

भारत सरकार

अन्तरिक्ष विभाग

कविरी भवन
बंगलोर 560 009

टिफ्टिक्ट आर्फीस मार्ग
भारत

तार : स्पेस

टेलेक्स : 0845 - 499 DOS IN

दूरभाष : 29822 और 31485



GOVERNMENT OF INDIA

DEPARTMENT OF SPACE

CAUVERY BHAVAN DISTRICT OFFICE ROAD

BANGALORE 560 009 INDIA

TELEGRAMS : SPACE TELEX : 0845 - 499 DOS IN

TELEPHONE : 29822 & 31485

सचिव

SECRETARY

No.7/2(4)/81-I

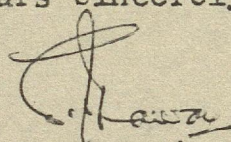
August 19, 1982

My dear Rajan,

I am glad to inform you that Government have approved your promotion to Grade G (Rs.2250-2750) with effect from 1st January 1983.

2. After assuming charge of the higher post on 1st January 1983, you may send the charge assumption report to DOS for issue of the necessary gazette notification.

Yours sincerely,


(S. Dhawan)

Shri Y.S.Rajan
Scientific Secretary ISRO
ISRO HQ
Bangalore

(731)

I recall TNS calling me to come down urgently. He handed over the original letter of SD as Secretary DOS and told me:

"Rajan: Keep it totally secret to yourselves. Don't tell Coma either. # On 1.1.83, come and give me the "charge assumption" note."

Having been in admin. I know the reason; some jealous person can go to a court, especially a lower level court. Courts being what they are, some of them may issue ~~a stay~~ or an interim stay order and delay the process. # TNS wanted to avoid it. We used to take care of such items ~~at~~ in

(732)

all promotions. We won't issue a collective order! Each person will have a separate letter, so that only that, if at all, gets delayed!

I don't recall whether I told Gama.

Now my continuous series of notes to SD from around ~~to~~ 1977 onwards to get out of ISRO, requesting SD to facilitate it, had taken a new direction. Despite my persistent writings, SD went on adding more responsibilities to me. I think, I was also doing well. I also did not let any of the work of ISRO suffer. In fact

(733)

I was continually ~~just~~ reminding
SD on items to be done. At my
~~the~~ level, I was solving many
conflicting situations within ISRO
between centres, within projects,
and sometimes even within people.

BP & TNS would have talked very
well of me. My international contacts
and conduct of cooperation were very
good - taking DFVLR coopⁿ. to
new levels; Prof Jordan / & SD
were great friends. I had handled
very delicate situations like Manned
Space Programme. Despite several
I conflicts within ISROHQ mainly
created by JPS, I was quietly
handling ISROHQ without which

(734)

SD would have caught in the whirlpool
ISROHQ petty fights!

All Directors URR, YP,
VRG, Pant — all had good
opinion of me — took my help.
In fact I had fulfilled the a
role of Sec. Secy, ISRO which SD
said: "I want to have a
~~Sec. Secy~~ Sci. Secy ISRO on whose
shoulders Directors of Centres can
unload some of their problems
— be it inter-Centre, intra-Centre
or with DOS or ISROHQ. They
should have the confidence in
sharing with him ^{the} details
and seek help." ~~He~~ SD knew

(735)

that because of his ~~name~~ ^{signature}
~~Dir~~ and the "name" of ISRO,
Directors may not frankly share
their opinion with Chairman ISRO!

For INSAT-1, my contributions
were very high. Similarly my
role for smooth transition of
NRSA into ISRO/DOS system
was non-trivial. And above

all my work to generate User
interfaces for Remote Sensing applications
and also in the evolution of NNRMS.

~~In all~~ Then the Defence interface -
Media and public relations - - -

Right from 1974, ~~for~~
all these works done by me for ISRO

(736)

are well known to SD. He also partly saw the logic of my analysis about my future in ISRO, which had strong tribal groups already well developed and I not belonging to any of them, due to the nature of my work since 1974 because SD took me to HQ. Who knows, I may not have adjusted to YP let tribes or ORR let tribes if I had joined one of them then.

But my coming to HQ under SD since 1974 really opened me up to many "worlds" of practical experience. I turned out to be a good Systems Engineers, Systems Manager as well as a High Level

(737)

Bureaucrat of GOI ~~(this is~~
in its best or better traditions.

(At this point I had to
recall how SB Krishnan who
was in DST as FA ck - more later
in ~~this chapter 2 next~~ the chapter

1990 - 2000 \Rightarrow an IAS officer
used to introduce me to ~~other~~
from all ^{Indra Sen} ~~Indra Sen~~
He will tell all about space,
TIFAC, Vision 2020 etc and end
saying "Above all Rajan is
a good bureaucrat, like us! #)
It was a unique blend.

My special role in ISRO
bringing out harmonious relations
to get things done has been
specially appreciated by Kalam

(738)

In his book Wings of Fire —
a brief para but a powerful
one as a "welder of people" and
as to how I had excellent
relations with drivers to top persons,
written by him in 1990's, years
away from his SLV-3 days.

~~So~~ For all these SD
had not rewarded me specially
except by more work. His
dilemma would have been, ~~how~~
how to let me go after shaping
me ~~for~~ assiduously so long.

Maybe if he was going ~~up~~ away
at 1980, his 60 years he might
have done — but it was prolonging!

(739)

He would have had no desire
after 60 to start anew as
he died in 54 years. He might
have felt ISRO a burden &
more, which was growing too
fast, demanding too much
of him. The energetic,
passionate developments ~~in ISR~~
~~with~~ in ISRO, with thousands of
young people pushing the projects
ahead against heavy odds
inherent in the Indian system,
would have made him happy
on one side and would have
created some fear too: that
he should not do anything to

(740)

disturb it! He would like
to avoid unnecessary experimentation.
INSAT-1A failures ~~and fortunately~~
~~accompanied a great success of INSAT-1B~~
would have added more of conservatism
in him. But he did not let
that stop the progress towards
IRS-~~1A~~ PSLV, ASLV projects.
But the processes for getting
approvals had been standardised
~~stop~~ before. For user coordination,
IEC was a good mechanism,
simpler because it was ~~in~~ within
three or four Secretaries to GOI.

But NNRMS was a great new
experiment; but unavoidable
because SD did not want to just

(741)

launch IRS and leave it at that for NRSA to disseminate imageries. Even "acquisition" of NRSA was a difficult experiment he had to engage in. On the VSSC front he was not prepared to make a drastic change of having a new Liquid engine Centre which he felt was needed but had emotional implications in VSSC, whipped by seniors. More so about a ISRO Company for which he had budgets as Corporate Front. ISRO would not have lost PS as he could have been the CEO or MD of it. He had done a wonderful

(742)

job of TT from ISRO to industries
(to sectors outside ^{mere} space projects) and
also in developing many major
Industry Cooperate (IC). A of
course TT & IC was close to
SD's heart; started by VS; but
operationally really moved by PS.

SD had chosen a very
surprising path to reward ^{me} for
my work ~~it~~ without any direct
disturbance of any thing that
was going on in ~~the~~ ISRO; to
create a ^{better} ~~any~~ avenue for my future
movement from ISRO, in case
I decide to do so. (With a grade

(743)

going at Joint Secretary level becomes much easier for me in Delhi (lefts — which was also essential in the local/hierarchy conscious Delhi establishments). He is now free to put some body in NRSA....

It would not have been without repercussions. When the matter became in 1.1.83, some aspirants from the Centres would have pushed for a special move for themselves with their Centre Directors. I recall my sending a note to SD, thanking him but also reminding that I hope he would take care of persons like Dr. S. Srinivasan, R. Jayamani etc.

(744)

SD just marked 'Good Luck'
& sent back to me. I don't
seem to have the paper in this
file. Maybe it is elsewhere.

On 1.1.83, ~~when~~
I went and signed the 'taking
charge' or assumption certificate
at TNS office, ~~I for~~ (TNS
had ensured that the number of
^{order} L copies were restricted to minimum
essential unlike the usual cyclostyling)
the news percolated after some time
in ISRO HQ. JPS in the crowded
lift ~~at~~ said "Rajan congratulations
I only told Chairman ISRO that this
should be done!" I did not
react. Others, mostly admin staff, in lift

(745)

would have found it later. I do not recall any 'bad' or 'different' reactions to me from any body in ISRO or other Centres. What type of inputs SD got I do & not know.

It was business as usual after that merit promotion raising me up in the pecking order & scale ~~in~~ within ISRO, but more ~~importantly~~ importantly ~~raising~~ raising my level in Govt bureaucracy at large enabling me to find a better career in the Indian S&T system / even in Socio-economic Ministries / Planif Commission etc. Those were days when private sector was

(746)

practically absent. Even for PSU's
the new scale (nearly equivalent
to JS level) was useful. Increase
in salary was ~~not~~ not significant.

Coming now back to
Aug 1982 time frame three
interesting papers are in my file

One ~~is~~ is the usual wrangle
in ISRO HQ: JPS wanting to become
equivalent to Sec. Secy ISRO in "powers" &
having got a INBAT Programme office in DOS
(legally it was not a DOS Sect and
would be in ISRO HQ in budgeting &
other matters). But it ~~satifies~~ satisfies
JPS ego that he had a totally
independent office & others who
may not know the technicality
would think so!

(747)

Much of the operational problems were met by Mr. Parriker in charge of Admn, Accounts & Others. For overall ISRO HQ purchase as per ISRO/DOS norms we had a Purchase Committee headed by A. Chandran. I, as Secy ISRO, was approving authority. . . .

JPS wanted to have all of these independent for his miniscule office & And issues an order. (He before) ^{and other items he handled in ISRO HQ like FMO (handled by Dr B S Rao)}
wants to erode ISRO HQ admin unified under Sec. Secy ISRO (alternative of having under a JS of DOS would be very different — & SD wanted to avoid it since PDB days)

JPS order, my ruling, and SD's 'equivocal' ruling may be seen

→ (748)

(748) (749)

Government of India
Department of Space
FREQUENCY MANAGEMENT OFFICE
ISRO HEADQUARTERS

For Chairman's eyes only pl

No.FMO/SFCG-3/82

September 29, 1982

OFFICE MEMORANDUM

For monitoring timely accomplishment and progressing all activities for logistics and other administrative support for the successful conduct of the 3rd Annual Meeting of the Space Frequency Coordination Group (SFCG) to be held at ISRO HQ during November 15-19, 1982, the following local support Committee is hereby constituted:

- Shri K S Mohanavelu
Dy Manager, FMO - Convenor
- Shri M P R Panicker
Admn. Officer-II, ISRO HQ
- Shri Aruldoss Vithakan
Accounts Officer, ISRO HQ

2. The Committee shall meet atleast once every week to take stock of actions underway and for actions to be initiated for timely completion of necessary arrangements as already detailed in the meeting taken by the undersigned with S/Shri Mohanavelu, Panicker and Vithakan. Matters which the Committee is unable to progress together with the associated bottlenecks, whether of "standard" procedures or of people (including their unavailability to hold timely meetings) shall be urgently and timely brought to the attention of the undersigned for obtaining necessary orders/resolutions from Chairman, ISRO.

I have no problems if all admin. matters is brought to Chairman ISRO. Admin. of ISRO HQ

There is a lot of heat at event. I am the Sec. of the admin. of ISRO HQ

(Jai P. Singh)
Ag Director, DOS/ISRO Frequency Mgmt

Convenor and Members of the Committee

- cc: 1. Secretary DOS/Chairman, ISRO
- 2. Scientific Secretary, ISRO
- 3. Chairman, ISRO HQ Purchase Committee (Shri A Chandran, Scientist SE)

SS-1815
30-9-82

You two will have to work together. It's no use for Admins!

then I Admin. of ISRO, ISRO, running likely run into serious problems
Ch, ISRO 1/10/82

(749)

Such problems continued fortunately only from JPS. Other colleagues in ISRO HQ were with me and sympathised ~~my~~ about my difficulties. It affected ISRO HQ admin/accounts — but in between

Pannicker will talk to me to relieve his load; he ~~had~~ ~~to~~ could do to TNS also — a protection for Pannicker if JPS creates problem. ~~But~~ Still

the ACR's of all of them were done by I Sec-Secy ISRO — JPS would have tried for it also in course of time!

Now mainstream work. Problems of AEM with

(750)

VRG. The letters from AEM to me enclosing his letter to Director VSSC & ^{Chairman} Chairman ISRO are enclosed in the following to be typed together.

One should note the type of problems for AEM! Even for posting within his Group he had to ask formal permission of Director VSSC. Normally these are informally discussed and finalised.

The letters ~~are~~ indicate the type of relations between them later leading to formation of APSU — a half-way (quarter-way solution by SD)

→ ~~751, 752, 753, 754~~
Done

0
A. E. Muthunayagam
Director, LPP

(751)

DR:LPP:I-03/
Sept. 27, 1982.

My dear Rajan:

Kindly recall my discussions regarding the assignment of senior personnel in LPP. After my discussions with Chairman, ISRO I have discussed with Director, VSSC and I have also put up a note to him as suggested by him. Director, VSSC has not discussed his views with me and he wants to discuss directly with Chairman, ISRO. I do not understand his plans. Therefore, I request that I may be given an opportunity for a discussion with Chairman before he takes a final decision. I request that you may kindly ensure that no manoeuvres take place in this matter. I am enclosing a copy of my letters to Director, VSSC, his reply and to Chairman, ISRO for your personal information. I also feel that the revised orders should be issued by Chairman, ISRO. Kindly do the needful.

With best regards,

Yours sincerely,

A. E. Muthunayagam
(A. E. Muthunayagam)

Encl. a/a

Shri Y.S. Rajan
Scientific Secretary
ISRO
Bangalore.

SS/2872
1-10-82

(752)
A. E. Muthunayagam
Director, LPP

The Director
VSSC

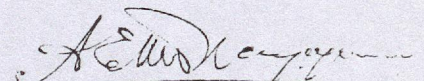
DR:LPP:II-01/

18
Sept. 16, 198

Based on the progress and the tasks ahead and availability of senior personnel to organise and manage these activities I feel, a slight modification in the existing arrangement is essential to ensure proper progress. Therefore, I suggest the following:

1. The FLPS Project, responsible for all fabrication work of LPP and vested with the responsibility of the pre-assembly of the engine hardware now may be made responsible for all fabrication, pre-assembly, functional assembly and integration of the engine, stage and their elements and sub-systems.
2. The LPTF Project, responsible for establishing the test facilities be made responsible for the fabrication of the test stands and other facilities of LPTF.
3. Need exists for a full time senior person to be in-charge of LPTF activities. It is suggested that Mr. S. Nambinarayanan may be redesignated as PD, LPTF and made in-charge of LPTF. He may be relieved of his assignments as PD, E&S for the present.
4. In order to effectively progress the E & S activities a full time senior person may be made in-charge of E&S. I feel there are two options for this. First, Mr. E. V. S. Namboodiri, if he can be spared from the present assignment, could be made PD, E&S on full time basis or alternatively Mr. M. K. G. Nair who is presently discharging the duties of the deputy to PD, E&S be made as PD, E&S or Dy. PD, E&S and be in-charge of E&S-LPP.
5. Mr. K. Kasiviswanathan may be redesignated as PD, FLPS and be responsible for fabrication, assembly and integration of Engine & Stage as envisaged in para-1 above.

You may kindly recall our brief discussions on this. I would like to have your views and suggestions in this matter so that necessary arrangements can be made formally. I will also be happy to discuss this in detail at a convenient time, if required by you.


(A. E. Muthunayagam)

(753)

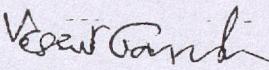
V. S. S. C.
DIRECTOR'S OFFICE

/PERSONAL/CONFIDENTIAL/

No VSSC-DR-D2-82

September 25, 1982.

Please refer to your note No DR:LPP: II-01 of September 18, 1982. As you are aware, the identification of the various segments of LPP like FLPS, LPTF, E&S and of the persons for the same have earlier been done by Chairman, ISRO. Any change therein will, therefore, have to be cleared with the Chairman. I have noted your views and would like to discuss this with Chairman before any changes in the existing responsibilities are made. I will revert to you on the subject as soon as possible.


(Vasant Gowariker)

Dr AE Muthunayagam
Director, LPP

(754)



भारत गणराज्य

(754)

3 4 5 1 (10 LINES)
3 5 6 1 (10 LINES)
TELEPHONE : 4 6 7 1 (10 LINES)
4 7 9 1 (8 LINES)
4 6 2 5 (4 LINES)

भारत सरकार
विक्रम साराभाई अन्तरिक्ष केन्द्र
त्रिश्चनेन्द्रपुरम - 695 022

TELEGRAM : SPACE

TELEX : 0884 - 201
0884 - 202

GOVERNMENT OF INDIA
VIKRAM SARABHAI SPACE CENTRE
TRIVANDRUM-695 022

DR:LPP:I-01/

September 27, 1982

Dear Prof. Dhawan:

Kindly refer to my discussions regarding the changes in the assignments for senior personnel in LPP to meet the programme tasks. As suggested by you, I have discussed this with Director, VSSC. He informed me that he will think over the issue and discuss with me. He also suggested that I could put up a note to him about my thinking. Accordingly I have sent him a personal and confidential note (copy enclosed in Annexure-A) on the 18th of September 1982 and requested for his views and suggestions so that I can put up the formal proposal to Chairman, ISRO for approval.

Director, VSSC has neither discussed with me nor divulged his views on this issue. He informed me to-day that he would discuss with Chairman, ISRO before any change is effected and revert to me. I do not know his plans on this.

In case Chairman, ISRO considers a solution different from my proposal I request that I may be given an opportunity for a discussion before Chairman takes the final decision to modify the order issued by him on LPP.

With kind regards,

Yours sincerely,


(A. E. Muthunayagam)

Encl. a/a

Prof. S. Dhawan
Chairman, ISRO
Bangalore.

भारतीय अन्तरिक्ष अनुसंधान संगठन

INDIAN SPACE RESEARCH ORGANISATION

(755)

I had acted as a bridge between AEM & VRA for sometime especially soothing the nerves of AEM (not that he was totally innocent — but he was more wronged by whole of VSSC and more importantly Liquid Programme was very vital for ^{the} future of ISRO launch vehicles).

Then another major task problem from SHAR/IREX to PSLV. From mere Static Test Facilities (STEX) which was limited role, all Range Test Facilities (~~VISTRACK excluded~~) were brought under IREX. R. Jeyamani

(756)

was in charge reporting to Director SHAR
(Pant) Jeyamani was aggressive
but very dynamic go-getter.

(Ratnaraj Hastings Jeyamani)

He had "suffered" total
subordination when ~~for~~ first/low
SLV-3's were integrated (Kalam fight)

"Are we to give only Sambhar-Rice
~~to~~ packets to SLV-3/VSSC fellows?

We are given no technical role!"

So he decided to take it on PSLV
wanting to take over Vehicle
Check out development role

as well. Pant was also a
~~quite~~ quiet aggressor

(757)

Would love to have more
work for this Centre! Dr. S. Srinivasan
Study Director — de facto Proj. Director
to be named later (or was
first named) was a soft spoken
person — technically very
competent & clear....

So lots of work was being
held up due to turf war... So
I had put up a note to SD
towards end 1982. Since SD would
argue for different sides, I had
given options & impact. And
a draft order too. I don't
remember what was done. But I remember
checkouts was with PSLV project only.
A similar decision

→ ~~758-763~~ ✓

(758)

Sh. 15/10/1983

Enclosure-1

STRICTLY CONFIDENTIAL

Sub: Integration and checkout activities
at Launch Complex

....

The integration and checkout activities pertaining to vehicle preparation and launch operations, and participation of the teams from VSEC/PSLV and SHAR have been a point of lengthy discussions between the concerned groups at different levels. SHAR has been entrusted with the total responsibility of ground support systems development, erection, commissioning and installation of the launch pad facilities including subassembly preparation facility, mobile service tower, pneumatic system installation and the various ground segments involving telemetry, tracking and command stations and communications, CCTV, timing and real time systems. Two major system projects for IREX and ISTRAC expansion with Management Boards have been constituted to handle the above responsibilities and establish the various facilities in the next three year time frame. The overall projections for manpower, budget and other resources for executing the tasks have also been discussed at different levels and approvals given.

Because of the dependence of the PSLV integration team on the IREX Project for establishment of the facilities required for vehicle preparation and launch operations in time, detailed discussions on the requirements of the launch pad facilities have been held in the continuous monthly PSLV-IREX meetings. A baseline document on the facilities requirements as well as draft contract for the facility establishment work have also been prepared and ratified by both the agencies.

....2/

(259)
-2-

2. While the Systems Concept Review (SCR) and Preliminary Design Reviews (PDR) were completed for most of the elements and the facility development has commenced, issues related to vehicle integration and checkout system development and vehicle preparation and launch operations activities have been discussed many a time, but agreement on work execution methodology has not been reached. Based on extensive discussions and the advise given by you during the planning phase, especially on the need for involving the launch complex personnel in the integration and checkout activities, I had conveyed to IREX the necessity to have IREX personnel to be associated with the Project in the integration and checkout team, right from inception so that they would be able to handle most of these responsibilities as the Project matures and almost entirely during the operational phase. However, for the past one year, IREX has not posted any technical personnel with the Project. On the other hand, based on the information provided by the Project on the on-board vehicle system for generating the facility requirements and handling systems, IREX is trying to work out details of the integration procedure as they would conceive. The Project's comments are also sought after preparation of these reports. Further, as regards checkout system, IREX would like Project to make a proposal for the establishment of vehicle checkout facilities at the launch complex, in order to frame this activity as a special contract back to the PSLV Project.

3. The above anomolous situation has developed because of the desire on the part of few individuals in IREX/SHAR to do the on-board vehicle systems integration, vehicle preparation and checkout activities eventhough these have been defined as the responsibility of the PSLV core project. While PSLV would be willing to

(260)

-3-

associate those personnel who are interested in the integration tasks, it will not be possible to give the responsibility for integration and checkout or establishment of the vehicle checkout system at Launch complex to IREX as part of their responsibility, as these are intimately connected with on-board vehicle system and would be carried out only by those who are engaged in the overall vehicle system coordinating between various subsystems development and the various facilities groups right from the beginning.

4. Although I have tried to prevail on IREX on the above issue requesting them to concentrate on the major task of establishment of the facilities required at the launch pad, it has not been possible to have their full attention to the facilities development tasks. On the other hand, substantial man-hours are being spent on interpreting meagre information available in the documents (for facility generation for integration activities provided by the project), leading thereby to shortages of manpower for the contracted tasks of facilities establishment.

5. At this stage, this problem can be resolved only by a mandate from Chairman, ISRO delineating the functions of Project in integration and checkout, vehicle preparation, and launch operations as in the approved Project Management Plan (copy enclosed) and, generation of launch complex facilities and ground stations by IREX. I am also apprehensive that the current trend of personnel in facilities diverting their attention to the systems development, integration and checkout activities is causing a depletion of personnel who should be involved in the generation and maintenance of the operational facilities. This will snow ball into a major problem area in the future if appropriate remedial actions are not taken now. It would seem that the level

(761)
-4-

of training and expertise of the personnel in the launch complex area should be carefully weighed against individual accomplishments and aptitude so that personnel in the facilities can be deployed selectively. Personnel with aptitude for system development, integration and checkout work may have to be transferred to the development centre or to the projects in order to set right the present situation.

6. On the other hand, a policy decision may be taken that the development work pertaining to integration and checkout be done at SHAR and correspondingly large scale movement of personnel with required expertise have to be effected from VSSC to constitute an Integration and checkout division at SHAR. However, this solution will create enormous personnel related problems leading to large scale settling times with corresponding impediments in the Project progress. It is necessary, in this context, that the staffing of operation facilities be done very carefully taking into account the inter-facility deployment and specialities so that minimal manpower at the required level are only available and they are tied to the facilities with a mandate to maintain and operate them as per the requirements.

Considering all the above aspects and to solve the issue of integration and checkout work methodology I am enclosing a draft memorandum which may be considered for issue.

(762)

Extract from Project Management Plan

-2-

2 ROLE AND RESPONSIBILITIES OF PSLV PROJECT,
PROJECT DIRECTOR PSLV AND PROJECT TEAM

2.1 The primary responsibility of the PSLV Project/the Project Director, PSLV and his team is to develop and deliver a flight worthy Polar Satellite Launch Vehicle (PSLV) within the constraints laid down. As such, the overall responsibility for technical decisions, budgets and progress of the Project as a whole covering all elements will be vested with the Project and the Project Director, who will be the Chief Executive.

2.1.1 Specifically, the Project responsibilities will include

- i) Definition of launch vehicle configuration and performance along with overall cost and schedule requirements for the development of the vehicle, mission and launch facilities and realisation of PSLV and the mission.
- ii) Management of system studies and preparation of technical specifications for mission, launch vehicle systems, associated facilities, launch complex and ground stations.
- iii) Defining baseline programme requirements, work breakdown structure (system level) and identification of contracts and contractors with the authority to change the technical specifications and financial contents of the contract.
- iv) Monitor progress of all elements of vehicle and facility development, budget and programme control for project and programme elements.

(763)

-3-

- v) Conduct design and status reviews for vehicle and facility development as per project review protocol.
- vi) Configuration management for the vehicle systems and mission related items.
- vii) Quality and reliability management for the vehicle systems and mission related facilities.
- viii) Establishment of facilities required for vehicle systems simulation, systems integration and checkout and associated technical support services.
- ix) Development and installation of vehicle checkout systems at Valiamala and at the launch complex.
- x) Coordination and synthesis of all software and hardware activities in the vehicle development including interaction studies/tests/interfacing details.
- xi) Coordination for mission planning and operations.
- xii) Preparation of various flight subassemblies, establishing and validating vehicle systems integration and checkout procedures and carrying out vehicle integration, checkout and launch operations for the developmental flights (levels of system aggregation and responsibilities are given in Table-1.)
- xiii) Post flight analysis and data management
- xiv) Administrative and financial matters of Project core team and activities directly handled by Project.

(764)

Draft

OFFICE MEMORANDUM

The organisation of PSLV Vehicle preparation, integration, checkout and launch operation activities have been a point of major discussions for some time. Having regard to the approved PSLV Project management plan and taking into account the nature and extent of work in facility establishment and deployment of personnel, it is decided that IREX will handle the responsibilities of all facilities other than the propellant filling system for liquid second stage and checkout systems to be installed in the launch control centre. These shall be organised by the PSLV project with appropriate subcontracts given to IREX and LPP.

With regard to methodology of integration and checkout, vehicle preparation and launch operations, which are defined as responsibilities of PSLV Project core team, SHAR/IREX shall identify the personnel to be involved in the above activities and post them to PSLV Project forthwith. On completion of initial developmental flights, these personnel will be reverted to SHAR/IREX to form part of the launch operations team for further flights.

Director, VSSC/Director, SHAR/Project Director, PSLV shall adopt the above guidelines and take necessary action to implement the integration and checkout tasks at the launch complex. The realignment of personnel and activities in accordance with this memorandum shall be completed before April 30, 1983.

Cwks (764a)

Mistake in
earlier pages
in 764. → ^{oo end} this
make (764a)

Should an organization go
through all such internal fights,
analysis done on them, ~~the~~ solved
at Chairman ISRO level? Can

these be brought up in a Board
level (say ISRO Council) as a
note for discussion & decision upon.

In an organization which respects
Chairman ISRO hierarchical Apex

this would have technically worked

and easier. So many complex

structures like that of PPEE

in Centre, ISRO HQ, Program Offices,

Sc. Secy ISRO would not be

needed. That is how many major

(765)

departments ~~run~~ in Govt. At
the most, a meeting at
Secretary level with all contending
parties with two or three hour
meeting with JS, AS present
~~may~~ would decide. ~~Most so~~

That ~~is~~ is model
may be useful for large Operational
system.

In an R&D intensive
development rich organisations like
ISRO, it would have been difficult
to unleash the creative energies
of many engineers / scientists (even
technicians) in that mode. ~~How~~
In the ISRO mode every body

(765)

wanted to do more; take on more responsibilities. Of course there was personal/professional competition. This complex mode of working put load on Chan ISRO but he spread it around through his ^{ISRO} HQ analysis & even some PPEQ analysis. It created more work for us; another way of looking at it, was (is) it increased the importance of ISRO HQ & Scientific Secy ISRO.

Against this ~~the~~ back drop IREX PPSLV turf war

(767)

my mind goes to the work
I did later for ISRO: 2010-
as Member ISG which resulted
in a report "Beginning of
a New Future" — I had

the benefit of discussing with
~~with~~ many top ISRO persons
(admirers — creme de la creme)

(More later) in the chapter (2000-2010)

I found, ^{while} ~~while~~ writing
about the IREX/PSLV, ~~in~~ ~~papers~~

the underlying cause of such
a fight ^{(that took place then!!) A hindsight insight!}
It was perhaps

not for grabbing more work.

(968)

Engineers at SHAR had already seen the ISRO's periodic promotion system and the interviews there on.

They could see that the questions especially the external experts

↳ were more around design & development (BP used to

moderate them, reminding the Committee that they are dealing with ^a person in an operational sector or testing etc not design & development!) But all

committees may not have been same!). The VSSC, ISAC

& even SAC persons ~~at~~ even

in anonymous questionnaire

considered SHAR, ISTRAC, IISH, etc,

(769)

units as infrady. They did not want those in these units to be deployed into VSSC, ISAC, SAC etc. Their attitude was

"They are service/support persons; let them stay there & retire."

Only those in VSSC, ISAC, & may be SAC are the right persons to lead ISRO to as Senior Directors, Chairman ISRO etc. This has been firmly built into the "Culture" of ISRO! VSSC/ISAC dominate as they did "Space hardware!" That is why SAC fought through and got some recognition. I have

(770)

not counted Padma ~~was~~ ^{award}.
Even for SHAR Directors were
"suppliers" from ~~the~~ VSSC. ~~ISA~~

The IREX / SHAR persons
had insights as early as
1982 about this trend. They
~~are~~ knew more of ground
realities!! That is perhaps the
reason that they were "fighting"
for ~~the~~ some developmental
work!!

It is a ~~conf~~ confirmed
fact now @ 2017 even (though
no ISRO person will openly admit it
by mouthing egalitarian/ment

(771)

slogans) that ISRO like the
All-India services like IAS, IFS,
IPS, IAAS, IRS etc had
its own ~~part~~ pecking order
of "superiority" — mainly being
in VSSC, ISAC and to a limited
extent in SAC, not in applications! —
and also has a large ~~of~~ "support
services" as secondary services
as the All India Services use the
State Admin Cadres, ~~and~~ CSSEK;
these "inferior" cadres have
to struggle & ~~service~~ serve the
superior cadres till retirement.
Occasionally some in the

(772)

Lower cadres may be rewarded
as (promoted) IAS etc, but
raising not above JS level!

May be this ^{is} the name
of the para struggles & luck!

I had one experience during
~~2015~~ 2014 where the ^{new} inductees
to ISRO (after 6 months to
~~1 1/2~~ 18 months of their joining)

are given an "induction training"

~~How~~ I thought how farcial
it is, after so many months.

~~Chair~~ They were to
finally meet some top people.

(773)

Chairman Isko was absent ;
so the senior most Alex presided
over. Navalgund en was there. So
was I.

Persons from ISTRAC blasted
the management for the second-
citizen treatment.

One lady said poignantly
"Sirs, first of all there is
no point in calling us after 18
months. But what we learnt
was that those who joined ISTRAC
are doomed to secondary status
till life. I and my friends
~~stated~~ came together for interview.

(77#)

and we were selected. It was an all ISRO selection. At the time of joining my friend was posted to VSSC and I to ISTRAC. No reason. We were not asked for ~~options~~ ~~to~~.

My friend said she is in an R&D group. Later some others told me that in ISTRAC ~~is~~ my future is doomed in ISRO.

We are not even allowed to be in ISAC for a week!"

Alex ~~etc~~ et al tried to bluff some thing. Actually they were all red faces.

(775)

My early intellectual (and
emotional upbringing Bhakti,
Vivekanand, Marx ~~et~~ make
Renaissance (unlike ~~et~~) makes
me revolt against such
built-in inequalities between
people — ~~more~~ human to
human! Even now @ 2017. But
all empirical / factual evidence
shows that inequality is
built-into human societies!
In the worst case as Pareto.
equilibrium!

*

*

(776)

There was another paper which got a little mixed up in years, I got it. It is dated 6th Sept 1982 - on INSAT-1. ~~The~~ The note is self explanatory. It appears that after the disastrous failure of INSAT-1A, work on INSAT-1B was being pushed by ^{INSAT-1} SSPO and PPK. I had kept ^{out} ~~my~~ from INSAT-1 SSPO work. Still I get leaked info. ~~The~~ My absence in their work was good for JPS. He did not even consult me nor gave papers, though

(779)

I was more knowledgeable
about the space segments, ^{communications, meetings etc} Still
Iq & the leaked info indicates
that the Project team was pushing
for July 1982 launch as per
the contract — after the INSAT-1A
failure in April 1982. Their
idea would have been pushing
for July 1982 meant, at best
end 1982 launch. I have given
my assessment and suggestions
^{paper} for technical inputs, which
was lacking. It was all
limited to PPK — JPS ~~with~~ ^{would}

(778)

go in & out and conveniently
claim that he was not a technical
person for satellites.

¶ My judgement on
the date of mid 1983 turned
out to be good. I have given
options to save the 'Core' mission.
RMV & KKR may not have been
spared by URR or PPK would have
resisted. But one Dr. Vasantha
was posted ~~to~~ (it was just for
namesake as he was pure aerodynamics
person - SD's student) - m

INSAT What next
(779) (784) Done
handwritten note 6th Sep 1982

For Chairman's use only (779) To: Prof. S. Dhawan (779)
From: Y S Rajan 6th Sept 1982

Sub : INSAT - What next?

1. Secretary / Chairman is aware that I rarely comment / advise on INSAT matters for the past $2\frac{1}{2}$ years, for variety of reasons. However, the present juncture is such that I thought I should place to Chairman my unsolicited advice. I address matters in the following note starting from items needing urgent attention ~~the~~ and ending with items of ^{short term} / future.

2. INSAT-1B I strongly advise that the spacecraft schedules are not pushed now. While I realise that reservation of orbital slots / launch etc are difficult, they should ~~also~~ all be subservient to the realities of spacecraft technology. There is no point in pushing INSAT-1B without some reasonable understanding about the various failures / anomalies in INSAT-1A. It may also be necessary to add a few

redundancies, requalify a few etc. Should there be a weight problem let us be ready to throw away ^{the} DCP, one S-Band transponder and so on. One most important function is Telecom and let us provide it well to the nation. Chairman may consider ^{getting} appropriate concurrence/ approvals for such an approach.

2.1 FORD REACTION: FACC may resist such an approach; they may try to throw legal documents. But we should force them to do as we want and if necessary with reasonable additional payments.

2.2 A reasonable schedule for a modified & well qualified INSAT-1B should be end-1983 or early 1983 and not July 1982.

2.3 INSAT-1B management by DOS

Before we leave the item of INSAT-1B let us ~~not~~ dwell on the management

from DOS side. It definitely requires a few changes with strong technical inputs. For variety of reasons, the present Project Director appears to inhibit healthy and rigorous technical dialogue within the team. This needs change. Also a Principal System Engineer with two technical persons supporting him should be posted at Palo Alto. Ideal person is R.M. Vasagam (let him choose the two ^{support} persons). DOS should inform Ford that this officer shall have all independent access to the Project. RMV should report to Prof URR directly. For Proj. Director's post, I am able to think only of Dr. Rangan. Yes; IRS will be a problem; but George probably can take care. With Dr. Rangan's Management Skill & Vasagam's imagination, INSAT-1B will come out well... Also the present fragmentation in the DOS management should be removed.. Let Prof. URRao be named as the Chief Executive for INSAT system from the DOS side as a clear p.r..

number two to Secretary DOS... Any paper for decision making should clearly come through the Chief Executive. The existing core team of INSAT-1 SSPO would require changes too. Let the new Proj. Dir. Choose the person (say 50%)

I do realise that these may cause some convulsions and personal agonies; but time available is too short and the task ahead is very large....

3. INSAT-1C etc

Urgent analyses on split-service - approach and paths to realise various ~~the~~ services should be initiated. Met, in my opinion, is least priority. One can even explore a part-indigenous approach with certain subsystems bought - USSR link up etc if cost is a problem.

For Telecomm (& TV to a limited extent) compact & reliable (even conservative from the state-of-art view point) designs

- 5 - (783)

should be the essence of IC etc.
By splitting services failure-probability
reduces. Also replenishment is not
a single event.

As of now investment on ground
for Telecomm alone is considerable. For
TV, telecomm can also provide distribution;
DRS can be played on low key or
even jettisoned for a while.

Investment on met ground segment
is not a waste. After all it is an
interactive imageprocessing facility. It can
be reformed ^{cite} for a while to ~~take~~ use
NOAA, TIROS pictures or even ~~the~~ Landsat
imageries. Let ~~it~~ not our urge to
provide a Geosyn. Met mission jeopardise
INSAT-1B, IC etc. Let met service
come slowly and perhaps as a single
satellite.

Ideas-man for this is
Vasagam. Let him shuttle between Palo
Alto & India... Whoever conducts
studies should ensure that Vasagam's ideas

-6 (184) (184)
are given full weightage and not
brushed aside.

4. PERSONS FOR CONDUCTING SUCH STUDIES: I

Can see Chairman posing this question.
Yes; I see a definite problem of not
having the right middle management
& senior ~~man~~ managers. We have more
of "passengers" or "prima donnas".
In any case, the management of INSAT-1B
and its scope require urgent attention.

I don't see any escape from deploying
the three best men of spacecraft technology
(URR, RMV & KKR) and also removing
some non-priority items from INSAT-1B
to increase redundancy / modify some.

5. I ~~can~~ write this note with pain
in heart. But as an organisation
we cannot avoid but act and prove
ourselves well.

Regards.

Rayu

6/9/87

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Before going on further with the notes given by SD back to me, I need to address many items which formed the ^{important} ~~core~~ programmes of ISRO/DOS.

My official notes would be in regular files of ISRO. But notes to SD have references to them as my tasks etc. On Human Space Flights — notes in ISRO files also would be very sparse as we had to keep it very confidential.

There are many such

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items which come to my mind.
I screen out many, though they
are interesting ones.

Before starting on some
specific items like Human Space
Flight, AIDS etc which would
take a few pages by themselves
even after editing, I want to
mention about an interesting episode.

It could have been late 1970's
or just 1980. Just before MA Vellodi
left.

He told me about an
object which had fallen somewhere
around Kolar district. Probably
~~Police~~ police might have handed
over to them. It appears to be a

(787)

part of a satellite - had
markings in Russian. It
might have been ~~a~~ ~~an~~ a
reentering Russian satellite
which had disintegrated.

MAV being from
External Affairs would have
thought to "buy" the whole
thing instead of trying to
research on it. I don't know
whether he told SD; would have.

If one tried to find out nothing
much ~~will~~ ~~or~~ would come

but the word would spread.

~~It~~ Already the Western
countries were creating problems

1523/Cot/2010
dt. 30.6.10

(788)

for USSR on their ^{use of} Nuclear
Power Sources on satellites. Within
India some ^{of} panic could be
created about falling of
USSR satellites.

So he told me: "Rajan
just seal it carefully, keep
in a cupboard in your office."
So I did. I don't know
where it is now!

Now let us get into
some specific big episodes. I
~~that~~ will not stick to chronology.

(789)

Will narrate one topic fully
(briefly) starting from the beginning
to the end of it.

First I take India's
first Cosmonaut project.

Sometimes during the
Emergency period, I think in 1976,
SD told me about the interest
from the Def. Ministry to send an
Indian ~~to~~ as a co-passenger in
one of Soviet manned flights;
they had already sent a few
such co-passenger cosmonauts
from East European Communist
countries & also from Vietnam.
Soviets ~~the~~ Govt thought it would

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add to the prestige of India.
But it also had other connotations
of India being like one of the
communist sister/brother countries
of USSR. Apparently SD had
conveyed his disinterest to IG
as it won't add any scientific/
technological knowledge to India
~~and~~ unlike the launch of Aryabhata
and for SEO-1 (agreement has
been written). Looks like IG
partly agreed but had requested
SD to engage with our Ministry of Defence
for having some S&T gains
for India from such a launch.
She had not shown any
undue hurry in the launch.

(791)

It was Brezhnev era. So SD's brief to me, was to emphasise the need to have some Indian experiments along with the ^{Indian} Cosmosant and we should ask for the same.

A mere sending of ~~an~~ ^a Indian group of which Soviet side will select was of no use. We should understand the SET aspects of selection etc.

I went for the meeting which was held by Shivraj Patil who was then MOS (Defence). I met him for first time.

The meeting had other top Airforce officials, who were

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happy about another opportunity for their officer. They were very familiar with Soviet side due to the continued purchase of MiG & other aircraft.

So the task of telling some difficult items in accepting the project "as is" from an offer at political level fell upon me. ~~The~~ Minister was obviously very irritated. Being a gentleman he did not shout at me ~~or~~ but showed his irritation through frequent interventions with a question. I clearly explained DoS/ISRO concerned and the

(793)

need to have some scientific gains right from the process of selection of cosmonauts.

Airforce persons did not even think of it, though they had an Institute of Aviation Medicine in Bangalore.

Anyway the meeting ended. Minister & Airforce would have decided that they would take the lead, in any case. Apparently nothing much happened. We were not contacted again, nor I recall any minutes of the meeting.

(194)

With elections called by I G
and Esounces, the matter ended
there partly, but not negatv.

That is why, Morarji Desai
asked SD about the use of
Manned flights when we went
at the time of SEO-1 (Bhaskara-1)
launch to USSR & SD met
PM (as was customary as he
and his team was in ~~USSR~~ ^{Moscow})
I had written about this in the
earlier chapter. SD's thoughts
~~me~~ on this matched that Morarji
Desai & it was left at that.

(795)

"I have wondered
~~that~~ what will our Cosmonaut
do after he goes & come back?"

— ~~was~~ the question / statement
with which that topic ended.

Moraji Bhai apparently was
not in a hurry to cancel it

(even if there was an oral
positive interest expressed by IG)

Then ~~the~~ with the fall
of Janata Govt in 1980,
Brezhnev might have taken
it up with IG. I don't recall
the year. My trips to Moscow
continued for Bhaskara relations

(796)

meetings. The whole matter of Indian possibly flying in a Soviet manner flight, never entered anywhere in ISRO ~~corridor~~ corridors. Also it was not even with the ~~AS~~ Acad. of Sciences USSR.

When in 1981 or 1982, I do not recall; I had to go work with of our IAF teams for work with USSR. From what SD briefed me, he had advised IG that we should insist upon our involvement & in selection of

(797)

of cosmonauts, we should ~~also~~
know the methods, about
technical equipment for
zero gravity tests etc and also
have some scientific experiment
to be conducted by
~~with~~ the cosmonaut, ~~even~~ she
had agreed and would have
told ~~the~~ ~~IAT~~ Minister for defence.

I read up a lot about
the biological aspects of space
flights in addition other engineering
details. ~~We had~~ At ISRO's
instance one Col. Sundaram
Director In-charge Aviation Medicine (IAM)

(P.T.O)

(798)

became a part of Indian team. He had to understand all the details of selection processes etc and possibly to learn to have some facilities in India. I think we had more than one meetings at Moscow — not sure. ~~A~~ I

had the great benefit of talking to Acad. Gizenko, who was the medical chief of Cosmonauts.

A few things I learned from him are still in my memory:

"Man adjusting to space is not a major problem but the physiological changes that occur in such an adaptation makes it

(799)

for him to adjust after they are back to earth. That is our greater concern."

"Woman adjust also well but their body rhythm and cycles are more bound to the Earth than men^{or}. But they also adapt well!"

He also explained why they had ~~ate~~ for a period abandoned further ~~from~~ flights of woman:

"Main problem is the space available for the cosmonauts. It is very limited. Already they have many problem. Having a woman in the

(800)

in the team in such a constrained space adds further tensions to the individuals. "

Many other physiological elements he said, ~~the~~ were not fully grasped by me though I read a lot.

All through I G had decided not to make the Manned flight a secret. #8 Even to a Parliament question she had given a vague answer to the effect that we ~~have~~ India had not committed ~~to~~ anything on it.

(801)

It is against this background a major formal meeting at technical level was to be attended IAF persons wanted to own it all for themselves ~~and~~ and did not like the intrusion by ISRO. I was just the only person. Rest were were IAF persons and some from HAL who had come for a major negotiation. Therefore Def. Secy P. K. Kaul had also come; the entire team was staying at Hotel Russia, for which all officers were eligible But by usual ISRO practice

(802)

Stayed in the Guest House of
Acad of Science ~~at~~ some distance
away.

On one of the days when
the final part of the meeting was
going on, there was a lot of
TV pictures being taken by the
Soviet side — camera + TV operatj.
I wanted to caution the leader
of our delegation — one top Air Force
Officers — temporarily drafted
into the discussion to maintain
protocol. ~~It~~ I could see ~~at~~ most
of the IAF/HAEL/DefMin team
very tired — I think some first night

803)

of continuous meetings & discussions probably a major contract negotiation. The leader of the Indian delegation looked very distracted and he was not even prepared for the meeting. Others in IAF briefed him. He was in a hurry to wind up. His Air Force work was obviously his priority. So he quietly avoided talking to me. Also I was very young some 38 years old with thick ^{long} hair on head and thick beard (almost looking like ~~Karl~~ Karl Marx with jet

(804)

black hair those days. (I have some photos of that period.)

So he was not therefore going to talk a ^{young junior} civilian officer. Also my designation Scientific Secretary ISRO would have baffled him.

Nothing very difficult took place in the meeting. Most of ISRO points of scientific/technical inputs of possible benefit to India have been incorporated. So our persons ~~will~~ ^{would} participate in technical aspects of selection — not just give a list ^{of officers} to the Soviets to select plus some experiments, some

(805)

rudimentary outline given. They were also prepared to carry India-made food from Defence Food Research Lab provided they meet the standards. So

I labelled

~~Am~~
no worry on that. But I was worried about the publicity aspects. Our PM had ~~announced~~ stated in Parliament earlier that India had not decided on the Manner Flight yet and if the Soviets show the meeting in their TV, it would be a contempt of Parliament! I should

(806)

Caution ~~over~~ the leader of our delegation
— otherwise without his request
Sovets won't listen. This was with
the Academy of USSR team where
my word ~~will be~~ would be taken
as final!

So we all left. I was
left with a problem! Major one!

Then I thought of an
idea: Reach P.K. Kaul directly.
He knew me well due to NRSA/
Landsat type meetings explained
before. ~~So~~ It was right; I
think Winter — may be Dec 1981
or Jan 1982 (mostly 1982 because
my note ~~was no~~ regarding

(802)

my Tasks from Jan 1, 1982 to June 30, 1982
referred to earlier //

Roads were full of ~~ice~~ ^{ice}.
Still I was prepared to go and
meet him in Hotel Russia. It
was not easy in USSR to make
calls. Since I was a person
familiar to them in Guest House
of Academy, I got through a
call. He was kind enough to
talk to me &

"Sir I want to talk
to you urgently. Some thing so
Confidential that I would not

(808)

like to tell it even on phone."

"Rajan I am tied up now -
Where are you? In this hotel?"

"Sir I am a little distance
away in Academy A.H. But
I don't mind. I will take
a taxi and come"

"Rajan, there is a big
formal reception now, where
many things are finalised as
well! You come first thing
in the morning. Say about
7 am; You can even have
breakfast here! I will
sure meet you!"

(809)

That night was worrisome. But I ~~knew~~ P.K. Kaul ~~kept~~ ^{kept} his words to me and also ~~knew~~ ^{knew} that I should not disturb him without ~~his~~ unnecessarily; some thing would be very critical.

Next day morning, I took a taxi & went to Hotel Rossia.

Heavy security cordon. I had my pass port — for them to

see a young fellow ~~is~~ trying to go where top Indian officials were there (~~the~~ (In their hierarchy

P. K. Kaul ~~Seey~~ had a Minister rank). I managed to go to

(870)

PKK's room.

He was very warm.

"Rajan! Tell me what bothers you!"

I then ^{very} briefly told about the start of the Manned Mission thing right from Energy period 1976 period of ICA to current. How she had kept it away from Parliament. Even current ^{her} ~~the~~ statement was that we are not involved in it yet.

"Now Parliament ~~is~~ is in session. photos & camera of The Soviet side took camera

(811)

and TV. I wanted to caution
~~our~~ our Indian team leader.

He ~~at~~ was too busy & went
off for his Air Force work!

Hence I wanted to tell you
so that you can decide!"

"Thanks Rajan, I did
not have this briefing at all.
I came for ~~some~~ some major
contracts. Probably Ministry might
have left it off as a minor
technical meeting to be handled
by Air Force. Thanks for I understand
the gravity of the situation.
I will brief them!"

(812)

Almost immediately he called the person who led the discussions. ~~or~~ ~~Other~~ A few others came with him.

He addressed him by name: "See this is Rajan from ISRO. Note one thing our Prime Minister had kept the entire manned mission project under wrap & she had not informed the Parliament. Now a session is on. Not a word on this should go public. Tell your Soviet

(813)

counter part immediately.
They should keep all their
photos / TV etc under wrap
for archives. Also no report
to press. Tell them that
it is critical and can
affect ^{our} relations !! "

Then he looked at
me fondly: "Rajan, you
can now go without worry!"
and patted me.

Other officers who treat
me like a junior student
during the meeting, looked at

(814)

me with wonder, as to who
this young nit-wit, was
having the ~~year of~~ care of
Defence Secy whom they cannot
also meet easily!"

Within ISRO also
I had to keep this matter
under wrap. I briefed SD orally.
I avoided much of writing.

Later some time Iq
decided to make it public.
We could ~~take~~ breath a little
easy. ISRO was not involved
much in the project, ~~the~~ having

(815)

ensured S&T inputs, making Indira different from the countries which flew their citizens in the Soviet flights as co-passengers.

Selection was from a number of jet pilots who had shown willingness. Rigorous medical tests & other skills (probably rigorous psychological tests)

I am not giving here the types of experiments - not very great but something novel. Indian food demanded (as it was more vegetarian) ~~not~~ modification to the the Soviet cosmonaut carrying module

(816)

to carry more volume. Feces volume from vegetarian food is purely ~~is~~ meat/potato meal of Russians would require about 4 times more volume.

I recall ^{going for} some meeting to ~~the~~ USSR with Col. Sundaram.

He was fond of Ballantyne ~~whisky~~ whiskey and used to take a crate of six bottles in duty free.

He ~~was~~ would manage in Indian customs!

Though ~~Indian~~ ~~role~~

Two persons selected with close tie & equal chance were ~~Col. Sh~~ Wgr Cdr Rakesh Sharma & Gp Capt ^{AN?} Malhotra. The Soviet plans

(817)

provide for 100% redundancy. Both were trained equally well. If on the ~~last~~ day of launch if some one developed a problem, cold or fever etc, the other will go!

Finally luck favoured Rakesh Sharma.

For the launch though ISRO/IAF etc role were none, some persons from ISRO also were invited to the launch at Baikanom. Though I had not seen Baikanom we decided that Dr. S. Srinivasan & one other person (I don't remember) could go to learn about their bigger launch systems. ~~BoDr SS~~

(818)

was a ~~strict~~ vegetarian. So
I gave him a card written
in Russian: It was not enough
to say vegetarian (avashniya)!
So so many withouts?

Bye byes - without
fish, egg, meat, chicken etc.
The preferred item of Bread,
Rice, Vegetables...

Told him show to the
ladies who serve.

It worked well for him.

Nation was electrified with
~~the~~ Rakesh Sharma ^{Money} hunting
in Space in 1984 (I think April 1984).
For most person it did not
matter who launched him. It was

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also told he would do some yoga exercises, Indian food etc. Enough for press.

Whether India had to aim for Human Space Flight was not a serious question. SD was clear on that. Fortunately INSAT-1B was up in space in June 1983 ^(Successful SLV-3D1 watched by PM in April 1983.) and was giving good service. ^{Otherwise} there would have been some criticism in some ^(better) informed fronts.

In spite of such a nice reception a month or so later, IG's political-policy instincts had prompted her to have an article about India's Self sufficiency in Space: She obviously did not want India to be judged

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by the Cosmonaut route alone,
though it was spectacular.

One ~~at~~ afternoon I was
called down by TNS to his room.

"Rajan, drop everything & come to
my room"

I came down. He told me
that PM wanted urgently to write an
article describing the achievements of
Indian Space Programme & the projections for
the future. The emphasis should be
on Self-sufficiency. "Do immediately,
if necessary sit in my room. He
took a bunch white Xerox papers;
that was his special need always!

~~I~~ I told him that
I ~~would~~ ^{would} go to my room and bring a draft

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in an hour.

TNS said: "Remember it should go in one hour".

Those were not the days we ~~can~~ could store in a computer; correct; cut & paste etc. Even if I have it typed in my room, after TNS revision, if any, then again we had to redo. I think I brought to TNS ~~an~~ a written draft. TNS did not make much changes. So he got it typed in his office. ~~Then~~ Then took it

SD. [#] He came back.

"^{By SD} ~~Seay~~ told me earlier

also not to bother him with it. Any way I showed him. He

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did not want to see. He said "You guys handle it with PMO". So I will take care of it! It may come in your name tomorrow!"

I went away. Indeed it came up in a ^{Delfin} paper, Hindustan Times. (Thanks to Gopal Raj of Hindu) I got a copy very recently. Gopal had even got the record of minutes of the meetings with Sach on Manner mission.

Except for a change of replacing "Self Reliance" by "Self sufficiency" there was no change. For me "Self-sufficiency" was a tall order not reachable! But the political system/elites loved the word theme!

→
Hindustan Times article 823, 824, 825, ~~826~~.

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Self-sufficiency in space technology

By Y. S. Rajan

OUR nation is understandably happy at Rakesh Sharma's space flight. With astronauts from the US and cosmonauts from the USSR performing "miracles" in space, Indians might have had a desire to see one of their own countrymen in space. This desire has been fulfilled while watching the joint Indo-Soviet flight. More importantly, thanks to India's considerable advances in the use of satellite communications specially symbolised by INSAT, the historical event was brought to many Indian homes and they were able to watch Rakesh Sharma's work in

the Salyut spacecraft and Prime Minister Indira Gandhi talking to him.

The entire theme of development of space science, technology and applications should be seen in its real perspective at this moment. The tone for such a correct perspective was set by the Prime Minister during the recent meeting of the Parliamentary Consultative Committee where she pointed out the importance of indigenous activities and achievements in space in the fields of satellite communication, increase in radio and televi-

sion coverage, remote sensing and weather forecasting.

Thanks to the far-sighted policy of the Government, space research started in India over two decades ago and it has matured in many ways. The goal of self-reliance, which in operational terms does not mean making every last bolt and nut in India, but stands for an effective self-sufficient Indian programme with a judicious mixture of international co-operation selected on terms of mutual interest, is steadily being reached. Of course while viewing these achievements, one has to see the prog-

ress made in space technology by comparable countries. China has recently demonstrated its capability for launching geosynchronous satellites with its own launcher—a capability which India plans to achieve in the early 1990's.

The Indian space programme, unlike in many other countries, has its origins in peaceful application. In the early days of Indian space activities, the main efforts were concentrated on doing space-science experiments. Even while many international co-operative e-

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May 7, 1984
Hindustan Times

Courtesy: Gopal Raj
who got it for me
→ see eval-b

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Indian studies in space technology

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periments were conducted, the theme of self-reliance made its presence felt in every facet of these experiments—establishing the Thumba Equatorial Rocket Launching Station (TERLS), operating it, building payloads for rockets and scientists making their own payloads.

These scientific experiments in ionospheric and atmospheric studies and astronomy did not contribute to any immediate national applications. They were meant to enhance knowledge of world science to which, as a big country, India has also an obligation to contribute. But because the accent was on indigenous experiments, the efforts did not merely stop at publishing scientific papers. Through this process was built the skilled manpower base for indigenous technology and applications. It may be worthwhile for some serious research to be undertaken to study the need for such a phase—not only for space but in other national tasks as well. Without development of a large pool of human resources, any talk of self-reliance is likely to end up as a pipe dream.

Around TERLS, near Trivandrum, a band of Indian technologists were nucleated in the Space Science and Technology Centre (SSTC) who studied and experimented at "Test Tube" levels various aspects of space technology— aerodynamics, structures, propulsion, propellants, electronics, inter-tial systems and so on. Many of these were tiny experiments with rockets of a few tens of millimetres—some even a repeat of what had been done and reported elsewhere. Though there were some imports, these experiments and the work of building expertise utilised Indian materials and components.

Another feature during the 1960's was that the budding space technologists at Trivandrum set up their own workshops and did everything from drilling to milling on their own premises—not too good a way of reaching self-sufficiency! Looking back, this appears to have been practical necessity.

The small requirements would not have attracted Indian industry.

Today the picture is different: much of ISRO's jobs for fabrication, be it for ground, antennae, launching ranges, massive high precision launch vehicle parts or satellite parts is done by various Indian industries spread through out the length and breadth of the country. This is a very notable indicator of the progress of the country. The successful launch of SLV 3, demonstrated that "India can do it."

A group of technologists and technicians from SSTC and a group from the Physical Research Laboratory (PRL) which had developed a pool of expertise through the indigenous space science experiments formed the base of the Indian satellite making programme at Bangalore since the 1970s. This group led to the successful design, development and launch of Aryabhata—the launch became possible due to the free supply of a Soviet rocket carrier by the Inter-cosmos Council of the USSR Academy of Sciences. It was a wise decision by the planners and the Government not to wait for an Indian launch vehicle to be built to launch an Indian made satellite. One probably could have done it but the initial annual budget levels of the space programme could then not have been limited to a few tens of lakhs rupees. Probably it was just as well to do the learning curves and "finger burnings, with lower funding levels.

The technology expertise that was built up for launch vehicles and satellites and the space science experiments did not by themselves make the whole picture for the Indian space programme in 1960's. The technology of satellite and launch vehicle making was recognised as the important and critical tool of the space era. Launch vehicles are the keys or corridors to the realm of space. Satellites are the "cozy homes" from which to use space. But these "cozy homes" cannot be utilised for national needs without a lot of activity on the ground, many of them very mundane. And the raison d'être of the Indian space programme was and is national developmental applications to reach the lives of millions of

Indians. The first step in this aspect of space activity was taken up in the mid-1960s when an Experimental Satellite Communication Earth Station ESCES was built at Ahmedabad with UNDP assistance. The entire system was imported from a Japanese company, but in keeping with its tradition of studied self-reliance, a band of Indian engineers and technicians worked out the systems engineering themselves and worked along with the Japanese. Once the station was built, the operations were fully in Indian hands.

It did not end there. With this group of expertise personnel as the backbone, the Department of Atomic Energy (DAE), which was then in-charge of the space programme, became the contractor to build India's first operational satellite for the Overseas Communication Service (OCS). DAE completed the task successfully. Many subsystems were selectively imported. But that experience enabled a dedicated and confident team to take up more challenging tasks of satellite communications for the country. A major Satellite Instructional Television Experiment (SITE) was undertaken with the help of an advanced US Applications Technology Satellite ATS.

These were the steps that began to make INSAT, still very much a dream in those days, closer to reality.

The 1970's were a period of projectisation. No longer was the focus on mere expertise building. Without specified tasks and clear-cut targets, end-products of a multi-disciplinary technology can be elusive. How much to bite at a time and chew was always a troubling question. By that time the world scene of space technology had dramatically changed. Man had landed on the moon. Planetary missions, big satellites and massive boosters had become common occurrences.

The tendency to go haywire or chew too much could have very easily diverted the Indian efforts during this period. But the attempt was to carve out specific Indian development goals and to build steadily a self-sufficient base

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Will for self-reliance

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so that these applications can be reasonably immune to possible future geo-political situations especially because space technology was adding new dimensions to the international arms race.

Where does Rakesh Sharma come into this picture? It is not just by the dramatic psychological impact of the event to create "space consciousness". The Indian

space programme has from the beginning had a small but significant component of experimentation with new things — some small, selected forays from the planned path. It is vital to do so in an area which is fast growing and which is in the frontier. So Rakesh Sharma symbolises Indian efforts to understand the problems and potentials of human space flights — about two decades after the Soviets and Americans did it first.

Will it lead to the emergence of carefully selected Indian goals in human flights? Some of the carefully selected scientific experiments in the joint Indo-Soviet flight seem to indicate so. The TERRA remote sensing experiment can have some immediate applications. On the happy occasion of Rakesh Sharma's return home after successful flight, it is good to ponder over our indigenous base, carefully nurtured and grown: The few thousand Indian men and women scientists, engineers, technicians, managers and other support personnel in whom the Indian indigenous space technology resides. Many of them are in their late thirties and early forties.

While the 70's of the Indian space programme is an experimental phase, the eighties will face three major diversionary forces: Pressures from the international commercial space business, the growing international arms race in space and its compulsions and pulls; and the desire for something dramatic since the carefully chalked-out indigenous effort may not seem to "Hit a Sixer", though it could perhaps be a "sure bat for a steady game". The Indian scientific and technical community is lucky to have enjoyed the support of the highest political levels in the country with the Prime Minister of this large country personally participating on many occasions to celebrate scientific and technical efforts — big or small.

The 80's and 90's are going to be very demanding on indigenous technology to serve the useful needs. Doubts may arise — some genuine and some mischievous. The chicken-hearted may be tempted to take easy routes of importing foreign technology and the excellent self-reliant base built assiduously may be shaken. But fortunately the will to sustain self-reliance is strong as seen by the many statements from the Prime Minister and the technology policy statement.

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We have come to the middle
of 1984 ~~the~~ which describing the
Manned Space Programme.

~~for~~ There were later linkages
too in the COSPAR meetings, the
same year. Our involvement
in COSPAR will be described more

around ADCOS. ~~we were~~ In the
COSPAR meeting there was a desire
when we were there attending it to
get our Cosmonauts & ~~etc etc~~ ^{celebrate}
it. Meeting I think, was in Graz,
Austria. Our embassy also
supported it. ~~It was not~~ I was
there; RR Daniëls, Al Miha were
all excited about it. But where
to get money — in foreign exchange?

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Since I was Sc. Secy ISRO and
the ITLU's came under my
administrative ~~space~~ span, I
~~was~~ worked out a method of
ITLU, Pans picking up the
food bill; Embassy person (Counsellor
~~of the~~ ~~or~~ Malhotra or higher level
told me he would bring the
liquor in his car.) & He
he was a Sikh Gentleman. He
came with his wife. Therefore
Indian hospitality was great.

Rakesh Sharma & Malhotra came.
I suggested to RRD & decided to
get both of them! I have
photographs of that unique

(828)

event with me. There were many ways in which Indian Space programme's had to be brought up in international community. We kept SD informed. He did not interfere in these mat did TNS. They all knew that I ~~am~~ was careful with funds and such events with apex international bodies like COSPAR was essential.

* *

Now I move to a series of events connected to ONISPACE-82 starting in 1981. The earlier threat was about YP's interest

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Starting ~~early~~ in 1980. I had obtained a general okay from SD to YP informally getting into the electoral process.

After that itself, YP was distancing himself from direct ~~inter~~ interventions in COUPDAS meetings. He ~~would~~ ^{would} ~~not~~ ^{always} leave to me & Chandra to handle. He would go and "lobby" in a sophisticated manner with the ~~for~~ powerful delegations like USA, France, Austria and also in NATO countries, G-77 etc. On the whole he was working towards majority of them favouring him.