

Workshop Manual

**Electrical system
Wiring diagrams**

B
2(0)

**31, 32, 41, 42, 43,
44, 300 series**

Group 30 Electrical system

Marine engines

MD31A • TMD31B, D, L-A
TAMD31B, D, S.O.L.A.S, L-A, M-A, P-A, S-A
AD31B, D, L-A, P-A • KAD32P
TMD41B, D, L-A
TAMD41B, D, S.O.L.A.S, L-A, M-A, P-A, H-A, H-B
D41B, D, L-A • AD41B, D, L-A, P-A
TAMD42AWJ, BWJ, WJ
KAMD42A, B, P • KAD42A, B, P
KAMD43P • KAD43P
KAMD44P-A, P-B, P-C • KAD44P-A, P-B, P-C
KAMD300-A • KAD300-A

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Safety Precautions

Introduction

This Workshop Manual contains technical data, descriptions and repair instructions for Volvo Penta products or product versions contained in the contents list. Ensure that the correct workshop literature is being used.

Read the safety information and the Workshop Manual “General Information” and “Repair Instructions” carefully before starting work.

Important

In this book and on the engine you will find the following special warning symbols.



WARNING! If these instructions are not followed there is a danger of personal injury, extensive damage to the product or serious mechanical malfunction.



IMPORTANT! Used to draw your attention to something that can cause damage, product malfunction or damage to property.

NOTE! Used to draw your attention to important information that will facilitate work or operations.

Below is a summary of the risks and safety precautions you should always observe or carry out when operating or servicing the engine.



Immobilize the engine by turning off the power supply to the engine at the main switch (switches) and lock it (them) in the OFF position before starting work. Set up a warning notice at the engine control point or helm.



Generally, all servicing should be carried out with the engine switched off. Some work (carrying out certain adjustments for example) requires the engine to be running. Approaching a running engine is dangerous. Loose clothing or long hair can fasten in rotating parts and cause serious personal injury.

If working in proximity to a running engine, careless movements or a dropped tool can result in personal injury. Avoid burns. Take precautions to avoid hot surfaces (exhausts, turbochargers, charge air pipes and starter elements etc.) and liquids in supply lines and hoses when the engine is running or has been turned off immediately prior to starting work on it. Reinstall all protective parts removed during service operations before starting the engine.



Check that the warning or information decals on the product are always clearly visible. Replace decals that have been damaged or painted over.



Never start the engine without installing the air cleaner (ACL). The rotating compressor in the Turbo can cause serious personal injury. Foreign objects entering the intake ducts can also cause mechanical damage.



Never use start spray or similar to start the engine. The starter element may cause an explosion in the inlet manifold. Danger of personal injury.



Avoid opening the coolant filling cap when the engine is hot. Steam or hot coolant can spray out at the same time as the pressure which has built up is lost. Open the filler cap slowly, and release the pressure in the cooling system if the filling cap or tap has to be opened, or if a plug or coolant hose has to be removed when the engine is hot. Steam or hot coolant can stream out in an unexpected direction.



Hot oil can cause burns. Avoid skin contact with hot oil. Ensure that the lubrication system is not under pressure before commencing work on it. Never start or operate the engine with the oil filler cap removed, otherwise oil could be ejected.



Stop the engine and close the sea cock before carrying out operations on the engine cooling system.








Only start the engine in a well-ventilated area. If operating the engine in an enclosed space, ensure that exhaust gases and crankcase ventilation emissions are ventilated out of the working area.



Always use protective goggles where there is a danger of pieces of metal, sparks from grinding, acid or other chemicals being thrown into your eyes. Your eyes are very sensitive, injury can lead to loss of sight!

- ⚠ Avoid skin contact with oil. Long-term or repeated contact with oil can remove the natural oils from your skin. The result can be irritation, dry skin, eczema and other skin problems. Used oil is more dangerous to health than new oil. Use protective gloves and avoid using oil-soaked clothes and rags. Wash regularly, especially before meals. Use the correct barrier cream to prevent dry skin and to make cleaning your skin easier.
- ⚠ Most chemicals used in products (engine and transmission oils, glycol, petrol and diesel oil) and workshop chemicals (solvents and paints) are hazardous to health. Read the instructions on the product packaging carefully! Always follow safety instructions (using breathing apparatus, protective goggles and gloves for example). Ensure that other personnel are not unwittingly exposed to hazardous substances (by breathing them in for example). Ensure that ventilation is good. Handle used and excess chemicals according to instructions.
- ⚠ Be extremely careful when tracing leaks in the fuel system and testing fuel injection nozzles. Use protective goggles! The jet ejected from a fuel injection nozzle is under very high pressure, it can penetrate body tissue and cause serious injury. There is a danger of blood poisoning.
- ⚠ All fuels and many chemicals are inflammable. Ensure that a naked flame or sparks cannot ignite fuel or chemicals. Combined with air in certain ratios, petrol, some solvents and hydrogen from batteries are easily inflammable and explosive. Smoking is prohibited! Ensure that ventilation is good and that the necessary safety precautions have been taken before carrying out welding or grinding work. Always have a fire extinguisher to hand in the workplace.
- ⚠ Store oil and fuel-soaked rags and fuel and oil filters safely. In certain conditions oil-soaked rags can spontaneously ignite. Used fuel and oil filters are environmentally dangerous waste and must be deposited at an approved site for destruction together with used lubricating oil, contaminated fuel, paint remnants, solvent, degreasing agents and waste from washing parts.
- ⚠ Never allow a naked flame or electric sparks near the batteries. Never smoke in proximity to the batteries. The batteries give off hydrogen gas during charging which when mixed with air can form an explosive gas – oxyhydrogen. This gas is easily ignited and highly volatile. Incorrect connection of the battery can cause a spark which is sufficient to cause an explosion with resulting damage. Do not disturb battery connections when starting the engine (spark risk) and do not lean over batteries.
- ⚠ Never mix up the positive and negative battery terminals when installing. Incorrect installation can result in serious damage to electrical equipment. Refer to wiring diagrams.
- ⚠ Always use protective goggles when charging and handling batteries. The battery electrolyte contains extremely corrosive sulfuric acid. If this comes into contact with the skin, wash immediately with soap and plenty of water. If battery acid comes into contact with the eyes, immediately flush with copious amounts of water and obtain medical assistance.
- ⚠ Turn off the engine and turn off power at main switch(es) before carrying out work on the electrical system.
- ⚠ The clutch must be adjusted with the engine shut off.
- ⚠ Use the lifting eyes mounted on the engine/reverse gear when lifting the drive unit. Always check that lifting equipment is in good condition and has sufficient load capacity to lift the engine (engine weight including reverse gear and any extra equipment installed). To ensure safe handling and to avoid damaging engine components on top of the engine, use a lifting beam to raise the engine. All chains and cables should run parallel to each other and as perpendicular as possible in relation to the top of the engine. If extra equipment is installed on the engine altering its center of gravity, a special lifting device is required to achieve the correct balance for safe handling. Never carry out work on an engine suspended on a hoist.

-  Never remove heavy components alone, even where secure lifting equipment such as secured blocks are being used. Even where lifting equipment is being used it is best to carry out the work with two people; one to operate the lifting equipment and the other to ensure that components are not trapped and damaged when being lifted.
When working on-board ensure that there is sufficient space to remove components without danger of injury or damage.
-  Components in the electrical and fuel systems on Volvo Penta products have been designed to minimize the risks of explosion and fire. The engine must not be operated in environments with adjacent explosive media.
-  Fuel delivery pipes must not be bent or straightened under any circumstances. Damaged pipes must be replaced.
-  Remember the following when washing with a high pressure washer: Never aim the water jet at seals, rubber hoses or electrical components. Never use a high pressure washer for engine cleaning.
-  Always use fuels recommended by Volvo Penta. Refer to the Instruction Book. The use of lower quality fuels can damage the engine. On a diesel engine poor quality fuel can cause the control rod to seize and the engine to overrev with the resulting risk of damage to the engine and personal injury. Poor fuel quality can also lead to higher maintenance costs.

General information

About the workshop manual

This workshop manual contains wiring diagrams, descriptions and repair instructions for the electrical system used in the standard engines in the 31, 32, 41, 42, 43, 44 and 300 series.

However, electrical components in the EDC system for engines in the 44 and 300 series are covered in a separate workshop manual, see "EDC I fuel system".

This Workshop Manual has been developed primarily for Volvo Penta service workshops and qualified personnel. Persons using this book are assumed to have a grounding in marine drive systems and be able to carry out related mechanical and electrical work.

Volvo Penta is continuously developing their products. We therefore reserve the right to make changes. All the information contained in this book is based on product data available at the time of going to print. Any essential changes or modifications introduced into production or updated or revised service methods introduced after the date of publication will be provided in the form of Service Bulletins.

Replacement parts

Replacement parts for electrical and fuel systems are subject to statutory requirements (US Coast Guard Safety Regulations for example). Volvo Penta Genuine parts meet these requirements. Any type of damage which results from the use of non-original Volvo Penta replacement parts for the product will not be covered under any warranty provided by Volvo Penta.

Certified engines

When doing service and repair on emission certified engines, it is important to be aware of the following:

Certification means that an engine type has been checked and approved by the relevant authority. The engine manufacturer guarantees that all engines made of the same type are equivalent to the certified engine.

This makes special demands on service and repair work, as follows:

- Maintenance and service intervals recommended by Volvo Penta must be complied with.
- Only Volvo Penta original spares may be used.
- Service to injection pumps, pump settings and injectors must always be done by an authorized Volvo Penta workshop.
- The engine must not be converted or modified, except for the accessories and service kits which Volvo Penta has approved for the engine.
- No installation changes to the exhaust pipe and engine air inlet ducts may be done.
- No seals may be broken by unauthorized personnel.

The general advice in the instruction book about operation, care and maintenance applies.

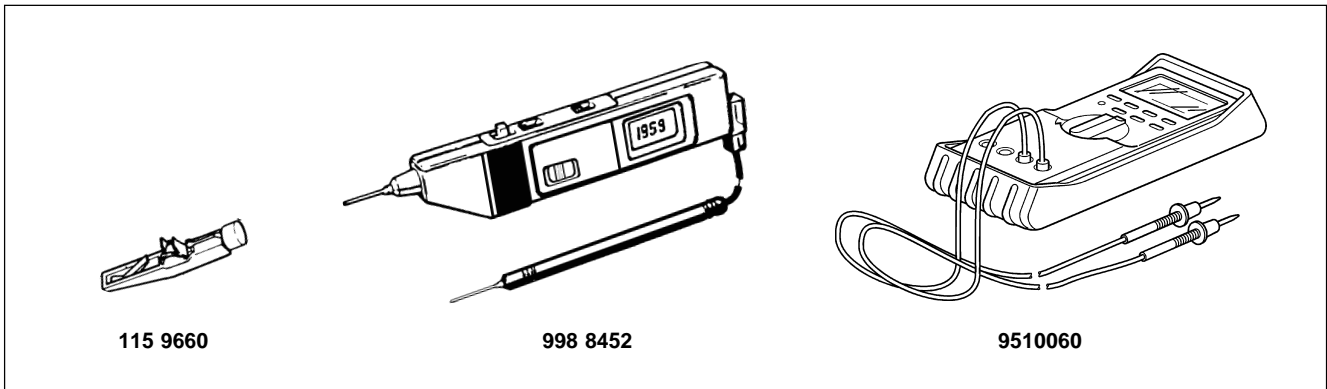


IMPORTANT! Delayed or inferior care/maintenance, and the use of non-original spares, mean that AB Volvo Penta can no longer be responsible for guaranteeing that the engine complies with the certified version.

Damage, injury and/or costs which arise from this will not be compensated by Volvo Penta.

Special tools

In all cases where it is practical the tool number, except for the final digit, has been stamped on the tool, The final digit (after the hyphen) is a control number.



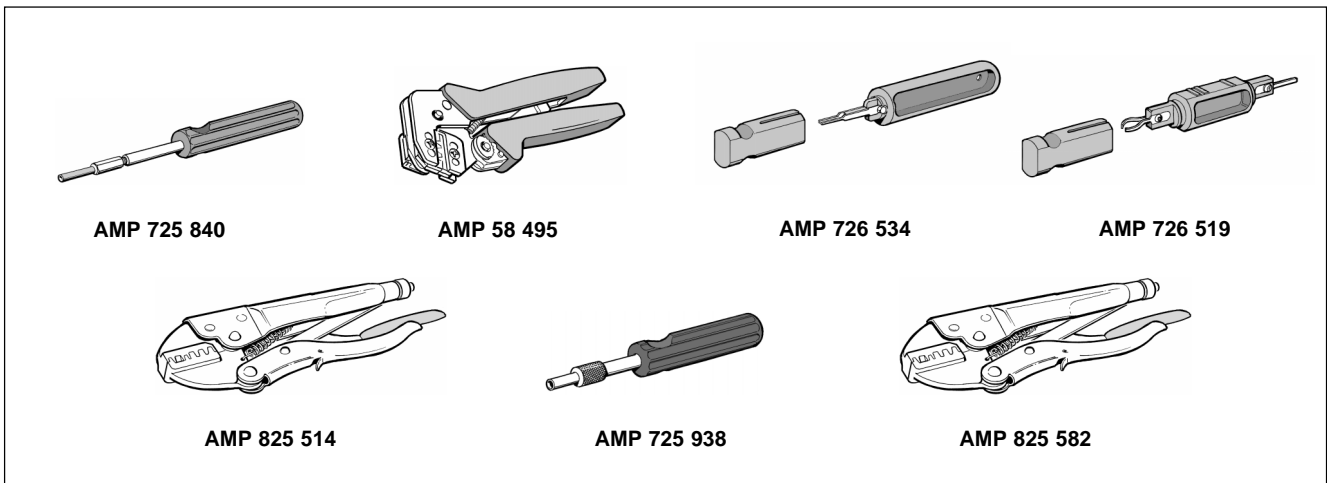
115 9660-8 Belt tensioner check tool

951 0060-8 Multimeter

998 8452-0 Digital probe tester

Other special equipment

The following tools are intended for use when working on the engines cable harness. The tools are not stocked by Volvo Penta and can only be ordered via a local **AMP** dealer. If you have difficulty finding an **AMP** sales outlet, contact Volvo Penta Quality Action Center for advice.



16 pin CPC connector, d=1.6 mm:

725 840-1 Terminal removal tool

58 495-1 Crimping pliers

JPT connector (42-pin EDC, 2- and 3-pin Bosch etc.):

726 534-1 Terminal removal tool 1.6 mm pin width

726 519-1 Terminal removal tool 2.8 mm pin width

825 514-1 Crimping pliers

Pin and sleeve terminals 3.5 mm:

725 938-0 Terminal removal tool

825 582-2 Crimping pliers

4.8 mm and 6.3 mm cable clamps: Male and female spade terminals

825 514-1 Crimping pliers

Design and Function

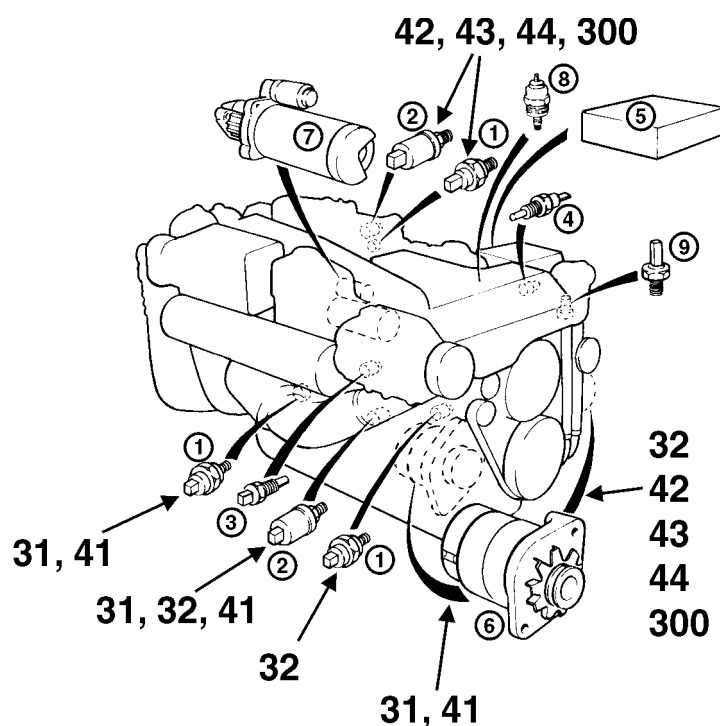
General

All of the engines have a 12-volt, 1-pole electrical system as standard, with an alternator. The exception is the KA(M)D44/300 which has a 1.5-pole system as standard.

The TAMD31M/41H/41M can have a 24 V 1.5-pole electrical system as an option.

The electrical systems of engine versions can otherwise differ in terms of equipment. The workshop manual does not state what is standard equipment or options or accessories. It only describes the repair methods.

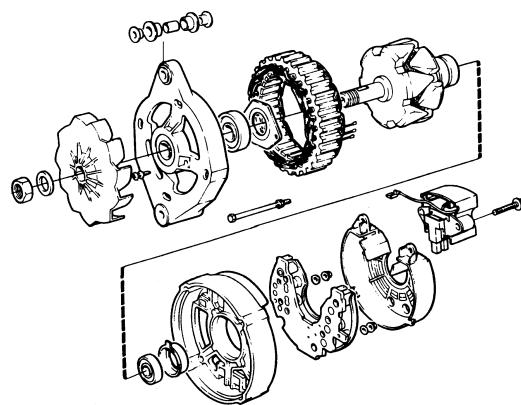
The generator is ready to be equipped with a wall mounted charge divider (twin diode) which divides the charge current to two separate battery circuits.



Location of electrical components

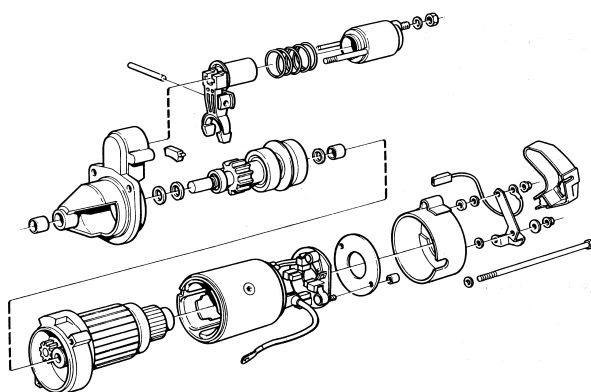
- | | |
|--|--|
| 1. Oil pressure sensor | 6. Generator |
| 2. Oil pressure sensor | 7. Starter motor |
| 3. Engine coolant temperature (ECT) switch | 8. Solenoid valve (on injection pump) |
| 4. Engine coolant temperature (ECT) sensor | 9. Inductive engine speed (RPM) sensor (only 32, 42, 43) |
| 5. Junction box | |

Renovation, please refer to the "Starter motor, Alternator" chapter in the workshop manual.



Starter motor

Renovation, please refer to the "Starter motor, Alternator" chapter in the workshop manual.



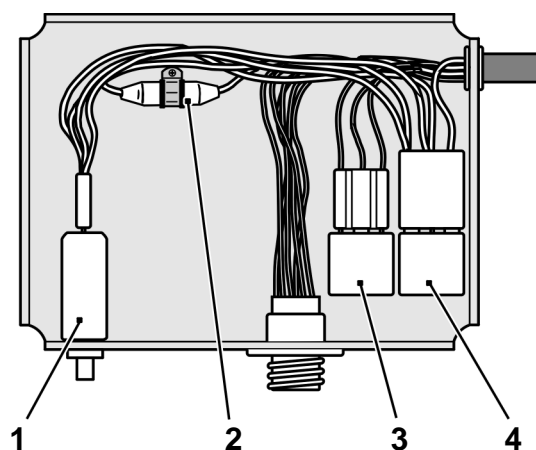
Junction box

The junction box is located on the front left hand side of the engine.

The components included differ depending on the engine type (see illustration) The relay location may be different to that in the illustrations, always check the cable colors at the terminals before commencing any fault-tracing.

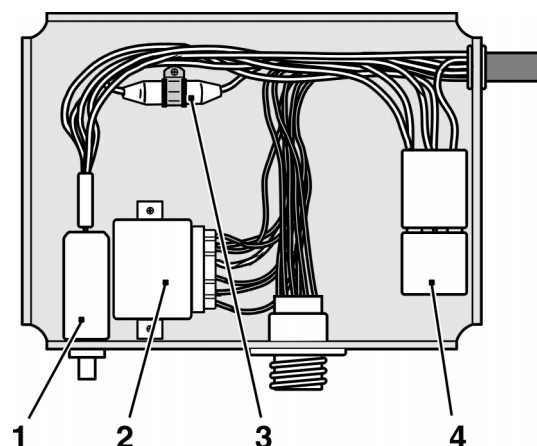
Junction box 31/41

1. Automatic fuse (24V version has 2 x)
2. Resistor
3. Ground relay (only 1.5 pole version)
4. Starter relay



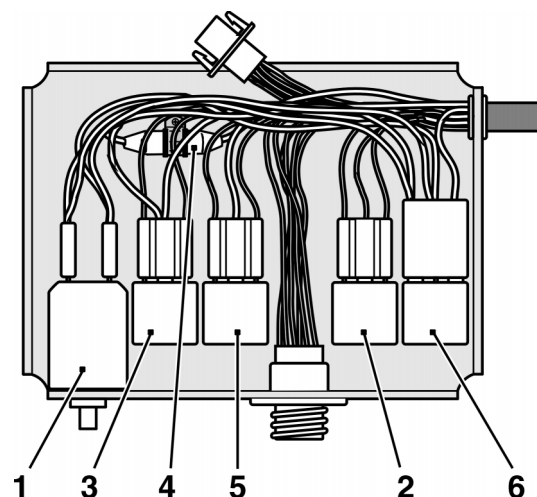
Junction box KAD32, KA(M)D42/43

1. Automatic fuse
2. Engine speed (RPM) relay
3. Resistor
4. Starter relay



Junction box KA(M)D44/300

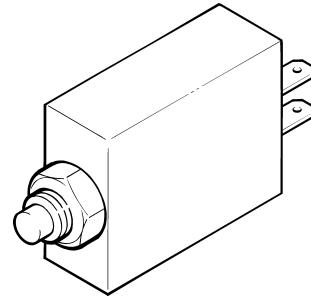
1. Automatic fuse (2 x)
2. Main relay
3. Stop relay
4. Resistor
5. Ground relay
6. Starter relay



Fuses

The engines are equipped with an 8 A semi-automatic fuse. The exception is KA(M)D44/300 and engines with 24 V systems which has two.

The fuses are in the terminal box. The fuses are reset with the button on the side of the box.



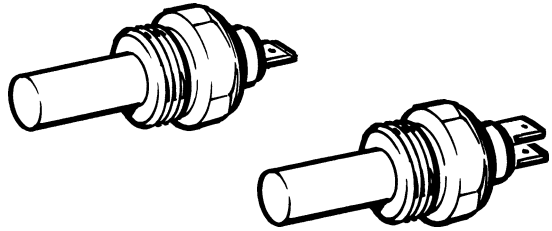
Switches

Coolant temperature switch

The engine coolant temperature (ECT) switches are closed with rising temperature according to the following:

12 V (1-pole) or 12/24 V (2-pole) **installed on thermostat** (applies to older versions) closes at $95^{\circ} \pm 3^{\circ}$.

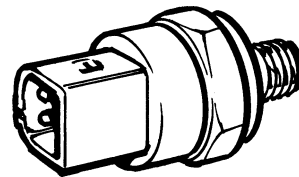
12 V (1-pole) or 12/24 V (2-pole) **installed on exhaust manifold** closes at $97^{\circ} \pm 3^{\circ}$.



Oil pressure sensor

The oil pressure switches are closed with falling temperature according to the following:

12/24 V (2-pin) closes at $69 \text{ kPa} \pm 14 \text{ kPa}$ ($0.7 \text{ bar} \pm 0.15 \text{ bar}$).



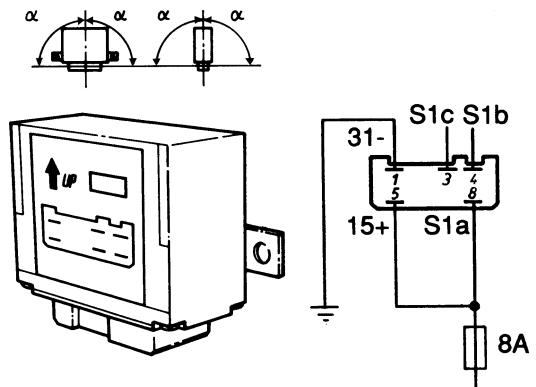
Tilt switch (S.O.L.A.S)

Detects tilt. When the angle is greater than $90^{\circ} \pm 5^{\circ}$ from horizontal the switch changes S 1b after approximately 0.5 seconds. After the switch a holding circuit is activated until voltage 15+ at terminal 5 is broken.

S 1b is normally open when in operation.

S 1c is normally shut when in operation.

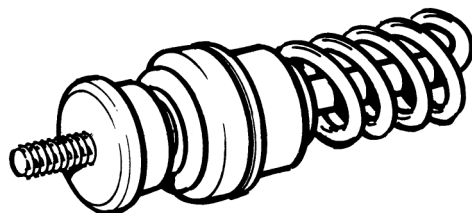
Supply voltage 10–30 V



Glow plugs (S.O.L.A.S)

2 pole, rated voltage $5.5 \text{ V} \pm 0.5 \text{ V}$, current 65.5 A, output $650 \pm 35 \text{ W}$. The same glow plugs are used on both the 12 V and 24 V systems.

The 12 V system normally has 2 glow plugs connected in series, in certain driving conditions the engines are modified to 4 glow plugs connected in series in groups (2+2) and the groups are connected in parallel. The 24 V system has 4 glowplugs connected in series.



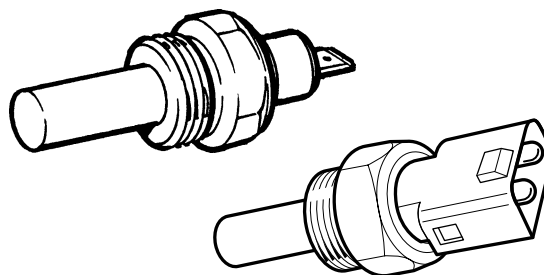
Sensor

Engine coolant temperature (ECT) sensor (1 or 2 pole)

Resistance tolerances, after 3 minutes temperature equalization and with operating voltage.

Tightening torques maximum **20 Nm**.

Test temp. C°	Single instrument sensor	Flying bridge sensor
60° ± 4°	134.0 Ω ± 13.5 Ω	67.0 Ω ± 6.5 Ω
90° ± 3°	51.2 Ω ± 4.3 Ω	25.6 Ω ± 2.1 Ω
100° ± 3°	38.5 Ω ± 3.0 Ω	19.3 Ω ± 1.5 Ω

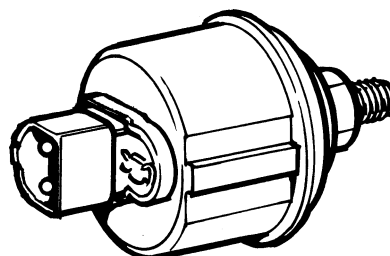


Oil pressure sensor, (0–10 bar)

Resistance tolerances, measuring with falling pressure at 20°C

	Single sensor	Flying bridge sensor
0 bar	10 Ω + 3 Ω, -5 Ω	5 Ω +1.8 Ω, -3 Ω
2 bar	52 Ω ± 4 Ω	25 Ω ± 2.4 Ω
4 bar	88 Ω ± 4 Ω	—
6 bar	124 Ω ± 5 Ω	61 Ω ± 3 Ω
8 bar	—	78 Ω ± 3 Ω

Tightening torque: maximum **30 Nm**

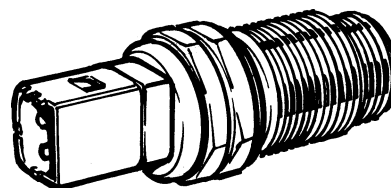


Engine speed (RPM) sensor (KAD32, KA(M)D42/43)

Type: Inductive sensor (cog counter). Internal resistance 1050 Ω ± 100 Ω.

Only for controlling the supercharger engine speed (rpm) relay. The engine speed relay in the instrument panel receives the input signal from the W output in the generator.

Tightening torque: maximum **50 Nm**



Solenoid valve (on injection pump)

Sliding electro-magnet activated when + is connected on the terminal pins.

Tightening torque: **43 Nm**.



Engine speed (RPM) relay (KAD32, KA(M)D42/43)

Function

Outputs:

- S 1 (terminal 5), closes to ground and engages the supercharger
- G + (pin 4), + supply to position sender

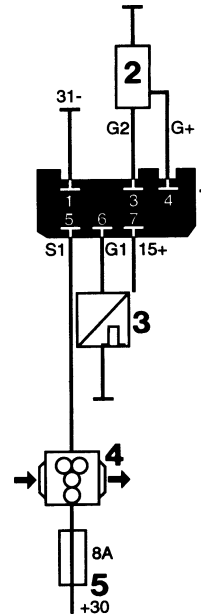
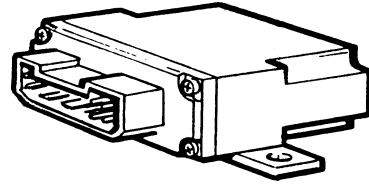
Inputs:

- G 1 (terminal 6), inductive engine speed (RPM) sensor
- G 2 (pin 3), + from position sender
- 15 + (terminal 7), ignition switch current
- 31 – (terminal 1), battery –

The engine speed (RPM) relay closes to ground via S 1 and connects the supercharger. With an increase in engine speed S 1 closes at 1700 rpm and breaks at 2400 rpm (KAMD) or 2600 rpm (KAD), ± 50 rpm.

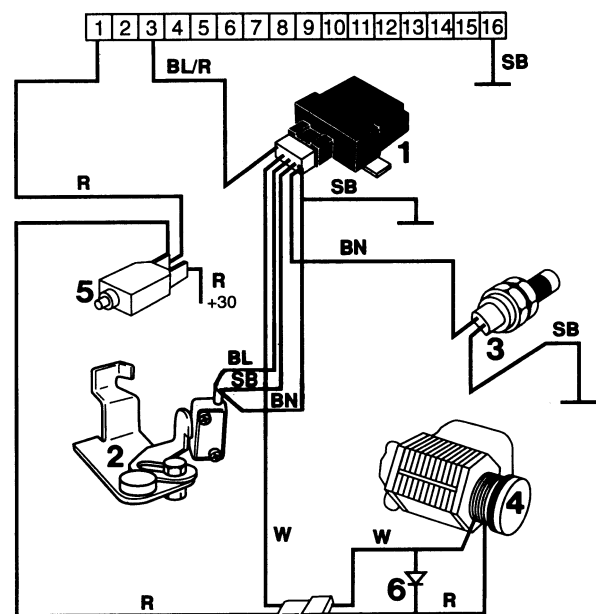
With a reduction in engine speed S 1 closes 4.5 seconds ± 2 seconds after the engine speed has gone below the set value 1700–2400 rpm (KAMD) or 1700–2600 rpm (KAD) and disconnects at 1400 rpm ± 150 rpm.

Between 600–3.100 rpm, S 1 closes if the “kick down” position sender opens and breaks the + supply to G 2.



Supercharger control

- | | |
|------------------------------|-------------------|
| 1. Engine speed (rpm) relay | 4. Supercharger |
| 2. Position sender | 5. Automatic fuse |
| 3. Engine speed (RPM) sensor | 6. Diode |



Fault-tracing

- **The supercharger is not engaged**

Disconnect connector to the supercharger solenoid. Run the engine above 1700 rpm, check that there is power supply at connector terminal using a circuit tester.

If there is current the fault lies in the solenoid or the cable to the connection.

The fault can also be due to the signal from the engine speed (RPM) sensor not being retained. Check sensor and wiring.

If the connector has no current the transient protection in the magnetic clutch may be damaged (conducts through) which may cause short-circuits. This in turn blows the fuse or damages the engine speed (RPM) relay.

- **The supercharger engages/disengages within the operating range (oscillates)**

Oxide or loose connections within the engine speed (RPM) sensor or the electronic module connectors. Cable breakage. Check and clean. The terminal pins should be smeared with contact grease.

- **The fuse blows when the compressor engages**

Remove the supercharger connector and check if the fuse still blows. If it did not there is a short-circuit in the magnetic clutch.

If the fuse blows despite the connector being disconnected there is a short-circuit in the engine speed relay.

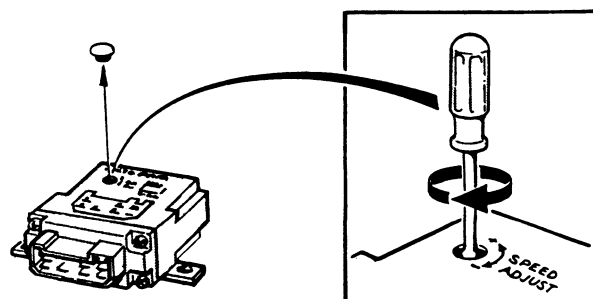
- **The supercharger disengages at the wrong engine speed (RPM)**

The disengagement engine speed is adjustable with a 27 revolution potentiometer on the junction box. Each revolution on the potentiometer corresponds to 48 rpm, in total 1296 rpm plus or minus at the potentiometer limit position.

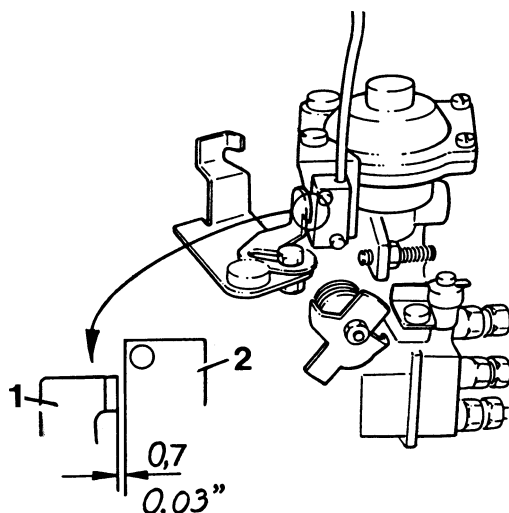
If adjustment with the potentiometer does not work the electronic module must be replaced.

- **The supercharger engages at the wrong engine speed (RPM)**

The cut-in speed is preprogrammed into the electronic box, except for "kickdown", when the position sender provides an impulse. Give full gas "Forwards" on the throttle. **Engine stationary!** Adjust the distance between the bracket (1) and position sender (2) to 0.028"/0.7 mm.



Engine speed adjustment



Adjusting the position sender

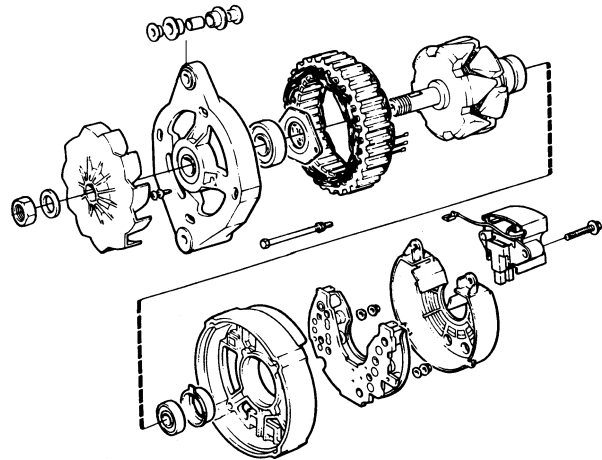
Charging system

General

The engines are equipped with 2 pole alternating current Valeo generators. Engines with 12 V systems have a 60 A generator, earlier versions have the same type of generator but the 50 A version. The generators are mechanically identical, electrically they have different winding resistances.

The engines with 24 V current have a 60 A generator, mechanically identical to the 12 V version but with larger dimensions.

The generator version is shown on a plate on the rear end.



Technical Data

Generator

Type:

Rectified three phase alternating current generators

Interference suppression condenser:

2.2 mF.

Voltage regulator type:

YV 77 (12V), ZV 37 (24V).

Output voltage:

14.2 V \pm 0.15 V at +20°C (12V)

28.5 V \pm 0.15 V at +20°C (24V),

temperature compensation – 10 mV \pm 2 mV/°C

Maximum current:

60 A alternatively 50 A (12 V), 60 A (24 V)

Faultfinding

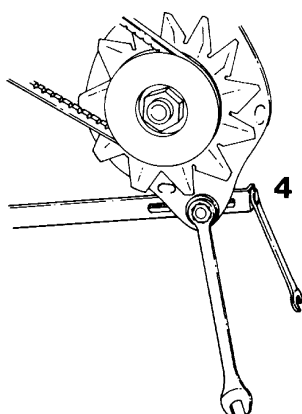
Before dismantling the generator fault-trace the battery circuit to eliminate other possible fault causes. When testing with the generator it should be "warm", run the engine at approximately 2000 rpm for 3 minutes before measuring.

⚠ WARNING! The generator, voltage regulator or battery circuit terminals must be connected when the engine is running. Do not disconnect these terminals while the engine is running. Carefully check that the measuring instrument is set to voltage supply (V), so that there is no short circuit between the generator terminals.

⚠ WARNING! Be especially careful that the supply cables, clothing or similar do not come into contact with the engine or generator pulleys or drive belts when the engine is running.

Generator belt

Special tools: 1159 660



Check the belt tension and condition. Split, worn or oily belts must be replaced. Adjust belt tension. Position tool 1159 660 behind the multi-V pulley driving edge. Adjust with belt tensioner (4).

Belt tension **20–25 kg**.

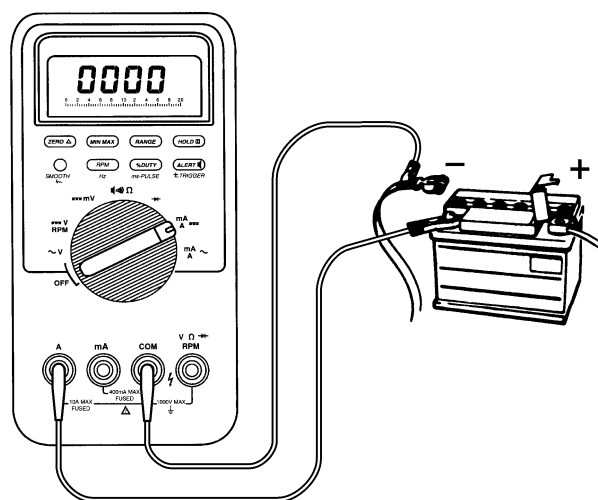
Current loss check

Special tools: 951 0060

Fault tracing is carried out with 951 0060. Note that other instruments may differ in the symbols displayed for set functions.

- 1**
Wash the battery with lukewarm water and dry. Remove the battery leads and clean the poles.
- 2**
Connect + terminal again.
- 3**
Switch off the ignition and any power consuming components connected to the starter battery.

4



Set the multimeter for measuring currents (mA) and connect the multimeter between the battery negative terminal and negative cable. The current loss must not exceed 0.1A with the ignition disconnected.

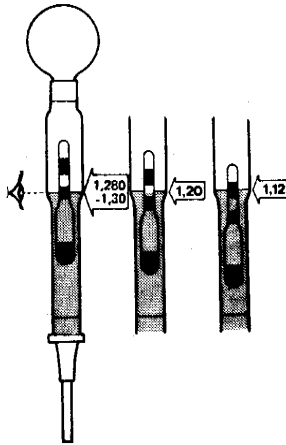
If the current loss is greater than 0.1 A:

- Check that there are no short circuits or lead over shorts occur at any terminal. Lead over shorts occur because of the dirty salt encrusted electrical components. Clean and check all terminals.

If the current loss is less than 0.1 A:

- Check the batteries' charge condition

Charging condition check



Check the charge condition using a hydrometer. Measure the acid weight in all cells at +20°C. Measurement must not occur directly after charging or filling with distilled water. The acid weight with a fully charged battery at +20°C should be 1.28. Charge the battery if the acid weight is lower than 1.21 (half charged). Charge with 5–6 A over approximately 10 hours.

⚠ WARNING! The battery generates hydrogen gas and is highly flammable and explosive. Never expose the battery to a naked flame or electric sparks. Ventilate the battery compartment well, especially after charging.

Check two hours after charging.

Acid weight is uneven between the cells. The difference between the cells is 0.04 points or more for example 1.28–1.24:

- The cell is probably short circuited. Replace battery.

The acid weight is even between cells, the battery is not fully charged:

- The battery is sulphated. Light sulphating can often be broken down by charging for a further 10 hours. Replace the battery if it does not help.

Battery, load test

Special tools: 951 0060

1

Check that the battery retains at least 1.21 in acid weight.

2

Remove ignition coil – terminal

3

Connect a voltmeter between the battery poles

4

Turn the starter motor for approximately 10 seconds and read off the start voltage which must not be less than 9.5 V (19 V in a 24 V system).

5

See if any of the cells bubble when the starter motor is turning (short circuit in the battery)

Voltage is lower than 9.5 V (19 V) or one of the cells is bubbling:

- Replace the battery and try again

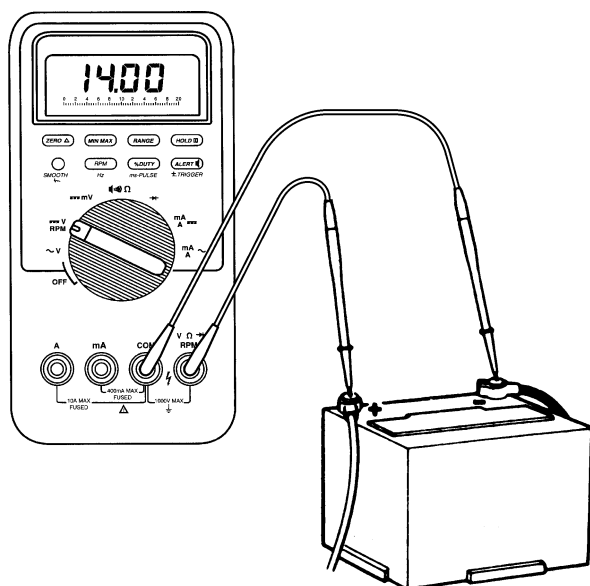
Voltage is 9.5 V (19 V) or higher:

- Battery OK; measure charge voltage according to the next paragraph.

Battery cable check

Special tools: 951 0060

1



Connect the multimeter between the battery positive and negative terminals. Run the engine at 2000 rpm. Read off and note the voltage between the battery terminals.

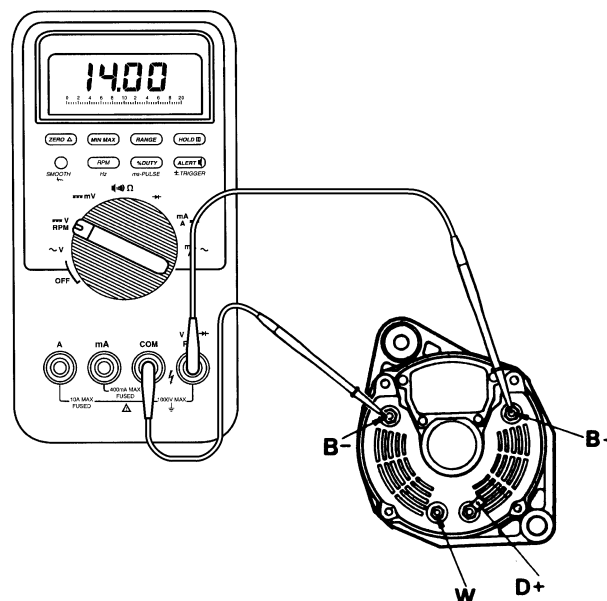
The generator puts out approximately 14.0 V (28.0 V):

- carry out test according to point 2.

The generator puts out more than 14.4 V (28.7 V):

- check the charging regulator, see Workshop manual "Starter motor, Generator".

2



Connect the multimeter between the generator B+ and the generator B-. Run the engine at 2000 rpm. The Generator output should be 14.0–14.4 V (28.0–28.7 V). Permitted voltage drop – difference between tests according to point 1 and point 2 should never be more than 0.4 V (0.7 V) in total.

Voltage drop less than 0.2 V (0.4 V):

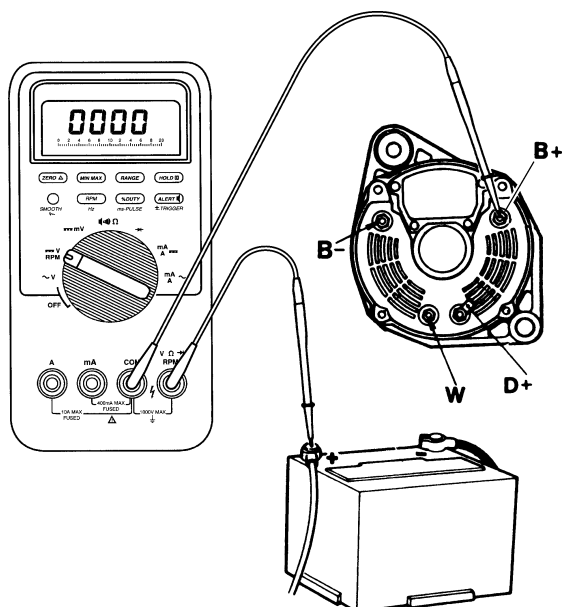
- Battery cables OK:

Voltage drop more than 0.3 V (0.6 V):

- Carry out test according to points 3 and 4.

Positive battery cable check

3

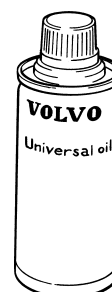


Connect the multimeter between the generator B+ and the battery positive terminal. Run the engine at 2000 rpm. The voltage drop must not be more than 0.2 V (0.5 V). If the voltage drop is more than 0.2 V (0.5 V) the cable terminals must be remedied according to point 5. Therefore carry out test according to point 4.

Corrective action

⚠ IMPORTANT! Switch off the ignition and disconnect the battery terminals before commencing work on the charging circuit.

5

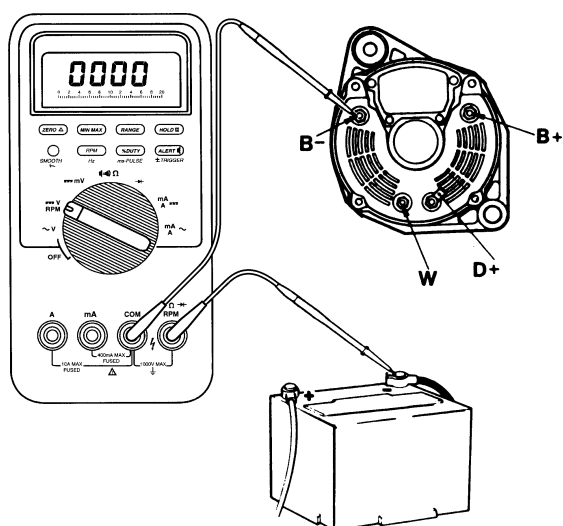


If the voltage drop in any of the tests according to points 3 or 4 is more than 0.2 V (0.5 V), the cable terminals must be removed and oxides etc. cleaned off. Spray with a moisture dispersing contact oil such as Volvo Universal oil or equivalent and retighten the terminals.

Go through the terminals for the battery, main switch, generator and starter motor.

Negative battery cable check

4



Connect the multimeter between the generator B- and the battery negative terminal.

Run the engine at 2000 rpm. The voltage drop must not be more than 0.2 V (0.5 V). If the voltage drop is more than 0.2 V (0.5 V) the cable terminals must be remedied according to point 5.

Engine

All models in the 31/41 series have a

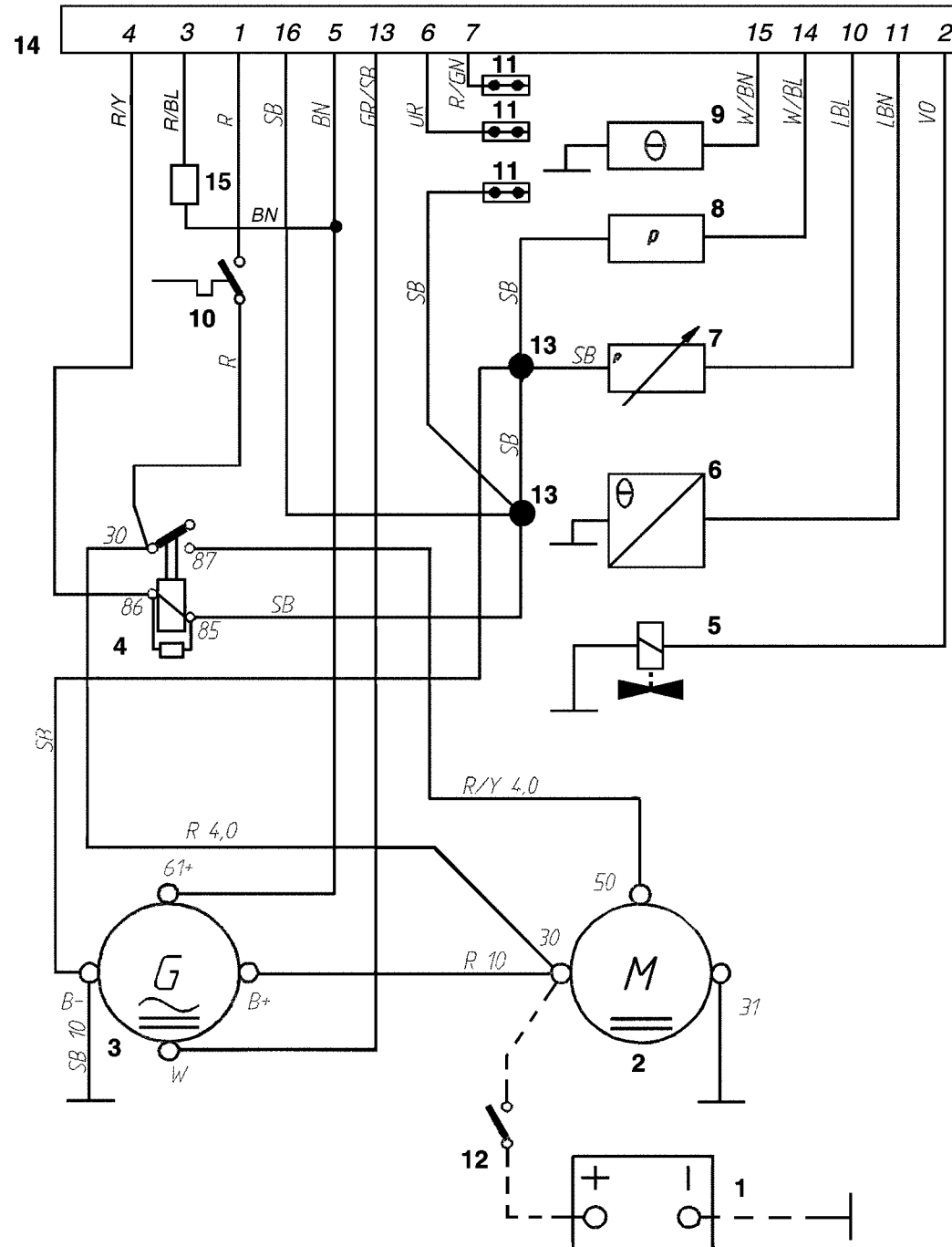
1-pole electrical system

1. Battery
2. Starter motor
3. Generator
4. Starter relay
5. Solenoid valve – Stop
6. Temperature sensor
7. Pressure sensor
8. Pressure switch NO 0.7 Bar
9. Temperature switch NO 97°C
10. Circuit breaker, 8 A (+)
11. Splice section (cable terminal)
12. Main switch
13. Connector, cannot be opened
14. CPC connector 16-pin
15. Resistor

Cable cross sections not given = 1.5 mm²

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	R	=	Red
BN	=	Brown	SB	=	Black
LBN	=	Light-brown	VO	=	Violet
GN	=	Green	W	=	White
GR	=	Gray	Y	=	Yellow
OR	=	Orange			



Engine

KAD32P, KA(M)D42A/B/P, KA(M)D43P

1-pole

Engine 32/42/43. 1-pole Electrical System

1. Battery
2. Generator
3. Starter motor
4. Starter relay
5. Control solenoid
6. Pressure switch NO 0.7 Bar
7. Pressure sensor
8. Temperature switch NO 97°C
9. Solenoid valve
10. Temperature sensor
11. Engine speed (rpm) sensor
12. Circuit breaker, 8 A
13. Connector
14. Engine speed relay
15. Position sender
16. Main switch
17. CPC connector 16-pin
18. Resistor

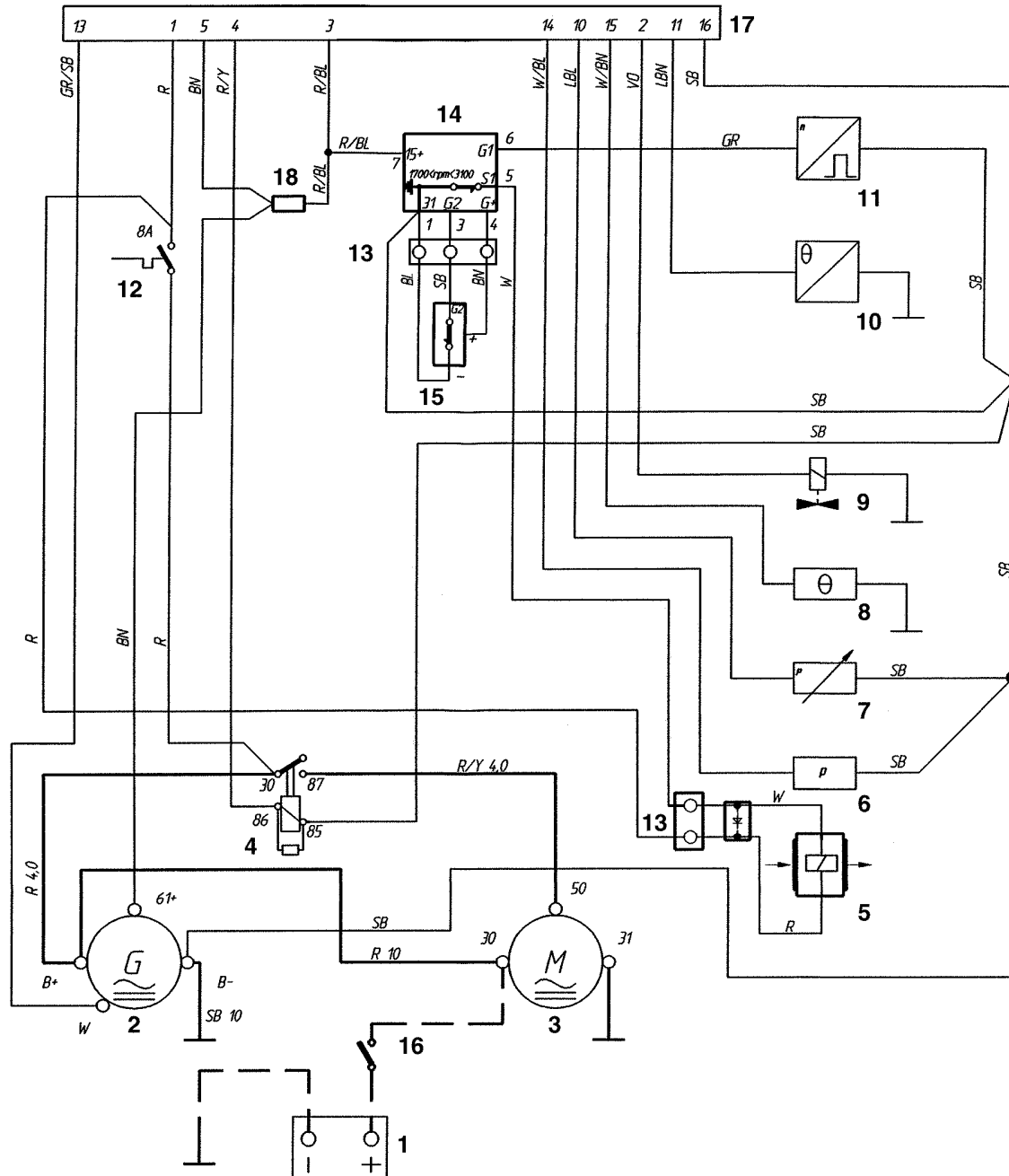
NO = Normally open during operation

Cable cross sections not given = 1.5 mm²

A broken line indicates a non-Volvo Penta cable

Cable color

BL = Blue	P = Pink
LBL = Light-blue	R = Red
BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



Engine

TAMD42AWJ, BWJ, WJ

1.5-pole*

* 1-pole during the start and stop phases, 2-pole at all other times.

Engine 42AWJ/BWJ/WJ. 1.5-pole electrical system

1. Battery
2. Generator
3. Starter motor
4. Starter relay
5. Control solenoid*
6. Oil pressure sensor NO 0.7 Bar
7. Oil pressure gauge
8. Engine coolant temperature (ECT) switch NO 97°C
9. Solenoid valve – Stop
10. Engine speed (rpm) sensor
11. Engine speed (rpm) sensor
12. Circuit breaker, 8 A (+)
13. Connector
14. Engine speed relay*
15. Limit switch*
16. Main switch
17. CPC connector 16-pin
18. Connector, cannot be opened
19. Thermal trigger 8 A (-)
20. Ground relay
21. Resistor

* The components are not installed on the engine, although the cables are in the wiring.

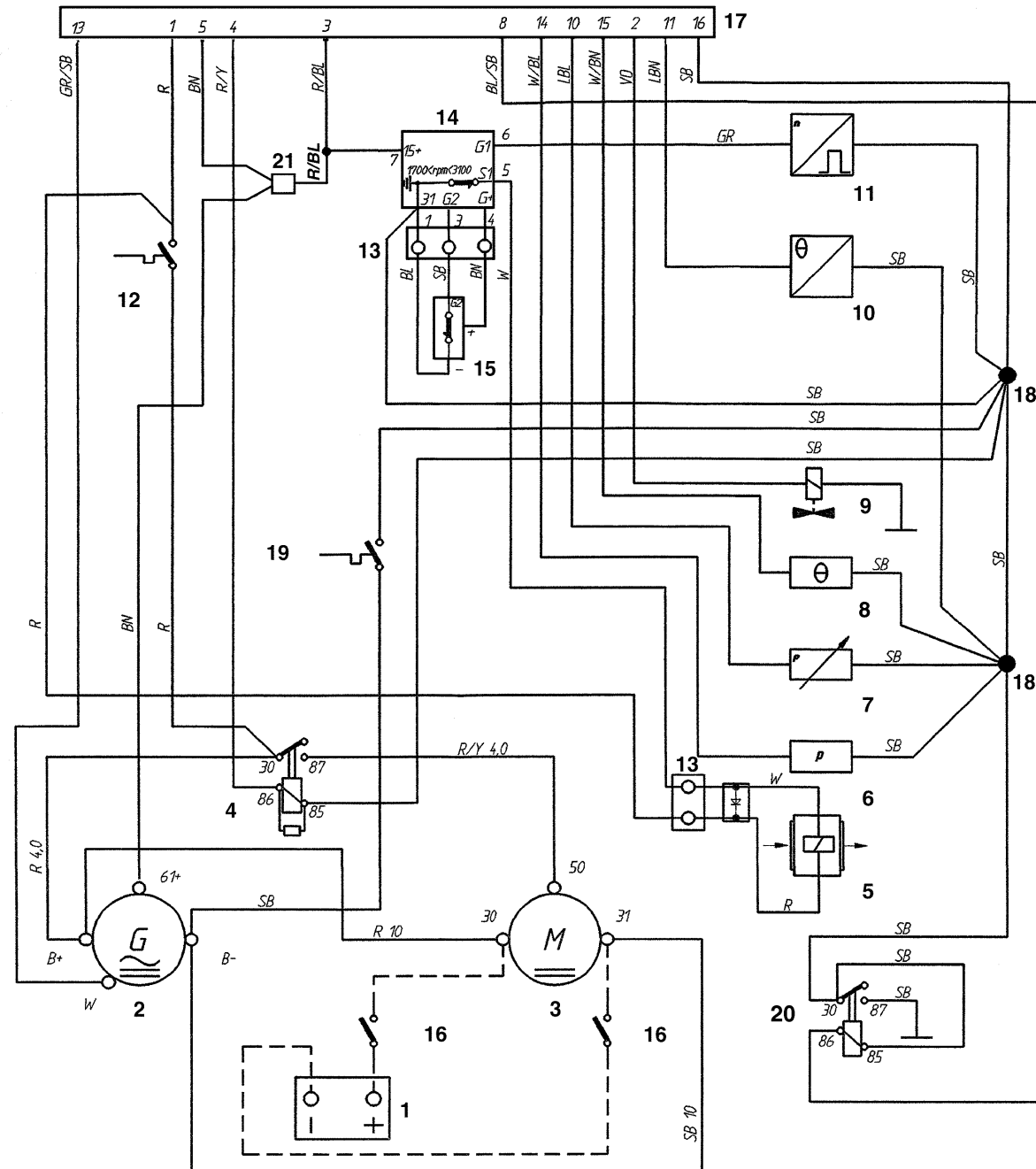
NO = Normally open during operation

Cable cross sections not given = 1.5 mm²

A broken line indicates a non-Volvo Penta cable

Cable color

BL = Blue	P = Pink
LBL = Light-blue	R = Red
BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



Engine

All models in the 31/41 series have a

12 V, 1.5-pole electrical system*

* 1-pole during the start and stop phases, 2-pole at all other times.

Engine 31/41. 12 V Electrical System 1.5-pole

1. Battery
2. Starter motor
3. Generator
4. Starter relay
5. Solenoid valve – Stop
6. Temperature sensor
7. Pressure sensor
8. Pressure switch NO 0.7 Bar
9. Temperature switch NO 97°C
10. Circuit breaker, 8 A (+)
11. Circuit breaker, 8 A (–)
12. Main switch
13. Connector, cannot be opened
14. CPC connector 16-pin
15. Ground relay
16. Glow plug relay*
17. Glow plugs*
18. Splice section
19. Inclination monitor (tilt sensor)**
20. Resistor

* These components are fitted only for S.O.L.A.S (Safety Of Life At Sea). They are available as an option for other system designs.

** This component is fitted only for S.O.L.A.S (Safety Of Life At Sea), however, the cabling contains the conductors for all system designs.

NO = Normally open during operation

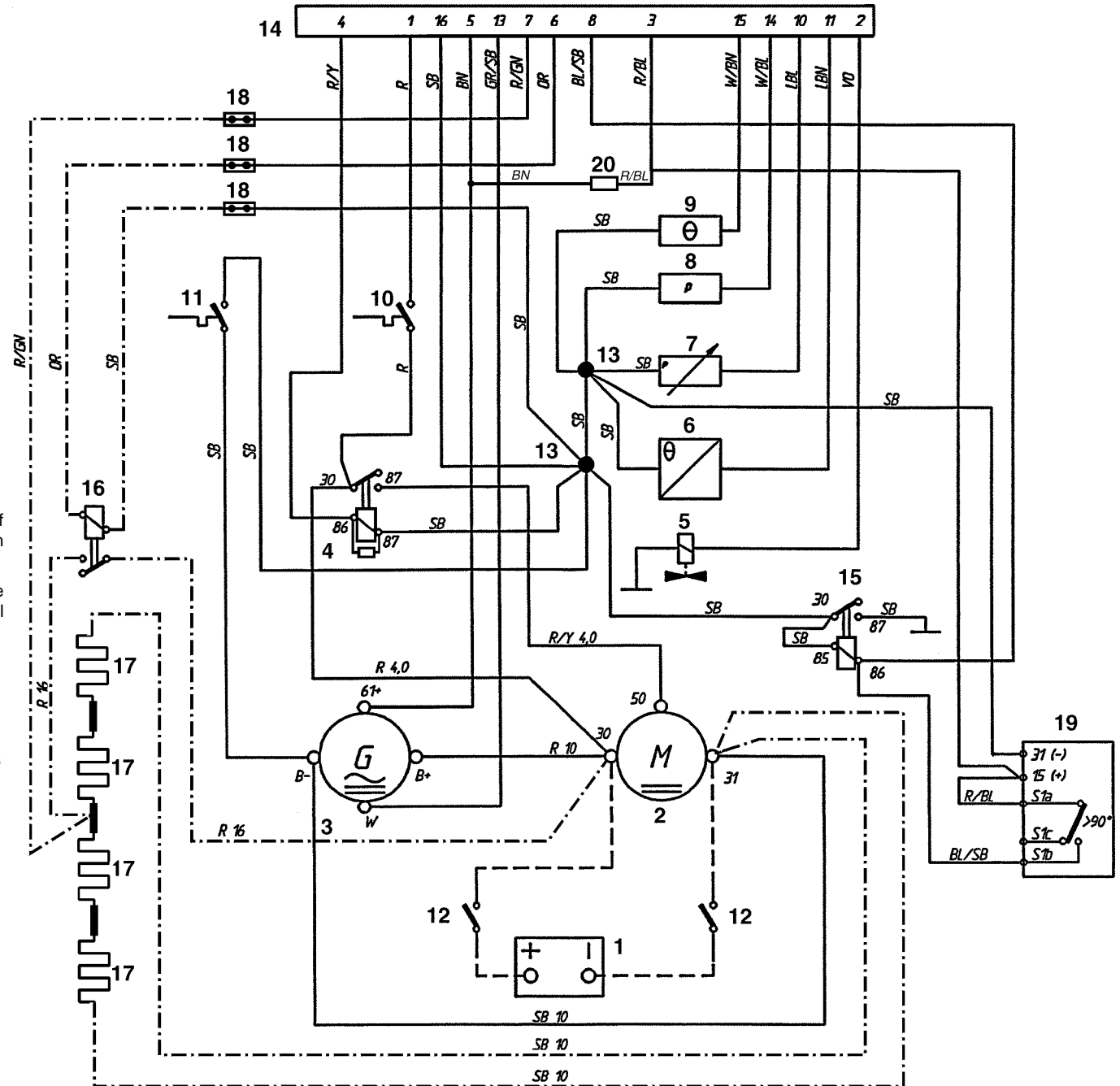
Cable cross sections not given = 1.5 mm²

A broken line indicates a conductor that Volvo Penta does not connect.

A dashed and dotted line indicates a conductor that is fitted only to engines with preheating (glow plugs)

Cable color

BL = Blue	P = Pink
LBL = Light-blue	R = Red
BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



Engine

All models in the 31/41 series have a

24 V, 1.5-pole* electrical system

* 1-pole during the start and stop phases, 2-pole at all other times.

Engine 31/41. 24 V Electrical System 1.5 pole

1. Battery
2. Starter motor
3. Generator
4. Starter relay
5. Solenoid valve – Stop
6. Temperature sensor
7. Pressure sensor
8. Pressure switch NO 0.7 Bar
9. Temperature switch NO 97°C
10. Circuit breaker, 8 A (+)
11. Circuit breaker, 8 A (–)
12. Main switch
13. Connector, cannot be opened
14. CPC connector 16-pin
15. Ground relay
16. Glow plug relay*
17. Glow plugs*
18. Splice section
19. Inclination monitor (tilt sensor)**
20. Resistor

* These components are fitted only for S.O.L.A.S (Safety Of Life At Sea). They are available as an option for other system designs.

** This component is fitted only for S.O.L.A.S (Safety Of Life At Sea), however, the cabling contains the conductors for all system designs.

NO = Normally open during operation

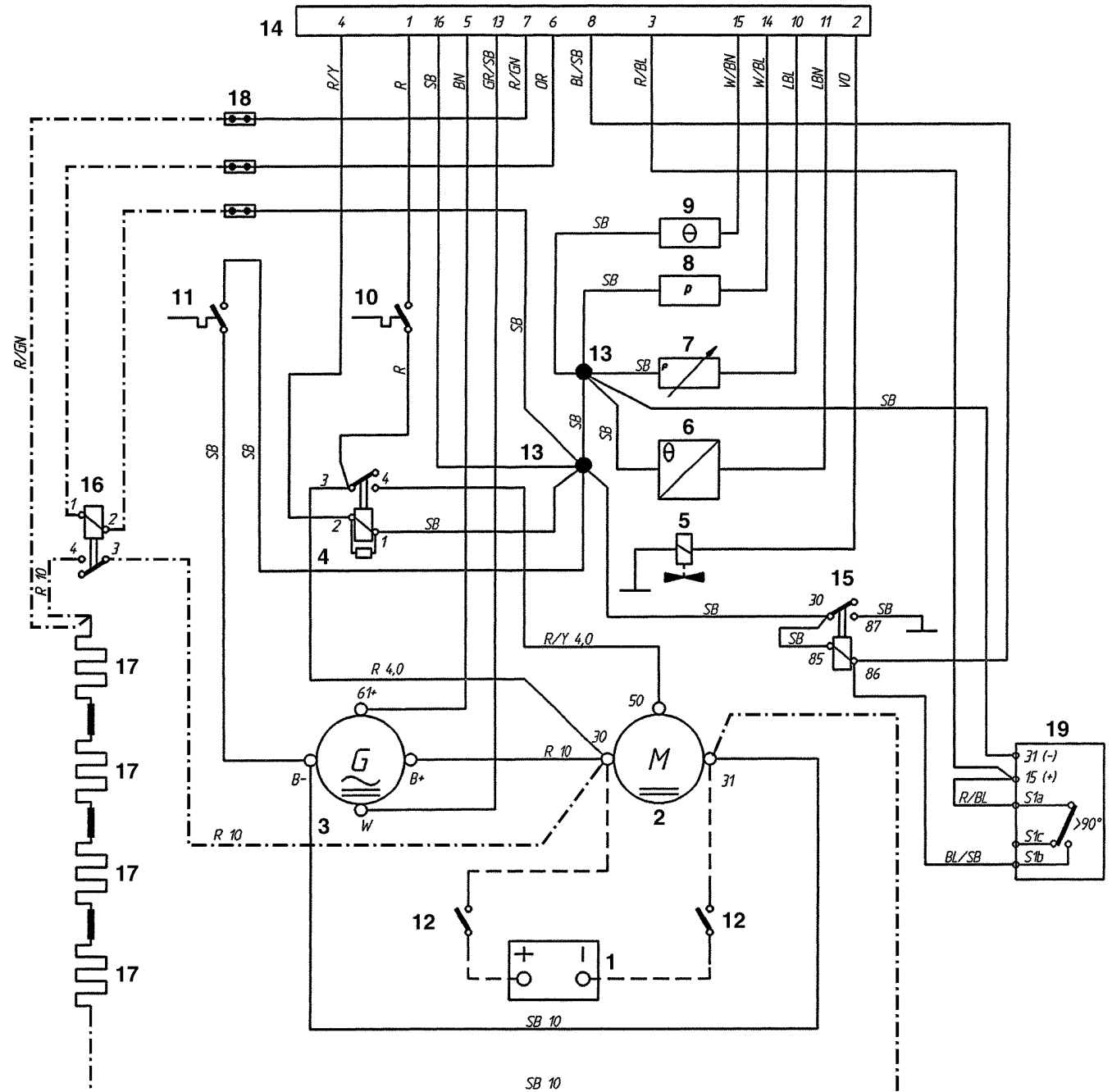
Cable cross sections not given = 1,5 mm²

A broken line indicates a conductor that Volvo Penta does not connect.

A dashed and dotted line indicates a conductor that is fitted only to engines with preheating (glow plugs)

Cable color

BL = Blue	P = Pink
LBL = Light-blue	R = Red
BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



Engine

KA(M)D44P-A, P-B, P-C
KA(M)D300-A

Engine KA(M)D44P-A

1. Battery
2. Main switch
3. Starter motor
4. Generator
5. Battery connection to engine
6. Oil pressure sensor
7. Oil pressure gauge
8. Engine coolant temperature (ECT) sensor (instrument)
9. Starter motor relay*
10. Main relay*
11. Stop relay*
12. Ground relay*
13. Circuit breaker, 8A*
14. Control Module
15. Charge air temperature sensor
16. Engine coolant temperature (ECT) sensor (EDC)
17. Position sender**
18. Fuel temperature sensor**
19. Actuator**
20. Alpha control solenoid**
21. Stop solenoid**
22. Engine speed (rpm) sensor
23. Compressor
24. Connector
25. Resistor*
26. Data Link Connector DLC*
27. LED
28. Injection pump
29. Electronic gear
30. Manual reserve system

*Located in the terminal box

**Located on the injection pump

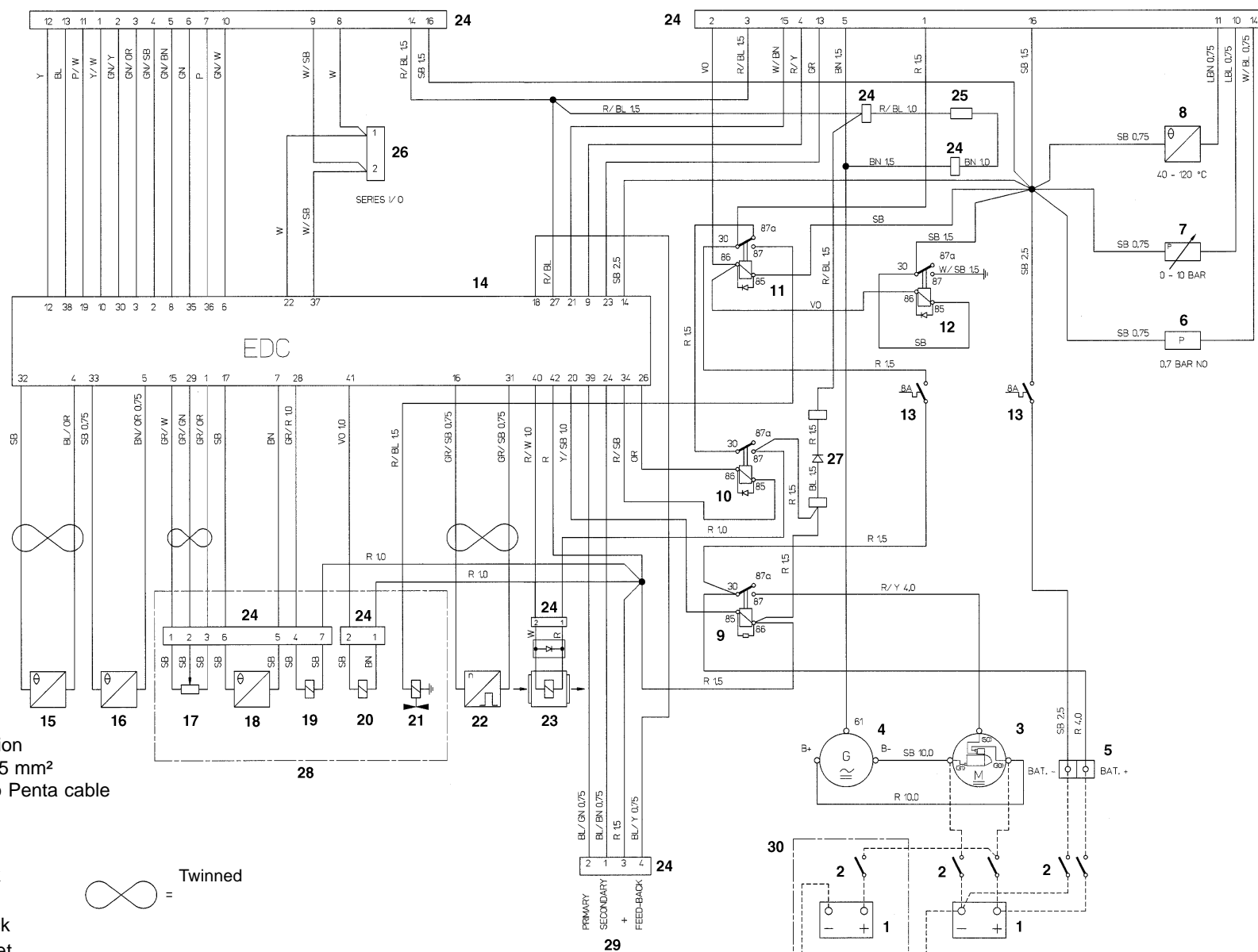
NO = Normally open during operation


Cable cross sections not given = 0.5 mm²

A broken line indicates a non-Volvo Penta cable

Cable color

BL = Blue	P = Pink
LBL = Light-blue	R = Red
BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



 = Twinned

Motor KA(M)D44P-B

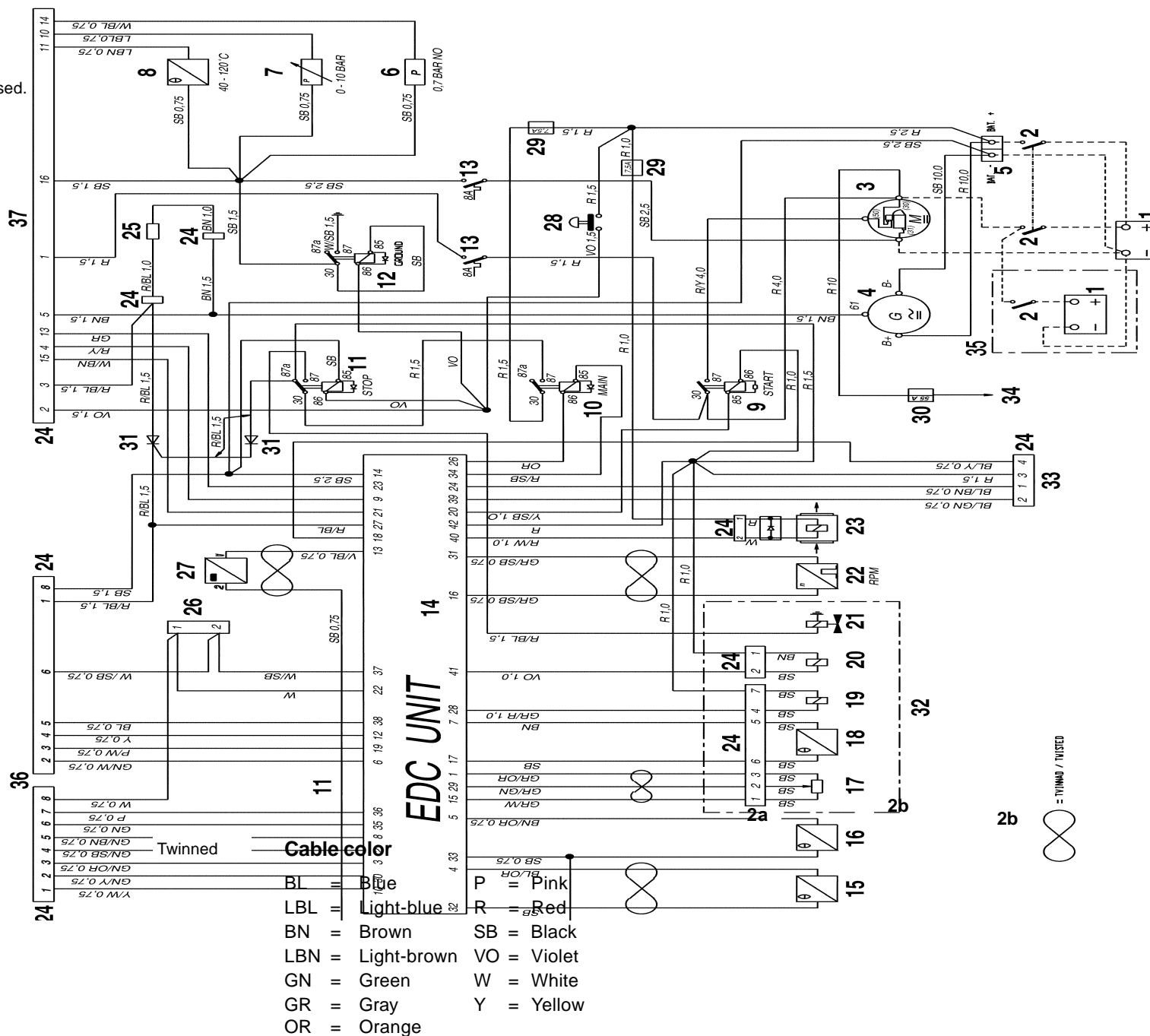
1. Battery
- 2a. Main switch
- 2b. Main switch. A two-pole switch can be used.
3. Starter motor
4. Generator
5. Batter connection to engine
6. Oil pressure sensor
7. Oil pressure gauge
8. Engine coolant temperature (ECT) sensor (instrument)
9. Starter motor relay*
10. Main relay*
11. Stop relay*
12. Ground relay*
13. Circuit breaker, 8A*
14. Control Module
15. Charge air temperature sensor
16. Engine coolant temperature (ECT) sensor (EDC)
17. Position sender**
18. Fuel temperature sensor**
19. Actuator**
20. Alpha control solenoid**
21. Stop solenoid**
22. Engine speed (rpm) sensor
23. Compressor
24. Connector
25. Resistor*
26. Data Link Connector DLC*
27. Needle lift sensor
28. Push button. Extra stop
29. Standard fuse 7.5A
30. Standard fuse 55A
31. LED
32. Injection pump
33. Electronic gear
34. To power trim pump
35. Manual reserve system
36. To push button panel, gas, gear
37. To instrument panel

*Located in the terminal box

** Located on the injection pump

NO = Normally open during operation
Cable cross sections not given = 0.5 mm²

A broken line indicates a non-Volvo Penta cable



Engines KA(M)D44P-C and KA(M)D300-A

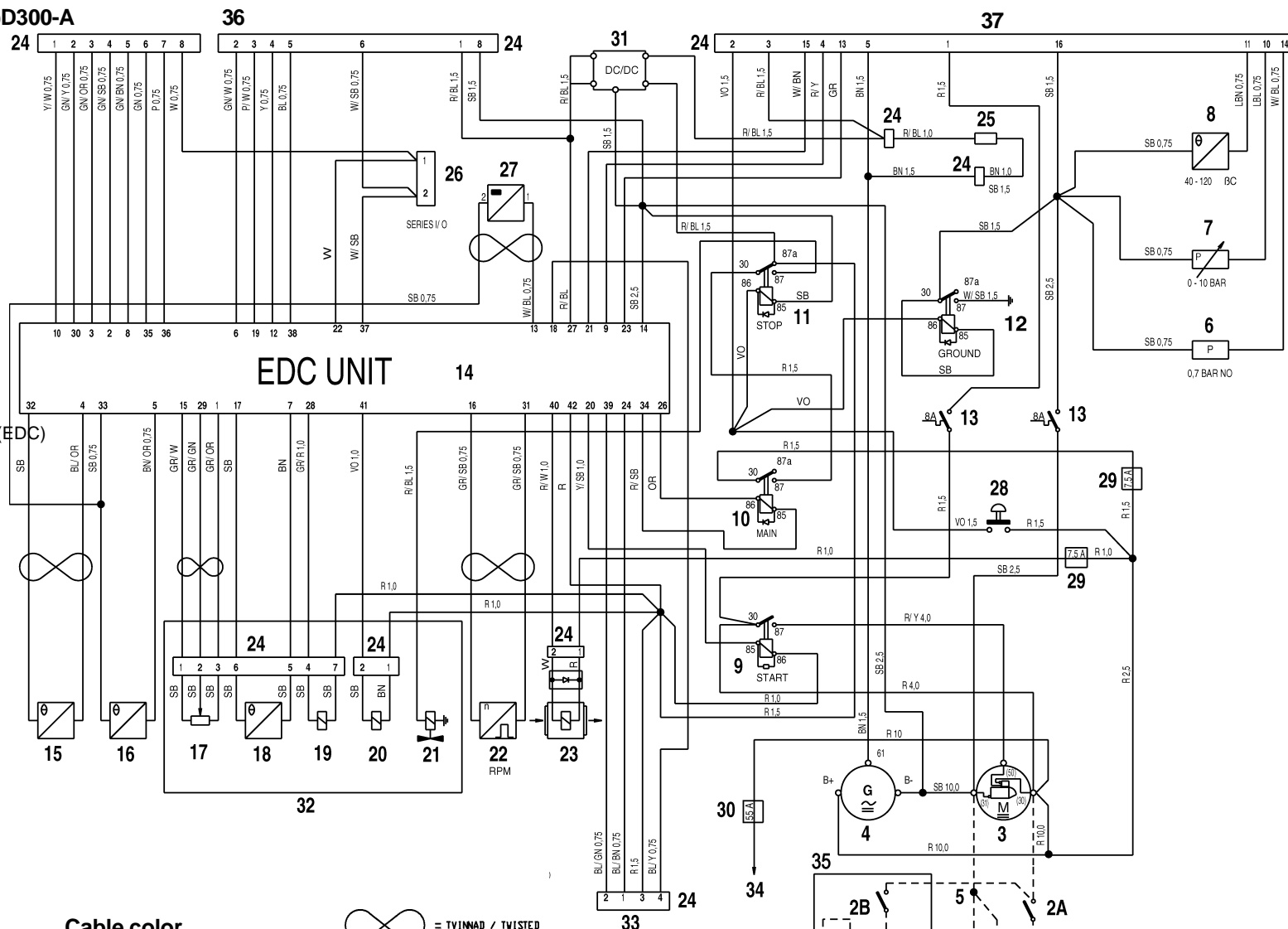
1. Battery
- 2A. Main switch
- 2B. Main switch for the manual reserve system
3. Starter motor
4. Generator
5. -
6. Oil pressure sensor
7. Oil pressure gauge
8. Engine coolant temperature sensor (instrument)
9. Starter motor relay*
10. Main relay*
11. Stop relay*
12. Ground relay*
13. Circuit breakers, 8A*
14. Control unit
15. Boost temperature sensor
16. Engine coolant temperature sensor (EDC)
17. Position sender**
18. Fuel temperature sensor**
19. Actuator**
20. Solenoid valve, Alfa**
21. Stop solenoid**
22. Engine speed sensor
23. Compressor
24. Connector
25. Resistor*
26. Diagnostic outlet*
27. Needle lift sensor**
28. Pushbutton, extra stop
29. Flat pin fuse, 7.5A
30. Fuse, 55A
31. DC/DC converter
32. Injector pump
33. Connector (electronic gear)
34. To power trim pump
35. Manual reserve system
36. 2x8-pole connector (control panel)
37. 16-pole connector (instrument)

*Located in the terminal box

**Located on the injection pump

NO = Normally open during operation
Cable cross sections not given = 0.5 mm²

A broken line indicates a non-Volvo Penta cable



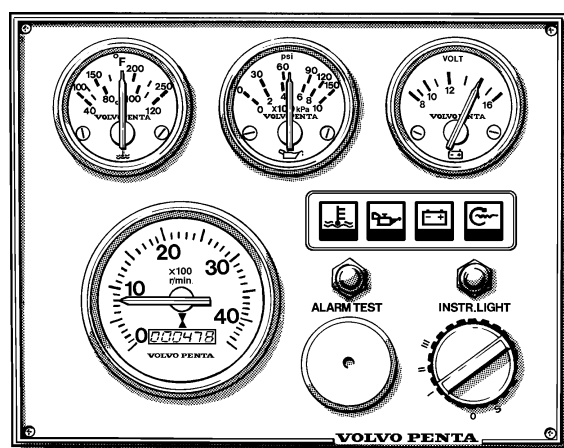
Cable color

BL = Blue	P = Pink
LBL = Light-blue	R = Red
BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	

∞ = TVINNAD / TWISTED

Instrument panel, main station

All models in the 31/32/41/42/43/44/300 series



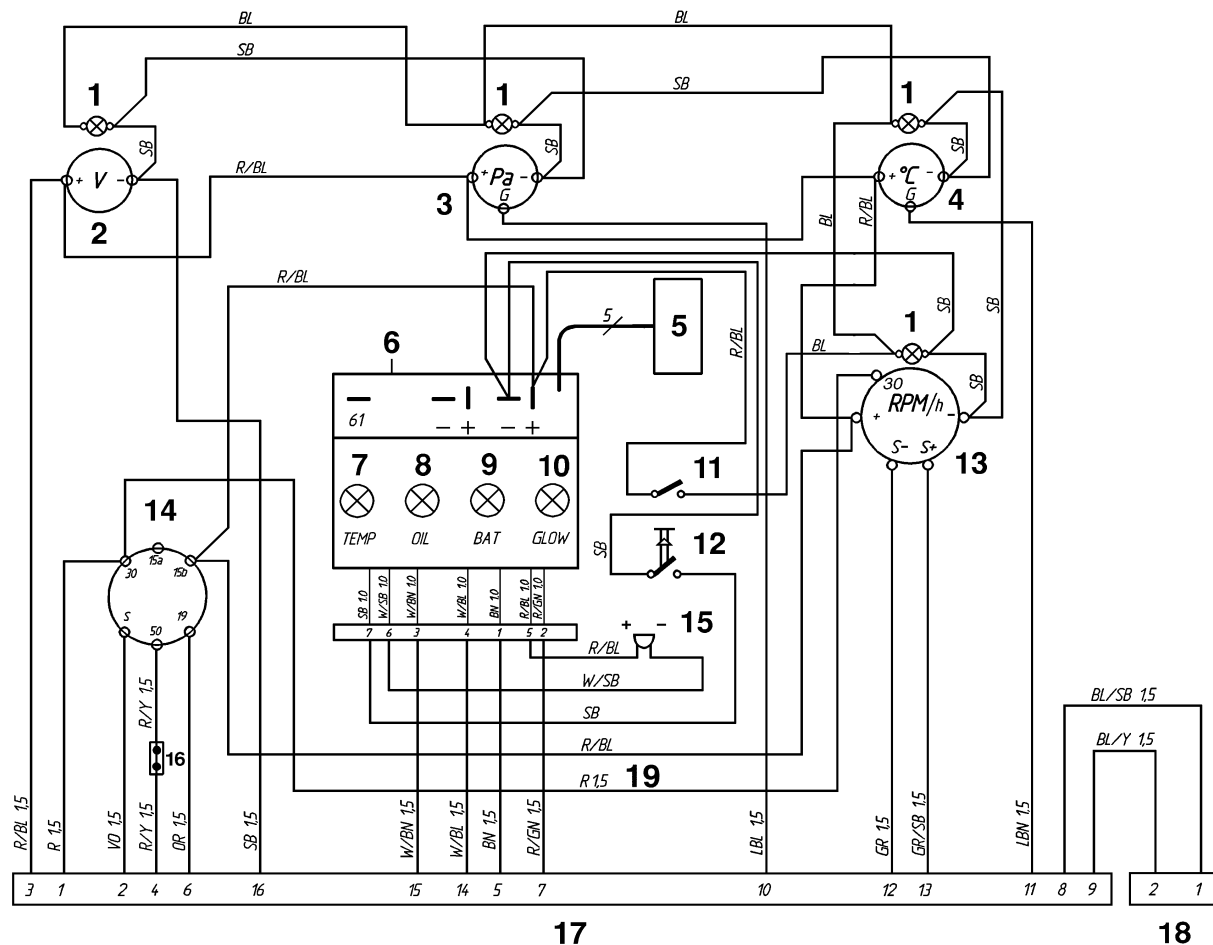
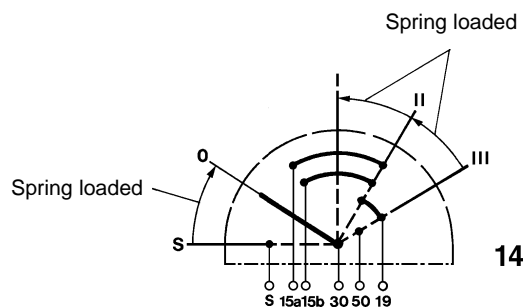
Instrument panel main control position

1. Instrument lighting
2. Voltmeter
3. Oil pressure gauge
4. Engine coolant temperature (ECT) gauge
5. Connector for connecting extra warning display (accessory)
6. Alarm unit
7. Engine coolant temperature warning lamp
8. Oil pressure warning lamp
9. Charge warning lamp
10. Warning lamp (not used)
11. Switch, Instrumentation lamps
12. Switch – Alarm test/acknowledge
13. Tachometer with built-in hours run meter
14. Ignition switch
15. Alarm (buzzer)
16. Splice section
17. CPC connector 16-pin
18. Connector, turbo/reverse gear
19. Power supply 30 for tachometer (late production)

Cable cross sections not given = 1.0 mm²

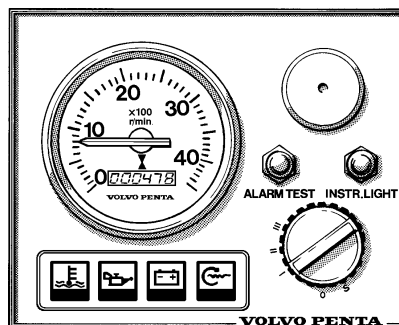
Cable color

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BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



Instrument panel, fly bridge

All models in the 31/32/41/42/43/44/300 series



Instrument panel, fly bridge

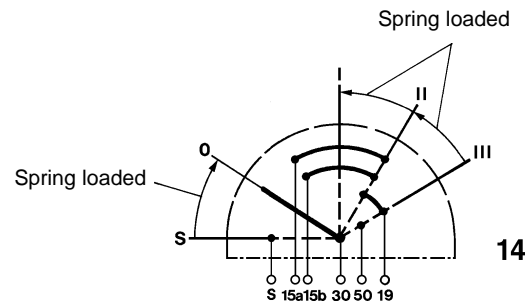
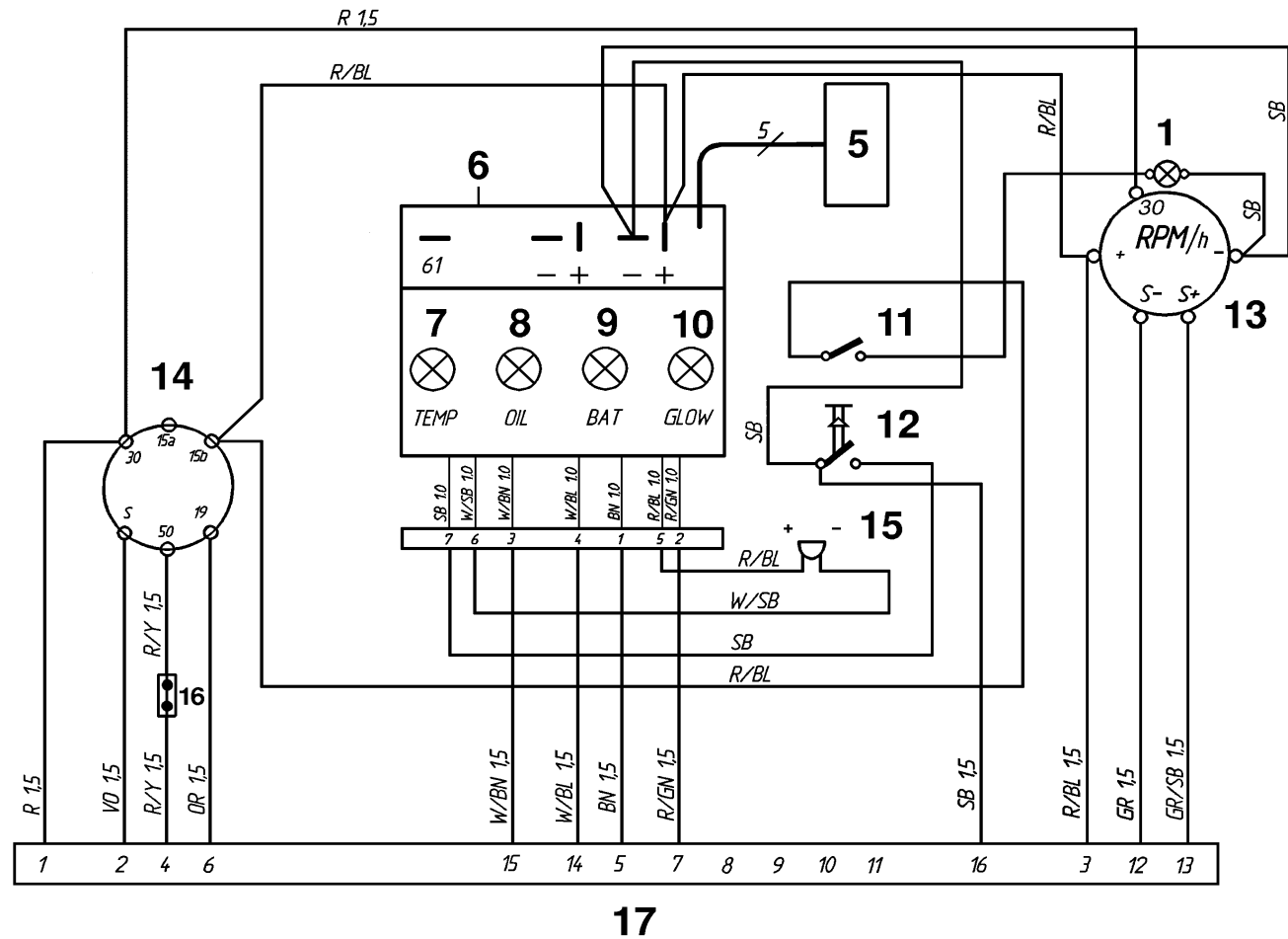
1. Instrument lighting
5. Connector for connecting extra warning display (accessory)
6. Alarm unit
7. Engine coolant temperature warning lamp
8. Oil pressure warning lamp
9. Charge warning lamp
10. Warning lamp (not used)
11. Switch, Instrumentation lamps
12. Switch – Alarm test/acknowledge
13. Tachometer with built-in hours run meter
14. Ignition switch
15. Alarm (buzzer)
16. Splice section
17. CPC connector 16-pin
18. Power supply 30 for tachometer (late production)

Cable cross sections not given = 1.0 mm²

A broken line indicates a non-Volvo Penta cable

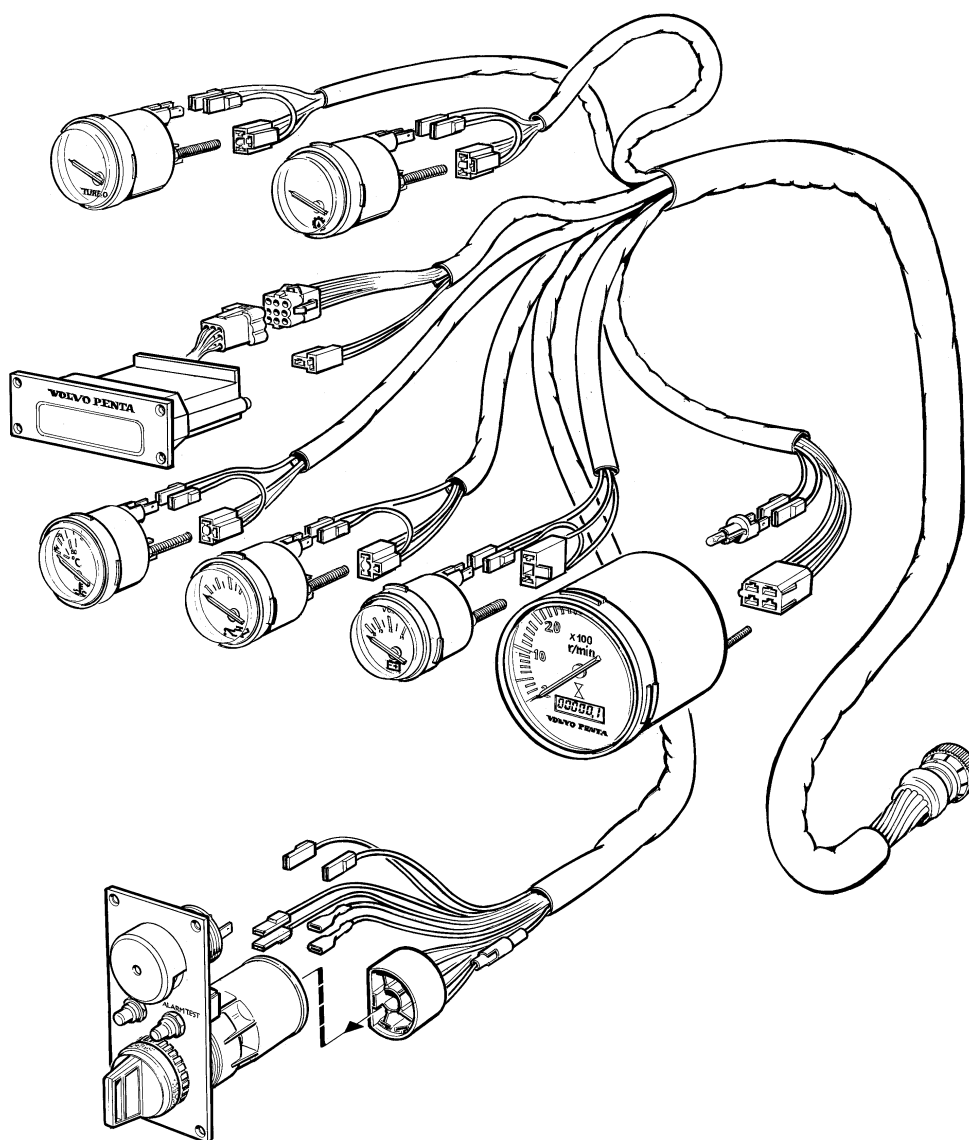
Cable color

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BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



Instrument kit, main station

All models in the 31/32/41/42/43/44/300 series

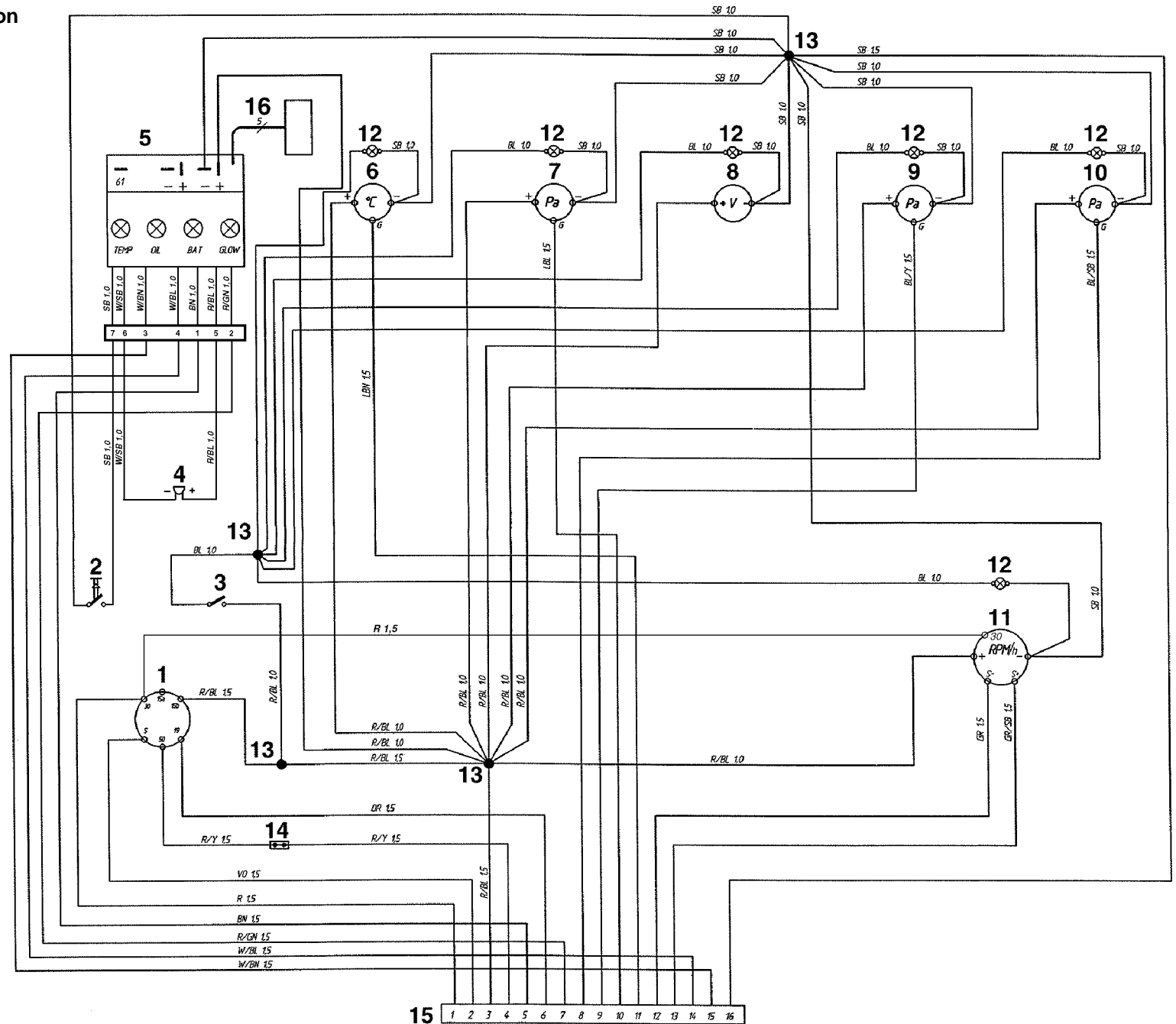


Instrumentation main control position

1. Ignition switch
2. Switch – Alarm test/acknowledge
3. Switch, Instrumentation lamps
4. Alarm (buzzer)
5. Alarm unit with warning lamps for:
 - Temperature
 - Oil level
 - Battery
 - Glow plugs
6. Engine coolant temperature (ECT) gauge
7. Oil pressure gauge – engine
8. Voltmeter
9. Boost pressure gauge
10. Oil pressure gauge, reverse gear
11. Tachometer with built-in hours run meter
12. Instrument lighting
13. Connector, cannot be opened
14. Splice section
15. CPC connector 16-pin
16. Connector for extra warning display (accessory)

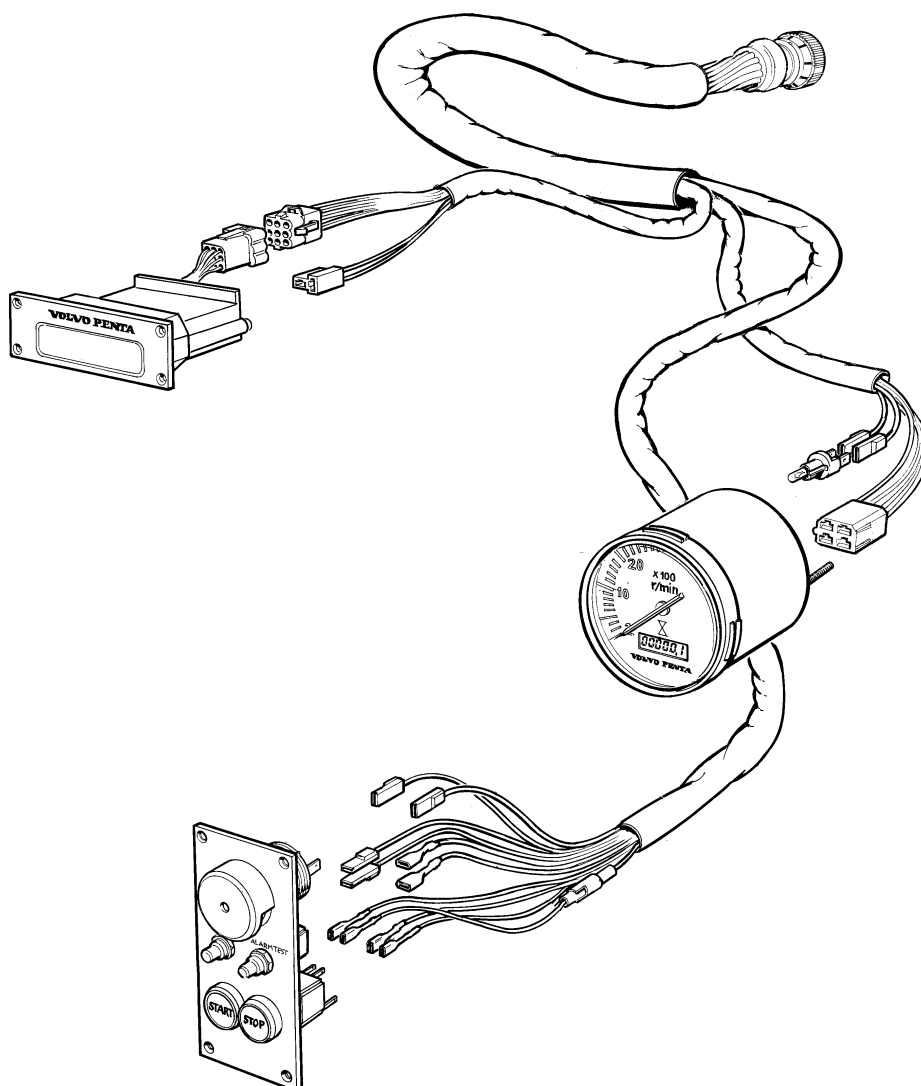
Cable color

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LBL = Light-blue	R = Red
BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



Instrument kit, fly bridge

All models in the 31/32/41/42/43/44/300 series



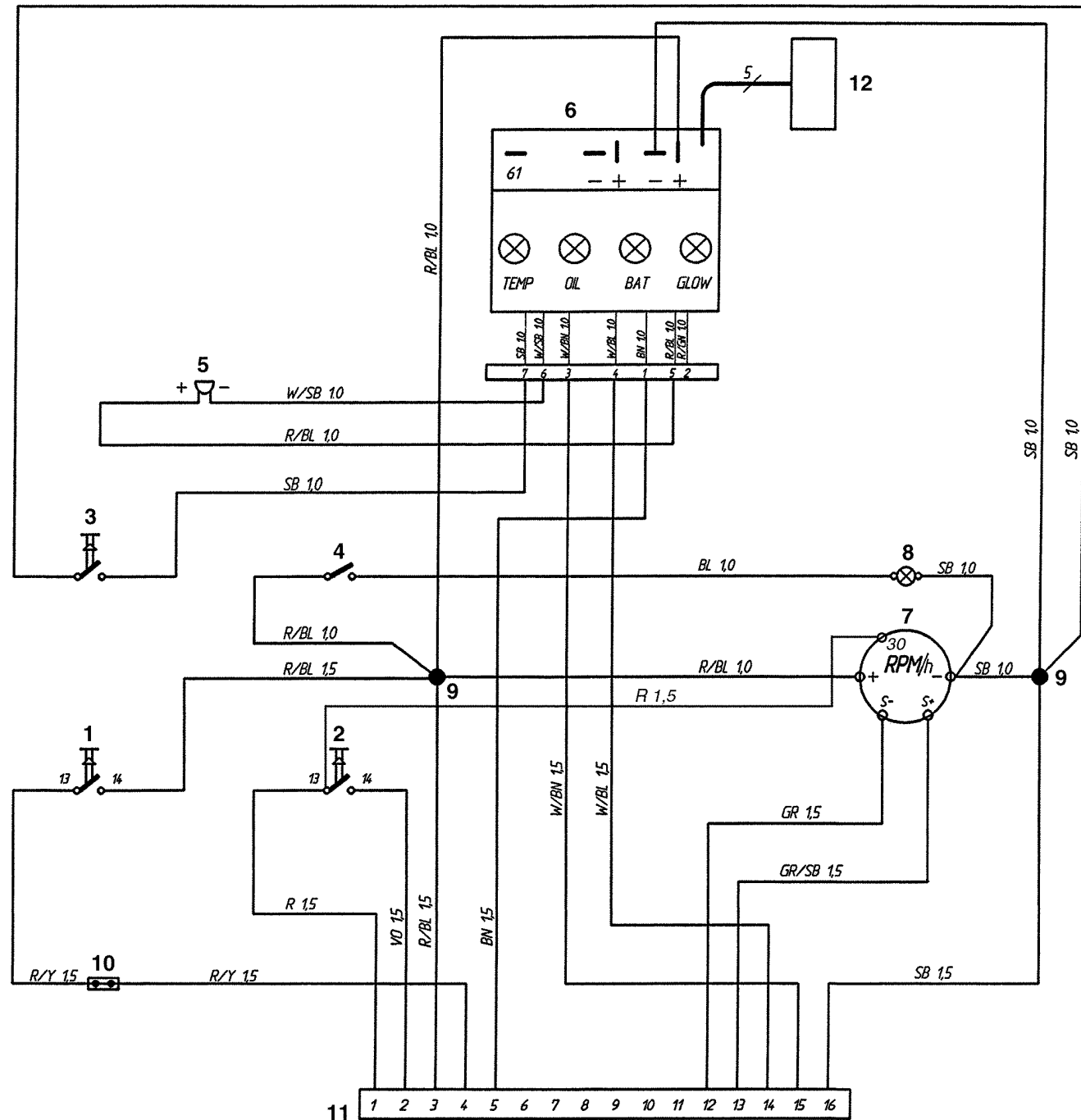
Instrumentation, fly-bridge

1. Push button, start
2. Push button, stop
3. Switch, Alarm test/acknowledge
4. Switch, Instrumentation lamps
5. Alarm (buzzer)
6. Alarm unit with warning lamps for:
 - Temperature
 - Oil level
 - Battery
 - Glow plugs
7. Tachometer with built-in hours run meter
8. Instrument lighting
9. Connector, cannot be opened
10. Splice section
11. CPC connector 16-pin
12. Connector for extra warning display (accessory)

NO = Normally open during operation

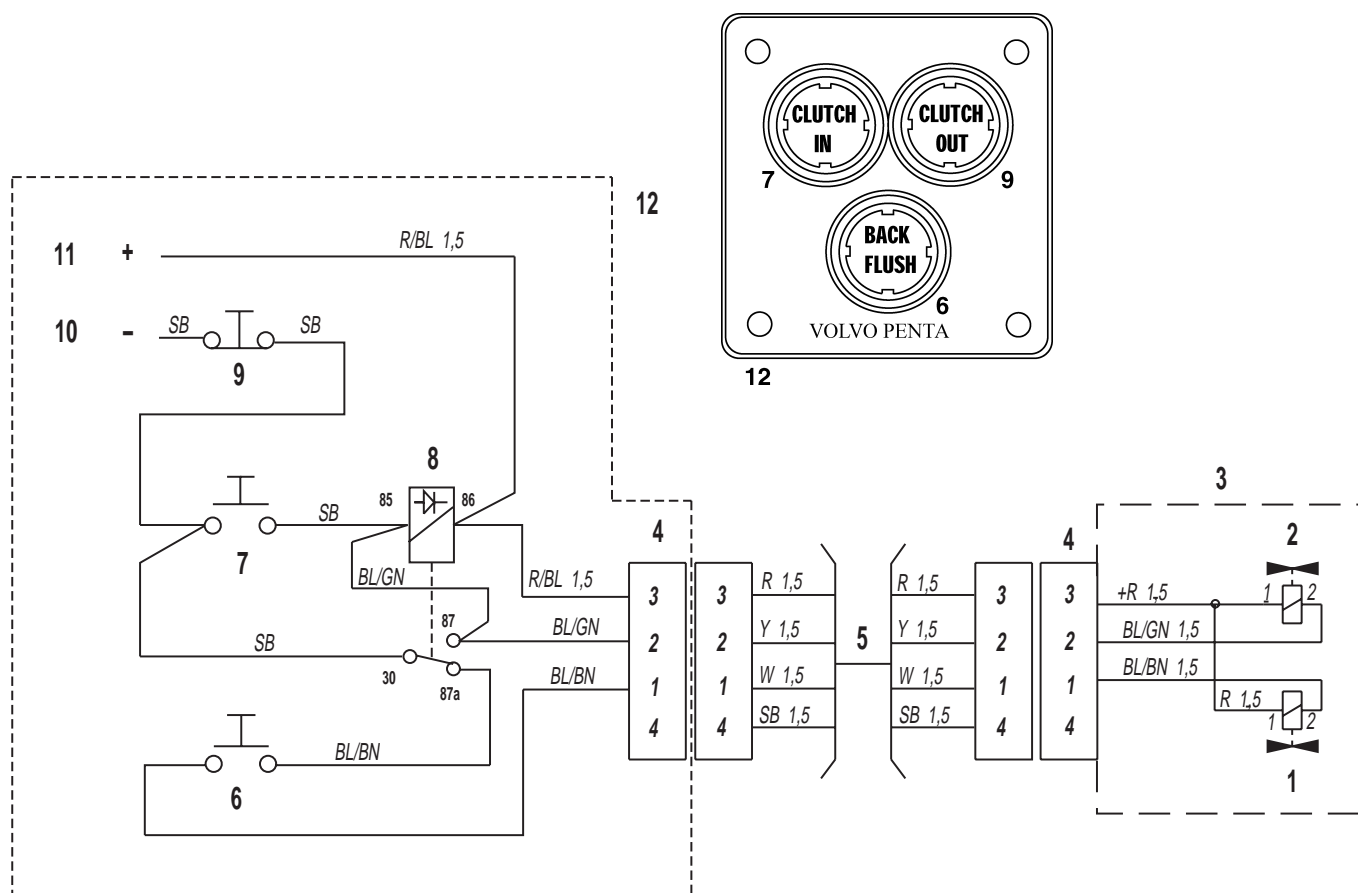
Cable color

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BN = Brown	SB = Black
LBN = Light-brown	VO = Violet
GN = Green	W = White
GR = Gray	Y = Yellow
OR = Orange	



Clutch control panel, Waterjet

TAMD42WJ / K22



1. Relay, back flush
2. Relay, clutch in
3. Cabling to gearbox
4. 4-pin cable terminal
5. Extension cables (3, 5, 7, 9 and 11 m)
6. Pushbutton, back flush
7. Pushbutton, clutch in
8. Relay, clutch in
9. Pushbutton, clutch out
10. Battery (-)
11. Battery (+)
12. Control panel

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow

Cable areas not stated = 1.0 mm².

A broken line indicates a non Volvo Penta cable.

Diode cable

TAMD42AWJ, BWJ, WJ and all models in the 31/41 series have a

12 V, 24 V, 1.5-pole* electrical system

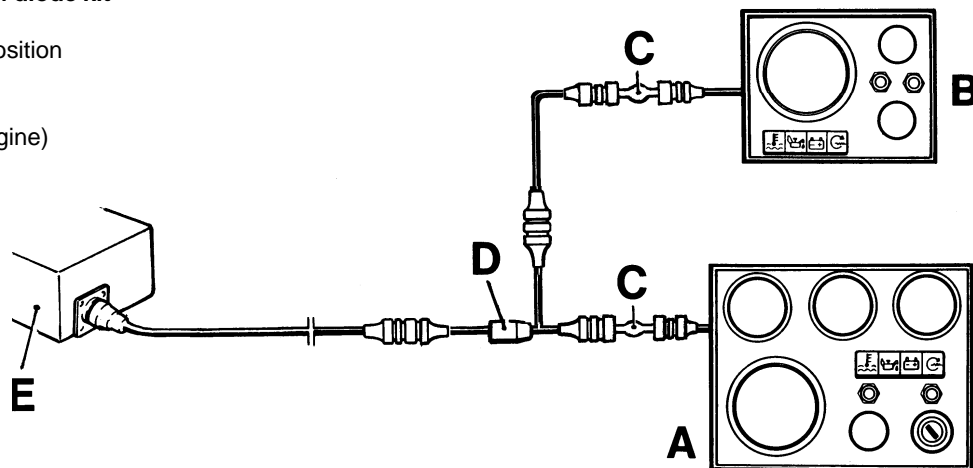
*1-pole during the start and stop phases, 2-pole at all other times.

Diode cable for 1.5-pole electrical system

The diode cable is necessary for the engine to be stopped electronically, using the starter switch or the stop button. The diode cable also protects against short-circuits (cable burn out) if the battery positive terminal is unintentionally connected to the engine body.

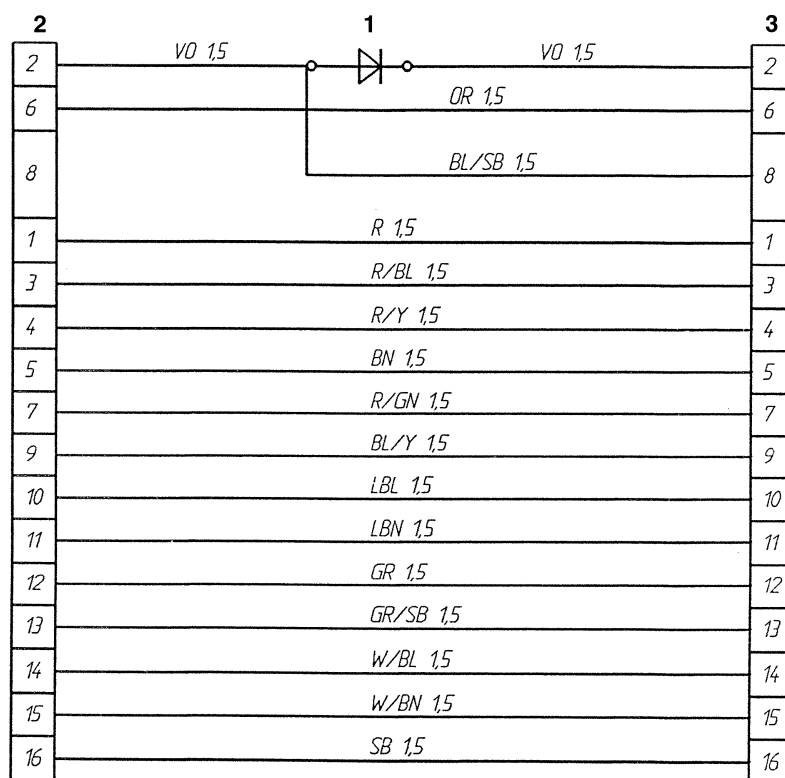
Outline diagram – Connection of diode kit

- A. Main panel
- B. Panel for alternative control position
- C. Diode kit
- D. Y connection
- E. Central electronic module (engine)



Diode kit (C)

- 1. Diode
- 2. 16 pin CPC, to instrument panel
- 3. 16 pin CPC, to engine



Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black

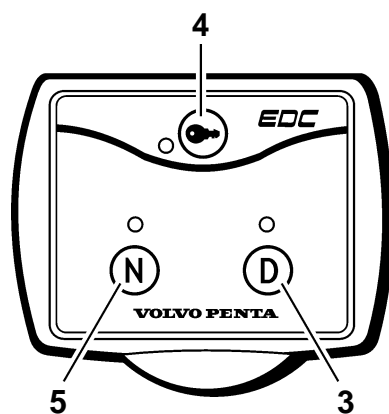
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow

Cable areas in mm² are given after the color codes in the wiring diagram.

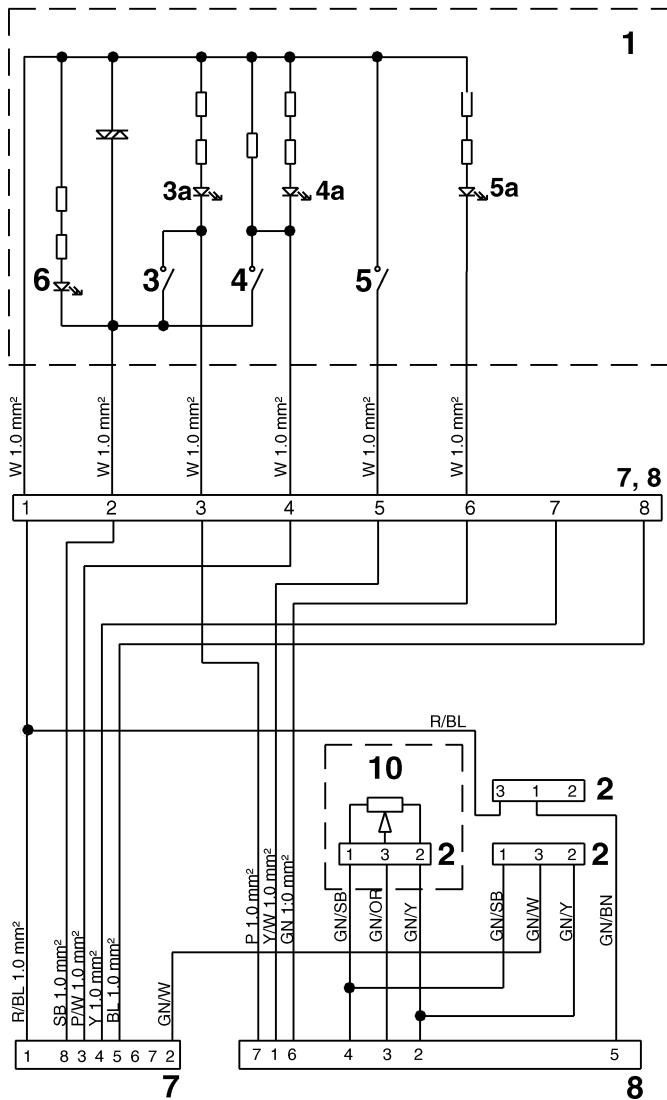
Control panel Type I

Single installation

KA(M)D44P-C, KA(M)D300-A



Single installation – single lever control

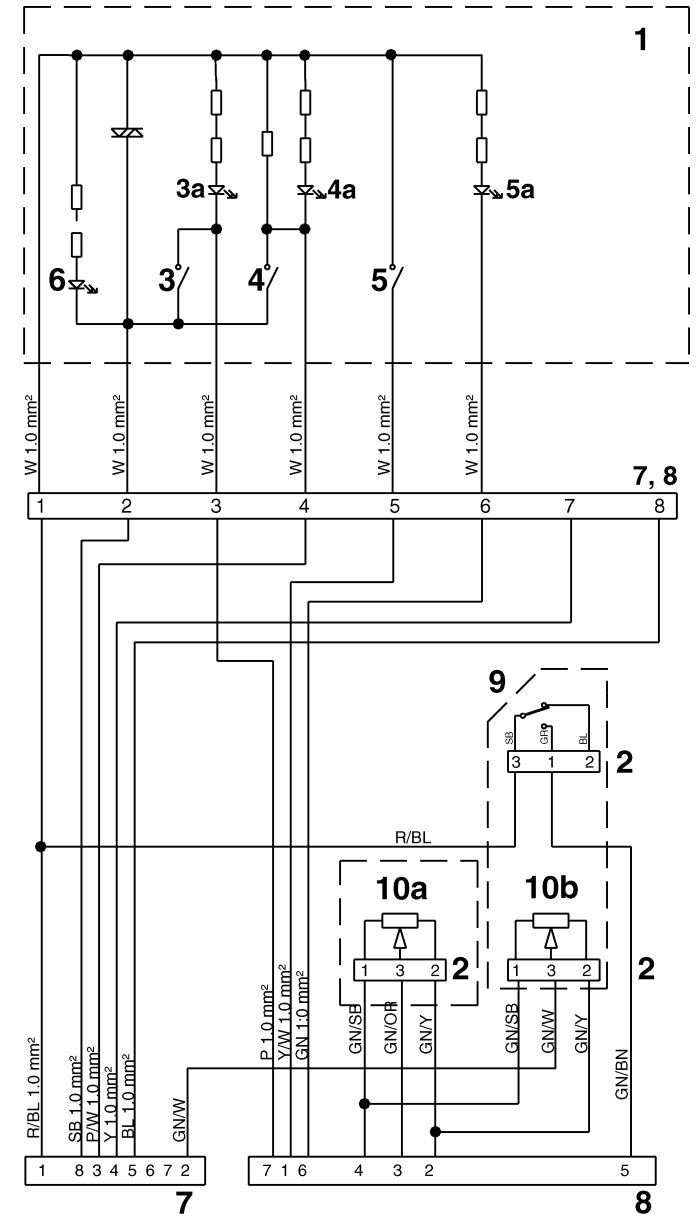


Color code

BL = Blue
BN = Brown
GN = Green
OR = Orange
P = Pink
R = Red
SB = Black
W = White
Y = Yellow

Cable areas = 0.75 mm².

Single installation – twin lever control



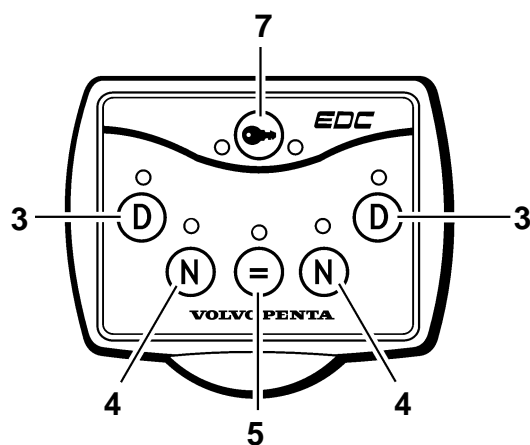
Position schedule (both wiring diagrams)

1. Control panel
2. Connector
3. Diagnostic button
- 3a. LED (yellow):
4. Activation button
- 4a. LED (red)
5. Neutral button
- 5a. LED (green)
6. LED for background illumination
7. 8-pin moisture-proof connection (male)
8. 8-pin moisture-proof connection (female)
9. Neutral position switch (only mechanically shifted reverse-gears)
10. Potentiometer, throttle opening / gear shift
- 10a. Control adapter, throttle opening
- 10b. Control adapter, gear shift

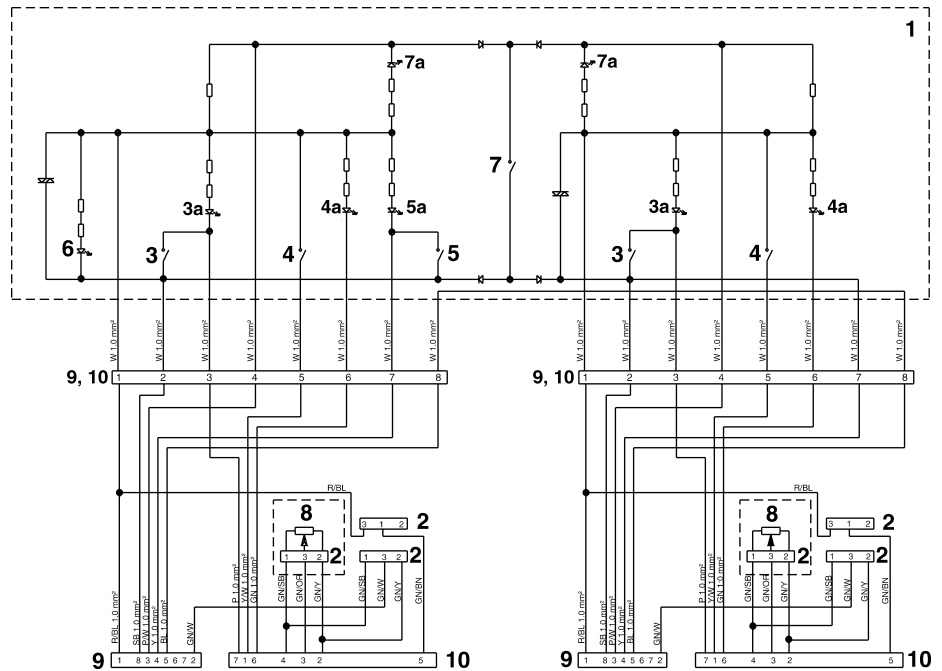
Control panel Type I

Twin installation

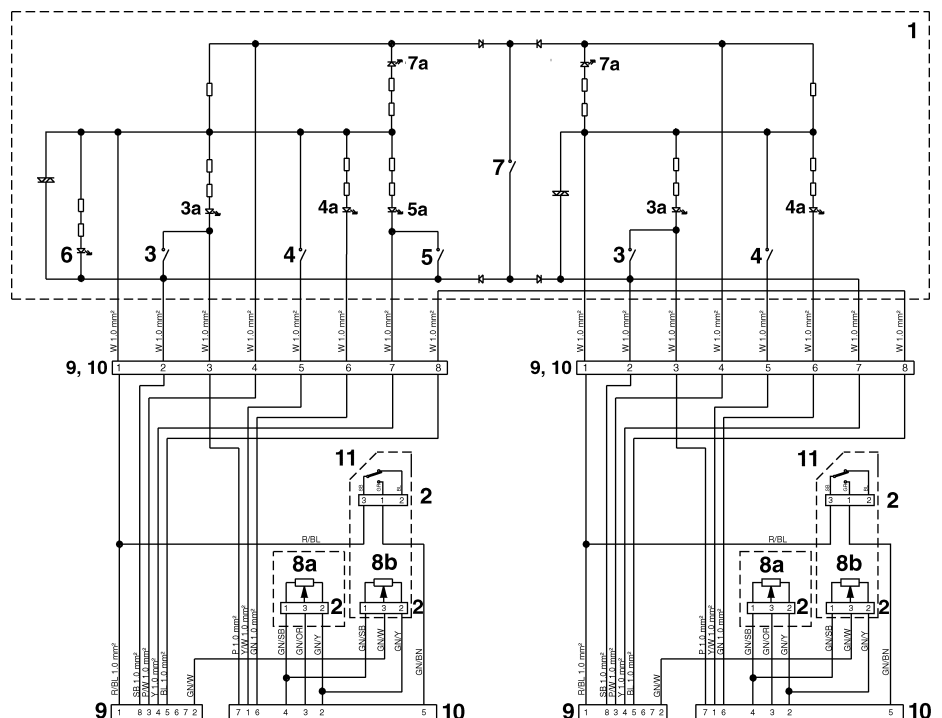
KA(M)D44P-C, KA(M)D300-A



Twin installation – single lever control



Twin installation – twin lever control



Color code

BL = Blue
BN = Brown
GN = Green
OR = Orange
P = Pink
R = Red
SB = Black
W = White
Y = Yellow

Cable areas = 0.75 mm².

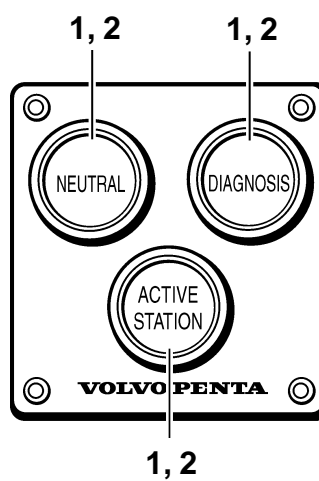
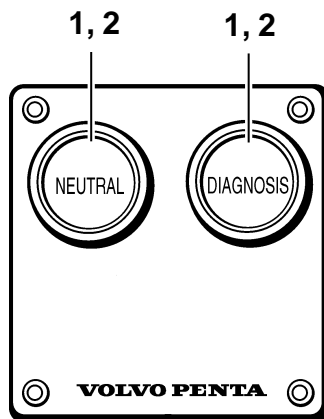
Position schedule (both wiring diagrams)

1. Control panel
2. Connector
3. Diagnostic button
- 3a. LED (yellow):
4. Neutral button
- 4a. LED (green)
5. Synchronization button
- 5a. LED (blue):
6. LED for background illumination
7. Activation button
- 7a. LED, 2 pcs (red) port and starboard.
8. Potentiometer, throttle opening / gear shift
- 8a. Control adapter, throttle opening
- 8b. Control adapter, gear shift
9. 8-pin connection (male)
10. 8-pin connection (female)
11. Neutral position switch (only mechanically shifted reverse gears)

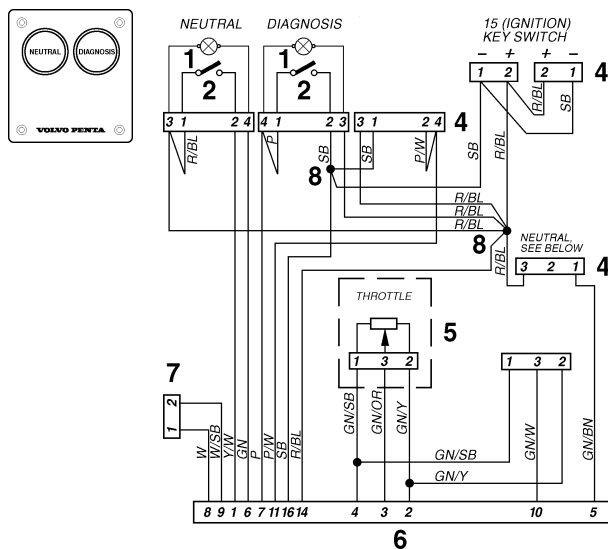
Control panel Type II

Single installation

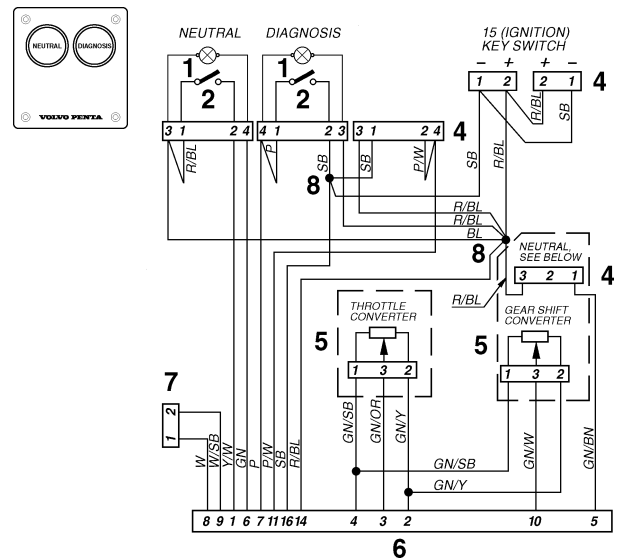
KA(M)D44P-A



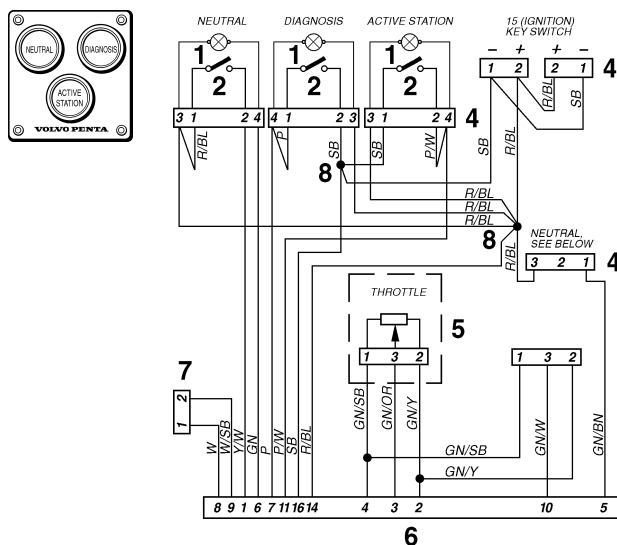
One helmsman's seat – single installation – single lever control



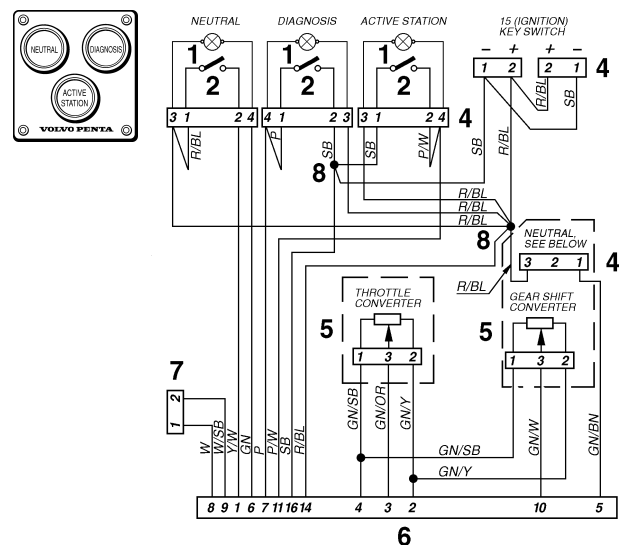
One helmsman's seat – single installation – twin lever control



Several helmsman's seats – single installation – single lever control

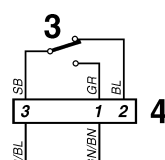


Several helmsman's seats – single installation – twin lever control

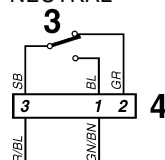


VP Controls:

Late model NEUTRAL



Early model NEUTRAL



Color code

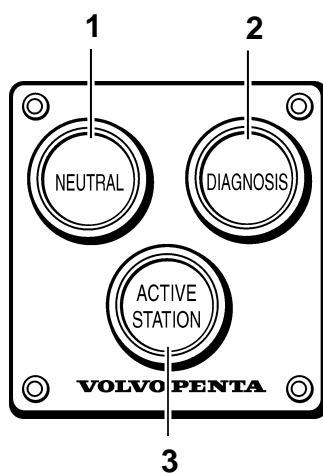
BL = Blue
BN = Brown
GN = Green
OR = Orange
P = Pink
R = Red
SB = Black
W = White
Y = Yellow

Cable areas = 0.75 mm².

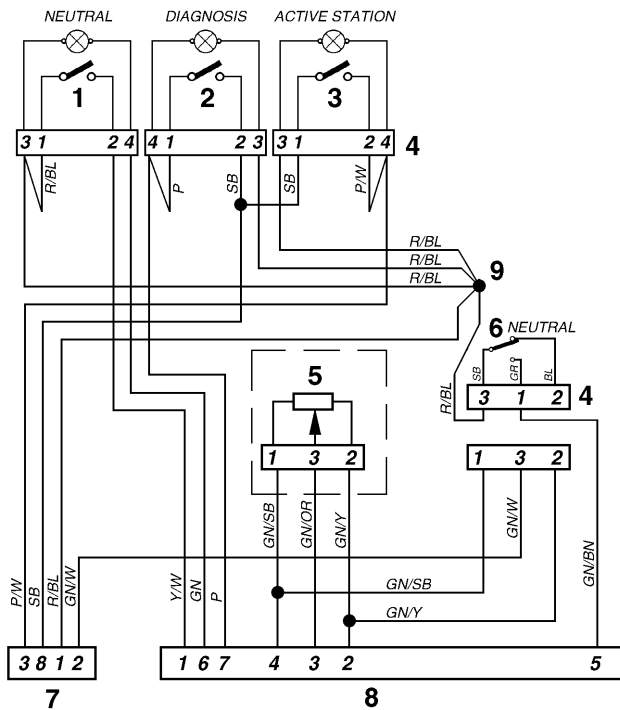
Position schedule (all wiring diagrams)

1. Indication lamp
2. 1-pin switch
3. Position switch
4. Connector
5. Potentiometer
6. 16-pin connection
7. 2-pin connection (diagnostic connector)
8. Joint

Control panel Type II
Single installation
KA(M)D44P-B/C, KA(M)D300-A



Single installation – single lever control

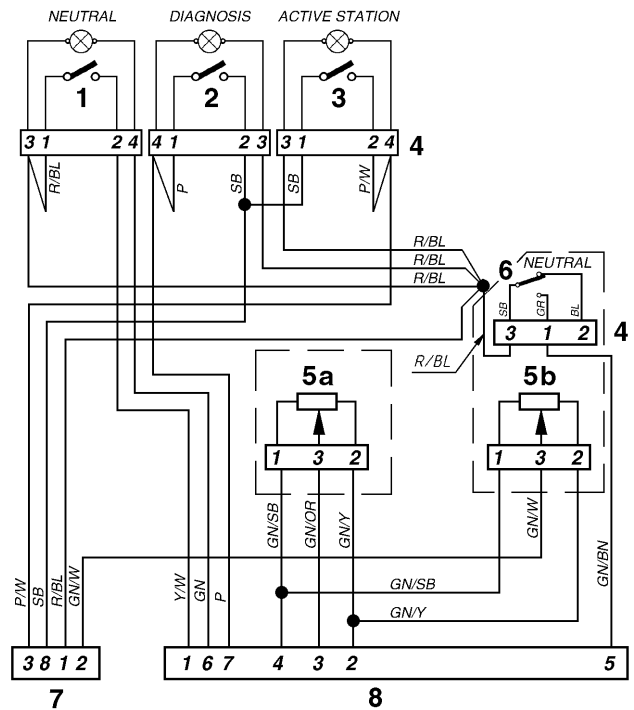


Color code

BL = Blue
BN = Brown
GN = Green
OR = Orange
P = Pink
R = Red
SB = Black
W = White
Y = Yellow

Cable areas = 0.75 mm².

Single installation – twin lever control



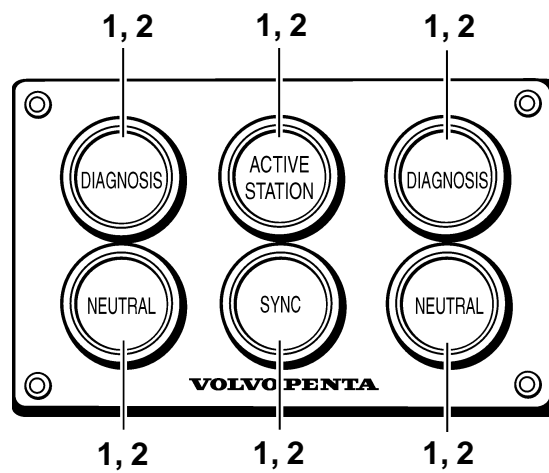
Position schedule (both wiring diagrams)

1. Press switch with indication lamp, "Neutral" (green)
2. Press switch with indication lamp, "Diagnostic" (yellow)
3. Press switch with indication lamp, "Active station" (red)
4. Connector
5. Potentiometer, throttle opening / gear shift
- 5a. Potentiometer, throttle opening
- 5b. Potentiometer, gear shift
6. Neutral position switch
7. 8-pin connection (male)
8. 8-pin connection (female)
9. Joint

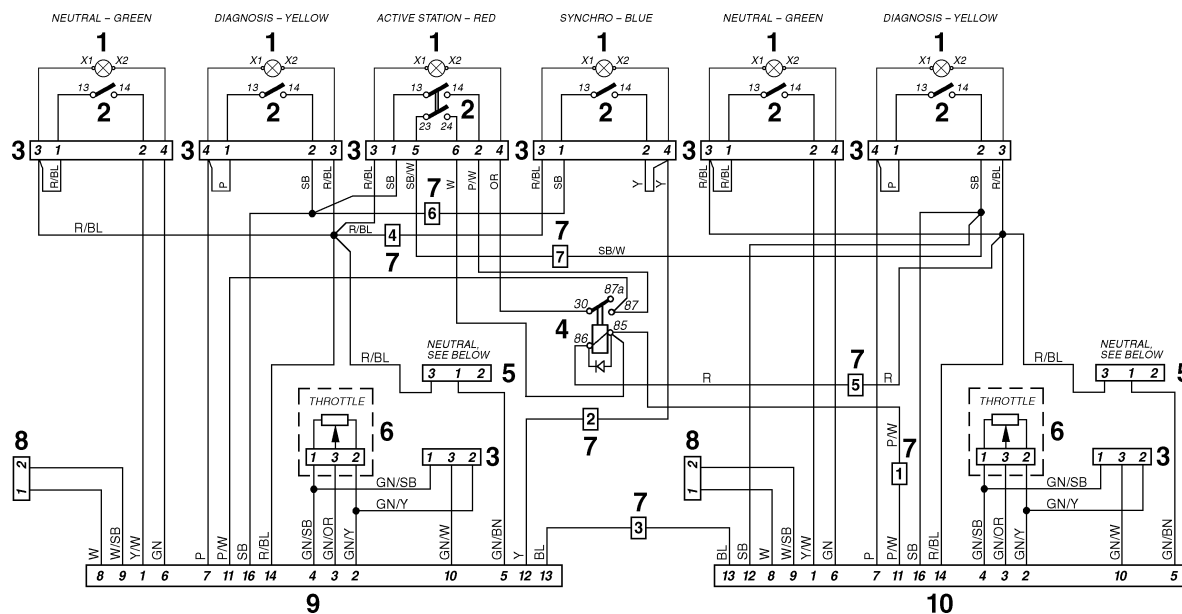
Control panel Type II

Twin installation

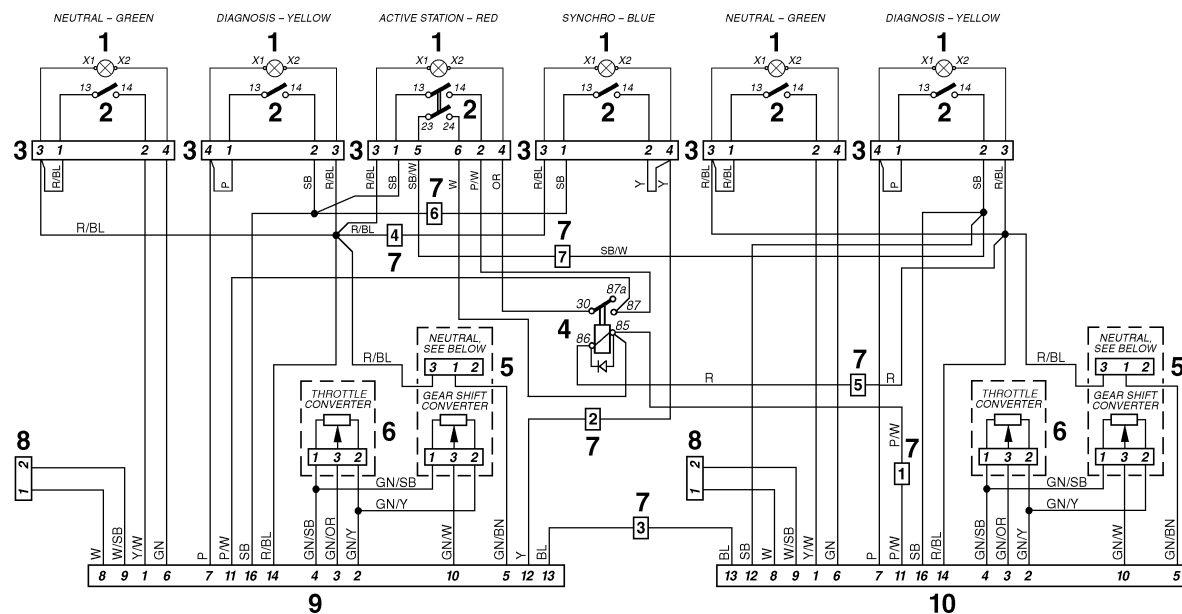
KA(M)D44P-A



Several helmsman's seats – twin installation – single lever control



Several helmsman's seats – twin installation – twin lever control



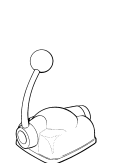
Color code

BL = Blue
BN = Brown
GN = Green
OR = Orange
P = Pink
R = Red
SB = Black
W = White
Y = Yellow

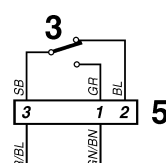
Cable areas = 0.75 mm².

VP Controls:

Late model



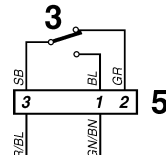
NEUTRAL



Early model



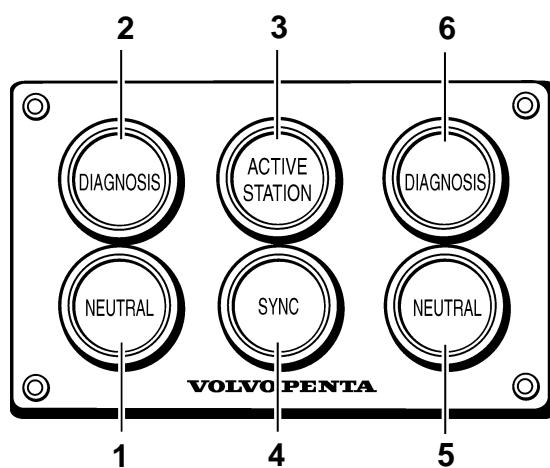
NEUTRAL



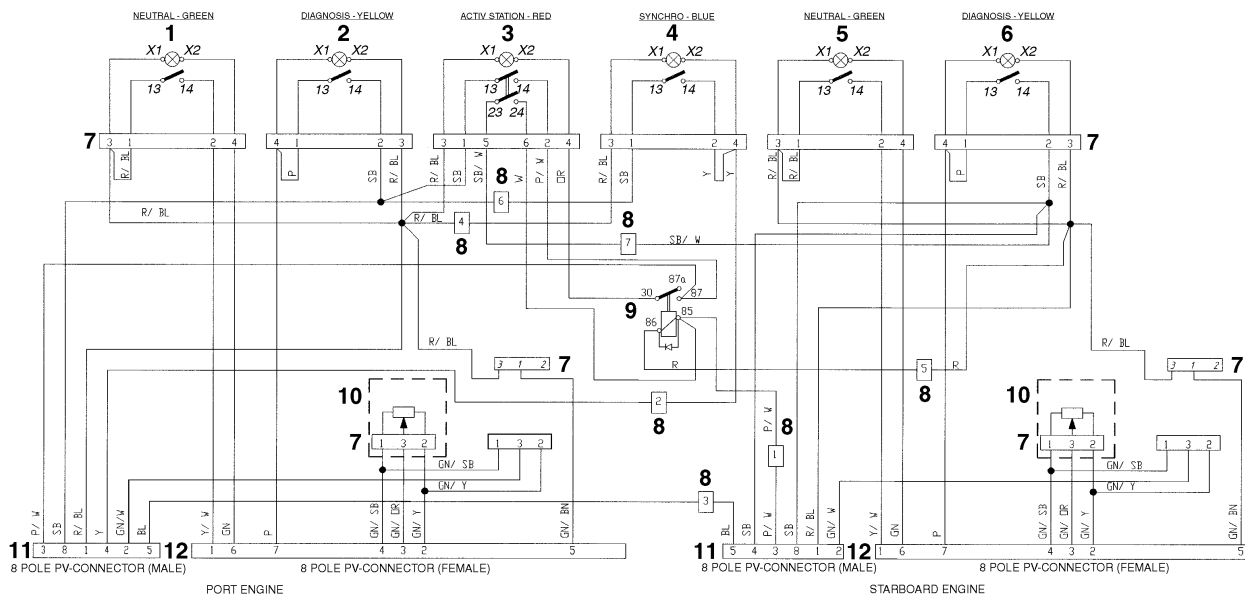
Position schedule (both wiring diagrams)

1. Indication lamp
2. Switch
3. Connector
4. Relay
5. Position switch
6. Potentiometer
7. Connector, Port – Starboard cable kit
8. 2-pin connection (diagnostic connector)
9. 16-pin connection, Port engine
10. 16-pin connection, Starboard engine

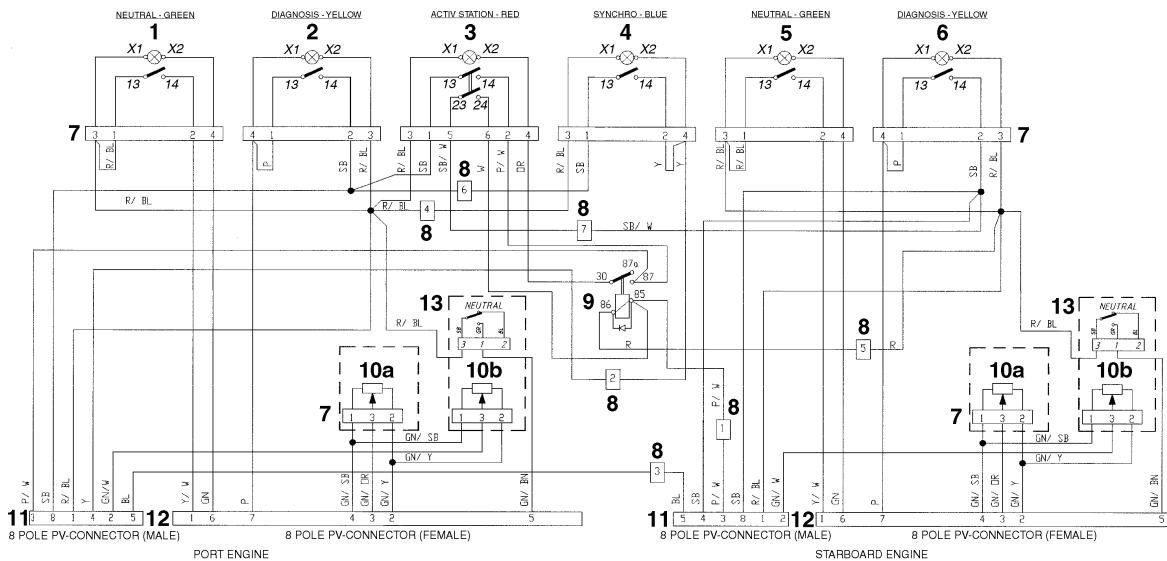
Control panel Type II
Twin installation
KA(M)D44P-B/C, KA(M)D300-A



Twin installation – single lever control



Twin installation – twin lever control



Color code

BL = Blue
BN = Brown
GN = Green
OR = Orange
P = Pink
R = Red
SB = Black
W = White
Y = Yellow

Cable areas = 0.75 mm².

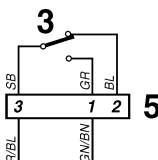
VP Controls: Late model



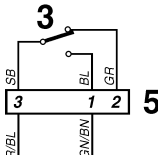
Early model



NEUTRAL



NEUTRAL



Position schedule (both wiring diagrams)

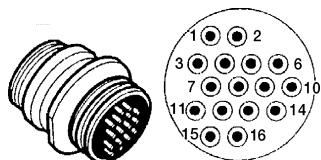
1. Press switch with indication lamp, "Neutral" – green
2. Press switch with indication lamp, "Diagnostic" – yellow
3. Press switch with indication lamp, "Active station" – red
4. Press switch with indication lamp, "Sync" – blue
5. Press switch with indication lamp, "Neutral" – green
6. Press switch with indication lamp, "Diagnostic" – yellow
7. Connector
8. Connector, Port – Starboard cable kit
9. Relay
10. Potentiometer, throttle opening / gear shift
- 10a. Potentiometer, throttle opening
- 10b. Potentiometer, gear shift
11. 8-pin connection (male) – Port engine
12. 8-pin connection (female) – Starboard engine
13. Neutral position switch (only mechanically shifted reverse gears)

Color codes, EDC cables

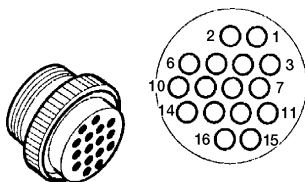
Single installation

KA(M)D44P-A

Pin numbers are marked on the connector.



M = Male connection

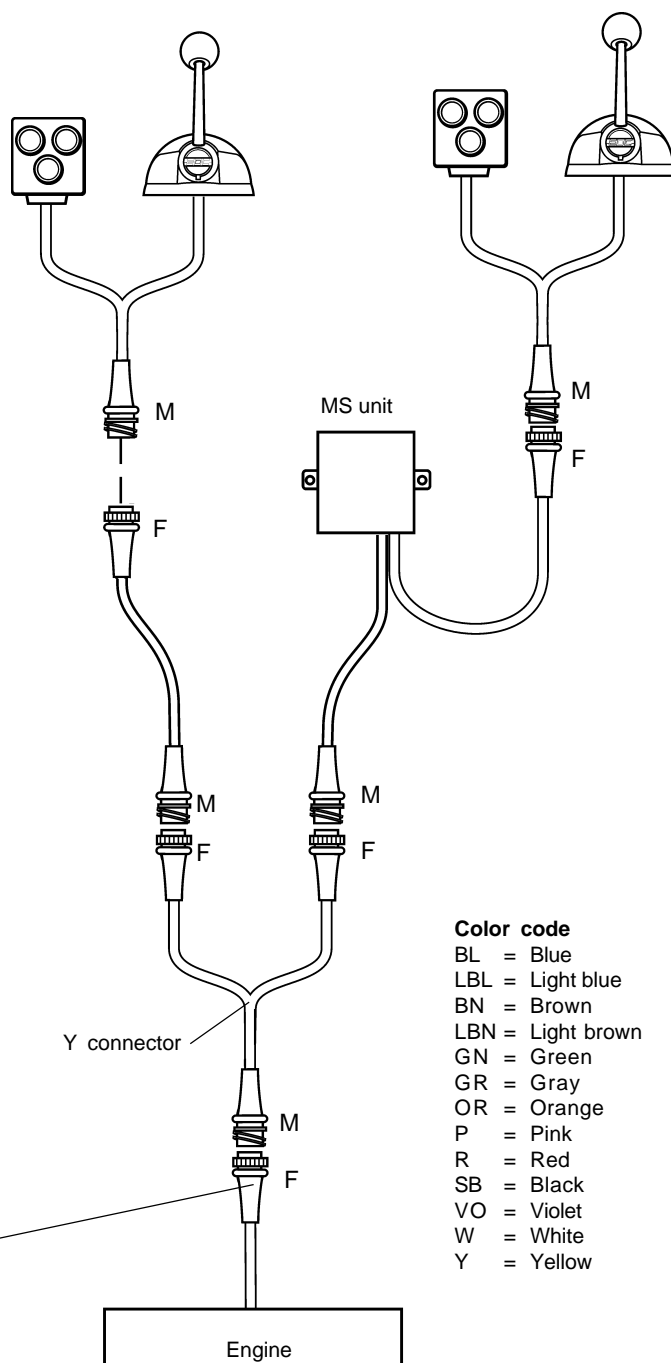


F = Female connection

Color code for 16-pin connection, single installation.
In single installations, all connectors have the same color code except the engine connector.

Color code

1. R	9. BL/Y
2. VO	10. LBL
3. BL/R	11. LBN
4. R/Y	12. GR
5. BN	13. GR/SB
6. OR	14. BL/W
7. R/GN	15. BN/W
8. BL/SB	16. SB



Color code for connector, engine

1. Y/W	9. SB/W
2. GN/Y	10. GN/W
3. GN/OR	11. P/W
4. GN/SB	12. Y
5. GN/BN	13. BL
6. GN	14. BL/R
7. P	15. -
8. W	16. SB

Color code

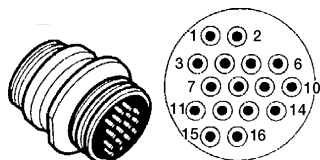
BL	= Blue
LBL	= Light blue
BN	= Brown
LBN	= Light brown
GN	= Green
GR	= Gray
OR	= Orange
P	= Pink
R	= Red
SB	= Black
VO	= Violet
W	= White
Y	= Yellow

Color codes, EDC cables

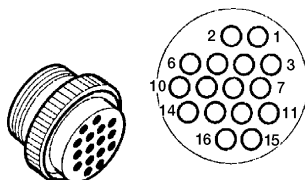
Twin installation

KA(M)D44P-A

Pin numbers are marked on the connector.



M = Male connection



F = Female connection

Color code for 16-pin connection, twin installation. In twin installations, all connectors have the same Color code except the connectors for the engine and the port and star-board controls.

Color code

- | | |
|----------|-----------|
| 1. R | 9. BL/Y |
| 2. VO | 10. LBL |
| 3. BL/R | 11. LBN |
| 4. R/Y | 12. GR |
| 5. BN | 13. GR/SB |
| 6. OR | 14. BL/W |
| 7. R/GN | 15. BN/W |
| 8. BL/SB | 16. SB |

Color code for connector, controls for port engine

- | | |
|----------|----------|
| 1. Y/W | 9. SB/W |
| 2. GN/Y | 10. GN/W |
| 3. OR/GN | 11. P/W |
| 4. GN/SB | 12. Y |
| 5. GN/R | 13. BL |
| 6. GN | 14. BL/R |
| 7. P | 15. - |
| 8. W | 16. SB |

Color code for connector, controls for star-board engine

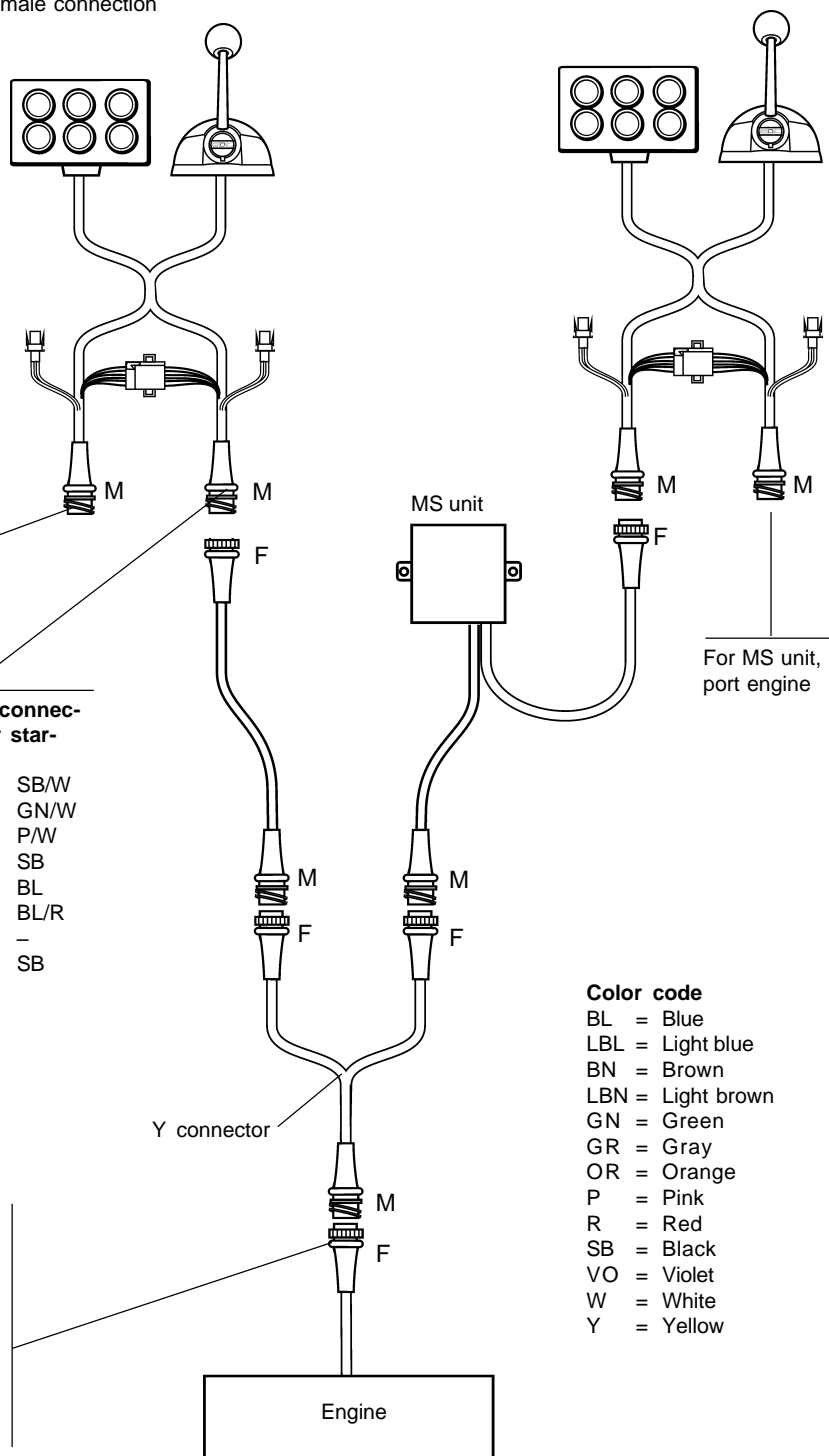
- | | |
|----------|----------|
| 1. Y/W | 9. SB/W |
| 2. GN/Y | 10. GN/W |
| 3. OR/GN | 11. P/W |
| 4. GN/SB | 12. SB |
| 5. GN/R | 13. BL |
| 6. GN | 14. BL/R |
| 7. P | 15. - |
| 8. W | 16. SB |

Color code for connector, engine

- | | |
|----------|----------|
| 1. Y/W | 9. SB/W |
| 2. GN/Y | 10. GN/W |
| 3. GN/OR | 11. P/W |
| 4. GN/SB | 12. Y |
| 5. GN/BN | 13. BL |
| 6. GN | 14. BL/R |
| 7. P | 15. - |
| 8. W | 16. SB |

Color code

- | | |
|-----|---------------|
| BL | = Blue |
| LBL | = Light blue |
| BN | = Brown |
| LBN | = Light brown |
| GN | = Green |
| GR | = Gray |
| OR | = Orange |
| P | = Pink |
| R | = Red |
| SB | = Black |
| VO | = Violet |
| W | = White |
| Y | = Yellow |

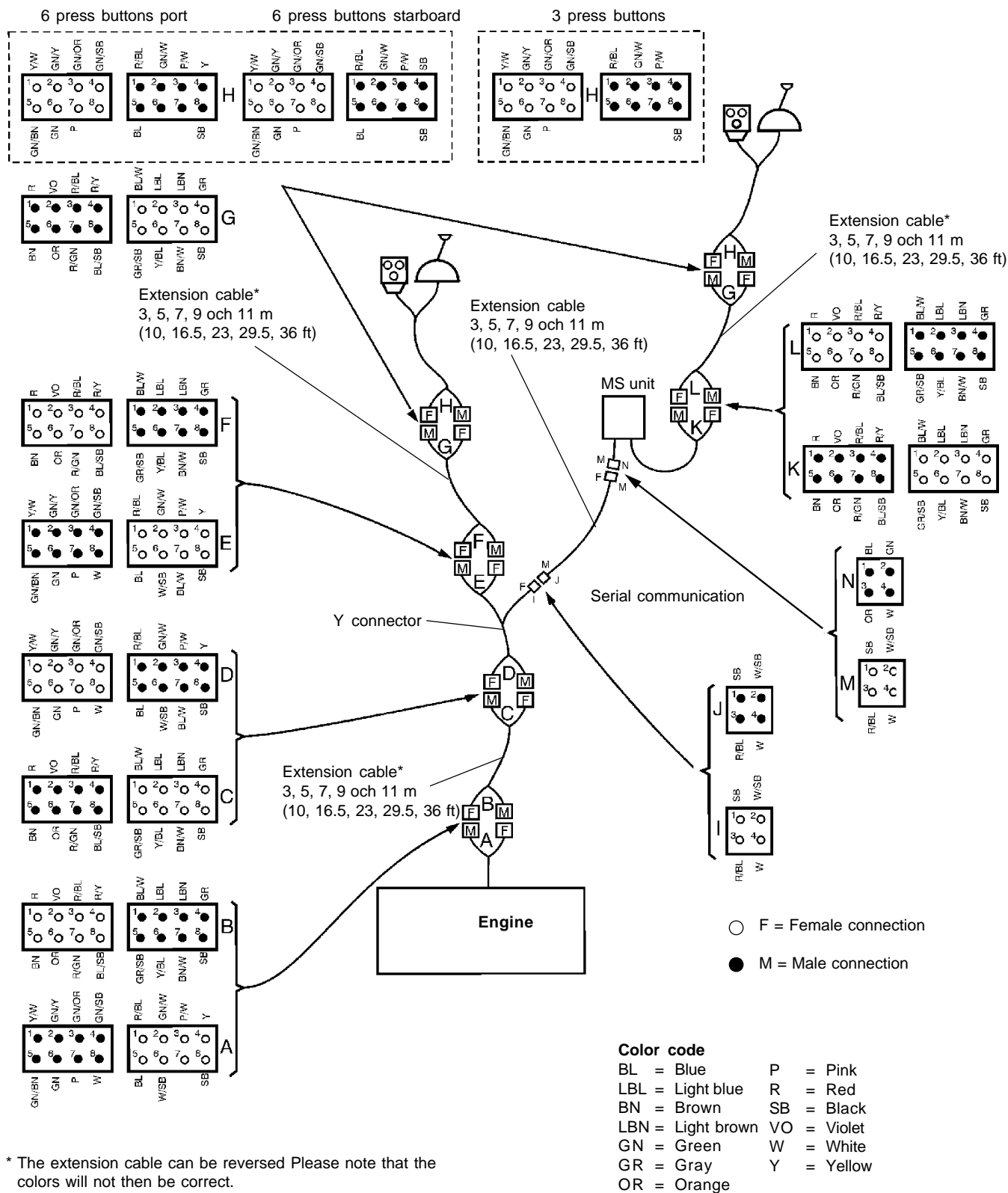


Color codes, EDC cables

KA(M)D44P-B/C, KA(M)D300-A

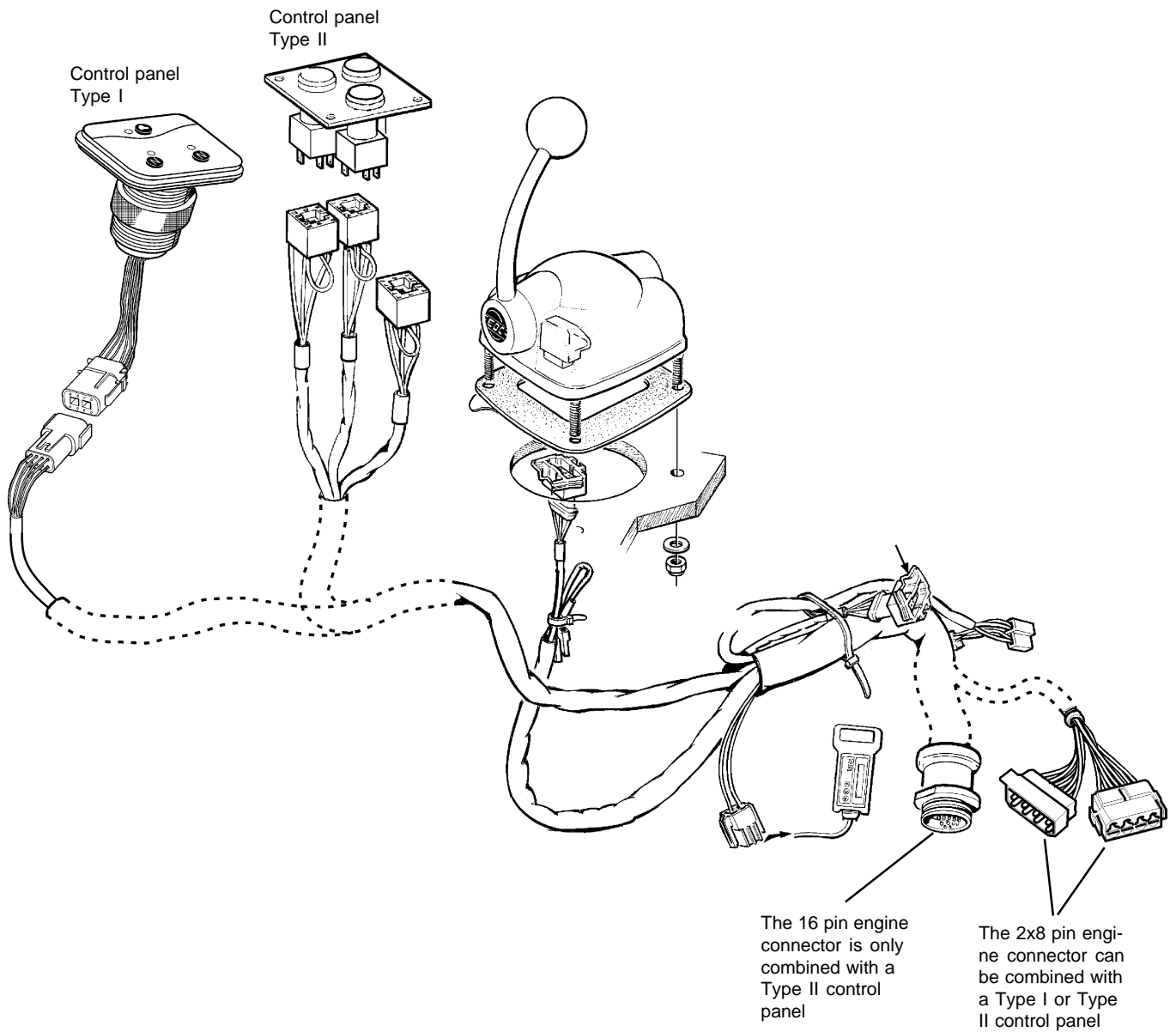
Twin installation

Single installation



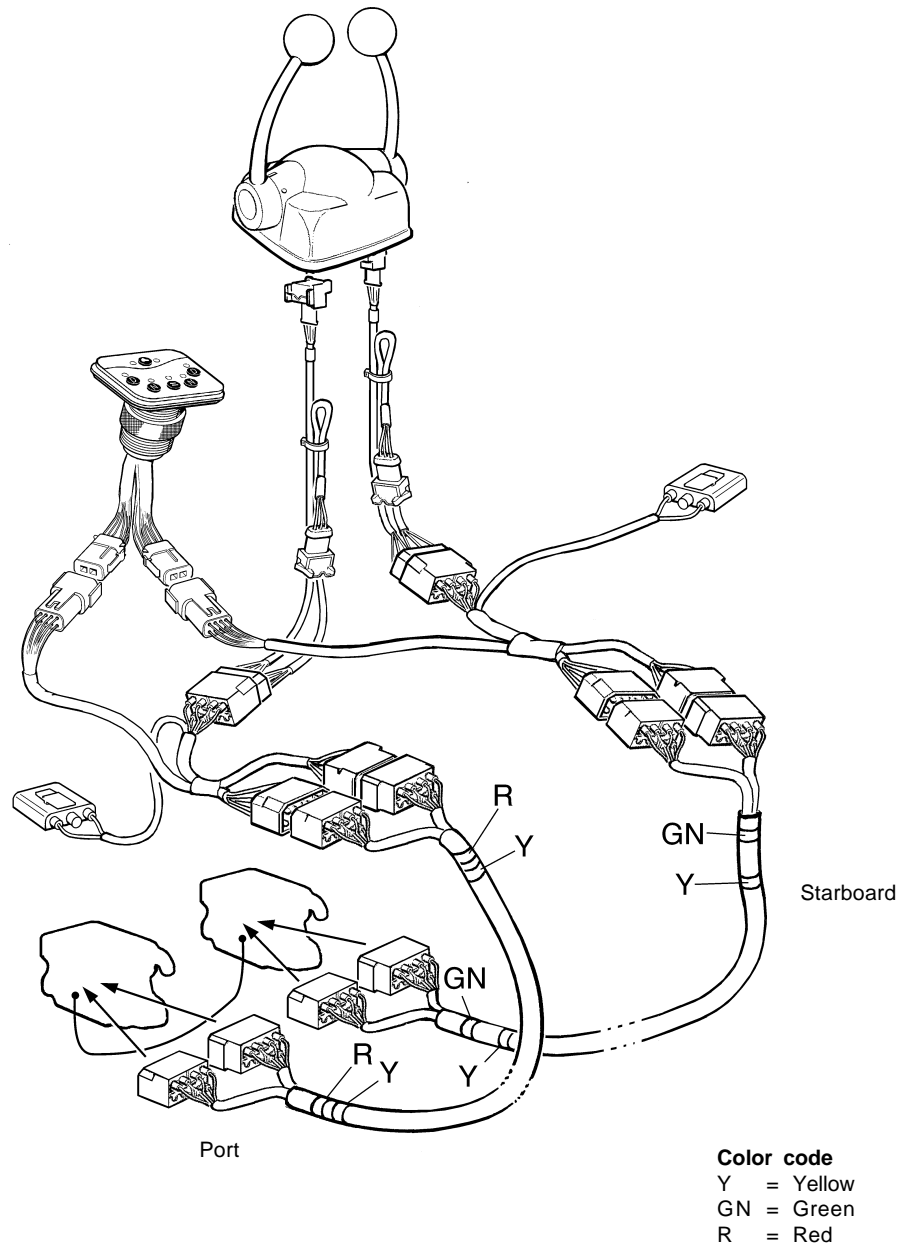
Electronic controls

Single installation



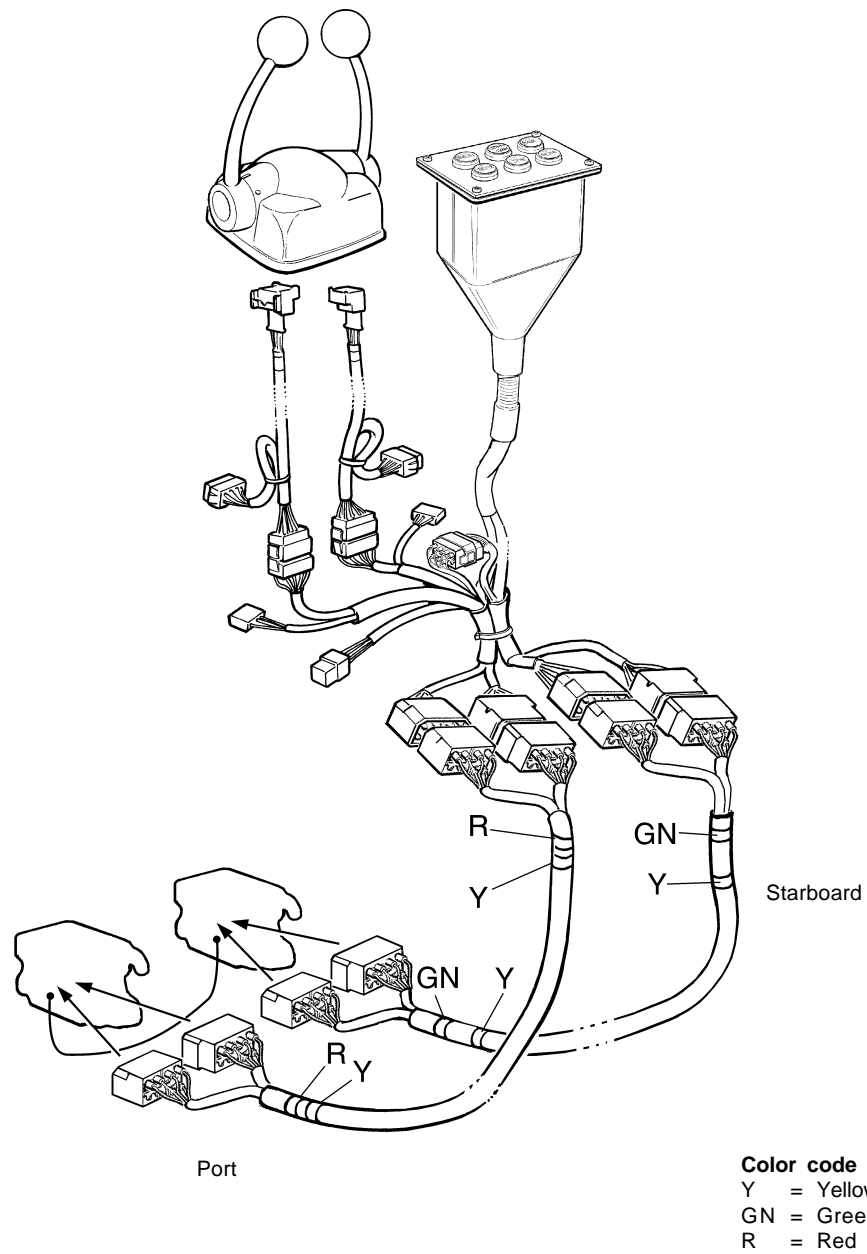
Electronic controls

Twin installation (control panel Type I)



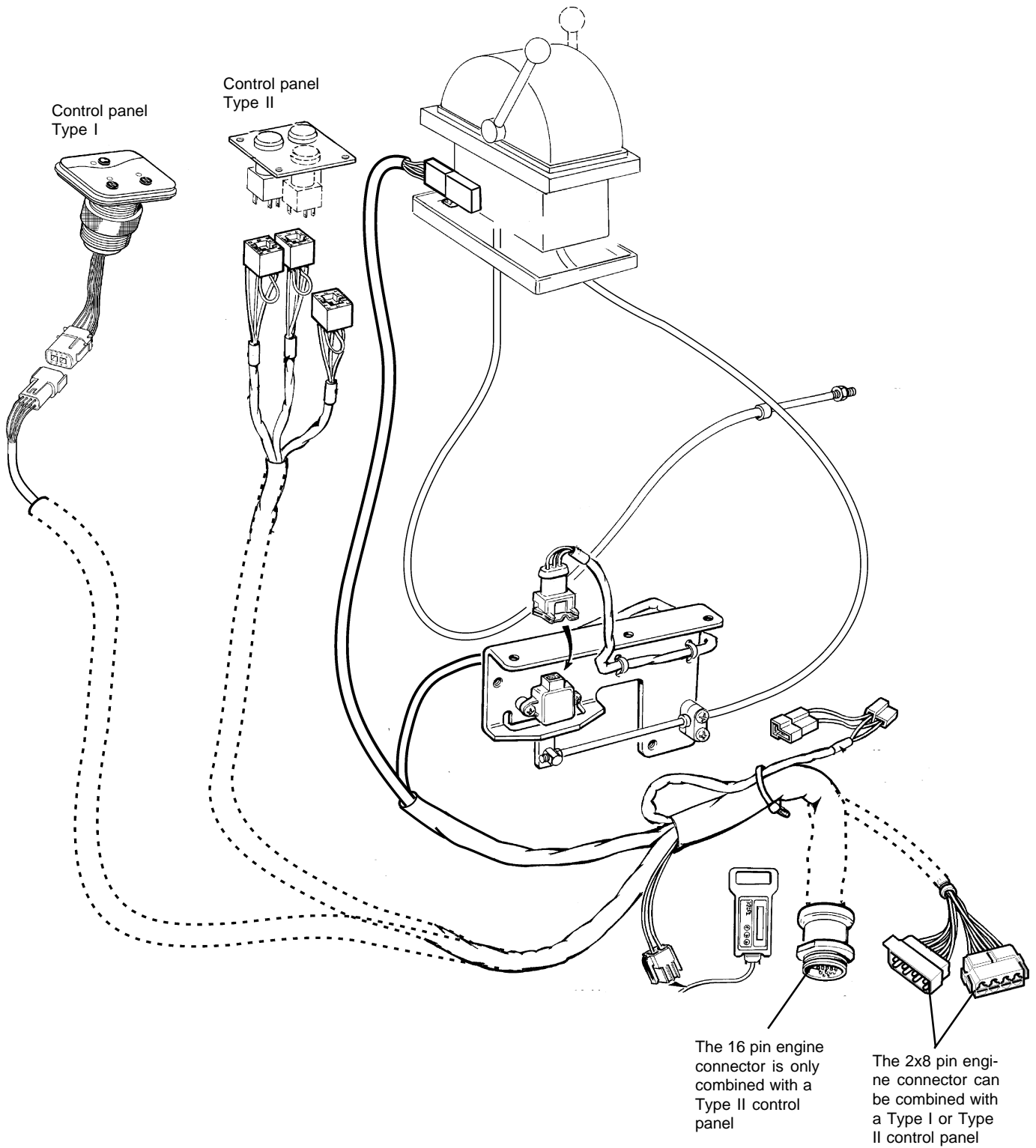
Electronic controls

Twin installation (control panel Type II)



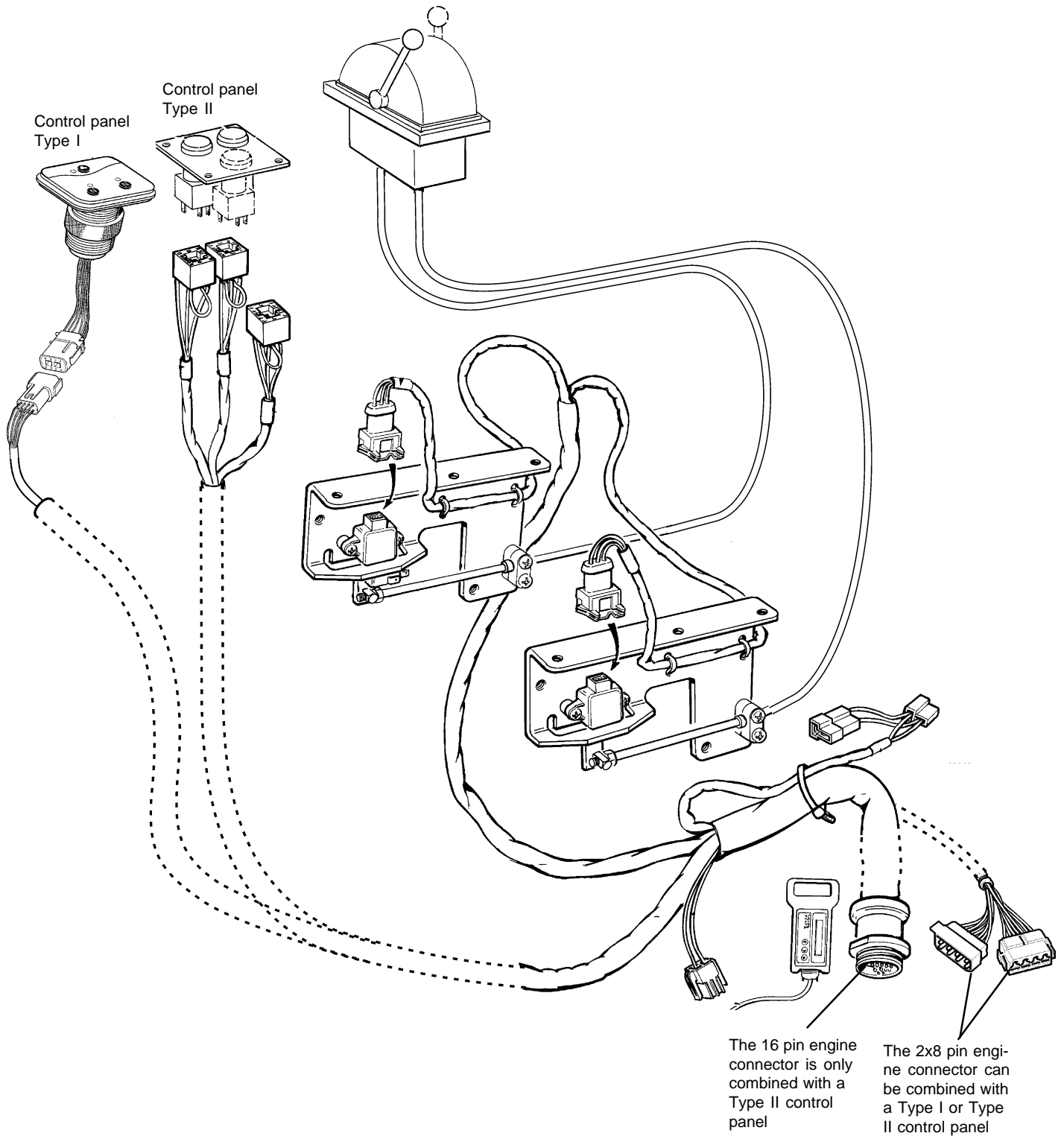
Mechanical twin lever control

Mechanical shifting



Mechanical twin lever control

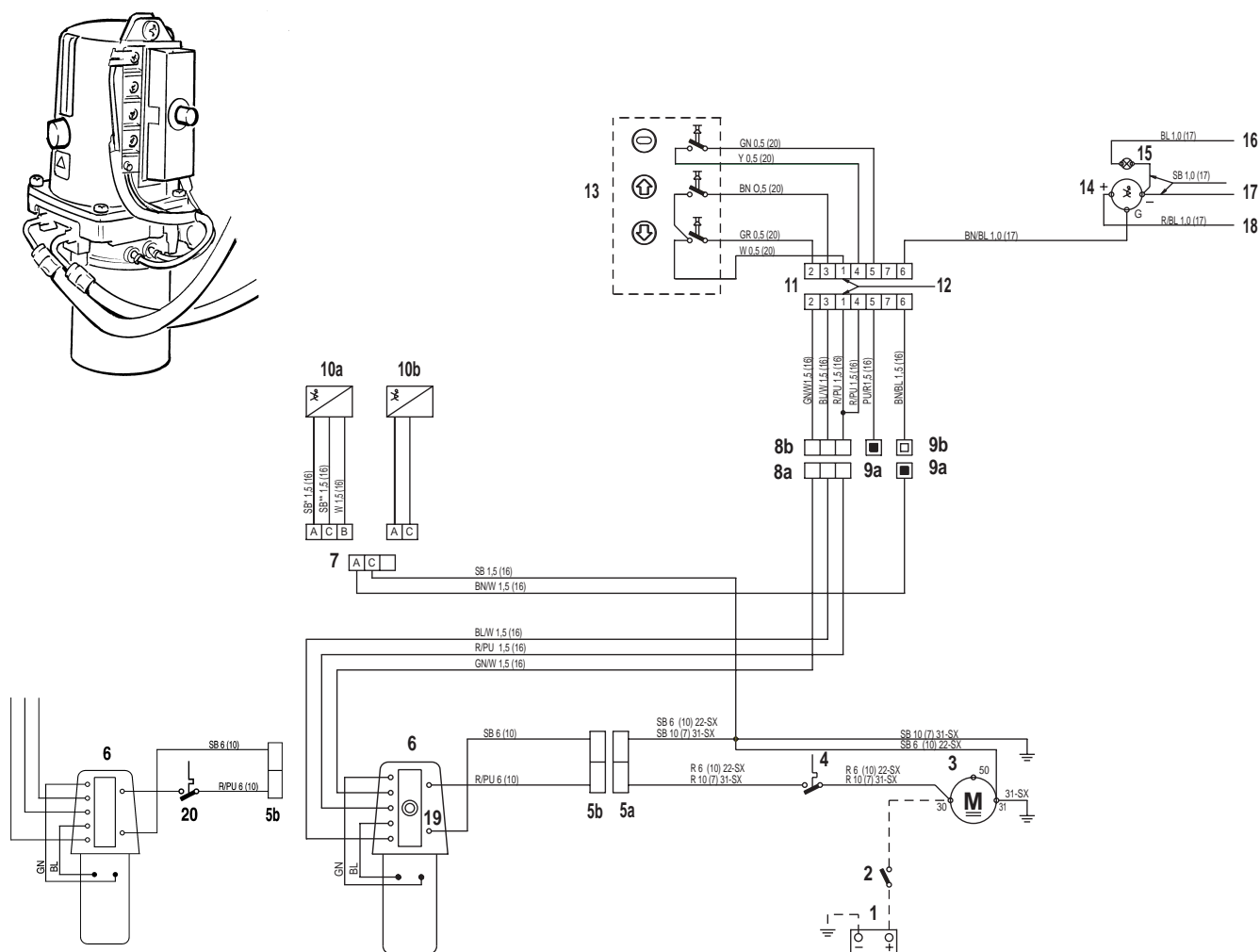
Electric shifting



Power trim

SX, DP-S,
290, 290-DP,
SP (all models), DP (all models),
DPX

Power Trim SX without trim limiter, early production



1. Battery
2. Main switch
3. Starter
4. Circuit breaker 50 A
- 5a. Connector, 2-pole male
- 5b. Connector, 2-pole female
6. Hydraulic pump
7. Connector with rubber cap, 3-pole
- 8a. Fully cast connectors, 3-pole female
- 8b. Fully cast connectors, 3-pole male
- 9a. Connector with rubber cap, 1-pole male
- 9b. Connector with rubber cap, 1-pole female
- 10a. Trim sender, digital
- 10b. Trim sender, analogue
11. Connector, 7-pole
12. Extension cable, Y-connector
13. Control panel
14. Trim instrument, analogue
15. Instrument lightning
16. Connecting terminal, instrument lightning (+) to main panel
17. Connecting terminal, fuse box (-) to main panel
18. Connecting terminal, fuse box (+) to main panel
19. Circuit breaker 10 A
20. Circuit breaker 10 A*

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow
SB*	=	Black ribbed	SB**	=	Black smooth

Cable areas in (mm²) are given after the cable color codes.
Cable areas in brackets are AWG (American Wiring Gauge).

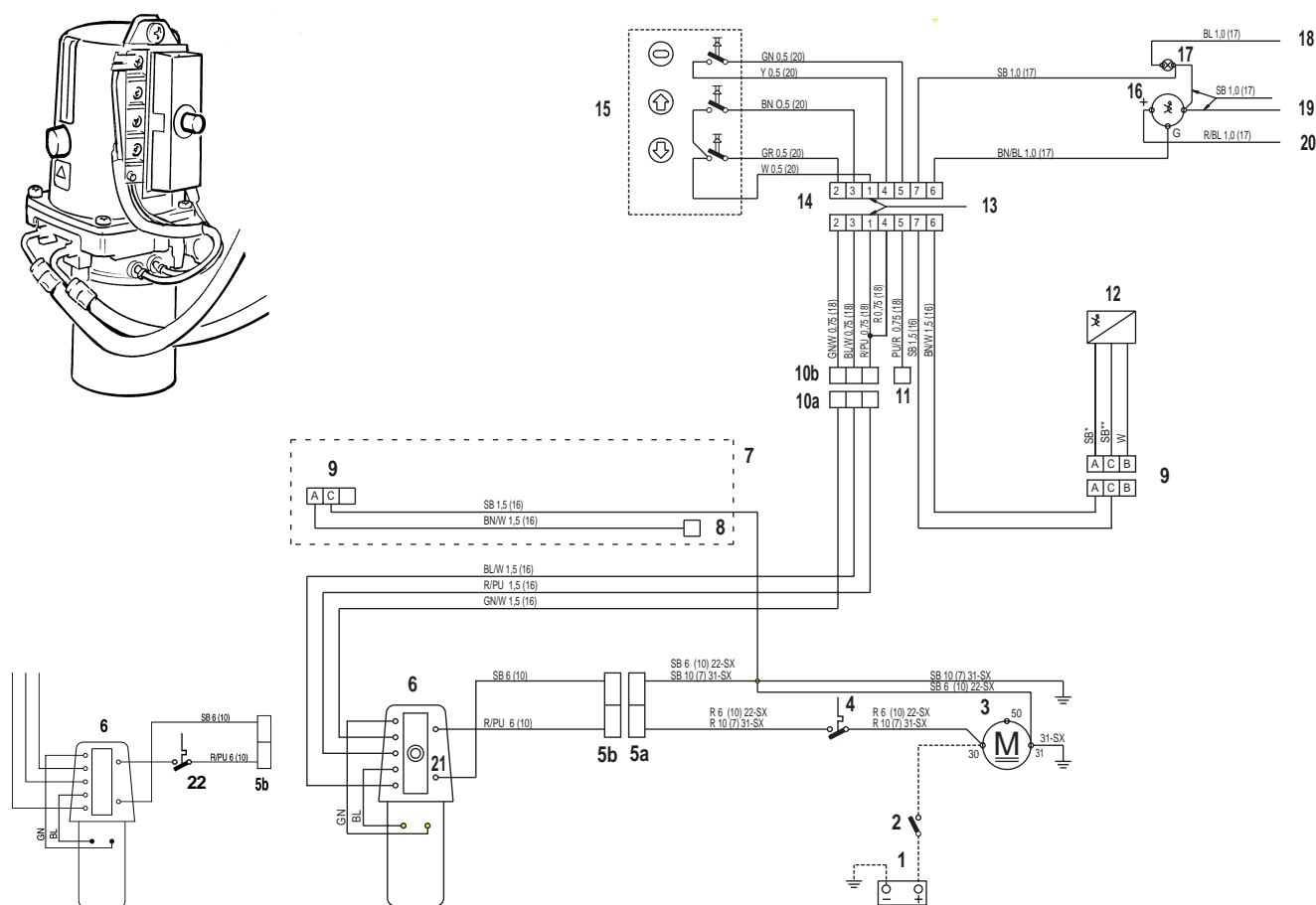
Conversion table:

mm ²	AWG
0.5	20
0.75	18
1.0	17
1.5	15–16
2.5	13
6	10
10	7

A broken line indicates a non-Volvo Penta cable.

* Only certain executions of SX-C1, SX-CLT1, SX-C1AC, SX-R1 and SX-R2

Power Trim SX without trim limiter, late production



1. Battery
2. Main switch
3. Starter
4. Circuit breaker 50 A
- 5a. Connector, 2-pole male
- 5b. Connector, 2-pole female
6. Hydraulic pump
7. Not used
8. Connector with rubber cap, 1-pole
9. Connector with rubber cap, 3-pole
- 10a. Fully cast connectors, 3-pole female
- 10b. Fully cast connectors, 3-pole male
11. Connector 1-pole, trim by-pass
12. Trim sender
13. Extension cable, Y-connector
14. Connector, 7-pole
15. Control panel
16. Triminstrument, analogue
17. Instrument lightning
18. Connecting terminal, instrument lightning (+) to main panel
19. Connecting terminal, fuse box (-) to main panel
20. Connecting terminal, fuse box (+) to main panel
21. Circuit breaker 10 A
22. Circuit breaker 10 A*

* Only certain executions of SX-C1, SX-CLT1, SX-C1AC, SX-R1 and SX-R2

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow
SB*	=	Black ribbed	SB**	=	Black smooth

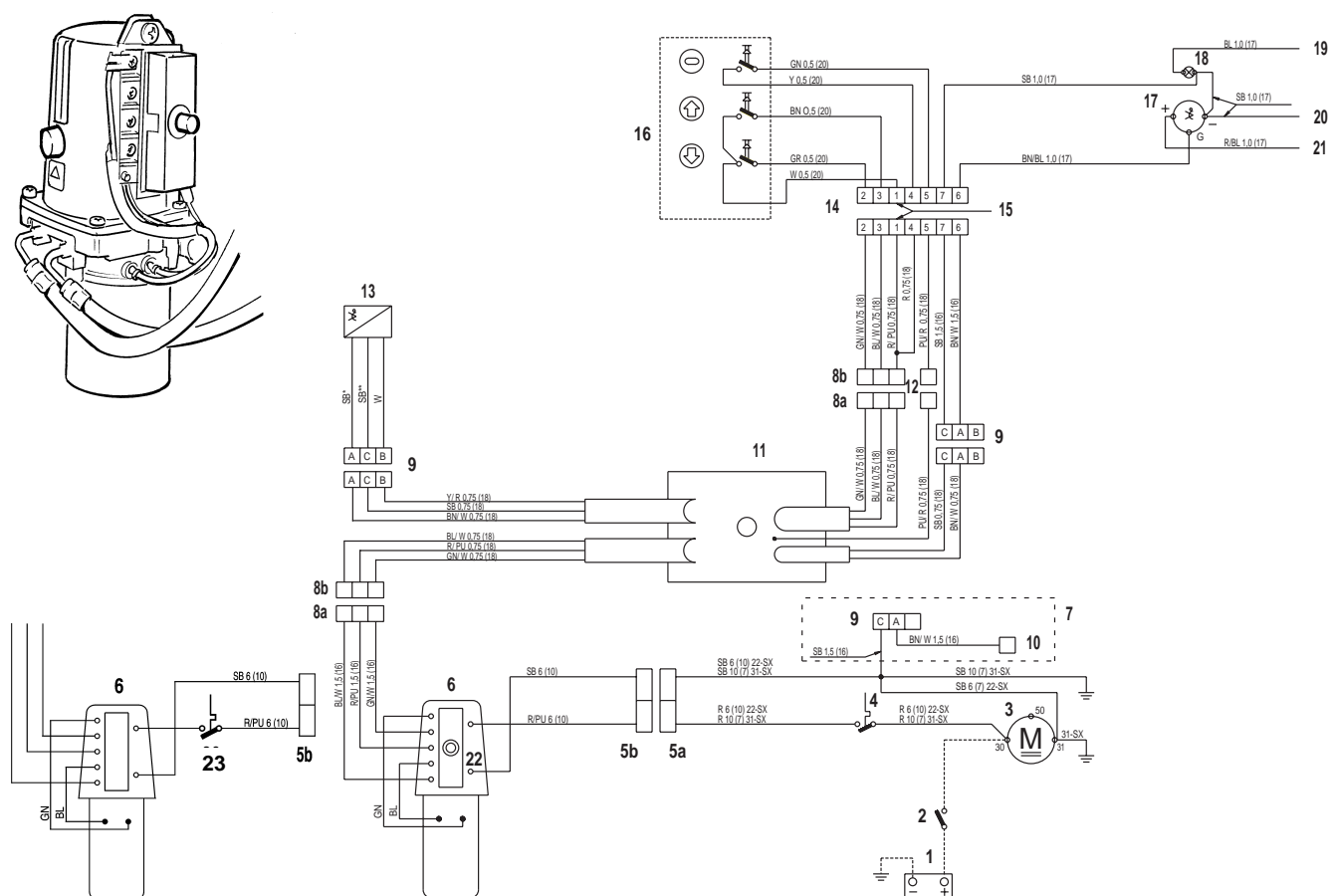
Cable areas in (mm²) are given after the cable color codes.
Cable areas in brackets are AWG (American Wiring Gauge).

Conversion table:

mm ²	AWG
0.5	20
0.75	18
1.0	17
1.5	15-16
2.5	13
6	10
10	7

A broken line indicates a non-Volvo Penta cable.

Power Trim SX, DP-S with trim limiter



1. Battery
2. Main switch
3. Starter
4. Circuit breaker 50 A
- 5a. Connector, 2-pole male
- 5b. Connector, 2-pole female
6. Hydraulic pump
7. Not used
- 8a. Fully cast connectors, 3-pole female
- 8b. Fully cast connectors, 3-pole male
9. Connector with rubber cap, 3-pole
10. Connector with rubber cap, 1-pole
11. Trim limiter
12. Connector, 1-pole
13. Trim sender
14. Connector, 7-pole
15. Extension cable, Y-connector
16. Control panel
17. Trim instrument, analogue
18. Instrument lightning
19. Connecting terminal, instrument lightning (+) to main panel
20. Connecting terminal, fuse box (-) to main panel
21. Connecting terminal, fuse box (+) to main panel
22. Circuit breaker 10 A
23. Circuit breaker 10 A*

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow
SB*	=	Black ribbed	SB**	=	Black smooth

Cable areas in (mm²) are given after the cable color codes.
Cable areas in brackets are AWG (American Wiring Gauge).

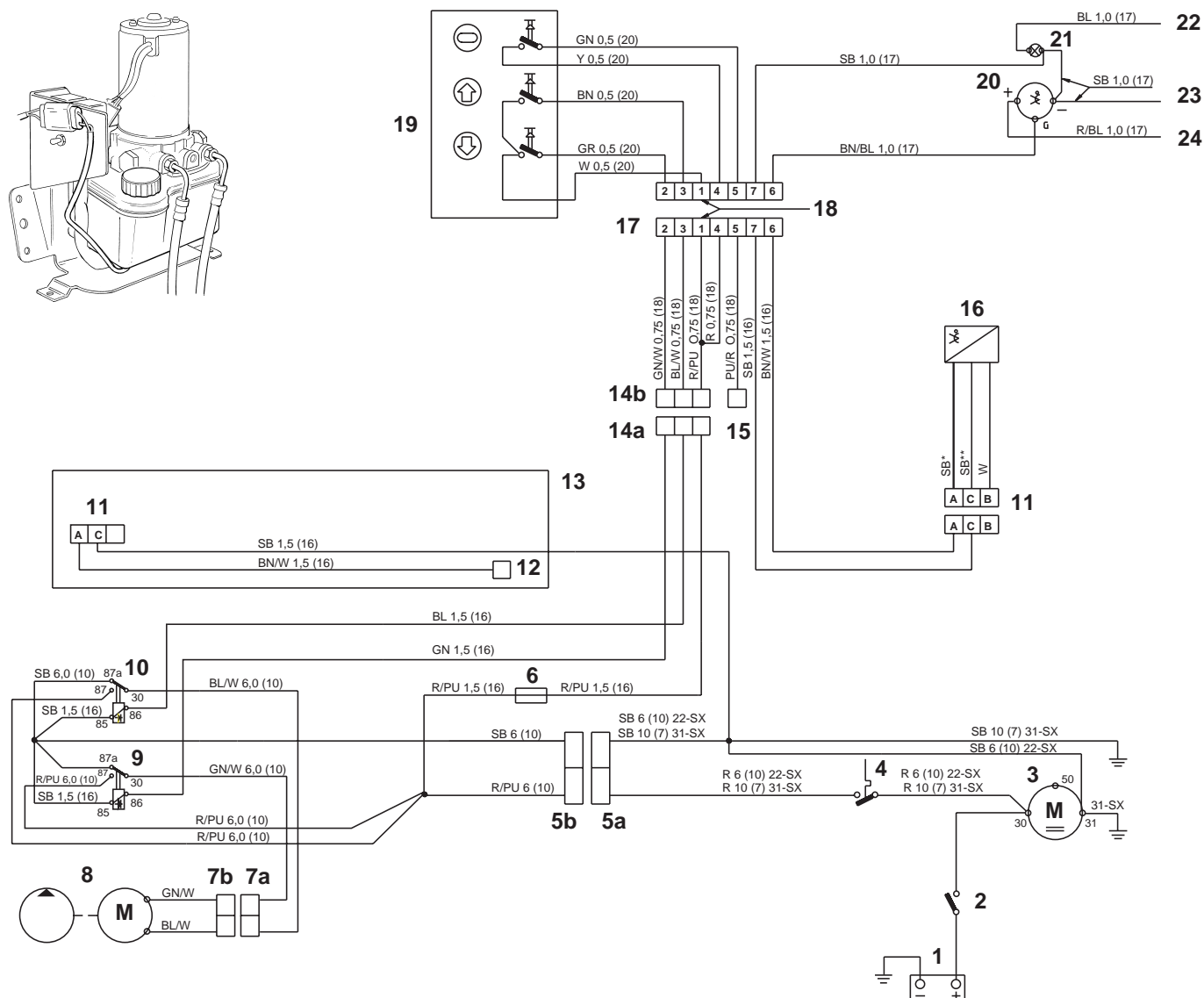
Conversion table:

mm ²	AWG
0.5	20
0.75	18
1.0	17
1.5	15–16
2.5	13
6	10
10	7

A broken line indicates a non-Volvo Penta cable.

* Only certain executions of SX-C1, SX-CLT1, SX-C1AC, SX-R1 and SX-R2

Power Trim SX without trim limiter



1. Battery
2. Main switch
3. Starter
4. Circuit breaker 50 A
- 5a. Connector, 2-pole male
- 5b. Connector, 2-pole female
6. Fuse 10 A
- 7a. Connector, 2-pole male
- 7b. Connector, 2-pole female
8. Hydraulic pump
9. Relay, down
10. Relay, up
11. Connector with rubber cap, 3-pole
12. Connector with rubber cap, 1-pole
13. Not used
- 14a. Fully cast connectors, 3-pole female
- 14b. Fully cast connectors, 3-pole male
15. Connector 1-pole
16. Trim sender
17. Connector, 7-pole
18. Extension cable, Y-connector
19. Control panel
20. Triminstrument, analouge
21. Instrument lightning
22. Connecting terminal, instrument lightning (+) to main panel
23. Connecting terminal, fuse box (-) to main panel
24. Connecting terminal, fuse box (+) to main panel

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow
SB*	=	Black ribbed	SB**	=	Black smooth

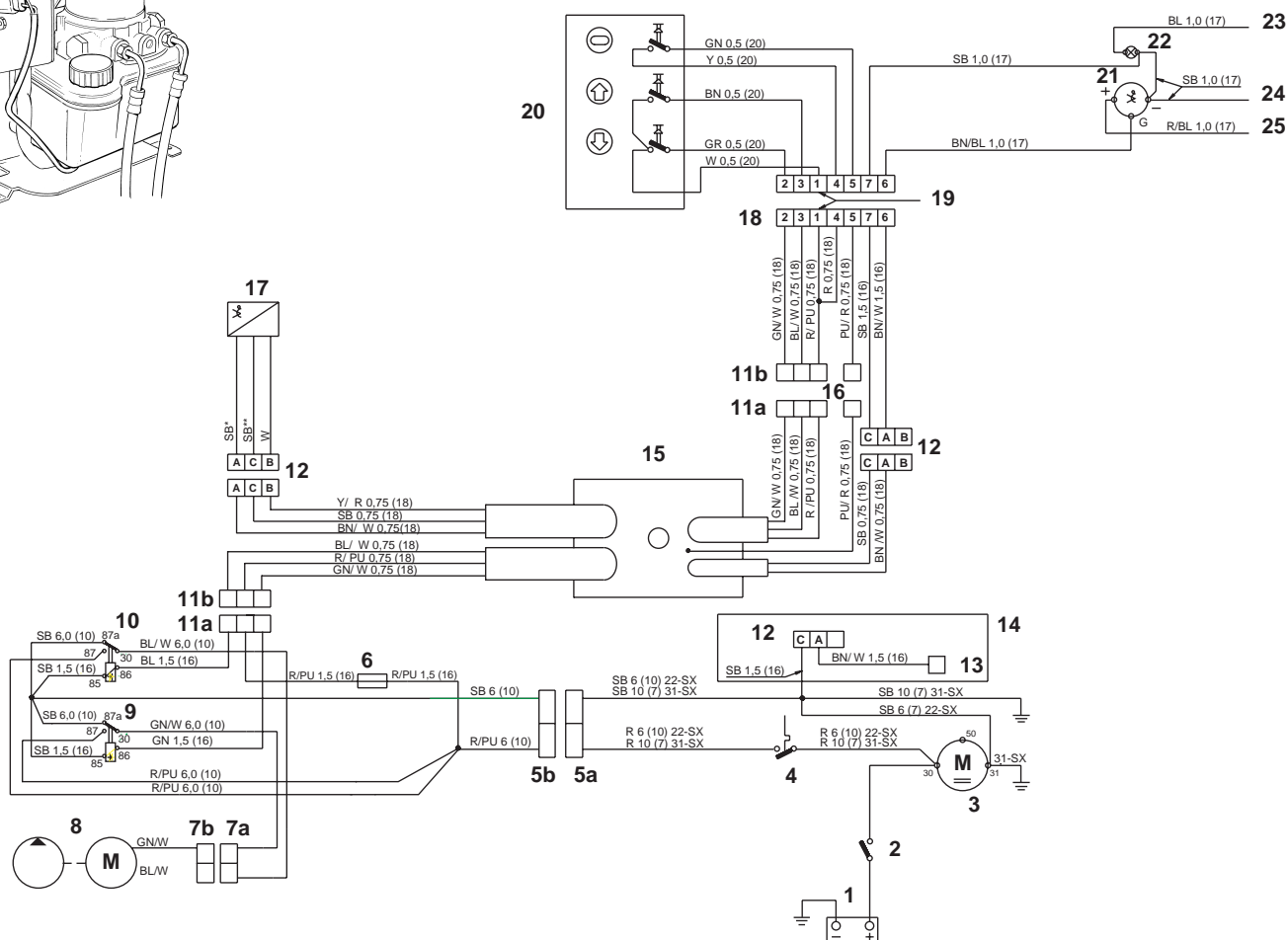
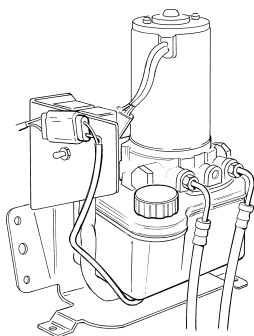
Cable areas in (mm²) are given after the cable color codes.
Cable areas in brackets are AWG (American Wiring Gauge).

Conversion table:

mm ²	AWG
0.5	20
0.75	18
1.0	17
1.5	15-16
2.5	13
6	10
10	7

A broken line indicates a non-Volvo Penta cable.

Power Trim SX with trim limiter



1. Battery
2. Main switch
3. Starter
4. Circuit breaker 50 A
- 5a. Connector, 2-pole male
- 5b. Connector, 2-pole female
6. Fuse 10 A
- 7a. Connector, 2-pole female
- 7b. Connector, 2-pole male
8. Hydraulic pump
9. Relay, down
10. Relay, up
- 11a. Fully cast connectors, 3-pole female
- 11b. Fully cast connectors, 3-pole male
12. Connector with rubber cap, 3-pole
13. Connector with rubber cap, 1-pole
14. Not used
15. Trim limiter
16. Connector, 1-pole
17. Trim sender
18. Connector, 7-pole
19. Extension cable, Y-connector
20. Control panel
21. Trim instrument, analogue
22. Instrument lightning
23. Connecting terminal, instrument lightning (+) to main panel
24. Connecting terminal, fuse box (-) to main panel
25. Connecting terminal, fuse box (+) to main panel

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow
SB*	=	Black ribbed	SB**	=	Black smooth

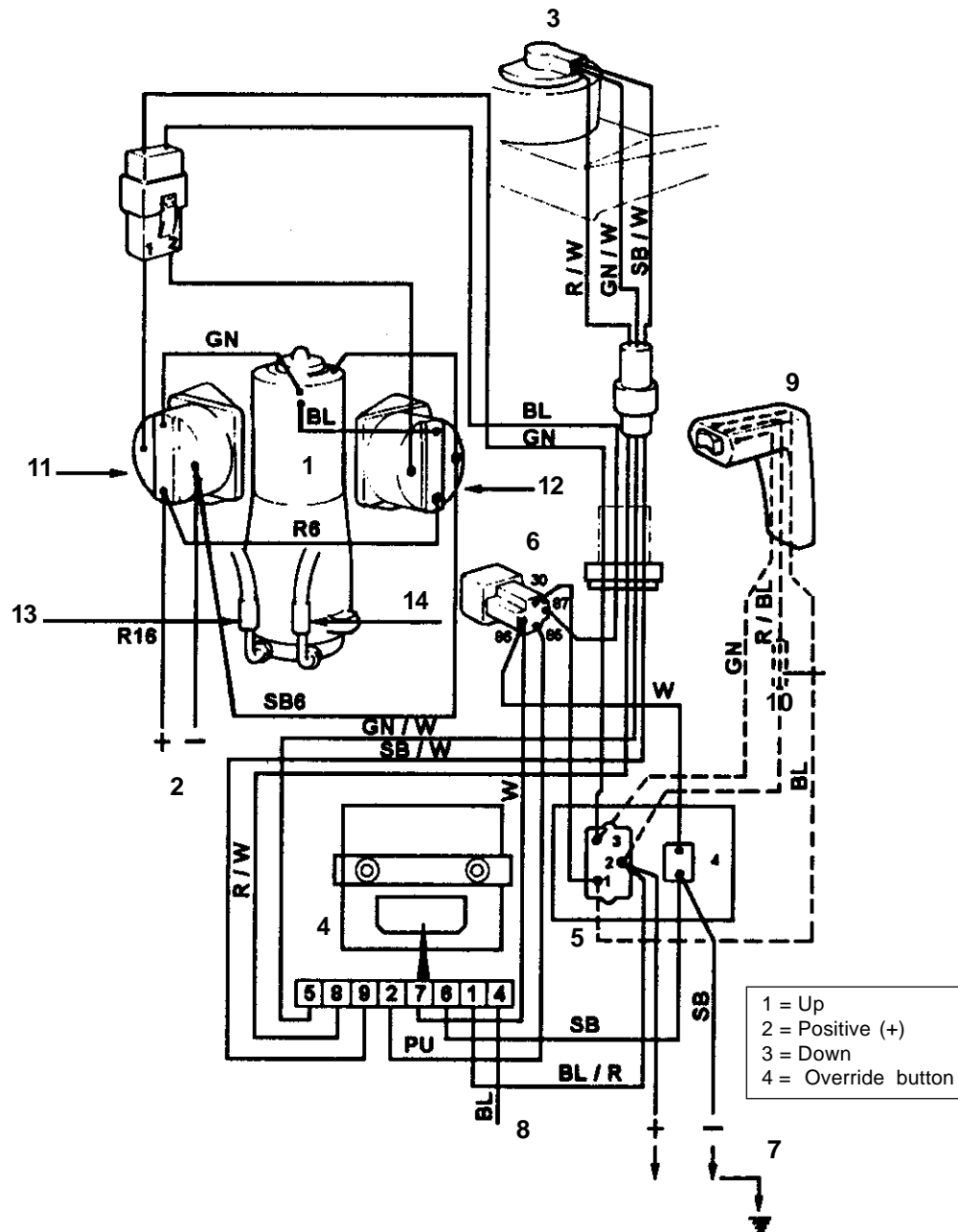
Cable areas in (mm²) are given after the cable color codes.
Cable areas in brackets are AWG (American Wiring Gauge).

Conversion table:

mm ²	AWG
0.5	20
0.75	18
1.0	17
1.5	15-16
2.5	13
6	10
10	7

A broken line indicates a non-Volvo Penta cable.

Power trim 290, 290A, 290-DP and 290A-DP (version 1)



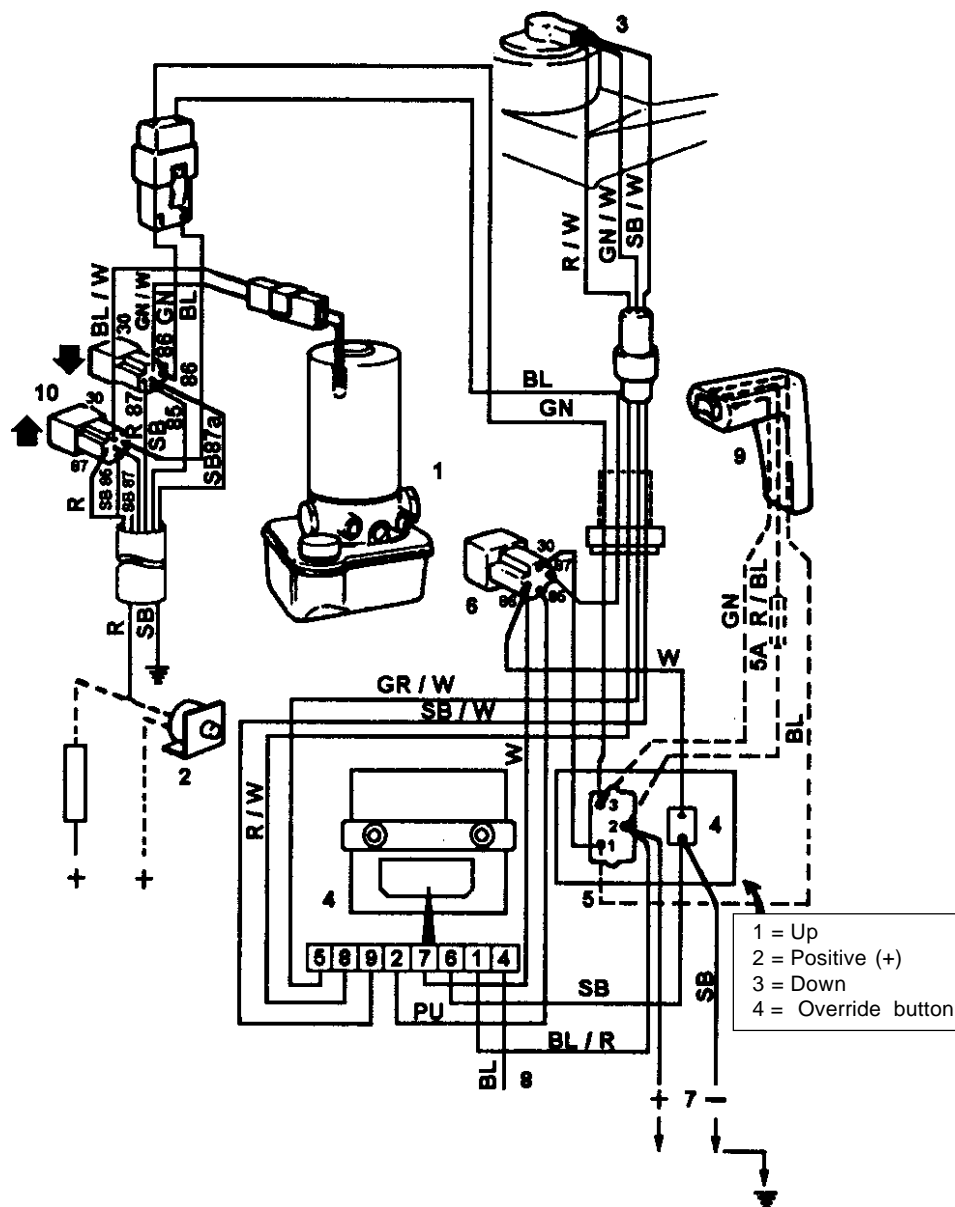
1. Oil pump
2. Fuse, 55 A
3. Trim sender
4. Trim indicator
5. Switch
6. Switching relay, "beach" position
7. Connector, instrument panel
8. Instrument lighting
9. Throttle-mounted switch (accessory)
10. Fuse, 5 A
11. Control relay, down
12. Control relay, up
13. Hydraulic hose, low pressure
14. Hydraulic hose, high pressure

Cable colors

BL	=	Blue	P	=	Pink
LBL	=	Light blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow

Cable cross sections not given = 1.5 mm²

Power trim 290, 290A, 290-DP, 290A-DP, SP, DP (version 2)



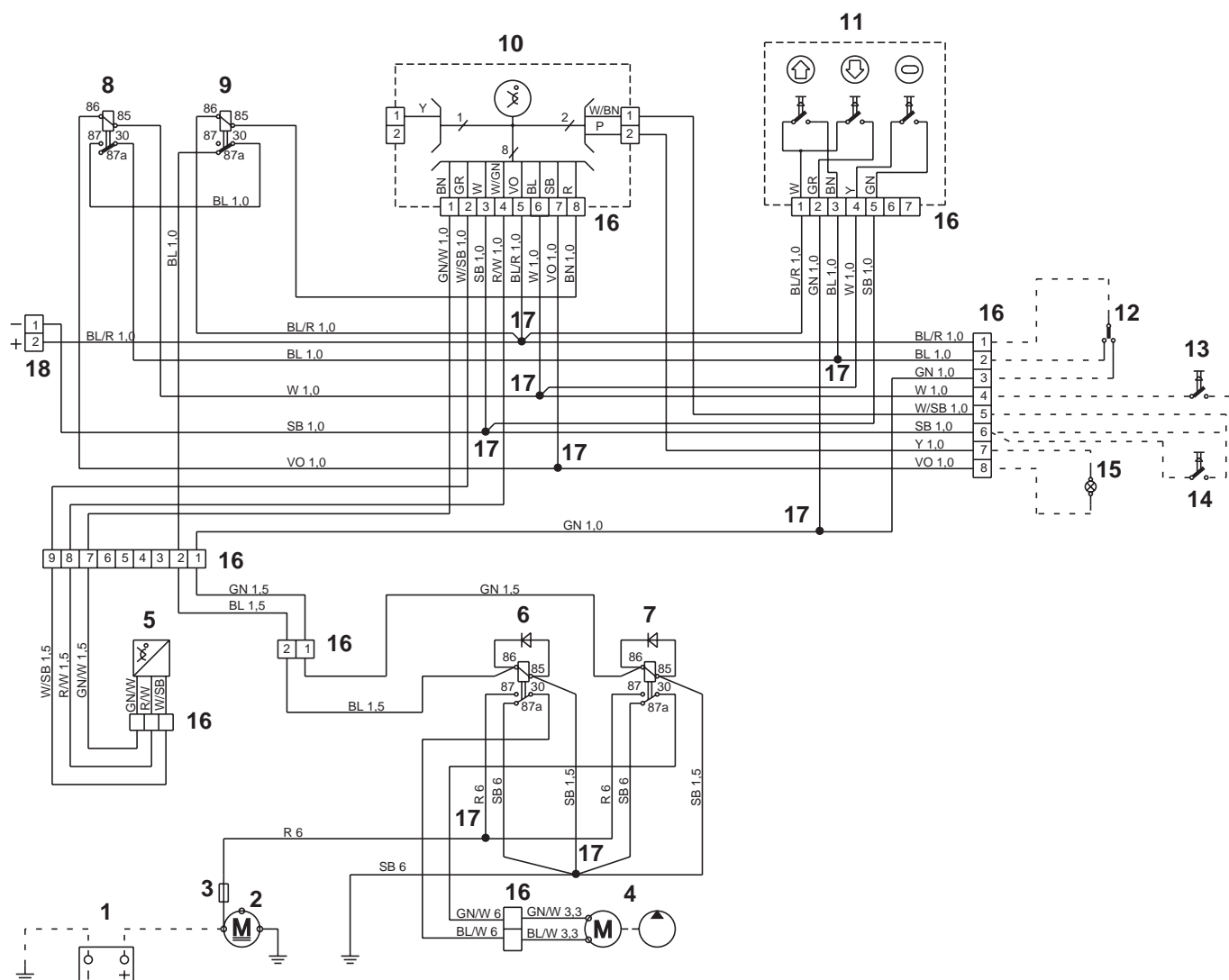
1. Oil pump
2. Fuse
3. Trim sender
4. Trim indicator
5. Switch
6. Switching relay, "beach" position
7. Connector, instrument panel
8. Instrument lighting
9. Throttle-mounted** switch (accessory)
10. Motor type relay (the arrow refers to the trim function, up/down.)

Cable colors

BL	=	Blue	P	=	Pink
LBL	=	Light blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow

Cable cross sections not given = 1.5 mm²

Power trim SP, DP (version 3)

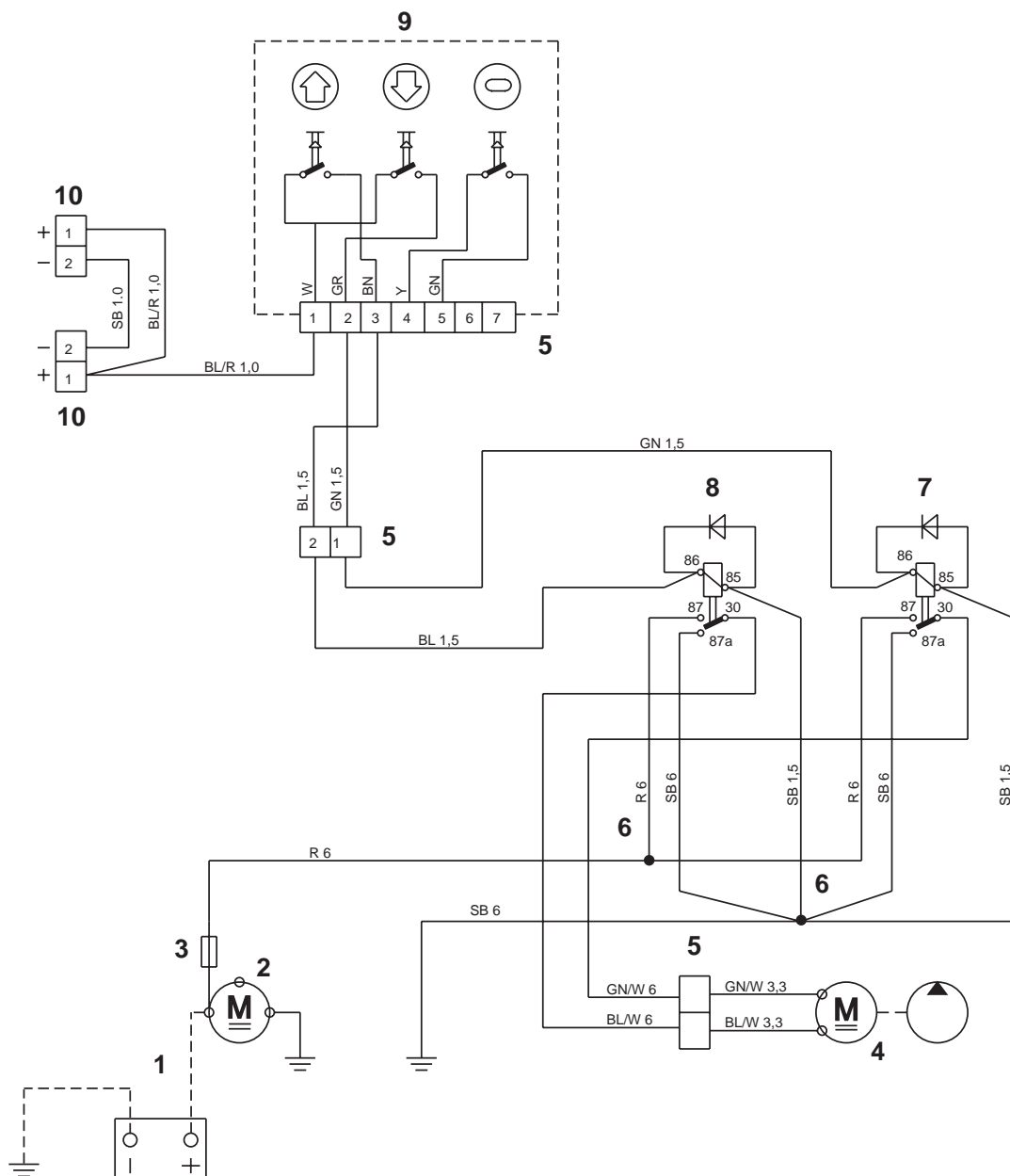


1. Battery
2. Starter
3. Fuse 55 A
4. Hydraulic pump
5. Trim sender
6. Relay, up
7. Relay, down
8. Relay, by-pass
9. Relay, lift stop
10. Trim instrument
11. Control panel
12. 1-pole two-way switch, up and down
13. 1-pole switch, by-pass standard
14. 1-pole switch, by-pass with hold function
15. Lamp
16. Connecting terminal, can not be opened
17. Connecting terminal, can not be opened
18. Connector, to main panel

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow

Cable areas in (mm²) are given after the cable color codes.
A broken line indicates a non-Volvo Penta cable.



1. Battery
2. Starter
3. Fuse 55 A
4. Hydraulic pump
5. Connector
6. Connecting point, cannot be opened
7. Reley, down
8. Reley, up
9. Control panel
10. Connector, to main panel

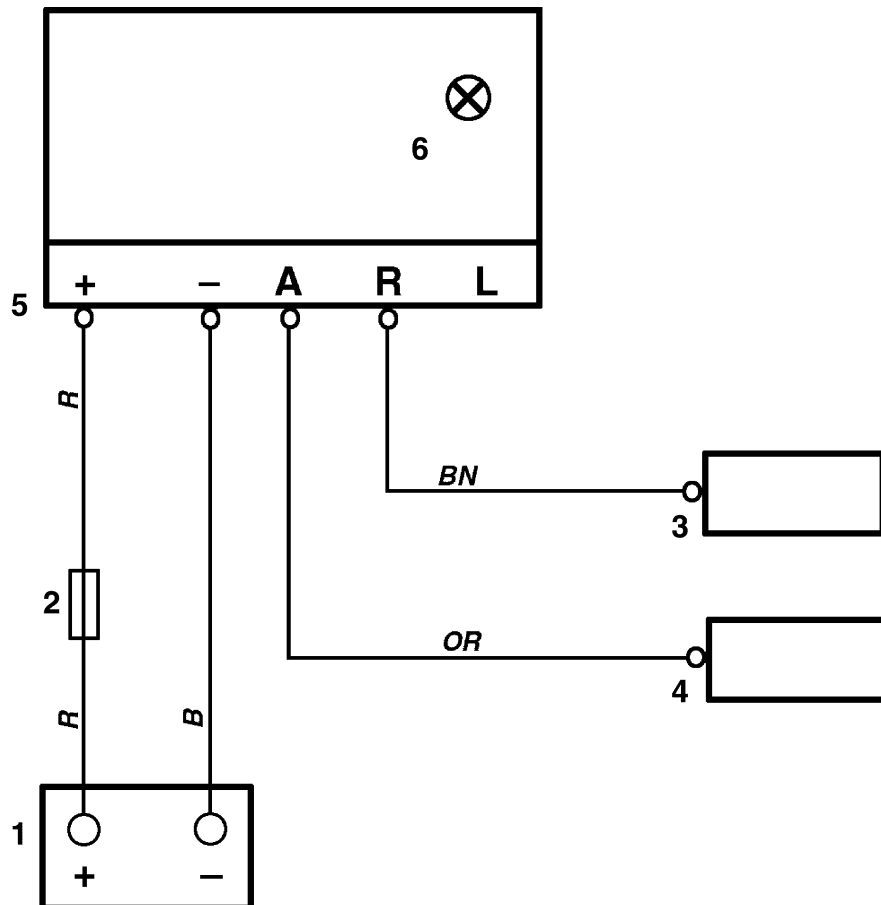
Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow

Cable areas in (mm²) are given after the cable color codes.
A broken line indicates a non-Volvo Penta cable.

Active Corrosion Protection System

12 V



1. Battery
2. Fuse 1 A
3. Active anode
4. Reference sensor
5. Electronic unit
6. LED light

Cable color

BL	=	Blue	P	=	Pink
LBL	=	Light-blue	PU	=	Purple
BN	=	Brown	R	=	Red
LBN	=	Light-brown	SB	=	Black
GN	=	Green	VO	=	Violet
GR	=	Gray	W	=	White
OR	=	Orange	Y	=	Yellow

Group	No.	Date	Regarding
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Notes

Report form

Do you have any complaints or other comments about this manual? Please make a copy of this page, write your comments down and post it to us. The address is at the bottom of the page. We would prefer you to write in English or Swedish.

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AB Volvo Penta
Customer Support
Dept. 42200
SE-405 08 Gothenburg
Sweden

