

Chapter 3
1960-70 ^{cont'd} (725)

As I had ~~not~~ mentioned earlier, for me there ~~was~~ ^{were} no questions to be asked. I totally trusted VS that he was taking care of my aspirations and future.

So I started the work. I did not even ask what scale? ~~what~~ How many increments? I was more keen about the work. I was satisfied that PRL/INCOSPAR paid reasonably well. I never had a habit of comparing. May be due to naivete or due to philosophical (Hindu) ascetic personality, which also is reinforced by high principles of Communist ethics, at least

(726)

as written in the books!) outlook.
There was no greed. P&P
also did not drive me to be
greedy. Right from my childhood
Periappa had taught me to
~~have a satisfied life for~~

have a satisfied outlook..
~~It is~~ I was greedy to
learn more; to know more.
I wanted to do so many things
for the country and people.

- It is probably that drive
that made me plunge into
the work. Now there ~~is~~ was a
great direct support from V.S.
I did not want to ~~do~~ convert
it to monetary advantage.

(727)

So I was not too particular about the paper work to be done for PRL/INCOSPAR. They continued with B-350 pm. from 1 Aug 1967, - no other allowance. I was told that orders will ~~be~~ issue later. It was the same ~~all~~ stipend I would have received had I continued as a Research Scholar in PRL. ~~for~~ 300-325-350, ~~as~~ as I had completed two years in July 1966.

INCOSPAR administration was headed by Prof E. V. Chitnis (Secretary, INCOSPAR). Mrs. S. Joshi (probably she was Suman Kelkar then before marriage)

(728)

Asst. Admin. Officer, Sivsantharan
PS to by EVC; both of whom
would be continually, daily
fired by Proj EVC.

I think he was doing
the work or report which VS
wanted and did not bother

about these. My immediate

boss O.P.N. Calla did

not bother about my case.

He wanted a good assistant.

He had his problems with

Proj EVC. He wanted to ~~discuss~~
report directly to VS.

~~the~~ VS and his

office, our office (Calla, Louis
and me) - just a single room
by arrangement as we had

(729)

many electronic equipments,
Dinesh Pakle one room ~~at~~ —
VS's student, Prof EVC &
Sivasankaran, Mrs Joshi, then
a office room with Kulty and
various components / equipment
received from NASA as gift.

Being in the same floor
of ~~at~~ where VS sat
had great advantage for us.

Calla utilises it to the
full, as he ~~not~~ would
call sometime to show
VS ~~a result of pro~~ a progress,
a new result. VS liked
such constant touch with
the new projects. Calla would
not ~~show~~ such items to

(730)

Prof EVE. He had a feeling
(partly ~~of~~ for genuine reasons)
that the existing PRL managers
Etc etc were favouring P.P. Kale
(who was incidentally son
of a top man in Calia).

Calla was very highly qualified
for those days B.Tech, B.E
~~& M.Tech~~ & M.E from
BITS Pilani and directly
~~recruited~~ recruited by Atomic
Energy and sent to PRL.

He was actually
caught in these

Another problem
for Calla was that in a defence

(731)

project, ~~Sara~~ which was
in ~~a fl~~ the second floor
(we were in first floor) ~~the~~
~~the~~ VS had made two
~~for~~ independent chiefs.
Dr. N. W. Nurnkar & Calla.

Nurnkar & EVC though
not friends were old students
of 2 VS. So NWN ~~with~~
would try to dominate
in the defence project, which
Calla had to ~~so~~ sweat
out!

I was caught in this
~~web~~ web. EVC who was
in good terms with me

(732)

right from my entry into
PRL, would ~~like~~ like to
understand about the
Transponder project and
progress through me. Calla
would tell me "Sundar, don't
tell him anything!"
How can I be? Similarly

since he had to submit
~~the~~ request for budget to
EVC, he would give some
lumpsum figures like components,
connectors etc. When EVC asked
for details in file, Calla used
to give a micro-detailed
list of components by their
code name! It would be

(733)

difficult for expert in
that field to decipher. So EVC
wouldn't ask me. Calla wouldn't
nor show these papers to me!
~~The~~ Totality of his ecosystem
(^{part-}real and perceived) was such
that he might have seen me
also a person which the management
might use to dislodge him! I
had no such designs. My focus
was on work and not on the
~~politic~~ power-politics that were
going on! I was aware of them!

I had to balance
delicately the information I gave
to EVC and the sensitivities

(734)
of Calla. He used to include to
a few components not required
for the transponder project into
the list so that he could do
some research and publish papers.
He was obsessed with publication
of papers from IETE journal
onwards to some "superior" journals.
I think he made one paper
~~where he~~ on transponder to ~~an~~
IETE journal where he had
my and Louise name. I think
I have the paper somewhere!

In the overall I would
give a reasonably true picture
to EVC. Some excess, I
would justify as a provision

(735)

for back up / breakages etc.
It was partly true as some
of the microwave active components
were prone to breakages & or
damages. In the overall Proj EVE
got a grip of what Transponder
project' was and what we are
doing, at the aggregate level
at which he had to operate.
It was a good training
for me.

In addition, I was
an informal technical adviser
for Mrs Joshi, who ~~was~~ had
to single handedly deal
with many technical components

(736)

to be sent to Calla, persons
in PRL, and above all Thumba
and SSTC. These were aid
from NASA, some from France.

For her alone with a typist
PA (Kulby) assisting her

would be impossible to even

sort out ~~and list~~ and

make a list of whom it

should reach. NASA would

send a bulk of cables,

transistors, connectors etc.

EVC did not bother to get
into these details. But when

there were enquiries from Trivandrum
or other places, he would get

(737)

into a ~~few~~ frenzy (a handsome
very fair man ~~at~~ with sharp ~~nose~~^{nose}
with his ~~&~~ whole face getting
not just pink but red).

You can imagine the plight
of the young lady Mrs. Joshi.
Sometimes she would cry! That
would make EVC short
further.

Since I joined Colla's
~~group~~ section, I ~~am~~ was
an INCOSPAR employee coming
under the domain of Mrs. Joshi's
administration. In fact
most of ~~&~~ the office memos

(738)

my appointments to PRL/SSTC
etc have been from her. She
had these administrative
responsibilities, as well, as she
was the only operational officer
(level administrative)
of INCOspar, PRL/SSTC,
PRL/TERLS etc.

~~So it~~ So for her, my
being in the group was ^a great
help. She was well aware of me
and I had the habit of being
all over PRL and knowing many
things of ^a different groups.

So on her request, I would help
Kulky to sort out various
components, cables, etc from NASA
and other agencies, match them

(739)

to the person to be sent etc.
Then Kutty's job was to pack,
address and send. All through
my professional life: in ISRO,
NASA, DST, TIFAC etc, I had
always taken pleasure in helping
others, even in petty tasks, which
were required for ^{the} organisation. In
the process I was also creating
for myself an ambience, which
was nourishing happiness. In all
organisations I worked ^{for} or associated
with, the "lower" and "middle"
level staff were all in love with
me and showed me great respect
and affection, irrespective the

(740)

position I held or irrespective of whether they ~~have~~ would benefit from me or not. That really gives me a special happiness.

Such an attitude might have been due to a variety of reasons. My Periapappa having been ~~a person~~ a kind person, as I have seen him from Kottaram days to treating all persons equally even in an orthodox Brahmin village. ~~He~~ Even some Muslim men would ~~can~~ come for loan. Of course, non-brahmins

(741)

~~I~~ had to enter ^{through} ~~to~~ the backdoor
But he ~~was~~ treated them affectionately.
So was Perianamma. Then later
my own indoctrination by the
great & powerful songs of Subrahmanya
Bharati, right from age of 10,
then Swami Vivekananda, Sivarama
etc - many Hindu & saints,
~~Christina~~ exposure to Christianity etc.
Later of the Marxist readings
which emphasized the role of
the working class and the masses.

Of course

My spending time with
such persons, might have taken
away some of my precious time.
Later I found in life, others who
(P.T.O)

(243)

a
of a few days at TIFR for Cosmic
Ray Conference (1966) I had seen
persons flocking around
Homi Bhabha as he had
his visits. So much so

Narayanan Nair who was one
of the ^{senior} students of Sarabhai (VS)
~~and~~ nearly completing his
Ph.D, commented to me about
a senior professor who was
clinging on to Bhabha and went
on repeating "Yes Sir" "Yes Sir"
all the time, "Sundaranajan:
see this person, he ~~is~~ is going
to go high up." He told it
in Malayalam to me. Indeed
that person went up and played

(742)

orientes towards "personal para"
spend their time more and better
in "power circuits". I have seen
them; even in PRL where the
single source of power (big para
at that) was Sarabhai. I have
seen how people vie with each
other to get his attention. I had
seen ~~them~~ more persons in

Such actions at Thumba (TERLS)
and SSTC when we used to
stay for rocket experiments for
a long time and Sara VS as
Director SSTC used to come for
monthly visits.

During the brief period

(744)

a major role in the national level science & technology for many long years!

My life, large part of it, was with the most powerful people, including Indira Gandhi.

It was much later in life I read a lot about "Psychology of Power" (~2008) when I was writing for a Tamil magazine. ~~and~~ I was also answering Q & A section with fairly long one-page answers. I had earlier ~~to~~ that written a book on Indian Power ~~the~~ Hierarchy "Discover your Power Quotient" published by Rajpal (~2007)

But some don't, Chasing power and being in power circuits alone to maximise one's own benefits

(745)

did not appeal to me. May
be a psychologist ~~may~~ would
categorize me differently: not
having enough stamina for the
competitive situation or in
popular terms as "not having
~~enough~~ killer ~~instinct~~ instinct.

But what it be, I had
enjoyed the way I ~~did my~~
~~trans~~ offered my help to all,
in addition, of course, doing
~~my~~ ~~the~~ my work very well.

I had fully plunged
myself with the transponder
work.

In fact, my association

(746)

with Abdul Kalam started in 1965, in one such mode of working. He had often come to Ahmedabad to coordinate the sounding rocket flights with Prof Bhavsar; that would involve Bhavsar's allocation of rockets to scientists, schedules etc. It was a fairly complex exercise involving scientific / technical constraints of the payload, the time of ^{experimental} observation etc. Kalam's role was to discuss with the ^{PRL} scientists issues relating to integration of the scientific payload with other equipment

(747)

Onboard rocket life para supplies,
~~trans~~ telemetry system; special
timing circuits if, any; and
also other requirement of nose
cone separation etc. Dr. T. S. G.

Sastry who was working on
geomagnetism through rockets
needed ~~stick~~ nose cone
made of ~~comp~~ (fibre glass) composites,
~~with~~ ^{other extraneous} to reduce magnetic pollution to
his reading. Dr. Satya Prakash
required special very low - electric -
leakage nose cone & tip.

In addition, volume, weight constraints
were there. Also the scientific payloads

(748)

had to satisfy various other tests to survive a rocket environment such as vibration tests. Above all monitoring schedules of different packages which ~~would~~ would go in the rockets. Dr Kalam ~~would~~ ~~to~~ was around 34 years of age then and I, 21 years. ~~So~~ Also we could converse in Tamil, a ~~rare~~ rare thing for him Ahmedabad. He knew English & Tamil. ~~Hindi~~ About nothing of Hindi. But we use it also in PRL. Of course with the scientists, he could complete all his work in English. And get necessary ^{NASA given} components

(749)

from Mrs. Joshi or request for a ~~new~~ new set required for integration.

One thing about Kalam was that he was curious to know more. He did not stop with his routine work. He wanted to know more about the scientific payload, what ~~are~~ ^{were} the scientific objectives etc. He was, in ~~the~~ PRL/SSTC hierarchy ~~too~~ relatively lower. He could not ask Bhavsar, Chitris et al. If he asked the individual scientists they would get into their details of specialisation, which was too much. Only a few were available in general in any SET establishment who could explain in simple terms,

(750)

without losing the main science
~~as~~ contents. I appeared to be
one such person for Kalam. He
used to ask me questions about
each of the pay load experiment
and I was a "good" explainer, at
least to his requirements. In
addition, we would discuss a little
bit about Thirukkural ~~etc~~ and
some Tamil literature. He would
also use me as a sounding
board for some of his desires
to indigenise many parts of
the \$ pay load support system;
~~the~~ ground telemetry; radar etc.
Though he ~~was~~ used to come
with \$ his colleague - friend Aravamudan

(751)

who was in-charge for test and evaluation of payloads at TERLS and the ground systems, a bright person, Aravamudan did not

have such ~~at~~ ambitions of indigenising; he would just do what ~~is~~ was assigned to him.

No more! He was so all his life in ISRO. I guess, ~~so~~ such

persons who were intelligent and capable and limiting themselves to specific assigned tasks ~~and~~

~~these~~ were also ~~are~~ very useful for the stability of ~~an~~ an organisation.

If every one is "pushy" "curious - pushy" and "greedy-to-do-more" like Kalam & me

(752)

it may also be good, but
organisations cannot sustain
too many such persons!!

In the early ~~2~~ years of Indian
Space Programme (at IRL/INCOSPAR,
SSTC etc) there were a large

number of such persons, who would
want to do more. That was

the style of Sarabhai to encourage

them even to points of ~~the~~
severe conflicts of terrain/curf.

~~So~~ He probably wanted more
ideas, more proposals to
~~to~~ convert the ideas into action;

~~he to~~ some would fall out
for a variety of reasons; some

(753)

won't stand out; many may become "also-ran". So he had choices. I am able decipher all these from hindsight; I started understanding these in the 1980's when I had to take on the overall - ISRO level responsibility as Scientific Secretary, ISRO etc.

During 1960's, I was also one of the players, active one, being watched by VS! Kalam also was probably one as ~~he~~ he (VS) had give some additional responsibilities for small projects for Air Force and several such

(154)

side projects.

So Kalam & I had a natural affinity. We did not have any conflict of interest.

Later when I had actually

next year (c. 1966) when I joined Calla's group to do

rocket borne transponder,

which ~~is~~ was a crucial ~~to~~

support instrument for ~~the~~ ^{the rocket payload} ~~the~~ scientists.

Instead of denying

approximate positions in which experimental readings were taken by their payloads,

the rocket borne transponder

(RBT) would give the precise

coordinates ~~and~~ of the rocket

(955)

trajectory. Sarabhai had managed to get a few Thomson CSF transponders and had got Callor trained in them in France. He was then supposed to indigenise and to produce in India. It was not an industrial technology transfer for ~~license~~ production under license. It was a fairly heavy one taking away a good part of rocket ~~house~~ nose case housing.

This RBT work made me much more close to Kalam and his group, as we also had to do the coordination

(756)

for integration etc. Also for testing
the ^{RBT} payloads we had to go
to Thumba (Calla, Louis & I)

I had seen the dedicated
work by Kalam; with a jeep,
they would be moving late
in the evening and even ~~the~~ nights.

He also liked to talk to me
whenever he came to Ahmedabad
and ~~to~~ whenever Calla, me etc went
to Thumba.

Later ~~after~~ during his
Presidency and later when
he had more "spare" time, used
to refer to our ~~the~~ PRL-Thumba
days, especially when I used to
~~to~~ ask him to write about me.

(757) post-2007

I used to tell him "Sir, you are about 12 1/2 ~~+~~ years elder to me, but one does not know who will be taken away by God first. About you a lot is written. You wrote a beautiful ~~one p~~ ~~couple~~ one paragraph about me in the Wings of Fire. We have the You tell so many good ^{narrate} things about me and many instances of my contribution to ISRO, TIFAC, DST, Bihar, Uttarakhand, PTU, ~~CIIE~~ CIIE etc. Why don't put down a few items about me, which I need not see. You can put a condition that it can be seen only after

(758)

my demise. A sort of obituary!"

He never likes me talk about death of me or him. ~~Est~~ ~~Tea~~

"Ye! you are so young I say!

Don't talk of ~~de~~ your death!

But I will write about, some

some 25 pages or more. It

will start with PRL days... #

... Everything .. okay" ... and

with some ~~mist~~ mischief"

mischievous tone add "It

~~was~~ will also include how

people from Thumba & also PRL

fellows, were so jealous

of you being so close to

Miss Joshi! She ~~gives~~ talking to

(759)

to you often!... Of course,
it will contain transponder
days... ISRO HR days etc

You were a fire brand; people
so ~~scared~~ scared of the
questions from Rajan during
reviews....."

He would add: "Had
you been in USA you would
have made millions of dollars,
for the continuous stream
of ideas you have and share.
Here, ^{for} most of it, ~~are not~~
you are not even given
credit, let alone money!"

(760)

Such a solid foundation for our friendship which spanned half-a-century was laid during those PRL days around rocket experiments, transponder, etc.

During those days at Ahmedabad and Thumba/Trivandrum, though we lived each other and continued our friendship, never

imagined that it would go long; it would take us completely beyond those rocket experiments and space

technology! We had been fed the vision for the space research by Vikram Sarabhai — what ~~to~~ was

(761)

ahead. But all ~~the~~ our vision
were limited ~~to~~ to what we would
do. Well, that ~~is~~ was what, VS would
have wanted as well: a lots of
~~fellow~~ ^{young} dynamic persons sharing
his vision and acting some thing
on it, fighting for their work,
keep doing undeterred by failures,
etc. Describes in a Tamil Verse:

"
ஊர் உழைப்பின் காரணத்தினால்
கால்கள் கால்களாயினால்!"

"~~Those~~ Those whose "eyes" are
only into their duties (or actions),
Don't care for their hunger
Nor do they sleep!"

¶ Even amidst the passion
for such a work, on which I had

(762)

a great faith would help
all Indian people (may be
a naive thought or belief!),

I had also a great belief
that application of Marxism would
solve India's problems and
world's problem: it was a
historical destiny, for which
we had to work, unite the
working class against capitalism!

I did not ~~at~~ a clear
~~distinct~~ idea as to how
capitalism works; it was symbolised
by America. So any thing America
~~does~~ did ~~not~~ not wrong
geopolitically (especially against

(763)

India, by favouring Pakistan because of their special military facts) was because the nature of capitalism and imperialism. That firm belief (ideology — a respectable term) would not ~~do~~ look at the problems caused by Soviet Union. In any case, USSR was a friend of India giving it political support in UN for Kashmir, etc.

But for me at the ground level, the admiration (or emulation) of ~~our~~ space science and technology from America (including the numerous components we got ~~and~~ from NASA and ~~the~~ hundreds of ~~a~~ NASA reports giving wealth of useful information to us,

(764)

the whole series of MIT Radiation
lab series from which I learnt
microwave design, transponder
design etc) did not appear
as a contradiction! ~~Then~~ We did
not have a similar access to
Russian components or journals,
Some scientific papers from USSR
written in English was at best
what we read. So was about
the reports from Japan, which was
active in space research even
in 1960's. In fact ESCES
(experimental ~~com~~ satellite
communication earth station)
at Ahmedabad, built with funding
from UNDP was built by a
Japanese company.

(765)

I wonder now as to how I was ~~some~~ coping with all such complex yet passionate pursuits (ranging from ~~space~~ space science, microwave engineering, rocket payload construction techniques, Communist literature, and several other ^{Western} philosophical ~~and~~ studies, more by Marxian writers!)

Now looking back that period, I wonder whether I had been obsessed with these so much that I did not give enough time to talk ~~at~~ on some "ordinary" matters with Periapappa & Peridamma. There

(768)

again my own version of
Marxian / Communist Organisation
of the society was in terms
of giving necessary material
needs to people and unnecessary
indulgence of "bourgeois attachment"
only to family ignoring the
great "historical destiny" of
human society was not required.

~~I was~~ I was taking care
of them in terms of all food,
some medical etc needs. In
fact, I would give all the money
I earn to Periamma. I don't
recall even maintaining a
bank account, as the earning

(767)

were just a pittance. Periamma managed every thing after giving me so pocket allowance.

I did not know ~~them~~ then the importance of sitting together in a family and just gossip: the happiness which it gives beyond all these ~~me~~ material needs, especially when there was some minimum need ~~satisf~~ satisfaction (which we all had!)

One ~~other~~ ~~and~~ other reason which would have given me ~~such~~ such an attitude was a passionate ~~poem~~ and even a flamboyant poem by Subramanya Bharati (my

(168)

~~great~~ great guru) which
I used to ~~to~~ repeat to
myself.

"தேயி சேயு திசும் தீயு - பல
தீயினதும் தீயு தீயினதும் வேறு - லாபம்
பாபத்தீயுதும் பம் பம் உய்யுதும் - பிழா
பாபும் பல வெயிடம் வெய்து - தீயா
தீயும் தீயுதும் பம்பும் தாய்தும் - வெய்தும்
தீயும் தீயுதும் தீயா வெயும் பிண்கையம் - பல
வேயுதும் தீயுதும் வேயுதும் வேயுதும் - தீயும்
தீயும் வேயும் தீயும் தீயுதும் வேயுதும்? "

~~It~~ (Translation of this poem ^{done}
by great ^{Tamil/English} experts ~~is~~ is available
~~in~~ as Bharati Paadabgal, published
by ~~the Tamil~~ The Tamil University,
Thanjavur; hence I am

(169)

not translation. It can be
~~to~~ seen in the Google site
by googling "yasurajan ~~kavitha~~
kavithaigal")

I was pumping myself
to ~~be~~ born for a Great
Life, unlike the mundane
humans who ~~live~~ earn some
food, eat, gossip etc and
become old and die! It is
a challenge on Kaali is what
Bharati said. May be I was
also doing. The works I
did ~~not~~ at PRL, Thumba, the
talks (gossip?) Kalam & I or
I with others had was not gossip!

(770)

They were great ~~contributions~~ contributions
to build modern India!

In fact my younger
son Vikram ~~is~~ used to
tell me (part-teasing) since
2004 when he had also
entered ^{into} a career and was
in Gurgaon, that I had been
all my a "nation-builder" and it
was lucky that I was in ISRO in
Prof Dhawan's ~~is~~ regime (he was
aware of it — he was born well
beyond Vikram's ^{Sardhan} period and hence
he gets the name!). ~~Looking~~
I used to agree with him;
probably ~~is~~ most of my life

(771)

even after my age of 60 years &
(especially very seriously before it)
my focus was more on how
to take the benefits of modern
knowledge to all the people
of India and make India ~~stronger~~

strong. In that process my
attention to persons who were
near and dear in the family
did not get as much attention
as I ought to have done, just
as an ordinary human being.

Of course, I did my duties of
making the "material life" of our
family good ~~and~~ as also the
educational opportunities for

88 ~~my~~ our children good. But

(772)

I was also lucky that my wife Goma took care of large part of the emotional aspects of the family too. But till my marriage at Ahmedabad my attention to that part for Periapappa & Periamma, should be judged as inadequate if I look back ~~now~~!

Along with ~~my~~ ~~ideals~~ ideological passion, ~~and~~ my commitment to the transponder work was total.

I even ignored fixing up of scale. I find from papers

(773)

the INCOSPAR administration
(mainly by EVC with or without
the knowledge of VS) had been
treating me as only not as
an employee & in terms of salary,
appointments etc. My work was
going on full speed. I find ~~it~~
from papers (also from my memory)
that my formal order of
being taken as an Engineer
in PRL/SSTC was from ~~the~~
1 April 1967. Full seven
months from 1 Aug 1966 to
31 - March 1967 had been
created as a Trainee period!
I did not bother to ask!
Actually in Govt service (PRL/SSTC

(74)

service was broken as Govt service
though ~~to be~~ purely legally
it was not!) so many months'
of loss would have meant a
lot in terms of seniority etc. It
had some impact in future
career, in terms of dates of
promotion. An interesting
paper I find ^{in my papers} ~~was~~ is that
PRL/SSTC had made me
to undertake an oath of
adhering to constitution etc almost
as it would be done for a minister.
I also remember that PRL had
asked me to fill a form in
which ~~state~~ ^{religion} / race / ~~caste~~ etc
were given. It would have

(775)

been some obsolete form from
Co I. I refused to write Race.
According to them I had
to write Brahmin against Race
(Hindu / Brahmin). I asked
them who told them this
anthropology. It was beyond
them. I ~~found~~ refused to
fill it, though I had given
a full declaration of oath,
gave Civil Surgeon certificate etc.

PRL Administration refused to
pay me salary. It went on
for sometime. Finally, I
think I they gave up and
I find my salary etc got
fixed from Oct 1967 onwards
(orders signed by Mrs. SS Joshi)

(776)

Calla was busy between
ISIS & Defence Project) and SSTC's
transponder project. He wanted to
show ~~the~~ success. Therefore ~~at~~ we
were trying push the Thomson-CSF
given transponder; it was bulky.
The packaging was very tight. ~~It~~
The whole circuitry was made of ~~two~~
electronics tubes because the design
was to ~~cover~~ convert the microwave
radar signal to an intermediate
radio frequency ^(i-f) stage in which the
signals are amplified. There was a
local oscillator ~~to mix~~ (microwave
frequency) to convert the input signal
to intermediate stages. Then at
the intermediate i-f stages, there

(778)

were
2nd many r-f coils ~~to~~ for
tuning the amplifiers. All of
them were classic circuits; probably
adapted from an aircraft version,
a little bit ~~rugged~~ compacted
and ruggedised for rocket version.

The entire unit was energised
by a 100V battery — almost a
foot long and thick, specially
done. Otherwise it was of same
technology of the type ~~of~~ to what
~~it~~ we was for torch lights.

The whole unit gave a
lot of trouble in terms of tuning
to the right frequencies. After
all the tuning ^{was completed,} when covered by

(778)
the top metallic cover, the
frequencies used to get shifted!
Open, ~~the~~ half close, time
again and ^{then} close; it was a
nightmare. After each success,
we used to 'araldite' them
so that things ~~don't~~ did not
shift. In those days, Araldite
made by CIBA in India, was
a great saviour for all of us
doing rocket payloads: from
scientists, to support ~~parts~~
payload engineers like us, the
power supply makers etc and
the rocket integration group
of at TERLS (Kalam & team) etc,
Araldite was the one which

(779)

held ~~together~~ together our delicate parts or joints, thus preventing problems during the ^{ground} vibration tests and eventually in the flight.

For us, there was more problems. If after all that frequency shifter, to take out the unwanted parts was a great trouble. Louise who did all these ~~to~~ job almost regularly ~~was~~ used ~~of~~ the soldering iron deftly! I had also learnt the techniques.

All the while even while working on the payload

(780)

I was very ~~unconf~~ uncomfortable with the design. While lots of drawings were given by Thompson-CSF there were very little information on rationale etc.

Any way that was the baseline Calla was working on; he had gone to France; and trained; also they had given hardware. Some how we managed to get ready (one or two payloads) and took them Thumba. A series of four rocket flights were to go; Sodium Vapor Flights of B. Bhavsar - Ranaraja Rao; one or two of transponder flights.

All of them were failures. Calla had gone

(781)

off earlier due to long uncertain
waits for flight integration. ~~It~~ For
a rocket flights we may have
to be ready to stay at TVM
for weeks together; testing of
payloads, not just ours, other
items for ~~the~~ ^{a rocket} flights; ~~reps~~ ~~retests~~

repairs - ~~retests~~ retests etc.

So the scientists / ~~top~~ bosses
like Calla may leave ~~as~~ persons
like us after they are satisfied
with their parts. Moreover Calla had
the ISIS work at Ahmedabad
which ~~was~~ had a team of
its own and he had strict deadlines
with the ~~uses~~ users (in defence).

I Many reasons were
attributed to the failure. For our

(782)

payload, the battery was told to be as one reason; as for other payload's the failure was attributed to a power supply ~~is~~ given by Kale's SSTC division ELD(S). Actually systematic review was lacking. I was sure that the failure was not due to our battery as it had over capacity even with wait's in the launch pad. I suspected it to be due to ~~vacuum~~ vacuum in the flight and corona discharge as we had high voltage generation inside for the microwave tubes.

One by one we were to solve. I had some ideas. But all these at Ahmedabad only.

(783)

When we were returning,
Louis and ~~me~~ I were given
special permission to fly from TVM to
Cochin to ~~At~~ Bombay and then
by train to Ahmedabad. We
were not eligible.
* * *

I should at this
point mention that my first
air flight took place from
~~the~~ Madras to Hyderabad

to Bombay to Ahmedabad along
with Mr. Calla. It was a
night flight ~~by Fokker - Friends~~

Fokker - Friendship. Night
flight as it was, in those
days, at concessional rates.

(784)

Almost after take off, there were thundering clouds and probably heavy ~~saves~~ rain bearing clouds on the way. The aircraft was buffeted up and down and through the windows ~~the~~ we could all see ferocious lightning activities away from us but around us! Most people started praying; ~~we~~ ~~could~~ I could hear "Hey Ram!" chants. Calla by my side did not speak at ~~at~~ all. His face was full of beads of sweat. I was trying to relax him. But no avail. He was very tense. I was probably the

(785)

the only one who was not
panicking. First flight excitement
or young age stupid courage? I
was just 22 or 23. I was not married. Finally the
flight landed at Hyderabad!

All were relieved.

* * *

Coming back to our Cochin flight;
we learnt that Sarebhai also
was returning by that flight. We
wanted to avoid seeing him after
the failed flight. He could easily
identify us, because in PRL we
were working in the same floor as VS.
Whenever he came to PRL, he used
to enter our room, to ask for progress.

(786)

Since there was a halt at Cochin, Louis and I rushed to the rest room and finished and ~~wanted~~ wanted to get into aircraft.

Lo and behold VS spotted us and asked us: "So the Spanish Armada is back. When can we get the next transponder? Six months or even earlier?" He was full of smile.

We said, "Yes, Sir" It was not easy. But ~~we~~ that was his remarkable spirit. He did not show anxiety; he might be feeling bad inside. But we were to be given confidence! It was a great relief for us.

After coming to Ahmedabad

(787)

we had a long discussion
with Calla. ~~We did~~ I argued
"against the battery discharge
theory" gave by TERLS persons.

We suspected vacuum corona
discharge. Our only solution was
to use a ~~wash~~ gasket (rubber
washer) used in pressure cookers.

~~One~~ One size fitted the Thomson
CSF ~~transponder~~ well. Still
ground tests showed problems,
though we pressurised ~~it~~ the
whole casing well, by fitting
a cycle valve used for pumping
cycle ~~tyres~~ ~~the~~ tyres.

Again solution was
It was suspected due to
the sand casting of the casing used
for closing all the circuits. It was

(788)

So we stuck upon the idea of putting some araldite in liquid form, ~~cover it~~ use the cylindrical casing ~~on a~~ with a cover, pressure cooker

gasket & cycle ~~to~~ valve.

Idea ~~is~~ was to pressurise the casing very much so that araldite was pushed into the pores. We ~~can~~ had a

couple of non-lethal accidents; the casing ~~fell~~ flew of the hand etc. The workshop

workers mostly "Panchals" ~~and~~ were very immature. Only old man with husky voice was called by every body as "Kaka".

(789)

If "Kaka" after assessing the work, ~~say~~ said "Ho jayaaga saab!" in his husky voice, it is done! In work & schedule!!

Any way we solved the vacuum problem, by pressuring the casing vessel, plugging pores, etc. The cycle ~~was~~ valve had to fly because ~~the~~ even before launch we had to check pressure, as slow leaks may take ~~to~~ place due to long delays.

But I ~~to~~ went one step further in convincing Cella to jettison the Thomson-CSF

(790)
route. I had designed a
new transponder. No intermediary
amplifiers. It ~~is~~ ^{is} ~~dis~~ was
directly the radar signal converted
into a pulse by a ^{sensitive} microwave
detector. A video amplifier
made ECIL made transistors.

Finally I had done all
link calculations. It could
work even for higher heights
of RH-560, and definitely
on Centaures which went to
much lower range. Only
Centaures was flown as
RH-56 was under development.
Finally we did it!

(291)

The transponder worked very well. Much easier to adjust as we had only one microwave active tube to handle at transmitter end; no local oscillator.

We also decided to avoid the complicated casing with pressure cooker gasket.

It was done by a good aluminum plate; no pores.

We built an ~~O-ring~~ O-ring.

No cycle valve needed.

~~After~~ We had to argue with TERLS persons. Our

point was that we were well within ~~but~~ rocket envelope, weight etc. We could also use

(792)

the power supply given by
the Rocket Integration group and
not insist on the huge dry
cell battery of Thomson-CSF.

We passed all tests.
The vacuum tests. Thermal tests
and also vibration tests.

Alas! In the flight
after take ~~off~~ off, there was
a huge block of pubscant
radar lock track, though at
ground it was rock steady
~~to~~ and radar locked
well.

What was the problem.
No body had a clue. The
Rocket Integration Team of Kalam

793)

And ~~the~~ the Rocket Test & Evaluation Team were all at a learning phase. They did not even identify the ~~error~~ possible Corona ~~fail~~ mode failure of the Thomson CSF transponder.

We had to guess and solve. If they learnt some thing in one payload, then they would apply to all, without analysing the applicability.

So again it was our head ache to find out.

* * *

It was ~~early~~ early 1968 I think. On one ~~side~~ side my letters to editor peaked and

(794)

transponder work also peaked
after the struggles during ~~1966/1967~~
1967 when he had failures.

I had abandoned
my engagement with ~~Marxism~~
communism and possible ~~revolutionary~~
revolutionary path somewhere
during middle of 1968. ~~People~~
~~People~~ People had been
approaching Periyappa & Periyamma,
may be through letters, about
possible alliance with me.
They had rejected a couple
of them. Periyamma once
told me that a relative
from the ~~side~~ lineage of my
(P.T.O)

Agenda Item 1:

Resignation of Dr. D.C. Sundaresh from Board of Governors

✓ (795)

my "small grandfather" (grandpa's brother) asked for alliance. ~~But~~

Though good persons, Peramma & Piriappa did not want any burden for me in life. That girl was the eldest and had sisters and was without father

So the burden of taking care of them, might fall on me, was ~~there~~ their judgement.

Peramma said "We have said, no. They may try to directly contact you. Don't accept!"

They were so concerned about

(796)

my ~~fact~~ future and were also aware of my naivete in such "worldly" reasons.

With my decision to quit revolutionary path & I had indicated to P & P that now I was ready for a suitable choice by them.

In Ahmedabad, it was difficult for them to find. Though, in principle, I supported "love marriage", personally

I did not know how to approach a girl I liked, propose etc. I also did not have the courage to accept their rejections. Also, I was too busy with my work

(1977)

ii on transponder and other
extra professional" readings.

It so happened
that one day Sasisekha - ben
(1968 end of month) came to our house when I
was there and came with a
young girl and in her
broken Tamil told my Periana
that she had brought a
Tamil Brahmin girl to talk
to her as her father had
come to their house. And
she said that it would be
good company for her. There
was only one operating hall
(living room) & ~~the~~ kitchen.
Three of them went into
the kitchen. ~~I~~ As was

(798)

my practice, & I sat
on the bed stacks (there
three beds of P & P & me
"Ologong" & pillars were
rolled and stacks. Good
~~light~~ height to sit.
There were no other
furniture in the house!

I did not even
lift my eyes to see the new
entrant, due to my shyness
to see girls directly! After
talking for some time with
Periamma they went away.
Periappa was in the hall.
I was reading some thing
as usual.

(799)

Next day morning
Sasirekha ben came running
to Periamma and told her

"I forgot something. What
about looking at the girl for
marriage with your son?"

Without a wink or
waiting for any body else
Periamma said, "Yes, I had
made up my mind yesterday
itself. It is actually Gomati
Amman's decision to send your
Gomati to our home!"

Periamma was a
great devotee of ~~San~~ the
Gomati Amman of The Sankaranga

(800)

near Kottaram, our village. She
~~will~~ would always remember Her.
Even when I seemed to have
some problem with my health
in Bombay, one night, as described
~~in~~ earlier, she had prayed
to Her. ~~to~~ & sitting at
Ahmedabad where it was difficult
to ~~find~~ find a South Indian
in those days, ~~the~~ suddenly
to have a young woman of
right age visiting our house
— being a daughter of a Tamil Brahmin —
was, for Periamma, a Divine
Decision. Sasirekha herself was

(P.T.O)

2, Gandhi Mandapam Road

Chennai 600 025, India

Tel: +91 44 24430228, 24901367, 24419466

Fax: +91 24914543

Website: 'www.cics.tn.nic.in'

(801)
happy and went off
saying that she would inform
(Gomati's father) R.V. S. Maniyan.

She did not return.

~~I think the of her father &~~

I think R.V. Maniyan and
Gomati came so that they ~~can~~ ^{could}
formalise the marriage proposal,
~~Agar~~ in a few days. Maniyan
stayed in Dharamadhra. He had
a car and loves driving. It was
easy for him. Sasirekha ben
~~had told~~ was again the intermediary.
By this time, ~~Periaf~~ Periaroma
had prepared me & Periaappa

(802)

for this marriage.

What was amazing to me was that Periamma who ~~is~~ was orthodox ~~to~~ did not bother even about the sub-caste of the Brahmin ~~who~~ Maniyam was. It was a great deviation in those days, for a person like her. Maybe she was pragmatic on this point (as she was when necessary) ~~to~~ because Tamil Brahmins were rare to get in Ahmedabad in those days. She had no methods of reaching out persons in Bombay, Delhi, Madras etc. ~~I was~~ ~~search~~ I had completed ~~But a greater~~

(803)

24 years and would ~~soon~~ soon
be 25, & as we were nearing end
of 1968.

But ~~at~~ So one can assume
about Periamma not enquiring
about the age of the girl - normally
she ~~is~~ was used ~~to~~ to a gap
of 5 years. Again this could be
pragmatism.

~~It~~ What was most
surprising was that she did
not even bother to match horoscope!
That too she had been the
daughter-in-law of ~~the~~ a great
astrologer (my grandfather) to
whom so ~~to~~ many persons, even
from distances, used to come to

(804)

match ~~marria~~ horoscopes for marriages! It is my grandfather who had calculated ~~the~~ ^{my} horoscope.

I come to a ~~conclusion~~ conclusion for Periamma, ~~that~~ Gomati Amman was ~~an~~ overriding all other considerations. So Gomati, Maniyan's daughter, for her was sent by Gomati Amman herself. No further questions!

Since Sasirekha ben expressed the desire that I met Gomati and talked to her, ~~about~~ Periamma told me to go. She ~~Maniyan~~ was in Setty's residence (Sasirekha ben's house). I went. Maniyan ~~told me~~

(805)

talked to me briefly, to know about my job etc. Already Setty, his friend, would have appraised him. Then Maniyar told me about Gomati briefly and she wanted to ~~know~~ know about my views on life; plans for life etc.

Then Sasirekha ben took me to the room (it was also the same type of house in which we stayed, except that Setty's occupied the whole house - no tenants.

But their family was big. Parents and five children, their ~~eldest~~ elder daughter Sukanya

(805)
Gomati's close friend in the
final stages of completing her
M.B.B.S. Even within these
space constraints, they all
left Gomati & me alone
to talk.

Unlike what Maniyan
told me, Gomati did not ask
any question! In fact I had
the series of questions given
by Maniyan and ~~was~~ used
them as a base, to faithfully
reply to Gomati! I was serious
(as I always was on such matters)
and replied as if I was writing
an exam! About views on life

(806)

I explained. But added that all these views ~~are~~ ^{were} real as of now and were ~~likely~~ likely to change as life went on. I said that so it would be with you.

"As we grow, ~~to~~ we experience different ~~with~~ situations. There are many things outside us which change! We have to adapt too! So therefore what shouldn't ~~be~~ bind us would be the trust we have in each of us. Our getting ~~to~~ into marriage won't depend upon whether we feel we can

(807)

repose such a trust on
each other!"

Probably ~~it~~ many
such things were told by me.

She was listening and did
not ~~not~~ interrupt me or

ask any question. She was
a graduate in Sociology and
Psychology from Sophia College,
Bombay University. I do not
remember whether ~~in~~ I interrupted
and asked her whether she had
any question. I do not think
I was that mature, in those days!

(808)

I get deeply ~~involve~~ and intensely involved in my thoughts and ideas (probably even now!)

~~The~~ The conversation would have lasted about 30 minutes or more.

I said good bye to all and went away home. A couple of hours later Sasitkha ben came running to our house and asked me about my height. I was ~~short~~ then and was always in a bush shirt and would have looked short. I had my sense of humor and said "Mami, you are are you

(809)

all worries that I am shorter than the girl. No way. If she were of my height ~~then~~ (5' 7") then we ~~were~~ ^{would} all be feeling that we have to look up to her. Women always look much taller than a man of same height!"

This was not enough for Sasi ben. \$ She had to have a proof! May be that was a clinching point in the discussions that might have gone after I left. She told me "Come and stand near me! Let us see in a mirror". She saw. \$ She was under my shoulder; she was

(800)
about 5' 1". She was beaming
with smile "Yes, ~~yes~~ you are
right. ~~She is~~ Goma is little
more ~~the~~ taller than me!" So
she ran back!

The marriage was fixed,
without the usual 'nischayalhanthana'
ceremony etc. That again
showed the firm belief of
Periamma ~~that~~ about the
Divine Decision. ~~We did not~~
~~have a ph.~~

We did not have
a phone at home & Maniyam
was to send some messages

(811)

to me via Setty mama
that he was going ~~to~~ via
Ahmedabad to Bombay by train
for some official work and
whether I could come and
see him in the railway
station.

I did a few times;
he would talk to me. Once
we had all gone to shopping
in Ahmedabad. Goma also was
a part of the ^{shopping} party. Maniyan
was so concerned about his daughter
that he would stop often to get
her Coca Cola. He would say "She will
get tired. So I do this ~~away~~ often!"

(812)

What a simple man! He did not even think that this "weakness" mentioned by him, ~~was~~ might bias my mind. On my part, a strong "~~Makia~~" "Made in India" practitioner and anti-US and therefore anti-Coca Cola, a symbol of "American imperialism" (@ 1968 for me), thus did not matter. Was it a part of "love" that obscures ~~weak~~ blinds one to the "weaknesses of the ^{#11} loved one ^{#11} ?

In one ~~of the~~ such

~~813~~
(813)

meeting at the Railway station,

Mamiyan asked me to give him my horoscope or post it.

I asked him "What is it

Mama? Having come so far,

you are thinking of horoscope - matching; & what if the

horoscopes do not match?

Would you cancel it?" ~~Yes.~~

Personally I had a strong dislike of looking at horoscope.

It comes from Subramanya

Bharati' Pudhiya Athichudi

~~(4/1/19)~~ (4/1/19 2/1/19 3/1/19)

"~~Be contemptuous to astrology!~~"

"Be contemptuous to astrology!"

(814)

But the simplicity and innocence in the face of Maniyan with some what of a sheepish smile he had when he asked, probably disarmed me. I did not get angry. After asking that question, I said that I would send. I did. I don't know what happened to his matching exercise! He never said anything. Nor did I ask him any time later, even after the marriage. Even now, our home records do not have the horoscope of Gomati! That was how my marriage was fixed!

(815)

Maniyar had an idea that he could come often to meet our family. I do not remember how the date of marriage June 2, 1969 was fixed. He would have consulted my Perappa & Peranna. Since our meechips were at the end of 1968, he had plenty of time to plan.

I recall one point: he had problems of getting a ^{Tamil} priest and other Brahmins for conducting the marriage at Dhurangadbra and also for arranging South Indian

(816)

type food etc. In addition, it would have been difficult for our family members who were residing at Bombay or Delhi to come to Dhruvachitra. Ahmedabad had excellent train connections. So Maniyan took the decision to conduct the marriage at Ahmedabad, at bridegroom's place — a departure from traditions.

Thus the fast movements during 1968 were on several fronts: a peak of my Marxian oriented writings to newspapers;

(817)

a lots of such writings to G.K. Pillai;
meetings with him & AK Nair;
almost all during the first half
say upto Aug 1968 (my one
letter is dated that). Some where
later may be in September/Oct 1968,
the decision to quit all ideas
of political ~~action~~ ~~the~~ possibilities
as described earlier. Almost
immediately thereafter the episode
~~is~~ described above: meeting
Maniyan & Gomati, fixing of
marriage by Peramma etc.

On the ~~workshop~~ worksite
after the $\frac{1}{2}$ immense pressures
of failures of the transponders

(818)

during 1967, ~~and~~ radical changes
to the design going ~~to~~ for
a video based transponder, totally
jettisoning the Thomson - CSF approach
to transponder making. Facing
initial problems of failure — all
problems not yet solved, ~~the~~

Amidst all these a major
life - decision, marriage fixed!

Such was the high pressure
year of 1968. I don't think I
ever felt the pressure. Though I
would not like to describe it
as courage, but it was a
period when I faced life on
multiple fronts without losing

(819)

* my balance. It was almost like life - as - usual.

Things were not yet, all easy and go. Get married & settle down.

* *

I had almost narrowed down the possible problem ~~of~~ of "random pulsing" of the transponder, when the rocket lifts off. It ~~was~~ worked in all other conditions very well.

It worked in every other conditions. So there had to be

(820)

Some thing during the flight.
It can be shock and vibrations.

The rocket team at TERLS
would say, they had tested
in the vibration table they
had (gift from USSR). I

found out that the vibration
table there ~~was~~ was hydraulic
driven and ~~goes~~ could go
only upto ^{about} 200 Hertz of
vibration. Rockets could ~~be~~
give upto 2000 Hertz. How
to ensure ~~that is~~ tests for that.

(821)

In the meanwhile I was trying to a theoretical basis for the "random pulse" occurring. If there ~~are~~ are very strong vibrations, the microwave diode which converts the ^{microwave} radar/pulse ~~to~~ into a small video pulse or else the ~~the~~ input transistors ~~in~~ ~~the~~ ~~at~~ ~~the~~ which amplifies this pulse, may be giving microphonics under heavy vibration. These in turn may get amplified further and ~~also~~ saturate

(822)

videoamplifier which then
gets into a random pulse
mode instead of faithfully
reproducing the radar pulse.

Well, it had been vibrates
for high levels at the TERLS
USSR given shaker. Nothing
happened. That would indicate
that ~~it was for~~ there was
some thing happening beyond
~~20~~ 200 Hz. That could be
"resonance"; only then the
vibration levels ~~may~~ ^{could go}

(823)

up very high. Which would
mean that there was
some thing in the transponder
which had a "resonance"
frequency beyond 200 Hz.

With my knowledge of
my B.Sc. (Hons) study on
"Acoustics" (I think the
book was by Richardson),
I could narrow down
our guess. The diameter
of the payload allowed for

(824)

Centaur rocket was about
1 ft (300 cm). ~~It~~ Such
a plate can have a resonance
frequency of about 300 Hz to
350 Hz.

So all the more
reason we need to go
to about 500 Hz ~~or so~~ or so.
Those were the days ⁽¹⁹⁶⁸⁾ ~~of~~ when
India was at rudimentary
stages of science and technology
development. So most institutions
would not have "vibration table"
Finally we found that only

(825)

Very good modern (of those days)
electrodynammic vibration table
was there at Defence Research
& Development (DRDL) at Hyderabad.

One problem facing
me ~~is~~ was that I had
~~get~~ identify the problem and
get it solved. The Thomson CSF
transponder had several other
problems (none of them made
~~a su~~ a success for a variety
of reasons) but it would have
this problem because it ~~has~~ ^{did}
not have high video amplification.

(826)

It had tubes etc. ~~but~~ In any case, it would not have worked for us. But this video amplifier system had the advantage of simplicity but ~~it~~ got into this problem! If we could keep the different modules separately and not have ~~a~~ one canister (a design inherited from Thomson CSF) we could avoid this resonance. But that was not possible. The ~~to~~ rocket integrator team had given a volume and weight