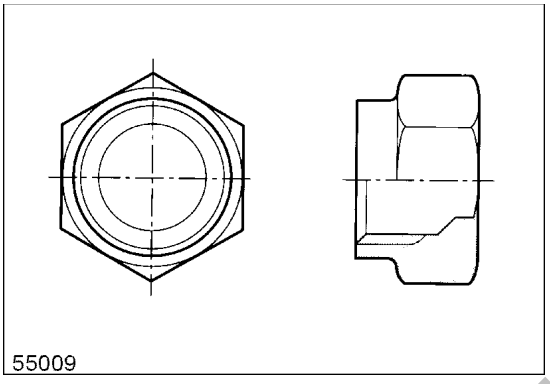
PRIMARY HYDRAULIC POWER SYSTEM - Torque (A.10.A - D.20.A.10)

CS540, CS640, CS520, CS660, CL560

Union nuts



55009 1

Ferrules

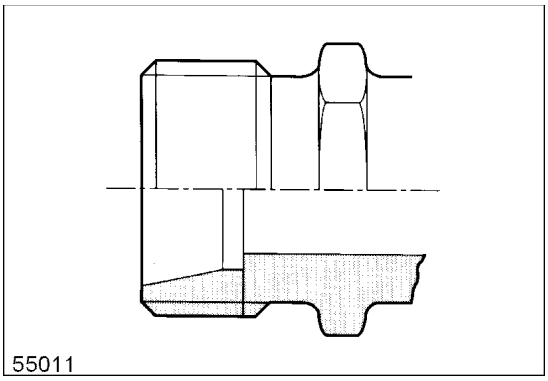
The ferrule must be pre-assembled on the tube. Tighten the union nut as specified in the table below. The ferrule and screw thread are greased.

Tube outer diameter mm (inch)	Torque Nm (lb.ft)	
	Minimum	Maximum
8 (0.32)	15 (11)	20 (15)
10 (0.4)	25 (18)	30 (22)
12 (0.47)	35 (26)	40 (29)
16 (0.63)	50 (37)	55 (40)
18 (0.71)	60 (44)	70 (51)
22 (0.87)	100 (74)	110 (81)
28 (1.10)	110 (81)	120 (88)

Metric fittings

Unions

Are suitable for use with union nuts and ferrules and ball-type nipples.



55011 2

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Air compressor - Torque (A.20.A.31 - D.20.A.10)

CS540, CS640, CS520, CS660, CL560

Connecting rod bolts	**6 Nm** (**53 lb ft**.)
Cylinder head bolts	**20 Nm** (**14.8 lb ft**.)
Drive pulley retaining nut	**100 Nm** (**73.8 lb ft**.)

Air compressor - Special tools (A.20.A.31 - D.20.A.40)

CS540, CS640, CS520, CS660, CL560

Description	Tool No.
Piston ring compressor (Standard band type ring compressor **60-125 mm**)	291048

Air compressor - General specification (A.20.A.31 - D.40.A.10)

CS540, CS640, CS520, CS660, CL560

Type	Single piston
Bore	**75 mm** (**2.95 in**.)
Stroke	**36 mm** (**1.42 in**.)
Swept volume	**159 cm3**
Maximum permissible pressure temperature in service	**220 ° C** (**428 ° F**)
Crankshaft end play	**0.2-0.6 mm** (**0.079-0.236 in**.)
Maximum air tank pressure	**10 bar** (**145 psi**)

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LIGHTING SYSTEM - Problem solving (A.40.A - G.40.A.30)

CS540, CS640, CS520, CS660, CL560

OPERATION

Exterior lighting consists of the following:
LH and RH headlights
LH and RH stubble lights (if equipped)
LH and RH direction indicators
LH and RH front park lights (if equipped)
LH and RH rear road lights
Cab front center work light
LH and RH cab inner work lights
LH and RH cab mid work lights
LH and RH cab outer headlights
LH and RH side lights
LH and RH rear work lights (if equipped)
Front flashing beacon
Rear flashing beacon (if equipped)
Licence plate light
Unload tube light
Grain tank light

The various lamps are controlled by switches and operated via relays as follows:
Road light switch is powered directly from battery.
Road light switch includes off, low beam, high beam positions, left/right turn positions and horn switch.
Work light switch includes work light switch itself and inner work switch. Inner work switch is powered through LH center work lights relay when work light switch is closed.
Refer to : **ELECTRICAL POWER SYSTEM - Electrical schematic frame 16 (A.30.A - C.20.E.16)**
Refer to : **ELECTRICAL POWER SYSTEM - Electrical schematic frame 17 (A.30.A - C.20.E.17)**
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Refer to : **ELECTRICAL POWER SYSTEM - Electrical schematic frame 19 (A.30.A - C.20.E.19)**
Refer to : **ELECTRICAL POWER SYSTEM - Electrical schematic frame 20 (A.30.A - C.20.E.20)**.

TROUBLESHOOTING

Before troubleshooting the exterior lighting system make sure that the following operating conditions are met:

A. The batteries are fully charged and all connections are clean and tight.

B. The transmission is in neutral or park.

C. Check all connectors for full installation, loose, corroded, pushed out, or bent terminals.

D. Fuses # 6, 7, 29, 30, 31, 32, 33, 34, 35, 49, 50, 51, 52, 53, 54, 55 and 56 are intact and have power.

E. If one of the work light circuits is not working, try swapping a relay from a working system for a quick and easy relay check. Otherwise, follow the circuit diagnostic tests to determine the fault.

F. If a bulb is not working, substitute with a known good bulb to verify circuit operation.

NOTE: *The batteries must be fully charged and all connections clean and tight. Use a multi-meter for these tests.*

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ELECTRONIC SYSTEM - Fault code index (A.50.A - C.40.G.10)

CS540, CS640, CS520, CS660, CL560

Group 100 - Sensors (with threshing engaged)

Code	Description	Reference
E101	**E101 - GROUNDSPEED SENSOR (B7) SHORT TO GROUND**	**Sensing system Ground speed sensor - Short circuit to ground (C.20.B.95.80 - G.30.B.53)**
E102	**E102 - GROUNDSPEED SENSOR (B7) SHORT CIRCUIT TO +VE**	**Sensing system Ground speed sensor - Short circuit to B+ (C.20.B.95.80 - G.30.B.54)**
E103	**E103 - GROUNDSPEED SENSOR (B7) OPEN CIRCUIT**	**Sensing system Ground speed sensor - Open circuit (C.20.B.95.80 - G.30.B.50)**
E104	**E104 - DRUMSPEED SENSOR (B9) SHORT TO GROUND**	**Sensing system Drum speed sensor - Short circuit to ground (K.40.B.95.80 - G.30.B.53)**
E105	**E105 - DRUMSPEED SENSOR (B9) SHORT CIRCUIT TO +VE**	**Sensing system Drum speed sensor - Short circuit to B+ (K.40.B.95.80 - G.30.B.54)**
E106	**E106 - DRUMSPEED SENSOR (B9) OPEN CIRCUIT**	**Sensing system Drum speed sensor - Open circuit (K.40.B.95.80 - G.30.B.50)**
E107	**E107 - FANSPEED SENSOR (B8) SHORT TO GROUND**	**Sensing system Fan speed sensor - Short circuit to ground (K.62.B.95.52 - G.30.B.53)**
E108	**E108 - FANSPEED SENSOR (B8) SHORT CIRCUIT TO +VE**	**Sensing system Fan speed sensor - Short circuit to B+ (K.62.B.95.52 - G.30.B.54)**
E109	**E109 - FANSPEED SENSOR (B8) OPEN CIRCUIT**	**Sensing system Drum speed sensor - Open circuit (K.40.B.95.80 - G.30.B.50)**
E110	**E110 - STRAW WALKER (B13) SENSOR SHORT TO GROUND**	**Sensing system Straw walker sensor - Short circuit to ground (K.42.E.95.50 - G.30.B.53)**
E111	**E111 - STRAW WALKER (B13) SENSOR SHORT CIRCUIT TO +VE**	**Sensing system Straw walker sensor - Short circuit to B+ (K.42.E.95.50 - G.30.B.54)**
E112	**E112 - STRAW WALKER (B13) SENSOR OPEN CIRCUIT**	**Sensing system Straw walker sensor - Open circuit (K.42.E.95.50 - G.30.B.50)**
E113	**E113 - RETURN ELEVATOR (B12) SENSOR SHORT TO GROUND**	**Sensing system Tailing speed sensor - Short circuit to ground (K.62.C.95.80 - G.30.B.53)**
E114	**E114 - RETURN ELEVATOR (B12) SENSOR SHORT CIRCUIT TO +VE**	**Sensing system Tailing speed sensor - Short circuit to B+ (K.62.C.95.80 - G.30.B.54)**
E115	**E115 - RETURN ELEVATOR (B12) SENSOR OPEN CIRCUIT**	**Sensing system Tailing speed sensor - Open circuit (K.62.C.95.80 - G.30.B.50)**
E116	**E116 - STRAW CHOPPER (B10) SENSOR SHORT TO GROUND**	**Sensing system Speed sensor - Short circuit to ground (K.64.C.95.80 - G.30.B.53)**
E117	**E117 - STRAW CHOPPER (B10) SENSOR SHORT CIRCUIT TO +VE**	**Sensing system Speed sensor - Short circuit to B+ (K.64.C.95.80 - G.30.B.54)**
E118	**E118 - STRAW CHOPPER (B10) SENSOR OPEN CIRCUIT**	**Sensing system Speed sensor - Open circuit (K.64.C.95.80 - G.30.B.50)**

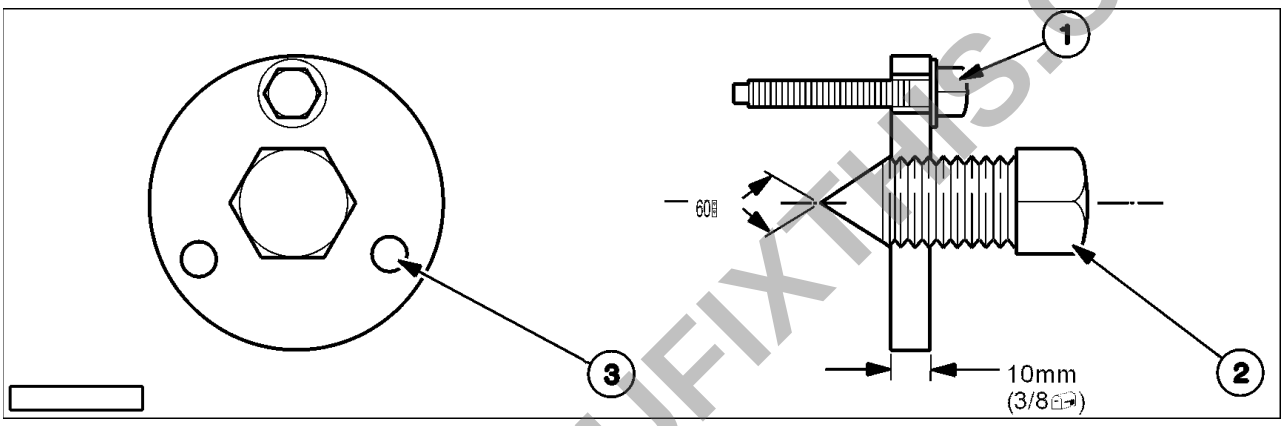
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INCH SERIES	Nm	lb.ft
1/ - 13	88	65
1/2 - 20	102	75
9/16 -18	122	90
5/6 -18	187	138
CYLINDER BLOCK PLUGS		
1/4 - 27 NPT	11	8
1/4 - 18 NPT	29.8	22
3/4 - 18 NPT	38	28
3/4 - 14 NPT	27	20

ENGINE - Special tools (B.10.A - D.20.A.40)

CS540, CS640, CS520, CS660, CL560



10_2-23_01 1

Fuel injection pump drive gear puller (Local manufacture or Special tool no.380000322 (295042)

1. Bolt 5/16-UNF x **2 in**. (**51 mm**) with integral washer (3 bolts required)
2. Bolt 3/4x16-UNC x **2 in**.(**51 mm**)
3. Three holes **0.375 in** (**9.5 mm**) dia. on **2.2 in** (**56.87 mm**) dia. equally spaced material of **0.394 in**. (**10 mm**) Plate HRLC P&O Steel

(Prior tool numbers, where applicable, shown in brackets)

Description	CNH number	(ex) NH number
Engine sling hook, (use with brackets 50075 and 50076)	380000216	290740
Engine revolving stand	380000301	290090
Engine overhaul brackets kit	380000313	293860
Cylinder pressure test kit	380000303	291309 & 295039
Lube pressure check kit	380000240	292870
Piston ring pliers	380000324	296028
Piston install band	380000325	296042
Crankshaft rear seal installer	380000332	297252 or 297194
Crankshaft front seal puller	-	297670
Crankshaft front seal installer	380000455	297115
Valve guide set reamers	380000319	295006
Valve spring compressor	380000302	291050
Water pump impeller seal installer	-	295007
Injector - hand pump tester	-	290284
Injector - cleaning kit	380000254	293671
Injector - splitting block	380000308	293760
Injector - splitting socket kit	380000309	293761
Injection pump drive gear puller	380000322	295042

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FUEL AND INJECTION SYSTEM - General specification (B.20.A - D.40.A.10)

CS540, CS640, CS520, CS660, CL560

Injection pump	Mechanically controlled governor on Bosch P7100
Rated speed	**2100 rpm**
Low idle speed	**1300 rpm**
High idle speed	**2205 rpm**
Injection pump timing	Set using fixed timing pins with engine at TDC

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ENGINE COOLANT SYSTEM - Torque (B.50.A - D.20.A.10)

CS540, CS640, CS520, CS660, CL560

TIGHTENING TORQUES

Description	Nm	Lb.ft
Thermostat housing	18	24
Temperature senders	15	20
Tensioner pulley bolt	40	54
Tensioner front cover	40	54
Idler pulleys	40	54
Pump connector to block	18	24
Water pump to block	48	65
Fan blade to support body	17	23
Fan blade to clutch support body	78	105

ENGINE COOLANT SYSTEM - General specification (B.50.A - D.40.A.10)

CS540, CS640, CS520, CS660, CL560

THERMOSTAT

Opening temperature	**79-83 °C** (**174-181 °F**)
Fully open	**93-96 °C** (**199-205 °F**)

WATER PUMP

Type	Centrifugal

DRIVE BELT

Belt tension	Maintained by tensioner

COOLING CAPACITIES
See CS Operators Manual

COOLANT FLOW

Coolant flow at rated engine speed	**340.6 L/min** (**90 US gpm**)

COOLING FLUID
See CS Operators Manual

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LUBRICATION SYSTEM - General specification (B.60.A - D.40.A.10)

CS540, CS640, CS520, CS660, CL560

OIL PUMP

Flow rate	**91 l/min**. (20 Imp Gpm) at 2100 Engine RPM and **1.38 bar** (**20 psi**)
Rotor clearance	**0.025-0.15 mm** (**0.001-0.006 in**)
Rotor to pump housing clearance	**0.15-0.28 mm** (**0.006-0.011 in**)
Rotor end play	**0.025-0.089 mm** (**0.001-0.0035 in**)
Pump gear to camshaft gear backlash	**0.40-0.56 mm** (**0.016-0.022 in**)

OIL PRESSURE

Minimum at low idle speed	**0.83 bar** (**12 psi**) at normal operating temperature
Minimum at engine rated speed	**2.41 bar** (**35 psi**) at normal operating temperature

OIL FILTER SUPPORT

Relief valve, Operating pressure	**3.8-4.1 bar** (**55-60 psi**)
Flow rate	**68.1-75.7 l/min**. (15-16.6 imp gal/min,**18-20 US gal**/min)

ENGINE OILS AND CHANGE PERIODS
Refer to the CS Operators manual

ENGINE OIL CAPACITIES

Model	Imp Pints	U.S. Gallons	Liters
6 CYL	48.6	6.08	23.0

GREASE and SEALANTS

Code	Number	Name
A	NLG**1 Grade** 2	Grease
B	ESF-M1C43-A	Grease-silicone light consistency
C	82995768	Sealer-anaerobic low strength (Loctite™ 565)
D & J	82995776	Sealer-silicone
E & F	82995774	Sealer-polyester urethane
G	82995773	Sealer-anaerobic (Loctite™ 565)
K	82995772	Thread and stud lock(Loctite™ 565)
L	82995771	Flexible gasket sealant

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STARTING SYSTEM - Problem solving (B.80.A - G.40.A.30)

CS540, CS640, CS520, CS660, CL560

OPERATION

When the key start is placed in the "START" position and the starter protection switch is in the "CLOSED" position, current flows through the coil side of the starter relay and then to ground. This closes the switch side of the starter relay and allows current flow to energize the solenoid of the starter and the starter motor will operate.
Refer to : **ELECTRICAL POWER SYSTEM - Electrical schematic frame 01 (A.30.A - C.20.E.01)**

TROUBLESHOOTING

Before troubleshooting the starting system make sure that the following operating conditions are met:

A. The batteries are fully charged and all connections are clean and tight.

B. Check fuses #1, #13 and #26.

C. The transmission is in neutral or park.

D. Battery switch closed.

NOTE: *The batteries must be fully charged and all connections clean and tight. Use a multi meter for these tests. For battery testing and service, see the battery section in the service manual.*

⚠ CAUTION ⚠

Z011 - DO NOT use a self-powered test light for any of these tests. Use of a self-powered test light can cause damage to components in this system.

⚠ CAUTION ⚠

Z008 - Before performing any of the electrical tests, be sure all operating controls are in neutral or park lock position. This will eliminate accidental movement of the machine or start-up of power driven equipment.

Problem	Possible Cause	Correction
Engine does not crank when key start switch is turned to start	Fuse #1.	A - Key start switch power supply test.**Start control - Testing (B.80.A.90 - G.40.A.20)**
	Key start switch (S3).	B - Key start switch (S3) test.**Start control Start switch - Testing (B.80.A.90.82 - G.40.A.20)**
	Engine protection (Neutral) switch (S2).	C - Engine protection (Neutral) switch (S2) test.**Cold start control - Testing (B.80.A.91 - G.40.A.20)**
	Starter relay circuit(s). Start Relay (K1).	D - Start relay (K1) circuit test.**Start control Start relay - Testing (B.80.A.90.80 - G.40.A.20)**
	Starter relay circuit(s). Start Relay (K1).	If test D is okay, install a new starter relay.
	Starter motor circuit. Starter motor (M1).	E - Starter motor circuit test.**Engine starter - Testing (B.80.A.82 - G.40.A.20)**
	Starter motor circuit. Starter Motor (M1).	If test E is okay, install a new starter motor.
The relay clicks but the engine does not crank	Starter relay (K1).	D - Starter relay (K1) circuit test.**Start control Start relay - Testing (B.80.A.90.80 - G.40.A.20)**
	Starter relay (K1).	If test D is okay, install a new starter relay.
	Start motor (M1).	E - Starter motor circuit test.**Engine starter - Testing (B.80.A.82 - G.40.A.20)**
	Start Motor (M1).	If test E is okay, install a new starter motor.

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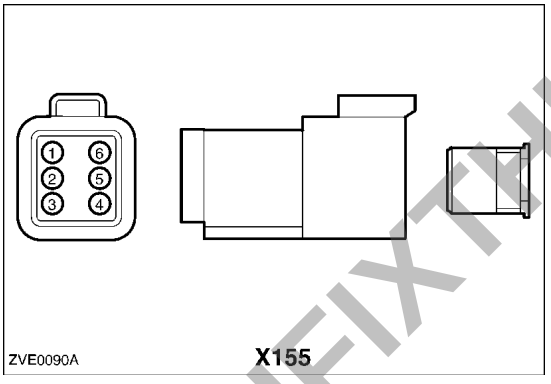
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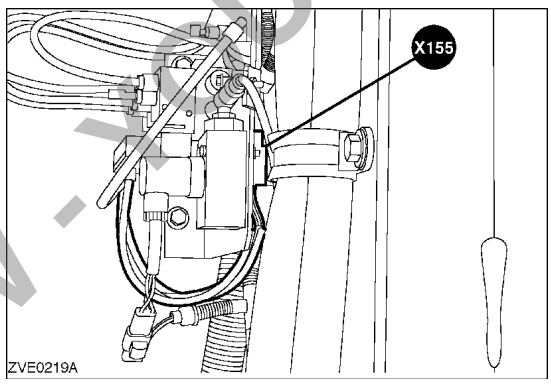
PNEUMATIC SOLENOIDS (Y8/Y9/Y15)

CONNECTOR X155 PNEUMATIC SOLENOIDS(Y8/Y9/Y15)		
POSITION	WIRE NUMBER	CIRCUIT REFERENCE
1	612 (WT)	UNLOADING TUBE ENGAGEMENT SOLENOID SIGNAL
2	112 (ZW)	UNLOADING TUBE ENGAGEMENT SOLENOID GROUND
3	112 (ZW)	HEADER ENGAGEMENT SOLENOID GROUND
4	064 (WT)	HEADER ENGAGEMENT SOLENOID SIGNAL
5	308 (WT)	THRESHING MECHANISM ENGAGEMENT SOLENOID SIGNAL
6	112 (ZW)	THRESHING MECHANISM ENGAGEMENT SOLENOID GROUND

NOTE: *For the wiring colour code refer to* ***Wiring General Information****.*



ZVE0090A 9

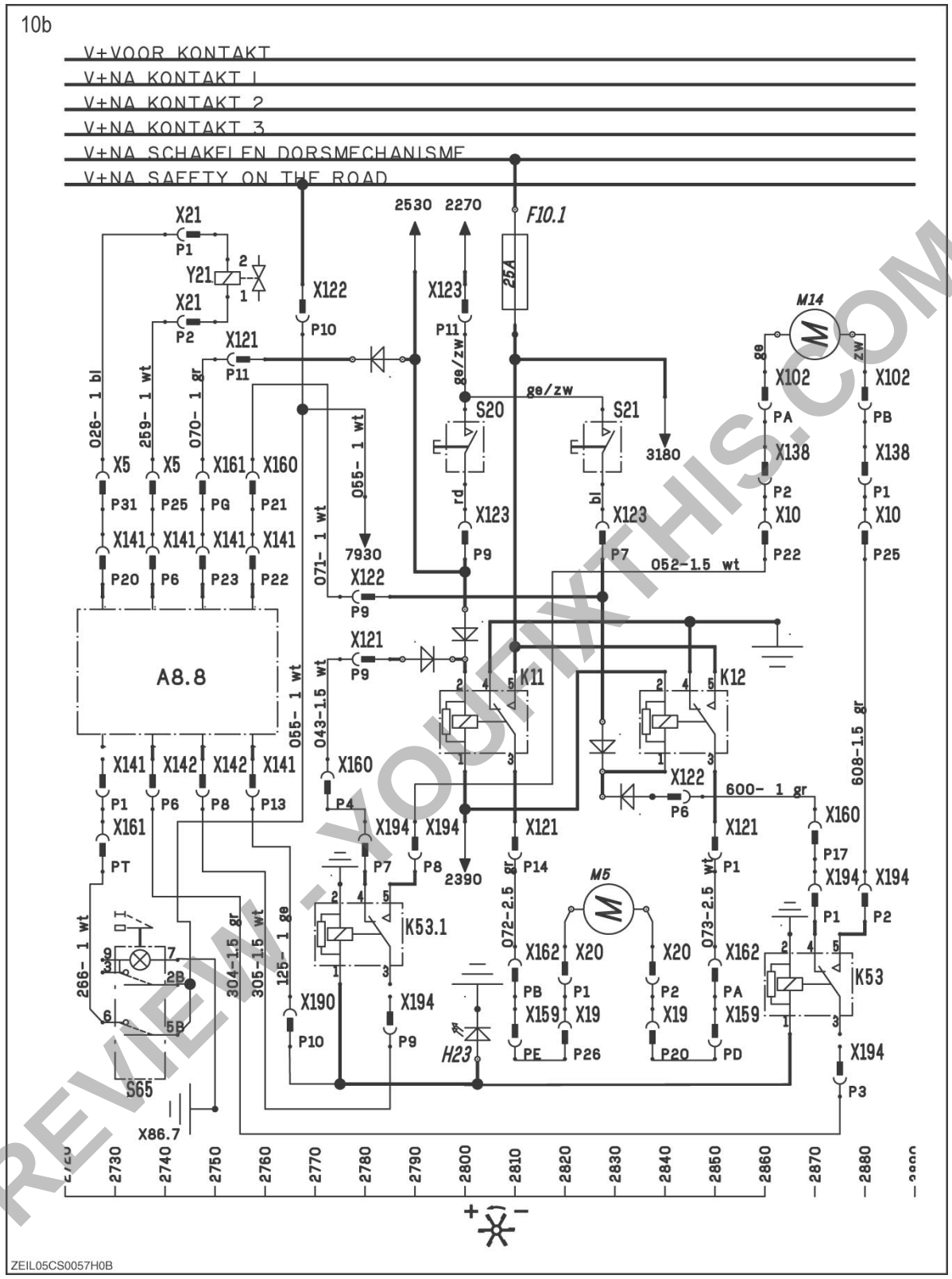


ZVE0219A 10

MID LEFT HAND SIDE

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ZEIL05CS0057H0A 2

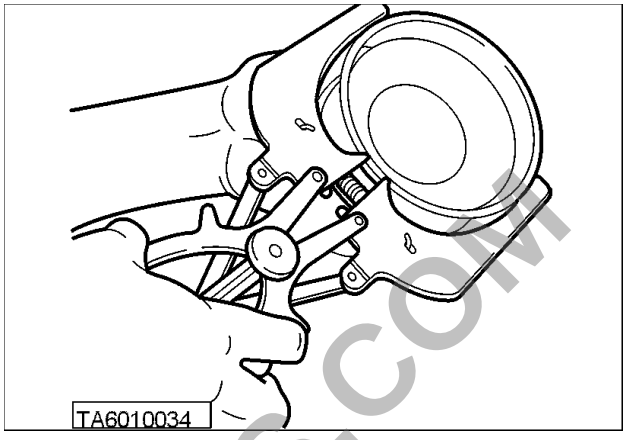
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Connecting rod and piston - Overhaul (B.10.A.47 - F.10.A.40)

CS540, CS640, CS520, CS660, CL560

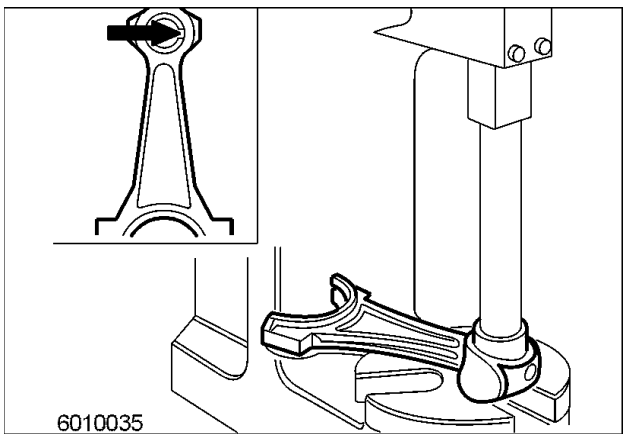
1. Remove piston pin snap rings from each side of piston and remove pin. Using an expander, Tool No.296028, refer to **ENGINE - Special tools (B.10.A - D.20.A.40)** and remove the piston rings. Ensure each piston and rod assembly, remains matched together for reassembly into the cylinder block.



TA6010034 1

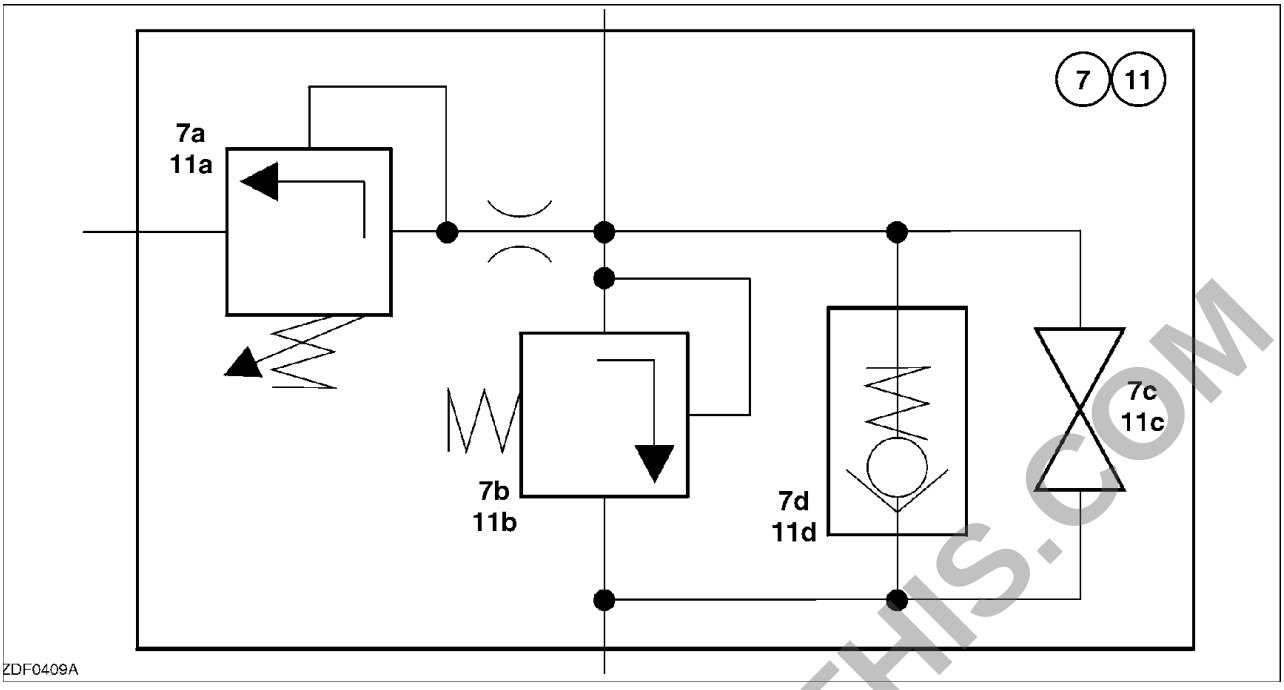
2. Clean the piston, and connecting rod assembly, in a suitable solvent and inspect for damage to ring lands, skirts, or pin bosses.
3. Check connecting rod components for damage, and place in an alignment fixture to check for distortion, and ensure that any distortion, is within specification as follows.
   Maximum twist **0.30 mm** (**0.012 in**).
   Maximum Bend **0.10 mm** (**0.004 in**).
4. Check piston pin bushing for damage or wear in the following manner.
   Measure the outside diameter of the piston pin, and inside diameter of the connecting rod bushing, to the following:
   44.442-44.447 mm (**1.7497-17499 in**).
   44.460-44.467 mm (**1.750-1.751 in**)
5. If connecting rod bushes are not to specification replace the old bush, using the following procedure.
6. Place the connecting rod securely in a bench press. Manufacture from suitable bar stock, a press tool with the end face ground at an angle, to suit the connecting rod bush side face. Position the tool on the bush, and gently drive the bush from its position. It is recommended a guide is manufactured to assist alignment of the bar stock during this operation.
7. A new bush can then be fitted in a similar manner, by using a suitable piece of bar stock, with an end face machined flat to suit the standard parallel bush. Use a guide as described, and gently drive in the new bush into the connecting rod.

NOTE: *Ensure the split in the small end bush is at right angles to centre line of connecting rod.*



6010035 2

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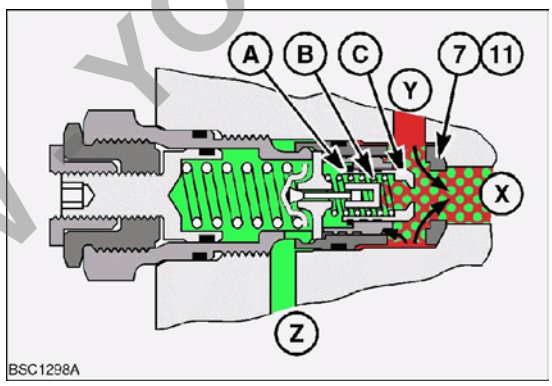


ZDF0409A 2

Multi function valve schematic

Charge check valve **(7d)** - **(11d)**

When the charge pressure in port **(Y)** becomes higher than the pressure in the high pressure port **(X)** and enough to overcome the tension of spring **(B)** carrier **(A)** will move to he left taking along poppet **(C)**. Oil from the charge pump will flow from port **(Y)** to port **(X)** filling the system.



BSC1298A 3

Pressure limiter **(7a)** - **(11a)**

When high pressure exceeds **420 bar** (**6090 psi**), poppet **(D)** will move to the left, compressing spring **(E)** due to the pressure behind the poppet pressurized oil will flow from port **(X)** into port **(Z)** to the main servo cylinder. The main servo cylinder will then move the swash plate of the hydrostatic pump towards neutral when the transmission is in drive mode and towards maximum displacement when the transmission is in brake mode.

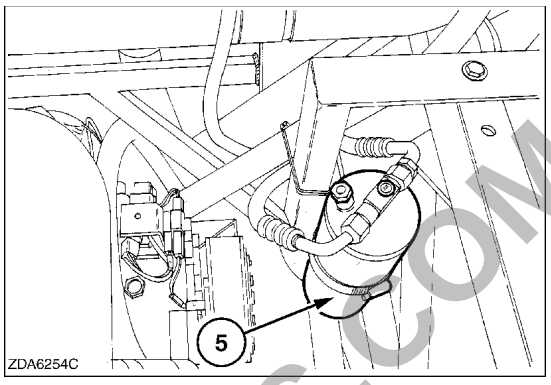
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ENVIRONMENT CONTROL Air-conditioning system - Component localisation (E.40.C - C.40.B.20)

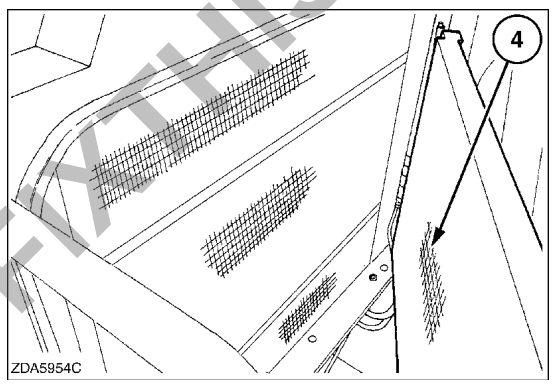
CS540, CS640, CS520, CS660, CL560

Filter-drier **(5)**



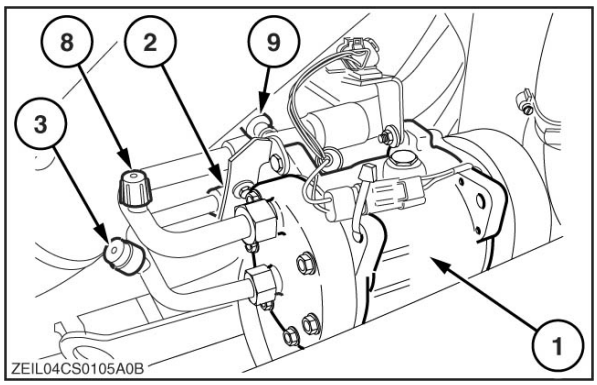
ZDA6254C 1

Condenser **(4)**



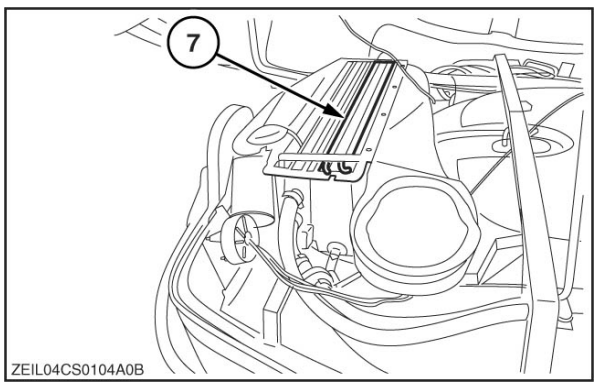
ZDA5954C 2

Compressor **(1)**
High pressure switch **(2)**
High pressure charge port **(3)** "D": Discharge port
Low pressure charge port **(8)** "S": Suction port
Low pressure switch **(9)**



ZEIL04CS0105A0B 3

Evaporator **(7)**



ZEIL04CS0104A0B 4

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6b HEADER HEIGHT CONTROL
CS540 1320 > 1324
CS640 1320 > 1324

Code	Description	Line
A8.	CCM - header + lateral flotation	1570
B18.	Oil pressure sensor (header lift cylinders)	1560
F3.	15A - header height control	1370
K18.	Relay - header up	1410
K19.	Relay - header down	1460
S27.	Switch - lateral flotation left down	1620
S28.	Switch - lateral flotation right down	1630
S29.	Switch - header up slow	1410
S30.	Switch - header down slow	1470
S47.	Switch - automatic header height control	1490
S50.	Switch - header up fast	1430
S51.	Switch - header down fast	1450
S80.	Switch - CCM override	1440
X12.	In-line harness connector (solenoid valves)	1520
X26.	In-line harness connector	1560
X40.	In-line harness connector	1600
X48.	In-line harness connector	1650
X88.	Header pressure sensor (B18)	1550
X121.	Fuse printed circuit (right hand console)	1470
X122.	Fuse printed circuit (right hand console)	1470
X123.	Multifunction handle (right hand console)	1380
X141.	CCM module (A8)	1530
X142.	CCM module (A8)	1590
X160.	In-line harness connector	1500
X161.	In-line harness connector	1560
X190.	Fuse printed circuit	1600
Y16.	Solenoid - lateral float right down	1660
Y17.	Solenoid - lateral float left down	1680
Y18.	Solenoid - header up	1520
Y19.	Solenoid - header down	1550
Y20.	Solenoid - compensation valve header height control	1570

Line: 1370 - 1700

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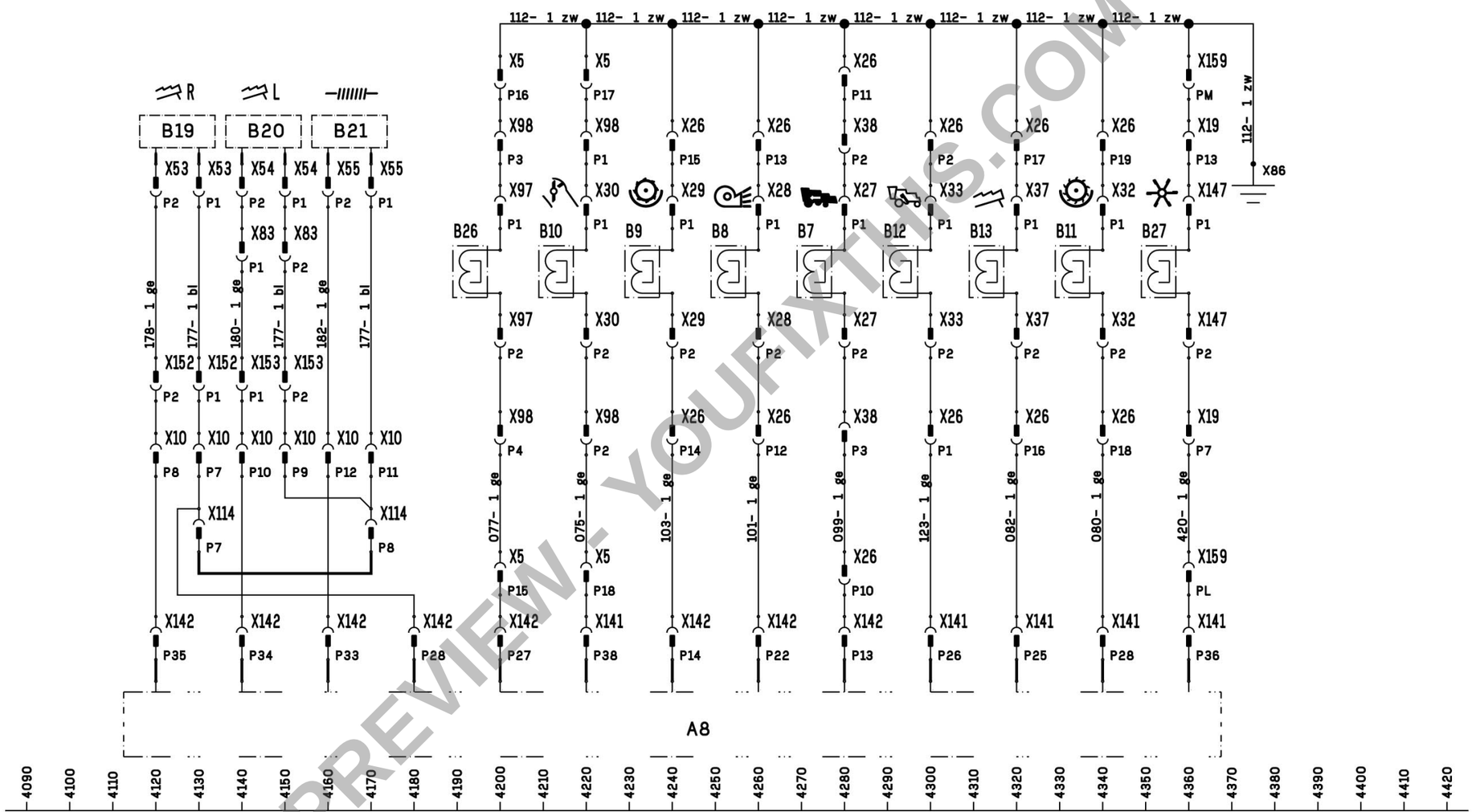
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15d

V+VOOR KONTAKT

V+NA KONTAKT 1

V+NA KONTAKT 3



ZEIL05CS0011J0A

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13b SIEVE LEVELLING SYSTEM
CS520 1376 > 1412
CS540 1364 > 1412
CS640 1364 > 1412
CS660 1376 > 1412

Code	Description	Line
A2.	Printed circuit - sieve levelling cleaning system	3580
A8.	CCM - sieve levelling cleaning system	3510
F2.	25A - sieve levelling cleaning system	3500
F7.	10A - manual adjustment sieve levelling cleaning system	3440
F28.	10A - on/off sieve levelling cleaning system	3480
M6.	Actuator - sieve levelling cleaning system	3630
R1.	Sieve levelling potentiometer	3630
S25.	Switch - sieve levelling cleaning system	3460
S26.	Switch - manual control sieve levelling cleaning system	3440
X23.	Inclinometer (A2)	3580
X24.	In-line harness connector (sieve levelling cleaning system)	3420
X26.	In-line harness connector	3720
X111.	Fuse printed circuit	3700
X112.	Fuse printed circuit	3450
X113.	Fuse printed circuit	3560
X115.	Fuse printed circuit	3560
X121.	Fuse printed circuit (right hand console)	3480
X141.	CCM module (A8)	3490
X142.	CCM module (A8)	3490
X157.	Sieve-levelling actuator (M6)	3620
X158.	Sieve-levelling actuator potentiometer (R1)	3610
X161.	In-line harness connector	3460
X190.	Fuse printed circuit	3580

Line: 3400 - 3730

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