

HYDRAULICS EXCAVATORS

POCLAIN

"1288 & 1488 C"



powersensor

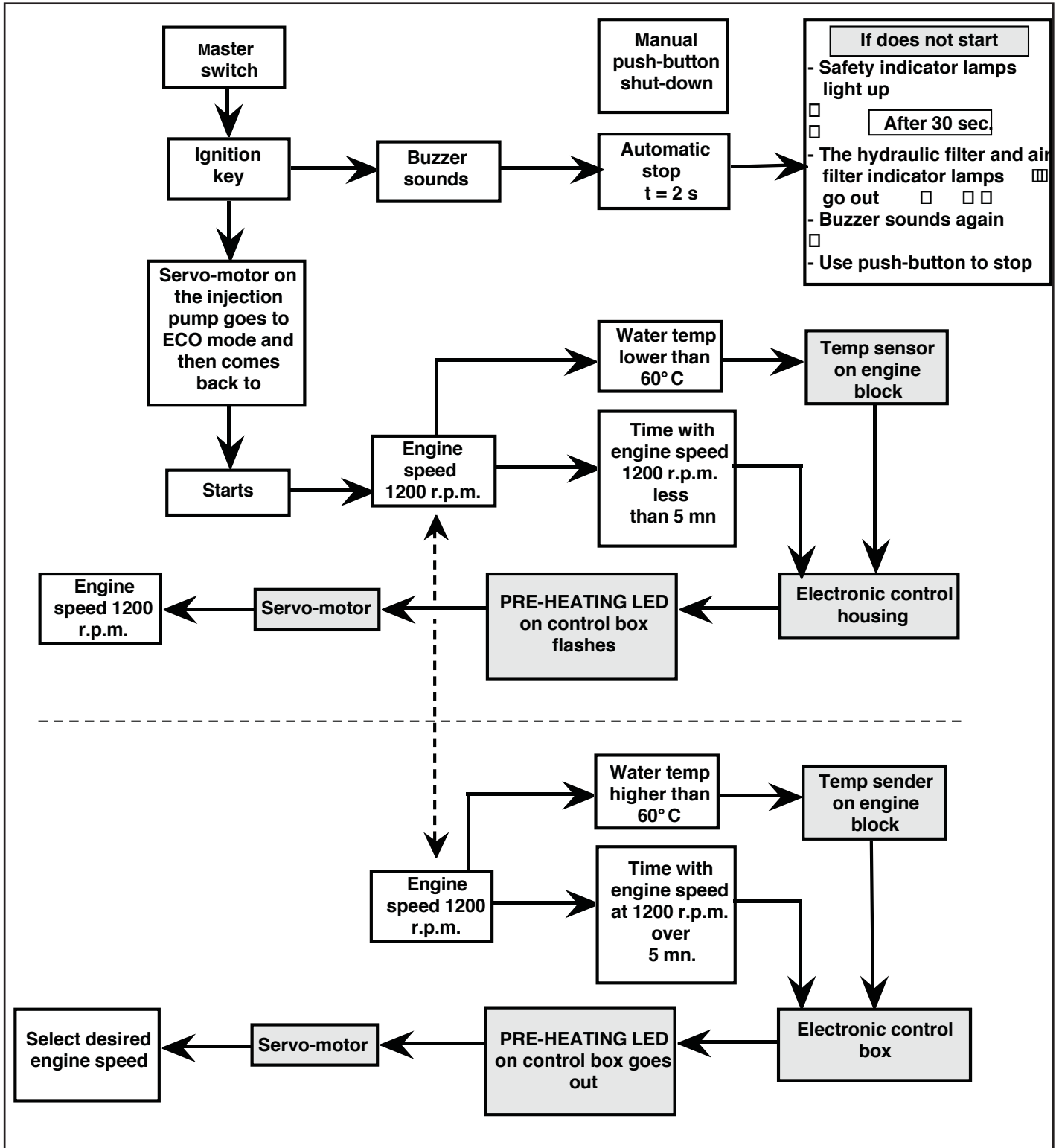


BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

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BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

STARTING ASSISTANCE



BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

ASSISTANCE FOR STARTING

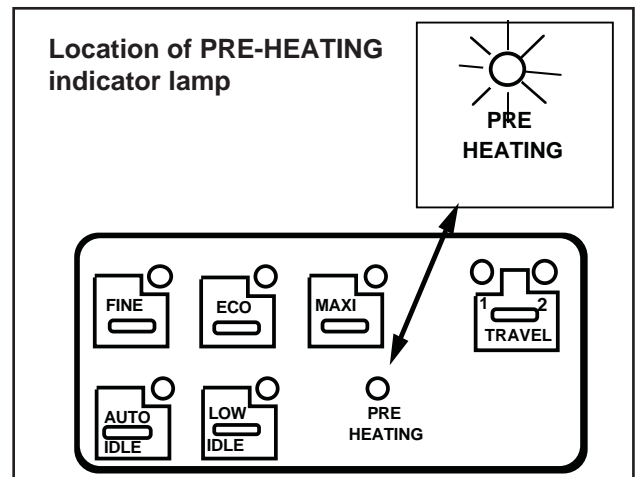
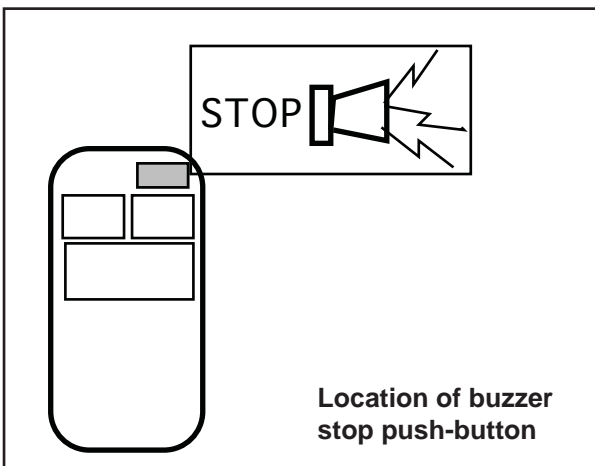
PURPOSE:

When the engine is switched on, the system provides:

- A pre-opening of the injection pump
- Automatic return of injection pump to the high idle position.

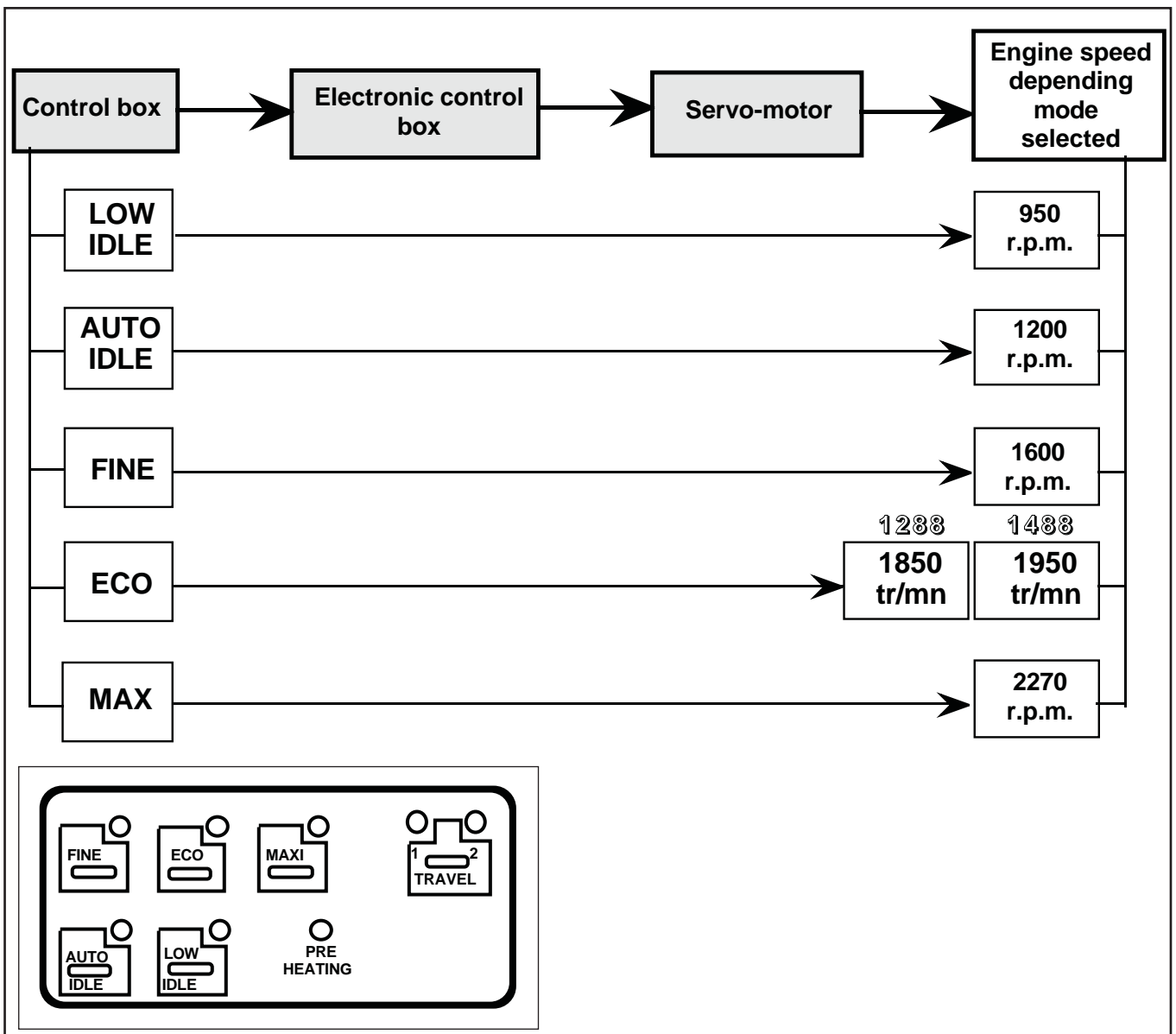
WORKING PRINCIPLES

- When the system is switched on using the ignition key, the buzzer sounds. The buzzer stops automatically after two seconds.
- If the engine does not start, the following warning lamps come on: battery charge, engine oil pressure, minimum pilot pressure, air filter and oil filter restriction warning. After 30 seconds, the last two warning lamps go out and the buzzer sounds (the buzzer can be turned off by the push-button on the instrument panel)
- If the engine starts, the injection pump servo-motor, which is in "ECO MODE" speed position, cuts in to provide an engine speed of 1200 rpm (high idle)..
- if the engine coolant water temperature is lower than 60°C or if the time that the motor runs at 1200 rpm is less than 5 minutes, the electronic system will not permit changing to the **LOW, FINE, ECO** or **MAX** modes. This is indicated by the **PRE-HEATING** indicator which has a flashing indicator lamp (LED).



BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

ELECTRIC ACCELERATION (AFTER ASSISTANCE WITH STARTING)



PURPOSE

To set the correct engine speed in accordance with the MODE selection made by the operator.

It provides the following :

- **2 idle modes**

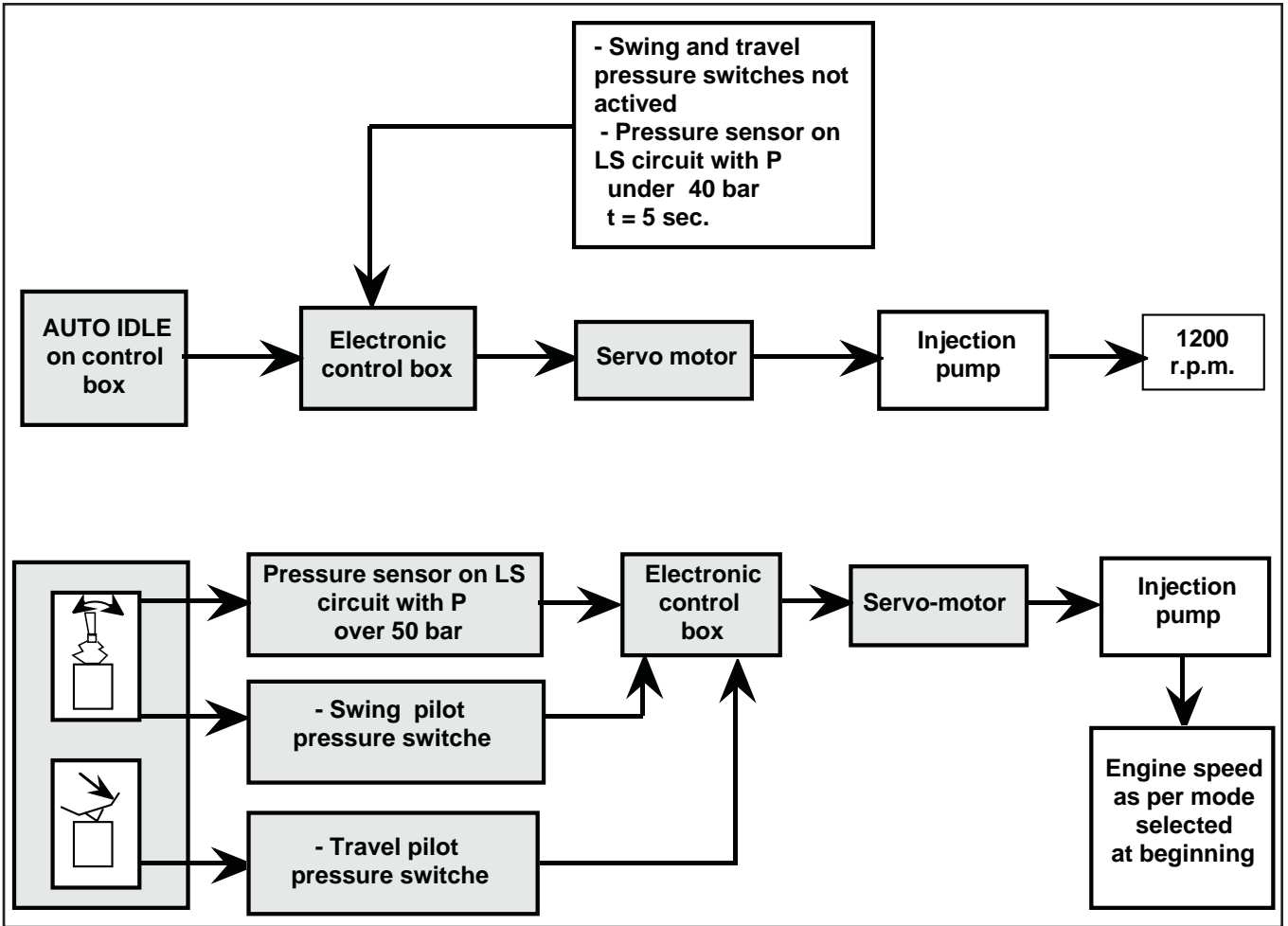
- **LOW IDLE** is the low idle speed at **950 rpm**.
- High idle (**1200 rpm**) cannot be selected and is only obtained automatically during assistance with starting when selecting **AUTO-IDLE** function (see page 1.5.00)

- **3 work modes**

- **FINE**: **1600 rpm** for low output work, and for handling
- **ECO**: **1850 (1288) or 1950 (1488) rpm**, economical digging is possible
- **MAX**: **2240 rpm**, maximum power, hard work

The mode is selected at the control box which informs the electronic control box. This sends a signal to the servo-motor which is directly connected to the injection pump lever. In this way engine speed is obtained in accordance with the selected mode.

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS
AUTOMATIC RETURN TO IDLE (AUTO-IDLE MODE)



PURPOSE

Sets engine speed to idle when none of the various controls for excavator functions are activated. This applies whichever mode has been selected (**FINE, ECO or MAX**)

WORKING PRINCIPLES

- The indicator lamp on the push-button lights up when the AUTO-IDLE mode is pressed to obtain automatic return to idle.
- On condition that no movement occurs at the control levers or pedals, also that the swing and travel pressure switches show no action and that the LOAD SENSING information line is at a pressure lower than 40 bar, all this for a period of 5 seconds.
- When these conditions are met, the electronic control box informs the injection pump servo-motor and the **AUTO-IDLE** mode (idling at **1200 rpm**) is obtained. The indicator lamp lights up on the push-button for the mode selected.- When one or more of the controls is operated again, the engine returns to the speed of the mode which was previously selected (**FINE, ECO or MAX**).

This is because information is given to the control box in the following manner:

For attachment and options functions

- When the L-S information pressure sensor detects a pressure greater than **50 bar**

For the swing function

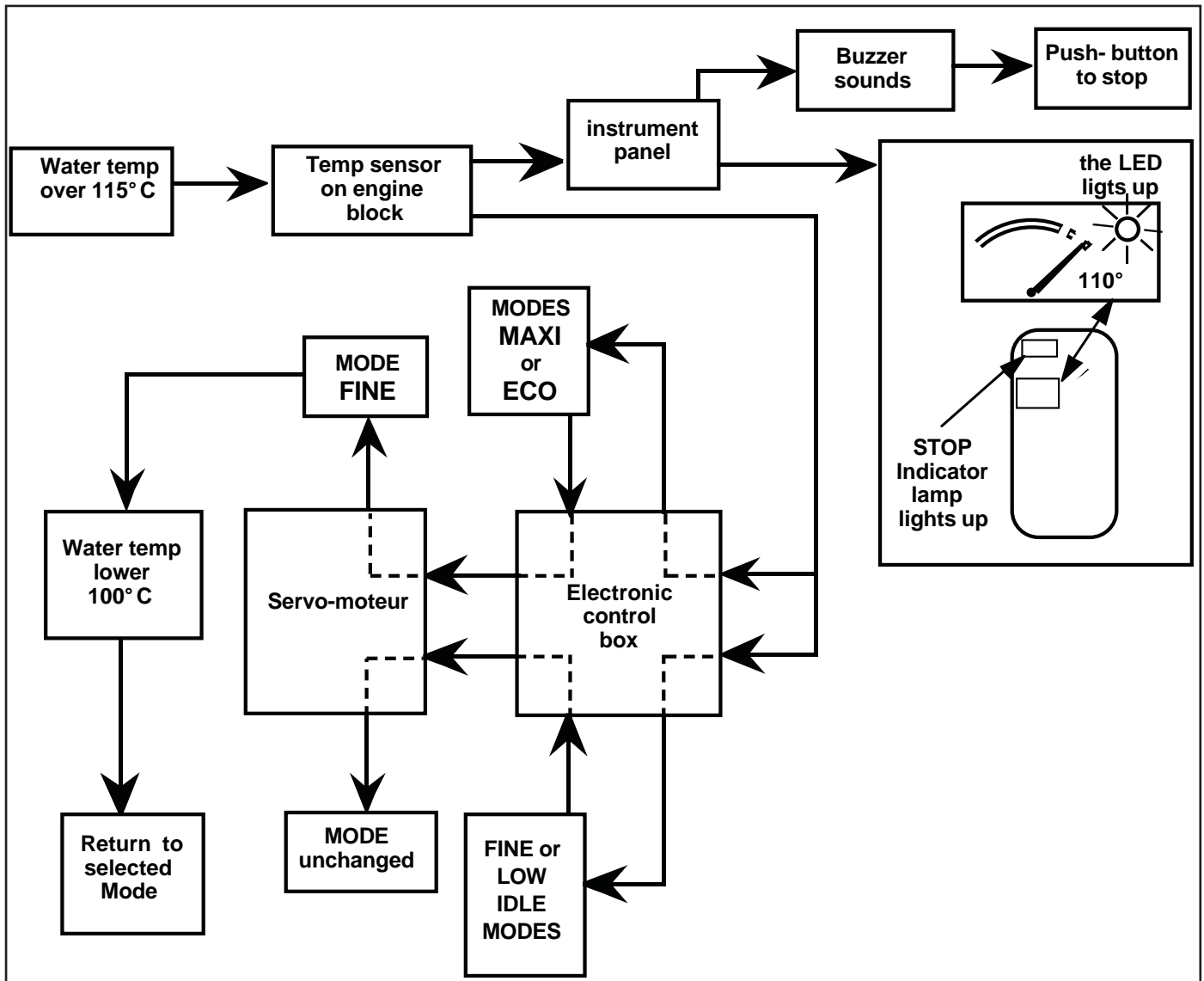
- When the pilot pressure switch receives a pressure information

For the travel function

- When the release pressure switch receives a pressure information
- In this case, the indicator lamp on the push-button stays on continuously.

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

ENGINE OVERHEATING SAFETY SYSTEM



PURPOSE

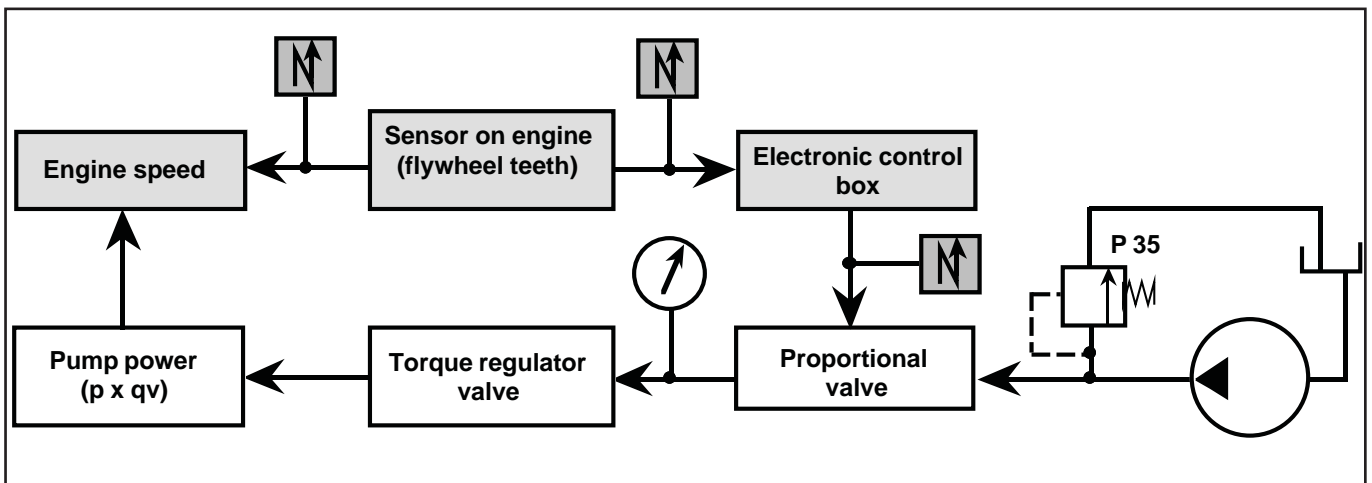
Safeguards the engine as regards temperature

WORKING PRINCIPLES

- If the engine coolant solution reaches a temperature in excess of 115°C, the sensor on the engine block gives information to the instrument panel
- The buzzer sounds (stopped by push-button)
- The stop warning lamp located at top left of instrument panel lights up.
- The engine temperature gauge needle is at the beginning of the 2nd red mark.
- The engine temperature gauge LED lights up.
- If the engine is in **ECO** or **MAX**, the information is transmitted to the electronic control box which reduces the engine speed to the **FINE** mode and the "FINE" LED lights up.
- If the engine is in **FINE** or **LOW IDLE**, there is no change
- At 100°C, the various modes: **FINE**, **ECO** or **MAX** can again be selected.

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

“SPEED-SENSING” SYSTEM



PURPOSE

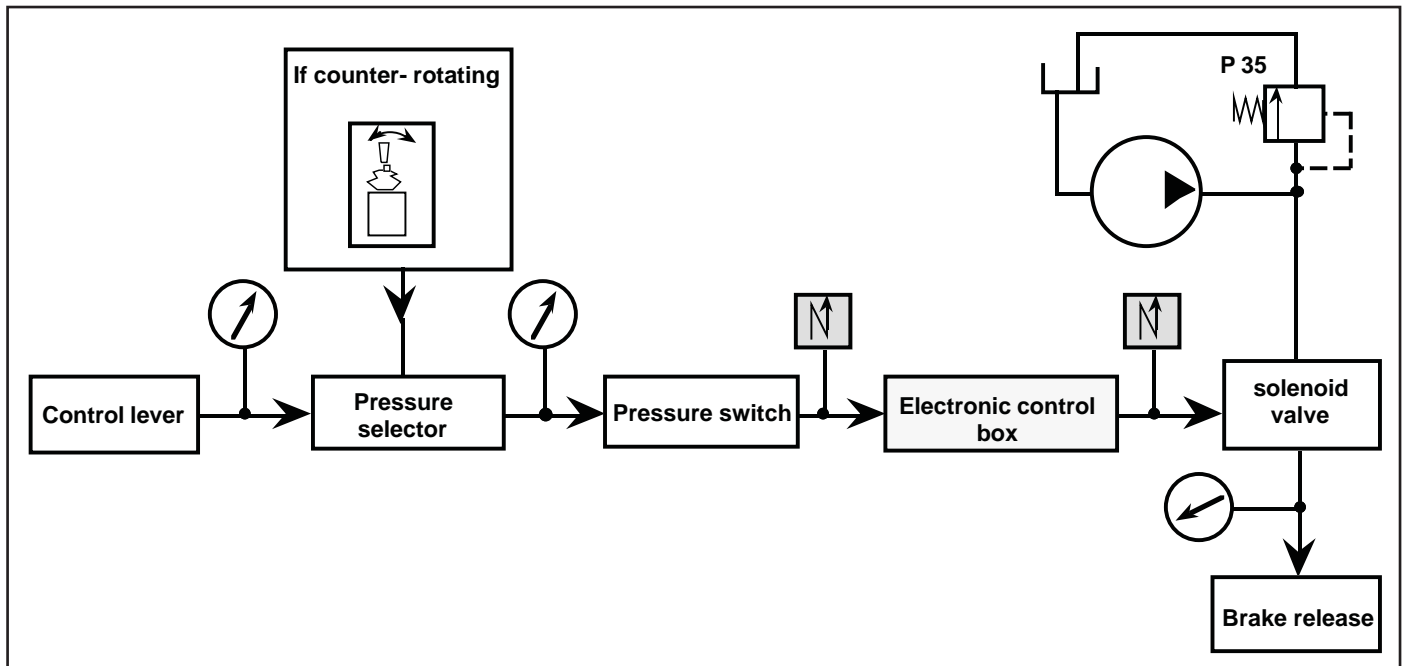
It maintains power balance between the available engine power and the demands of the hydraulic system, regardless of engine speed selected.

WORKING PRINCIPLES

- A sensor located on the teeth of the engine flywheel, detects engine speed and transmits it to the electronic control box.
- If the hydraulic power which has been consumed causes engine speed to fall, electric information coming from the electronic control box acts on a hydraulic proportional valve, fed by pressure from the hydraulic assistance circuit.
- Depending on the intensity of the signal received, which depends itself on the engine speed, this valve delivers a pilot pressure which acts on the torque regulator valve of the hydraulic pump, to reduce the flow supplied by the pump so that the hydraulic power consumed is in line with engine speed (depending on mode selected)

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

UPPERSTRUCTURE SWING BRAKE RELEASE



PURPOSE

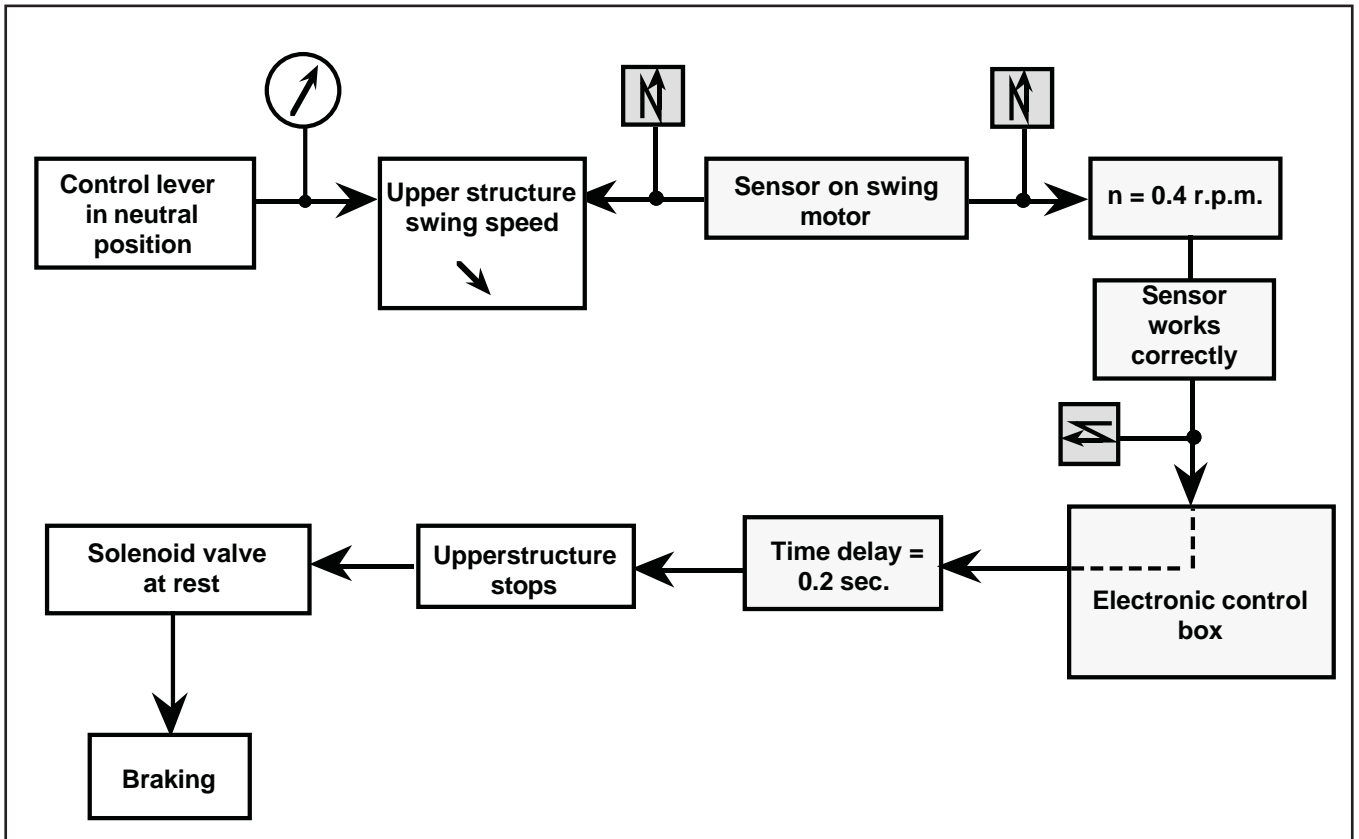
- Enables the upperstructure swing hydraulic motor brake release to take place

WORKING PRINCIPLES

- When the control lever is tilted, the pilot pressure actuates a pressure selector. The pressure selector closes a pressure switch which informs the electronic control box
- This in turn activates a solenoid valve, fed by the hydraulic assistance circuit pressure. This pressure arrives at the hydraulic motor brake and releases the brake.
- Since the hydraulic motor is being fed it drives the upperstructure round by means of a reduction gear
- When the operator swings in the opposite direction, without stopping at the control lever neutral position, the pressure selector is pressed onto the other side and the pressure switch informs the electronic control box, which maintains the swing brake in the released position.

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

UPPER STRUCTURE SWING BRAKING (good sensor on hydraulic motor)



OBJECTIVE

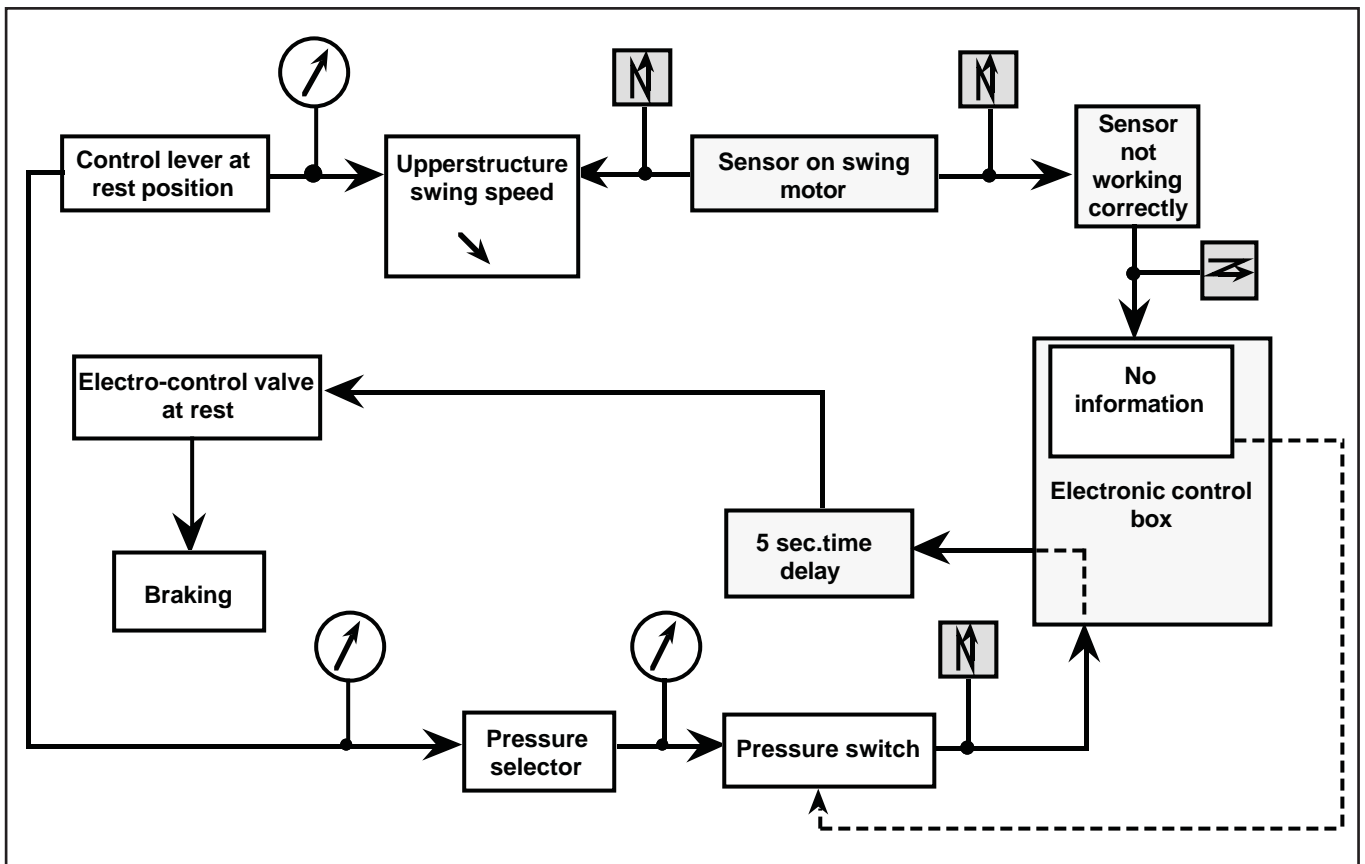
- Optimise the upper structure swing braking time in relation to its swing speed

WORKING PRINCIPLE

- When the control lever is at rest, the upper structure decelerates
- At a speed of 0.4 rpm the hydraulic motor sender no longer informs the electronic control box.
- At that moment, a time delay of 0.2 seconds allows the electro-control valve to remain piloted so that the upper structure can stop completely before the hydraulic motor brake is applied.

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

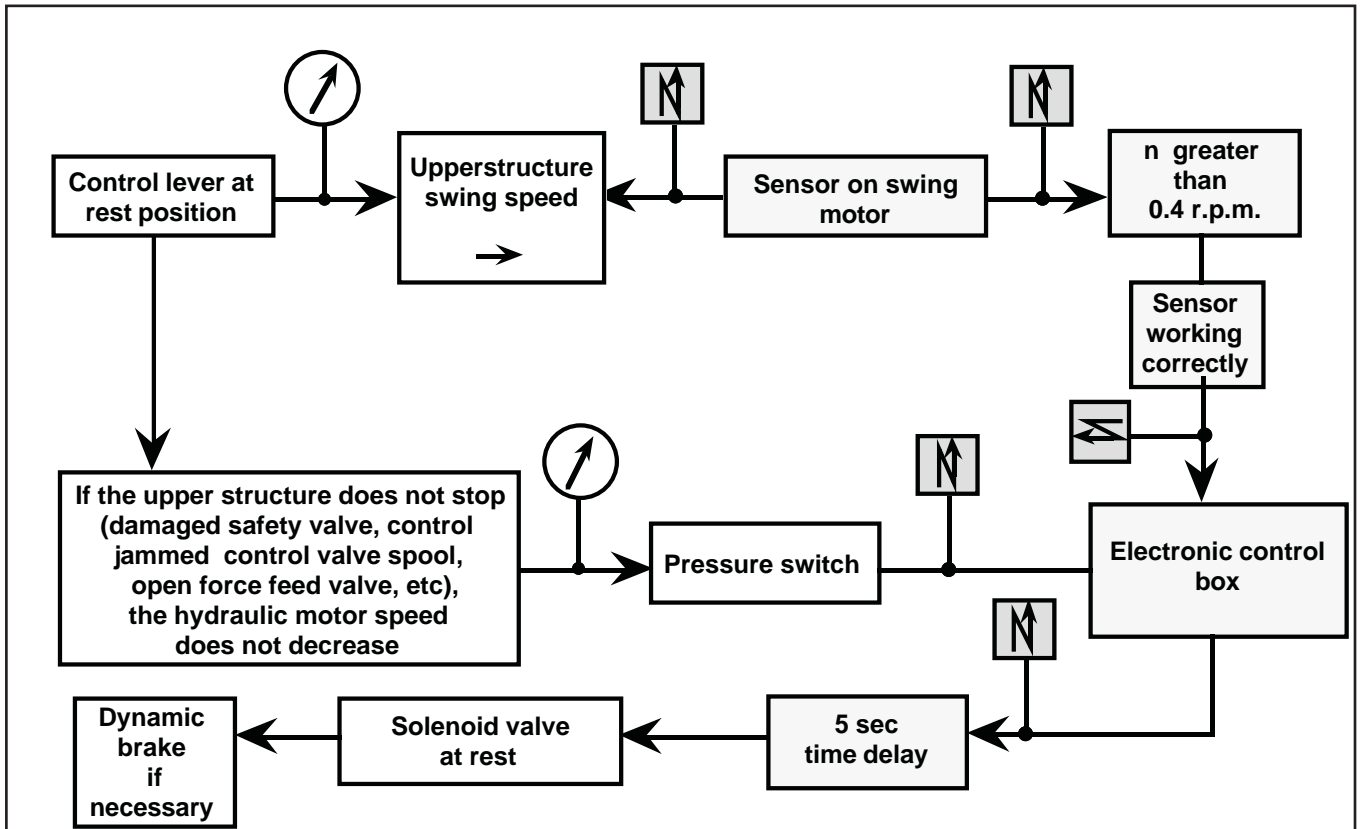
FRENATURA DELLA ROTAZIONE DELLA TORRETTA (captatore sul motore idraulico: guas)



- Nel caso in cui il captatore sia difettoso, il contatto manometro del circuito di pilotaggio della rotazione della torretta informa la scatola di controllo elettronico e questa autorizza in questo momento una temporizzazione di 5 secondi.

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

UPPERSTRUCTURE BRAKING (good sensor, but defects in operation of hydraulic circuit)

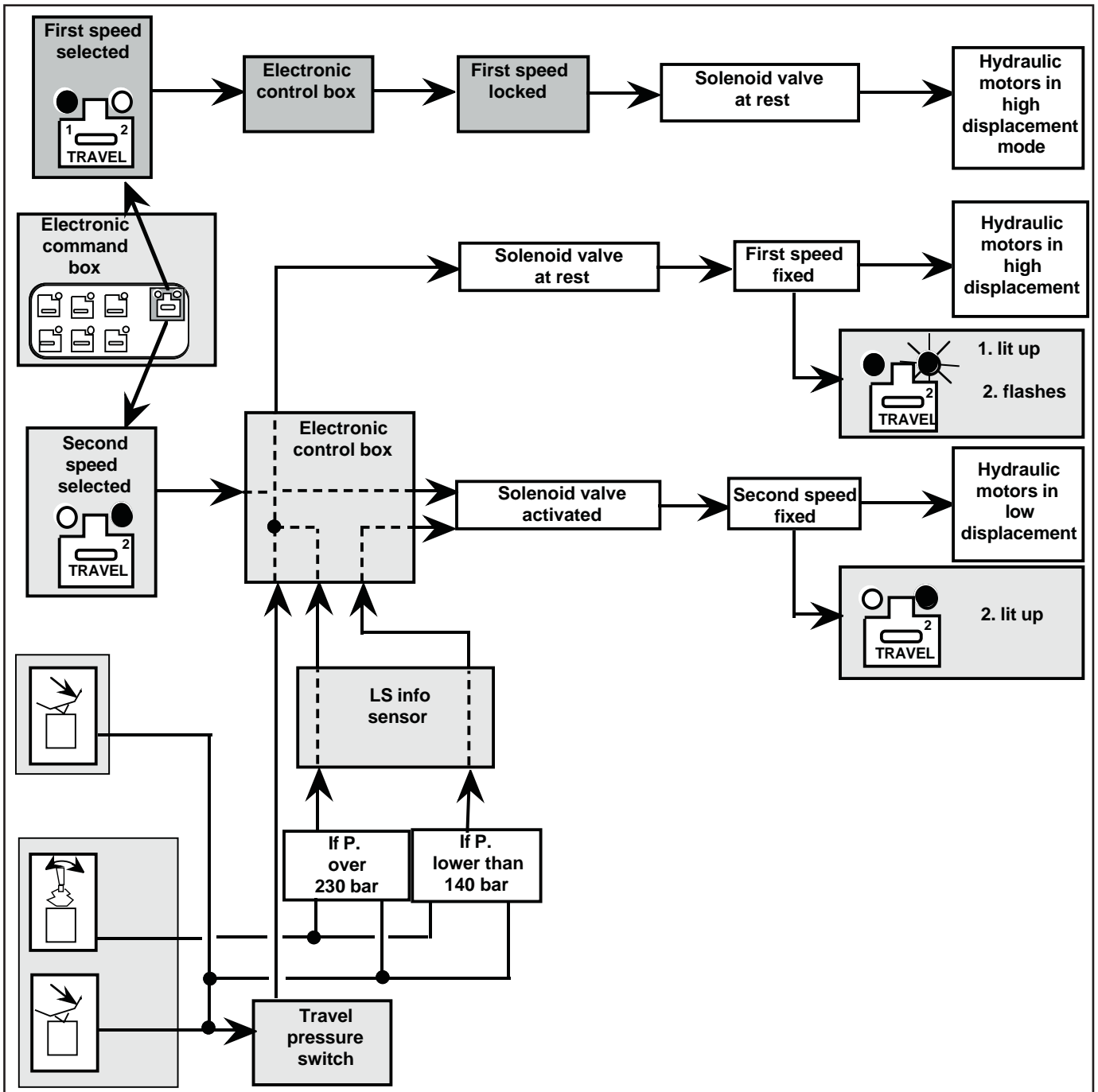


- When there is a hydraulic problem (defective safety valve or anti-cavitation valve, control valve spool jammed) regardless of the control lever being at rest, the upper structure keeps on turning. The sensor is still informed and requests the electronic control housing to release the brake.

But the pressure switch is not activated. In this situation, braking* takes place after 5 seconds (* this can be dynamic braking).

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

AUTOMATIC TRAVEL SEQUENCES (TWO-SPEED EXCAVATOR)



BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

AUTOMATIC TRAVEL SEQUENCES (TWO-SPEED C EXCAVATORS)

PURPOSE

- The **TRAVEL 2** mode enables the high speed position and automatic speed change to be obtained by reading LOAD SENSING information circuit pressures and the travel pilot pressure (activated pressure switch: pressure greater than 6 bar)
- The **TRAVEL 1** mode enables the machine to be locked in first speed.

WORKING PRINCIPLES

- To select **1st speed**, press the **TRAVEL** key to turn on **indicator lamp 1** (This happens automatically when starting up). The control box locks the machine in this speed. The speed change solenoid valve is at rest position, the motors are in high displacement (low speed).
- To select **second speed**, press the **TRAVEL** key so as to light up **LED 2**. The electronic control box activates the speed change solenoid valve and the hydraulic travel motors are in low displacement (high speed).

WORKING WITH ATTACHMENTS ONLY IN TRAVEL 2 MODE

- The **indicator lamp 2** stays on, **indicator lamp 1** stays off. The electro-control valve is activated, the hydraulic motors are in high displacement mode (See hydraulic travel motor operation).

WORKING WITH ATTACHMENTS AND TRAVEL OR WITH TRAVEL ALONE.

In this case, if the LOAD SENSING information is higher than **300 bar**, whatever may be the functions being operated, a sensor fitted on this line informs the electronic control box. A pressure switch fitted on the hydraulic travel motors pilot circuit also informs the control box.

These two information inputs taken together enable the control box to deactivate the solenoid valve and to obtain the high displacement on the hydraulic travel motor, which gives first speed (**LED 2 flashes and LED 1 lights up**)

If now the LOAD SENSING information circuit pressure falls to a pressure lower than **140 bar**, the control box activates the solenoid valve, the motors return to low displacement, and so change to second speed (**only LED 2 is lit up**)

BASIC PRINCIPLES OF ELECTRONICALLY ASSISTED SYSTEMS

Section

4001

ELECTRICAL SCHEMATICS
1288/1488 Crawler excavators

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SPECIFICATIONS

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


SCHEMATIC SYMBOLS


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


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

 (n) Supply on printed circuit




 (n) Battery terminal

 (n) Printed circuit connection terminal

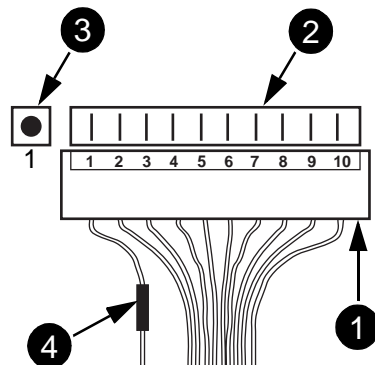
 Printed circuit earth connector

 A1 Instrument panel connector

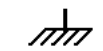
 1 or  1 or  1 Harness identification

 1(1) or  (1) or  (1) Harness identification followed by path identification number

 (1) or  (1) Printed circuit earth connectors



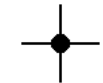
The installation position for the harness connector (1) on connector (2) of the printed circuit is identified by a red mark (3) followed by the figure 1 on the printed circuit. This identification corresponds to the position of path 1 of the harness connector (1). This position is completed when the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

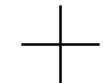
 Local earth

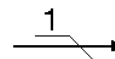
 Wire number

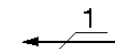
NC Closed circuit


NO Open circuit

 Intersection of two wires with connection point


 Intersection of two wires without connection point


 Link with following plate

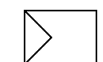
 Link with preceding plate

 Return to another plate with the same letter

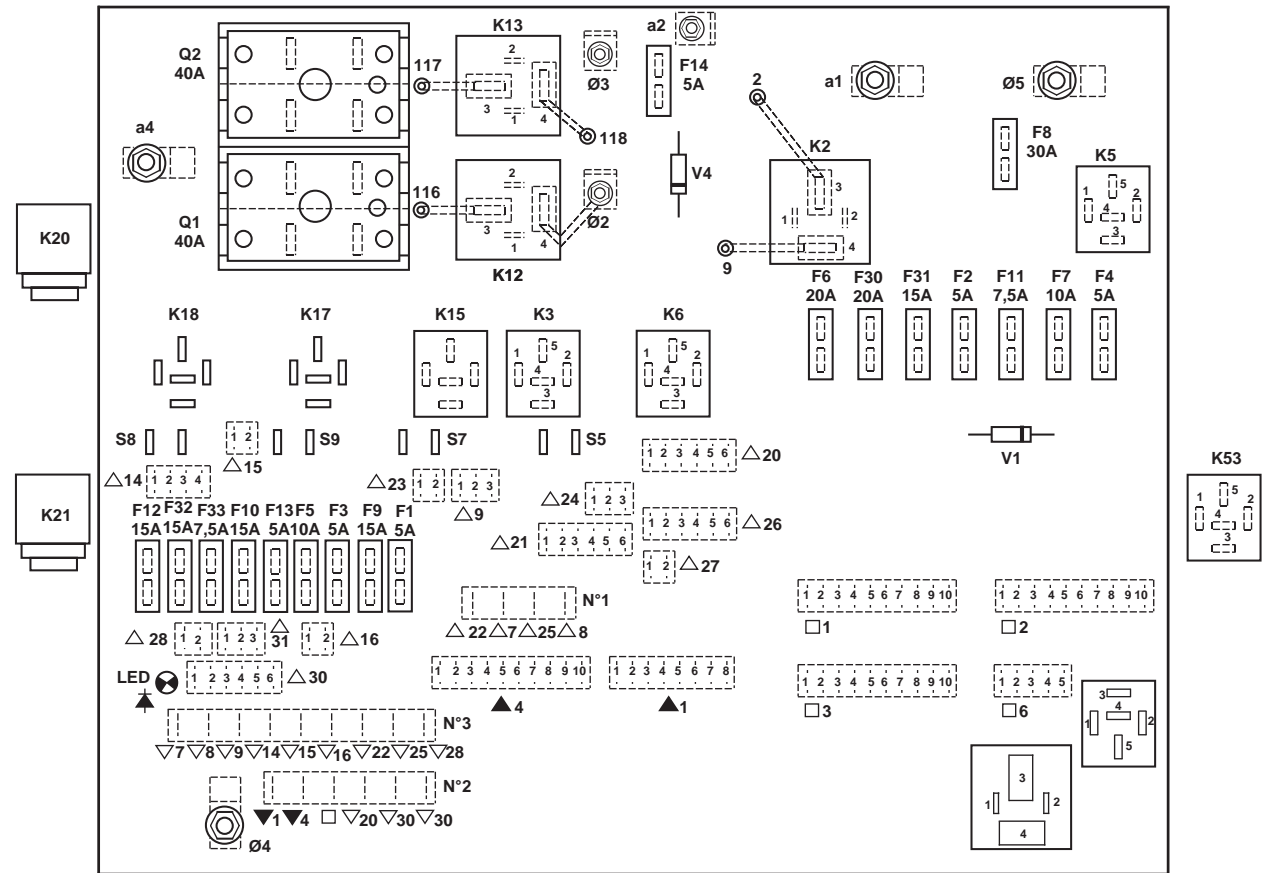
 Bulbs

 Test bulb


 Light emitting diode (LED)

 Regulator

DESCRIPTION OF ELECTRICAL CABINET PRINTED CIRCUIT (STANDARD EQUIPMENT)



CM97C001

- Q 1 24 Volts supply before contact
- Q 2 12 Volts supply before contact (radio)
- Q 4 24 volt supply before Q1 and Q2 circuit breaker contact
- F2 Fuse, starter switch (5A)
- F3 Fuse, 5A, instrument panel, injection pump sender, alternator
- F4 Fuse, 5A, cab lighting, horn relay
- F5 Fuse, 10A, working lights, rotary light (optional)
- F6 Fuse, 20A, upperstructure working lights
- F7 Fuse, 10A, horn
- F8 Fuse, 30A, upperstructure power point
- F9 Fuse, 15A, windshield washer, windshield wiper
- F10 Fuse, 15A, ventilation, heater
- F11 Fuse, 7.5A, cigarette lighter
- F12 Fuse, 15A, pilot safety
- F30 Fuse, 20A, cab working lights
- F31 Fuse, 15A, windshield wiper intermittent action
- F33 Fuse, 7.5A, electronic control box, diagnostic socket
- H14  Diagnostic (LED) lamp

- K2 General contact relay
- K3 Hourmeter relay, ignition warning lamp
- K5 Horn relay
- K6 Attachment and upperstructure working light relay
- K12 Starter motor solenoid relay
- K13 Injection pump solenoid relay
- K15 Cold start assistance relay
- K20 Windshield wiper intermittent action
- K21 Pilot safety relay
- K53 Fuel heater relay base
- Q1 Circuit breaker, 40A, starter motor
- Q2 Circuit breaker 40A, injection pump solenoid
- Sh5, Sh7, Sh8, Sh9 Not used
- V1 General contact diode
- V4 Radio diode
- Ø 2 Starter connection
- Ø 3 Solenoid/injection pump connection
- Ø 4 Printed circuit earth
- Ø 5 Upperstructure power line connection

ELECTRICAL CABINET PRINTED CIRCUIT WIRING (STANDARD)

- 1 4 terminal block
- 1 Harness, 10-way connector, floor harness
- 2 Harness, 10-way connector, floor harness
- 3 Harness, 10-way connector, floor harness
- 6 Harness, 5-way connector, floor harness
- △ 9 Harness 3-way connector, floor harness
- △ 20 Harness, 6-way connector, cab power connection
- △ 21 Harness, 6-way connector, cab power connection
- △ 26 Harness, 6-way connector, windshield wiper (K20 intermittent action)
- △ 27 Harness, 2-way connector, windshield washer
- △ 30 Harness, 6-way connector, electronic control box
- △ 31 Harness, 3-way connector, troubleshooting test socket
- ▲ 1 Harness, 8-way connector, common harness
- ▲ 4 Harness, 10-way connector, engine