SPIRE/MSSL/M/0048.10

STRUCTURE MEETING 18/8/98

AGENDA

i) REPORT ON ESA I/F MEETING
   SCHEDULE

ii) REVIEW OF STRUCTURAL DESIGN

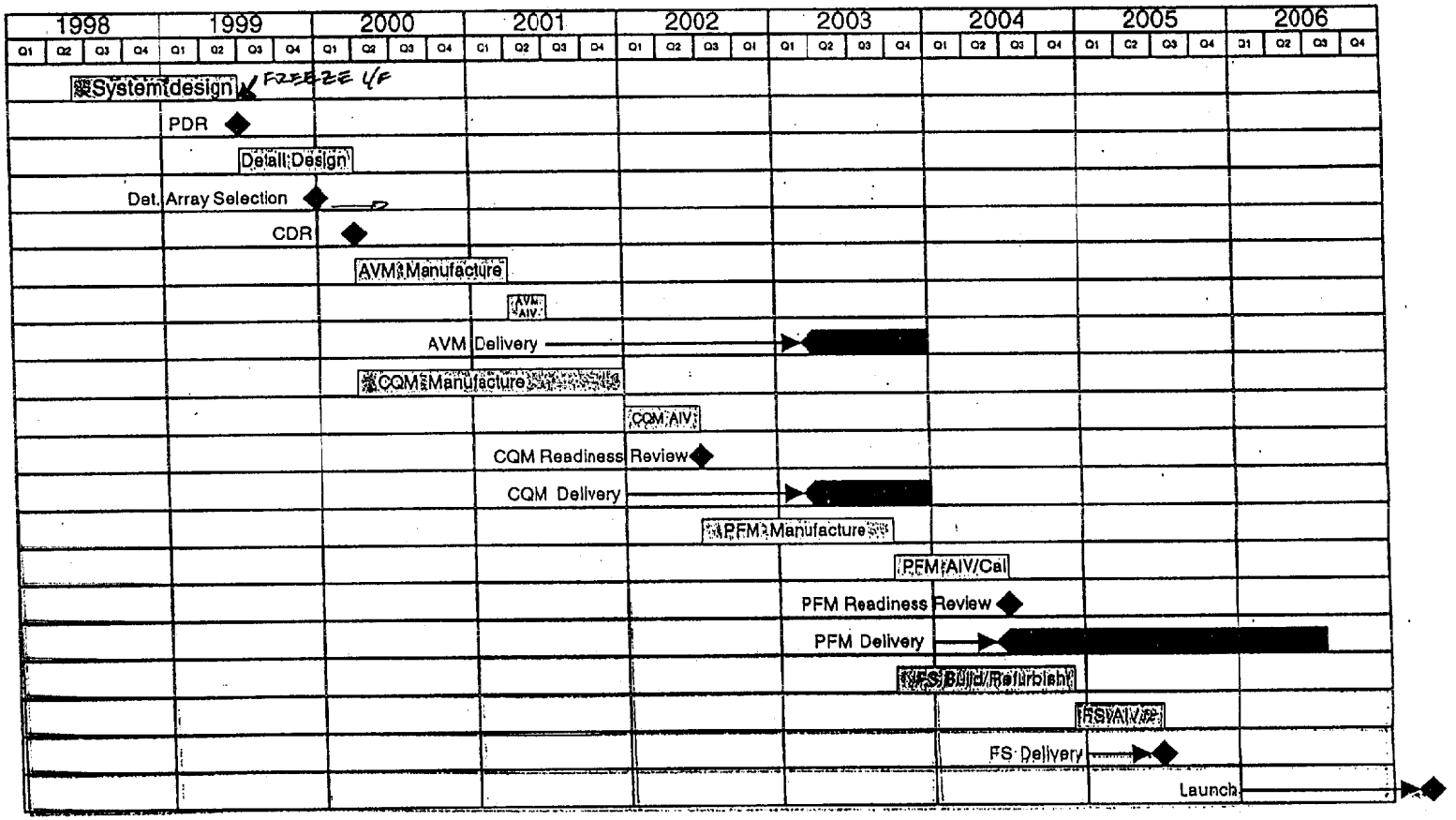
iii) BAKEOUT INSTRUMENT

iv) WORKPLAN

v) SCHEDULE OF NEED DATES/MILESTONES/MEETING

vi) DIVISION OF RESPONSIBILITIES. + COSTS.
   + FUNDING.

SPIRE Instrument Development Schedule



17th July 1998

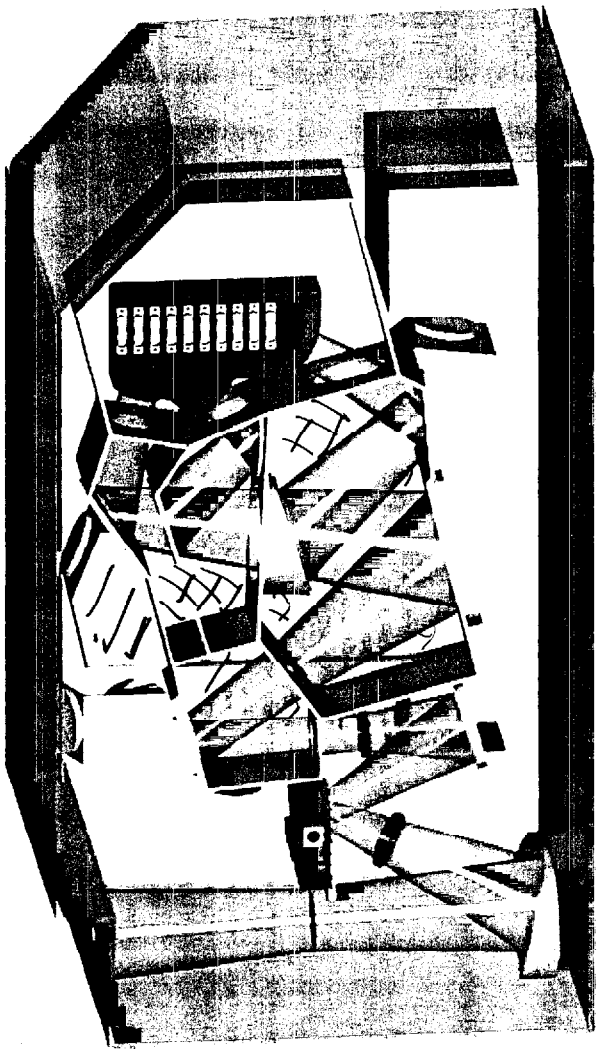
SPIRE STRUCTURE.

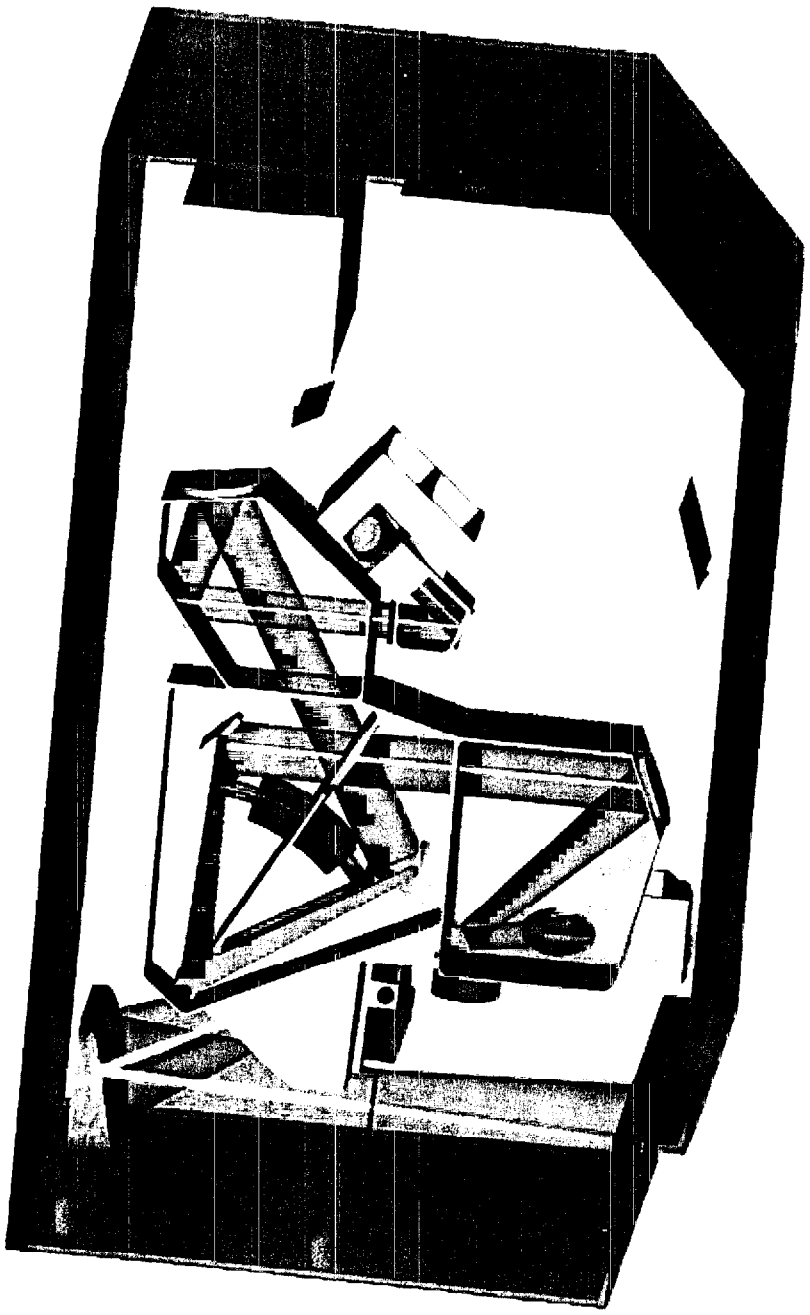
- **What we have.**
  - **Outline design of Photometer.**
  - **Exterior profile of instrument.**
  - **Preliminary mass estimate.**
  - **Preliminary thermal budget.**

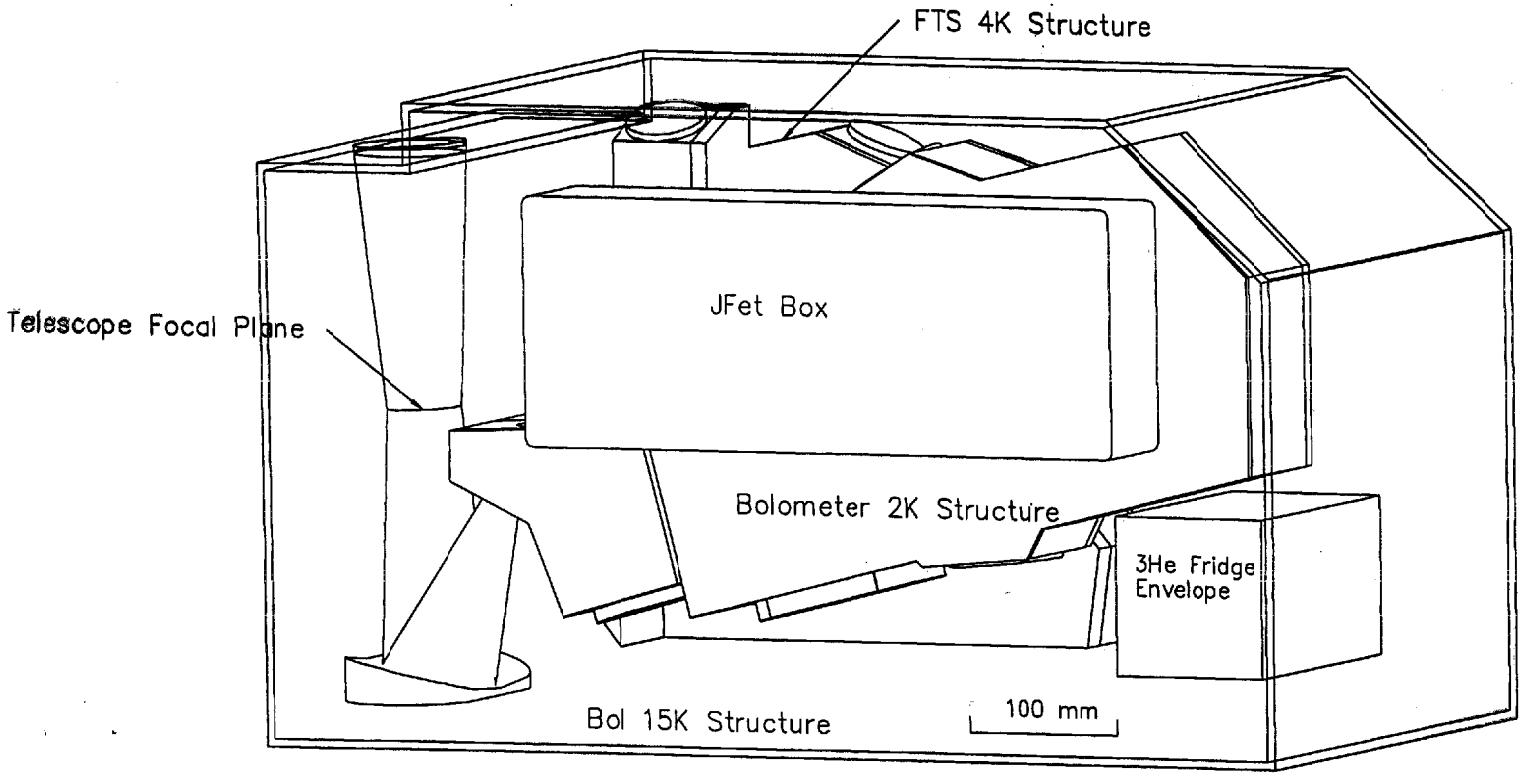
- **What we need.**
  - **Revised optical design of FTS.**
  - **Outline mechanical design of FTS.**
  - **Preliminary layout of internal structure.**
  - **Revised mass estimate.**
  - **Revised thermal budget.**
  - **Outline design of instrument structure.**
  - OUTLINE AIV/TEST PROCEDURE.

- **This will allow.**
  - **Definition of the spacecraft mechanical interface.**
  - **Definition of the spacecraft thermal interface.**

- MOUNTING SCHEME FOR OPTICS
- " " FOR DETECTOR ARRAYS
- ACCESSIBILITY.
- ERROR BUDGET.
- ^{3}He COOLER MOUNTING SCHEME.






FTS 4K Structure
Telescope Focal Plane
JFet Box
Bolometer 2K Structure
3He Fridge
Envelope
Bol 15K Structure
100 mm

BASELINE INSTRUMENT FOR STRUCTURAL DESIGN.

(1) WORST CASE [redacted] TO BE USED.

(2) FEED HORN ARRAYS WITH FET BOX.

(3) PHOTOMETER DESIGN AS A0
- ASSUME BAFFLING IS AS FOR OPEN ARRAYS.
- ASSUME ALL SURFACES HAVE A TREATMENT OR APPLIED SURFACE TO MAKE THEM BLACK.

(4) SPECTROMETER: ADOPT EXISTING DESIGN AS BASELINE

(5) HELIUM BATH →

	ORB	GND
'2K' STRUCTURE	= 1.8K	/ 1.8
'4K' STRUCTURE	= 4K	/ 3.3K
'15K' STRUCTURE	= 9K	/ 9.5K
OPTICAL BENCH	= 11.7K	/ 34K.
FIRST SHIELD	= 30K	/ 13[redacted]K.

(6) FET BOX HEAT SUNK TO [redacted] FIRST SHIELD

(7) MASS ESTIMATES - FRASER'S 20/1/98

(8) STARTING POINT OEM'S AUTOCAD DESIGN.
[+ OPTICAL DESIGNS.]

(9) THERMAL DISSIPATIONS.

(9) MIN RESONANT FREQ 150HZ. 50g VIBRATION.

(1) CEA CRYOHARNESS AS PER ICD.

(2) THERMAL MODEL → TAKE LATEST MATHCAD MODEL.

Second version

FIRST BOL instrument --- preliminary mass budget --- 20th Jan. 1990

Mass estimate (all figures in grammes)

mass @ 300mK	1455	surface area = 0.06 square metres
2K - 0.3 K	500	tensioned Kevlar cord ?
2K - 0.3 K	800	cables, heatsinks and connectors
mass @ 2 K	7670	surface area = 0.5 square metres
4K - 2K	700	carbon fibre - epoxy composite
4K - 2K	800	cables, heatsinks and connectors
mass @ 4 K	9456	surface area = 1.0 square metre
15K - 4K	1000	carbon fibre - epoxy composite
15K - 4K	800	cables, heatsinks and connectors
mass @ 15 K	9919	surface area = 1.45 square metres
TOTAL	33100	
Back up **TOTAL**	38645	

common components at 15K

enclosure	9324	single enclosure, aluminium equivalent to 2.5 mm thick all over
M3	95	aspect ratio of 10:1, includes fasteners

components at 4K

chopper	500	chopper mechanism and mirror M4
Spectrometer channel		
enclosure	3766	enclosure sharing a single wall with the 4K box for photometer
pick-off mirror	25	
relay mirror 1	40	aspect ratio of 10:1, includes fasteners
relay mirror 2 & 3	120	aspect ratio of 10:1, includes fasteners
Scan mechanism	2800	lightweighted mirrors plus scan mechanism
Input polariser	50	includes fasteners
Collimator	120	includes fasteners
Camera mirrors	200	
cooling system		
4K heat strap	300	from 4K box to outer shell of 15K enclosure
Photometer channel		
enclosure	1680	enclosure sharing a single wall with the 4K spectrometer box
blocking filter	30	filter and clamp ring
cold stop	25	
cooling system		
4K heat strap	300	from 4K box to outer shell of 15K enclosure

components at 2K

3 He Fridge	~~4000~~ 500g.	

Spectrometer channel

enclosure	840	enclosure independent of the 2K box for the photometer
field stop	30	including a 2K blocking filter
camera mirror 2	100	
fold mirror 3	70	
blocking filters	80	
2K heat strap	200	from 2K box to outer shell of 15K enclosure

Photometer channel

enclosure	1470	enclosure independent of the 2K box for the spectrometer
blocking filter x2	200	2K blocking filter + clamp ring
dichroic 1	50	including clamp ring
dichroic 2	50	including clamp ring
Flat	40	
Mirror M5	90	including fixings
Mirror M6	75	including fixings
Mirror M7	175	including fixings
2K heat strap	200	from 2K box to outer shell of 15K enclosure

components at 0.3 K

Spectrometer channel

enclosure	202	enclosure independent of the 300mK box for the photometer
arrays	100	
thermal strap	300	includes fixings

Photometer channel

enclosure	403	enclosure independent of the 300mK box for the spectrometer
array 1	50	
array 2	50	
array 3	50	
thermal strap	300	includes fixings

Mass Increase For Back Up Option

300 mK increase to	2000	due to increased mass of detectors.
15 K increase by	5000	due to inclusion of JFET box and additional connectors / wiring.

P R Hastings / G F Morrison
Royal Observatory, Edinburgh

WORK PLAN

GOALS "9TH OCTOBER '98".

- REDUCED MASS BUDGET – 7/10/98
- SOLID MODEL LAYOUT IN 'SDRC (IDEAS)'
- CONCEPT FOR SUPPORTING STRUCTURE.

ACTIONS

FRASER:– ALL RELEVANT INFORMATION TO MARK – DIMENSIONS.

BRUCE: – FTS OPTICAL MODEL TO FRASER

FRASER: – CHECK FTS LAYOUT WITH NEW MODEL

MARK: – TRANSLATE INTO SOLID MODEL.

– WRITE CONCEPT DESCRIPTIONS.

DATES:

FRASER – 2/MSSL 2ND WK SEPTEMBER.

REVIEW EARLY OCTOBER – EDINBURGH.

MEETING WITH CAS 8/10/98. → CONCEPT.

GOALS I 20/12/98.

THERMAL MECHANICAL MODEL DEMONSTRATING
Frequency; Thermal loads + vibration

ACTIONS MARK : STRUCTURAL MODEL ACCORDING TO PRESCRIPTION IN MATHCAD MODEL.

DATES REVIEW IN DECEMBER.

ASSUMPTIONS FOR RE-COSTING:

- INFO → KJK, MSC BY AUG. 28 LATEST
- SCHEDULE: AS PRESENTED BY BMS TODAY
- COST TO END FY 06/07 [≡ LAUNCH + N3M6]
- INCLUDE VAT
- START FROM BEGINNING FY 98/99
- COST SEPARATELY:
  - REFURBISHED QM = FS
  - NO FS ₺

Long, JA (Judy)

From: King, KJ (Ken)
Sent: 24 May 1999 15:28
To: Long, JA (Judy)
Subject: FW: Actions from meeting

-----Original Message-----
From: Bruce Swinyard [mailto:B.M.Swinyard@rl.ac.uk]
Sent: 19 August 1998 09:58
To: wto@mssl.ucl.ac.uk; mjc@mssl.ucl.ac.uk; wkpg@msslac.mssl.ucl.ac.uk; Colin Cunningham; F.Morrison@roe.ac.uk; g.wright@roe.ac.uk; M.J.Griffin@qmw.ac.uk; Ken King
Subject: Actions from meeting

Dear All,

As promised here are a list of actions from yesterday's meeting. Ken's not in till next week but when he is I will harrass him about rejuvenating the master action list and attach formal numbers to these at that stage.

1. Ask ESA to define the exactly what is required from SPIRE to freeze the spacecraft interfaces in mid-1999.
Resp: MJG
Date: To be raised at next i/f meeting (October 1998)

2. Revise mass estimates for feedhorn option
Resp: CRC
Date: 7/10/98

3. Summarise thermal dissipation for various operations modes
Resp: MJG/BMS
Date: 7/10/98

4. Check and distribute vibration levels used for ISO instruments
Resp: BMS
Date: 11/9/98

5. Transfer optical; thermal and mechanical data used for AO solid model to Mary Carter
Resp: GFM
Date: 11/9/98

6. Send new optical design for FTS to Fraser Morrison
Resp: BMS
Date: 20/8/98

7. Check new FTS layout against existing solid model and report any anomalies
Resp: GFM
Date: 11/9/98

8. Write up and circulate notes on AO solid model design.
Resp: GFM
Date: 11/9/98

In addition I will write a short note outlining the baseline assumptions for the instrument to be used for the structural design before 11/9/98. Could all e-mail exchanges include me, Matt and Ken in the CC: list.

Please let me know of any omissions or errors in the action list.

Cheers B.