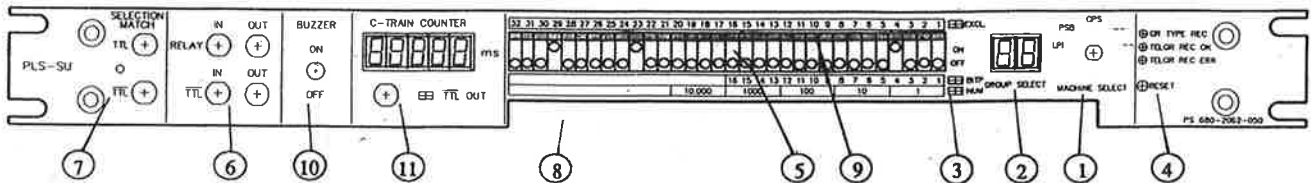


THE PLS - SELECTION UNIT USERS MANUAL

E. Siesling



PLS-SU

The PLS - Selection Unit Users Manual

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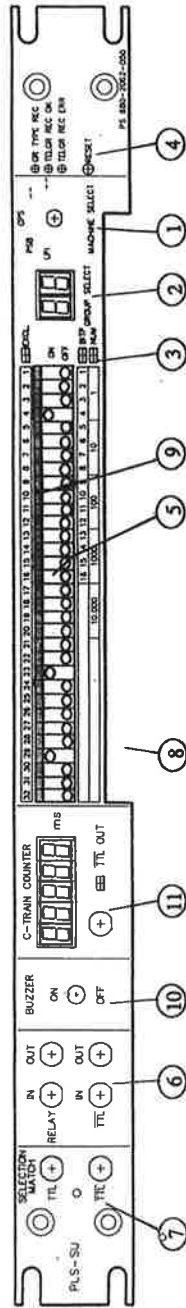


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1. Introduction

The evolution of the PLS telegram from 8 users to 24 users made it necessary to develop a new PLS-Selection Unit (PLS-SU), which was formally known as the TCU. The new PLS-SU differs from the old TCU in that the old TCU decoded the trigger signal(s) from the incoming 8 user lines, where as the new PLS-SU receives the new MTG cable (Master Timing Generator), which is distributed around the various buildings and equipment racks. Any PLS telegram containing exclusive, bit-pattern or numeric- value group information that is distributed on this cable, can be selected. The treatment of those different groups will be done automatically inside the PLS-SU, thanks to special PLS information distributed on the MTG cable, and will be transparent to the user. A front panel indicator helps the user to make his choice of selection for each type of group, by using selection line-switches. The selected PLS information allows the conditioning of an external signal (such as timing or trigger pulse), moreover, the PLS-SU can be used as a simple PLS telegram observation unit, allowing you to synchronize visually or by an acoustic signal, with the machine cycling, as in the case of trouble shooting.

PLS-SU, the idea:

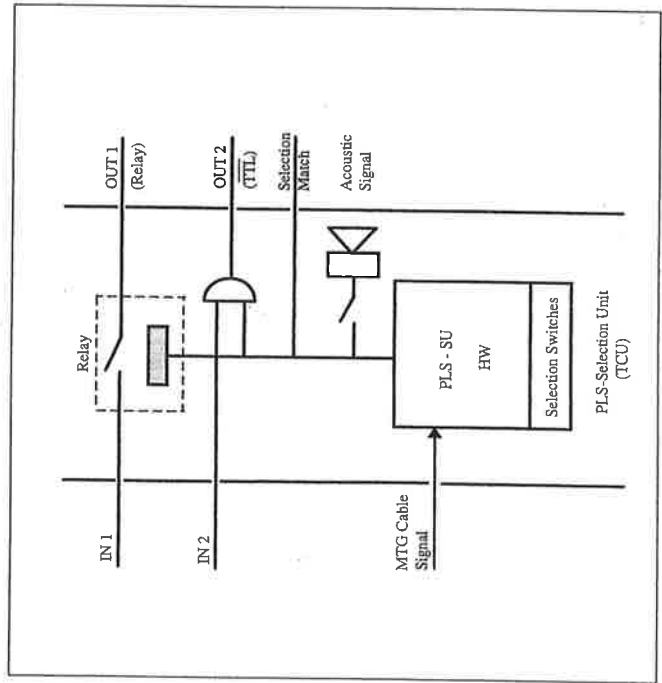


Fig. 1.1

2. The PLS-Selection Unit 19" 1 unit high

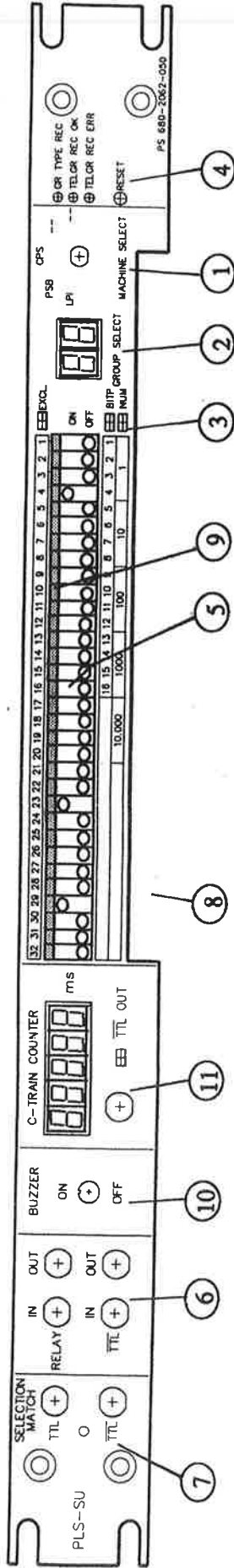


Fig. 2.1

2.1 Front panel explanation:

1. Machine select: to select the Machine, CPS, PSB or LPI. (2 spare positions)
2. Group select: to select the Group of the chosen Machine.
3. Group Type LED's indicating the Group Type and the line-switches function (Exclusive-, Bitpattern- or Numeric-Group).
4. Diagnostic LED's signaling Group Type Reception, Telegram Reception OK, Telegram Reception ERROR and the Reset button.
5. Line switches to select line 1 - 32.
6. Relay and TTL logic (the latter can be set, by a jumper on the PCB, to either $\overline{\text{TTL}}$ or TTL 50 Ohm).
7. Selection Match with TTL and TTL 50 Ohm output and indication LED.
8. Drawer for PLS Telegram documentation, manual and notes.
9. LED's indicating the received PLS Group Value (Lines) corresponding to the selected Group of the chosen Machine.
10. Buzzer: acoustic signal when a selected Line is detected.
11. C-Train Preset Counter for the chosen Machine with output indication LED and LEMO output (1 usec $\overline{\text{TTL}}$).

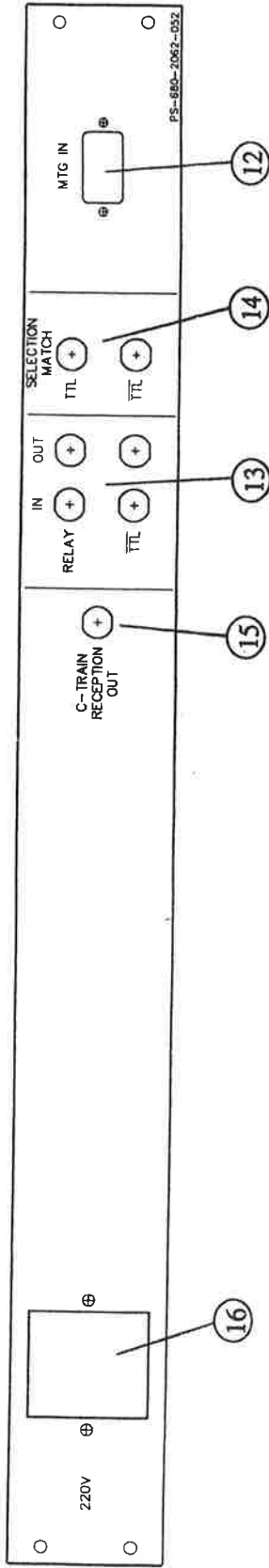


Fig. 2.2

2.2 Rear panel explanation:

- 12. MTG cable in.
- 13. Relay and TTL logic (the latter can be set, by a jumper on the PCB, to either TTL or TTL 50 Ohm, independent from the setting of the outputs on the front [6]).
- 14. Selection Match with TTL and TTL 50 Ohm output and indication LED.
- 15. C-Train output pulse (1 usec TTL).
- 16. 220V power .

The previous drawings (Fig. 2.1 & 2.2) and the numbering of the different elements will be used throughout this manual, as a reference to explain the operation of the various functions and their relation to the Telegram Lines.

3. How to select a Line

A PLS Telegram message is composed of a set of machine related data, which are subdivided in Groups. Each Group is described by two quantities: the Group Number and the corresponding Group Value. The Group Number determines a coherent set of data, the Group Value specifies a sixteen bit value belonging to the selected Group.

Telegrams are associated with a Machine, and the time at which a Telegram becomes valid is determined by a Simple Event, "Ready PLS Telegram", distributed on the MTG-cable and transparent to the user.

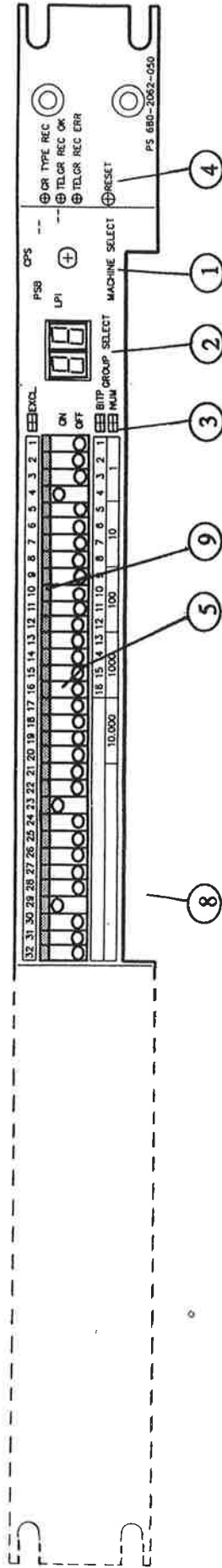


Fig. 3.1

3.1 The Machine

First the Machine can be selected using the 5 position switch [1]: LPI, PSB, CPS and two spare positions. The decade-switches [2] allow the Group to be chosen and the Line Switches [5] select the Group Value. In the drawer [8] of the PLS-SU one can find a sheet with information tables on the Groups and Group Values for the three Machines CPS, PSB and LPI.

For example the CPS and LPI Telegrams: (The numbers correspond to the switches on the PLS-SU)

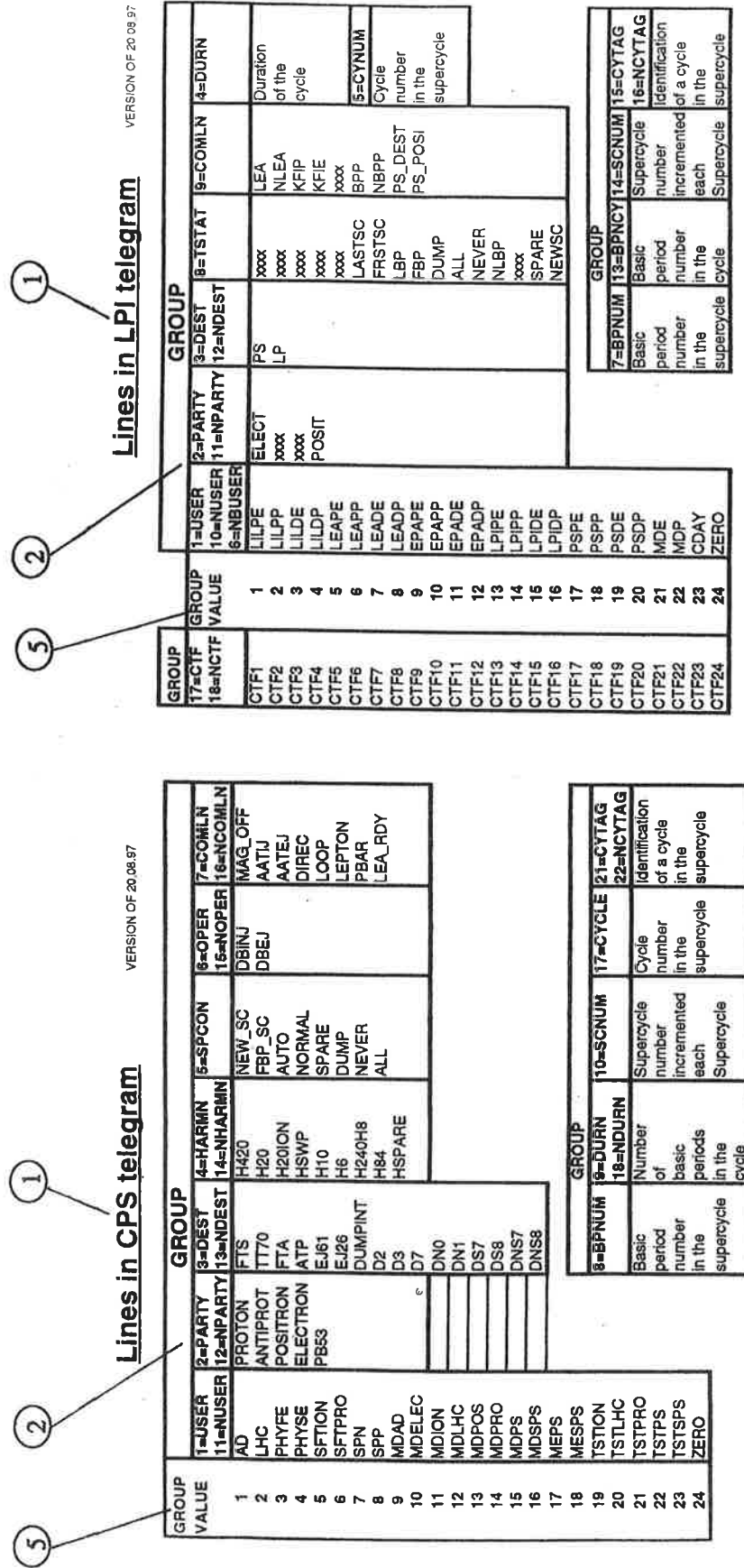


Fig. 3.2

3.2.2 Bitpattern Group: (For example CPS Telegram Group 7: COM(bined) L(i)N(e) Group)

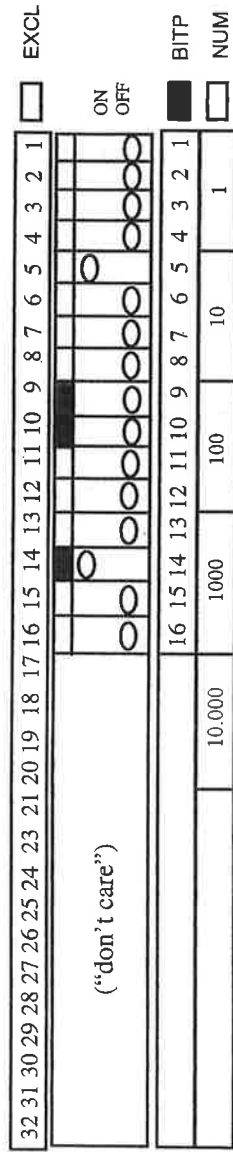


Fig. 3.4

For a Bitpattern group function bar second from the bottom is valid, and is indicated by the BITP LED.

More than one of the 16 Lines can be valid at a time (16 Bit-pattern) and will be indicated by the Line-LED's [9].

Any Line can be selected with the Line-switches [5], and in the case where one or more of the valid Lines of the received pattern corresponds with your selection, a Selection Match is true. (Switches 17 to 32 do not have any effect, so can be considered as a "don't care" state).

Selection Match is an OR function of the selected Lines and the received Lines.

In this case the received valid Group Value (bitpattern) is 9, 10 and 14 and are indicated by the Line-LED's 9, 10 and 14. Line 5 and 14 have been selected since their Line Switches are in position "ON". Line 14 is selected and is part of the received bitpattern so a Selection Match is true.

3.2.3 Numeric Group: (For example CPS Telegram Group 17: CYCLE (number in the supercycle))

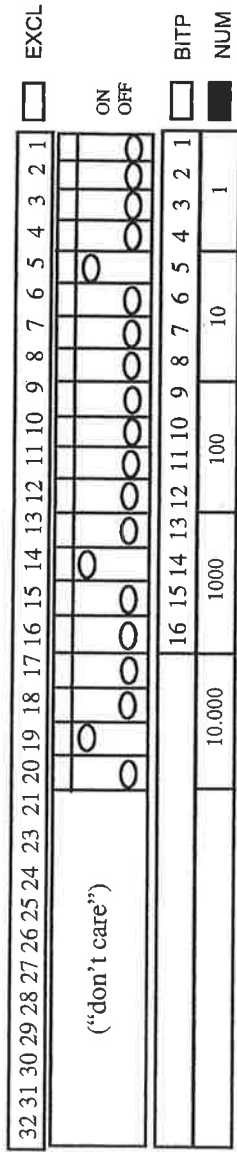


Fig. 3.5

For a Numeric group the bottom function bar is valid, and is indicated by the NUM LED. The received number (Numeric) is indicated by the Line-LED's [9] in BCD for every decade: 1, 10, 100, 1.000 and 10.000. A number can be selected by setting each digit in BCD with four Line-switches [5] for each decade.

Example:

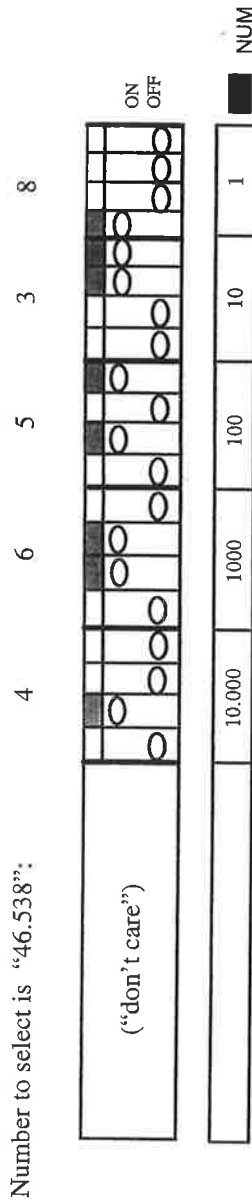


Fig. 3.6

If the received Number corresponds with the selected Number, then the number indicated by the LED's is the same as the number selected with the Line-switches, hence a Selection Match is true. This is the case in the given example. Selection Match is an AND function of the selected Number and the received Number.

3.3 Delay after switching on the PLS-SU:

Attention: After switching on the PLS-SU or after a Reset [4] it can take up to one minute before the Group Type data has been received and stored in an internal RAM. The functioning of the PLS-SU cannot be guaranteed before this delay has elapsed. **The moment of Group Type reception will be indicated by the LED "Gr Type Rec"**.

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4. The C-Train Preset Counter

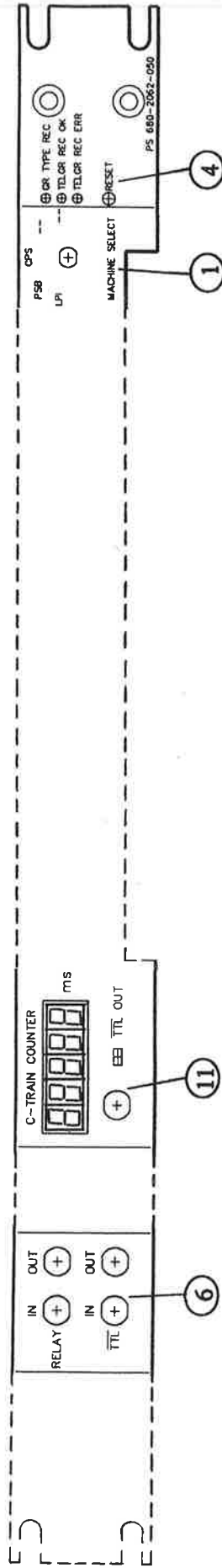


Fig. 4.1

The C-Train Preset Counter [11] is triggered internally by the C-Train Start-Pulse STC indicating the start of a cycle, these pulses are PX.STC-MTG for CPS, BX.STC-MTG for PSB and HX.STC-MTG for LPI. The Start-Pulse is automatically related to the selected Machine chosen with the Machine Select switch [1] but is independent of the selected Group [2] or Line [5]. There will be a C-Train output pulse for every cycle of the chosen Machine. The Preset switches allow the choice of a delay in msec for the C-Train output after the STC has been received (max. 99.999msec). The C-Train output is a 1 usec TTL^{bar} pulse and is indicated on the front panel by a LED next to the LEMO output.

To create a trigger conditioned by PLS data, use the Selection Match gated TTL^{bar} in/output [6] in combination with the C-Train output [11]. This will be discussed in detail on page 15 "How to create a trigger-pulse".

If necessary, a Start-Pulse other than the STC can be chosen by changing the settings of the specific DIP switches on the PCB. This is NOT a normal operation, and, if required, a detailed explanation can be found in the PLS-SU Specialist Manual (PS/OP technical note 97-54) under "How to change the C-Train Counter start-pulse".

5. The In- and Outputs:

On the rear panel of the PLS-SU there are two important connectors, the 220 Volts power [16] and the famous MTG cable (canon 9 pins) [12]. Furthermore, there are several LEMO connectors on the back as well as on the front panel: Selection Match TTL and TTL^{bar} [7 & 14], Relay and TTL^{bar} logic [6 & 13] and C-Train out [11 & 15]. An acoustic signal can be given by the Buzzer [10].

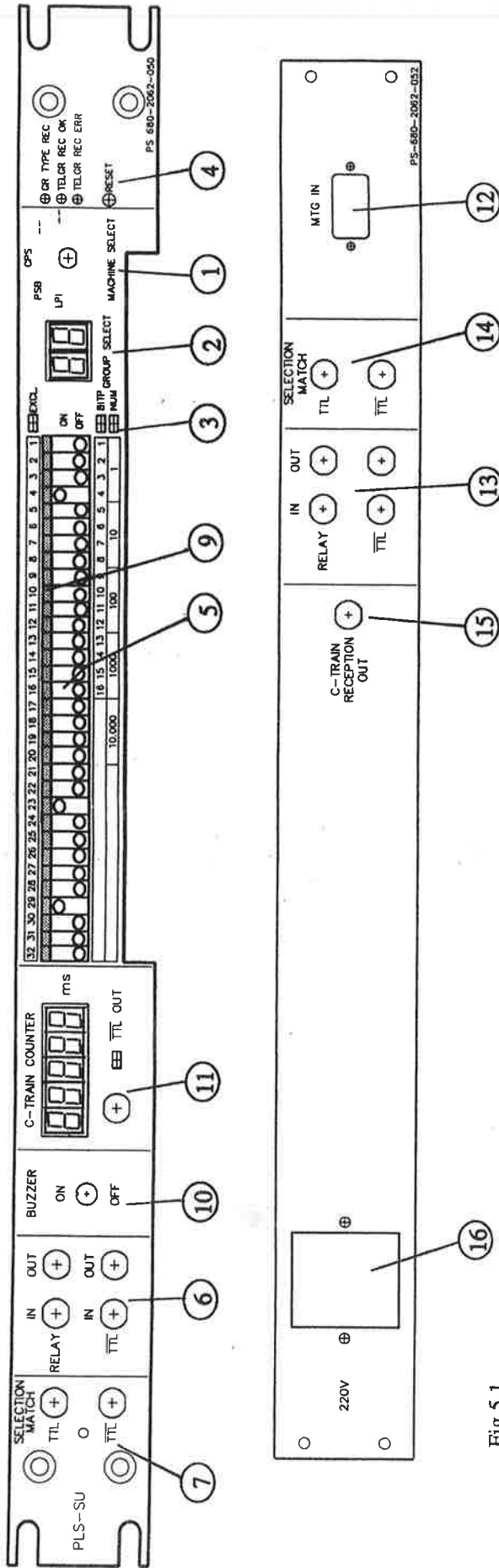


Fig 5.1

5.1 The Selection Match [7 & 14]

On both front and back panels we find the Selection Match TTL (50 Ohm) and TTL^{bar} outputs [7 & 14]. On the front panel they are accompanied by an indication LED that tells us visually when a selection match is true. A selection match is true only if the selected Line [5] is equal to the received line [9] of the selected Group [2] of the chosen Machine [1]. A detailed explanation on how to select a line can be found on page 6 under 3. "How to select a Line".

5.2 The Buzzer [10]

The Buzzer [10], when switched on, gives a short "beep" at the moment that a Selection Match becomes true. For example, if at Ready-PLS, the Machine, Group and Line of a valid Telegram correspond to the selected, then a beep will sound. The buzzer is useful in cases where it is not possible to watch the LED's for Selection Match.

5.3 The Relay and TTL^{bar} in/out [6 & 13]

On both the front and the back panel we find, next to the Selection Match output, a Relay in/out and TTL^{bar} in/out LEMO connectors [6 & 13]. These input gates are conditioned by the Selection Match.

For the Relay gate, the relay stays closed while Selection Match is true, and so there is a galvanic connection between Relay in and out. **The relay is a Celduc D31A3240 with a maximum voltage of 100V and current of 250mA.**

The input for the TTL^{bar} in/out is always TTL^{bar} logic, where the output can be configured as TTL^{bar} or as TTL 50 Ohm. Front and back panel outputs are configured individually on the PCB by jumpers. **The standard output installation is TTL^{bar}.** Information will be added next to the output in case it has been set to TTL 50 Ohm. A detailed explanation can be found in the PLS-SU Specialist Manual (PS/OP technical note 97-54) under "TTL 50 Ohm option".

5.4 The C-Train out [11]

The C-Train output [11] is a 1usec TTL^{bar} pulse that arrives every cycle of the chosen Machine [1] and can be found on the front and back panels. A LED can be found on the front panel indicating the presence of this signal. The Preset switches allow the selection of the delay, in msec, for the C-Train out, after reception of the STC for the selected Machine.

6. How to create a conditioned C-Train pulse

To create a conditioned C-Train pulse in a particular cycle one has to use the TTL^{bar} in/out [6] in combination with the C-Train output [11].

By selecting a Line one can choose the PLS condition to trigger on (see page 6, "How to select a Line"). With the Preset switches one can set the delay in msec for the C-Train output pulse after the Start Pulse STC arrived (see page 12, "The C-Train Preset Counter").

By using the C-Train out as input for the gated TTL^{bar} in/out you will be able to create a 1 usec trigger-pulse at x msec in the selected cycle.

The output of this TTL^{bar} gate can be either TTL^{bar} or TTL 50 Ohm depending on the position of the appropriate jumper on the PCB. **The standard output installation is TTL^{bar}**. Information will be added next to the output in case it has been set to TTL 50 Ohm. A detailed explanation can be found in the PLS-SU Specialist Manual (PS/OP techn. note 97-54) under "TTL 50 Ohm option".

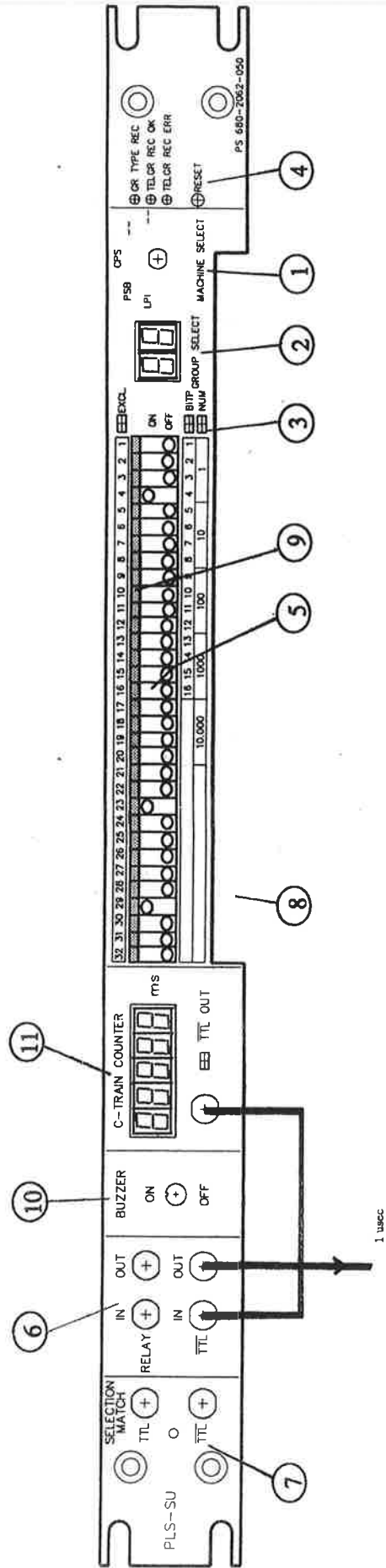


Fig. 6.1

The in- and output signal behavior:
 (C-train Out is input for the gated TTL^{bar})

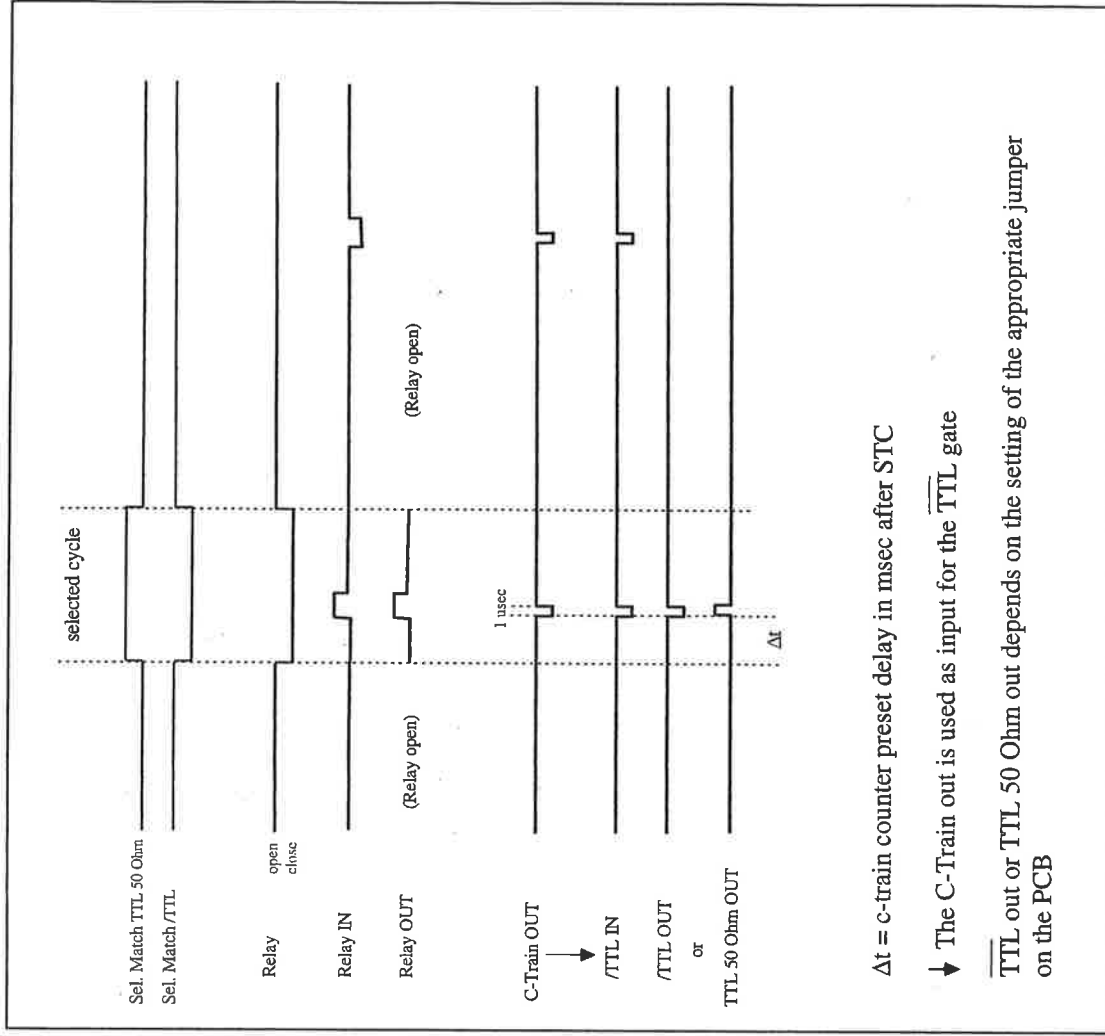


Fig. 6.2

6.1 Example on how to select a line and to create a trigger-pulse

If, for example, you want to trigger your scope, or another instrument, at 35 msec after start of the CPS SFTPRO cycle, you can apply the following procedure:

Like described before in "How to select a Line" the Machine can be selected by using the 5 position switch [1]. With the decade-switches [2] the Group can be chosen and with the Line Switches [5] the Group Value. In the drawer [8] of the PLS-SU one can find a sheet with information-tables on the Lines in the Machine Telegrams. In this example you look at the CPS Machine so the Machine switch [1] should be on position "CPS". The decade-switches [2] should be on "01" since SFTPRO is a member of the Group "USER" which has group-number "1". Switch "6" of the Line Switches [5] should be on the position "ON" so the SFTPRO cycle, which has group-value "6", is selected.

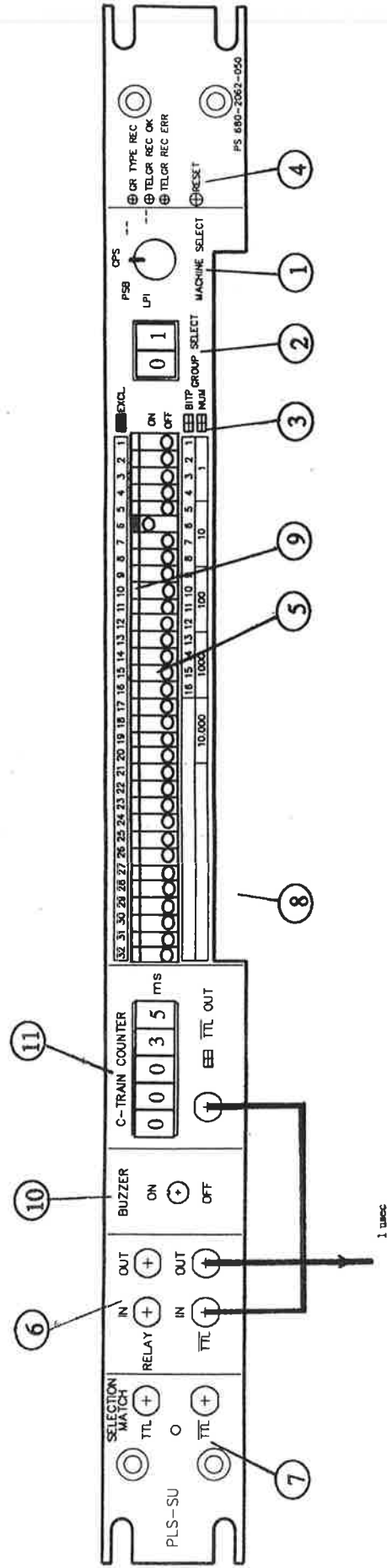


Fig. 6.3

Since you want to have a trigger-pulse at 35 msec after start of the CPS SFTPRO cycle the decade switches of the C-Train Preset Counter [11] should be set to "00035" and the 1 usec pulse C-Train Out should be connected to the gated TTL^{bar}-in. Like this you will find a trigger-pulse of 1 usec at 35 msec after start of the SFTPRO cycle on the TTL^{bar}-out Lemo. The TTL^{bar}-out can also be configured as TTL-out 50 Ohm depending on the position of the appropriate jumper on the PCB. A detailed explanation can be found in the PLS-SU Specialist Manual (PS/OP techn. note 97-54) under "TTL 50 Ohm option".