ERROR CODE	SYMPTOM(S)	POSSIBLE CAUSE	POSSIBLE SOLUTION
blank display	display screen on dash display or handset is blank	positive or negative control voltage is missing	make sure the key switch is closed and voltage is present between PZ7 and PZ3 and between TB4 and PZ3
		open circuit between logic card plug "Y" and dash display or handset	check for loose connection or open wires
-01	forward or reverse contactor will not pick up	seat switch not adjusted correctly	check seat switch for proper closure
		open circuit between battery positive TB3	check for loose connection or open wires between TB3, key switch, positive side of the seat switch, and TB4
-02	forward contactor doesn't close because of Static Return to Off lock out	forward switch closed on start-up	return switch lever to neutral, then return lever to forward position
		short circuit between TB2 and TB5	check for short circuit between TB2 and wire
-03	reverse contactor doesn't close because of Static Return to Off lock out	reverse switch closed on start-up	return switch lever to neutral, then return lever to reverse position
		short circuit between TB2 and TB6	check for short circuit between TB2 and the wire
-04	forward or reverse contactor will not pick up	forward or reverse switch closed on initial start-up	depress accelerator; error code changes to 03 or 02 depending on the affected contactor
		excessive leakage from TB2 to battery negative	check voltage at TB2 with key and seat switches closed and switch in neutral; voltage should be greater than 60% of battery voltage
-05	forward or reverse contactor will not pick up	defective brake switch circuit	check brake switch for closure with brake pedal released; check for open circuit or loose connections
		defective start switch circuit	check start switch for closure with accelerator depressed; check for open circuit or loose connections
-06	forward or reverse contactor will not pick up	accelerator pedal depressed before closing forward or reverse directional switch	close directional switch or release accelerator pedal
		open circuit between directional switches and battery positive, TB5, or TB6	check control wires and connections for directional switches
-07	forward or reverse contactor picks up but control will not work when accelerator pedal is depressed	accelerator input defective or not adjusted correctly	check voltage at TB1 (should be less than 3.7 volts)
		open circuit between battery negative and TB1	check for broken wires or loose connections or open potentiometer/voltage supply
-08	forward or reverse contactor does not pick up	accelerator input defective or not adjusted correctly	check voltage at TB1 (input voltage should be more than 3.0 volts)
		short circuit between battery negative and TB1	check for short circuit from wire to battery negative (resistance should be greater than 4.7K ohms)
-09	forward or reverse contactor will not pick up	forward or reverse switch closed or adjusted to be held closed	replace or adjust switches to make sure that they open when directional switch is returned to neutral
		short circuit between battery positive and TB5 or TB6	check wires from TB5 and TB6 for short circuits
-15	forward or reverse contactor does not pick up	discharged battery	check battery for proper open circuit voltage; charge battery if necessary
		defective battery	check each battery for proper voltage (greater than 1.95 volts per cell)

ERROR CODE	SYMPTOM(S)	POSSIBLE CAUSE	POSSIBLE SOLUTION
-16	forward and reverse contactors will not pick up	incorrect control card adjustment	check function 15 for proper adjustment for battery being used
		battery over-charged or incorrect battery used	check battery for proper open circuit voltage
-17	forward or reverse contactor will not close	invalid card type selection	review function 17; adjust and set card type value as instructed by OEM service manual
-23	forward or reverse contactor does not pick up	defective F and R contactor coil circuit	check for open circuit or loose connection between PB4 and positive side of F contactor coil and between PB5 and positive side of R contactor coil; remove plug B and check resistance from PB4 to positive side of F coil (should be 10-14 ohms) and repeat for R coil
-24	SCR control does not operate	defective F or R contactor	see code 23
		defective RB contactor	check RB contactor power tips for closure and pick up; check for open circuit between positive side of RB contactor and PB2
-25 (only found on handset)	short tip life on F and R or 1A contactor	defective 1A contactor	check 1A contactor for binding or slow operation when dropping out
-26	SP or FW contactor picks up immediately when key switch is closed	defective coil driver internal to logic card	replace logic card
-41	reduced or no power to traction motor in SCR range	open thermal protector circuit	check for loose connection or broken wire between black wire-thermal proctor and PZ1 and between gray wire-thermal proctor and PZ5
		defective thermal protector	at room temp., measure resistance between black and gray wire; replace TP if greater than 300 ohms
		SCR is in thermal cut-back	allow control to cool
-42	no power to traction motor in SCR range	open sensor wire circuit to PZ4	check for loose connection or broken wire from current sensor to PZ4 on the logic card
-43	stall currents in SCR range are higher than normal and cannot be controlled by C/L adjustment	open sensor wire circuit to PZ3	check for loose connection or broken wire from current sensor to PZ3 on the logic card
-44	forward or reverse contactors can only be closed by opening and closing the key switch	defective 5 REC circuit	check for shorted 5 REC; check for shorted 5 REC snubber (25 REC)
		defective 2 REC circuit	check for shorted 2 REC; check for shorted 2 REC snubber (22 REC)
		open choke (1X)	check for open circuit between T5 and T3 (resistance should be 0 ohms)
		1 REC defective	turn off time for 1 REC out of specification; replace 1 REC if above checks fail to find problem
-45	forward or reverse contactors can only be closed by opening and closing the key switch	defective 1 REC circuit	check for open circuit or loose connections between 1 REC and PZ8; check the same between 1REC (3 REC snubber) and PZ9
		defective 2 REC circuit	check for shorted 2 REC; check for shorted 2 REC snubber (22 REC)
-46	forward or reverse contactor does not pick up	defective 1 REC	check for shorted 1 REC; check for defective 1 REC insulator (co-therm) that may short 1 REC heat sink to base plate
		defective 1A contactor	check for welded 1A contactor power tips
-47	forward or reverse contactors can only be closed by opening and closing the key switch	defective 2 REC circuit	check that 2 REC will gate on; check for open circuit or loose connection between 2 REC gate and PZ10; check the same for 1C through the 2 REC circuit

ERROR CODE	SYMPTOM(S)	POSSIBLE CAUSE	POSSIBLE SOLUTION
-47	forward or reverse contactors can only be closed by opening and closing the key switch	F or R contactor or power tips bouncing open	check that these tips do not bounce during operation
-48	forward or reverse contactor does not pick up	defective forward or reverse contactor	check for welded power tips on contactor; check for slow functioning of contactor
		defective 3 REC circuit	check for shorted 3 REC; check for shorted 3 REC snubber (23 REC)
-49	forward or reverse contactors can only be closed by opening and closing the key switch	defective 5 REC circuit	check for shorted 5 REC; check for shorted 5 REC snubber (25 REC); check that 5 REC gates on; check for open circuit between 5 REC and PZ12
		shorted 2 REC circuit	check for shorted 2 REC; check for shorted 2 REC snubber (22 REC)
		defective capacitor circuit	check for open capacitor; check for loose connection at capacitor terminals
-50	forward or reverse contactor picks up, but control does not work	defective 2 REC circuit	check for loose connection between spider assembly and 5 REC (BUS A), between 5 REC and 2 REC, between 2 REC and PZ11, and between 2 REC gate and PZ10; make sure 2 REC gates on
-51	forward or reverse contactors can only be closed by opening and closing the key switch	excessive source inductance	tag lines without filters are being used; battery cables are too long
		high peak current in motor	check for shorted field winding or armature winding
-52	forward or reverse contactors can only be closed by opening and closing the key switch	excessive source inductance	tag lines without filters are being used; battery cables are too long
		defective 4 REC circuit	check for shorted 4 REC; check for open 4 REC circuit
		defective 3 REC circuit	check for open 3 REC circuit
-53	forward or reverse contactors can only be closed by opening and closing the key switch	1 REC turn off failure not related to plugging	stall vehicle in both directions and note any error codes that more closely define the problem
		1 REC turn off related to plugging	Check for open 4 REC circuit; check current sensor for loose or open connection in power circuit; check yellow and green wire from sensor to logic card for open and loose connection
		defective motor circuit	check motor circuit for open connections; check motor brushes for proper seating
		F or R contactor power bouncing open	make sure F and R contactors do not bounce open during vehicle operation
-54	control does not operate	defective logic card	replace logic card
-57	forward or reverse contactors can only be closed by opening and closing the key switch	reversed yellow and green current sensor wires	make sure the green wire connects to PZ4 and the yellow wire connects to PZ3
		reversed power cable connection	make sure the battery negative cable connects to SCR NEG and the motor A2 cable connects to SCR A2
-70	control does not operate	defective regen sensor input circuit	check yellow sensor wire for open circuit or loose connections between sensor and PA4
-71	control does not operate	defective regen sensor input circuit	check green sensor wire for open circuit or loose connections between sensor and PA5
-72	regen control does not operate	open connection in the PA6	check for open circuit between PA6 and the A2 connection of the RB contactor and between 7 REC and A2 connection of the RB contactor
-73	forward or reverse contactors can only be closed by opening and closing the key switch	defective RB contactor	check RB contactor for smoothness of operation and excessive wear on moving parts
		intermittent PA6 input	check for loose connections in PA6 circuit from PA6 to A2 connection of RB contactor

ERROR CODE	SYMPTOM(S)	POSSIBLE CAUSE	POSSIBLE SOLUTION
-74	forward or reverse contactors can only be closed by opening and closing the key switch	defective RB contactor	check RB contactor for smoothness of operation and excessive wear on moving parts
		intermittent PA6 input	check for loose connections in PA6 circuit from PA6 to A2 connection of RB contactor
		defective RB contactor coil circuit	check RB contactor coil for resistance (should be between 10 and 14 ohms); check coil connection from PB2 to RB coil (-) for loose connections; check coil connections from battery positive to RB coil (+) for loose connections
-75	forward or reverse contactors can only be closed by opening and closing the key switch	1 REC turn off failure not related to regen	stall vehicle in both directions and note any error codes that more closely define the problem
		1 REC turn off related to regen	check for loose connections on all regen power circuits from battery positive to RB contactor A2 connection; check for loose connection on yellow wire from sensor 2 to PA4, green wire from sensor 2 to PA5, and wire 17 from RB contactor to PA6
		defective motor circuit	check motor circuit for open connections; check motor brushes for proper seating
		F or R contactor or power tips bouncing open	make sure F and R contactors do not bounce open during vehicle operation
-76	forward or reverse contactors can only be closed by opening and closing the key switch	intermittent connection in battery power circuit	check battery power circuit for loose connections; check power fuse, battery connectors, line contactors, etc. for possible openings during regen cycle
		excessive source inductance	check for unfiltered tag lines and long battery cables
-90	error code flashes on and off	user defined error code is displayed by switch closure or motor brush sensor closure to negative	see OEM instruction manual
		terminal 1 shorted to negative	check for shorts
		defective input switch or TMM card	check for shorts in the input switch; replace TMM card
-91	error code flashes on and off	user defined error code is displayed by switch closure or motor brush sensor closure to negative	see OEM instruction manual
		terminal 3 shorted to negative	check for shorts
		defective input switch or TMM card	check for shorts in the input switch; replace TMM card
-92	error code flashes on and off	user defined error code is displayed by switch closure or motor brush sensor closure to negative	see OEM instruction manual
		terminal 4 shorted to negative	check for shorts
		defective input switch or TMM card	check for shorts in the input switch; replace TMM card
-93	error code flashes on and off	user defined error code is displayed by switch closure or motor brush sensor closure to negative	see OEM instruction manual
		terminal 5 or 6 shorted to negative	check for shorts
		defective input switch or TMM card	check for shorts in the input switch; replace TMM card

ERROR CODE	SYMPTOM(S)	POSSIBLE CAUSE	POSSIBLE SOLUTION
-94	error code flashes on and off	user defined error code is displayed by switch closure or motor brush sensor closure to negative	see OEM instruction manual
		terminal 8 or 10 shorted to negative	check for shorts
		defective input switch or TMM card	check for shorts in the input switch; replace TMM card
-95	error code flashes on and off	user defined error code is displayed by switch closure or motor brush sensor closure to negative	see OEM instruction manual
-95	error code flashes on and off	terminal 11 or 12 shorted to negative	check for shorts
		defective input switch or TMM card	check for shorts in the input switch; replace TMM card
-117	pump contactor doesn't close	invalid card type selection	review function 17; adjust and set card type value as instructed by OEM service manual
-123	pump contactor doesn't pick up	defective pump contactor coil circuit	check for open circuit or loose connection between PB4 and positive side of pump contactor coil; check resistance from PB4 to positive side of F coil (should be between 10 and 14 ohms)
		defective 1A contactor coil	check resistance from positive side of coil to its plug connection (should be between 10 and 14 oms)
-124	control does not operate	defective pump contactor	pump power tips fail to close because of welded power tips, binding contactor tip assembly, or a defective pump contactor coil
		open motor circuit	check for open motor circuit from A1 connection the A2 connection on control panel
		defective 1A contactor	see error code 123
-125 (only found on handset)	short tip life on pump or 1A contactor	defective 1A contactor	check 1A contactor for binding or slow operation when dropping out
-141	reduced or no power to pump motor in SCR range	open thermal protector circuit	check for loose connection or broken wire between black wire-thermal proctor and PZ1 and between gray wire-thermal proctor and PZ5
		defective thermal protector	at room temp., measure resistance between black and gray wire; replace TP if greater than 300 ohms
		SCR is in thermal cut-back	allow control to cool
-142	no power to pump motor in SCR range	open sensor wire circuit to PZ4	check for loose connection or broken wire (green wire) from current sensor to PZ4 on the logic card
-143	stall currents in SCR range are higher than normal and cannot be controlled by C/L adjustment	open sensor wire circuit to PZ3	check for loose connection or broken wire (yellow wire) from current sensor to PZ3 on logic card
-144	forward or reverse contactors can only be closed by opening and closing the key switch	defective 5 REC circuit	check for shorted 5 REC; check for shorted 5 REC snubber (25 REC)
		defective 2 REC circuit	check for shorted 2 REC; check for shorted 2 REC snubber (22 REC)
		open choke (1X)	check for open circuit between T5 and T3 (resistance should be 0 ohms)

ERROR CODE	SYMPTOM(S)	POSSIBLE CAUSE	POSSIBLE SOLUTION
-144	forward or reverse contactors can only be closed by opening and closing the key switch	1 REC defective	turn off time for 1 REC out of specification; replace 1 REC if above checks fail to find problem
-145	forward or reverse contactors can only be closed by opening and closing the key switch	defective 2 REC circuit	check for shorted 2 REC; check for shorted 2 REC snubber (22 REC)
		defective 1 REC circuit	check for open circuit between 1REC and PZ8; check for open circuit between 1REC (3 REC snubber) and PZ9
		defective 1 REC	intermittent or open 1 REC gate; replace 1 REC after above checks fail to find problem
-146	pump contactor doesn't pick up	defective 1 REC	check for shorted 1 REC; check for defective 1 REC insulator (co-therm) that may short 1 REC heat sink to base plate
		defective 1A contactor	check for welded 1A contactor power tips
-147	pump contactor can only be closed by opening and closing the key switch	defective 2 REC circuit	check that 2 REC will gate on; check for open circuit or loose connection between 2 REC gate and PZ10; check the same for 1C through the 2 REC circuit
		F or R contactor or power tips bouncing open	make sure F and R contactors do not bounce open during vehicle operation
-148	pump contactor doesn't pick up	defective forward or reverse contactor	check for welded forward or reverse power tips; check for slow operation of forward or reverse contactor
		defective 3 REC circuit	check for shorted 3 REC; check for shorted 3 REC snubber (23 REC)
-149	pump contactor can only be closed by opening and closing the key switch	defective 5 REC circuit	check for shorted 5 REC; check for shorted 5 REC snubber (25 REC); check that 5 REC gates on; check for open circuit between 5 REC and PZ12
		shorted 2 REC circuit	check for shorted 2 REC; check for shorted 2 REC snubber (22 REC)
		defective capacitor circuit	check for open capacitor; check for loose connection at capacitor terminals
-150	pump contactor picks up, but control doesn't operate	defective 2 REC circuit	check for open circuit between spider assembly and 5 REC (BUS A), between 5 REC and 2 REC, between 2 REC and PZ11, and between 2 REC gate and PZ10; make sure 2 REC gates on
-151	pump contactor can only be closed by opening and closing the key switch	excessive source inductance	tag lines without filters are being used; battery cables are too long
		high peak current in motor	check for shorted field winding or armature winding
-152	pump contactor can only be closed by opening and closing the key switch	excessive source inductance	tag lines without filters are being used; battery cables are too long
		defective 4 REC circuit	check for shorted 4 REC; check for open 4 REC circuit
		defective 3 REC circuit	check for open 3 REC circuit
-154	control does not operate	defective logic card	replace logic card
-157	pump contactor can only be closed by opening and closing the key switch	reversed yellow and green current sensor wires	make sure the green wire connects to PZ4 and the yellow wire connects to PZ3
		reversed power cable connection	make sure the battery negative cable connects to SCR NEG and the motor A2 cable connects to SCR A2