A&QT-R 2004 (THETA 14)
2004 IEEE-TTTC-International Conference on Automation,
Quality and Testing Robotics
May 13-15, 2004, Cluj-Napoca, Romania

CONTROLLER DRIVE INSTALLATION FOR THE LOCOMOTIVES OF TYPE LDE 2100 / LDH 1250

Author: ing. Sorin Monțescu

SC SOFTRONIC SRL
Strada Unirii, No. 37,
CRAIOVA, DOLJ, 200409,
Telefon/Fax: 0040251 414822
e-mail:softronic@softronic.ro

This paper – work reffers to the command controller for the Electric Disel Locomotive LDE 2100 HP and Hydraulic Diesel Locomotive LDH 1250 HP. This command is done using the wired integrated logic and programmed logic, which leads to the simplifyiny of the technical solution and to reliability increasing.

Key words: controller, drive pressure, position measuring head, tension / pressure measuring head, automatic regulation system

1. INTRODUCTION

The fact that, on the market have already appeared, some appropriate measuring heads that fulfill the most pretentious quality standards and behavior demands and the expansion of the automatic survey systems, control and drive systems, based on powerful microprocessors, lead to the solution of replacement for the classical drive controller from LDE 2100 CP or LDH 1250 CP, from the system of the cabled logics (lobes with contacts, mechanically powered pneumatic faucet) in the system of the programmed logics (automatically programmed). This modification leads to the a better efficiency of the locomotive, reduces its driving effort, simplifies the maintenance activity from depots and not last but not the least the reduced gauge of the new controller offers more space and comfort in the locomotive's cabin.

2. PRESENT STAGE

The classical controller is an ensemble of axes with lobes, contacts and cams that, depending on their position, realizes the closure of the specific electrical circuits and generates the drive pressure for the mechanic regulator of the diesel engine. This solution has a series of disadvantages:

- the gauge is very big, reducing the space from the driving cabin (fact resented more at LCD where both driving posts are placed into an unique cabin)
- the effort deposed for handling is considerable

- the used contracts are very difficult to replace
- the lobes and the used cams lead to errors in the drive pressure generation by the mechanically powered faucet
- in the actual structure it cannot be integrated into an automatic survey and drive system because it requires a change of information with intelligent peripherals

3. INSTALLATION DESCRIPTION

3.1. Controller drive installation for locomotives (Figure 1) is made up of:
- mechanic construction controller
- angular position measuring heads, one for each of the two axes of the controller (inverter and principal)
- drive unity with microprocessor
- block of relays for electrical circuits establishment
- for both drive posts, an unique execution pneumatic element , more precisely a tension – pressure measuring head

The installation actions the execution and commutation elements from the pneumatic and electrical circuits of the locomotive according to the commands received from the mechanic, it verifies their correct execution and actions in the case of a harm regime.

The command of the traction regimes is realized by the transmission of commands towards the execution elements from the force circuits according to the position of the controller from the active drive post.

3.2. The controller like the mechanical construction has, from the point of view of the commands and of the handling manner, the same positions and functions as the one that actually equips the great majority LDE / LDH:
- the mechanical blocking / unblocking key of the drive post
- the joystick of the ax in inverter which has the positions Back, Zero, Forward
- the joystick of the main ax which has the positions for traction and a position of Zero

The traditional mechanical blockings are kept and there are introduced the electrical blockings to assure the uniqueness of the commands from a single post.

From the constructive point of view, the installation presents a simple and appropriate structure that totally eliminates the electrical contacts on lobes by their replacement with angular displacement sensors.

3.3. The control unit with microprocessor receives information about the position of the two joysticks, commands the electrical and pneumatic execution elements and realizes the bidirectional communication on a buss RS 485 with the rest of the system.

3.4. The elements used in order to detect the position of the two joysticks (the main ax and the inverter ax) are angular displacement measuring heads. The

positions of these sensors (entrances for microprocessor) are read and interpreted by the control unit and according to them there are generated the specific commands (exists).

3.5. The block of relays realizes the closure of the electrical circuits being driven by the microcontroller according to the entrance signals

3.6. The execution element used to regulate the drive air (the proportional electrical valve) is a tension – pressure measuring head. For a variant of the tension in the limits 0-5 V this generates a pressure of 0…3,2 bars necessary for the mechanical regulator to vary the revolution of the diesel engine.

3.7. Entrance / exist signals

- 2 analogical entrances 0..5 Vcc from the angular position measuring heads
- 1 analogical exit 0..5 Vcc towards the pressure measuring head
- 8 numeric exits for the command of the electrical circuits
- 2 numeric exits to realize the electrical blockings between the drive posts
- 1 serial interface RS485 for the information change (imposed speed, real speed, stair of the joystick for the main ax, position of the joystick for the inverter ax) with the rest of the system

4. CONCLUSIONS

The replacement solution of the classical controller with drive installation which has been proposed presents the following advantages:

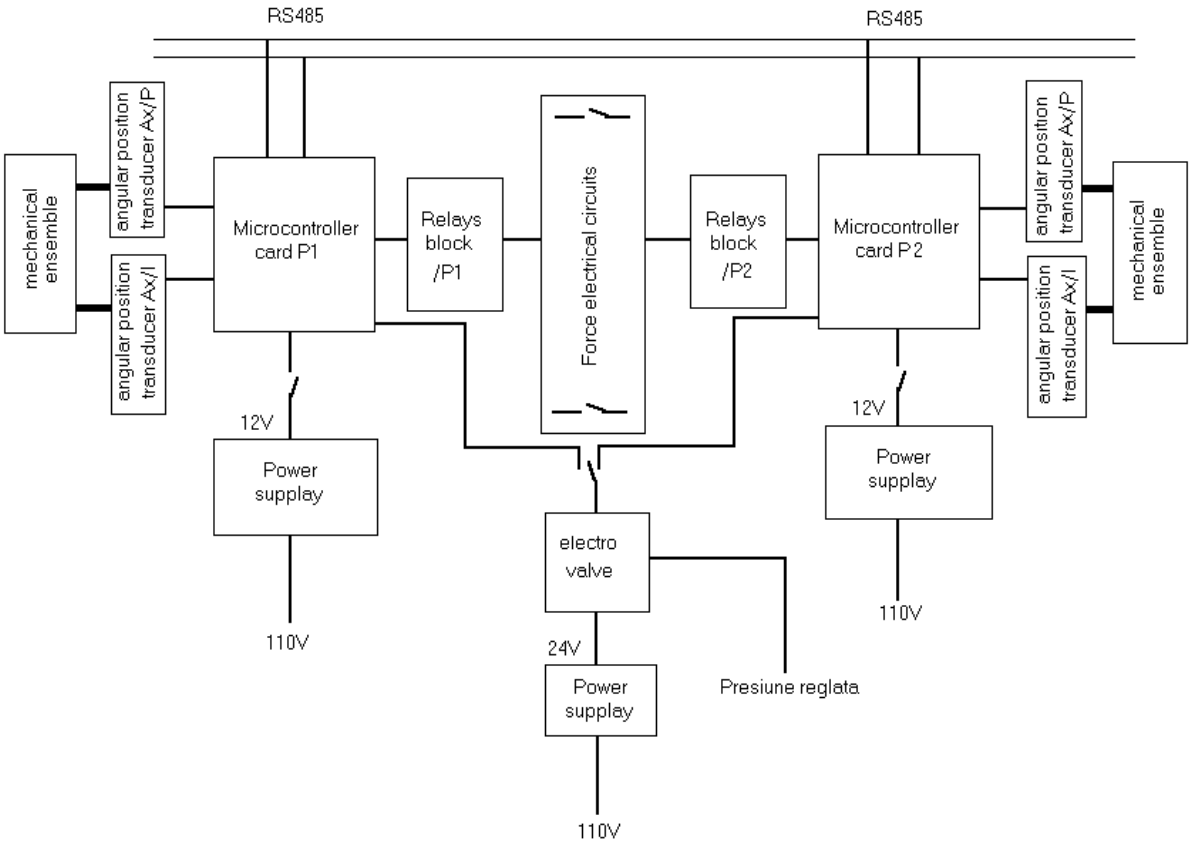
- very reduced gauge (300 x 300 mm with a weight of appreciatively 1 Kg)
- smaller price
- great reliability
- it does not requires maintenance and the reparation is easy
- the possibility to be integrated in an automatic system (for example a buckle of prescription for the speed)

5. BIBLIOGRAFIE

1. Dumitru, I., Zglăruță, E. – Diesel hidraulic locomotives Tehnical Publishing, Bucarest

2. * * * - Operating and maintenance Instruction Manual of the Diesel – electric locomotive 060 – DA, DE 2100 HP, Ducumentation and Tehnical Publication Centre – 1967.

FIGURE 1



Legend:
controler ansamblu mecanic = controller of the mechanical ensemble
traductor poziție unghiularã = angular position measuring head
microcontroler = micro controller
bloc de relee = block of relays
circuite electrice locomotivã = electrical circuits of the locomotive
sursã alimentare = alimentation source
valvã = valve
presiune reglatã = regulated pressure