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ESTABLISHMENT OF AN ELECTRONIC SERVICE AND TRAINING CENTRE,
RAMNAGAR, U.P.

DP/IND/85/062

INDIA

Technical report: The status of the ESTC project in Ramnagar
and related recommendations for follow-up activities*

Prepared for the Government of India
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of K. Popov, consultant in design,
production and assembly of electronic components - CTA

Backstopping officer: J. Fürkus, Engineering Industries Branch

United Nations Industrial Development Organization

Vienna

* This document has not been edited.

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SUMMARY

This report summarizes the work carried out by the consultant during his field mission in May/June 1988, in connection with the counterpart engaged in the establishment of an Electronic Service and Training Centre (ESTC) at Ramnagar in the State of Uttar Pradesh, where entrepreneurs will start assembling and manufacturing electronic modules and devices. The Centre will assist them in training engineers in related electronic, electrical and mechanical fields, as well as in consultancy and services in production, technology and quality control of the produced electronic equipment.

The status of the project is briefly reviewed and progress performed in the period between the last mission of the CTA, Dr. R. El Hadidy in September/October 1987 and this visit of the CTA, Mr. K. Popov.

The report includes a workplan and appropriate recommendations for the successful implementation of the project concerned.

CTA's ACTIVITIES

- 19.04.88 - Travel to Vienna
- 20.04.88 - Discussions on PCB equipment to be ordered for ESTC Ramnagar.
Participants: K.S. Popov, CTA,
: H. Hoeger, Expert on PCB production,
: W. Siegert, OMI General Manager,
: J. Fuerkus, IDO, Engineering Ind. Branch, UNIDO
- 22.04.88 - Travel to Sofia
- 24.05.88 - Travel to Vienna
- 25.05.88 - Travel to Delhi
- 26.05.88 - Arrival Delhi early morning, Briefing at the UNDP Office,
New Delhi.
Participants: Gamil Hamdy, Res. Rep.
: M. Islam, SIDFA
: Mrs. V. Sukuntha
Same day in the afternoon, travel to Ramnagar.
Arrival at Ramnagar late in the night.
- 27.05.88 - Visiting ESTC with Mrs. Sukuntha
Discussions with Director Principal, Mr. Jeyaraj on
project matters.
- 28.05.88 - CTA together with Director Principal discussed in detail the
implementation of the work-plan and elaborate actions to be
taken for its implementation.
- 29.05.88 - Day off
- 30.05.88 - Status of equipment provided by UNDP and Government of India
has been reviewed.
- 31.05.88 - CTA and the Director Technical revised the layout of
mechanical workshop and the tool room. Decision has been
taken on partitions to be erected, foundations for the
machines to be constructed, new housing for the presses
to be developed.
- 01.06.88 - CTA and Director Principal prepared a detailed work programme.
02.06.88
- 03.06.88 - Discussions on the structure of ESTC. Discussions on training
programmes to be organized by the Centre.
Participants: Director Principal, Director Training and CTA

- 04.06.88 - Participation in the meeting organized in connection with the visit of Mr. R. Raghunathan, ESTC, Chairman and Development Commissioner of the Small-Scale Industries. Mr. M. Islam, SIDFA, Mr. T.R. Bhalotra, Director, SSI Electronics. Problems impeding further implementation of the project have been discussed and solutions suggested.
- 05.06.88 - Visit to the paper milling plant at Lalkua.
- Discussing a training programme to be organized for the electrical technicians and engineers with:
D.K. Dutt - Vice President
S.K. Jain - Manager
- Selecting furniture for ESTC from Kodessia Eng. Works, Izatnagar/Bareilly/and Bareilly Furniture House, Bareilly.
- 06.06.88 - Updating the work programme with the Director Technical
07.06.88 Mr. Promod Kumar and the Director Training, Mr. N.N. Bhargav
Discussing partitions to be provided for the different departments, units and labs. Work on the final report.
- 08.06.88 - Discussing with Director Principal Mr. Jeyaraj, Director Technical P.K. Gupta and Director Training N.N. Bhargav the final version of the work programme, the revised fielding of experts, as well as the appointment schedule for the project's national staff. A video movie on plated through printed circuit boards and equipment for its production has been shown and discussed.
- 09.06.88 - Work on the final report.
- 10.06.88 - Final discussions
- 11.06.88 - Day off
- 12.06.88 - Travel to Ambala with the Principal Director Mr. Jeyara
- 13.06.88 - Visiting IDDC, Ambala. Travel to Delhi.
- 14.06.88 - Travel to Gurgaon. Visiting ETDC Gurgaon.
- 15.06.88 - Debriefing at UNDP - New Delhi.
- 16.06.88 - Travel to Vienna.
- 17.06.88 - Debriefing at UNIDO, Vienna.
- 18.06.88 - Day off
- 19.06.88 - Day off
- 20.06.88 - Debriefing at UNIDO, Vienna
- 21.06.88 - Travel to Sofia

STATUS OF THE PROJECT AS PER 01.06.1988

1. Location: The ESTC is located around 5 km. away from Ramnagar. Nowadays, there is no transport in common organized to allow the staff to attend its working place. Most of the staff are utilizing the car of the Director Principal to reach the centre.
2. Building: The building for the ESTC of around 2400 sq. m. has been completed. However, it has not been accepted by the relevant authorities due to the fact that some cracks have appeared in the walls. These cracks are now under observation in order to establish if they are of importance for the safe operation of the building. Some partitions are still to be erected for the proper operation of the different units, labs and departments. The flooring of the rooms, located on the second floor of the building, have to be completed. Sanitary fittings and internal water pipelines have been installed. Electrical lines for light and normal use are available. However, water supply is available only for two hours a day, this does not allow the normal operation of some equipment, especially for PCB production.

A storage tank is under construction with a capacity of 50,000 lts. it is expected to be completed and connected to the water source by the end of September 1988.

Electrical supply in Ramnagar is frequently interrupted. A 500 KVA power transformer has been provided for the Centre but it has not been connected to a priority line. Power interruptions are quite frequent here too. It is necessary to have some alternative sources for the normal operation of the ESTC/2 stand by generators of 100 KVA each/. The power interruption will especially affect the PCB production, as well as any work executed on computers not provided with uninterruptable power supplies.

A telephone line is still not provided and ESTC is without any connection to the external world. Once in operation, an inter-house connection system will also be needed.

Compressed air is a need for PTH PCB production. The installation of a compressor with accessories will facilitate the operation of the equipment which has to be installed.

The construction of 20 industrial sheds of 104 sq.m. has also been completed. These are grouped in 5 buildings of 4 sheds each around the ESTC, up to the end of May 1988 none of them had been occupied. Potential users however, are showing interest in renting them for the establishment of some related industries.

3. Manpower/Staff: At the end of May 1988, 10 technically qualified persons have been in position (Annex 1). The administrative staff of the Centre has still not been selected and appointed. This fact impedes the work of the Centre as the administrative part of the work has to be carried out by technical personnel, this disrupts their normal work. It was noted that only 3 fellowship nomination forms had been submitted, however, so far none have materialized (Annex 2). Experts are fielded if not entirely according to schedule, much more regularly. So far 3.2 m/m of expert assistance has been implemented (Annex 3).

4. Equipment: The status of the equipment provided by UNDP and GOI contributions is reflected in Annex 4 and 5. It should be noted that although some orders have been placed by UNIDO with delivery terms in May 1987, they have still not arrived at the site.

Many items (around 60%) from the GOI contributions have arrived. In order to make them operational, partitions should be provided in the respective rooms and power connections installed.

It has been noted that the temperature in April, May and June may reach 45°C which for some of the equipment will be a disaster. In this connection, air conditioning is a must for certain departments and should be provided at the soonest.

The placement and number of air conditioners to be provided has been discussed and defined (10 pcs).

To reduce the influence of the net fluctuations, voltage stabilizers should be ordered and used.

5. Outputs to be produced: To comply with the project objectives the following outputs have to be produced at the completion of the project:

OUTPUT 1 Assembling and production department consisting of the following sub-outputs;

- Printed Circuit Boards production unit
- Wound Component production unit
- Printed Circuit Boards assembling unit
- Production unit for mechanical components with tool room

OUTPUT 2 Extension and common services unit consisting of the following sub-outputs:

- Testing, calibration and quality control lab
- Environmental testing lab
- Design and development of electronic devices and products lab providing advice and guidance to entrepreneurs, potential occupants of sheds at the Ramnagar Centre
- Printed Circuit Boards design lab

OUTPUT 3 TV's and VCR's repair and maintenance shop

OUTPUT 4 Library and documentation consisting of the following sub-outputs:

- Library provided with technical books, manuals and periodicals
- Computerised technical documentation
- Unit to issue periodically information for industrial entrepreneurs
 - ESTC News Letter

OUTPUT 5 Training

These are the outputs that when produced will allow the Centre to train successfully participants to the courses and render services to industrial entrepreneurs.

For a better illustration the organization chart of ESTC has been revised to reflect the expected outputs to be produced by the completion of the project. (Annex 6).

FINDINGS AND RECOMMENDATIONS

1. The construction of the ESTC has been completed. It represents a large building of 2,400 sq.m. with all rooms for laboratories and production located on the ground floor and class rooms, library and display room located on the second floor. Five industrial sheds each containing four separate units of 104 sq.m. have been completed too. Industrial entrepreneurs are supposed to establish here some industries with common and extension services provided by the ESTC.
2. The size of the rooms planned to house technical activities is very large (2 rooms of 14 m x 22 m and 4 rooms of 10.5 m x 14.2 m). As different activities have to be concentrated in those rooms, some of which need to be air conditioned, a need to erect partitions arises.
3. It was established that:
 - Water supply is available only for 2 to 3 hours a day.
 - Electrical supply is very unreliable and power interruptions occur several times a day. Power interruptions last mostly 2 to 3 hours and some power failures have a duration of 8 hours.
 - The ESTC does not have any telephone connection and communication with any place is very difficult.
 - The ESTC is located five kilometers away from Ramnagar and to reach it there is no transport in common organized.
 - The temperature during the months of April, May and June is very high and may reach 45°C.
4. The technical staff appointed consists of 10 persons, including the Principal Director - appointed since 2 months, and the Director Technical and the Director Training being on duty since 4 and 5 months respectively.
5. Three persons have been nominated for fellowships; however, none have been implemented to date.
6. Around 3.2 months of expert assistance was implemented. Four of the consultants who will commute according to a revised time schedule (Annex 7) have been selected, with another two to be selected in the near future.

7. Around 60% of the equipment provided as GOI contribution (mainly machine tools and electronic measuring and testing equipment) is already at the site, it is tested and has now to be installed and made operational.
8. The main part of the UNDP provided equipment was ordered, however, only a few items arrived, some of them damaged - spark erosion machine others, as in the case of a digital multimeter - only the options have been received with the basic instruments still missing.
9. Equipment has been ordered according to the project document, however, although the funds provided for this purpose are almost exhausted a number of instruments and machines are still necessary for the normal operation of the ESTC. A request for an increase of the GOI and UNDP contributions will be prepared and submitted for approval to the attention of participants at the Project mid-term evaluation.
10. A lot has been achieved, however, much more has to be done. In this connection a detailed work programme was prepared (Annex 8) and its timely implementation will lead to a successful completion of the project.
11. It was established that some cracks have appeared in some spots of the ground floor ceiling, the seriousness of the cracks is still under investigation, it has not yet been proved that they are of no danger to the safe operation of the ESTC building. It is therefore recommended that the construction organization carries out at the soonest the required test by the Indian Standards and the entire building inclusive of the second floor be taken over by ESTC for normal operation.
12. Partitions should be erected according to the expert's recommendations with some slight changes due to:
 - the erection of the additional building to house two mechanical presses of 63 t. and 25 t. each. It is supposed that the presses will be the source of vibration which will disturb the normal work of the other labs.
 - the wish to keep the main production units together.
 - the need of air conditioning of the design and development labs, as well as of the testing, calibration and quality control labs.

13. For the normal operation of some equipment (PCB production) a continuous water flow is required. For this purpose it is recommended to complete the construction of the water tank with a capacity of 50,000 lts. and to connect it to the water source before the arrival of the PCB production equipment. Water should be provided too, to the industrial sheds surrounding the ESTC.
14. Electrical supply is of a vital importance to any industry or institution. As the power supply at Ramnagar is very erratic and does not look like being improved in the near future, it is highly recommended to erect a housing for an alternate source of electrical supply. Two generators of 100 Kw each should be installed to provide the ESTC and industries around it with electrical power. As a first step a single generator should be provided as soon as possible.
15. It is highly recommended to request from the local authorities, the installation of a telephone connection.
16. Some of the equipment provided or to be provided by the UNDP contribution can be operated in the range of normal temperature. Calibration and measurement are normally carried out in air conditioned rooms. In this connection, about 10 air conditioners should be provided and installed as follows:
 - Tool room - 2
 - PCB production (dark and yellow rooms) - 2
 - Calibration, testing and quality control - 3
 - PCB design - 2
 - Training - 1Fans should be installed at soonest to create more suitable working conditions for the staff members.
17. Availability of compressed air is another requirement for the normal operation of PCB production equipment. A compressor with its accessories should be provided for that purpose. The capacity of the compressor however, should be calculated in connection with future needs which may arise.
18. Although some furniture has been ordered and received much more is needed for the different units, labs, classrooms, stores and offices.

19. One of the ESTC objectives is to train the staff of the industries established in the region. In this connection it will have to be in continuous contact with those industries, visiting them to study their needs and organizing courses at their sites. For that purpose a van will be needed to transport staff and equipment. The van will be used to bring the staff from Ramnagar to the ESTC because for the time being, no other mode of transportation exists.
20. For the time being, 10 technical people are posted at ESTC performing all kinds of work. It is imperative to appoint as soon as possible, the administrative officer, the account officer and the store officer. More technical staff should be selected and appointed up to the end of the year to carry out the increasing activities of the ESTC. It is recommended to start with the selection and appointment of the following staff members:
- Senior scientific officers - 3
 - Junior scientific officers - 4
 - Technical assistants - 8
 - Laboratory assistants - 4
 - Draftsman - 1
- Some supporting staff should be recruited up to the end of the year too.
21. Training of the staff abroad should be organized in a more realistic way. The present nominees are requesting placement in the USA, Japan or Canada. This will be very difficult for implementation, Suppliers of equipment should be asked to organize some courses in connection with equipment delivered. Experts and consultants should be requested also to assist in selection of suitable placement. The CTA is ready to organize the following training programmes at the Academic Association for Scientific Instrumentation, Sofia, Bulgaria for a duration of two months each.
- Design and development of PCB boards
 - Double-sided plated through PCB production
22. Experts should be fielded for the second time only after the arrival of the equipment and the creation of adequate conditions for its commissioning. As the climate at Ramnagar during the summer is rather heavy, it is recommended that this should be taken into consideration and the experts should be fielded only when climatic conditions are normal. A revised fielding chart is given as Annex 7.

23. Living conditions at Ramnagar are not exactly the best. In order to attract capable staff, some incentives should be created such as:
- Construction of staff houses in the neighbourhood of ESTC
 - Organization of a staff canteen
- For the accommodation of the participants to the different courses organized by the ESTC, a guest house should be erected.
24. As the main part of the UNDP provided equipment has been ordered but not received, UNDP, New Delhi and PAC, Vienna - should investigate the reason of this delay of more than one year.
25. In order to simplify the installation and commissioning of the PCB manufacturing unit it is recommended to place an order for the outstanding etching machine to the same producer delivering the basic equipment for PCB production. In this way he can be requested to install the equipment and start the manufacturing process.
26. The main ESTC objective is to provide training to industry's staff members, as it is staffed and equipped the ESTC may start its training programme. However, it is highly recommended that the initial courses should be of a short duration (not longer than two weeks). The reasons for that are quite obvious:
- Organization of a course is not an easy matter. Experience should be gathered and feedback collected. Courses of short duration allow a larger flexibility on those matters.
 - Industrial entrepreneurs are not very happy when their staff are absent for long periods, they do however, normally agree to have their staff trained when the duration is a short period.
 - Courses with a duration of more than one month should be organized only for non-employed persons and that only after the ESTC is staffed and equipped for that purpose.
27. A similar institution with similar objectives was established at Ambala, Haryana in 1982. It is the Instruments Design, Development and Facilities Centre. It is recommended to establish close links with it to learn from its experience in order to avoid errors which are common when such institutions are started.

ESTC's STAFF IN POSITION

1.	Director Principal	- L.J.Jeyaraj
2.	Director Technical	- K.Gupta
3.	Director Training	- M.N.Bhargava
4.	Senior Scientific Officer	- S.V.Singh
* 5.	Junior Scientific Officer	- M.K.Gupta
* 6.	Junior Scientific Officer	- V.K.Gupta
* 7.	Technical Assistant	- Gurminder Singh
8.	Technical Assistant	- Mrs Prem Wati
9.	Lab Assistant	- Om Prakash Tamta
10.	Lab Assistant	- Bipin Kumar Pant.

* - Nominated for fellowships.

ANNEX 2

FELLOWSHIP NOMINATIONS SUBMITTED

1. M.K.Gupta - Junior Scientific Officer
2. V.K.Gupta - Junior Scientific Officer
3. Gurminder Singh- Technical Assistant.

EXPERT ASSISTANCE IMPLEMENTED

1. Consultant on design, production and assembly of electronic components - CTA R. El-Hadidy - 1 m/m.

2. Consultant on printed circuit boards production - H. Hoeger - 0.9 m/m.

3. Consultant on printed circuit boards design - W. Bosshart - 0.5 m/m.

4. Consultant on design, production and assembly of electronic components - CTA K. Popov - 1 m/m.

STATUS OF U N D P PROVIDED EQUIPMENT

P.R.	ITEM	DESCRIPTION	P.O.	EQUIPMENT RECEIVED	REMARKS
1/86	1	500 MHz Oscilloscope	15-7-E0257	n.r.	
	2	275 MHz Storage Oscilloscope	15-8-D0215	n.r.	
	3	Logic trouble shooting unit	n.r.	n.r.	
	4	Microprocessor trainer kit	n.r.	n.r.	
	5	3 D Die sinking machine, work table pantograph	15-7-E0255	rec.	
	6	Spark erosion machine	15-7-E0255	rec.	
	7	Multifrequency L C R meter	15-7-E0257	n.r.	
	8	Electronic counter	15-7-E0257	n.r.	
	9	Personal/Micro Computer System IBM PC/XT	15-7-E0256	n.r.	
	10	Data Entry System	15-7-E0257	n.r.	
2/86	1	200 MHz Oscilloscope	n.r.	n.r.	
	2	AM/FM Signal Generator 10 KHz - 10 MHz	n.r.	n.r.	Cancelled per Dr. Hadidy
	3	Video Camera	15-8-D0223	rec.	
	4	Video Cassette Recorders(2 pcs)	15-9-D0223	rec.	
	5	Audio Frequency Generator 20Hz -20MHz	15-8-D0224	rec.	
	6	High voltage probe(2pcs)	15-8-D0224	rec.	
	7	Digital voltmeter 4 ¹ / ₂ digits with all options	n.r.	n.r.	Cancelled per Dr. Hadidy
	8	Colour Pattern Generator	15-8-D0223	rec.	
	9.	Distribution Amplifier	15-8-D0216	n.r.	
	10	Distribution amplifier/ 4 pcs/High frequency	15-8-D0216	n.r.	
	11	Colour TV test receiver/20"/2pcs	15-8-D0216	n.r.	
	12	Polyscope	n.r.	n.r.	Cancelled per Dr. Hadidy
	13	Video Sweep Generator (2pcs)	n.r.	n.r.	Cancelled per Dr. Hadidy

P.R.	ITEM	DESCRIPTION	P.O.	EQUIPMENT RECEIVED	REMARKS
	14	UHF/MHF Sweep Generator with RF and IF	n.r.	n.r.	
	15	Black and White Pattern Generator	15-8-D0223	rec.	
	16	Projection System	15-8-D0216	n.r.	
	17	I.C. Tester	n.r.	n.r.	Cancelled-Hadidy
	18	Static Work benches (25 pcs)	15-8-D0218	rec.	No.reduced to 5
	19	Audio Analyzer Range 20 Hz to 100 KHz	n.r.	n.r.	Cancelled-Hadidy
	20	Equipment for the manufacturing of D/S PTH PCBs	n.r.	n.r.	To be clarified
	21	Process Camera with adjustable frame holder	n.r.	n.r.	To be clarified
	22	Drilling machine for PCB	n.r.	n.r.	To be clarified
	23	Beta Scope	n.r.	n.r.	Cancelled-Hadidy
	24	Drafting Table with accessories	n.r.	n.r.	Cancelled-Hadidy
	25	Neutralising Tank and Pump Assembly with pH-metering Facility	n.r.	n.r.	Cancelled-Hadidy
	26	Frame Holding/Lifting, Vacuum Assembly	n.r.	n.r.	To be clarified
	27	Temperature Controlled Soldering Work Station (20 pcs)	n.r.	n.r.	No.reduced to 10 Dr.Hadidy
	28	Wire-wrapping Tools (20 pcs)	n.r.	n.r.	No.reduced to 5 Dr.Hadidy
	29	LSI Desoldering Tools (10 pcs)	n.r.	n.r.	No.reduced to 5 Dr.Hadidy
	30	Injection Moulding Machine	n.r.	n.r.	To be clarified
	31	Metallisation Equipment with guns	n.r.	n.r.	Cancelled-Hadidy
	32	Precision Tools and gauges	15-8-D0331	n.r.	
	33	Initial Moulding Tools	n.r.	n.r.	Cancelled-Hadidy
	34	Precision Digital Multimeter	15-8-D0229	rec.	Centre received option only/one card.

P.R.	Item	Description	P.O.	Equipment received	Remarks
	35	Multifrequency LCR Meter	n.r.	n.r.	Canceled Dr.Hadidy
3/86	1	Accessories for PCB Artwork	15-8-D0502	n.r.	To be delivered.

Remarks: Out of 18 items ordered (PO - issued) only 7 have been received
Two items are received without having got purchase orders.

STATUS OF GOI PROVIDED EQUIPMENT

Item	Description	Quantity	Status			
			rec.	ord.	U.sel.	canc.
1.	Stabilised D.C.power supply 15V/2A	4	x			
2.	Stabilised D.C. power supply 30V/2A	2	x			
3.	Stabilised D.C.power supply 300V/5A	1	x			
4.	Double pulse generator	1	x			
5.	Function generator(audio)0.1 Hz - 2MHz	1			x	
6.	RF output power meter,DC-250MHz,0-100W	1	x			
7.	AF output power meter,up to 10W	1	x			
8.	Decade resistance box,up to 22 M Ohm	4			x	
9.	Decade capacitor box,50 pF-11.11 uF	4	x			
10.	Low distortion AF signal generator, 1 Hz - 1 MHz	2	x			
11.	Standard signal generator,30Hz-30KHz	1	x			
12.	RF step attenuator, 0-132 dB	1	x			
13.	Distortion level meter,0.3%-100%	1	x			
14.	oil test set(0-50 kV)	1				x
15.	High voltage break down tester	1			x	
16.	DC microvolt meter, 300 uV - 30 V	1	x			
17.	Single-phase,variatic,servo stabilizer 10A	1	x			
18.	Oscilloscope dual beam 10 MHz	2	x			
19.	Oscilloscope dual beam 50 MHz	1	x			
20.	IC tester	1				x
21.	VHF/UHF & UHF/VHF convertor	1			x	
22.	Analog multimeters	10	x			
23.	Digital multimeters	5	x			
24.	Multiple output power supply unit for ICs	2	x			
25.	RF millivoltmeter 1mV - 30V, 20 Hz- 10 MHz	1	x			

Item	Description	Quantity	Status			
			rec.	ord.	U.sel.	canc.
26.	Digital voltmeter	2	x			
27.	Isolation transformer, 115/230V	1	x			
28.	Etching machine plate size 33x38 cms., bath cap. 15 liter	1			x	
29.	Retouching desk sight size 81x106 cm	1			x	
30.	Lining up table sight size 84x122 cm	1			x	
31.	Arc lamp, arc current 50A, load 17A	1			x	
32.	Bench vacuum frame exposure area 66x56 cm., load 2.6A	1			x	
33.	Printing down unit, bed dimension 60x75 cm	1			x	
34.	Shearing machine for laminates, motor driven	1			x	
35.	Screen printing equipment including frames, screens	1			x	
36.	Gold plating equipment	1			x	
37.	Tanks for developing & cleaning, 3'x2'x1'	3			x	
38.	Hand operated laminate shear	1			x	
39.	Hand operated anglo cutter	1			x	
40.	Water deioniser	1			x	
41.	Refrigerator 286/290 litres	1			x	
42.	Whirler/drying	1			x	
43.	Miscellaneous accessories for PCBs	1 set			x	
44.	Drafting tables and accessories, 1000 x 1500 mm	6			x	
45.	Drilling machine - medium speed 10,000-12,000 RPM, Bench	1			x	
46.	Routing machine	1			x	
47.	PCB inspection jig-magnifier & template	1			x	
48.	Soldering irons of different ratings 10W/35W/60W	50			x	

Item	Description	Quantity	Status			
			rec.	ord.	U.sel.	canc.
49.	Extention boards and chords	20 sets			x	
50.	Automatic insulation removing machine	2			x	
51.	Handtools (pneumatic hand cutters, benders, screw drivers & crimping tools)	20 sets			x	
52.	Analog multimeters	5	x			
53.	Work benches with appropriate power respectacles/consols	10			x	
54.	Centralised power supply 30V, 5A	1	x			
55.	Desoldering pumps, cupboards	2			x	
56.	YAGI antenna with fixtures & accessories	1			x	
57.	Booster amplifier	1			x	
58.	Component winding jigs & accessories	1			x	
59.	Multiple spindle automatic coil winding machine	4			x	
60.	Motorised coil winding machine	5			x	
61.	Honey comb winding machine	1			x	
62.	Hand operated coil winding machine	4			x	
63.	Bench vice, tools, for bobbin manufacture	2 sets			x	
64.	Miniature hand operated presses	5			x	
65.	Ceramic cutting precision saw	1			x	
66.	FET input multimeter	4	x			
67.	Inpregnation facility complete with vacuum pump with housing, timer, temperature controller and drying oven 560x400 mm.	1 set			x	
68.	Audio signal generator 30 Hz - 30 KHz	1	x			
69.	RF signal generator 1Hz - 1MHz	1			x	
70.	Q - meter	1	x			
71.	LCR bridge	1	x			
72.	Insulation tester 20 MOhm at 15 kV	2			x	

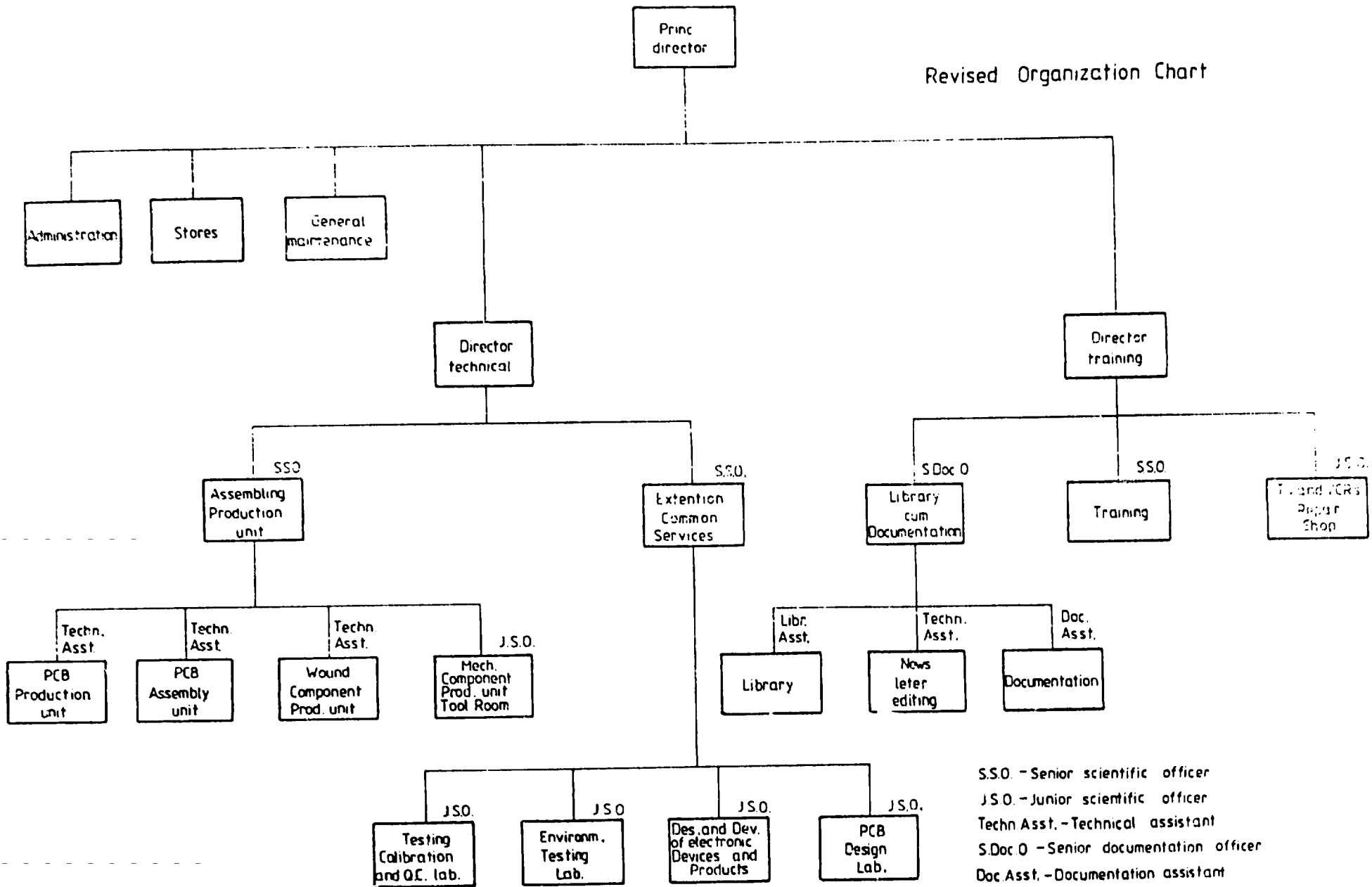
Item	Description	Quantity	Status			
			rec.	ord.	U.sel.	canc.
73.	DC power supply 30V, 10A	1	x			
74.	Drilling machine, pillar, with accessories, 19 mm	1			x	
75.	Power hacksaw	1			x	
76.	Voltage stabiliser mains 240V	1			x	
77.	Auto transformers 0-300V, 0-10Amp.	3			x	
78.	Other accessories, wooden formers, probes, handtools, soldering equipment, storage racks, coil winding jigs	3 sets			x	
79.	Digital inductance meter with Q measurement	1	x			
80.	Test panels for transformers & power supplies with loading devices	4			x	
81.	Desk calculator with printer, 12 digits, 4 basic functions and memory	3			x	
82.	Pocket calculator, 8 digits, LCD	20	x			
83.	Intercom system 24 lines, TDM & PAM	1			x	
84.	Public address amplifier system	1			x	
85.	Cassette recorder with 2-band radio, 1200 mW output	1			x	
86.	Display boards	1 set			x	
87.	Filling cabinets, racks	5	x			
88.	Bradma machine	1			x	
89.	Ammonia printing machine, full size	1			x	
90.	Telex equipment	1			x	
91.	Overhead projector with synchronous slide projector, 25 cm x 25 cm transparency	1	x			
92.	Photo copying machine input size 11", 17", 20 copies/min.	1	x			
93.	Electronic typewriter-typing line 13"x14", paper width double foolscap	1			x	
94.	Centre lath centre ht-170mm distance between centres 1000 mm	1	x			

Item	Description	Quantity	Status			
			rec.	ord.	U.sel.	cancl.
95.	Centre lathe precision H.S. centre ht 260mm centre distance 2000 mm	1	x			
96.	Centre lathe, centre ht 100mm, centre distance 800mm.	1		x		
97.	Knee type milling M/C. Universal table size 1070x230 mm	1	x			
98.	Milling machine, table size 1350x310mm	1	x			
99.	Surface grinder-working surface 280 x 460 mm Max. grind ht. mm	1	x			
100.	Universal cylindrical grinder; Sewing over table 350mm, Centre distance 2000mm	1	x			
101.	Universal tool & cutter grinder sewing 280 mm, height of centres; 130 mm	1	x			
102.	Bench drilling machine, capacity 13 mm	1			x	
103.	Radial drilling machine, capacity 50mm with tapping attachment, max. drilling radius 1500 mm	1	x			
104.	Portable drilling machine, 19 mm	2			x	
105.	Filling machine, stroke 38mm, table round 288 mm dia	1			x	
106.	Power hacksaw cap. 200 mm motorized- two speed	1			x	
107.	Riveting machine, foot operated, toggle action equipped with punching, rivetting, bending facilities, work bed 200x200mm, stroke 30mm	1			x	
108.	Bending tools	1 set			x	
109.	Bench vice, handtools/round magnetic clutch	5 sets	x			
110.	Power press 50 ton, stroke 1 1/2"x2 1/2"	1		x		
111.	Power press 20 ton, stroke 1 1/2"x2 1/2"	1		x		
112.	Hand presses (No. 4 to No. 8)	1 set			x	
113.	Work benches (Range 35-300A)	1 set			x	
114.	Electric welding outfit cap 300 amp. voltage range 24-32, KVA rating 15	1 set			x	

Item	Description	Quantity	Status			
			rec.	ord.	U.sel.	canc.
115.	Gas welding outfit	1 set			x	
116.	Measuring tools	1 set			x	
117.	Combined shearing and punching machine capacity for shoot 4.5 mm flats up to 6 mm, round up to 12 mm	1			x	
118.	Hand operated shear	2			x	
119.	Tradle guillotine shearing machine max cut 48",cutting cap up to 16 SWG/2mm	1		x		
120.	Shaping machine 630 mm	1		x		
121.	Spot welder,throat depth 160/17 mm C.S.G., weldability MST, 4, 2.5 KVA	1			x	
122.	Injection moulding machine cap.300 cmc	1			x	
123.	Electrode type metal pot salt bath furnace 350x350x550 mm	1			x	
124.	Electrically heated forces air circulation tempering furnace 450 mm	1			x	
125.	Electrically heated chamber type ancaling furnace 300x450x600 mm	1			x	
126.	Oil quenching tank, 800x800x1200 mm	1			x	
127.	Spray painting shop, 30 litres, 75p.s.l.1				x	
128.	Engraving machine	1			x	

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Revised Organization Chart



S.S.O. - Senior scientific officer
 J.S.O. - Junior scientific officer
 Techn Asst. - Technical assistant
 S.Doc 0 - Senior documentation officer
 Doc.Asst. - Documentation assistant

REVISED EXPERTS FIELDING CHART

	Total m/m	1987	1988	1989	1990
11 - 61 CTA (Mr.Hadidy)	1	1 m/m (09-10)			
11 - 67 CTA (Mr.Popov)	4		1 m/m (05-06)	1 m/m I Quarter	0.5 m/m I Quarter
			1 m/m IV Quarter		0.5 m/m IV Quarter
11 - 62 PCB design technology (Mr.Bosshart)	2,5		0.5 m/m (05) 1 m/m IV Quarter	1 m/m IV Quarter	
11 - 63 PCB manufac- turing tech- nology (Mr.Hoeger)	2,5		0,9 m/m (01)	1,1 m/m II or III Quarter	0.5 m/m I Quarter
11 - 64 Wound Com- ponents technology (to be selec- ted)	2,5		1 m/m IV Quarter	1,5 m/m IV Quarter	
11 - 65 Colour TV and VCR Repair (to be selec- ted)	2,5		0,7 m/m IV Quarter	1 m/m IV Quarter	0,8 m/m IV Quarter
11 - 66 Testing Calibra- tion and Q.C. (Mr.O' Connor)	2,5		0,7-1 m/m (08)	1 m/m I Quarter	0,8-0,5 m/m I Quarter.

REVISED WORK PROGRAMME

SUBJECT	1988				1989				1990			
	II	III	IV		I	II	III	IV	I	II	III	IV
<u>Completing the Construction of ESTC Building</u>												
1. Acceptance of building.												
2. Completion of the second floor of ESTC building												
- Flooring of the last two rooms.												
3. Beautification around the building.												
4. Furnishing the ESTC.												
- Selecting furniture for Administr. Staff												
- " " High level Techn.Staff												
- " " Reception												
- " " Lecture rooms												
- " " Display room.												
- Ordering furniture for Administr. Staff												
- " " High level Techn.Staff												
- " " Reception												
- " " Lecture rooms.												
- " " Display room.												

SUBJECT	1988			1989				1990			
	II	III	IV	I	II	III	IV	I	II	III	IV
- Receiving and inspecting furniture for:											
- Administr. Staff											
- High level Techn. Staff											
- Reception											
- Lecture rooms.											
- Display room.											
5. Completing partitions of ETDC's building.											
- Planning partitions for:											
- Assembling and Production Depts											
- Extention and Common Services Unit											
- TV and VCRs Repair and Maintenance Shop											
- Training Unit.											
- Erecting partitions of Assembling and Production Departments.											
- Erecting partitions of Extention and Common Services Unit.											
- Erecting partitions of TVs and VCRs Repair and Maintenance Shop.											

SUBJECT	1988			1989				1990				
	II	III	IV	I	II	III	IV	I	II	III	IV	
- Erecting partitions of Training Unit												
- Planning electrical, water and compressed air installation for:												
- Assembling and Production Department												
- Extention and Common Services Unit												
- TVs and VCRs Repair and Maintenance Shop												
- Training Unit.												
- Providing Assembly and Production Department with electrical, water and compr.air installation.												
- Prov - Extention and Common Services Unit												
- Prov - TVs and VCRs Repair and Maintenance Shop												
- Prov - the Training Unit.												
6. Providing ESTC with a continuous water supply.												
- Erection of a water tower with a tank capacity of 50000 lt.												
- Providing pipes, tubes and pumps to connect it to the water soutce.												

SUBJECT	1988			1989				1990			
	II	III	IV	I	II	III	IV	I	II	III	IV
7. Providing the Centre with an alternate source of power.											
- Selection of the stand by generators (2 pcs).											
- Placing orders for the generators.											
- Erecting the housing for the generators.											
- Electrical connection to the ETDC electric circuit.											
- Functional testing of generators.											
8. Providing the Centre with air conditioners and fans.											
- Selecting type of fans to be installed .											
- Placing orders for fans.											
- Receiving and installing fans.											
- Defining premises to be airconditioned.											
- Selecting type and size of airconditioners.											
- Placing orders for airconditioners.											
- Receiving and installing airconditioners.											
9. Providing ESTC with compressed air.											
- Selecting departments to be provided with compressed air.											
- Selecting number and type of compressors.											
- Placing order for compressors.											
- Installing piping for compressed air.											
- Receiving and installing compressors.											
- Testing and operation of compressors.											

SUBJECT	1988			1989				1990			
	II	III	IV	I	II	III	IV	I	II	III	IV
<u>Providing ESTC with Transport and Communication</u>											
1. Providing ESTC with a van.											
- Selecting the van.											
- Getting authorization to place the order.											
- Placing order for the van.											
- Receiving and testing the van.											
2. Providing ESTC with telephone lines.											
- Applying for a telephone connection.											
- Selecting intercom system.											
- Ordering the intercom system.											
- Receiving and testing the intercom system.											
- Installing internal communication lines.											
- Commissioning the intercom system.											
- Receiving the outward telephone connection.											
<u>Appointment of Staff</u>											
1. Appointment of Administrative Staff.											
- Appointment of Administrative Officer.											
- Appointment of Account Officer.											
- Appointment of Store Officer.											
2. Appointment of Technical Staff.											
- Sr. Scientific Officer /3/											
- Jr. Scientific Officer /6/2											
- Technical Assistant /10/2											
- Laboratory Assistant /6/4											
- Draftsman.											

SUBJECT	1988			1989				1990			
	II	III	IV	I	II	III	IV	I	II	III	IV
3. Appointment of Supporting Staff.	_____x										
<u>Training</u>											
1. Training of Director Principal Abroad.	_____x										
2. Training of Director Technical Abroad.	_____x										
3. Training of Director Training Abroad.	_____x										
<u>Establishment of an Assembling and Production Department</u>	_____x										
1. Establishment of a PCB Production Unit.	_____x										
- Selecting UNDP provided equipment.	_____x										
- Selecting GOI provided equipment.	_____x										
- Placing orders for UNDP prov.equipment.	_____x										
- Placing orders for GOI prov.equipment.	_____x										
- Receiving and testing UNDP provided equipment.	_____x										
- Receiving and testing GOI provided equipment.	_____x										
- Preparing premises for PCB production unit.	_____x										
- Providing power, water, compressed air and exhaust installations.	_____x										
- Selecting furniture.	_____x										
- Receiving and inspecting furniture.	_____x										
- Installing equipment received.	_____x										
- Training key staff abroad.	_____x										
- Training of staff at site.	_____x										
- Assistance provided by international consultant.				_____x				_____x			
- Test run of PCB production unit.				_____x				_____x			

SUBJECT	1988			1989				1990				
	II	III	IV	I	II	III	IV	I	II	III	IV	
- Normal operation of PCB production unit.												
2. Establishment of a PCB assembling unit.	_____x											
- Selecting UNDP provided equipment.	x											
- Selecting GOI provided equipment.			x									
- Placing orders for UNDP provided equipment.												x
- Placing orders for GOI provided equipment.												x
- Selecting furniture for the assembled unit (benches, shelves, armiras, etc.).			x									
- Placing orders for furniture.												x
- Preparing premises for PCB assembl. unit.												x
- Receiving and testing UNDP prov. equipment.												x
- Receiving and testing GOI prov. equipment.												x
- Receiving and inspecting furniture.												x
- Installing equipment received.												x
- Furnishing premises.												x
- Training of key-staff abroad.												x
- Training of staff at site.						x	x			x	x	
- Assistance provided by international consultant.						x	x			x	x	
- Normal operation of PCB assembling unit.	_____x											
3. Establishment of a wound component production unit.	_____x											
- Selecting UNDP provided equipment.												x
- Selecting GOI provided equipment.												x
- Placing orders for UNDP provided equipment.												x
- Placing orders for GOI provided equipment.												x
- Selection of furniture.												x

SUBJECT	1988			1989				1990				
	II	III	IV	I	II	III	IV	I	II	III	IV	
- Placing order for furniture.												
- Preparing premises for wound comp. unit.												
- Receiving and testing of UNDP prov. equipment.												
- Receiving and testing of GOI prov. equipment.												
- Installing equipment received.												
- Receiving and inspecting furniture.												
- Furnishing premises.												
- Training of key staff abroad.												
- Training of staff at site.												
- Assistance provided by international consultant.												
- Normal operation of the unit.												
4. Establishment of a production unit for mechanical mechanical components with tool room.												
- Selecting UNDP provided equipment.												
- Selecting GOI provided equipment.												
- Placing orders for UNDP provided equipment.												
- Placing orders for GOI provided equipment.												
- Selecting furniture for the unit.												
- Placing orders for furniture.												
- Preparing premises for the unit.												
- Erecting additional room for presses.												
- Planning power supply for each equipment.												
- Electrical supply provided.												
- Receiving UNDP provided equipment.												
- Receiving GOI provided equipment.												

SUBJECT	1988			1989				1990				
	II	III	IV	I	II	III	IV	I	II	III	IV	
- Receiving and inspecting furniture.												
- Furnishing premises.												
- Installing equipment received.												
- Training of key staff abroad.												
- Training of staff at site.												
- Assistance provided by international consultant.												
- Normal operation of unit.												
<u>Establishment of an Extension and Common Services Unit.</u>												
1. Establishment of a testing, calibration and quality control lab.												
- Selecting UNDP provided equipment.												
- Selecting GOI provided equipment.												
- Placing orders for UNDP provided equipment.												
- Placing orders for GOI provided equipment.												
- Selecting furniture for the lab.												
- Placing orders for Lab's furniture.												
- Preparing lab's premises.												
- Planning and providing adequate electrical connections.												
- Receiving and testing UNDP provided equipment.												
- Receiving and Testing GOI provided equipment.												
- Receiving and inspecting lab furniture.												
- Installing equipment received.												
- Training of key staff abroad.												
- Training of staff at site.												

SUBJECT	1988			1989				1990				
	II	III	IV	I	II	III	IV	I	II	III	IV	
- Assistance provided by international consultant.		x	x		x	x			x	x		
- Normal operation of unit.	-----x											
2. Establishment of an environmental testing lab.	-----x											
- Selecting UNDP provided equipment.									x	x		
- Selecting GOI provided equipment.									x	x		
- Placing orders for UNDP provided equipment.									x	x		
- Placing orders for GOI provided equipment.									x	x		
- Selecting lab's furniture.									x	x		
- Placing orders for lab's furniture.									x	x		
- Preparing lab's premises.									x	x		
- Planning and providing adequate electrical, water and compressed air connections.									x	x		
- Receiving and Testing UNDP provided equipment.										x	x	
- Receiving and Testing GOI provided equipment.										x	x	
- Receiving and expecting lab's furniture.										x	x	
- Installing equipment received.											x	x
- Training of key-staff abroad.										x	x	
- Training of staff at site.											x	x
- Assistance provided by international consultant.											x	x
- Normal operation of lab.	-----x											
3. Establishment of Design and Development Lab for Electronic Devices and Products.	-----x											
- Selecting UNDP provided equipment.												x
- Selecting GOI provided equipment.												x
- Placing orders for UNDP provided equipment.												x
- Placing orders for GOI provided equipment.												x

SUBJECT	1988			1989				1990			
	II	III	IV	I	II	III	IV	I	II	III	IV
- Selecting furniture.			x								
- Placing orders for furniture.					x						
- Receiving and Testing of UNDP provided equipment.							x				
- Receiving and Testing of GOI provided equipment.											x
- Preparing premises.			x								
- Planning and preparing adequate electrical connections.					x						
- Receiving and inspecting furniture.							x				
- Installing equipment received.											x
- Preparing a list of items to be developed.											x
- Training of key staff abroad.									x	x	
- Training of staff at site.									x		x
- Assistance provided by international consultant.			x	x	x				x	x	
- Normal operation.											x
4. Establishment of a PCB design and development lab.											x
- Selecting UNDP provided equipment.											x
- Selecting GOI provided equipment.											x
- Placing orders for UNDP provided equipment.											x
- Placing orders for GOI provided equipment.											x
- Selecting furniture.											x
- Placing orders for furniture.											x
- Preparing premises.											x
- Planning and preparing adequate electric connection.											x
- Receiving and testing UNDP provided equipment.											x
- Receiving and testing GOI provided equipment.											x

SUBJECT	1988			1989				1990			
	II	III	IV	I	II	III	IV	I	II	III	IV
- Installing furniture received.	_____x										
- Installing equipment received.	_____x										
- Training of key staff abroad.	_____x										
- Training of staff at site.			x-----x				x-----x				
- Assistance provided by international consultant.			x-----x				x-----x				
- Normal operation.	_____x										
<u>Establishment of a TV's and VCR's Repair and Maintenance Shop.</u>											
	_____x										
- Selecting UNDP provided equipment.	_____x		x-----x								
- Selecting GOI provided equipment.	_____x		x-----x								
- Placing orders for UNDP provided equipment.			x-----x				x-----x				
- Placing orders for GOI provided equipment.			x-----x				x-----x				
- Selecting furniture.			_____x								
- Placing orders for furniture.			_____x								
- Preparing premises.			_____x								
- Planning and providing adequate electric connection.			_____x								
- Receiving and testing UNDP provided equipment.			x-----x			x-----x					
- Receiving and testing GOI provided equipment.			x-----x			x-----x					
- Receiving and inspecting furniture.			_____x								
- Installing equipment received.	_____x										
- Training of key staff abroad.							x-----x				
- Training of staff at site.			x-----x				x-----x			x-----x	
- Assistance provided by international consultant.			x-----x				x-----x				x-----x
- Normal operation.										x-----x	

SUBJECT	1988			1989				1990			
	II	III	IV	I	II	III	IV	I	II	III	IV
<u>Establishment of a Library Cum Documentation.</u>	_____x										
- Drawing a list of publications to be provided initially.	_____x										
- Ordering publications and books.	_____			_____x							
- Drawing a list of periodicals to be subscribed initially.	_____x										
- Subscribing to periodicals.	_____			_____x							
- Preparing premises.	_____			_____x							
- Selecting furniture.	_____x										
- Placing orders for furniture.	_____			_____x							
- Receiving and inspecting furniture.	_____			_____x							
- Furnishing premises.	_____			_____x							
- Receiving initial batch of books.	_____x	_____x	_____x								
- Receiving periodicals.				_____x_____x							
- Start to catalogue books and periodicals.				_____x_____x							
- Initiate contacts with Centre's staff and industrialists.				_____x_____x							
- Start issuing an information sheet about activities at ESTC.				_____x_____x							
<u>Establishment of a Maintenance Unit to Look-after the Centre.</u>	_____x										
- Appointment of staff to maintain the electrical installation.	_____			_____x							
- Appointment of staff to maintain water piping, tabs, tanks, etc.	_____			_____x							
- Selecting tools needed.	_____			_____x							

SUBJECT	1988			1989				1990				
	II	III	IV	I	II	III	IV	I	II	III	IV	
- Placing orders for tools needed.	—————x											
- Receiving and inspecting tools ordered.	—————x											
- Preparing a programme for periodic inspections.	—————x											
- Normal operation.	—————x											
<u>Mid Term Evaluation.</u>				x—————x								
- Preparing progress report and request for additional UNDP assistance.	—————x											
- Participation to mid term evaluation.				x—————x								
<u>Reporting</u>												
- Preparing progress report every 12 months.	x—————x											
<u>Terminal Tripartite Review.</u>												
- Preparing the draft terminal report.								x—————x				
- Participation to the terminal tripartite review.										x—————x		