

# Charged Particle Telescope: Phase-A Study Summary Report

ESTEC/Contract No. 13997/99/NL/PB

Document No.  
**ASRO/CPT/WP10000-SUM**

Issue 1  
9 November 2000

Written by:

Eino Valtonen

Aboa Space Research Oy  
FIN-20014 Turun yliopisto  
Finland

Approved by:

Petteri Nieminen

ESTEC  
TOS-EMA

## CONTENTS

<b>1 INTRODUCTION .....</b>	<b>1</b>
1.1 PURPOSE .....	1
1.2 SCOPE.....	1
1.3 REFERENCES .....	1
1.4 OVERVIEW.....	3
<b>2 TOP-LEVEL TECHNOLOGICAL REQUIREMENTS.....</b>	<b>4</b>
2.1 GENERAL OBJECTIVES OF CPT .....	4
2.2 ENGINEERING NEEDS FOR DATA.....	5
2.3 VALUE-ADDED PRODUCTS .....	5
2.4 PERFORMANCE REQUIREMENTS.....	6
<b>3 STRATEGY AND MISSION REVIEW .....</b>	<b>6</b>
3.1 STRATEGY .....	6
3.2 FLIGHT OPPORTUNITIES .....	7
<b>4 AVAILABLE TECHNOLOGIES.....</b>	<b>7</b>
4.1 TECHNOLOGIES ON PREVIOUS MISSIONS .....	7
4.2 NEW TECHNOLOGIES AND RECOMMENDATIONS FOR CPT.....	8
<b>5 ARCHITECTURAL DESIGN OF CPT .....</b>	<b>9</b>
5.1 SENSOR SYSTEM.....	9
5.1.1 <i>General considerations</i> .....	9
5.1.2 <i>Low Energy Telescope</i> .....	10
5.1.3 <i>High Energy Telescope</i> .....	12
5.2 ELECTRONICS AND SOFTWARE.....	14
5.2.1 <i>System design</i> .....	14
5.2.2 <i>Analog electronics</i> .....	14
5.2.3 <i>Digital electronics and data processing</i> .....	16
5.2.4 <i>Software</i> .....	17
<b>6 SPACECRAFT RESOURCES REQUIREMENTS .....</b>	<b>19</b>
6.1 FUNCTIONAL REQUIREMENTS AND ELECTRICAL INTERFACES .....	19
6.2 MECHANICAL AND THERMAL INTERFACES.....	20
<b>7 SIMULATION AND CALIBRATION PLANS.....</b>	<b>20</b>
7.1 SIMULATION PLAN .....	20
7.2 CALIBRATION PLAN .....	21
<b>8 GROUND SEGMENT .....</b>	<b>22</b>
8.1 MODEL PHILOSOPHY .....	22
8.2 PRODUCT ASSURANCE .....	23
8.3 DESIGN VERIFICATION .....	24

8.4 ELECTRICAL GROUND SUPPORT EQUIPMENT .....	25
8.5 GROUND OPERATIONS.....	25
8.6 GROUND SEGMENT DURING FLIGHT .....	26
<b>9 ON-GROUND DATA ANALYSIS .....</b>	<b>26</b>
9.1 DATA PRODUCTS.....	26
9.2 ANALYSIS TOOLS .....	27
<b>10 REQUIREMENTS SPECIFICATIONS.....</b>	<b>27</b>
<b>11 IMPLEMENTATION PLAN .....</b>	<b>28</b>