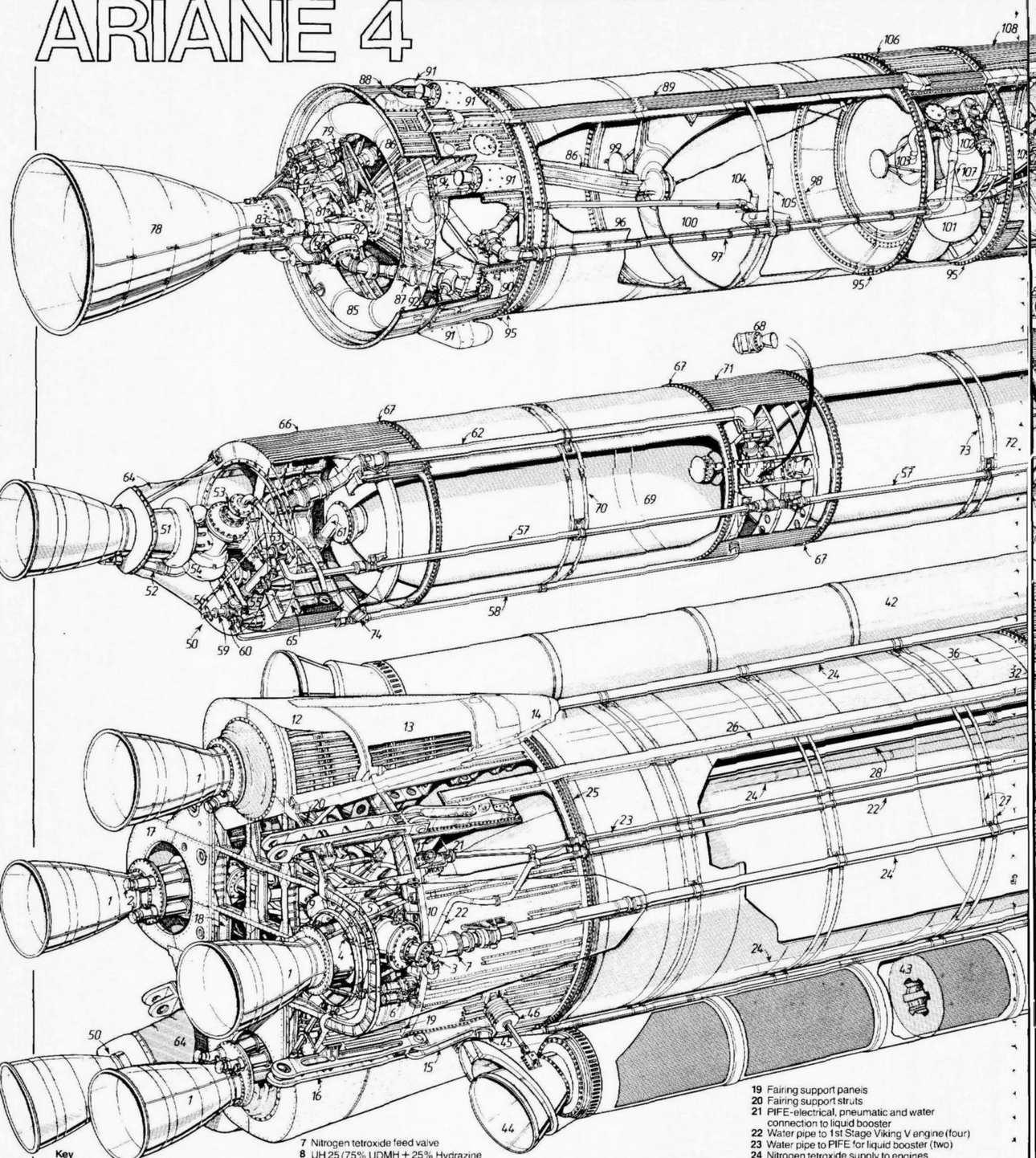
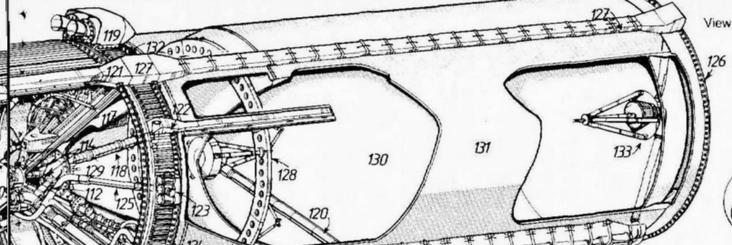
ARIANE 4





TIM HALL
Les Mureaux, France

FLIGHT INTERNATIONAL

Key

First stage
1 Viking V engine (67 tonnes thrust at sea level)
2 Exhaust duct from turbopump turbine
3 Water pump
4 Pogo suppressor
5 Gas generator for turbopump turbine
6 Actuator (one), for engine gimballing
7 Nitrogen tetroxide feed valve
8 UH 25 (75% UDMH + 25% Hydrazine Hydrate) tank, (steel)
9 Tank pressurisation control system
10 Thrust frame (aluminium alloy, skins and stiffeners)
11 Cruciform structure with attachments for strap-ons
12 Fairing rear panel (heat-resistant twin skin)
13 Fairing middle panel (aluminium alloy)
14 Fairing front panel (aluminium alloy)
15 Strap on booster attachment forgings (four)
16 Launch table attachment mountings
17 Heatshield
18 Heatshield support structure
19 Fairing support panels
20 Fairing support struts
21 PIFE-electrical, pneumatic and water connection to liquid booster
22 Water pipe to 1st Stage Viking V engine (four)
23 Water pipe to PIFE for liquid booster (two)
24 Nitrogen tetroxide supply to engines
25 Propulsion-bay forward frame (steel)
26 Electrical external ducting
27 Feed-line ties
28 UH 25-tank pressurisation line
29 8200 litre water tank in inter-tank skirt
30 Inter-tank skirt (aluminium alloy skin and stiffeners)
31 Front pick up points for liquid booster
32 Steel frames
33 Nitrogen tetroxide tank (steel)
34 Stiffened structure for booster pick up points
35 Electrical duct ties
36 Nitrogen-tetroxide pressurisation line
37 Forward skirt (aluminium alloy skin and stiffeners)
38 Separation rockets (eight, with protective caps)
39 UH 25 feed to engines
40 Axis change of 45° between 1st Stage and 2nd Stage
41 Inter-stage conical skirt (aluminium alloy skin and stiffeners). Skirt has three access hatches, two shown here open

Solid Boosters
42 Solid Booster of 11.5m length (steel casing)
43 Propellant grain (9,500Kg of flexadine powder)
44 Nozzle of solid booster (thrust-line offset 12')
45 Lower attachment point
46 Spring separation-mechanism
47 Upper attachment point
48 Electrical connectors
49 Destruction charge and arming mechanism

Liquid Boosters
50 Liquid Boosters of 18m length
51 Viking VI engine (59.8 tonnes thrust at sea level)
52 Turbopump exhaust
53 Turbopump, Nitrogen-tetroxide
54 Turbopump, UH 25
55 Tank pressurisation control system
56 Pressuration line from Turbopump exhaust
57 Nitrogen tetroxide-tank pressurisation line
58 UH 25 , tank pressurisation line
59 Ground pressuration points
60 Ground fueling points
61 UH 25 feed to engine
62 *Nitrogen tetroxide feed to engine*
63 Water umbilical pipe to PIFE on 1st stage
64 Gaiter
65 Tripod thrust frame
66 Rear skirt (aluminium alloy skin and stiffeners)
67 Steel frames
68 Separation rockets (six)
69 UH 25 tank (stainless steel)
70 Feed-line ties
71 Inter tank skirt (aluminium alloy skin and stiffeners)
72 Nitrogen tetroxide tank (stainless steel)
73 Pressurisation-line ties
74 Rear mounting point
75 Forward 2-point mounting system
76 Forward skirt (aluminium alloy skin and stiffeners)
77 Conical head (aluminium alloy)

Second Stage
78 Viking IV engine (77 tonnes thrust in vacuum)
79 Actuator (two, for engine gimballing)
80 Turbopump exhaust
81 Turbopump, Nitrogen-tetroxide
82 Turbopump, UH 25
83 Pogo suppressor
84 Engine attachment to thrust frame
85 Water tank taurus
86 Nitrogen tetroxide feed line
87 UH 25 feet line
88 Aft skirt (aluminium alloy skin and stiffeners)
89 Electrical ducts
90 Roll-control thrusters (three, in one fairing)
91 Separation motors (four posigrade , two retrograde)
92 Fuel tank drain
93 Conical thrust frame (aluminium alloy skin and stiffeners)
94 Destruction charge and arming devices
95 Steel frames
96 UH 25 tank (aluminium)
97 Helium pressurisation line
98 Baffle
99 Reflector for content-control
100 Nitrogen tetroxide tank
101 Helium tanks (three)
102 Helium valves and pressurisation system
103 Nitrogen tetroxide pressure inlet
104 UH 25 pressure inlet
105 Electrical duct and pressurisation line ties
106 Forward skirt (aluminium alloy skin and stiffeners)
107 Diaphragm
108 Inter-stage skirt (aluminium alloy skin and stiffeners)

Third Stage
109 HM7B engine (6 tonnes thrust in vacuum)
110 Turbopump exhaust
111 Actuator (two, for gimballing)
112 Liquid oxygen feed line
113 Helium pressurisation-tank
114 Helium lines
115 Liquid hydrogen pressurisation line
116 External duct (fuel and pressurisation lines)
117 Conical thrust frame (aluminium alloy skin and stiffeners)
118 *Liquid oxygen pressurisation line*
119 Separation rockets (four)
120 Liquid hydrogen feedline
121 Telemetry recorder and transmitter
122 Destruct arming unit
123 Attitude and roll control thrusters
124 Hydrogen vent
125 Hydrogen feedline
126 Steel frame — attaches to VEB
127 Electrical ducts
128 Baffle
129 Liquid oxygen tank (aluminium)
130 Liquid hydrogen tank (aluminium)
131 External insulation (PVC-covered cork)
132 Rear skirt (aluminium alloy skin and *stringers*)
133 De-spin device

Vehicle equipment bay (VEB)
134 Annular platform
135 Equipment
136 Removeable outer panels
137 Diaphragm
138 Inner cone
139 Outer cone
140 Guidance and beacon antennae

Payload
141 Short SPELDA (Type 10) (Aluminium alloy honeycomb with carbon fibre facing)
142 Truncated cone top of SPELDA
143 Pyrotechnic joint
144 Separation springs
145 Adaptor 937
146 Eurostar satellite
147 Long Fairing (Type 02), consisting of two halves of aluminium alloy honeycomb with carbon fibre facing, linked by rivets which are cut by a pyrotechnic cord at separation
148 Adaptor 1194
149 Olympus satellite