
HYDRAULICS EXCAVATORS

1188

Update 06-2000



CRAWLER AND WHEELED EXCAVATORS 1188 SCHEMATIC SET

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NOTE: CASE Company reserves the right to make changes in the specification and design of the machine without prior notice and without incurring any obligation to modify units previously sold.

The description of the models shown in this manual has been made in accordance with the technical specifications known as of the date of design of this document.

Section

1001

SAFETY, GENERAL INFORMATION AND TORQUE SPECIFICATIONS

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SAFETY



WARNING: This symbol means **WARNING ! BE VIGILANT ! YOUR SAFETY IS AT RISK**. The message that follows the symbol contains important safety information. Read it carefully. Be sure you understand the possible risks of injury or even death.

To avoid all risks, always follow the safety notes contained in this section and throughout this manual.

Put the warning tag shown below on the key for the keyswitch when servicing or repairing the machine. One warning tag is supplied with each machine. Additional tags, Part Number 321-4614, are available from your service parts supplier.



PDG0328



WARNING: Read the Operator's Manual carefully and make sure you understand how to operate the controls correctly.



WARNING: Never operate the machine and attachment controls unless you are seated in the operator's seat. If you are not in the operator's seat, you run the risk of serious injury.



WARNING: The machine is built to carry the operator only. Do not allow passengers to ride on the machine.



WARNING : Prior to starting up the engine read the safety messages contained in the operator's manual carefully. Read all safety stickers on the machine. Have people move back from the machine. Learn how to use the controls before starting up the machine. It is your responsibility to follow the manufacturer's instructions on how to operate and maintain the machine. It is your responsibility to follow applicable rules and regulations. Service and Operator's Manuals are available from your J.I. Case Dealer.



WARNING: If you wear loose clothing or if you omit to use safety equipment for your work, you risk injury. Always wear clothes that do not risk getting caught in the machine. Other safety equipment may be necessary, in particular : helmets, safety shoes, ear plugs, safety glasses, protection mask, thick gloves and reflecting clothes.



WARNING: When working close to the fan with the engine running, avoid wearing loose clothing and operate with extreme caution.



WARNING: When checking the hydraulic circuits, follow procedures to the letter. **DO NOT CHANGE** procedures.



WARNING: Prior to operating the hydraulic cylinders of this machine for setting or to bleed the circuit, have all people standing around the machine move away.



WARNING: Wear gloves or insulated mittens when working on hot parts.



WARNING: Lower all attachments to the ground or rest them on stands before carrying out maintenance jobs.



WARNING: Fine sprays of hydraulic oil under pressure can penetrate the skin and cause serious infection. If hydraulic oil under pressure penetrates the skin, see a doctor immediately. Maintain all hoses and pipes in good condition. Make sure that all connections are properly tightened. Change all hoses or pipes that have been damaged or that are suspect. **DO NOT CHECK** for leaks with bare hands. Use a piece of cardboard or wood.



WARNING: To remove a hardened pin such as a pivot pin, or a hardened shaft, use a soft head hammer (brass or bronze) or a brass or bronze strip and a steel head hammer.



WARNING: When using a hammer to remove or reassemble pivot pins, or when using compressed air, or when using a grinder make sure to wear safety glasses that protect the eyes from all sides.



WARNING: Use proper lifting/hoisting equipment to lift wheels or tracks and always work on safe ground. Prevent the machine from moving using correct safety chocks.



WARNING: When performing maintenance or repair operations on the machine, make sure that the work shop floor, the cab and the steps of the excavator are free from oil, water, grease, tools etc. Use oil absorbing material or rags as necessary. Always think safety.



WARNING: Certain components of this machine are very heavy. Use hoisting tools or additional assistance as recommended in this manual.



WARNING: Exhaust fumes can cause death. If it is necessary to start up the engine in a closed building, evacuate exhaust fumes using an exhaust pipe extension. Open the doors and let fresh air into the building.



WARNING: When battery liquid is frozen, the battery can explode if : (1) you try to charge the battery or (2) you try to start the engine by connecting an auxiliary power source. To prevent battery electrolyte from freezing keep the battery fully charged. If you do not follow these instructions, you or others nearby may be injured.



WARNING: Batteries contain acid and explosive gases. A spark, a flame or an improper cable connection may cause an explosion. For proper connection of cables to the battery of this machine see the Operator's Manual. If you do not follow these instructions, you risk severe injury.

TWIN WHEELS

Safety rules



WARNING: *In all cases, before removing twin wheels, always deflate both tyres completely.*



WARNING: *If a tyre bursts it can cause serious injury. Check tyres regularly to see that they are in good condition and always be sure to inflate them to the correct pressure.*



WARNING: *Never face a tyre when checking pressure or adding air. Always stand in front of the tread. Use an inflation cage if the wheel has been removed from the machine. Make sure all people standing in the area move well away.*



WARNING: *Never weld near a tyre. If this can not be avoided, it is mandatory to remove the tyre before performing any welding operations.*



WARNING: *Make sure that all decals on the machine are perfectly legible, clean them regularly and replace any decals which are damaged, missing or painted over, with new ones.*

Safety instructions

- Use appropriate, good quality tools to disassemble the various wheel components. Never use a hammer. Use a rubber, plastic or copper-faced mallet.

IMPORTANT: *Never remove the inner tyre valve extension, as this will be necessary afterwards for inflating and deflating the tyre.*

IMPORTANT: *If the valve or the valve extension are no longer accessible, take the necessary precautions and then, imperatively, puncture the tyre.*

- Use suitable grease to facilitate the installation and removal of the tyre.
- Never re-inflate a tyre on the machine which has been used at a pressure lower than 5.6 bar.
- Check the various components: tyre, rim, shoulder, retaining ring and replace any defective items.
- Never reuse a retaining ring which is distorted or rusty.

GENERAL INFORMATION

CLEANING

Clean all metal parts except bearings with white spirit or steam. Do not use caustic soda when steam cleaning. After cleaning, dry and lubricate all parts. Clean hydraulic lines with compressed air. Clean bearings with kerosene, then dry them and lubricate them.

INSPECTION

Check all parts when disassembled. Change all parts showing wear or damage. Scratches that are not too deep can be removed by honing or with a rag dipped into buffing compound. A full visual inspection to detect wear and pitting and subsequent changing of parts will prevent premature failure.

BEARINGS

Check that bearings rotate freely. If their adjustment is too loose or if they do not run regularly, change them. Wash bearings with a good solvent or kerosene and let them dry. **DO NOT DRY BEARINGS WITH COMPRESSED AIR.**

NEEDLE BEARINGS

Before inserting needle bearings into a bore, remove all metal particles from the edge of the bore. Prior to mounting bearings with a press, coat the inside and the outside of the bearing with vaseline.

GEARS

Check all the gears for wear or damage. Change worn or damaged gears.

SEAL RINGS, O-RINGS, GASKETS

Always use new seal rings. O-rings and gaskets. Coat sealing rings and O-rings with vaseline.

SHAFTS

Check all shafts showing signs of wear or damage. Check that the surface of a shaft running in a bearing is not damaged.

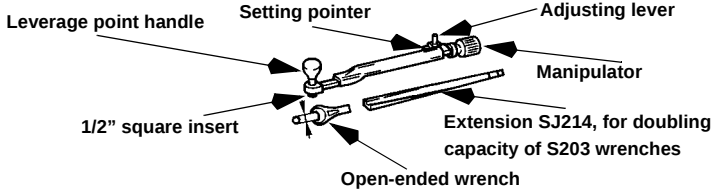
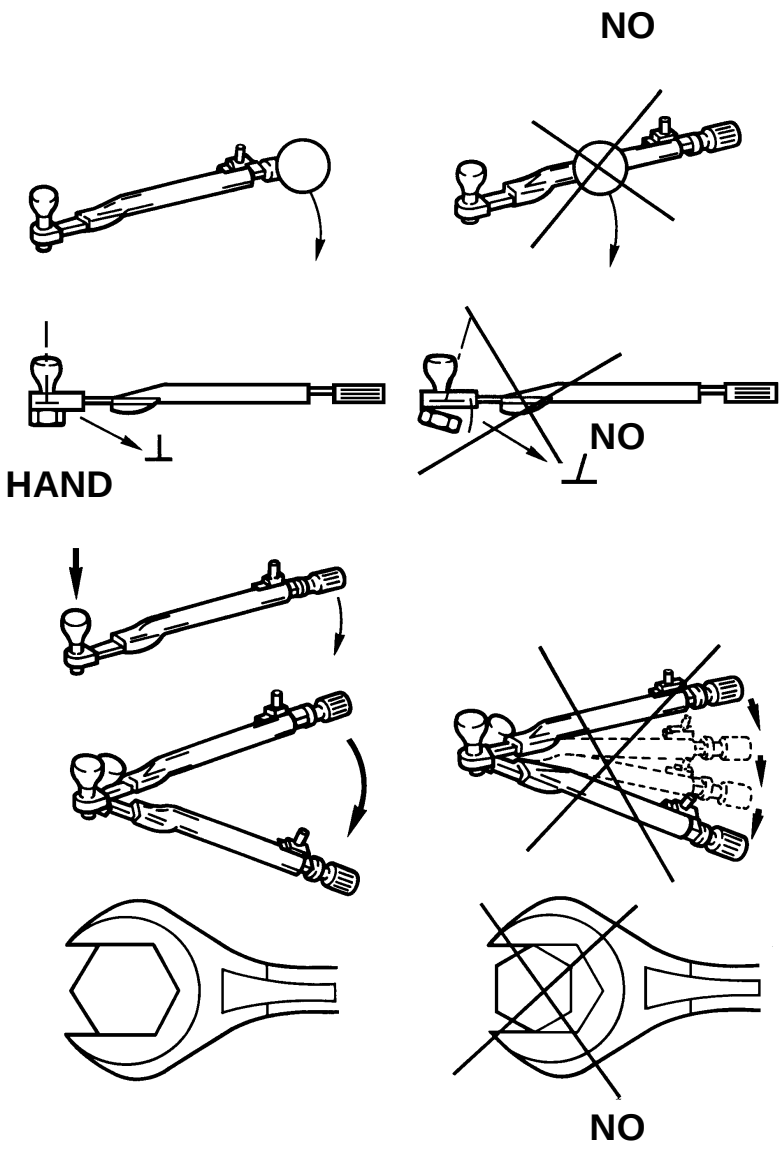
SPARE PARTS

Always use original CASE spare parts. To order spare parts, see the Spare Parts Catalogue to indicate the proper reference of original CASE spare parts. Failures caused by the use of parts that are not original CASE spare parts are not covered by the warranty.

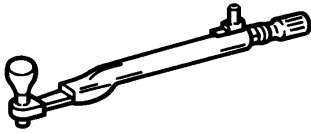
LUBRICATION

Use only oils and lubricants specified in the Operator's and Service Manuals. Failures due to the use of oils and lubricants not specified are not covered by the warranty.

CORRECT USE OF TORQUE WRENCHES

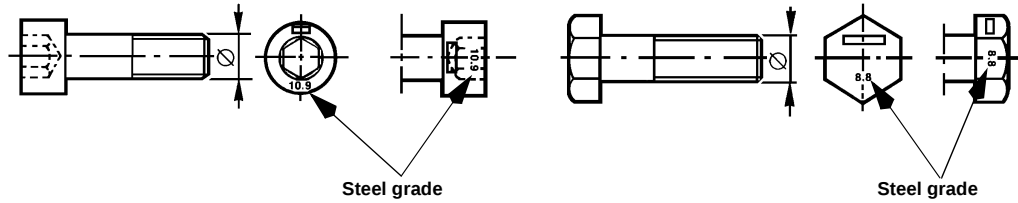
TORQUE WRENCHES	 PDG0315
CORRECT USE a - Hold the wrench by the handle provided. b - When tightening, always keep the wrench perpendicular to the screw. c - Keep one hand on the leverage point handle on the wrench. d - Tighten progressively in one movement. e - Position a correctly dimensioned socket or open-ended wrench on the flats of the screw head.	 NO HAND NO NO PDG0316

HARDWARE TIGHTENING ORDER

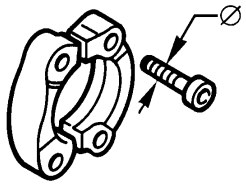
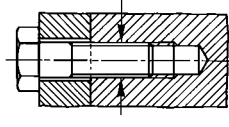
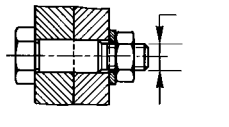
TORQUE WRENCHES	 PDG0317
INITIAL TORQUE a - Torque wrench. - Follow the correct order of procedure when tightening. - Cross or diagonal pattern tightening.	PDG0318
FINAL TORQUE Always tighten in clockwise order.	PDG0319

STANDARD SCREW A TORQUE SPECIFICATIONS

Correct screw identification



PDG0320

	Diameter x thread size Grade 8.8	 Key 		Torque			
				Nm		lb.ft	
							
Two-part hydraulic connector (to SAE J518 specifications) 	M5 x 0.8	4	8	5.5	5.5	4.1	4.1
	M6 x 1	5	10	9	9	6.7	6.7
	M8 x 1.5	6	13	22.5	22.5	16.6	16.6
	M10 x 1.5	8	17	45	45	33.2	33.2
	M12 x 1.75	10	19	70	80	51.6	59
	M14 x 2	12	22	100	120	73.8	88.6
	M16 x 2	14	24	170	200	125.5	147.6
	M18 x 2.5	14	27	250	300	184.5	221.4
	M20 x 2.5	17	30	350	400	258.3	295.2
	M22 x 2.5	17	32	500	600	369	442.8
	M24 x 3	-	36	600	700	442.8	516.6
	M27 x 3	-	41	900	1000	664.2	738
	M30 x 3.5	-	46	1200	1400	885.6	1033.2
Components assembled by screws and bolts SCREW  BOLT 	Grade 10.9						
	M5 x 0.8	4	8	75	75	5.6	5.6
	M6 x 1	5	10	12.5	12.5	9.3	9.3
	M8 x 1.5	6	13	35	35	25.8	25.8
	M10 x 1.5	8	17	60	70	44.3	51.6
	M12 x 1.75	10	19	100	120	73.8	88.6
	M14 x 2	12	22	170	200	125.5	147.6
	M16 x 2	14	24	250	300	184.5	221.4
	M18 x 2.5	14	27	350	400	258.3	295.2
	M20 x 2.5	17	30	500	600	369	442.8
	M22 x 2.5	17	32	700	800	516.6	442.8
	M24 x 3	-	36	900	1000	664.2	738
	M27 x 3	-	41	1200	1400	885.6	1033.6
	M30 x 3.5	-	46	1700	1900	1254.6	1402.2



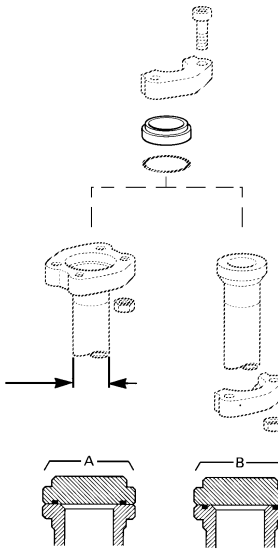
Zinc bichromate

Phosphate

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METAL CAP REFERENCES

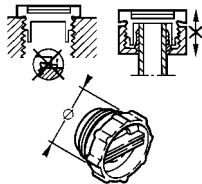
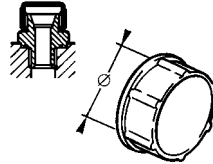
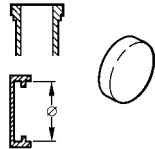
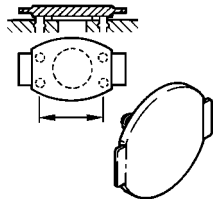
To SAE J518 specifications

	NP 250 bar Ø ND	NP 400 bar Ø ND	Part number	
			A	B
 PDG0323	13 mm	-	D5327838	E5327839
	19 mm	-	F5327840	G5327841
	25 mm	-	H5327842	J5327843
	32 mm	-	K5327844	L5327845
	38 mm	-	M5327846	N5327847
	-	13 mm	U5327830	V5327831
	-	19 mm	W5327832	X5327833
	-	25 mm	Z5327834	A5327835
	-	32 mm	B5327836	C5327837

NP = Nominal pressure

NP = Nominal diameter

PLASTIC PLUG AND CAP REFERENCE CHART

	Dia. x pas	Part number	Dia. x pas	Part number
Tapped orifices and connectors with tightening nuts = screw-type plugs  PDG0324	M10 x 1.5 M12 x 1.5 M14 x 1.5 M16 x 1.5 M18 x 1.5	F3237416 G3237417 H3237418 J3237419 K3237420	M20 x 1.5 M22 x 1.5 M24 x 1.5 M27 x 2	L3237421 M3237422 N3237423 Q3237448
Unions = Screw-type plugs  PDG0325	M12 x 1.5 M14 x 1.5 M16 x 1.5 M18 x 1.5	X3237409 Z3237410 A3237411 B3237412	M20 x 1.5 M22 x 1.5 M30 x 1.5	C3237413 D3237414 E3237415
S.A.E tube or hose collars = external plugs  PDG0326	NP 250 bar 30.2 38.1 44.5 50.8 60.4	J2537460 K2537461 L2537462 M2537463 N2537464	NP 400 bar 31.8 41.3 47.6 54 63.6	P2537465 Q2537466 R2537467 S2537468 T2537469
S.A.E orifices = caps for installation into tapped fitting orifices  PDG0327	NP 250 bar L = 38.1 47.65 52.35 58.07 69.85	A2340480 B2340481 C2340482 D2340483 E2340484	NP 400 bar L = 40.5 50.8 57.15 66.7 79.4	K1640415 R1640421 S1640422 T1640423 Z1640479

NP = Nominal pressure

ND = Nominal diameter

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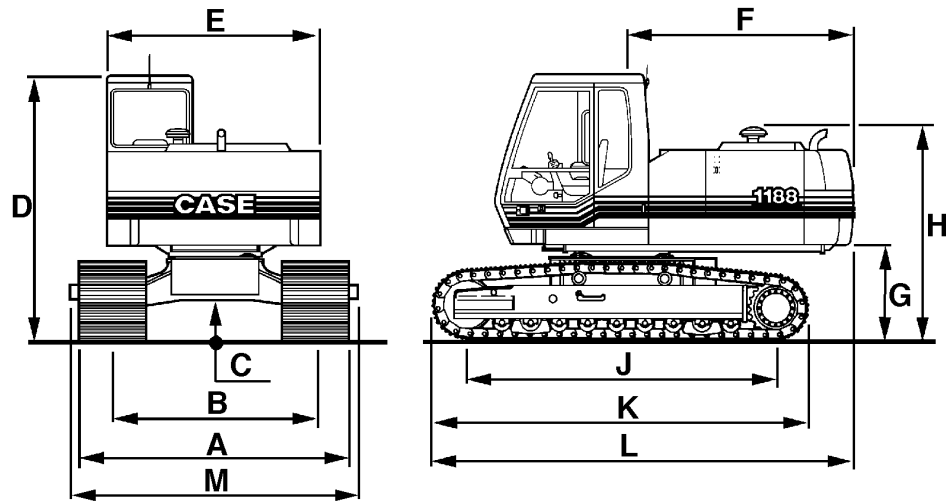
Section 1002

SPECIFICATIONS 1188 *Plus* Crawler Excavators

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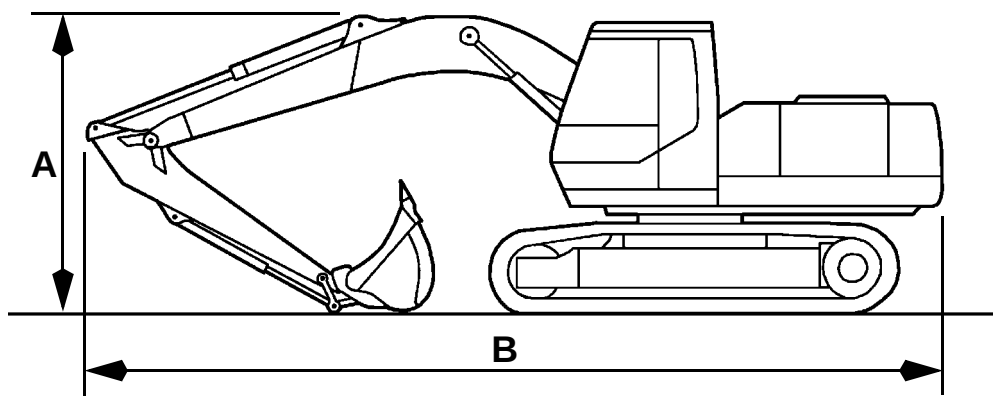
MACHINE OVERALL DIMENSIONS



PDH0253M

	LC Type	CK Type
A (0.50 m track pads)	2.87 m	2.47 m
A (0.60 m track pads)	2.97 m	2.57 m
A (0.75 m track pads)	3.12 m	2.72 m
A (0.90 m track pads)	3.27 m	
B	2.37 m	1.97 m
C	0.50 m	0.50 m
D	3.11 m	3.11 m
E	2.44 m	2.44 m
F (radius)	2.67 m	2.67 m
G	1.15 m	1.15 m
H	2.50 m	2.50 m
J	3.59 m	3.25 m
K	4.41 m	4.07 m
L	4.48 m	4.72 m
M	3.00 m	2.61 m

TRANSPORTATION OVERALL DIMENSIONS



PDH0256

NOTE: Cab height above ground: see section "Machine overall dimensions".

Boom	Dipper	A	B
One-piece 4.80 m	1.70 m	3.35	9.45
	2.20 m	3.20	9.10
	2.50 m *	3.25	8.80
	2.80 m	3.45	8.85
	3.40 m	3.95	8.60
One-piece 5.40 m	1.70 m	3.30	10.05
	2.20 m	3.05	9.05
	2.50 m *	3.10	9.50
	2.80 m	3.40	9.45
	3.40 m	3.75	9.40
Articulated	1.70 m	3.75	8.25
	2.20 m	3.75	7.30
	2.50 m *	3.75	8.55
	2.80 m	3.75	8.95
	3.40 m	3.75	9.70
Adjustable	1.70 m	3.60	7.55
	2.20 m	3.55	7.30
	2.50 m *	3.70	7.10
	2.80 m	4.10	6.80
	3.40 m	4.85	6.45
Handling	Handling	3.20	9.20

NOTE: These values are given in metres.

* Special for Germany

GENERAL MACHINE SPECIFICATIONS

Engine

Make and type	CASE 6TA 590
Total SAE horsepower at 2800 rpm	126.4 kW (172 hp)
4 stroke, 6 cylinder	turbo-charged diesel
Capacity	5880 cm ³
Bore	102 mm
Stroke	120 mm
Cooling	water-cooled
Starting:	2 x 12 volt batteries, 24 V, 120 A/h

Working specifications

Engine speed	2000 rpm
Power: SAE J1995	119 kW (160 hp)
DIN 70020 - DIN 6271	113 kW (152 hp)
EEC 80/1269 - ISO 9249	113 kW (152 hp)
Specifications maintained up to an altitude of 3000 m at a temperature of 25°C.	
Capacities: Engine oil sump	14.3 L
Fuel tank	330 L
Fuel tank filler pump, electrical	optional
Average hourly consumption	21.2 L/h
Engine and pump assembly mounted on rubber blocks.	
Heavy-duty dust filtration.	

Hydraulic system

Variable output system with independent and simultaneous operation of all functions.
Electronic regulation of hydraulic power ("Powersensor" system) for optimal use of engine power.

3 regulation modes:

"FINE": For work requiring extreme precision.

"ECO" (ECONOMICAL): For normal jobs.

"MAX" (MAXIMUM): In this position, the operator has the entire power of the machine available for use.

Automatic engine return to idle at operator's choice.

Working pressure	350 bar
Capacity of hydraulic reservoir	180 L
Total system capacity	288 L

Pumps:

One double-body variable displacement pump for supplying travel motors and attachments.

Flow	320 L/min
------------	-----------

One single body variable displacement pump supplying the upperstructure swing.

Flow	88 L/min
------------	----------

Installed hydraulic power	109.3 kW (148 hp)
---------------------------------	-------------------

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Fixed flow pump for the pilot systems.

Parallel, closed centre type attachment and travel control valves.

Flow rates per function, independent of pressures.

Oil cooler with air cooling from engine.

Multispiral high pressure hoses

minimum safety factor 2 to 4 times the working pressure

Self-lubricating hydraulic swivel.

Electrical system

Circuit voltage circuit 24 volt, negative earth

Batteries two low-maintenance 12 volt batteries

All electrical system safety functions are grouped in an electrical cabinet with a printed circuit.

Instrument panel with printed circuit.

Automatic instrument panel lamp testing.

Two-stage alarm system.

Upperstructure electrical power connection (24 V, 15 Amp.).

Battery master switch.

Upperstructure

All welded frame

Modular structure.

Transverse walkway giving access to the various components.

Sound-proofed, lockable cowling meeting all current regulations.

Tool box with tool set.

Swing

Hydraulic motor with reduction gear and automatic static brake.

Swing speed 8.5 rpm

Turntable alternating rollers and internal teeth

Bearing surface and tooth lubrication centralised

Cab

Removable, sound-proofed, on flexible mounting blocks.

Up and over windshield.

Tinted windshield.

Pre-fitted for radio installation.

Transparent roof hatch optional equipment

Sliding window on door optional equipment

Polycarbonate windows optional equipment

Cab safety guards available on request

Elevated cab available on request

Ant-vandal cab optional equipment

Operation

De-luxe seat with armrests and multi-position adjustment (vibration level III/ISO 7096).

Hydraulically assisted controls.

Attachment and swing 2 control levers

Travel..... 2 pedals

Single-speed windshield wiper, plus intermittent action, windshield washer, heating, de-frosting, two-speed ventilation, cab light, cigarette lighter, sun shield.

Working lights:

On upperstructure 2 x 70 W

On attachment 70 W

Front and rear (on cab) optional equipment

Rear (on cab) 70 W

Air conditioning optional equipment

Cab sun-shield..... optional equipment

Cab blower optional equipment

Undercarriage

One-piece undercarriage chassis with welded components.

Lifetime lubricated rollers.

Tractor type tracks; grease cylinder type track tension; shock absorber for shock absorption.

Removable sprocket tooth rings.

Front and rear chain guide (central optional).

Safety devices

In the event of engine failure, the attachment can be lowered, under control, to the ground.

Cancellation of controls by lifting the left-hand control arm.

Tinted safety glass, horn.

Cab safety guardsavailable on request

Safety valves optional equipment

Overload indicator optional equipment

Roller type seat belt..... optional equipment

Fire extinguisher optional equipment

Rotary light special for certain countries

Indicators

Engine coolant solution temperature, hydraulic fluid temperature, fuel level and hourmeter.

Warning and indicator lamps

Engine oil pressure, battery charge, hydraulic and engine air filter start of restriction indicator.

Warning/indicator lamp test.

Attachments

Sealed linkages, all linkages greased from ground level or walkway.

Double acting cylinders with end-of-stroke shock absorbers.

Play take-up system on bucket linkage.

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Noise level

Certified by the manufacturer.

In accordance with European directive 86/662/EEC.

Inside operator's compartment (LpA)79 dB(A)

Outside machine (LwA)105 dB(A)

Ground pressure

With attachment: 5.40 m boom, 2.20 m dipper and 970 L bucket

Machine equipped with 0.50 m track pads

LC Type0.561 bar

CK Type0.599 bar

Machine equipped with 0.60 m track pads

LC Type0.474 bar

CK Type0.505 bar

Machine equipped with 0.75 m track pads

LC Type0.387 bar

CK Type0.412 bar

Machine equipped with 0.90 m track pads

LC Type only0.329 bar

Travel

Sprockets driven by hydraulic motors (Dual displacement optional).

Independent drive to each track.

Manual controlled travel block providing precise adjustment of travel speed regardless of pressure exerted on travel pedals.

Travel speeds:

(single speed machine), max. speed from 0 to 3.1 kph

(2-speed machine), max. speed..... First speed: from 0 to 3.1 kph

Second speed: from 0 to 5.5 kph

Braked motors (automatic static brake).

Gradeability:

LC Type90%

CK Type80%

Tractive force:

LC Type 17850 daN

CK Type 17950 daN

Hydraulic speed limiter, automatic when descending slopes.

WEIGHTS

Machine (LC Type)

Boom	Dipper	LC Type			
		Track pads 0.50 m	Track pads 0.60 m	Track pads 0.75 m	Track pads 0.90 m
One-piece 4.80 m	1.70 m	21 990	22 295	22 745	23 205
	2.20 m	22 030	22 335	22 785	23 245
	2.50 m *	22 045	22 350	22 800	23 260
	2.80 m	22 120	22 420	22 870	23 335
	3.40 m	22 155	22 460	22 910	23 370
One-piece 5.40 m	1.70 m	22 125	22 430	22 880	23 340
	2.20 m	22 165	22 470	22 920	23 380
	2.50 m *	22 180	22 485	22 935	23 395
	2.80 m	22 255	22 555	23 005	23 470
	3.40 m	22 290	22 595	23 045	23 505
Articulated	1.70 m	23 000	23 305	23 755	24 215
	2.20 m	23 040	23 345	23 795	24 255
	2.50 m *	23 055	23 360	23 810	24 270
	2.80 m	23 125	23 430	23 880	24 340
	3.40 m	23 165	23 465	23 920	24 380
Adjustable	1.70 m	22 670	22 975	23 425	23 885
	2.20 m	22 710	23 015	23 465	23 925
	2.50 m *	22 725	23 030	23 480	23 940
	2.80 m	22 795	23 100	23 550	24 010
	3.40 m	22 835	23 135	23 590	24 050
Handling	Handling (without clamshell)	20 775	21 075	21 530	21 990

NOTE: These values are given in kg, with 970 L backhoe bucket.

* Special for Germany

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(CK Type)

Boom	Dipper	CK Type		
		Track pads 0.50 m	Track pads 0.60 m	Track pads 0.75 m
One-piece 4.80 m	1.70 m	21 395	21 675	22 090
	2.20 m	21 435	21 715	22 130
	2.50 m *	21 450	21 730	22 145
	2.80 m	21 520	21 800	22 215
	3.40 m	21 560	21 840	22 250
One-piece 5.40 m	1.70 m	21 530	21 810	22 225
	2.20 m	21 570	21 850	22 265
	2.50 m *	21 585	21 865	22 280
	2.80 m	21 655	21 935	22 350
	3.40 m	21 695	21 975	22 385
Articulated	1.70 m	22 405	22 685	23 095
	2.20 m	22 445	22 725	23 140
	2.50 m *	22 460	22 740	23 155
	2.80 m	22 530	22 810	23 225
	3.40 m	22 570	22 845	23 260
Adjustable	1.70 m	22 075	22 355	22 765
	2.20 m	22 115	22 395	22 810
	2.50 m *	22 130	22 410	22 825
	2.80 m	22 200	22 480	22 895
	3.40 m	22 240	22 515	22 930
Handling	Handling (without clamshell)	20 180	20 455	20 870

NOTE: These values are given in kg, with 970 L backhoe bucket.

* Special for Germany

Attachments

Booms (with dipper cylinder)	
4.80 m	1575 kg
5.40 m	1710 kg
Adjustable boom.....	2255 kg
Adjustable boom.....	2520 kg
Dipper (with yoke, connecting link and bucket cylinder)	
1.70 m	980 kg
2.20 m	1020 kg
2.50 m (Special for Germany)	1025 kg
2.80 m	1105 kg
3.40 m	1140 kg
Handling boom 5.90 m (with dipper cylinder)	1530 kg
Handling dipper 4.30 m	580 kg

Counterweight

4500 kg

Cab

291 kg

1002-12

Tools

NOTE: The selection of bucket capacity depends on the density of the material (See "Density of various spoils and materials" in the operator's manual) and the attachment configuration in addition to the compactness and structure of the ground).

Earthmoving buckets

Width	SAE heaped capacity	Weight
0.60 m.....	460 L	585 kg
0.75 m.....	590 L	615 kg
0.85 m.....	680 L	645 kg
0.90 m.....	730 L	690 kg
1.05 m.....	870 L	745 kg
1.15 m.....	970 L	775 kg
1.25 m.....	1060 L	845 kg
1.40 m.....	1200 L	890 kg

All earthmoving buckets are equipped with teeth with removable tooth tips and pins with side play take-up system. Heavy duty supplement optional (add 5% to the capacity shown). Side cutters optional (add 8 cm to the width shown).

Trench buckets with ejector

Width	SAE heaped capacity	Weight
0.45 m.....	310 L	755 kg

Ditch cleaning buckets equipped with teeth

Width	CECE capacity	Weight
2.00 m.....	900 L	780 kg

Ditch cleaning buckets equipped with reversible blade (notched or smooth)

Width	CECE capacity	Weight
2.00 m.....	900 L	825 kg

Buckets equipped with smooth blade

Width	CECE capacity	Weight
2.20 m.....	1000 L	815 kg

V-shaped bucket

Width	CECE capacity	Weight
0.50 - 3.00 m	670 L	615 kg

Trench clamshell with ejector

Width	Opening	Capacity	Weight
0.55 m.....	1.94 m.....	350 L	1180 kg

Earthmoving clamshells

Width	Opening	Capacity	Weight
0.92 m.....	1.72 m.....	500 L	1270 kg
1.02 m.....	1.83 m.....	650 L	1300 kg
1.27 m.....	1.83 m.....	850 L	1395 kg

Rehandling clamshells

Width	Opening	Capacity	Weight
1.03 m.....	2.14 m.....	1000 L	1240 kg

Boring clamshell

Width	Capacity	Weight
1.18 m.....	180 L	1025 kg
1.48 m.....	350 L	1175 kg

Sugar beet clamshell

Width	Opening	Capacity	Weight
1.81 m.....	2.50 m.....	2050 L	1440 kg
2.05 m.....	2.50 m.....	2350 L	1625 kg
2.29 m.....	2.50 m.....	2600 L	1703 kg

5-tine stone grab with removable tine tips

Opening diameter	Weight
2.12 m.....	1815 kg

Scrap metal 5 tine grab

Opening diameter	Weight
2.00 m.....	1300 kg

FLUIDS AND LUBRICANTS

Lubricants must have the correct properties for each application.



WARNING: *The conditions of use for individual fluids and lubricants must be respected.*

Hydraulic fluid

CASE hydraulic fluid is specially designed for high pressure applications and for the CASE hydraulic system. The type of fluid to be used depends on the ambient temperature.

Temperate climates

-20°C to +40°C
Fluid type ISO VG 46
CASE reference: POHYDR

Hot climates

0°C to +60°C
Fluid type ISO VG 100
CASE reference: POHYDC

Cold climates

-40°C to +20°C
Fluid type ISO VG 22
CASE reference: POHYPF

These various grades of fluid must be in conformity with CASE France specification P9903201Z.

Temperate climate biodegradable fluid:

This yellow fluid is compatible with standard fluid. If adopted, it is advisable to drain the circuit completely.
Fluid type ISO VG 46
CASE reference: CASYNTH 46

This grade of fluid must be in conformity with CASE France specification P9903203B

Transmission component oil

Extreme pressure oil used for transmission components inside sealed housings.
Extreme pressure oil type API GL5 grade 80W90 or ISO VG 150

Grease

The type of grease to use depends on ambient temperature.

Temperate and hot climates

-20°C to +60°C
Extreme pressure grease EP NLGI grade 2 with molybdenum disulphide.

Cold climates

-40°C to +20°C
Extreme pressure grease EP NLGI grade 0.

Engine oil

CASE engine oil No. 1 is recommended for your engine. This oil ensures correct lubrication of your engine in all working conditions.

If CASE No. 1 Multipurpose or Performance engine oil is not available, use oil corresponding to category API/CG/CF.

NOTE: Do not put any Performance Additive or other additive in the sump. Oil change intervals shown in this manual are based on tests carried out on CASE lubricants.

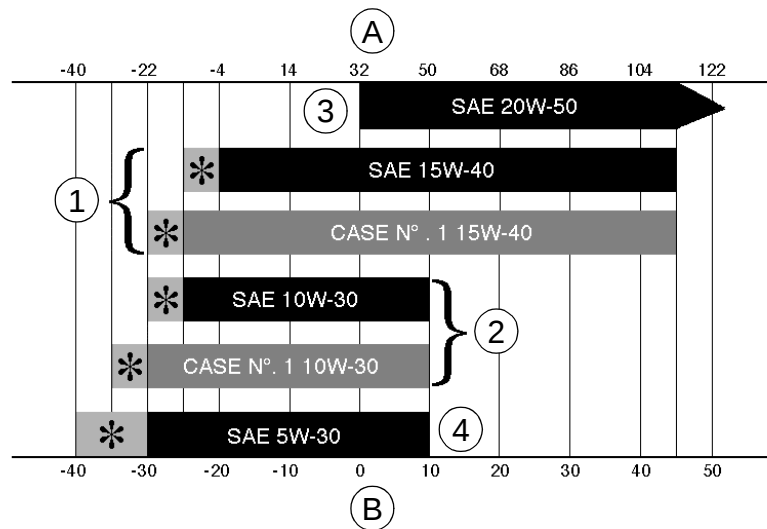


RD97F136



RB97F100

Oil viscosity/Oil range



CS98M561

(A) FAHRENHEIT TEMPERATURE

(B) CELSIUS TEMPERATURE

(1) ALL SEASONS

(2) WINTER

(3) TROPICAL

(4) ARCTIC

SHOWS THAT AN ENGINE OIL HEATER OR ENGINE COOLANT SOLUTION HEATER MUST BE USED.

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Fuel

Use fuel which is to ASTM (American Society for Testing and Materials) D975 standard.

Use Grade No. 2 fuel. The use of other types of fuel can result in a loss of power and may cause high fuel consumption.

In cold weather, the use of a mixture of fuels No. 1 and No. 2 is temporarily permitted. Consult your fuel supplier.

If the temperature falls below the fuel cloud point (point at which wax begins to form) the wax crystals will cause power loss or will prevent the engine from starting.

IMPORTANT: *In cold weather, fill the fuel tank at the end of the day's work, in order to prevent the formation of condensation.*

Fuel storage

Long storage can lead to the accumulation of impurities and condensation in the fuel. Engine trouble can often be traced to the presence of water in the fuel.

The storage tank must be placed outside and the temperature of the fuel should be kept as low as possible. Drain off water and impurities regularly.

Antifreeze/anti-corrosion

Use anti-freeze in all seasons to protect the cooling system from corrosion and all risk of freezing.

In environments with a temperature higher than -36°C, use a mixture of 50% ethylene-glycol based anti-freeze.

For areas where the temperature is below -36°C, it is advisable to use a blend of 40% water and 60% anti-freeze.

Environment

Before carrying out any servicing operation on this machine and before disposing of used fluids or lubricants, always think of the environment. Never throw fluid or oil on the ground and never keep them in leaking receptacles.

Consult your local ecological recycling centre to obtain information on the appropriate means of disposing of these substances.

Components made from plastic or resin

When cleaning polycarbonate windows, the console, the instrument panel, the gauges, etc., do not use petrol (gasoline), paraffin (kerosene), paint solvents, etc. Use only water, soap and a soft cloth.

The use of petrol (gasoline), de paraffin (kerosene), paint solvents, etc, will cause discoloration, cracking or deformation of these components.

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DETAILED SPECIFICATIONS PER COMPONENT

High pressure hydraulic pump

With variable displacement.

Weight	130 kg
Maximum displacement.....	2 x 80 cm ³ /rev.
Maximum flow.....	320 L/min
Driven speed	2000 rpm
Setting for attachment and travel flow cancellation valve	355 to 365 bar
Setting for the Load-Sensing valve, static and dynamic	20 to 23 bar
Setting for torque regulating valve With engine running at 2000 rpm at a pressure of 300 bar, the flow should be in excess of	147 L/min

Hydraulic swing pump

Variable flow pump.

Flow cancellation pressure	290 to 300 bar
Displacement.....	46 cm ³ /rev.
Maximum flow.....	92 L/min
Setting for ΔP on the torque regulating valve	16 bar

Hydraulic pilot system pump

External tooth gear pump

Displacement	12 cm ³ /rev.
Max. flow	24 L/min
Rated pressure.....	34 to 38 bar

Hydraulic filters

Weight (per filter)	0.5 kg
By-pass pressure setting	3.5 bar
Restriction indicator setting	3.1 bar
Filtration diameter.....	10 μ

Attachment control valve

Bore	22
Spool stroke.....	10 mm
Spool pilot pressure	8 to 22 bar
Valve pressure setting: Main relief valve	395 to 415 bar
Secondary relief valves, boom, bucket, dipper	395 to 425 bar

Flow setting for balance valves:

Large chambers of boom cylinders	200 to 220 L/min
Large chambers of dipper cylinders	190 to 210 L/min
Large chambers of bucket cylinders.....	180 to 200 L/min

Travel control valve

Bore	20
Spool stroke.....	10 mm
Spool pilot pressure	8 to 22 bar
Pressure setting of travel secondary relief valves	395 to 425 bar
Flow setting for travel balance valves.....	155 to 165 L/min

Swing control valve

Bore	16
Spool pilot pressure	8 to 22 bar
Relief valve pressure settings	310 to 330 bar

Low flow control valve (optional)

One or two units.

Weight (with one unit)	8 kg
Bore	12
Spool pilot pressure	8 to 22 bar
Pressure setting for secondary relief valves	
Clamshell swing	130 to 150 bar
Articulated boom	390 to 425 bar
Balance valve flow setting (Each spool allows only 30 L/min)	30 L/min

High flow control valve (optional)

Weight	32 kg
Bore	20
Spool pilot pressure	8 to 22 bar
Rated pressure setting for secondary relief valves	400 bar
Balance valve flow setting	140 L/min
Flow via spool mechanical stop	100 L/min

Hydraulic hammer control valve (optional)

Weight	32 kg
Bore	20
Spool pilot pressure	8 to 22 bar
Rated pressure of the secondary relief valve	200 bar
Balance valve flow setting (depending on type of hammer being used)	50 to 180 L/min

Boom cylinders

Fitted with dash-pot on large end and a flow limiter in the separator block (large chamber end).

Weight (per cylinder)	145 or 155 kg
Dimensions:	
Barrel diameter	110 or 115 mm
Rod diameter	80 mm
Stroke	1100 mm
Time required for boom raising	See section 8001

Dipper cylinder

Fitted with dash-pot on small and large chambers
and a flow limiter (large chamber end).

Weight	220 and 224 kg
Dimensions:	
Barrel diameter	125 mm
Rod diameter	90 mm
Stroke	1370mm

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Bucket cylinder

Fitted with dash-pot on small chamber end.

Weight 145 and 149 kg

Dimensions:

Barrel diameter..... 110 mm

Rod diameter..... 80 mm

Stroke..... 1100 mm

Articulated boom cylinder

Fitted with dash-pot on large chamber end.

Weight 136 kg

Dimensions:

Barrel diameter..... 100 mm

Rod diameter..... 70 mm

Stroke..... 983.5 mm

Handling dipper cylinder

Fitted with dash-pot at large and small chamber ends.

Weight 165 and 169 kg

Dimensions:

Barrel diameter..... 110 mm

Rod diameter..... 80 mm

Stroke..... 1320 mm

Clamshell cylinder

Weight 288 kg

Dimensions:

Barrel diameter..... 155 mm

Rod diameter..... 105 mm

Stroke..... 480 mm

Sugar beet clamshell cylinder

Fitted with dash-pot at large chamber end.

Weight 63 kg

Dimensions:

Barrel diameter..... 100 mm

Rod diameter..... 70 mm

Stroke..... 350 mm

5-tine iron and stone clamshell cylinders

Weight 30 kg

Dimensions:

Barrel diameter..... 75 mm

Rod diameter..... 60 mm

Stroke..... 280 mm

Hydraulic swing motor

Type..... F12-60

Weight 20.2 kg

Displacement..... 59.8 cm³/rev.

Theoretical speed..... 1563 rpm

Swing reduction gear

Reduction gear with multi-disc, oil bath type brake.

Weight	125 kg
Reduction ratio	1/34.5
Theoretical speed at output shaft	45 rpm
Upperstructure braking torque	7644 mdaN
Pressure required for complete brake release	9 bar
Swing pinion	13 teeth, module 11
Number of brake discs:	
Sintered discs	6
Steel discs	5
Thickness of new friction discs	2.9 mm
Minimum thickness of sintered discs	2.7 mm
Reduction gear housing capacity	5 L

Hydraulic travel motor (single speed excavators)

Type	F12-80
Weight	37.7 kg
Displacement	80.4 cm ³ /rev.
Theoretical speed	1959 rpm

Hydraulic travel motor (two-speed excavators)

Type	T12-80
Weight	30 kg
Displacement	80/45 cm ³ /rev.
Theoretical speed, first speed	1968 rpm
Theoretical speed second speed	3499 rpm

Travel reduction gear (single speed excavators)

Reduction gear equipped with multi-disc oil bath type brake.

Weight	180 kg
Reduction ratio	1/75.5
Theoretical speed at output shaft	26 rpm
Shaft output torque	3500 mdaN
Pressure required for complete brake release	13 bar
Number of brake discs:	
Sintered discs	7
Steel discs	6
Thickness of new friction discs	2.2 mm
Thickness of new steel discs	1.4 mm
Minimum thickness of sintered discs	2.15 mm
Minimum thickness of steel discs	1.37 mm
Capacity of the reduction gear housing	2.5 L

Travel reduction gear (two-speed excavators)

Reduction gear equipped with multi-disc oil bath type brake.

Weight	180 kg
Reduction ratio	1/75.5
Theoretical speed at output shaft:	
First speed	26 rpm
Second speed	46 rpm
Output shaft torque	3500 mdaN
Pressure required for complete brake release	13 bar
Number of brake discs:	
Sintered discs	7
Steel discs	6
Thickness of new friction discs	2.2 mm
Thickness of new steel discs	1.4 mm
Minimum thickness of sintered discs	2.15 mm
Minimum thickness of steel discs	1.37 mm
Reduction gear housing capacity	2.5 L

Hydraulic reservoir

Weight of the empty reservoir	215 kg
Reservoir capacity	180 L
Total system capacity	288 L

Water radiator/oil cooler

Weight empty	51 kg
Capacity (water)	6 L
Capacity (oil)	2.3 L
Radiator cap pressure	1.03 bar

Control block (control pedal)

Weight	3.5 kg
Theoretical output pressure, depending on angle to which pedal is tilted:	
from 0° to 1°-3°	7.2 to 8 bar
from 0° to 9°-11°	22 to 26 bar
from 0 to 11°-12°	35 bar
Push-rod stroke	0 to 5.8 mm

Attachment and swing control block (control lever)

Weight	2.7 kg
Theoretical output pressure, depending on angle to which lever is tilted:	
from 0 to 1°-4°	6.2 to 7 bar
from 0 to 16°-19°	18.4 to 21.6 bar
from 0 to 19°-21° (Previous type)	26 to 28 bar
from 0 to 19°-21° (New type)	28 to 34 bar
Pushrod stroke	7.55 mm

Manual travel control block (inching)

Weight	3 kg
Theoretical output pressure, depending on angle to which lever is tilted:	
from 0° to 2°-4°	7.3 to 8 bar
from 0° to 19°-20° on indexing	24 to 26 bar
from 0° to 20°2-22°	26 to 30 bar
from 0° to 24°-26°	35 bar
Pushrod length	8.75 mm

Boom lowering flow limiter

Flow	100 and 110 L/min
Spring length setting	22 mm

Dipper retracting flow limiter

Flow	95 and 105 L/min
Spring length setting	27 mm

Pressure limiter (P10)

Weight	7.5 kg
Pressure setting (at test point M9)	6 to 9 bar

Hydraulic swivel

Weight	140 kg
Number of passages	9

Solenoid valve block

Pressure setting of the limiter (P35)	in excess of 34 bar
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Swing safety/forced feed block

Pressure setting for secondary relief valves	300 to 320 bar
--	----------------

Dipper cylinder and boom cylinder safety valves

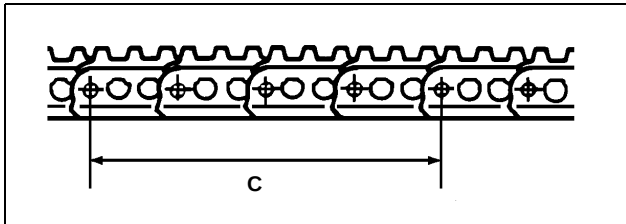
Pressure setting for the secondary relief valve	395 to 425 bar
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Load holding block, dipper cylinder and boom cylinders

Pressure setting for the secondary relief valve	395 to 415 bar
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Chains

Weight (per chain) without track pads	572 kg	525 kg
Weight (per chain) with 0.50 m track pads	1326 kg	1218 kg
Chain tension.....	310 to 330 mm	280 to 290 mm
Number of links (per chain)	49	45
Type.....	D60	D60
Length under tension (per chain).....	9.310 m	8.550 m



PDG0369

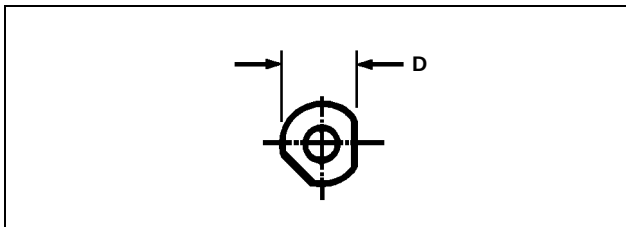
Internal wear on spacers and wear on pins (check on 4 links)

Original dimension

C 762 mm 762 mm

Wear limit

C 783 mm 783 mm



PDG0370

External wear on spacers

Original dimension

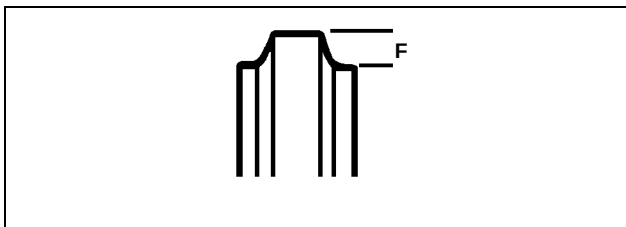
D 58.77 mm 58.77 mm

Wear limit

D 47 mm 47 mm

Idler wheel

Type.....	D6R	D6R
Oil capacity	0.30 L	0.30 L
Weight (with sliders)	129 kg	129 kg



PDG0373

Weight on guide height

Original dimension

F 25 mm 25 mm

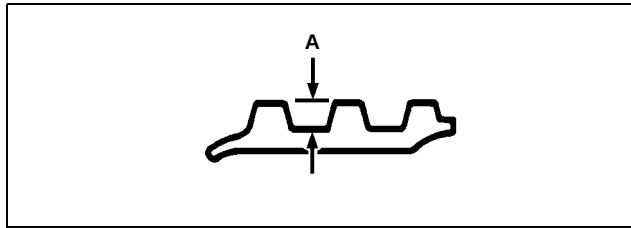
Wear limit

F 30 mm 30 mm

1188LC model**1188CK model****Track pads**

Weight:

0.50 m.....	15.40 kg.....	15.40 kg
0.60 m.....	18.50 kg.....	18.50 kg
0.75 m.....	23.10 kg.....	23.10 kg
0.90 m.....	27.80 kg	
Number per track.....	49.....	45
Track pad screw torque	510 to 570 Nm	510 to 570 Nm



PDG0371

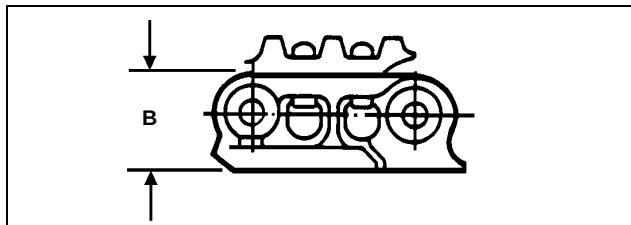
Pad rib wear

Original dimension

A..... 26 mm 26 mm

Wear limit

A..... 12 mm 12 mm

Links

PDG0372

Height wear

Original dimension

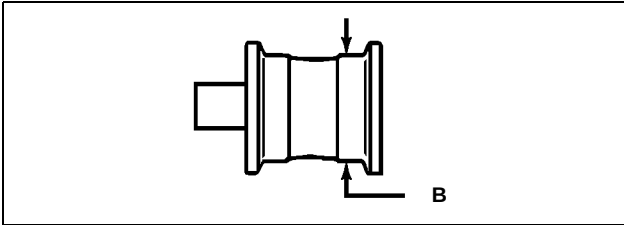
B..... 105 mm 105 mm

Wear limit

B..... 97 mm 97 mm

Upper roller

Type.....	D60.....	D60
Weight	19.50 kg.....	19.50 kg
Oil capacity	0.34 L.....	0.34 L
Number per track set	2.....	2
Retaining screw torque setting	600 Nm.....	600 Nm



PDG0374

Rim diameter wear

Original dimension

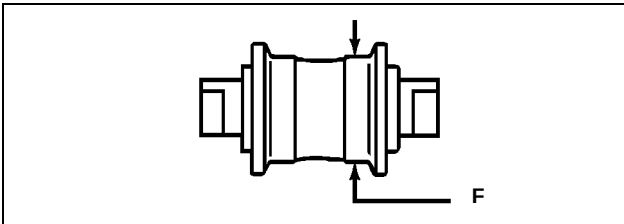
B.....	130 mm.....	130 mm
--------	-------------	--------

Wear limit

B.....	119 mm.....	119 mm
--------	-------------	--------

Lower roller

Type.....	D6M.....	D6M
Weight	43 kg.....	43 kg
Oil capacity	0.44 L.....	0.44 L
Number per track set	9.....	8
Retaining screw torque setting	500 Nm.....	500 Nm



PDG0375

Rim diameter wear

Original dimension

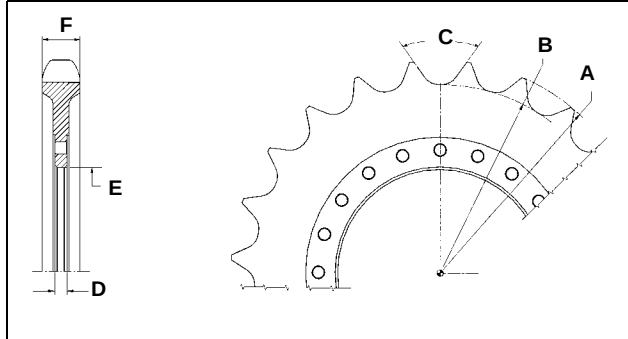
F.....	160 mm.....	160 mm
--------	-------------	--------

Wear limit

F.....	147 mm.....	147 mm
--------	-------------	--------

1188LC model**1188CK model****Sprocket**

Type	D60	D60
Weight	61.60 kg	61.60 kg
Number of teeth (per sprocket)	21	21
Retaining screw torque setting	500 Nm	500 Nm



PDG0385

Original dimension

A	664.6 mm	664.6 mm
B	584.6 mm	584.6 mm
C	60°	60°
D	25 mm	25 mm
E	350 mm	350 mm
F	72 mm	72 mm

Shock absorbers

Weight (per shock absorbers)	79 kg	79 kg
Grease adaptor torque setting	100 Nm	100 Nm
Number (per track)	1	1

Turntable

Weight	270 kg
Number of teeth	72
Module	11
Retaining screw torque setting on	
Outer ring on upperstructure	500 Nm
Inner ring on undercarriage	500 Nm

Batteries

Weight of one battery	
With electrolyte	37 kg
Without electrolyte	29 kg
Number of batteries	2
Voltage of each battery	12 volts
Starting capacity at -17°C	800 amps
Charge for capacity test (load)	400 amps

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Alternator

Weight	5 kg
Manufacturer	Bosch
Flow	28 volts at 45 amps
Resistance of the rotor coil	9.0 ohms
Resistance of the stator coil	0.22 ohms
Minimum length of brushes	14 mm
Rotor out-of-round	0.05 mm maximum

Starter motor

Weight	25.5 kg
Manufacturer	Bosch
No load test at 27°C	
Voltage	24 volts
Current consumption	85 amps maximum
Brush pressure per spring	47 to 53 Nm
Minimum length of brushes	8.5 mm
Armature out-of-round	0.03 mm maximum
Commutator diameter	42.5 mm minimum

Section 1002

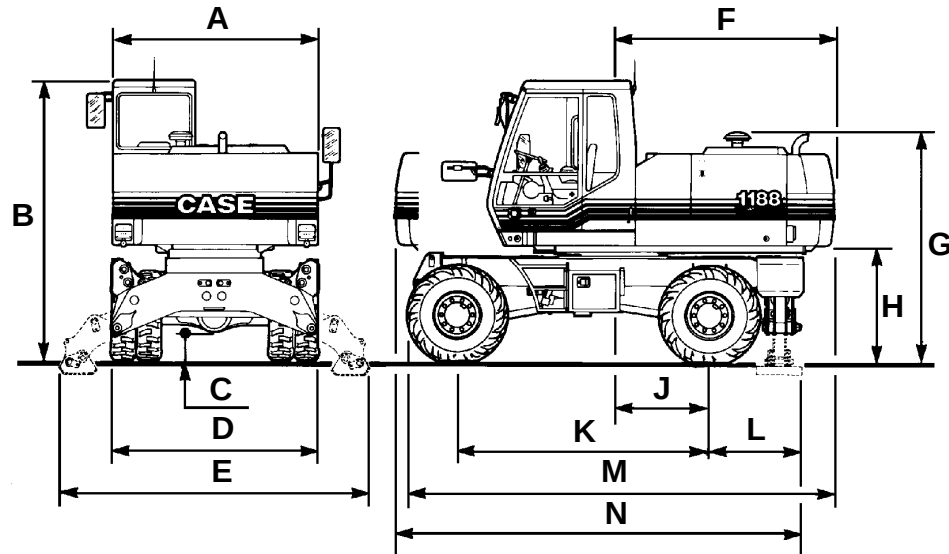
SPECIFICATIONS 1188 *Plus* Wheeled Excavators

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MACHINE OVERALL DIMENSIONS

P2A Version

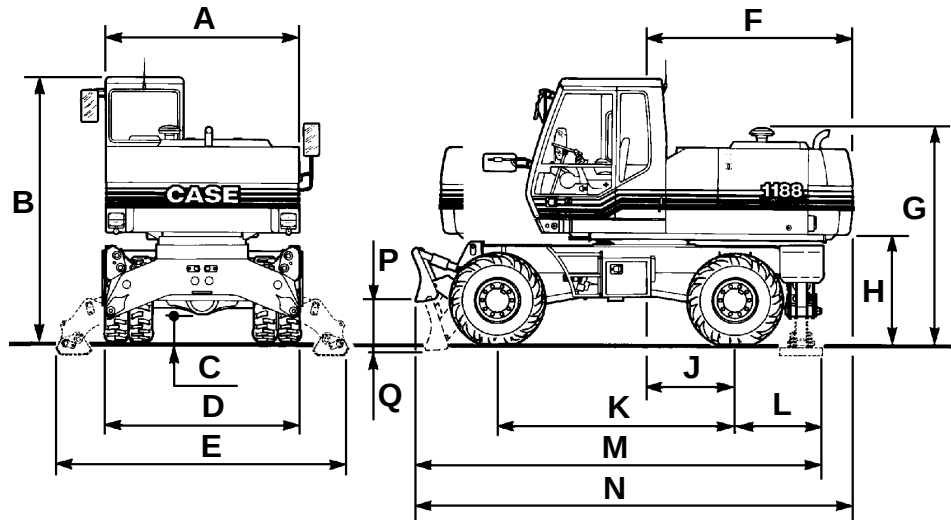


PDH0115

A	2.44 m
B (11.00-20 wheels)	3.35 m
B (18-22.5XF wheels)	3.40 m
C	0.32 m
D	2.49 m
E	3.71 m
F (radius)	2.70 m
G (11.00-20 wheels)	2.77 m
G (18-22.5XF wheels)	2.82 m
H (11.00-20 wheels)	1.29 m
H (18-22.5XF wheels)	1.34 m
J	1.15 m
K	3.00 m
L	1.11 m
M	5.14 m
N	4.97 m

1002-4

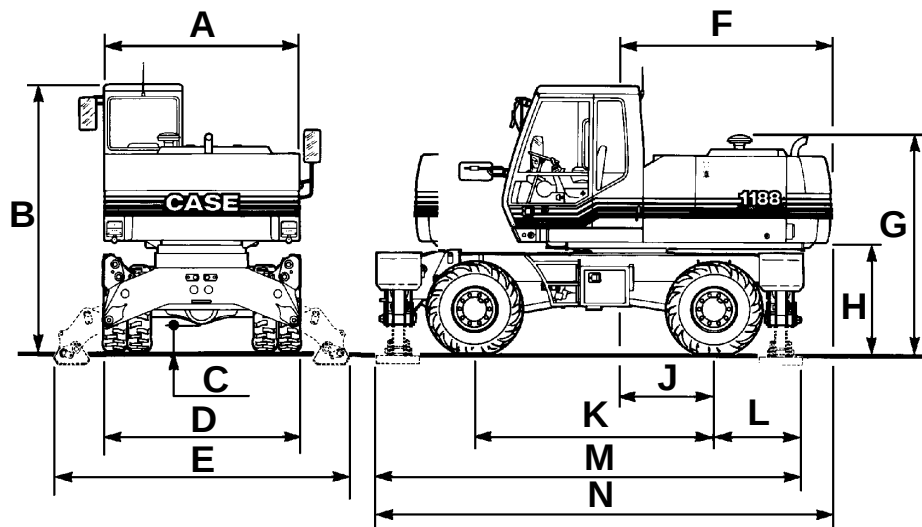
P2AL Version



PDH0116

A	2.44 m
B (11.00-20 wheels)	3.35 m
B (18-22.5XF wheels)	3.40 m
C	0.32 m
D	2.49 m
E	3.71 m
F (radius)	2.70 m
G (11.00-20 wheels)	2.77 m
G (18-22.5XF wheels)	2.82 m
H (11.00-20 wheels)	1.29 m
H (18-22.5XF wheels)	1.34 m
J	1.15 m
K	3.00 m
L	1.11 m
M	5.09 m
N	5.53 m
P	0.48 m
Q	0.14 m

P2A+2A Version

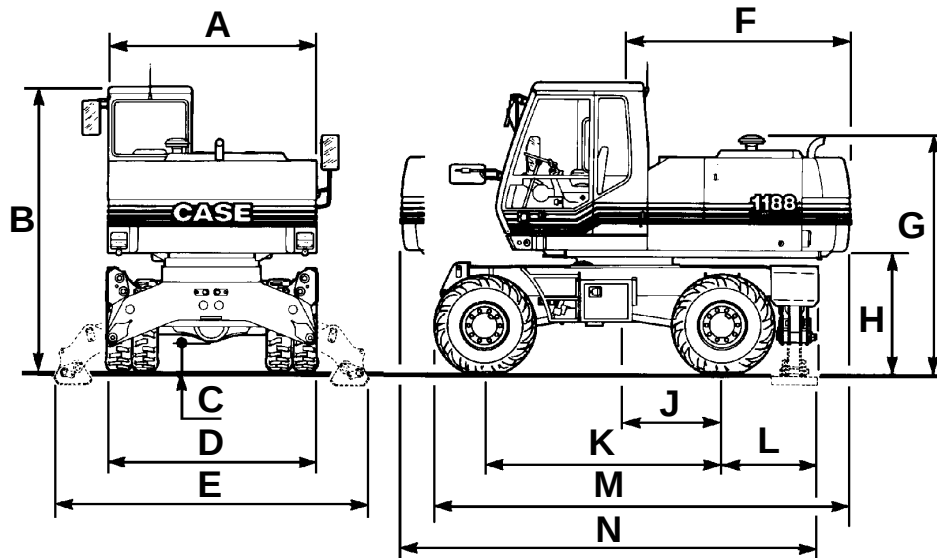


PDH0117

A	2.44 m
B (11.00-20 wheels)	3.35 m
B (18-22.5XF wheels)	3.40 m
C	0.32 m
D	2.49 m
E	3.71 m
F (radius)	2.70 m
G (11.00-20 wheels)	2.77 m
G (18-22.5XF wheels)	2.82 m
H (11.00-20 wheels)	1.29 m
H (18-22.5XF wheels)	1.34 m
J	1.15 m
K	3.00 m
L	1.11 m
M	5.32 m
N	5.76 m

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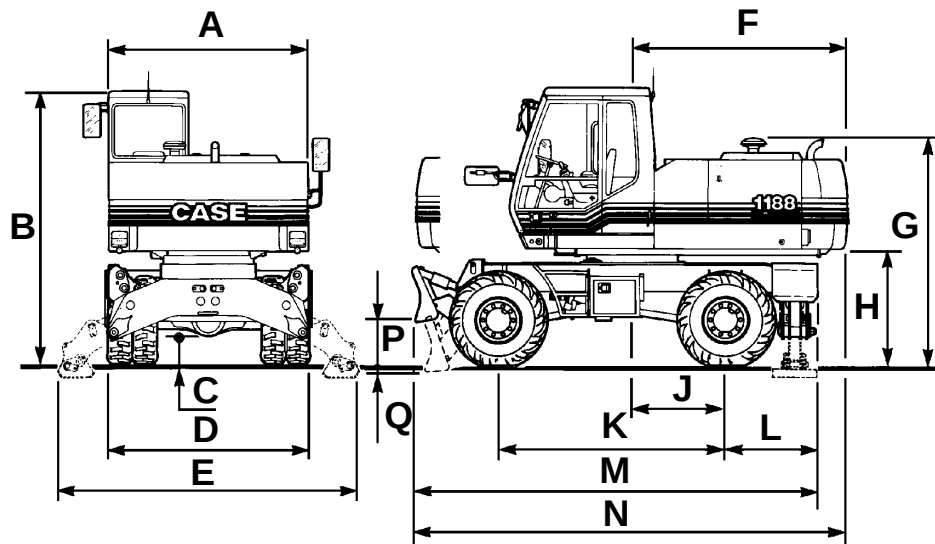
PM2A Version (special for Germany)



PDH0118

A	2.44 m
B	3.35 m
C	0.32 m
D	2.49 m
E	3.71 m
F (radius)	2.67 m
G	2.74 m
H	1.38 m
J	1.15 m
K	2.80 m
L	1.11 m
M	4.91 m
N	4.93 m

PM2AL Version (special for Germany)

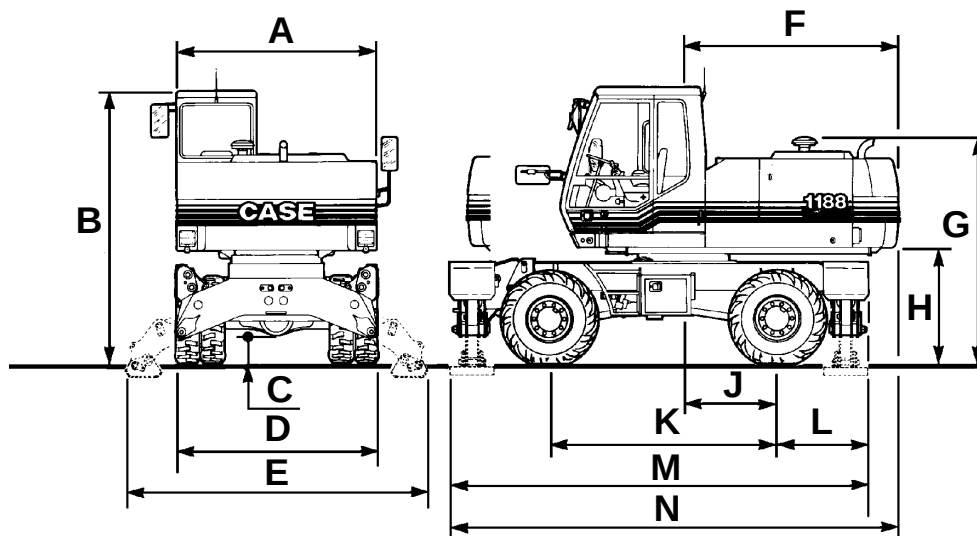


PDH0119

A	2.44 m
B	3.35 m
C	0.32 m
D	2.49 m
E	3.71 m
F (radius)	2.67 m
G	2.74 m
H	1.38 m
J	1.15 m
K	2.80 m
L	1.11 m
M	4.89 m
N	5.30 m
P	0.48 m
Q	0.14 m

1002-8

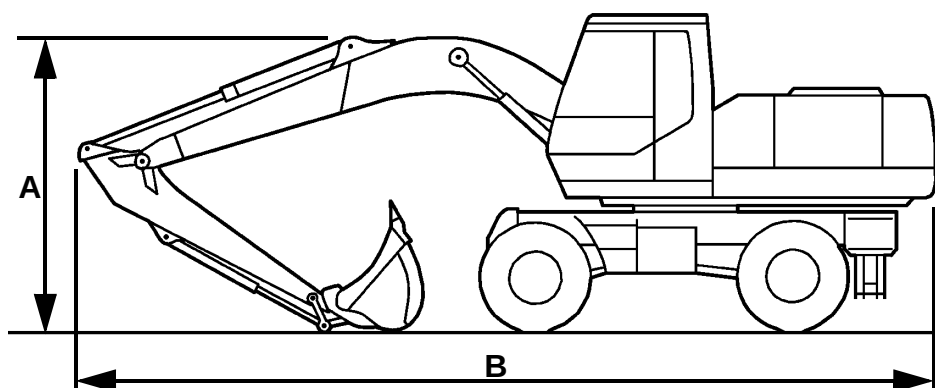
PM2A+2A Version (special for Germany)



PDH0120

A	2.44 m
B	3.35 m
C	0.32 m
D	2.49 m
E	3.71 m
F (radius)	2.67 m
G	2.74 m
H	1.38 m
J	1.15 m
K	2.80 m
L	1.11 m
M	5.12 m
N	5.52 m

TRANSPORTATION OVERALL DIMENSIONS



PDH0126

NOTE: For top of cab to ground, see "Overall dimensions".

P2A Version

Boom	Dipper	A	B
4.80 m one-piece	1.70 m	3.00	9.15
	2.20 m	3.15	8.90
	2.80 m	3.80	8.90
	3.40 m	4.30	8.65
5.40 m one-piece	1.70 m	3.10	9.75
	2.20 m	3.20	9.55
	2.80 m	3.35	9.55
	3.40 m	3.80	9.45
Articulated	1.70 m	3.00	9.85
	2.20 m	3.10	9.50
	2.80 m	3.35	9.35
	3.40 m	3.80	9.30
Adjustable	1.70 m	3.35	9.55
	2.20 m	3.30	9.00
	2.80 m	3.60	8.90
	3.40 m	4.75	8.35
Handling		3.00	9.30

P2AL and P2A+2A Versions

Boom	Dipper	A	B
4.80 m one-piece	1.70 m	3.45	9.20
	2.20 m	3.70	8.95
	2.80 m	4.15	8.75
	3.40 m	4.80	8.45
5.40 m one-piece	1.70 m	3.10	9.75
	2.20 m	3.30	9.55
	2.80 m	3.80	9.55
	3.40 m	4.30	9.35
Articulated	1.70 m	3.00	9.85
	2.20 m	3.15	9.50
	2.80 m	3.50	9.30
	3.40 m	4.70	9.00
Adjustable	1.70 m	3.35	9.55
	2.20 m	3.55	9.10
	2.80 m	3.90	8.75
	3.40 m	5.20	8.15
Handling		3.00	9.30

NOTE: These values are given in metres.

GENERAL MACHINE SPECIFICATIONS

Engine

Make and type	CASE 6TA 590
Total SAE horsepower at 2800 rpm	126.4 kW (172 hp)
4 stroke, 6 cylinder	turbo-charged diesel
Capacity	5880 cm ³
Bore	102 mm
Stroke	120 mm
Cooling	water-cooled
Starting	2 x 12 volt batteries, 24 V, 120 A/h

Working specifications

Engine speed	2000 rpm
SAE: Horsepower	119 kW (160 hp)
DIN 70020 - DIN 6271	113 kW (152 hp)
CEE 80/1269 - ISO 9249	113 kW (152 hp)
Specifications maintained up to an altitude of 3000 m at a temperature of 25°C.	
Capacities: Engine oil sump	14.3 L
Fuel tank	330 L
Fuel tank filler pump, electrical	optional
Average hourly consumption	21.2 L/h
Engine and pump assembly mounted on flexible mountings.	
Heavy-duty dust filtration.	

Hydraulic system

Variable flow system with independent and simultaneous operation of all functions.
Electronic regulation of hydraulic power ("Powersensor" system) for optimal use of engine power.

3 regulation modes:

"FINE": For work requiring extreme precision.

"ECO" (ECONOMICAL): For normal work.

"MAX" (MAXIMUM): In this position, the operator has the entire power of the machine available for use.

Automatic engine return to idle at operator's choice.

Working pressure	350 bar
Capacity of hydraulic reservoir	180 L
Total system capacity	288 L

Pumps:

One double-body variable displacement pump for supplying travel motors and attachments.

Flow

320 L/min

One single variable displacement pump supplying the upperstructure swing.

Flow

88 L/min

Installed hydraulic power

109 kW (148 hp)

Fixed flow pumps for the pilot systems.
 Parallel, closed centre type attachment and travel control valves.
 Flow rates per function, independent of pressures.

Oil cooler with air cooling from engine.
 High pressure multispiral hoses
 minimum safety factor 2 to 4 times working pressure
 Self-lubricating hydraulic swivel.

Electrical system

Circuit voltage circuit 24 volt, negative earth
 Batteries two low-maintenance 12 volt batteries
 All electrical system safety functions are grouped in an electrical cabinet with a printed circuit.
 Instrument panel with printed circuit.
 Automatic instrument panel lamp testing.
 Two-stage alarm system.
 Upperstructure electrical power socket (24 V, 15 Amp.).
 Battery master switch.

Upperstructure

All welded frame

Modular structure.
 Transverse walkway giving access to the various components.
 Sound-proofed, lockable cowling meeting all current regulations.
 Tool box with tool set.

Swing

Hydraulic motor with reduction gear and automatic static brake.
 Swing speed 8.5 rpm
 Turntable alternating rollers and internal teeth
 Centralised bearing surface and tooth lubrication

Cab

Removable, sound-proofed, on flexible mounting blocks.
 Up and over windshield.
 Tinted windshield.
 Pre-fitted for radio installation.
 Transparent roof hatch optional equipment
 Sliding window on door optional equipment
 Polycarbonate windows optional equipment
 Cab safety guards available on request
 Elevated cab available on request
 Ant-vandal cab optional equipment

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Operation

De-luxe seat with armrests and multi-position adjustment (vibration level III/ISO 7096).

Hydraulically assisted controls.

Attachment and swing 2 control levers

Hydraulically assisted steering Orbitrol system

Single-speed windshield wiper, plus intermittent action, windshield washer, heating, de-frosting, two-speed ventilation, cab light, cigarette lighter, sun shield.

Working lights:

On upperstructure 2 x 70/75 W

On attachment 70 W

Front and rear (on cab) optional equipment

Rear only (on cab) optional equipment

Air conditioning optional equipment

Cab sun-shield optional equipment

Cab blower optional equipment

Undercarriage

Modular design providing for dozer blade or stabilizers to be installed at the front.

Stabilizers with articulated pads which can be locked for uneven ground.

Oscillating front axle + or - 7°

Automatic hydraulic front axle locking can be disengaged when required.

Automatically locking dozer blade and stabilizers with check valves.

Two drive axles with planetary reduction gears.

Tool boxes.

Tyres

4 wheels 18-22.5XF

8 wheels 10.00-20 (with dual wheel spacer)

PM type (special for Germany): 8 wheels 11.00-20 (with twin wheel spacer)

Brakes

Single-disc, oil-bath brakes.

Service brakes: dual front and rear circuit with hydraulic pedal control.

Parking and working brake: electro-hydraulic acting control on all 4 wheels.

Hydrostatic engine brake.

Safety devices

For travel or transport, the upperstructure can be locked from the driving position.

In the event of engine failure, the attachment can be lowered, under control, to the ground.

Cancellation of controls by lifting the left-hand control arm.

Tinted safety-glass windows, horn, flashing marker light.

Cab safety guards available on request

Safety valves optional equipment

Overload indicator optional equipment

Roller type seat belt optional equipment

Fire extinguisher optional equipment

Rotary light special for certain countries

Indicators

Engine coolant solution temperature, hydraulic fluid temperature, fuel level and hourmeter.

Warning and indicator lamps

Engine oil pressure, battery charge, hydraulic oil filter and engine air filter restriction, brake minimum pressure, parking brake, steering assistance warning.

Warning/indicator lamp test.

Travel

Hydro-mechanical transmission with variable displacement hydraulic motor and range selector providing
infinitely variable speed from 0 to 7.3 kph (work-site range)
from 0 to 24.5 kph (road range)
(PM type, special for Germany) from 0 to 6 kph (work-site range)
from 0 to 20 kph (road range)

Control by pedal and manual inverter with gradual action, enabling any desired speed to be set.

Hydraulic speed limiter, automatic when descending slopes.

Maximum continuous gradeability46%

Outer turning circle8.70 m

(PM type, special for Germany)8.27 m

Hydraulically assisted steering with safety system.

Attachments

Sealed linkages, greasing of all linkages possible from the ground, double acting cylinders fitted with end-of-stroke shock absorbers.

Play take-up system on bucket linkage.

Noise level

Certified by the manufacturer.

In accordance with European directive 86/662/EEC.

Inside operator's compartment (LpA)79 decibels

Outside machine (LwA)105 decibels

WEIGHTS

Machine

Boom	Dipper	Versions		
		P2A	P2AL	P2A+2A
4.80 m one-piece	1.70 m	18 820	19 480	20 295
	2.20 m	18 860	19 520	20 335
	2.80 m	18 945	19 605	20 420
	3.40 m	18 980	19 640	20 455
5.40 m one-piece	1.70 m	18 955	19 615	20 430
	2.20 m	18 995	19 655	20 470
	2.80 m	19 080	19 740	20 555
	3.40 m	19 115	19 775	20 590
Articulated	1.70 m	19 860	20 520	21 335
	2.20 m	19 900	20 560	21 375
	2.80 m	19 985	20 645	21 460
	3.40 m	20 025	20 685	21 500
Adjustable	1.70 m	19 495	20 155	20 970
	2.20 m	19 540	20 200	21 015
	2.80 m	19 625	20 285	21 100
	3.40 m	19 660	20 320	21 135
Handling	Handling (without clamshell)	17 605	18 265	19 080

NOTE: Loads shown are in kg for machine in 4 wheel configuration 18-22.5XF with 970 L backhoe bucket (for 8 wheel configuration 11.00-20: add 360 kg).

Machine (PM type, special for Germany)

Articulated boom	Dipper	Versions		
		PM2A	PM2AL	PM2A+2A
	2.20 m	19 365	20 025	20 840
	2.50 m	19 380	20 040	20 855
	2.80 m	19 455	20 115	20 930

NOTE: Loads are shown in kg, with 8 wheel 11.00-20 configuration and 970 L backhoe bucket.

Attachments

Booms (with dipper cylinder)	
4.80 m one-piece (P type)	1575 kg
5.40 m one-piece (P type)	1710 kg
Adjustable (P type)	2255 kg
Articulated (P and PM type)	2520 kg
5.90 m handling boom (with dipper cylinder) (P type)	1530 kg
Dipper (with yoke, connecting link and bucket cylinder)	
1.70 m (P type)	980 kg
2.20 m (P and PM type)	1020 kg
2.50 m (PM type)	1025 kg
2.80 m (P and PM type)	1105 kg
3.40 m (P type)	1140 kg
4.30 m handling dipper(P type)	580 kg
Quick coupler (optional)	330 kg
Hydraulic hammers (optional)	
CB 2850 type	1233 kg
CB 3750 type	1597 kg

(PM type, special for Germany)

Adjustable boom (with dipper cylinder)	1935 kg
Dipper (with yoke, connecting link and bucket cylinder)	
2.20 m	1010 kg
2.80 m	1095 kg

Counterweight

3800 kg (P type)
3100 kg (PM type)

Cab

295 kg

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Tools

NOTE: The selection of bucket capacity depends on the density of the material (See "Density of various spoils and materials" in the operator's manual) and the attachment configuration as well as the compactness and structure of the ground.

Earthmoving buckets

Width	CECE capacity	Weight
0.60 m.....	460 L	585 kg
0.75 m.....	590 L	615 kg
0.85 m.....	680 L	645 kg
0.90 m.....	730 L	690 kg
1.05 m.....	870 L	745 kg
1.15 m.....	970 L	775 kg
1.25 m.....	1060 L	845 kg
1.40 m.....	1200 L	890 kg

All earthmoving buckets are equipped with teeth with removable tooth tips and pins with side play take-up system.
Heavy duty supplement optional (add 5% to the capacity shown).
Side cutters optional (add 8 cm to the width shown).

Trench buckets with ejector

Width	CECE capacity	Weight
0.45 m.....	310 L	755 kg

Ditch cleaning buckets equipped with teeth

Width	CECE capacity	Weight
2.00 m.....	900 L	780 kg

Ditch cleaning buckets equipped with reversible blade (notched or smooth)

Width	CECE capacity	Weight
2.00 m.....	900 L	825 kg

Ditch-cleaning buckets equipped with smooth blade

Width	CECE capacity	Weight
2.20 m.....	1000 L	815 kg

V-shaped bucket

Width	CECE capacity	Weight
0.50 - 3.00 m	670 L	625 kg

Trench clamshell with ejector

Width	Opening	Capacity	Weight
0.55 m.....	1.94 m.....	350 L	1180 kg

Earthmoving clamshells

Width	Opening	Capacity	Weight
0.92 m.....	1.72 m.....	500 L	1270 kg
1.02 m.....	1.83 m.....	650 L	1300 kg
1.27 m.....	1.83 m.....	850 L	1395 kg

Rehandling clamshells

Width	Opening	Capacity	Weight
1.03 m.....	2.14 m.....	1000 L	1240 kg

Boring clamshell

Opening diameter	Capacity	Weight
1.18 m.....	180 L	1025 kg
1.48 m.....	350 L	1175 kg

Sugar beet clamshell

Width	Opening	Capacity	Weight
1.81 m.....	2.50 m.....	2050 L	1440 kg
2.05 m.....	2.50 m.....	2350 L	1625 kg
2.29 m.....	2.50 m.....	2600 L	1703 kg

5-tine stone grab with removable tine tips

Opening diameter	Weight
2.12 m.....	1815 kg

Scrap metal 5 tine grab

Opening diameter	Weight
2.00 m.....	1300 kg

FLUIDS AND LUBRICANTS

Lubricants must have the correct properties for each application.



WARNING: *The conditions of use for individual fluids and lubricants must be respected.*

Hydraulic fluid

CASE hydraulic fluid is specially designed for high pressure applications and for the CASE hydraulic system. The type of fluid to be used depends on the ambient temperature.

Temperate climates

-20°C to +40°C
Fluid type ISO VG 46
CASE reference: POHYDR

Hot climates

0°C to +60°C
Fluid type ISO VG 100
CASE reference: POHYDC

Cold climates

-40°C to +20°C
Fluid type ISO VG 22
CASE reference: POHYPF

These various grades of fluid must be in conformity with CASE France specification P9903201Z.

Temperate climate biodegradable fluid:

This yellow fluid is compatible with standard fluid. If adopted, it is advisable to drain the circuit completely.
Fluid type ISO VG 46
CASE reference: CASYNTH 46

This grade of fluid must be in conformity with CASE France specification P9903203B.

Transmission component oil

Extreme pressure oil used for transmission components inside sealed housings.
Extreme pressure oil type API GL5 grade 80W90 or ISO VG 150.

Grease

The type of grease to use depends on ambient temperature.

Temperate and hot climates

-20°C to +60°C
Extreme pressure grease EP NLGI grade 2 with molybdenum disulphide.

Cold climates

-40°C to +20°C
Extreme pressure grease EP NLGI grade 0.

Engine oil

CASE engine oil No. 1 is recommended for your engine. This oil ensures correct lubrication of your engine in all working conditions.

If CASE No. 1 Multipurpose or Performance engine oil is not available, use oil corresponding to category API/CG/CF.

NOTE: Do not put any Performance Additive or other additive in the sump. Oil change intervals shown in this manual are based on tests carried out on CASE lubricants.

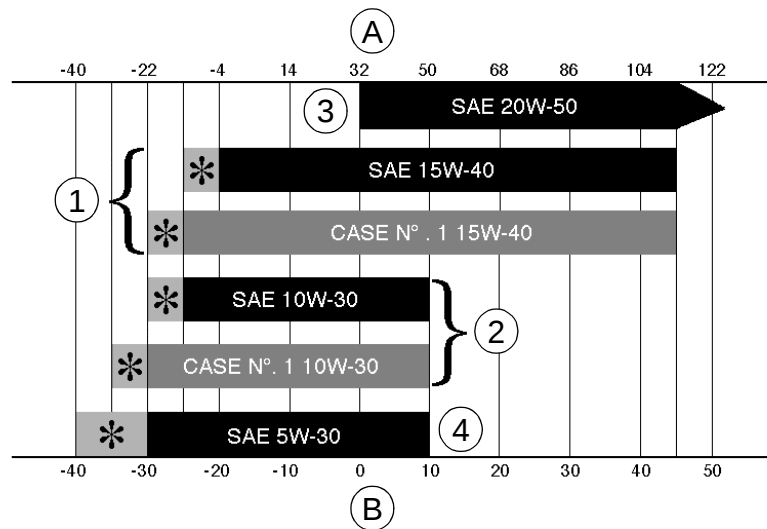


RD97F136



RB97F100

Oil viscosity/Oil range



CS98M561

(A) TEMPERATURE FAHRENHEIT

(B) TEMPERATURE CELSIUS

(1) ALL SEASONS

(2) WINTER

(3) TROPICAL

(4) ARCTIC

(*) SHOWS THAT AN ENGINE OIL HEATER OR ENGINE COOLANT SOLUTION HEATER MUST BE USED.

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Fuel

Use fuel which is to ASTM (American Society for Testing and Materials) D975 standard.

Use Grade No. 2 fuel. The use of other types of fuel can result in a loss of power and may cause high fuel consumption.

In cold weather, the use of a mixture of fuels No. 1 and No. 2 is temporarily permitted. Consult your fuel supplier.

If the temperature falls below the fuel cloud point (point at which wax begins to form) the wax crystals will cause power loss or will prevent the engine from starting.

IMPORTANT: *In cold weather, fill the fuel tank at the end of the day's work, in order to prevent the formation of condensation.*

Fuel storage

Long storage can lead to the accumulation of impurities and condensation in the fuel. Engine trouble can often be traced to the presence of water in the fuel.

The storage tank must be placed outside and the temperature of the fuel should be kept as low as possible. Drain off water and impurities regularly.

Antifreeze/anti-corrosion

Use anti-freeze in all seasons to protect the cooling system from corrosion and all risk of freezing.

In environments with a temperature higher than -36°C, use a mixture of 50% ethylene-glycol based anti-freeze.

For areas where the temperature is below -36°C, it is advisable to use a blend of 40% water and 60% anti-freeze.

Environment

Before carrying out any servicing operation on this machine and before disposing of used fluids or lubricants, always think of the environment. Never throw fluid or oil on the ground and never keep them in leaking receptacles.

Consult your local ecological recycling centre or your CASE Dealer to obtain information on the appropriate means of disposing of these substances.

Components made from plastic or resin

When cleaning polycarbonate windows, the console, the instrument panel, the gauges, etc., do not use petrol (gasoline), paraffin (kerosene), paint solvents, etc. Use only water, soap and a soft cloth.

The use of petrol (gasoline), de paraffin (kerosene), paint solvents, etc, will cause discoloration, cracking or deformation of these components.

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Gearbox	26
Steering box	26
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Water radiator/oil cooler	27
Attachment and swing control block (control lever)	27
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Accumulator	28
Dipper cylinder and boom cylinder safety valves	28
Load holding block, dipper cylinder and boom cylinders	28
Turntable	28
Front axle	29
Rear axle	29
Batteries	30
Alternator	30
Starter motor	30

DETAILED SPECIFICATIONS PER COMPONENT

High pressure hydraulic pump

Variable displacement.

Weight	130 kg
Max. displacement.....	2 x 80 cm ³ /rev.
Max. flow	320 L/min
Driven speed	2000 rpm
Attachment and travel flow cancellation valve setting	355 to 365 bar
Load-Sensing valve setting	
static.....	20 to 22 bar
dynamic.....	19 to 22 bar
Torque regulating valve setting	
With engine speed at 2000 rpm at a pressure of	
300 bar, the flow should be in excess of	147 L/min

Hydraulic swing pump

Variable flow pump.

Flow cancellation pressure	290 to 300 bar
Displacement.....	46 cm ³ /rev.
Max flow	92 L/min
Setting for ΔP on the torque regulating valve	16 bar

Pilot system, steering and braking hydraulic pump

External tooth two-body gear pump.

Weight	3.5 kg
First pump body (pilot system):	
Displacement	12 cm ³ /rev.
Maximum flow	24 L/min
Rated pressure.....	34 to 38 bar
Second pump body (steering and braking):	
Displacement	12 cm ³ /rev.
Maximum flow	24 L/min

Hydraulic filters

Weight (per filter)	0.5 kg
By-pass pressure setting	3.5 bar
Restriction indicator pressure setting	3.1 bar
Filtration diameter.....	10 μ

Attachment control valve

Bore	22
Spool stroke.....	10 mm
Spool pilot pressure	8 to 22 bar
Valve pressure setting:	
Main relief valve	395 to 415 bar
Boom, dipper and bucket secondary relief valves.....	395 to 425 bar

Balance valve flow settings

Boom cylinder large chambers	200 to 220 L/min
Dipper cylinder large chambers	190 to 210 L/min
Bucket cylinder large chambers	180 to 200 L/min

Travel control valve

Bore	20
Spool stroke.....	10 mm
Spool pilot pressure	8 to 22 bar
Travel secondary relief valve pressure settings.....	395 to 425 bar
Stabilizer and dozer blade secondary relief valve pressure settings	380 to 410 bar
Travel balance valve flow settings	190 to 200 L/min
Four stabilizers, lowering	160 to 180 L/min
Four stabilizers, raising	80 to 100 L/min
Two stabilizers, lowering	155 to 175 L/min
Two stabilizers, raising	40 to 70 L/min
Two stabilizers plus dozer blade, lowering	155 to 175 L/min
Two stabilizers plus dozer blade, raising.....	60 to 80 L/min

Swing control valve

Bore	16
Spool pilot pressure	8 to 22 bar
Relief valve pressure settings.....	310 to 330 bar

Low flow control valve (optional)

One or two units	
Bore	12
Spool pilot pressure	8 to 22 bar
Pressure setting for clamshell rotation	130 to 150 bar
Pressure setting for articulated boom.....	390 to 425 bar
Balance flow setting (each spool allows only 30 L/min)	30 L/min

High flow control valve (optional)

Bore	20
Spool pilot pressure	8 to 22 bar
Secondary relief valve rated pressure setting	400 bar
Balance flow setting.....	140 L/min
Flow via spool mechanical stop	100 L/min

Hydraulic hammer control valve (optional)

Bore	20
Spool pilot pressure	8 to 22 bar
Secondary relief valve rated pressure	200 bar
Balance valve flow setting (depending on type of hammer being used)	50 to 180 L/min

Boom cylinders (first type)

Equipped with dash-pot on the large chamber end and a flow limiter on the separator block (on the large chamber end).

Weight (per cylinder)	145 kg
-----------------------------	--------

Dimensions:

Barrel diameter.....	110 mm
Rod diameter.....	80 mm
Stroke	1100 mm
Time required for boom raising.....	See section 8001

1002-24

Boom cylinders (second type)

Equipped with dash-pot at large and small chamber ends
and a flow limiter on the separator block (on the large chamber end).

Weight (per cylinder) 155 kg

Dimensions:

Barrel diameter..... 115 mm

Rod diameter..... 80 mm

Stroke..... 1100 mm

Time required for boom raising..... See section 8001

Dipper cylinder

Equipped with dash-pot at large and small chamber ends
and a flow limiter (on the large chamber end).

Weight 220 and 224 kg

Dimensions:

Barrel diameter..... 125 mm

Rod diameter..... 90 mm

Stroke..... 1370 mm

Handling dipper cylinder

Equipped with dash-pot at small and large chamber ends.

Weight 165 and 169 kg

Dimensions:

Barrel diameter..... 110 mm

Rod diameter..... 80 mm

Stroke..... 1320 mm

Bucket cylinder

Equipped with dash-pot at small chamber end.

Weight 145 and 149 kg

Dimensions:

Barrel diameter..... 110 mm

Rod diameter..... 80 mm

Stroke..... 1100 mm

Articulated boom jib cylinder

Weight 180 kg

Dimensions:

Barrel diameter..... 110 mm

Rod diameter..... 70 mm

Stroke..... 824 mm

Articulated boom cylinder

Equipped with dash-pot on the large chamber end
and a flow limiter (on the large chamber end).

Weight 136 kg

Dimensions:

Barrel diameter..... 100 mm

Rod diameter..... 70 mm

Stroke..... 983.5 mm

Clamshell cylinder

Weight	288 kg
Dimensions:	
Barrel diameter.....	155 mm
Rod diameter.....	105 mm
Stroke.....	480 mm

Sugar beet clamshell cylinder

Equipped with dash-pot on the large chamber end.

Weight	63 kg
Dimensions:	
Barrel diameter.....	100 mm
Rod diameter.....	70 mm
Stroke.....	350 mm

5-tine iron and stone clamshell cylinders

Weight	30 kg
Dimensions:	
Barrel diameter.....	75 mm
Rod diameter.....	60 mm
Stroke.....	280 mm

Stabilizer cylinders

Equipped with piloted check valves.

Weight	93.5 kg
Dimensions:	
Barrel diameter.....	125 mm
Rod diameter.....	95 mm
Stroke.....	520 mm

Dozer blade

Weight	39.5 kg
Dimensions:	
Barrel diameter.....	95 mm
Rod diameter.....	70 mm
Stroke.....	200 mm

Steering cylinder

Dimensions:	
Barrel diameter.....	90 mm
Rod diameter.....	50 mm
Stroke.....	170 mm

Axle locking cylinders

Equipped with piloted check valves.

Weight	37.2 kg
Dimensions:	
Rod diameter.....	70 mm
Stroke.....	135 mm

1002-26

Hydraulic swing motor

Type	F12-60
Weight	20.2 kg
Displacement.....	59.8 cm ³ /rev.
Theoretical speed	1563 rpm

Swing reduction gear

Reduction gear with multi-disc, oil-bath type brake.

Weight	125 kg
Reduction ratio	1/34.5
Theoretical speed at output shaft	45 rpm
Upperstructure braking torque	7644 mdaN
Pressure required for complete brake release	9 bar
Swing pinion	13 module 11 teeth
Number of brake discs:	
Sintered discs.....	6
Steel discs	5
Thickness of new friction discs	2.9 mm
Minimum thickness of sintered discs	2.7 mm
Reduction gear housing capacity	5 L

Hydraulic travel motor

Type	A6VM107/43-97
Weight	85 kg
Minimum displacement.....	43 cm ³ /rev.
Maximum displacement.....	97 cm ³ /rev.
Theoretical maximum speed	4226.5 rpm
Speed change pressure	300 to 310 bar

Gearbox

Weight	94 kg
Reduction ration in first gear.....	1/6
Reduction ratio in second gear.....	1/1.8
Speed change control pressure.....	34 to 36 bar

Steering box

Relief valve pressure setting	155 to 170 bar
Secondary relief valve pressure settings.....	200 to 220 bar

Brake unit

Engagement/Disengagement unit

Engagement pressure	125 to 140 bar
Disengagement pressure	150 to 165 bar
Maximum service brake pressure	40 to 60 bar
Parking brake pressure	125 to 165 bar
Working brake pressure	in excess of 34 bar
Pressure switch:	
Minimum braking pressure	105 bar
minimum steering system pressure	5 bar
Brake lights	5 bar
Parking brake	105 bar

Hydraulic reservoir

Weight of empty reservoir	215 kg
Reservoir capacity	180 L
Total system capacity	288 L

Water radiator/oil cooler

Empty weight	51 kg
Capacity (water)	6 L
Capacity (oil)	2.3 L
Radiator cap pressure	1.03 bar

Attachment and swing control block (control lever)

Weight	2.7 kg
Theoretical output pressure depending on angle to which lever is tilted:	
from 0 to 1°-4°	6.2 to 7 bar
from 0 to 16°-19°	18.4 to 21.6 bar
de 0 to 19°-21° (Old type)	26 to 28 bar
de 0 to 19°-21° (New type)	28 to 34 bar
Push-rod stroke	7.55 mm

Travel and option travel control block

Weight	3.5 kg
Theoretical output pressure depending on angle to which pedal is tilted:	
from 0° to 1°-3°	7.2 to 8 bar
from 0° to 9°-11°	22 to 26 bar
from 0 to 11°-12°	35 bar
Pushrod stroke	0 to 5.8 mm

Manual travel control block (inching)

Weight	2.5 kg
Theoretical output pressure depending on angle to which lever is tilted:	
from 0° to 2°-4°	8 bar
from 0° to 20°	24 bar
from 0° to 25°	24 bar
Pushrod stroke	7.5 mm

Travel control pedal

Weight	1.350 kg
Minimum pressure	8 bar
Maximum pressure	27 bar
Spool stroke	15 mm

Boom lowering flow limiter

Flow	100 and 110 L/min
Spring length setting	22 mm

Dipper retraction flow limiter

Flow	95 and 105 L/min
Spring length setting	27 mm

1002-28

Pressure limiter (P10)

Weight 7.5 kg
Pressure setting (at test point M9)..... 8 to 12 bar

Hydraulic swivel

Weight 134 kg
Number of passages 16

Solenoid valve block

Limiter pressure setting (P35)in excess of 34 bar

Swing safety/forced feed block

Secondary relief valve pressure setting 300 to 320 bar

Accumulator

Weight 2.8 kg
Nitrogen volume 0.75 L
Inflation pressure 65 bar
Maximum working pressure..... 210 bar

Dipper cylinder and boom cylinder safety valves

Secondary relief valve pressure settings..... 395 to 425 bar

Load holding block, dipper cylinder and boom cylinders

Secondary relief valve pressure settings..... 395 to 415 bar

Turntable

Weight 270 kg
Number of teeth 72
Module 11
Retaining screw torque setting on
 External ring on upperstructure 500 Nm
 Internal ring on undercarriage 500 Nm

Front axle

Make and type	CARRARO 652 FR
Weight	730 kg
Wheel reduction gear oil capacity.....	2.5 litres
Axle housing oil capacity	17 litres
Type of oil	TRANSELF EP 80W90 API GL5
Type of grease	GREASE EP2

Crown wheel and pinion - differential:

Crown wheel and pinion ratio	3.363:1
Play between teeth of crown wheel and pinion	0.21 to 0.28 mm
Differential pinion shaft bearing pre-load.....	P = 76 to 114 N
Total differential pinion shaft bearing pre-load.....	T = (P + 22) to (P + 34) N
Thickness of pinion shaft shims	2.5 to 3.4 mm (from 0.10 to 0.10 mm)

Steering pivot:

Thickness of shims for adjusting pivot bushings	0.1 to 0.3 mm
Pivot bushing pre-load	0.0 to 0.10 mm
Play between the bushing and the axle half-shaft, at the wheel end	0.16 to 0.25 mm
Play between the bushing and the axle half-shaft, at the differential end	0.13 to 0.232 mm

Final drive:

Reduction gear ratio	6.23:1
Total transmission ratio	20.95:1

Brake:

Thickness of new brake disc	4.8 to 4.9 mm
Wear limit	3.9 mm

Rear axle

Make and type	CARRARO 852 FR
Weight	636 kg
Wheel reduction gear oil capacity.....	2.5 litres
Axle housing oil capacity	25 litres
Type of oil	TRANSELF EP 80W90 API GL5
Type of grease	GREASE EP2

Crown wheel and pinion - differential:

Pinion/crown wheel ratio	3.363:1
Play between pinion and crown wheel	0.21 to 0.28 mm
Differential pinion shaft bearing pre-load.....	P = 76 to 114 N
Total differential pinion shaft bearing pre-load.....	T = (P + 22) to (P + 34) N
Thickness of pinion shaft shims	2.5 to 3.4 mm (from 0.10 to 0.10 mm)

Final drive:

Reduction gear ratio	6.23:1
Total transmission ratio	20.95:1

Brake:

Thickness of new brake disc	9.9 to 10.1 mm
Wear limit	8.5 to 8.7 mm
Permissible wear per brake disc	1.4 mm
Reactor plate thickness	9.5 to 9.6 mm

1002-30

Batteries

Weight of one battery	
With electrolyte.....	37 kg
Without electrolyte.....	29 kg
Number of batteries	2
Voltage of each battery	12 volts
Cold starting capacity at -17°C.....	800 amps
Charge for capacity test (load)	400 amps

Alternator

Weight	5 kg
Manufacturer	Bosch
Flow	28 volts at 45 amps
Resistance of rotor coil	9.0 ohms
Resistance of stator coil	0.22 ohms
Minimum brush length	14 mm
Rotor out-of-round	0.05 mm maximum

Starter motor

Weight	25.5 kg
Manufacturer	Bosch
No load test at 27°C	
Voltage	24 volts
Current consumption.....	85 amps maxi
Brush pressure per spring	47 to 53 Nm
Minimum brush length	8.5 mm
Armature out-of-round	0.03 mm maximum
Commutator diameter	42.5 mm minimum

Section

4001

ELECTRICAL SCHEMATICS
1188 Crawler Excavators (old version)

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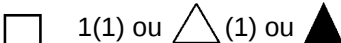
SPECIFICATIONS

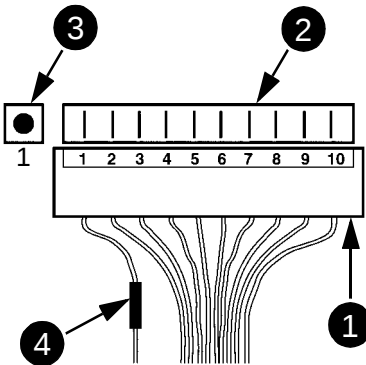
System voltage.....	24 Volts negative earth and 12 Volts negative earth
Batteries	2 x 12 Volt 120 A/hour low maintenance batteries
Alternator	BOSCH, 28 Volts, 45 Amps
Starter motor	BOSCH, 24 Volts, 4.0 kW

SCHEMATIC SYMBOLS

- A (n) Radio/ housings
- B (n) Indicators/ pressure switches/ loudspeakers/ pressostats/ senders/ heat sender/ gauge
- E (n) Lighting components
- F (n) Fuses
- G (n) Electrical supply generators
- H (n) Warning devices (visible and audible)
- K (n) Relays
- M (n) Motors
- P (n) Instruments
- R (n) Resistors/ heater plugs
- S (n) Switches/ battery master switch
- Sh (n) Shunt resistors
- V (n) Diodes
- X (n) Supply line connections
- Y (n) Solenoid valves, solenoids

NOTA : The (n) shows the component number

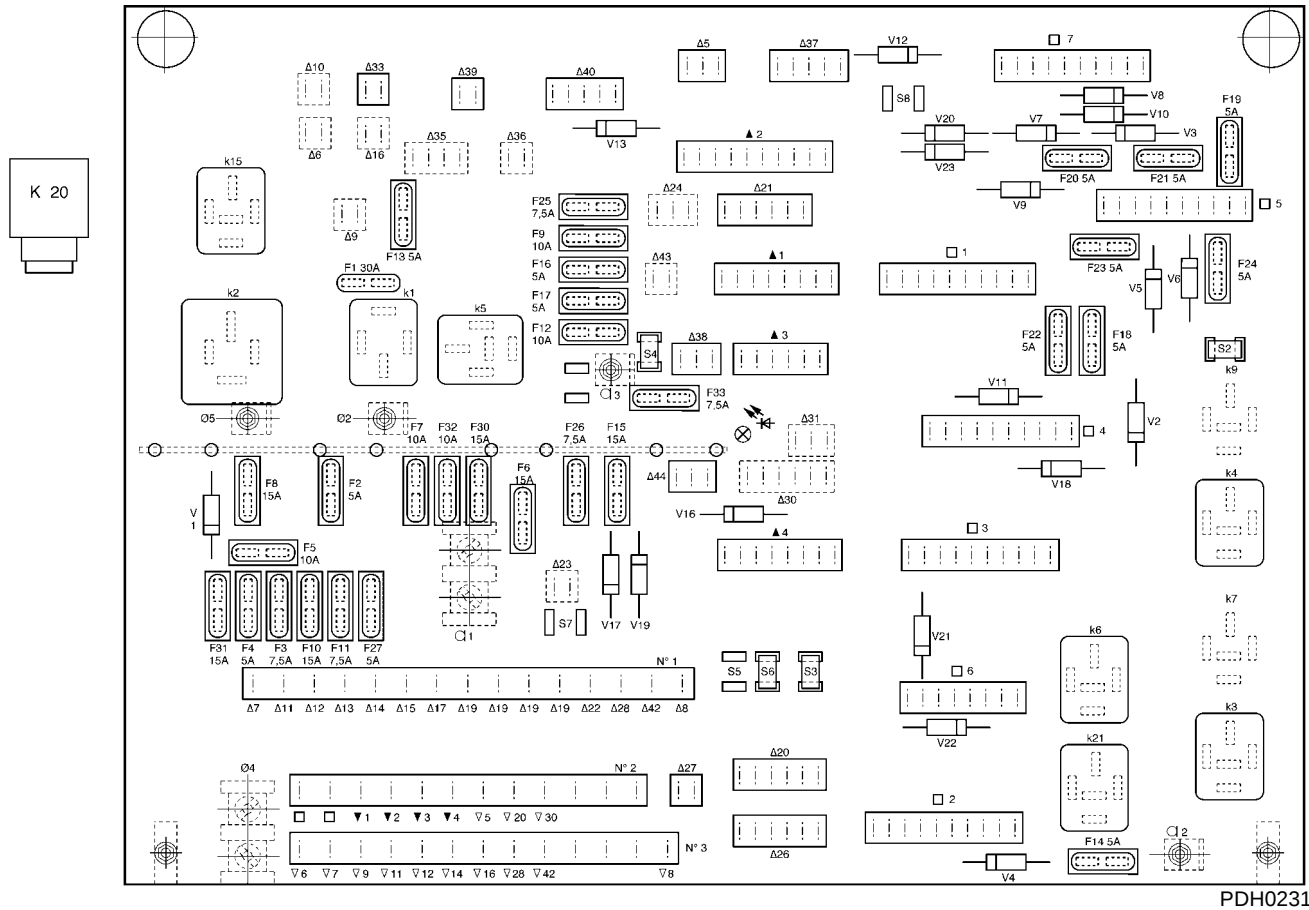
-  (n) Supply on printed circuit
-  (n) Battery terminal
-  (n) Printed circuit earth connection terminal
-  Printed circuit earth connector
-  A1 Instrument panel connector
-  1 ou  1 ou  1 Harness identification
-  1(1) ou  (1) ou  1 (1) Harness identification followed by path identification number
-  (1) ou  (1) Printed circuit earth connectors



The installation position for the harness connector (1) on connector (2) of the printed circuit is identified by a red mark (3) followed by the figure 1 on the printed circuit. This identification corresponds to the position of path 1 of the harness connector (1). This position is completed when the path 1 line is shown by a red ring (4) located on line 1 wire, or by red paint marking.

-  Local earth
-  Wire number
-  Closed circuit
-  Open circuit
-  Intersection of two wires with connection point
-  Intersection of two wires without connection point
-  Link with following plate
-  Liaison planche précédente
-  Return to another plate with the same letter
-  Bulbs
-  Test bulb
-  Light emitting diode (LED)
-  Regulator

DESCRIPTION OF ELECTRICAL CABINET PRINTED CIRCUIT
(STANDARD EQUIPMENT)

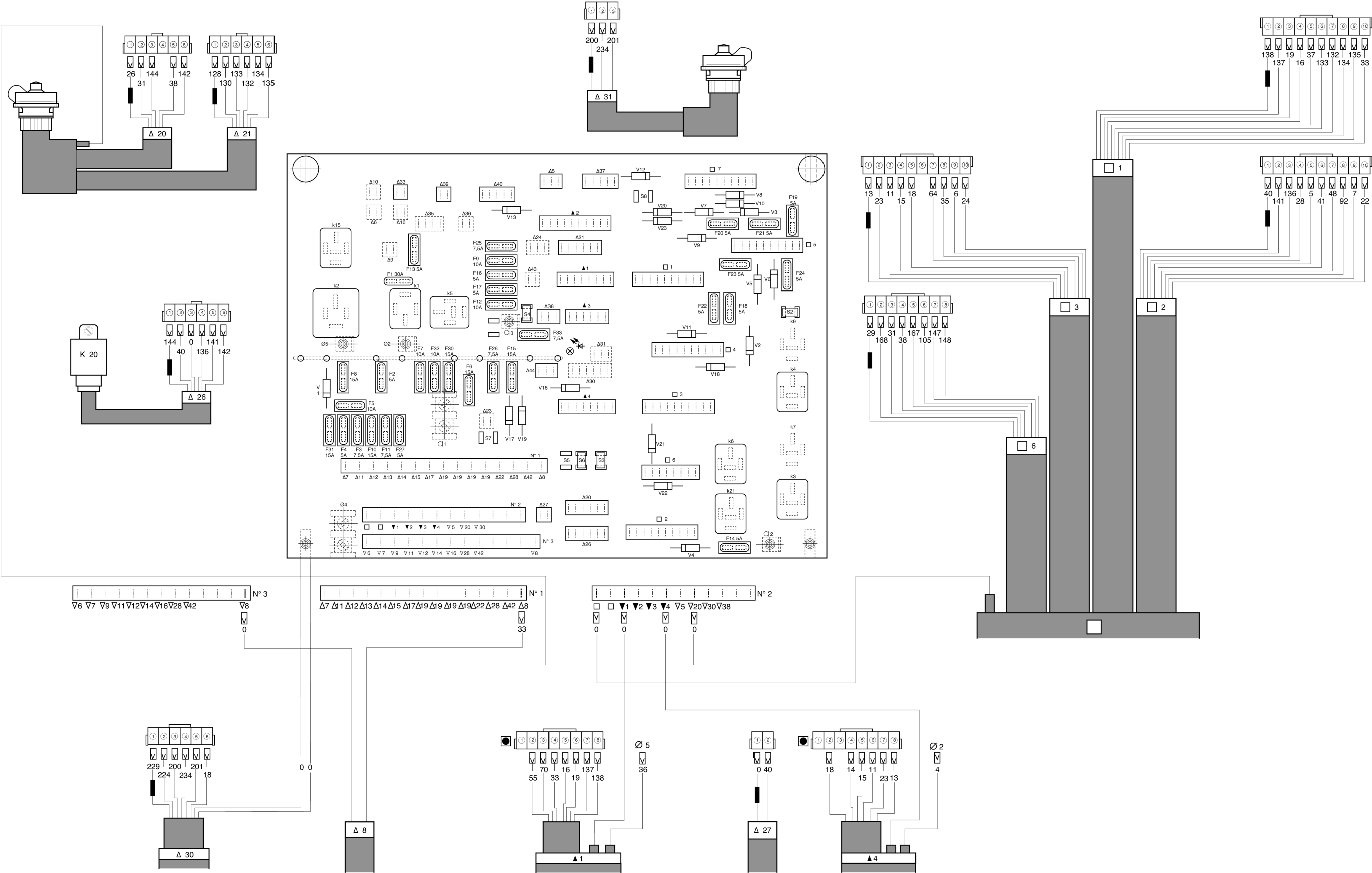


- Q 1 24 Volts supply before contact
Q 2 12 Volts supply before contact (radio)
Q 3 Not used
F2 5A fuse, starter switch
F3 7.5A fuse, instrument panel
F4 5A fuse, driving position lighting, horn relay
F6 15A fuse, upperstructure working lights
F7 10A fuse, horn
F8 15A fuse, upperstructure power point
F9 10A fuse, windshield washer, windshield wiper
F10 15A fuse, ventilation, heater
F11 7.5A fuse, cigar lighter
F12 10A fuse, pilot safety
F15 - F26 Not used
F31 15A fuse, windshield wiper intermittent action
F32 10A fuse, not used
F33 7.5A fuse, supply to electronic control box
Trouble- shooting test LED

- K1 Starter motor relay
K2 General contact relay
K3 Hourmeter relay
K4 Electrical control box supply relay
K5 Horn relay
K6 Upperstructure and attachment working light relay
K20 Windshield wiper intermittent action
K21 LH control arm pilot safety relay
Sh2, Sh3, Sh4 et Sh6 Shunt
Sh1, Sh5, Sh7, Sh8 Not used
V1 General contact LED
V2 K3 relay LED
Ø 2 Starter connection
Ø 4 Printed circuit earth
Ø 5 Upperstructure power line connection

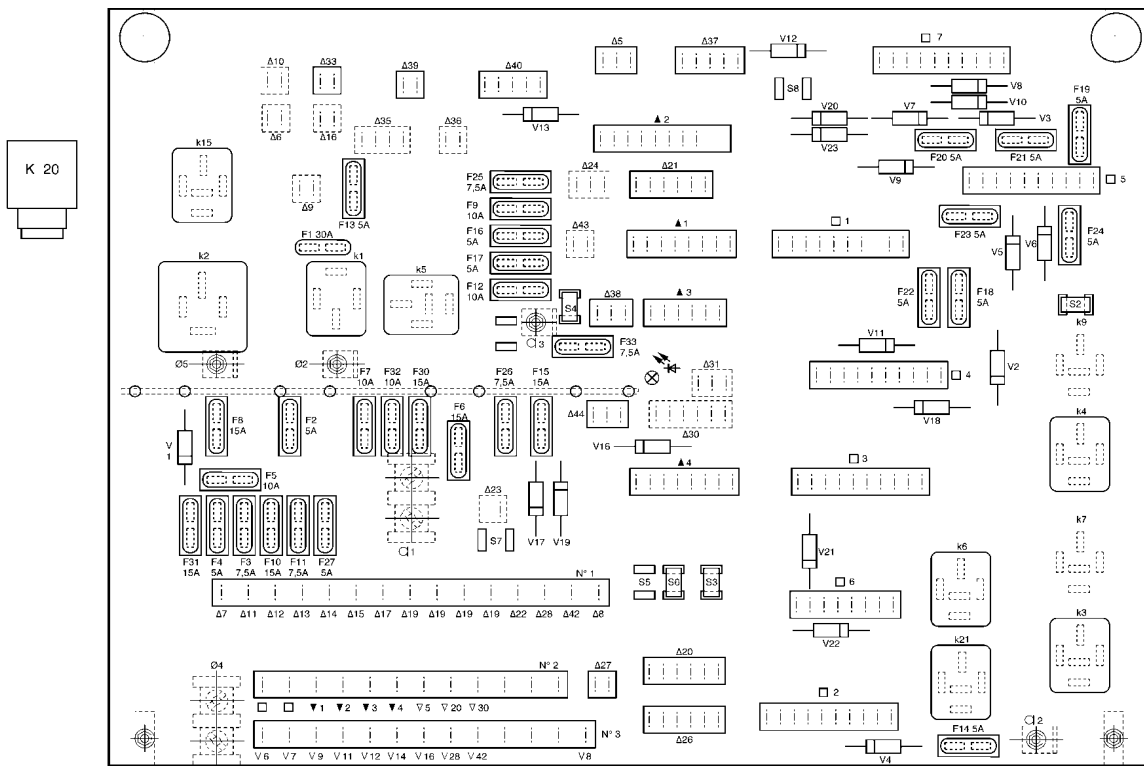
ELECTRICAL CABINET PRINTED CIRCUIT WIRING
(STANDARD EQUIPMENT)

- 1 Harness 10- way connector, floor harness
2 Harness 10- way connector, floor harness
3 Harness 10- way connector, floor harness
6 Harness 8- way connector, floor harness
8 Safety clips, upperstructure working light
20 Harness, 6- way connector, cab power connection
21 Harness, 6- way connector, cab power connection
26 Harness, 6- way connector, windshield wiper (K20 intermittent action)
27 Harness, 2- way connector, windshield washer
30 Harness, 6- way connector, electronic control box
31 Harness, 3- way connector, trouble- shooting test socket
1 Harness, 8- way connector, common harness
4 Harness, 8- way connector, engine



ELECTRICAL CABINET PRINTED CIRCUIT WIRING
(OPTIONAL EQUIPMENT)

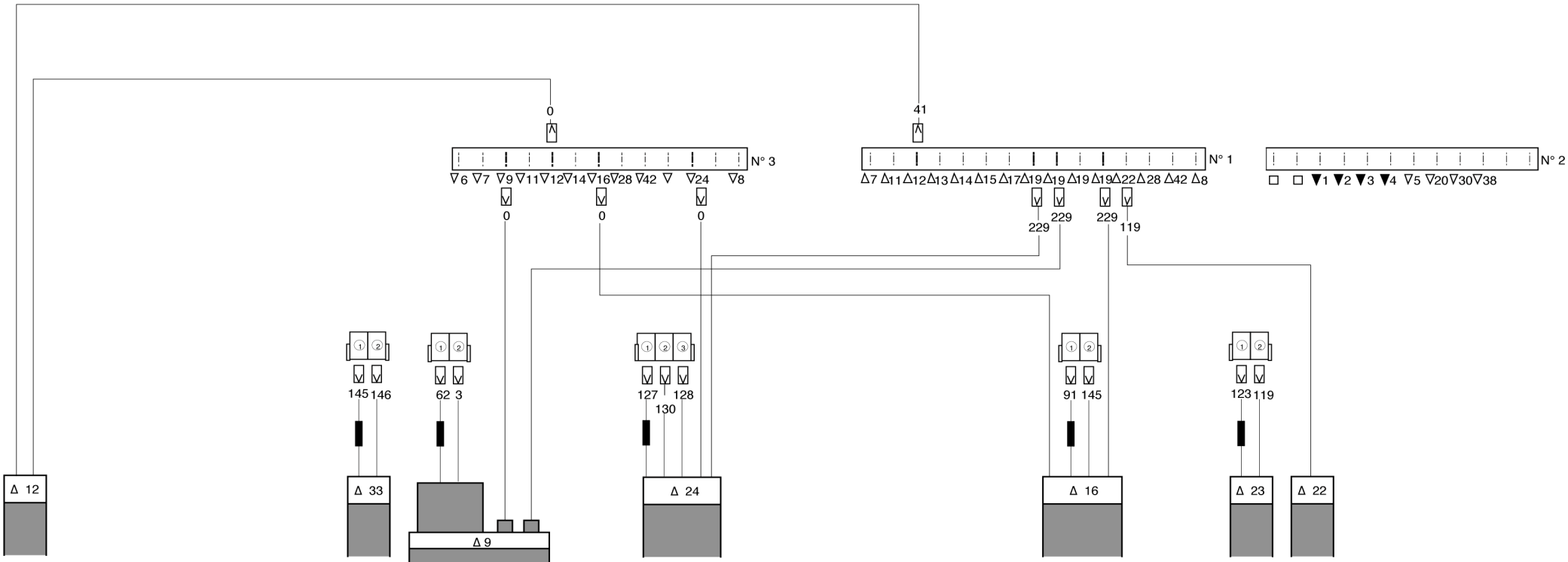
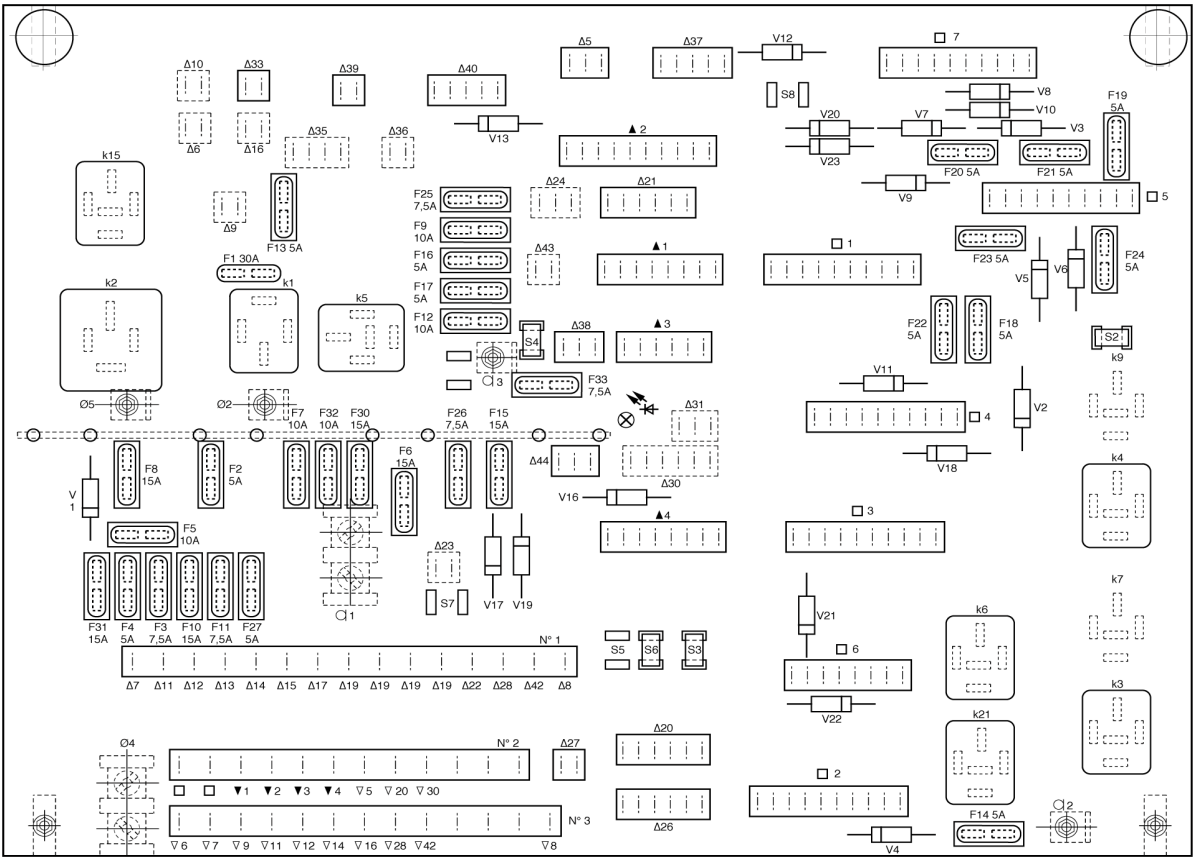
ELECTRICAL CABINET PRINTED CIRCUIT WIRING
(OPTIONAL EQUIPMENT)



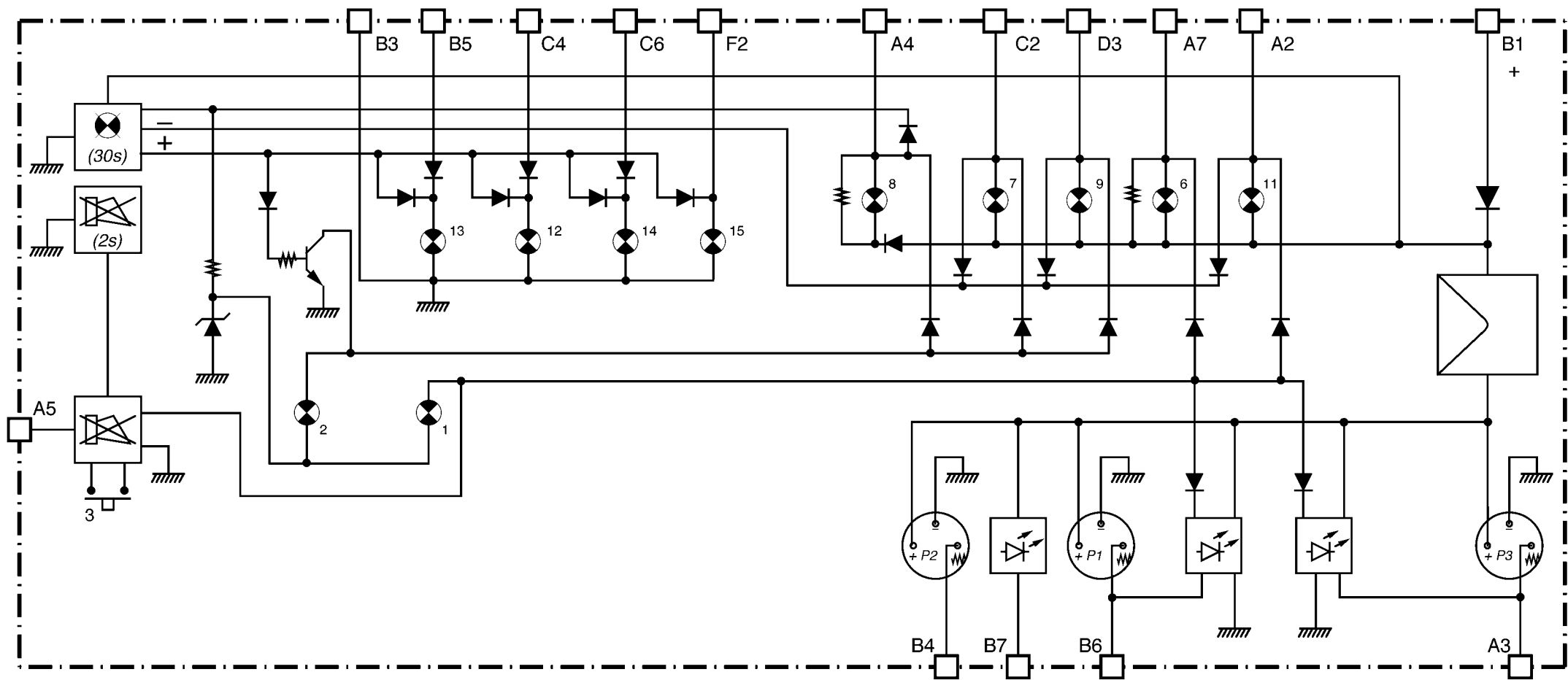
- △ 9 Harness, cold start assistance (optional)
- △ 12 Harness, fuel heating device (optional)
- △ 16 Harness, overload indicator (optional)
- △ 22 Harness, cold start assistance glow plug (optional)
- △ 23 Harness, cold start assistance heating element (optional)
- △ 24 Harness, cab front working lights and rear working light (optional)
- △ 33 Harness, overload indicator (optional)

PDH0231

- | | |
|---|--|
| F1 30A fuse, cold start assistance (optional) | K15 Cold start assistance relay (optional) |
| F5 10A fuse, working lights and rotary light relay (specific to certain countries) | V4 Radio LED (optional) |
| F13 5A fuse, overload indicator (optional) | V11 Overload indicator lamp (optional) |
| F14 5A fuse, radio (optional) | V21 Overload indicator lamp (optional) |
| F30 30A fuse, cab working lights (optional) | V22 Rotary light indicator lamp (specific to certain-countries) |



P10 INSTRUMENT PANEL ELECTRICAL SCHEMATIC (PLATE 1)

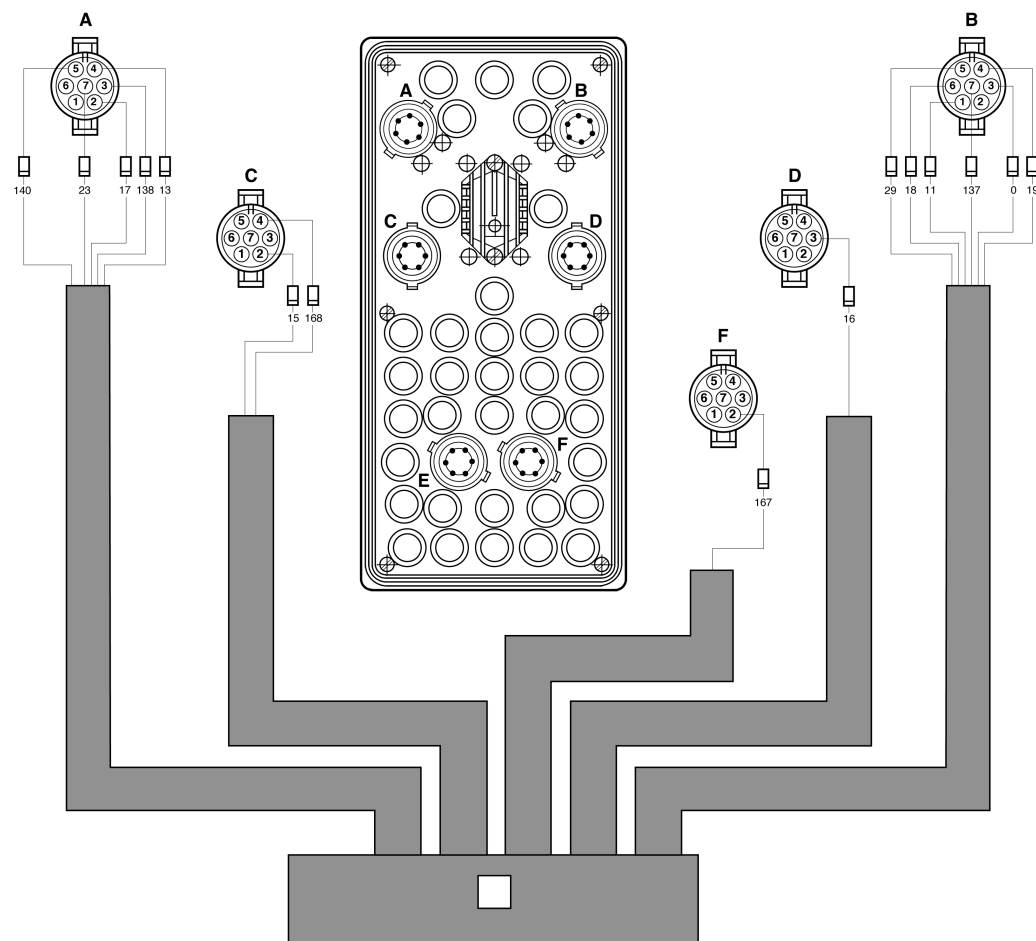


PDH0233

- A2** Minimum pilot pressure red warning lamp connector
- A3** Hydraulic oil temperature indicator connector
- A4** Battery charge red warning lamp connector
- A5** Audible warning red, orange indicator lamp connector
- A7** Engine oil pressure red warning lamp connector
- B1** 24 Volt supply
- B3** Earth
- B4** Fuel level indicator connector
- B5** Gauge lighting connector
- B6** Engine coolant temperature indicator connector
- B7** Fuel minimum level connector
- C2** Air filter restriction red warning lamp connector
- C4** Overload indicator orange warning lamp connector (optional)
- C6** Not used
- D3** Hydraulic oil filter restriction red warning lamp connector
- F2** Rotary light orange indicator lamp connector (optional)
- P1** Engine coolant temperature indicator
- P2** Fuel level gauge
- P3** Hydraulic oil temperature indicator

- 1** Stop alarm red warning lamp
- 2** Alarm orange warning lamp
- 3** Audible warning stop push button
- 6** Engine oil pressure red warning lamp
- 7** Air filter restriction red warning lamp
- 8** Battery charge red warning lamp
- 9** Hydraulic oil filters restriction red warning lamp
- 11** Minimum pilot pressure red warning lamp
- 12** Overload indicator orange warning lamp (optional)
- 13** Indicator lighting lamp
- 14** Not used
- 15** Rotary light orange indicator lamp (optional)

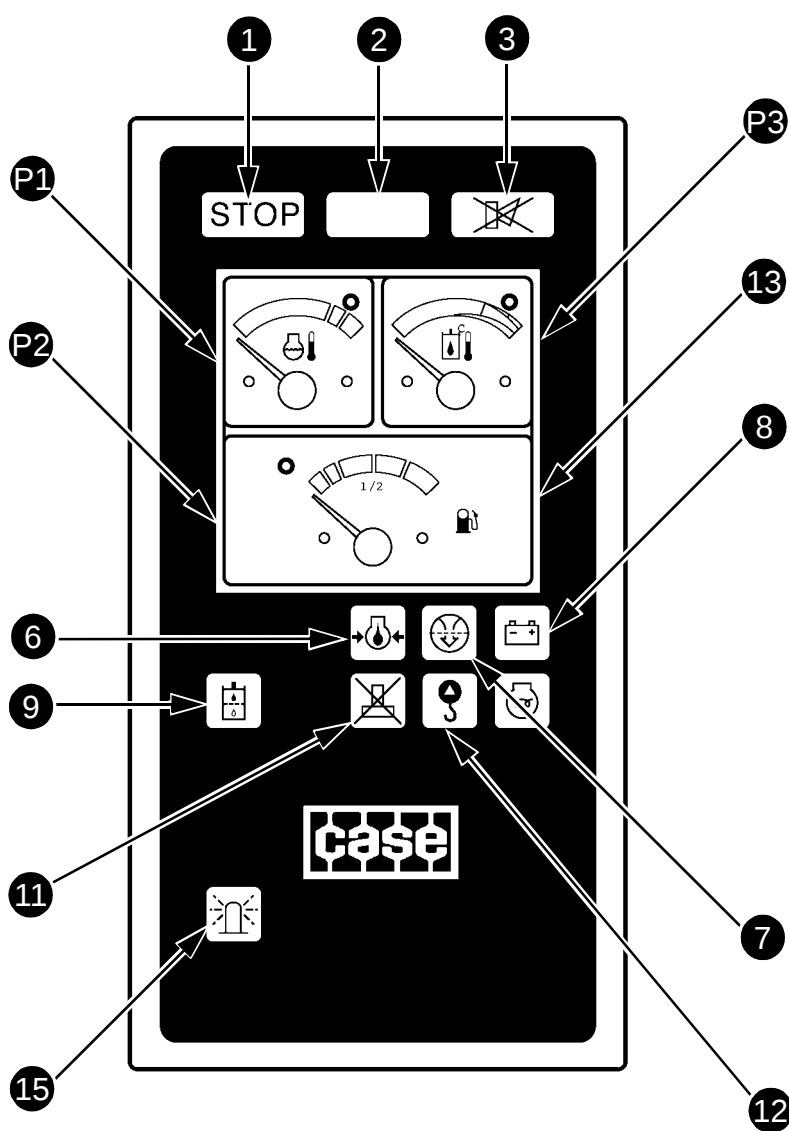
INSTRUMENT PANEL WIRING



PDH0235

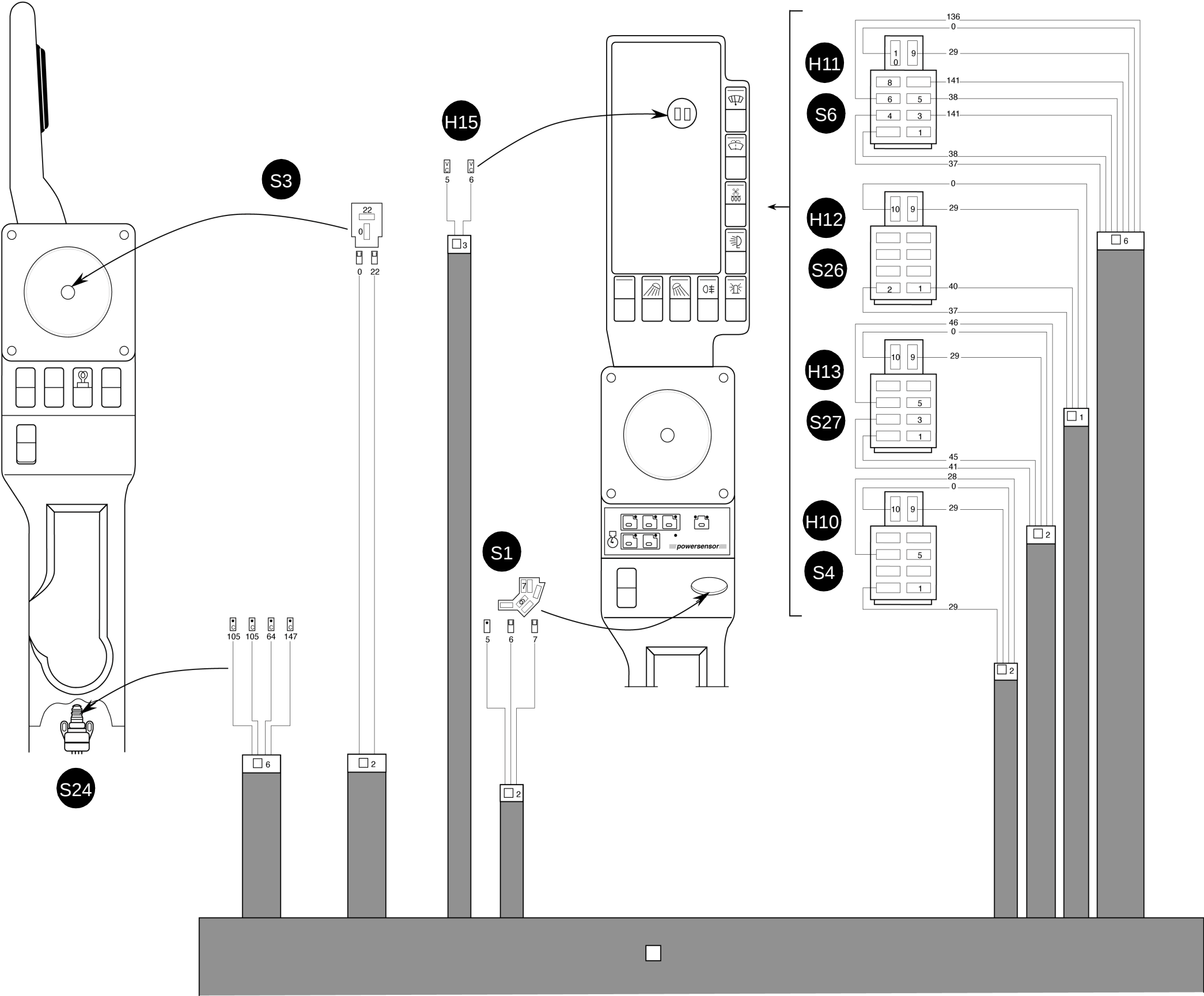
- A** 7- way connector : minimum pilot pressure red warning lamp, hydraulic oil temperature indicator, battery-charge red warning lamp, audible warning cut- out push button, engine oil pressure red warning lamp, alarm orange warning lamp, stop alarm red warning lamp.
- B** 7- way connector : 24 Volt supply, earth, fuel level gauge, indicator lighting, engine coolant temperature indicator.
- C** 7- way connector : air filter restriction red warning lamp, overload indicator orange warning lamp (optional).
- D** 7- way connector : hydraulic oil filter restriction red warning lamp.
- F** 7- way connector : rotary light orange indicator lamp (optional)

INSTRUMENT PANEL (FRONT FACE)



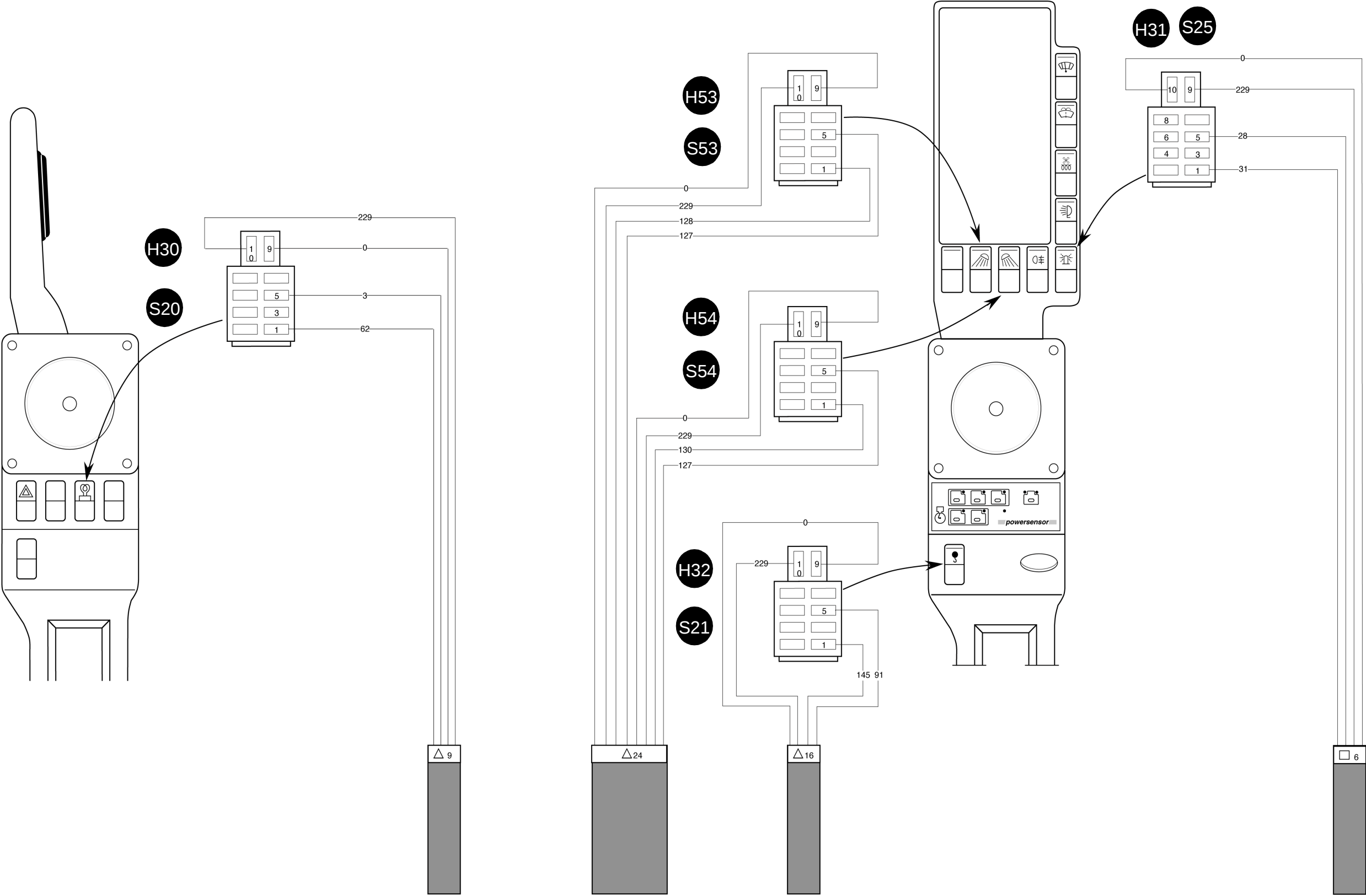
PDH0234

- | | |
|---|--|
| 1 Stop alarm red warning lamp | P1 Engine coolant temperature indicator |
| 2 Alarm orange warning lamp | P2 Fuel level indicator |
| 3 Audible warning cut- out push button | P3 Hydraulic oil temperature indicator |
| 6 Engine oil pressure red warning lamp | |
| 7 Air filter restriction red warning lamp | |
| 8 Battery charge red warning lamp | |
| 9 Hydraulic oil filter restriction red warning lamp | |
| 11 Minimum pilot pressure red warning lamp | |
| 12 Overload indicator orange warning lamp (optional) | |
| 13 Indicator lighting lamp | |
| 14 Not used | |
| 15 Rotary light orange indicator lamp (optional) | |



**RIGHT- HAND CONTROL ARM, LEFT- HAND CONTROL ARM
(STANDARD EQUIPMENT)**

- H10** Working light switch lighting
- H11** Windshield wiper switch lighting
- H12** Eclairage interrupteur lave-glace
- H13** Eclairage interrupteur ventilateur de chauffage
- H15** Alarme sonore tableau de bord
- S1** Commutateur à clé
- S3** Interrupteur avertisseur
- S4** Interrupteur phares de travail
- S6** Interrupteur essuie-glace
- S22** Clavier de commande (voir section 4002)
- S24** Commutateur sécurité pilotage
- S26** Interrupteur lave-glace
- S27** Interrupteur ventilateur de chauffage
- ☐ Faisceau plancher



**RIGHT-HAND AND LEFT-HAND CONTROL ARM WIRING
(OPTIONAL EQUIPMENT)**

- H30** Cold start assistance switch lighting (optional)
- H31** Rotary light switch lighting (optional)
- H32** Oveload indicator switch lighting (optional)
- H53** Front working light switch lighting (optional)
- H54** Rear working light switch lighting (optional)
- S20** Cold start assistance switch (optional)
- S21** Oveload indicator switch (optional)
- S25** Rotary light switch (optional)
- S53** Front working light switch (optional)
- S54** Rear working light switch (optional)
- ☐ **6** Rotary light harness (optional)
- ☐ **9** Cold start assistance harness (optional)
- ☐ **16** Oveload indicator harness (optional)
- ☐ **24** Front working lights, rear working light harness (optional)

ELECTRICAL SCHEMATIC (PLATE 2)

ELECTRICAL CABINET

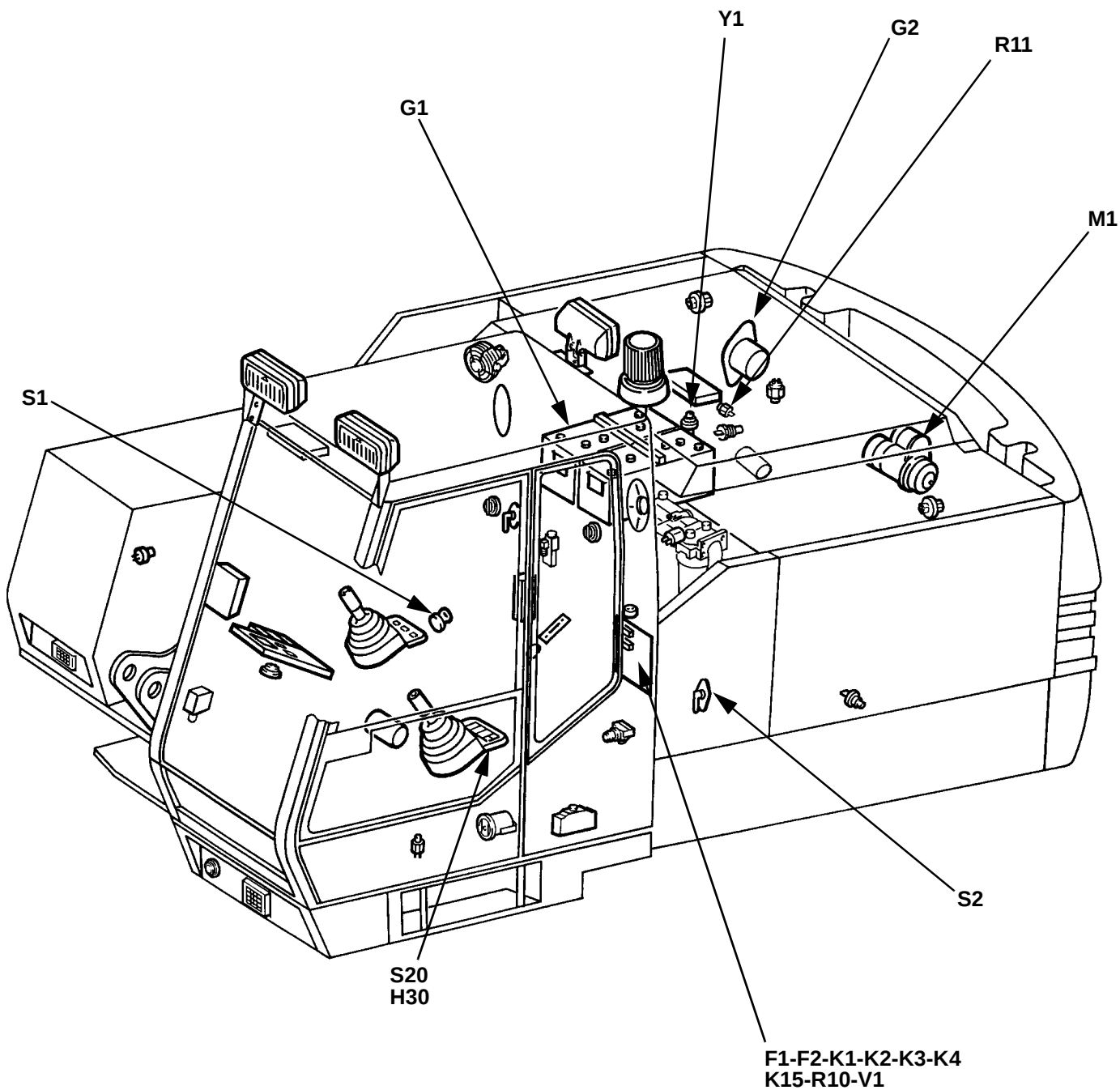
- F1 30A fuse, cold start assistance
- F2 5A fuse, starter switch
- K1 Starter motor relay
- K2 General contact relay 24 Volts, 50A
- K3 Hourmeter relay
- K4 Electronic control box supply relay
- K15 Cold start assistance relay
- R10 0.85 Ohm resistor
- V1 General contact diode

FLOOR

- H30 Cold start assistance switch lighting (optional)
- S1 Key switch
- S20 Battery master switch

UPPERSTRUCTURE

- G1 Batteries
- S2 Battery master switch



WIRING CONNECTIONS BETWEEN SCHEMATICS

- A See schematic plate 5
- J See schematic plate 7

WIRING CONNECTION WITH SCHEMATIC PLATE 3

Cables 2, 9, 11, 13, 24 and 0



ELECTRICAL SCHEMATIC (PLATE 3)

INSTRUMENT PANEL

P10 Instrument panel (see schematic plate 1)

ELECTRICAL CABINET

- F3 7.5A fuse, instrument panel
- F4 5A fuse, cab lighting, horn relay
- F7 10A fuse, horn
- K5 Horn relay

CAB

- E1 Cab lighting
- S10 Cab lighting switch
- X1 (K) Connector

FLOOR

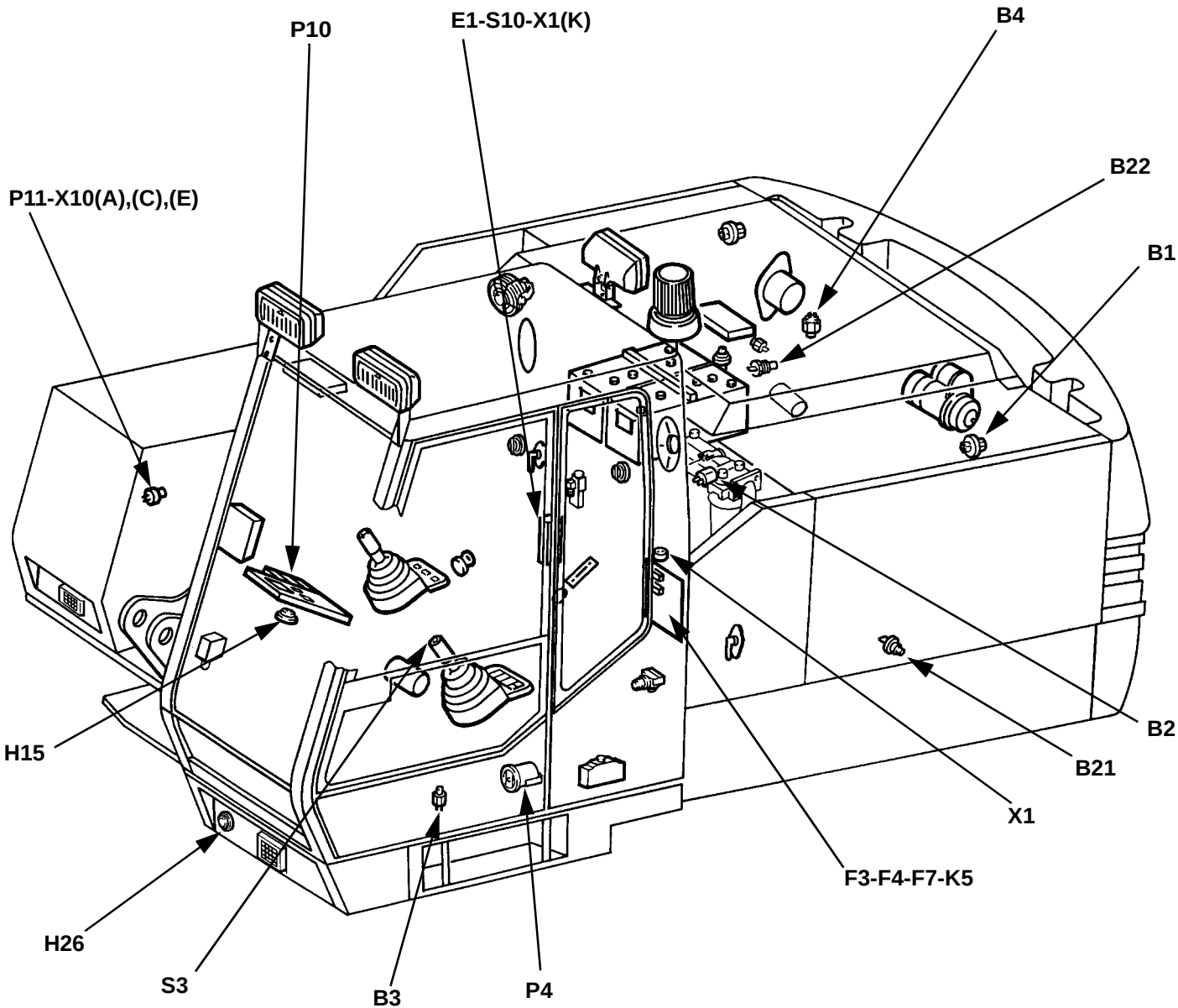
- B3 Pilot pressure pressostat
- H15 Instrument panel audible warning
- P4 Hourmeter
- S3 Horn switch
- X1 Cab power connection

UPPERSTRUCTURE

- B1 Air filter restriction pressostat
- B2 Hydraulic oil filter restriction pressostat
- B21 Hydraulic oil temperature sensor
- H26 Horn
- P11 Fuel level indicator
- X10 (A), (C), (E) Connectors

ENGINE

- B4 Engine oil pressure pressostat
- B22 Engine coolant temperature sensor



WIRING CONNECTION BETWEEN SCHEMATICS

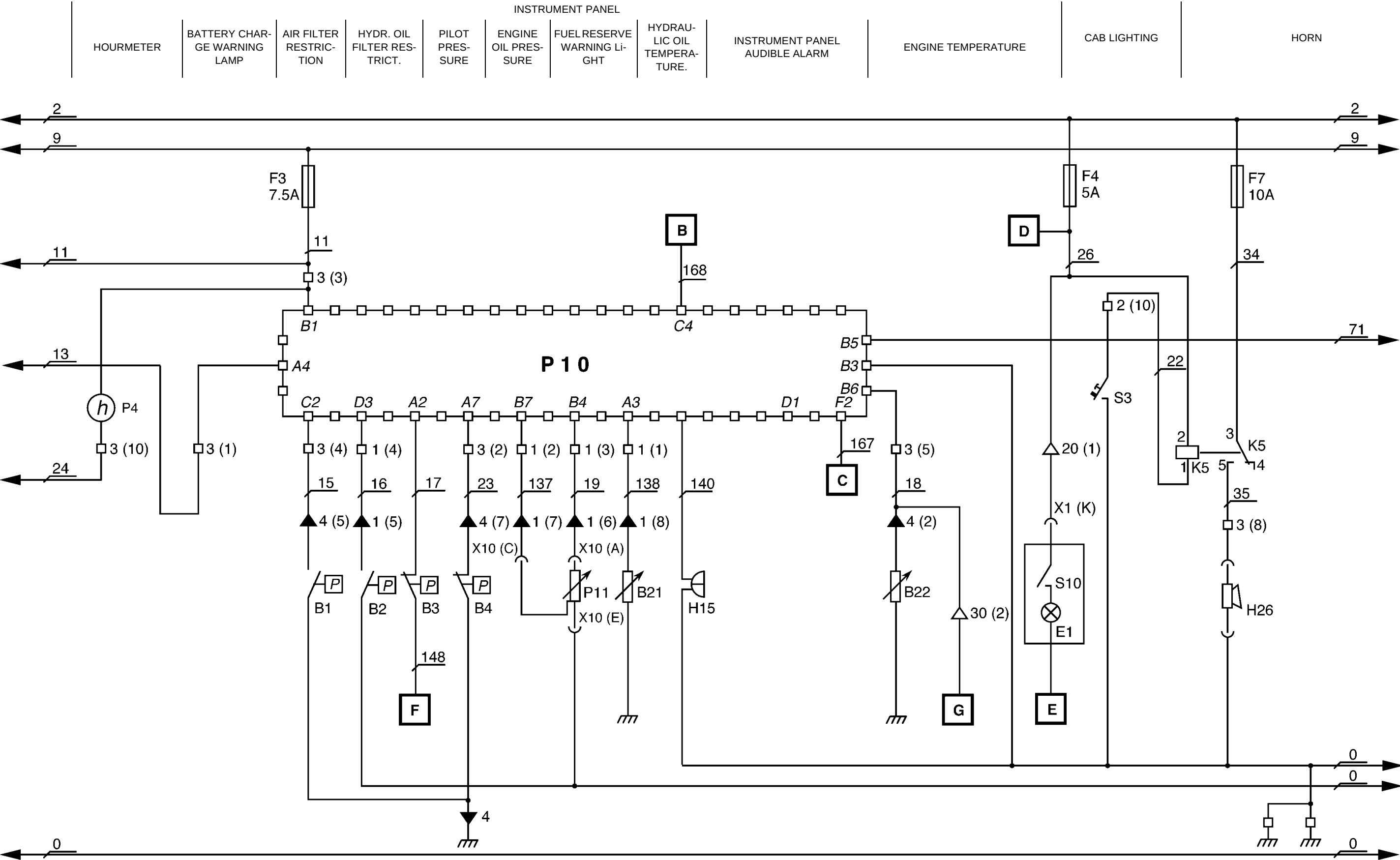
- B See schematic plate 5
- C See schematic plate 4
- D See schematic plate 5
- E See schematic plate 4
- F See schematic plate 5
- G See schematic plate 6

WIRING CONNECTION WITH SCHEMATIC PLATE 2

Cables 2, 9, 11, 13, 24 and 0

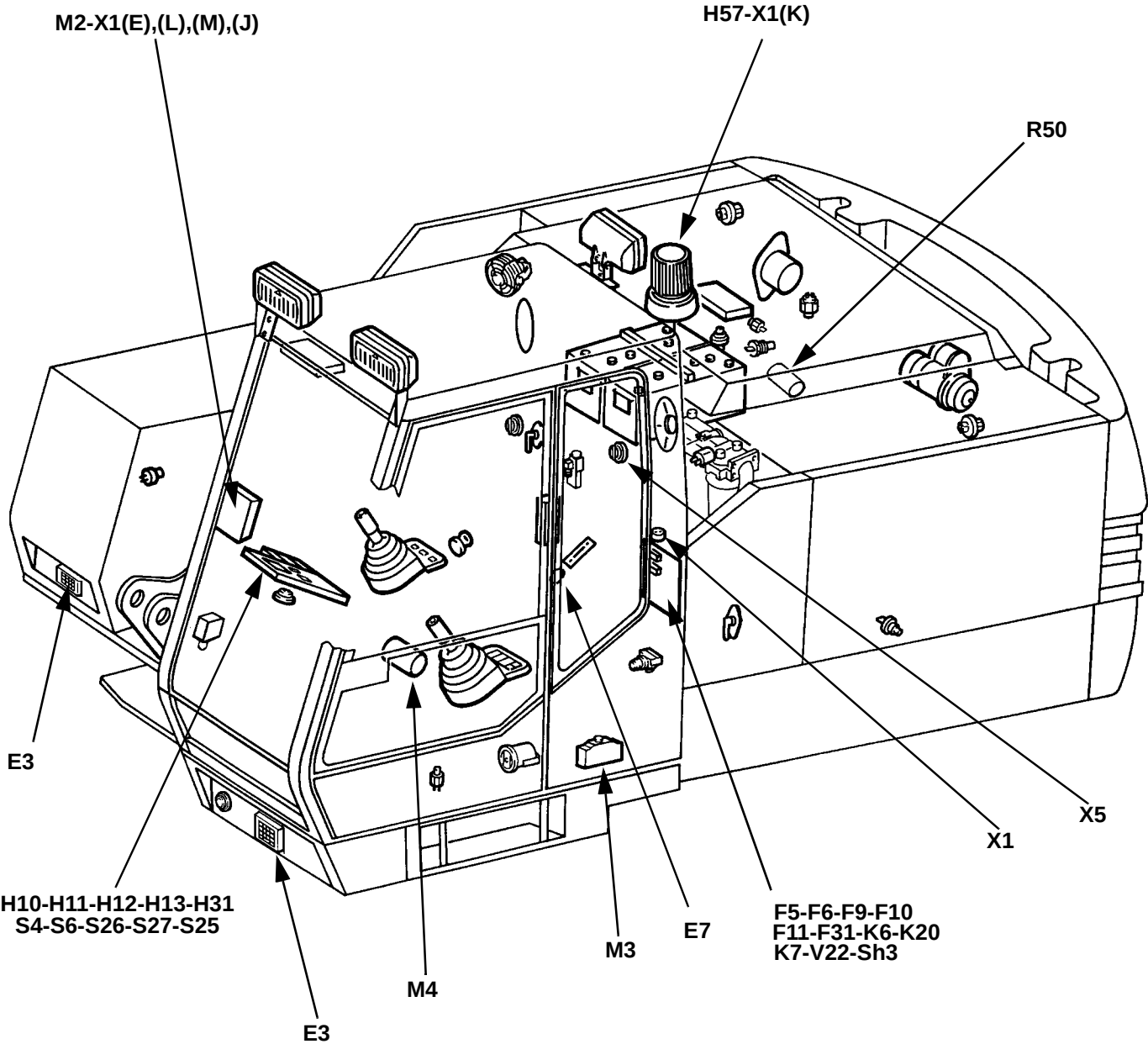
WIRING CONNECTION WITH SCHEMATIC PLATE 4

Cables 2, 9, 71 and 0



PDH0225

ELECTRICAL SCHEMATIC (PLATE 4)



INSTRUMENT PANEL

- H10 Working light switch lighting
- H11 Windshield wiper switch lighting
- H12 Windshield washer switch lighting
- H13 Heater blower switch lighting
- H31 Rotary light switch lighting (optional)
- S4 Working light switch
- S6 Windshield wiper switch
- S25 Rotary light switch (optional)
- S26 Windshield washer switch
- S27 Heater blower switch

ELECTRICAL CABINET

- F5 10A fuse, working light, rotary light relay (optional)
- F6 15A fuse, upperstructure working lights
- F9 10A fuse, windshield washer, windshield wiper
- F10 15A fuse, ventilation, heater
- F11 7.5A fuse, cigarette lighter
- F31 15A fuse, windshield wiper intermittent action
- K6 Working light relay
- K20 Windshield wiper intermittent action
- Sh3 Shunt
- V22 Rotary light indicator lamp (optional)

CAB

- H57 Rotary light (optional)
- M2 Windshield wiper motor
 - E : Blue
 - J : White
 - L : Grey
 - M : Black
- X1 (F) Rotary light connector (optional)
- X1 (E) (L) (M) (J) Windshield wiper motor connector

WIRING CONNECTION BETWEEN SCHEMATICS

- C See schematic plate 3
- E See schematic plate 3
- H See schematic plate 6

FLOOR

- E7 Cigarette lighter
- M3 Windshield washer motor
- M4 Heater blower motor
- X1 Cab power connection

UPPERSTRUCTURE

- E2 Attachment working light (on boom)
- E3 Upperstructure working light
- X5 (3) Connector
- X5 (6) Connector

ENGINE

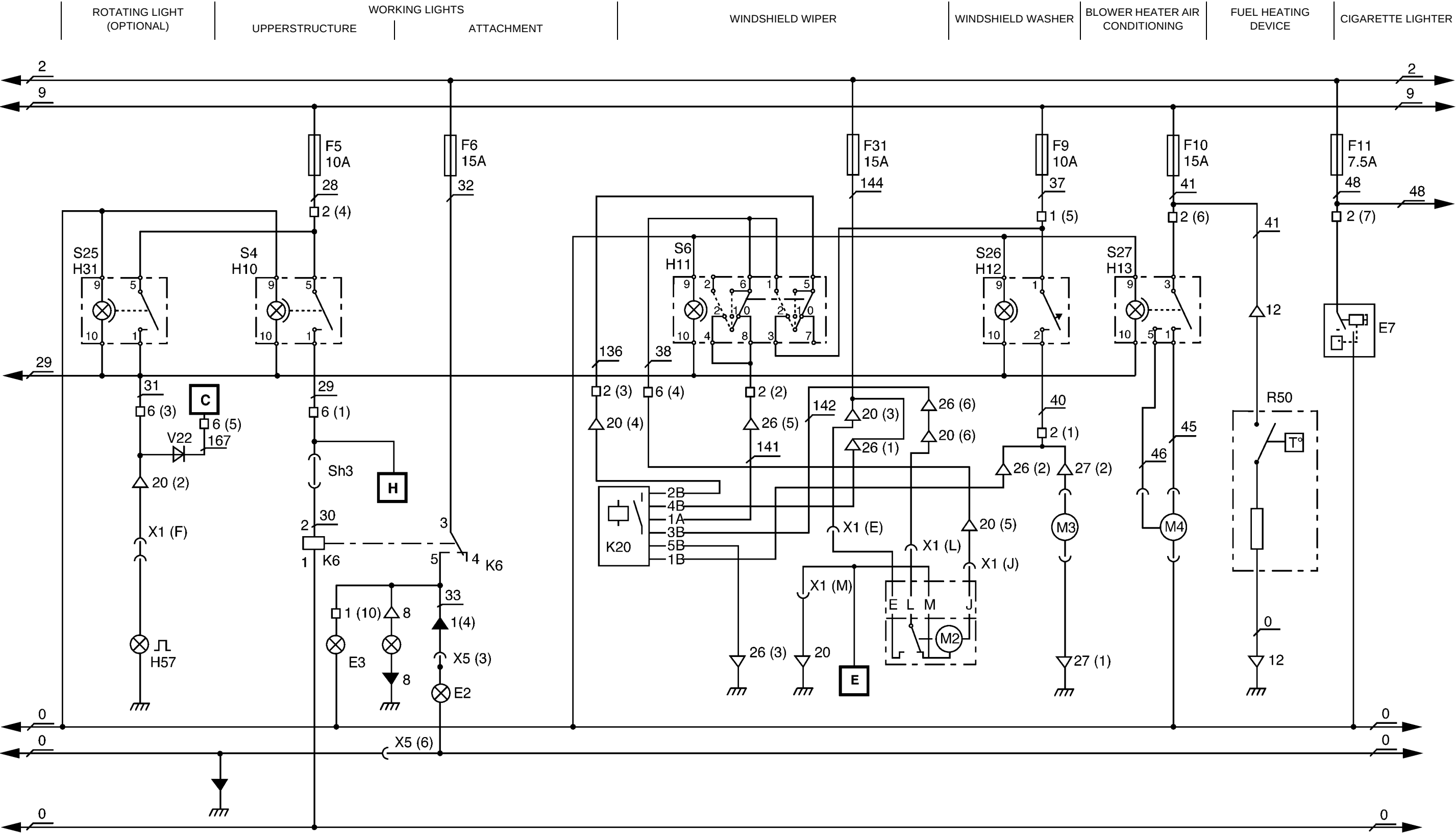
- R50 Fuel heating device

WIRING CONNECTION WITH SCHEMATIC PLATE 3

Cables 2, 9, 29 and 0

WIRING CONNECTION WITH SCHEMATIC PLATE 5

Cables 2, 9, 48 and 0



PDH0226

ELECTRICAL SCHEMATIC (PLATE 5)

INSTRUMENT PANEL

- H32 Overload indicator switch lighting (optional)
- S21 Overload indicator switch (optional)

ELECTRICAL CABINET

- F8 15A fuse, upperstructure power line connection
- F12 10A fuse, pilot safety
- F13 5A fuse, overload indicator (optional)
- F14 15A fuse, radio
- F30 15A fuse, cab working lights (optional)
- K21 Pilot safety relay
- Sh2 Shunt
- Sh4 Shunt
- V4 Radio diode (optional)
- V21 Overload indicator diode (optional)

CAB

- B5 RH loudspeaker (optional)
- B6 LH loudspeaker (optional)
- E10 Front working lights (optional)
- E11 Rear working light (optional)
- M6 Blower motor
- S29 Blower switch (optional)
- X1(A) (B) (C) (D) RH and LH loudspeaker connector (optional)
- X1 (H) (G) Front working light, rear working light connectors (optional)
- X14 (1) (2) Blower motor connectors (optional)

FLOOR

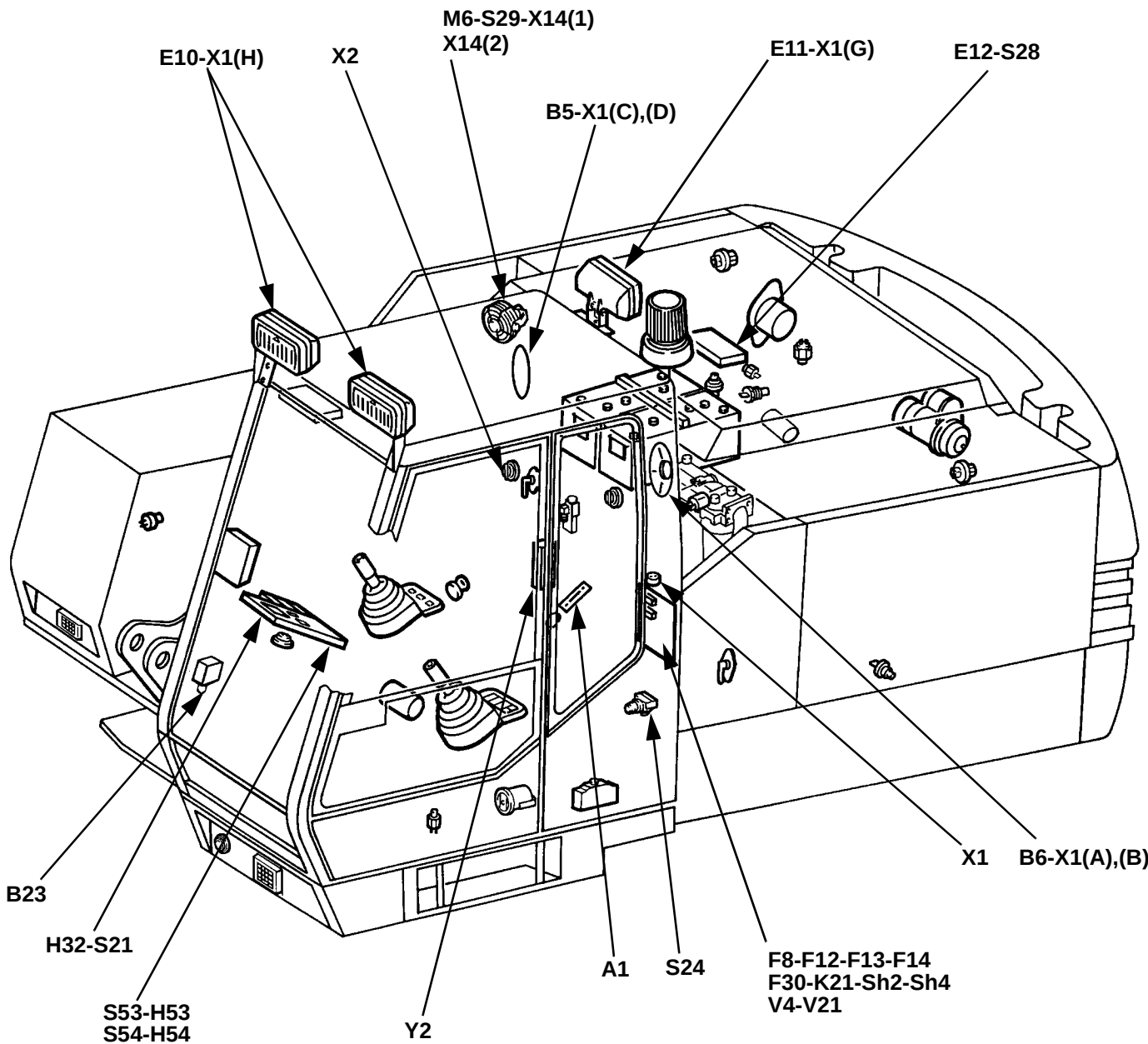
- A1 Radio (optional)
- H53 Front working light switch lighting (optional)
- H54 Rear working light switch lighting (optional)
- S24 Pilot safety switch
- S53 Front working light switch (optional)
- S54 Rear working light switch (optional)
- X1 Cab power connection socket
- Y2 Pilot safety solenoid valve

UPPERSTRUCTURE

- B23 Overload indicator pressostat on boom foot (optional)
- X2 Upperstructure power line connection

ENGINE

- E12 Engine compartment light (optional)
- S28 Engine compartment lighting switch (optional)

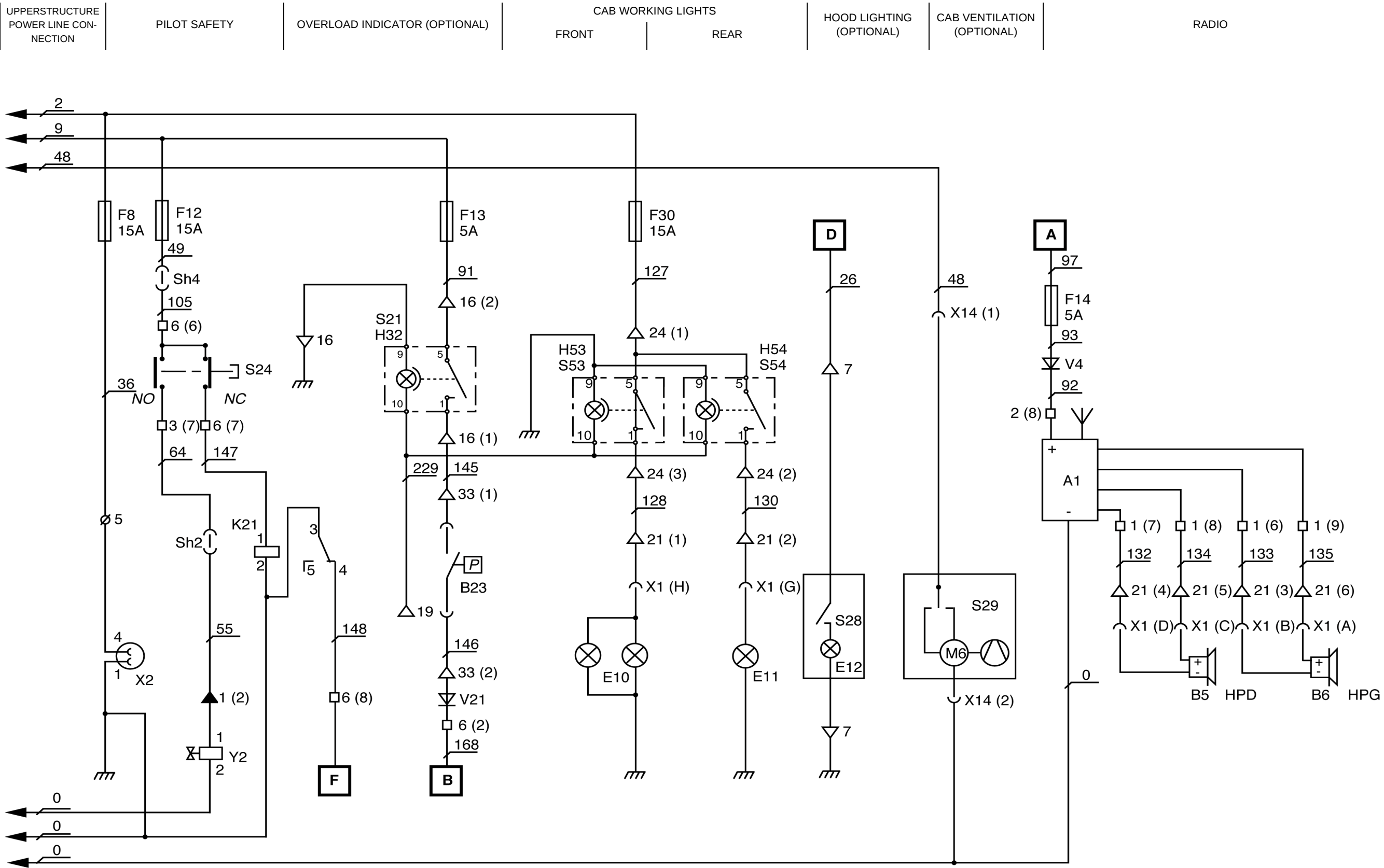


WIRING CONNECTION BETWEEN SCHEMATICS

- A See schematic plate 2
- B See schematic plate 3
- D See schematic plate 3
- F See schematic plate 3

WIRING CONNECTION WITH SCHEMATIC PLATE 4

Cables 2, 9, 48 and 0



PDH0227

ELECTRICAL SCHEMATIC (PLATE 6)

ELECTRICAL CABINET

- H14 Functioning indicator lamp (LED)
- F33 7.5A electronic control box supply

CAB

- A2 Electronic control box
- S22 Control panel
- X3 Connector
- X4 Troubleshooting test socket

FLOOR

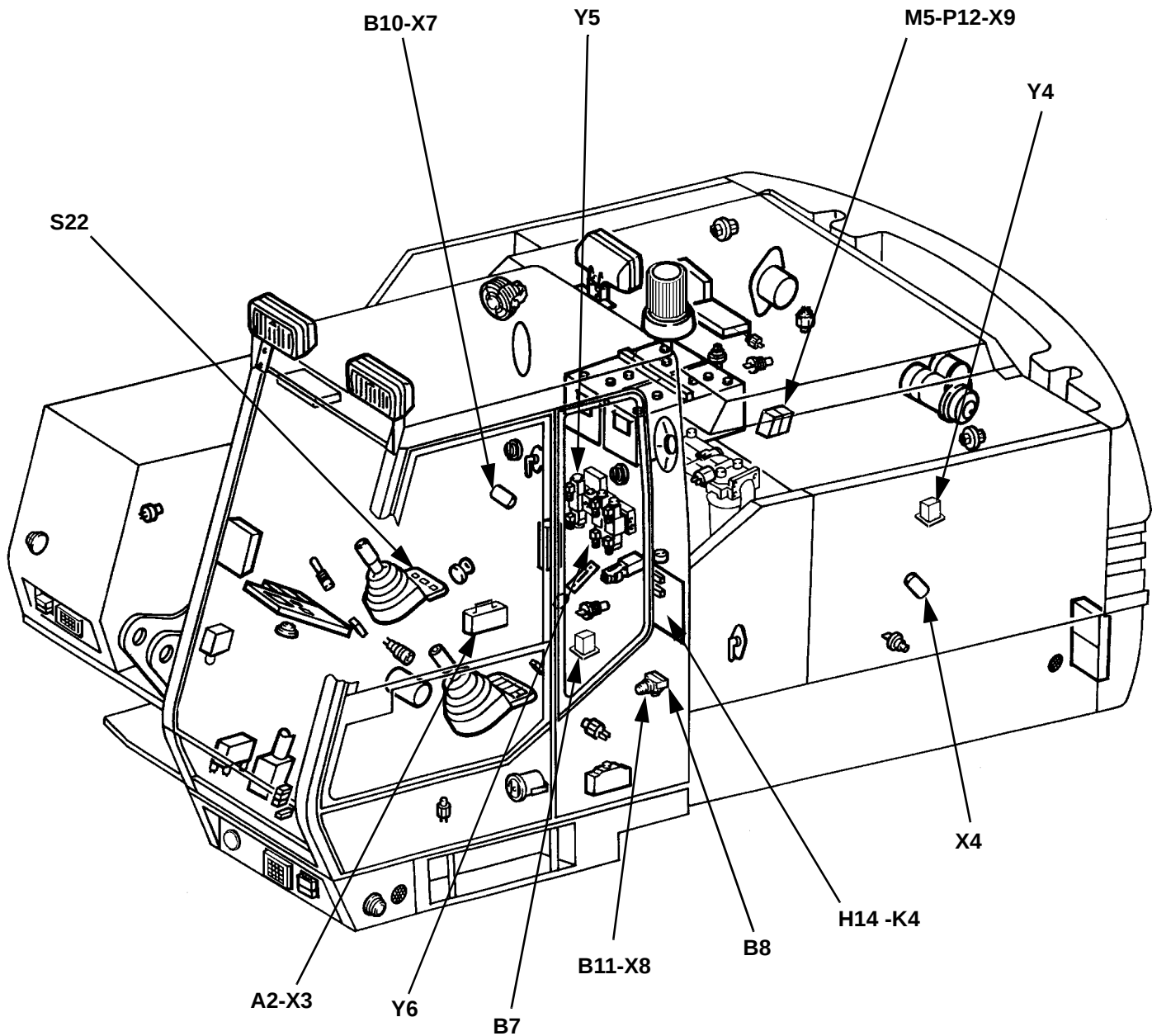
- B8 Travel detection pressostat

UPPERSTRUCTURE

- B7 Swing detection pressostat
- B10 Swing motor speed detector
- B11 Hydraulic pressure sender
- K4 Electronic supply relay
- Y5 Upperstructure swing brake release control solenoid valve
- Y6 Travel motor displacement change solenoid valve (two-speed excavators only)

ENGINE

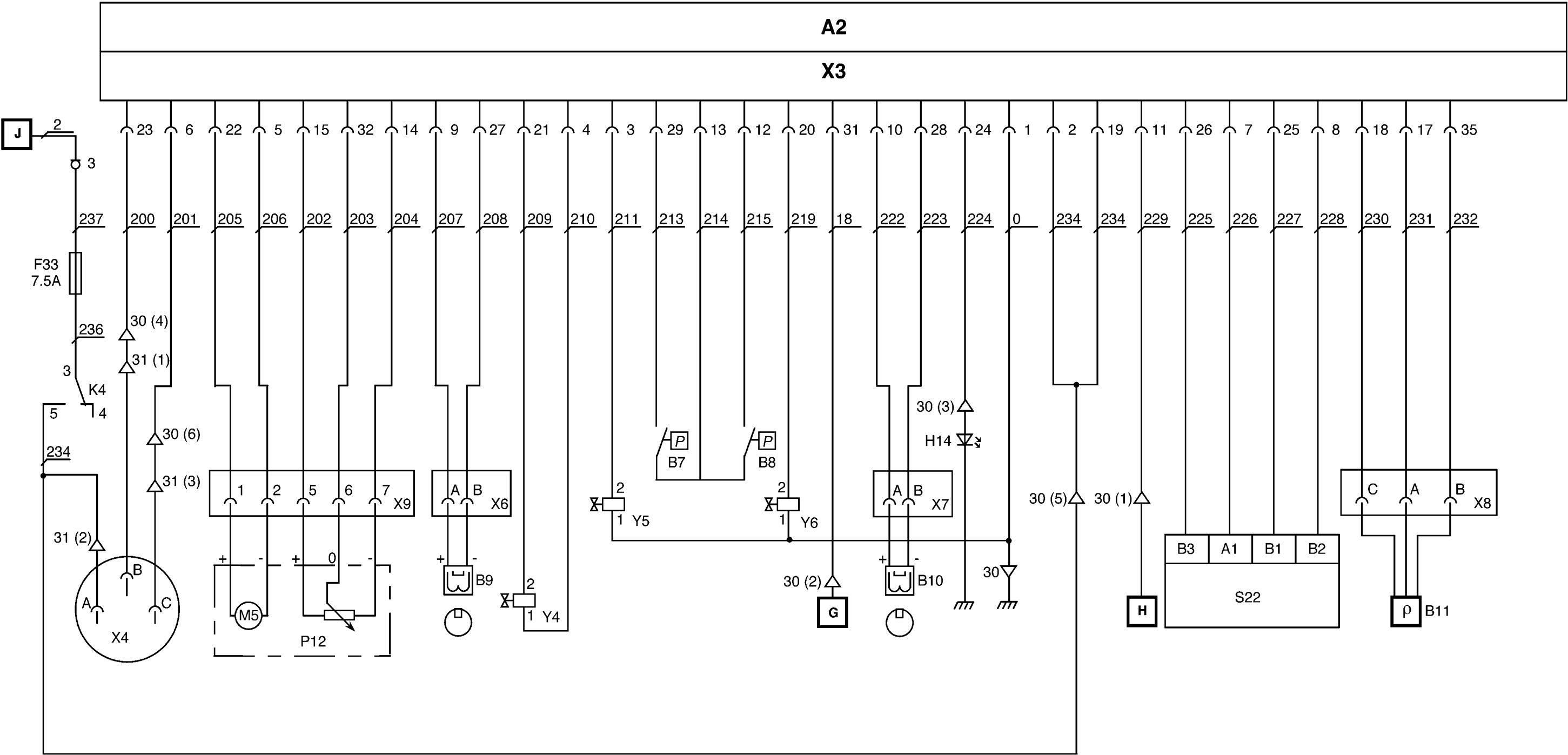
- B9 Engine speed detector
- M5 Injection pump servo-motor
- P12 Servo-motor potentiometer
- X6 Connector
- X7 Connector
- X8 Connector
- X9 Connector
- Y4 DRE4 proportional pressure reduction valve



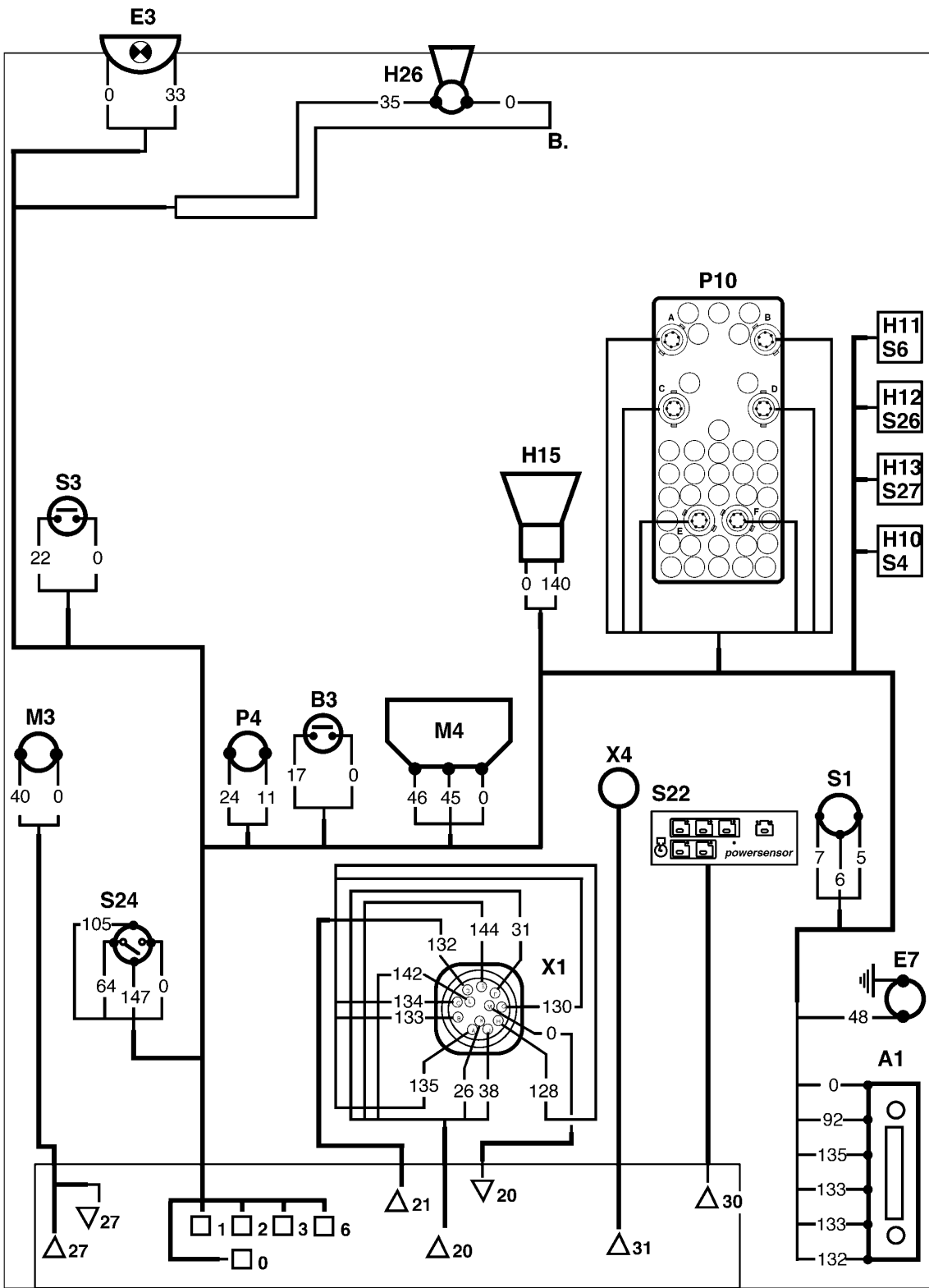
WIRING CONNECTION BETWEEN SCHEMATICS

- G See schematic plate 3
- H See schematic plate 4
- J See schematic plate 2

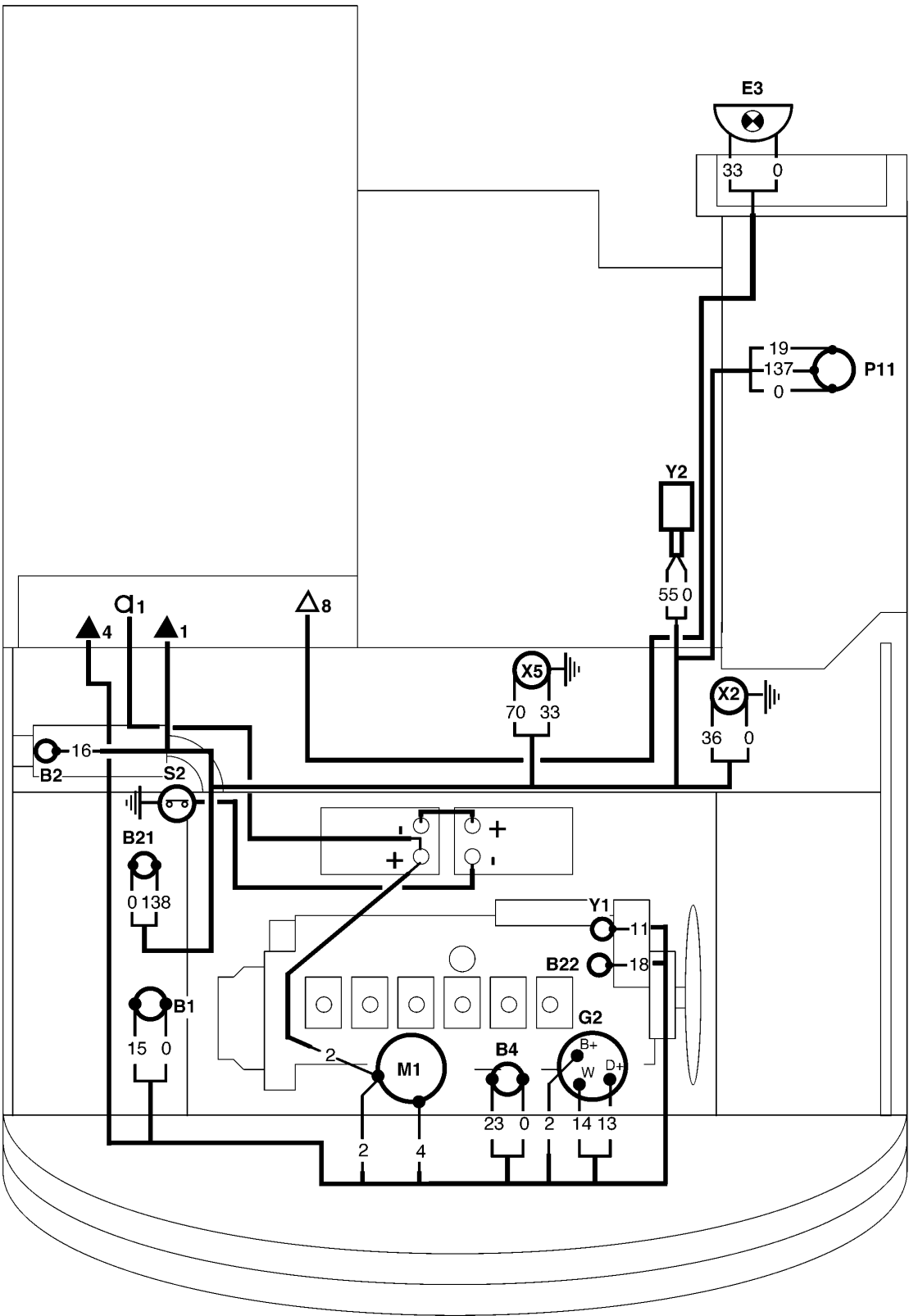
TRUBLESHOOTING TEST SOCKET	INJECTION PUMP SERVO-MOTOR	ENGINE SPEED DE-TECTOR.	SWING PRES. RE-DUC. DRE4	SWING BK. REL. ELEC-TR.	PRESSURE SWITCH SWING TRAV.	TRAV. DISP. CHANG.	WA-TER T.	U/STRUCT SWING SPEED DETECTOR	FUNCT. LED	BATT. 0V	BATT. +28V	INST. PNL. LI-GHTG. +28V	CONTROL PANEL	PRESSURE SENDER
----------------------------	----------------------------	-------------------------	--------------------------	-------------------------	-------------------------------------	--------------------	-----------	-------------------------------	------------	----------	------------	--------------------------	---------------	-----------------



CAB FLOOR WIRING (STANDARD EQUIPMENT)



ENGINE MODULE AND UPPERSTRUCTURE WIRING (STANDARD EQUIPMENT)



CAB FLOOR WIRING (STANDARD EQUIPMENT)

△ 20,△ 20,△ 21,△ 27,△ 31,△ 30
□1,□ 2,□ 3,□ 6, and □ 0

FLOOR

- A1 Radio (optional)
- B3 Pilot pressure pressostat
- E3 Upperstructure working light
- E7 Cigarette lighter
- H10 Working light switch lighting
- H11 Windshield wiper switch lighting
- H13 Heater blower switch lighting
- H15 Instrument panel audible warning
- H26 Horn
- M3 Windshield washer motor
- M4 Heater blower motor
- P4 Hourmeter
- P10 Instrument panel
- S1 Key switch
- S3 Horn switch
- S4 Working light switch
- S6 Windshield wiper switch
- S22 Control panel
- S24 Pilot safety switch
- S26 Windshield washer switch
- S27 Heater blower switch
- X1 Cab floor/cab power connector
- X4 Troubleshooting test socket

ENGINE MODULE AND UPPERSTRUCTURE WIRING
(STANDARD EQUIPMENT)

○ 24 volts supply before contact
▲ 1,▲ 4 and △ 8

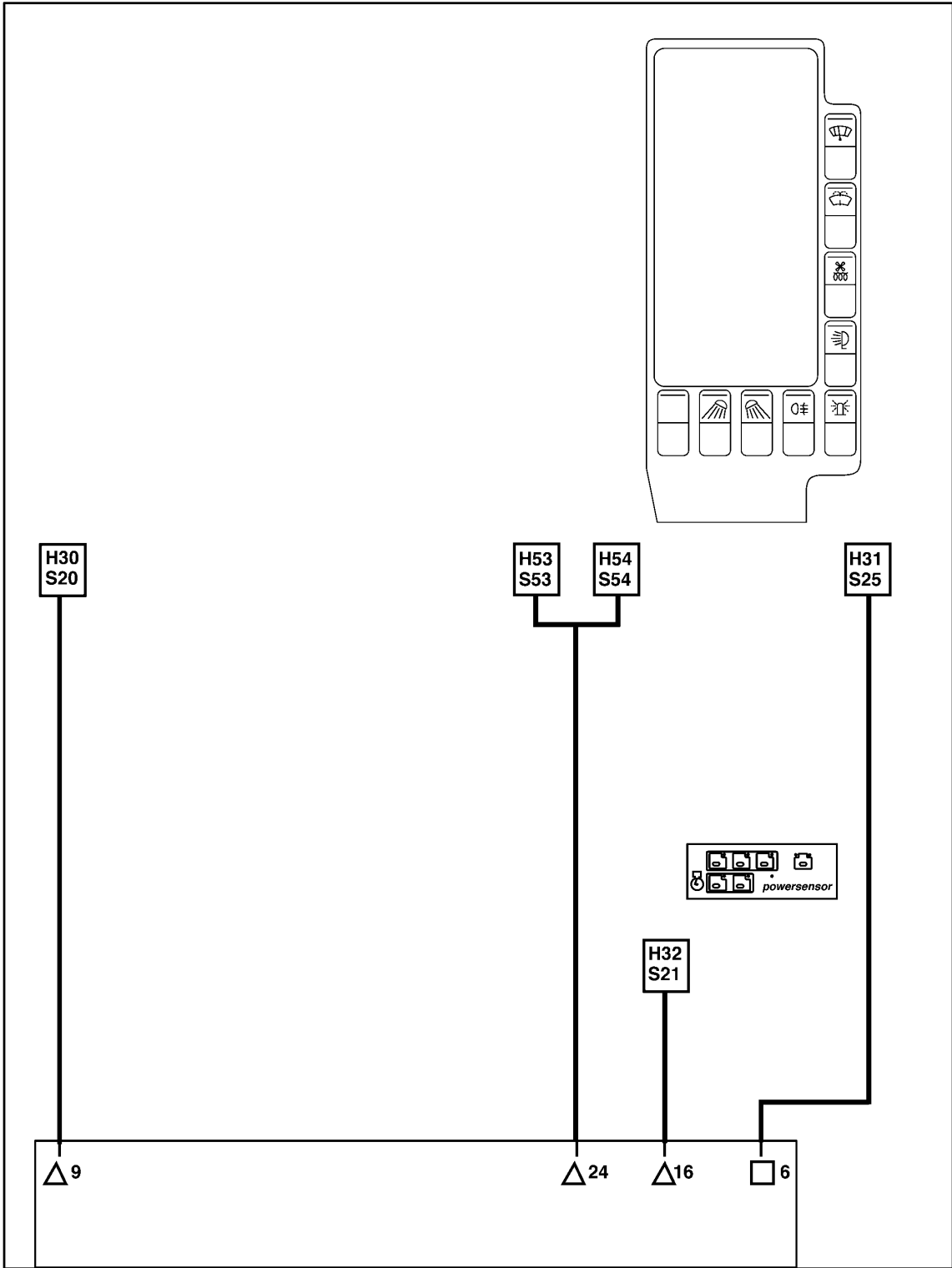
UPPERSTRUCTURE

- B1 Air filter restriction pressostat
- B2 Hydraulic oil filter restriction pressostat
- B21 Hydraulic oil temperature sender
- E3 Upperstructure working light
- P11 Fuel level indicator
- S2 Battery master switch
- X2 Upperstructure power line connection
- X5 Attachment working light power connection
- Y2 Pilot safety solenoid switch

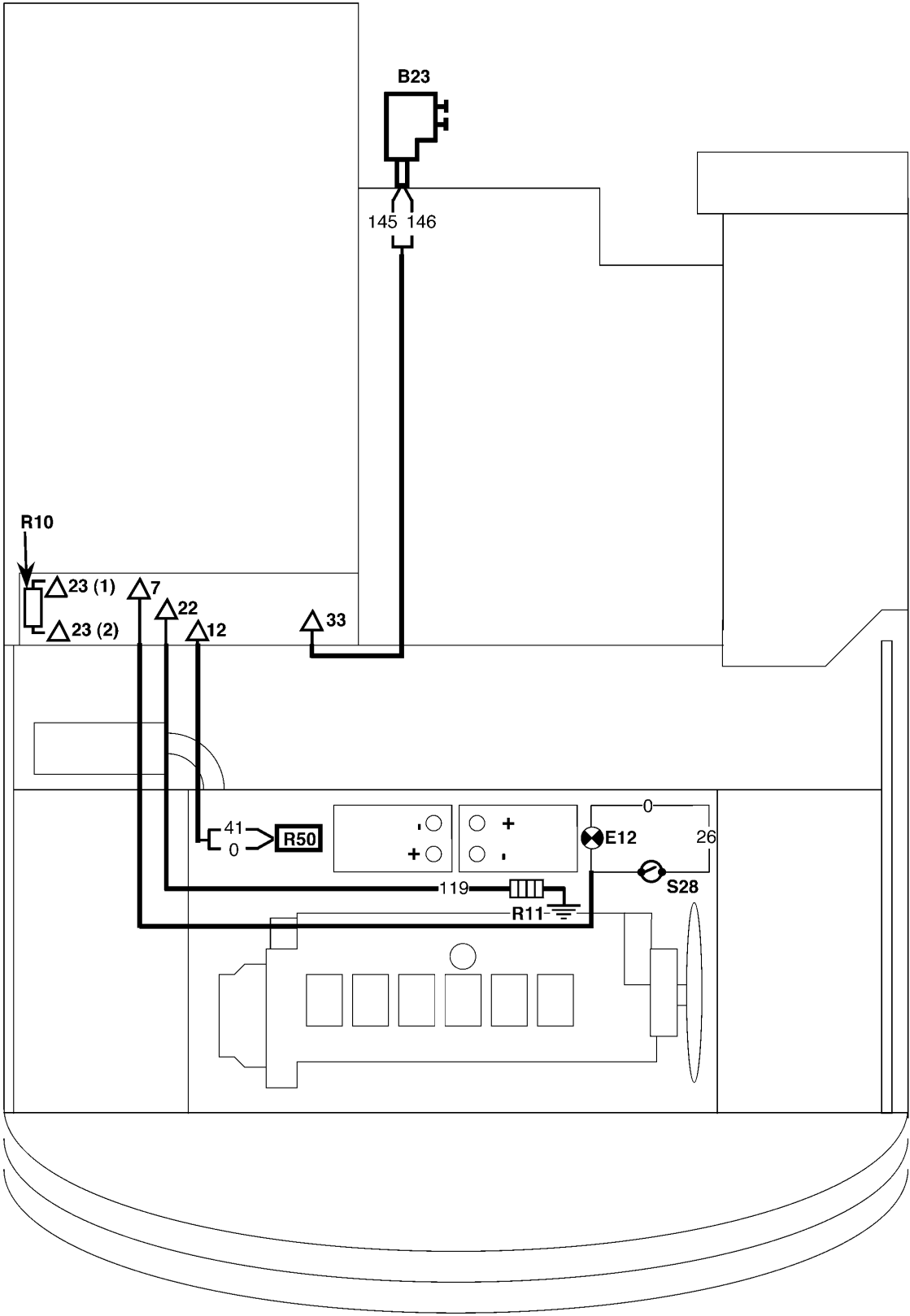
ENGINE

- B4 Engine oil pressure pressostat
- B22 Engine coolant temperature sender
- G2 Alternator
- M1 Starter motor
- Y1 Engine shut-down solenoid valve

CAB FLOOR WIRING (OPTIONAL EQUIPMENT)



ENGINE MODULE AND UPPERSTRUCTURE WIRING (OPTIONAL EQUIPMENT)



CAB FLOOR WIRING (OPTIONAL EQUIPMENT)

Electrical cabinet

▲ 3,△ 9,△ 16,△ 24,□ 6

UPPERSTRUCTURE

- H30 Cold start assistance switch lighting
- H31 Rotary switch lighting
- H32 Overload indicator switch lighting
- H53 Front working light switch lighting
- H54 Rear working light switch lighting
- S20 Cold start assistance switch
- S21 Overload indicator switch
- S25 Rotary light switch
- S53 Front working light switch
- S54 Rear working light switch

ENGINE MODULE AND UPPERSTRUCTURE WIRING (OPTIONAL EQUIPMENT)

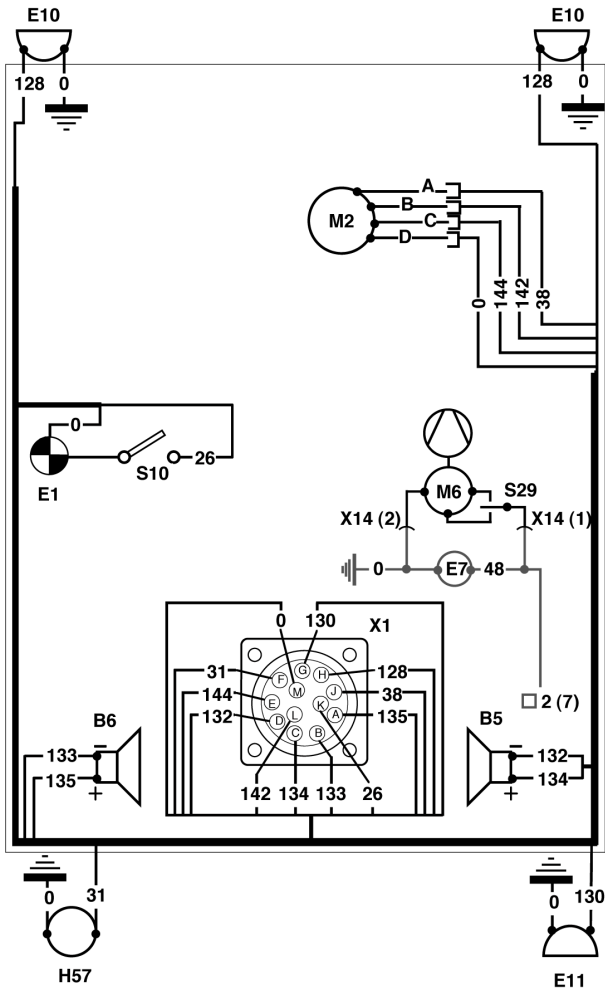
Electrical cabinet

△ 7,△ 12,△ 22,△ 23 (1) (2),△ 33

UPPERSTRUCTURE

- B23 Overload indicator
- E12BEngine compartment light
- R10 Cold start assistance resistor
- R11 Cold start assistance grow plug
- R50 Fuel oil heating device
- S28 Engine compartment working light switch

CAB AND CAB OPTIONAL EQUIPMENT WIRING



- A**
B
C
D
E1
E7
E10
E11
H57
B5
B6
M2
M6

White wire
Grey wire
Blue wire
Black wire
Cab lighting
Cigarette lighter (see wiring pages 19-24)
Front working lights (optional)
Rear working light (optional)
Rotary light (optional)
Loudspeaker (optional)
Loudspeaker (optional)
Windshield wiper motor
Cab blower motor (optional)
- S10**
S29
X1
X14(1)
X14(2)
2(7)

Cab lighting switch
Cab blower switch (optional)
Cab floor/cab power connector (see cab floor wiring schematic page 24)
Cab blower plug (optional)
Cab blower plug (optional)
10-way connector (see printed circuit wiring page 5).

PDH0228

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Section

4001

ELECTRICAL SCHEMATICS
1188 Crawler excavators (new version)

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SPECIFICATIONS

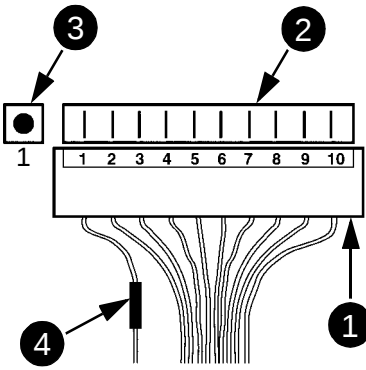
Circuit voltage	24 volt negative earth and 12 volt negative earth
Batteries	2 x 12 Volt 120 A/hrs, low maintenance
Alternator	Bosch, 28 volt, 45 amps
Starter motor.....	Bosch, 24 volt, 4.0 kW

SCHEMATIC SYMBOLS

- A (n) Radio/housings
- B (n) Indicators/pressure switches/loud-speakers/detectors/thermal detector/gauge
- E (n) Lighting components
- F (n) Fuses
- G (n) Electrical supply generators
- H (n) Warning devices (lighted and audible)
- K (n) Relays
- M (n) Motors
- P (n) Instruments
- R (n) Resistors/heating elements/heating plugs
- S (n) Switches/rotating switches/main circuit breaker
- Sh (n) Shunt resistors
- V (n) Diodes
- X (n) Supply line connections
- Y (n) Solenoid valves, solenoid shut-off valves

NOTE: The (n) shows the component number.
Example: K2 is relay N°2.

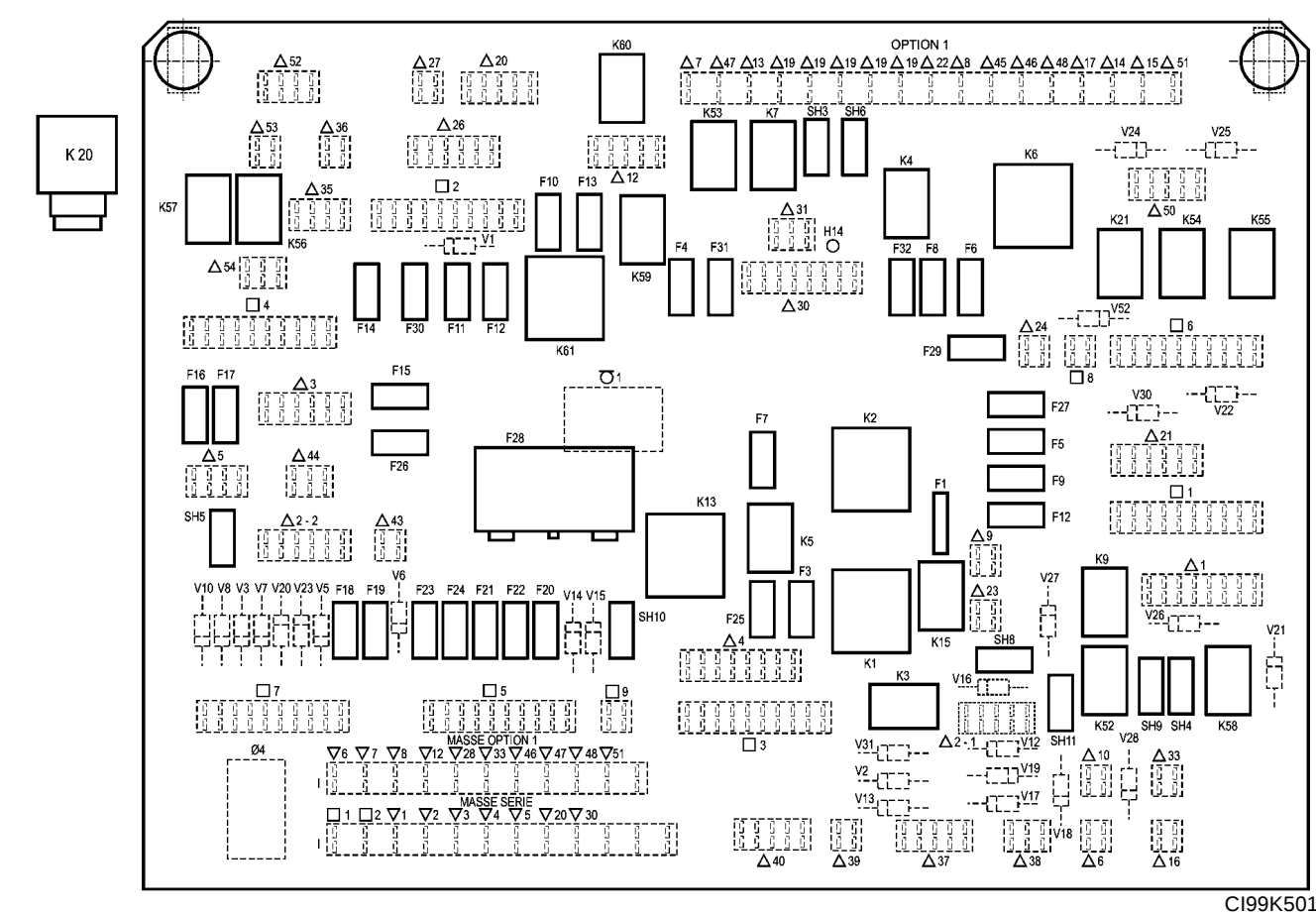
-  (n) Supply on printed circuit
-  (n) Battery terminal
-  (n) Printed circuit connection terminal
-  Printed circuit earth connector
-  A1 Instrument panel connector
-  1 or  1 or  1 Identification of harness
-  1(1) or  1(1) or  1(1) Identification of harness, followed by path identification number
-  (1) or  (1) Printed circuit earth connectors



The installation position for the harness connector (1) on connector (2) of the printed circuit is identified by a red mark (3) followed by the figure 1 on the printed circuit. This identification corresponds to the position of path 1 of the harness connector (1). This position is completed when the path 1 line is shown by a red ring (4) located on line 1 wire, or by red paint marking on the housing.

-  Local earth
-  Wire number
-  Closed circuit
-  Open circuit
-  Intersection of two wires with connection point
-  Intersection of two wires without connection point
-  Link with following plate
-  Link with preceding plate
-  Return to another plate with the same letter
-  Bulbs
-  Test bulb
-  Light emitting diode (LED)
-  Regulator

DESCRIPTION OF ELECTRICAL CABINET PRINTED CIRCUIT (STANDARD)

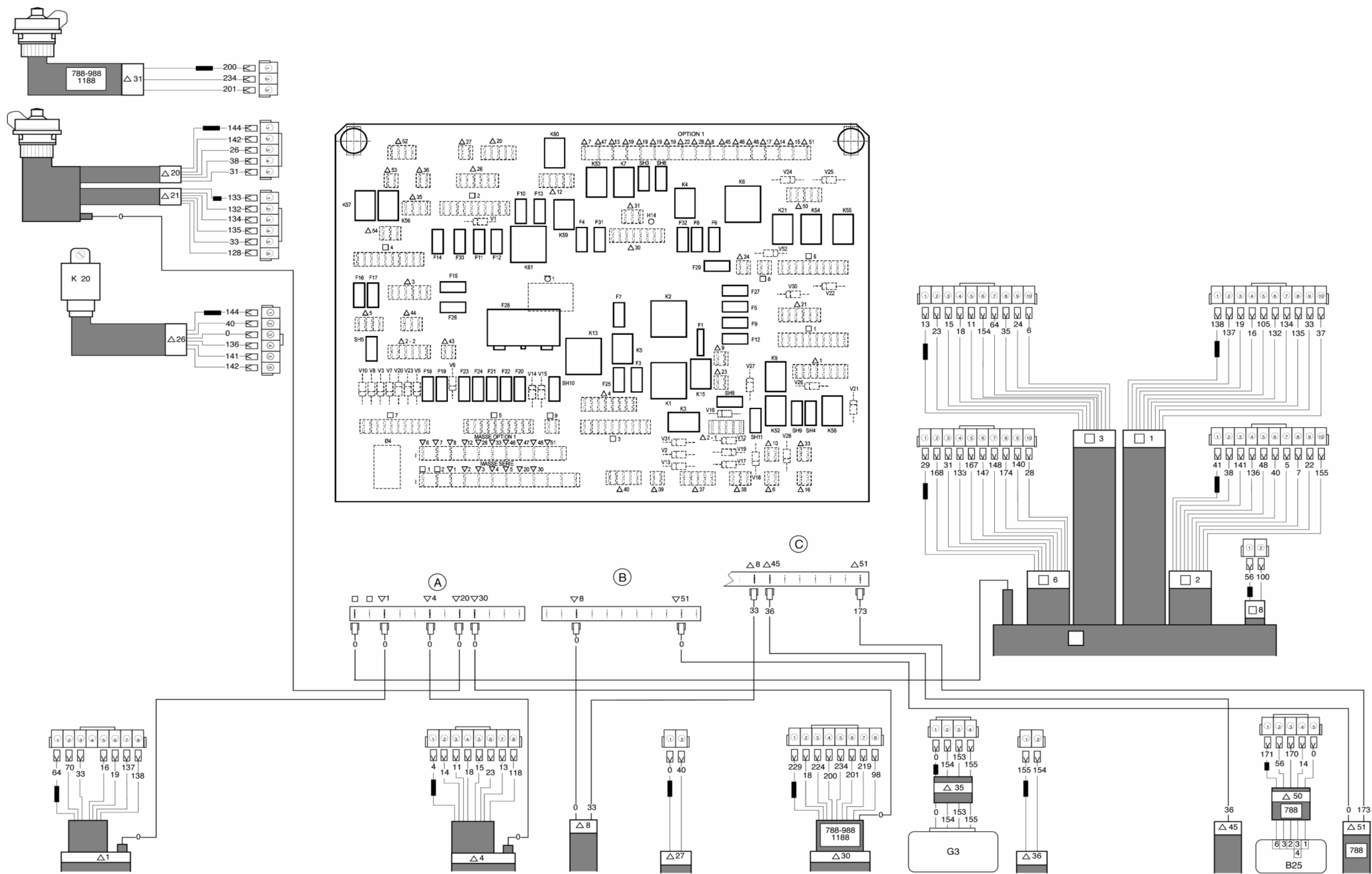


- 1 24 volt printed circuit supply
- 2 24 volt printed circuit supply
- Ø 4 (1) Printed circuit earth
- Ø 4 (2) Printed circuit earth
- F1 Fuse, 30 A, starter motor solenoid, thermostart
- F2 Fuse, 5 A, starter key switch
- F3 Fuse, 7.5 A, instrument panel, hourmeter
- F4 Fuse, 5 A, cab lighting, horn (control), hood lighting
- F5 Fuse, 10 A, working lights (control), rotary light (std), night lighting for switch on instrument panel and electronics
- F6 Fuse, 15 A, attachment working light, rear cab light, upperstructure working lights
- F7 Fuse, 10 A, horn (power)
- F8 Fuse, 15 A, upperstructure socket, fuel pump
- F9 Fuse, 10 A, windshield washer, windshield wiper (BAT + R)
- F10 Fuse, 10 A, heater
- F11 Fuse, 7.5 A, cigar lighter, cab blower
- F12 Fuse, 10 A, pilot safety, overload indicator
- F14 Fuse, 10 A, step-down transformer / radio
- F15 Fuse, 15 A, general lighting
- F27 Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold

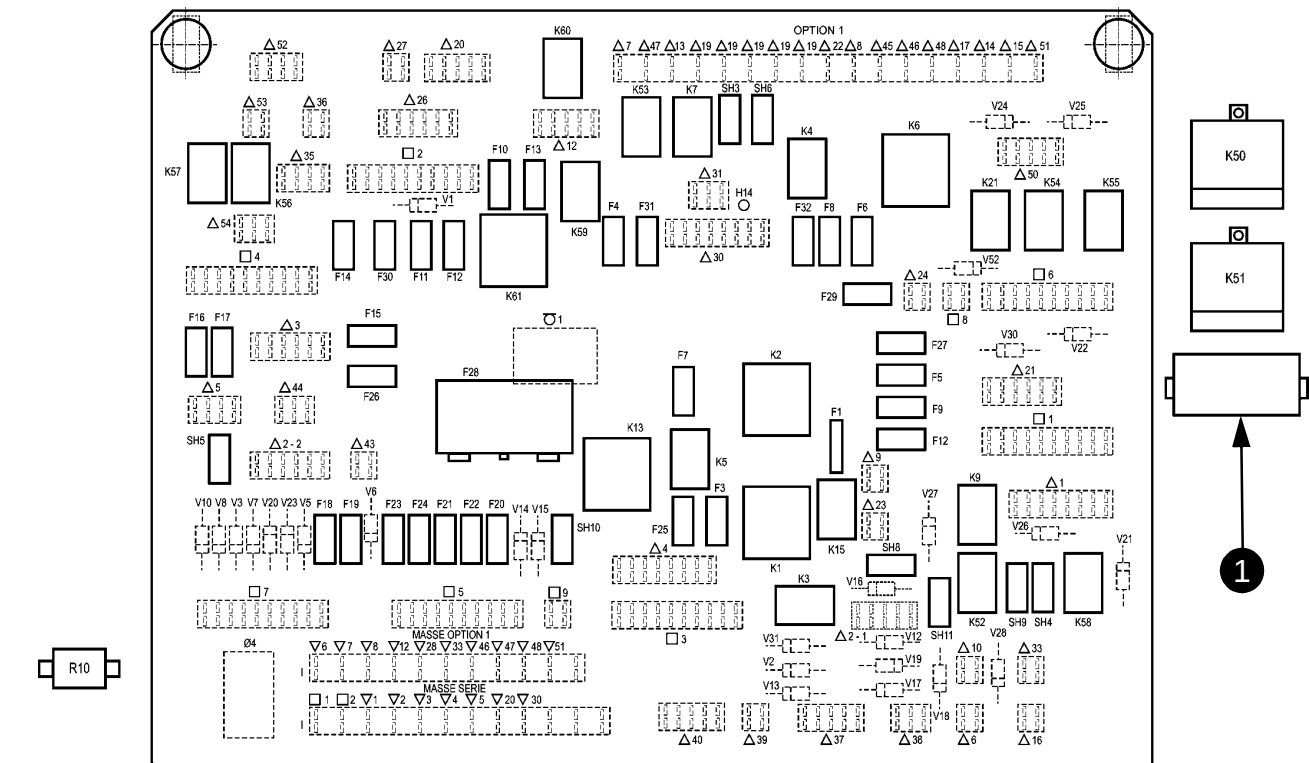
- detector (788P heavy lift)
- F28 Fuse, 40 A, engine stop/start solenoid (injection)
- F30 Fuse, 10 A, windshield wiper (BAT +)
- F32 Fuse, 5 A, (BAT +) electronics
- H14 Troubleshooting test LED
- K1 Starter motor relay
- K2 Battery relay
- K3 Hourmeter relay
- K4 Electronic supply relay
- K5 Horn relay
- K6 Working light relay
- K13 Engine stop solenoid relay
- K20 Windshield wiper intermittent action
- K21 Safety relay piloting pressure switch piloting
- K54 Frequency threshold detector relay (threshold: 1 = 1600 rpm) (788)
- K55 Frequency threshold detector relay (threshold: 2 = 1400 rpm) (788)
- K61 Battery relay (heater/air conditioner)
- Sh3, Sh4, Sh6 Shunt
- V1 Starter key switch diode
- V24 K54 relay diode
- V25 K55 relay diode
- V30 Buzzer diode

ELECTRICAL CABINET PRINTED CIRCUIT WIRING (STANDARD)

- 1 Floor harness, 10 way connector
- 2 Floor harness, 10 way connector
- 3 Floor harness, 10 way connector
- 6 Floor harness, 10 way connector
- 8 Floor harness, 2 way connector
- △ 1 Common harness, 8-way connector
- △ 4 Engine harness, 8-way connector
- △ 8 Harness, RH front upperstructure working light, clip,
- △ 20 Cab socket harness, 5-way connector
- △ 21 Cab socket harness, 6-way connector
- △ 26 Harness time delay, 6-way connector
- △ 27 Harness windshield washer, 2-way connector
- △ 30 Electronic harness, 8-way connector (788/988/1188)
- △ 31 Diagnostic plug harness, 4-way connector (788/988/1188)
- △ 35 Step-down transformer harness 24V - 12V, 4-way connector
- △ 36 12V socket harness, 2-way connector
- △ 45 Upperstructure socket harness
- △ 50 Threshold detector harness, 5-way connector (788)
- △ 51 Harness, heavy lift solenoid valve (788)
- ▽ 8 Harness earth, front RH upperstructure working light, clip
- A Standard earth
- B Optional earth 1
- C Option 1



DESCRIPTION OF ELECTRICAL CABINET PRINTED CIRCUIT (OPTIONAL)



C199J044

- F1** Fuse, 30 A, starter motor solenoid, thermostart
- F4** Fuse, 5 A, cab lighting, horn (control), hood lighting
- F5** Fuse, 10 A, working lights (control), rotary light (std), night lighting for switch on instrument panel and electronics
- F8** Fuse, 15 A, upperstructure socket, fuel pump
- F11** Fuse, 7.5 A, cigar lighter, cab blower
- F13** Fuse, 15 A, air conditioner
- F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)
- F29** Fuse, 10 A, cab front working light
- F31** Fuse, 10 A, fuel heater
- K15** Thermostart relay
- K50** Adjustable boom raising limiter relay
- K51** Adjustable boom retracting limitation relay
- K53** Fuel heater relay
- K59** Air conditioning compressor relay
- K60** Air conditioning condenser relay
- K61** Battery relay (heater/air conditioner)
- R10** Resistor, 0.85 Ohms

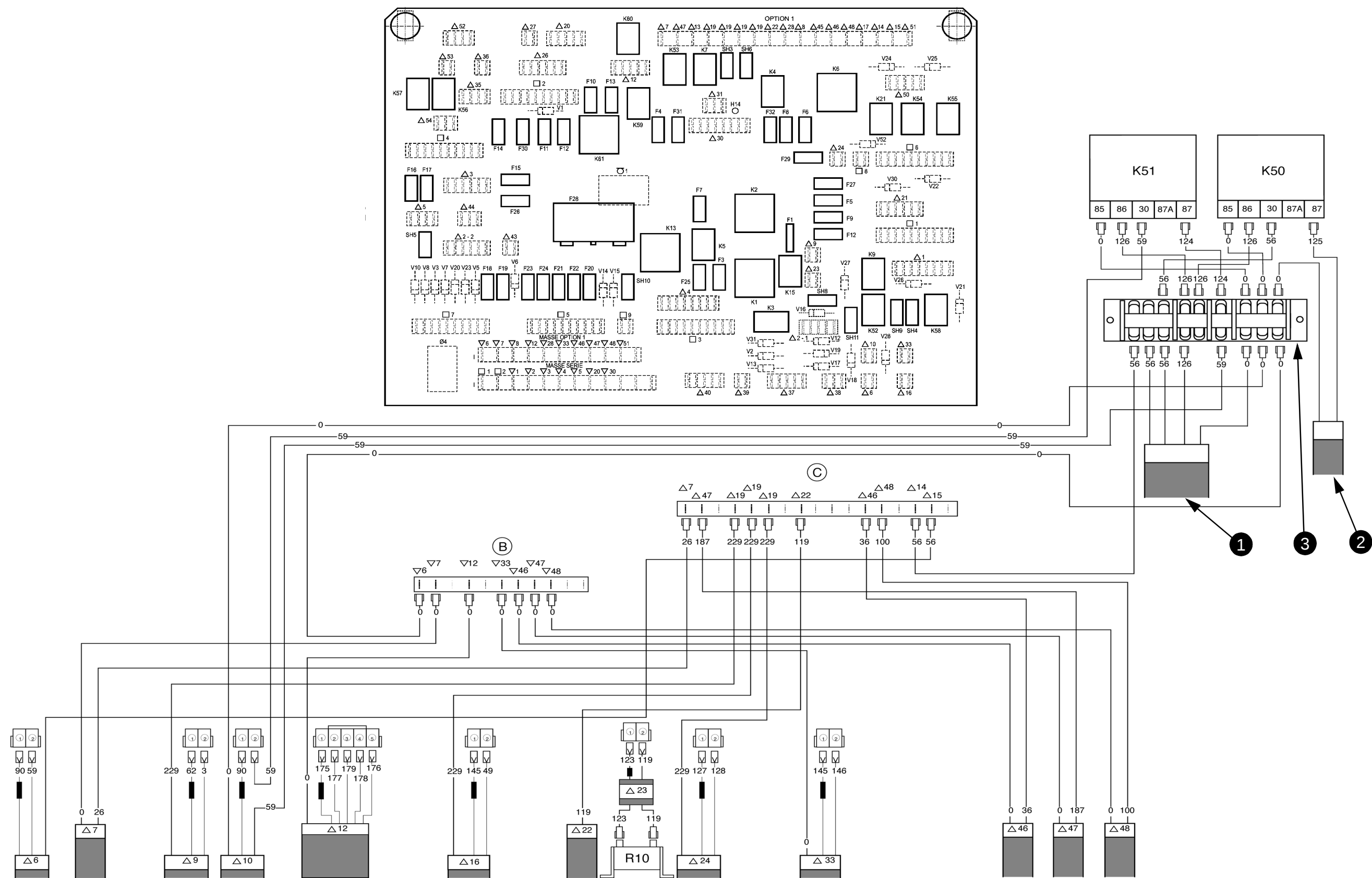
- V21** Overload indicator lamp diode on instrument panel
- V22** Rotary light diode on instrument panel
- V52** Quick coupler switch diode
- 1** Connection strip

ELECTRICAL CABINET PRINTED CIRCUIT WIRING (OPTIONAL)

- △ **6** Adjustable boom harness, 2-way connector
- △ **7** Hood lighting harness, clip
- △ **9** Cold start switch harness, 2-way connector
- △ **10** Adjustable boom harness, 2-way connector
- △ **12** Air conditioner harness, 5-way connector
- △ **16** Overload indicator switch harness, 2-way connector
- △ **22** Cold start plug harness, clip
- △ **23** Thermostart element harness, 2-way connector
- △ **24** Front cab light switch harness, 2-way connector
- △ **33** Overload indicator pressure switch harness
- △ **46** Fuel pump harness, clip
- △ **47** Fuel heater harness, clip
- △ **48** Quick coupler solenoid valve harness, clip
- ▽ **6** Adjustable boom harness earth, clip
- ▽ **7** Hood lighting harness earth, clip
- ▽ **12** Air conditioning harness earth, clip
- ▽ **33** Overload indicator pressure switch harness earth, clip
- ▽ **46** Harness earth, fuel pump, clip
- ▽ **47** Fuel heater harness earth, clip
- ▽ **48** Tool quick coupler harness earth, clip

- 1** Boom reach limitation detector cable
- 2** Boom reach limitation solenoid valve cable
- 3** Connection strip

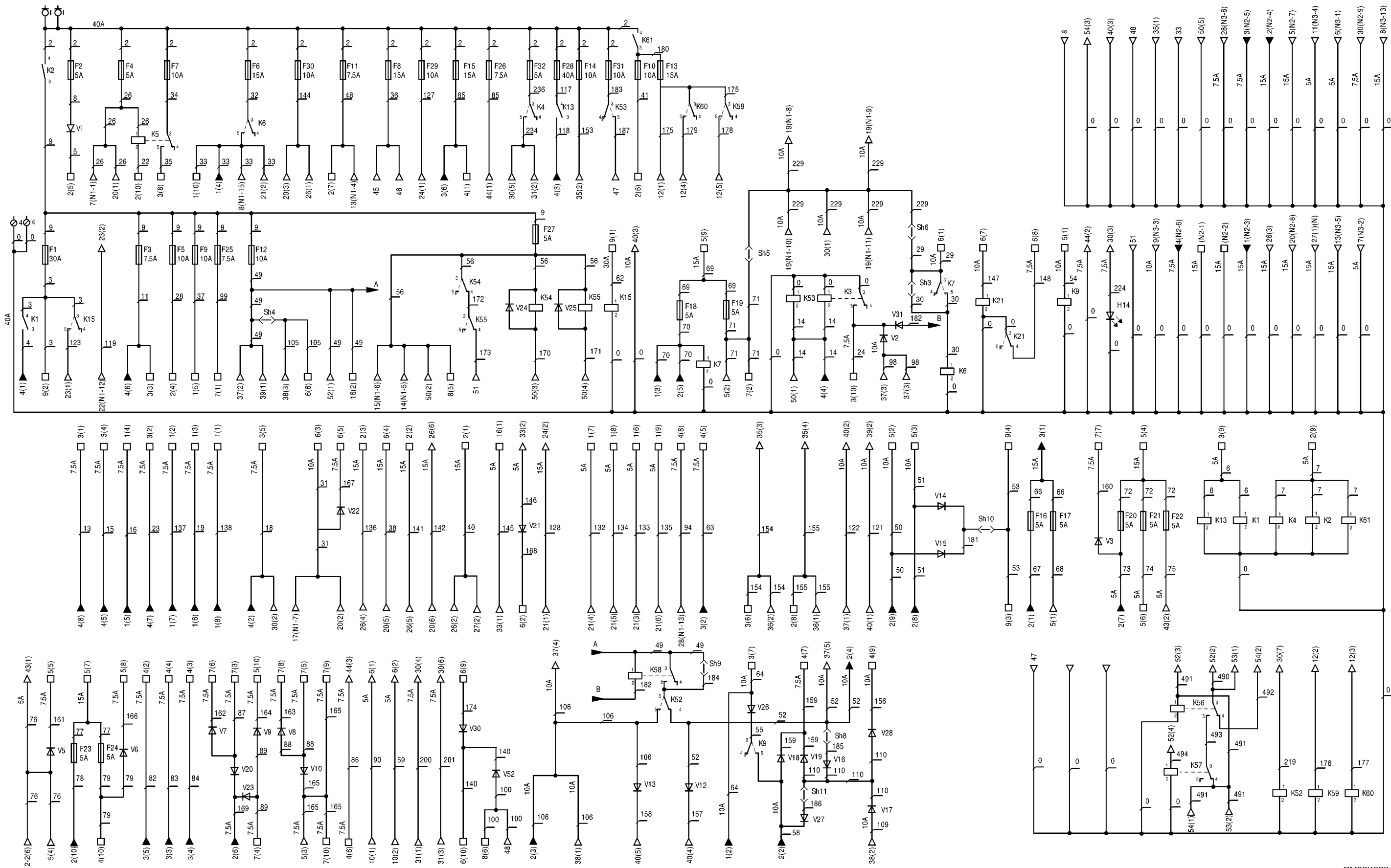
- B** Optional earth
- C** Option 1



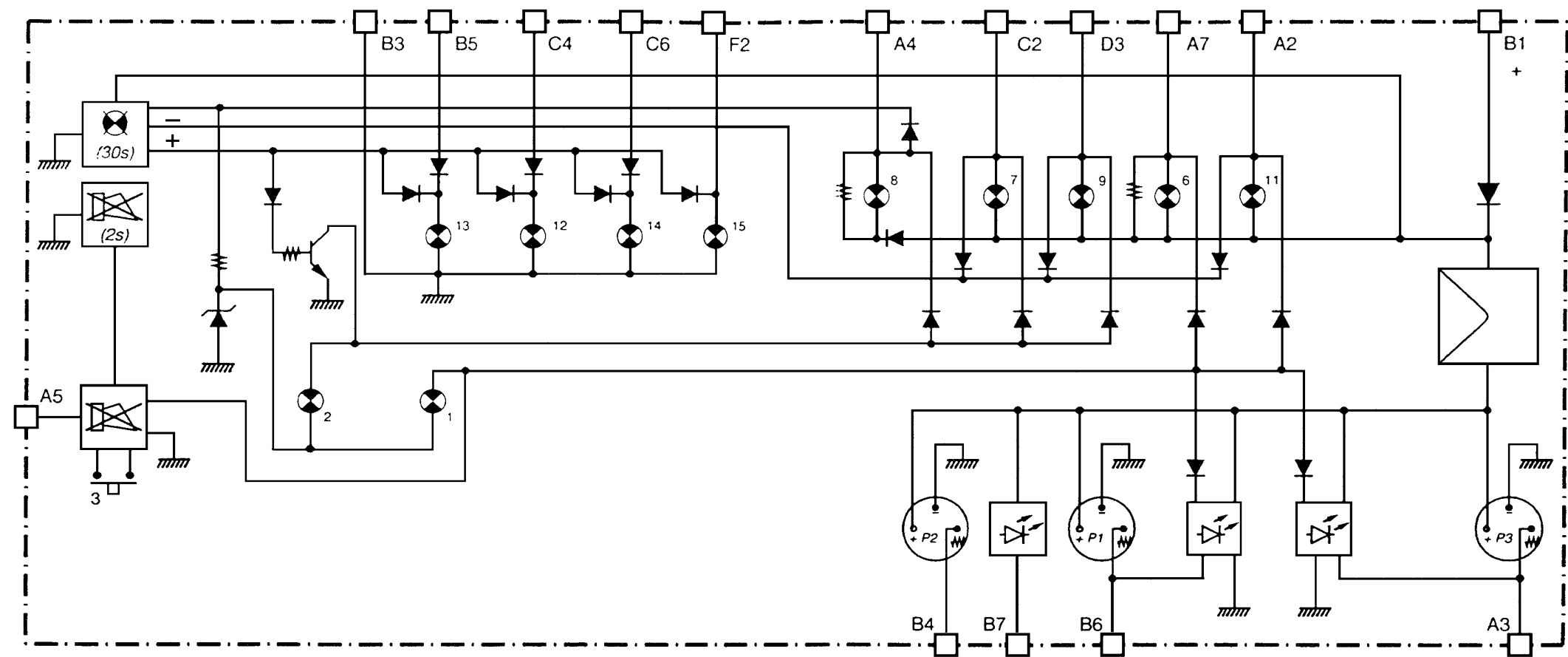
PRINTED CIRCUIT SCHEMATIC GUIDE

-  **1** (1) 24 V PCB supply
-  **1** (2) 24 V PCB supply
-  **4** (1) Printed circuit earth
-  **4** (2) Printed circuit earth
- F1** Fuse, 30 A, starter motor solenoid, thermostart
- F2** Fuse, 5 A, starter key switch
- F3** Fuse, 7.5 A, instrument panel, hourmeter
- F4** Fuse, 5 A, cab lighting, horn (control), hood lighting
- F5** Fuse, 10 A, working lights (control), rotary light (std), night lighting for switch on instrument panel and electronics
- F6** Fuse, 15 A, attachment working light, rear cab light, upperstructure working lights
- F7** Fuse, 10 A, horn (power)
- F8** Fuse, 15 A, upperstructure socket, fuel pump
- F9** Fuse, 10 A, windshield washer, windshield wiper (BAT + R)
- F10** Fuse, 10 A, heater
- F11** Fuse, 7.5 A, cigar lighter, cab blower
- F12** Fuse, 10 A, pilot safety, overload indicator
- F13** Fuse, 15 A, air conditioner
- F14** Fuse, 10 A, step-down transformer / radio
- F15** Fuse, 15 A, general lighting
- F16** Not used
- F17** Not used
- F18** Not used
- F19** Not used
- F20** Not used
- F21** Not used
- F22** Not used
- F23** Not used
- F24** Not used
- F25** Not used
- F26** Not used
- F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)
- F28** Fuse, 40 A, engine stop/start solenoid (injection)
- F29** Fuse, 10 A, cab front working light
- F30** Fuse, 10 A, windshield wiper (BAT +)
- F31** Fuse, 10 A, fuel heater
- F32** Fuse, 5 A, (BAT +) electronics
- H14** Troubleshooting test LED

- K1** Starter motor relay
- K2** Battery relay
- K3** Hourmeter relay
- K4** Electronic supply relay
- K5** Horn relay
- K6** Working light relay
- K7** Not used
- K9** Pilot safety relay/axle unlocking
- K13** Engine stop solenoid relay
- K15** Thermostart relay
- K20** Windshield wiper intermittent action
- K21** Safety relay piloting pressure switch piloting
- K52** Not used
- K53** Fuel heater relay
- K54** Frequency threshold detector relay (threshold: 1 = 1600 rpm) (788)
- K55** Frequency threshold detector relay (threshold: 2 = 1400 rpm) (788)
- K56** Not used
- K57** Not used
- K58** Not used
- K59** Air conditioning compressor relay
- K60** Air conditioning condenser relay
- K61** Battery relay (heater/air conditioner)
- S3** Shunt relay K7
- S4** Not used
- S5** Not used
- S6** Night lighting (switch)
- S8** Not used
- S9** Not used
- S10** Not used
- S11** Not used
- V1** Starter key switch diode
- V2** Diode less engine running
- V3** Not used
- V5, V6, V7, V8, V9, V10** Not used
- V12, V13, V14, V15, V16, V17, V18, V19, V20** Not used
- V21** Overload indicator lamp diode on instrument panel
- V22** Rotary light diode on instrument panel
- V23** Not used
- V24** K54 relay diode
- V25** K55 relay diode
- V26** Not used
- V27** Not used
- V28** Not used
- V30** Buzzer diode
- V31** Not used
- V52** Quick coupler switch diode



P10 INSTRUMENT PANEL ELECTRICAL SCHEMATIC P. 10 (PLATE 1)

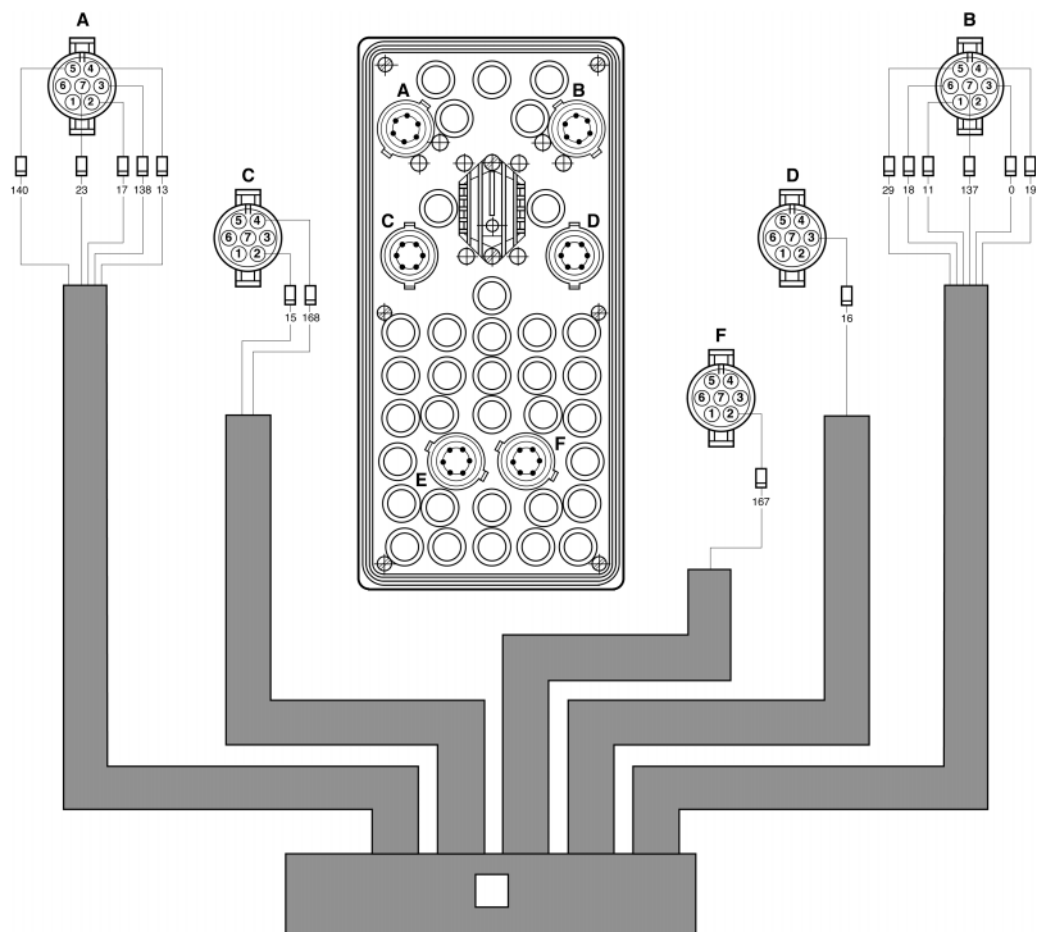


PDH0233

- A2** Minimum pilot pressure red warning lamp connector
A3 Hydraulic oil temperature warning lamp connector
A4 Battery charge red warning lamp
A5 Red and orange warning lamp connector for audible warning device
A7 Engine oil pressure red warning lamp connector
B1 24 volt power supply
B3 Earth
B4 Fuel level warning lamp connector
B5 Gauge lighting connector
B6 Engine coolant solution temperature gauge connector
B7 Fuel minimum connector
C2 Air filter restriction red warning lamp connector
C4 Overload indicator orange warning lamp connector (optional)
C6 Connector not used
D3 Hydraulic oil filter restriction red warning lamp connector
F2 Rotary light orange indicator lamp connector (special for certain countries)
P1 Engine coolant solution temperature indicator lamp
P2 Fuel level gauge
P3 Hydraulic oil temperature indicator

- 1** Stop alarm red warning lamp
2 Alarm orange warning lamp
3 Audible warning device stop push-button
6 Engine oil pressure red warning lamp
7 Air filter restriction red warning lamp
8 Battery charge red warning lamp
9 Hydraulic oil filter restriction red warning lamp
11 Minimum pilot pressure red warning lamp
12 Overload indicator orange warning lamp (optional)
13 Gauge lighting indicator lamp
14 Not used
15 Rotary light orange indicator lamp (optional)

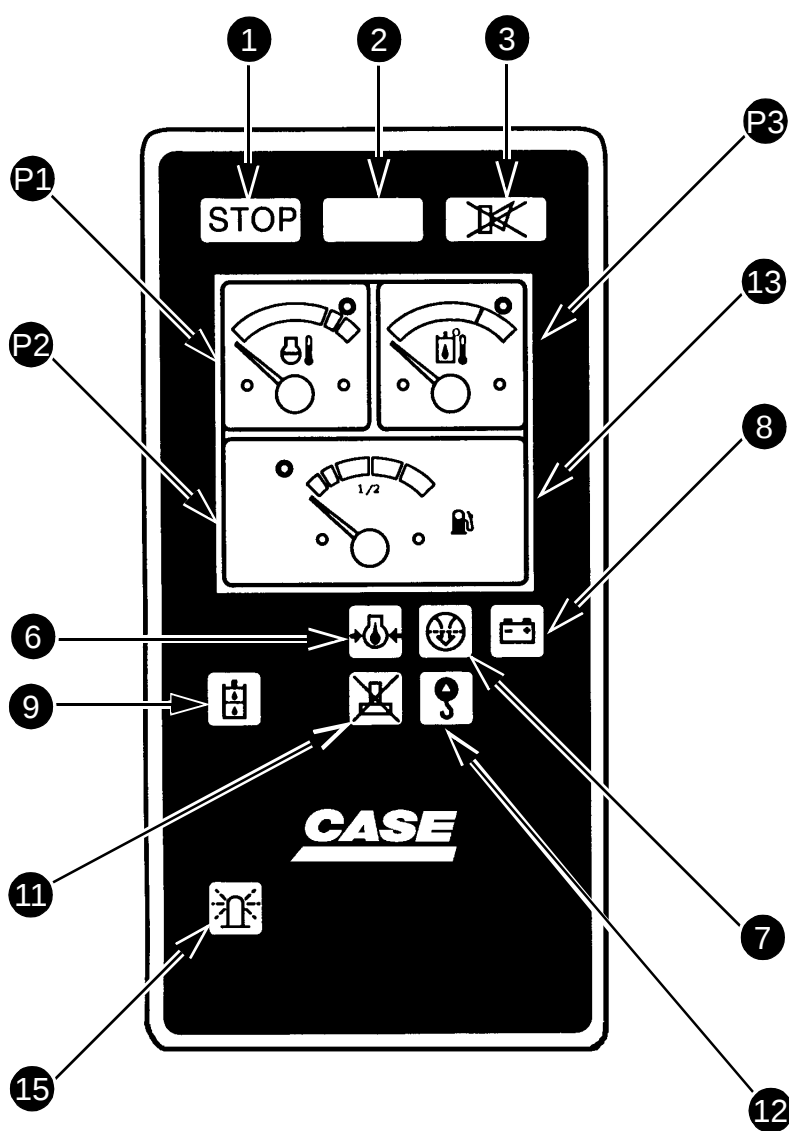
INSTRUMENT PANEL WIRING



PDG0235

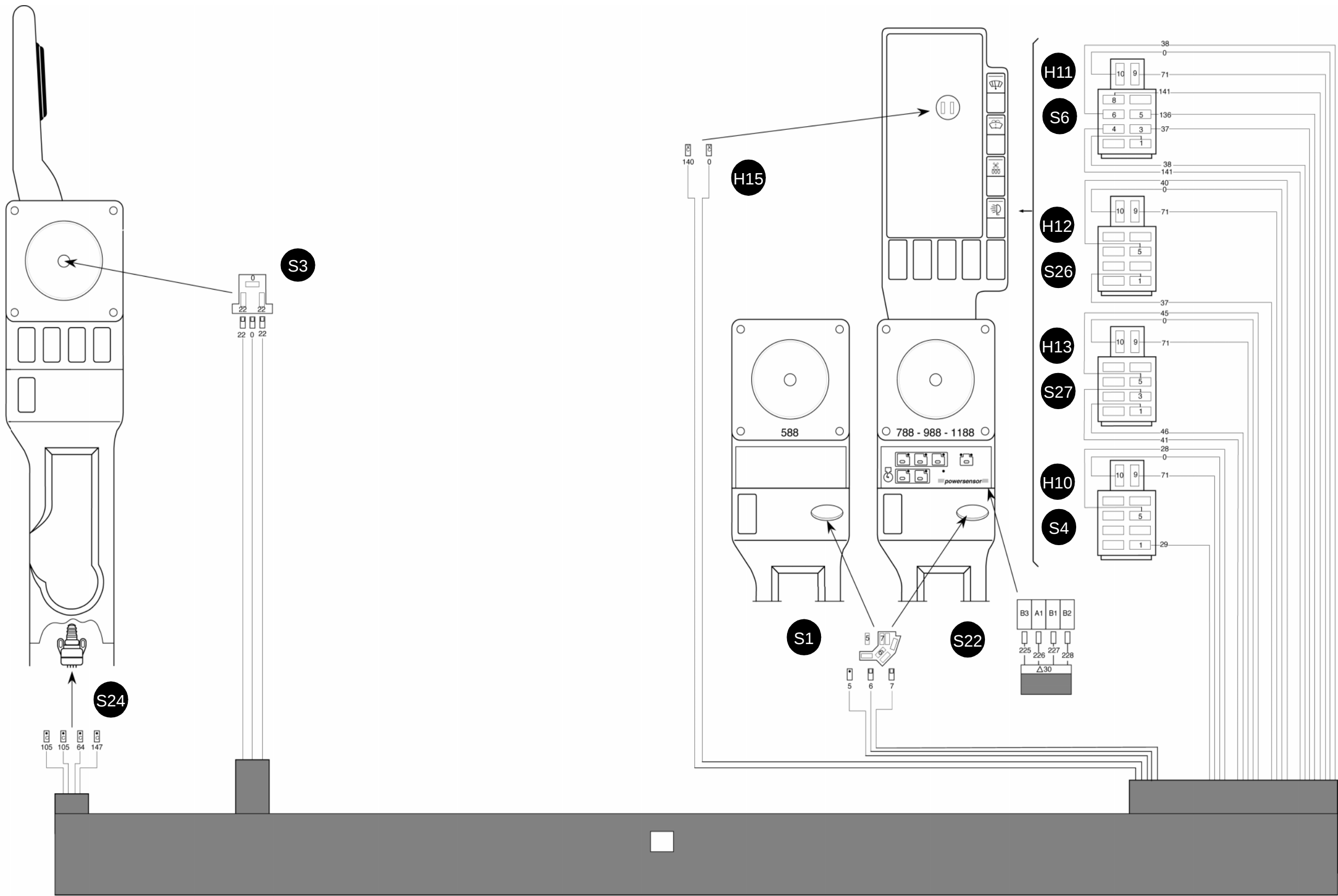
- A** 7 way connector: Minimum pilot pressure red warning lamp, hydraulic oil temperature indicator lamp, battery charge red warning lamp, audible warning cancellation push-button, engine oil pressure red warning lamp, orange alarm warning lamp, red stop alarm warning lamp
- B** 7 way connector: 24 Volts supply, earth, fuel level gauge, gauge lighting, engine coolant temperature indicator.
- C** 7 way connector: air filter restriction red warning lamp, overload indicator orange indicator lamp (optional).
- D** 7 way connector: hydraulic oil filter restriction red warning lamp.
- F** 7 way connector: rotary light orange indicator lamp (optional).

INSTRUMENT PANEL (FRONT FACE)



CS99K502

- 1** Stop alarm red warning lamp
- 2** Alarm orange warning lamp
- 3** Audible warning device stop push-button
- 6** Engine oil pressure red warning lamp
- 7** Air filter restriction red warning lamp
- 8** Battery charge red warning lamp
- 9** Hydraulic oil filter restriction red warning lamp
- 11** Minimum pilot pressure red warning lamp
- 12** Overload indicator orange warning lamp (optional)
- 13** Gauge lighting indicator lamp
- 15** Rotary light orange indicator lamp (optional)
- P1** Engine coolant solution temperature indicator lamp
- P2** Fuel level gauge
- P3** Oil temperature indicator

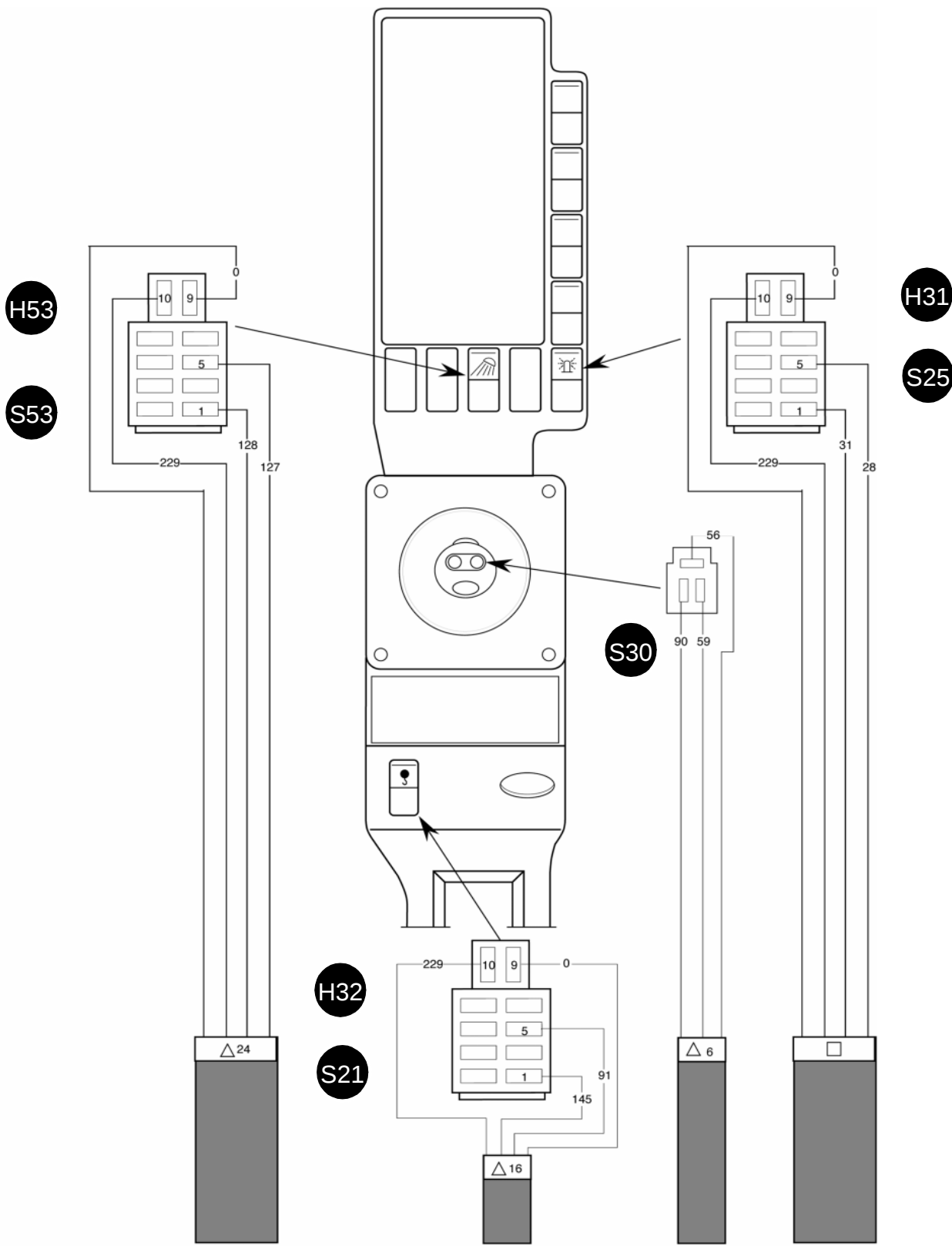
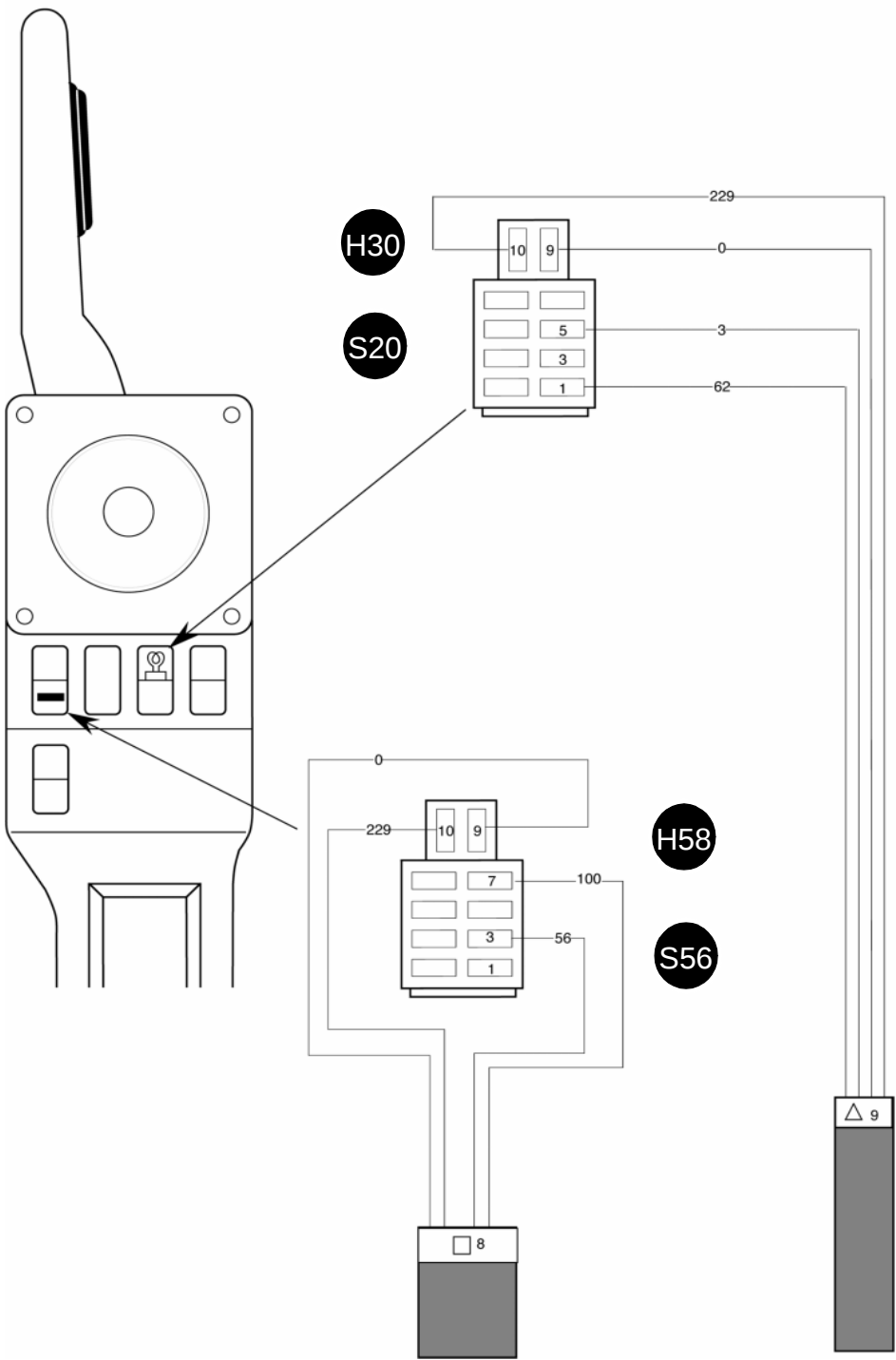


**RIGHT-HAND CONTROL ARM AND LEFT-HAND CONTROL ARM WIRING
(STANDARD)**

- H10** Working brake switch lighting
- H11** Windshield wiper switch lighting
- H12** Windshield washer switch lighting
- H13** Heater blower switch lighting
- H15** Instrument panel audible warning
- S1** Key switch
- S3** Horn switch
- S4** Working light switch
- S6** Windshield wiper switch
- S22** Control keyboard (788-988-1188)
- S24** Pilot safety switch
- S26** Windshield washer switch
- S27** Heater blower switch

☐ Floor harness

☐ **30** Electronic harness



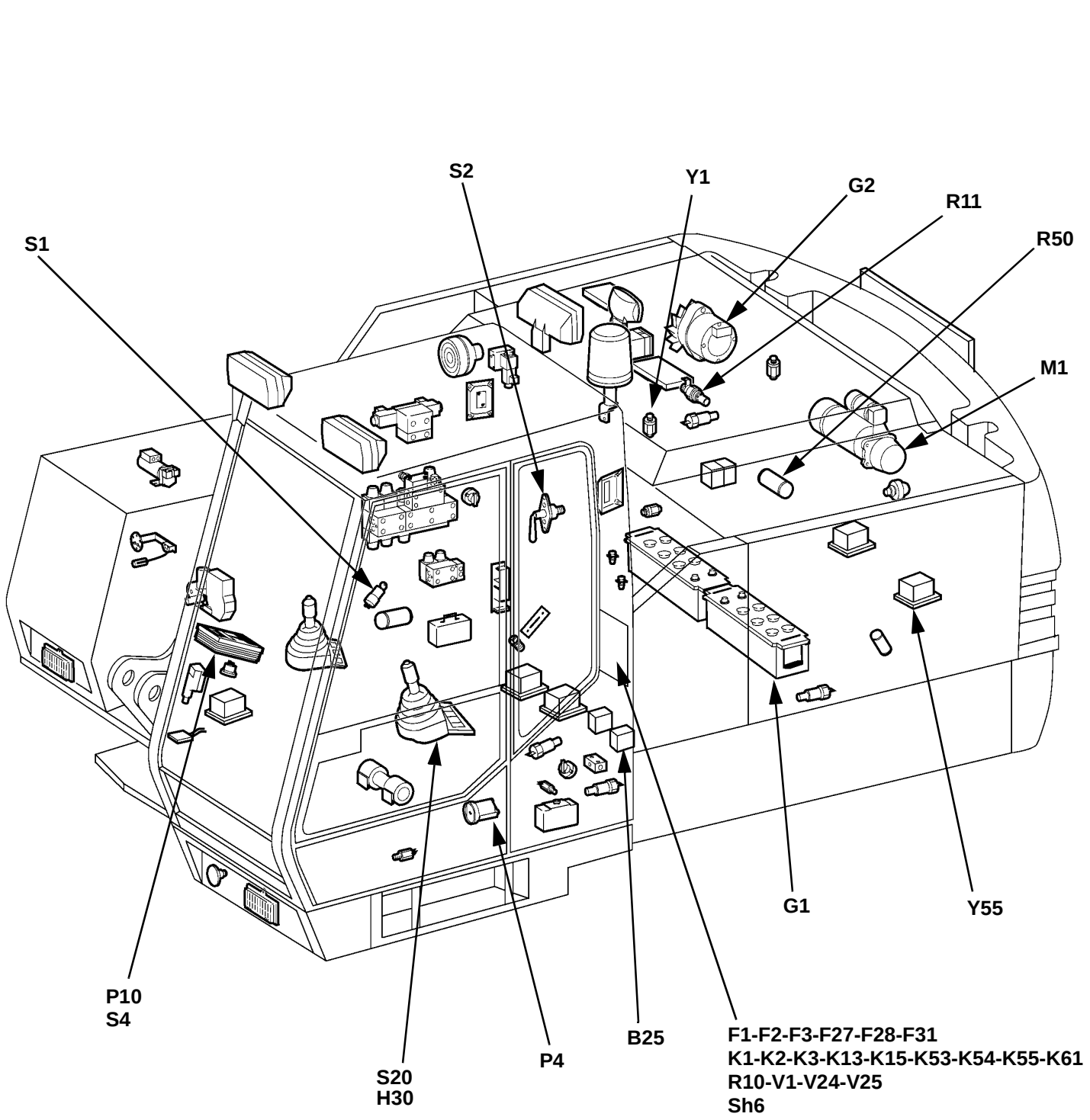
RIGHT-HAND AND LEFT-HAND CONTROL ARM WIRING (OPTIONAL)

- H30** Cold start assistance switch lighting (optional)
- H31** Rotary light switch lighting (optional)
- H32** Overload indicator switch lighting (optional)
- H53** Cab front working light switch lighting (optional)
- H58** Quick coupler switch lighting (optional)
- S20** Cold start assistance switch (optional)
- S21** Overload indicator switch (optional)
- S25** Rotary light switch (optional)
- S30** Adjustable or articulated boom control switch (optional)
- H53** Cab front working light switch lighting (optional)
- S56** Quick coupler switch (optional)

- △ **6** Harness - adjustable boom control
- △ **9** Cold start assistance harness
- △ **16** Overload indicator harness
- △ **24** Harness – front working lights, rear working light

- **8** Floor harness

ELECTRICAL SCHEMATIC (PLATE 2)



ELECTRICAL CABINET

- B25** Threshold detector (788)
- F1** Fuse, 30 A, starter motor solenoid, thermostart
- F2** Fuse, 5 A, starter key switch
- F3** Fuse, 7.5 A, instrument panel, hourmeter
- F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)
- F28** Fuse, 40 A, engine stop/start solenoid (injection)
- F31** Fuse, 10 A, fuel heater
- K1** Starter motor relay
- K2** Battery relay
- K3** Hourmeter relay
- K13** Engine stop solenoid relay
- K15** Thermostart relay
- K53** Fuel heater relay
- K54** Frequency threshold detector relay (threshold: 1 = 1600 rpm) (788)
- K55** Frequency threshold detector relay (threshold: 2 = 1400 rpm) (788)
- K61** Battery relay (heater/air conditioner)
- R10** Resistor, 0.85 Ohms
- V1** Starter key switch diode
- V24** K54 relay diode
- V25** K55 relay diode
- Sh6** Shunt

FLOOR

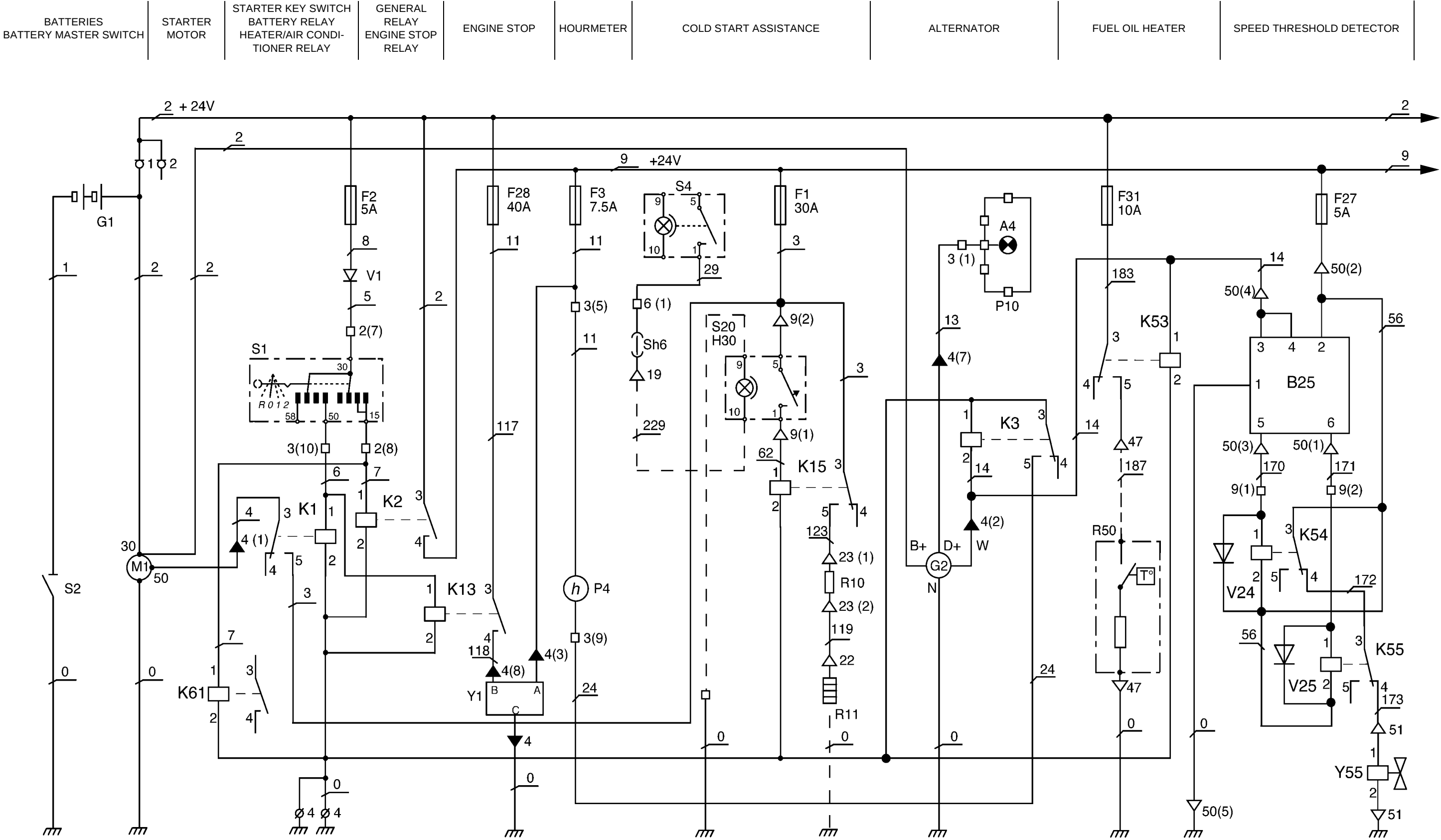
- P4** Hourmeter
- P10** Instrument panel
- H30** Cold start assistance switch lighting (optional)
- S1** Key switch
- S4** Working light switch
- S20** Cold start assistance switch (optional)

UPPERSTRUCTURE

- G1** Batteries
- S2** Battery master switch
- Y55** Heavy lift solenoid valve (788)

ENGINE

- G2** Alternator
- M1** Starter motor
- R11** Cold start assistance plug (optional)
- Y1** Engine shut-down solenoid valve
- R50** Fuel heater (optional)



ELECTRICAL SCHEMATIC (PLATE 3)

INSTRUMENT PANEL

P10 Instrument panel

ELECTRICAL CABINET

- F3 Fuse, 7.5 A, instrument panel, hourmeter
- F12 Fuse, 10 A, pilot safety, overload indicator
- K21 Safety relay piloting pressure switch piloting
- Sh4 Shunt
- Sh6 Shunt
- V21, V26, V30 Diode

ON FLOOR

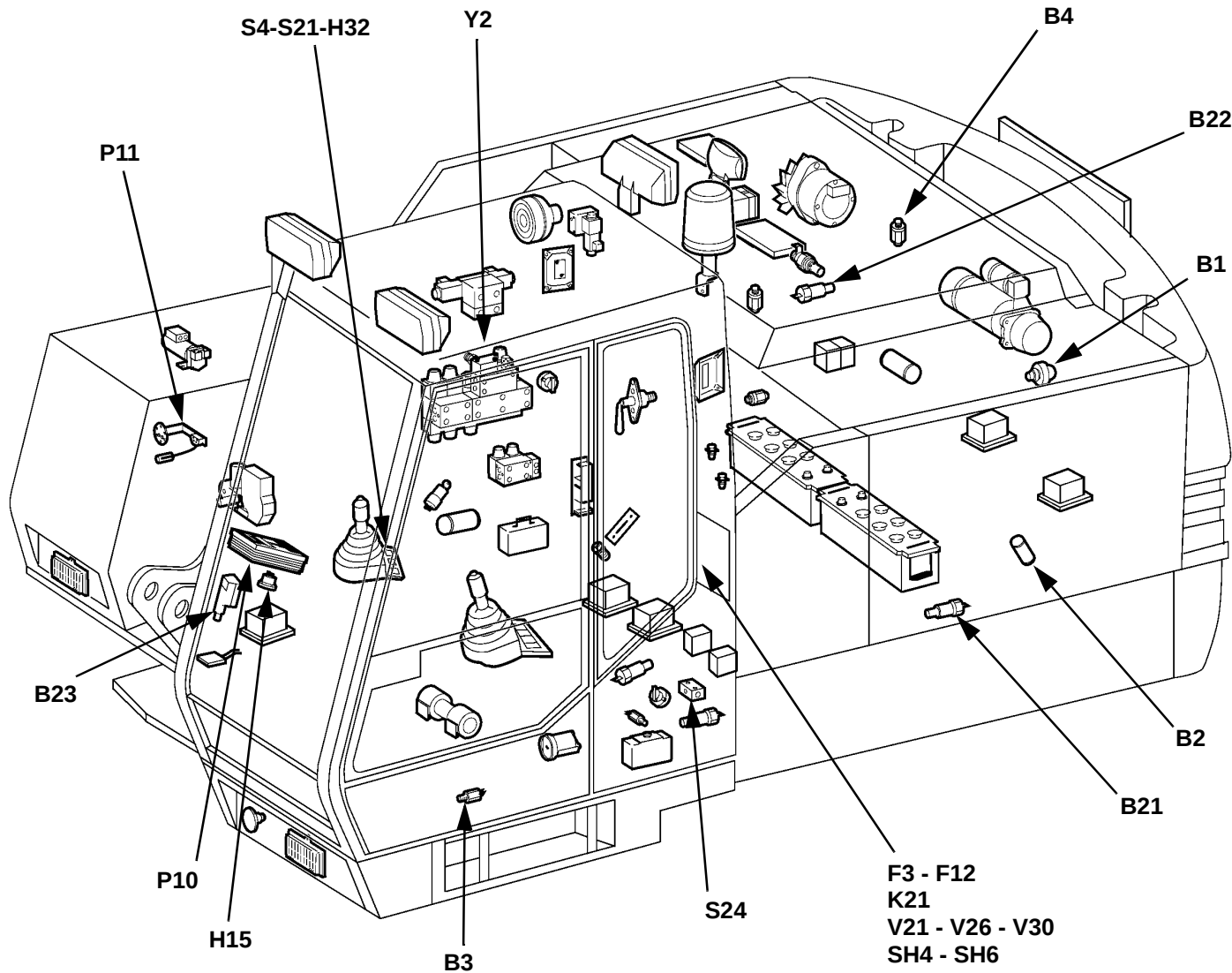
- B3 Pilot pressure switch
- H15 Instrument panel audible warning
- H32 Overload indicator switch lighting (optional)
- S4 Working light switch
- S21 Overload indicator switch (optional)
- S24 Pilot safety switch

UPPERSTRUCTURE

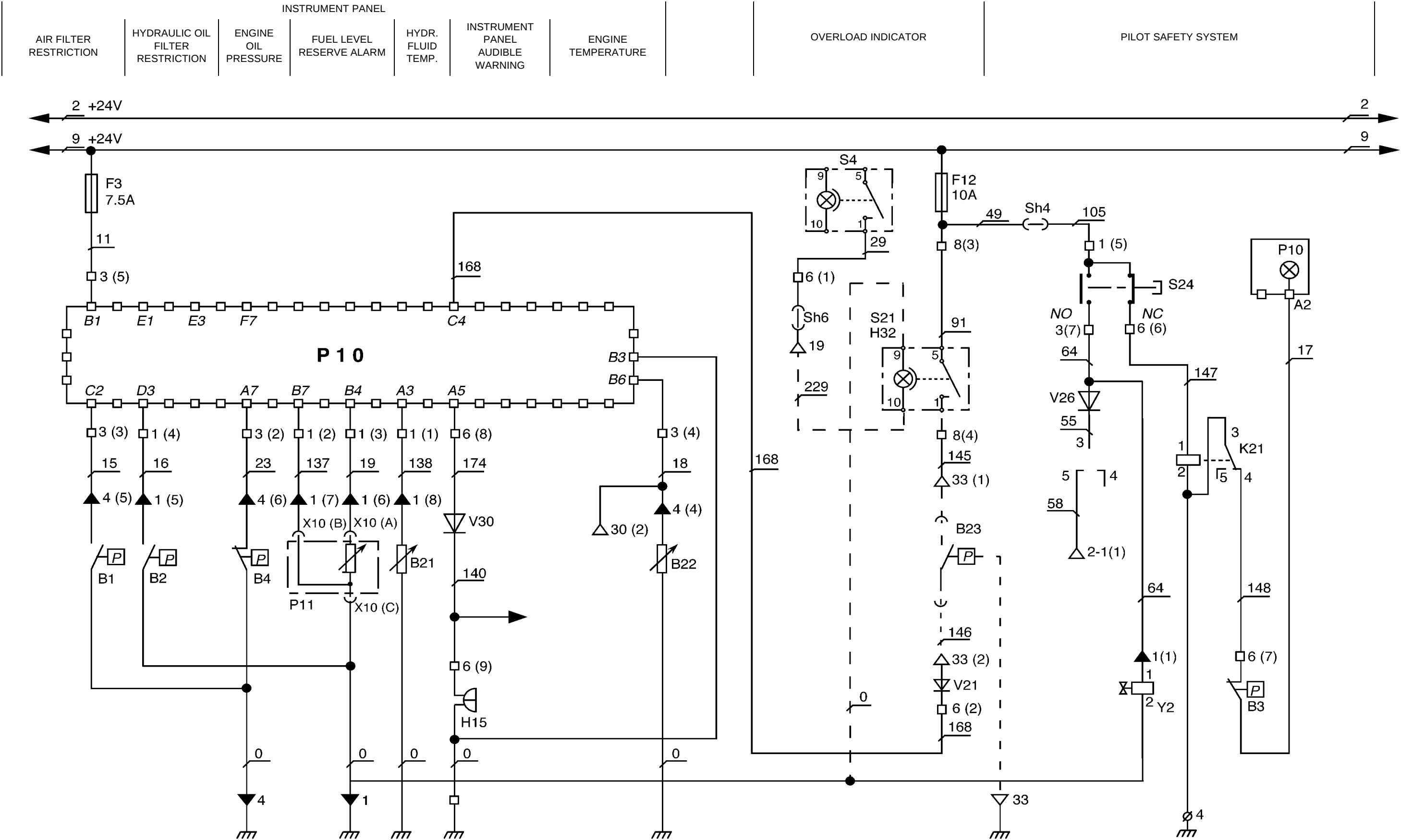
- B1 Air filter restriction pressure switch
- B2 Hydraulic oil filter restriction pressure switch
- B21 Hydraulic oil temperature sender
- B23 Overload indicator (optional)
- P11 Fuel level gauge
- Y2 Pilot safety solenoid valve

ENGINE

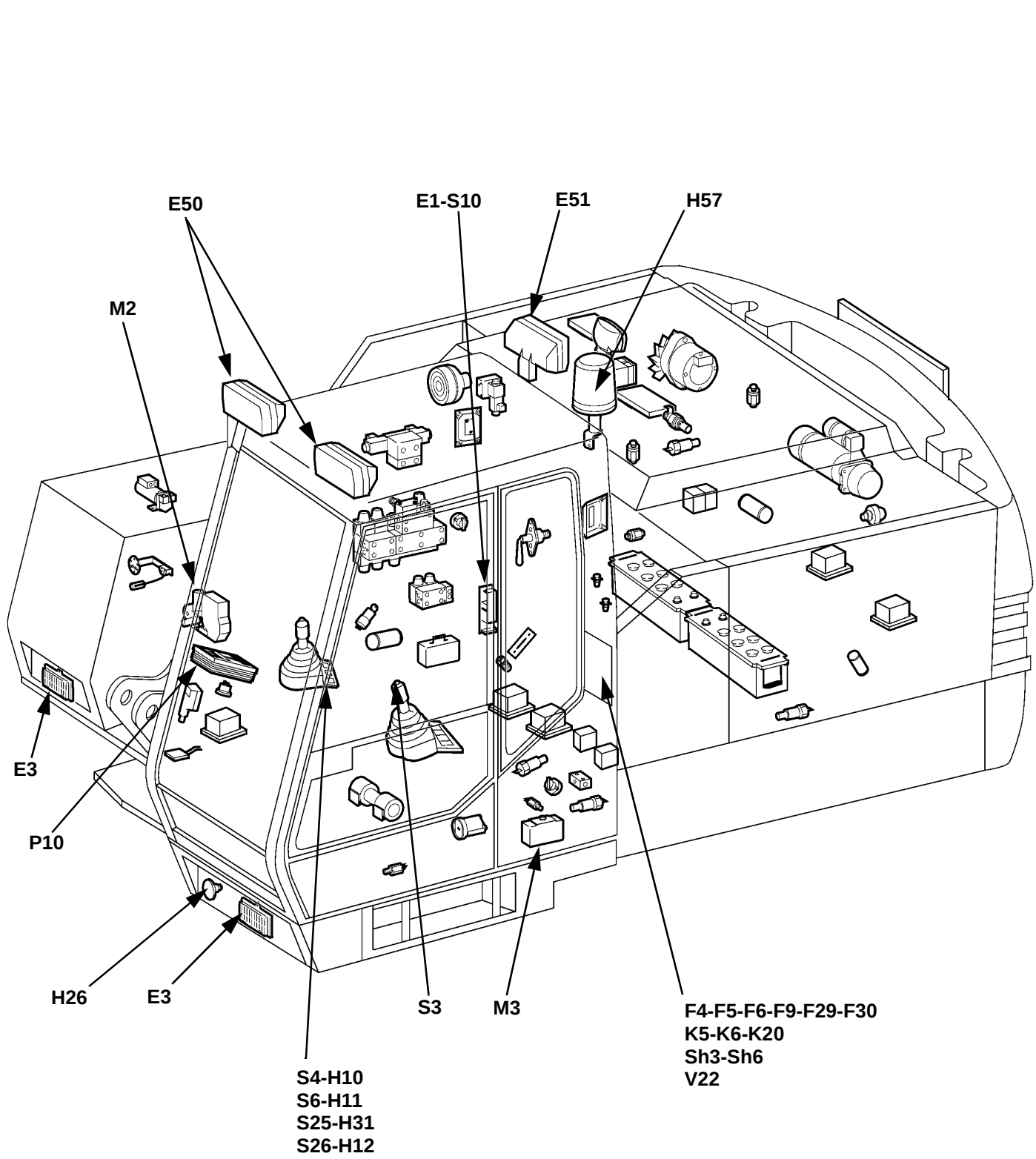
- B4 Engine oil pressure switch
- B22 Engine coolant temperature sender



CM99K022



ELECTRICAL SCHEMATIC (PLATE 4)



INSTRUMENT PANEL

- H10 Working brake switch lighting
- H11 Windshield wiper switch lighting
- H12 Windshield washer switch lighting
- H31 Rotary light switch lighting (optional)
- S4 Working light switch
- S6 Windshield wiper switch
- S25 Rotary light switch (optional)
- S26 Windshield washer switch

ELECTRICAL CABINET

- F4 Fuse, 5 A, cab lighting, horn (control), hood lighting
- F5 Fuse, 10 A, working lights (control), rotary light (std), night lighting for switch on instrument panel and electronics
- F6 Fuse, 15 A, attachment working light, rear cab light, upperstructure working lights
- F9 Fuse, 10 A, windshield washer, windshield wiper (BAT + R)
- F29 Fuse, 10 A, cab front working light
- F30 Fuse, 10 A, windshield wiper (BAT +)
- K5 Horn relay
- K6 Working light relay
- K20 Windshield wiper intermittent action
- Sh3 Shunt
- Sh6 Shunt

- V22 Rotary light diode on instrument panel

CAB

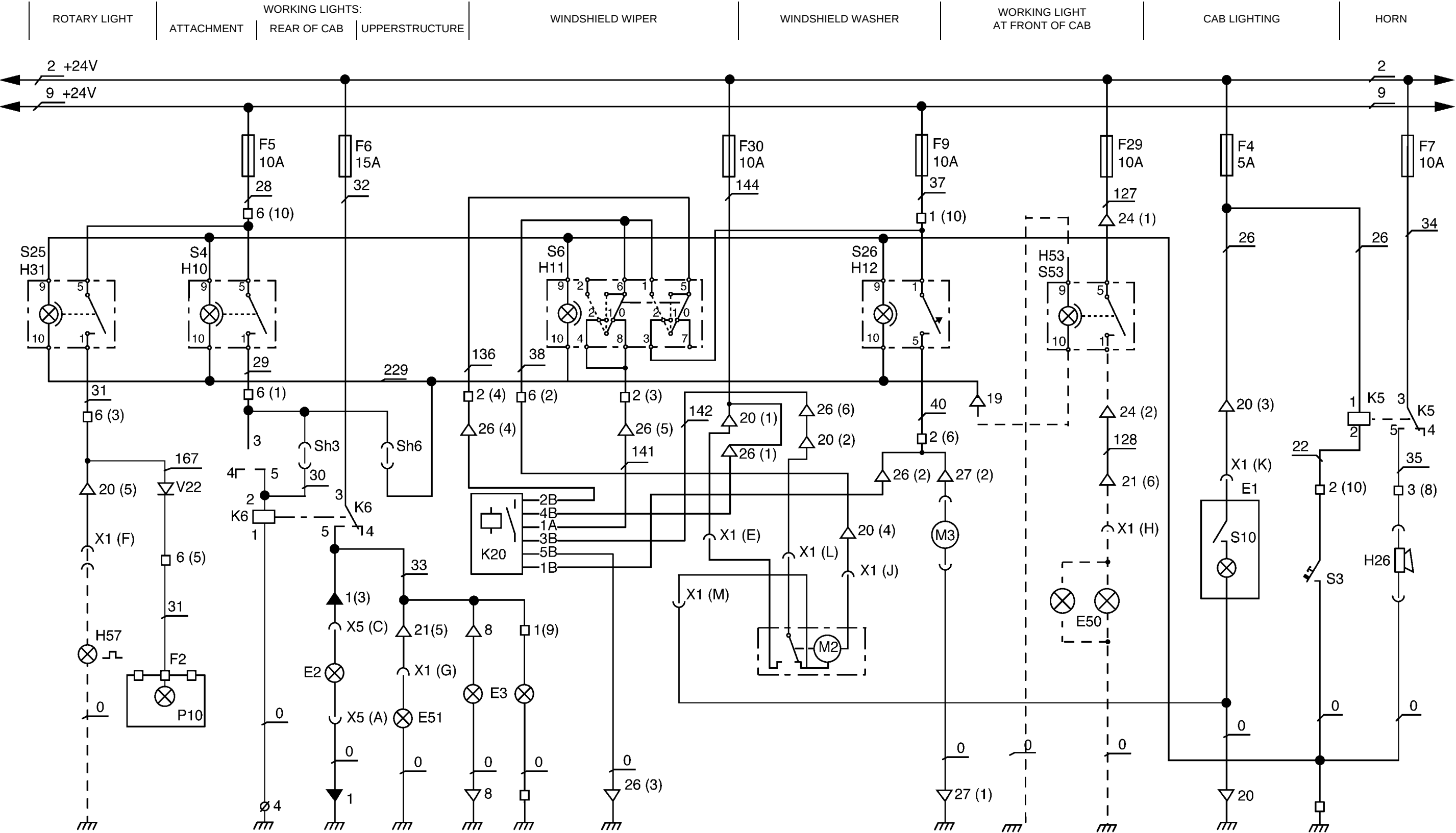
- E1 Cab lighting
- E50 Cab front working lights
- E51 Cab rear working light
- H57 Standard or Italian rotary light
- M2 Windshield wiper motor
- E Blue
- J White
- L Grey
- M Black
- P10 Instrument panel
- S10 Cab lighting switch

ON FLOOR

- H26 Horn
- M3 Windshield washer motor
- S3 Horn switch

UPPERSTRUCTURE

- E2 Attachment working light on boom
- E3 Upperstructure working lights



CM99K011

ELECTRICAL SCHEMATIC (PLATE 5)

ELECTRICAL CABINET

- F2 Fuse, 5 A, starter key switch
- F4 Fuse, 5 A, cab lighting, horn (control), hood lighting
- F8 Fuse, 15 A, upperstructure socket, fuel pump
- F10 Fuse, 10 A, heater
- F11 Fuse, 7.5 A, cigar lighter, cab blower
- F13 Fuse, 15 A, air conditioner
- F14 Fuse, 10 A, step-down transformer / radio
- Sh6 Shunt

ON FLOOR

- A1 Radio
- E7 Cigarette lighter
- G3 Step-down transformer 24V / 12V
- H13 Heater blower switch lighting
- M4 Heater blower motor
- S4 Working light switch
- S27 Heater blower switch
- X5 12V accessories socket

CAB

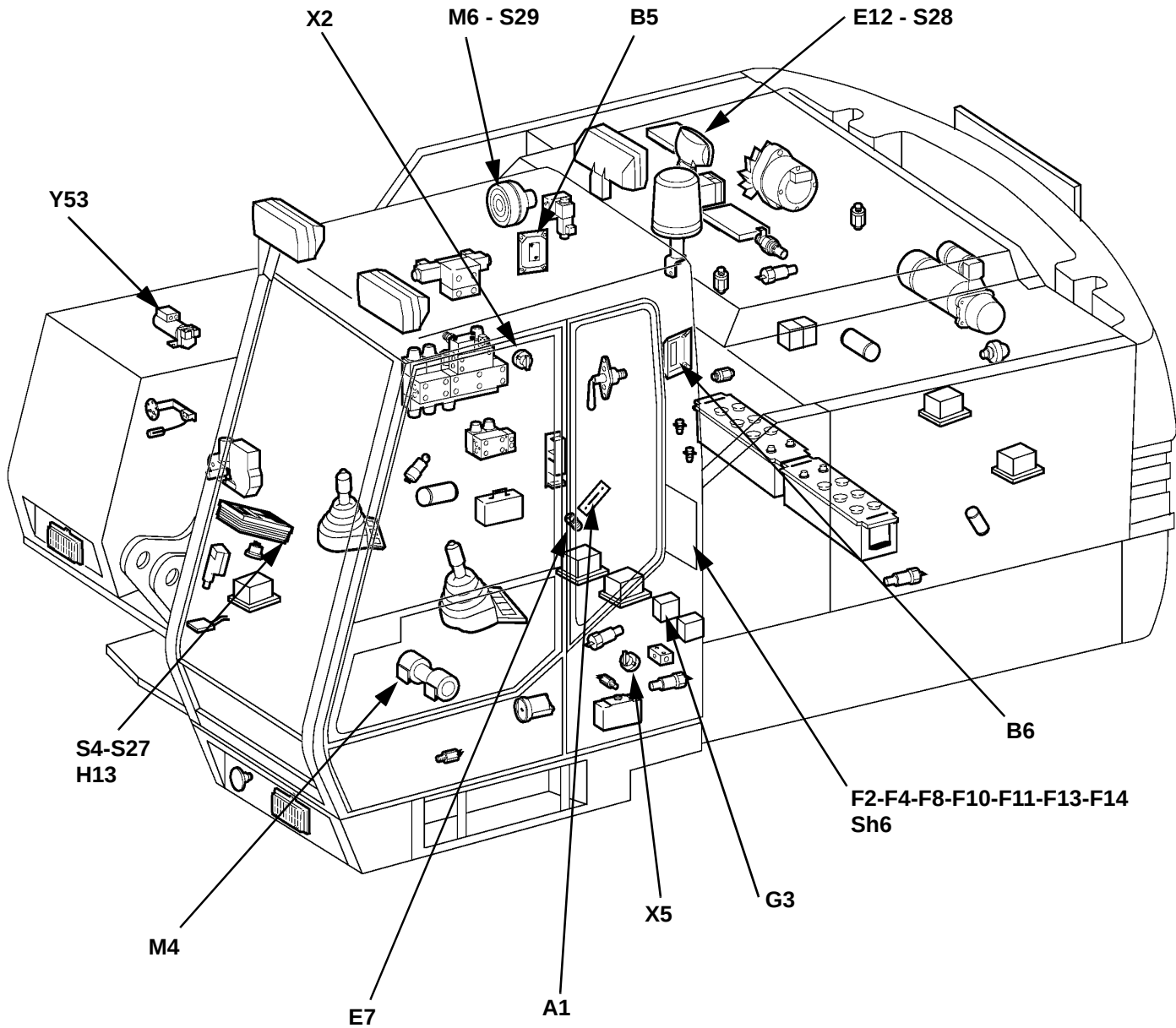
- B5 RH loudspeaker (optional)
- B6 LH loudspeaker (optional)
- M6 Cab blower motor (optional)
- S29 Cab blower switch (optional)

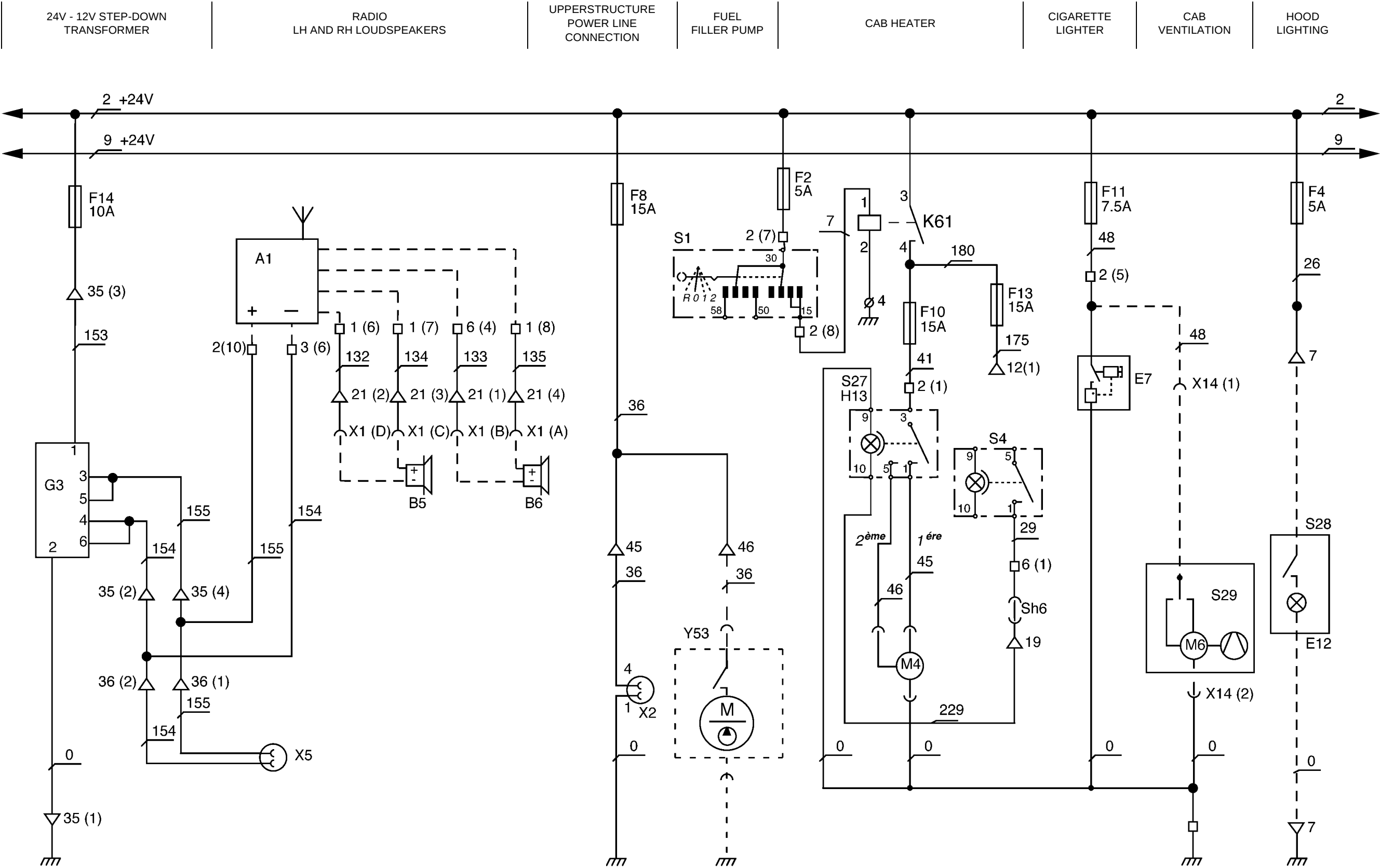
UPPERSTRUCTURE

- X2 Upperstructure power line connection
- Y53 Fuel filler pump (optional)

ENGINE

- E12 Engine compartment light (optional)
- S28 Engine compartment lighting switch (optional)





CM99K012

ELECTRICAL SCHEMATIC (PLATE 6) (788C/988C/1188C)

ELECTRICAL CABINET

- F2 Fuse, 5 A, starter key switch
- F32 Fuse, 5 A, (BAT +) electronics
- K4 Electronic supply relay
- H14 Troubleshooting test LED
- Sh6 Shunt
- V1 Diode

CAB

- A2 Electronic control box (788-988-1188)
- S22 Control keyboard (788-988-1188)
- X3 35-way connector (788-988-1188)
- X4 Troubleshooting test socket (788-988-1188)

ON FLOOR

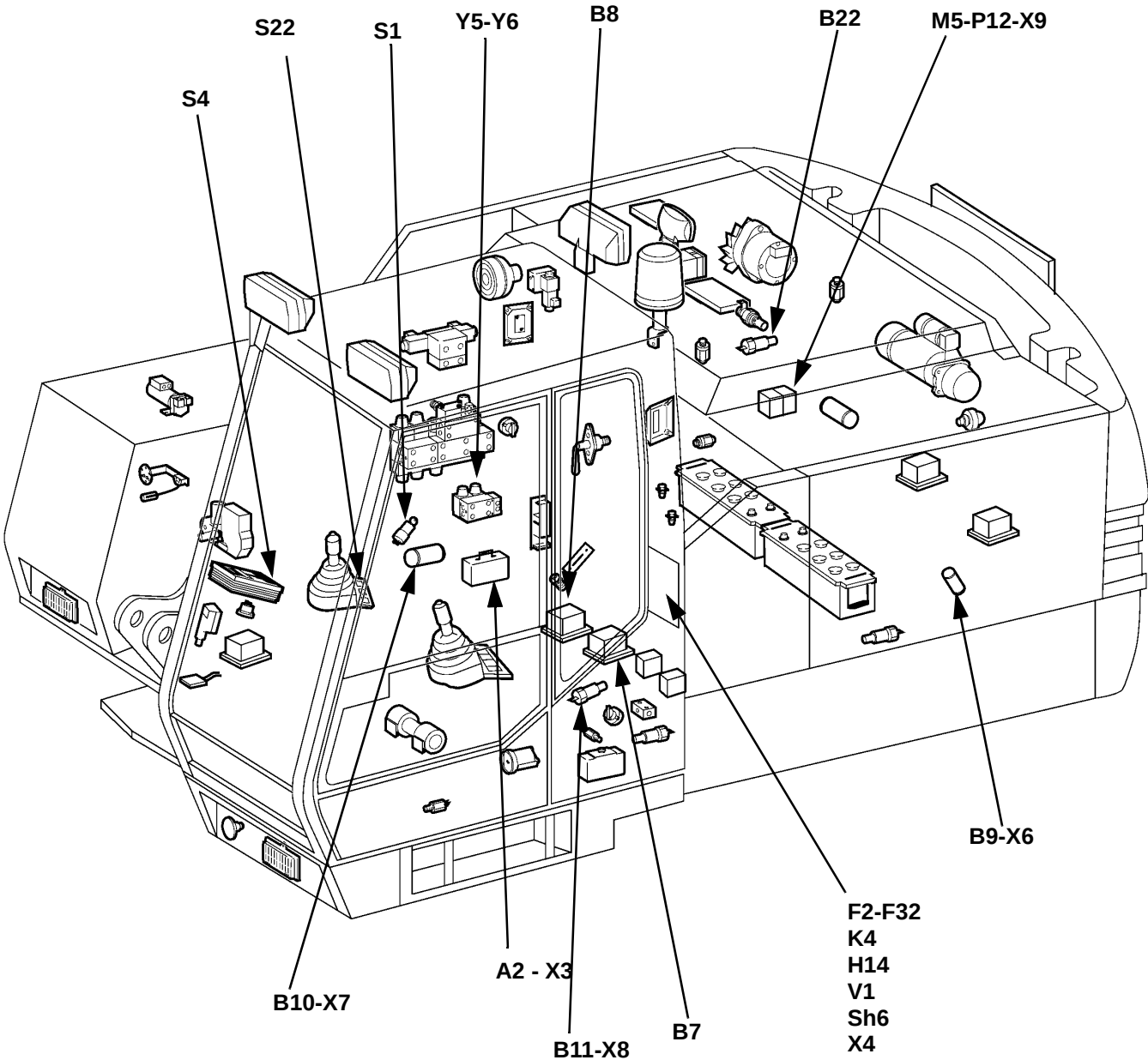
- B8 Travel detector pressure switch (788-988-1188)
- S1 Key switch
- S4 Working light switch

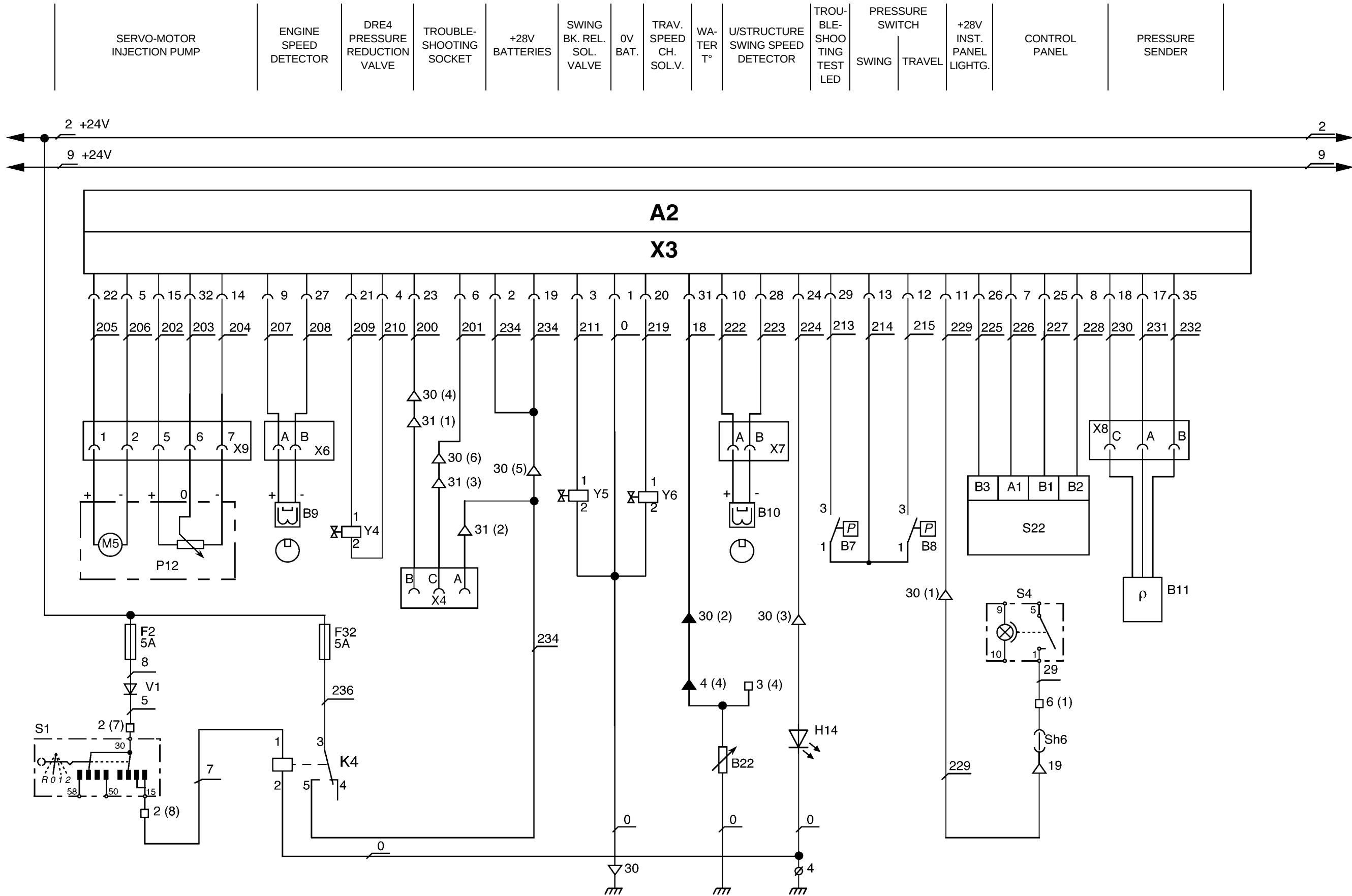
UPPERSTRUCTURE

- B7 Swing detection pressure switch (788-988-1188)
- B10 Swing motor speed detector (788-988-1188)
- B11 Hydraulic pressure sender (788-988-1188)
- Y5 Upperstructure brake release control solenoid valve
- Y6 Travel motor displacement change electro-control valve

ENGINE

- B9 Engine speed detector (788-988-1188)
- B22 Engine coolant temperature sender
- M5 Injection pump servo-motor (788-988-1188)
- P12 Servo-motor potentiometer (788-988-1188)
- X6 Engine speed detector connector (788-988-1188)
- X7 Upperstructure swing speed detector connector
- X8 Hydraulic pressure sender connector (788-988-1188)
- X9 Injection pump servo-motor connector (788-988-1188)
- Y4 DRE4 proportional pressure reduction valve





ELECTRICAL SCHEMATIC (PLATE 7)

ELECTRICAL CABINET

- F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)
- K50** Adjustable boom raising limiter relay
- K51** Adjustable boom retracting limitation relay
- Sh6** Shunt
- V52** Diode

CAB

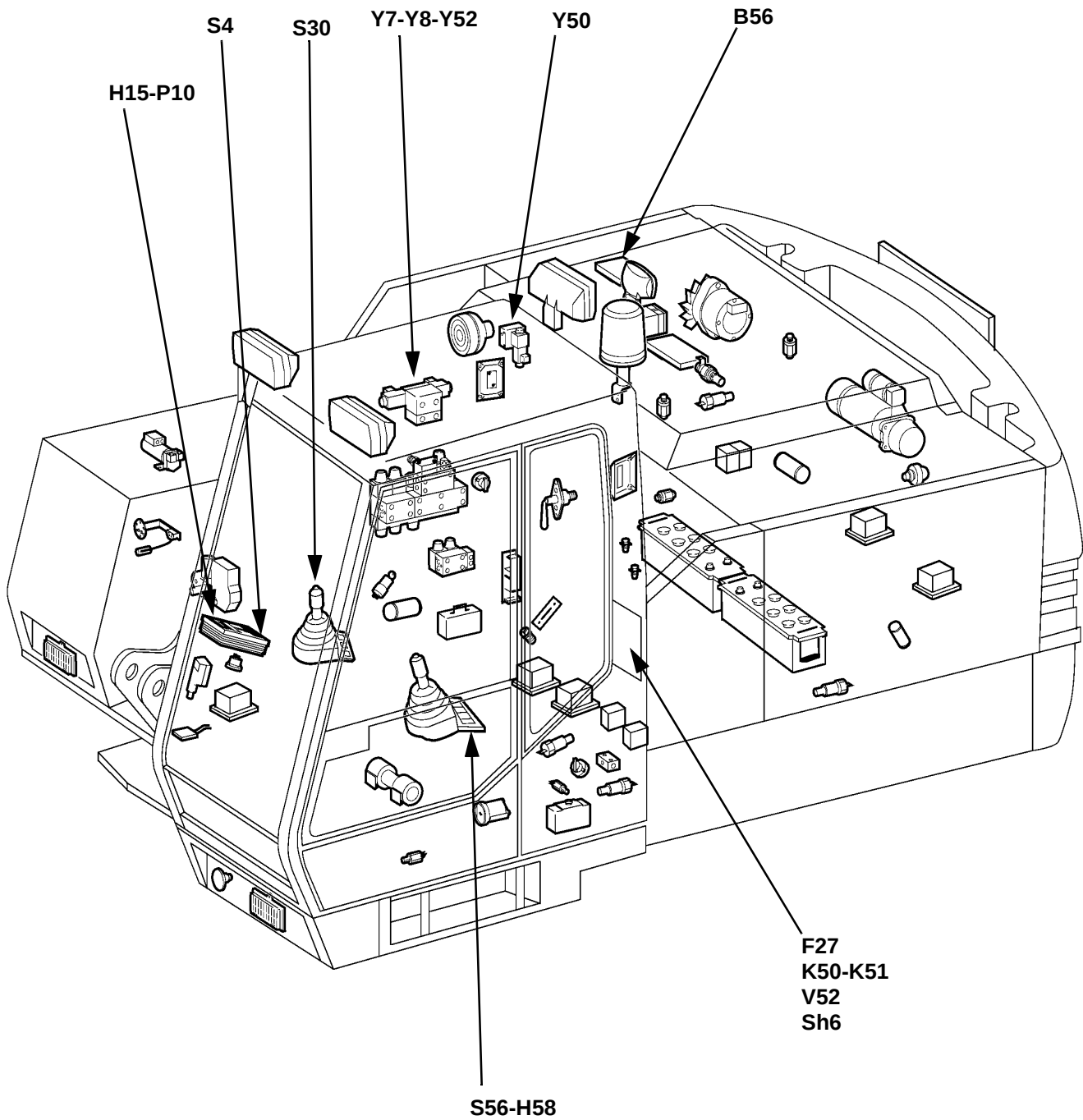
- H58** Quick coupler switch lighting (optional)
- S4** Working light switch
- S30** Adjustable or articulated boom control switch (optional)
- S56** Quick coupler switch (optional)

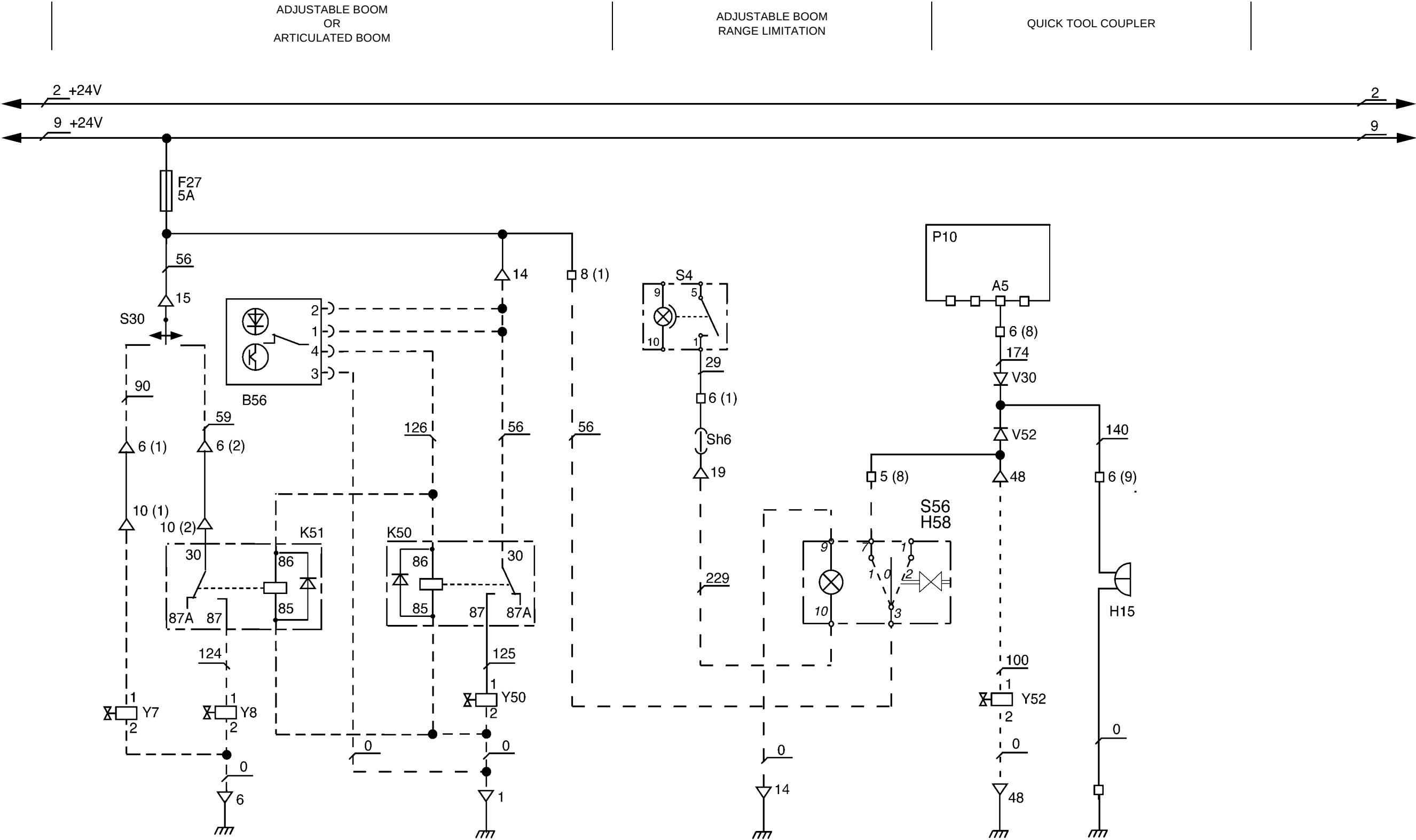
UPPERSTRUCTURE

- B56** Boom raising range limitation detector (optional)
- Y7** Adjustable or articulated boom extending electro-valve (optional)
- Y8** Adjustable or articulated boom retracting electro-valve (optional)
- Y50** Adjustable boom raising height limiter solenoid valve (optional)
- Y52** Quick coupler solenoid valve (optional)

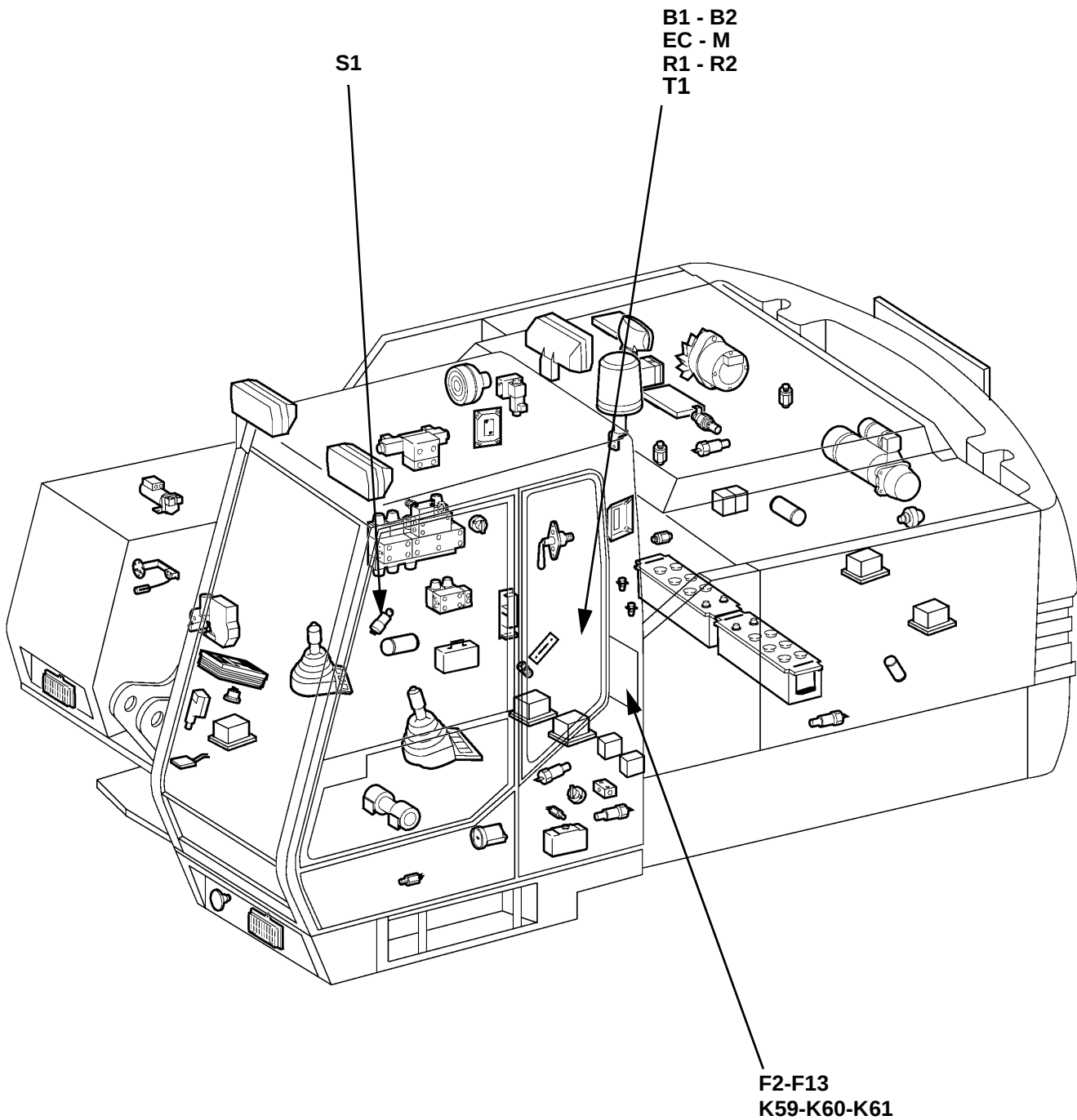
INSTRUMENT PANEL

- H15** Instrument panel audible warning
- P10** Instrument panel





ELECTRICAL SCHEMATIC (PLATE 8)

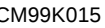


ELECTRICAL CABINET

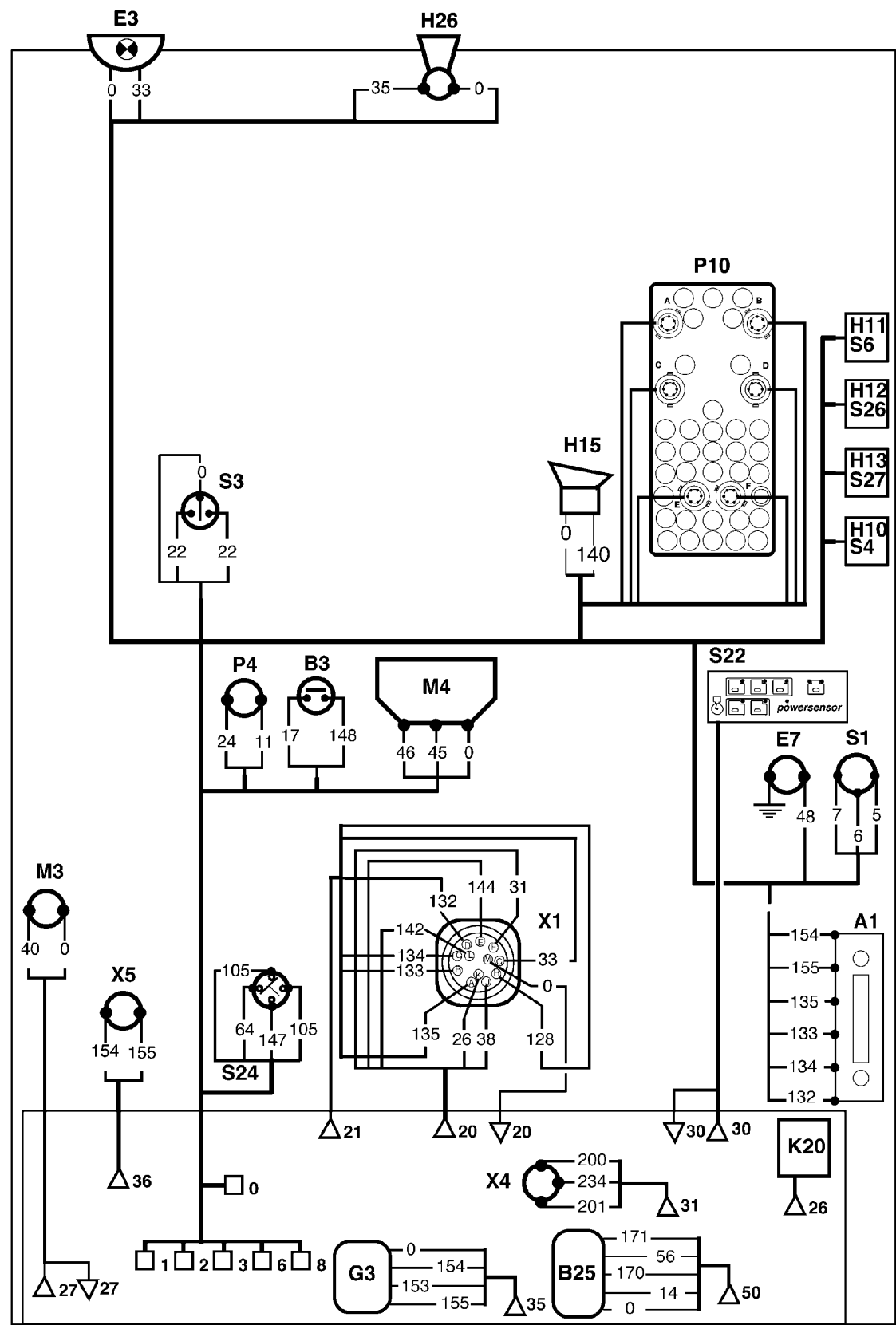
- F2** Fuse, 5 A, starter key switch
- F13** Fuse, 15 A, air conditioner
- K59** Air conditioning compressor relay
- K60** Air conditioning condenser relay
- K61** Battery relay (heater/air conditioner)

CAB

- B1** Air filter restriction pressure switch
- B2** Hydraulic oil filter restriction pressure switch
- EC** Compressor
- M** Condenser blower and blower motors
- R1** Blower speed resistor
- R2** Blower speed resistor
- S1** Key switch
- T1** Pressure switch



CAB FLOOR WIRING (STANDARD)



△▽□ See page 4

FLOOR

- A1 Radio
- B3 Pilot pressure switch
- B25 Threshold detector (788)
- E3 Upperstructure working lights
- E7 Cigarette lighter
- G3 Step-down transformer 24V / 12V
- H10 Working brake switch lighting
- H11 Windshield wiper switch lighting
- H12 Windshield washer switch lighting
- H13 Heater blower switch lighting
- H15 Instrument panel audible warning
- H26 Horn
- K20 Windshield wiper intermittent action
- M3 Windshield washer motor
- M4 Heater blower motor
- P4 Hourmeter
- P10 Instrument panel
- S1 Key switch
- S3 Horn switch
- S4 Working light switch
- S6 Windshield wiper switch
- S22 Control keyboard (788-988-1188)
- S24 Pilot safety switch
- S26 Windshield washer switch
- S27 Heater blower switch
- X1 Cab floor/cab connector
- X4 Troubleshooting test socket (788-988-1188)
- X5 12V accessories socket

CM99K023

ENGINE MODULE AND UPPERSTRUCTURE WIRING (STANDARD)

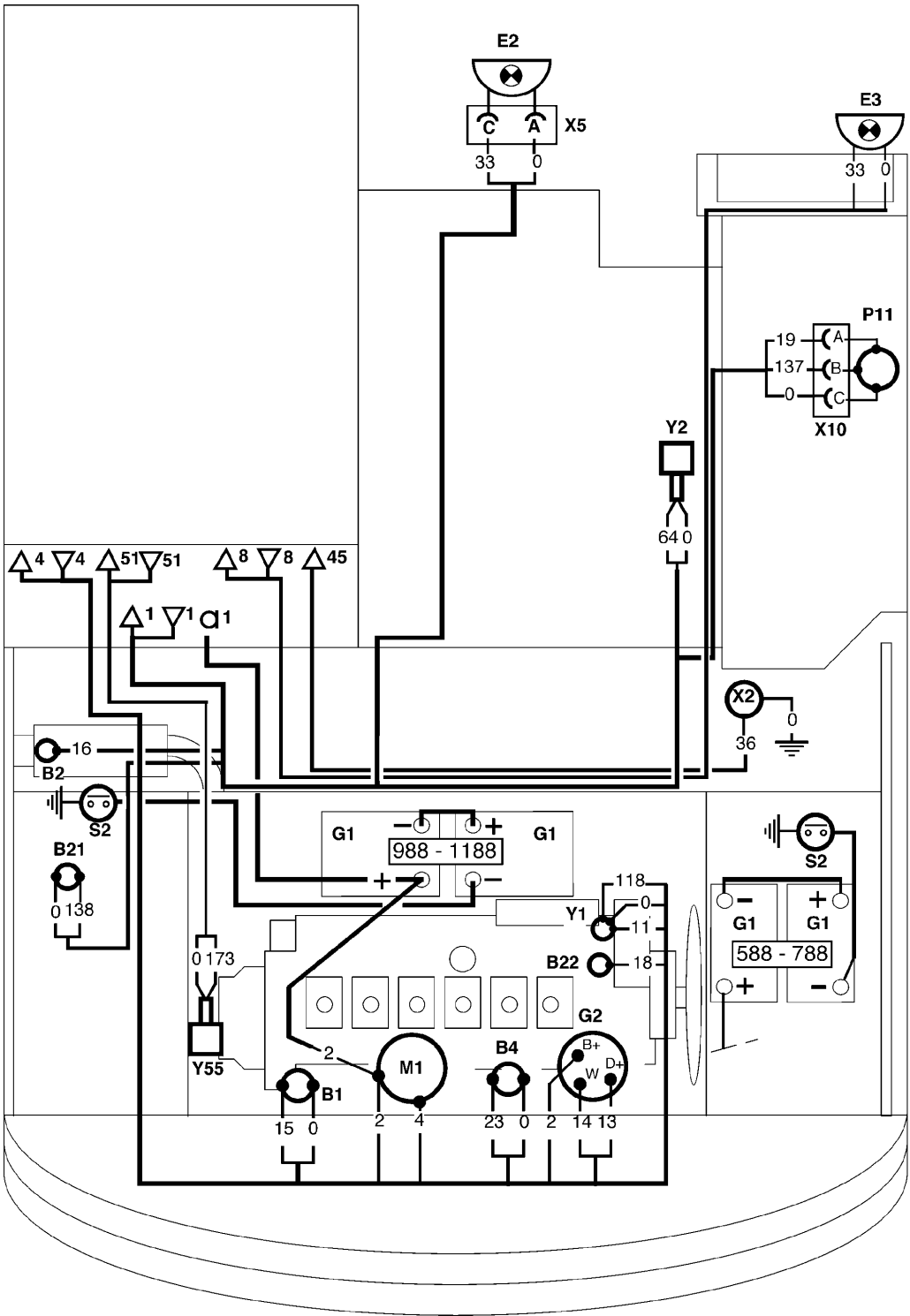
△ ▽ □ See page 4

UPPERSTRUCTURE

- B1** Air filter restriction pressure switch
- B2** Hydraulic oil filter restriction pressure switch
- B21** Hydraulic oil temperature sender
- E2** Attachment working light on boom
- E3** Upperstructure working lights
- G1** Batteries
- P11** Fuel level gauge
- S2** Battery master switch
- X2** Upperstructure power line connection
- X5** Attachment working light power connection
- X10** Fuel level indicator connector
- Y2** Pilot safety solenoid valve
- Y55** Heavy lift solenoid valve (788)

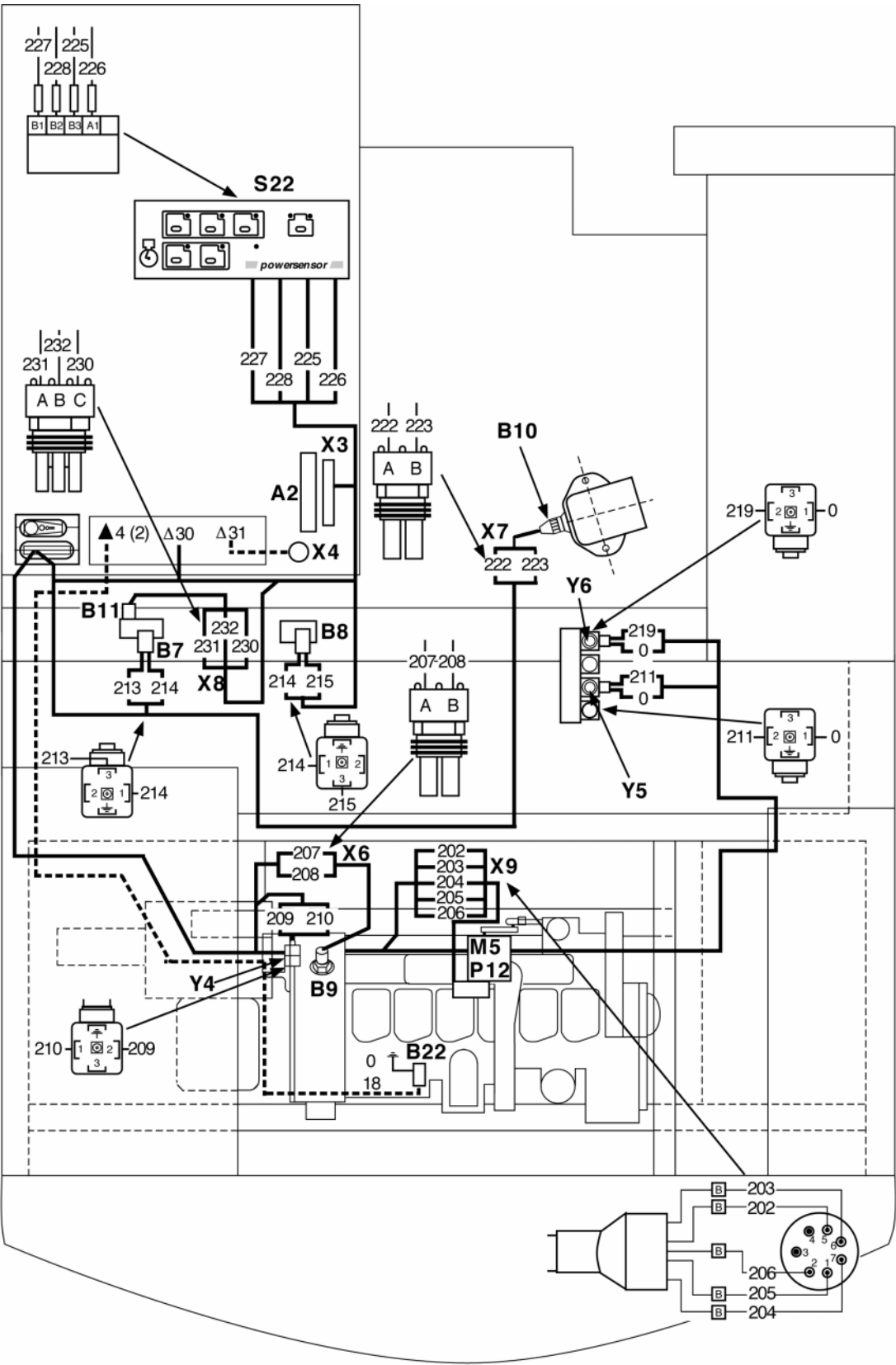
ENGINE

- B4** Engine oil pressure switch
- B22** Engine coolant temperature sender
- G2** Alternator
- M1** Starter motor
- Y1** Engine shut-down solenoid valve

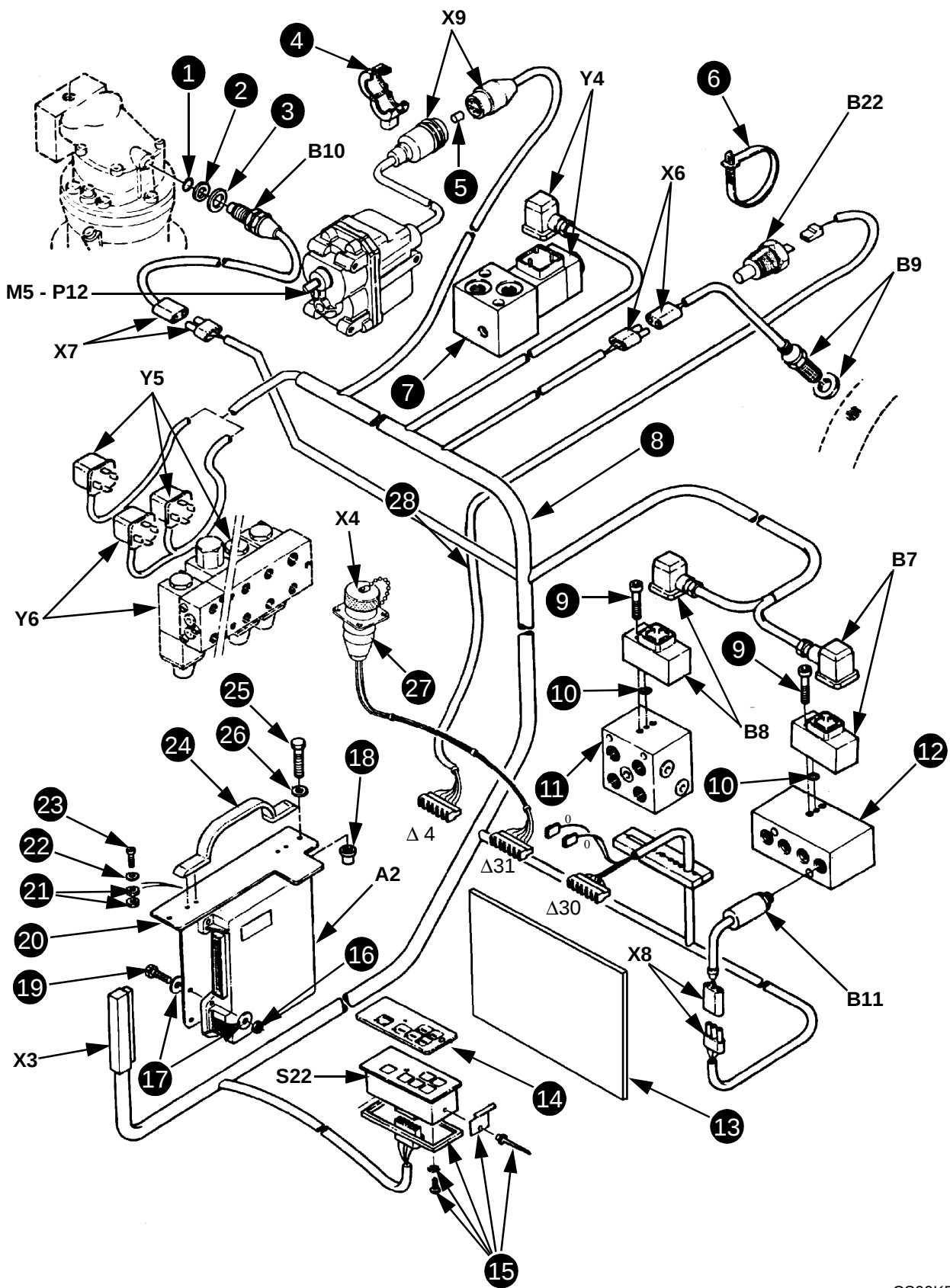


CM99K027

788C-988C-1188C ELECTRONIC WIRING CIRCUIT



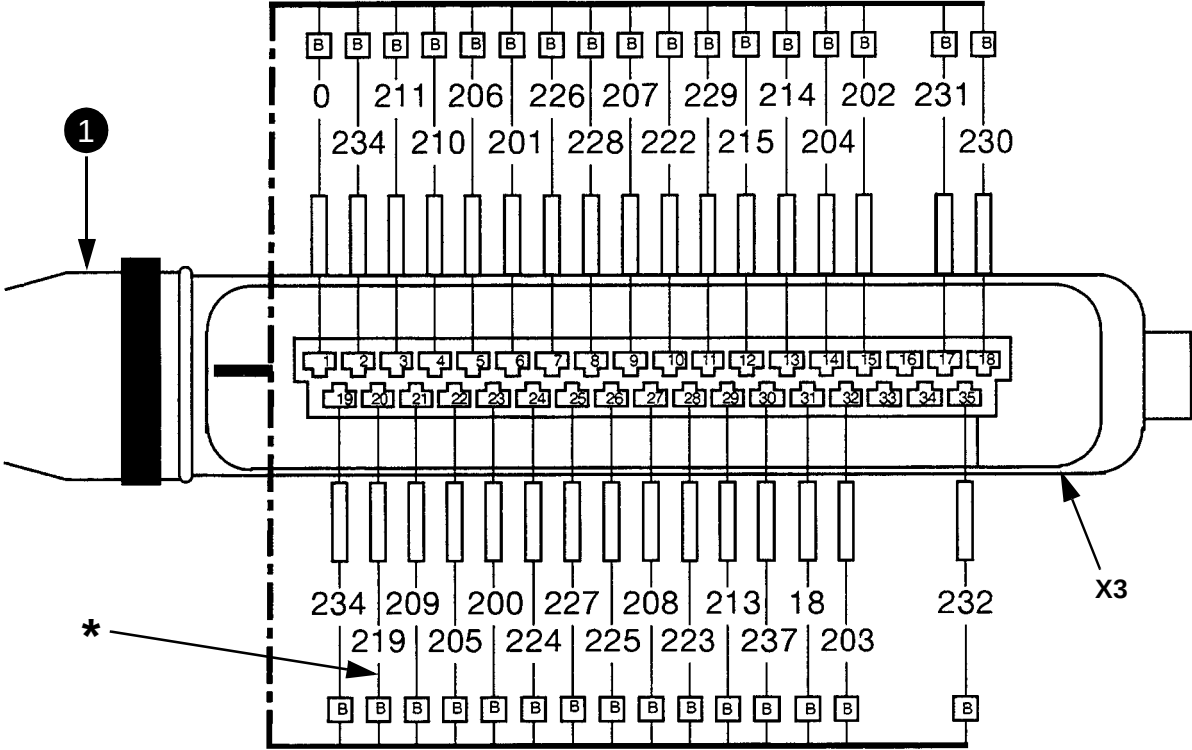
CM99K026



CS99K540

DETAILS OF 35 PINS CONNECTOR X3 ON 788C-988C-1188C EXCAVATORS

788C-988C-1188C ELECTRONIC WIRING CIRCUIT



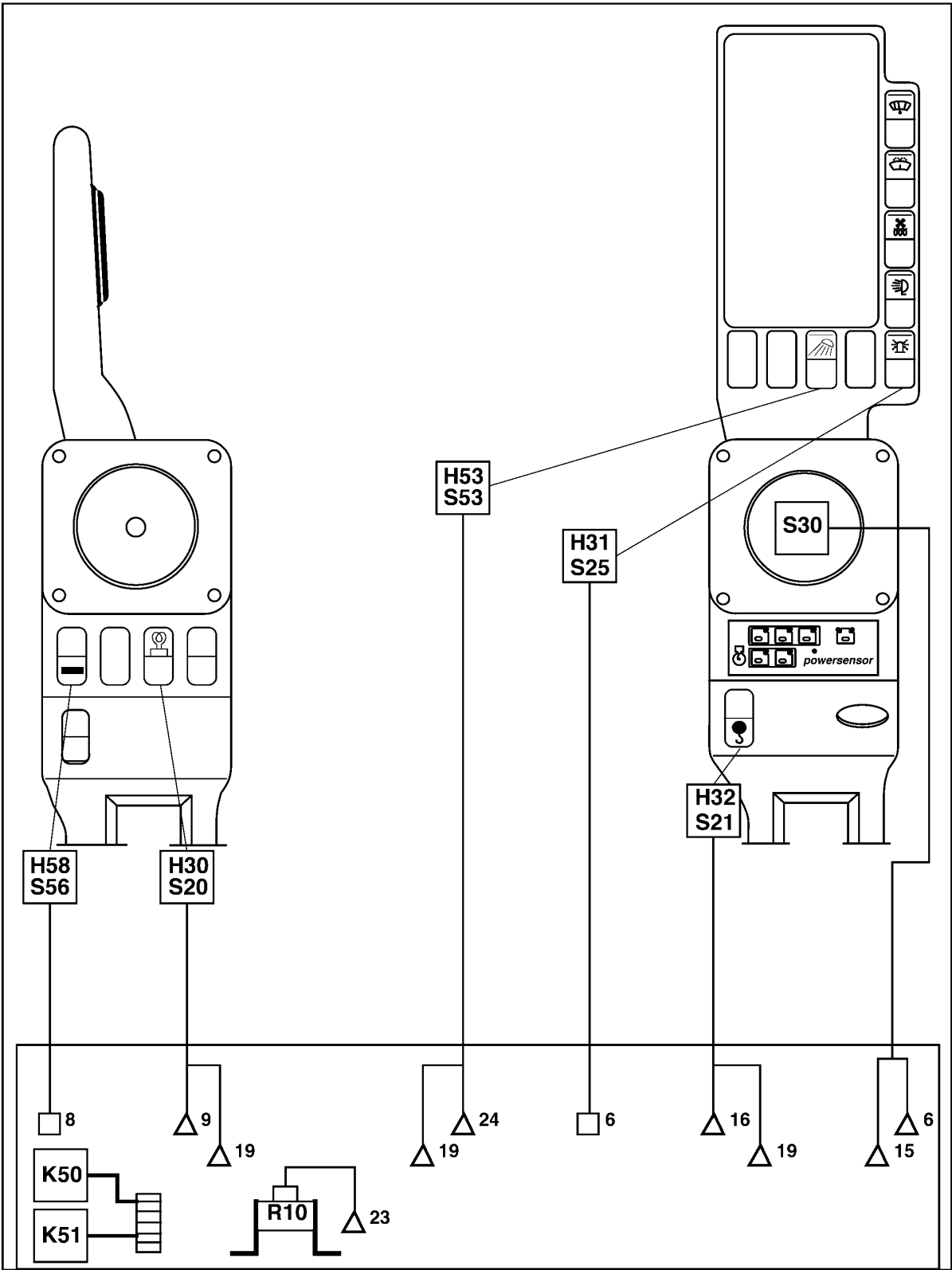
- A2 Electronic control box (788-988-1188)
- B7 Swing detection pressure switch (788-988-1188)
- B8 Travel detector pressure switch (788-988-1188)
- B9 Engine speed detector (788-988-1188)
- B10 Swing motor speed detector (788-988-1188)
- B11 Hydraulic pressure sender (788-988-1188)
- B22 Engine coolant temperature sender
- M5 Injection pump servo-motor (788-988-1188)
- P12 Servo-motor potentiometer (788-988-1188)
- S22 Control keyboard (788-988-1188)
- X3 35-way connector (788-988-1188)
- X4 Troubleshooting test socket (788-988-1188)
- X6 Engine speed detector connector (788-988-1188)
- X7 Upperstructure swing speed detector connector
- X8 Hydraulic pressure sender connector (788-988-1188)
- X9 Injection pump servo-motor connector (788-988-1188)
- Y4 DRE4 proportional pressure reduction valve
- Y5 Upperstructure brake release control solenoid valve
- Y6 Travel motor displacement change electro-control valve

- 1 O-ring
- 2 Ring
- 3 Washer
- 4 Lock
- 5 Plug
- 6 Clamp
- 7 Pressure reduction valve
- 8 Electronic harness
- 9 Screw
- 10 O-ring
- 11 Travel block
- 12 Swing block
- 13 Printed circuit card
- 14 Decal
- 15 Control panel retention
- 16 Nut
- 17 Washer
- 18 Rivet
- 19 Screw
- 20 Bracket
- 21 Nuts
- 22 Washer
- 23 Screw
- 24 Handle
- 25 Screw
- 26 Washer
- 27 Troubleshooting socket harness
- 28 Engine harness

CS99K546

- * Wire 219, only on two-speed excavators
- 1 Electronic harness
- X3 35-pin connector

CAB FLOOR WIRING (OPTIONAL)



ELECTRICAL CABINET

1 Connecting strip

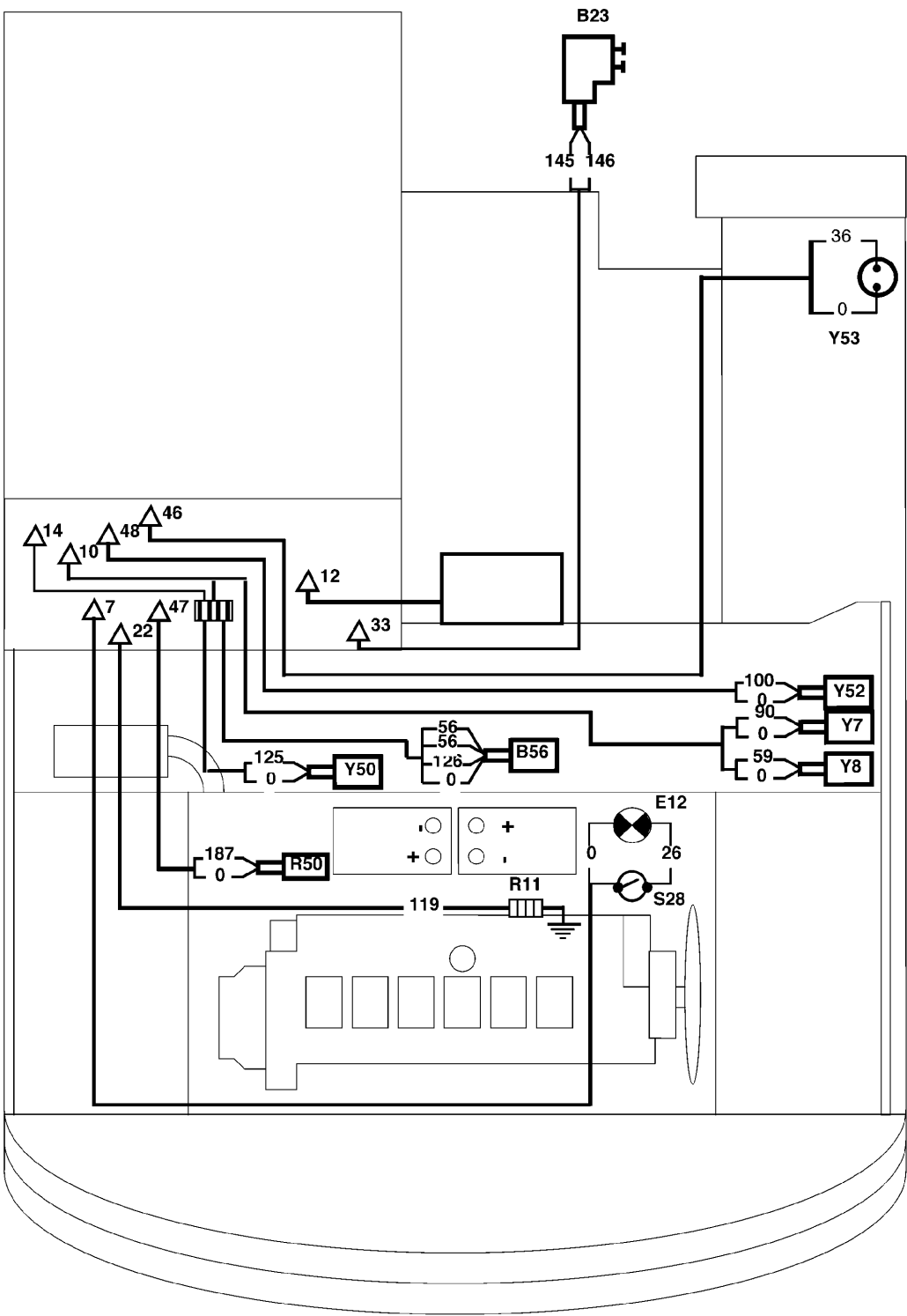
△ ▽ □ See page 6

INSTRUMENT PANEL

- H30 Cold start assistance switch lighting (optional)
- H31 Rotary light switch lighting (optional)
- H32 Overload indicator switch lighting (optional)
- H53 Cab front working light switch lighting (optional)
- H58 Quick coupler switch lighting (optional)
- K50 Adjustable boom raising limiter relay
- K51 Adjustable boom retracting limitation relay
- R10 Resistor, 0.85 Ohms
- S20 Cold start assistance switch (optional)
- S21 Overload indicator switch (optional)
- S25 Rotary light switch (optional)
- S30 Adjustable or articulated boom control switch (optional)
- S53 Front working lights switch (optional)
- S56 Quick coupler switch (optional)
- V52 Quick coupler switch diode

CM99K024

ENGINE MODULE AND UPPERSTRUCTURE WIRING (OPTIONAL)



ELECTRICAL CABINET

- 1 Connecting strip
- 2 Air conditioner
- △ ▽ See page 6

UPPERSTRUCTURE

- B23 Overload indicator (optional)
- B56 Boom raising range limitation detector (optional)
- R50 Fuel heater (optional)
- Y7 Adjustable or articulated boom extending electro-valve (optional)
- Y8 Adjustable or articulated boom retracting electro-valve (optional)
- Y50 Adjustable boom raising height limiter solenoid valve (optional)
- Y52 Quick coupler solenoid valve (optional)
- Y53 Fuel filler pump (optional)

ENGINE

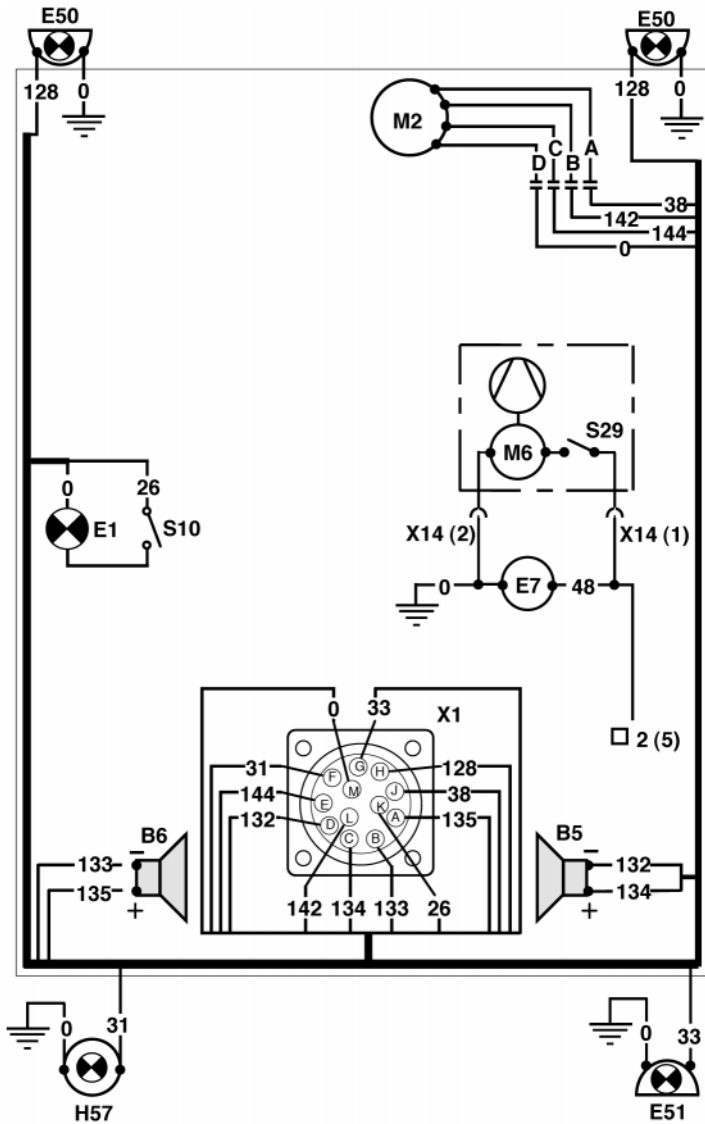
- E12 Engine compartment light (optional)
- R11 Cold start assistance plug (optional)
- S28 Engine compartment lighting switch (optional)

CM99K028

CAB AND CAB OPTION WIRING

- A White wire
- B Grey wire
- C Blue wire
- D Black wire
- E1 Cab lighting
- E7 Cigarette lighter
- E50 Cab front working lights
- E51 Cab rear working light
- H57 Standard or Italian rotary light
- B5 RH loudspeaker (optional)
- B6 LH loudspeaker (optional)
- M2 Windshield wiper motor
- M6 Cab blower motor (optional)
- S10 Cab lighting switch
- S29 Cab blower switch (optional)

- X1 (A) (B) (C) (D) Cab floor/cab LH and RH loudspeaker connector
- X1 (H) (G) Cab floor/cab front and rear working lights connector (optional)
- X1 (E) (J) (M) (L) Cab floor/cab working light, windshield wiper motor connector
- X1 (F) Cab floor/cab rotary light connector (specific to certain countries)
- X1 (K) Cab floor/cab interior lighting connector.
- X14 (1) (2) Cab blower plug (optional)
- 2 (7) 10 way connector (see printed circuit wiring on page 5)



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Section

4001

ELECTRICAL SCHEMATICS
1188 Wheeled Excavators (old version)

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SPECIFICATIONS

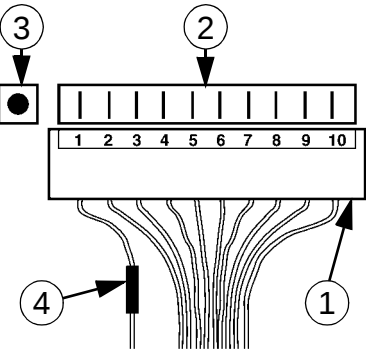
System voltage.....	24 Volts negative earth and 12 Volts negative earth
Batteries	2 x 12 Volts 120 A/hrs, low maintenance batteries
Alternator.....	BOSCH, 28 Volts, 45 Amps
Starter motor	BOSCH, 24 Volts, 4.0 kW

SCHEMATIC SYMBOLS

- A (n)** Radio/housings
- B (n)** Indicators/pressure switches/loudspeakers/pressostats/senders/heat sender/gauge
- E (n)** Lighting components
- F (n)** Fuses
- G (n)** Electrical supply generators
- H (n)** Warning devices (visible and audible)
- K (n)** Relays
- M (n)** Motors
- P (n)** Instruments
- R (n)** Resistors/heater plugs
- S (n)** Switches/battery master switch
- Sh (n)** Shunt resistors
- V (n)** Diodes
- X (n)** Supply line connections
- Y (n)** Solenoid valves, solenoids

NOTE : The (n) shows the component number

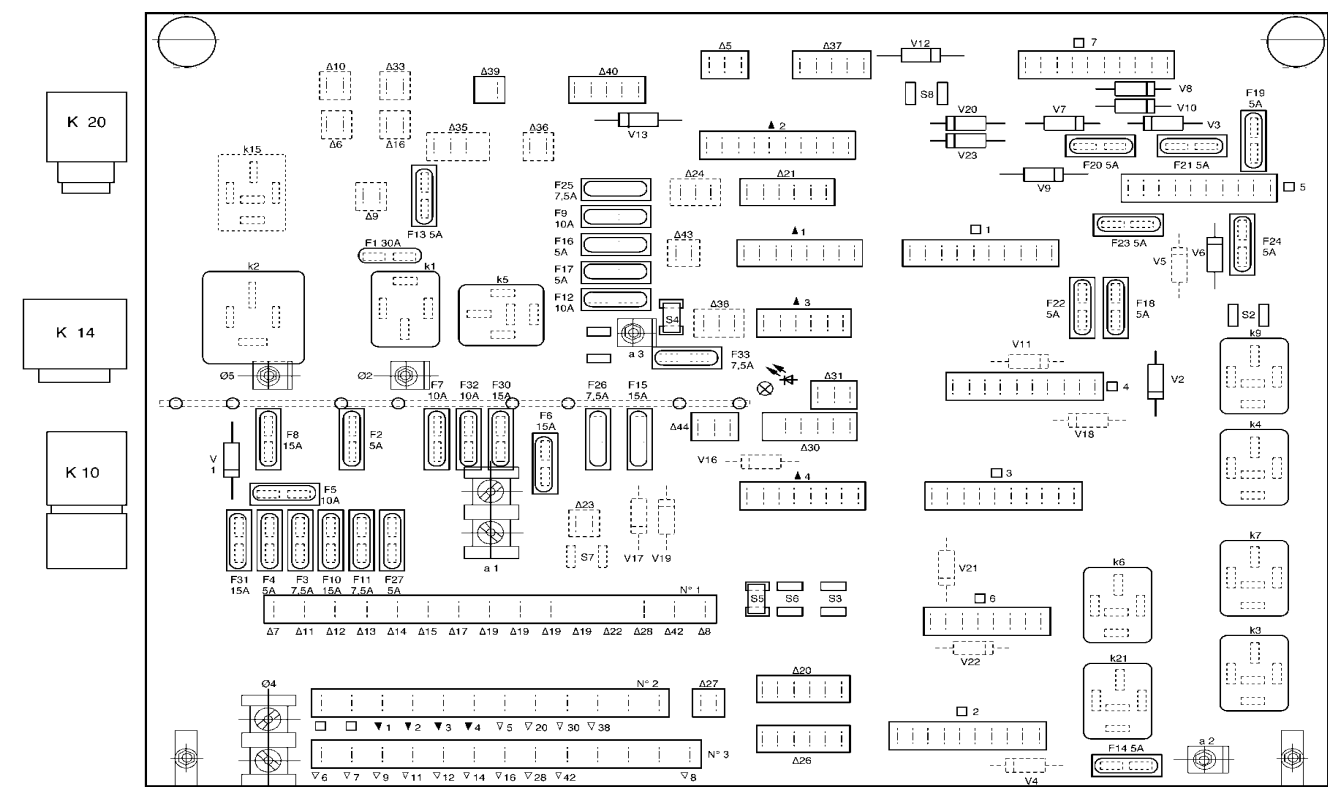
-  (n) Supply on printed circuit
-  (n) Battery terminal
-  (n) Printed circuit earth connection terminal
-  Printed circuit earth connector
-  A1 Instrument panel connector
-  1 or  1 or  1 Harness identification
-  1(1) or  1(1) or  1 (1) Harness identification followed by path identification number
-  (1) or  (1) Printed circuit earth connectors



The installation position for the harness connector (1) on connector (2) of the printed circuit is identified by a red mark (3) followed by the figure 1 on the printed circuit. This identification corresponds to the position of path 1 of the harness connector (1). This position is completed when the path 1 line is shown by a red ring (4) located on line 1 wire, or by red paint marking.

-  Local earth
-  Wire number
- NC** Closed circuit
- NO** Open circuit
-  Intersection of two wires with connetion point
-  Intersection of two wires without connetion point
-  Link with following plate
-  Link with preceding plate
-  Return to another plate with the same letter
-  Bulbs
-  Test bulb
-  Light emitting diode (LED)
-  Regulator

DESCRIPTION OF ELECTRICAL CABINET PRINTED CIRCUIT (STANDARD)



PDH0215

- Q1 24 Volts supply before contact
- Q2 12 Volts supply before contact (radio)
- Q3 Not used
- F2 5A Fuse, starter switch
- F3 7.5A Fuse, instrument panel
- F4 5A Fuse, cab lighting, horn relay
- F6 15A Fuse, upperstructure headlights
- F7 10A Fuse, horn
- F8 15A Fuse, upperstructure power line connection
- F9 10A Fuse, windshield washer, windshield wiper
- F10 15A Fuse, ventilation, heater, fuel heating device
- F11 7.5A Fuse, cigar lighter
- F12 10A Fuse, pilot safety
- F15 15A Fuse, main beam headlights
- F16 5A Fuse, RH stop light
- F17 5A Fuse, LH stop light
- F18 5A Fuse, front RH side light
- F19 5A Fuse, front LH side light
- F20 5A Fuse, front RH dipped headlights
- F21 5A Fuse, front LH dipped headlights
- F23 5A Fuse, RH main beam headlight
- F24 5A Fuse, LH main beam headlight

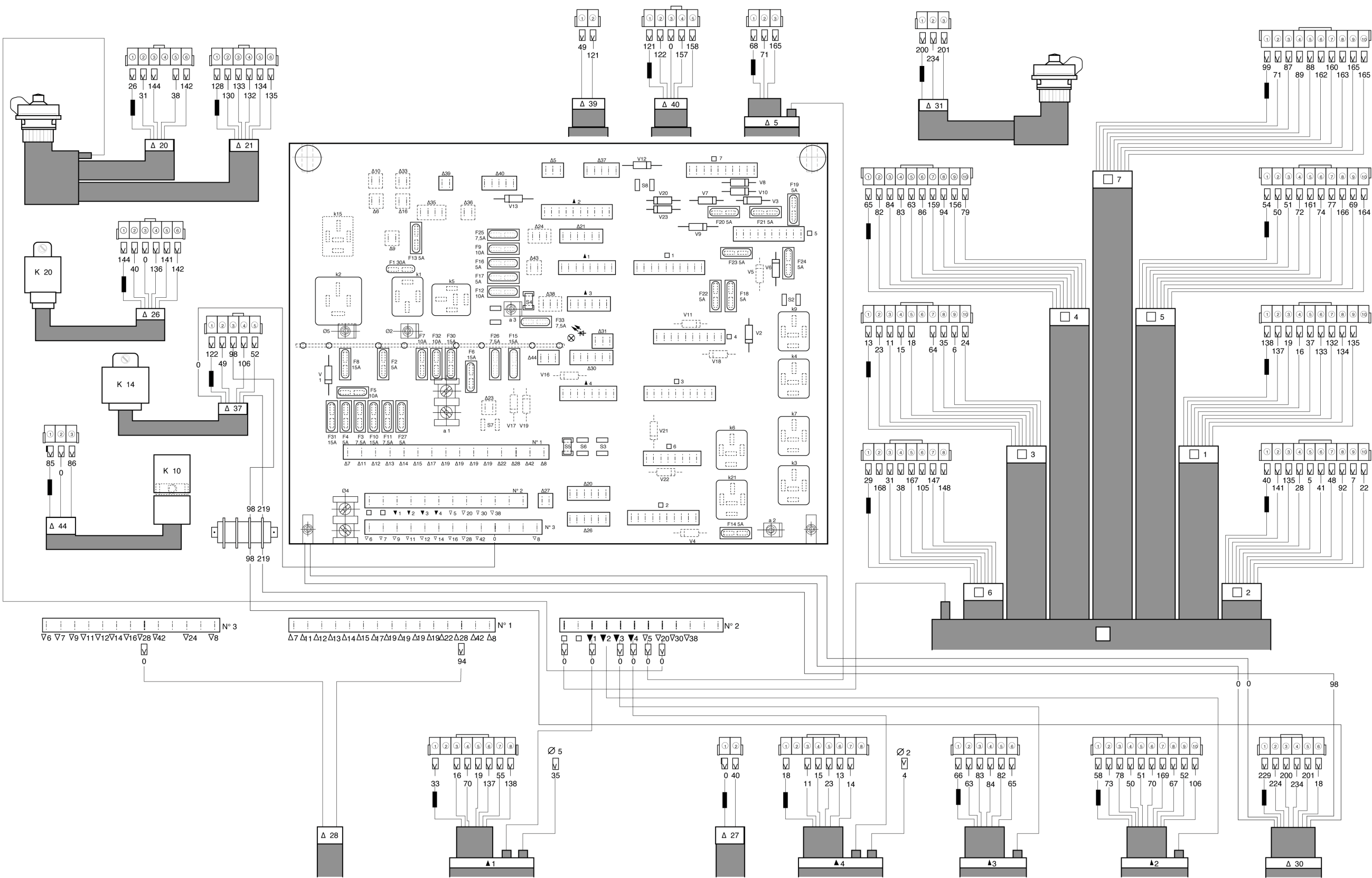
- F25 7.5A Fuse, parking brake
- F26 7.5A Fuse, direction indicators, hazard warning
- F31 15A Fuse, windshield wiper intermittent action
- F32 10A Fuse, (not used)
- F33 7.5A Fuse, electronic control box
- ⚡ Troubleshooting test LED
- K1 Starter motor relay
- K2 General contact relay
- K3 Hourmeter relay
- K4 Electronic control box supply relay
- K5 Horn relay
- K6 Working light relay
- K7 Upperstructure and attachment light relay
- K9 Axle unlocking relay
- K10 Flasher unit relay
- K14 Speed change relay
- K20 Windshield wiper intermittent action
- K21 LH control arm pilot safety relay
- Sh2, Sh4, Sh5, Sh8 Shunt
- Sh6, Sh7 Not used

- V1 General contact diode
- V2 K3 relay diode
- V3 Side light diode
- V6 Main beam headlight diode
- V7 Diode for RH direction indicator lamp
- V8 Diode for LH direction indicator lamp
- V9 Hazard warning diode

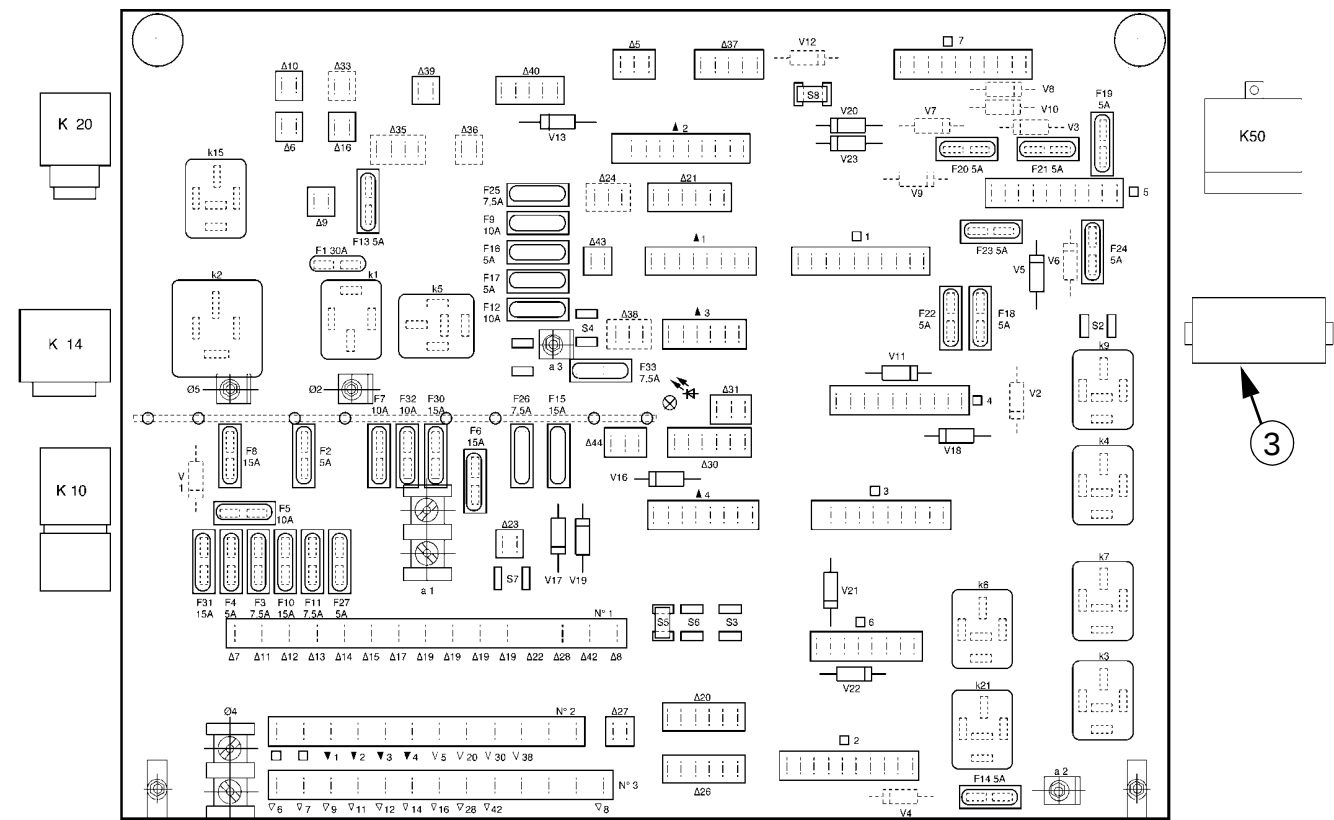
- V10 LH direction indicator diode
- V20 RH direction indicator diode
- V23 Hazard warning diode
- Ø2 Starter connection
- Ø4 Printed circuit earth
- Ø5 Upperstructure power line connection

ELECTRICAL CABINET PRINTED CIRCUIT WIRING (STANDARD)

- 1 Harness, 10 way connector, floor harness
- 2 Harness, 10 way connector, floor harness
- 3 Harness, 10 way connector, floor harness
- 4 Harness, 10 way connector, floor harness
- 5 Harness, 10 way connector, floor harness
- 6 Harness, 8 way connector, floor harness
- 7 Harness, 10 way connector, floor harness
- △5 Harness, 3 way connector, direction indicator, hazard warning
- △20 Harness, 6 way connector, cab power connection
- △21 Harness, 6 way connector, cab power connection
- △26 Harness, 6 way connector, windshield wiper, K20 intermittent action
- △27 Harness, 2 way connector, windshield washer
- △28 Safety clips, working brake, parking brake
- △30 Harness, 6 way connector, electronic control box
- △31 Harness, 3 way connector, troubleshooting test socket
- △37 Harness, 5 way connector, two-speed
- △39 Harness, 2 way connector, parking brake pressostat
- △40 Harness, 5 way connector, two-speed control
- △44 Harness, 3 way connector, flasher unit
- ▲1 Harness, 8 way connector, common harness
- ▲2 Harness, 10 way connector, lighting and electro
- ▲3 Harness, 6 way connector, brake unit
- ▲4 Harness, 8 way connector, engine
- ▼1 Clip, common harness
- ▼2 Clip, lighting and electro
- ▼3 Clip, brake unit
- ▼4 Clip, engine
- ▽28 Clip, working brake, parking brake
- ▽5 Clip, direction indicator, hazard warning
- ▽20 Clip, cab power connection



DESCRIPTION OF ELECTRICAL CABINET PRINTED CIRCUIT (OPTIONAL)



PDH0245

- F1**

30A Fuse, cold start assistance (optional)

F5

10A Fuse, working light and rotary light relay (specific to certain countries)

F13

5A Fuse, overload indicator (optional)

F14

5A Fuse, radio (optional)

F22

5A Fuse, rear foglight (specific to certain countries)

F27

5A Fuse, adjustable boom (optional)

F30

30A Fuse, cab working lights (optional)

K15

Cold start assistance relay (optional)

K50

Adjustable boom raising range limitation relay
- V4**

Radio diode (optional)

V5

Rear foglight diode (specific to certain countries)

V11

Overload diode (optional)

V16, V17, V18, V19

Pilot system cancellation diode (specific to certain countries)

V21

Overload diode (optional)

V22

Rotary light diode (specific to certain countries)

Sh8

Shunt (pilot system cancellation)
For this option, remove shunt Sh4 and install it at Sh8

ELECTRICAL CABINET PRINTED CIRCUIT WIRING (OPTIONAL)

- 1**

Adjustable boom raising range limitation detector cable (specific to certain countries)

2

Adjustable boom raising range limitation electro control harness (specific to certain countries)

3

4 unit strip (specific to certain countries)
- ▽

Adjustable boom raising range limitation cable (on terminal no. 3)

△ **6**

Harness, adjustable boom (PM version, special for Germany)

9

Harness, cold start assistance (optional)

10

Harness, adjustable boom (PM version, special for Germany)

11

Rear foglight harness (specific to certain countries)

12

Harness, fuel heating device (optional)

15

Cable, adjustable boom raising range limitation (specific to certain countries)

16

Overload indicator harness (optional)

22

Cold start assistance heater plug harness (optional)

23

Cold start assistance heating element harness (optional)

24

Cab front lamps and rear working lamp harness (optional)

33

Overload indicator harness (optional)

38

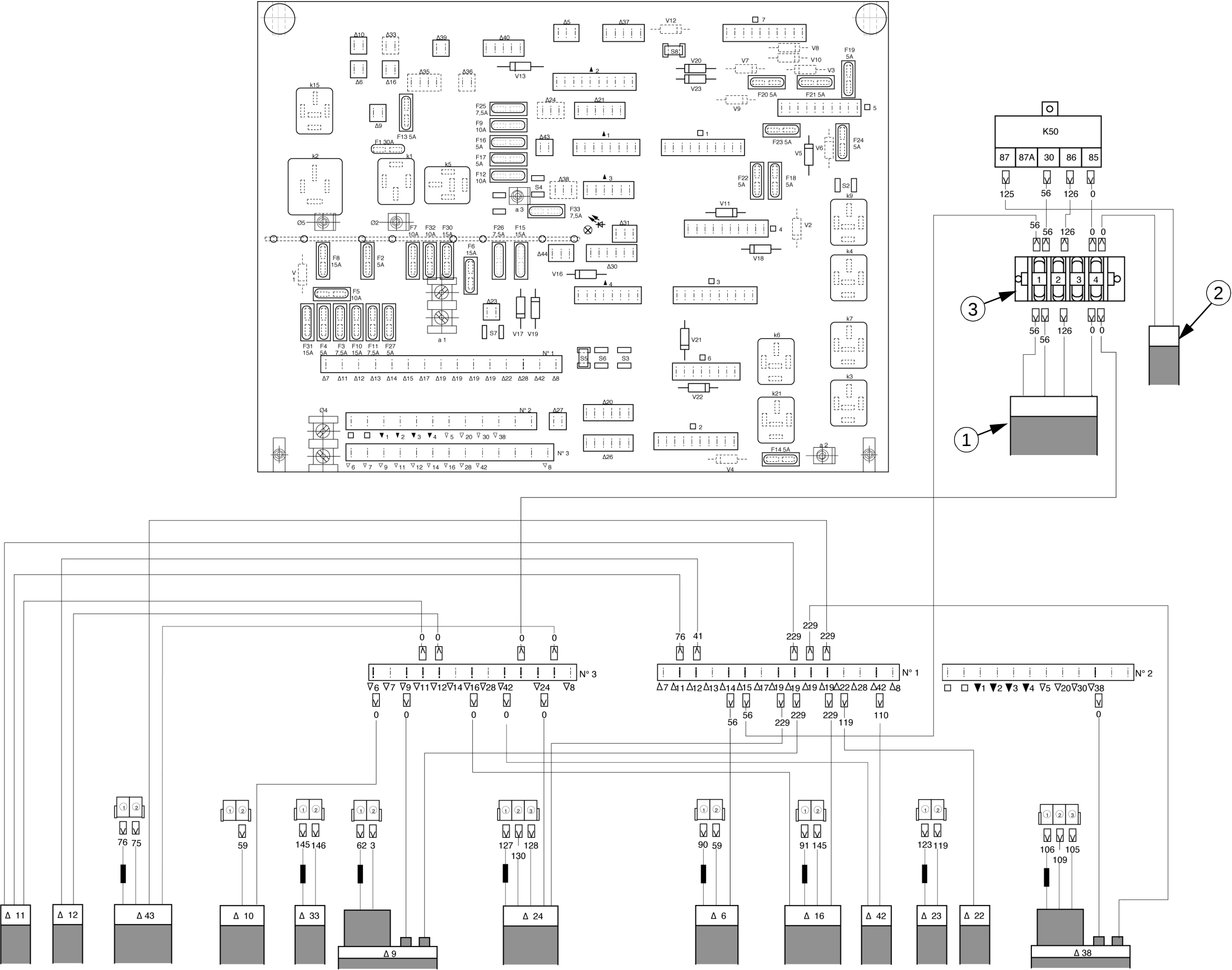
Harness, pilot system cancellation (specific to certain countries)

42

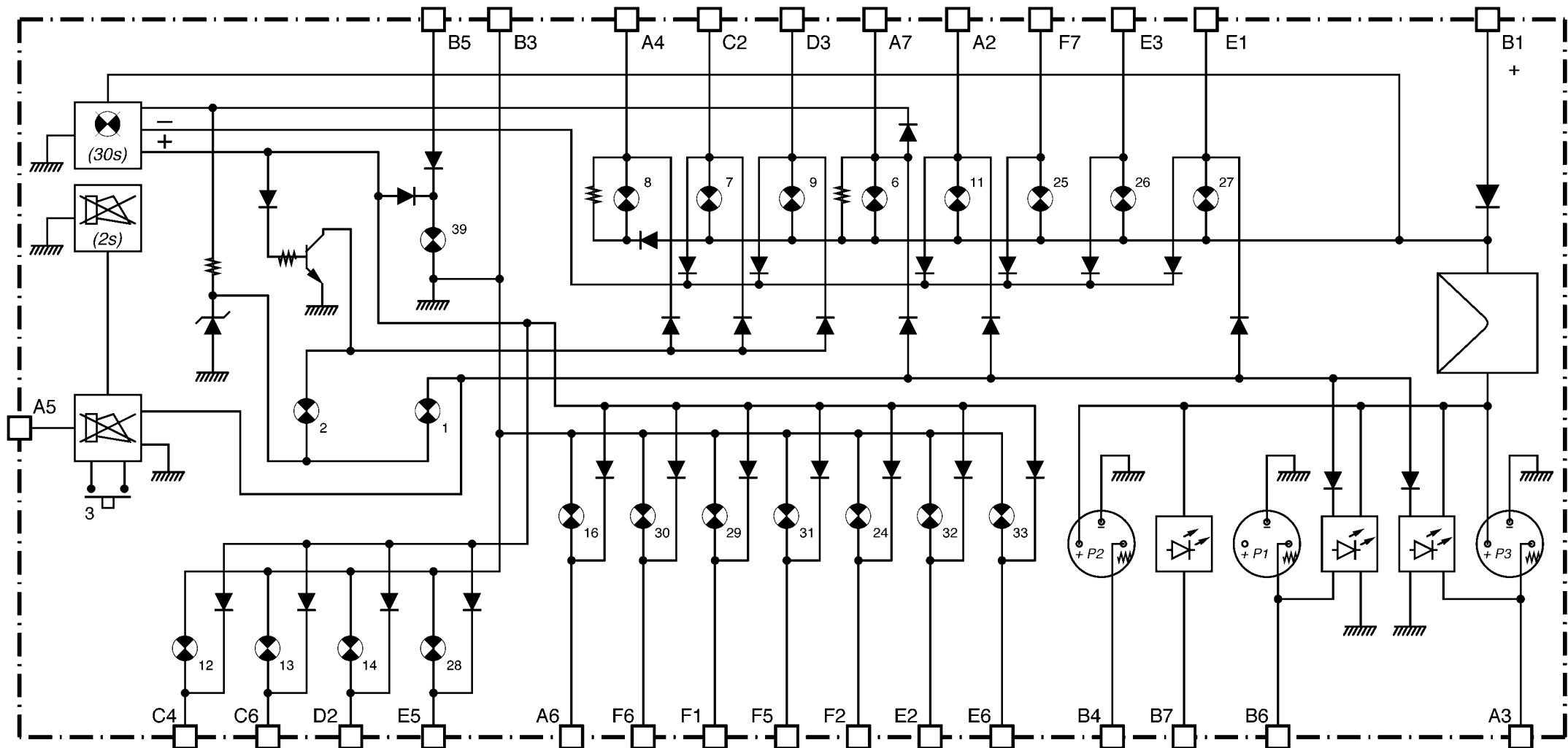
Cable, pilot system cancellation (specific to certain countries)

43

Rear foglight harness (specific to certain countries)
- Lep 7-57580GB
- Issued 07-94



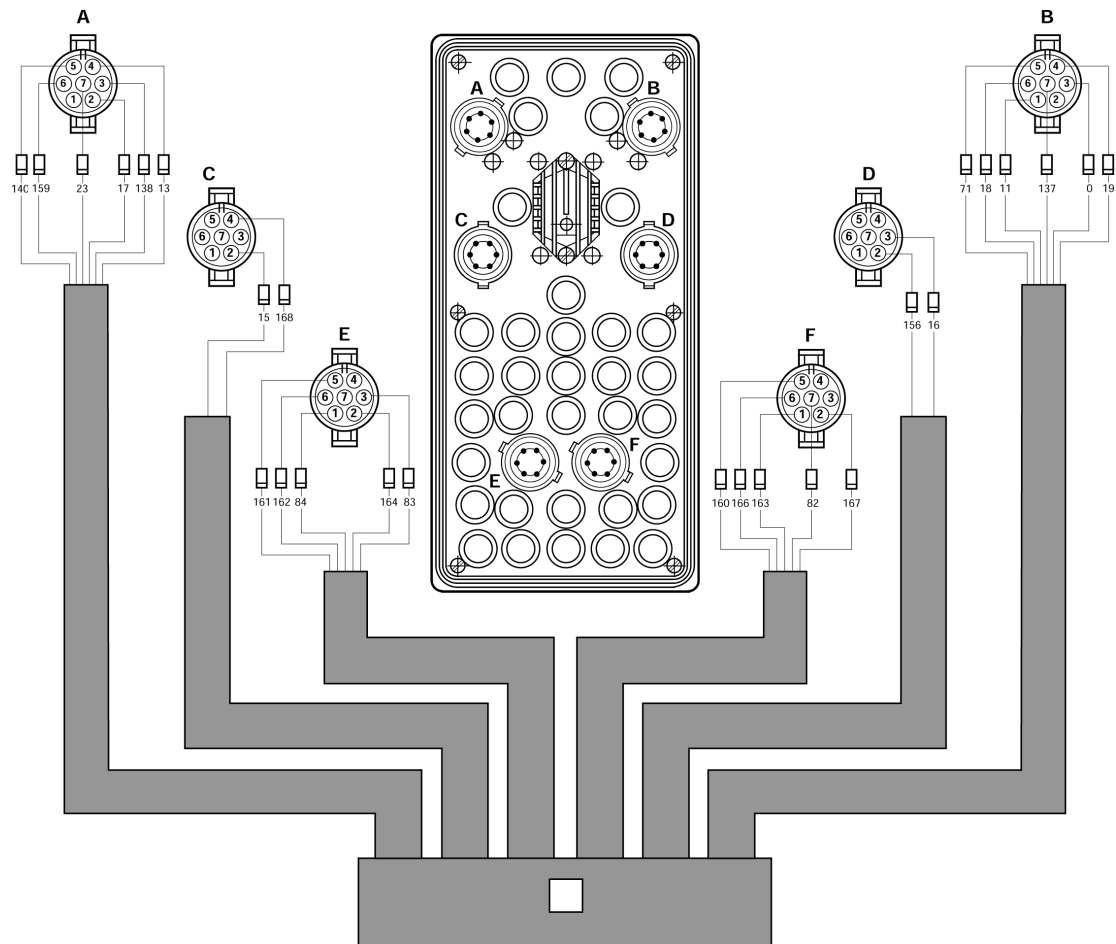
P10 INSTRUMENT PANEL ELECTRICAL SCHEMATIC(PLATE 1)



PDH0217

- | | | |
|--|---|--|
| A2 Minimum pilot pressure red warning lamp connector | E2 Hazard warning red warning lamp connector | 9 Hydraulic oil filter restriction red warning lamp |
| A3 Hydraulic oil temperature indicator connector | E3 Parking brake red warning lamp connector | 11 Minimum pilot pressure red warning lamp |
| A4 Battery charge red warning lamp connector | E5 Rear foglight orange indicator lamp connector (specific to certain countries) | 12 Overload indicator orange indicator lamp (optional) |
| A5 Audible warning red, orange indicator lamp connector | E6 RH direction indicators green warning lamp connector | 13 Not used |
| A6 Front axle unlocking orange indicator lamp connector | F1 LH direction indicators green indicator lamp connector | 14 Pilot system cancellation green indicator lamp (specific to certain countries) |
| A7 Engine oil pressure red warning lamp connector | F2 Rotary light orange indicator lamp connector (specific to certain countries) | 16 Front axle unlocking orange indicator lamp |
| B1 24 Volts supply | F5 Side light green indicator lamp connector | 24 Rotary light orange indicator lamp (specific to certain countries) |
| B3 Earth | F6 Main beam blue indicator lamp connector | 25 Minimum steering pressure red warning lamp |
| B4 Fuel level indicator connector | F7 Minimum steering pressure red warning lamp connector | 26 Parking brake and working brake red warning lamp |
| B5 Indicator lighting connector | P1 Engine coolant temperature indicator | 27 Minimum braking pressure red warning lamp |
| B6 Engine coolant temperature indicator connector | P2 Fuel level indicator | 28 Rear foglight orange indicator lamp (specific to certain countries) |
| B7 Fuel minimum level connector | P3 Hydraulic oil temperature indicator | 29 LH direction indicator green indicator lamp |
| C2 Air filter restriction red warning lamp connector | | 30 Main beam blue indicator lamp |
| C4 Overload indicator orange warning lamp connector (optional) | | 31 Side light green indicator lamp |
| C6 Not used | | 32 Hazard warning red warning lamp |
| D2 Pilot system cancellation green indicator lamp connector (specific to certain countries) | 1 Stop alarm red warning lamp | 33 RH direction indicators green indicator lamp |
| D3 Hydraulic oil filter restriction red warning lamp connector | 2 Alarm orange indicator lamp | 39 Instrument panel lamp |
| E1 Minimum braking pressure red warning lamp connector | 3 Audible warning stop push button | |
| | 6 Engine oil pressure red warning lamp | |
| | 7 Air filter restriction red warning lamp | |
| | 8 Battery charge red warning lamp | |

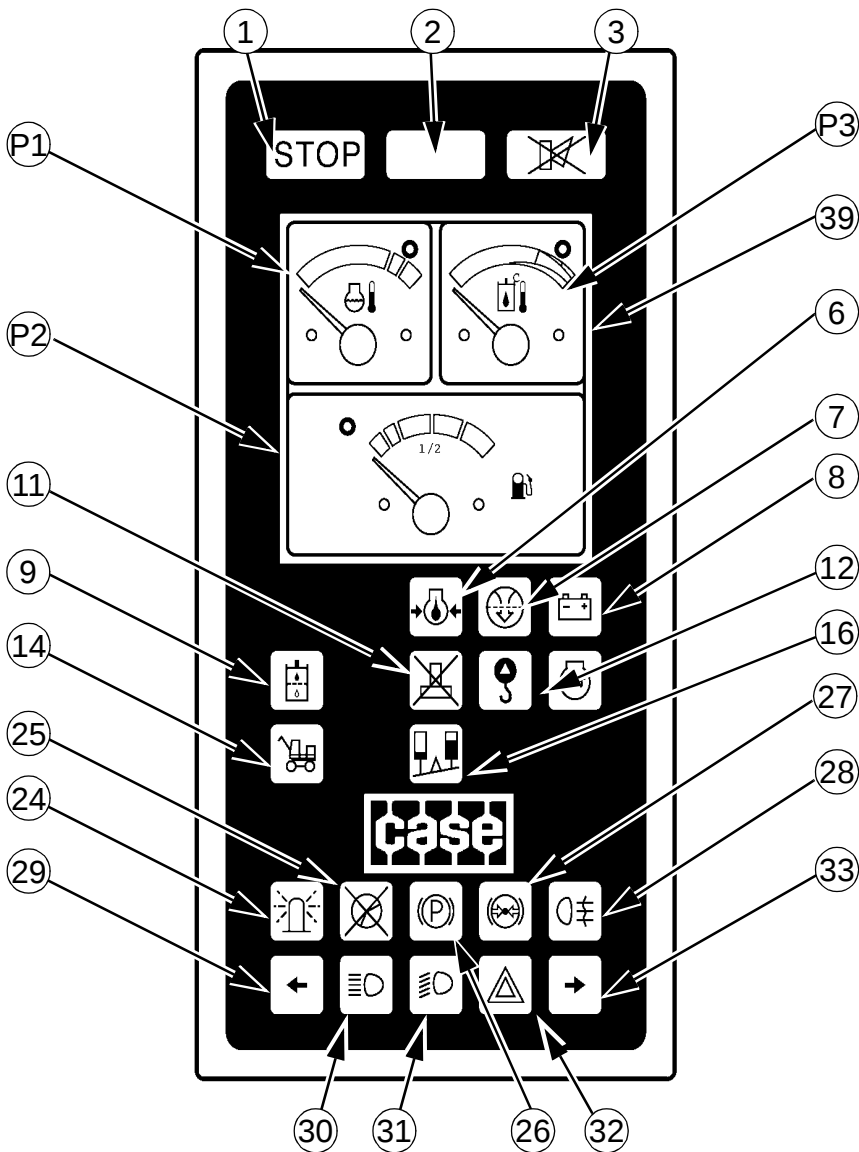
INSTRUMENT PANEL WIRING



CM97G031

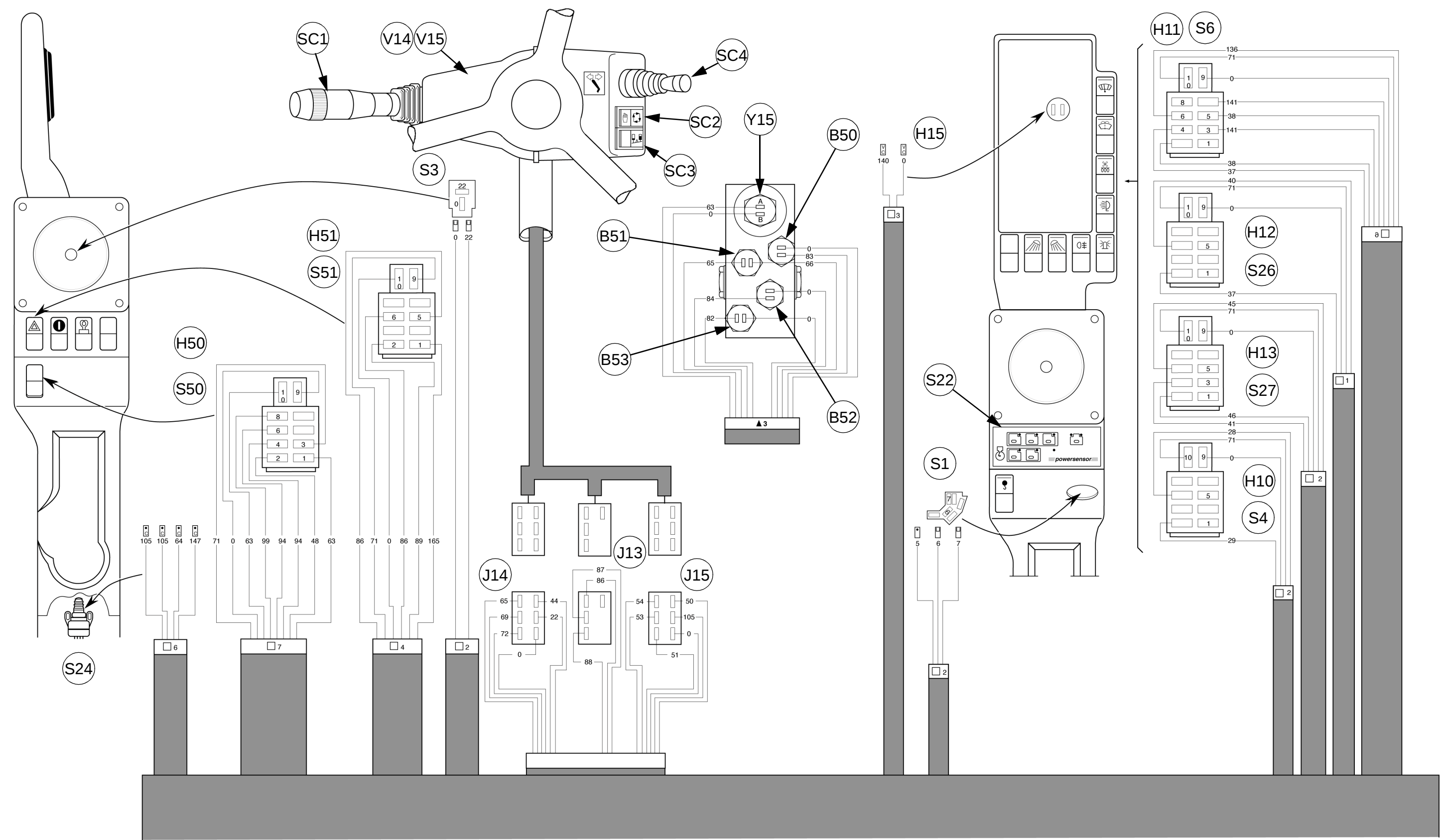
- A** 7 way connector : minimum pilot pressure red warning lamp, hydraulic oil temperature gauge, battery charge red warning lamp, audible warning stop push button, front axle unlocking orange indicator lamp, engine oil pressure red warning lamp, alarm orange warning lamp, stop alarm red warning lamp.
- B** 7 way connector : 24 Volts supply, earth, fuel level gauge, gauge lighting, engine coolant temperature gauge.
- C** 7 way connector : air filter restriction red warning lamp, overload indicator orange indicator lamp (optional).
- D** 7 way connector : pilot system cancellation green indicator lamp (specific to certain countries), hydraulic oil filter restriction red warning lamp.
- E** 7 way connector : minimum braking pressure red warning lamp, hazard warning red warning lamp, parking brake red warning lamp, rear foglight orange indicator lamp (specific to certain countries), RH direction indicators green indicator lamp.
- F** 7 way connector : LH direction indicator green indicator lamps, rotary light orange indicator lamp (specific to certain countries), side light green indicator lamp, main beam blue indicator lamp, minimum steering pressure red warning lamp.

INSTRUMENT PANEL (FRONT FACE)



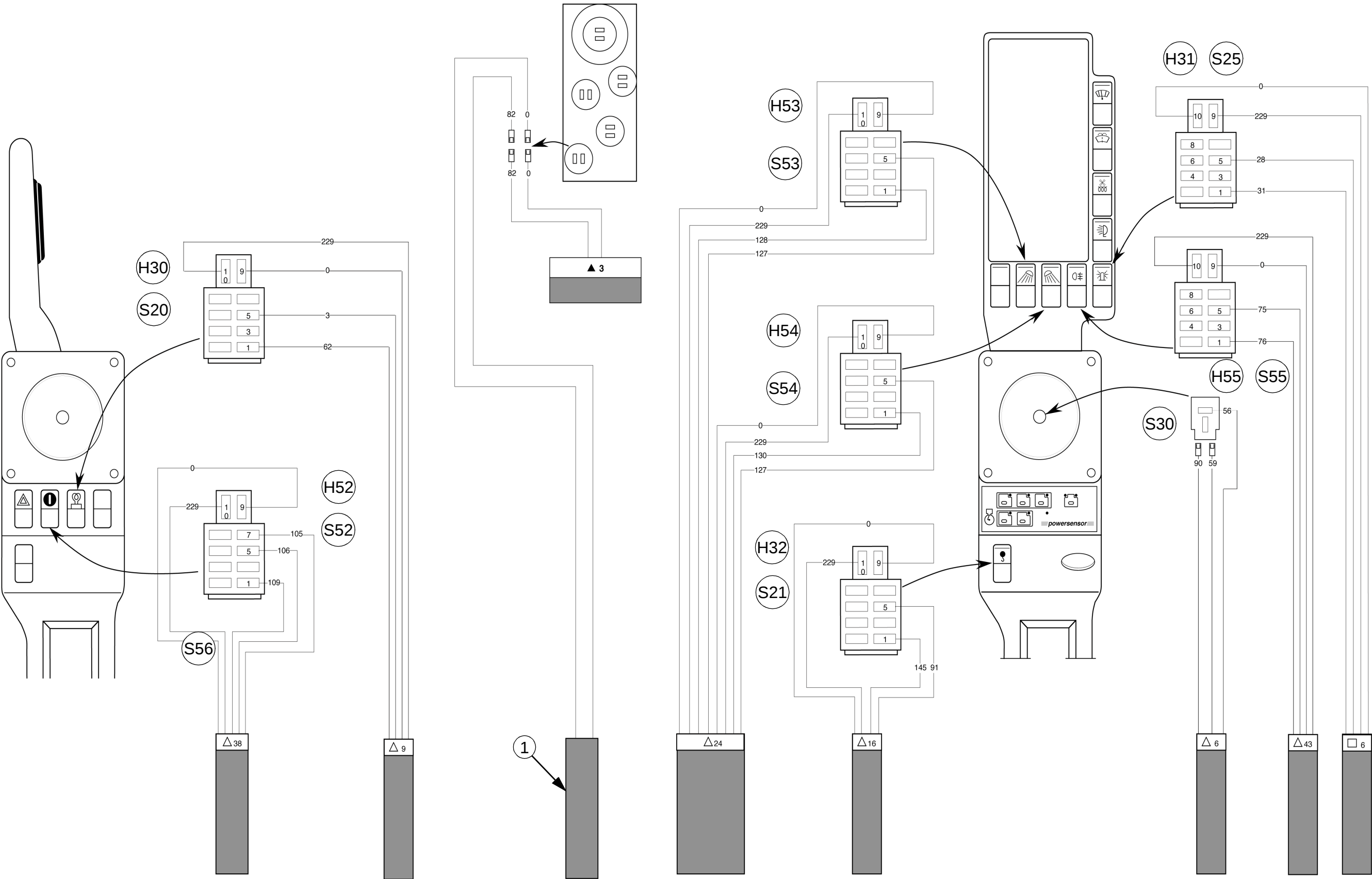
- | | |
|--|---|
| 1 Stop alarm red warning lamp | 26 Parking brake red warning lamp |
| 2 Alarm orange indicator lamp | 27 Minimum braking pressure red warning lamp |
| 3 Audible warning stop push button | 28 Rear foglight orange indicator lamp (specific to certain countries) |
| 6 Engine oil pressure red warning lamp | 29 LH direction indicator green indicator lamp |
| 7 Air filter restriction red warning lamp | 30 Main beam blue indicator lamp |
| 8 Battery charge red warning lamp | 31 Side light green indicator lamp |
| 9 Hydraulic oil filter restriction red warning lamp | 32 Hazard warning red warning lamp |
| 11 Minimum pilot pressure red warning lamp | 33 RH direction indicator green indicator lamp |
| 12 Overload indicator orange warning lamp (optional) | 39 Instrument panel lamp |
| 13 Not used | P1 Engine coolant temperature gauge |
| 14 Pilot system cancellation green indicator lamp (specific to certain countries) | P2 Fuel level gauge |
| 16 Front axle unlocking orange indicator lamp | P3 Hydraulic oil temperature gauge |
| 24 Rotary light orange indicator lamp (specific to certain countries) | |
| 25 Minimum steering pressure red warning lamp | |

PDH0219



RIGHT-HAND CONTROL ARM, LEFT-HAND CONTROL ARM AND
COMMODO WIRING (STANDARD)

- B50 Working brake pressure switch
- B52 Minimum braking pressure pressure switch
- B53 Steering pressure switch
- B51 Stop pressure switch
- H10 Working brake switch lighting
- H11 Windshield wiper switch lighting
- H12 Windshield washer switch lighting
- H13 Heater blower switch lighting
- H15 Instrument panel audible warning
- H51 Hazard warning switch lighting
- H50 Working brake and parking brake switch lighting
- J13 Connector
- J14 Connector
- J15 Connector
- S51 Hazard warning switch
- S50 Working brake and parking brake switch
- SC1 Combined switch for direction indicator (commodo),dipped headlights, headlights main beam, sidelights, headlight flasher and horn
- S1 Key switch
- S3 Horn switch
- S4 Working light switch
- S6 Windshield wiper switch
- S22 Instrument panel (see section 4002)
- S24 Pilot safety switch
- S26 Windshield washer switch
- S27 Heater blower switch
- SC2 Front axle automatic and manual unlocking switch
- SC3 Front axle locking switch
- SC4 Stabilizer lowering and raising momentary inverter switch
- V14-V15Stabilizer solenoid valve diodes
- Y15 Parking brake and working brake control solenoid valve
- ▲ 3 Braking unit harness
- Floor harness



**RIGHT-HAND AND LEFT-HAND CONTROL ARM WIRING
(OPTIONAL EQUIPEMENT)**

- H30** Cold start assistance switch lighting (optional)
 - H31** Rotary light switch lighting (optional)
 - H32** Overload indicator switch lighting (optional)
 - H52** Pilot system cancellation switch lighting (specific to certain countries)
 - H53** Front working light switch lighting (optional)
 - H54** Rear working light switch lighting (optional)
 - H55** Rear foglight switch lighting (specific to certain countries)
 - S20** Cold start assistance switch (optional)
 - S21** Overload indicator switch (optional)
 - S25** Rotary light switch (optional)
 - S30** Adjustable boom control switch (PM version, specific to certain countries)
 - S52** Pilot system cancellation switch (specific to certain countries)
 - S53** Front working lights switch (optional)
 - S54** Rear working lights switch (optional)
 - S55** Rear foglight switch (optional)
-
- 1** Steering brake harness (specific to certain countries)
 - ▲ 3** Braking unit harness (standard)
 - 6** Rotary light harness (optional)
 - △ 6** Adjustable boom control harness (PM version, specific to certain countries)
 - △ 9** Cold start assistance harness (optional)
 - △ 16** Overload indicator harness (optional)
 - △ 24** Front working light, rear working light harness (optional)
 - △ 38** Pilot system cancellation harness (specific to certain countries)
 - △ 43** Rear foglight harness (specific to certain countries)

ELECTRICAL SCHEMATIC (PLATE 2)

ELECTRICAL CABINET

- F1 30A Fuse, cold start assistance
- F2 5A Fuse, starter switch
- K1 Starter motor relay
- K2 General contact relay 24 Volts, 50A
- K3 Hourmeter relay
- K4 Electronic control box supply relay
- K15 Cold start assistance relay
- R10 0.85 Ohm resistor
- V1 General contact diode floor

FLOOR

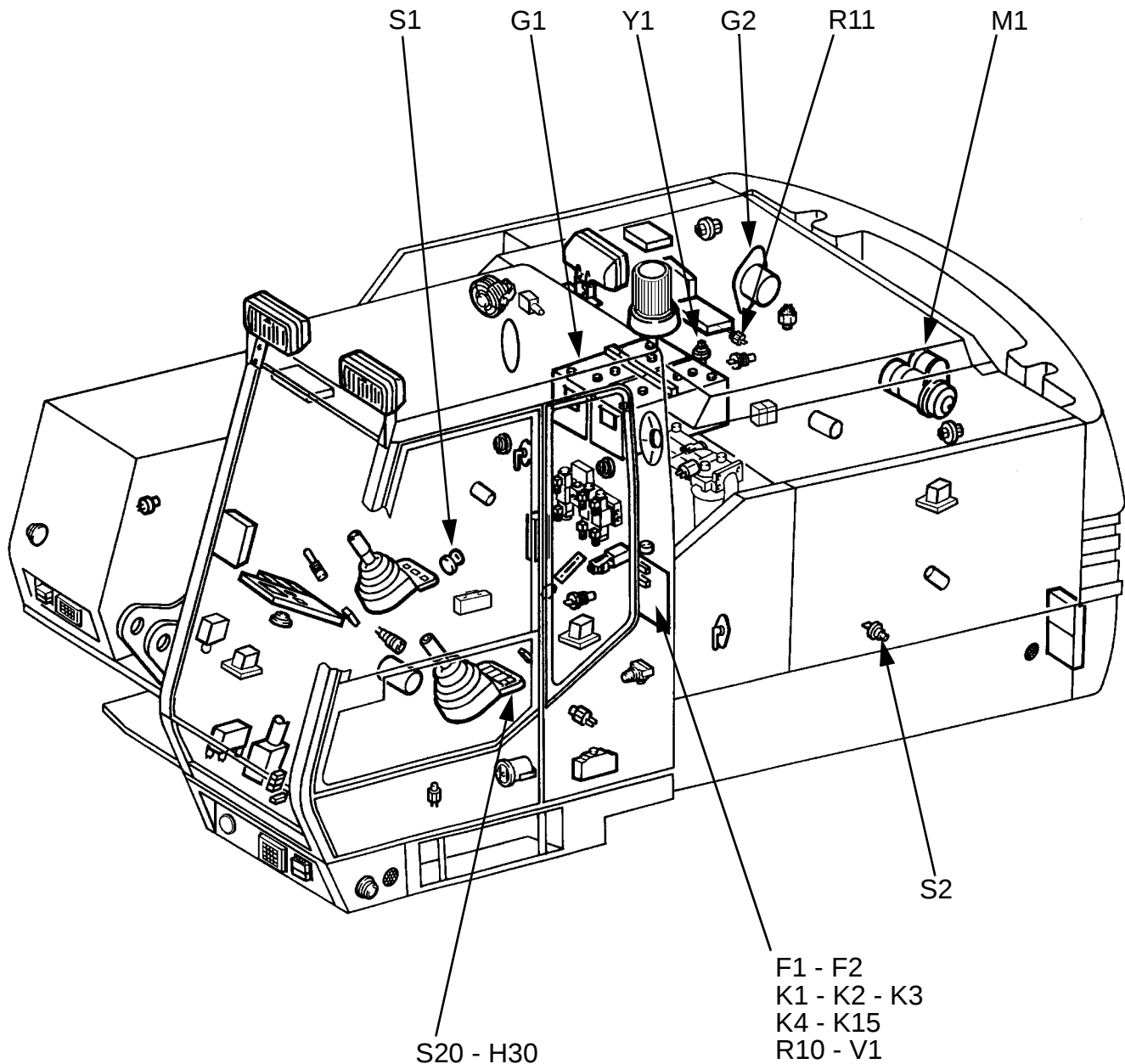
- S1 Key switch
- H30 Cold start assistance switch lighting (optional)
- S20 Cold start assistance momentary switch (optional)

UPPERSTRUCTURE

- G1 Batteries
- S2 Battery master switch

ENGINE

- G2 Alternator
- M1 Starter motor
- R11 Pre-heater plug
- Y1 Injection pump solenoid

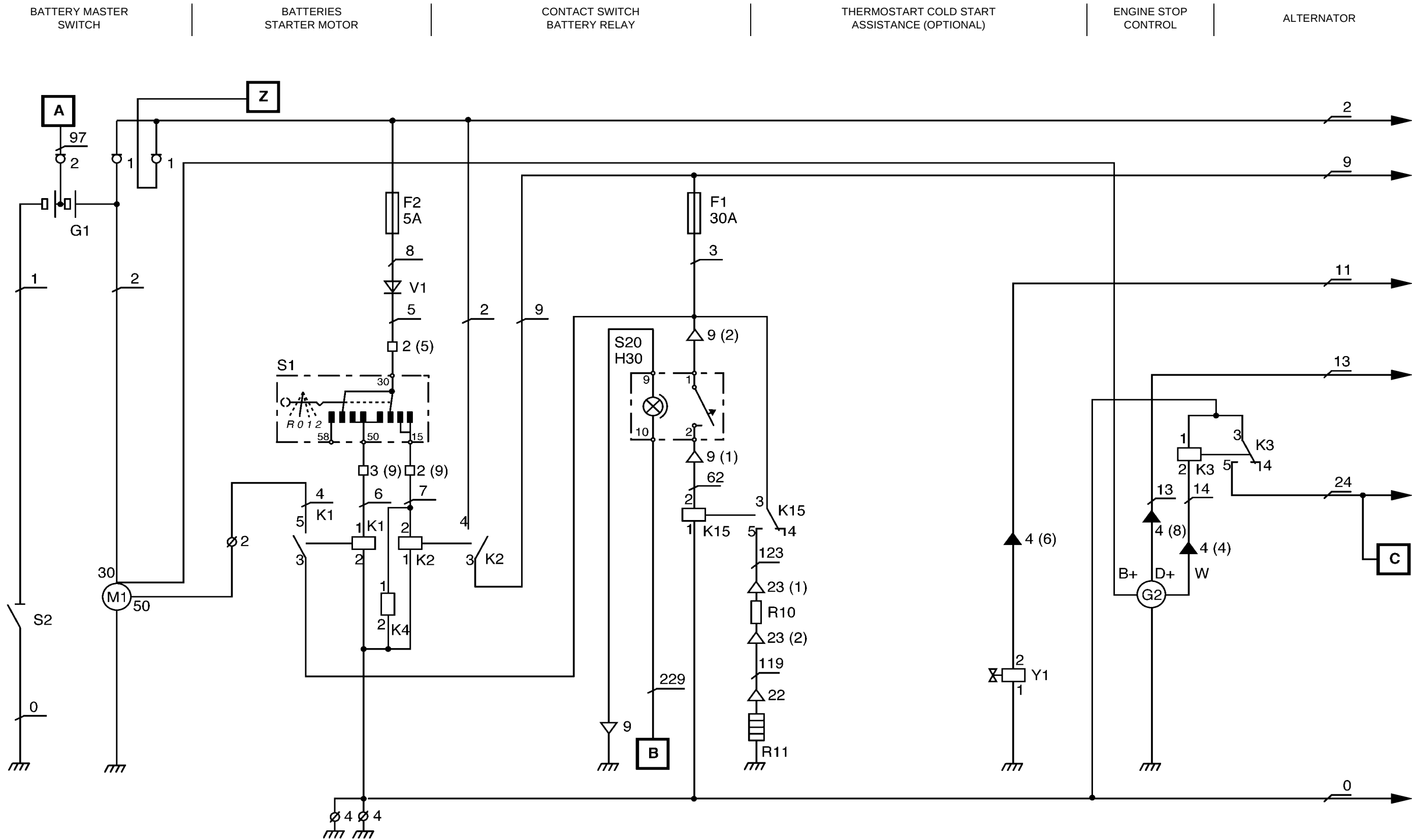


WIRING CONNECTIONS BETWEEN SCHEMATICS

- A See schematic plate 5
- B See schematic plate 7
- C See schematic plate 8
- Z See schematic plate 8

WIRING CONNECTION WITH SCHEMATIC PLATE 3

Cables 2, 9, 11, 13, 24 and 0



ELECTRICAL SCHEMATIC (PLATE 3)

INSTRUMENT PANEL

P10 Instrument panel (see schematic plate 1)

ELECTRICAL CABINET

F3 7.5A Fuse, instrument panel
F4 5A Fuse, cab lighting, horn relay
F7 10A Fuse, horn
K5 Horn relay

CAB

E1 Cab lighting
S10 Cab lighting switch
X1(K) Connector

FLOOR

B3 Pilot pressure pressostat
H15 Instrument panel audible warning
P4 Hourmeter
S3 Horn switch
X1 Cab/cab floor connector

WIRING CONNECTION BETWEEN SCHEMATICS

D See schematic plate 7
E See schematic plate 7
F See schematic plate 7
G See schematic plate 7
H See schematic plate 7
I See schematic plate 7

J See schematic plate 6
K See schematic plate 5
L See schematic plate 7
M See schematic plate 7
N See schematic plate 7
O See schematic plate 6

P See schematic plate 4
Q See schematic plate 5
R See schematic plate 4
S See schematic plate 7
T See schematic plate 6
Y See schematic plate 8

WIRING CONNECTION WITH SCHEMATIC PLATE 2

Cables 2, 9, 11, 13, 24 and 0

WIRING CONNECTION WITH SCHEMATIC PLATE 4

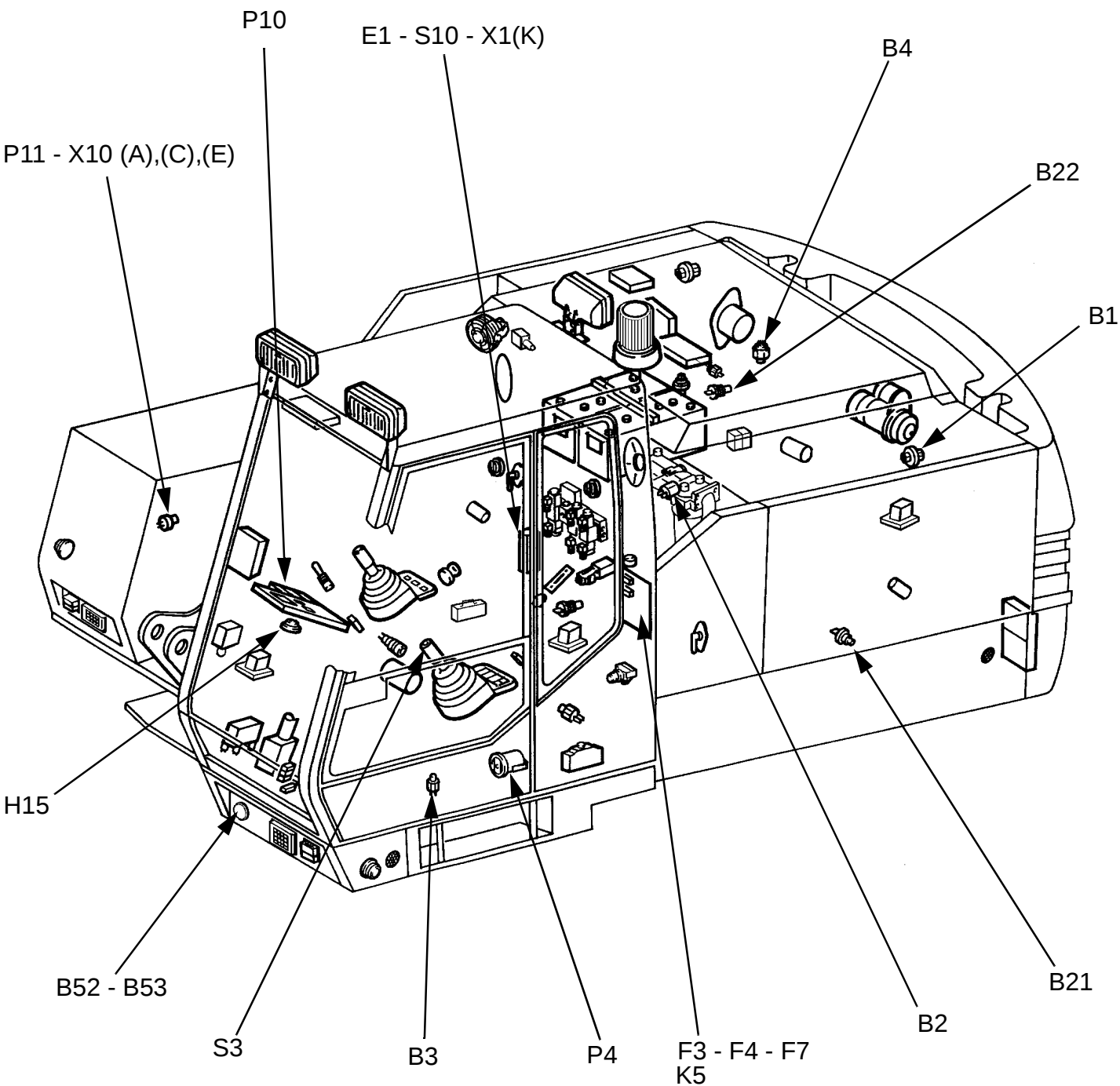
Cables 2, 9, 71 and 0

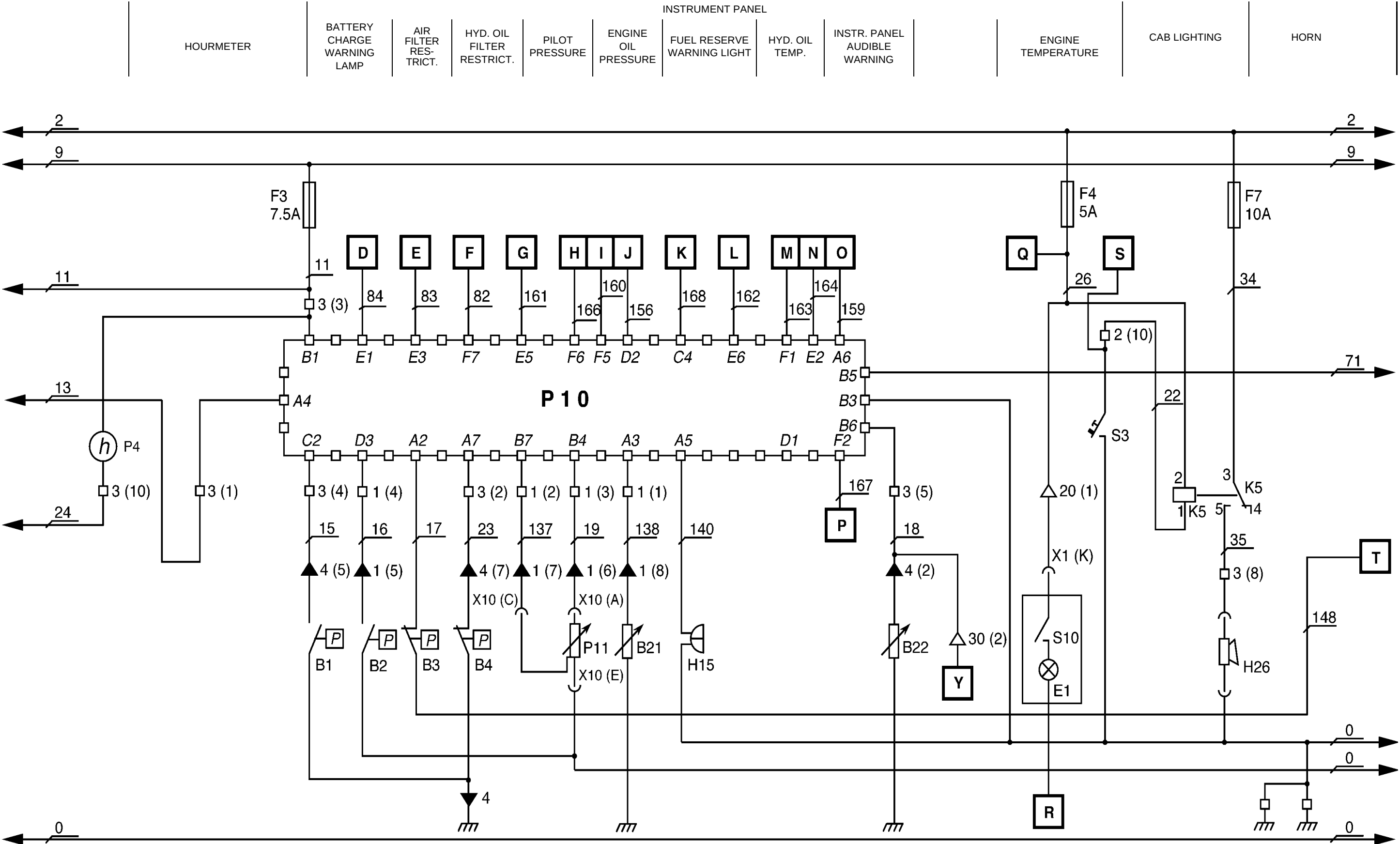
UPPERSTRUCTURE

B1 Air filter restriction pressostat
B2 Hydraulic oil filter pressostat
B21 Hydraulic oil temperature sender
H26 Horn
P11 Fuel level indicator
X10 (A) C (E) Connectors

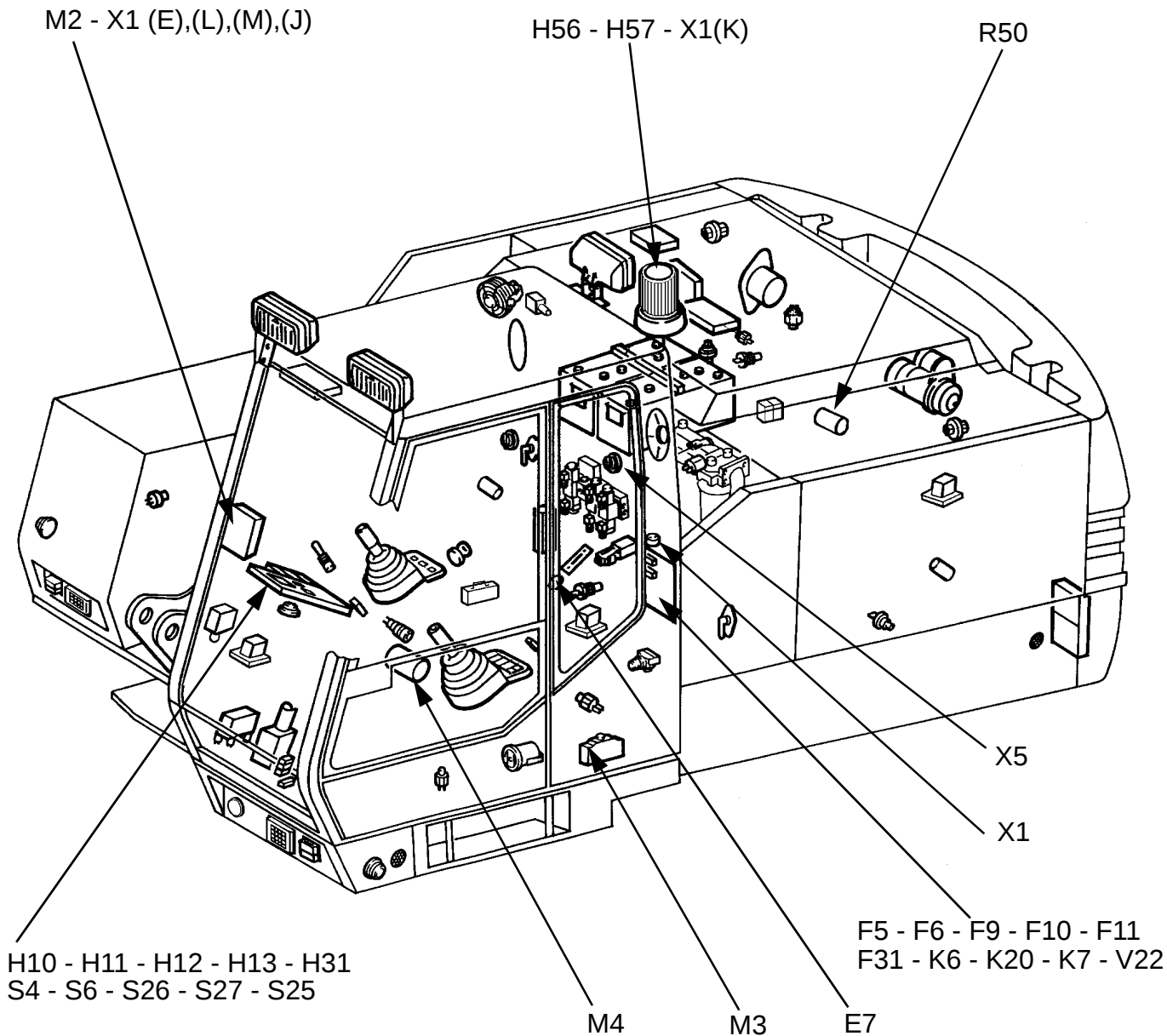
ENGINE

B4 Engine oil pressure pressostat
B22 Engine coolant temperature sender





ELECTRICAL SCHEMATIC (PLATE 4)



INSTRUMENT PANEL

- H10** Working light switch lighting
- H11** Windshield wiper switch lighting
- H12** Windshield washer switch lighting
- H13** Heater blower switch lighting
- H31** Rotary light switch lighting (specific to certain countries)
- S4** Working light switch
- S6** Windshield wiper switch
- S25** Rotary light switch (specific to certain countries)
- S26** Windshield washer switch
- S27** Heater blower switch

ELECTRICAL CABINET

- F5** 10A Fuse, headlight and rotary light relay (specific to certain countries)
- F6** 15A Fuse, upperstructure working lights
- F9** 10A Fuse, windshield washer, windshield wiper
- F10** 15A Fuse, blower, heater
- F11** 7.5A Fuse, cigar lighter
- F31** 15A Fuse, windshield wiper intermittent action
- K6** Working light relay
- K7** Working light relay
- K20** Windshield wiper intermittent action
- V22** Rotary light indicator lamp diode (specific to certain countries)

WIRING CONNECTION BETWEEN SCHEMATICS

- P** See schematic plate 3
- R** See schematic plate 3
- U** See schematic plate 6
- V** See schematic plate 6 and 7
- A1** See schematic plate 8

CAB

- M2** Windshield wiper motor
- E** : Blue
- J** : White
- L** : Grey
- M** : Black
- X1(F)** Rotary light connector (specific to certain countries)
- X1(E) (L) (M) (J)** Windshield wiper motor connector

FLOOR

- E7** Cigar lighter
- M3** Windshield washer motor
- M4** Heater blower motor
- X1** Cab/cab floor power connection

UPPERSTRUCTURE

- E2** Attachment working lights (on boom)
- H56** Rotary light (specific to certain countries)
- H57** Standard rotary light (optional)
- X5 (3), (6)** Attachment working light power connection

ENGINE

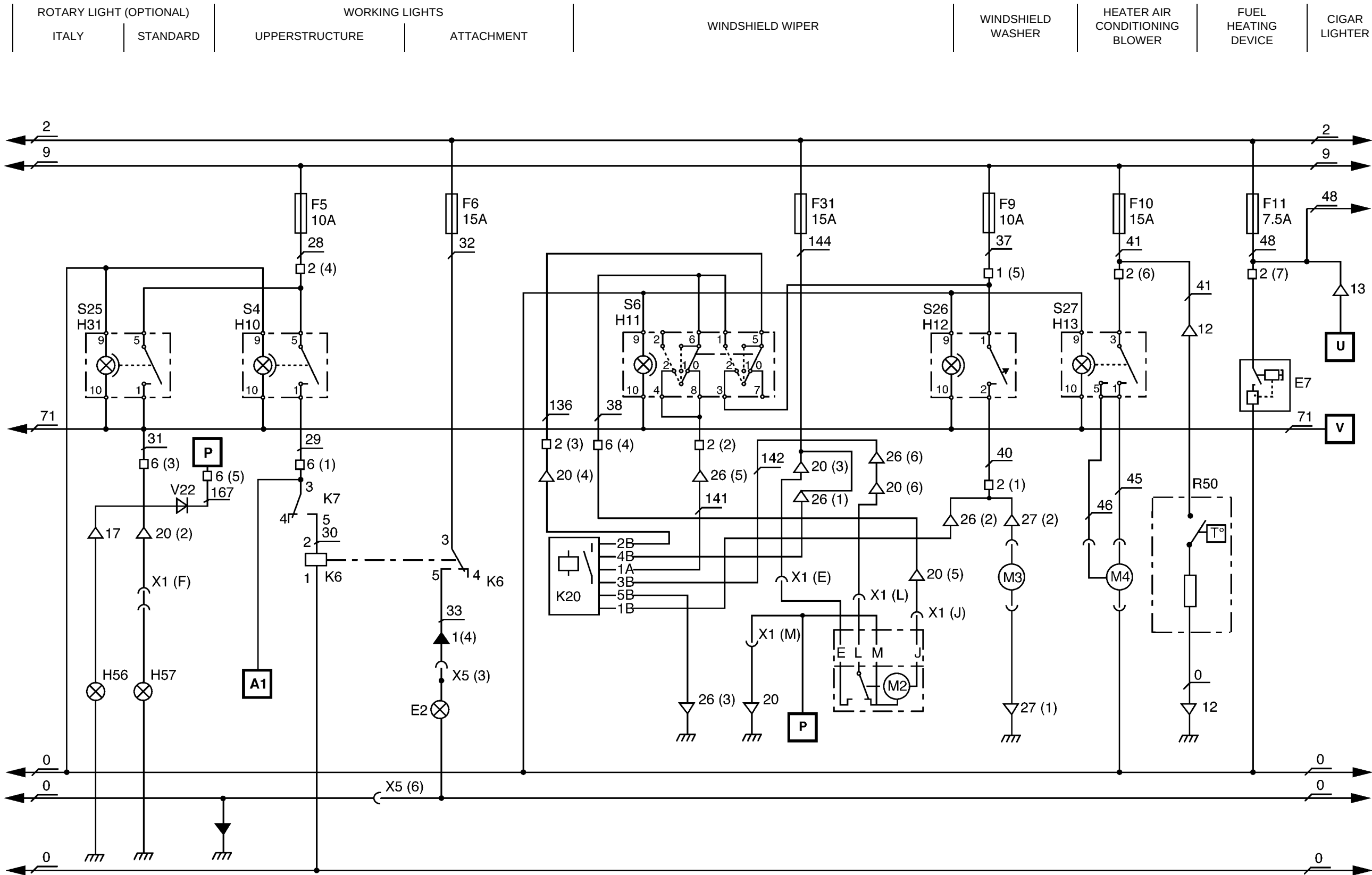
- R50** Fuel heating device

WIRING CONNECTION WITH SCHEMATIC PLATE 3

Cables 2, 9, 71 and 0

WIRING CONNECTION WITH SCHEMATIC PLATE 5

Cables 2, 9, 48 and 0



ELECTRICAL SCHEMATIC (PLATE 5)

ELECTRICAL CABINET

- F8 15A Fuse, upperstructure power line connection
- F13 5A Fuse, overload indicator (optional)
- F14 5A Fuse, car radio
- F30 15A Fuse, cab working light (optional)
- V4 Radio diode (optional)
- V21 Overload indicator diode (optional)

CAB

- B5 RH loudspeaker (optional)
- B6 LH loudspeaker (optional)
- E10 Front working lights (optional)
- E11 Rear working light (optional)
- H53 Front working light switch lighting (optional)
- H54 Rear working light lighting (optional)
- M6 Blower motor (optional)
- S53 Front working light switch (optional)
- S54 Rear working light switch (optional)
- S29 Blower switch (optional)
- X1(A)(B)(C)(D)RH and LH loudspeaker connector (optional)
- X1 (H) (G) Front working lights/rear working light connector (optional)
- X14(1) (2) Blower motor connector (optional)

FLOOR

- A1 Radio (optional)
- H32 Overload indicator switch lighting (optional)
- S21 Overload indicator switch (optional)
- X1 Cab power connection

UPPERSTRUCTURE

- B23 Overload indicator pressostat, on boom foot (optional)
- X2 Upperstructure power connection

ENGINE

- E12 Engine compartment light (optional)
- S28 Engine compartment lighting switch (optional)

WIRING CONNECTION BETWEEN SCHEMATICS

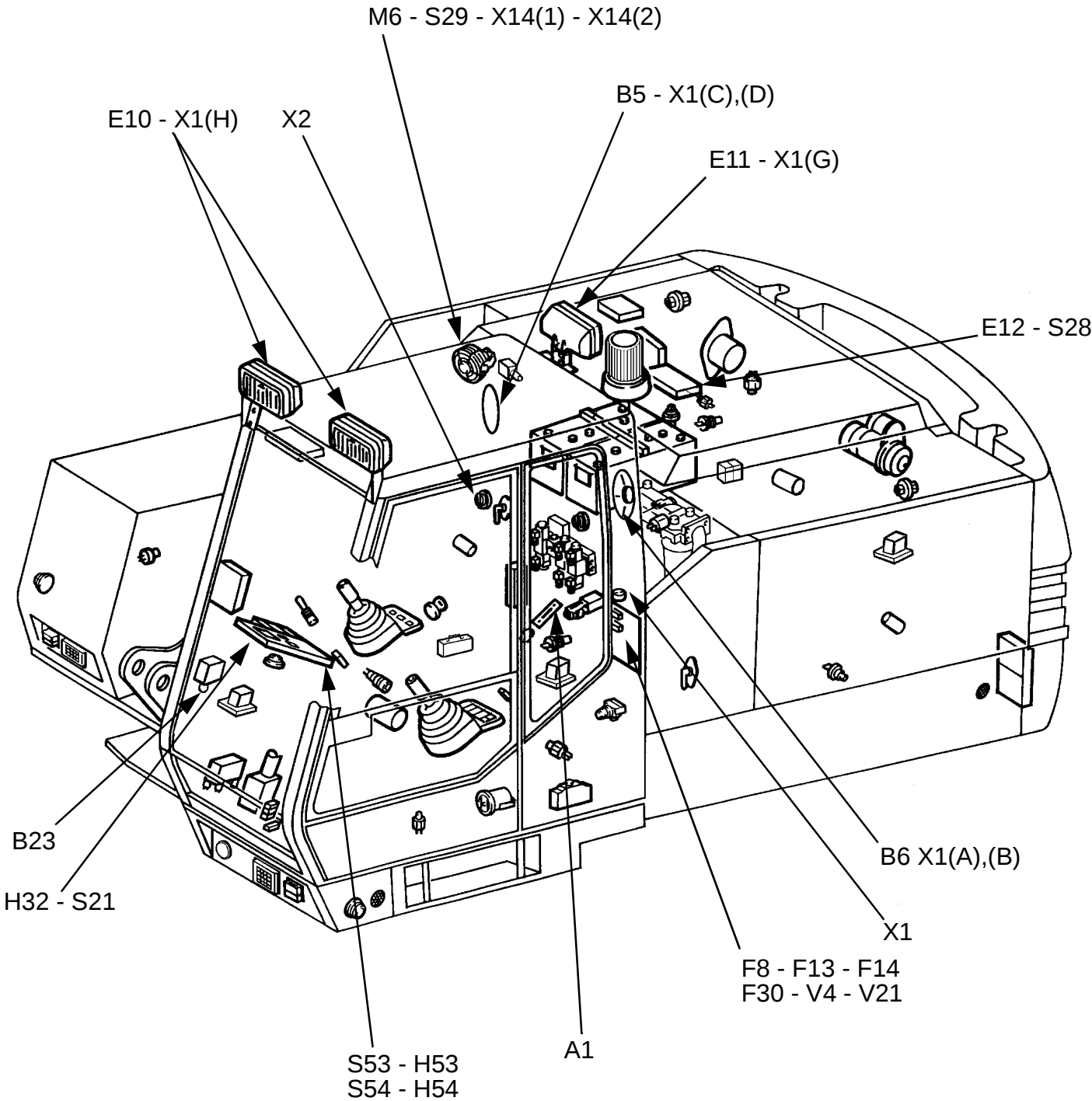
- A See schematic plate 2
- K See schematic plate 3
- Q See schematic plate 3
- X See schematic plate 7

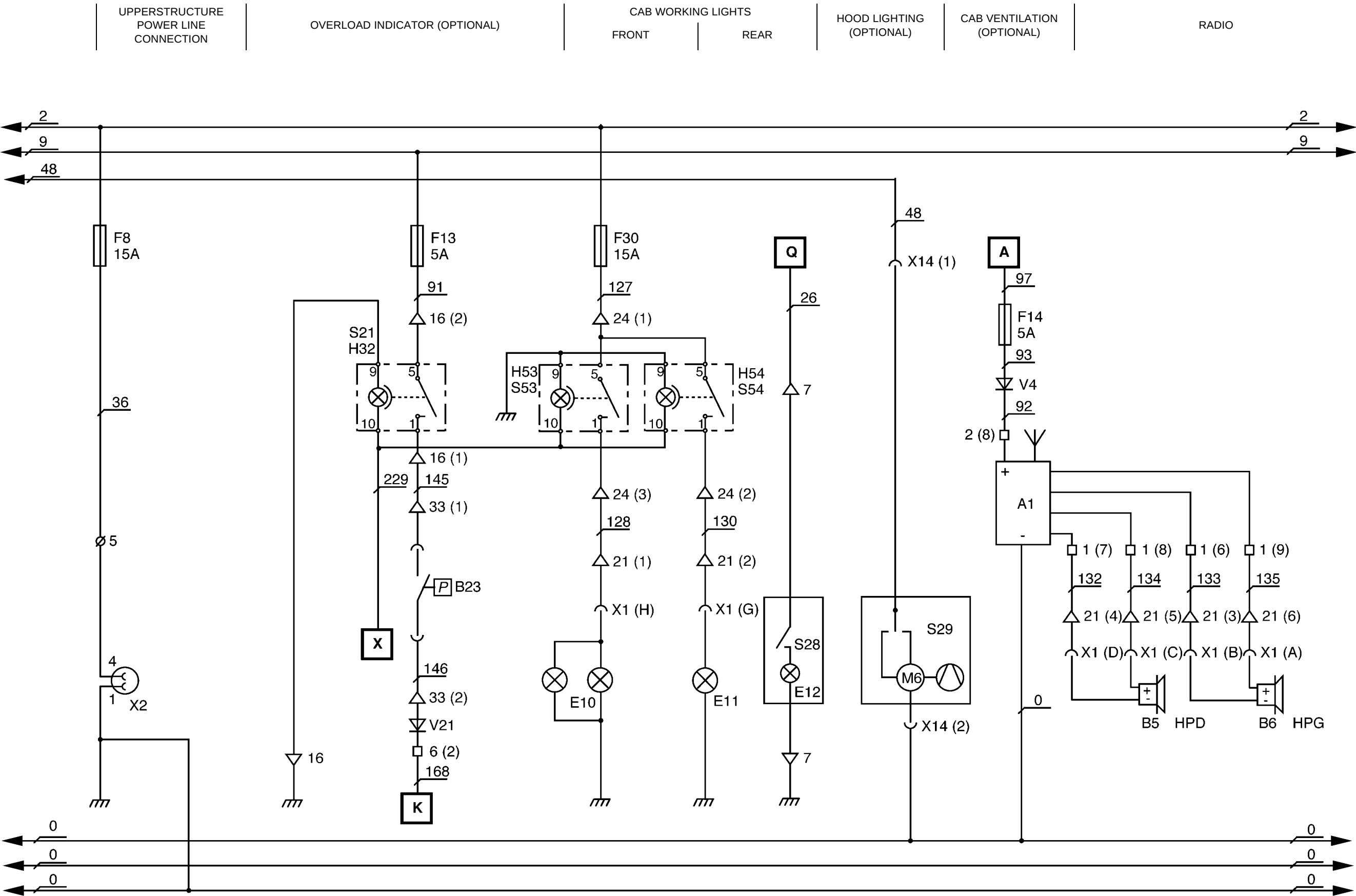
WIRING CONNECTION WITH SCHEMATIC PLATE 4

Cables 2, 9, 48 and 0

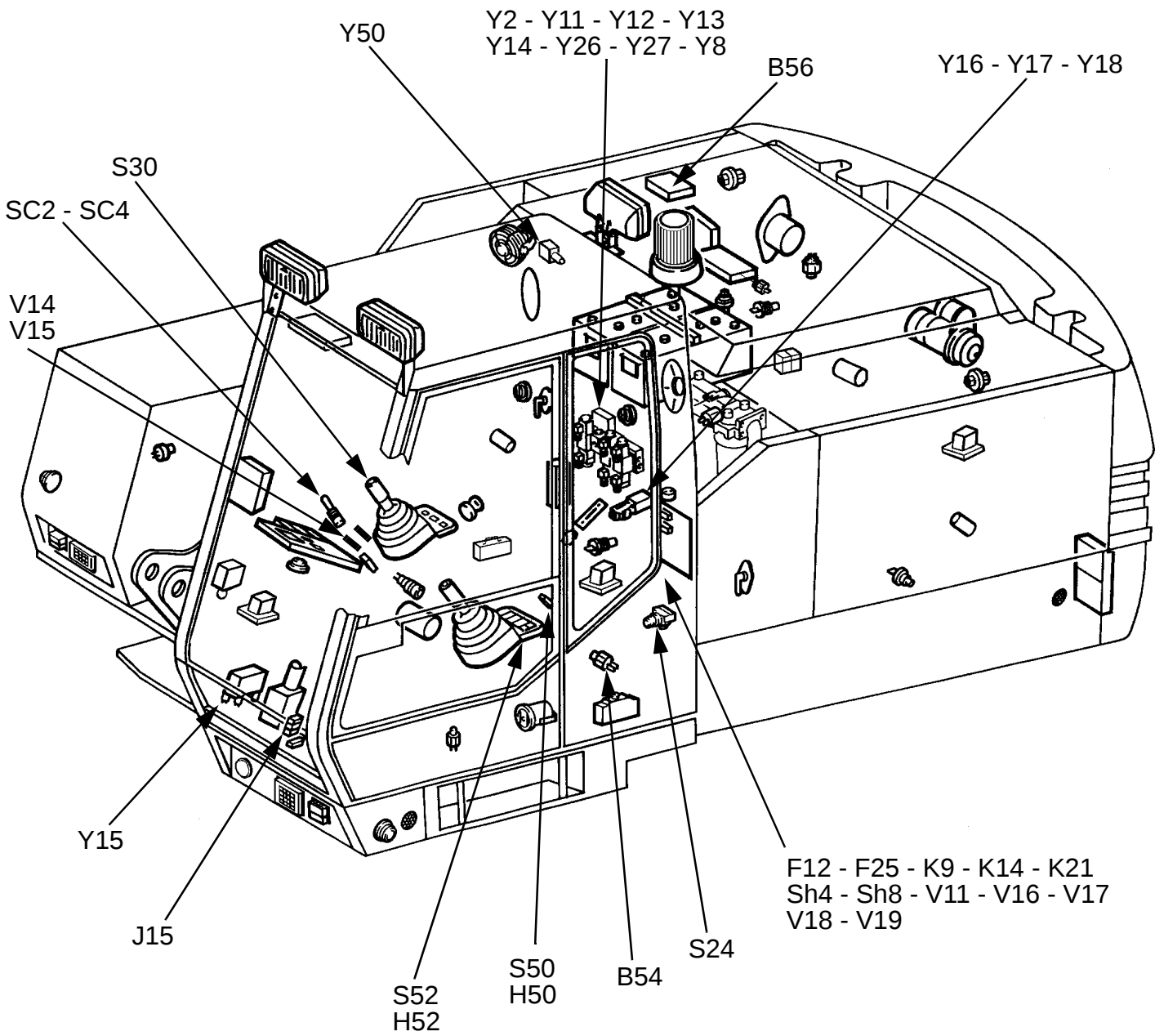
WIRING CONNECTION WITH SCHEMATIC PLATE 6

Cables 2, 9, 48 and 0





ELECTRICAL SCHEMATIC (PLATE 6)



ELECTRICAL CABINET

- F12** Fuse 10A, pilot safety
- F25** Fuse 7.5A, parking brake
- F27** Fuse 5A, adjustable boom
- K9** Front axle unlocking relay
- K14** Speed change relay
- K21** Pilot safety relay
- Sh4** Shnut(standard equipment)
- Sh8** Shunt (pilot cancellation option special for Italy, remove shunt Sh4 and substitute shunt Sh8)
- V11** Pilot system cancellation indicator lamp (specific to certain countries)
- V16, V17, V18 and V19** Pilot system cancellation indicator lamps (specific to certain countries)

FLOOR

- B54** Front axle unlocking pressure switch
- H50** Working brake, parking brake switch lighting
- H52** Pilot system cancellation switch lighting (specific to certain countries)
- J15** Connectors
- S52** Pilot system cancellation switch (specific to certain countries)
- S24** Pilot safety switch (hand control lever shown in raised position)
- S30** Adjustable boom adjustment switch
- S50** Working brake, parking brake switch
- V14-V15** Stabilizer solenoid valve diodes (in commodo)

UPPERSTRUCTURE

- B56** Adjustable boom range limitation detector (optional)
- SC4** Stabilizer raising and lowering momentary inverter switch
- SC2** Front axle automatic and manual unlocking switch
- SC3** Front axle locking and unlocking switch
- Y2** Pilot safety solenoid valve
- Y8** Adjustable boom adjustment solenoid valve
- Y11** Gear box solenoid valve (first speed)
- Y14** Gear box solenoid valve (second speed)
- Y13** Front axle unlocking solenoid valve
- Y12** Pilot system cancellation solenoid valve (specific to certain countries)
- Y15** Parking brake and working brake control solenoid valve
- Y16** Working brake solenoid valve (Standard)
- Y17, Y18** Working brake solenoid valves (specific to certain countries)
- Y26, Y27** Stabilizer solenoid valves
- Y50** Adjustable boom range limitation solenoid valve (optional)

WIRING CONNECTION BETWEEN SCHEMATICS

- J** See schematic plate 3
- O** See schematic plate 3
- T** See schematic plate 3
- U** See schematic plate 4
- V** See schematic plate 4
- W** See schematic plate 7

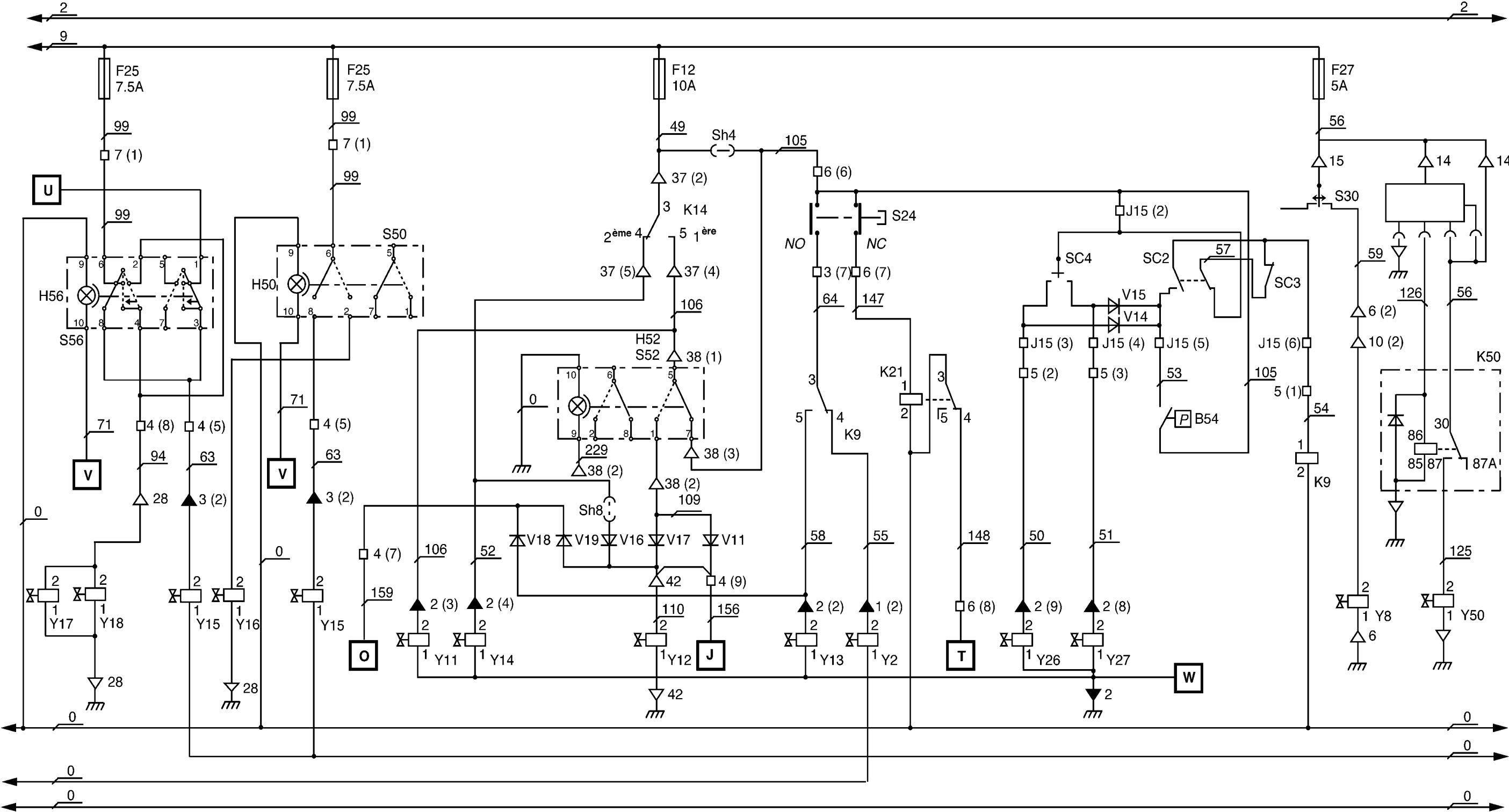
WIRING CONNECTION WITH SCHEMATIC PLATE 5

Cables 2, 9, and 0

WIRING CONNECTION WITH SCHEMATIC PLATE 7

Cables 2 and 0

WORKING BRAKE- PARKING BRAKE		TWO-SPEED	PILOT SYSTEM CANCELLATION (OPTIONAL)	AXLE UNLOCKING	PILOT SAFETY	STABILIZERS	ADJUSTABLE BOOM WITH NIPPLES (OPTIONAL)	ADJUSTABLE BOOM RANGE LIMITATION (OPTIONAL)
GERMANY	STANDARD							



ELECTRICAL SCHEMATIC (PLATE 7)

ELECTRICAL CABINET

- F15 Fuse 15A, main beam headlights
- F16 Fuse 5A, stop lights
- F17 Fuse 5A, LH stop light
- F18 Fuse 5A, RH front side light
- F19 Fuse 5A, LH front side light
- F20 Fuse 5A, RH front side lights
- F21 Fuse 5A, LH front side light
- F22 Fuse 5A, Rear foglight (specific to certain countries)
- F23 Fuse 5A, RH main beam headlight
- F24 Fuse 5A, LH main beam headlight
- F26 Fuse 7.5A, direction indicators and hazard warning
- K7 Upperstructure and attachment working light relay
- K10 Flasher unit
- Sh5 Shunt
- V2 K3 indicator relay diode
- V3 Dipped headlights diode
- V5 Rear foglight indicator lamp diode (specific to certain countries)
- V6 Headlight main beam indicator lamp diode
- V7 RH direction indicator - lamp diode
- V8 LH direction indicator - lamp diode
- V9 Hazard warning indicator lamp diode
- V10 LH direction indicator light diode
- V20 RH direction indicator light diode
- V23 Hazard warning diode

CAB

- H55 Rear foglight switch lighting (specific to certain countries)
- S55 Rear foglight control (specific to certain countries)

WIRING CONNECTION BETWEEN SCHEMATICS

- B See schematic plate 2
- D See schematic plate 3
- E See schematic plate 3
- F See schematic plate3
- G See schematic plate 3
- H See schematic plate 3
- I See schematic plate 3
- L See schematic plate 3

- SC1 Direction indicator (commodo), main beam and dip switch, side lights and headlight flasher switch

FLOOR

- B53 Steering pressure switch
- B52 Pressure switch for minimum braking pressure
- B51 Stop light pressure switch
- B50 Parking brake pressure switch
- J13, 14 Connectors

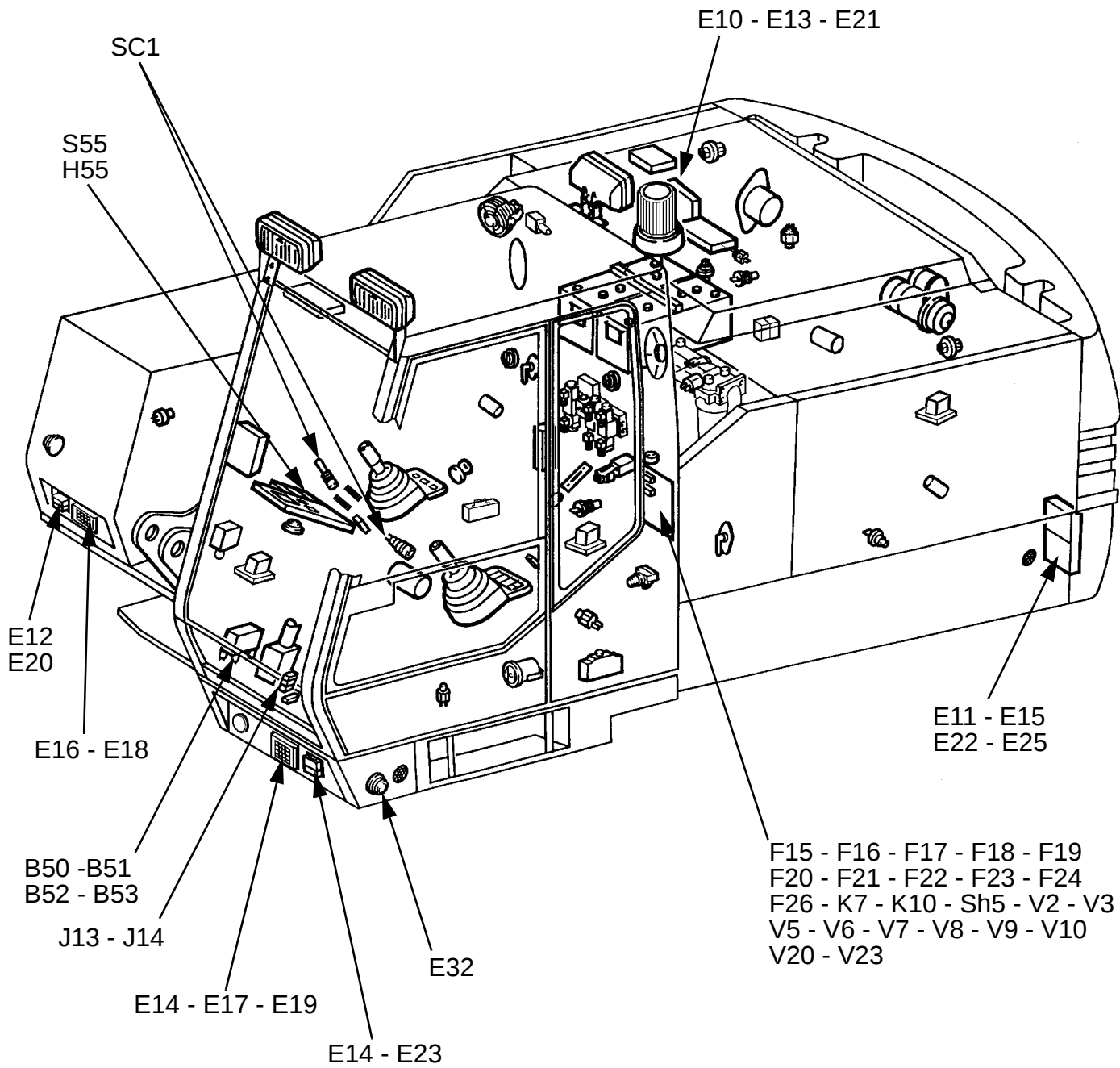
UPPERSTRUCTURE

- E10 RH rear stop light
- E11 LH rear stop light
- E12 Front RH side light
- E13 Rear RH side light
- E14 Front LH side light
- E15 Rear LH side light
- E16 Front RH dipped headlight
- E17 Front LH dipped headlight
- E18 RH main beam headlight
- E19 LH main beam headlight
- E20 Front RH direction indicator light
- E21 Rear RH direction indicator light
- E22 Rear LH direction indicator light
- E23 Front LH direction indicator light
- E24 Dipper lighting (specific to certain countries)
- E25 Rear foglight (specific to certain countries)
- E29 Registration plate lighting (specific to certain countries)
- E31 Front RH side-mounted direction indicator
- E32 Front LH side-mounted direction indicator
- E33 RH marker light (specific to certain countries)
- E34 LH marker light (specific to certain countries)

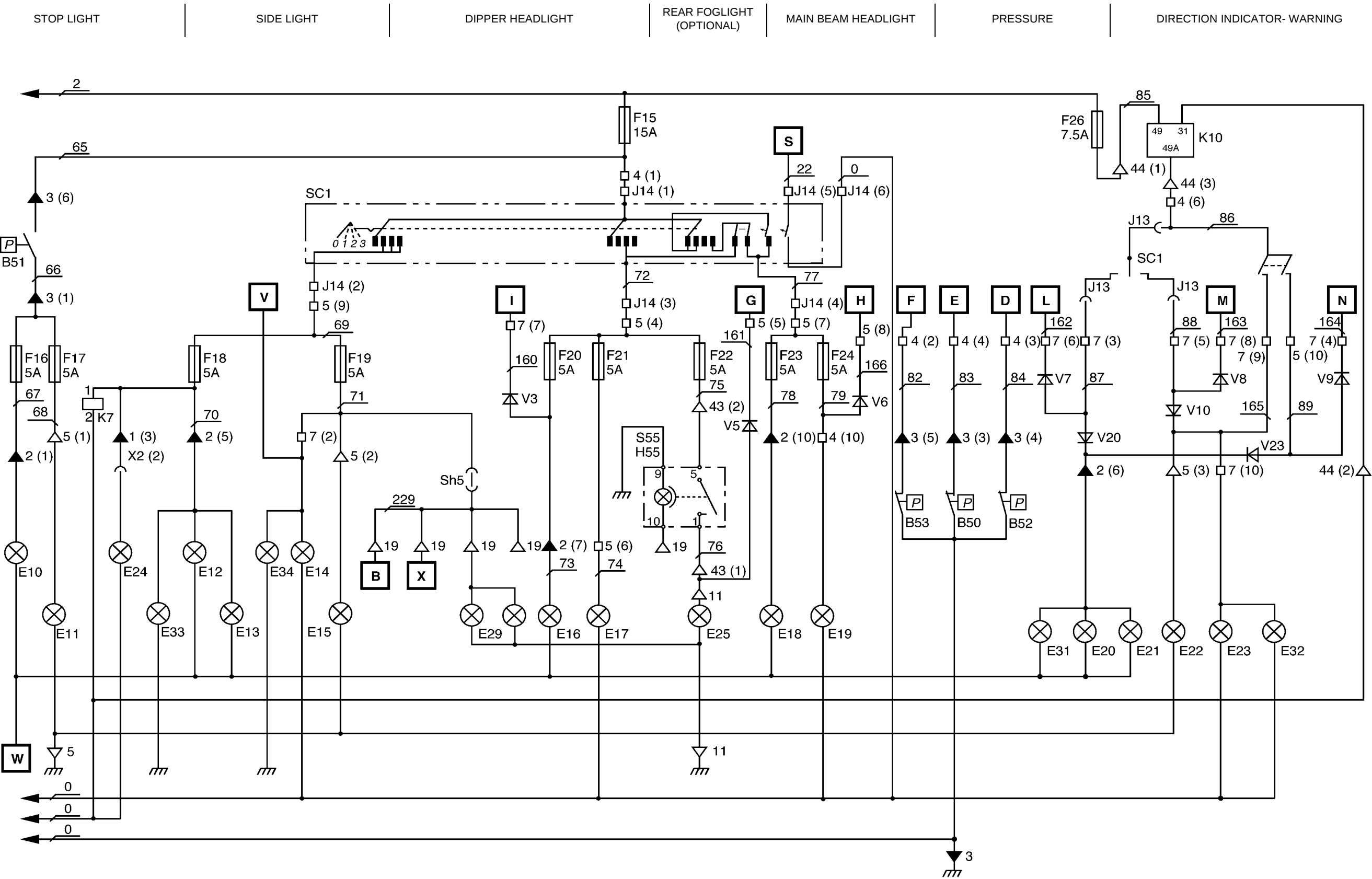
- M See schematic plate 4
- N See schematic plate 4
- S See schematic plate 4
- V See schematic plate 4 and 6
- W See schematic plate 6
- X See schematic plate 5

WIRING CONNECTION WITH SCHEMATIC PLATE 6

Cables 2, and 0



PDH0221



SCHEMATIC ELECTRICAL (PLATE 8)

ELECTRICAL CABINET

- H14 Functioning indicator lamp (LED)
- F33 7.5A Fuse for electronic control box supply

CAB

- A2 Electronic control box
- S22 Control panel
- X3 Connector
- X4 Troubleshooting test socket

FLOOR

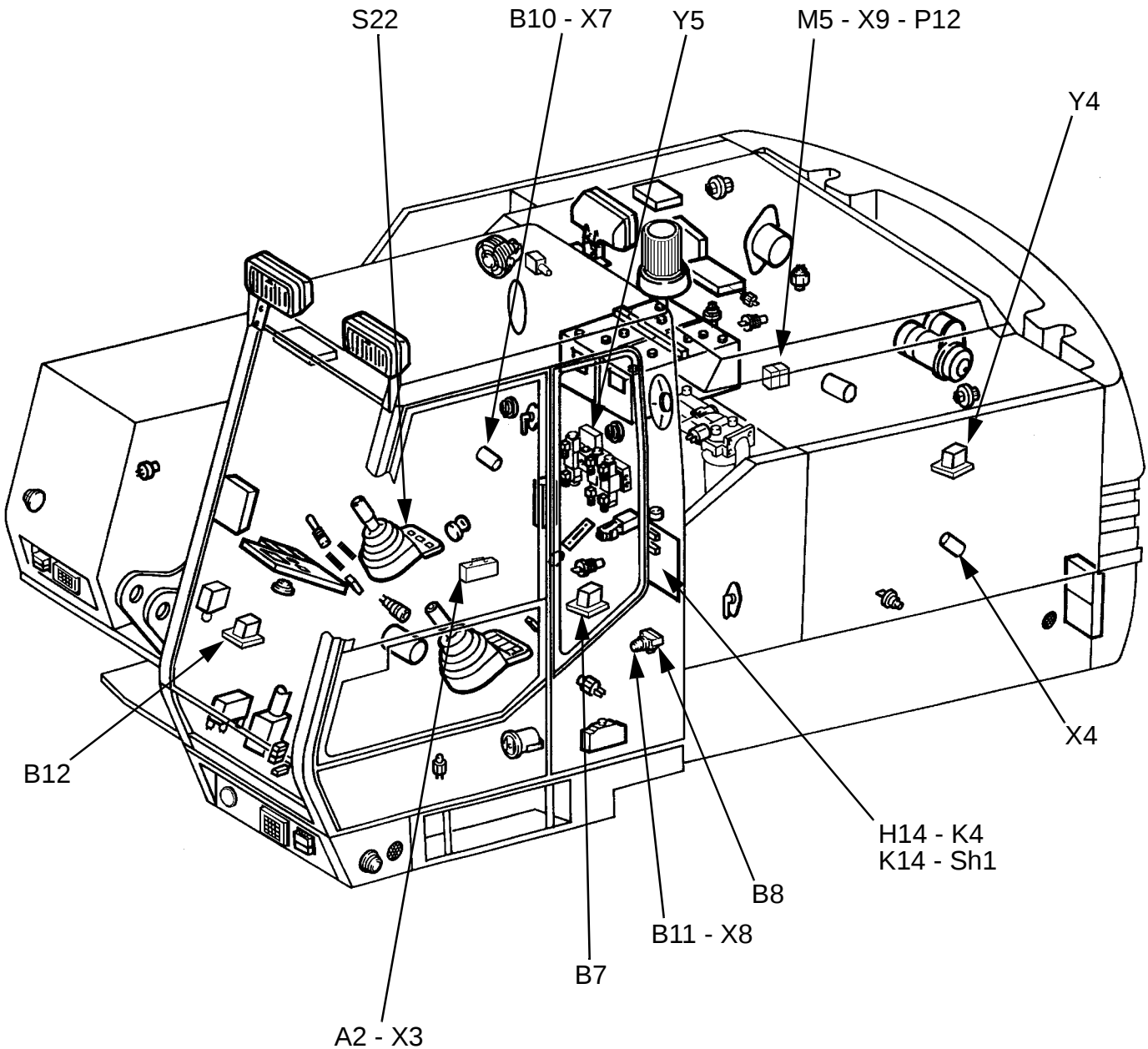
- B8 Travel detection pressostat

UPPERSTRUCTURE

- B7 Swing detection pressostat
- B10 Swing motor speed detector
- B11 Hydraulic pressure sender
- B12 Speed change pressure switch
- K4 Electronic supply relay
- K14 Two-speed travel relay
- Y5 Upperstructure swing brake release control solenoid valve

ENGINE

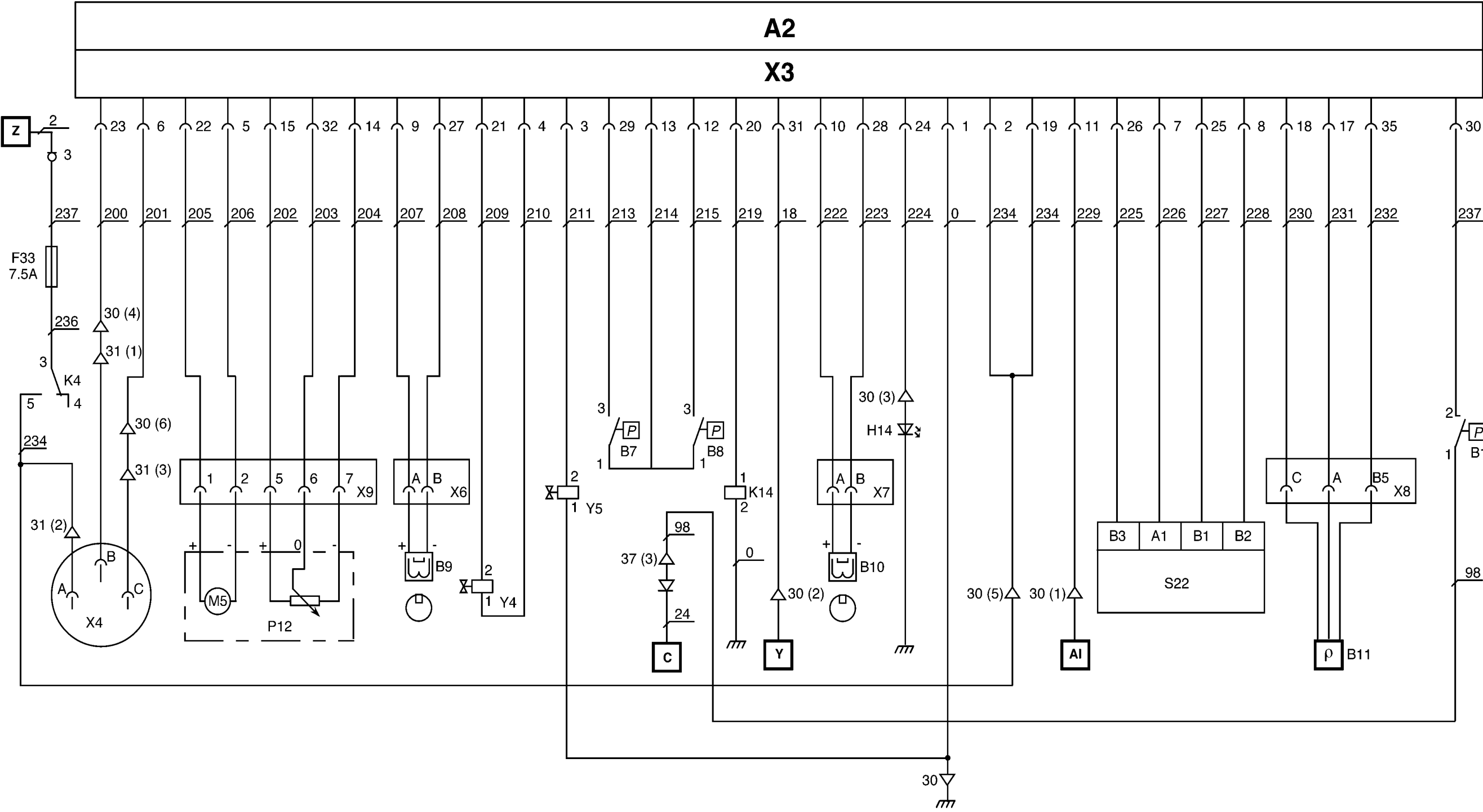
- B9 Engine speed detector
- M5 Injection pump servo-motor
- P12 Servo-motor potentiometer
- X6 Connector
- X7 Connector
- X8 Connector
- X9 Connector
- Y4 DRE4 proportional pressure reduction valve



WIRING CONNECTION BETWEEN SCHEMATICS

- C See schematic plate 2
- Y See schematic plate 3
- A1 See schematic plate 4
- Z See schematic plate 2

TROUBLESHOOTING TEST SOCKET	INJECTION PUMP SERVO-MOTOR	ENGINE SPEED DETECTOR	SWING PRESS REDUC. DRE4	SWING BK. REL. ELECTR	PRESSURE SWITCH		TRAV. RELAY.	WATER T°	U/STRUCT. SWING SPEED DETECTOR	FUNCT. LED	BATT. 0V	BATT. +28V	INST. PNL. LIGHTG. +28V	CONTROL PANEL	PRESSURE SENDER
					SWING	TRAV.									



CAB FLOOR WIRING (STANDARD)

▲ 3, ▼ 3, △ 20, △ 20, △ 21, △ 27, △ 31, △ 30
□ 1, □ 2, □ 3, □ 4, □ 5, □ 6, □ 7, and □ 0

FLOOR

- A1 Radio (optional)
- B3 Pilot pressure pressostat
- B53 Steering pressure switch
- B52 Pressure switch for minimum braking pressure
- B51 Stop light pressure switch
- B50 Parking brake pressure switch
- B54 Front axle unlocking pressure switch
- E7 Cigar lighter
- E14 Front LH side light
- E17 Front LH dipped headlight
- E19 LH main beam headlight
- E23 Front LH direction indicator light
- E32 LH side-mounted direction indicator
- H10 Working light switch lighting
- H11 Windshield wiper switch lighting
- H12 Windshield washer switch lighting
- H13 Heater blower switch lighting
- H15 Instrument panel audible warning
- H26 Horn
- H50 Parking brake and working brake switch lighting
- H51 Hazard warning switch lighting
- J13 Steering column connector (commodo)
- J14 Steering column connector (commodo)
- J15 Steering column connector (commodo)
- M3 Windshield washer motor
- M4 Heater blower motor
- P4 Hourmeter
- P10 Instrument panel
- S1 Key switch
- S3 Horn switch
- S4 Working light switch
- S6 Windshield wiper switch
- S22 Control panel (see section 4002)
- S24 Pilot safety switch
- S25 Rotary light switch (specific to certain countries)
- S26 Windshield washer switch
- S27 Heater blower switch
- S50 Parking brake and working brake switch
- S51 Hazard warning switch
- X1 Cab floor/cab connector
- X4 Troubleshooting test socket

ENGINE MODULE AND UPPERSTRUCTURE WIRING (STANDARD)

⌚ Volts supply before contact

▲ 1, ▲ 2, ▲ 3, ▲ 4, △ 5 and △ 28

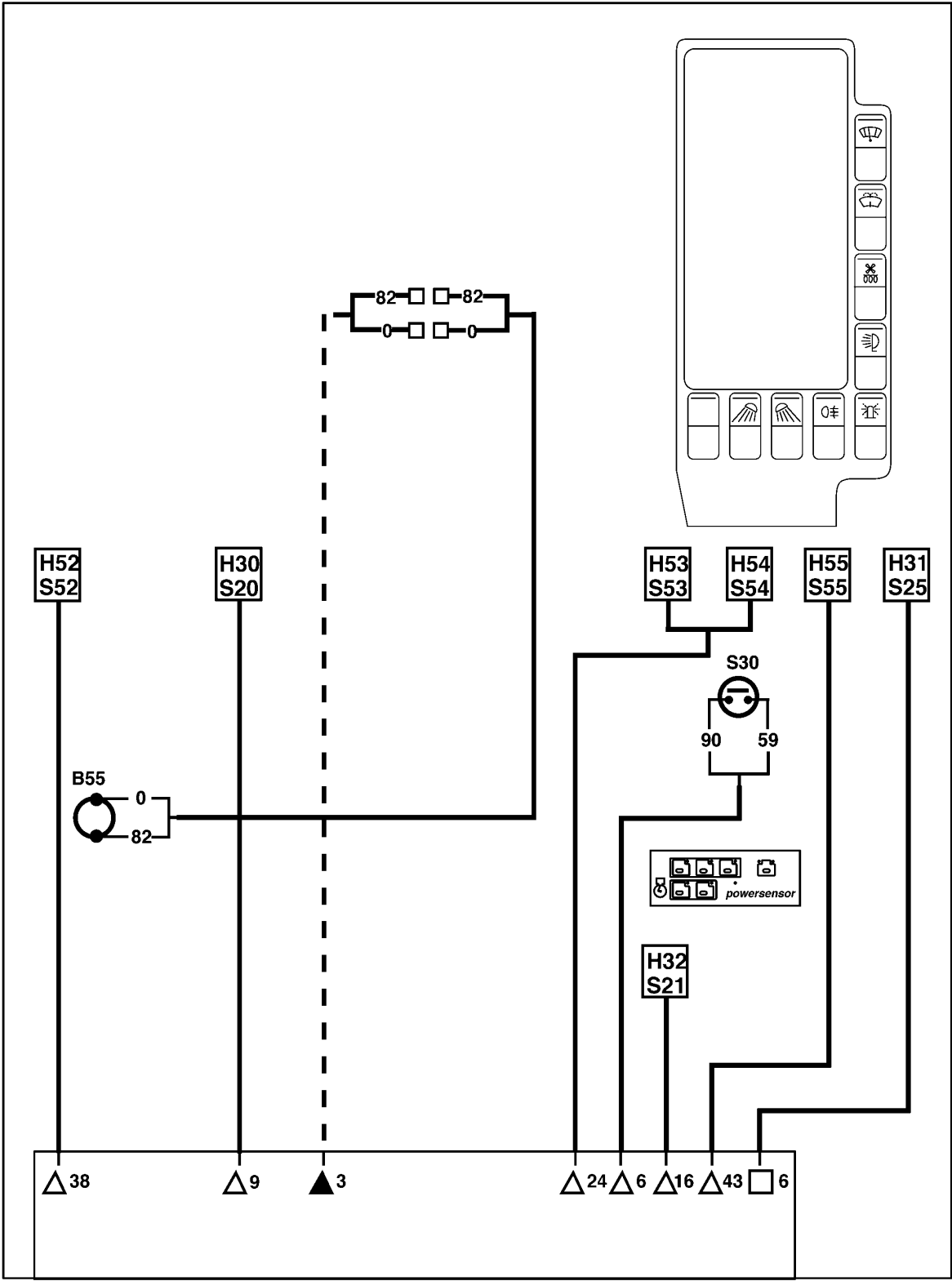
UPPERSTRUCTURE

- B1 Air filter restriction pressostat
- B2 Hydraulic oil filter restriction pressostat
- B21 Hydraulic oil temperature sender
- E10 RH rear stop light
- E11 LH rear stop light
- E12 Front RH side light
- E13 Rear RH side light
- E15 Rear LH side light
- E16 Front RH dipped headlight
- E18 RH main beam headlight
- E20 Front RH direction indicator light
- E21 Rear RH direction indicator light
- E22 Rear LH direction indicator light
- E31 RH side-mounted direction indicator
- P11 Fuel level gauge
- S2 Battery master switch
- X2 Upperstructure power line connection
- X5 Attachment working light power line connection
- Y2 Pilot safety solenoid valve
- Y11 Gear box solenoid valve (first speed)
- Y13 Front axle unlocking solenoid valve
- Y14 Gear box solenoid valve (second speed)
- Y15 Parking brake and working brake solenoid valve
- Y16 Working brake solenoid valve (standard)
- Y17-Y18 Working brake solenoid valves (specific to certain countries)
- Y26-Y27 Stabilizer raising and lowering solenoid valves

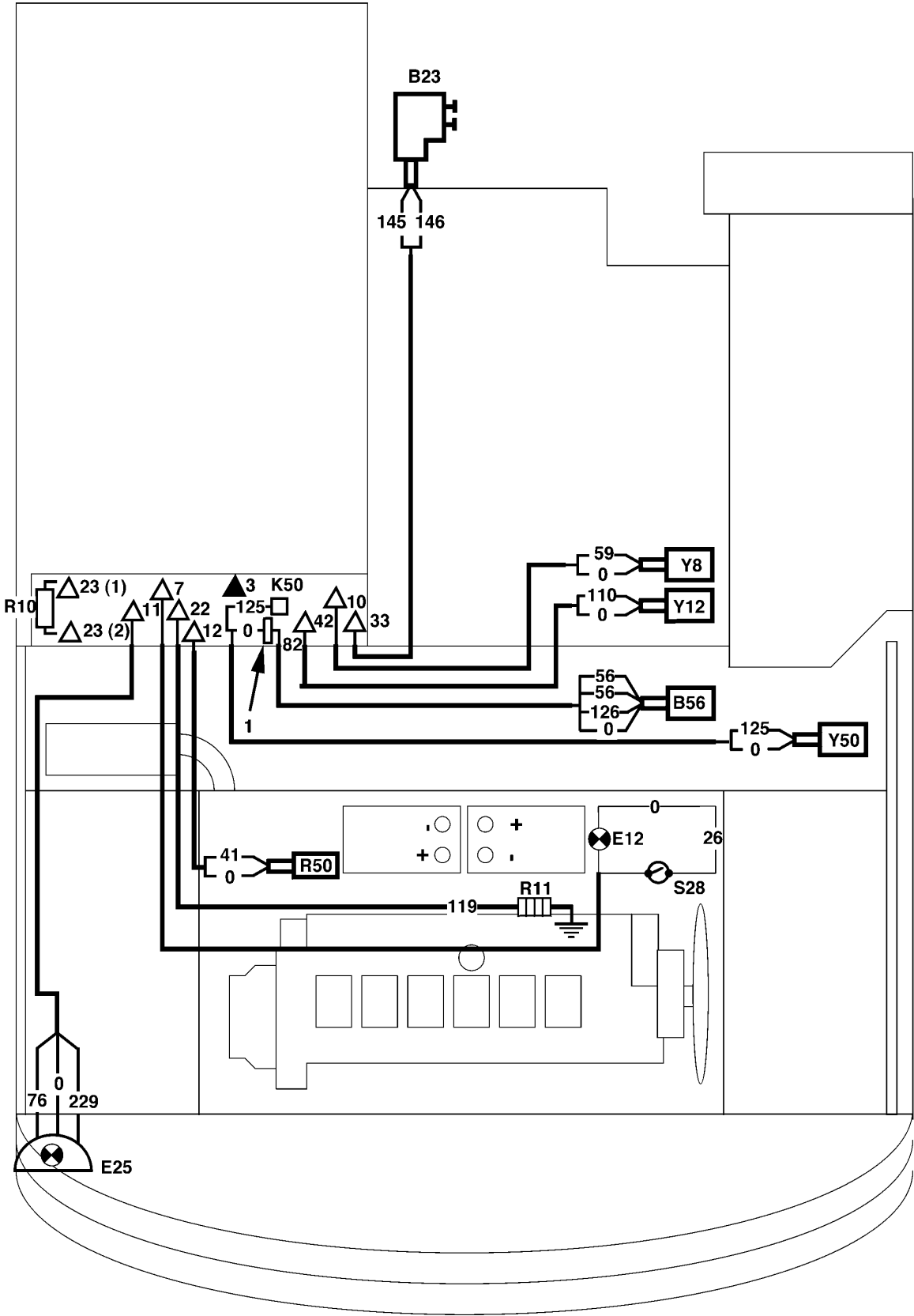
ENGINE

- B4 Engine oil pressure pressostat
- B22 Engine coolant temperature sender
- G2 Alternator
- M1 Starter motor
- Y1 Engine stop solenoid valve

CAB FLOOR WIRING (OPTIONAL)



ENGINE MODULE AND UPPERSTRUCTURE WIRING (OPTIONAL)



CAB FLOOR WIRING (OPTIONAL)

ELECTRICAL CABINET

▲ 3, △ 6, △ 9, △ 16, △ 24, △ 38, △ 43 and □ 6

UPPERSTRUCTURE

- B55 Steering brake pressure switch
- H30 Cold start assistance switch lighting
- H31 Rotary light switch lighting
- H32 Overload indicator switch lighting
- H52 Pilot system cancellation switch lighting
- H53 Front working light switch lighting
- H54 Rear working light switch lighting
- H55 Foglight switch lighting
- S20 Cold start assistance switch
- S21 Overload indicator switch
- S25 Rotary light switch
- S30 Adjustable boom control switch
- S52 Pilot system cancellation switch
- S53 Front working light switch
- S54 Rear working light switch
- S55 Foglight switch

ENGINE MODULE AND UPPERSTRUCTURE WIRING (OPTIONAL)

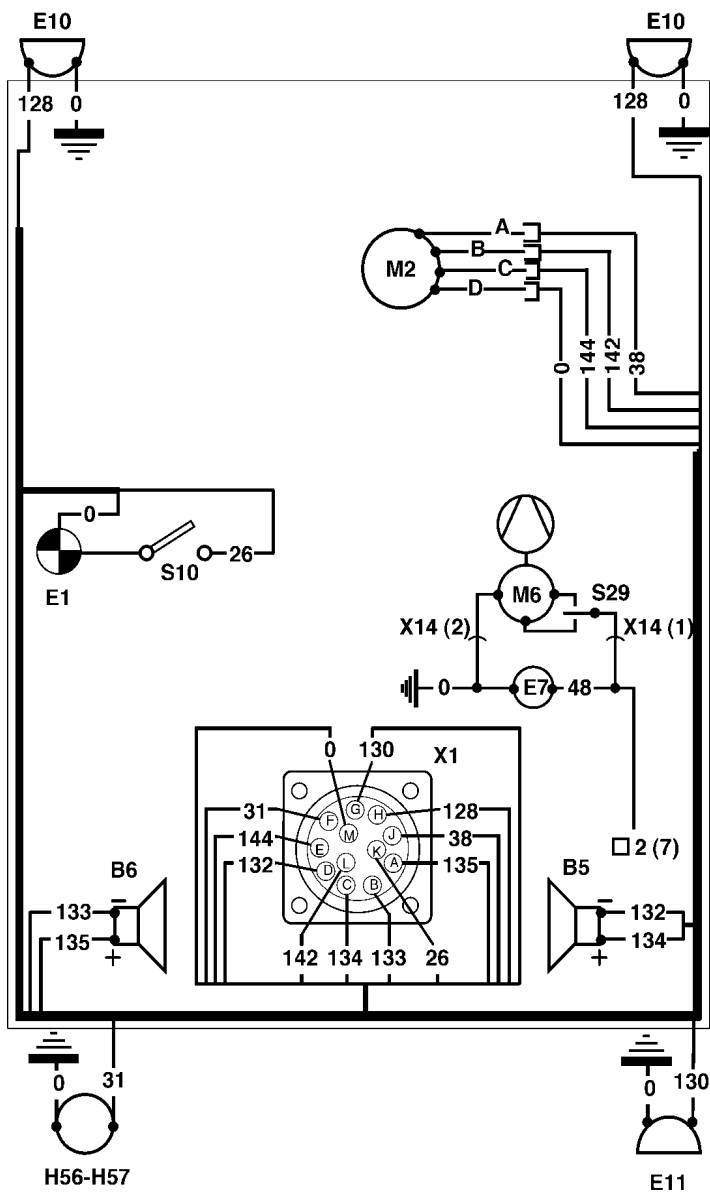
ELECTRICAL CABINET

▲ 3, △ 7, △ 10, △ 11, △ 12, △ 22 △ 23 (1) (2), △ 33, △ 42

UPPERSTRUCTURE

- B23 Overload indicator
- B56 Boom raising range limitation detector
- E12 Engine compartment light
- E25 Rear foglight
- K50 Adjustable boom raising range limitation relay
- R10 Cold start assistance heater element
- R11 Cold start assistance plug
- R50 Fuel heating device
- S28 Engine compartment light switch
- Y12 Pilot system cancellation solenoid valve
- Y8 Adjustable boom solenoid valve
- Y50 Adjustable boom raising range limitation solenoid valve
- 1 4 unit strip

CAB AND CAB OPTION WIRING



- | | | | |
|------------|--|----------------|--|
| B | Grey wire | M2 | Windshield wiper motor |
| C | Blue wire | M6 | Cab blower motor (optional) |
| D | Black wire | S10 | Cab lighting switch |
| E1 | Cab lighting | S29 | Cab lower switch (optional) |
| E7 | Cigar lighter (see wiring page 28) | X1 | Cab floor/cab connector (see cab floor wiring schematic page 28) |
| E10 | Front working lights (optional) | X14(1) | Cab blower plug (optional) |
| E11 | Rear working light (optional) | X14(2) | Cab blower plug (optional) |
| H56 | Rotary light (specific to certain countries) | □ 2 (7) | 10 way connector (see printed circuit wiring page 5) |
| H57 | Standard rotary light (optional) | | |
| B5 | RH loudspeaker (optional) | | |
| B6 | LH loudspeaker (optional) | | |

PDH0224

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Section

4001

ELECTRICAL SCHEMATICS
1188 Wheeled excavators (new version)

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SPECIFICATIONS

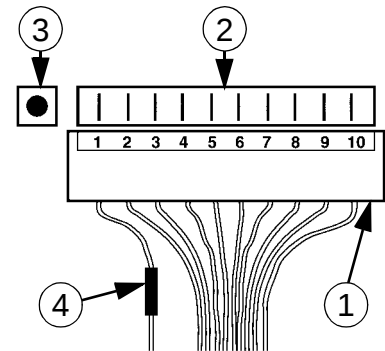
Circuit voltage	24 volt negative earth and 12 volt negative earth
Batteries	2 x 12 Volt 120 A/hrs, low maintenance
Alternator	Bosch, 28 volt, 45 amps
Starter motor	Bosch, 24 volt, 4.0 kW

SCHEMATIC SYMBOLS

- A (n) Radio/housings
- B (n) Indicators/pressure switches/loud-speakers/detectors/thermal detector/gauge
- E (n) Lighting components
- F (n) Fuses
- G (n) Electrical supply generators
- H (n) Warning devices (lighted and audible)
- K (n) Relays
- M (n) Motors
- P (n) Instruments
- R (n) Resistors/heating elements/heating plugs
- S (n) Shunt resistors/switches/rotating switches/main switch
- Sh (n) Shunt
- V (n) Diodes
- X (n) Supply line connections
- Y (n) Solenoid valves, solenoids

NOTE: The (n) shows the component number.
Example: K2 is relay N°2.

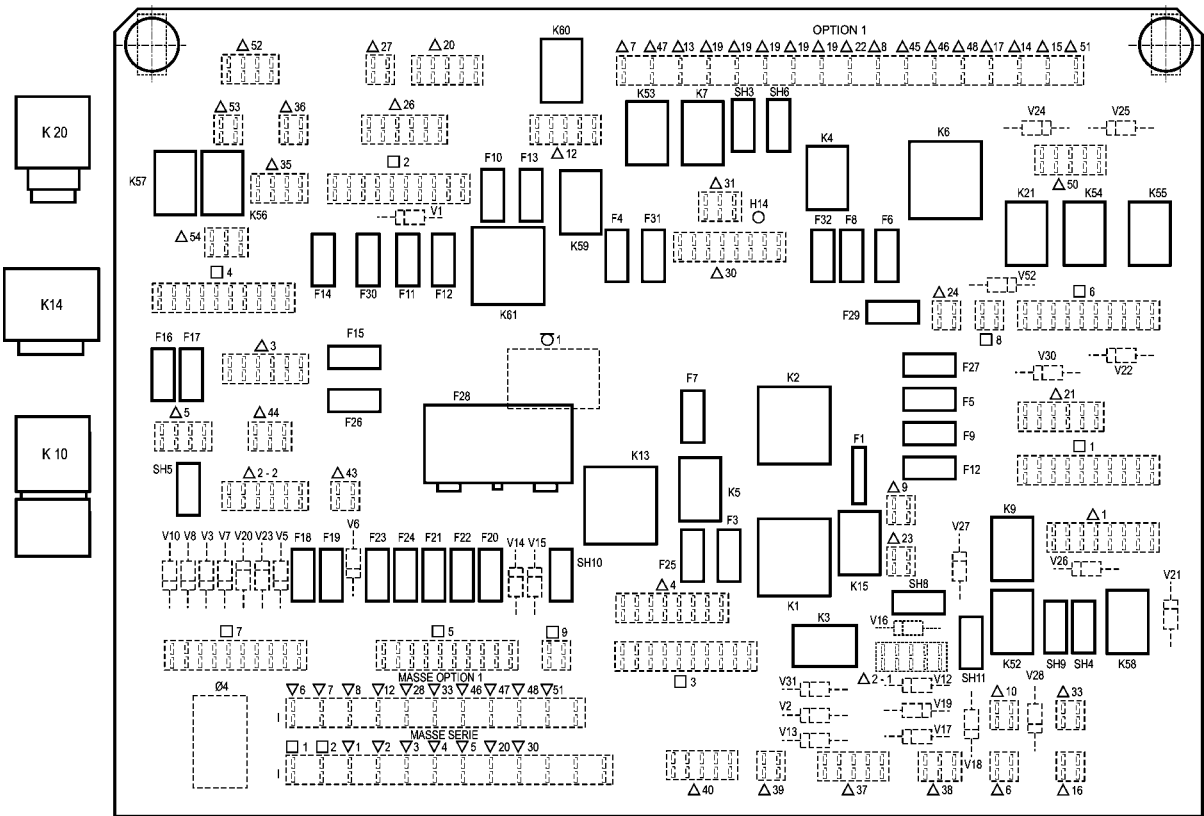
-  (n) Supply on printed circuit
-  (n) Battery terminal
-  (n) Printed circuit connection terminal
-  Printed circuit earth connector
-  A1 Instrument panel connector
-  1 or  1 or  1 Identification of harness
-  1(1) or  1(1) or  1(1) Identification of harness, followed by path identification number
-  (1) or  (1) Printed circuit earth connectors



The installation position for the harness connector (1) on connector (2) of the printed circuit is identified by a red mark (3) followed by the figure 1 on the printed circuit. This identification corresponds to the position of path 1 of the harness connector (1). This position is completed when the path 1 line is shown by a red ring (4) located on line 1 wire, or by red paint marking.

-  Local earth
-  Wire number
-  Closed circuit
-  Open circuit
-  Intersection of two wires with connection point
-  Intersection of two wires without connection point
-  Link with following plate
-  Link with preceding plate
-  Return to another plate with the same letter
-  Bulbs
-  Test bulb
-  Light emitting diode (LED)
-  Regulator

DESCRIPTION OF ELECTRICAL CABINET PRINTED CIRCUIT (STANDARD)



CI99J043

- F1** Fuse, 30 A, starter motor solenoid, thermostart
- F2** Fuse, 5 A, starter switch
- F3** Fuse, 7.5 A, instrument panel, hourmeter
- F4** Fuse, 5 A, cab lighting, horn (control), hood lighting
- F5** Fuse, 10 A, working lights (control), rotary light (std), rotary light (Italy)
- F6** Fuse, 15 A, attachment working light, rear cab light
- F7** Fuse, 10 A, horn (power)
- F8** Fuse, 15 A, upperstructure socket, fuel pump
- F9** Fuse, 10 A, windshield washer, windshield wiper (BAT + R)
- F10** Fuse, 10 A, heater
- F11** Fuse, 7.5 A, cigarette-lighter, cab blower, batt.+ working brake for Germany
- F12** Fuse, 10 A, two-speed electro, axle unlocking, piloting neutralisation (std - Italy), stabilizers, direction of travel control, overload indicator
- F14** Fuse, 10 A, step-down transformer / radio
- F15** Fuse, 15 A, general lighting
- F16** Fuse, 5 A, RH rear brake light
- F17** Fuse, 5 A, LH rear brake light
- F18** Fuse, 5 A, RH front/rear sidelight, dipper lighting + cassette
- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- F20** Fuse, 5 A, RH front dipped headlight
- F21** Fuse, 5 A, LH front dipped headlight
- F22** Fuse, 5 A, rear fog light

- F23** Fuse, 5 A, RH main beam headlight
- F24** Fuse, 5 A, LH main beam headlight
- F25** Fuse, 7.5 A, parking brake electro, working brake electro (std/D/I)
- F26** Fuse, 7.5 A, flasher, warning
- F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)
- F28** Fuse, 40 A, engine stop/start solenoid (injection)
- F30** Fuse, 10 A, windshield wiper (BAT +)
- F32** Fuse, 5 A, (BAT +) electronics
- H14** Troubleshooting test LED
- K1** Starter motor relay
- K2** Battery relay
- K3** Hourmeter + transmission brake pressure switch + two-speed supply relay
- K4** Electronic supply relay
- K5** Horn relay
- K6** Working light relay
- K7** Relay authorizing working lights if sidelights on
- K9** Pilot safety relay/axle unlocking
- K10** Flasher unit relay
- K13** Engine stop solenoid relay
- K14** Speed change relay (588)
- K20** Windshield wiper intermittent action
- K21** Safety relay piloting pressure switch piloting

- K52** Speed change relay (except 588)
- K54** Frequency threshold detector relay (threshold: 1 = 1600 rpm)
- K55** Frequency threshold detector relay (threshold: 2 = 1400 rpm)

- Sh6, Sh8, Sh10, Sh11** Not used
- V1** Starter key switch diode
- V2** Diode less engine running
- V3** Dipped headlight indicator lamp diode on instrument panel
- V6** Main beam headlight indicator lamp diode on instrument panel
- V7** RH flashing indicator lamp diode on instrument panel
- V8** LH flashing indicator lamp diode on instrument panel
- V9** Warning indicator lamp diode on instrument panel
- V10** LH flasher diode
- V12** 2nd speed indicator lamp diode on 588P

- K56** Reverse travel relay
- K57** Forward travel relay
- K58** Two-speed supply relay
- K61** Battery relay (heater/air conditioner)
- Sh4, Sh5, Sh9** Shunt

- V13** 1st speed indicator lamp diode on 588P
- V14** Stab lowering diode
- V15** Stab raising diode
- V18** Axle unlocking indicator lamp diode on instrument panel
- V20** RH flasher diode
- V22** Rotary light diode on instrument panel
- V23** Warning diode
- V24** K54 relay diode
- V25** K55 relay diode
- V26** Axle unlocking diode
- V30** Buzzer diode
- V31** K58 relay diode

PRINTED CIRCUIT WIRING (STANDARD)

- 1** (1) 24 volt printed circuit supply
- 1** (2) 24 volt printed circuit supply

- 4** (1) Printed circuit earth
- 4** (2) Printed circuit earth

- 1** Floor harness, 10 way connector
- 2** Floor harness, 10 way connector
- 3** Floor harness, 10 way connector
- 4** Floor harness, 10 way connector
- 5** Floor harness, 10 way connector
- 6** Floor harness, 10 way connector
- 7** Floor harness, 10 way connector
- 8** Floor harness, 2 way connector
- 9** Floor harness, 2 way connector

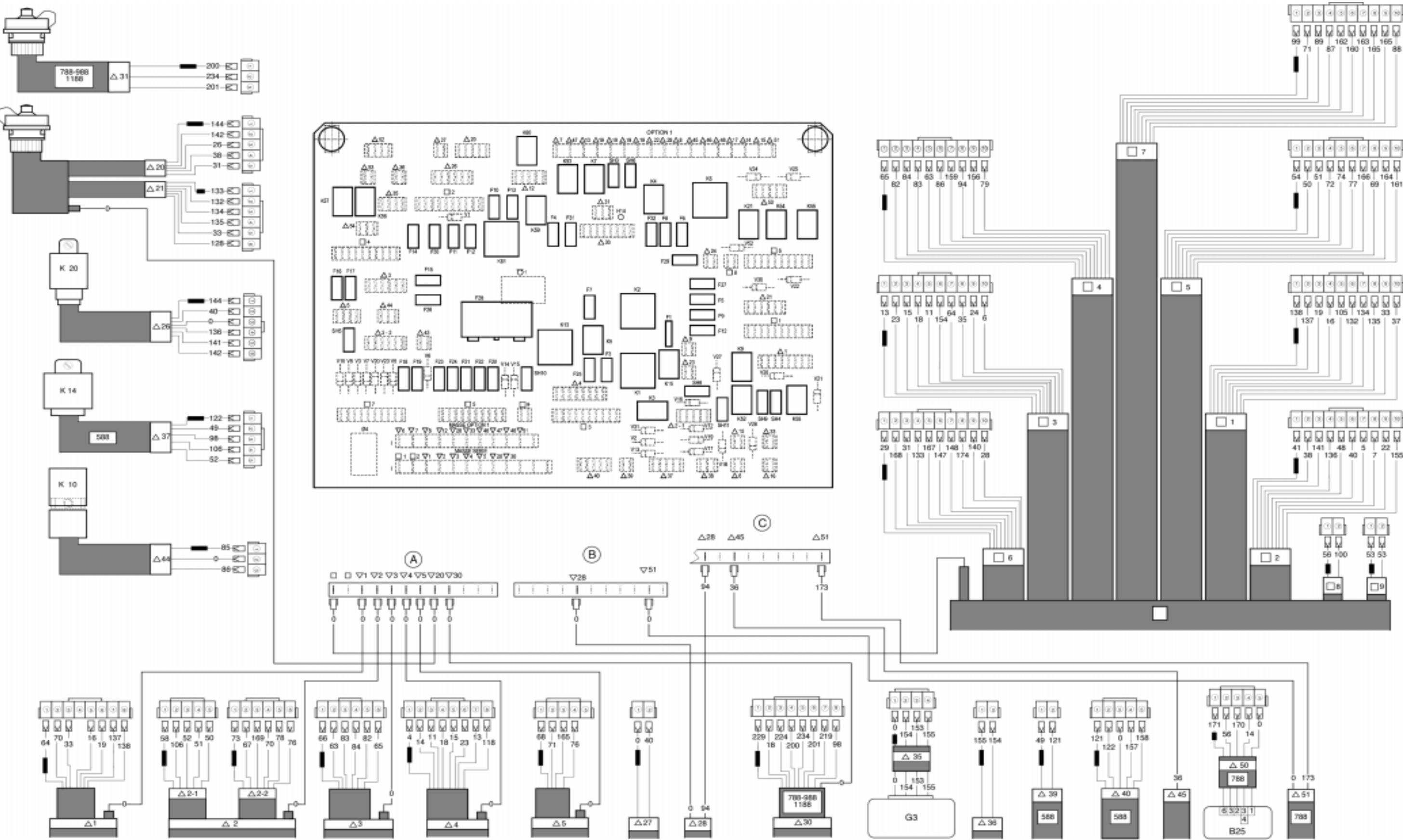
- 1** Common harness, 8-way connector
- 2-1** Lighting / solenoid valve harness, 5-way connector
- 2-2** Lighting / solenoid valve harness, 6-way connector
- 3** Central brake harness, 6-way connector
- 4** Engine harness, 8-way connector
- 5** LH rear lighting harness, 4-way connector
- 20** Cab socket harness, 5-way connector
- 21** Cab socket harness, 6-way connector
- 26** Windshield wiper time delay harness, 6-way connector
- 27** Windshield washer, 2-way connector
- 28** Working brake solenoid valve harness, clip
- 30** Electronic harness, 8-way connector (788/988/1188)
- 31** Diagnostic plug harness, 3-way connector (788/988/1188)
- 35** Step-down transformer harness 24V - 12V, 4-way connector

- 36** 12V socket harness, 2-way connector
- 37** Bi-stable relay harness on 588, 5-way connector
- 39** Brake pressure switch harness on 588, 2-way connector
- 40** Two-speed control box harness, 5-way connector (588)
- 44** Flasher unit harness, 3-way connector
- 45** Upperstructure socket harness
- 50** Threshold detector harness, 5-way connector (788)
- 51** Heavy lift solenoid valve harness (788), clip

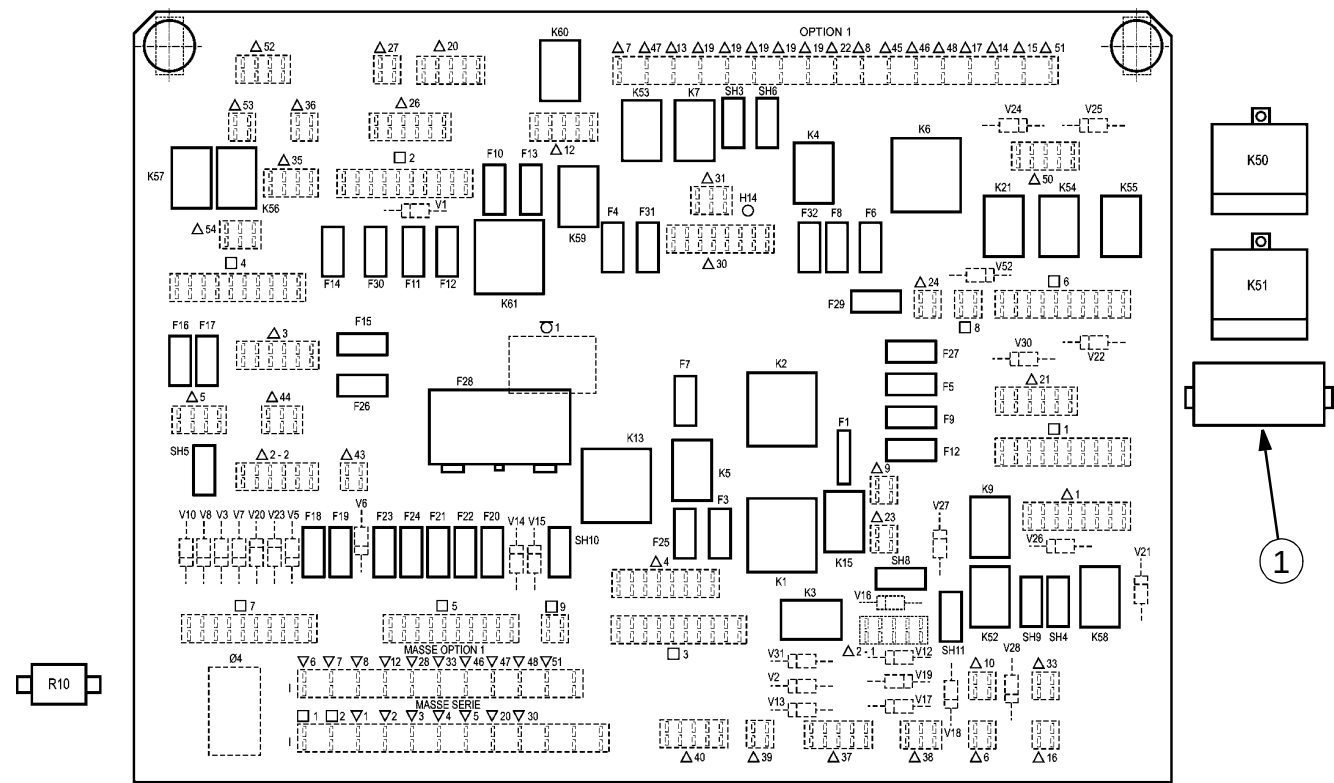
- 1** Floor harness earth, clip
- 2** Floor harness earth, clip

- 1** Common harness earth, clip
- 2** Lighting / solenoid valve harness earth, clip
- 3** Brake unit earth harness, clip
- 4** Engine harness earth, clip
- 5** LH rear harness earth, clip
- 20** Cab socket harness, clip
- 28** Working brake solenoid valve harness, clip
- 30** Electronic harness earth, clip
- 51** Heavy lift solenoid valve harness, clip

- A** Standard earth
- B** Optional earth
- C** option



DESCRIPTION OF ELECTRICAL CABINET PRINTED CIRCUIT (OPTIONAL)



CI99J044

- F1** Fuse, 30 A, starter motor solenoid, thermostart
- F4** Fuse, 5 A, cab lighting, horn (control), hood lighting
- F5** Fuse, 10 A, working lights (control), rotary light (std), rotary light (Italy)
- F6** Fuse, 15 A, attachment working light, rear cab light
- F8** Fuse, 15 A, upperstructure socket, fuel pump
- F11** Fuse, 7,5 A, cigarette-lighter, cab blower, batt.+ working brake for Germany
- F12** Fuse, 10 A, two-speed electro, axle unlocking, piloting neutralisation (std - Italy), stabilizers, direction of travel control, overload indicator
- F13** Fuse, 15 A, air conditioner
- F18** Fuse, 5 A, RH front/rear sidelight, dipper lighting + cassette
- F22** Fuse, 5 A, rear fog light
- F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)

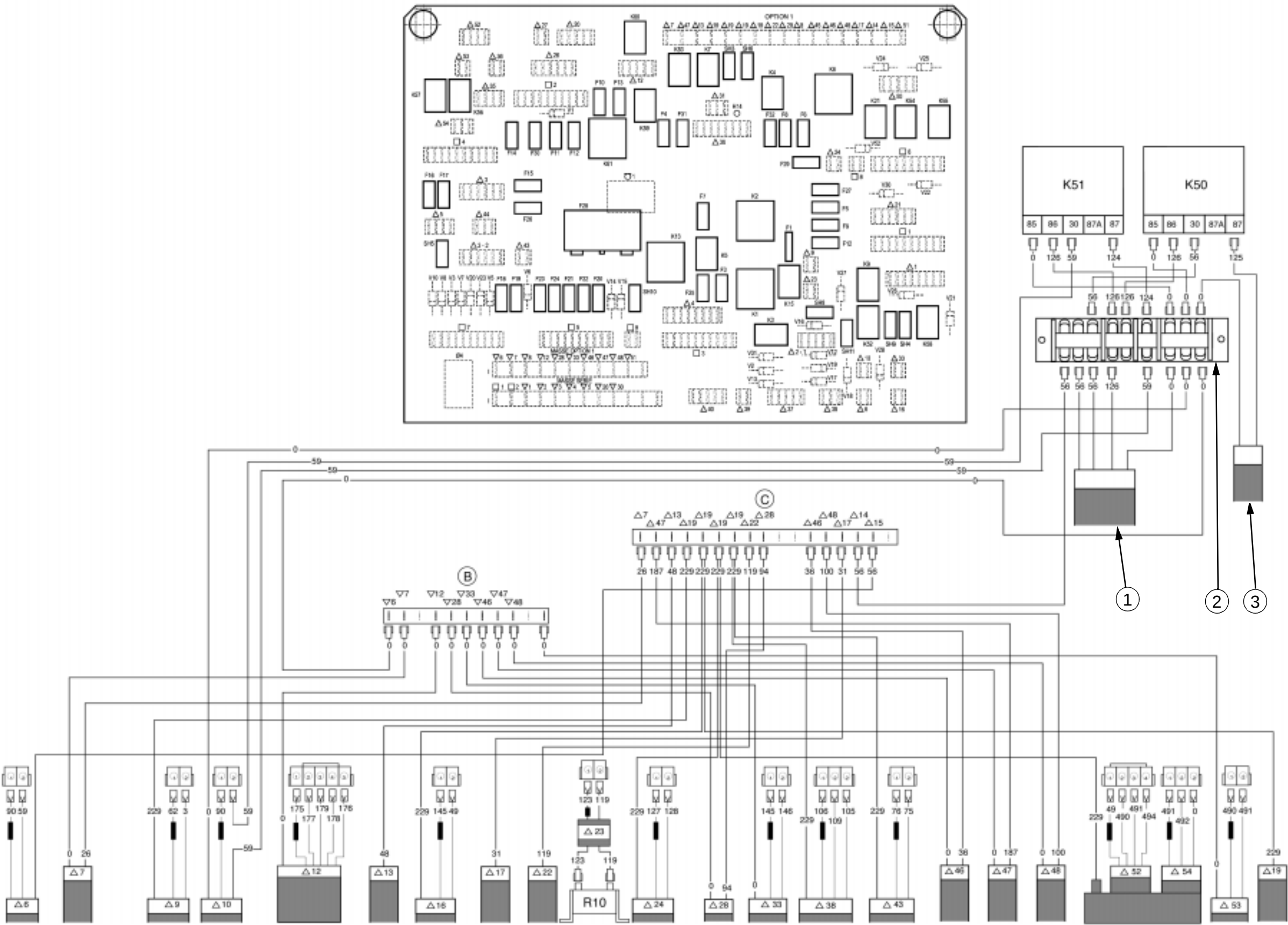
- F29** Fuse, 10 A, cab front working light
- F31** Fuse, 10 A, fuel heater
- K15** Thermostart relay
- K50** Adjustable boom raising limiter relay (optional)
- K51** Adjustable boom retracting limitation relay (optional)
- K53** Fuel heater relay
- K59** Air conditioning compressor relay
- K60** Air conditioning condenser relay
- R10** Resistor, 0.85 Ohms
- V5** Fog light indicator lamp diode on instrument panel
- V16, V17, V19** Diode for Italy
- V21** Overload indicator lamp diode on instrument panel
- V27** Axle electro unlocking diode for Italy
- V28** Pilot system cancellation indicator lamp diode on instrument panel
- V52** Quick coupler switch diode
- Sh8, Sh9, Sh10, Sh11** Shunt
- Sh3, Sh4, Sh5, Sh6** Not used

1 Connection strip

PRINTED CIRCUIT WIRING (OPTIONAL)

- △ **6** Adjustable boom harness, 2-way connector
- △ **7** Hood lighting harness, clip
- △ **9** Cold start switch harness, 2-way connector
- △ **10** Adjustable boom harness, 2-way connector
- △ **12** Air conditioner harness, 5-way connector
- △ **13** Working brake
- 14** Adjustable boom maximum reach limitation harness, clip
- △ **16** Overload indicator switch harness, 2-way connector
- △ **17** Upperstructure rotary light harness, clip
- △ **19** Registration plate harness, clip
- △ **19** Option switches lighting harness, clip
- △ **22** Cold start plug harness, clip
- △ **23** Thermostart element harness, 2-way connector
- △ **24** Front cab light switch harness, 2-way connector
- △ **28** Working brake solenoid valve harness
- △ **33** Overload indicator pressure switch, 2-way connector
- △ **38** Pilot system cancellation switch, Italy, 3-way connector
- △ **43** Rear fog light switch harness, 2-way connector
- △ **46** Fuel pump harness
- △ **47** Fuel heater harness, clip
- △ **48** Quick coupler solenoid valve harness, clip
- △ **52** Direction of travel reverser switch harness, 4-way connector
- △ **53** Direction of travel reverser relay harness, 2-way connector
- △ **54** Direction of travel reverser indicator lamp, 3-way connector
- ▽ **6** Adjustable boom harness earth, clip
- ▽ **7** Hood lighting harness earth, clip
- ▽ **12** Air conditioning harness earth, clip
- ▽ **33** Overload indicator pressure switch harness earth, clip
- ▽ **47** Fuel heater harness earth, clip
- ▽ **48** Tool quick coupler harness earth, clip

- 1** Boom reach limitation solenoid valve cable
- 2** Connection strip
- 3** Boom reach limitation detector cable



PRINTED CIRCUIT SCHEMATIC GUIDE

-  **1** (1) 24 V PCB supply
-  **1** (2) 24 V PCB supply

- F1** Fuse, 30 A, starter motor solenoid, thermostart
- F2** Fuse, 5 A, starter switch
- F3** Fuse, 7.5 A, instrument panel, hourmeter
- F4** Fuse, 5 A, cab lighting, horn (control), hood lighting
- F5** Fuse, 10 A, working lights (control), rotary light (std), rotary light (Italy)
- F6** Fuse, 15 A, attachment working light, rear cab light
- F7** Fuse, 10 A, horn (power)
- F8** Fuse, 15 A, upperstructure socket, fuel pump
- F9** Fuse, 10 A, windshield washer, windshield wiper (BAT + R)
- F10** Fuse, 10 A, heater
- F11** Fuse, 7,5 A, cigarette-lighter, cab blower, batt.+ working brake for Germany
- F12** Fuse, 10 A, two-speed electro, axle unlocking, piloting neutralisation (std - Italy), stabilizers, direction of travel control, overload indicator
- F13** Fuse, 15 A, air conditioner
- F14** Fuse, 10 A, step-down transformer / radio
- F15** Fuse, 15 A, general lighting
- F16** Fuse, 5 A, RH rear brake light
- F17** Fuse, 5 A, LH rear brake light
- F18** Fuse, 5 A, RH front/rear sidelight, dipper lighting + cassette
- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- F20** Fuse, 5 A, RH front dipped headlight
- F21** Fuse, 5 A, LH front dipped headlight
- F22** Fuse, 5 A, rear fog light
- F23** Fuse, 5 A, RH main beam headlight
- F24** Fuse, 5 A, LH main beam headlight
- F25** Fuse, 7.5 A, parking brake electro, working brake electro (std/D/I)
- F26** Fuse, 7.5 A, flasher, warning
- F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)
- F28** Fuse, 40 A, engine stop/start solenoid (injection)
- F29** Fuse, 10 A, cab front working light
- F30** Fuse, 10 A, windshield wiper (BAT +)
- F31** Fuse, 10 A, fuel heater
- F32** Fuse, 5 A, (BAT +) electronics

- H14** Troubleshooting test LED

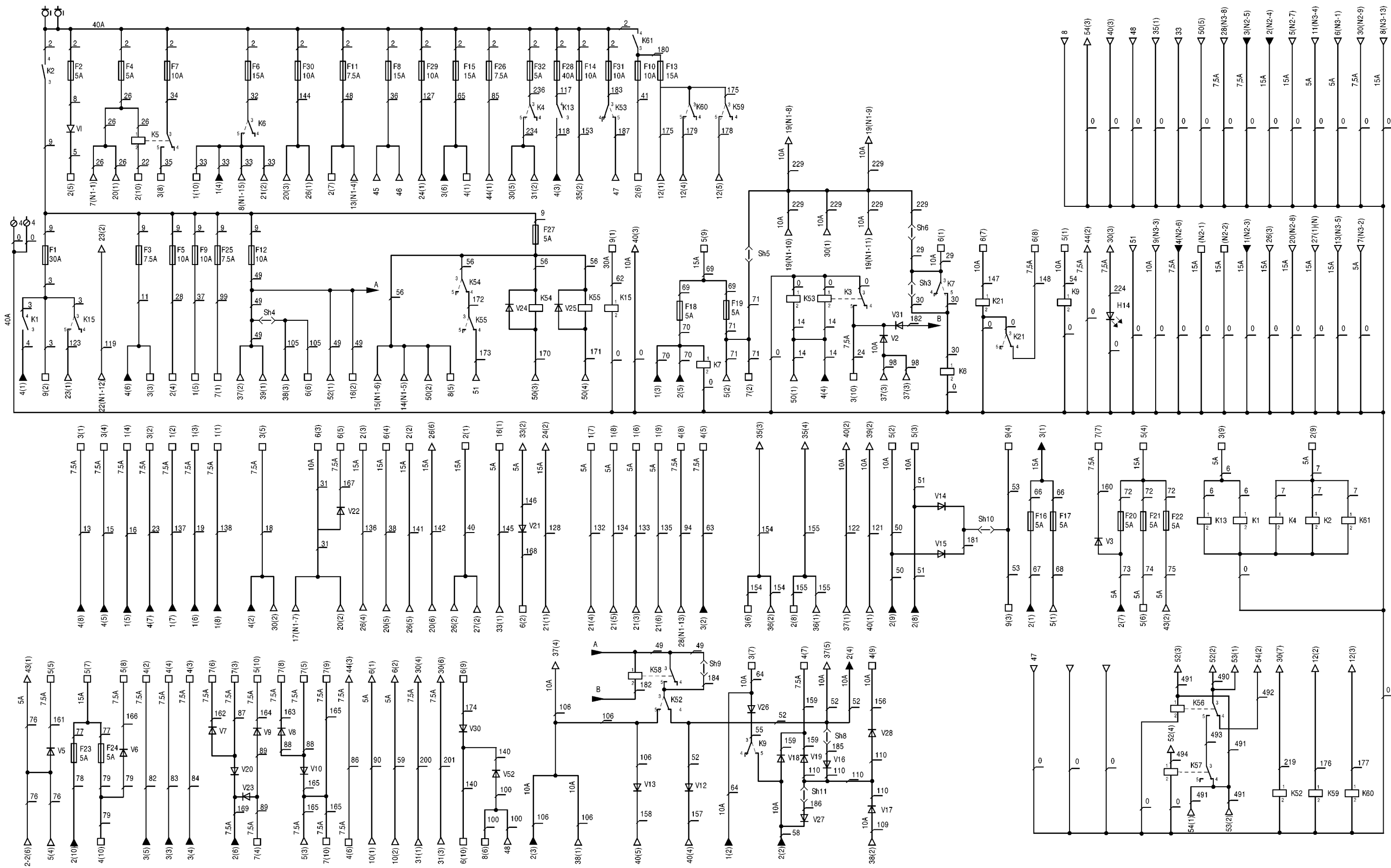
- K1** Starter motor relay
- K2** Battery relay
- K3** Hourmeter + transmission brake pressure switch + two-speed supply relay
- K4** Electronic supply relay
- K5** Horn relay
- K6** Working light relay
- K7** Relay authorizing working lights if sidelights on
- K9** Pilot safety relay/axle unlocking
- K13** Engine stop solenoid relay
- K15** Thermostart relay
- K21** Safety relay piloting pressure switch piloting
- K52** Speed change relay (except 588)
- K53** Fuel heater relay
- K54** Frequency threshold detector relay (threshold: 1 = 1600 rpm)
- K55** Frequency threshold detector relay (threshold: 2 = 1400 rpm)

- K56** Reverse travel relay
- K57** Forward travel relay
- K58** Two-speed supply relay
- K59** Air conditioning compressor relay
- K60** Air conditioning condenser relay
- K61** Battery relay (heater/air conditioner)

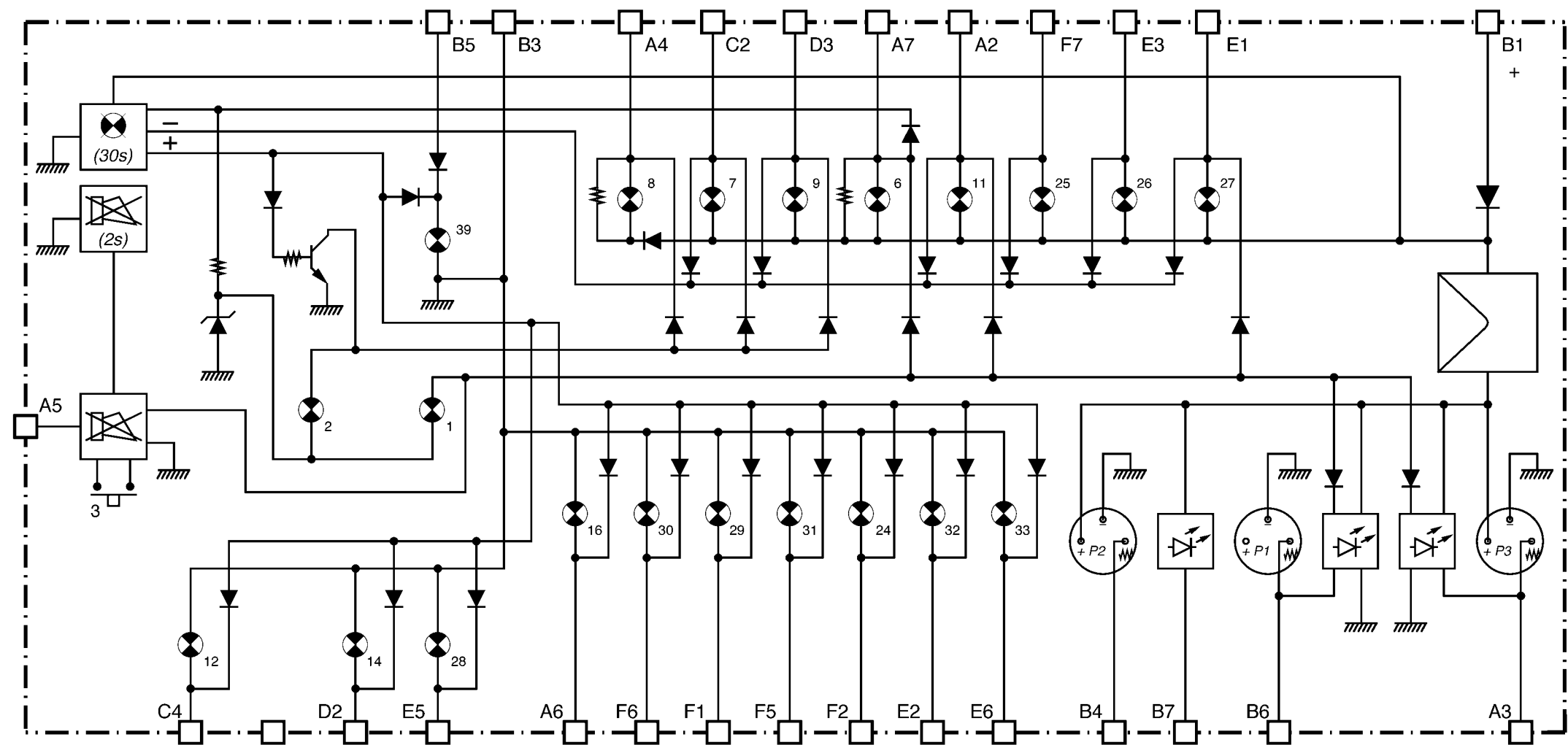
- Sh4** Shunt OK Standard - not Italy
- Sh5** Shunt Night lighting (switch) + P excavator registration plate
- Sh8** Shunt OK Italy - not standard
- Sh9** Shunt contact K58 two-speed supply
- Sh10** Shunt if dozer - stab independent
- Sh11** Shunt - Italy axle unlocking

- V1** Starter key switch diode
- V2** Diode less engine running
- V3** Dipped headlight indicator lamp diode on instrument panel
- V5** Fog light indicator lamp diode on instrument panel
- V6** Main beam headlight indicator lamp diode on instrument panel
- V7** RH flashing indicator lamp diode on instrument panel
- V8** LH flashing indicator lamp diode on instrument panel
- V9** Warning indicator lamp diode on instrument panel
- V10** LH flasher diode
- V12** 2nd speed indicator lamp diode on 588P
- V13** 1st speed indicator lamp diode on 588P
- V14** Stab lowering diode
- V15** Stab raising diode
- V16** Diode for Italy
- V17** Diode for Italy
- V18** Axle unlocking indicator lamp diode on instrument panel
- V19** Diode for Italy
- V20** RH flasher diode
- V21** Overload indicator lamp diode on instrument panel
- V22** Rotary light diode on instrument panel
- V23** Warning diode
- V24** K54 relay diode
- V25** K55 relay diode
- V26** Axle unlocking diode
- V27** Axle electro unlocking diode for Italy
- V28** Pilot system cancellation indicator lamp diode on instrument panel
- V30** Buzzer diode
- V31** K58 relay diode
- V52** Quick coupler switch diode

- Ø 4** (1) printed circuit earth
- Ø 4** (2) printed circuit earth



P10 INSTRUMENT PANEL ELECTRICAL SCHEMATIC P. 10 (PLATE 1)



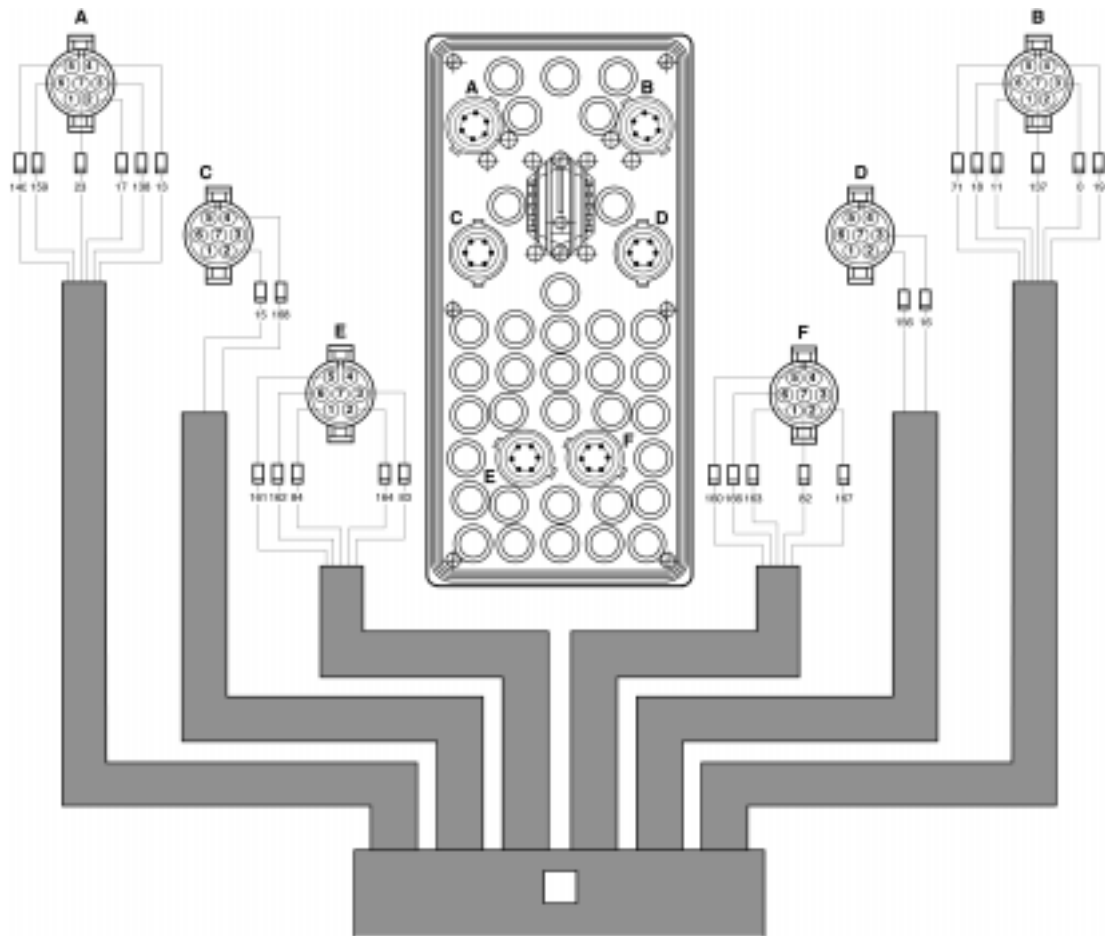
CM97G029

- A2** Minimum pilot pressure red warning lamp connector
- A3** Hydraulic oil temperature warning lamp connector
- A4** Battery charge red warning lamp
- A5** Red and orange warning lamp connector for audible warning device
- A6** Orange warning lamp connector for front axle unlocking
- A7** Engine oil pressure red warning lamp connector
- B1** 24 volt power supply
- B3** Earth
- B4** Fuel level warning lamp connector
- B5** Gauge lighting connector
- B6** Engine coolant solution temperature gauge connector
- B7** Fuel minimum connector
- C2** Air filter restriction red warning lamp connector
- C4** Overload indicator orange warning lamp connector (optional)
- D2** Pilot system cancellation green indicator lamp (special for certain countries)
- D3** Hydraulic oil filter restriction red warning lamp connector

- E1** Brake minimum pressure red warning lamp connector
- E2** Hazard warning red indicator lamp connector
- E3** Parking brake red warning lamp connector
- E5** Rear fog light orange indicator lamp connector (special for certain countries)
- E6** Right-hand direction indicator green indicator lamp connector
- F1** Left-hand direction indicator green indicator lamp connector
- F2** Rotary light orange indicator lamp connector (special for certain countries)
- F5** Dipped headlight green indicator lamp connector
- F6** Main beam headlight blue connector
- F7** Steering minimum pressure red warning lamp connector
- P1** Engine coolant solution temperature indicator
- P2** Fuel level gauge
- P3** Hydraulic oil temperature indicator
- 1** Stop alarm red warning lamp
- 2** Orange alarm warning lamp
- 3** Audible warning device stop push-button
- 6** Engine oil pressure red warning lamp
- 7** Air filter restriction red warning lamp
- 8** Battery charge red warning lamp

- 9** Hydraulic oil filter restriction red warning lamp
- 11** Minimum pilot pressure red warning lamp
- 12** Overload indicator orange warning lamp (option)
- 14** Pilot system cancellation green indicator lamp (special for certain countries)
- 16** Front axle unlocking orange warning lamp
- 24** Rotary light orange indicator lamp (special for certain countries)
- 25** Minimum steering pressure red warning lap
- 26** Parking brake and working brake red warning lamp
- 27** Minimum braking pressure red warning lamp
- 28** Rear fog light orange indicator lamp (special for certain countries)
- 29** Left-hand direction indicator green indicator lamp
- 30** Main beam headlight blue indicator lamp
- 31** Dipped headlight green indicator lamp
- 32** Hazard warning light red warning lamp
- 33** Right-hand direction indicator green indicator lamp
- 39** Gauge lighting indicator lamp

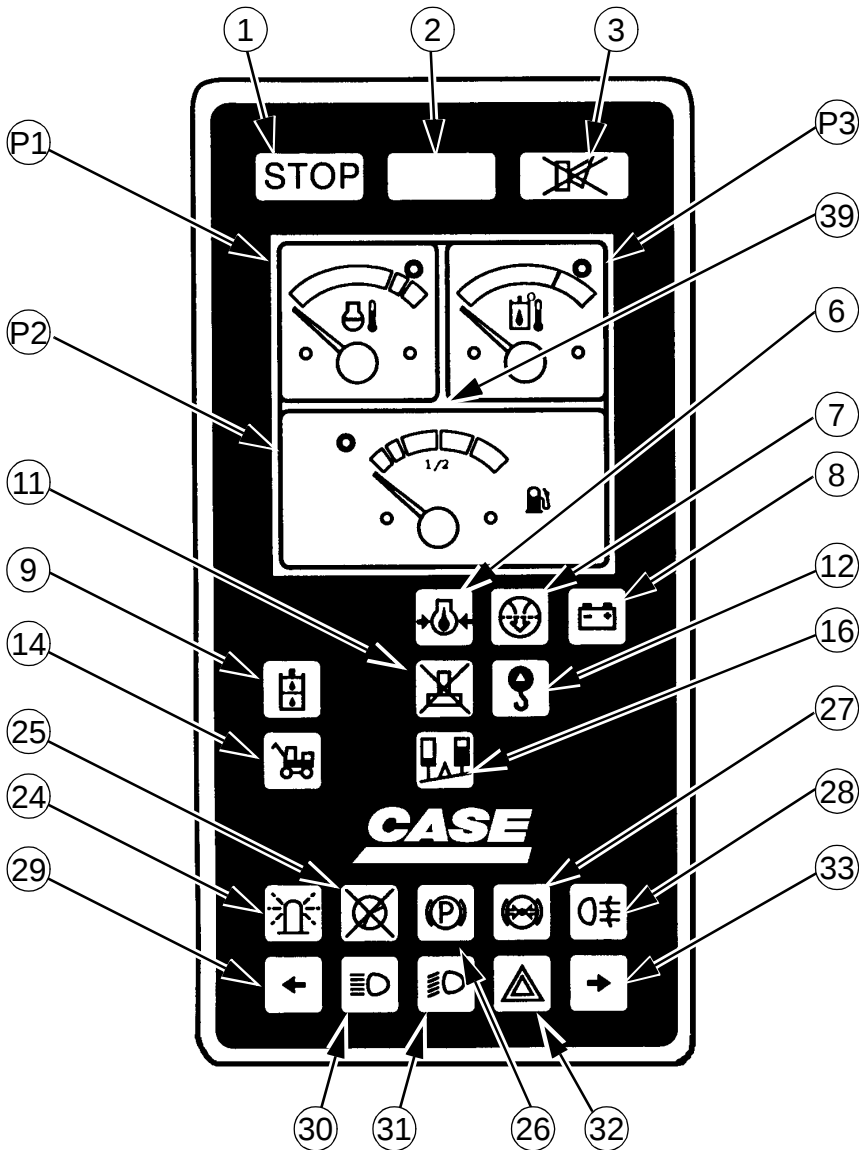
INSTRUMENT PANEL WIRING



CM97G031

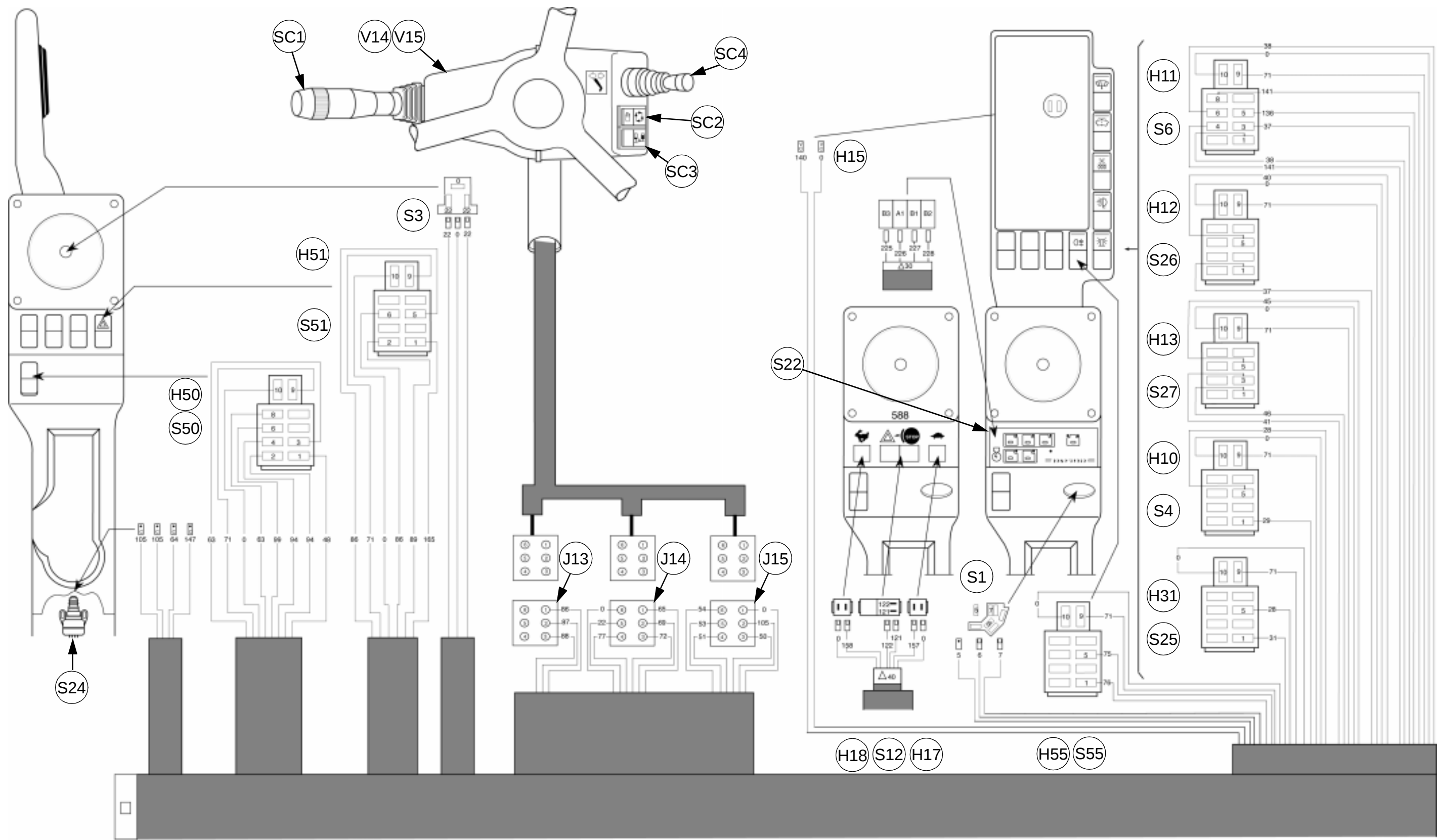
- A** 7 way connector: minimum pilot pressure red warning lamp, hydraulic oil temperature indicator, battery charge red warning lamp, audible warning stop push button, front axle unlocking orange indicator lamp, engine oil pressure red warning lamp, alarm orange warning lamp, stop alarm red warning lamp.
- B** 7 way connector: 24 Volts supply, earth, fuel level gauge, gauge lighting, engine coolant temperature indicator.
- C** 7 way connector: air filter restriction red warning lamp, overload indicator orange indicator lamp (optional).
- D** 7 way connector: pilot system cancellation green indicator lamp (specific to certain countries), hydraulic oil filter restriction red warning lamp.
- E** 7 way connector: minimum braking pressure red warning lamp, hazard warning red warning lamp, parking brake red warning lamp, rear fog light orange indicator lamp (specific to certain countries), RH direction indicators green indicator lamp.
- F** 7 way connector: LH direction indicator green indicator lamps, rotary light orange indicator lamp (specific to certain countries), side light green indicator lamp, main beam blue indicator lamp, minimum steering pressure red warning lamp.

INSTRUMENT PANEL (FRONT FACE)



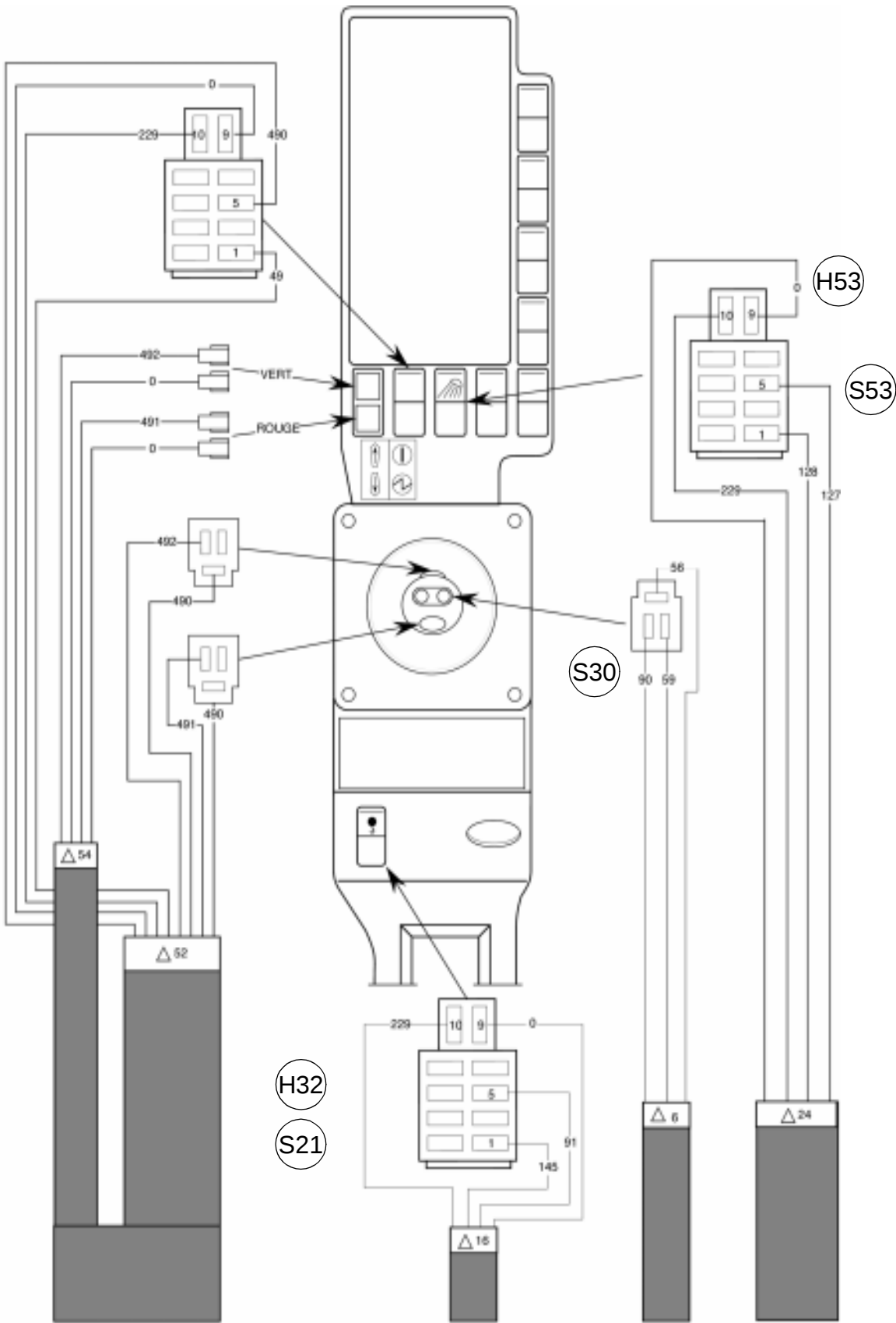
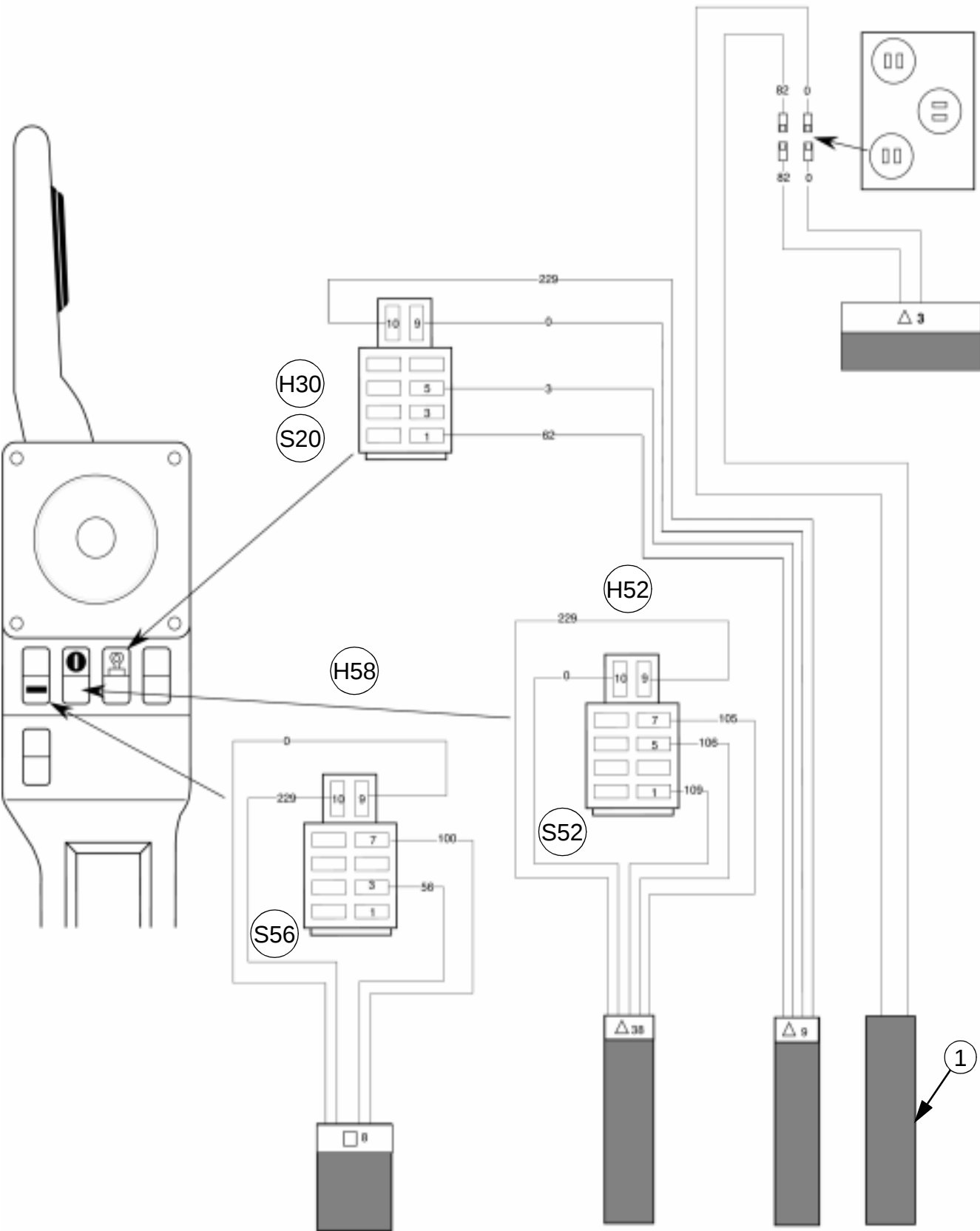
CS9K501

- | | |
|---|--|
| 1 Stop alarm red warning lamp | 27 Minimum braking pressure red warning lamp |
| 2 Alarm orange warning lamp | 28 Rear fog light orange indicator lamp (special for certain countries) |
| 3 Audible warning device stop push-button | 29 Left-hand direction indicator green indicator lamp |
| 6 Engine oil pressure red warning lamp | 30 Headlight main beam blue indicator lamp |
| 7 Air filter restriction red warning lamp | 31 Dipped headlight green indicator lamp |
| 8 Battery charge red warning lamp | 32 Hazard warning light red warning lamp |
| 9 Hydraulic oil filter restriction red warning lamp | 33 Right-hand direction indicator green indicator lamp |
| 11 Minimum pilot pressure red warning lamp | 39 Gauge lighting indicator lamp |
| 12 Overload indicator orange warning lamp (optional) | P1 Engine coolant solution temperature indicator lamp |
| 14 Pilot cancellation green indicator lamp (special for certain countries) | P2 Fuel level gauge |
| 16 Front axle unlocking orange indicator lamp | P3 Oil temperature indicator |
| 24 Rotary light orange indicator lamp (special for certain countries) | |
| 25 Minimum steering pressure red warning lamp | |
| 26 Parking brake red warning lamp | |



**RIGHT-HAND CONTROL ARM, LEFT-HAND CONTROL ARM AND
COMMODO WIRING (STANDARD)**

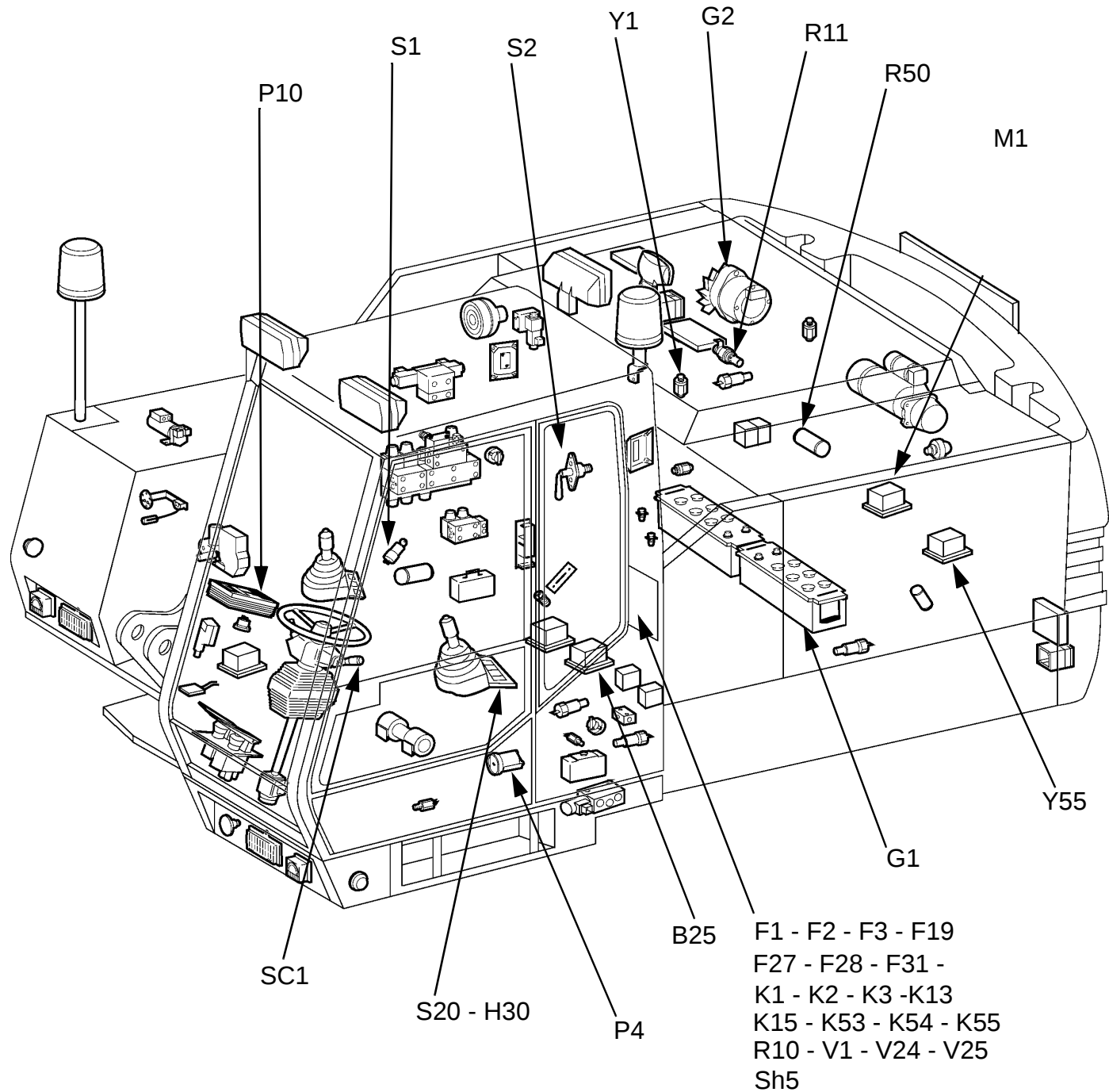
- H10** Working brake switch lighting
- H11** Windshield wiper switch lighting
- H12** Windshield washer switch lighting
- H13** Heater blower switch lighting
- H14** Troubleshooting test LED
- H15** Instrument panel audible warning
- H17** First speed green indicator light (588)
- H18** Second speed blue indicator light (588)
- H31** Rotary light switch lighting
- H50** Working brake and parking brake switch lighting (optional)
- H51** Hazard warning switch lighting
- H55** Rear fog light switch lighting
- J13** Steering column connector
- J14** Steering column connector
- J15** Steering column connector
- S1** Key switch
- S3** Horn switch
- S4** Working light switch
- S6** Windshield wiper switch
- S12** Two-speed switch (588)
- S22** Control keyboard (788-988-1188)
- S24** Pilot safety switch
- S25** Rotary light switch (optional)
- S26** Windshield washer switch
- S27** Heater blower switch
- S51** Hazard warning switch
- S52** Pilot system cancellation switch (optional)
- S55** Rear fog light switch
- SC1** Direction indicator combination switch (commodo), main beam and dip switch, side lights and headlight flasher switch
- SC2** Front axle automatic and manual unlocking switch
- SC3** Front axle locking and unlocking switch (in the axle unlocked position)
- SC4** Stabilizer raising and lowering momentary inverter switch
- V14-V15**Stabilizer solenoid valve diodes (in combination switch (commodo))
- ☐ Floor harness
- ☐ **30** Electronic harness
- ☐ **40** Two-speed control box harness (588)



RIGHT-HAND AND LEFT-HAND CONTROL ARM WIRING (OPTIONAL)

- H30** Cold start assistance switch lighting (optional)
- H32** Overload indicator switch lighting (optional)
- H52** Pilot system cancellation switch lighting (optional)
- H53** Cab front working light switch lighting (optional)
- H58** Quick coupler switch lighting (optional)
- S20** Cold start assistance switch (optional)
- S21** Overload indicator switch (optional)
- S30** Adjustable or articulated boom control switch (optional)
- S52** Pilot system cancellation switch (optional)
- S53** Cab front working light switch (optional)
- S56** Quick coupler switch (optional)
 - 1** Steering brake harness
 - ▲ 3** Central braking harness (standard)
 - △ 6** Adjustable boom control harness
 - △ 9** Cold start assistance harness
 - △ 16** Overload indicator harness
 - △ 24** Front working lights harness
 - △ 38** Pilot system cancellation harness
- 8** Floor harness

ELECTRICAL SCHEMATIC (PLATE 2)



ELECTRICAL CABINET

- F1** Fuse, 30 A, starter motor solenoid, thermostart
 - F2** Fuse, 5 A, starter switch
 - F3** Fuse, 7.5 A, instrument panel, hourmeter
 - F19** Fuse, 5 A, LH front/rear sidelight + night lighting
 - F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)
 - F28** Fuse, 40 A, engine stop/start solenoid (injection)
 - F31** Fuse, 10 A, fuel heater
 - K1** Starter motor relay
 - K2** Battery relay
 - K3** Hourmeter + transmission brake pressure switch + two-speed supply relay
 - K13** Engine stop solenoid relay
 - K15** Thermostart relay
 - K53** Fuel heater relay
 - K54** Frequency threshold detector relay (threshold: 1 = 1600 rpm)
 - K55** Frequency threshold detector relay (threshold: 2 = 1400 rpm)
 - K61** Battery relay (heater/air conditioner)
 - R10** Resistor, 0.85 Ohms
 - Sh5** Shunt Night lighting (switch) + P excavator registration plate
 - V1** Starter key switch diode
 - V24** K54 relay diode
 - V25** K55 relay diode
- FLOOR**
- S1** Key switch
 - H30** Cold start assistance switch lighting (optional)
 - S20** Cold start assistance switch (optional)

UPPERSTRUCTURE

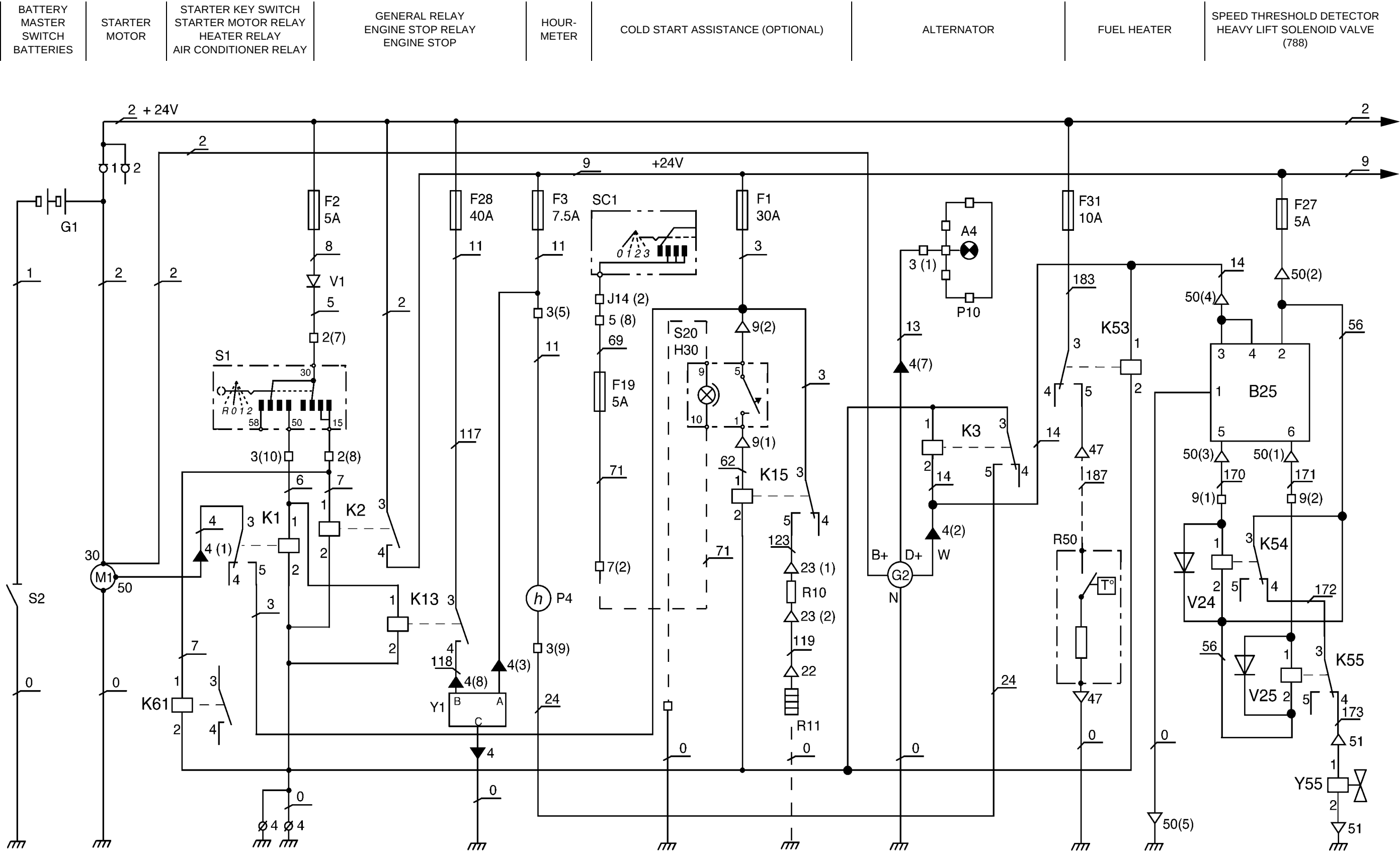
- G1** Batteries
- S2** Battery master switch
- B25** Threshold detector (788)
- Y55** Heavy lift solenoid valve (788)

ENGINE

- G2** Alternator
- M1** Starter motor
- R11** Cold start assistance plug (optional)
- R50** Fuel heater (optional)
- Y1** Engine shut-down solenoid valve

CAB

- P4** Hourmeter
- P10** Instrument panel
- SC1** Direction indicator combination switch (commodo), main beam and dip switch, side lights and headlight flasher switch



ELECTRICAL SCHEMATIC (PLATE 3)

INSTRUMENT PANEL

- P10** Instrument panel
- H32** Overload indicator switch lighting (optional)
- S21** Overload indicator switch (optional)

ELECTRICAL CABINET

- F3** Fuse, 7.5 A, instrument panel, hourmeter
- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- Sh5** Shunt Night lighting (switch) + P excavator registration plate
- V21** Overload indicator lamp diode on instrument panel
- V30** Buzzer diode

CAB

- SC1** Direction indicator combination switch (commodo), main beam and dip switch, side lights and headlight flasher switch

FLOOR

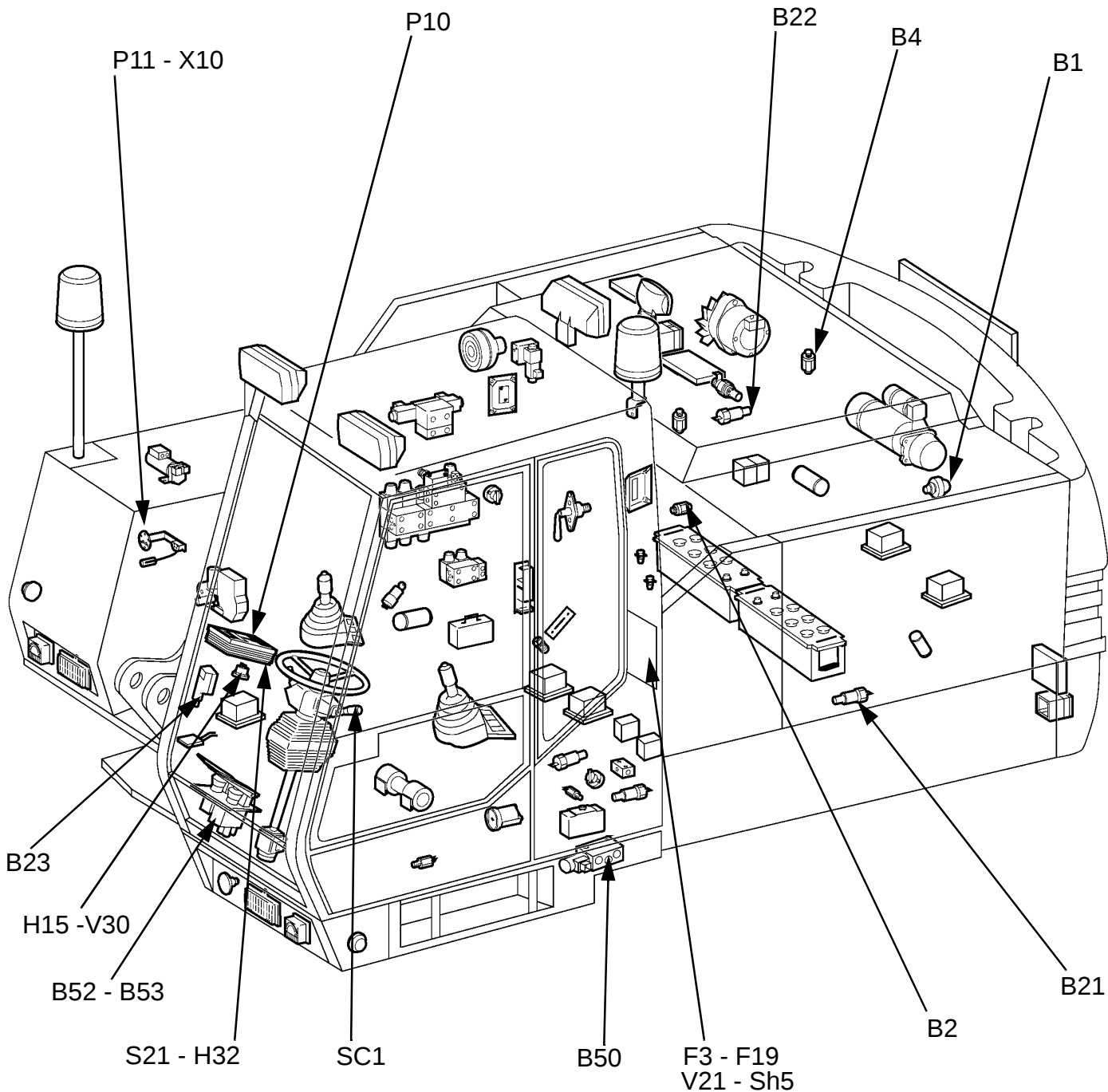
- B50** Parking brake pressure switch
- B52** Pressure switch for minimum braking pressure
- B53** Steering pressure switch
- E15** Rear LH side light

UPPERSTRUCTURE

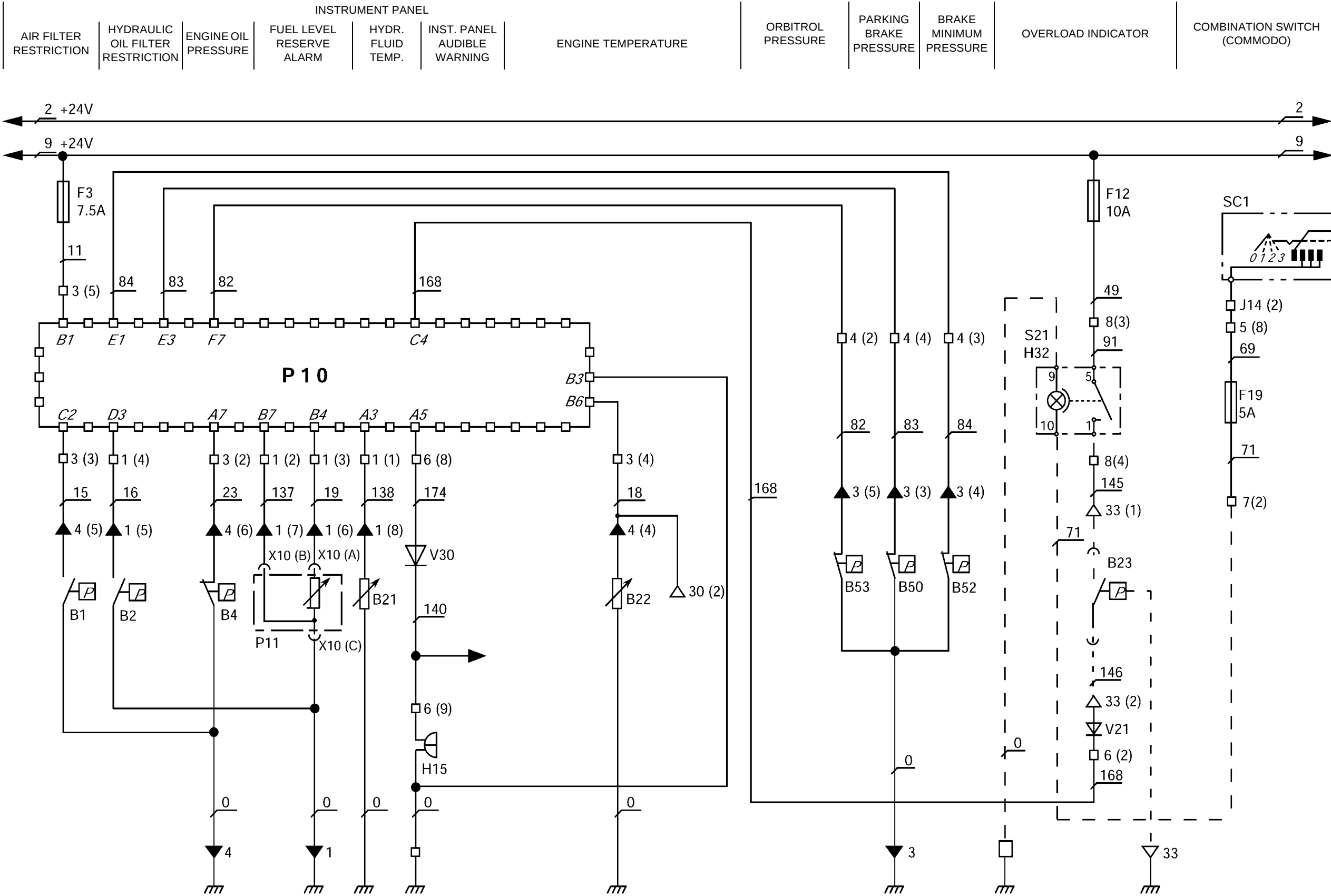
- B1** Air filter restriction pressure switch
- B2** Hydraulic oil filter restriction pressure switch
- B21** Hydraulic oil temperature sender
- B23** Overload indicator (optional)
- P11** Fuel level gauge
- X10** Fuel level indicator connector

ENGINE

- B4** Engine oil pressure switch
- B22** Engine coolant temperature sender



CM99K025



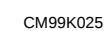
ELECTRICAL CABINET

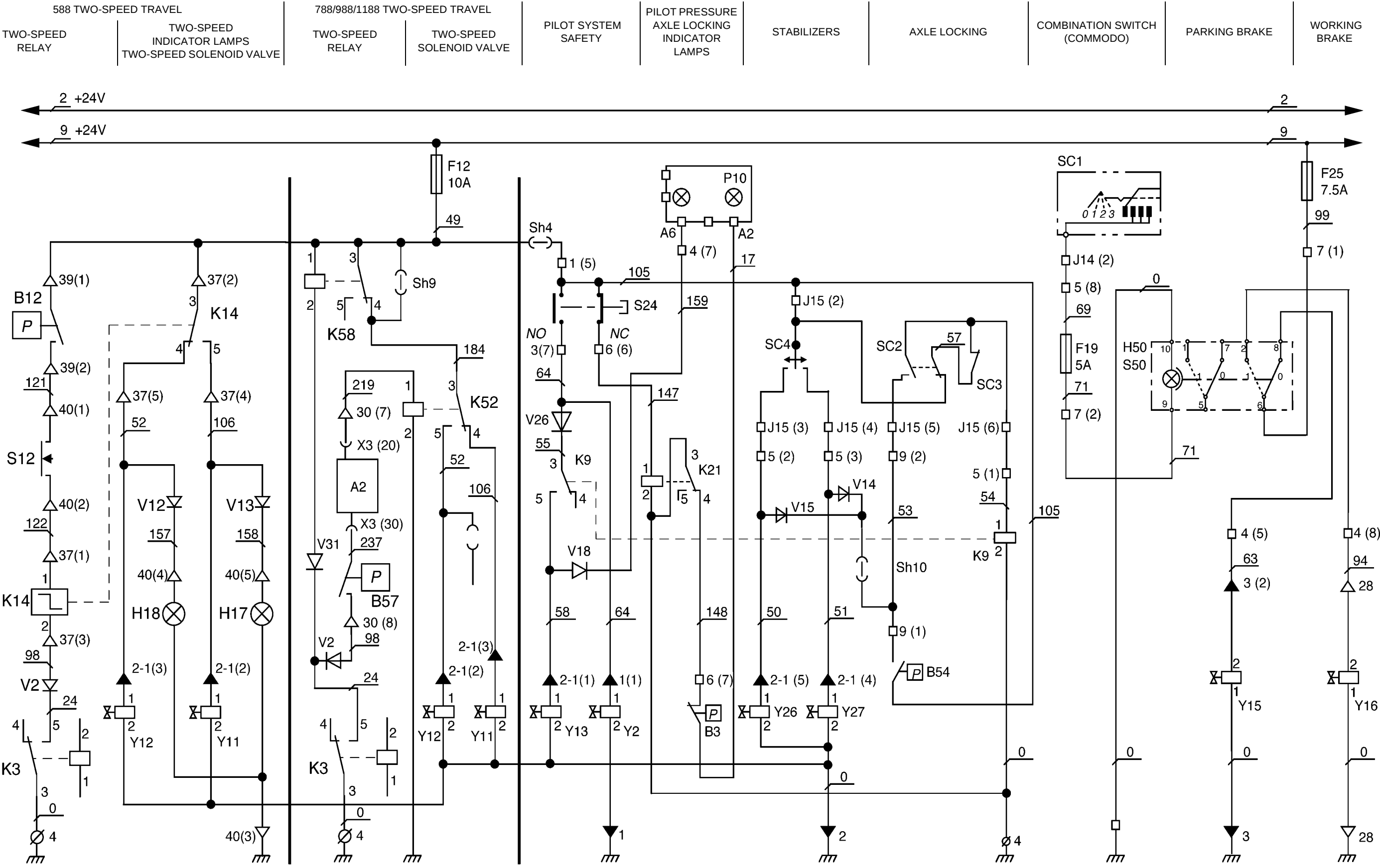
- FLOOR**

- ## UPPERSTRUCTURE

- CAB**

- H17** First speed green indicator light (588)
H18 Second speed blue indicator light (588)
P10 Instrument panel
SC1 Direction indicator combination switch (com-
 modo), main beam and dip switch, side lights
 and headlight flasher switch





ELECTRICAL SCHEMATIC (PLATE 5)

ELECTRICAL CABINET

- F4** Fuse, 5 A, cab lighting, horn (control), hood lighting
- F7** Fuse, 10 A, horn (power)
- F15** Fuse, 15 A, general lighting
- F16** Fuse, 5 A, RH rear brake light
- F17** Fuse, 5 A, LH rear brake light
- F18** Fuse, 5 A, RH front/rear sidelight, dipper lighting + cassette
- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- F20** Fuse, 5 A, RH front dipped headlight
- F21** Fuse, 5 A, LH front dipped headlight
- F23** Fuse, 5 A, RH main beam headlight
- F24** Fuse, 5 A, LH main beam headlight
- F26** Fuse, 7.5 A, flasher, warning
- K5** Horn relay
- K7** Relay authorizing working lights if sidelights on
- K10** Flasher unit relay
- Sh5** Shunt Night lighting (switch) + P excavator registration plate
- V3** Dipped headlight indicator lamp diode on instrument panel
- V6** Main beam headlight indicator lamp diode on instrument panel
- V7** RH flashing indicator lamp diode on instrument panel
- V8** LH flashing indicator lamp diode on instrument panel
- V9** Warning indicator lamp diode on instrument panel
- V10** LH flasher diode
- V20** RH flasher diode
- V23** Warning diode

CAB

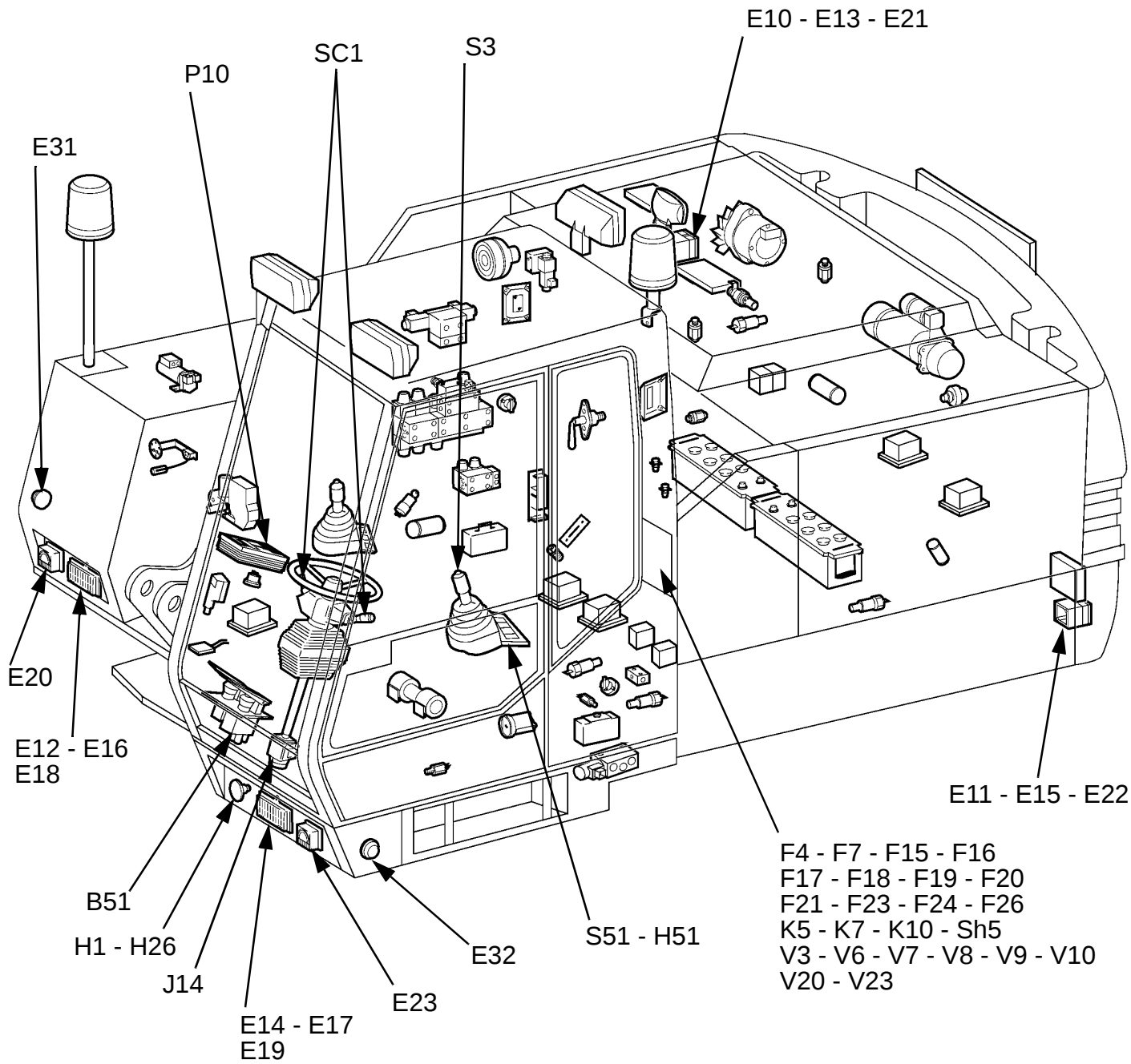
- H51** Hazard warning switch lighting
- P10** Instrument panel
- S3** Horn switch
- S51** Hazard warning switch
- SC1** Direction indicator combination switch (com-modo), main beam and dip switch, side lights and headlight flasher switch

FLOOR

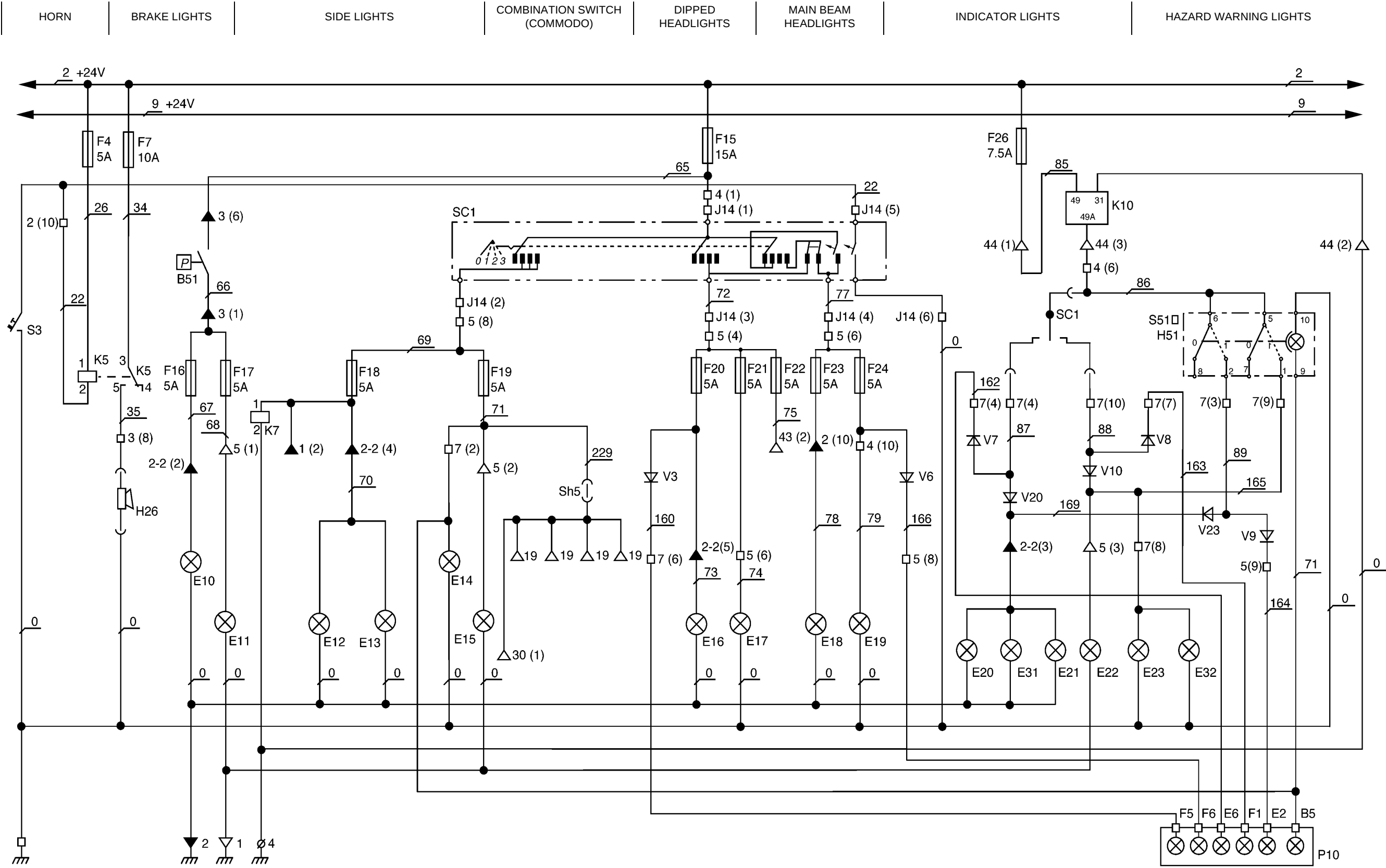
- B51** Brake light pressure switch
- H26** Horn
- J14** Steering column connector

UPPERSTRUCTURE

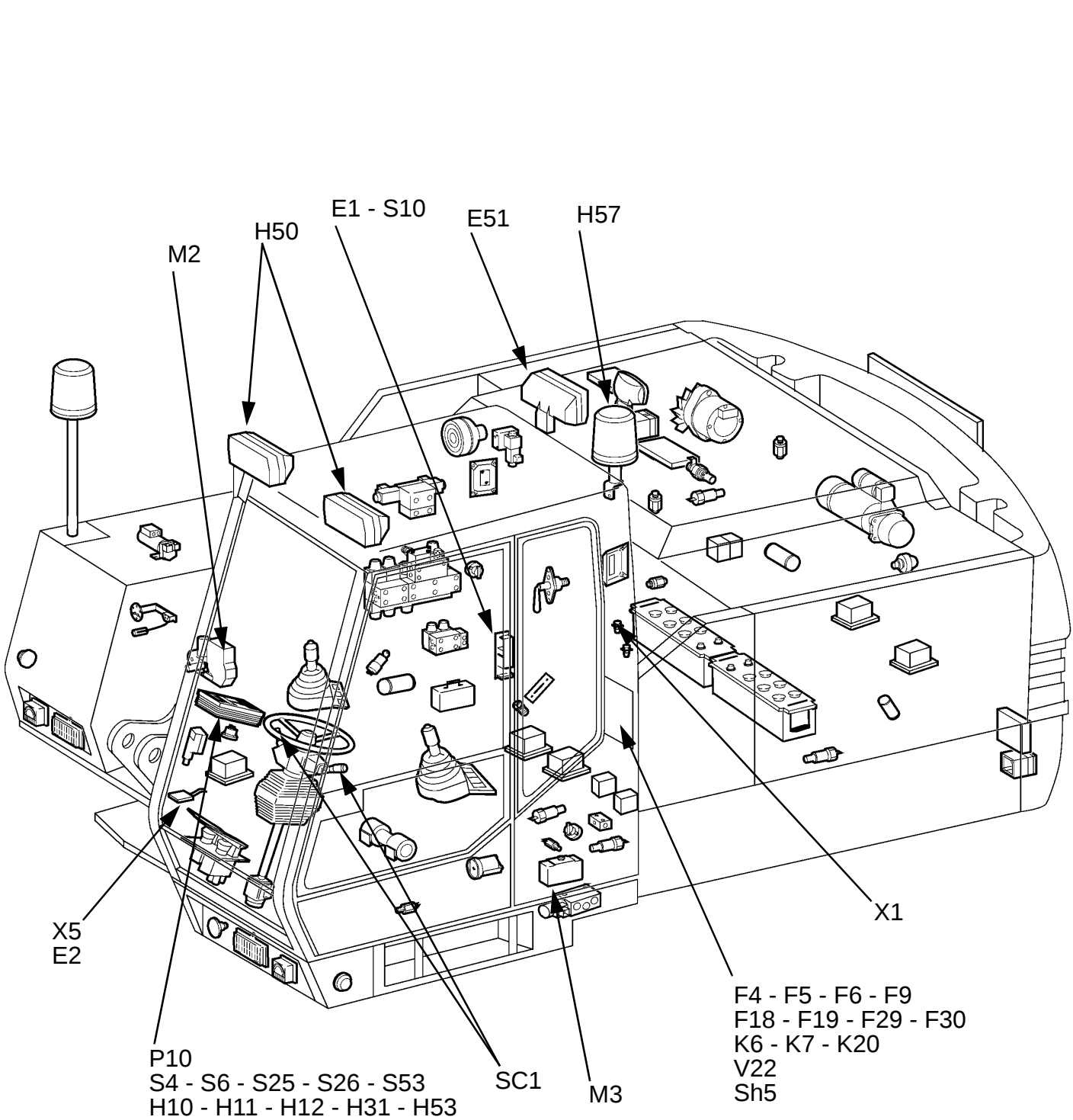
- E10** RH rear brake light
- E11** LH rear brake light
- E12** Engine compartment light (optional)
- E12** Front RH side light
- E13** Rear RH side light
- E14** Front LH side light
- E15** Rear LH side light
- E16** Front RH dipped headlight
- E17** Front LH dipped headlight
- E18** RH main beam headlight
- E19** LH main beam headlight
- E20** RH front direction indicator
- E21** RH rear direction indicator
- E22** LH rear direction indicator
- E23** LH front direction indicator
- E31** RH side-mounted direction indicator
- E32** LH side-mounted direction indicator



CM99K025



ELECTRICAL SCHEMATIC (PLATE 6)



INSTRUMENT PANEL

- H10** Working brake switch lighting
- H11** Windshield wiper switch lighting
- H12** Windshield washer switch lighting
- H31** Rotary light switch lighting (optional)
- H53** Cab front working light switch lighting (optional)
- S4** Working light switch
- S6** Windshield wiper switch
- S25** Rotary light switch (optional)
- S26** Windshield washer switch
- S53** Cab front working light switch (optional)

ELECTRICAL CABINET

- F4** Fuse, 5 A, cab lighting, horn (control), hood lighting
- F5** Fuse, 10 A, working lights (control), rotary light (std), rotary light (Italy)
- F6** Fuse, 15 A, attachment working light, rear cab light
- F9** Fuse, 10 A, windshield washer, windshield wiper (BAT + R)
- F18** Fuse, 5 A, RH front/rear sidelight, dipper lighting + cassette
- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- F29** Fuse, 10 A, cab front working light
- F30** Fuse, 10 A, windshield wiper (BAT +)
- H57** Standard or Italian rotary light
- K6** Working light relay
- K7** Relay authorizing working lights if sidelights on
- K20** Windshield wiper intermittent action
- Sh5** Shunt Night lighting (switch) + P excavator registration plate
- V22** Rotary light diode on instrument panel

CAB

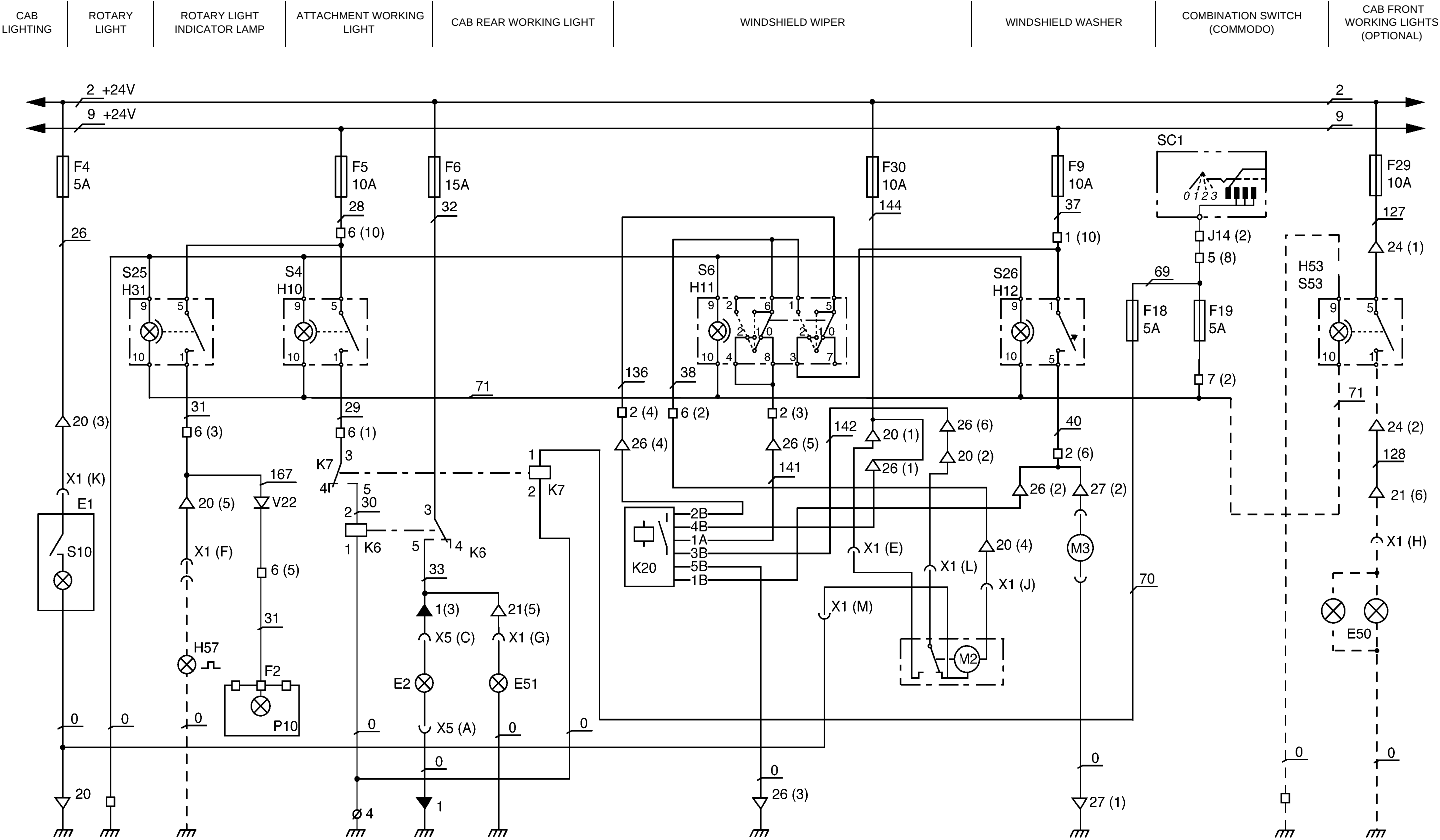
- E1** Cab lighting
- H50** Working brake and parking brake switch lighting (optional)
- H51** Hazard warning switch lighting
- M2** Windshield wiper motor
cable item 144 = blue cable
cable item 142 = grey cable
cable item 0 = black cable
cable item 38 = white cable
- P10** Instrument panel
- S10** Cab lighting switch
- SC1** Direction indicator combination switch (commodo), main beam and dip switch, side lights and headlight flasher switch
- X1 (E)** Cab floor/Cab windshield wiper motor blue connector
- X1 (G)** Cab floor/cab connector
- X1 (J)** Cab floor/Cab windshield wiper motor white connector
- X1 (K)** Cab floor/cab connector
- X1 (L)** Cab floor/Cab windshield wiper motor grey connector
- X1 (M)** Cab floor/Cab windshield wiper motor black connector
- X1 (F)** Cab floor/Cab rotary light connector (optional)

FLOOR

- M3** Windshield washer motor

UPPERSTRUCTURE

- E2** Attachment working light on boom
- H57** Standard or Italian rotary light
- X5 (A), (C)** Attachment working light power connection



ELECTRICAL SCHEMATIC (PLATE 7)

ELECTRICAL CABINET

- F8 Fuse, 15 A, upperstructure socket, fuel pump
- F10 Fuse, 10 A, heater
- F11 Fuse, 7,5 A, cigarette-lighter, cab blower, batt.+ working brake for Germany
- F14 Fuse, 10 A, step-down transformer / radio
- F19 Fuse, 5 A, LH front/rear sidelight + night lighting
- G3 Step-down transformer 24V / 12V

INSTRUMENT PANEL

- H13 Heater blower switch lighting
- S27 Heater blower switch
- S29 Cab blower switch (optional)

FLOOR

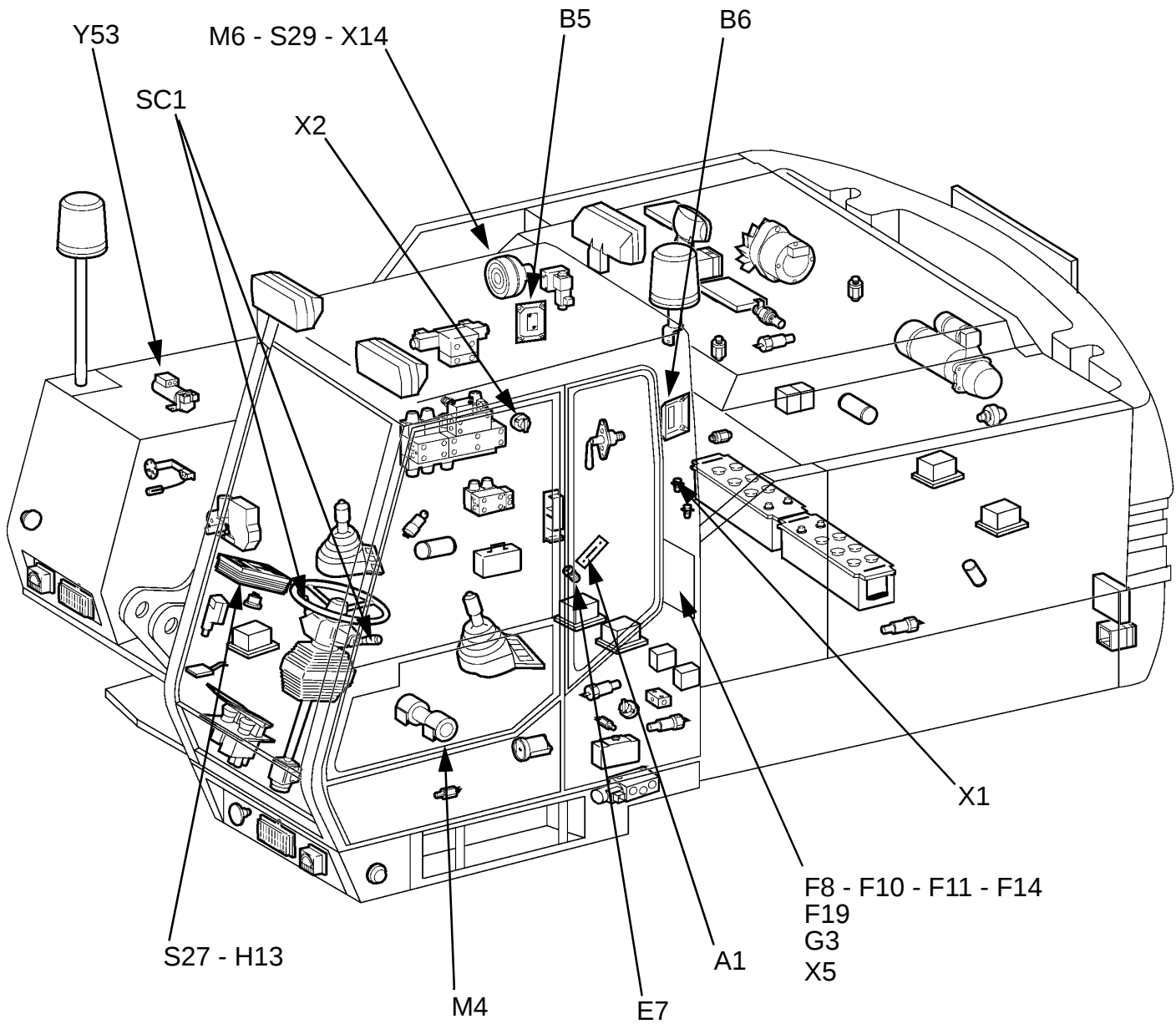
- A1 Radio (optional)
- E7 Cigarette lighter
- M4 Heater blower motor
- SC1 Direction indicator combination switch (com-modo), main beam and dip switch, side lights and headlight flasher switch

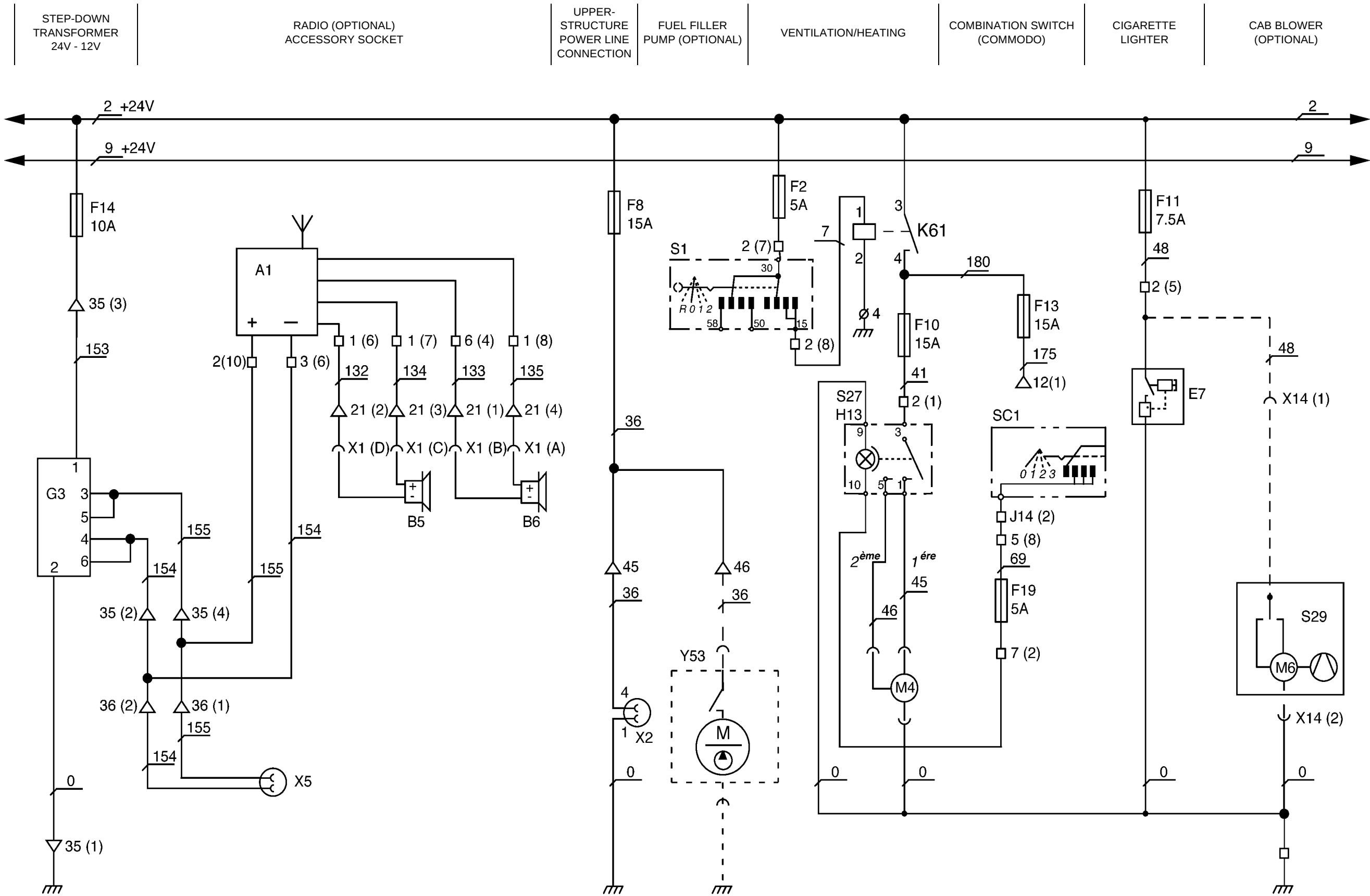
CAB

- B5 RH loudspeaker (optional)
- B6 LH loudspeaker (optional)
- M6 Cab blower motor (optional)
- X1(A),(B),(C),(D) Cab floor/cab LH and RH loud-speaker connector (optional)
- X5 12V accessories socket
- X14 (1),(2) Blower motor connector (optional)

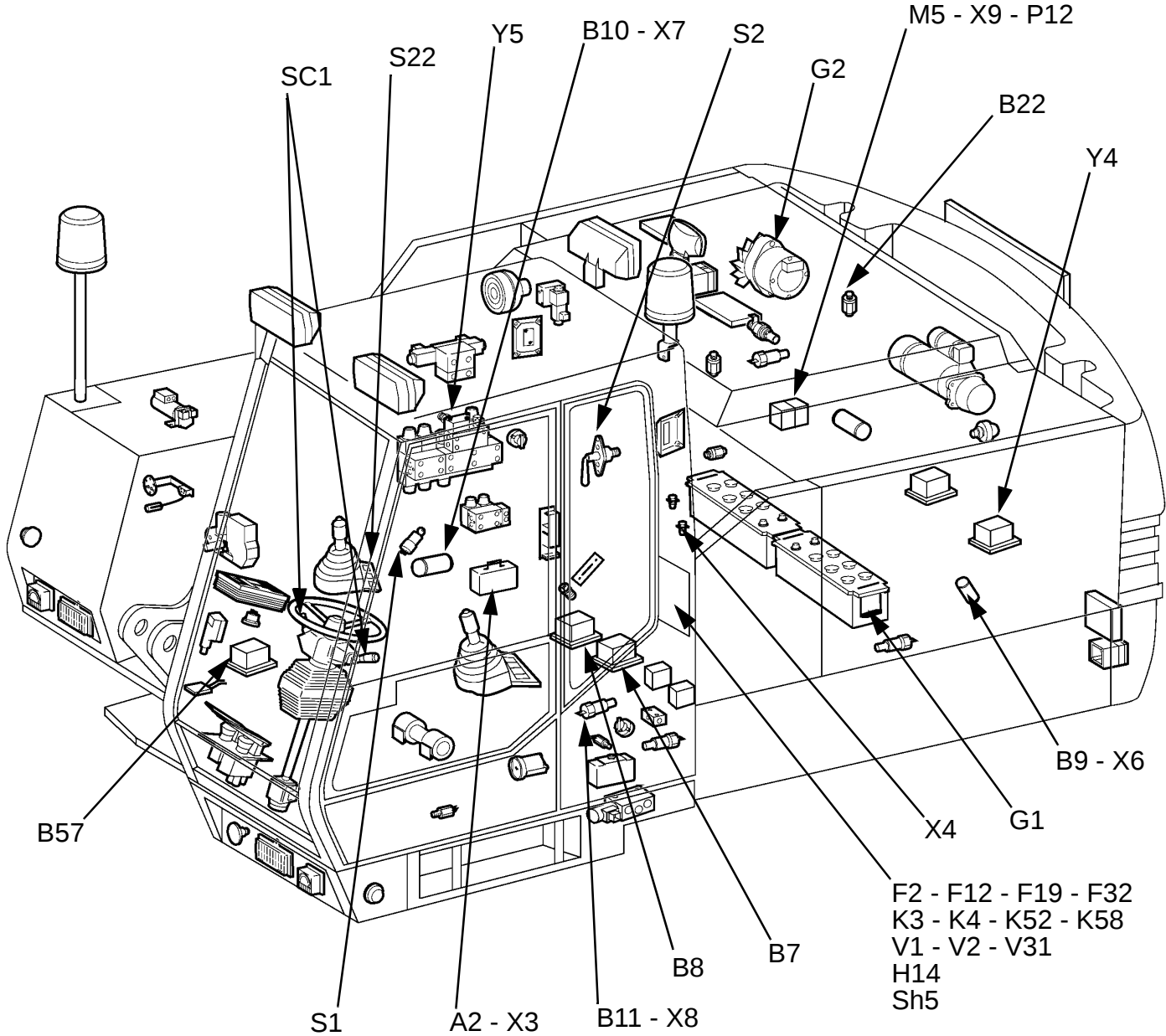
UPPERSTRUCTURE

- X2 Upperstructure power line connection
- Y53 Fuel filler pump (optional)





ELECTRICAL SCHEMATIC (PLATE 8)



ELECTRICAL CABINET

- F2** Fuse, 5 A, starter switch
- F12** Fuse, 10 A, two-speed electro, axle unlocking, piloting neutralisation (std - Italy), stabilizers, direction of travel control, overload indicator
- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- F32** Fuse, 5 A, (BAT +) electronics
- H14** Troubleshooting test LED
- K3** Hourmeter + transmission brake pressure switch + two-speed supply relay
- K4** Electronic supply relay
- K52** Speed change relay (except 588)
- K58** Two-speed supply relay
- Sh5** Shunt Night lighting (switch) + P excavator registration plate
- V1** Starter key switch diode
- V2** Diode less engine running
- V31** K58 relay diode

CAB

- S1** Key switch
- S22** Control keyboard (788-988-1188)
- SC1** Direction indicator combination switch (commodo), main beam and dip switch, side lights and headlight flasher switch
- X3** 35-way connector (788-988-1188)
- X4** Troubleshooting test socket (788-988-1188)

FLOOR

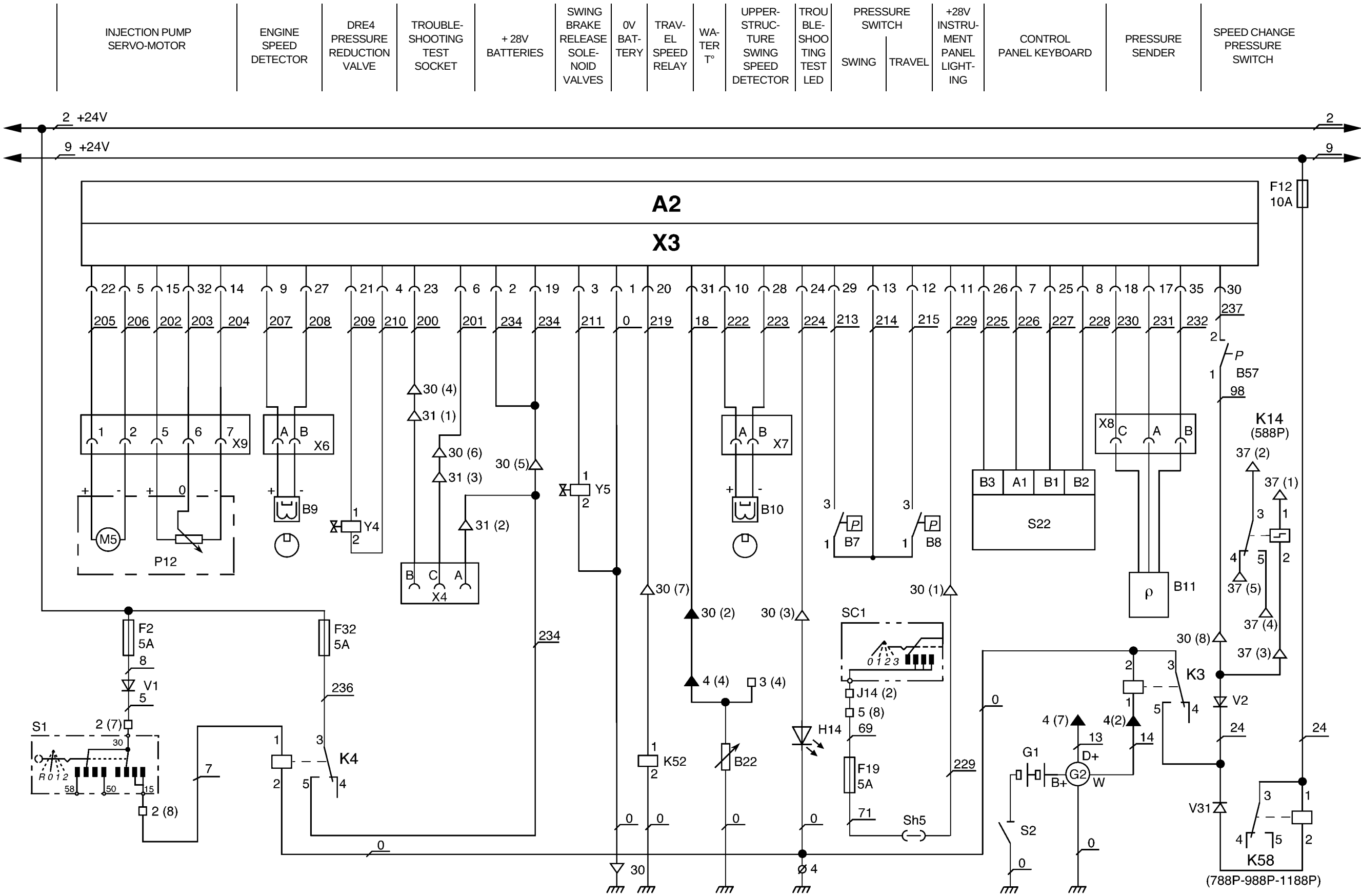
- B8** Travel detector pressure switch
- S1** Key switch

UPPERSTRUCTURE

- B7** Swing detection pressure switch
- B10** Swing motor speed detector
- B11** Hydraulic pressure sender (788-988-1188)
- B57** Speed change pressure switch
- G1** Batteries
- S2** Battery master switch
- Y5** Upperstructure brake release control solenoid valve

ENGINE

- B9** Engine speed detector (788-988-1188)
- B22** Engine coolant temperature sender
- G2** Alternator
- M5** Injection pump servo-motor (788-988-1188)
- P12** Servo-motor potentiometer (788-988-1188)
- X6** Engine speed detector connector (788-988-1188)
- X7** Upperstructure swing speed detector connector
- X8** Hydraulic pressure sender connector (788-988-1188)
- X9** Injection pump servo-motor connector (788-988-1188)
- Y4** DRE4 proportional pressure reduction valve



ELECTRICAL SCHEMATIC (PLATE 9)

ELECTRICAL CABINET

- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- F27** Fuse, 5 A, remote controlled or articulated boom, tool quick coupler, air suspension seat, speed threshold detector (788P heavy lift)
- K50** Adjustable boom raising limiter relay (optional)
- K51** Adjustable boom retracting limitation relay (optional)
- Sh5** Shunt Night lighting (switch) + P excavator registration plate

CAB

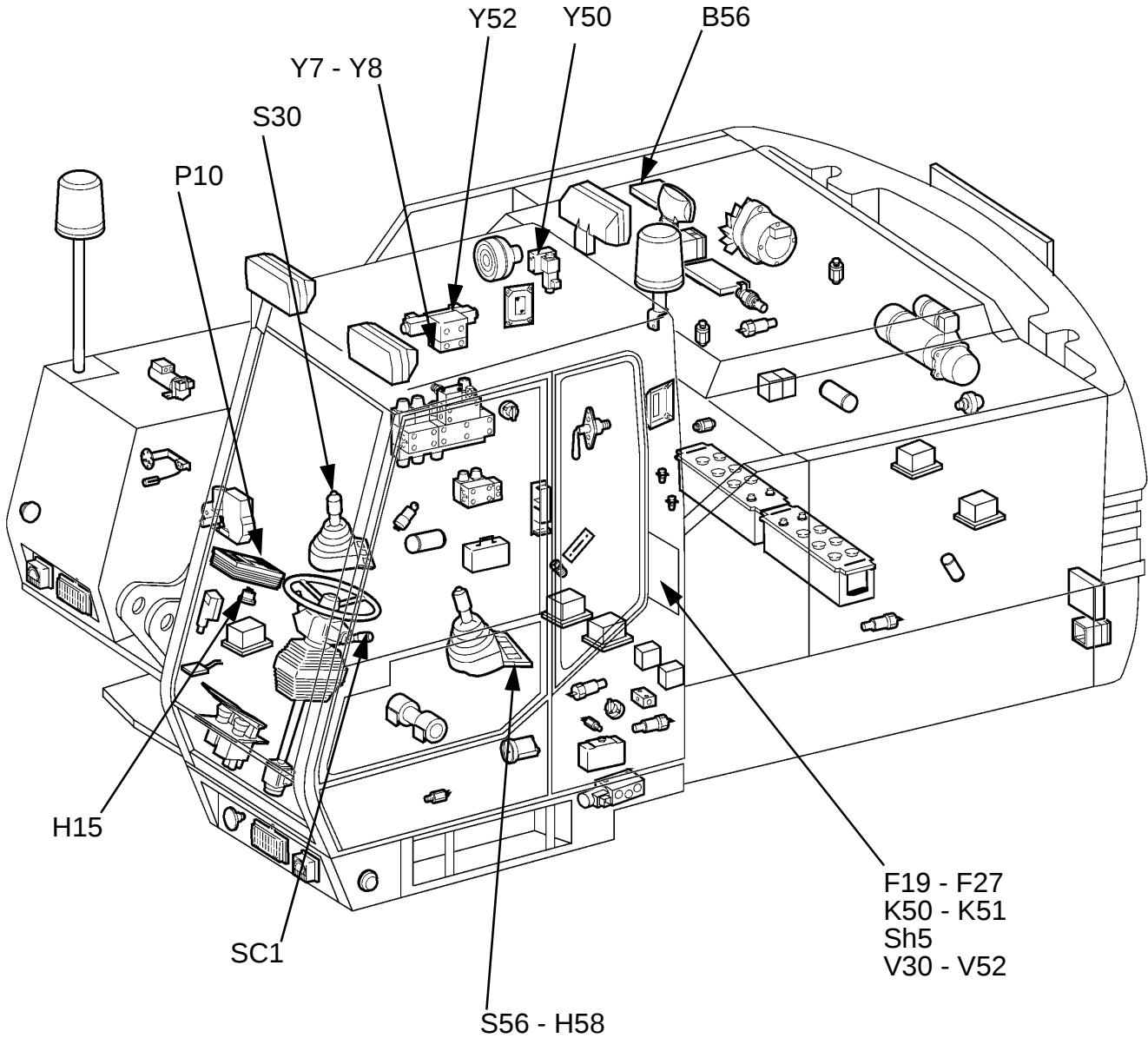
- H58** Quick coupler switch lighting (optional)
- SC1** Direction indicator combination switch (commodo), main beam and dip switch, side lights and headlight flasher switch
- S30** Adjustable or articulated boom control switch (optional)
- S56** Quick coupler switch (optional)

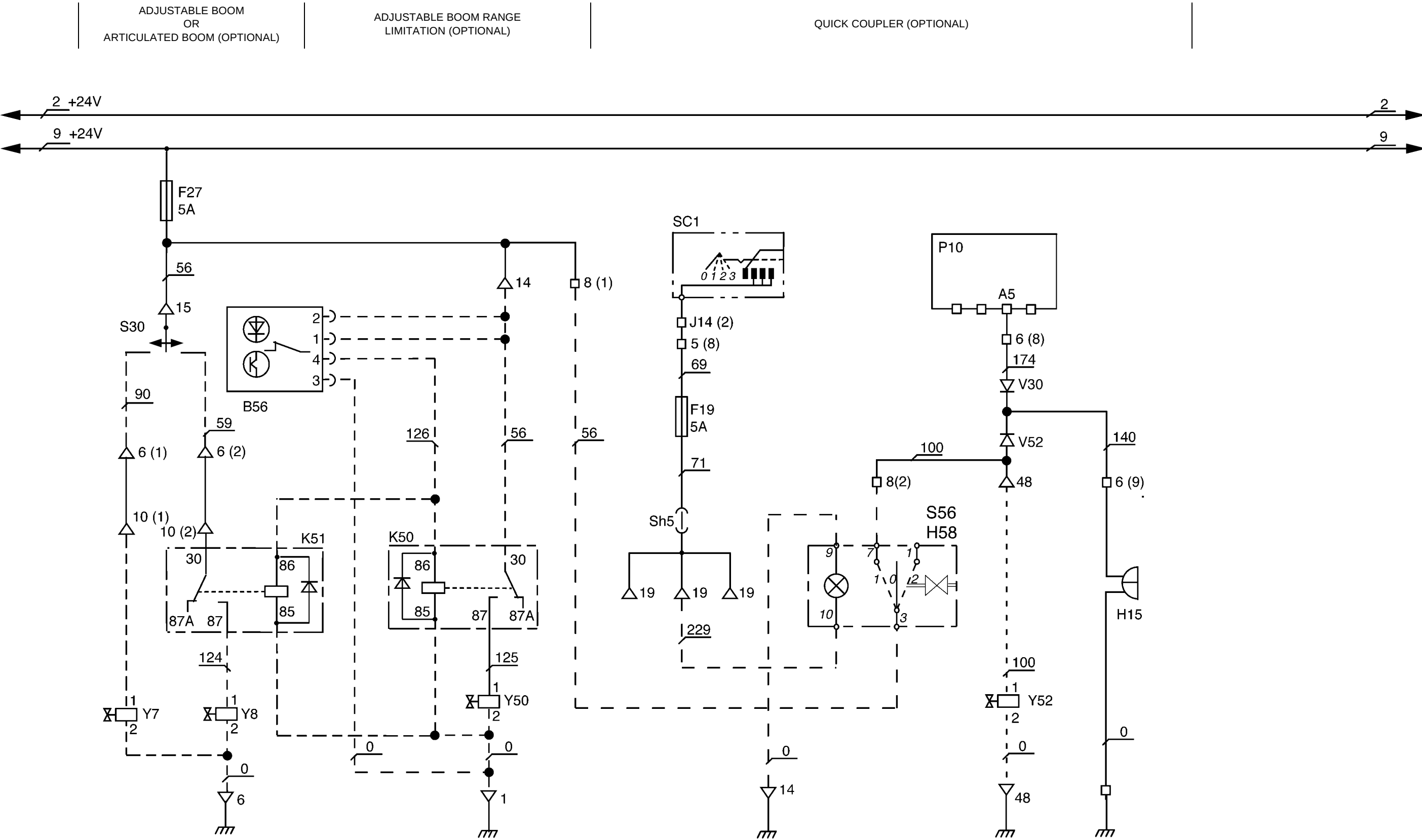
UPPERSTRUCTURE

- B56** Boom raising range limitation detector (optional)
- Y7** Adjustable or articulated boom extending electrovalve (optional)
- Y8** Adjustable or articulated boom retracting electrovalve (optional)
- Y50** Adjustable boom raising height limiter solenoid valve (optional)
- Y52** Quick coupler solenoid valve (optional)

INSTRUMENT PANEL

- H15** Instrument panel audible warning
- P10** Instrument panel
- V30** Buzzer diode
- V52** Quick coupler switch diode





ELECTRICAL SCHEMATIC (PLATE 10)

ELECTRICAL CABINET

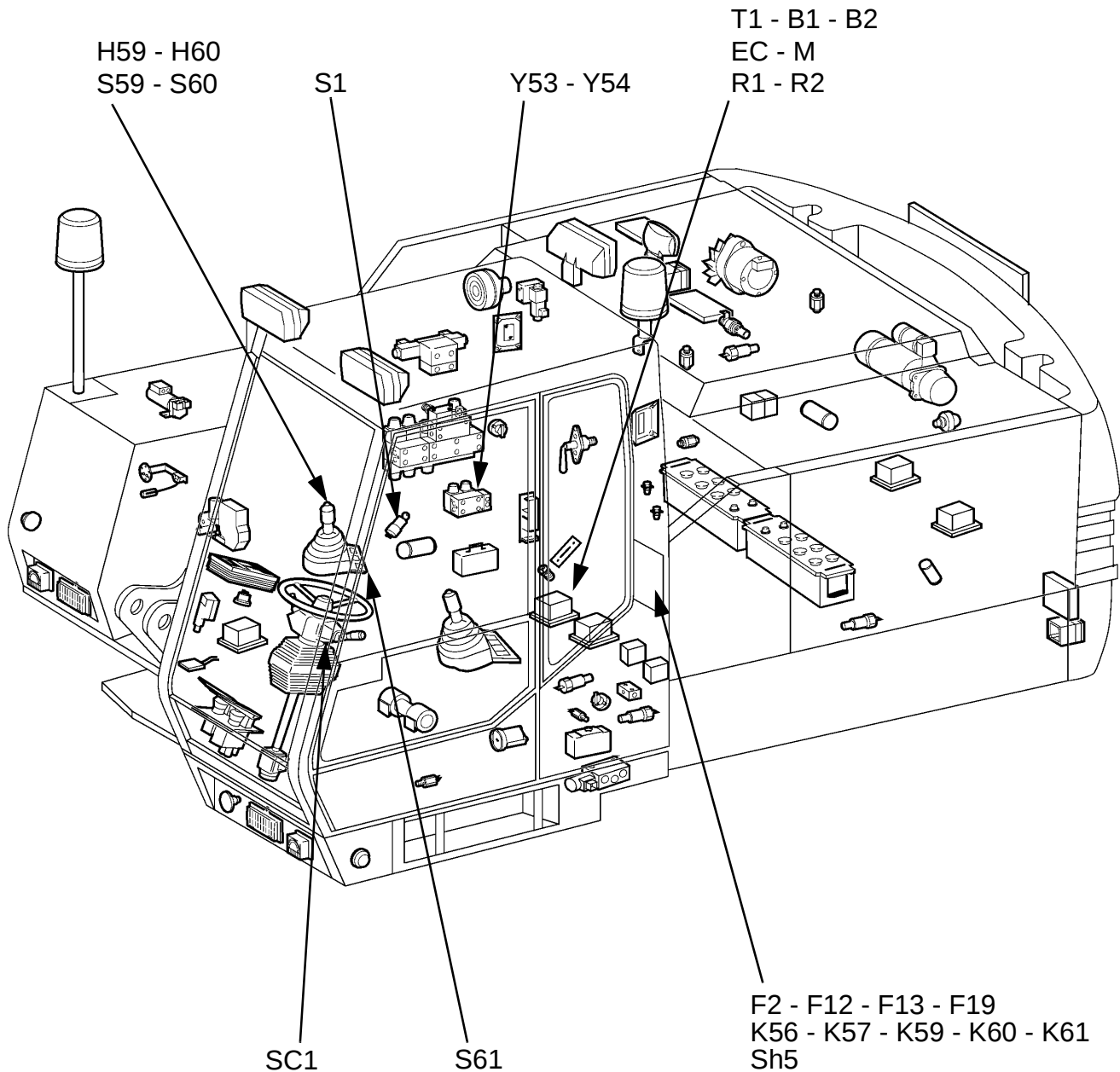
- F2** Fuse, 5 A, starter switch
- F12** Fuse, 10 A, two-speed electro, axle unlocking, piloting neutralisation (std - Italy), stabilizers, direction of travel control, overload indicator
- F13** Fuse, 15 A, air conditioner
- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- K56** Reverse travel relay
- K57** Forward travel relay
- K59** Air conditioning compressor relay
- K60** Air conditioning condenser relay
- K61** Battery relay (heater/air conditioner)
- Sh5** Shunt Night lighting (switch) + P excavator registration plate

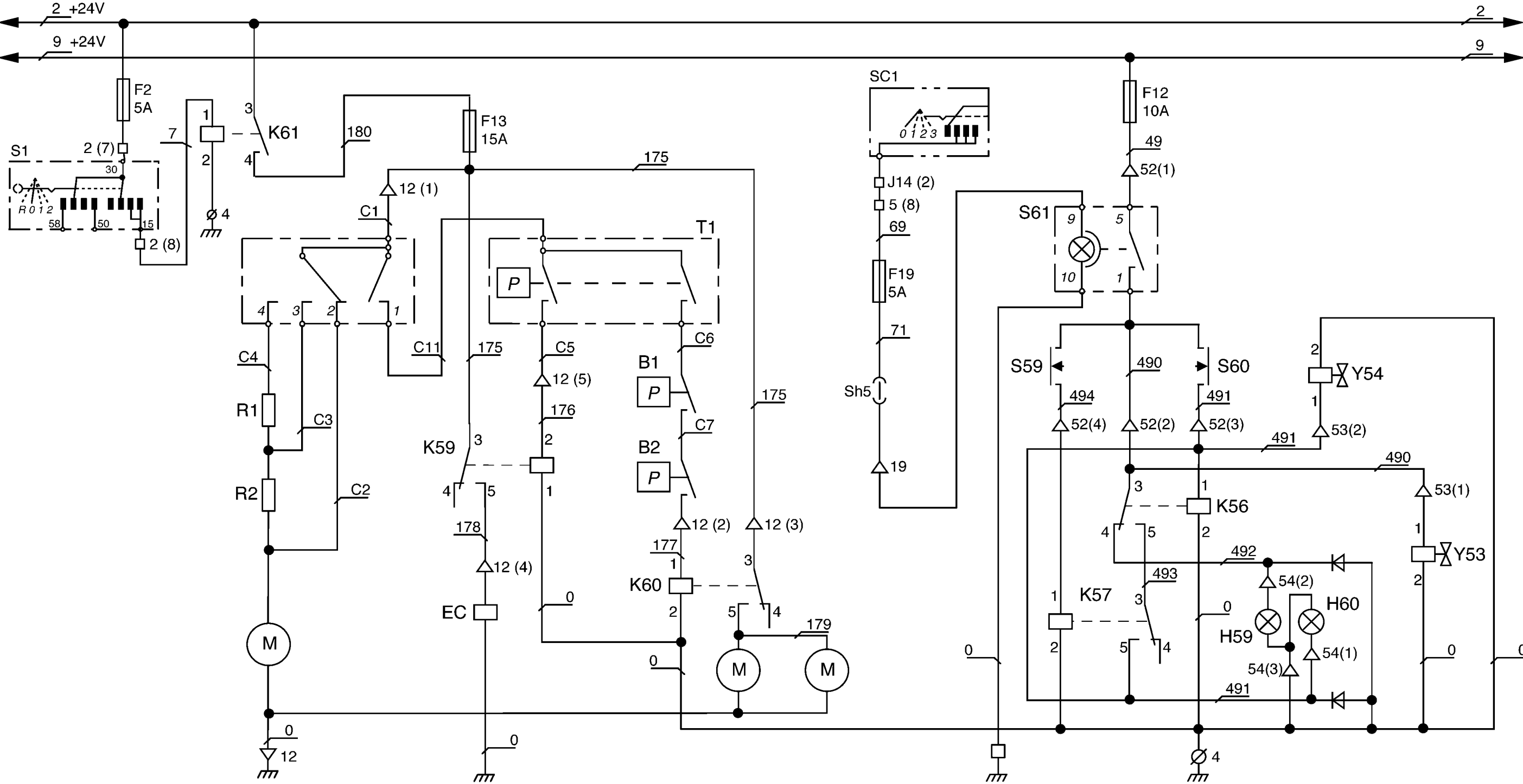
CAB

- B1** Condenser blower relay pressure switch
- B2** Condenser blower relay pressure switch
- EC** Compressor
- H59** Forward travel green indicator lamp (optional)
- H60** Reverse travel red indicator lamp (optional)
- M** Condenser blower and blower motors
- R1** Blower speed resistor
- R2** Blower speed resistor
- SC1** Direction indicator combination switch (com-modo), main beam and dip switch, side lights and headlight flasher switch
- S1** Key switch
- S59** Forward travel switch (optional)
- S60** Reverse travel switch (optional)
- S61** Direction of travel reverser switch (optional)
- T1** Pressure switch

UPPERSTRUCTURE

- Y53** Forward travel solenoid valve (optional)
- Y54** Reverse travel solenoid valve (optional)





ELECTRICAL SCHEMATIC (PLATE 11)

Supplement for Italy

ELECTRICAL CABINET

- F5** Fuse, 10 A, working lights (control), rotary light (std), rotary light (Italy)
- F12** Fuse, 10 A, two-speed electro, axle unlocking, piloting neutralisation (std - Italy), stabilizers, direction of travel control, overload indicator
- F19** Fuse, 5 A, LH front/rear sidelight + night lighting
- F25** Fuse, 7.5 A, parking brake electro, working brake electro (std/D/I)
- K3** Hourmeter + transmission brake pressure switch + two-speed supply relay
- K9** Pilot safety relay/axle unlocking
- K52** Speed change relay (except 588)
- K58** Two-speed supply relay
- Sh5** Shunt Night lighting (switch) + P excavator registration plate
- Sh8** Shunt OK Italy - not standard
- Sh9** Shunt contact K58 two-speed supply
- Sh11** Shunt - Italy axle unlocking
- V2** Diode less engine running
- V16** Diode for Italy
- V17** Diode for Italy
- V18** Axle unlocking indicator lamp diode on instrument panel
- V19** Diode for Italy
- V26** Axle unlocking diode
- V27** Axle electro unlocking diode for Italy
- V31** K58 relay diode

FLOOR

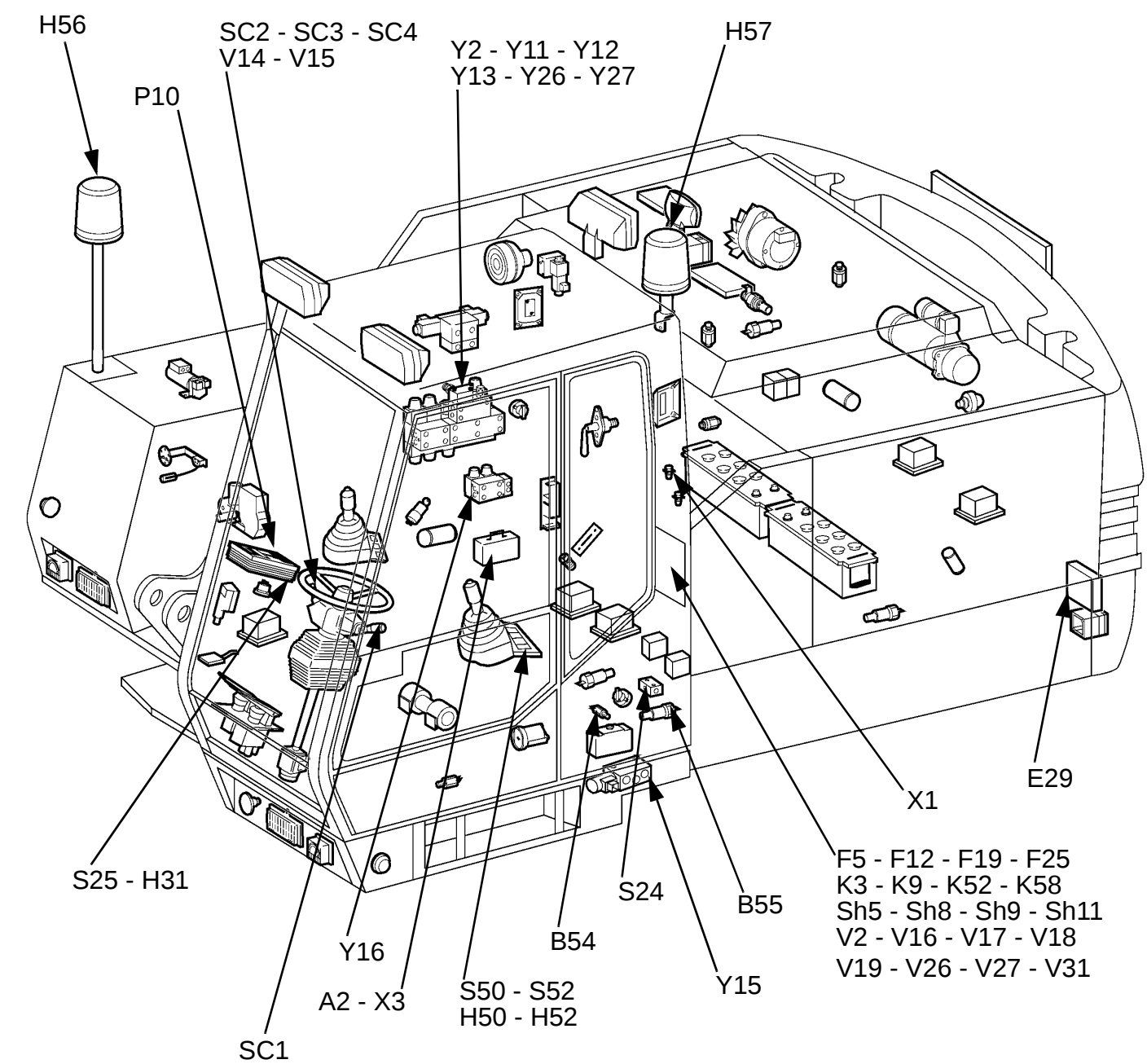
- A2** Electronic control box (788-988-1188)
- B54** Front axle unlocking pressure switch
- B55** Steering brake pressure switch (optional)
- H50** Working brake and parking brake switch lighting (optional)
- H52** Pilot system cancellation switch lighting (optional)
- SC2** Front axle automatic and manual unlocking switch
- SC3** Front axle locking and unlocking switch (in the axle unlocked position)
- SC4** Stabilizer raising and lowering momentary inverter switch
- S24** Pilot safety switch
- S50** Parking brake and working brake switch (optional)
- S52** Pilot system cancellation switch (optional)
- V14-V15** Stabilizer solenoid valve diodes (in combination switch (commodo))
- X3(20)** 35-way connector for A2 control box

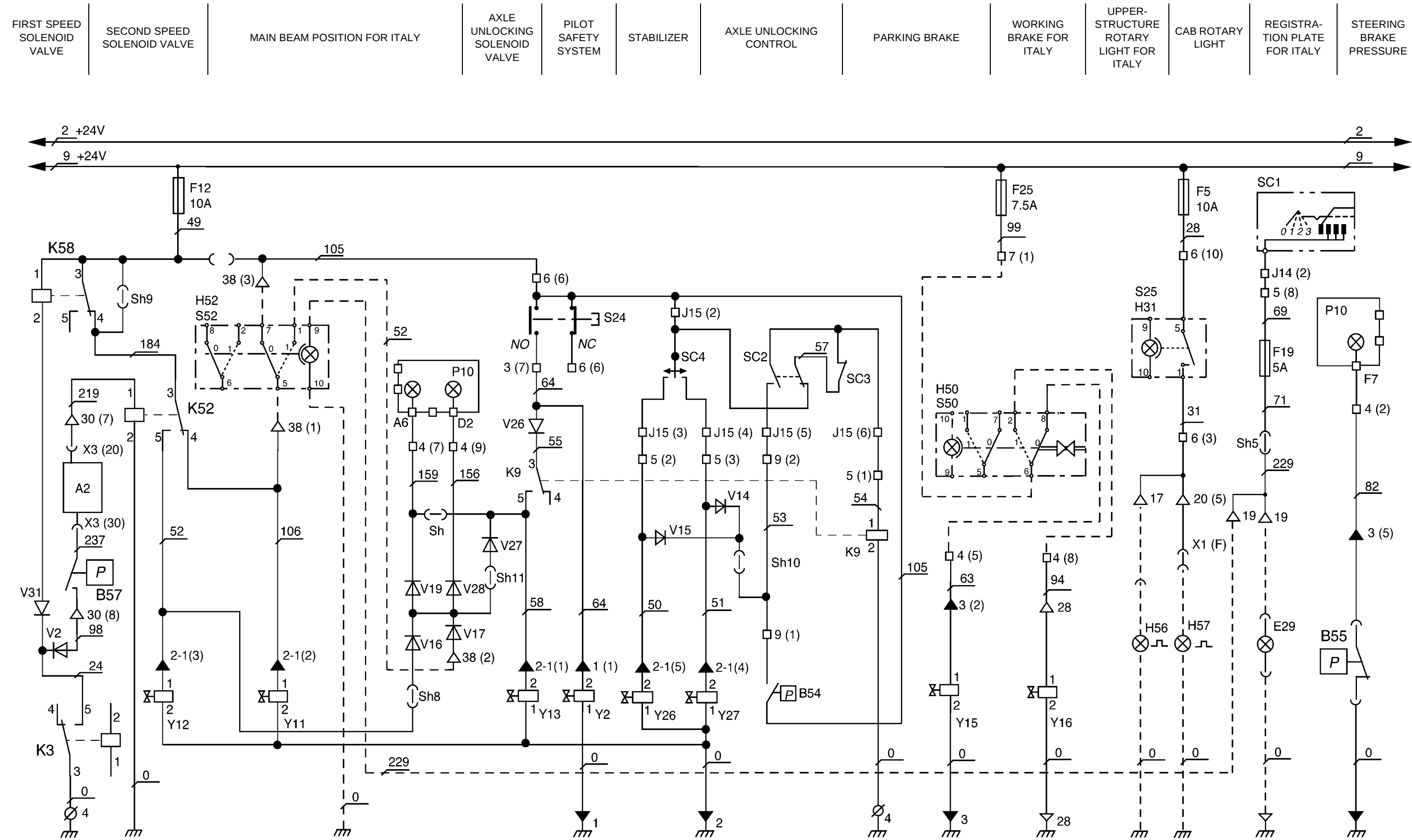
UPPERSTRUCTURE

- E29** Registration plate lighting (optional)
- H56** Upperstructure rotary light (Italy) (optional)
- Y2** Pilot safety solenoid valve
- Y11** Gear box solenoid valve (first speed)
- Y12** Gear box solenoid valve (second speed)
- Y13** Front axle unlocking solenoid valve
- Y15** Parking brake solenoid valve
- Y16** Working brake solenoid valve
- Y26** Stabilizer raising solenoid valve
- Y27** Stabilizer lowering solenoid valve

CAB

- H31** Rotary light switch lighting
- H57** Standard or Italian rotary light
- P10** Instrument panel
- SC1** Direction indicator combination switch (commodo), main beam and dip switch, side lights and headlight flasher switch
- S25** Rotary light switch (optional)
- X1** Cab floor/cab connector





ELECTRICAL SCHEMATIC (PLATE 12)

Supplement for Switzerland

ELECTRICAL CABINET

- F11 Fuse, 7,5 A, cigarette-lighter, cab blower, batt.+ working brake for Germany
- F25 Fuse, 7.5 A, parking brake electro, working brake electro (std/D/I)

CAB

- H50 Working brake and parking brake switch lighting (optional)
- P10 Instrument panel
- S50 Parking brake and working brake switch (optional)

FLOOR

- B55 Steering brake pressure switch (optional)

UPPERSTRUCTURE

- E20 RH front direction indicator
- E23 LH front direction indicator
- Y15 Parking brake solenoid valve
- Y17 Working brake solenoid valve (Germany) (optional)
- Y18 Working brake solenoid valve (Germany) (optional)

Supplement for Belgium

ELECTRICAL CABINET

- F15 Fuse, 15 A, general lighting
- F19 Fuse, 5 A, LH front/rear sidelight + night lighting
- F22 Fuse, 5 A, rear fog light
- Sh5 Shunt Night lighting (switch) + P excavator registration plate
- V5 Rear fog light diode

CAB

- H55 Rear fog light switch lighting
- P10 Instrument panel
- SC1 Direction indicator combination switch (commodo), main beam and dip switch, side lights and headlight flasher switch
- S55 Rear fog light switch

UPPERSTRUCTURE

- E25 Rear fog light
- E29 Registration plate lighting (optional)

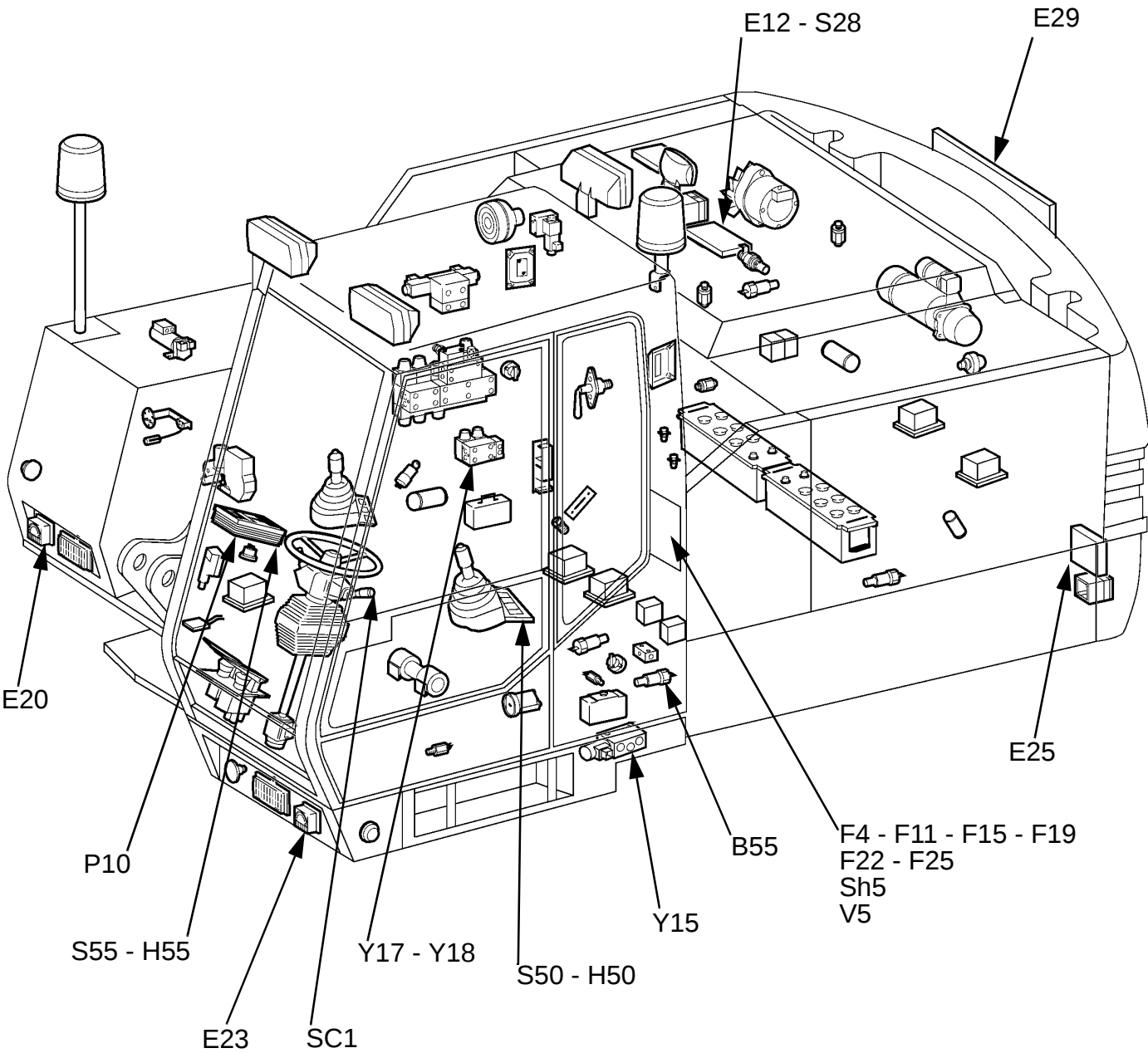
Supplement for Northern Europe

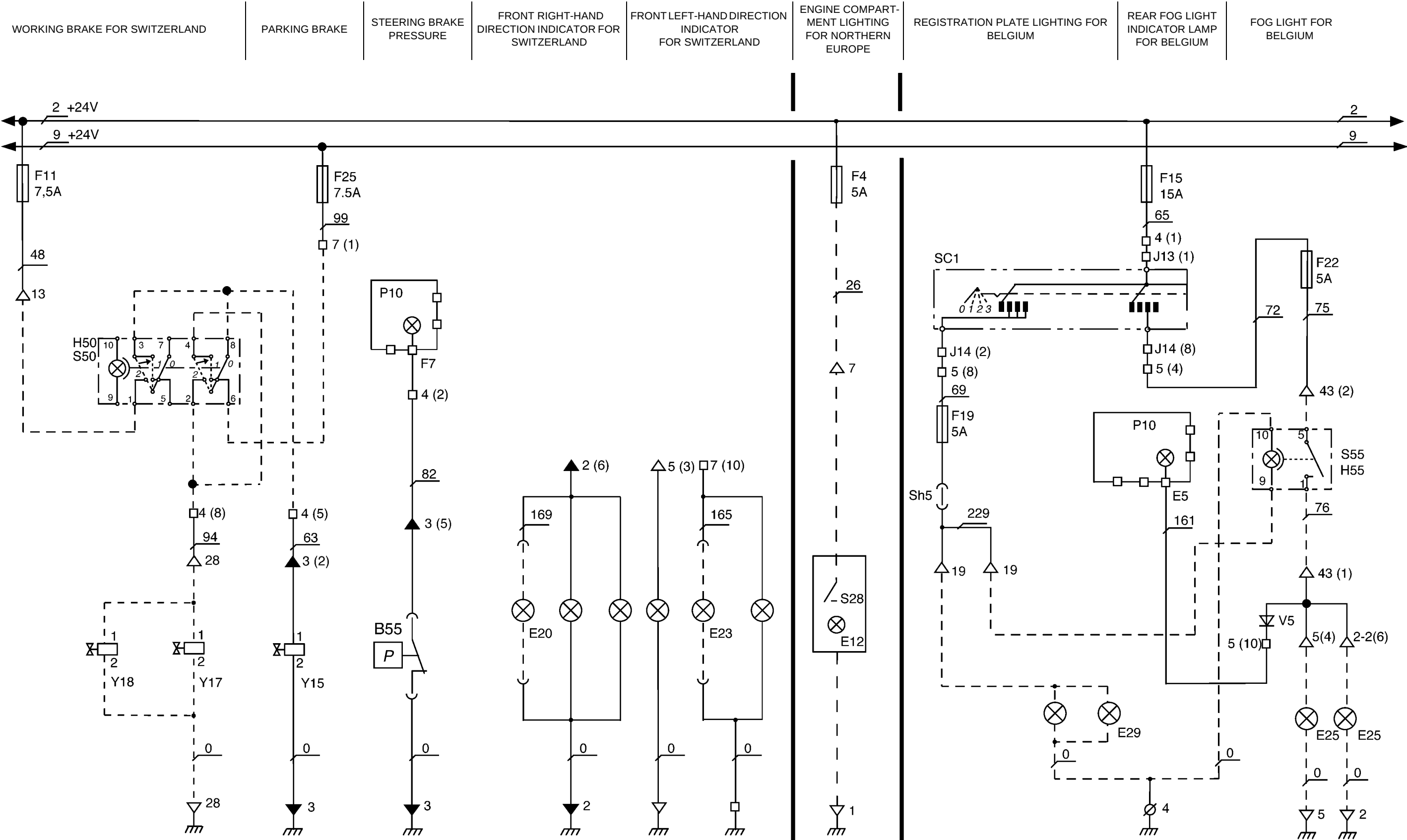
ELECTRICAL CABINET

- F4 Fuse, 5 A, cab lighting, horn (control), hood lighting

ENGINE

- E12 Engine compartment light (optional)
- S28 Engine compartment lighting switch (optional)





ELECTRICAL SCHEMATIC (PLATE 13)

Supplement for Germany

ELECTRICAL CABINET

- F11 Fuse, 7,5 A, cigarette-lighter, cab blower, batt.+ working brake for Germany
- F15 Fuse, 15 A, general lighting
- F18 Fuse, 5 A, RH front/rear sidelight, dipper lighting + cassette
- F25 Fuse, 7.5 A, parking brake electro, working brake electro (std/D/I)

CAB

- H50 Working brake and parking brake switch lighting (optional)
- P10 Instrument panel
- SC1 Direction indicator combination switch (com-modo), main beam and dip switch, side lights and headlight flasher switch
- S50 Parking brake and working brake switch (optional)

ON FLOOR

- B55 Upperstructure steering brake pressure

SWITCH

- E24 Dipper lighting (optional)
- X5(A), X5(B) Dipper lighting connector (optional)
- Y15 Parking brake solenoid valve
- Y17 Working brake solenoid valve (Germany) (optio-nal)
- Y18 Working brake solenoid valve (Germany) (optio-nal)

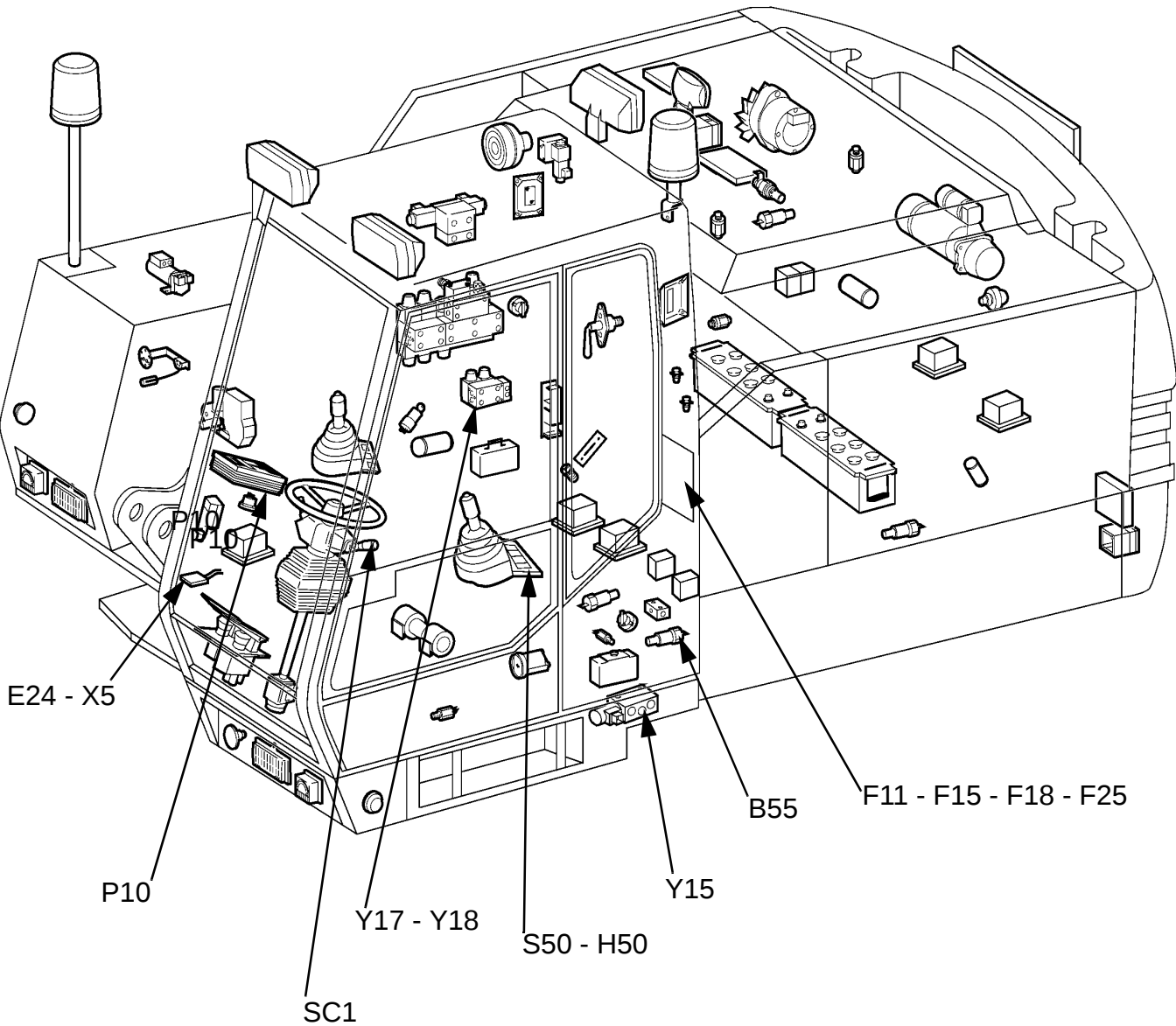
Supplement for Austria

CAB

- P10 Instrument panel

ON FLOOR

- B55 Upperstructure steering brake pressure



CM99K025

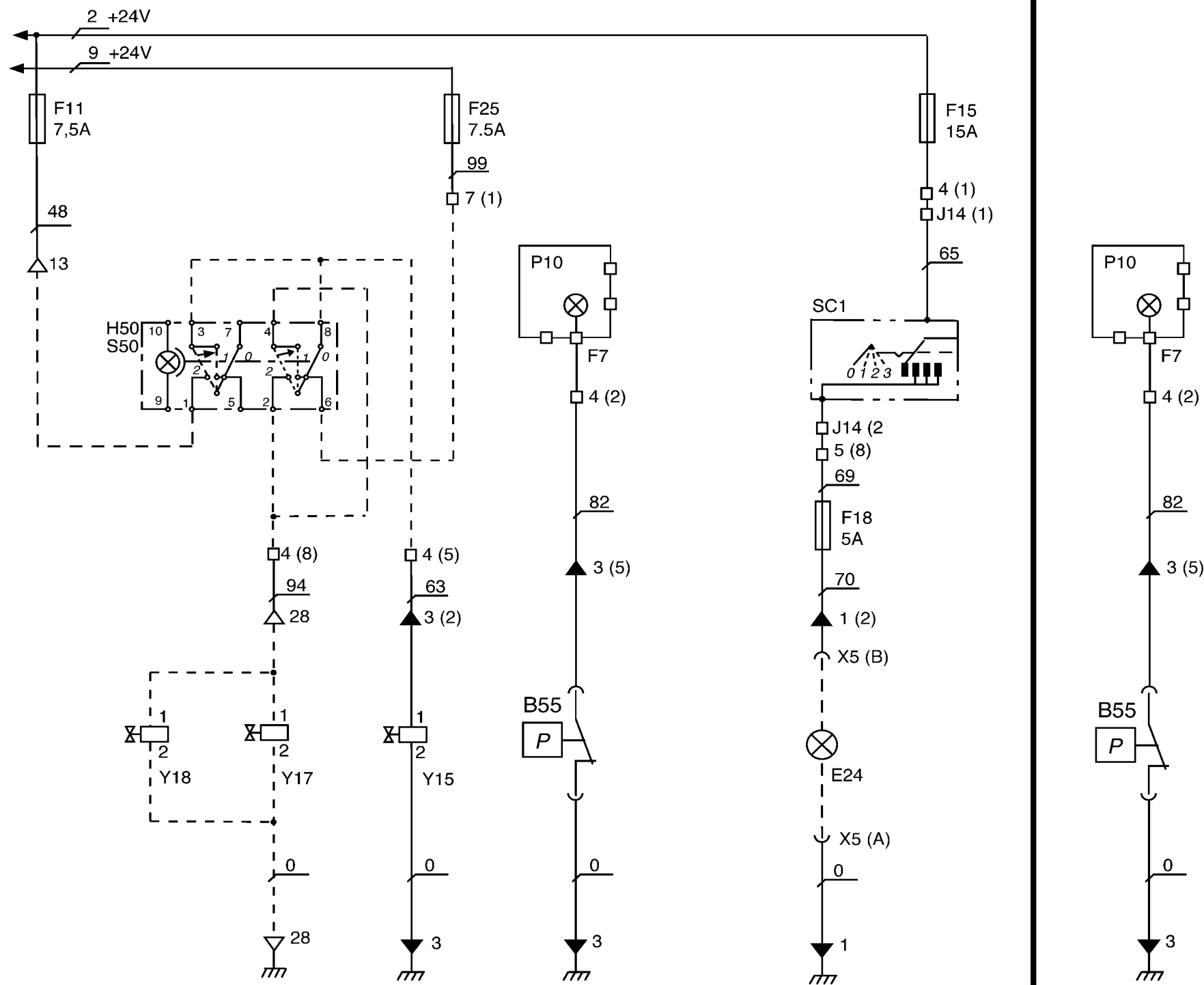
WORKING BRAKE FOR GERMANY

PARKING BRAKE

STEERING BRAKE PRESSURE

DIPPER LIGHTING FOR GERMANY

STEERING BRAKE PRESSURE FOR AUSTRIA



CAB FLOOR WIRING (STANDARD)

△ ▽ □ ■ See page 4

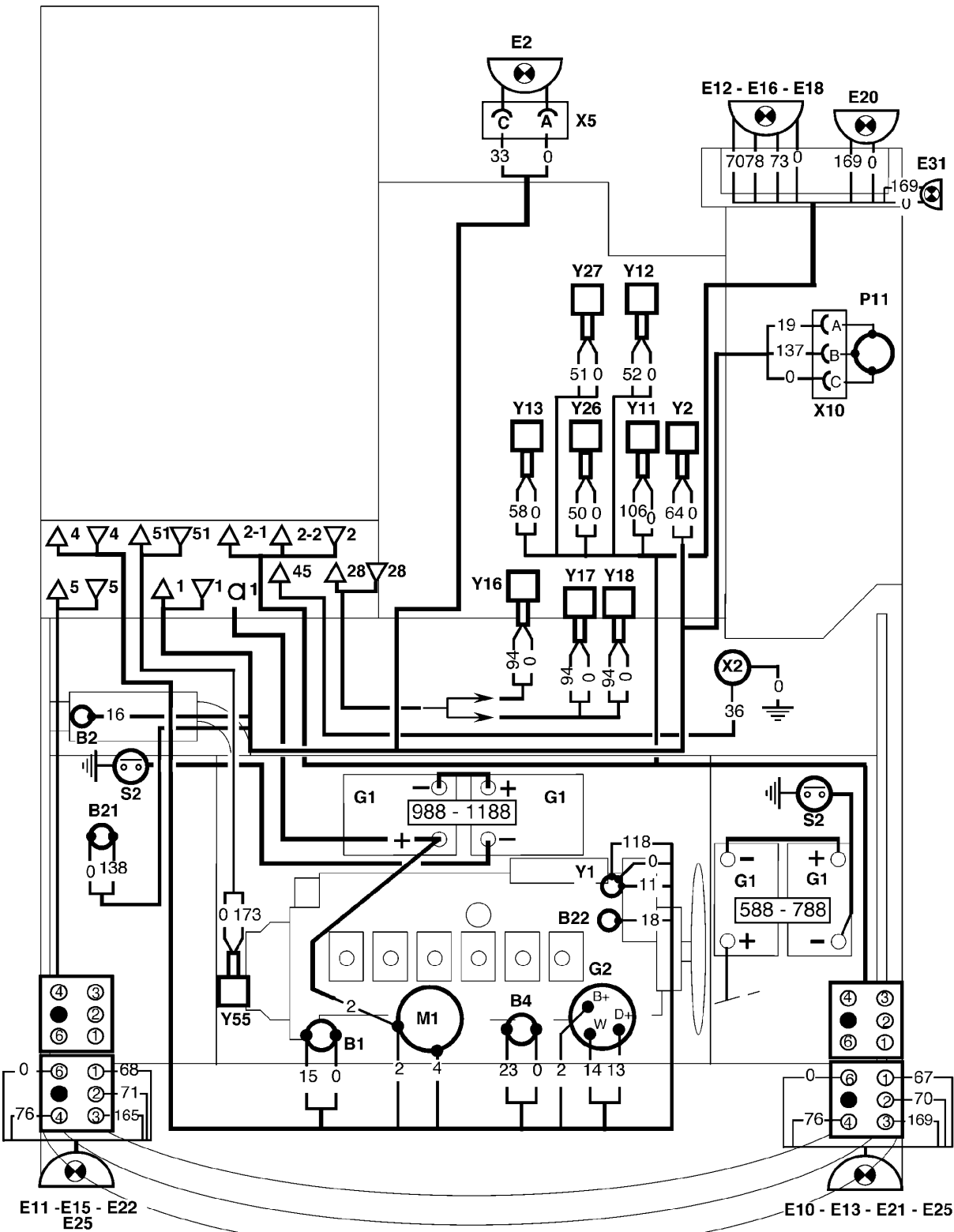
FLOOR

- A1 Radio (optional)
- B3 Pilot pressure switch
- B12 Brake pressure switch (588)
- B25 Threshold detector (788)
- B50 Parking brake pressure switch
- B51 Brake light pressure switch
- B52 Pressure switch for minimum braking pressure
- B53 Steering pressure switch
- B54 Front axle unlocking pressure switch
- E7 Cigarette lighter
- E14 Front LH side light
- E17 Front LH dipped headlight
- E19 LH main beam headlight
- E23 LH front direction indicator
- E32 LH side-mounted direction indicator
- G3 Step-down transformer 24V / 12V
- H10 Working brake switch lighting
- H11 Windshield wiper switch lighting
- H12 Windshield washer switch lighting
- H13 Heater blower switch lighting
- H15 Instrument panel audible warning
- H17 First speed green indicator light (588)
- H18 Second speed blue indicator light (588)
- H26 Horn
- H31 Rotary light switch lighting
- H50 Working brake and parking brake switch lighting (optional)
- H51 Hazard warning switch lighting
- H55 Rear fog light switch lighting
- K10 Flasher unit relay
- K20 Windshield wiper intermittent action
- K52 Speed change relay (except 588)
- M3 Windshield washer motor
- M4 Heater blower motor
- P4 Hourmeter
- P10 Instrument panel
- S1 Key switch
- S3 Horn switch
- S4 Working light switch
- S6 Windshield wiper switch
- S12 Two-speed switch (588)
- S22 Control keyboard (788-988-1188)
- S24 Pilot safety switch
- S25 Rotary light switch (optional)
- S26 Windshield washer switch
- S27 Heater blower switch
- S50 Parking brake and working brake switch (optional)
- S51 Hazard warning switch
- S55 Rear fog light switch
- X4 Troubleshooting test socket (788-988-1188)
- X5 12V accessories socket
- Y15 Parking brake solenoid valve

CM99J049

ENGINE MODULE AND UPPERSTRUCTURE WIRING (STANDARD)

△ ▽ □ See page 4



UPPERSTRUCTURE

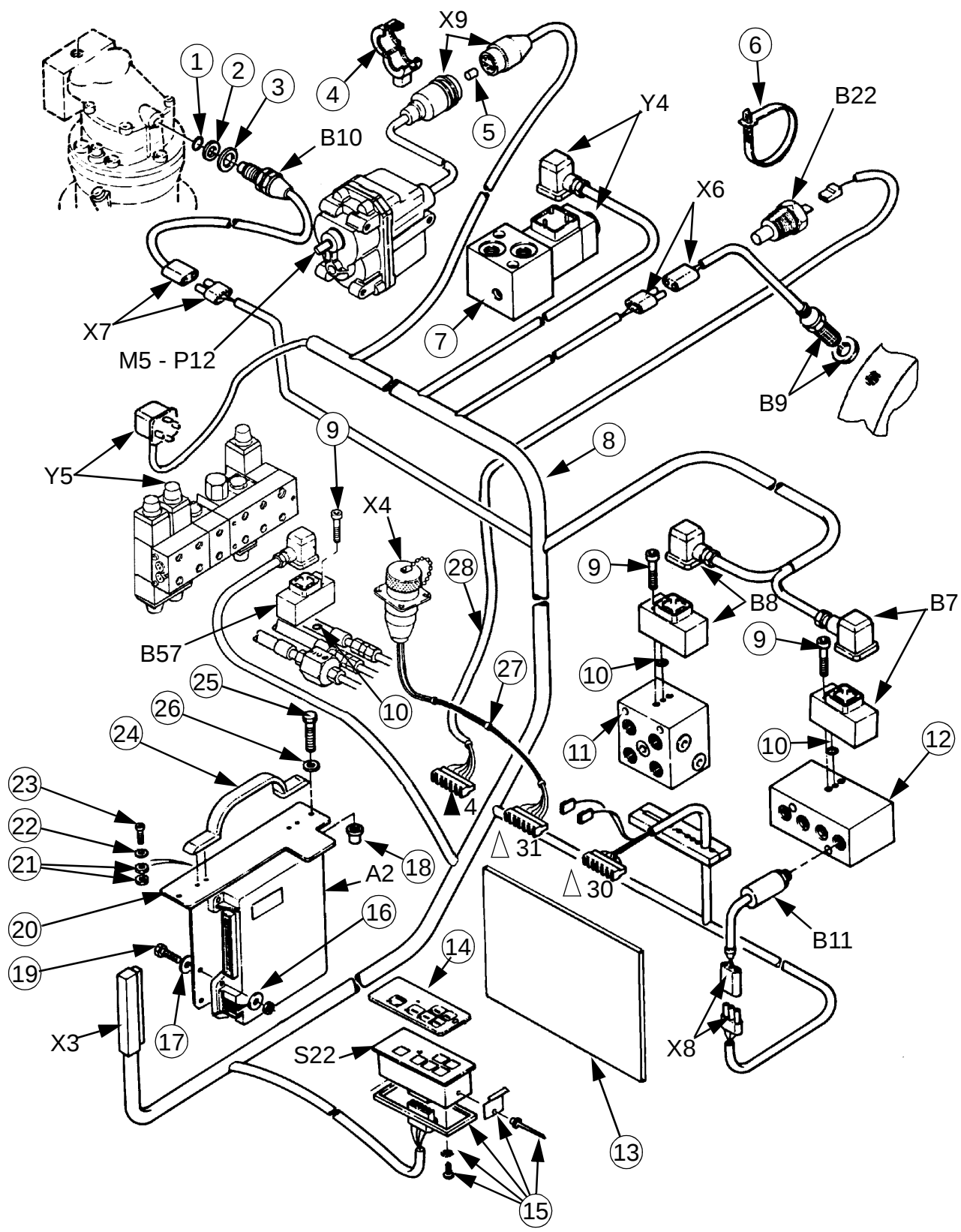
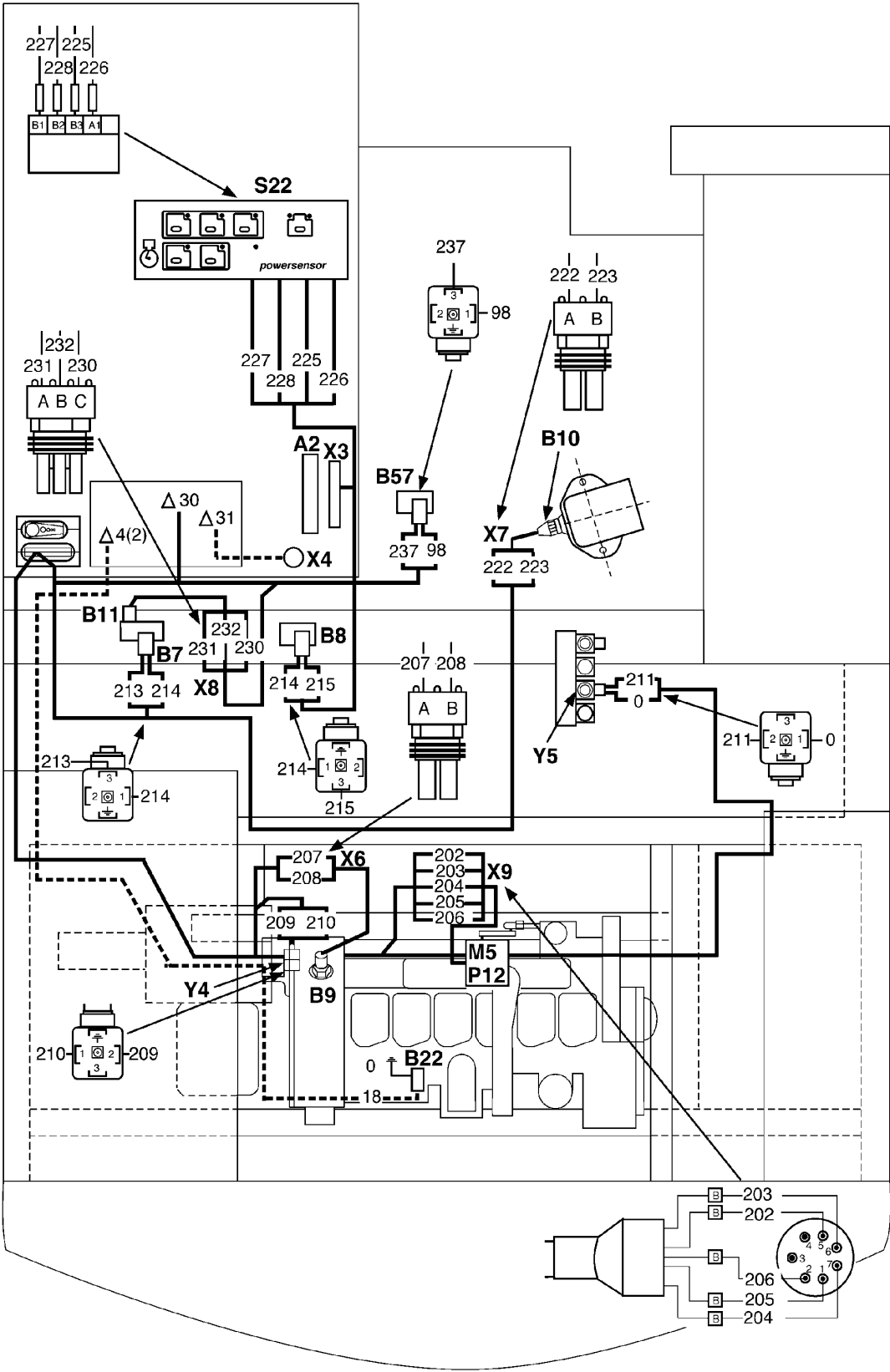
- B1** Air filter restriction pressure switch
- B2** Hydraulic oil filter restriction pressure switch
- B21** Hydraulic oil temperature sender
- E2** Attachment working light on boom
- E10** RH rear brake light
- E11** LH rear brake light
- E12** Front RH side light
- E13** Rear RH side light
- E15** Rear LH side light
- E16** Front RH dipped headlight
- E18** RH main beam headlight
- E20** RH front direction indicator
- E21** RH rear direction indicator
- E22** LH rear direction indicator
- E25** Rear fog light
- E31** RH side-mounted direction indicator
- G1** Batteries
- P11** Fuel level gauge
- S2** Battery master switch
- X2** Upperstructure power line connection
- X5** Attachment working light power connection
- X10** Fuel level indicator connector
- Y2** Pilot safety solenoid valve
- Y11** Gear box solenoid valve (first speed)
- Y12** Gear box solenoid valve (second speed)
- Y13** Front axle unlocking solenoid valve
- Y16** Working brake solenoid valve
- Y17** Working brake solenoid valve (Germany) (optional)
- Y18** Working brake solenoid valve (Germany) (optional)
- Y26** Stabilizer raising solenoid valve
- Y27** Stabilizer lowering solenoid valve
- Y55** Heavy lift solenoid valve (788)

ENGINE

- B4** Engine oil pressure switch
- B22** Engine coolant temperature sender
- G2** Alternator
- M1** Starter motor
- Y1** Engine shut-down solenoid valve

CM99K029

ELECTRONIC CIRCUIT WIRING (788P-988P-1188P)



ELECTRONIC CIRCUIT WIRING (788P-988P-1188P)

- △ See page 4

1

Electrical harness

A2

Electronic control box (788-988-1188)

B7

Swing detection pressure switch

B8

Travel detector pressure switch

B9

Engine speed detector (788-988-1188)

B10

Swing motor speed detector

B11

Hydraulic pressure sender (788-988-1188)

B22

Engine coolant temperature sender

B57

Speed change pressure switch

M5

Injection pump servo-motor (788-988-1188)

P12

Servo-motor potentiometer (788-988-1188)

S22

Control keyboard (788-988-1188)

X3

35-way connector (788-988-1188)

X4

Troubleshooting test socket (788-988-1188)

X6

Engine speed detector connector (788-988-1188)

X7

Upperstructure swing speed detector connector

X8

Hydraulic pressure sender connector (788-988-1188)

X9

Injection pump servo-motor connector (788-988-1188)

Y4

DRE4 proportional pressure reduction valve

Y5

Upperstructure brake release control solenoid valve
- 1

O-ring
- 2

Ring
- 3

Washer
- 4

Lock
- 5

Plug
- 6

Clamp
- 7

Pressure reduction valve
- 8

Electronic harness
- 9

Screw
- 10

O-ring
- 11

Travel block
- 12

Swing block
- 13

Printed circuit card
- 14

Decal
- 15

Control panel fixing hardware
- 16

Nut
- 17

Washer
- 18

Rivet
- 19

Screw
- 20

Bracket
- 21

Nuts
- 22

Washer
- 23

Screw
- 24

Handle
- 25

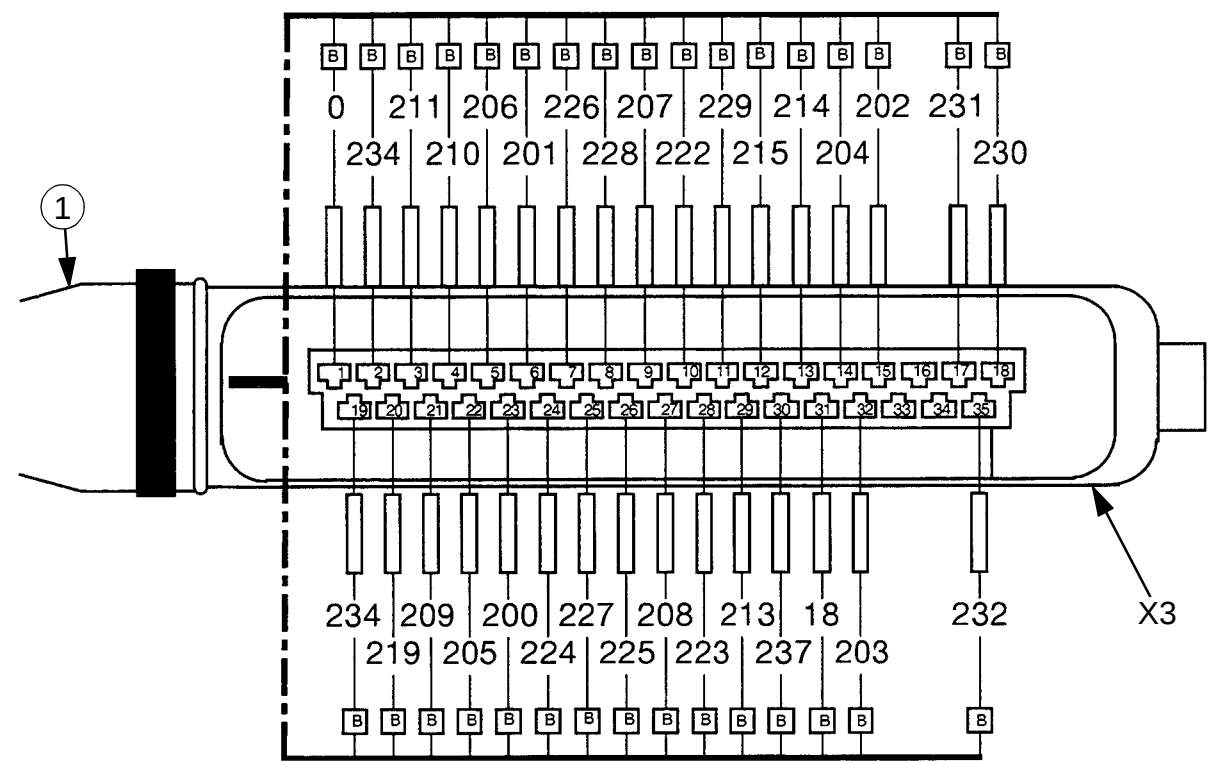
Screw
- 26

Washer
- 27

Troubleshooting socket harness
- 28

Engine harness

DETAILS OF 35 PIN CONNECTOR X3 EXCAVATORS 788P/988P/1188P



CS99K546

CAB FLOOR WIRING (OPTIONAL)

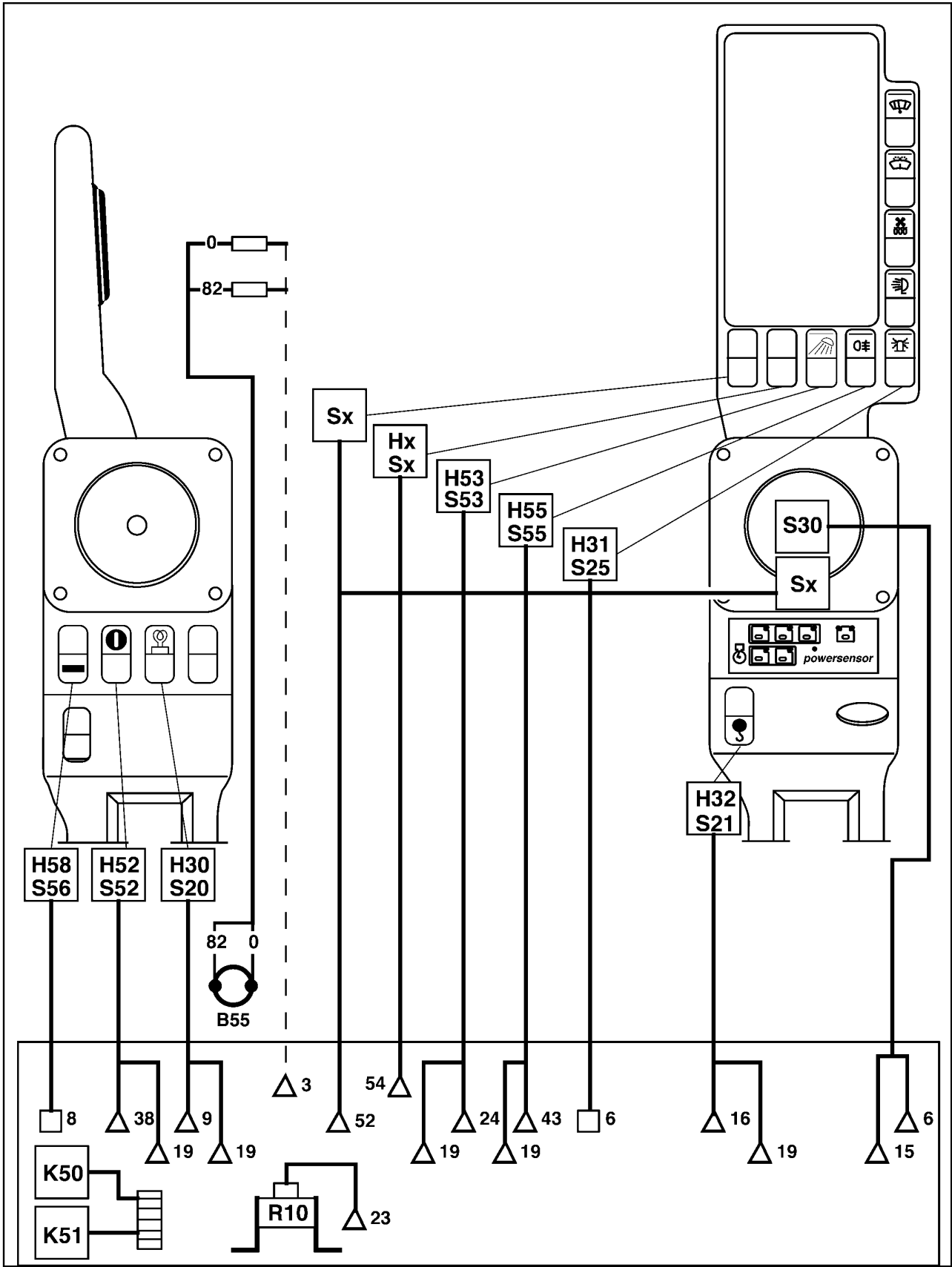
ELECTRICAL CABINET

1 Connecting strip

△ ▽ □ See page 6

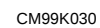
INSTRUMENT PANEL

- B55** Steering brake pressure switch (optional)
- H30** Cold start assistance switch lighting (optional)
- H32** Overload indicator switch lighting (optional)
- H52** Pilot system cancellation switch lighting (optional)
- H53** Cab front working light switch lighting (optional)
- H58** Quick coupler switch lighting (optional)
- K50** Adjustable boom raising limiter relay (optional)
- K51** Adjustable boom retracting limitation relay (optional)
- R10** Resistor, 0.85 Ohms
- S20** Cold start assistance switch (optional)
- S21** Overload indicator switch (optional)
- S30** Adjustable or articulated boom control switch (optional)
- S52** Pilot system cancellation switch (optional)
- S53** Cab front working light switch (optional)
- S56** Quick coupler switch (optional)

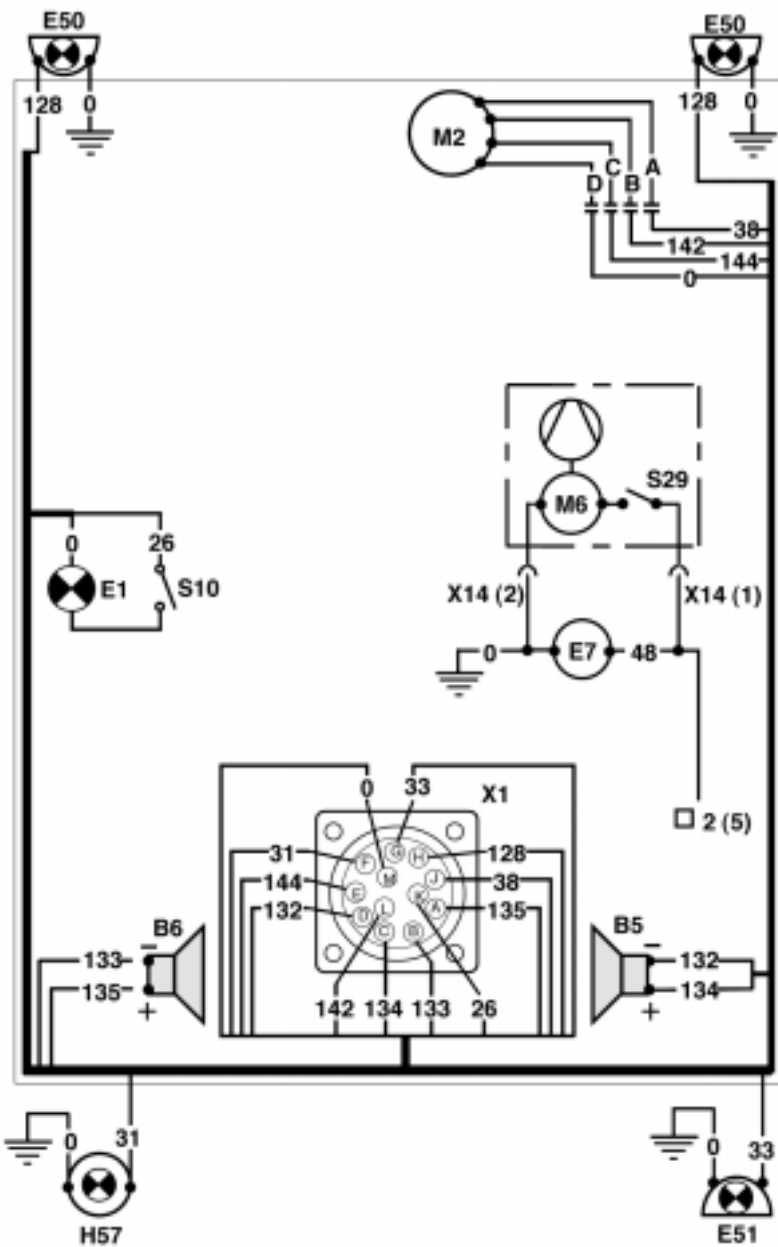


CM99J051

E12 Engine compartment light
R11 Cold start assistance plug (optional)
S28 Engine compartment lighting switch (optional)



CAB AND CAB OPTION WIRING



- A White wire
- B Grey wire
- C Blue wire
- D Black wire
- B5 RH loudspeaker (optional)
- B6 LH loudspeaker (optional)
- E1 Cab lighting
- E7 Cigarette lighter
- E50 Cab front working lights
- E51 Cab rear working light
- H57 Standard or Italian rotary light
- M2 Windshield wiper motor
- M6 Cab blower motor (optional)
- S10 Cab lighting switch
- S29 Cab blower switch (optional)

- X1 (A) (B) (C) (D) Cab floor/cab LH and RH loudspeaker connector
- X1 (H) (G) Cab floor/cab front and rear working lights connector (optional)
- X1 (E) (J) (M) (L) Cab floor/cab windshield wiper motor connector
- X1 (F) Cab floor/cab rotary light connector (specific to certain countries)
- X1 (K) Cab floor/cab interior lighting connector
- X14 (1) (2) Cab blower plug (optional)
- 2 (7) 10 way connector (see printed circuit wiring on page 5)

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Section 4002

ELECTRONIC AND TROUBLESHOOTING SYSTEM 1188 Crawler excavators

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This symbol is used in this manual to indicate important safety messages. Whenever you see this symbol, carefully read the message that follows, as there is a risk of serious injury.



Turn the battery master switch to the "Off" position before carrying out any service work on the circuit.

TOOLS REQUIRED



PD00012

1. *PHOTO-DIGITAL TACHOMETER CAS 10449*
2. *AEROSOL M1703414*
(For cleaning and de-oxidation of electrical contacts)

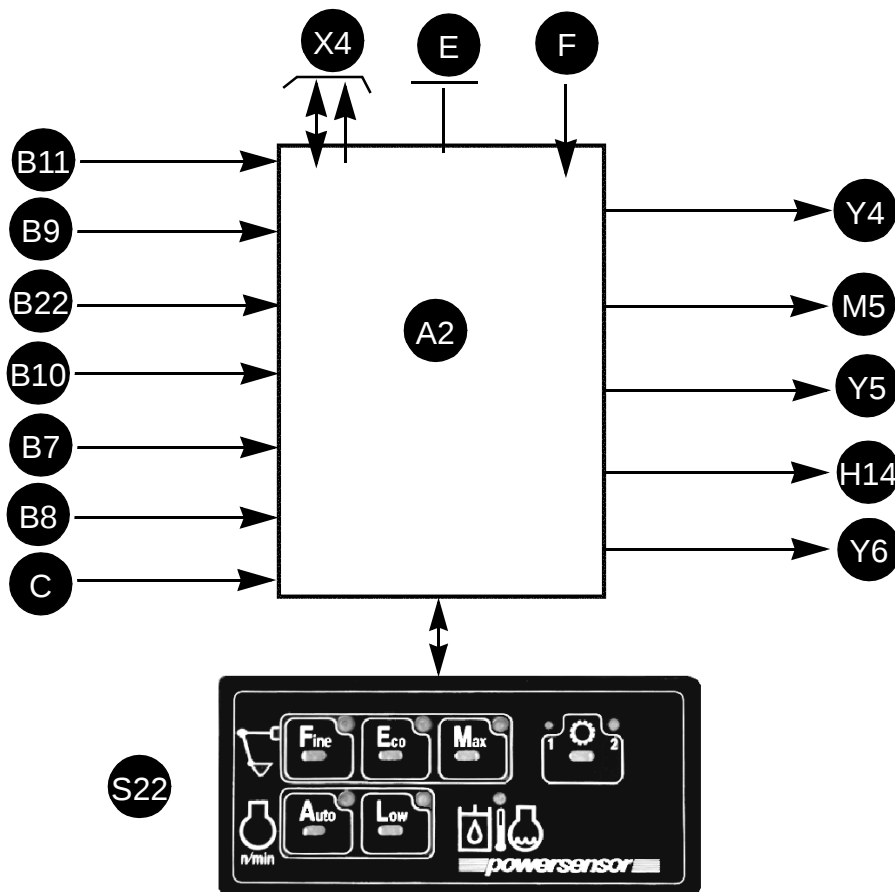
ELECTRONIC SYSTEM

General

Some of the machine's functions are managed and checked electronically. The functions concerned are as follows:

- Cold start assistance.
- Electric acceleration.
- Automatic return to idle.
- Engine overheating safety system.
- Engine / hydraulic system power regulation: "Speed sensing".
- Swing braking and brake release.
- Automatic travel sequencing (Two-speed excavators only).
- Electronic system diagnosis.

Components connected to electronic system



PDH0471

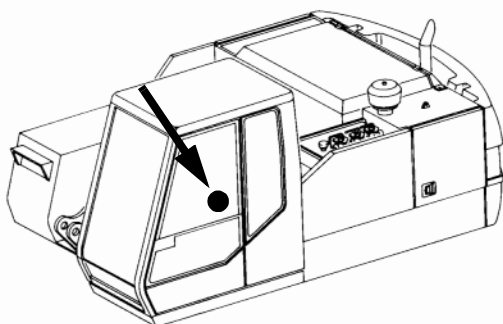
PH0732A

A2 Electronic control box
B7 Swing detector pressure switch
B8 Travel detector pressure switch
B9 Engine speed detector
B10 Swing motor speed detector
B11 Hydraulic pressure detector
B22 Engine coolant temperature sender
H14 Correct operation indicator light (LED)

M5 Injection pump servo-motor
S22 Control keyboard
X4 Diagnostic socket
Y4 Proportional pressure reduction valve DRE4
Y5 Upperstructure brake release electro-control valve
Y6 Travel motor displacement change electro-control valve (two-speed excavators only)
C Lighting 28 volts
E Earth
F 28 volt battery

Location of components on the excavator

(A2) Electronic control box



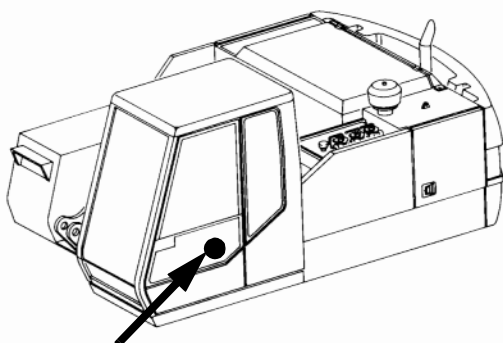
PDH0472



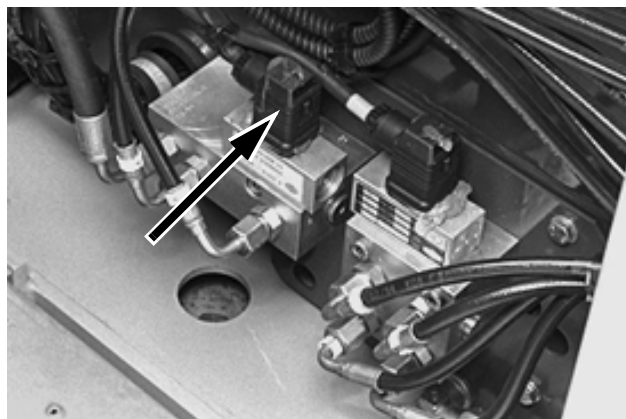
PE09306

Located to the right of the operator's seat, it contains the electronic card through which all information passes. The card is connected to the other components by means of a 35-pin connector.

(B7) Swing detection pressure switch



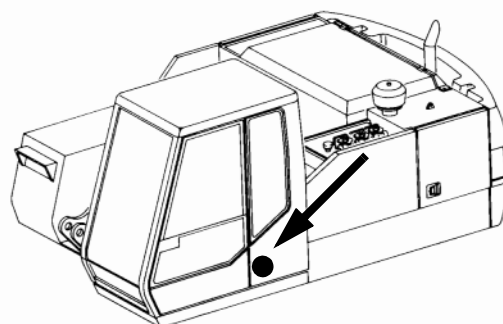
PDH0472



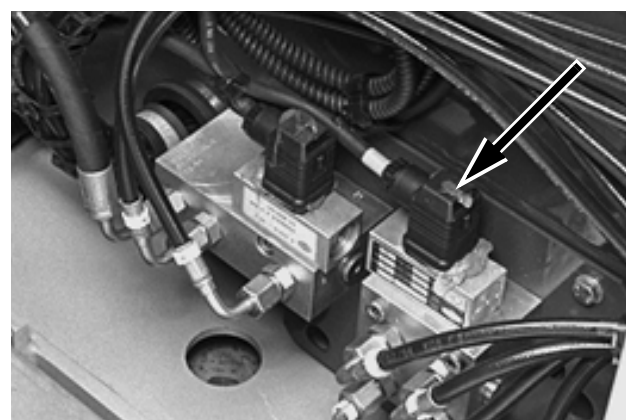
PDH08504

Located on the rear panel of the cab floor, it closes at about 6 bar (RH or LH swing pilot pressure).

(B8) Travel detector pressure switch



PDH0472

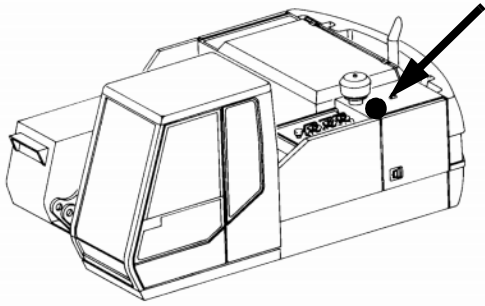


PH08504

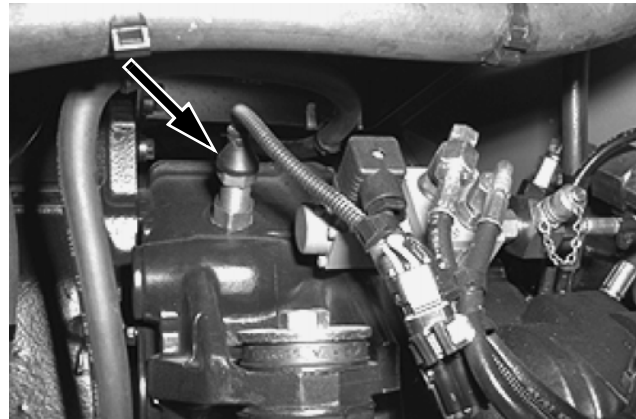
Located on the rear panel of the cab floor, it closes at about 6 bar (travel brake release pilot pressure).

4002-6

(B9) Engine speed detector



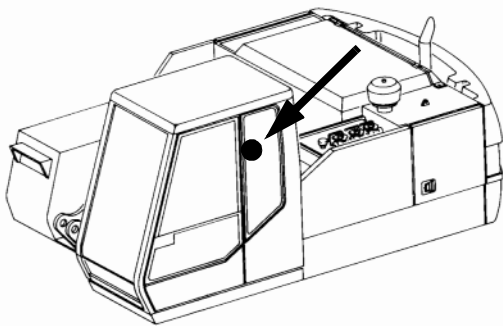
PDH0472



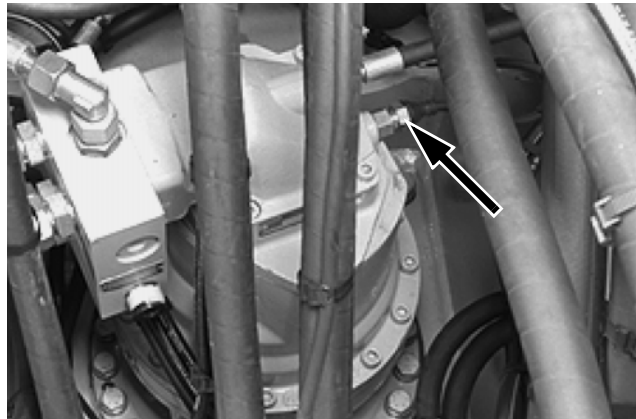
PH00918

Mounted in line with the starter ring teeth, it delivers a signal with a frequency corresponding to the time interval between the passage of two consecutive teeth.

(B10) Swing motor speed detector



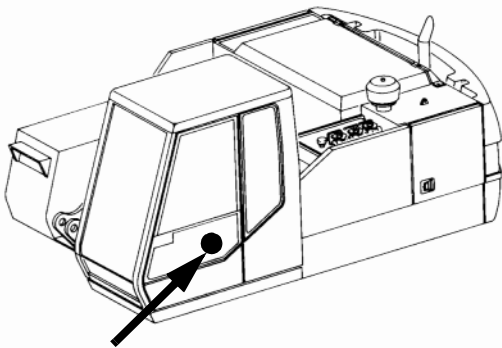
PDH0472



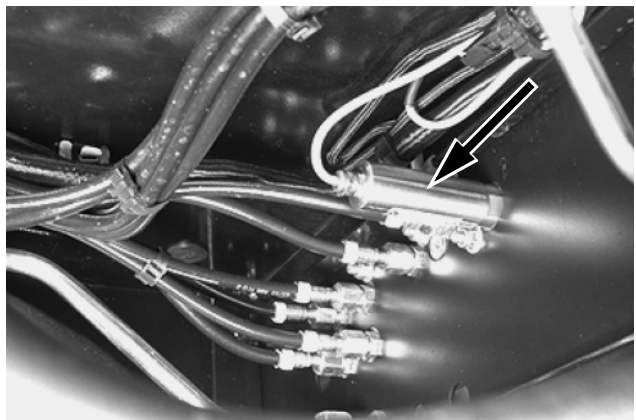
PH01002

Located behind the hydraulic motor housing and opposite a sprocket, it delivers a signal with a frequency corresponding to the passage of two consecutive teeth.

(B11) Hydraulic pressure sender



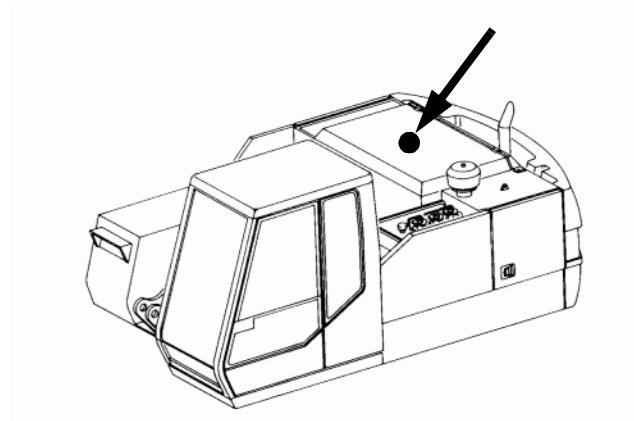
PDH0472



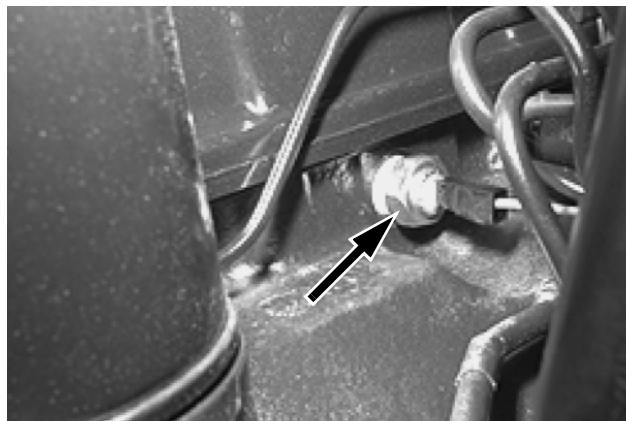
PH01034

Located under the cab floor, it measures the highest pressure (Load-Sensing) in the excavator attachment and travel hydraulic systems.

(B22) Engine coolant temperature sender



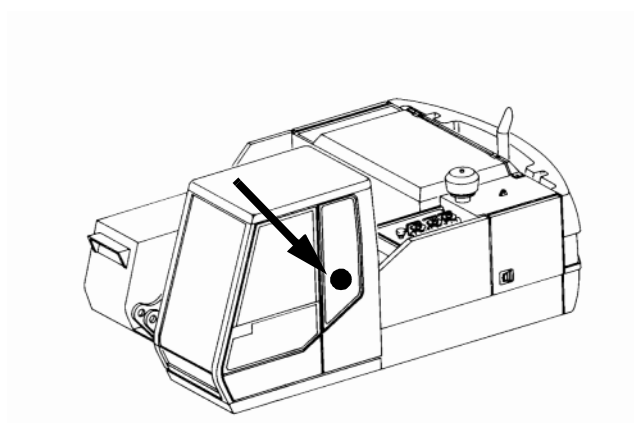
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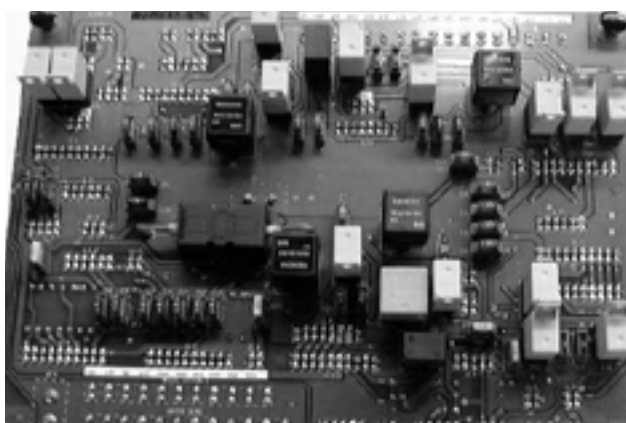
PH00917

Mounted on the engine block, it delivers a pressure of between 0 and 28 volts. It is the ratio between this voltage and the battery voltage which is used for information processing purposes

(H14) Led diagnostic (LED)



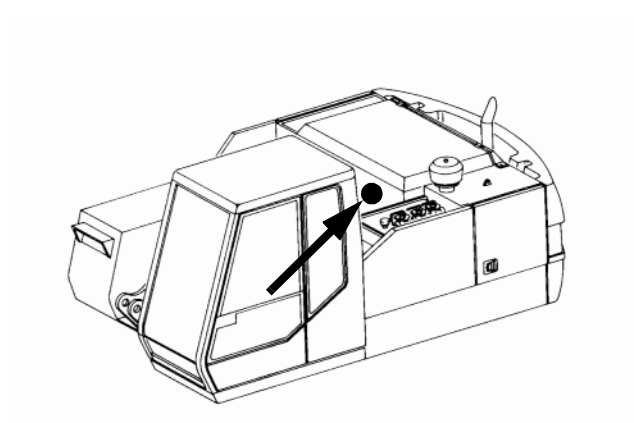
PDH0472



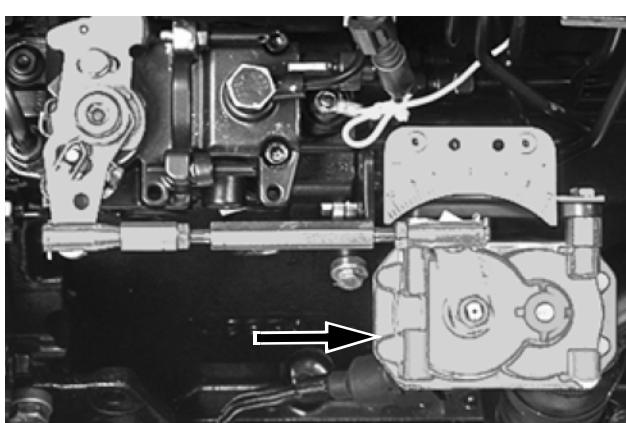
CD99J017

This consists of a red warning lamp (Light-Emitting Diode) mounted on the printed circuit board. This indicator lamp is continuously "on" when the circuit is trouble-free. It starts to flash on and off if one or more defects occur in the system. Such defects can be identified by means of a lighting code system (See page 10).

(M5) Servo-motor (injection pump lever control)



PDH0472

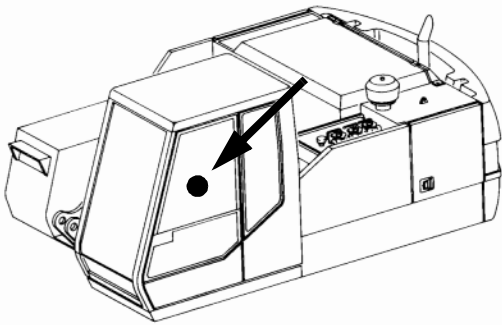


PH08508

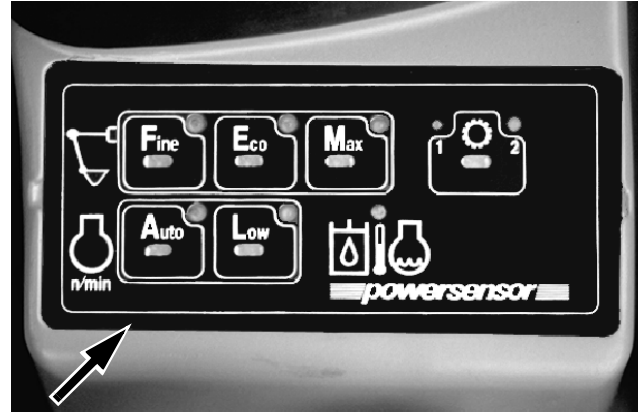
Mounted on the engine, it control the injection pump lever.

4002-8

(S22) Control panel



PDH0472



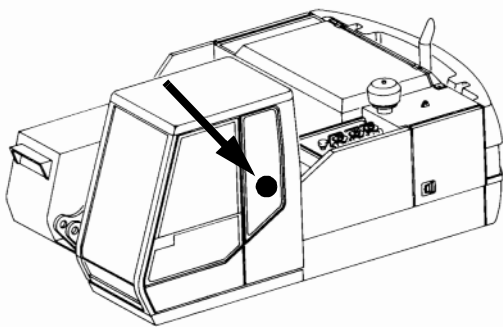
PH07328

Located near the right-hand control lever, it has a front face covered with a silk-screened plastic film, an electronic circuit board with six momentary-action push-buttons, eight LED type indicator lamps, electronic components and a connector.

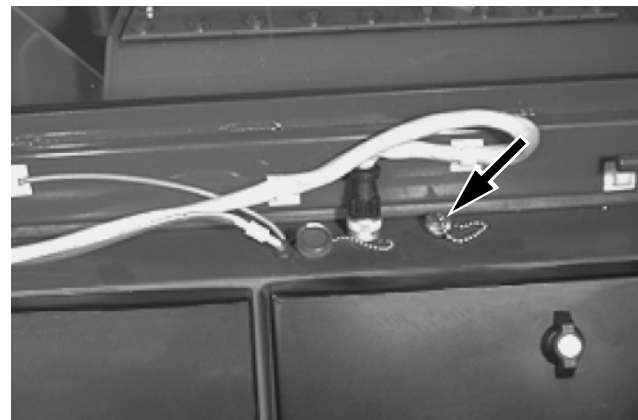
The functions of the control panel can be classified under four modes:

- The "Work" mode, consisting of the following push-buttons: "FINE" 1580 to 1620 rpm (low flow work, handling), "ECO" 1880 to 1920 rpm (economical, digging) and "MAX" 2180 to 2220 rpm (maximum power, hard work).
- The "Idle" mode consisting of the following push-buttons: "LOW" 900 to 1000 rpm (low idle) and "AUTO" 1180 to 1220 rpm (automatic idle).
- The "Travel" mode (two-speed excavators only) has two indicator lamps: "POSITION 1" (low speed) and "POSITION 2" (high speed).
- The "Pre-heat" mode has an indicator lamp: a flashing lamp shows the machine has not yet reached its normal operating temperature. When that lamp goes out the machine is ready to work.

(X4) Troubleshooting test socket



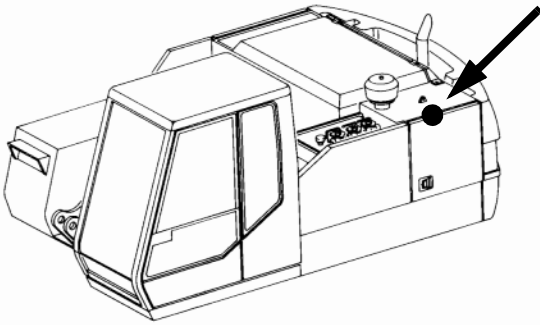
PDH0472



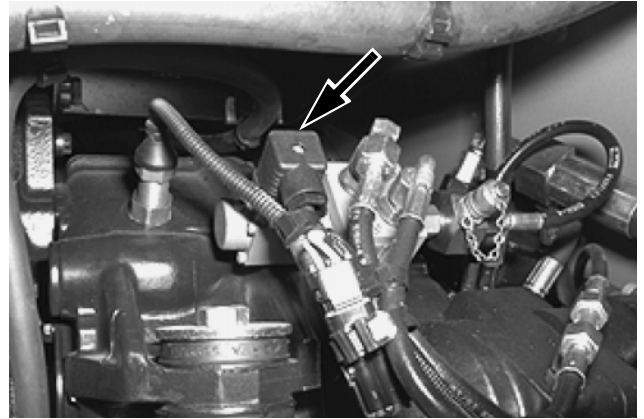
PH010834D

Located in the cab, behind the seat, it is protected by a trim panel. It is for use connected to a dialogue console which can perform in-depth diagnosis of the machine and which is also used for reading and modifying the "excavator parameters".

Y4 Proportional pressure reduction valve DRE4



PDH0472

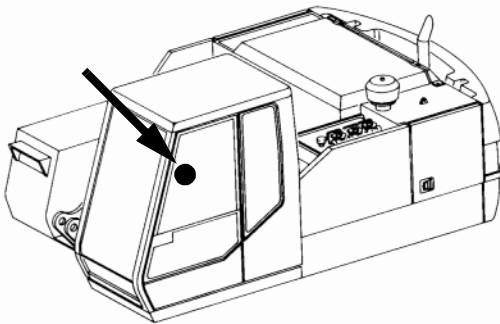


PH00918

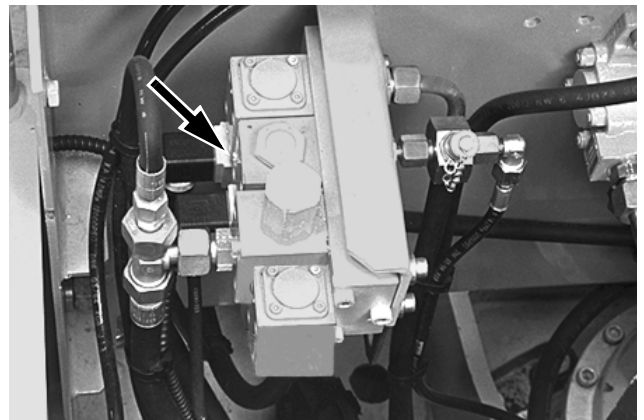
Mounted on the main pump, it delivers an output pressure which is proportional to the current passing through it, thus enabling a check to be made of the variable flow pump hydraulic torque.

NOTE: The photo shows the DRE4 reduction valve on the 988 excavator. On the 788 the DRE4 reduction valve is identical, but is mounted in a different manner.

Y5 Upperstructure brake release control solenoid valve



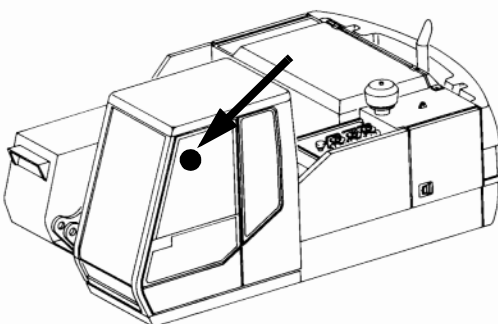
PDH0472



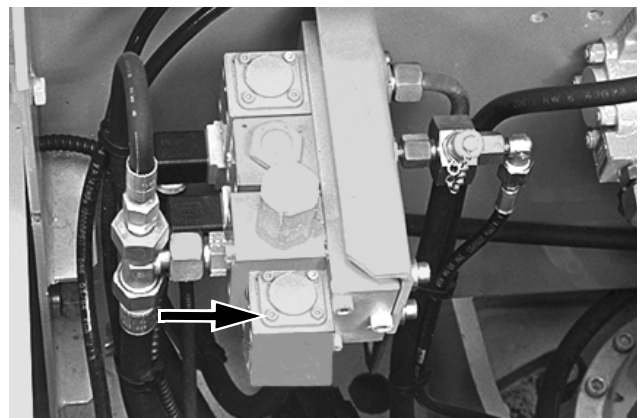
PH08422

Located behind the cab on the valve bank partition, it is actuated to release the upperstructure brake. It brakes the upperstructure when not actuated.

Y6 Travel motor displacement change electro-control valve (Two-speed excavators only)



PDH0472



PH08524

Located behind the cab on the valve bank partition, it selects high speed (low displacement) when it is actuated, or low speed (high displacement) when it is not actuated.

ELECTRONIC SYSTEM DIAGNOSIS

Diagnosis without console

General

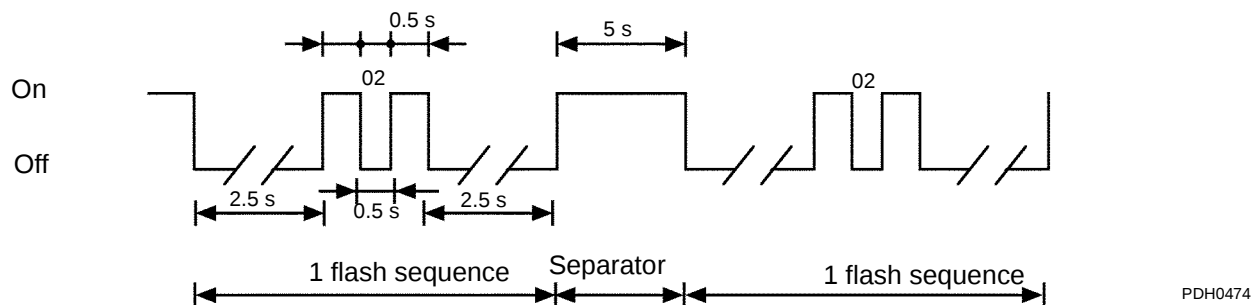
The machine is equipped with an integrated diagnostic system which is designed to locate problems which may occur in the system. Such defects are displayed by means of an indicator lamp (LED) inserted in the printed circuit located in the cab behind the operator's seat. This indicator lamp (LED) is on continuously when the system is fault-free. It starts to flash when one or more defects appear.

The defect signalling code is as follows:

The indicator lamp lights up for half a second, then goes out for half a second, a number of times equal to the code. At the end of the cycle the indicator lamp lights up for 5 seconds, the cycle starts again.

Example: 1 defect to be displayed:

- Servo-motor failure: Associated defect code 02

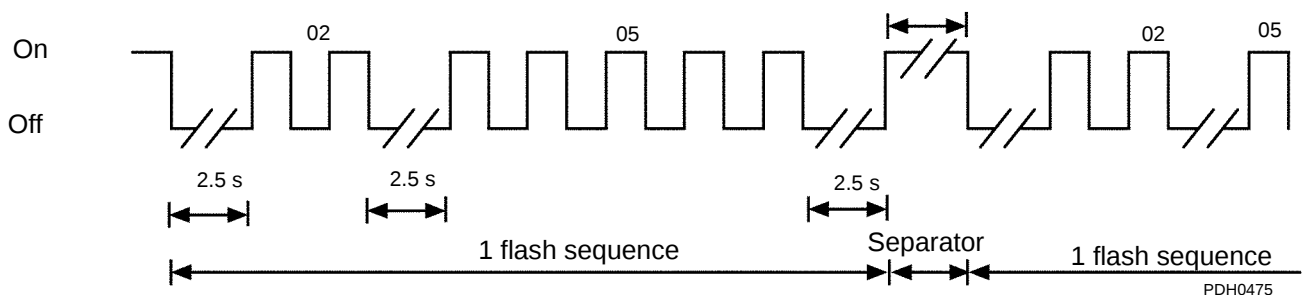


One flashing sequence may contain more than one defect, in which case they will be listed in numerical sequence and coded as shown in the example below:

Example: 2 defects to be displayed:

- Failure of components connected with the measurement of water temperature: Associated defect code 05.

- Failure of components connected with the engine electrical acceleration: Associated defect code 02.



The defect codes are as follows:

Defect code 01	Not used
Defect code 02	Components connected with the engine electrical acceleration
Defect code 03	Components associated with the measurement of hydraulic pressure
Defect code 04	Components associated with the measurement of engine speed
Defect code 05	Components associated with the measurement of water temperature
Defect code 06	Components associated with pressure reduction
Defect code 07	Components associated with the control of travel motor displacement (two-speed excavators only)
Defect code 08	Components associated with upperstructure braking and brake release
Defect code 09	Components associated with the control keyboard
Defect code 10	Components associated with the control box
Defect code 11	Calibration impossible
Defect code 12	Components associated with the control box
Defect code 13	Components associated with the control box

Defect code 01

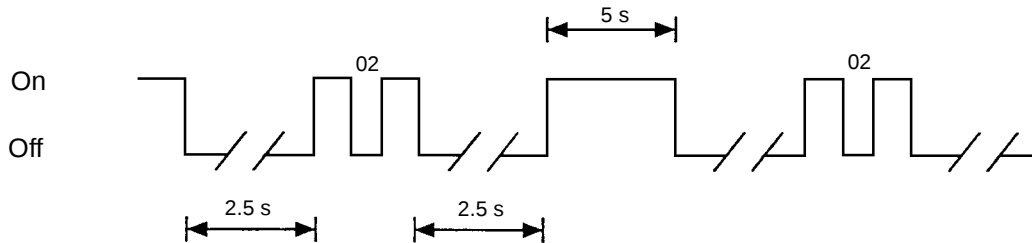
Not used.

Defect code 02: Components associated with engine electrical acceleration

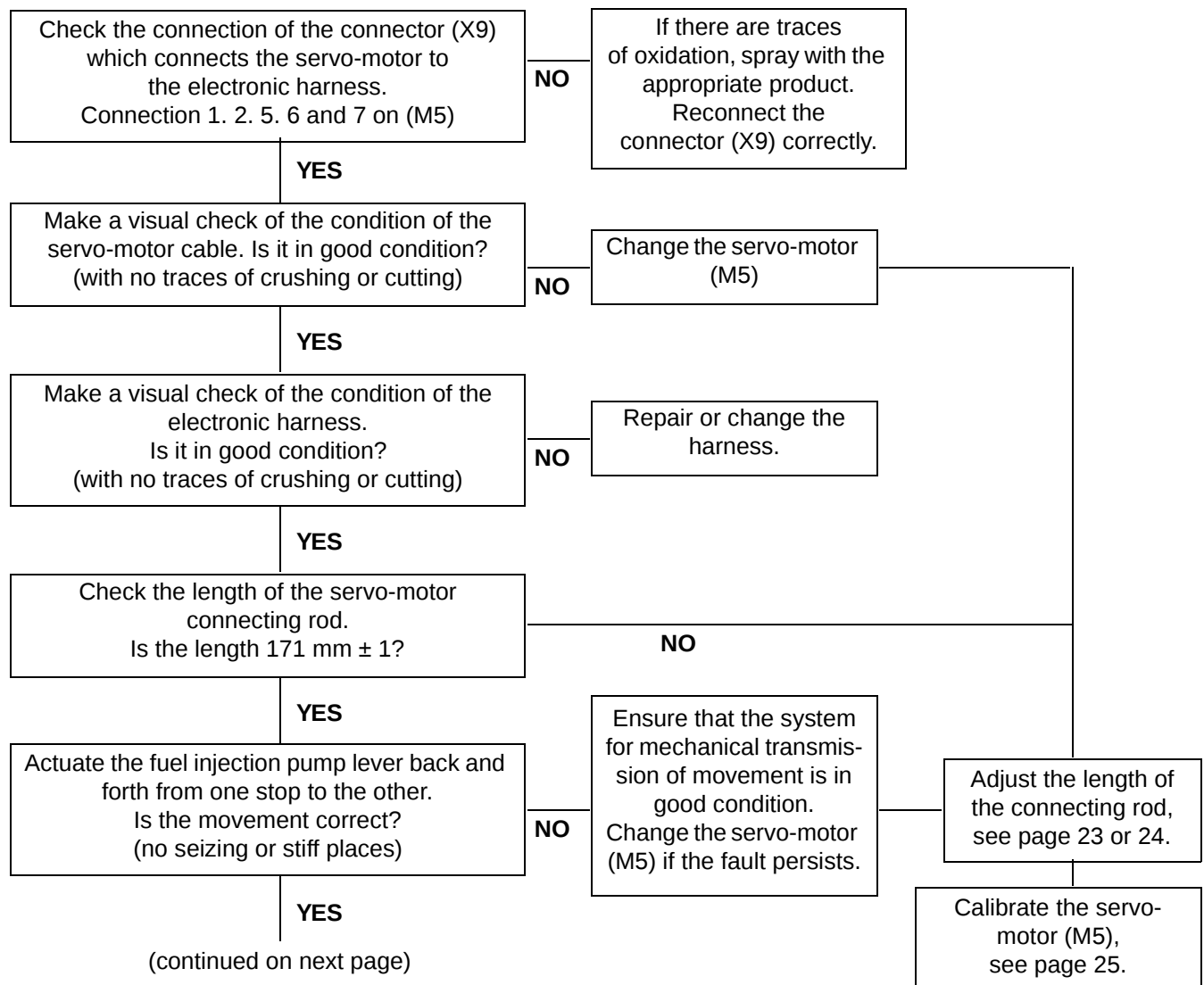
Problems found:

- Engine returns automatically to idle (lever against the injection pump minimum stop)
- Control keyboard completely off except travel mode on two-speed excavators only
- The code appears regardless of the type of electric motor failure (short-circuit or open circuit)

Illustration of the indicator lamp signal

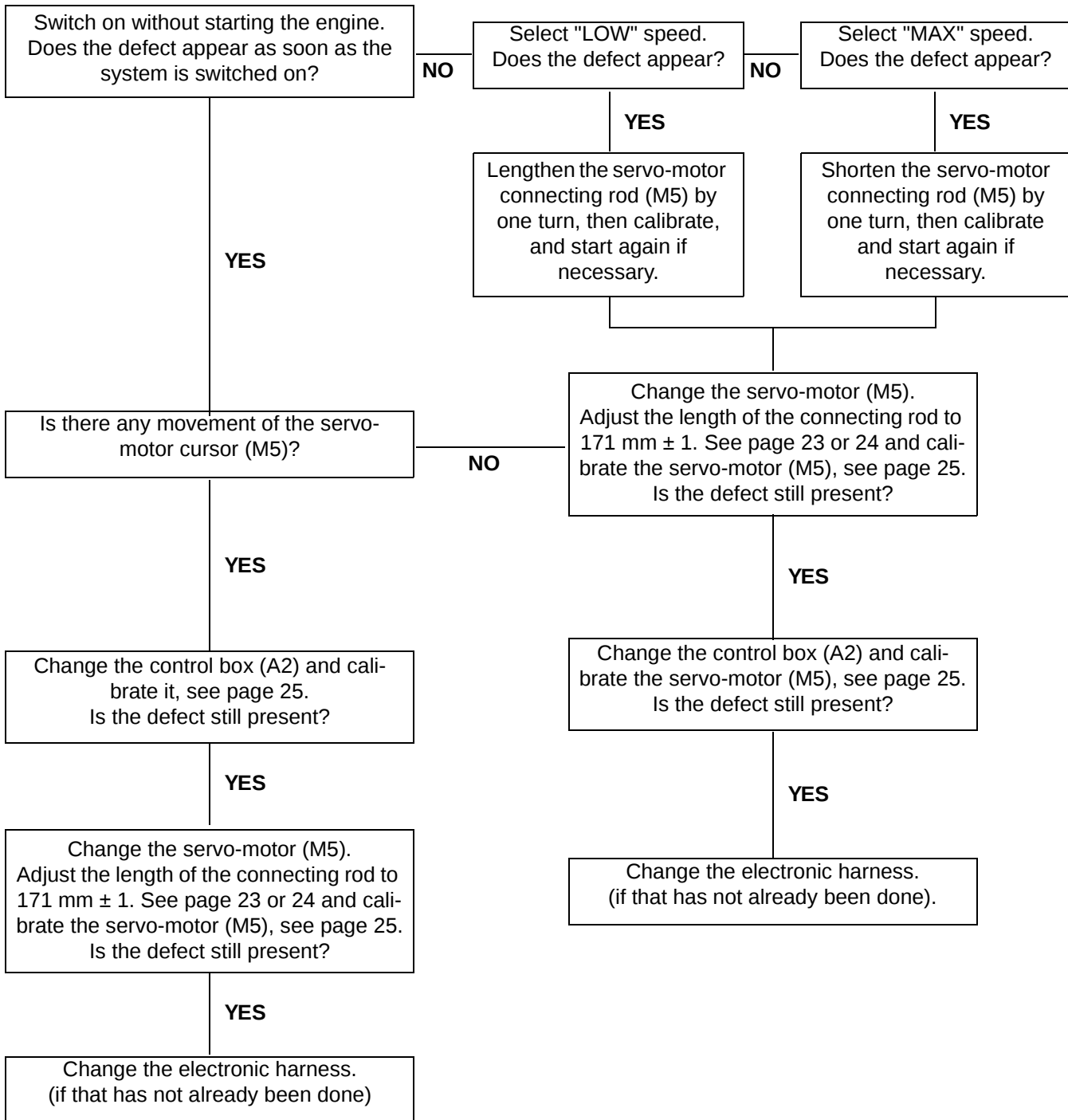


PDH0491



NOTE: After each corrective action, switch off and on again to reset the system.

(continued from previous page)



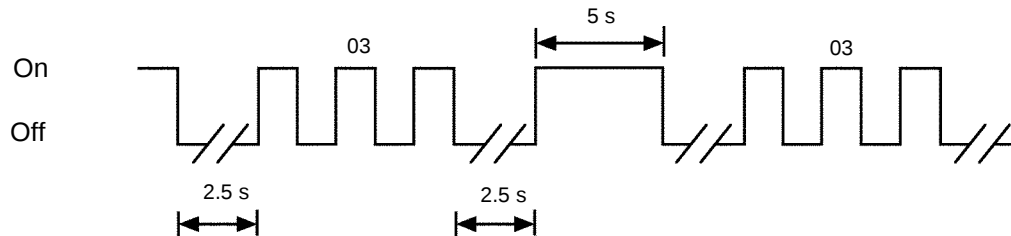
NOTE: Switch off and on again after each corrective action to reset the system. In the event of a servo-motor failure, a temporary repair solution is possible consisting of fixing the control connecting rod into one of the holes in the graduated strip, thus allowing the engine to run at constant speed. Disconnect the servo-motor plug (X9). If this temporary solution is used, it is essential that the connecting rod fastening is disconnected before stopping the engine, to allow it to run at idle (otherwise there is a danger of damaging the turbo-charger).

Defect code 03: Components associated with the measurement of hydraulic pressure (L.S.)

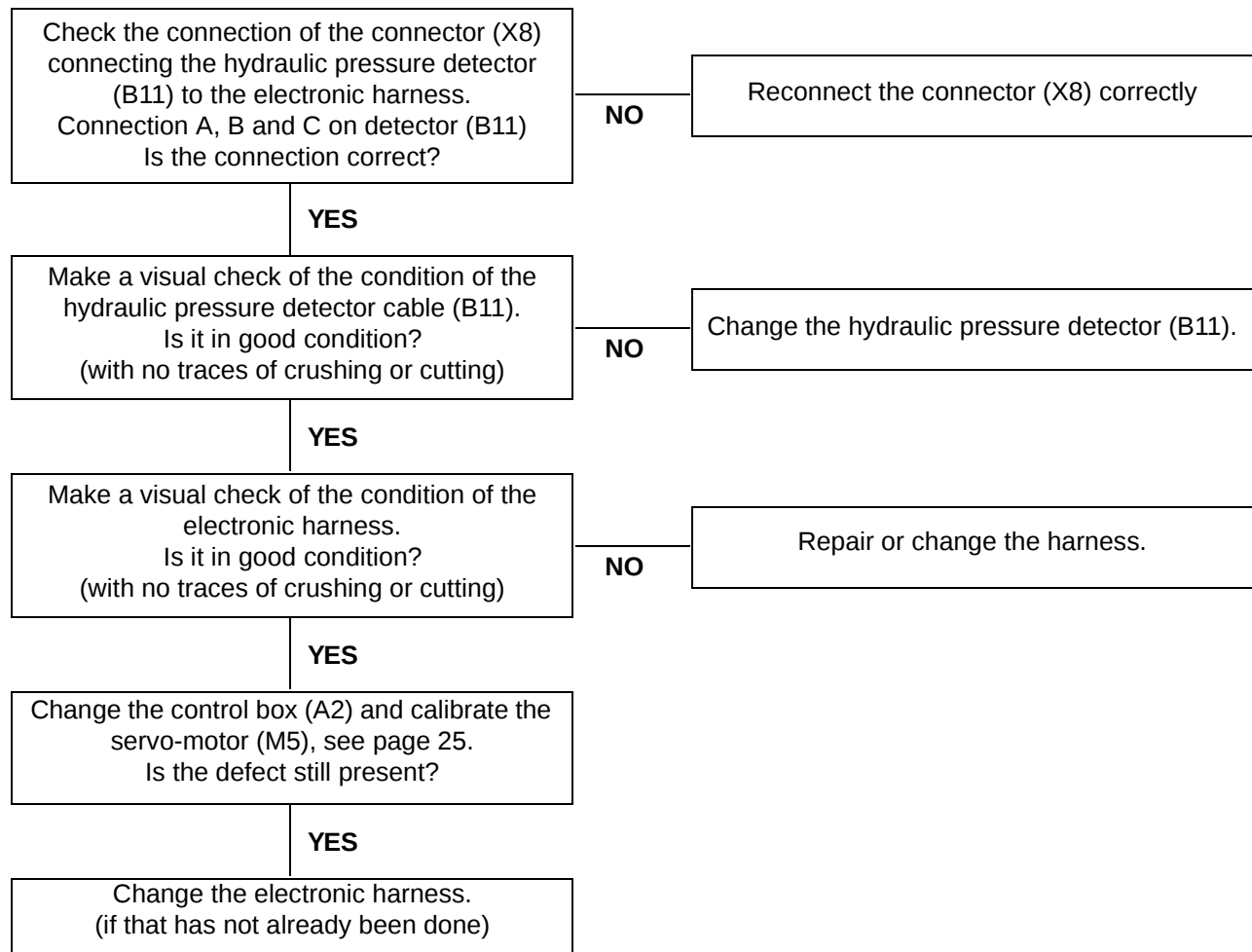
Problems found:

- "Auto" (automatic idle) inoperative
- Automatic travel speed system inoperative
- This defect is indicated in all cases of failure of the pressure detector (B11) (short-circuit, open circuit etc.)

Illustration of the indicator lamp signal



PDH0476



4002-14

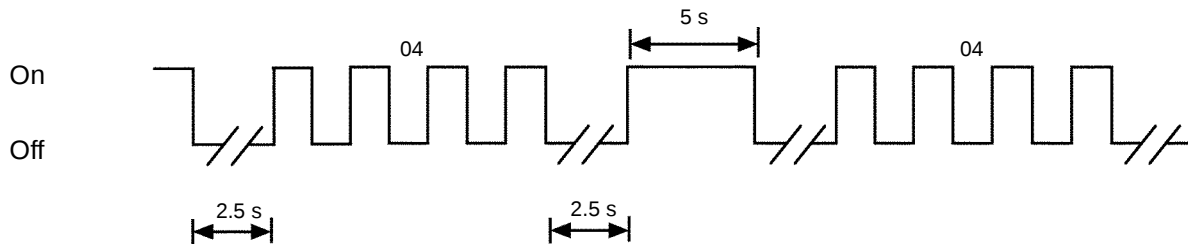
Defect code 04: Components associated with the measurement of engine speed

Problems found:

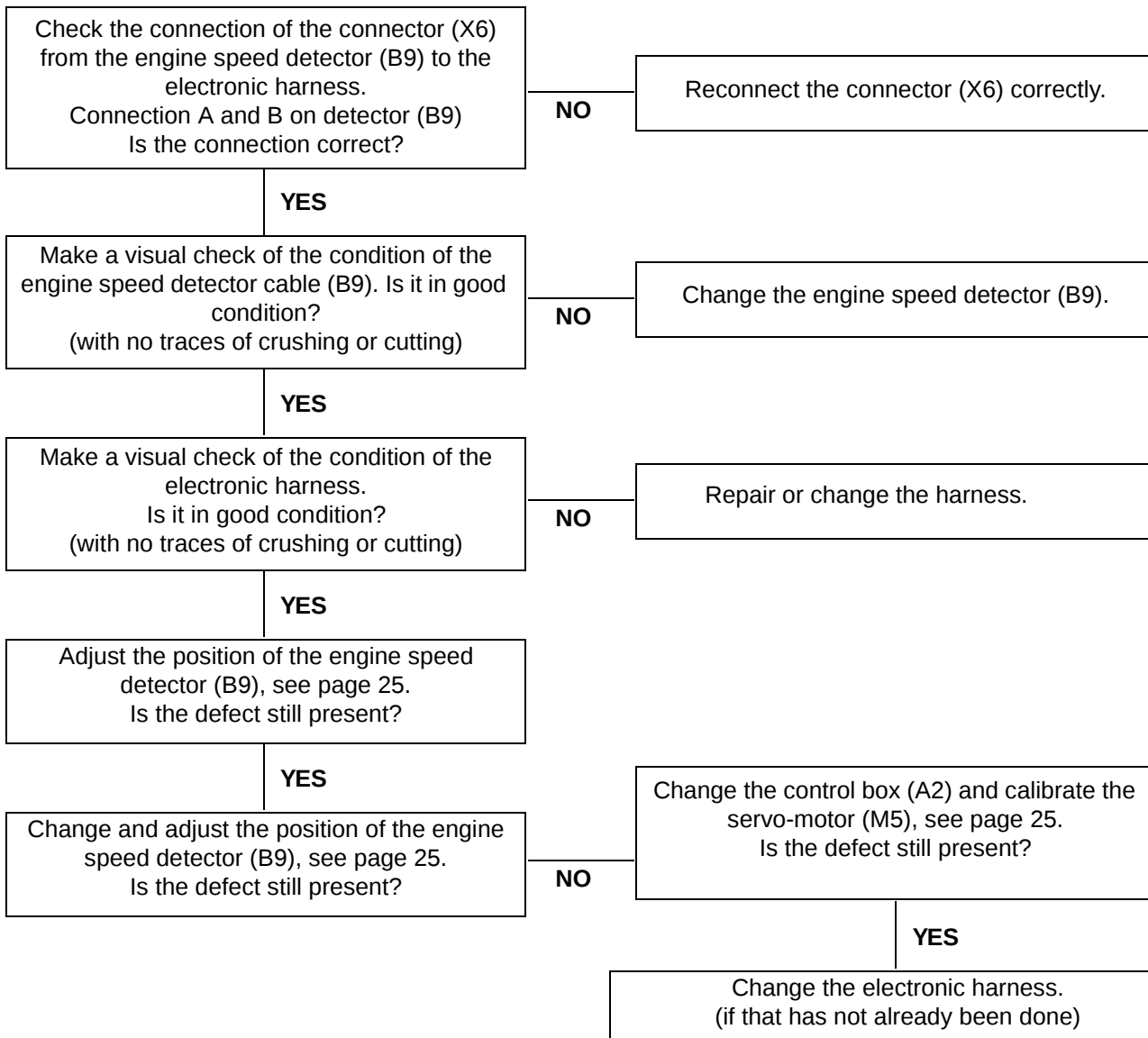
- Reduced hydraulic power, DRE4 pressure fixed when swing is not actuated
- Engine speed safety system inoperative
- Engine starts up directly in "ECO" mode and stays there
- No Auto Idle

NOTE: The failure is more often detected by these symptoms than by the LED flashing.

Illustration of the indicator lamp signal



PDH0477

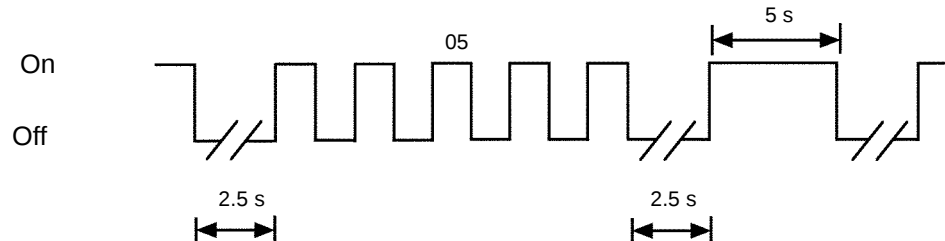


Defect code 05: Components associated with the measurement of water temperature

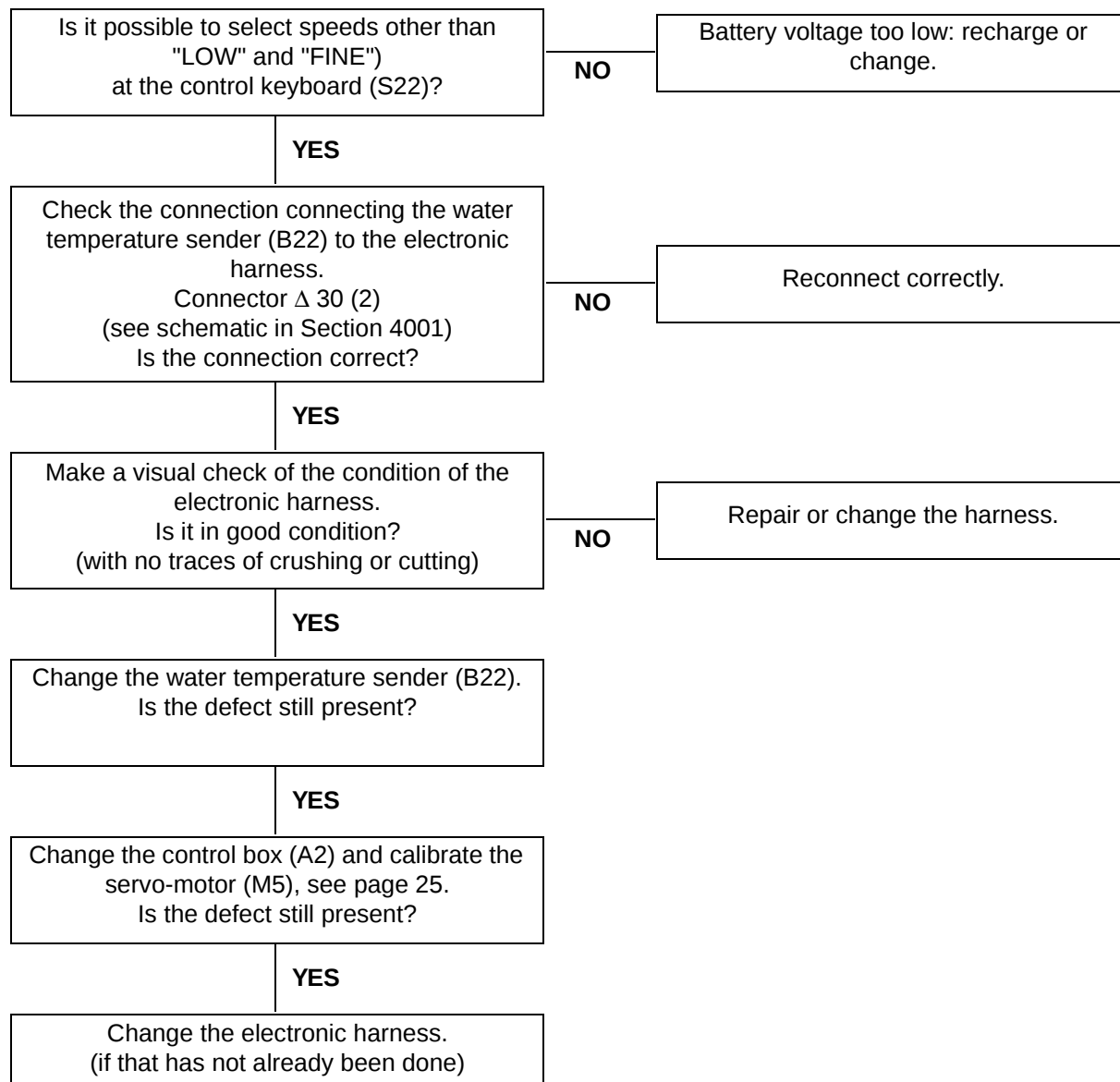
Problems found:

- Indicator on instrument panel inoperative
- When starting up from cold, warm-up time reduced to one minute
- Over-heating safety system inoperative
- Short-circuits and open circuits on following items cause this failure: sender, wire, indicator and printed circuit board

Illustration of the indicator lamp signal



PDH0478



4002-16

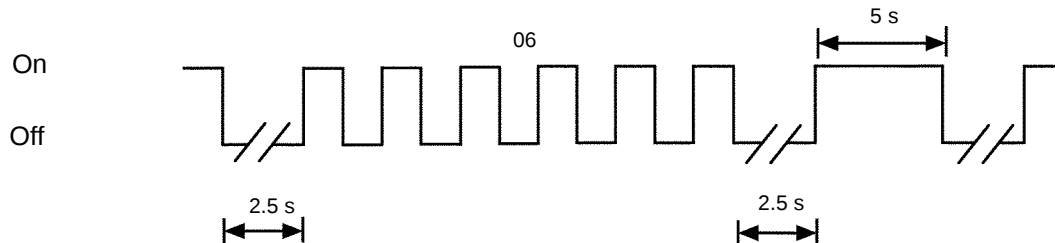
Defect code 06: Components associated with pressure reduction

Problems found:

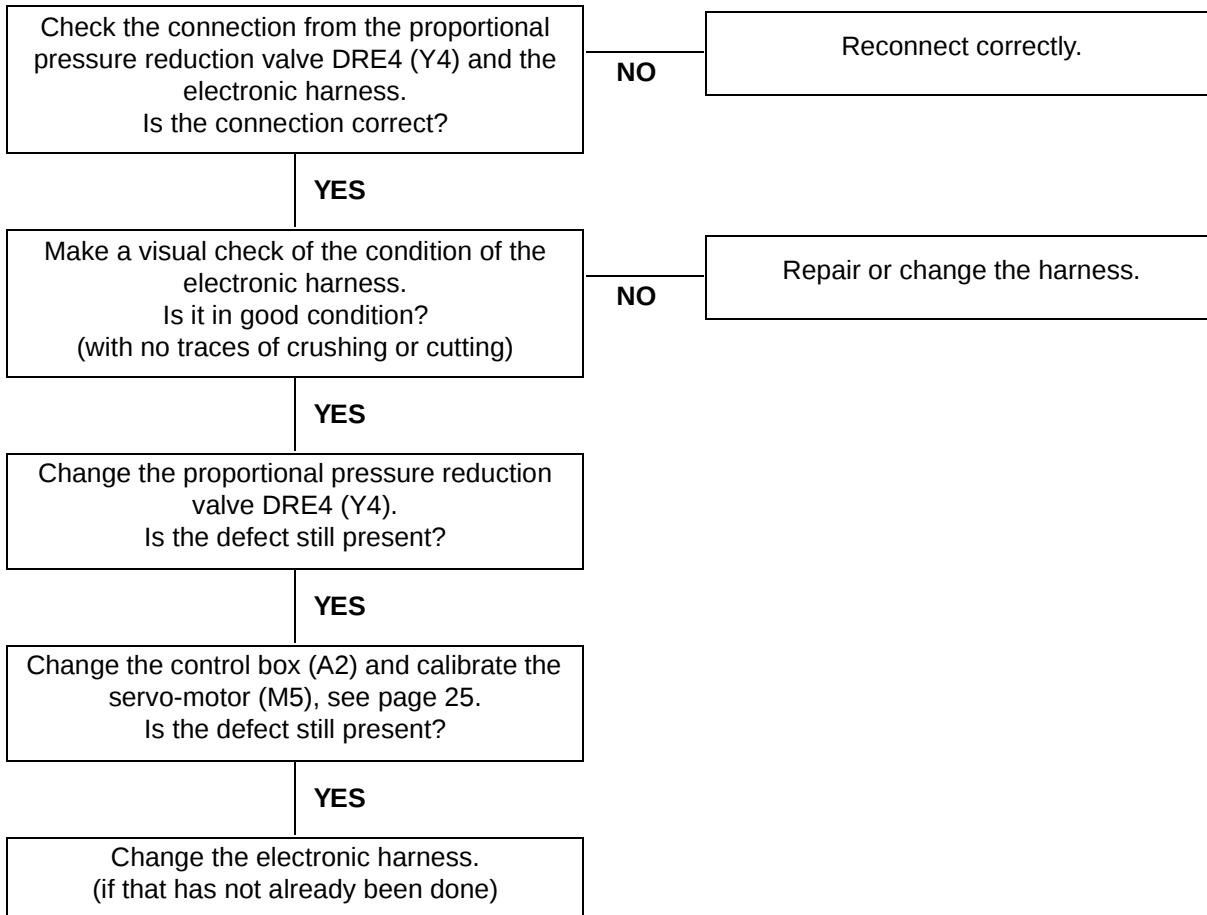
- Engine stalls under load
- Zero pressure at valve

NOTE: This defect is indicated by valve short-circuits and open circuits.

Illustration of the indicator lamp signal



PDH0479



Defect code 07: Components associated with the control of travel motor displacement (two-speed excavators only)

Problems found:

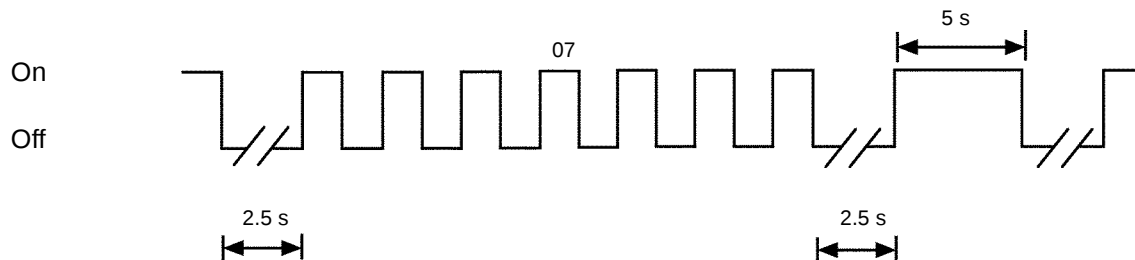
- Speed change inoperative (control panel locked in 1st speed)

NOTE: This defect is indicated if the displacement change solenoid valve (Y6) is short-circuited or cut off.

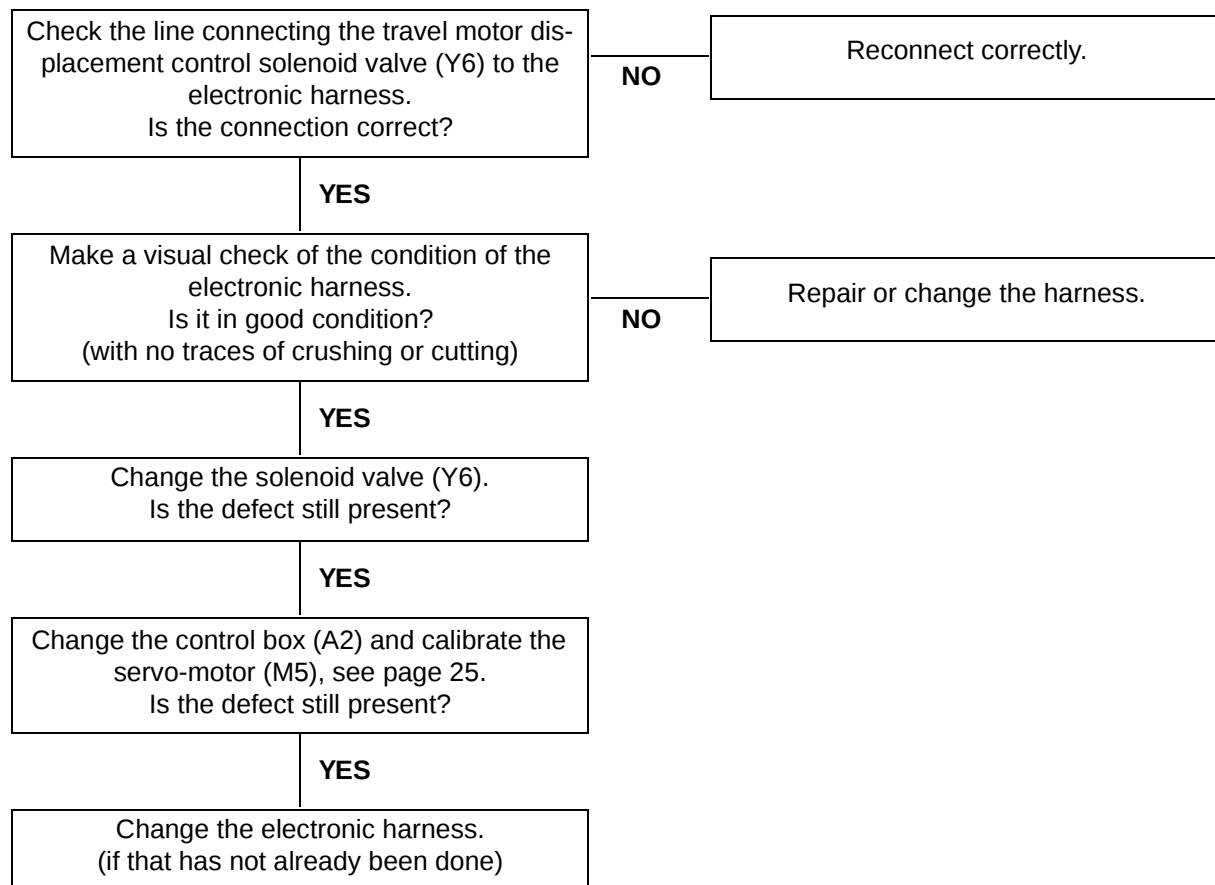
Travel pressure switch failure

- No defect indicated on the LED
- Open circuit: 1st and 2nd speeds operate but no automatic return to 2nd speed → 1
- Circuit broken: Automatic return from 2nd → 1st when the attachment circuit pressure increases
- No Auto Idle

Illustration of the indicator lamp signal



PDH0480



4002-18

Defect code 08: Components associated with the upperstructure braking and brake release

Problems found:

- Upperstructure swing impossible
- No brake release

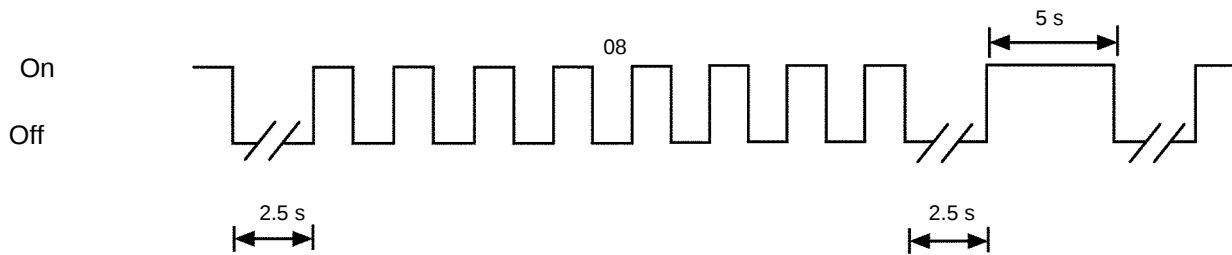
Brake release solenoid valve defective:

- Short circuit and open circuit detected by electronics

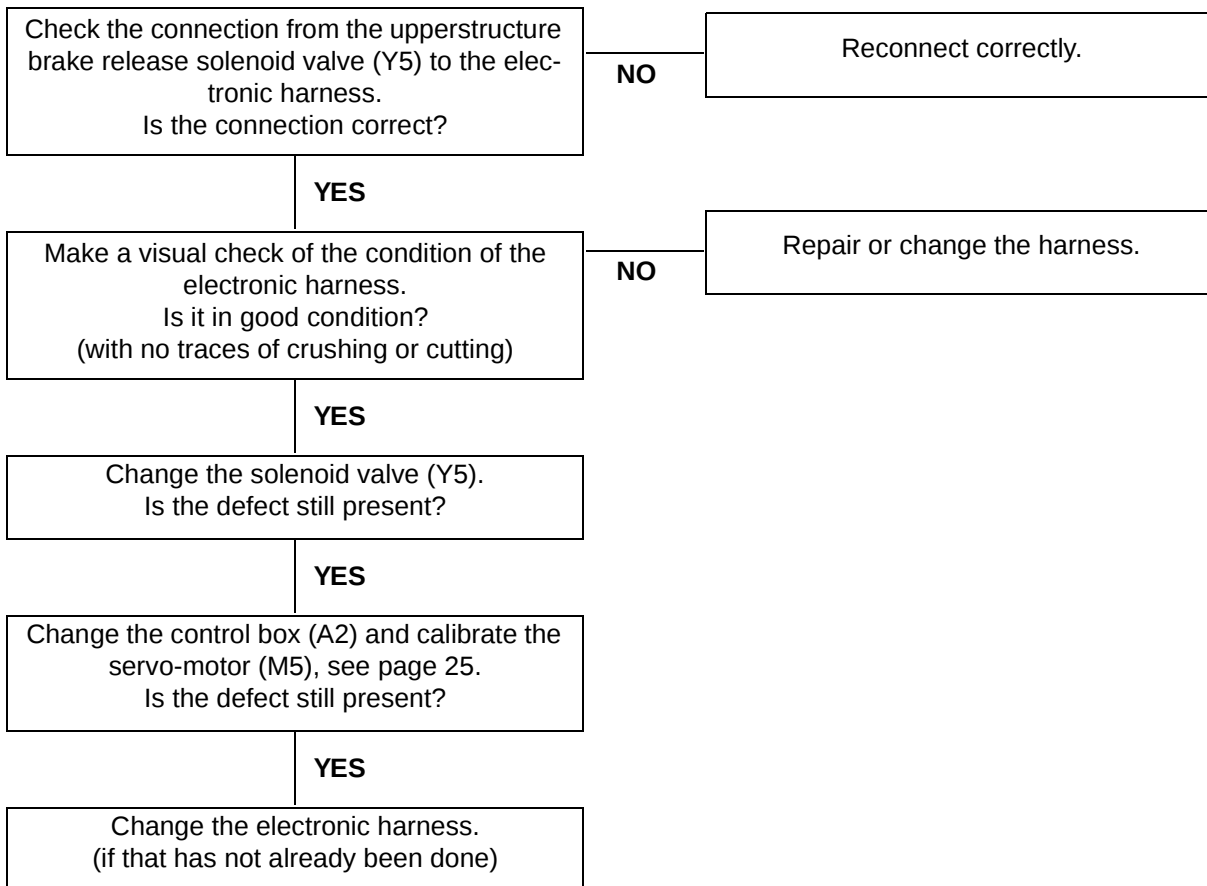
Swing pressure switch failure:

- Not detected by electronics
- Short circuit: continuous brake release
- Open circuit: no brake release

Illustration of the indicator lamp signal



PDH0481

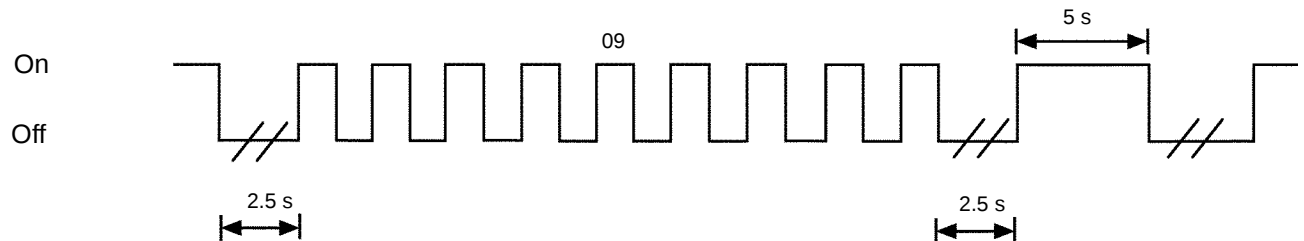


Defect code 09: Components associated with the control keyboard

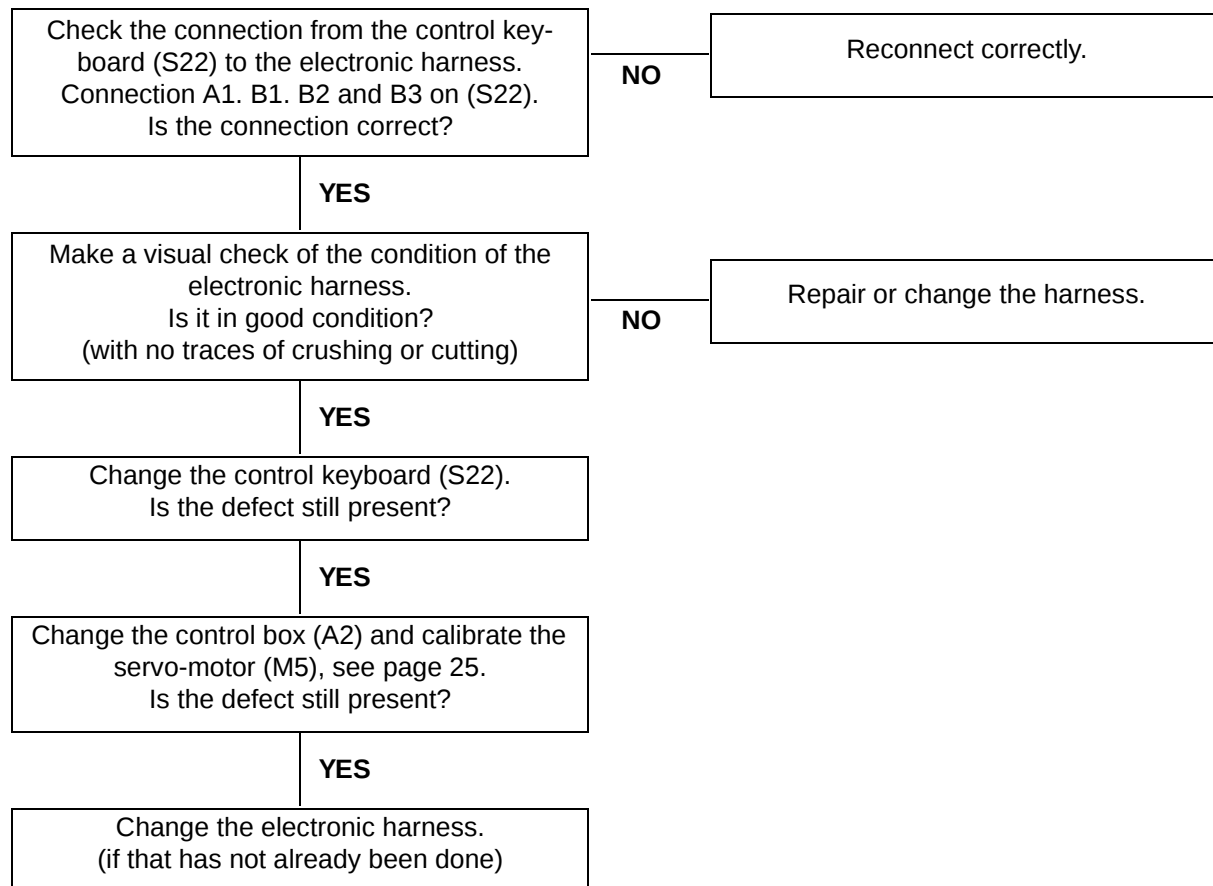
Problems found:

- Control keyboard jammed, generally "off" except travel and "LOW IDLE" in certain cases
- "Auto" (automatic idle) inoperative
- Machine on "FINE" and travel on position 2.

Illustration of the indicator lamp signal

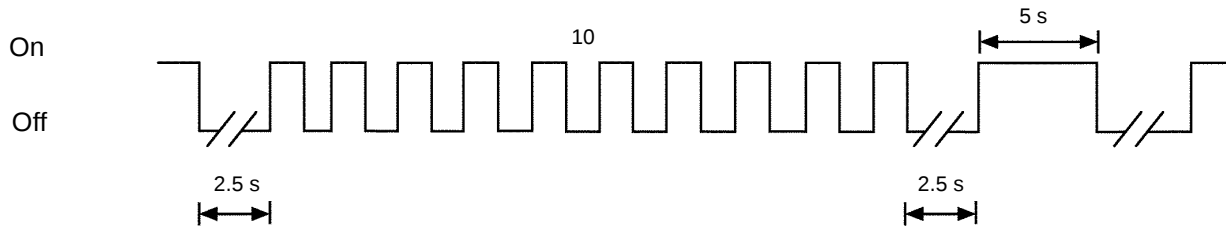


PDH0482

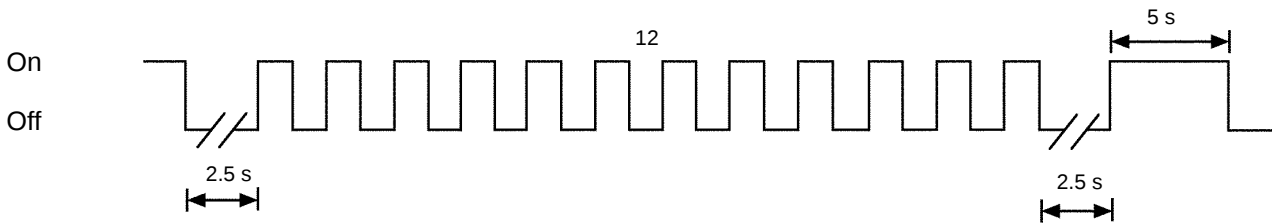


Defect code 10, 12 and 13: Components associated with the control box

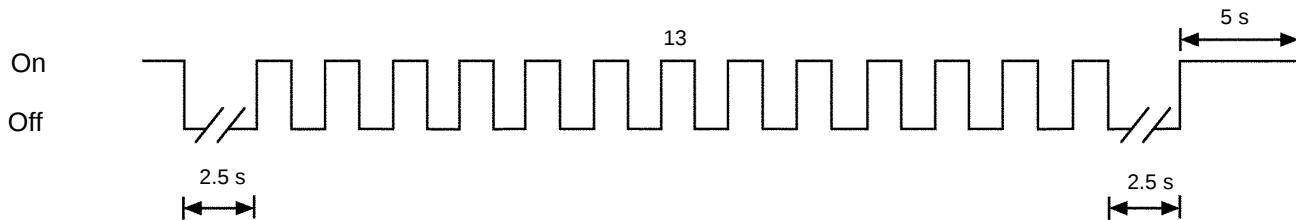
Illustration of the indicator lamp signal



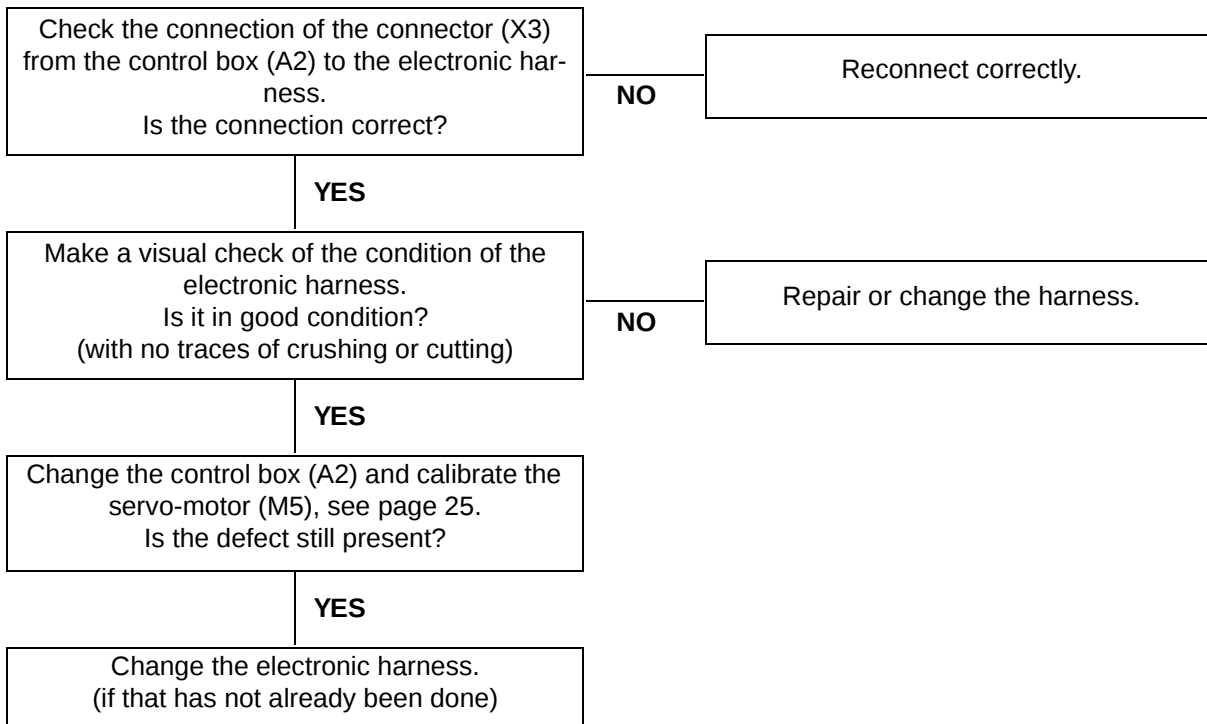
PDH0483



PDH0484

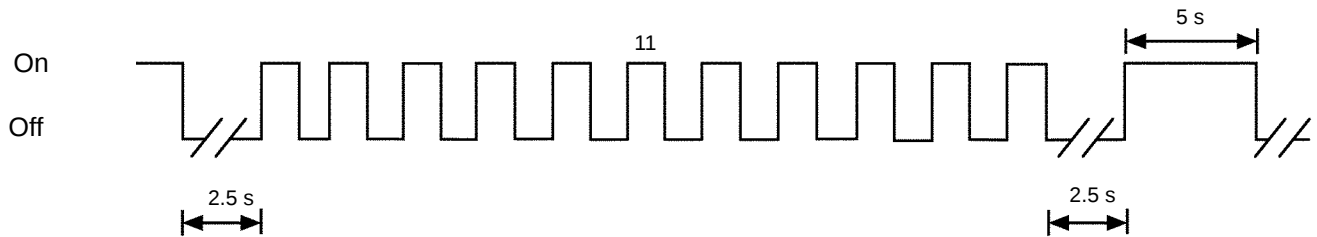


PDH0485



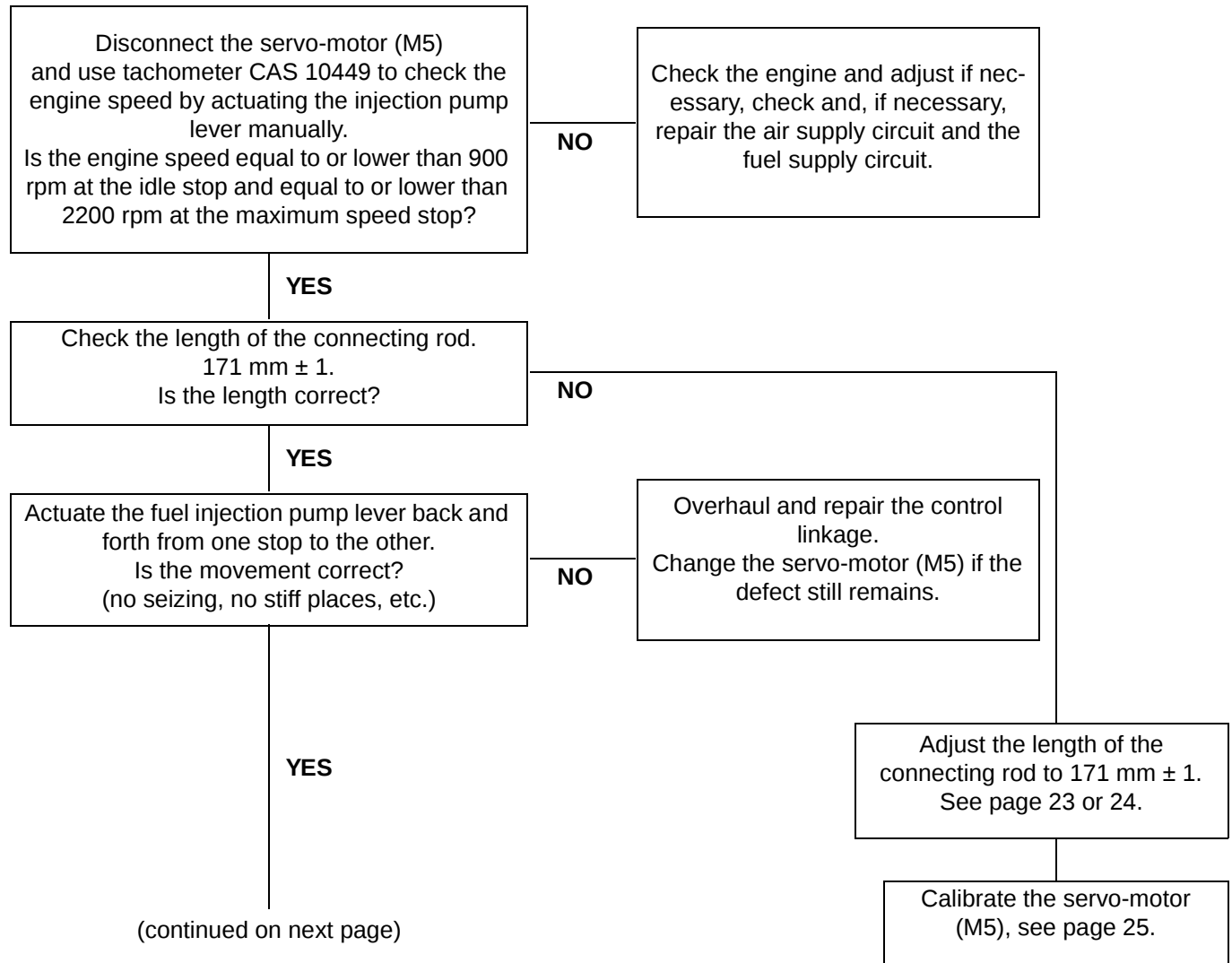
Defect code 11: Calibration impossible

Illustration of the indicator lamp signal



PDH0486

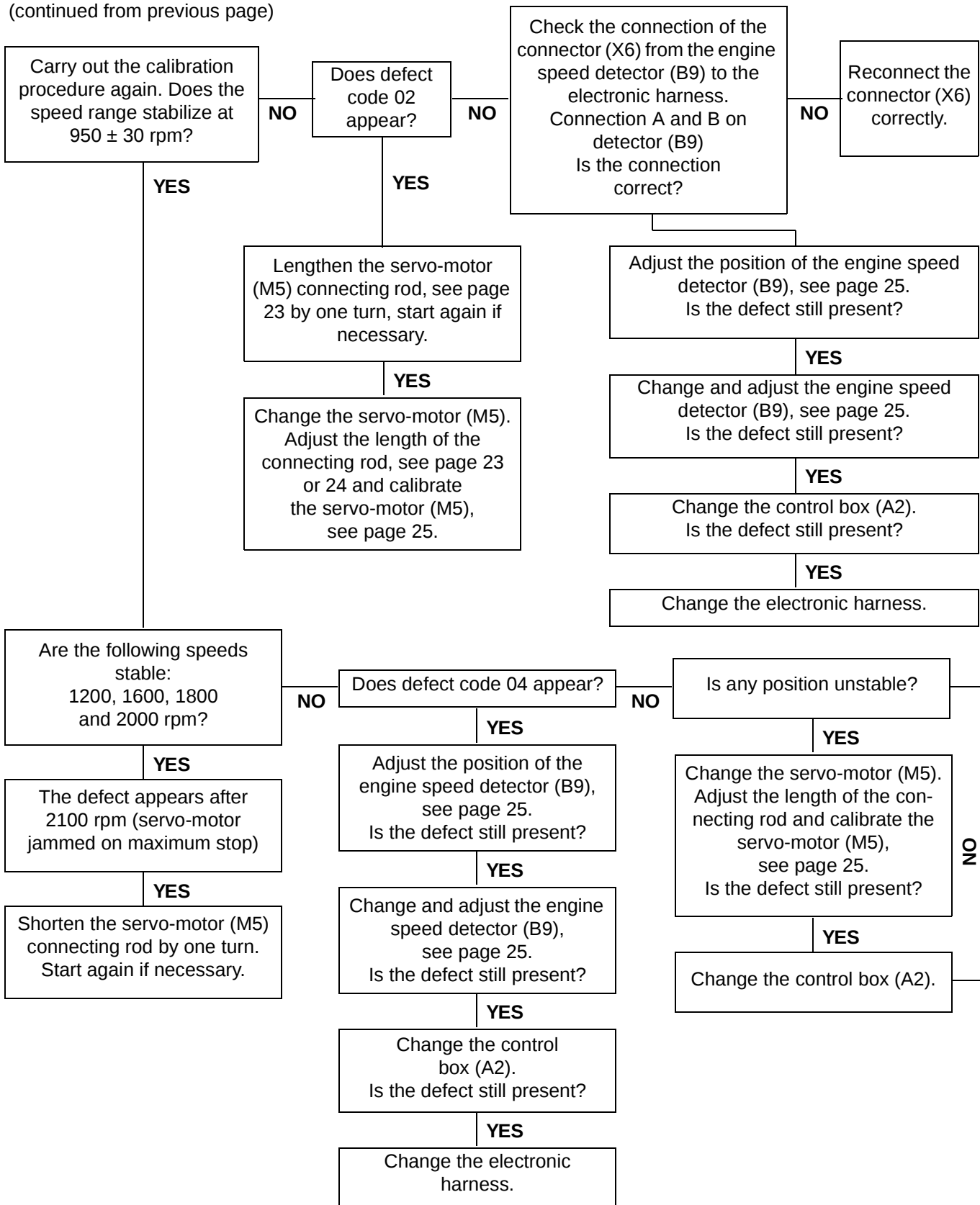
Defect appearing after the calibration procedure



NOTE: Switch off and on again after each corrective action to reset the system. and start the calibration procedure again.

4002-22

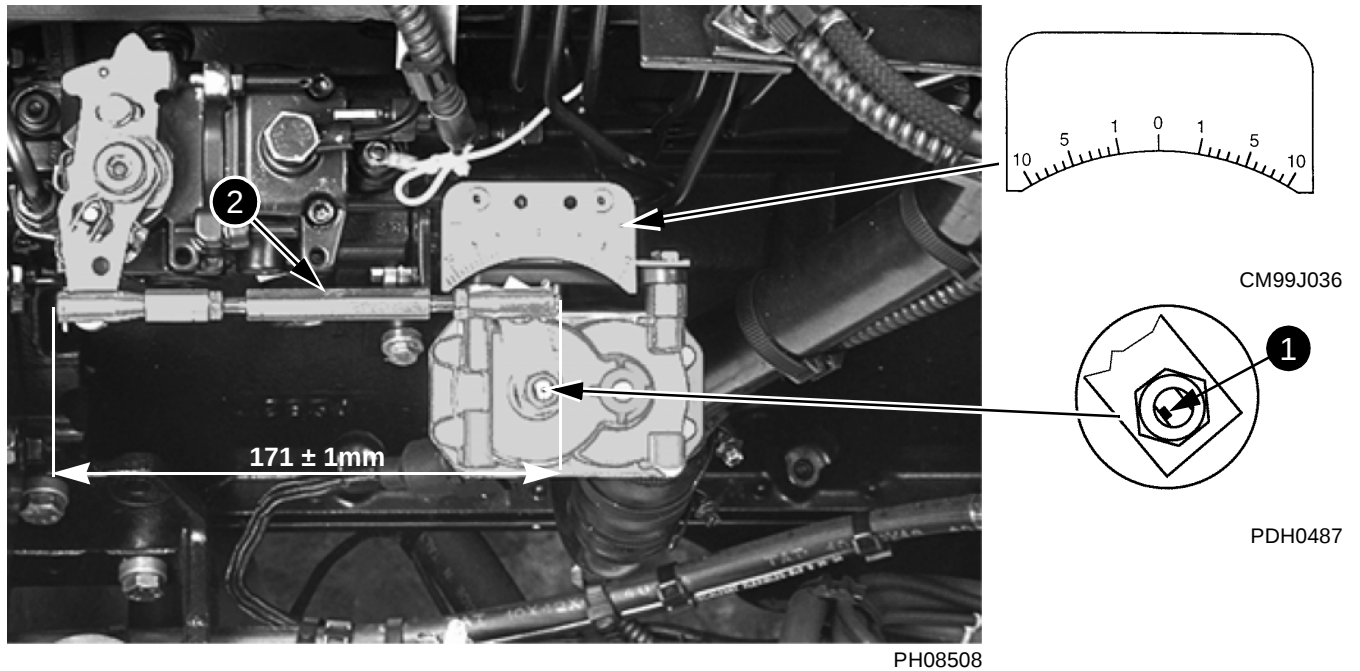
(continued from previous page)



NOTE: If the calibration procedure is not completed after 300 seconds: **Calibration impossible.** Switch off and on again after each corrective action to reset the system. and start the calibration procedure again.

Settings

Electric acceleration (M5) mechanical adjustment - old type fitting (graduations centred on the gauge)



STEP 1

Turn the battery master switch to the "Off" position.

STEP 2

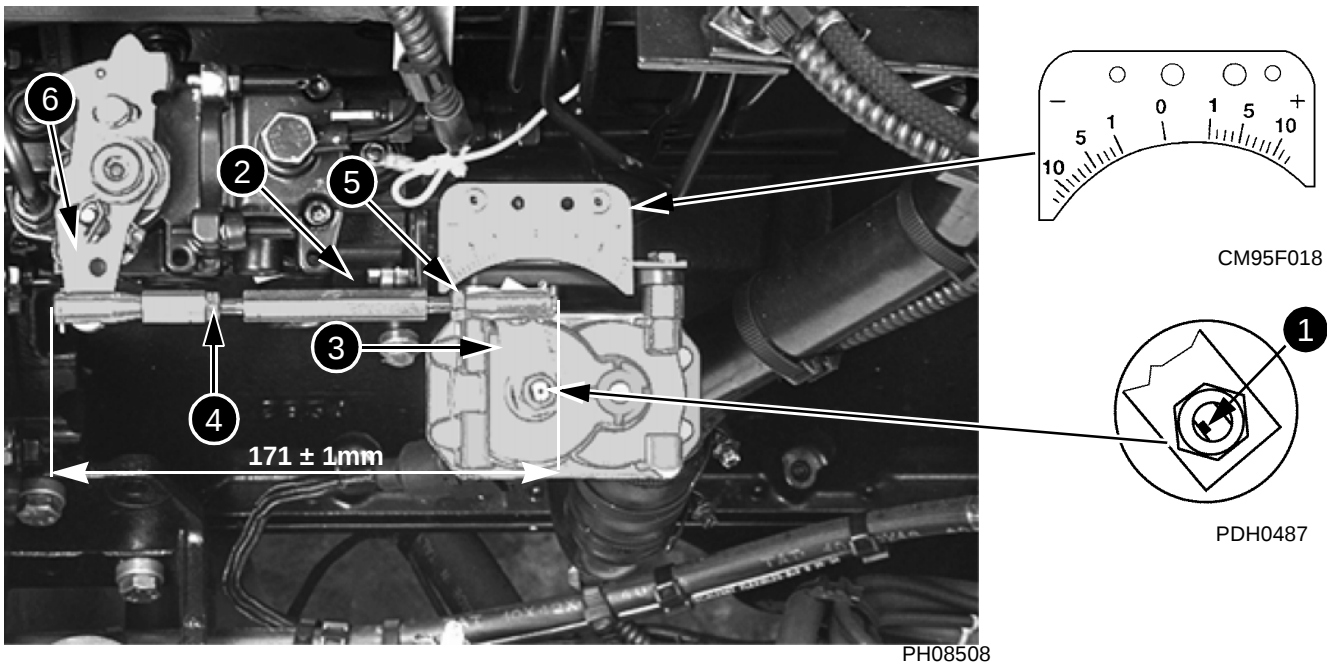
Make sure that the servo-motor (1) axis mark is correctly positioned.

STEP 3

Adjust the connecting rod (2) to the following length: 171 ± 1 mm.

4002-24

Electric acceleration (M5) mechanical adjustment - new type fitting (graduations offset 15° on the gauge)



STEP 1

Turn the battery master switch to the "Off" position.

STEP 2

Make sure that the servo-motor (1) axis mark is correctly positioned.

STEP 3

Adjust the connecting rod (2) to the following length: 171 ± 1 mm.

STEP 4

Install the connecting rod (2) on the lever (3) of the acceleration motor.

STEP 5

Place the injection pump lever (6) in the "idle" position (LH stop), mark its position and then place the lever in the "accelerated" position (RH stop) and mark its position.

STEP 6

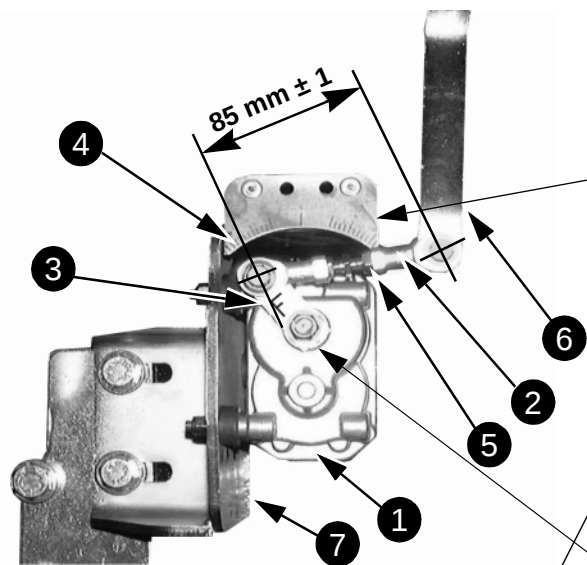
Check if the two marks previously noted are located on the same graduation but with opposite signs. If this is not the case, use the connecting rod (2) to make the "idle/accelerated" positions more symmetrical and then tighten the two lock-nuts (4) and (5).

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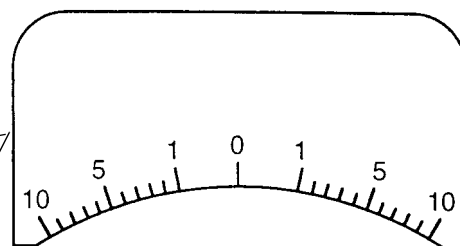
4002-26

Mechanical adjustment of electrical acceleration (M5) on "low emissions" models

788

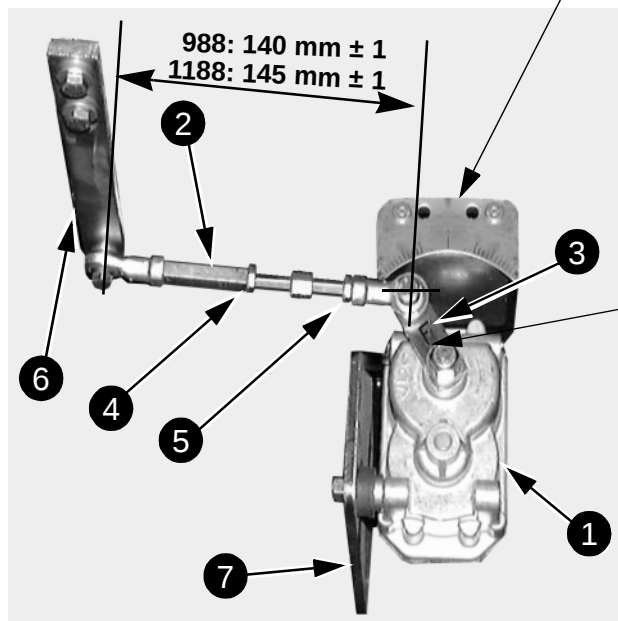


CD99J001

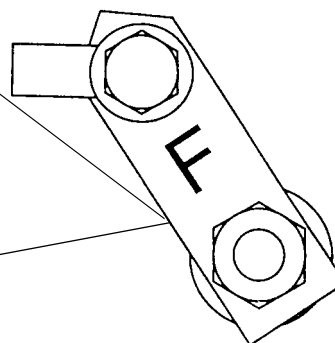


CM99J036

988/1188



CD99J002



CM99J035

STEP 1

Turn the battery master switch to the "Off" position.

STEP 2

Make sure that the lever (3) of the Servo-motor (1) is correctly positioned (letter F facing the operator).

STEP 3

Position bracket (7) on the engine block, with the apertures centred.

STEP 4

Adjust the connecting rod (2) to the recommended length for the excavator model concerned:

788: 85 mm ± 1

988: 140 mm ± 1

1188: 145 mm ± 1

STEP 5

Install the connecting rod (2) on the lever (3) of the acceleration motor.

STEP 6

Place the injection pump lever (6) in the "idle" position (LH stop), mark its position on the gauge and then place the lever (6) in the "accelerated" position (RH stop) and mark its position on the gauge.

STEP 7

Check if the two marks previously noted are located on the same graduation but with opposite signs. If this is not the case, change the position of the bracket (7) on the engine block and lock the screws.

STEP 8

Change the length of the connecting rod to make the "idle/accelerated" positions more symmetrical.

4002-28

Electric acceleration calibration

STEP 1

Start the engine and warm it up to normal operating temperature, then press the "LOW" (low idle) key. Switch off the engine.

STEP 2

Place the LH control arm in the "Safety" position.

STEP 3

Using the left hand, press simultaneously on the "LOW" and "MAX" keys on the control panel.

STEP 4

Using the right hand, switch on the machine.

STEP 5

Wait for the LED's on the keyboard, except for the "ECO" key, to go out, and then release the keys.

STEP 6

Start the engine. The "LOW" and "MAX" indicator lamps should flash, showing that the calibration phase is starting.

NOTE: *This phase lasts less than six minutes. The engine will run successively at 950, 1200, 1600, 1800, 2000 and 2240 rpm, and will then stay at "medium idle" speed (not shown on control panel), which is 1200 rpm.*

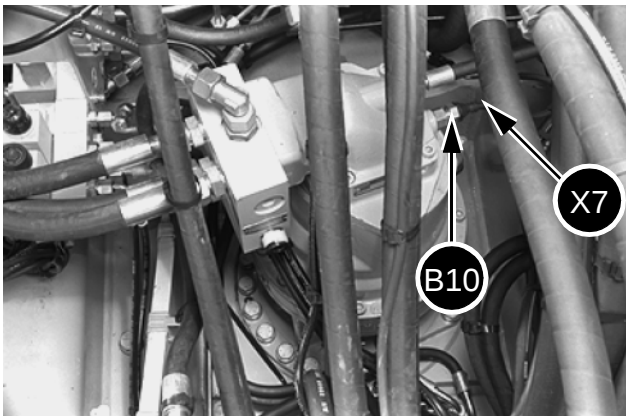
STEP 7

Check that the printed circuit board indicator lamp (LED) stays on continuously.

If this is not the case, note the defect code(s) and refer to the corresponding page.

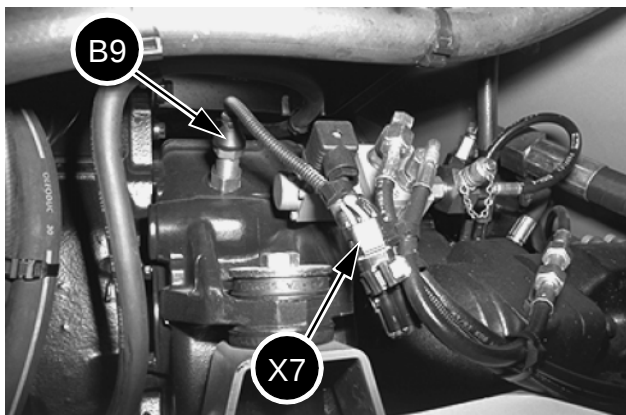
If defect code 11 is displayed (calibration impossible) refer to page 4002-21.

Adjusting the engine speed detector (B10)



PH01002

Adjusting the engine speed detector (B9)



PH00918

STEP 1

Disconnect the connector (X7).

STEP 2

Check the condition of the seal and that the washers are present. Loosen the lock-nut and screw the detector up to the stop, then unscrew it one turn.

STEP 3

Tighten the lock-nut to a torque of 10 Nm and reconnect the connector (X7).

STEP 1

Disconnect the connector (X6).

STEP 2

Loosen the lock-nut and screw the detector up to the stop, then unscrew it one turn.

STEP 3

Tighten the lock-nut to a torque of 10 Nm and reconnect the connector (X6).

Section 4002

ELECTRONIC AND TROUBLESHOOTING SYSTEM 1188 Wheeled excavators

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This symbol is used in this manual to indicate important safety messages. Whenever you see this symbol, carefully read the message that follows, as there is a risk of serious injury.



Turn the battery master switch to the "Off" position before carrying out any service work on the circuit.

TOOLS REQUIRED



PD00012

1. *PHOTO-DIGITAL TACHOMETER CAS 10449*
2. *AEROSOL M1703414*
(For cleaning and de-oxidation of electrical contacts)

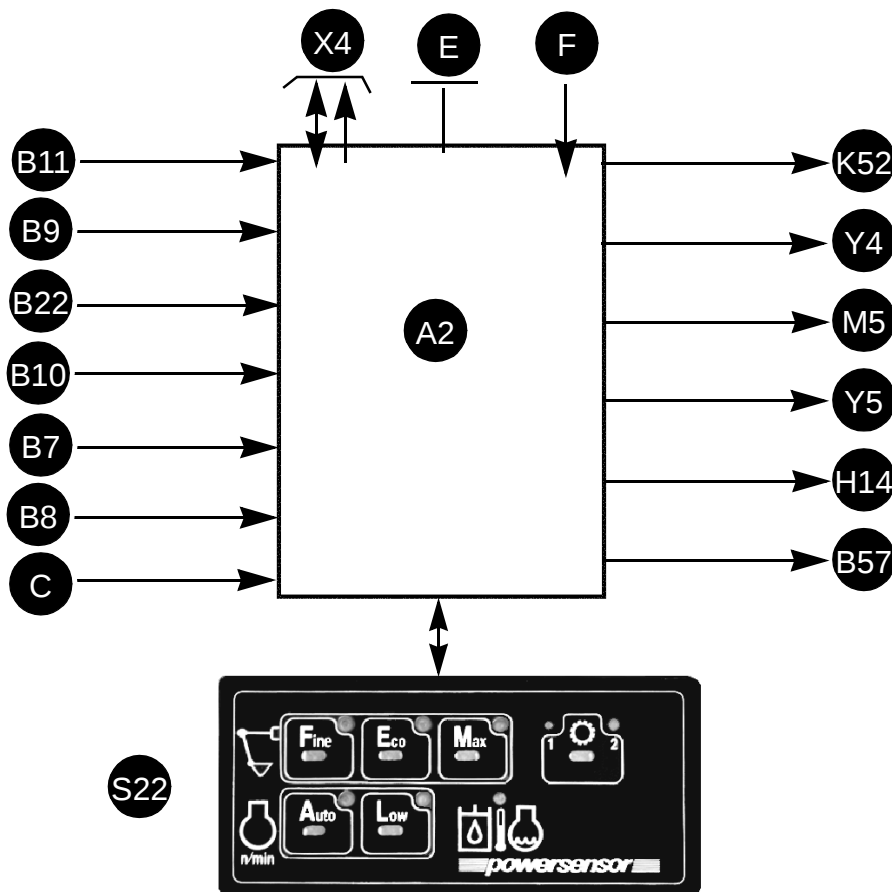
ELECTRONIC SYSTEM

General

Some of the machine's functions are managed and checked electronically. The functions concerned are as follows:

- Cold start assistance.
- Electric acceleration.
- Automatic return to idle.
- Engine overheating safety system.
- Engine / hydraulic system power regulation: "Speed sensing".
- Swing braking and brake release.
- Speed change.
- Electronic system diagnosis.

Components connected to electronic system



PDH0471

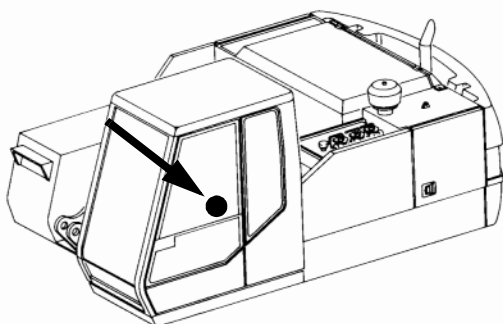
PH07328A

- A2** Electronic control box
- B7** Swing detector pressure switch
- B8** Travel detector pressure switch
- B9** Engine speed detector
- B10** Swing motor speed detector
- B11** Hydraulic pressure detector
- B57** Brake pressure switch
- B22** Engine coolant temperature sender
- H14** Correct operation indicator light (LED)
- K52** Two-speed relay

- M5** Injection pump servo-motor
- S22** Control keyboard
- X4** Diagnostic socket
- Y4** Proportional pressure reduction valve DRE4
- Y5** Upperstructure brake release electro-control valve
- C** Lighting 28 volts
- E** Earth
- F** 28 volt battery

Location of components on the excavator

(A2) Electronic control box



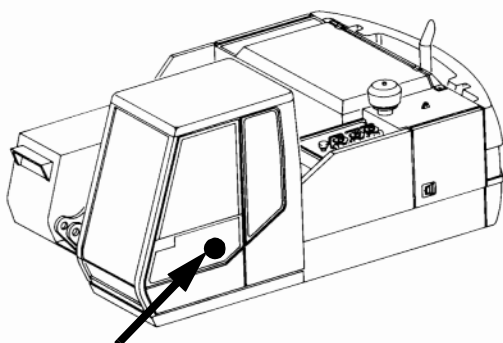
PDH0472



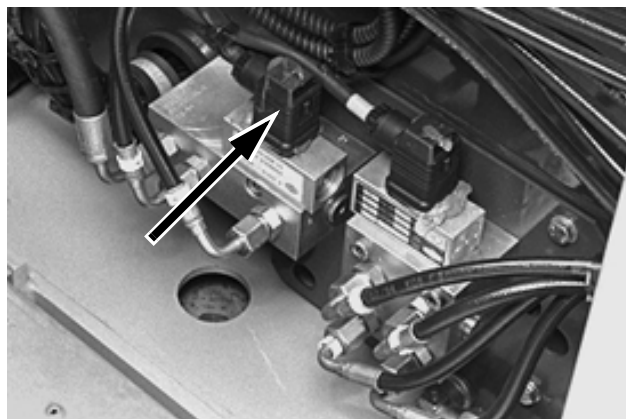
PE09306

Located to the right of the operator's seat, it contains the electronic card through which all information passes. The card is connected to the other components by means of a 35-pin connector.

(B7) Swing detection pressure switch



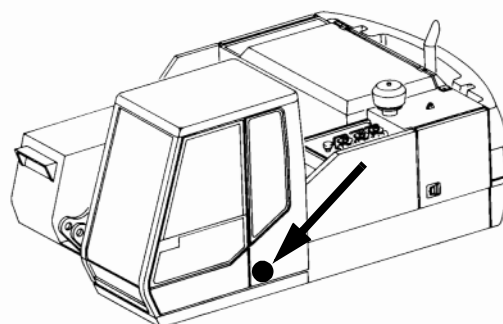
PDH0472



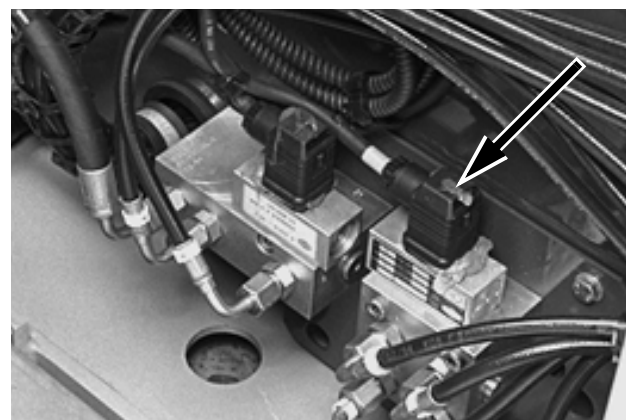
PDH08504

Located on the rear panel of the cab floor, it closes at about 6 bar (RH or LH swing pilot pressure).

(B8) Travel detector pressure switch



PDH0472

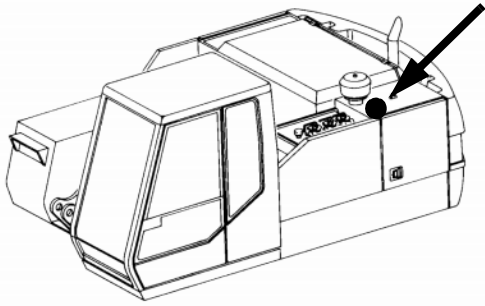


PH08504

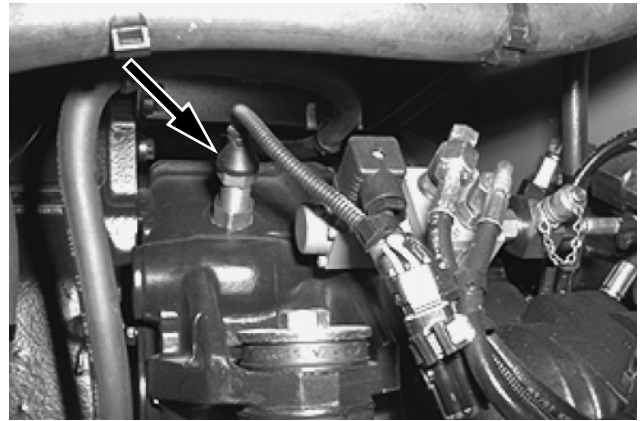
Located on the rear panel of the cab floor, it closes at about 6 bar (travel brake release pilot pressure).

4002-6

(B9) Engine speed detector



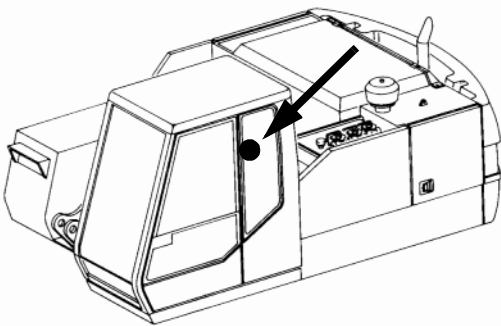
PDH0472



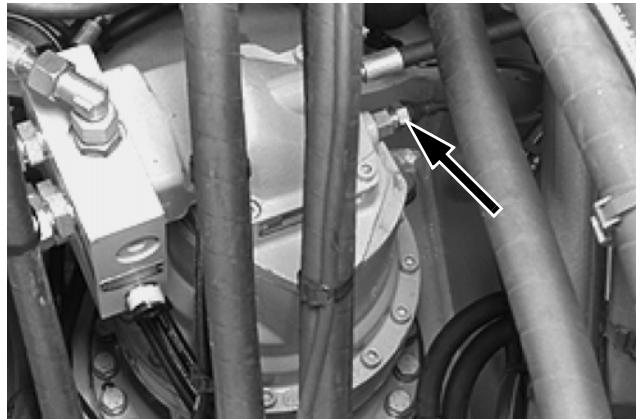
PH00918

Mounted in line with the starter ring teeth, it delivers a signal with a frequency corresponding to the time interval between the passage of two consecutive teeth.

(B10) Swing motor speed detector



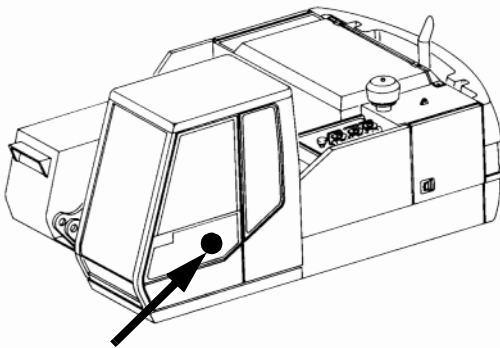
PDH0472



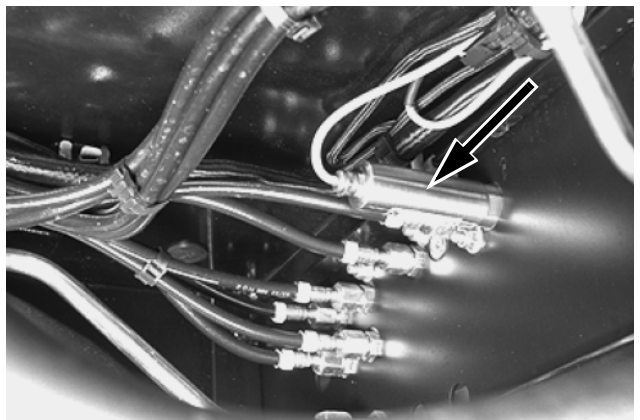
PH01002

Located behind the hydraulic motor housing and opposite a sprocket, it delivers a signal with a frequency corresponding to the passage of two consecutive teeth.

(B11) Hydraulic pressure sender



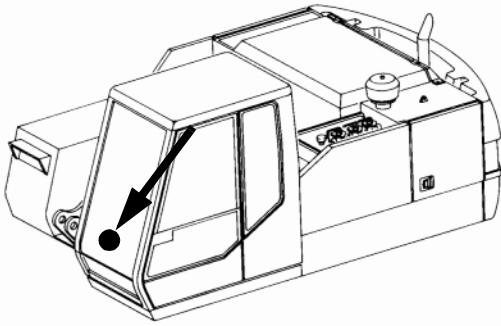
PDH0472



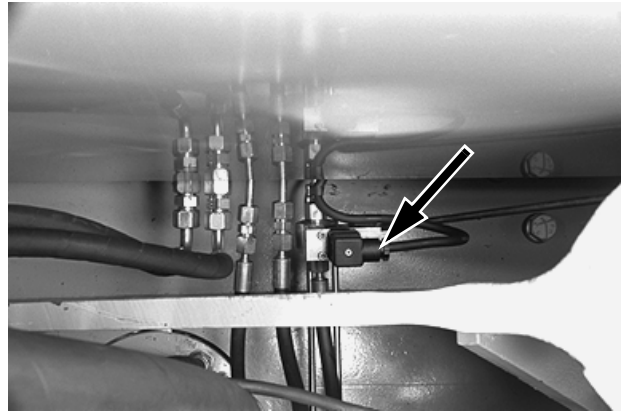
PH01034

Located under the cab floor, it measures the highest pressure (Load-Sensing) in the excavator attachment and travel hydraulic systems.

(B57) Brake pressure switch (speed change)



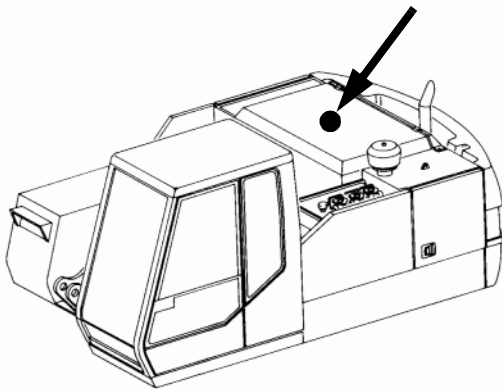
PDH0472



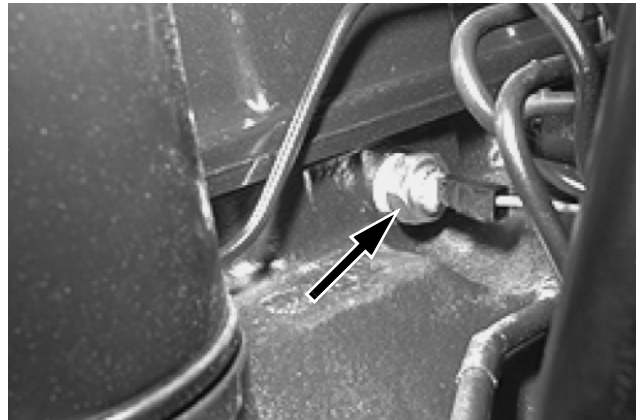
PH01012

Located under the upperstructure and the undercarriage frame, it closes at about 40 bar (brake circuit pressure).

(B22) Engine coolant temperature sender



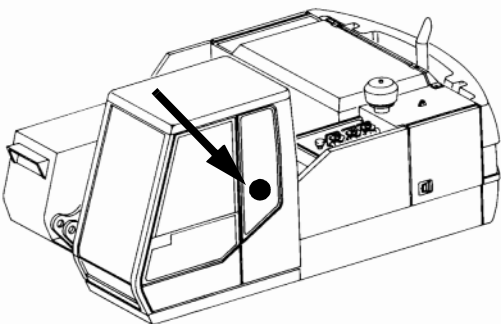
PDH0472



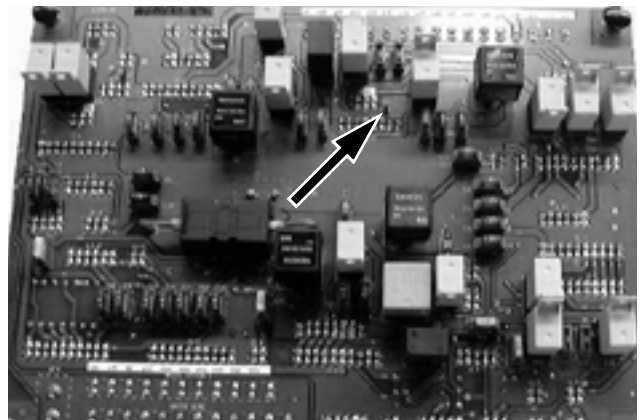
PH00917

Mounted on the engine block, it delivers a pressure of between 0 and 28 volts. It is the ratio between this voltage and the battery voltage which is used for information processing purposes

(H14) Led diagnostic (LED)



PDH0472

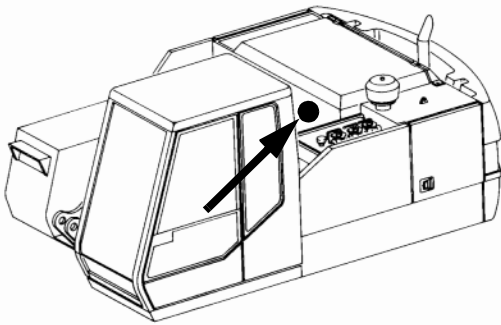


CD99J017

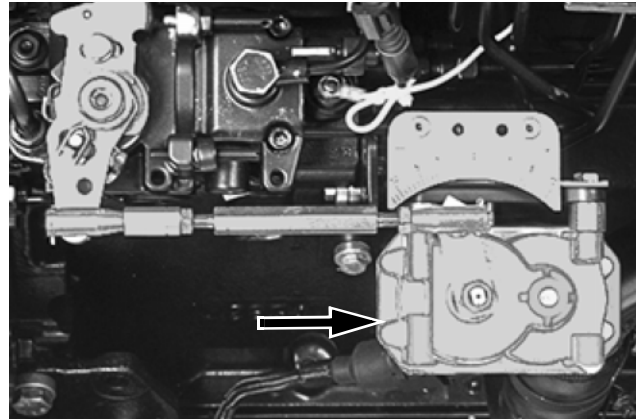
This consists of a red warning lamp (Light-Emitting Diode) mounted on the printed circuit board. This indicator lamp is continuously "on" when the circuit is trouble-free. It starts to flash on and off if one or more defects occur in the system. Such defects can be identified by means of a lighting code system (See page 10).

4002-8

(M5) Servo-motor (injection pump lever control)



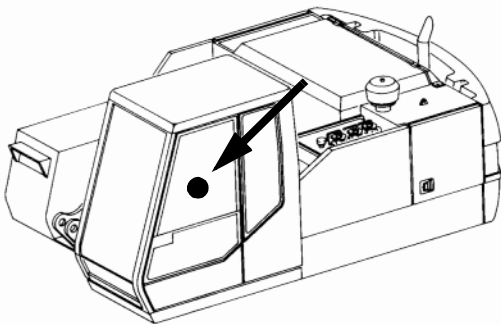
PDH0472



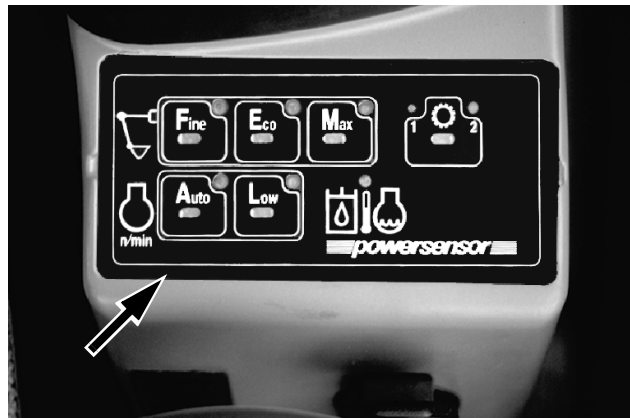
PH08508

Mounted on the engine, it control the injection pump lever.

(S22) Control panel



PDH0472



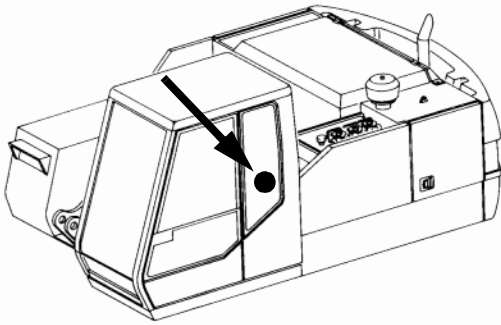
PH07328

Located near the right-hand control lever, it has a front face covered with a silk-screened plastic film, an electronic circuit board with six momentary-action push-buttons, eight LED type indicator lamps, electronic components and a connector.

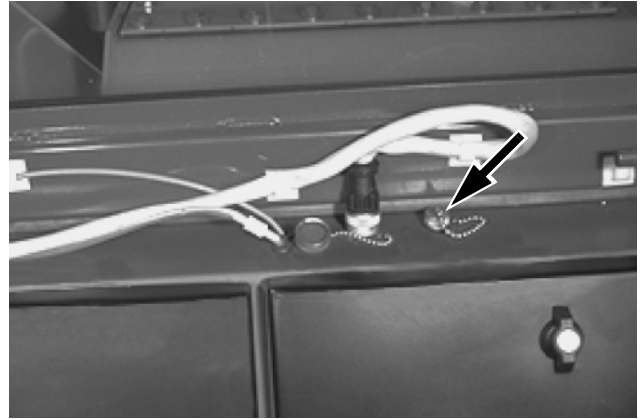
The functions of the control panel can be classified under four modes:

- The "Work" mode, consisting of the following push-buttons: "FINE" 1580 to 1620 rpm (low flow work, handling), "ECO" 1880 to 1920 rpm (economical, digging) and "MAX" 2180 to 2220 rpm (maximum power, hard work).
- The "Idle" mode consisting of the following push-buttons: "LOW" 900 to 1000 rpm (low idle) and "AUTO" 1180 to 1220 rpm (automatic idle).
- The "Travel" mode (two-speed excavators only) has two indicator lamps: "POSITION 1" (low speed) and "POSITION 2" (high speed).
- The "Pre-heat" mode has an indicator lamp: a flashing lamp shows the machine has not yet reached its normal operating temperature. When that lamp goes out the machine is ready to work.

(X4) Troubleshooting test socket



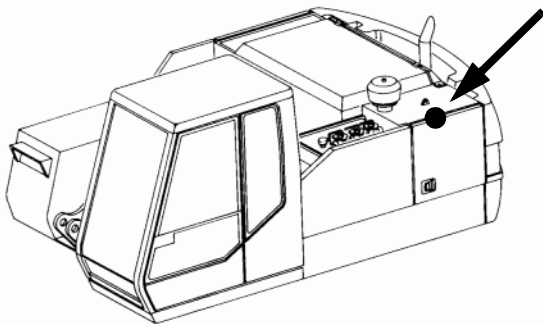
PDH0472



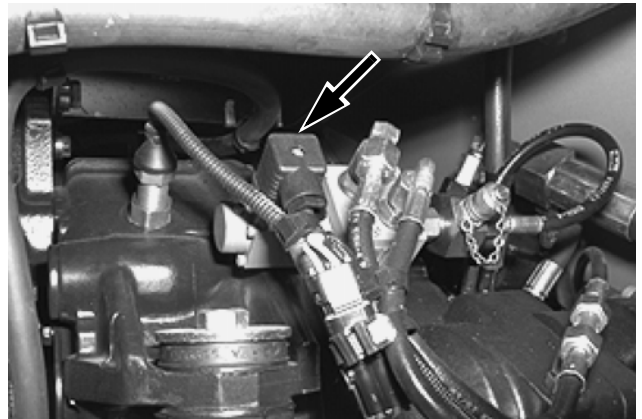
PE10834

Located in the cab, behind the seat, it is protected by a trim panel. It is for use connected to a dialogue console which can perform in-depth diagnosis of the machine and which is also used for reading and modifying the "excavator parameters".

(Y4) Proportional pressure reduction valve DRE4



PDH0472

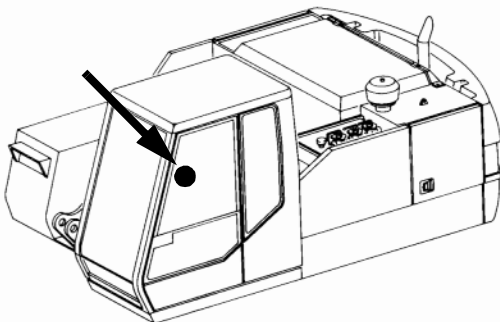


PH00918

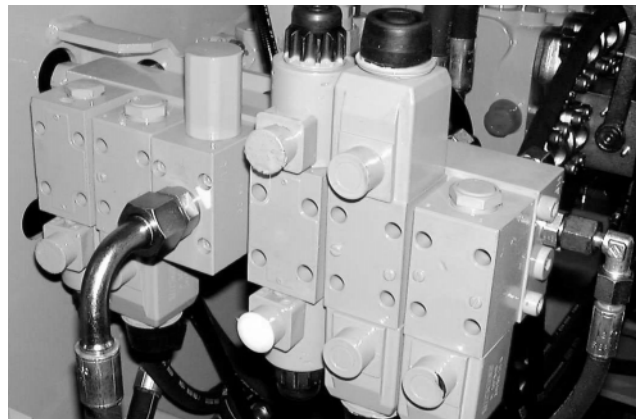
Mounted on the main pump, it delivers an output pressure which is proportional to the current passing through it, thus enabling a check to be made of the variable flow pump hydraulic torque.

NOTE: The photo shows the DRE4 reduction valve on the 988 excavator. On the 788 the DRE4 reduction valve is identical, but is mounted in a different manner.

(Y5) Upperstructure brake release control solenoid valve



PDH0472



CD99J018

Located behind the cab on the valve bank partition, it is actuated to release the upperstructure brake. It brakes the upperstructure when not actuated.

ELECTRONIC SYSTEM DIAGNOSIS

Diagnosis without console

General

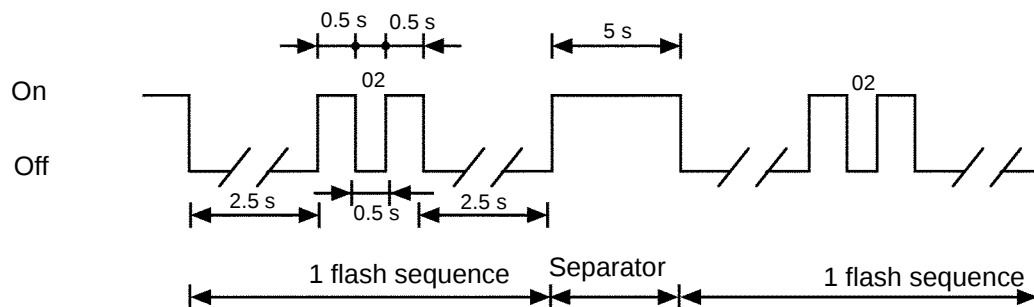
The machine is equipped with an integrated diagnostic system which is designed to locate problems which may occur in the system. Such defects are displayed by means of an indicator lamp (LED) inserted in the printed circuit located in the cab behind the operator's seat. This indicator lamp (LED) is on continuously when the system is fault-free. It starts to flash when one or more defects appear.

The defect signalling code is as follows:

The indicator lamp lights up for half a second, then goes out for half a second, a number of times equal to the code. At the end of the cycle the indicator lamp lights up for 5 seconds, the cycle starts again.

Example: 1 defect to be displayed:

- Servo-motor failure: Associated defect code 02



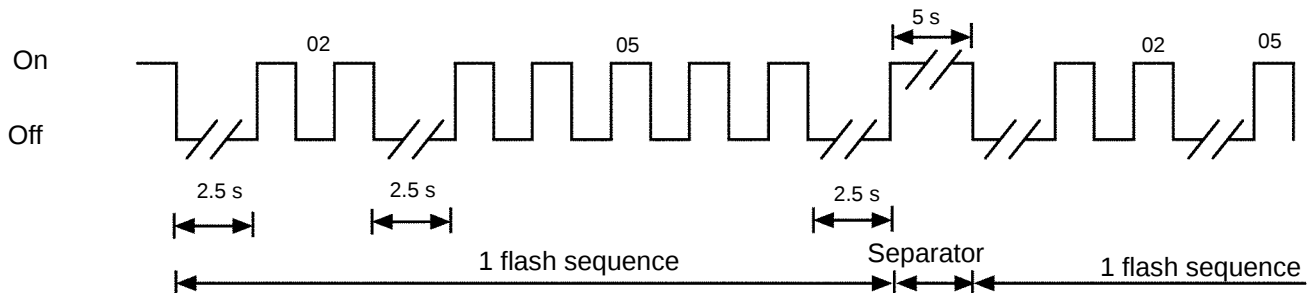
PDH0474

One flashing sequence may contain more than one defect, in which case they will be listed in numerical sequence and coded as shown in the example below:

Example: 2 defects to be displayed:

- Failure of components connected with the measurement of water temperature: Associated defect code 05.

- Failure of components connected with the engine electrical acceleration: Associated defect code 02.



PDH0475

The defect codes are as follows:

Defect code 01	Not used
Defect code 02	Components connected with the engine electrical acceleration
Defect code 03	Components associated with the measurement of hydraulic pressure
Defect code 04	Components associated with the measurement of engine speed
Defect code 05	Components associated with the measurement of water temperature
Defect code 06	Components associated with pressure reduction
Defect code 07	Components associated with speed change control
Defect code 08	Components associated with upperstructure braking and brake release
Defect code 09	Components associated with the control keyboard
Defect code 10	Components associated with the control box
Defect code 11	Calibration impossible
Defect code 12	Components associated with the control box
Defect code 13	Components associated with the control box

Defect code 01

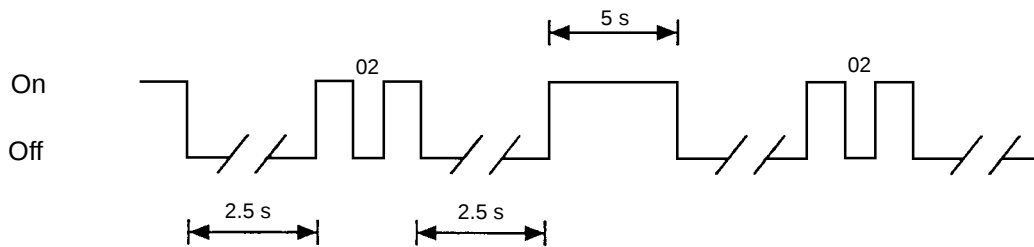
Not used.

Defect code 02: Components associated with engine electrical acceleration

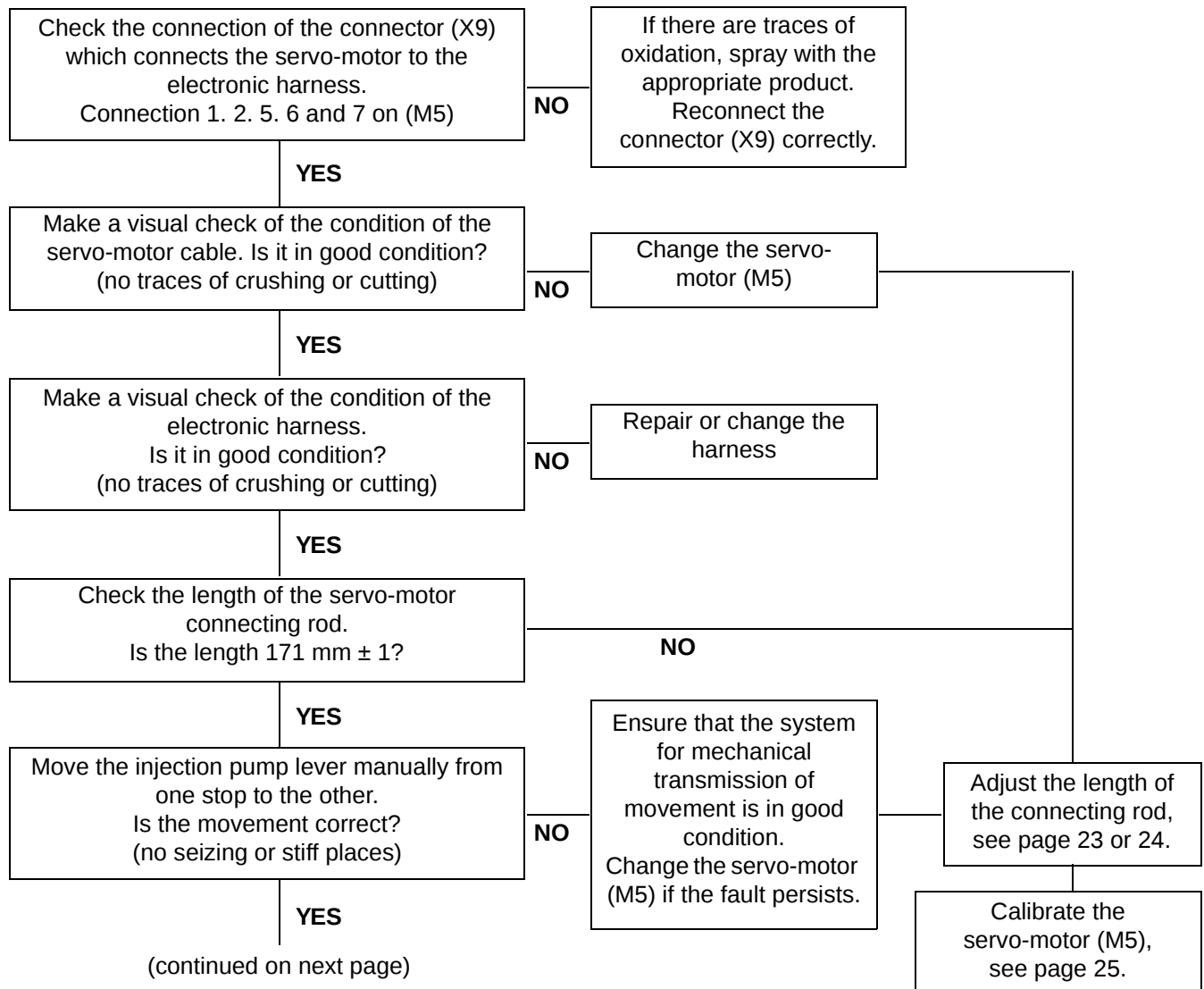
Problems found:

- Engine returns automatically to idle (lever against the injection pump minimum stop)
- Control keyboard completely off except travel mode on two-speed excavators only
- The code appears regardless of the type of electric motor failure (short-circuit or open circuit)

Illustration of indicator lamp

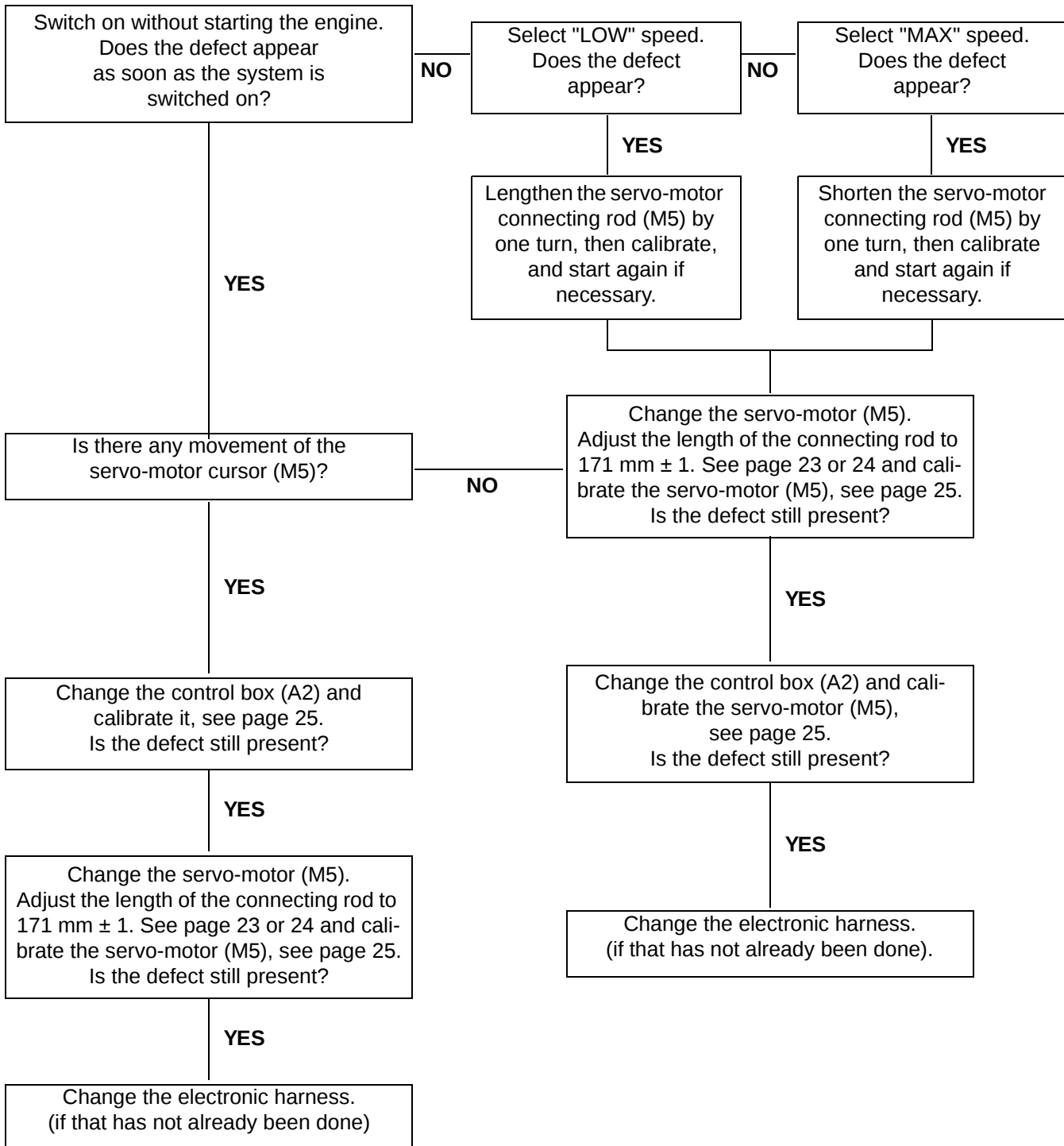


PDH0491



NOTE: After each corrective action, switch off and on again to reset the system.

(continued from previous page)



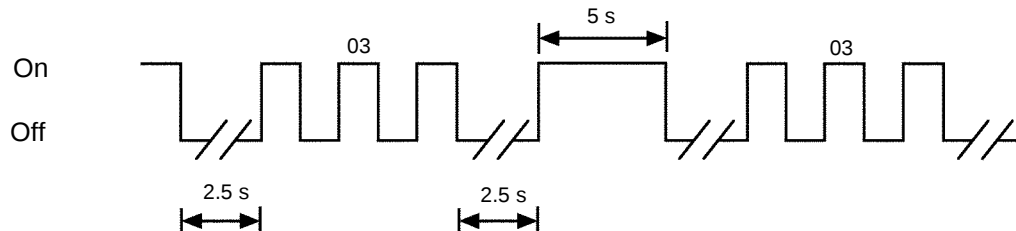
NOTE: Switch off and on again after each corrective action to reset the system. In the event of a servo-motor failure, a temporary repair solution is possible consisting of fixing the control connecting rod into one of the holes in the graduated strip, thus allowing the engine to run at constant speed. Disconnect the servo-motor plug (X9). If this temporary solution is used, it is essential that the connecting rod fastening is disconnected before stopping the engine, to allow it to run at idle (otherwise there is a danger of damaging the turbo-charger).

Defect code 03: Components associated with the measurement of hydraulic pressure (L.S.)

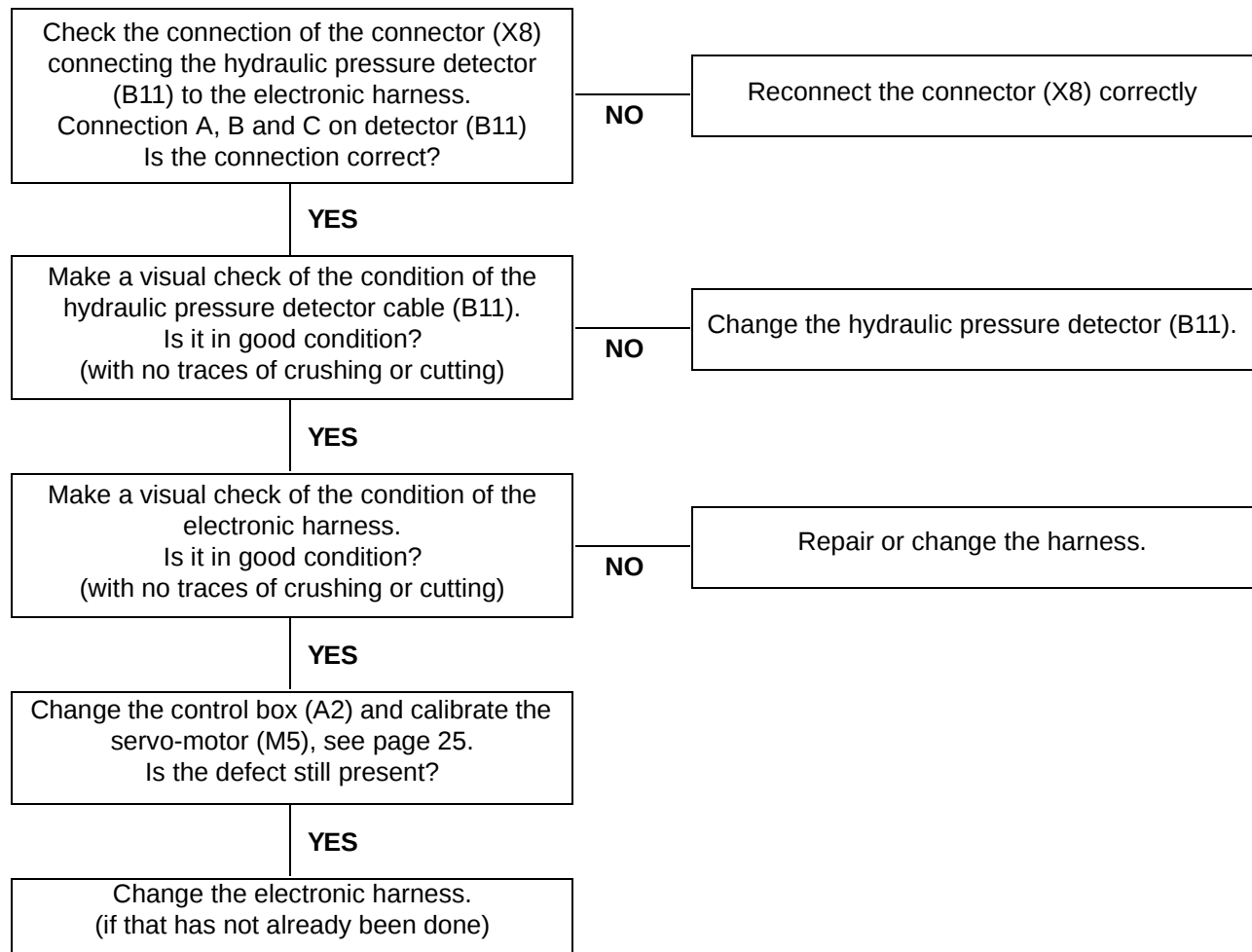
Problems found:

- "Auto" (automatic idle) inoperative
- Automatic travel speed system inoperative
- This defect is indicated in all cases of failure of the pressure detector (B11) (short-circuit, open circuit etc.)

Illustration of indicator lamp signal



PDH0476



4002-14

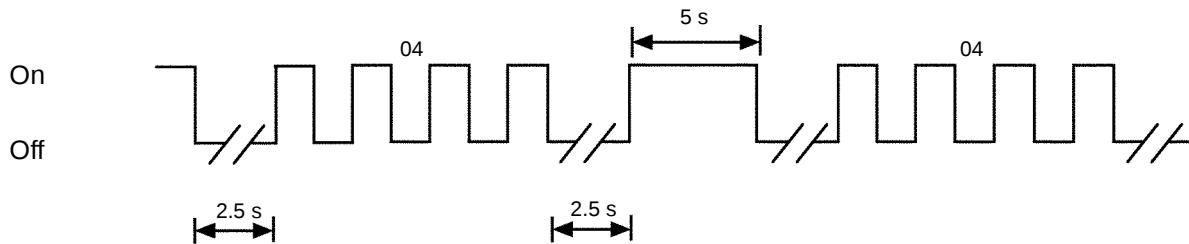
Defect code 04: Components associated with the measurement of engine speed

Problems found:

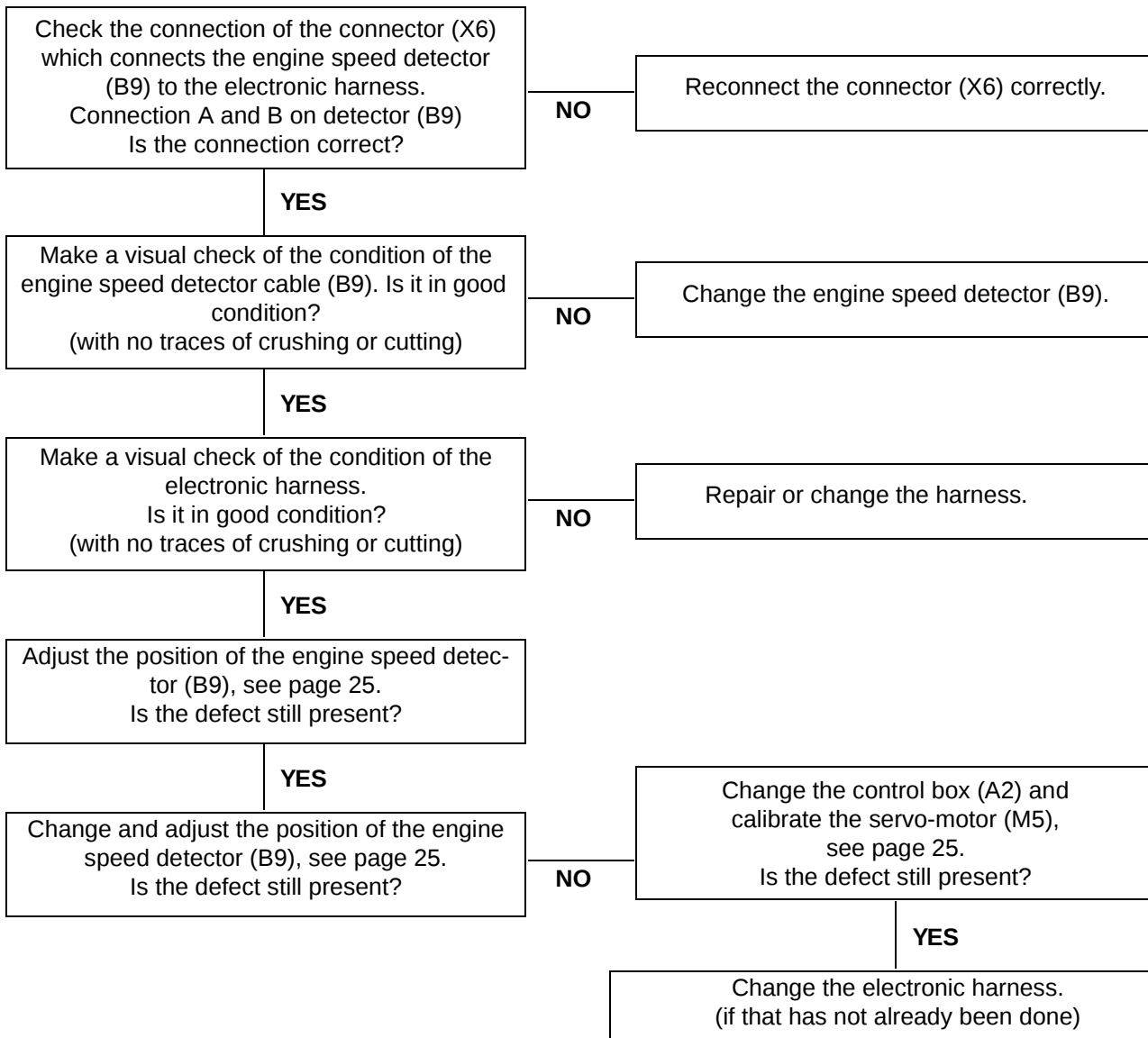
- Reduced hydraulic power, DRE4 pressure fixed when swing is not actuated
- Engine speed safety system inoperative
- Engine starts up directly in "ECO" mode and stays there
- No Auto Idle

NOTE: The failure is more often detected by these symptoms than by the LED flashing.

Illustration of indicator lamp signal



PDH0477

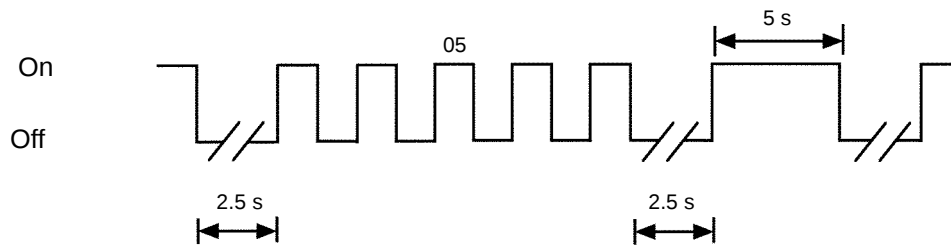


Defect code 05: Components associated with the measurement of water temperature

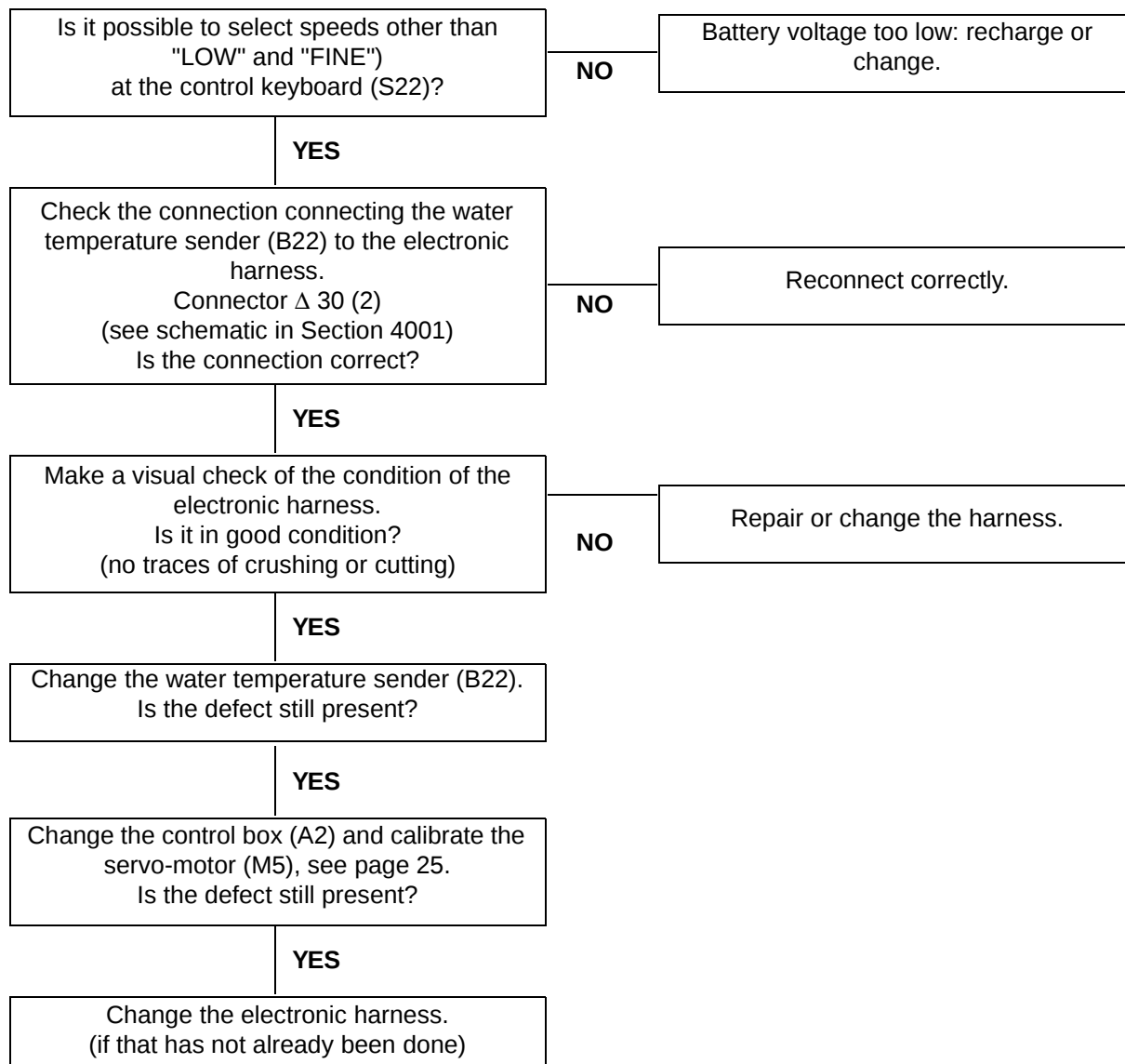
Problems found:

- Indicator on instrument panel inoperative
- When starting up from cold, warm-up time reduced to one minute
- Over-heating safety system inoperative
- Short-circuits and open circuits on following items cause this failure: sender, wire, indicator and printed circuit board
- Open circuits: sender, unconnected wires, no defect code 5. Each time the engine is stopped, there is 5 minutes pre-heating time

Illustration of the indicator lamp signal



PDH0478



4002-16

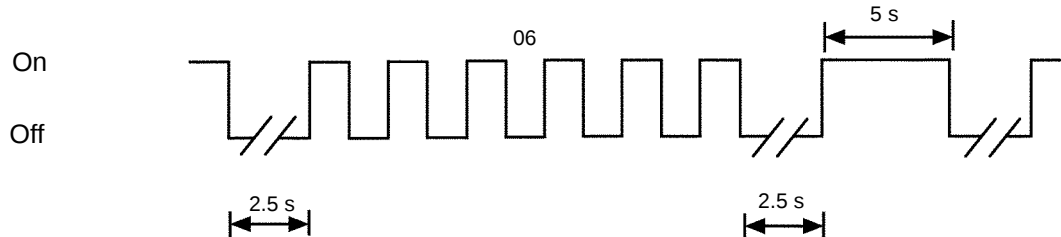
Defect code 06: Components associated with pressure reduction

Problems found:

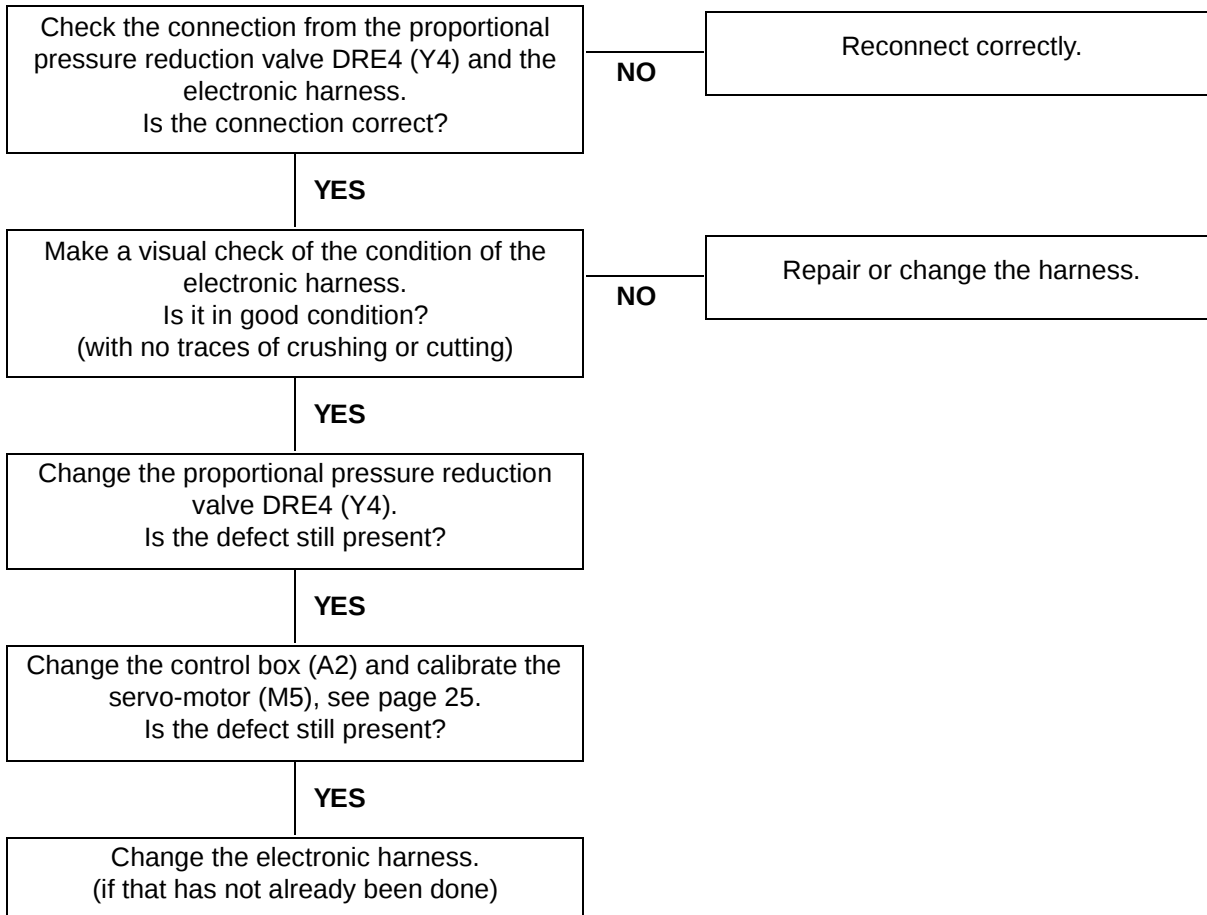
- Engine stalls under load
- Zero pressure at valve

NOTE: This defect is indicated by valve short-circuits and open circuits.

Illustration of the indicator lamp signal



PDH0479



Defect code 07: Components associated with the speed change control

Problems found:

- Speed change inoperative (the excavator is stuck in second speed)

NOTE: The electronic system does not detect failures in the K52 relay. Open circuit or short-circuit

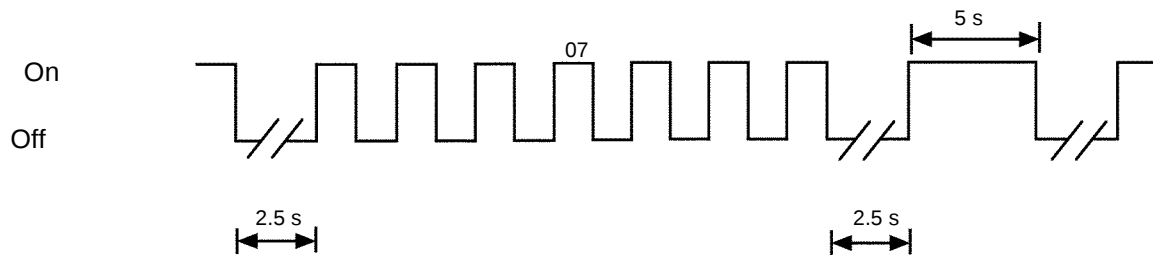
Travel pressure switch failure

- Open circuit: Impossible to change speed when pressing brake pedal
- Circuit broken: It is possible to change speed without pressing the brake pedal

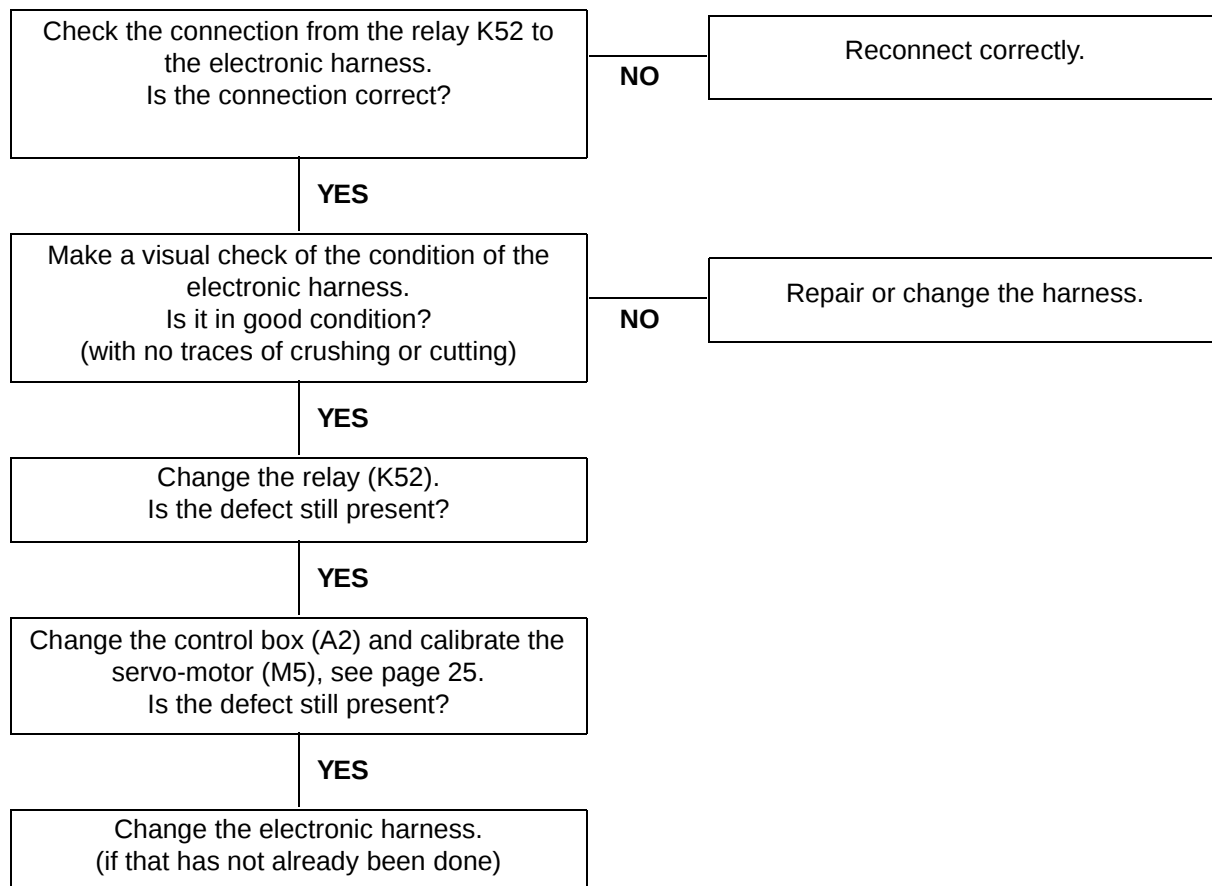
Solenoid valve failure (not displayed on the LED)

- It should always be excited (at one side or the other) as soon as the machine is switched on
- If it is supplied with current but does not move, change it.
- If it is not supplied with current and no failure is indicated, check the contacts in the relay K52

Illustration of the indicator lamp signal



PDH0480



4002-18

Defect code 08: Components associated with the upperstructure braking and brake release

Problems found:

- Upperstructure swing impossible
- No brake release

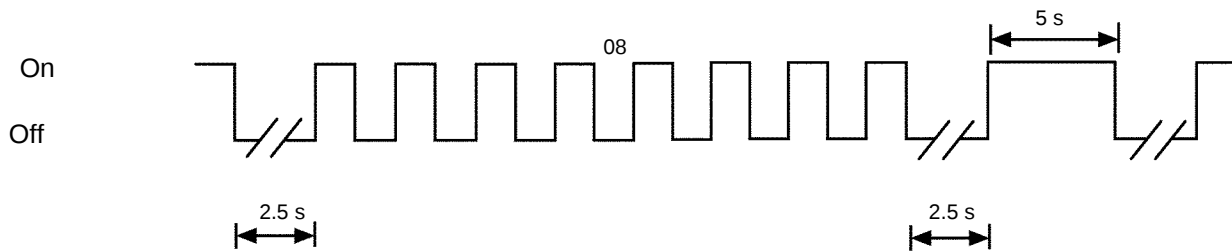
Brake release solenoid valve defective:

- Short circuit and open circuit detected by electronics

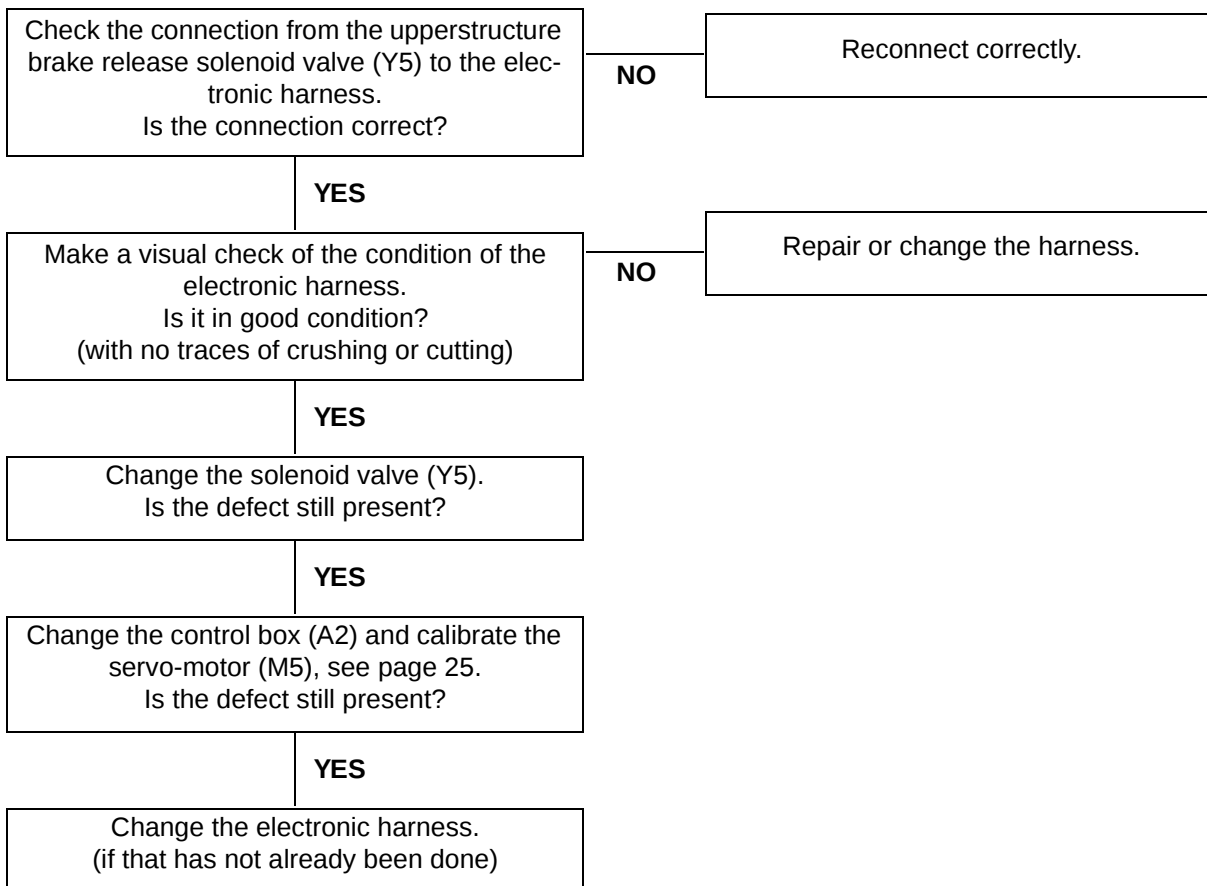
Swing pressure switch failure:

- Not detected by electronics
- Short circuit: continuous brake release
- Open circuit: no brake release

Illustration of the indicator lamp signal



PDH0481

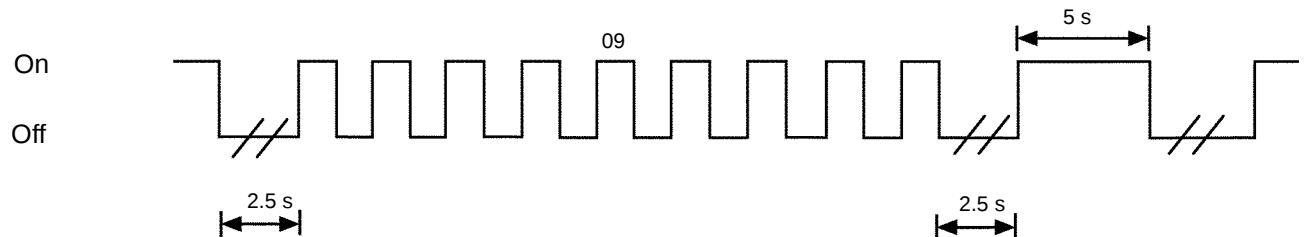


Defect code 09: Components associated with the control keyboard

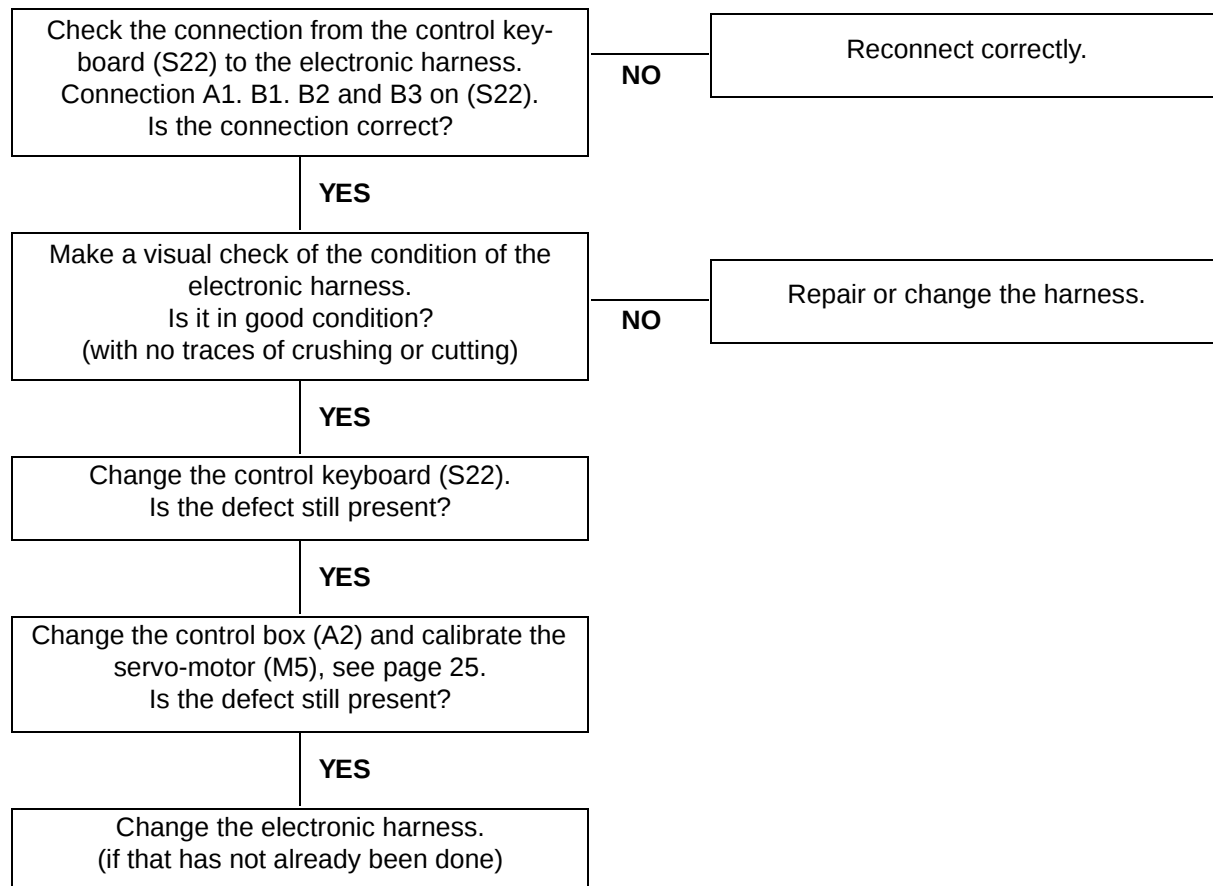
Problems found:

- Control keyboard jammed, generally "off" except travel and "LOW IDLE" in certain cases
- "Auto" (automatic idle) inoperative
- Machine on "FINE" and travel on position 2.

Illustration of the indicator lamp signal

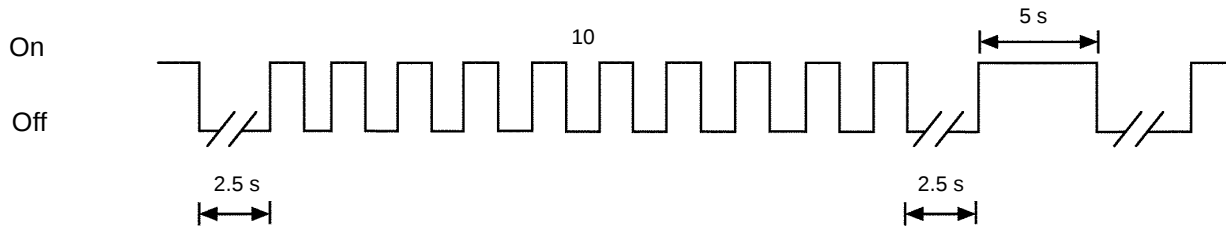


PDH0482

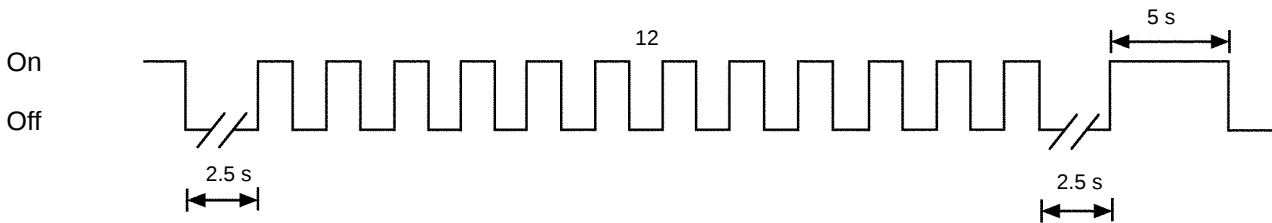


Defect code 10, 12 and 13: Components associated with the control box

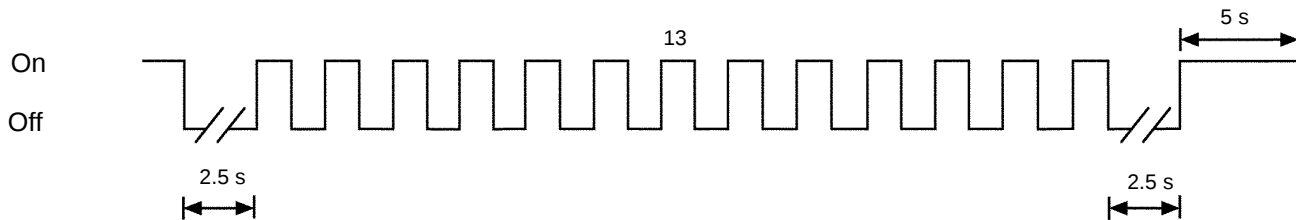
Illustration of the indicator lamp signal



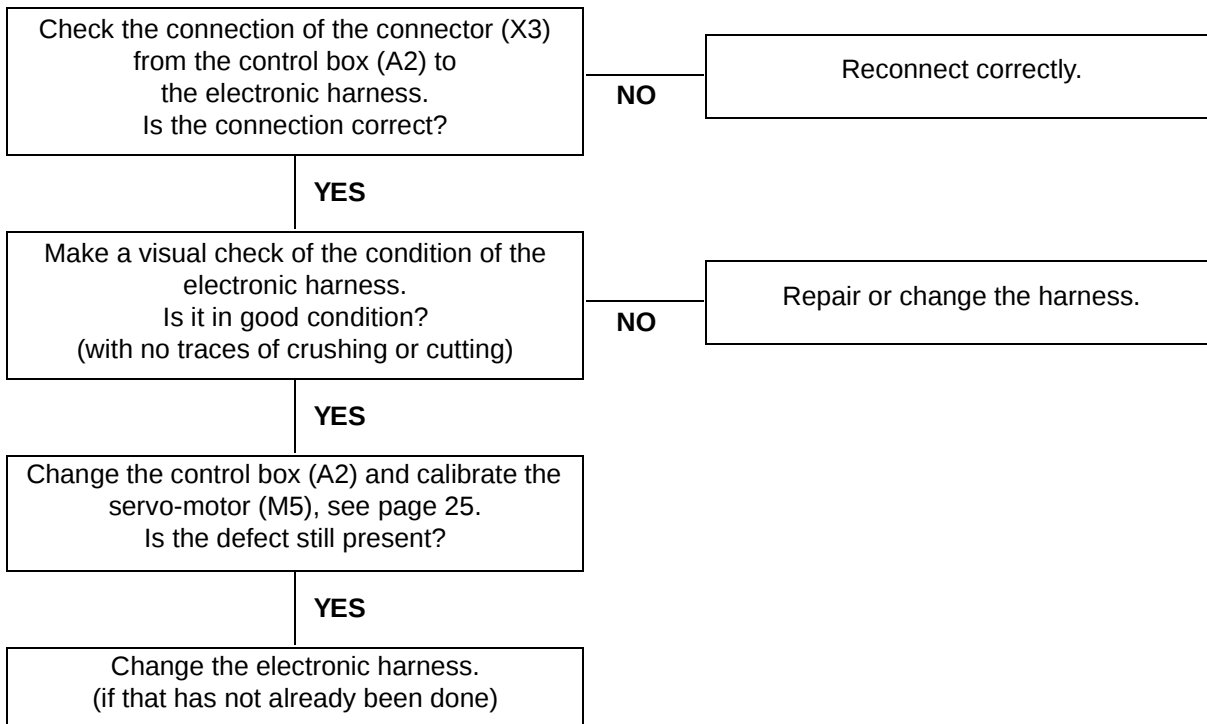
PDH0483



PDH0484

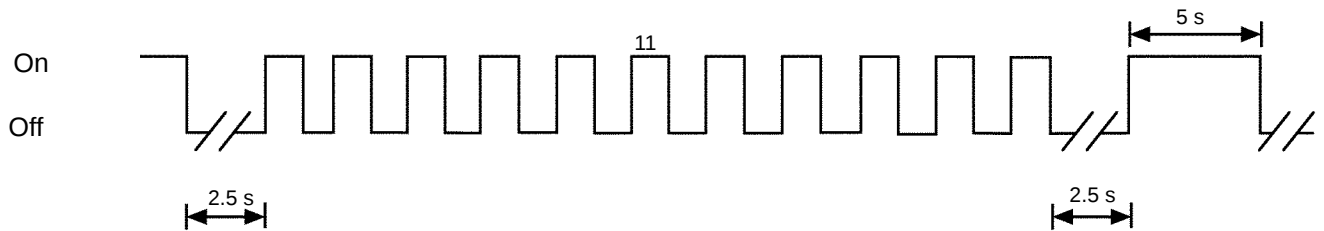


PDH0485



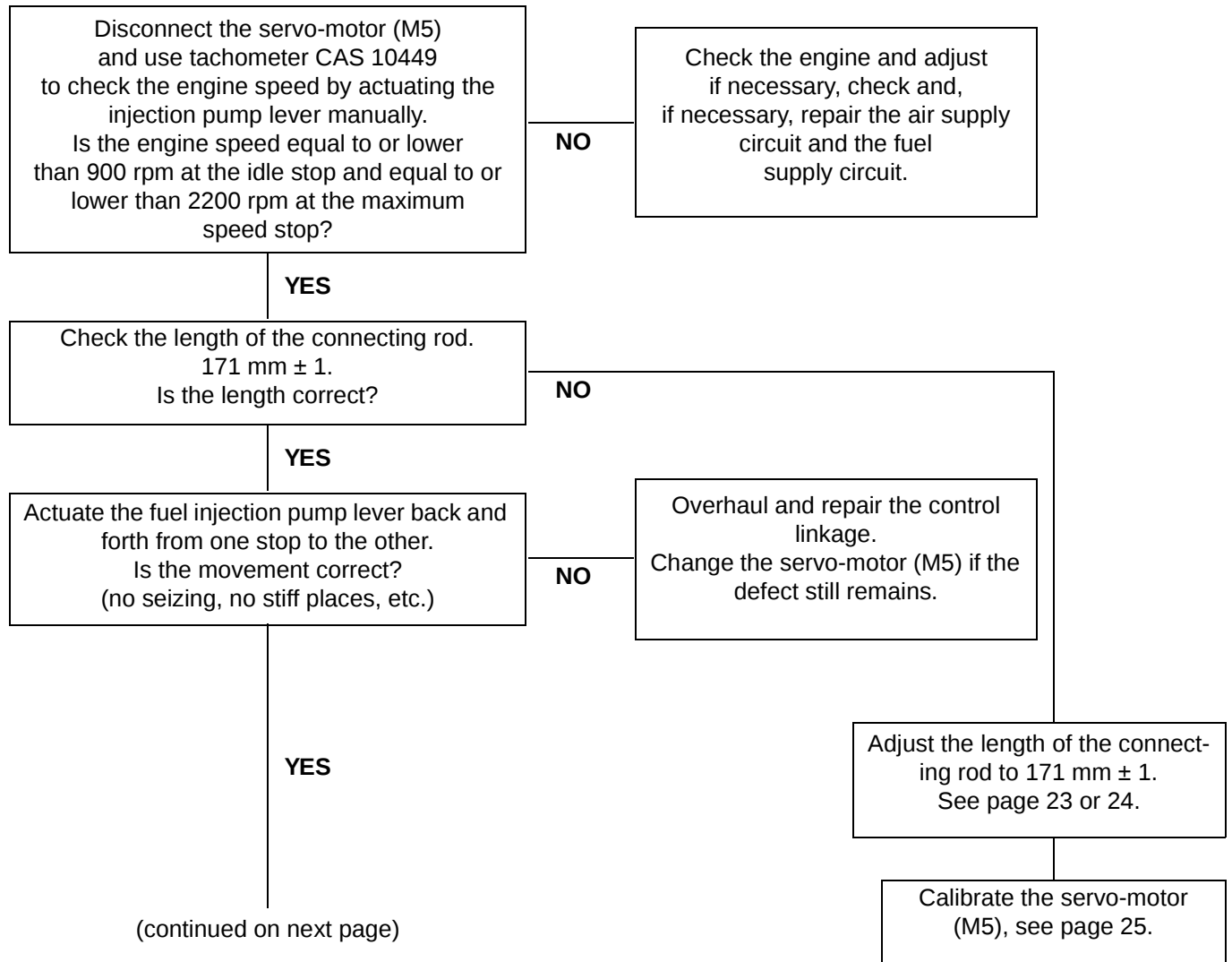
Defect code 11: Calibration impossible

Illustration of the indicator lamp signal



PDH0486

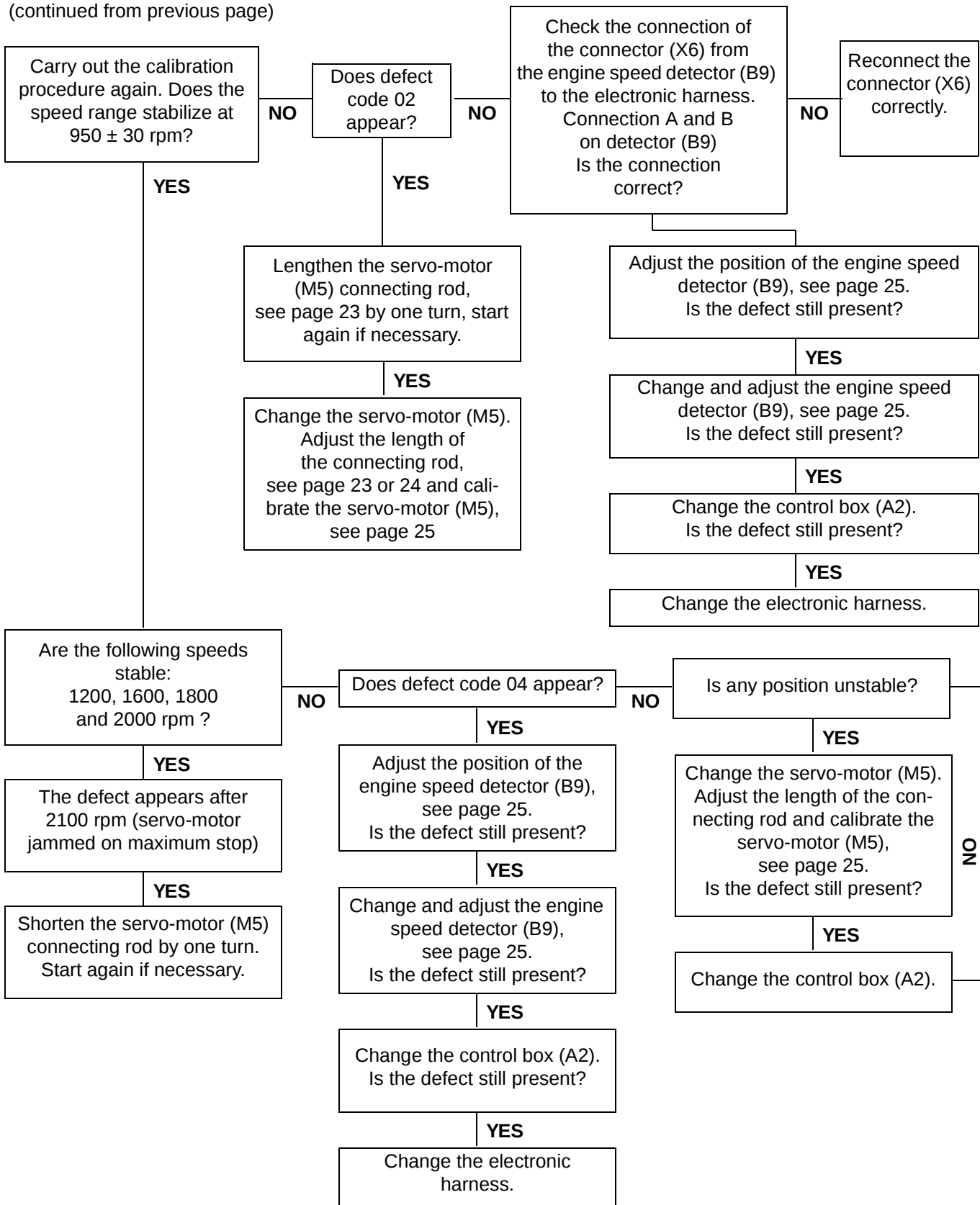
Defect appearing after the calibration procedure



NOTE: Switch off and on again after each corrective action to reset the system. and carry out the calibration procedure again.

4002-22

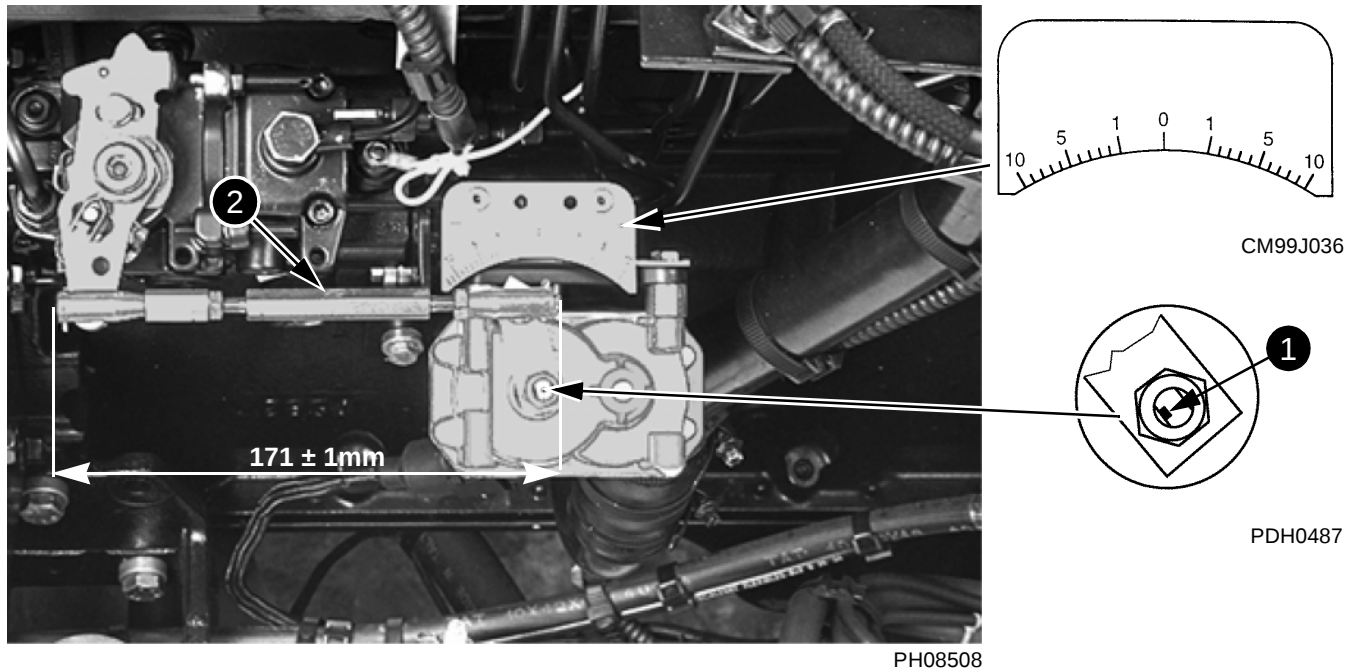
(continued from previous page)



NOTE: If the calibration procedure is not completed after 300 seconds: **Calibration impossible.** Switch off and on again after each corrective action to reset the system. and start the calibration procedure again.

Settings

Electric acceleration (M5) mechanical adjustment - old type fitting (graduations centred on the gauge)



STEP 1

Turn the battery master switch to the "Off" position.

STEP 2

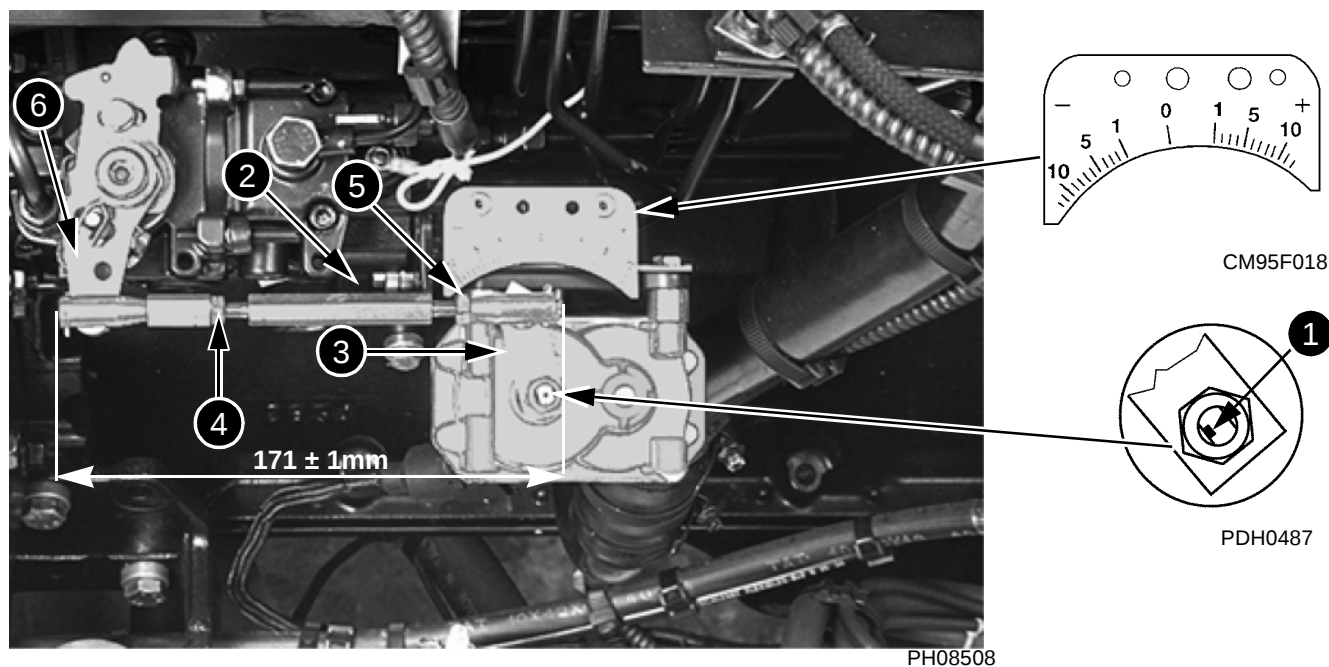
Make sure that the servo-motor (1) axis mark is correctly positioned.

STEP 3

Adjust the connecting rod (2) to the following length: 171 ± 1 mm.

4002-24

Electric acceleration (M5) mechanical adjustment - new type fitting (graduations offset 15° on the gauge)



STEP 1

Turn the battery master switch to the "Off" position.

STEP 2

Make sure that the servo-motor (1) axis mark is correctly positioned.

STEP 3

Adjust the connecting rod (2) to the following length: 171 ± 1 mm.

STEP 4

Install the connecting rod (2) on the lever (3) of the acceleration motor.

STEP 5

Place the injection pump lever (6) in the "idle" position (LH stop), mark its position and then place the lever in the "accelerated" position (RH stop) and mark its position.

STEP 6

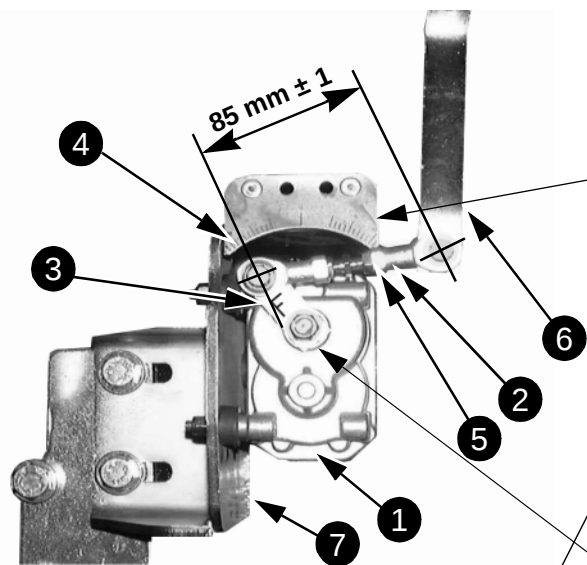
Check if the two marks previously noted are on the same graduation but with opposite signs. If this is not the case, use the connecting rod (2) to make the "idle/accelerated" positions more symmetrical and then tighten the two lock-nuts (4) and (5).

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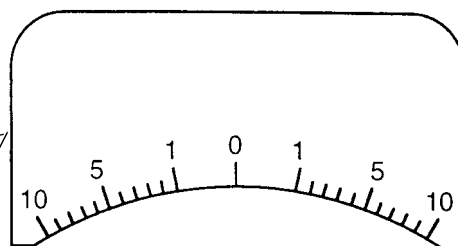
4002-26

Mechanical adjustment of electrical acceleration (M5) on "low emissions" models

788

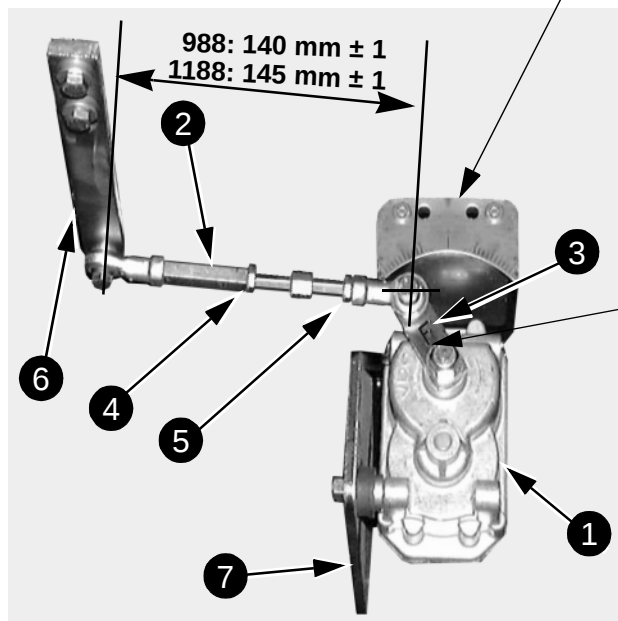


CD99J001

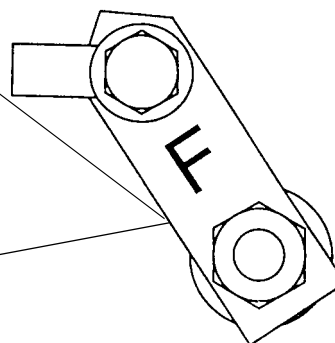


CM99J036

988/1188



CD99J002



CM99J035

STEP 1

Turn the battery master switch to the "Off" position.

STEP 2

Make sure that lever (3) of the servo-motor (1) is correctly positioned (letter F facing the operator).

STEP 3

Position bracket (7) on the engine block, with the apertures centred.

STEP 4

Adjust the connecting rod (2) to the recommended length for the excavator model concerned:

788: 85 mm ± 1

988: 140 mm ± 1

1188: 145 mm ± 1

STEP 5

Install the connecting rod (2) on the lever (3) of the acceleration motor.

STEP 6

Place the injection pump lever (6) in the "idle" position (LH stop), mark its position on the gauge and then place the lever (6) in the "accelerated" position (RH stop) and mark its position on the gauge.

STEP 7

Check if the two marks previously noted are located on the same graduation but with opposite signs. If this is not the case, change the position of the bracket (7) on the engine block and lock the screws.

STEP 8

Change the length of the connecting rod to make the "idle/accelerated" positions more symmetrical.

4002-28

Electric acceleration calibration

STEP 1

Start the engine and warm it up to normal operating temperature, then press the "LOW" (low idle) key. Switch off the engine.



Do not actuate any of the controls during this procedure.

STEP 2

Place the LH control arm in the "Safety" position.

STEP 3

Using the left hand, press simultaneously on the "LOW" and "MAX" keys on the control panel.

STEP 4

Using the right hand, switch on the machine.

STEP 5

Wait for the LED's on the keyboard, except for the "ECO" key, to go out, and then release the keys.

STEP 6

Start the engine. The "LOW" and "MAX" indicator lamps should flash, showing that the calibration phase is starting.

NOTE: *This phase lasts less than six minutes. The engine will run successively at 950, 1200, 1600, 1800, 2000 and 2240 rpm, and will then stay at "medium idle" speed (not shown on control panel), which is 1200 rpm.*

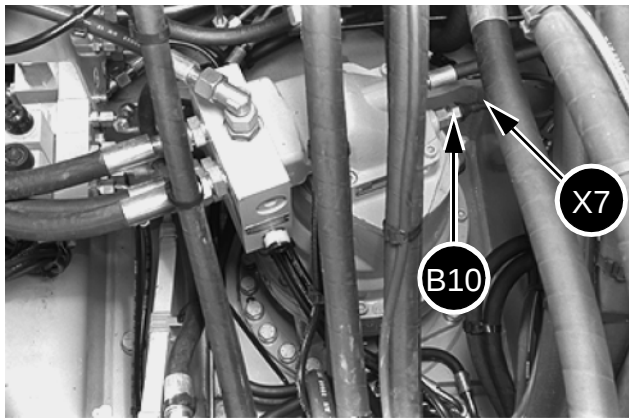
STEP 7

Check that the printed circuit board indicator lamp (LED) stays on continuously.

If this is not the case, note the defect code(s) and refer to the corresponding page.

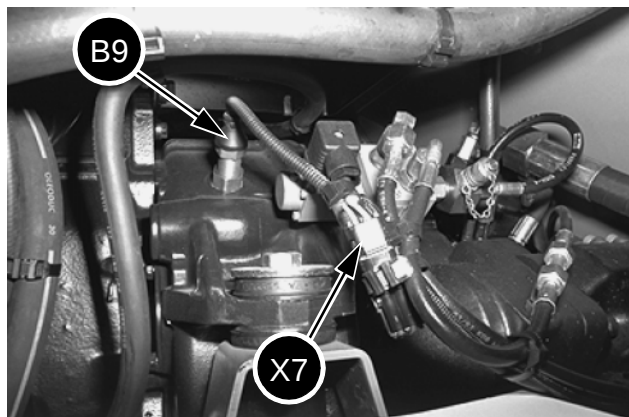
If defect code 11 is displayed (calibration impossible) refer to page 4002-21.

Adjusting the engine speed detector (B10)



PH01002

Adjusting the engine speed detector (B9)



PH00918

STEP 1

Disconnect the connector (X7).

STEP 2

Check the condition of the seal and that the washers are present. Loosen the lock-nut and screw the detector up to the stop, then unscrew it one turn.

STEP 3

Tighten the lock-nut to a torque of 10 Nm and reconnect the connector (X7).

STEP 1

Disconnect the connector (X6).

STEP 2

Loosen the lock-nut and screw the detector up to the stop, then unscrew it one turn.

STEP 3

Tighten the lock-nut to a torque of 10 Nm and reconnect the connector (X6).

Section

8001

HYDRAULIC CHECKS, ADJUSTMENTS AND SCHEMATICS

1188 Crawler Excavators

TABLE OF CONTENTS

TOOLS REQUIRED	3
Tools to be made	4
PRESSURE SETTING SCHEMATIC	6
PRESSURE SETTING	7
HYDRAULIC SCHEMATIC (MONO-SPEED)	13
HYDRAULIC SCHEMATIC (TWO-SPEED)	15

TOOLS REQUIRED



PE01419

1. ONE E3744473 MULTI-TEST KIT

This is used to check pressure (two pressure scales, differential pressure, peak pressure), flow, rotational speed and temperature)



PF01410

2. ONE 18 to 270 LITRE FLOW TURBINE, ORDER:

ONE D3144471 FLOW TURBINE
TWO G4223358 PLATES (M30 x 2)
TWO Z8230181 FLANGES (Ø 15)
ONE W5431976 HIGH PRESSURE DN25 HOSE
TWO D330421 SEALS
FOUR D4024267 HALF-FLANGES
EIGHT Z1232983 SCREWS (12 X 75)

**3. ONE Q5931990 HIGH PRESSURE DN19 HOSE
ONE B8031969 LOW PRESSURE DN12 HOSE**



PG04005

4. ONE A3237549 M14 x 1.5 PRESSURE TAPPING FITTING



PE18402

**5. TWO P2144487 MINIMESS HOSES, LENGTH 2500 mm
TWO C5144412 HOSE CONNECTORS**

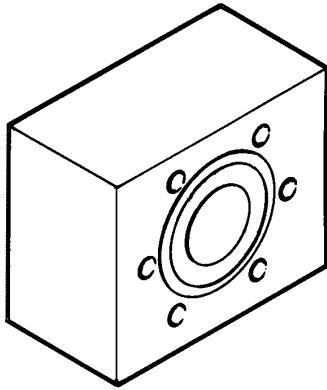


PG04006

**6. TWO Q3337452 27 x 200 PLUGS
ONE P4237556 27 x 200 FEMALE UNION
ONE L3237536 D12 MALE/FEMALE UNION
ONE J3237534 DOUBLE UNION**

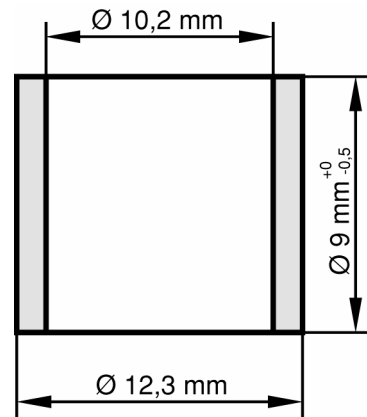
8001-4

Tools to be made



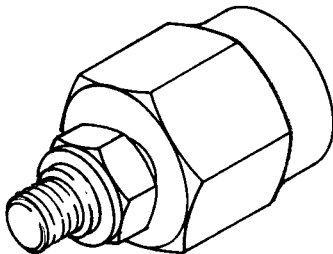
PDH0505

7. TWO G1037352 DN25 - DN19 REDUCERS



PDG0239

1. A spacer for limiting hand control valve spool



PDH0506

8. ONE W5137530 SPECIAL CONNECTOR

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1188C EXCAVATOR PRESSURE SETTING SCHEMATIC

NOTE : All values indicate in the pressure setting schematic are nominal values.

Location of adjustment points

- A Main relief valve
- B Boom balance valve
- C Boom raising secondary relief valve
- D Bucket balance valve
- E Dipper balance valve
- F Bucket opening secondary relief valve
- G Dipper extending secondary relief valve
- H Dipper retracting secondary relief valve
- J Bucket closing secondary relief valve
- K Boom lowering secondary relief valve
- L Backhoe clamshell secondary relief valve
- M Articulated boom secondary relief valve
- N Backhoe offset or remote control secondary relief valve
- P Backhoe offset or remote control secondary relief valve
- Q Articulated boom secondary relief valve
- R Backhoe clamshell secondary relief valve
- S Swing main relief valve
- T Travel balance valve, forward travel
- U RH reverse travel secondary relief valve
- V LH reverse travel secondary relief valve
- W LH forward travel secondary relief valve
- X RH forward travel secondary relief valve
- Y RH forward travel balance valve
- Z RH forward travel relief valve
- A1 LH swing secondary relief valve
- A2 Swing torque valve
- A3 Swing flow cancellation
- A4 Swing torque spool pressure differential
- LS Attachment and travel load sensing
- AD Attachment and travel flow cancellation
- RC Torque regulator

Location of the various pressure test points fitted on the machine

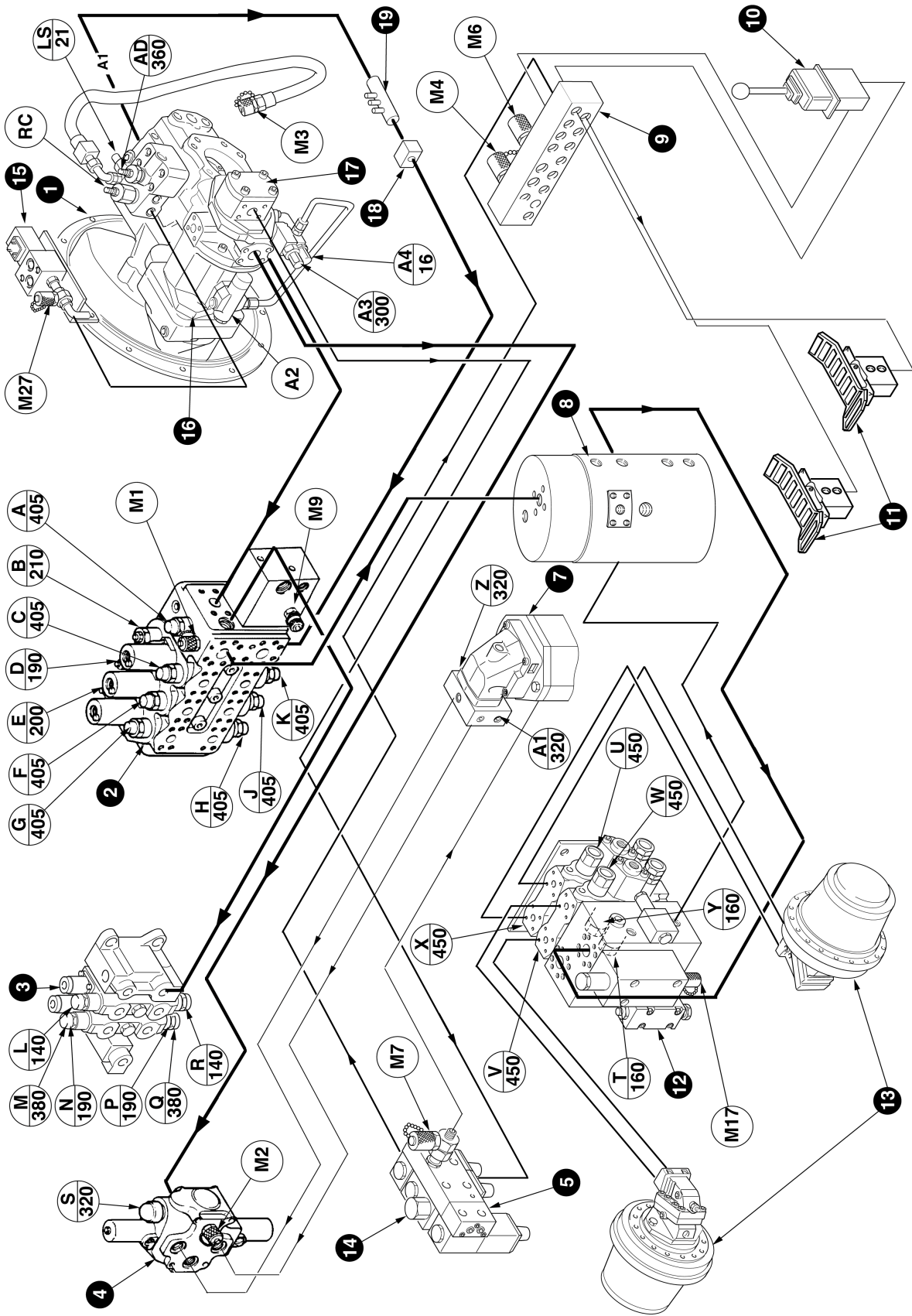
- M1 On the attachment control valve
- M2 On the swing control valve
- M3 On the anti- surge hose
- M4 On the manifold
- M6 On the manifold
- M7 On the swing brake supply hose
- M9 On the connector block (inlet plate side) of the P10 attachment control valve, as in dynamic mode
- M27 On the proportioning valve

Location of pressure test points to be fitted

- M17 On the speed limiter

Location of main hydraulic components

- 1 Variable flow high pressure pump
- 2 Attachment control valve
- 3 Option control valve
- 4 Swing control valve
- 5 Solenoid valve block
- 6 Swing motor
- 7 Swing reduction gear
- 8 Hydraulic swivel
- 9 Manifold
- 10 Travel hand control block (Inching)
- 11 Travel foot control block
- 12 Travel control valve
- 13 Travel moto-reduction gear
- 14 P35 pressure limiter
- 15 Proportional pressure reduction valve
- 16 Variable flow swing pump
- 17 Servo- pump
- 18 Union block
- 19 Flowmeter turbine



PDH0514

PRESSURE SETTING

Fitting the flow turbine on the A1 pump body (attachments and travel)

Disconnect the variable flow A1 pump body outlet hose from the union block fitted on the power module side member, counterweight side. Fit the flow turbine (D3144471) with the hose (W5431976) recommended in the tool list

Bringing the hydraulic system up to temperature between 50 and 55°C.

Raise one track using the attachment. Operate travel, with bucket or clamshell against the stops

Checking the engine speeds with no load and the pressures supplied by the proportioning valve.

Install the revolution counter and connect the multi tester at TEST POINT M27.

Working mode	Speed (rpm)	Pressures (bar)
MEDIUM-IDLE	1180 to 1220	23.5 to 26.5
LOW-IDLE	900 to 1000	27 to 29.5
FINE	1580 to 1620	20 to 23
ECO	1880 to 1920	14 to 17
MAX	2220 to 2260	7.5 to 10.5

If the speeds are outside the tolerances, first check the linkage of the servo-motor connecting rod (length end to end = 171 ± 1 mm) and do the calibration again.

IMPORTANT : All inspections and adjustments must be made with the various engine speeds and at a temperature of 50°.

Checking the pilot pressure with the armrest lowered

Connect the multi tester to the manifold at TEST POINT M4. Put the machine in "MAX" mode. The pressure should be between 34 and 38 bar. If it is not, check the P35 or the electrical circuit.

NOTE: After each check, if the parameters are wrong, the component concerned must be adjusted or replaced.

Pressure setting the Load Sensing valve (L.S.)

Static test (with one 0 to 40 bar pressure gauge)

Put the machine in FINE mode.

IMPORTANT : Start the engine before connecting the pressure gauge at TEST POINT M1.

Raise the left-hand armrest as a safety measure. Connect the pressure gauge at TEST POINT M3. The pressure should be between 8 and 12 bar. If it is not, check the P10's.

Connect the pressure gauge at TEST POINT M1. The difference between TEST POINTS M1 and M3 should be from 20 to 23 bar.

Dynamic test (with multitester)

Fit the spacer on the control lever push rod on the boom raising function. Connect the two multitester outlets at TEST POINTS M1 and M3. Operate the boom raising function. The pressure difference should be between 20 and 23 bar.

8001-8

Checking the hydraulic and power and pressures supplied by the proportioning valves, with the engine under load

Checking the hydraulic and power and pressures supplied by the proportioning valves, with the engine under load Connect the multitester at TEST POINTS M1 and M2. Put the machine in "MAX" mode. Block one attachment and the swing so as to check their maximum pressures which should be between 355 and 365 bar for the attachments and between 290 and 300 bar for the swing. Adjust the main relief valve on the attachment control valve to 300 bar, with the bucket function against the stops. Overtighten the swing flow cancellation valve by two turns. Feed the bucket function alone.

- a) The pressure supplied by the proportioning valve should be between 10.5 and 14 bar.
- b) The flow from the pump should be greater than 76 l/mn.
- c) The engine speed should be between 1950 and 1990 rpm.

Feed the bucket and the swing functions simultaneously. The pressure supplied by the proportioning valve should be between 16 and 21 bar. Unscrew the swing flow cancellation valve by two turns and set it to between 290 and 300 bar. Reset the pressure of the relief valve at the limit of attachment flow cancellation.

Checking maximum flow on the variable displacement pump (using one single flow turbine)

Put the machine in "MAX" mode. Connect the multitester to measure the flow. Operate dipper retract and bucket close simultaneously. The flow should be over 157 l/mn.

Checking the balance flows

NOTE: *In this case the valve should be untightened to increase flow.*

Attachment control valves

Feed, one after another, the large chambers of the boom, bucket and the dipper.

The flows should be between:

Boom: 100 et 110 l/mn

Bucket: 90 et 100 l/mn

Dipper: 95 and 105 l/mn

Travel control valve

Forward direction

Select speed 1. Raise each track using the attachment. With the inching valve control lever at maximum, operate each track in forward travel. Flows noted should be between 77 and 83 l/mn.

If the values noted are between 70 and 90 l/mn, adjust the balance valves. If not, check the adjustment of the automatic flow divider.

Using stopwatch

The sprockets should turn between 25 and 27 rpm.

If the rpm noted is between 23 and 29 rpm, adjust the balance valves. If not, check the adjustment of the automatic flow divider.

Reverse direction

Same procedure as for forward direction. This being said, if the flow readings are between 70 to 90 l/mn, or the sprocket revolutions between 23 and 29 rpm, adjust the mechanical stops in the valve spool caps.
LH travel (section on inlet plate side): small cap.
RH travel: large cap.

If readings are lower or higher than the above, check the adjustments of the automatic flow divider.

When these adjustments have been completed, the flowmeter turbine must be removed.

Checking or adjusting all valves

Connect the multimeter at TEST POINT M1. Put the machine in "MAX" mode. Overtighten the main relief valve by two turns. Overtighten the attachment and travel flow cancellation valve by two turns.

Secondary relief valves C, F, G, H and J on attachment control valve (except boom cylinder small chambers)

Put the machine in "FINE" mode. Fit the recommended spacer on each push rod of the control lever for the function being operated. The pressures noted, with the cylinders against the stops, should be between 395 and 425 bar.

If the small chamber of the dipper cylinder is fitted with a safety valve or loading holding valve, and the pressure cannot be reached, adjust those valves.

Boom small chamber secondary relief valve K.

Do not use the spacer on the push rod. For excavators equipped with a safety valve or loading holding valve, disconnect the pilot hose or hoses from those valves.

Plug at the valve end with plug (A2537406) and at the hose end with the second plug and the double union (J3237534). Operate the function. The pressure noted should be between 395 and 425 bar.

For other excavators, exchange with the bucket small chamber secondary relief valve, previously adjusted. Check the pressure on bucket opening.

Secondary relief valves U, V, W and X on travel control valve

Block the tracks mechanically in both travel directions. Put the machine in "MAX" mode, with the inching valve lever at maximum. Operate each track one after another, in both directions.

The pressures noted should be between 395 and 425 bar.

Adjusting the main relief valve A

Feed the bucket function with no spacer on the push rod. Loosen the main relief valve until the same pressure is obtained as on the bucket safety valve.

Adjusting the attachment and travel flow cancellation valve AD

Loosen this valve two turns. Operate the bucket against the stops. Adjust to a value between 355 and 365 bar.

Fit the flow turbine (D3144471) with the reducers (G1037352) and hose (Q5931990) at the swing control valve inlet.

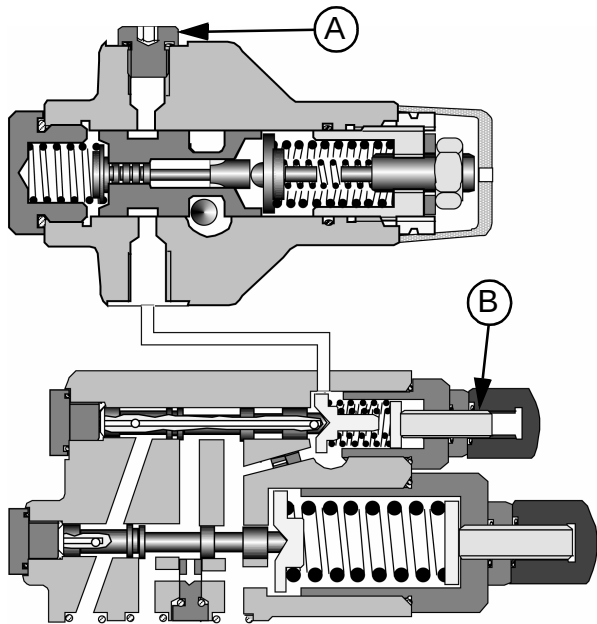
8001-10

Checks or adjustments on the swing

Swing flow cancellation valve A3

Connect the multimeter at TEST POINT M2. Block the upperstructure mechanically. Put the machine in "MAX" mode. Operate the swing in one direction. The pressure noted should be between 290 and 300 bar.

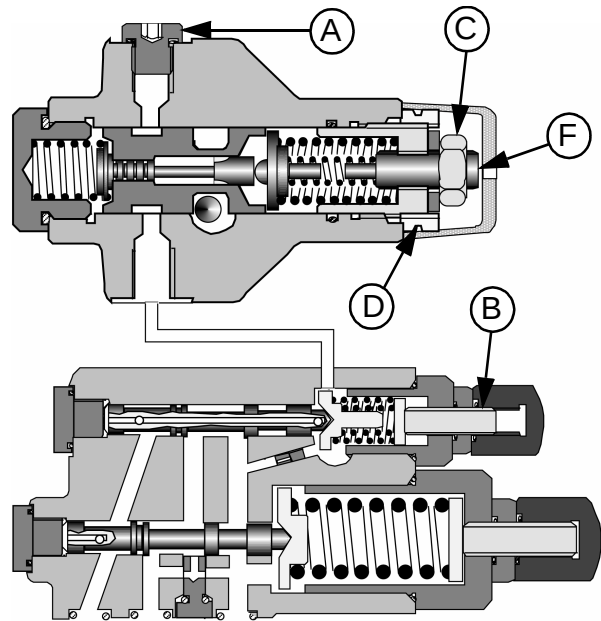
Torque spool A4 pressure differential



PDH0508

Remove the plug (A) opposite the inlet of the rigid pipe on the torque valve. Fit the union (W5137530), the union (L3237536) and the D12 hose (B8031969). Place this hose in the tank. Operate the swing in one direction. The pressure read at TEST POINT M2 should be 16 bar. If is not, adjustments should be made at the screw (B) of the torque spool.

Hydraulic power



PDH0508

Put the machine in "MAX" mode. Operate the swing in one direction. Adjust the main swing relief valve to 170 bar. The flow should be between 85 and 93 l/mn. Then, adjust to 230 bar. The flow should be between 62 and 70 l/mn.

If adjustment is necessary, it must be made in the following manner:

Adjust the main relief valve to 170 bar.

Untighten the central screw lock nut (C) on the torque valve, and untighten the screw by 5 turns. Retighten the lock nut (C). Untighten the big lock nut (D), and, using the central screw, adjust so as to obtain a flow between 85 and 93 l/mn. Tighten the lock nut (D). Adjust the main relief valve to 230 bar. Untighten lock nut (C) on the central screw. Screw in and adjust so as obtain a flow between 62 and 70 l/mn. Retighten the lock nut (C). With the swing blocked in one direction, set the pressure at the main relief valve to the same value as that of the flow cancellation valve.

Secondary relief valves A1 and Z

Overtighten the flow cancellation valve and the main relief valve for this function by one turn. Operate the swing in both directions. The pressure should be between 300 and 320 bar. If it is not, change the valve or valves.

Main relief valve S

Disconnect one motor feed hose, at the control valve. Plug at the control valve end using 27 x 200 plug (Q3337452), and on the hose end with the second plug and the 27 x 200 female union (P4237556). Operate the direction of swing concerned. Adjust to between 310 and 330 bar.

Reconnect the motor.

Adjusting the control cancellation valve A3

Operate the swing in one direction. Adjust to a value between 290 and 300 bar.

Remove the flow meter

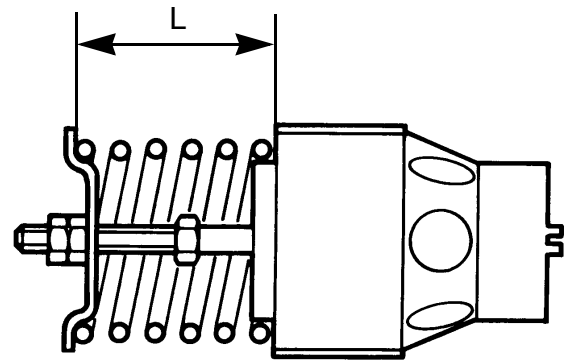
Checking the spring brake release

Connect the two multimeter outlets at TEST POINTS M2 and M7. With the upperstructure immobilized, operate the control lever. The pressure at TEST POINT M7 should show 35 bar before the pressure rises at TEST POINT M2. If not, check the brake release circuit.

Checking the travel brake

Block one track mechanically. Install the pressure tapping fitting (A32337549) at TEST POINT M17 underneath the speed limiter on the travel control valve inlet plate. Connect the multimeter at TEST POINTS M1 and M17. Operate the blocked track gradually. The pressure at TEST POINT M17 should be between 15 and 25 bar, before the pressure rises at TEST POINT M1.

Checking the boom and dipper flow limiters



PDH0509

Pressure on dipper retraction at TEST POINT M1 should be between 40 and 70 bar.

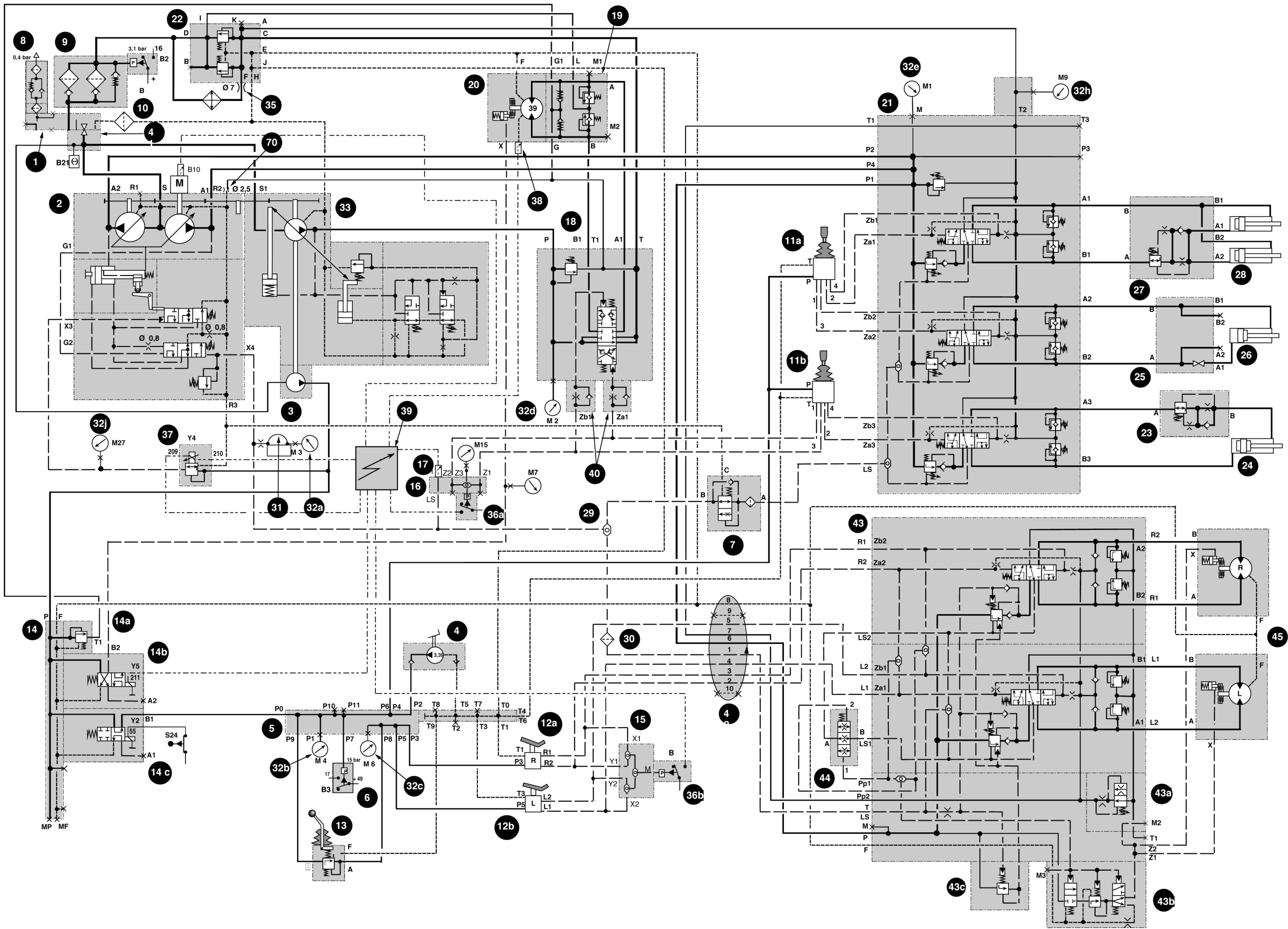
If it is not, adjust the limiter spring to $L = 27 \text{ mm}$.

If boom lowering is not correct, adjust the spring to $L = 26.5 \text{ mm}$.

1188C HYDRAULIC SCHEMATIC (TWO- SPEED)

DESCRIPTION

- | | |
|--|--|
| <p>1 - Réservoir</p> <p>2 - High pressure hydraulic pumps</p> <p>- Two variable flow bodies for attachments, travel and options</p> <p>3 - Fixed flow low pressure pump for the servo-circuit</p> <p>4 - Pressure release pump (foot pedal)</p> <p>5 - Servo-circuit manifold</p> <p>6 - Minimum pilot pressure switch</p> <p>7 - Anti-surge valve and filter on LS information line (attachments/options)</p> <p>8 - Hydraulic reservoir filler cap with self-pressurizing valve and gauge filter</p> <p>9 - Return manifold with filter elements and restriction indicator</p> <p>10 - Magnetic filter</p> <p>11a - Manual control block for boom and bucket (or clamshell) functions</p> <p>11b - Manual control block for dipper and swing functions</p> <p>12a - Right-hand travel control block</p> <p>12b - Left-hand travel control block</p> <p>13 - Manual travel control block</p> <p>14 - Solenoid valve block consisting of:</p> <p>14a - P35 pressure limiter</p> <p>14b - Automatic swing brake and brake release solenoid valve</p> <p>14c - Arm rest safety solenoid valve</p> <p>15 - Travel information selector block (AUTO-IDLE function)</p> <p>16 - Swing information selector block (Automatic braking and brake release and AUTO-IDLE))</p> <p>17 - LS information pressure sensor</p> <p>18 - Swing control valve block</p> <p>19 - Swing function forced feed/safety flanged block</p> <p>20 - Hydraulic swing motor with static brake</p> <p>21 - Attachment control valve block (boom, bucket, dipper)</p> <p>22 - P10 pressure limiter block (2) on return circuits</p> <p>23 - Dipper cylinder small chamber flow limiter</p> <p>24 - Dipper cylinder (dashpot on small and large chamber)</p> <p>25 - Backhoe-offset selector block</p> <p>26 - Bucket cylinder (dashpot on small chamber)</p> <p>27 - Boom cylinder feed divider block with flow limiter on cylinder large chambers</p> <p>28 - Boom cylinder (dashpot on large chambers)</p> <p>29 - Pressure selector between LS information circuits for attachments/options and travel</p> <p>30 - Travel LS information filter</p> <p>31 - Accumulator hose</p> <p>32 - Pressure tapping points</p> | <p>32a - M1: attachment/travel or option circuit pressure</p> <p>32e - M2: swing circuit pressure</p> <p>32d - M3: pump LS information circuit pressure</p> <p>32b - M4: servo feed circuit pressure</p> <p>32c - M6: Travel pedal valve block feed circuit pressure</p> <p>32h - M9: P10 pressure (2) in dynamic mode</p> <p>32j - M27: Torque regulator valve pilot circuit pressure (supplied by proportioning valve)</p> <p>33 - Variable flow swing pump</p> <p>35 - Calibrated orifice for oil cooler circuit flow</p> <p>36a - Swing pilot pressure switch</p> <p>36b - Travel pilot pressure switch</p> <p>37 - Electro-hydraulic proportioning valve</p> <p>38 - Hydraulic swing motor speed detector</p> <p>39 - Electronic control box</p> <p>40 - Braking valves on swing control valve spool pilots</p> <p>41 - Hydraulic reservoir shut-off valve</p> <p>42 - Hydraulic swivel</p> <p>43 - Travel control valve block</p> <p>43a - Speed limiter</p> <p>43b - Hydraulic travel motor automatic brake release valve</p> <p>43c - Anti-excess flow valve</p> <p>44 - Travel anti bypass block</p> <p>45 - Fixed displacement hydraulic travel motors (with static brake)</p> <p>70 - Block with calibrated orifice for variable flow pump body irrigation</p> <p>R1 - RH forward</p> <p>R2 - RH reverse</p> <p>L1 - LH forward</p> <p>L2 - LH reverse</p> |
|--|--|

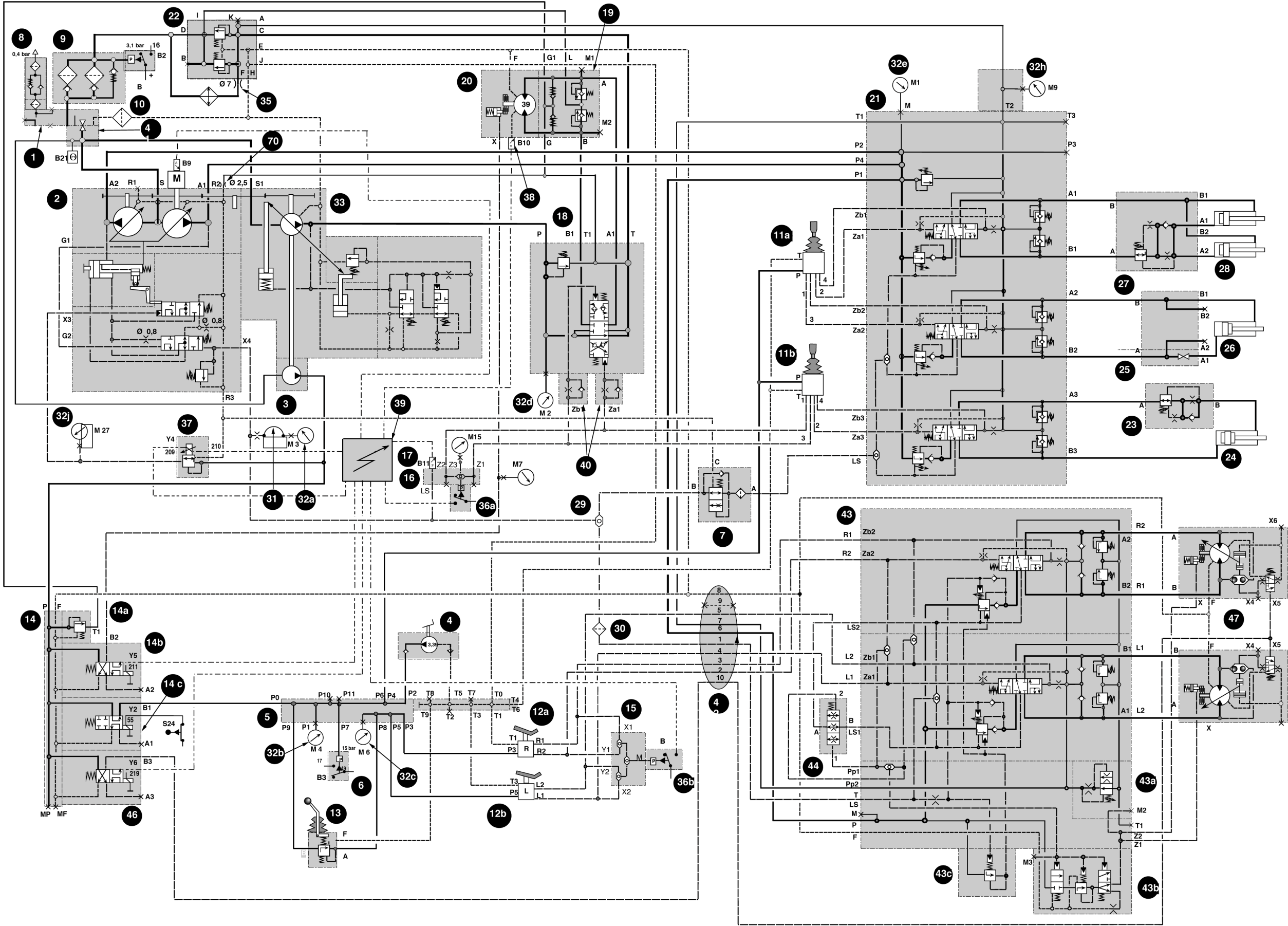


1188C HYDRAULIC SCHEMATIC (TWO-SPEED)

DESIGNATIONS:

- 1 - Reservoir
- 2 - High pressure hydraulic pumps
 - Two variable flow bodies for attachments, travel and options
- 3 - Fixed flow low pressure pump for the servo-circuit
- 4 - Pressure release pump (foot pedal)
- 5 - Servo- circuit manifold
- 6 - Minimum pilot pressure switch
- 7 - Anti- surge valve and filter on **LS** information line (attachments/ options)
- 8 - Hydraulic reservoir filler cap with self-pressurizing valve and gauge filter
- 9 - Return manifold with filter elements and restriction indicator
- 10 - Magnetic filter
- 11a - Manual control block for boom and bucket (or clamshell) functions
- 11b - Manual control block for dipper and swing functions
- 12a - Right- hand travel control block
- 12b - Left- hand travel control block
- 13 - Manual travel control block
- 14 - Solenoid valve block consisting of:
- 14a - **P35** pressure limiter
- 14b - Automatic swing brake and brake release solenoid valve
- 14c - Arm rest safety solenoid valve
- 15 - Travel information selector block (AUTO-IDLE function)
- 16 - Swing information selector block (Automatic braking and brake release and AUTO-IDLE)
- 17 - **LS** information pressure sensor
- 18 - Swing control valve block
- 19 - Swing function forced feed/safety flanged block
- 20 - Hydraulic swing motor with static brake
- 21 - Attachment control valve block (boom, bucket, dipper)
- 22 - **P10** pressure limiter block (2) on return circuits
- 23 - Dipper cylinder small chamber flow limiter
- 24 - Dipper cylinder (dashpot on small and large chamber)
- 25 - Backhoe- offset selector block
- 26 - Bucket cylinder (dashpot on small chamber)
- 27 - Boom cylinder feed divider block with flow limiter on cylinder large chambers
- 28 - Boom cylinder (dashpot on large chambers)
- 29 - Pressure selector between **LS** information circuits for attachments/options and travel
- 30 - Travel **LS** information filter
- 31 - Accumulator hose

- 32 - Pressure tapping points
- 32a - **M1**: attachment/travel or option circuit pressure
- 32e - **M2**: swing circuit pressure
- 32d - **M3**: pump **LS** information circuit pressure
- 32b - **M4**: servo feed circuit pressure
- 32c - **M6**: travel pedal valve block feed circuit pressure
- 32h - **M9**: **P10** pressure (2) in dynamic mode
- 32j - **M27**: torque regulator valve pilot circuit pressure (supplied by proportioning valve)
- 33 - Variable flow swing pump
- 35 - Calibrated orifice for oil cooler circuit flow
- 36a - Swing pilot pressure switch
- 36b - Travel pilot pressure switch
- 37 - Electro-hydraulic proportioning valve
- 38 - Hydraulic swing motor speed detector
- 39 - Electronic control box
- 40 - Braking valves on swing control valve spool pilots
- 41 - Hydraulic reservoir shut-off valve
- 42 - Hydraulic swivel
- 43 - Travel control valve block
- 43a - Speed limiter
- 43b - Hydraulic travel motor automatic brake release valve
- 43c - Anti-excess flow valve
- 44 - ravel anti bypass block
- 46 - Solenoid valve for hydraulic travel motor displacement change
- 47 - Variable displacement hydraulic travel motor
- 70 - Block with calibrated orifice for variable flow pump body irrigation
- R1 - RH forward
- R2 - RH reverse
- L1 - LH forward
- L2 - LH reverse



Section

8001

HYDRAULIC CHECKS, ADJUSTMENTS AND SCHEMATICS 1188 WHEELED EXCAVATORS

8001-2

TABLE OF CONTENTS

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TOOLS REQUIRED



PE01419

1. ONE E3744473 MULTI-TEST KIT

This is used to check pressure (two pressure scales, differential pressure, peak pressure), flow, rotational speed and temperature.



PF01410

2. ONE 18 TO 270 LITRE FLOW TURBINE, ORDER:

ONE D3144471 FLOW TURBINE
TWO G4223358 PLATES (M30 X 2)
TWO Z8230181 FLANGES (Ø 15)
ONE W5431976 HIGH PRESSURE DN25 HOSE
TWO D330421 SEALS
FOUR D4024267 HALF-FLANGES
EIGHT Z1232983 SCREWS (12 X 75)

**3. ONE Q5931990 HIGH PRESSURE DN19 HOSE
ONE B8031969 LOW PRESSURE DN12 HOSE**



PG04005

4. ONE A3237549 M14 X 1.5 PRESSURE TAPPING FITTING



PG03824

5. ONE U1237211 and W1237213 PRESSURE TEST POINT



PE18402

**6. TWO P2144487 MINIMESS HOSES, LENGTH 2500 mm
TWO C5144412 HOSE CONNECTORS**

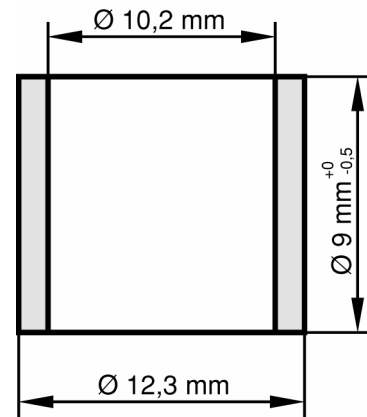
8001-4



PG04006

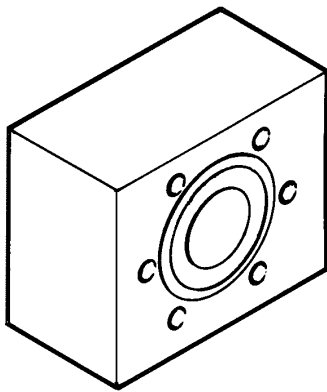
7. TWO Q3337452 27 X 200 PLUGS
ONE P4237556 27 X 200 FEMALE UNION
ONE L3237536 D12 MALE/FEMALE UNION

Tools to be made



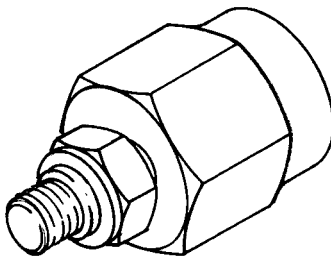
PDG0239

1. A spacer for limiting hand control valve spool stroke



PDH0505

8. TWO G1037352 DN25 - DN19 REDUCERS



PDH0506

9. ONE W5137530 SPECIAL CONNECTOR

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1188P PRESSURE SETTING SCHEMATIC

NOTA : All values indicated in the pressure setting schematic are nominal values.

Location of adjustments points

- A Attachment main relief valve
- A1 Forward travel secondary relief valve
- A2 Reverse travel secondary relief valve
- A3 Orbitrol main relief valve
- B Boom balance valve
- C Boom raising secondary relief valve
- D Bucket balance valve
- E Dipper balance valve
- F Bucket opening secondary relief valve
- G Dipper extending secondary relief valve
- H Dipper retracting secondary relief valve
- J Bucket closing secondary relief valve
- K Boom lowering secondary relief valve
- L Backhoe clamshell
- M Articulated boom secondary relief valve
- N Backhoe offset or remote control secondary relief valve
- P Backhoe offset or remote control secondary relief valve
- Q Articulated boom secondary relief valve
- R Backhoe clamshell secondary relief valve
- S Swing main relief valve
- T Travel balance valve
- U Stabilizer balance valve
- V Stabilizer raising secondary relief valve
- W Stabilizer lowering secondary relief valve
- X RH swing secondary relief valve
- Y LH swing secondary relief valve
- Z Travel motor regulator adjustment screw
- A4 Swing torque valve
- A5 Swing flow cancellation
- A6 Swing torque spool pressure differential
- LS Attachment and travel Load-Sensing
- AD Attachment and travel flow cancellation
- RC Torque regulator

Location of pressure test points to be fitted

- M5 On the steering cylinder feed circuit
- M10 On the front drive axle
- M11 On the rear drive axle
- M12 On the parking brake

Location of main hydraulic components

- 1 Variable flow high pressure pump
- 2 Attachment control valve
- 3 Option control valve
- 4 Swing control valve
- 5 Solenoid valve block
- 6 Travel direction inverter
- 7 Swing motor
- 8 Hydraulic swivel
- 9 Union block
- 10 Swing pressure selector block
- 11 Travel control valve
- 12 Stabilizer/dozer blade selector valve
- 13 Brake module
- 14 Orbitrol (steering)
- 15 Manifold
- 16 Union block
- 17 Front drive axle
- 18 Gearbox
- 19 Rear drive axle
- 20 DRE4 proportional pressure reduction valve
- 21 P35 pressure limiter
- 22 Brake module filter
- 23 Flowmeter turbine
- 24 Travel motor
- 25 Union block
- 26 Variable flow swing pump
- 27 Servo pumps

Location of the various pressure test points fitted on the machine

- M1 On the attachment control valve
- M2 On the swing control valve
- M3 On the anti-surge hose
- M4 On the manifold
- M6 On the pressure selector block (rear cab floor)
- M7 On the swing brake supply hose
- M8 On the brake module
- M9 On the connector block (inlet plate side) of the P10 attachment control valve, as in dynamic mode)
- M18 On the travel control valve
- M22 On the travel motor
- M27 On the proportioning valve

PDH0504

PRESSURE SETTING

Fitting the flow turbine on the A1 pump body (attachments and travel)

Disconnect the variable flow A1 pump body outlet hose from the union block fitted on the power module side member, counterweight side. Fit the flow turbine (D3144471) with the hose (W5431976) recommended in the tool list.

Bringing the hydraulic system up to temperature between 50 and 55°C

Raise the excavator using the stabilizers and dozer blade.

Operate travel, with bucket or clamshell against the stops.

Checking the engine speeds with no load and the pressures supplied by the proportioning valve

Install the revolution counter and connect the multitester at TEST POINT M27.

Working model	Speeds (rpm)	Pressures (bar)
MEDIUM-IDLE	1180 to 1220	23.5 à 26.5
LOW-IDLE	900 to 1000	27 à 29.5
FINE	1580 to 1620	20 à 23
ECO	1880 to 1920	14 à 17
MAX	2220 to 2260	7.5 à 10.5

If the speeds are outside the tolerances, first check the linkage of the servo-motor connecting rod (length end to end = 171 ± 1 mm) and do the calibration again.

IMPORTANT : *IMPORTANT : All inspections and adjustments must be made with the various engine speeds and at a temperature of 50° C.*

Checking the pilot pressure with the armrest lowered

Connect the multitester to the manifold at TEST POINT M4. Put the machine in "MAX" mode. The pressure should be between 34 and 38 bar. If it is not, check the P35 or the electrical circuit.

NOTA : *After each check, if the parameters are wrong, the component concerned must be adjusted or replaced.*

Pressure setting the Load Sensing valve (L.S.)

Static test (with one 0 to 40 bar pressure gauge)

Put the machine in FINE mode.

IMPORTANT : *Start the engine before connecting the pressure gauge at TEST POINT M1.*

Raise the left-hand armrest as a safety measure. Connect the pressure gauge at TEST POINT M3. The pressure should be between 8 and 12 bar.

If it is not, check the P10's.

Connect the pressure gauge at TEST POINT M1. The difference between TEST POINTS M1 and M3 should be from 20 to 23 bar.

Dynamic test (with multitester)

Fit the spacer on the control lever push rod on the boom raising function. Connect the two multitester outlets at TEST POINTS M1 and M3. Operate the boom raising function. The pressure difference should be between 20 and 23 bar.

Checking the hydraulic and power and pressures supplied by the proportioning valves, with the engine under load

Connect the multimeter at TEST POINTS M1 and M2. Put the machine in "MAX" mode. Block one attachment and the swing so as to check their maximum pressures which should be between 355 and 365 bar for the attachments and between 290 and 300 bar for the swing. Adjust the main relief valve on the attachment control valve to 300 bar, with the bucket function against the stops. Overtighten the swing flow cancellation valve by two turns. Feed the bucket function alone.

- a) The pressure supplied by the proportioning valve should be between 10.5 and 14 bar.
- b) The flow from the pump should be greater than 76 l/mn.
- c) The engine speed should be between 1950 and 1990 rpm.

Feed the bucket and the swing functions simultaneously. The pressure supplied by the proportioning valve should be between 16 and 21 bar. Unscrew the swing flow cancellation valve by two turns and set it to between 290 and 300 bar. Reset the pressure of the relief valve at the limit of attachment flow cancellation.

Checking maximum flow on the variable displacement pump (using one single flow turbine)

Put the machine in "MAX" mode. Connect the multimeter to measure the flow. Operate dipper retract and bucket close simultaneously. The flow should be over 157 l/mn.

Checking the balance flows

NOTA : *In this case the valve should be untightened to increase flow.*

Attachment control valves

Feed, one after another, the large chambers of the boom, bucket and the dipper.

The flows should be between :

Boom : 100 and 110 l/mn

Bucket : 90 and 100 l/mn

Dipper : 95 and 105 l/mn

Travel control valve

Connect the multimeter at TEST POINT M6 to check the pilot pressure of the travel control valve spool in forward direction. Lift the excavator using the stabilizers and the dozer blade. Select job site speed. Operate travel in forward and reverse direction. The pressures noted should be 24 bar minimum.

If not, the pressure regulator must be adjusted or shims must be added under the spring or springs of the spool or spools of the direction inverter.

Operate travel in forward direction. the flow noted should be between 95 and 100 L/mn.

If not, the balance valve must be adjusted.

Operate travel in reverse direction. the flow noted should be between 95 and 100 L/mn. If not, adjust the stop screw on the control valve section big cap.

Stabilizer and dozer blade control valve

When being lowered, the flow should be, for :

2 pads, 4 pads or 2 pads + blade : between 77 and 87 L/mn.

If not, the balance valve must be adjusted.

When raising, the flow should be, for :

2 pads : between 20 and 25 l/mn.

4 pads : between 40 and 50 l/mn.

2 pads + dozer blade : between 30 and 40 l/mn.

When these adjustments have been completed, the flowmeter turbine must be removed.

Checking or adjusting all valves

Connect the multimeter at TEST POINT M1. Put the machine in "MAX" mode. Overtighten the main relief valve by two turns. Overtighten the attachment and travel flow cancellation valve by two turns.

Secondary relief valves C, F, G, H and J on attachment control valve (except boom cylinder small chambers)

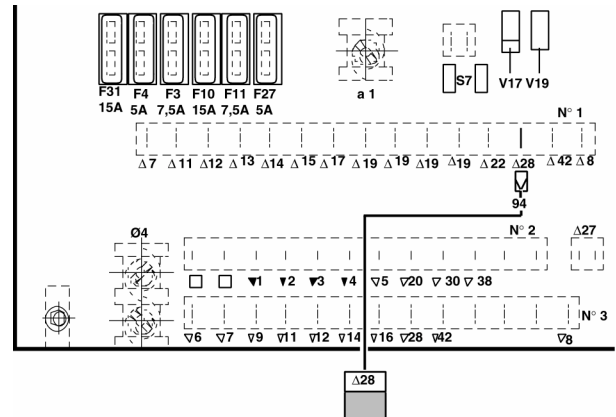
Put the machine in "FINE" mode. Fit the recommended spacer on each push rod of the control lever for the function being operated. The pressures noted, with the cylinders against the stops, should be between 395 and 425 bar.

If the small chamber of the dipper cylinder is fitted with a safety valve or load holding valve, and the pressure cannot be reached, adjust those valves.

Boom small chamber secondary relief valve K

Do not use the spacer on the push rod. Close the shut-off valve on the boom control valve section. Feed the function. The pressure noted should be between 395 and 425 bar.

Travel speed limiter secondary relief valves A1 and A2



PDH0507

Disconnect cable 94 (brown colour), behind the printed circuit in the cabinet. Put the machine in "MAX" mode. Apply the parking brake. Select road speed. Operate the direction inverter in one direction. Press down on the travel pedal. Repeat the operation in the opposite direction of travel. The pressures noted should be between 395 and 425 bar.

Stabilizer control valve secondary relief valves V and W

Operate against the stops on raise and on lower. The pressures noted should be between 390 and 420 bar.

Adjusting the main relief valve A

Feed the bucket function with no spacer on the push rod. Loosen the main relief valve until the same pressure is obtained as on the bucket relief valve.

Adjusting the attachment and travel flow cancellation valve AD

Loosen this valve two turns. Operate the bucket against the stops. Adjust to a value between 355 and 365 bar.

8001-10

Hydraulic travel motor displacement change

Put the machine in "FINE" mode. Connect the two outlets of the multitester at TEST POINTS M1 and M22. Loosen the direction of travel inverter lever stiffness adjusting screw. With cable 94 still disconnected, apply the parking brake. Select road speed. Press down slightly on the travel pedal. Keep the direction of travel inverter just beginning to move. At a pressure between 300 and 310 bar at TEST POINT M1, the pressure at TEST POINT M22 should begin to rise.

If it does not, the motor must be adjusted.

NOTA : *The screw must be loosened to increase the pressure.*

Re-tighten the direction inverter lever stiffness adjusting screw. Re-connect cable 94.

Orbitrol housing main relief valve A3

Fit a pressure test point (W1237213) at TEST POINT M5 at P inlet of the housing. Connect the multitester. Operate the control against the stops in both directions. The pressures noted should be between 155 and 170 bar.

If they are not, disassemble the housing and check all the valves.

Brake module engagement and disengagement pressures

Connect the multitester at TEST POINT M8 on the brake module. Operate the parking brake several times. The minimum engagement pressure should be between 125 and 140 bar. The maximum disengagement pressure should be between 150 and 165 bar. If it is not, check the brake module.

Parking brake pressure

Fit a pressure test point (U1237211) at TEST POINT M12. Bleed the parking brake circuit. Connect the multitester. With the parking brake control in the released position, the pressure noted should be between 125 and 165 bar. With the control in the braked position, the pressure should not be greater than 0.5 bar. If it is, check the circuit.

Service brake pressures

On the front drive axle

Fit a minimess pressure tapping fitting (A3237549) at TEST POINT M10 in place of the bleed screw support. Bleed the circuit. Connect the multitester. Press down on the brake pedal. The pressure read should be between 45 and 60 bar. Release the brake pedal. The pressure should fall to a value of lower than 0.5 bar. If it does not, check the circuit or the brake unit.

On the rear drive axle

Same as on the front drive axle, but with the pressure tapping fitting at TEST POINT M11.

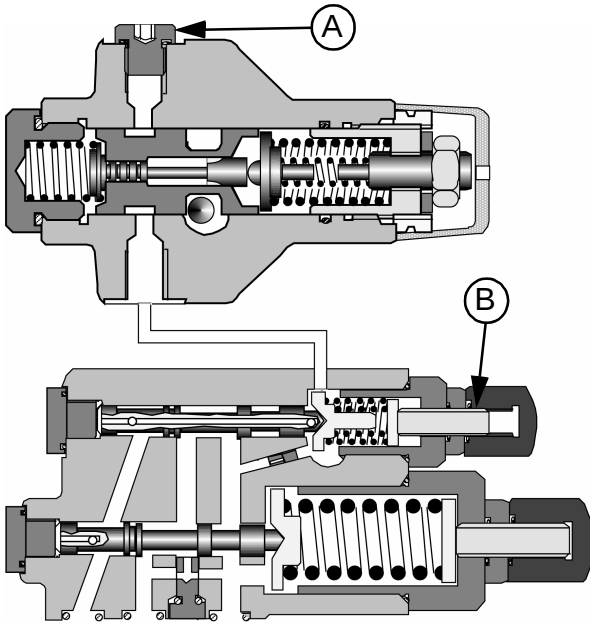
Fit the flowmeter turbine (D3144471) with the reducers (G1037352) and hose (Q5931990) at the swing control valve inlet.

Checks or adjustments on the swing

Swing flow cancellation valve A5

Connect the multitester at TEST POINT M2. Block the upperstructure mechanically. Put the machine in "MAX" mode. Operate the swing in one direction. The pressure noted should be between 290 and 300 bar.

Torque spool A4 pressure differential

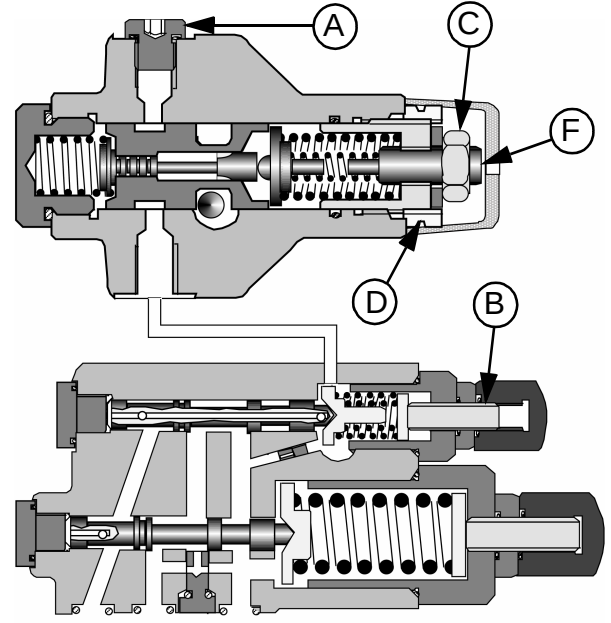


PDH0508

Remove the plug (A) opposite the inlet of the rigid pipe on the torque valve. Fit the union (W5137530), the union (L3237536) and the D12 hose (B8031969). Place this hose in the tank. Operate the swing in one direction. The pressure read at TEST POINT M2 should be 16 bar.

If it is not, adjustments should be made at the screw (B) of the torque spool.

Hydraulic power



PDH0508

Put the machine in "MAX" mode. Operate the swing in one direction. Adjust the main swing relief valve to 170 bar. The flow should be between 85 and 93 l/mn. Then, adjust to 230 bar. The flow should be between 62 and 70 l/mn.

If adjustment is necessary, it must be made in the following manner :

Adjust the main relief valve to 170 bar. Untighten the central screw lock nut (C) on the torque valve, and untighten the screw by 5 turns. Retighten the lock nut (C). Untighten the big lock nut (D), and, using the central screw, adjust so as to obtain a flow between 85 and 93 l/mn. Tighten the lock nut (D). Adjust the main relief valve to 230 bar. Untighten lock nut (C) on the central screw. Screw in and adjust so as to obtain a flow between 62 and 70 l/mn. Retighten the lock nut (C). With the swing blocked in one direction, set the pressure at the main relief valve to the same value as that of the flow cancellation valve.

Secondary relief valves X and Y

Overtighten the flow cancellation valve and the main relief valve for this function by one turn. Operate the swing in both directions. The pressure should be between 300 and 320 bar.

If it is not, change the valve or valves.

8001-12

Main relief valve S

Disconnect one motor feed hose, at the control valve. Plug at the control valve end using 27 x 200 plug (Q3337452), and on the hose end with the second plug and the 27 x 200 female union (P4237556). Operate the direction of swing concerned. Adjust to between 310 and 330 bar. Reconnect the motor.

Adjusting the flow cancellation valve AD

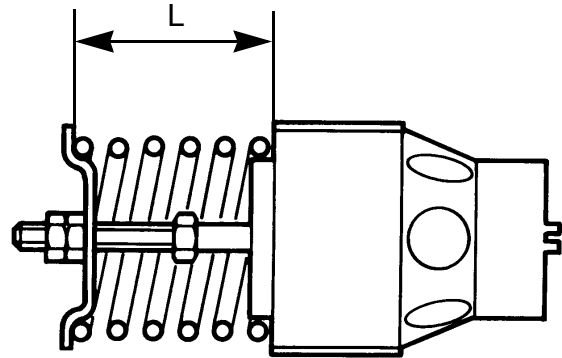
Operate the swing in one direction. Adjust to a value between 290 and 300 bar.

Remove the flowmeter

Checking the swing brake release

Connect the two multitester outlets at TEST POINTS M2 and M7. With the upperstructure immobilized, operate the swing control lever. The pressure at TEST POINT M7 should show 35 bar before the pressure rises at TEST POINT M2. If it does not, check the brake release circuit.

Checking the boom and dipper flow limiters



PDH0509

Pressure on dipper retraction at TEST POINT M1 should be between 40 and 70 bar.

If it is not, adjust the limiter spring to $L = 27$ mm.

If boom lowering is not correct, adjust the spring to $L = 26.5$ mm.

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1188P HYDRAULIC SCHEMATIC

- DESCRIPTION :**
- 1** Reservoir
 - 2** Variable flow 2 - body high pressure pumps for attachments, travel, stabilizers and options
Low pressure pump for steering/braking circuit
 - 3** Low pressure pump for servo-system
 - 4** Foot pressure release pump
 - 5** Servo-circuit manifold
 - 6** Pilot circuit minimum pressure switch
 - 7** Anti-surge valve and filter on LS circuit
 - 8** Hydraulic reservoir filler cap with self pressurizing valve and gauge filter
 - 9** Return manifold with filter elements and restriction indicator
 - 10** Magnetic filter on functional leak returns
 - 11a** Boom-bucket function manual control block
 - 11b** Dipper-swing function manual control block
 - 12** Travel control pedal
 - 13** Travel direction inverter (INCHING)
 - 13a** Travel pilot pressure switch (automatic front axle unlocking)
 - 14** Hydraulic servo-block consisting of :
 - 14a** Solenoid valve (**Y2** and **Y13**) arm rest raising safety system, front axle locking and unlocking
 - 14b** Arm rest raising safety selector block, front axle locking and unlocking
 - 14c** Automatic swing brake and brake release solenoid valve (**Y5**)
 - 14d** 35 bar pressure limiter (**P35**)
 - 14e** Working brake solenoid valve (**Y16**)
 - 14f** Travel speed change solenoid valve (**Y11** : job site speed, **Y12** : road speed)
 - 14g** Stabilizer and dozer blade solenoid valve (**Y26** : raising, **Y27** : lowering)
 - 15** Travel pilot pressure selector block (AUTO-IDLE)
 - 16** Swing pilot pressure selector block (automatic braking and brake release and AUTO-IDLE)
 - 17** LS information pressure sender
 - 18** Swing control valve block
 - 19** Swing function forced feed/safety flanged block
 - 20** Hydraulic swing motor with static brake

- 21** Attachment control valve block (boom, bucket, dipper)
- 21** P10 pressure limiter block (2) on return circuits
- 22** Flow limiter on dipper cylinder small chamber
- 23** Dipper cylinder (dashpot on small and large chamber)
- 24** Backhoe-clamshell selector block
- 25** Bucket cylinder (dashpot on the small chamber)
- 26** Boom cylinder feed divider block with flow limiter on cylinder large chamber
- 27** Boom cylinders (dashpot on small and large chambers)
- 28** Pressure selector on attachments/options and
- 29** travel/stabilizer LS circuit
- 29b** and **29c** Pressure selector on brake circuits (travel brake and dynamic brake)
- 30** Variable flow high pressure pump for swing function
- 31** Hose/accumulator on pump LS information circuit
- 32** Pressure tapping points
- 32e M1** : attachment/travel or option circuit pressure
- 32d M2** : swing circuit pressure
- 32a M3** : pump LS information circuit pressure
- 32b M4** : servo-feed circuit pressure
- 32c M6** : travel pilot circuit pressure (forward travel)
- 32f M8** : brake module circuit pressure
- 32h M9** : **P10** pressure (2) in dynamic mode
- 32g M18** : travel/stabilizer control valve feed circuit pressure
- 32h M22** : hydraulic travel motor displacement change circuit pressure
- 32j M27** : torque regulator valve pilot circuit pressure (delivered by proportioning valve)
- 33** Steering/braking circuit filter
- 34** Boom cylinder large chamber valve (for transport position)
- 35** Calibrated orifice for oil cooler circuit flow
- 36a** Swing pilot pressure switch
- 36b** Travel pilot pressure switch
- 37** Electro-hydraulic proportioning valve

- 38** Hydraulic swing motor speed detector
- 39** Electronic control box
- 40** Braking valves on swing control valve spool pilot
- 41** Hydraulic reservoir shut-off valve
- 42** Steering box (orbitrol)
- 43** Brake unit
- 44a** Accumulator on parking brake circuit
- 44b** Accumulator on front axle braking circuit
- 44c** Accumulator on rear axle braking circuit
- 45** Travel speed change braking pressure switch
- 46a** Minimum steering pressure switch
- 46b** Pressure switch (stoplights)
- 47a** Parking brake pressure switch
- 47b** Minimum braking pressure switch
- 48** 16 passage hydraulic swivel
- 49** Travel and stabilizer/dozer blade control valve block
- 50** Hydraulic travel motor (with displacement change)
- 51** Travel motor forced feed flanged block
- 52** Speed limiter and safety block
- 53** Two-speed box with parking brake and speed range change cylinder
- 54** Speed range change safety and indexing block
- 55** Hydraulic travel motor disengagement block (for speed range change)
- 56** Calibrated orifice on parking brake circuit
- 57** Brake on front axle and steering cylinder
- 58** Brakes on rear axle
- 59** Front axle beam locking cylinder
- 60** Stabilizer/dozer blade selector valve
- 61** Front stabilizer or dozer blade feed connection block
- 62** Stabilizer cylinders with single piloted valve on large chamber
- 63** Single piloted valve on stabilizer or dozer blade cylinder small chamber
- 64** Flow limiter on stabilizer cylinder small chamber
- 65** Dozer blade cylinders with single piloted valve on the large chamber
- 66** Calibrated orifice on dozer blade cylinder small chamber feed line
- 67** Braking valves on dozer blade cylinder large chambers
- 70** Block with calibrated orifice for variable flow pump body irrigation

