Launch operations

Chapter 5

5.1. General

Ariane 4 launch operations are carried out by Arianespace from the Ariane Launch Site number 2 (ELA-2), located at the Guiana Space Centre (CSG), in French Guiana.

General information concerning French Guiana is given in Annex 2.

Buildings and associated facilities available for spacecraft preparation are described in the Payload Preparation Complex (EPCU) Manual (CD-ROM).

Operations in the EPCU are carried out under the responsibility of Arianespace with the support of CSG teams.

This chapter describes the typical spacecraft operations carried out in Guiana.

5.2. Launch campaign organization

During the operations at CSG, the User interfaces with the Mission Director (CM) representing the entire Launch Authority (Arianespace and CSG). The Mission Manager, the User's contact in the previous phases, maintains his responsibility for all the non-operational activities.

The launch campaign organization is presented here below.

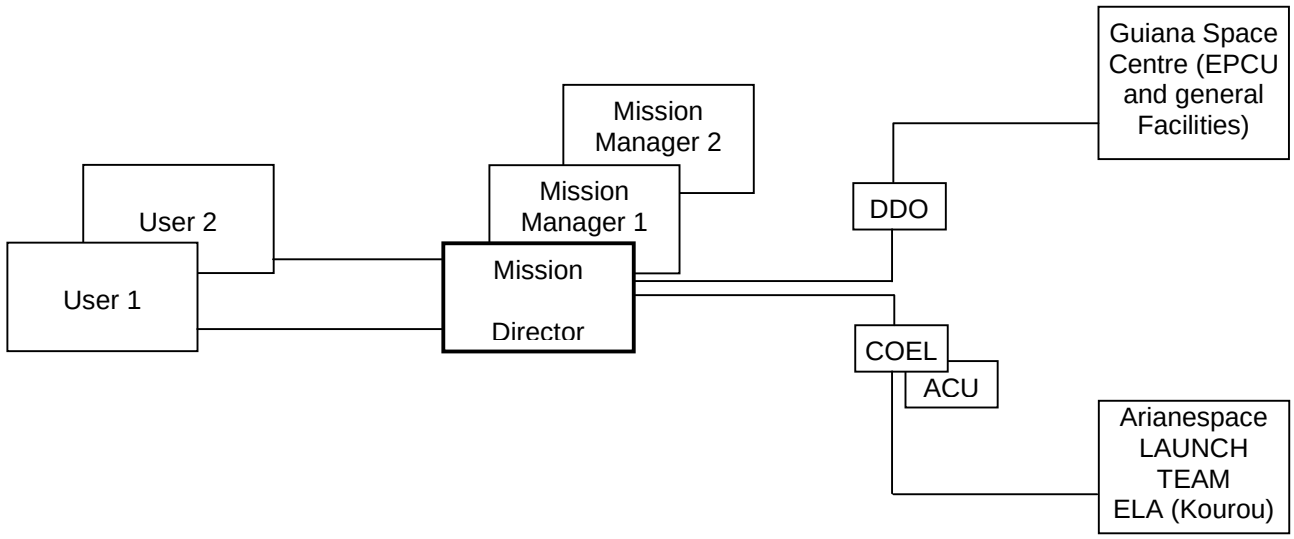


Fig. 5.2.a. – Launch campaign simplified organization chart

5.3. Operational safety constraints

The Safety Regulations define the rules applicable to all operations involving the use of hazardous systems or products, and the constraints to be observed in the definition and performance of launch vehicle and spacecraft operations.

5.3.1. Limits of liability

The Spacecraft Authority is responsible for all spacecraft and associated ground equipment operations. When potential sources of danger are handled by CSG personnel, operations remain under the responsibility of the Spacecraft Authority.

Safety of the User's team comes under the general heading of safety of personnel working at the CSG, governed by CSG Safety Regulations.

Any activity involving a potential source of danger is to be reported to CSG, which in return takes all steps necessary to provide and operate adequate collective protection equipment, and to activate the emergency facilities.

Each member of the spacecraft team must comply with the safety rules regarding personal protection equipment This is checked by CSG, which gives the relevant clearance to start operations.

On request from the User, CSG can provide specific items of protection for members of the spacecraft team. Upon arrival at CSG, spacecraft personnel will be given safety courses. In addition, training courses on the operations of range facilities will be given to appointed operators.

All payload activities on the launch site are carried out in accordance with instructions given in the related procedures prepared by the User and by the Ariane Authority where combined operations are concerned. These procedures are approved by the CSG Ground Safety Department, and covered by formal authorizations.

5.3.2. Constraints

5.3.2.1. Ground Constraints

From spacecraft encapsulation onwards, the launch vehicle and the payload (composed of one or more spacecraft) represent hazards for one another.

Restrictions on payload operations and access may therefore be imposed during periods of combined operations due to safety constraints.

Coordination is exercised by the Ariane Authority.

5.3.2.2. Flight constraints

- *During the powered phase* of the launch vehicle and up to separation of the payload(s), no telecommand signal can be sent to the payload(s), or generated by a spacecraft onboard system (sequencer, computer, etc...). During this powered phase a waiver can be studied to make use of commands defined in paragraph 4.4 providing that the radio electrical environment is not affected.

- *After the powered phase and before the spacecraft separation,* the commands defined in paragraph 4.4 can be provided to the spacecraft.

- *To command operations on the payload after separation* from the launch vehicle, microswitches or telecommand systems (after 20 s) can be used. Initiation of operations on the payload after separation from the launch vehicle, by a payload on-board system programmed before lift-off, must be inhibited until physical separation.

	H0 – 1h30 mn	3rd Stage burn-out	Separation	Separation + 20 s
Telecommand	NO	NO	NO	YES
S/C Sequencer	NO	NO	YES	YES
L/V orders	NO * WAIVER POSSIBLE	YES	NO	NO

5.4. Spacecraft field operations and planning

Definition of operations:

Operations at the CSG are carried out in three phases:

- Phase 1: spacecraft preparation and checkout (if needed).
- Phase 2: spacecraft hazardous operations (both phases are named POI).
- Phase 3: combined operations for spacecraft SPELDA/Fairing encapsulation (or SYLDA) and launch site (this phase is named POC).

Phase 1 operations take place in S1 buildings at the CSG Technical Centre or in S3 buildings for the non hazardous operations.

Phase 2 operations are carried out in S2, S3 and S4 buildings, located in the Ariane Launch Complex.

Phase 3 operations take place in S3 Buildings and on the payload platform (PFCU) on the ARIANE Launch Site.

Figures 5.4.a, 5.4.b and 5.4.c show the location of these facilities.

The spacecraft campaign duration, from equipment arrival in French Guiana until, and including, departure from Guiana, should not exceed 49 calendar days (45 days before launch, day of launch and three days after launch).

A typical spacecraft operations time schedule is shown in figure 5.4.d. It is based on a daily two shifts, five days a week basis.

A typical operations flow diagram is shown in figure 5.4.e. as a guide line.

5.4.1. Phase 1: Spacecraft preparation and checkout (if needed)

Details of port and airport facilities are given in Annex 2. Unloading is carried out by the port or airport authorities under the Users responsibility in coordination with Arianespace. Equipment should be packed on pallets or in containers and protected against rain and condensation.

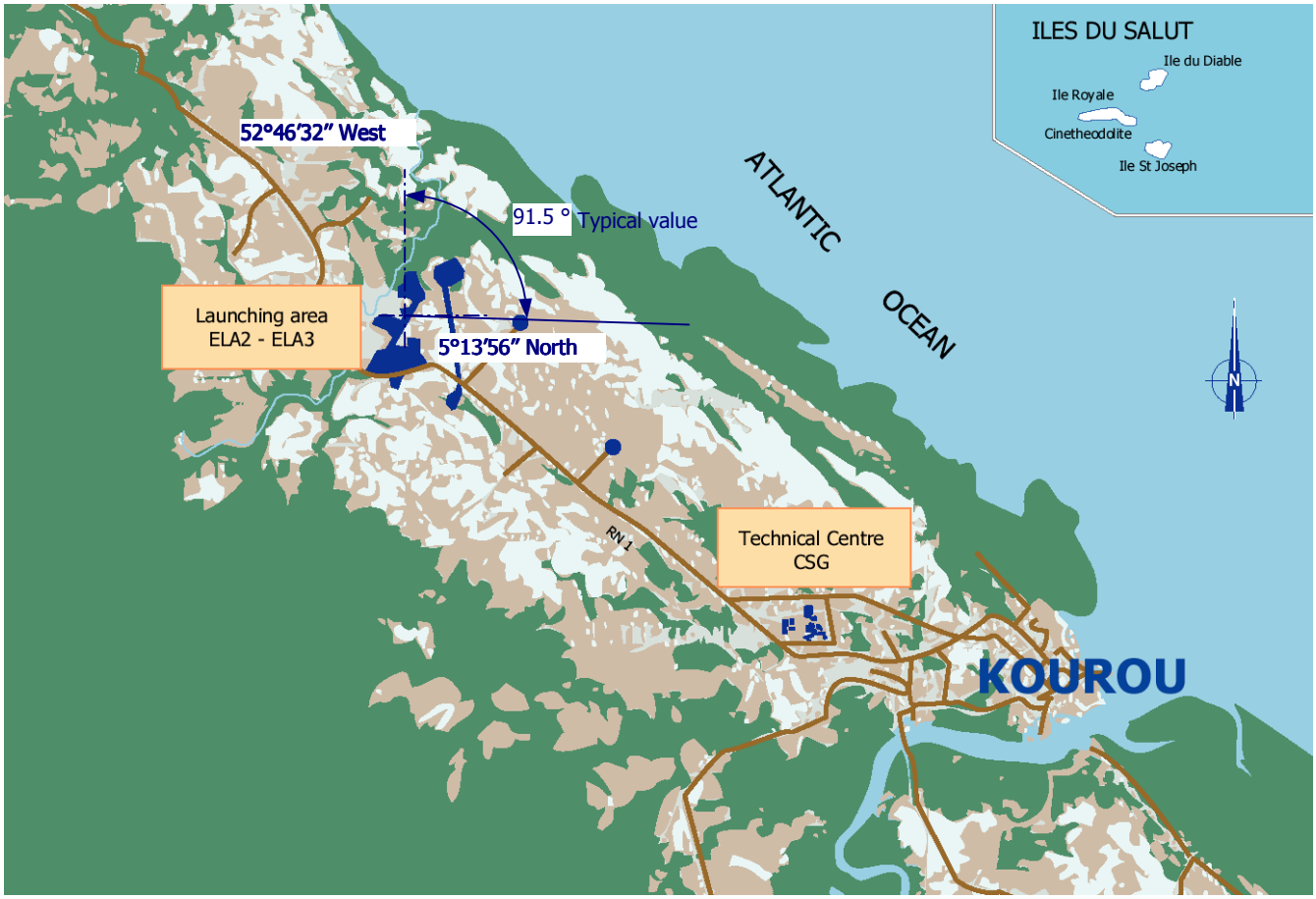


Fig. 5.4.a – Guiana Space Centre (CSG)

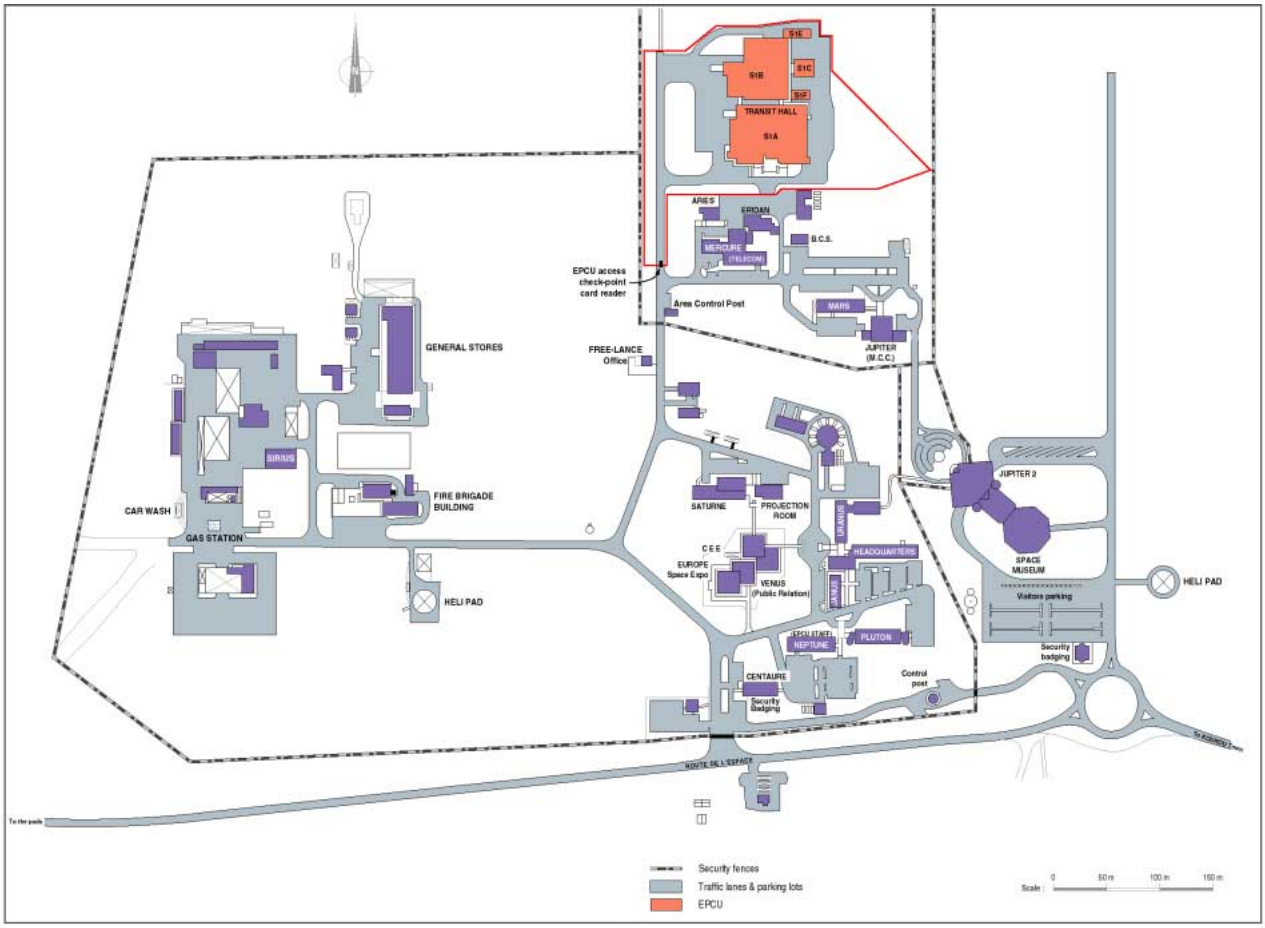


Fig. 5.4.b – CSG Technical Centre

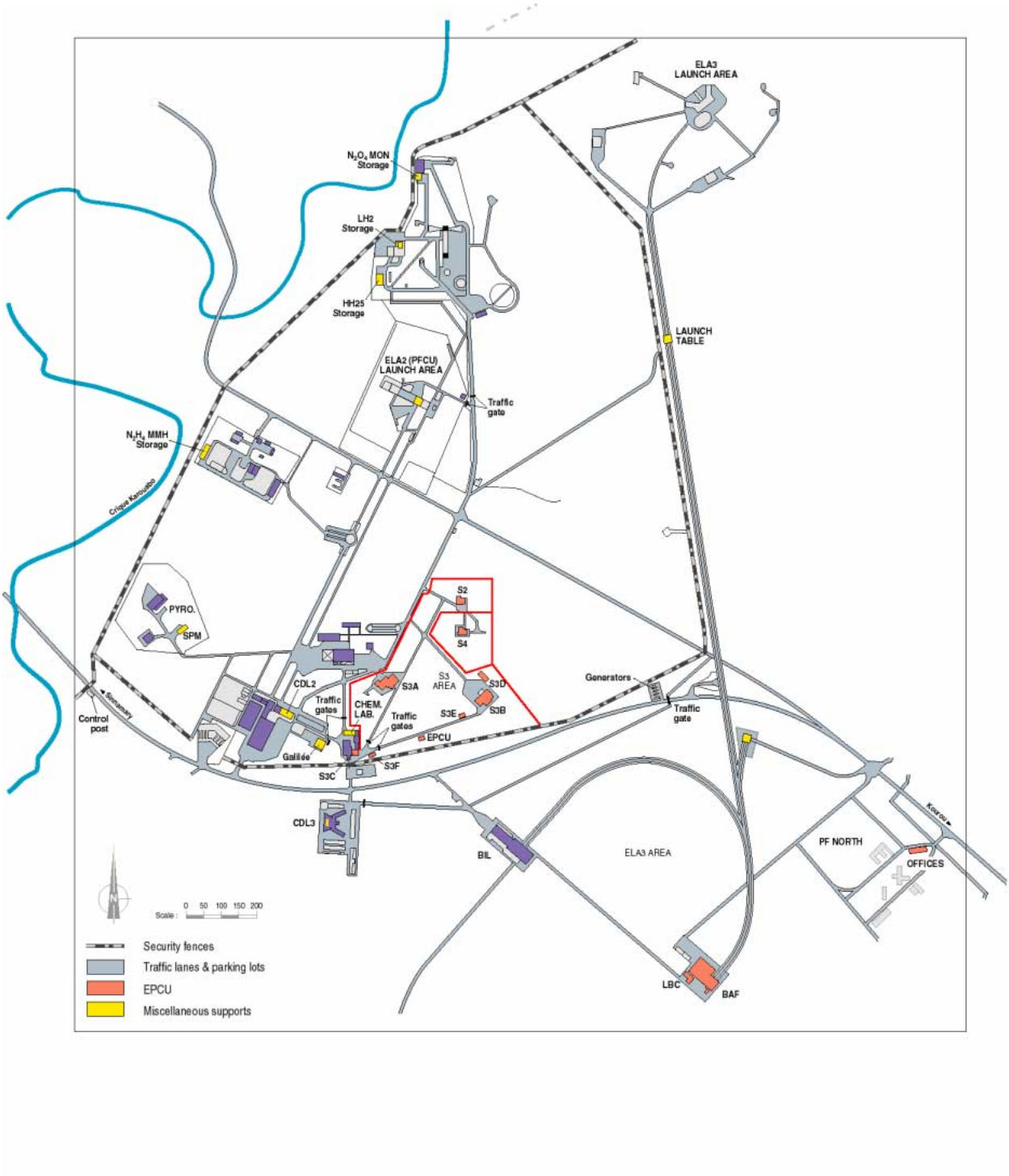


Fig. 5.4.c – Ariane Launch Complex n° 2 (ELA-2)

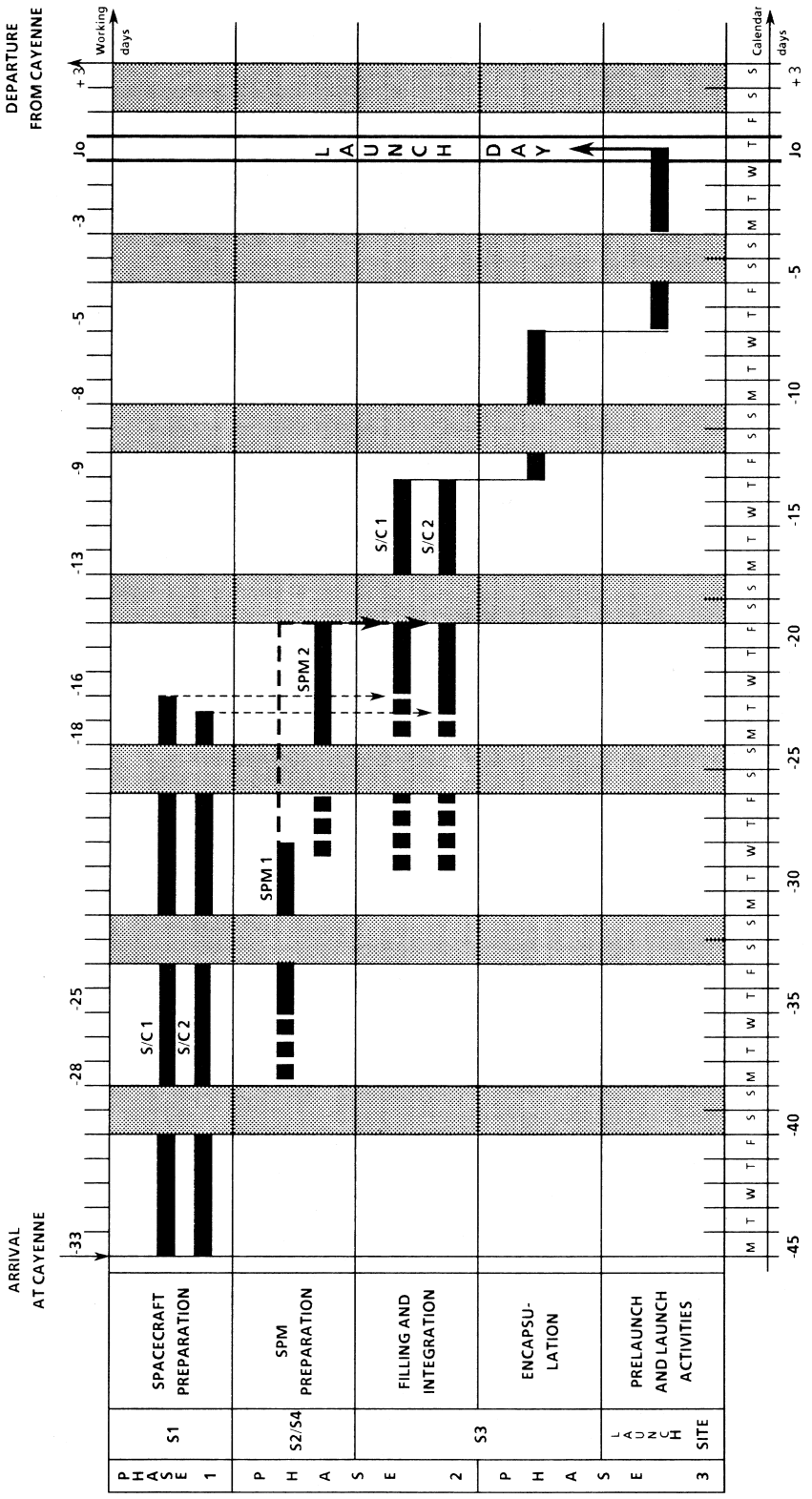


Fig. 5.4.d – Typical spacecraft operations time schedule (example)
Dual Launch

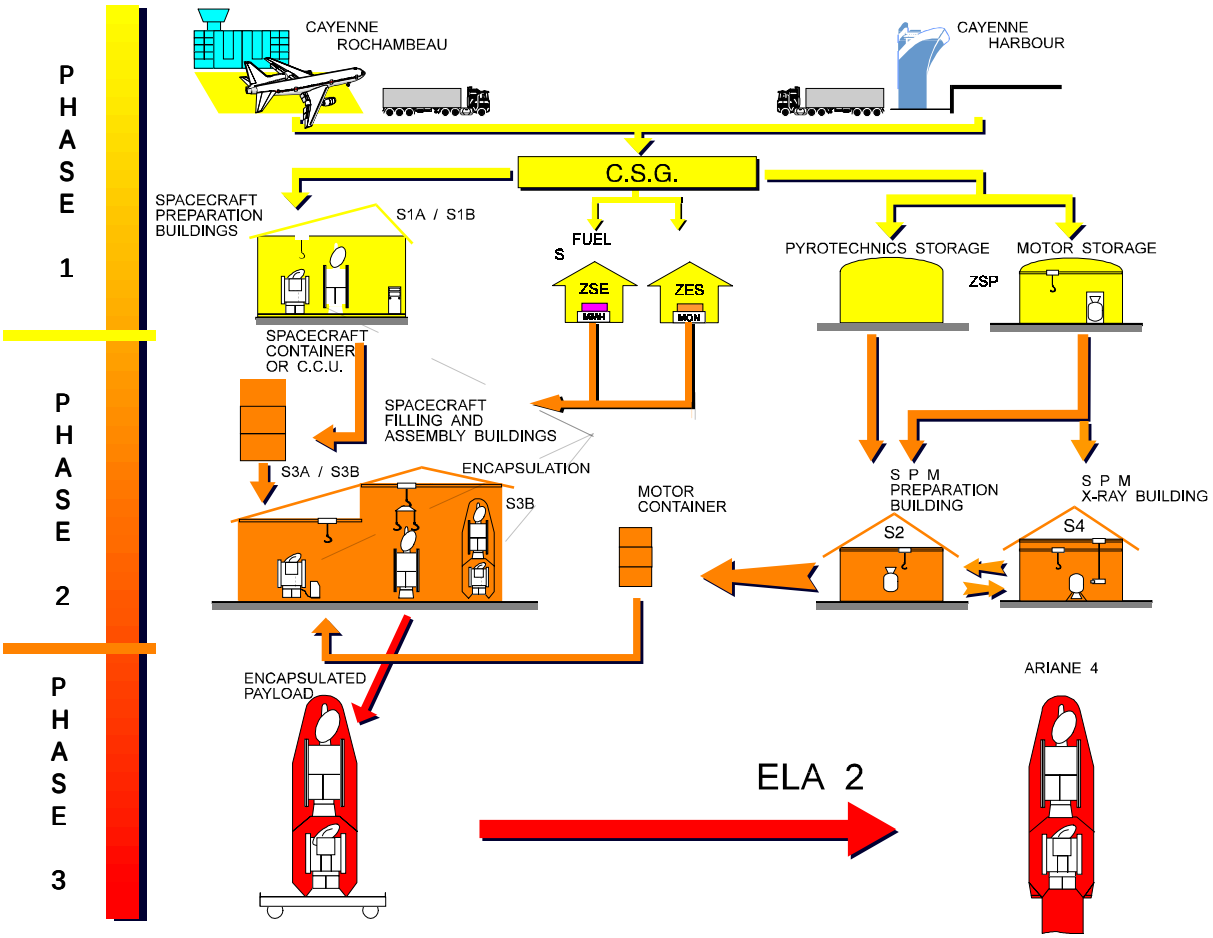


Fig. 5.4.e – Typical operations flow diagram

Cayenne port and airport are linked to the CSG by road. Transport within French Guiana is coordinated by the Ariane Authority and usually carried out by CSG (minimum speed 50 km/h).

On arrival at the CSG Technical Centre, the spacecraft in its container, together with associated ground equipment, are unloaded in the S1 area Transit Hall.

In the Spacecraft Operations Plan (POS), the User defines the way his equipment should be arranged and laid out in CSG buildings.

The Ariane Authority is in charge of equipment unloading and dispatching operations.

Solid motors in their containers are stored in SPM buildings of the ZSP. Pyrotechnic systems and any other hazardous systems of the same class are stored in the pyrotechnic devices buildings of the ZSP. Hazardous fluids are stored in the propellant-support zone of the Ariane launch site. Radioactive sources are normally stored in S1 building unless otherwise specified by CSG Safety.

The User states which equipment has to be stored in an air-conditioned environment. Other equipment will be stored under open shed conditions.

Spacecraft check-out equipment is accommodated in S1 building and connected to the CSG power and operational networks with CSG support.

The spacecraft is removed from its container and deployed in the S1 clean room. This also applies for flight spare equipment.

The spacecraft is assembled and undergoes functional checks (non-hazardous mechanical and electrical tests). Category B pyrotechnic items only may be integrated into the spacecraft in S1 building.

Appropriate operations interfacing with L/V operations are carried out during this phase (such as: mechanical fit check, electrical check out of flight adaptor and ground lines, etc ...).

When all checks have been completed, the spacecraft is placed in its own container or in the Payload Container (CCU) for transport to the Ariane Launch Complex.

A typical flow diagram of phase 1 operations is shown in figure 5.4.1.a.

If used, the equipments to be installed in the COTE are to be qualified either acoustic or random with respects to the following levels :

- Acoustic (time duration 1 min)

Octave bands	31.5	63	125	250	500	1000	2000	Overall
Levels (dB)	133	132	128	125	123	122	118	137

- Random

Bandwith (Hz)	Overall level (g eff)	PSD	Time duration
20 - 2000	12	0.0727	1 min on 3 axes

5.4.2. Phase 2: Spacecraft hazardous operations

Hazardous operations are carried out in S2 and S4 buildings for solid propellant motors (SPMs) and S3 building for spacecraft. Liquid propellant motors are prepared in a filling hall in S3 building. Validation of spacecraft ground equipment such as filling and pressurization systems are carried out by the Spacecraft Authority in S3 building before arrival of the spacecraft. The SPM is assembled to the spacecraft in the same hall of S3 building.

The spacecraft operations performed in S3A/S3B buildings will be monitored from S3C building or direclty from S1. The associated Electrical Ground Support Equipment used during hazardous operations may be located in and operated from the control rooms of S3C building or directly operated from S1.

Some phase 2 operations can be undertaken in parallel with phase 1 operations.

A typical flow diagram of phase 2 operations is shown in figure 5.4.2.a.

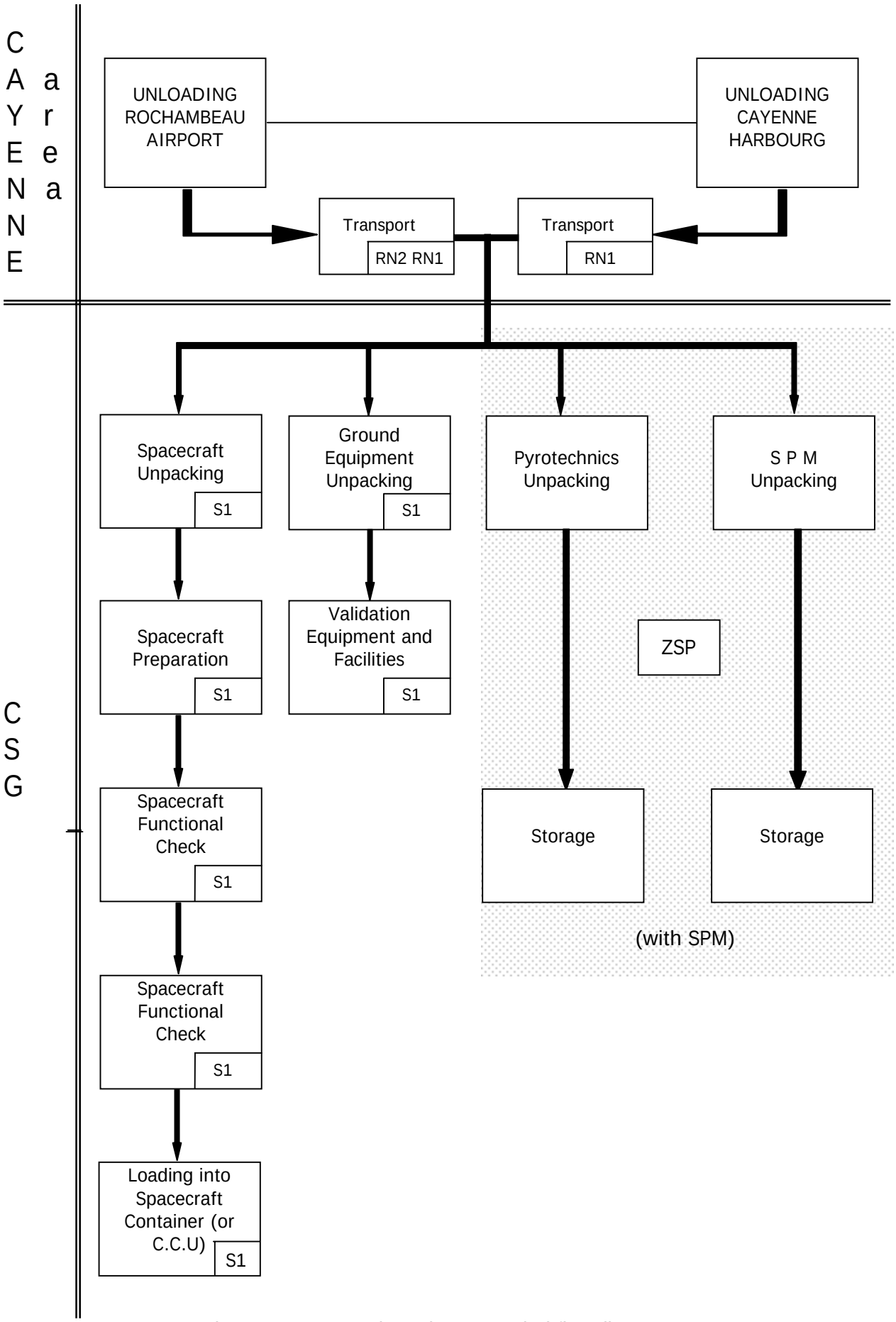


Fig. 5.4.1.a – Operations phase 1: typical flow diagram

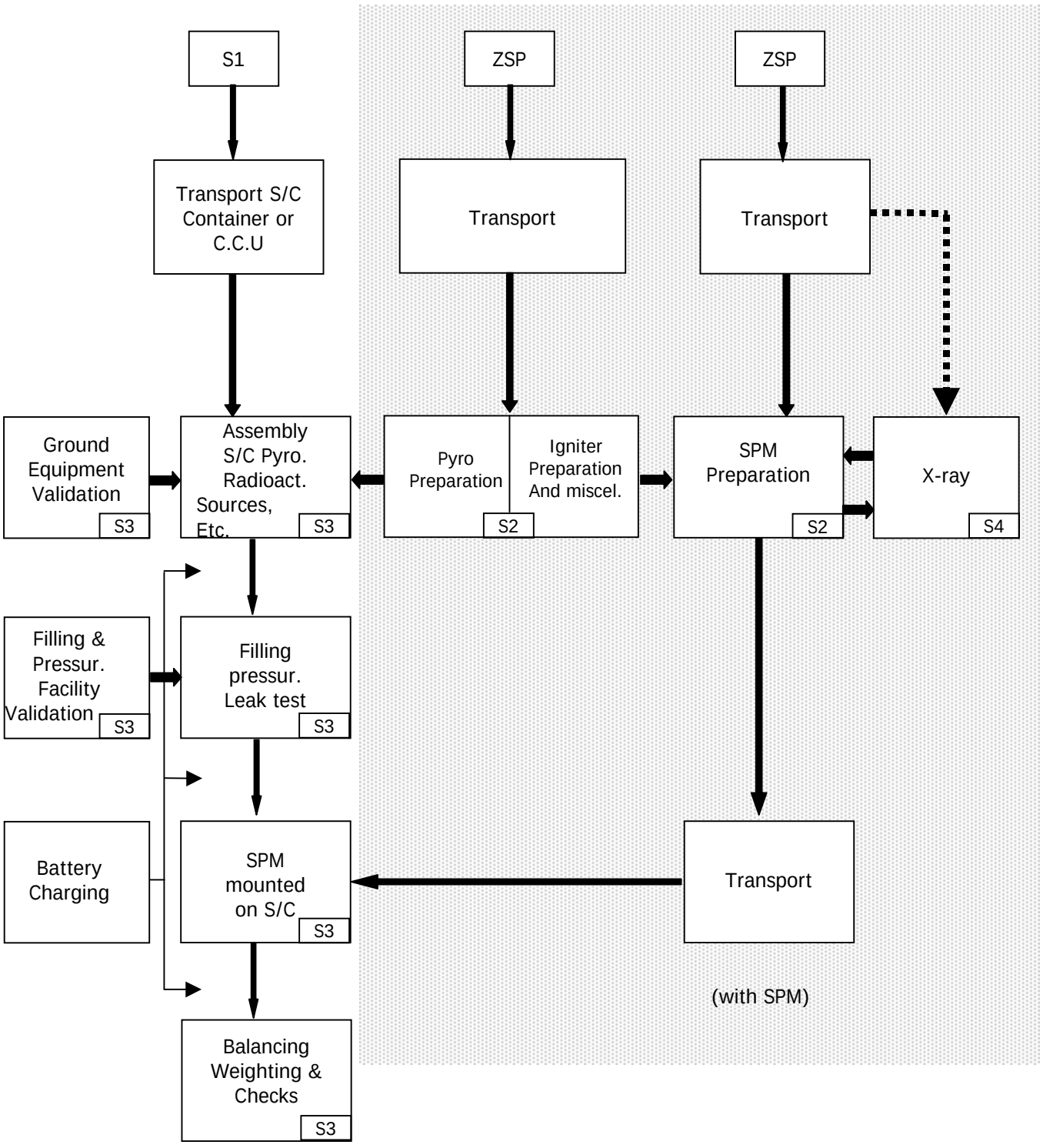


Fig. 5.4.2.a – Operations phase 2: typical flow diagram

5.4.2.1. Pyrotechnic preparation

Checks of pyrotechnic systems required before integration into the spacecraft are carried out in S2 building.

5.4.2.2. Preparation of SPMs

Removal from store and transport to S2.
SPMs stored in the SPM building of the ZSP, can undergo X-ray examination in S4 building, before or after transport in their containers, to S2 building. SPM X-ray checks are carried out by the User with Ariane technical support.

Preparation and checks.
The SPM is assembled and checked The pyrotechnic motor ignition system is transported from the pyrotechnic devices building of the ZSP to S2 building for check prior to assembly into the motor.

Packing and transport to S3.
When fitted with its igniter, the SPM is placed in its container and transported to the access airlock of S3 building.

Preparation for assembly.
The SPM, with its igniter fitted, is removed from its container, and placed in one of the S3 Filling and Assembly Halls.

5.4.2.3. Operations on spacecraft

5.4.2.3.1. Transport and installation in S3

The spacecraft in its container or in a CCU (see EPCU manual) is transported from building S1 to the access air lock of building S3 no earlier than 20 working days before launch. It is then removed from the container, and placed in one of the filling and assembly halls. If S1 building is not used, the spacecraft in its container is transported directly from airport or habour to access dock of S3 building, not earlier than 20 working days before launch.

5.4.2.3.2. Fluid filling and pressurization

The spacecraft tanks are filled and pressurized to flight level.

When necessary, depressurization, purging and flushing operations may be carried out in a S3 hall.

Propellant fluid filling and pressurization operations are carried out by the User. The pressure and temperature monitoring equipment is located in S3C control room.

Spacecraft batteries may be trickle charged in S3 building, except during dynamic hazardous operations.

Ground lines (continuity, insulation, etc ...) between S3 Buildings, hardlines and radio links between S3 and S1 buildings have been checked previously and certified by Arianespace (and witnessed by the Spacecraft Authority if so requested).

5.4.2.3.3. Assembly of pyrotechnics, radioactive sources and miscellaneous items

The assembly of various hazardous items (category A pyrotechnic devices, SPM, radioactive sources, etc...) into spacecraft is carried out in S3 building.

5.4.2.4. Final spacecraft assembly

5.4.2.4.1. Balancing and weighing

If required by the User, a balancing operation may be carried out on the spacecraft, with or without SPM and fluids, under the responsibility of the User, with CSG technical support. A weighing device is available in each Filling and Assembly Hall (the balancing machine is located in S3A).

5.4.2.4.2. Checks and inspection

Electrical, mechanical and arming checks are carried out in the S3 building assembly hall. A spacecraft final inspection is made before the beginning of the Combined Operations Plan (P.O.C.) (refer to chapter 6).

5.4.3. Phase 3: Combined operations for Spacecraft/SPELDA-Fairing encapsulation and launch site

5.4.3.1. Typical flow diagram of phase 3 operations See figure 5.4.3.1.a

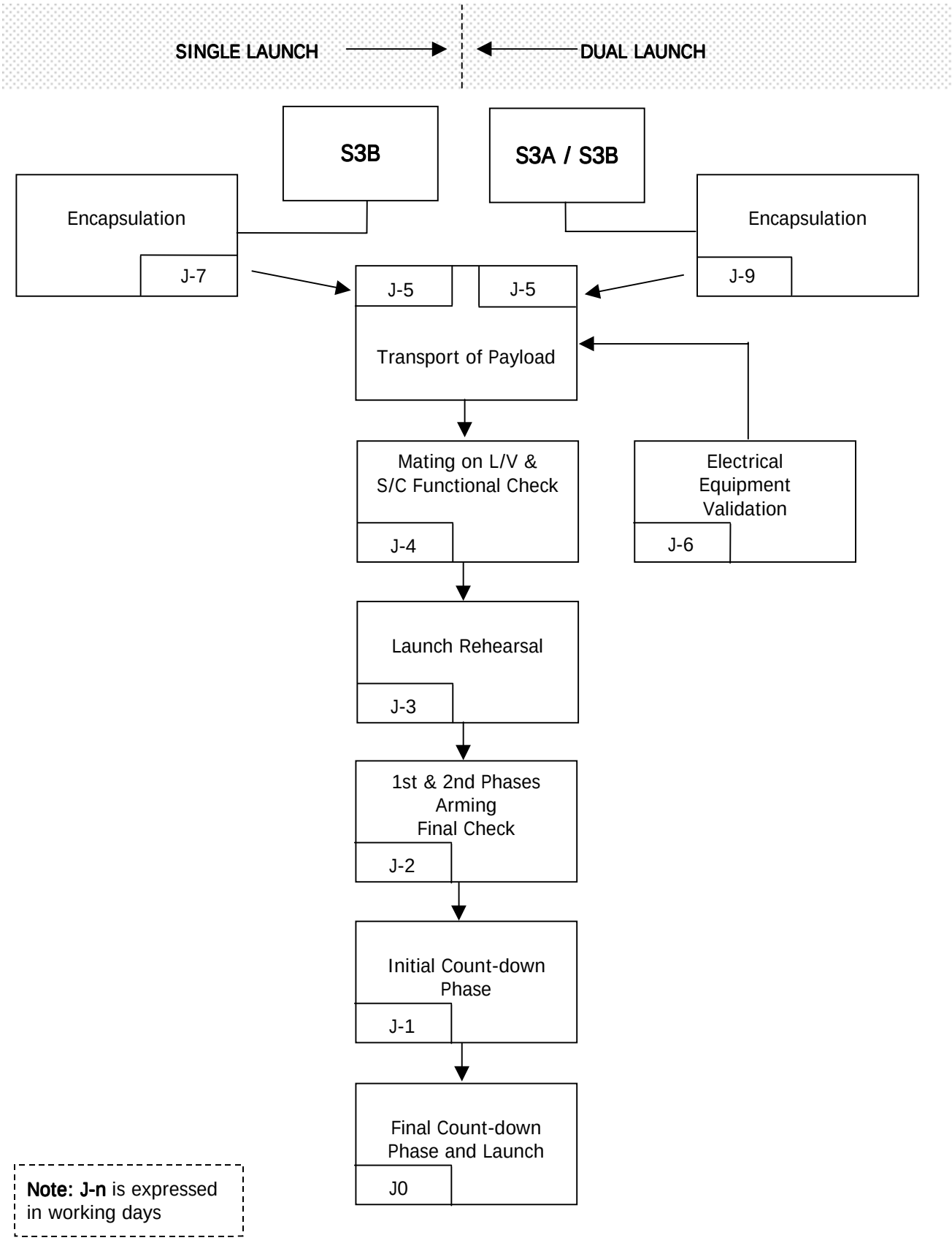


Fig. 5.4.3.1.a – Operations phase 3: typical flow diagram

5.4.3.2. Encapsulation phase

The encapsulation phase is the first step of the "combined operations" and is carried out by Arianespace following the procedure presented here after.

See figure 5.4.3.2.a for single spacecraft encapsulation and refer to figures 5.4.3.2.b and 5.4.3.2.c when a dual spacecraft/SPELDA-Fairing composite is to be launched.

Each spacecraft with its adaptor is handled by means of its own handling equipment. For this reason spacecraft and spacecraft handling equipment must be capable of accepting an additional mass of 125 kg, corresponding to the spacecraft adaptor and the VEB inner cone (250 kg for ACU 1663SP).

Ground lines, breakout boxes (continuity, insulation, resistance, patching,.) between S3 buildings, hardlines and radio links between S3 and S1 Buildings have been checked previously and certified by Arianespace (and witnessed by the Spacecraft Authority if so requested).

5.4.3.2.1. Typical Single spacecraft encapsulation sequence with SPELDA (see figure 5.4.3.2.a)

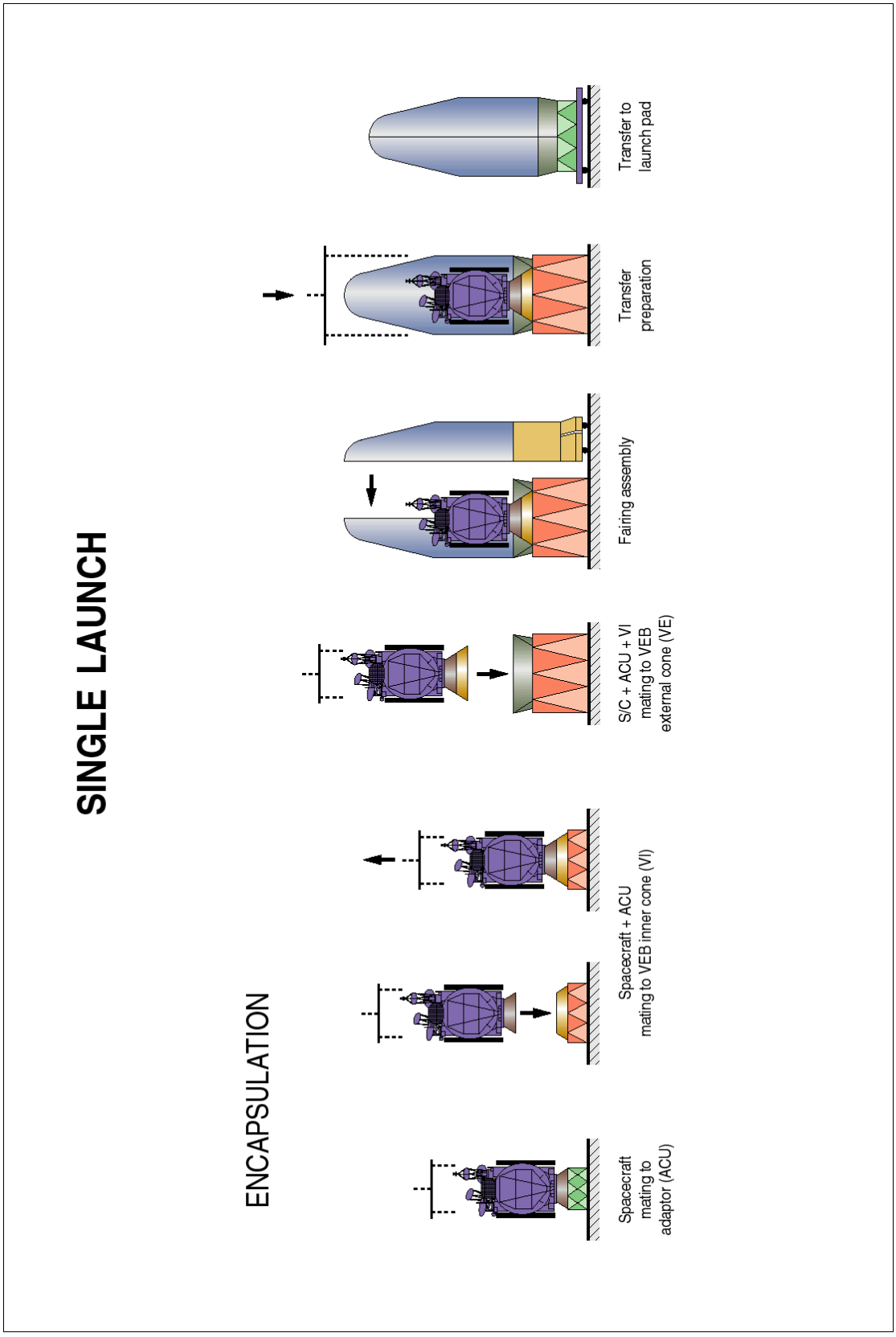
After final inspection, the spacecraft is mated to its adaptor before being encapsulated in the fairing in S3B building. Using the fairing handling equipment, the encapsulated spacecraft is placed on the trailer in the S3B airlock.

5.4.3.2.2. Typical dual launch encapsulation sequence with SPELDA (see figures 5.4.3.2.b and 5.4.3.2.c)

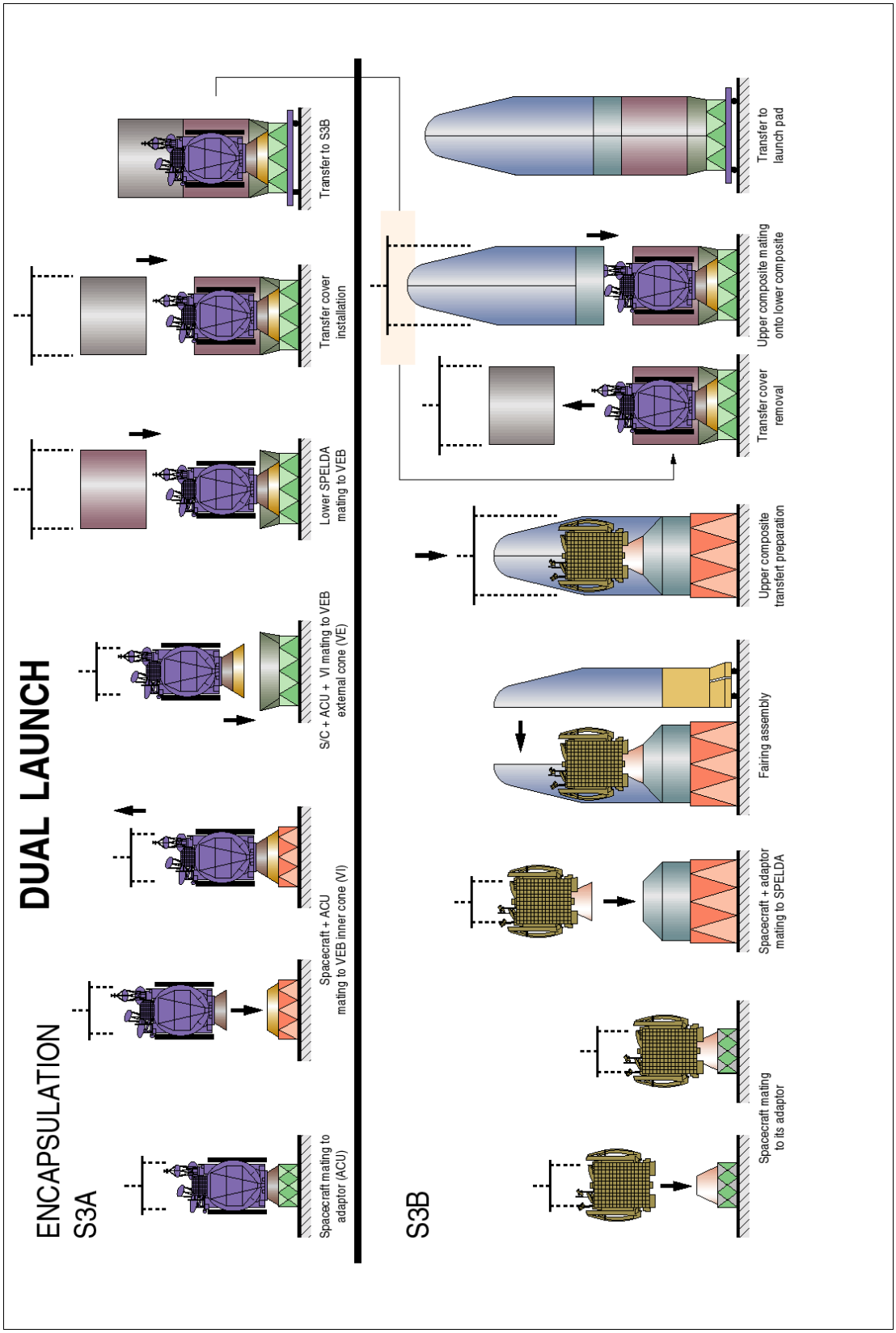
After final inspection of both spacecraft, they are, in parallel, mated to their respective adaptor. The upper spacecraft, placed on SPELDA-top is encapsulated in the fairing while inner spacecraft is placed inside the SPELDA cylinder. Inner spacecraft is finally covered by the encapsulated upper spacecraft. Using the fairing handling harness, the encapsulated payload is placed on the trailer in the S3B airlock.

5.4.3.2.3. Typical dual launch encapsulation sequence with SYLDA

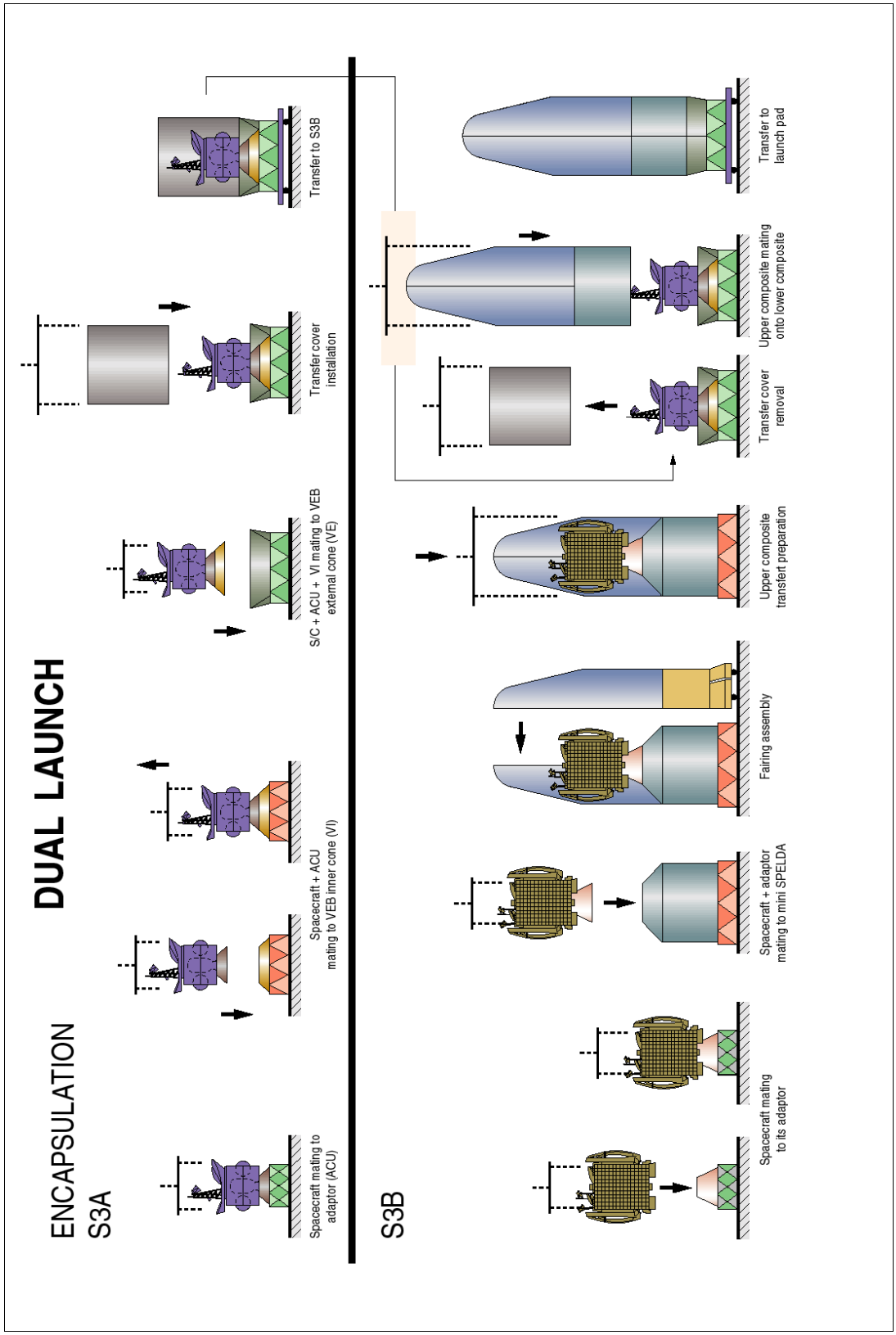
After final inspection of both spacecraft, the SYLDA / upper spacecraft / inner spacecraft composite is assembled under the responsibility of Arianespace in S3A (or S3B) Building On completion of assembly the composite, if necessary, is placed in the Payload container (CCU) and transported in S3B building The composite is inspected and mated on the VEB inner cone and encapsulated in the fairing. Using the fairing handling equipment, the encapsulated payload is placed on the trailer in the S3B airlock.



5.4.3.2.a – Typical Single Launch Encapsulation Sequence



5.4.3.2.b – Typical dual Launch Encapsulation Sequence with short SPELDA



5.4.3.2.c – Typical Dual Launch Encapsulation Sequence with mini SPELDA

5.4.3.3. Transport of payload

The Ariane authority is responsible for transporting the encapsulated payload on its trailer from S3B building to the Launch Pad. After uncoupling from the trailer at the bottom of the tower, the encapsulated payload is hoisted onto the PFCU level and lowered onto this platform.

5.4.3.4. Assembly to the launch vehicle

Mating of the encapsulated payload onto the launch vehicle is achieved through a bolted interface. This is an Arianespace responsibility.

After the payload is mated on the launch vehicle, ventilation is provided through the pneumatic umbilical(s).

5.4.3.5. Preparation and checkout of the payload

Umbilical cabling (continuity, insulation, etc...) and radio links have been checked previously and certified by Arianespace (and witnessed by the Spacecraft Authority if so requested).

A functional check of each spacecraft is carried out in accordance with the combined activities time-schedule, together with certain routine operations (leak test, battery charging, visual inspection).

Before arming operations, a combined launcher/payload stray voltage test may be performed depending on EMC analysis; this implies both launch vehicle and payload radio systems to be activated.

Spacecraft activities have to allow for launch vehicle accessibility and radio-silence constraints.

An "inert" spacecraft has no active sub-system. A spacecraft on standby is defined as presenting a steady state (no mechanical or electrical change of state), with no radio transmission. Trickle charging of batteries is admissible, and radio receivers may be permanently switched on. These conditions are discussed at the time of the safety submissions and finalized in the Combined Operations Plan (POC).

Arming and disarming checks of hazardous circuits are carried out by the User after clearance by the COEL with Safety Officer's agreement.

5.4.3.6. Launch rehearsal

A launch rehearsal is held at J-3 with the servicing tower remaining around the launch vehicle. This rehearsal implies the activation of all electrical and mechanical facilities involved in an Ariane launch together with the spacecraft ground network(s), in order to validate all the interfaces. The H0 instant will be discussed with the User, usually set at 06:00 pm.

5.4.3.7. Checkout and preparation before launch countdown

The spacecraft can be checked out via cable and/or radio links, at authorized times.

At J-2 the sequence of arming operations is the following:

- Arming phase 1 for the launch vehicle (fitting and connection of the launch vehicle pyrotechnic devices). During this operation, access to the spacecraft is prohibited and radio-silence is required.
- Fitting of the spacecraft flight plugs (the spacecraft must be inert or in standby mode).
- Closure of the spacecraft access door(s) on the fairing or SPELDA no more access to the spacecraft until launch).
- Arming phase 2 for the launch vehicle (fitting of the flight arming plugs).

5.4.3.8. L/V Storable propellants filling operations

These operations consist in filling the launch vehicle first stage, second stage, and PAL; this part is independent of the final countdown sequence. There is no access to the spacecraft during these operations.

5.4.3.9. Launch countdown sequence (see figure 5.4.3.9.a)

The final countdown sequence starts at about H0-11 hours.

During this sequence, the main constraints applying to the spacecraft are the following:

- Spacecraft RF and functional tests:
  RF and/or functional tests may be performed at any time between J0 start of the countdown and H0 – 1 h 30.

- SPM arming (if necessary)
  SPM arming phase starts at either H0-50 or H0-45 minutes

- Spacecraft RF flight configuration
  The final RF flight configuration set up must be completed before H0-1h30 and remains unchanged until 20 s after separation.

- L/V automatic sequence
  Initiated at H0-6 minutes.

- Spacecraft internal power switch on
  The external/internal power switch on phase is performed such that the spacecraft must be ready for launch by H0-3 mn 40 s latest.

- Countdown hold
  In case of stop action during the final sequence, the spacecraft can be reconfigured in external power supply, and the count down clock is set back to H0-6 minutes.

- Spacecraft stop action
  The spacecraft stop action is activated until H0-9 seconds.

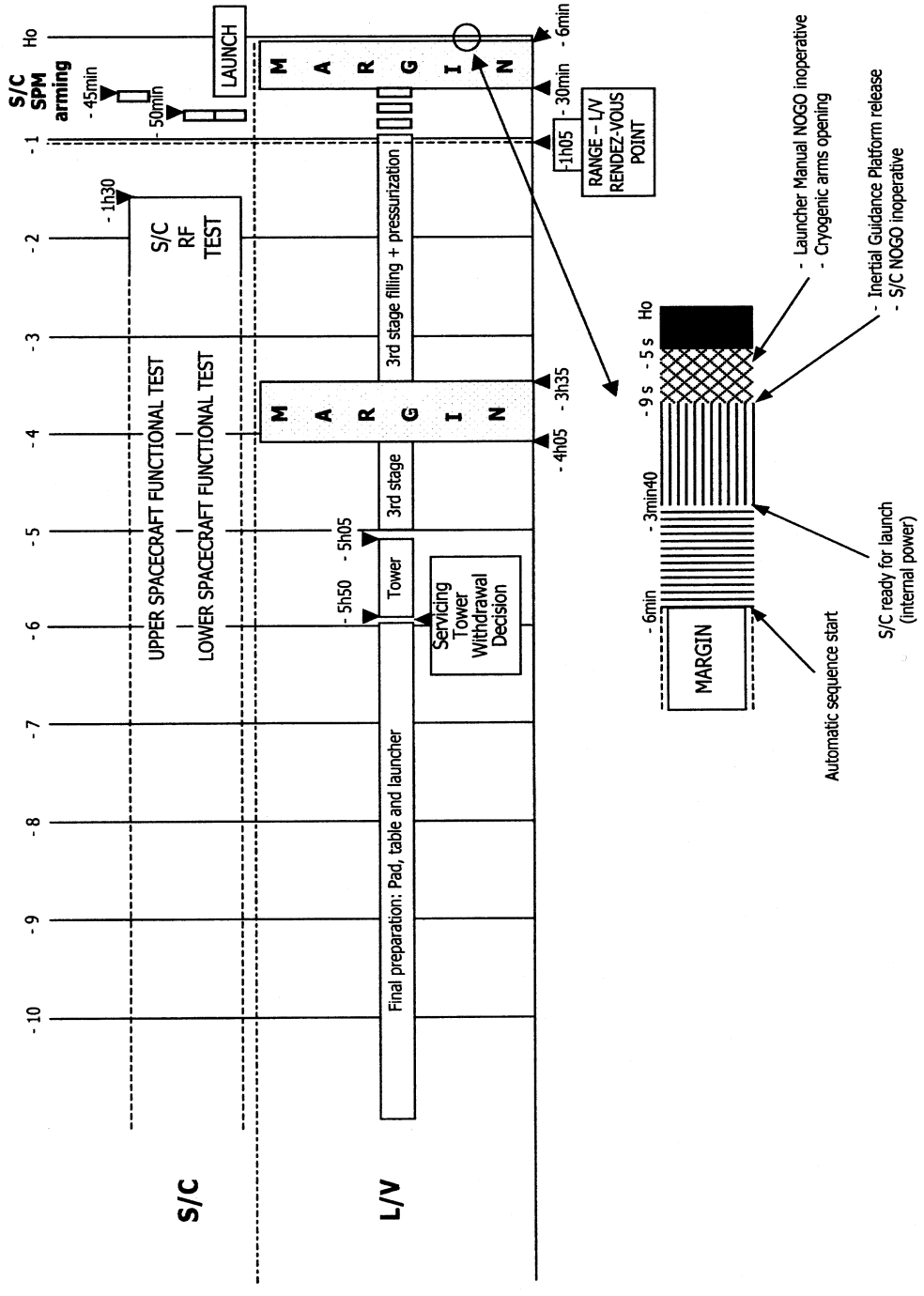


Fig. 5.4.3.9.a – Final Countdown Phase

5.5. Operational organization

Responsibilities are defined as below:

PDG — Arianespace - Chairman Of the Board and Chief Executive Officer (responsible of the Arianespace's commitments - Flight Director)

DMS (*User*) — Spacecraft Mission Director ("Directeur de la Mission Satellite"). Responsible for checking the compatibility of his spacecraft mission objectives with the capability of the launch system. The CM may not proceed with the launch without the agreement of the DMS.

CPS (*User*) — Spacecraft Project Manager ("Chef de Projet Satellite"). The CPS delegates preparation, activation and checkout of the spacecraft to the Spacecraft Preparation Manager (RPS).

Note: *The DMS or CPS is responsible for synthesis of reports (spacecraft preparation and satellite orbital ground station network).*

RPS (*User*) — Spacecraft Preparation Manager ("Responsable de la Preparation Satellite"). Responsible for the preparation, activation and checkout of the spacecraft.

RCUA (*AE*) — Ariane Payload Manager ("Responsable Charge Utile Ariane"). Responsible for the compatibility between the launch objectives and the Ariane Launch system.

ARS (*User*) — Satellite Ground Stations Network Assistant ("Adjoint Reseau Stations sol satellite") Responsible for liaison between the CSG control room and the Satellite Orbital Operations Centre.

CPAP (*AE*) — Ariane Production Project Manager ("Chef de Projet Ariane Production") Responsible of the Ariane Design Authority.

CG/D — Range Director. Delegates:
1) preparation, activation and operational coordination of the CSG facilities and Ariane down-range stations to the Range Operations Manager (DDO).
2) safety of persons and property to the Safety Officer.

CM (*AE*) — Mission Director ("Chef de Mission") Responsible for preparation and execution of the launch campaign.

DDO (*CSG*) — Range Operations Manager ("Directeur d'Operation") Responsible for the preparation, activation and operational coordination of the Range facilities and Ariane down-range stations.

RMCU (*CSG*) — Payload facilities Manager ("Responsable des moyens charge Utile") Responsible for EPCU maintenance and operation technical support.

RS (*CSG*) — Safety Responsible ("Responsable Sauvegarde") Responsible for the safety of persons and property.

COEL (*AE*) — Launch Site Operations Manager ("Chef des Operations Ensemble de Lancement") Responsible for the preparation, activation and checkout of the launch vehicle and launch-complex facilities. Coordinates all operations on the launch pad (Launch Tower and Launch Centre).

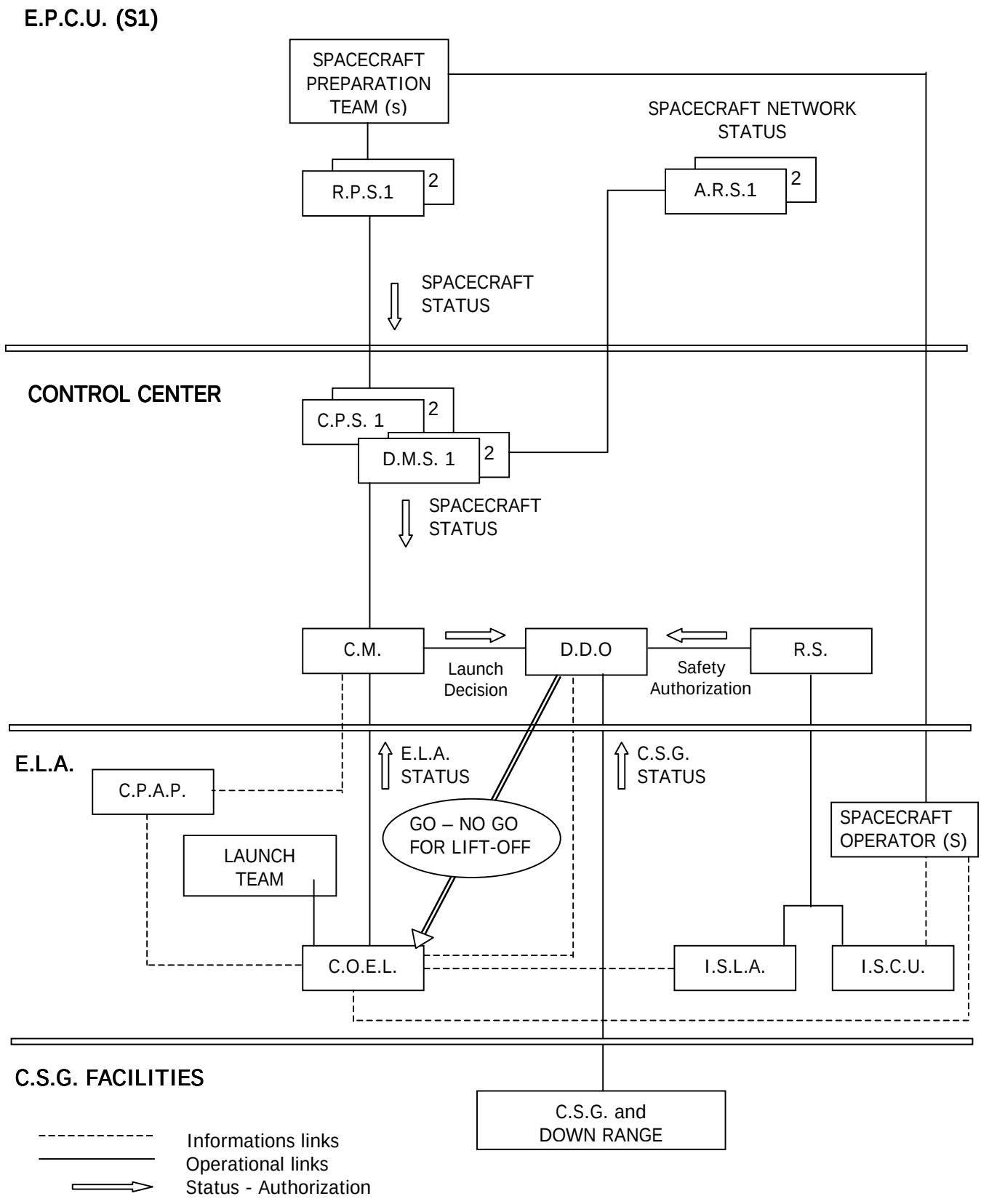
ACU (*AE*) — Payload Deputy ("Adjoint charge utile"). COEL assistant for the Launch System/Payload combined operations coordination.

ISLA (*CSG*) — Launch Area Safety Officer ("Ingenieur Sauvegarde Lancement"). Represents the Safety Officer on the launch site.

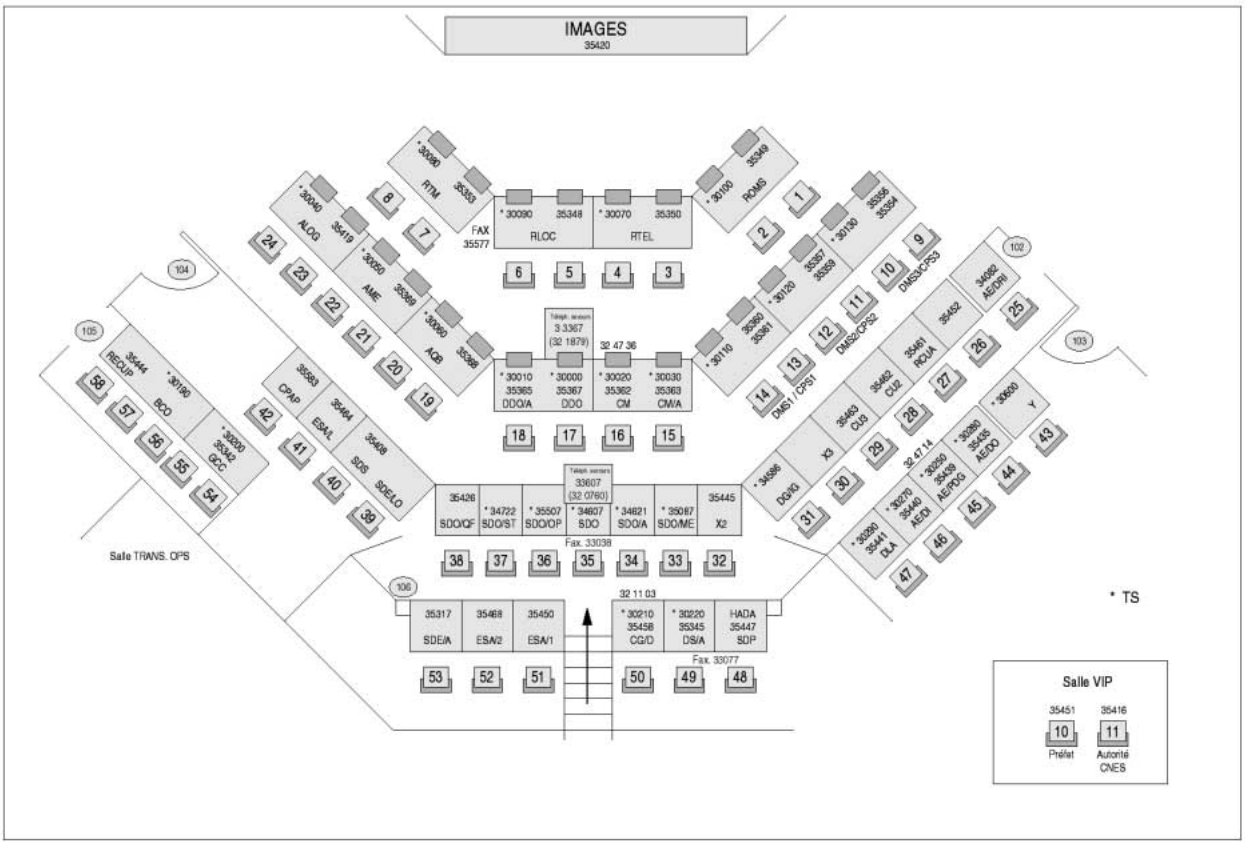
ISCU (*CSG*) — Payload Safety Officer ("Ingenieur Sauvegarde Charge Utile"). Responsible for control of the payload hazardous operations.

A typical operational countdown organization is presented figure 5.5.a.

A typical control centre configuration for the above personnel during countdown is shown in figure 5.5.b.



5.5.a – Typical operational countdown organization



5.5.b – Typical control centre configuration for Ariane Launch

5.6. Launch constraints

5.6.1. Launch Window

5.6.1.1. Definitions

a) Launch Period:
A period of two consecutive calendar months which will allow the launching of a User's spacecraft with daily Launch Window possibilities.

b) Launch Slot:
One calendar month within a Launch Period.

c) Launch Day:
The day of the Launch Slot, during which the Launch Window starts, selected for launching Ariane and its payload with the agreement of the User(s) and Arianespace.

The latest acceptable Launch Day is scheduled 10 days earlier than the end of the Launch Slot.

d) Instant of launch
Launch vehicle lift-off time, defined in hours, minutes and seconds, within one Launch Window.

e) Satellite Injection Window(s) (SIW):
Daily limited window(s) during which satellite injection into the required orbit is achievable.

f) Launch Window(s) (L/W):
A Launch Window starts at the beginning of the Satellite Injection Window(s) advanced by the Ariane powered flight time.

Daily L/W duration is identical to SIW duration.

g) Launch capability:
The launch capability starts on completion of 3rd stage filling (normally H0-105 minutes) and terminates at the end of the LWs requested by the User. This launch capability can amount to 5 hours.

5.6.1.2. Procedure for dual GTO launches

- The satellite reference dual launch window will be presented in the DUA and will be agreed upon by the Customer and Arianespace at the Preliminary Mission Analysis Review. The calculation will be based on the following reference orbit and time.

Reference time: Time of the first passage at orbit perigee in UT hours. This first passage may be fictitious if injection occurs beyond perigee.

Reference orbit (osculating parameters at first perigee except for apogee altitude):

Apogee altitude:	35 786 km at apogee 6
Perigee altitude:	200 km
Inclination:	7°
Argument of perigee:	178°
Longitude of descending node:	11° West (with reference to Greenwich Meridian)

- The final launch window calculation will be based on actual orbit parameters in terms of lift-off time.

- The final launch window will be agreed upon by the Client(s) and Arianespace at the Final Mission Analysis Review and no further modification shall be introduced without the agreement of each party.

5.6.1.3. Constraints for dual GTO launches

The Ariane Authority requires daily common launch windows of at least 45 minutes in order to allow the possibility of a minimum of two launch attempts every day.

In order for this requirement to be met, the spacecraft launch window corresponding to the reference orbit and time defined above must contain at least the window described in Fig. 5.6.1.3.a for the launch period of interest.

Note:

- The physical and mathematical definition of the minimum window are as follows:
The daily window is 45 minutes long. The opening of the window corresponds to a solar aspect angle of 65° with respect to the reference AMF attitude which permits instantaneous transfer from the reference GTO orbit to geosynchronous orbit at apogee 6 (when the line of apsides is colinear with the line of nodes).

- Reference AMF attitude:
  Right ascension: perpendicular to radius vector at apogee 6
  Declination: - 7.45° with respect to equatorial plane

5.6.1.4. Constraint for single GTO launches

The daily launch window will be at least 45 minutes long in one or several parts.

5.6.1.5. Constraints for non GTO orbits

At User's request, daily launch windows shorter than 45 minutes may be negociated after analysis.

5.6.2. Launch postponement

If the launch does not take place inside the Launch Window(s) of the scheduled Launch Day, the launch will be postponed by 24 or 48 hours depending on the situation, it being understood that the reason for postponement has been cleared. Launch time (H0) is set at the start of the new Launch Window and the countdown is restarted at about H0 – 11 hours.

At the end of a Launch Window during which launch has not taken place, and assuming the irreversible phase of the automatic sequence has not been reached (H0 – 5 seconds), the following operations are carried out:

a) spacecraft switching on external (and remote controled desarming of the AKM, when applicable),
b) draining and flushing of 3rd stage,
c) depressurization of the 1st and 2nd stages,
d) return of the gantry around the launch vehicle,
e) launch vehicle, payload and ground facilities placed in countdown-hold configuration.

The payload may be maintained in the stand-by mode during all these operations.

5.6.3. Engines shutdown before lift-off

If first stage engines have been shutdown before lift-off, a new launch can be scheduled, within a minimum time period of 13 days.

Since 3rd stage filling arms will have been retracted, a much longer emergency draining procedure is necessary, as a result of which the gantry cannot be brought back around the launch vehicle until approximately 30 hours after the unsuccessfull launch attempt. However the payload compartment remains air-conditionned and electricaly connected, to the ground support equipment. In this configuration, unless anomalies were experienced on the post aborted launch check-out, it will remain on the 3rd stage until the next launch attempt.

5.7. Orbital operations support network

Satellite orbital operations are not an Arianespace responsibility.

However Arianespace can help the User to define and/or choose the orbital operations support network which best suits his requirements.

5.8. Evaluation of parameters at injection

Between H0 + 40 minutes and H0 + 1 hour the Ariane Authority will provide the User with a composite satellization diagnosis. This information includes an estimate of orbital parameters at injection (3rd stage cut-off) and 3rd stage attitude just before payload separation (see also para. 6.4.6.1).

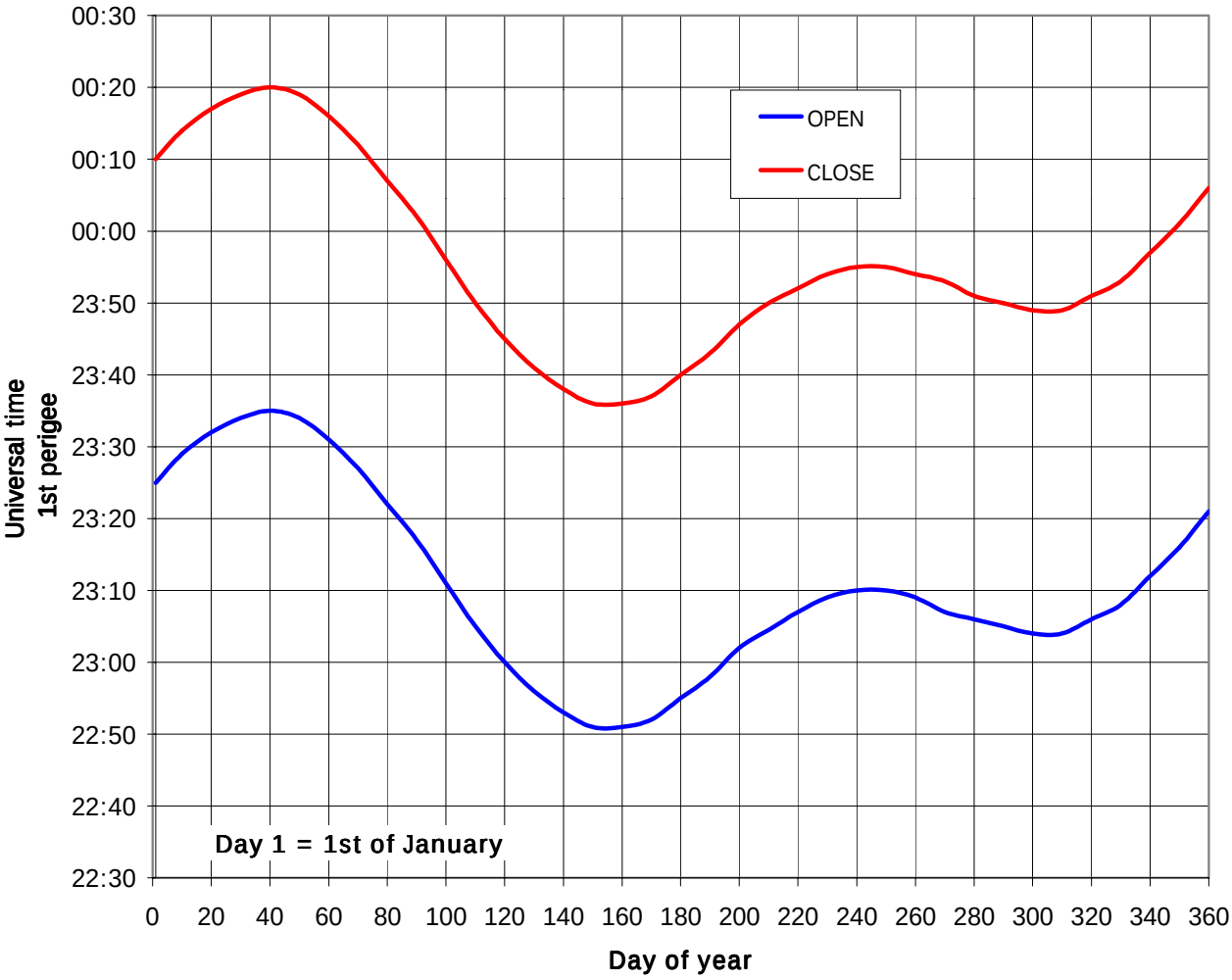


Fig. 5.6.1.3.a – Minimum launch window at first perigee passage