
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-3C

2.1 Summary	2-1
2.2 Technical Description	2-1
2.2.1 Major Characteristics of LM-3C	2-1
2.3 LM-3C System Composition	2-2
2.3.1 Rocket Structure	2-2
2.3.2 Propulsion System	2-7
2.3.3 Control System	2-7
2.3.4 Telemetry System	2-7
2.3.5 Tracking and Safety System	2-8
2.3.6 Coast Phase Propellant Management and Attitude Control System	2-8
2.3.7 Cryogenic Propellant Utilization System	2-8
2.3.8 Separation System	2-19
2.3.9 Auxiliary System	2-19
2.4 Definition of Coordinate Systems and Attitude	2-21
2.5 Missions To Be Performed by LM-3C	2-22
2.6 Upgrading to LM-3C(3B)	2-23

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	3-12

CALT'S PROPRIETARY

3.4.1 Ways to Enhance Mission Performance	3-12
3.4.2 Special Mission Requirements	3-17
3.5 Injection Accuracy	3-17
3.6 Pointing Accuracy	3-18
3.6.1 Perigee Coordinate System Definition	3-18
3.6.2 Separation Accuracy	3-19
3.7 Spin-up Accuracy	3-20
3.7.1 Longitudinal Spin-up Accuracy	3-20
3.7.2 Lateral Spin-up Accuracy	3-20
3.8 Launch Windows	3-20

CHAPTER 4 PAYLOAD FAIRING

4.1 Fairing Introduction	4-1
4.1.1 Summary	4-1
4.1.2 4000F Fairing	4-4
4.1.3 4000Z Fairing	4-6
4.1.4 4200F Fairing	4-7
4.1.5 4200Z Fairing	4-8
4.1.6 How to Use the Fairing Static Envelope	4-9
4.2 Fairing Structure	4-9
4.2.1 Dome	4-10
4.2.2 Biconic Section	4-10
4.2.3. Cylindrical Section	4-11
4.2.4 Reverse Cone Section	4-11
4.3 Heat-proof Function of the Fairing	4-11
4.4 Fairing Jettisoning Mechanism	4-11
4.4.1 Lateral Unlocking Mechanism	4-11
4.4.2 Longitudinal Unlocking Mechanism	4-12
4.4.3 Fairing Separation Mechanism	4-16
4.5 RF Windows and Access Doors	4-18

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	5-15

CALT'S PROPRIETARY

5.2.4 Anti-collision Measures	5-16
5.3 Electrical Interface	5-22
5.3.1 Summary	5-22
5.3.2 In-Flight-Disconnectors (IFDs)	5-25
5.3.3 Umbilical System	5-26
5.3.4 Anti-lightning, Shielding and Grounding	5-32
5.3.5 Continuity of SC "Earth-Potential"	5-32
5.3.6 Miscellaneous	5-32
5.4 RF Link	5-34
5.4.1 RF Relay Path	5-34
5.4.2 Characteristics of RF Link	5-34

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	6-18
6.4.1 Frequency requirement	6-18
6.4.2 Loads Applied for SC Structure Design	6-18
6.4.3 Coupled Load Analysis	6-19
6.5 SC Qualification and Acceptance Test Specifications	6-19
6.5.1 Static Test (Qualification)	6-19
6.5.2 Vibration Test	6-19
6.5.3 Acoustic Test	6-22
6.5.4 Shock Test	6-23
6.5.5 Proto-flight Test	6-23
6.6 Environment Parameters Measurement	6-24

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 for Encapsulation-on-pad Method	8-4
8.3.3 SC/LV Combined Operations for Encapsulation-in-BS3 Method	8-11
8.3.4 SC Preparation and Checkouts	8-12
8.4 Launch Limitation	8-16
8.4.1 Weather Limitation	8-16
8.4.2 "GO" Criteria for Launch	8-16
8.5 Pre-launch Countdown Procedure	8-16
8.6 Post-launch Activities	8-17

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

CALT'S PROPRIETARY

9.3 Composition of Safety Control System	9-3
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

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

CALT'S PROPRIETARY

LCC	Launch Control Console
LEO	Low Earth Orbit
LH₂/LH	Liquid Hydrogen
LM	Long March
LOX	Liquid Oxygen
LV	Launch Vehicle
MCCC	Mission Command and Control Center
MEO	Medium Earth Orbit
MRS	Minimum Residue Shutdown
PLF	Payload Fairing
PUS	Propellant Utilization System
RF	Radio Frequency
RMS	Root Mean Square
SC	Spacecraft
SRM	Solid Rocket Motor
SSO	Sun synchronous Orbit
TSLC	Taiyuan Satellite Launch Center
TT&C	Tracking and Telemetry and Control
UDMH	Unsymmetrical Dimethyl Hydrazine
UPS	Uninterrupted Power Supply
VEB	Vehicle Equipment Bay
XSCC	Xi'an Satellite Control Center
XSLC	Xichang Satellite Launch Center