
Introduction

Chapter 1

1.1. Purpose of the User's manual

This manual is intended to provide Users with information of the Ariane 4 series of launch vehicles.

The reader should also refer to the "C.S.G. Safety Regulations" which is applicable for spacecraft design and operations and the "Payload Preparation Complex (E.P.C.U.) Manual" (CD-ROM).

The above three documents constitute the Ariane technical reference documentation used for the Ariane-spacecraft feasibility phase studies. On completion of the feasibility phase, formal documentation will be established in accordance with the procedures outlined [in Chapter 6](#) of this manual.

1.2. The Ariane 4 launch system

Arianespace offers a complete launch system including the vehicle, the launch facilities and the associated services.

The *launch vehicle* is basically the Ariane three-stage-vehicle using liquid propellants and an inertial guidance system. Depending on the required performance and the composition of its payload, one of several launch configurations can

be selected by Arianespace based upon the utilization of strap-on boosters and dual launch systems. These configurations are [described in paragraph 1.3.](#)

The launch vehicle itself is described in more [detail within annex 1.](#)

The *launch facilities* located in French Guiana comprise the Payload Preparation Complex EPCU and the Ariane Launch Complex ELA 2.

Arianespace is organized to offer a *Launch Service* based on a continuous interchange of information between a Spacecraft Interface Manager (User), and the Ariane Mission Manager (Arianespace) who are appointed at the time of the launch contract signature. As from that date, the Ariane Mission Manager is responsible for the execution of the Launch Service Contract. For a given launch, therefore, there are one or two Spacecraft Interface Manager(s) and one or two Arianespace Mission Manager(s), depending on whether the launch is a single or a dual one.

For the preparation and execution of the Guiana operations, the Ariane launch team is managed by a specially assigned Mission Director who will work directly with the User's operational team.

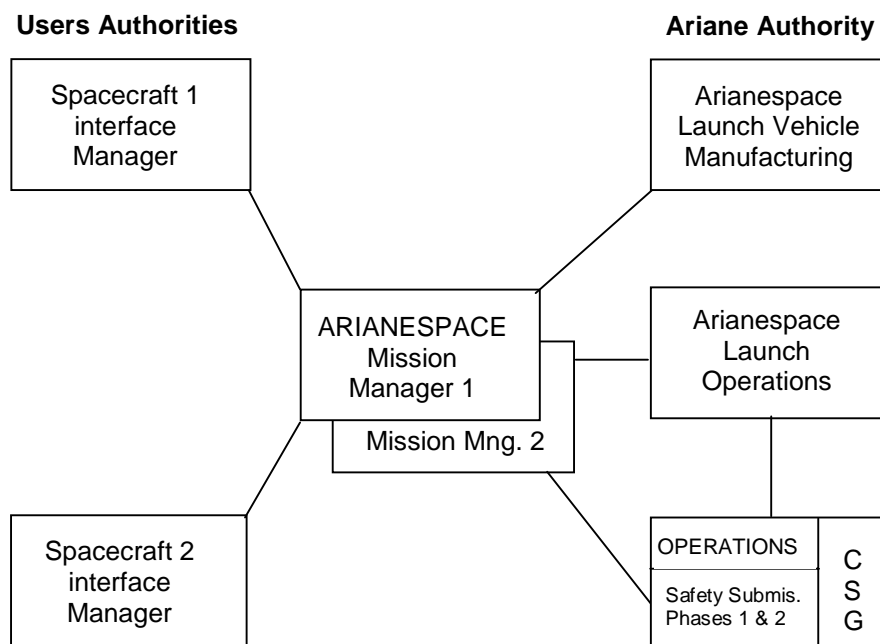


Fig. 1.1 – Principle of Users/Arianespace Relationship

1.3. The Ariane 4 series of launch vehicles

There are six different *launch vehicle configurations* each having a different strap-on boosters arrangement for the first stage (see para. 1.3.1.). There is also a number of *spacecraft compartment configurations* (see para. 1.3.2.), allowing for single and dual launches. The appropriate combination of these two is selected by Arianespace taking into account the volume and mass performance required. This combination is known as the *launch configuration*.

1.3.1. Launch vehicle configurations

Depending on the total payload mass to be launched, the launch vehicle will have zero, two or four strap-on boosters giving the configurations:

- 40 (with no strap-on boosters),
- 42 (with 2 strap-on boosters),
- 44 (with 4 strap-on boosters).

The strap-on boosters will be selected, from the two types available according to the performance required i.e. they may be:

- P (for Solid propellant),
- L (for Liquid propellant).

The possible launch vehicle configurations are as follows: (see 1.3.1.a and 1.3.1.b).

- ARIANE 40 : no strap-on booster
- ARIANE 42P : 2 Solid strap-on boosters
- ARIANE 44P : 4 Solid strap-on boosters
- ARIANE 42L : 2 Liquid strap-on boosters
- ARIANE 44LP : 2 Liquid + 2 Solid strap-on boosters
- ARIANE 44L : 4 Liquid strap-on boosters

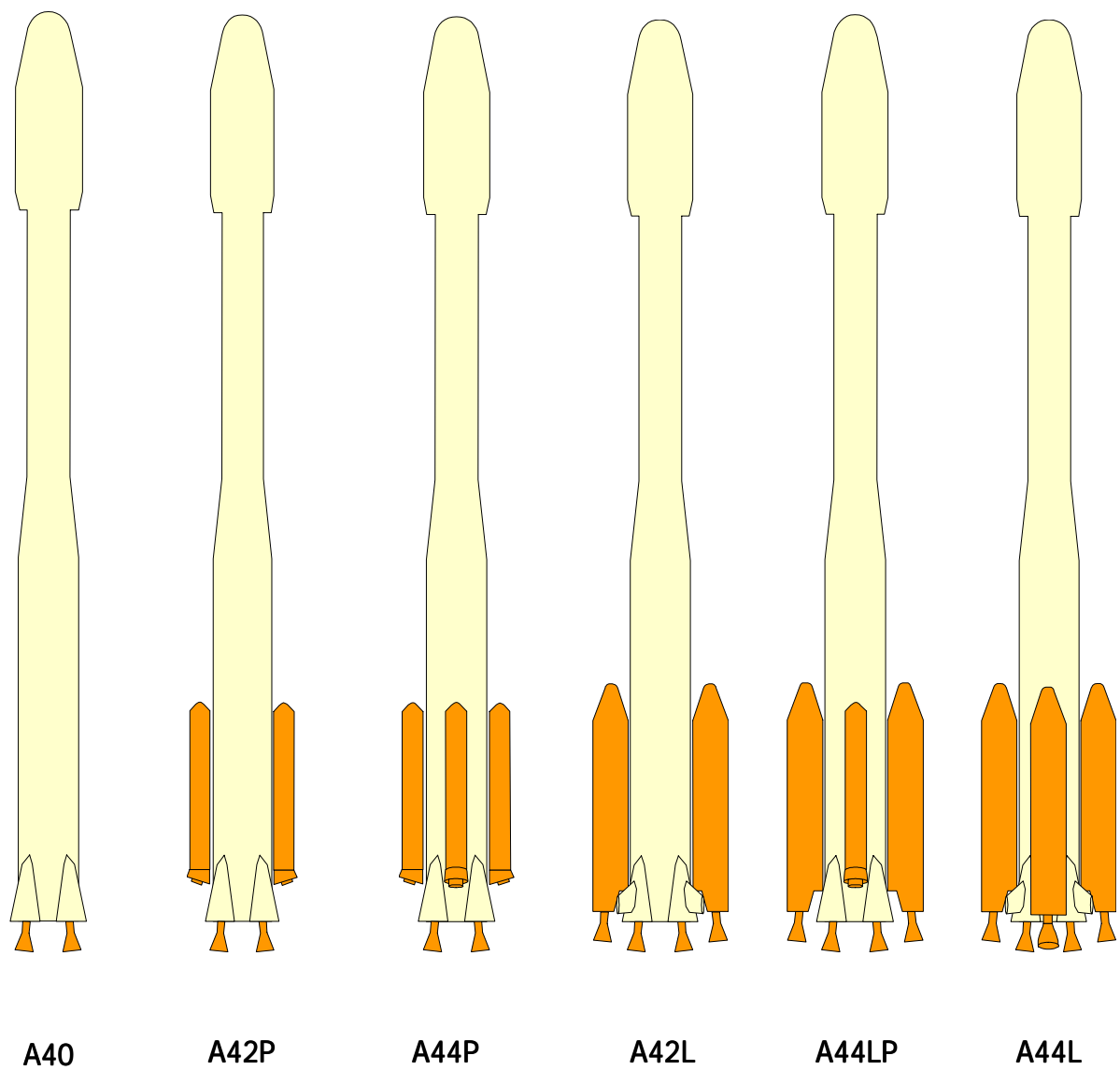


Fig. 1.3.1.a - Ariane 4 launch vehicle configurations

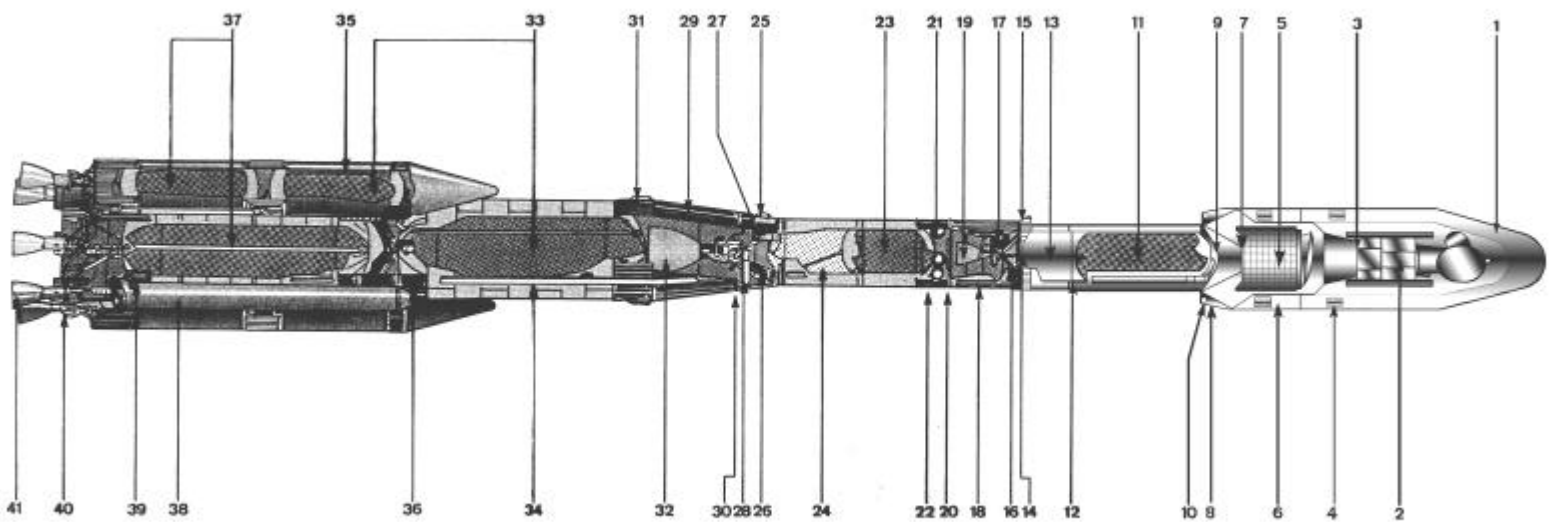


Fig. 1.3.1.b. Launch vehicle inboard profile (Ariane 4ALP)

- | | | | |
|-------------------------------------|--|--|---------------------------------------|
| 1 Fairing | 12 Anti-sloshing device | 22 second-stage front skirt | 32 second-stage engine-Viking IV |
| 2 Upper spacecraft | 13 Liquid-oxygen tank | 23 N ₂ O ₄ tank | 33 N ₂ O ₄ tank |
| 3 Upper spacecraft separation plane | 14 Roll and attitude control system | 24 UH25 tank | 34 External cable duct |
| 4 Fairing door | 15 Third stage acceleration rockets (2x2) | 25 Second stage retro rockets (2) | 35 Liquid strap on boosters (2) |
| 5 Inner spacecraft | 16 Third-stage thrust frame | 26 Second-stage thrust frame | 36 Intertanks skirt |
| 6 SPELDA | 17 Helium pressurization tank | 27 Second-stage acceleration rockets (4) | 37 UH25 tank |
| 7 Inner spacecraft separation plane | 18 Interstage 2-3 | 28 Second-stage torroidal water tank | 38 Solid strap-on boosters (2) |
| 8 Vehicle Equipment Bay (VEB) | 19 Third-stage engine HM-7B | 29 Interstage 1-2 | 39 First-stage thrust frame |
| 9 Third stage sealing membrane | 20 2/3 separation plane | 30 1-2 separation plane | 40 Fairings |
| 10 VEB Equipment | 21 2 nd stage helium pressurization tanks (3) | 31 First stage retro-rockets (4x2) | 41 First-stage engines – 4 vikings V |
| 11 Liquid-hydrogen tank | | | |

1.3.2. Payload compartment configurations

The Ariane 4 launch vehicle has two basic spacecraft compartment configurations, one for single spacecraft launches and one for dual spacecraft launches:

- Single launch ([see fig. 1.3.2.a](#))

Fairings available:

Type 01: short fairing, 8.6 m high,

Type 02: long fairing, 9.6 m high,

Type 03: extra long fairing, 11.1 m high (on request).

- Dual launch ([see fig. 1.3.2.b, 1.3.2.c, 1.3.2.d](#))

For dual launches either the SPELDA or SYLDA carrying structure will be used ([see Figure 1.3.2.b](#)).

SPELDA is mounted above the VEB. It surrounds the inner spacecraft and supports the upper spacecraft and the fairing.

Three types of SPELDA are available:

Type 10	: Short SPELDA, 3.8 m high
Type 30	: Mini-SPELDA, 2.8 m high
Type 40	: Mini-SPELDA +300, 3.1 m high (also called SMS for stretched mini SPELDA)

The SPELDA, mini-SPELDA and stretched mini SPELDA can be used with either a short fairing or a long fairing.

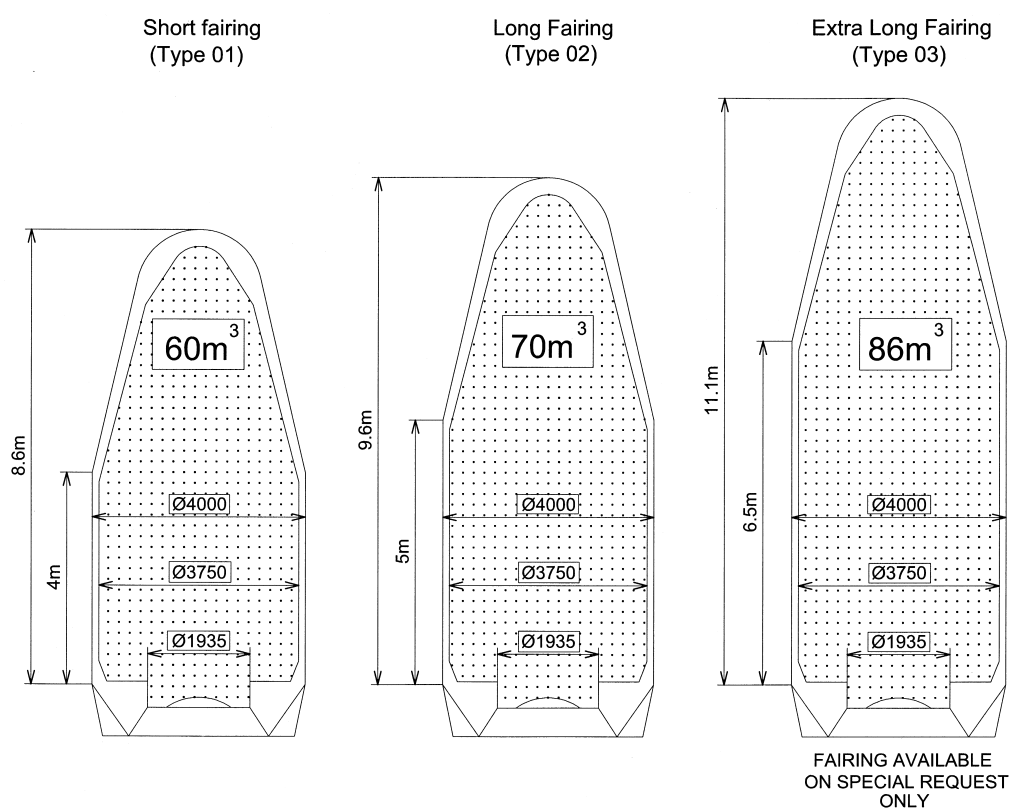


Fig. 1.3.2.a - Payload compartment configurations for single launches

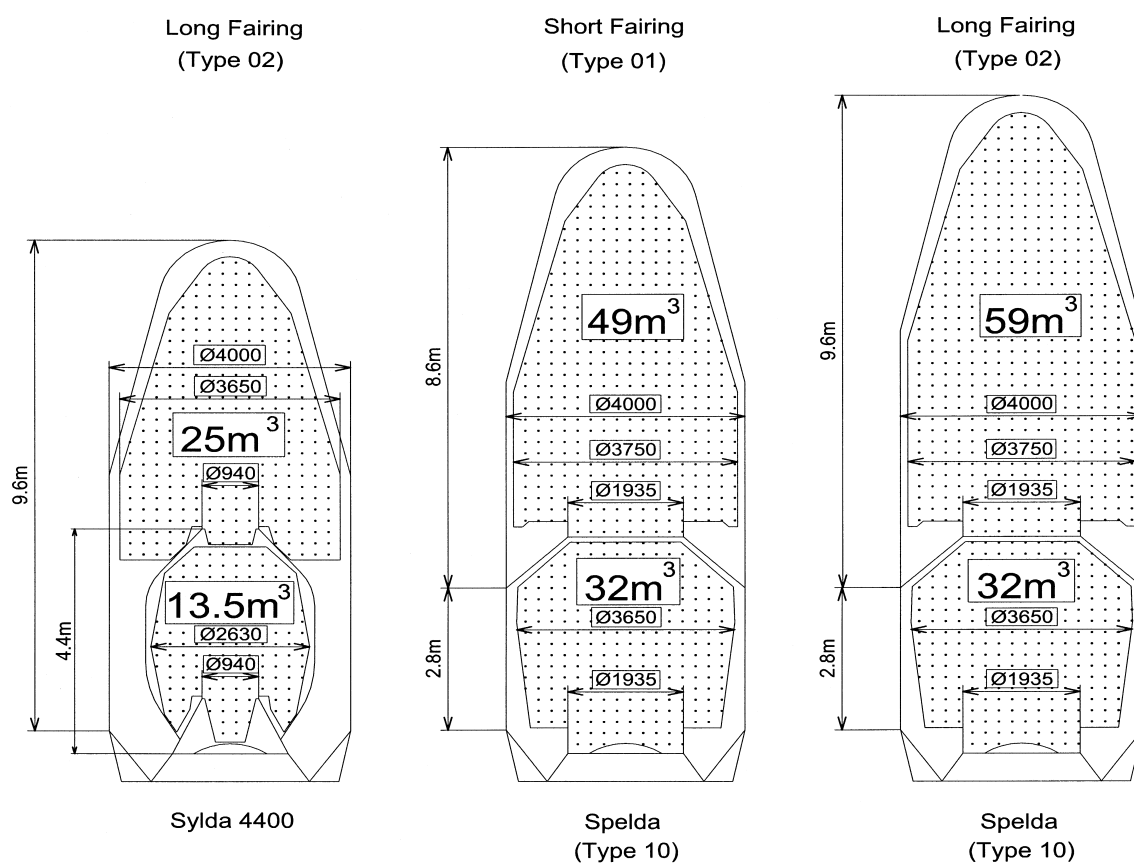


Fig. 1.3.2.b - Payload compartment configurations for dual launches

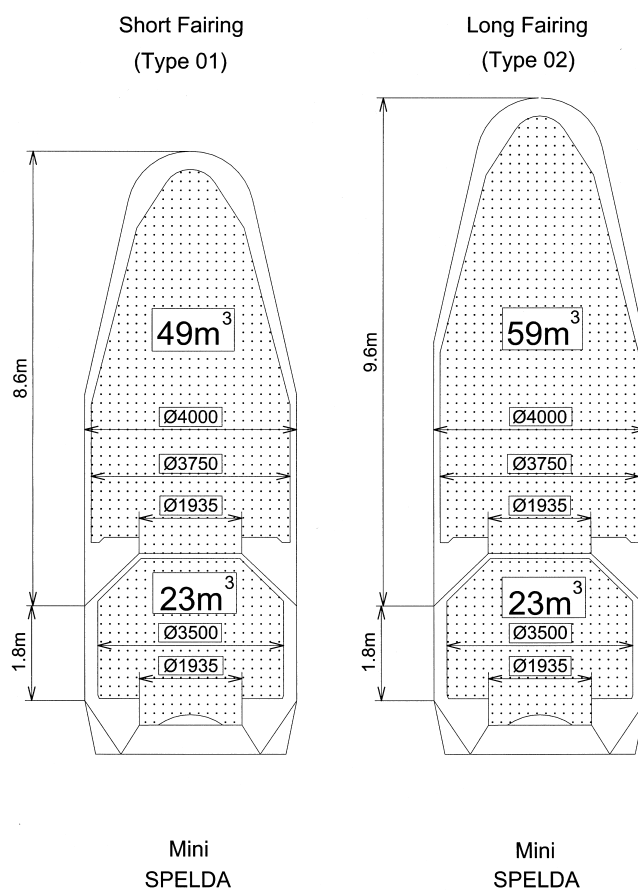


Fig. 1.3.2.c - Payload compartment configurations for dual launches (cont'd)

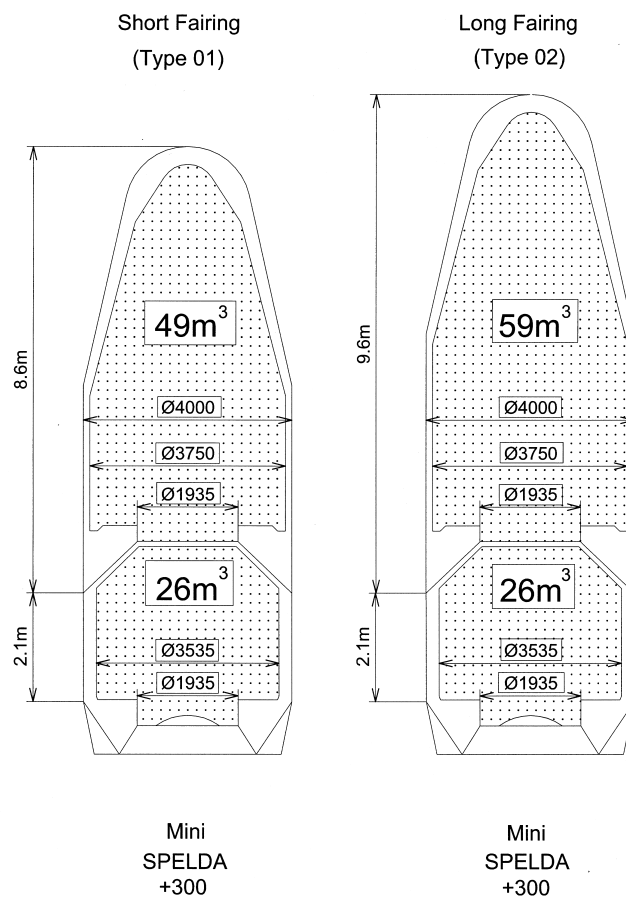


Fig. 1.3.2.d - Payload compartment configurations for dual launches (cont'd)