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1. INTRODUCTION

1.0 Purpose of document.
This document defines a logical, electrical, and functional interface standard for the ING telescopes that enables the seamless integration of detector controller subsystems to the common telescope data acquisition system (DJ). By establishing this interface, all developers of detector controller (CCDC) hardware and software who wish to use the ING DJ system are presented with a clear and concise definition of the capabilities of the system and the methods of using these capabilities.

1.1 Document version control.
The responsibility of document control is placed with the ING Software Group who are responsible for the strict change and version control of it. The generalized aim of version control is to assure that increasing minor version number changes will assure compatibility to all lower versions with the same major version number. The major version number will be used to designate a generalized area of use (e.g. autoguiders, science ccd’s, photon counters, etc.) or be used to indicate incompatibility with prior releases when compatibility cannot be achieved. It is recommended that the major version numbers between 90 and 99 be reserved for development and experimental use only. It would be most productive if version number compliance can be indicated in CCDC and DJ software version numbering. The ING Software Group also have the responsibility to provide interpretation of the document contents.

1.2 Scope of the document.

1.3 Who should read it and use it.
Anyone involved with the development and use of detector controllers for use on instrumentation supported by the ING. The ING provides a large portion of the infrastructure required to support observations on the telescopes, therefore, anyone who wants to make their instrument work reliably within that infrastructure is required to read and understand this document. Please refer to the ING Software Group for an interpretation of any specific wording in this document.
2. TECHNICAL REQUIREMENTS OF INTERFACE.

2.0 Logical requirements.

DETECTOR CONTROLLER IDENTIFICATION
   PHYSICAL TYPE OF CONTROLLER
   TYPE OF SERVICE
   ADDRESSING AND SELECTION OF CONTROLLER
   SCOPE AND VISIBILITY OF ADDRESS, SELECTION, IDENTIFICATION

DETECTOR IDENTIFICATION
   PHYSICAL DETECTOR TYPE
   DETECTOR READOUT MODE (SEQUENCER CODE) REQUIREMENTS
   DETECTOR ENVIRONMENT (BIAS VOLTAGES, TEMPERATURE, ETC.) REQUIREMENTS

IMAGE DATA CHANNEL IDENTIFICATION
   STORAGE REQUIREMENTS
   POST ACQUISITION PROCESSING REQUIREMENTS

2.1 Functional requirements.
The acquisition of an astronomical image involves the following processes:-
   detector stabilization
   detector reset
   shutter control
   image integration timing
   detector readout
   analog to digital conversion
   image data transfer
   post acquisition processes on image data
   collection of image descriptors
   formatting of image data and descriptors
   storage of formatted image file
   serving of image file to requesting clients
   error recovery
   synchronization of acquisition processes
The functional requirements and the distribution of the processes involved in acquiring an electronic image and storing it with sufficient detail of how it was acquired can be classified in the following way.

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<tr>
<th><strong>FUNCTIONAL CLASSIFICATION</strong></th>
<th><strong>DATA ACQUISITION PROCESSES</strong></th>
<th><strong>SUB SYSTEM RESPONSIBLE</strong></th>
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<td>detector controller</td>
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<tr>
<td></td>
<td>detector reset</td>
<td>detector controller</td>
</tr>
<tr>
<td></td>
<td>detector readout</td>
<td>detector controller</td>
</tr>
<tr>
<td></td>
<td>analog to digital conversion</td>
<td>detector controller</td>
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<tr>
<td>IMAGE INTEGRATION CONTROL</td>
<td>shutter control</td>
<td>detector controller</td>
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<tr>
<td></td>
<td>integration timing</td>
<td>detector controller</td>
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<td></td>
<td>preflash timing</td>
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<td>IMAGE DATA TRANSFER CONTROL</td>
<td>image data transmission</td>
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<td></td>
<td>image data reception</td>
<td>Data Junction</td>
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<td></td>
<td>image data error checking</td>
<td>Data Junction</td>
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<tr>
<td>POST ACQUISITION PROCESSING</td>
<td>image stitching</td>
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<td>image data normalization</td>
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<td>image data stacking</td>
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<td>IMAGE DESCRIPTOR COLLECTION</td>
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<td>timing descriptors</td>
<td>Data Junction</td>
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<td>Data Junction</td>
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<td></td>
<td>telescope descriptors</td>
<td>Data Junction</td>
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<tr>
<td></td>
<td>misc descriptors (eg. meteorology)</td>
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<td>FORMAT AND STORAGE CONTROL</td>
<td>formatting</td>
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<td>storage</td>
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<tr>
<td>IMAGE SERVING</td>
<td>client request processing</td>
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<tr>
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<td>image transmission</td>
<td>Data Junction</td>
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<td>ERROR RECOVERY</td>
<td>recovery of control</td>
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<td>recovery of data</td>
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<td>SYNCRONIZATION CONTROL</td>
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<td></td>
<td>status collection</td>
<td>Data Junction</td>
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</table>

2.2 **Physical requirements.**

2.3 **Capacity requirements.**