

## CONTENTS

### CHAPTER 1 INTRODUCTION

1.1 Long March Family and Its History	1-1
1.2 Launch Sites for Various Missions	1-4
1.2.1 Xichang Satellite Launch Center	1-4
1.2.2 Taiyuan Satellite Launch Center	1-5
1.2.3 Jiuquan Satellite Launch Center	1-5
1.3 Launch Record of Long March	1-6

### CHAPTER 2 GENERAL DESCRIPTION TO LM-3A

2.1 Summary	2-1
2.2 Technical Description	2-1
2.2.1 Major Characteristics of LM-3A	2-1
2.3 LM-3A System Composition	2-2
2.3.1 Rocket Structure	2-2
2.3.2 Propulsion System	2-5
2.3.3 Control System	2-5
2.3.4 Telemetry System	2-5
2.3.5 Tracking and Safety System	2-6
2.3.6 Coast Phase Propellant Management and Attitude Control System	2-6
2.3.7 Cryogenic Propellant Utilization System	2-6
2.3.8 Separation System	2-17
2.3.9 Auxiliary System	2-17
2.4 Definition of Coordinate Systems and Attitude	2-19
2.5 Missions To Be Performed by LM-3A	2-20
2.6 Satellites Launched by LM-3A	2-21

### CHAPTER 3 PERFORMANCE

3.1 Introduction	3-1
3.2 Mission Description	3-1
3.2.1 Standard Geo-synchronous Transfer Orbit (GTO)	3-1
3.2.2 Flight Sequence	3-2
3.2.3 Characteristic Parameters of Typical Trajectory	3-4
3.3 Standard Launch Capacities	3-6
3.3.1 Basic Information on XSLC	3-6
3.3.2 Launch Capacity to Standard GTO	3-7
3.3.3 Mission Performance	3-7
3.4 Optimization Analysis on Special Missions	3-11

**CALT'S PROPRIETARY**

3.4.1 Ways to Enhance Mission Performance	3-11
3.4.2 Special Mission Requirements	3-14
3.5 Injection Accuracy	3-15
3.6 Pointing Accuracy	3-16
3.6.1 Perigee Coordinate System Definition	3-16
3.6.2 Separation Accuracy	3-16
3.7 Spin-up Accuracy	3-18
3.7.1 Longitudinal Spin-up Accuracy	3-18
3.7.2 Lateral Spin-up Accuracy	3-18
3.8 Launch Windows	3-18

**CHAPTER 4 PAYLOAD FAIRING**

4.1 Fairing Introduction	4-1
4.1.1 Summary	4-1
4.1.2 How to Use the Fairing Static Envelope	4-3
4.2 Fairing Structure	4-4
4.2.1 Dome	4-4
4.2.2 Forward Cone Section	4-5
4.2.3. Cylindrical Section	4-5
4.2.4 Reverse Cone Section	4-5
4.3 Heat-proof Function of the Fairing	4-5
4.4 Fairing Jettisoning Mechanism	4-6
4.4.1 Lateral Unlocking Mechanism	4-6
4.4.2 Longitudinal Unlocking Mechanism	4-6
4.4.3 Fairing Separation Mechanism	4-6
4.5 RF Windows and Access Doors	4-10

**CHAPTER 5 MECHANICAL/ELECTRICAL INTERFACE**

5.1 Description	5-1
5.2 Mechanical Interface	5-1
5.2.1 Composition	5-1
5.2.2 Payload Adapter	5-1
5.2.3 SC/LV Separation System	5-9
5.2.4 Anti-collision Measures	5-10
5.3 Electrical Interface	5-16
5.3.1 Summary	5-16
5.3.2 In-Flight-Disconnectors (IFDs)	5-19

**CALT'S PROPRIETARY**


---

5.3.3 Umbilical System	5-20
5.3.4 Anti-lightning, Shielding and Grounding	5-26
5.3.5 Continuity of SC "Earth-Potential"	5-26
5.3.6 Miscellaneous	5-26
5.4 RF Link	5-28
5.4.1 RF Relay Path	5-28
5.4.2 Characteristics of RF Link	5-28

**CHAPTER 6 ENVIRONMENTAL CONDITIONS**

6.1 Summary	6-1
6.2 Pre-launch Environments	6-1
6.2.1 Natural Environment	6-1
6.2.2 SC Processing Environment	6-4
6.2.3 Air-conditioning inside Fairing	6-5
6.2.4 Electromagnetic Environment	6-7
6.2.5 Contamination Control	6-9
6.3 Flight Environment	6-13
6.3.1 Pressure Environment	6-13
6.3.2 Thermal environment	6-14
6.3.3 Static Acceleration	6-16
6.3.4 Vibration environment	6-16
6.3.5 Acoustic Noise	6-17
6.3.6 Shock Environment	6-17
6.4 Load Conditions for SC Design	6-19
6.4.1 Frequency requirement	6-19
6.4.2 Loads Applied for SC Structure Design	6-19
6.4.3 Coupled Load Analysis	6-20
6.5 SC Qualification and Acceptance Test Specifications	6-20
6.5.1 Static Test (Qualification)	6-20
6.5.2 Vibration Test	6-20
6.5.3 Acoustic Test	6-23
6.5.4 Shock Test	6-24
6.5.5 Proto-flight Test	6-24
6.6 Environment Parameters Measurement	6-24

CALT'S PROPRIETARY

---

## CHAPTER 7 LAUNCH SITE

7.1 General Description	7-1
7.2 Technical Center	7-3
7.2.1 LV Preparation Building (BL)	7-3
7.2.2 SC Preparation Building (BS)	7-3
7.3 Launch Center	7-18
7.3.1 General	7-18
7.3.2 Launch Complex # 2	7-20
7.4 Mission Command & Control Center (MCCC)	7-25
7.4.1 General	7-25
7.4.2 Functions of MCCC	7-25
7.4.3 Configuration of MCCC	7-25
7.5 Tracking Telemetry and Control System (T,T&C)	7-27
7.5.1 General	7-27
7.5.2 Main Functions of TT&C	7-27
7.5.3 Tracking Sequence of TT&C System	7-27

## CHAPTER 8 LAUNCH SITE OPERATION

8.1 Briefing to Launch Site Operation	8-1
8.2 LV Checkouts and Processing	8-1
8.3 SC/LV Combined Operations	8-3
8.3.1 Summary	8-3
8.3.2 SC/LV Combined Operation	8-4
8.3.3 SC Preparation and Checkouts	8-6
8.4 Launch Limitation	8-11
8.4.1 Weather Limitation	8-11
8.4.2 "GO" Criteria for Launch	8-11
8.5 Pre-launch Countdown Procedure	8-11
8.6 Post-launch Activities	8-12

## CHAPTER 9 SAFETY CONTROL

9.1 Safety Responsibilities and Requirements	9-1
9.2 Safety Control Plan and Procedure	9-1
9.2.1 Safety Control Plan	9-1
9.2.2 Safety Control Procedure	9-1
9.3 Composition of Safety Control System	9-3

**CALT'S PROPRIETARY**

9.4 Safety Criteria	9-4
9.4.1 Approval procedure of safety criteria	9-4
9.4.2 Common Criteria	9-4
9.4.3 Special Criteria	9-5
9.5 Emergency Measures	9-5

**CHAPTER 10 DOCUMENTS AND MEETINGS**

10.1 General	10-1
10.2 Documents and Submission Schedule	10-1
10.3 Reviews and Meetings	10-5

**ABBREVIATIONS**

<b>ADS</b>	Automatic Destruction System
<b>BL</b>	Launch Vehicle Processing Building
<b>BL1</b>	Launch Vehicle Transit Building
<b>BL2</b>	Launch Vehicle Testing Building
<b>BM</b>	Solid Rocket Motor Testing and Processing Buildings
<b>BMX</b>	Solid Rocket Motor X-ray Building
<b>BS</b>	SC Processing Buildings
<b>BS2</b>	SC Non-hazardous Operation Building
<b>BS3</b>	SC Hazardous Operation Building
<b>CALT</b>	China Academy of Launch Vehicle Technology
<b>CDS</b>	Command Destruction System
<b>CLA</b>	Coupled Load Analysis
<b>CLTC</b>	China Satellite Launch and Tracking Control General
<b>CS</b>	Commanded Shutdown
<b>EDC</b>	Effect Day of the Contract
<b>EGSE</b>	Electrical Ground Support Equipment
<b>GEO</b>	Geo-synchronous Orbit
<b>GSE</b>	Ground Support Equipment
<b>GTO</b>	Geo-synchronous Transfer Orbit
<b>JSLC</b>	Jiuquan Satellite Launch Center
<b>LC</b>	Launch Center
<b>LCC</b>	Launch Control Console

CALT'S PROPRIETARY

---

<b>LEO</b>	Low Earth Orbit
<b>LH<sub>2</sub>/LH</b>	Liquid Hydrogen
<b>LM</b>	Long March
<b>LOX</b>	Liquid Oxygen
<b>LV</b>	Launch Vehicle
<b>MCCC</b>	Mission Command and Control Center
<b>MEO</b>	Medium Earth Orbit
<b>MRS</b>	Minimum Residue Shutdown
<b>PLF</b>	Payload Fairing
<b>PUS</b>	Propellant Utilization System
<b>RF</b>	Radio Frequency
<b>RMS</b>	Root Mean Square
<b>SC</b>	Spacecraft
<b>SRM</b>	Solid Rocket Motor
<b>SSO</b>	Sun synchronous Orbit
<b>TC</b>	Technical Center
<b>TSLC</b>	Taiyuan Satellite Launch Center
<b>TT&amp;C</b>	Tracking and Telemetry and Control
<b>UDMH</b>	Unsymmetrical Dimethyl Hydrazine
<b>UPS</b>	Uninterrupted Power Supply
<b>VEB</b>	Vehicle Equipment Bay
<b>XSCC</b>	Xi'an Satellite Control Center
<b>XSLC</b>	Xichang Satellite Launch Center