

ET206

Troubleshooting the EV T100 Control



CLARK[®]

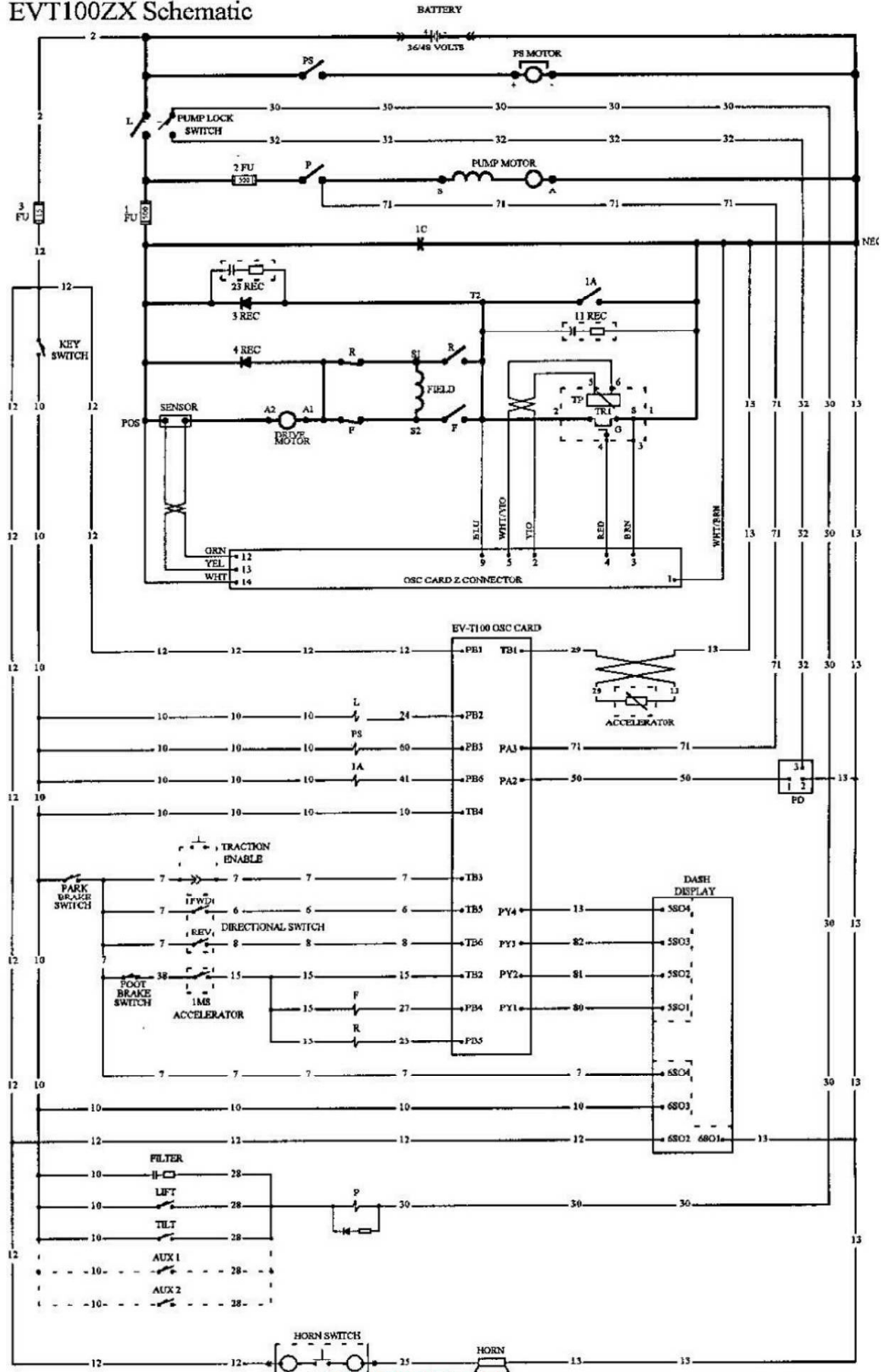
TECHNICAL TRAINING

Copyrighted Material
Intended for CLARK dealers only
Do not sell or distribute

Contents

About this Class.....	3
Class Objectives.....	3
Class Content.....	4
About Safety.....	5
Section 1. EV T100 Sequence of Operation.....	6
Identification of Abbreviations.....	6
Identification of Symbols.....	7
Sequence 1. Drive Control.....	8
Sequence 2. Connect the Battery.....	10
Sequence 3.Close the Key Switch.....	12
Sequence 3.Close the Key Switch (Continued).....	14
Sequence 4.Park Brake Switch & Static Return to Off (SRO) Checks.....	16
Sequence 5.Energizing the Directional Contactors	18
Sequence 5.Energizing the Directional Contactors (Continued).....	20
Sequence 6.Turning 'ON'the Transistor.....	22
Sequence 7.Turning 'OFF'the Transistor, Capacitor Charging and Flyback ..	24
Sequence 8.Accelerator, Thermal Protector and Pulse Monitor Trip (PMT)..	26
Sequence 9.1 A Contactor Operation.....	28
Sequence 10.Plugging.....	30
Sequence 10.Plugging (continued).....	32
Sequence 10.Plugging (continued).....	34
Sequence 11.Hydraulic Functions.....	36
Section 2. Control Panel.....	38
Control Panel Description.....	38
Control Feature.....	40
Control Panel Maintenance.....	44
Control Panel Troubleshooting	46
Section 3. Handset Instructions.....	48
Factory Card Settings-Standard.....	49
Factory Card Settings-High Performance.....	50
Factory Card Settings- Standard Pump Control.....	52
Factory Card Settings-High Performance Pump Control.....	53
Internal Resistance Compensation.....	55
Internal Resistance Compensation Worksheet	57
Description of Traction Logic Card Funtions.....	58
Description of Pump Logic Card Funtions.....	63
Section 4. Trouble Codes.....	67
Status Code Blank and 01.....	68
Status Code 02 and 03.....	69
Status Code 05 and 06.....	70
Status Code 07 and 08.....	71
Status Code 09 and 11.....	72
Status Code 15 and 16.....	73
Status Code 17 and 23.....	74
Status Code 24 and 26.....	75

EVT100ZX Schematic



Copyrighted Material
Intended for CLARK dealers only
Do not sell or distribute

EVT100ZX Schematic

The schematic diagram illustrates the electrical system for the EVT100ZX. Key components and their connections are as follows:

- BATTERY:** 36/48 VOLT, connected to the PS MOTOR and the PUMP LOCK SWITCH.
- PS MOTOR:** Connected to the battery and the PUMP LOCK SWITCH.
- PUMP LOCK SWITCH:** Controls the PUMP MOTOR.
- PUMP MOTOR:** Connected to the PUMP LOCK SWITCH and the OSC CARD Z CONNECTOR.
- KEY SWITCH:** Controls the DRIVE MOTOR.
- DRIVE MOTOR:** Connected to the KEY SWITCH and the OSC CARD Z CONNECTOR.
- FIELD:** Connected to the DRIVE MOTOR and the OSC CARD Z CONNECTOR.
- TR1:** Transformer connected to the OSC CARD Z CONNECTOR.
- ACCELERATOR:** Connected to the OSC CARD Z CONNECTOR.
- DASH DISPLAY:** Connected to the OSC CARD Z CONNECTOR.
- OSC CARD Z CONNECTOR:** A terminal block with pins 1 through 30 and 71, connecting various components.
- Wires:** Labeled with numbers 1 through 30 and 71, indicating the wiring paths.

The diagram also shows various switches and relays, including the PARK BRAKE SWITCH, TRACTION ENABLE, DIRECTIONAL SWITCH, FOOT BRAKE SWITCH, and HORN SWITCH. The HORN SWITCH is connected to the HORN.

OPERATIONAL SEQUENCE #3

Close the Key Switch

A. Closing the Key Switch will supply battery positive to terminal TB-4 of the EVT100ZX control card, Line, PS and 1A contactor coils, all hydraulic function switches and the Park Brake Switch through the #10 wires. The card will check the battery volts at this time to see if it corresponds with the voltage setting within the card.

Note: Status Code -15 or -16 will be displayed if the battery voltage is less than or higher than the preprogrammed battery voltage setting, function #15.

B. Battery Positive will also be supplied to the Dash Display through wire #10 to terminal 6SO3. This voltage will signal the dash display self test, lighting all indicators for about 2 seconds, and to sound the Seat Belt Warning Alarm and turn the Seat Belt Warning Indicator ON for 8-10 seconds.

C. The EVT100ZX control card will send data signals on wires #80, #81, #82, and #13 to the dash display to light all the display segments as a visual check for the operator. If all the segments are working, 8888 will be displayed for about 2 second.

D. After the 2 second segment check, the EVT100ZX control card will sense the absence of battery voltage at terminal TB-3 indicating that the park brake switch is not closed. It will send a signal to the dash display to show a -01 Status Code representing an open park brake switch.

Note: If the truck hours exceed the preprogrammed maintenance reminder hours (functions 19 & 20), a Status Code -99 will be displayed for about 4 seconds between the 8888 display and the normal truck display. The truck will be disabled while the -99 Status Code and the maintenance indicator are displayed.

E. The Dash Display will sense the absence of battery voltage at terminal 6SO4 also indicating that the park brake switch is not closed. The Dash Display will illuminate the Park Brake indicator.

Voltages Present:

- A. Battery positive on all #10 wires
- B. Battery positive at terminal 6SO3
- C. NA
- D. 0 volts at terminal TB-3
- E. 0 volts at terminal 6SO4

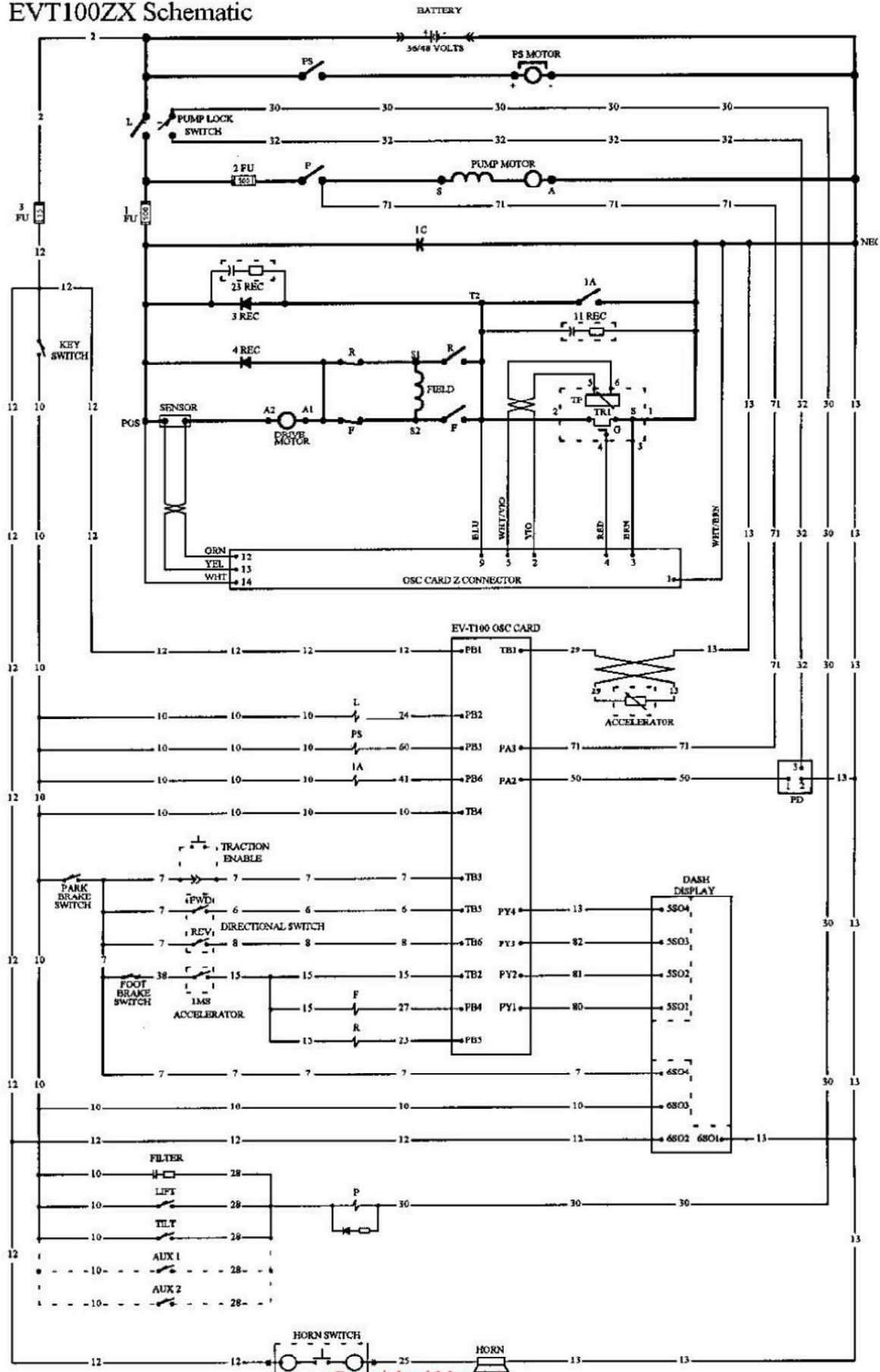
EVT100ZX Schematic

The schematic diagram illustrates the electrical system for the EVT100ZX, featuring a 36/48V battery and various control components. The system is organized into several functional sections:

- Power Distribution:** The battery is connected to a 36/48V line, which branches into multiple circuits. A 3 FU (Fuses) is shown on the left, and a 1 FU is shown near the pump lock switch.
- Pump and Drive Motors:** The pump motor is controlled by a pump lock switch and a pump motor. The drive motor is controlled by a drive motor and a field. The pump motor is also connected to a pump lock switch and a pump motor.
- Control Switches:** The system includes a key switch, a park brake switch, a foot brake switch, a directional switch, a traction enable switch, a filter, lift, tilt, aux 1, and aux 2.
- EV-T100 OSC CARD:** This card is the central control unit, with terminals PB1 through PB6, TB1 through TB6, PY1 through PY4, and PA1 through PA3. It is connected to a dash display with segments 5501 through 5504 and 6501 through 6504.
- Other Components:** The diagram also shows a sensor, a horn switch, and a horn.

The diagram uses a color-coded wiring system: ORN (Orange), YEL (Yellow), WHI (White), BLU (Blue), WHT/YO (White/Yellow), YTO (Yellow/Orange), PFD (Purple), and REN (Red).

EVT100ZX Schematic



Copyrighted Material
Intended for CLARK dealers only
Do not sell or distribute

OPERATIONAL SEQUENCE #4

Park Brake Switch & Static Return to Off (SRO) Checks

- A. Releasing the park brake lever will close the park brake switch.
- B. Battery volts will be supplied through the #7 wire to the dash display terminal 6SO4. The parking brake indicator will turn OFF.
- C. Battery volts will also be supplied through the #7 wire to terminal TB-3 of the EVT100ZX control card. The -01 Status code on the display will be replaced by the battery condition display or some other status code.
- D. Battery volts will also be supplied to the common terminal of the directional switches and through the normally closed points of the foot brake switch and wire #38 to the common terminal of the 1MS switch.
- E. The control will not allow the truck to start until the following SRO checks are satisfied:
 - 1) Voltage at terminals TB-3 of the EVT100ZX control card must be at battery voltage. (Status Code -01 if voltage is 0)
 - 2) Checks for open F & R switch inputs, terminals TB-5 and TB-6 must be 0 volts for 1.0 second after voltage is applied to terminal TB3. (Status Code -02 or -03)
 - 3) Checks for open 1MS switch input, terminals TB-2 must be 0 volts for 1.0 second after voltage is applied to terminal TB3. (Status Code 11)
 - 4) Checks the accelerator input voltage at terminal TB-1 of the EVT100ZX control card. Must be greater than 2.5 volts. (Status Code -08)

Note: The EVT100ZX control will repeat the above SRO checks any time that the park brake switch remains open for more than 2.0 seconds.

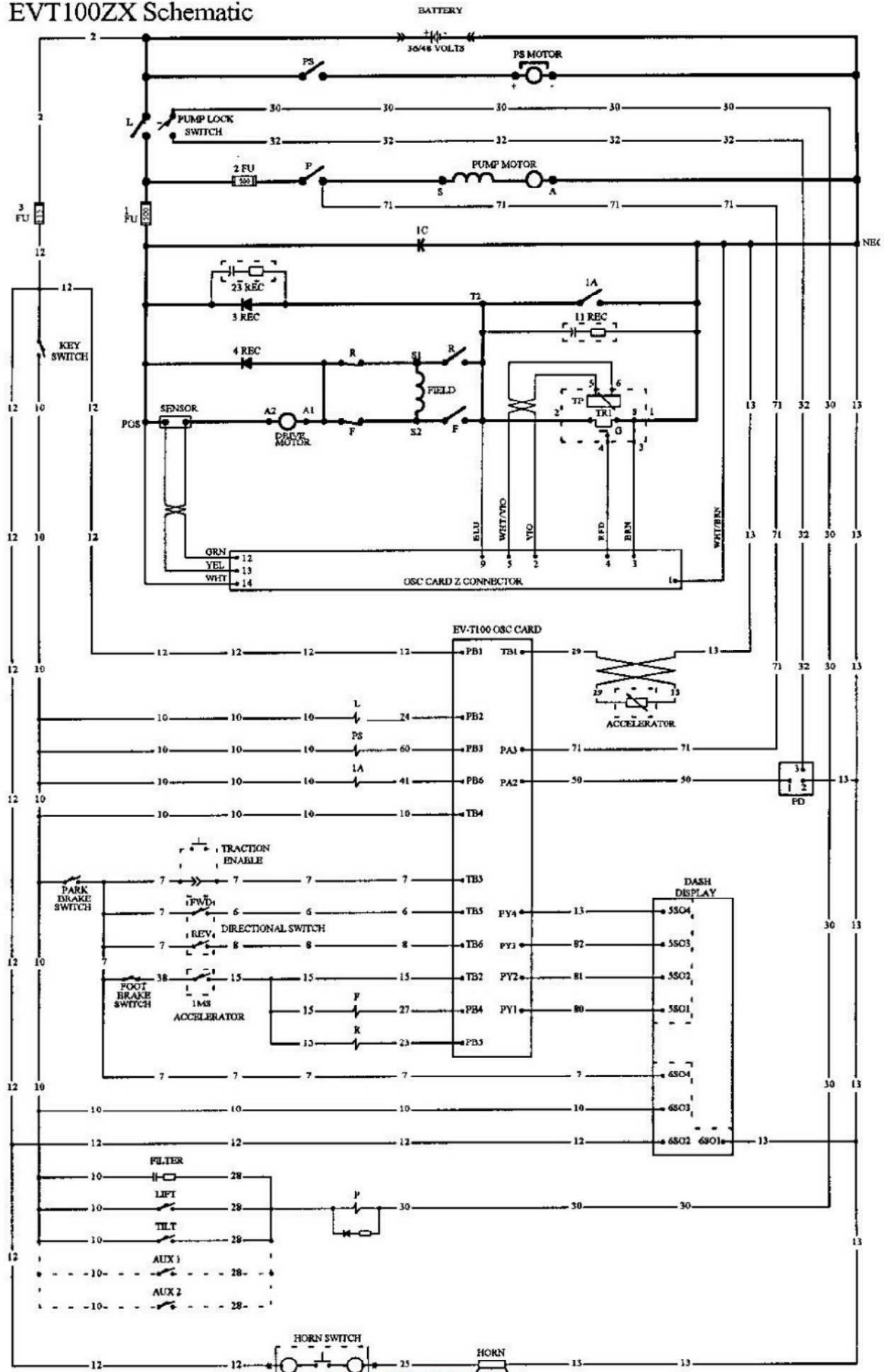
- F. If all of the above SRO checks are satisfied, the EVT100ZX control card will send a signal to the dash display to show the state of battery charge.

Note: The battery state of charge is displayed as a 3 digit positive number dependent on the battery condition, and the battery indicator will be 'ON'.

Voltages Present:

- A. Battery Positive
- B. Battery Positive
- C. Battery Positive
- D. Battery Positive
- E. See explanations 1-4 above.
- F. NA

EVT100ZX Schematic



Copyrighted Material
Intended for CLARK dealers only
Do not sell or distribute

OPERATIONAL SEQUENCE #5

Energizing the Directional Contactors

A. Moving the directional lever to forward will close the forward switch. With the forward switch closed, battery positive will be applied to terminal TB-5 of EVT100ZX control card through wire #6.

B. The EVT100ZX control will now make the following start-up checks:

- 1) T2 voltage, terminal PZ-14, must be above 12% battery volts. This checks for shorted 1A contactor driver, shorted power transistor, shorted #11 REC Snubber, or welded 1A contactor tips. (Status Code -46)
- 2) T2 voltage, terminal PZ-14, must be below 88% battery volts. This checks for shorted forward or reverse contactor drivers, shorted #3 REC, 23 REC or welded forward or reverse contactor tips. (Status code -48)
- 3) The current sensor is present in the power circuit and the green and yellow wires from the sensor are connected to terminals PZ-12 and PZ-13 of the EVT100ZX control card. (Status Code -42 or -43)

C. When the EVT100ZX control card senses battery positive at terminals TB-3 and TB-5 and 0 volts at TB-6, it will complete the circuit from the power steer contactor coil to battery negative through wire #60 at terminal PB-3 of the EVT100ZX control card.

Note: If battery voltage is applied to both terminals TB-5 and TB-6 at the same time, the control will be shut OFF. (Status Code -09)

D. This will energize the power steer contactor coil and in turn, close the normally open contactor tips.

E. The power steer motor now operates because current flows from battery positive to the steer motor and to battery negative. (NOTE: Permanent Magnet Motor)

NOTE: The EVT100ZX control card will now start to accumulate the running hours of the truck because the power steer motor is now running. The EVT100ZX control card tracks the running time in Seconds, Minutes and Hours but the time is displayed only in full 1 hour increments.

Voltages Present:

- A. Battery positive at TB-5
- B. See explanations 1-3 above
- C. 10-13 volts across the PS coil
- D. Battery positive
- E. Battery volts across motor