GENERAC®
POWER SYSTEMS, INC.

The "Logic" Type Intelligence System

PART 11
THE "LOGIC" TYPE INTELLIGENCE SYSTEM

STANDBY ELECTRIC POWER SYSTEMS
All Series

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NOTES

Section 11.1

SYSTEM FAMILIARIZATION

General

The "Logic" type intelligence system consists of three (3) solid state circuit boards called (a) a utility voltage sensor board, (b) a system control board, and (c) an exercise board. All three circuit boards are housed in a circuit board compartment located in the transfer switch enclosure door.

This system differs from the CPU type intelligence system in several ways. The most obvious difference is that the "Logic" system utilizes three (3) circuit boards, including an exercise circuit board.

Another difference is that the "Logic" system incorporates a system control circuit board that is fully programmable.

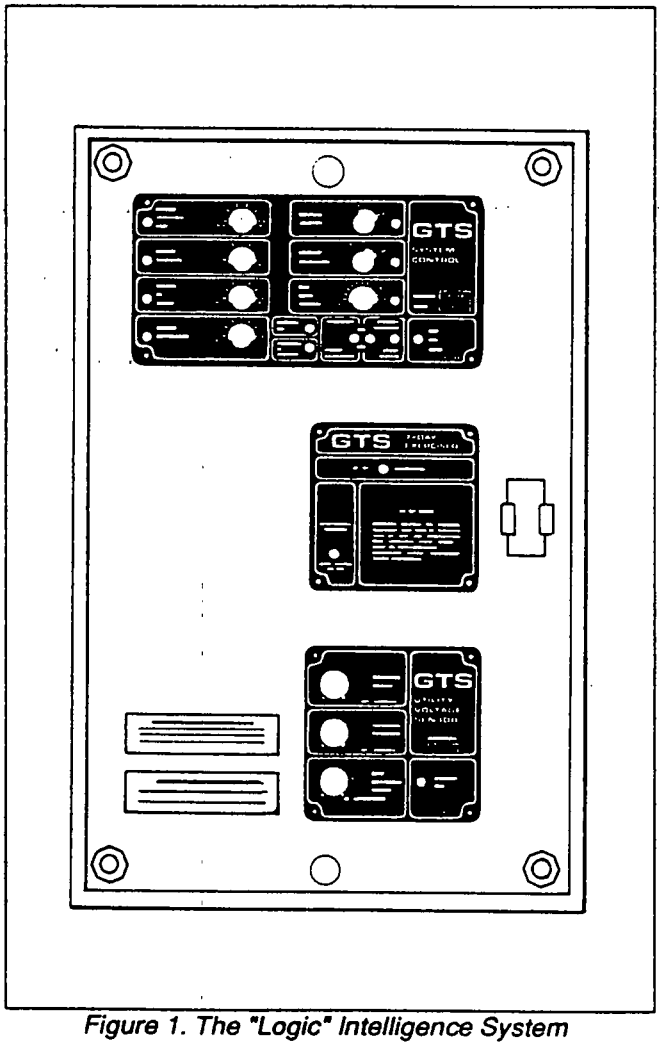


Figure 1. The "Logic" Intelligence System

What the System Does

The utility voltage sensor board constantly monitors "Utility" power source voltage. Should that source voltage drop below a preset level, the utility voltage sensor board will close the 2-wire start circuit (wires 178 and 183). On closure of that circuit, a DC control/latch-crank circuit board (housed in the generator console) will crank and start the engine. The utility voltage sensor board will also open a "utility loss sensor circuit" to the system control board, to "tell" the system control board that "Utility" power has dropped low.

With the generator engine running and "Standby" source power available to the transfer switch, the system control circuit board will be turned on. That circuit board incorporates sensors and timers for the control of automatic operation as follows:

- A "Standby On" lamp (LED) on the circuit board turns on, to indicate that (a) the generator is running, (b) the system control board is powered, and (c) 12 volts DC power is available to the transfer relay (and to a "time delay neutral relay, if so equipped). Because circuit board action holds the grounded side of the relay circuits open, the relays do not energize at this time.
- An "engine minimum run timer" on the circuit board starts timing (an LED comes on), to establish the minimum length of time the engine must run before it can be shut down. This prevents shutdown of a cold engine.
- An "engine warmup timer" starts timing and its lamp (LED) turns on at the same time the "minimum run timer" comes on. The timer establishes a preset engine warmup period before the load can be transferred to the "Standby" source.
- When generator AC output voltage and frequency have reached the settings of a "standby voltage sensor" and a "standby frequency sensor", these two lamps (LED's) turn on.
- When the "engine warmup timer" has timed out and when standby voltage and frequency have reached preset levels, system control board action will close the grounded side of the transfer relay (and the time delay neutral relay, if so equipped) to ground. These relays will now energize.
- As the transfer relay energizes, its normally-open contacts close and "Standby" source voltage trips the main contacts to "Neutral".

What the System Does (Continued)

NOTE: If so equipped, as the time delay neutral relay energizes its normally-closed contacts open to open the transfer mechanism's "transfer to Standby" circuit. The main contacts will remain at "Neutral" as long as the relay remains energized. A "time delay neutral timer" on the circuit board establishes the length of time the time delay neutral relay will remain energized and thus the length of time the main contacts remain at "Neutral".

- Transfer to "Standby" occurs when the transfer relay energizes and when the time delay neutral relay de-energizes.

The utility voltage sensor board continues to seek an acceptable preset "Utility" source voltage. When that source voltage is restored above the preset level of a "voltage pickup sensor", utility voltage sensor board action closes the "utility loss sensor circuit". Closure of that circuit to ground "tells" the system control board that "Utility" voltage has been restored. An "engine cool-down timer" on the system control board then starts timing and, when it has timed out, system control board action opens the transfer relay circuit to ground and (if so equipped) closes the time delay neutral relay circuit to ground.

The transfer relay de-energizes, its normally-closed contacts close, and "Utility" source power trips the main contacts to "Neutral". When a "time delay neutral timer" on the system control board has timed out, circuit board action will open the time delay neutral relay circuit to ground. That relay will then de-energize and the main contacts will complete the transfer action back to the "Utility" power supply.

Following retransfer, an "engine cooldown timer" on the system control board will start timing. When that timer has timed out, circuit board action will open the 2-wire start circuit. Generator engine shutdown will then occur.

The 7-Day Exercise Feature

The 7-day exercise circuit board is powered by transformer reduced (step-down) voltage from the transfer mechanism's LOAD terminal lugs. This circuit board establishes an automatic startup and "exercise" cycle that occurs once every seven (7) days, on a day and at a time of day selected.

Loss of operating voltage will normally result in loss of timer count and the day and time of exercise would become scrambled. To prevent this, a 9 volts transistor battery has been provided to supply minimum operating power during the time the main contacts are at "Neutral" during as transfer action. The battery does not prevent loss of timing count during periods at "Neutral", but will prevent the preset day and time of exercise from becoming scrambled.

NOTE: A deluxe programmable exercise circuit board is also available. See Part 12, "Transfer Switch Options".

Section 11.2
AUTOMATIC OPERATING SEQUENCES

SEQ.	CIRCUIT BOARD	TIMER/SENSOR	ACTION
1	Utility voltage sensor	Voltage dropout sensor	"Utility" source voltage drops below 70-95% of the voltage pickup sensor setting (factory set to about 80%).
2	Utility voltage sensor	Line interrupt delay timer	Line interrupt delay timer times for 0.1 to 10 seconds (factory setting is about 5 seconds).
3	Utility voltage sensor		Circuit board action closes 2-wire start circuit, generator cranks and starts.
4	System control System control System control	"Standby On" lamp ON Engine minimum run timer Engine warmup timer	Lamp ON indicates generator is running and system control board is powered. Timer can be set for 5 to 30 minutes, is factory set for 10 minutes. Engine cannot be shut down in automatic mode until timer has timed out. Timer can be set for 5 seconds to 30 minutes, or turned off. Transfer to "Standby" cannot occur until timer has finished timing.
5	System control System control	Standby voltage sensor Standby frequency sensor	Can be set to 70-90% of generator rated voltage. Can be set for 80-90% of rated generator frequency. Transfer to "Standby" cannot occur until generator AC voltage and frequency have reached the setting of these sensors.
6	System control	"Transfer to Standby" LED turns ON Time delay neutral timer's LED turns ON (if so equipped)	Transfer relay is energized and transfer to "Standby" occurs. Main contacts trip to "Neutral" and remain at "Neutral" for 0.1 to 10 seconds (adjustable). When time delay neutral timer has timed out, transfer to "Standby" occurs.
7			Loads are powered by "Standby" power supply.
8	Utility voltage sensor	Voltage pickup sensor	Sensor is adjustable from 70-95% of rated "Utility" voltage. On restoration of "Utility" voltage above the sensor setting, circuit board closes a "utility loss sensor circuit" to the system control board and Sequence 8 begins.
9	System control	Return to "Utility" timer	Return to "Utility" timer is adjustable from 1-30 minutes.
10	System control	Return to "Utility" timer Time delay neutral timer's LED turns ON (if so equipped)	When timer times out, circuit board action de-energizes the transfer relay and re-transfer back to "Utility" occurs. When return to "Utility" timer times out, circuit board action will energize time delay neutral relay. That relay will stay energized for 0.1-10 seconds to hold main contacts at "Neutral" for the pre-selected time length.
11	System control	Engine cooldown timer	Following retransfer, engine cooldown timer turns on. When timer finishes timing, generator shutdown will occur (providing the "engine minimum run timer" has also finished timing).
12	Utility voltage sensor	Voltage dropout sensor	Circuit board continues to monitor "Utility" power source voltage.

Section 11.3

UTILITY VOLTAGE SENSOR CIRCUIT BOARD

The utility voltage sensor circuit board is discussed in Part 10, Section 10.3. Also see Part 8, Section 8.8, "Multi-Voltage Transfer Switches".

Section 11.4

SYSTEM CONTROL CIRCUIT BOARD

General

The system control circuit board is powered by transformer reduced (step-down) "Standby" source voltage. The board is "programmable", in that its sensors and timers are adjustable (unlike the CPU board which has "fixed" sensors and timers). The circuit board mounts sensor and timer lamps (LED's) which turn on to indicate sensor/timer operation. Thus, automatic operation can be monitored by simply observing the LED's.

A system control board cover (Figure 1) is mounted to the circuit board by screws and separated from the board by "standoffs". A second set of screws and standoffs retain the board to the transfer switch enclosure. Holes in the circuit board cover permit the sensor/timer LED's to be seen.

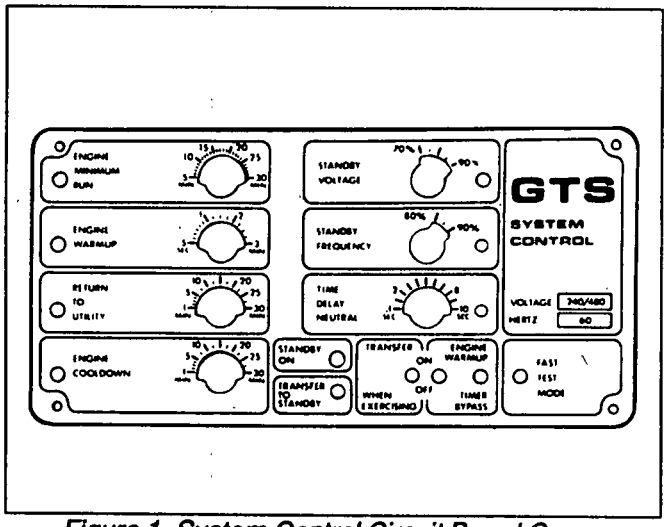


Figure 1. System Control Circuit Board Cover

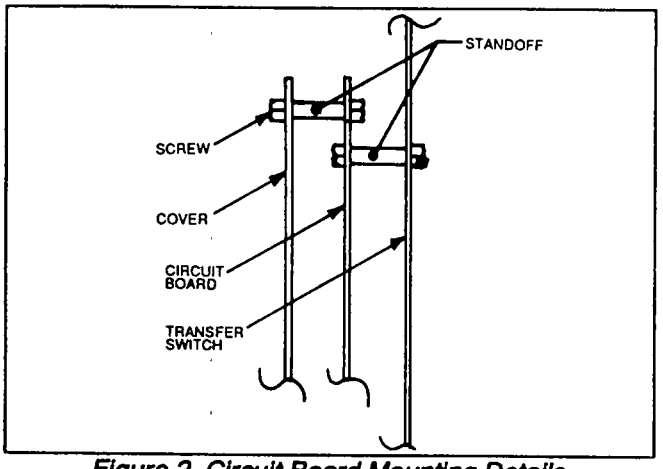


Figure 2. Circuit Board Mounting Details

Circuit Board Connections

A 15-pin connector is provided on the circuit board (Figure 3). Connector pin numbers, associated wire numbers and functions of each circuit are listed in the following chart:

PIN NO.	WIRE NO.	FUNCTION AND DESCRIPTION
1	196	Not Used (Test Point).
2	191	Transformer reduced (step-down) "Standby" source power supply to circuit board.
3	192	Same as Pin No. 2.
4	199	High (+DC) side of "utility loss sensor circuit" from utility voltage sensor board. "Tells" the system control board that "Utility" voltage is low or out.
5	200	Low (grounded) side of "utility loss sensor circuit". Function is same as Pin No. 4.
6	202	Low (grounded) side of "Fast Test" and "Normal Test" circuits to system test switch.
7	177	Part of 2-wire start circuit (becomes Wire 183).
8	197	Low (grounded) side of exercise signal circuit from exercise circuit board. Exercise board grounds this circuit to initiate system exercise.
9	194	High side (+12 volts DC) of transfer relay and time delay neutral relay coils circuit.
10	201	High side of "Fast Test" circuit. Pin No. 6 is the low (grounded) side of this circuit.
11	193	Low (grounded) side of time delay neutral relay circuit. Pin No. 9 is the high side of circuit.
12	203	High (+DC) side of "Normal Test" circuit. Pin No. 6 is the low (grounded) side of circuit.
13	198	High (+DC) side of exercise signal circuit from exercise circuit board. Pin No. 8 (Wire No. 197) is the low (grounded) side of circuit.
14	178	Part of 2-wire start circuit (see Pin No. 7).
15	23	Low (grounded) side of transfer relay circuit. Pin No. 9 is the high side of this circuit.

Section 11.5

EXERCISE CIRCUIT BOARD

Introduction

The 7-day exercise circuit board is powered by transformer reduced (step-down) voltage from the transfer mechanism LOAD terminals (T1, T2, T3). The circuit board function is to start and exercise the standby generator once every seven (7) days, on a pre-selected day and at a pre-selected time. A "Timer Operating lamp (LED) is provided. The lamp will flash to indicate that power is available and the timer is operating.

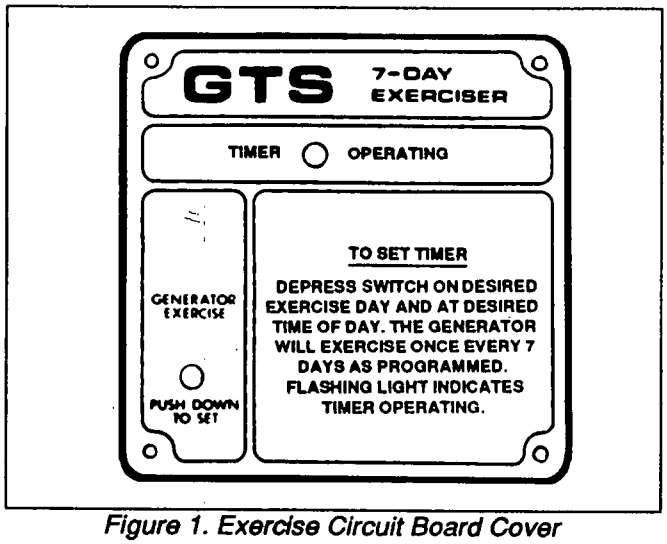


Figure 1. Exercise Circuit Board Cover

NOTE: An optional programmable exercise circuit board is also available. See Part 12, "Transfer Switch Options".

9 Volts Transistor Battery

During a transfer action (when transferring to either power source side), the transfer mechanism's LOAD terminals will be disconnected from both power source sides for a brief period. Power for operation of the exercise board is not available for this short time span. For that reason, a 9 volts battery has been provided to prevent the timer setting from becoming scrambled during transfer.

It is recommended that the 9 volts battery be removed and replaced at least once annually.

Circuit Board Operation

Transformer reduced (step-down) voltage is delivered to the circuit board from the transfer mechanism LOAD terminals.

This voltage supply operates a timer (clock) Once every seven (7) days on a pre-selected day and at a pre-selected time of day, circuit board action will close the 2-wire start circuit. At the same time, circuit board action will complete a Wires 197/198 circuit to the system control board. The standby generator will start. Transfer to the "Standby" side may or may not occur, depending on the pre-selected position of a "transfer on exercise" switch on the system control board.

Generator "exercise" will last for approximately 20-30 minutes.

Circuit Board Connector

A 9-pin connector is provided to interconnect the exercise board with other transfer switch components. Connector pin numbers, associated wires and functions of each circuit are identified in the following chart.

PIN NO.	WIRE NO.	FUNCTIONS AND DESCRIPTION
1	195	Not Used (Test Point)
2	185	Transformer reduced power supply from LOAD terminal lugs.
3	---	Not Used
4	198	High (+DC) side of exercise signal to system control circuit board.
5	197	Low (grounded) side of exercise signal to system control circuit board.
6	0	Same as Pin No. 2
7	178	Part of 2-wire start circuit.
8	---	Not Used
9	177	Part of 2-wire start circuit (becomes Wire 183).

Section 11.6
SENSOR AND TIMER SETTINGS

Utility Voltage Sensor Circuit Board

Sensor and timer settings on this board are identical to those on the CPU type intelligence system. See Section 10.5.

NOTE: For multi-voltage transfer switches, also see Sections 8.8 and 9.7. Utility voltage sensor boards used on multi-voltage units mount a "voltage selector" switch.

NOTE: The utility voltage sensor board may require calibration to match actual system voltage. For calibration procedure, see Test 4 in Section 8.10 or Test 27 in Section 9.9.

System Control Circuit Board

ENGINE MINIMUM RUN TIMER:

Establishes the minimum length of time the generator must run before it can be shut down in automatic mode, to prevent shutdown of a cold engine. Timer is adjustable from 5 to 30 minutes and is usually factory set to about 10 minutes.

ENGINE WARMUP TIMER:

Provides for an engine warmup time before automatic transfer of loads to the "Standby" side can occur. Timer is adjustable from 5 seconds to 30 minutes and is usually factory set to about 1 minute.

NOTE: The circuit board provides an "Engine Warmup Timer Bypass Switch".

RETURN TO UTILITY TIMER:

Establishes a time interval between restoration of "Utility" voltage above the setting of a "voltage pickup sensor" and re-transfer back to that source. This time interval is required to prevent re-transfer that might otherwise occur as the result of transient voltages. Timer is adjustable between 1 and 30 minutes, is usually factory set to about 5 minutes.

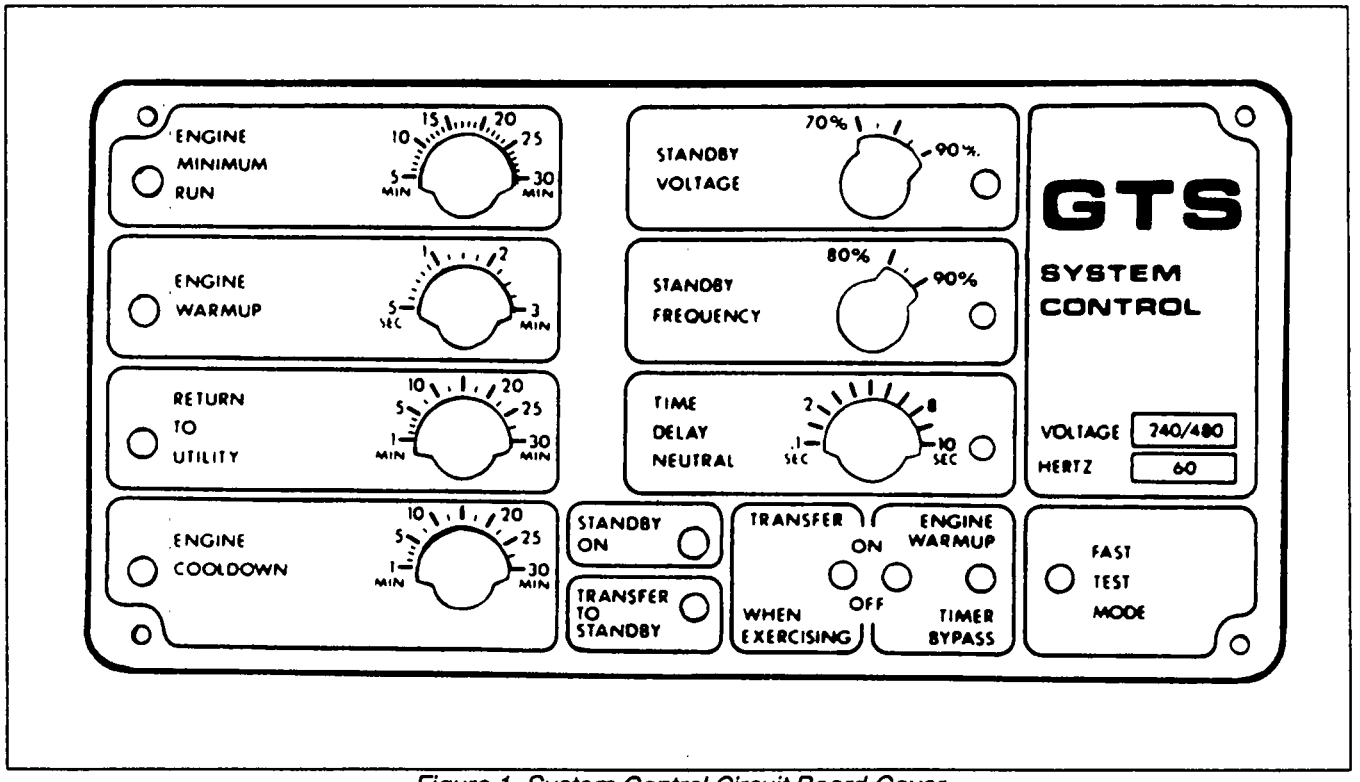


Figure 1. System Control Circuit Board Cover

System Control Circuit Board (Continued)

ENGINE COOLDOWN TIMER:

Provides a time delay between re-transfer back to the "Utility" source and generator engine shutdown. This time delay is necessary, to prevent shutdown of a hot engine (allows internal engine-generator temperatures to stabilize at no-load before shutdown). Timer is adjustable from 1 to 30 minutes. It is usually factory set to about 10 minutes.

STANDBY VOLTAGE SENSOR:

Establishes the minimum generator AC output voltage that must be available before the system can transfer to the "Standby" source side. The sensor is adjustable from 70 to 90 percent of system rated voltage. It is usually factory set to about 80 percent of system voltage.

STANDBY FREQUENCY SENSOR:

Establishes the minimum generator AC output frequency that must be available before system can transfer to the "Standby" source side. Sensor is adjustable from 80-90 percent of rated frequency and is usually set at the factory to about 80 percent.

TIME DELAY NEUTRAL TIMER:

This timer establishes the length of time that the time delay neutral relay will remain energized during a transfer or re-transfer action. That is, it will establish the time delay with the main contacts at "Neutral" (LOAD disconnected from both power supplies). Timer is adjustable from 0.1 to 10 seconds and factory set to about 5 seconds.

STANDBY ON LAMP (LED):

Although not an adjustment, this lamp is mentioned for informational purposes. The LED illuminates to indicate that the standby generator is running and transformer reduced "Standby" voltage is available for system control board operation.

TRANSFER TO STANDBY LAMP:

Not an adjustment. Lamp will turn on when the transfer relay has been energized by circuit board action, i.e., as soon as transfer to "Standby" has occured.

TRANSFER WHEN EXERCISING SWITCH:

Permits the owner/operator to decide whether loads will be transferred to the "Standby" source side during the 7-day exercise. Use the switch as follows:

- If you wish loads to be transferred to "Standby" during exercise, set the switch upward to "On".
- If you do not wish loads to be transferred during exercise, set the switch down to "Off".

ENGINE WARMUP TIMER BYPASS SWITCH:

Permits the time delay between engine startup and transfer to "Standby" to be eliminated. If the switch is set to "On", transfer will occur as soon as generator AC output voltage and frequency have reached the settings of the standby voltage and frequency sensors (with no engine warmup).

- To bypass the engine warmup timer, set the switch to "On".
- To provide an engine warmup time before transfer, set the switch to "Off".

FAST TEST MODE LAMP (LED):

Not an adjustment. Lamp (LED) will turn on whenever a "Fast Test" operation is in progress.

7-Day Exercise Timer Setting

See Figure 2. A "Generator Exercise" switch has been provided. On the desired day of exercise and at the desired time of day, push the switch in and hold for about 15 seconds. The system will automatically start and exercise every seven (7) days thereafter, on the day and at the time of day selected.

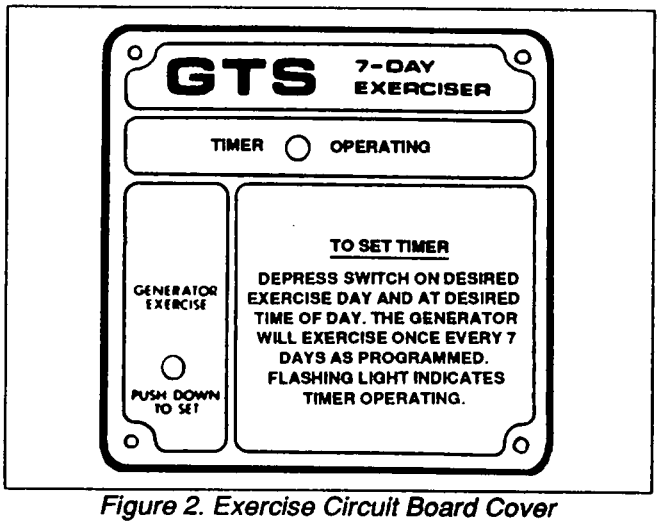


Figure 2. Exercise Circuit Board Cover

Section 11.7
INPHASE MONITOR CONTROL

Introduction

A new Inphase Monitor Control circuit board will soon be used on GTS type transfer switches having the LOGIC type control system. The Inphase Monitor Control circuit board cover is shown in Figure 1, below.

The new Inphase Monitor Control was a new system as of September 1993. The feature will become standard on all GTS systems.

Description

The Inphase Monitor Control provides instantaneous transfer of the load to either of two live voltage sources. Transfer time is less than one (1) second (the time it takes the transfer mechanism to actuate). Operators can select between instant transfer and "Time Delay Neutral". The latter is already standard equipment on Generac GTS type transfer switches.

Operation

The system operator selects his own operating parameters. In a generator startup and transfer situation, the system will respond automatically to the operator's pre-set instructions. For example, load circuits will not be transferred from the Utility power supply to the Generator set power supply until after the genset has attained a preset minimum voltage and frequency output. Another requirement for transfer to the Genset is the generator engine must warm up.

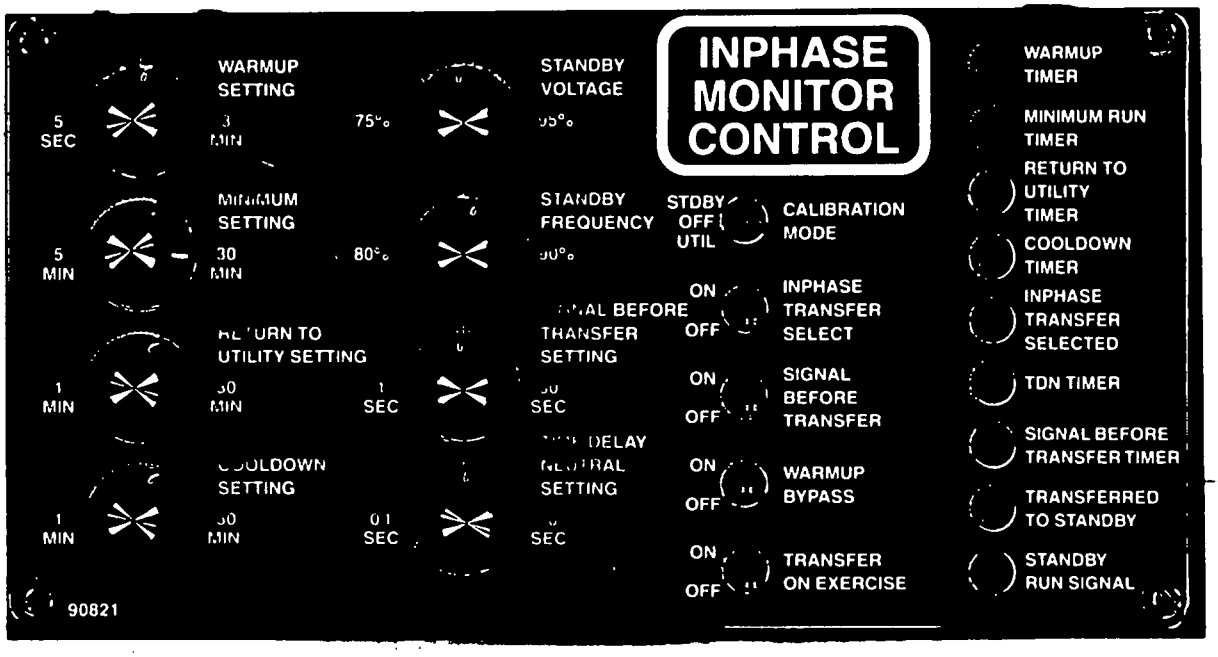
Inphase Transfer Specifications

The Inphase Monitor Control circuit board is operational only when the generator set is running. Transfer will occur when Utility and Generator voltage and phase are comparatively equal, with a maximum difference of 20° between the power sources. To assure precision matching control, minimum voltage and frequency ranges are specified by the operator. In addition, each inphase control is programmed with the use of an onboard DIP switch, to match the actuation time of the corresponding switch. Inphase transfer is utilized only between two live power sources, and NOT during a Utility source failure. The Inphase Monitor Control is designed to transfer loads under the following conditions:

- ☐ When Genset frequency is between 58-62 Hz (48-52 Hz for 50 Hz systems).
- ☐ When the Genset and Utility power source frequencies are within 2 Hz.
- ☐ When the Genset and Utility source voltages are within 85-110 percent of normal voltage.
- ☐ When both power sources are able to come into phase within 10 seconds.
- ☐ When less than 10 seconds has elapsed since the engine warmup timer has indicated a "go ahead".

If any one of the preceding conditions are not met, the system will automatically revert to Time Delay Neutral.

Figure 1. Inphase Monitor Control Circuit Board



Inphase Transfer Specifications (continued)

Timers and Sensors

WARMUP SETTING: This establishes the length of time the Genset must warm up before the transfer to the generator can occur. The Warmup timer starts after the the generator's voltage and frequency thresholds have been reached. Adjustable from 5 seconds to 3 minutes.

MINIMUM SETTING: Once the generator has been started, it must run for a minimum length of time before it can be shut down. The timer is adjustable from 5 to 30 minutes.

RETURN TO UTILITY SETTING: The "Return to Utility Timer" starts running when the utility power has returned to the value established by the Utility Voltage Sensor circuit board settings. The Timer can be adjusted from 5 to 30 seconds.

COOL DOWN SETTING: After re-transfer back to the Utility source has occurred, this timer allows the Genset engine to cool down before engine shutdown can occur. Timer is adjustable from 1 to 30 minutes.

STANDBY VOLTAGE: This sensor establishes the minumum Genset voltage that must be available before transfer to generator AC output can occur. transfer to Genset output can occur only when the generator's voltage and frequency exceed this setting.Sensor is adjustable from 75%-95% of the Genset's output voltage.

STANDBY FREQUENCY: Establishes the minumum Genset frequency that must be available before the transfer to the Genset can occur. Sensor is adjustable from 80%-90% of generator's normal AC frequency.

SIGNAL BEFORE TRANSFER SETTING: If the "Signal Before Transfer" function is selected, this timer will control the amount of time the signal remains active. Timer is adjustable from 1 to 30 seconds.

NOTE: *The "Signal Before Transfer" feature provides a time delay that allows elevators to continue operating before transfer to another power supply occurs. (See Section 12.5)*

TIME DELAY NEUTRAL SETTING: This timer holds the transfer mechanism's main contacts in their neutral position for the length of time the timer is setfor. "Neutral" is the main contacts position where the LOAD is disconnected from both the UTILITY and GENSET power supplies. Timer is adjustable from 0.1 to 10 seconds.

Selector Switches

CALIBRATION MODE SWITCH: This switch has three positions, identified as "STDBY", "OFF, and "UTIL". The switch allows the installer to calibrate the circuit board to the existing Genset output voltage and to the existing Utility power source voltage. The board must be calibrated to both power source voltages in order to initiate transfer and re-transfer at the correct voltages. To calibrate the circuit board to the correct voltage, see *"Calibrating the Circuit Board"* in this section.

NOTE: *Loads cannot be transferred unless the generatorand Utility source voltage are within 85% to 110% of the nominal (calibrated) voltage.*

INPHASE TRANSFER SELECT SWTCH: This switch allows the operator or installer to select either "Inphase Transfer" or "Time Delay Neutral" operation. The switch may be positioned as follows:

Switch at "ON": Inphase transfer operation is selected. See "Inphase Transfer Specifications" on Page 11.7-1.

Switch at "OFF": Time delay neutral operation is sele ed.

SIGNAL BEFORE TRANSFER SWITCH: This switch allows the operator to activate or bypass the "Signal Before Transfer" feature. To activate, place switch on the "ON" position. To eliminate, place the switch in the "OFF" position. Timer is adjustable from 1 to 30 seconds.

NOTE: *See Section 12.5 for information on the "Signal Before Transfer" feature. Certain relays and some other components are required to make the "Signal Before Transfer" option operational.*

WARM-UP BYPASS SWITCH: This switch allows the operator to eliminate the engine "Warm-up Timer", allowing the Transfer Switch to activate as soon as voltage and frequency parameters are met. The "Warm-up Timer" will be bypassed when the switch is in the "ON" position. (See "Warm-up Setting" under "Timers and Sensors").

TRANSFER ON EXERCISE SWITCH: The Genset will start and exercise weekly as programmed by the installer or operator. To transfer load circuits during the weekly exercise cycle, set this switch to "ON". If loads are NOT to be transferred during the exercise, set the switch to "OFF".

Inphase Transfer Specifications (continued)

Advisory Lamps

GENERAL: The advisory lamps on the Inphase Monitor Control consist of nine (9) LED's (light emitting diodes) as follows:

- Six (6) timer LED's are green.
- A red "Inphase Transfer Selected" LED.
- A red "Transferred to Standby" lamp.
- A red "Standby Run Signal" lamp.
- The four (4) red timer lamps will turn on when their respective timers are activated.
- The "Inphase Transfer Selected" lamp will illumi nate when the Inphase Transfer Select switch is set to "ON", indicating the system will operate in its "inphase" mode, and NOT in the Time Delay Mode.
- The "Trasnsferred to Standby" lamp indicates the Generator is supplying power to the load circuits.
- The "Standby Run Signal" lamp indicates that the generator is running and that the Inphase Monitor Board is operational and controlling the generator.

NOTE: *The Inphase Monitor circuit board is operational only when the generator is running.*

PIN#	WIRE#	FUNCTION
1	266	Source AC input for Power Board 40 VAC to wire 191 from TR1 on both lines.
2	191	Source AC Input for Board Power 40 VAC to wire 266. from TR1 on both lines.
3	202	Utility voltage from TR3 20 VAC to wire 264 used to determine Inphase Transfer Timing.
4	264	Utility voltage from TR3, 20 VAC to wire 202 used to determine Inphase Transfer Timing.
6	194	12 VDC positive output when Genset is operating. Used for TR and TD relay coil.
7	178	Ground side of normally open contacts for 2 wire start circuit, circuit will close contacts to keep the engine running.
8	177	12 VDC positive of side of normally open contacts of 2 wire start circuit, replaces wire 183 in transfer switch.
9	23	Switched ground for the "Transfer Relay", when grounded, the Transfer Relay energizes and the con tactor will move.
10	193	Switched Ground for the "Time Delay" relay to hold to ground as long as time delay timer is active.
11	267	Switched ground for optional Signal Before Transfer relay.
12	199	This signal is normally pulled low internally when utility is present. When utility loss occurs, this signal is allowed to float up to positive 12 VDC. The Inphase Montior Board then senses that there is a utility failure.
13	198	When this board input goes to positive 12 VDC the Inphase Monitor functions in the exercise mode.
14	201	Positive 12 VDC signal when pulled low (to ground) the Inphase Monitor goes to fast test mode.
15	203	Positive 12 VDC signal, when pulled low (to ground) the "Inphase Monitor" goes into "Normal Test Mode".
16	265	12 VDC positive input for optional "Return to Normal Bypass feature.

Inphase Transfer Specifications (continued)

Calibrating the Circuit Board

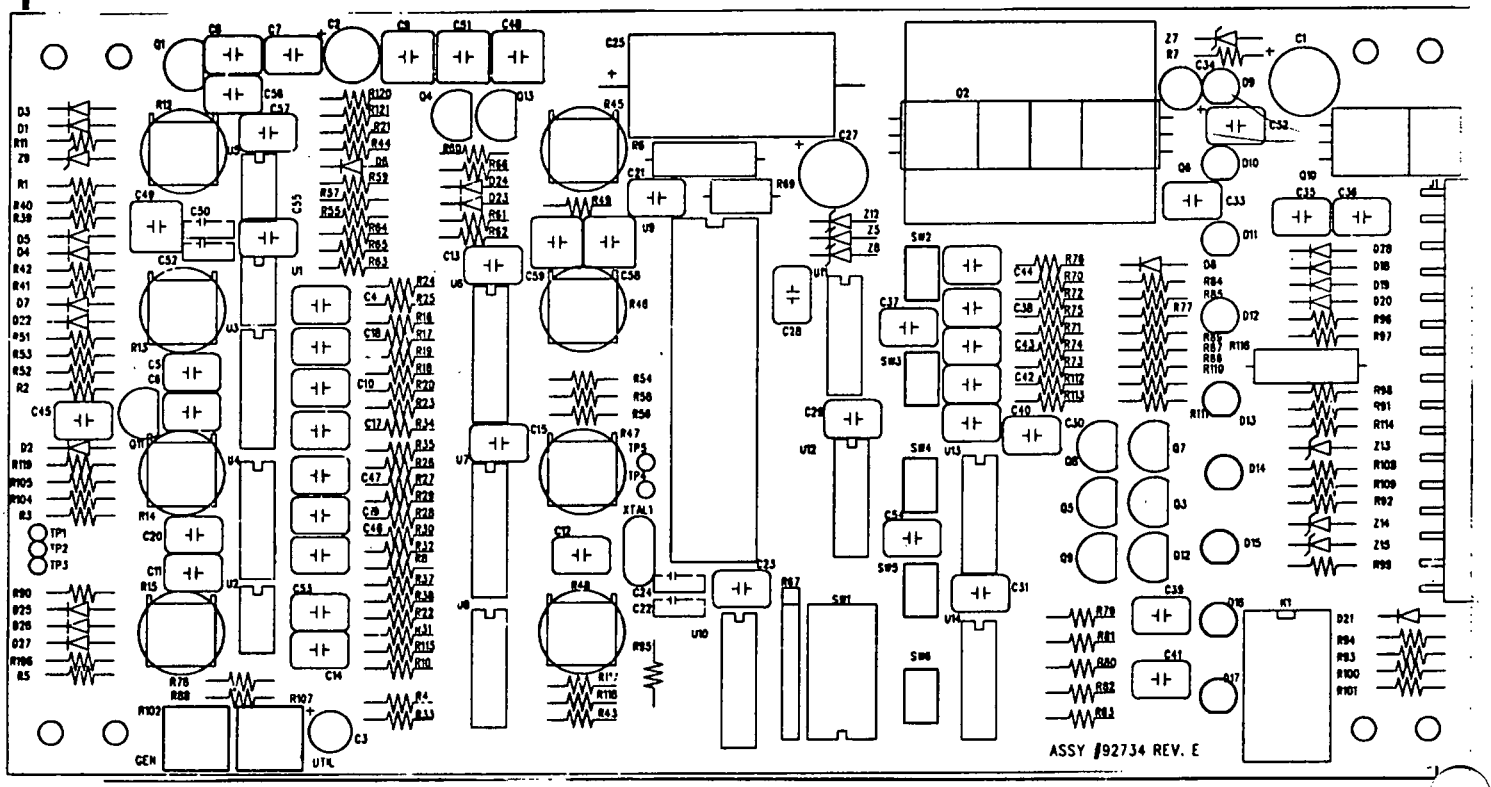
(Also see "Calibration Mode Switch" on Page 11.7-2) The Inphase Monitor Circuit Board must be calibrated to the existing Utility and Standby source voltages, if the system is to operate properly. To calibrate the board, two (2) adjustment potentiometers (R102, R107) are provided in the lower left corner of the circuit board (Figure 2 below). R102 is the generator adjustment, and R107 is used for utility calibration. The circuit board may be calibrated as follows:

1. Check that Utility supply voltage is available to system.
2. Start the generator, let it stabilize and warm up. The"Standby Run Signal" lamp should be on.
3. Set the Calibration Mode Switch to "STDBY" and observe the four (4) top LED's on the circuit board (Warm-up Timer, Minimum Run Timer, Return to Utility Timer and Cool down Timer). These are the red LED lamps.
   a. If the two upper LED's are flashing, calibration is set too low.
   b. If the two bottom LED's are flashing, calibration is set too high.
4. On the circuit board, adjust potentiometer R102 until the two center LED's are flashing (minimum Run and Return to Utility).
5. Now, set the Calibration Mode Switch to "UTIL" and observe the four upper LED's on the circuit board.
6. Adjust potentiometer R107 until the two center LED's are flashing (Minimum Run and Return to Utility).
7. Set the Calibration Mode Switch to "OFF". The Inphase Monitor Board is calibrated.

NOTE: *With the Calibration Mode switch set to "STDBY" or "UTIL", the four top LED's should turn "ON" in sequence. That is, the lights should sweep on and off, from one light to the next. Calibration is obtained when the two center lamps of the four (Minimum Run and Return to Utility) are flashing.*

NOTE: *The Inphase Monitor Control Circuit Board should be calibrated when the transfer switch has been installed as part of an operating system. In addition, new replacement circuit boards should be calibrated.*

Figure 2. Inphase Monitor Control Circuit Board



Inphase Transfer Specifications (continued)

Circuit Board Switch 1 (Continued)

If the Inphase Monitor Control Circuit Board is replaced, switch SW1 on the new replacement MUST be reset to match system requirements.The individual switches that make up SW1 are numbered from "1" (bottom) through "8" (top), as shown in Figure 3 at right. To "marry" the Circuit Board to the specific transfer switch assembly, set the switches as indicated in the chart below.

Figure 3. SW1

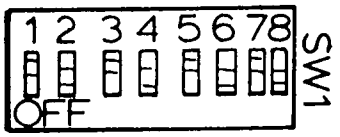
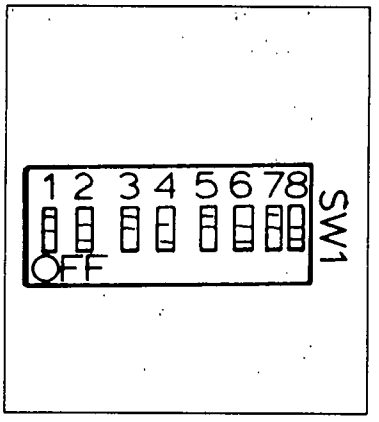


TABLE A. SW1 SETTINGS- "Y" TYPE SWITCHES

TRANSFER SWITCH	SWITCH RATED 208/416 VOLTS								SWITCH RATED 240/480 VOLT							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
105 AMPS, 2-POLE "Y" TYPE (63302)	*	ON	OFF	ON	ON	OFF	ON	OFF	*	ON	OFF	ON	ON	ON	ON	OFF
105 AMPS, 3-POLE "Y" TYPE (62642)	*	ON	OFF	ON	OFF	ON	ON	ON	*	ON	OFF	ON	ON	OFF	ON	ON
105 AMPS, 4-POLE "Y" TYPE (63597)	*	ON	OFF	ON	OFF	OFF	ON	OFF	*	ON	OFF	ON	OFF	ON	ON	OFF
150 AMPS, 2-POLE "Y" TYPE 63312)	*	ON	OFF	ON	ON	OFF	OFF	ON	*	ON	OFF	ON	ON	ON	OFF	OFF
150 AMPS, 3-POLE "Y" TYPE(62643)	*	ON	OFF	ON	OFF	ON	OFF	ON	*	ON	OFF	ON	ON	OFF	ON	OFF
150 AMPS, 4-POLE "Y" TYPE (63599)	*	ON	OFF	ON	OFF	OFF	OFF	OFF	*	ON	OFF	ON	OFF	ON	OFF	OFF
0 AMPS, 2-POLE "Y" TYPE (62677)	*	ON	OFF	ON	OFF	OFF	ON	OFF	*	ON	OFF	ON	OFF	ON	ON	OFF
200 AMPS, 3-POLE "Y" TYPE (64198)	*	ON	OFF	OFF	ON	ON	OFF	ON	*	ON	OFF	ON	OFF	OFF	ON	ON
200 AMPS, 4-POLE "Y" TYPE (63598)	*	ON	OFF	ON	OFF	OFF	ON	ON	*	ON	OFF	ON	ON	OFF	OFF	ON
300 AMPS, 2-POLE "Y" TYPE (62645)	*	ON	OFF	ON	OFF	ON	OFF	OFF	*	ON	OFF	ON	OFF	ON	ON	ON
300 AMPS, 3-POLE "Y" TYPE (62646)	*	ON	OFF	ON	OFF	ON	ON	ON	*	ON	OFF	ON	ON	ON	OFF	OFF
300 AMPS, 4-POLE "Y" TYPE (64100)	*	ON	OFF	ON	OFF	ON	ON	ON	*	ON	OFF	ON	ON	ON	OFF	OFF
420 AMPS, 2-POLE "Y" TYPE (62647)	*	ON	OFF	ON	OFF	ON	OFF	OFF	*	ON	OFF	ON	OFF	ON	ON	ON
420 AMPS, 3-POLE "Y" TYPE (62648)	*	ON	OFF	ON	OFF	OFF	ON	OFF	*	ON	OFF	ON	ON	OFF	OFF	ON

NOTE: On boards not installed at the factory, SW1 must be set by the installer. SW1 must be set to match the type of transfer switch in which the board is installed.

The individual switches on SW1 are numbered from "1" (bottom) through "8" (top), as shown in the figure to the right. To make the circuit board compatible to the specific transfer switch assembly, set the switches as indicated in the chart below. Improper settings may cause transfer outside the 20-degree specification.



DIP Switch Settings — WN type Transfer Switches

TRANSFER SWITCH	SWITCH RATED 208 VOLTS								SWITCH RATED 240/416/480/600 VOLTS							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
100 amps, 3-pole (64787)	*	ON	ON	OFF	ON	OFF	ON	OFF	*	ON	ON	OFF	ON	ON	ON	ON
100 amps, 4-pole (64788)	*	ON	ON	OFF	ON	ON	OFF	OFF	*	ON	ON	ON	OFF	OFF	OFF	OFF
150 amps, 2-pole (64789)	*	ON	ON	OFF	ON	ON	OFF	ON	*	ON	ON	ON	OFF	OFF	OFF	OFF
150 amps, 3-pole (64790)	*	ON	ON	OFF	ON	ON	OFF	ON	*	ON	ON	ON	OFF	OFF	OFF	ON
150 amps, 4-pole (64791)	*	ON	ON	OFF	ON	ON	OFF	OFF	*	ON	ON	ON	OFF	OFF	ON	OFF
200 amps, 2-pole (64789)	*	ON	ON	OFF	ON	ON	OFF	ON	*	ON	ON	ON	OFF	OFF	OFF	OFF
200 amps, 3-pole (64790)	*	ON	ON	OFF	ON	ON	OFF	ON	*	ON	ON	ON	OFF	OFF	OFF	ON
200 amps, 4-pole (64791)	*	ON	ON	OFF	ON	ON	OFF	OFF	*	ON	ON	ON	OFF	OFF	ON	OFF
300 amps, 2-pole (64795)	*	ON	ON	OFF	OFF	ON	ON	OFF	*	ON	ON	OFF	ON	OFF	OFF	ON
300 amps, 3-pole (64796)	*	ON	ON	OFF	OFF	ON	OFF	ON	*	ON	ON	OFF	ON	OFF	OFF	ON
300 amps, 4-pole (64797)	*	ON	ON	OFF	OFF	ON	ON	ON	*	ON	ON	OFF	ON	ON	OFF	OFF
400 amps, 2-pole (64795)	*	ON	ON	OFF	OFF	ON	ON	OFF	*	ON	ON	OFF	ON	OFF	OFF	ON
400 amps, 3-pole (64796)	*	ON	ON	OFF	OFF	ON	OFF	ON	*	ON	ON	OFF	ON	OFF	OFF	ON
400 amps, 4-pole (64797)	*	ON	ON	OFF	OFF	ON	ON	ON	*	ON	ON	OFF	ON	ON	OFF	OFF
600 amps, 3-pole (72111)	*	ON	OFF	OFF	ON	ON	ON	ON	*	ON	OFF	ON	OFF	ON	ON	OFF
600 amps, 4-pole (72117)	*	ON	OFF	OFF	ON	ON	OFF	ON	*	ON	OFF	ON	OFF	ON	OFF	OFF
800 amps, 3-pole (72113)	*	ON	OFF	OFF	ON	ON	OFF	OFF	*	ON	OFF	ON	OFF	OFF	ON	OFF
800 amps, 4-pole (72119)	*	ON	OFF	OFF	ON	ON	ON	OFF	*	ON	OFF	ON	OFF	OFF	ON	ON
1000 amps, 3-pole (72113)	*	ON	OFF	OFF	ON	ON	OFF	OFF	*	ON	OFF	ON	OFF	OFF	ON	OFF
1000 amps, 4-pole (72119)	*	ON	OFF	OFF	ON	ON	ON	OFF	*	ON	OFF	ON	OFF	OFF	ON	ON
1200 amps, 3-pole (72114)	*	ON	OFF	OFF	ON	OFF	ON	ON	*	ON	OFF	ON	OFF	OFF	OFF	ON
1200 amps, 4-pole (72120)	*	ON	OFF	ON	OFF	ON	OFF	OFF	*	ON	OFF	OFF	ON	ON	OFF	OFF
1600 amps, 3-pole (72114)	*	ON	OFF	OFF	ON	OFF	ON	ON	*	ON	OFF	ON	OFF	OFF	OFF	ON
1600 amps, 4-pole (72120)	*	ON	OFF	ON	OFF	ON	OFF	OFF	*	ON	OFF	OFF	ON	ON	OFF	OFF
2000 amps, 3-pole (72115)	*	OFF	ON	ON	OFF	OFF	ON	ON	*	OFF	ON	ON	ON	ON	ON	ON
2000 amps, 4-pole (72121)	*	OFF	ON	ON	OFF	OFF	OFF	ON	*	OFF	ON	ON	ON	ON	ON	OFF
2600 amps, 3-pole (72116)	CONSULT THE FACTORY								*	OFF	OFF	ON	OFF	OFF	ON	OFF
2600 amps, 4-pole (72122)	CONSULT THE FACTORY								CONSULT THE FACTORY							

* Set Switch 1 to OFF for 60 Hz systems; set Switch 1 to ON for 50 Hz systems.