

JPL Telemetry and Command System (TCS) for I&T

TCS is a collection of software for telemetry processing, telemetry visualization, analysis and management, sequence generation and commanding, system scripts, interfacing software and quality monitoring software. This software is configured and installed in an integrated environment to support project development. In addition, this collection of software is used to support flight operations. The integration engineering support will be provided by JPL as part of the TCS where Projects can begin spacecraft development and prepare for mission operations. The entire system is typically run on 1 to 3 Sun workstations and a serial to ethernet converter.

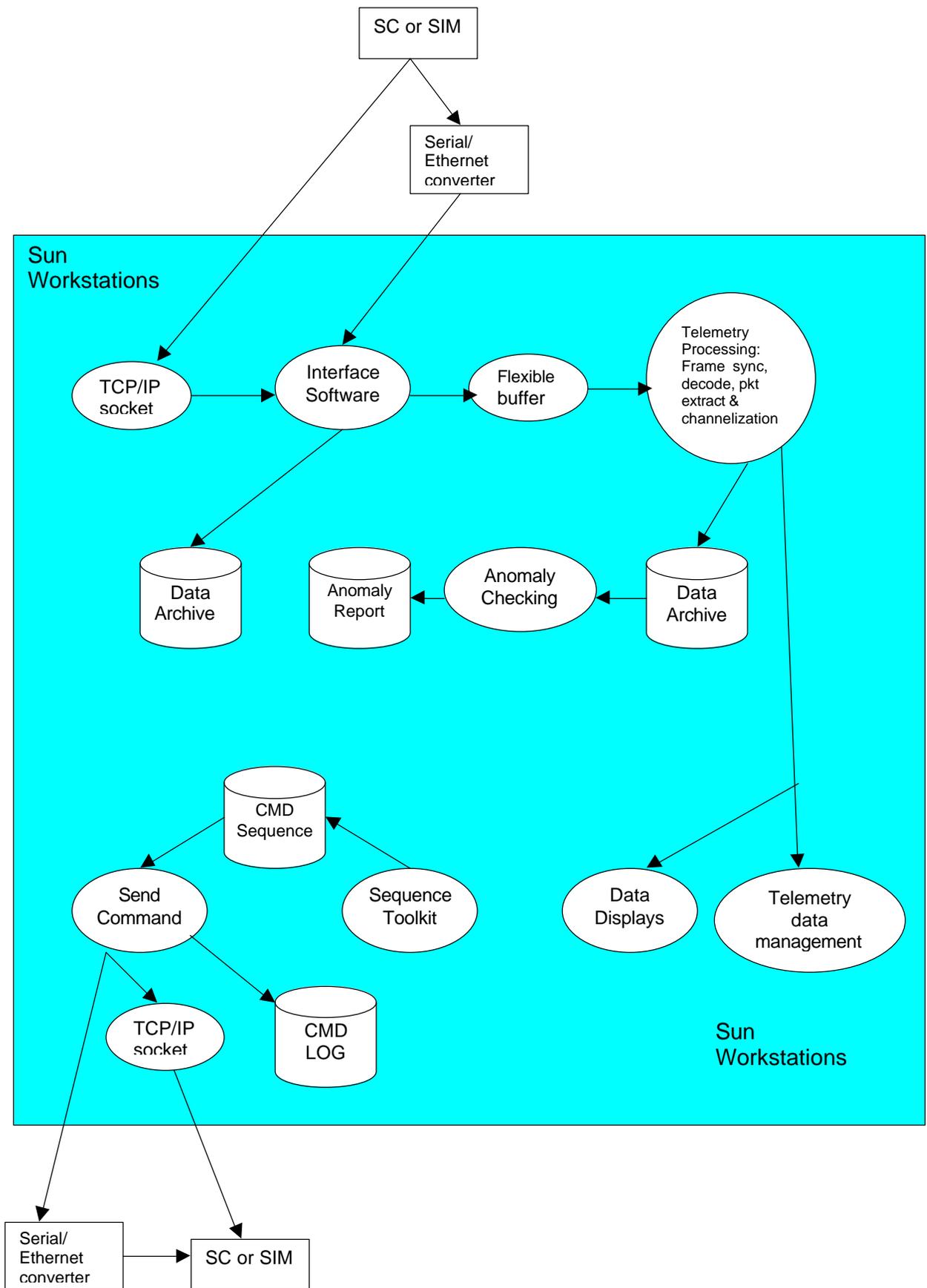
TCS is a major subset of the JPL Advanced MultiMission Operations System which includes, in addition to the TCS as described earlier, file data management, spacecraft analysis, imaging processing, and navigation capabilities.

Downlink

TCS typically has a spacecraft or spacecraft simulator providing actual spacecraft telemetry to a serial port using RS 442 protocol or TCP/IP socket. The interface software receives data from a serial port via a low cost serial-ethernet converter provided by Performance Technologies Inc. Whether the data arrives via the socket or the serial port, the interface software formats it and processes it into input suitable for further telemetry processing. The telemetry processing software provides frame synchronization, decoding, packet extraction and channelization. Data is available in realtime to the same telemetry visualization and analysis software that will be used in flight. The Telemetry Data Management System (TDS) is also included as part of TCS to store the raw and processed data before they are archived. During processing, TCS software monitors the telemetry for anomalies and produces an anomaly report for archiving with the test data.

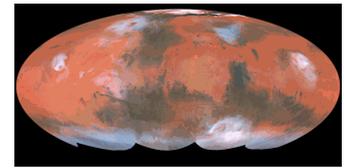
Uplink

The Sequence Toolkit and Command software are two parts of the TCS uplink environment. This software is also used during flight operations. The Sequence Toolkit can be used to create realtime commands and command sequences. Command software can then be used to send the actual command bits to the spacecraft ground support equipment via a TCP/IP socket or serial hardware port. TCS keeps a complete log of commands sent. This ability to use the actual command and sequence software within the TCS environment allows the uplink products to be validated during system test and ATLO, well before they are required for operations





Mars Reconnaissance Orbiter (MRO) PREPROPOSAL CONFERENCE



MARCH 9, 2001

167 Conference Room, 1:00-5:00 PM

[Questions & Answers](#) | [Questions & Answers 4/6/01](#) | [MRO Pre-proposal View Graphs](#) | [Pre-proposal Conference Attendees](#)

[Aerobraking References](#)

[JPL Telemetry and Command System \(TCS\) for I&T](#)

[PAYLOAD ACCESS AND TESTING](#)

Questions and Answers

Q1: What are the expected field strengths from the use of a dipole radar antenna?

A1: The requirement is to design to 100 V/m at 20MHz +/- 5 MHz. If we get any new information prior to the final release, these values will be updated.

Q2: What is the expected release date for the instrument AO?

A2: Draft Release at the end of March. Final release 4-6 weeks later.

Q3 : How many and what types of optical assemblies are planned for both the science objective and navigation on the MRO?

A3: The payload will be solicited through the NASA Announcement of Opportunity (AO) process. Given the provisional selections already (verbally) made and solicited investigation classes, the probable payload set, as we understand it today (3/9/01), will contain the following optics:

- Three refractive optics assemblies are contained within the PMIRR Mk-II, MARCI+, and Optical Navigation (OpNav) camera instruments
- Two reflective optics assemblies are contained within the High Resolution Imager (HRI) and Visible-Near Infrared spectrometer (VisNIR) instruments

Q4: Will a list of attendees be provided to all attendees of meeting?

A4: Yes - it will be posted on the MRO RFP web site.

Q5: Will you provide the value of the TWTA that you will use for adjustment if the contractor procures them?

A5: Yes. JPL will provide a best estimate of the cost and delivery time for the TWTAs with the final RFP when it is released.

Q6: Please elaborate on the rationale for providing the SDST and TWTAs as GFE.

A6: MRO plans to participate in a block buy currently being initiated for the SDSTs. We expect this to be the most cost-effective approach for the project.

We expect that we will benefit from an existing relationship with a TWTA contractor that may prove to be effective for MRO from both a cost and schedule perspective.

Q7: Is the Project Polices document available?

A7: Not yet. MRO plans to post the PP document on the web site no later than 3-23 (with a goal

of 3-16).

Q8: Is there a cost savings associated with not using JPL's TWTAs?

A8: The contractor can determine this when JPL provides best estimate cost and delivery information with the final RFP.

Q9: What level of concern, if any, do you have that when MRO begins collecting science data, that a great dust storm, similar to that seen by Viking (which clouded the whole planet) makes taking high resolution data nearly impossible?

A9: The orbiter begins primary science phase at the beginning of dust storm season, but highest data rates occur in Northern Spring and Summer when such storms are least likely to occur. Imaging of dust storm development is itself a high science priority.

Q10: What is the status of the SubMM instrument mentioned in the back-up material?

A11: A sub-millimeter sounder may or may not be solicited by the Announcement of Opportunity. If solicited, selection would depend on overall optimization of the science payload.

Q11: Data compression is a proven way to reduce data volume and gain higher resolution. Are you interested?

A11: Science instrument teams responding to the Announcement of Opportunity are likely to propose data compression schemes; these will be evaluated as part of payload selection.

Q12: Will the MRO cameras and optical assemblies be designed internally at JPL or will these be competitively bid as a "design to specification" program?

A12: The implementation modes and procurement strategies vary by investigation:

- The NASA provisionally selected MCO Science Recovery Investigations (PMIRR Mk-II and MARCI+) are Principle Investigator (PI)-developed.
- Dan McCleese (JPL) is the PI for PMIRR
- Mike Malin (MSSS) is the PI for MARCI
- The optical navigation camera is a Mars Technology Program development at JPL with a TBD implementation plan.
- The High Resolution Imager (HRI) and the Visible Near Infrared Spectrometer (VisNIR) will be solicited through the NASA Announcement of Opportunity process.
- Draft AO will be available by the end of March
- Selections planned by August, 2001.

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