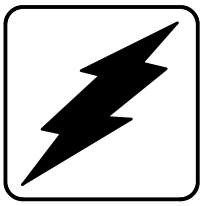
Installation

Automatic Transfer Switches



Models:

M340

Logic:

Microprocessor

ISO 9001
KOHLER GENERATORS
INTERNATIONALLY REGISTERED
U.S.A. Plant ISO Registered

KOHLER®
POWER SYSTEMS

TP-5460 3/92b

Contents

Safety Precautions & Instructions

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTE

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

HAZARDOUS VOLTAGE/ ELECTRICAL SHOCK

⚠ WARNING

Hazardous voltage.
Can cause severe injury or death.

Disconnect power sources before servicing. Barrier must be installed after adjustments, maintenance, or servicing.

(under 600 Volt)

⚠ DANGER

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(600 Volt and above)

⚠ WARNING

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Do not open enclosure until all power sources are disconnected.

(under 600 Volt)

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Do not open enclosure until all power sources are disconnected.

(600 Volt and above)

Hazardous voltage can cause severe injury or death. Disconnect set from load by opening line circuit breaker or by disconnecting generator output leads from transfer switch and heavily taping ends of leads. If high voltage is transferred to load during test, personal injury and equipment damage may result. The GENERATOR SAFEGUARD BREAKER MUST NOT BE USED IN PLACE OF LINE CIRCUIT BREAKER!

Hazardous voltage can cause severe injury or death. The transfer switch is energized; proceed with care! High voltage can cause personal injury, damage equipment, or lead to future failures. Remove watch, rings, and jewelry that can cause short circuits.

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

Hazardous voltage can cause severe injury or death. To prevent the possibility of electrical shock, de-energize the normal power source to be connected to the transfer switch before making any line or auxiliary connections.

Hazardous voltage can cause severe injury or death. De-energize both normal and emergency power sources before proceeding. Move Generator Master Switch on controller to OFF position and disconnect battery negative (–) before working on transfer switch! Turn the transfer switch selector switch to the OFF position.

Hazardous voltage can cause severe injury or death. Disconnect inner panel harness at in-line connector. This will de-energize circuit board and logic circuitry, but allow transfer switch to continue to supply utility power to necessary lighting and equipment. Hazardous voltage will exist if any accessories mounted to inner panel are NOT wired through and de-energized by harness separation. Such accessories may be at line voltage.

Hazardous voltage can cause severe injury or death. Keep everyone away from the set and take precautions to prevent unqualified personnel from tampering. Have the set and electrical circuits serviced only by qualified technicians. Wiring should be inspected at the recommended interval shown in the service schedule – replace leads that are frayed or in poor condition. Do not operate electrical equipment when standing in water, on wet ground, or when your hands are wet.

Hazardous voltage can cause severe injury or death. Disconnect harness plug before installing any accessories involving connection to transformer assembly primary terminals. Terminals are at line voltage!

NOTE

HARDWARE DAMAGE! Transfer switch may make use of both American standard and metric hardware. Be sure to use the correct size tools to prevent rounding of bolt heads and nuts.

NOTE

A manual operator handle is provided on the transfer switch for maintenance purposes only. Return the transfer switch to the Normal position. Remove manual operator handle (if used) and store it on the transfer switch in the place provided when service is completed.

Ratings

The rating label is attached to the transfer switch. Data relating to each specific switch is included on the nameplate. Unit installation must not exceed the rated capacity of the switch, as shown on the nameplate.

For location of the transfer switch in the system see Figure 1. The switch should be as close as possible to the critical electrical loads connected to it.

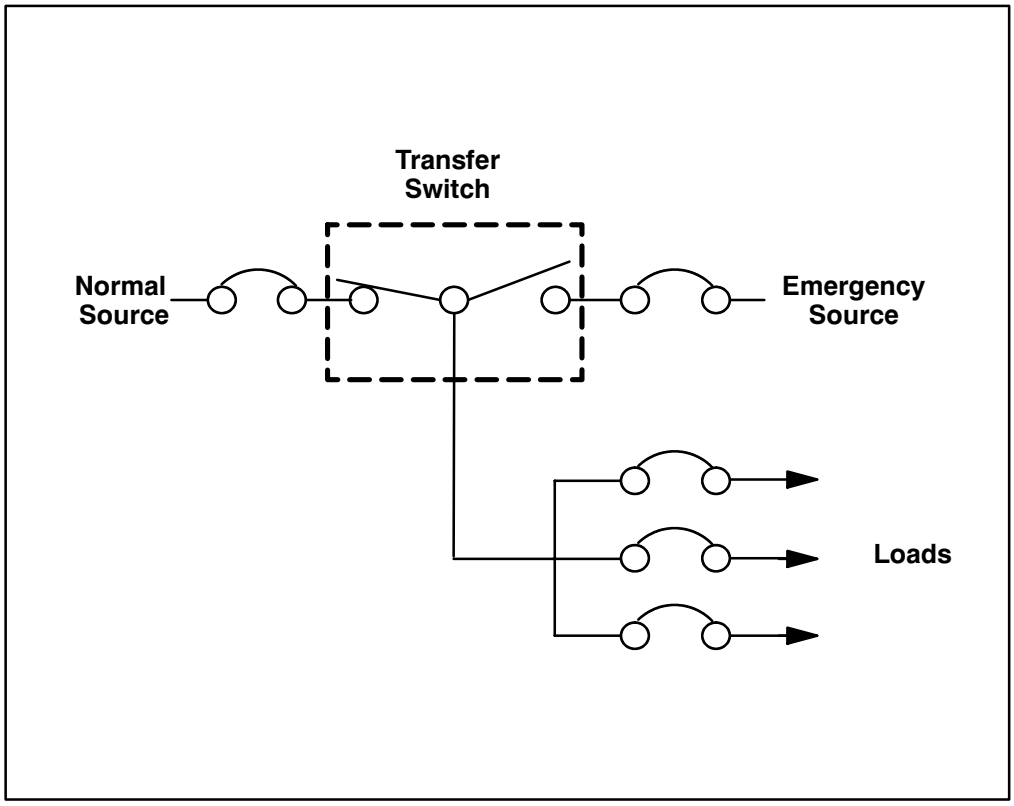

Figure 1. Transfer Switch Location

Installation

Kohler transfer switches are factory wired and tested. Installation requires mounting and control initialization plus connection of utility, load, emergency cables and any auxiliary contact/control circuits. Do not remove protective packing until ready for complete installation. Protect switch at all times from excessive moisture, construction grit, and metal chips.

Unpacking

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

Lifting

Any lifting devices must be attached to the switch's mounting holes or lifting eyes only. Do

not lift the switch at any other points. Protect arc barriers from impact at all times.

Mounting

All enclosed switches have the control panel mounted on the cabinet door. For open-type switches, mount the control panel to the right of the transfer switch. See installation drawings for open switch mounting dimensions and spacing requirements.

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(under 600 Volt)

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Hazardous voltage Will cause severe injury or death. De-energize both normal and emergency power sources before proceeding. Move Generator Master Switch on controller to OFF position and disconnect battery negative (–) before working on transfer switch! Turn the transfer switch selector switch to the OFF position.

Line Connections

Wiring diagrams are furnished at the back of this manual. Interconnection diagrams (3-pole and 2-pole) are furnished to show actual lead wiring.

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

Do not run cables behind the transfer switch. Cables can be bundled to the side of the switch. Maintain proper electrical clearance between the live metal parts and grounded metal. Use cable spacers provided on 70, 104 and 150-Amp, 600-Volt class switches.

Spacers are not required on 240-Volt class switches.

On 225–400-Amp switches, remove the cover shields from the switch to connect power cables to the emergency lugs and switched neutral lugs (Accessory 36).

Connect source and load conductors to clearly marked contactor terminal lugs. Remove surface oxides from conductors by cleaning with a wire brush. When aluminum conductors are used, apply oxidation inhibitor to conductors. Tighten lugs and carefully wipe away excess oxidation inhibitor. Tighten cable lugs to the torque specified in table A, following.

Note

Application of oxidation inhibitor is required for all aluminum terminations.

Contactor Rated Amps	Tightening Torque inch pounds (Nm)
30 – 104	50 (5.6)
150	200 (22.6)
225 – 400	600 (67.8)
600 – 1200	500 (56.5)
1600 – 4000	Suitable for Bus Bar Lugs

Table A. Tightening Torque Values for Lug Connectors

⚠ WARNING

Hazardous voltage.
Can cause severe injury or death.

Do not open enclosure until all power sources are disconnected.

(under 600 Volt)

Hazardous voltage can cause death or severe injury! On 225–400-Amp switches, reinstall the cover shields over the Emergency lugs and overlapping neutral (accessory 36) lugs. If these shields are not in place when the switch is energized, the lugs will be exposed. Touching these energized lugs can result in shock, burns, or death.

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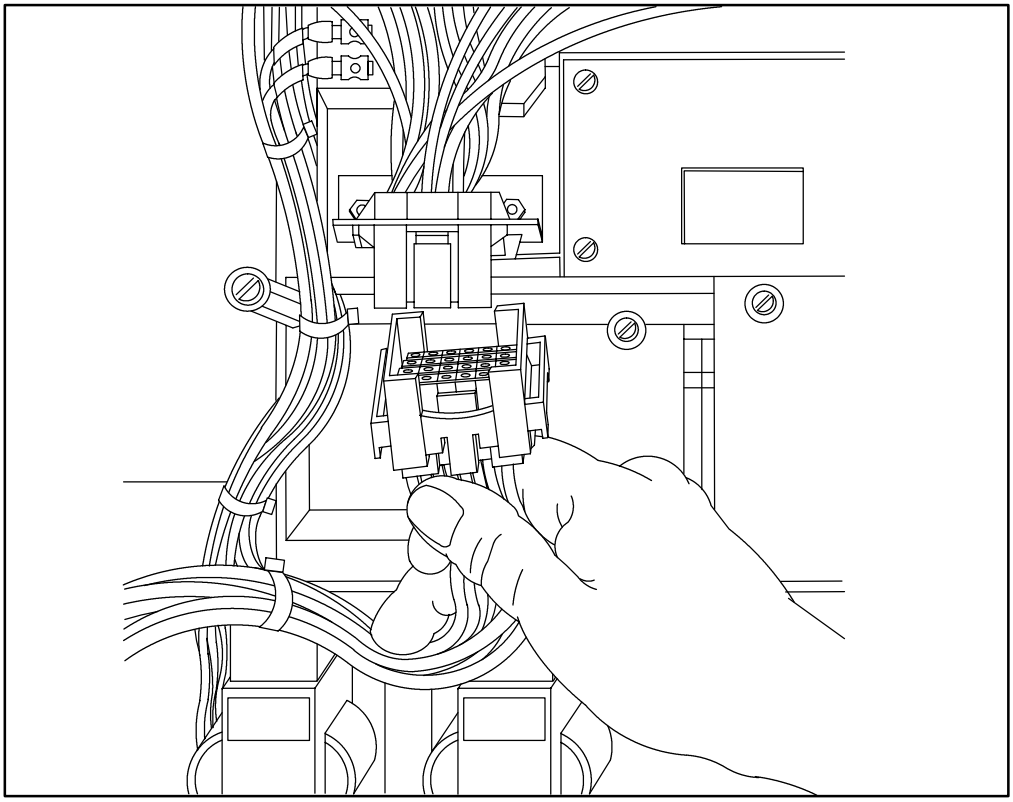


Figure 2. In-Line Disconnect Plug

All internal connections are made at the factory. The transfer switch and the control panel each have their own wire harness. The two harnesses are joined together by the in-line disconnect plug. The plug is already engaged on enclosed transfer switches. For open type switches, the plug must be engaged after installation is completed. See Figure 2.

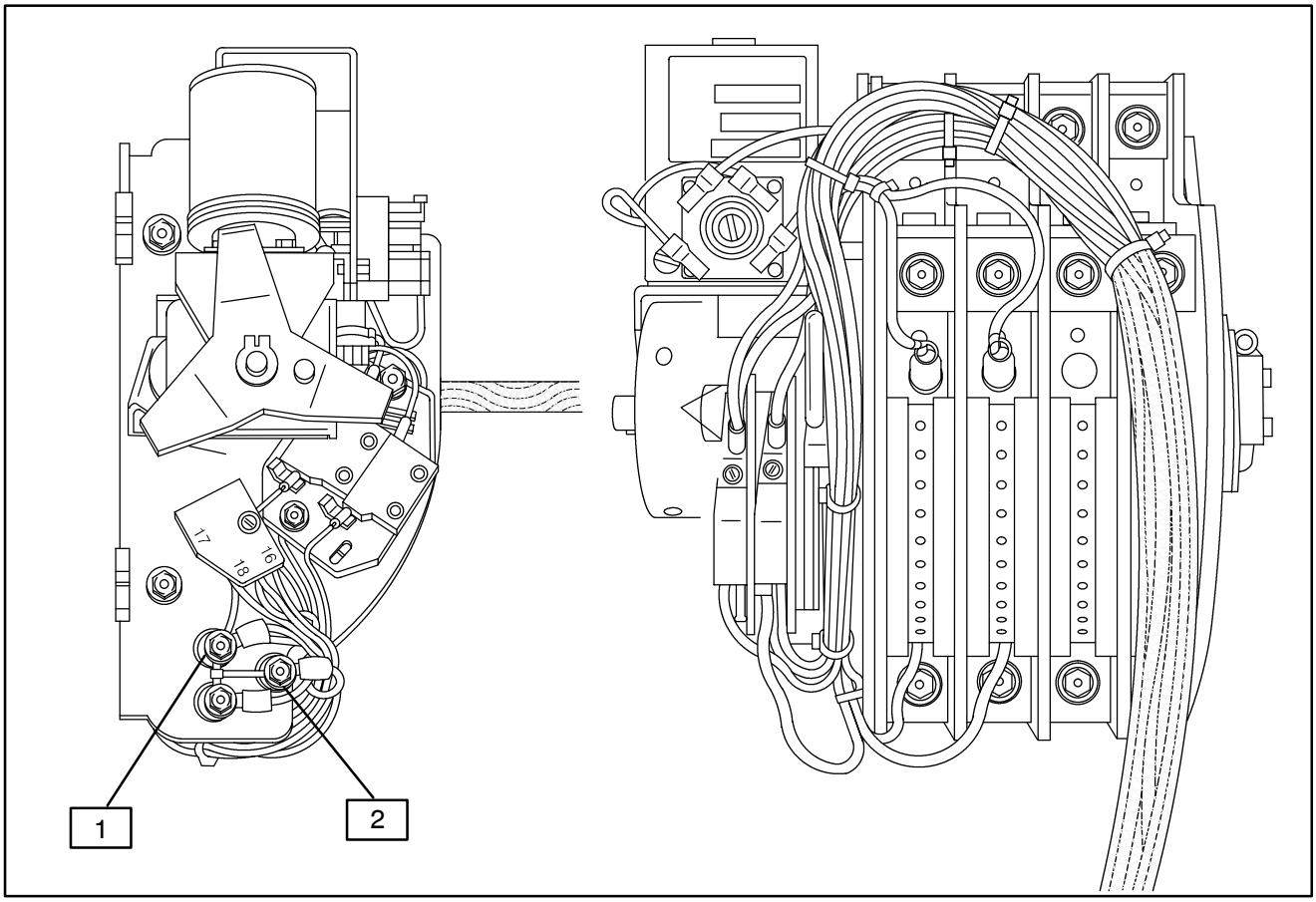
Auxiliary Connections

Connect auxiliary circuit wires to appropriate control panel terminals as shown on the appropriate diagram (see contactor wiring diagrams in the “Wiring Diagrams” section). Any auxiliary contact connections are customer specified and should be shown on the installation’s plans. Standard auxiliary contacts include one set closed in the normal position and one set closed in the emergency position. Additional contacts of both types are optional.

Note any optional accessories that may have been furnished on this switch and make auxiliary connections if necessary.

Engine-Starting Connections

The engine-starting connections are located on the transfer switch contactor. A red decal near the contactor points to engine-start terminals. Engine-start terminal locations are also described on interconnection diagrams in this book. Connect engine-start signal wires to terminals 3 and 4 on the contactor. See Figure 3.



1. Engine Start Terminal 3
2. Engine Start Terminal 4

Figure 3. Typical Engine Starting Connections 30–150-Amp Contactor Shown

Functional Tests

Functional Testing consists of three parts: *manual operation, voltage checks and electrical operation.*

Setting the clock/calendar is required to complete basic transfer switch installation. See instructions following under *Initializing the Control, Setting the Time & Date* following. See **Transfer Switch Control Operation & Setup** (TP-5569) for complete instructions on control operation and programming.

Caution

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

Read and understand all instructions on installation drawings and labels affixed to the switch. Note any optional accessories that have been furnished with the switch and review their operation. See *Checking Installed Control Options* following.

First, check the transfer switch nameplate for rated voltage. It should be the same as normal line voltage and emergency line voltage as indicated on the generator set nameplate.

Manual Operation Check

1. Perform the manual operation test **before** attempting to electrically test the automatic transfer switch. The intent is to verify that the contactor and all auxiliary switches operate smoothly and that there is no damage from shipping or installation.
2. Open *both* the normal and emergency source circuit breakers. This procedure will check manual operation of the Transfer Switch.
3. Separate the contactor control in-line disconnect plugs if you have not already done so. See Figure 8.
4. A permanently-mounted handle is provided on 30–150-Amp switches. A detachable manual operator handle is provided on 225–4000-Amp switches. Manual operator handles are to be used for maintenance and inspection purposes only. Select the appropriate switch amperage size below and follow directions for installing the handle. See Figures 4. through 7.

NOTE

A manual operator handle is provided on the transfer switch for maintenance purposes only. Return the transfer switch to the normal position. Remove manual operator handle (if used) and store it on the transfer switch in the place provided when service is completed.

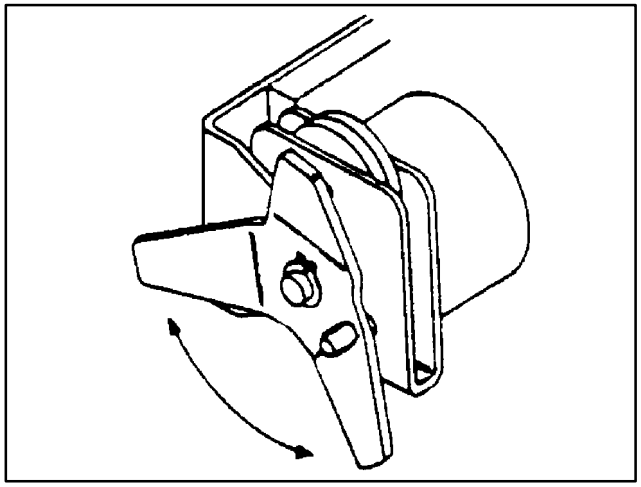


Figure 4. Operating Handle, 30–150-Amp.

For 30–150-Amp Switches: Operate 3-point handle as shown in Figure 4.

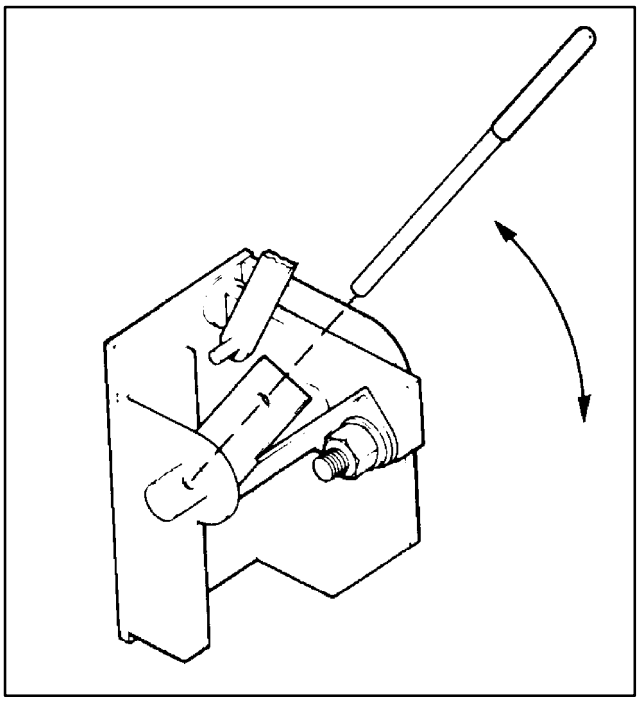


Figure 5. Operating Handle, 225–400-Amp.

For 225–400-Amp Switches: Insert manual handle as shown in Figure 5.

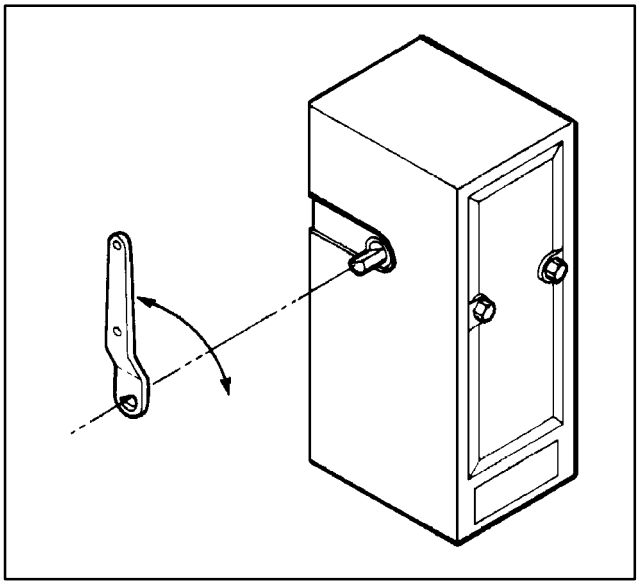


Figure 6. Operating Lever, 600–800-Amp.

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

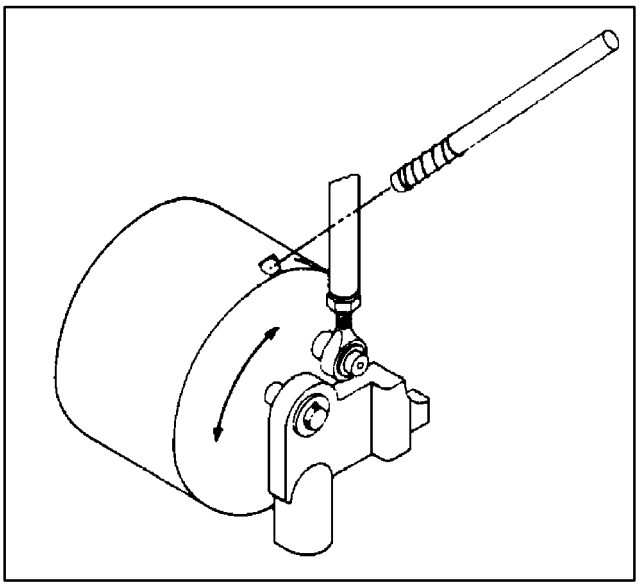


Figure 7. Operating Lever, 1000–4000-Amp.

For 1000–4000-Amp Switches: Insert manual handle into hole provided in rotating weight. See Figure 7.

5. Move the installed handle in the direction shown to manually operate the transfer switch. The switch should operate smoothly and without binding. Return the transfer switch to the normal position. Remove manual operator handle and store it on the transfer switch in the place provided.

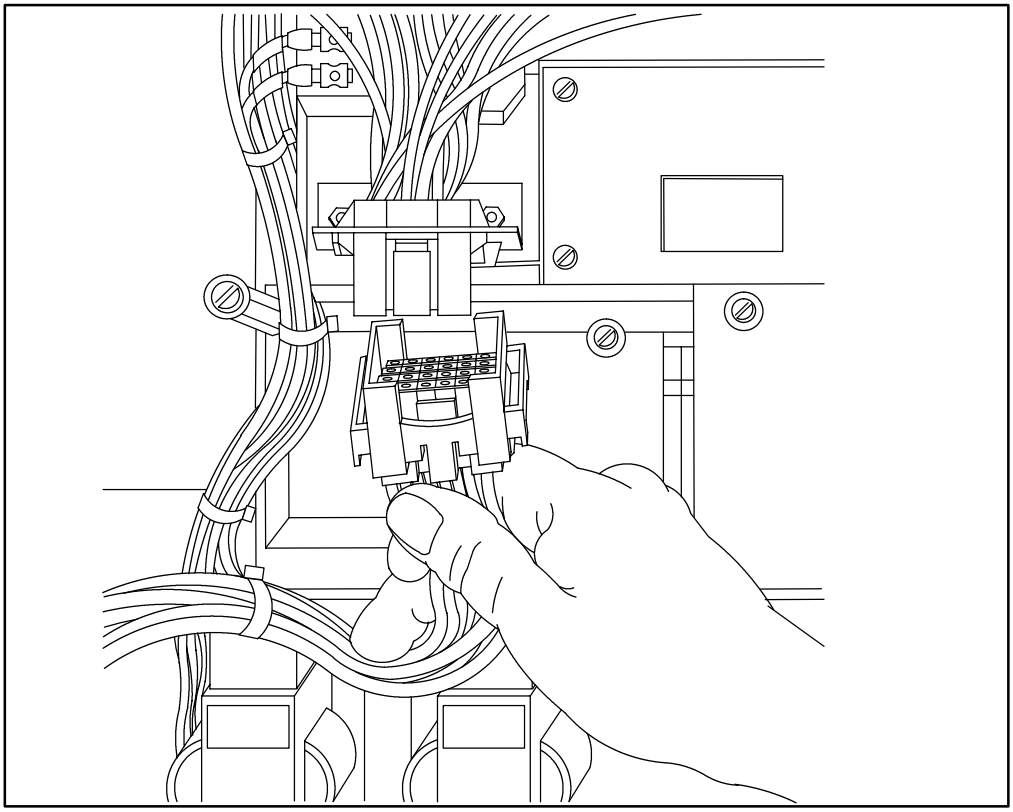


Figure 8. In-Line Disconnect Plug

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Voltage Checks

6. Close the normal source circuit breaker.
7. Use an accurate voltmeter to check for proper voltage and phase rotation (phase-to-phase and phase-to-neutral voltages) at the contactor's normal-source terminals.
8. Close the emergency-source circuit breaker.
9. Manually start the generator set using the engine control switch on the generator set controller.
10. Use an accurate voltmeter to check for proper voltage and phase rotation (phase-to-phase and phase-to-neutral voltages) at the contactor's emergency-source terminals.
11. If necessary, adjust the generator voltage regulator, following the generator set manufacturer's instructions. The automatic transfer switch will respond only to rated voltage and frequency specified on the nameplate. Check phase rotation; it should be the same as that of the normal source.
12. Shut down the generator set using the engine control switch on the generator set controller. Connect the two M340 in-line disconnect plug halves and wait until the time delay engine cooldown (TDEC) has completed timing per the factory setting (see the factory test sheet for settings). After the TDEC has completed timing, the generator set controller's engine control switch can be placed in the AUTO position.

Electrical Operation Test

13. Reconnect the contactor control in-line disconnect plugs. See Figure 8.

    The transfer switch should be in the Normal position. The following procedure will check the electrical operation of the automatic transfer switch.

14. Place the selector switch in the AUTO TRANSFER position (if so equipped). See Figure 9.

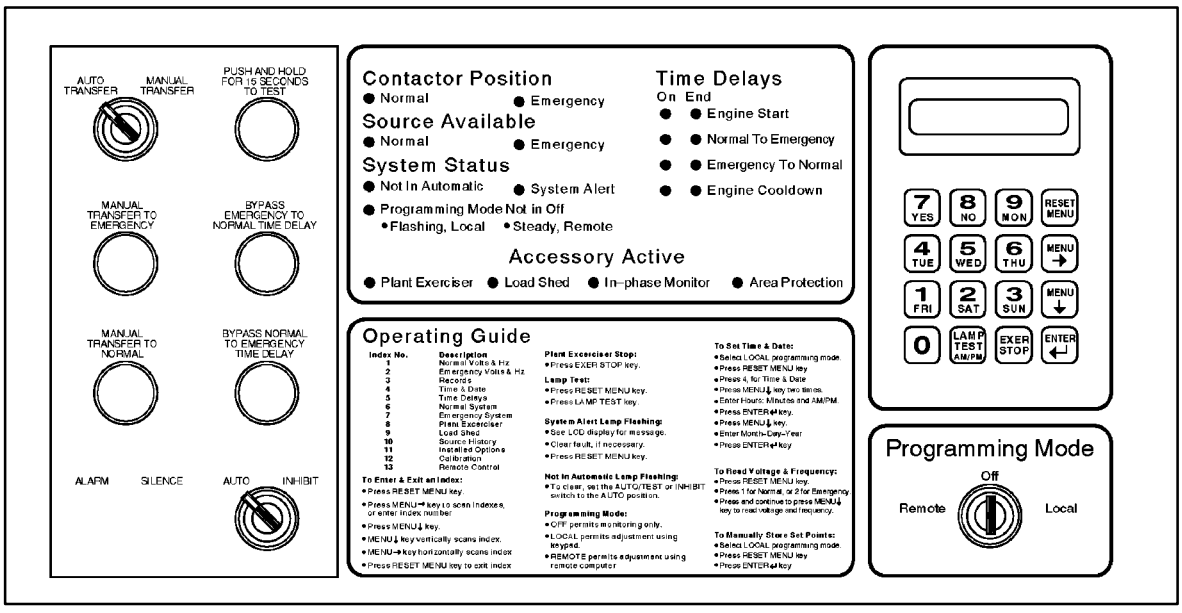


Figure 9. Transfer Switch Control Switches

15. Press the door-mounted test switch and hold it for 15 seconds. The generator set should start and run. This should happen after the Time Delay Engine Start (TDES) has completed timing.
16. The transfer switch will operate to the emergency position. The transfer will occur after the Normal-to-Emergency Time Delay (TDNE) has completed timing.
17. Release the door-mounted test switch. The transfer switch will operate back to normal after the emergency-to-normal time delay has completed timing.
18. Time Delay Engine Cooldown (TDEC) allows the engine to continue running for an additional unloaded running time. The transfer switch TDEC will complete timing before any TDEC function in the generator set controller begins timing.

This completes functional tests of the transfer switch. The generator set starting control should be left in the “automatic” position.

NOTE

If you connect the transfer switch in-line disconnect plugs together with the generator controller’s master switch in the AUTO position, the generator set will IMMEDIATELY start and run in the generator set controller’s cool-down period until the generator set controller’s cool-down timer has completed timing.

Initializing the Control

After completing the basic startup procedures described on the preceding pages, please take a few moments with the owner to review the settings and modes they would like to have for the operation of the transfer switch. Use the worksheets provided to guide you through this process. The switch has been set at the factory with default settings for the switch's operation. Most likely, you will be making some changes to the settings to match site conditions and owner's preferences. You can assure your customer that the transfer switch will provide standby protection as soon as the logic plug is connected and the electrical source and load cables are connected to the transfer switch.

Note

The only function that will not work without doing anything beyond this point is a programmed exercise period if the exercise function is enabled. So you should at least set the time and date.

The following will guide you through initializing of the M340 transfer switch's control and changing of factory settings as desired. You may work with the following indexes and functions to check and/or modify settings.

- Index 4, Time & Date (required)
- Index 11, Installed Options
- Index 5, Time Delays
- Index 6, Normal System Setpoints
- Index 7, Emergency System Setpoints
- Index 8, Plant Exerciser Setup
- Index 9, Load Shed Settings
- Index 13, Remote Control

Setting the Time & Date

Turn the programming mode switch to LOCAL. Press "4" on the keypad and proceed as follows.

Key Entry	Display	Description
4 TUE	INDEX NUMBER 4	The following clock-calendar settings should be made when the transfer switch is first installed and energized.
MENU ↓	TIME 00:00	To set time of day, press digit keys for hours:minutes and press AM, or PM, to set correct time.
ENTER ↵	ENTRY ACCEPTED	Shows that clock has been set. Seconds will reset to zero.
MENU ↓	DATE 00--00--00	To set date, press digit keys for month, day and year. Display will show new date setting.

ENTER	**ENTRY ACCEPTED**	Shows that date has been set. Day, and week of month are automatically set when you set the date.
MENU	**DAY TUE**	Current day of week
MENU	**DAY OCCURS # 1**	The number that appears (1- 5) relates to the number of times that a given day occurs in the current month. For instance, if the current day is TUEsday, this screen example shows that the current day is the first Tuesday of the month. The control uses these numbers in the calendar exercise mode.
MENU	**14-DAY TMR WK 1**	If 14-day exerciser mode has been selected, this additional screen will show week 1 or 2 of the current 2-week (14-day) period.
RESET MENU	**ENTER INDEX 1--13**	
ENTER	**STORE SETPOINTS**	*Do this after making any switch settings. The display shows that setpoints are stored in semi-permanent memory.*

Return the programming mode switch to the OFF position.

Checking Installed Control Options

Review the accessories furnished with the transfer switch. Access Index 11 and use the *M340 Transfer Switch Control Operation & Setup* manual (TP-5569) *Off/monitor Mode* to guide you through the procedure. Enter the enabled features indicated on the following worksheet.

Installed Control Options Worksheet

Control Option	Enabled YES or NO	
INPHASE MON	_____	Inphase monitor.
PHA SEQ/LOSS	_____	Source phase sequence
NORM & EMER	_____	Normal and emergency: over and under, voltage and frequency sensing.
PLANT EXERC	_____	Programmed periodic generator set exerciser.
TD EXTENDED	_____	Extended (to 99 minutes maximum) time delay.
MAN OVERRIDE	YES	Automatic override of all possible manual functions to provide power to the load.

Time Delays

Fill out this worksheet by entering the desired time delay settings in minutes and seconds (MN:SE). Then follow the instructions in the **M340 Transfer Switch Control Operation & Setup** manual (TP-5569) *Local/programming Mode*, if you need to change any settings.

Time Delay Worksheet

Time Delay Function	Factory Setting	Normal Limit	Extended Limit	New Setting
Engine Start (TDES)	00:05	0 – 00:06	99:00*	____:____
Normal to Emergency (TDNE)	00:05	0 – 05:00	99:00	____:____
Emergency to Normal (TDEN)	00:05	0 – 30:00	99:00	____:____
Engine Cooldown (TDEC)	00:05	0 – 30:00	99:00	____:____

***Note**

It is possible to set the time delay on engine start as long as 99 minutes. But a TDES setting of longer than 6 seconds (00:06) without the battery backup option (PA-294869) installed is not recommended. If a longer delay is desired before the switch transfers the load, set the longer delay in the TDNE. Then the generator set will be running, supplying power to the timing function, and able to assume the load as soon as the timing has completed.

Normal & Emergency System Setpoints

Review load protection requirements for voltage and frequency levels needed. Then decide necessary pickup and dropout settings for transfer switch operation. Enter these necessary settings into the following worksheet. Access Index 9 and use the **M340 Transfer Switch Control Operation & Setup** manual (TP-5569) *Local/programming Mode* to guide you through setting procedures.

Setpoint Worksheet

	Setting Limits	Factory Setting Normal	Factory Setting Emergency	New Setting Normal	New Setting Emergency
Overvolt Dropout	115 – 135%	115%	115%	_____%	_____%
Overvolt Pickup	110 – 130%	110%	110%	_____%	_____%
Undervolt Pickup	75 – 100%	90%	90%	_____%	_____%
Undervolt Dropout	70 – 95%	85%	85%	_____%	_____%
Overfreq Dropout	105 – 135%	115%	115%	_____%	_____%
Overfreq Pickup	100 – 130%	110%	110%	_____%	_____%
Underfreq Pickup	85 – 100%	90%	90%	_____%	_____%
Underfreq Dropout	80 – 95%	85%	85%	_____%	_____%

Plant Exerciser Settings

There are three different plant exercisers that you can use. Only one of the following may be selected for use at any one time.

- **7-Day or weekly exercise**r provides exercise events that will happen at the same time, on the same day(s), and for the same duration every week.

- **14-Day or two week exerciser** provides exercise events that will happen at the same time, on the same day(s), and for the same duration every other week. These can be programmed to provide weekly exercise events as well.

- **Calendar exerciser** allows exercise on any two times that the day of the week occurs in a month. The calendar exerciser is a true calendar type, and it "knows" when a day of the week will occur in any given month once the date has been set in Index 4.

All three exerciser types allow up to five *exercise events* to be programmed. With two *exercise periods* possible for each event, each exerciser type allows up to ten exercise periods to be programmed.

The choice of exercising the generator set either under load or unloaded is selectable only if option KD-23-G has been installed. If you have this option installed, check the selector toggle switch's position to see whether the generator set will be exercised under load, or unloaded. The load/no-load switch is located on the inner side of the transfer switch door.

Decide which plant exerciser mode you desire and fill in the events you wish to program into the M340 transfer switch's memory. See the **M340 Transfer Switch Control Operation & Setup** manual (TP-5569) for additional exerciser-mode descriptions and procedures.

7-Day Exerciser Worksheet

Event #	Start Time		Day of Week		Run Time
Yes?	HR:MN	AM/PM	1st Day	2nd Day	HR:MN
1 _____	____:____	___	_____	_____	____:____
2 _____	____:____	___	_____	_____	____:____
3 _____	____:____	___	_____	_____	____:____
4 _____	____:____	___	_____	_____	____:____
5 _____	____:____	___	_____	_____	____:____

14-Day Exerciser Worksheet

Event #	Start Time		Day of Week		Week	Run Time
Yes?	HR:MN	AM/PM	1st Day	2nd Day	1 or 2	HR:MN
1 _____	____:____	___	_____	_____	_____	____:____
2 _____	____:____	___	_____	_____	_____	____:____
3 _____	____:____	___	_____	_____	_____	____:____
4 _____	____:____	___	_____	_____	_____	____:____
5 _____	____:____	___	_____	_____	_____	____:____

Calendar Exerciser Worksheet

Event #	Start Time		Day	Occurrence #		Run Time
Yes?	HR:MN	AM/PM	of Week	1st	2nd	HR:MN
1 _____	____:____	___	_____	_____	_____	____:____
2 _____	____:____	___	_____	_____	_____	____:____
3 _____	____:____	___	_____	_____	_____	____:____
4 _____	____:____	___	_____	_____	_____	____:____
5 _____	____:____	___	_____	_____	_____	____:____

Load Shed Settings

Review load shedding requirements for loads connected to the system. Then determine necessary times (in minutes and seconds) before and after transfer to either source that particular blocks of load are to be disconnected. Also determine the time (in minutes and seconds) that needs to elapse between shed-return operations. Lastly, decide the number of load blocks (1–9) that are to be reconnected after transfer to the emergency source. Enter these settings into the following worksheet. Access Index 9 and use the **M340 Transfer Switch Control Operation & Setup** manual (TP-5569), *Local/programming Mode* to guide you through setting procedures.

Note

Standard time ranges are shown below. If extended time delay is enabled, maximum setting is 99 minutes.

Load Shed Worksheet

		Normal	Emergency
Load Shed	Standard Range	MN:SC	MN:SC
Time Before	0 – 60 Sec.	____:____	____:____
Time After	0 – 5 Sec.	____:____	____:____
Time Sequence	0 – 5 Sec.	____:____	____:____
Loads to Return	1 – 9	___	___

Notes

Communications Settings

Select the connection type and communication access this M340 transfer switch will have by completing the following "Communication Settings Worksheet."

See the **M340 Transfer Switch Control Operation & Setup** manual (TP-5569) *Local/programming Mode, Index 13* to enter this data in to the M340 transfer switches program memory.

Communication Settings Worksheet

Do you want to control and monitor this M340 transfer switch using a personal computer? _____
Answer Yes or No. If your answer is "No," ignore the rest of this worksheet.

What access method are you planning to use? Check 1 (one).

____ **LOCAL** – direct connection of one M340 transfer switch to a PC.

____ **LAN (local area network)** – direct connection of more than one M340 transfer switch to one PC.
Indicate address number for THIS M340 transfer switch on the network:_____.
See the *M340 Transfer Switch Control Operation & Setup Manual* (TP-5569) *Local/programming Mode, Index 13*.

____ **REMOTE** – single modem-to-modem connection.
_____ **Indicate the SYS. ID** (system identification) number you wish to assign to THIS M340 transfer switch.

____ **REMLAN** – remote local area network, modem-to-modem connection. This is a LAN connected to a modem, accessed by a PC connected to a modem.
Indicate the SYS. ID (system identification) number you wish to assign to this M340 transfer switch LAN _____.
Indicate address number for THIS M340 transfer switch on the network:_____.
See the *M340 Transfer Switch Control Operation & Setup Manual* (TP-5569) *Local/programming Mode, Index 13*.

Remote Communication Requirements

The equipment required to remotely operate and monitor the M340 transfer switch varies according to the following factors:

- the connection type and access method that you plan to use,
- the physical distance between the PC (personal computer) and the M340 transfer switch unit(s), or network.

All remote PC functions are accomplished with Kohler's M340 Monitor Software program (PA-294862). The following table shows connection types and connection hardware that may be required for a personal computer, network and transfer switch.

Option KD-51-A is a factory installed RS-485 port adaptor board.

Kit PA-294866 is the same board as option KD-51-A for field installation.

Option KD-51-B is a factory installed RS-232 port adaptor board.

Kit PA-294867 is the same board as option KD-51-B for field installation.See Figures 10 to 14.

The hardware requirements are shown in the following table.

Communication Hardware Table			
Connection Type:	**for PC:**	**for Network:**	**for Transfer Switch: Accessory (Board Kit)**
Local, Single up to 50 feet	PA-294992	None	KD-51-B (PA-294867)
Local, Single up to 4000 feet	PA-294863 RS-232-to-RS-485 Converter	None	KD-51-A (PA-294866)
Local Area Network	PA-294863 RS-232-to-RS-485 Converter	None	KD-51-A (PA-294866)
Remote, Single	PA-294864 Modem to PC Kit	None	KD-51-B (PA-294867) PA-294865 Modem to Transfer Switch Kit
Remote Local Area Network	PA-294864 Modem to PC Kit	PA-294865 Modem to Transfer Switch Kit, PA-294911 RS-232-to-RS-485 Converter	KD-51-A (PA-294866)

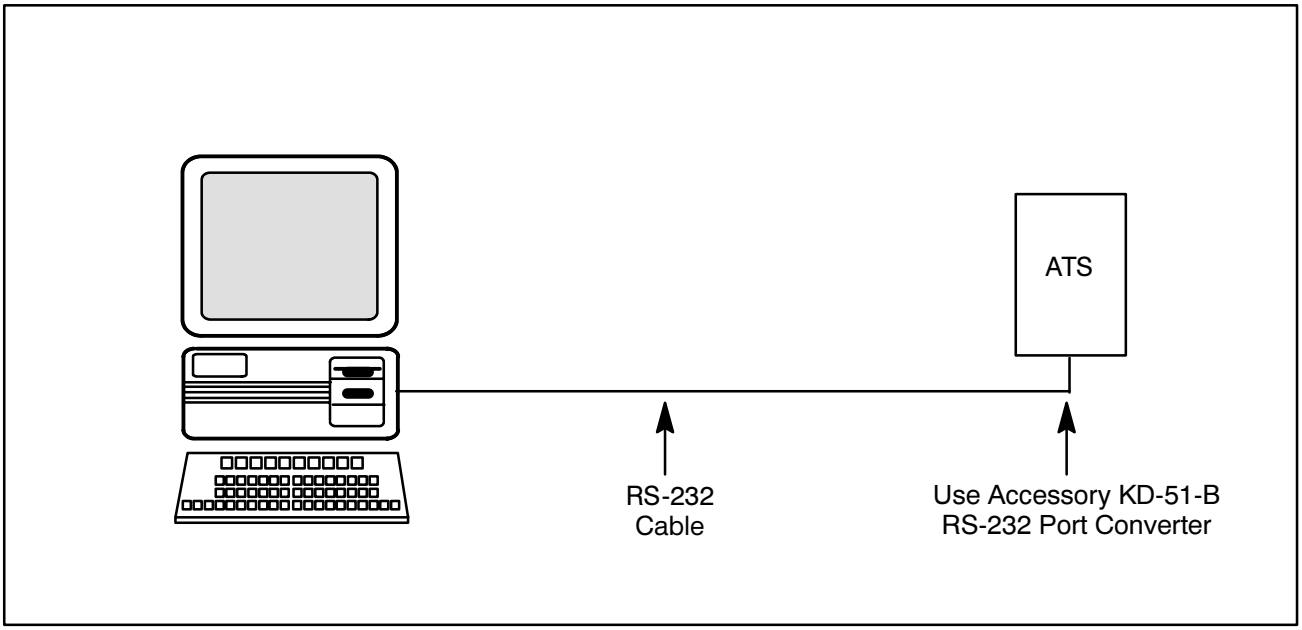


Figure 10. Local Single Connection, up to 50 feet (15.24 meters)

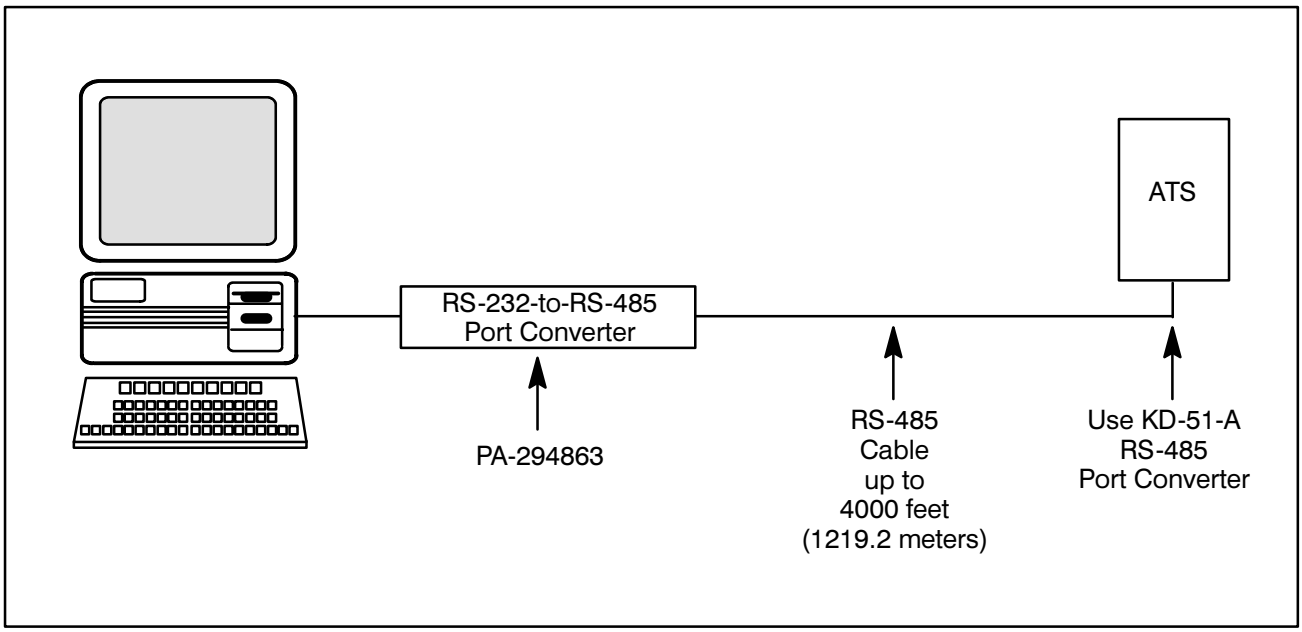


Figure 11. Local Single Connection, up to 4000 feet (15.24 to 1219.2 meters)

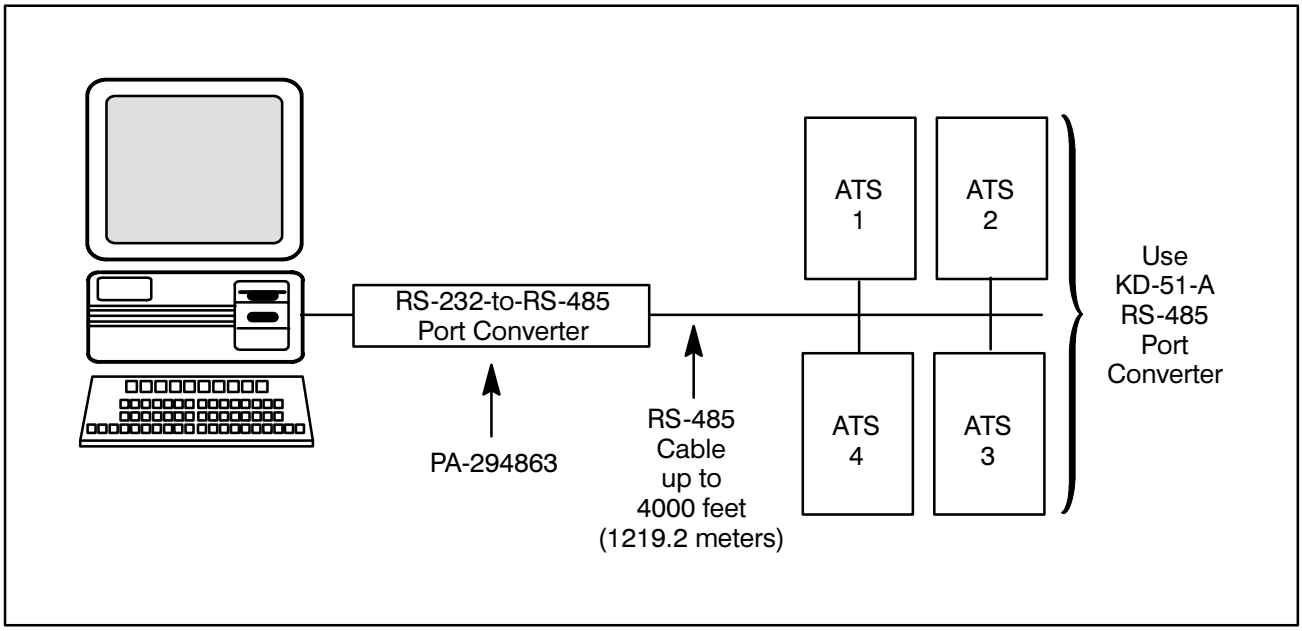


Figure 12. Local Area Network

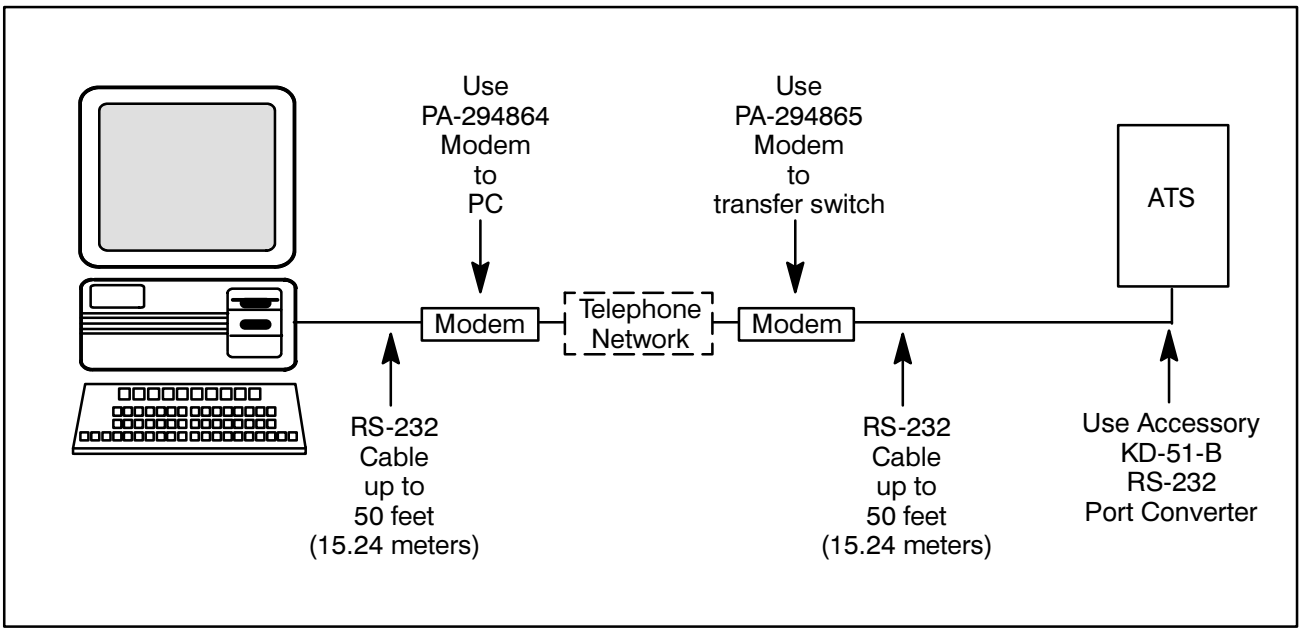


Figure 13. Remote Single Connection

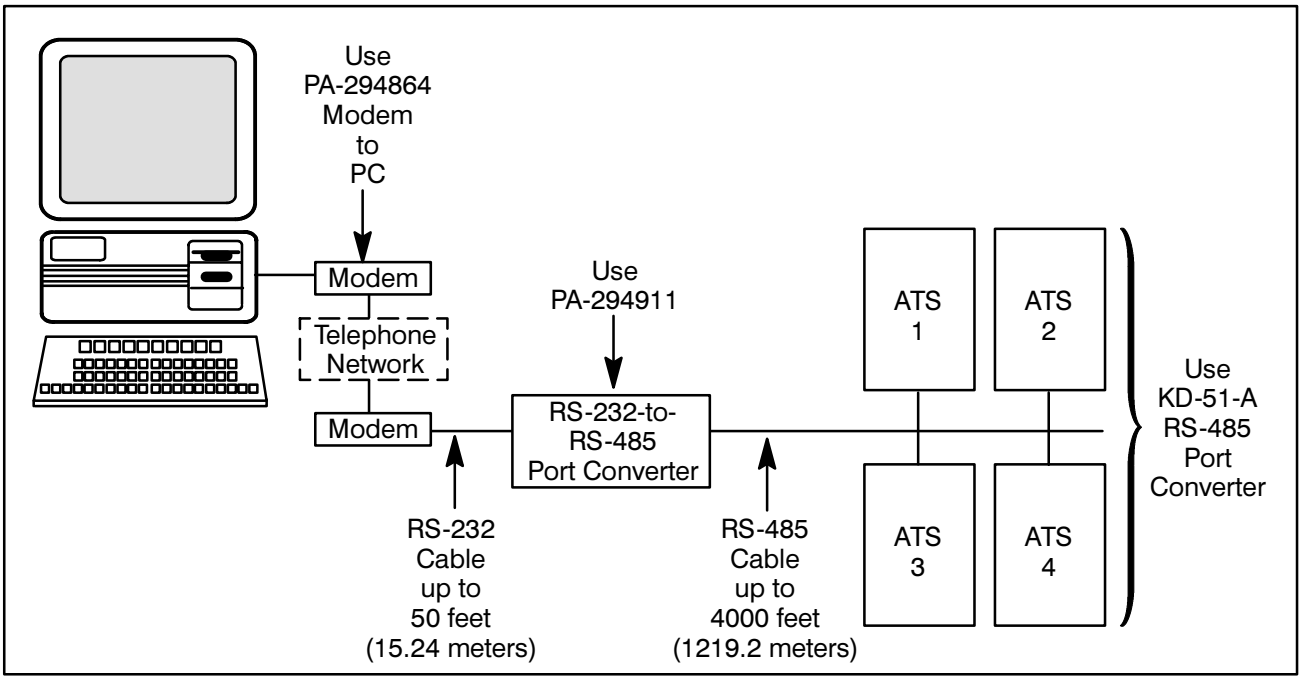


Figure 14. Remote Area Network

Wiring Diagrams & Drawings

Interconnection Diagrams

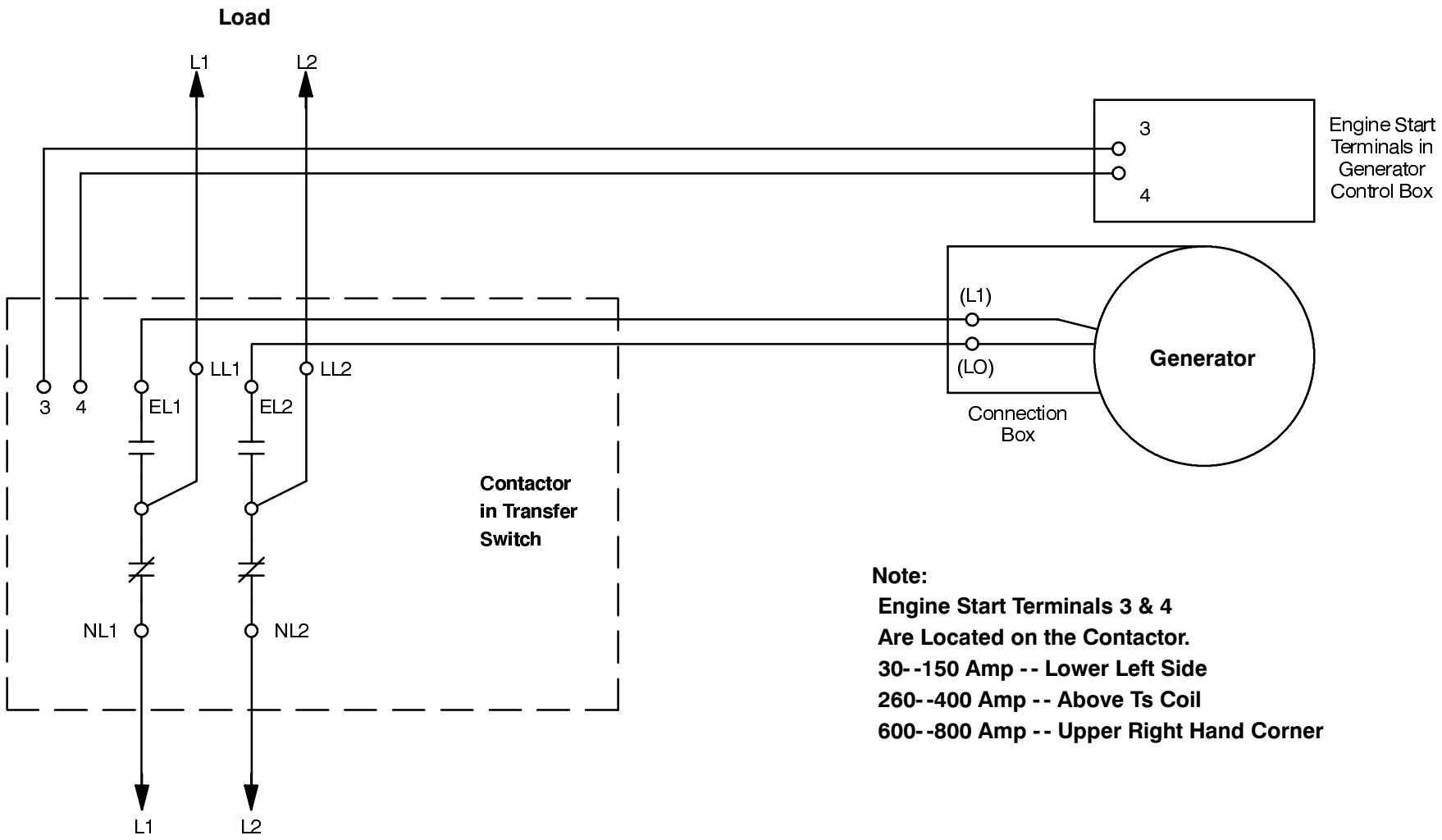
30–800-Amp,1-phase, 2-wire Interconnection Diagram	ADV-5454
30–800-Amp,1-phase, 3-wire Interconnection Diagram	ADV-5455
30–800-Amp, 3-phase 3 & 4-wire Interconnection Diagram	ADV-5456
1000–4000-Amp, 3-phase, 4-wire Interconnection Diagram	ADV-5268

Enclosure Dimensions

Enclosure Dimensions	30–150-Amp	ADV-5238 sheet 1
Enclosure Dimensions	225–400-Amp	ADV-5238 sheet 2
Enclosure Dimensions	600–800-Amp	ADV-5238 sheet 3
Enclosure Dimensions	1000–1200-Amp	ADV-5448 sheet 1
Enclosure Dimensions	1600–4000-Amp	ADV-5448 sheet 2

Contactor Wiring

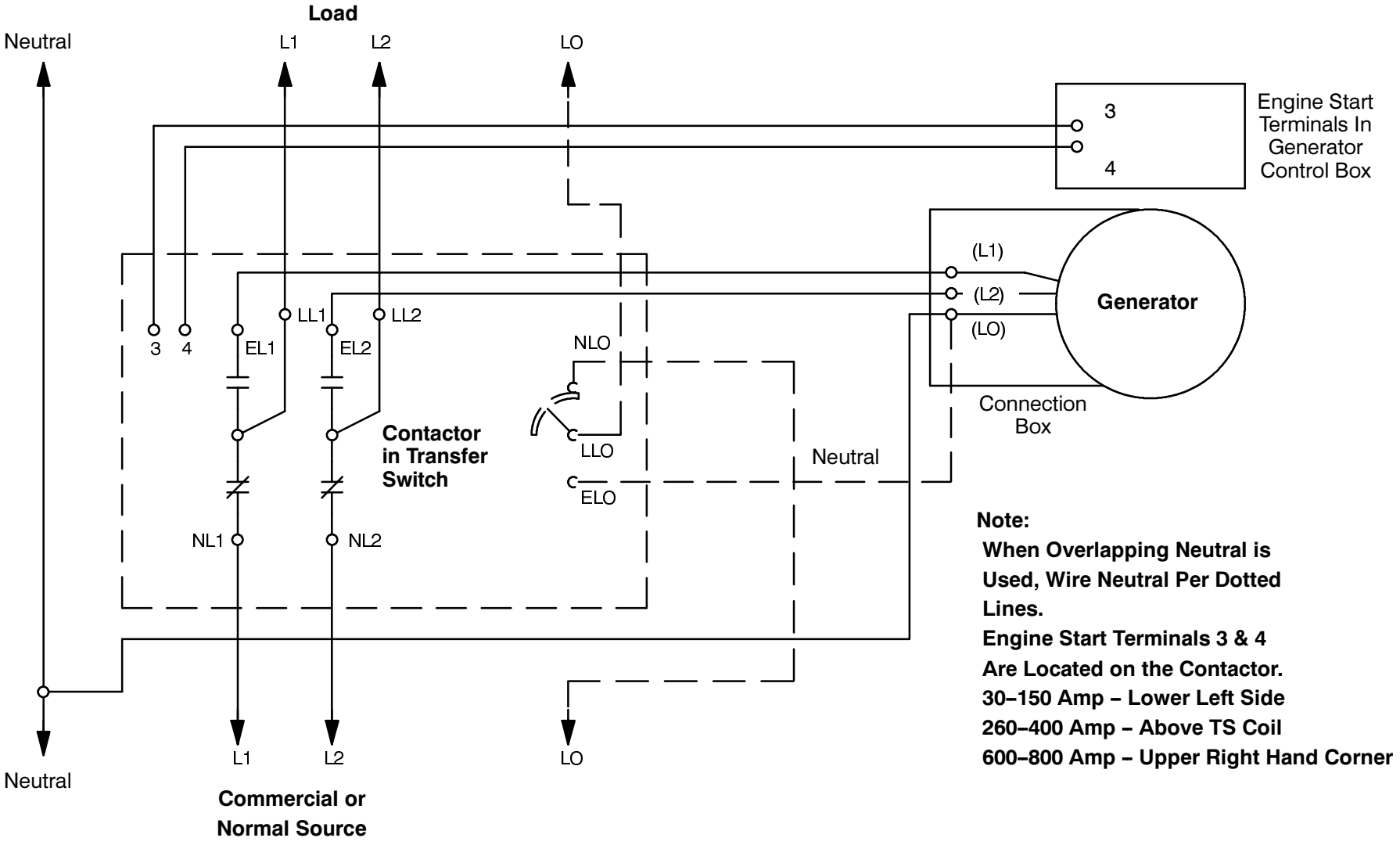
2-Pole Contactor Wiring	294859 sheet 1
3-Pole Contactor Wiring	294859 sheet 2



Note:
Engine Start Terminals 3 & 4
Are Located on the Contactor.
30--150 Amp -- Lower Left Side
260--400 Amp -- Above Ts Coil
600--800 Amp -- Upper Right Hand Corner

1-Phase, 2-Wire

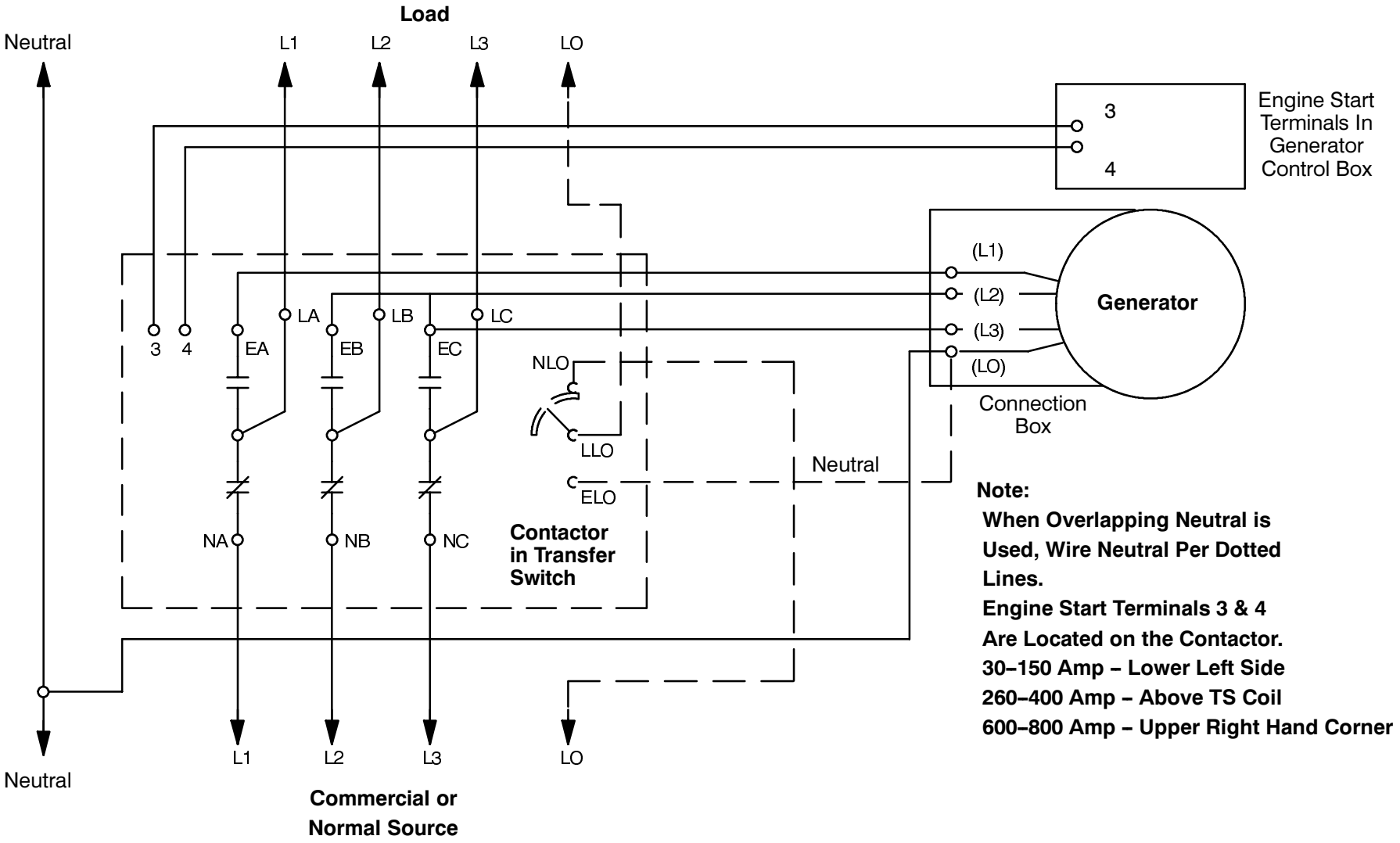
Diagram, Interconnection ADV-5454



Note:
When Overlapping Neutral is Used, Wire Neutral Per Dotted Lines.
Engine Start Terminals 3 & 4 Are Located on the Contactor.
30–150 Amp – Lower Left Side
260–400 Amp – Above TS Coil
600–800 Amp – Upper Right Hand Corner

1-Phase, 3-Wire

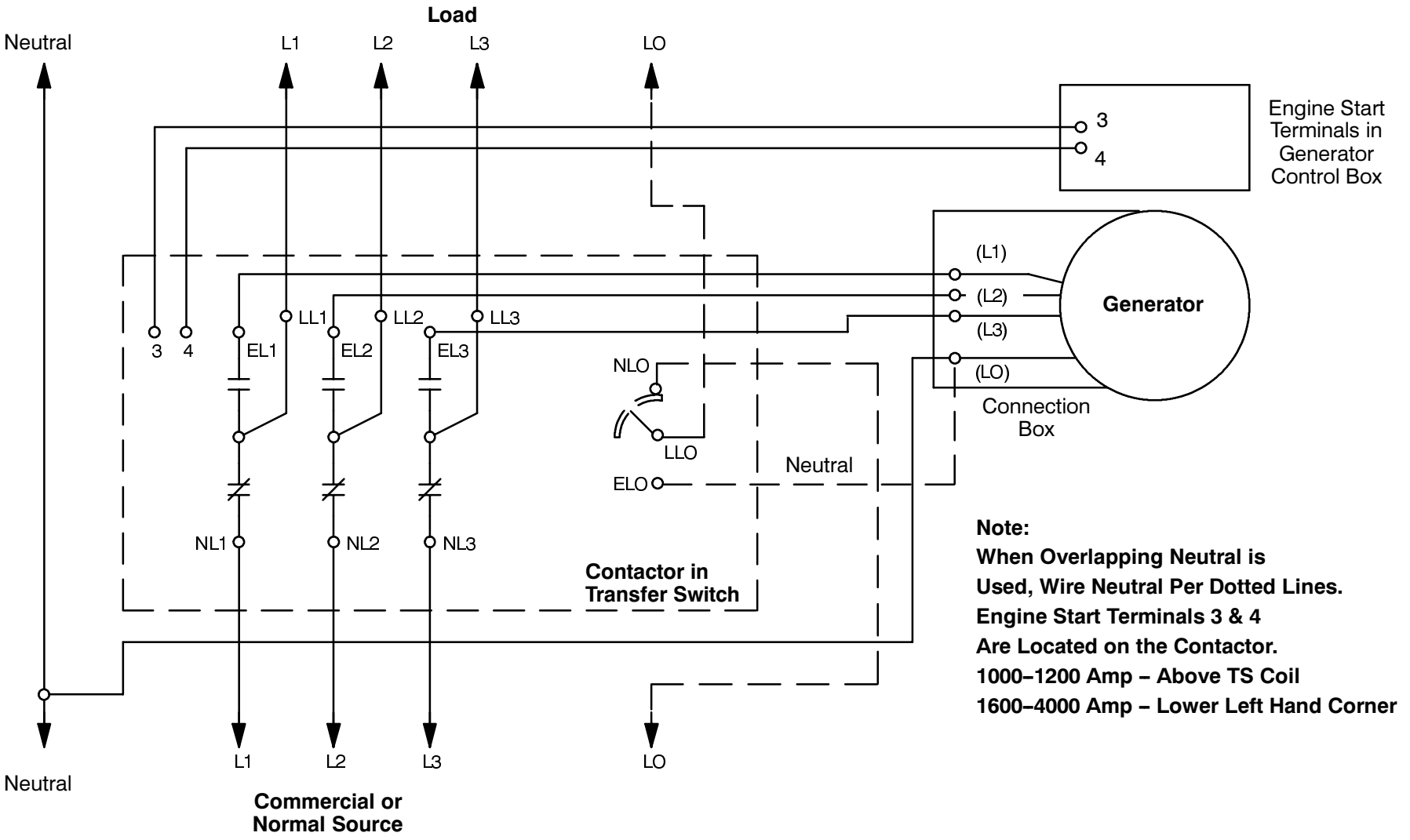
Diagram, Interconnection ADV- -5455



Note:
When Overlapping Neutral is Used, Wire Neutral Per Dotted Lines.
Engine Start Terminals 3 & 4 Are Located on the Contactor.
30–150 Amp – Lower Left Side
260–400 Amp – Above TS Coil
600–800 Amp – Upper Right Hand Corner

3-Phase, 3 & 4-Wire

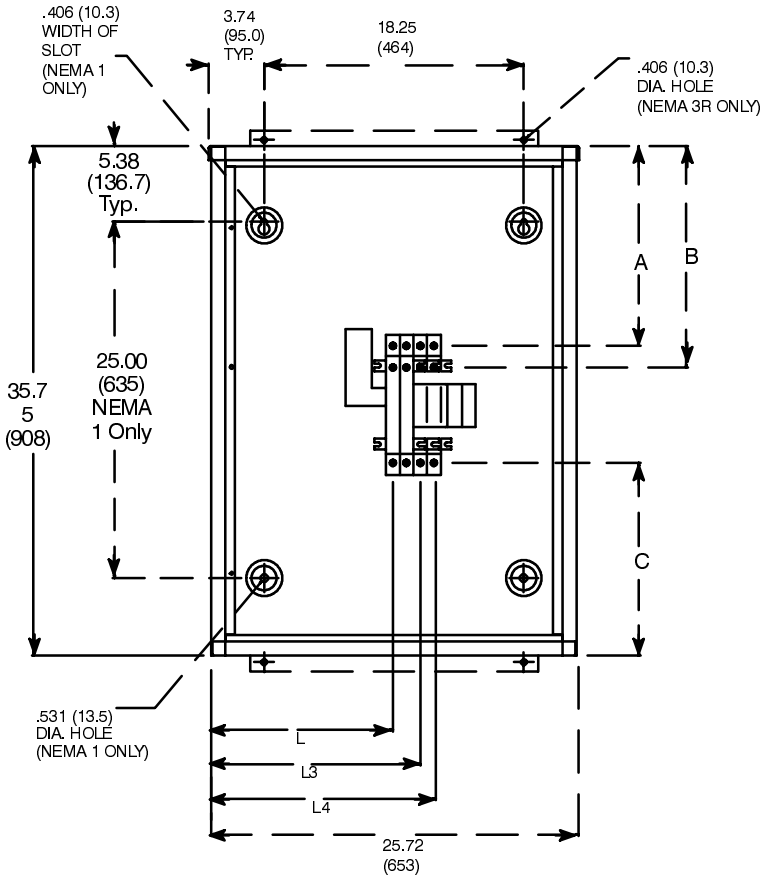
Diagram, Interconnection ADV- -5456

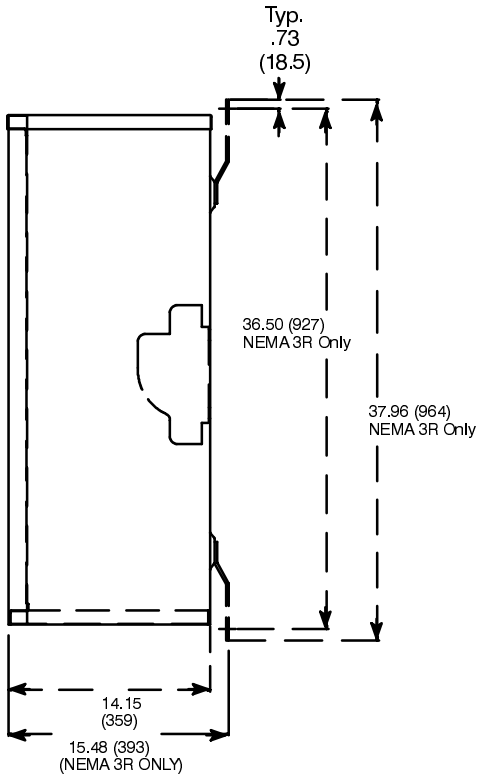


Note:
When Overlapping Neutral is Used, Wire Neutral Per Dotted Lines.
Engine Start Terminals 3 & 4 Are Located on the Contactor.
1000–1200 Amp – Above TS Coil
1600–4000 Amp – Lower Left Hand Corner

1000–4000-Amp
3-Phase, 3 & 4-Wire

Diagram, Interconnection ADV–5268





RATING	A	B	C	L	L3	L4
30,70,104 AMP	14.38 (365)	15.50 (394)	14.50 (368)	11.00 (279)	12.46 (316)	13.19 (335)
150 AMP	14.25 (362)	15.88 (403)	13.38 (340)	12.30 (312)	14.22 (361)	15.18 (386)

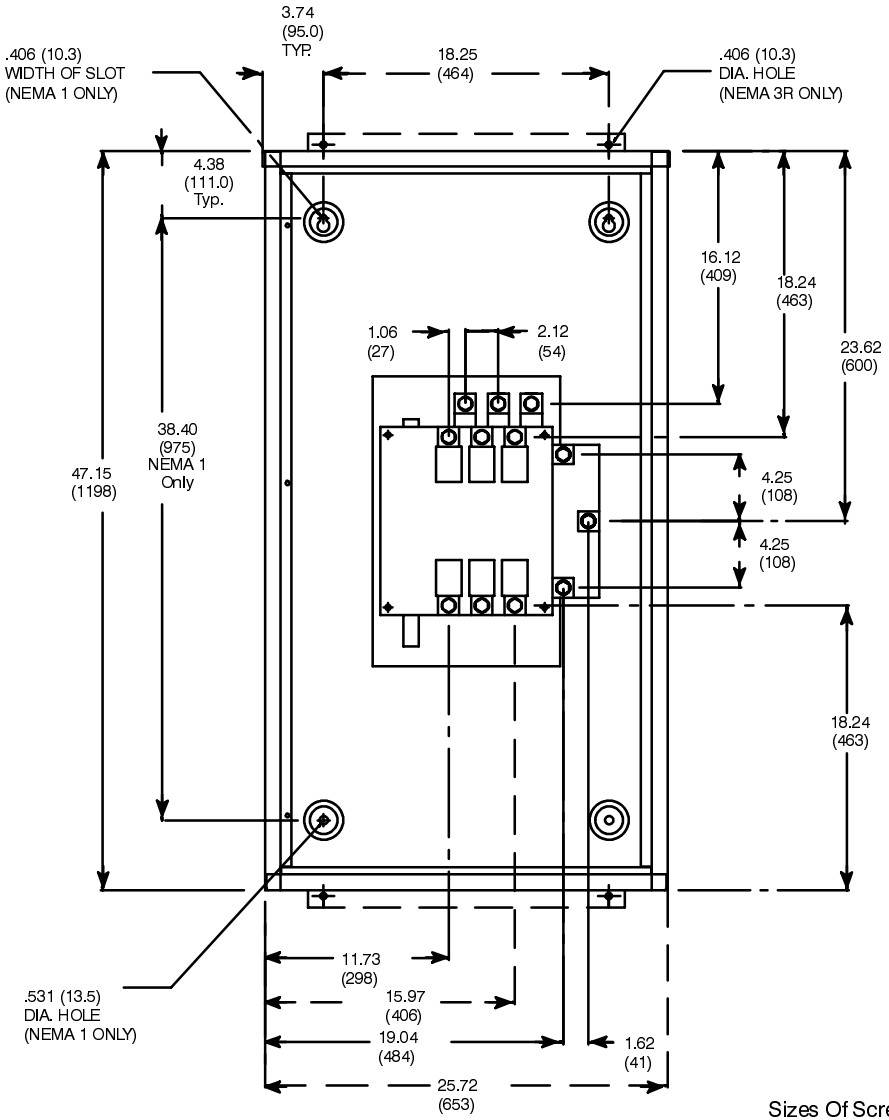
Sizes Of Screw Type Terminals
For External Power Connections

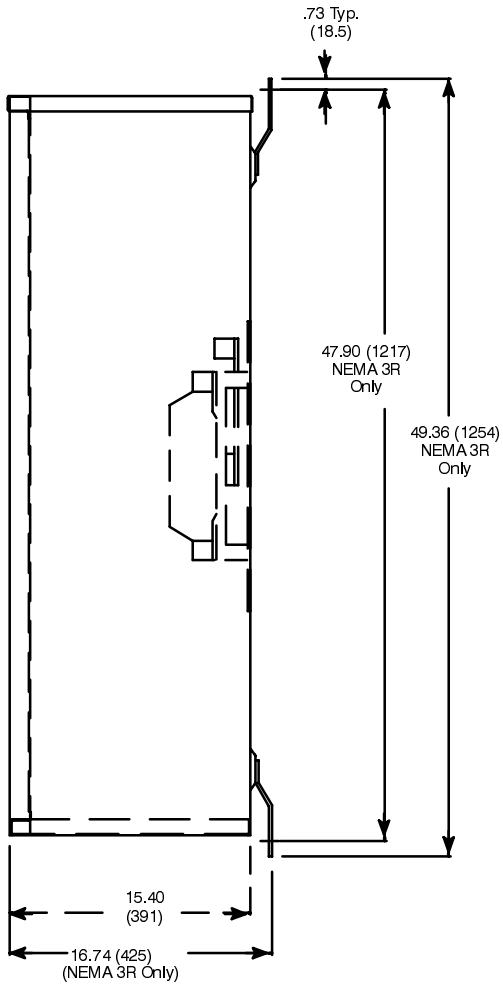
Switch Rating (AMPS)	Range Of AL--CU Wire Size
30	One #14 To #6 AWG
70	One #14 To 1/0 AWG
104	One #14 To 2/0 AWG
150	One #8 To 3/0 AWG

Notes:
1. Numbers In Parentheses Are Millimeters
2. Dimensions Are For Reference Only.

Enclosure Dimensions
30 - - 150-Amp

ADV- -5238a



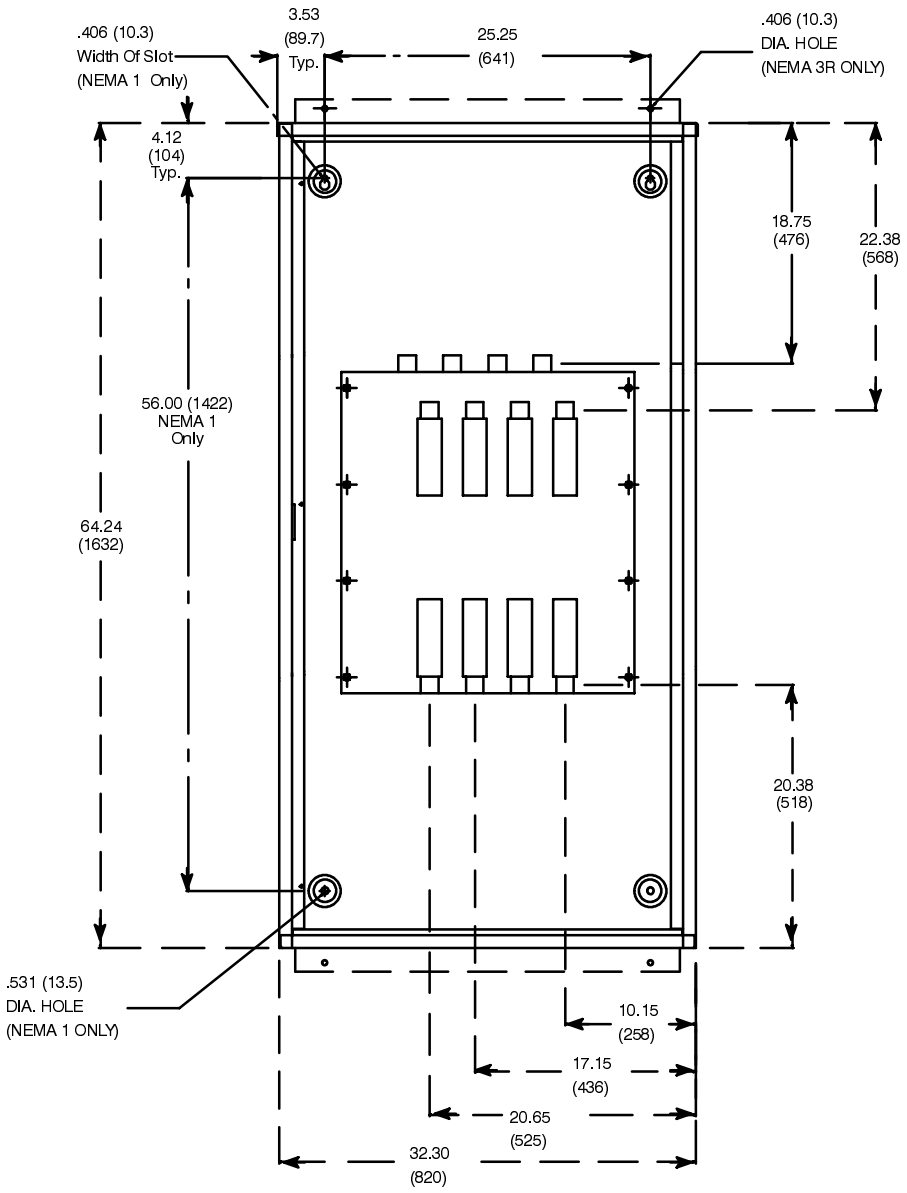


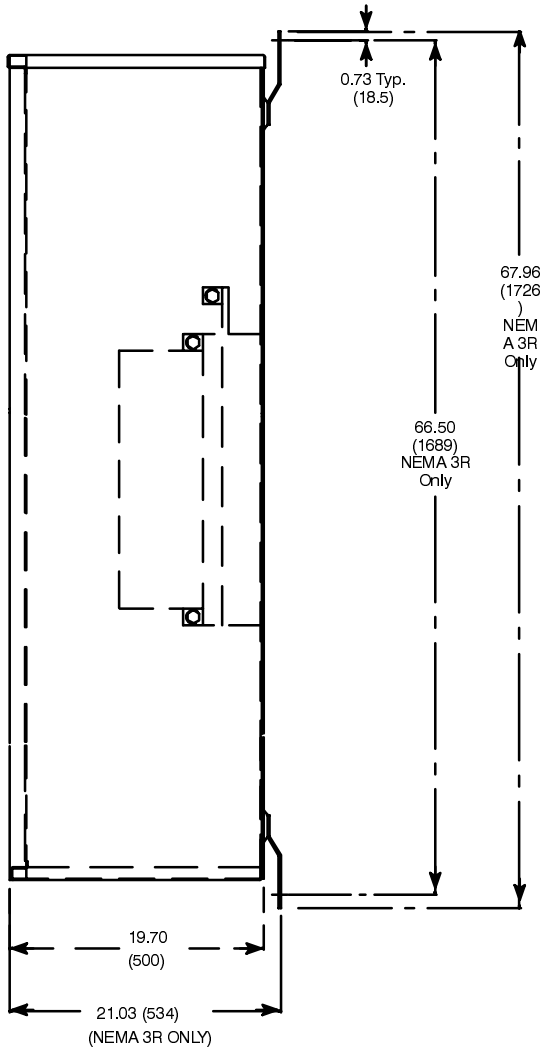
Sizes Of Screw Type Terminal
For External Power Connections

Switch Rating (AMPS)	Range Of Al--Cu Wire Size
225- -400	Two #1/0 AWG TO 250 MCM Or One #4 AWG TO 600 MCM

Note:
1. Numbers In Parentheses Are Millimeters.
2. Dimensions Are For Reference Only.

Enclosure Dimensions
NEMA 1
225 - - 400-Amp
ADV-5238b





Size Of Screw Type Terminal
For External Power Connections

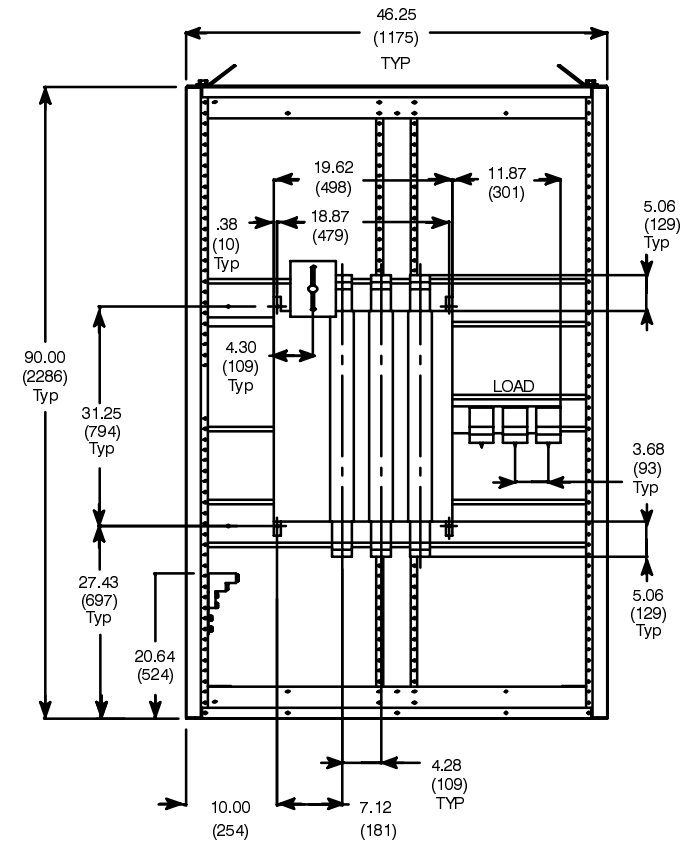
Switch Rating (Amps)	Range Of Al--cu Wire Size
600 & 800	Three #2 Awg To 600 Mcm

Notes:

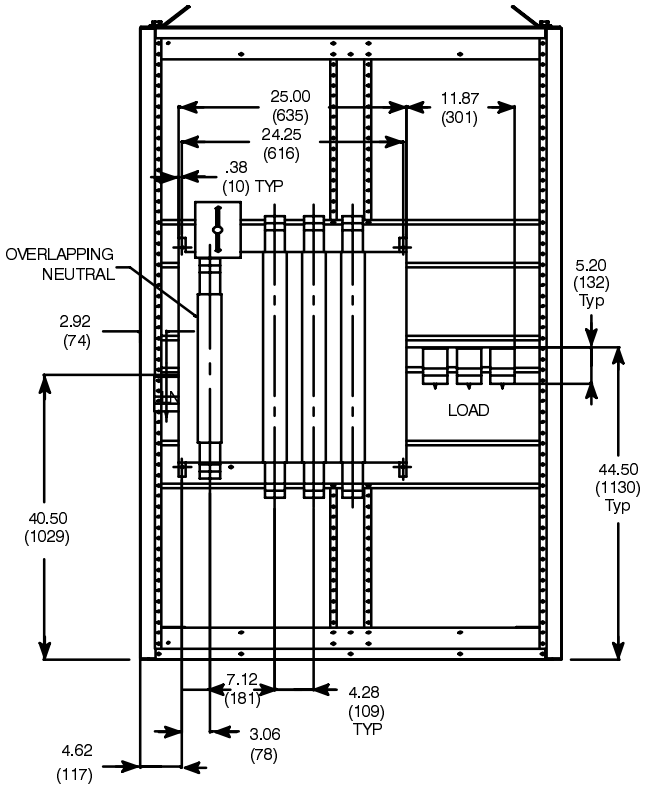
1. Numbers In Parentheses Are Millimeters.
2. Dimensions Are For Reference Only.

600--800 Amp Transfer Switch Enclosure Mounting

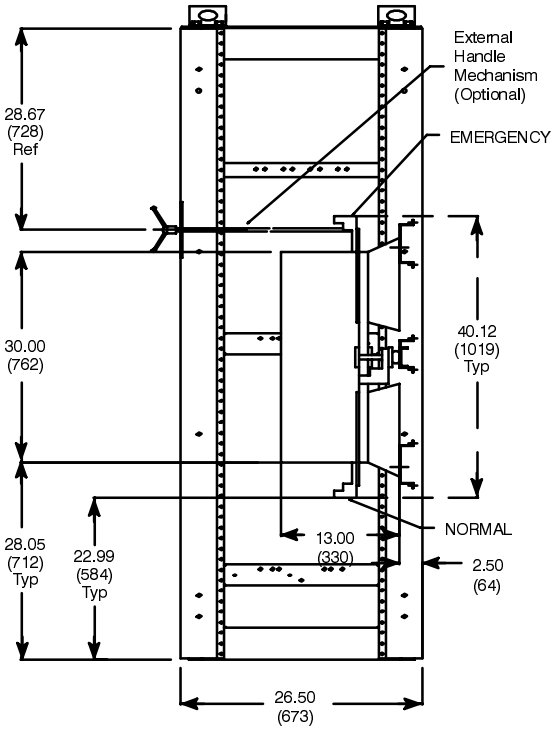
ADV-5238c

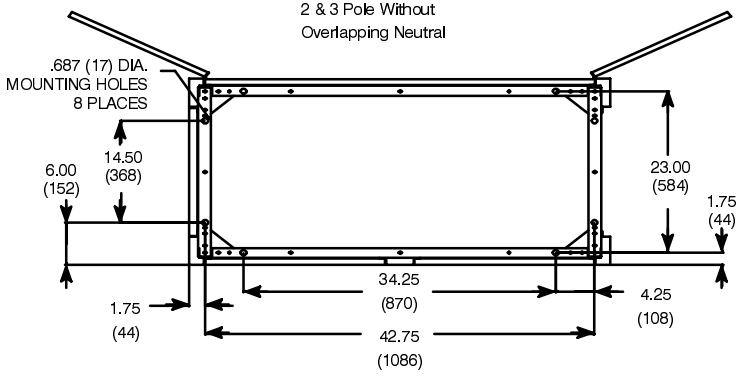


2 & 3 Pole Without
Overlapping Neutral



2 & 3 Pole With
Overlapping Neutral





Bottom View

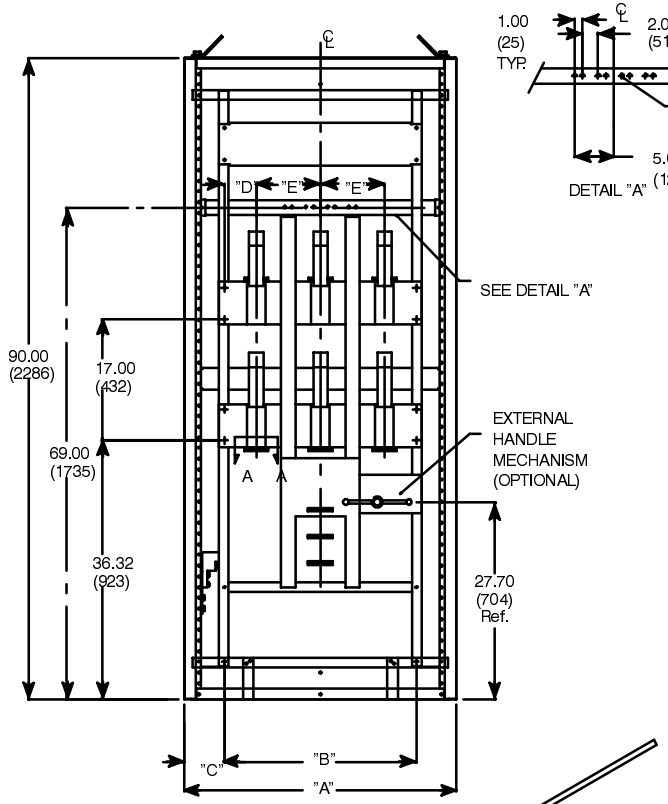
NOTES:
NEMA Type 1 - - General Purpose, Indoor, Floor Supported.

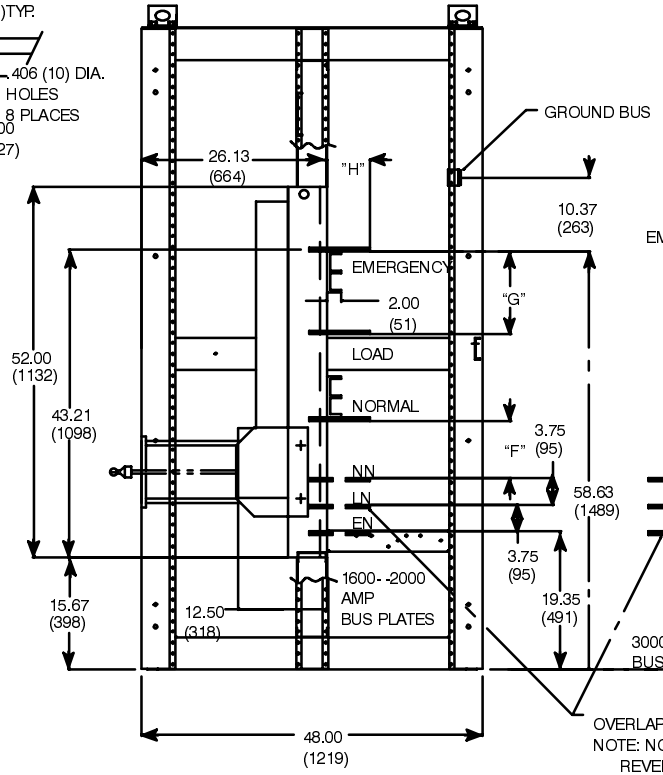
1. Free Standing, Frame Construction.
2. Removable Doors, Key Locking Handle. Two Doors With Single Center Latch.
3. Sides, Top, And Back Removable. Open Bottom.
4. Provisions For Lifting.
5. Enclosures Constructed In Accordance With UL Standard 508 (Ansi C33.76- - 1971) As Referenced In UL Standard 1008.
6. Use Operator's Manual. Refer To This Publication Prior To Installation And Operation Of The Switch.

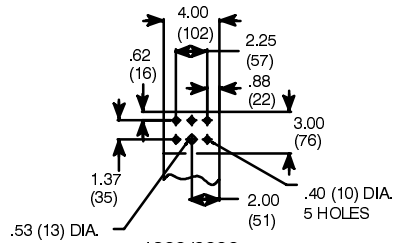
Dimensions In ( ) Are Millimeter Equivalents.
Size Of UL Listed Solderless Screw Type Terminals For External Power Connections. Four # 2 AWG To 600 MCM AL- - CU Wire.

1000 - - 1200-Amp
2 & 3 Pole With
Overlapping Neutral

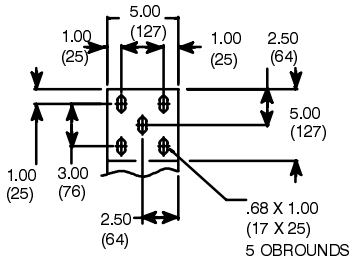
ADV-5448a



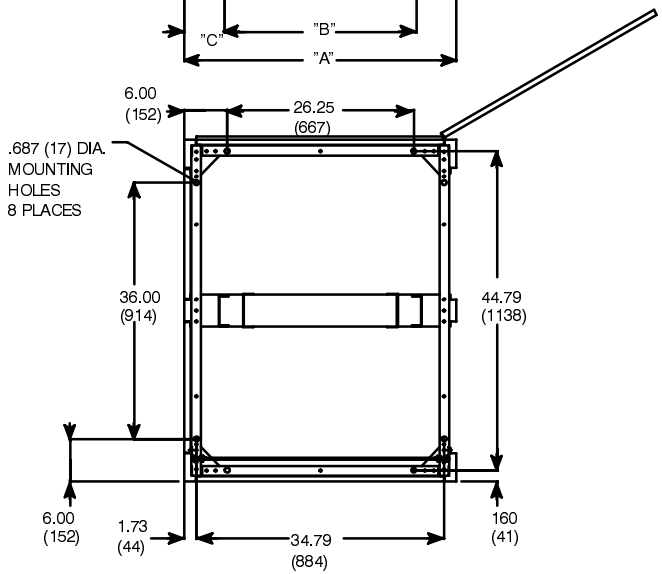




1600/2000
AMP

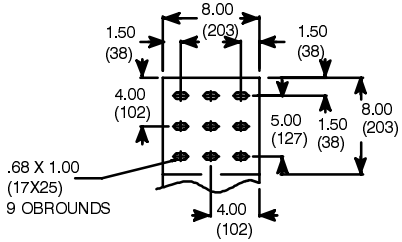


3000 AMP



AMP SIZE	DIMENSIONS							
	A	B	C	D	E	F	G	H
1600 & 2000	38.25 (972)	27.00 (686)	5.63 (143)	4.50 (114)	9.00 (229)	7.65 (194)	11.62 (295)	6.00 (152)
3000	48.25 (1226)	30.00 (762)	9.12 (232)	5.00 (127)	10.00 (254)	7.15 (182)	1175 (298)	10.00 (254)
4000	48.25 (1226)	39.00 (991)	4.62 (117)	6.50 (165)	13.00 (330)	7.15 (182)	1175 (298)	13.00 (330)

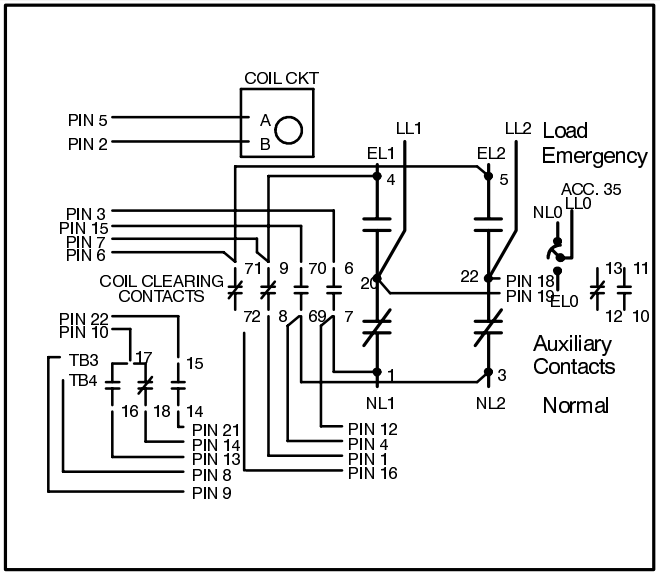
NOTES:
NEMA Type 1 - - General Purpose, Indoor, Floor Supported
1. Free Standing, Frame Construction.
2. Removable Doors, Key Locking Handle. Single Door Hinged On Right With Single Center Latch For 1600- -2000 Amps.
3. Sides, Top, And Back Removable. Open Bottom.
4. Provisions For Lifting.
5. Enclosures Constructed In Accordance With UL Standard 508 (ANSI C33.76- -1971) As Referenced In UL Standard 1008.
6. The Transfer Switch Unit Is Mounted On The Inside Back Surface And The Accessory Control Panel Mounted On The Inside Door Surface. Both Units Are Terminated By A Quick Disconnect Plug Located On The Inside Of The Door.
7. Use Operator's Manual. Refer To This Publication Prior To Installation And Operation Of The Switch.
Dimensions In ( ) Are Millimeter Equivalents.



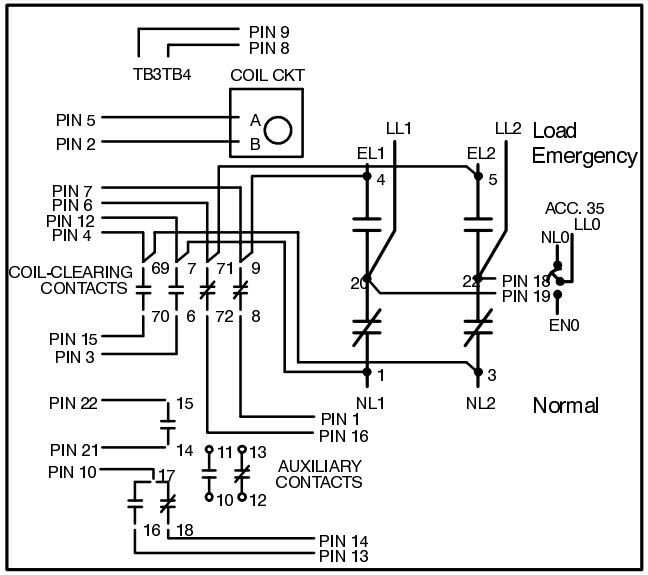
4000 AMP

VIEW A - - A
3 EXPLODED VIEWS

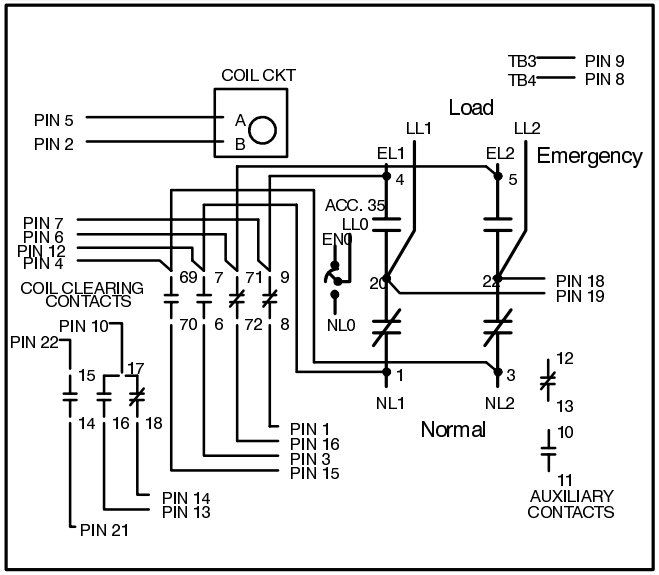
Enclosure Dimensions
1600- -4000 Amp
ADV-5448,
sheet 2 of 2



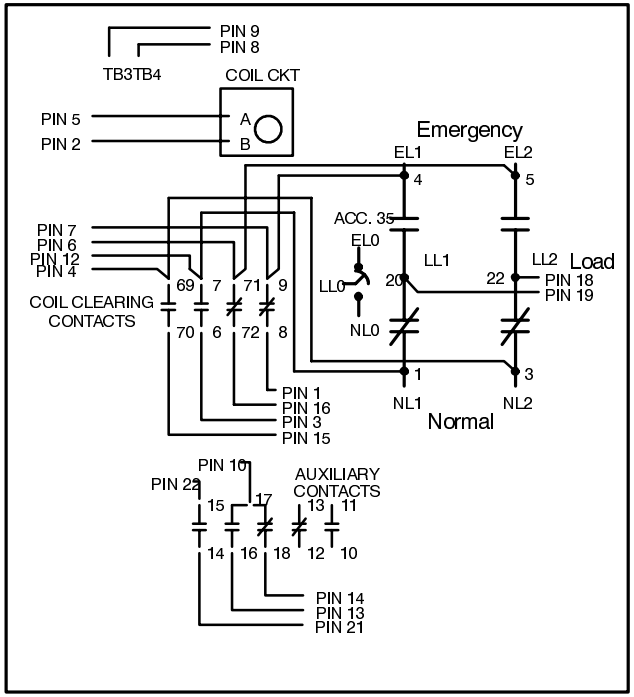
30-70-104- & 150-Amp



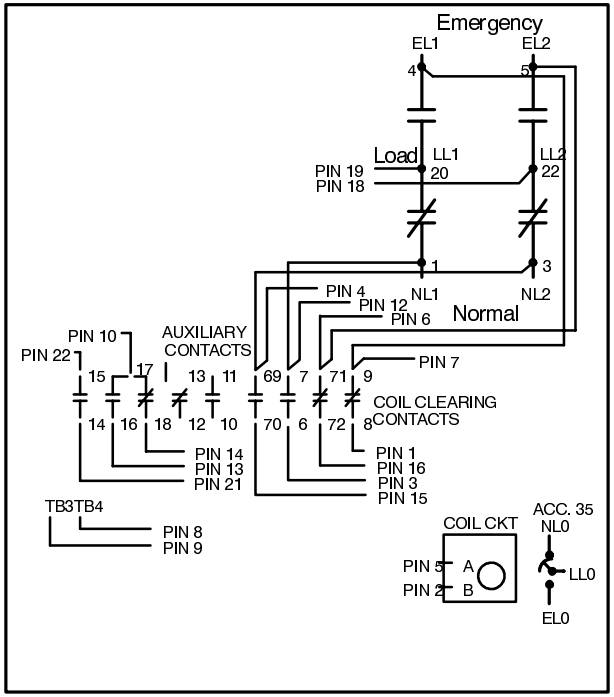
225-260-& 400-Amp



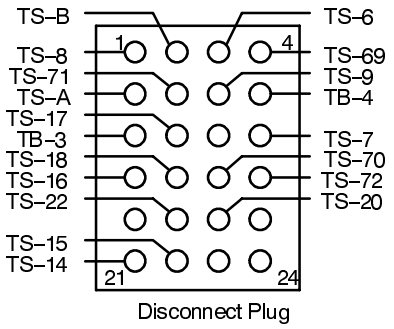
600-& 800-Amp



1000-& 1200-Amp



1600-2000- 2500-3000, 4000-Amp

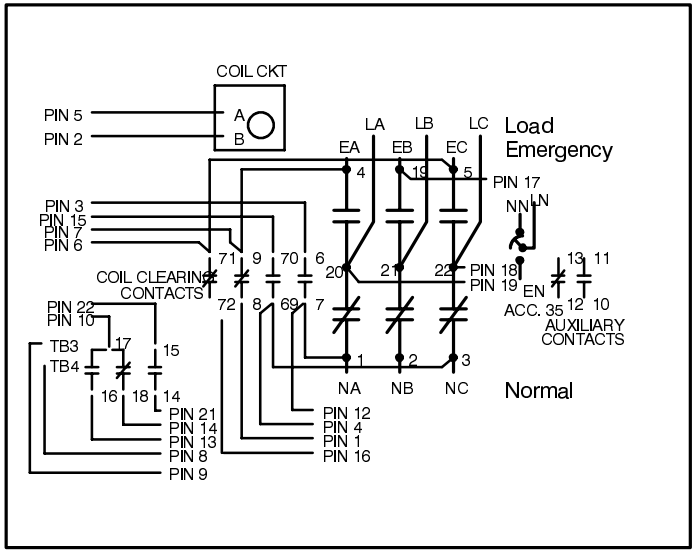


Disconnect Plug

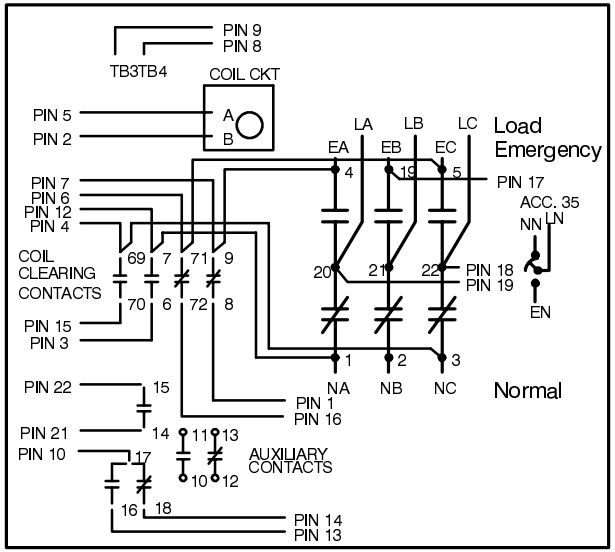
Notes:

Switch Shown in Normal Position
Stranded #20 Wires on 30–150a
And Stranded #16 Awg on 225–4000a
TB3 & TB4 are Engine Start Terminals

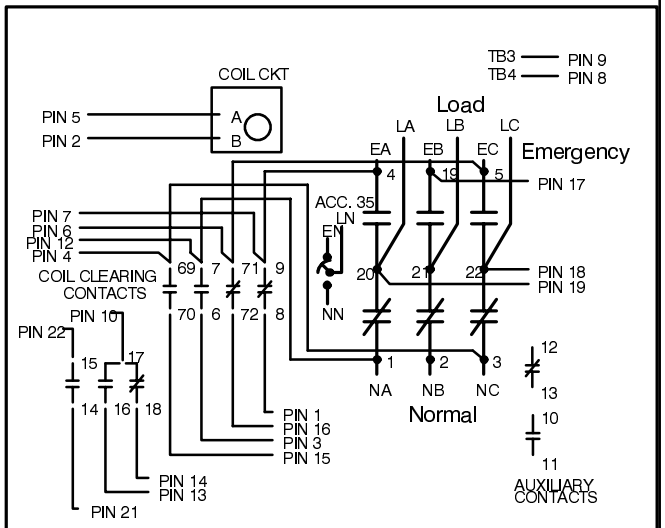
2-Pole Contactor Wiring
294859, sheet 1 of 2



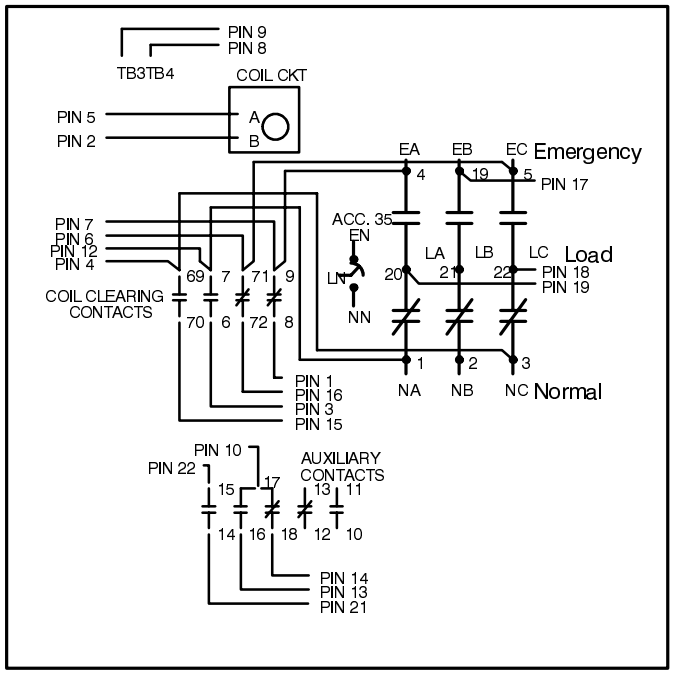
30-70-104-& 150-Amp



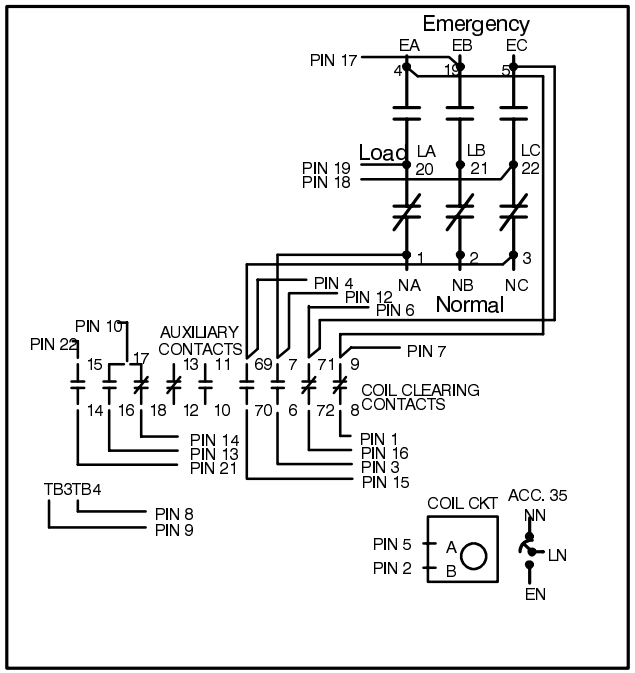
225-260-& 400-Amp



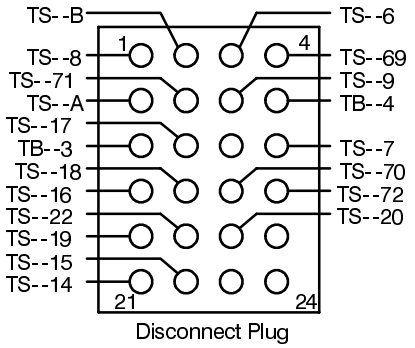
600-& 800-Amp



1000-& 1200-Amp



1600-2000-2500-3000-4000-Amp



Disconnect Plug

Notes:

Switch Shown In Normal Position
Stranded #20 Wires on 30-150
and Stranded #16 AWG on 225-4000A
TB3 & TB4 are Engine Start Terminals

3-Pole Contactor Wiring
294859, sheet 2 of 2

KOHLER®
POWER SYSTEMS

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Phone 920-565-3381, Web site www.kohlergenerators.com
Fax 920-459-1646 (U.S.A. Sales), Fax 920-459-1614 (International)
For the nearest sales and service outlet in U.S.A. and Canada
Phone 1-800-544-2444

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TP-5460 3/92b

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