DEPARTMENT OF SPACE

DEMAND NO.90

Department of Space

A. The Budget allocations, net of recoveries, are given below:

			(In crores c							n crores of	of Rupees)
	Λ	Major Head		get 2000- Non-Plan	2001 Total	Revi: Plan	sed 2000-: Non-Plan	2001 Total	Budget 2001-2002 Plan Non-Plan Total		
	Revenue <i>Capital</i> Total	1	1346.89 <i>353.11</i>	319.22 	1666.11 <i>353.11</i>	1330.79 <i>269.21</i>	308.52 	1639.31 <i>269.21</i>	1288.46 421.54	320.00	1608.46 <i>421.54</i>
1.	Secretariat - Economic Services	3451	0.01	4.14	4.15	0.01	4.17	4.18	0.01	4.17	4.18
Spa	ace Research	0.01	0.01			0.01					
Roc	cket Development										
Ζ.	Geo -Synchronous Satellite	3402	125 72		125 72	75 46		75 46	08.31		08.31
		5402	6.96		6.96	10.80		10.80	0.35		0.35
		Total	132.68		132.68	86.26		86.26	98.66		98.66
3.	GSLV MK-II Development	3402	0.10		0.10				5.00		5.00
		Total	0.10		0.10				5.00		5.00
4.	Cryogenic Upper Stage										
	(CUS) Project	3402	22.26		22.26	15.67		15.67	20.34		20.34
		5402 Total	3.25		3.25	6.33		6.33	0.96		0.96
5	C-20 Cryogenic Stage	IUlai	20.01		25.51	22.00		22.00	21.30		21.30
0.	Development	3402	4.00		4.00				0.10		0.10
		5402	1.00		1.00				0.10		0.10
		Total	5.00		5.00				0.20		0.20
6.	Polar Satellite Launch Vehicle -										
	Continuation Project	3402	83.07		83.07	91.00		91.00	90.00		90.00
		5402	15.00		15.00	1.00		1.00	15.00		15.00
7	Vikrom Sorobboi Space Contro	10tai 2402	98.07	105 29	98.07 166.70	92.00		92.00	105.00	100.26	105.00
7.	Vikram Salabhai Space Centre	5402 5402	20 70	105.30	20.70	09.02 14.66	101.24	1/ 66	/3 22	100.30	103.07
		Total	82.02	 105.38	187.40	74.28	101.24	175.52	106.53	100.36	206.89
8.	Indian Space Research										
	Organisation - Inertial Systems										
	Unit (IISU)	3402	6.80		6.80	6.39		6.39	10.80		10.80
		5402	1.23		1.23	0.18		0.18	3.33		3.33
~		Total	8.03		8.03	6.57		6.57	14.13		14.13
9.	Sriharikota Centre	3402	38.18	40.60	78.78	32.31	39.66	71.97	34.10	41.67	75.77
		0402 Total	10.30 53.56	 10 60	15.30	15.54	 30 66	15.54 87.51	15.00	 11 67	15.00 01.57
10.	ISRO Telemetry, Tracking &	iotai	00.00	40.00	54.10	47.00	00.00	07.01	40.00	41.07	01.07
	Command Network	3402	8.41	13.56	21.97	8.21	13.66	21.87	8.51	14.42	22.93
		5402	4.14		4.14	4.95		4.95	7.24		7.24
		Total	12.55	13.56	26.11	13.16	13.66	26.82	15.75	14.42	30.17
11.	Liquid Propulsion Systems						~~ ~~				
	Centre	3402	19.54	32.93	52.47	15.82	32.69	48.51	24.02	35.71	59.73
		5402 Total	0.07 27.61	32 93	60 54	23.24	 32 69	55 93	61.88	 35 71	97.00 97.50
12.	Second Launch Pad &	iotai	27.01	02.00	00.04	20.24	02.00	00.00	01.00	00.77	07.00
	Common Facilities	3402	0.31		0.31	0.50		0.50	0.50		0.50
		5402	125.34		125.34	79.50		79.50	131.50		131.50
		Total	125.65		125.65	80.00		80.00	132.00		132.00
13.	Other Schemes of Rocket										
	Development	3402	5.00		5.00				0.10		0.10
		5402 Total	5.00		5.00				0.10		0.10
14.	Radar Development Cell	3402	0.88		0.88	0.90		0.90	0.20		0.20
		5402	0.31		0.31	0.31		0.31	0.30		0.30
		Total	1.19		1.19	1.21		1.21	1.28		1.28
15. GSLV Continuation Project 3402								5.00		5.00	
Tota	al - Rocket Development		581.97	192.47	774.44	446.57	187.25	633.82	616.83	192.16	808.99
Set	ellite Development										
16.	Indian Remote Sensing	2400	0.50		0.50	0.50		0.50			
		3402 Total	0.52		0.52	0.52		0.52			
		iotal	0.02		0.02	0.52		0.52			

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						1			(<i>I</i> .	n crores of	Rupees)
		Major Head	Bud Plan	get 2000-: Non-Plan	2001 Total	Revi Plan	sed 2000-2 Non-Plan	2001 Total	Buo Plan	dget 2001-: Non-Plan	2002 Total
17.	IRS P4(Oceansat)	3402	3.12		3.12	1.30		1.30	0.50		0.50
18.	IRS P5(Cartosat)	3402	42.57		42.57	23.17		23.17	30.04		30.04
	. ,	5402	24.93		24.93	16.35		16.35	4.67		4.67
		Total	67.50		67.50	39.52		39.52	34.71		34.71
19.	IRS P6 (Resourcesat)	3402	45.92		45.92	25.04		25.04	28.23		28.23
		5402	2.53		2.53	0.24		0.24	2.31		2.31
		Total	48.45		48.45	25.28		25.28	30.54		30.54
20.	G-SAT-1	3402	3.50		3.50	3.50		3.50	3.00		3.00
21.	G.SAT-2 & 3	3402	19.50		19.50	14.00		14.00	30.00		30.00
		5402	0.50		0.50						
		Total	20.00		20.00	14.00		14.00	30.00		30.00
22.	IRS-II (Cartosat-2) Satellites	3402	8.00		8.00	7.41		7.41	32.86		32.86
		5402	2.00		2.00	2.59		2.59	7.14		7.14
		Total	10.00		10.00	10.00		10.00	40.00		40.00
23.	IRS-II B/C	3402	5.00		5.00				5.00		5.00
24.	Direct-To-Home Satellite										
	(including Launch Services)	3402	0.10		0.10				0.10		0.10
25.	ISRO Satellite Centre	3402	46.93	33.70	80.63	37.21	32.30	69.51	52.81	33.56	86.37
		5402	9.29		9.29	10.42		10.42	38.64		38.64
~ ~		Total	56.22	33.70	89.92	47.63	32.30	79.93	91.45	33.56	125.01
26.	Laboratory for Electro-Optics										
	System	3402	5.84		5.84	6.06		6.06	6.81		6.81
		5402	11.88		11.88	7.66		7.66	11.54		11.54
07	0.047.0	Iotal	17.72		17.72	13.72		13.72	18.35		18.35
27.	G-SAI 3	3402							10.00		10.00
28.	MEISAI	3402							48.00		48.00
		5402							2.00		2.00
Tat	al Catallita Davalanment	Iotai				455 47		407 77	50.00	 22 EC	50.00
Sna	ai - Salenne Development		232.13	33.70	205.05	155.47	32.30	10/.//	313.05	33.30	347.21
20	Space Applications Centre	3402	36 61	38.02	75 53	20.24	38 37	67 61	37.84	13 00	81 7/
20.	Opace Applications Centre	5402	21 11	00.02	21 11	21.82	00.07	21.82	12.36	+0.00	12.36
		Total	57 72	38 92	96 64	51.02	38 37	89.43	50.20	43 90	94 10
30	Development and Educational	iotai	01.12	00.02	50.04	01.00	00.07	00.40	00.20	40.00	54.10
00.	Communication Unit	3402	2 25	3 98	6 23	1 84	3 78	5 62	3.62	3 89	7 51
		5402	6 20	0.00	6.20	11.89	0.70	11.89	14.38	0.00	14.38
		Total	8 45	3.98	12 43	13 73		17.51	18.00		21.89
31.	National Natural Resources	, otar	0.10	0.00	12.10	10.10	0.70	11.01	10.00	0.00	21.00
011	Management System	3402	10.89		10 89	19.97		19 97	17 19		17 19
32.	National Remote Sensing	0.01									
<u> </u>	Agency	3402	7.46	5.29	12.75	8.93	3.79	12.72	8.61	2.54	11.15
33.	Others	3402	10.53		10.53	10.47		10.47	10.88		10.88
		5402	1.09		1.09	1.58		1.58	1.44		1.44
		Total	11.62		11.62	12.05		12.05	12.32		12.32
34.	North Eastern Space										
	Applications Centre	3402	1.00		1.00	2.00		2.00	5.00		5.00
Tot	al - Space Applications		97.14	48.19	145.33	107.74	45.94	153.68	111.32	50.33	161.65
Spa	ace Sciences										
35.	Physical Research Laboratory	3402	12.17	9.11	21.28	15.10	7.10	22.20	19.12	6.60	25.72
36.	India Millenium Mission	3402							10.00		10.00
37.	Others (NMRF & Other										
	Schemes)	3402	17.00	0.80	17.80	20.92	0.87	21.79	24.77	0.85	25.62
Tot	al - Space Sciences		29.17	9.91	39.08	36.02	7.97	43.99	53.89	7.45	61.34
38.	Other Programmes	3402	39.55	22.64	62.19	39.77	23.21	62.98	54.20	24.15	78.35
		5402	3.81		3.81	2.17		2.17	17.27		17.27
		. Total	43.36	22.64	66.00	41.94	23.21	65.15	71.47	24.15	95.62
INS	AT Operational			. .=			_			.	
39.	Master Control Facility	3252	4.00	8.17	12.17	3.81	7.68	11.49	4.05	8.18	12.23
		5252	3.82		3.82	11.63		11.63	3.58		3.58
		Total	7.82	8.17	15.99	15.44	7.68	23.12	7.63	8.18	15.81
40.	INSAI-2 Satellites				70 10	400.00		400	0=		0=
4.4	(Including Launch Services)	3252	73.40		73.40	100.07		100.07	35.20		35.20
41.		3252	5/5.43		5/5.43	654.57		654.57	449.55		449.55
	(including Launch Services)	5252	59.57		59.57	42.17		42.17	50.45		50.45
		iotal	035.00		035.00	090.74		090.74	500.00		500.00

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								(1)	n crores of	^r Rupees)
		Budget , 2000-2001			Revised, 2000-2001			Budget, 2001-2002		
Major Head		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
Total - INSAT Operational		716.22	8.17	724.39	812.25	7.68	819.93	542.83	8.18	551.01
42. Aid Materials & Equipment	ts-Gross 3606		0.02	0.02		0.72	0.72		0.15	0.15
Deduct-Transfers to Functional										
Major Head	3606		-0.02	-0.02		-0.72	-0.72		-0.15	-0.15
Net-Aid Materials & Equipments Total										
Grand Total		1700.00	319.22	2019.22	1600.00	308.52	1908.52	1710.00	320.00	2030.00
C. Plan Outlay	Head of Dev	Budget Support	IEBR	Total	Budget Support	IEBR	Total	Budget Support	IEBR	Total
1. Space Research	13402	1700.00		1700.00	1600.00		1600.00	1710.00		1710.00

1. Secretariat - Economic Services: Provision is made for expenditure to be incurred on the Secretariat of the Department of Space.

2 & 15. Geo-synchronous SatelliteLaunch Vehicle (GSLV) Project/GSLV Continuation Project: The scope of the GSLV Project is to develop and qualify a Geo-synchronous Satellite Launch Vehicle (GSLV) for placing 2000 kg class of INSAT series spacecraft in Geosynchronous transfer orbit. The revised cost estimate of the project is Rs.1405.19 crore. The first developmental flight of GSLV is scheduled during 2001. Provision proposed under GSLV-Continuation Project is for continuation of the GSLV Programme beyond the developmental flights.

GSLV MK-II Development: These are improved 3 versions of GSLV. GSLV-MK-II is same as GSLV MK-I except that the imported cryogenic stage is replaced by an indigenously developed cryo stage. GSLV-MK-III is the advanced version with C-20 cryo upper stage and large solid booster to achieve payload capability of 3000 to 3500 kg.

4. Cryogenic Upper Stage Project (CUSP): The objective of the Cryogenic Upper Stage Project is to develop and qualify a restartable Cryogenic Stage using Liquid Oxygen and Liquid Hydrogen for the upper stage of GSLV MK-II.

C-20 Cryogenic Stage Development: This is a 5 larger cryogenic stage, to be developed indigenously for GSLV which will enable launch of 3000-3500 kg class of communication satellites in Geo-stationary Transfer Orbit.

6. PSLV Continuation Project: Keeping in view the need for continuity of production and cost advantage in batch production, 6 more flights of PSLV have been approved by the Government. The sanctioned cost of the project is Rs.665.93 crore. The first indigenous launch of operational remote sensing satellite was achieved by PSLV-C1, which launched IRS-1D from SHAR on 29th September 1997, making a major milestone in the Indian Space Programme. The second PSLV-C2 was launched on 26.5.1999 successfully injecting IRS-P4 (Oceansat) as well as two foreign satellites KITSAT-3 and TUBSAT, heralding India's entry into commercial launch vehicle market. The third flight of PSLV series is scheduled during 2001.

Vikram Sarabhai Space Centre: This is a National Centre for Research and Development in Space Technology. The main thrust of the work in the Centre is towards indigenous development of rockets and satellite launch vehicles with their associated control and guidance systems and electronics. The main efforts of the Centre are now focussed towards the realisation of the PSLV and GSLV.

ISRO Inertial Systems Unit (IISU): The major task 8. of the ISRO Inertial Systems Unit (IISU) is to pursue a strong research and development programme in the critical area of inertial systems for satellite launch vehicles and allied inertial components and systems for satellite programmes of ISRO.

Sriharikota Centre (SHAR): SHAR Centre is the operational base for static testing, solid propellant production and launch services. The facilities at the Solid Propellant Space Booster Plant (SPROB) are being utilised for processing of solid motors for launch vehicle programmes; the PSLV launch complex and ground support facilities have been fully operationalised.

ISRO Telemetry, Tracking & Command Network (ISTRAC): ISTRAC organised into a separate Unit with Headquarters at Bangalore, has ground stations at Bangalore, Trivandrum, SHAR, Lucknow, Car Nicobar and Mauritius for supporting the IRS/PSLV/GSLV Missions. The Spacecraft Control Centre is at Bangalore.

Liquid Propulsion Systems Centre: LPSC is 11. entrusted with the responsibility for development of all liquid propulsion systems for launchers and satellite projects of ISRO.

Second Launch Pad and Common Facilities : 12. Second Launch Pad is being established at Sriharikota to take care of requirements of PSLV/GSLV launches. The sanctioned cost of the Project is Rs.289.00 crore

Other Schemes of Rocket Development (Large 13. Solid Boosters): A large solid booster is proposed to be developed for use in GSLV MK-III to enhance payload capability to 3-3.5 tons in GTO. The development efforts and production of this solid module would require addition/augmentation to propellant processing, motor preparation and testing facilities.

Radar Development Cell (RDC): The cell is 14 responsible for research, development and productionisation of Radars.

IRS P4 (Oceansat): The sanctioned cost of the project 17. is Rs.47.75 crore. The IRS P4 satellite is oriented towards oceanographic, land and atmospheric applications thus catering to a new set of application areas. Further the data from IRS P4 also help in conducting specific experiments that are relevant for future developments. The spacecraft was successfully launched on-board PSLV-C2 on 26th May, 1999. All the subsystems on-board IRS-P4 are operating satisfactorily.

18&19. IRS P5 (Cartosat)/IRS P6 (Resourcesat): The sanctioned cost of the project is Rs.248.49 crore and Rs.141.58 crore respectively. These are planned to be launched by PSLV Continuation flights.

20,21& 27 G.SAT-1/G.SAT 2 & 3: G.SAT satellites will be flown on the initial developmental flights of GSLV. The sanctioned cost of G.SAT-1 is Rs.31.15 crore, and that of G.SAT-2 is Rs.48.50 crore.

22 & 23. **IRS-II A (Cartosat-2)/IRS-II B/C:** Taking into account the increased use of space imageries for different applications and continued service required from IRS Satellites, provision has been made in the Ninth Plan for taking up work relating to IRS-II Satellites. The sanctioned cost of IRS-IIA (Cartosat-2) is Rs.216.73 crore.

24. **Direct-to-Home Satellite:** The basic concept of a Direct -To -Home TV Satellite System is a high power satellite operating in the Ku-band for direct broadcasting of TV Programmes to homes. It is proposed to conduct configuration studies on DTH satellite system.

25. **ISRO Satellite Centre (ISAC):** ISAC is mainly responsible for planning of spacecraft and for development of technologies related to satellite mainframe.

26. **Laboratory for Electro-Optics System (LEOS):** LEOS is established under the overall umbrella of ISRO Satellite Centre (ISAC). The prime responsibility of this unit is development and productionisation of sensors for launch vehicles and satellites. The unit is organised into two major groups (I) Sensor Development Group and (ii) Applied Optics Group.

28. **METSAT:** METSAT is a dedicated meteorological satellite planned to be launched by PSLV.

29. **Space Applications Centre (SAC):** SAC is entrusted with the task of research and development works in the areas of satellite communications, remote sensing, geodesy and meteorology and the development of payloads for the satellite projects.

30. **Development and Educational Communication Unit (DECU):** DECU is engaged in mass communication software including television programmes with a developmental orientation, communications research and training programmes.

National Natural Resources Management System 31. (NNRMS): The system has been established in the country, combining optimally the advantages of the satellite remote sensing and conventional methods. The IRS series of spacecraft form the most vital component of NNRMS. One of the major objectives of NNRMS is to evolve a Natural Resources Information System (NRIS) for the country for all resources themes at National/ Regional/State/District/Taluk levels, with appropriate integration and linkages. All Departments and agencies of Central Government and State Governments/Union Territories concerned with natural resources management participate in NNRMS. Department of Space is the nodal agency for NNRMS and the Planning Committee of NNRMS (PC-NNRMS) coordinates this national effort. Strengthening of the infrastructure, applications development and manpower development have been undertaken in the country in an integrated manner.

32. **National Remote Sensing Agency (NRSA):** This is an autonomous registered society under the Department of Space, located at Hyderabad. It is the premier organisation in the country for operational services and applications of remote sensing technology. It is mainly responsible for acquisition, processing and dissemination of satellite and aircraft remote sensing data, training of users in different applications techniques and conducting resources surveys using remote sensing techniques.

33. **Space Applications – Others:** Provision is made for the following:

(a) Five Regional Remote Sensing Service Centres, which are already operational, are providing digital data analysis facility for the users.

- (b) Integrated Mission for Sustainable Development (IMSD) for localespecific land and water resources development plans.
- (c) Remote Sensing Applications Mission (RSAM) to conduct large scale demonstration projects in selected areas like crop production forecasting, land use mapping, forest type density mapping and damage detection, water-shed prioritisation, environmental effects of mining/super thermal power stations, monitoring urban sprawl and coastal environment.
- (d) Digital Photogrametric work station etc., for augmentation of Data Processing Facility, and Data Archival Facilities at NRSA.

North Eastern - Space Applications Centre (NE-34. SAC): The North Eastern - Space Applications Centre (NE-SAC) is an autonomous institution under the Department of Space registered under the Societies Registration Act. The main aim of establishing the NE-SAC is to provide an operational high-technology infrastructure that will enable the NE States to adopt space technology inputs into their developmental activities. The Centre will be able to provide developmental support to the North Eastern region by undertaking specific projects, utilising space technology inputs - both from remote sensing and satellite communications. In doing so, the Centre would network with the state governments in the region and the NEC, to generate solutions for developmental activities in the region. In due course of time, the Centre would also promote space science research activities in the region and network with the academic institutions in the region.

35. **Physical Research Laboratory (PRL):** PRL is the premier national institution carrying out research in space science and allied fields. It is an autonomous institution supported mainly by way of grants-in-aid by the Department of Space.

36. India Millenium Mission : As the delivery of actual S&T based products and services to the society, industry and economy involve multidisciplinary and multiinstitutional tasks in partnership with industries and NGOs, an integrated India Millenium 2020 Missions in thirty closely linked sectors have been formulated. The fund allocation is to initiate activities to launch these missions.

37. **Space Sciences – Others:** The major activities are the funding of the research projects of interest to the Department in universities and academic institutions. Provisions are also included for the following:

- (i) Meteorological payload and balloon facility
- (ii) National Mesosphere, Stratosphere and Troposphere Radar Facility (NMRF), to monitor continuously winds, waves, turbulence and atmospheric stability in the middle atmosphere and to promote advanced research in atmospheric, space sciences and related disciplines.
- (iii) Space Science promotion and inter-agency space science projects.
- (iv) An international Geosphere-Biosphere Programme (IGBP) has been initiated under the auspices of the International Council of Scientific Union. Considering the importance and relevance of such a programme to India and significant contribution that Department of Space could make in this area, a programme has been initiated.
- (v) IRS Promotional Efforts.

- (vi) Indian Middle Atmosphere Programme
- (vii) Symposia/Conference
- (viii) ISRO Computer Network
- (ix) Value Added Services
- (x) Multi Agency Funded Projects
- (xi) Sensor Development
- (xii) Disaster Management System
- (xiii) Acoustic Test Facility
- (xiv) Micro gravity research application
- (xv) Bio-diversity characterisation
- (xvi) Acquisition of data from foreign satellites
- (xvii) Megha Tropiques
- (xviii) Space Station Experiments.
- 38. **Other Programmes:** Provision is made for the following:
 - (a) procurement of critical items of materials, components which have long procurement/manufacture lead times and for indigenous development of strategic items.
 - (b) Provision is made for expenditure to be incurred on the ISRO Head Quarters functioning from Bangalore, Liaison Offices at Bombay, Delhi, Paris and Washington, which provides overall direction and scientific, technical and managerial support to ISRO Centres/Units and coordination to the Programmes & Projects of the Department of Space.
 - (c) Civil Engineering Division is responsible for execution

of all civil, electrical and air conditioning work required for the various programmes of the Department of Space.

- (d) Construction of quarters and Office buildings at Bangalore and Hassan.
- (e) Various collaborative programmes with developed and developing countries.
- (f) For international cooperation including the provisions for the Centre for Space Services and Technology Education in Asia and the Pacific (CSSTE-AP).

39. **Master Control Facility :** Master Control Facility (MCF) located at Hassan in Karnataka , is charged with the responsibility of control and operation of INSAT AND G.SAT satellites in orbit, through a network of antennae, earth stations, computers and satellite control facilities. Monitoring the health of the satellite is integral to the functions of MCF.

40. Indian National Satellite-2 (INSAT-2) Satellites: The provision under INSAT-2 Satellites includes provision for (i) INSAT-2 C,D,E Operational Satellites (ii) Acquisition of INSAT-2DT satellite from Arabsat organisation and (iii) Augmenting the capacity of INSAT system through leasing of Transponders.

41. **Indian National Satellite-3 (INSAT-3) Satellites:** The objective of INSAT-3 Spacecraft Project is (I) to build five INSAT-3 satellites (INSAT-3A to 3E) keeping flexibility for mid-course corrections to accommodate emerging requirements, carry out mission planning, launch campaign and initial phase operations and (ii) to establish required programme elements for carrying out the same. INSAT-3B, launched on 22.3.2000, is operational. INSAT-3A and 3C are planned for launch during 2001-2002. The sanctioned cost of the project including launch services is Rs.2429.12 crore.