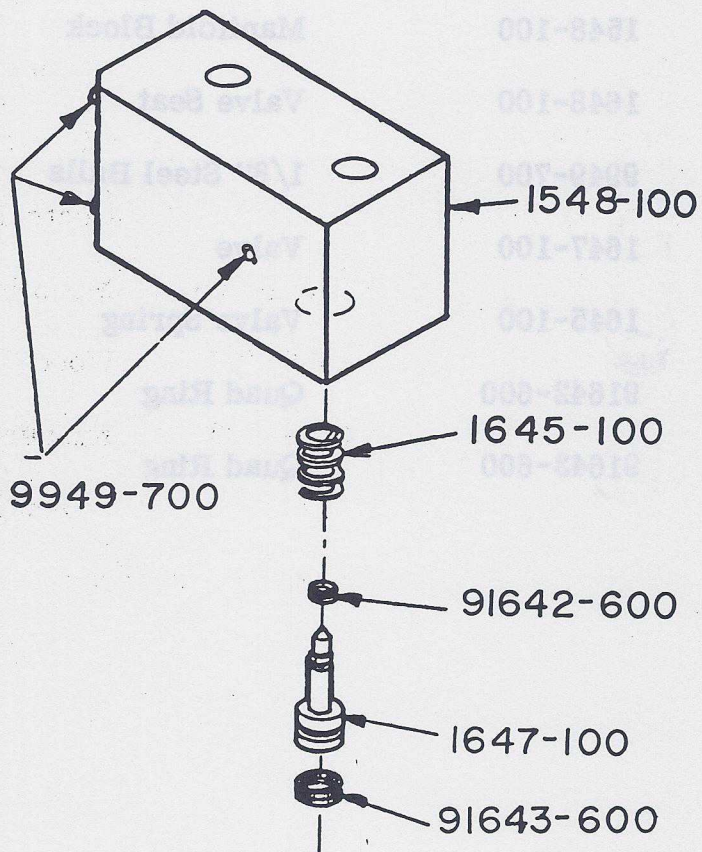
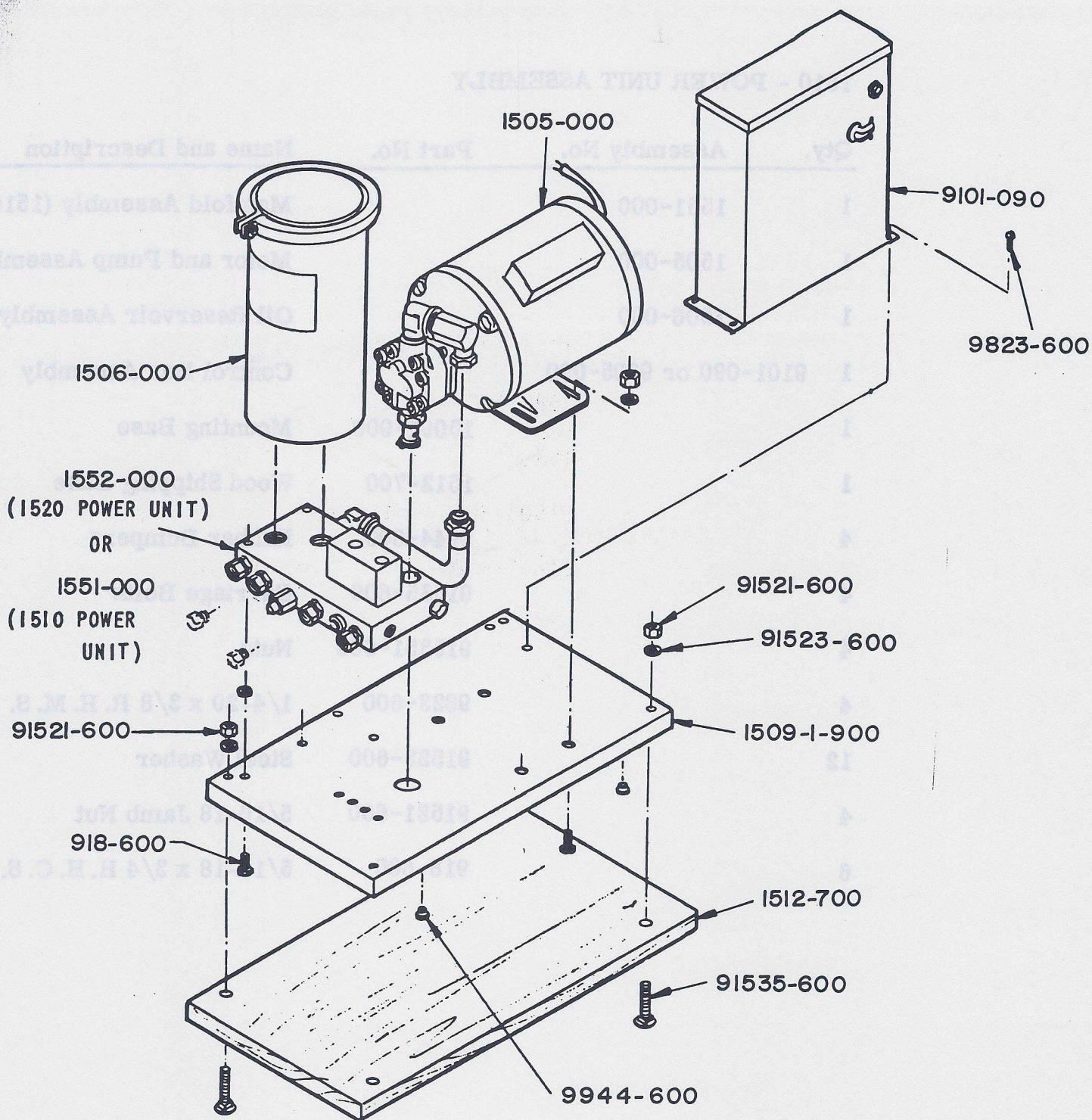


Figure Q

1548-000 SUB MANIFOLD ASSEMBLY (1510 & 1520)

1510 - POWER UNIT ASSEMBLY

| Qty. | Assembly No. | Part No. | Name and Description |
|------|----------------------|------------|---------------------------|
| 1 | 1551-000 | | Manifold Assembly (1510) |
| 1 | 1505-000 | | Motor and Pump Assembly |
| 1 | 1506-000 | | Oil Reservoir Assembly |
| 1 | 9101-090 or 9105-090 | | Control Box Assembly |
| 1 | | 15091-900 | Mounting Base |
| 1 | | 1512-700 | Wood Shipping Base |
| 4 | | 9944-600 | Rubber Bumpers |
| 4 | | 91535-600 | Carriage Bolts |
| 4 | | 915351-600 | Nuts |
| 4 | | 9823-600 | 1/4-20 x 3/8 R. H. M. S. |
| 12 | | 91523-600 | Steel Washer |
| 4 | | 91521-600 | 5/16-18 Jamb Nut |
| 6 | | 918-600 | 5/16-18 x 3/4 H. H. C. S. |

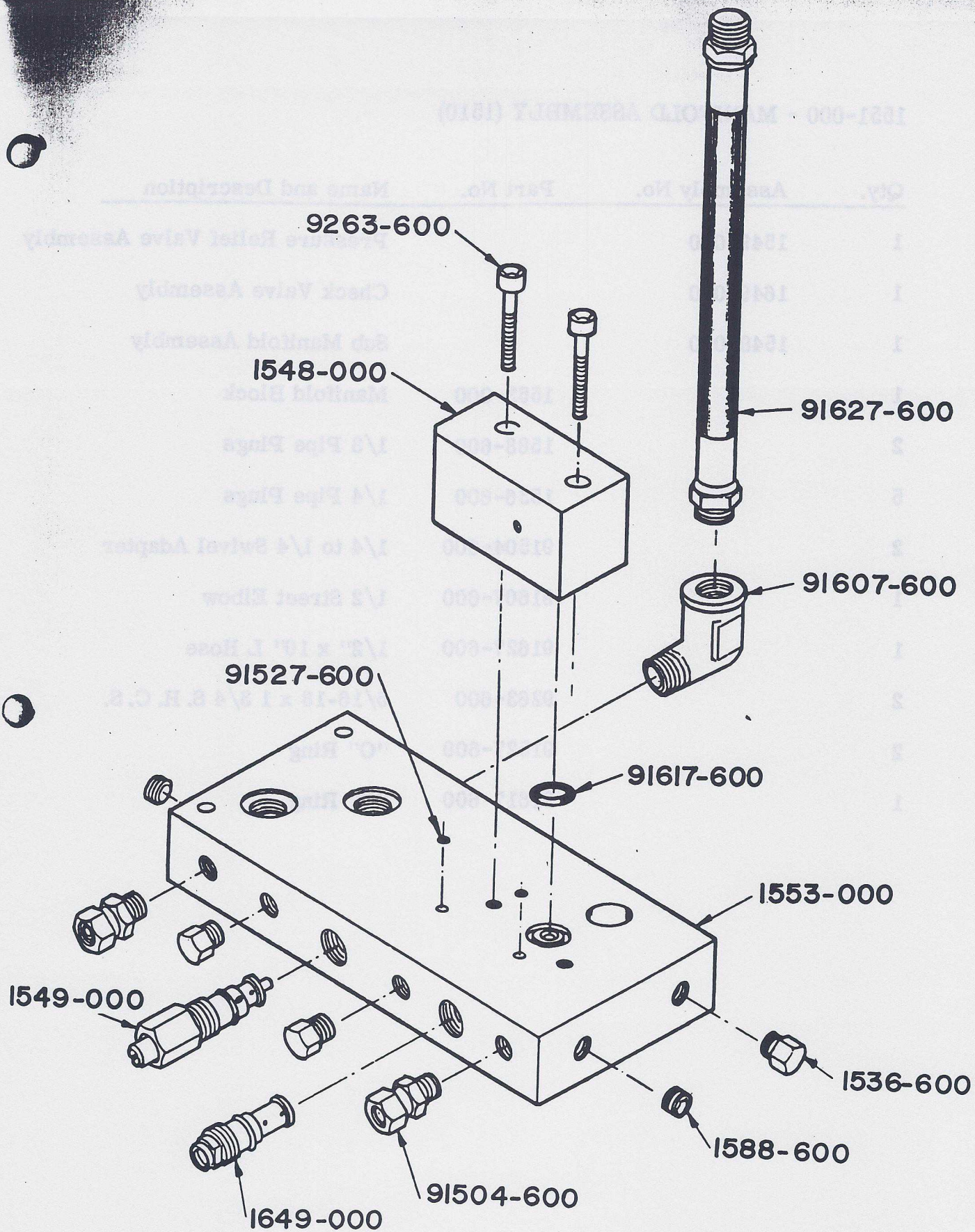


1510 Power Unit Assembly

Figure R

1551-000 - MANIFOLD ASSEMBLY (1510)

| Qty. | Assembly No. | Part No. | Name and Description |
|------|--------------|-----------|--------------------------------|
| 1 | 1549-000 | | Pressure Relief Valve Assembly |
| 1 | 1649-000 | | Check Valve Assembly |
| 1 | 1548-000 | | Sub Manifold Assembly |
| 1 | | 1553-000 | Manifold Block |
| 2 | | 1588-600 | 1/8 Pipe Plugs |
| 5 | | 1536-600 | 1/4 Pipe Plugs |
| 2 | | 91504-600 | 1/4 to 1/4 Swivel Adapter |
| 1 | | 91607-600 | 1/2 Street Elbow |
| 1 | | 91627-600 | 1/2" x 10" L Hose |
| 2 | | 9263-600 | 5/16-18 x 1 3/4 S. H. C. S. |
| 2 | | 91527-600 | "O" Ring |
| 1 | | 91617-600 | "O" Ring |



1551-000 MANIFOLD ASSEMBLY (1510)

Figure S

DOOR CONTROLS



DOR-O-MATIC

DOR-O-MATIC



DOOR CONTROLS