

**SECTION 7**  
**ELECTRICAL SYSTEM**

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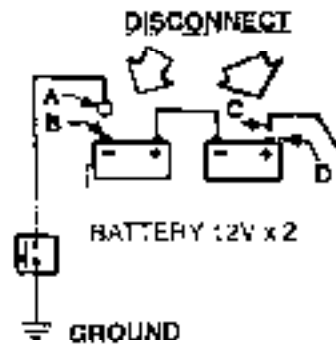
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## SAFETY RULES

- WARNING:** When working on the electrical system, always wear safety glasses and remove rings, wrist watches or any other metal jewellery.



- WARNING:** Prior to any maintenance or repair of electrical components, disconnect the GROUNDING CABLE "A" from the negative post "B" of the battery. DISCONNECT CABLE "C" FROM POSITIVE POST "D".



- WARNING:** NEVER PLACE METAL OBJECTS on the battery to avoid short-circuits.



- WARNING:** BATTERY GASES ARE FLAMMABLE. Never get near batteries with open flames or sparks. During recharging, the generation of gases is higher.
- WARNING:** BATTERY GASES ARE DANGEROUS if contacting the skin or other materials.

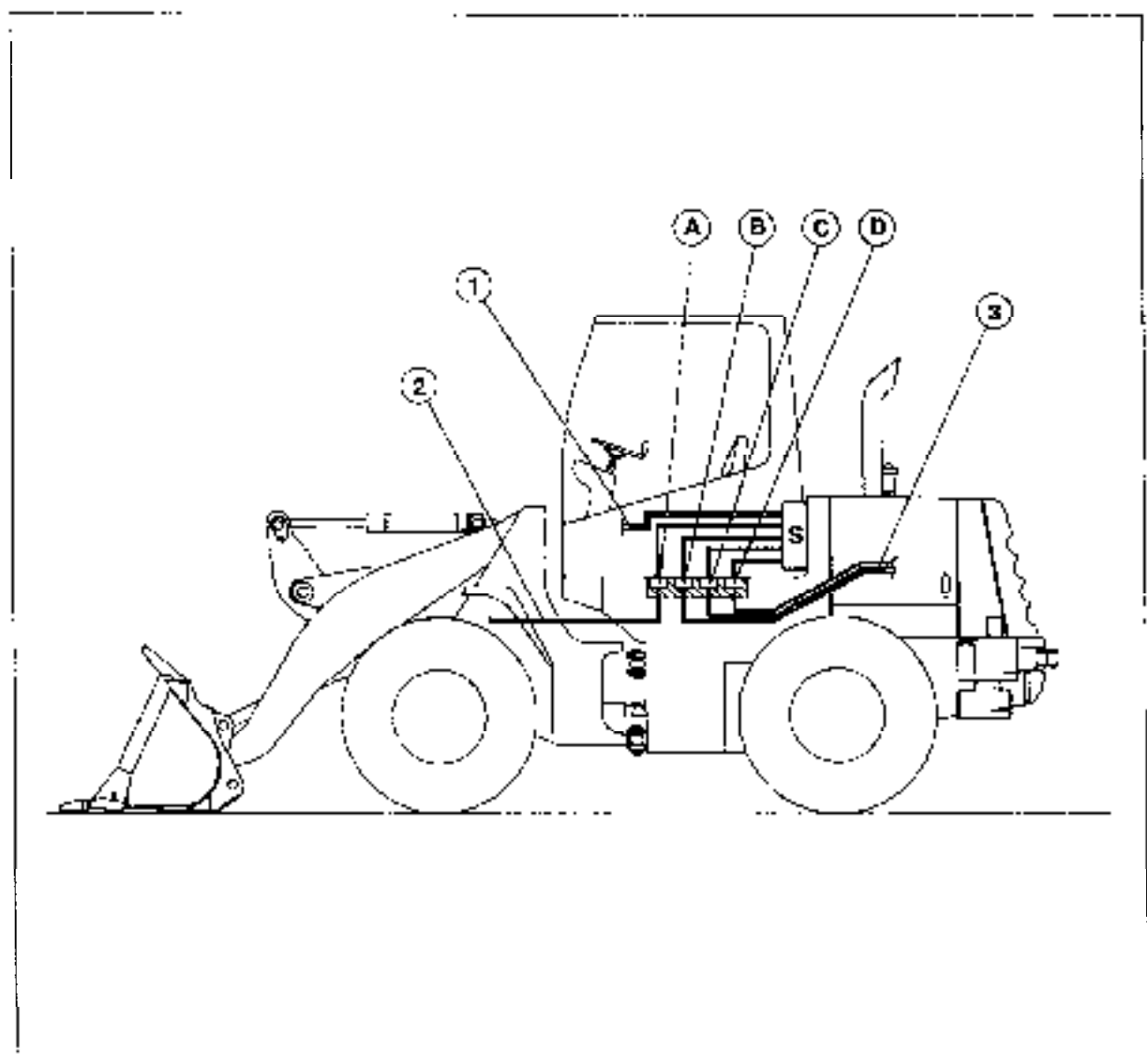
## 7.1 GENERAL LAY-OUT OF ELECTRICAL SYSTEM

The electric wirings are divided into three main groups:

- 1 Cab wiring group, identified by different colours connected to all the electrical components in the cab.
- 2 Front frame wiring group, identified by numbers, connected to all the electrical components involving the front frame.

- 3 Rear frame wiring group, identified by numbers, connected to all the electrical components involving the rear frame.

The three groups of main wirings are connected among themselves by four connectors (A-B-C-D) located in the area under the cab floor. All wires are connected to the logic board (S) located inside the rear panel behind the operator's seat.



A-B-C-D, Connectors - S, Logic board - 1, Cab wiring - 2, Front frame wiring - 3, Rear frame wiring.

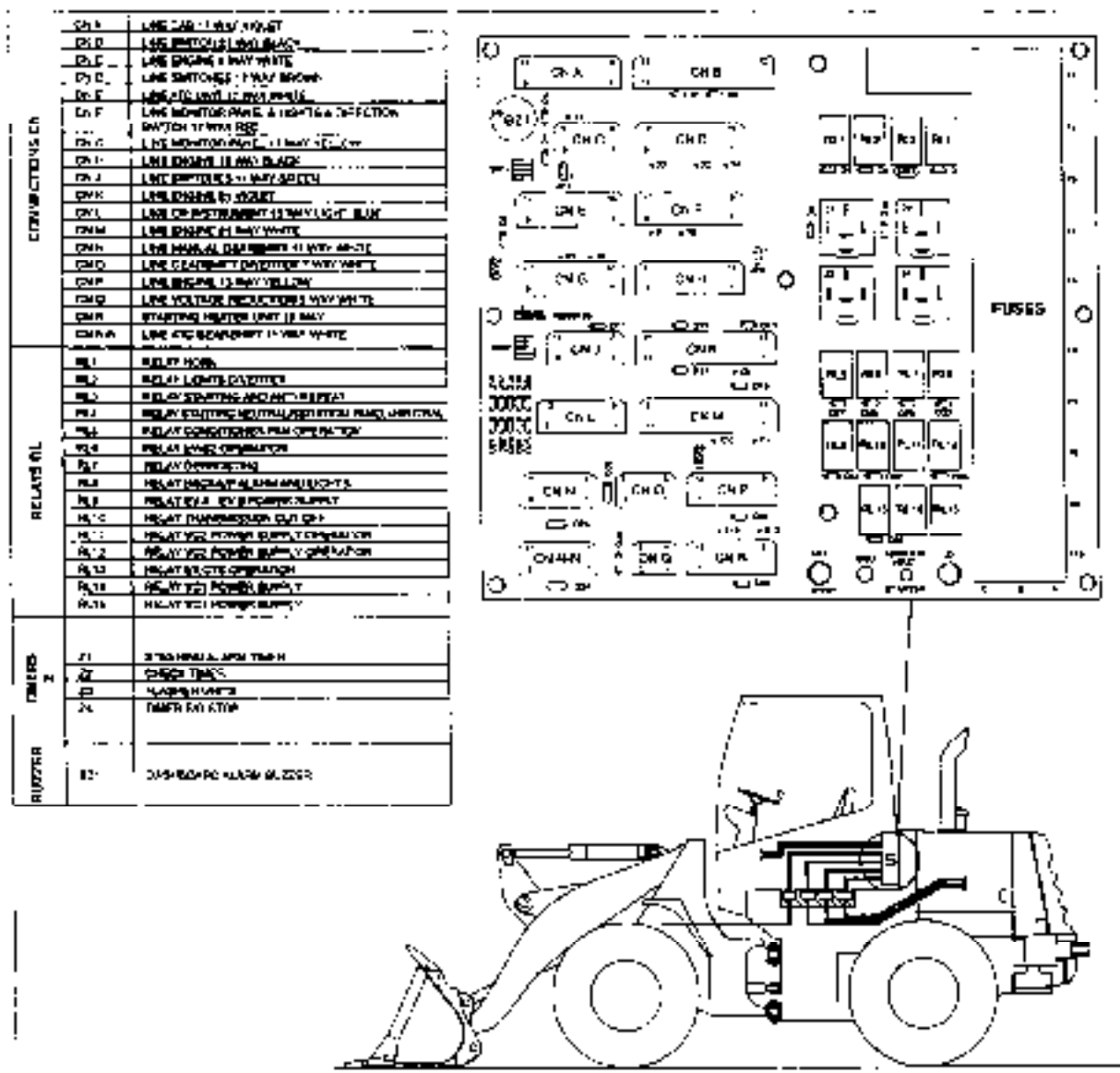
7.2 LOGIC BOARD

The logic board is located inside the rear panel behind the operator's seat. To reach it, loosen the two retaining knobs.

All the components of the machine are connected to the board by the 'CN' connections.

Also, the fuses, the solenoid switches ('RL' relays), timers 'Z' the cab buzzer and two switches 'SW1' and 'SW2' to divert the gearshift control from manual to mechanic and viceversa, are located,

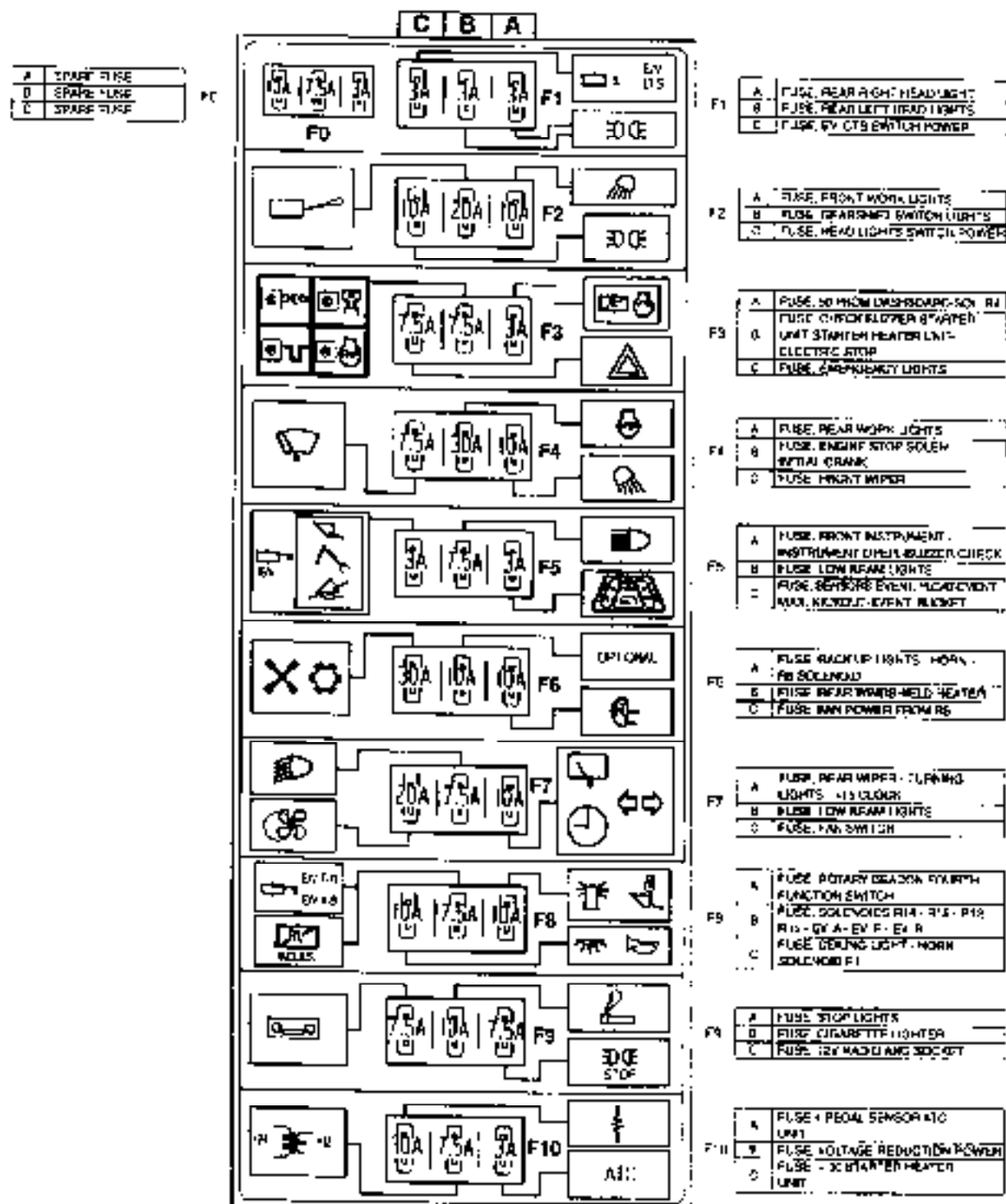
7.2.1 CONNECTIONS - RELAYS - TIMERS - BUZZER



5 Logic board

Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this manual!

## 7.2.2 FUSES



Carefully read persons and machine SAFETY PRECAUTIONS (at the beginning of this manual)

## 7.3 CONNECTORS

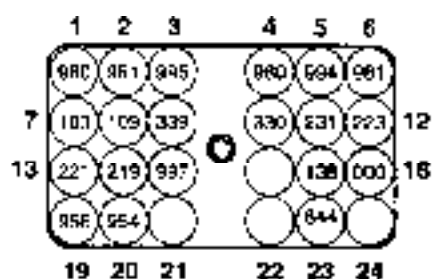
The connectors (A-B-C-D) are located in the lower part of the cab, connecting the main wiring to the logic board (S).

The coloured wires arrive from the upper side, the numbered wires from the lower side.

On connectors A-B-C (fig. connectors) there are 24

connecting points, whereas on connector D (fig. connector D) there are 18. The description and the function of each wire on the connector has a corresponding number-colour, as it can be found in the description of each connector.

CONNECTOR A

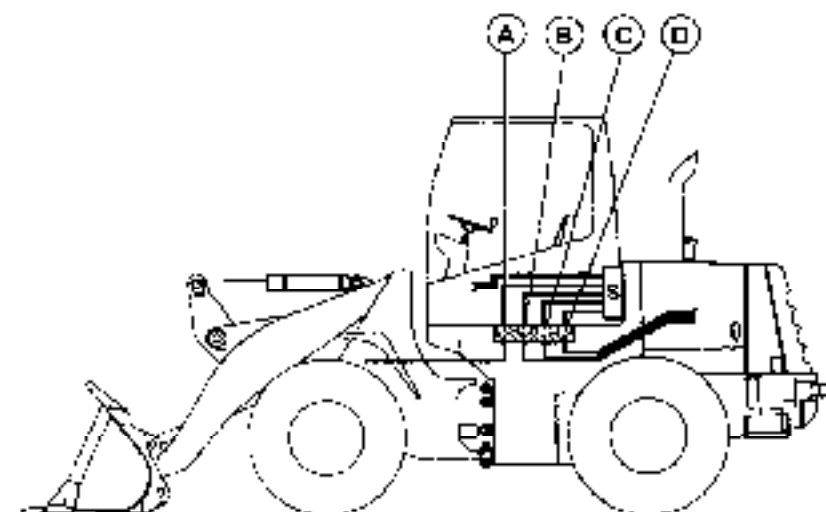


Reference on connector	Description - Function	Colour	Wire
11	SIGNAL BOOM KICKOUT	-	980
21	SIGNAL BUCKET POSITIONER	-	98
31	POWER BOOM KICKOUT	-	-
41	SIGNAL BOOM KICKOUT	G-N	985
51	POWER BUCKET POSIT. PROX	V-B	990
61	SIGNAL BUCKET POSITIONER	V-B	994
71	RIGHT TURNING LIGHT	A-N	901
81	LEFT TURNING LIGHT	A-N	103
91	LEFT HEAD LIGHT	G-N	109
101	RIGHT HEAD LIGHT	G-N	329
111	LEFT LOW BEAM	P-N	330
121	RIGHT LOW BEAM	P-N	231
131	RIGHT HIGH BEAM	H-B	227
141	LEFT HIGH BEAM	H-B	221
151	EVENTUAL 4TH FUNCTION	V-B	718
161	EVENTUAL 4TH FUNCTION	V-B	997
171	WORK POWER	C-N	138
181	GND	Z-N	000
191	EVENTUAL 4TH	Z-N	958
201	GND EVENTUAL 4TH	H-B	954
211	-	-	-
221	-	-	-
231	EMERGENCY STOPPING PRESS	-	944
241	-	-	-

\* NOT CONNECTED

Symbol of wires

C = Orange	N = Black
A = Light blue	S = Pink
B = White	R = Red
L = Blue	V = Green
G = Yellow	Z = Violet
H = Grey	

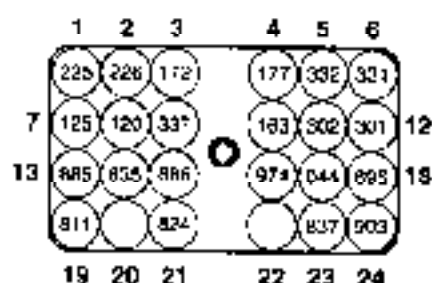


A-B-C-D. Connectors

Carefully read before and machine SAFETY PRECAUTIONS (at the beginning of this manual).

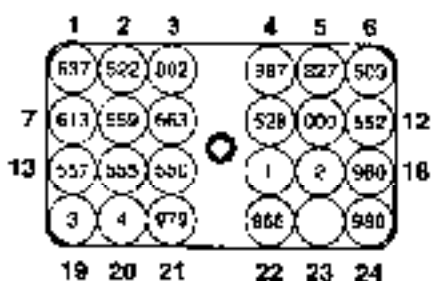
## CONNECTOR B

Reference on connector	Description - Function	Colour	Wire
1)	RIGHT REAR WORK LIGHT	G	225
2)	LEFT REAR WORK LIGHT	C	226
3)	RIGHT STOP LIGHT	B-V	172
4)	LEFT STOP LIGHT	B-C	177
5)	LEFT HEAD LIGHT	E	317
6)	RIGHT HEAD LIGHT	G-N	331
7)	RIGHT TURNING LIGHT	E	125
8)	LEFT TURNING LIGHT	X	120
9)	IGNITION PLATE LIGHT	L-B	317
10)	BACKUP ALARM	C-V	169
11)	RIGHT BACKUP	A-G	302
12)	LEFT BACKUP LIGHT	F-V	301
13)	FRONT WINDSHIELD WASHER	F-V	385
14)	EMERG. STEERING PRESSURE OUTPUT	A-H	835
15)	REAR WINDSHIELD WASHER		886
16)	TRANSM. CLUTCH PRESSURE	V-B	974
17)	GND CLOCK	G-N	1044
18)	PRE HEAT SOLFN PUMPER GND	Z	895
19)	GND	Y	00C
20)	-	-	-
21)	COMPRESSOR	V-A	881
22)	EVAPORATOR FAN	Z	7
23)	EVAPORATOR FAN	R	827
24)	ELECTRIC STOP	N-N	903



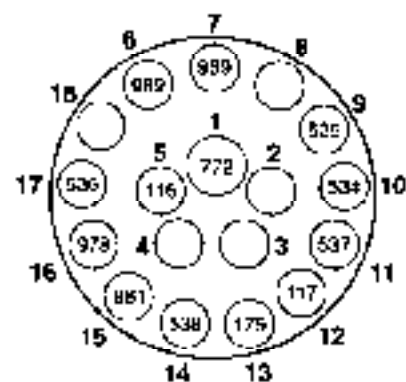
## CONNECTOR C

Reference on connector	Description - Function	Colour	Wire
1)	D+	G	607
2)	ALTERNATOR W	G-N	172
3)	STARTER RELAY SWITCH	G-V	802
4)	POWER FOR EVENT G	-	907
5)	START, HEATER TEMP SENS	C-N	897
6)	ENGINE OIL LOW PRESSURE	D	500
7)	BRAKE ACCUMULATOR LOW PRESSURE	A	613
8)	TRANSM. OIL TEMPERATURE	B-V	556
9)	AIR CLEANER SWITCH	C-D	666
10)	COOLANT HIGH TEMP SW	V-A	578
11)	GND	Y	00C
12)	COOLANT TEMP GAUGE	R-V	552
13)	FUEL LEVEL	Z	557
14)	RESERVE IGNITION - OPTION	Z-H	585
15)	TRANSM. OIL TEMP GAUGE	A-G	550
16)	EV. A	A-K	1
17)	EV. D	A-K	2
18)	POWER FOR EV. A	A-B	900
19)	EV. F	L-G	2
20)	EV. R	Z-N	4
21)	POWER FOR EV. F	S	979
22)	EV. FUEL START HEATER 1 <sup>st</sup>	-	865
23)	EV. FUEL START HEATER 2 <sup>nd</sup>	-	-
24)	POWER FOR EV. R	-	965



## CONNECTOR D

Reference on connector	Description - Function	Colour	Wire
1)	N/A	R	772
2)	OP SENSOR	-	-
3)	OP SENSOR	-	-
4)	OP SENSOR	-	-
5)	IGNITION	-	-
6)	1ST STAT HEATER (25AMP)	R	116
7)	2ND STAT HEATER (25AMP)	R	985
8)	EL. STOP (IN. CRANK 25AMP)	B	902
9)	GROUND 1ST SPEED SENSOR	D	964
10)	SPEED SENSOR 1	N	535
11)	SPEED SENSOR 2	L	534
12)	SPEED SENSOR 3	L	537
13)	STOP LIGHTS SWITCH POWER	R	117
14)	STOP LIGHTS SWITCH OUTPUT	R-N	176
15)	ACC. PEDAL SENS. SEGN SW	B-N	586
16)	ACC. PEDAL SENS. SEGN PWR.	H	900
17)	PARK BRAKE PRESS. SW	-	980
18)	GROUND PMS SPEED SENS. SIGNAL	-	536
19)	-	-	-



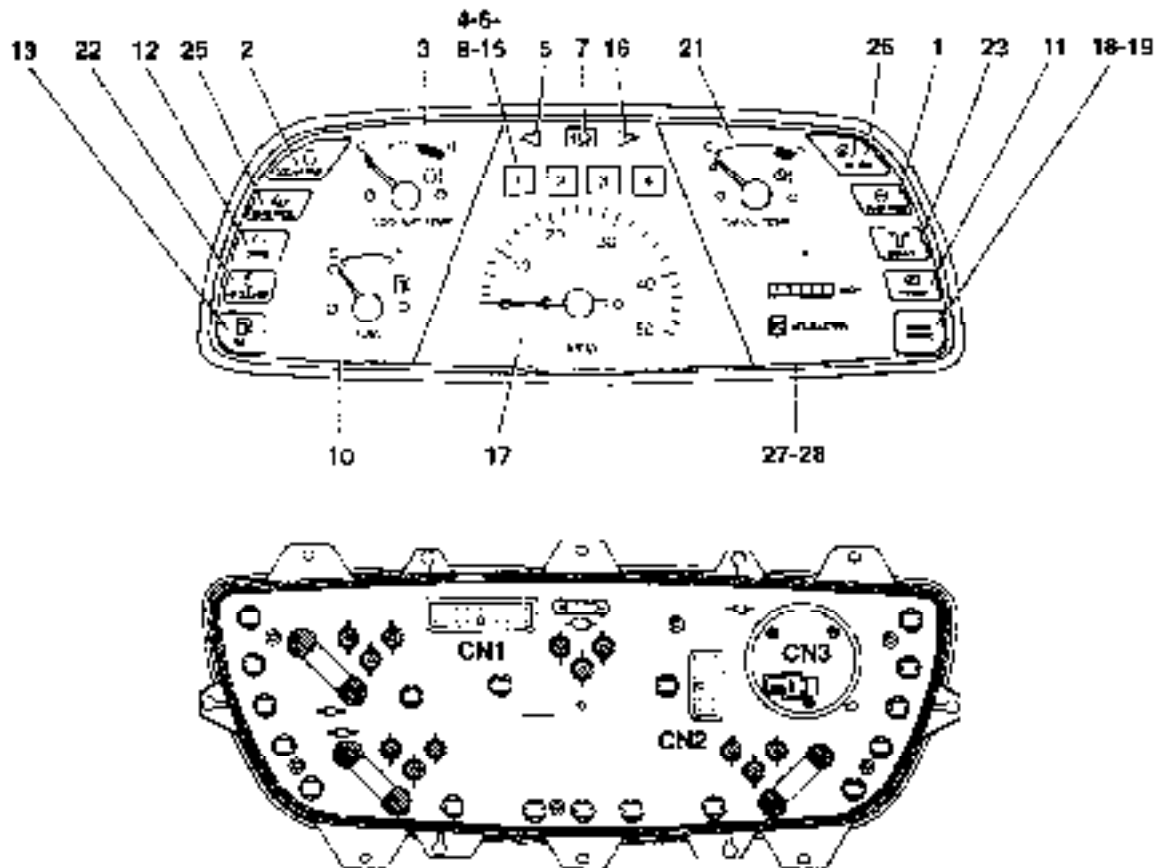
NOT CONNECTED

Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual)

## 7.4 METERS AND SWITCHES CLUSTER

The operating status monitor system monitors the loader operating status by means of the sensors and switches installed on the loader and displays the information on the cluster gauge unit in the operator's compartment to inform the operator of the current operating status of the loader.

The cluster gauge unit consists of meters including the speedometer, monitor lamps (warning lamps) which indicate whether or not each system is operating properly, and indicator lamps.

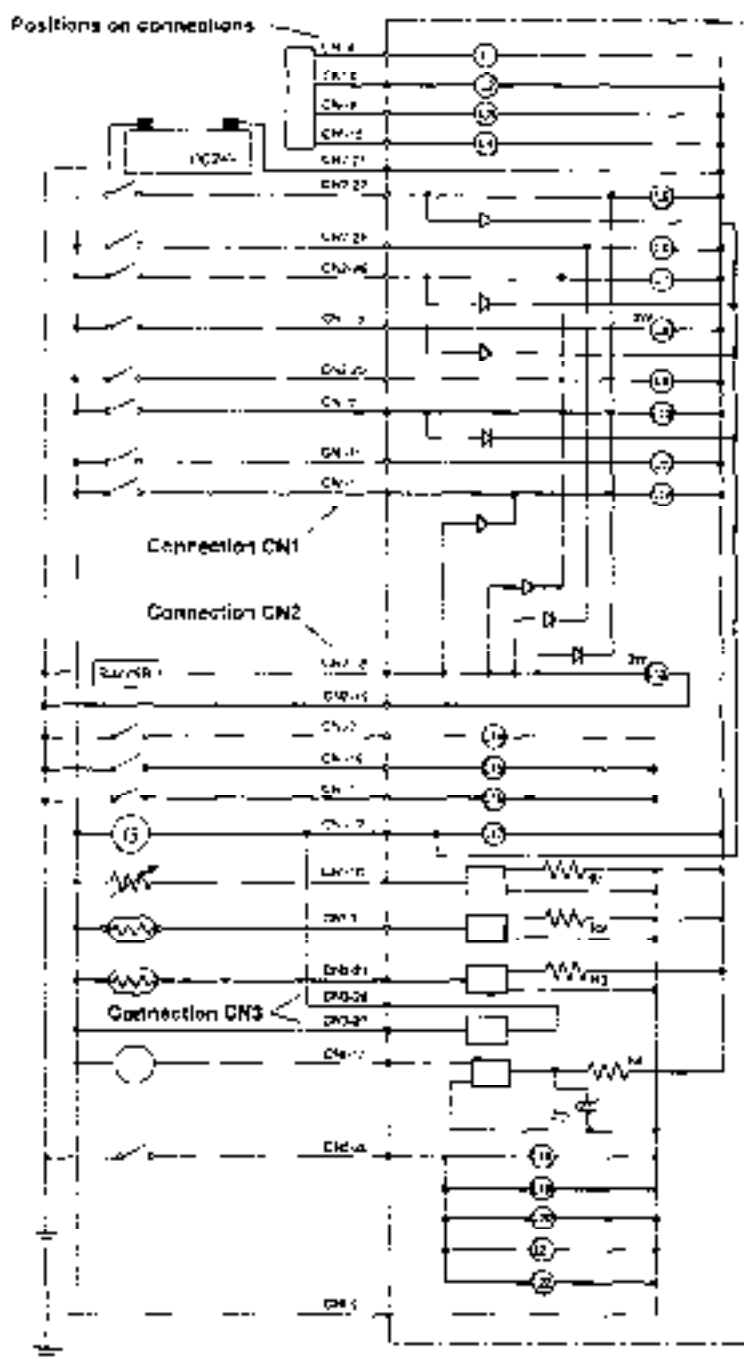


CONNECTION CN1	1	Indicat. accum. oil low pressure
	2	Indicat. engine coolant high temperature
	3	Indicat. coolant temperature
	4	Light, instrument cluster
	5	Light, left turning
	6	Light, instrument cluster
	7	High beams
	8	Light, instrument cluster
	8	Ground
	10	Flat tire
	11	Indicator, parking brake
	12	Indicator, battery charge
	13	Indicator, fuel reserve
	14	Not connected
	15	Light, instrument cluster
	16	Light, right turning
	17	Speedometer

CONNECTION CN2	18	Buzzer
	19	General indicator
	20	Instrument cluster light
	21	Indicat. transmission oil temperature
	22	Indicat. oil cleaner clogging
	23	Indicat. emergency steering
	24	Batteries
CONNECTION CN3	25	Indicat. engine oil low pressure
	26	Indicat. trans. oil high temperature
	27	Humidity (ground)
	28	Hour-meter (battery)

Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of the manual)





Electric diagram of instrument and switch panel

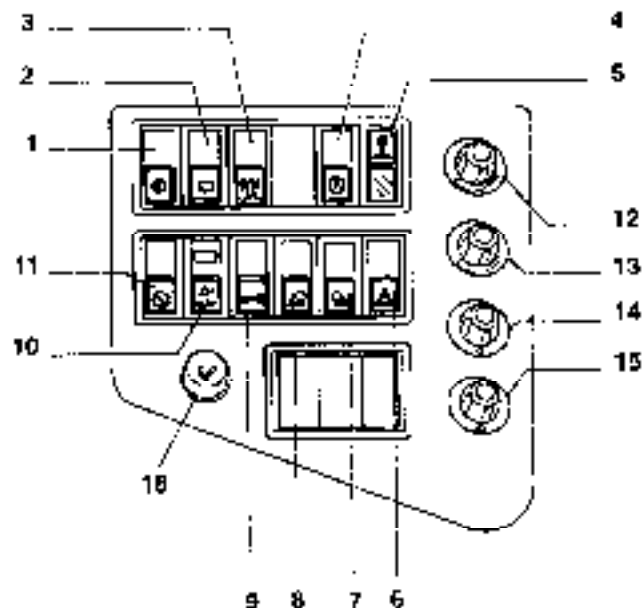
- FW : FUEL METER  
 WTM : ENGINE WATER TEMPERATURE GAUGE  
 OTM : TRANSMISSION OIL TEMPERATURE GAUGE  
 EHM : ENGINE HOUR METER  
 SM : SPEEDOMETER  
 L1-L13 : MONITOR LAMPS  
 L14-L18 : INSTRUMENT LAMPS

Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this manual.

## 7.4 INDICATORS ON INSTRUMENT CLUSTER

Meter	Engine water temperature gauge	Transmission oil temperature gauge	Fuel meter
Scale			
Measurement point	67°C ↗ 102°C ↗	50°C ↗ 120°C ↗	E ✓ F ↗
Standard value	49.8Ω 16.8Ω	91.7Ω 10.4Ω	80Ω 10Ω

## 7.5 SWITCH PANEL

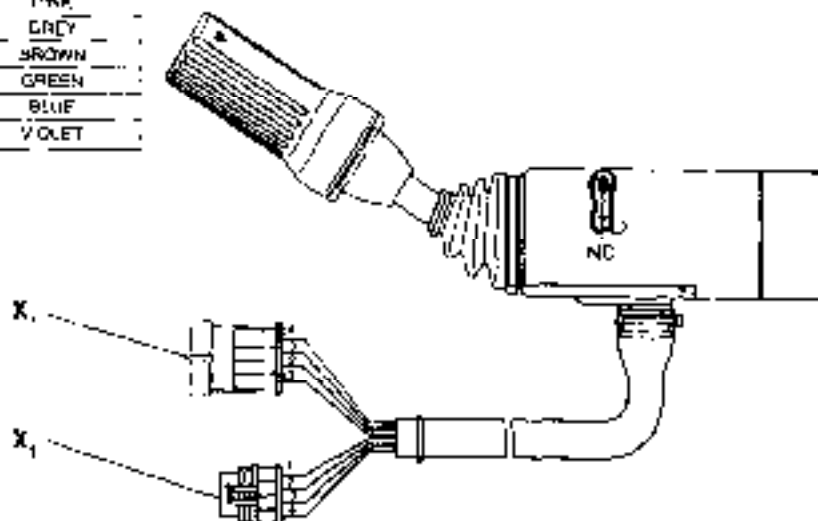


1. Front windshield washer button - 2. Rear wiper switch - 3. Rotary beacons switch - 4. Automatic transmission switch - 5. Pre-heater indicator - 6. Emergency lights switch - 7. Rear work lights switch - 8. Front work lights switch - 9. Head lights and low beam switch - 10. L.T.S ON switch - 11. Transmission cut-off switch - 12. Fan switch - 13. Warm-cold switch - 14. Air re-circulation switch - 15. Conditioner switch - 16. Cigarette lighter.

Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual).

## 7.6 GEARSHIFT SELECTOR

CONNECTIONS	WIRE	TERMINAL	COLOUR
X <sub>1</sub>	2	VP	RED
	3	Γ	YELLOW
	4	Π	PINK
		Σ	GREY
X <sub>2</sub>		C	BROWN
	2	Δ	GREEN
	3	Α	BLUE
	4	Π	VOLET



SPEED SELECTION
1 - 1 <sup>st</sup> speed
2 - 2 <sup>nd</sup> speed
3 - 3 <sup>rd</sup> speed

SPEED SELECTION
Γ - FORWARD
Π - REVERSE
N - NEUTRAL

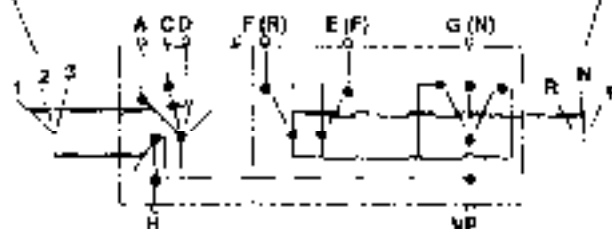


Diagram of electric gearshift selector

Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this manual.

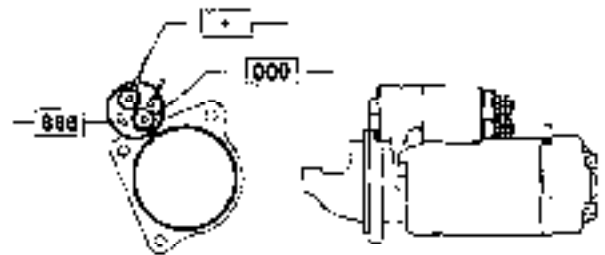
## 7.7 COMPONENTS ON MACHINE

### 1 - STARTER MOTOR

#### WIRES

- + To battery
- 888 To starter solenoid switch
- 000 Ground

LOCATION - Left rear side of engine under fuel filters



### 2 - ENGINE STOP SOLENOID

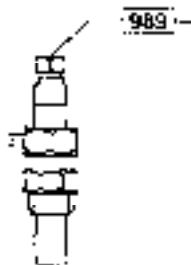
#### WIRES

- 903 To starter switch (7)

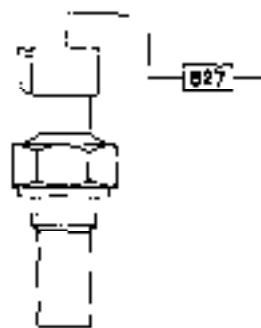
LOCATION - On injection pump



### 3 - STARTER HEATER



### 4 - THERMOSTAT FOR STARTER HEATER



### 5 - FUEL SOLENOID VALVE

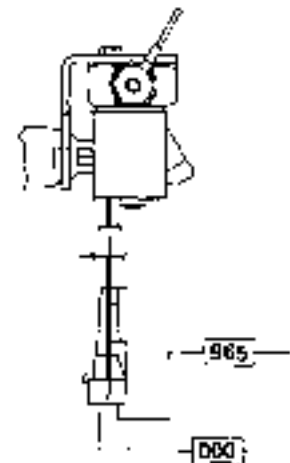
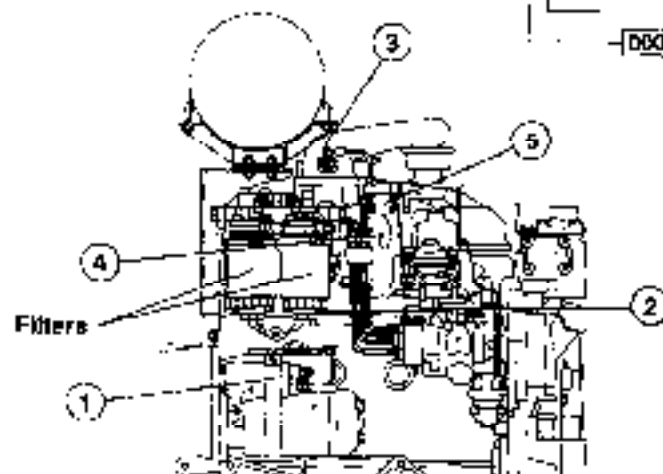
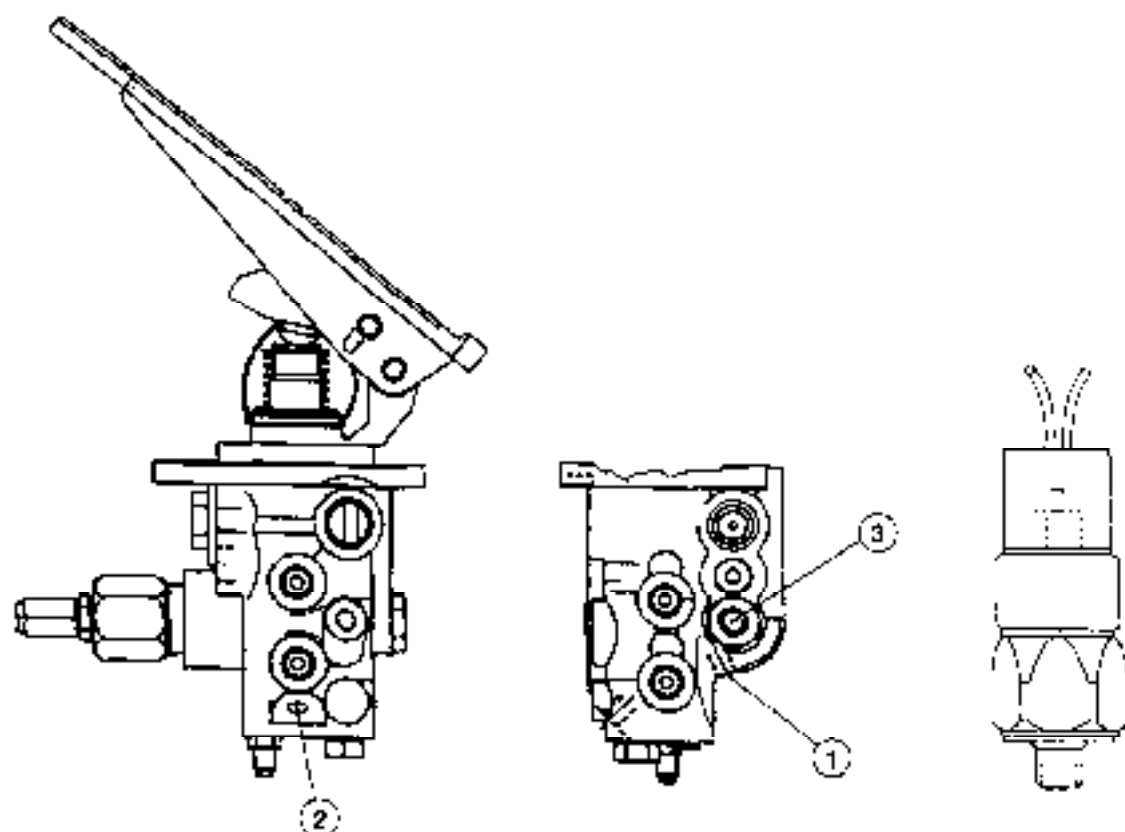


Illustration of components on engine

1. Starter motor
2. Engine stop solenoid valve
3. Heater starter
4. Thermostat for starter heater
5. Fuel solenoid valve



## PRESSURE SWITCHES ON BRAKE PEDAL VALVE

**1 - STOP LIGHTS CONTROL SWITCH****WIRES**

- 117 To fuse F9A on logic board  
175 To stop lights

**TECHNICAL SPECIFICATIONS**

- Thread: M10 x 1  
Setting:  $1.8 \pm 0.5$  bar

**2 - TRANSMISSION CUT-OFF SWITCH****WIRES**

- 974 To switch for transmission cut off arrangement  
000 To ground

**TECHNICAL SPECIFICATIONS**

- Thread: M10 x 1  
Setting:  $1.5 \pm 1$  bar  
Tightening torque: 2 daNm

**3 - BRAKES ACCUMULATOR OIL LOW PRESSURE SENSOR****WIRES**

- 613 To instrument and switch cluster  
000 To ground on front frame

**TECHNICAL SPECIFICATIONS**

- Thread: R 1/8 tapered  
Setting:  $0.0 \pm 5$  bar

Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual).

### AIR CLEANER CLOGGING SENSOR

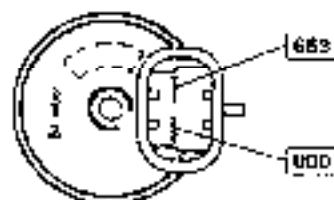
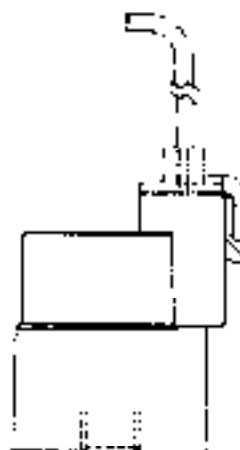
#### WIRES

- 663** To indicator on instrument cluster  
**000** To ground

#### TECHNICAL SPECIFICATIONS

Setting (closing of contact): 57 to 67 mbar

Tightening: tighten manually, without using tools



### ENGINE OIL LOW PRESSURE SENSOR

#### WIRES

- 503** To instrument and switch cluster

#### TECHNICAL SPECIFICATIONS

Thread: R 1/8 tapered

Setting:  $0.5 \pm 0.1$  bar

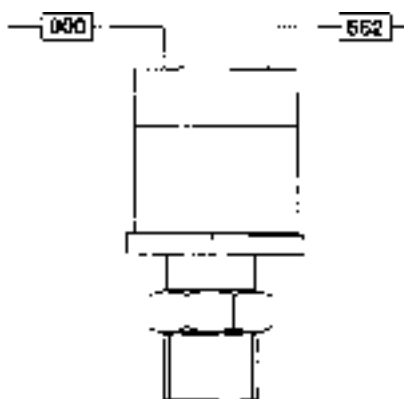


**PARKING BRAKE ENGAGED PRESSURE SWITCH****WIRES**

- 662** To indicator on instrument cluster  
**000** To ground

**TECHNICAL SPECIFICATIONS**

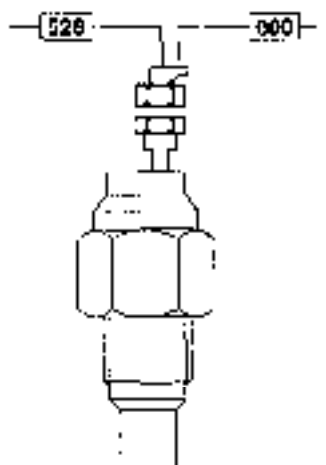
- Thread: R 1/8 tapered  
 Setting:  $12 \pm 1$  bar

**COOLANT MAX. TEMPERATURE SWITCH****WIRES**

- 526** To indicator on instrument cluster  
**000** To ground

**TECHNICAL SPECIFICATIONS**

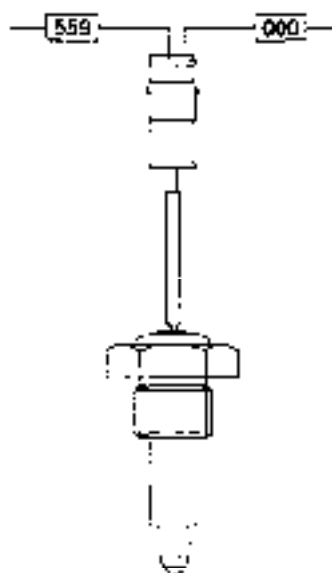
- Thread: M16x1.5  
 Setting:  $10^{\circ} \pm 1^{\circ}\text{C}$

**TRANSMISSION OIL MAX. TEMPERATURE SWITCH****WIRES**

- 559** To indicator on instrument and switch cluster  
**000** To ground

**TECHNICAL SPECIFICATIONS**

- Thread: M16x1.5  
 Setting:  $122 \pm 3^{\circ}\text{C}$   
 Tightening torque: 2 daNm

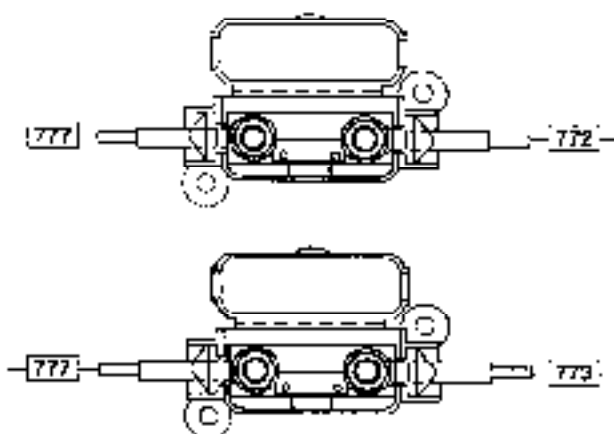


Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual).

## 50 AMP "LINK" FUSES

## WIRES

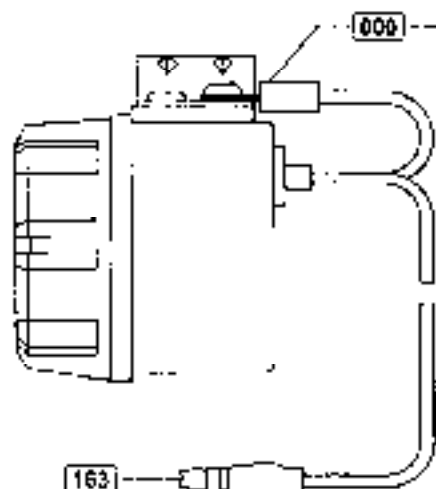
- 772 To diverter box  
 773 To alternator  
 777 To "-" of batteries



## BACK-UP ALARM

## WIRES

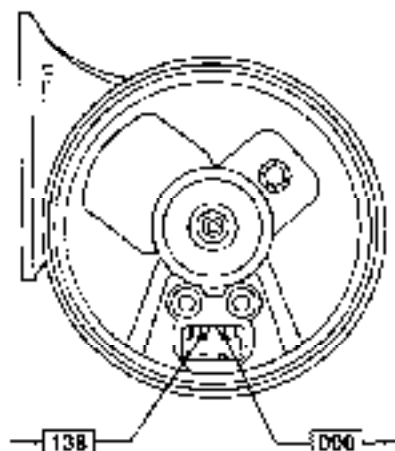
- 163 To back-up alarm  
 000 To ground



## HORN

## WIRES

- 138 To horn relay S0  
 000 To ground





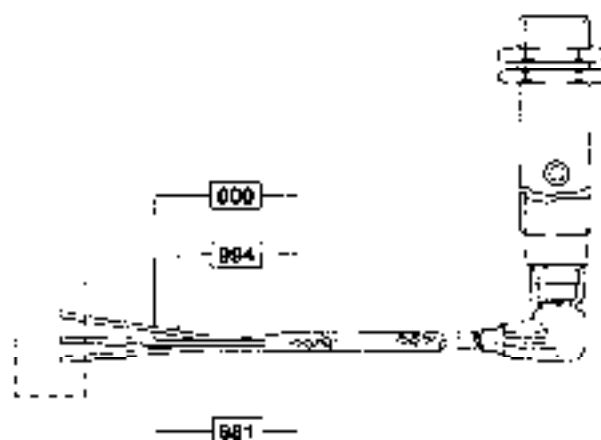
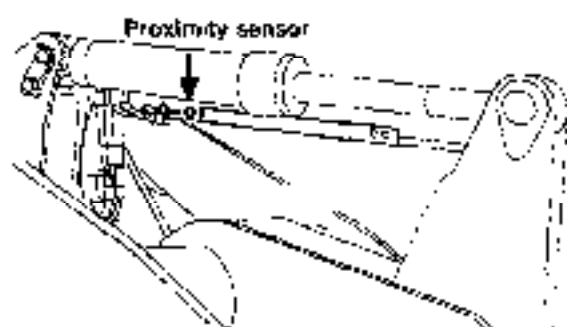
**BUCKET POSITIONER PROXIMITY SENSOR****WIRES**

- 981** To bucket solenoid valve  
**994** To F5C fuse on logic board  
**000** To ground

**TECHNICAL SPECIFICATIONS**

- Thread: M18x1  
 Tightening torque: 2.5 daNm

**LOCATION** On end of bucket control right cylinder rod

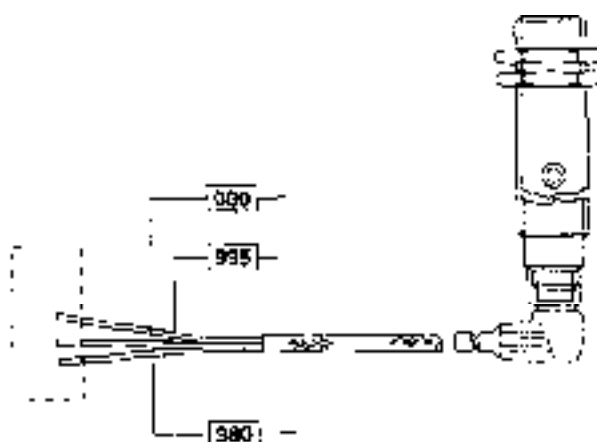
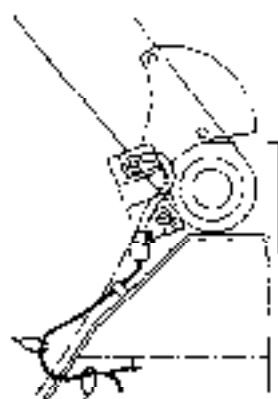
**BOOM KICK-OUT PROXIMITY SENSOR****WIRES**

- 980** To boom solenoid valve  
**995** To F5C fuse on logic board  
**000** To ground on frame

**TECHNICAL SPECIFICATIONS**

- Thread: M16x1  
 Tightening torque: 2.5 daNm

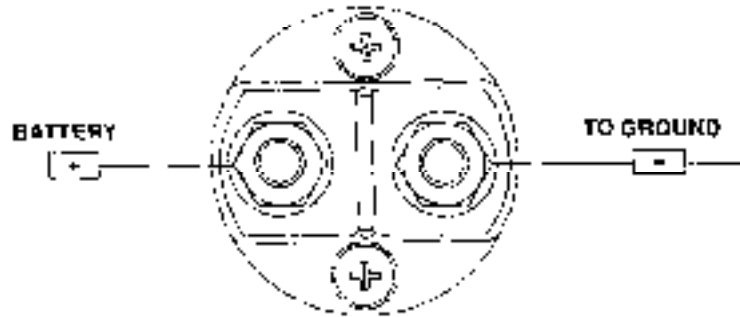
**LOCATION** On front frame, at the upper end of left boom



Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual)

## MAIN SWITCH

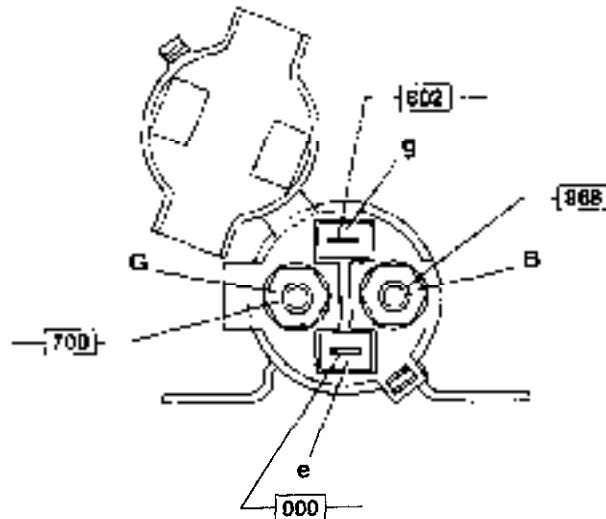
LOCATION - Rear end of machine



## STARTER SOLENOID SWITCH

### WIRES

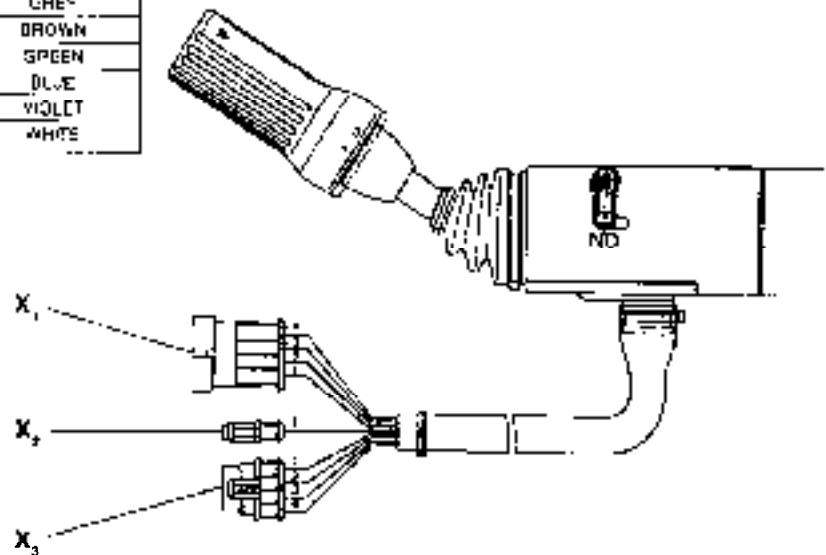
- 700** Position **G** to starter switch
- 802** Position **g** to starter neutralizer solenoid switch
- 888** Position **B** to starter motor
- 000** Position **e** to ground



Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual)

## TRANSMISSION (AUTOMATIC) GEARSHIFT SELECTOR

CONNECT	WIRE	TERMINAL	COLOR
X <sub>1</sub>	1	VP	RED
	2	E	YELLOW
	3	F	PINK
	4	G	GREEN
X <sub>2</sub>	1	C	BROWN
	2	D	GREEN
	3	A	BLUE
X <sub>3</sub>	4	H	VIOLET
	1	P	WHITE



SPEED SELECTION
1 = 1 <sup>st</sup> speed
2 = 2 <sup>nd</sup> speed
3 = 3 <sup>rd</sup> speed
4 = 4 <sup>th</sup> speed

SPEED SELECTION
F = FORWARD
R = REVERSE
N = NEUTRAL

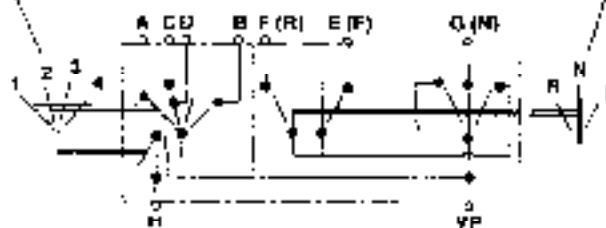


Diagram of electric gearshift selector

Carefully read operator and machine SAFETY PRECAUTIONS at the beginning of this manual;

### 1<sup>st</sup> TRANSMISSION SPEED SENSOR

#### WIRES

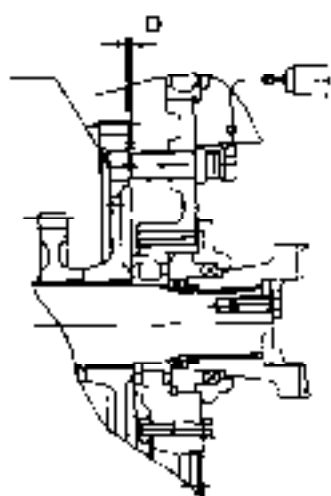
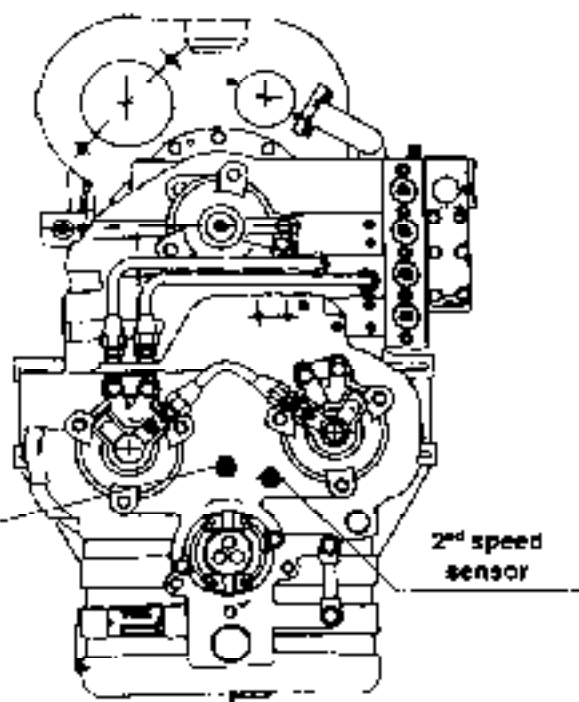
- 534 To ATC unit through connector D  
535 To ground



### 2<sup>nd</sup> TRANSMISSION SPEED SENSOR

#### WIRES

- 536 To ground  
537 To ATC unit through connector D

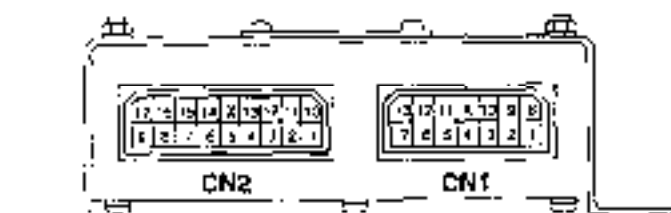
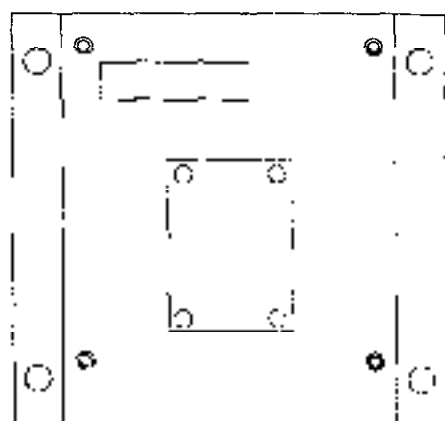


**D** = distance between sensor and transmission gear  
(refer to setting)

**Note for the installation of the sensors:** Apply LOCTITE 572 to 1st and 2nd sensor.

**Setting.** In order to obtain a correct installation of the sensors, tighten them to contact the transmission gear, then loosen the sensor one and 1/2 turn.

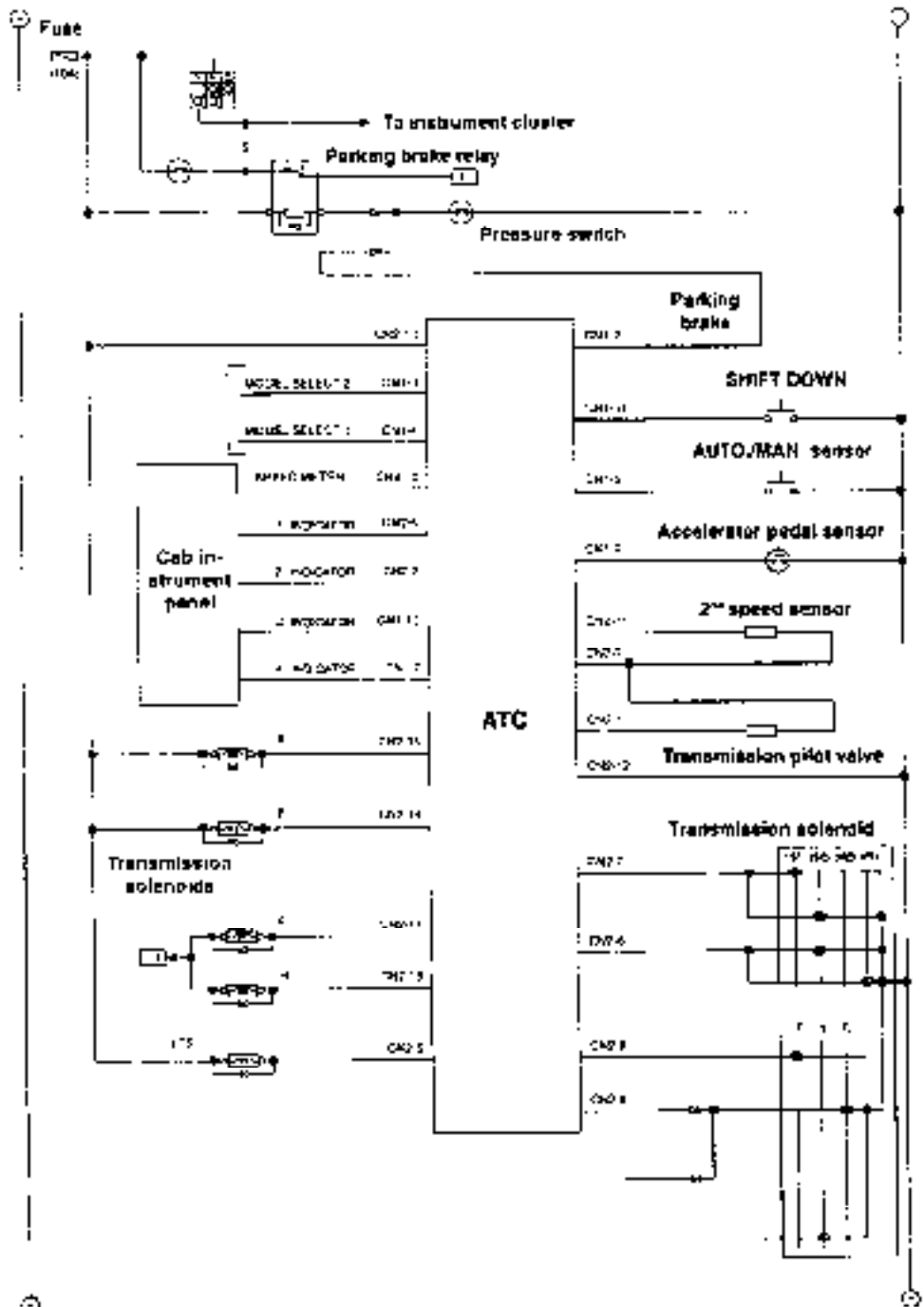
## ATC (AUTOMATIC TRANSMISSION) ELECTRONIC UNIT



CN2	
Position	Connection
1	Speed sensor
2	Ground
3	2 <sup>nd</sup> Indicator
4	1 <sup>st</sup> indicator
5	APS solenoid
6	Switch "B"
7	Switch "A"
8	Reverse selector
9	Forward selector
10	Tachometer
11	2 <sup>nd</sup> speed sensor
12	Ground
13	Batteries
14	Solenoid "B"
15	Solenoid "A"
16	Solenoid "Reverse"
17	Solenoid "Forward"

CN1	
Position	Connection
1	Ground
2	Switch, parking brake engaged
3	Selection "2"
4	Selection "1"
5	Selection AUTOM /MANUAL
6	Brakes
7	4 <sup>th</sup> indicator
8	Pressure switch
9	Accelerator pedal sensor
10	Odometer (not available)
11	Shift down switch
12	
13	3 <sup>rd</sup> indicator

Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual)

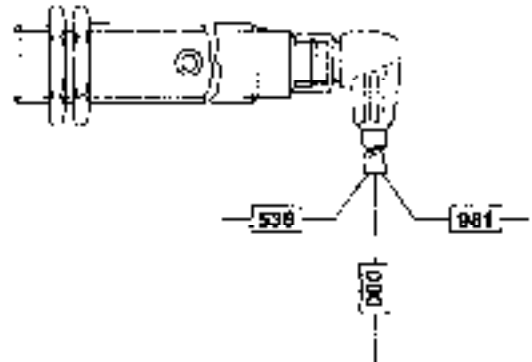


Carefully read personal and machine SAFETY PRECAUTIONS (at the beginning of this manual)

### PROXIMITY SENSOR (Accelerator pedal)

#### WIRES

- 538** To ATC electronic unit  
**981** To F10A fuse on logic board  
**000** To ground



#### TECHNICAL SPECIFICATIONS

- Thread: M18x1  
 Tightening torque: 2 daNm

LOCATION - Under accelerator pedal

