Zebra Data Stripping
Outline of requirements
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December 1985
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ZEASTRA Data Stripping
Outline of requirements

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a) Overview of telemetry format

The basic unit of the telemetry is the scientific record (SR). At the nominal telemetry rate one SR is collected every 100 sec. One SR consists of 524288 bytes, and is organized as follows:

\[ \begin{align*}
1 \text{ SR} & = 128 \text{ sub-frames (SF)} \\
1 \text{ SF} & = 64 \text{ frames} \\
1 \text{ frame} & = 32 \text{ 16-bit words (=64 byte)}
\end{align*} \]

Therefore 1 SF is 4096 bytes. This seems a natural unit for the blocksize of the flight tapes. Every 100 sec one will have 128 such blocks + 1 extra block containing the ground frame. Although the content of the ground frame will be much shorter (8 bytes), we feel necessary to use a single blocksize on tape. The unused part of the ground frame block will be filled with a TBD pattern.

With the assumptions above, one can estimate the tape filling efficiency and the number of tapes required for a typical duration of the mission of 24 hrs. The tape efficiency is computed using the industry standards for a 1600 bpi tape, and assuming each file contains a single file (and is terminated by a double tape mark).

- Tape efficiency: 78.6 %
- One tape contains: 7740 blocks
- being 84 % full
- covering 60 SRs
- for a duration of 100 minutes
- Tapes required: 15 for a 24-hr flight

b) Data stripping process flow

1) Copy tape to disk (via separate process or simultaneously with Pass One below)

2) Pass One: determine missing frames/subframes (either fill with a marking pattern, if simultaneous with step 1, or keep track via software, pointers etc.). Also monitor relevant HK parameters and perform limit checking. Build a disk directory (input directory).
For our internal use we have also computed the amount of work disk space needed in IBM cylinders (1 cyl = 465 1024-byte blocks) to process a single flight tape.

<table>
<thead>
<tr>
<th>Input flight tape</th>
<th>31703040 bytes</th>
<th>67 cylinders</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 image file</td>
<td>592128 bytes</td>
<td>1.3 cylinders</td>
</tr>
<tr>
<td>1 image tape (up to)</td>
<td>8 files</td>
<td>11 cylinders</td>
</tr>
<tr>
<td>1 timing file (*)</td>
<td>3542016 bytes</td>
<td>7.5 cylinders</td>
</tr>
<tr>
<td>1 timing tape for</td>
<td>60 SRs</td>
<td>25 cylinders</td>
</tr>
<tr>
<td>Directories approx.</td>
<td></td>
<td>&lt;&lt; 1 cylinders</td>
</tr>
<tr>
<td>Total space needed</td>
<td></td>
<td>103 cylinders</td>
</tr>
</tbody>
</table>

(*) for a typical duration of 30 min.

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Milano, 20 December 1985

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