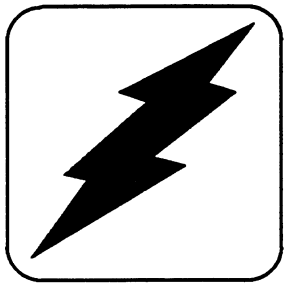
Series S340™
Automatic Transfer /
Bypass–Isolation Switch
150–800 Amps



# Operation and Installation Manual

KOHLER
Transfer Switches



TP–5448 (8–90)

# Safety Precautions and Instructions

A Transfer Switch, like any other electro-mechanical device can pose potential dangers to life and limb if improperly maintained or imprudently operated. The best safeguards against accident are to be ever mindful of the potential dangers and to always use good common sense. In the interest of safety, some general precautions relating to operating of a transfer switch follow. Keep these in mind. This manual contains several types of safety precautions which are explained below.

### ⚠ DANGER

Danger is used to indicate the presence of a hazard which *will* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

### ⚠ WARNING

Warning is used to indicate the presence of a hazard which *can* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

### ⚠ CAUTION

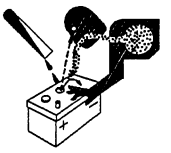
Caution is used to indicate the presence of a hazard which *will* or *can* cause *minor* personal injury or property damage if the warning is ignored.

**NOTE**

Note is used to notify people of installation, operation, or maintenance information which is important but not hazard-related.

### ⚠ CAUTION

**EXPLOSIVE BATTERY GASES!** The gases generated by a battery being charged are highly explosive. Do not smoke or permit flame or spark to occur near a battery at any time, particularly when it is being charged. Avoid contacting terminals with tools, etc., to prevent burns and to prevent sparks that could cause an explosion. Remove wristwatch, rings, and any other jewelry before handling battery. Any compartment containing batteries must be well ventilated to prevent accumulation of explosive gases. To avoid sparks, do not disturb battery charger connections while battery is being charged and always turn charger off before connecting or disconnecting charger clips to battery terminals.



### ⚠ CAUTION

**SULFURIC ACID!** Avoid contact with battery electrolyte. It contains acid which can eat holes in clothing, burn skin, and cause permanent damage to eyes. Always wear splash-proof safety goggles when working around the battery. If battery electrolyte is splashed in the eyes or on skin, immediately flush the affected area for 15 minutes with large quantities of clean water. In the case of eye contact, seek immediate medical aid. Never add acid to a battery once the battery has been placed in service. Doing so may result in dangerous spattering of electrolyte.

**⚠ DANGER**

**HAZARDOUS VOLTAGE!** The Transfer Switch is energized: proceed with care! High Voltage can cause personal injury, damage equipment, or lead to future failures. Remove watch, rings, and jewelry than can cause short circuits.

**HAZARDOUS VOLTAGE!** Disconnect inner panel harness at in-line connector. This will de-energize circuit board and logic circuitry, but allow transfer switch to continue to supply utility power to necessary lighting and equipment. Potential electrocution will exist if any accessories mounted to inner panel are NOT wired through and de-energized by harness separation. Such accessories may be at line voltage.

**HAZARDOUS VOLTAGE!** The Automatic Transfer Switch is energized; proceed with care! High Voltage can cause personal injury, damage equipment, or lead to future failures. Remove rings, watches, and jewelry that can cause short circuits. This test should be done only by a qualified electrician. Follow manufacturer's instructions when operating tester.

**⚠ DANGER**

**SHOCK HAZARD!** De-energize the normal source branch to be connected to the Transfer Switch before making any line or auxiliary connections.

**SHOCK HAZARD!** De-energize both normal and emergency sources before proceeding. Move Generator Master Switch on controller to OFF position and disconnect battery negative (-) before working on transfer switch! Turn the transfer switch selector switch to the OFF position.

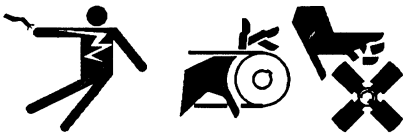
**SHOCK HAZARD!** The Transfer Switch will now be energized. Proceed with care!

**⚠ CAUTION**

**SHOCK HAZARD!** To prevent the possibility of electrical shock, de-energize the normal power source branch to be connected to the Transfer Switch before making any line or auxiliary connections.

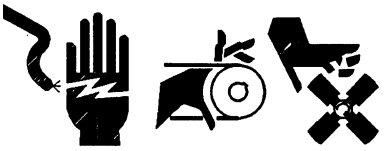
**SHOCK HAZARD!** De-energize both normal and emergency sources before proceeding!

**SHOCK HAZARD!** Disconnect harness plug before installing any accessories involving connection to transformer assembly primary terminals 76, 77, 78, and 79. Terminals are at line voltage!



**⚠ DANGER**

**UNIT STARTS WITHOUT NOTICE!** Units with Automatic Transfer Switch start automatically. Potential injury or electrocution can result. De-energize both normal and emergency power source before proceeding. Turn Generator Master Switch on controller to OFF position, and disconnect battery cables (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to generator. Turn the transfer switch selector switch to the OFF position.



**⚠ WARNING**

**UNIT STARTS WITHOUT NOTICE!** Units with Automatic Transfer Switches start automatically. Turn Generator Master Switch on controller to OFF position, and remove battery cables (remove negative lead first and reconnect it last) to disable generator set before working on any equipment connected to generator.

**⚠ DANGER**

**HIGH VOLTAGE!** Remember that wherever electrical energy is present, there is the potential danger of electrocution. Keep everyone away from the set and take precautions to prevent unqualified personnel from tampering. Have the set and electrical circuits serviced only by qualified technicians. Wiring should be inspected at the recommended interval shown in the service schedule – replace leads that are frayed or in poor condition. Do not operate electrical equipment when standing in water, on wet ground, or when your hands are wet.

**⚠ WARNING**

**BODILY INJURY!** If not removed, the manual operator handle can result in bodily injury during a load transfer. A detachable operator handle is provided on the Transfer Switch for maintenance purposes only. Return the Transfer Switch to the Normal position. Remove manual operator handle and store it on the Transfer Switch in the place provided when service is completed.

**⚠ CAUTION**

**BODILY INJURY!** A detachable operator handle is provided on the Transfer Switch for maintenance purposes only. Return the Transfer Switch to the Normal position. Remove manual operator handle and store it on the Transfer Switch in the place provided when service is completed.

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# Contents

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# Safety Decals

Warning decals are attached to the equipment in prominent places to advise the operator or service technician of potentially hazardous situations. These decals are reproduced here to improve operator recognition and enhance effectiveness. For further explanation, see the preceding section of safety precautions. Before operating or servicing the equipment, be sure to understand the message of each decal. Replace any missing or damaged decals.

**CAUTION**

During installation of this transfer switch, it is of the utmost importance to keep any foreign material such as dirt, grit metal drill chips and such out of the contactor solenoid operating mechanism. Make sure that the solenoid mechanism is completely covered during installation.

After installation, use the manual operating handle, located on the contactor, to insure that it operates freely. Do Not use a screwdriver to force the mechanism.

297509

**WARNING**

MORE THAN ONE LIVE CIRCUIT- SEE DIAGRAM

DISCONNECT ALL SOURCES OF SUPPLY BEFORE SERVICING

**ADVERTISSEMENT**

PLUS D'UN CIRCUIT SOUS TENSION- VOIR SCHEMA

COUPER TOUTES LES SOURCES D'ALIMENTATION AVANT DE FAIRE L'ENTRETIEN ET LES REPARATIONS

**DANGER**

**HIGH VOLTAGE**

**IMPORTANT**

**ALIGN HANDLE INDICATORS**

**DO NOT LEAVE IN INTERMEDIATE POSITION**

**CAUTION**

**DO NOT FORCE INTERLOCKED HANDLES**

**WARNING**

To insure against shock or burns, dicsonnect all supply sources before working on this switch

**WARNING**

**Hazardous voltage. Can cause severe injury or death.**

Barrier must be installed after adjustments, maintenance, or servicing,

294328

**BE SURE THAT THE LINE VOLTAGE IS THE SAME AS THE VOLTAGE SHOWN ON THE NAMEPLATE BEFORE RECONNECTING THIS PLUG.**

# Introduction

The Kohler **Automatic Transfer And Bypass–Isolation Switch** is designed to give maximum flexibility and to assure continuity of service under various conditions. It provides a means for maintaining essential load circuits. At the same time, it permits periodic testing, maintenance and inspection of the Automatic Transfer Switch.

The equipment combines manual and automatic switches to achieve these functions. The Bypass and Isolation Switches are manually operated. The Automatic Transfer Switch operates electrically.

The **Bypass Switch** is manually operated to bypass the Automatic Transfer Switch contacts closed on either source. There is no interruption to the load. If the Automatic Transfer Switch is out of service, the Bypass Switch also serves as a manually operated transfer switch.

The **Isolation Switch** is manually operated (only after the Bypass Switch has been operated) to withdraw the Automatic Transfer Switch from service for ease of scheduled periodic maintenance. The Isolation Switch also provides a test position for checking electrical operation of the Automatic Transfer Switch without interrupting service to connected loads.

The **Automatic Transfer Switch** is an emergency device used for transferring critical loads from a normal (preferred) source to an emergency (standby) source of power. This transfer automatically occurs when the normal source voltage fails, or is substantially reduced, and the emergency source has reached an acceptable level.

Upon normal source failure, the Automatic Transfer Switch signals the start of the engine–generator set. The Automatic Transfer Switch continuously senses for the presence of an acceptable normal source and will retransfer load to the normal source after it has been restored to an acceptable level. After retransfer of the load, the engine–start signal from the Automatic Transfer Switch is cancelled and the generator set is allowed to shut down.

Figure 1. shows the location of the equipment in the system.

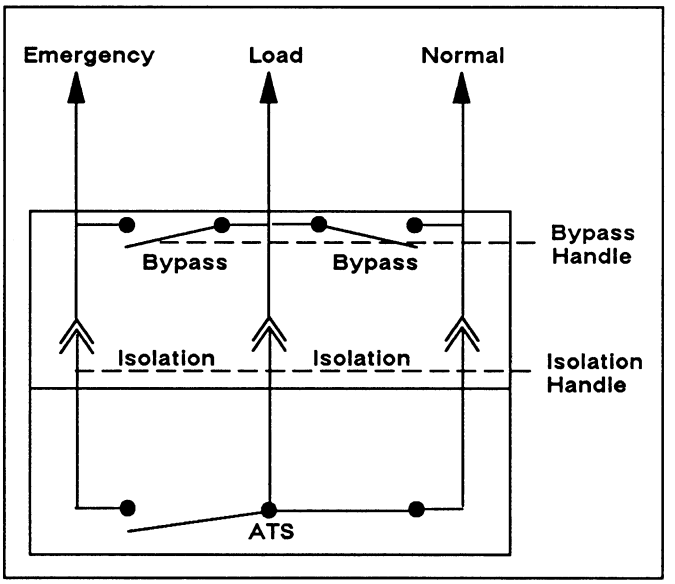



**Figure 1. Switch Connection.**

# Installation

Kohler Transfer Switches are factory wired and tested. Installation simply requires mounting, and connection of service cables and auxiliary control circuits. Do not remove protective packing until ready for complete installation. Protect switch at all times from excessive moisture, construction grit, and metal chips.

## Unpacking

Carefully unpack or uncrate switch and check for damage. Report any damage immediately to the Kohler Distributor.

Any lifting devices must be attached to the switch mounting holes only. Do not lift Transfer Switch at any other points. Protect arc barriers at all times from impact.

## Lifting

Any lifting devices must be attached to the switch's mounting holes or lifting eyes only. See Figure 2. Do not lift the switch at any other points. Protect arc barriers from impact at all times.

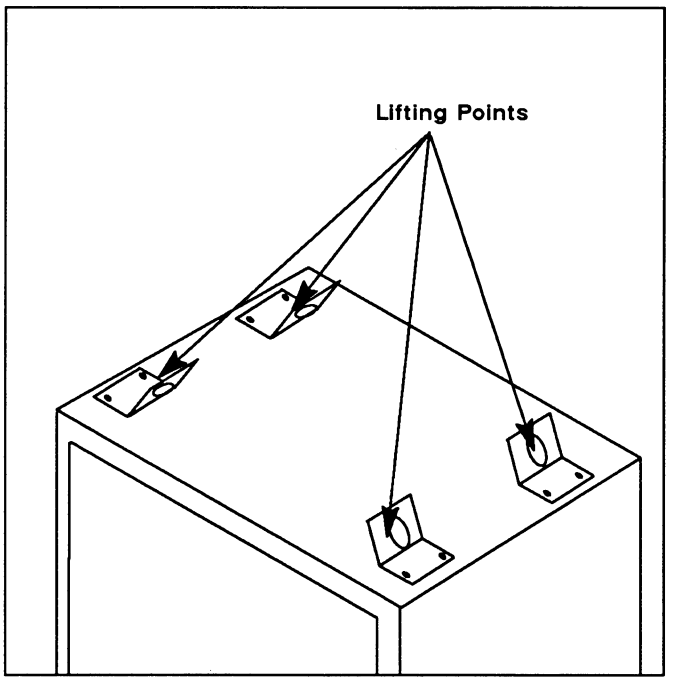



**Figure 2. Lifting Points.**

## Mounting

All free-standing enclosed switches have the Control Panel mounted on the cabinet door. For open type switches, mount the Control Panel to the right of the Transfer Switch, preferably on the inside surface of the enclosure door. See installation Drawings for open switch mounting dimensions and spacing requirements.


**Shock Hazard!** De-energize conductors connected to the bypass switch before making any line or auxiliary circuit connections. Be sure that Normal and Emergency line connections are in proper phase rotation. Also, place the generator set start control switch in its OFF position and make sure that the generator set is not in operation.

## Line Connections

Wiring Diagrams are furnished at the back of this manual. One diagram is for 3 pole Transfer Switches and the other is for 2 pole Transfer Switches. Two Harness Wiring Diagrams are furnished to show actual point-to-point wiring. A 3-pole and a 2-pole are provided.

All conductors should enter enclosure adjacent to the Transfer Switch terminals. Protect the Transfer Switch from metal chips and construction grit at all times. Standard terminal lugs are solderless screw type and will accept the conductor sizes listed on the Installation Drawing.

Do not run cables behind the Transfer Switch. Cables can be bundled to the side of 150-400-Amp switches and the left side of 600-800-Amp switches. Maintain proper electrical clearance between the live metal parts and grounded metal: 1/2 inch (12.7 mm) minimum for 140-400-Amp switches; 1 inch (25.4 mm), for switches over 400 Amps.

On 150-400-Amp switches, remove the cover shields from the switch to connect power cables

to the Emergency lugs and switched neutral lugs (Accessory 36).

Connect source and load conductors to clearly marked Bypass–Isolation Switch terminal lugs. Remove surface oxides from conductors by cleaning with wire brush. When aluminum conductor is used, apply joint compound to conductor. Tighten conductor and carefully wipe away excess compound. Tighten cable lugs to the torque specified in table A, following.

| Socket Size across flats inches (mm) | Tightening Torque inch pounds (Nm) |
|---|---|
| 3/8 (9.53) | 375 (42.4) |
| 1/2 (12.7) | 500 (56.5) |

**Table A. Tightening Torque Values for Socket–Head Screw Connectors**

**WARNING**

**Hazardous voltage can cause death or severe injury!** On 150–400–Amp switches, reinstall the cover shields over the Emergency lugs and switched neutral (accessory 36) lugs. If these shields are not in place when the switch is energized, the lugs will be exposed. Touching these energized lugs can result in shock, burns, or death.

All internal connections are made at the factory. The Transfer Switch and the control panel each have their own wire harness. The two harnesses are joined together by the In–Line Disconnect Plug. The plug is already engaged on enclosed Transfer Switches. For open type switches , the plug must be engaged after installation is completed.

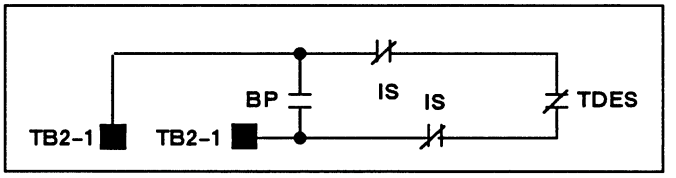
## Auxiliary Connections

Connect auxiliary circuit wires to appropriate Control Panel terminals as shown on the appropriate diagram. External circuits can include generator set start signal, auxiliary contacts, signal lights,and Test Switch. The Test Switch is already installed on enclosed Automatic Transfer Switches. For open type switches, the Test switch is supplied loose.

Note any Optional Accessories that may have been furnished on this switch, and make auxiliary connections if necessary.

## Engine–Starting Connections

The engine–starting connections are located on the bypass–isolation switch. Connect signal wires to terminals TB2–1 and TB2–2 as shown below.




**Engine–Starting Contacts (shown de–energized).**

# Functional Test

The Functional Test consists of three checks: voltage checks, manual operation, and electrical operation.

**Caution**

Perform these checks in the order given, in order to avoid damaging the switch.

Read and understand all instructions on installation drawings and labels affixed to the switch. Note any optional accessories that have been furnished with the switch and review their operation. See the "Accessories" section. Check the following:

- The Bypass handle should be in the NORMAL position.
- The Isolation handle should be in the TEST position.
- The Automatic Transfer Switch should be in the NORMAL position.

On 600–800–amp switches, turn the Isolation Handle to the TEST position, if necessary. If handles are not in their correct positions, follow instructions for bypassing and isolating the automatic transfer switch. **Do not attempt to force operation of the handles!** Electrical interlocks prevent improper sequence of operation.

Perform the following voltage checks and manual test operation **before** attempting to electrically test the automatic transfer switch. The intent is to verify that all switches operate smoothly ant that there is no damage from shipping or installation.

## Voltage and Emergency Check

First, check the nameplate for rated voltage. It should be the same as normal and emergency line voltages.


**Hazardous voltage can cause death or severe injury.**The switch will now be energized. Proceed with care! Do not touch power terminals.

1. Close the normal source circuit breaker. Normal–source–available and load–connected–to normal lamps should light.
2. Use an accurate voltmeter th check for proper phase–to–phase and phase–to–neutral voltages at the Bypass Switch's normal–source terminals.
3. Close the emergency–source circuit breaker.
4. Manually start the generator set. The emergency–source–available lamp should light.
5. Use an accurate voltmeter to check for proper phase–to–phase and phase–to–neutral voltages at the Bypass Switch emergency–source terminals.
6. If necessary, adjust the generator voltage regulator, following the generator set manufacturer's instructions. The Automatic Transfer Switch will only respond to rated voltage and frequency specified on the nameplate. Check phase rotation; it should be the same as that of the normal source.
7. Shut down the generator set, following the generator set manufacturer's instructions.

## Manual Operation Test

This procedure will check manual operation of the Bypass Switch, Isolation Switch, and Transfer Switch.

1. Close the normal–source circuit breaker.
2. Bypass the Automatic Transfer Switch. See Figure 3.

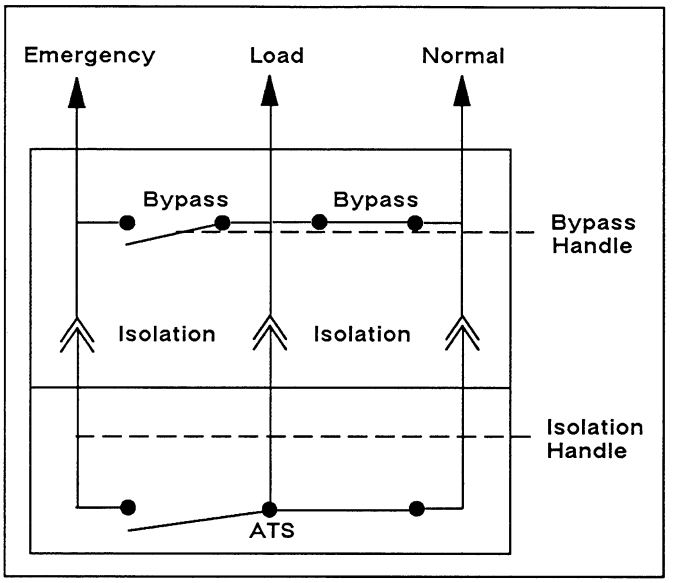



**Figure 3. Bypass Position (Connected to Normal).**

*For 150–800–Amp Switches:* Turn the bypass handle to the NORMAL position.

3. Isolate the Automatic Transfer Switch. See Figure 4.

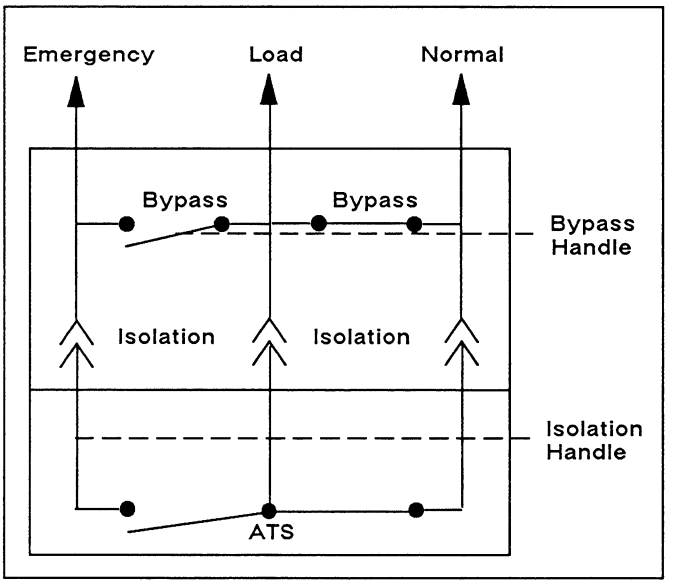



**Figure 4. Isolation Position.**

*For 150–400–Amp Switches:* Turn the isolation handle to the "Test" position, then, to the "open" position. Padlock the Isolation Handle.

*For 600–800–Ampere Switches:* Push in and turn the Isolation Handle to the "T" Test position, then, push in and turn to the "O" Open position. Padlock the Isolation Handle.

**WARNING**

**Hazardous voltage can cause death or severe injury.** The switch will now be energized. Proceed with care!

4. A manual operating handle is provided for testing and maintenance purposes.

*For 150–400–Amp Switches:* Insert the manual operating lever in the main shaft as shown in Figure 5.

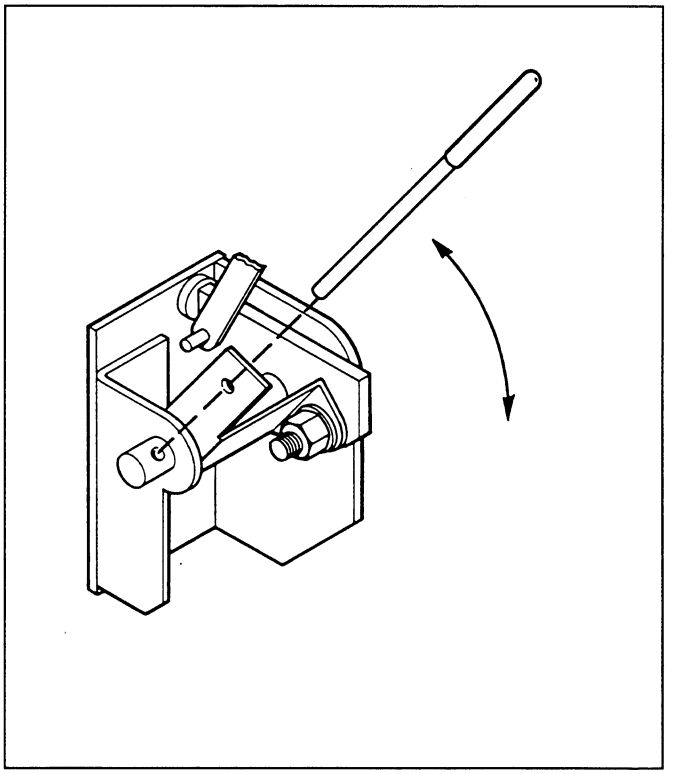


**Figure 5. Operating Lever, 150–400–Amp.**

*For 600–800–Amp Switches:* Place the operating handle onto the pivot shaft extension as shown in Figure 6.

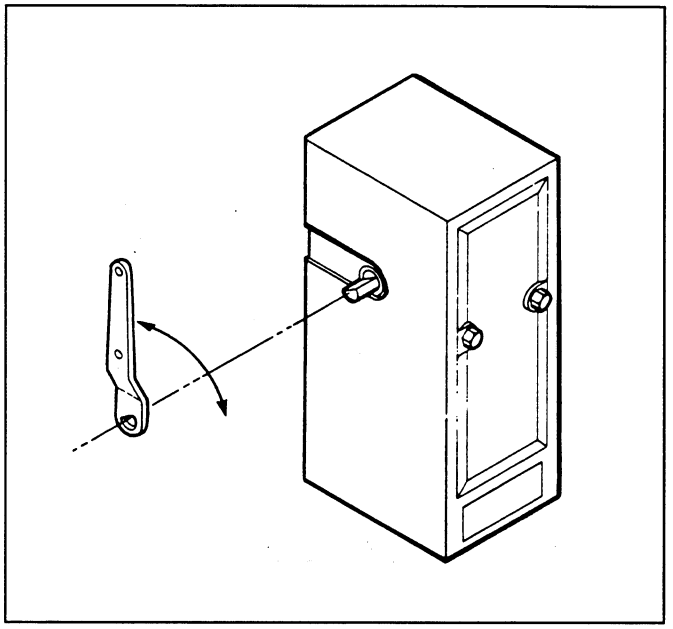


**Figure 6. Operating Lever, 600–800–Amp.**

5. Move the operating handle, or lever, to manually operate the transfer switch. The switch should operate smoothly, without binding. Return the transfer switch to the Normal position. Remove the operating lever (if equipped) and store it on the transfer switch, in the place provided.

## Electrical Operation Test

**(Figures 7. to 9.)**
This procedure will check the electrical operation of the Automatic Transfer Switch. Put the generator set's master switch in its "automatic" position.

1. Unlock the isolation handle, then, put the handle in the TEST position as follows:

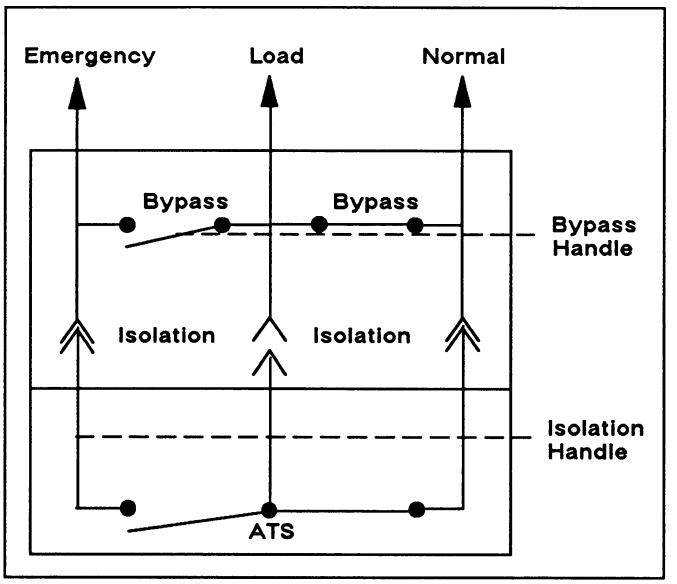



**Figure 7. Test Isolation.**

2. Operate and *hold* the transfer test toggle switch in the TEST position until the generator set starts and runs. This should happen within 15 seconds. Release the toggle switch.

   The Emergency Source Available lamp should light. The Automatic Transfer Switch should operate to the emergency position. If Accessory 01–A is used, the transfer will occur after a time delay (up to 5 minutes). The Automatic Transfer Switch should operate back to normal after the Accessory 03–C time delay (up to 30 minutes). Operation of Accessory 08, Reset to Normal Time Delay, will bypass the time delay. Accessory 04–C time delay should keep the generator set running for an unloaded cool–down period.

3. Turn the Isolation Handle to the CLOSED position. Release the toggle switch.

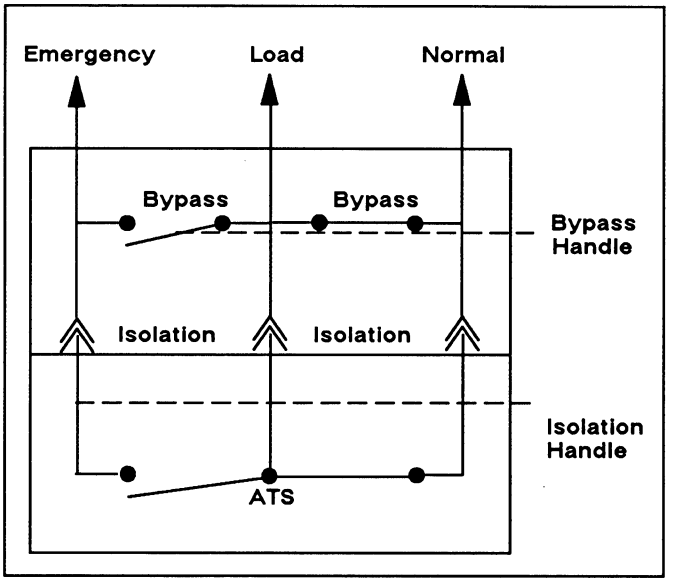



**Figure 8. Isolation Closed.**

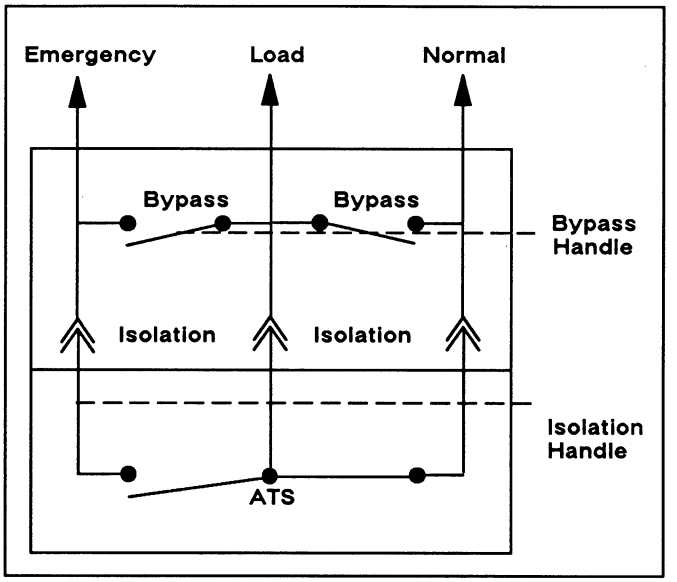



**Figure 9. Automatic Position.**

4. To return the Bypass Switch to the Automatic position, turn the Bypass Handle to the Automatic position.

This completes the functional test. The generator set starting control should be left in the "automatic" position.

# Bypassing

This procedure will describe bypassing of the closed Automatic Transfer Switch contacts. Bypassing is required before the ATS can be tested or isolated. The Bypass Switch must be in the AUTO position and the Isolation Switch contacts must be closed.

1. Note which "Load Connected To" lamp is on (Normal or Emergency). This is the position of the Automatic Transfer Switch (see Figure 10. and 11.).

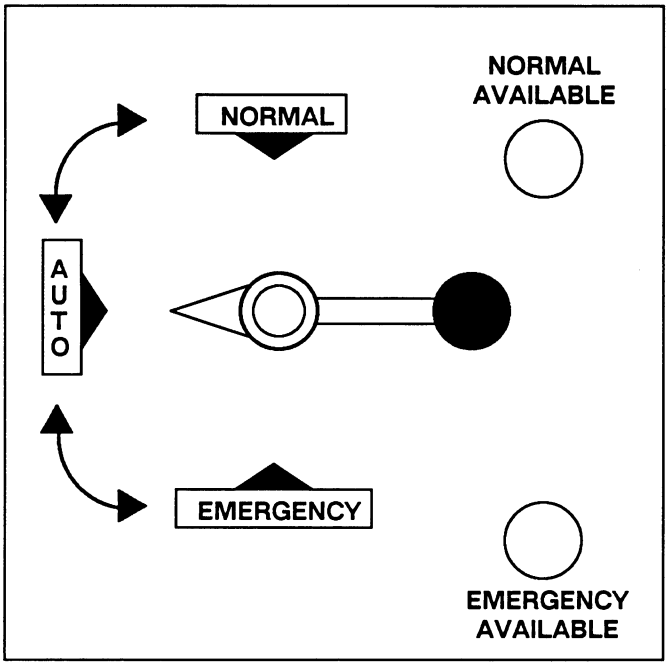



**Figure 10. 150–400 Amp Bypass Handle.**

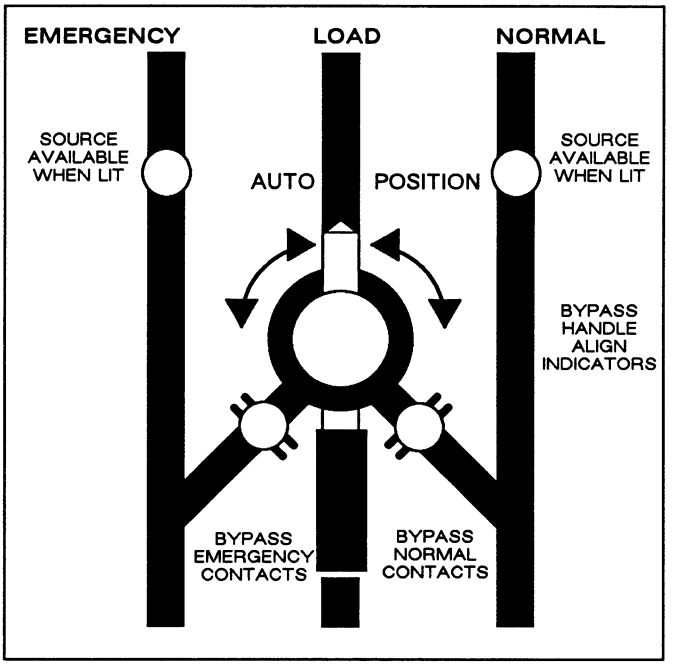



**Figure 11. 600–800 Amp Bypass Handle.**

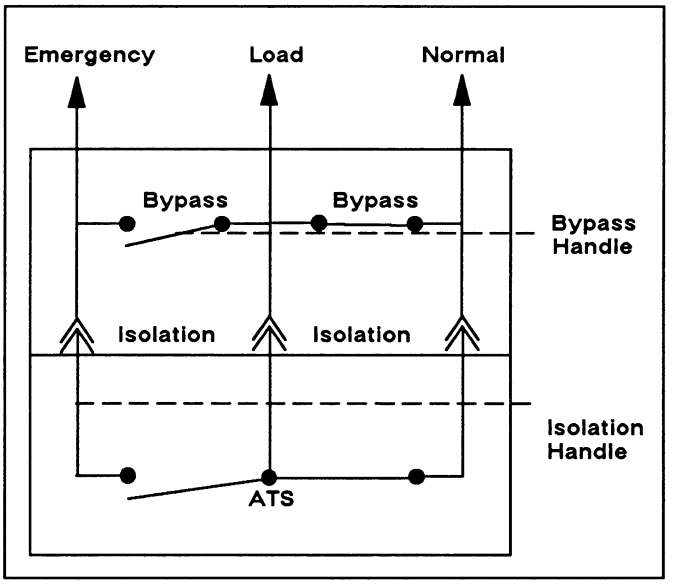



**Figure 12. Source Bypass to Normal.**

2. Bypass to the **same** source that load is connected to, as follows (select direction):

   *Bypass to Normal:* Turn the Bypass Handle clockwise to NORMAL.

   *Bypass to Emergency:* Turn the Bypass Handle counterclockwise to EMERGENCY.

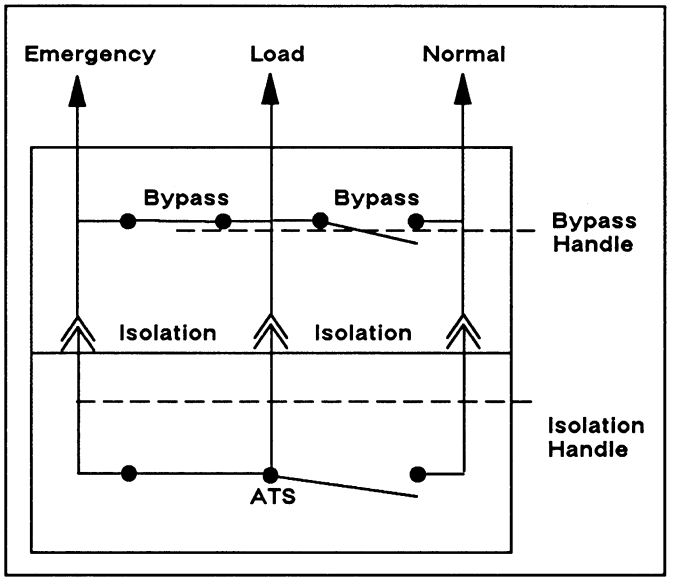



**Figure 13. Source Bypass to Emergency.**

Return the Bypass Switch to the **Automatic** position as follows (see Figure 14.).

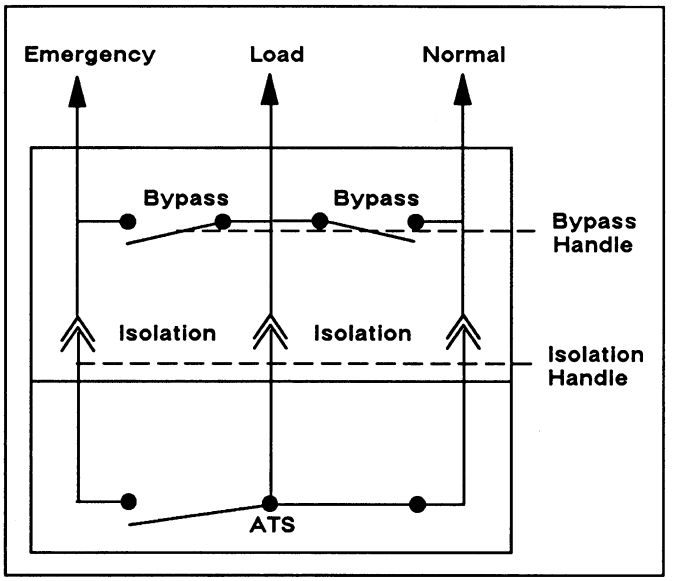



**Figure 14. Automatic Position.**

1. The Isolation Handle Must be in the **Closed** position. Carefully follow instructions under "Isolation," if the handle is not in the **Closed** position.
2. To bypass to Automatic, check to see which source-connected-to lamp is on and turn the Bypass Handle to the Automatic Position.

# Isolation

This procedure will describe isolation of the Automatic Transfer Switch. Isolating is required before any service work can be performed on the Automatic Transfer Switch. Check the load-connected-to lamps to see which source is connected to load.

1. Bypass the closed Automatic Transfer Switch contacts by carefully following directions under "Bypass."
2. Isolate the Automatic Transfer Switch as follows (see Figures 15. and 16.):

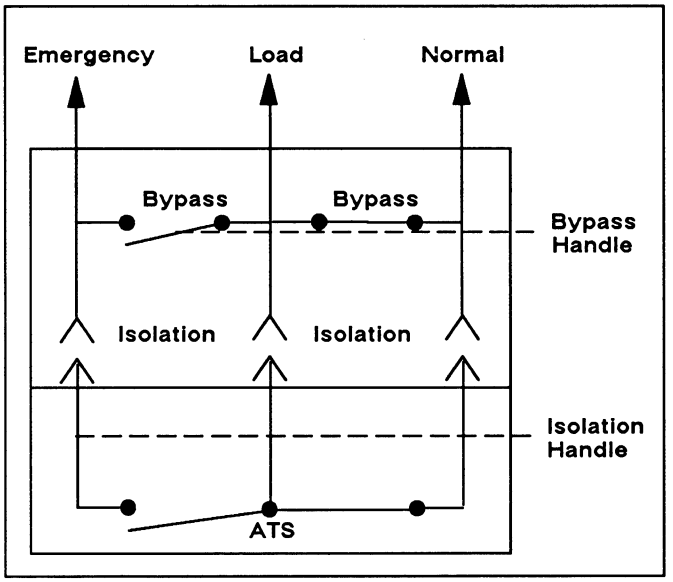



**Figure 15. Isolation to Open.**

**Caution**

Align the indicator. Do not leave the handle in an intermediate position.

*For 150-400-Amp Switches:* Turn the Isolation Handle to the TEST position. Then pull out the Isolation Handle and continue turning it to the OPEN position. To lock the handle, pull out the locking lever in the face plate and insert a padlock through the hold in the locking lever.

*For 600-800-Amp Switches:* Push in the Isolation Handle and turn it to the TEST position. Then push in again and continue turning the Isolation Handle to the OPEN position. Padlock the Isolation Handle.

The Transfer Switch can now be removed for bench inspection and maintenance. See "Transfer Switch Removal."

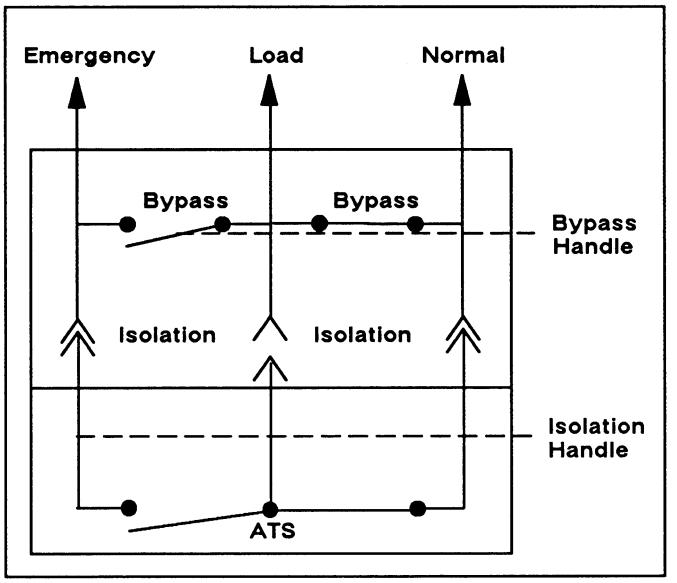



**Figure 16. Isolation to Test.**

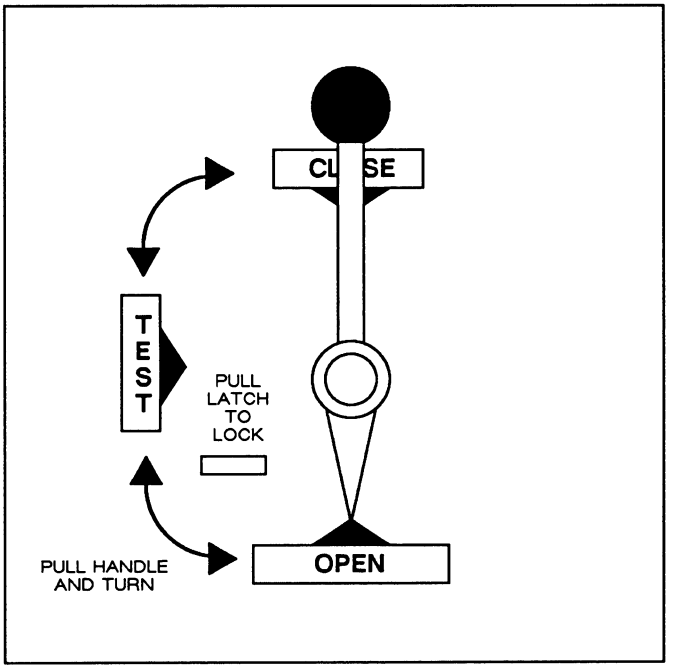



**Figure 17. 150-400 Amp Isolation Handle.**

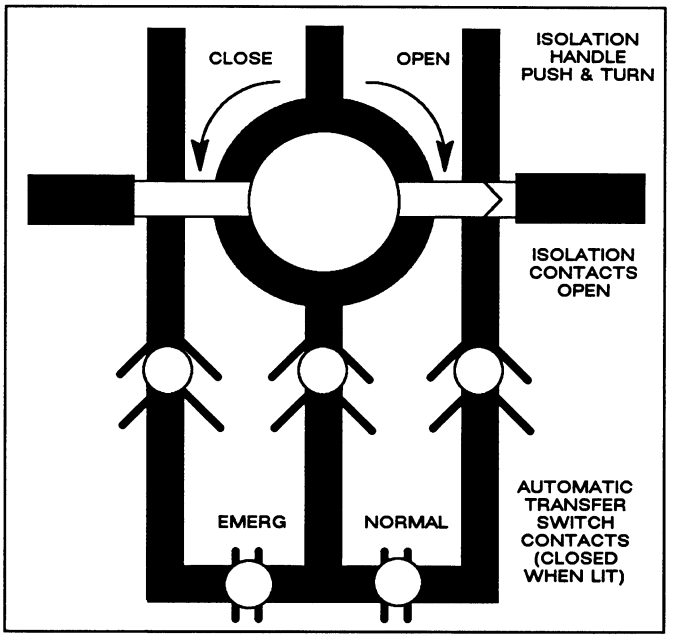



**Figure 18. 600–800 Amp Isolation Handle.**

# Transfer Switch Removal

This procedure explains removal of the Transfer Switch for inspection and Maintenance.

1. Bypass and Isolate the Automatic Transfer Switch: Carefully follow directions under "Bypassing" and "Isolation." Padlock the isolation handle in the OPEN position.

**WARNING**

**The Bypass-Isolation Switch is Energized!** Do not touch isolation contact fingers. Shock, burns and death could result.

2. Open the cabinet door (lower door on 600–800 Amp switches).

3. Separate the in-line disconnect plugs by squeezing the plugs. Do not pull on the harness wires. Label, tape and disconnect wires to auxiliary contacts on 600–800 Amp transfer switches.

4. Remove the Transfer Switch as follows:

   *For 150–400 Amp switches:* Lift the panel latch (upper left of ATS panel) and pull the Transfer Switch straight out on the guide rods. The transfer switch weighs about 30 pounds (15 kg). See Figure 19.

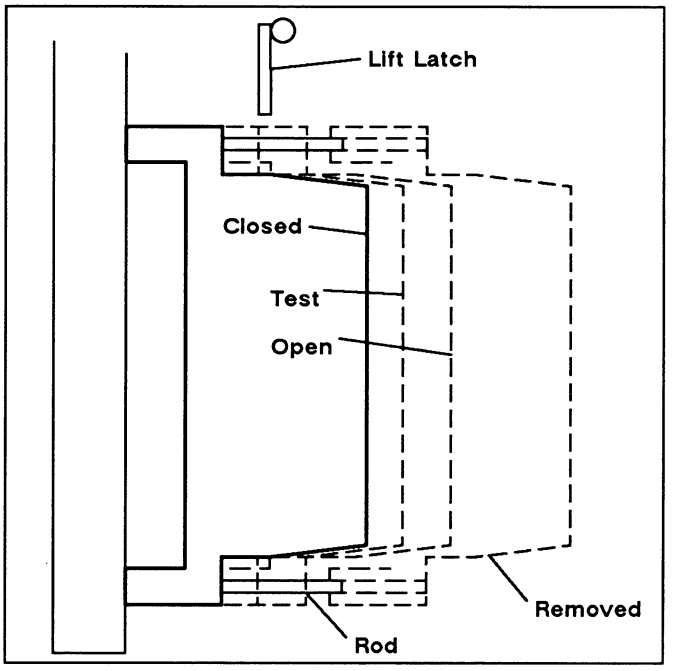



**Figure 19. 150–400 Amp Transfer Switches.**

*For 600–800 Amp Transfer Switches:*

**WARNING**

**Hold Transfer Switch firmly when safety retaining nut is removed to prevent Transfer Switch from falling outward.** Failure to do so could cause personal injury or damage to the switch!

Pull out the disconnect pin to release linkage to Isolation Handle. Remove safety retaining nut from upper tight mounting bushing. Push down spring-loaded balancing handle (right side) until bushings are at top of key slots. Grasp back panel of Transfer Switch and pull it straight out. Do not lift at any other points (to protect barriers). Then, lift Transfer Switch out of cabinet. Transfer Switch weighs about 100 pounds (50 kg). See Figure 20.

5. Close the cabinet door.

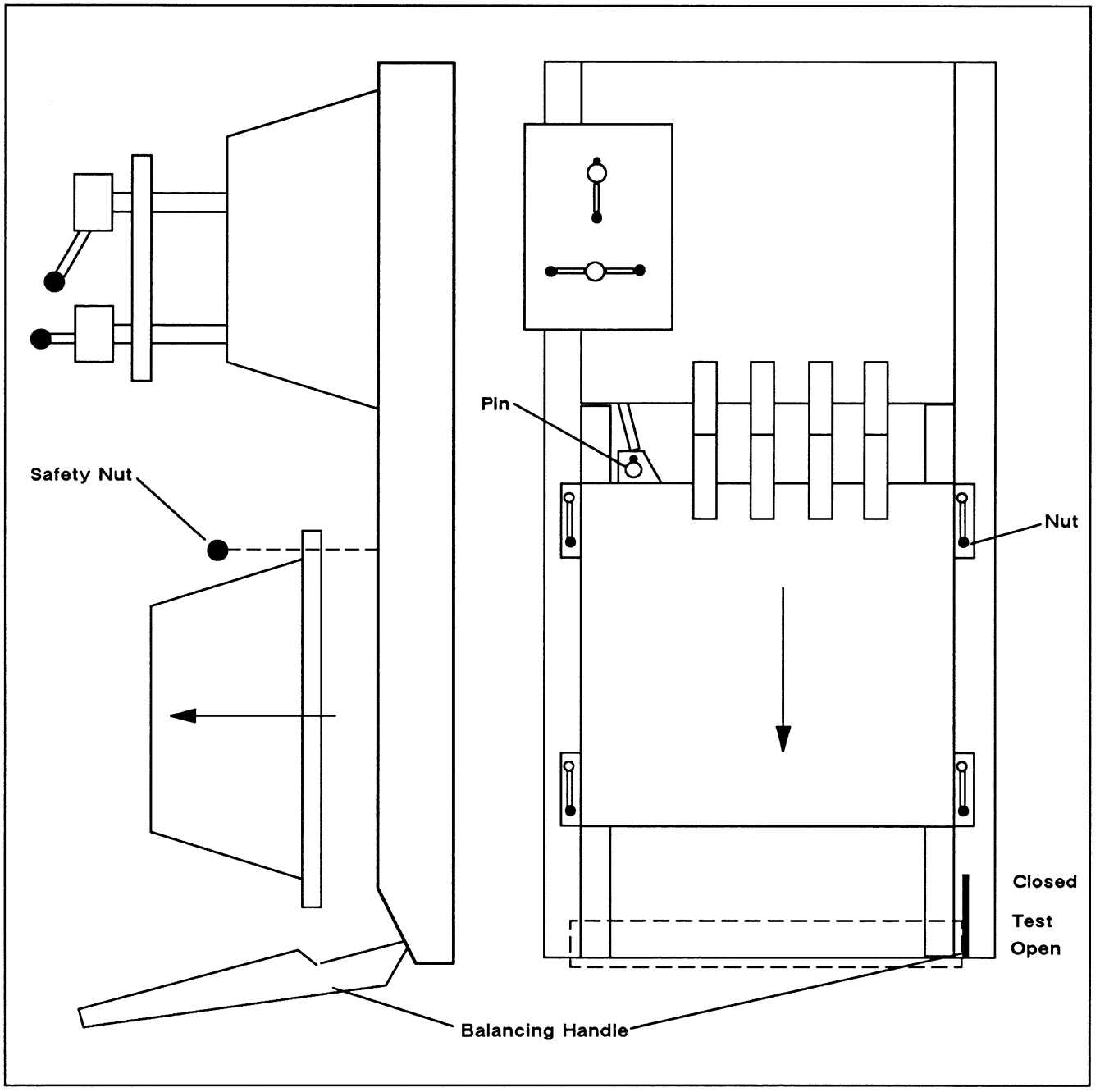



**Figure 20. 600–800 Amp Transfer Switches.**

# Transfer Switch Reinstallation

This procedure explains how to install the Transfer Switch, after inspection & maintenance.

**WARNING**

**The Bypass-Isolation Switch is energized.** Do not touch isolation contact fingers-- shock, burns, or death could result!

1. Open the cabinet door (lower door on 600-800-Amp switches).

**Caution**

All arc chutes and pole covers must be in place on the Transfer Switch. The Transfer Switch normal contacts must be closed (use the manual operator handle provided to manually transfer the switch, if necessary).

Be sure to install the correct Transfer Switch into the enclosure. If more than one is supplied, each will be labelled.

2. Install the transfer switch as follows:

*For 150-400-Amp Switches:* Align the Transfer Switch on the guide rods and push the transfer switch in until it stops see Figure 21.

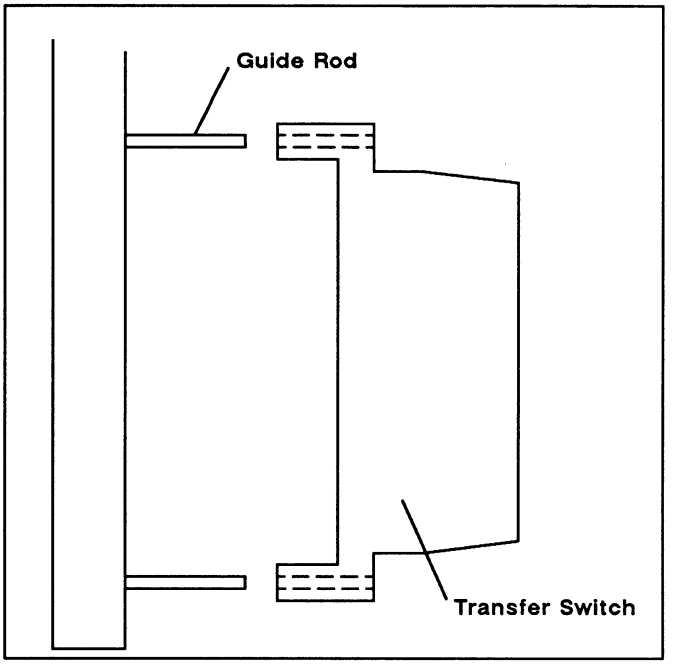



**Figure 21. Guide Rods, 150-400-Amp.**

*For 600-800-Amp Switches:* Grasp the back panel of the Transfer Switch and lift it onto two support brackets extending out from the mounting channels. Press the balancing down (right side), until the slots accept the mounting bushings. Push the panel flat against rails and secure it by lifting up the balancing handle. Install the safety retaining nut (upper right corner). Position linkage from Isolation Handle between the "U" bracket on the Transfer Switch (use handle to line up), then insert the quick-disconnect pin and press ring flush. See Figure 22.

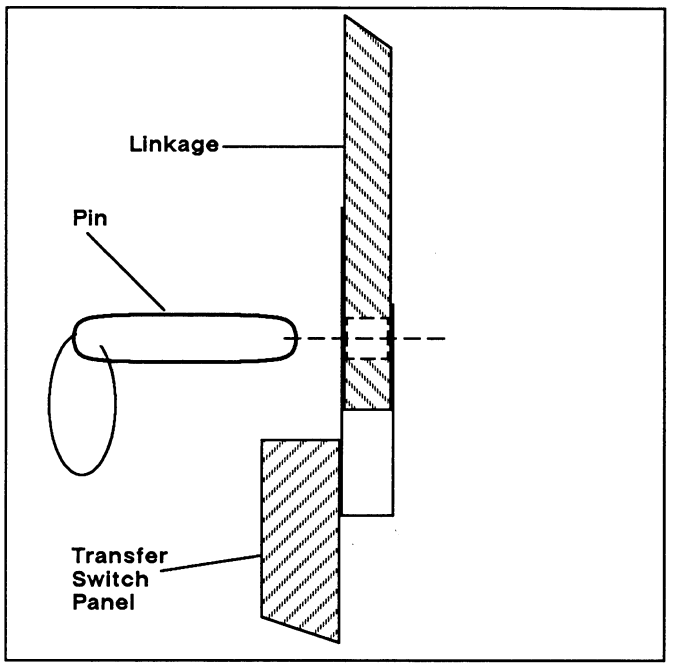



**Figure 22. Reconnecting Linkage, 600–800–Amp.**

**WARNING**

Install the safety retaining nut onto the upper–right mounting bushing, to prevent Transfer Switch from falling outward which could cause personal injury or damage to the switch.

3. Reconnect the in–line disconnect plugs by grasping and pressing them together. Be sure to connect the correct plugs. Reconnect wires previously removed from auxiliary contacts on 600–800–Amp transfer switches.
4. Close the cabinet door.
5. Unlock the Isolation Handle. Carefully follow directions under "Isolation" to put the Isolation Handle in the TEST position, then the CLOSE position. Finally, follow directions under "Bypassing" to put the Bypass Handle in the AUTO position.

# Return to Service

This procedure explains return of the Automatic Transfer Switch to service, after inspection and maintenance. Observe the load-connected-to lamps on the cabinet door.

1. See instructions under "Transfer Switch Reinstallation," preceding.

**WARNING**

Close the cabinet door to prevent personal injury in case of electrical system fault.

2. Move the Transfer Switch into the TEST position as follows (see Figure 23.).

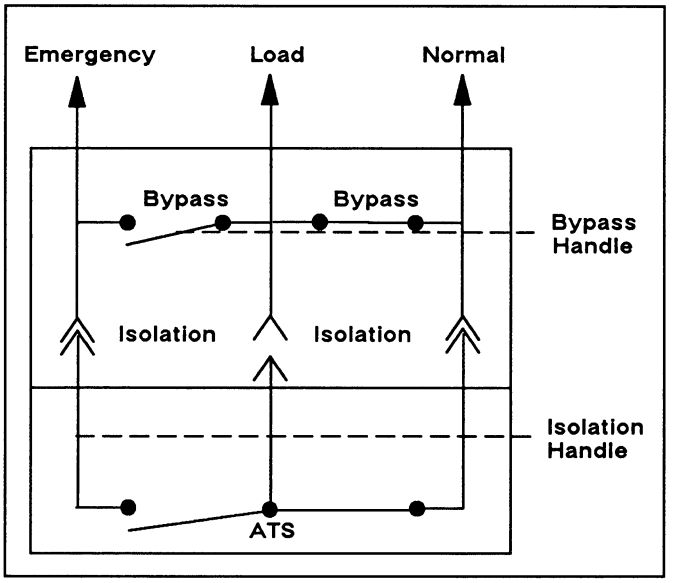



**Figure 23. Test Position.**

*For 150–400–Amp Switches:* Turn the Isolation Handle clockwise to the TEST position.

*For 600–800–Amp Switches:* Turn the Isolation Handle counterclockwise to the TEST position.

## Electrical Operation Test

This procedure will check the electrical operation of the Automatic Transfer Switch, without interrupting service to load. The Transfer Switch should remain bypassed for this test.

1. Operate and hold the door-mounted test switch until the generator set starts (this should happen within 15 seconds).
2. The Transfer Switch will operate to the emergency position. The "load-connected-to-emergency" lamp should come on. Transfer may be time-delayed for several seconds.
3. The Transfer Switch will operate back to the normal position after the return-to-normal time delay. The "load-connected-to-normal" lamp should come on. Operate the door-mounted time delay bypass-to-normal switch, or the Automatic Transfer Switch will transfer after the time delay (up to 30 minutes).
4. The time-delay-engine-cooldown will allow the generator set to run unloaded for several minutes before the generator set shuts down.

The isolating contacts **cannot** be closed until the Transfer Switch is in the **same** position as the Bypass Switch.

5. Check the position of the Bypass Handle. Its position should indicate the source that is bypassed.
6. See which load-connected-to lamp is on (normal or emergency). The lamp indicates the position of the Transfer Switch. If it is not in the same position as the Bypass Switch, change the position of the Transfer Switch as follows:

*To operate to Normal:* Press the return-to-normal switch. The load-connected-to-normal lamp should come on.

*To operate to Emergency:* Press and hold the test switch. After the generator set has started and the normal-to-emergency time delay has timed out, the load-connected-to-emergency lamp should come on.

**WARNING**

Do not close the isolating contacts unless the Transfer Switch and Bypass Switch are

in the same position (normal or emergency)!

7. Close the isolating contacts as follows (see Figure 24.).

   *For 150–400–Amp Switches:* Turn the Isolation Handle clockwise to the CLOSE position.

   *For 600–800–Amp Switches:* Push in and turn the Isolation Handle to the CLOSED position.

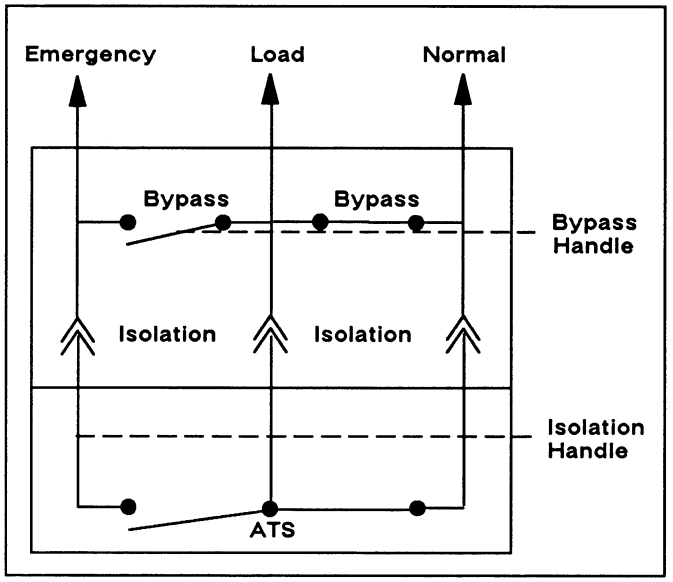
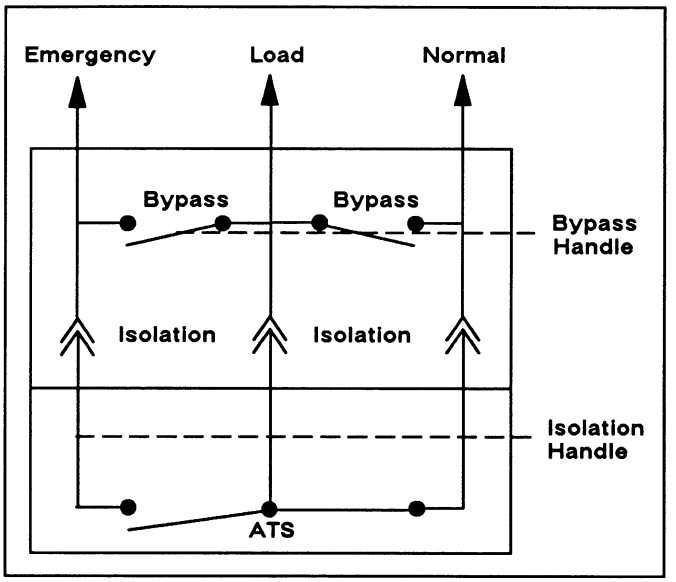



**Figure 24. Closed Position.**

8. Turn the Bypass Handle to the AUTO position (see Figure 25.).




**Figurer 25. Automatic Position.**

## To Change Transfer Switch Position

*Operate to Normal:* Press the Bypass Time Delay Emergency–to–Normal toggle switch (if equipped). The load–connected–to–normal lamp should come on.

*Operate to Emergency:* Press and hold the Test switch as necessary to let the generator set start and transfer time delays to time out. As the generator set starts and connects to load, the load–connected–to–emergency lamp should come on.

# Manual Load Transfer

This procedure will allow manual load transfer to the opposite source, if the Automatic Transfer Switch is out of service. A brief interruption of service to the load will occur during manual transfer. Observe the load-connected-to lamps on the door.

1. Bypass and isolate the automatic transfer switch, carefully following instructions under. "Bypassing" and "Isolation."
2. Check to see that both normal-source-available and emergency-source-available lamps are on. Start the generator set, if necessary.
3. Turn the Bypass Handle to the AUTO position.
4. Turn the Bypass Handle to the opposite source-- counterclockwise to the emergency source, or clockwise to the normal source.

# General Maintenance

Reasonable care in preventive maintenance will insure high reliability and long life for the Automatic Transfer Switch.

**Operate the Transfer Switch at least once per week.** The generator set should be exercised under load for at least 30 minutes per week. Before exercising, first check the following.

- Bypass Handle must be in the Automatic position.
- Isolation Handle must be in the Closed position.
- Transfer Switch must be in the Normal Position.

Use the door-mounted Test switch to check electrical operation of the Automatic Transfer Switch. Because the Test switch only simulates normal source failure, service is interrupted only during the actual transfer of load.

**Maintain Transfer Switch Lubrication.** The Transfer Switch has ben properly lubricated, and under normal operating conditions, no further lubrication is required. Renew factory lubrication if the switch is subjected to severe dust or abnormal operating conditions. Relubricate the operator if The TS coil is replaced. Use #44 Silicon Grease (DOW).

**Inspect main current carrying contacts.** Once per year, de-energize all sources. Brush and vacuum away any excessive dust accumulation. Remove barriers to check condition of contact material. Replace contacts when pitted or excessively worn.

# Sequence of Operation

Note any Optional Accessories that may have been furnished on this switch, and review their operation. See "Accessories".

## Normal Source Failure

Load transfer to the emergency source automatically begins when the voltage sensing circuit detects reduced voltage or total loss of the normal source. Relay NR1 will de-energize whenever the voltage level falls below the preset dropout point of the voltage sensing circuit.

NR1 relay de-energizes, signalling a failure, and relay TDES begins its timing cycle. TDES relay is a time delay on dropout to override momentary outages. This delay prevents nuisance starting of the generator set. If the normal source voltage returns above the voltage dropout setting before the time delay expires, the NR1 relay energizes and the timing cycle is reset to zero.

TDES relay de-energizes after the time delay and signals the generator set to start. At the same time, a voltage frequency relay (EFR) begins monitoring the emergency source. The EFR will energize when the emergency source voltage and frequency reach the proper pickup points-approximately ten seconds elapses from dropout of the NR relay to acceptance by the sensor. This time span occurs because the generator set must crank, start, and run up to nominal pickup points. If the emergency source is available immediately, the sensor may accept as soon as TDES relay drops out.

When the emergency source is acceptable, the ER relay is energized after a timing cycle. ER relay is controlled by a time delay on pickup to prevent immediate load transfer to the emergency source.

When the ER relay energizes, the TS coil is energized, the Transfer Switch operates, and all switch contacts (main, controls, auxiliaries) reverse position. The Transfer Switch is now supplying the load from the emergency source and will remain in this position until the normal source is restored.

## Normal Source Restoration

Load transfer to the normal source automatically begins when the voltage sensing circuit detects restoration of the normal source. The voltage level must rise above the preset pickup point on all phases before the circuit will accept the normal source again.

When the normal source is accepted by the voltage sensing circuit the NR1 relay is energized after a time delay period. This time delay insures that the normal source has stabilized before reconnection of vital loads. If the emergency source fails during this timing cycle, the ER relay drops out, and the load is immediately transferred to the normal source, if acceptable.

NR1 relay energizes which in turn energizes NR relay, and ER relay is dropped out. The TS coil is energizes, the Transfer Switch operates, and all switch contacts (mains, controls, auxiliaries) reverse position. The Transfer Switch is now supplying the load from the normal source.

NR1 relay energizes the Time Delay Engine Cool-off (TDES) relay, which signals the generator set to shut down. All circuits are reset for any future normal source failure.

# Troubleshooting


**SHOCK HAZARD!** The Transfer Switch is energized; proceed with care! High Voltage can cause personal injury, damage equipment, or lead to future failures. Remove watch, rings and jewelry that can cause short circuits.

Note any Optional Accessories that may have been furnished on this switch, and review their operation. See "Accessories".

## Generator Set Does Not Start When Test Switch Is Operated.

1. **Check Operation.** Make sure the Test Switch is placed in "TEST" position.
2. **Check Engine Controls.** Make sure control is in "automatic" position. Make sure batteries are charged and connected.
3. **Check Wiring.** Make sure start signal wires from generator set controls are connected to terminals TB2–1 and TB2–2 on the contactor. See "Wiring Diagram".
4. **Check Signal Circuit.** Disconnect and tape engine start wires. Connect ohmmeter between terminals TB2–1 and TB2–2 on the contactor. Reading should indicate an open circuit. Place Test Switch in "TEST" position. After Time Delay Engine Start (TDES) operates, ohmmeter should indicate a closed circuit.

**Note**

Engine start contacts and circuit may be disabled by removing wires from terminals 57 and 58 at main logic board.

## Transfer Switch Does Not Retransfer The Load After Normal Returns or After Test Switch Is Placed In "AUTO" Position.

1. **Check Operation.** Make sure at least 30 minutes have passed to allow for time delay to operate.
2. **Check Normal Source voltage levels.** This reading can be taken on the transformer assembly terminals. On a 3 phase system, voltmeter should read phase–to–phase voltage between terminals NA and NB, NA and NC, NB and NC. On a single phase system, voltmeter should read system voltage between terminals NA and NC.
3. **Check Low AC Voltage circuits.** Check voltage on transformer secondaries. On 3–phase systems voltage at T2–T3 should be 24 Volts, with 12 Volts at T1–T4 and T1–T5. No voltage at these points indicates a defective transformer. If these voltages are correct, check the circuit board voltages (at terminals 62–65, 24 Volts; 62–63, 12 Volts). No voltage at these points indicates interconnection harness problems.

## With Generator Set Running, Transfer Switch Does Not Transfer The Load To Emergency.

1. **Check Operation.** Make sure sufficient time has passed to allow for the time delay on transfer to emergency to operate (up to 30 minutes).
2. **Check Engine Controls.** Check generator output frequency and voltage. Output should be at least 90% of nominal voltage and 95% of nominal frequency. Make sure any generator output circuit breakers are closed.
3. **Check Wiring.** Voltmeter should read phase–to–phase voltage between Transfer Switch terminals EA and EC, and also between terminals EA and EC on transformer assembly.

4. **Check Low AC Voltage Circuit.** With the proper voltage on the transformer primaries, check the secondary voltage at T6–T7 which should be 24 Volts. If the voltage is correct, check the circuit board voltage at terminals 20 and 67 which should read 24 Volts. No voltage here indicates interconnection harness problems.

## Transfer Switch Retransfers The Load, But Generator Set Continues To Run

1. **Check Operation.** Make sure sufficient time has passed to allow for the engine–cooldown time delay, up to 5 minutes, to time out.
2. **Check Engine Controls.** Make sure engine starting controls in "automatic" position.
3. **Check Signal Circuit.** Disconnect and tape wires to terminals 57 and 58 on the main logic board. Connect ohmmeter between these terminals; reading should indicate an open circuit.

If the problem is isolated to signal circuits on the control panel of the Transfer Switch, call your local Kohler Distributor.

## Bypass Handle Cannot Be Turned

1. Make sure that a source–available lamp is on.
2. Observe the Load–Connected–To signal lights. Make sure the Transfer Switch contacts are closed on the same source to which you are trying to bypass.

## Isolation Handle Cannot Be Turned to Closed Position

1. Make sure that a Source–Available lamp is on.
2. On 600–800–Amp switches, make sure that the Isolation Handle is *pushed in* before turning it.
3. Observe Load–Connected–To lights. Make sure that the Transfer Switch contacts are closed on the same source to which you are bypassed.

### Normal Source Fails, While in Bypassed–to–Normal Position

1. Make sure that the Emergency–Source–Available lamp is on.
2. Put the Isolation Switch in the Test position. See "Isolation." The Automatic Transfer Switch will operate to the Emergency position.
3. Manually transfer the load to the Emergency source as follows:

   *For 150–400–Amp switches:* Turn the Bypass Handle to AUTO, and then to EMERGENCY.
   *For 600–800–Amp switches:* Turn the Bypass Handle to AUTO, then to EMERGENCY (window indicators show open contacts, then closed contact on emergency source.
4. Close the Isolation Switch. See "Isolation."

# Solid State Logic Circuit

The logic circuit is mounted on the inside of the enclosure door and is connected to the contactor by means of a cable terminating in a plug. An extender cable is offered if it is desired to mount the intelligence circuit a greater distance away from the switching panel than the standard cable allows.

Logic inner panels come in one size regardless of the type of switch and the number of accessories. The panel is punched for the maximum number of accessories that can be installed.

All Logic inner panels have power transformers for normal, and emergency source sensing. The number of transformers required depends upon the number of phases and the accessories requested.

A solid-state accessory cage for 8 plug-in printed circuit cards may be mounted above the main logic board.

The main logic board contains circuitry to provide an adjustable time delay (0-60 sec.) on normal to emergency, a fixed delay of 2.5-4 sec. on engine starting and an adjustable delay (1-30 min.) on emergency to normal. A light emitting diode is provided for each of these functions and lights after the circuit has performed its function.

Time Delay Engine Cooldown Accessory 4 (TDEC) function is controlled by a printed circuit card. The time range for Accessory 4C is 1-30 minutes. Cards for undervoltage, overvoltage, underfrequency and overfrequency are used interchangeably in Accessories 5, and 26C. Accessories 2E and 30 are controlled by discrete timing relays. Time Delay Engine Start Accessory 2E (TDES), because it functions when no power source is available, is supplied as a separate time delay relay.

**Note**

Upon initial energization of the transfer switch (if TDEC is used), the Engine Start will be closed until the time setting has elapsed. To avoid this, put the Engine Start switch in the OFF position for this period of time. This will only occur on the initial energization.

Each accessory plug-in card has screwdriver adjustment knobs. In addition, each card has a cap nut that covers the adjustment. Voltage cards and frequency cards are interchangeable. Empty card slots are covered by blank covers. Timing cards are key-interlocked to prevent improper insertion into voltage-frequency card slots.

# Optional Accessories

## Time Delays

**Acc. 2-A, E, F, G, H - TDES (Time Delay Engine Start)** - delays initiation on the engine start circuit in order to ignore momentary power outages or fluctuation. This timer begins timing when the normal source fails. After the timing cycle is complete its contacts close, and signal the generator set to start. The standard sequence is then resumed. See Figure 26. for location.

| Accessory | Adjustment Range | Max. CCW | Max. CW |
|---|---|---|---|
| 2-A | 3-20 sec. | 3 seconds | 20 seconds |
| 2-E | Fixed | 3 seconds | 3 seconds |
| 2-F | 20-240 sec. | 20 seconds | 240 seconds |
| 2-G | .5-6 sec. | .5 seconds | 6 seconds |
| 2-H | 3-30 min. | 3 minutes | 30 minutes |

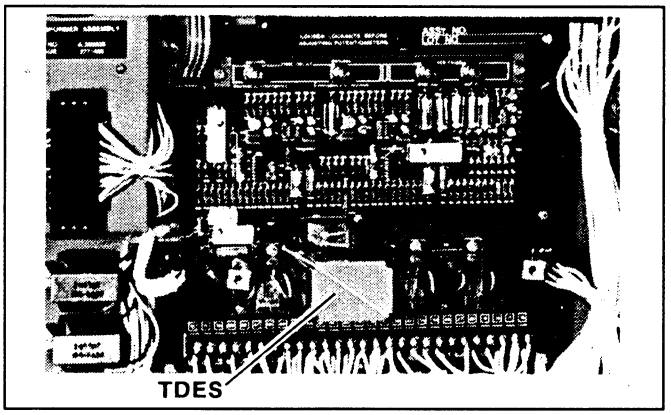



**Figure 26. Time Delay on Engine Start Location.**

These accessories listed from 4-C to 26-C utilize additional circuit boards in a mother board card cage. This card cage is bolted to the inner panel and uses its own interconnection cord to connect to the main circuit board. See Figure 27.

**WARNING**

**SHOCK HAZARD!** Disconnect harness plug before installing any accessories involving connection to transformer assembly primary terminals, or terminals 76, 77, 78, 79. Terminals are at line voltage!

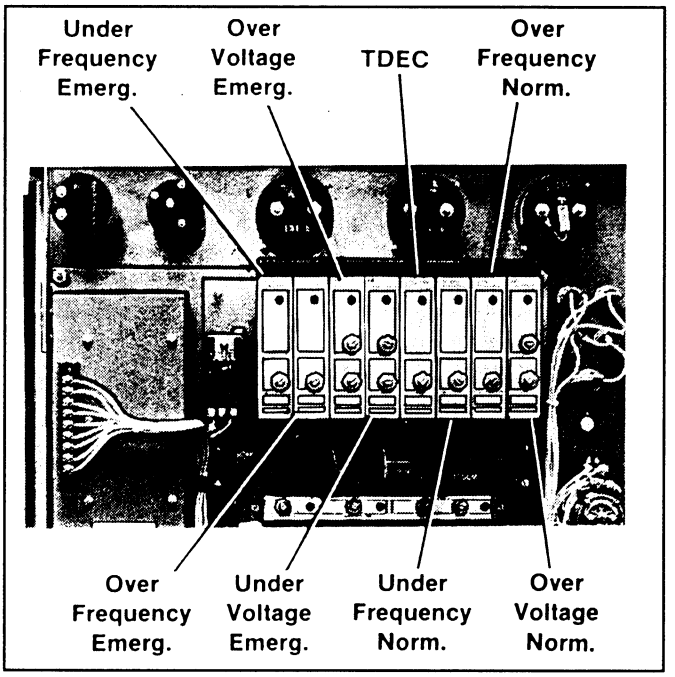



**Figure 27. Accessory Cards.**

❑ Acc. 4-C - TDEC (Time Delay Engine Cool Off) - allows the engine to run at no load for an adjustable (1-30 min.) time after transferring back to normal. Upon normal source restoration and retransfer to the normal source, the TDEC timing circuit will begin and keep the engine running for a cool-down period. See Figure 28. for connections.

❑ Acc. 4–D – (TDEC) Delay for Engine Cool–Off. Similar to accessory 4–C except set at 5 minutes. Does not require a logic case. It is a separate relay and socket. Cannot be used with accessory 5–A through 5–H.

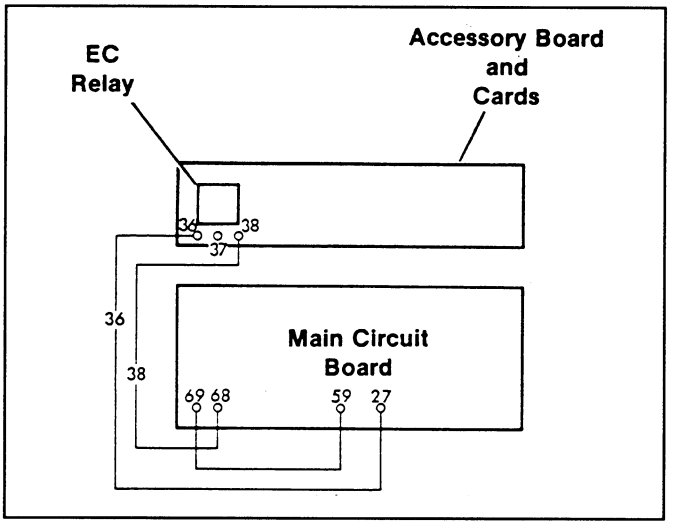



**Figure 28. TDEC Connections.**

## Source Monitors– Hz, Volts, Phase Sequence– Acc's 5 & 26

❑ Acc. 5–A – Underfrequency Card for Emergency Source (Adjustable 45–60 Hz) monitors generator frequency (one phase only) and will initiate transfer to the normal source if available.

❑ Acc. 5–C – Overfrequency Card for Emergency Source (Adjustable 50–65 Hz) monitors generator frequency (one phase only) and will initiate transfer to the normal source if available.

❑ Acc. 5–D, F – Undervoltage Card for Emergency Source (Adjustable – Factory set to dropout at 70% voltage and to pickup again at 90% voltage, unless otherwise specified) monitors generator voltage (one phase only or three phase only) and will initiate transfer to normal source if available.

❑ Acc. 5–E – Overvoltage Card for Emergency Source (Adjustable – Factory set to dropout at 115% voltage and to pickup again at 105% voltage, unless otherwise specified) monitors generator voltage (one phase only) and will initiate transfer to normal source if available.

❑ Acc. 5–H – Phase Sequence Relay will not permit transfer in either direction unless both sources have same phase rotation.

❑ Acc. 26–H – Underfrequency protection for the normal source. Adjustable from 45–60 Hz, monitors one phase only.

## Front Panel Indicators and Controls

These manual controls, if furnished, are connected on the enclosure door or shipped loose if so specified. Optional accessories can be added later in kit form. See Figure 29. for location of accessories on enclosure door.

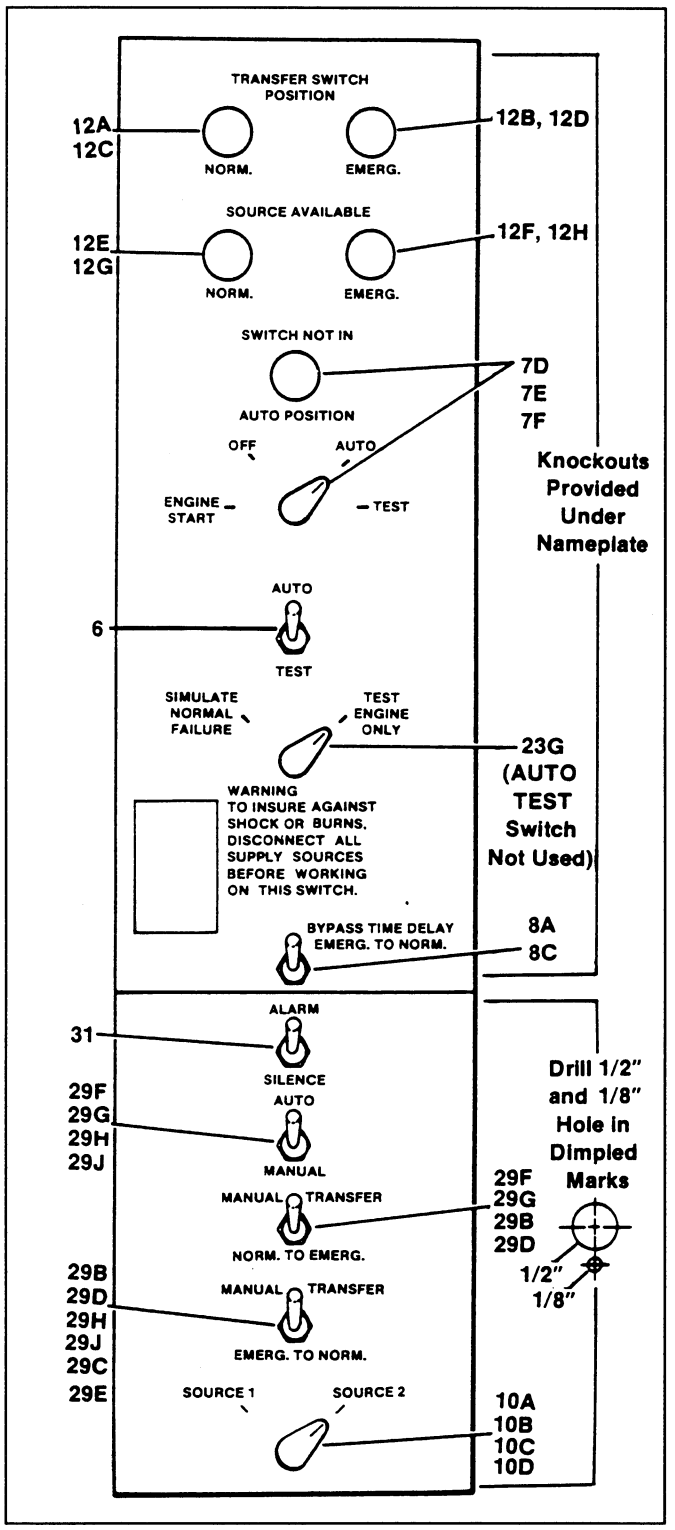



**Figure 29. Door-Mounted Accessories.**

❑ Acc. 6–A, C–H – Two–Position Switch, either momentary or maintained contact; toggle or key operated.

*Auto* – Enables automatic transfer switch operation.

*Test* – Simulates a normal source failure, for as long as the switch is held or left in the "Test" position. See Figure 30. for connections.

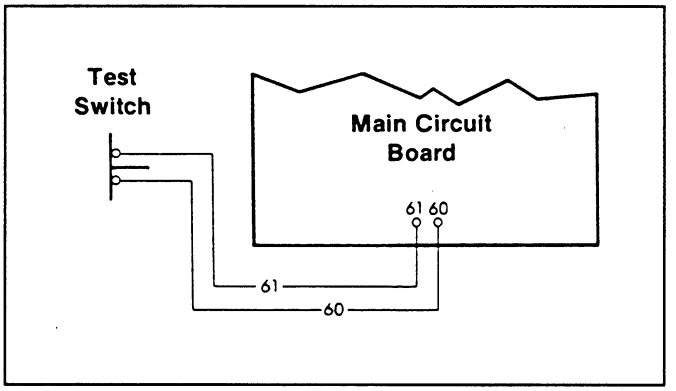


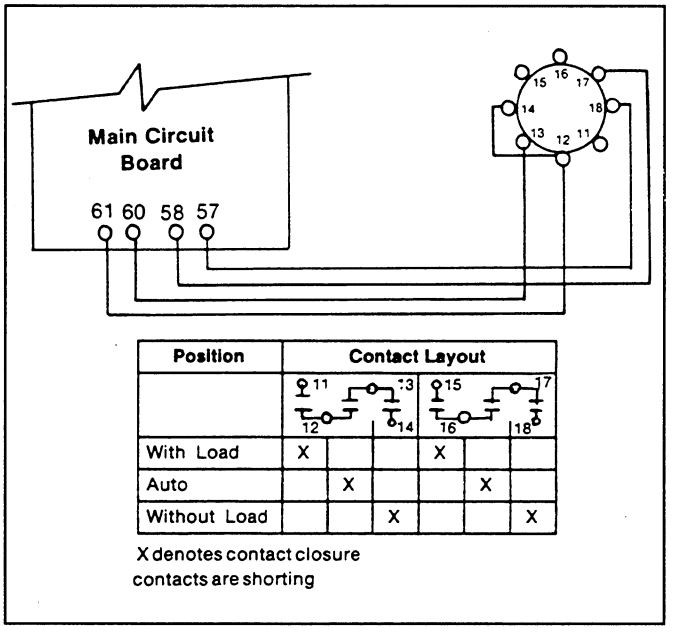

**Figure 30. Maintained Test Switch Connection.**

❑ Acc. 6–L, M – Three–Position Switch, selects one of three modes of operation:

*Auto*– Enables automatic transfer switch operation.

*Test with load*– generator set starts, and load is transferred to the generator set.

*Test without load*– generator set starts, and runs unloaded. See Figure 31. for connections.




| Position | Contact Layout | | | | | |
|---|---|---|---|---|---|---|
| | 11 12 | 13 14 | | 15 16 | 17 18 | |
| With Load | X | | | X | | |
| Auto | | X | | | X | |
| Without Load | | | X | | | X |

X denotes contact closure
contacts are shorting

**Figure 31. Three–Position Switch Connection.**

## Operation Mode Selector Switch With Lamp

❑ Acc. 7–C–F – Four–Position Switch With Lamp, selects one of four operation modes. The

lamp lights to show that the switch is not in the AUTO position.

*Engine Start* – Closes the engine–start circuit to test run generator set. The transfer switch will not transfer, unless the normal source fails.

*Off*– De–energizes control circuits, and opens the engine–start circuit. The transfer switch will not operate. If the generator set is started locally (at the generator set controller) and the generator line circuit breaker is closed, the switch will transfer to emergency.

*Auto*– Enables automatic transfer switch operation.

*Test*– Simulates normal source failure. See Figure 32. and 33. for connections.

**Note**

Be sure to connect all (8) switch contact jumpers. Remove standard auto–test switch.

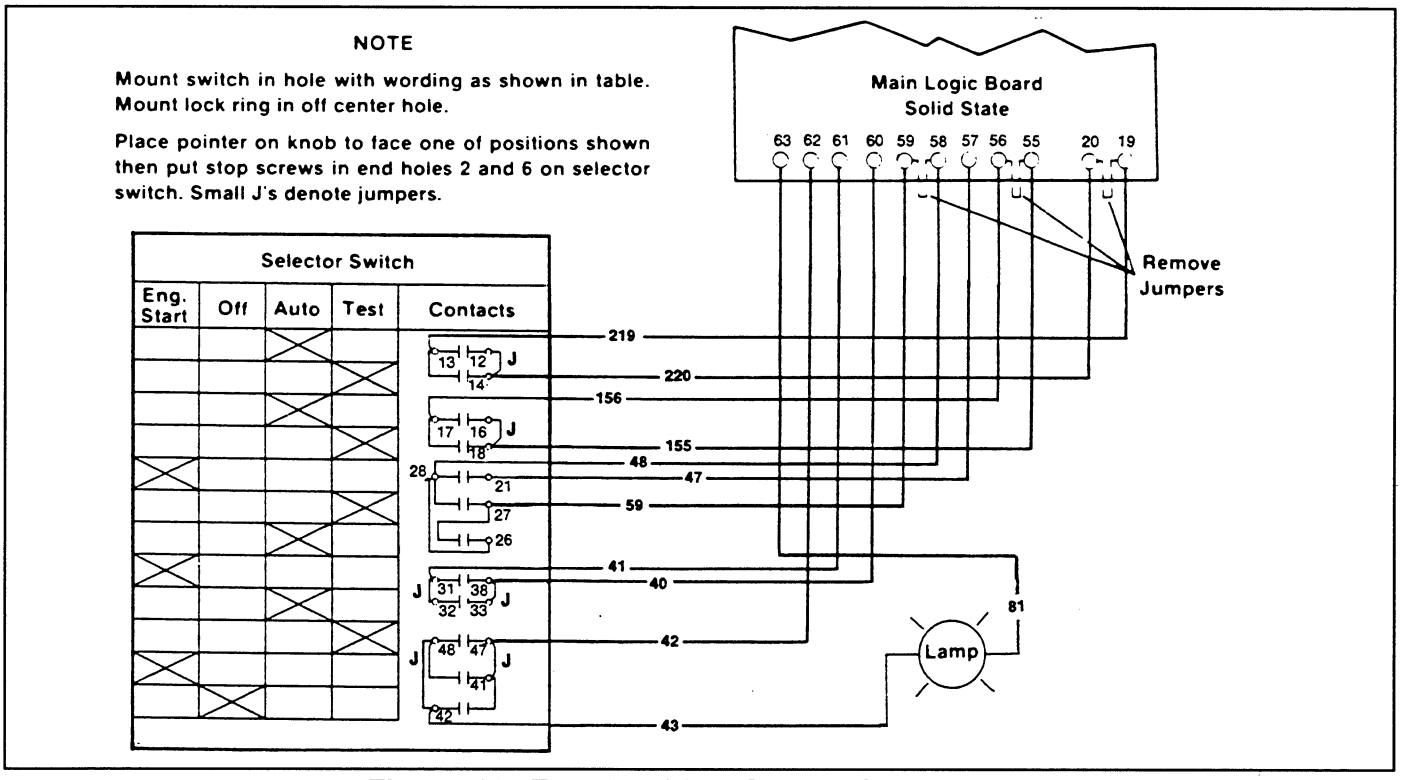



**Figure 32. Four Position Switch Connection.**

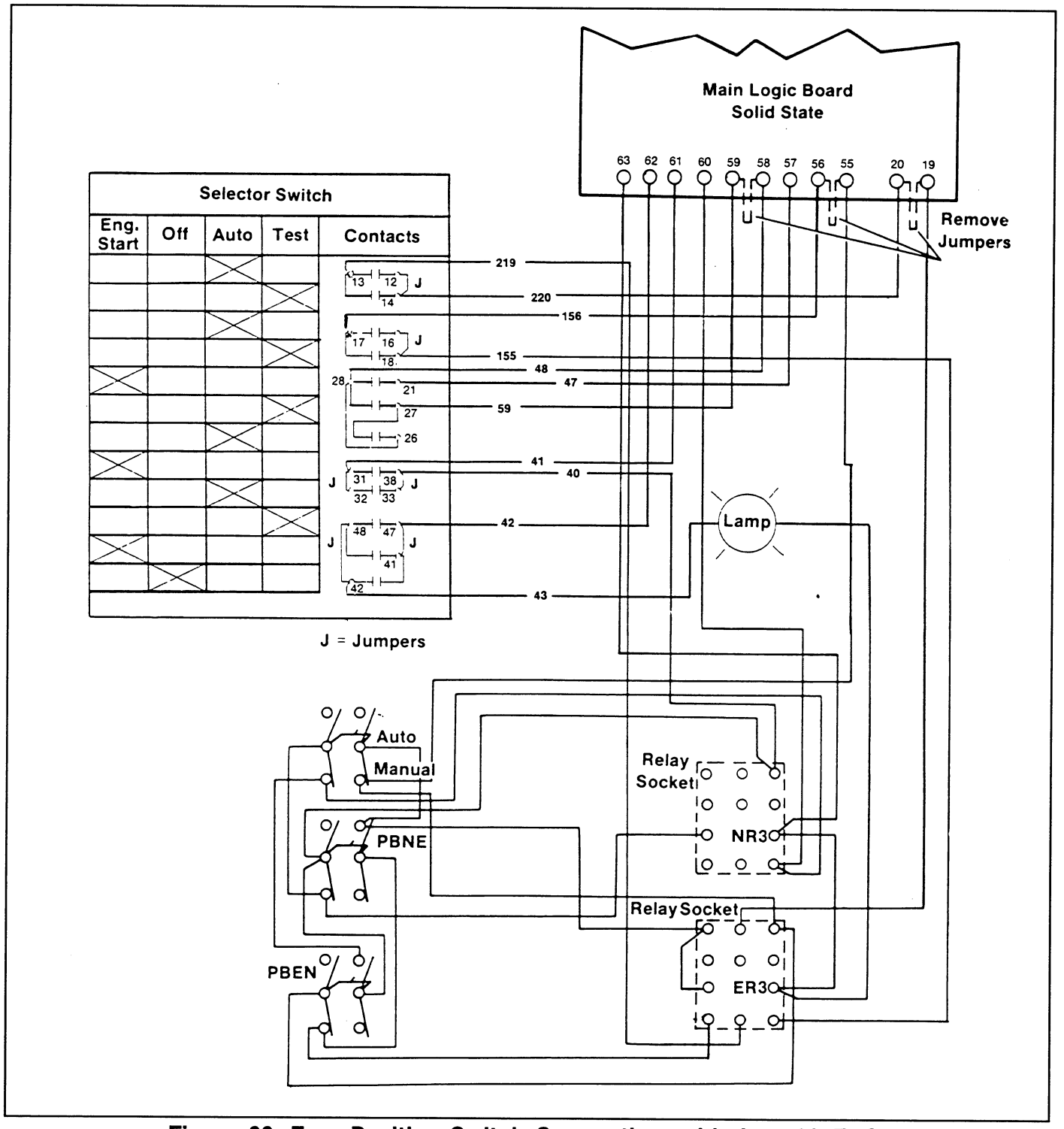



**Figure 33. Four Position Switch Connection, with Acc. 29–F, G.**

## Time Delay Override Switch– Acc 8

❑ Acc. 8–A, C – Bypass Time Delay, Emergency to Normal may be used to override the standard Time Delay Emergency to Normal in transferring to the normal source. See Figure 34. for connections.

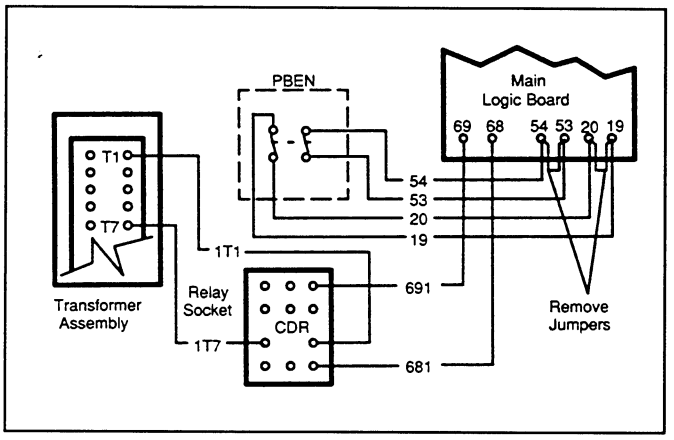



**Figure 34. Bypass Switch Connection.**

## Preferred-Source Selector Switches -Acc. 10

❑ Acc. 10-A-F - Source Selector Switch allows selection of either source as the preferred source. The preferred source is the one that the switch will transfer to, if that source is available. Sources may both be utilities, generator sets, or utility and generator set.

## Manual Operation Switches- Acc. 29

❑ Acc.29-B, D - Switch operation from emergency to normal, after normal source is available and time delays have completed timing.
Switch operation from normal to emergency, after emergency source is available and time delays have completed timing. See Figure 35. for connections. Relay ER4 maintains the engine-start signal when the transfer switch is in the emergency position.

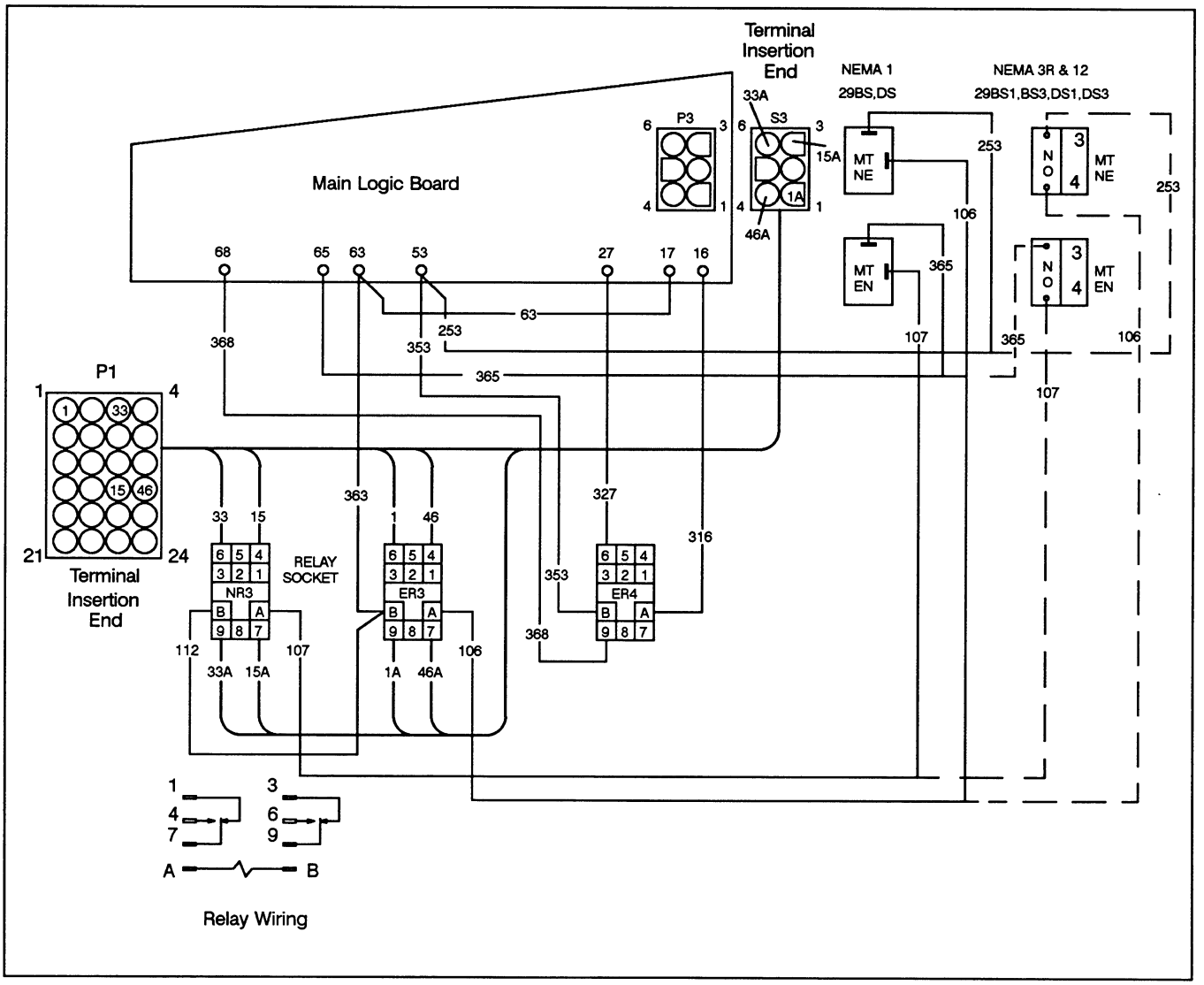



**Figure 35. Manual (PBEN, PBNE) Switch 29-B, D Connections.**

❑ Acc. 29–C, E – Switch operation from emergency to normal, after normal source is available and time delays have completed timing.

See Figure 36. for connections.

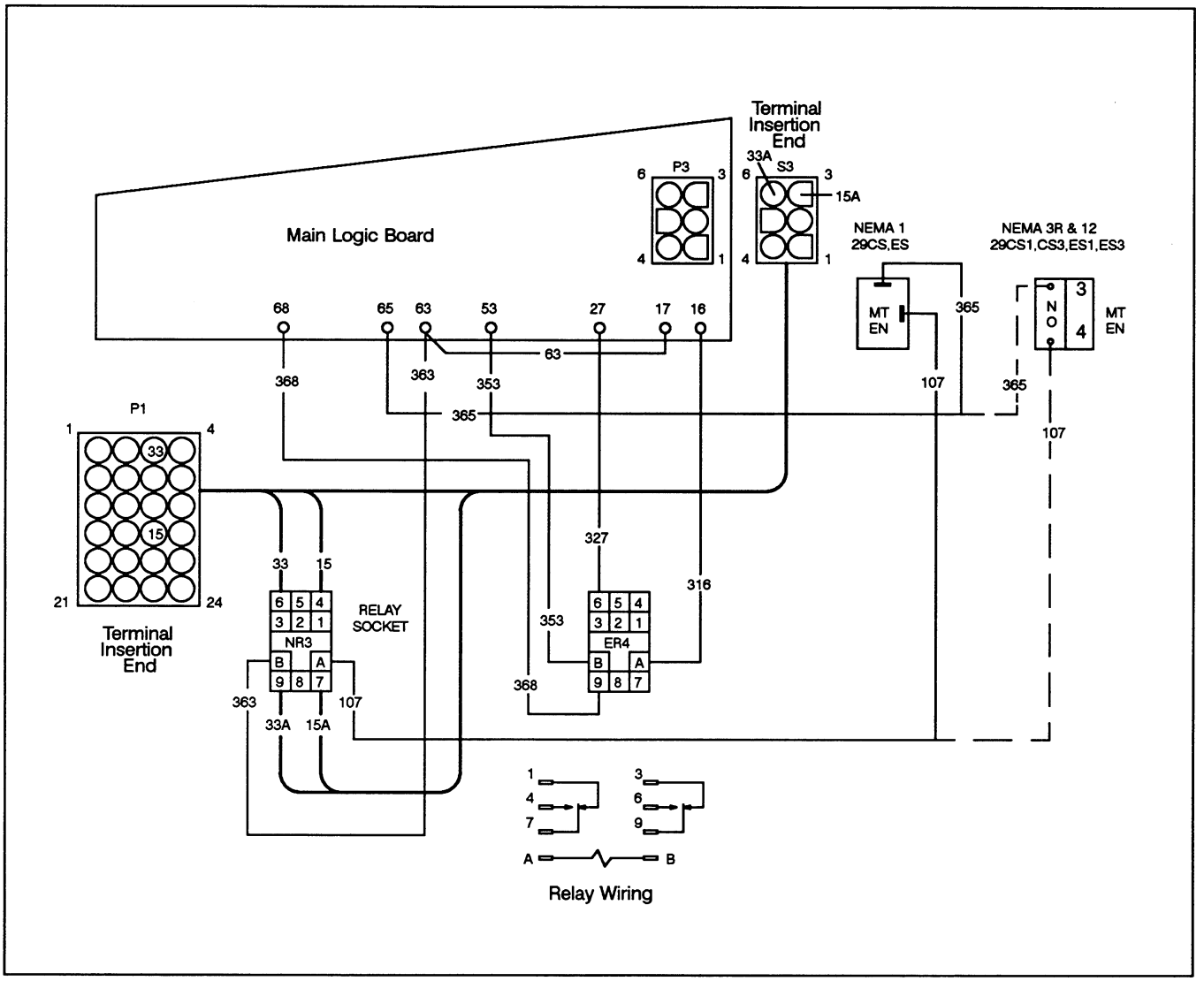



**Figure 36. Manual (PBEN) Switch 29–C, E Connections.**

❑ Acc. 29–F, G – Switch operation from emergency to normal, after normal source is available and time delays have completed timing.

Switch operation from normal to emergency, after emergency source is available, and time delays have completed timing.

The automatic–manual switch allows either automatic, or manual switch operation. see Figure 37. for connections.

Relay ER4 maintains the engine–start signal when the transfer switch is in the emergency position.

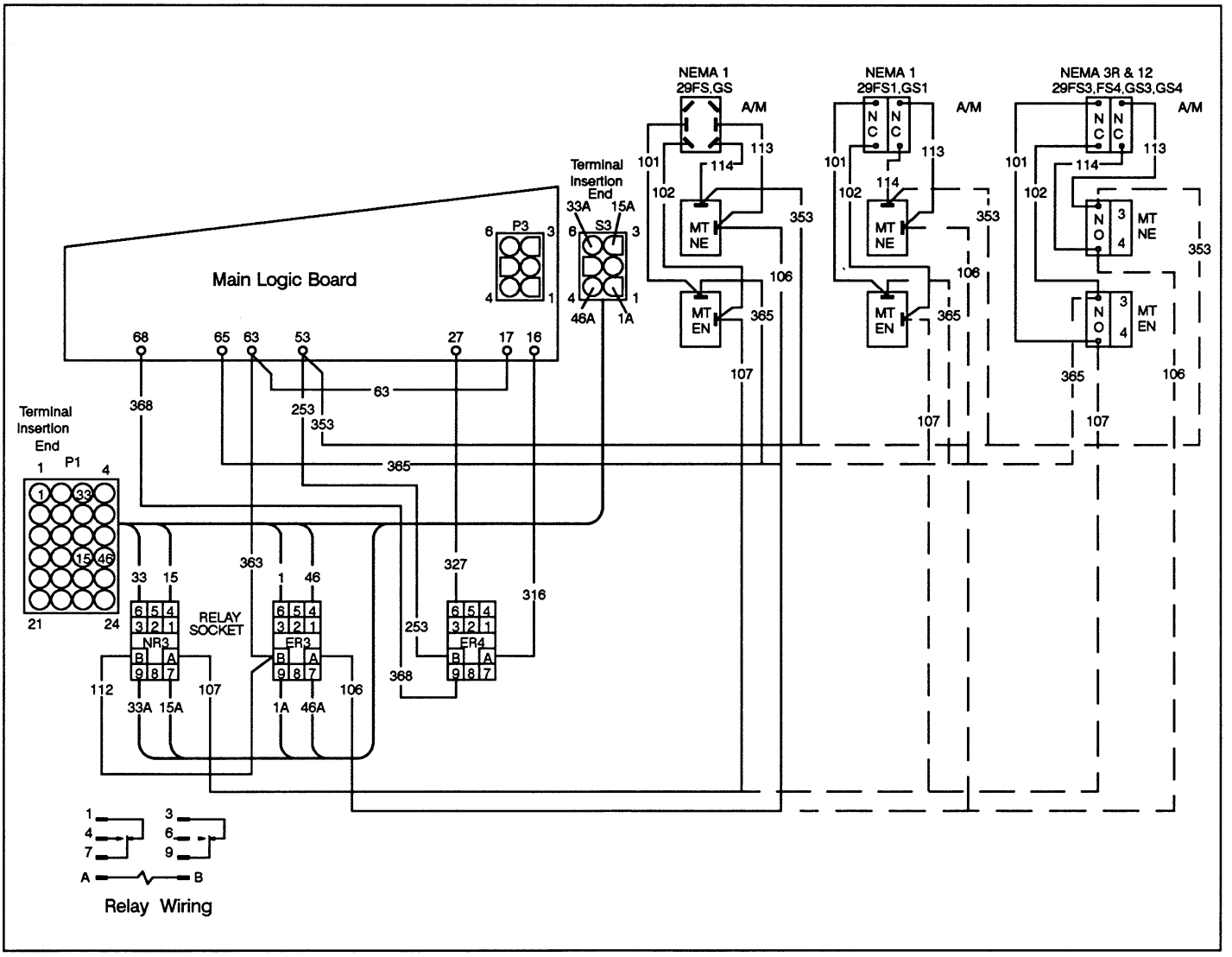



**Figure 37. 29–F, G Connections.**

❑ Acc. 29–H, J – Switch operation from emergency to normal, after normal source is available and time delays have completed timing. The automatic–manual switch allows for either automatic, or manual, operation of the transfer switch. See Figure 38. for connections.

Relay ER4 maintains the engine–start signal when the transfer switch is in the emergency position.

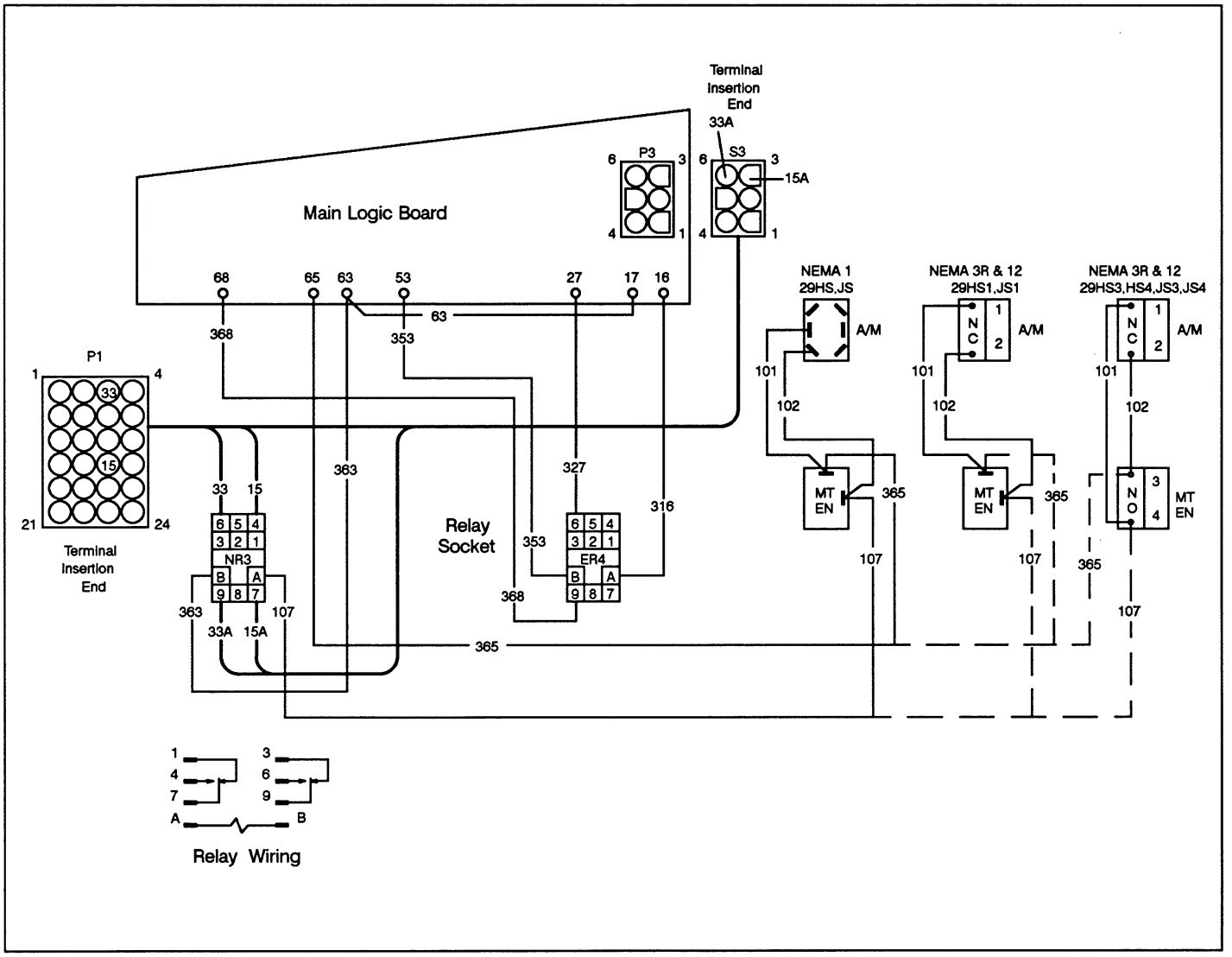



**Figure 38. Manual (PBEN) Switch 29–H, J Connections.**

❑ Acc. 29–O, P – Switch operation from emergency to normal, with switch override circuit, plus a two–position selector switch for automatic or manual operation. See Figure 39. for connections.

*Normal Source Restoration*

When the normal source is accepted by the voltage sensing circuit, depress the Push Button Emergency to Normal (PBEN) Switch. The NR relay energizes. The standard sequence of operation is resumed.

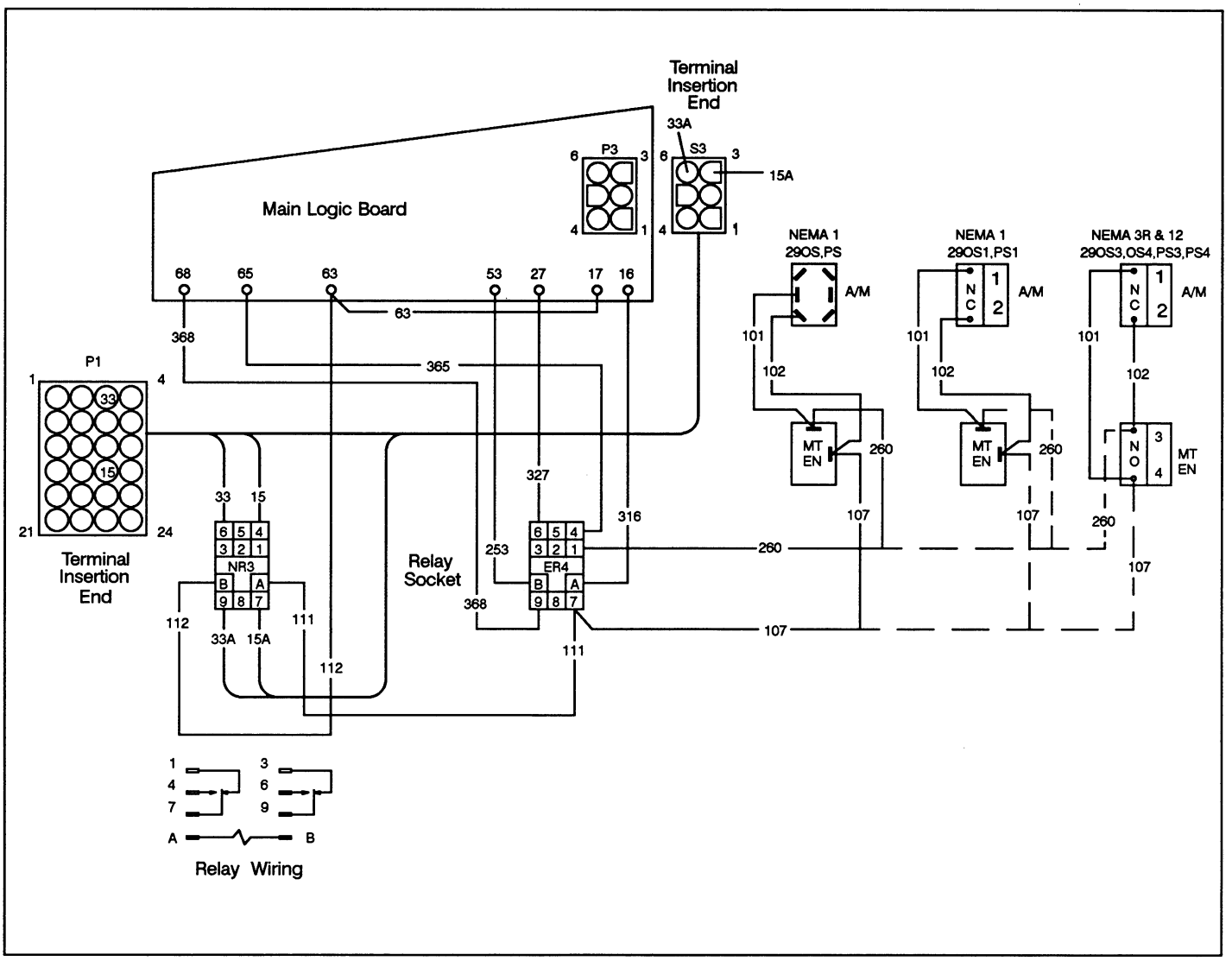



**Figure 39. Manual (PBEN) Switch 29–O, P Connections.**

❑ Acc. 29–Q, R – Switch operation from emergency to normal and normal to emergency with switch override circuit. See Figure 40. for connections.

*Normal Source Failure*

After the generator set has started, generator voltage is available and time delays have elapsed, momentarily depress the manual Normal to Emergency (PBNE) Switch. The standard sequence will then be resumed.

*Normal Source Restoration*

When normal source returns and is accepted by the voltage sensing circuit, manually transfer to the normal source after time delays have elapsed.

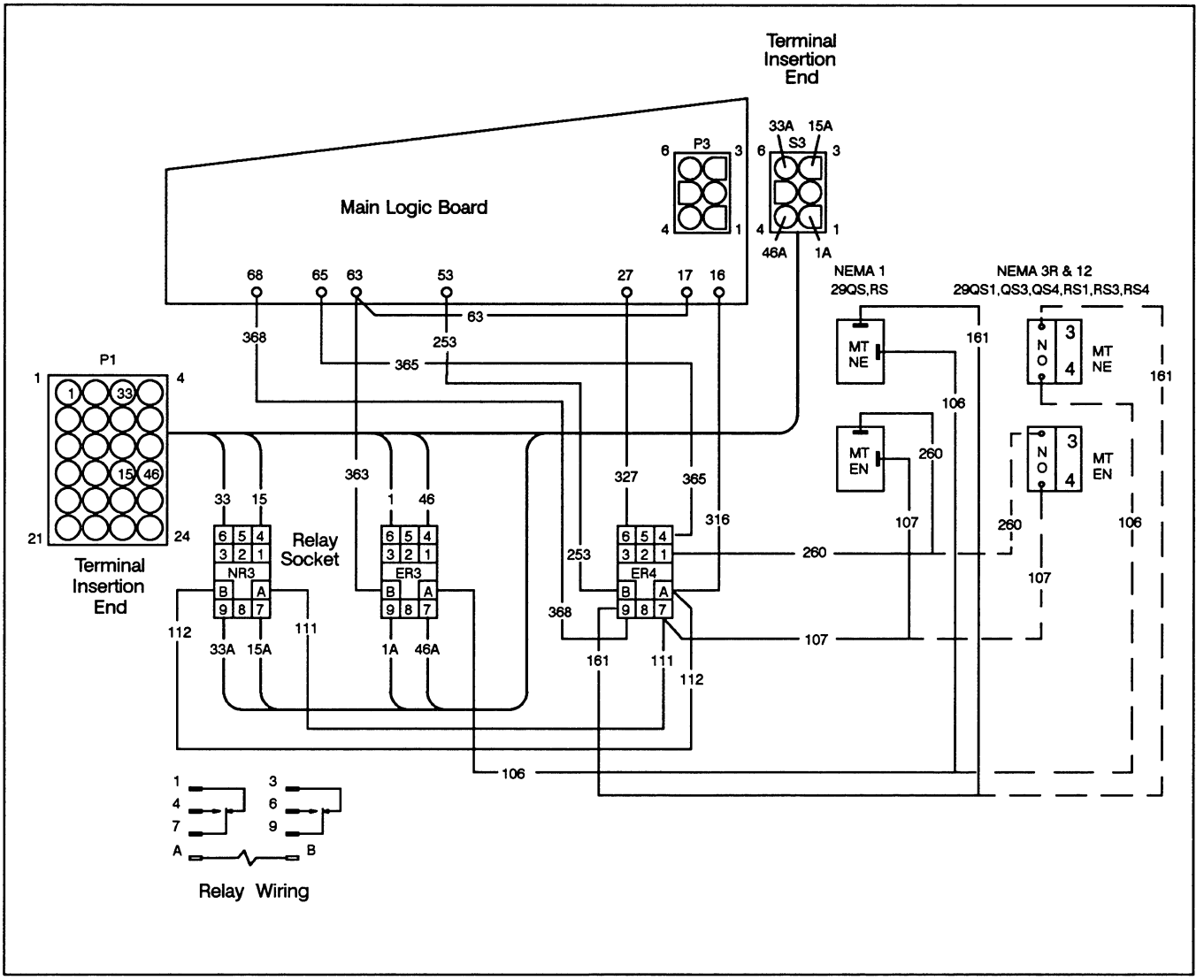



**Figure 40. Manual (PBEN, PBNE) Switch, 29–Q, R Connections.**

❑ Acc. 29–S, T – Switch operation from emergency to normal and normal to emergency, with switch override circuit. Plus a two–position selector switch for automatic or manual operation. See Figure 41. for connections.

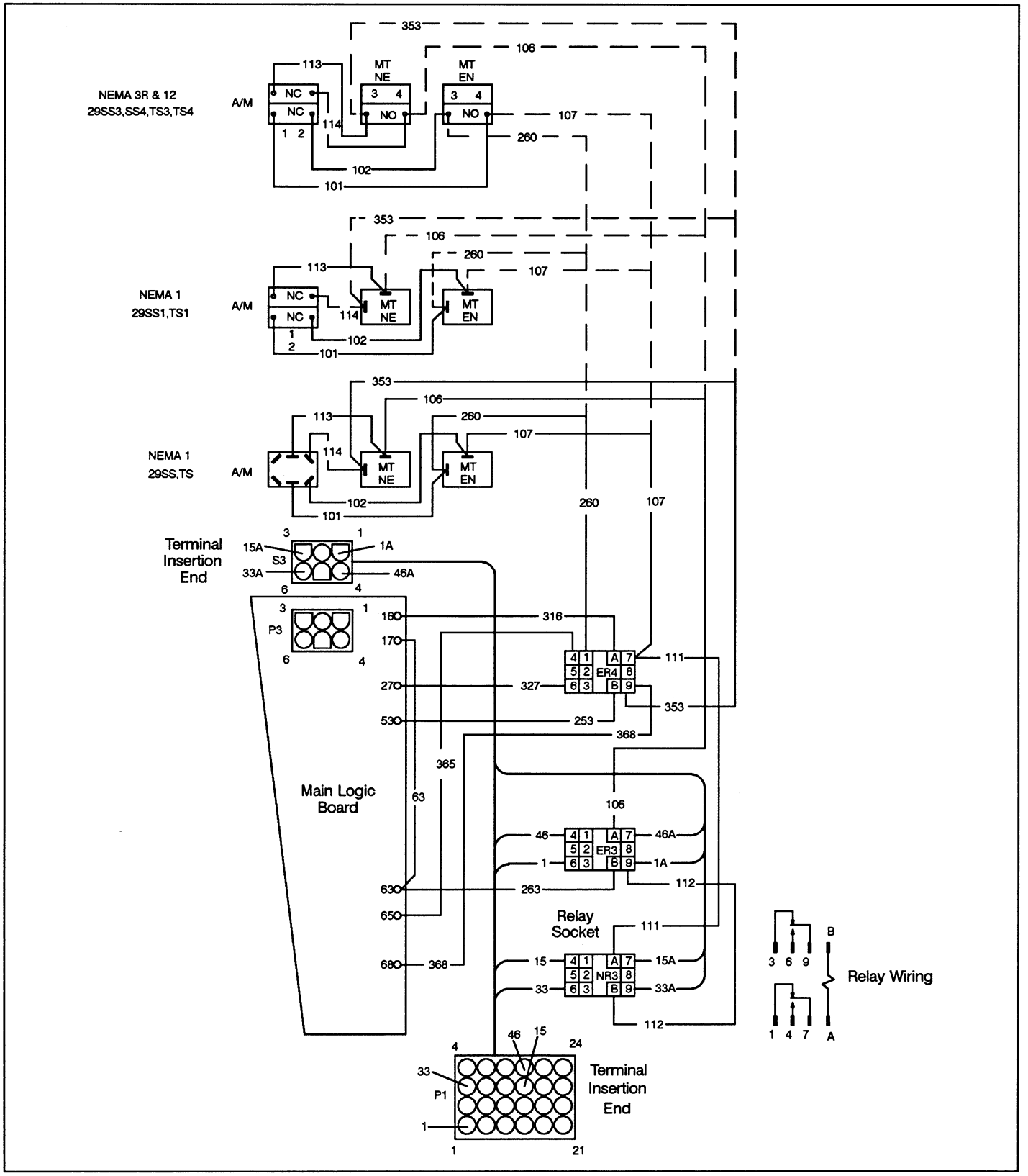



**Figure 41. 29–S, T Connections.**

❑ Acc. 29–U, V – Switch operation from emergency to normal, with switch override circuit. See Figure 42. for connections.

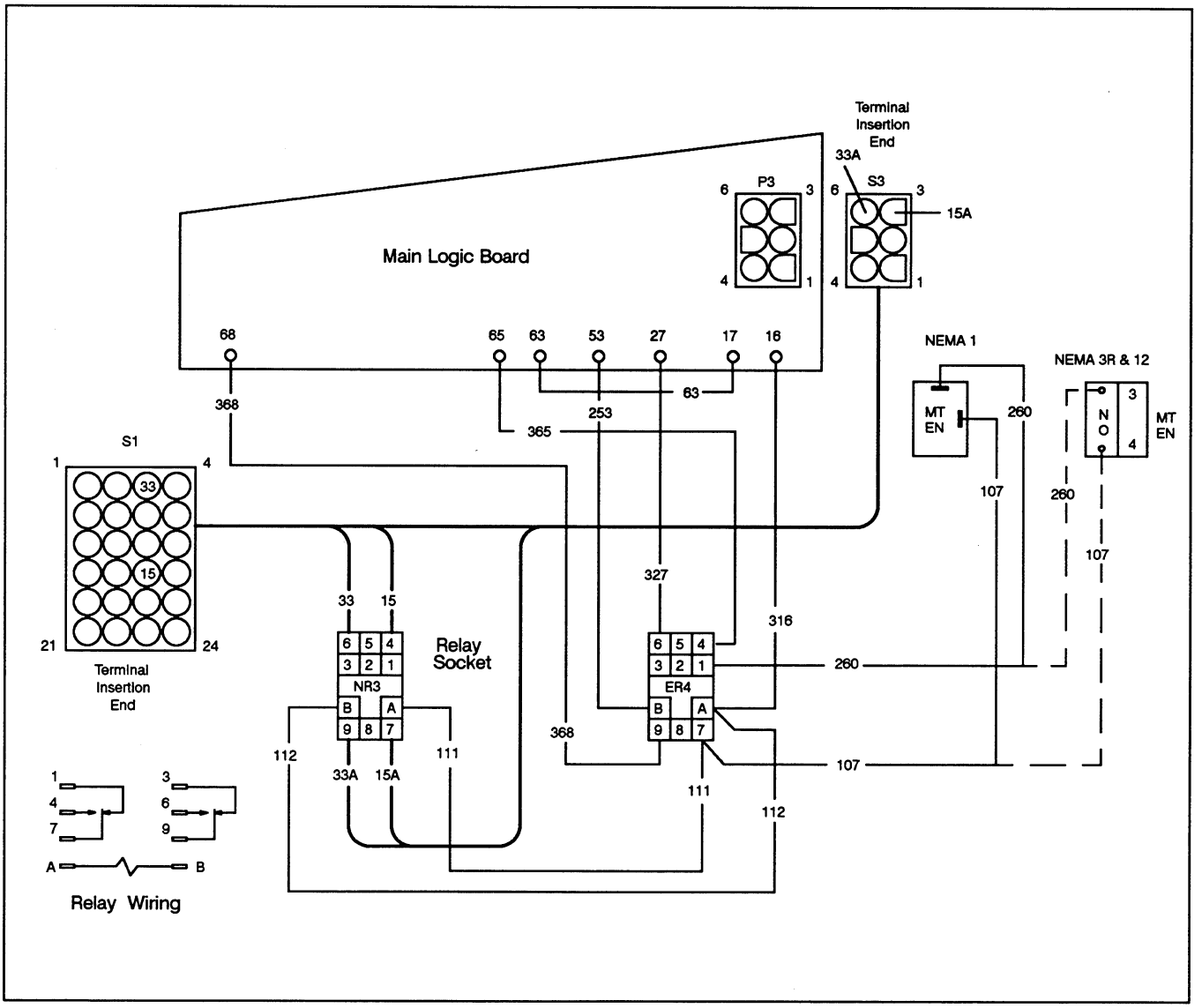



**Figure 42. 29–U, V Connections.**

## Panel Lamps– Acc. 12

All panel lamps if furnished, are mounted on the Transfer Switch enclosure door or shipped loose as specified. See Figures 43. thru 46. for connections.

❑ Acc. 12–A – Normal Position, light to show transfer switch connected to normal source. See Figure 43. for connections.

❑ Acc. 12–B – Emergency Position, lights to show transfer switch connected to emergency source. See Figure 44. for connections.

❑ Acc. 12–E – Normal source, lights to show normal source available. See Figure 45. for connections.

❑ Acc. 12–F – Emergency Source, lights to show emergency source available. See Figure 46. for connections.

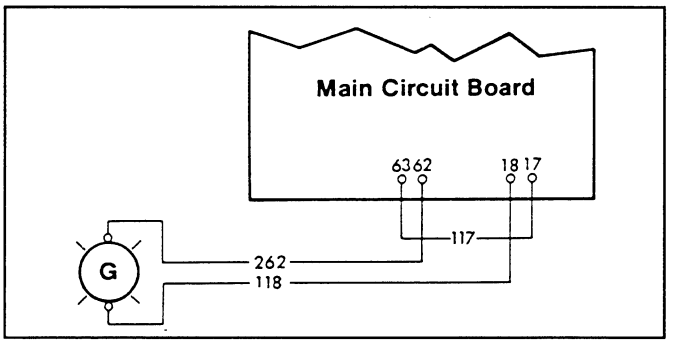



**Figure 43. 12–A Connections.**

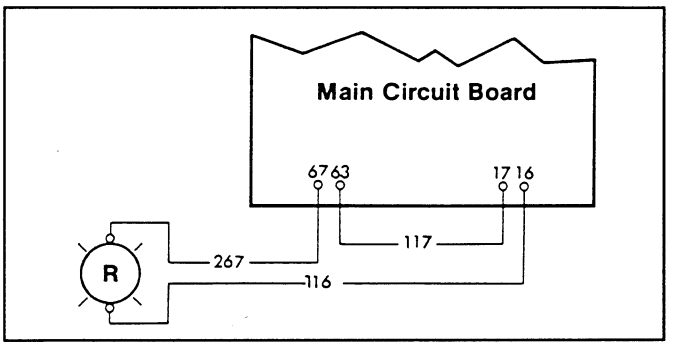



**Figure 44. 12–B Connections.**

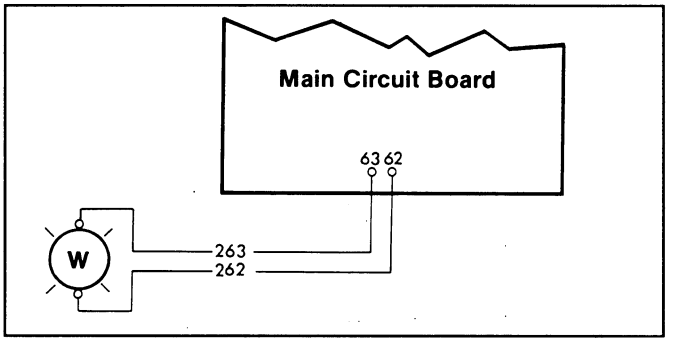



**Figure 45. 12–E Connections.**

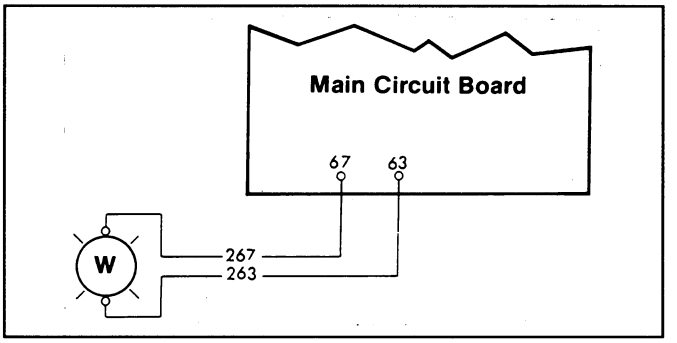



**Figure 46. 12–F Connections.**

❑ Acc. 31–A, B – Audible Alarm–Silence Switch alarm sounds when transfer switch is in the emergency position. Switch is used to silence alarm. Alarm is mounted on outside of enclosure, with switch nearby. See Figure 47. for connections.

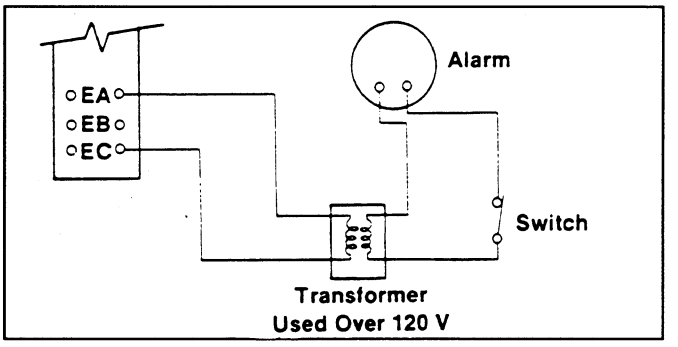



**Figure 47. Audible Alarm Connections.**

## Auxiliary Relay Contacts- Acc. 14

These relay contacts operate from the voltage source and, are energized as soon as normal or emergency power is available. They are located on the left hand side of the inner panel mounted on the door. Contacts are rated for 10 Amps, 1/3HP at 120VAC.

❑ 14-C Three Sets of Contacts Available on Normal Side. See Figure 48. for connections.

❑ 14-D Three Sets of Contacts on Emergency Side. See Figure 49.

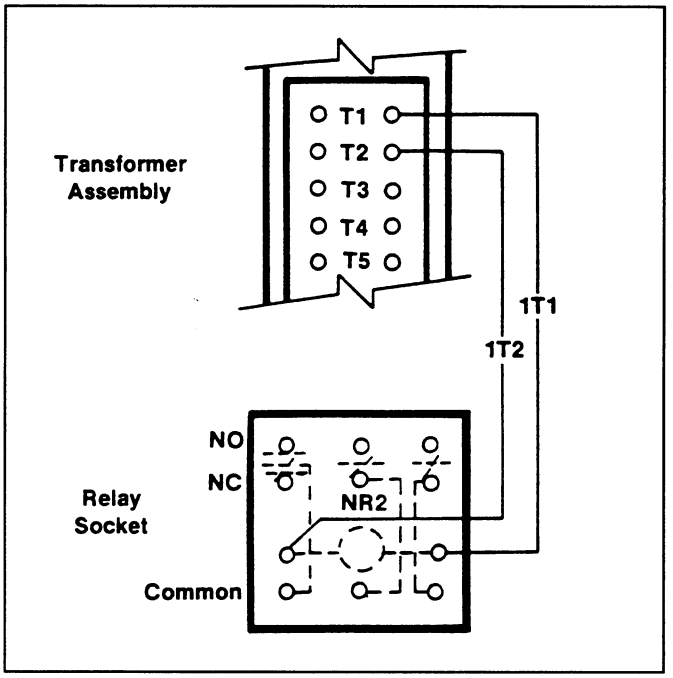



**Figure 48. 14-C Connections.**

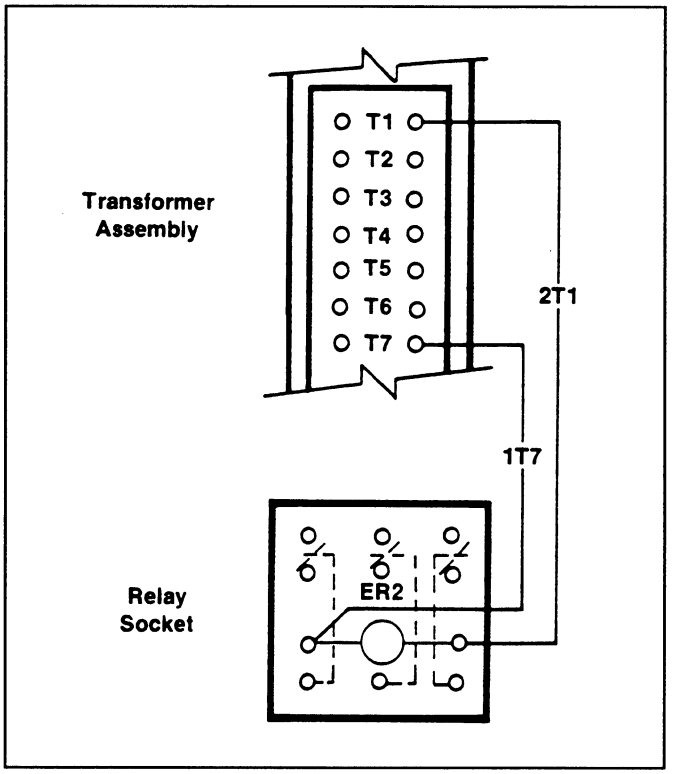



**Figure 49. 14-D Connections.**

## Contactor-Main Shaft Auxiliary Contacts- Acc. 15

One Acc. 15-A is supplied standard on 600-Volt-class transfer switches.

Accessory 15A is mounted on the transfer switch. Connect external circuits to the terminals indicated. The location of the auxiliary contacts varies according to the Amp size of the transfer switch. One set of auxiliary contacts is closed when the transfer switch is connected to the normal source. One set is closed when the transfer switch is connected to the emergency source. See tables following.

**WARNING**

**SHOCK HAZARD!** Do not make any connections before de-energizing both the normal and emergency sources. Open normal and emergency source circuit breakers.

Auxiliary Contact Terminals, 150-400-Amp

| Contact Sets | Closed On Normal | Closed on Emergency |
|---|---|---|
| standard | TB2 5-6 | TB2 3-4 |

Auxiliary Contact Terminals, 600-800-Amp

| Contact Sets | Closed On Normal | Closed on Emergency |
|---|---|---|
| standard | TS 12 -13 | TS 10-11 |
| 1st optional | TS 31-32 | TS 29-30 |
| 2nd optional | TS 35-36 | TS 33-34 |
| 3rd optional | TS 39-40 | TS 37-38 |

**Note**

Contacts 10 and 11 are not to be used if accessory 23-D or G is selected (accessory connected at terminals 74 and 75 of logic panel terminal strip).

**Note**

Contacts 16, 17 and 18 are not to be used if accessories 12-A, B, C or D have been selected (accessories connected at terminals 16, 17 and 18 of main logic board).

**Note**

Contacts 14 and 15 are connected to engine-start circuit, and should not be used for auxiliary connections.

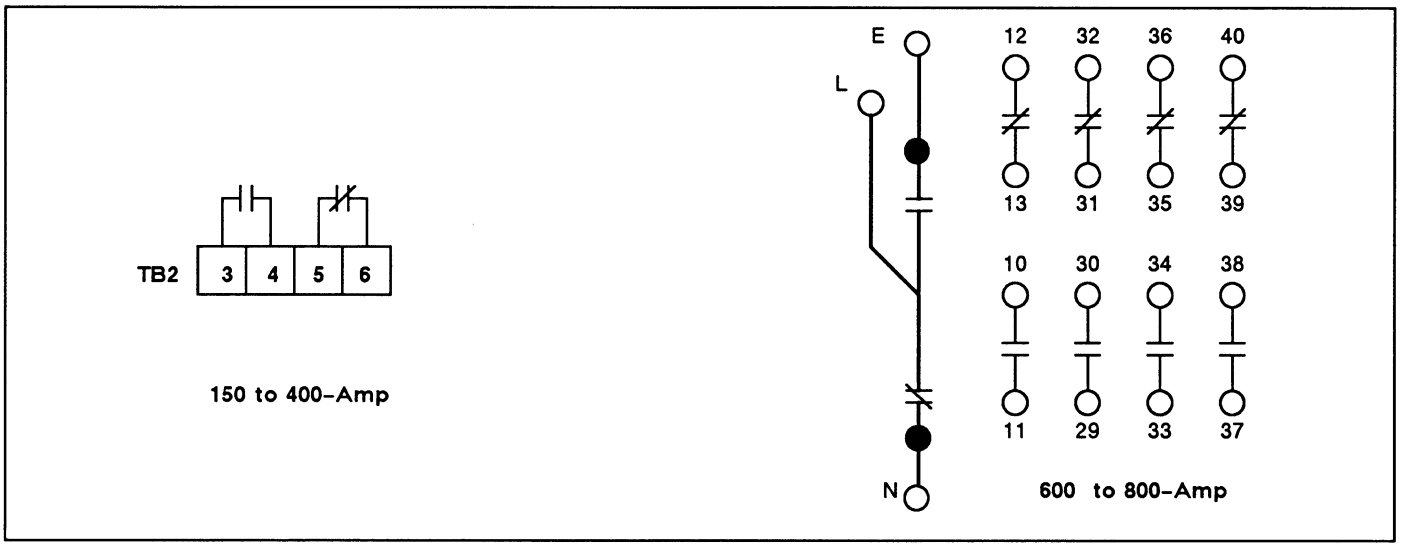



**Figure 50. Contactor Auxiliary Locations.**

## Generator Set Exercising Timer -Acc. 23

This timer, if furnished, is used for periodic exercising of the emergency generator set. This timer is factory set for a 30 minute minimum exercise period once a week. The generator set should be exercised under load once a week for a minimum of 30 minutes. Optional Accessory 23 can be added later in kit form. Include Serial Number and Switch Number of Transfer Switch when ordering kit.


**Shock Hazard!** Disconnect harness plug before installing any accessories involving connection to transformer assembly primary terminals 76, 77, 78,and 79. Terminals are at line voltage!

❑ Acc. 23–C – Timer does not simulate a normal source failure. The Transfer Switch is not affected. The generator set is signalled to run unloaded for the set time period.

❑ Acc. 23–D – Timer simulates a normal source failure. The Transfer Switch transfers load to the emergency generator during the exercise period.

**Note**

Accessories 23–D and G have an override circuit to return switch to normal should emergency source fail during an exercise run. Normal LED's on logic cards will stay off until exerciser completes timing.

*To Adjust (see Figure 52.):*
*Set Exercise Day & Period*

1. Decide what day (or days) of the week to exercise the plant.
2. Remove the screw from the index cam lobe marked with the decided day.
3. Hold 24–hour dial from turning and with other hand unscrew the thumbnut by turning it clockwise. Remove dial from center arbor–shaft.
4. Set the ON tripper to the time of day when exercise period should start. Set the OFF tripper to the time of day when the exercise period should stop.
5. On the "last" tripper of the day, insert the switch cutout index pin on the bottom side of the tripper.
6. The index cam has 14 day positions. Turn the index cam counterclockwise until the desired exercise day is under the black tip of the cut-off switch lever. Thread a supplied screw into each position hole except the position(s) for the desired exercise day(s).
7. Replace the dial on the center arbor–shaft, leaving the thumbnut untightened. Turn the dial clockwise until the actual time of day aligns with the time pointer. Hand tighten the thumbnut, while holding the dial from turning.

*Troubleshooting – Figures 51., 52.*
If Acc. 23–C timer contact 3–5 does not close during the set exercise period, the engine–generator set will not be signalled to run. If the contact remains closed beyond the set exercise period, the generator set will continue running. In either case, Acc. 23–C timer is malfunctioning.

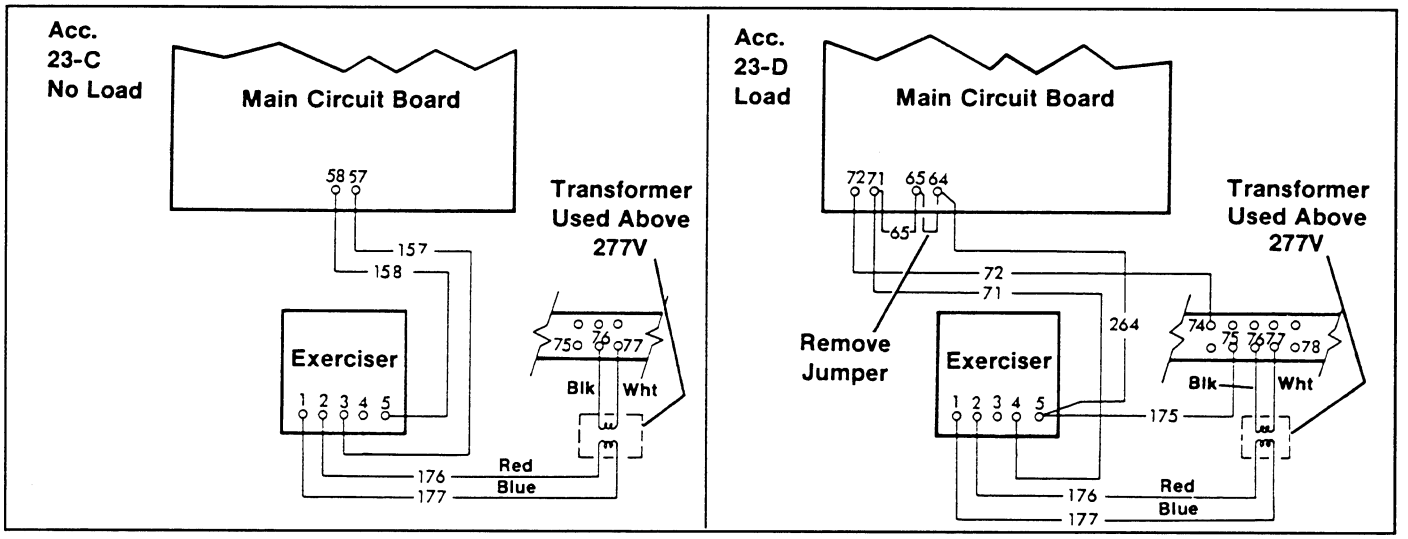



**Figure 51. Exercise Timer Connections.**

Note: Dial turns clockwise.
Day-of-week index cam revolves in 14 days.

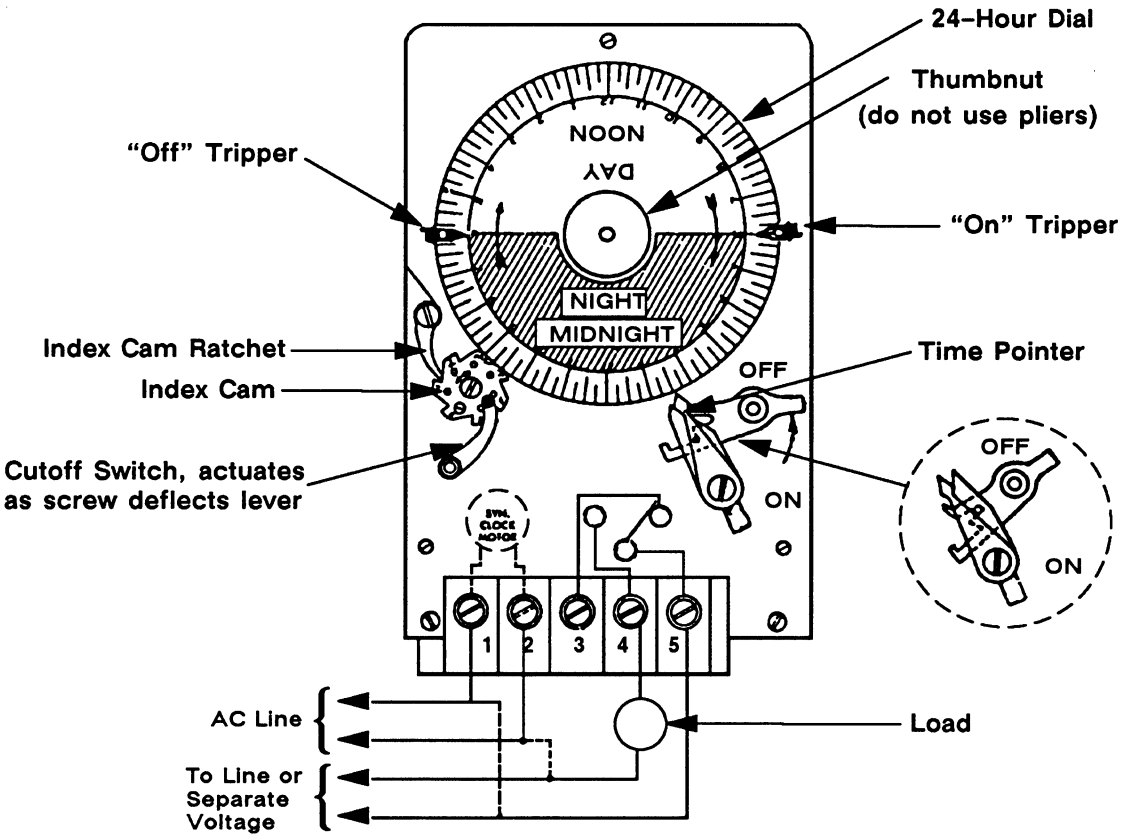



**Figure 52. Exercise Timer (Acc. 23) Connections & Setting.**

If Acc. 23–D timer contact does not open during the set exercise period, the engine–generator plant will not be signalled to run and the load will not be transferred to the emergency source. If the contact remains open beyond the set exercise period, the plant will continue running and the load will remain connected to the emergency source. Immediate retransfer may be accomplished by manually opening the emergency source circuit breaker. Make sure that full rated normal voltage is available before doing this. In either case, Acc. 23–D timer is malfunctioning.

❑ Acc. 23–G – Plant Exerciser with selector switch to select a simulation of power failure or engine test mode. Selects a 23–C or 23–D type of operation. See Figure 52.

## Battery Charger– Acc. 24

Kohler automatic, adjustable–float battery chargers are mounted below the main circuit board on the enclosure door. Select charger by output, DC voltage. See Figures 53. and 54. for connections.

**WARNING**

**Shock Hazard!** Terminals 78 and 79 are at line voltage. Disconnect harness plug before installing charger.

❑ Acc. 24–A 12–Volt output

❑ Acc. 24–B 24–Volt output

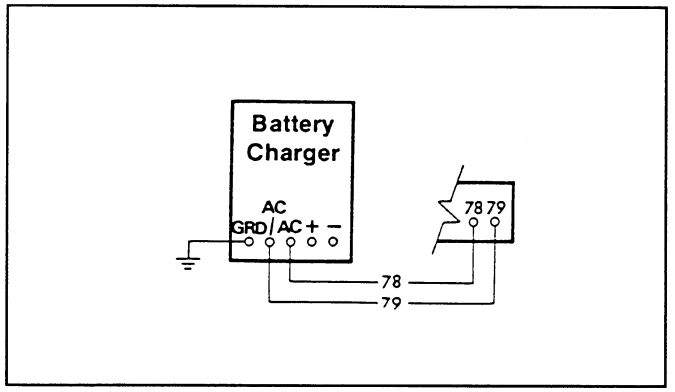



**Figure 53. 24-A Connections.**

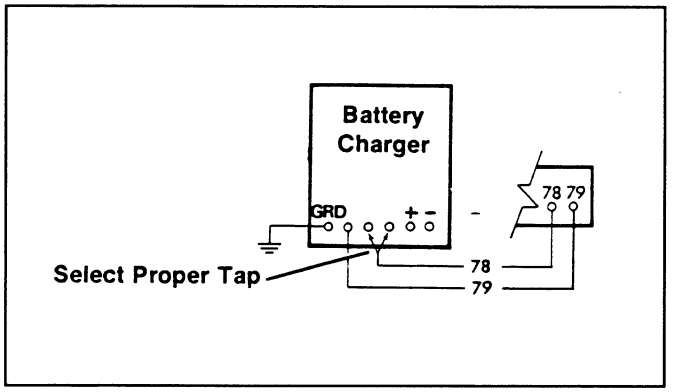



**Figure 54. 24-B Connections.**

## Area Protection with Override -Acc. 26-D

These accessories are for use with an external area-protection panel (provided by others). Load will transfer to emergency upon an open contact signal from the area protection panel. In the event that the emergency source fails and the normal source is present, an override circuit will bypass the area protection panel signal and re-transfer the switch to the normal source. See Figures 55. thru 57.

**WARNING**

**Shock Hazard!** Disconnect harness plug before installing any accessories involving connection to transformer assembly primary terminals 76, 77, 78, and 79. Terminals are at line voltage!

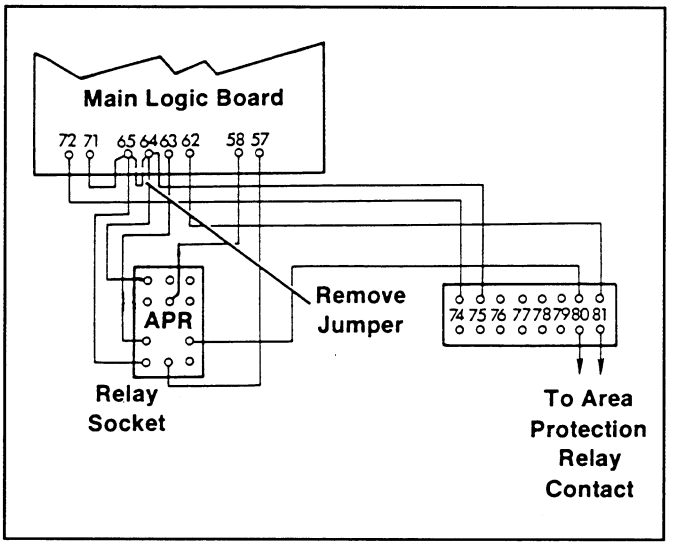



**Figure 55. Area Protection Without Accessories.**

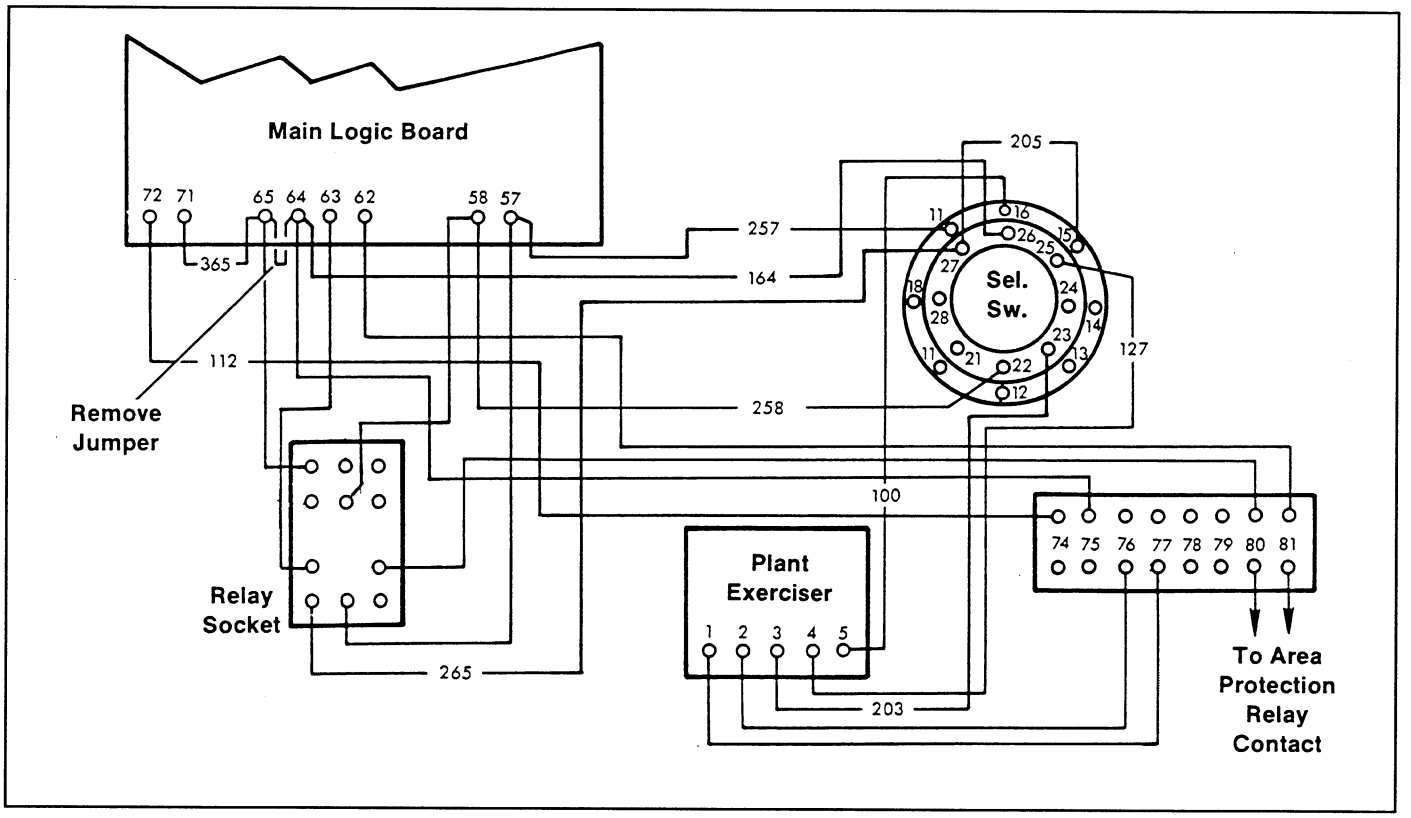



**Figure 56. Area Protection with Acc. 23-G.**

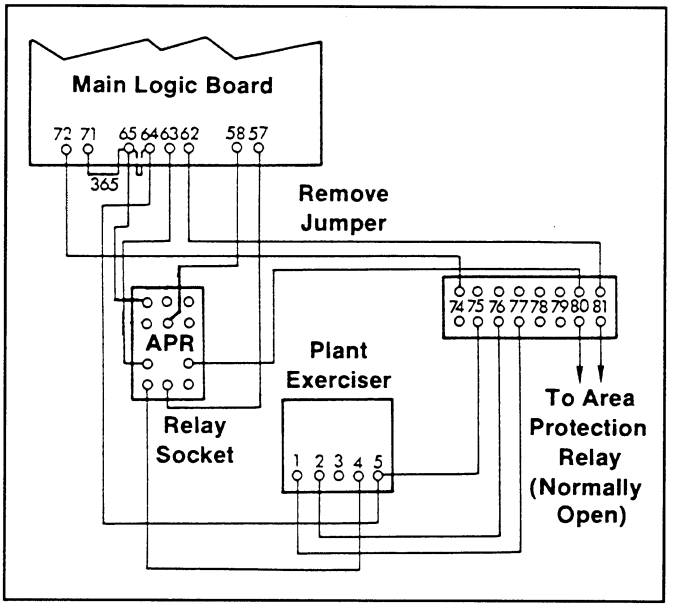



**Figure 57. Area Protection with Acc. 26-D.**

1. The Area Protection Control initiates closing of the engine starting contact.
2. Closing of the engine starting contact activates the engine starting control to start the generator set.
3. As soon as the generator set starts, the emergency lights go on.
4. When the generator set is up to proper voltage and frequency, the automatic transfer switch transfers the connected load to the generator set.
5. An extra contact on Relay APR can be used to help provide an audible or visual signal to indicate which circuit has shorted or failed.
6. The engine-generator set will keep running, and the transfer switch will remain connected to the generator set even though the normal source is available. When the fault has been corrected and the circuit breaker has been reclosed, then the supervisory relay is energized, the transfer switch returns to its normal position, and the generator set shuts down.
7. If the generator set should fail while it is connected to the load, Accessory 26 will bypass the time delay circuits and the transfer switch will retransfer the load to the normal source immediately, if available.

## Cranking Limiter (Solid State) -Acc. 30-A, B, C

The cranking limiter opens the generator set starting circuit after an adjustable time delay (2-200 seconds). The time delay is initiated by

loss of the normal source. See Figure 58. for connections.

❑ Acc. 30–A is for 2–wire engine start circuits, and is adjustable from 30–200 seconds.

❑ Acc. 30–B is for 3–wire engine start circuits, and is adjustable from 30–200 seconds, with no cranking disconnect.

❑ Acc. 30–C is for 3–wire engine start circuits, and is adjustable from 30–200 seconds, with cranking disconnect.

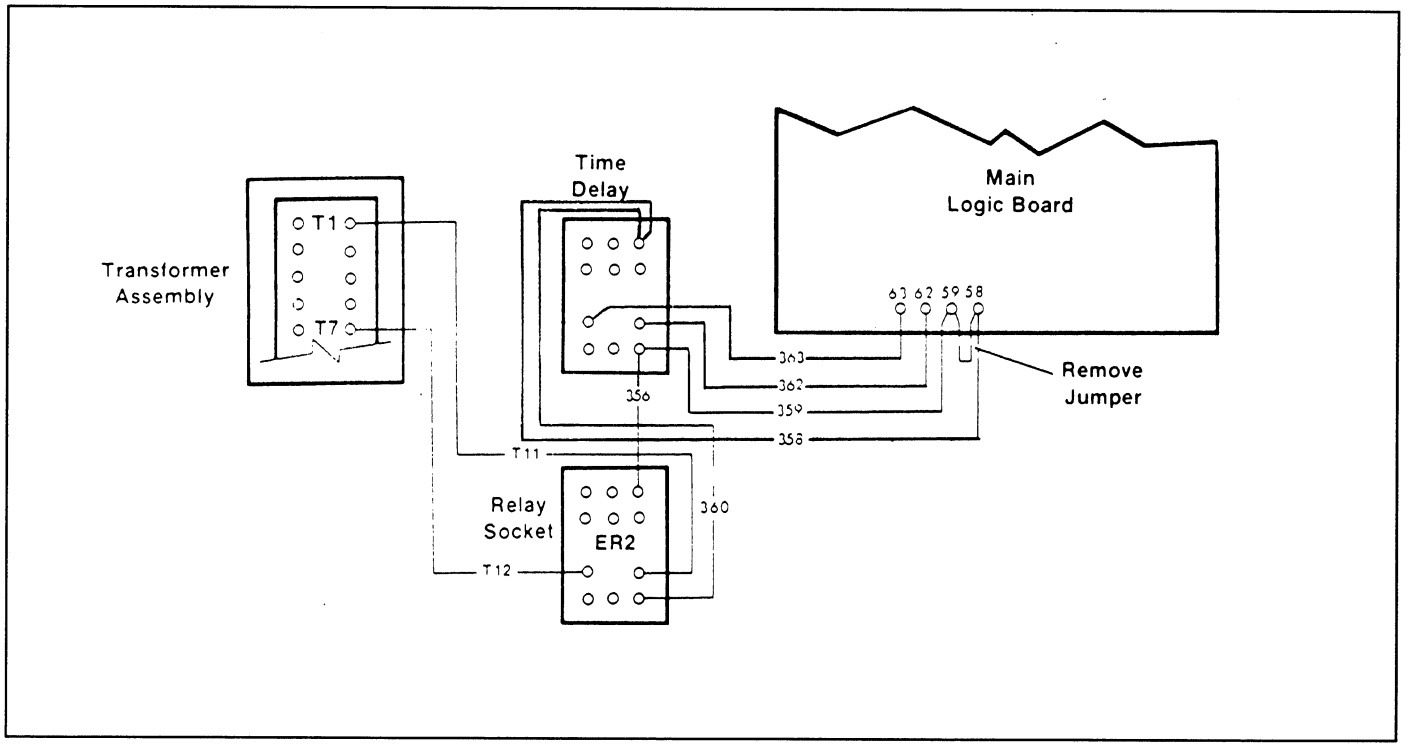



**Figure 58. Cranking Limiter Connections.**

## Motor Load Transfer, Inphase Monitor or Synch–Check Relay– Acc. 34

Acc. 34, is a control for transfer and retransfer of motor loads, so that inrush currents do not exceed normal starting currents. This avoids nuisance tripping of circuit breakers and possible mechanical damage to motor couplings.

❑ Acc. 34–A Inphase Monitor. Monitors the normal and emergency sources and will not permit transfer in either direction until the phase voltages are within +/–15° and have a frequency difference within 2 cycles. If the source supplying the load fails or drops below 70% the monitor will override itself and permit immediate transfer. See Figure 59. for connections.

When the normal source returns, the NR relay energizes and ER relay is dropped out. After approximately 2 seconds the inphase monitor senses both sources of power, and its output relay energizes to initiate inphase transfer. The TS coil is energized and the standard sequence of operation is resumed.

When the test switch is used, the inphase monitor senses both sources of power approximately 2 seconds after the ER relay energizes. The TS coil is energized and the standard sequence of operation is resumed.

If neither source of power is available when the inphase monitor starts its sensing mode, the output relay picks up after 2 seconds and allows the TS coil to be energized.

Optional Accessory 34–A can be added later in kit form. Include Serial Number and Catalog Number of Transfer Switch when ordering Acc. 34–A.

❑ Acc 34–E Inphase Monitor for use with two utility sources.

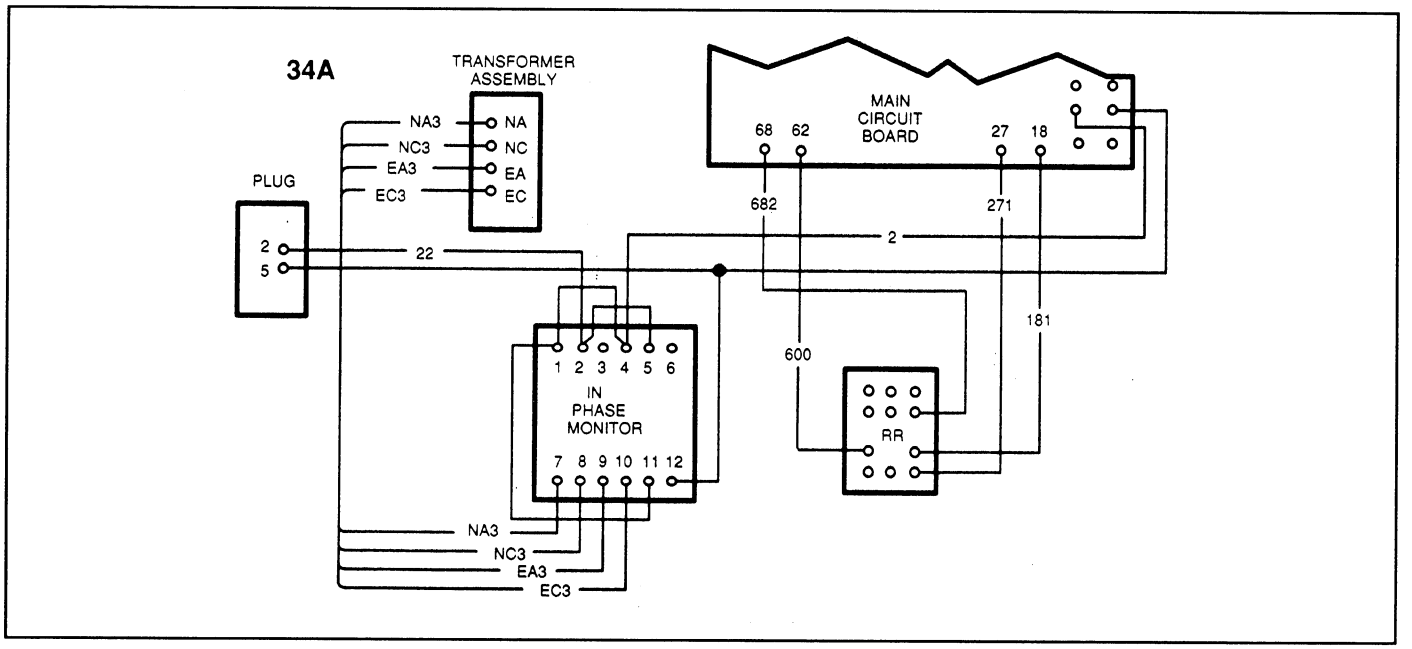



**Figure 59. Inphase Monitor Connections.**

❑ Acc. 34–B, C, D Synch–check relay. Monitors normal and emergency sources and will not permit transfer until phase voltages have been within 10 for approximately 60 milliseconds. If source supplying load drops 10% to 30% (adjustable), the relay will override itself, permitting immediate transfer. Accessory operates in either direction or emergency–to–normal or normal to emergency direction only. See Figure 60. for connections.

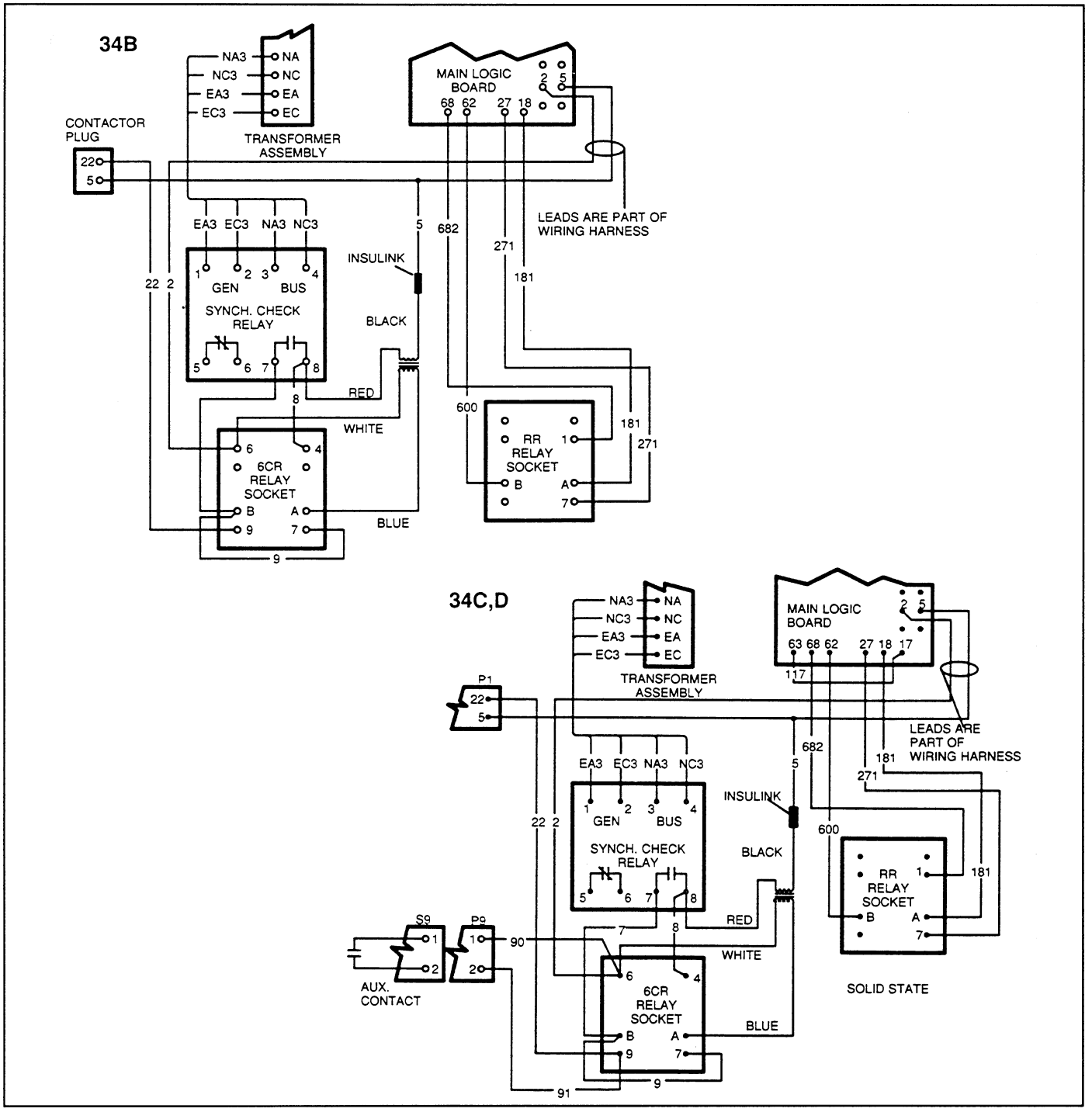



**Figure 60. Synch-Check Relay Connections.**

*Troubleshooting*

1. Connect a voltmeter between terminals NA and EA on the transfer Switch. Set the meter scale to at least twice the system phase-to-phase voltage.

2. Manually start the generator set. After it has reached maximum output voltage, the meter needle should sweep back and forth at a regular rate between 0 Volts and about twice the system voltage.

3. Place test switch in "TEST" position, the load should transfer to the emergency source when the meter indicates approximately 0 Volts. If transfer does not occur, Acc. 34 is malfunctioning.

4. Place test switch in "AUTOMATIC" position, the load should retransfer back to the normal

source after time delay. The retransfer should occur when the meter reads approximately 0 Volts. If retransfer does not occur after the time delay, Acc. 34 is malfunctioning.

5. Immediate retransfer may be accomplished by manually opening the generator set–emergency source circuit breaker. Make sure that full rated normal voltage is available before doing this.
6. Disconnect and remove voltmeter.

## Load–Shedding Contacts– Acc. 35

Load–shed contacts (2NO, 2NC) are controlled by an adjustable time delay to operate before and/or after transfer. The contacts are provided for use in disconnecting and adding load. See Figures 61. and 62.

**WARNING**

**Shock Hazard!** Disconnect harness plug before installing any accessories involving connection to transformer assembly primary terminals 76, 77, 78, and 79. Terminals are at line voltage!

❑ Acc. 35–G – operates from an adjustable 0.6–60 seconds prior to transfer and resets immediately after transfer.

❑ Acc. 35–H – operates from an adjustable 0.6–60 seconds prior to transfer and resets 3 seconds after transfer.

❑ Acc. 35–J – operates immediately at time of transfer, and 0.6–60 seconds (adjustable) after transfer.

❑ Acc. 35–K – operates 0.3 seconds before transfer and 3–300 seconds (adjustable) after transfer.

❑ Acc. 35–L – operates 3–300 seconds (adjustable) before and after transfer.

*Relay Contact Ratings*

| Service Voltage | Amps 2 Poles |
|---|---|
| 120 AC | 10 |
| 240 AC | 10 |
| 480 AC | 10 |
| 600 AC | 7.5 |
| 12 DC | 10 |
| 24 DC | 10 |
| 32 DC | 10 |
| 125 DC | 0.4 |

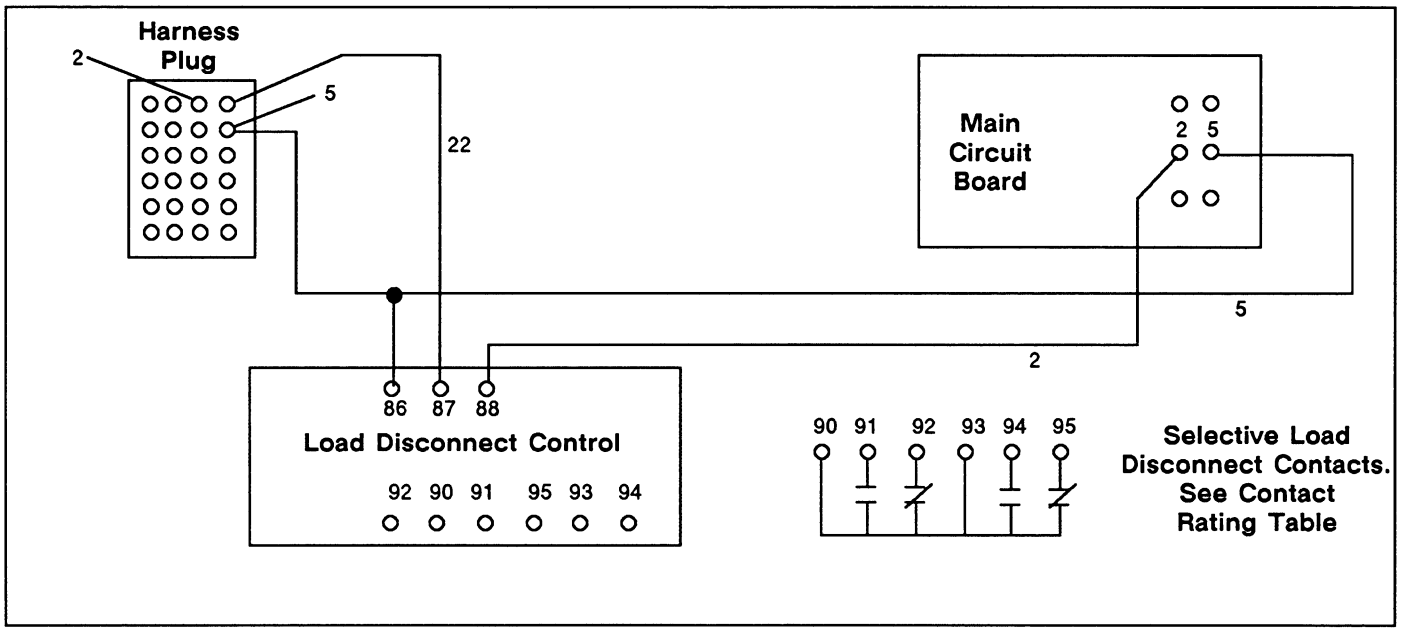



**Figure 61. 35–G, H, L Connections.**

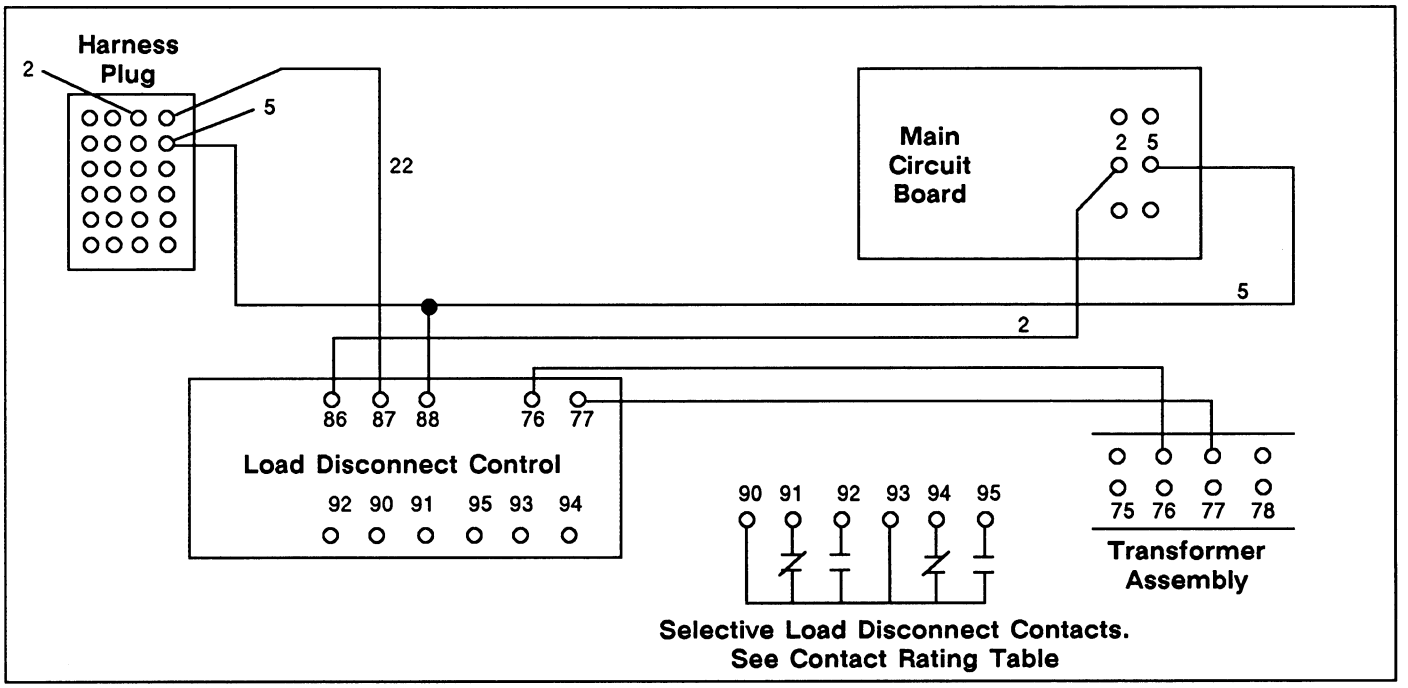



**Figure 62. 35-J Connections.**

# Disconnecting the Inner Control Panel Assembly

The In-Line Disconnect Plug is furnished for repair purposes only and should not have to be separated. If it must be separated, follow these steps carefully. See Figure 63.

**WARNING**

**Shock Hazard!** Disconnect inner panel harness at in-line connector. This will de-energize circuit board and logic circuitry, but allow transfer switch to continue to supply utility power to necessary lighting and equipment. Potential electrocution will exist if any accessories mounted to inner panel are NOT wired through and de-energized by harness separation. Such accessories may be at line voltage.

Follow Steps 1a. and 1b. before disconnecting or reconnecting the plug, and observe the position of the Transfer Switch.

## To Disconnect the Plug

1a. If the Transfer Switch is in the Normal position, place the generator set starting switch in the OFF position. Then open the emergency source circuit breaker.

1b. If the Transfer Switch is in the Emergency position, open the normal source circuit breaker. Place the generator set starting switch in the TEST or RUN position.

2. Separate the In-Line Disconnect Plug by grasping and squeezing the plug. Do not pull on the wires.

3. Remove and tape the signal wires connected to the engine start terminals on the contactor (Terminals 3 and 4).

## To Reconnect the Plug

1a. If the Transfer Switch is in the Normal position, place the generator set starting switch in the OFF position. Then open the emergency source circuit breaker.

1b. If the Transfer Switch is in the Emergency position, open the normal source circuit breaker.

2. Reconnect the signal wires to the appropriate engine start terminals.

3. Engage the In-Line Disconnect Plug by grasping and pressing together.

4a. If the Transfer Switch is in the Normal position, place the generator set starting switch in the AUTOMATIC position. Then close the emergency source circuit breaker.

4b. If the Transfer Switch is in the Emergency position, close the normal source circuit breaker. The load will be automatically retransferred to the normal source after time delay. For immediate retransfer, open and then reclose the emergency source circuit breaker. Place the generator set starting switch in the AUTOMATIC position.

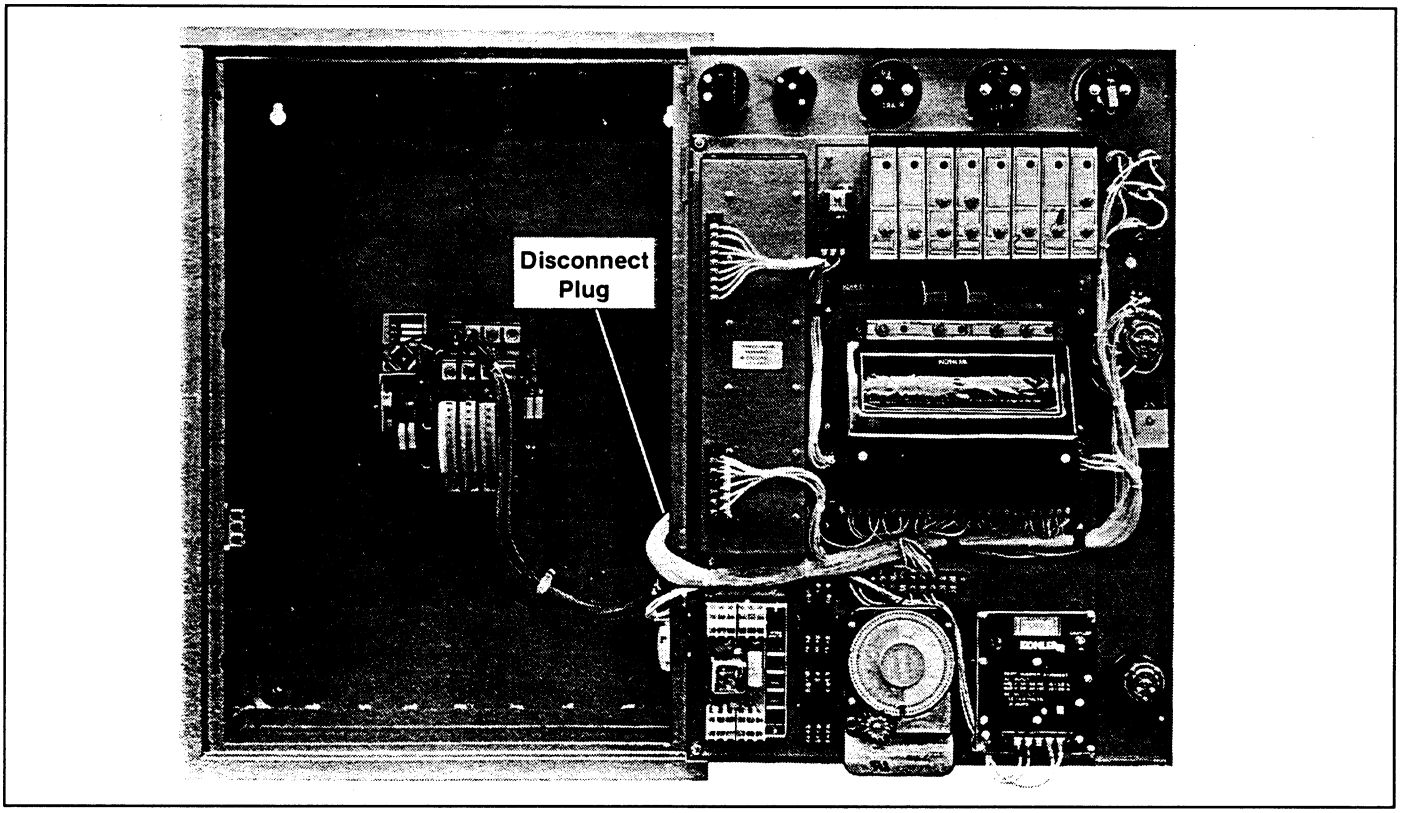



**Figure 63. In-Line Disconnect Plug.**

# Main Circuit Board Voltage and Time Delay Adjustments

The main circuit board contains a (normal source) undervoltage circuit. To adjust proceed as follows (Figure 64.):

**Note**

Normal source must be disconnected. Use variable AC power supply to establish voltage levels.

1. Remove Capnuts from adjustment knobs.
2. Set Drop-out knob maximum Counterclockwise.
3. Set Pick-up knob maximum Counterclockwise.
4. Increase line Volts to desired Drop-out value (normally 70%) LED should be ON.
5. Rotate Drop-out Clockwise until LED goes OFF.
6. Rotate Pick-up to maximum Clockwise until LED is OFF.
7. Increase line Volts to desired Pick-up value (normally 90%) LED is OFF.
8. Rotate Pick-up knob Counterclockwise until LED comes ON.
9. Recheck Pick-up and Drop-out by running voltage up and down check by LED indication.

10. After making adjustments, reinstall cap nuts to secure settings.

The main circuit board also contains Time Delay circuits of Normal to Emergency and Emergency to Normal. Each time delay is adjusted by turning the potentiometer clockwise to increase and counterclockwise to decrease (TDNE – 0–60 sec.; TDEN – 0–30 min.). The corresponding LED will go on; indicating when the timing function has been completed. After making adjustments; reinstall cap nut to secure setting.

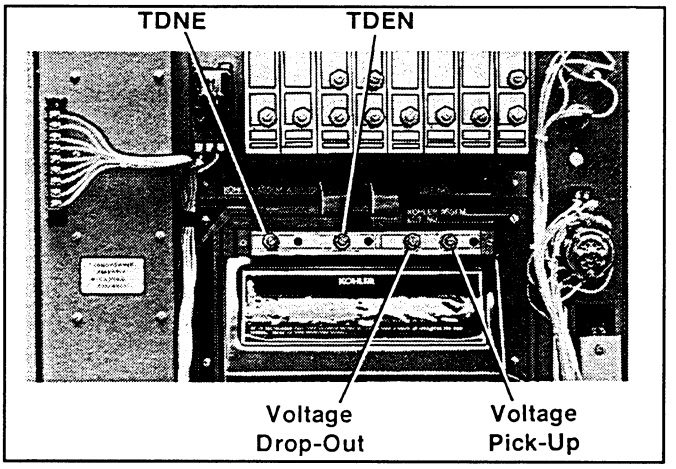



**Figure 64. Main Circuit Board Adjustments.**

# Accessory Card Adjustments

Devices such as voltage sensing relays, timers, etc. furnished with transfer switches will be similar to one of the following types of devices and adjustments should be made as shown for that type of device.

**Note**

Disconnect emergency source and substitute variable AC supply as necessary to establish voltage levels.

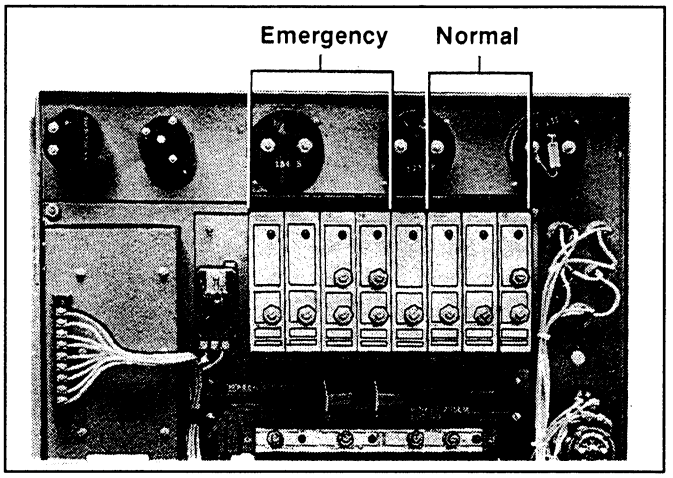



**Figure 65. Accessory Card Adjustments.**

Place cards in their proper location as indicated by the nameplate on top of the card cage. See Figure 65.

## Undervoltage Card

1. Remove Cap nuts from adjustment knobs.
2. Set Drop–out maximum Counterclockwise.
3. Set Pick–up maximum Counterclockwise.
4. Increase line Volts to desired Drop–out value (normally 70%) LED should be ON.
5. Rotate Drop–out Clockwise until LED goes OFF.
6. Rotate Pick–up to maximum Clockwise until LED is OFF.
7. Increase line Volts to desired Pick–up value (normally 90%). LED is OFF.
8. Rotate Pick–up knob Counterclockwise until LED comes ON.
9. Recheck Pick–up and Drop–out by running voltage up and down check by LED indication.
10. After making adjustments, reinstall cap nuts to secure settings.

## Overvoltage Card

1. Remove cap nuts from adjustment knobs.
2. Set Drop–out to maximum Counterclockwise.
3. Set Pick–up to maximum Counterclockwise.
4. Set line voltage to pull in value desired (normally 105%) LED is OFF.
5. Rotate Pick–up Clockwise until LED comes ON.
6. Rotate Drop–out maximum Clockwise.
7. Set line voltage to Drop–out value desired (normally 115%).

8. Rotate Drop-out Counterclockwise until LED is OFF.
9. Drop line voltage to pull-in desired value. LED should come ON.
10. Increase line voltage to desired Drop-out value. LED should go OFF.
11. After making adjustments, reinstall cap nuts to secure settings.

## Frequency Cards

Under and overfrequency cards for both normal and emergency are factory set for 60-Hz voltage. Pickup and drop-out values are as follows:

| System Hz | Overfrequency | Underfrequency |
|---|---|---|
| 60 | Dropout @ 65 Hz<br>Pickup @ 63 Hz | Dropout @ 55 Hz<br>Pickup @ 57 Hz |
| 50 | Dropout @ 55 Hz<br>Pickup @ 53 Hz | Dropout @ 45 Hz<br>Pickup @ 47 Hz |

Use the following procedures when altering frequency card settings. See Figure 66.

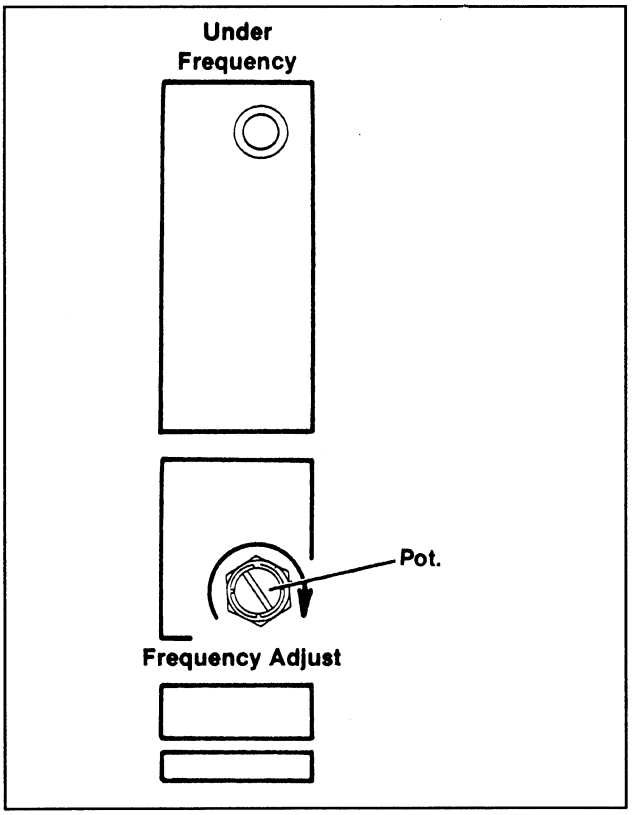



**Figure 66. Frequency Card Adjustment.**

**Caution**

Do not adjust R23 and R24 on circuit cards.

*50 Hz.*

1. Remove cap nut.
2. Turn pot to full counterclockwise position.
3. Observe position of pot's screwdriver slot, and turn clockwise 90 degrees.
4. Reinstall capnut to hold setting.

*60 Hz.*

1. Remove cap nut.
2. Turn pot to full-clockwise position.
3. Observe position of pot's screwdriver slot, and turn counterclockwise 45 degrees.
4. Reinstall capnut to hold setting.

## Time Delay Engine Cool-Off Card

This card is adjustable from 1-30 minutes. To increase time, turn adjuster clockwise; decrease time, counterclockwise. The LED will light after the timing function has completed. After making adjustments, reinstall cap nut to secure setting.

# Wiring Diagrams

**150 - 400-Amp**

**1-Phase, 2-Pole, 3-Wire**

Schematic ..... 297688
Interconnection ..... 294263

**3-Phase, 3 & 4-Pole, 3 & 4 Wire, with or without overlapping neutral**

Schematic ..... 294149
Interconnection ..... 294150

**600 - 800-Amp**

**1-Phase, 2-Pole, 3-Wire**

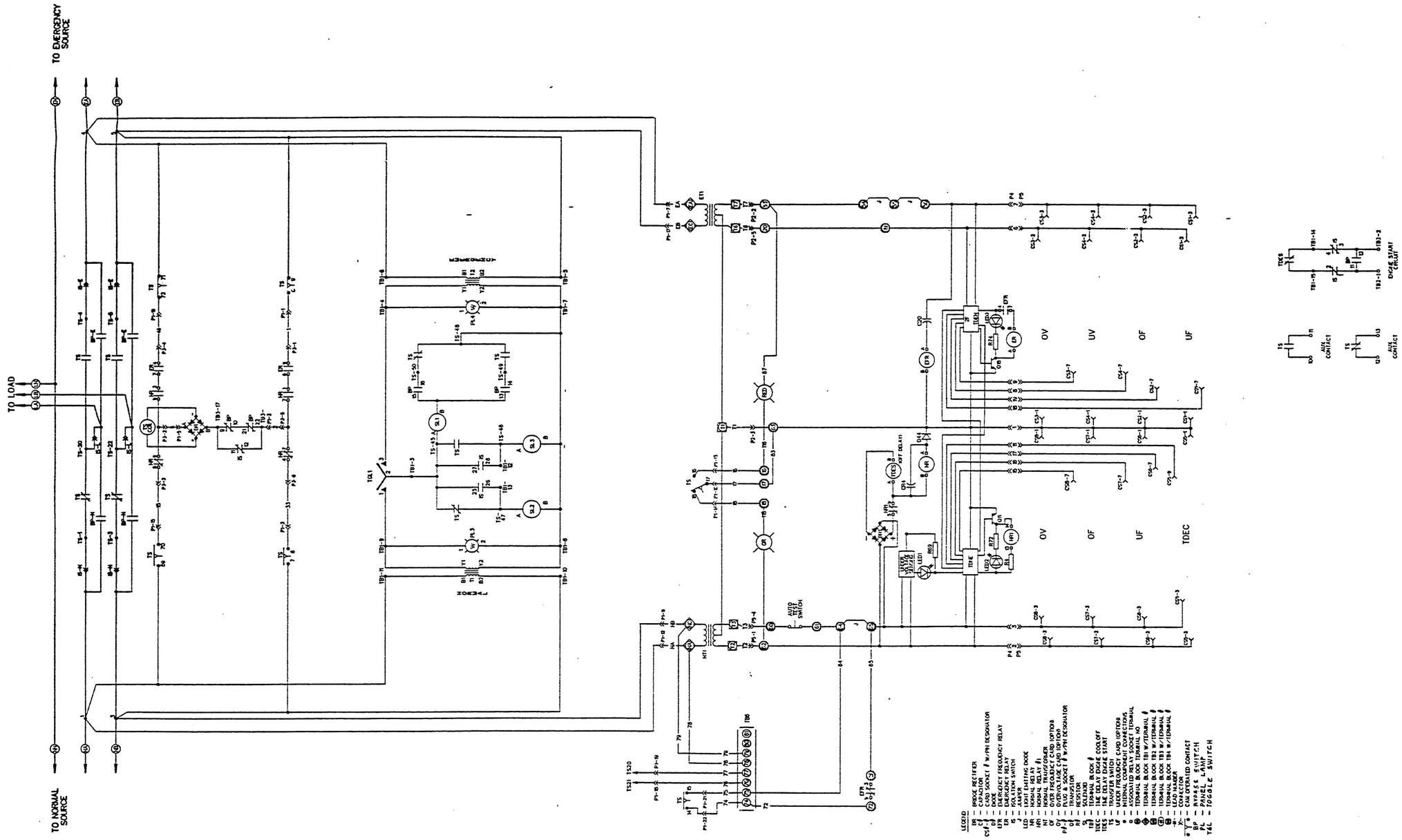
Schematic ..... 297662
Interconnection ..... 297663

**3-Phase, 3 & 4-Pole, 3 & 4-Wire, with or without overlapping neutral**

Schematic ..... 297664
Interconnection ..... 297665

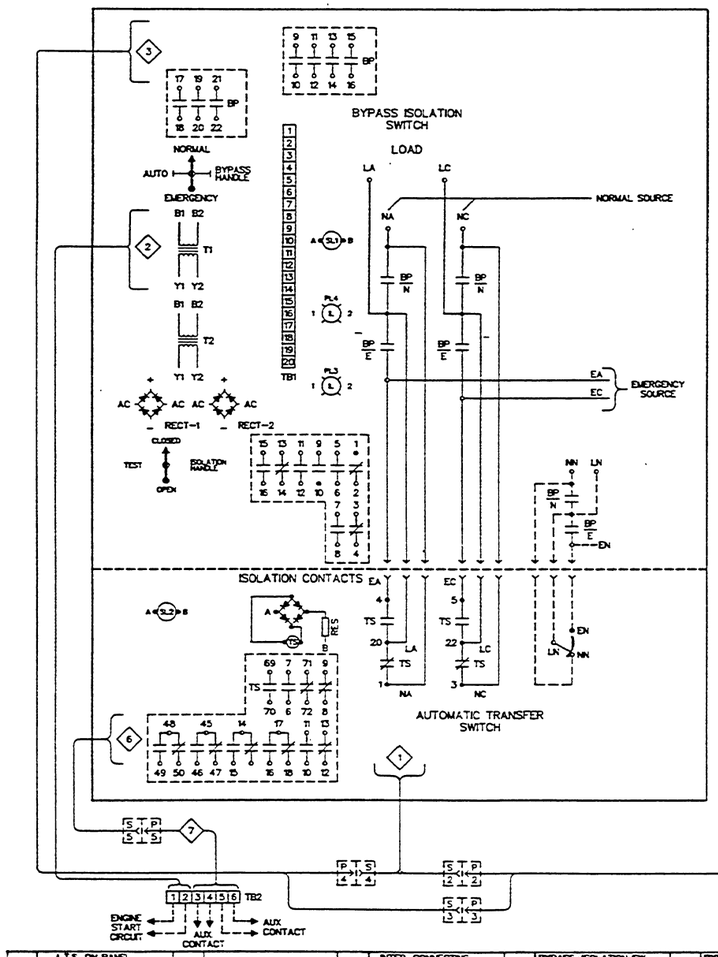
# Dimension Drawings

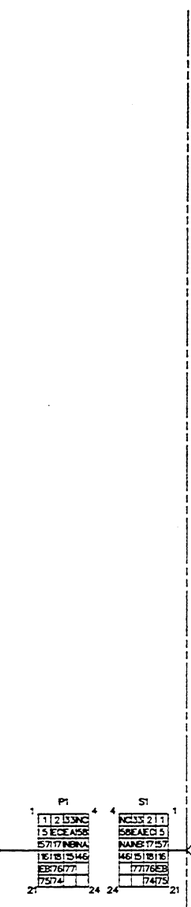
**150 - 400-Amp cabinet** ..... ADV-5487
**600 - 800-Amp cabinet** ..... ADV-5459
**600 - 800-Amp Power Module & Inner Panel Assembly** ..... ADV-5460

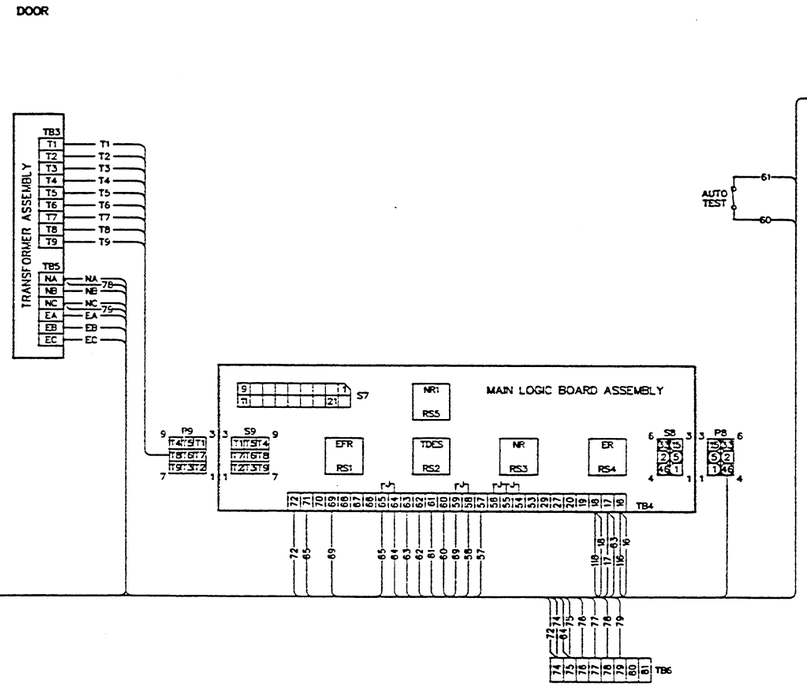


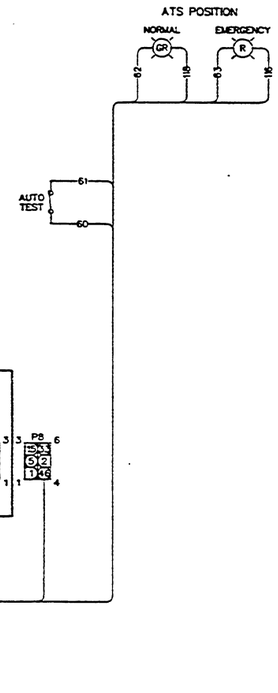

**Schematic Diagram, 150 – 400–Amps**
**Automatic Transfer Switch with Bypass–Isolation**
**1–Phase, 2–Pole, 3–Wire**

297688




LEGEND

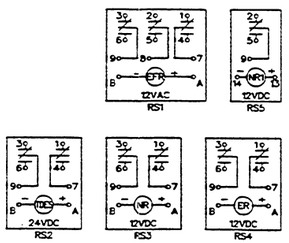
ACC – ACCESSORY
BP – BYPASS SWITCH
EFR – ENGINE FAILURE RELAY
ER – EMERGENCY RELAY
GR – GREEN
IL – INDICATING LIGHT
J – JUMPER
NR – NORMAL RELAY
PL – PILOT LIGHT
PN – PLUG NUMBER
R – RED
RECT – RECTIFIER
RES – RESISTOR
SK – SOCKET NUMBER
SOL – SOLENOID
T – TRANSFORMER
TB – TERMINAL BOARD
TDES – TIME DELAY ENGINE START
TS – TRANSFER SWITCH

| WIRE NO. | A.T.S. ON PANEL WIRE CONNECTIONS TO ① S2, S4 & S5 | WIRE NO. | LOGIC BOARD HARNESS ④ | WIRE NO. | INTER-CONNECTING HARNESS P1, P2 & P3 ⑤ | WIRE NO. | BYPASS-ISOLATION SW. STATIONARY WIRING ② | WIRE NO. | BYPASS-ISOLATION SW. CONNECTION TB1, S3 & P4 ③ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | TS-8 . S2-1 | 1 | S1-1 . P8-1 | 1 | P1-1 . P2-1 | 4 | TB1-2 . NC | 7 | TB1-14 . P4-1 |
| 2 | TS-A . S2-2 | 2 | S1-2 . P8-5 | 2 | P1-2 . P2-2 | 5 | TB1-4 . EC | 7 | TB1-14 . S3-1 |
| 3 | TS-6 . S2-3 | 5 | S1-5 . P8-2 | 3 | P1-3 . P2-3 | 6 | TB1-3 . EA | 8 | TB1-13 . S4-2 |
| 4 | TS-3 . S2-4 | 15 | S1-15 . P8-3 | 4 | P1-4 . P2-4 | 7 | TB1-14 . 15-2 | 8 | TB1-13 . S3-2 |
| 4 | TS-3 . TS-69 | 16 | S1-13 . TB4-16 | 5 | P1-6 . P2-5 | 8 | TB1-13 . 15-4 | 9 | TB1-17 . S3-3 |
| 5 | TS-5 . S2-5 | 17 | S1-10 . TB4-17 | 6 | P1-7 . P2-6 | 9 | TB1-17 . BP-20 . 15-15 | 16 | TB1-15 . P4-5 |
| 5 | TS-5 . TS-71 | 18 | S1-14 . TB4-18 | 7 | P1-8 . P3-1 | 14 | TB1-1 . NA | 17 | TB1-12 . P4-6 |
| 6 | TS-4 . S2-6 | 33 | S1-3 . P8-6 | 8 | P1-9 . P3-2 | 15 | BP-18 . BP-22 . S1-A | 18 | TB1-11 . P4-7 |
| 6 | TS-4 . TS-69 | 46 | S1-16 . P8-4 | 9 | P1-5 . P3-5 | 16 | TB1-15 . 15-6 . BP-21 | 19 | TB1-19 . P4-8 |
| 7 | TS-14 . S2-21 | 57 | S1-9 . TB4-57 | 10 | P1-10 . P2-7 | 17 | TB1-12 . BP-17 . 15-8 | 20 | TB1-18 . P4-9 |
| 8 | TS-15 . S2-22 | 58 | S1-8 . TB4-58 | 11 | P1-14 . P2-12 | 18 | TB1-11 . SL2-A | 28 | TB1-16 . P4-3 |
| 10 | TS-17 . S2-7 | 74 | S1-22 . TB6-74 | 12 | P1-13 . P2-13 | 19 | TB1-15 . BP-14 | 30 | TB1-5 P4-4 |
| 11 | TS-18 . S2-12 | 75 | S1-21 . TB6-75 | 13 | P1-11 . P2-10 | 20 | TB1-18 . BP-16 | O=OPEN CONTACT X=CLOSED CONTACT | |
| 12 | TS-16 . S2-13 | 76 | S1-18 . TB6-76 | 14 | P1-12 . P2-11 | 21 | TB1-5 . PL3-1 | | |
| 13 | TS-2 . S2-10 | 77 | S1-19 . TB6-77 | 33 | P1-15 . P2-5 | 22 | TB1-6 . PL3-2 | | |
| 14 | TS-1 . S2-11 | EA | S1-7 . TB5-EA | 34 | P1-16 . P2-8 | 23 | TB1-8 . PL4-2 | | |
| 15 | TS-1 . TS-7 | EB | S1-17 . TB5-EB | 74 | P1-22 . P2-22 | 24 | TB1-7 . PL4-1 | | |
| 16 | TS-46 . S4-5 | EC | S1-6 . TB5-EC | 75 | P1-21 . P2-21 | 25 | BP-13 . BP-15 . 15-11 | | |
| 17 | TS-47 . S4-6 | NA | S1-12 . TB5-NA | 76 | P1-18 . P2-18 | 26 | TB2-1 . BP-11 . 15-1 | | |
| 18 | TS-48 . S4-7 | NB | S1-11 . TB5-NB | 77 | P1-19 . P2-19 | 27 | TB2-2 . BP-12 . 15-3 | | |
| 19 | TS-49 . S4-8 | NC | S1-4 . TB5-NC | EB | S1-17 . P2-17 | 28 | TB1-16 . BP-9 . 15-13 | | |
| 20 | TS-50 . S4-9 | | | | | 29 | BP-10 . BP-19 | | |
| 28 | TS-8 . S4-3 | | | | | 30 | TB1-9 . 15-5 . 15-7 . 15-9 | | |
| 30 | TS-45 . S4-4 | | | | | 31 | TB1-10 . S1-B . S2-8 | | |
| 33 | TS-70 . S2-9 | WIRE NO. | A.T.S. AUX. ⑥ | WIRE NO. | A.T.S. AUX. ⑦ | 35 | 15-12 . 15-10 | | |
| 34 | TS-72 . S2-8 | | | | | 36 | 15-14 . 15-16 | | |
| EB | TS-19 . S2-17 | 37 | TB-10 . S5-1 | 37 | TB2-3 . P5-1 | | | | |
| LA | LA . S2-18 | 38 | TB-11 . S5-2 | 38 | TB2-4 . P5-2 | | | | |
| LC | LC . S2-19 | 39 | TB-12 . S5-3 | 39 | TB2-5 . P5-3 | | | | |
| | | 40 | TB-13 . S5-4 | 40 | TB2-6 . P5-4 | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

| AUX. CONT. | BYPASS HANDLE POSITION EMERG. | 60°–10° | AUTO. | 10°–60° | NORM. |
|---|---|---|---|---|---|
| 9–10 | 0 | C | X | 0 | 0 |
| 11–12 | X | X | 0 | 0 | 0 |
| 13–14 | X | X | 0 | 0 | 0 |
| 15–16 | 0 | 0 | 0 | X | X |
| 17–18 | 0 | 0 | 0 | X | 0 |
| 19–20 | 0 | 0 | X | 0 | 0 |
| 21–22 | 0 | X | 0 | 0 | 0 |

| AUX. CONT. | ISOLATION HANDLE POSITION CLOSED | TEST | OPEN |
|---|---|---|---|
| 1–2 | X | X | 0 |
| 3–4 | X | X | 0 |
| 5–6 | 0 | X | X |
| 7–8 | 0 | X | X |
| 9–10 | X | X | 0 |
| 11–12 | 0 | X | X |
| 13–14 | X | X | 0 |
| 15–16 | 0 | X | X |

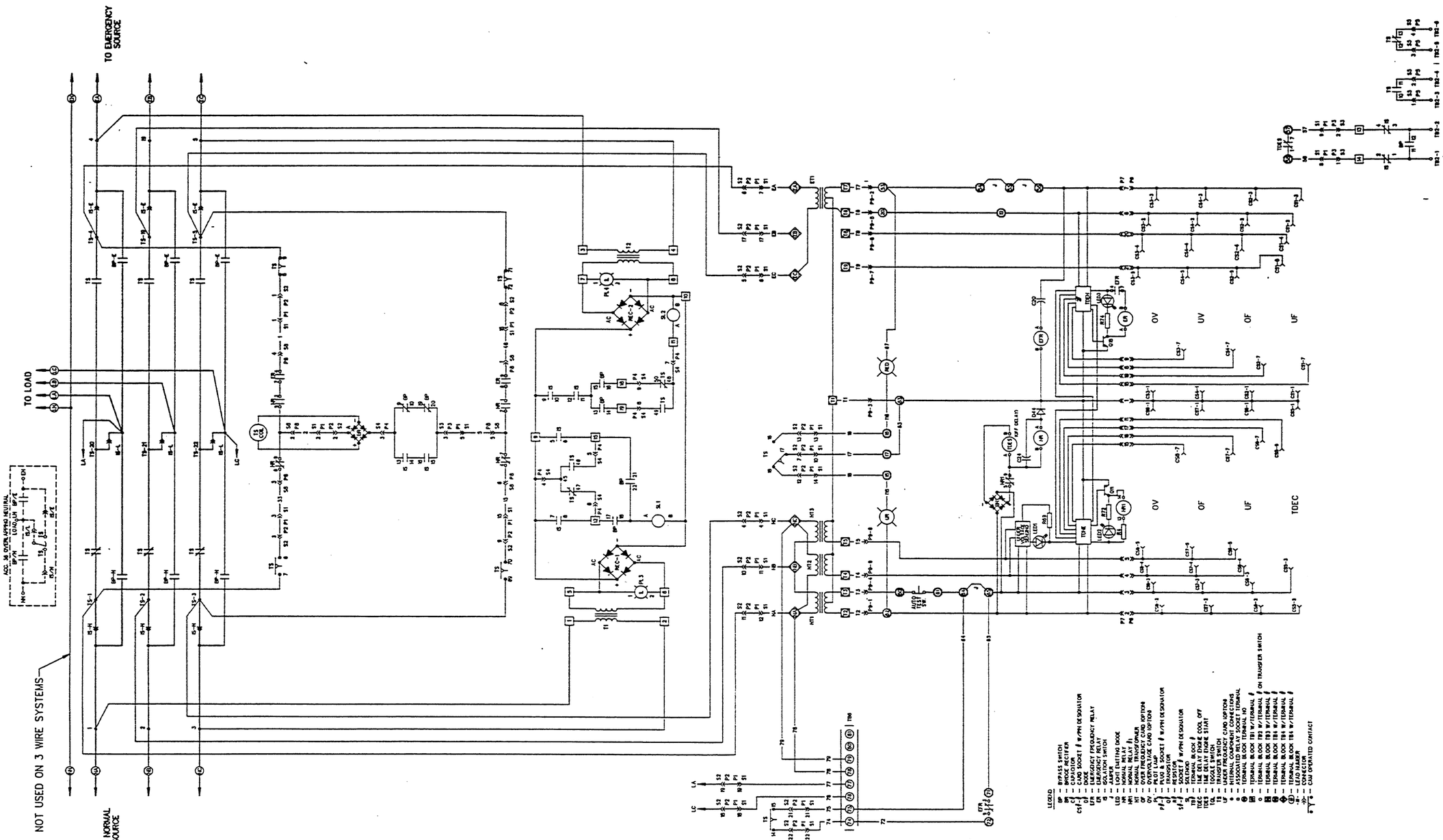
RELAY INTERCONNECTION DIAGRAMS
VIEWED FROM TOP AS ASSEMBLED




NOTE
1. SWITCH SHOWN DE-ENERGIZED CONNECTED TO NORMAL SOURCE.
2. THIS SIGN INDICATES A BRANCH CIRCUIT.
3. CONNECTION POINTS THAT HAVE BOTH CUSTOMER CONNECTIONS AND FACTORY CONNECTIONS ARE SHOWN OPEN AS CUSTOMER CONNECTION POINTS.
4. OPERATOR'S MANUAL IS FURNISHED WITH EACH AUTOMATIC TRANSFER SWITCH. REFER TO THIS PUBLICATION PRIOR TO INSTALLATION AND OPERATION OF THE SWITCH.
5. MATING PLUG AND SOCKET TERMINAL NUMBERS MATCH WHEN PLUGGED TOGETHER.
6. SL1 = ISOLATION LOCK TO PREVENT CONNECTING ATS UNLESS SOURCE TO LOAD IS SAME AS SOURCE BYPASSED
7. SL2, SL3 = ALLOW BYPASS ONLY TO THE SOURCE TO WHICH THE TRANSFER SWITCH LOAD IS CONNECTED

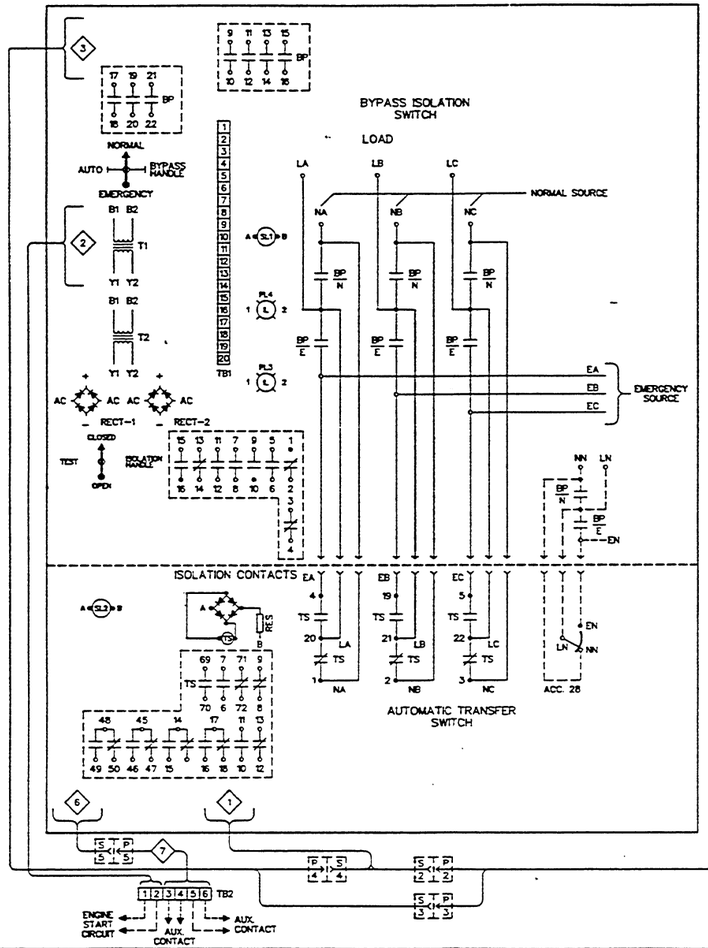
**Logic Interconnection, 150 – 400–Amps**
**1–Phase, 2–Pole, 3–Wire**
**with, or without Overlapping Neutral**

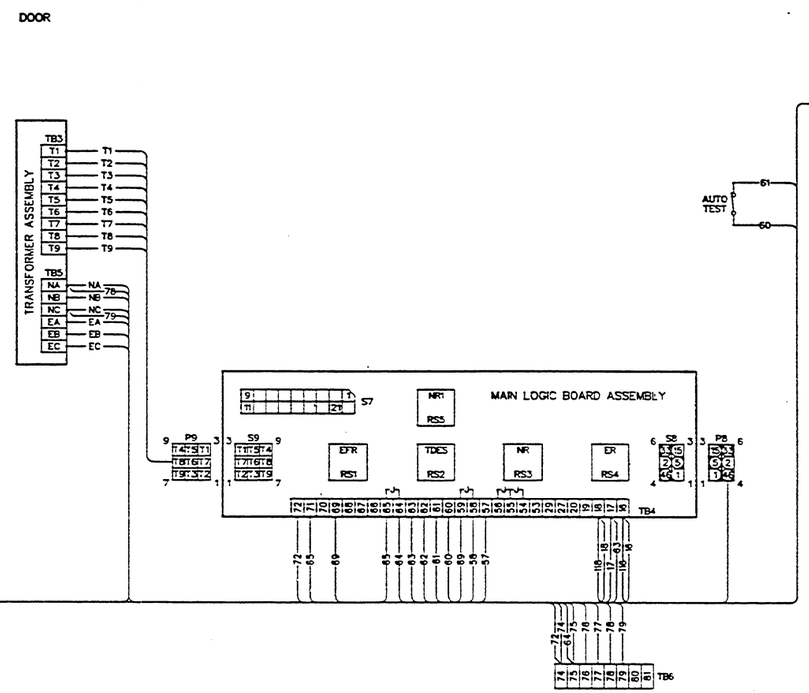
294263




**Schematic Diagram, 150 – 400–Amps**
**Automatic Transfer Switch with Bypass–Isolation**
**3–Phase, 3 or 4–Pole, 3 or 4–Wire**
**with, or without Overlapping Neutral**

294149



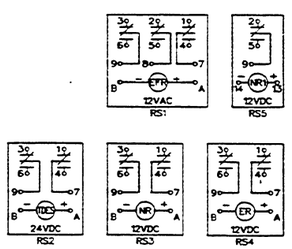




LEGEND

ACC – ACCESSORY
BP – BYPASS SWITCH
EFR – ENGINE FAILURE RELAY
ER – EMERGENCY RELAY
GR – GREEN
IL – INDICATING LIGHT
J – JUMPER
NR – NORMAL RELAY
PL – PILOT LIGHT
P# – PLUG NUMBER
R – RED
RECT – RECTIFIER
RES – RESISTOR
S# – SOCKET NUMBER
SOL – SOLENOID
T – TRANSFORMER
TB – TERMINAL BOARD
TDES – TIME DELAY ENGINE START
TS – TRANSFER SWITCH

| WIRE NO. | A.T.S. ON PANEL WIRE CONNECTIONS TO S2, S4 & S5 ① | WIRE NO. | LOGIC BOARD HARNESS ④ | WIRE NO. | INTER-CONNECTING HARNESS P1, P2 & P3 ⑤ | WIRE NO. | BYPASS-ISOLATION SW. STATIONARY WIRING ② | WIRE NO. | BYPASS-ISOLATION SW. CONNECTION TB1, S3 & P4 ③ |
|---|---|---|---|---|---|---|---|---|---|
| 1 | TS-8 . S2-1 | 1 | S1-1 . P8-1 | 1 | P1-1 . P2-1 | 4 | TB1-2 . NC | 7 | TB1-14 . P4-1 |
| 2 | TS-4 . S2-2 | 2 | S1-2 . P8-5 | 2 | P1-2 . P2-2 | 5 | TB1-4 . EC | 7 | TB1-14 . S3-1 |
| 3 | TS-6 . S2-3 | 5 | S1-5 . P8-2 | 3 | P1-3 . P2-3 | 6 | TB1-3 . EA | 8 | TB1-13 . S4-2 |
| 4 | TS-3 . S2-4 | 15 | S1-15 . P8-3 | 4 | P1-4 . P2-4 | 7 | TB1-14 . IS-2 | 8 | TB1-13 . S3-2 |
| 4 | TS-3 . TS-69 | 16 | S1-13 . TB4-16 | 5 | P1-6 . P2-5 | 8 | TB1-13 . IS-4 | 9 | TB1-17 . S3-3 |
| 5 | TS-5 . S2-5 | 17 | S1-10 . TB4-17 | 6 | P1-7 . P2-6 | 9 | TB1-17 . BP-20 . IS-15 | 16 | TB1-15 . P4-5 |
| 5 | TS-5 . TS-71 | 18 | S1-14 . TB4-18 | 7 | P1-8 . P3-1 | 14 | TB1-1 . NA | 17 | TB1-12 . P4-6 |
| 6 | TS-4 . S2-6 | 33 | S1-3 . P8-6 | 8 | P1-9 . P3-2 | 15 | BP-18 . BP-22 . SL1-A | 18 | TB1-11 . P4-7 |
| 6 | TS-4 . TS-9 | 46 | S1-16 . P8-4 | 9 | P1-5 . P3-5 | 16 | TB1-15 . IS-6 . BP-21 | 19 | TB1-19 . P4-8 |
| 7 | TS-14 . S2-21 | 57 | S1-9 . TB4-57 | 10 | P1-10 . P2-7 | 17 | TB1-12 . BP-17 . IS-8 | 20 | TB1-18 . P4-9 |
| 8 | TS-16 . S2-22 | 58 | S1-8 . TB4-58 | 11 | P1-14 . P2-12 | 18 | TB1-11 . SL2-A | 28 | TB1-16 . P4-3 |
| 10 | TS-17 . S2-7 | 74 | S1-22 . TB6-74 | 12 | P1-13 . P2-13 | 19 | TB1-19 . BP-14 | 30 | TB1-9 . P4-4 |
| 11 | TS-18 . S2-12 | 75 | S1-21 . TB6-75 | 13 | P1-11 . P2-10 | 20 | TB1-18 . BP-16 | O=OPEN CONTACT X=CLOSED CONTACT | |
| 12 | TS-16 . S2-13 | 76 | S1-18 . TB6-76 | 14 | P1-12 . P2-11 | 21 | TB1-5 . PL3-1 | AUX. | BYPASS HANDLE POSITION |
| 13 | TS-2 . S2-10 | 77 | S1-19 . TB6-77 | 33 | P1-15 . P2-9 | 22 | TB1-6 . PL3-2 | CONT. | EMERG. 80°–10° AUTO. 10°–80° NORM. |
| 14 | TS-1 . S2-11 | EA | S1-7 . TB5-EA | 34 | P1-16 . P2-8 | 23 | TB1-8 . PL4-2 | 9-10 | 0 0 X 0 0 |
| 14 | TS-1 . TS-7 | EB | S1-17 . TB5-EB | 74 | P1-22 . P2-22 | 24 | TB1-7 . PL4-1 | 11-12 | X X 0 0 0 |
| 16 | TS-46 . S4-5 | EC | S1-6 . TB5-EC | 75 | P1-21 . P2-21 | 25 | BP-13 . BP-15 . IS-11 | 13-14 | X X 0 0 0 |
| 17 | TS-47 . S4-6 | NA | S1-12 . TB5-NA | 76 | P1-18 . P2-18 | 26 | TB2-1 . BP-11 . IS-1 | 15-16 | 0 0 0 X X |
| 18 | TS-48 . S4-7 | NB | S1-11 . TB5-NB | 77 | P1-19 . P2-19 | 27 | TB2-2 . BP-12 . IS-3 | 17-18 | 0 0 0 X 0 |
| 19 | TS-49 . S4-8 | NC | S1-4 . TB5-NC | EB | S1-17 . P2-17 | 28 | TB1-16 . BP-9 . IS-13 | 19-20 | 0 0 X 0 0 |
| 20 | TS-50 . S4-9 | | | | | 29 | BP-10 . BP-19 | 21-22 | 0 X 0 0 0 |
| 28 | TS-8 . S4-3 | | | | | 30 | TB1-9 . IS-5 . IS-7 . IS-9 | AUX. | ISOLATION HANDLE POSITION |
| 30 | TS-45 . S4-4 | | | | | 31 | TB1-10 . SL1-B . SL2-B | CONT. | CLOSED TEST OPEN |
| 33 | TS-70 . S2-9 | WIRE NO. | A.T.S. AUX. ⑥ | WIRE NO. | A.T.S. AUX. ⑦ | 35 | IS-12 . IS-10 | 1-2 | X X 0 |
| 34 | TS-72 . S2-8 | | | | | 36 | IS-14 . IS-16 | 3-4 | X X 0 |
| EB | TS-19 . S2-17 | 37 | TS-10, S5-1 | 37 | TB2-3, P5-1 | | | 5-6 | 0 X X |
| LA | LA . S2-18 | 38 | TS-11, S5-2 | 38 | TB2-4, P5-2 | | | 7-8 | 0 X X |
| LC | LC . S2-19 | 39 | TS-12, S5-3 | 39 | TB2-5, P5-3 | | | 9-10 | X X 0 |
| | | 40 | TS-13, S5-4 | 40 | TB2-6, P5-4 | | | 11-12 | 0 X X |
| | | | | | | | | 13-14 | X X 0 |
| | | | | | | | | 15-16 | 0 X X |

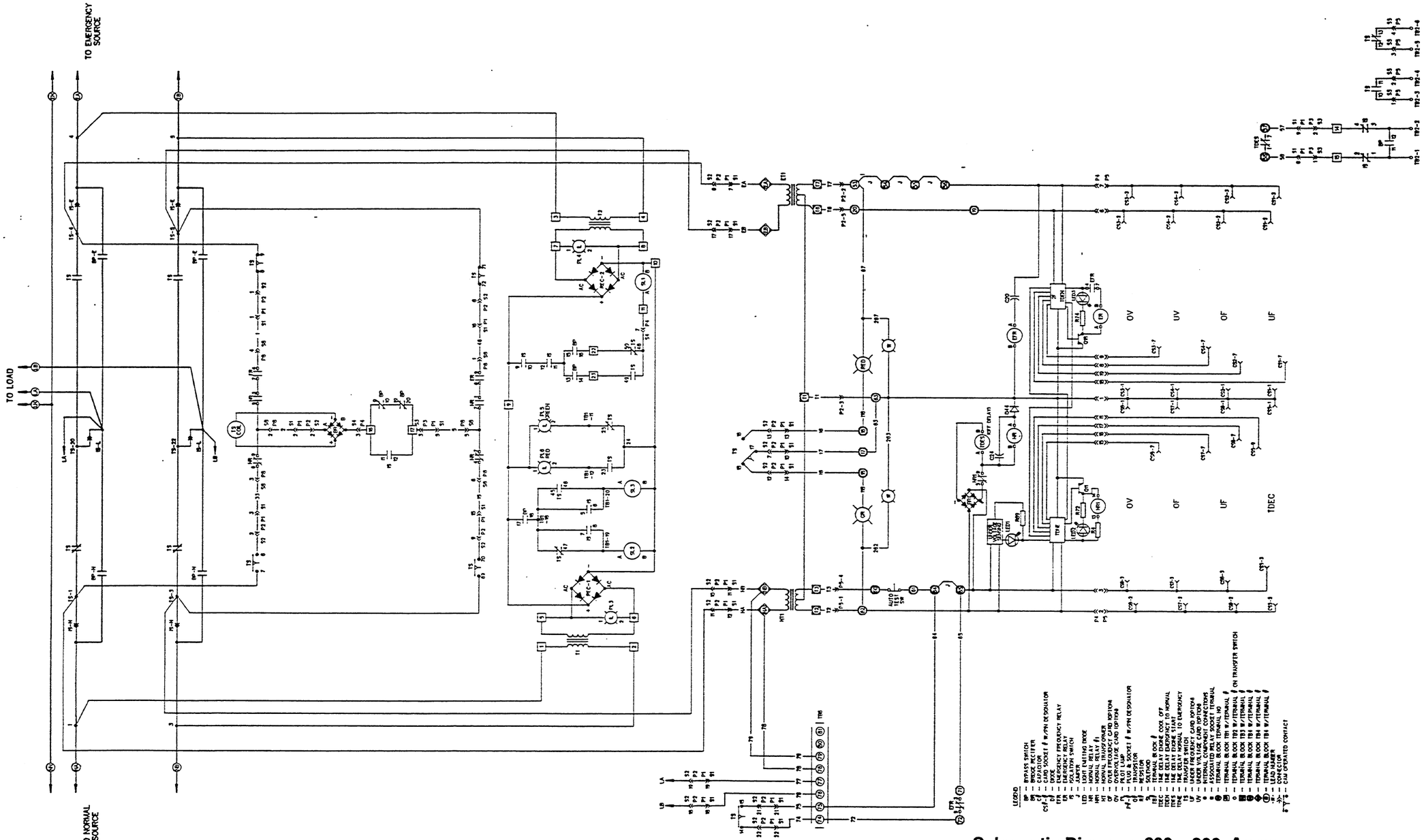
RELAY INTERCONNECTION DIAGRAMS VIEWED FROM TOP AS ASSEMBLED




NOTE:
1. SWITCH SHOWN DE-ENERGIZED, CONNECTED TO NORMAL SOURCE.
2. THIS SIGN INDICATES A BRANCH CIRCUIT.
3. CONNECTION POINTS THAT HAVE BOTH CUSTOMER CONNECTIONS AND FACTORY CONNECTIONS ARE SHOWN OPEN AS CUSTOMER CONNECTION POINTS.
4. OPERATOR'S MANUAL IS FURNISHED WITH EACH AUTOMATIC TRANSFER SWITCH. REFER TO THIS PUBLICATION PRIOR TO INSTALLATION AND OPERATION OF THE SWITCH.
5. MATING PLUG AND SOCKET TERMINAL NUMBERS MATCH WHEN PLUGGED TOGETHER.
6. SL1 – SOLENOID LOCK TO PREVENT CONNECTING ATS UNLESS SOURCE TO LOAD IS SAME AS SOURCE BYPASSED.
7. SL2, SL3 – ALLOW BYPASS ONLY TO THE SOURCE TO WHICH THE TRANSFER SWITCH LOAD IS CONNECTED.

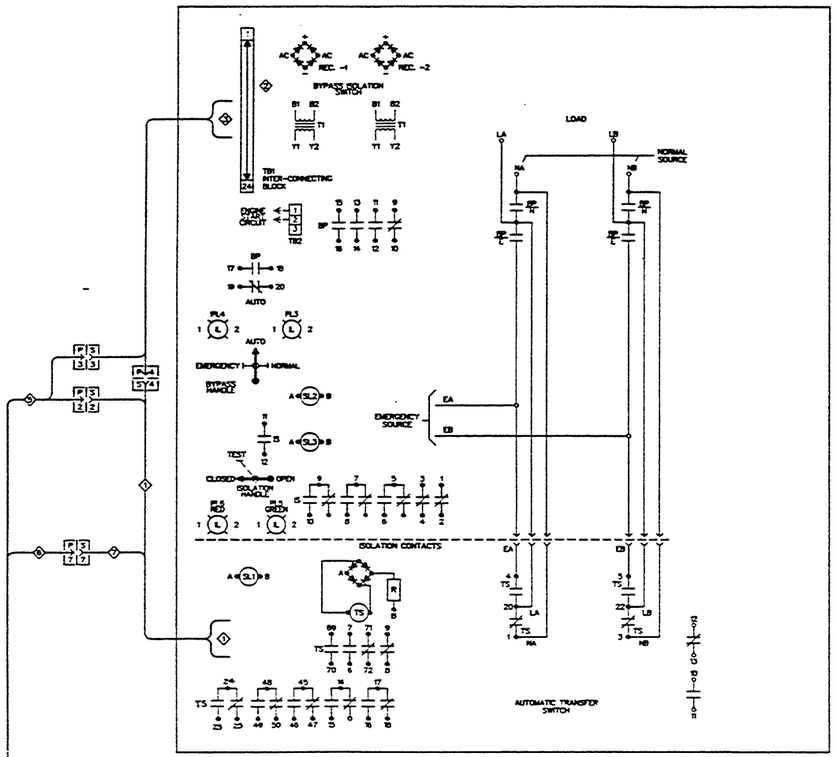
**Logic Interconnection Diagram, 150 – 400–Amps**
**3–Phase, 3 or 4–Wire**
**with, or without Overlapping Neutral**

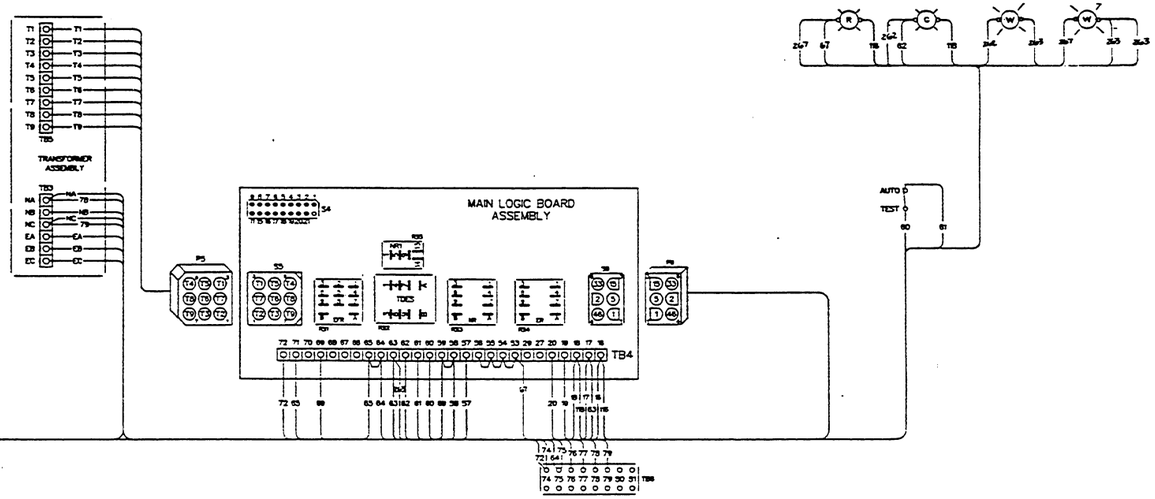
**294150**

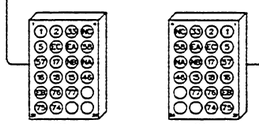



**Schematic Diagram, 600 – 800–Amps**
**Automatic Transfer Switch with Bypass–Isolation**
**1–Phase, 2–Pole, 3–Wire**

297662



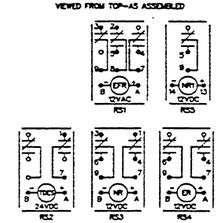

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 32 | TB1-13, PL3-1, PL6-1 | | | | | | | | | |
| | | 31 | TB1-10, SL1-B | | | | | | | | | |
| | | 31 | SL3-B, TB1-10, SL2-B | | | | | | | | | |
| | | 30 | TB1-9, BP-17, S-9 | | | | | | | | | |
| | | 29 | BP-10, BP-19 | | | | | | | | | |
| 34 | TS-72, S2-6 | 28 | TB1-17, BP-9, S-11 | | | | | | | | | |
| 33 | TS-70, S2-9 | 27 | TB2-2, BP-12, S-3 | | | | | | | | | |
| 28 | TS-8, S4-3 | 26 | TB2-1, BP-11, S-1 | | | | | | | | | |
| 20 | TS-50, S4-9 | 25 | BP-13, BP-13, S-10 | NC | S1-4, TB3-NC | | | | | | | |
| 18 | TS-49, S4-6 | 24 | TB1-7, PL4-1 | NB | S1-11, TB3-NB | | | EB | P7-4, P1-17 | | | |
| 18 | TS-48, S4-7 | 23 | TB1-8, PL4-2 | NA | S1-12, TB3-NA | | | 77 | P7-6, P1-18 | | | |
| 17 | TS-47, S4-8 | 22 | TB1-6, PL3-2 | EC | S1-6, TB3-EC | | | 76 | P7-5, P1-15 | 11-12 | 0 | X | 0 |
| 16 | TS-46, S4-5 | 21 | TB1-3, PL3-1 | EB | S1-17, TB3-EB | 34 | P1-18, P2-8 | 75 | P7-2, P1-21 | 9-10 | 0 | X | 0 |
| 15 | TS-45, S4-4 | 20 | TB1-22, BP-16 | EA | S1-7, TB3-EA | 33 | P1-13, P2-9 | 74 | P7-1, P1-22 | 7-8 | 0 | X | X |
| 14 | TS-1, TS-7 | 19 | TB1-23, BP-14 | 77 | S1-19, TB6-77 | 32 | P1-24, P3-4 | | | 5-6 | 0 | X | X |
| 14 | TS-1, S2-11 | 18 | TB1-21, SL1-A | 76 | S1-18, TB6-76 | 14 | P1-12, P2-11 | WIRE NO. | HARNESS P7 TO P1 | 3-4 | X | X | 0 |
| 13 | TS-2, S2-10 | 17 | SL2-A, TB1-18, S-8 | 75 | S1-21, TB6-75 | 13 | P1-11, P2-10 | | | 1-2 | X | X | 0 |
| 12 | TS-18, S2-13 | 16 | SL3-A, TB1-20, S-6 | 74 | S1-22, TB6-74 | 12 | P1-13, P3-6 | AUX. CONT. | | CLOSED | | TEST | OPEN |
| 11 | TS-18, S2-12 | 15 | TB1-19, BP-18, S-7 | 58 | S1-8, TB4-58 | 11 | P1-14, P3-5 | | | ISOLATION HANDLE POSITION | | | |
| 10 | TS-17, S2-7 | | TB1-15, S-5 | 57 | S1-9, TB4-57 | 10 | P1-10, P2-7 | | | | | | |
| 8 | TS-4, TS-9 | 14 | TB1-1, NA | 56 | S1-10, TB4-56 | 9 | P1-9, P3-3 | | | | | | |
| 6 | TS-4, S2-6 | 12 | TB1-12, PL6-2 | 33 | S1-3, P5-4 | 8 | P1-8, P3-2 | | | | | | |
| 5 | TS-3, TS-71 | 11 | TB1-11, PL3-2 | 18 | S1-14, TB4-18 | 7 | P1-8, P3-1 | | | | | | |
| 5 | TS-3, S2-3 | 9 | TB1-16, BP-20, S-12 | 17 | S1-10, TB4-17 | 6 | P1-7, P2-6 | 19-20 | 0 | 0 | X | 0 | 0 |
| 4 | TS-3, TS-69 | 8 | TB1-14, S-4 | 16 | S1-13, TB4-16 | 5 | P1-6, P2-5 | EB | T5-19, S7-4 | 17-18 | 0 | X | 0 | X | 0 |
| 4 | TS-3, S2-4 | 7 | TB1-13, S-2 | 15 | S1-12, P5-3 | 4 | P1-4, P2-4 | 77 | T5-21, S7-6 | 15-16 | 0 | 0 | 0 | X | X |
| 3 | TS-6, S2-3 | 6 | TB1-3, EA | 5 | S1-5, P5-2 | 3 | P1-3, P2-3 | 76 | T5-20, S7-5 | 13-14 | X | X | 0 | 0 | 0 |
| 2 | TS-4, S2-2 | 5 | TB1-4, EB | 2 | S1-2, P5-5 | 2 | P1-2, P2-2 | 75 | T5-13, S7-2 | 11-12 | X | X | 0 | 0 | 0 |
| 1 | TS-8, S2-1 | 4 | TB1-2, NB | 1 | S1-1, P3-1 | 1 | P1-1, P2-1 | 74 | T5-14, S7-1 | 9-10 | 0 | 0 | X | 0 | 0 |
| WIRE NO. | A.T.S. ON PANEL WIRE CONNECTIONS TO J2 & J4 | WIRE NO. | BYPASS-ISOLATION SWITCH, STATIONARY WIRING | WIRE NO. | BYPASS-ISOLATION SWITCH CONNECTION TB1, S3, & P4 | WIRE NO. | LOGIC BOARD HARNESS S1 | WIRE NO. | INTER-CONNECTING HARNESS P1, P2, & P3 | WIRE NO. | A.T.S. TO HARNESS S7 | AUX. CONT. | EMERG. | 80°-10° | AUTO | 10°-180° | NORM. |
| | | | | | | | | | | | | | BYPASS HANDLE POSITION | | | | |
| | | | | | | | | | | | | O=OPEN CONTACT X=CLOSED CONTACT | | | | | |

LEGEND

EFR – EMERGENCY FIRED. RELAY
ER – EMERGENCY RELAY
IS – ISOLATION SWITCH
NR – NORMAL RELAY
NR1 – NORMAL RELAY #1
P – PLUG
PL – PILOT LAMP
R – RESISTOR
REC – RECTIFIER
RS – RELAY SOCKET
S – SOCKET
SL – SOLENOID
TB – TERMINAL BLOCK
TDES – TIME DELAY ENGINE START
T – TRANSFORMER
TS – TRANSFER SWITCH
● – COMPONENT TERMINAL UTILIZED
▬ – RELAY SOCKET TERMINAL UTILIZED

RELAY INTERCONNECTION DIAGRAMS

VIEWED FROM TOP—AS ASSEMBLED




NOTE:
1. SWITCH SHOWN DE-ENERGIZED CONNECTED TO NORMAL SOURCE.
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3. ○ INDICATES CUSTOMER CONNECTION POINTS.
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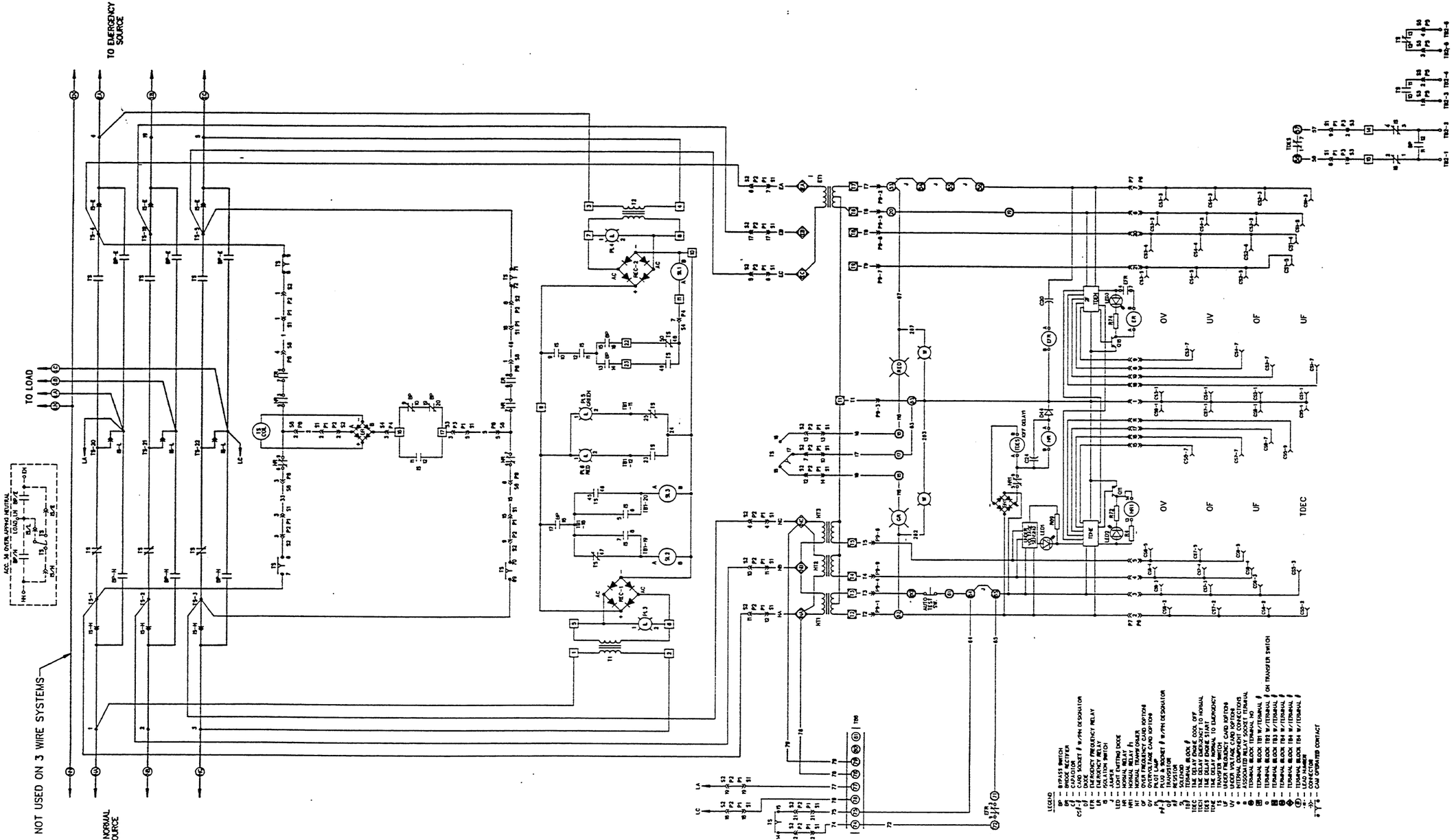
8. SL1 – SOLENOID LOCK TO PREVENT CONNECTING ATS UNLESS SOURCE TO LOAD IS SAME AS SOURCE BYPASSED
9. S1, S2, SL2 – ALLOW BYPASS ONLY TO THE SOURCE TO WHICH THE TRANSFER SWITCH LOAD IS CONNECTED

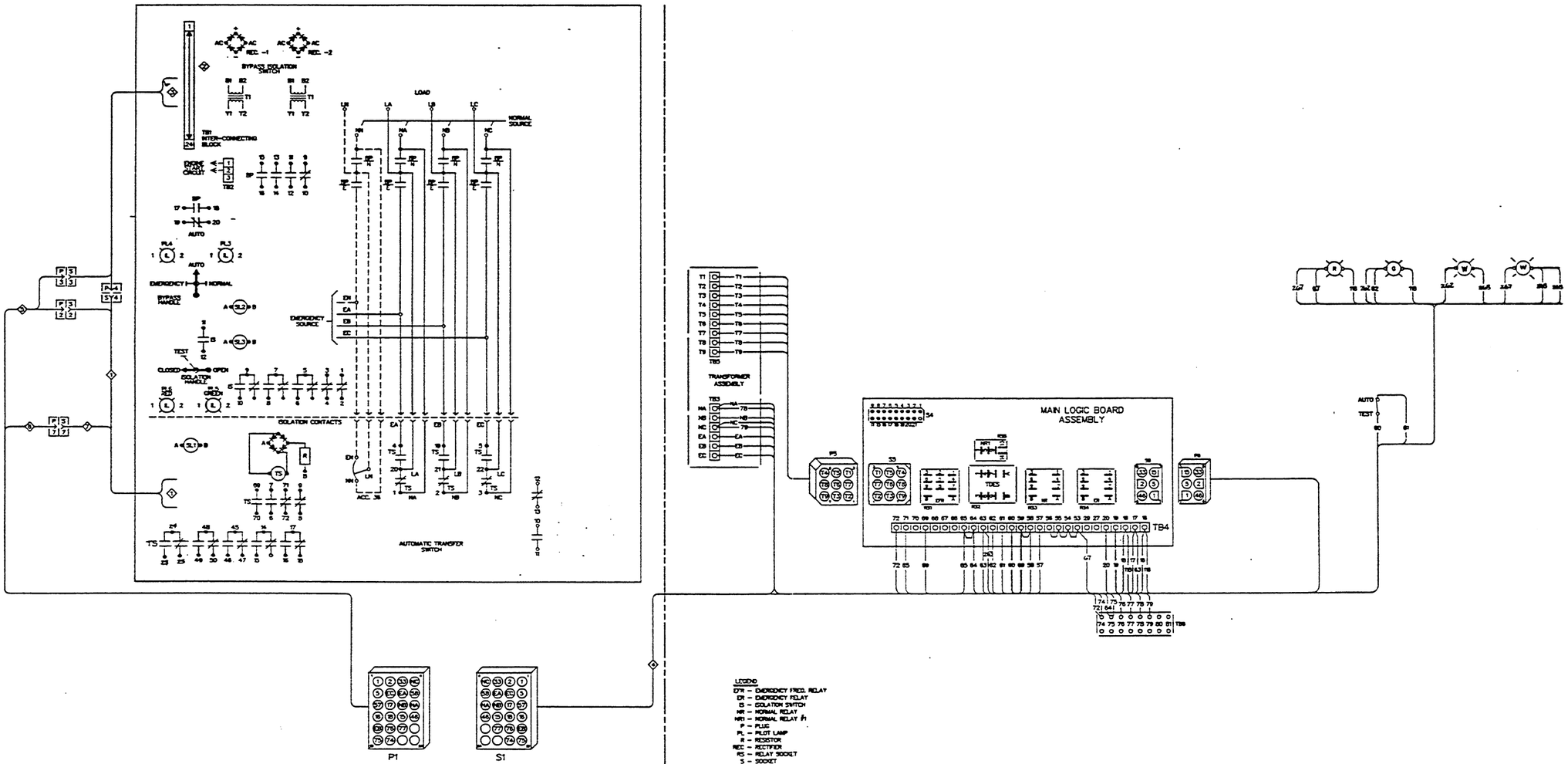
**Logic Interconnection Diagram, 600 – 800–Amps**
**1–Phase, 2–Pole, 3–Wire**

297663




**Schematic Diagram, 600 – 800–Amps**
**Automatic Transfer Switch with Bypass–Isolation**
**3–Phase, 3 or 4–Pole, 3 or 4–Wire**
**with, or without Overlapping Neutral**

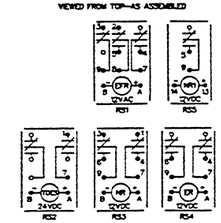
297664




| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 32 | TB1-13, PL3-1, PL8-1 | | | | | | | | | | | | | |
| | | 31 | TB1-10, SL1-B | | | | | | | | | | | | | |
| | | 31 | SL1-B, TB1-10, SL2-B | | | | | | | | | | | | | |
| | | 30 | TB1-9, BP-17, S-9 | | | | | | | | | | | | | |
| | | 29 | BP-10, BP-19 | | | | | | | | | | | | | |
| 34 | TS-72, S2-6 | 28 | TB1-17, BP-8, S-11 | | | | | | | | | | | | | |
| 33 | TS-70, S2-9 | 27 | TB2-2, BP-12, S-3 | | | | | | | | | | | | | |
| 28 | TS-8, S4-3 | 26 | TB2-1, BP-11, S-1 | | | | | | | | | | | | | |
| 20 | TS-50, S4-9 | 25 | BP-13, BP-15, S-10 | | | NC | S1-4, TB3-NC | | | | | | | | | |
| 18 | TS-48, S4-6 | 24 | TB1-7, PL4-1 | | | NB | S1-11, TB3-NB | | | | | DB | P7-6, P1-17 | | | |
| 19 | TS-49, S4-7 | 23 | TB1-8, PL4-2 | | | NA | S1-12, TB3-NA | | | | | 77 | P7-8, P1-18 | | | |
| 17 | TS-47, S4-6 | 22 | TB1-6, PL3-2 | | | EC | S1-6, TB3-EC | | | | | 76 | P7-3, P1-19 | 11-12 | 0 | X | 0 |
| 16 | TS-46, S4-5 | 21 | TB1-3, PL3-1 | 32 | TB1-13, S3-4 | DB | S1-17, TB3-DB | 34 | P1-18, P2-6 | | | 75 | P7-2, P1-21 | 9-10 | 0 | X | 0 |
| 15 | TS-43, S4-4 | 20 | TB1-22, BP-16 | 28 | TB1-17, P4-3 | EA | S1-7, TB3-EA | 33 | P1-13, P2-9 | | | 74 | P7-1, P1-22 | 7-8 | 0 | X | X |
| 14 | TS-1, TS-7 | 19 | TB1-23, BP-14 | 20 | TB1-22, P4-9 | 77 | S1-18, TB6-77 | 32 | P1-24, P3-4 | | | | | 5-6 | 0 | X | X |
| 14 | TS-1, S2-11 | 18 | TB1-21, SL1-A | 19 | TB1-23, P4-8 | 76 | S1-16, TB6-76 | 14 | P1-12, P2-11 | | | WIRE NO. | HARNESS P7 TO P1 ⟨6⟩ | 3-4 | X | X | 0 |
| 13 | TS-2, S2-10 | 17 | SL1-A, TB1-18, S-16 | 18 | TB1-21, P4-7 | 75 | S1-21, TB6-75 | 13 | P1-11, P2-10 | | | | | 1-2 | X | X | 0 |
| 12 | TS-18, S2-13 | 16 | SL1-A, TB1-20, S-8 | 17 | TB1-18, P4-6 | 74 | S1-22, TB6-74 | 12 | P1-13, P3-6 | | | | | AUX. CONT. | CLOSED | | TEST | | OPEN | |
| 11 | TS-18, S2-12 | 15 | TB1-BP, BP-18, S-7 | 16 | TB1-20, P4-5 | 58 | S1-8, TB4-58 | 11 | P1-14, P3-5 | | | | | | ISOLATION HANDLE POSITION | | | | | |
| 10 | TS-17, S2-7 | | TB1-18, S-5 | 15 | TB1-18, P4-4 | 57 | S1-9, TB4-57 | 10 | P1-10, P2-7 | | | | | | | | | | | |
| 6 | TS-4, TS-9 | 14 | TB1-1, NA | 12 | TB1-12, P4-11 | 46 | S1-15, P3-4 | 9 | P1-9, P3-3 | | | | | | | | | | | |
| 6 | TS-4, S2-6 | 12 | TB1-12, PL6-2 | 12 | TB1-12, S3-6 | 33 | S1-3, P3-6 | 8 | P1-8, P3-2 | | | | | | | | | | | |
| 5 | TS-5, TS-71 | 11 | TB1-11, PL3-2 | 11 | TB1-11, P4-10 | 18 | S1-14, TB4-18 | 7 | P1-5, P3-1 | | | | | | | | | | | |
| 5 | TS-3, S2-3 | 9 | TB1-8, BP-20, S-12 | 11 | TB1-11, S3-5 | 17 | S1-10, TB4-17 | 6 | P1-7, P2-6 | | | | | 19-20 | 0 | 0 | X | 0 | 0 | |
| 4 | TS-3, TS-69 | 8 | TB1-16, S-4 | 9 | TB1-18, S3-3 | 15 | S1-13, TB4-15 | 5 | P1-6, P2-5 | | | DB | TS-19, S7-4 | 17-18 | 0 | X | 0 | X | 0 | |
| 4 | TS-3, S2-4 | 7 | TB1-15, S-2 | 8 | TB1-14, S3-2 | 5 | S1-5, P3-2 | 4 | P1-4, P2-4 | | | 77 | TS-21, S7-6 | 15-16 | 0 | 0 | 0 | X | X | |
| 3 | TS-6, S2-3 | 6 | TB1-3, EA | 8 | TB1-14, P4-2 | 5 | S1-5, P8-2 | 3 | P1-3, P2-3 | | | 76 | TS-20, S7-5 | 13-14 | X | X | 0 | 0 | 0 | |
| 2 | TS-A, S2-2 | 5 | TB1-4, EC | 7 | TB1-13, S3-1 | 2 | S1-2, P8-5 | 2 | P1-2, P2-2 | | | 75 | TS-18, S7-2 | 11-12 | X | X | 0 | 0 | 0 | |
| 1 | TS-8, S2-1 | 4 | TB1-2, NC | 7 | TB1-13, P4-1 | 1 | S1-1, P3-1 | 1 | P1-1, P2-1 | | | 74 | TS-14, S7-1 | 9-10 | 0 | 0 | X | 0 | 0 | |
| WIRE NO. | A.T.S. OR PANEL WIRE CONNECTING TO S2 & S4 ⟨1⟩ | WIRE NO. | BYPASS-ISOLATION SWITCH, STATIONARY WIRING ⟨2⟩ | WIRE NO. | BYPASS-ISOLATION SWITCH CONNECTION TBI, S3, & P4 ⟨3⟩ | WIRE NO. | LOGIC BOARD HARNESS S1 | WIRE NO. | INTER-CONNECTING HARNESS P1, P2, & P3 ⟨4⟩ | WIRE NO. | A.T.S. TO HARNESS S7 ⟨5⟩ | | | AUX. CONT. | ENERG. | 80°-90° | AUTO | 10°-80° | NORM. |
| | | | | | | | | | | | | | | | BYPASS HANDLE POSITION | | | | | |
| | | | | | | | | | | | | | | | O=OPEN CONTACT X=CLOSED CONTACT | | | | | |

LEGEND
- DFR – EMERGENCY FREQ. RELAY
- ER – EMERGENCY RELAY
- S – ISOLATION SWITCH
- NR – NORMAL RELAY
- NR1 – NORMAL RELAY #1
- P – PLUG
- PL – PILOT LAMP
- R – RESISTOR
- REC – RECTIFIER
- RS – RELAY SOCKET
- X – SOCKET
- SOL – SOLENOID
- TB – TERMINAL BLOCK
- TDES – TIME DELAY ENGINE START
- TS – TRANSFER SWITCH
- T1 – TRANSFORMER
- 6 – COMPONENT TERMINAL UTILIZED
- 6 – RELAY SOCKET TERMINAL UTILIZED

RELAY INTERCONNECTION DIAGRAMS
VIEWED FROM TOP–AS ASSEMBLED




NOTE
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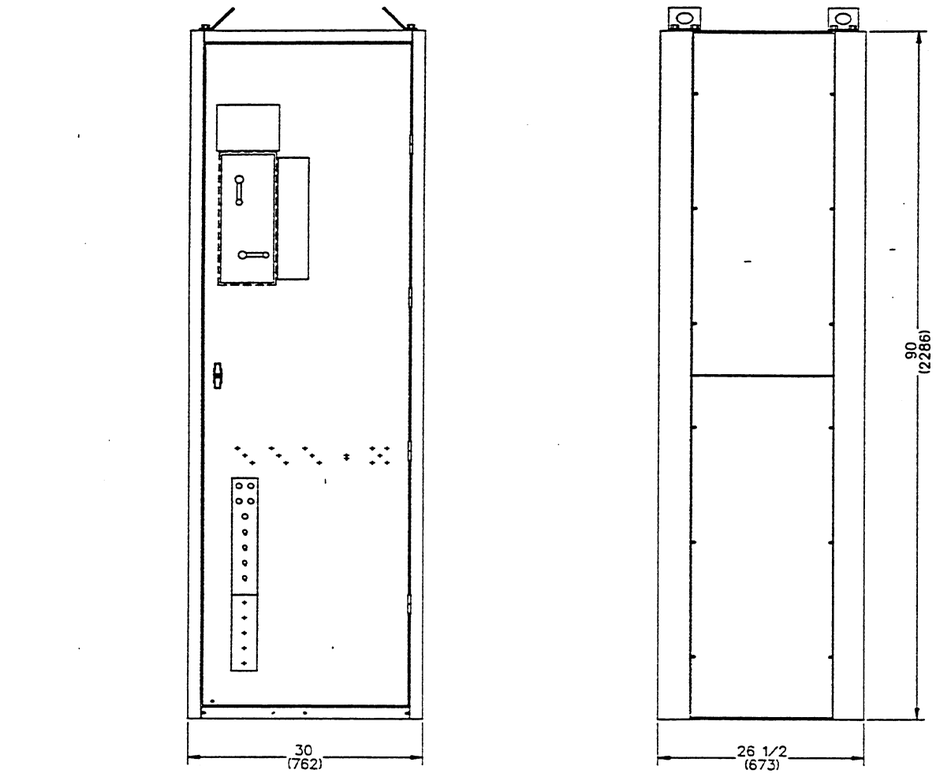
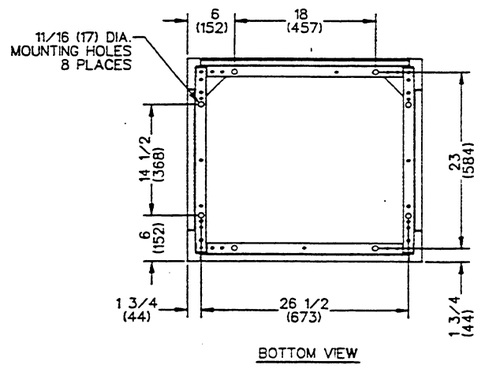
9. SL2, SL3 – ALLOW BYPASS ONLY TO THE SOURCE TO WHICH THE TRANSFER SWITCH LOAD IS CONNECTED.

**Logic Interconnection Diagram, 600 – 800–Amps 3–Phase, 3 or 4–Pole, 3 or 4–Wire with, or without Overlapping Neutral**

297665



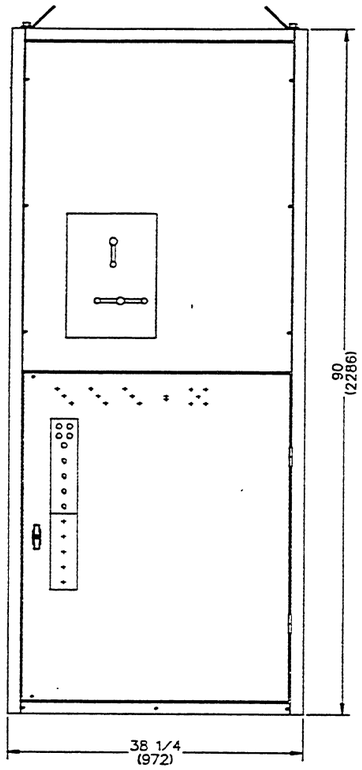

BOTTOM VIEW

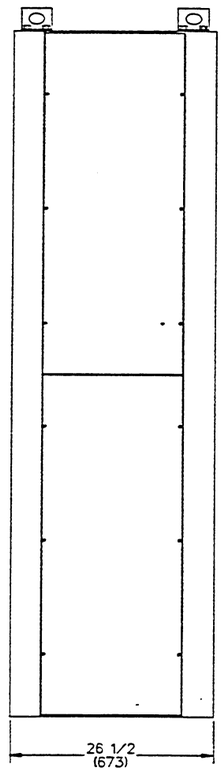
NOTES:
NEMA TYPE 1 – GENERAL PURPOSE, INDOOR, FLOOR SUPPORTED
1. FREE STANDING, FRAME CONSTRUCTION.
2. REMOVABLE DOOR, KEY LOCKING HANDLE. SINGLE DOOR HINGED ON RIGHT WITH SINGLE CENTER LATCH.
3. SIDES, TOP, AND BACK REMOVABLE. OPEN BOTTOM
4. PROVISIONS FOR LIFTING.
5. ENCLOSURES CONSTRUCTED IN ACCORDANCE WITH UL STANDARD 508 (ANSI C33.76–1971) AS REFERENCED IN UL STANDARD 1008.
6. THE TRANSFER SWITCH UNIT IS MOUNTED ON THE INSIDE BACK SURFACE AND THE ACCESSORY CONTROL PANEL MOUNTED ON THE INSIDE DOOR SURFACE. BOTH UNITS ARE TERMINATED BY A QUICK DISCONNECT PLUG LOCATED ON THE INSIDE OF THE DOOR.
7. USE OPERATOR'S MANUAL. REFER TO THIS PUBLICATION PRIOR TO INSTALLATION AND OPERATION OF THE SWITCH.

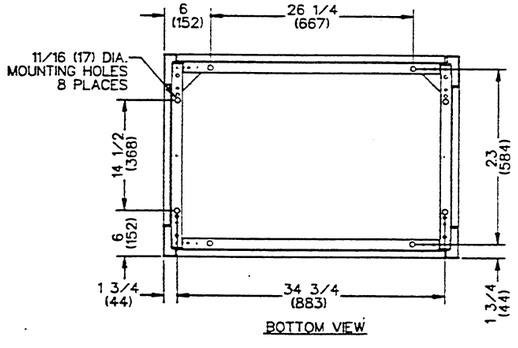
THE SPACE REQUIRED IN FRONT OF THE ENCLOSURE FOR DOOR SWING IS 26 1/4 (667).

DIMENSIONS IN () ARE MILLIMETER EQUIVALENTS.

**Dimensions, 150 – 400–Amps**
**Automatic Transfer Switch with Bypass–Isolation** **ADV–5487**




BOTTOM VIEW

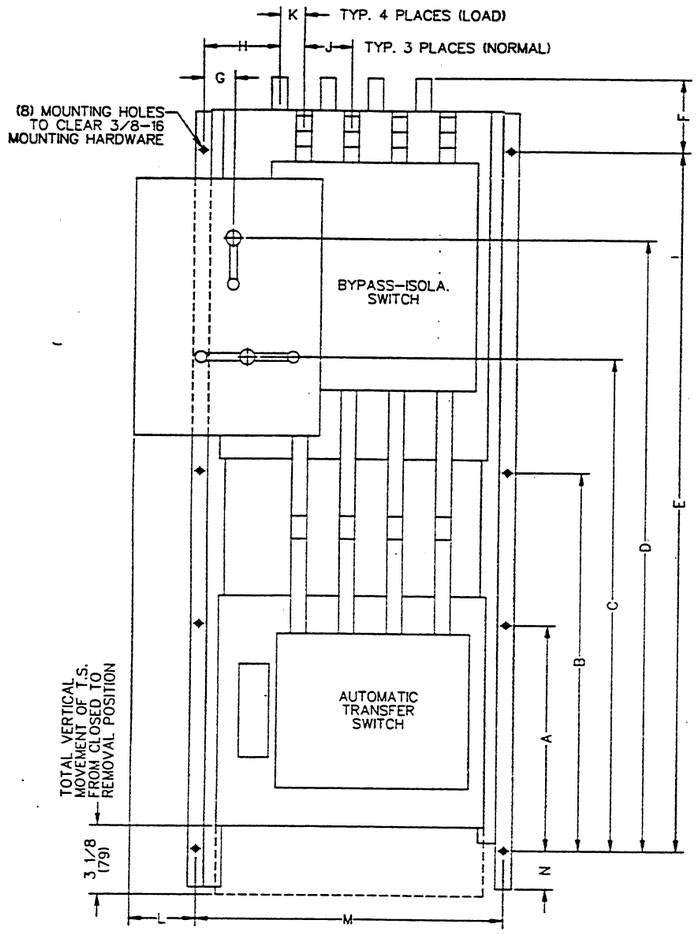
NOTES:
NEMA TYPE 1 – GENERAL PURPOSE, INDOOR, FLOOR SUPPORTED

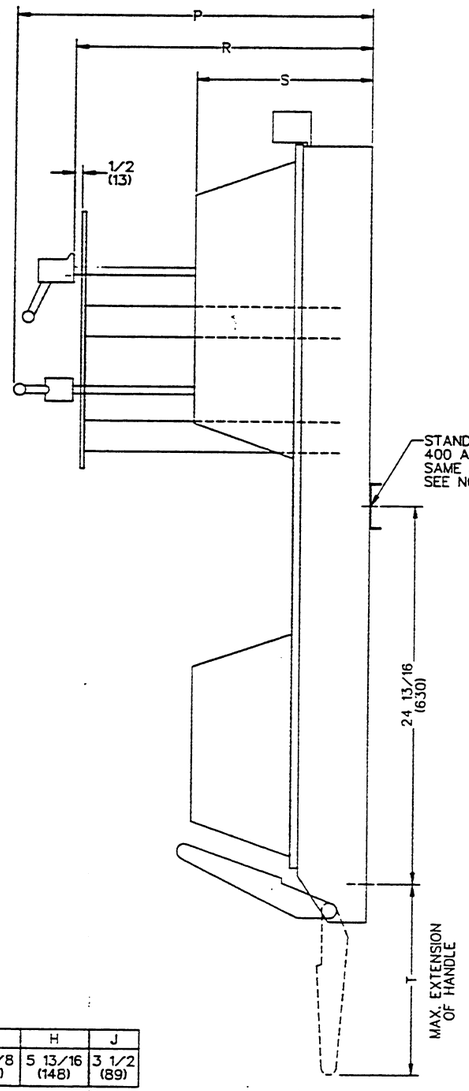
1. FREE STANDING, FRAME CONSTRUCTION.
2. REMOVABLE DOOR, KEY LOCKING HANDLE. SINGLE DOOR HINGED ON RIGHT WITH SINGLE CENTER LATCH.
3. SIDES, TOP, AND BACK REMOVABLE. OPEN BOTTOM.
4. PROVISIONS FOR LIFTING.
5. ENCLOSURES CONSTRUCTED IN ACCORDANCE WITH UL STANDARD 508 (ANSI C33.76–1971) AS REFERENCED IN UL STANDARD 1008.
6. THE TRANSFER SWITCH UNIT IS MOUNTED ON THE INSIDE BACK SURFACE AND THE ACCESSORY CONTROL PANEL MOUNTED ON THE INSIDE DOOR SURFACE. BOTH UNITS ARE TERMINATED BY A QUICK DISCONNECT PLUG LOCATED ON THE INSIDE OF THE DOOR.
7. USE OPERATOR'S MANUAL. REFER TO THIS PUBLICATION PRIOR TO INSTALLATION AND OPERATION OF THE SWITCH.

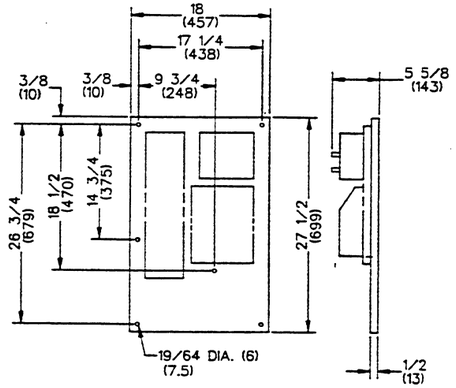
THE SPACE REQUIRED IN FRONT OF THE ENCLOSURE FOR DOOR SWING IS 34 1/2 (876).

DIMENSIONS IN ( ) ARE MILLIMETER EQUIVALENTS.

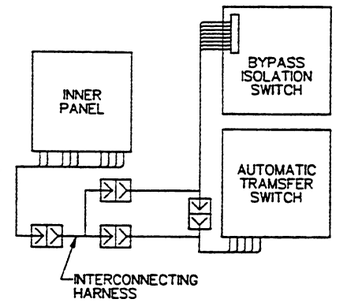
**Dimensions, Enclosure, 600 – 800–Amps**
**Automatic Transfer Switch with Bypass–Isolation** **ADV–5459**




INNER PANEL ASSEMBLY




| AMP SIZE | A | B | C | D | E | F | G | H | J |
|---|---|---|---|---|---|---|---|---|---|
| 600–800 | 18 3/4 (476) | 37 3/4 (949) | 39 1/4 (997) | 47 (1194) | 56 1/2 (1435) | 3 1/2 (89) | 2 5/8 (67) | 5 13/16 (148) | 3 1/2 (89) |

| AMP SIZE | K | L | M1 | M2 | N | P | R | S | T |
|---|---|---|---|---|---|---|---|---|---|
| 600–800 | 1 3/4 (44) | 3 1/2 (89) | 19 3/4 (502) | 23 1/4 (591) | 1 3/4 (44) | 24 3/4 (629) | 21 1/4 (540) | 13 1/2 (343) | 7 1/4 (184) |

NOTE:
M1: WITHOUT OVERLAPPING NEUTRAL TRANSFER CONTACT.
M2: WITH OVERLAPPING NEUTRAL TRANSFER CONTACT.

NOTE:

1. FOR TWO POLE SWITCHES, OMIT CENTER POLE.
2. WHEN INSTALLING, CONNECT NORMAL, EMERGENCY, AND LOAD CONDUCTORS TO CLEARLY MARKED TERMINALS.
3. ALL INTERNAL CONNECTIONS ARE MADE AT THE FACTORY.
4. MAINTAIN ELECTRICAL CLEARANCE OF 1/2 INCH (13 MM) MINIMUM BETWEEN LIVE METAL PARTS AND GROUNDED METAL FOR 400 AMP, AND 1 INCH (25 MM) FOR 600 AND 800 AMP.
5. THE INNER PANEL IS CONNECTED TO THE AUTOMATIC TRANSFER AND BYPASS-ISOLATION SWITCH BY WIRE HARNESSES WITH A COMMON IN-LINE QUICK DISCONNECT PLUG. (CONSULT FACTORY FOR AVAILABLE EXTENSION HARNESSES.)
6. WHEN OPEN TYPE SWITCHES ARE INTENDED FOR ENCLOSURE TYPE MOUNTING BY OTHERS:
   .A. 600 AND 800 AMP – MOUNT THE SWITCH UNIT ON INSIDE BACK SURFACE.
   B. THE INNER PANEL ON THE INSIDE DOOR SURFACE.
7. OPERATOR'S MANUAL IS FURNISHED WITH EACH AUTOMATIC TRANSFER AND BYPASS ISOLATION SWITCH. REFER TO THIS PUBLICATION PRIOR TO INSTALLATION, AND OPERATION ON THE SWITCH.
8. SIZES OF AL–CU U.L. LISTED SODERLESS SCREW TYPE TERMINALS FOR EXTERNAL POWER CONNECTIONS:
   600 AND 800 AMP–
   THREE CABLES PER LUG: NO. 2 MIN. TO 600 MCM MAX.

DIMENSIONS IN ( ) ARE MILLIMETER EQUIVALENTS.

**Dimensions, Open Switch 600 – 800–Amps**
**Automatic Transfer Switch with Bypass–Isolation** **ADV–5460**