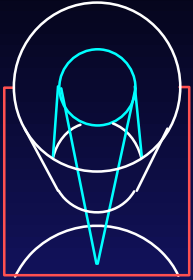


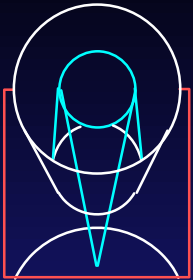
The Payload Operations Control Center (POCC) Applications Software Support (PASS) System

**STScI Software Workshop 2000
January 18, 2000
Presenter: Carey Myers**

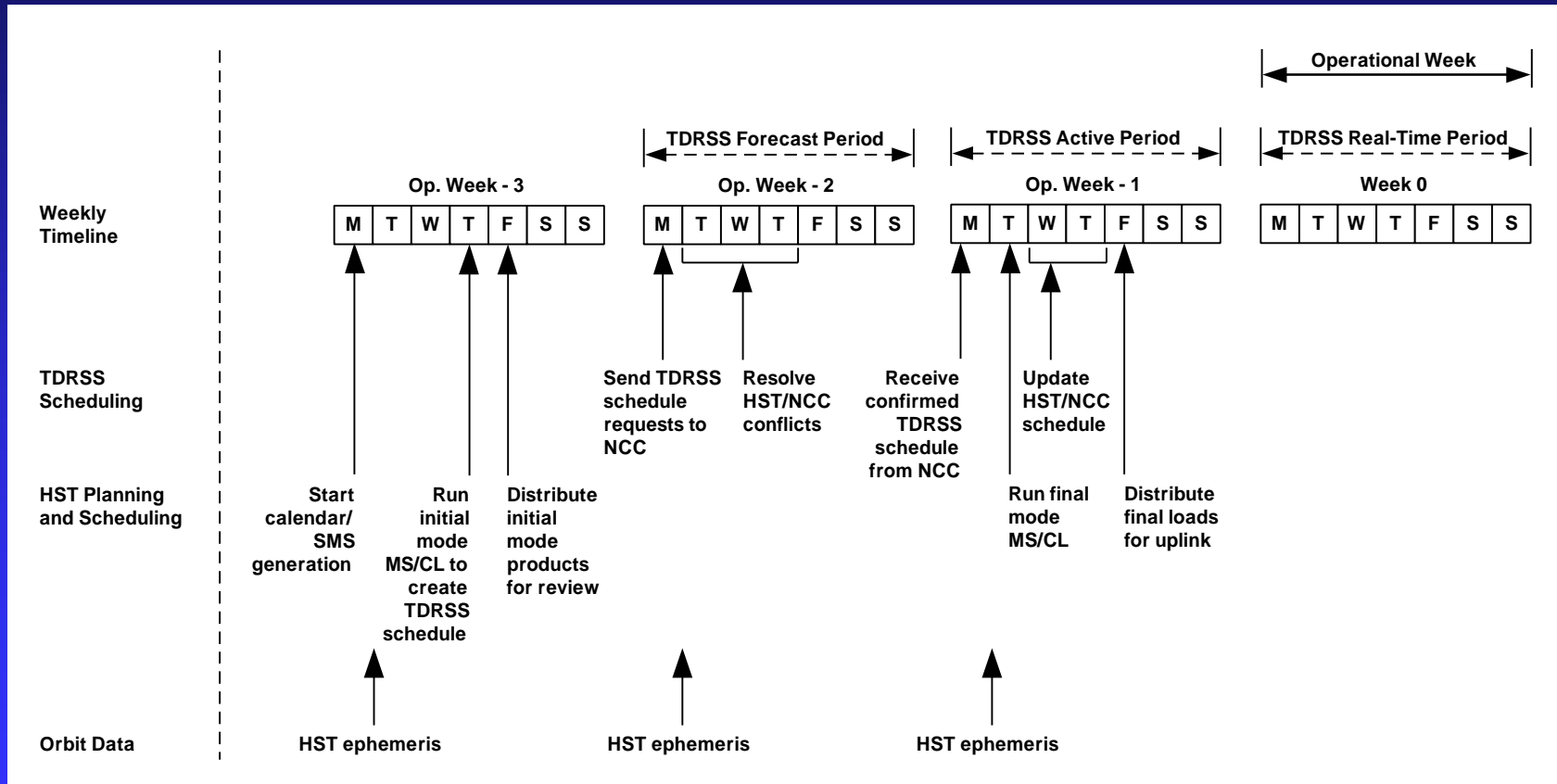


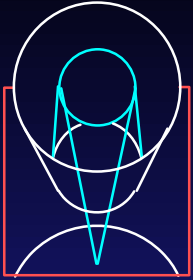
PASS Development

- ❖ Organizationally, PASS is part of the overall CSC contract at STScI under the ESS division
- ❖ Location: Laurel, Maryland (Routes 95 and 198)
- ❖ Staff: Software development, system engineering and analysis, testing/configuration management, system administration, and documentation support
- ❖ URL:
<http://pasbye.hst.nasa.gov/sepg/pnshome.htm>



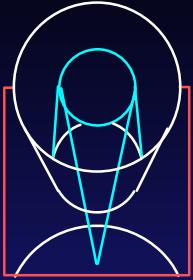
PASS Operations Timeline





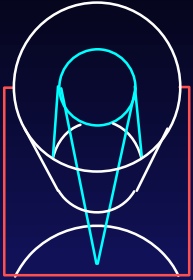
PASS Operations Overview (1 of 2)

- ❖ Start 3 weeks ahead with generation of weekly calendar and SMS
- ❖ Run initial-mode mission scheduler (MS) and command loader (CL) with SMS input
 - MS generates initial TDRSS schedule
 - CL is run in three parts: 2 days, 2 days, 3 days
 - TDRSS schedule requests are sent to the Network Control Center (NCC) via the User Planning System (UPS)
 - Initial-mode products are distributed for Mission Operations, Systems Engineering, and Software (MOSES) review



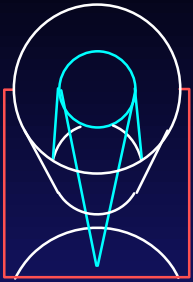
PASS Operations Overview (2 of 2)

- ❖ Generate merge SMSs (as needed)
- ❖ Receive confirmed TDRSS schedule and updated orbit data
- ❖ Run final-mode MS and CL
 - MS conforms with final TDRSS schedule
 - CL is run in three parts: 2 days, 2 days, 3 days
 - Loads and related products are sent to real-time system for uplink



MS/CL Weekly Operational Throughput

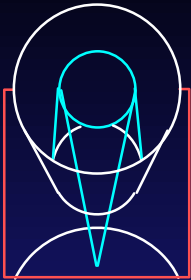
Area	Pre-V2K	Pre-SM2	Post-SM2
SMS statements	10,800	14,800	38,000
SLEW (type 2)	50	50	60
SLEW (all)	?	200	400
TEXT	887	1,000	4,500
TAPEUSE	300	300	580
Tables	20	20	9,000
DF-224 loads	10	10	10
commands	10,500	11,000	12,000
NSSC-1 loads (ATP)	24	24	24
loads (RTS)	700	700	50
commands	11,000	12,000	17,000



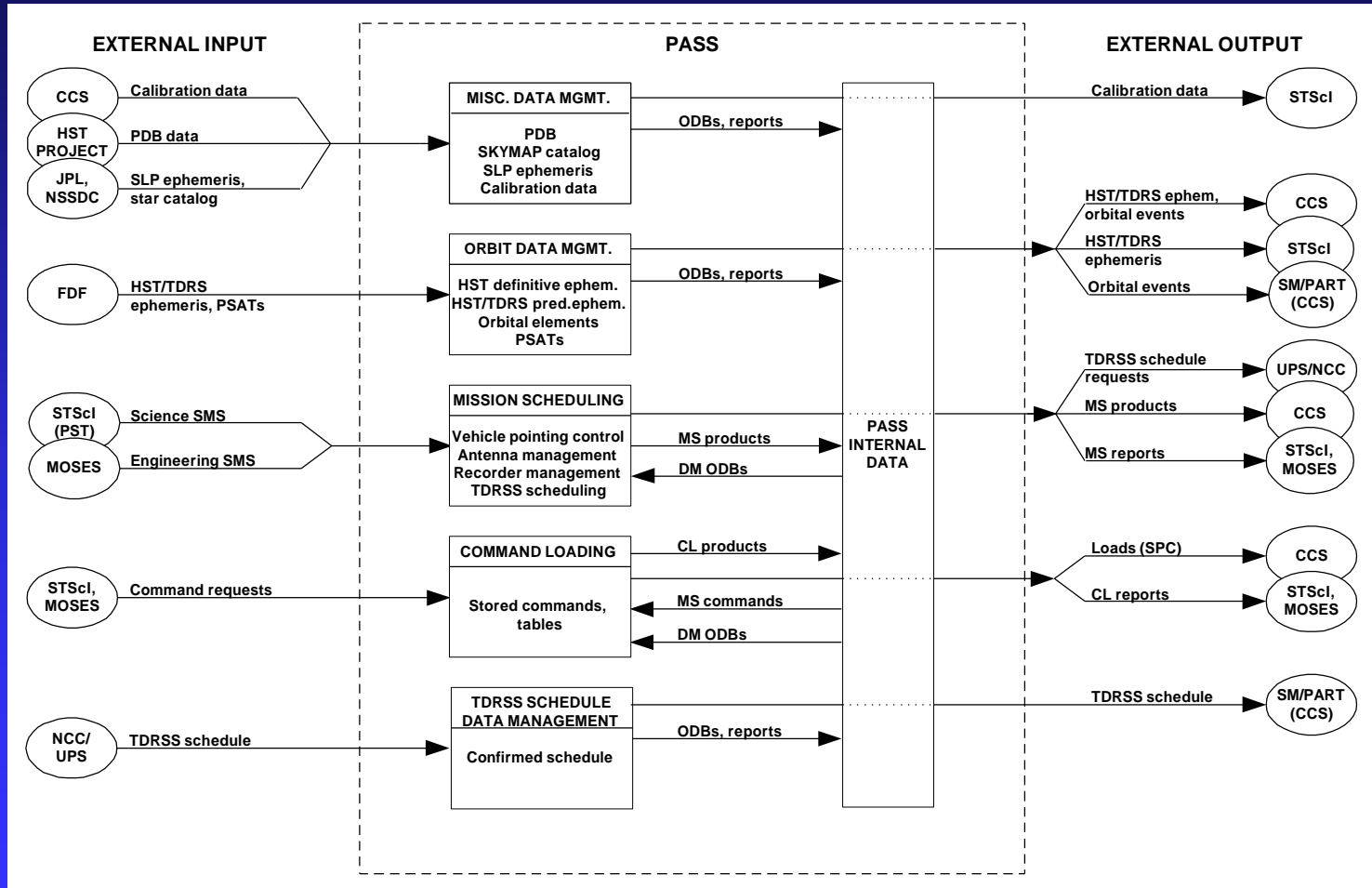
MS/CL Weekly Operational Performance

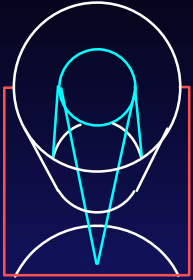
Area	Pre-V2K SMS	Post-SM2 SMS	Post-Alpha Port
MS:			
Wall-clock time	2.0 hours	1.0 hour	10 minutes
Disk blocks	95,000	120,000	95,000
Files	~1,000	1,000	450
CL:			
Wall-clock time	2.5 hours	1.5 hours	10 minutes*
Disk blocks	250,000	220,000	200,000
Files	~1,500	300	350*

*Includes processing formerly performed by the OPCMAN image.



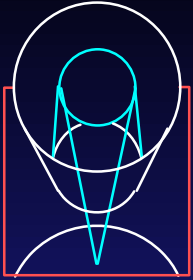
PASS Interface Overview





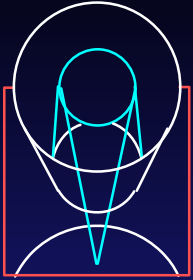
PASS Functional Subsystems

- ❖ Data management (DM)
 - Maintain operational data for centralized access (e.g., PDB, orbit, TDRSS schedule, SKYMAP, and SLP data)
 - Accept/transmit data to/from external interfaces
 - Provide standard display system
- ❖ Mission scheduling
- ❖ Command loading



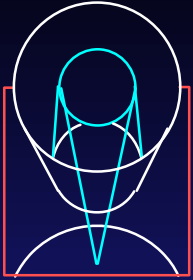
Mission Scheduling Functions (1 of 4)

- ❖ Accept weekly vehicle and science activities (SMS)
 - Continuity mode (initial, continuity)
 - TDRSS schedule mode (initial, final)
- ❖ Verify vehicle pointing control activities
 - Profile activities (e.g., SLEW, GSACQ, SCAN, FHST)
 - Perform constraint checks (e.g., SAA, field-of-view, maneuver sizing, Sun, RFI)
 - Generate uplink parameters for commanding
 - Compute attitude-dependent occultation times for FHSTs and V1-axis (i.e., bright Earth, dark Earth, Moon)
 - Select FHST reference stars



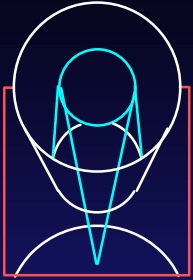
Mission Scheduling Functions (2 of 4)

- ❖ Manage antennas and solar arrays to optimize coverage and power
 - Determine antenna-to-TDRS visibility (based on Earth, IRAC, HGA gimbal/spline limit, White Sands, Sun, SA, and aperture door constraint checks)
 - Select antenna-TDRS communications baseline (in either initial TDRS mode or final “conform” mode)
 - Determine SA slew and off-nominal incidence commanding
- ❖ Manage science and engineering data recording (records and dumps for either tape or solid state devices)



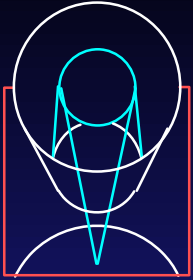
Mission Scheduling Functions (3 of 4)

- ❖ Expand schedule to support HST commanding requirements
 - Generate FHST automatic map requests
 - Generate HGA spline/track and stop commanding
 - Generate LGA switch commanding
 - Generate SA slew and off-nominal incidence commanding
 - Generate auto-group commanding (e.g., FHST shutter close)
 - Generate engineering data records (e.g., during ZOE)
 - Generate communications commanding (e.g., hardware setup, transmitter on/off)



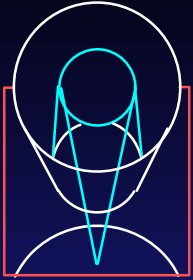
Mission Scheduling Functions (4 of 4)

- ❖ Generate weekly TDRSS schedule requests
 - Accept SMS communication requests
 - Add science and engineering dump requests
 - Add engineering downlink for every view
 - Add generic uplink and tracking requests
- ❖ Generate reports



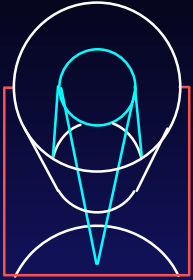
Command Loading Functions

- ❖ Accept commanding input from MS and/or user
 - Run time span and load break times
 - Continuity data
- ❖ Expand command group input
- ❖ Perform command timing and fabrication checks
- ❖ Translate commands and time to binary uplink form
 - Perform onboard memory management
 - Build stored command loads for NSSC-1 and DF-224/HST486 processors (i.e., ATP, RTS, TCP, CP, SP, PIT)
 - Generate memory load commands (from table requests) to update onboard tables
- ❖ Generate reports
- ❖ Package loads for transmission to CCS



PASS Users

- ❖ STScI
 - SPST operations group
 - Project database group
 - Command group (via Test SMS system)
- ❖ GSFC: Mission operations system engineers (MOSES)
- ❖ HST test facilities
 - VEST
 - ESTIF
 - DSTIF
 - SITS



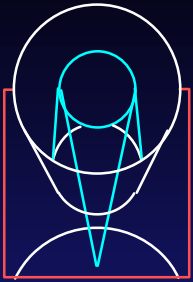
PASS Hardware/Software Overview (1 of 2)

❖ Platform

- **DEC Alpha**
 - ☞ ALPHASERVER 2100-5/250 with Open VMS 7.1
 - ☞ DEC 3000 with Open VMS 7.1
- **DEC VAX 4000-106A with VMS 6.1**
- **PC-based LINUX system**
- **SGI Indigo 2 with IRIX 6.2 and Oracle 7.3.3 (for CCS interface support)**
- **Sun Ultra 5 workstations (2)**
- **Windows-NT servers**

❖ PC support

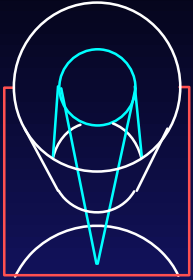
- **Windows 95/NT**
- **Lotus Notes and VMS e-mail systems**
- **Netscape Navigator**
- **Microsoft Office (Word, Excel, Access, PowerPoint)**
- **Visio**
- **Adobe Acrobat**



PASS Hardware/Software Overview (2 of 2)

- ❖ Language: Fortran, C, X-windows MOTIF, assembly
- ❖ Software size statistics:

Area	Source Lines	Images	Modules			
			Fortran	C	Assembly	Displays
PASS overall	1,240,000	107	5,910	272	18	1,213
PASS P&S (VAX)	708,000	56	3,268	272	16	866
PASS P&S (Alpha)	634,000	32	2,035	207	5	293



PASS Future Plans

- ❖ Port PASS applications to UNIX
- ❖ Incorporate MOSES load checking tools
- ❖ Automate sending TDRS schedule updates to UPS/NCC
- ❖ Support UPS/NCC'98 flexible scheduling