SSPMA

Sump and Sewage Pump Manufacturers Association

Since 1956, we are a North American trade organization of sump, effluent, and sewage pump manufacturers and their suppliers.

Working together to:

- train wastewater and plumbing professionals, and
- create product performance and safety standards.

SSPMA members collaborate with each other and government regulators to educate consumers and professionals on the latest products, their application, proper sizing techniques, safe installation and use, and good maintenance practices.

SSPMA MEMBERS

Barnes Pumps / Crane Pumps & Systems

Champion Pump Company, Inc.

Eco-Flo Products Inc. / Ashland Pump Company

Franklin Electric / Little Giant

Goulds Water Technology, a xylem brand

GP Enterprises Co., Ltd.

Liberty Pumps

Pentair Water

Superior Pump Company

Zoeller Company

SSPMA ASSOCIATE MEMBERS

AK Industries

Alderon Industries

John Crane, Inc.

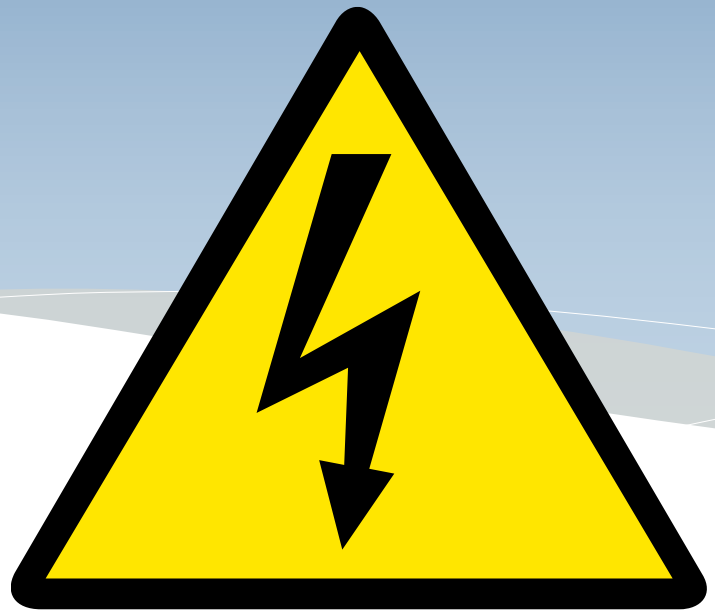
LevelGuard / Touch Sensor Technologies

See Water, Inc.

SJE-Rhombus

Topp Industries, Inc.

BASIC ELECTRICAL THEORY RELATING TO ONSITE SEPTIC CONTROLS



WHY USE A CONTROL PANEL?

- CONVENIENCE OF ALARM AND CONTROL IN ONE PACKAGE
- CONTROL OF LARGER HORSEPOWER PUMPS (CONTACTOR CONTROL)
- ALLOWS MANUAL OPERATION OF THE PUMP
- PUMP MONITORING
- CONTROL OF 3 PHASE PUMPS
- DUPLEX OPERATIONS
- CONTROL OF PUMPS REQUIRING EXTERNAL START COMPONENTS
- INTRINSICALLY SAFE APPLICATIONS
- TIMED DOSE APPLICATIONS

SAFETY FIRST

- ALWAYS TURN OFF POWER WHEN WORKING INSIDE A CONTROL PANEL
- VOLTAGE ALWAYS FOLLOWS THE PATH OF LEAST RESISTANCE
- IT TAKES LESS THAN 1/2 AMP OF CURRENT TO STOP YOUR HEART

- **TO KILL POWER TO THE ENTIRE CONTROL PANEL YOU MUST TURN OFF THE CIRCUIT BREAKER FEEDING THE CONTROL PANEL - LOCATED OUTSIDE AND SEPARATE FROM THE CONTROL PANEL.**
- **TURNING OFF THE CIRCUIT BREAKERS INSIDE THE CONTROL PANEL ONLY KILLS POWER TO THE COMPONENTS DOWN STREAM OF THE BREAKERS. EVERYTHING BEFORE THE CIRCUIT BREAKERS IS STILL LIVE.**

TERMINOLOGY & DEFINITIONS

VOLTS - The practical meter-kilogram-second unit of electrical potential difference and electromotive force equal to the difference of potential between two points in a conducting wire carrying a constant current of one ampere when the power dissipated between these two points is equal to one watt and equivalent to the potential difference across a resistance of one ohm when one ampere is flowing through it

- THINK OF VOLTAGE AS THE PRESSURE BEING PRODUCED BY THE PUMP, THINK OF THIS AS H.P.

TERMINOLOGY & DEFINITIONS

AMPERE (AMPS) - The practical meter-kilogram-second unit of electric current that is equivalent to a flow of one coulomb per second or to the steady current produced by one volt applied across a resistance of one ohm

- THINK OF CURRENT (AMPS) AS THE FLOW RATE, HOW FAST THE WATER FLOWS THROUGH THE PIPES. THINK OF THIS AS GAL/MIN

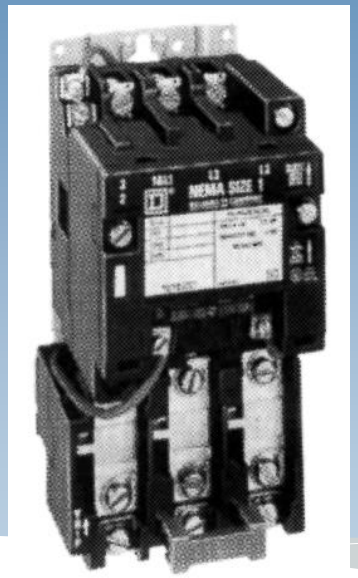
TERMINOLOGY & DEFINITIONS

OHM - The practical meter-kilogram-second unit of electric resistance equal to the resistance of a circuit in which a potential difference of one volt produces a current of one ampere

- THINK OF OHMS AS THE RESISTANCE THAT ACTS ON THE WATER. THE MORE RESTRICTIONS THE HIGHER THE RESISTANCE. THINK OF THIS AS TDH (TOTAL DYNAMIC HEAD)

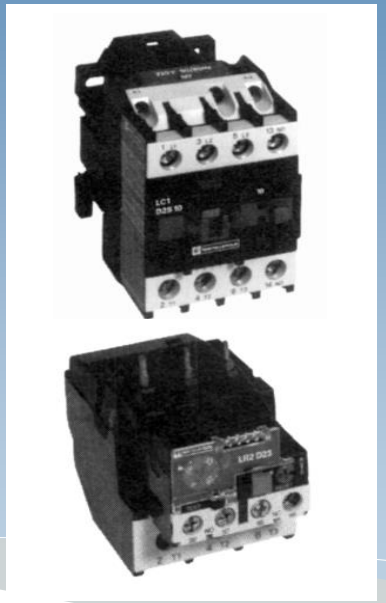
COMPONENTS

MOTOR CONTACTORS



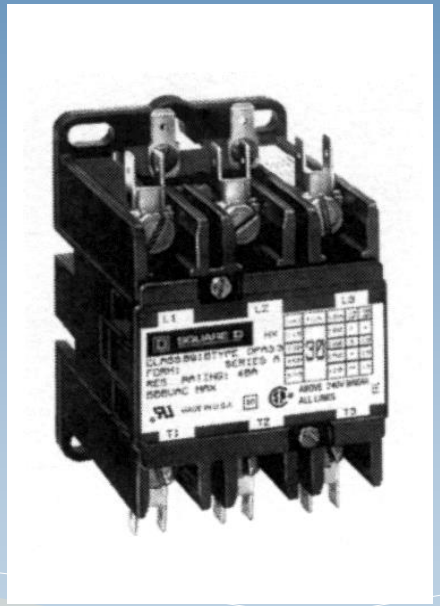
Full Voltage Contactors and Starters - NEMA Rated

10 MILLION CYCLE RATING



IEC Style Contactors and Overloads

15 MILLION CYCLE RATING

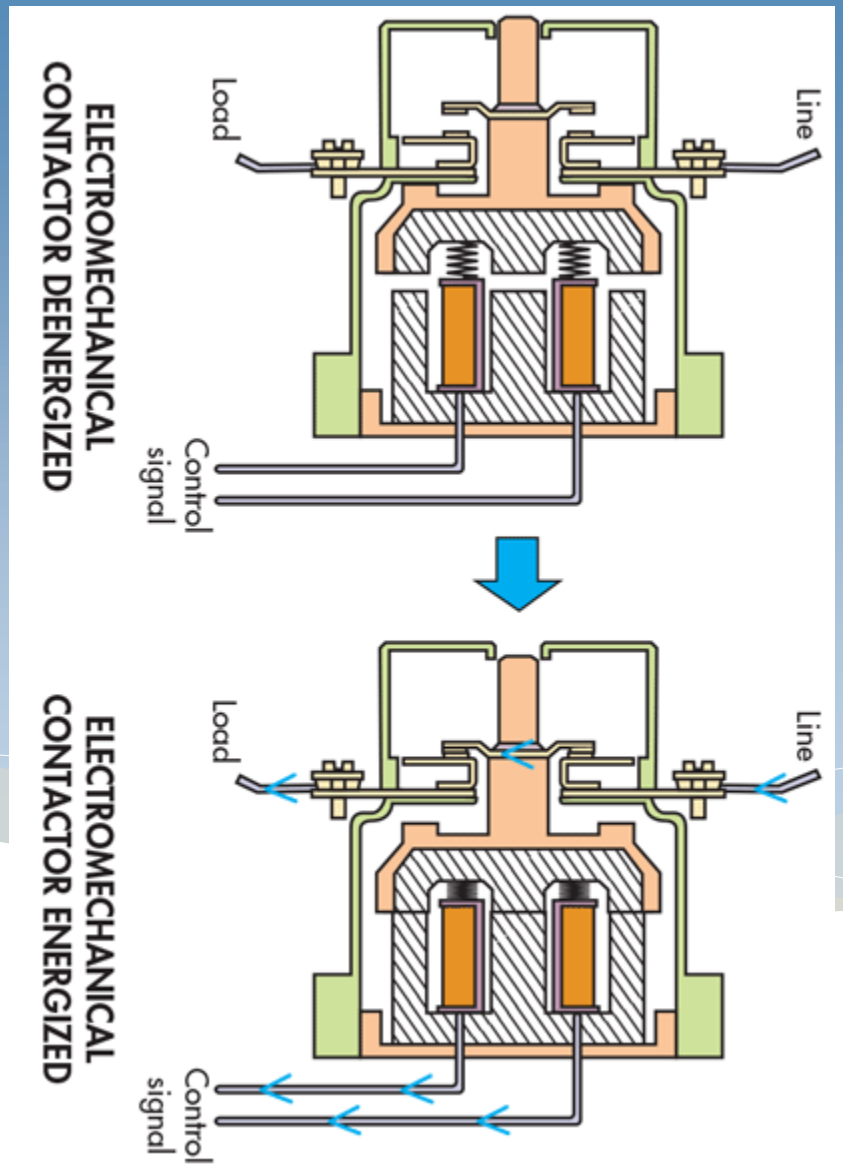


DEFINITE PURPOSE CONTACTORS

2.5 MILLION CYCLE RATING

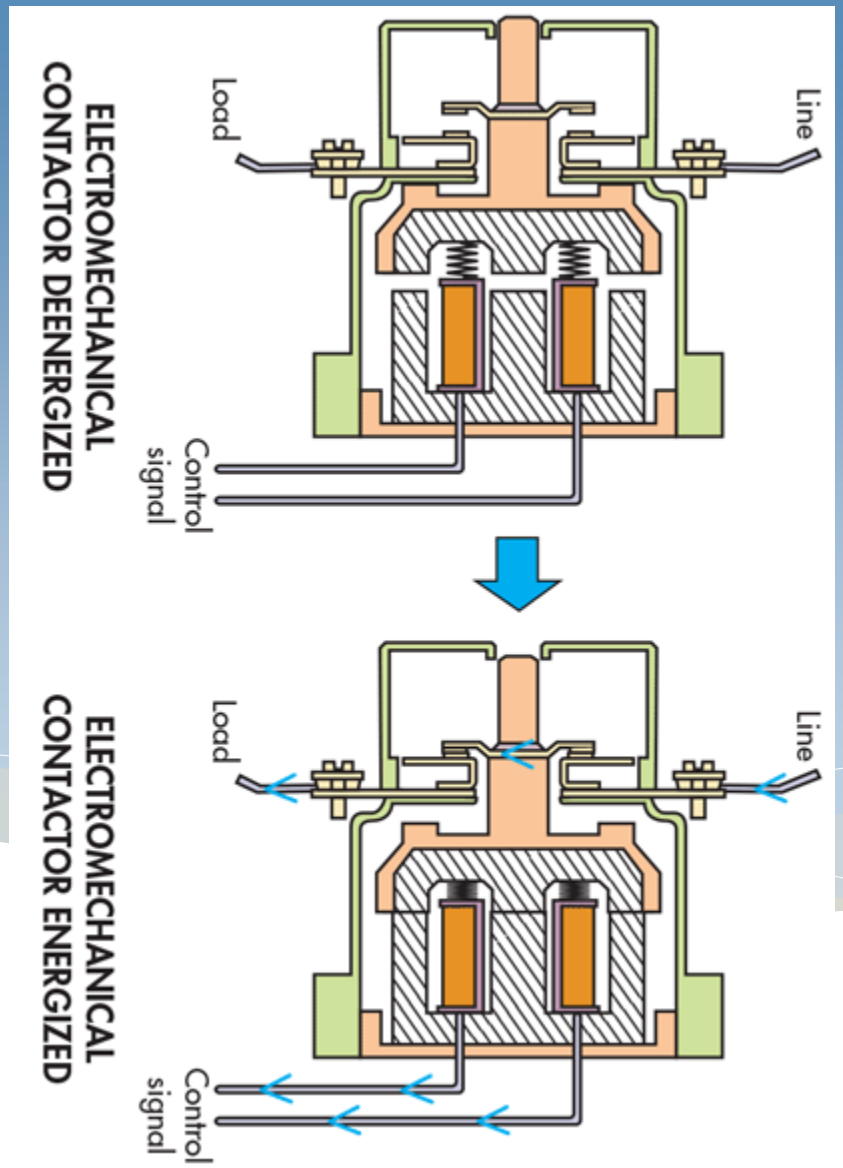
- A MOTOR CONTACTOR IS AN ELECTRICALLY CONTROLLED SWITCH USED FOR SWITCHING AN ELECTRICAL POWER CIRCUIT, SIMILAR TO A RELAY EXCEPT WITH A HIGHER CURRENT RATING.

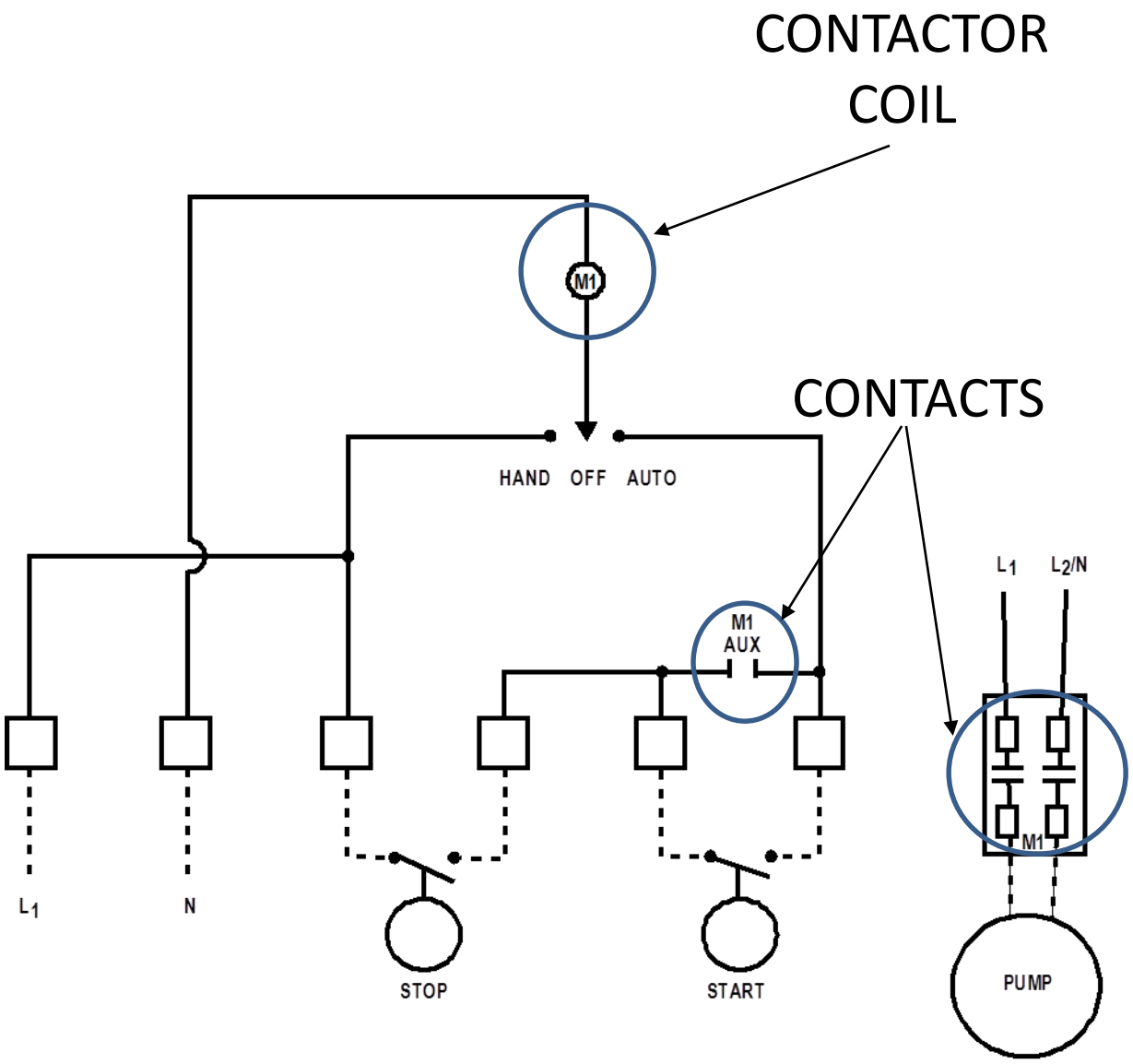
- A CONTACTOR IS CONTROLLED BY A CIRCUIT WHICH HAS A MUCH LOWER POWER LEVEL THAN THE SWITCHED CIRCUIT



- A MOTOR CONTACTOR COIL IS CONNECTED MECHANICALLY TO THE SWITCHING CONTACTS, BUT SEPARATE ELECTRICALLY

- NORMALLY OPEN (NO) AND NORMALLY CLOSED (NC) REFER TO THE CONTACT POSITION IN AN **UNENERGIZED** STATE




CONTACTOR
COIL
M1
CONTACTS
HAND OFF AUTO
M1
AUX
L1
L2/N
M1
L1
N
STOP
START
PUMP

CIRCUIT BREAKER - The National Electrical Manufacturers Association (NEMA) defines a circuit breaker as a device designed to open and close a circuit, by non-automatic means, and to open the circuit automatically on a predetermined overcurrent without injury to itself when properly applied within its rating.

WHAT THIS MEANS TO US - A CIRCUIT BREAKER PROTECTS THE **ASSOCIATED WIRING** DURING A CATASTROPHIC MOTOR FAILURE DUE TO:

- GROUND FAULT
- THERMAL OVERLOAD
- SHORT CIRCUIT

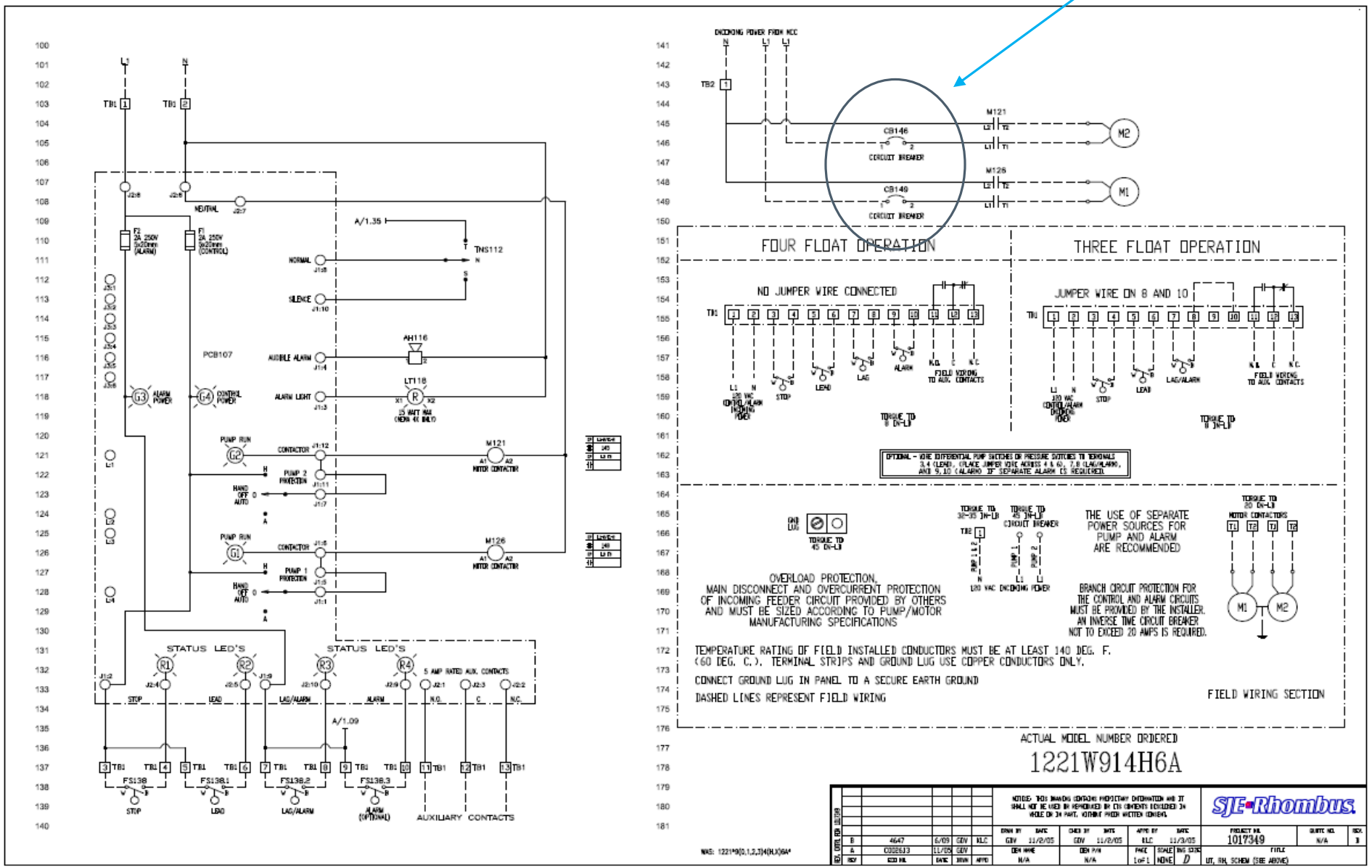
CIRCUIT BREAKERS

THERMAL-MAGNETIC MOLDED CASE

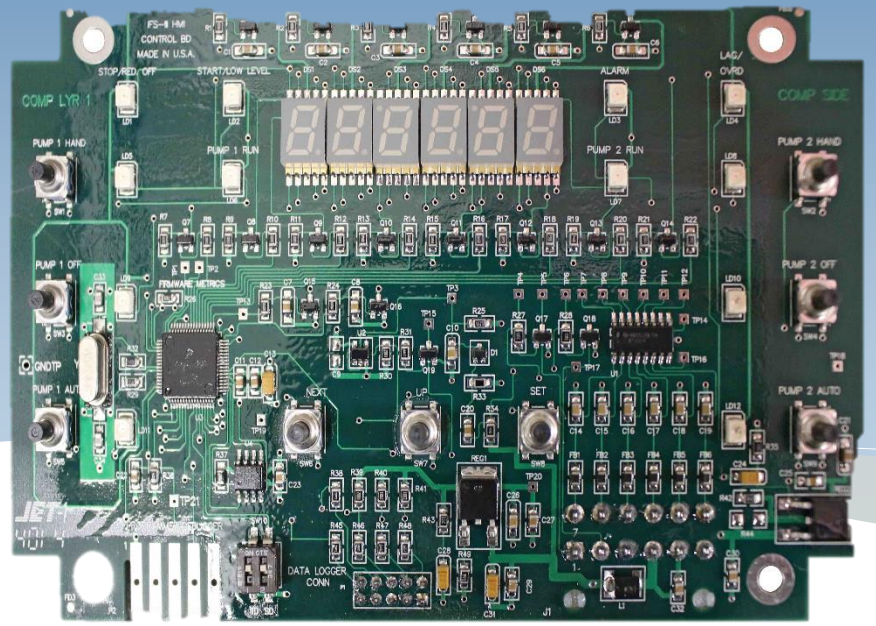
THERMAL-MAGNETIC MOLDED CASE (MINIATURE)

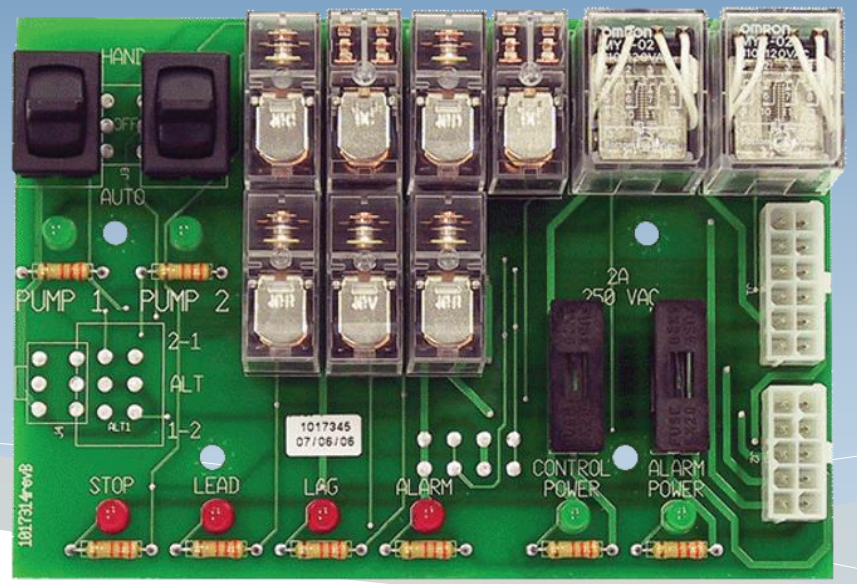
INSTANTANEOUS TRIP/MAGNETIC ONLY/MCP

115VAC CIRCUIT BREAKERS



CIRCUIT BOARDS





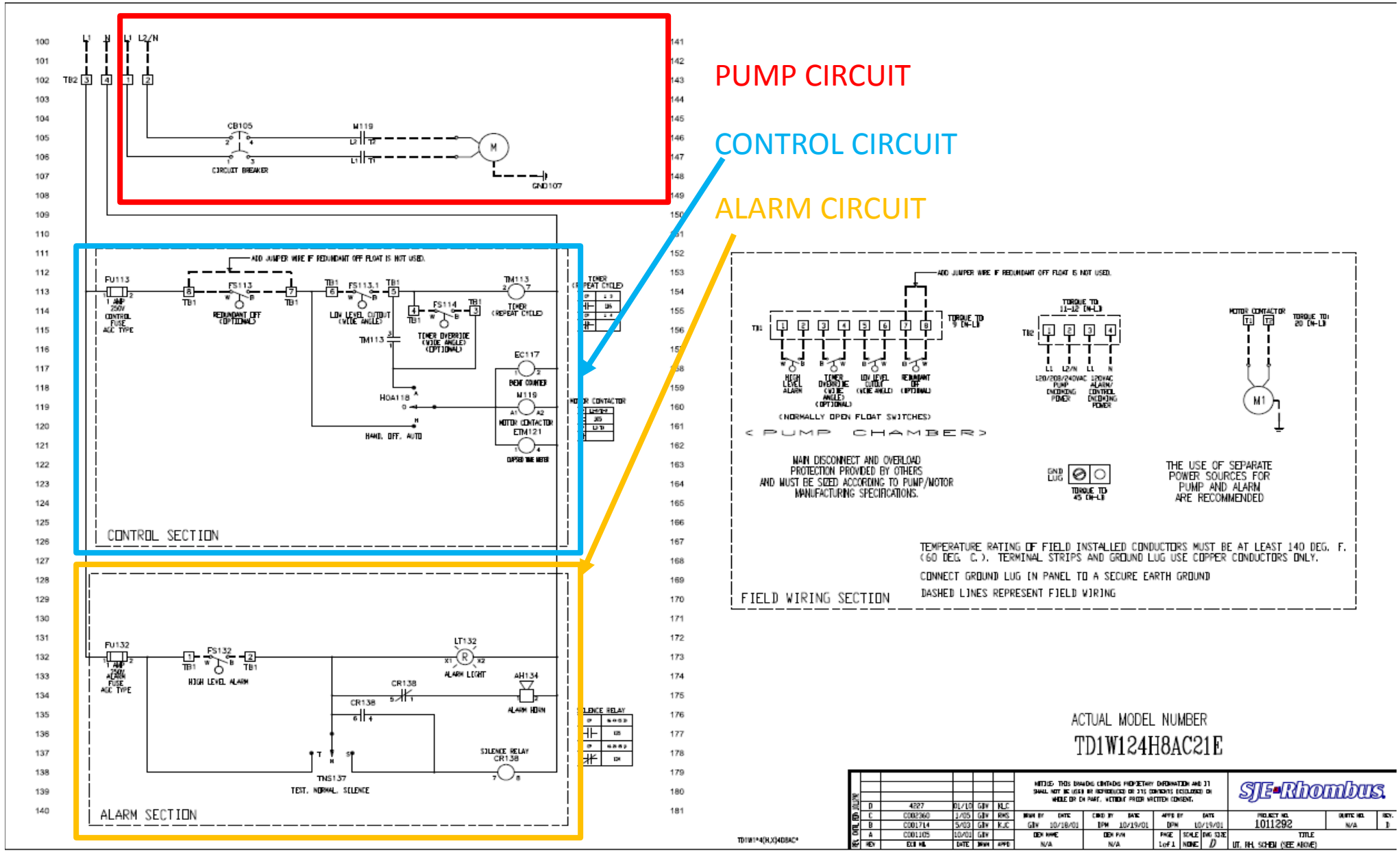
MICROPROCESSOR BASED

ANALOG/RELAY LOGIC

3 CIRCUITS

- PUMP CIRCUIT
- CONTROL CIRCUIT
- ALARM CIRCUIT

- **THE PUMP CIRCUIT PROVIDES POWER TO THE PUMP.**
- **THE CONTROL CIRCUIT POWERS THE MOTOR CONTACTOR COIL, ETM'S, CC'S, PUMP RUN LIGHTS.**
- **THE ALARM CIRCUIT POWERS THE HORN & BEACON, AND CAN BE COMBINED WITH THE CONTROL CIRCUIT, BUT SHOULD ALWAYS BE SEPARATE ELECTRICALLY FROM THE PUMP CIRCUIT.**


PUMP CIRCUIT
CONTROL CIRCUIT
ALARM CIRCUIT
CONTROL SECTION
ALARM SECTION
FIELD WIRING SECTION
ADD JUMPER WIRE IF REDUNDANT OFF FLOAT IS NOT USED.
(NORMALLY OPEN FLOAT SWITCHES)
< PUMP CHAMBER >
MAIN DISCONNECT AND OVERLOAD PROTECTION PROVIDED BY OTHERS AND MUST BE SIZED ACCORDING TO PUMP/MOTOR MANUFACTURING SPECIFICATIONS.
THE USE OF SEPARATE POWER SOURCES FOR PUMP AND ALARM ARE RECOMMENDED
TEMPERATURE RATING OF FIELD INSTALLED CONDUCTORS MUST BE AT LEAST 140 DEG. F. (60 DEG. C.). TERMINAL STRIPS AND GROUND LUG USE COPPER CONDUCTORS ONLY.
CONNECT GROUND LUG IN PANEL TO A SECURE EARTH GROUND
DASHED LINES REPRESENT FIELD WIRING
ACTUAL MODEL NUMBER
TD1W124H8AC21E
SJE-Rhombus
TITLE
LIT. WH. SCHEM (SEE ABOVE)

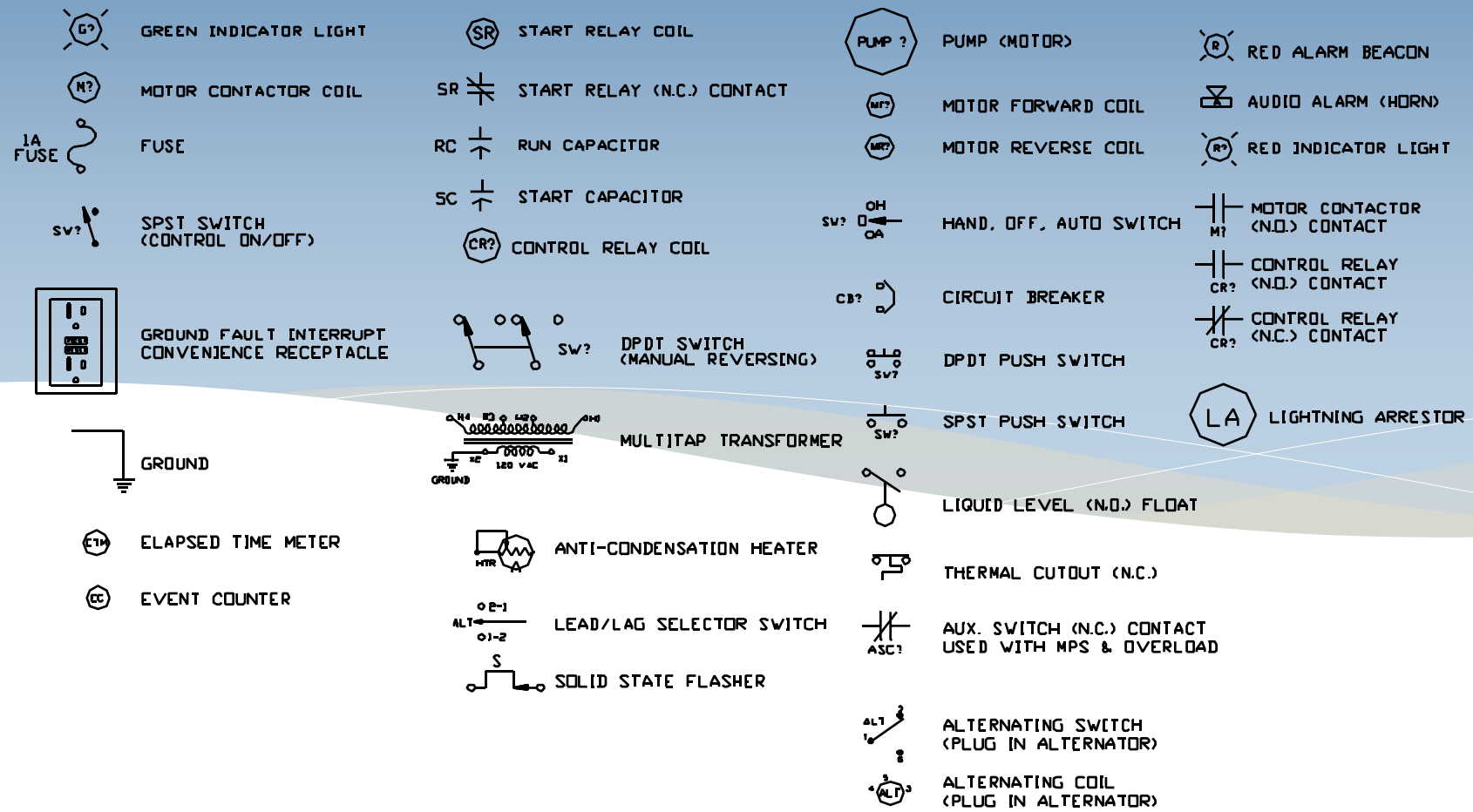
READING SCHEMATICS - 101

READING A SCHEMATIC

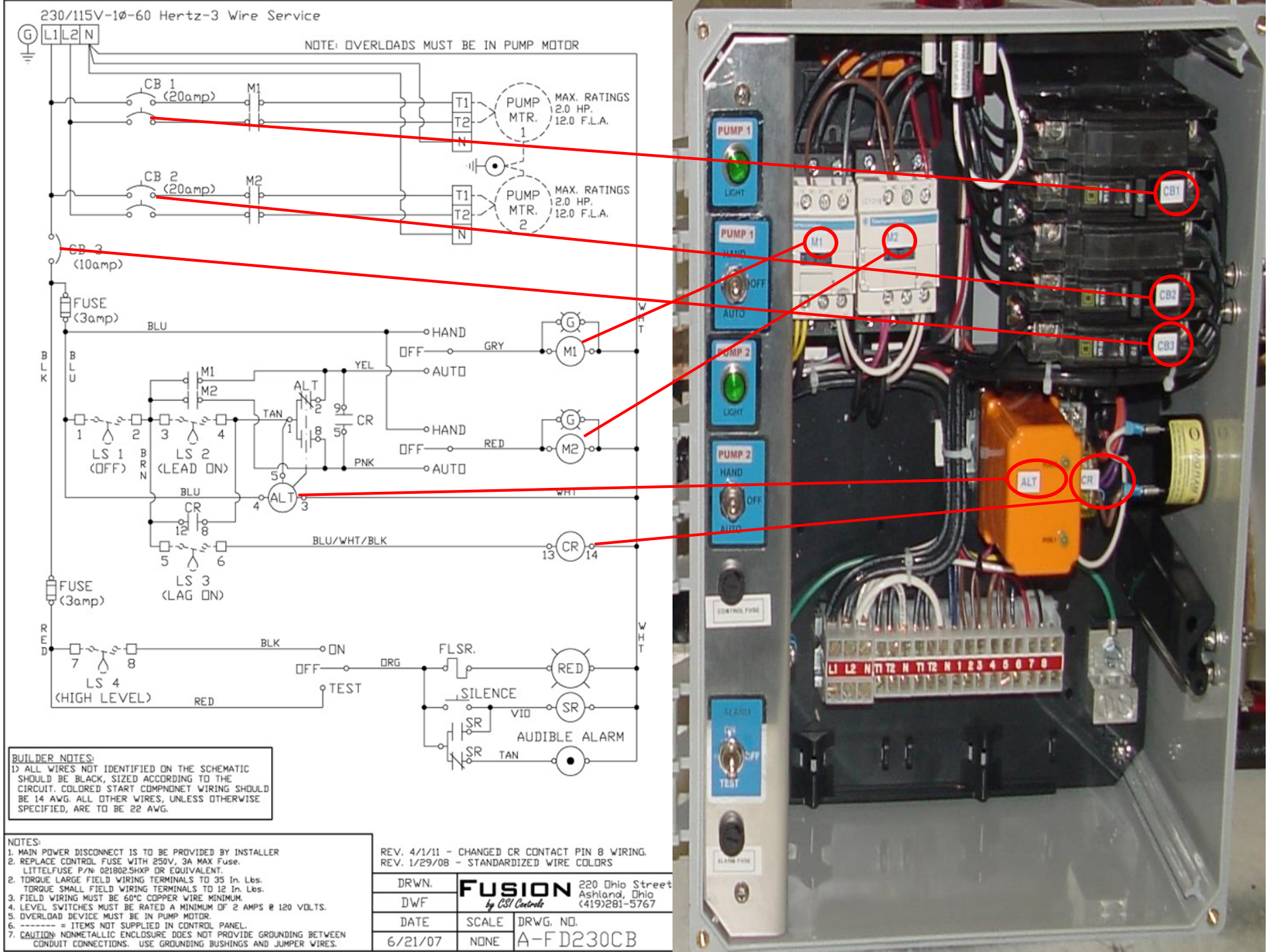
READING A SCHEMATIC IS LIKE READING A ROAD MAP

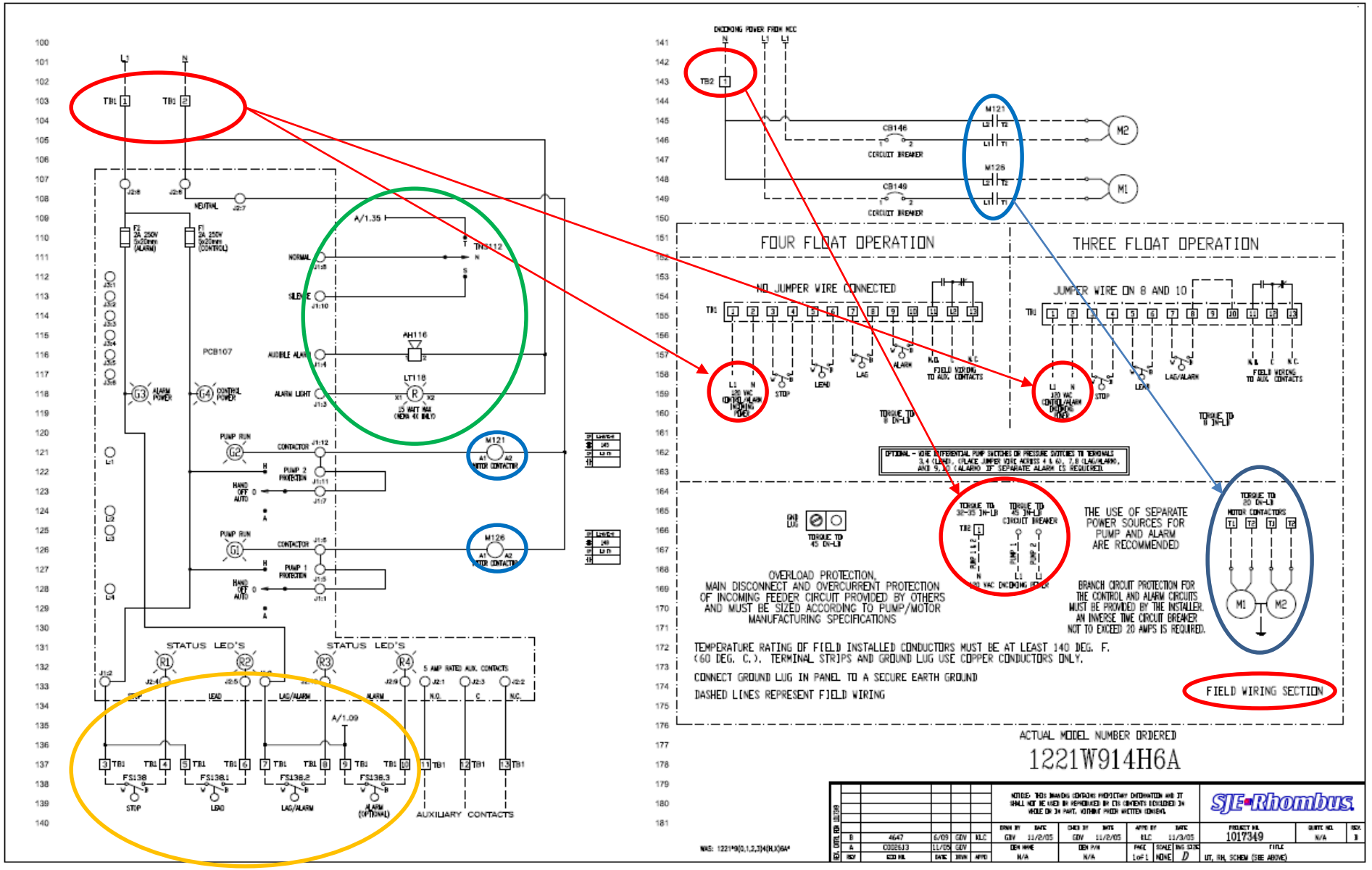
- FIND YOUR STARTING POINT AND DESTINATION, THEN FOLLOW THE MAP.
- USE YOUR METER TO CHECK CIRCUITS ALONG THE WAY
- IT'S OKAY TO ASK FOR DIRECTIONS IF YOU GET LOST

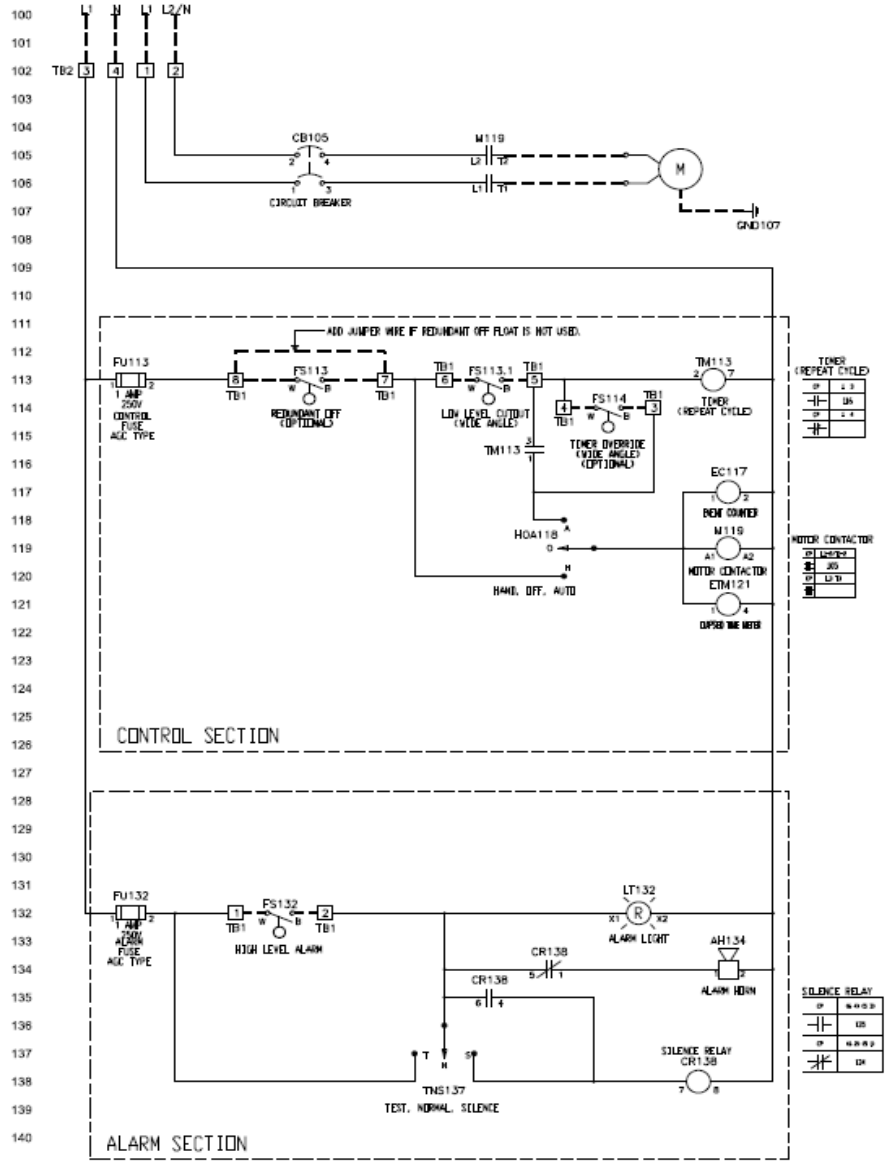
COMMON SCHEMATIC SYMBOLS

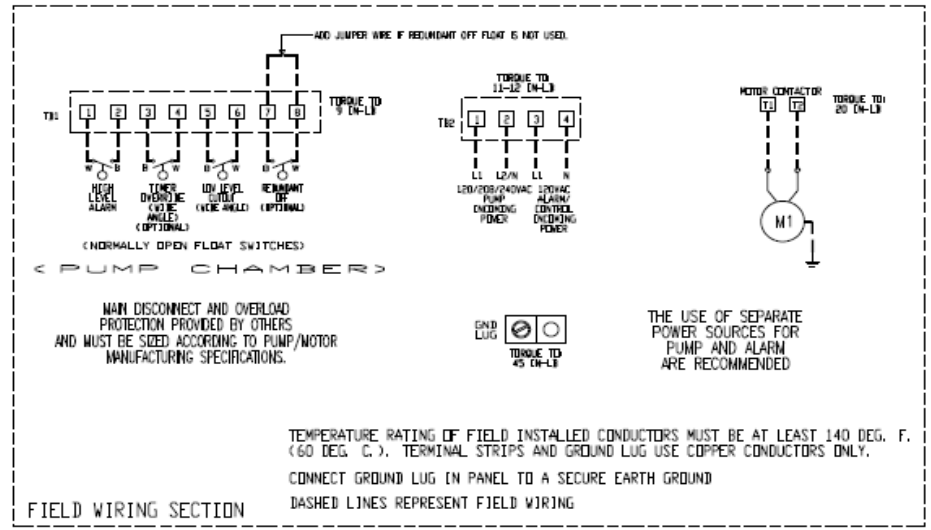


? DENOTES THE NUMBER OF ITEM


230/115V-1Ø-60 Hertz-3 Wire Service
NOTE: OVERLOADS MUST BE IN PUMP MOTOR
CB 1 (20amp)
M1
CB 2 (20amp)
M2
CB 3 (10amp)
PUMP MTR. 1
PUMP MTR. 2
MAX. RATINGS 2.0 HP. 12.0 F.L.A.
FUSE (3amp)
FUSE (3amp)
HAND
OFF
AUTO
LS 1 (OFF)
LS 2 (LEAD ON)
LS 3 (LAG ON)
LS 4 (HIGH LEVEL)
ALT
CR
FLSR.
SILENCE
SR
AUDIBLE ALARM
TEST
BUILDER NOTES:
1) ALL WIRES NOT IDENTIFIED ON THE SCHEMATIC SHOULD BE BLACK, SIZED ACCORDING TO THE CIRCUIT. COLORED START COMPNONET WIRING SHOULD BE 14 AWG. ALL OTHER WIRES, UNLESS OTHERWISE SPECIFIED, ARE TO BE 22 AWG.
NOTES:
1. MAIN POWER DISCONNECT IS TO BE PROVIDED BY INSTALLER
2. REPLACE CONTROL FUSE WITH 250V, 3A MAX Fuse. LITTELFUSE P/N: 021802.5HXP OR EQUIVALENT.
2. TORQUE LARGE FIELD WIRING TERMINALS TO 35 In. Lbs. TORQUE SMALL FIELD WIRING TERMINALS TO 12 In. Lbs.
3. FIELD WIRING MUST BE 60°C COPPER WIRE MINIMUM.
4. LEVEL SWITCHES MUST BE RATED A MINIMUM OF 2 AMPS @ 120 VOLTS.
5. OVERLOAD DEVICE MUST BE IN PUMP MOTOR.
6. ------- = ITEMS NOT SUPPLIED IN CONTROL PANEL.
7. CAUTION: NONMETALLIC ENCLOSURE DOES NOT PROVIDE GROUNDING BETWEEN CONDUIT CONNECTIONS. USE GROUNDING BUSHINGS AND JUMPER WIRES.
REV. 4/1/11 - CHANGED CR CONTACT PIN 8 WIRING.
REV. 1/29/08 - STANDARDIZED WIRE COLORS
DRWN. DWF
DATE 6/21/07
FUSION by CSI Controls
220 Ohio Street Ashland, Ohio (419)281-5767
SCALE NONE
DRWG. NO. A-FD230CB
CB1
CB2
CB3
ALT
CR
M1
M2


FOUR FLOAT OPERATION
THREE FLOAT OPERATION
NO JUMPER WIRE CONNECTED
JUMPER WIRE ON 8 AND 10
STATUS LED'S
STATUS LED'S
AUXILIARY CONTACTS
OVERLOAD PROTECTION,
MAIN DISCONNECT AND OVERCURRENT PROTECTION
OF INCOMING FEEDER CIRCUIT PROVIDED BY OTHERS
AND MUST BE SIZED ACCORDING TO PUMP/MOTOR
MANUFACTURING SPECIFICATIONS
THE USE OF SEPARATE
POWER SOURCES FOR
PUMP AND ALARM
ARE RECOMMENDED
BRANCH CIRCUIT PROTECTION FOR
THE CONTROL AND ALARM CIRCUITS
MUST BE PROVIDED BY THE INSTALLER.
AN INVERSE TIME CIRCUIT BREAKER
NOT TO EXCEED 20 AMPS IS REQUIRED.
TEMPERATURE RATING OF FIELD INSTALLED CONDUCTORS MUST BE AT LEAST 140 DEG. F.
(60 DEG. C.). TERMINAL STRIPS AND GROUND LUG USE COPPER CONDUCTORS ONLY.
CONNECT GROUND LUG IN PANEL TO A SECURE EARTH GROUND
DASHED LINES REPRESENT FIELD WIRING
FIELD WIRING SECTION
ACTUAL MODEL NUMBER ORDERED
1221W914H6A
SJE-Rhombus





ACTUAL MODEL NUMBER

TD1W124H8AC21E

TD1W1*4(H,X)4DBAC*

REV	DESCRIPTION	DATE	DRAWN	APPD
D	4827	01/10	GBW	KLC
C	C0002360	1/05	GBW	RMS
B	C0001714	5/03	GBW	KJC
A	C0001105	10/02	GBW	

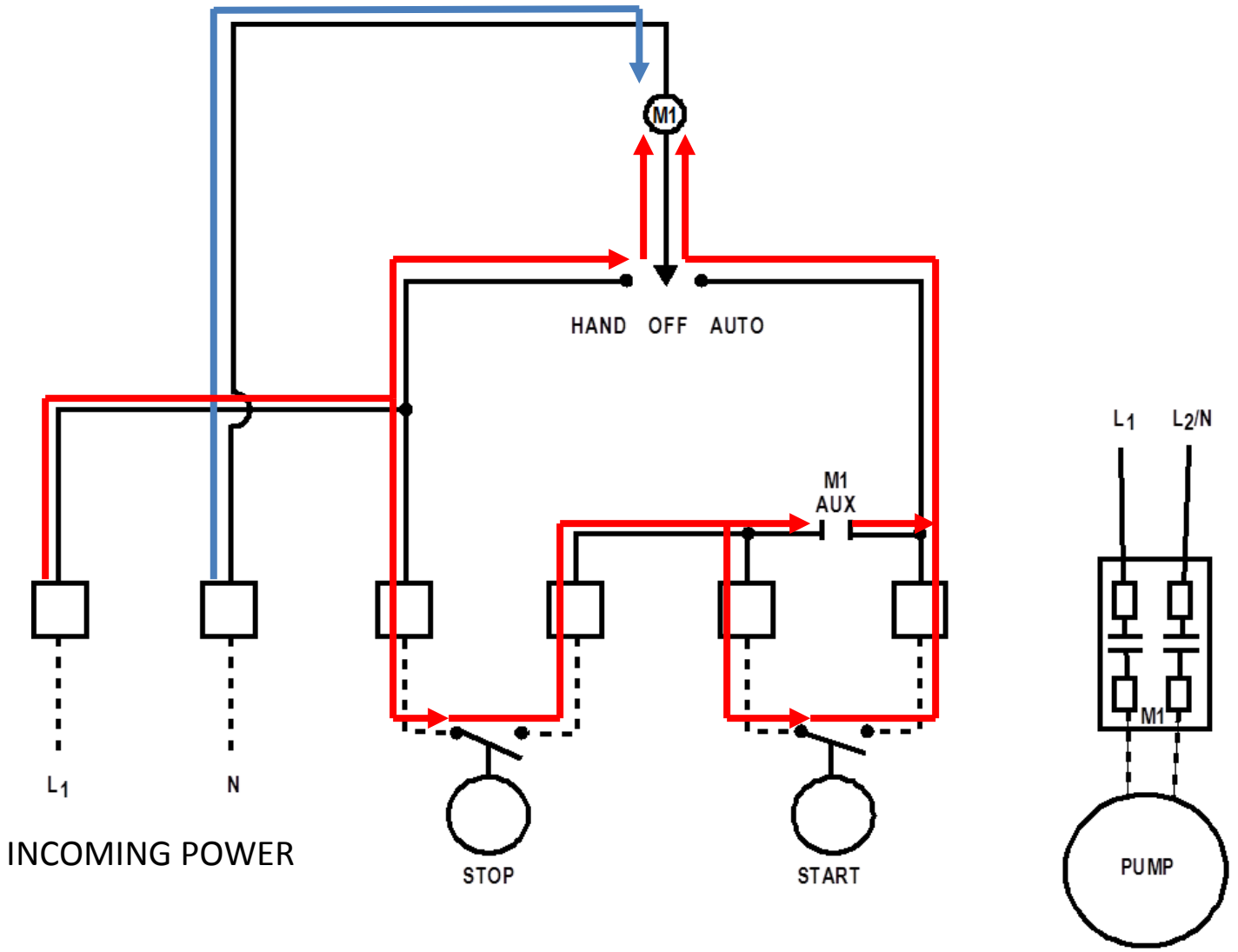
SJE-Rhombus

DRAWN BY	DATE	CHKD BY	DATE	APPD BY	DATE
GBW	10/18/01	DPM	10/19/01	DPM	10/19/01

DRAWING NAME: N/A
DRAWING P/N: N/A
PAGE: 1 of 1
SCALE: NONE
DWG SIZE: D

PROJECT NO.	QUOTE NO.	REV.
1011292	N/A	D

TITLE: UT, RM, SCHEM (SEE ABOVE)



SIMPLE LATCHING CIRCUIT

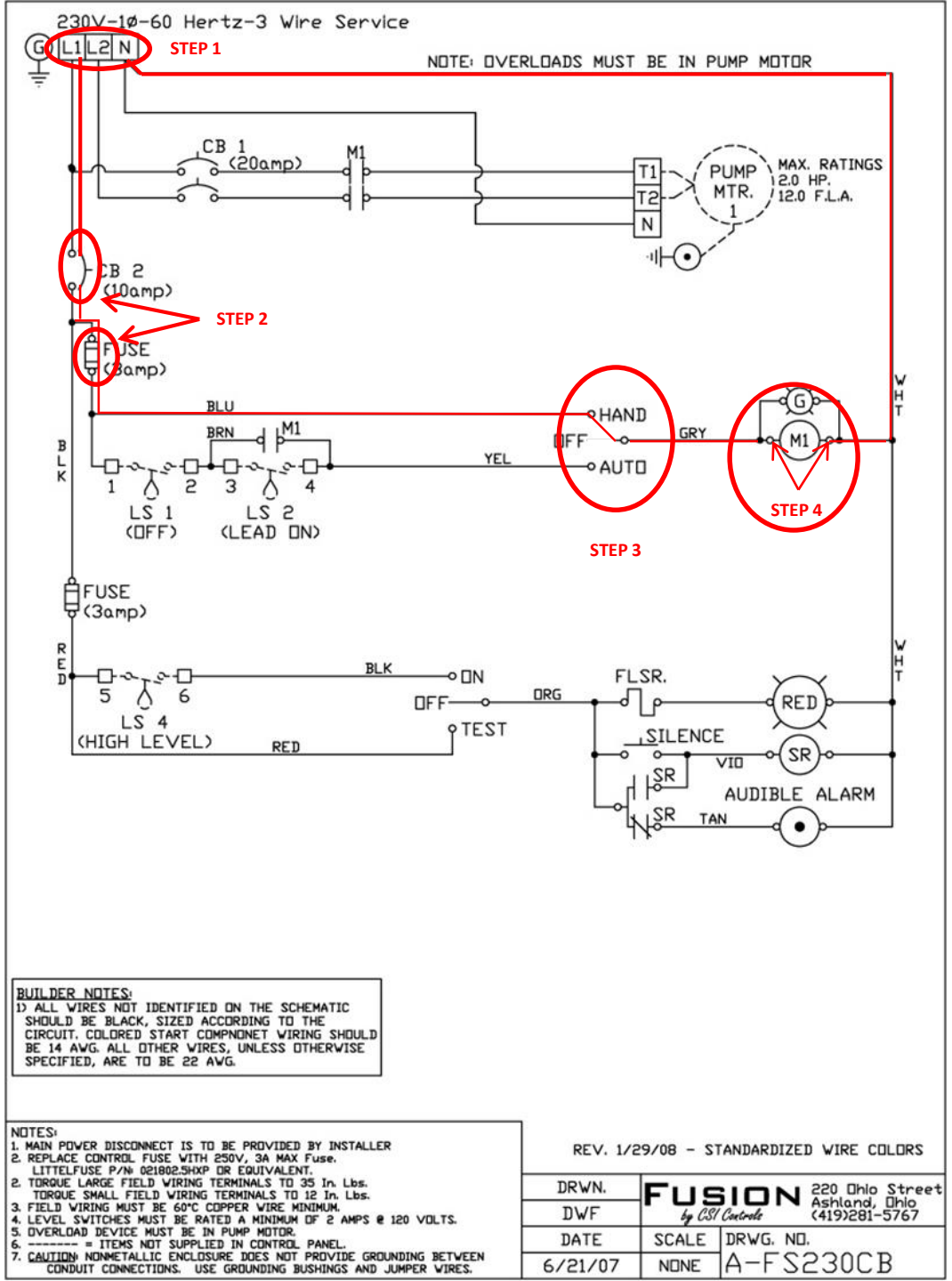
IN THIS EXAMPLE THE PUMP WILL NOT RUN IN HAND OR AUTO, CONTACTOR DOES NOT PULL IN. PUMP DOES RUN WHEN CONTACTOR IS PUSHED IN MANUALLY.

STEP 1: PLACE HOA SWITCH TO "OFF", CHECK INCOMING VOLTAGE FOR CONTROL ALARM CIRCUIT

STEP 2: CHECK FUSES AND CIRCUIT BREAKERS

STEP 3: PLACE HOA SWITCH TO "HAND"

STEP 4: CHECK VOLTAGE AT MOTOR CONTACTOR COIL



IN THIS EXAMPLE OUR PUMP WILL NOT RUN IN HAND OR AUTO, CONTACTOR DOES PULL IN.

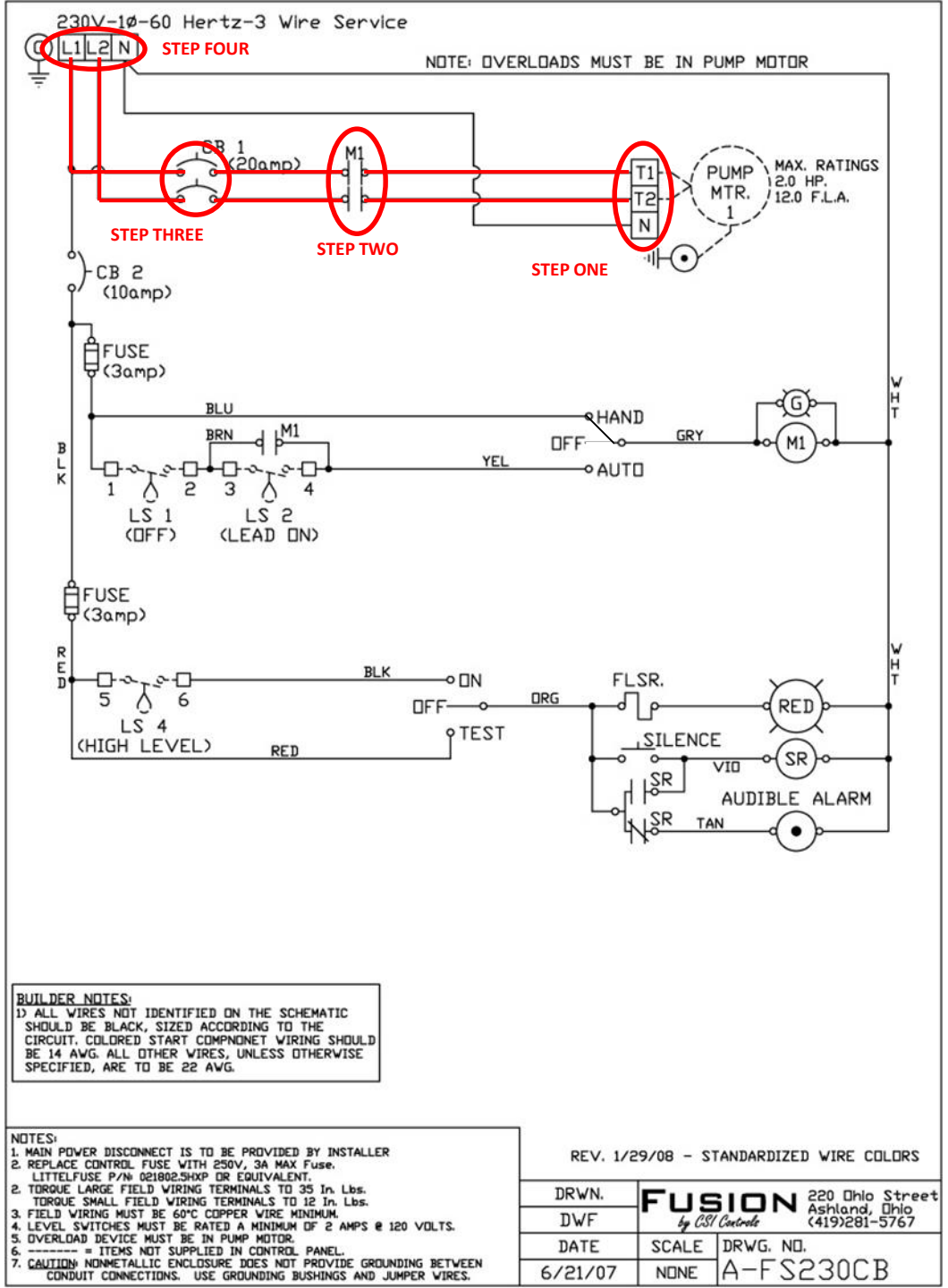
WHAT IS OUR FIRST STEP?

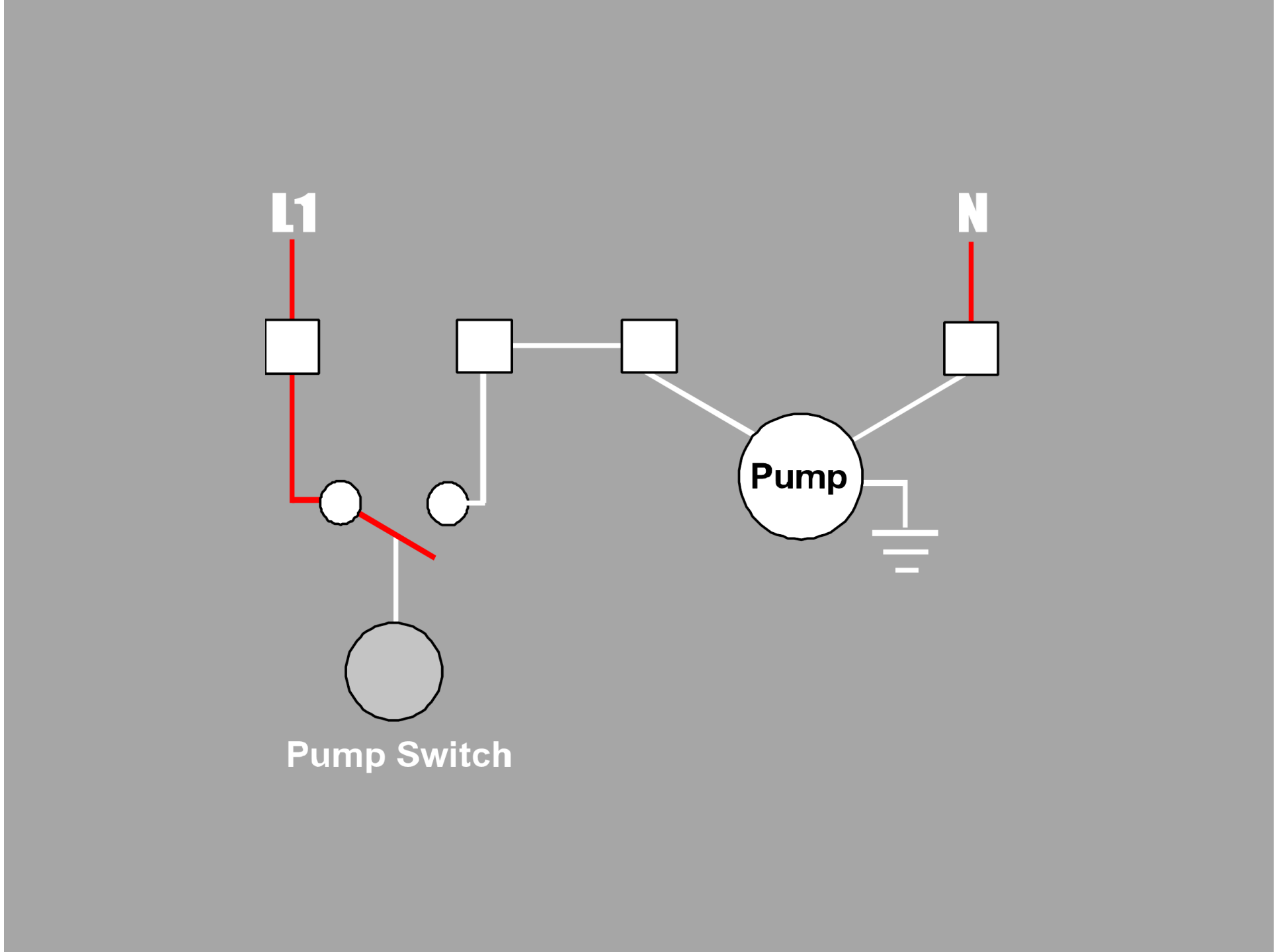
A: CHECK POWER AT THE PUMP CONNECTION. IS IT THERE? YES – PUMP NEEDS TO BE CHECKED. NO-WORK YOUR WAY BACKWARDS & GO TO THE NEXT STOP.

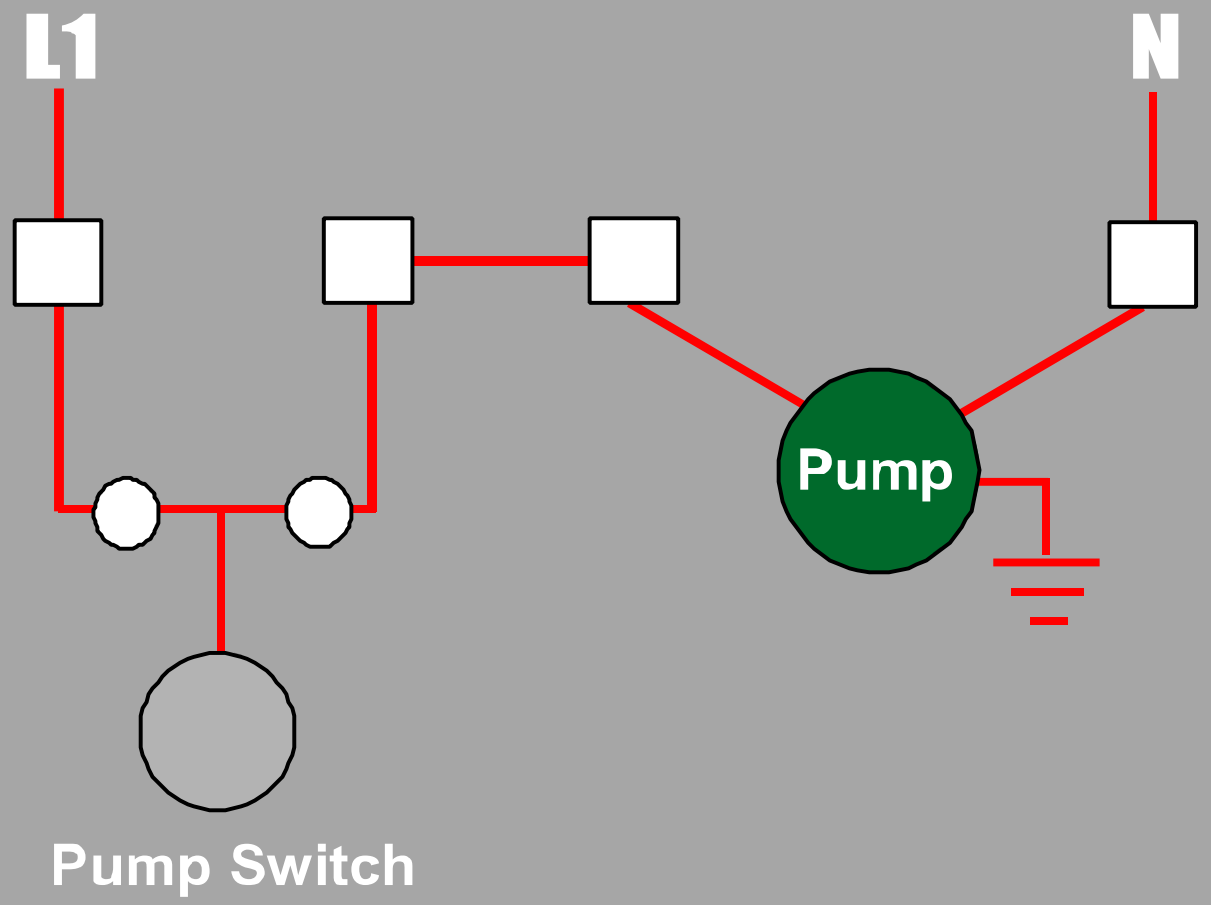
CHECK POWER AT MOTOR CONTACTOR CONTACTS.

CHECK POWER AT CIRCUIT BREAKER.

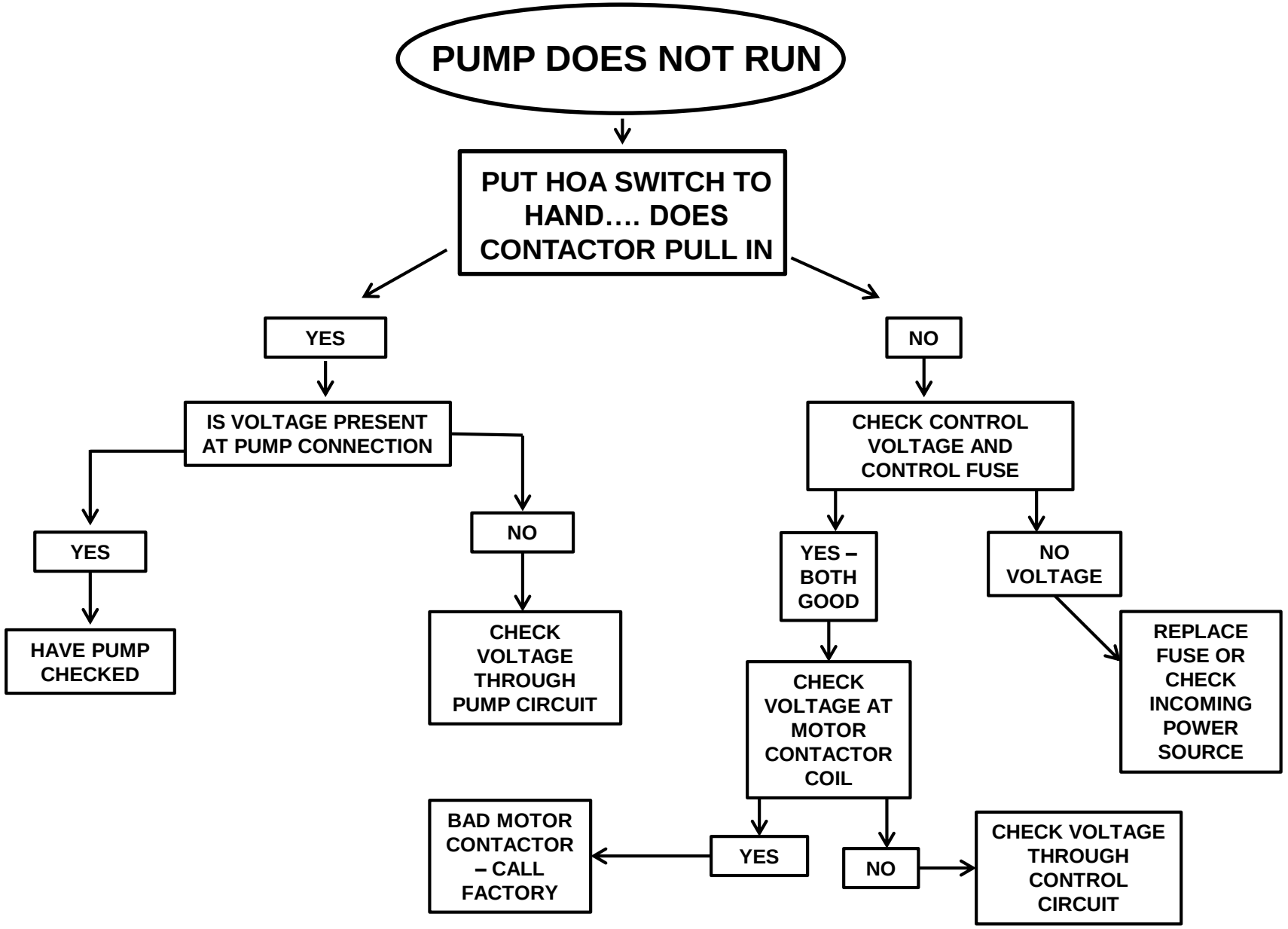
CHECK INCOMING PUMP POWER.




L1
N
Pump
Pump Switch


L1
N
Pump
Pump Switch

TROUBLESHOOTING A PUMP CIRCUIT IN A CONTROL PANEL



QUESTIONS?

Sump and Sewage Pump Manufacturers Association

This concludes the education portion of this session

Pumps bearing the "SSPMA-Certified" seal have been tested by the member manufacturer in accordance with SSPMA Industry Standards.

The Standards are designed to provide accurate performance data for sump, effluent and sewage pumping equipment, to assist in their proper application and selection.