TECHNOLOGY TRANSFER OF LOW COST REMOTE SENSING UTILIZATION, GROUND DATA COLLECTION AND CARTOGRAPHIC EQUIPMENT & SYSTEMS DEVELOPED IN INDIA

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Abstract

The development of simple, rugged and low-cost instruments and systems for remote sensing and allied work and their technology transfer to Indian industries is described. The current status of production and marketing of these items by the licencee industries is detailed and a preview of other instruments/systems developed by ISRO & NRSA and awaiting technology transfer is provided.

The Indian Space Research Organisation (ISRO) and the National Remote Sensing Agency (NRSA) have developed a wide range of low cost instruments that are required for the analysis and interpretation of aerial and satellite remote sensing data, for the collection of ground data and for various cartographic analyses and studies.

These instruments have been designed to be rugged and reliable and have been tropicalized. Their prices are also substantially lower than those of similar instruments available elsewhere. The expertise required for their manufacture has been transferred by ISRO and NRSA to suitable industrial companies. Most of these instruments are being regularly manufactured and are marketed in India by these companies. The others will be entering the market soon.

A set of descriptive brochures on these instruments giving their technical specifications is available. A list of these pieces of equipment, the names of various companies that have been licensed to manufacture them and their sales record are given in Table I. Prices range from about U.S.$ 200 for the illuminating magnifier to about U.S.$ 25,000 for the multispectral colour additive viewer. Prices of equipment about to enter the market will be available on request.

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In addition to the instruments listed in Table I, a number of other intruments/systems are in various stages of development (ISRO/NRSA) and/or technology transfer (to industry). These are listed in Table II.

The Indian industries who have been licenced to manufacture these Remote Sensing utilization and allied technologies have recently come together as the Federation of Indian Remote Sensing Companies (FORSCI, pronounced FORE-SEE). FORSCI is pooling the efforts and resources of its individual member-companies to promote joint developmental activities, export promotion of low-cost remote sensing utilisation equipment and systems and Remote Sensing Consultancy services.

The impending launch of the Indian Remote Sensing Satellite (IRS) has provided a focus and sense of urgency to Indian efforts to establish the various applications of Remote Sensing and to integrate industrial involvement in the process.

TABLE- I

STATUS OF TECHNOLOGY TRANSFER AND PRODUCTION OF ISRO & NRSA DEVELOPED LOW-COST REMOTE SENSING UTILISATION, GROUND TRUTH COLLECTION AND CARTOGRAPHIC INSTRUMENTS/SYSTEMS

(Updated as on July 31, 1987)

INSTRUMENT/PROCESS/ SYSTEM	ISRO/NRSA LICENCEE INDUSTRIES	PRODUCTION/MARKETING STATUS
1. **Optical Reflecting Projector** (TT-N-02)	Optomech Engineers Shed No.35, TIE, Balanagar, Hyderabad 500 037 Tel. 263538	Under regular production 90 units sold
2. **Diazo Printer** (TT-S-10)	-do-	Under regular production 40 units sold
3. **Large Format Optical Enlarger** (TT-S-11)	-do-	Under regular production 50 units sold
4. **Multiband Ground Truth Radiometer** (TT-S-12)	-do-	Under regular production. 10 units sold
5. **Map Master** (TT-N-11)	-do-	Production model under fabrication
6. **Multispectral Colour Additive Viewer** (TT-N-01)	Remote Sensing Instruments, H.No.2-2-18/18/3/16 Bagh Amberpet, Hyderabad 500 013 Tel. 263176	Under regular production. 15 units sold

INSTRUMENT/PROCESS/ SYSTEM	ISRO/NRSA LICENCEE INDUSTRIES	PRODUCTION/MARKETING STATUS
7. **Light Table with Co-ordinate measuring System** (TT-N-03)	Remote Sensing Instruments H.No.2-2-18/18/3/16, Bagh Amberpet, Hyderabad 500 013 Tel. 263176	Under regular production 10 units sold
8. **Simple Light Table** (TT-N-03)	-do-	Under regular production 70 units sold
9. **Viewing Desk** (TT-N-03)	-do-	Under regular production 5 units sold
10. **Colour Composite Printer** (TT-N-06)	-do-	Under regular production.
11. **Illuminating Magnifier** (TT-N-04)	Dynascan Inspection Systems 18-10A, Cambridge Road, Bangalore 560 008 Tel. 586129	Under regular production 1400 units sold
12. **Analog Image Analyser** (TT-N-08)	Speck Systems, B-49, Electronic Complex, Hyderabad 500762 Tel. 851812	Under regular production 15 units sold
13. **Dual Densitometer** (TT-N-05)	-do-	Under regular production

INSTRUMENT/PROCESS/ SYSTEM	ISRO/NRSA LICENCEE INDUSTRIES	PRODUCTION/MARKETING STATUS
14. **Optical Pantograph** (TT-N-12)	Hi-Tech Ooptics, H.No.2-2-18/18/3/1 Bagh Amberpet Hyderabad 500 013	Under regular production
15. **Spectroradiometer** (TT-I-02)	Hind High Vacuum, Site No.17, Peenya Industrial Area Phase-I, Bangalore 560 058 Tel.384615/384458	Under regular production 40 units sold
16. **Agro-Photometer MK-II** (Photometer for in-situ measurement of water stress and chlorophyll content in plant foliage) (TT-I-04)	Optomech Engineers, Shed No.25, TIE, Balanagar, Hyderabad 500 18	Under regular production 15 units Sold
	ELICO. Sanatnagar Indl. Estate Hyderabad 500 018 Tel. 260285;Tlx:155-6714 Grams: ELICOPY	First production batch completed
17. **Hygrophotometer** (TT-I-07)	Tata Tea Ltd P.O.Box No.9, Munnar, 685 612, Kerala Tel.241 & 242;Tlx:0455-290	Under productionisation

INSTRUMENT/PROCESS/ SYSTEM	ISRO/NRSA LICENCEE INDUSTRIES	PRODUCTION/MARKETING STATUS
18. **Interactive Intelligent Image Graphic Display Terminal** (IIGDT)	Sita Electronics, 12-5-35/A/9, Sriniket Tarnaka, Hyderabad 500 017 Tel. 71071	First production batch underway
19. **Microprocessor based Multi-spectral Interactive Data Analysis System (Micro-MIDAS)**	-do-	First production batch underway
20. **Microfiche Camera** (TT-N-07)	Micro Documentation Instruments, 2-2-18/18/6, Bagh Amberpet Hyderabad 500 013 Tel. 552 638	Under regular production
	Optomech Engineerss Shed No.25, TIE, Balanagar Hyderabad 500 018 Tel. 263538	Under regular production
21, **OPTOCOAT-1,2 & 3** 22 & 23 (TT-I-06A)	Optical Coating Laboratory 16, 3rd main road Jayamahal Extn., Bangalore 560 048	Coating line being installed
	Harvin Optical & Glass Industries, C-34, Industrial Estate, Sanathnagar, Hyderabad 500 018 Tel.260226, TLX:155-6305 HARVIN IN Grams: HARVIN	-do-

TABLE-II

In addition, the following equipment/technologies are in the current ISRO/NRSA Technology Transfer pipeline and are awaiting completion of development and/or licencing to suitable industries:

NRSA DEVELOPED ITEMS

1. NRSA Transferoscope
2. NRSA Stereo Transferoscope
3. Automatic Microfische Camera
4. IRS Format Synchroniser (Decommutator and computer interface)
5. Light Pointer
6. Synchronised Dual Visual Projection System with Automatic Audio Synchronisation
7. Thermal Sensor (for Pollution studies)
8. Drum Scanner
9. Texture Meter

ISRO (ISAC) DEVELOPED ITEMS

10. Variable Angle of Incidence Spectrophotometer
11. OPTOCOAT 4-5-6 (Special thin-film optical coating processes)

ISRO (SAC) DEVELOPED ITEMS

12. Quick Look Film Viewer (motorised system for 10X enlargement of aerial films)
13. 70 MM Format Optical Enlarger (for viewing 70 mm Landsat MSS Chips at 1:25,000 scale)
14. Modified B2 Enlarger (for 2X to 5X enlargement of 70 mm format aerial films)
15. Variable Magnification Large Format Optical Enlarger (VMLFOE)
16. High Magnification Enlarger (HME)
17. Extended Band Ground Truth Radiometer
18. Parallel Signal and Image Processing System (PASIPS)
19. Digital Image Analyses System (with 65 software packages):-
    a) PC-AT based system (Low end image analyses system - LIPS)
    b) Medium & High-end image analyses system - MIP & HIPS