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BIF003W/2-135717-82
Volume I of II
Revision D

1982 January 29
Page Count: 161
Unit 10-Copy No.: 44

P-244

APR 8 1982

GROUND DATA PROCESSING SUBSYSTEM
SOFTWARE DESCRIPTION
FOR
FARRAH I AND II

(Vehicles 4433 and 4434)

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1.6 FARRAH GDPS OVERVIEW

Figure 1.6-1 shows an overview of the GDPS data flow from preprocessing through the in-line processing and on to post-processing.

1.6.1 DDT Subsystem

The DDT Subsystem will transfer FARRAH analog PCM onto a formatted disc file on the CDC CYBER-175 using a pair of Plessey microcomputers to synchronize, qualify, delete no-data and filler words, report sync status, and reverse, if necessary, the intercept word groups (I-W-Gs) constituting the FARRAH payload PCM. This data will be formatted into buffers of 2046 16-bit words, which will be sent to the Cyber Disk via an LMSC manufactured shift register, which will pack the lower 8 bits of two successive Plessey words into the lower 16 bits of a 24-bit data compressor word. The 24-bit words will enter the time word port of the data compressor and have time channel two labeled in the upper 8 bits of the 24-bit word. These 24-bit data compressor words will be output as 410 IW-type 60 bit per word records on the Cyber Disk by existing DDT system software, where FARRAH applications software will read and ignore the unused eight bits in each 24 bits of data in the record.

This system will be capable of transferring Real-Time Analog PCM at the full 1.024 M-bit rate to the Cyber Disk.

1.6.2 Readout Processing

Job ROP-- (Task ROPS10F) will provide the means to automatically determine the number of readins in a readout residing on a DDT transfer (XFR--) file, and of these, which contain one or more TCR DF tasks. For each TCR DF task, Job ROP-- will generate Job TCR-- to preprocess and process the TCR data. For each readin, Job ROP-- will generate routine DF preprocessing Job NDF--, and routine Omni/TI preprocessing Job NOT--.

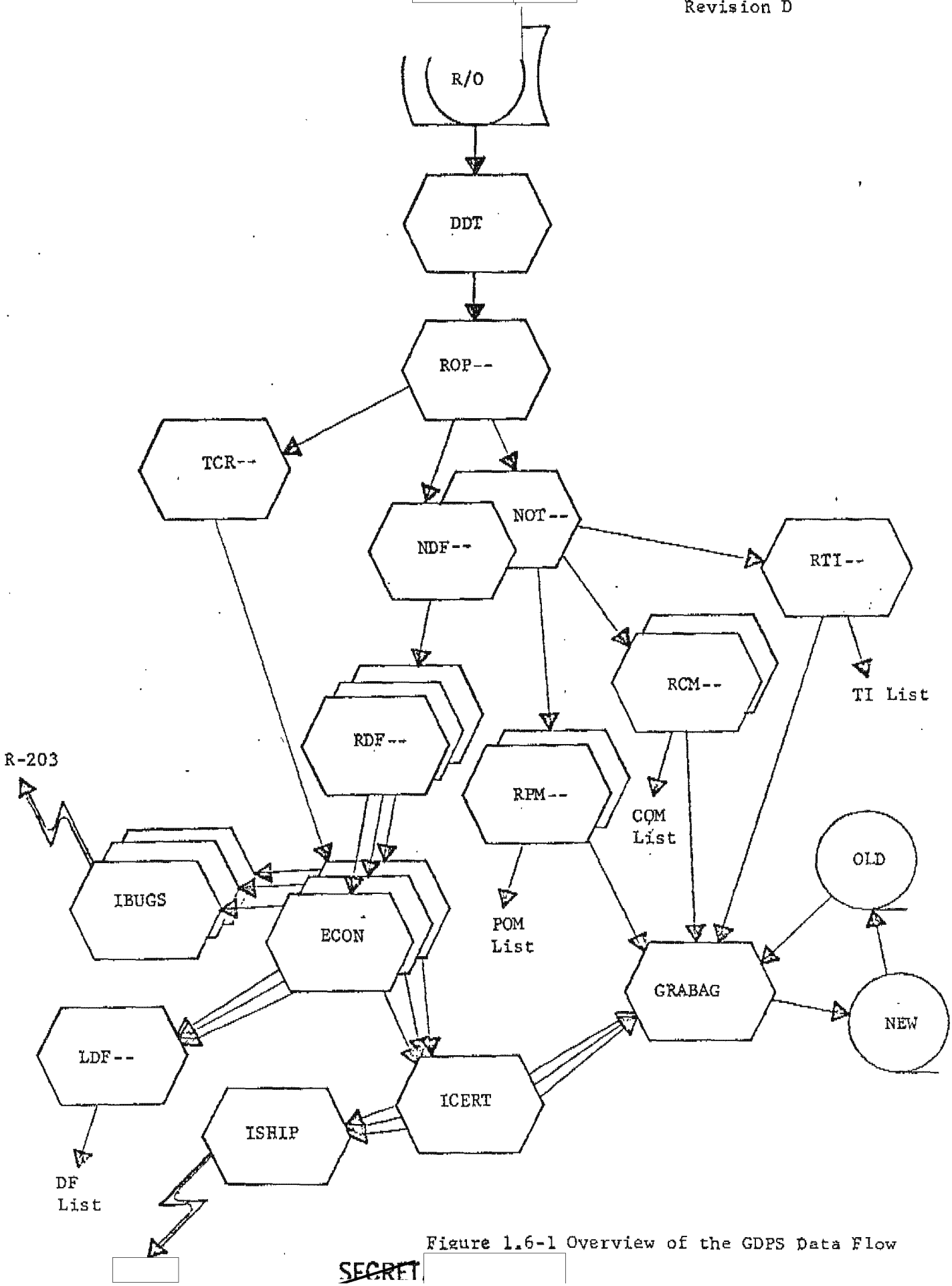

Figure 1.6-1 Overview of the GDPS Data Flow

Job XFL-- will list the header record of a transfer file followed by the data records in a ones-and-zeroes format for displaying the intercept word groups.

1.6.3 Readin Preprocessing

Jobs NDF-- and NOT— shall perform data type separation, coarse engineering units conversion, establishment of platform configuration, CW false alarm elimination and calibrated engineering units conversion, TI correlation to handover receivers, CW flagging for those blips collected when the CW receiver was commanded in the pulse reject bypass mode of processing, spin clocking, blip level geopositioning (DF only), transaction (piece) separation for routine DF and Omni/TI data, respectively. Job TCR-- shall perform both preprocessing and signal formation and reporting functions for TCR DF data.

The readin preprocessor will form and catalog files of blip level data and supporting information. Files of family name NDF-- will contain DF, and NOT-- will contain Omni and TI data. These files shall be archived (via MADSTACK) as a source for selective re-runs in support of term analysis.

1.6.4 Transaction (Piece) Processing

Jobs TCR--, RDF--, RPM--, RCM--, and RTI-- shall process blip level FARRAH payload data to the summary level on a task, multi-task, or sub-task basis, as determined by GDPS data processing ground rules which seek to minimize total processing time for the collected data while also expediting the reporting of priority DF data.

Files of family name PIP-- will contain blip, burst, series, cross-reference, and supporting data for data certification editing and short term analysis for each DF transaction (piece) of a readin. Files of family name QIP-- will contain similar levels of data for either Pulse Omni or CW Omni data for each Omni transaction (piece), for short term analysis. Files of family name TIR-- will contain TI receiver activity in alphanumeric format for long term analysis in conjunction with analog data, for each readin.

1.6.5 Data Certification

Data certification will be performed on an interactive basis using Job "ECON" to modify or flag for deletion those signals which qualify for manual certification prior to reporting. "ECON" will generate history formatted files for Itemy-59 report generation and for history collection, using Job "ICERT".

1.6.6 Report Generation

Data reports in Roster-203 and [redacted] formats will be made by Jobs "IBUGS" and "ISHIP", respectively.

Job "IBUGS" will input the linked files, thus allowing report generation with or without editing. Separate Roster-203 reports will be output for TCR transactions.

Job "ISHIP" will read history formatted files that represent the combined DF tasks, both the TCR and non-TCR.

Hard copy listings will be made from DF data for second-level search, by Job LDF--, which will be batched from "ECON" at the completion of data certification editing.

Hard copy listings of Pulse Omni and, separately, CW Omni data shall be generated at the transaction level as a part of routine processing.

Roster-167 reports will be produced for FARRAH data via existing features of GRABAG and URSALA/RAQUEL FDPS data editing software.

1.6.7 Externals Processing

Jobs TPS--, DTS--, EXT--, SUB--, and PLT-- will perform processing of subcommutated data to support payload engineering evaluation of spacecraft health and status.

1.6.8 Engineering Test and Systems Test Support

Jobs TST--, NDF--, and NOT-- will support systems test pre-launch. Jobs VDF-- and VOM-- will permit validation listings of directive creation to be generated. Job QQQ-- will be used in engineering evaluation of interative DF geopositioning software elements.

1.6.9 Validation Jobs

Jobs PIP--, QIP--, TRU30, NDF-- and NOT-- will be used in the data preparation phase of validation to generate format converted data.

2.0 READOUT SUBSYSTEM

Readout subsystem software for the FARRAH GDPS will consist of two major subdivisions:

2.1 DDT Subsystem
2.2 Readout Processing

2.1 DDT SUBSYSTEM

The DDT subsystem will be heavily modified for support of the FARRAH GDPS, by virtue of the introduction of a pair of Plessey microcomputers to perform the I-W-G sync and no-data-word compression functions for the subsystem.

2.1.1 CDC CYBER-175 Software

Existing applications software for the DDT subsystem will be expanded to download the Plessey microcomputers at the start of each pass (when FARRAH spacecraft PCM is to be processed), and will be revised to show such pertinent information as TRG time, payload readin number, and sync status during the transfer process of FARRAH PCM data.

2.1.2 Plessey Microcomputer Software

2.1.2.1 Purpose. The Plessey microcomputer software will perform several functions in the production mode, as specified below:

- Receive FARRAH PCM data from the bit-and format synchronizer at bit rates up to 1.024 megabits, in either a forward (time increasing) or a reverse (time decreasing) direction.

- Monitor frame sync and drop data not acquired in frame sync.

- Qualify I-W-Gs and drop those which do not qualify.

- Drop no-data and filler I-W-Gs.

- Build records for output to the transfer file via the data compressor, via formats specification of Section 1.1, Figure C of the GDPS Methods Document, Reference B.

- Build a trailer record for output to the transfer file and to DDT Program DATAACQ at the end of a readout, per formats of Figure D, OP. CIT.

- Output to DDT Program DATAACQ selected data types for display, per format of Figure E, OP. CIT.

The Plessey microcomputer software will perform several functions in the test mode, as specified below.

- Verify the Plessey hardware in the stand-alone mode
- Verify Plessey MP1 to MP2 interface
- Verify Plessey MP2 to data compressor interface
- Verify Plessey MP1 to bit-and format synchronizer interface

2.1.2.2 Input. Input to the Plessey microcomputers in the production mode will consist of the following:

- FARRAH PCM (forward or reverse direction)
- Control directives, via DDT programs PREPACQ and DATAACQ

Input to the Plessey microcomputers in the test mode will consist of the following:

- Frame simulated data, generated by MP1
- Simulated format synchronizer data, generated by MP2
- Real format synchronizer data, generated by a hardware simulator