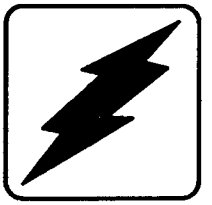
Training Manual

Transfer Switch Controller



Models:
M340
M340+

KOHLER®
POWER SYSTEMS

TP-5975 2/98

TABLE OF CONTENTS

OPTIONS

INTRODUCTION

This manual is not to be used for installation or service. It is only intended as an informational training guide for the Kohler M340 series Transfer Switch Controller and does not necessarily contain all available service and sales information. The Manufacture reserves the right to make changes to this literature and the products represented at any time without notice and without incurring obligation.

Information found in this publication is based on data available at time of printing. Manuals are available for service, parts and installation of this equipment from Kohler Co. Generator Division, Service Parts Department.

TP-5823 SOFTWARE OPERATION MANUAL - M340, M340+

TP-5672 SERVICE & PARTS MANUAL - M340+

TP-5604 SERVICE MANUAL - M340

TP-5664 OPERATION & INSTALLATION MANUAL - M340+

A generator set and transfer switch, like any other electromechanical device, can pose potential dangers to life and limb if improperly maintained or operated.

Caution, Warning and Danger precautions listed below are included in manuals and on labels attached to equipment.

Please familiarize yourself with this important information.

⚠ DANGER

Danger indicates the presence of a hazard that *will* cause *severe* personal injury, death, or substantial property damage.

⚠ WARNING

Warning indicates the presence of a hazard that *can* cause *severe* personal injury, death, or substantial property damage.

⚠ CAUTION

Caution indicates the presence of a hazard that *will* or *can* cause *minor* personal injury or property damage.

NOTICE

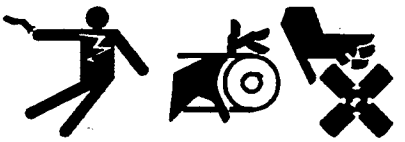
Notice communicates installation, operation, or maintenance information that is important but not hazard related.

Safety decals affixed to the generator set in prominent places advise the operator or service technician of potential hazards and how to act safely. The decals are reproduced in this publication to improve operator recognition. Replace missing or damaged decals.

Safety decals affixed to the transfer switch in prominent places advise the operator or service technician of potential hazards and how to act safely. The decals are reproduced here to improve operator recognition. Replace missing or damaged decals.

Accidental Starting

⚠ WARNING



Accidental starting.
Can cause severe injury or death.

Disconnect battery cables before working on generator set (disconnect negative lead first and reconnect it last).

Disabling generator set. Accidental starting can cause severe injury or death. Turn generator set master switch to OFF position, disconnect power to battery charger, and remove battery cables (remove negative lead first and reconnect it last) to disable generator set before working on the generator set or connected equipment. The generator set can be started by an automatic transfer switch or remote start/stop switch unless these precautions are followed.

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

Servicing transfer switch. Hazardous voltage can cause severe injury or death. De-energize both normal and emergency power sources before proceeding. Move generator set 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.

Servicing transfer inner panel. Hazardous voltage can cause severe injury or death. Disconnect inner panel harness at inline 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 exists for any accessories mounted to inner panel which are NOT wired through the inner panel harness and de-energized by inline connector separation. Such accessories are at line voltage.

KOHLER M340 / M340+

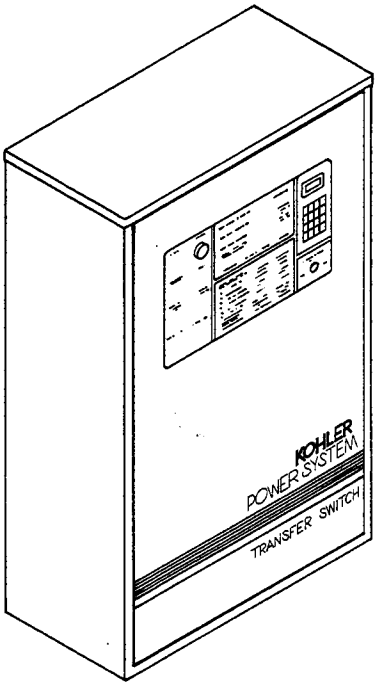
AUTOMATIC TRANSFER SWITCH CONTROL

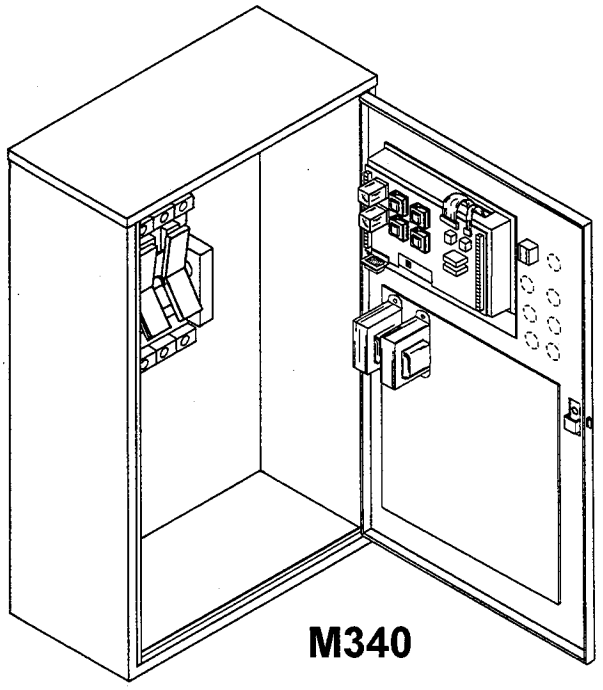
The M340 Series of Automatic Transfer Switches feature Microprocessor based controllers providing high flexibility and numerous standard features.

The Controllers can be programmed and monitored both locally by a front panel mounted Keypad and Visual Display or remotely by Computer and communications accessories.

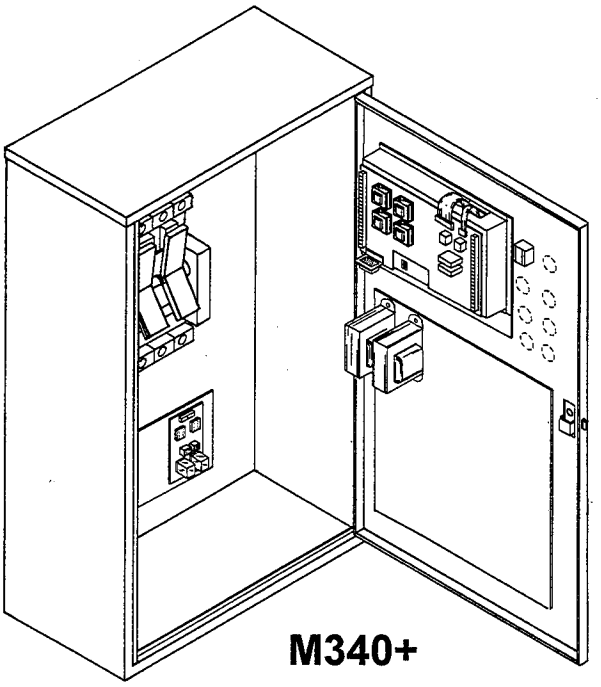
The standard M340 controller is used with fast acting, single coil actuated, double throw switching mechanisms that do not have a neutral or off position.

The Plus (+) version of the M340 Transfer Switch is designed for applications requiring an open or "OFF" position. (Programmed Transition) The control relays are located on a separate Interface board. This feature allows customer selection of power switching mechanisms, including circuit breakers and motor starting contactors capable of providing an Off position.





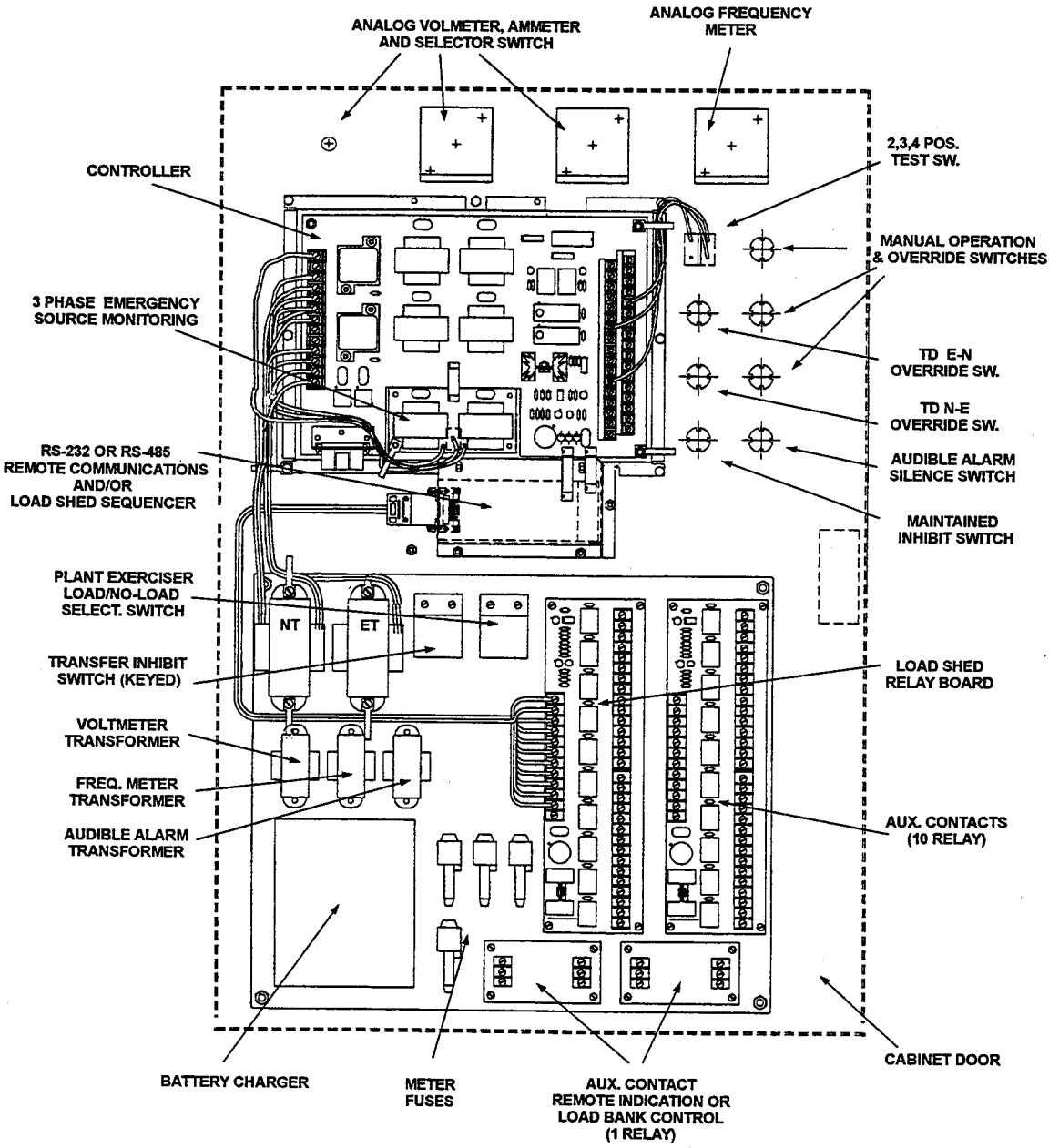
M340



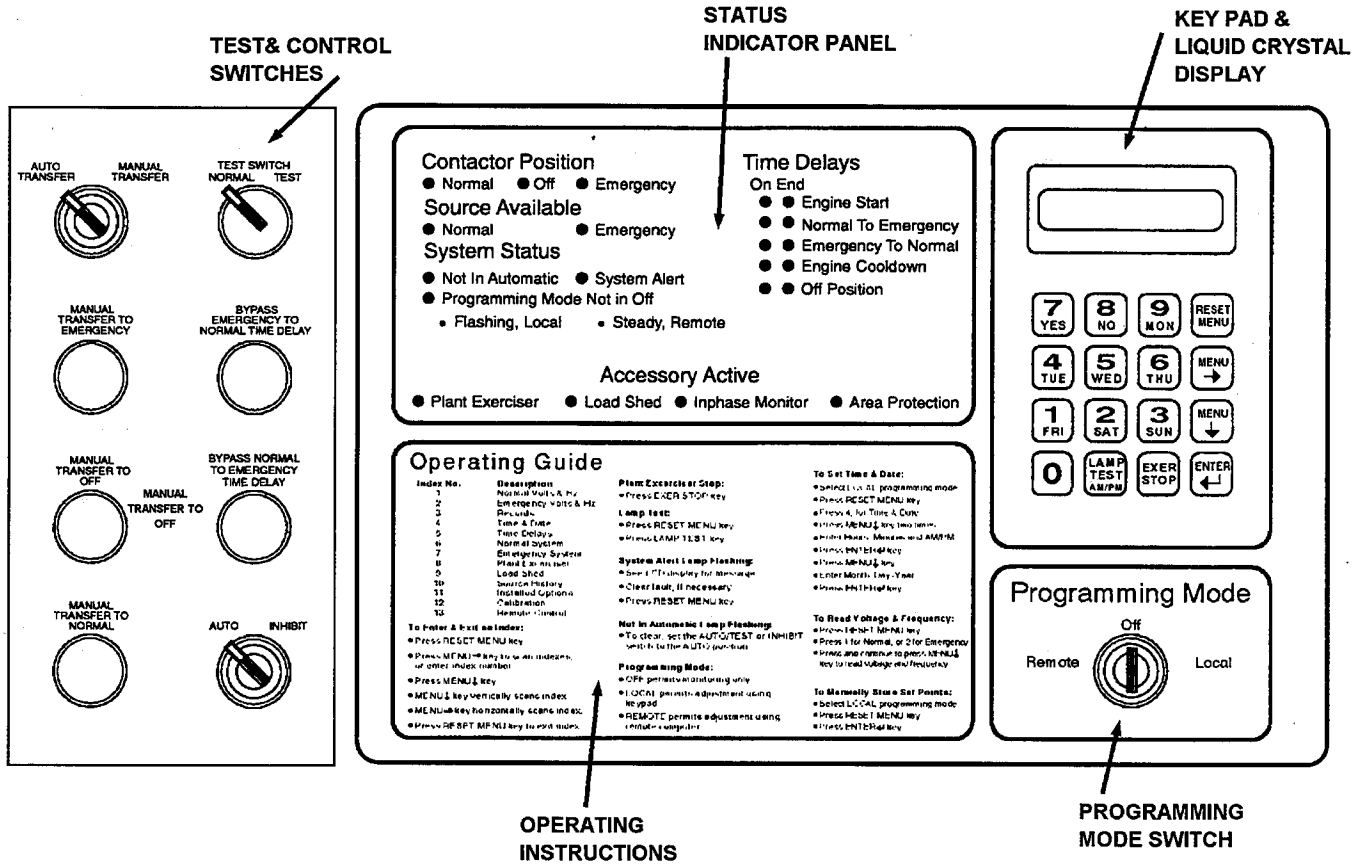
M340+

INNER DOOR PANEL

CONTROLLER, POWER TRANSFORMERS
AND OPTIONAL COMPONENT LOCATION.



M340 CONTROL PANEL



The panel illustrated is the M340 + version with optional control switches.

The **Status Indicator Panel** provides LED indication of Switch position, available power source, system Status, time delay status and accessories that are active.
Illumination of the LED indicators can be tested with the "Lamp Test" button on the Key Pad.

In addition to the features of the standard M340 Status/Control panel the M340+ includes LED indicators for the "Contactor Off" position and "Off Position" Time Delay.

The **Key Pad and Liquid Crystal Display** allow local programming and monitoring.

Selection of Programming location and lockout is provided by the 3-position **Programming Mode Selector switch**.

The **Operating Guide** is conveniently printed on the front panel.

A Series of **Control Push-button and Selector Switches** for Manual & Bypass transfers are offered as options and installed next to the control panel. A Push-button Test switch is standard.

STATUS INDICATORS (LED'S)

Red, Green and Yellow light emitting diodes are mounted on the Indicator panel board to provide visual status. (+) Indicates M340+ panel only.

Contactor Position.

- NORMAL: (GRN)
  Indicates load contacts are closed to the Normal source.

- EMERGENCY. (RED)
  Indicates load contacts are closed to the Emergency source.

(+) OFF. (YEL)
  Indicates load contacts to both Normal and Emergency sources are open.

Source Available.

- NORMAL. (GRN)
  Indicates Normal source has acceptable voltage and frequency.

- EMERGENCY. (RED)
  Indicates Emergency source has acceptable voltage and frequency.

(Both may be present at the same time.)

System Status.

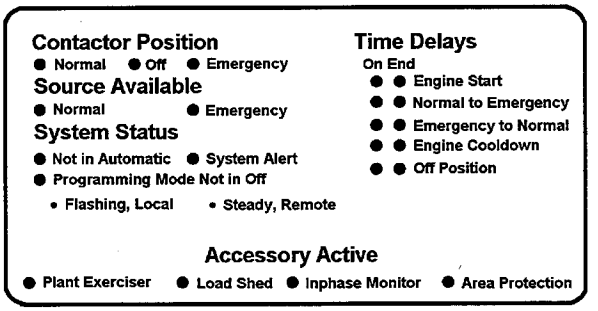
- NOT IN AUTOMATIC. (FLASHING RED)
  Indicates Auto/Manual switch is in the Manual position or the Test switch is actuated.

- SYSTEM ALERT. (FLASHING RED)
  Indicates possible problem with contactor or logic operation.

  Indicates FAULT signal received from the Generator Set.

- PROGRAMMING MODE NOT IN OFF(YEL)
  (FLASHING) Indicates programming switch is in the LOCAL position.

  (STEADY) Indicates programming switch is in the REMOTE position.



(M340+ Panel)

Time Delays. (YEL)

- ENGINE START. (If Emergency source is a Generator Set.)
  "ON" LED Indicates delay time is starting
  "END" LED Indicates engine has been signaled to start.

- NORMAL TO EMERGENCY.
  "ON" LED Indicates that the normal to emergency time delay is timing.
  "END" LED indicates that the time delay has ended timing.

- EMERGENCY TO NORMAL.
  "ON" LED Indicates that that the Emergency to Normal time delay is timing.
  "END" LED Indicates that the time delay has completed timing.

- ENGINE COOL-DOWN.
  "ON" LED Indicates that the Engine cool-down timer is timing.
  "END" LED illuminates until the engine has shut down.

(+) OFF POSITION.
  "ON" LED Indicates that the OFF (Neutral) position time delay is timing.
  "END" LED Indicates that the time delay has completed timing.

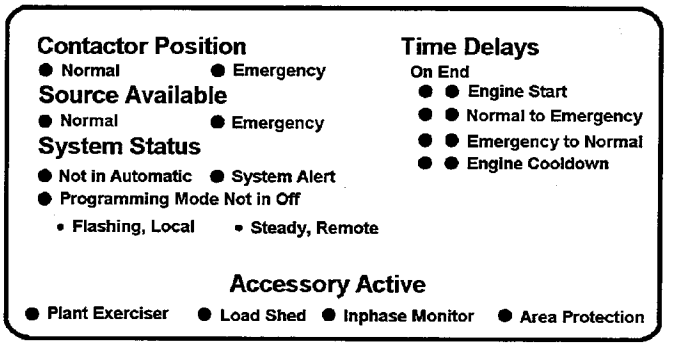
Accessory Active.

- PLANT EXERCISER
  Indicates that the exerciser is operating.

- LOAD SHED
  Indicates that the programmed load shedding is active.

- INPHASE MONITOR. (ZC switches only)
  Indicates that the sources are being monitored for phase relationship to allow Inphase transfer.

- AREA PROTECTION
  Indicates that the controller is in the Area Protection mode.



(M340 Panel)

PROGRAMMING MODE SWITCH

Remote.

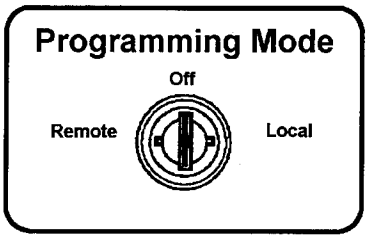
Allows both status *monitoring* and *setting* of the transfer switch controls by a connected *personal computer*. The switch can be also monitored locally.

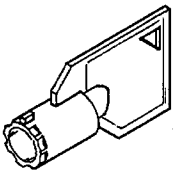
Off.

Transfer switch status settings and power source my be *monitored* from the local LCD display or connected computers. Settings cannot be changed when in the OFF position.

Local.

Allows both status *monitoring* and *setting* of transfer switch control from the microprocessor's *LCD display and keypad* , can be monitored from a remote location.





The programming mode switch is keyed to prevent unwanted tampering with the transfer switch control. **Do not leave the Switch in the LOCAL position when the transfer switch is unattended.**

KEYPAD & DISPLAY

- **Keypad.**

The keypad is used to input information into the controller. Some keys have a dual function. Thirteen menus are available for monitoring and making setting changes

- NUMBER KEYS.
  Used to provide a numeral input, day of week and Yes/No response.

- MENU KEYS
  ⇓ Scrolls between layers of indexes
  ⇒ Used if more than one action is required within a layer.

- RESET MENU KEY
  Used to exit an index or layer and resets the program back to the beginning.

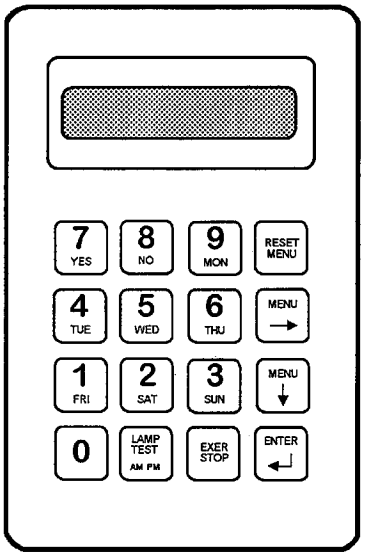
- ENTER KEY
  Used to input the information on the screen into the controllers memory.

- LAMP TEST KEY
  Used to illuminate LED's on the Status Panel. It will black out the LCD screen.

- EXER STOP KEY
  Will stop a generator's exercise run.

- **Display**

The display is provided by a dot matrix Liquid Crystal Display panel.



OPERATING GUIDE

Operating Guide

Index No.	Description
1	Normal Volts & Hz
2	Emergency Volts & Hz
3	Records
4	Time & Date
5	Time Delays
6	Normal System
7	Emergency System
8	Plant Exerciser
9	Load Shed
10	Source History
11	Installed Options
12	Calibration
13	Remote Control

To Enter & Exit an Index:
- Press RESET MENU key.
- Press MENU → key to scan indexes or enter index number.
- Press MENU ↓ key.
- MENU ↓ key vertically scans index.
- MENU → key horizontally scans index.
- Press RESET MENU key to exit index.

Plant Exerciser Stop:
- Press EXER STOP key

Lamp Test:
- Press RESET MENU key.
- Press LAMP TEST key

System Alert Lamp Flashing:
- See LCD display for message
- Clear fault, if necessary
- Press RESET MENU key.

Not In Automatic Lamp Flashing:
- To clear, set the AUTO/TEST or INHIBIT switch to the AUTO position.

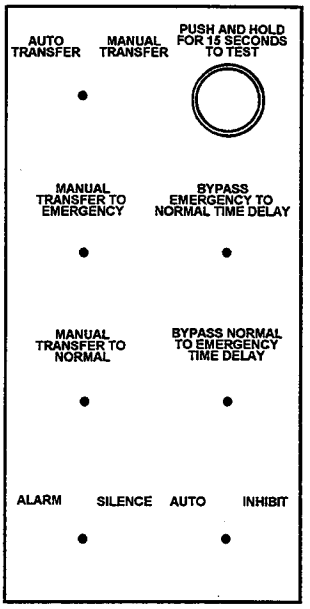
Programming Mode:
- OFF permits monitoring only.
- LOCAL permits adjustment using keypad.
- REMOTE permits adjustment using remote computer.

To Set Time & Date:
- Select LOCAL programming mode.
- Press RESET MENU key
- Press 4, for Time & Date
- Press MENU ↓ key two times.
- Enter Hours Minutes and AM/PM
- Press ENTER ↵ key
- Press MENU ↓ key
- Enter Month - Day - Year
- Press ENTER ↵ key.

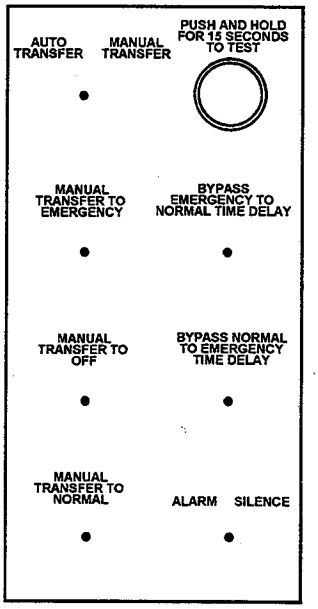
To Read Voltage & Frequency:
- Press RESET MENU key.
- Press 1 for Normal, 2 for Emergency
- Press and continue to press MENU ↓ key to read voltage and frequency.

To Manually Store Set Points:
- Select LOCAL programming mode.
- Press RESET MENU key.
- Press ENTER ↵ key.

CONTROL SWITCHES



M340



M340+

- **Push Button "TEST"**

This feature is provided on all switches as standard. It simulates a Normal source failure.

A 3-position switch which includes an "engine-start" and a 4-position switch which adds an "off" position are offered as options.

7 additional knock-outs are provided in the door panel to accept optional switches for Manual operation and time delay over-rides.

The following are offered as optional switches:

- **Auto Transfer / Manual Transfer**

Allows operating the transfer switch between Normal and Emergency sources manually.

- **Manual Transfer to Emergency**

Transfers the load to the Emergency source when the Selector switch is in the Manual Transfer position.

- **Manual Transfer to Off (+)**

Opens the Switch to the neutral position when the Selector switch is in the Manual Transfer Position disconnecting both sources from the Load.

(+) Available on Transfer switches incorporating mechanisms allowing a neutral "off" position.

- **Manual Transfer to Normal**

Transfers the Load to the Normal source when the Selector switch is in the Manual Transfer position.

- **Bypass Normal to Emergency Time Delay**

Will over-ride the time delay of transfer from the Normal to Emergency source.

- **Bypass Emergency to Normal Time Delay**

Will over-ride the time delay of retransfer from Emergency to the Normal source.

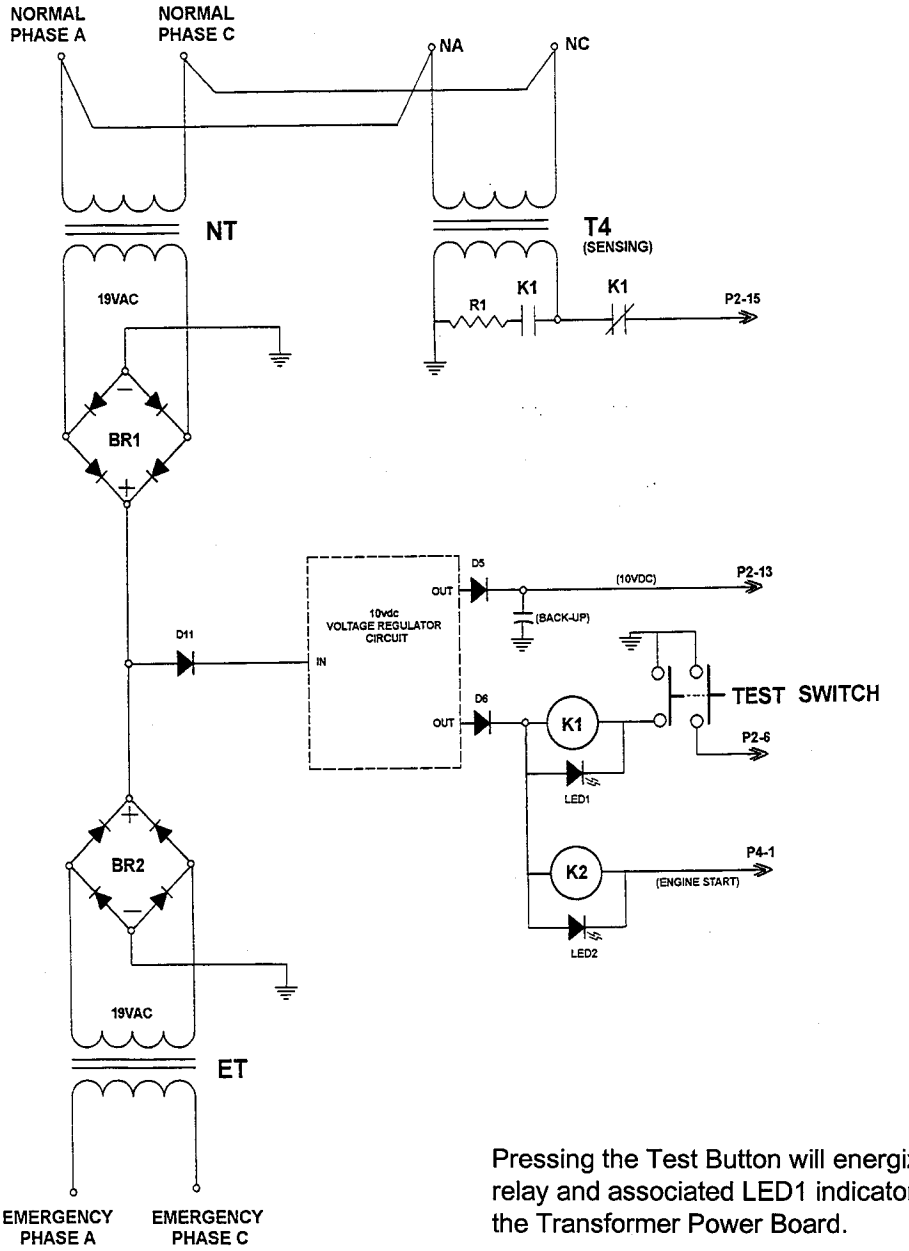
- **Auto / Inhibit**

The Inhibit position prevents the switch from transferring under any conditions.

- **Alarm / Silence**

Used to turn off Audible alarms when equipped.

TEST SWITCH

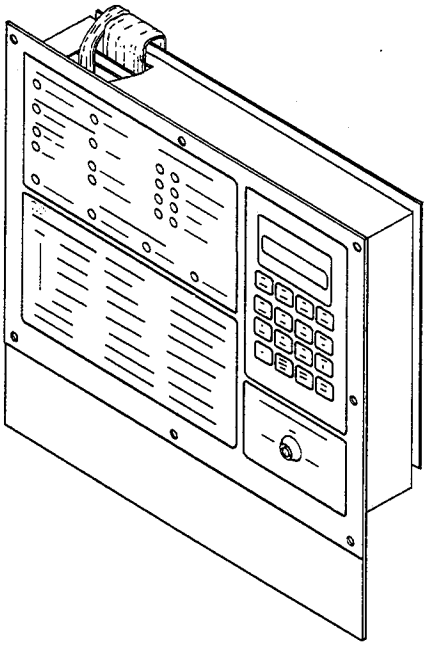


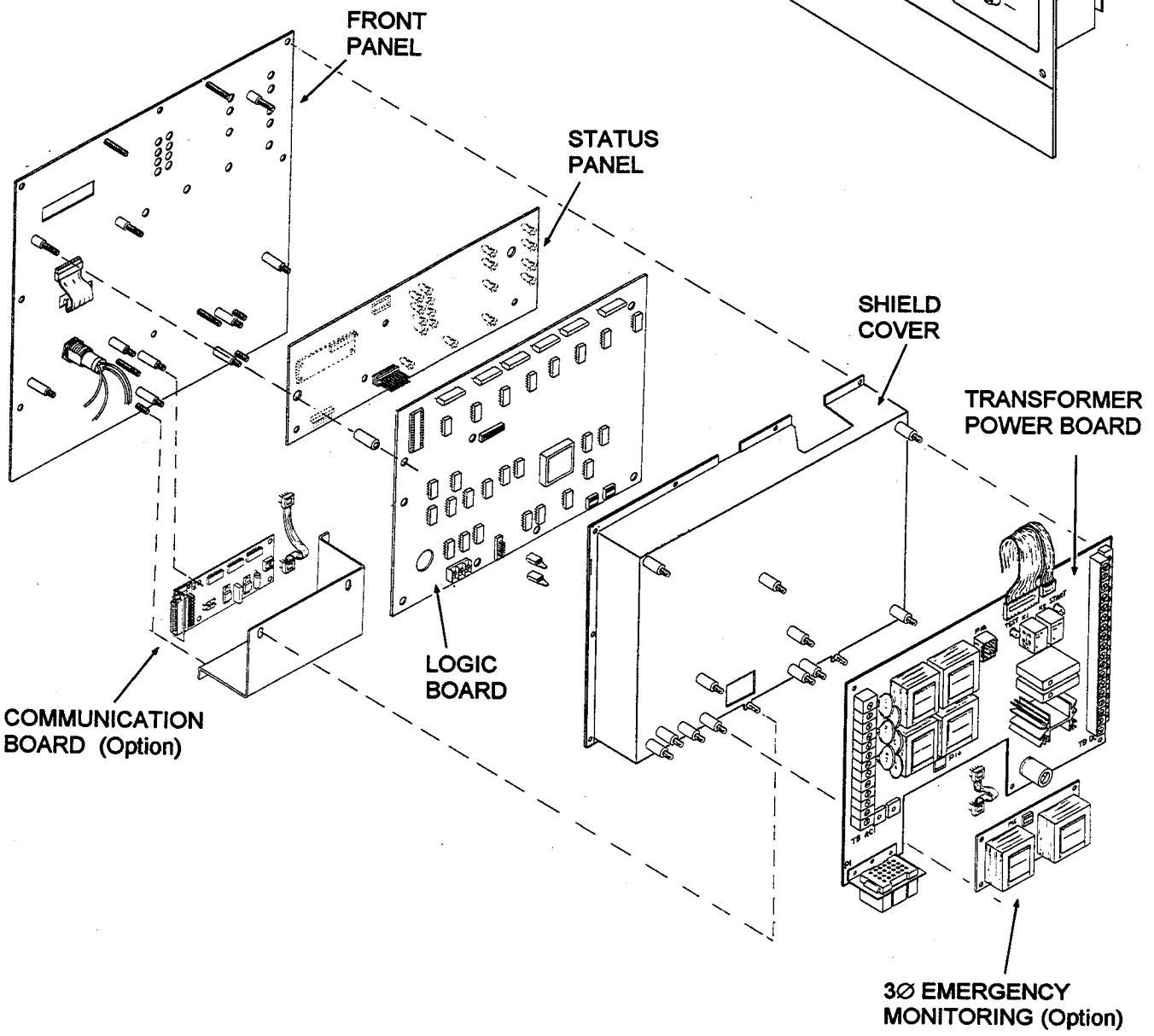
Pressing the Test Button will energize the K1 relay and associated LED1 indicator located on the Transformer Power Board.

The n.c. contacts of the K1 relay will open the secondary circuit from the T4 sensing transformer to simulate a power failure. The n.o. contacts will close placing a load resistor across the transformer secondary.

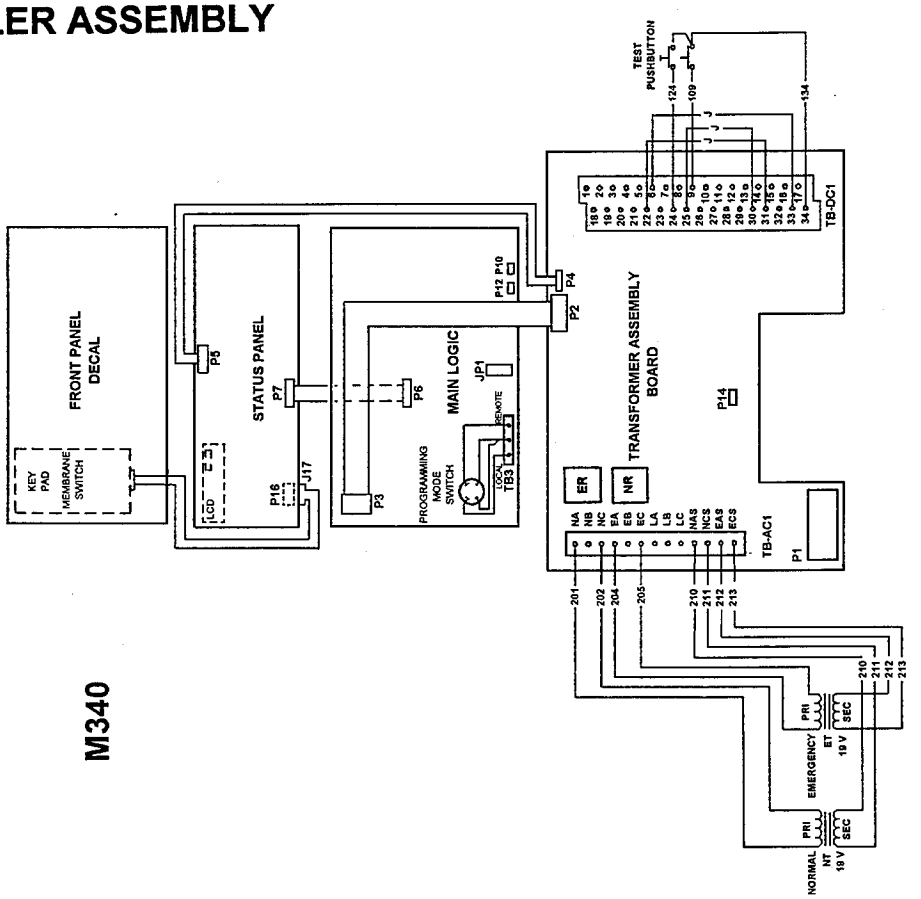
ASSEMBLY COMPONENTS

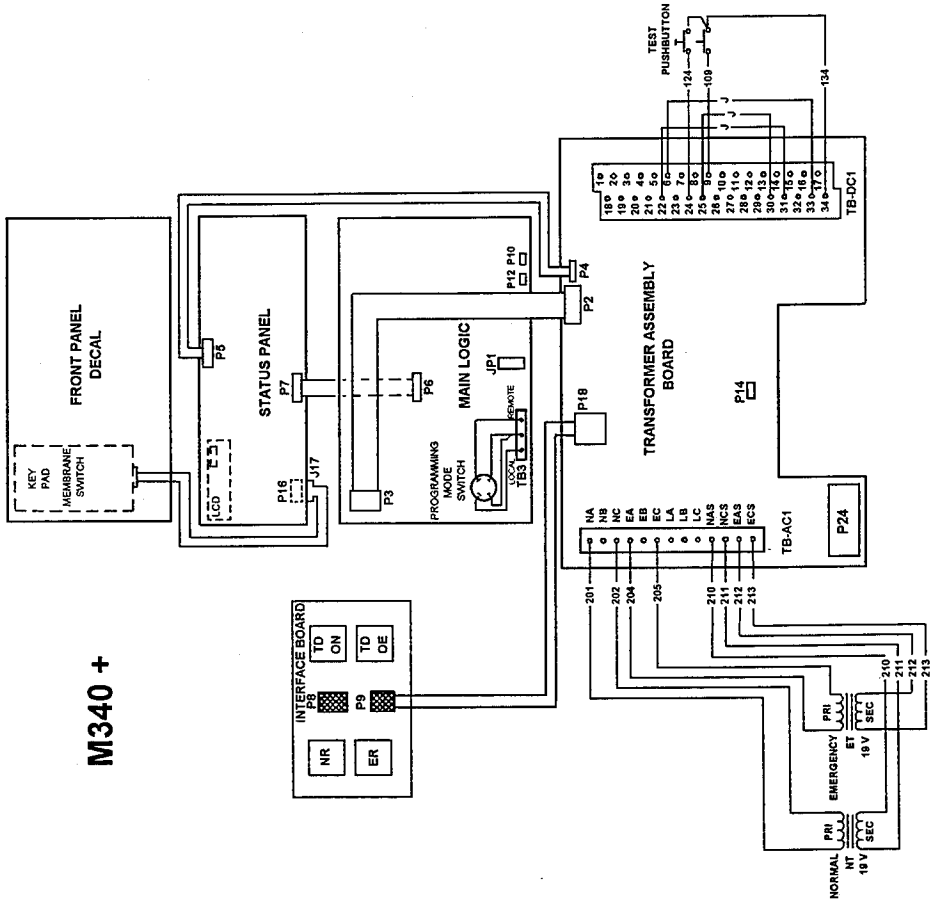
The M340 Series Controllers are serviced as an assembly. Individual circuit boards and components are illustrated to aid in better understanding features, operation and optional component location.





CONTROLLER ASSEMBLY





BOARD INTERFACING

FRONT PANEL

The Key-Pad is an integral part of the Front Panel decal.

Connections from the Key-Pad membrane switch to the Status Panel are made through an eight pin ribbon connector to the P16 connector block.

The Programming Mode 3-Position Selector Switch is hard wired to the TB3 screw terminal strip located on the Logic Board.

STATUS PANEL

The Liquid Crystal Display (LCD) board is located on the Status panel behind the cut-out window of the Front Panel.

The Status Panel for the **M340** contains 19 indicator LED's, the **M340+** panel has 22.

Interfacing between the Status Panel and the Logic board is by the P7 to P6 in-line pin connector.

The P5 provides interconnection between the Status panel and the Transformer Power Board P4 connector.

LOGIC BOARD

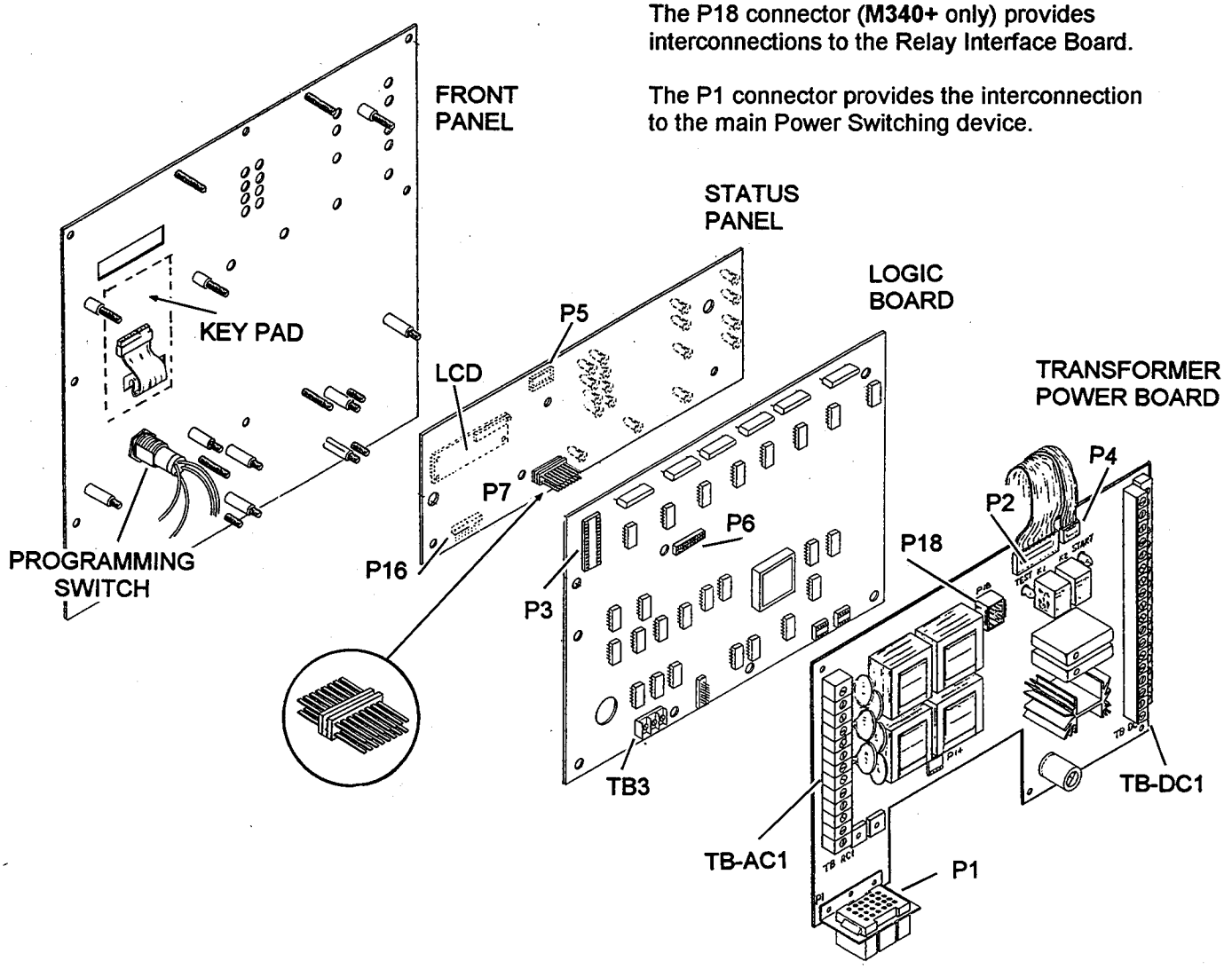
Interconnections from the Transformer Power board to the Logic Board is via the ribbon connector from P2 - P3.

TRANSFORMER POWER BOARD

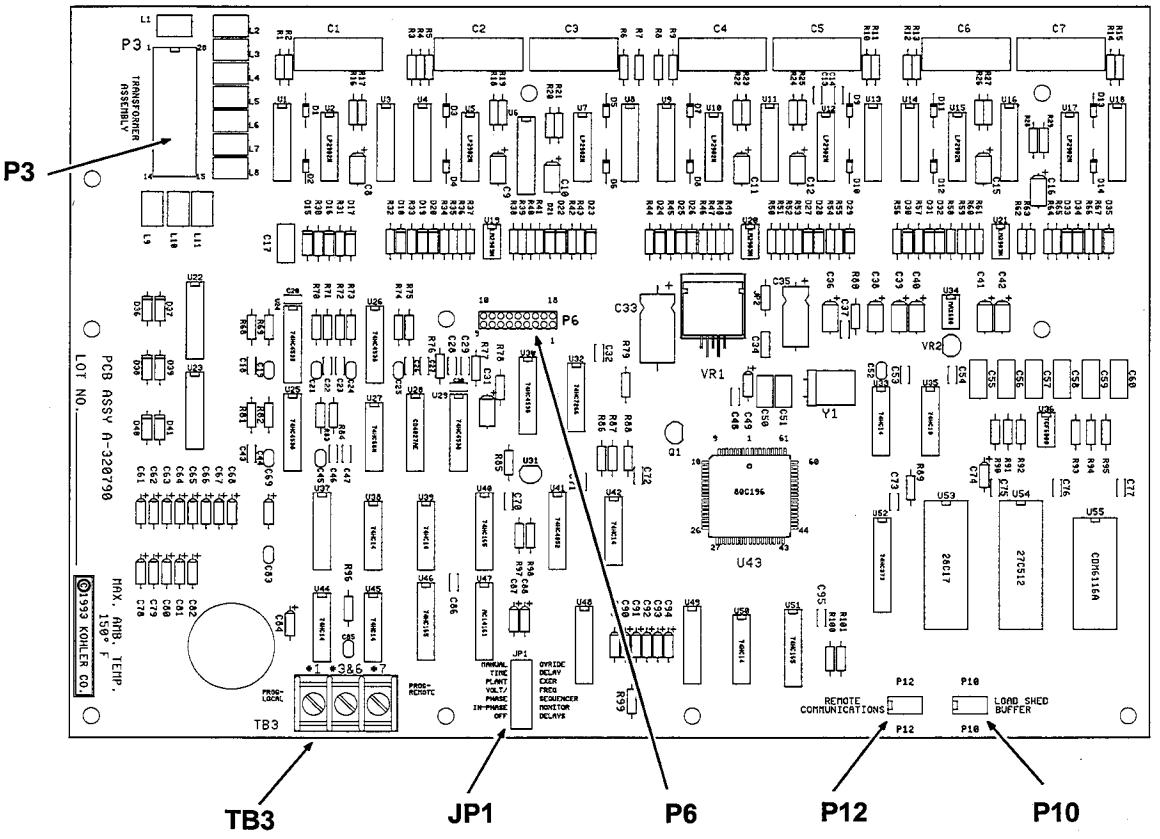
Terminal strips TB-AC1 and TB-DC1 provide connecting points for the normal and emergency source transformer primary and secondaries and various DC control connections.

The P18 connector (**M340+** only) provides interconnections to the Relay Interface Board.

The P1 connector provides the interconnection to the main Power Switching device.



LOGIC BOARD
(M340+)



The Logic Board contains the Micro-processor and performs the decision making function of the controller. Inputs and outputs are interfaced with various connectors.

The **P3** Connector is the interface connection for the Power sensing circuit and transfer control functions.

P6 is a direct pin connector to the Status Panel board.

P10 Socket interfaces the Load Shed Buffer circuit board required when the Load Shed option is installed.

P12 Socket allows interconnecting the optional RS-285 or RS-485 Communication circuit boards.

The **TB3** is a three screw terminal strip for connection of the Programming key switch.

The **JP1** consists of a series of parallel terminal pins which can be jumpered by installing shunt tabs to enable or disable specific options:

Manual Override
Time Delay
Plant Exerciser
Volt/Frequency
Phase Sequencer
Inphase Monitor
Off Delays (M340+)

TRANSFORMER POWER BOARD
(M340)

The Transformer Power Board provides the AC and DC power supply for the Controller Assembly.

The Power Transformers NT (normal) and ET (emergency) are selected to match the line to line voltage and located on the accessories panel below the Controller.

The Transformer primary and secondaries are connected to the TB-AC1 terminal strip. The 19vac secondary voltage is rectified and regulated at 10vdc and supplied to the Logic Board. Regulation is provided by Q1 and its surrounding components.

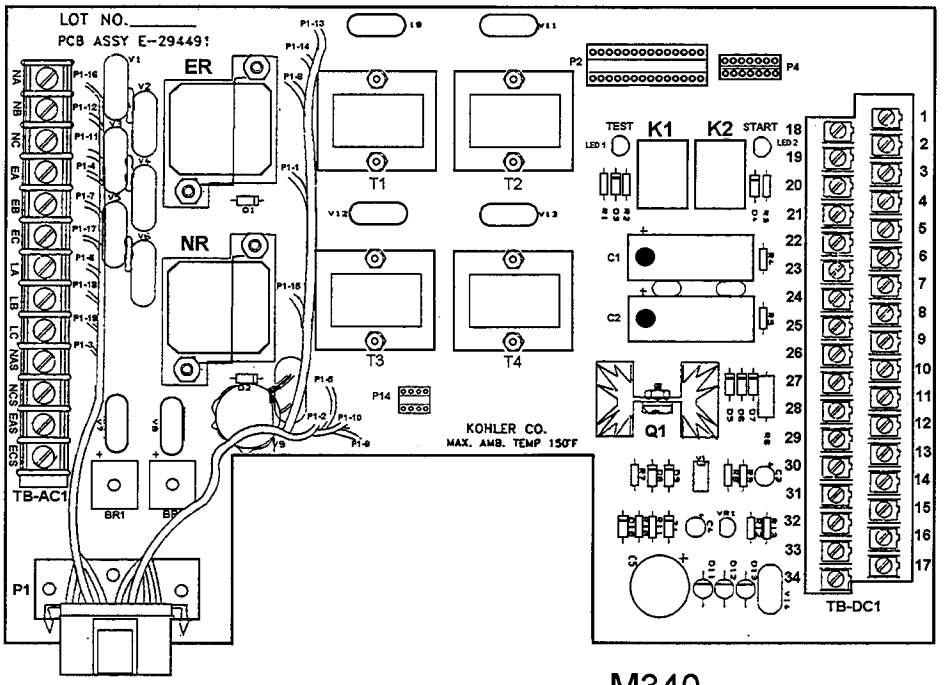
Capacitors C1 and C2 will provide approximately 30 Sec. of back-up power to the exerciser clock if power to both the NT and ET transformers is lost. A 12v battery back-up supply can also be connected to TB-DC1-29.

The T1, T3 and T4 transformers monitor the Normal 3 phase source and provide Voltage sensing input. Transformer T2 senses phase A - C of the Emergency source. VOLTAGE SENSING IS VIA THE P1 / P24 CONNECTOR.

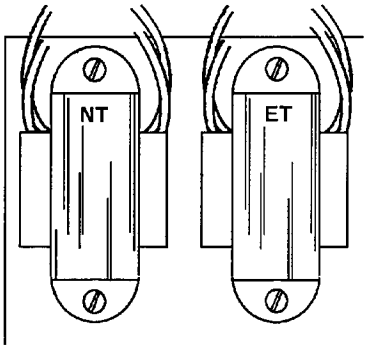
The NR and ER relays control the transfer mechanism of the Normal and Emergency power switching devices .

The K1 TEST RELAY and LED1 will energize when the TEST PUSH-BUTTON is pressed. It provides an open in the T4 secondary to simulate a phase failure and simultaneously places a burden resistor across the transformer secondary.

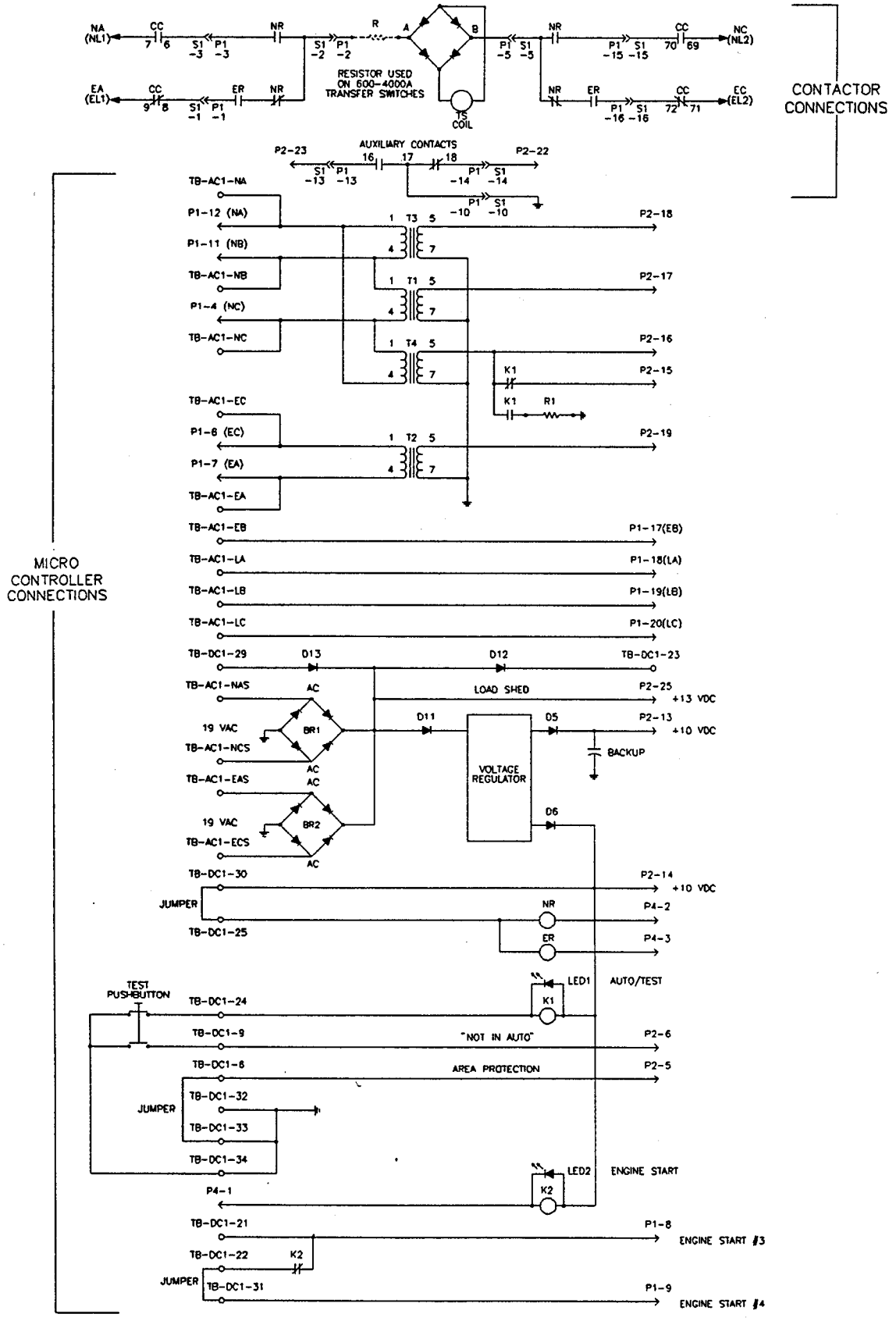
The K2 ENGINE START relay and LED2 will energize when a start command is received from the Logic. Contacts connected across TB-DC1 terminals 21 & 22 will close when the relay is energized.



M340



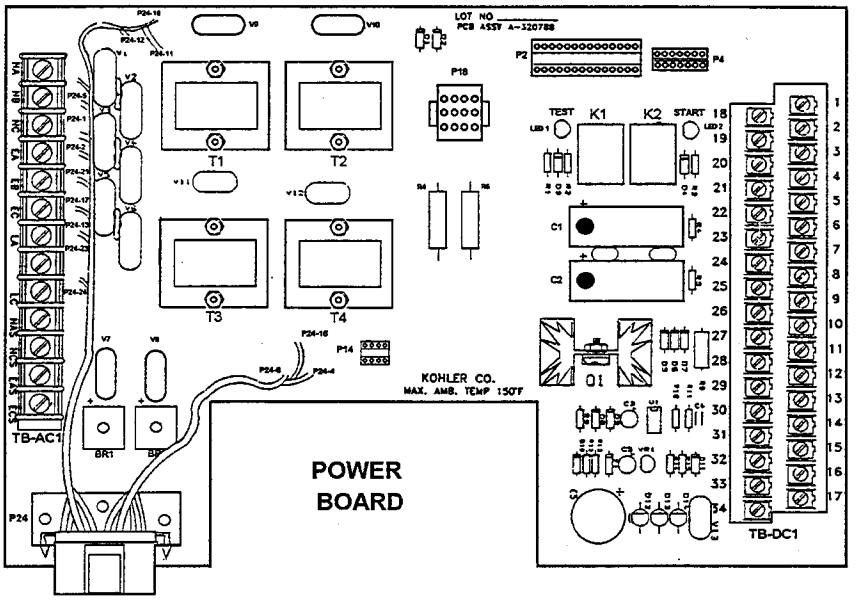
TRANSFORMER POWER BOARD
(M340)

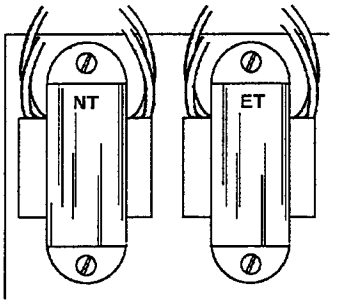


TRANSFORMER POWER BOARD
(M340+)

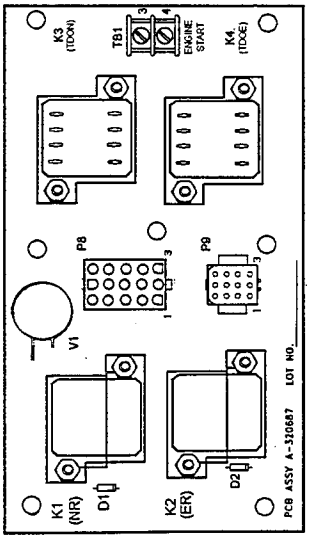
The Transformer Power board on the Plus controller provides the same function as the standard M340.

NR and ER control relays are remotely mounted on an interface board and interfaced through the P18 to P9 connectors





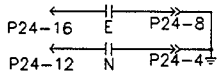
POWER
TRANSFORMERS



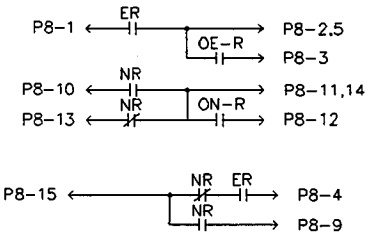
INTERFACE
BOARD

TRANSFORMER POWER BOARD
(M340+)

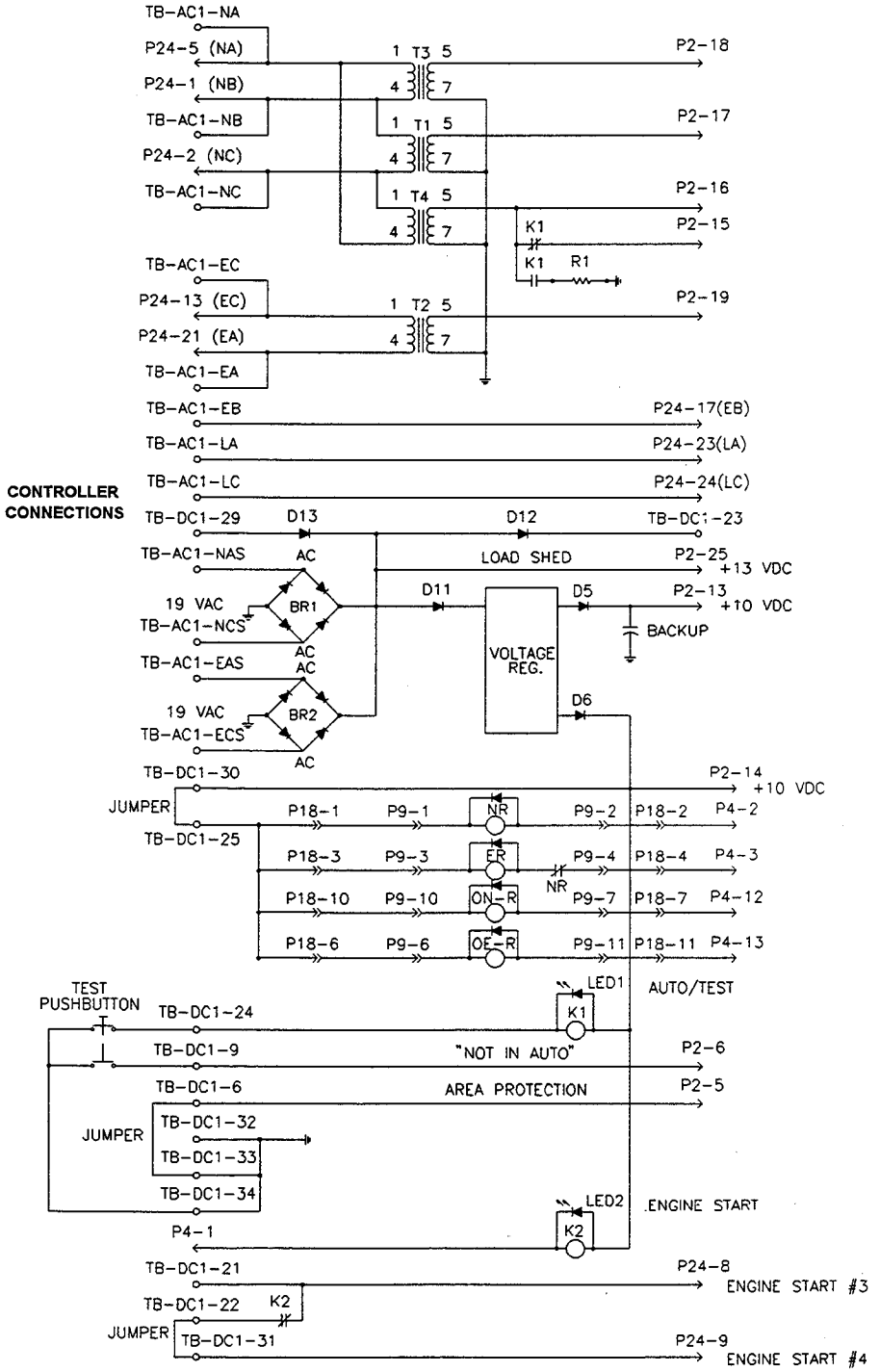
AUXILIARY POSITION CONTACTS (ON CONTACTOR)



INTERFACE RELAY CONTACTS



CONTROLLER CONNECTIONS



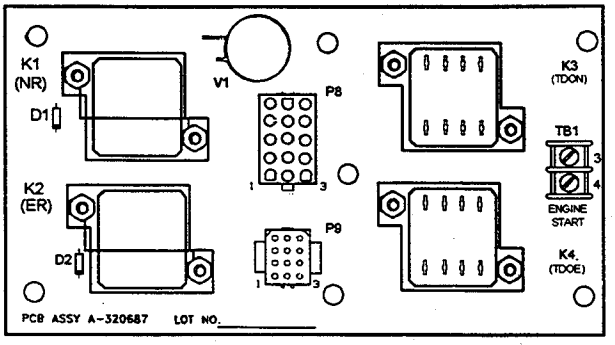
INTERFACE BOARD (M340+)

The Interface Board used on M340+ systems allows flexibility in the selection of Power Switching devices.

The Normal source control relay (NR) and the Emergency source control relay (ER) are located on the board and energized from the controller logic via the P9 connector. The relay contacts are interfaced to the power transfer switching coil, solenoid or motor through the P8 connector.

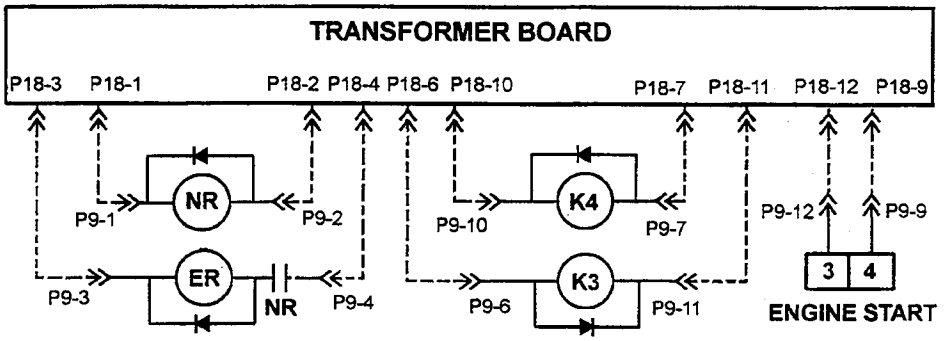
Control voltage to both relays is 12vdc. The K2 (ER) relay is a 2-pole device and the K1 (NR) is a 3-pole and therefore not interchangeable.

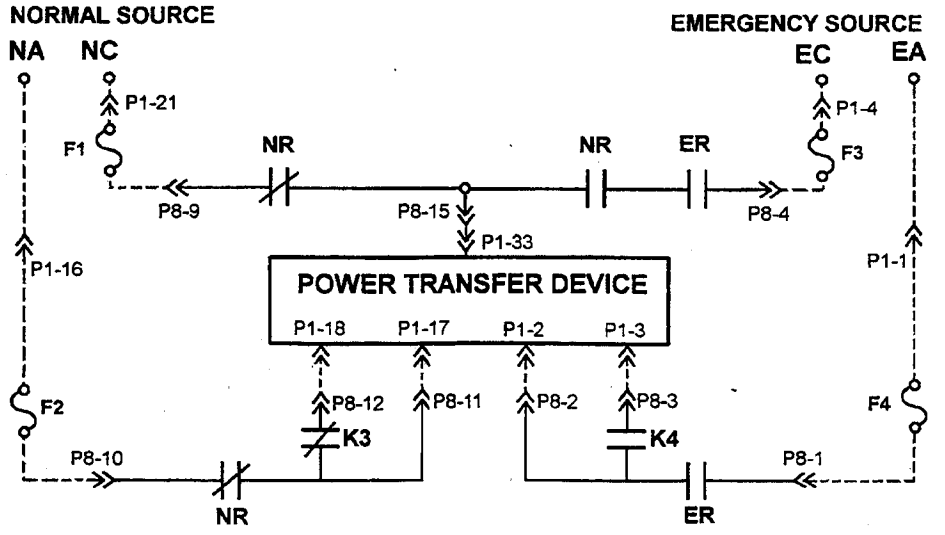
Two relay sockets K3 and K4 are located on the board and allow for insertion of 12vdc control relays required for programmed transition with a M340+ switch.



On controllers allowing programmed transition other than the microprocessor M340+ (E33+ S340+), Solid State timer relays replace the K3 and K4 control relays to provide the "off time delays".

TB1 Engine Start terminals 3-4 are parallel connected to the Engine Start terminals TB-DC1-21 (3) and TB-DC1-31 (4) on the Transformer Power board.





Illustrated in NORMAL position with normal power present.

TB-AC1 TERMINAL STRIP

These terminals are used to interface the Normal (NT) and Emergency (ET) power transformers to the Transformer Assembly Board.

Source voltage for the transformer primaries is supplied to the terminal strip via the P1 / P24 harness connector.

The transformers are selected to match the system phase voltage and provide 19vac input to the DC logic power supply.

NA NORMAL SOURCE, PHASE A
NB NORMAL SOURCE, PHASE B
NC NORMAL SOURCE, PHASE C
EA EMERGENCY SOURCE, PHASE A
EB EMERGENCY SOURCE, PHASE B
EC EMERGENCY SOURCE, PHASE C
LA LOAD, PHASE A
LB LOAD, PHASE B
LC LOAD, PHASE C
NAS NORMAL SOURCE, PHASE A TRANSFORMER SECONDARY 19V.
NCS NORMAL SOURCE, PHASE C TRANSFORMER SECONDARY 19V.
EAS EMERGENCY SOURCE, PHASE A TRANSFORMER SECONDARY 19V.
ECS EMERGENCY SOURCE, PHASE C TRANSFORMER SECONDARY 19V.

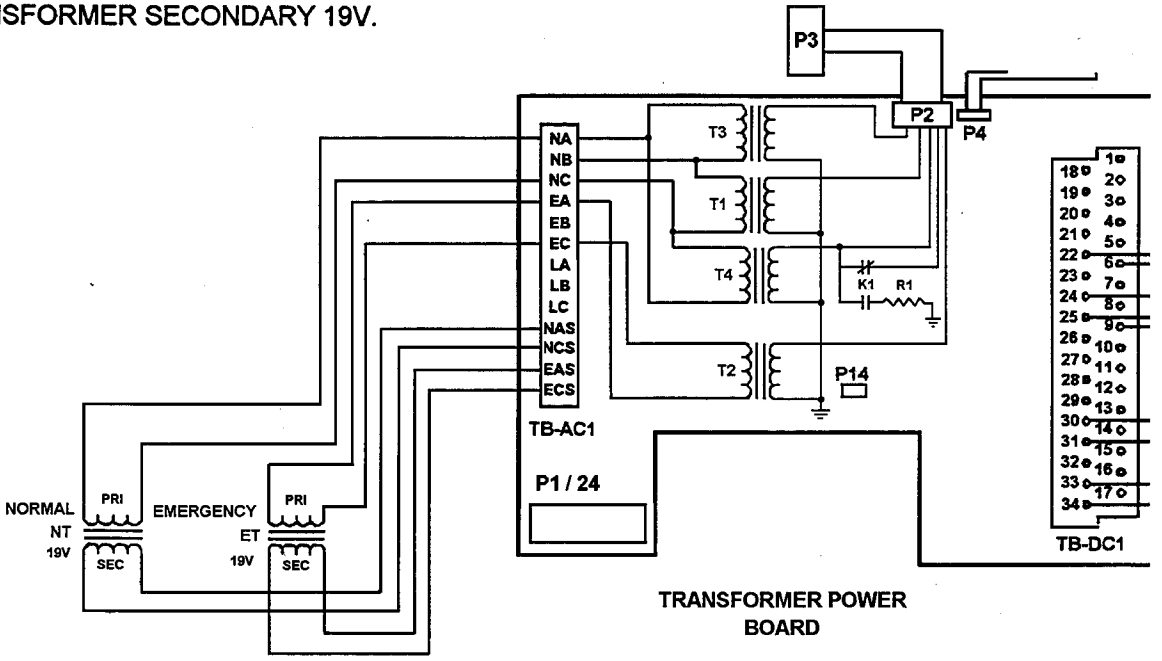
VOLTAGE SENSING

On Three Phase systems all three phases of the Normal source and phase A-C of the Emergency source are monitored.

Transformers T1, T3, and T4 sense the Normal voltage source from the TB-AC1 terminals, T2 monitors the emergency source.

The secondary voltage is provided to the Main Logic board via the P2-P3 connector.

Three phase sensing of the Emergency power can be added as an option.



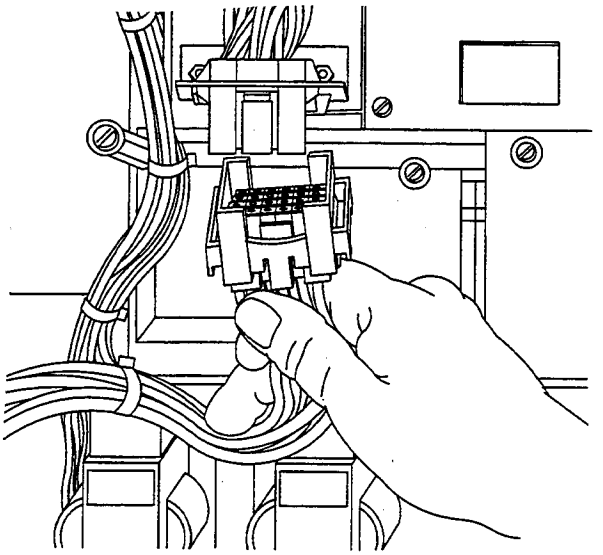
CONTROLLER ASSEMBLY

P1 / P24 CONNECTOR

This 24 pin plug connector interfaces the main switching contact assembly and the controller assembly. It provides the electrical power and voltage sensing supply for the controller.

Auxiliary and coil clearing contacts mechanically operated by the transfer mechanism and engine start signal are also routed through this connector.

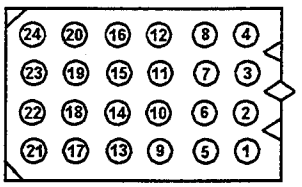
M340 and M340+ CONTROLLERS ARE NOT INTERCHANGEABLE



P1 CONNECTOR (M340)

PIN No.

1. Coil Clearing Contacts, Emergency Phase A.
2. Transfer Solenoid, Rectifier A/B
3. Coil Clearing Contacts Normal Phase A
4. Normal Phase C
5. Transfer Solenoid, Rectifier A/B
6. Emergency Phase C
7. Emergency Phase A
8. Engine Start #3
9. Engine Start #4
10. Contactor Position Indicator Grd.
11. Normal Phase B
12. Normal Phase A
13. Emergency Contactor Position
14. Normal Contactor Position
15. Coil Clearing Contacts Normal Phase C
16. Coil Clearing Contacts Emergency Phase C
17. Emergency Phase B
18. Load Phase A
19. Load Phase B
20. Load Phase C
21. Normal Limit Switch #1 — When req.
22. Normal Limit Switch #2
23. N/A
24. N/A



P1 / P24

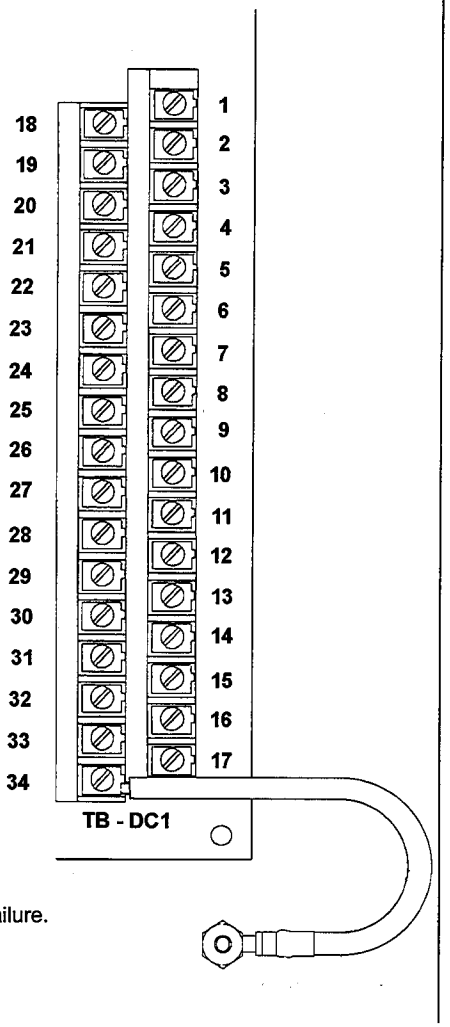
P24 CONNECTOR (M340+)

PIN No.

1. Normal Phase B
2. Normal Phase C
3. N/A
4. Normal Contactor position - Common auxiliary contact .
5. Normal Phase A
6. N/A
7. N/A
8. Emergency Contactor position - Common auxiliary contact
9. N/A
10. N/A
11. Engine Start #3
12. Normal contactor position - Normally open auxiliary contact.
13. Emergency Phase C
14. N/A
15. Engine Start #4
16. Emergency contactor position - Normally open auxiliary contact.
17. Emergency Phase B
18. N/A
19. N/A
20. N/A
21. Emergency Phase A
22. N/A
23. Load Phase A
24. Load Phase C

TB-DC1 TERMINAL STRIP

No.		FUNCTION
1	OUTPUT	Terminal is grounded if the programming-mode key is not in the off' position.
2	INPUT	A manual transfer to Normal occurs when terminal is grounded.
3	INPUT	The NORMAL to EMERGENCY time delay is bypassed when terminal is grounded.
4	INPUT	The EMERGENCY to NORMAL time delay is bypassed if terminal is grounded.
5	OUTPUT	If plant exerciser is set to no-load and is active, the load bank control is on, terminal is grounded.
6	INPUT	The Area-protection mode is inactive if terminal is grounded.
7	INPUT	A manual transfer to EMERGENCY occurs if terminal is grounded
8	INPUT	Fault 1 message appears on LCD if grounded.
9	INPUT	Not-in-Automatic LED flashes if grounded.
10	INPUT	Generator Set will Exercise with load if grounded.
11	INPUT	Fault 2 message appears on LCD if grounded
12	INPUT	Manual transfer to "OFF' occurs if grounded.
13	N/A	
14	OUTPUT	Terminal is grounded if logic board is not in Automatic mode.
15	N/A	
16	N/A	
17	OUTPUT	Terminal is grounded if contactor is in the "OFF" position.
18	OUTPUT	Terminal is grounded if EMERGENCY source is available.
19	OUTPUT	Terminal is grounded if a System-Status alert occurs.
20	INPUT	When in the Manual Mode a ground will allow manual transfer.
21	OUTPUT	To engine start terminal (3).
22	OUTPUT	From remote Start/Stop relay (K2) NC contact.
23	OUTPUT	Output voltage source to optional dry contact kit. (unregulated DC)
24	INPUT	Ground will energize the K1 Test relay to simulate a Normal source failure.
25	INPUT	10VDC+ to transfer control relays.
26	OUTPUT	Terminal is grounded if Normal Source is available.
27	OUTPUT	Terminal is grounded if contactor is in the Emergency position.
28	OUTPUT	Terminal is grounded if contactor is in the Normal position.
29	INPUT	External DC supply input.
30	OUTPUT	Regulated 10VDC + supply.
31	OUTPUT	Engine start terminal (4).
32, 33, 34		Ground.



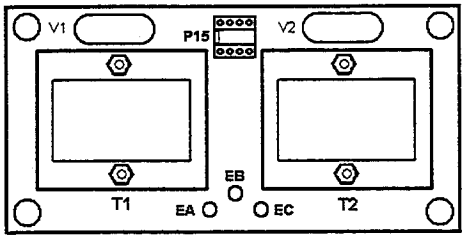
EMERGENCY SOURCE 3 PHASE SENSING
(OPTIONAL)

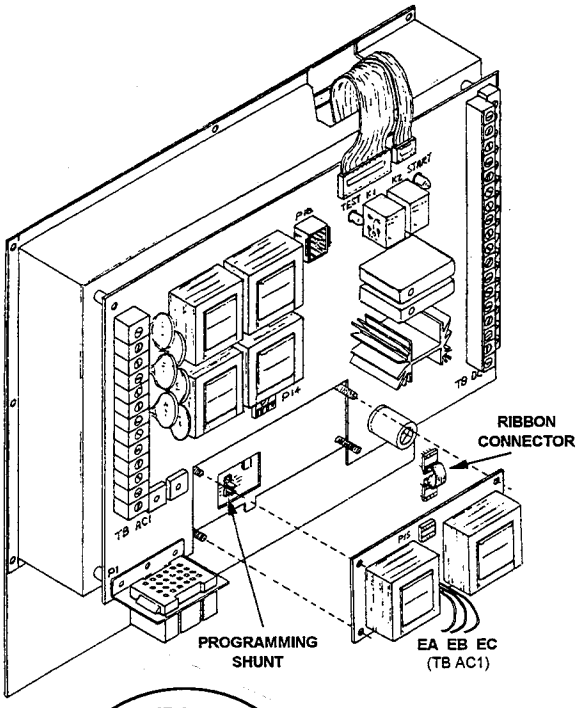
If it is required to Sense all three phases of the Emergency Source, two additional transformers are provided on an optional transformer assembly board.

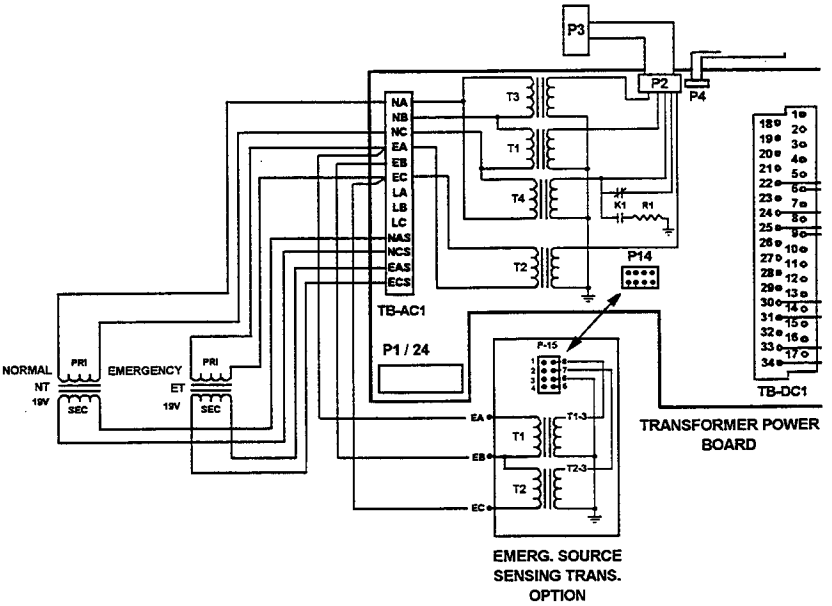
A ribbon connector interfaces the transformer secondaries (P-15) to the Transformer Power Board (P14). The blue stripe on the ribbon aligns to the slotted side of the sockets.

Primary leads EA, EB, EC are wired to the TB AC1 terminal strip to sense all three phases of the Emergency source.

The PHASE SEQUENCER programming shunt must be installed to activate this accessory.







JP1
SHUNT CONTROLLED OPTIONS

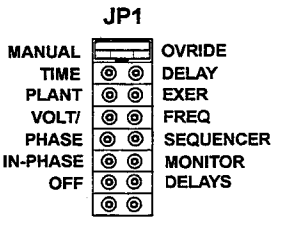
MANUAL OVERRIDE

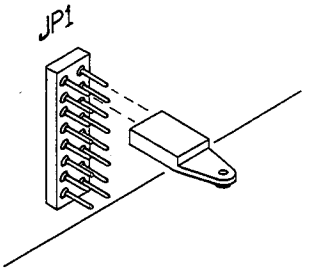
A shunt installed on these terminals will allow the Transfer mechanism to always seek the NORMAL source.

If a Manual Transfer Push Button option is installed, (29) an attempt to transfer to the EMERGENCY source will be inhibited if the NORMAL source is acceptable.

Removing the shunt with the Manual Transfer Push Button option (29) installed will allow a manual transfer between either source if available.

Time delays are bypassed on a manual transfer.

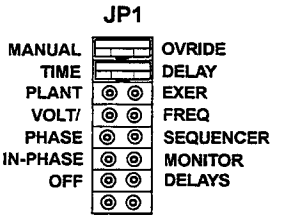


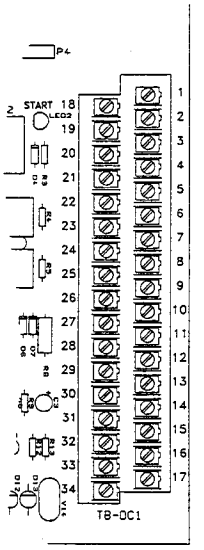


TIME DELAY

Installing a shunt at the Time Delay terminal will allow adjustable extensions of all time delays, TDNE, TDES*, TDEN, TDEC, TDOE, TDON and Load Shedding, to 99 minutes.

*If a Delay on Engine Start (TDES) beyond 6 seconds is required, a back-up power supply to the controller is necessary. This power supply will prevent loss of clock memory which would occur approximately 6 seconds after loss of the Normal source supply. This is available in kit form or a 12 - 24 volt battery can be connected to the Transformer Power Board terminals TB-DC1-29 (+) and TB-DC1-32 (-).



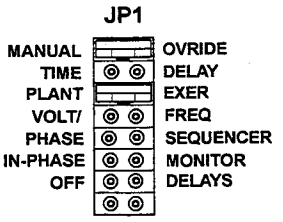


PLANT EXERCISER

A shunt placed between these terminals will activate the Plant Exerciser option. This will allow the Engine Generator to start and run for a pre-programmed setting. No transfer of load will be initiated.

If a complete Engine Generator run and transfer of load between the Normal and Emergency source is desired, a jumper must also be added between terminals 10 and 32 on the TB-DC1 terminal strip.

A switch can also be installed between terminals 10 and 32 to allow selection of exercising the Engine Generator with or without transferring the load.

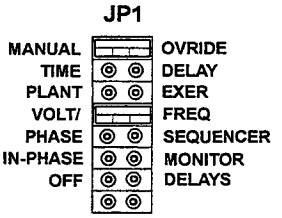


JP1
SHUNT CONTROLLER OPTIONS

VOLT/FREQ

Placing a shunt across these terminals will enable the optional OVERVOLTAGE and OVER and UNDER FREQUENCY PROTECTION CIRCUITS.

A transfer to the Alternate source will be initiated if an:
Overvoltage condition should occur on any phase of the Normal Source.
Over or Under-Frequency on one phase of the Normal source.
Overvoltage and Over-Frequency on one phase of the Emergency source.

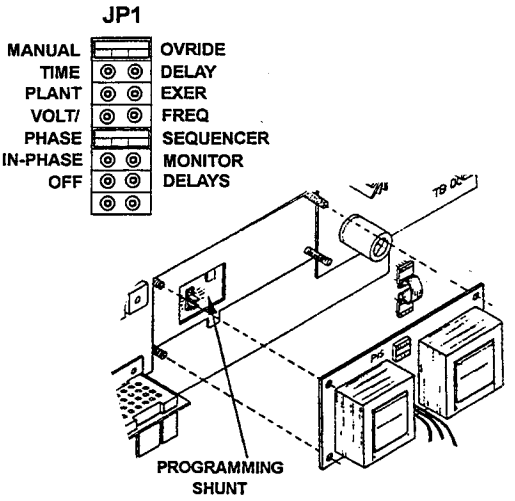


PHASE SEQUENCER

Enabling this option will inhibit transfer of the load to a source with a phase sequence other than ABC.

The option also provides protection from exposing a 3 phase load to a single phase source. Upon loss of one phase of a 3 phase system, a transfer to the alternate source will be initiated.

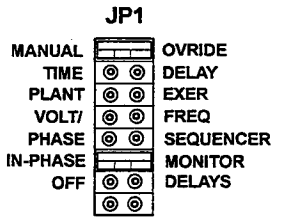
The optional 3 phase sensing transformer must be installed to provide full monitoring of the Emergency source.



IN-PHASE MONITOR

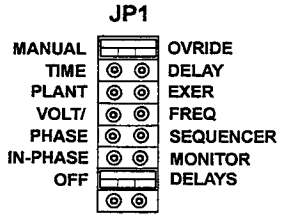
When highly inductive loads such as motors are quickly transfered from one electrical source to another a high inrush of current could occur if the sources where out of phase. This could cause damage to the motors and related equipment.

Shunting these terminals will provide monitoring of one phase of both sources and only allow a transfer when the two are within the desired phase angle and approaching a zero phase angle difference.



OFF DELAYS (M340+)

The Switch will transfer to the neutral position for 5 seconds prior to transfer to the source it is seeking. Load is not connected to either source during this period.



COMMUNICATIONS

LOCAL & REMOTE (OPTIONAL)

The ability to communicate with the Transfer Switch from a distant location via a PC and Modem is a major feature of the M340 controller.

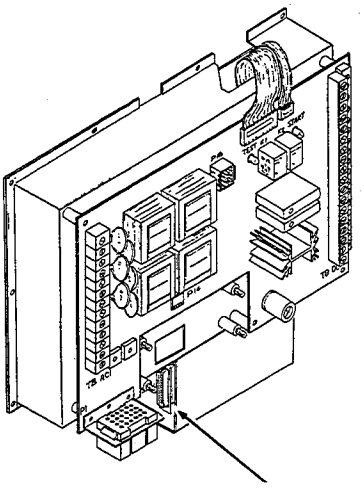
Communication interfacing between a PC and the optional communication board located in the M-340 controller depends on the distance between the two.

LOCAL CONNECTIONS

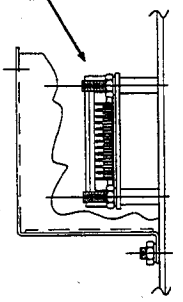
If a single transfer switch is within 50 ft. a direct connection to the computer can be made with an RS-232 cable assembly to an optional RS-232 board installed in the M340 Controller.

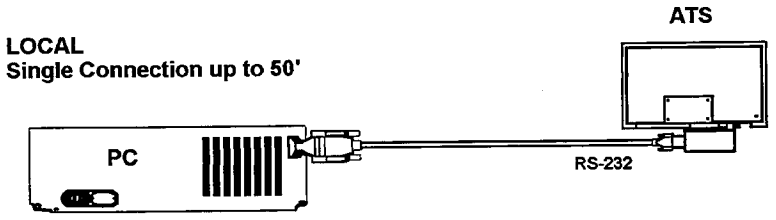
Distances greater than 50 ft. require the use of a RS-232 / RS-485 port converter. A shielded twisted pair of conductors can then be used from the converter to a RS-485 communication board.

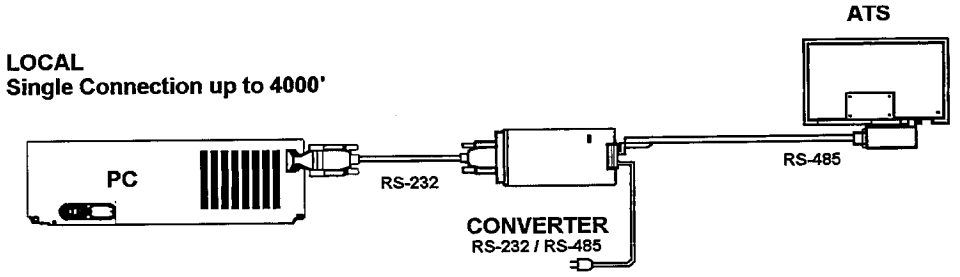
When locally communicating to a network of Transfer switches, shielded twisted pairs are used to interconnect the RS-485 boards. A load resister is required on the last board in the network. The total allowable distance from the converter to the last connected board is 4000 ft.

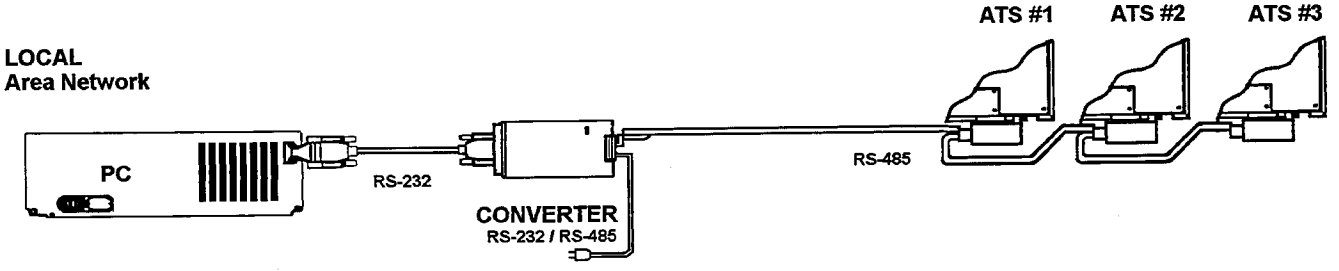


COMMUNICATION BOARD







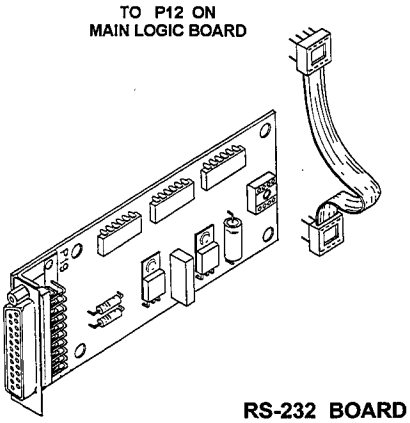


COMMUNICATIONS

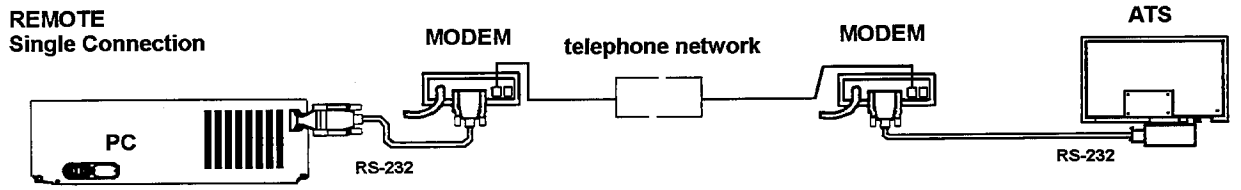
REMOTE CONNECTIONS

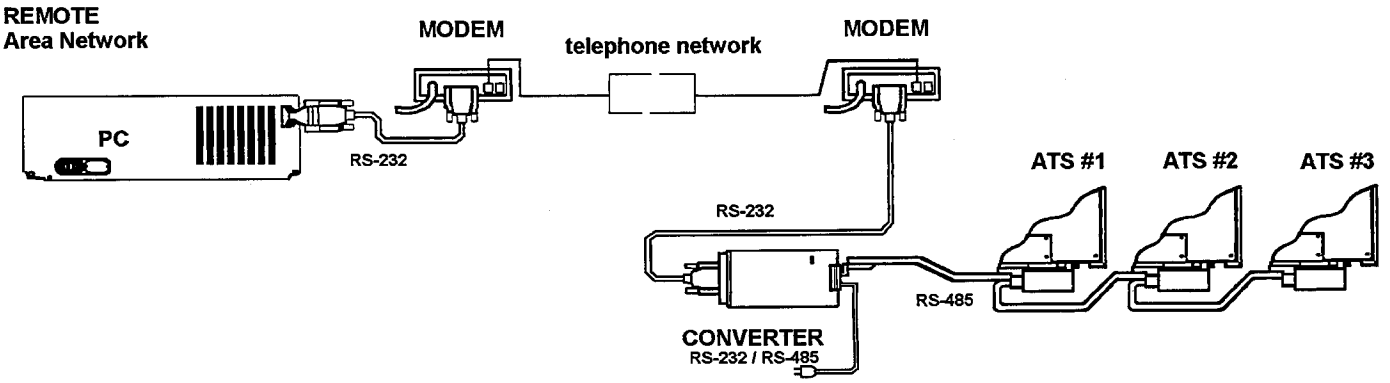
With the use of Modems, communication between a PC and the ATS is possible any where a phone line is available.

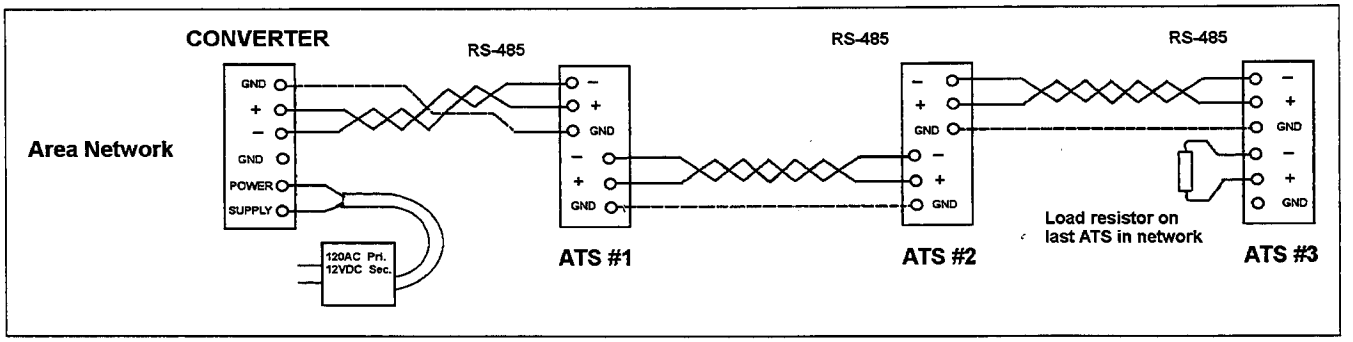
Area Network connections from the receiving Modem to the last ATS in the network is the same as a local area network.



RS-232 BOARD







AUXILIARY DRY CONTACTS
(OPTIONAL)

Single and 10 relay dry contact assemblies are offered which energize upon preselected conditions.

Terminals are provided for connection of the dry contacts to a customer supplied power source and control devices or indicators.

Each relay provides a set of normally open and normally closed contacts rated at 10A / 120VAC.

Relay board Terminal 42A provides power from TB-DC1 terminal 23 (+) to the relay coil(s). The coil is energized when the corresponding K terminal receives a negative (-) signal.

A 6A fuse and holder are included in the kits. for protection of the DC supply circuit to the relay coil.

10 RELAY ASSEMBLY

Up to 10 conditions can be inputted to provide remote indication or control of customer selected devices.

(-) Signals from the output terminals of the TB-DC1 Terminal strip such as;

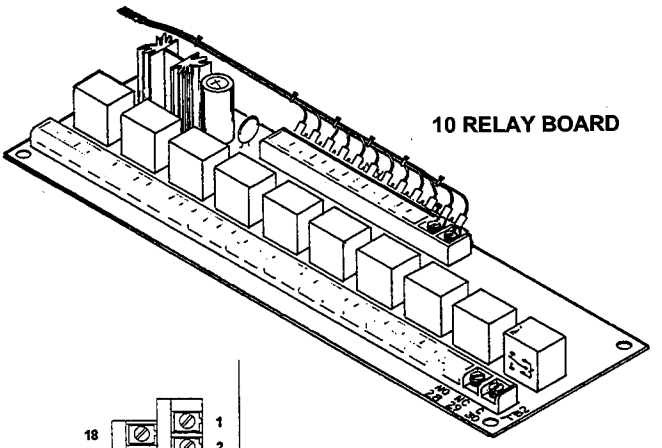
28 (CONTACTOR IN NORMAL POSITION.)
27 (CONTACTOR IN EMERG. POSITION)
26 (NORMAL SOURCE AVAILABLE)
18 (EMERG. SOURCE AVAILABLE)
14 (AUTO/MAN SWITCH IS NOT IN AUTO)
1 (PROGRAMMING SW. NOT IN OFF)
19 (SYSTEM ALERT CONDITION)
5 (LOAD BANK CONTROL)

are wired to the K terminals and will energize the corresponding K relay. Refer to the Function List under the TB-DC1 Terminal Strip section.

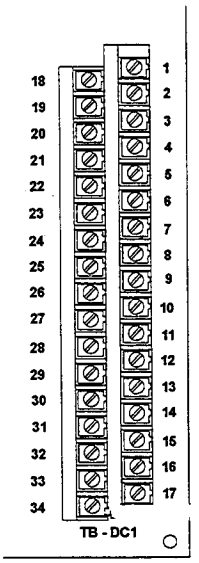
1 RELAY ASSEMBLY

Single relay dry contact kits with one normally open and one normally closed contact are also offered for customer connection.

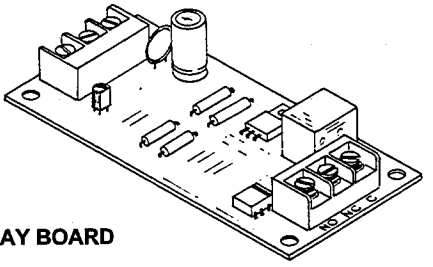
Space is allocated on the accessory door panel for two single relay assemblies.



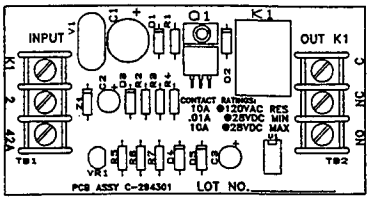
10 RELAY BOARD



CONTROLLER
TERMINALS TB-DC1



1 RELAY BOARD



LOAD SHED
(OPTIONAL)

The Load Shed option is primarily used to reduce the Motor Starting load imposed on an emergency generator when transferring from the Normal source.

The size of an Emergency Standby System can be reduced if it is not required to carry all loads supplied by the Primary source, or if motor loads can be selectively or sequentially applied.

The Load Shed Option allows shedding of customer selected loads prior to a "test" transfer from the Primary source. Time to perform this function is adjustable from 0 - 60 seconds.

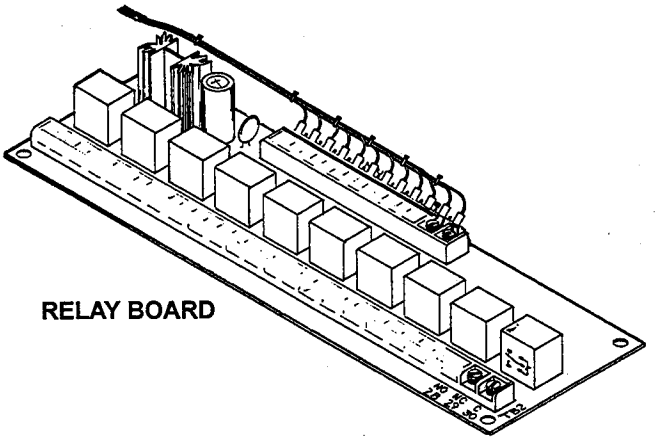
On a successful switch transfer, the selected loads can be systematically or sequentially applied to the Secondary source. Time provided is adjustable from .6 to 60 seconds.

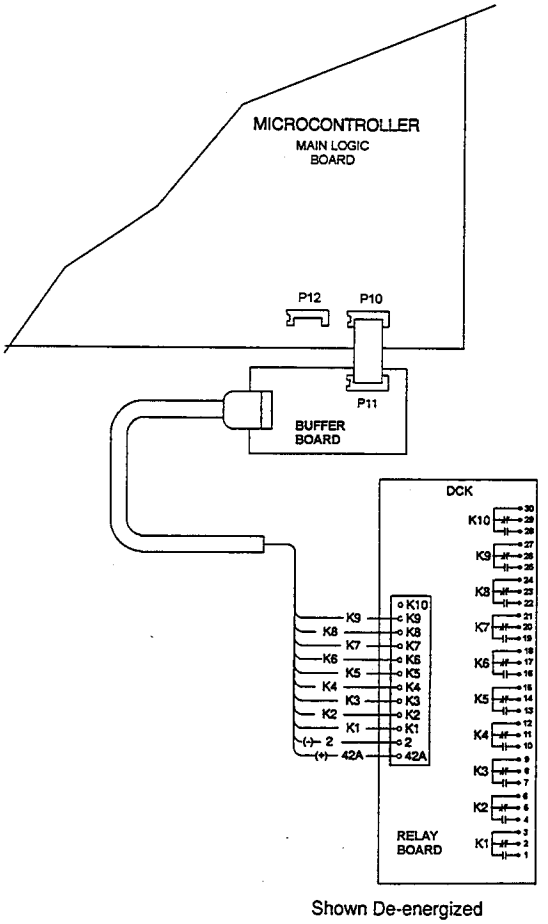
Included with a Relay Assembly is a Buffer/Sequencer circuit board for control of up to nine (9) customer selected loads.

Time delay and sequencing of the control relays is programmed at the Key Pad or PC. The relays can be controlled as a block or individually sequenced. K1 is the first relay activated. K10 is non-operational. One Common, Normally Open and Normally Closed dry contact terminal is provided for each relay.

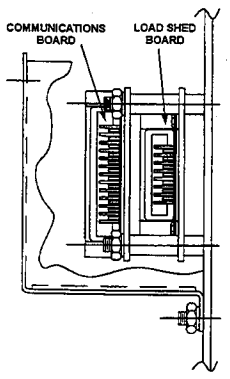
Load contactors and motor starters controlled by the relays are customer supplied devices.

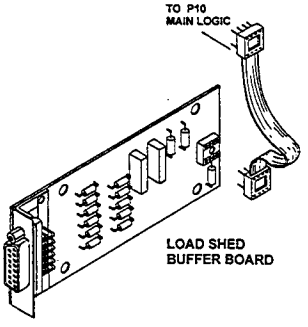
The Relay circuit board assembly is located on the inner door panel. The Sequencer board is mounted at the Communications board location.


RELAY BOARD



Shown De-energized





AREA PROTECTION
(OPTIONAL)

There are various design schemes offered under the term Area Protection. Some require additional transfer switches and others separate or duplicate circuits.

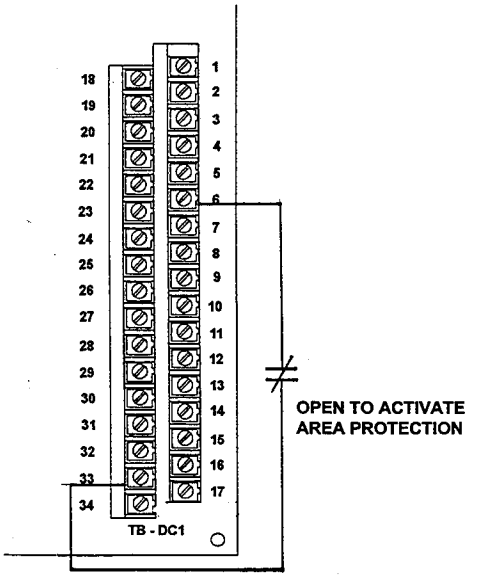
In addition to the standard Controller sensing circuit, modules can be installed to monitor the power at specific or critical areas. A transfer to the emergency source will be initiated if power to any of the protected areas is not within the predetermined level.

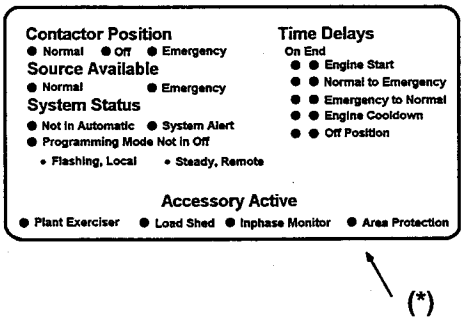
Terminals are provided on the TB-DC1 terminal strip for connection of contacts from customer supplied voltage sensing devices. An open circuit between the terminals will cause an engine start and transfer to the emergency source.

While the traditional use for area protection is to provide emergency power to a preselected circuit, the option is also used for customer initiated start-up and transfer to emergency in preparation for an oncoming storm.

Area protection is activated on the M-340 controller when the jumper is REMOVED between Terminals 6 and 33 of TB-DC1 and replaced by a set of dry contacts or a switch.

<u>An open circuit between Terminal 6 and 33 (grd) will light the Area Protection LED indicator (*) and initiate an engine start and transfer to the Emergency source.</u>

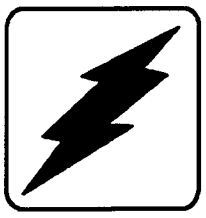




KOHLER® POWER SYSTEMS

Training Manual

Transfer Switch Controller
M340
M340+



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