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Service Manual

LT III
Transfer Switch
30 to 260 Amperes

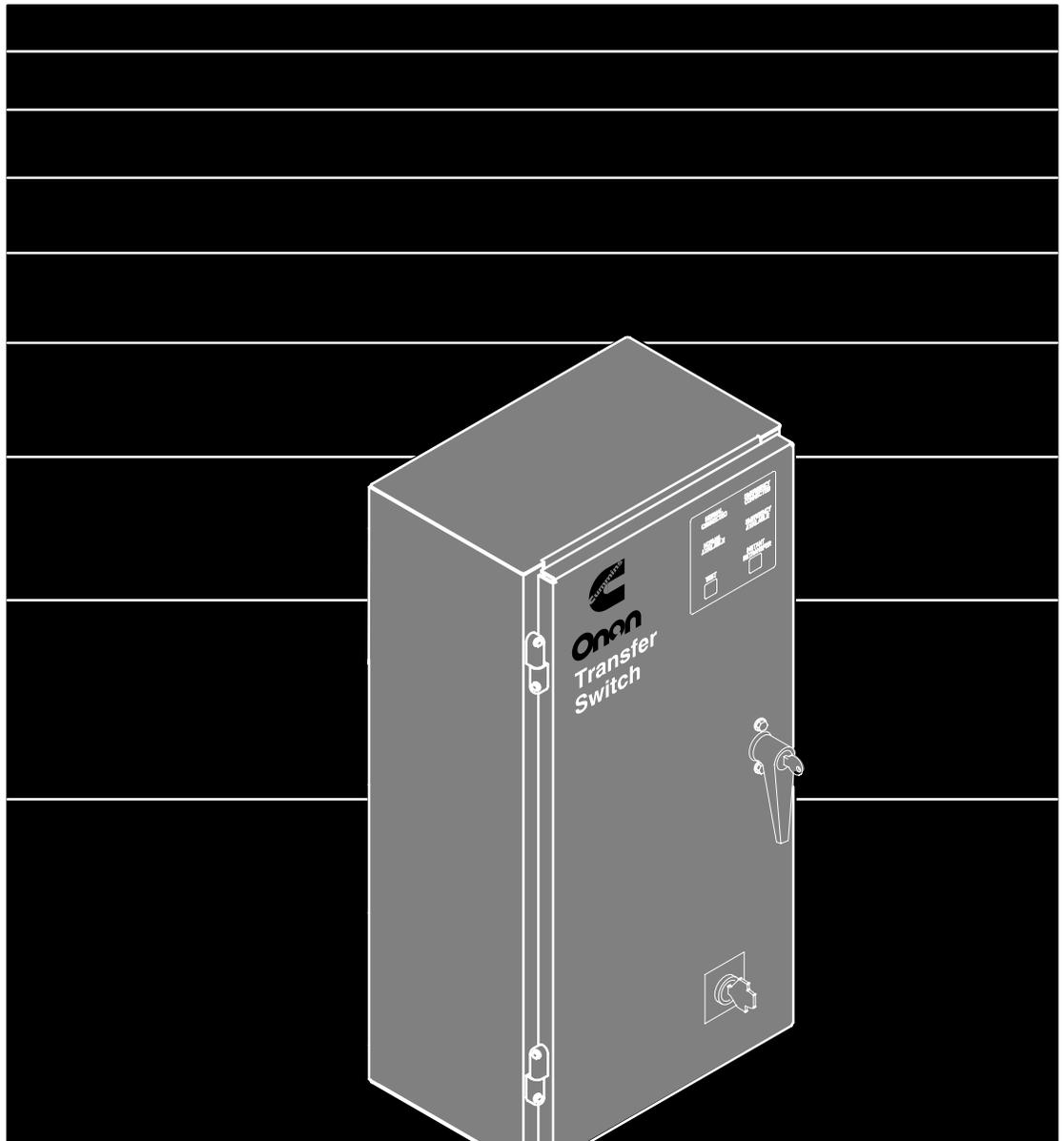


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⚠WARNING

INCORRECT SERVICE OR REPLACEMENT OF PARTS CAN RESULT IN DEATH, SEVERE PERSONAL INJURY, AND/OR EQUIPMENT DAMAGE. SERVICE PERSONNEL MUST BE QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE.

Safety Precautions

This manual includes the following symbols to indicate potentially dangerous conditions. Read the manual carefully and know when these conditions exist. Then take the necessary steps to protect personnel and the equipment.

⚠ DANGER *This symbol warns of immediate hazards that will result in severe personal injury or death.*

⚠ WARNING *This symbol refers to a hazard or unsafe practice that can result in severe personal injury or death.*

⚠ CAUTION *This symbol refers to a hazard or unsafe practice that can result in personal injury or product or property damage.*

High voltage in transfer switch components presents serious shock hazards that can result in severe personal injury or death. Read and follow these suggestions.

Keep the transfer switch cabinet closed and locked. Make sure only authorized personnel have the cabinet and operational keys.

Due to the serious shock hazard from high voltages within the cabinet, all service and adjustments to the transfer switch must be performed only by an electrician or authorized service representative.

If the cabinet must be opened for any reason:

1. Move the operation selector switch on the generator set or Stop/Auto/Handcrank switch on the automatic transfer switch (whichever applies) to Stop.
2. Disconnect the starting batteries of the generator set (remove the ground [-] lead first).
3. Remove AC power to the automatic transfer switch. If the instructions require otherwise, use extreme caution due to the danger of shock hazard.

Place rubber insulative mats on dry wood platforms over metal or concrete floors when working on any electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling any electrical equipment.

Jewelry is a good conductor of electricity and should be removed when working on the electrical equipment.

Do not work on this equipment when mentally or physically fatigued, or after consuming alcohol or any drug that makes the operation of equipment unsafe.

1. Introduction

ABOUT THIS MANUAL

This manual contains service procedures for an LT III transfer switch. Refer to the schematic and wiring diagram package that was shipped with the transfer switch for specific information about its configuration.

Use all normal and necessary safety precautions before starting any service procedures. Identify all hazards by referring to the Safety Precautions and observe all warnings and cautions within the manual. Whenever troubleshooting, remember that the generator set, transfer switch, and utility power source are all interdependent.

This transfer switch is available with two control packages: control package A has the standard feature set, and control package B has a higher level of features. This manual covers both control packages.

TRANSFER SWITCH APPLICATION

Transfer switches are an essential part of a building's standby or emergency power system. The Normal power source, commonly the utility line, is backed up by an Emergency power source, often a generator set. The transfer switch supplies the electrical load with power from one of these two power sources.

The load is connected to the common of the transfer switch (Figure 1-1). Under normal conditions, the load is supplied with power from the Normal source (as illustrated). If the Normal power source is interrupted, the load is transferred to the Emergency power source. When Normal power returns, the load is retransferred to the Normal power source. The transfer and retransfer of the load are the two most basic functions of a transfer switch.

AUTOMATIC TRANSFER SWITCHES

Automatic transfer switches, capable of automatic operation without operator involvement, perform the following basic functions:

1. Sense the interruption of the Normal power source.
2. Send a start signal to the generator set (Emergency power source).
3. Transfer the load to the Emergency power source.
4. Sense the return of the Normal power source.
5. Retransfer the load to the Normal power source.
6. Send a stop signal to the generator set.

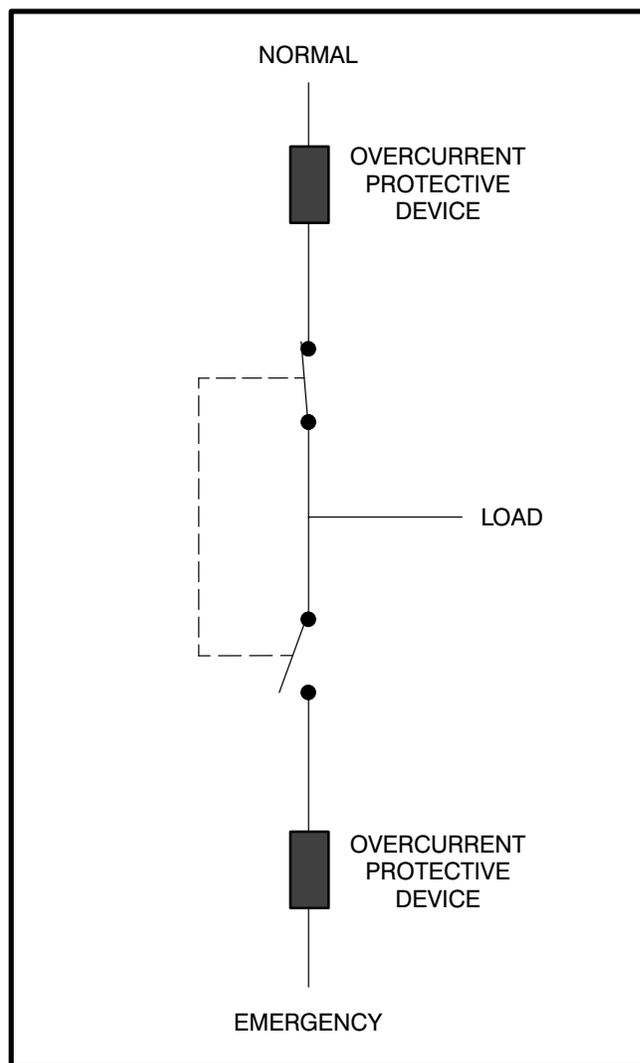


FIGURE 1-1. LOAD TRANSFER SWITCH (TYPICAL FUNCTION)

TRANSFER SWITCH PROTECTION

Transfer switches are continuously rated devices. With proper maintenance, they will carry load currents up to their nameplate ratings for any time duration. Transfer switches are designed to safely withstand normally occurring surge currents from electrical devices in their load circuits. They are also designed to safely withstand the surge currents, which can occur on a short circuit or fault condition, as long as the available fault current does not exceed the rating of the switch and its protective device, and the transfer switch is installed with proper protective equipment.

All automatic transfer switches are required to be installed with appropriate overcurrent protection on the normal source side of the transfer switch, and on the emergency source side of the switch (Figure 1-1). Protective devices may be circuit breakers, fuses, or other suitable overcurrent protective system components. A list of allowable protective equipment is affixed to the transfer switch. The listed protective device must be installed at some point in the circuit between the transfer switch and the electrical services that feed the device.

REMOVING AND REPLACING ELECTRONIC CONTROL COMPONENTS

⚠️WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Disconnect connector J1/P1 before working on the electronic control system.*

Disconnecting J1/P1 removes all power to the door. Be sure to remove all power before replacing components.

No special tools are required to remove and replace control system components.

The transfer switch must always maintain compliance with any applicable codes and standards. Improper servicing can create an unsafe installation that might cause severe personal injury, death, and/or equipment damage.

For proper operation, field connections to Normal, Emergency, Load and Ground lugs must be torqued to the values shown in Table 1-1.

TABLE 1-1. LUG TIGHTENING REQUIREMENTS

SWITCH SIZE (AMPS)	TIGHTENING TORQUES	WIRE RANGE
Ground Lug (All)	35 in-lbs (4 N•m)	4–14 AWG CU
30	35 in-lbs (4 N•m)	3–10 AWG CU
60	75 in-lbs (8.5 N•m)	2–10 AWG CU
100	80 in-lbs (9 N•m)	2/0–14 AWG CU-AL
150	80 in-lbs (9 N•m)	3/0–6 AWG CU-AL
200	275 in-lbs (31 N•m)	300 MCM–6 AWG CU-AL
260	275 in-lbs (31 N•m)	400 MCM–6 AWG CU-AL

⚠️WARNING *Incorrect installation, service, or replacement of parts can result in severe personal injury, death and/or equipment damage. Service personnel must be qualified to perform electrical and/or mechanical component installation.*

MODEL IDENTIFICATION

Identify your model by referring to the Model and Specification number as shown on the nameplate. Electrical characteristics are shown on the lower portion of the nameplate. The nameplate is located on the cabinet door.

If it is necessary to contact a dealer or distributor regarding the transfer switch, always give the complete Model, Specification, and Serial number as listed on the nameplate. This information is necessary to properly identify your unit among the many types manufactured.

Refer to the next page of this section for a list of feature/option codes for transfer switches at spec level J and above.

On spec J transfer switches, the model number is made up of code segments that designate various features or options:

LT	60	00000	J
1	2	3	4

1. LT - 3-Pole Transfer Switch Series
2. Ampere Rating

30	150
60	200
100	260
3. Sequentially assigned spec number - issued for each specific combination of accessories, voltages, frequency and standards codes.
4. Specification letter - advances with production modification

FEATURE DESCRIPTION	FEATURE OPTION	FEATURE DESCRIPTION	FEATURE OPTION
Control Options		Agency Approvals	
Control Package A	C021	Listing – UL	A046
Control Package B	C022	Certification – CSA	A047
Frequency		Listing – Not Applicable	A048
60 Hertz	A044	Battery Chargers	
50 Hertz	A045	Battery Charger – 2A,12/24V	K001
Voltage		Battery Charger – 10A,12V	K002
120 VAC	R020	Battery Charger – 10A, 24V	K003
208 VAC	R021	Mechanical Latching	
220 VAC	R022	Mechanically Held Line Side	A005
240 VAC	R023	Mechanically Held Both Sides	A007
380 VAC	R024	Programmed Transition	
415 VAC	R025	0.1 to 3.0 Seconds	J027
440 VAC	R035	0.1 to 30 Seconds	J028
480 VAC	R026	Miscellaneous	
600 VAC	R027	Module – 3-Wire Start	M002
Phase		Term Block – Batt Chrg Alarms	N002
System – 1 Phase, 2-W or 3-W	A041	Switch – Manual Override	N014
System – 3 Phase, 3-W or 4-W	A042		

TABLE 1-2. CONTROL FEATURES

Control Package A	Control Package B
<ul style="list-style-type: none"> • Time Delay Start: 3 seconds • Transfer Time Delay: 3 seconds • Retransfer Time Delay: 5 minutes • Stop Delay: 5 minutes • Undervoltage Sensing: Single Phase on Normal and Emergency –Pickup 85% of Nominal –Dropout 75% of Pickup • Remote Test Terminals 	<ul style="list-style-type: none"> • Time Delay Start: 0 to 15 seconds (adjustable) • Transfer Time Delay: 2 to 120 seconds (adjustable) • Retransfer Time Delay: 6 seconds to 30 minutes (adjustable) • Stop Delay: 2 seconds to 10 minutes (adjustable) • Undervoltage Sensing: Three phase Differential Sensing on Normal, Single phase Emergency –Pickup 85 – 100% of nominal (adjustable) –Dropout: 75 – 98% of Pickup (adjustable) • LED status indicators for Source Available and Switch position on both Normal and Emergency • Remote Test Terminals • Momentary Test Switch • Retransfer Bypass Switch • 7 Day Exerciser Clock with or without load • Auto/Manual retransfer

2. Description and Operation

GENERAL

This section describes the operation of the LT III transfer switch. The descriptions cover the standard and most optional features.

COMPONENT DESCRIPTIONS

Cabinet Exterior

The cabinet meets the requirements of the National Electrical Manufacturers Association (NEMA) for a UL Type 1 cabinet. This type is designated as a general-purpose, indoor cabinet. The door of a typical switch is shown in Figure 2-1.

Indicator Lamps (Control Package B Only)

Control package B comes with four indicator lamps on the cabinet door. The Normal Available and Emergency Available lamps are lit whenever their

corresponding power sources (utility or generator set) are producing power. These two lamps can be lit simultaneously.

The Normal Connected and Emergency Connected lamps indicate which power source is connected to the load. Only one of these two lamps can be lit.

Test/Instant Retransfer Switch (Control Package B Only)

Control package B has a Test and an Instant Retransfer switch. The momentary Test switch sends a start signal to the generator set. After the transfer time delay, the generator set will assume the load—provided that the Load/No-Load switch (Figure 2-2) is in the Load position.

The Instant Retransfer will initiate retransfer to utility power bypassing the normal retransfer delay.

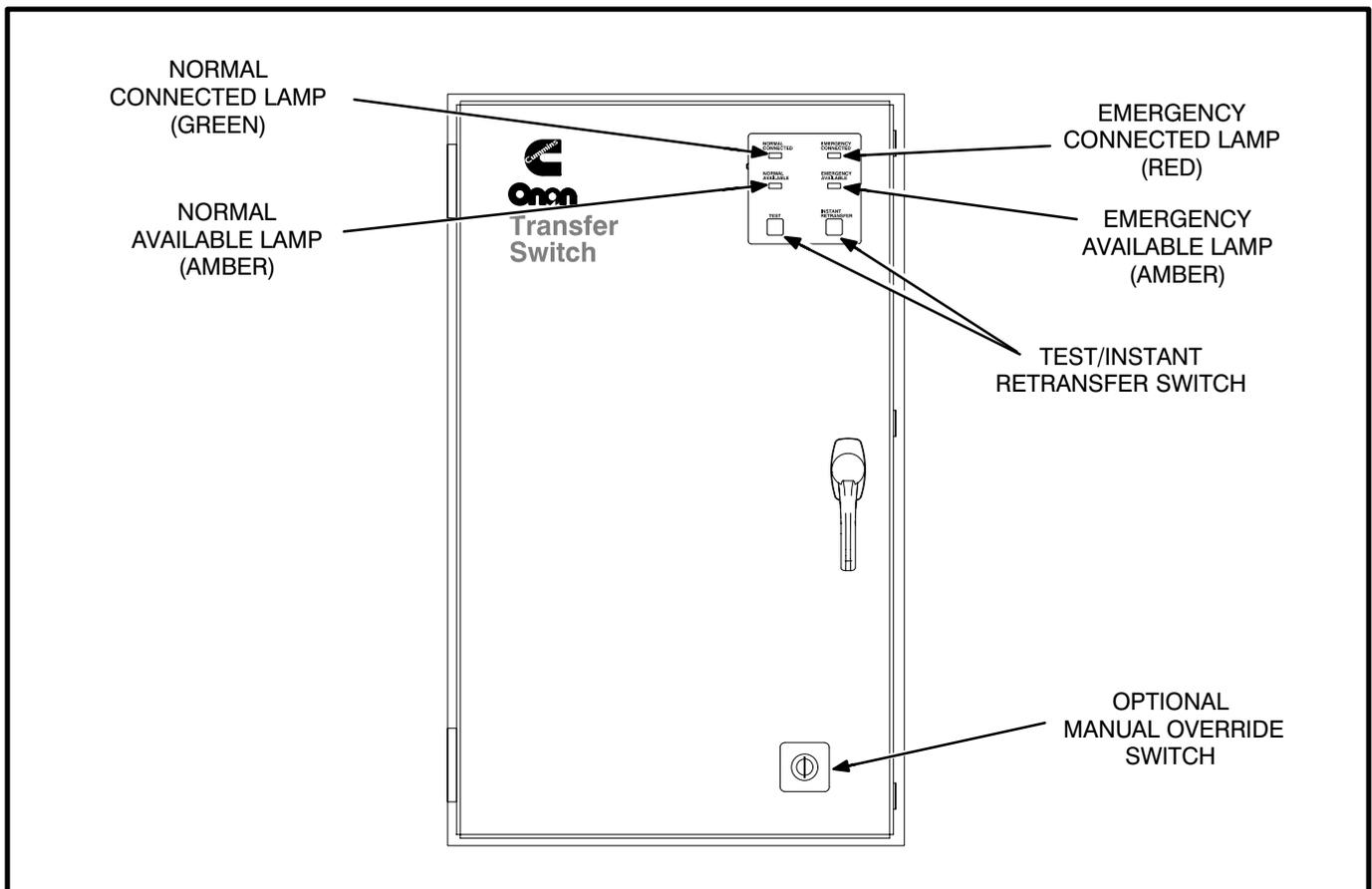


FIGURE 2-1. CABINET WITH CONTROL PACKAGE B AND OPTIONS

Optional Manual Override Switch

This optional three position key operated switch is mounted on the front of the cabinet door (Figure 2-1). This switch is used to override the electronic control. In the Auto position, the transfer switch is set for automatic operation.

Moving the switch to the Close Emergency position bypasses the electronic control and causes the load to transfer immediately to Emergency power, if Emergency power is available.

Moving the switch to the Close Normal position bypasses the electronic control and causes the load to retransfer immediately to the Normal power source, if Normal power is available.

TRANSFER SWITCH ASSEMBLY

The transfer switch (Figure 2-2) opens and closes the contacts that transfer the load between Normal and Emergency power. The transfer switch is mechanically interlocked to prevent simultaneous closing to both power sources. The main parts of the transfer switch discussed here are the contact assemblies and auxiliary contacts.

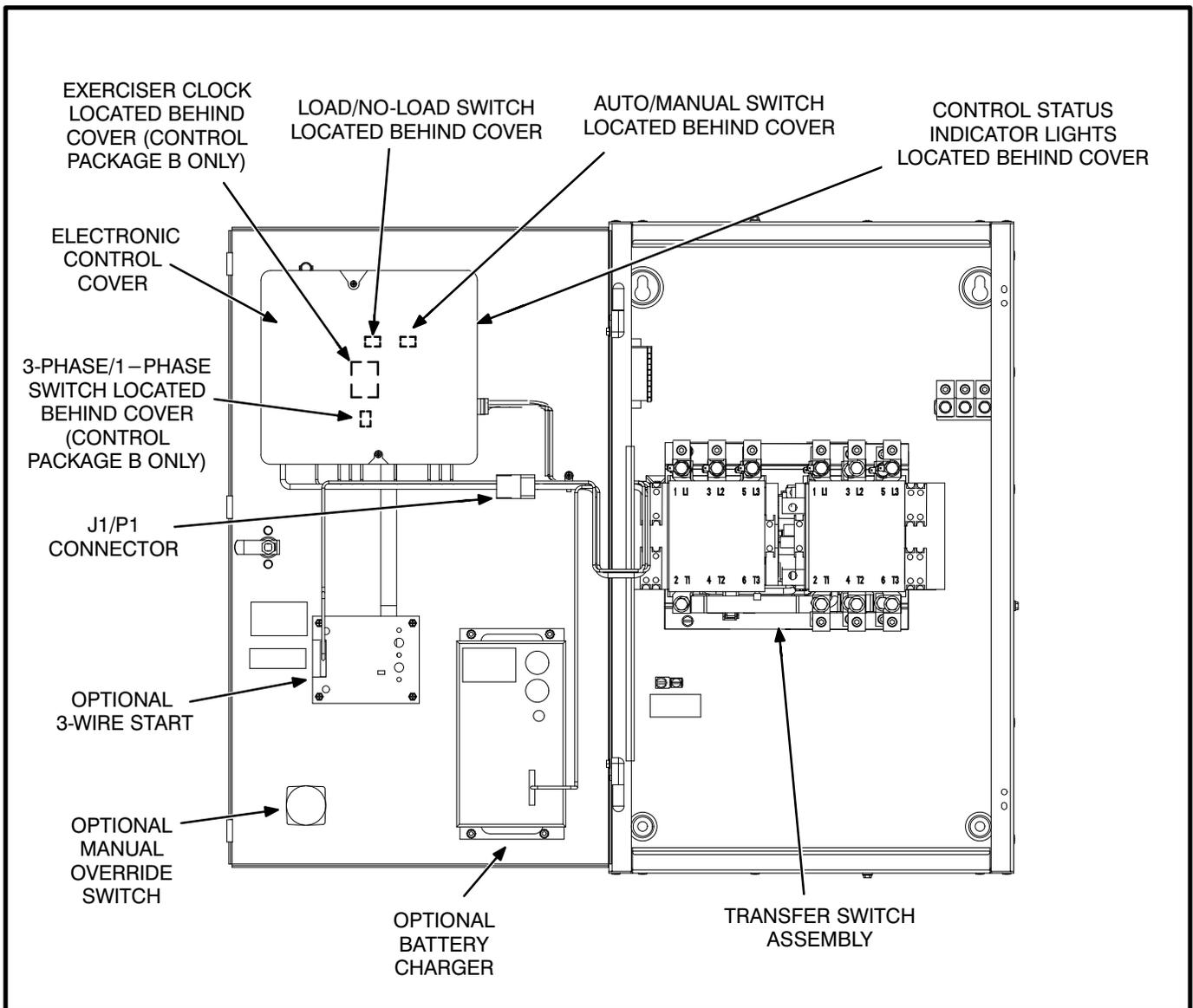


FIGURE 2-2. TRANSFER SWITCH INTERIOR COMPONENTS

Contact Assemblies

The automatic transfer switch comes in a three pole configuration only and is provided with a neutral bar. The contact assemblies make and break the current flow. When closed to the Normal power source the contacts are mechanically held. The Emergency side may or may not be mechanically held, depending on the options selected. A mechanical interlock prevents them from closing to both power sources at the same time.

Auxiliary Contacts

Auxiliary contacts, for external alarm or control circuitry, are available for the Normal and Emergency sides of the transfer switch. Refer to Figure 2-3 for auxiliary contact locations. The contacts have ratings of 10 amperes at 600 VAC. Figure 2-3 shows the normally open and normally closed positions of the auxiliary contacts with the transfer switch in the neutral position. Moving the transfer switch to Normal or Emergency actuates the corresponding auxiliary contacts.

Use number 18 to number 10 AWG wire. For connection to the screw terminal, strip the insulation back 3/8 inch (10 mm).

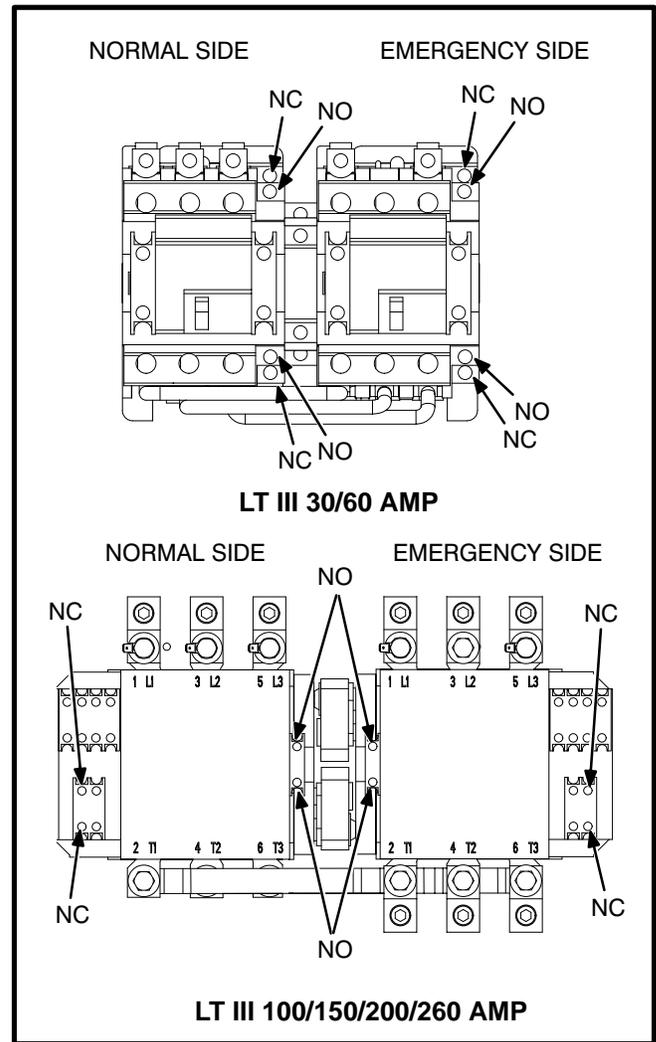


FIGURE 2-3. AUXILIARY CONTACTS

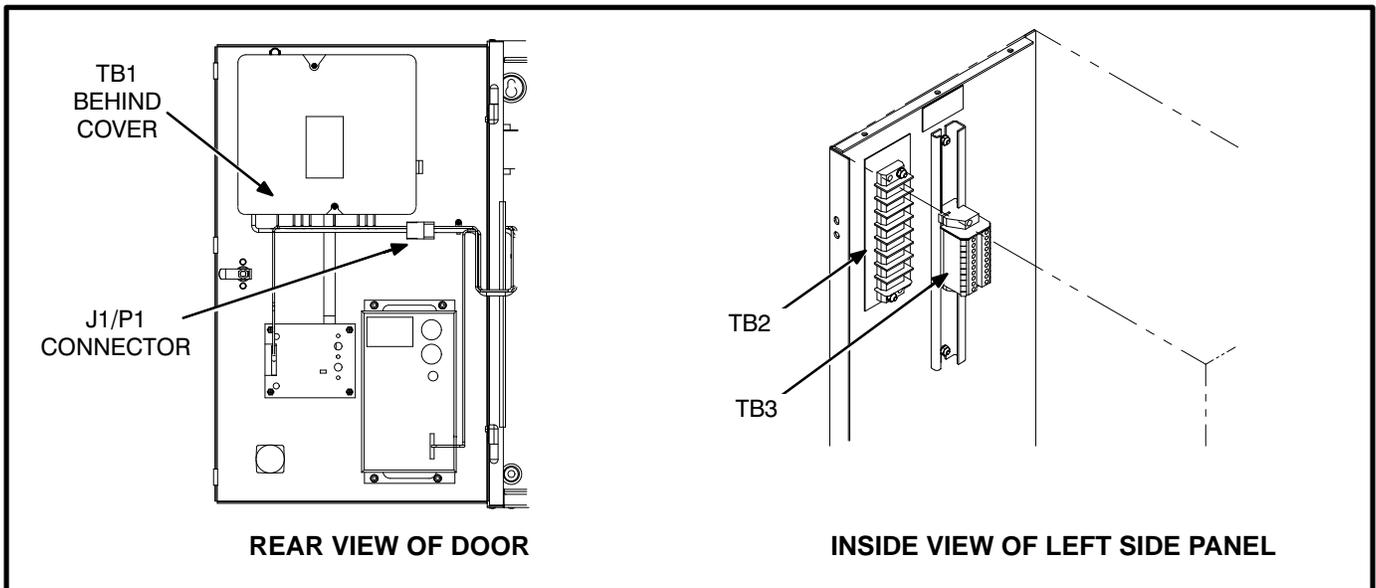


FIGURE 2-4. CONTROL WIRING CONNECTIONS

Terminal Blocks

Connections of standard and optional control wiring are made at terminal blocks TB2 and TB3 (Figure 2-4). Terminal block TB1 on the electronic control is prewired.

Terminal block TB3 provides the connection terminals for the 3-Wire Start and battery charger alarm contacts.

Connectors

Disconnecting J1/P1 (Figure 2-4) disconnects all line power from the door. Refer to sheets 2 and 4 in your schematic and wiring diagram package.

ELECTRONIC CONTROL

This section describes the switches and adjustment pots on the electronic control.

The control includes voltage sensing circuits, time delay circuits, control relays and status indicator lights. Control package B has adjustment potentiometers and indicator lamps. The adjustments are covered in Section 3.

Auto/Manual Switch

The Auto/Manual switch, located on the control circuit board (Figure 2-2), is used to enable or disable the automatic retransfer function. This switch has two positions. In the Auto position, normal automatic retransfer is enabled. In the Manual position, automatic retransfer (from a functioning generator set back to utility power) is disabled; only manual retransfer is possible. To manually retransfer, turn the

optional Manual Override switch to Close Normal or with control package B, press the Instant Retransfer switch.

In the event of generator set failure, the control logic will ignore the Auto/Manual switch and initiate retransfer to utility power.

Load/No-Load Switch

The Load/No-Load switch is located on the control circuit board. During a test or exercise cycle the generator set will assume the load if this switch is set to Load. If the switch is set to No-Load, the gen-set will start, but the load will not transfer to the generator set.

Cal/85% Pickup Switch (Control Package A Only)

Control package A has a Cal/85% Pickup switch located on the control circuit board. Setting the switch in the 85% position will set the voltage sensors to pickup at 85 percent voltage. The Cal setting is used for calibration (refer to Section 3 for calibration procedures). Setting the switch to Cal will set the voltage sensors to pickup at 100 percent.

3-Phase/1-Phase Switch (Control Package B Only)

Control package B has a 3-Phase/1-Phase switch, located on the control circuit board. When the normal source is three-phase, the switch must be set to the 3-phase position for proper voltage sensing. For a single-phase normal source, the switch must be set to 1-phase.

Time Delays

The time delay settings on control package A are preset. The time delay settings are adjustable on control package B. Refer to Section 3 for adjustment procedures.

Start Time Delay: This delay is preset to 3 seconds on control package A and is adjustable from 0.5 to 15 seconds on control package B. This brief time delay prevents generator set starting during power interruptions of short duration. Timing starts the moment of Normal (utility) power interruption. If the duration of interruption exceeds the delay time, the control system signals the generator set to start.

Transfer Time Delay: This delay timing begins when generator voltage and frequency reach the settings of the control. After the delay, the transfer switch transfers the load to the Emergency power source. This brief time delay allows the generator set to stabilize before the load is applied. The time is preset to 3 seconds on control package A and is adjustable from 2 to 120 seconds on control package B.

Retransfer Time Delay: This delay begins the moment Normal line voltage returns. After the delay, the transfer switch can retransfer the load to the Normal source. The delay allows the Normal source to stabilize before retransfer. The time is preset to 5 minutes on control package A and it is adjustable from 6 seconds to 30 minutes on control package B.

Stop Time Delay: This delay is preset to 5 minutes on control package A and is adjustable from 2 seconds to 10 minutes on control package B. It begins timing when the load is retransferred to the Normal power source. At the end of the delay, the stop signal is sent to the generator set. This time delay allows the generator set to cool down at no load before stopping.

Undervoltage Sensing

Control package A has undervoltage sensing for one phase of the Normal and Emergency sides with fixed pickup and dropout settings. Control package B has three phase undervoltage sensing for the Normal side and single phase sensing of the Emergency side. Control package B also has adjustable pickup and dropout settings. Refer to Section 3 for adjustment procedures.

The voltage sensors for the Normal and Emergency side, monitor source voltages for an undervoltage

condition and generate signals, which are sent to the time delays. If, for example, an undervoltage condition is sensed on the Normal source, the voltage sensor sends a signal to the time delay that initiates and controls the timing for generator set start and the transfer of load.

On control package A, Pickup voltage is preset to 85% of Normal, and Dropout is preset to 75% of Pickup. On control package B, Pickup is adjustable from 85% to 100% of Normal, and Dropout is adjustable from 75% to 98% of Pickup.

OPTIONAL MODULES

Figure 2-2 shows the interior of a typical LT III transfer switch. Due to differences in cabinet sizes, the location of some of the optional modules in the transfer switch may not be the same as shown here. Refer to Section 3 for adjustments and settings for these modules.

Three-Wire Starting Option

The optional three-wire starting control enables the transfer switch to start and stop a three-wire start generator set. Three-wire starting logic is similar to a single-pole, double-throw switch. A common is closed to one side to send a start signal, and to the opposite side to send a stop signal. In addition to start and stop functions, the control has an overcrank relay, a preheat relay, two Timing lamps, a Lockout lamp, a Reset switch, a preheat delay On/Off switch, and an Auto/Stop/Handcrank switch.

Float Battery Charger Option

The optional float-charge battery charger regulates its charge voltage to continuously charge without damage to the battery. As the battery approaches full charge, the charging current automatically tapers to zero amperes or to steady-state load on the battery. The battery charger has an ammeter for indication of charging current and has a fuse for protection of the battery charger circuit.

Exerciser Clock Option

The exerciser clock is used to start and run the generator set at programmable intervals and for selected durations. It is a 7-day, 24-hour clock that can store and execute up to four start/stop programs per day. The exerciser clock also has a test feature that can be used to initiate a genset start and run cycle.

Refer to Section 3 for programming information.

Area Protection/ Remote Test Transfer

The transfer switch can be wired with a remote test switch. Closure of a set of contacts across the remote test inputs (terminals 7 and 8 of TB2) will initiate the transfer switch test mode. During remote test a start/run signal is sent to the generator set.

If the Load/No-Load switch on the control circuit board is in the Load position (Figure 2-2), a simulated utility power failure occurs. The load is transferred to the generator set when generator set power becomes available.

If the Load/No-Load switch is in the No-Load position, the generator set will start and run, but it will not assume the load during the remote test.

Program Transition Option

The optional Program Transition module is used to provide a delay during transition. Programmed transition allows the transfer switch to assume a mid-transition position for an adjustable interval of time. In this position the load is not connected to either (Normal or Emergency) power source.

This feature allows residual voltage from inductive loads to decay to an acceptable level before transfer is completed. The length of time that the transfer switch is in the mid-position can be adjusted from 0.1 to 3 seconds or 0.1 to 30 seconds, depending on the timer option. The proper adjustment is a function of the load.

OPERATION

Automatic Operation

The basic operation of the transfer switch is automatic and does not require operator involvement. The transfer switch automatically starts the genset on interruption of Normal power and transfers the load circuit when proper genset voltage is reached.

When Normal power is restored, the transfer switch automatically transfers the load back to the Normal source and stops the genset.

For automatic operation, place control switches in the positions given below.

- **Auto – Manual Switch:**
Auto position.
- **Optional – Manual Override Switch:**
Auto position.
- **Operation Selector Switch (engine control):**
Remote position. (Two-wire start only.)
- **Stop/Auto/Handcrank switch:**
Auto position. (Three-wire start only.)

The generator set must also be set for automatic operation.

GENERATOR SET EXERCISE

Run the generator for at least 30 minutes once each week with at least 50 percent load (if possible). If you do not have control package B, with the exerciser clock, the remote test input can be used to test the generator set each week.

The exerciser clock has programmable exercise periods that will exercise the generator set automatically with or without load, depending on the position of the Load/No-Load switch. If the Normal power source has an interruption while the generator set is exercising without load, the automatic transfer switch will transfer the load to the generator set.

Generator Set Start Test

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts whenever the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform.*

1. Place the Load/No-Load selector switch, on the control (Figure 2-2), in the No-Load position.

The Load/No-Load selector switch must be in the No-Load position.

2. Close the cabinet door.

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Close and lock the cabinet door when not working inside cabinet.*

3. **Control Package A:** Activate the remote test input. The generator set should start and run.

At the end of the test period, deactivate the remote test input. The generator will stop.

Control Package B: Press and hold the Test switch on the front of the door. The generator set should start and run.

At the end of the test period, release the test switch. The generator will stop.

4. In anticipation of scheduled or automatic generator set exercise, check that the Load/No-Load selector switch is in the desired position (Figure 2-2). Refer to *Generator Set Exercise*. Close and lock the cabinet door.

With-Load Standby System Test

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts whenever the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform.*

1. Place the Load/No-Load selector switch, on the control circuit board, in the Load position.

The Load/No-Load selector switch must be in the Load position in order to test with load.

2. Close the cabinet door. If optional Manual Override switch is installed, make sure it is in the Auto position.

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Close and lock the cabinet door when not working inside cabinet.*

3. **Control Package A:** Activate the remote test input. The generator set should start and assume the load after the start and transfer time delays.

At the end of the test period, deactivate the remote test input. The generator will stop after the retransfer and stop time delays.

Control Package B: Press and hold the Test switch on the front of the door. The generator set should start and assume the load after the start and transfer time delays.

At the end of the test period, release the Test switch. The generator will stop after the retransfer and stop time delays. If desired, press the Instant Retransfer switch to bypass a long retransfer delay.

4. In anticipation of scheduled or automatic generator set exercise, check that the Load/No-Load selector switch is in the desired position. Refer to *Generator Set Exercise*. Close and lock the cabinet door.

Overcrank Reset (3-Wire Start Only)

An overcrank condition exists when the generator set fails to start within the overcrank time limit. When this condition occurs, the Lockout lamp on the 3-Wire Start module will light. To reset the automatic starting circuit:

1. Correct the engine starting problem.
2. Push the Overcrank Reset button inward and release to reset the overcrank relay.

PLANNED MAINTENANCE

Performing the yearly planned maintenance procedures in Table 2-1 will increase the operational reliability of the transfer switch. The following procedures must only be performed by technically qualified personnel, following the procedures provided in this manual. **If repair or replacement of components is necessary, call your dealer or distributor.**

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. In addition, incorrect installation, service, or parts replacement can result in severe personal injury, death, and/or equipment damage. Therefore, all corrective service procedures must only be performed by technically qualified personnel, following the procedures provided in this manual.*

⚠WARNING *The transfer switch presents a shock hazard that can cause severe personal injury or death unless all AC power is removed. Be sure to move the generator set operation selector switch to Stop, disconnect AC line power, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first) before servicing.*

⚠WARNING *Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.*

TABLE 2-1. ANNUAL MAINTENANCE

1. DISCONNECT ALL SOURCES OF AC POWER:

Disconnect both AC power sources from the transfer switch before continuing. Turn the generator set operation selector switch to Stop. (The selector switch is located on the generator set control panel.) ***If there is an external battery charger, disconnect it from its AC power source.*** Then disconnect the set starting battery (negative [-] lead first).

2. CLEAN

- a. Thoroughly dust and vacuum all controls, switching mechanism components, interior buswork, and connecting lugs.
- b. Close the cabinet door and wash **exterior** surfaces with a damp sponge (mild detergent and water). ***Do not allow water to enter the cabinet, especially at lamps and switches.***

3. INSPECT

- a. Check buswork and supporting hardware for carbon tracking, cracks, corrosion, or any other types of deterioration. If replacement is necessary, call your dealer or distributor.
- b. Check stationary and movable contacts. If contact replacement is necessary, the procedures are described in section 5.
- c. Check system hardware for loose connections. Tighten as indicated in step 4.
- d. Check all control wiring and power cables (especially wiring between or near hinged door) for signs of wear or deterioration.
- e. Check all control wiring and power cables for loose connections. Tighten as indicated in step 4.
- f. Check the cabinet interior for loose hardware. Tighten as indicated in step 4.

4. PERFORM ROUTINE MAINTENANCE

- a. Tighten buswork, control wiring, power cables, and system hardware, as necessary. Retorque all cable lug connections. Lug torque requirements are listed in section 1.
- b. Service or replace the batteries.

5. CONNECT AC POWER AND CHECK OPERATION

- a. Connect the set starting battery (negative [-] lead last). Connect the normal AC power source, enable the backup power source. If applicable, connect power to the battery charger.
- b. Verify proper operation of the battery charger.
- c. Test system operation as described in this section. Close and lock the cabinet door.

3. Adjustments and Settings

INTRODUCTION

This section provides information on calibrating and adjusting the electronic control. Adjusting the settings on the optional components and programming the exerciser clock are also covered in this section.

CALIBRATING AND ADJUSTING THE ELECTRONIC CONTROL

The adjustment pots for undervoltage and time delay settings on control package B are shown in Figure 3-1.

⚠️WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts whenever the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform.

Connect the Battery

Make sure that the RUN switch on the generator is in the STOP position and connect the battery (negative [-] lead last). If applicable, reconnect the external battery charger.

⚠️WARNING Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any arc, spark, or flame while servicing batteries.

Connect AC Line Power

Connect AC line power to the automatic transfer switch. The Normal Available and Normal Connected lamps will light if the voltage sensors are calibrated (if equipped with Manual Override switch, it must not be set at Close to Emergency).

Voltage Sensors

Control package A has undervoltage sensing for one phase of the Normal and Emergency sides with fixed pickup and dropout settings. The Pickup voltage is preset to 85% of Normal, and Dropout is preset to 75% of Pickup.

Control package B control has three phase undervoltage sensing for the Normal side and single phase sensing of the Emergency side. This control has adjustable pickup and dropout settings. Pickup is adjustable from 85% to 100% of Normal, and Dropout is adjustable from 75% to 98% of Pickup. The adjustment procedure is described in the following section.

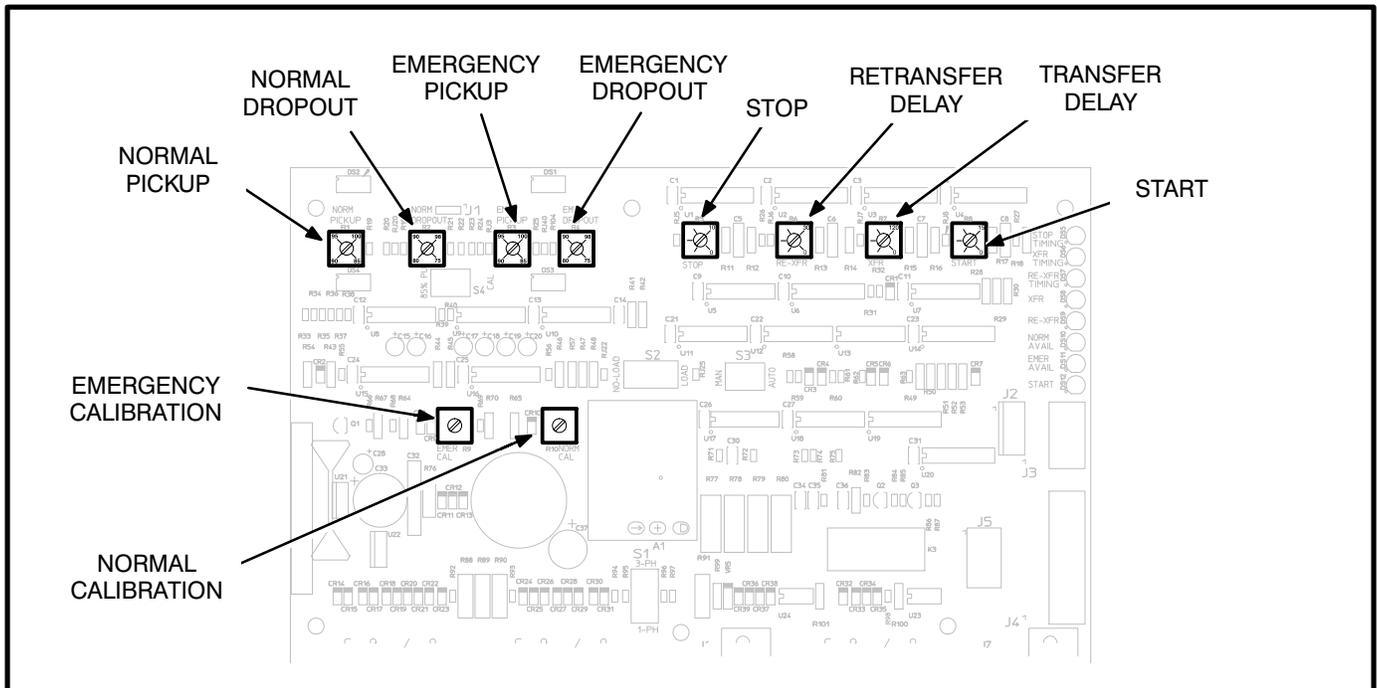


FIGURE 3-1. CONTROL PACKAGE B ADJUSTMENTS

Undervoltage Sensor Calibration

⚠ CAUTION *Incorrect setting of the calibration (Cal) adjustments will result in abnormal operation of the transfer switch.*

⚠ WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts whenever the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform.*

All adjustments are made by turning the appropriate potentiometer with a screwdriver. The adjustment potentiometers are accessed by removing the cover from the control.

A separate voltage sensor is used for each power source. The adjustment pot locations are shown in Figure 3-2. The Normal sensor monitors the Normal (utility) power source. The Emergency sensor monitors the Emergency (generator set) power source.

The voltage sensors monitor the Normal and Emergency power sources for an undervoltage condition. To calibrate the undervoltage sensors:

Control Package A:

1. Move the calibration switch (Figure 3-2) to the CAL position (100% pickup setting).

2. Turn on Normal source and check for nominal voltage.
3. Slowly turn the Normal calibration (Cal) potentiometer clockwise until the Normal Available lamp just turns ON.
4. Turn on Emergency source and check for nominal voltage.
5. Slowly turn the Emergency calibration (Cal) potentiometer clockwise until the Emergency Available lamp just turns ON.
6. Move the calibration switch (Figure 3-2) to the 85 % position. This set the unit to 85% pickup and 75% dropout.

Control Package B:

1. Perform the following for the Normal source undervoltage sensor:
Turn the Normal Pickup pot (Figure 3-2) fully clockwise to 100% pickup.
Turn the Normal calibration (Cal) pot fully counterclockwise.
Turn the Normal Dropout pot fully clockwise to 97% dropout.
2. Turn on Normal source and check for nominal voltage.
3. Slowly turn the Normal calibration (Cal) potentiometer clockwise until the Normal Available lamp just turns ON.

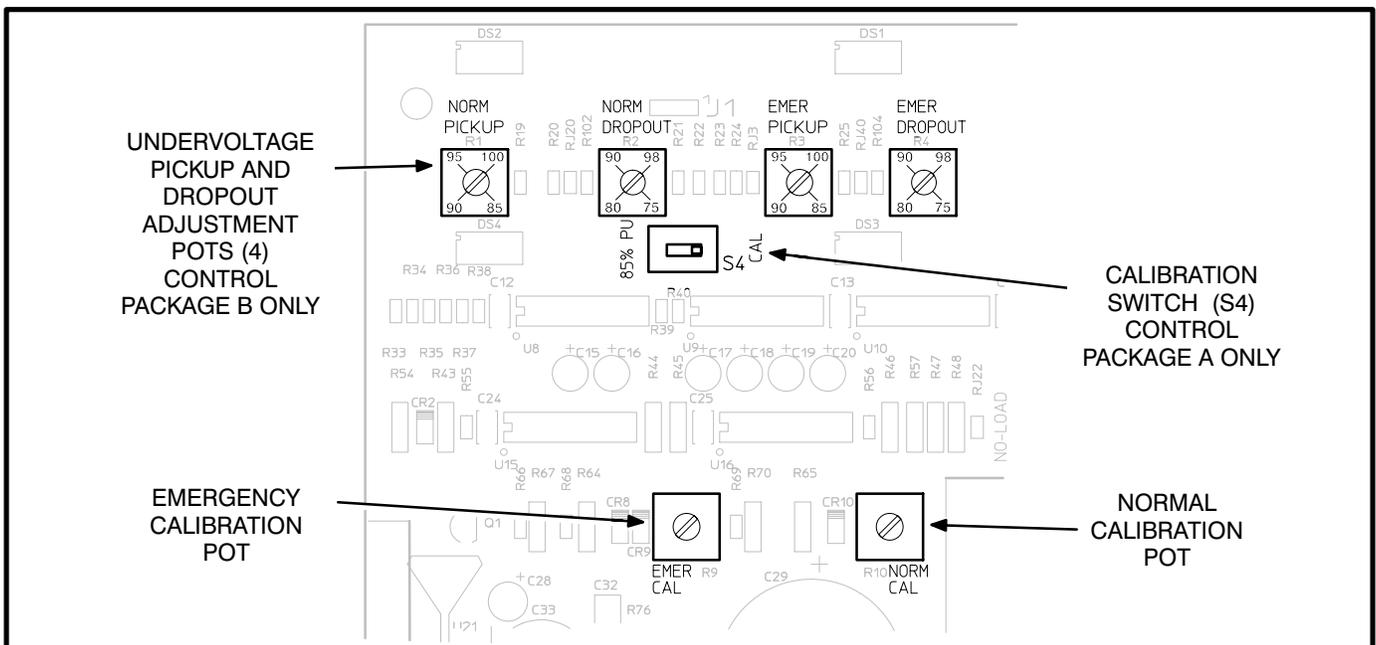


FIGURE 3-2. UNDERVOLTAGE CALIBRATION, PICKUP AND DROPOUT ADJUSTMENT

4. Perform the following for the Emergency source undervoltage sensor:
 Turn the Emergency Pickup pot fully clockwise to 100% pickup.
 Turn the Emergency calibration (Cal) pot fully counterclockwise.
 Turn the Emergency Dropout pot fully clockwise to 97% dropout.
5. Turn on Emergency source and check for nominal voltage.
6. Slowly turn the Emergency calibration (Cal) potentiometer clockwise until the Emergency Available lamp just turns ON.
7. Turn off both power sources.

Pickup 85% to 100% of nominal voltage
 Dropout 75% to 98% of pickup voltage

To set the pickup and dropout percentages, align the slots on the potentiometers with the desired markings as shown in Figure 3-2).

TIME DELAY

The time delay controls the following functions:

- Start time delay
- Stop time delay
- Transfer time delay
- Retransfer time delay

The time delays on control package A are preset. The time delays on control package B are adjustable over the following ranges:

Proceed to Undervoltage Pickup and Dropout Adjustments.

Undervoltage Pickup and Dropout Adjustments (Control Package B Only)

Undervoltage dropout occurs when an undervoltage condition is sensed. Pickup occurs when an acceptable voltage is sensed. Undervoltage dropout and pickup are preset on control package A. Undervoltage dropout and pickup are adjustable over the following ranges on control package B:

DELAY	ADJUSTMENT RANGE
Start	0 to 15 seconds
Stop	0 to 10 minutes
Transfer	0 to 120 seconds
Retransfer	0 to 30 minutes

FUNCTION ADJUSTMENT RANGE

To set the time delays, align the slots on the potentiometers with the desired markings, see Figure 3-3.

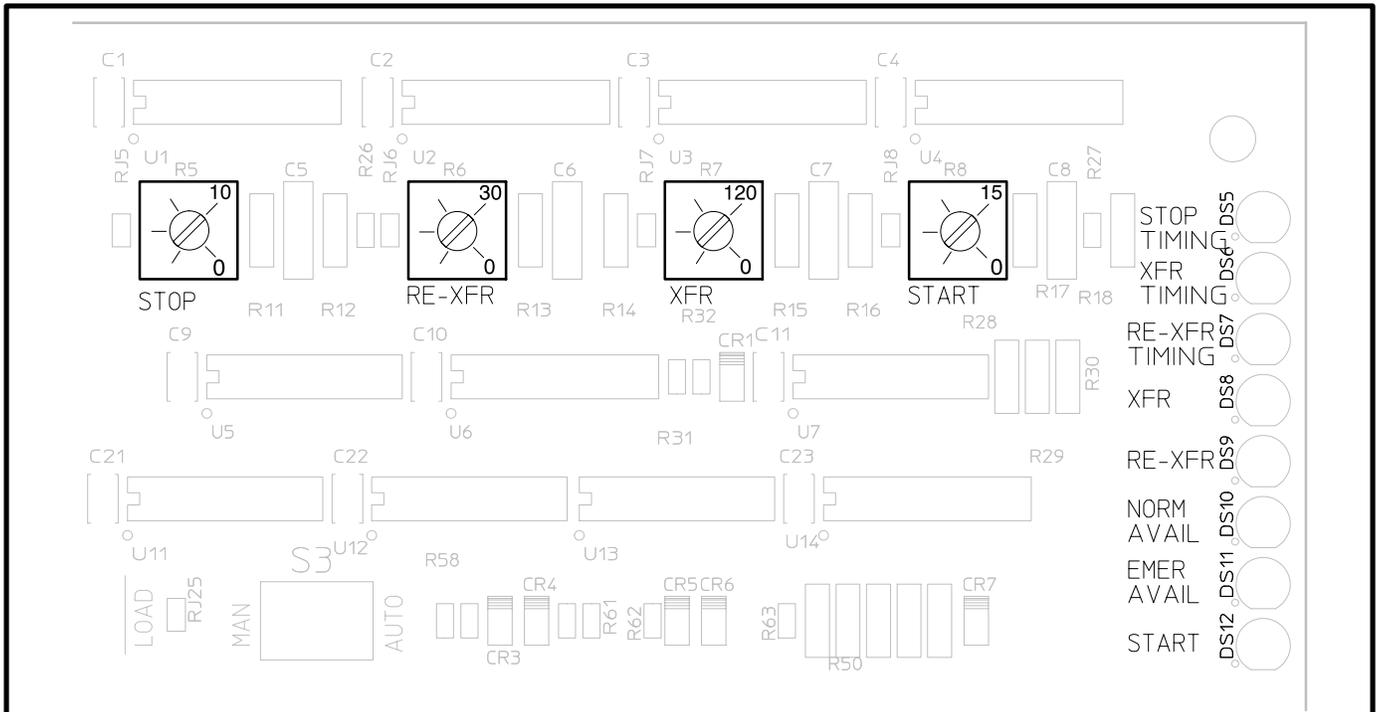


FIGURE 3-3. CONTROL PACKAGE B TIME DELAY ADJUSTMENT

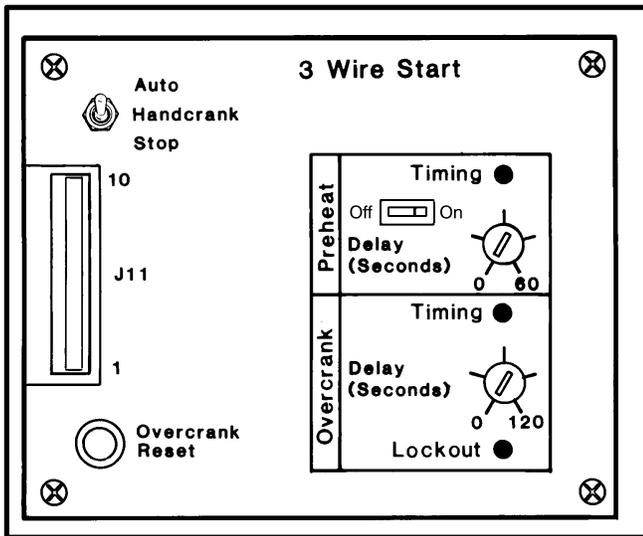


FIGURE 3-4. 3-WIRE START

3-WIRE START MODULE

The 3-Wire Start module has two adjustable timers.

The Preheat timer delays the start signal to allow preheating the generator set. The Preheat timer's range of adjustment is 0 to 60 seconds.

If a preheat delay is desired, make sure that the Preheat timer's On/Off switch is in the On position.

The Overcrank timer limits the time that the generator set starter is allowed to operate. The Overcrank timer's range of adjustment is 0 to 120 seconds.

To set the timers, align the slots on the potentiometers with the desired markings on the faceplate (Figure 3-4).

The Auto/Handcrank/Stop switch has three positions that function as follows:

Auto: Allows the generator set to start and assume the load if a power outage occurs. **This is the normal operating position.**

Stop: Shuts down the generator set and prevents it from starting. **Use this position when servicing the generator set.**

Handcrank: Prevents the automatic transfer switch from starting the generator set, but allows starting and stopping at the set. **Use this position for generator set maintenance.**

Connections for the optional 3-Wire Start module are made at TB3.

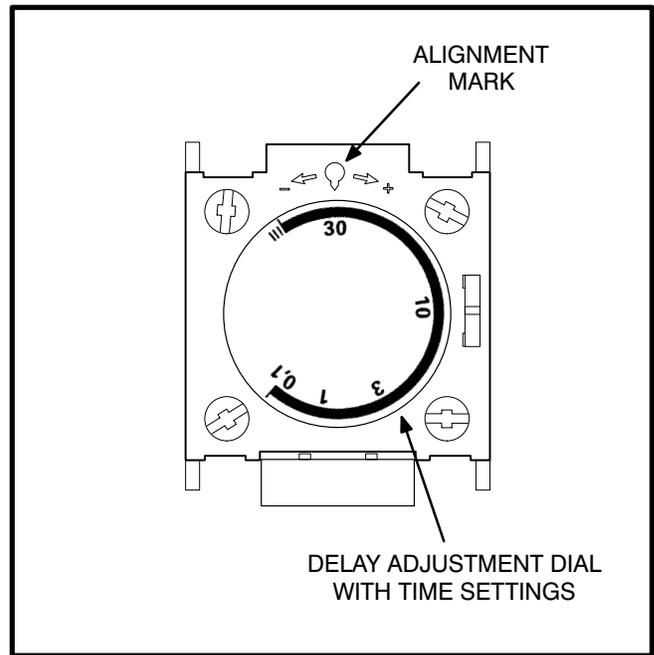


FIGURE 3-5. PROGRAM TRANSITION MODULE

PROGRAM TRANSITION

The Program Transition module (Figure 3-5) is used to provide a delay during transition. Programmed transition allows the transfer switch to assume a mid-transition position for an adjustable interval of time. In this position the load is not connected to either (Normal or Emergency) power source.

The delay feature allows residual voltage from inductive loads to decay to an acceptable level before transfer is completed. This module is available in either a 0.1 to 3 second or 0.1 to 30 second adjustment range. The proper adjustment is a function of the load.

To set the time delay, rotate the dial to align the desired time setting on the dial with the alignment mark on the timer.

EXERCISER CLOCK (CONTROL PACKAGE B ONLY)

The exerciser clock is used to start and run the generator set at programmable intervals and for selected durations. It is a 7-day, 24-hour clock that can store and execute up to four start/stop programs per day (one minute minimum duration). The exerciser clock also has a test feature that can be used to initiate a genset start and run cycle.

Programming the exerciser clock requires setting the time of day and entering the exercise start and stop times as described in the following sections. The exerciser clock has backup power for approximately six hours. (When the clock is running on backup power the segments around the display will flash on and off). After six hours the day and time will have to be reset. Exercise programs will not be lost during a power outage (exercise programs are stored in EEPROM).

To reset the exerciser clock:

Resetting the exerciser clock erases all existing day, time and exercise program settings.

Depress and hold the arrow, plus and set buttons (→) (+) (D) simultaneously. Release the plus and set buttons while continuing to hold the arrow button. When all aspects of the LCD display appear, release the arrow button.

To set the day and time:

1. With the exerciser clock powered, press all three buttons simultaneously to reset the time. The time display area will show (— : —) and a small clock symbol will appear in the upper left corner of the display. Refer to Figure 3-6.
2. Press the arrow (→) button once to set the day-of-week. The clock symbol will begin flashing to indicate the clock is being programmed and the display will show midnight (0:00).
3. Press the plus (+) button as many times as necessary until the current day-of-week is displayed.
Example: 1 = Monday, 2 = Tuesday, etc.
4. Press the arrow (→) button again to set the hour of the day. The clock uses 24-hour (military) time.
5. Press the plus (+) button until the current hour is displayed.
Example: 2:00 PM is 14:00.

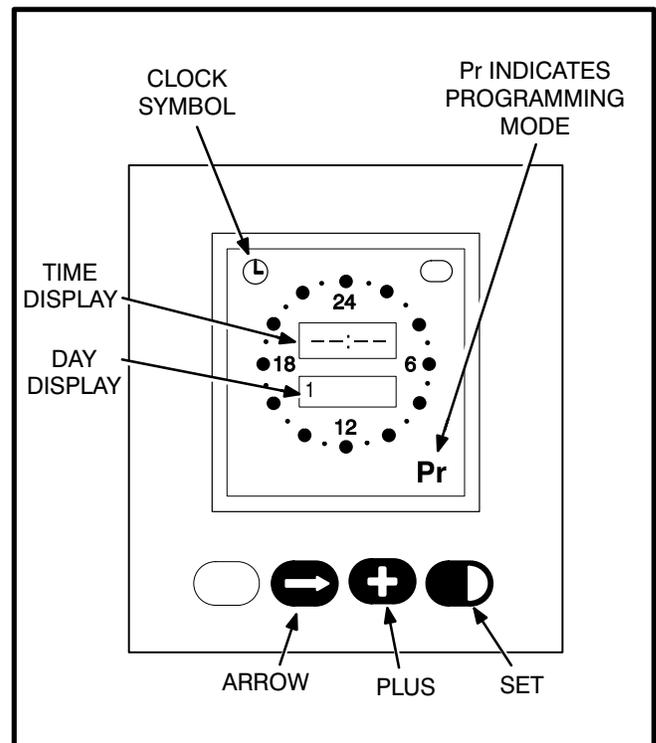


FIGURE 3-6. EXERCISER CLOCK

6. Press the arrow (→) button again to set the minutes.
7. Press the plus (+) button until the current minutes are displayed.
Note that by holding the plus (+) button down, the minutes will increment in 5 minute intervals.
8. To set or change the exercise program, press the arrow (→) button again and go to step two in the following section. To return to the normal operating mode, press the arrow (→) button eight times (clock symbol appears in the display).

To set the exercise start and stop time:

1. Press the arrow (→) button four times to start the programming mode.
2. The letters **Pr** will appear in the lower right hand corner of the display when the programming mode is reached (**Pr** will be flashing if there are no existing programs). Press the arrow (→) button as many times as necessary to advance to the day to be programmed.
To clear an existing program for the day selected, press the plus and set (+) (D) buttons at the same time.

- Press the plus (+) button to increment the **Start** time of the exercise program. The display will show midnight (0:00). Note that by holding the (+) button down, the minutes will increment in 15 minute intervals. When the **Start** time is reached, press the set (**⏻**) button (On Mode is indicated, Figure 3-7).

Then increment the time with the plus (+) button to the desired **Stop** time. When the **Stop** time is reached, press the set (**⏻**) button (Off Mode is indicated, Figure 3-7).

Example to exercise the genset one hour:

Set Start at 7:00 PM (19:00)

Set Stop at 8:00 PM (20:00)

Note that the exercise time is indicated by a band of segments illuminated around the outer ring of the clock from the start to the stop time Figure 3-7).

To clear the program, press the plus and set (+) (**⏻**) buttons at the same time.

- Pressing the arrow (→) button advances to the next day. The program will be copied to the next day if the next day does not have an existing program.

To change or clear the program, press the plus and set (+) (**⏻**) buttons at the same time.

Double check the program setting for each day. Press the arrow (→) button repeatedly until the clock mode is passed and the program mode (Pr) is reached. Carefully check each days program and clear any unwanted programs.

- When finished programming, press the arrow (→) button until the clock appears in the upper left corner of the display.

During the exercise period, the ON mode is indicated in the ellipse in the upper right corner of the display (Figure 3-7).

To check the programs:

Push the arrow (→) button to review each setting.

To erase (clear) a program:

Press the arrow (→) button until the program mode (Pr) is reached. Press the arrow (→) button again to select the desired day. To clear the program for the day selected, press the plus and set (+) (**⏻**) buttons at the same time.

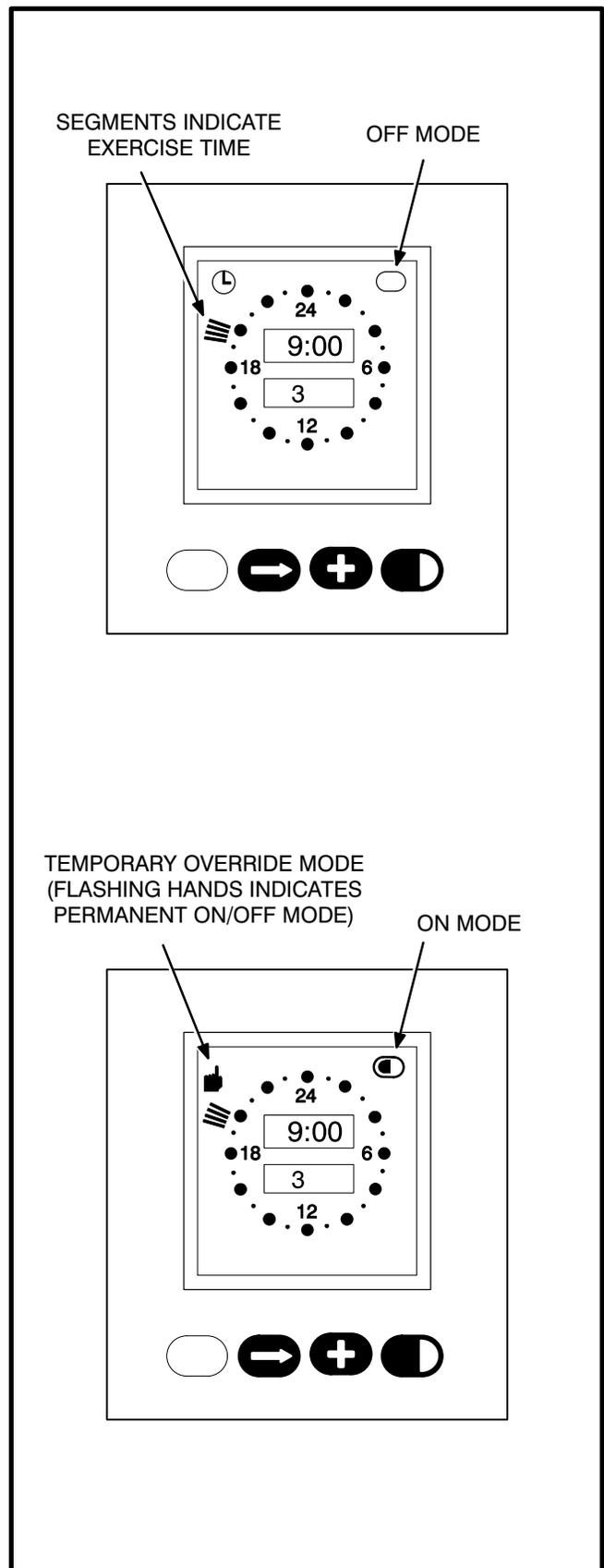


FIGURE 3-7. EXERCISER CLOCK ON/OFF MODE

To Initiate or Override an Exercise Program:

The exerciser clock has a built-in test feature. Once the clock time has been set, the set button (**■**) can be used to initiate a test or to cancel a test in progress.

The Load/No Load switch, on the control circuit board (Figure 2-2) can be set to test the genset with or without load, as desired.

With the normal source connected and available, pressing the set (**■**) button once will initiate a test sequence. A hand will be displayed in the upper left corner of the display and the On mode will be indicated inside the ellipse in upper right corner of the display (Figure 3-7). Pressing the set (**■**) button again will stop the test and the ellipse will indicate the OFF mode.

To temporarily override an activated exercise program, momentarily press the set (**■**) button. A small hand will appear in the upper left corner of the display (Figure 3-7). The current program will be overridden and the clock will automatically set for the next program. Momentarily pressing the set (**■**) button again will return to the current program.

Permanent On/Off Mode:

Holding the set (**■**) button down until a *flashing hand appears* in the upper left corner of the display initiates the permanent On/Off mode (Figure 4-8). The On mode is indicated by a continuous band of segments illuminated around the clock. The Off mode is indicated by all of the segments around the clock being off. Pressing the set (**■**) button momentarily toggles between the permanent On and permanent Off modes. Holding the set (**■**) button down until the clock symbol returns to the upper left corner of the display, ends the continuous On/Off mode and returns to the normal program mode.

Test With Load or Without Load

The exerciser clock has a built-in test button. Once the clock time has been set, the set button (**■**) can be used as a test button.

The Load/No-Load switch, on the control circuit board (Figure 2-2) can be set to test the genset with or without load, as desired.

With the normal source connected and available, pressing the set (**■**) button once will initiate a test sequence. A hand will be displayed in the upper left corner of the display and the On mode will be indicated inside the ellipse in upper right corner of the display (Figure 3-7). Pressing the set (**■**) button again will stop the test and the ellipse will indicate the OFF mode.

FLOAT BATTERY CHARGER

The optional float-charge battery charger (Figure 3-8) regulates its charge voltage to continuously charge the battery. As the battery approaches full charge, the charging current automatically tapers to zero amperes or to steady-state load on the battery.

There are two chargers available. One battery charger is rated for 10 amperes at 12 or 24 VDC. The other battery charger is rated for 2 amperes at 12 or 24 VDC.

Power to the battery charger is supplied directly from the Normal source through connector J6/P6. The output of the battery charger is connected to the GND and B+ terminals of TB2 (or TB3 if the 3-Wire Start module is used). Refer to sheets 2 and 4 of the schematic and wiring diagram package.

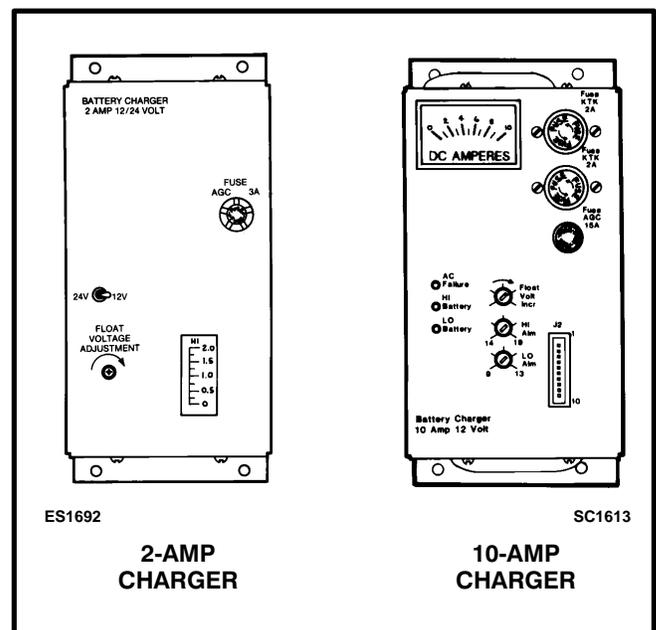


FIGURE 3-8. BATTERY CHARGER

Battery Charger Float Voltage

The float voltage is set at the correct value at the factory and should not require adjustment. However, if the battery shows signs of being overcharged or undercharged, the float voltage can be adjusted. A high specific gravity, bubbling of electrolyte, and loss of water indicate a high float voltage. A low specific gravity indicates a low float voltage.

⚠ WARNING *Ignition of explosive battery gases can cause severe personal injury. Do not smoke or cause any spark, arc, or flame while servicing batteries.*

To change the float voltage, a fully charged battery, a hydrometer, a small screwdriver, and an accurate voltmeter (0.5% accuracy) are needed. Use the following procedures to adjust the float voltage.

⚠ CAUTION *Attempting to adjust or test the battery charger with a deeply discharged battery can lead to the false conclusion that the charger is malfunctioning. Always use a fresh, fully charged battery when adjusting or testing the charger.*

⚠ CAUTION *Always disconnect the battery charger from its AC source (remove the charger's AC input fuses) before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage DC control circuits.*

1. Turn the operation selector for the generator set to Stop and disconnect the starting battery (negative [-] lead first). The selector switch is located on the generator set control panel on two-wire start systems and on 3-Wire Start module on three-wire start systems.
2. Connect the fully charged battery (negative [-] lead last) to the generator set and verify the charge condition with the hydrometer. A fully charged lead-acid battery will have a specific gravity of 1.260 at 77° F (25° C).
3. Connect the voltmeter directly to the battery terminals and measure the voltage.

4. Compare the voltage reading with the value shown in Table 3-1. If the voltage is above or below the recommended float voltage, open the cabinet door and adjust as specified in step 5.
5. If the voltage is correct, proceed to step 7.

TABLE 3-1. BATTERY FLOAT VOLTAGES

Lead-Acid Batteries	
Battery Voltage	Float Voltage
12	13.3
24	26.6

Nickel-Cadmium Batteries	
Float Voltage Charge Per Cell	
1.38 to 1.45 volts	
Example: Float charge for 10 cell battery should be 13.8 to 14.5 volts.	

5. Use a small screwdriver to turn the adjustment potentiometer (located on charger panel) counterclockwise to decrease the float voltage and clockwise to increase the float voltage. Adjust in small steps and wait five minutes for the voltage to stabilize before making additional adjustments.

⚠ WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use care when making adjustments to avoid touching electrical contacts. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform.*

6. When adjustments are complete, close and lock the transfer switch cabinet door.
7. Disconnect the voltmeter from the battery terminals and disconnect the test battery (negative [-] lead first) from the generator set.
8. Reconnect the generator set starting battery (negative [-] lead last) and place the operation selector switch in the Auto (three-wire start) or Remote (two-wire start) position.

10-AMP CHARGER ALARM SETTINGS

The alarm contacts are rated for 4 amperes at 120 VAC or 30 VDC. Connections to these contacts are made at terminals 41-42-43 (AC failure), 44-45-46 (high battery voltage), and 47-48-49 (low battery voltage) of TB3 (Figure 3-9).

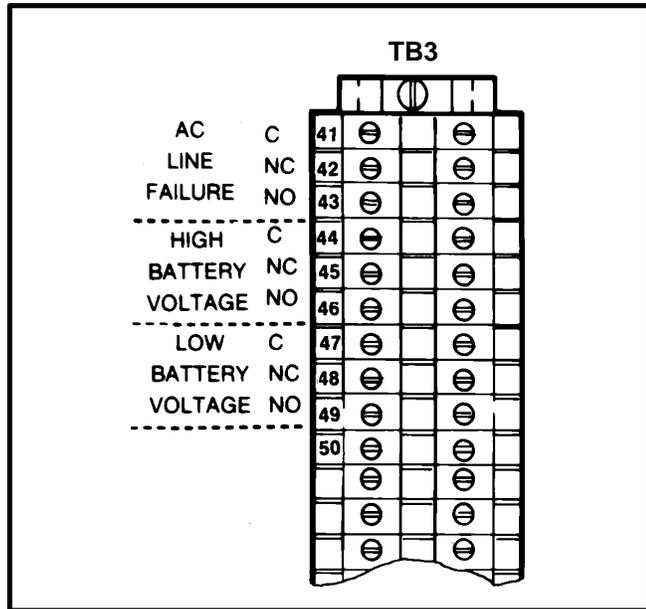


FIGURE 3-9. 10-AMPERE BATTERY CHARGER ALARM CONTACTS (SHOWN DE-ENERGIZED)

Under normal operating conditions, the Low Bat and AC Fail relays are energized and the High Bat relay is de-energized. In response to a Low Bat or AC Fail condition, the appropriate normally energized relay (Low Bat or AC Fail) drops out. In response to a High Bat condition, the normally de-energized High Bat relay is energized.

If the battery voltage rises above the HI alarm setting or drops below the LO alarm setting for 90 seconds, the corresponding (HI or LO) battery alarm LED is lit and a corresponding (optional) set of form C relay contacts is activated.

The high and low alarm adjustments are set at the factory. The ranges and factory settings are:

12-volt charger

9 VDC to 13 VDC (LO Alarm)

Factory Setting: 12.5 VDC

14 VDC to 19 VDC (HI Alarm)

Factory Setting: 14.5 VDC

24-volt charger

18 VDC to 25 VDC (LO Alarm)

Factory Setting: 25 VDC

27 VDC to 36 VDC (HI Alarm)

Factory Setting: 29 VDC

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts whenever the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform.*

1. Open the cabinet door.
2. Use a small screwdriver to turn the HI Alm or LO Alm adjustment potentiometers on the charger panel counterclockwise to decrease the alarm voltage and clockwise to increase the alarm voltage. The graduations on the adjustment potentiometers are approximate (± 1 volt).
3. When finished, close and lock the cabinet door.

When you have finished the adjustments of the optional control modules, close and lock the cabinet door.

CONVERTING TRANSFER SWITCH PHASE SETTING (CONTROL PACKAGE B ONLY)

Converting a transfer switch from single-phase to three-phase operation or from three-phase to single-phase operation is a three-step procedure:

⚠ CAUTION *Incorrect placement of transformer jumper wires can cause damage to the control when power is applied. To perform this conversion procedure correctly, refer to and comply with the schematics and wiring diagrams that were shipped with the transfer switch.*

1. Disconnect both AC power sources.

⚠ WARNING *AC voltages and currents present an electrical shock hazard that can cause severe personal injury or death. Make sure that both AC power sources (Normal and Emergency) are disconnected.*

2. Place the 3-Phase/1-Phase switch (S1) on the control circuit board in the appropriate position (Figure 2-2).
3. Place the transformer jumper wires (on the control board) in the appropriate positions. Refer to sheet 3 of the schematic and wiring diagram package.

4. Troubleshooting

INTRODUCTION

This section describes the control system operation and provides a troubleshooting guide to help diagnose transfer switch problems.

CONTROL SYSTEM OPERATION

The following text covers the operation of the electronic control system. The following situations and control responses are described:

- Normal Power Source Connected to Load
- Normal Power Source Interrupted
- Emergency Power Source Connected to Load
- Normal Power Source Restored
- Test/Exercise With/Without Load

Some of the control commands can be verified by observing the indicator lamps on the control (Figure 4-1). The control schematic (Section 6) and your schematic and wiring diagram package will help you follow the operation descriptions.

⚠WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 connector. The following procedures are to be performed by technically qualified personnel only.

Indicator Lamps

Eight indicator lamps are mounted on the upper right side of the control circuit board. Remove the circuit board cover to view the indicator lamps. Refer to Table 4-1.

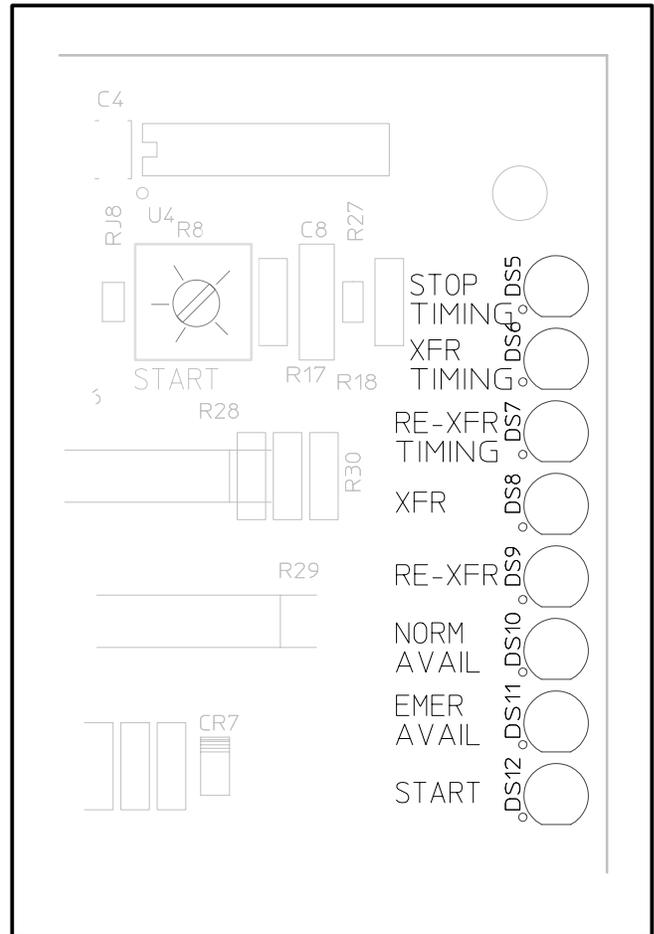


FIGURE 4-1. CONTROL INDICATOR LAMPS

TABLE 4-1. CONTROL CIRCUIT BOARD INDICATOR LAMPS

LAMP	INDICATES
Stop Timing DS5	The control is timing out the generator stop delay. At the end of this delay, a stop signal is sent to the generator set and the Start (Gen Set) and Stop Timing lamps go out.
Transfer Timing DS6	Control is timing out for transfer to Emergency power. At the end of the timing period, the lamp goes out and the Transfer (Active) lamp turns on.
Retransfer Timing DS7	Control is timing out for retransfer to Normal power. At the end of the timing period, the lamp goes out and the Retransfer (Active) lamp turns on.
Transfer (Active) DS8	Control is signaling for transfer to Emergency power. The Emergency Available lamp is also on.
Retransfer (Active) DS9	Control is signaling for retransfer to Normal power. The Normal Available lamp is also on.
Normal Available DS10	Normal voltage is available and within the voltage settings of the voltage sensor.
Emergency Available DS11	Emergency voltage is available and within the voltage settings of the voltage sensor.
Start (Gen Set) DS12	The control is signaling the generator set to run. This lamp is dimly lit (or off) when both sources are off.

Normal Power Source Connected to Load

The Normal Available lamp is on to indicate that the normal power source is within the voltage settings of the voltage sensor. The Retransfer Active lamp is on to indicate that the control is signaling for the load to be connected to the normal power source (retransfer). No other indicator lamps are on.

The normally energized genset start relay (A1-K3) and the retransfer relay (A1-K1) are energized and contactor coil K1 is energized connecting the Load to the Normal power source. The K1 auxiliary contacts are actuated, the contacts change position from their normal state.

Normal Power Source Interrupted

An interruption in power can be defined as not only the complete loss of power but also as any situation where the voltage is outside the settings of the voltage sensor. The voltage sensor responds to all power interruptions by blocking the Normal Available signal.

Normal Voltage Sensor: The undervoltage sensor begins timing if the source fails or if the voltage falls below the dropout setting. The undervoltage dropout time delay is factory set for 0.8 seconds and is not adjustable. Unless power is lost completely, both the Normal Available lamp and the Retransfer Active lamp remain on during the undervoltage dropout time delay. If the voltage returns during the 0.8 second delay, the sensor resets itself. This short delay prevents the time delay module from responding during momentary dips in voltage.

Start Time Delay: If the Normal power source is still faulty after the voltage sensor has timed out, all indicator lamps go out and the start time delay begins timing. The start time delay is 3 seconds on control package A and is adjustable from 0.5 to 15 seconds on control package B. All lamps stay out while the start time delay is timing. The start time delay prevents generator set startup when a power interruption of very short duration occurs. If the Normal power source returns during the timing period, the start time delay is reset.

Capacitor C29 on the electronic control board provides power to the electronic control and time delay during this timing period. A start signal is produced when the time delay expires.

After the start time delay has timed out, a signal from the time delay de-energizes the normally energized two-wire start relay (A1-K3), lights the Start Gen Set lamp (dimly), and (if applicable) sends a start signal to the 3-Wire Start module.

On two-wire start systems, A1-K3 contacts close and signal the generator set to run. On three-wire start systems, a relay in the 3-Wire Start module signals the generator set to run. The Start Gen Set lamp remains lit as long as the control is signaling the generator set to run.

Emergency Voltage Sensor: The Emergency voltage sensor monitors the voltage output from the generator set. When the voltage rises above the pickup setting, the sensor signals that the Emergency power source is available. The Emergency Available lamp lights and stays on as long as the Emergency power source is within the voltage settings of the voltage sensor.

Transfer Time Delay: The transfer time delay begins timing as soon as the voltage sensor signals that Emergency voltage is available. The transfer time delay is fixed at 3 seconds for control package A and is adjustable from 2 to 120 seconds on control package B. The Transfer Timing lamp lights to indicate that the transfer time delay is timing. This pause before transferring the load to the generator is to allow the generator set to stabilize.

Transfer of Load: After the transfer time delay has timed out, the transfer signal energizes the transfer control relay A1-K2.

When A1-K2 is energized, its normally open contacts close and energize the K1 relay trip coil, if applicable. When K1 relay de-energizes, the K1 auxiliary contacts change back to their normal state.

Relay K2 closing coil is energized, when K2 closing coil is energized, K2 contacts close and connect the Load to the Emergency power source.

If the optional Program Transition module is used, there is a pause (0.1 to 3 or 0.1 to 30 seconds) at the neutral position. The timing of this pause is controlled by setting on the Program Transition module.

The Transfer Active lamp lights and stays on as long as the control is signaling for the load to be connected to the Emergency power source.

The K2 auxiliary contacts are actuated when the transfer switch is in the Emergency position, the contacts change from their normal state.

Emergency Power Source Connected to Load

The Emergency Available lamp is on to indicate that the Emergency power source is within the voltage settings of the voltage sensor. The Transfer Active lamp is on to indicate that the control is signaling for the load to be connected to Emergency power source. The Start Gen Set lamp is on to indicate that the control is signaling for the generator set to run.

Normal Power Source Returns

The time delay circuit is programmed to identify the Normal power source as the preferred power source. The return of Normal power initiates several control responses that eventually cause the load to retransfer to the Normal side (assuming that the Auto/Manual switch A1-S3, is in the Auto position).

Normal Voltage Sensor: The Normal voltage sensor monitors the Normal power source. When the voltage satisfies the pickup setting requirements, the sensor signals that Normal voltage is available. The Normal Available lamp lights and stays on as long as the Normal source voltage is within the voltage settings of the voltage sensor.

Retransfer Time Delay: The retransfer time delay begins timing as soon as the voltage sensor signals that Normal voltage is available. The retransfer time delay is 5 minutes with control package A and is adjustable from 6 seconds to 30 minutes with control package B. The Retransfer Timing lamp lights while the retransfer time delay is timing. This delay allows the line voltage to stabilize before retransferring to the Normal power source.

Retransfer of Load: After the retransfer time delay has timed out, the time delay generates a retransfer signal. The retransfer signal energizes the retransfer control relay A1-K1.

When retransfer relay A1-K1 is energized, its normally open contacts close, and energize the K2 trip coil, if applicable. When the K2 relay de-energizes the K2 auxiliary contacts change back to their normal state.

Relay K1 contactor coil is energized connecting the Load to the Normal power source.

If the Program Transition module is used, there is a pause (0.1 to 3 or 0.1 to 30 seconds) at the neutral position. The timing of this pause is controlled by the setting on the Program Transition module.

The Retransfer Active lamp lights and stays lit as long as the control is signaling for the load to be connected to the Normal power source.

The K1 relay auxiliary contacts are actuated when the transfer switch is in the normal position, the contacts change from their normal state.

Stop Time Delay: The stop time delay begins timing as soon as the Retransfer Complete lamp lights. The stop time delay is 5 minutes with control package A and is adjustable from 2 seconds to 10 minutes with control package B. The Stop Timing lamp lights while the stop time delay is timing. This delay allows the generator set to cool down while running at no load. When the stop time delay has timed out (provided that A1-K3 is de-energized), the time delay energizes the two-wire start relay (A1-K3), turns off the Start Gen Set lamp, and (if applicable) sends a stop signal to the 3-Wire Start module.

On two-wire start systems, A1-K3 contacts open, removing the generator set run signal. On three-wire start systems, a relay in the 3-Wire Start module signals the generator set to stop. After the generator set stops, the Emergency Available lamp goes out.

Test/Exercise With/Without Load

To follow this description of of generator set test and exercise functions, refer to the control schematic in section 6.

Signal to Test/Exercise: The signals that initiate test or exercise enter the electronic control circuit board at:

- Remote Test input J4-5
- Exerciser Clock output (control package B only)
- Momentary Test switch on the front panel (control package B only)

The signal consists of a switch closing to ground or the exerciser clock output going low.

Starting the Generator Set: When an exercise signal is received, the normally energized two-wire start relay is de-energized and a start signal (if applicable) is sent to the 3-Wire Start module.

Generator Set Starts: As the generator set runs and produces power (at an acceptable voltage), the Emergency Available lamp lights.

With/Without Load: If A1-S2 is in the Without Load position, the control senses that both sources are available. The control is configured to prefer Normal. No transfer of load occurs.

If A1-S2 is in the With Load position, a power failure (although simulated) is sensed and transfer of load timing begins. After the transfer delay, the control signals for a transfer of load.

End of Test/Exercise: The test/exercise period is stopped by removing the ground from J4-5, or (on control package B only) by releasing the test switch on the front panel or when the exerciser clock exercise period elapses.

If the test/exercise was conducted without load, the two-wire start signal is removed (A1-K3 is energized) and (if applicable) a stop signal is sent to the 3-Wire Start module.

If the test/exercise was conducted with load, the Normal voltage sensor will sense Normal power and begin retransfer timing.

After the retransfer delay has timed out, retransfer to the Normal power source occurs. After retransfer, and after the stop time delay, the control sends out a stop signal. This signal terminates both two-wire and three-wire start signals.

Instant Retransfer (Control Package B only): When testing with load, you can bypass the retransfer delay by pressing the Instant Retransfer switch on the front panel to override the retransfer timer.

TROUBLESHOOTING

Use the following troubleshooting guide to help diagnose transfer switch problems. The troubleshooting guide is divided into sections based on the symptom. Common problems are listed with their possible causes. Refer to the corrective action column for the appropriate test or adjustment procedure. The section and page number in the right column lists the location of the test or adjustment procedure in this manual.

Conditional schematics are used to highlight the circuitry that is energized during the sequence of events. These conditional schematics are for a typical transfer switch with options. Always refer to the (five sheet) schematic and wiring diagram package that was shipped with the transfer switch for specific information about its configuration.

Make a through inspection of the transfer switch wiring to make sure that good wire harness and ground connections are made. Correct wiring problems before performing any tests or replacing any components.

Model TGHAA Generator Sets

Refer to the TGHAA generator set service manual for problems related to the generator set.

If normal (utility) power or genset power are available, and the TGHAA generator set control does not indicate that they are available, check fuses F1 and F2 (also check F3 and F4 if applicable). If the fuses are open, correct any overload or fuse connection problems before replacing the fuses. Refer to the following Description of Problem for transfer switch problems.

Troubleshooting Warnings

⚠ WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 before removing and replacing components. The following procedures are to be performed by technically qualified personnel only.*

⚠ WARNING *Improper operation of the generator set presents multiple hazards that can cause severe personal injury or death. Observe all of the safety precautions in your generator set manuals.*

Description of Problem

	Page
Power Outage Occurs, But Generator Set Does Not Start	4-7
Generator Starts But Does Not Assume Load	4-9
Transfer Switch Does Not Retransfer When Normal Voltage Returns – or – On Initial Installation	4-11
Generator Set Continues To Run After Retransfer Of Load To Normal Source	4-13
Generator Set Starts During Normal Power Service	4-14
Generator Set Does Not Exercise/Exercises But Does Not Transfer Load	4-15
Battery Charger Malfunction	4-16

⚠WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. The following procedures are to be performed only by technically qualified personnel. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 (on the accessory control panel) before removing and replacing components.

⚠WARNING Improper operation of the generator set presents multiple hazards that can cause severe personal injury or death. Observe all safety precautions in your generator set manuals.

TABLE 4-1. POWER OUTAGE OCCURS, BUT GENERATOR SET DOES NOT START

Trouble	Possible Cause	Corrective Action	Section/ Page
Genset Does Not Start When Normal Power Is Lost <i>DS12 ON</i>	1. Manual override switch S3 not in Auto or defective (if equipped).	1a. Set manual override switch to Auto.	2-2
	2. 3-Wire Start: Selector switch S2 not in Auto position.	1b. Check switch wiring and switch function. 2. Set selector switch to Auto.	3-4
	3. 3-Wire Start: Overcrank condition.	3. Check for overcrank condition. Reset and wait for preheat. If genset does not crank, check connections to 3-wire start module including ribbon cable to electronic control assembly and check 3-wire start module.	3-4
	4. 2-Wire Start: Selector switch on genset control not in Remote.	4. Set selector switch on genset to Auto	
	5. Genset cranks but does not start. Genset problem.	5. Check fuel system. Refer to genset service manual.	
	6. Genset does not crank.	6a. Start genset at genset control. If it starts, check wiring of TB2 per the wiring diagram (Section 6). Check the wiring between the transfer switch and the genset. If OK, go to step seven. 6b. If it does not crank, check batteries and cable connections (also refer to troubleshooting Table 4-7). 6c. If it cranks but does not start at genset control, check fuel system and refer to genset service manual.	
	7. No genset start signal from transfer switch.	7. Check for start signal between J4-1 and J4-2. Zero VDC should be measured. Check P4-1, P4-2 connections, If good, the electronic control A1 is defective.	5-6
<i>DS12 OFF</i>	1. Defective electronic control A1.	1. Replace electronic control assembly A1.	5-6

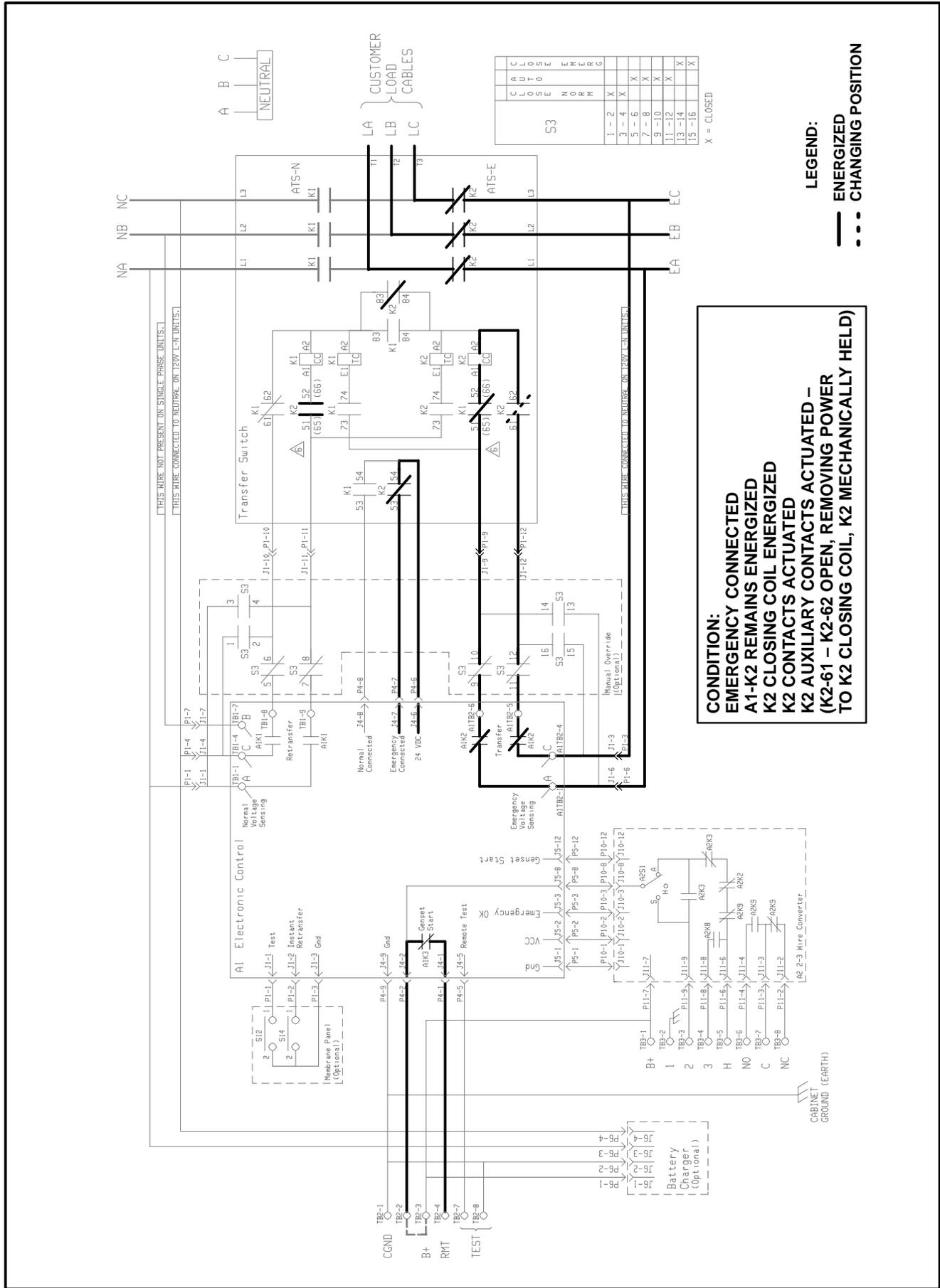


FIGURE 4-3. TYPICAL CONDITIONAL SCHEMATIC – EMERGENCY CONNECTED

⚠WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. The following procedures are to be performed only by technically qualified personnel. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 (on the accessory control panel) before removing and replacing components.

⚠WARNING Improper operation of the generator set presents multiple hazards that can cause severe personal injury or death. Observe all safety precautions in your generator set manuals.

TABLE 4-2. GENERATOR SET STARTS BUT DOES NOT ASSUME LOAD

Trouble	Possible Cause	Corrective Action	Section/ Page
Genset Starts But Does Not Assume Load <i>DS11 ON</i>	1. Manual Override switch S3 not in Auto or defective (if equipped). 2. Generator voltage not available at A1-TB2-5 to A1-TB2-6. 3. Generator voltage available at A1-TB2-5 to A1-TB2-6 but emergency closing coil (K2-CC) doesn't energize. 4. Emergency side closes but K2 contacts are defective.	1. Place Manual Override switch in Auto. Check switch wiring and switch. 2a. Test relay A1-K2, replace relay if faulty. 2b. Defective electronic control asm. (A1). 3a. If normal side is still held, check K1 and K2 auxiliary contacts and normal side trip coil (K1-TC), if equipped. 3b. If equipped with program transition module, check setting and operation. 3c. Check emergency side closing coil (K2-CC). 4. Inspect K2 contacts.	5-8 5-6 5-6 5-3/ 5-6 3-4 5-3/ 5-6 5-3/ 5-6
<i>DS11 OFF</i>	1. Low voltage from genset. 2. Bad connection at connector P1. 3. Emergency side voltage sensor out of calibration. 4. Emergency side undervoltage pickup setting out of adjustment. 5. Transfer inhibit customer input. 6. Defective electronic control asm. (A1).	1. Check output voltage from genset. 2. Check continuity through connector P1. 3. Calibrate emergency side undervoltage sensor. 4. Adjust undervoltage pickup setting. 5. Check for ground signal at J4-4. 6. Replace the electronic control asm. A1.	3-2 3-2 5-6

⚠WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. The following procedures are to be performed only by technically qualified personnel. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 (on the accessory control panel) before removing and replacing components.

⚠WARNING Improper operation of the generator set presents multiple hazards that can cause severe personal injury or death. Observe all safety precautions in your generator set manuals.

**TABLE 4-3. TRANSFER SWITCH DOES NOT RETRANSFER WHEN
NORMAL VOLTAGE RETURNS AFTER A POWER OUTAGE
or
ON INITIAL INSTALLATION**

Trouble	Possible Cause	Corrective Action	Section/ Page
Does Not Retransfer After Re-transfer Time Delay <i>DS10 ON</i>	1. Manual Override switch S3 not in Auto or defective (if equipped).	1. Place Manual Override switch in Auto. Check switch wiring and switch.	5-8
	2. Auto/Manual switch A1-S3 not in Auto.	2. Place Auto/Manual switch A1-S3 in Auto.	2-2
	3. Line voltage not available at A1-TB1-8 to A1-TB1-9.	3a. Test relay A1-K1, replace relay if faulty.	5-6
	4. Line voltage available at A1-TB1-8 to A1-TB1-9 but normal closing coil (K1-CC) doesn't energize.	3b. Defective electronic control asm. (A1).	5-6
		4a. If emergency side is still held, check K1 and K2 auxiliary contacts and emergency side trip coil (K2-TC), if equipped.	5-3/ 5-6
	4b. If equipped with program transition module, check setting and operation.	4c. Check normal side closing coil (K1-CC).	3-4 5-3/ 5-6
5. Normal side closes but K2 contacts are defective.	5. Inspect K2 contacts.	5-3/ 5-6	
<i>DS10 OFF</i>	6. Defective electronic control asm. (A1).	6. Replace the electronic control asm. A1.	5-6
	1. Normal side line voltage inadequate.	1. Measure normal side voltage.	3-2
	2. Bad connection at connector P1.	2. Check continuity through connector P1.	
	3. Normal side voltage sensor out of calibration.	3. Calibrate normal side undervoltage sensor.	3-2
	4. Normal side undervoltage setting out of adjustment.	4. Adjust undervoltage pickup setting.	
	5. Test mode active.	5. Check for ground signal at J4-5.	5-9
	6. Test switch activated or defective.	6. Test switch shorted. Remove ribbon cable and recheck.	
	7. Exerciser clock in test mode.	7. Check exerciser clock program.	3-5
8. Defective electronic control asm. (A1).	8. Replace the electronic control asm. A1.	5-6	

⚠WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. The following procedures are to be performed only by technically qualified personnel. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 (on the accessory control panel) before removing and replacing components.

⚠WARNING Improper operation of the generator set presents multiple hazards that can cause severe personal injury or death. Observe all safety precautions in your generator set manuals.

TABLE 4-4. GENERATOR SET CONTINUES TO RUN AFTER RETRANSFER OF LOAD TO NORMAL SOURCE

Trouble	Possible Cause	Corrective Action	Section/ Page
Genset Continues To Run After Retransfer	1. Exercise program set on exerciser clock (if equipped).	1. Check exerciser clock settings.	3-5
	2. Remote start customer input.	2. Check for remote test input at J4-5.	5-9
	3. Test switch defective on front panel (control package B).	3. Disconnect ribbon cable from membrane touch panel.	
	4. Retransfer time delay still timing.	4. Check setting, if time exceeds maximum setting, electronic control assembly (A1) is defective.	3-3

⚠WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. The following procedures are to be performed only by technically qualified personnel. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 (on the accessory control panel) before removing and replacing components.

⚠WARNING Improper operation of the generator set presents multiple hazards that can cause severe personal injury or death. Observe all safety precautions in your generator set manuals.

TABLE 4-5. GENERATOR SET STARTS DURING NORMAL POWER SERVICE

Trouble	Possible Cause	Corrective Action	Section/ Page
Genset Starts During Normal Power Service	<ol style="list-style-type: none"> 1. 2-Wire Start: Selector switch on genset not set on Remote. 2. 3-Wire Start: Selector switch on 3-wire start module not set on Auto. 3. Exercise period set on exerciser clock (control package B only) 4. Remote test customer input. 5. Test switch defective on front panel (control package B only). 6. Momentary voltage dip from normal source. 	<ol style="list-style-type: none"> 1. Set selector switch to Remote. 2. Set selector switch on 3-wire start module on Auto. 3. Refer to exerciser clock programming instructions. 4. Check for remote test input at J4-5. 5. Remove ribbon cable, if genset stops test switch is defective. 6. Check undervoltage settings, adjust if needed (control package B only). 	<p>3-4</p> <p>3-5</p> <p>5-9</p> <p>3-2</p>

⚠WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. The following procedures are to be performed only by technically qualified personnel. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 (on the accessory control panel) before removing and replacing components.

⚠WARNING Improper operation of the generator set presents multiple hazards that can cause severe personal injury or death. Observe all safety precautions in your generator set manuals.

TABLE 4-6. GENERATOR SET DOES NOT EXERCISE/EXERCISES BUT DOES NOT TRANSFER LOAD

Trouble	Possible Cause	Corrective Action	Section/ Page
Genset Does Not Exercise	1. 2-Wire Start: Selector switch on genset not set on Remote.	1. Set selector switch to Remote.	–
	2. 3-Wire Start: Selector switch on 3-wire start module not set on Auto.	2. Set selector switch on 3-wire start module on Auto.	3-4
	3. Exercise period not programmed on exerciser clock (control pkg. B only).	3. Refer to exerciser clock programming instructions.	3-5
	4. Genset cranks but does not start.	4. Genset fuel system or other genset problem, refer to genset service manual.	
	5. No start signal from transfer switch when exercise clock is in program mode or remote start signal present.	5. Check for start signal between J4-1 and J4-2. Zero VDC should be measured. Check P4-1, P4-2 connections, If good, the electronic control assembly A1 is defective.	
	6. Genset does not crank.	6. Refer to troubleshooting Table 4-1.	4-7
Genset Exercises But Does Not Assume Load	1. Load/No-load switch on A1 not in Load position.	1a. Check position of Load/No-Load switch located on the electronic control assembly A1.	2-2
		1b. Refer to Table 4-2 for additional causes.	4-9

⚠WARNING AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. The following procedures are to be performed only by technically qualified personnel. Use extreme caution to avoid touching electrical contacts when the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform. Remove power to the door by disconnecting connector J1/P1 (on the accessory control panel) before removing and replacing components.

⚠WARNING Improper operation of the generator set presents multiple hazards that can cause severe personal injury or death. Observe all safety precautions in your generator set manuals.

TABLE 4-7. BATTERY CHARGER MALFUNCTIONS

Trouble	Possible Cause	Corrective Action	Section/ Page
Battery Charger Fails To Charge	1. No DC output.	1a. Check battery charger fuse(s). 1b. Check input voltage to battery charger, make sure input voltage is adequate and that it is the correct charger for the available voltage.	3-7
Battery Charger Under- charges	2. Float voltage set too low. 1. Defective battery. 2. Battery charger float level set too low.	1c. Defective battery charger. 2. Increase float level adjustment. 1. Check for defective battery(ies). 2. Increase float level adjustment. Periodically check specific gravity to obtain the proper charge rate.	3-8 3-8
Battery Charger Over- charges	1. Battery charger float level set too high.	1a. Check battery for signs of electrolyte bubbling. Add electrolyte if needed. 1b. Decrease float level adjustment. Periodically check specific gravity to obtain the proper charge rate.	3-8

5. Transfer Switch Service

INTRODUCTION

This section covers the service procedures for the serviceable components of the transfer switch assembly. There are two types of contactor assemblies. Each type corresponds to an ampere range. The two ampere range groups are: 30- through 60-ampere switches and 100- through 260-ampere switches. A separate section covers the removal and service procedures for each amperage range group.

The contactor assemblies make and break the current flow. When closed to the Normal power source the contacts are mechanically held. The Emergency side may or may not be mechanically held, depending on the options selected. A mechanical interlock prevents them from closing to both power sources at the same time.

Refer to Figure 2-2 for transfer switch component locations.

DISCONNECT AC POWER

Before beginning any service procedure:

- If a generator set provides Emergency power, turn the operation selector switch to Stop. (The selector switch is located on the generator set control panel.)
- **Disconnect all sources of AC power from the transfer switch.**
- If there is an external battery charger, disconnect it from its AC power source. Then disconnect the set starting battery (negative [-] lead first).

⚠WARNING *The transfer switch presents a shock hazard that can cause severe personal injury or death unless all AC power is removed. Disconnect all sources of AC power from the transfer switch before servicing. Be sure to move the generator set operation selector switch to Stop, disconnect the battery charger from its AC power source, and disconnect the starting battery (negative [-] lead first).*

RECONNECTING AC POWER (When Finished)

After all service procedures are completed:

- If a generator is the Emergency power source, connect the negative (-) battery cable to the starting battery. If applicable, connect the battery charger to its AC power source.
- Reconnect the Normal power source and Emergency power source.
- Place the operation selector switch in the Remote position.

⚠WARNING *AC power within the cabinet and the rear side of the cabinet door presents a shock hazard that can cause severe personal injury or death. Use extreme caution to avoid touching electrical contacts whenever the cabinet door is open. Do not wear jewelry or loose clothing. Stand on a dry, non-conductive surface such as a rubber mat or wooden platform.*

30- THROUGH 60-AMPERE CONTACTOR ASSEMBLY SERVICE

If a generator set provides Emergency power, turn the operation selector switch to Stop. (The selector switch is located on the generator set control panel.) **Disconnect both the Normal and Emergency power sources from the transfer switch.** If there is an external battery charger, disconnect it from its AC power source. Then disconnect the set starting battery (negative [-] lead first).

⚠WARNING *AC power within the cabinet presents an electrical shock hazard that can cause severe personal injury or death. Disconnect all sources of AC power from the transfer switch before servicing.*

The following procedures cover the service procedures for the 30- through 60-ampere contactor assembly. Refer to Figure 5-1 for an illustration of a typical 30- through 60-ampere contactor assembly.

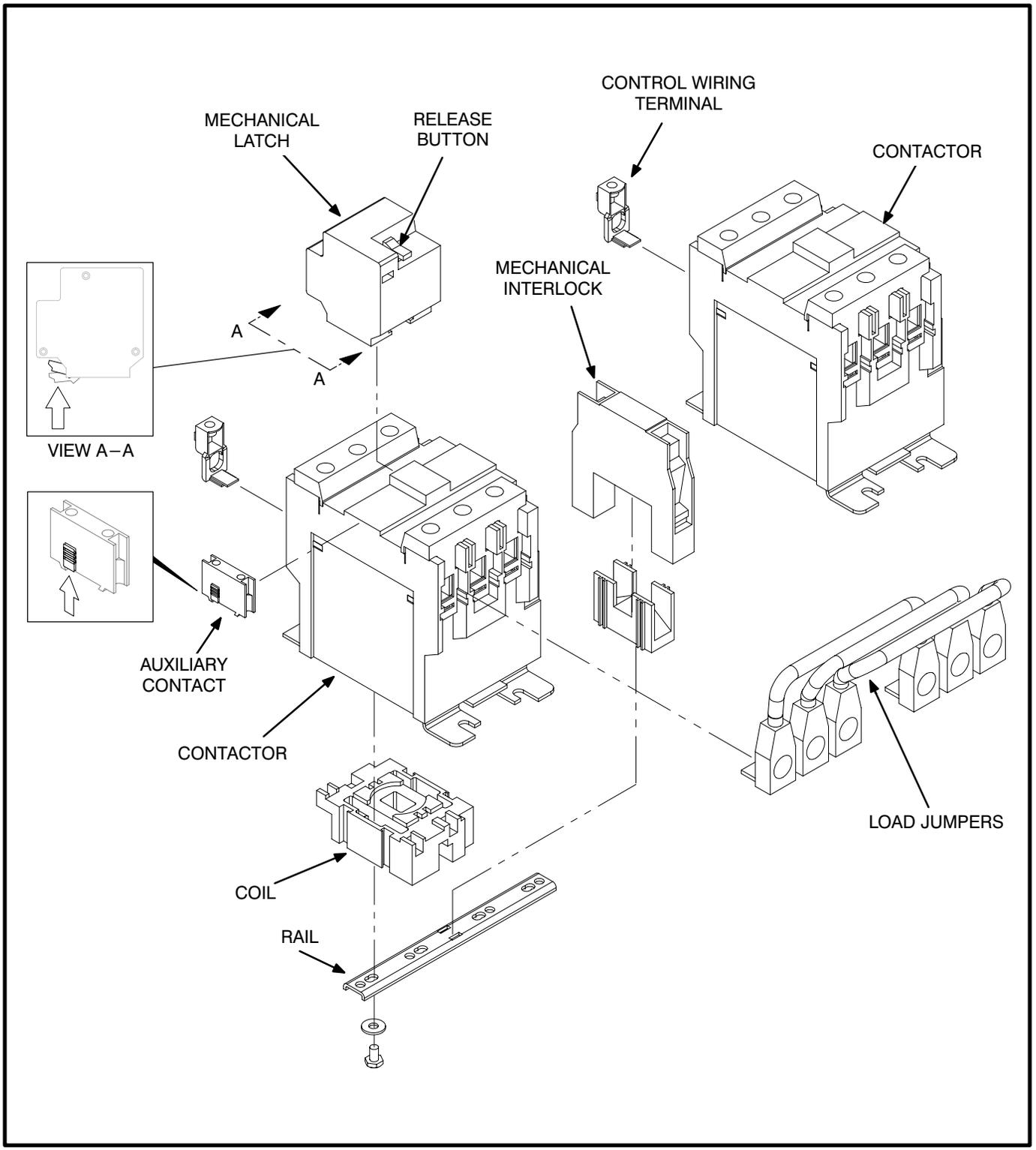


FIGURE 5-1. 30- THROUGH 60-AMPERE CONTACTOR ASSEMBLY

Auxiliary Contact

The optional auxiliary contacts are attached to the Normal and Emergency side of the transfer switch as shown in Figure 5-1. The auxiliary contacts are secured to the contactor assembly by a mechanical latch.

If an ohmmeter check indicates a faulty contact, remove the auxiliary contact by sliding the locking tab up and sliding the auxiliary contact off the contactor as shown in Figure 5-1.

Slide the new auxiliary contact into the track on the contactor until a click is heard indicating that the latch is engaged. Transfer the leads from the old auxiliary contact to the new one.

Mechanical Latch

The mechanical latch can be used to release a mechanically held contactor. Push the orange release button on top of the contactor forward, to release the contactor.

The mechanical latch contains a set of contacts and a trip coil on the Normal side. The mechanical latch is optional on the Emergency side. The mechanical latch is attached to the Normal and Emergency sides of the transfer switch as shown in Figure 5-1.

If an ohmmeter check indicates a faulty contact, or if the trip coil does not function when the appropriate voltage (indicated on top of the mechanical latch) is applied, replace the defective mechanical latch. Remove the mechanical latch by lifting the locking tab on the mechanical latch (Figure 5-1). Slide the mechanical latch out as shown in Figure 5-1.

Note the trip coil cannot be checked with an ohmmeter due to a rectifier circuit contained inside the sealed coil assembly.

Install the mechanical latch by sliding it into the contactor assembly as shown in Figure 5-1. The mechanical latch should lock in place. Transfer the leads from the old mechanical latch to the new one.

Mechanical Interlock

The mechanical interlock prevents the Normal and Emergency power sources from closing at the same time. The interlock contains two sets of normally closed contacts and the mechanism that provides the mechanical interlock.

If an ohmmeter check indicates a faulty contact, or if the mechanical interlock does not function properly, replace the mechanical interlock. Remove the contactor assembly and then remove the bottom rail to access the mechanical interlock. When reinstalling, align the pin on the side of the mechanical interlock with the hole in the contactors.

Contactor Assembly

The contactor assembly has no adjustable components. The main contacts in the 30- through 60-ampere contactor assemblies are not serviceable. If the contacts are defective replace the contactor assembly. The contactor coil is replaceable.

Contactor Coil: If the contactor coil is suspect, it can be checked with an ohmmeter. Remove the harness leads from the coil. Refer to Table 5-1 for the resistance values based on transfer switch voltage. Replace the coil if defective.

TABLE 5-1. 30- THROUGH 60- AMPERE CONTACTOR COIL RESISTANCE VALUES

COIL VOLTAGE RATING	RESISTANCE OF WINDINGS IN OHMS \pm 10%
120 VAC 60 Hz	28
208 VAC, 60 Hz	86
220 VAC, 50/60 Hz	102
240 VAC, 50/60 Hz	131
380 VAC, 50/60 Hz	310
415 AC, 50/60 Hz	390
440 AC, 50/60 Hz	410
480 AC, 60 Hz	480
600 AC, 60 Hz	775

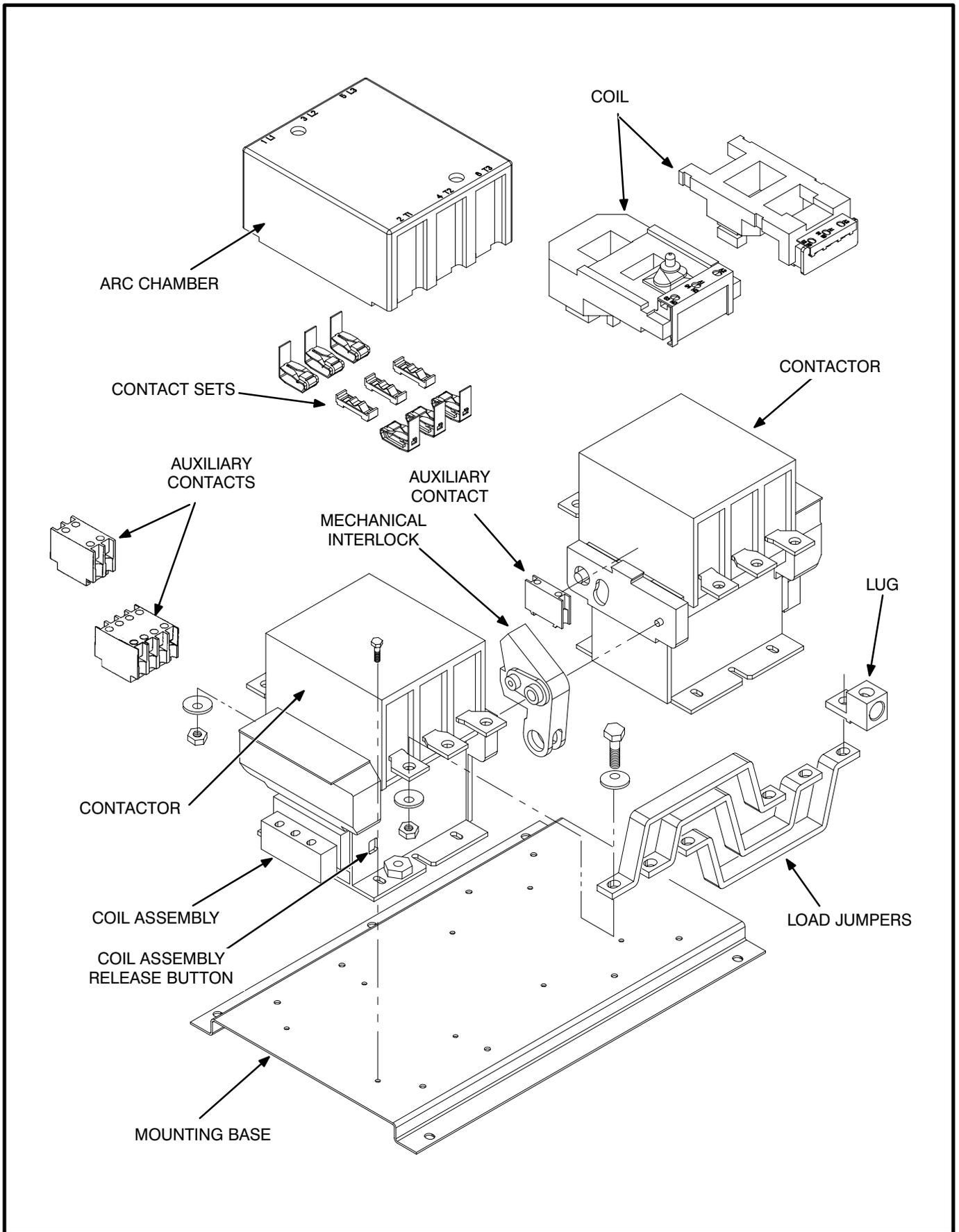


FIGURE 5-2. 100- THROUGH 260-AMPERE CONTACTOR ASSEMBLY

100- THROUGH 260-AMPERE CONTACTOR ASSEMBLY SERVICE

If a generator set provides Emergency power, turn the operation selector switch to Stop. (The selector switch is located on the generator set control panel.) **Disconnect both the Normal and Emergency power sources from the transfer switch.** If there is an external battery charger, disconnect it from its AC power source. Then disconnect the set starting battery (negative [-] lead first).

⚠WARNING *AC power within the cabinet presents an electrical shock hazard that can cause severe personal injury or death. Disconnect all sources of AC power from the transfer switch before servicing.*

The following procedures cover the service procedures for the 100- through 260-ampere contactor assembly. Refer to Figure 5-2 for an illustration

of a typical 100- through 260-ampere contactor assembly.

Auxiliary Contact Service

The optional auxiliary contacts are attached to the Normal and Emergency side of the transfer switch as shown in Figure 5-3. The auxiliary contacts are secured to the contactor assembly by a mechanical latch.

If an ohmmeter check indicates a faulty contact, replace the defective auxiliary contact. Remove the auxiliary contact by lifting the locking tab on the auxiliary contact assembly shown in Figure 5-3. Slide the auxiliary contact assembly out as shown in Figure 5-3

Slide the new auxiliary contact into the track on the contactor until a click is heard indicating that the latch is engaged. The auxiliary contact should lock in place. Transfer the leads from the old auxiliary contact to the new one.

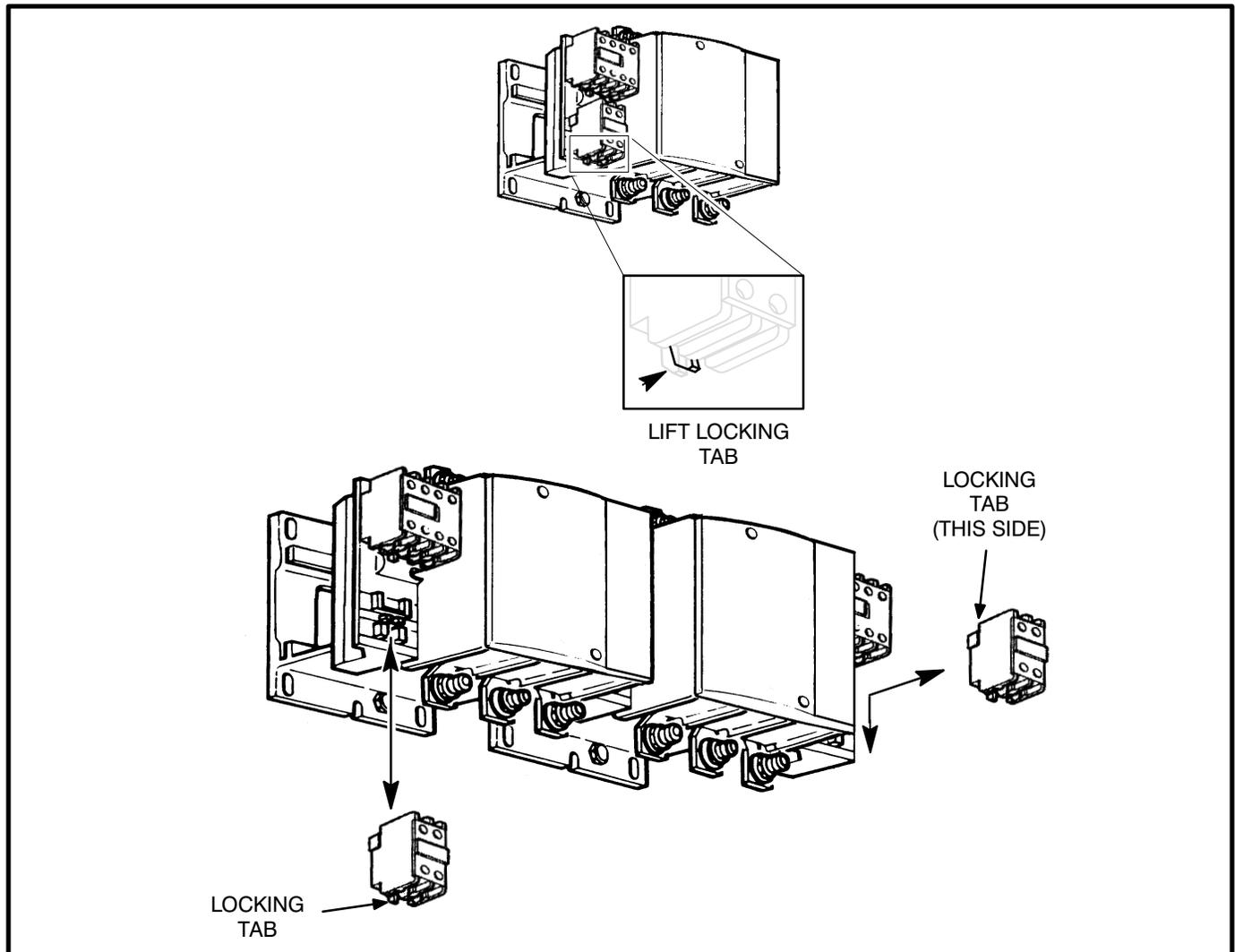


FIGURE 5-3. AUXILIARY CONTACT ASSEMBLY REMOVAL/INSTALLATION

Contactor Assembly Service

The contactor assembly has no adjustable components. It is normal for the arc chamber and the main contacts to darken with use. The main contacts, arc chamber and the closing coil and trip coil assembly are replaceable.

Arc Chamber: The arc chambers are secured with quarter-turn fasteners. To remove the arc chambers, push down on the fasteners with a screwdriver and rotate 90° in either direction. To reinstall, again push down on the fasteners and rotate 90° in either direction. Release the fastener and check for a secure fit.

Main Contact Set: The main contacts are replaceable, do not file, lubricate or attempt to repair the main contact set. The upper contacts are removed by depressing the retainer on top the contacts and rotating the retainer and contact set out of the holder. The bottom contacts are removed by removing the hex socket screw that secures it to the contactor assembly.

Contactor Closing Coil and Trip Coil: The contactor assemblies use either an electrically held or a magnetically held coil. The service procedures are the same for either type of coil. If the closing coil or trip coil do not function when the appropriate voltage (indicated on the side of the coil) is applied, replace the coil assembly.

Note the closing coil and trip coil cannot be checked with an ohmmeter due to a rectifier circuit contained inside the sealed coil assembly.

The coil assembly does not have adequate clearance to slide out when the transfer switch assembly is installed. Remove the transfer switch mounting bolts and move the assembly out until clearance for removing the coil assembly is obtained. To remove the coil assembly, press in on the orange button on the side of the coil assembly (Figure 5-2), and slide the assembly out of the contactor assembly. Reinstall the coil assembly by holding in on the orange button while inserting the coil assembly into the contactor assembly (Figure 5-2).

Mechanical Interlock Service

The mechanical interlock prevents the Normal and Emergency power sources from closing at the same time. If the mechanical interlock does not function properly, Replace the mechanical interlock.

ELECTRONIC CONTROL CIRCUIT BOARD

The electronic control circuit board (A1) is not field repairable. The relays A1-K1 and A1-K2 are socketed for service replacement.

Before replacing the electronic control circuit board, check each of the connectors for continuity and verify that the control is receiving the proper inputs. In most cases problems related to the electronic control are the result of a poor connection.

If a generator set provides Emergency power, turn the operation selector switch to Stop. (The selector switch is located on the generator set control panel.) **Disconnect both the Normal and Emergency power sources from the transfer switch.** If there is an external battery charger, disconnect it from its AC power source. Then disconnect the set starting battery (negative [-] lead first).

⚠WARNING *AC power within the cabinet presents an electrical shock hazard that can cause severe personal injury or death. Disconnect all sources of AC power from the transfer switch before servicing.*

To access the electronic control circuit board for service, open the cabinet door, disconnect the J1/P1 connector and remove the electronic control circuit board cover. The circuit board is secured by additional screws and will not come out when the cover mounting screws are removed.

Relay A1-K1 and A1-K2 Service: Move the wire relay retainer to the side of the relay and pull the relay out of the socket. The relay has a 12VDC coil that can be checked by applying voltage to it. If the coil or contacts are defective, install a new relay in the socket and secure with the wire retainer.

Electronic Control Circuit Board Replacement: Carefully remove the connectors from the control. Make sure that all connections are clearly mark for reconnection. Remove the mounting screws and remove the control. Install new control and carefully reconnect all of the connectors.

Refer to the Adjustments and Settings Section (3) for information on calibrating and adjusting the electronic control.

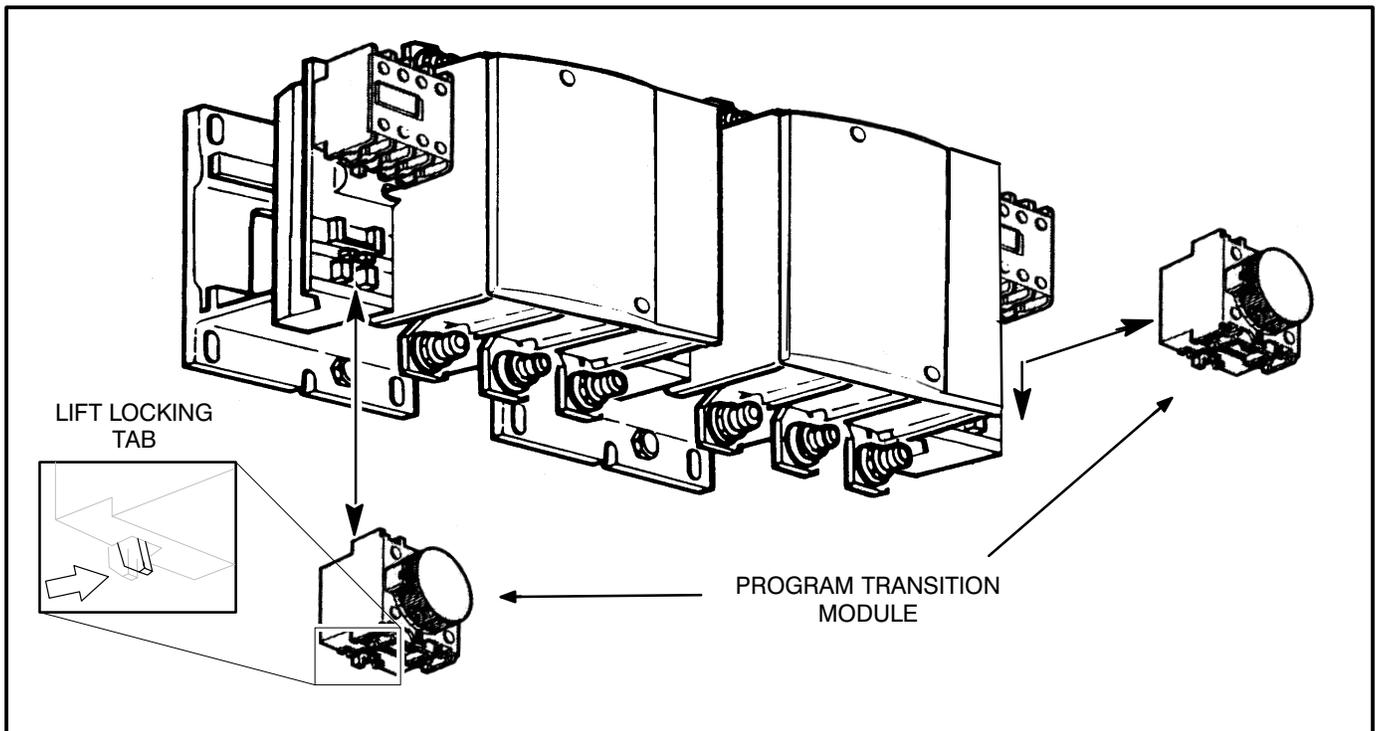


FIGURE 5-4. PROGRAM TRANSITION MODULE REMOVAL/INSTALLATION

PROGRAM TRANSITION MODULE

The Program Transition module (Figure 5-4) is used to provide a delay during transition. The delay allows residual voltage from inductive loads to decay to an acceptable level before transfer is completed. This module is available in either a 0.1 to 3 second or 0.1 to 30 second adjustment range. The proper adjustment is a function of the load.

If a generator set provides Emergency power, turn the operation selector switch to Stop. (The selector switch is located on the generator set control panel.) **Disconnect both the Normal and Emergency power sources from the transfer switch.** If there is an external battery charger, disconnect it from its AC power source. Then disconnect the set starting battery (negative [-] lead first).

⚠WARNING AC power within the cabinet presents an electrical shock hazard that can cause severe personal injury or death. Disconnect all sources of AC power from the transfer switch before servicing.

If the program transition module fails to provide the delay that is set on the timer, or if the contacts do not actuate after the set time, replace the program transition module. If circuit breaker tripping is a problem, increase the time set on the program transition module. To set the time delay, refer to Section 3.

To remove the program transition module, lift the locking tab on the bottom of the program transition module and slide it out of the contactor assembly as shown in Figure 5-4. Install the program transition module by holding up on the locking tab and sliding the program transition module into the contactor assembly. The program transition module should lock in place.

MANUAL OVERRIDE SWITCH S3

The optional three position key operated switch is mounted on the front of the cabinet door. The switch is used to override the electronic control. In the Auto position, the transfer switch is set for automatic operation.

Moving the switch to the Close Emergency position bypasses the electronic control and causes the load to transfer immediately to Emergency power, if Emergency power is available.

Moving the switch to the Close Normal position bypasses the electronic control and causes the load to retransfer immediately to the Normal power source, if Normal power is available.

If a generator set provides Emergency power, turn the operation selector switch to Stop. (The selector switch is located on the generator set control panel.) **Disconnect both the Normal and Emergency power sources from the transfer switch.** If there is an external battery charger, disconnect it from its AC power source. Then disconnect the set starting battery (negative [-] lead first).

⚠WARNING *AC power within the cabinet presents an electrical shock hazard that can cause severe personal injury or death. Disconnect all sources of AC power from the transfer switch before servicing.*

The switch can be checked with an ohmmeter. Make sure the switch contacts close according to the contact connect chart, shown in Figure 5-5, for each switch position. To access the switch contacts, open the cabinet door, disconnect the J1/P1 connector and remove the S3 harness connections. Also check for good connections between the switch terminals and the harness.

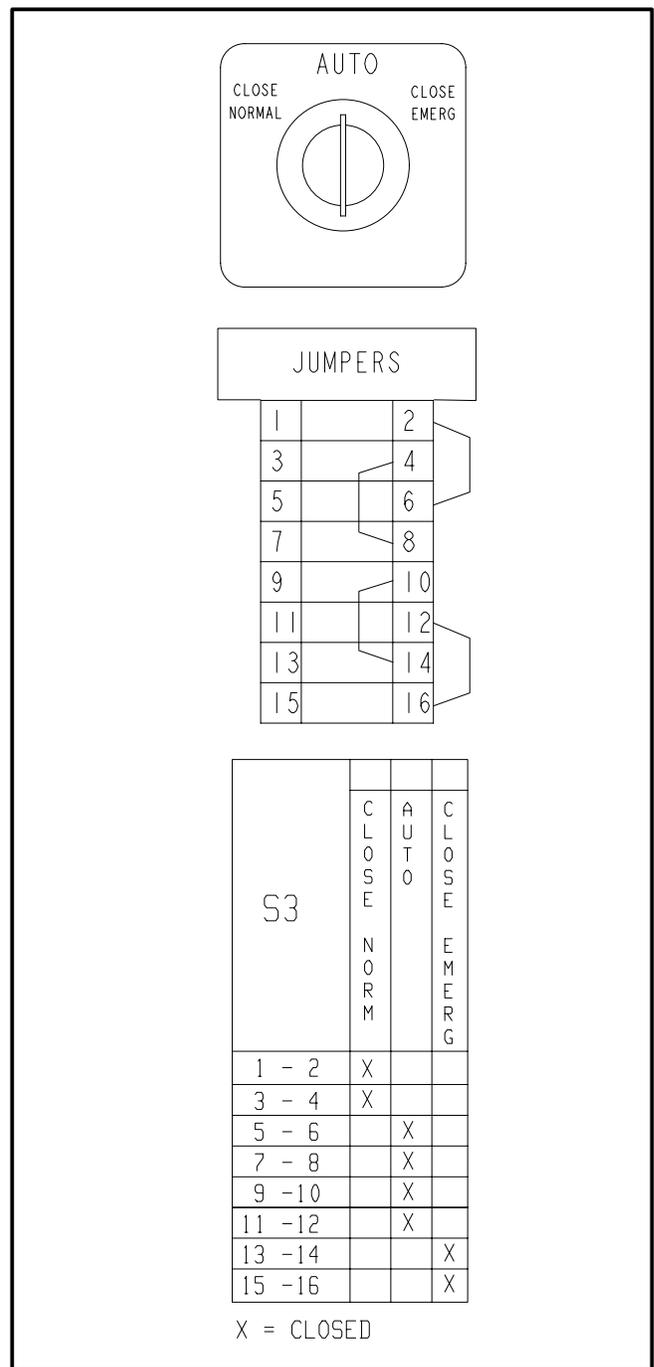


FIGURE 5-5. MANUAL OVERRIDE SWITCH S3

MEMBRANE TOUCH PANEL (CONTROL PACKAGE B ONLY)

Control package B has a Test switch and an Instant Retransfer switch. The momentary Test switch sends a start signal to the generator set. After the transfer time delay, the generator set will assume the load—provided that the Load/No-Load switch, located on the control circuit board, is in the Load position.

The Instant Retransfer switch will initiate retransfer to utility power bypassing the normal retransfer delay.

The touch panel can be checked for shorted or open contacts with an ohmmeter.

If a generator set provides Emergency power, turn the operation selector switch to Stop. (The selector switch is located on the generator set control panel.) **Disconnect both the Normal and Emergency power sources from the transfer switch.** If there is an external battery charger, disconnect it from its AC power source. Then disconnect the set starting battery (negative [-] lead first).

⚠WARNING *AC power within the cabinet presents an electrical shock hazard that can cause severe personal injury or death. Disconnect all sources of AC power from the transfer switch before servicing.*

Access the membrane switch ribbon cable by opening the cabinet door, disconnecting the J1/P1 connector, and removing the electronic control circuit board cover. Remove the membrane switch ribbon cable from the electronic control circuit board J3 connector, located near the top of the board.

Use an ohmmeter to check the Test and Instant Retransfer switches. Depress each switch and check for continuity at the pins indicated in Figure 5-6. The circuit should be open when the switch is not depressed, and it should read continuity when the switch is depressed. Replace a faulty membrane switch.

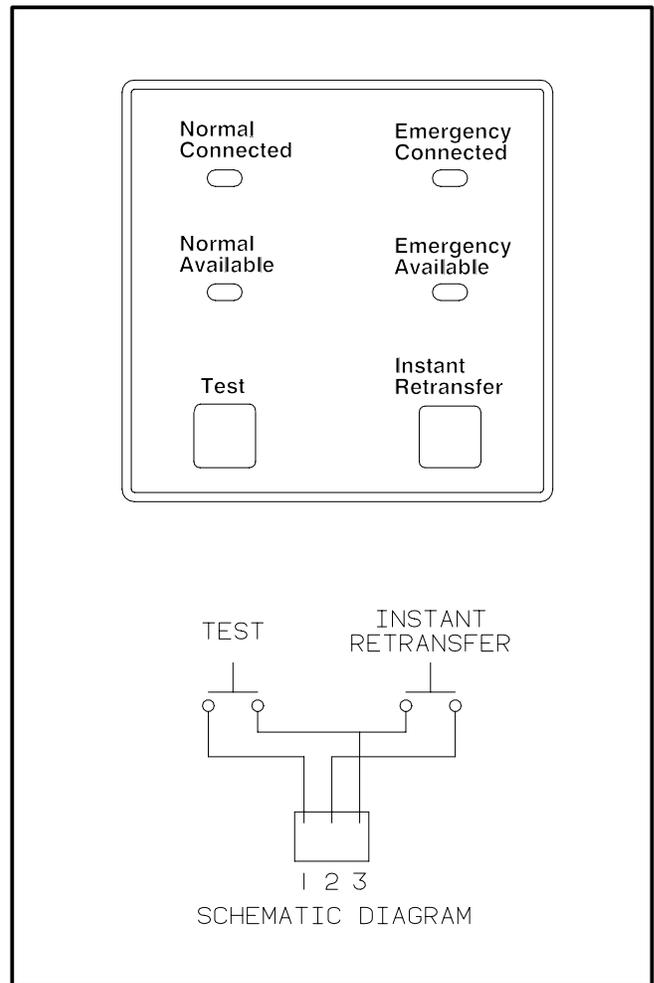
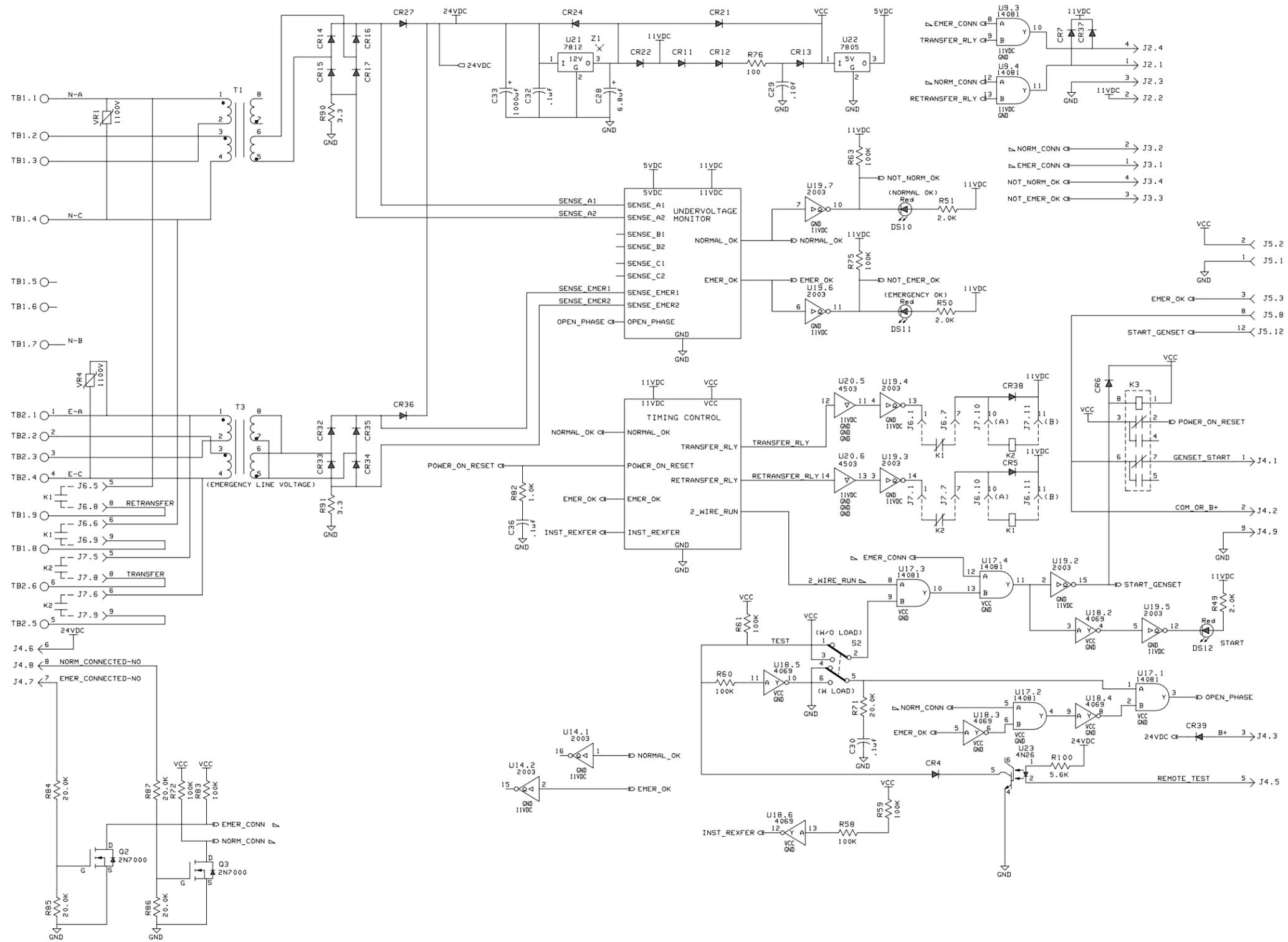


FIGURE 5-6. MEMBRANE TOUCH PANEL

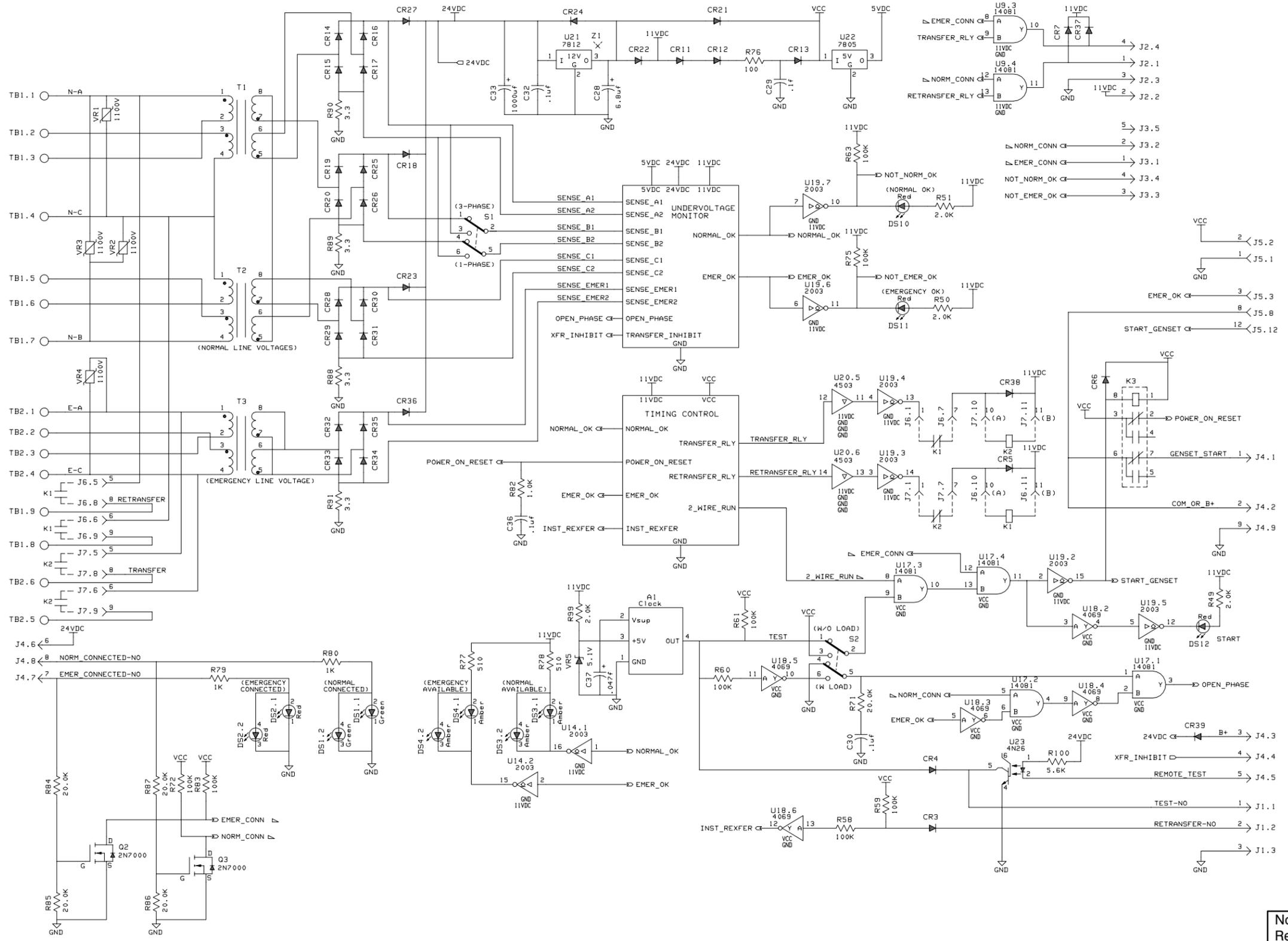
6. Schematics/Wiring Diagrams

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 Modified

FIGURE 6-1. CONTROL BOARD (CONTROL PACKAGE A) 300-4754

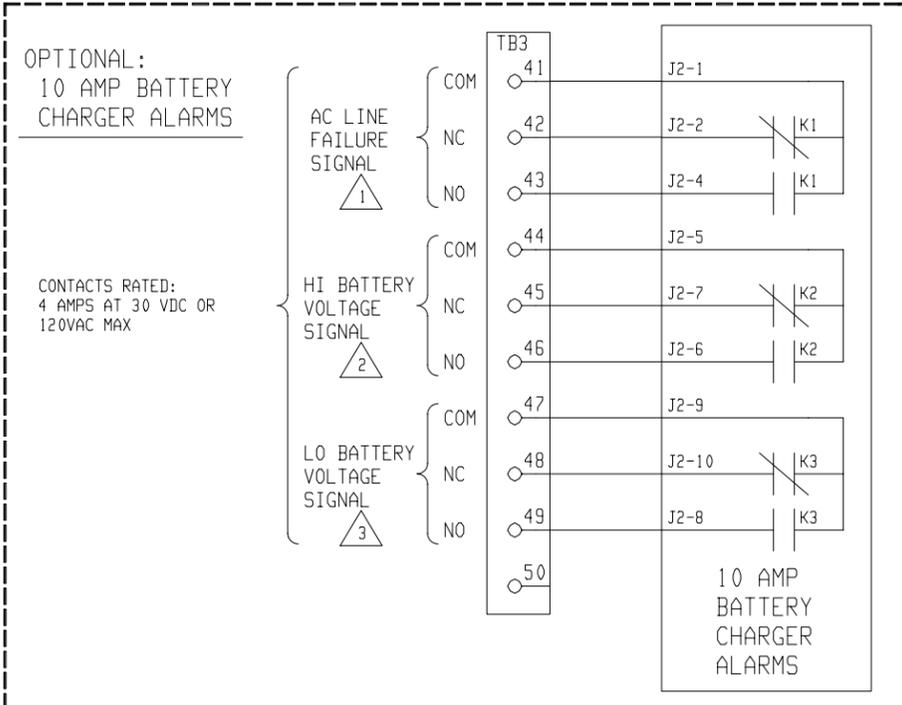
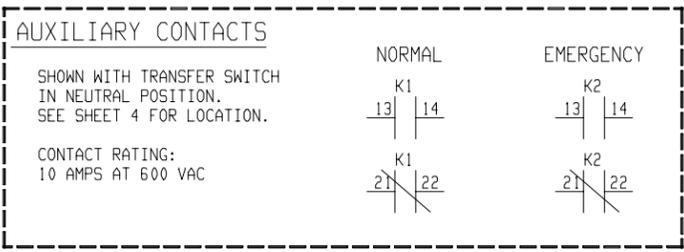
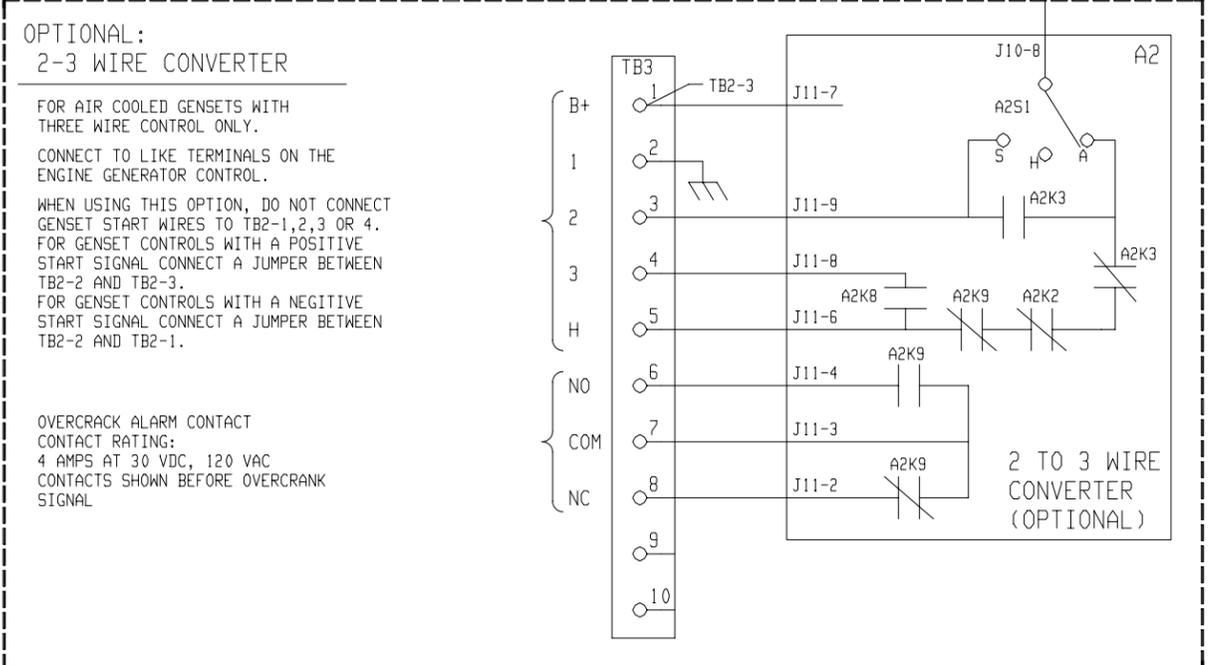
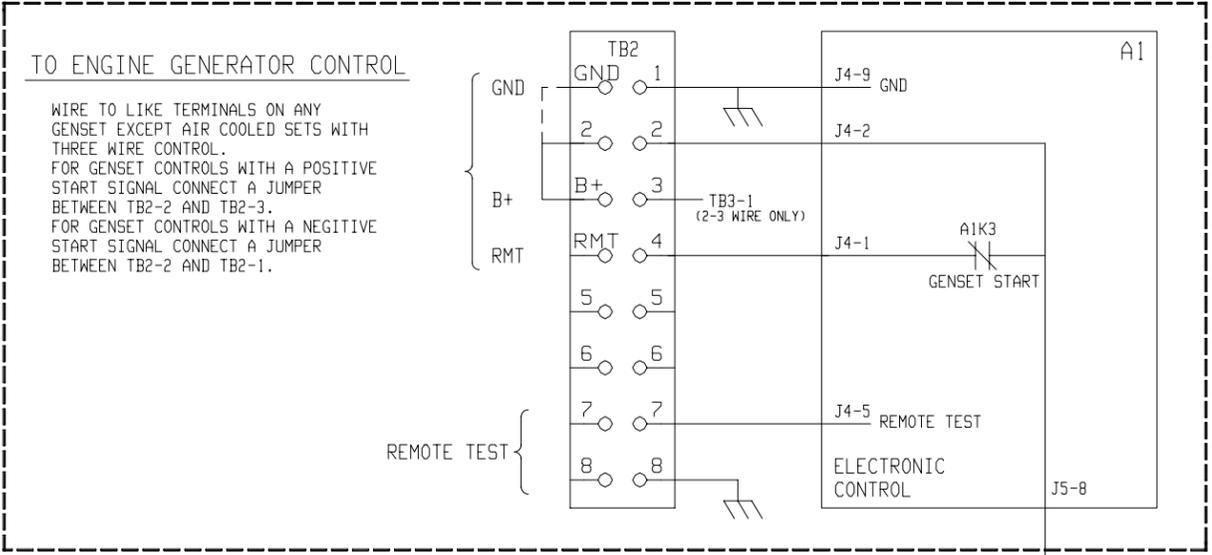


No. 300-4750 sh 1 of 4
 Rev. D Sys: HP System
 Modified

FIGURE 6-2. CONTROL BOARD (CONTROL PACKAGE B) 300-4750

CUSTOMER CONNECTIONS

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.



- 1. SHOWN WITH SOURCE NOT AVAILABLE.
- 2. SHOWN UNDER NORMAL BATTERY VOLTAGE CONDITION. CONTACTS TRANSFER UNDER A HIGH BATTERY VOLTAGE CONDITION.
- 3. SHOWN UNDER A LOW BATTERY VOLTAGE CONDITION.

- FEATURES:
 BASE CONTROL
 30-60 AMP
 3 POLE
 CONTACTOR LATCHED BOTH SIDES
 120 VOLT 1 PHASE
 240 VOLT 1 PHASE
 208 VOLT 3 PHASE
 240 VOLT 3 PHASE
 380 VOLT 3 PHASE
 415 VOLT 3 PHASE
 440 VOLT 3 PHASE
 480 VOLT 3 PHASE
 600 VOLT 3 PHASE
- OPTIONS:
 UPGRADED CONTROL
 BATTERY CHARGER
 BATTERY CHARGER ALARMS
 2-3 WIRE CONVERTER
 MANUAL OVERRIDE SWITCH

No. 626-2252 sh 1 of 5
 Rev. B Sys: HP System
 Modified

FIGURE 6-3. WIRING DIAGRAM TRANSFER SWITCH 626-2252

NOTES:

4. ALL COMPONENTS ARE SHOWN DE-ENERGIZED.
 5. FOR SINGLE PHASE UNITS:
120/240, 3 WIRE-CONNECT POWER CABLES TO A AND C
120 L-N, 2 WIRE-CONNECT POWER CABLES TO A AND NEUTRAL
- ⚠ A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-3 WHEN USED WITH A GENSET WITH A POSITIVE START SIGNAL. A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-1 WHEN USED WITH A GENSET WITH A NEGITIVE START SIGNAL.

LEGEND:

- K1(CC) NORMAL CLOSING COIL
- K1(TC) NORMAL TRIP COIL
- K2(CC) EMERGENCY CLOSING COIL
- K2(TC) EMERGENCY TRIP COIL
- S3 MANUAL OVERRIDE SWITCH
- S12 TEST SWITCH
- S14 INSTANT RETRANSFER SWITCH

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

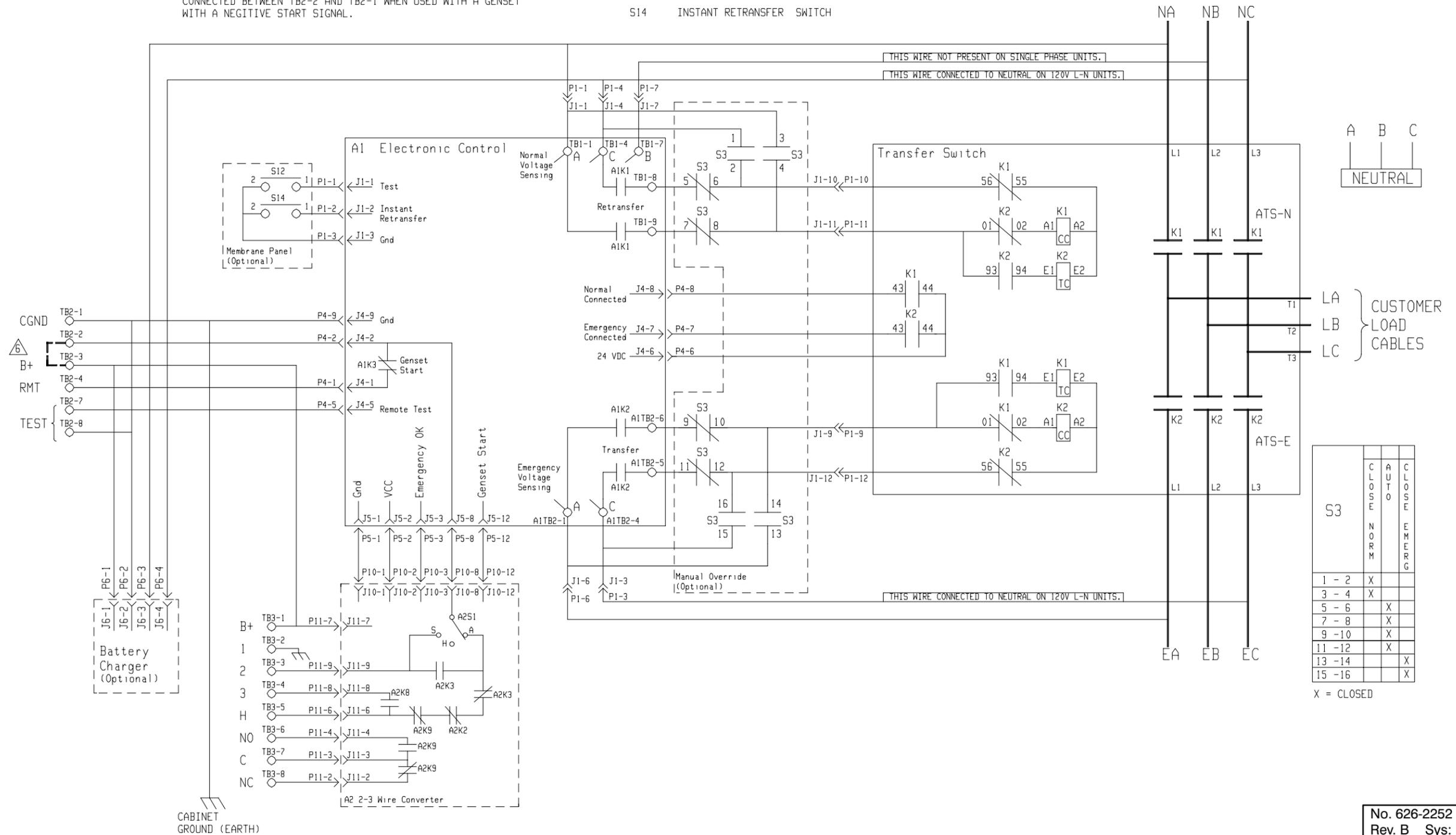


FIGURE 6-4. WIRING DIAGRAM TRANSFER SWITCH 626-2252

VOLTAGE	CONTROL TRANSFORMER CONNECTIONS
120 VAC 1 PH L-N	
240 VAC 1 PH	
208 VAC 220 VAC 240 VAC 3 PH	
380 VAC 415 VAC 440 VAC 480 VAC 600 VAC 3 PH	

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

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 Modified

FIGURE 6-5. WIRING DIAGRAM TRANSFER SWITCH 626-2252

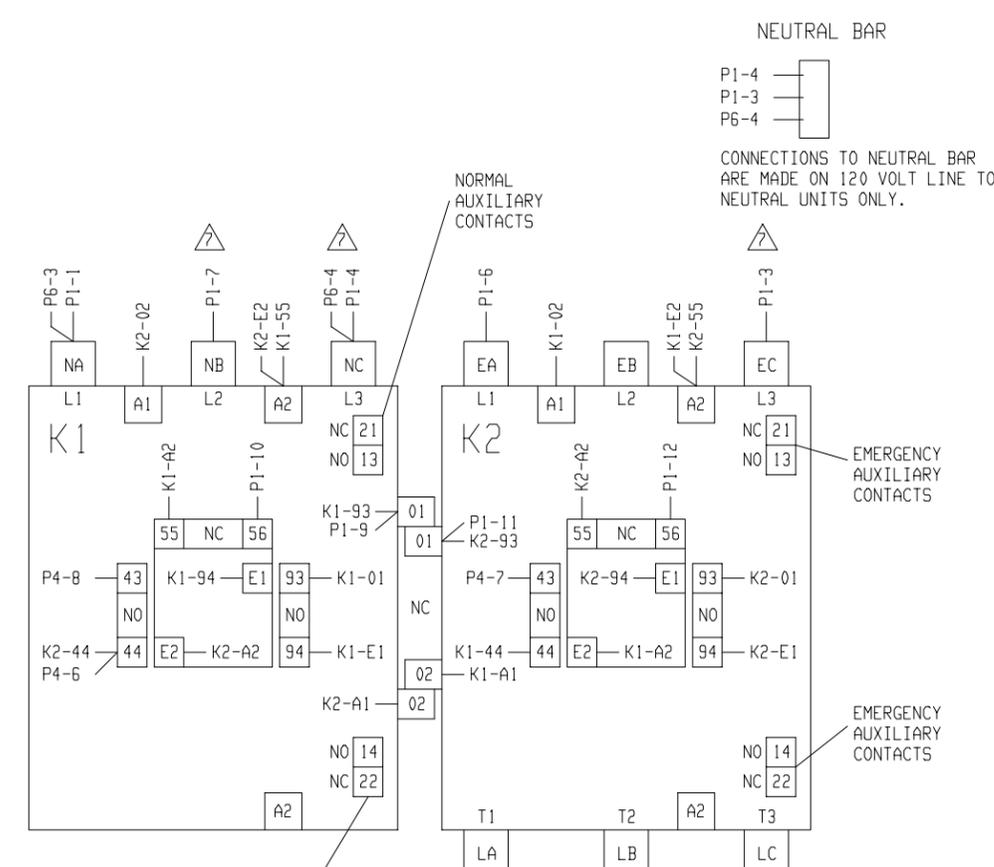
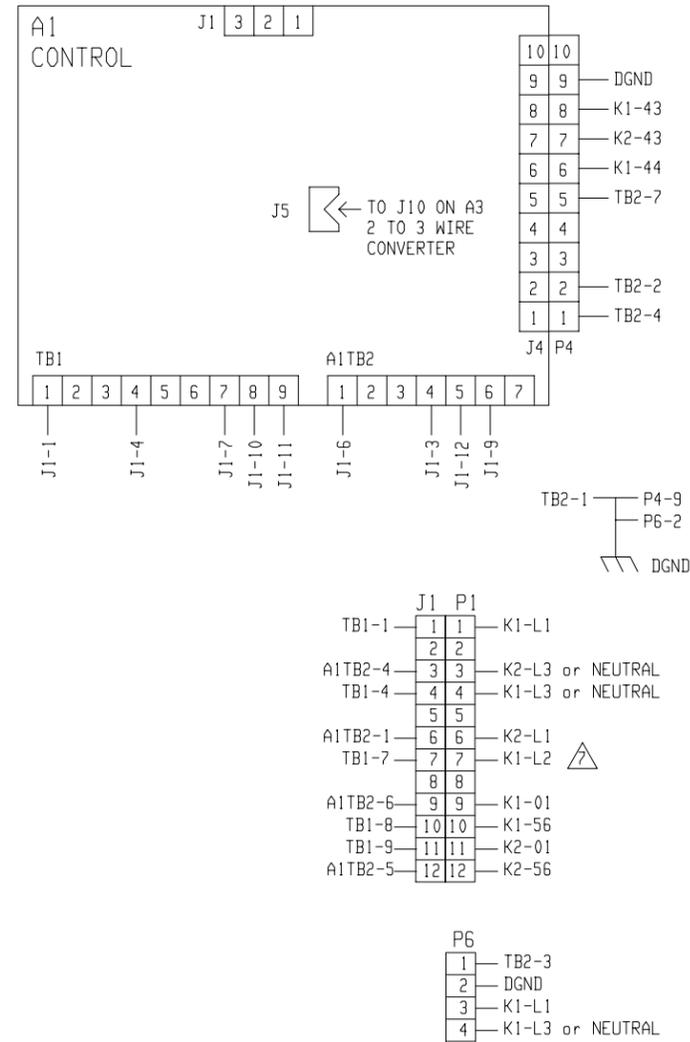
STANDARD WIRING

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

REAR VIEW OF DOOR

LEFT SIDEWALL

REAR WALL OF CABINET



NOTES:

⚠️ A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-3 WHEN USED WITH A GENSET WITH A POSITIVE START SIGNAL. A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-1 WHEN USED WITH A GENSET WITH A NEGATIVE START SIGNAL.

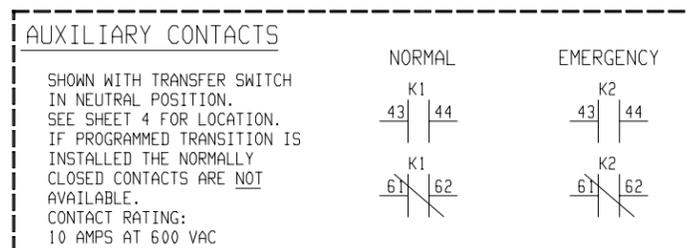
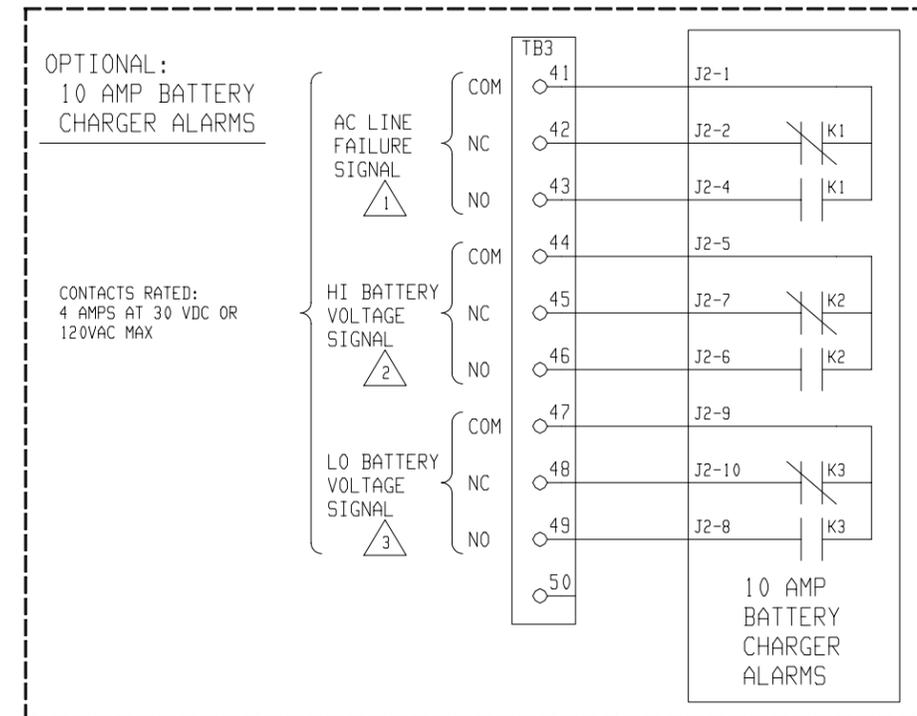
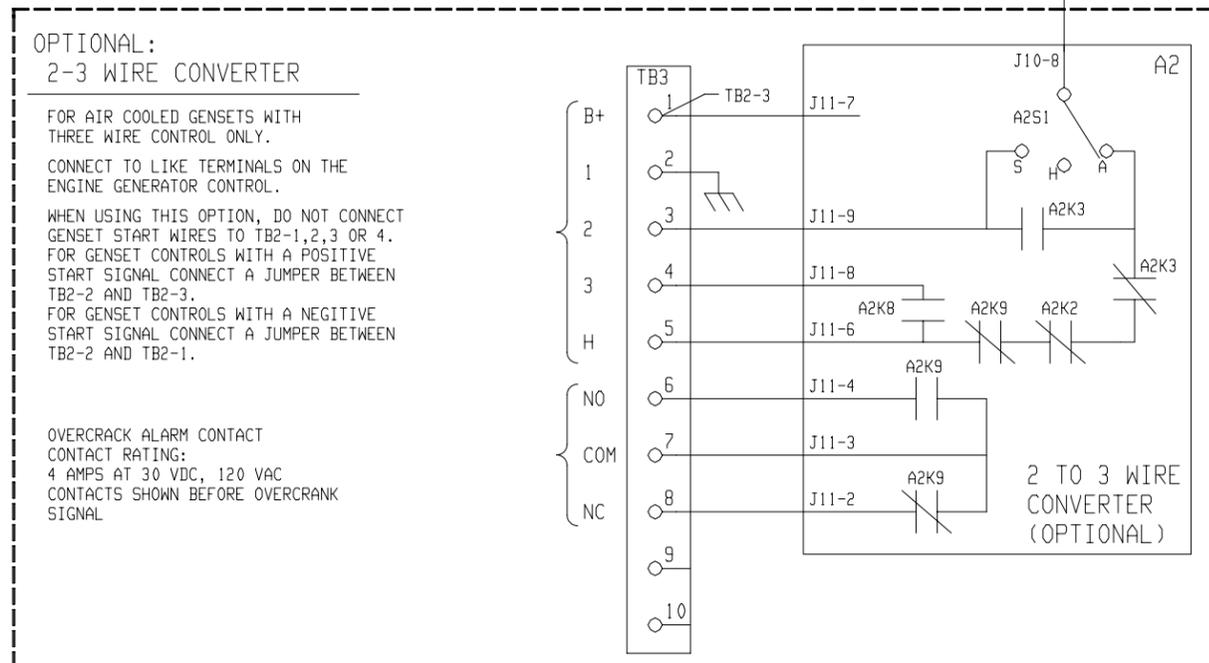
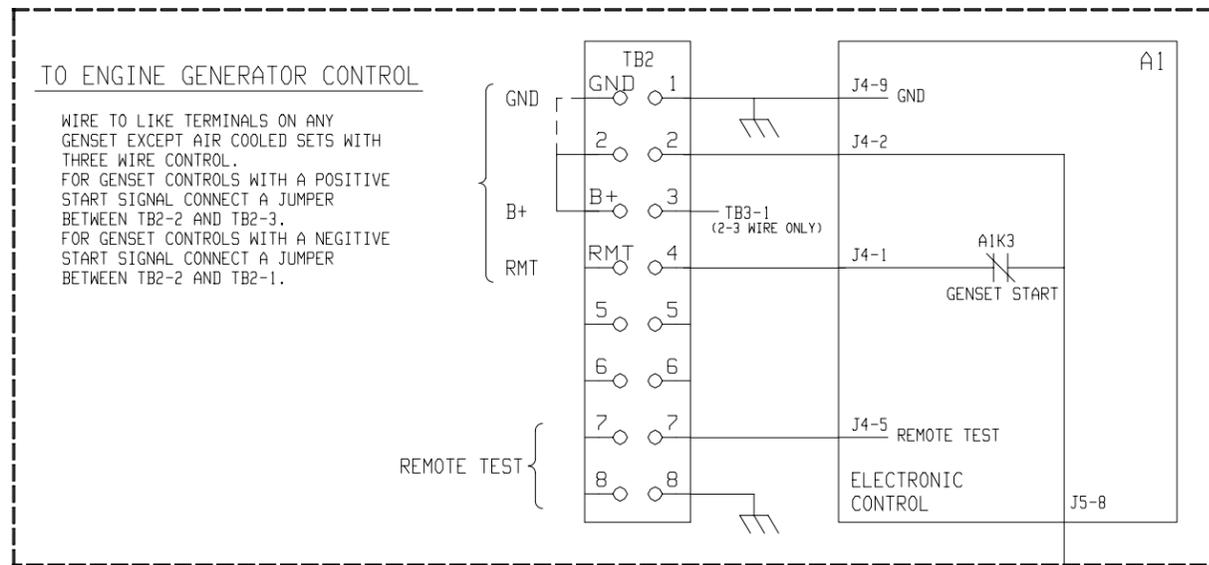
⚠️ ON ALL SINGLE PHASE UNITS, THE WIRE FROM K1-L2 TO P1-7 IS NOT PRESENT. ON 120 VOLT LINE TO NEUTRAL UNITS THE WIRES SHOWN TERMINATED TO K1-L3 AND K2-L3 WILL BE CONNECTED TO THE NEUTRAL BAR.

No. 626-2252 sh 4 of 5
Rev. B Sys: HP System
Modified

FIGURE 6-6. WIRING DIAGRAM TRANSFER SWITCH 626-2252

CUSTOMER CONNECTIONS

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.



- 1. SHOWN WITH SOURCE NOT AVAILABLE.
- 2. SHOWN UNDER NORMAL BATTERY VOLTAGE CONDITION. CONTACTS TRANSFER UNDER A HIGH BATTERY VOLTAGE CONDITION.
- 3. SHOWN UNDER A LOW BATTERY VOLTAGE CONDITION.

FEATURES:
 BASE CONTROL
 100-260 AMP
 3 POLE
 CONTACTOR LATCHED BOTH SIDES
 120 VOLT 1 PHASE
 240 VOLT 1 PHASE
 208 VOLT 3 PHASE
 240 VOLT 3 PHASE
 380 VOLT 3 PHASE
 415 VOLT 3 PHASE

OPTIONS:
 UPGRADED CONTROL
 BATTERY CHARGER
 BATTERY CHARGER ALARMS
 2-3 WIRE CONVERTER
 MANUAL OVERRIDE SWITCH

No. 626-2242 sh 1 of 5
 Rev. B Sys: HP System
 Modified

FIGURE 6-8. WIRING DIAGRAM TRANSFER SWITCH 626-2242

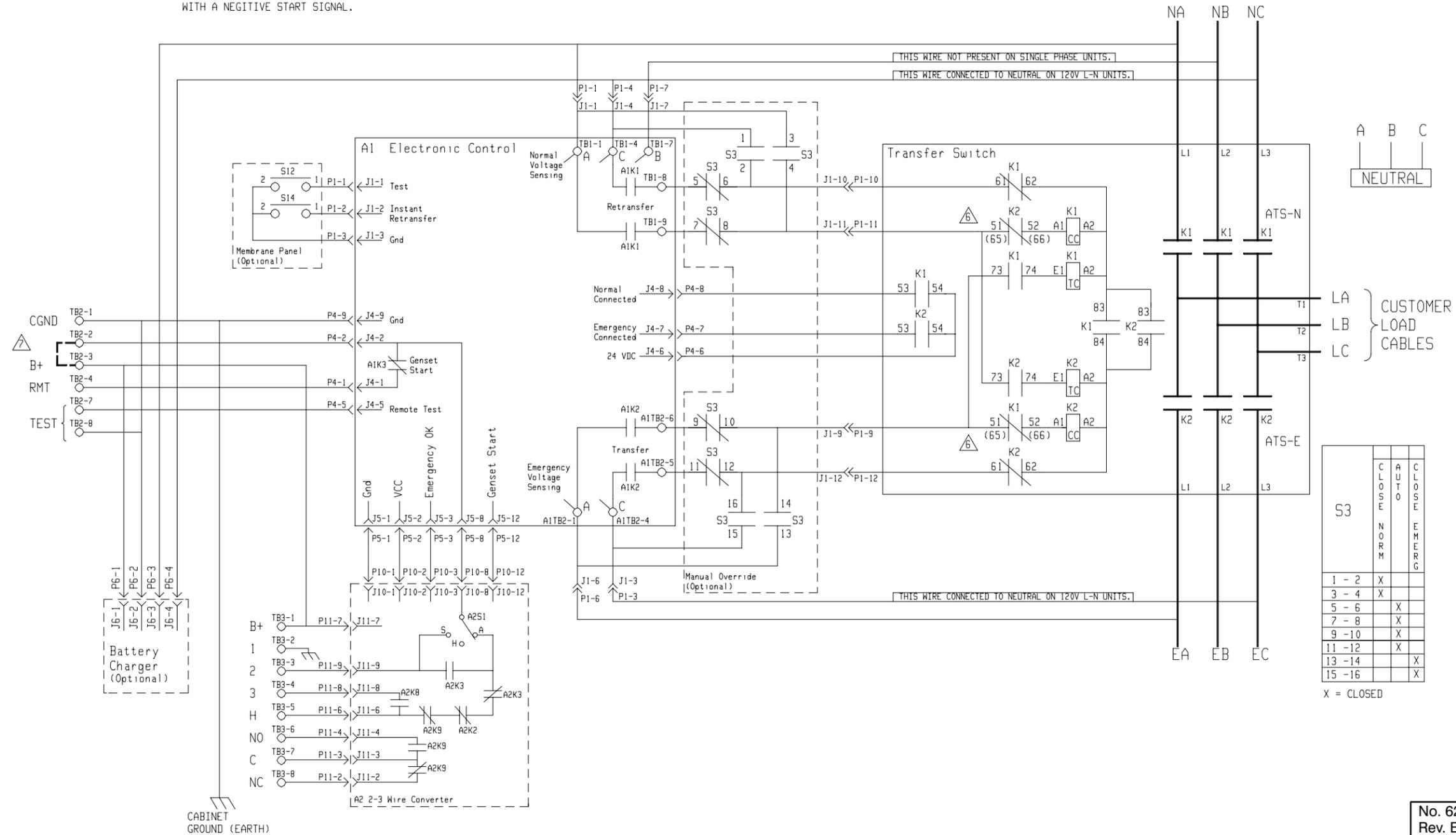
NOTES:

4. ALL COMPONENTS ARE SHOWN DE-ENERGIZED.
5. FOR SINGLE PHASE UNITS:
120/240, 3 WIRE-CONNECT POWER CABLES TO A AND C
120 L-N, 2 WIRE-CONNECT POWER CABLES TO A AND NEUTRAL
6. WHEN PROGRAMMED TRANSITION IS INSTALLED, THESE CONTACTS WILL BE LABELED K1-65,66 AND K2-65,66. THE CLOSING OF THE CONTACT WILL BE DELAYED BY THE TIME SET ON THE PNEUMATIC TIMERS INSTALLED ON THE TRANSFER SWITCH.
7. A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-3 WHEN USED WITH A GENSET WITH A POSITIVE START SIGNAL. A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-1 WHEN USED WITH A GENSET WITH A NEGITIVE START SIGNAL.

LEGEND:

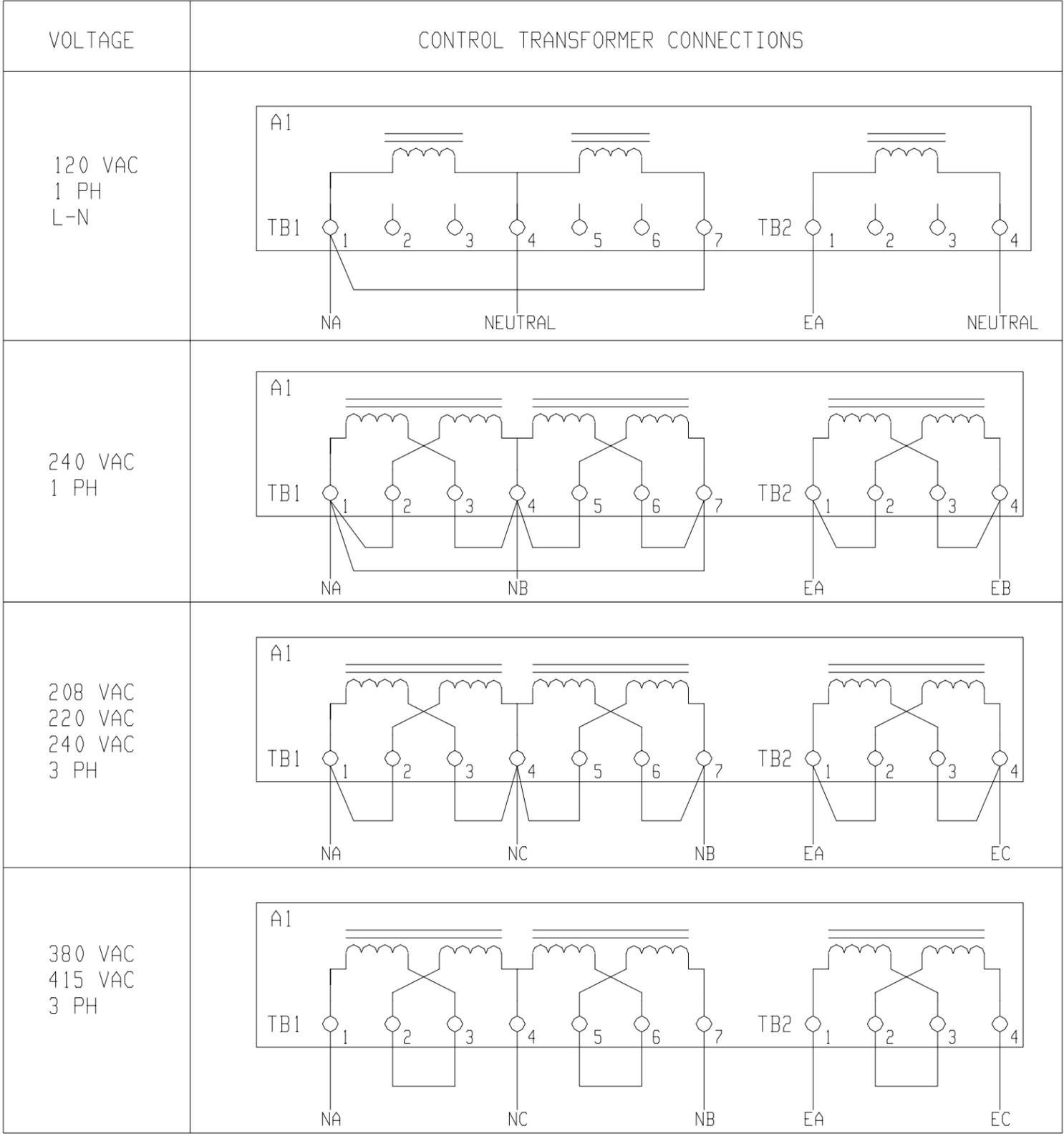
- K1(CC) NORMAL CLOSING COIL
- K1(TC) NORMAL TRIP COIL
- K2(CC) EMERGENCY CLOSING COIL
- K2(TC) EMERGENCY TRIP COIL
- S3 MANUAL OVERRIDE SWITCH
- S12 TEST SWITCH
- S14 INSTANT RETRANSFER SWITCH

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.



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Modified

FIGURE 6-9. WIRING DIAGRAM TRANSFER SWITCH 626-2242



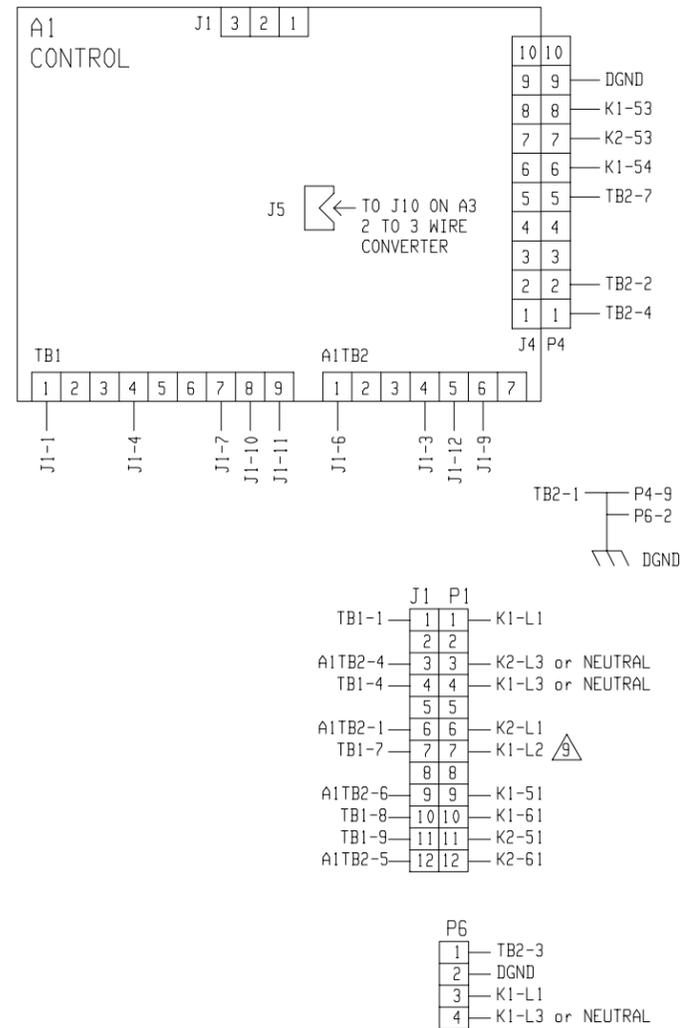
THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

No. 626-2242 sh 3 of 5
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 Modified

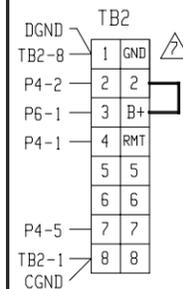
FIGURE 6-10. WIRING DIAGRAM TRANSFER SWITCH 626-2242

STANDARD WIRING

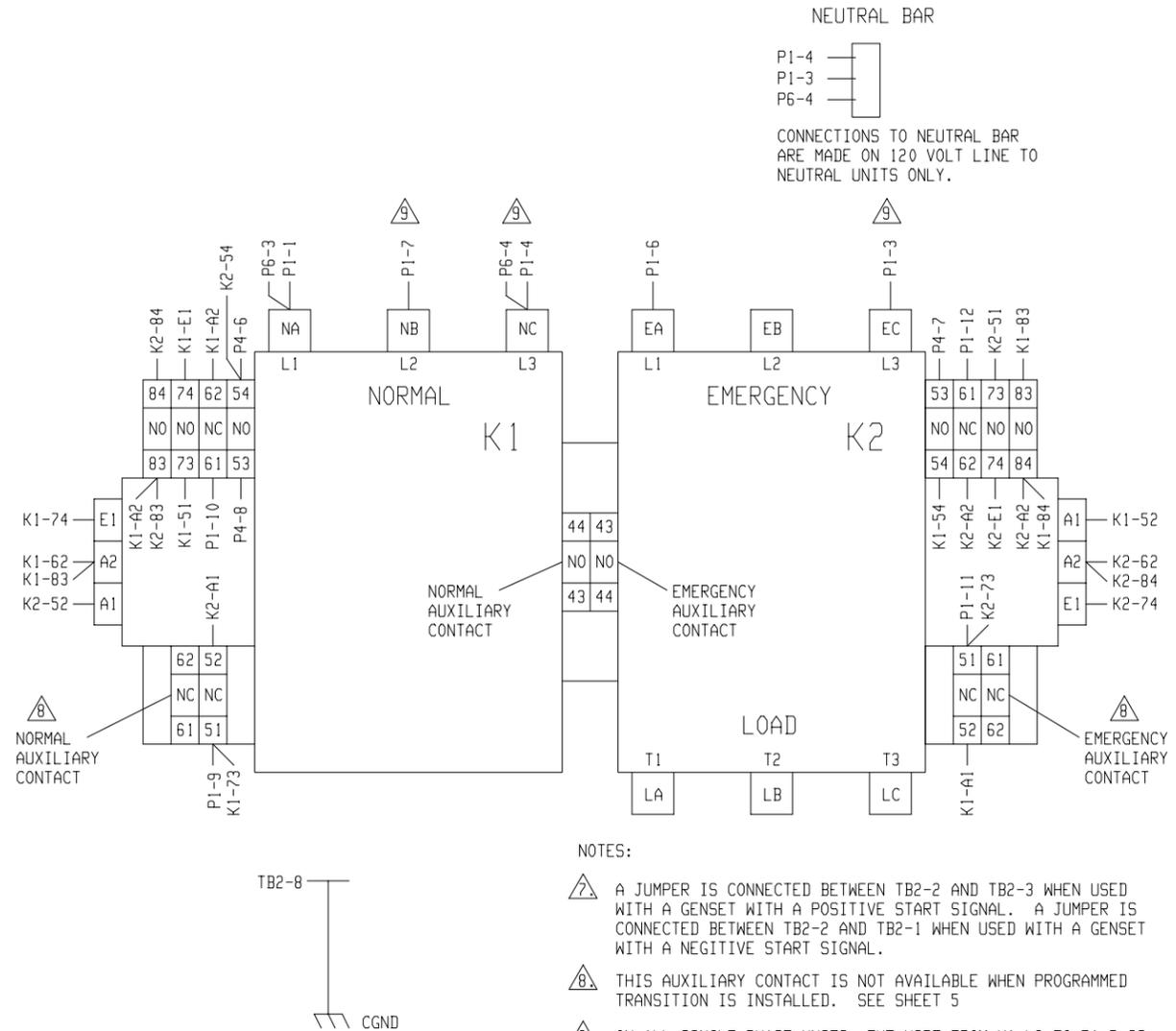
REAR VIEW OF DOOR



LEFT SIDEWALL



REAR WALL OF CABINET



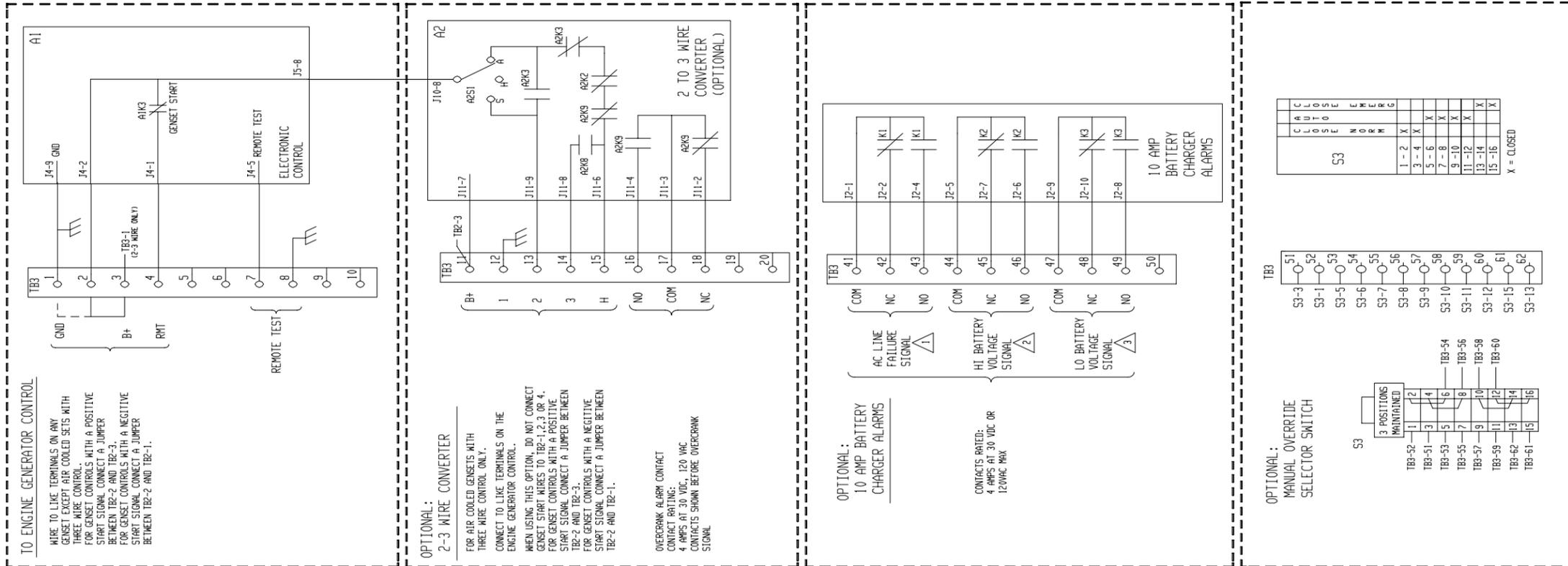
- NOTES:
- 7 A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-3 WHEN USED WITH A GENSET WITH A POSITIVE START SIGNAL. A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-1 WHEN USED WITH A GENSET WITH A NEGATIVE START SIGNAL.
 - 8 THIS AUXILIARY CONTACT IS NOT AVAILABLE WHEN PROGRAMMED TRANSITION IS INSTALLED. SEE SHEET 5
 - 9 ON ALL SINGLE PHASE UNITS, THE WIRE FROM K1-L2 TO P1-7 IS NOT PRESENT. ON 120 VOLT LINE TO NEUTRAL UNITS THE WIRES SHOWN TERMINATED TO K1-L3 AND K2-L3 WILL BE CONNECTED TO THE NEUTRAL BAR.

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

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Modified

FIGURE 6-11. WIRING DIAGRAM TRANSFER SWITCH 626-2242

CUSTOMER CONNECTIONS



TO ENGINE GENERATOR CONTROL

WIRE TO LIVE TERMINALS ON ANY GENSET EXCEPT AIR COOLED SETS WITH THREE WIRE CONTROL. FOR GENSET CONTROLS WITH A POSITIVE START SIGNAL, CONNECT A JUMPER BETWEEN TB2-2 AND TB2-3. FOR GENSET CONTROLS WITH A NEGATIVE START SIGNAL, CONNECT A JUMPER BETWEEN TB2-2 AND TB2-1.

- 1. SHOWN WITH SOURCE NOT AVAILABLE.
- 2. SHOWN UNDER NORMAL BATTERY VOLTAGE CONDITION. CONTACTS TRANSFER UNDER A HIGH BATTERY VOLTAGE CONDITION.
- 3. SHOWN UNDER A LOW BATTERY VOLTAGE CONDITION.

OPTIONAL:

2-3 WIRE CONVERTER

FOR AIR COOLED GENSETS WITH THREE WIRE CONTROL ONLY. CONNECT TO LIVE TERMINALS ON THE ENGINE GENERATOR CONTROL. WHEN USING THIS OPTION, DO NOT CONNECT GENSET START WIRES TO TB2-1, 2, 3 OR 4. FOR GENSET CONTROLS WITH A POSITIVE START SIGNAL, CONNECT A JUMPER BETWEEN TB2-2 AND TB2-3. FOR GENSET CONTROLS WITH A NEGATIVE START SIGNAL, CONNECT A JUMPER BETWEEN TB2-2 AND TB2-1.

OVERCRANK ALARM CONTACT

CONTACT RATING:
4 AMPS AT 30 VDC, 120 VAC
CONTACTS SHOWN BEFORE OVERCRANK SIGNAL

OPTIONAL:

10 AMP BATTERY CHARGER ALARMS

CONTACTS RATED:
4 AMPS AT 30 VDC OR
120VAC 1PH

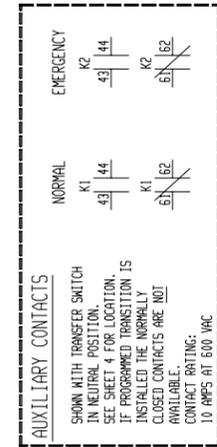
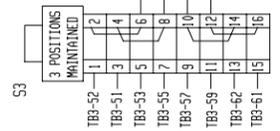
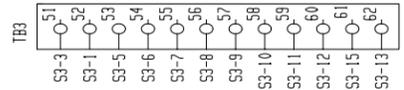
FEATURES:
BASE CONTROL
30-60 AMP
3 POLE OPEN CONSTRUCTION
CONTACTOR LATCHED NORMAL SIDE
120,240 VOLT 1 PHASE
208240,380,415,440,480,600 VOLT 3 PHASE

OPTIONS:
UPGRADED CONTROL
BATTERY CHARGER
BATTERY CHARGER ALARMS
2-3 WIRE CONVERTER
MANUAL OVERRIDE SWITCH

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

C	A	C
L	L	L
O	O	O
F	F	F
E	E	E
S	S	S
3	3	3
1	1	1
2	2	2
4	4	4
6	6	6
8	8	8
10	10	10
12	12	12
14	14	14
15	15	15
16	16	16

X = CLOSED



No. 626-2264 sh 1 of 5
Rev. A Sys: HP System
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FIGURE 6-13. WIRING DIAGRAM 626-2264 (OPEN CONSTRUCTION)

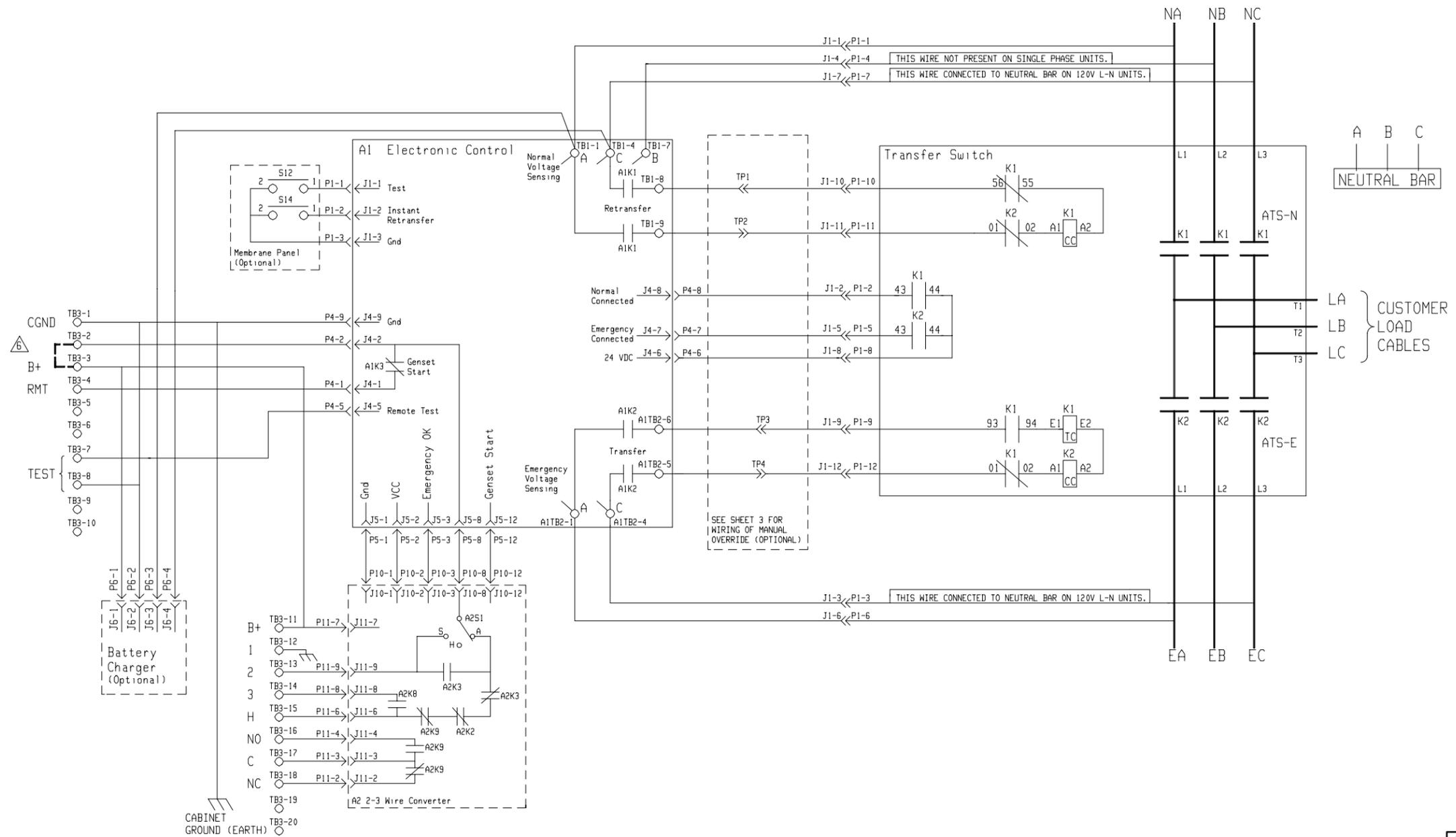
NOTES:

4. ALL COMPONENTS ARE SHOWN DE-ENERGIZED.
 5. FOR SINGLE PHASE UNITS:
120/240, 3 WIRE-CONNECT POWER CABLES TO A AND C
120 L-N, 2 WIRE-CONNECT POWER CABLES TO A AND NEUTRAL
- ⚠ A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-3 WHEN USED WITH A GENSET WITH A POSITIVE START SIGNAL. A JUMPER IS CONNECTED BETWEEN TB2-2 AND TB2-1 WHEN USED WITH A GENSET WITH A NEGATIVE START SIGNAL.

LEGEND:

- K1(CC) NORMAL CLOSING COIL
- K1(TC) NORMAL TRIP COIL
- K2(CC) EMERGENCY CLOSING COIL
- K2(TC) EMERGENCY TRIP COIL
- S3 MANUAL OVERRIDE SWITCH
- S12 TEST SWITCH
- S14 INSTANT RETRANSFER SWITCH

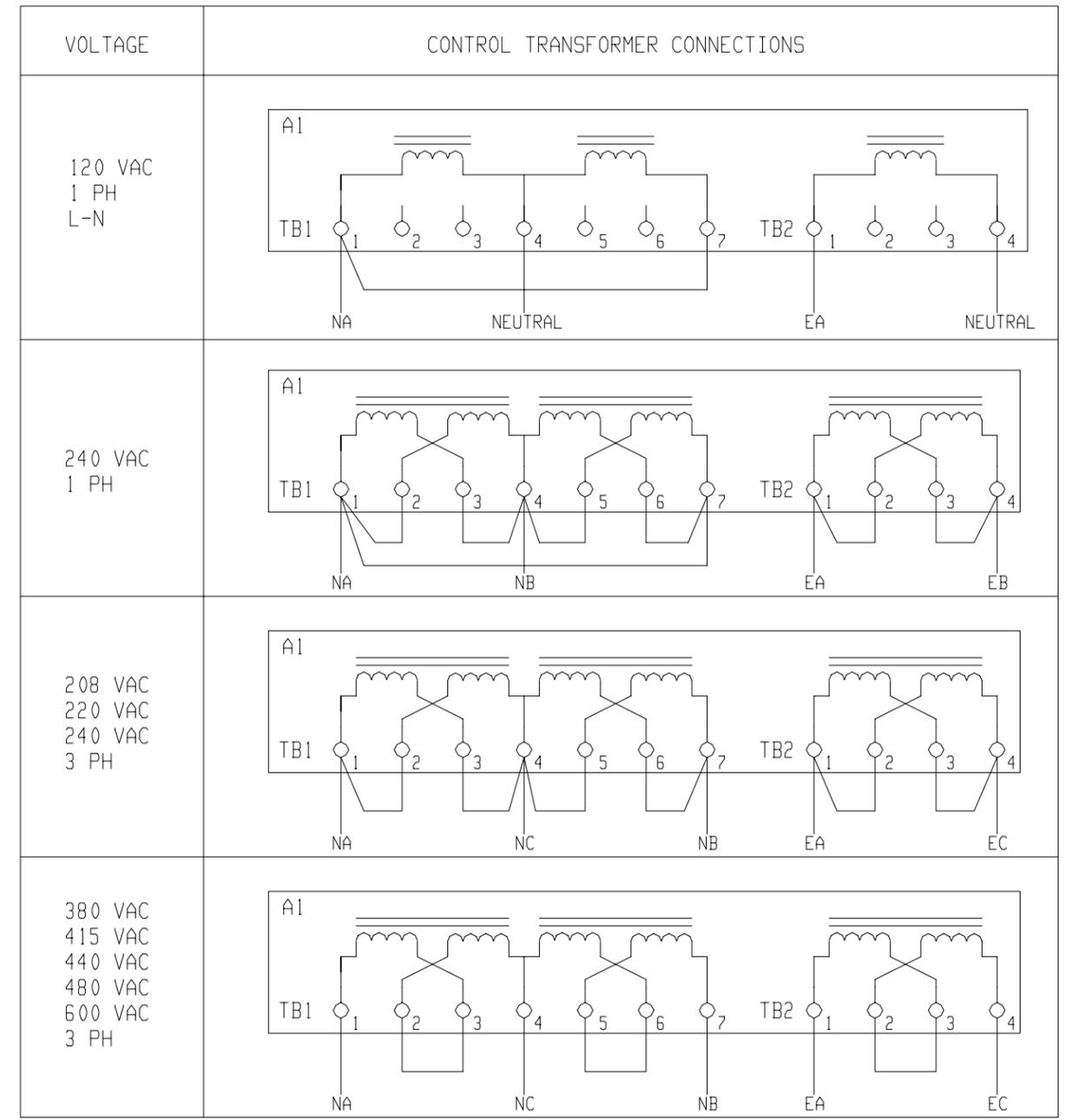
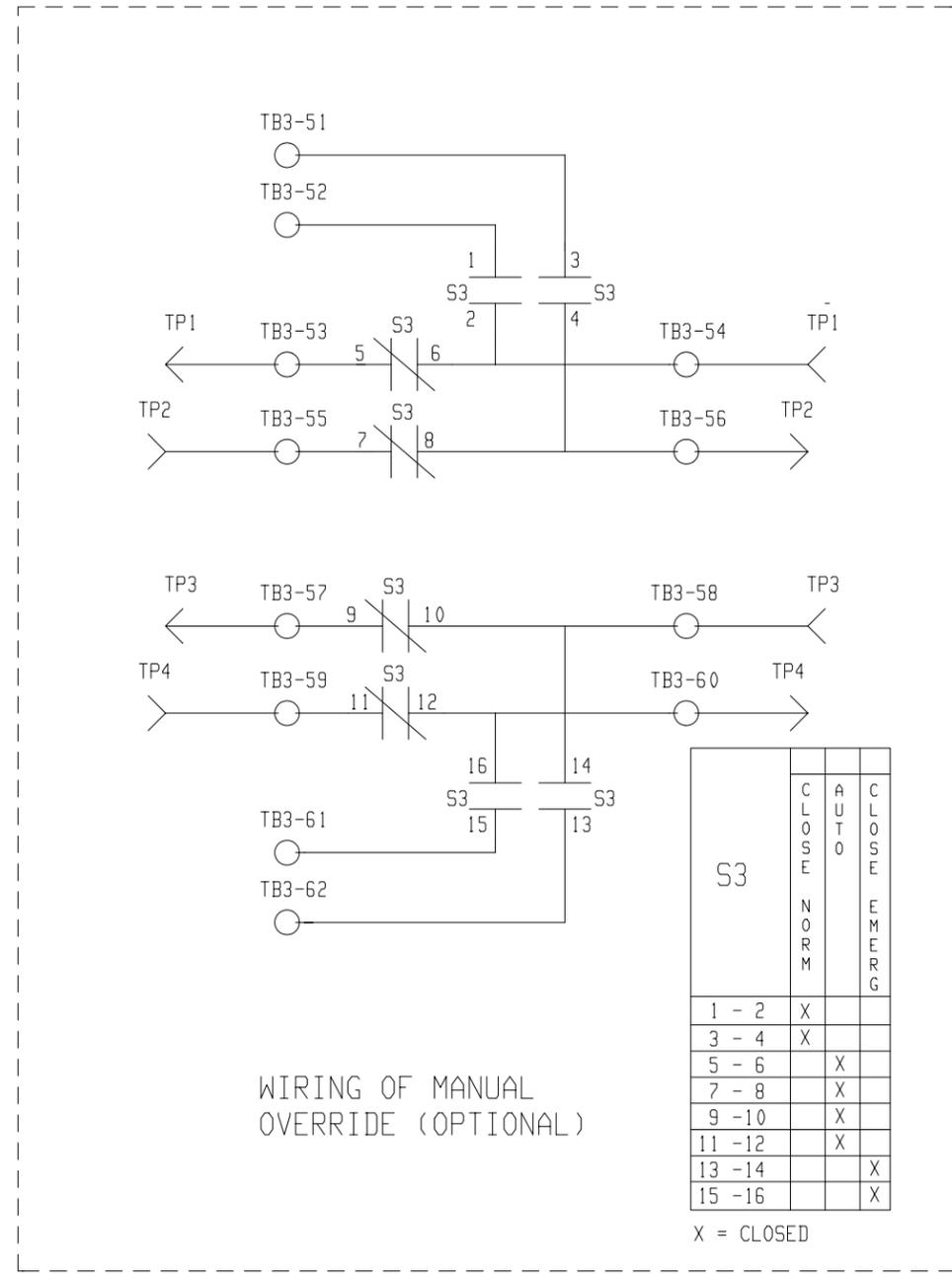
THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.



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FIGURE 6-14. WIRING DIAGRAM 626-2264 (OPEN CONSTRUCTION)

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

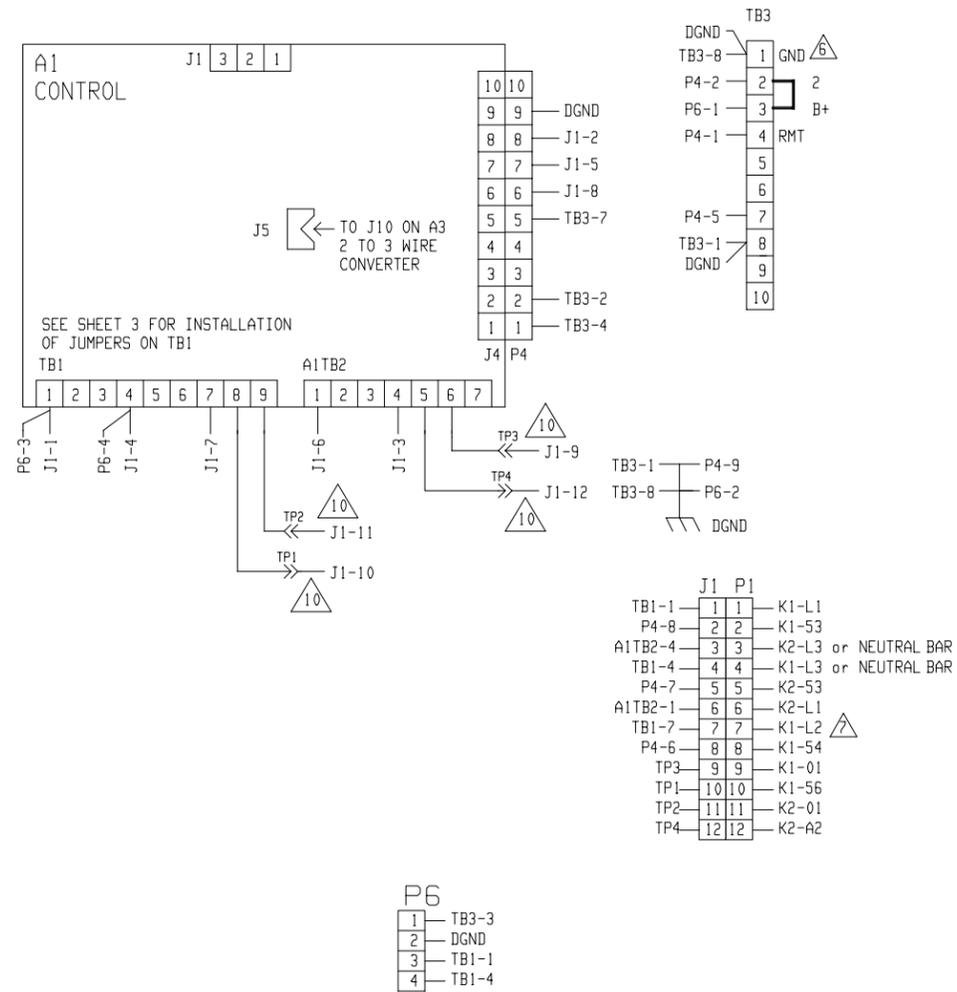


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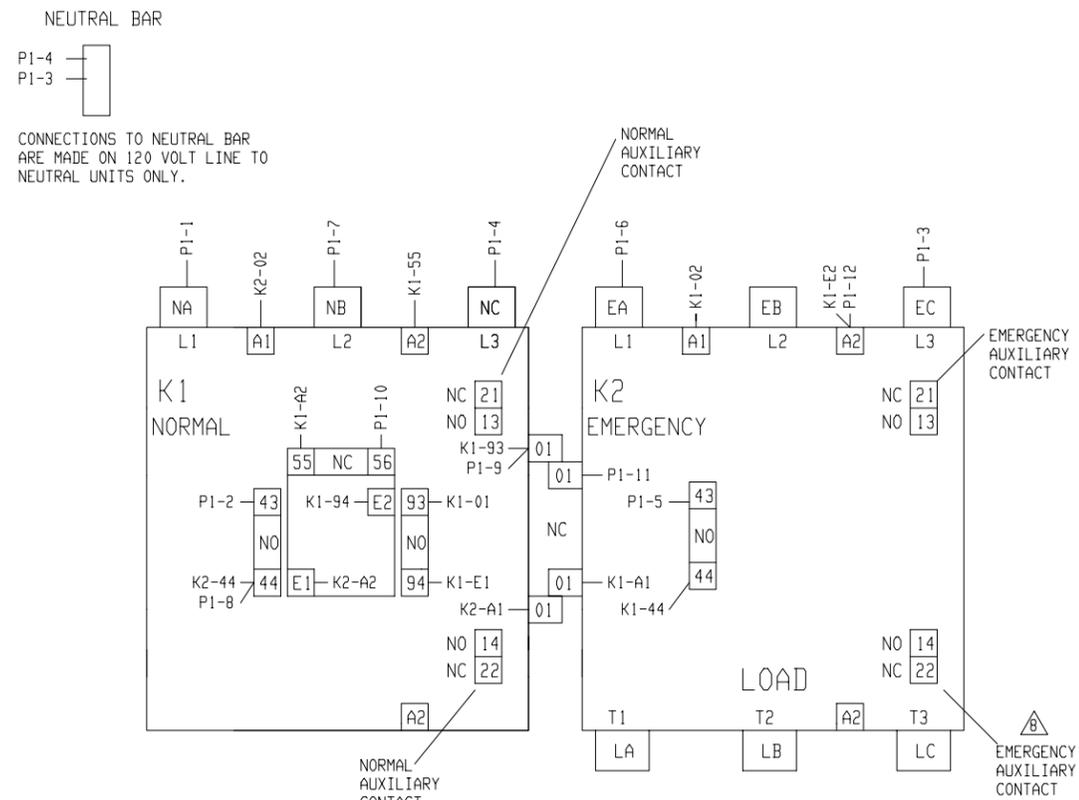
FIGURE 6-15. WIRING DIAGRAM 626-2264 (OPEN CONSTRUCTION)

STANDARD WIRING

FRONT VIEW OF CONTROL PLATE



THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

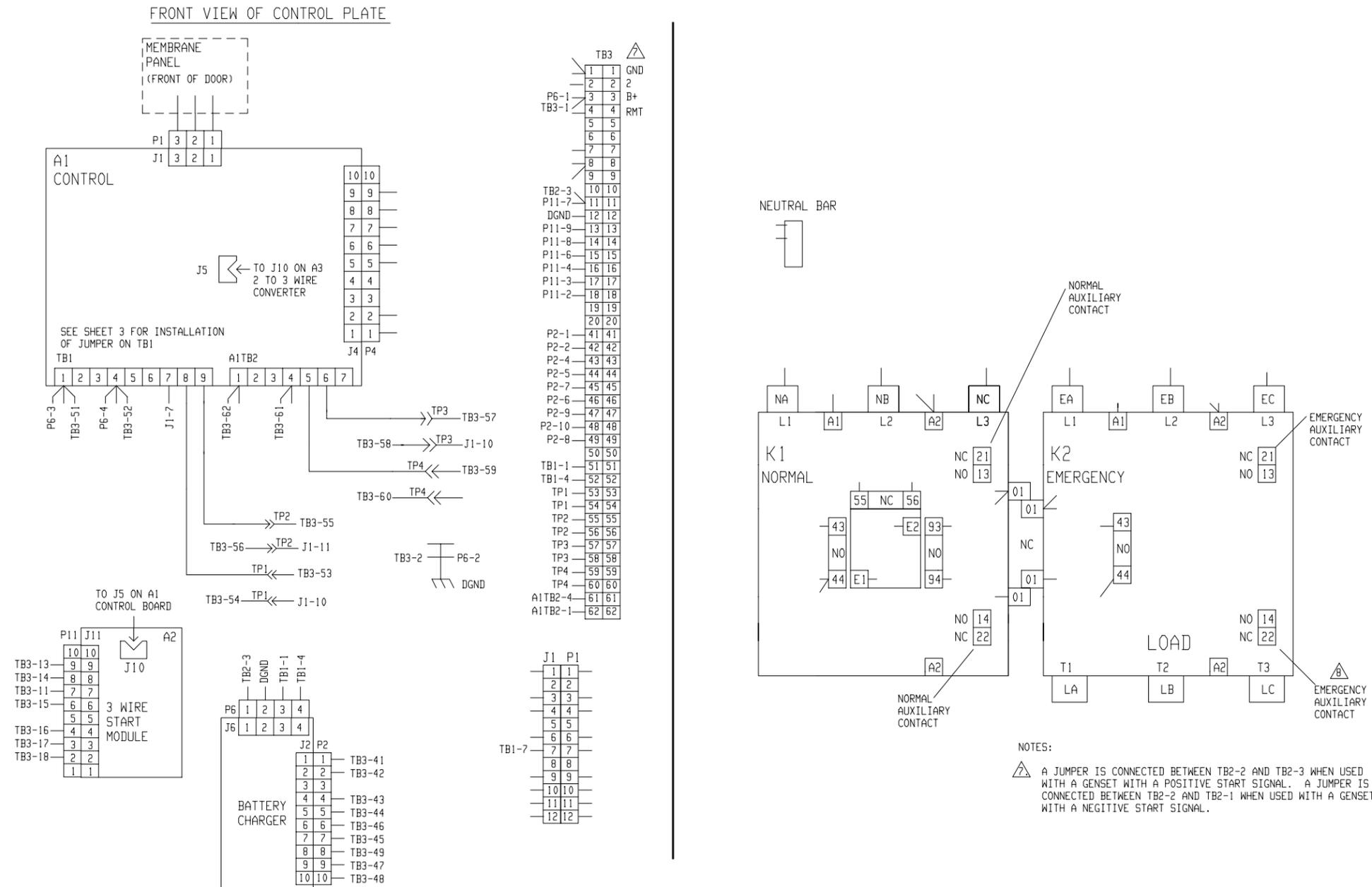


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FIGURE 6-16. WIRING DIAGRAM 626-2264 (OPEN CONSTRUCTION)

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 5-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

OPTION WIRING



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FIGURE 6-17. WIRING DIAGRAM 626-2264 (OPEN CONSTRUCTION)

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 3-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.

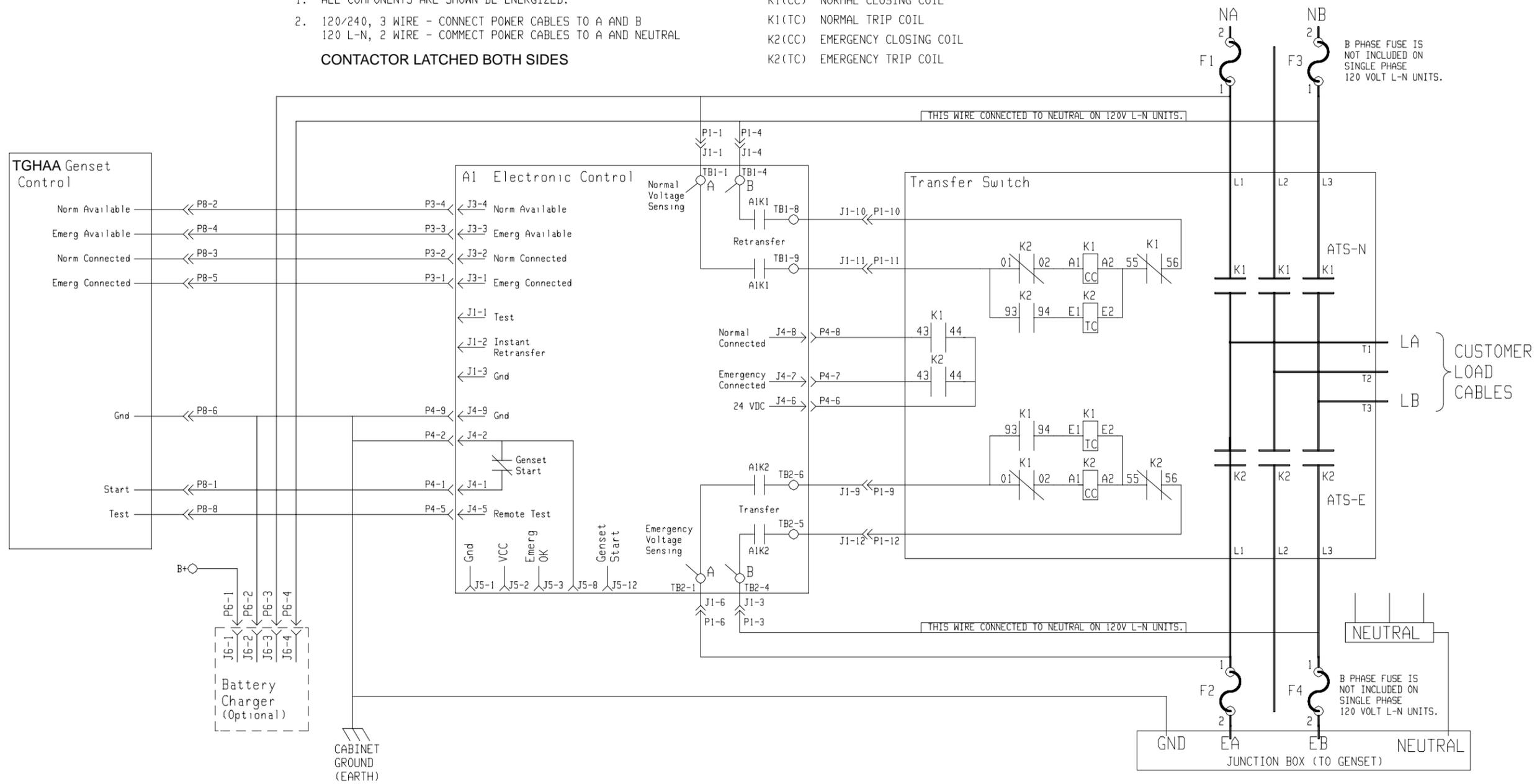
NOTES:

1. ALL COMPONENTS ARE SHOWN DE-ENERGIZED.
2. 120/240, 3 WIRE - CONNECT POWER CABLES TO A AND B
120 L-N, 2 WIRE - COMECT POWER CABLES TO A AND NEUTRAL

CONTACTOR LATCHED BOTH SIDES

LEGEND

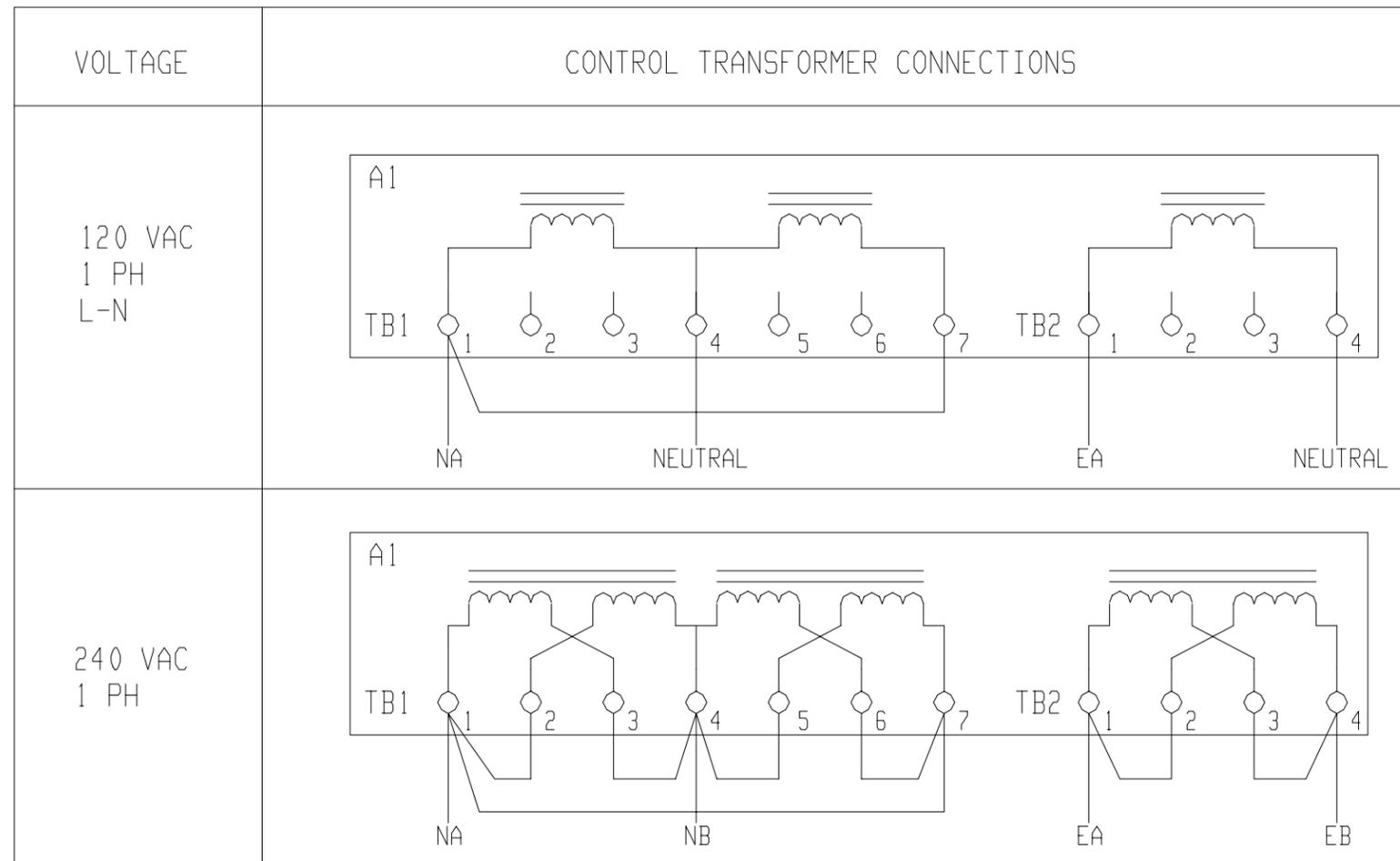
- K1(CC) NORMAL CLOSING COIL
- K1(TC) NORMAL TRIP COIL
- K2(CC) EMERGENCY CLOSING COIL
- K2(TC) EMERGENCY TRIP COIL



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FIGURE 6-18. WIRING DIAGRAM 626-2255 (TGHA APPLICATIONS)

THIS IS A REPRESENTATIVE (GENERIC) SCHEMATIC / WIRING DIAGRAM. FOR TROUBLESHOOTING, REFER TO THE 3-SHEET SCHEMATIC AND WIRING DIAGRAM PACKAGE THAT WAS INCLUDED WITH YOUR TRANSFER SWITCH.



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FIGURE 6-19. WIRING DIAGRAM 626-2255 (TGHA APPLICATIONS)

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763-574-5000 International Use
Fax: 763-528-7229

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