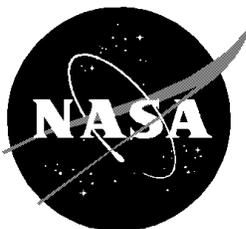


Payload Operations Control Center Annex MCC/JSC POCC/Remote POCC Interface Requirements

Payload Integration Plan

August 2003



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

DESCRIPTION OF CHANGES TO
PAYLOAD INTEGRATION PLAN
ANNEX 5 BLANK BOOK
DATA REQUIREMENTS FOR THE
PAYLOAD OPERATIONS CONTROL CENTER ANNEX
MCC/JSC POCC/REMOTE POCC INTERFACE REQUIREMENTS

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FOREWORD

This document defines the format and contents of the payload data required for the Space Shuttle Program (SSP) to integrate a payload for flight and for payload ground operations. The SSP uses several Integration Plans (IPs) to document various categories of payloads e.g. Payload Integration Plan (PIP), Mission Integration Plan (MIP), Carrier Integration Plan (CIP) etc. For all purposes, the PIP will be referred as the PIP, the MIP, and the CIP. The PIP annex releases that are required for a payload, and the schedule for their submittal, are identified in the basic SSP IP. The customer is requested to provide the defined data, sign the title sheet, and the Change Request (CR) form, and return the completed document to the Mission Integration Manager (MIM). A copy is also to be provided to the Payload Operations Control Center (POCC) Annex 5 Book Manager.

The POCC Annex 5 Book Manager will review the data for compliance with SSP capabilities and contact the customer if there are any questions or if further negotiations are required.

Original signed by
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1.0 INTRODUCTION

This document provides the information necessary to prepare and submit payload data requirements in the Payload Operations Control Center (POCC) Annex 5, Mission Control Center (MCC)/National Aeronautics and Space Administration (NASA) Lyndon B. Johnson Space Center (JSC) POCC/Remote POCC Interface Requirements document. The POCC Annex 5 Book Manager will provide a current copy of the POCC Annex 5 blank book to the Payload Customer at Launch minus (L-)12 to L-10 months. In case of variance between the POCC Annex 5 and the Payload Integration Plan (PIP), the PIP shall take precedence. In this document, the PIP document will be referred as the PIP, the Mission Integration Plan (MIP), or the Carrier Integration Plan (CIP). Any requirements submitted in the POCC Annex 5 that are not within the scope of the PIP will not be considered binding on NASA for implementation.

Payload Customers must submit data requirements via the POCC Annex 5 document, in accordance with the schedule defined in the PIP. Based on customer submittal, JSC will identify the requirements by discussion/negotiation and prepare the draft POCC Annex 5 for signatures and baselining. Revisions to the basic POCC Annex 5 may be generated as required via the Integration Control Board (ICB) Change Request (CR) process.

At the first integration meeting with NASA, the POCC Annex 5 Book Manager will be available to aid in preparation of the POCC Annex 5. Required data, as well as questions and comments, should be directed to the POCC Annex 5 Book Manager, Mission Operations Directorate (MOD), Operations Division/DO. Payload Customers should be familiar with the POCC Capabilities Document (PCD) NSTS 21063-POC-CAP when submitting POCC Annex 5 requirements.

The POCC Annex 5 is used for specifying the remote POCC interfaces, and the MCC data routing configuration requirements and the internal MCC/JSC and POCC/Customer Support Room (CSR) requirements.

Note: For payload reflights, an update to the previous baselined POCC Annex 5 and redefinition of POCC data routing may be required.

2.0 POCC ANNEX 5 ORGANIZATION AND SCOPE

The POCC Annex 5 provides a standard and efficient medium for communicating requirements from the customer to the implementer. It also enables the Space Shuttle Program (SSP) implementer to provide the customer with additional information needed to design, develop, and test the required support interfaces. The Payload Customer should be familiar with the PCD document (NSTS 21063-POC-CAP), in order to design, develop, and test their software and hardware for ground support.

Appendix A to this document contains samples of the POCC Annex 5 tables, figures, and nonstandard services definitions from Annex 5. Payload Customers can use this appendix for references to the POCC Annex 5 document.

Appendix B to this document is the "Blank" POCC Annex 5 that will be completed by the customer and submitted to JSC. All data must be submitted in the format specified in this appendix. General guidelines for the completion of the POCC Annex 5 are as follows:

- a. Document Number - The POCC Annex 5 will be assigned the same NSTS number as the parent PIP. NSTS XXXXX is to be placed in the upper right-hand corner of the cover/signoff page directly above "Annex 5".
- b. Cover/Signoff Page - This page is to be completed with the official payload name and the date submitted. The Payload Customer representative will sign this page prior to submission to JSC. Upon review and response to the POCC Annex 5 input, and after resolution of issues as required, the POCC Annex 5 will be signed by the NASA Goddard Space Flight Center (GSFC) Network Director, and the POCC Annex 5 Book Manager. If, at any time, changes are required in parts I through V of the POCC Annex 5, a review of the revised POCC Annex 5 by the payload representative and the POCC Annex 5 Book Manager is required prior to its release.
- c. Description of Changes - This page will be completed by JSC to reflect the current and previous changes to the POCC Annex 5.
- d. Preface - The preface is to be completed with the payload name, POCC acronym, and POCC data destination.
- e. Applicable Documents - Documents known to be applicable to the POCC Annex 5 are listed in the Table of Contents, Tables, Figures, and Applicable Documents sections.

- f. Acronyms and Abbreviations - JSC provides a list of standard acronyms and abbreviations used in POCC Annex 5. The customer must supplement this appendix with the acronyms and abbreviations that are unique to the payload.

The POCC Annex 5 is divided into five parts as follows:

- a. Part I - General Service Requirements
- b. Part II - Payload Data Requirements
- c. Part II - JSC POCC Facility Requirements
- d. Part IV - Nonstandard Service Requirements
- e. Part V - JSC Response to Customer Requirements (from Part IV)

3.0 INSTRUCTIONS FOR POCC ANNEX 5 PART I - GENERAL SERVICE REQUIREMENTS

3.1 General

Part I will reference the current POCC Capabilities Document, NSTS 21063-POC-CAP and contains categories, which deal with the specific functional services, involved in flight support operations.

The support categories described in NSTS 21063-POC-CAP and Part I of this document are as follows:

- a. Telemetry
- b. Command
- c. Trajectory
- d. Video
- e. Voice communication
- f. Orbiter Communications Adapter (OCA)
- g. Facsimile (FAX)
- h. Communications services

- i. Facilities and support services
- j. Interface testing

In some cases nonstandard services may be required that do not fall into any of the standard categories described in the PCD. These requirements should be identified in early working group meetings. The POCC Annex 5 Book Manager will assist the customer with the incorporation of these requirements into the document, as appropriate.

Note: The NASA POCC Annex 5 manager will execute the POCC Annex 5 in accordance with those functions identified as "required" in the PIP.

Part I provides a checklist (refer to tables 1-1 through 1-5 of Appendix B) of the services provided through the MCC data routing and Remote POCC interfaces. The blanks opposite each service provide space to indicate that the service is Required (RQ), Not Required (NR), or Not Applicable (N/A). The applicable tables will also reflect the acronyms and codes assigned by JSC to identify the payload and Remote POCC(s).

In Part I there are nonstandard facilities and services are indicated as by an asterisk. Nonstandard services are defined as those services that differ in any way or degree from the standard services defined by this document and the PCD. The description and detail of the nonstandard services must be provided by the customer in Part IV of the POCC Annex 5. Should a required standard service be considered inadequate, the modifications to that service will be identified as a non-standard service, and may lead to a cost and/or schedule impact to the customer.

The customer should review the standard services that are highlighted in section 3.2 below and detailed in either the referenced PCD section, or in this document. The POCC Annex 5 Book Manager's will provide any additional clarification needed by the customer. Since the data is used at JSC for resource allocation planning, a positive response must be given for the services desired in all the POCC Annex 5 tables (i.e., "RQ" services).

3.2 Highlights of Standard Service Checklist

This section contains the major characteristics of all standard services, and parallels the checklist tables in Parts I and II of the POCC Annex 5. Each service, where applicable, also references the PCD section(s) that describe the capability in detail. The customer should identify the services required by filling in the appropriate blanks as indicated in the heading of each table.

3.2.1 JSC MCC/Remote POCC Telemetry Interface Service General Requirements.- (Reference NSTS 21063-POC-CAP, section 3). Reference table 1-3 in Appendices A and B of this document.

3.2.1.1 Payload/POCC Identification: JSC can route a maximum of two data formats Decom Format Loads (DFLs) simultaneously to Remote POCCs (external to JSC) utilizing unique payload and POCC identification codes (reference table 1-1 in Appendices A and B of this document). These codes are assigned by JSC, provided by the POCC Annex 5 Book Manager, and annotated in the PIP sections 8.5 or 8.6 as appropriate.

- a. Payload acronym (four characters)
- b. Payload Identification (ID) Code (3-digit decimal)
- c. JSC POCC acronym (four characters)
- d. JSC POCC Source/Destination Code (S/DC) [Octal Most Significant Bit (MSB)]
- e. Remote POCC acronym (four characters)
- f. Remote POCC S/DC [Octal MSB]

3.2.1.2 Internal Data Routing Requirements: The customer should provide the following JSC interfaces and equipment resources (reference NSTS 21063-POC-CAP, Appendix F). Reference table 1-2 in Appendices A and B of this document).

- a. The MCC provides Operational Downlink (OD) data direct to the MCC workstations. The MCC can also be configured to route data to Experiment Ground Support Equipment (EGSE) installed in the JSC POCC and/or in the CSR.

- b. MCC Workstation - The MCC workstation is available for processing and display of Payload Data Interleaver (PDI) data and Orbiter Instrumentation (OI)/General Purpose Computer (GPC) parameters from the OD. Requirements on the system are specified in section III of this document. MCC workstations are only available in certain POCC rooms.
- c. Customer Interface Panels (CIPs) - CIPs/Walker Boxes are available to connect EGSE. Four types of data are available at each CIP (PDI, Customer Ancillary Service (CAS), Payload Parameter Frame (PPF), and status), and in addition, two 50 MHz interfaces are also available on the Independent Payload Data Stream (IPDS).
- d. CSR - The CSR interface consists of RS232 and RS422 data ports. PDI, PPF and CAS data are available at these ports.

3.2.1.3 Extract, Format, and Transmit PDI Frame Data from OD: (Reference NSTS 21063-POC-CAP, section 3). Reference tables 1-2 and 1-3 in Appendices A and B of this document.

- a. PDI data is provided in either Serial (SER) or Block Data Format (BDF).
- b. The telemetry BDF is identical in structure and content to that specified in NSTS 21063-POC-CAP, Appendix A.
- c. PDI SER data is output to the Remote POCC at the same rate as the payload data is output from the Orbiter/PDI (NSTS 21063-POC-CAP, section 3).
- d. PDI BDF data is transmitted at the same effective frame rate as received by the MCC.

3.2.1.4 Extract, Format, and Transmit PPF Data from the OD: (Reference NSTS 21063-POC-CAP, section 3). Reference tables 1-2 and 1-3 in Appendices A and B of this document.

- a. Data to Remote POCCs is provided only in BDF.
- b. BDF is identical to that described in NSTS 21063-POC-CAP, Appendix A.
- c. Data is sequenced in accordance with the customer format definition contained in Part II, table 2-1, of this POCC Annex 5. Data for completion of this table is found in Annex 4, the Command and Data Annex.

- d. For MCC routing, PPF data is provided in either BDF or SER format. The bit rate for SER formats is 4560 bps.
- e. One PPF format per payload is allowed.

3.2.1.5 Extract, Format, and Transmit CAS Data from the OD: (Reference NSTS 21063-POC-CAP, section 3). Reference tables 1-2 and 1-3 in Appendices A and B of this document.

- a. Data to the POCCs are provided only in BDF.
- b. BDF is identical in structure to that described in NSTS 21063-POC-CAP, Appendix A.
- c. A standard set of calibrated CAS data is formatted and sequenced as described in NSTS 21063-POC-CAP, Appendix J.
- d. The CAS data block content and formatting sequence normally remains constant for the entire mission.

Note: The Flight Control Team's (FCTs) selection of downlink formats may preclude the availability of certain CAS parameters. Payload Customers must submit a list of all required CAS parameters to the Mission Integration Manager (MIM) and POCC Annex 5 Book Manager via the PIP and POCC Annex 5 document in section IV.

3.2.1.6 Format and Transmit JSC Status and Data Quality Information: (Reference NSTS 21063-POC-CAP, section 3). Reference table 1-3 in Appendices A and B of this document.

- a. Data to Remote POCCs is provided only in BDF.
- b. The status data block is identical in structure and content to that specified in NSTS 21063-POC-CAP, Appendix A.

3.2.1.7 Acquisition and Routing of Independent Payload Data Streams: (Reference NSTS 21063-POC-CAP, section 3). Reference tables 1-2 and 1-5 in Appendices A and B of this document.

- a. Direct Space Network (SN) acquisition of payload telemetry and routing of data to the remote POCC by GSFC is obtained via dedicated circuits. Payload downlink will use Orbiter Ku-band channel 2 or 3 (bent pipe). A payload can bypass the Orbiter and communicate directly through the SN. This is a nonstandard service (reference NSTS 21063-POC-CAP, section 3).
- b. Data can be routed to the JSC POCC CIP/Walker Boxes.

3.2.2 JSC MCC/Remote POCC or Internal Command Interface Service, General Requirements.- (Reference NSTS 21063-POC-CAP, section 4). Reference tables 1-2 and 1-3 in Appendices A and B of this document.

3.2.2.1 Payload Commanding through JSC MCC: (Reference NSTS 21063-POC-CAP, section 4). Reference table 1-2 in Appendices A and B of this document.

- a. The customer can receive, validate, format, and uplink remote POCC generated payload commands in real time. The command data block format is identical in structure and content to that described in NSTS 21063-POC-CAP-POC-CAP, section 4 and Appendix B.
- b. The storage of payload commands at the MCC is a nonstandard service. Command data is submitted via Annex 4 (reference NSTS 21063-POC-CAP, section 4).
- c. The size and routing of a command message depends on the payload/Orbiter interface. Available interfaces are Payload Signal Processor (PSP), Multiplexer/Demultiplexer (MDM), and Standard Serial Interface (SSI).

Note: A Payload ID is tied to only one of the available command interfaces (PSP, MDM, or SSI). If the Payload customer requires more than one command interface, additional Payload IDs will be assigned for each command interface. If a Payload Customer requires multiple interfaces for a Payload ID, it is a nonstandard option and further negotiations will take place before approval.

- d. The command rate from the Remote POCC to the Orbiter/payload interface must not exceed one NASA Communications (NASCOM) command block per 2 second.
- e. The user can transmit Command Acceptance Pattern (CAP) messages in real time from the MCC to the originating remote POCC.
 1. Specific messages are as defined in NSTS 21063-POC-CAP, section 4.
 2. CAP data blocks are identical in form and content to those described in NSTS 21063-POC-CAP, Appendix B.
 3. Customer-generated test command messages can be received from the remote POCC. CAP messages are returned from the MCC to the remote POCC (reference NSTS 21063-POC-CAP, section 4, and Appendix B).

- f. The MCC command interface to JSC POCC workstations and/or EGSE for command uplink is the same as a remote POCC. S/DCs' are required for routing of the data and are assigned by JSC.
- g. The Ku-band high rate transmission provides a POCC data interface to the MCC for commanding via the 128 kbps uplink.

3.2.2.2 Real-Time Command History Data from the MCC to the Remote POCC: (Reference NSTS 21063-POC-CAP, section 4). Reference table 1-3 in Appendices A and B of this document.

- a. Command history is the status of the last 75 command events. (Reference NSTS 21063-POC-CAP, section 4). JSC command history messages will be transmitted to the JSC MCC or remote POCCs upon request.
- b. The NASCOM standard transmission rate for command history is 8 blocks per second. The rate can be reduced by request to 1 block per second as a nonstandard service.

3.2.3 JSC MCC/Remote POCC Trajectory Related Interface Services General Requirements.- (Reference NSTS 21063-POC-CAP, section 5). Reference table 1-3 in Appendices A and B of this document.

3.2.3.1 Orbiter Operational State Vector Data to Remote POCC: (Reference NSTS 21063-POC-CAP, section 5.3.1). Reference table 1-3 in Appendices A and B of this document.

- a. Data is furnished in the format of standard Improved Interrange Vectors (IIRVs), using Aries Mean of 1950 (M50) Coordinate System, or using J2000 Coordinate System in the True of Date Rotating (TDR) Coordinate System. The format is defined in NSTS 21063-POC-CAP, section 5 and Appendix C.
- b. The current Orbiter state vector is transmitted automatically at 1-hour intervals on the hour. Automatic state vector transmission can be inhibited and transmitted only upon request.
- c. A maneuver search is available for an interval from current time to 120 minutes past current time. For any maneuver ignitions, the vectors for maneuver initiate, maneuver end, and intermediate positions will be furnished.
- d. The standard state vector trajectory transmission rate is 5 NASCOM blocks per second. Rate can be reduced by request to 1 block per second as a nonstandard service.

3.2.3.2 Planning Orbiter State Vector Data to the Remote POCC: (Reference NSTS 21063-POC-CAP, section 5). Reference table 1-3

in Appendices A and B of this document. Mission Control Center-Houston (MCC-H) responds to a voice request to receive planning vectors. This data is available for a time not to exceed 48 hours from time of request, and has the same constraints as operational state vector data.

3.2.3.3 Operational Attitude Data: (Reference NSTS 21063-POC-CAP, section 5). Reference table 1-3 in Appendices A and B of this document.

- a. Requests are made by voice, and data is transmitted at the cyclic rate of the MCC trajectory system.
- b. An Orbiter body matrix is furnished in the Aries Mean 1950 Coordinate System.
- c. Content includes the body matrix and the Greenwich Mean Time (GMT).
- d. The format is identical to that described in NSTS 21063-POC-CAP, Appendix C.

3.2.3.4 Planning Attitude Data: (Reference NSTS 21063-POC-CAP, section 5). Reference table 1-3 in Appendices A and B of this document.

- a. Data is sent from the MCC, upon request, for all attitude timeline entries covering the next 48-hour period (major attitude modes only).
- b. Body matrix and supporting data may be furnished in standard form (M50) or as a rotation matrix with reference to the true Local Vertical/Local Horizontal (LVLH) Coordinate System.
- c. Data content depends upon the attitude mode of the Orbiter inertial hold, rotation mode, or LVLH.
- d. The data format is as described in NSTS 21063-POC-CAP, Appendix C.

3.2.3.5 Payload State Vectors from Remote POCC: (Reference NSTS 21063-POC-CAP, section 5). Reference table 1-3 in Appendices A and B of this document. JSC MCC will receive and process payload state vectors transmitted in standard 4800 bit NASCOM format.

Note: Free Flier payload state vector data, if required, may be provided to JSC via NASCOM blocks, fax, and/or voice communication. This requirement must be coordinated with payload operations support personnel, and documented in Part III of Annex 5, and the Joint Operations Interface Procedures (JOIP).

3.2.4 External Voice Services.- Provide remote POCC access to JSC MCC communication loops (reference NSTS 21063-POC-CAP-POC-CAP, Section 7). Reference tables 1-4 and 2-5 in Appendices A and B of this document.

- a. Extension of any voice loop from JSC to a Remote POCC from the NISN/GSFC interface is a nonstandard service (reference NSTS 21063-POC-CAP, section 7).
- b. Distribution of voice loops from a remote POCC to other locations is only authorized by agreement with NASA (reference NSTS 21063-POC-CAP, section 7).
- c. Eight standard voice loops are available between the JSC and the remote POCC via NASCOM. These include:
 1. A/G-1
 2. A/G-2
 3. Flight Director
 4. MCC Coordination - The Mission Control Center Coordination (MCC Coord) loop is mandatory if any of the following standard support services are selected. (Reference NSTS 21063-POC-CAP, table 7-1):
 - (a) CAS
 - (b) Command Interface
 - (c) PDI
 - (d) PPF
 - (e) Trajectory
 - (f) Video
 5. Ops Action
 6. Ops Support

7. Program Manager

8. Prime Ops

- d. Remote Facility (REMFAC) dedicated loops are available as a nonstandard service. (Example: HST COORD, SHAB COORD, etc.)

3.2.5 JSC MCC/Remote POC Video Support Services.- Provide capability for transmission of NASA video services to the remote POC (reference NSTS 21063-POC-CAP, section 6). Reference tables 1-4 and 2-4 in Appendices A and B of this document.

Video services are as described in NSTS 21063-POC-CAP, section 6.

- a. NASA Select - Video communications services are available via the NASA Domestic Satellite (DOMSAT) Television Network. Most NASA centers are networked via this system. Extension of the video services via other means is a nonstandard service and may be negotiated and provided for on a cost reimbursable basis.

- b. OD - Downlinked video communications

Orbiter downlinked video is National Television Standards Committee (NTSC)-7 broadcast quality Television (TV) and nominally will have no audio interleaved in the video signal.

- c. The physical and electrical interface to a common carrier is compatible with that described in NSTS 21063-POC-CAP, section 6.
- d. Digital Television (DTV) is downlinked through the Orbiter Closed Circuit Television (CCTV) system to the ground Statistical Multiplexer (STAT MUX) and the ground DTV equipment and distributed through the Building 30 Serial Digital Interface (SDI) switch. This capability is described in NSTS 21063-POC-CAP, section 6.

3.2.6 Orbiter Communication Adapter Support Services.- Orbiter Communications Adapter - The MCC provides the capability to uplink text and graphics information to the Orbiter Communications Adapter (OCA). The uplink to the OCA system can occur via the Tracking and Data Relay Satellite (TDRS) Ku-band forward link or the TDRS S-band link; however, the S-band link uplink is limited to a special 7-bit ASCII character set. Text and graphics, including 256 gray-scale images, can be uplinked via the Ku-band system.

The OCA uplink capability is initiated by the Flight Activity Officer (FAO) Multipurpose Support Room (MPSR) personnel via the Orbiter Text and Information System (OTIS) located in the FAO MPSR. If uplink is via the Ku-band link, message inputs to the FAO are compiled into composite messages and are uplinked to the Orbiter in bitmap format. If uplink is to occur via the S-band link, the customized ASCII format is used. Note that the prime uplink method is via Ku-band. The OCA provides the following two modes of image uplinks capability:

- a. Mode 1 - 200 dots/inch, 1 bit/pixel, 44 seconds uplink time.
- b. Mode 2 - 200 dots/inch, 8 bits/pixel, 4.2 minutes uplink time (Ku-band only).

As each page is uplinked, a data monitor, included as part of the OTIS, verifies good data leaving the OTIS.

3.2.7 Facsimile Services.- (Reference NSTS 21063-POC-CAP, section 9). Reference table 1-4 in Appendices A and B of this document.

- a. Full period operational fax service to NASA and commercial facilities. The customer should identify the POCC station number in table 1-4.
- b. Direct customer access is available in the MCC MPSR.
- c. Only dedicated fax circuits via NASCOM are documented in POCC Annex 5 in Part III.

3.2.8 Communications Services.- (Reference NSTS 21063-POC-CAP, sections 8 and 12). Reference table 1-4 in Appendices A and B of this document.

- a. SSP support of remote POCC communications requirements consists of providing circuits for the selected standard and nonstandard services.
- b. SSP customers retain the option of providing their own dedicated voice and data circuits to the remote POCC.
- c. NASA Select or Orbiter Downlink (DL) Video communications services are available via the DOMSAT TV Network System. Most NASA centers are networked via this system. Extension of the video services via other means is a nonstandard service and may be negotiated on a cost reimbursable basis.

- d. Nonstandard SSP-provided communications circuits and equipment, if required, can be negotiated on a cost reimbursable basis.

3.2.9 Facilities and Support Services.- (Reference NSTS 21063-POC-CAP, Appendix G). Reference table 1-5 in Appendices A and B of this document.

3.2.9.1 Local Support and Interfaces: Provide the following JSC MCC interfaces and equipment resources (reference NSTS 21063-POC-CAP, Appendix G). Reference table 1-5 in Appendices A and B of this document.

- a. Telescience Support Center (TSC) Interface - JSC/MCC will provide generic voice and data interfaces to the TSC.
- b. CAS - Data sets will be provided by JSC MCC to GSFC for a remote POCC in Real Time (RT) and/or as a Postflight (PF) data product in accordance with requirements identified in the PIP.
- c. Operational Data reduction Complex (ODRC)- This is the primary data storage and archive facility, providing access to current and historical Space Shuttle mission data and SIM data through an electronic interface. ODRC is a client/server system with a database, data collection, data retrieval, job scheduler and request handler software. (See NSTS 21063-POC-CAP, section 3 for more information.)

3.2.9.2 External Support and Interfaces: Provide the following JSC external interfaces and equipment resources (reference NSTS 21063-POC-CAP, section 8 and Appendix F). Reference table 1-5 in Appendices A and B of this document.

- a. GSFC Shuttle/POCC Interface Facility (SPIF) provides a standard interface between the GSFC POCC and the JSC MCC. The SPIF is required for routing of CAS data.
- b. SN resources including the TDRS are available for dedicated direct link payload support as a nonstandard service. Utilization of data links and routing services is negotiated directly with GSFC (reference NSTS 21063-POC-CAP, section 12).
- c. IPDS routing will be provided via GSFC/NASA NISN as a nonstandard service.

- d. MCC/NASA George C. Marshall Space Flight Center (MSFC) POCC interfaces will provide support as required for International Space Station (ISS) type payloads.
- e. MCC/Huntsville Operations Support Center (HOSC) is the major interface that provides the communications support and facilities for the Space Shuttle operations activities at MSFC. The HOSC will provide the main interface for ISS payload type systems operations and data distribution. The HOSC will also provide generic upper stage support of SSP Payload Assist Module (PAM) missions, as defined in the PAM Integration Plan (IP) and the Inertial Upper Stage (IUS) IP, for IUS missions.
- f. Electronic Data Transfer System (EDTS) via 9.6 kbps and 64 kbps circuits systems is an optional service for non-MSFC-managed missions.
- g. White Sands Ground Terminal (WSGT) STAT MUX is a NASCOM resource available for providing high rate synchronous digital data up to 48 Mb/s in support of high rate data missions as a nonstandard service.

3.2.10 Testing Support Remote POCC Interface Testing.-
Provides the resources to perform MCC/Remote POCC interface testing for those standard services that have been selected (reference NSTS 21063-POC-CAP, section 11). Reference table 1-5 in Appendices A and B of this document.

- a. A customer-provided binary file or analog tape of the PDI input payload data stream will be used by JSC for telemetry test tape generation (reference NSTS 21063-POC-CAP, section 11).
- b. JSC will support MCC/POCC interface verification testing as a standard service utilizing an SSP-provided test tape.
- c. JSC strongly recommends customer support of interface testing for all command and data services selected.
- d. JSC/Remote POCC interface testing will begin typically 6 to 8 weeks prior to a mission and will be conducted in accordance with specific payload requirements as identified in the PIP (reference NSTS 21063-POC-CAP, section 11).
- e. Each test supported by the POCC and JSC requires the Payload Customer to respond with a POCC Test Results Report (PTRR) (reference NSTS 21063-POC-CAP, section 11).

- f. Operations testing will primarily consist of Joint Integrated Simulations (JISs) commencing at approximately 6 weeks prior to launch.
- g. Early Testing (ET) support prior to MCC readiness (greater than L-3 months) is a nonstandard service and must be specified in the PIP, and in the POCC Annex 5. The schedule must be detailed in order to provide JSC-necessary information to assess total support requirements.
- h. POCC command validation testing must include selected hazardous and nonhazardous commands.

3.3 Nonstandard Services

Nonstandard services that do not fall within standard service categories can normally be provided. Identify and describe any optional services and associated test requirements in Part IV of the POCC Annex 5 (refer to section 6 of this document).

4.0 INSTRUCTIONS FOR POCC ANNEX 5 PART II - PAYLOAD DATA REQUIREMENTS

This part of the POCC annex contains unique payload and other related data that JSC requires to configure the MCC for payload data routing, and POCC interface communications. Where applicable, forms have been provided in which to document this data.

The configuration data will be reviewed for compatibility, acceptance, and validity. The customer will be notified of the results via telephone, or email.

POCC Annex 5 tables are required for CAS, PDI, and PPF definition. Tables are also provided for voice, video, and data routing. These tables, 2-1 through 2-5, should be included in the POCC Annex 5 document. If a table is not required, a statement stating the table is not required should be inserted where that table would normally be located. Tables 2-2 through 2-5 will be completed by the customer and by the POCC Annex 5 Book Manager and be included in the SSP baseline document.

4.1 Information for Completing POCC Annex 5 Tables

4.1.1 Data Characteristics.- (Reference NSTS 21063-POC-CAP, section 3). Reference table 2-1 in Appendices A and B of this document

- a. PDI data rates - Provide the actual PDI telemetry rate (kbps, or Mbps) for each payload stream. The format numbers listed in the table, one through eight, are not the DFL numbers, but merely a count of the number of different formats the payload has in the Command and Data Annex 4. The source for DFL numbers is Annex 4.
- b. PDI telemetry mode - Frame Sync Mode (1,2,3) or Block Mode (4).
- c. MCC PDI percent tolerance - Bit rate error tolerance for MCC PDI SER data processing. One percent is the default value of this function and is not applicable for BDF transmission.
- d. PDI status register - Status register is available for all PDI telemetry modes. The PDI status register data, if required, will be output to all POCC interfaces to which the PDI is routed (reference NSTS 21063-POC-CAP, section 3).
- e. IPDS data rate (kbps, or Mbps) and TDRS Ku-band channel source.
- f. Simultaneous PDI DL formats - Provide a "Yes" indicator if two DFLs are contained within a Telemetry Format Load (TFL) for a payload.

4.1.2 Payload Parameter Frame Definition.- (Reference NSTS 21063-POC-CAP, section 3). Reference table 2-2 in Appendices A and B of this document.

- a. POCC Annex 5 table 2-2 must be completed to extract and route PPF data to the POCC(s). One PPF format is allowed per payload vehicle ID, and the PPF format should contain all the parameters (payload only) that require extraction from the OD. Before attempting to complete this table, the customer should carefully review NSTS 21063-POC-CAP, section 3, and the current Command and Data Annex 4 to the PIP.
- b. POCC Annex 5 table 2-2 requires the following information to be supplied by the customer with the exception of items 1 and 2 that will be provided by the POCC Annex 5 Book Manager.

1. Payload acronym
2. PPF format number (32-39) - Assigned during POCC Annex 5 preparation activity.
3. PPF measurement number - As defined in the Command and Data Annex 4.
4. PPF Word Number, Table 2-2 - The start word location for the parameter in the PPF format (words 10-285). The first table gives the word allocations to be used for formatting the one Sample per Second (S/S) and five S/S parameters. Each PPF word length is 16 bits. If the parameter is less than 16 bits, fill data is used. If a parameter requires more than one PPF word (greater than 16 bits), the customer is to fill out a line for the start PPF word only. Enough 16-bit word slots should be left blank to accommodate the parameter length. The number of sequential PPF words (16 bits each) which must be assigned to a parameter is calculated with the PPF bit number being identical to the Air to Ground (A/G) bit number; the number of bits, plus the start bit, divided by 16 and rounded off to the next highest integer should equal the number of consecutive PPF words.

The table contains only the first word location for five S/S parameters. MCC generates the additional sample locations. These are symmetrically spaced 57 word slots starting at word location 33, 90, 147, 204, and 261.

5. Start bit - As defined in the Command and Data Annex 4, MDM parameters are 00-15, and PDI decom parameters are 00-07.
6. Data length - As defined in the Command and Data Annex 4, MDM parameters are 01-64, and PDI parameters are 01-08.
7. Sample Rate (SR) - MDM source equals one or five S/S, and PDI source equals one S/S. A parameter should be assigned the highest sample rate in which it appears in any OD format.
8. Source P or F - Data source where P equals parameter from PDI decom; F equals parameter from MDM.

9. Required child PPF measurement number - You are required to provide all child Measurement Stimuli Identifications (MSIDs) related to Parent PPF measurement indicated in columns 1-10.

Table 1.- PAYLOAD PARAMETER FRAME WORD NUMBER IDENTIFICATION

| Words 1-9 header words | |
|---------------------------------|-------------------------------------|
| Words 10-32 1 S/S parameters | Words 33-57 5 S/S (1st sample) |
| Words 58-89 1 S/S | Words 90-114 5 S/S (2nd sample) |
| Words 115-146 1 S/S | Words 147-171 5 S/S (3rd sample) |
| Words 172-203 1 S/S | Words 204-228 5 S/S (4th sample) |
| Words 229-260 1 S/S | Words 261-285 5 S/S (5th sample) |

4.1.3 External Data Interface Requirements.- (Reference NSTS 21063-POC-CAP, section 8). Reference table 2-3 in Appendices A and B of this document.

- a. Data type identifiers (i.e., PDI, PPF, Command (CMD), etc.) and circuit routing will be defined jointly by the customer and the POCC Annex 5 Book Manager during POCC Annex 5 development.
- b. Provide the maximum transmission rate in kbps, or Mbps.
- c. The customer will identify the telemetry data transmission mode required as BDF, SER, Integrated Services Digital Network (ISDN), Transmission Control Protocol/Internet Protocol (TCP/IP), or ATM. Also, indicate the unique BDF data multiplexing requirements; otherwise, the PDI, PPF, CAS, and status, if required, will be multiplexed on a single circuit.
- d. The customer will indicate the circuit routing "From Site", "To Site", and "Extend To Building" locations.

- e. Extension of NASA-provided circuits to a Remote POCC from the NISN interface point will be indicated as standard or non-standard in the Standard/Nonstandard (S/N) column.
- f. The PCD provides a definition of the S/N services.
- g. Service Period Days is based on the number of days prior to launch, on orbit, and postlanding activities required to support your mission. Support activities required prior to launch should be indicated in the Prelaunch (LAU) column in the L-days; e.g., for 120 days support, enter -120. Support activities required postlanding, should be indicated in the Postlanding (LNDG) column in Landing plus days; e.g., for 3 days activity required subsequent to wheels stop, enter +3; however, if you have no postlanding service requirements, enter the word "land" in the applicable column. The total number of service period days to support prelaunch, on-orbit through nominal landing phase, and postlanding will be specified at the bottom of the table. The footnote reads as "Total service period days _____". Postlanding begins at wheels stop.

Note: The Payload Customer should not assume that the POCC services are available during each JIS. The Payload Customer should schedule the POCC resources that are required during each test, and JISSs. POCC resources are limited prior to each mission, and are used and allocated to support tests, and ISS requirements.

- h. IMPL Agency information will be provided by the POCC Annex 5 manager.
- i. The customer will provide a point of contact for coordination of POCC data interface requirements.

4.1.4 External Video Interface Requirements.- (Reference NSTS 21063-POC-CAP, section 6). Reference table 2-4 in Appendices A and B of this document.

- a. SSP TV is provided to the NASA TV Network by JSC as NASA Select.
- b. NASA Select is a color signal and may contain Space Shuttle DL video provided to PAO for release to the media.

- c. SSP will provide video interfaces to the Remote POCC as a standard or nonstandard service as indicated in the S/N column.
- d. The following TV sources are available for distribution to the customer:
 - 1. NASA Select - This video is a NTSC-7 standard quality broadcast TV signal released by the Public Affairs Office (PAO).
 - 2. Orbiter DL video - This video source is the raw unconverted space Shuttle downlinked video. This source is NTSC-7 standard broadcast quality TV and nominally will have no audio interleaved in the video signal.
 - 3. DTV - DTV provides an improved digital quality video DL and number of channels. This video source is a nonstandard service.
- e. The customer will indicate the transmission routing "From Site", "To Site", and "Extend To Building" locations.
- f. Service Period Days is based on the number of day's prior to launch, on orbit, and postlanding activities required to support the mission. Support activities required prior to launch should be indicated in the Prelaunch LAU column in the L-days; e.g., for 120 days support, enter -120. Support activities required postlanding, should be indicated in the Postlanding LNDG column in Landing plus days; e.g., for 3 days activity required subsequent to wheels stop, enter +3; however, if you have no postlanding service requirements, enter the word "land" in the applicable column. The total number of service period days to support prelaunch, on-orbit through nominal landing phase, and postlanding will be specified at the bottom of the table. The footnote reads as Total service period days. Postlanding begins at wheels stop.

Note: The Payload Customer should not assume that the POCC services are available during each JIS. The Payload Customer should schedule the POCC resources that are required during each test, and JIS(s). POCC resources are limited prior to each mission, and are used and allocated to support tests, and ISS requirements.

- g. The video sources described above in paragraph "d" and identified for distribution to Remote POCCs should be indicated in table 2-4 in Appendices A and B of this document.
- h. IMPL Agency information will be provided by the POCC Annex 5 manager.
- i. The customer will provide a point of contact for coordination of any nonstandard service video requirements.

4.1.5 External Voice Interface Requirements.- (Reference NSTS 21063-POC-CAP, section 7). Reference table 2-5 in Appendices A and B of this document.

- a. Voice loop identifiers will be provided jointly by the customer and the POCC Annex 5 Book Manager.
- b. Voice circuit utilization should be identified as Monitor (M) only or Talk/Monitor (TM).
- c. The customer will indicate the circuit routing "From Site", "To Site", and "Extend To Building" locations.
- d. Extension of voice circuits to the Remote POCC from the NASCOM interface point will be indicated as Standard (S) or Nonstandard (N) in the S/N columns. This determination is made by the POCC Annex 5 Book Manager and the GSFC/NISN representative.
- e. Service Period Days is based on the number of day's prior to launch, on orbit, and postlanding activities required to support the mission. Support activities required prior to launch should be indicated in the prelaunch LAU column in the Launch-minus days; e.g., for 120 days support, enter -120. Support activities required postlanding, should be indicated in the Postlanding LNDG column in Landing plus days; e.g., for 3 days activity required subsequent to wheels stop, enter +3; however, if you have no postlanding service requirements, enter the word "land" in the applicable column. The total number of service period days to support prelaunch, on-orbit through nominal landing phase, and postlanding will be specified at the bottom of the table. The footnote reads as Total service period days. Postlanding begins at wheels stop.

Note: The Payload Customer should not assume that the POCC services are available during each JIS. The Payload Customer should schedule the POCC resources that are required during each test, and JISS. POCC resources are limited prior to each mission, and are used and allocated to support tests, and ISS requirements.

- f. IMPL Agency information will be provided by the POCC Annex 5 manager.
- g. The customer will provide a point of contact for coordination of any nonstandard service voice loop requirements.

5.0 INSTRUCTIONS FOR POCC ANNEX 5 PART III - JSC POCC FACILITIES REQUIREMENTS

5.1 Introduction

This part of POCC Annex 5 contains the operational requirements for the EGSE, telemetry, internal voice loop communications, and MCC workstation display requirements. The required level of detail is described in USA003634, Payload Control Center (POCC) User's Guide.

5.2 Description of Tables

5.2.1 Table 3-1 - JSC POCC Customer Operator Position Requirement Summary Submittal.- (Reference NSTS 21063-POC-CAP, section 9). Reference table 3-1 in Appendices A and B for the customer to fill in.

- a. Column one is a list of the customer operator positions (Title).
- b. Column two requires the maximum number of persons per shift for that particular operator position. Also, at the bottom of this column provide the total sum of the personnel per shift.
- c. Column three requires a list of POCC room numbers (Location).
- d. Column four requires a "Yes" if Orbiter data is required.

- e. Column five requires a "Yes" if the position requires PDI data.
- f. Column six requires a "Yes" if the position requires the use of the JSC MCC Electronic Flight Note (EFN) system.
- g. Column seven provides space for "Note No." for clarification.

5.2.2 JSC Inventory of POCC EGSE Requirements.- (Reference NSTS 21603-POC-CAP, section 9). Reference table 3-2 in Appendices A and B of this document.

Table 3-2 provides the customer's inventory of POCC EGSE and application requirements.

- a. Column one requires that each piece of EGSE have a sequential reference number starting from one.
- b. Column two requires the equipment description of the EGSE equipment. The equipment description preface should begin with the Payload or Experiment acronym name (example: HST Laptop)
- c. Column three indicates the POCC room number where the EGSE will be located.
- d. Column four designates the operator position.
- e. Column five specifies the EGSE equipment application use.
- f. Column six provides space for "Note No." for clarification.

Table 3-3 provide the customer's inventory of POCC interface requirement submittal. (Reference Appendices A and B).

- a. Column one requires that each piece of EGSE have a sequential reference number starting from 1. This number should match the equipment reference number in table 3-2.
- b. Column two indicates the POCC room numbers the EGSE will be located in.
- c. Column three lists the operator position (Title) that corresponds to that particular EGSE equipment.
- d. Columns four through six identifies the network connectivity requirements. It identifies if it is a stand alone Local Area Network (LAN), the Information Network System (INS) interface, or if it is an analog phone line interface.

- e. Columns seven through 12 identify the video interface requirements. It identifies if the TV monitor or Video Cassette Recorder (VCR) is driven by Radio Frequency (RF), Baseband, or DTV signals.
- f. Columns 10-12 identifies if the VCR recorder requires a RF interface, Baseband interface, or DTV interface.
- g. Columns 13-17 identifies the EGSE services/interfaces required; Timing, CAS, CMD, OD data, Orbiter TLM, and/or Payload IPDS.
- h. Column 18 identifies the requirements for network wiring and connectivity.

5.2.3 Table 3-4 - JSC POCC Internal Voice Loop Requirements Submittal.- (Reference NSTS 21603-POC-CAP, section 7). (Reference table 3-4 in Appendices A and B for the customer to fill in.

- a. Column one identifies the voice loop name.
- b. Column two identifies the T/M requirements.
- c. Column three provides a "Comments" space to add any remarks required for a voice loop, i.e. proprietary voice loop to TBD operations position.

5.3 MCC Workstation Display Requirements

The JSC MCC will provide a set of mission unique displays for MCC workstation viewing. Payload Customers who require Orbiter and/or payload parameters not provided by the JSC MCC mission-unique displays may submit a request for the desired displays.

Dedicated customer workstation displays are to be negotiated with the lead Payload Officer or the designee at the Payload Operations Work Group (POWG) meetings scheduled prior to the Flight Operations Review (FOR). These services will be treated as nonstandard services and documented accordingly in the applicable PIP, as appropriate.

5.4 POCC Room Layout

POCC room assignments will be worked with each Payload Customer during scheduled POWG and/or Technical Interchange Meetings (TIM) as appropriate. The POCC Facilities Coordinator will

provide the customer with necessary details of available POCC facilities. The customer is responsible to provide a room layout of positions, supporting EGSE, and JSC MCC workstations (where applicable). An example of a Payload Customers room layout is provided in Appendixes A and B of this document and figures 3-1 through 3-4. Payload Customer room layouts are to be considered as preliminary in nature and are to be used by the Facilities Coordinator for planning and space management. The Facilities Coordinator in concert will use subsequent drawings to update this document as deemed necessary with the POCC Annex 5 Book Manager.

5.5 Functional Internal Interfaces

The customer is requested to provide a functional drawing of unique customer LANs and communications/data/commanding interfaces. Examples of functional internal interfaces by a previously flown payload are available in figure 3-5 of Appendix A. The drawing should include, but is not limited to LAN, INS, and IP servers etc. Interface drawing(s) should agree with customer-provided information in table 3-3 in Part III in Appendixes A and B of this document.

5.6 POCC Console Layout

The customer is requested to provide individual console layout drawings. Reference figure 3-6 in Appendix A of this document.

5.7 JSC MCC Communications

Customers who require connectivity to any external interfaces (incoming and/or outgoing) must have their architecture reviewed by the Network Access Control Board (NACB). The NACB will ascertain if JSC MCC Security guidelines are met. Customers may have to develop a security plan and submit their plan to the mission MIM and cc the POCC Facilities Coordinator for NACB review and approval.

6.0 INSTRUCTIONS FOR POCC ANNEX 5 PART IV NONSTANDARD SERVICE REQUIREMENTS

6.1 General

Part IV of the POCC Annex 5 is used for the customers definition of nonstandard service requirements. Part IV must be completed if nonstandard services are required; otherwise it should be marked not applicable. Only those requirements for nonstandard services identified and costed in the baselined PIP will be defined and detailed in this part of the POCC Annex 5. This detail must be provided at a level that allows NASA to design, develop and test the added capability.

Nonstandard services should be categorized by discipline; i.e., telemetry, command, voice, etc., in the same order as they are presented in this document. Details are required in Part IV if nonstandard services are selected in the POCC Annex 5 tables, or if there is an indication that optional communication circuits are to be provided by NASA.

6.2 Initial Nonstandard Service Definition

Prior to the PIP signoff, the definition and discussion of nonstandard service requirements must be provided at a level of detail that allows a cost and programmatic impact assessment by JSC. The required level of detail for Level A and Level B requirements definition is described in NSTS 21063-POC-CAP, section 10.

JSC will develop a Rough Order of Magnitude (ROM) cost estimate based on customer-provided nonstandard service definition. If the customer decides to delete the requirement it will simply be deleted from the PIP. Initial design and implementation planning will begin with the receipt of a customer funding commitment letter.

6.3 Basic POCC Annex 5 Release

The basic POCC annex must contain the description of the customer's nonstandard service requirements. This information will be included in the Cargo Integration Review (CIR) summary. The basis for this detail will have been gained through additional negotiations and working sessions. After final details are completed, JSC will have the data necessary to

complete the design, implementation, and testing of the added capability. The NSTS 21063-POC-CAP, section 10 describes these Level C requirements.

7.0 INSTRUCTION FOR POCC ANNEX 5 PART V - JSC RESPONSE TO CUSTOMER REQUIREMENTS

7.1 General

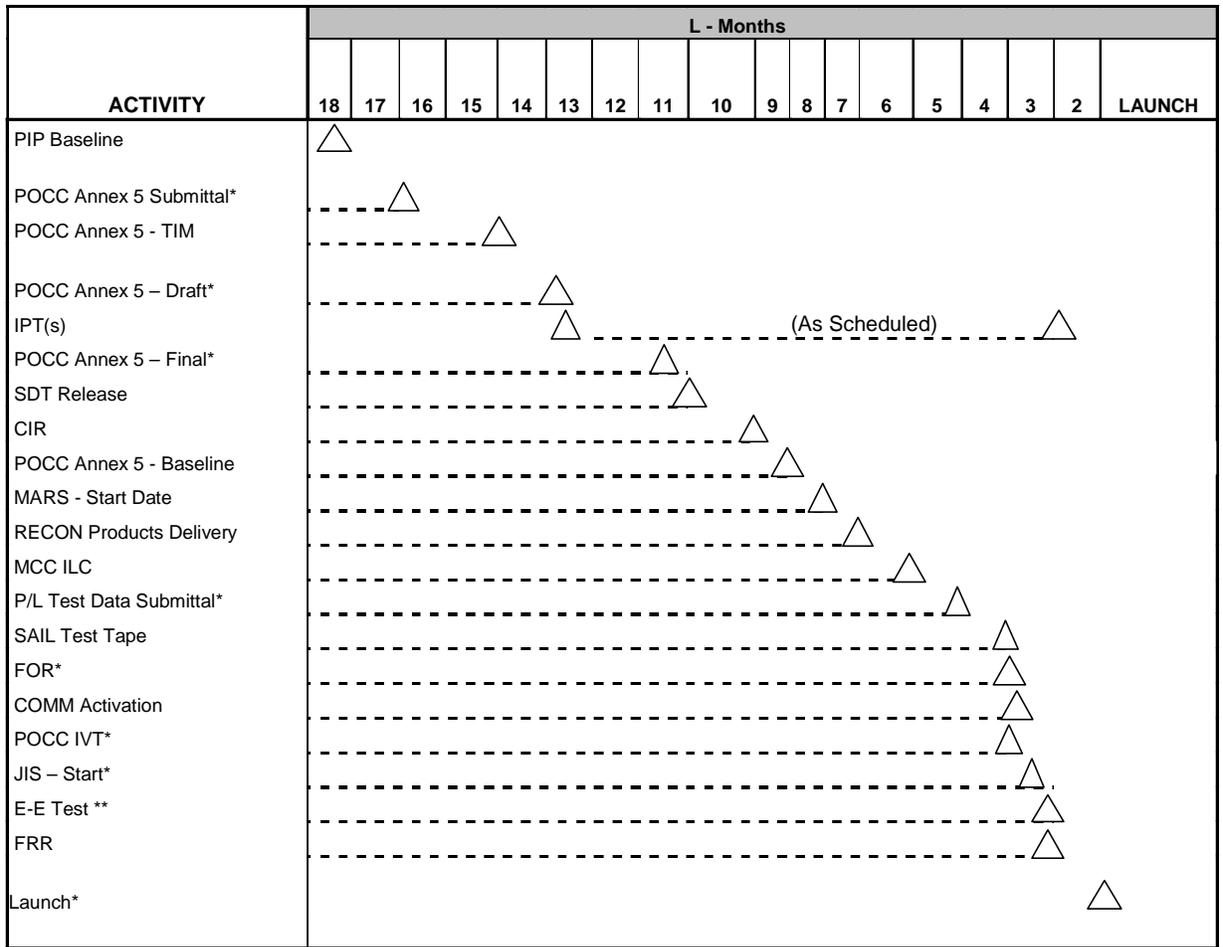
In Part V, JSC provides response to the customer's nonstandard service requirements. "TBD" and "TBR" items are to be specified in accordance with the PIP in section 8.5 requirements. Standard services are implemented according to the latest version of the PCD (reference NSTS 21603-POC-CAP). The POCC Annex 5 baseline will be published based on the integration schedule in section 15 of the PIP.

7.2 Response to Interface Nonstandard Services

JSC will list the nonstandard interface services response by function: (i.e., telemetry data, command, trajectory, voice, video, etc.).

7.3 POCC Annex 5 Requirements Development and RECON Timeline

Implementation of POCC support requirements will be in accordance with the STS Flight Production Template (FPT) and the RECON Detailed Network (RDN) schedule.



* Payload Customers activity

** If Applicable

Figure 1.- POCC Annex 5 requirements development and RECON timeline.

8.0 POCC CHANGE REQUEST

8.1 General

After the POCC Annex 5 document or addendum has been baselined, the Payload Customer must submit a PCR (refer to Appendix C of this document) to add or change POCC requirements in the POCC Annex 5. The POCC Annex 5 Book Manager will determine whether or not the new POCC requirements will be implemented in the POCC Annex 5 document via a CR, if time permits. Otherwise, once all the authorized signatures on the PCR have been obtained, the PCR requirements will be considered an extension to the POCC Annex 5 document for that specific mission. After the mission, all the PCRs will be submitted on a final CR to change the Annex 5 document and be placed in the Payload Integration Library System (PILS). Any requirements submitted in the PCR that are not within the scope of the PCD will not be considered binding on NASA for implementation.

9.0 INFORMATION TECHNOLOGY SECURITY PLAN

9.1 General

JSC-29234 MOD Information Technology (IT) Security and Contingency Planning Processes Document - The MOD IT Security and Contingency Planning Processes document outlines JSC MODs IT security and contingency planning processes and policies as they relate to the latest version of the Center's IT Security Handbook, JPG 2810.1.

JPG 2810.1 - All IT systems at JSC must be in compliance with the Centers IT Security Procedures and Guidelines Document, JPG 2810.1. JPG 2810.1 is specifically tailored for JSC's complex information technology environment.

All Payload Customers must be in compliance with the Center's IT Security procedures and guidelines by submitting a security plan to the MIM for approval for the NACB. If a security plan is not submitted or approved by the NACB, then the Payload Customer will not be allowed to connect their Ground Support Equipment (GSE) in the JSC POCC areas. For additional security information, please log onto the web page <http://mod.jsc.nasa.gov/itsec/>.

Customers are also required to complete an approved IT Security Training course prior to obtaining access to MCC Systems per the JPG 2810.1 and PCD (reference NSTS 21603-POC-CAP, section 2).

10.0 CONTINGENCY PLAN

10.1 General

In the event of a declared SSP contingency, customers should be aware that all hardware and documentation will be impounded for investigation purposes. It will be released upon compliance with data/hardware release policies and approval by the appointed Accident Investigation Board (AIB).

11.0 JSC SITE AND POCC BADGES

11.1 General

All badging should be arranged in advance through the MIM. Two badges are required for access in the JSC MCC: A JSC site badge and a Controlled Access Area (CAA) badge.

The JSC site badge is issued from Security Control just inside the JSC main gate in Building 110. Their hours are Monday through Friday, 7:00 a.m. to 4:00 p.m.

The CAA badges are issued from the Building 30 Security Office. Their hours are Monday through Friday, 6:30 a.m. to 4:00 p.m., except during missions, when they are open 24 hours a day.

All badges must be returned to Security Control at either Building 30 or 110 on or before their expiration date.

12.0 SHIPPING EXPERIMENT GROUND SUPPORT EQUIPMENT TO JSC POCC, AND SHIPPING EGSE FROM JSC POCC

12.1 General

Payload Customers should be familiar with JSC 24339 [Property Control of Experiment Ground Support Equipment at the Lyndon B. Johnson Space Center (JSC 24339)]. If you have any questions, please address them to the assigned POCC Facilities Coordinator via the MIM or the Annex 5 Book Manager.

APPENDIX A

POCC ANNEX 5 DOCUMENT (SAMPLES)

Table 1-1.- POCC/PAYLOAD IDENTIFICATION

This Table identifies the payload by acronym and Identification (ID) code (decimal).

Remote POCC acronym(s) and source/destination code(s), (Octal Most Significant Bit (MSB)), are assigned for data identification and routing.

| Instruction reference section | Item no. | Payload/POCC | Payload | |
|-------------------------------|----------------------------|----------------------------|-------------------|---|
| | | | 1 | 2 |
| 3.2.1.1 | 1 | Payload acronym | SPTL | |
| | 2 | Payload ID | 034(dec) | |
| | 3 | JSC POCC: | | |
| | | a. Acronym | JSC | |
| | b. Source/destination code | 160(oct) (1) | | |
| | 4 | Remote POCC 1: | | |
| | | a. Acronym | SPF2 | |
| | | b. Source/destination code | 226(oct) (2,3) | |
| | 5 | Remote POCC 2: | | |
| a. Acronym | | | | |
| | b. Source/destination code | | | |

Notes: (1) Commands from JSC have a source code of 007.

(2) Required for telemetry playback.

(3) Commands from SPF2 have a source code of 207.

Table 1-2.- JSC INTERNAL DATA ROUTING REQUIREMENTS

a. Telemetry

Telemetry (TLM) data (is/is not) required to be routed within the Mission Control Center (MCC). Routing requirements are indicated in this table as Required (RQ) or Not Required (NR).

| Instruction reference section | Item no. | TLM data type | JSC facility | | | | |
|-------------------------------|----------|---------------|---------------|--------|-----|----------|--------|
| | | | JSC POCC EGSE | | | CSR EGSE | |
| | | | RS 232 | RS 422 | ECL | RS 232 | RS 422 |
| 3.2.1.3 | 1 | PDI serial | | RQ | | | NR |
| | 2 | PDI block | | | | | |
| 3.2.1.4 | 3 | PPF serial | | | | | |
| | 4 | PPF block | | | | | |

Notes: (1) One data line per payload is available at the CSR. Data can be transmitted in either serial or block mode.

(2) PDI and Orbiter parameters are available at the MCC workstations. Selection of the parameters for display is documented in the PIP, and Annex 4.

Table 1-2.- JSC INTERNAL DATA ROUTING REQUIREMENTS (Concluded)

b. Independent Payload Data Streams (IPDS)

Instruction reference section 3.2.1.7

IPDS data routing to CIP (RQ/NR): NR *

c. Command

Instruction reference section 3.2.2

1. Command from JSC POCC EGSE (RQ/NR): RQ *

2. Command from JSC POCC workstation (RQ/NR):
(Buildable or Prestored) NR

3. Command I/F (MDM, PSP, SSI): PSP

Note: MCC prestored commands are documented via Annex 4.

d. Customer Ancillary Service (CAS)

Instruction reference section 3.2.1.5

CAS data routing to CIP (RQ/NR): RQ

Note: Payload Customers must list their required CAS parameters in the PIP, section 8; and in the POCC Annex 5, in Part IV.

*Nonstandard service

Table 1-3.- EXTERNAL DATA ROUTING REQUIREMENTS - ORBITER DOWNLINK TELEMETRY, COMMAND, AND TRAJECTORY

External data routing (is/is not) required. Data routing requirements are indicated in this table as RQ or NR.

| Instruction reference section | Item no. | Data type | Remote POCC 1 (GSFC) | Remote POCC 2 (GSFC) |
|-------------------------------|----------|---|----------------------|----------------------|
| 3.2.1.3 | 1 | PDI: | | |
| | | a. Block | RQ | RQ |
| | | b. Serial | NR | NR |
| 3.2.1.4 | 2 | PPF block | RQ | NR |
| 3.2.1.5 | 3 | CAS Data* | RQ | NR |
| 3.2.1.6 | 4 | Status block | RQ | NR |
| 3.2.2 | 5 | Remote POCC commanding mode: | | |
| | | a. 4800 bit NASCOM block: | | |
| | | 1. MDM (X) | RQ | NR |
| | | 2. PSP () | | |
| | | 3. SSI () | | |
| | | b. 128 kbps uplink () | NR | NR |
| 3.2.2.2 | 6 | R/T commands: | | |
| | | a. History | RQ | NR |
| | | b. Rate-NASCOM blk/sec (default equals 8) | 8 | NR |
| 3.2.3 | 7 | Trajectory data I/F services: | | |
| 3.2.3.1 | | a. TX operational state vectors | RQ | NR |
| | | Rate-NASCOM blk/sec (default equals 5) | 5 | NR |

Table 1-3.- EXTERNAL DATA ROUTING REQUIREMENTS - ORBITER DOWNLINK TELEMETRY, COMMAND, AND TRAJECTORY (Concluded)

| Instruction reference section | Item no. | Data type | Remote POCC 1 (GSFC) | Remote POCC 2 (GSFC) |
|-------------------------------|----------|---|----------------------|----------------------|
| 3.2.3.2 | | b. TX planning state vectors | RQ | NR |
| 3.2.3.3 | | c. TX operational attitude | RQ | NR |
| 3.2.3.4 | | d. TX planning attitude | RQ | NR |
| 3.2.3.5 | | e. RCV payload state vectors from (remote POCC acro): | RQ | NR |
| | | - Rate-NASCOM blk/sec | 1 | NR |
| | | - TCP/IP | GSFC/FDF | NR |

* Payload Customers must list their required CAS parameters in the PIP, section 8; and in the POCC Annex 5, in Part IV.

Table 1-4.- EXTERNAL COMMUNICATIONS ROUTING

External communications service (is/is not) required. The services required by the Remote POCC 1 and/or POCC 2 are indicated in this table as RQ or NR. For Transmission Control Protocol/Internet Protocol (TCP/IP) and Facsimile (FAX) services, enter the Uniform Resource Locator (URL) and station number in the applicable columns.

| Instruction reference section | Item no. | Service | Remote POCC 1 (GSFC) | Remote POCC 2 (GSFC) |
|-------------------------------|----------|--|----------------------|----------------------|
| 3.2.4 | 1 | Standard voice | | |
| | | Loops: | | |
| | | a. A/G 1 | RQ | NR |
| | | b. A/G 2 | RQ | NR |
| | | c. FLT DIR | RQ | NR |
| | | d. MCC Coord | RQ | NR |
| | | e. Ops Action | RQ | NR |
| | | f. Ops Support | RQ | NR |
| 3.2.4 | 2 | g. Pgm Mgr | RQ | NR |
| | | h. Prime Ops | RQ | NR |
| 3.2.4 | 2 | Dedicated voice loop (REMFAC): HST COORD | RQ | NR |
| 3.2.5 | 3 | Video: | | |
| | | a. NASA SELECT | RQ | NR |
| | | b. Orbiter Downlink: | | |
| | | 1. Color converted | NR | NR |
| | | 2. Field sequential | NR | NR |
| | | 3. Digital TV | NR | NR |
| 3.2.6 | 4 | Orbiter Communications Adapter (OCA): data interface 128 kbps | RQ | NR |
| 3.2.7 | 5 | Dedicated Facsimile* circuit: POCC station no. (281) 483-XXXX | RQ | NR |

Table 1-4.- EXTERNAL COMMUNICATIONS ROUTING (Concluded)

| Instruction reference section | Item no. | Service | Remote POCC 1 (GSFC) | Remote POCC 2 (GSFC) |
|-------------------------------|----------|--|----------------------|----------------------|
| 3.2.8 | 6 | Communications provided by: Customer () NASA* (X) | <hr/> RQ | <hr/> NR |

*Nonstandard service

- Notes:
1. Use of MCC OCA is documented via the Joint Operations Interface Procedure (JOIP).
 2. MCC FAX services other than a dedicated circuit via NASA Communication (NASCOM) are documented in this POCC Annex 5.

Table 1-5.- FACILITIES AND SUPPORT SERVICE

Facility and support service (is/is not) required. Those services required are indicated in this table as RQ or NR.

| Instruction reference section | Item no. | Facility/service | RQ/NR |
|-------------------------------|----------|--|-------|
| 3.2.9.1 | 1 | Local support and interfaces: | |
| | | a. TSC | NR |
| | | b. CAS RT(X) PF(X) | RQ(1) |
| | | c. ODRC | RQ |
| 3.2.9.2 | 2 | External support and interfaces: | |
| | | a. SPIF (GSFC) | NR * |
| | | b. SN (GSFC) | RQ * |
| | | c. IPDS (GSFC) | RQ * |
| | | d. MCC/MSFC POCC I/F | NR |
| | | e. MCC/HOSC I/F (MSFC) | NR ** |
| | | f. EDTS (MSFC) | NR ** |
| | | g. STAT MUX (WSGT) | NR ** |
| 3.2.10 | 3 | Testing support Remote POCC I/F testing*** Test data source: High density source media () Payload data source media (X) | RQ |

*Nonstandard service

**Nonstandard service for non-MSFC managed missions

***Command validation test should include hazardous and nonhazardous commands

Note: (1) Near real-time CAS data will be available through the Orbiter Data Reduction Center (ODRC).

Table 2-1.- DATA CHARACTERISTICS

Instruction reference section 4.1.1

Payload ID*: 034

| Item TLM no. description | No. of PDI formats | | | | | | | |
|--|--------------------|------------|------------|------------|-------------|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1. PDI data rate (Kbps): <u>X</u> (Mbps): | 32 | 4 | 4 | 4 | .500 | | | |
| 2. PDI mode (1, 2, 3, 4) | <u>1,3</u> | <u>1,2</u> | <u>1,3</u> | <u>1,3</u> | <u>1,3</u> | | | |
| 3. MCC PDI** percent tolerance (1.00-9.99): | <u>N/A</u> | | | | | | | |
| 4. PDI status register (RQ, NR): | <u>NR</u> | | | | | | | |
| 5. IPDS data rate (kbps): <u>X</u> (Mbps): | <u>1024</u> | <u>32</u> | <u>4</u> | <u>4</u> | <u>.500</u> | | | |
| TDRS channel (2 or 3): | <u>2,3</u> | <u>2,3</u> | <u>2,3</u> | <u>2,3</u> | <u>2,3</u> | | | |
| 6. Simultaneous PDI DL formats***:(Yes/No) <u>NO</u> . | | | | | | | | |

*One table is required for each payload ID.

**Default tolerance is 1.00 percent for serial data. Not applicable for block data.

***State here if simultaneous PDI downlink formats from Annex 4 are required.

Table 3-1.- JSC POCC CUSTOMER OPERATOR POSITION REQUIREMENTS SUMMARY (Sample)

| Customer operator position (Title) | No. per shift | POCC location (room no.) | Number of consoles, tables | Orbiter data required? | TLM data required? | EFN system? | Notes |
|------------------------------------|---------------|--------------------------|----------------------------|------------------------|--------------------|-------------|-------|
| MSTRS | 4 | 212 | 2 Tables | | | | |
| MGM | 4 | 212 | 2 Tables | | Yes | | |
| ADSEP | 2 | 212 | 1 Table | | | | |
| SAMS | 4 | 212 | 2 Tables | | Yes | | |
| FIM | 1 | 217 | 1 Console | | | | |
| HST Program | 3 | 217 | 1 Console | | | Yes | |
| HST Project | 6 | 217 | 1 Console | | | Yes | |
| Photo/TV | 1 | 217 | 1 Console | | | Yes | |
| MIM | 1 | 217 | 1 Console | | | Yes | 2 |
| SMM | 4 | 217 | 1 Console | | | Yes | |
| Systems | 6 | 217 | 1 Console | | | Yes | |
| System Overflow | 1 | 217 | 1 Console | | | Yes | |
| VIP | 2 | 217 | 1 Console | | | Yes | |
| CAD | 1 | 3301 | 3 Tables | | | Yes | |
| Contamination | 2 | 3301 | 3 Tables | | | Yes | |
| EVA | 11 | 3301 | 4 Console | | | Yes | 3 |
| HST | 2 | 3301 | 3 Tables | | | Yes | |
| ORU | 2 | 3301 | 1 Table | | | Yes | |
| SSE | 10 | 3301 | 4 Console | | | Yes | 3 |
| Thermal | 2 | 3301 | 2 Tables | | | | 1 |
| VIPR/MIMS | 2 | 3301 | 2 Tables | | | Yes | 3 |
| | | | | | | | |

TOTAL PER SHIFT 71

- Notes: (1) Shares with ORU.
 (2) Shares with FIM.
 (3) Need two EFN PCs.

Table 3-2.- JSC INVENTORY OF POCC EGSE and APPLICATION SUBMITTAL (Sample)

| EGSE no. | EGSE equipment | POCC room no. | Operator position | Application | Notes |
|----------|----------------------|---------------|-------------------|-------------------------------|---------------------|
| 1 | HST PC | 217 | VIP | Access to ISP data | Stand Alone |
| 2 | HST Laptop | 217 | HST Program | Access to ISP data | |
| 3 | HST Desktop Computer | 217 | HST Program | Access to ISP data | |
| 4 | HST Desktop Computer | 217 | HST Program | Access to ISP data | |
| 5 | HST Desktop Computer | 217 | HST Program | Access to ISP data | |
| 6 | HST Desktop Computer | 217 | HST Program | Access to ISP data | |
| 7 | HST Desktop Computer | 217 | HST Program | Access to ISP data | |
| 8 | HST Laptop | 217 | HST Project | Access to ISP data | Stand Alone |
| 9 | HST PC/Mac | 217 | Systems Overflow | Access to ISP data | |
| 10 | HST PC/Mac | 217 | Photo/TV | Access to ISP data | |
| 11 | HST Desktop Computer | 217 | Photo/TV | Access to ISP data | |
| 12 | HST PC/Mac | 217 | SMM | Access to ISP data | |
| 13 | HST Desktop Computer | 217 | Systems | Access to ISP data | |
| 14 | HST Desktop Computer | 217 | Systems | Access to ISP data | |
| 15 | HST PC/Mac | 217 | Systems | Access to ISP data | |
| 16 | HST Desktop Computer | 217 | SMM | Access to ISP data | |
| 17 | HST Desktop Computer | 3301 | CAD | Access to ISP data | Connected to No. 21 |
| 18 | HST Lazier Printer | 3301 | CAD | Office-type Work | Connected to No. 17 |
| 19 | HST VCR | 3301 | SSE | Record Orbiter Video downlink | |
| 20 | HST TV Monitor | 3301 | SSE | Used for VCR Tuner | Connected to No. 19 |
| 21 | HST Ethernet Hub | 3301 | CAD | Access to ISP data | |
| 22 | MSTRS TV Monitor | 212 | MSTRS | View experiment video | Connected to No. 23 |
| 23 | MSTRS VCR | 212 | MSTRS | Record experiment video | |
| 24 | MSTRS Laptop PC | 212 | MSTRS | Access to INS | |
| 25 | MGM Printer | 212 | MGM | Office-type Work | Connected to No. 26 |
| 26 | MGM Desktop PC | 212 | MGM | View experiment TLM | |

Table 3-2.- JSC INVENTORY OF POCC EGSE and APPLICATION SUBMITTAL (Sample)
(Concluded)

| EGSE no. | EGSE equipment | POCC room no. | Operator position | Application | Notes |
|-----------------|-----------------------|----------------------|--------------------------|---------------------------------------|---------------------|
| 27 | ADSEP Laptop PC | 212 | ADSEP | Stand Alone | |
| 28 | SAMS TV Monitor | 212 | SAMS | View experiment video | Connected to No. 29 |
| 29 | SAMS VCR | 212 | SAMS | Record experiment video | |
| 30 | SAMS Laptop PC | 212 | SAMS | View experiment TLM and send commands | |

**Table 3-3.- JSC INVENTORY OF POCC EGSE INTERFACE REQUIREMENTS SUBMITTAL
(Sample)**

| EGSE no. (cont) | POCC Room No. | Operator position Title | Network requirements | | | Video interface requirements | | | | | | Services/interfaces | | | | | Network wiring & connectivity (EGSE no.) (4) |
|-----------------------|---------------------|-------------------------------|-------------------------|-----|-------------------------|------------------------------|---------------|-----|----------------|--|--|---------------------|-----|-----|--------------------|--------------------|--|
| | | | Stand Alone LAN | INS | Analog Phone Line | TV Monitor (1) | | | VCR Record (1) | | | Timing | CAS | CMD | Orbiter OD Data | Orb/PLD TLM (2) | |
| RF | Base- Band | DTV | | | | RF | Base- Band | DTV | | | | | | | | | |
| 1 | 217 | VIP | Yes | | Yes | | | | | | | | | | | | Access to ISP data |
| 2 | 217 | HST PROGRAM | Yes | | | | | | | | | | | | | | Access to ISP data |
| 3 | 217 | HST PROGRAM | Yes | | | | | | | | | | | | | | Access to ISP data |
| 4 | 217 | HST PROGRAM | Yes | | | | | | | | | | | | | | Access to ISP data |
| 5 | 217 | HST PROGRAM | Yes | | | | | | | | | | | | | | Access to ISP data |
| 6 | 217 | HST PROGRAM | Yes | | | | | | | | | | | | | | Access to ISP data |
| 7 | 217 | HST PROGRAM | Yes | | | | | | | | | | | | | | Access to ISP data |
| 8 | 217 | HST Project | Yes | | | | | | | | | | | | | | Access to ISP data |
| 9 | 217 | Systems Overflow | Yes | | | | | | | | | | | | | | Access to ISP data |
| 10 | 217 | Photo/TV | Yes | | | | | | | | | | | | | | Access to ISP data |
| 11 | 217 | Photo/TV | Yes | | | | | | | | | | | | | | Access to ISP data |
| 12 | 217 | SMM | Yes | | | | | | | | | | | | | | Access to ISP data |
| 13 | 217 | Systems | Yes | | | | | | | | | | | | | | Access to ISP data |
| 14 | 217 | Systems | Yes | | | | | | | | | | | | | | Access to ISP data |
| 15 | 217 | Systems | Yes | | | | | | | | | | | | | | Access to ISP data |
| 16 | 217 | SMM | Yes | | | | | | | | | | | | | | Connected to #2 |
| 17 | 3301 | CAD | Yes | | | | | | | | | | | | | | Connected to #21 |
| 18 | 3301 | CAD | Yes | | | | | | | | | | | | | | Connected to #17 |
| 19 | 3301 | SSE | Yes | | | | | | Yes | | | | | | | | Access to ISP data |
| 20 | 3301 | SSE | Yes | | | | | | | | | | | | | | Connected to #19 |

**Table 3-3.- JSC INVENTORY OF POCC EGSE INTERFACE REQUIREMENTS SUBMITTAL
(Sample) (Concluded)**

| EGSE no. (cont) | POCC Room No. | Operator position Title | Network requirements | | | Video interface requirements | | | | | | Services/interfaces | | | | | Network wiring & connectivity (EGSE no.) (4) | |
|-----------------------|---------------------|-------------------------------|-------------------------|-----|-------------------------|------------------------------|---------------|-----|----------------|---------------|-----|---------------------|-----|-----|--------------------|--------------------|--|-----------------------|
| | | | Stand Alone LAN | INS | Analog Phone Line | TV Monitor (1) | | | VCR Record (1) | | | Timing | CAS | CMD | Orbiter OD Data | Orb/PLD TLM (2) | | Payload IPDS (3) |
| | | | | | | RF | Base- Band | DTV | RF | Base- Band | DTV | | | | | | | |
| 21 | 3301 | CAD | Yes | | | | | | | | | | | | | | | Access to ISP data |
| 22 | 212 | MSTRS | | | | | | | | | | | | | | | | Connected to #23 |
| 23 | 212 | MSTRS | | | | | | | Yes | | | | | | | | | |
| 24 | 212 | MSTRS | Yes | Yes | | | | | | | | | Yes | | | | | RS422 I/F |
| 25 | 212 | MGM | | | | | | | | | | | | | | | | Connected to #26 |
| 26 | 121 | MGM | | | | | | | | | | | | | | Yes | | |
| 27 | 212 | ADSEP | Yes | | Yes | | | | | | | | | | | | | |
| 28 | 212 | SAMS | | | | | | | | | | | | | | | | Connected to #29 |
| 29 | 212 | SAMS | | | | | | | | Yes | | | | | | | | |
| 30 | 212 | SAMS | | | | | | | | | | | | | | Yes | | Ethernet I/F |

Notes:

- (1) RF is "normal" TV - i.e. NASA Select, CNN, Weather Channel, Orbiter Downlink, etc. Baseband TV is Orbiter Downlink with time-tag.
- (2) TLM data downlinked via Orbiter OD and "strip-n-ship" to POCC.
- (3) Independent Payload Data Stream (i.e. Ku-band bent pipe, etc.)
- (4) This EGSE connected to EGSE no(s). Provide a wiring diagram of Connectivity and Services. (Reference Appendix A, figure 3-1 thru 3-4).
- (5) Payload Customer data flow diagram attached (reference Appendix A, figure 3-5).

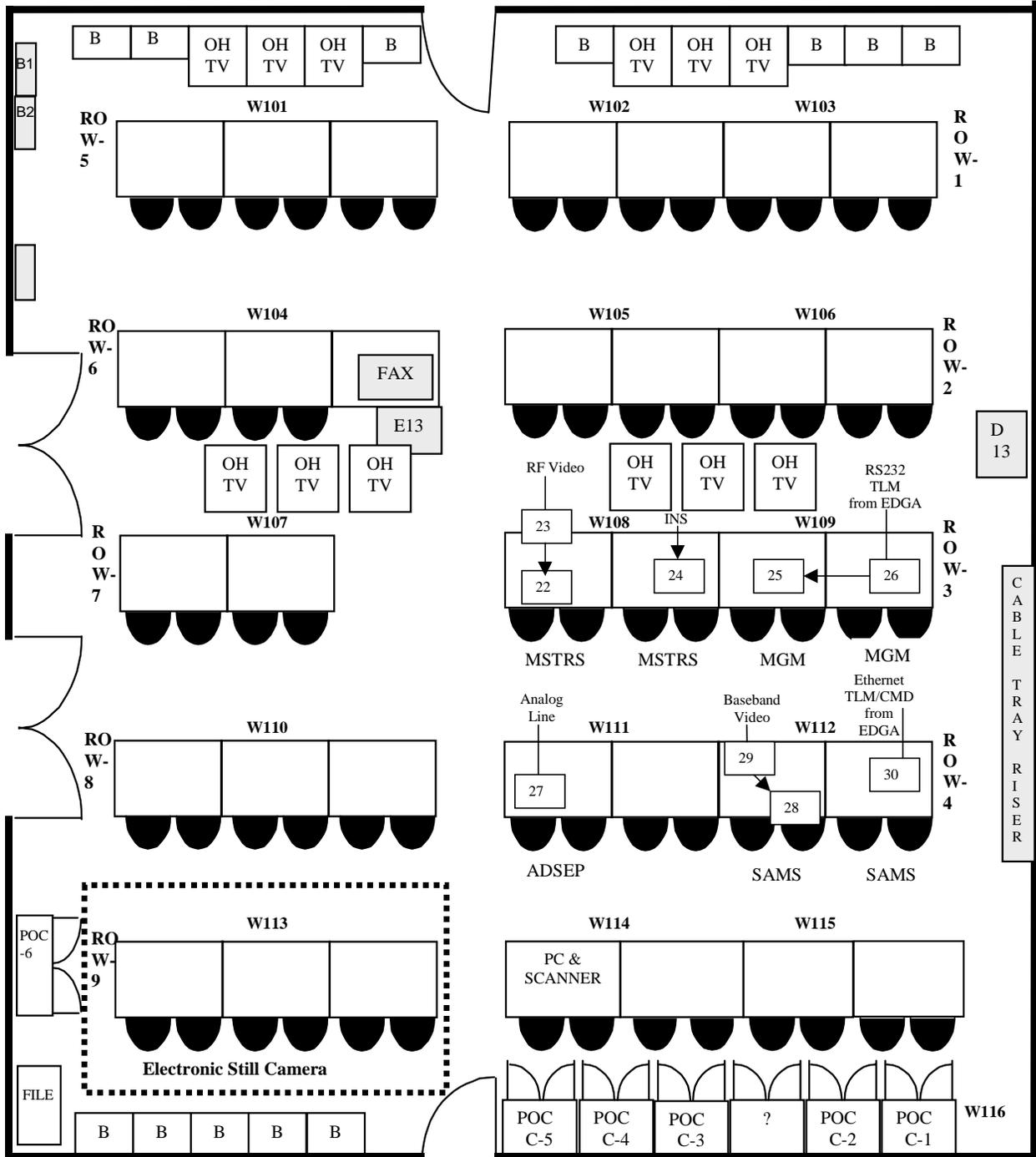


Figure 3-1.- JSC POCC Room No. 212 layout. (Sample)

HST POCC - ROOM 217 (STS-109)

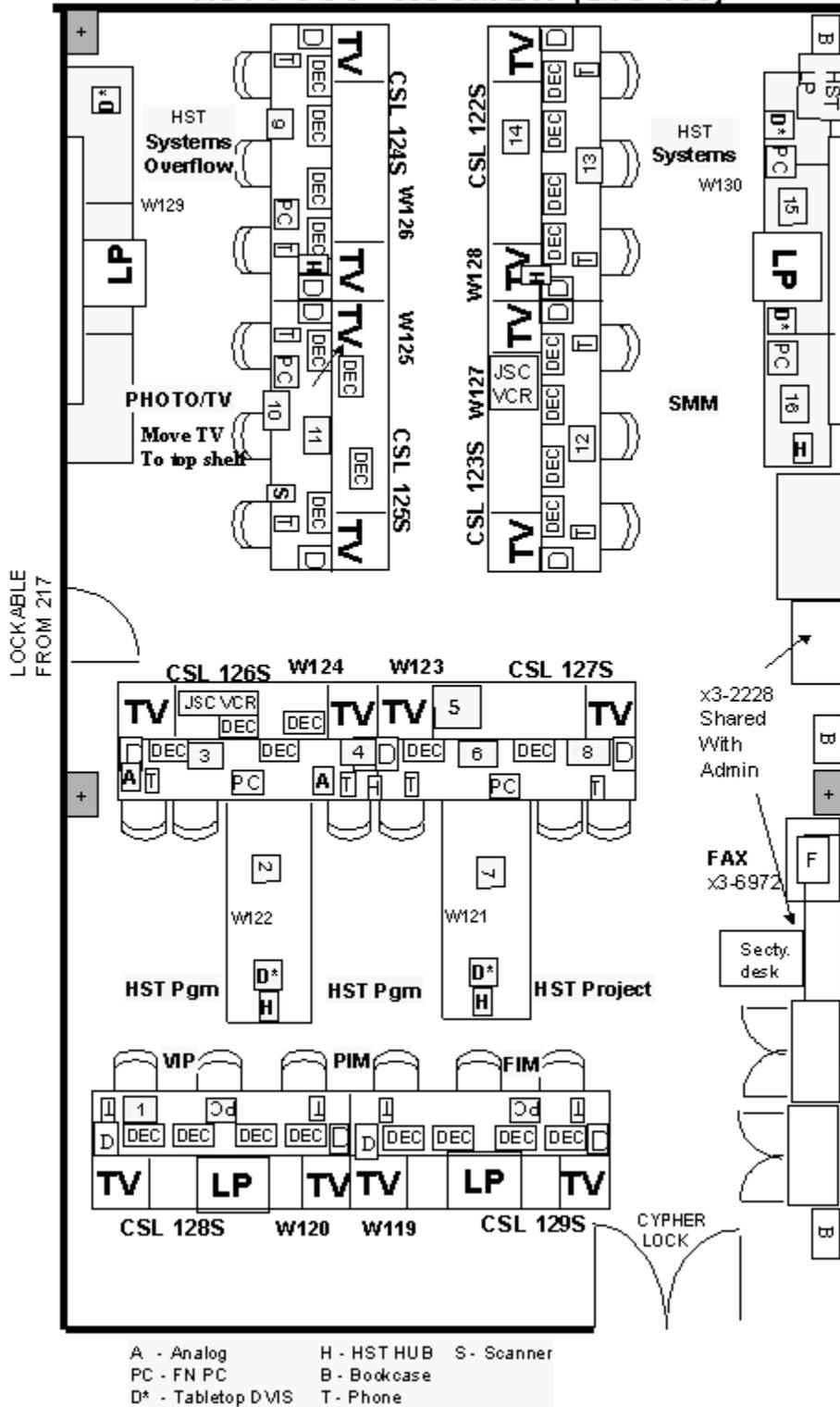
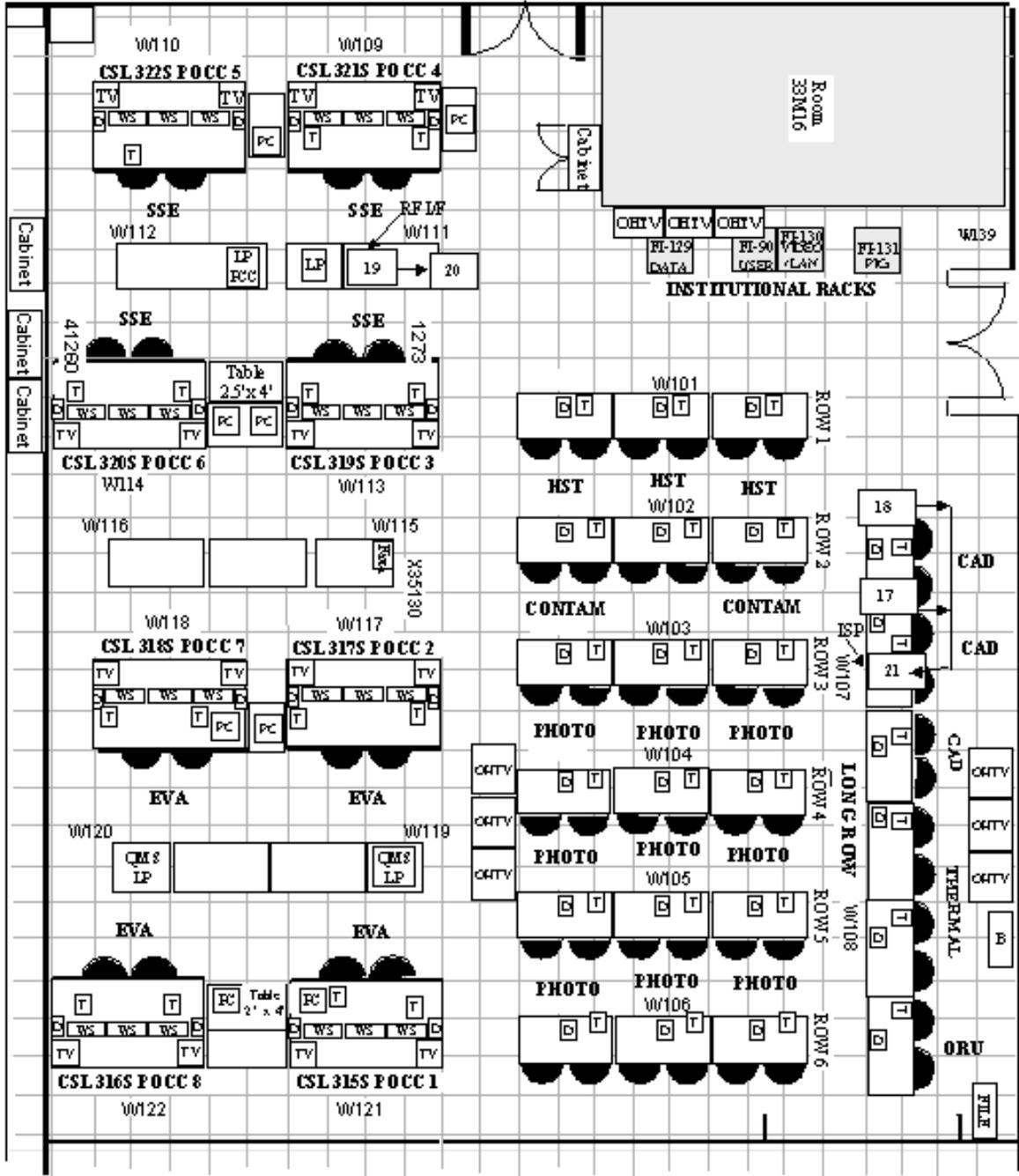


Figure 3-2.- JSC POCC Room No. 217 layout. (Sample)



D=DMIS Display
 WS=MCC Workstation/Monitor
 T= Telephone
 CHTV= Central Television
 PC= MCC PC
 W=Custom LFPanel(Wall Box)

Figure 3-3.- JSC POCC Room No. 3301 layout. (Sample)

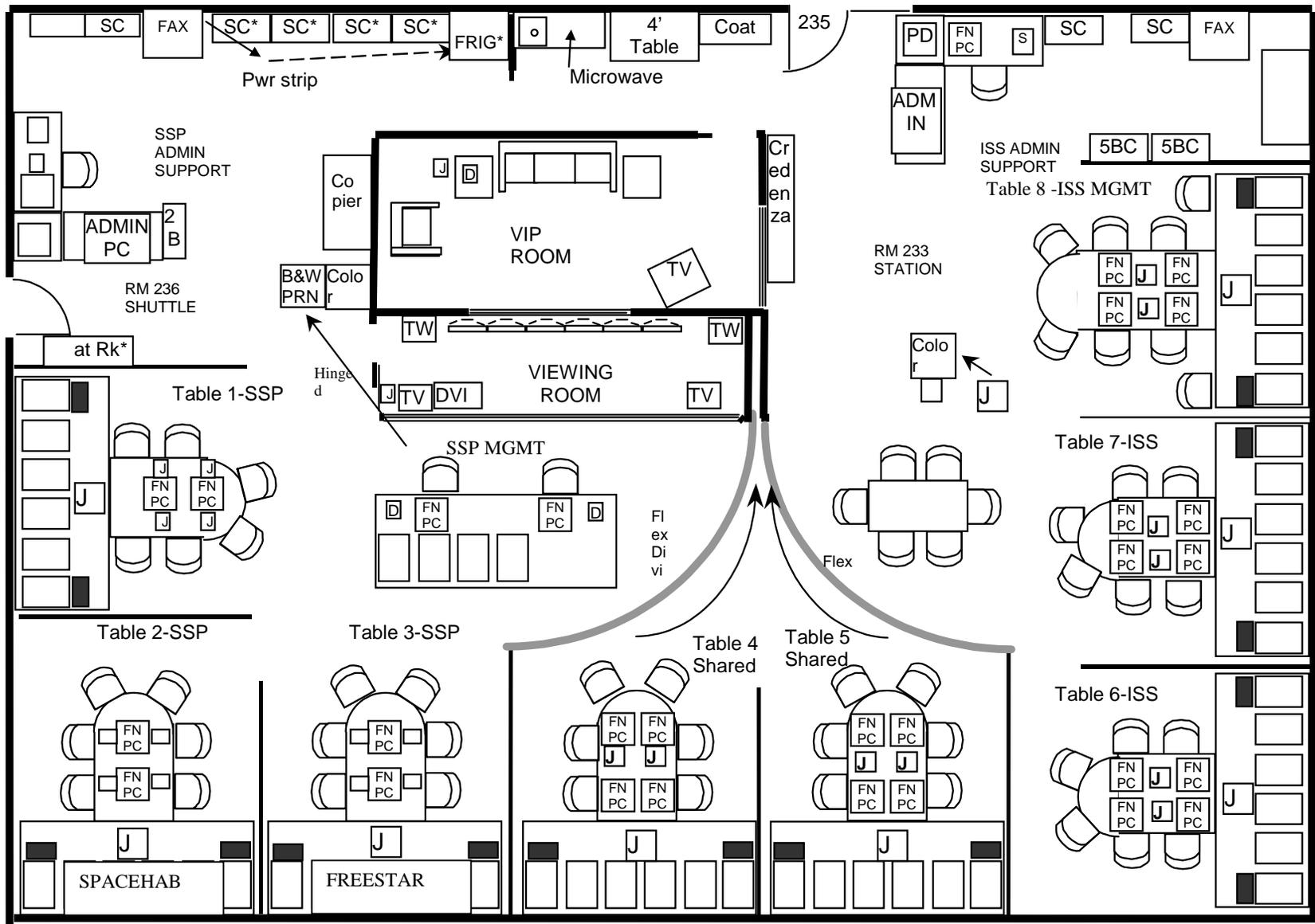


Figure 3-4.- JSC CSR No. 236 layout. (Sample)

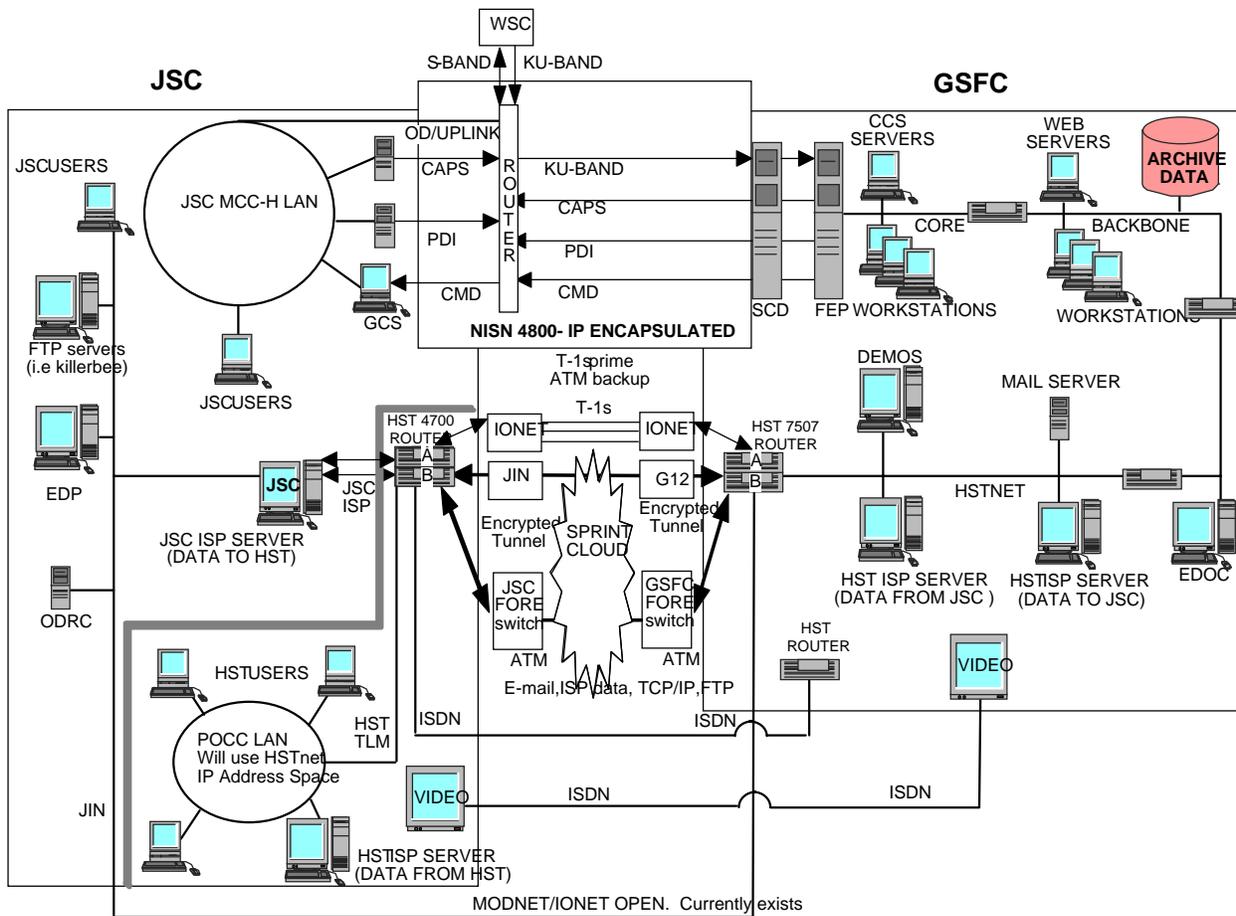


Figure 3-5.- Payload customer data flow. (Sample)

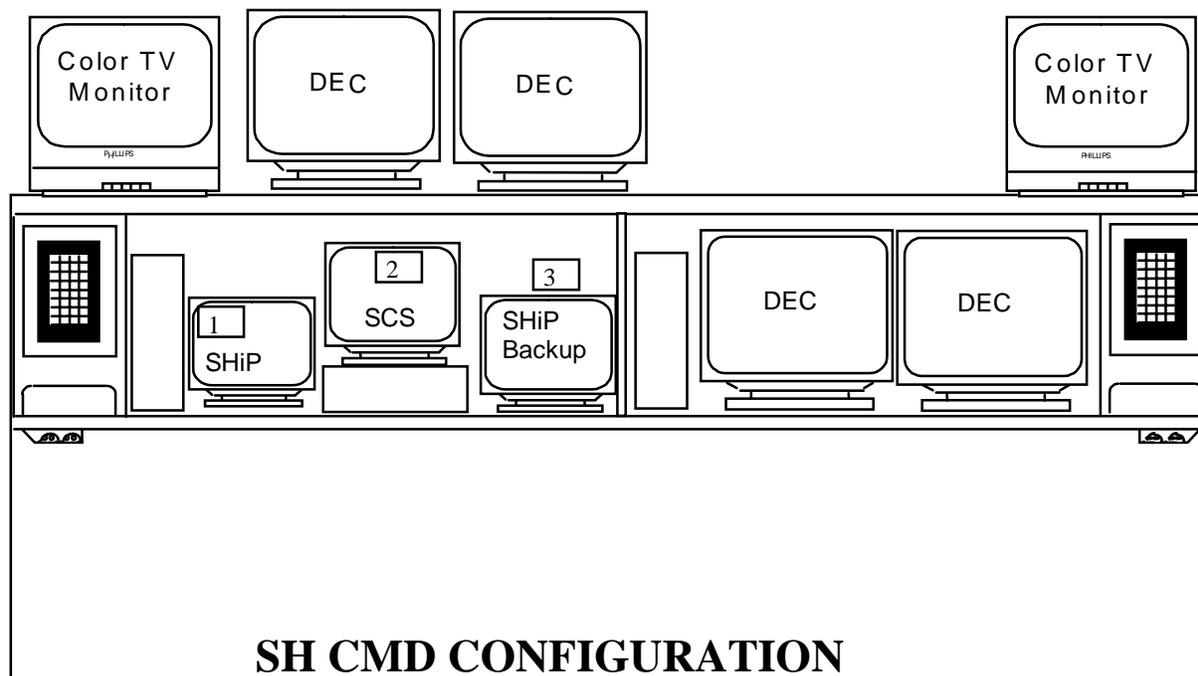
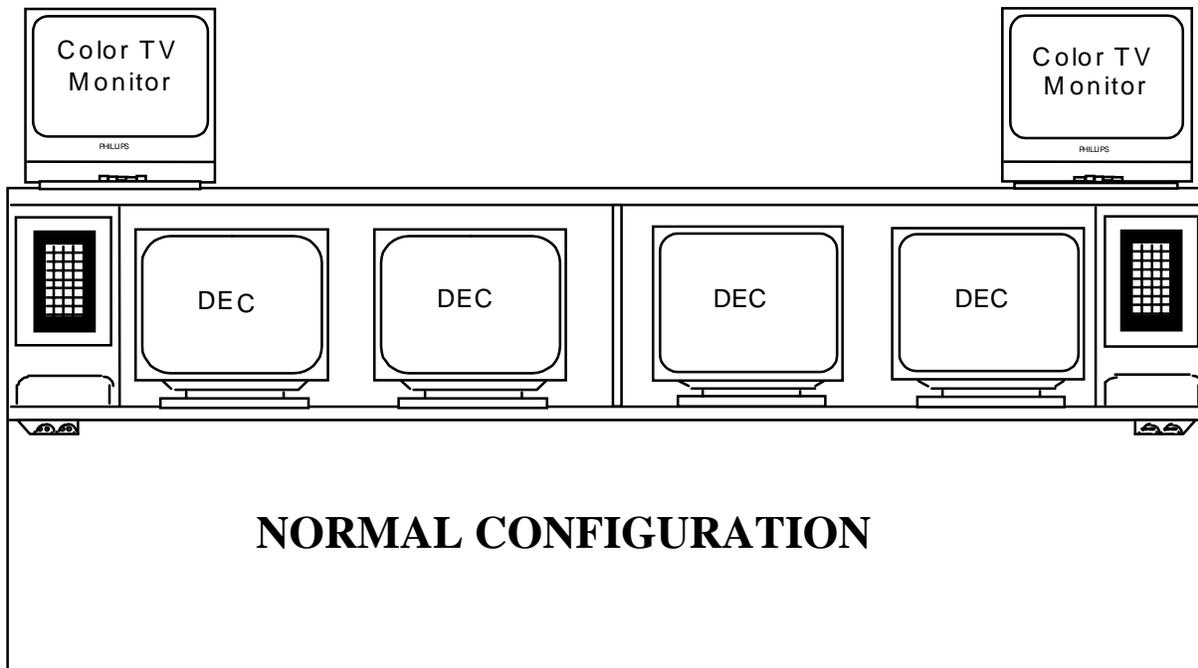


Figure 3-6.- JSC POCC console layout - Console 124S - B30M, Room No. 217. (Sample)

4.0 PART IV - INTERFACE NONSTANDARD SERVICE REQUIREMENTS (SAMPLE)

4.1 Introduction

This part of the Payload Operations Control Center (POCC) Annex 5 contains detailed requirements for nonstandard services external to the Lyndon B. Johnson Space Center (JSC) Mission Control Center (MCC). External interface nonstandard services defined in section 8.5 of the Payload Integration Plan (PIP) must be detailed here to a level that allows the MCC and/or NASA Integrated Services Network (NISN) to design, develop, and implement these additional capabilities. (Level C Requirements - reference NSTS 21063-POC-CAP, section 10.3.1.)

4.2 External Interface Nonstandard Services

List the external interface optional services by function:
(i.e., telemetry data, command, trajectory, video, voice, etc.)

4.2.1 Data Circuits.-

4.2.1.1 Provide access to SPACEHAB Subsystem data between the SPACEHAB POCC in the JSC POCC and Boeing-Huntsville in Huntsville, Alabama.

4.2.1.2 Provide SPACEHAB Payload Data Interleaver (PDI) data service from the John F. Kennedy Space Center (KSC) landing facility to the KSC Firing Room. This service is required from Orbiter landing (wheels stop) through landing plus 4 hours or Orbiter power down.

4.2.2 External Data Flow Testing.-

4.2.2.1 Provide interface to support a readiness data flow test from JSC/Electronic System Test Laboratory (ESTL) Building 44 to MCC/POCC Building 30M (hard-line) beginning 5 days prior to the Verification and Validation Test (which occurs approximately at Launch minus (L-)14 days). The STS-107 software load at MCC is requested to support this test. SPACEHAB will support this test with flight (qualification units) equipment at ESTL and mission support Ground Support Equipment (GSE) at MCC. This requirement is for JSC to document the data flow configuration for SPACEHAB. SPACEHAB GSE DTA and (timing) is very sensitive to the different cable lengths.

4.2.3 Video.- None required

4.2.4 Voice Loops.-

- a. Extend 19 voice loops to KSC Hangar "L", EMA Room 180 as defined in table 2-4.
- b. Extend 17 voice loops to Marshall Space Flight Center (MSFC) Building 4663 (Room TBD) as defined in table 2-4.

4.2.5 Television.-

4.2.5.1 Extend NASA Select television and raw Orbiter video downlink to KSC Hangar "L" Room 180 EMA and MSFC, Building 4663.

4.2.6 Miscellaneous.- None

4.3 Internal Interface Nonstandard Services

List the internal interfaces nonstandard services by function: (i.e., EGSE, network requirements, video, services/interfaces, network wiring/connectivity, voice loop requirements, etc.).

4.3.1 Data Circuits.-

4.3.1.1 Provide the CAS data parameters listed below to JSC Building 30/MCC for the MSTRS payload.

| Parameter | MSID |
|------------------------|-------------|
| M50 State Vector X | V90H4277C |
| M50 State Vector Y | V90H4278C |
| M50 State Vector Z | V90H4279C |
| M50 Velocity Vector X | V90L4281C |
| M50 Velocity Vector Y | V90L4282C |
| M50 Velocity Vector Z | V90L4283C |
| State Vector Time Tag | V90W4285C |
| Attitude Quaternion E1 | V90U2240C |
| Attitude Quaternion E2 | V90U2241C |
| Attitude Quaternion E3 | V90U2242C |
| Attitude Quaternion E4 | V90U2243C |
| GPC GMT-Clock time | V91M1999P |

4.3.1.2 Provide CAS data (six parameters) interface to SPACEHAB Experiments (ARMS, BDS-05, AST-10/1 & 10/2, PhAB-4 and ZCG-1) GSE at JSC Building 30/MCC.

4.3.1.3 Provide one additional 100 baseT Ethernet line from WB107 for CM-2 on row one, Room 3301.

4.3.2 Internal Data Flow Testing.-

4.3.2.1 Provide interface to support a data flow test 2 weeks prior to first Joint Integrated Simulation (JIS). Specifics of this test to be provided after September 2001 Payload Operations Work Group (POWG).

4.3.2.2 Provide interface to support a data flow and command test during all JISs. Specifics of this test to be provided after September 2001 POWG.

4.3.3 Video.- None required

4.3.4 Voice Loops.-

4.3.4.1 Provide dedicated external voice loops for SPACEHAB and their customers from JSC to KSC/MSFC as defined in table 2-4.

4.3.5 Television.- None required

4.3.5.1 Provide Baseband Television (TV) Orbiter downlink with Greenwich Mean Time (GMT) time tag in upper right-hand corner of video screen on National Aeronautics and Space Administration (NASA) channel No. 60.

4.3.6 Miscellaneous.-

4.3.6.1 Provide rooms to accommodate three additional paper simulations at JSC Building 30/MCC with voice loop support.

5.0 PART V - JSC RESPONSE TO CUSTOMER INTERFACE NONSTANDARD SERVICE REQUIREMENTS (SAMPLE)

5.1 Introduction

This part of the annex provides information required at the MCC POCC and Remote POCC to design and develop compatible interfaces. The nonstandard services as described in Part IV of this annex will be provided by the SSP as indicated.

5.2 External Interface Nonstandard Service Response

5.2.1 Data Circuits.-

5.2.1.1 SSP will provide access to SPACEHAB subsystem data between the SPACEHAB POCC in the JSC POCC and Boeing-Huntsville in Huntsville, Alabama.

5.2.1.2 SSP will provide SPACEHAB PDI data service from the KSC landing facility to the KSC Firing Room. This service is required from Orbiter landing (wheels stop) through landing plus 4 hours or Orbiter power down.

5.2.2 External Data Flow Testing.-

5.2.2.1 SSP will provide interface to support a readiness data flow test from JSC/ESTL Building 44 to MCC/POCC Building 30M (hard line) beginning 5 days prior to the Verification and Validation Test (which occurs approximately at L-14 days). The STS-107 software load at MCC is requested to support this test. SPACEHAB will support this test with flight (Qualification units) equipment at ESTL and mission support GSE at MCC. This requirement is for JSC to document the data flow configuration for SPACEHAB.

5.2.3 Video.- None required

5.2.4 Voice Loops.-

5.2.4.1 SSP will extend 19 voice loops to KSC Hangar "L", EMA Room 180 as defined in table 2-4.

5.2.4.2 SSP will extend 17 voice loops to MSFC Building 4663 as defined in table 2-4.

5.2.5 Television.-

5.2.5.1 SSP will extend NASA Select television and raw Orbiter video downlink to KSC Hangar "L" Room 180 EMA and MSFC, Building 4663.

5.2.6 Miscellaneous.- None required

5.3 Internal Interface Nonstandard Services

JSC will provide the following internal interfaces.

5.3.1 Data Circuits.-

5.3.1.1 SSP will provide the CAS data parameters listed in section 4.3.1 to JSC Building 30/MCC for the MSTRS payload.

5.3.1.2 SSP will provide CAS data (six parameters) interface to SPACEHAB Experiments (ARMS, BDS-05, AST-10/1 & 10/2, PhAB-4 and ZCG-1) GSE at JSC Building 30/MCC.

5.3.1.3 SSP will provide one additional 100base T Ethernet line from WB107 for CM-2 on row one, Room 3301.

5.3.2 Internal Data Flow Testing.-

5.3.2.1 SSP will provide interface to support a data flow test 2 weeks prior to the first JIS. Specifics of this test to be provided after the September 2001 POWG.

5.3.2.2 SSP will provide interface to support a data flow and command test during all JISS. Specifics of this test to be provided after the September 2001 POWG.

5.3.3 Video.-

5.3.3.1 SSP will provide baseband TV Orbiter downlink with GMT time tag in upper right-hand corner of video screen on NASA channel No. 60.

5.3.4 Voice Loops.-

5.3.4.1 SSP will provide dedicated external voice loops for SPACEHAB and their customers from JSC to KSC and MSFC as defined in table 2-4.

5.3.5 Television.- None required

5.3.6 Miscellaneous.-

5.3.6.1 SSP will provide rooms to accommodate three additional paper simulations at JSC Building 30/MCC with voice loop support. These simulations are to be 8-10 hours in duration.

APPENDIX B

POCC ANNEX 5 - BLANK BOOK

PAYLOAD INTEGRATION PLAN

PAYLOAD OPERATIONS CONTROL CENTER Annex 5

MCC/JSC POCC/REMOTE POCC INTERFACE REQUIREMENTS

PAYLOAD

ANNEX VERSION

DATE

DESCRIPTION OF CHANGES TO
PAYLOAD OPERATIONS CONTROL CENTER ANNEX 5
MCC/JSC POCC/REMOTE POCC INTERFACE REQUIREMENTS
(PAYLOAD NAME)

| CHANGE NO. | DESCRIPTION/AUTHORITY | DATE | PAGES AFFECTED |
|---------------|-----------------------|------|-------------------|
| | | | |

PAYLOAD OPERATIONS CONTROL CENTER ANNEX 5

MCC/JSC POCC/REMOTE POCC INTERFACE REQUIREMENTS

(PAYLOAD NAME)

(BASELINE DATE)

PREPARED BY DATE

PAYLOAD REPRESENTATIVE DATE

GSFC INTERFACE REPRESENTATIVE DATE

POCC ANNEX 5 MANAGER DATE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
LYNDON B. JOHNSON SPACE CENTER
HOUSTON, TEXAS

PREFACE

In this document, the Payload Integration Plan (PIP) document will be referred as the PIP, the Mission Integration Plan (MIP), or the Carrier Integration Plan (CIP). This POCC Annex 5 to the PIP defines and details the Lyndon B. Johnson Space Center (JSC) Mission Control Center (MCC) data routing and Remote Payload Operations Control Center (POCC) interface customer requirements levied on the Space Shuttle Program (SSP) Mission Control and Communications resources by payload/name. All requirements contained within the POCC Annex 5 are traceable to the higher level requirements identified in the PIP. In case of variance between the POCC Annex 5 and the PIP, the PIP shall take precedence. Any requirements submitted in this document that are not within scope of the PIP will not be considered binding on the National Aeronautics and Space Administration (NASA) for implementation. The PIP is the formal contract between the customer and SSP implementer. However, this POCC Annex 5, when signed and executed by both the payload representative and the SSP implementer (POCC Annex 5 manager) within the scope of the PIP will constitute the detailed interface agreement between the SSP and the customer for payload operations support.

(POCC) at (POCC location) has been designated as the primary POCC for (payload/name) operations.

Comments or questions relative to this POCC Annex 5 should be directed to the POCC Annex 5 Book Manager, Mission Operations Directorate (MOD), Operations Division/DO, at NASA JSC.

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APPLICABLE DOCUMENTS

The following documents apply directly to this POCC Annex 5 and do not conflict in content or purpose with the interface agreement between customer and implementer:

- a. NSTS XXXXX Payload Integration Plan
- b. NSTS 21063-POC-CAP POCC Capabilities Document
- c. NSTS 21000-A05, Data Requirements for the Payload Operations Control Center Annex 5

The following documents are input data sources required to configure the SSP MCC resources.

Compliance with the data requirements defined in these documents is assumed in this POCC Annex 5:

- a. NSTS XXXXX, Annex 4, Command and Data Annex 4 to the PIP
- b. JSC 27508, Payload Operations Workbook (POW)
- c. USA003624, Payload Operations Control Center (POCC) User Guide
- d. JSC 29234, MOD IT Security & Contingency Plan Processes Document
- e. JPG 2810.1, JSC Center IT Security Procedures and Guideline Document
- f. JSC 24339, Property Control of Experiment Ground Support Equipment (EGSE) at the Lyndon B. Johnson Space Center document

ACRONYMS AND ABBREVIATIONS

The following is a list of generic acronyms and abbreviations. Please provide your payload specific acronyms and/or abbreviations that are contained within this POCC Annex 5:

| | |
|--------|--|
| ACRO | Acronym |
| A/G | Air to Ground |
| BDF | Blocked Data Format |
| BLK | Block |
| bps | bits per second |
| CAP | Command Acceptance Pattern |
| CAS | Customer Ancillary Service (System) |
| Ch | Channel |
| CIP | Customer Interface Panel |
| | Carrier Integration Plan |
| CIR | Cargo Integration Review |
| CLI | Comparison Laboratory Inc. (Interface) |
| CMD | Command |
| COORD | Coordination |
| CR | Change Request |
| CSR | Customer Support Room |
| DAC | Direct Access Channel |
| DFL | Decom Format Load |
| DIR | Director |
| DL | Downlink |
| DOMSAT | Domestic Satellite |
| DRF | Data Requirements Form |
| DTV | Digital Television |
| EBCDIC | Extended Binary Coded Decimal Interchange Code |
| EC | Experiment Computer |
| ECIO | Experiment Computer Input/Output |
| ECL | Emitter Coupled Logic |
| ECOS | Experiment Computer Operating System |
| EGSE | Experiment Ground Support Equipment |
| ESTL | Electronic Systems Test Laboratory |
| ET | Early Testing |
| EXP | Experiment |
| FAX | Facsimile |
| FLT | Flight |
| FMT | Format |
| FOR | Flight Operations Review |
| FTS | Federal Telecommunications System |

| | |
|-------|---|
| GCOS | Ground Computer Operating System |
| GMT | Greenwich mean time |
| GN | Ground Network |
| GPC | General Purpose Computer |
| GSFC | Goddard Space Flight Center |
| | |
| HDRR | High Data Rate Recorder |
| HDT | High Density Tape |
| HOSC | Huntsville Operations Support Center (MSFC) |
| HRM | High Rate Multiplexer |
| | |
| ICB | Integration Control Board |
| ICD | Interface Control Document |
| ID | Identification |
| IIRV | Improved Interrange Vectors |
| ILT | Integrated Load Checkout |
| IMPL | Implementing |
| INS | Information Network System (replaced JIN) |
| IPDS | Independent Payload Data Stream |
| ISDN | Integrated Services Digital Network |
| IUS | Inertial Upper Stage |
| I/F | Interface |
| IP | Integration Plan |
| | Internet Protocol |
| IPT | Integrated Product Team |
| IT | Information Technology |
| IVT | Interface Verification Test |
| | |
| JIN | JSC Information Network (see INS) |
| JIS | Joint Integrated Simulation |
| JOIP | Joint Operations Interface Procedures |
| JPG | JSC Procedures and Guidelines |
| JSC | Lyndon B. Johnson Space Center |
| | |
| kbps | kilo bits per second |
| | |
| LAN | Local Area Network |
| LAU | Launch |
| LJ | Left Justified |
| LNDG | Landing |
| LVLH | Local Vertical/Local Horizontal |
| | |
| M | Monitor |
| Max | Maximum |
| Mb/s | Mega Bits per Second |
| MCC | Mission Control Center (JSC) |
| MCC-H | Mission Control Center-Houston |
| MCC-M | Mission Control Center-Moscow |

| | |
|--------|---|
| MDM | Multiplexer/Demultiplexer |
| MGR | Manager |
| MHz | Megahertz |
| MIM | Mission Integration Manager |
| MIP | Mission Integration Plan |
| MIPS | Mission Integration Planning System |
| MOD | Mission Operations Directorate |
| MPSR | Multipurpose Support Room |
| MSB | Most Significant Bit |
| MSFC | George C. Marshall Space Flight Center |
| MSID | Measurement Stimuli Identification |
| | |
| N | Nonstandard |
| NASA | National Aeronautics and Space Administration |
| NASCOM | NASA Communications (Network) |
| NISN | NASA Integrated Services Network |
| NR | Not Required |
| NTSC | National Television Standards Committee |
| N/A | Not Applicable |
| | |
| OCA | Orbiter Communications Adapter |
| OD | Operational Downlink |
| | Orbiter Downlink |
| ODRC | Orbiter Data Reduction Center (JSC) |
| OITS | Operations Interface Transfer System |
| OPS | Operations |
| | |
| PAM | Payload Assist Module |
| PAO | Public Affairs Office |
| PCD | POCC Capabilities Document |
| PCR | POCC Change Request |
| PDI | Payload Data Interleaver |
| PDRE | Payload Data Recording Equipment |
| PDT | Payload Data Tape |
| PF | Postflight |
| PGM | Program |
| PILS | Payload Integration Library System |
| PIP | Payload Integration Plan |
| PLR | Payload Recorder |
| POCC | Payload Operations Control Center |
| POW | Payload Operations Workbook |
| POWG | Payload Operations Work Group |
| PPF | Payload Parameter Frame |
| PSP | Payload Signal Processor |
| PTRR | POCC Test Results Report |
| P/L | Payload |
| | |
| RCV | Receive |
| REH | Remote Extension Houston (Russian Computers) |

| | |
|---------|---|
| REM | Remote Extension Moscow (American Computers) |
| REMFAC | Remote Facility |
| REV | Revision |
| RJ | Right Justified |
| ROM | Rough Order of Magnitude |
| RQ | Required |
| RT | Real Time |
| | |
| S | Standard |
| SAIL | Shuttle Avionics Integration Laboratory (JSC) |
| SC | Subsystem Computer |
| SCIO | Subsystem Computer Input/Output |
| SDI | Serial Digital Interface |
| SDT | Shuttle Data Tape |
| SEC | Second |
| SER | Serial |
| SIO | Serial Input/Output |
| SMA | Science Monitoring Area (JSC) |
| SN | Space Network |
| SPIF | Shuttle-POCC Interface Facility (GSFC) |
| SR | Sample Rate |
| SSI | Standard Serial Interface |
| SSP | Space Shuttle Program |
| STATMUX | Statistical Multiplexer |
| S/DC | Source/Destination Code |
| S/N | Standard/Nonstandard |
| S/S | Sample per Second |
| | |
| TBD | To Be Determined |
| TBR | To Be Resolved |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TDR | True of Date Rotating (Coordinate System) |
| TDRS | Tracking and Data Relay Satellite |
| TFL | Telemetry Format Load |
| TLM | Telemetry |
| TSC | Telescience Support Center |
| TV | Television |
| TX | Transmit |
| T/M | Talk Monitor |
| | |
| UHF | Ultra High Frequency |
| URL | Uniform Resource Locator |

1.0 PART I - GENERAL SERVICE REQUIREMENTS

1.1 Introduction

This part of the Payload Operations Control Center (POCC) Annex 5 states the general requirements for telemetry, command, trajectory, and communications services to support the payload. The completed checklists within this part provides a positive response for each of the standard services offered and optional services most frequently requested. The required level of detail is described in Section 10 of the POCC Capabilities Document (PCD) for nonstandard services defined in Part IV of this POCC Annex 5.

1.2 Description of Tables

Table 1-1 identifies the payloads and Remote POCC(s). Tables 1-2 through 1-5 contain the actual service checklists applicable to the POCC interfaces and are associated with each functional capability described in the PCD.

The standard service requirements, as indicated in Part I of this POCC Annex 5, will be provided in accordance with the PCD, NSTS 21063-POC-CAP, current issue.

Table 1-1.- POCC/PAYLOAD IDENTIFICATION

This table identifies the payload by acronym and Identification (ID) code (decimal).

Remote POCC acronym(s) and Source/Destination Code (S/DC)(s), (Octal Most Significant Bit (MSB)), are assigned for data identification and routing.

| Instruction reference section | Item no. | Payload/POCC | Payload | |
|-------------------------------|----------|--|---------|---|
| | | | 1 | 2 |
| 3.2.1.1 | 1 | Payload acronym | | |
| | 2 | Payload ID | | |
| | 3 | JSC POCC: a. Acronym b. Source/destination code | | |
| | | | | |
| | 4 | Remote POCC 1: a. Acronym b. Source/destination code | | |
| | | | | |
| | 5 | Remote POCC 2: a. Acronym c. Source/destination code | | |
| | | | | |

Table 1-2.- JSC INTERNAL DATA ROUTING REQUIREMENTS

a. Telemetry

Telemetry (TLM) data (is/is not) required to be routed within the Mission Control Center (MCC). Routing requirements are indicated in this table as Required (RQ) or Not Required (NR).

| Instruction reference section | Item no. | TLM data type | JSC facility | | | | |
|-------------------------------|----------|---------------|---------------|--------|-----|----------|--------|
| | | | JSC POCC EGSE | | | CSR EGSE | |
| | | | RS 232 | RS 422 | ECL | RS 232 | RS 422 |
| 3.2.1.3 | 1 | PDI serial | | | | | |
| | 2 | PDI block | | | | | |
| 3.2.1.4 | 3 | PPF serial | | | | | |
| | 4 | PPF block | | | | | |

Notes: (1) One data line per payload is available at the CSR. Data can be transmitted in either serial or block mode.

(2) PDI and Orbiter parameters are available at the MCC workstations. Selection of the parameters for display is documented in the PIP Annex 4.

Table 1-2.- JSC INTERNAL DATA ROUTING REQUIREMENTS (Concluded)

b. Independent Payload Data Streams (IPDS)

Instruction reference section 3.2.1.7

IPDS data routing to CIP (RQ/NR): _____ *

c. Command

Instruction reference section 3.2.2

1. Command from JSC POCC EGSE (RQ/NR): _____ *

2. Command from JSC POCC workstation (RQ/NR):
(Buildable or Prestored) _____

3. Command I/F (MDM, PSP, SSI): _____

Note: MCC prestored commands are documented in Annex 4.

d. Customer Ancillary Service (CAS)

Instruction reference section 3.2.1.5

CAS data routing to CIP (RQ/NR): _____

Note: Payload Customers must list their required CAS parameters in the PIP, section 8; and in the POCC Annex 5, in Part IV.

*Nonstandard service

Table 1-3.- EXTERNAL DATA ROUTING REQUIREMENTS - ORBITER DOWNLINK TELEMETRY, COMMAND, AND TRAJECTORY

External data routing (is/is not) required. Data routing requirements are indicated in this table as RQ or NR.

| Instruction reference section | Item no. | Data type | Remote POCC 1 | Remote POCC 2 |
|-------------------------------|----------|---|---------------|---------------|
| 3.2.1.3 | 1 | PDI: a. Block b. Serial | _____ | _____ |
| 3.2.1.4 | 2 | PPF block | _____ | _____ |
| 3.2.1.5 | 3 | CAS Data* | _____ | _____ |
| 3.2.1.6 | 4 | Status block | _____ | _____ |
| 3.2.2 | 5 | Remote POCC commanding mode: a. 4800 bit NASCOM block: 1. MDM () 2. PSP () 3. SSI () b. 128 kbps uplink () | _____ | _____ |
| 3.2.2.2 | 6 | R/T commands: a. History b. Rate-NASCOM blk/sec (de- fault equals 8) | _____ | _____ |
| 3.2.3 | 7 | Trajectory data I/F services: | | |
| 3.2.3.1 | | a. TX operational state vectors Rate-NASCOM blk/sec (de- fault equals 5) | _____ | _____ |

Table 1-3.- EXTERNAL DATA ROUTING REQUIREMENTS - ORBITER DOWNLINK TELEMETRY, COMMAND, AND TRAJECTORY (Concluded)

| Instruction reference section | Item no. | Data type | Remote POCC 1 | Remote POCC 2 |
|-------------------------------|----------|--|--------------------|--------------------|
| 3.2.3.2 | | b. TX planning state vectors | _____ | _____ |
| 3.2.3.3 | | c. TX operational attitude | _____ | _____ |
| 3.2.3.4 | | d. TX planning attitude | _____ | _____ |
| 3.2.3.5 | | e. RCV payload state vectors from (remote POCC acro): - Rate-NASCOM blk/sec - TCP/IP | _____ _____ | _____ _____ |

Note: Payload Customers must list their required CAS parameters in the PIP, section 8; and in the POCC Annex 5, in Part IV.

Table 1-4.- EXTERNAL COMMUNICATIONS ROUTING

External communications service (is/is not) required. The services required by the Remote POCC 1 and/or POCC 2 are indicated in this table as RQ or NR. For Internet and Facsimile (FAX) services, enter Uniform Resource Locator (URL) and station number in the applicable columns.

| Instruction reference section | Item no. | Service | Remote POCC 1 | Remote POCC 2 |
|-------------------------------|----------|---|--|--|
| 3.2.4 | 1 | Standard voice Loops: a. A/G 1 b. A/G 2 c. FLT DIR d. MCC Coord e. Ops Action f. Ops Support g. Pgm Mgr h. Prime Ops | _____ _____ _____ _____ _____ _____ _____ _____ | _____ _____ _____ _____ _____ _____ _____ _____ |
| 3.2.4 | 2 | Dedicated voice loop (REMFAC): | _____ | _____ |
| 3.2.5 | 3 | Video: a. NASA Select b. Orbiter Downlink: 1. Color converted 2. Field sequential 3. Digital TV | _____ _____ _____ _____ _____ | _____ _____ _____ _____ _____ |
| 3.2.6 | 4 | Orbiter Communications Adapter (OCA): data interface 128 kbps | _____ | _____ |
| 3.2.7 | 5 | Dedicated Facsimile* circuit: POCC station no. | _____ | _____ |
| 3.2.8 | 6 | Communications provided by: Customer () NASA* () | _____ | _____ |

*Nonstandard service

- Notes: 1. Use of MCC OCA is documented via JOIP.
2. MCC FAX services other than a dedicated circuit via NASA Communication (NASCOM) are documented in this POCC Annex 5.

Table 1-5.- FACILITIES AND SUPPORT SERVICE

Facility and support service (is/is not) required. Those services required are indicated in this table as RQ or NR.

| Instruction reference section | Item no. | Facility/service | RQ/NR |
|-------------------------------|----------|--|--|
| 3.2.9.1 | 1 | Local support and interfaces: a. TSC b. CAS RT() PF() c. ODRC | _____ _____* _____ |
| 3.2.9.2 | 2 | External support and interfaces: a. SPIF (GSFC) b. SN (GSFC) c. IPDS (GSFC) d. MCC/MSFC POCC I/F e. MCC/HOSC I/F (MSFC) f. EDTS (MSFC) g. STAT MUX (WSGT) | _____ _____* _____* _____* _____ ____** ____** ____** |
| 3.2.10 | 3 | Testing support Remote POCC I/F testing*** Test data source: High density source media () Payload data source media () | _____ _____ |

- *Nonstandard service
- **Nonstandard service for non-MSFC managed missions
- ***Command validation test should include hazardous and nonhazardous commands

2.0 PART II - PAYLOAD DATA REQUIREMENTS

2.1 Introduction

This part of the POCC Annex 5 contains payload data tables that the NASA JSC requires configuring the SSP MCC and communications resources for support of your payload requirements.

2.2 Description of Tables

Table 2-1 contains data characteristics. Tables 2-2 through 2-5 contain the reconfiguration requirements for Payload Parameter Frame (PPF); external data, video, and voice.

JSC's response to these requirements is contained in Part V of this POCC Annex 5.

Table 2-1.- DATA CHARACTERISTICS

Instruction reference section 4.1.1

Payload ID*: _____

| Item no. | TLM description | No. of PDI formats | | | | | | | |
|----------|---|--------------------|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1. | PDI data rate (kbps): (Mbps): | | | | | | | | |
| 2. | PDI mode (1, 2, 3, 4) | _____ | | | | | | | |
| 3. | MCC PDI** percent tolerance (1.00-9.99): | _____ | | | | | | | |
| 4. | PDI status register (RQ, NR): | _____ | | | | | | | |
| 5. | IPDS data rate (kbps): (Mbps): | _____ | | | | | | | |
| | TDRS channel (2 or 3): | _____ | | | | | | | |
| 6. | Simultaneous PDI DL formats***:(Yes/No | _____ | | | | | | | |

*One table is required for each payload ID.

**Default tolerance is 1.00 percent for serial data. Not applicable for block data.

***State here if simultaneous PDI downlink formats from Annex 4 are required.

Table 2-3.- EXTERNAL DATA INTERFACE REQUIREMENTS

Payload Acronym: _____

Instruction reference section 4.1.3

| Data type | Max rate (Kbps, Mbps) | TX mode BDF, SER, ISDN, ATM TCP/IP | Circuit routing* | | | | | Service period (days)** | | IMPL agency* | Notes |
|-----------|-----------------------|------------------------------------|--------------------|------------------|-------|-----------------|-------|-------------------------|------|--------------|-------|
| | | | From site/location | To site/location | S / N | Extend to Bldg. | S / N | LAU | LNDG | | |
| | | | | | | | | | | | |

Point of contact:

*Annex manager will provide information for these columns.

**Flight duration is scheduled for _____ days.

Table 2-4.- EXTERNAL VIDEO INTERFACE REQUIREMENTS*

Payload Acronym: _____

Instruction reference sections 3.2.5 and 4.1.5

| Video services | Transmission routing* | | | | | Service period (days)* | | IMPL agency* | Notes |
|----------------|------------------------|----------------------|-------------|-----------------------|-------------|------------------------|------|--------------|-------|
| | From site/ location | To site/ location | S / N | Extend to Bldg. | S / N | LAU | LNDG | | |
| | | | | | | | | | |

Point of contact:

*This table is required by JSC only if NASA is to implement the video routing and interface.

Note: The distribution of NASA SELECT video signals within NASA centers will be documented in the respective centers documents.

Table 2-5.- EXTERNAL VOICE INTERFACE REQUIREMENTS

Payload Acronym: _____

Instruction rference sections 3.2.4 and 4.1.4

| Voice loops | | Circuit Routing* | | | | | Service period (days)** | | IMPL agency* | Notes |
|-------------|-----|------------------------|----------------------|-------------|-----------------------|-------------|-------------------------|------|--------------|-------|
| Name | T/M | From site/ location | To site/ location | S / N | Extend to Bldg. | S / N | LAU | LNDG | | |
| | | | | | | | | | | |

Point of contact:

*Annex manager will provide information for these columns.

**Flight duration is scheduled for _____ days.

Note: The distribution of external voice within NASA centers is to be documented in the respective Centers documents.

3.0 PART III - JSC POCC FACILITIES REQUIREMENTS

3.1 Introduction

This part of POCC Annex 5 contains the operational requirements for Experiment Ground Support Equipment (EGSE), telemetry, internal voice loop communications, and MCC workstation display requirements. The customer must provide an EGSE hardware diagram, that details all interfaces e.g. telemetry, command, and video. The required level of detail is described in USA003624, Payload Operations Control Center (POCC) User's Guide.

3.2 Description of Tables

Tables 3-1, 3-2, 3-3, and 3-4 are blank tables to be submitted by the Payload Customer to detail facility requirements by position. Table 3-4 provides a table to detail Payload Customer internal voice loop requirements at JSC.

3.3 MCC Workstation Display Requirements

The JSC MCC will provide a set of mission-unique displays for MCC workstation viewing. Payload Customers who require Orbiter and/or Payload parameters not furnished by the JSC MCC mission-unique displays may submit a request for the desired displays.

Dedicated customer workstation displays are to be negotiated with the lead Payload Officer or his designee at the Payload Operations Working Group (POWG) meetings scheduled prior to the Flight Readiness Review (FRR). These services will be treated as nonstandard services and documented accordingly in the applicable Payload Integration Plan (PIP), as appropriate.

3.4 Room Layouts

Figure 3-1 provides a blank room layout for the Payload Customer to fill out and submit as their requirement for POCC Room 212. Figure 3-2 provides a blank room layout for POCC Room 217. Figure 3-3 provides a blank room layout for POCC Room 3301. Figure 3-4 provides a layout of the Customer Support Room (CSR) in Room 236.

Figure 3-6 provides a blank diagram of the POCC Console layouts.

3.5 Functional Interfaces

Appendix A, figure 3-5 provides an example of the functional interfaces provided by a previously flown payload. Figure 3-5 provides a blank sheet to submit Payload Customers data flow interfaces requirements for a specific flight.

3.6 JSC MCC IT Security

3.6.1 General.-

3.6.2 MCC External Interfaces Policy.-

3.6.3 MCC security policy is based upon a variety of requirements.-

- a. Federal Government
- b. NASA Agency
- c. JSC center level document JPG 2810.1, Johnson Space Center Information Technology Security Handbook
- d. MOD directorate level MCC facility specific requirements

The JSC requirements define several facility/system Sensitivity/Level (S/L) designations based upon the impact due to inaccuracy, alteration, disclosure, or unavailability of the asset or resource:

- a. Based upon JPG 2810.1 Section 5.4, risk analysis.
 1. S/L 3 or mission is mission critical and impact would be irreparable and/or major loss of a major tangible asset or resource.
 2. S/L 2 or Scientific, Engineering, and Research (SER) where impact would be adverse and/or significant loss of a major tangible asset or resource.
 3. S/L 1 or administrative is typically an administrative system where the impact would be minimal and/or loss of some tangible asset or resource.

The JSC MCC has been designated as a sensitivity level 3 facility based upon the JSC security requirements. JSC MOD and the JSC MCC operate and conduct business per the requirements,

from the federal level down to the facility specific level. All customers, users, developers, and operators of the MCC resources must also follow these requirements.

3.6.4 JSC MCC External Interface Policy.- The security of the JSC MCC is paramount since decisions made on the facility configuration of its external interfaces can have a direct impact on the safety and success of the space program as a whole. This policy is documented in the JSC MCC Security Control Architecture (SCA), dated 02/28/97 and signed by NASA. As a general policy, all services across the external interfaces are denied unless explicitly allowed. However, during MCC operations there is sometimes a need to send and/or receive electronic information outside its operational boundaries. In accommodating this, the MCC strives to regulate the external connectivity per its policies governing connectivity and utilization of the Internet. These are as follows:

- a. All services across the external interfaces are denied unless explicitly allowed.
- b. Information Network System (INS)/Internet connections will not be used or required for mission-critical (SL3) support.
- c. All Internet connections to the JSC MCC will be achieved via the INS.
- d. All INS/Internet connections to the JSC MCC systems will be protected by boundary host (firewall) under MCC control.
- e. No direct remote access will be allowed to mission-critical (SL3) systems via the INS/Internet.
- f. All software is scanned for malicious code and inappropriate coding practices.

All interfaces to the JSC MCC are evaluated on a case-by-case basis and controlled via configuration management and risk management. For those interfaces that cannot be made secure or do not meet the above policies, a risk acceptance can be considered in order to support operational requirements.

Table 3-2.- JSC INVENTORY OF POCC EGSE and APPLICATION SUBMITTAL

| EGSE no. | EGSE equipment | POCC room no. | Operator position | Application | Note no. |
|----------|----------------|---------------|-------------------|-------------|----------|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |
| 16 | | | | | |
| 17 | | | | | |
| 18 | | | | | |
| 19 | | | | | |
| 20 | | | | | |
| 21 | | | | | |
| 22 | | | | | |
| 23 | | | | | |
| 24 | | | | | |
| 25 | | | | | |
| | | | | | |

Table 3-3.- JSC INVENTORY OF POCC EGSE INTERFACE REQUIREMENTS SUBMITTAL

| EGSE No. (cont) | POCC Room No. | Operator position (title) | Network requirements | | | Video interface requirements | | | | | | Services/interfaces | | | | | Network wiring & connectivity (EGSE no.) (4) | |
|-----------------|---------------|---------------------------|----------------------|-----|-------------------|------------------------------|-----------|-----|----------------|-----------|-----|---------------------|-----|-----|-----------------|-----------------|--|------------------|
| | | | Stand Alone LAN | INS | Analog Phone Line | TV Monitor (1) | | | VCR Record (1) | | | Timing | CAS | CMD | Orbiter OD Data | Orb/PLD TLM (2) | | Payload IPDS (3) |
| | | | | | | RF | Base-Band | DTV | RF | Base-Band | DTV | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | |

- Notes: (1) RF is "normal" TV - i.e. NASA Select, CNN, Weather Channel, Orbiter Downlink, etc. Baseband TV is Orbiter Downlink with time-tag.
 (2) TLM data downlinked via Orbiter OD and "strip-n-ship" to POCC.
 (3) Independent Payload Data Stream (i.e. Ku-band bent pipe, etc.)
 (4) This EGSE connected to EGSE no(s). Provide a wiring diagram of Connectivity and Services
 (5) PL Customer to provide a Data Flow diagram in figure 3-5.

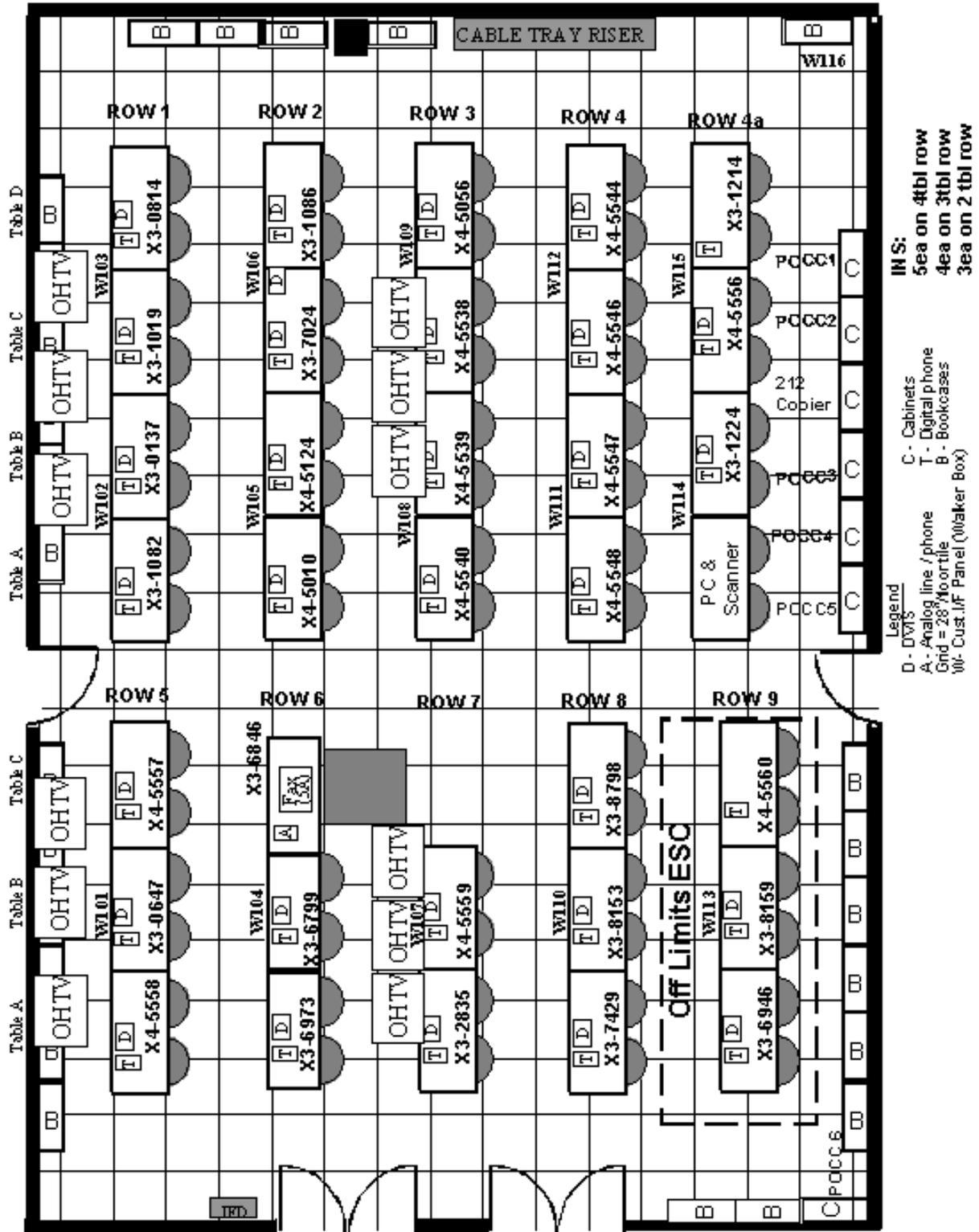


Figure 3-1.- JSC POCC Room No. 212 layout.

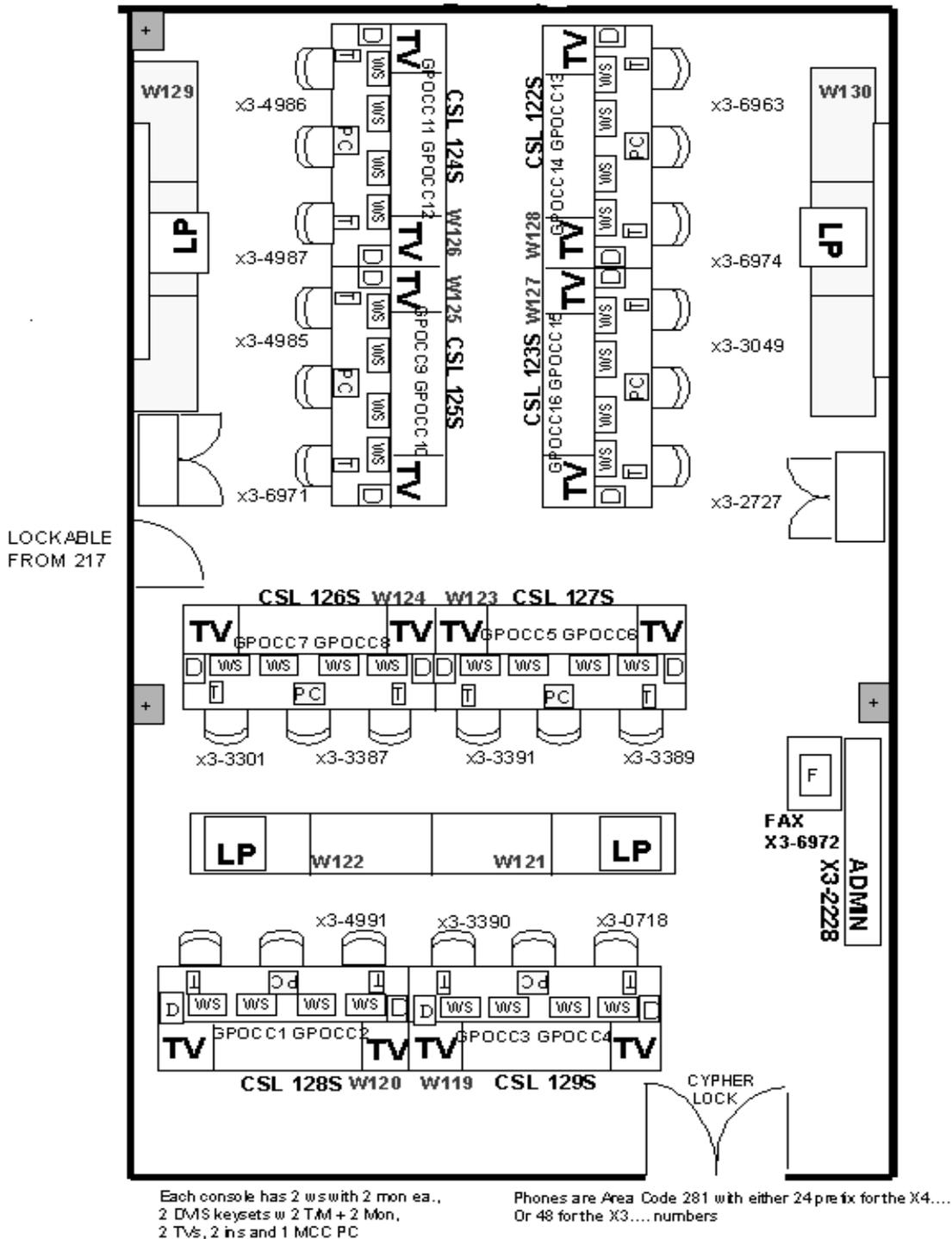
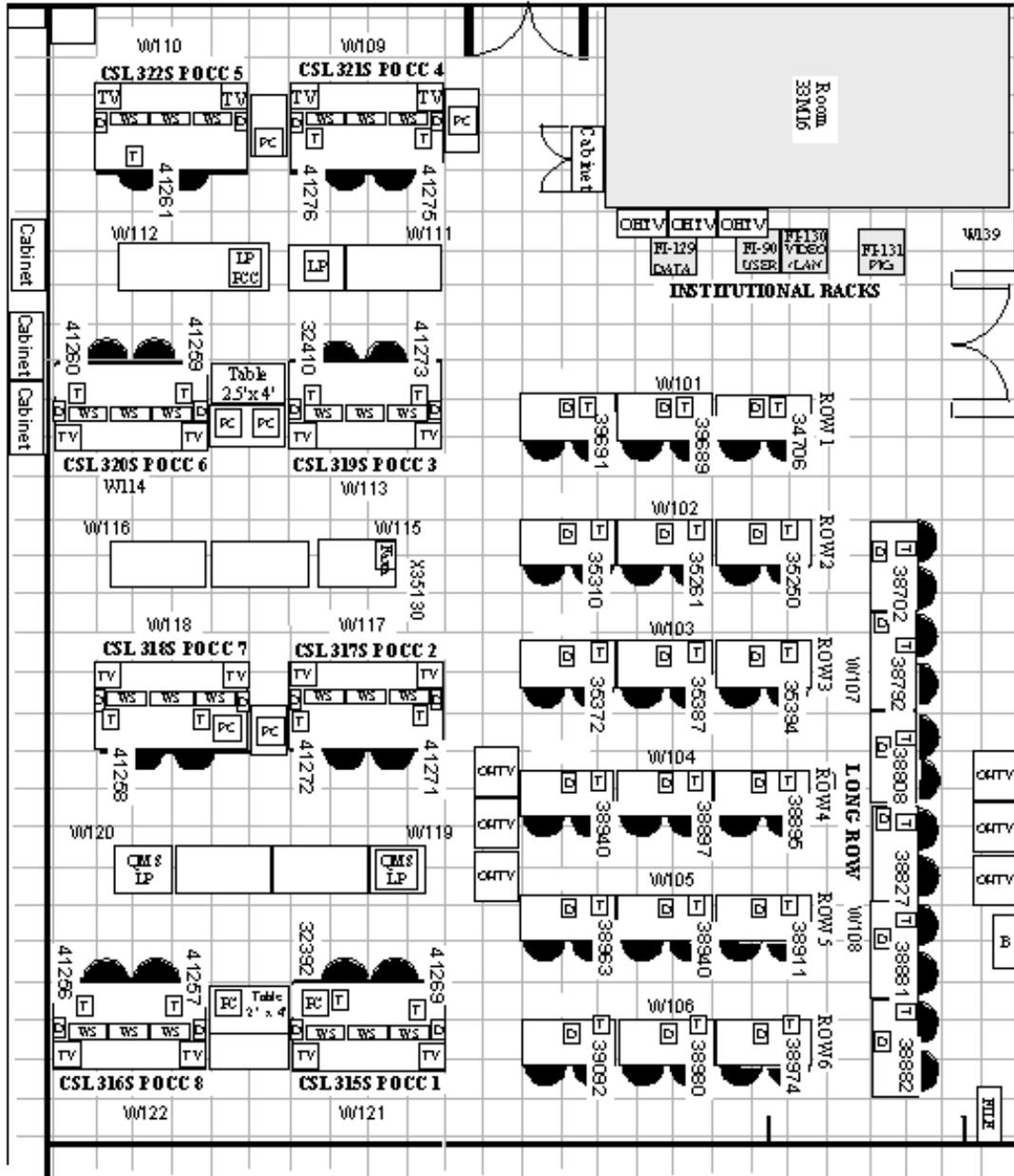


Figure 3-2.- JSC POCC Room No. 217 layout.



I=IMIS Keyset
 WS=MCC Workstation Monitor
 I= Telephone
 OHTV= Overhead Television
 PC= MCC PC
 W=Customer LFP Panel (Walker Box)

Figure 3-3.- JSC POCC Room No. 3301 layout.

WS names: CSR1 – CSR 17; Tables 1-5 each have a WS with two monitors labeled Mon 0 and Mon 1.

JP is network Printer: They are labeled CSR X NOTE: Hardware placement is conceptual only. Drawing not to scale.

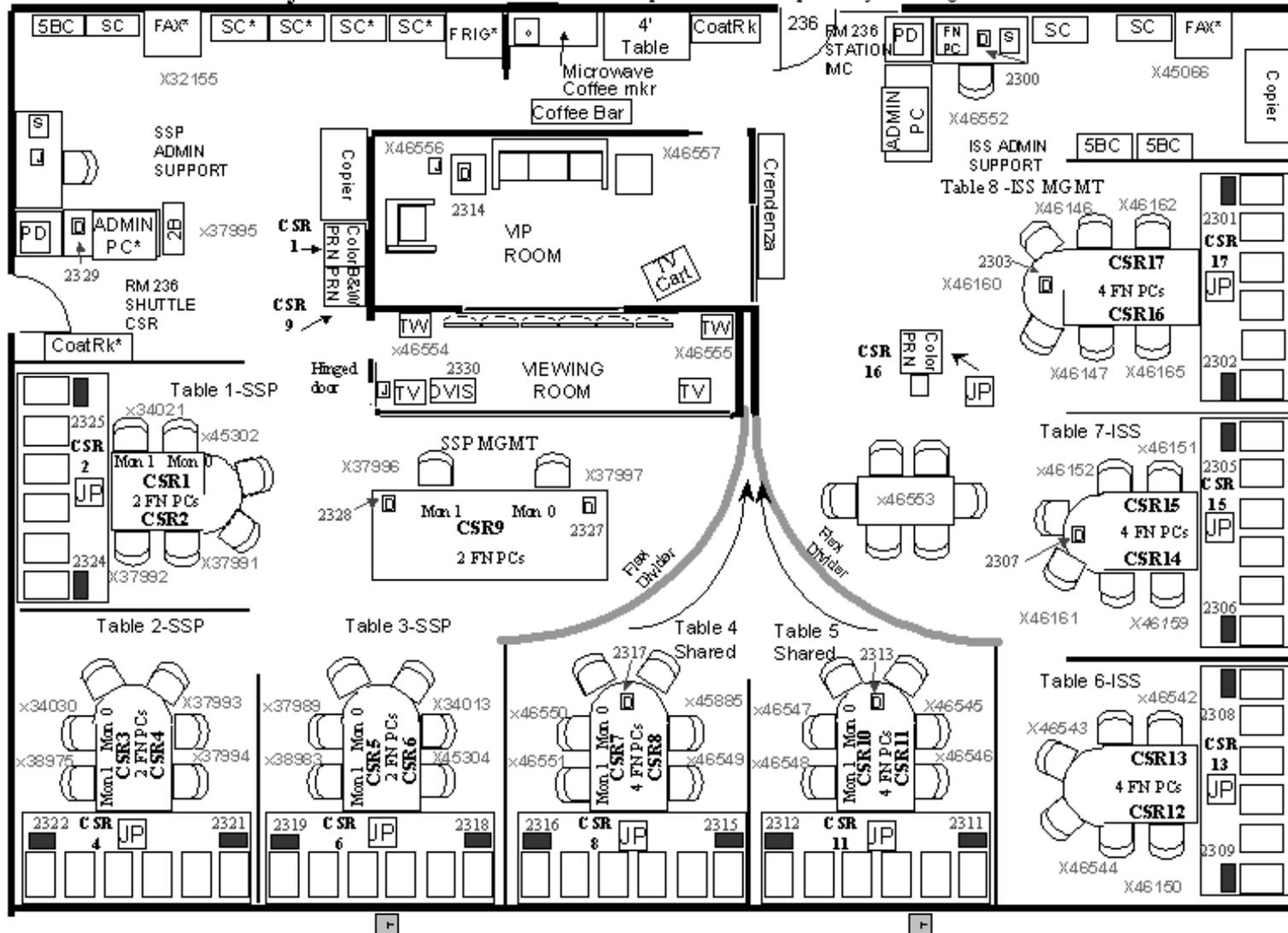


Figure 3-4.- JSC CSR No. 236 layout.

Figure 3-5.- Payload customers data flow diagram.

Note: The customer will provide Figure 3-5.- Payload Customers Data Flow Diagram to JSC.

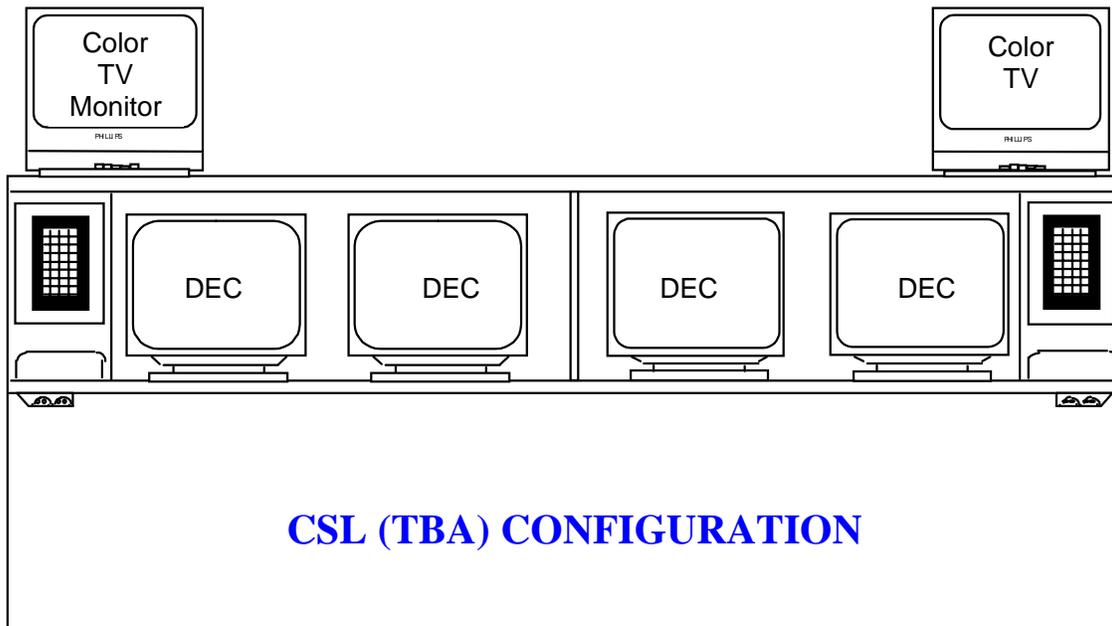
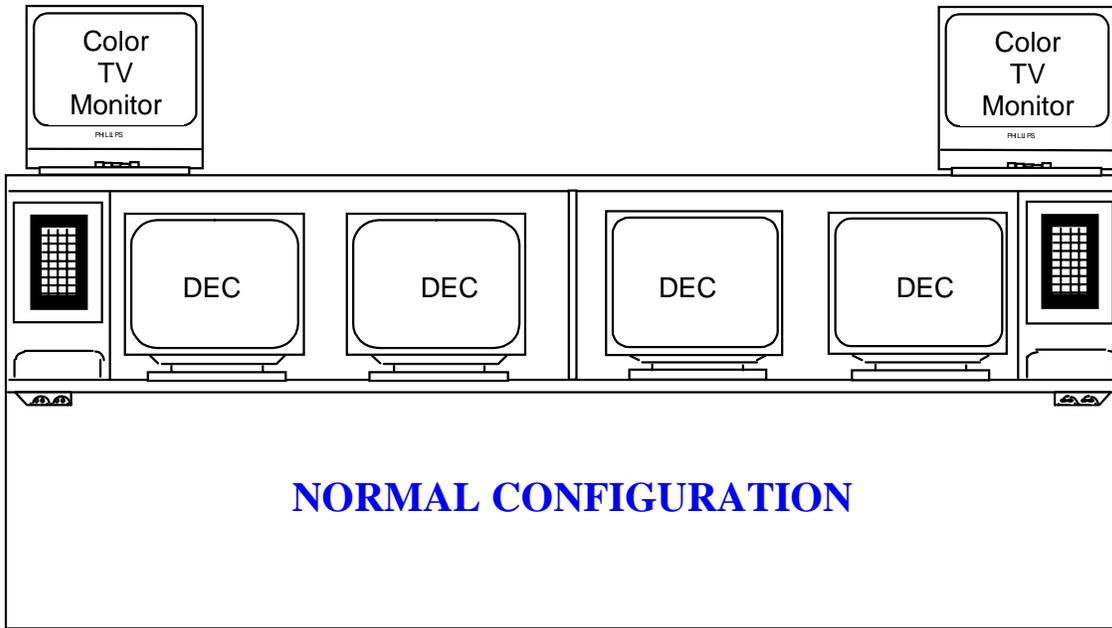


Figure 3-6.- JSC POCC console layouts-for B30M (Room 217 and Room 231 Science Center, if being used), and B30S for Room 3301.

4.0 PART IV - INTERFACE NONSTANDARD SERVICE REQUIREMENTS

4.1 Introduction

This part of the POCC Annex 5 contains detailed requirements for nonstandard services external to the JSC MCC. External interface nonstandard services defined in section 8.5 of the PIP must be detailed here to a level that allows the MCC and/or NISN to design, develop, and implement these additional capabilities. (Level C Requirements - Reference NSTS 21063-POC-CAP, section 10.3.1.)

4.2 External Interface Nonstandard Services

List the external interface optional services by function:
(i.e., telemetry data, command, trajectory, voice, video, etc.)

4.2.1 Data Circuits.-

4.2.2 External Data Flow Testing.-

4.2.3 Video.-

4.2.4 Voice Loops.-

4.2.5 Television.-

4.2.6 Miscellaneous.-

4.3 Internal Interface Nonstandard Services

List the internal interfaces nonstandard services by function:
(i.e., EGSE, network requirements, video, services/interfaces, network wiring/connectivity, voice loop requirements, etc.).

4.3.1 Data Circuits.-

4.3.2 External Data Flow Testing.-

4.3.3 Video.-

4.3.4 Voice Loops.-

4.3.5 Television.-

4.3.6 Miscellaneous.-

5.0 PART V - JSC RESPONSE TO CUSTOMER INTERFACE NONSTANDARD REQUIREMENTS

5.1 Introduction

This part of the POCC Annex 5 provides information required at the Remote POCC to design and develop compatible interfaces. The nonstandard services as described in part IV of this POCC Annex 5 will be provided by the SSP as indicated.

5.2 External Nonstandard Service Response

5.2.1 Data Circuits.-

5.2.2 External Data Flow Testing.-

5.2.3 Video.-

5.2.4 Voice Loops.-

5.2.5 Television.-

5.2.6 Miscellaneous.-

5.3 Internal Nonstandard Service Response

List the internal interfaces nonstandard services by function: (i.e., EGSE, network requirements, video, services/interfaces, network wiring/connectivity, voice loop requirements, etc.).

5.3.1 Data Circuits.-

5.3.2 External Data Flow Testing.-

5.3.3 Video.-

5.3.4 Voice Loops.-

5.3.5 Television.-

5.3.6 Miscellaneous.-

APPENDIX C
POCC CHANGE REQUEST FORM

POCC CHANGE REQUEST

| | | |
|--|--|------------|
| Title: | | PCR # |
| | | Need Date: |
| Originator: _____ Flight: STS- Payload: _____ Position: _____ | Customer Management Approval: _____ Mission Manager/Date | |
| System/Subsystem <input type="checkbox"/> Data <input type="checkbox"/> Video <input type="checkbox"/> Voice <input type="checkbox"/> Power <input type="checkbox"/> Workstation <input type="checkbox"/> Other (Specify) _____ | | |
| Description of Request/Problem: | | |
| Justification For Change/Impact: | | |
| DO NOT WRITE BELOW THIS LINE | | |
| Comments: | | |
| Approval: D05/POCC Coordinator _____ Date _____ D05/Lead Payload Officer _____ Date _____ | | |