ESO - La Silla

ESO 360 TCS UPGRADE

Engineering Panel
ELC Team Proposal

TECHNICAL DOCUMENT

3p6-PLA-ESO-60400-1

DRAFT

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Table of Contents

1. INTRODUCTION

The new VLT-TCS will usually be operated by the users via graphic interfaces, by this way the computer will be executing commands to the remote hardware drivers; nevertheless the system hardware should provide an alternative command control for manual or 'Engineering mode'. For that, the control panel shall have the possibility to switch all the telescope auxiliary functions (AF's) from computer control to manual mode.

The purpose of this document is to highlight the convenience to be able to operate the AF's in Engineering mode, which will be very useful in case of problems troubleshooting, or control in manual mode.

We would thank the officers in charge of the telescope operations, the 3p6 technical staff and the 360 Team in general, for their contribution respect to this document.

2. CURRENT SYSTEM

Today the telescope AF's may be commanded from a similar panel, one problem is the obsolete documentation of the old part and the amount of unused hardware that we will carry with the new VLT-TCS if this part is not removed.

Due to that the control interfaces have been upgraded from RIOS to VME-LCU's, practically the whole RIOS peripheries will be dismissed. Since the current control is interconnected to RIOS and is part of the racks, it will not be possible to eliminate the RIOS hardware without affecting the current AF's control.

2.1 DOCUMENTATION

The RIOS system has been partially modified during the upgrade to provide the required signals to the new VLT modules. These changes have not been properly documented due to:

-Time Lack, modifications exist in drafts mode.
-We don't have originals (just copies).
-Because of several simultaneous copies circulation in the past years, always the corrections were done in some of them (drifting from each other), now we may find differences at electronic drawings with the same denomination.
-Drawing's statuses don't correspond to the electric/electronics circuits.

-The existent drawing circuits are generic, without signal names. The same circuit board is used at several interfaces and the connections depend on the application. It is impossible to interpret the function without knowing what is really connected.

In front of the outlined situation, there are two alternatives:

1. To update the old documentation for a general overview of the current system, if we continue with both systems interconnected (VLT/RIOS TCS).

2. Upgrade completely the system, by replacing the old AF's control, and documenting the new unit.

2.2 INTERLOCK

The documentation status is uncertain, since we must to modify the chain at some points to provide an extra computer status signal to know, in case of interlock, where it was interrupted, first we must have a clear overview of the whole chain.
The current system status is working, the disadvantage is that there are no test points, and the schematics are generic: All the boards are identical, but the different signals connected to each one are not identified.

3. PROPOSAL

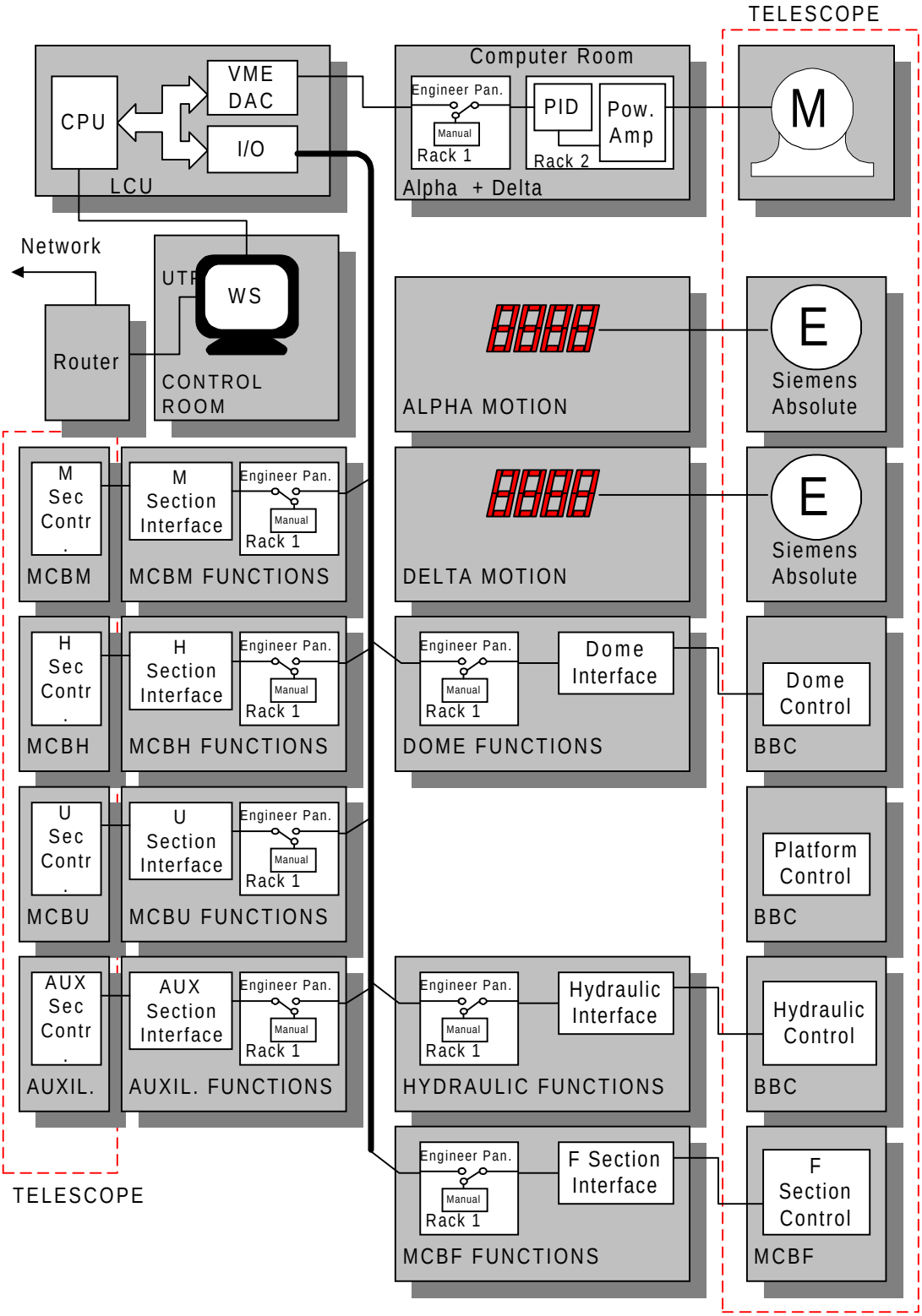
The new control offers the user the choice to switch the control from remote to manual mode, by which the functions will depend of the panel push buttons, and the panel layout will include only the available functions (currently we have several push-buttons from non existent functions).
As it was already pointed, the interlock chain documentation has to be compared with the wiring and functionality for documentation update, and the new required status.

3.1 HARDWARE

Considering upgrade goals, just the TCS computer peripheral drivers were replaced. The power stage, motor-amplifiers and power distribution continues being the same, if we remove the RIOS chassis, the PID pre amplifiers have to be relocated.
In principle the interlock-chain and protections will remain unchanged, except for security or VLT software compatibility where the logic may require changes at some segments.

4. NEW AUXILIARY FUNCTIONS CONTROL SYSTEM

4.1 GENERAL BLOCK DIAGRAM



4.2 DESCRIPTION

According the block diagram, the Engineering panel allows to select the control source, remote via computer or manual.
The manual mode enables the operator to control directly the different system parts. This mode is foreseen mainly for troubleshooting at engineering level to locate the failure area. It is assumed that the person who operates the telescope via engineering panel knows what he is doing, even if the interlock system protects limit conditions anyway.

It is foreseen to use industrial heavy duty luminous push buttons, which will signalize the respective limits.
The control-enable status will be shown by green LED's at the respective controls. As long as the signal enable is not present, the function is disabled by the interlock. In that case the user has to check the respective operations manual that will describe the possible interlock conditions (updated version of *3.6 m CONTROL MANUAL Part 1 & 2*).

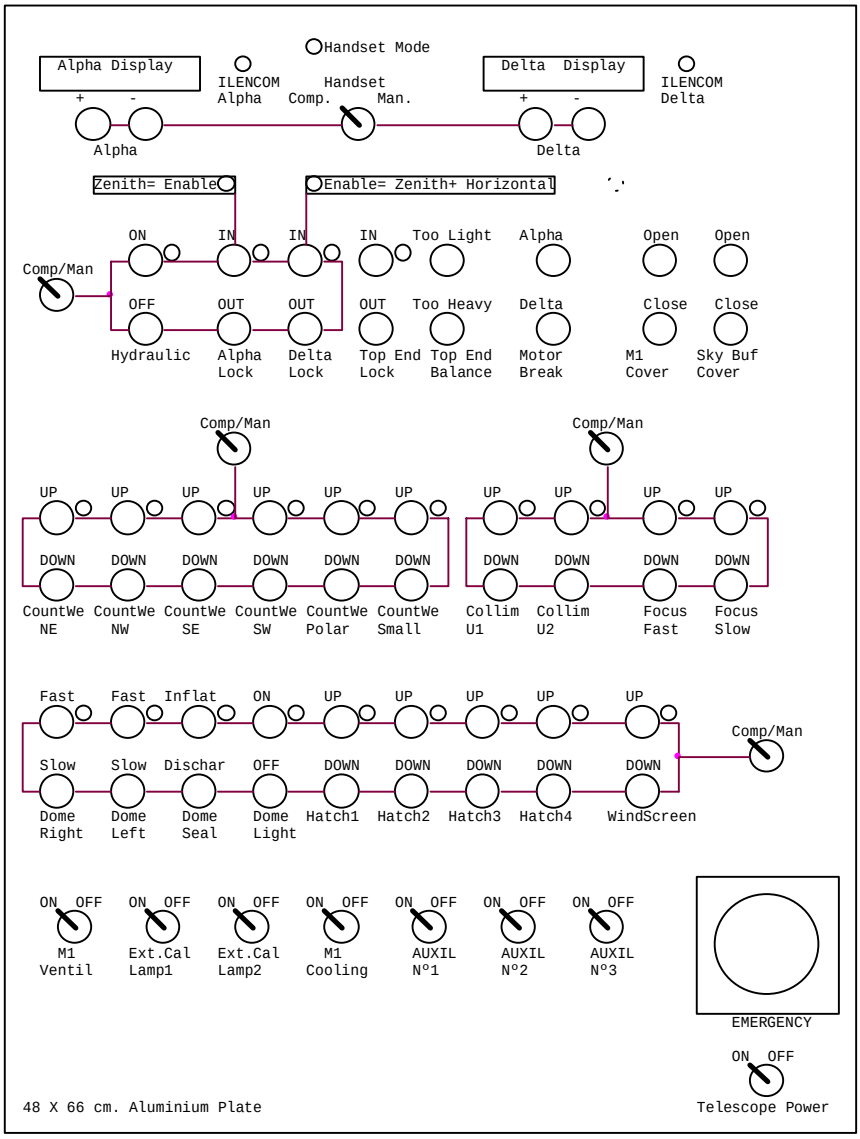
There are two interlock master signals at the top of the control panel 'ILENCOM', for Alpha and Delta respectively, which is the indication to the operator of some abnormal condition.

The speed for manual mode is preset internally, the reference voltage is delivered to the pre amplifiers. The selector switch at the engineering panel allows the user to choose between computer, manual or handset.

A four-digit display, from an absolute encoder, will show permanently the telescope position for both axes.

The engineering panel layout has been designed associating and grouping the functions for the user according to operational requirements, without relation to the place where the electric/electronic control may be located.

4.3 ENGINEERING PANEL LAYOUT



All the AF's controls will be activated by relay logic. The relays will be mounted in the rack backside on respective rails; each relay will have an LED, which will show the active status. Screws at terminal strips' will fix the connection wires.

All signals will be connected to terminal strips, without connectors (if possible) and the respective identification. This technique has given a good result in the NTT controls and also was used by the latest Garching designs. The main advantage is that simultaneously each connection is an identified test point for troubleshooting.

According to the experience the potential failure sources are bad or intermittent connections. Usually this type of failure is difficult to reproduce, difficult to locate and eradicate, and consequently it is the main reason for time lost at the telescopes.

The plug-in connectors should only be reserved for parts that are frequently exchanged. Permanent connections don't need this kind of connector. It is true that everything can fail and it should be easily replaceable, but between the possibility that precisely the plug is in fact the origin of fails, it is preferable to have connections with terminals strips where the wiring is fixed by screw.

5. TECHNICAL SPECIFICATIONS

5.1 Electric specifications

The push buttons are the usually industrial used for control, type Siemens (3SB32 21-0AA21). Illuminated with lamps of 24Vdc with a Ba 9s socket, the red color will indicate that a limit condition is present. A green LED near the respective push-button will indicate the enable status.

The Manual/Computer switch will be a Siemens type 3SB31 11 2KA21.

The MCB will work in remote mode when either engineering panel mode or LCU mode is active. The switch Computer/Manual will control a relay group that will make the corresponding selection. The relays will be Phoenix Contact UMK-8RELS/KSR-24/21-21.

One emergency switch type Siemens 3SB30 01 CA21. will be part of the Engineering Panel.