TLRS-3 SYSTEM UPGRADES

Richard Eichinger, Grace Cheng, Bill Crawford, Don Cresswell,
Henry Crooks, Bud Donovan, Dave Edge,
Ken Emenheiser, Bill Hanrahan, Mike Heinick,
Herb Hopke, Van Husson, Toni Johnson, Mark Levy, Paul Malitson,
Dennis McCollums, Alan Murdoch, Tom Oldham, Don Patterson,
Paul Seery, Mike Selden, Charles Steggerda, Tom Varghese,
Scott Wetzel, Anne Wheeler

Allied Signal Aerospace Company
BFEC/CDSL
10210 Greenbelt Road
Seabrook, MD 20706
USA
Several other groups of personnel participated in the TLRS-3 upgrade and they are: the Survey Section, the Precision Measurement Equipment Laboratory, the Architectural and Engineering Services Department, the Precision Timing Section and the station personnel at TLRS-3 and MOBLAS-7.

Abstract

This presentation describes the upgrades to the Transportable Laser Ranging System, serial number three (TLRS-3), and the impact that these upgrades will have on the TLRS-3 performance in the field. The four major areas of system upgrades are the HP-380 computer, the Optical Attenuation Mechanism (OAM), the upgraded spatial, spectral and temporal filtering for improved daylight ranging capability, and the software upgrade to enable the system to track the Etaon satellites.

The TLRS-3 was returned to the Goddard Geophysical and Astronomical Observatory (GGAO) in December 1991 for system upgrades in preparation of the TOPEX/POSEIDON campaign scheduled to begin in the summer of 1992. Many system upgrades were incorporated into the system while interleaving planned facility maintenance making TLRS-3 a more versatile and more dependable laser ranging system.
OBJECTIVES AND GOALS

HP-380 COMPUTER UPGRADE
OPTICAL ATTENUATION MECHANISM UPGRADE
DAYLIGHT TRACKING CAPABILITY
ETALON RANGING CAPABILITY
FACILITY MAINTENANCE

Bendix Field Engineering Corporation
HP 380 COMPUTER FEATURES

HP 380: 16MB RAM, 660MB HARD DISC, 330MB OPTICAL DISC, HP UX 8.0

REAL TIME DSP PARALLEL INTERFACE TO MIK-11/2 COMPUTER

INCLUDED MULTI-SATELLITE/MULTI-LEVEL OPERATIONS CAPABILITY

IMPROVED STAR CALIBRATION PROGRAMS (FK5, GLOBAL/KALMAN, 70 STARS)

ETALON RANGING CONTROL AND DATA ACQUISITION

TUNED IRVs; ie TEMPORAL FILTER IMPROVEMENT

Bendix Field Engineering Corporation
OPTICAL ATTENUATION MECHANISM FEATURES

MANUAL CONTROLLED OPERATION

COMPUTER CONTROLLED OPERATION

SOLENOID ACTUATED TRANSMIT ND FILTER: FIXED VALUE

VARIABLE RECEIVE ND ATTENUATION RANGE: 0.01 to 4.0 ND

SOLENOID ACTUATED DAYLIGHT FILTER
DAYLIGHT TRACKING

SPATIAL FILTER APERATURE REDUCED to 500 MICRONS

DAYLIGHT SPECTRAL FILTER REDUCED FROM 10 to 3 ANGSTROMS

ALIGNMENT COLLIMATOR MAKES DAYLIGHT STAR CALIBRATION POSSIBLE

TELESCOPE FOCUS MUST BE ADJUSTED FOR DAYTIME/NIGHTTIME TRACKING
ETALON TRACKING

CAPABLE OF 5 pps OPERATION TO 135 MILLISECOND RANGE

DATA AQUISITION CHANGES TO 2.5 pps FOR GREATER THAN 135 ms

LOW SIGNAL AMPLITUDE RETURNS WHEN TESTED AT GGAO
TLRS-3 IMPROVEMENT SUMMARY

HP-380 COMPUTER SYSTEM
OPTICAL ATTENUATION MECHANISM
AUTOMATED TRANSMIT ND FILTER
AUTOMATED 3A SPECTRAL FILTER
COLLIMATOR ALIGNMENT TELESCOPE
SIMMERED CAPACITOR BANK FOR LASER OSCILLATOR HEAD
TEMPORAL FILTER REFINED

SPATIAL FILTER TIGHTENED
TRANSMIT/RECEIVE OPTICS RECONFIGURED
BORESIGHT AND COELOSTAT ALIGNMENT PROCEDURES REDEFINED
CESIUM FREQUENCY STANDARD REPLACED
FREQUENCY STANDARD UPS REPLACED
DOME AND VAN REPAIRED
AC POWER RECONFIGURED
TLRS-3 vs. MOBLAS 7 GORF INTERCOMPARISON

TLRS-3 CALIBRATION RMS 1/92 thru 5/92

CALIBRATION RMS (mm)


AJISAI
ERS1
LAGEOS
STARLETTE
TLRS-3 vs. MOBLAS 7 GORF INTERCOMPARISON

TLRS-3 SATELLITE RMS  1/92 thru 5/92

CDSL/NESS/S. WETZEL  5/13/92
TLRS-3 vs. MOBLAS 7 GORF INTERCOMPARISON

TLRS-3 MEAN BIAS 1/92 thru 5/92

12/28/91
1/17/92
2/6/92
2/26/92
3/17/92
4/6/92
4/26/92

15
10
5
0
-5
-10
-15

MEAN BIAS (mm)

12-16

AJISAI
ERS1
LAGEOS
STARLETTE

CDSLRNESS,WETZEL

5/13/92