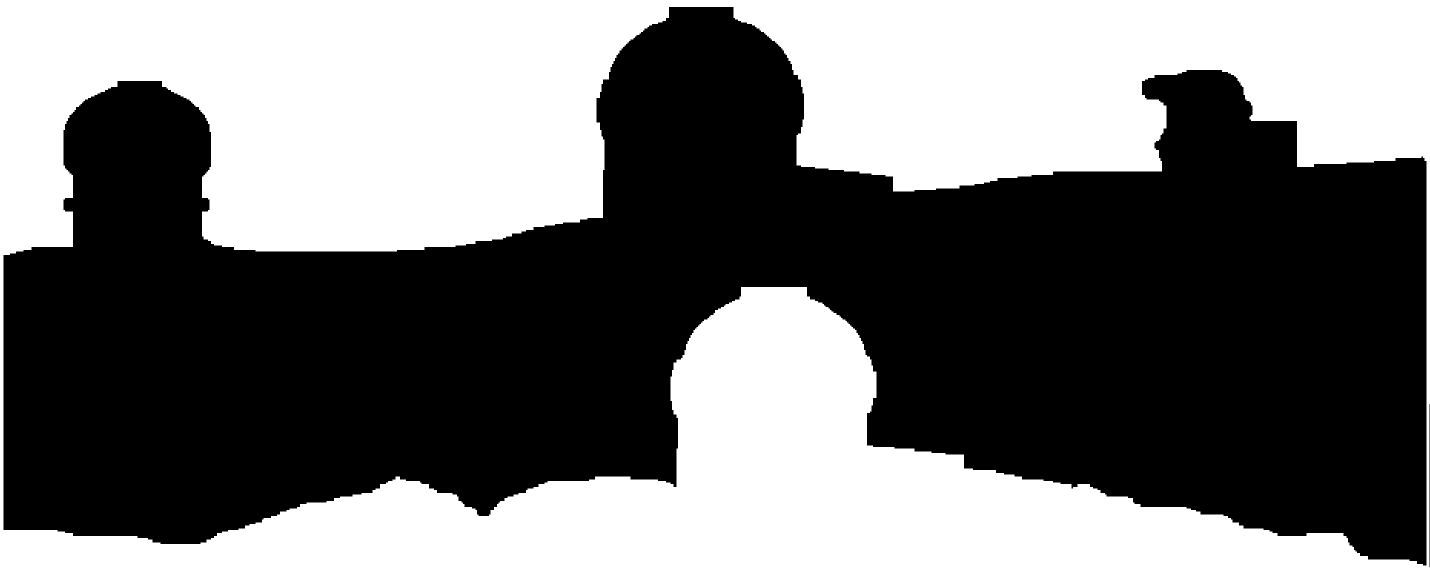
GEMINI
8-M Telescopes
Project

PG-S-G0002
Revision E1

Document/Drawing Control Plan



Ruth Kneale
Project Librarian, Systems Engineering

August 4, 1999

GEMINI PROJECT OFFICE 950 N. Cherry Ave. Tucson, Arizona 85719
Phone: (520) 318-8545 Fax: (520) 318-8590

Gemini Document/Drawing Control Plan
Approval Form

Revision E1
August 4, 1999

Program Manager: ______________________________
J. Oschmann

Systems Engineer: ______________________________
E. Hansen

Contents

1.0 Introduction

Gemini documents will be tracked and controlled by Systems Engineering under three general categories:

Gemini Project documents: reports, technical notes, specifications, etc.
Gemini Project Drawings: AutoCad generated, etc.
Gemini Project Interface Control Documents (ICDs)

The following are the guidelines to be followed for the purpose of tracking and archiving of these documents and drawings. Separate guidelines are given for documents and drawings in sections 2.0 and 3.0 respectively, and for ICD's in Section 4.0. Systems Engineering will assign document numbers and store/track completed documents and drawings.

Storage of released documents and drawings will include hard-copy and electronic files where ever possible. The electronic files will be archived as read-only files in one central location on the Novell network (currently the "H:\systems" drive) under the appropriate major subdirectories. The transfer of files to this location is described in section 5.0.

Released drawings and all documents will be tracked by systems engineering, but the numbering system applies to all items expected to be released at some time in the future. It is up to the responsible group manager and/or originator to determine when a particular document/drawing is at a stage for release and/or tracking by systems engineering. Reasonable suggestions for changes/additions to these procedures are always welcome. Please contact the Project Librarian or the Systems Engineer with any difficulties this system imposes.

2.0 Gemini Document Control

2.1 Document Number System

All Gemini Project documents will have a specific project document number. All documents will be classified according to: (1) type of document; (2) originating group; and (3) specific document number. All documents within each type, i.e., reports, specifications, etc. will be given a sequential number. A summary, with examples, is listed below.

Example: RPT-O-G0001

Document Types:

CON	Contractor Reports / Documents
GSC	Science Committee Meeting Materials
ICD	Interface Control Document
PG	Program Guidelines
REF	Reference Documents
REV	Review Materials
RPT	Reports
SPE	Specifications
SWG	Science Working Group Materials
TN	Technical Notes

Originating Group:

A	Administration
C	Controls
HR	Human Resources
I	Instrumentation
O	Optics
PM	Project Management
PS	Project Science
TE	Telescope/Enclosure
S	Systems
+	Contractor designation (*see below*)

2.1.1 Contractor Documents:

Contractor documents are reports of work done directly for Gemini by outside vendors.

Example: CON-COR-G0002

where COR=Corning; whatever vendor abbreviation is agreed upon, usually either the first three letters of the vendor name, or an accepted acronym.

2.1.2 Reference Documents:

Reference documents include any information that may be *indirectly* related to the Gemini Telescope, or not related at all, but that may contain worthwhile information. This includes newsletters, technical reports, and library reference books.

Example: REF-RGO-G0001

Where RGO=Royal Greenwich Observatory.

2.1.3 Document Numbering and Control

The Project Librarian in Systems Engineering will maintain a document log. A document number should be obtained as soon as it is determined by the author and Group Manager that a document will be written and released. At a minimum, the document number should appear on the front cover and title page of the report, technical note, specification, etc.

Inform the Project Librarian in Systems Engineering if a document is to be re-released at a different version under the original document number (for instance, an updated manual), and provide appropriate copies to the Project Librarian.

Whenever possible, a complete document in one electronic file is requested — for instance, combining tables, spreadsheets, text and illustrations in a word processing document. If this is not possible, then separate electronic files which make up the document will provided to the Project Librarian in Systems Engineering for archiving. At the same time, a hard copy of the document will be kept on file. *In all cases, avoid using a typewriter or cut and pasting information that will not appear in electronic format.*

Master electronic files of documents will be stored in read-only format on the H:\ drive of the Novell network under the subdirectory H:\\systems\document, in the following format:

H:\systems\document\AAA\BB\GXXXXCD.*

Where "AAA" refers to the type of document (see 2.1 above)
"BB" refers to the originating group (4 letters maximum)
"GXXXX" refers to the sequential number assigned by Systems Engineering
"C" refers to the version or revision *letter* (must use a *letter* for filename here even if version *number* is used on the document)
"D" refers to the document part number if the entire document can not be placed into one file.
"*" is the file extension (AmiPro, Word, text files, DWG files, etc.)

Systems Engineering will be able to update, add, and delete files. Section 5.0 describes how to send documents to Systems Engineering for archiving. A list of current documents can be found on the Intranet site under "Documents and Drawings".

3.0 Gemini Drawing Control

3.1 Drawing Formats and Standards

All drawings for manufacture will be drawn on the standard blank with all blocks filled in. The title block format may be obtained from the Project Librarian or the Systems Engineer. The drawings should also conform to the standards that apply to the type of drawing (mechanical, optical, etc.). These standards will be listed in the appropriate section of the Gemini design requirements document. Any exceptions to the standards should be clearly stated on the drawing.

All drawings should be identified with a unique number conforming to the system described below. A log of assigned numbers will be kept by the Project Librarian in Systems Engineering.

3.2 Drawing Number Format

All drawing numbers will be identified using the following format:

11-AA-2222-3333

"**11**" identifies the Primary Number, defined by the Gemini group, where:

83 is for Systems Engineering
85 is for the Optics Group
86 is for the Enclosure Group
87 is for the Telescope Group
88 is for the Controls Group
89 is for the Instrument Group
90 is for Interface Control Drawings

"**AA**" identifies the contractor that generated the drawing. Up to four letters may be used, i.e. GP for the Gemini Project, M3 for M3 Engineering, etc.

The secondary number "**2222**" represents the sub-tasks within each group. Each group manager is responsible for this breakdown. A list will be available in Systems Engineering and on the Intranet for tracking; if additional subtasks are needed, please notify the Project Librarian.

"**3333**" represents a unique identification number from 0001 to 9999. See Systems Engineering for a number if needed.

An example of a drawing number is given:

87-GP-0101-0001 -Telescope Group, Gemini Project drawing, Nasmyth Platform subtask, drawing number 1.

The breakdown of the various groups is given (under "2222") in Appendix A. This drawing number description list can also be found on the Intranet under "Documents and Drawings".

3.3 Archiving Drawings

Systems Engineering will not be keeping a master set of full size drawings (hard-copy). Instead drawings for control will be reduced to B size drawings and stored in ring binders. There will be a master copy (maintained by the Project Librarian) and a reference copy (maintained by the responsible group manager). The stamped master copy will not be available for general use. All information on the drawing must be readable on the B size drawings. Only released drawings will be maintained by Systems Engineering.

All released drawings must be filed on a master disc and stored in a designated area. Restricted access to these master discs will be necessary to prevent loss of files. Always ensure you have a printed copy of all completed drawings to enable the drawing to be redrawn in case of an emergency. All released drawings and subsequent revisions will be stored to disk (through the network wherever possible) and given to the Project Librarian. The files will be stored in a subdirectory using the first part of the drawing number as the path designation with the following format:

H:\DRAWINGS\11\2222\3333CD#.*

where "3333CD#" refers to the file name used in AutoCad and the assigned drawing number. The "C" refers to the drawing size (A, B, C, D, or E) and the "D" refers to the revision letter ("A" through "Z"). The “#” refers to the sheet number. The "*" is the default file extension for the originating software used (usually AutoCad). The equivalent international drawing sizes may be used on the drawings, but the final stored drawing file name will conform to the single letter ANSI standard to simplify the file name by one character. The relation of the two is (closest size):

A:A4
B:A3
C:A2
D:A1
E:A0

If a floppy disk is used to transfer data, it will be clearly marked with the intended path designation on the disk if the subdirectory structure is not used on the transfer disk. The master "released" subdirectory will have the complete subdirectory structure. Section 5.0 describes transfer of files for storage in this system.

All drawing numbers must be logged in a master drawing index which will be kept by the Project Librarian in System Engineering, who will issue all drawing numbers or blocks of numbers. This will prevent the same number being allocated to two drawings. If the Project Librarian is not present, see the System Engineer or the Project Secretary.

Each drawing should carry "used on drawing" numbers. The drawing number will not specifically identify whether it is a full assembly, subassembly or a part drawing.

Each drawing must carry the AutoCad file directory and file name. Only the drawing number is needed to fulfill this requirement if this system of storage is adhered to. If needed, the file directory and name should appear just under the drawing border near the lower right corner (along bottom). For any exceptions, information on the storage location and file name should be shown on the drawing.

Where several sheets are required for one drawing number, the drawings must be drawn on the same size sheets. They should be identified as "sheet 'x' of 'y' ". An exception may be made for attaching "A" size sheets for purpose of revision descriptions.

3.4 Drawing Control

Drawings ready for manufacture or release outside of the Gemini project staff for purposes such as quotations will be indicated by the appropriate group manager's signature in the stamped "Approved for Release" box. This signature indicates the drawing is ready for release, since it has completed the appropriate Gemini review procedures. The drawing is then passed to System Engineering for a signature in the "Approved for Release" box; this signature indicates that the drawing has been reviewed by Systems Engineering for compliance with Gemini review and approval procedures and is now under formal control. The Project Librarian will log the appropriate information in the drawing control database. A "B" size copy of the drawing and an electronic file (on the network or floppy disk appropriately marked) are to be supplied to Systems Engineering at this time for storage. **No drawings are to be released outside of the Gemini program without these signatures.** If no one is available in a timely manner in Systems Engineering, the responsible engineer/designer may initial the "release" box while leaving the requested information (drawing and file) in the appropriate systems engineering mail slot or at the appropriate desk (Project Librarian or System Engineer). A common area on the network will be available for electronic transfer of these files. If transferred electronically, Systems Engineering should be notified for proper logging of the drawing information. This may be done in person or by an electronic mail message with all of the appropriate information (location, drawing number, name, revision, size, 'used on' information, etc.).

Revision status should be shown on the drawings. Details of the revisions may be recorded in the revision block or on a separate sheet of the drawing. ***Interface Control Drawings*** are controlled as described in section 4.3.

4.0 Interface Control Documents

An Interface Control Document (ICD) is a document that defines any and all interfaces between two subsystems with descriptions, calculations, and drawings. Introductory ICDs are documents that describe a specific subsystem, and has all ICDs associated with that subsystem attached. Systems Engineering is responsible for tracking all ICDs and maintaining copy control procedures. Formats for ICDs are available on the Novell network, under H:\systems\document\icd\working\forms\.

4.1 ICD Numbering

Each subsystem is assigned a subsystem tracking number. Subsystem numbers are listed in Appendix B. ICDs are identified using the numbers of the two interacting subsystems, i.e.:

ICD A.B.C / X.Y.Z

where A.B.C. is the first subsystem identifier and X.Y.Z is the second. Up to three levels of subsystem identification may be used. Systems Engineering maintains an Interface Control Document Organization chart in the Systems and Documentation area that graphically shows the interactions between the subsystems.

4.2 ICD Database

The Project Librarian maintains a complete ICD database to track progress, release dates, copy control, and associated documents. Various reports, such as group responsibility listings, released ICD listings, or subsystem breakdowns are available through the database report section. This information is also available on Gemini's World Wide Web site, under "Interface Control Databases" accessible from the front page.

The database will be double-checked for accuracy periodically by the Project Librarian. Help is to be enlisted from the secretarial staff as needed for this check. At the end of each month, the summary for each group's Interface Control Documents will be sent to each Group Manager as requested.

In addition, a list of currently "controlled" ICD's will be compiled by the Project Librarian and sent to all technical staff with a cover note reminding all that changes must be documented and sent on to the Change Control Board (described in section 4.3).

4.3 ICD Tracking and Control

Release of Interface Control Documents and Drawings

For an original release of an Interface Control Document or Drawing, the Group Manager(s) or their designee along with Systems Engineering must sign a master hardcopy in the appropriate location. Systems Engineering will help circulate these documents to get concurrence and signatures from all involved. When not obvious, Systems Engineering will make the determination on which groups/individuals should sign. The time line for these released ICDs is by the Critical Design Review date of a subsystem on either side of the interface. Drafts should be circulated to the appropriate people far in advance. The people involved should judge the timeline needed to come to resolution in time for the CDR (or first prototype for software interfaces not going through a formal CDR phase). Experience suggests that not more than a few days should be allowed for final review and approval (or minds *will* change!).

If signatures are required (by the Group manager) from remote locations such as partner institutions or employees at remote sites, electronic transmission (email, FTP, fax) routing of the documents and drawings is encouraged. Faxed copies of signature pages and signed parts of drawings (showing Drawing title, number and revision) are also acceptable and encouraged to speed up the review and acceptance of these documents.

When an ICD is ready for release, an electronic file in the appropriate format is sent to the Project Librarian (see Section 5.0). The Project Librarian is responsible for attaching copies of the current associated drawings to the ICD and circulating it to the appropriate managers for signatures. Once signed off, an electronic copy of the ICD will be moved into a restricted-access subdirectory in read-only format, and the signed hard copy will be filed in the Systems area for future use. Any faxed signature pages will be filed with the master ICD or drawing.

All copies of signed and controlled ICDs will be stamped with a Copy Control stamp and identified. In the above-mentioned database, in the section for Copy Control, a list will be maintained of every individual to receive a copy of the ICD. As the ICD changes (whether it be through an associated drawing change or a change of information), the Project Librarian will be responsible for ensuring that all individuals on the Copy Control list receive updates. <u>Only</u> people listed in the Copy Control section will receive updates. The Group Managers should periodically review this list (for ICD's they are involved with) for completeness. Notify the Project Librarian of any additions you would like to see to this list. Once an Interface Control Document (or Interface Drawing) is under formal control (indicated by the first "signed off" version) the master is kept by systems engineering (both electronic and a master hard copy with signatures). Their originators should delete or appropriately mark any uncontrolled copies (electronic or paper) as "out of date". Future revisions ***must*** be made from the System Group master copies.

4.3.1 Change Control

To request a change in an ICD or ICD Drawing, a Change Request Form (sample shown in Appendix C) should be filled out clearly describing the desired change. These forms will be available from anyone in Systems Engineering or the project secretarial staff. Where possible, Systems Engineering will provide assistance in filling out these forms. The person requesting must provide a detailed description of the desired change to be made to the interface, which documents and drawings are affected, and reason for requesting the change including any appropriate backup documentation/calculations, etc. There will be a place to mark whether the Group Manager responsible for the request believes that the change effects only an interface to work within that Group's area of responsibility (and the ICD being changed previously only effected that one group), or if it may effect one of the interfaces to the other engineering groups. The approval process is slightly different for these two cases. These procedures are outlined in the following:

4.3.1.1 ICD and ICD drawing changes within one Group:

Group Manager reviews requested change
Approves/ rejects Change Request
If approved, passes copy of Change Request Form to Systems Engineering

Change is considered "approved" at this point

Systems Engineering will make the requested change in any ICD document.
ICD Drawings will be updated by Systems Engineering or Group Responsible (upon mutual agreement)
Sign-off Change Request Form
Sign-off revised ICD
File masters (electronic and hard copy)
File Change Request Form with ICD master hardcopy
- Send copies to the Change Control Board "for information"
- Maintain Change Request Form File for Change Control Board
Update Database
Circulate revised ICD to people affected (as listed in database)

Note: Revised ICD does *not* require group managers signature.

4.3.1.2 ICD and ICD drawing changes between Groups:

Change Request Form Circulated by Systems or Group seeking change
- Groups affected
- Systems Engineering
Group Managers involved and Systems Engineering review requested change
All must approve Change Request Form for change to take effect.

Change is considered "approved" at this point

Systems Engineering will make the requested change in any ICD

Sign-off revised ICD (or drawing)
File masters (electronic and hard copy)
File Change Request Form with ICD master hardcopy
- Send copies to the Change Control Board "for information"

- Maintain Change Request Form File for Change Control Board

Update Database

Circulate revised ICD to people affected (as listed in database).

Note: Revised ICD does *not* require group managers signature.

4.3.2 Conflict Resolution:

In the advent that a requested change is rejected and the originator believes that this unacceptable (and no resolution is found leading to an acceptable Change Request), the originator may appeal this to the Change Control Board (described in section 4.3.3).

- For this case, *the change is not accepted* unless the Change Control Board approves.

In the same manner, if a change approved is unacceptable to someone not in the approval loop and the conflict cannot be resolved, an appeal may be made to the Change Control Board. An example here may be that an interface within a group was changed and approved by the Group Manager, but Systems Engineering believes this was a mistake (and the Group Manager disagrees), Systems Engineering may appeal to the Change Control Board.

-In this case, the *change stands as approved* unless the Change Control Board overturns the approval.

4.3.3 Change Control Board

The Change Control Board exists to help monitor changes made to interfaces within the Gemini Project. For most of the changes described above, this is simply a periodic review of the interface changes that have been approved since the last meeting. It is simply a secondary check after the fact that the changes seem reasonable and serves to help ensure communications among the groups, keeping all up to date on changes.

The Change Control Board is made up of the following:

Project Manager
Project Scientist
Head of Instrumentation
Systems Engineering Manager
Mechanical Systems Engineer
Electronic Systems Engineer
Optics Group Manager
Controls Group Manger

Four from the above list must be present. One must be from Systems Engineering; the meeting is chaired by Systems Engineering

Meetings are scheduled once per month. They should normally be a fast, regular meeting simply noting changes that have occurred. A list of all the changes that have been approved (in a given month) are to be sent out to all Change Control Board members (by the Project Librarian). Any conflicts resolved require Chair and Project Manager signatures on updated Change Request Form or ICD being approved.

Minutes will be taken and distributed by secretarial staff or the Project Librarian, depending upon availability.

On occasion, the Change Control Board serves as the mechanism for conflict resolution when agreement on Interface Control Documents and Drawings and changes to them can not be agreed in a timely manner. The following examples list possible conflicts for the Change Control Board to consider and rule on:

1. ICD or drawing cannot be agreed to prior to issue of a contract on one side of an interface and deemed important by one party involved. Person/group wishing ICD to be approved must prepare and distribute ICD/drawing in advance of Change Control Board Meeting for consideration.
2. ICD Change Request approved that someone wishes to appeal.
3. Rejected ICD Change Request that originator wishes to appeal.

5.0 Data Transfer

In addition to transferring information by hand to Systems Engineering, the network will be set up with a restricted access transfer subdirectory for documents and drawings, and a directory for working ICD files. Currently, these directories are:

H:\transfer\document*name*
H:\transfer\dwg*name*
H:\systems\document\ICD\working

where *name* refers to the person originating the document or drawing. For drawings, within this identified *name* directory, normal drawing number procedures can apply; even if a person is working on drawings from separate primary and secondary number identifiers, once the Project Librarian is notified, those drawings will be moved out of the transfer directory into the appropriate H:\drawings directory. If a subdirectory does not exist with your name and you need to transfer documents or drawings, see either the Project Librarian or the Project Computer Coordinator to have a subdirectory set up. In addition to the transfer directory on the LAN, e-mailed files are also acceptable, as are notifications of FTP locations. Since the shared LANs between the Hilo and Tucson offices has been set up, copying files into the above locations should not be a problem. If it is, notify the Project Librarian, describe the problem, and list an alternate location that the document or drawing can be found.

Once the file of interest is stored in one of these temporary areas, notify Systems Engineering in person, by note or electronic mail with the information requested about the file (see sections 2.0 and 3.0). If the file is from a non-Tucson location, the Project Librarian will print a hard-copy of the document/drawing, to be supplied to Systems Engineering at the same time. The file will then be transferred to the permanent storage area once properly logged in the database. Currently this storage area is designated on the "H:" drive under the appropriate subdirectory as previously described. This area will be accessible to the Project Librarian and a designated backup.

For ICDs, when the ICD is ready for control procedures (see Section 4.0) notify Systems Engineering of the working file name. A copy will be archived in a restricted area as a "read-only" file; a copy will be left in the working directory to use as a base for the next revision.

Copies of all the latest released ICDs, both general and specific, are also available through the project's internal web site, in the Metadata/Library section. These copies can be downloaded by staff at any time; if an official copy with signatures is needed, contact the Project Librarian.

Appendix A

Drawing Number Descriptions

11-AA-2222-3333

The "2222" part of the drawing numbers are to be broken down into the following categories:

Primary Number 83

0000	Systems engineering - general
1000	Cable Ports
2000	Electrical Schematics
3000	Mechanical Drawings

Primary Number 85

0000	Optics - general
1000	General
2000	Primary Mirror Assembly
2100	Primary Mirror Lifting Fixture
2200	Primary Thermal Control
2500	Telas Cell Structure Drawings
3000	f/16 Secondary Mirror Module Assembly
3100	f/16 Secondary Mirror Tip-Tilt System
3101	Lockheed M2 Tilt System Drawings
3200	f/16 Secondary Mirror
3300	Deployable Secondary Baffle
3301	Leaf Prototype, M2 Deployable Baffle
3400	M2 Positioning System Drawings
3500	M2 Central Hole Cover
3600	Anti-Rotation Mechanism, M2 Assembly
3700	M2 Assembly Lifting Equipment
3800	M2 Electrical
3900	M2 Assembly Tooling
4000	Large Secondary Mirror Assembly
6000	Wide Field f/6 Corrector Assembly
7000	Narrow Field f/6 Corrector Assemblies
8000	Optics Accessories (Scaffolding etc)

Primary Number 86

0000	Enclosure - general

0100	Mauna Kea Site Plan
0200	Mauna Kea Construction Sequence
0300	Cerro Pachon Site drawings
0400	Site data measurements and laboratory tests - general
0402	Mauna Kea Site - 1992
0403	Mauna Kea Site - 1993
0404	Mauna Kea Site - 1994
0412	Cerro Pachon Site - 1992
0413	Cerro Pachon Site - 1993
0414	Cerro Pachon Site - 1994
0420	Candidate enclosure shapes
0430	Mauna Kea Geophysical survey grid
0431	Cerro Pachon, Topographical map
0440	Enclosure water tunnel model
0500	Hale Pohaku - General
0502	PDR Drawings
05A0	Hale Pohaku - Architectural Drawings
05C0	Hale Pohaku - Civil Drawings
05E0	Hale Pohaku - Electrical Drawings
05M0	Hale Pohaku - Mechanical Drawings
05S0	Hale Pohaku - Structural Drawings
05T0	Hale Pohaku - Title Drawings
0600	Mauna Kea Site - Utilities relocation construction documents (General)
0700	Enclosure design development drawings (General)
0710	Functional design requirements (Support Facility)
0720	Provisional design review (Enclosure)
0730	Functional Design review (Enclosure)
0800	Mauna Kea Enclosure construction documents (General)
08A0	Mauna Kea Enclosure - Architectural drawing
08B0	Mauna Kea Enclosure - Support bogies (if separate)
08E0	Mauna Kea Enclosure - Electrical drawings
08M0	Mauna Kea Enclosure -Mechanical drawings
08S0	Mauna Kea Enclosure -Structural drawings
0900	Cerro Pachon Enclosure construction documents - (General)
09A0	Cerro Pachon Enclosure - Architectural drawing
09B0	Cerro Pachon Enclosure - Support Bogies (if separate)
09E0	Cerro Pachon Enclosure - Electrical drawings
09M0	Cerro Pachon Enclosure - Mechanical drawings
09S0	Cerro Pachon Enclosure - Structural drawings
1150	Foundation - General
1200	Mauna Kea support facility, base and site work - Construction drawings
12A0	Mauna Kea support facility, base and site work - Architectural drawings
12C0	Mauna Kea support facility, base and site work - Civil drawings
12E0	Mauna Kea support facility, base and site work - Electrical drawings
12F0	Mauna Kea support facility, base and site work - Fire protection drawings

12G0	Mauna Kea support facility, base and site work - Cover sheet and general drawings
12M0	Mauna Kea support facility, base and site work - Mechanical drawings
12P0	Mauna Kea support facility, base and site work - Pipe work drawings
12S0	Mauna Kea support facility, base and site work - Structural drawings
1300	Cerro Pachon support facility, base and site work - Construction drawings
13A0	Cerro Pachon support facility, base and site work - Architectural drawings
13C0	Cerro Pachon support facility, base and site work - Civil drawings
13E0	Cerro Pachon support facility, base and site work - Electrical drawings
13F0	Cerro Pachon support facility, base and site work - Fire protection drawings
13M0	Cerro Pachon support facility, base and site work - Mechanical drawings
13P0	Cerro Pachon support facility, base and site work - Pipe work drawings
13S0	Cerro Pachon support facility, base and site work - Structural drawings
1400	Cerro Pachon Road Construction Documents - General
1500	Cerro Pachon Generator Bldg. Construction Documents - General
15A0	Cerro Pachon Generator Bldg. Construction Documents - Architectural Drawings
15C0	Cerro Pachon Generator Bldg. Construction Documents - Civil Drawings
15E0	Cerro Pachon Generator Bldg. Construction Documents - Electrical Drawings
15M0	Cerro Pachon Generator Bldg. Construction Documents - Mechanical Drawings
15S0	Cerro Pachon Generator Bldg. Construction Documents - Structural Drawings
1600	Cerro Pachon Cafeteria, Kitchen, Dormitories Construction Documents - General
16A0	Cerro Pachon Cafeteria, Kitchen, Dormitories Construction Documents - Architectural
16C0	Cerro Pachon Cafeteria, Kitchen, Dormitories Construction Documents - Civil
16E0	Cerro Pachon Cafeteria, Kitchen, Dormitories Construction Documents - Electrical
16M0	Cerro Pachon Cafeteria, Kitchen, Dormitories Construction Documents - Mechanical
16S0	Cerro Pachon Cafeteria, Kitchen, Dormitories Construction Documents - Structural
1700	Cerro Pachon Power Construction Documents - General
1800	Cerro Pachon Water Construction Documents - General
1900	La Serena Construction Offices and Laboratories Construction Documents - General
19A0	La Serena Construction Offices and Laboratories Construction Documents - Arichitectural
19C0	La Serena Construction Offices and Laboratories Construction Documents - Civil
19E0	La Serena Construction Offices and Laboratories Construction Documents - Electrical
19M0	La Serena Construction Offices and Laboratories Construction Documents - Mechanical
19S0	La Serena Construction Offices and Laboratories Construction Documents - Structural Drawings
2000	24" Planetary Patrol Telescope
3000	Coating Plant
4000	Enclosure base foundation survey, MK
5000	Coast Steel Fabricator drawings (General)
5100	Coast Steel drawings – Mauna Kea
5200	Coast Steel drawings – Cerro Pachon

Primary Number **87**

0000	Telescope Assembly - General
0100	Mount - general
0101	Mount Frame
0102	Access Platforms, Railings, Cassegrain Flooring
0200	Tube - General
0201	Center Section and Trunnions
0202	Altitude Disks
0203	Altitude Drive Rings
0204	Main Trusses
0205	Truss Ring
0206	f/6 Top End
0207	f/16 Top End
0208	Top End Location and Latching
0209	Secondary Mirror Support Vanes, Tensioning System
0210	Mirror Cell Support Frame
0211	Altitude Brake Rotor
0212	Top End Vane Assembly
0300	Azimuth Track - General
0301	Track
0302	Transportation, Lifting Jigs
0303	Installation Template Jig
0304	Azimuth Drive Ring
0305	Azimuth Brake Rotor
0400	Bearings - General
0401	Azimuth Bearings
0402	Altitude Bearings
0403	Hydraulic Supply, Cooling, Return Systems
0500	Drives - General
0501	Azimuth Drives
0502	Altitude Drives
0503	Azimuth Limit Switch Assembly
0504	Altitude Limit Switch Assembly
0600	Encoders - General
0601	FDE Test Rig
0602	FDE Disk Guided Mount
0603	Azimuth Encoders
0604	Altitude Encoders
0605	Friction Driven Encoders
0606	Azimuth Tachometer Mount Assembly
0700	Brakes, Stops - General
0701	Azimuth Brakes, Locking Pins
0702	Azimuth Emergency Stops, Seismic Pads
0703	Altitude Brakes, Locking Pins
0704	Altitude Emergency Stops, Seismic Pads

0800	Balance System - General
0900	Mirror Covers - General
1000	Cable Transfer - General
1001	Azimuth Cable Twister
1002	Altitude Cable Wrap
1003	Cable Guides, Break Panels
1100	Baffles - General
1200	Telescope Components
1300	Primary Mirror Cell Cart Test Frame Assembly
2070	Latching Mechanisms
4000	Azimuth General Assembly
4020	Azimuth Brake Assembly
4030	Azimuth Over Travel Stops
4100	Thermal Control System - General
4200	Handling, Installation and Maintenance Equipment - General
4201	Primary Mirror Handling Equipment
4202	Top End Handling Equipment
4203	Telescope Component Handling & Transportation Equipment
4300	Safety Interlocks - General
4400	Laser launch Telescope Path
5000	Altitude General Assembly
5010	Altitude Drive Assembly
5015	Altitude Manual Drive & Thermal Box
5020	Altitude Brake Assembly
5030	Altitude Over Travel Stop Assembly
5050	Altitude Locking Pin Assembly
5060	Altitude Moving Counterbalance Assembly
5070	Altitude Bearing Jacking Assembly
5080	OSS Assembly MCSF Pin Lifting Mechanism
6000	Factory Test Program - General
6001	Telescope Dimensions
6010	Handling Cart
6100	Installation - General
6101	Azimuth Track
6102	Mount Assembly
6103	OSS Assembly
6104	Drives
6105	Bearings
6202	Mount Fabrication Pre-Assembly
6203	Factory Pre-Assembly
7000	Interface Control Drawings
8000	Telescope Assembly – Reference
9000	Telescope Wire Routings

Primary Number **88**

0000	Controls - general
1000	Hydrostatic Bearing Control
1100	HBS Placement
2000	Interlock System
3000	Secondary Control System
4000	Enclosure Control System
5000	Primary Mirror Control System
6000	Plant Room Control System
7000	Mount Control System
8000	Cassegrain Rotator Control System
9000	Platform Lift Control System

Primary Number 89

0000	Instrumentation - general
1000	Cable Wrap
2000	A&G
2100	A&G WFS
3000	AO
4000	Science Instruments - General
4100	NIRI
4110	NIRI Array Controller
4200	NIRS
4210	NIRS Array Controller
4300	HROS
4400	GMOS
4410	GMOS CCD Controller
4500	MIRI
4600	Michelle
4700	COB
4800	Phoenix
4900	QUIRC Camera
5000	Calibration Unit
6000	Zeiss - General
6100	Gemini System
6200	Support Structures, Rotary Tables, & Probe Arms
6300	HRWFS/AC unit
6400	Science Fold Unit
6500	Test & Handling Equipment
6600	Electronics

Primary Number 90

0000	Interface Control - general

0001	Telescope contract
0002	Primary mirror cell and related components
0003	Secondary mirror system and related components
0004	Optical Alignment Equipment
0005	Primary Mirror Lifting Fixture
0006	Coating Facility
0007	Instrumentation

Appendix B

Subsystem Identification Numbers

Note: The single-level subsystem identifiers (italicized) are purely for major system identification, and are not used in ICD identification.

1.0	*Telescope System*
1.1	Telescope Assembly
1.1.1	Telescope Structure, Drives, and Brakes
1.1.2	Encoders
1.1.3	Hydrostatic Bearings
1.1.4	Secondary Vanes
1.1.5	Azimuth Track
1.1.8	Alt. Cable Wrap
1.1.9	Az. Cable Wrap
1.1.10	Primary Mirror Covers
1.1.11	Telescope Control
1.1.12	Mount Control
1.1.13	Interlock System
1.1.14	Bearing Control
1.1.15	Laser Launch Telescope
1.2	M1 Assembly
1.2.1	M1 Cell Structure
1.2.2	M1 Support System
1.2.3	M1 Mirror
1.2.4	Radiation Plate System
1.2.5	Surface Heating
1.2.7	M1 Baffle Assembly
1.2.9	AtmDC
1.2.10	M1 Control
1.3	Prime Focus WFS
1.4	M2 Assembly
1.4.1	Positioning and Baffles
1.4.2	Tip/Tilt System
1.4.3	M2 Mirror
1.4.4	M2 Control System
1.4.5	M2 Handling Fixture
1.5	CR/ISS
1.5.1	Cassegrain Rotator
1.5.3	Instrument Support Structure
1.5.4	Cassegrain Rotator Control System
1.6	A&G System

1.6.1	A&G Components
1.6.2	WFS and Acquisition Camera
1.6.3	WFS Controllers
1.7	Calibration Unit
1.8	Adaptive Optics
1.8.1	AO Components
1.8.2	AO Wavefront Sensor
1.8.3	AO WFS Controller
1.8.4	AO Components Controller
1.8.5	AO Sequencer
1.9	Science Instruments
1.9.1	Instrument Components
1.9.2	Detector
1.9.3	Detector Controller
1.9.4	Instrument Components Controller
1.9.5	Instrument Sequencer
1.9.6	Instrument Handling
1.10	On-Instrument WFS
1.10.1	OIWFS Feed Optics
1.10.2	OIWFS Camera/Controller
1.11	Telescope Miscellaneous
1.12	Polarimetry Unit
2.0	*Enclosure*
2.1	Enclosure Carousel System
2.1.1	Enclosure Carousel
2.1.2	Platform Lift
2.1.3	Enclosure Control
2.2	Enclosure Base
2.3	Coating Chamber
2.4	Cleaning Facilities and Cart
2.5	Mirror Lifting Fixture
2.6	In-Situ Mirror Cleaning
2.7	Cass Handling Rig
2.8	Top End Cart
2.9	M1 Mirror Cell Cart
3.0	*Support Facilities*
3.1	Observatory Control (Control Room)
3.2	Data Handling (Control Room)
3.3	Plant Equipment
3.4	Plant Room Controller
3.5	Instrument Labs
3.6	System Services
3.7	Thermal Enclosures
3.10	Thermal Air Flow
3.12	Beam Feed to Pier Lab

3.13	Laser Delivery System
3.14	SF Communications
3.15	Site Electrical Power
3.17	Support Facility Foundations
3.18	Helium Compressors
3.19	Helium Chiller
3.20	Optics Chiller
4.0	*Sea Level Facilities*
4.1	SL Building
4.2	SL Communications

Appendix C

GEMINI INTERFACE CONTROL DOCUMENT CHANGE CONTROL FORM

Interface Control Document:
Person Requesting Change: *Date:*

1. Describe change to Interface Control Document. (Attach additional sheets as required.)

2. Reason for change: (Check appropriate categories.)
   Clarification Additional information Change Appeal to CCB

3. Do referenced drawings need to be revised?
   No. Yes. (If yes, list drawings and attach "red lines" or new revisions.)

4. Will change affect other groups?
   No. Yes. If yes, who? ____

Approval:

<u>If "No" to Item 4, only one Group Manager's signature is required.</u>

Group Manager: __________________________ Group Manager: ______________________
Systems Engineering: ______________________ Project Manager: _____________________
(Required for appeals/conflict approval)

cc: Change Control Board