

CHAPTER 7

LAUNCH SITES

This chapter describes general information on the facilities and services provided by Jiuquan Satellite Launch Center (JSLC) and Xichang Satellite Launch Center (XSLC).

Part A: Jiuquan Satellite Launch Center (JSLC)

A7.1 JSLC General Description

JSLC is subordinated to China Satellite Launch and Tracking Control General (CLTC). JSLC is mainly used for conducting LEO and SSO missions. JSLC is located in Jiuquan region, Gansu Province, Northwestern China. **Figure A7-1** shows the location of Jiuquan, as well as the layout of JSLC.

Jiuquan is of typical inland climate. The annual average temperature is 8.7°C. There is little rainfall and thunder in this region.

Dingxin Airport is 80km southwest to JSLC. The runway of Dingxin Airport is capable of accommodating large aircraft. The Gansu-Xinjiang Railway and the Gansu-Xinjiang Highway pass by JSLC. There are a dedicated railway branch and a highway branch leading to the Technical Centers and the Launch Centers of JSLC.

By using of cable network and communications network, JSLC provides domestic and international telephone and facsimile services for the user.

JSLC consists of headquarter, South Launch Site, North Launch Site, Communication Center, Mission Center for Command and Control (MCCC), Tracking System and other logistic support systems. The North Launch Site is composed of North Technical Center and North Launch Center, which is dedicated for launching LM-2C and LM-2D. The South Launch Site is composed of South Technical Center and South Launch Center, which is dedicated for launching Two-stage LM-2E and LM-2E/ETS, as well as LM-2EA. This chapter only introduces the South Launch Site.

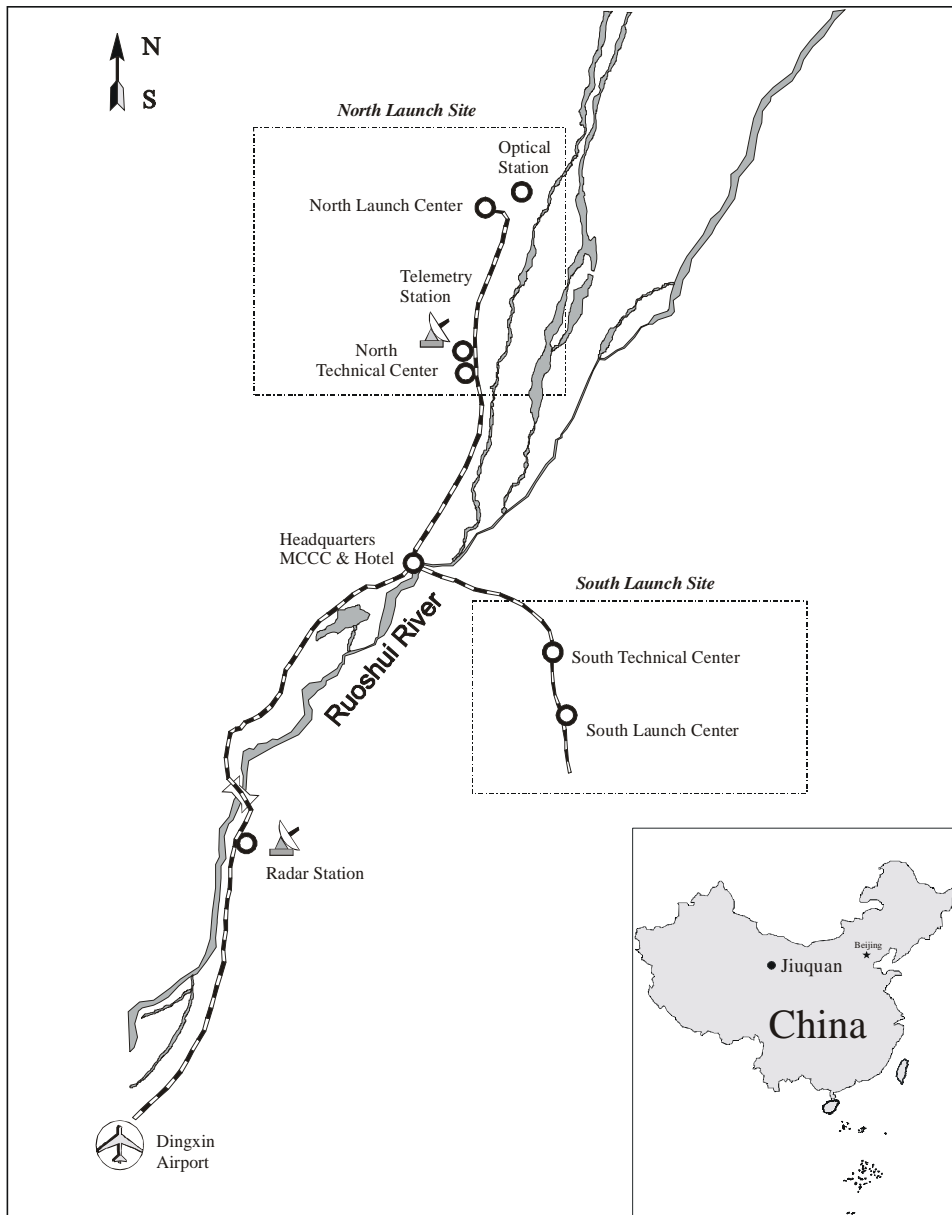


Figure A7-1 JSLC Map

A7.2 South Technical Center

South Technical Center includes LV Vertical Processing Building (BLS), LV Horizontal Transit Building (BL1), SC Non-hazardous Operation Building (BS2), SC Hazardous Operation Building (BS3), Solid Rocket Motor (SRM) Checkout and

Processing Building (BM) and Pyrotechnic Storage and Processing Building (BP1, BP2). The LV and the SC will be processed, tested, checked, assembled and stored in South Technical Center. Refer to **Figure A7-2**.

A7.2.1 LV Horizontal Transit Building (BL1)

BL1 is mainly used for transiting the LV and relevant ground equipment. It mainly includes LV horizontal processing hall, transit room and unit testing rooms.

LV horizontal processing hall is 78 meters long, 24 meters wide. It is mainly used for LV horizontal processing. There are three steel tracks and a moveable overhead crane inside the hall.

The transit room, which is 42 meters long, 30 meters wide, is equipped with a moveable overhead crane with the maximum height of 12 meters. The gate of the transit room is 8 meters wide, 8 meters high.

A7.2.2 LV Vertical Processing Building (BLS)

BLS is mainly used for LV integration, LV & SC integration, LV vertical checkouts, LV & SC combined checkouts. BLS includes two high-bays and two vertical-processing halls.

Each vertical-processing hall is 26.8 meters wide, 28 meters long, 81.6 meters high, and it is equipped with following facilities:

- ✧ 13-floor moveable platform;
- ✧ A crane with maximum lifting capability of 50t/30t/17m;
- ✧ 380V/220V/50Hz and 110V/60Hz power supply;
- ✧ Air-conditioning system;

The corresponding environment parameters inside BLS are:

- ✓ Temperature: 20±5°C;
 - ✓ Relative humidity: 35%~55%;
 - ✓ Cleanness (class): 100,000.
- ✧ Grounding System;
 - ✧ Fire alarm & protection system.

See **Figure A7-3**.

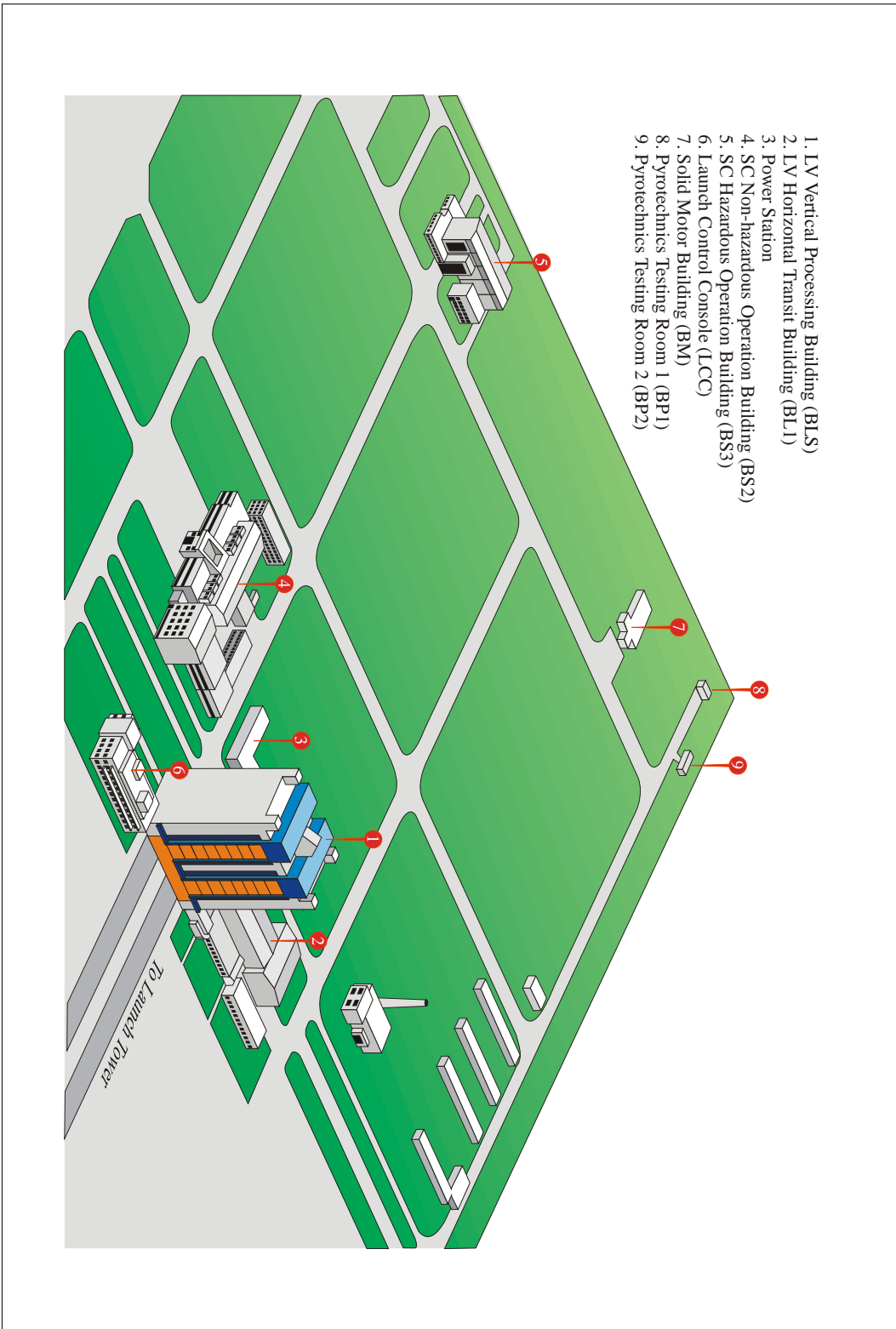


Figure A7-2 South Technical Center

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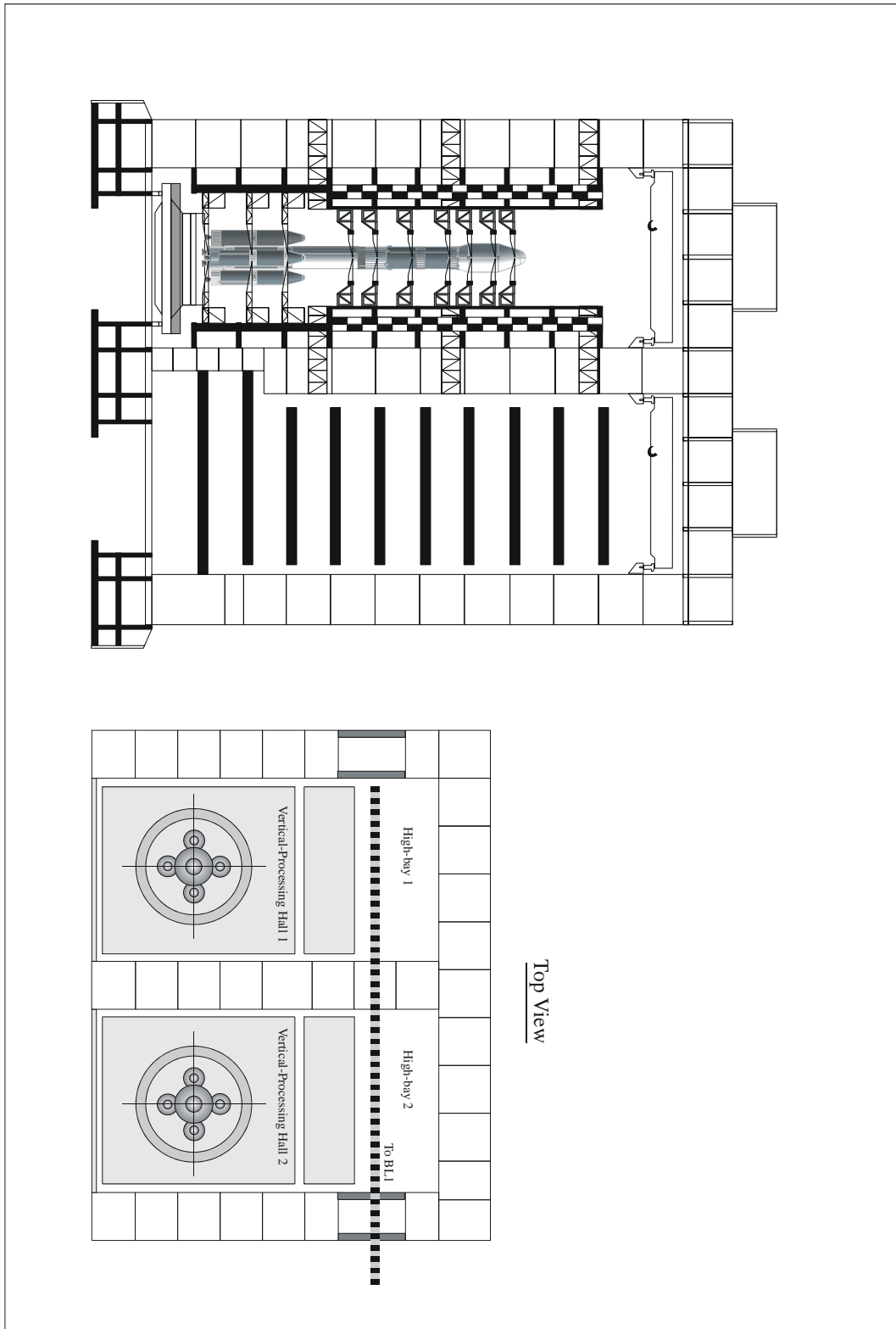


Figure A7-3 LV Vertical Processing Building (BLS)

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A7.2.3 SC Non-hazardous Operation Building (BS2)

The SC Non-hazardous Operation Building (BS2) is a clean area for SC testing and integration. BS2 consists of the following parts:

- ◇ BS2 Transit Hall: (Crane Lifting Capability: 32t/10t/17m);
- ◇ SC Testing Hall: (Crane Lifting Capability: 32t/10t/17m);
- ◇ Air-drench Rooms;
- ◇ System Test Equipment (STE) Rooms;
- ◇ Unit-level Test Rooms;
- ◇ Control Room;
- ◇ Equipment Storage Rooms;
- ◇ RF Room;
- ◇ Offices etc.

Refer to **Figure A7-4** and **Table A7-1**.

Table A7-1 Room Area and Environment in BS2

Room	Usage	Dimension		Environment		
		L×W (m×m)	Area (m ²)	T (°C)	Humidity (%)	Cleanness (Class)
01	BS2 Transit Hall	30×24	720			
02	SC Testing Room	72×24	1728	23±5	35~55	100,000
03	Locker Room for Men	12×6.5	78			
04	Locker Room for Women	9×6.5	58.5			
05	Air-drench Room	12×6.5	78			
06	Air-drench Room	6×6.5	39			
07	System Test Equipment Room	18×6.5	117	15~25	35~55	100,000
08	Unit-level Test Room	12×6.5	78	15~25	35~55	100,000
09	Unit-level Test Room	18×6.5	117	15~25	35~55	100,000
10	Unit-level Test Room	12×6.5	78	15~25	35~55	100,000
11	Control Room	18×6.5	117	20~25	35~55	100,000
12	Equipment Storage Room	6×6.5	39	20~25	35~55	100,000
14	RF Room	18×6.5	117	20~25	35~55	100,000
15	Equipment Storage Room	6×6.5	39	20~25	35~55	100,000

In addition, BS2 is equipped with gas-supply, grounding, air-conditioning, fire alarm & protection and cable TV systems. It also provides 380V/220V/50Hz and 110V/60Hz power-supplies.

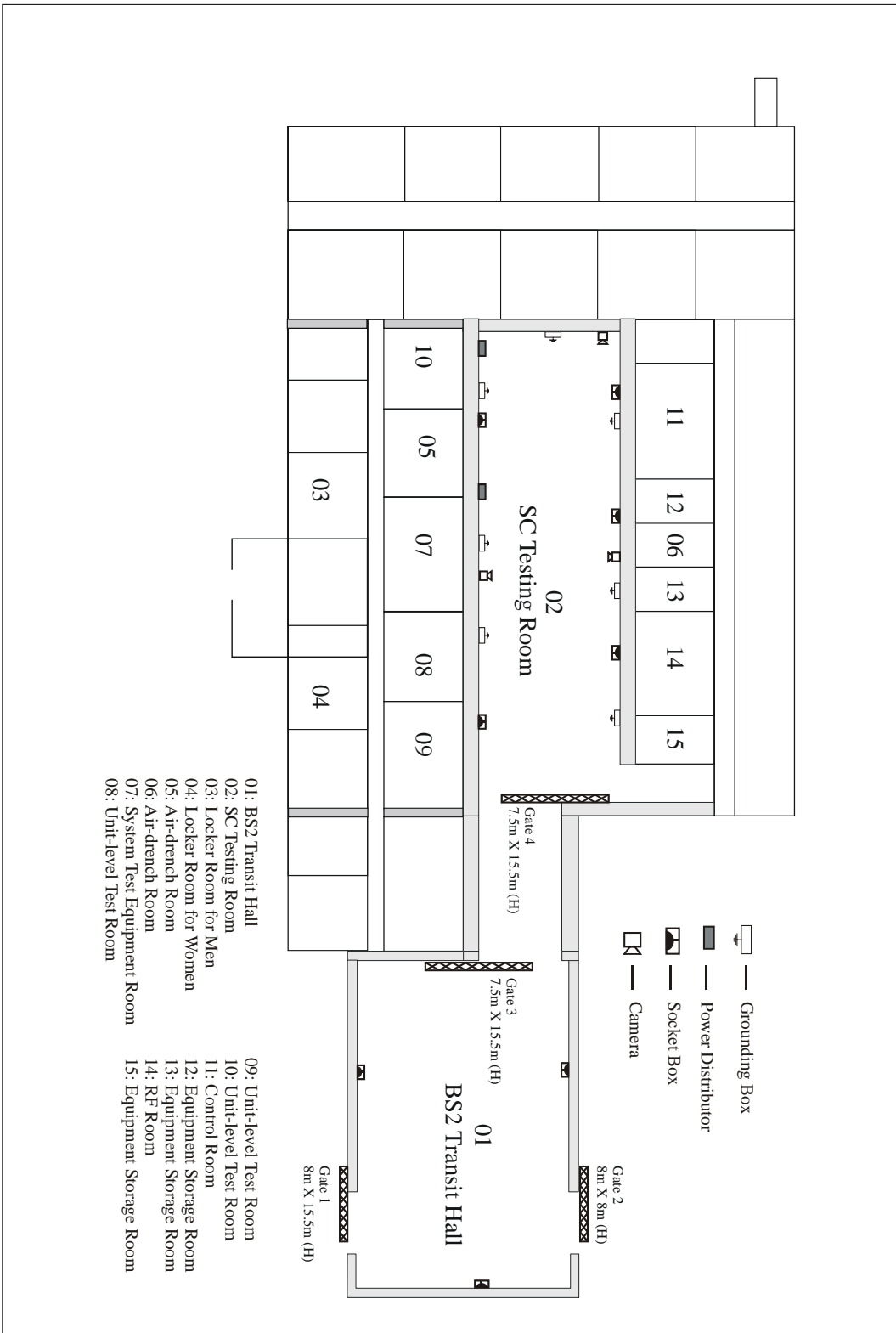


Figure A7-4 Layout of First Floor of BS2

A7.2.4 SC Hazardous Operation Building (BS3)

The SC hazardous operation building (BS3) is a clean area for SC's hazardous assembly, mono-propellant or bi-propellant fueling, the integration of the SC and the Fairing, spinning balance and weighing. BS3 mainly consists of the following parts:

- ✧ BS3 transit hall: (Crane Lifting Capability:16t/3.2t/17m);
- ✧ SC fueling hall: (Crane Lifting Capability: 16t/3.2t/17m);
- ✧ SC assembly hall: (Crane Lifting Capability: 16t/3.2t/18m);

Refer to **Figure A7-5** and **Table A7-2**.

Table A7-2 Room Area and Environment in BS3

Room	Usage	Dimension		Environment		
		L×W (m×m)	Area (m ²)	T (°C)	Humidity (%)	Cleanness (Class)
01	BS3 Transit Hall	24×15	360			
02	SC Fueling Hall	12×18	216	15~25	35~55	100,000
03	Testing Room	7.5×6	45	15~25	35~55	100,000
04	Testing Room	6×6	36	15~25	35~55	100,000
05	Locker Room	6×6	36			
06	Testing Room	6×6	36	15~25	35~55	100,000
07	SC Assembly Hall	36×18	648	15~25	35~55	100,000
08	Fuel-filling Room	6×6	36	15~25	35~55	100,000
09	Fuel-filling Room	7.3×6	43.8	15~25	35~55	100,000
10	Office	4.3×6	25.8			
11	Air-drench Room	3×6	18			
12	Oxidizer-filling room	6×6	36	20~25	35~55	100,000
13	Room of Air-conditioning Unit					
14	Power Distribution Room					

In addition, BS3 is equipped with electronic weighing, gas-supply, air-conditioning, grounding, fire alarm & protection and cable TV systems. It also provides 380V/220V/50Hz and 110V/60Hz power-supplies.

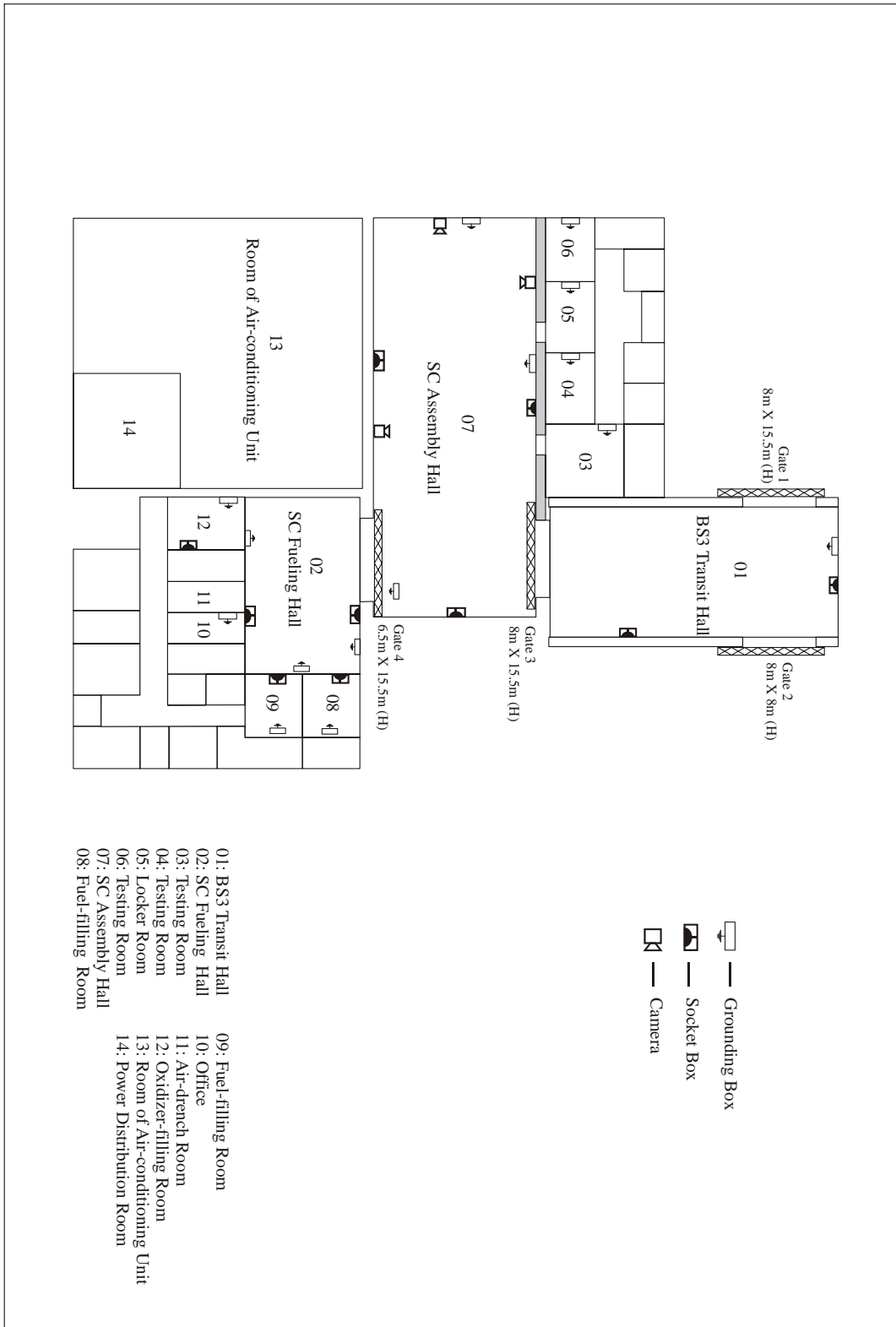


Figure A7-5 Layout of First Floor of BSS3

A7.2.5 SRM Checkout and Processing Building (BM)

The SRM Checkout and Processing Building (BM) is used for the storage of the SRM, SRM assembly, pyrotechnics checkout, X-ray checkout of SRM, etc.

BM mainly consists of following parts:

- ✧ SRM Processing Hall;
- ✧ SRM Storage Room;

Refer to **Figure A7-6**. The area and environment are listed in **Table A7-3**.

Table A7-3 Room Area and Environment in BM

Room	Usage	Measurement		Environment		
		L×W (m×m)	Area (m ²)	T (°C)	Humidity (%)	Cleanness (Class)
01	SRM Processing Hall	24×15	360	18~28	35~55	100,000
02	SRM Storage Room	6×6	36	18~28	35~55	100,000
03	Locker Room	3.3×5	16.5			
04	Power Distribution Room	3.3×5	16.5			
05	Meeting Room	3.3×5.1	16.83			
06	Testing Room	3.3×5.1	16.83	18~28	40~60	100,000
07	Data-processing Room	6.6×5.1	33.66			
08	Testing Room			18~28	40~60	100,000

A series of anti-thunder, anti-static measures have been adopted in BM. BM is equipped with air-conditioning and fire alarm & protection systems. It also provides 380V/220V/50Hz and 110V/60Hz power-supply.

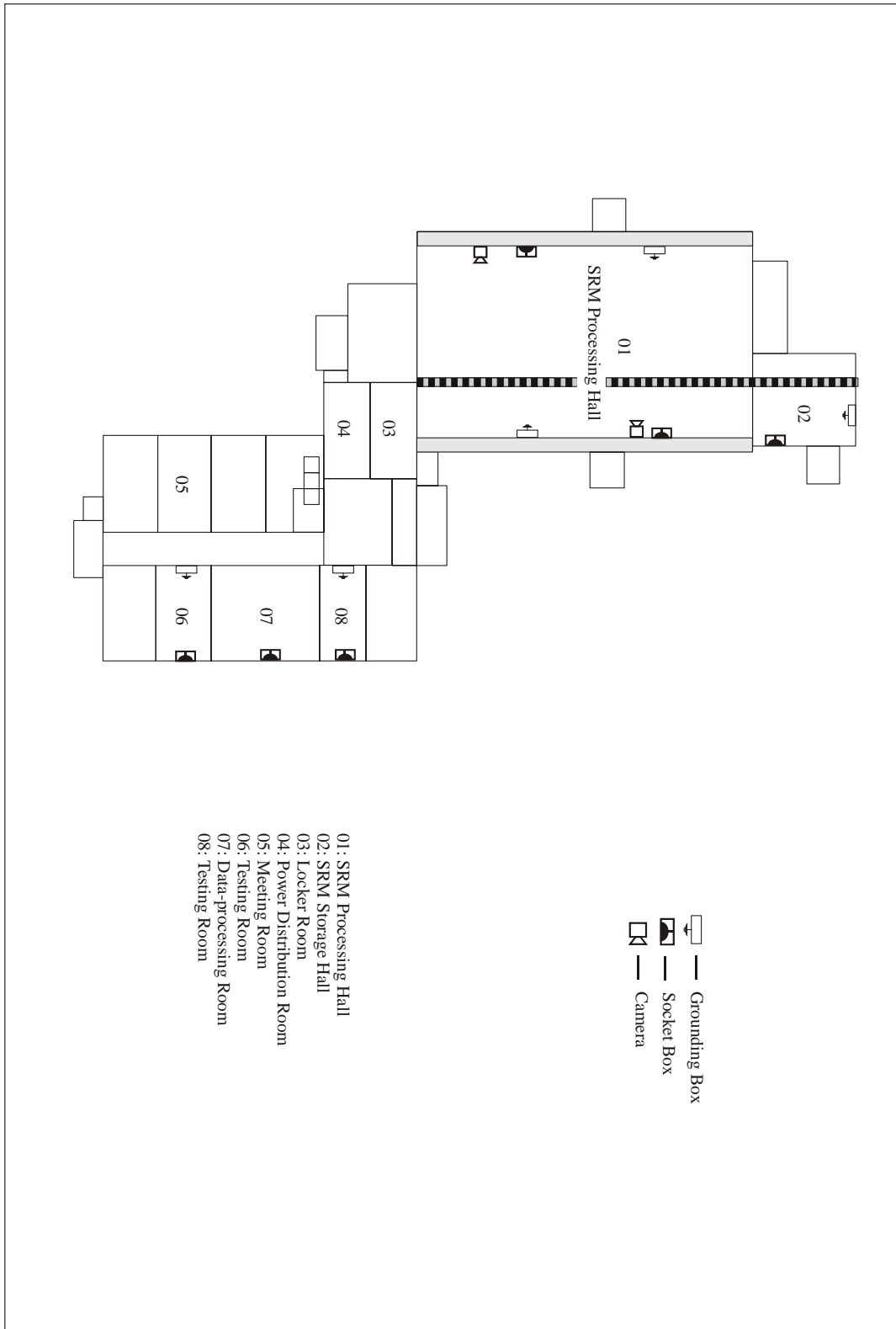


Figure A7-6 BM Layout

A7.2.6 Launch Control Console (LCC)

Launch Control Console (LCC) is located beside BLS. LCC is electrically connected with Launch Tower and BS2 via cables and radio frequency. LCC is of following main functions:

- ✧ Commanding and coordinating LV system and SC system to conduct comprehensive checkouts and launch;
- ✧ Remote control on LV pre-launch process, fire-protecting system of the launch tower;
- ✧ Common and testing communications between South Technical Center and South Launch Center;
- ✧ Launch Monitoring and Controlling;
- ✧ Medical Assistance and Weather Forecast.

The LCC mainly consists of following parts:

- ✧ LV Control Room;
- ✧ SC Control Room;
- ✧ Checkout & Launch Command Room;
- ✧ Communication Center;

Refer to **Figure A7-7** and **Table 7-4**.

Table A7-4 Room Area and Environment in LCC

Room	Usage	Dimension		Environment		
		L×W (m×m)	Area (m ²)	T (°C)	Humidity (%)	Cleanness (Class)
01	SC Control Room	13.2×19	237.6	18~26	40~70	
02	Checkout & Launch Command Room	13.2×19	237.6	18~26	40~70	
03	LV Control Room		118.8	18~26	40~70	
04	Locker Room					
05	Meeting Room	8×6	48			
06	Anteroom	3.3×5.1	16.83			
07	Testing Room	6×5	30	18~26	40~70	
08	Testing Room	8×6	48	18~26	40~70	
09	Testing Room	4×6	24	18~26	40~70	

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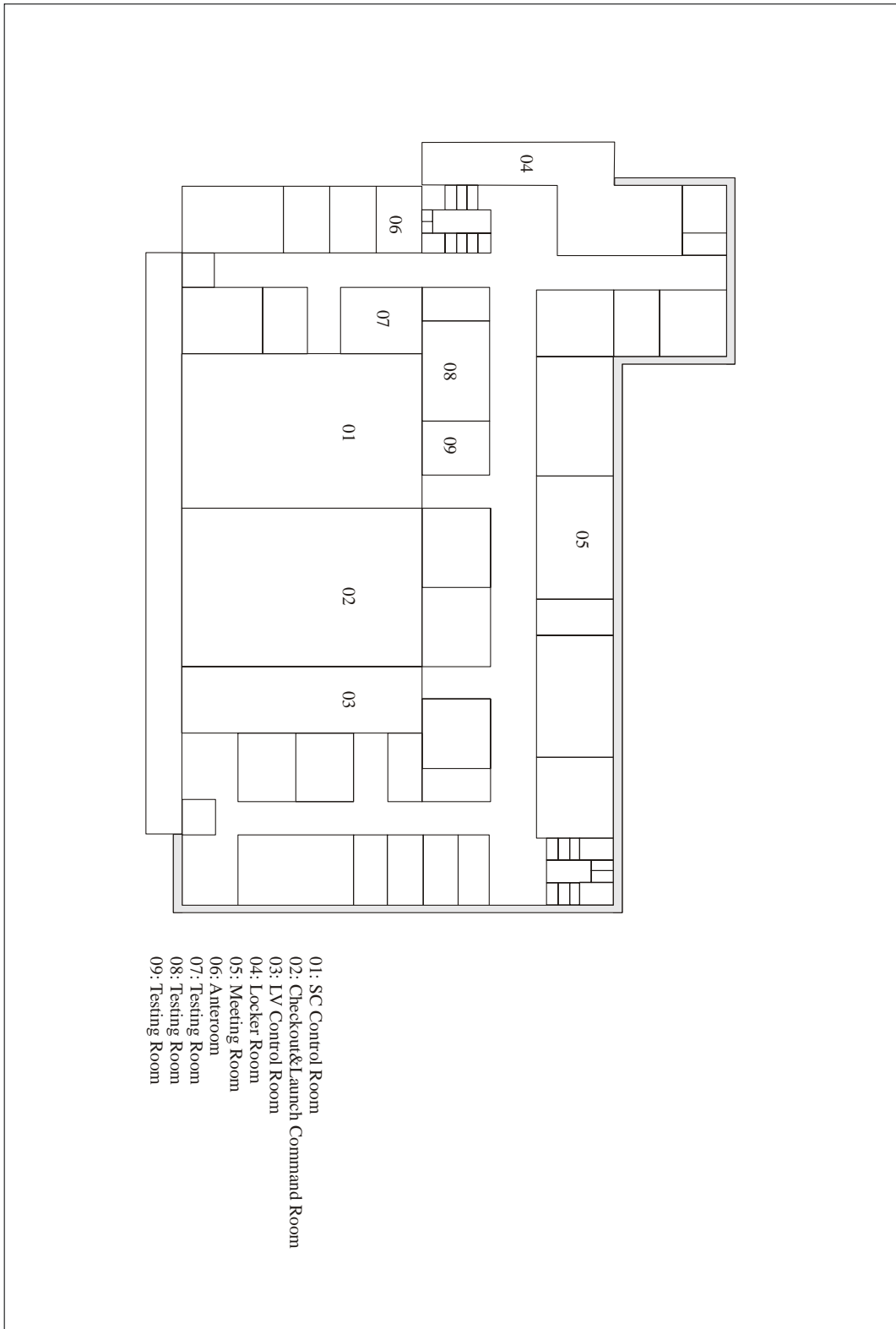


Figure A7-7 Layout of the Second Floor of LCC

A7.2.7 Pyrotechnics Storage & Testing Rooms (BP1 & BP2)

BP1 and BP2 are used for the storage & testing of LV and SC pyrotechnics. BP1 and BP2 are equipped with power-supply, anti-lightning & grounding and fire-extinguish systems.

A7.2.8 Power Supply, Grounding, Lightning Protection, Fire Alarm & Protection Systems in the South Technical Center

- **Power Supply System**

Two sets of 380V/220, 50Hz power supplies are provided in the south technical center, which spare each other. The power supply for illumination is separate to that. In addition, all of the sockets inside BS2 and BS3 are explosion-proof.

- **Lightning Protection and Grounding**

In technical areas, there are three kinds of grounding, namely technological grounding, protection grounding and lightning grounding. Some advanced lightning protection and grounding measures are adopted in all the main buildings and a common grounding base is established for each building. All grounding resistance is lower than 1Ω. Grounding copper bar is installed to eliminate static in the processing areas.

- **Fire Alarm & Protection System**

All the main buildings are equipped with fire alarm & protection system. The fire alarm system includes ultraviolet flame sensors, infrared smoke sensors, photoelectric smoke sensors, manual alarm device and controller, etc. The fire protection system includes fire hydrant, powder fire-extinguisher etc.

A7.3 South Launch Center

A7.3.1 General

Coordinates of the Launch Tower for LM-2E:

Longitude: 100°17.4'E,

Latitude: 40°57.4'N

Elevation: 1073m

The launch site is 1.5 km away from the South Technical Center. Facilities in the launch area are umbilical tower, moveable launch pad, underground equipment room, fuel storehouse, oxidizer storehouse, fuelling system, power-supply system, gas-supply system, communication system, etc. Refer to **Figure A7-8**.

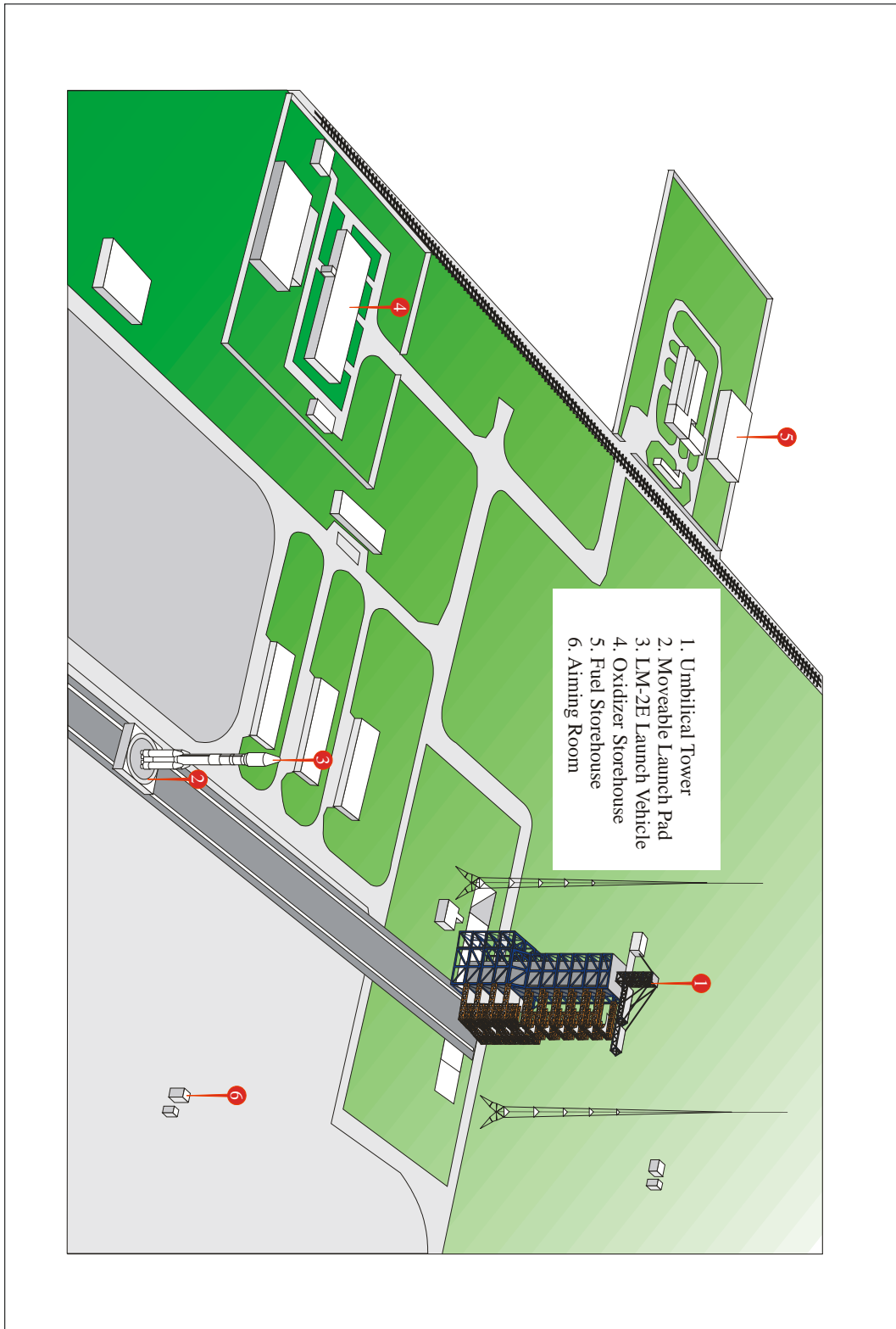


Figure A7-8 South Launch Center

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A7.3.2 Umbilical Tower

The umbilical tower is an 11-floor fixed steel structure with height of 75m. The tower is to support electrical connections, gas pipelines, liquid pipelines, as well as their connectors for both SC and LV. The umbilical tower has a rotating-platform system, whose load-bearing capability is 15kN for each single platform. There is also a rotary crane on the top of the umbilical tower. See **Figure A7-9**.

The umbilical tower provides an air-conditioned SC operation area, in which the temperature, humidity and air cleanliness can be guaranteed. The area is well grounded, the grounding resistance is less than 1Ω.

The umbilical tower is equipped with hydrant system and powder fire extinguishers.

A common elevator and explosion-proof elevator are available in the umbilical tower, of which carrying speeds are 1.75m/s and 1.0m/s respectively. The maximum load-bearing capability of the elevators is 1000kg.

The umbilical tower has a sealed cable tunnel, in which the umbilical cables connect the LV, SC and underground equipment room. The resistance of each cable is less than 1Ω.

A7.3.3 Moveable Launch Pad

The moveable launch pad is mainly used for performing LV vertical integration and checkouts in BLS, transferring LM-2E from BLS to the launch area vertically, and locating and locking itself beside the umbilical tower. The moveable launch pad can also vertically adjust the position of the launch vehicle to make the preliminary aiming. The ignition flame can be exhausted through the moveable launch pad.

The moveable launch pad is 24.4m long, 21.7m wide, 8.34m high, and weighs 750t. It can continuously change its moving speed in 0~28m/min., and the moving acceleration is less than 0.2m/s. It takes the moveable launch pad, carrying LM-2E, about 40 minutes to move from BLS to umbilical tower (1.5km).

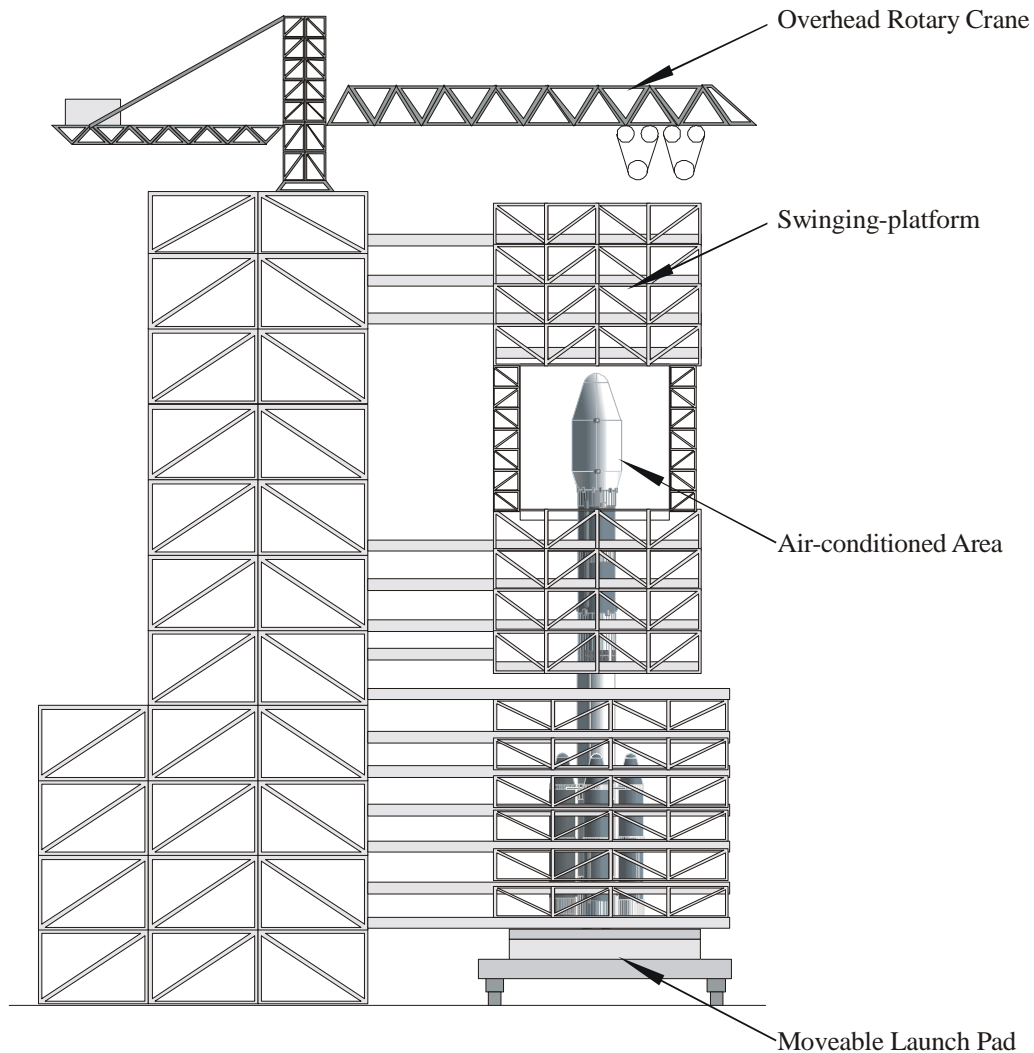


Figure A7-9 Umbilical Tower

A7.3.4 Underground Equipment Room

The underground equipment room is located under the umbilical tower, whose construction area is 800m^2 . It mainly includes power-supply room, equipment rooms, power distribution room, optic cable terminal room, room of air-conditioning unit, etc. The underground equipment room is air-conditioned, the internal temperature is $20\pm 5^\circ\text{C}$ and relative humidity is not greater than 65%. The equipment room is well grounded with resistance less than 1Ω . A 3-ton crane is equipped inside the equipment room.

A7.3.5 Mission Command & Control Center (MCCC)

MCCC includes command and control hall, computer room, internal communication room and offices, etc. **Figure A7-10** shows the layout of MCCC.

MCCC is of following main functions:

- ✧ Command all the operations of the tracking stations and monitor the performance and status of the tracking equipment;
- ✧ Perform the range safety control after the lift-off of the launch vehicle;
- ✧ Gather the TT&C information from the stations and process these data in real-time;
- ✧ Provide acquisition and tracking data to the tracking stations and Xi'an SC Control Center (XSCC);
- ✧ Provide display information to the SC working-team console;
- ✧ Perform post-mission data processing.

The Configuration of MCCC is as follows:

- ✧ Real-time computer system;
- ✧ Command and control system.
- ✧ Monitor and display for safety control, including computers, D/A and A/D converters, TV display, X-Y recorders, multi-pen recorders and telecommand system.
- ✧ Communication system.
- ✧ Timing and data transmission system.
- ✧ Film developing and printing equipment.

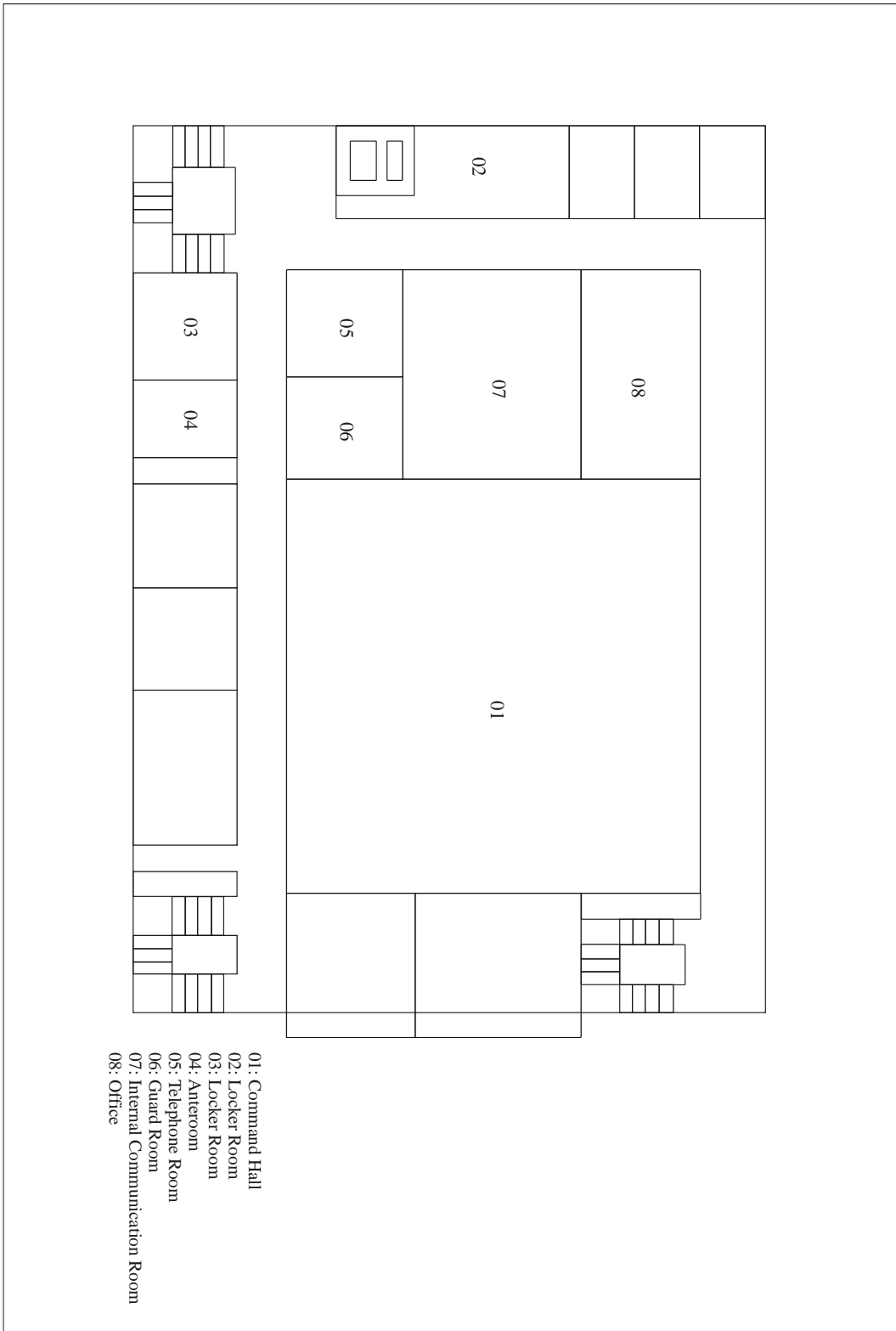


Figure A7-10 MCCC Layout

A7.4 Tracking, Telemetry and Control System (TT&C)

The TT&C system of JSLC and TT&C system of Xi'an SC Control Center (XSCC) form a TT&C net for the mission.

The TT&C system of JSLC mainly consists of:

- ✧ MCCC;
- ✧ Radar Stations;
- ✧ Optical Tracking Stations;
- ✧ Mobile Tracking Stations.

The TT&C system of XSCC mainly includes:

- ✧ Weinan Tracking Station;
- ✧ Nanning Tracking Station;
- ✧ Mobile Tracking Stations.

Main Functions of TT&C are described as follows:

- ✧ Recording the initial LV flight data in real time;
- ✧ Measuring the trajectory of the launch vehicle;
- ✧ Receiving, recording, transmitting and processing the telemetry data of the launch vehicle and the SC;
- ✧ Making flight range safety decision;
- ✧ Computing the SC/LV separation status and injection parameters.

Part B: Xichang Satellite Launch Center (XSLC)

B7.1 XSLC General Description

XSLC is subordinated to China SC Launch and Tracking Control General (CLTC). This launch site is mainly to conduct GTO missions.

XSLC is located in Xichang region, Sichuan Province, southwestern China. Its headquarter is located in Xichang City, 65 km away from the launch site. **Figure B7-1** shows the location of Xichang.

Xichang is of subtropical climate and the annual average temperature is 16°C. The ground wind in the area is usually very gentle in all the four seasons.

Xichang Airport is located at the northern suburbs of Xichang City. The runway of Xichang Airport is capable of accommodating large aircraft such as Boeing 747 and A-124.

The Chengdu- Kunming Railway and the Sichuan-Yunnan Highway pass by XSLC. The distance between Chengdu and XSLC is 535km by railway. There are a dedicated railway branch and a highway branch leading to the Technical Center and the Launch Center of XSLC.

By using of cable network and SC communication network, XSLC provides domestic and international telephone and facsimile services for the user.

XSLC consists of headquarter, Technical Center, Launch Center, Communication Center, Mission Center for Command and Control (MCCC), three tracking stations and other logistic support systems.

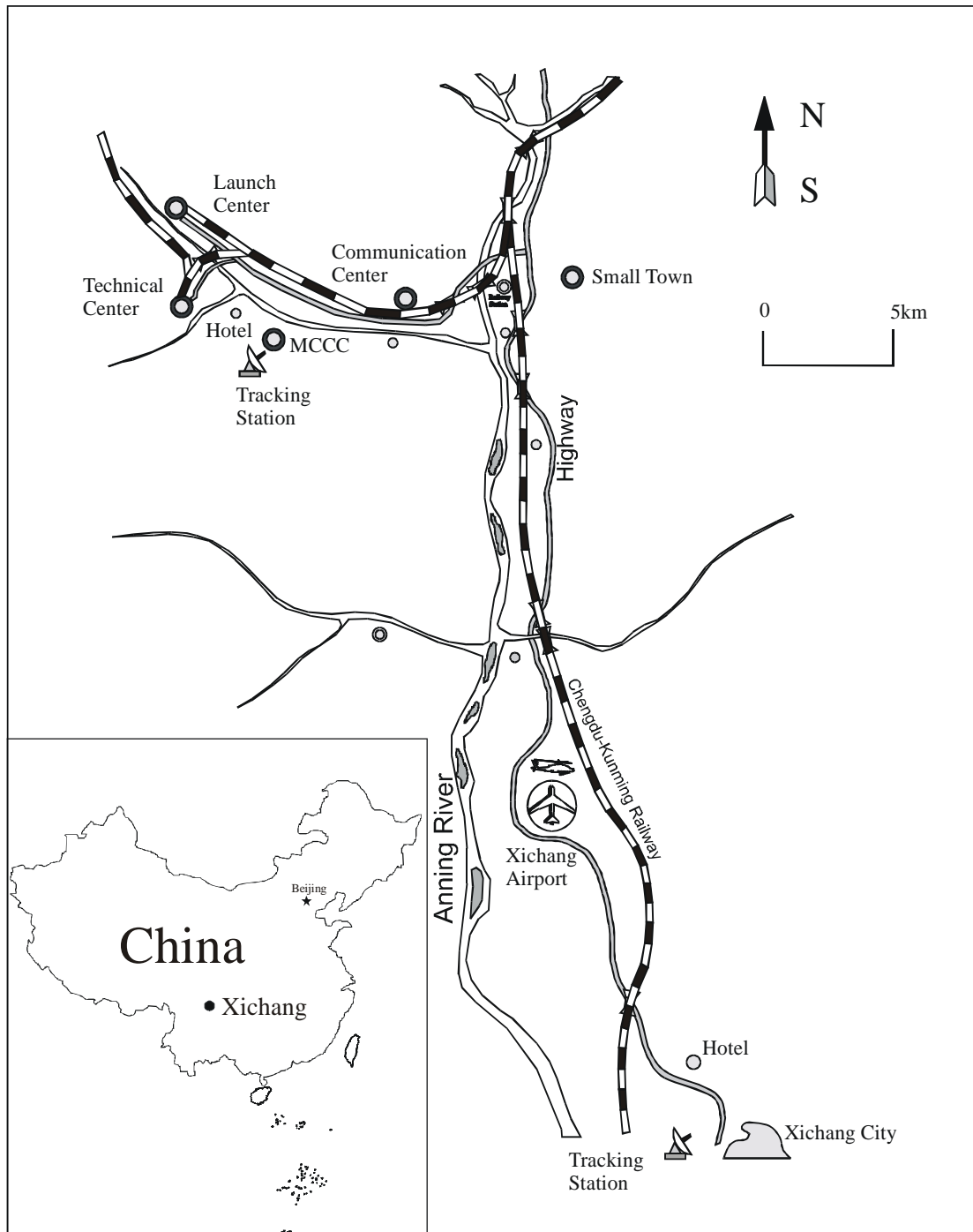


Figure B7-1 XSLC Map

B7.2 Technical Center

Technical center includes LV Processing Building (BL), SC Processing Buildings (BS), Power Station, Truck-Barn, etc. The LV and the SC will be processed, tested, checked, assembled and stored in Technical Center. Refer to **Figure B7-2**.

B7.2.1 LV Processing Building (BL)

The LV Processing Building (BL) comprises of Transit Building (BL1) and Testing Building (BL2).

B7.2.1.1 BL1

BL1 is mainly used for the transiting and loading of the LV and other ground equipment. BL1 is 54 meters long, 30 meters wide, 13.9 meters high. The railway branch passes through BL1. BL1 is equipped with movable overhead crane. The crane has two hooks with capability of 50t and 10t respectively. The crane's maximum lifting height is 9.5meters.

B7.2.1.2 BL2

BL2 is mainly used for the testing operation, necessary assembly and storage of the launch vehicle. This building is 90m long, 27m wide and 15.58m high, with the capability of processing one launch vehicle and storing another vehicle at the same time. A two-hook overhead movable crane is equipped in BL2. The lifting capabilities of the two hooks are 15t and 5t respectively. The lifting height is 12 meters. There are testing rooms and offices beside the hall.

B7.2.2 SC Processing Buildings (BS)

The SC Processing Buildings includes Test and Fueling Building (BS2 and BS3), Solid Rocket Motor (SRM) Testing and Processing Buildings (BM), X-ray Building (BMX), Propellant Storage Rooms (BM1 and BM2). BS2 is non-hazardous operation building, and BS3 is hazardous operation building (BS3). All of the SC's pre-transportation testing, assembly, fuelling and SC/Adapter operations will be performed in BS2 and BS3. Refer to **Figure B7-3**, **Table B7-1** and **Table B7-2**.

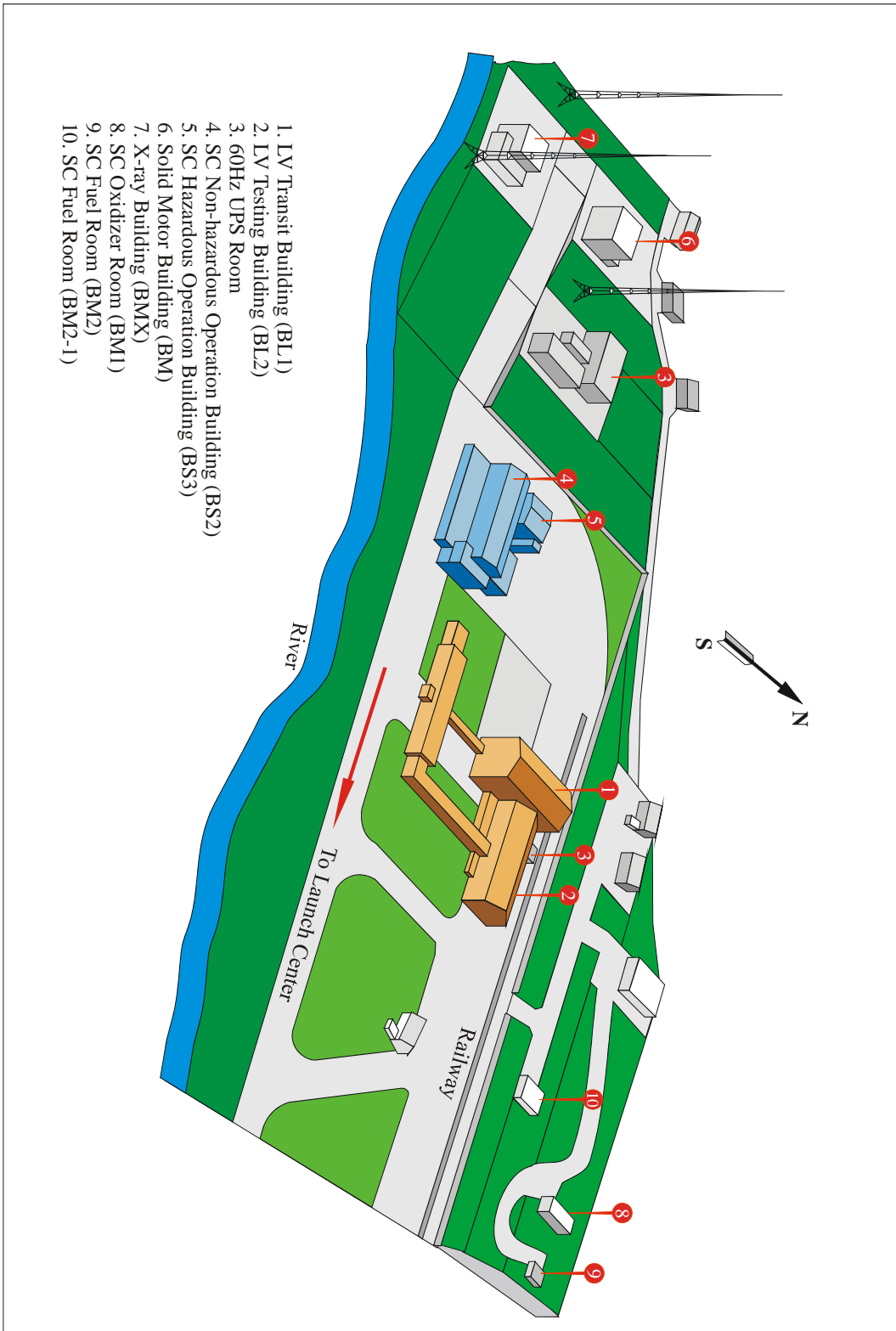


Figure B7-2 Technical Center

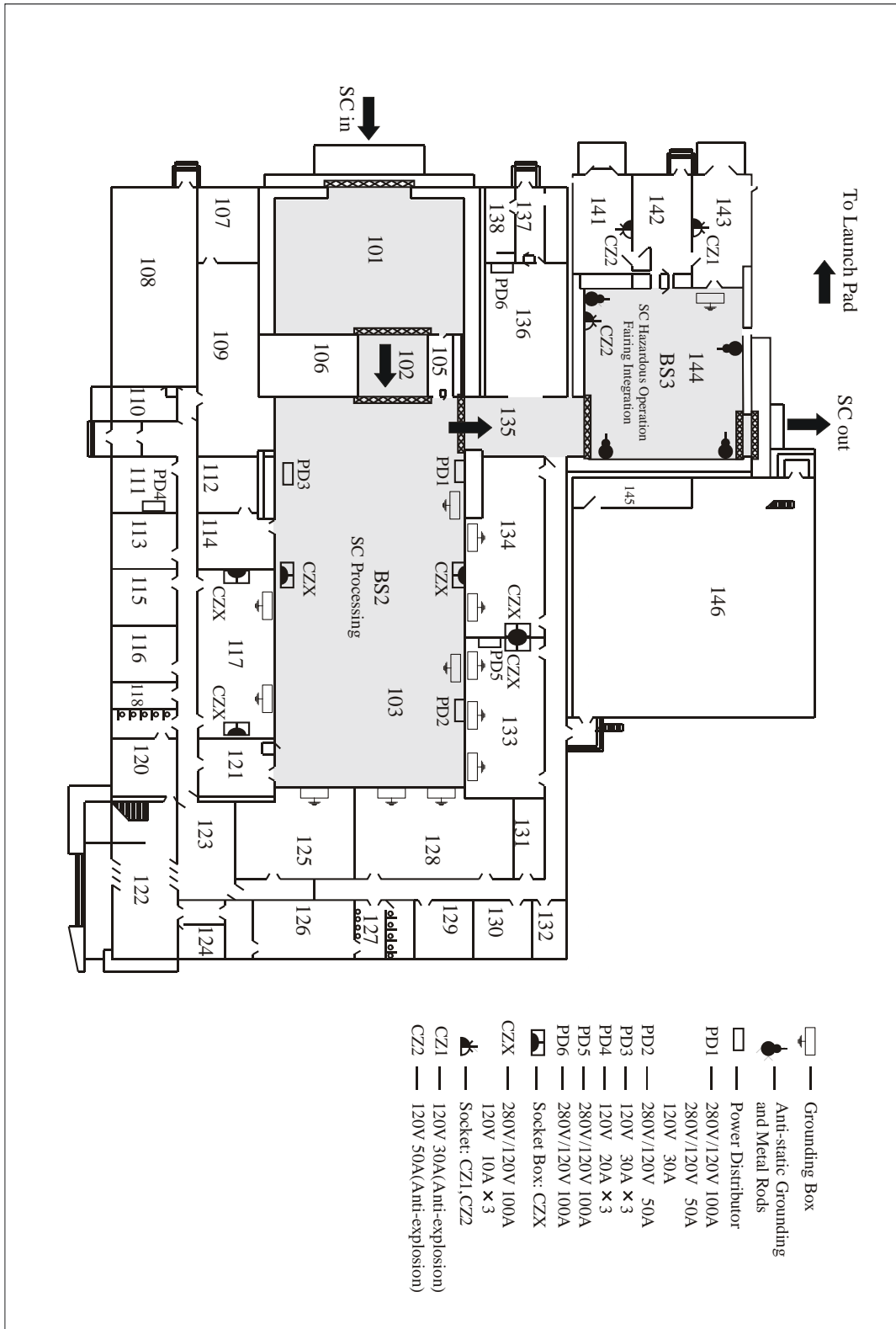


Figure B7-3 Layout of First Floor of BS Building

B7.2.2.1 Non-Hazardous Operation Building (BS2)**● General**

The Non-Hazardous Operation Room Building (BS2) consists of the following parts:

- ✧ Transit Hall (101);
- ✧ Air-lock Room (102);
- ✧ SC Test Hall (High Bay, 103);
- ✧ System test Equipment (STE) rooms (134B, 134C)
- ✧ Clean Rooms (107, 109);
- ✧ Battery Refrigerator (131);
- ✧ Leakage Test Rooms (136,137), etc..

Refer to **Figure B7-3** and **Table B7-1**.

● Transit Hall (101)

Lifting Capability of the crane equipped in Transit Hall:

Main Hook:	16t
Subsidiary Hook:	3.2t
Lifting Height:	15m

● SC Testing Room (High-bay 103)

It is used for the SC's measurement, solar-array operations, antenna assembly, etc. SC weighing and dry-dynamic-balance operation is also performed in high-bay 103.

Lifting capacity:

Main hook:	16t
Subsidiary hook:	3.2t
Lifting height:	15m

Electronic scale weighing range: 50-2721.4kg

Maximum capacity of Dynamic balance instrument: 7700kg

A supporter for fixing the antenna is mounted on the inner wall. A ladder and a platform can be used for the installation of the antenna. There are large glass windows for watching the whole testing procedure from outside. Hydra-set is also available for the SC lifting and assembly. For the dynamic balance test, adapting sets should be prepared by SC side.

Table B7-1 Room Area and Environment in BS2

Room	Usage	Measurement		Door W×H (m×m)	Environment		
		L×W×H (m×m×m)	Area (m ²)		T (°C)	Humidity (%)	Cleanness (Class)
101	Transit Hall	12×18×18	216	5.4×13	18~28	50±10	100,000
102	Air-Lock	6×5.64×13	33.8	5.4×12.5	18~28	50±10	100,000
103	SC-Level Test Area	42×18×18	756	5.4×12.5	15~25	35~55	100,000
107	Unit-Level Test Room)	6×6.9	41.4	1.5×2.1	22±2	30~36	100,000
109	Unit-Level Test Room)	18×6.9	124.2	1.5×2.1	22±2	30~36	100,000
111	Office	6×6×3	36	1.5×2.1	20~25	30~36	
112	Storage Room	6.9×6×3	41.4	1.5×2.1	20~25	35~55	100,000
113	Office	6×6×3	36	1.5×2.1	20~25	30~60	
114	Storage Room	6.9×6×3	41.4	1.5×2.1	20~25	35~55	100,000
115	Office	6×6×3	36	1.5×2.1	20~25	30~60	
116	Office	6×6×3	36	1.5×2.1	20~25	30~60	
117A	Test Room	18×6.9×3.0	124.2	1.5×2.1	20~25	30~60	
125	Office	10.5×6.9×3	72.5	1.5×2.1	20~25	30~60	
128D	Office	15.9×6.9×3	110	1.5×2.1	20~25	30~60	
129	Security Equipment	6×6×3.0	36	1.5×2.1	20~25	30~60	
130	Communication Terminal Room	6×6×3.0	36	1.5×2.1	20~25	30~60	
131	Battery Refrigerator	6.9×3.9×3.0	27	1.5×2.1	5~15	≤60	
132	Wire-Distribution Room	6×4.25×3.0	25.5	1.5×2.1	20~25	30~60	
133C	Measurement Equipment	18×6.9×3.0	124.2	1.5×2.1	20~25	30~60	
134B	Measurement Equipment	18×6.9×3.0	124.2	1.5×2.1	20~25	30~60	
135	Passage	6.9×6×13	41.4	5.0×12.5	20~25	≤55	100,000
136	Leakage-Test	12×9.3×7	111.6	3.8×6	20~25	≤55	100,000
137	Leakage Control	6×3.62	21.7	1.5×2.1	18~28	≤70	
138	Passage to BS3	6×3.9	23.4	1.5×2.1	18~28	≤70	

B7.2.2.2 Hazardous Operation Building (BS3)

The hazardous operation building (BS3) is a clean building for SC's hazardous assembly, mono-propellant or bi-propellant fueling, the integration of the SC and the SRM, spinning balance and weighing.

- **General**

The hazardous operation building (BS3) mainly consists of the following parts:

- ◇ SC fueling and assembly hall (144);
- ◇ Oxidizer fueling-equipment room (141);
- ◇ Propellant fueling-equipment room (143);
- ◇ Fueling operation room (142).

Refer to **Figure B7-3** and **Table B7-2**.

- **SC Fueling and Assembly Hall (144)**

It is used for the fueling of hydrazine or bi-propellant, the integration of SC and SRM, wet-SC dynamic balance, leakage-check and SC/LV combined operations.

An explosion-proof movable crane is equipped in this hall. The crane's specifications are as follows:

Lifting capacity:

Main hook:	16t
Subsidiary hook:	3.2t
Lifting height:	15m

The power supply, power distribution and the illumination devices are all explosion-proof. The walls between the fueling operation room and the assembly room, leakage test room, air-conditioning equipment room are all reinforced concrete walls for safety and protection. The door between the fueling and assembly hall and the high-bay 103 in BS2 has the capacity of anti-pressure. Hydra-set is available for SC assembly and lifting.

A Germany-made weighing scale (EGS300) is equipped. Its maximum weighing range is 2721.4kg(6000lb) with accuracy of 0.05kg (0.1lb). The measurement of the weighing platform is 2m×1.5m(79in×59in). Another weighing equipment up to 10t will be provided.

Inside hall 144, there are eye washing device, gas-alarm and shower for emergency.

- **Measurement Equipment Room (133, 134)**

Room 133 is for system-level test and room 134 is for storage of supporting test equipment. RF system is provided so that SC side can use the equipment in BS2 to monitor the spacecraft wherever it is in BS 3 or at the launch complex (#1 or #2). uplink and downlink RF channel are provided.

Table B7-2 Room Area and Environment in BS3

Room	Usage	Measurement		Door W×H (m×m)	Environment		
		L×W×H (m×m×m)	Area (m ²)		T (°C)	Humidity (%)	Cleanness (Class)
133C	Measurement Equipment	18×6.9×3.0	124.2	1.5×2.1	20~25	30~60	
134B	Measurement Equipment	18×6.9×3.0	124.2	1.5×2.1	20~25	30~60	
135	Passage	6.9×6×13	41.4	5.0×12.5	20~25	≤55	100,000
136	Leakage-Test	12×9.3×7	111.6	3.8×6	20~25	≤55	100,000
137	Leakage Control	6×3.62	21.7	1.5×2.1	18~28	≤70	
138	Passage to BS2	6×3.9	23.4	1.5×2.1	18~28	≤70	
141	Oxidizer Fueling Equipment Storage Room	8.1×6×3.5	48.6	2.8×2.7	18~28	≤60	
142	Fueling Control Room	8.1×6×3.5	48.6	1.5×2.1	18~28	≤60	
143	Propellant Fueling Equipment Storage Room	8.1×6×3.5	48.6	2.8×2.7	18~28	≤60	
144	Fueling /Assembly Hall	18×18×18	324	5.4×13	15~25	35~55	100,000

B7.2.2.3 SRM Checkout and Processing Building (BM)● **General**

The SRM Checkout and Processing Building (BM) is used for the storage of the SRM and pyrotechnics, SRM assembly, pyrotechnics checkout, X-ray checkout of SRM, etc.

BM consists of following parts:

- ◇ Checkout and Processing Hall;
- ◇ SRM Storage Room;
- ◇ Pyrotechnics Storage;
- ◇ Checkout Room;
- ◇ Offices;
- ◇ Locker Room;
- ◇ Room of air-conditioning unit.

Refer to **Figure B7-4**. The area and environment are listed in **Table B7-3**.

Table B7-3 Room Area and Environment in BM

Room	Usage	Measurement		Door W×H(m)	Environment		
		L×W×H (m×m×m)	Area (m ²)		T (°C)	Humidity (%)	Cleanness (Class)
101	Reception	5.1×3×3.5	15.3	1.0×2.7			
102	Rest room	3.3×3×3.5	9.9	1.0×2.7			
103	Office	6.0×5.1×3.5	30.6	1.5×2.7			
104	Spare Room	5.1×3×3.5	15.3	1.0×2.7			
105	Spare Room	5.1×3×3.5	15.3	1.0×2.1			
106	Pyro Storage	5.1×3×3.5	15.3	1.0×2.1	21±5	<55	
107	Pyro Storage	5.1×3×3.5	15.3	1.0×2.1	21±5	<55	
108	Air-conditioning	10.6×6×3.5	93.8	1.5×3.0			
109	SRM Checkout and X-rays Processing	12×9×9.5	108	3.6×4.2	21±5	<55	
110	SRM Storage	6×3.9×3.5	23.4	2.0×2.6	21±5	<55	

● **SRM Checkout and X-rays Processing Room (109)**

This hall is equipped with explosion-proof movable crane. Its lifting capacity is 5t and lifting height is 7m.

A railway (1435mm in width) is laid in the hall. It leads to the SRM X-ray hall (BMX) and the cold soak chamber.

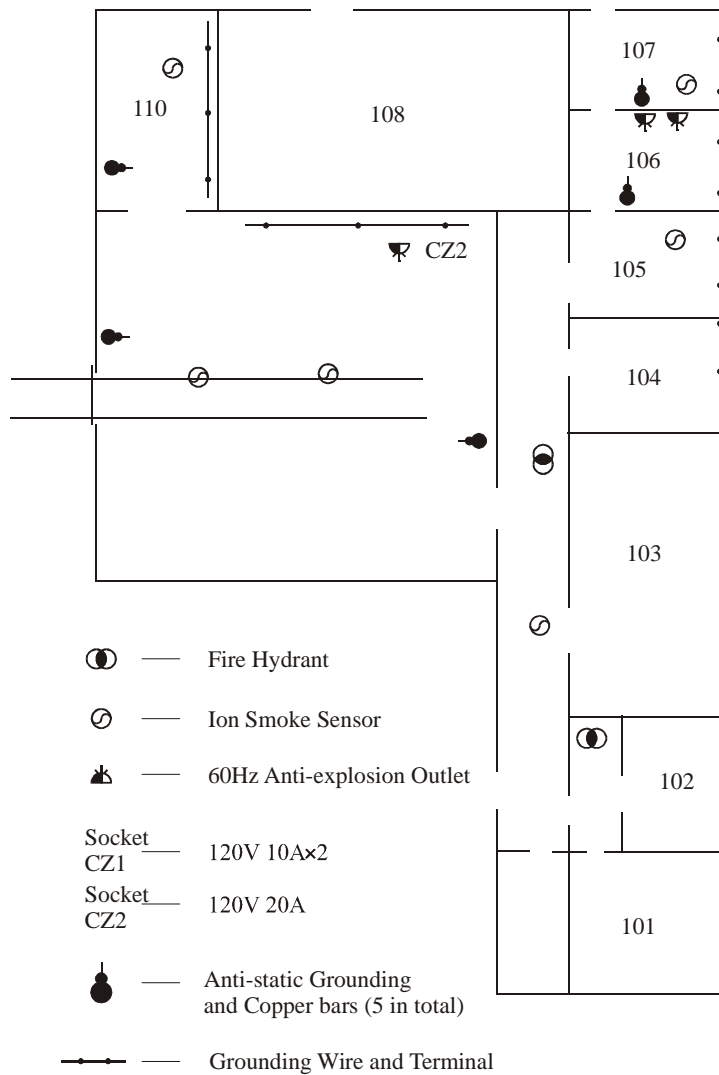


Figure B7-4 Layout of BM

B7.2.2.4 SRM X-ray Building (BMX)● **General**

The BMX is used for X-ray and cold-soak of solid motors. BMX consists of the following parts: cold soak chamber, X-ray operation hall, control room, detecting equipment room, modular cabinet room, film Processing, processing and evaluation rooms, chemical and instrument room, offices, locker room and room of air-conditioning unit. Refer to **Figure B7-5**. The area and environment are listed in **Table B7-4**.

Table B7-4 Room Area and Environment in BM

Room	Usage	Measurement		Door W×H (m)	Environment		
		L×W×H (m)	Area (m ²)		T (°C)	Humidity (%)	Clearance (Class)
101	X-ray Detection	12.5×10×15	125	3.2×4.5	20~26	35~55	
102	Cold-soak	3.2×3×4	9.6	3.2×3.5	0~15	35~55	
103	X-ray Control	5×3.6×3.7	18	1.0×2.1	20~26	35~60	
104	Detection	5×3.3×3.7	16.5	1.0×2.0	20~26	35~60	
105	Modular Cabinet	5×3.3×3.7	16.5	1.5×2.4	20~26	35~60	
106	Film Process	6×5.1×3.7	30.6	1.2×2.1	18~22	<70	
107	Film Processing	3.6×3.1×3.7	11.1	1.0×2.1			
108	Chemical /instrument	5.1×3.3×3.7	16.8	1.0×2.4			
109	Film evaluation	5.1×3.3×3.7	16.8	1.0×2.4			

● **X-ray Detection Room (101)**

This hall is used for x-ray operations of SRM. Linatron 3000A linear accelerator was equipped. The nominal electron beams energy are 6, 9 and 11 million electronic volts (mev). The continuous duty-rated output at full power and nominal energy is 3000 rads/min at one meter on the central axis. The X-ray protection in the hall is defined according to the calculation based on the specifications of the Linatron 3000A. The main concrete wall is 2.5 meters thick.

The doors between the hall and the control room and the large protection door are equipped with safety lock devices. The hall is provided with dosimeter and warning

device, high-voltage emergency cut-off button for X-ray equipment, X-ray beam indicator and various protections. All these mean to assure the safety of the operators.

The hall is equipped with an explosion-proof movable overhead crane with lifting height of 8m and a telescopic arm that supports the head of the X-ray machine.

A railway (1435mm in width) is laid in the hall and leads to the cold-soak chamber and the SRM checkout and processing hall (BM).

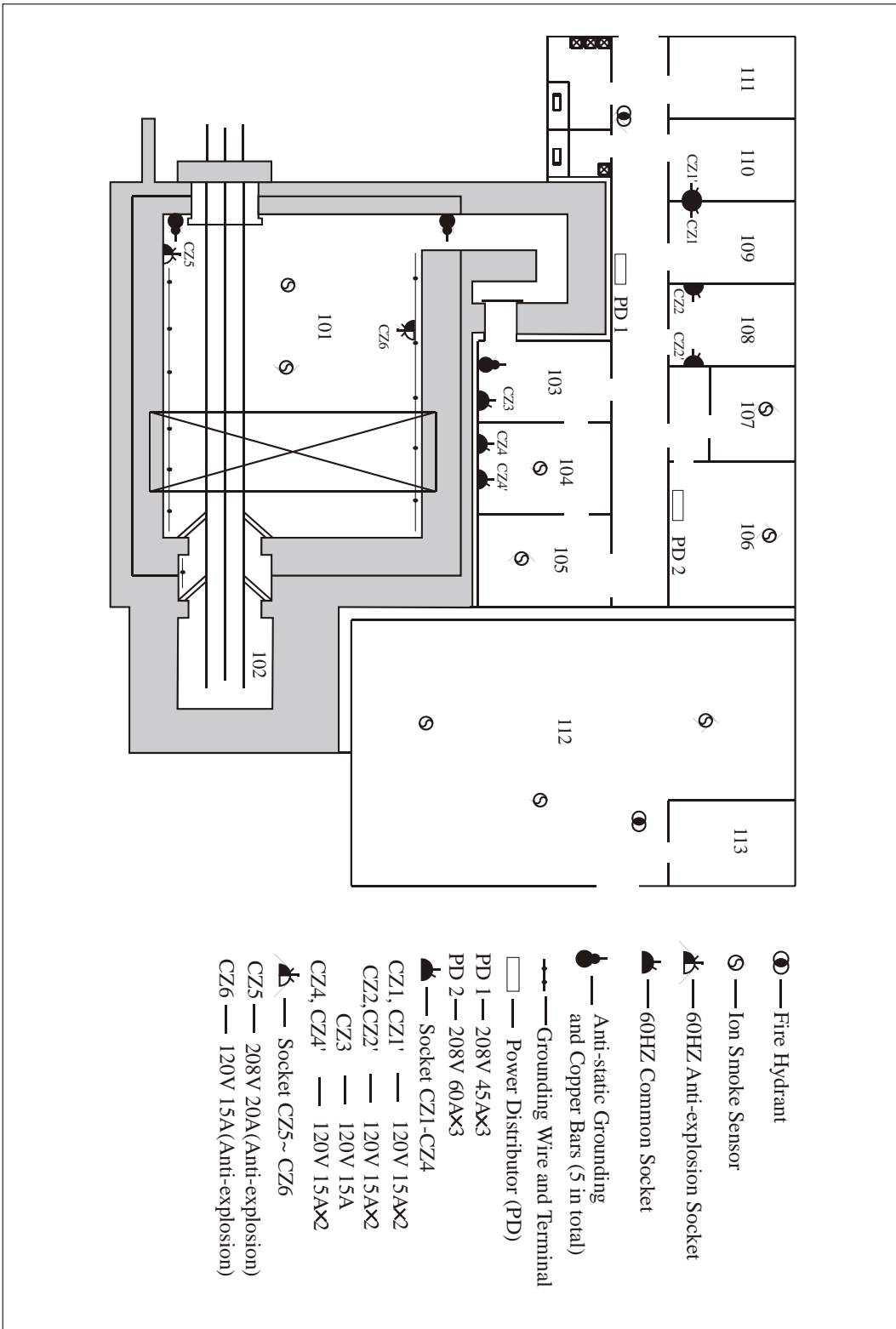


Figure B7-5 Layout of BMX

B7.2.2.5 Hazardous Substances Storehouse

Hazardous substance storehouses are used for the storage inflammable and explosive articles. BM1 and BM2 are for the storage of SC propellants. There are also other houses for the test and storage of LV pyrotechnics.

B7.2.2.6 Power Supply, Grounding, Lightning Protection, Fire-Detection and Alarm

● Power Supply System

All SC processing hall and rooms, such as 103, 144, 133, 134 etc., are equipped with two types of UPS: 60Hz and 50Hz.

◇ 60Hz UPS

Voltage: 208/110V±1%
Frequency: 60±0.5Hz
Power: 64kVA

◇ 50Hz UPS

Voltage: 380/220V±1%
Frequency: 50±0.5Hz
Power: 130kVA

Four kinds of power distributors are available in the all SC processing halls and rooms. Each of them has Chinese/English description indicating its frequency, voltage, rated current, etc.

All of the sockets inside 144 and other hazardous operation area are explosion-proof.

● Lightning Protection and Grounding

In technical areas, there are three kinds of grounding, namely technological grounding, protection grounding and lightning grounding. All grounding resistance is lower than 1Ω.

Grounding copper bar is installed to eliminate static at the entrance of fueling and assembly hall, in the oxidizer fueling equipment room and the propellant fueling equipment room.

The SRM checkout room (109), SRM storage room (110), pyrotechnics storage and checkout rooms (106, 107) are also equipped with grounding copper bar at the entrance to eliminate static. In BMX and terminals room, there are also grounding copper bar to eliminate static. The SRM checkout and Processing building is equipped with a grounding system for lightning protection. There are two separate lightning rods outside SRM.

- **Fire Detection and Alarm System**

The SRM checkout room (109), SRM storage room (110), pyrotechnics storage and checkout rooms (106, 107), air-conditioning equipment room (108) are all equipped with ionic smoke detectors. The office (103) is equipped with an automatic fire alarm system. When the detector detects smoke, the automatic fire alarm system will give an audio warning to alarm the safety personnel to take necessary measures.

X-ray operation hall, control room, equipment room, modular cabinet room, film Processing and processing room, air conditioning room are all equipped with smoke sensors. The control room is equipped with fire alarm system. In case of a fire, the alarm system will give a warning to alarm the safety personnel to take necessary measures.

B7.3 Launch Center

B7.3.1 General

Coordinates of Launch Pad #2 for LM-3B:

Longitude: 102.02°E,

Latitude: 28.250°N

Elevation: 1826m

The launch site is 2.2 km (shortcut) away from the Technical Center. Facilities in the launch area mainly consist of Launch Complex #1 and Launch Complex #2. Refer to **Figure B7-6**.

Launch Complex #1 is designated for LM-3 and LM-2C launch vehicles.

Launch Complex #2 is about 300 meters away from Launch Complex #1.

Launch Complex #2 is designated for launches of LM-2E, LM-3A, LM-3B and LM-3C. It is also a backup launch complex for LM-3.

Two types of power supply are available in the launch center:

- ✧ 380V/220V, 50Hz power supplied by the transformer station;
- ✧ 120V/60Hz power supplied by the generators.

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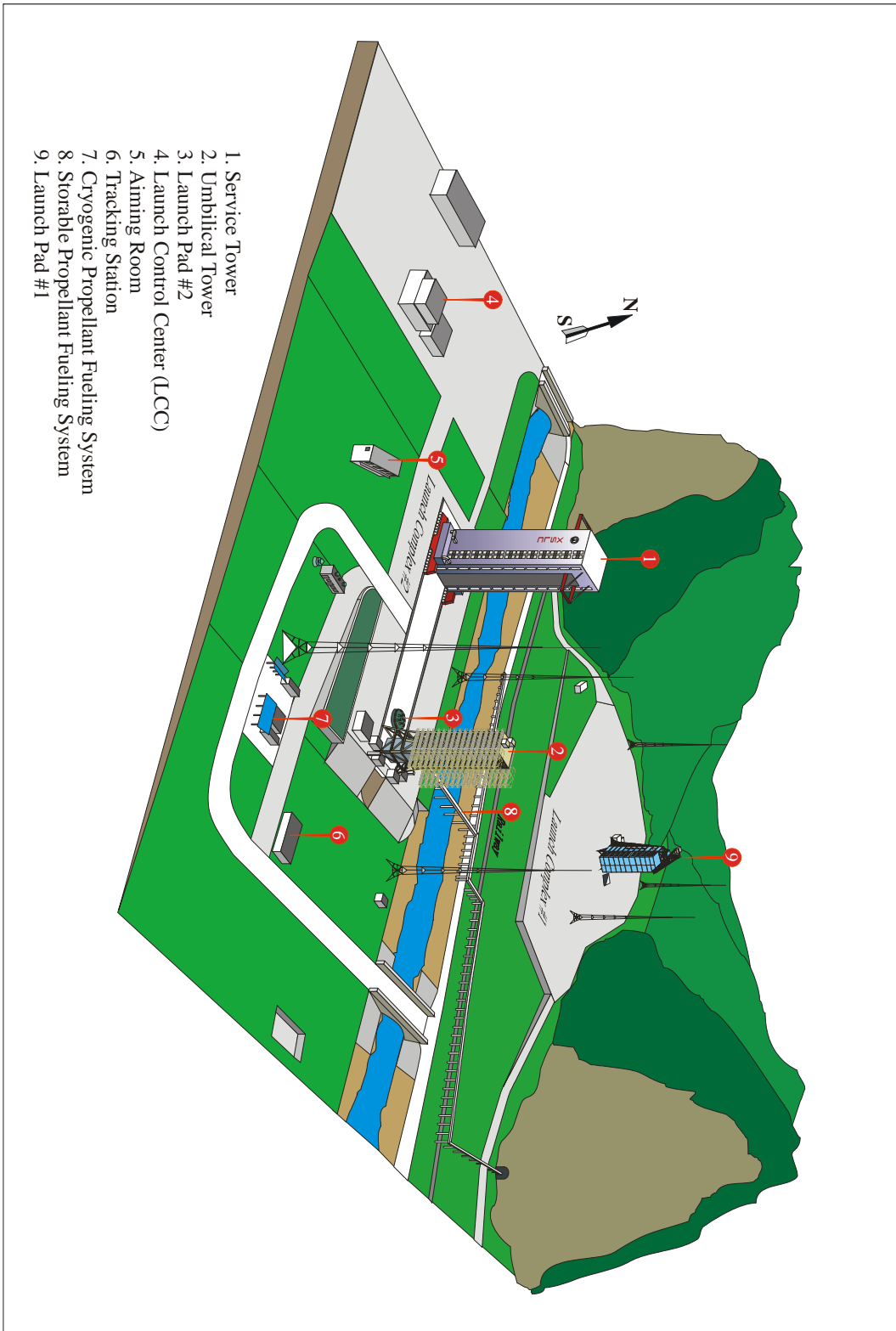


Figure B7-6 Launch Center

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B7.3.2 Launch Complex #2

This launch complex includes launch pad, service tower, umbilical tower, launch control center (LCC), fueling system, gas supply system, power supply system, lightning-proof tower, etc. Refer to **Figure B7-7**.

B7.3.2.1 Service Tower

Service Tower is composed of tower crane, running gear, platforms, elevators, power supply and distributor, fueling pipeline for storable propellant, fire-detectors & extinguishers, etc.

This tower is 90.60 meters high. Two cranes are equipped on the top of the tower. The effective lifting height is 85 meters. The lifting capability is 20t (main hook) and 10t (sub hook). There are two elevators (Capability 2t) for the lifting of the personnel and stuff. The tower has platforms for the checkouts and test operations of the launch vehicle and the SC.

The upper part of the tower is an environment-controlled clean area. The cleanliness level is Class 100,000 and the temperature within the SC operation area can be controlled in the range of 15 ~ 25 °C. SC/LV mating, SC test, fairing encapsulation and other activities will be performed in this area. A telescopic/rotate overhead crane is equipped for these operations. This crane can rotate in a range of 180° and its capability is 8t.

In the Service Tower, Room 812 is exclusively prepared for SC side. Inside room 812, 60Hz UPS (Single phase 120V, 5kW) is provided. The grounding resistance is less than 1Ω. The room area is 8m².

Besides the hydrant system, Service Tower is also equipped with plenty of powder and 1211 fire extinguisher.

B7.3.2.2 Umbilical Tower

Umbilical Tower is to support electrical connections, gas pipelines, liquid pipelines, as well as their connectors for both SC and LV. Umbilical Tower has swinging-arm system, platforms and cryogenic fueling pipelines. Through the cryogenic fueling

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pipelines, LV side will perform the cryogenic propellant fueling. Umbilical Tower also has air-conditioning system for SC/Fairing, RF system, communication system, rotating platforms, fire-extinguish system, etc.

The ground power supply cables will be connected to the SC and the launch vehicle via this umbilical tower. The ground air conditioning pipelines will be connected to the fairing also via this tower to provide clean air into the fairing. The cleanliness of conditioned air is class 100,000, the temperature is 15~25°C and the humidity is 35~55%.

In Umbilical Tower, Room 722 is exclusively prepared for SC side. Its area is 8m². Inside 722, 60Hz/50Hz UPS (Single phase 110V/220V/15A) is provided. The grounding resistance is lower than 1Ω.

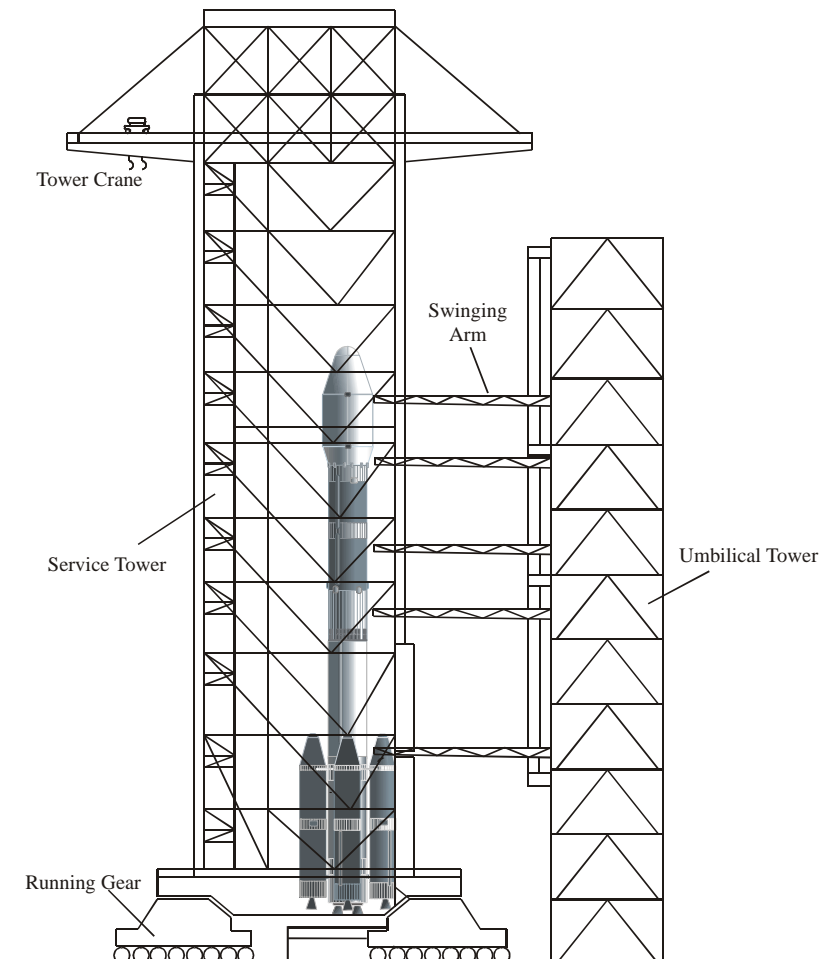


Figure B7-7 Launch Complex #2

B7.3.2.3 Launch Control Center (LCC)

- **General**

Launch Control Center (LCC) is a blockhouse structure with ability of explosion-proof. The on-tower operations (such as pre-launch tests, fueling, launch operations) of LV are controlled in LCC. The SC launch control can also be conducted in LCC. Its construction area is 1000m². The layout of LCC is shown as **Figure B7-8**.

The LCC includes the launch vehicle test rooms, SC test rooms, fueling control room, launch control room, display room for mission director, air-conditioning system, evacuating passage, etc. The whole LCC is air-conditioned.

- **SC Test Room (104,105)**

There are two rooms for the tests of the SC, see **Figure B7-8**. The area of each room is 48.6 m². The inside temperature is 20±5°C and the relative humidity is 75%.

The grounding resistance is less than 1Ω. 380V/220V, 50Hz and 120V/208V, 60Hz power distribution panels are equipped in each room.

The SC is connected with the control equipment inside test room through umbilical cables. Refer to **Chapter 5**. The detailed cable interface will be defined in ICD.

- **Telecommunication**

Telephone and cable TV monitoring system are available in the SC test room, SC operation platform on tower, BS2 and MCCC.

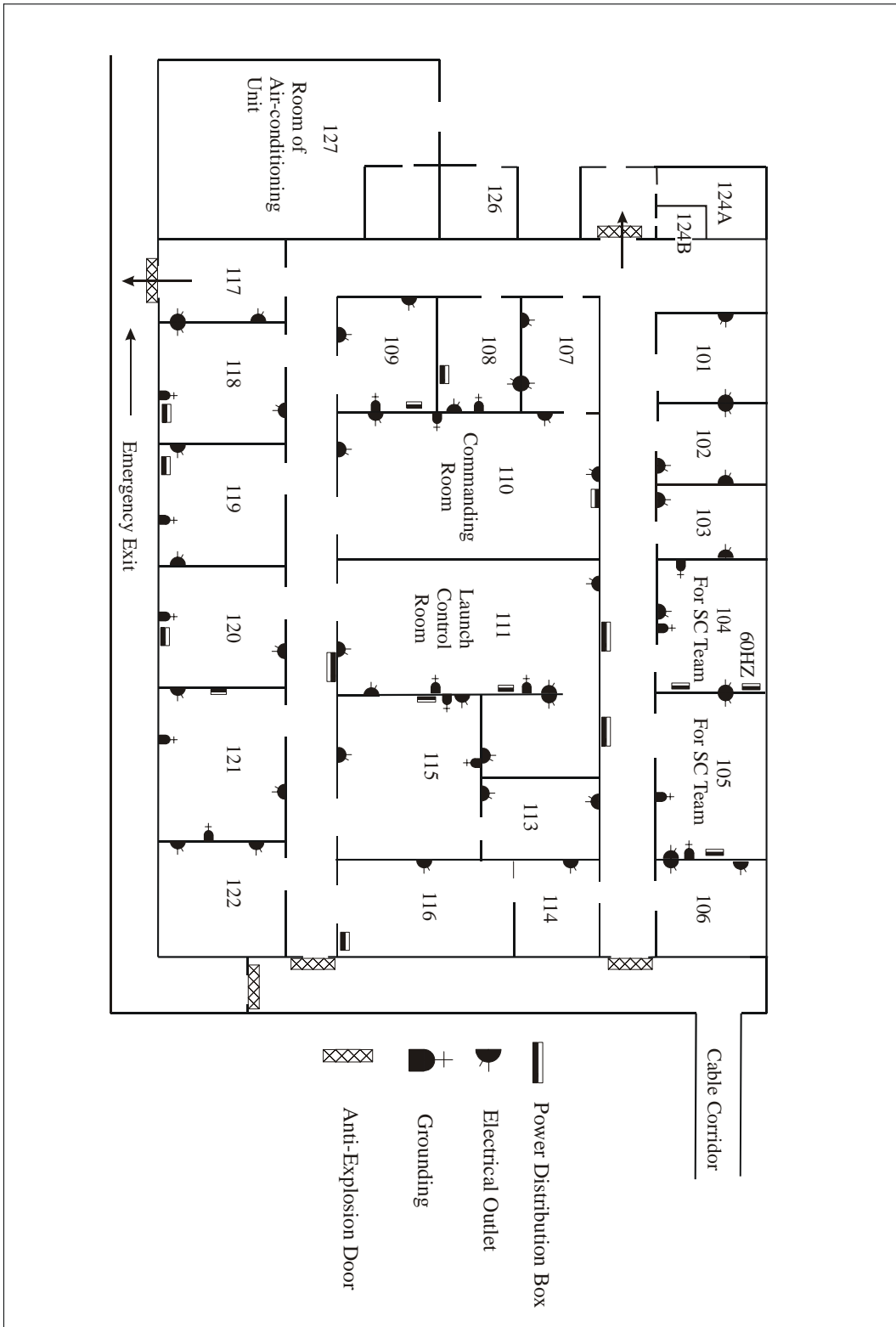


Figure B7-8 Layout of LCC

B7.4 Mission Command & Control Center (MCCC)

B7.4.1 General

MCCC is located 7km southeast from the launch area. The whole building includes two parts: one is the command and control hall and the other is computer room. The command and control hall consists of two areas: the command area and the range safety control area. Around the hall are operation rooms and offices. There is a visitor room on the second floor and the visitors can watch the launch on television screen. There is cable TV sets for visitors. **Figure B7-9** shows the layout of MCCC.

B7.4.2 Functions of MCCC

- ✧ Command all the operations of the tracking stations and monitor the performance and status of the tracking equipment.
- ✧ Perform the range safety control after the lift-off of the launch vehicle.
- ✧ Gather the TT&C information from the stations and process these data in real-time.
- ✧ Provide acquisition and tracking data to the tracking stations and Xi'an SC Control Center (XSCC).
- ✧ Provide display information to the SC working-team console.
- ✧ Perform post-mission data processing.

B7.4.3 Configuration of MCCC

- ✧ Real-time computer system.
- ✧ Command and control system.
- ✧ Monitor and display for safety control, including computers, D/A and A/D converters, TV display, X-Y recorders, multi-pen recorders and tele-command system.
- ✧ Communication system.
- ✧ Timing and data transmission system.
- ✧ Film developing and printing equipment.

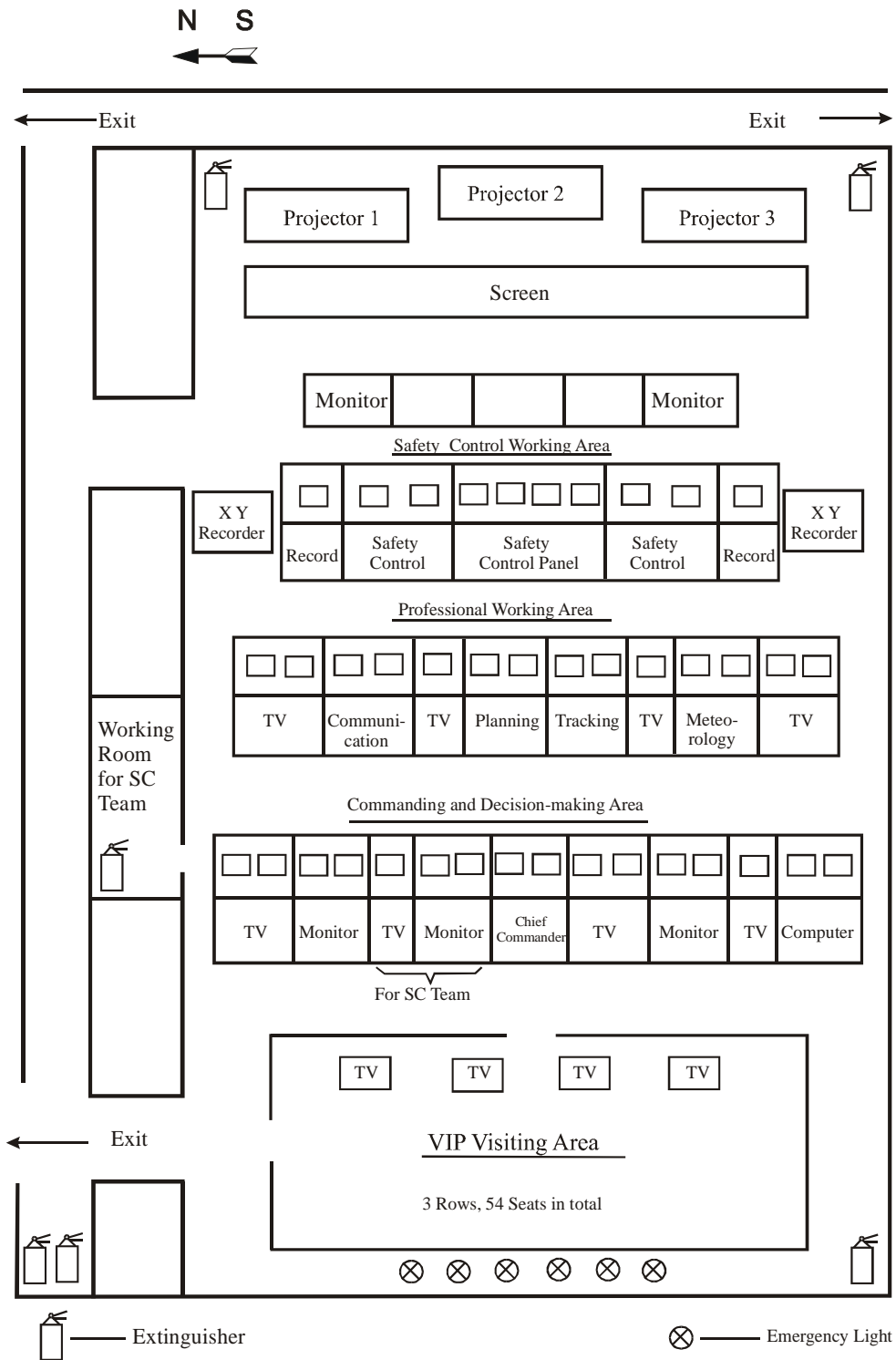


Figure B7-9 Layout of MCCC

B7.5 Tracking, Telemetry and Control System (TT&C)

B7.5.1 General

The TT&C system of XSLC and TT&C system of Xi'an SC Control Center (XSCC) form a TT&C net for the mission.

The TT&C system of XSLC mainly consists of:

- ✧ Xichang Tracking Station;
- ✧ Yibin Tracking Station;
- ✧ Guiyang Tracking Station.

The TT&C system of XSCC mainly includes:

- ✧ Weinan tracking station;
- ✧ Xiamen tracking station;
- ✧ Instrumentation Ships.

Xichang Tracking Station includes optical, radar, telemetry and telecommand equipment. It is responsible for measuring and processing of the launch vehicle flight data and also the range safety control. Data received and recorded by the TT&C system are used for the post-mission processing and analysis.

B7.5.2 Main Functions of TT&C

- ✧ Recording the initial LV flight data in real time;
- ✧ Measuring the trajectory of the launch vehicle;
- ✧ Receiving, recording, transmitting and processing the telemetry data of the launch vehicle and the SC;
- ✧ Making flight range safety decision;
- ✧ Computing the SC/LV separation status and injection parameters.