

BIOKOSMOS 9 ESA/IBMP INVESTIGATOR MEETING
ESTEC
22-25 May 1989
Room 16471
TENTATIVE AGENDA

Monday, 22 May

14:00	Welcoming Remarks		ESA
	Introduction and Review of Agenda		
14:15	The BIODOSMOS Programme	ESA	IBMP
	Participation		ESA
15:00	Coffee/Tea		
15:10	Biokosmos 9 Experiment Overview		ESA
	Introduction Splinter Meetings		
15:30	Splinter Meetings	CARAUCOS	DFVLR/IBMP
		SEEDS	Frankfurt/IBMP
		PROTODYN	Aarhus/ETH/Trondheim/IBMP
16:30	Splinter Meetings	FLIES	Madrid/Alicante/IBMP
	DOSICOS		DFVLR/IBMP
17:30	Adjourn		

Tuesday, 23 May

9:00	Agenda Introduction		ESA
9:10	Experiment CARAUCOS		DFVLR/IBMP
10:20	Coffee/Tea		
10:30	Experiment FLIES		Madrid/Alicante/IBMP
11:40	Experiment PROTODYN		Aarhus/ETH/Trondheim/IBMP
12:30	LUNCH		
14:00	Late Access Discussion		IBMP/ESX
14:30	Experiment DOSICOS		DFVLR/IBMP
15:20	Coffee/Tea		
15:30	Experiment SEEDS		Frankfurt/IBMP
16:20	ESA Exposure Facility ERA		ESA
16:50	Adjourn		

Wednesday, 24 May

9:00	Introduction Ground Support Equipment (GSE)	ESA
9:15	Demonstration GSE	ESA
9:50	GSE Supplement and Shipment	ESA
10:15	Coffee/Tea	
10:30	Biokosmos 9 Ground Operations Specimen Importation Organisation Ground Control Experiments Data Acquisition during Flight Entrance to IBMP	IBMP/ESA
	Lodging, Transportation, Visa Communications from and to USSR (Hotel or IBMP) Telephone, Telex, Datafax, Letters	
12:00	Biokosmos 9 Launch Date and Schedule Pending Investigator-related Actions	IBMP/ESA
12:30	LUNCH	
14:00	Ground Investigations Mutual Exchange Investigators	ESA/IBMP
14:30	Biokosmos 10 Mission ESA Participation	IBMP ESA
15:00	Experiments on MIR (constraints, operations) ESA Participation	IBMP ESA
15:30	Coffee/Tea	
15:45	Related ESA Studies BIOBOX MIR Incubator Temperature Recorders	ESA
16:15	General Discussion	ESA/IBMP
16:30	Adjourn	
17:30	Reception and Dinner offered by ESA	

Thursday, 25 May

9:15	Introduction Tours	ESA
9:20	Tour BIORACK Tour COLUMBUS Mockup	ESA
10:20	Coffee/Tea	
10:30	Collection GSE Supplement Lists Final Agreements on Experiment Implementation IBMP Format of Experiment Description Schedule Milestones Any Other Matter	ESA/IBMP
12:00	Adjourn	

THE BIOSATELLITE PROGRAMME: ESA PARTICIPATION
ПРОГРАММА "БИОСПУТНИК"
УЧАСТИЕ СТОРОНОЙ ЕКА

Biosatellite-8 (1987): 2 experiment packages,
some Ground Support Equipment.

Milestones: Successful flight in October 1987.

Preliminary results presented at ESTEC in
April 1988.

Final results presented during the Biosatellite-8
Symposium in Moscow, December 1988.

BiosateHite-9 (1989): 5 experiment packages,
Ground Support Equipment.

Milestones: ESA experiment selection completed April 1988.

IBMP experiment selection completed August 1988.

Preparatory meetings at IBMP:

- Nov. 1988.

Start of Biosatellite-9 project activities at ESTEC.

- Dec. 1988.

- March 1989.

- Meeting with ESA and IBMP investigators at
ESTEC, 22-25 May 1989.

Planned:

- Installation of Ground Support Equipment at
IBMP by the end of June 1989.

- Biosatellite-9 mission support,
August 1989.

Biosatellite-10: - Joint ESA-IBMP facility (Biobox)?

- Additional single experiments?

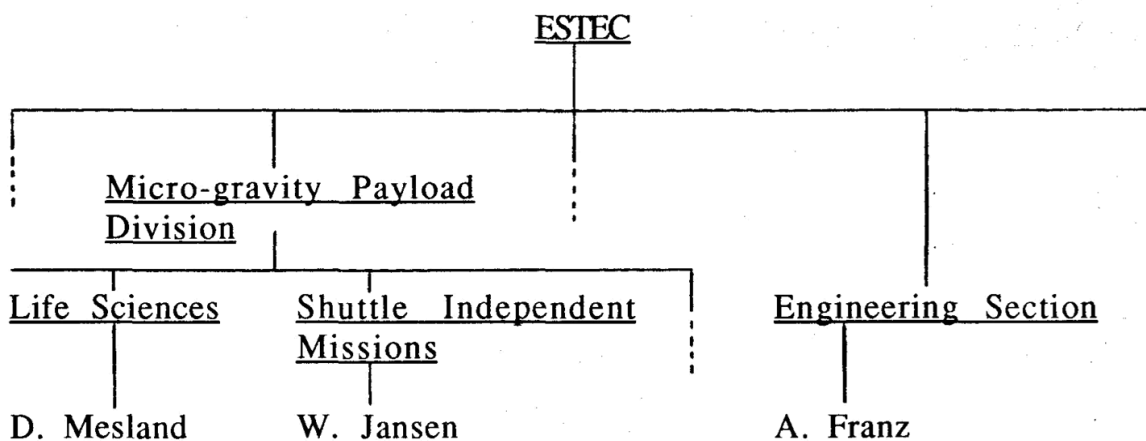
- Ground Support Equipment?

THE BIOSATELLITE PROGRAMME: ESA PARTICIPATION
ПРОГРАММА "БИОСПУТНИК"
УЧАСТИЕ СТОРОНОЙ ЕКА

Organisation on ESA Head Office level:

Letter Agreement between the Director General of ESA and the Chairman of the Interkosmos Council on a mission-by-mission basis.

Organisation on ESTEC level (project organisation):



BIOKOSMOS 9
ESA/Inst.BioMed.Problems
Joint Life Sciences Experiments
DEFINITION

BIOKOSMOS 9 ESA/IBMP EXPERIMENT SUMMARY

Experiment name	Organism studied	Investigations	Investigators
PROTODYN	Brassica napus Daucus carota (protoplasts)	Cell culture technology Cell proliferation Cell wall synthesis Cell aggregation Cell ultrastructure Cell wall composition Plant regeneration	Rasmussen Gmuender Iversen Tairbekov Kordyum Losovaja
FLIES	Drosophila melanogaster (embryos and adults)	Insect embryogenesis Embryo morphology Insect longevity Population density effects	Marco Miquel Ushakov
CARAUCOS	Carausius morosus (eggs)	Insect embryogenesis Embryo morphology Embryo behaviour Embryo histology Effects cosmic radiation	Buecker Reitz Ruether Heinrich Beaujean Alpatov Ushakov Zachvatkin
DOSICOS	Lactuca sativa (seeds)	Cosmic and solar radiation dosimetry Influence UV component on rad/ug effects	Reita Buecker Facijs Heinrich Beaujean Schopper Vichrov Kovalev Dudkin Marenny Nevsgodina
SEEDS	Arabidopsis thaliana (seeds)	Dosimetric technology Mutagenic effects Seed ultrastructure Tumorogenesis	Kranz Bork Schopper Schott Ganssaue Baikan Dudkin Potapov Nevsgodina Schevchenko

BIOKOSMOS 9 EXPERIMENT CONFIGURATION SHEET

EXPERIMENT NAME: PROTODYN

INVESTIGATORS

ESA: O.Rasmussen, F.Gmuender, T.H.Iversen

IBMP: M.G.Tairbekov, E.L.Kordyum, V.V.Losovaja

Exp.Unit i/d	H/W Type	Trans- port	Contents	
			Biological	Chemical
PROTODYN1	IML1.PROTO Type I,w/o container	degC 4	Protoplasts, B.napus, 4 bags * D.carota, 4 bags * 0.6 ml/bag 50000 cells/ml	Liquid medium
PROTODYN2	idem	4	Protoplasts B.napus, 2 bags * 2 bags D.carota, 2 bags * 2 bags	
PROTODYN3	idem	4	Protoplasts B.napus, 4 bags D.carota, 4 bags	
PROTODYN4	IML1.DCCS Type I,w/o container	4	Protoplasts B.napus, 2 culture 0.2 ml/culture 50000 cells/ml	idem
PROTODYN 5	idem	4	idem	
PROTODYN 6	idem	4	Protoplasts D.carota, 2 culture	

* For analysis by IBMP investigators

All hardware will be loaded into the Late Access Box (LAB). Loading of the LAB into the satellite will be at ten (10) hours before launch.

BIOKOSMOS 9 EXPERIMENT CONFIGURATION SHEET

EXPERIMENT NAME: FLIES

INVESTIGATORS

ESA: R.Marco, J.Miquel

IBMP: I.A.Ushakov

Exp.Unit i/d	H/W Type	Trans- port	Contents	
			Biological	Chemical
FLIES 1	D1, FLY ** Type I w/o contr	deg C 10	15 embryos, Oregon R	Solid agar medium
FLIES 2	idem	10	idem	idem
FLIES 3	idem	10	20 embryos, Minute (y;M3)	idem
FLIES 4	idem	10	idem	idem
FLIES 5	idem	22	40 adult males, * Oregon R, 1 day old #	idem
FLIES 6	idem	22	idem	idem
FLIES 7	idem	22	80 adult males, * Oregon R, 1 day old #	idem
FLIES 8 @	idem	22	idem	idem
FLIES 9	idem	22	40 adult males, * Oregon R, 15 days old #	idem
IFLIES10	idem	22	80 idem *	idem
FLIES11	idem	deg C 22	40 adult females, * Oregon R, 1 day old #	idem
FLIES12	idem	22	idem	idem
FLIES13	idem	22	80 adult females, * Oregon R, 1 day old #	idem
FLIES14 @	idem	22	idem	idem
FLIES15	idem	22	40 adult females, * Oregon R, 15 days old	idem
FLIES16	idem	22	80 idem *	idem

* For analysis by IBMP investigators

At time of hand-over to Soviet personnel at Moscow
(Launch minus 4 days)

@ Optionally FLIES 8 can be a duplicate of FLIES 9 and FLIES14
a duplicate of FLIES15.

**Alternatively, IBMP containers may be used

BIOKOSMOS 9 EXPERIMENT CONFIGURATION SHEET

EXPERIMENT NAME: CARAUCOS

INVESTIGATORS

ESA: H.Buecker, G.Reitz, W.Ruether, W.Heinrich,
R.Beaujean.

IBMP: A.Alpatov, I.Ushakov, Y.Zachvatkin

Exp.Unit i/d	H/W Type	Trans- port	Contents	
			Biological	Chemical
CARAUCOS1	Type II BioKms 8 w/o cntnr 60x60x90mm	degC 22	Eggs, 12 days old ## 153 eggs/sheet 4 sheets * 4 sheets * Eggs, 26 days old # 153 eggs/sheet 4 sheets * 2 sheets *	CR39 dosimtr CN dosimtr CR39 dosimtr CN dosimtr
CARAUCOS2	idem	22	Eggs, 26 days old # 153 eggs/sheet 2 sheets * 4 sheets 4 sheets Eggs, 12 days old ## 153 eggs/sheet 4 sheets	CN dosimtr CN dosimtr CR39 dosimtr CR39 dosimtr
CARAUCOS 3	idem	22	Eggs, 12 days old ## 153 eggs/sheet 4 sheets Eggs, 3 days old # 153 eggs/sheet 4 sheets 4 sheets	CN dosimtr CR39 dosimtr CN dosimtr
Additional Pre-Launch		Controls	Eggs, 12 days old ## 2 sheets * 8 sheets * ## Eggs, 26 days old # 2 sheets * 8 sheets * ## 153 eggs/sheet	No dosimtrs

* For analysis by IBMP investigators

At time of hand-over to Soviet personnel at Moscow
(Launch minus 4 days)

##To be confirmed

BIOKOSMOS 9 EXPERIMENT CONFIGURATION SHEET

EXPERIMENT NAME: DOSICOS

INVESTIGATORS

ESA: G.Reitz, H.Buecker, R.Facius, W.Heinrich,
R.Beaujean, E.Schopper

IBMP: A.Vichrov, E.Kovalev, V.Dudkin, A.Marennny,
L.Nevsgodina

Exp.Unit i/d	H/W Type	Transport	Contents	
			Biological	Chemical
DOSICOS 1	Type I w/o contr	degC 22	None	As in BioKms 8
DOSICOS 2	idem	22	None	idem
DOSICOS 3	idem #	22	None	idem
DOSICOS 4	idem #	22	Seeds, L.sativa 4 sheets *	LiF, CN, CR39
DOSICOS 5	As BioKms8 Min.Shield Exp. *	22	Seeds, L.sativa 1 sheet *	CR39
DOSICOS 6	idem #	22	Seeds, L.sativa 1 sheet *	CR39

* For analysis by IBMP investigators

To be mounted on exposure facilities.

BIOKOSMOS 9 EXPERIMENT CONFIGURATION SHEET

EXPERIMENT NAME: SEEDS

INVESTIGATORS

ESA: A.R.Kranz, U.Bork, E.Schopper, J.U.Schott,
E.Ganssaue, B.Baikan

IBMP: V.E.Dudkin, Y.V.Potapov, L.Nevsgodina,
V.V.Shevchenko

Exp.Unit i/d	H/W Type	Trans- port	Contents	
			Biological	Chemical
SEEDS 1	BR Type II	deg C 22	2250 seeds Enkhaim diploid 250 per subset 3 subsets/sheet 2250 seeds Enkhaim tetraploid 250 per subset 3 subsets/sheet Total of 6 subsets/ sheet Total of 3 sheets (2+1*)	6 AgCl detec- tors/sheet LiF detectors
SEEDS 2 #	BR Type I	22	1250 seeds Enkhaim diploid 250 per sheet 1250 seeds Enkhaim tetraploid 250 per sheet Total of 500 seeds/ sheet Total of 5 sheets (4+1*)	Emulsion on glass ## Total 5 layers **
SEEDS 3	idem	22	idem Total of 5 sheets (2+3*)	idem Total 5 layers **

All containers are filled with Argon (1 atm)

* For analysis by IBMP investigators

** Analysis by IBMP investigators, preferably in Germany.

To be mounted on exposure facility. ## To be confirmed.

SPLINTER MEETINGS

OBJECTIVES

- REACH AGREEMENT ON EXPERIMENT DESCRIPTIONS
- REACH AGREEMENT ON EXPERIMENT CONFIGURATION
- DISCUSS EACH OTHERS PARTY CONTRIBUTION TO THE POST FLIGHT ANALYSIS
- RESOLVE OPEN ISSUES, IF PRESENT
 - E.G. PROTODYN - FIXATION OF PRE_LAUNCH SAMPLE
 - FLIES - WHICH SET TO BE FLOWN BY MIQUEL
 - CARAUCOS - ADDITIONAL CONTROLS, AGE OF STAGE II EGGS
 - SEEDS - TYPE AND APPLICATION OF EMULSIONS
- ORGANIZE PRESENTATION OF EXPERIMENT FOR TOMORROW

ORGANISATION

- TREE SEPERATE TABLES
- MR. JANSEN AND MS. KRUIJSEN TO HELP OVERCOME PROBLEMS WITH TRANSLATION

LATE ACCESS DISCUSSION

POINTS

- ACCOMODATION OF A RANGE OF IMPORTANT BIOLOGICAL EXPERIMENTS IS IMPOSSIBLE IF PREPARATION HAS TO TAKE PLACE IN MOSCOW (AT LEAST 2 DAYS BEFORE LAUNCH)
- THIS IS THE ONLY REASON WHY EXPERIMENT EGGS COULD NOT BE FLOWN ON THIS MISSION
- THEREFORE, FOR FUTURE MISSIONS, IT IS IMPORTSNT THAT FOREIGN PI'S CAN PREPARE THEIR EXPERIMENTS AT THE LAUNCH SITE/ THIS ALSO REDUCES THE ADDITIONAL ENVIRONMENTAL RISE CAUSED BY EXPERIMENT TRANSPORT.
- MOREOVER, THE VOLUME OF EXPERIMENTS THAT CAN BE LATE ACCESSED (L_10 HOURS) INTO THE SATELLITE NEEDS TO BE INCREASED

Ground Support Equipment
Наземное Оборудование

1. Laminar Flow Bench, class 100, width 150 cm, incl.
stainless steel working surface,
support stand,
UV lighting.
2. Refrigerator, volume 330 liters, incl. 2 shelves.
3. Froster, volume 500 liters, temperature -30 degr. C.
4. Temperature Test Chambers (two off), incl. laboratory tables,
temperature range: -40 to +180 degr. C.,
work space dimensions (width x depth x height): 56x50x50 cm.
5. Table top centrifuges, in particular:
one centrifuge (small) for 24 Eppendorf cups of 1.5 or 2.2 ml,
one centrifuge (larger) with sample temperature setting between 0 and 40 degr. C,
incl. a range of accessories.
6. Portable autoclave, volume 25 litres.
7. Automatic vortex mixers (two off).
8. Magnetic stirrer.
9. Water demineralisation equipment, incl. accessories.
10. pH/Temperature meter.
pH range 0-14, temperature range 0-100 degr. C.

Ground Support Equipment
Наземное оборудование

11. Digital thermometer.
12. Water distillation equipment, capacity 3 litres.
13. Electronic scale, capacity 2220 grams.
14. Picoprocessor. Model 2080 TL.
15. Personal computers (two off), type LEO 286-12 PC/AT, incl.
colour monitors,
keyboards,
accessories.
16. Microscopes, in particular:

one Inverted Microscope, type Nikon Diaphot,
two stereoscopic binocular microscopes Nikon SMZ-2B
one stereoscopic trinocular microscope Nikon SMZ-2T,
incl. a range of accessories.
17. Photocamera, type Nikon 801,

compatible with Microscopes, item 16.
18. Image analysis systems, VIDS-IV, 2 off,

compatible with Microscopes (item 16) and
Personal Computers (item 15).

Ground Support Equipment
Наземное оборудование

19. Temperature controlled transport boxes (eight off),

set point temperatures: 4, 10 and 22 degr. C,
batteries (four off), 12 V, 65 Ah,
battery chargers (two off).
20. Transport trolleys, 4 off,

i.e. one trolley each per transport box and battery
(item 19), for transport of the flight samples from Moscow
to the launch site.
21. Stick-on loggers, in particular:

10 temperature recorders,
2 pressure recorders, software.

Supplement to the ESA provided Ground Support Equipment
Дополнение представляемого стороной ЕКА
Наземного оборудования

Any items in addition to the 21 items listed under "Ground Support Equipment" and needed by the Investigators can either be carried to Moscow by them or submitted to ESTEC for inclusion in the second shipment.

If submitted to ESTEC, such items must be in ESTEC before departure of the second transport (items 19, 20, 21), i.e. by the end of June. A detailed and complete description would be needed as soon as possible.

Form sheets will be distributed during the meeting in order to facilitate the preparation of the additional items list mentioned above.

Ground Support Equipment: Transport to USSR
Транспортировка Наземного Оборудования в СССР

Reference: "Ground Support Equipment", sheets 1-3.

Items 1-18:

22-25 May 1989: Available for demonstration at ESTEC.

26-31 May 1989: Preparation of transport.

As from 5 June 1989: Transport can take place; exact date unknown.

Transport by road.

Departure: ESTEC, Noordwijk, Holland.

Destination: IBMP, Moscow, USSR.

Planned arrival Moscow: between 26 June and 7 July 1989.

Items 19, 20, 21:

Transport boxes (item 19), incl. inserts, still undergoing temperature tests.

Transport trolleys (item 20) in manufacturing; prototype available for demonstration 22-25 May 1989.

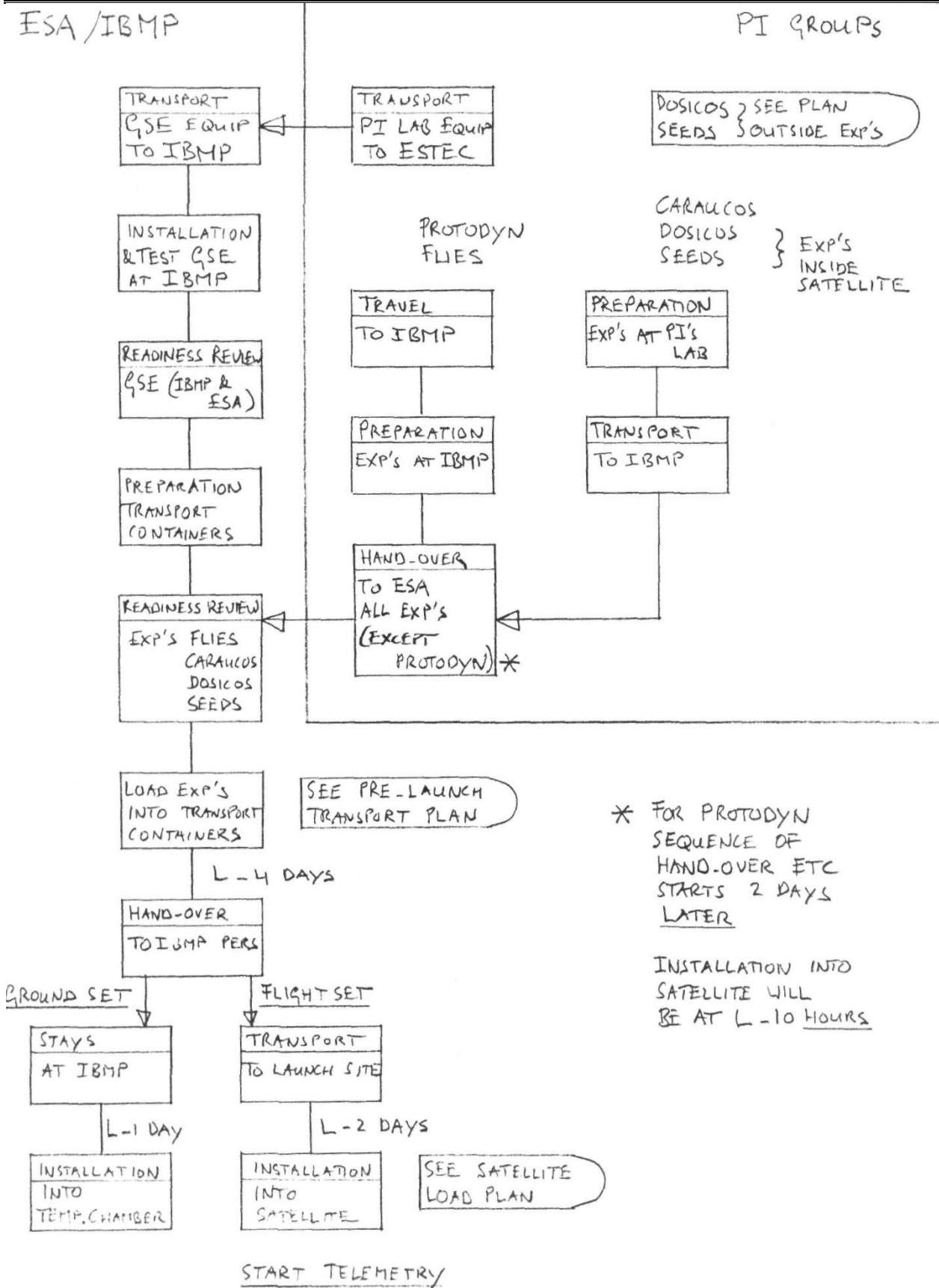
Stick-on loggers (item 21) have been ordered for mid-June. Demonstration of a temperature recorder ordered for a different project foreseen in the period 22-25 May.

Note: two temperature recorders and two pressure recorders can be made available for **flight**.

Road transport from ESTEC to IBMP of items 19, 20 and 21 is scheduled for early July. Exact dates: to be decided.

ESA/IBMP
BIOKOSMOS A
EXPERIMENT
GROUND OPERATIONS

GROUND OPERATIONS PRE-LAUNCH

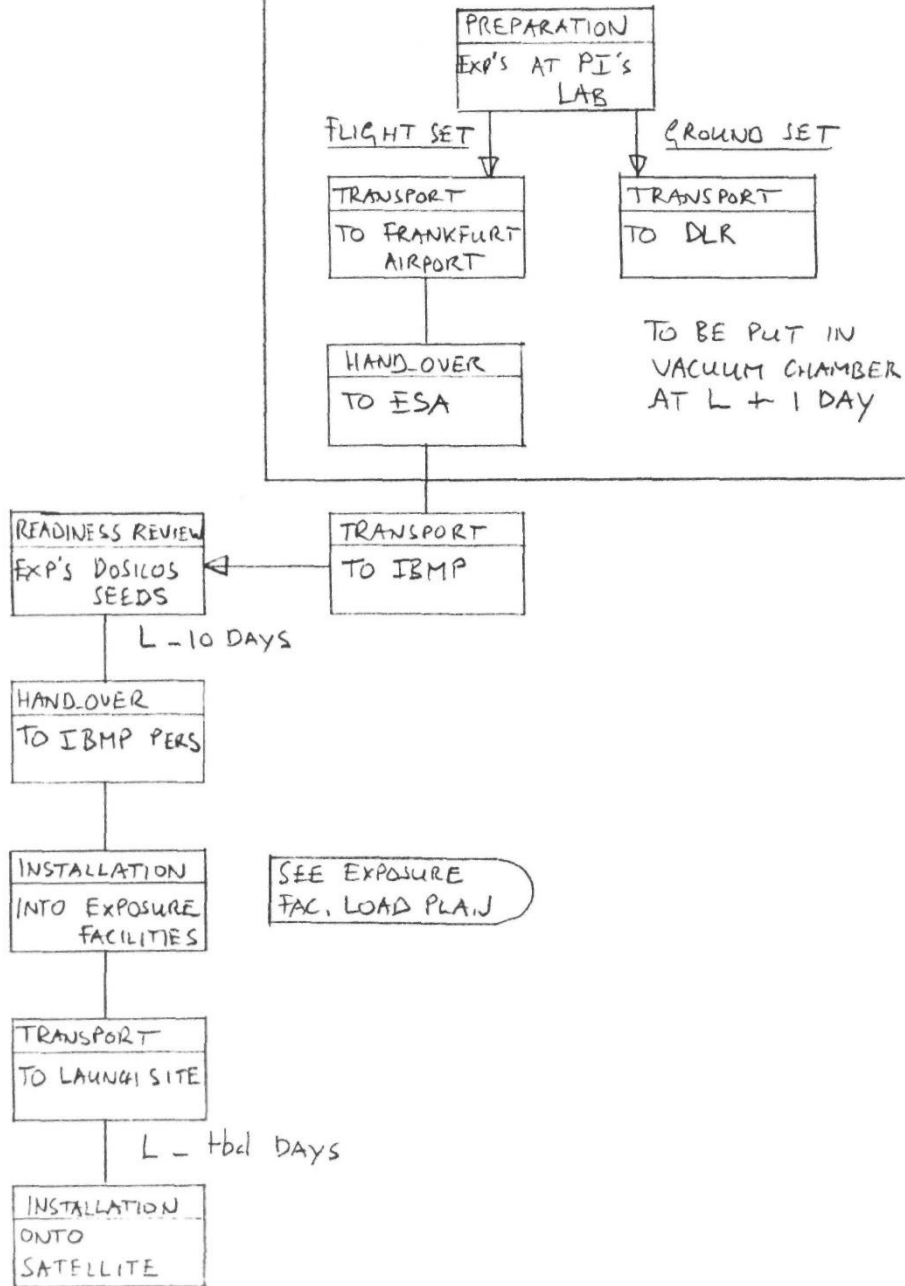


GROUND OPERATIONS PRE-LAUNCH: OUTSIDE EXPERIMENTS

ESA/IBMP

PI GROUPS

DOSICOS SEEDS



TRANSPORT PLAN PRE-LAUNCH

TRANSPORT CONTAINER	CONTENTS	
TRANS 1F +4°C	Late Access Box (LAB 1F)	
	PROTODYN 1 PROTODYN 2 PROTODYN 3 <u>plus</u> TEMP. RECORDER	PROTODYN 4 PROTODYN 5 PROTODYN 6 (TEMP. 1F)
TRANS 2F +10°C	FLIES 1 FLIES 2 <u>plus</u> TEMP. RECORDER	FLIES3 * FLIES 4 (TEMP. 2F)
TRANS 2F +22°C	Late Access Box (LAB 2F)	
	FLIES 5 FLIES 6 FLIES 7 FLIES 8 FLIES 9 FLIES 10 <u>plus</u> TEMP. RECORDER	FLIES 11 FLIES 12 FLIES 13 FLIES 14 FLIES 15 FLIES 16 DOSICOS 1 (TEMP. 3F)
TRANS 2F +22°C	DOSICOS 2 CARAUCOS 1 CARAUCOS 2 <u>plus</u> TEMP. RECORDER	CARAUCOS 3 SEEDS1 SEEDS3 (TEMP. 4F)

* TO BE LOADED INTO LAB 2F
FOR INSTALLATION INTO SATELLITE

SIMILAR CONTENTS OF TRANSPORT CONTAINERS TRANS 1G-4G

FOR GROUND CONTROL PURPOSES

SATELLITE LOADING PLAN

PROTODYN 1	PROTODYN 2	PROTODYN 3
PROTODYN 4	PROTODYN 5	PROTODYN 6

LAB 1F (with insulating foah)

LATE ACCESS POSITION
ON SATELLITE HATCH

Flies 1	Flies 2	Flies 3	Flies 4	Dosicos 1
Flies 5	Flies 6	Flies 7	Flies 8	
Flies 9	Flies 10	Flies 11	Flies 12	
Flies 13	Flies 14	Flies 15	Flies 16	

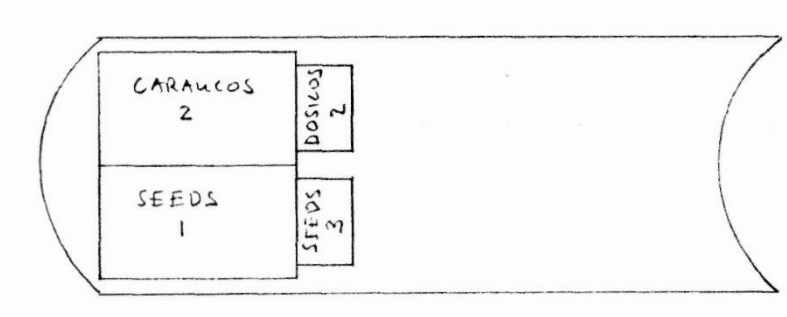
LAB 2F

HORIZONTAL POSITION
IN SATELLITE

CARAUCOS 1	CARAUCOS 2
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LAB 3F (tbc)

VERTICAL POSITION
IN SATELLITE



Cylinder (tbc)

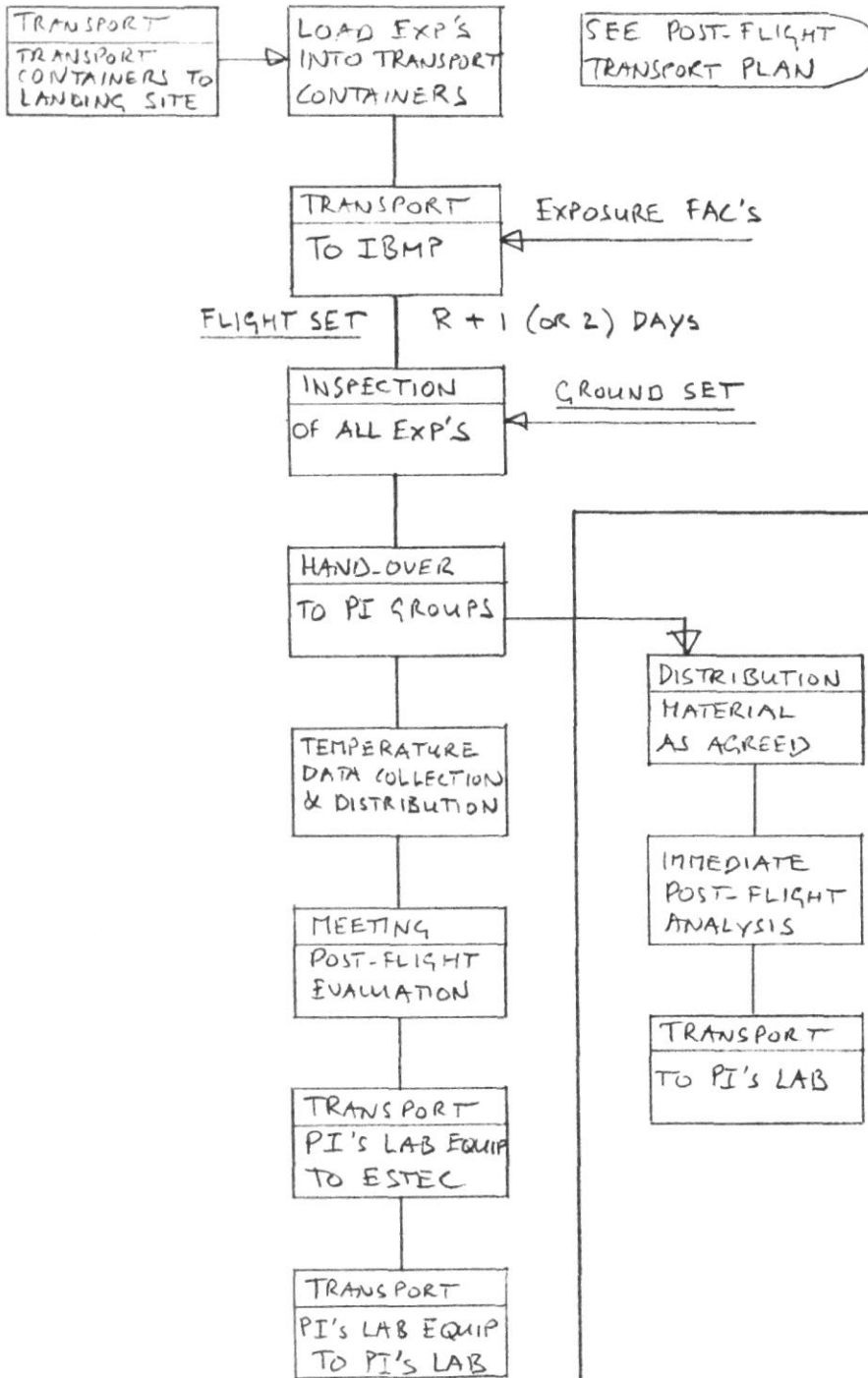
tbd POSITION
IN SATELLITE

GROUND OPERATIONS, GROUND CONTROL

- "SYNCHRONOUS" GROUND CONTROL WILL BE PERFORMED WITH A DELAY OF 24 HOURS RELATIVE TO THE FLIGHT EXPERIMENTS.
- PRE - AND POST - FLIGHT TRANSPORT PHASES WILL BE SIMULATED, USING IDENTICAL TRANSPORT HARDWARE.
- GROUND SET OF EXPERIMENTS WILL BE LOADED IN ALUMINIUM CONTAINERS IDENTICAL TO THOSE USED IN FLIGHT (LAB'S AND CYLINDER (tbc))
- FLIGHT TEMPERATURE CONDITIONS WILL BE COMMUNICATED TO THE GROUND CONTROL ROOM AT IBMP, AND SIMULATED IN THE GROUND CONTROL TEMPERATURE CHAMBER.
- GROUND CONTROL OF OUTSIDE EXPERIMENTS (PART OF DOVICOS AND SEEDS) WILL BE PERFORMED IN A VACUUM CHAMBER AT DLR, KÖLN, ALSO WITH 24 HOURS DELAY

GROUND OPERATIONS POST FLIGHT

PRE-LANDING



ESA / IBMP

PI GROUPS

TRANSPORT PLAN POST FLIGHT

SIMILAR TO PRE-LAUNCH

EXCEPT

ALL TEMPERATURES SET TO +22°C (tbc)

Excerpt of Letter Agreement

4. BOTH PARTIES WILL USE THEIR BEST EFFORTS TO FAVOUR THE OPTIMISATION OF THE SCIENTIFIC RETURN OF THE EXPERIMENTS AND TO ENCOURAGE INTERNATIONAL COOPERATION AMONG THE SCIENTISTS CONCERNED.

5. THE SCIENTIFIC AND TECHNICAL DATA OF SAID EXPERIMENTS SHALL BE EQUALLY ACCESSIBLE TO BOTH PARTIES FOR THEIR RESPECTIVE OWN USE. THE PARTIES WILL EXCHANGE PRELIMINARY WRITTEN REPORTS ON EACH EXPERIMENT 6 MONTHS AFTER THE END OF THE MISSION ; FINAL WRITTEN REPORTS OR DRAFT JOINT PAPERS FOR PUBLICATION ON EACH EXPERIMENT WILL BE AVAILABLE NOT LATER THAN TWO YEARS AFTER THE END OF THE MISSION. AFTER THE EXCHANGE OF THE PRELIMINARY REPORTS EACH PARTY MAY PRESENT OR PUBLISH PRELIMINARY SCIENTIFIC RESULTS. AFTER THE FINAL REPORTS HAVE BEEN EXCHANGED, EACH PARTY IS FREE TO PRESENT OR PUBLISH ALL THE SCIENTIFIC RESULTS.

THE BIOBOX FACILITY УСТАНОВКА "БИОБОКС"

CONCEPTUAL DESCRIPTION:

BIOBOX consists of three separate, connectable units:

1. INCUBATOR/CENTRIFUGE UNIT.
2. ELECTRONICS UNIT.
3. BATTERY UNIT.

The BIOBOX flight facility (units 1 and 2) can fly as an autonomous payload facility in recoverable satellites of the KOSMOS type.

EXPERIMENT ACCOMMODATION:

In the micro-gravity section:

- one rack for 12 BIORACK type I containers, or
- one position for 2 BIORACK type II/E containers, or
- one position for 2 CIS containers, or
- a combination of the above.

On the 1g centrifuge:

- 8 BIORACK type I containers, 4 of these having power and data interfaces.

ENVIRONMENTAL CONTROL:

The temperature in the Incubator/Centrifuge Unit can be set at any value between 4 degr. C and 37 degr. C.

For a particular mission the temperature profile will be programmable between these limits.

**THE BIOBOX FACILITY
УСТАНОВКА "БИОБОКС"**

ELECTRONICS UNIT:

External power interfaces:

flight: 28 V DC,

ground: 220 V AC (50 Hz), 110 V AC (60 Hz), 12 V DC.

BATTERY UNIT (no flight item):

Used when no external power is available, typically during transport.

Power delivered at 12 V DC.

TYPICAL MISSION PROFILES:

	Profile 1	Profile 2
Pre-launch, pre-operational	4 degr. C	4 or 10 degr. C
On-orbit	37 degr. C	22 degr. C
Post-operational, re-entry, post-landing	4 degr. C	4 degr. C

Mission duration: from 2 to 8 weeks.

USE OF BIOBOX EQUIPMENT:

In the lab.	Inc/Centr.	no.1	Electr.	no.1	No Batt.
Transport	Inc/Centr.	no.2	Electr.	no.2	Battery Unit
Flight	Inc/Centr.	no.2	Electr.	no.3*	No Batt.

*Can be pre-installed in the satellite.

**THE BIOBOX FACILITY
УСТАНОВКА "БИОБОКС"**

BIOBOX schedule:

- June-October 1989: Conceptual study with two industrial contractors in competition.
- December 1989: Start of detailed design and manufacturing phase with one selected company.
- Summer 1991: Flight hardware available.

Candidate flight opportunity:

USSR **Biosatellite-10** flight.

Needed: discussion with IBMP.

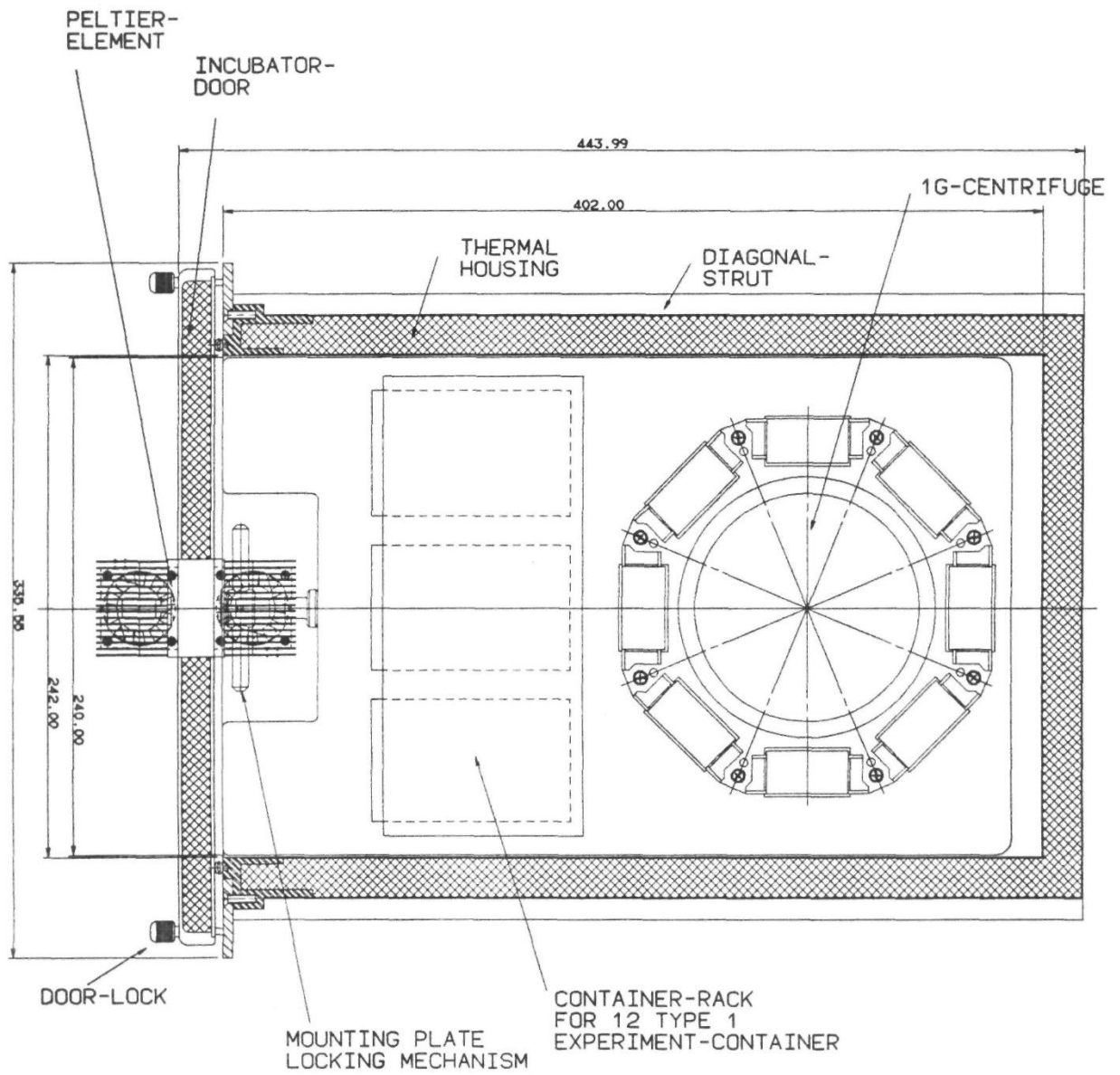


FIGURE 6.2-3: BIOBOX Facility top view
 1 centrifuge, 12 Type 1 Exp. Cont.
 configuration no. 1

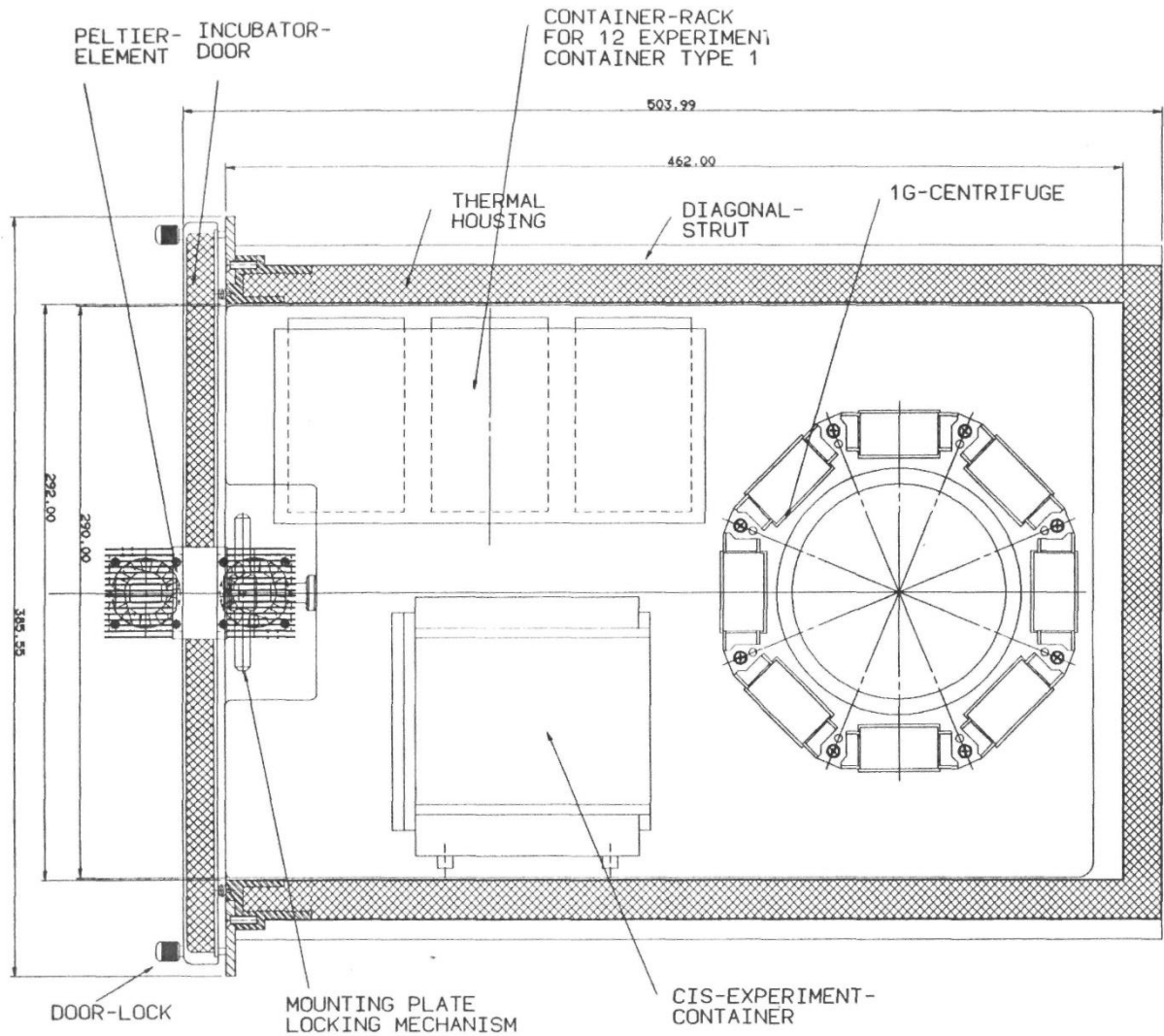


FIGURE 6.2-8: BIOBOX Facility Top View:
 1 centrifuge, 12 Type 1 Exp. Cont., 1 CIS Exp. Cont.;
 Configuration no. 6