

# TROUBLESHOOTING OF ENGINE CONTROL SYSTEM (ENG MODE)

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## Connector types and installation positions

- ★ The Address column in the following table indicates the addresses of the connector layout drawing (Cubic diagram) and the circuit diagram.
- ★ Codes indicated in the fields of the circuit diagram addresses:  
**ENG:** Engine control system, **TM:** Transmission control system, **WRK:** working equipment control system, **MON:** Monitor system, **OTH:** Others
- ★ The characters in parenthesis in the Connector Type fields indicate the colors of the connector bodies.

Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
1.PS	DT-T	2	1st solenoid	AJ-4	TM
1.SW	DT	2	1st fill switch	AJ-4	TM
2.PS	DT-T	2	2nd solenoid	AJ-3	TM
2.SW	DT	2	2nd fill switch	AJ-3	TM
3.PS	DT-T	2	3rd solenoid	AJ-3	TM
3.SW	DT	2	3rd fill switch	AJ-4	TM
4.PS	DT-T	2	4th solenoid	AJ-5	TM
4.SW	DT	2	4th fill switch	AJ-5	TM
A1	M	6	Blower motor and resistor	U-2	—
A2	SWP	6	Air mix servo motor	U-2	—
A3	M	2	Thermistor	U-2	—
A4	X	2	Air servomotor	U-8	—
A5	X	2	Condenser switch	T-1	—
A6	YAZAKI	2	Hi, Lo switch	T-1	—
A7	YAZAKI	4	Blower relay (Main)	W-6	—
A8	YAZAKI	4	Blower relay (Hi)	W-6	—
A9	YAZAKI	4	Blower relay (M2)	W-6	—
A10	YAZAKI	4	Blower relay (M1)	W-5	—
A11	YAZAKI	4	Condenser relay	W-5	—
A12	YAZAKI	4	Condenser Hi (1) relay	W-5	—
A13	YAZAKI	4	Condenser Hi (2) relay	W-4	—
A14	YAZAKI	4	MAG clutch relay	W-4	—
A20	Terminal	1	Ground	T-1	—
A21	YAZAKI	2	Water temperature sensor (Automatic air conditioner model)	W-3	—
A22	YAZAKI	2	Room temperature sensor (Automatic air conditioner model)	U-2	—
A23	YAZAKI	2	Outside temperature sensor (Automatic air conditioner model)	A-7	—
A24	DT-T	2	Diode (Automatic air conditioner model)	W-3	—
A25	DT-T	2	Diode (Automatic air conditioner model)	V-3	—
A26	DT-T	2	Intermediate connector (Automatic air conditioner model)	W-4	—
AL1	M	6	Intermediate connector (Air conditioner relay)	U-2	—
AL2	S (W)	12	Intermediate connector (Air conditioner relay)	V-2	—
B01	DT	3	Condenser R	B-7	—
B02	DT	3	Condenser L	A-7	—
B03	DT-T	2	Emergency brake switch 1	G-9	TM
B04	DT-T	2	Emergency brake switch 2	G-9	TM
B05	DT-T	2	Front brake ACC low pressure switch	K-3	WRK

Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
B06	DT-T	2	Rear brake ACC low pressure switch	J-2	WRK
BR1	DT-T (Gr)	12	Intermediate connector (Bulkhead)	I-2	WRK
C01	YAZAKI	9	AM/FM radio	L-9	—
C02	KES0	2	Speaker (Right)	E-9	—
C03	KES0	2	Speaker (Left)	G-9	—
C04	M	2	Front working lamp (Right)	B-8	—
C05	M	2	Front working lamp (Left)	B-8	—
C07	KES1	2	Rotary lamp	C-8	—
C08	M	1	Door switch (Right) (Room lamp)	C-8	—
C09	M	1	Door switch (Left) (Room lamp)	B-8	—
C10	—	2	Cigarette lighter	A-7	—
C12	M	6	Front wiper motor	A-7	OTH
C15	M	4	Rear wiper motor	F-9	OTH
C17	KYORITSU ES	4	Warning lamp switch	D-9	
C18	Plug	1	Warning lamp (Beacon)	F-9	
C19	DT-T	6	Glass heater switch	D-9	
C29	M	1	Glass heater ON	E-9	
C33	H	1	Rear glass heater	E-9	
C35	H	1	Rear glass heater	G-9	
C39	Terminal	1	Ground	C-8	
C40	Terminal	1	Ground	C-8	OTH
C41	M	1	Warning lamp	E-9	
C43	YAZAKI	6	Side wiper switch	B-8	OTH
C44	M	4	Right side wiper motor	A-7	OTH
C45	M	4	Left side wiper motor	F-1	OTH
C46	M	1	Intermediate connector (Power supply)	D-9	OTH
C47	Terminal	1	Ground	F-9	OTH
C47	AMP172021-2	16	A/C control AMP	P-1	—
C47	AMP040	20	A/C control AMP (Automatic air conditioner model)	D-9	—
C48	AMP172245-2	12	A/C control AMP	P-1	—
C48	AMP040	16	A/C control AMP (Automatic air conditioner model)	D-9	—
C49	SWP	8	Left servomotor	R-1	—
C50	SWP	8	Right servomotor	M-3	—
C51	YAZAKI	2	Diode (Automatic air conditioner model)	Q-1	—
CAN1	DT-T	3	Resistor	O-1	E-9
CAN2	DT-T	3	Resistor	R-9	—
CHK0	X	1	Inspection connector 0	R-1	—
CHK1	X	1	Inspection connector 1	R-1	—
CL1	S	8	Intermediate connector	A-4	—
CL2	S (L)	12	Intermediate connector (Wiper motor)	A-4	OTH
CL5	S	16	Intermediate connector	M-2	—
CL6	DT-T (G)	12	Intermediate connector (Monitor panel controller)	M-2	WRK
CL6	M	6	Intermediate connector (Automatic air conditioner model)	W-3	—
CL7	DT-T (Gr)	12	Intermediate connector (Monitor panel controller)	M-2	WRK
CL8	DT-T	12	Intermediate connector (Monitor panel controller)	N-1	WRK
CL9	DT-T	8	Intermediate connector (Monitor panel controller)	O-1	WRK
CL10	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-1	J-6
CN1	DT-T	2	Injector	Y-5	A-3

Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
CN2	DT-T	2	Injector	Y-5	A-2
CN3	DT-T	2	Injector	Y-9	A-2
CN4	DT-T	2	Injector	Z-9	A-1
CN5	DT-T	2	Injector	Z-9	A-2
CN6	DT-T	2	Injector	AC-8	A-2
COMB1	M	3	Front combination lamp (Right)	A-6	MON
COMB1	M	3	Front combination lamp (Left)	E-1	MON
D1	DT-T	2	Dust indicator	AB-9	MON
DIODE	DT-T	2	Diode (Parking brake solenoid)	AE-6	WRK
DL	DT-T (Gr)	12	Connector (S-NET)	U-8	MON
E01	DT-T	2	Intermediate connector (Starting motor)	L-3	H-2
E02	Terminal	1	Alternator R	K-8	G-1
E03	Terminal	1	Alternator B	K-8	G-1
E04	Terminal	1	Alternator E	L-8	H-1
E06	Terminal	1	Heater relay	AC-8	F-9
E07	Terminal	1	Heater relay	AC-7	F-9
E10	DT-T	2	Compressor magnetic clutch	I-9	—
E11	DT-T	2	Diode	J-9	—
E14	Terminal	1	Ground	L-4	H-1
E28	DT	2	Diode (Engine heater relay)	Z-3	E-9
E29	Terminal	1	Engine oil pressure switch	Z-5	MON
E30	Terminal	1	Starting motor B	K-3	H-2
EL2	HD-24	31	Intermediate connector (Engine injector)	Z-1	C-4
EL3	HD-24	31	Intermediate connector (Engine)	Z-2	B-4
ER-1	DT-T	4	Intermediate connector (Starting motor)	L-4	I-2
EREV	DT-T	2	Engine speed sensor	AC-6	E-3
F01	M	6	Intermediate connector (Right front lamp)	A-5	MON
F02	M	6	Intermediate connector (Left front lamp)	D-1	MON
F03	Terminal	1	Horn	B-1	MON
F04	Terminal	1	Horn	A-1	MON
F05	Terminal	1	Horn	C-1	MON
F06	Terminal	1	Horn	C-1	MON
F07	DT-T	2	Switching pump cut-off	A-1	MON
F09	DT-T	3	Bucket positioner proximity switch	A-3	WRK
F10	DT-T	3	Lift arm positioner proximity switch (std)	A-3	WRK
F13	DT-T	2	Lift arm damper solenoid	D-1	WRK
F14	DT-T	2	Diode (Damper solenoid)	D-1	WRK
F15	DT-T	3	Lift arm angle signal (For load meter)	A-5	WRK
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1	WRK
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1	WRK
F18	DT-T	3	Lift arm angle sensor (For boom EPC)	A-5	WRK
F19	DT-T	3	Bucket positioner proximity switch (For boom EPC)	A-3	WRK
F20	DT-T	2	Lift arm RAISE EPC	A-2	WRK
F21	DT-T	2	Lift arm LOWER EPC	A-1	WRK
F22	DT-T	2	Bucket TILT EPC	A-1	WRK
F23	DT-T	2	Bucket DUMP EPC	A-1	WRK
F24	DT-T	2	ATT EXT EPC (op)	A-2	WRK
F25	DT-T	2	ATT RET EPC (op)	A-2	WRK

Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
F26	DT-T	2	Lift arm EPC cut-off solenoid	C-1	WRK
F27	DT-T	2	Diode (Boom EPC cut-off solenoid)	A-4	WRK
F28	DT-T	2	Oil temperature sensor	B-1	WRK
FF1	S	10	Intermediate connector (Front lamp)	E-1	MON
FF2	DT-T (Gr)	8	Intermediate connector (Work equipment sensor)	E-1	WRK
FL1	S	12	Intermediate connector (Front lamp)	V-1	MON
FL2	DT-T (Gr)	8	Intermediate connector (Work equipment sensor)	V-2	WRK
FL3	DT-T	6	Intermediate connector (Load meter)	X-3	WRK
FS1	L	2	Intermediate connector (Fuse box)	W-7	K-8
FS2	L	2	Intermediate connector (Fuse box)	V-7	L-9
FS3	S (W)	16	Intermediate connector (Fuse box)	V-8	K-8
FS4	S (W)	12	Intermediate connector (Fuse box)	U-8	L-8
FS5	M	6	Intermediate connector (Fuse box)	V-7	MON
FS6	Plug	1	Intermediate connector (Fuse box)	V-7	—
FS7	Plug	1	Intermediate connector (Fuse box)	W-7	—
F.PS	DT-T	2	F clutch solenoid	AJ-6	WRK
F.SW	DT	2	F clutch fill switch	AJ-6	WRK
G	YAZAKI	2	Engine G speed sensor	AA-5	E-1
G01	Terminal	1	Backup buzzer	L-8	TM
G02	Terminal	1	Backup buzzer	L-7	TM
G04	M	2	Rear working lamp (Left)	K-9	MON
G05	M	2	Rear working lamp (Right)	I-9	MON
GR1	DT-T	4	Intermediate connector (Fan reverse solenoid, rear working lamp)	L-7	WRK
GR2	DT-T	2	Fan reverse solenoid	J-9	WRK
HEAD	M	3	Headlamp (Right)	A-6	MON
HEAD	M	3	Headlamp (Left)	E-1	MON
HT	Terminal	1	Engine heater relay	AC-9	E-9
L01	SWP	6	Parking brake switch	M-5	TM
L02	SWP	6	Dimmer switch, light switch	M-4	MON
L03	SWP	6	Turn and hazard switch	M-5	MON
L04	SWP	14	Shift switch	M-3	G-8
L05	DT-T	2	Steering wheel horn switch	M-5	—
FL7	DT-T (B+)	12	Intermediate connector (Work equipment solenoid)	N-1	WRK
FL8	DT-T (G)	8	Intermediate connector (Work equipment solenoid)	N-2	WRK
FL9	DT-T	6	Intermediate connector (3rd solenoid)	N-2	WRK
L07	DT-T	6	Monitor mode/Cancel switch	P-1	MON
L08	DT-T	6	Monitor INC/DEC switch	P-1	MON
L09	DT-T	2	Stop lamp switch	P-1	MON
L10	DT-T	3	Left brake pressure sensor	R-1	TM
L11	DT-T	2	Air suspension seat	S-1	—
L12	DT-T	4	Right direction switch, intermediate connector	O-7	TM
L13	DT-T	2	Lift arm N lock switch	O-7	WRK
L14	DT-T	4	Boom lever KDS & HOLD	M-6	TM
L15	DT-T	4	Bucket lever LDM cancel	M-6	WRK
L16	M	2	Intermediate connector	V-2	—
L17	M	4	DC24V/DC12V converter	W-5	—
L18	YAZAKI	2	DC12V socket	W-3	—
L19	M	4	Flasher unit	U-8	MON

Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
L20	M	2	Alarm buzzer	U-8	MON
L21	S	10	Front, rear wiper switch	N-2	OTH
L22	DT-T	3	Throttle pedal	O-1	H-8
L23	DT-T	3	Low idling switch	O-1	H-8
L25E	DT-T	2	Lift arm & bucket EPC lever	M-6	WRK
L25S	DT-T	2	PPC valve and electrical detent	N-6	WRK
L26E	DT-T	2	Lift arm & bucket EPC lever	O-7	WRK
L26S	DT-T	2	PPC valve and electrical detent	N-6	WRK
L27S	DT-T	2	PPC valve and electrical detent	N-7	WRK
L28	DT-T	4	Lift arm & bucket EPC lever	M-7	WRK
L29	DT-T	4	Lift arm & bucket EPC lever	N-6	WRK
L30	DT-T	4	3rd EPC lever	O-8	WRK
L31	M	6	Intermittent wiper timer	W-7	OTH
L34	DT-T	4	Joystick lever positioner	W-6	WRK
L35	DT-T	2	Joystick EPC solenoid	P-1	WRK
L36	DT-T	2	Joystick EPC solenoid	P-1	WRK
L37	DTM	12	Joystick lever switch	Q-1	TM
L38	DT-T	3	Joystick N lock switch	W-7	TM
L39	DT-T	6	Joystick ON/OFF switch	T-1	TM
L40	DT-T	6	Steering speed mode switch	S-1	TM
L41	Relay	6	Joystick cut-off relay	M-5	WRK
L42	Plug	1	Connector (Auxiliary power supply)	A-5	—
L43	Plug	1	Connector (Auxiliary power supply)	A-5	—
L44	M	6	Intermediate connector (Printer)	V-3	MON
L45	D-sub	25	Printer	—	MON
L46	G	4	Printer	—	MON
L51	AMP070	20	Monitor panel controller	M-2	MON
L52	AMP070	18	Monitor panel controller	M-3	MON
L53	AMP070	12	Monitor panel controller	M-3	MON
L54	AMP070	18	Monitor panel controller	M-3	MON
L55	AMP070	12	Monitor panel controller	M-4	MON
L56	AMP070	12	Monitor panel controller	M-3	L-8, MON
L57	AMP070	14	Monitor panel controller	M-4	MON
L58	AMP040	8	Monitor panel controller	M-4	—
L61	DRC23	24	Transmission and fan pump motor controller	P-8	I-8, TM
L62	DRC23	40	Transmission and fan pump motor controller	P-8	I-8, TM
L63	DRC23	40	Transmission and fan pump motor controller	Q-8	J-8, TM
L71	DRC23	24	Lift arm bucket & joystick controller	Q-9	WRK
L72	DRC23	40	Lift arm bucket & joystick controller	Q-9	TM
L73	DRC23	40	Lift arm bucket & joystick controller	R-9	TM
L81	DRC23	24	Engine controller	Q-8	A-8
L82	DRC23	40	Engine controller	Q-8	B-8
L83	DRC23	40	Engine controller	Q-8	C-8
L90	DT-T	4	Model selection connector	P-8	A-6
L100	Terminal	1	Ground	R-1	J-1
L101	S (W)	16	Intermediate connector (Relay sub unit)	T-9	J-6
L102	S (L)	16	Intermediate connector (Relay sub unit)	T-9	J-5
L103	S (W)	16	Intermediate connector (Relay sub unit)	S-9	MON

Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
L104	S (W)	16	Intermediate connector (Relay sub unit)	T-9	WRK
L105	S (W)	12	Intermediate connector (Relay sub unit)	T-9	—
L106	S (W)	16	Intermediate connector (Relay sub unit)	S-9	MON
L111	—	5	Winker & hazard relay	X-7	MON
L112	—	5	Air cleaner clogging relay	W-7	MON
L113	—	5	Steering changeover relay	W-8	L-6
L114	—	5	Automatic preheating relay	V-8	L-5
L115	—	5	Engine controller power supply relay	V-9	—
L116	—	4	Neutral safety relay	W-7	TM
L117	—	4	Backup lamp relay	W-7	TM
L118	—	4	Stop lamp relay	V-8	MON
L119	—	4	Horn relay	V-8	MON
L120	—	4	Parking brake relay	V-8	TM
L123	—	5	Lift arm detent relay	X-9	—
L124	—	5	Bucket detent relay	W-9	—
L125	—	5	Lift arm damper relay	V-9	TM
L126	—	4	Emergency steering relay	X-8	TM
L127	—	4	Front working lamp relay	X-7	—
L128	—	4	Rear working lamp relay	X-9	MON
L129	—	4	Rear glass heater relay	V-9	—
L130	—	4	Transmission pump cut-off relay	V-9	TM
LC.PS	DT-T	2	Torque converter lockup solenoid (OPT)	AJ-5	TM
LC.SW	DT	2	Torque converter lockup fill switch (OPT)	AJ-5	TM
LL1	DT-T	6	Intermediate connector (Relay)	O-7	E-5
LL2	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-7	E-6
LL3	DTHD#12	1	Intermediate connector (Ground)	N-7	E-5
LL4	DT-T (Br)	12	Intermediate connector (Throttle pedal)	N-6	E-6
LL5	DT	3	Intermediate connector (Joystick model)	M-5	WRK
LL6	DT-T (Gr)	12	Intermediate connector (Joystick model)	Q-1	WRK
LL7	DT-T (G)	12	Intermediate connector (Joystick model)	Q-1	WRK
LL8	DT-T (Gr)	8	Intermediate connector (Joystick switch)	Q-1	WRK
LR1	DTHD#12	1	Intermediate connector (Slow blow fuse)	X-2	J-2
LR4	L	2	Intermediate connector (Slow blow fuse)	X-1	J-3
LR5	DT-T	6	Intermediate connector (Auto grease controller)	X-3	MON
LR6	L	2	Intermediate connector (Ground)	X-2	J-3
LR8	DTHD#8	1	Intermediate connector (Ground)	X-2	J-2
LR9	DT-T	12	Intermediate connector (Steering, brake oil pressure switch)	X-1	TM
LR10	DT-T	12	Intermediate connector	X-1	J-3
LT1	HD-24	31	Intermediate connector (Transmission)	W-3	TM
NE	YAZAKI	2	Engine NE speed sensor	AB-6	E-1
OL	DT-T	2	Engine oil level sensor	AC-1	MON
PB.PS	DT-T	2	Parking brake solenoid	AI-2	TM
PB.SW	DT-T	2	Parking brake indicator switch	AI-2	TM
PCV1	SUMITOMO	2	Supply pump (No. 1)	Z-4	A-1
PCV2	SUMITOMO	2	Supply pump (No. 2)	AA-5	A-1
PFUEL	AMP174357-2	3	Common rail pressure signal	AB-5	E-2
PIM	SUMITOMO	3	Boost pressure signal	AC-7	E-2
R01	Terminal	1	Battery relay	J-2	L-1

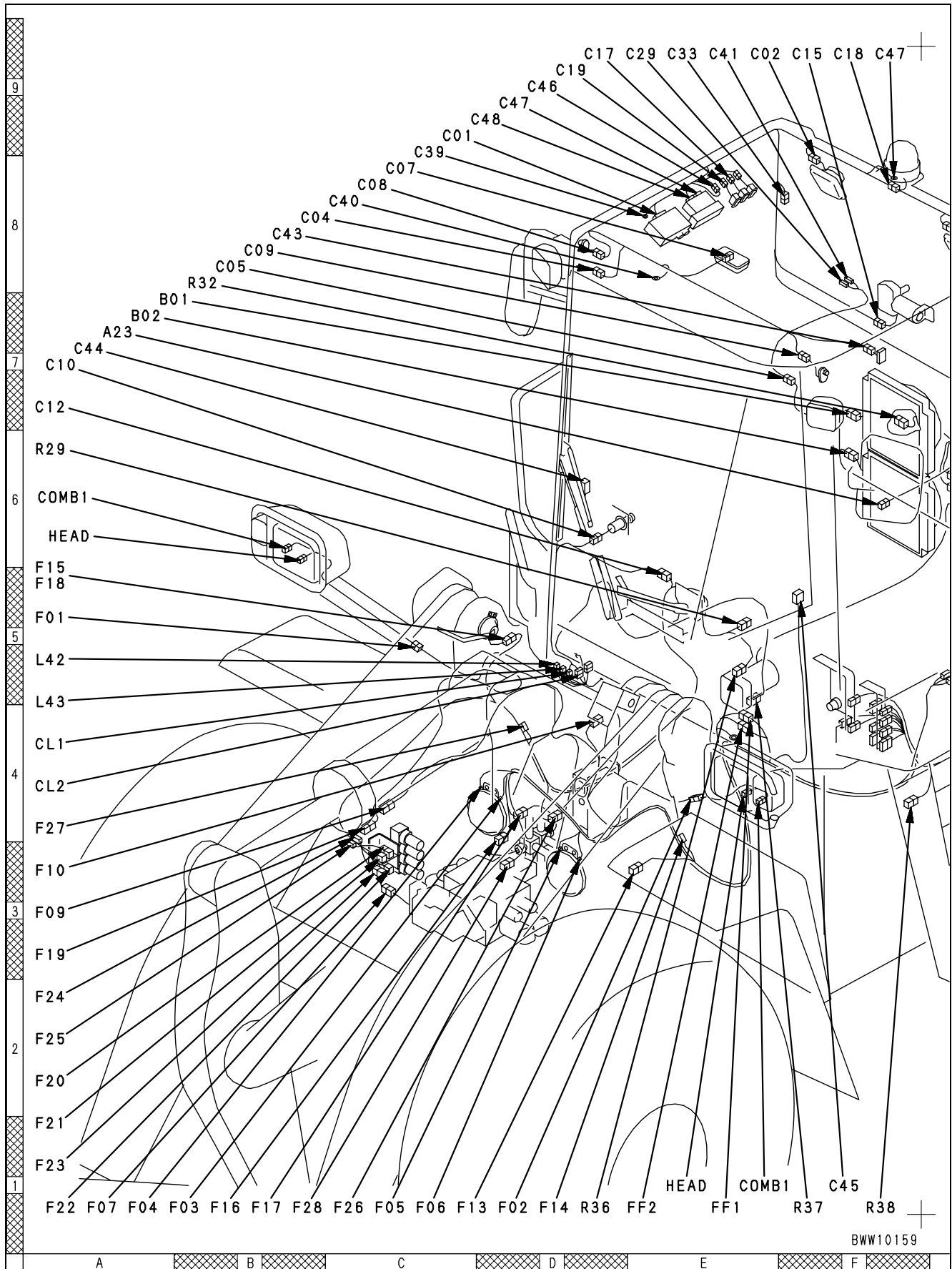


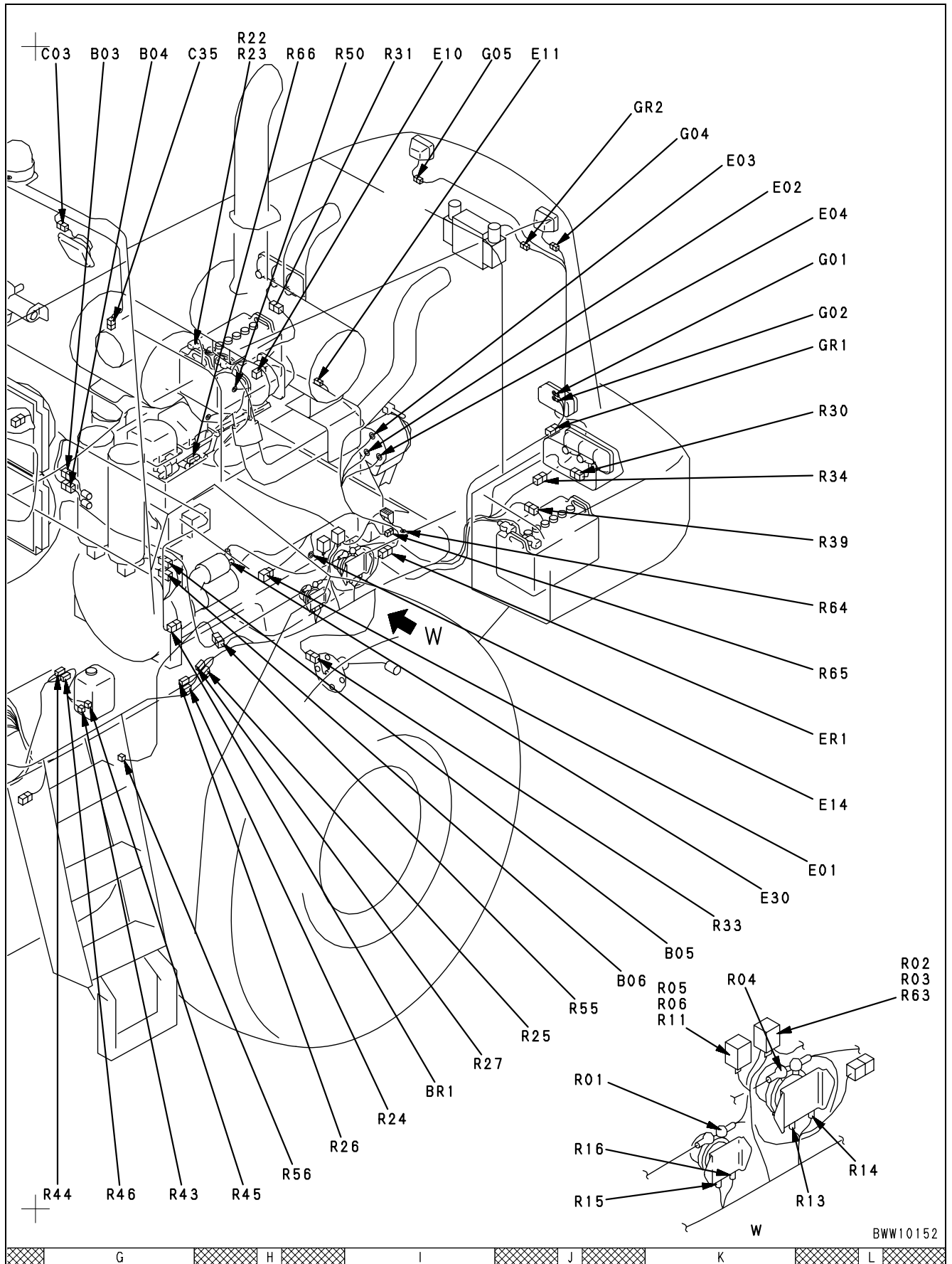
Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
R02	Terminal	1	Slow blow fuse	L-2	L-2
R03	Terminal	1	Slow blow fuse	L-2	L-2
R04	Terminal	1	Battery relay	K-2	L-1
R05	Terminal	1	Slow blow fuse	K-2	L-3
R06	Terminal	1	Slow blow fuse	K-2	L-2
R11	Terminal	1	Slow blow fuse	K-2	L-2
R13	Terminal	1	Battery relay	L-1	L-2
R14	Terminal	1	Battery relay	L-1	L-2
R15	Terminal	1	Emergency steering relay	J-1	TM
R16	Terminal	1	Emergency steering relay	J-1	TM
R22	Terminal	1	Battery	H-9	K-1
R23	Terminal	1	Battery	H-9	K-1
R24	DT-T	2	Diode (Battery relay)	I-1	L-4
R25	DT-T	2	Diode (Battery relay)	J-2	L-3
R26	DT-T	2	Diode (Starting motor)	H-1	L-3
R27	DT-T	2	Diode (Starting motor)	I-2	L-3
R29	DT-T	2	Oil fan EPC	A-6	TM
R30	M	6	Rear combination lamp (Left)	L-7	TM
R31	M	6	Rear combination lamp (Right)	I-9	TM
R32	DT-T	2	Coolant level sensor	B-8	MON
R33	DT-T	2	Fuel level gauge sensor	K-3	MON
R34	M	2	License lamp	L-6	MON
R36	DT-T	3	Steering pump pressure switch	D-1	TM
R37	DT-T	3	Emergency steering pressure switch	F-1	TM
R38	DT-T	6	Auto grease controller	F-1	MON
R39	DT-T	2	Battery level sensor	L-6	MON
R43	KES1	2	Front windshield washer	G-1	OTH
R44	DT-T	2	Diode (Washer)	G-1	OTH
R45	KESI	2	Rear windshield washer	H-1	OTH
R46	DT-T	2	Diode (Washer)	G-1	OTH
R50	Terminal	1	Ground	H-9	K-1
R55	DT-T	2	Intermediate connector (Rear brake oil temperature)	J-2	TM
R56	DT-T	2	Rear brake oil temperature sensor	H-1	TM
R63	Terminal	1	Slow blow fuse	L-2	—
R64	Terminal	1	Ground	L-5	—
R65	DT-T	6	Auto tilt motor switch (OPT)	L-5	—
R66	DT-T	2	Auto tilt motor	H-9	—
REV OUT	DT-T	2	Speed sensor	AH-2	TM
R.PS	DT-T	2	R clutch solenoid	AJ-6	TM
R.SW	DT	2	R clutch fill switch	AJ-6	TM
S01	DT-T	6	Front working lamp switch	P-1	MON
S02	DT-T	6	Rear working lamp switch	P-1	MON
S03	DT-T	6	Transmission cut-off ON/OFF switch	M-4	TM
S04	DT-T	6	Right direction ON/OFF switch	N-9	G-8
S05	DT-T	6	Transmission cut-off set switch	M-9	TM
S06	DT-T	6	Torque converter lockup ON/OFF switch	O-8	TM
S07	DT-T	6	Boom damper ON/OFF switch	O-1	TM
S12	DT-T	6	Remote positioner set switch (Joystick model)	N-7	WRK

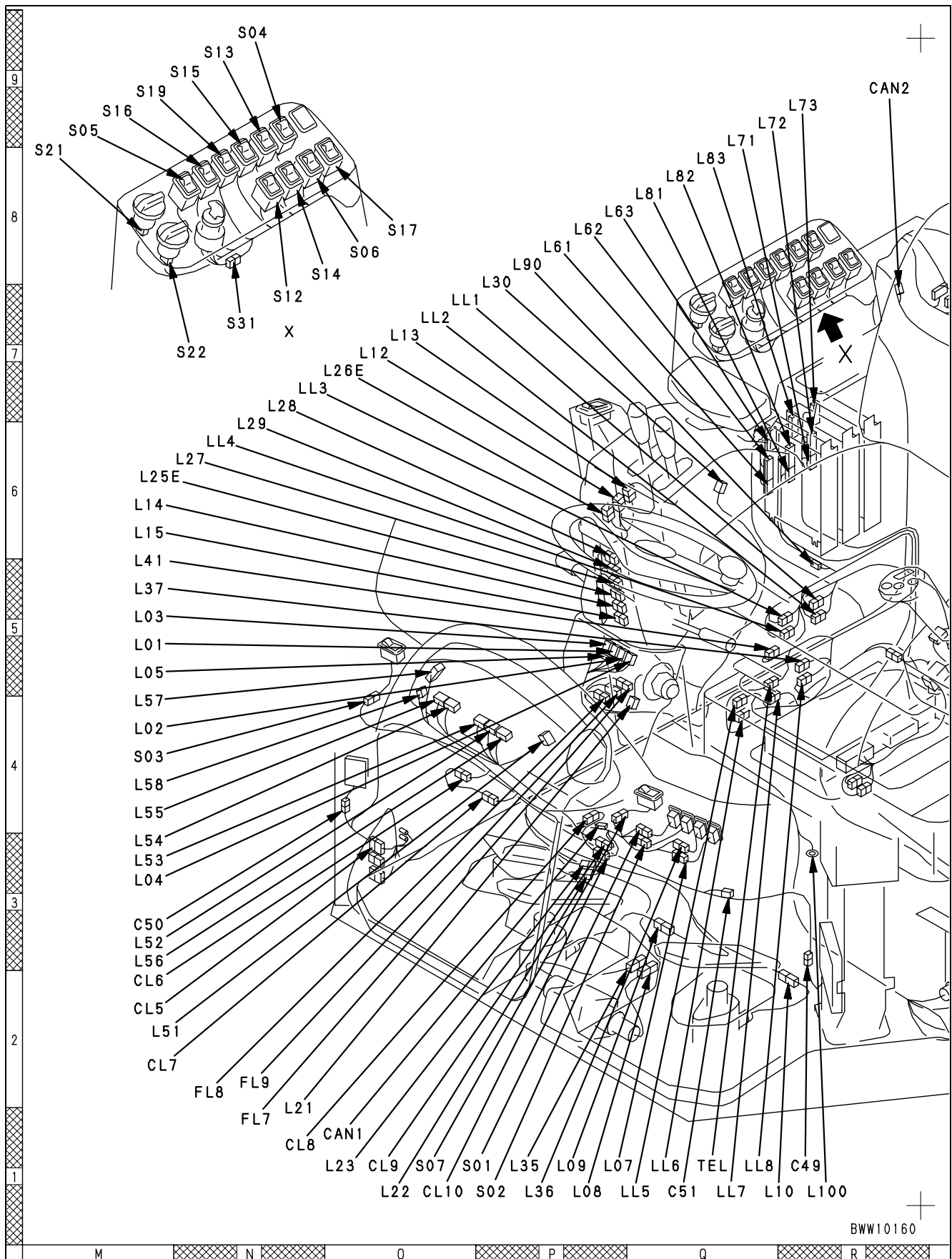
Connector No.	Type of Connector	Number of Pins	Device Name	Address	
				Arrangement Drawing	System Diagram
S13	DT-T	6	Upper remote position ON/OFF switch (Joystick model)	N-9	WRK
S14	DT-T	6	Lower remote position ON/OFF switch (Joystick model)	N-8	WRK
S15	DT-T	6	Automatic digging switch (Joystick model)	N-9	WRK
S16	DT-T	6	Emergency steering check switch	M-9	TM
S17	DT-T	6	Auto grease switch	O-8	—
S19	DT-T	6	Hydraulic fan reverse switch	M-9	TM
S21	DT-T	4	Engine power mode switch	M-8	J-8
S22	DT-T	4	Auto shift mode switch	N-7	TM
S31	DT	4	Starting switch	N-7	K-8
TEL	DT-T (Gr)	12	Connector	Q-1	J-4
THL	DT-T	3	Fuel temperature sensor	AB-5	E-1
TC.C	DT-T	2	Torque converter oil temperature sensor (Monitor)	—	TM
TM.T	DT-T	2	Transmission oil temperature sensor	AJ-4	—
TWH	DT-T	2	Engine water temperature sensor (Monitor)	AD-2	MON
TWL	DT-T	3	Engine water temperature sensor (Preheater)	AB-1	E-2

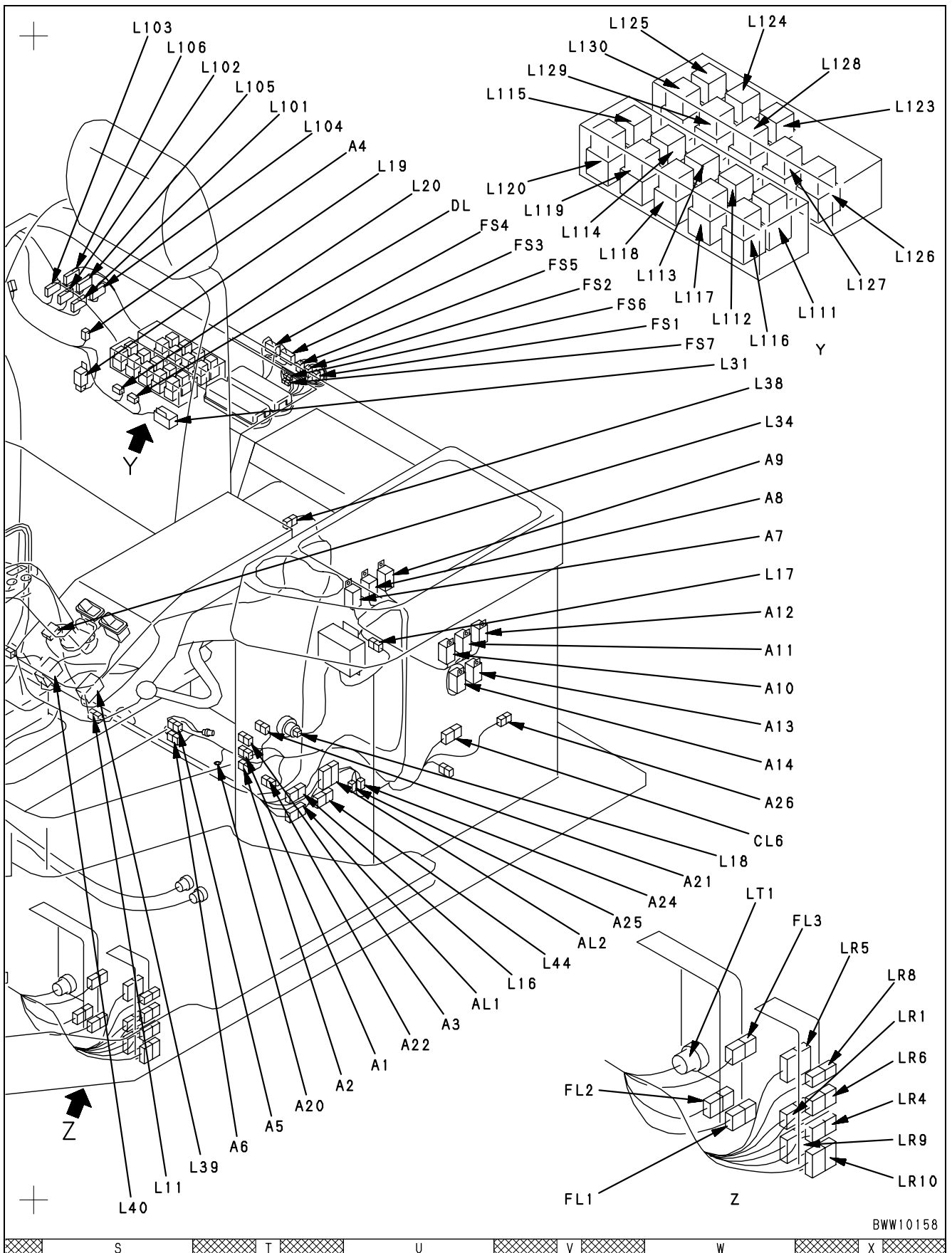
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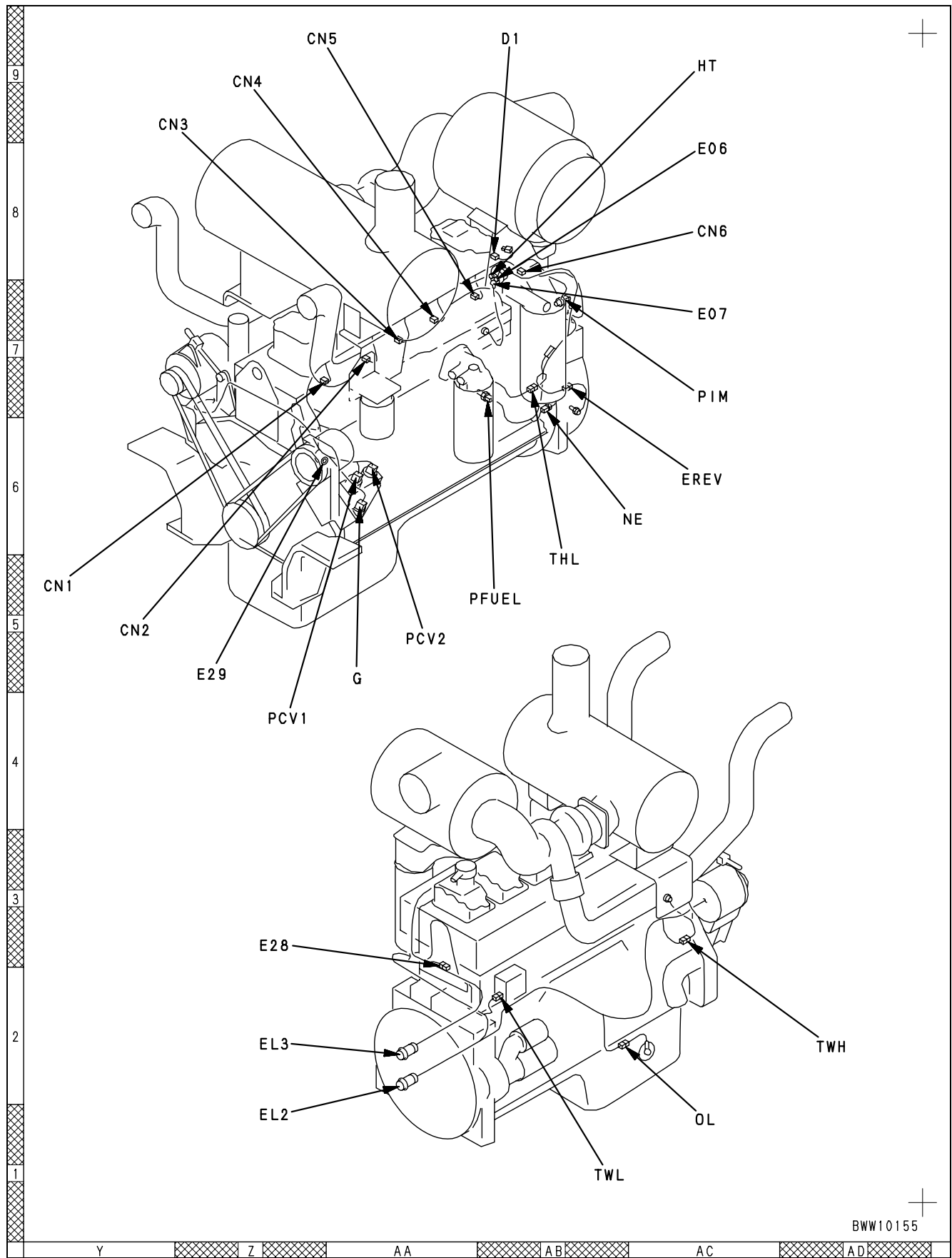
# Connectors layout drawing



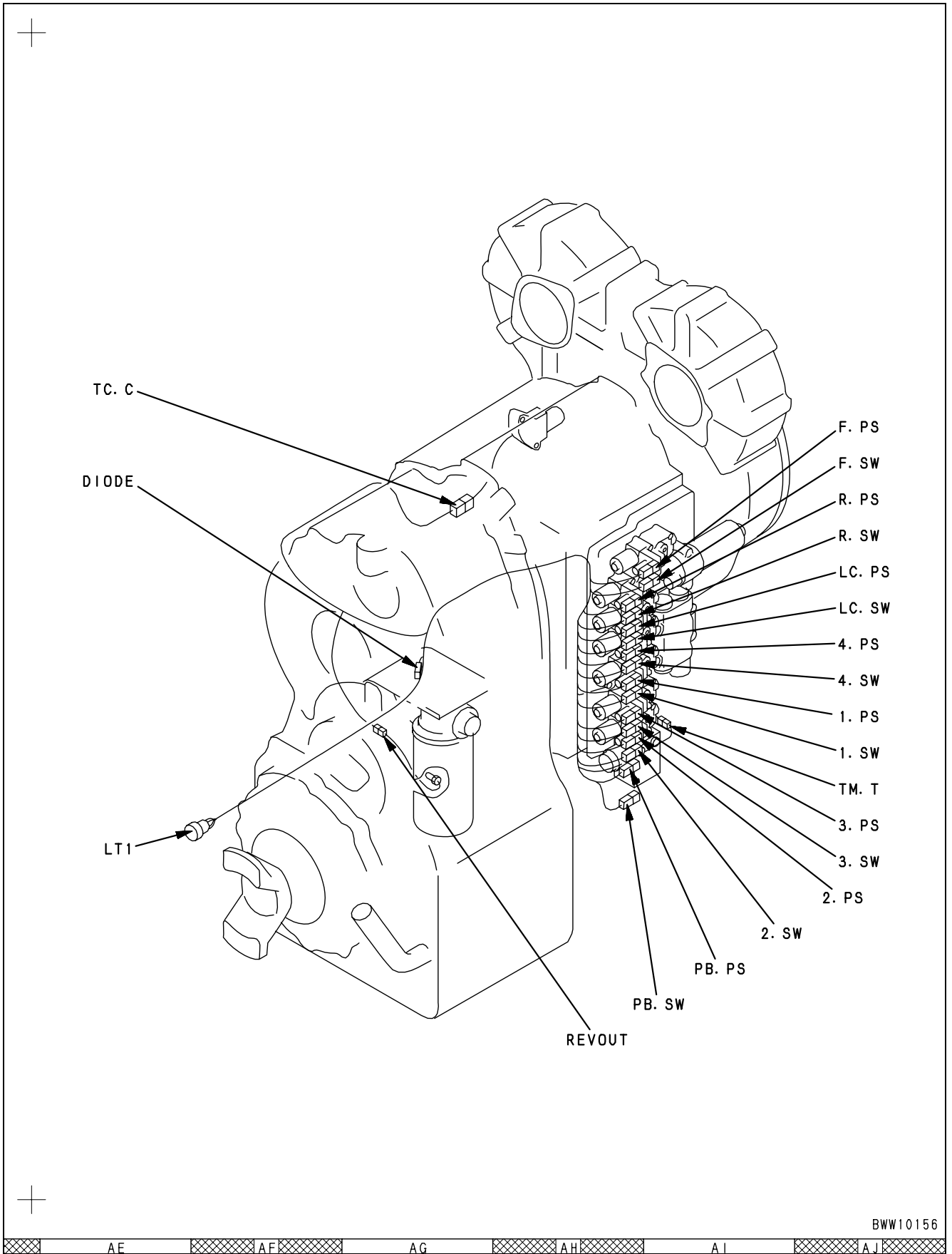






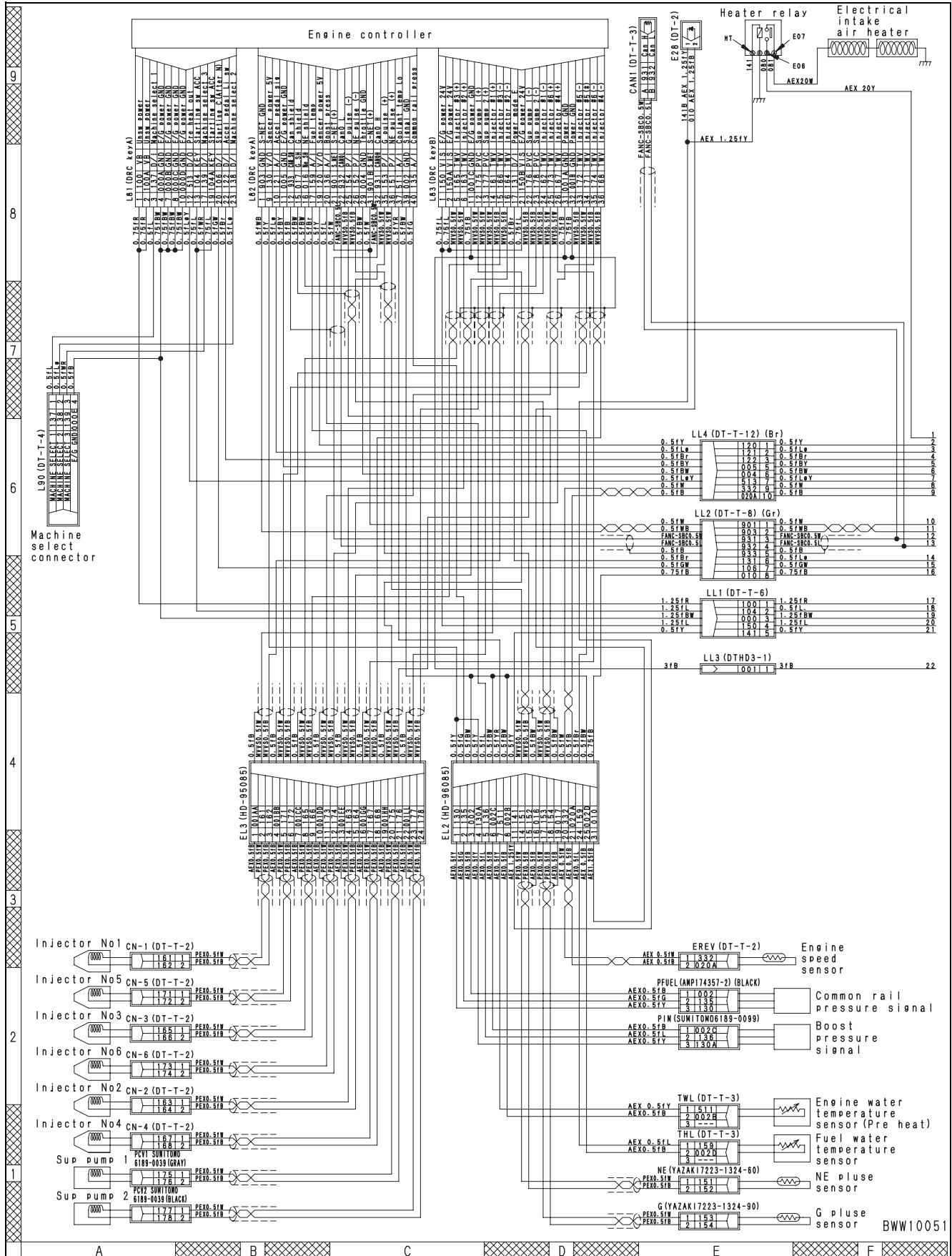






# Engine control system diagram

ZOOM – see section 90, page 90-37





# TROUBLESHOOTING OF TRANSMISSION CONTROL SYSTEM (TM MODE)

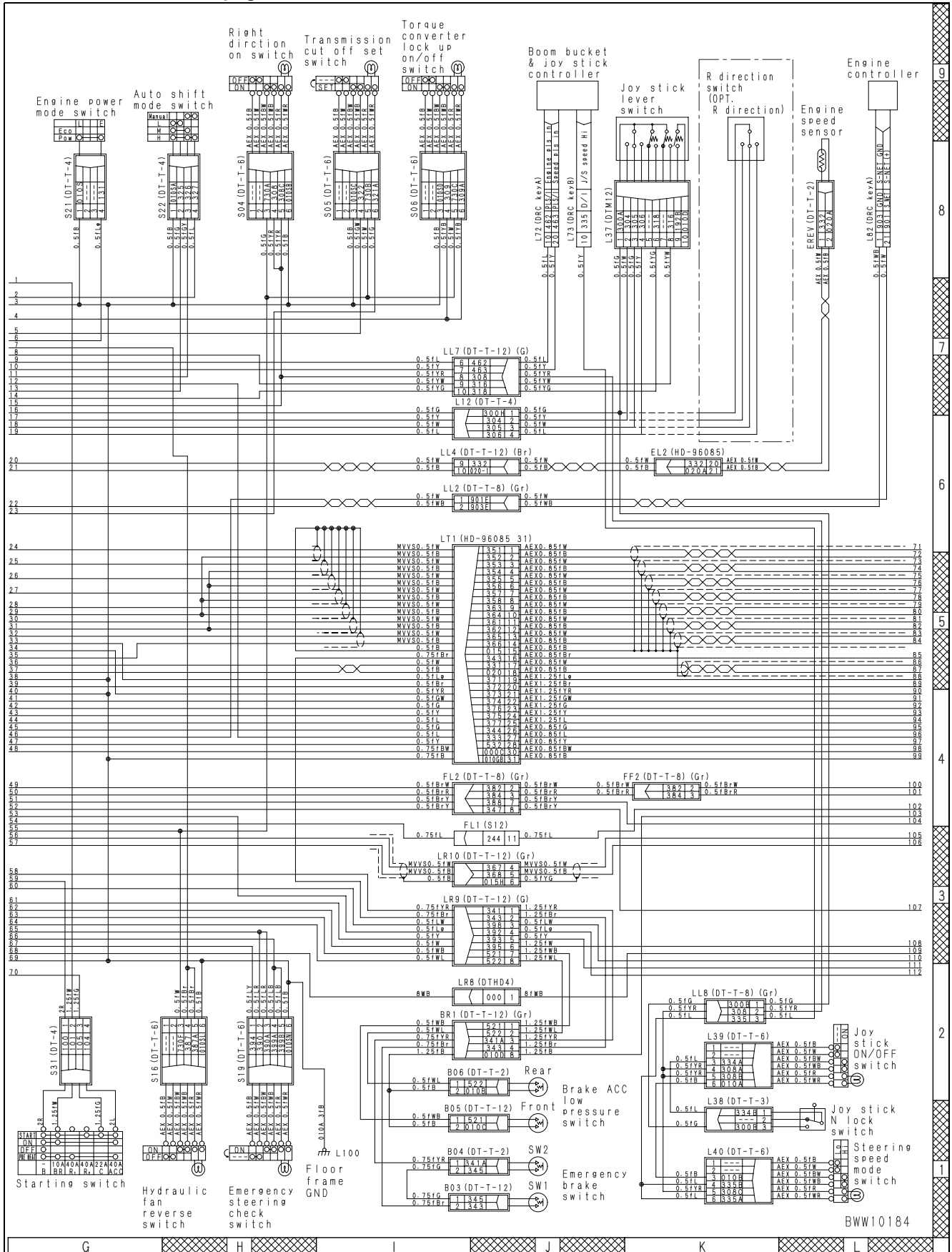
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Error code [15SELH] 1st_ECMV fill switch system disconnected	20-427
Error code [15SFL1] 2nd_ECMV fill switch system short-circuited	20-428
Error code [15SFLH] 2nd_ECMV fill switch system disconnected	20-429
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Action code [TM-28]	Fan reverse solenoid system hot short-circuiting) . . . . .	20-542
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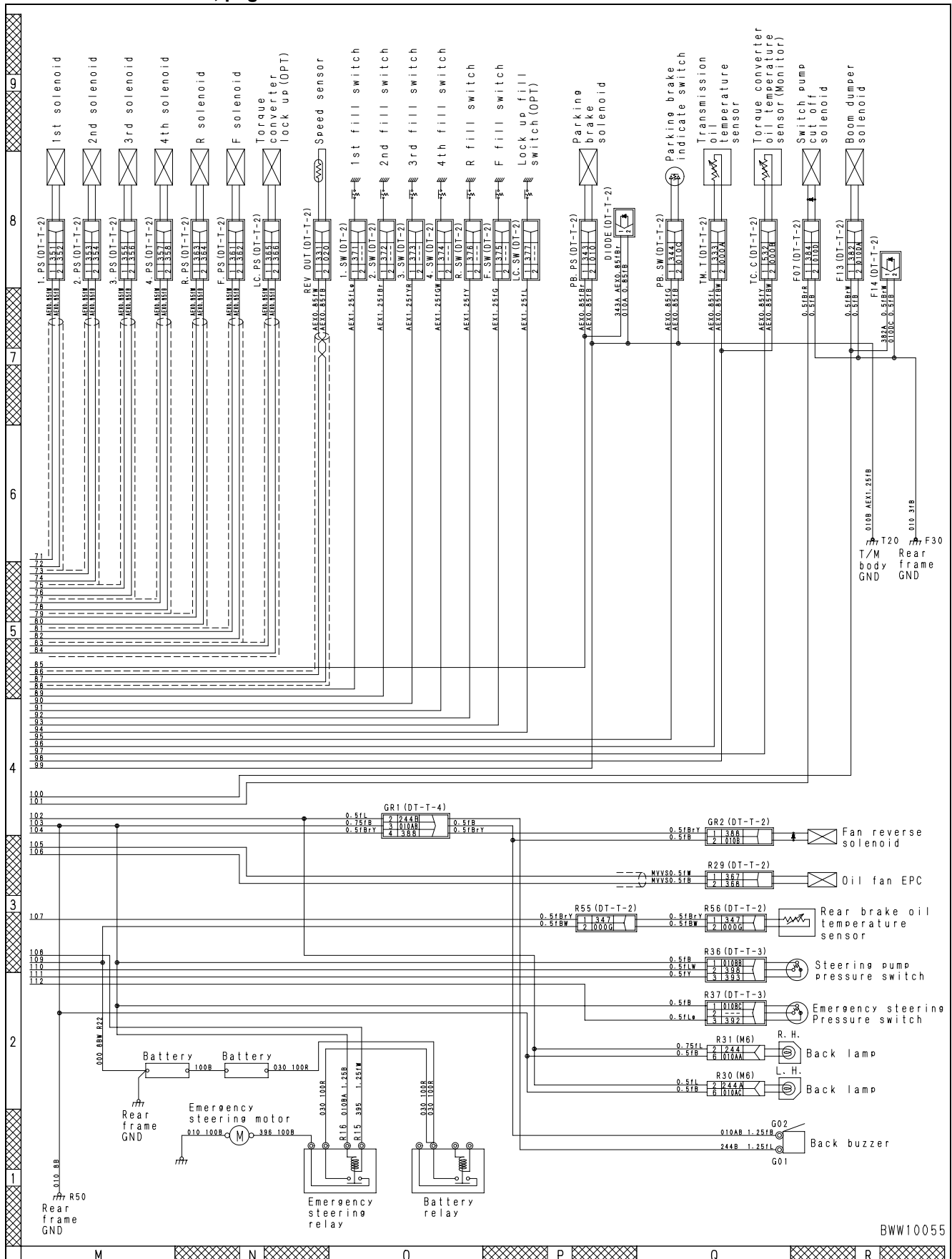


ZOOM – see section 90, page 90-39





ZOOM – see section 90, page 90-41



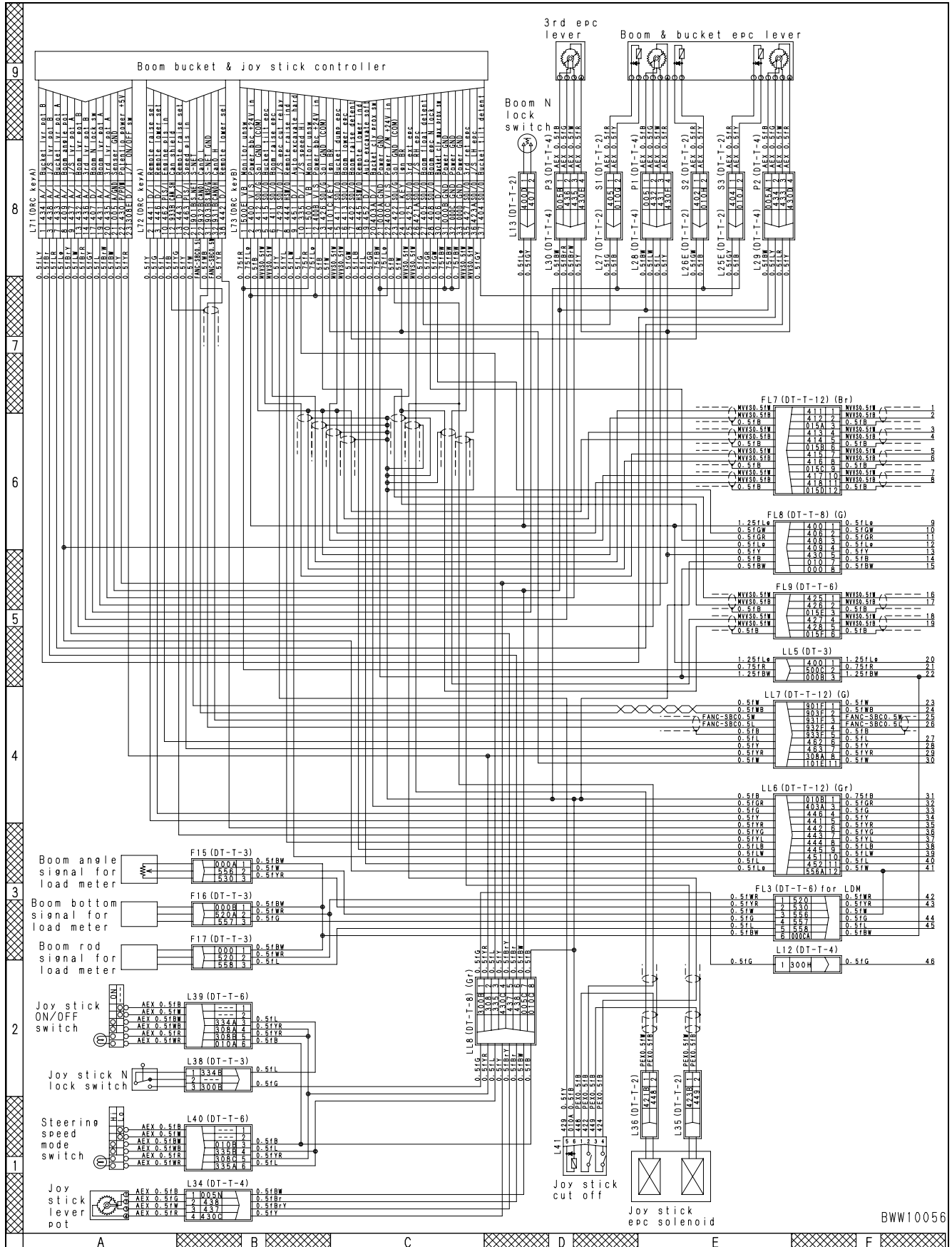
# TROUBLESHOOTING OF WORK EQUIPMENT CONTROL SYSTEM (WORK MODE)

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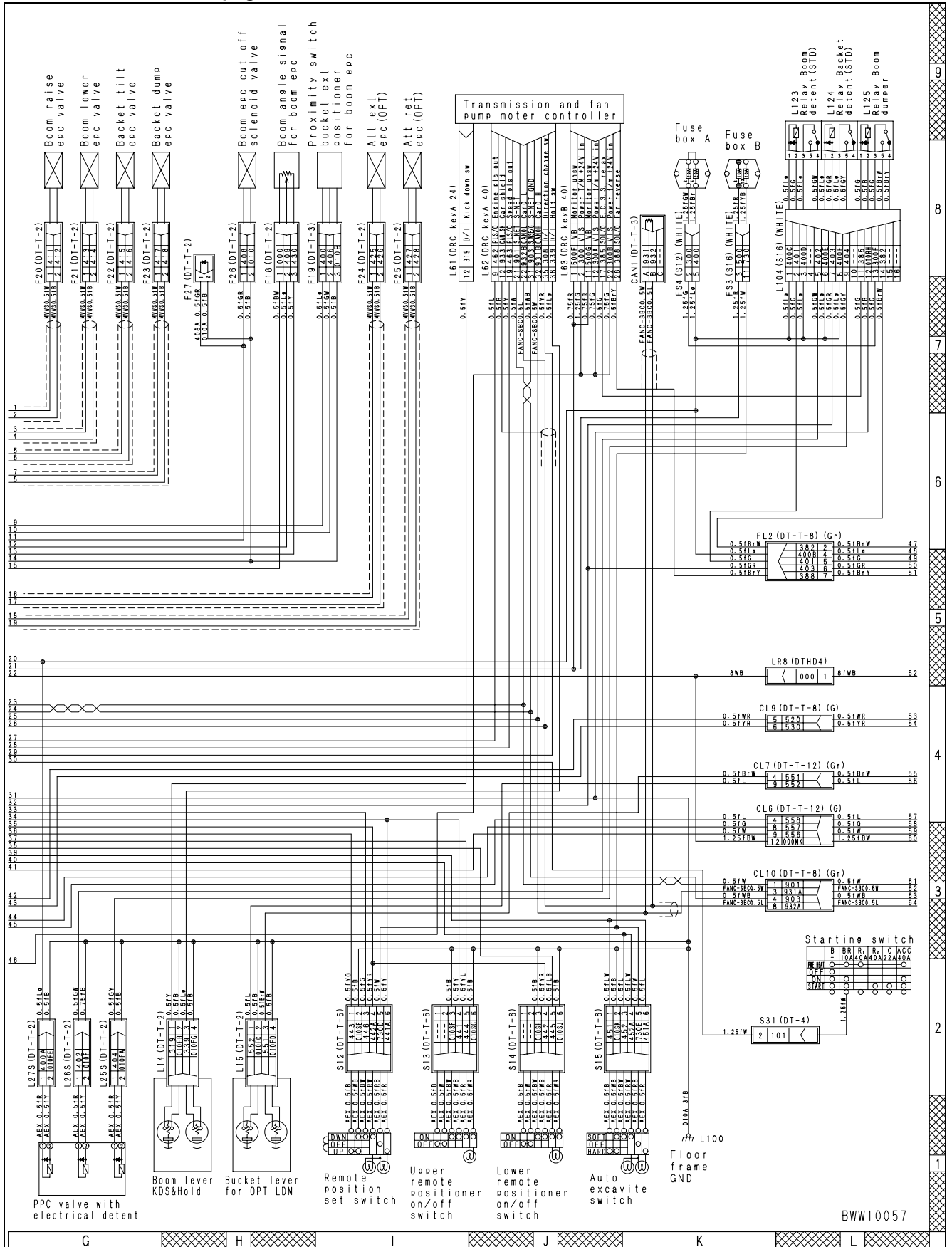
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# Work equipment control system diagram

ZOOM – see section 90, page 90-43



ZOOM – see section 90, page 90-43





# TROUBLESHOOTING OF MONITOR SYSTEM (MON MODE)

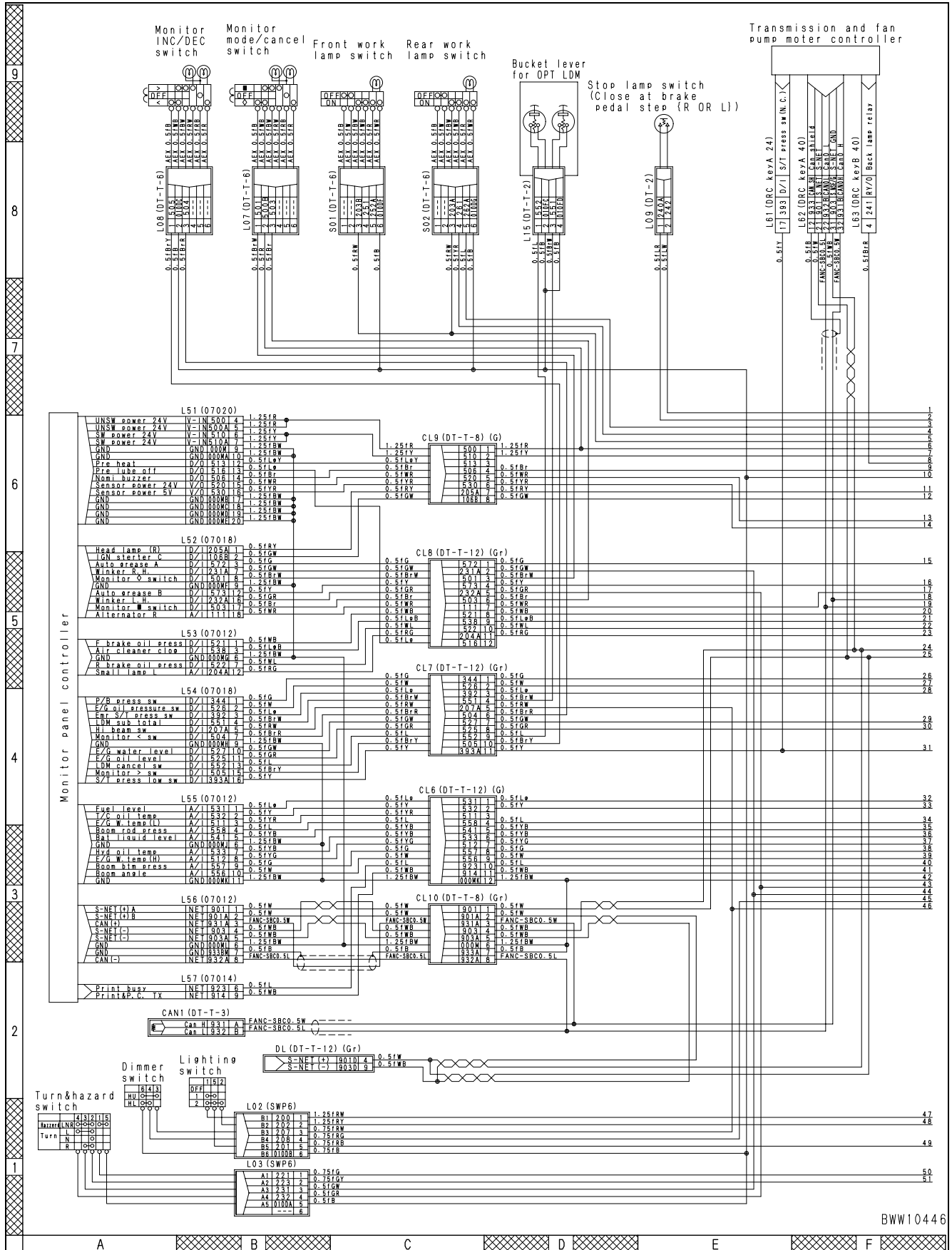
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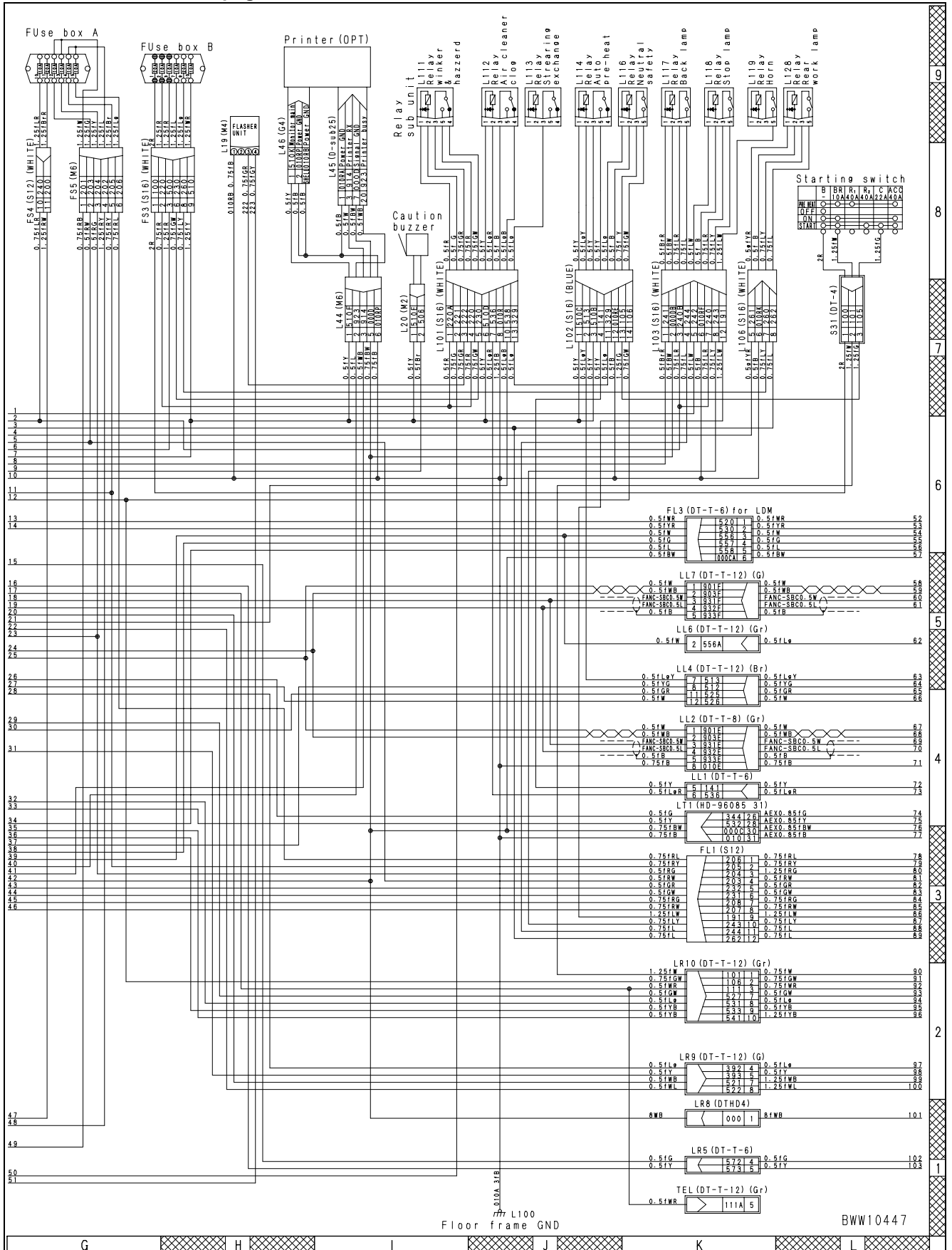
# Monitor system diagram

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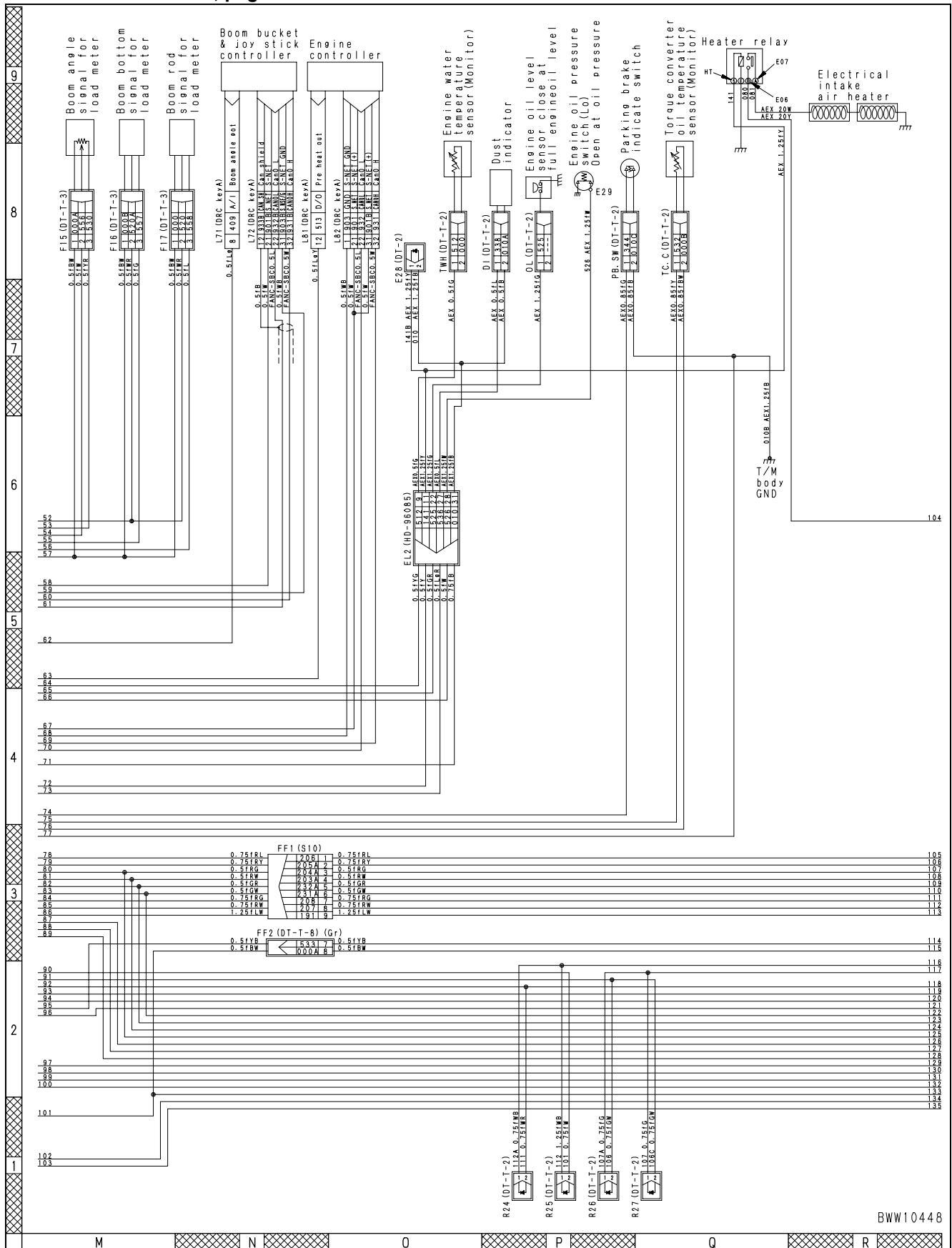


BWW10446

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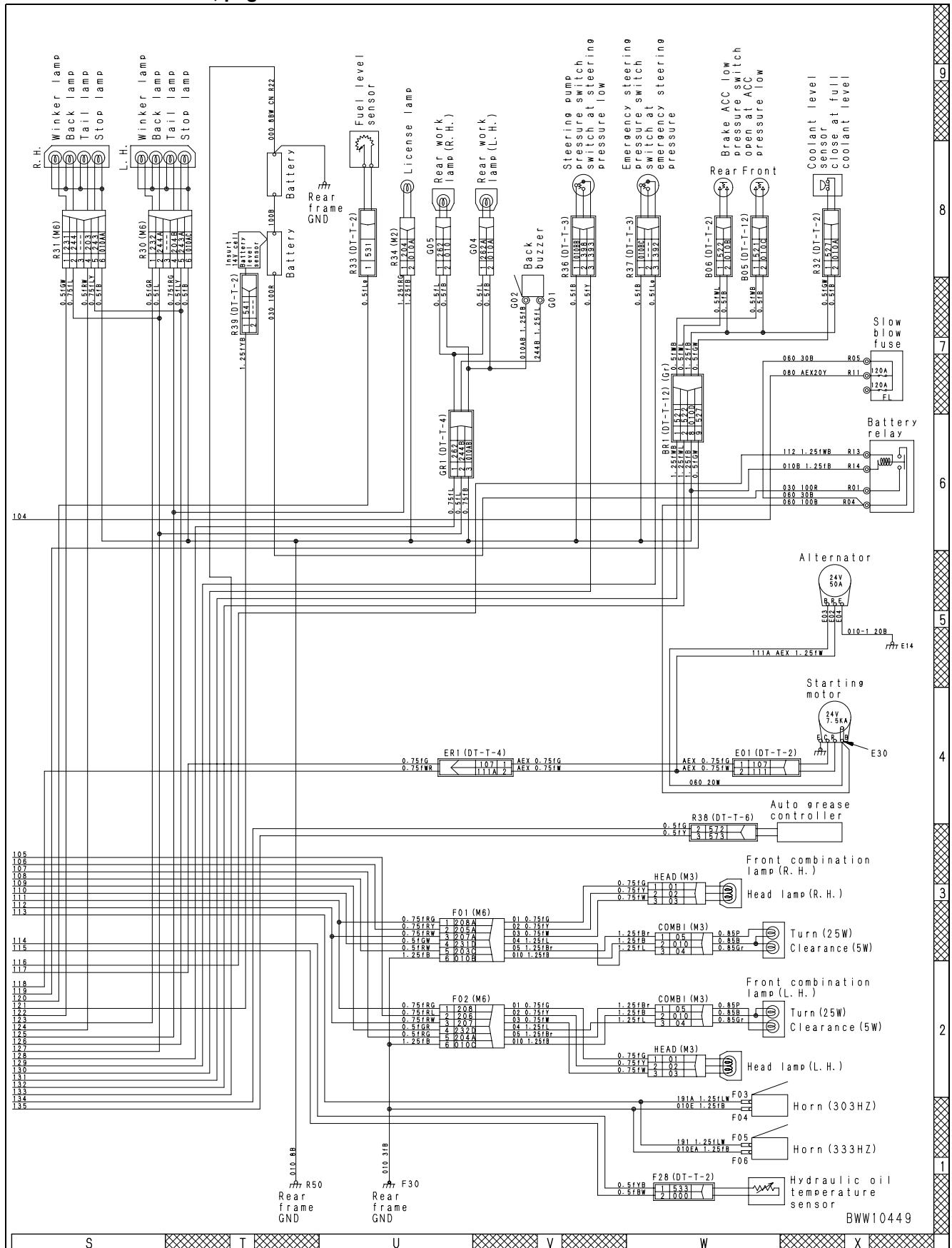


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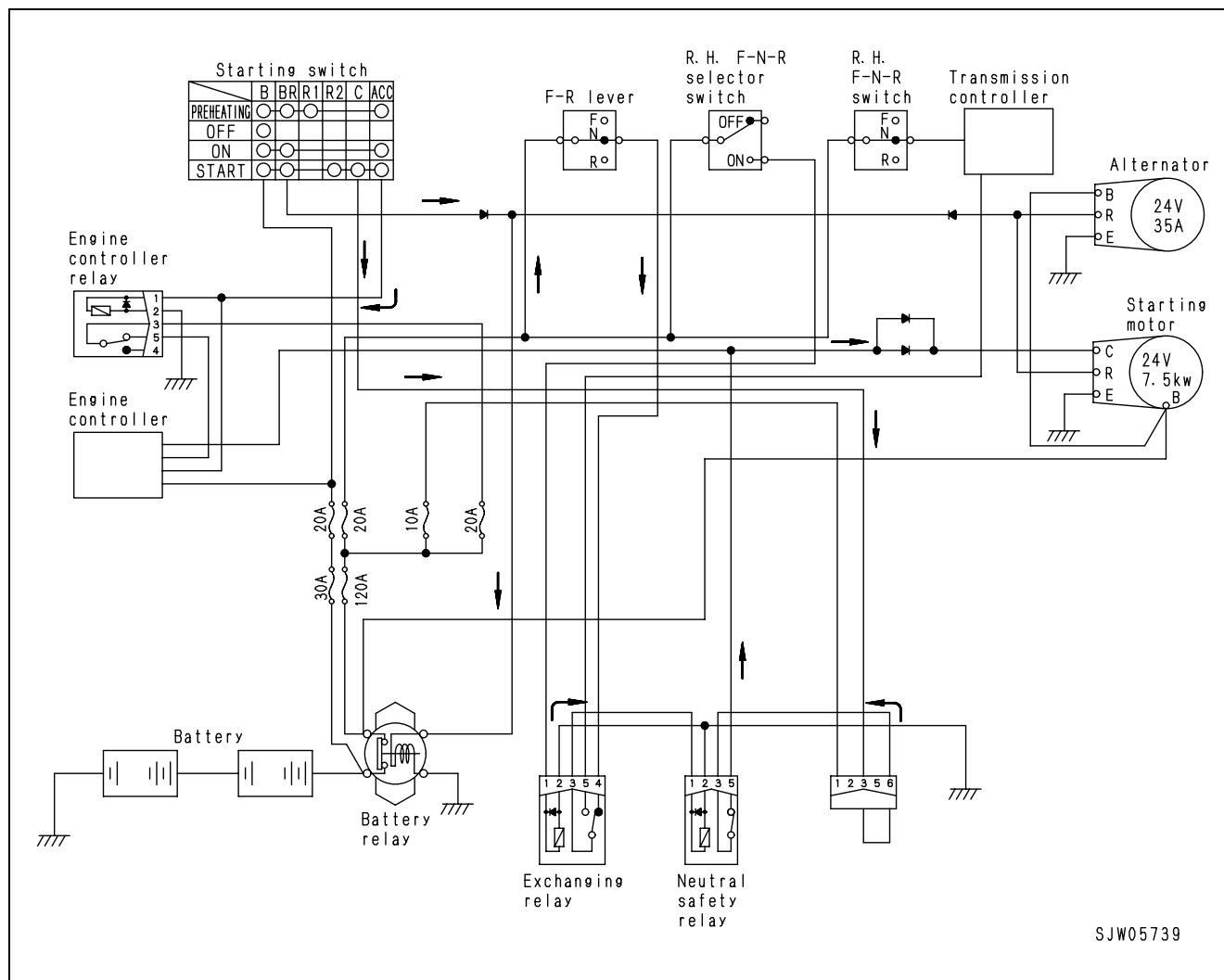


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# Engine starting circuit



SJW05739

## Function

Adoption of the neutral safety circuit assured safety when starting the engine.

- The engine cannot start except when the forward-reverse lever is in the N (neutral) position.
- When the right FNR selector switch (op) is in the ON position, the engine cannot start except when the right FNR switch (op) is in the N (neutral) position.
- When the J/S (joystick steering) (op) is in the ON position, the engine cannot start except when the FNR switch of J/S lever is in the N (neutral) position and also the J/S lever is in the N (neutral) position.

## Operation

### 1. When the starting switch is in the [ON] position

- If you place the starting switch in the [ON] position, the terminals **B** and **BR** of starting switch close. Current flows from the battery, and goes through the starting switch and battery relay coil to grounding, closing the battery relay contacts. By this operation, every circuit of the machine is powered.

In addition, a current flows from the **ACC** terminal of the starting switch to the engine controller power relay, operating the relay to power the engine controller for operation. By this, the engine is completely ready for start.

### 2. Neutral safety circuit

- If you place the forward-reverse lever at the N (neutral) position, and then, current flows from the **N** contact of forward-reverse lever and goes through the exchange relay to the neutral safety relay coil. As a result, the current is carried between the terminals 3 and 5 of neutral safety relay.
- When the right FNR switch (OPT) is used (when the right FNR selector switch is in the ON position), current flows from the right FNR selector switch to the exchange relay coil to operate the relay.

If the right FNR switch is in the N (neutral) position at that time, the T/M controller outputs current to the exchange relay. It flows from the T/M controller to the exchange relay and finally it reaches the neutral safety relay coil. As a result, the current is carried between the terminals 3 and 5 of neutral safety relay.

- When the J/S steering (OPT) is used, lower the J/S arm rest and place the J/S selector switch in the ON position. Then, current flows from the J/S selector switch to the exchange relay coil to operate the relay.

If the FNR switch of the J/S lever is in the N (neutral) position and the J/S lever is in the N (neutral) position, the T/M controller outputs current to the exchange relay.

It goes through the exchanger relay to the neutral safety relay coil, consequently making the current flow between the terminals 3 and 5 of the neutral safety relay.

(When the J/S steering is mounted, the J/S flip switch and J/S selector switch are mounted instead of the right FNR selector switch in the figure above, and the J/S lever FNR switch is mounted instead of right FNR switch.)

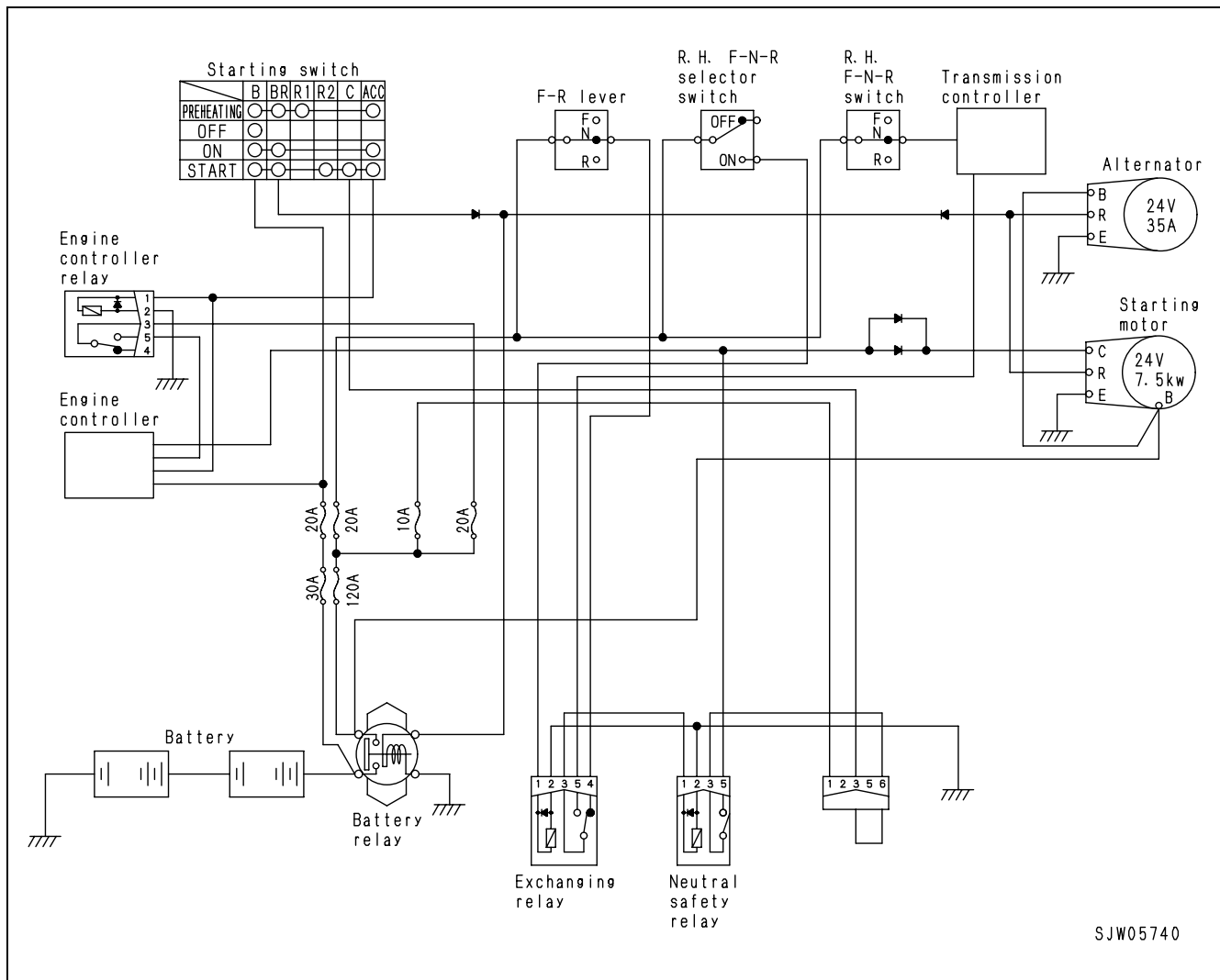
### 3. When the starting switch is in the [Start] position

- If you place the starting switch in the [Start] position, and then, current goes from the terminal **B** of starting switch, terminal **C**, terminal **3** of neutral safety relay, and terminal **5** to the starter, starting the engine.
- At the same time, the current from the terminal **C** of starting switch flows to the engine controller.

Then, the engine controller calculates signals of the engine speed, water temperature, etc. to control injection volume optimally.

- Except when the forward-reverse lever is in the N (neutral) position, the right FNR switch is the N (neutral) position (when the right FNR switch is used), or the J/S lever FNR switch is in the N (neutral) position and also the J/S lever is in the N (neutral) position, the neutral safety relay, not allowing the engine to start.

# Engine stop circuit



## Operation

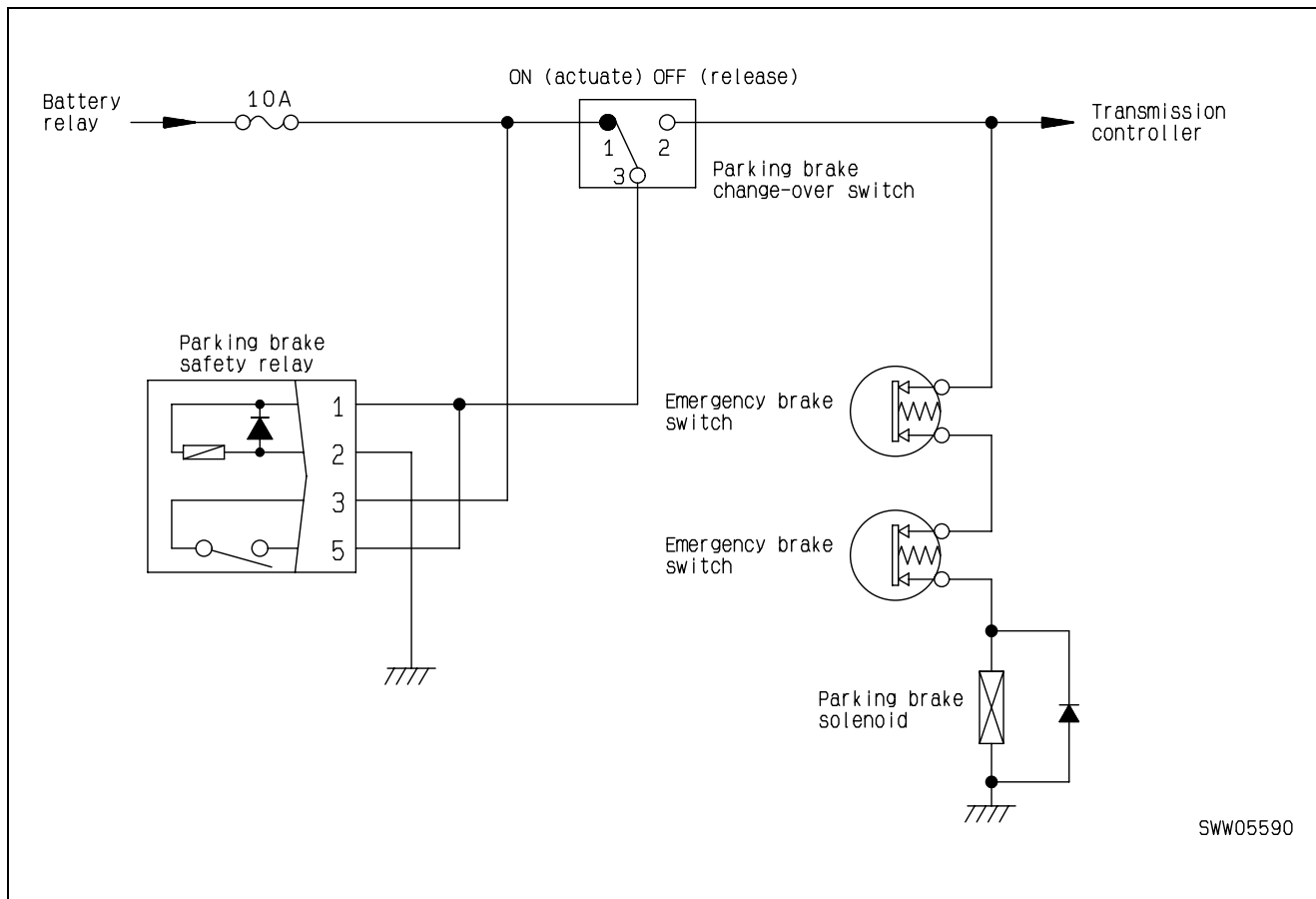
If you place the starting switch in the [OFF] position, and then, current at the **ACC** terminal of starting switch is shut off, cutting off the **ACC** signal to the engine controller. Then, the engine controller stops supplying fuel to the engine. At the same time, current to the engine controller power relay coil is shut off and the relay is turned off. As a result, the operating power of the engine controller is shut down, preventing malfunctions.

When the fuel supply is stopped, the engine reduces its speed and stops. Then, the power generation of the alternator stops to shut off voltage supply from the terminal **R** of the alternator. In addition, the current from the terminal **BR** of starting switch is shut off. Consequently, the battery relay contact opens to shut down the power supplied to every circuit of the machine.

# Parking brake circuit

## Operation

1. When the starting switch is in the OFF position.

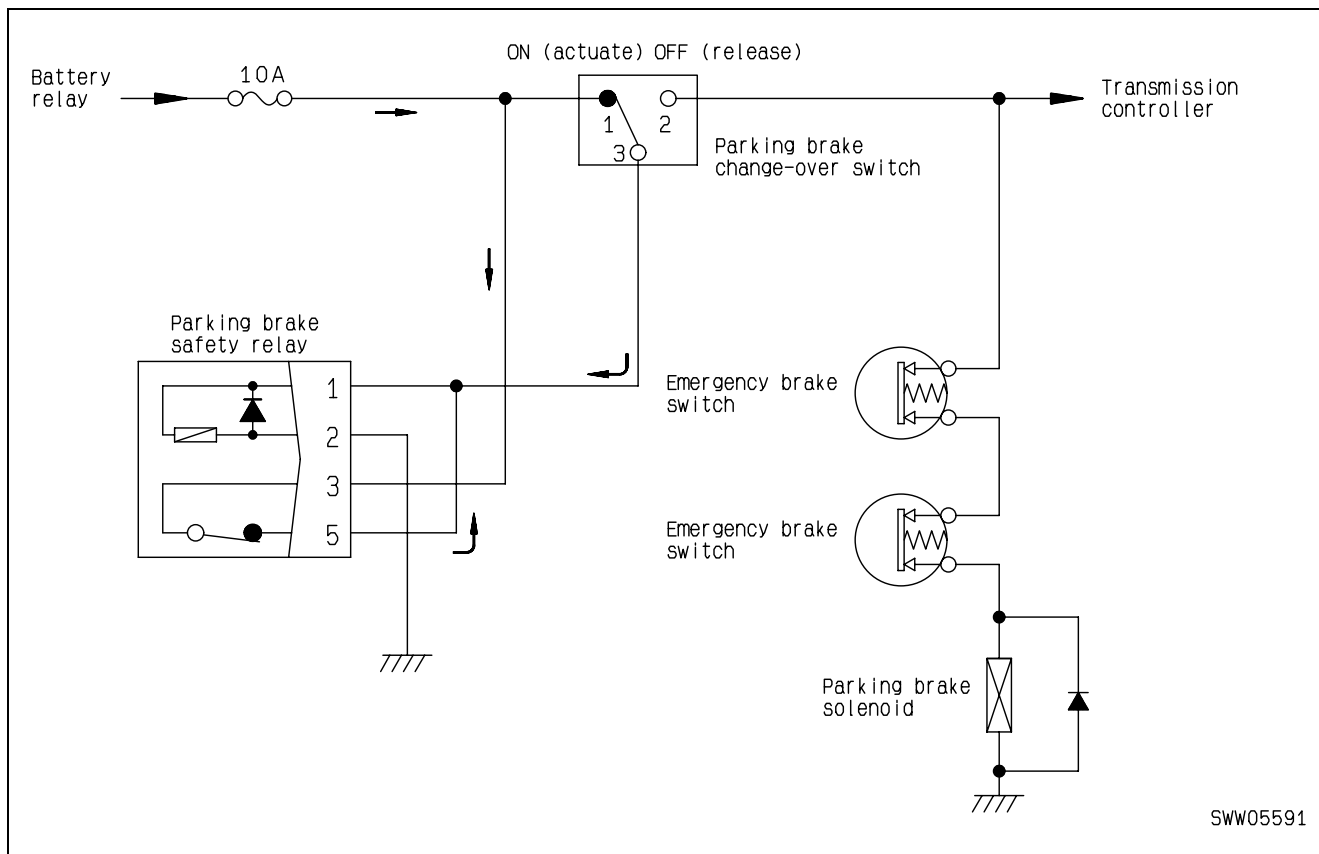


If you place the starting switch in the OFF position, and then, the battery relay contact opens, not allowing current to flow to the parking brake circuit. For this reason, if the starting switch is in the OFF position, the current does not flow to the parking brake solenoid regardless of whether the parking brake switch is in the ON or OFF position, operating the parking brake.



## 2. When the starting switch is in the ON position

## 2-1. When the parking brake switch is in the ON (operation) position before placing the starting switch in the ON position

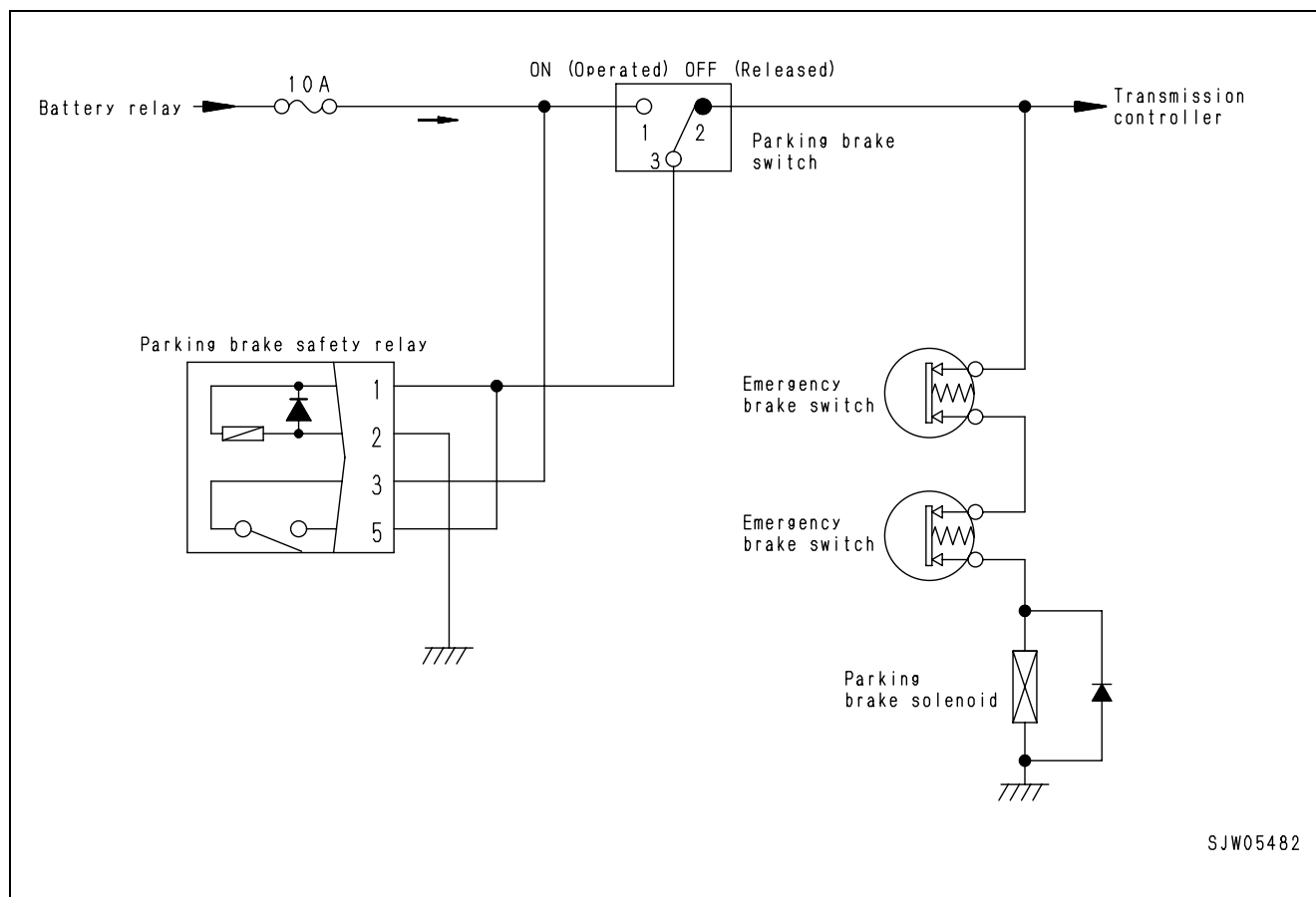


- Since the parking brake selector switch is in the ON (operate) position, current goes through the battery relay, contact 1 of parking brake selector switch, contact 3, and parking brake safety relay coil to the grounding.

Consequently, the terminals 3 and 5 of the parking brake safety relay close. The current from the battery relay continues to flow to the parking brake safety relay coil and opens the battery relay contact which is held open until the current stops flowing to the parking brake circuit.

- At that time, the current does not flow to the parking brake solenoid and the parking brake remains in operation.
- In addition, this signal is input to the T/M controller to prevent dragging of the parking brake by placing the transmission in the neutral position during the operation of the parking brake.
- If you place the parking brake selector switch in the OFF (open) position after that, current goes through the battery relay, parking brake safety relay, contact 3 of parking brake selector switch, contact 2, emergency brake switch, and parking brake solenoid to the grounding, consequently releasing the parking brake.

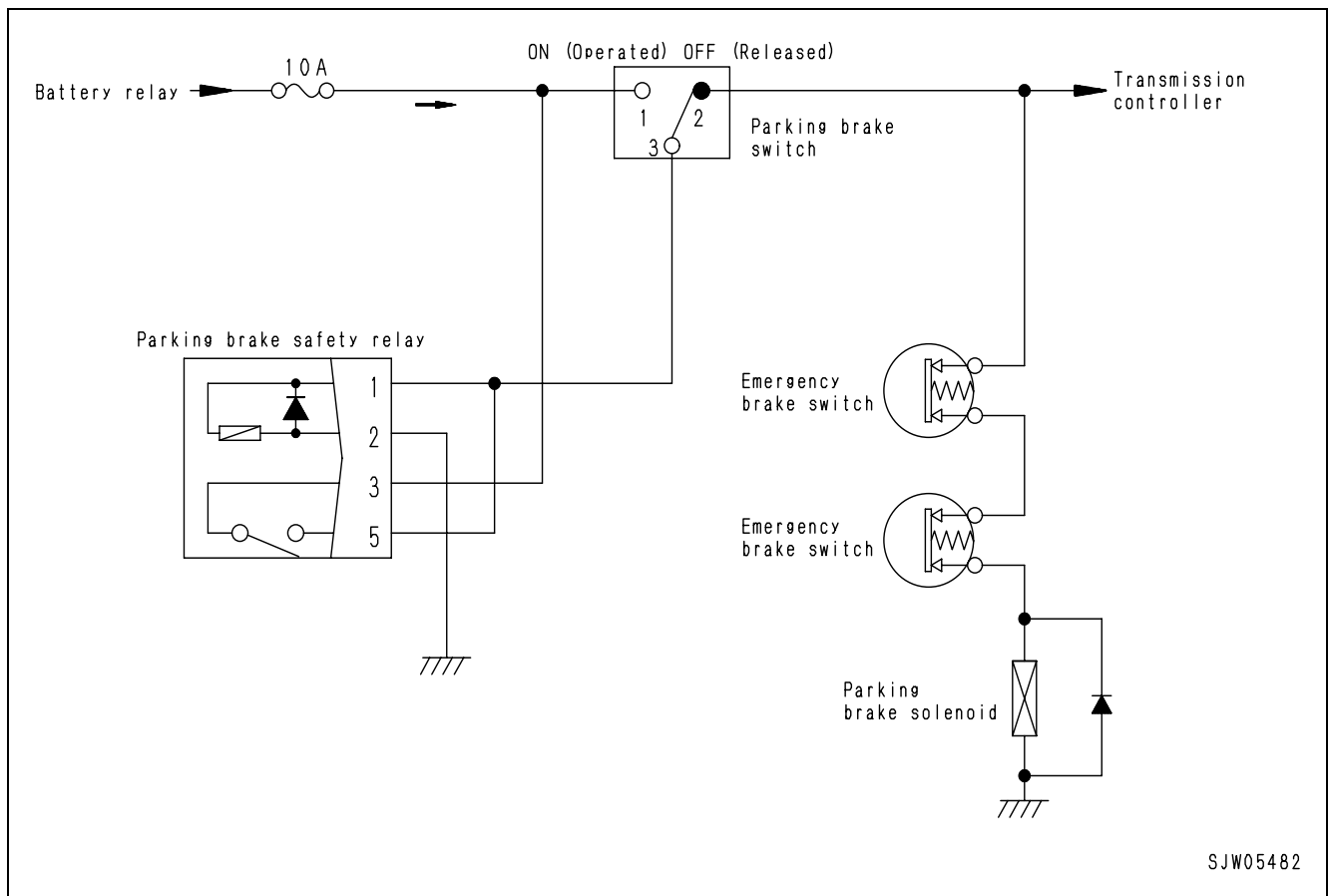
2-2. When the parking brake is in the OFF (release) position before placing the starting switch in the ON position



- Since current does not flow to the parking brake safety relay when the starting switch is in the OFF position, the relay contact is open.

Even if you place the starting switch in the ON position, the current does not flow to the parking brake solenoid. Therefore, the parking brake will not be released automatically.

3. When the main brake oil pressure lowers  
(emergency brake operates)



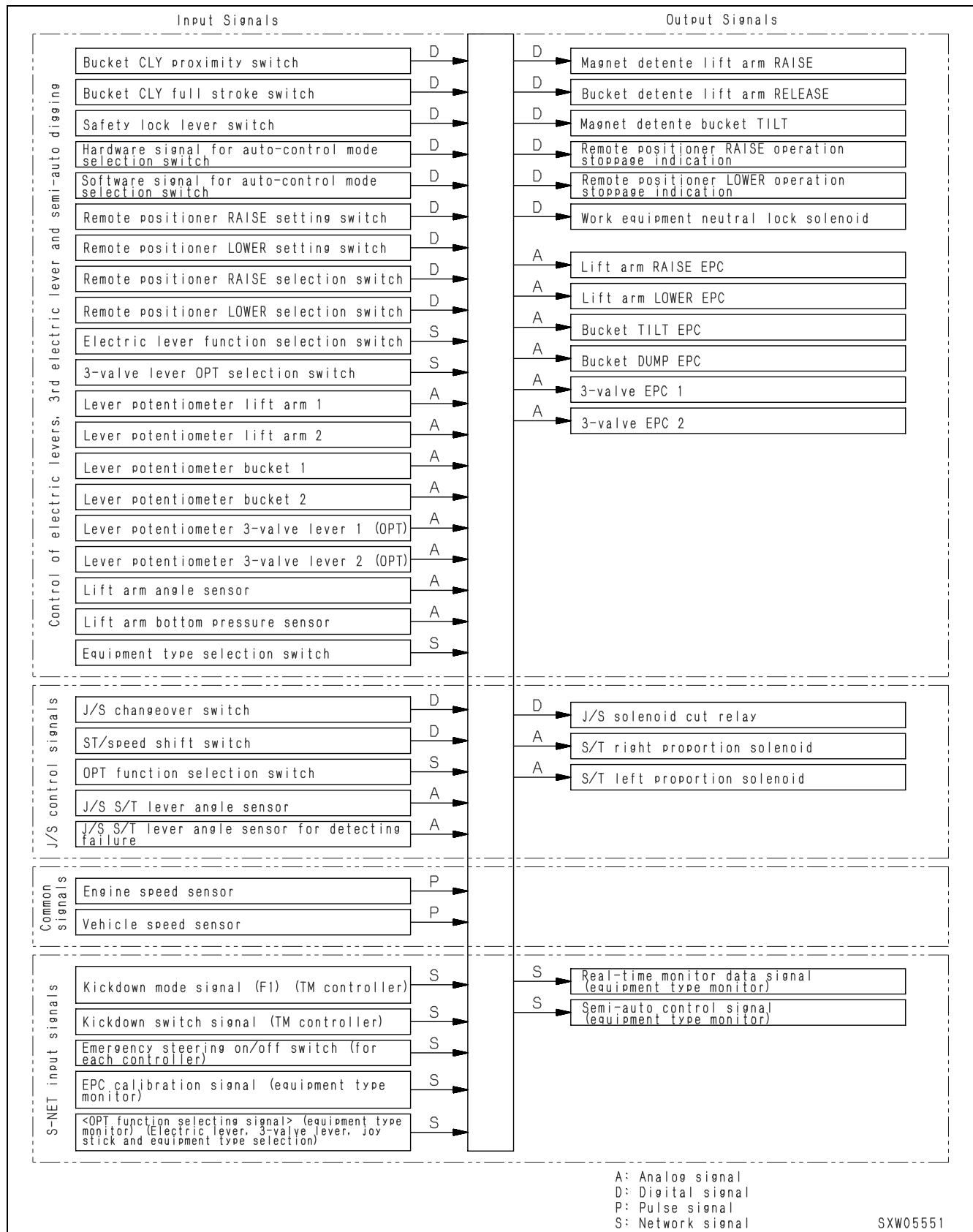
- When the main brake oil pressure lowers, the contact of the emergency brake switch mounted to the accumulator opens. This shuts off current to the parking brake solenoid, consequently draining the oil pressure out of the parking brake cylinder to operate the parking brake.

In this case, however, the parking brake release signal is being issued to the T/M controller unlike when you place the parking brake switch in the ON position. Therefore, the transmission is not switched to the N position.

By using this design and the engine brake when the emergency brake functions, you can shorten a braking distance. Even if the emergency brake should function, it is possible to move the machine.

# Work equipment control system (op)

## System diagram



1. Work equipment control

1-1. Electric lever control

Lift arm controlling function

This function controls the EPC valve according to how much the lift arm lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the lift arm RAISE/LOWER function to be performed.

Bucket controlling function

This function controls the EPC valve according to how much the bucket lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the bucket TILT/DUMP function to be performed.

3<sup>rd</sup> Lever controlling function

This function controls the EPC valve according to how much the 3<sup>rd</sup> lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the 3<sup>rd</sup> valve cylinder EXTEND/RETRACT function to be performed.

