zation in electronics.

This way, according to the choice made at each step, new groups will be turned out the level of assistant technicians, skilled workers, supply and so forth.

We believe that framework as flexible as it is, has the advantage of making possible a better adjustment of skilled personnel supply taking into consideration the changes as far the labour demand.

OPTION I

1 - Day time cource - Full utilization

System: Intensive (8 hours a day)

Entrance variable: $\frac{A}{B}$ (yearly)

Graduation variable: $\frac{A}{B}$ (yearly)

Teachers' working system: full time.

Number od teachers (instructors): 11

Course duration: 1 year (10 months)

Enrollment System: every year (February)

Number of possible graduates per year: 396

Estimate of Capacity of Allotment

A = Number of teachers X Number of daily hours X 200 days/per year

B = Course duration in hours

2 - Night Shift

System: 4 hours a day, not intensive

Entrance variable: period of three months (36 students)

Graduation variable: period of three months (36 students)

Teachers' working system: part time

Number of Teachers: 11

Course duration: two years (2 x 10 months)

System of enrollment: period of three months

Number of students graduating every year: 108

Total Number of Every Year Graduates - Option I
396 + 108 = 504

OPTION II

System: three shifts (4 hours a day) not intensive

Entrance variable: period of three months

Graduation variable: period of three months

Teachers' working system:

a) Full time for day shift

b) Part time for night shift

Number of teachers: 11 + 11

Course duration: 2 years (2 x 10 months)

System of enrollment: every three months
(36 students per class)

Number of students graduating every year: 108 ...
students in each shift

Total pf Graduates Every Year - Option II
3 x 108 = 324

OPTION III

System: free

The student is allowed to enroll for the modules so that he can advance his graduation. He may attend even six classes a day. In this case there would be classes in the morning and at night.

Entrance variable: period of three months

Graduation variable: period of three months

Teachers' working system:

a) Full time for a day shift

b) Part time night shift

Number of teachers: 11 + 11

Course duration: . at least one year and three months

. utmost 2 years

System of enrrolment: every three months (36 students per class)

Number of students graduating every year: at least 108 per shift and utmost 144... per shift

Total Number of Every Year Graduates - Option III
At least 108 x 2 = 216
Utmost 144 x 2 = 288

SUMARY OF THE OPTIONS

Option	Course Duration	System of Enrollment	Day Shift	Night Shift	Graduation	Total
I	10 months	Yearly	8 hours	-	396	504
	20 months	Every trimester	-	4 hours	108	
II	20 months	Every trimester	4 h.+ 4 h.	-	108 X 3	324
III	At least:15m	Every trimester	8 hours	4 hours	At least: 216	216
	Utmost: 24 m				Utmost:288	288

2 - Prepare teaching material for modules as well as audio-visual aids for both electrical technology and electronics.

3 - Encourage the training of five teachers both in the fields of electrotechnology and electronics and electronics at Technical Education Trainig Institute of Japan, during the second semester, 1977.

4 - Encourage the training of six teachers of specific subjects related to the areas of electrotechnology and electronics, at a Center os Technical Education in Brazil, during the second semester, 1978.

X - DURATION

This project will last for three years until it can really work out its results.

XI - JUSTIFICATION

. Improve SENAI facilities as far as laboratories and shops are concerned

CHARACTERISTICS OF THE PROJECT

. Increasing the possibility of utilization of the avaiable installation (capacity)

. To up-to-date the teaching system concerning professional training

. Offer basic courses in electrotechnology and:
- specialization in industrial electronics
- training of assistant technician
- trade courses
- upgrading courses
- supply for any of the 32 modules

. Provide means for both enterprises and industries to apply tests and

conduct experiences in the Center laboratories

Carry out technological researches in local industries with the purpose of introducing the improvement of teaching

THE LAW 5 692/1971

From 1971, with the new education law, it has been possible to identify the need for stimulating, even more, the new trends in education considering the programs wich could eventually meet the real needs of preparation of skilled workers. This way, it was possible for SENAI to emphasize even more its educational work which has been carryied out since 1942.

ELECTRICAL AND ELECTRONICS INDUSTRY IN BRAZIL

We can easily characterize such industry in three parts:

- industries concerned with production of consumer's goods
- companies concerned with capital expenditure
- industries concerned with production of intermediary goods (components)

Characteristics of Electrical Techonology and Electronics in Brazil

CHART II

Items / Segments	Employer	Number of Enterprises	Investment	Sales
Consumer's goods	33%	21%	49%	52,5%
Capital Expenditure	37%	40%	32%	28,0%
Intermediary goods	30%	39%	19%	19,5%
T o t a l	100%	100%	100%	100,0%

OUR PROBLEMS

. CAPITAL AND TECHNIQUE

The brazilian industries concerned with electricity and electronics in a great proportion are short of capital and technique. Those are really our principal limitations. All the others are a natural consequence of those first two such as the problems in finding market for our production or the other way, competing with foreign markets in business.

. TECHNOLOGY

Such industries face real problems as far as technology is concerned. The situation is so difficult that for the industries to up-to-date their techniques it takes a long time within many limitations and even though our industries need new projects to be developed in new fashion. It really takes them a long time and very seldom can they do that, since it takes not less than one to one and half years to design and produce a new item. Foreign companies in Brazil can do that even if it requires a long process in a matter of two months. (*)

Small industries represent those wich need to buy foreign "Know-how" and that would cost them such a high cost that they prefer to develop their own technology. They are short of information concerning any new alteration of technology and "know-how". They are not able to follow such development and are also short of capital or financial resources, specially in foreign exchange. These campanies ate sometimes compelled to import technological "packages". It is very difficult for them to familiarize with the content of such packages. Besides that, they have to take in order to utilize such packages. (**)

(*) The japanese industry, for example, has to plan ahead of time for the production of any item and they manufacture at least 50000 units, since their domestic needs are very significant. This way, when they transfer any "know-how" to one of their representatives in Brazil, the cost involved in tool making and in projects has already beem paid for.

(**) VIDAL, José Walter Batista, Secretário de Tecnologia Industrial do Ministério da Indústria e Comércio. Entrevista concedida à Revista Eletricidade Moderna, nº 36, jan/fev. 1976.

SHORTAGE OF LABORATORIES

In spite of the great difficulties and challenges, the electrical and electronics industry in Brasil has won some hard battles.
A few thecnicians think that such industry has not developed enough and besides that is retroceding.
I do not think we shoud say that but is tru that the possibility of understanding any up-to-date "know-how" is not satisfactory. We shoud develop our own technology. Our government firmly believes that our national companies will eventually compete with any other industrial field as far as technology is concerned. We should not be so pessimistic in relation to the cost os technological researches. They are creative technologies and would not contribute in such proportion to increase the production cost. We should emphasize that omitting creative research (field or applied) may contribute to increase such costs if we are obliged to buy "know-how" in inferior conditions. Research costs may be reduced or even become almost covered by the government finacial support.

THE PAST

In 1950 when our country had serious exchange problems, many companies at work have developed a grear deal. In 1955 such companies represented 80% in all.

THE PRESENT

The present situation is up-side-down and we notice the reduction of national participation in such industries. Here are some data concerning production and the general situation so that we may have an idea of position of the electro-electronics industry.

Technical data concerning the behavior os such activities in Brazil in 1975.

SITUATION	UNITS	1975
Consumption of electrical power (KW)	62.885	December
Skilled workers employed	70.398	August
Wages Paid (Cr$ 1.000)	166.885	August
Average Wages (Cr$ 1,00)	2.370	August
Proportion of Average Wages of Production per machines and electrical Equipment	280	November
Exporting Machines and Electrical Equipment (U$ 1,000.00 FOB)	140.946	Jan./Nov.

Sources: CEBRACO, IBGE, IBS, Light, ACSP, FGV, ABDIB, Cacex, August, 1975
December, 1975.

WORLD SITUATION OF THE SPECIALIZATION (*)

COUNTRIES	PIB US$ 10^9	POPULATION X 10	FOREIGN CONSUPTION POPULATION GOODS	INTERMEDIARY GOODS	INVESTMENT EXPENDITURE	TOTAL	PIB RELANTIONSHIP TOTAL CONSUMPTION	PER CAPITA CONSUMPTION
East Germany	284,8	60,29	2.138,4	1.940,1	3.468,9	7.754,9	2,65	125,18
Denmark	23,9	5,03	173,7	97,6	195,3	566,6	1,95	92,76
Spain	52,1	34,87	215,0	109,8	438,0	562,8	1,46	21,87
United States	1.289,6	208,10	5.982,7	9.204,3	29.914,9	45.101,9	3,49	216,73
France	207,5	52,01	801,0	961,0	2.357,8	4.119,8	1,99	79,20
Holland	51,7	13,49	322,4	171,6	522,0	1.016,0	1,97	75,30
Italy	96,6	54,87	281,3	336,7	976,5	1.594,5	1,65	29,06
Japan	309,0	107,06	4.095,7	4.368,2	5.966,3	14.430,2	4,66	134,77
Norway	17,7	3,97	84,0	62,1	177,4	323,5	1,83	81,40
United Kingdom	127,3	58,47	1.404,1	970,3	1.799,6	4.174,0	3,28	71,38
Sweden	46,5	8,31	396,5	200,4	442,9	1.039,8	2,24	125,05
Switzerland	36,1	6,43	396,5	117,8	325,6	597,0	1,65	92,72
Brazil	84,4	105,46	597,4	541,0	702,3	1.841,3	2,18	17,46
						Media	2,38	89,45

(*) - Brazil Position in relation to other countries in consumption of the three basics segments os Electronical Industry (Consumer's Goods, Intermediary Goods and Investment) Year: 1974

Source: Revista Eletricidade Moderna, no. 36, Jan./Fev. 1976.

EXPANSION OF THAT INDUSTRY IN MINAS GERAIS

All information given previously show the importance of the activities concerning the elctro-electronics industry in our country. We hope that huge investments of capital will take place in Minas Gerais within the three forthcoming years for the following: expansion of the ironworks (siderurgy), production of automobile plants and all those will, for sure, bring other field industries to our State. The investment estimate in the field of electrical material and commnication will correspond to 660.320 millions cruzeiros, and this will open the possibility of hiring 6.633 new employees. (*)

SENAI IN MINAS GERAIS

This Agency in Minas Gerais has been trying to develop its activities to prepare human resources for the industrial development of our State to meet our needs. The SENAI programs at present have been considered by the "2nd. Plano Mineiro de Desenvolvimento Econômico e Social" (the Plan for the Economical and Social Development in Minas Gerais).

(*) - Labor Market Perspective in Minas Gerais, pages 13 to 28, INEP - UTRAMIG, 1976.

3.10.14 - TRADE TRAINING PROGRAMS FOR YOUNGSTERS (SENAI/MG)

Systematic professional training for youngsters (14 and 18 years) at both the specific training centers and at industries (including in service-trade training is among ou main objectives).

Goals:

1976 - 1800 graduates
1977 - 1980 graduates
1978 - 2178 graduates

It is easy to justify this program as far as the training ofthe youngster is about two years and half. Besides that, a general full training is offered which is equivalent to the first four years of high school (jun-or). It should be emphasized that a great proportion of the population is found at this age level.

EXECUTIVE UNIT
(Carrying out the Programe)

SENAI AND LOCAL INDUSTRIES

3.10.15 - PROGRAM: PROFESSIONAL UPGRADING (SENAI/MG)

Its main objective is the intensive training of workers over 16 years trying to meet the specific needs of the different small localities. This program may be carried out with other kinds of money appropriation.

Goals:

1976 - 6600 skilled workers
1977 - 7260 skilled workers
1978 - 7980 skilled workers
1979 - 8780 skilled workers

Due to the increase of the supply snd demand of skill labor in the state in a such a short time, the program above is full justified. The professional upgrading program is one of the main concerns within the whole training program of SENAI.

3.10.16 - PROGRAM-SUPPLY (SENAI/MG)

The main objective os this program is to create conditions for the SENAI alunni to make up for their regular high school program.

Goals:

1976 - 180
1977 - 216
1978 - 260
1979 - 312

The main justification for this program lies upon the Training Resposibilities of Industries.

SENAI will do its best to help in terms of reducing the operational cost os such burden.

3.10.17 - PROGRAM: SUPPLY (SENAI/MG)

This program aims at upgrading both industry working personnel as well as SENAI own working groups, Means of specialization for that purpose will also be provided.

Goals:

(Participants X average class schedule of the courses)

1976 - 171.600 men/hour
1977 - 188.760 men/hour
1978 - 207.600 men/hour
1979 - 228.360 men/hour

It becomes evident that the program aims at increasing productivity of SENAI as well as of industries, through upgrading and creation of means of specialization. Of course, everybody knows how important productivity is as far as methods of production are concerned.

3.10.18 - PROGRAM: TRAINING SENIOR HIGH SCHOOL TECHNICIANS (SENAI/MG)

It aims at full or partial qualification at Senior High school level. This will also involve the system os Central Area school complementary training with the schools.

Goals:

1976 - 25
1977 - 32
1978 - 41
1979 - 80 (Including the first graduating group at Senior High School level)

The main justification of this program lie in the fact that the experience and Know-how attained by SENAI System in Minas Gerais aims at professional training and skilled workers thus involved. I mean at Senior High School level. This is the first step to be given by SENAI in this area of teaching and training.

A FINAL WORD

It is not our purpose to set a new Center for Professional Training. We are trying to broad our objectives as far as the unit carrying out training in basic electricity is concerned. We also want to rationalize and make obvius the possibilities of resources from the administration and its support to prepare teaching material for such goal (Printing Shop Technical Unit).

What we want is not to meet the real needs of all industries in Minas Gerais and maybe in the whole country by means of saving efforts at high labor scale, trying to introduce in our present system a set of technological units.

We hope, this say, to cut downthe limitations already identified in relation to the participation of human resources in the process of production in the field of electricity and electronics.

XII - COOPERATION REQUESTED

1 - TECHNICIANS AND/OR TEACHERS (INSTRUCTORS)

- Electrotechnology engineer (2).
- Technician Trained in electrotechnology (1).
- Electronics engineer (1)
- Technician trained in electronics (1)

We hope to request from Japan, from January 1978 on, 4 japanese technicians to set up the program. There will be two technicians trained in electrotechnology and two trained in electronics.
Their work will be mainly training the same number of brazilian technicians in their special fields as well as set up the equipments and laboratories both in electronics and electrotechnology.
From January 1979 on the participation of a japanese technician will be requested to follow the first project in action.

2 - TRAINING

a - Five scholarships for brazilians will be requested from the second semester of 1977 on: two of them will be for technicians at high school level (electronics), two for techinician trained in electrical technology and one for an electrical engineer or an electronics engeneer to supervise the unit.

b - We suggest that the fellowship students should attend the course (Instructor Training Program - 6 month cource offered by the institute of Vocational Training (IVT) at Segamihara, Kanagawa.

c - We also suggest that the technicians should take part in the related activities for preparation of teaching materials. We should like that at least one them would have the opportunity to familiarize with up-to.date techniques of preparation and utilizationof teaching aids.

It is hped that the engeneer to be in charge of supervising the Unit, besides receiving specific training, should have the opportunity of taking part in the "Seminar For Professional Training" at the Tokio International Center (Ichigays).

3 - EQUIPMENTS

All the facilities of the Center, including mainly the laboratories and shops will be indicated as well as the teaching activities to be developed. This specification aims at giving the Japanese Government more flexibility to choose the equipment and accessories to be donated. This will make the project easier carried out. It is understood that both the equipments and laboratories will be within the purpose of training students.

Due to the natural difficulties to obtain bibliography from foreign countries, we will not got technical books published in Japan.

XIII - FLOW CHART OF RESOURCES APPLICATION

Cooperation Requested (US $)

Years	Technicians and/or Instructors	Cost US $	H/M Training in Japan	Cost US $	Equipment	Total US $
Year I (1977)	-	-	30	45,000.00	Others (*)	45,000.00
Sub-total (1)	-	-	30	45,000.00	-	45,000.00
Year II (1978)	48 H/M Technicians from Japan	140,000.00	-	-	Others	140,000.00
Sub-total (2)	48	140,000.00	-	-	-	140,000.00
Year III (1979)	12 H/M Japan Technician	35,000.00	-	-	Others	35,000.00
Sub-total (3)	12 H/M	35,000.00	-	-	-	35,000.00
Overhall Total	60 H/M	175,000.00	30	45,000.00	-	35,000.00

XIV - CHRONOGRAM OF THE TECHNICAL COOPERATION

Specification \ Years	Year I (1977)		Year II (1978)		Year III (1979)	
TECHNICAL ASSISTANCE						
1. Training both technicians and/or Instructors from Japan to Brazil						
Electrical Power Engineer (1)						
Electrical Power Technician (1)						
Electronics Engineer (1)						
Electronics Technician (1)						
Electrical Power Engineer (1)						
1. Training Personne in Japan						
Foreign scholarships in Japan at the "Institute of Vocational Training" for:						
Electrical Power Engineer (1)						
Electronics Technicians (2)						
Electrical Power Technicians (2)						

XV - TECHNICIANS AND TEACHING STAFF

1 - TEACHING STAFF

The basic training of eleven instructors must be at Senior High School level both in electrical technology and electronics. Of course they should be trained in specific subjects. Sérgio de Freitas Pacheco Vocational Training Centre will supply the instructors in general education.

2 - TRAINING

a - Scholarships abroad

Five technicians will be selected to receive special training in pedagogy and in service training at the japanese electronics industries.

Wages to be paid during the cource abroad

(Cr$)

AREA	LEVEL	QUANT.	MONTHLY PAY	COURSE DURATION	EXPENSES
Electro-technology	Higher	1	12.000,00	6 months	72.000,00
Electro-technology	High School	2	9.000,00	6 months	108.000,00
Electronics	High School	2	9.000,00	6 months	108.0(00
Total	-	5	-	-	288.000,00

Training at the Institute of Vocational Training in Japan.

b - Domestic scholarships

Six scholarships will be awarded to technicians who will be giving training (workshop) both in pedagogical orientation as well as in service training at electronics industries.

Expenditure for training technicians in Brazil (Cr$)

AREA	LEVEL	NO. OF TECHIN:	MONTHLY PAY	WAGES TO BE PAID	DAILY RATES AND TRAVEL EXPEND.	TOTAL EXPENDITURE
Electronics and electro-technology	High School	6	8.000,00	624.000,00 (*)	324.000,00	948.000,00

(*) - Thirteen salaries will be paid. The training will last as far as each area of trainig is concerned. Both the courses and in-training services will take during 1977. The preference will be the federal agency in São Paulo - CENAFOR and all São Paulo industries.

The expenditure related to the salaries to be paid to eleven technicians in both 1978 and 1979 have been stimated for thirteen months and an average salary between Cr$ 12.000,00 and Cr$ 18.800,00.

Observations

Expenses related to purchasing equipment have also been estimated as the national resources approximately Cr$ 600,00 in order to complement the set up both laboratories and shops.
It is to be noted under the classification of Odds and Ends, expenses concerning concerning trips within country have also been estimated. That includes the expenses for 5 japanese techinicians to live in Brazil from 1978 to 1979.

3 - EQUIPMENTS

Equipments (or sets of equipments) wich are found in SENAI electrical laboratory

QUANTITY	SPECIFICATION	FULL PRICE (Cr$)
1	Rovemak Band Saw	61.800,00
2	Bench Drill Press (16 mm)	13.640,00
1	Electrical Emery Board	3.380,00
1	Bench Emery Board	630,00
1	Winding Frame	12.200,00
1	Hidraulic Forgiving Press (15 ton)	2.100,00
3	Security Bench with two vises	3.960,00
24	Bench for Wiring Motors with Test Panel and Tool Window	48.000,00
6	Industrial Installation Panel	72.049,00
2	Industrial installation Panel with Equipment for teaching purposes for automation	24.683,00
1	Buffing Machine	5.000,00
18	Three Phase-inductiron Motor	6.384,00
1	Wood Benches for Turing Wires	6.800,00
1	Central Connection Panel	7.150,00
	TOTAL	267.776,00

4 - UNALIENABLE ASSETS

Both specific and describe all installations to be directly utilized to carry out the whole project, such as

Electricity Shop:

. Avaiable area : 959 m^2
. Area to be built : 926 m^2
. Construction specification:
Two flights for both electrical and electronics laboratories, according to plans and lay-outs (annex).

Estimate:

Real cost of the present unit:	Cr$ 1.314.375,00
Real state cost of the area to be built (Cr$ 3.000,00)	3.131.360,00
Real cost of equipment avaiable:	267.776,00
Total cost	Cr$ 4.713.511,00

5 - ODDS AND ENDS (MISCELLANEOUS)

5.1 - Means of transportation (SENAI owns at present the following vehicles)

. Volkswagen Standard "Kombi"
Made in 1976. Capacity: 1000 Kg or 8 passengers. Licence no.: AK-8246

. Volkswagen Sedan 1300 L
Made in 1975. Capacity: 4 passengers.
Licence no. AO-1893

. Volkswagen Sedan 1300
Made in 1969. Capacity: 4 passengers
Licence no. AF-1537

. Volkswagen Variant
Made in 1975. Capacity: 5 passengers
Licence no.: AN-8759

. Dodge Dart Gran Sedan Luxe - 4 doors
Made in 1975. Capacity: 5 passengers
Licence no.: AS-7728

. Chevrolet Opala Sedam - 4 doors
Made in 1973. Capacity: 5 passengers
Licence no. AH-9002

. Chevrolet C-10 (Pick Up)
Made in 1975. Capacity: 1000 kg
Licence no.: CF-6492

. Ford F-350 (Truck 3/4)
Made in 1975. Capacity: 3000 Kg
Licence no.: CF-6567

5.2 Consumer's material: indispensable for courses

. Electroducts

. Magnetic Wires

. Thermoplastic Wires

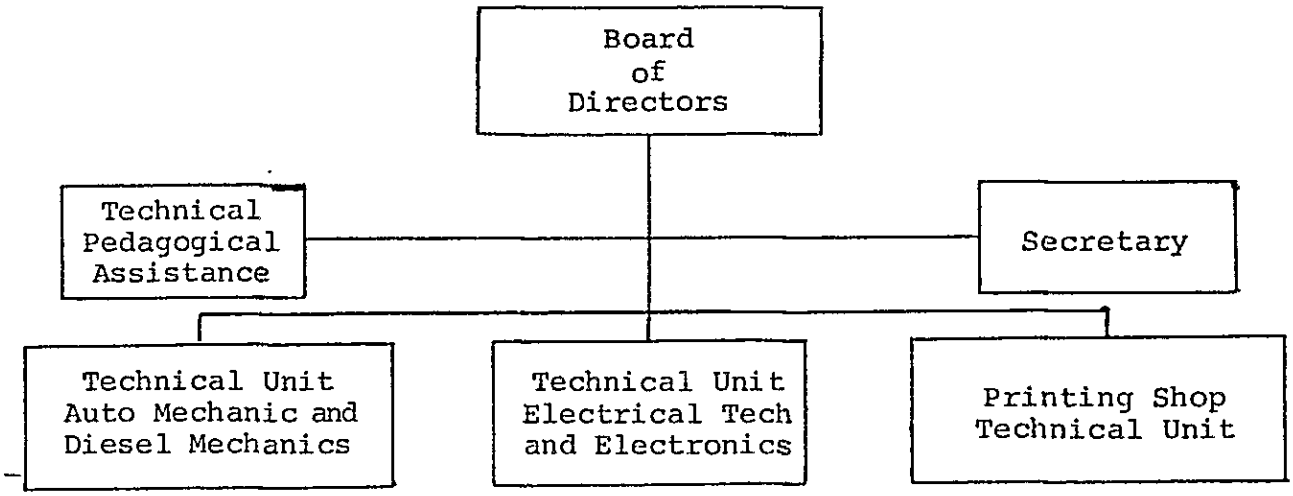
. Electronic Components

. Insulating Material

. Magnetic Plates

5.3 Structural Administration of the Training Unit

Organizational Structure of the Professional Training Center Sérgio de Freitas Pacheco



The technical Unit related to electrotechnology and electronics will have a very simple organization. This will be the unit set up: a technical supervisor (an operational engineer or a higher course engineer (5 years) in electrotechnology and eleven instructors to train students in individual areas.

The technical pedagogical assistance will be as follows: three technical supervisors, a teaching technician (pedagogue) and an education advisor.

5.4 Structured Units of the General Training Supervising

UNIT	RESPONSIBLE	DEGREE	SCHOOLING SPECIALIZATION
Vocational Training Department	Geraldo Eustáquio de Souza	3º	Economist, B.E.S.
Assistant to the Vocational Training Department	Macário Gomes Rosa	3º	Pedagogue, B.A.E.
Vocational Training Centres	Carmen Rocha Dias	3º	Pedagogue, B.A.E.
Within Industry Training Division	José Humberto R. dos Santos	3º	Pedagogue, B.A.E.
TRAINING CENTRES			
1. CFP - ARG	Ismar Moraes	3º	Pedagogue, B.A.E.
2. CFP - JFN	José Benedito Jardim	3º	Lawyer
3. CFP - NL	Plínio Alves de Azevedo	2º	Accountant
4. CFP - MM	Ari Gomes de Souza	3º	Lawyer
5. CFP - FR	Telmo Teles Rocha	3º	Lawyer
6. CFP - JIP	Hélio Guimarães	3º	Pedagogue, B.A.E.
7. CFP - IT	Augusto Teixeira	3º	Pedagogue, B.A.E.
8. CFP - SJ	Antônio Elias Cecílio	3º	Pedagogue, B.A.E.
9. CFP - EL	Antônio Roscoe Fonseca	3º	Pedagogue, B.A.E.
10. CFP - SFP	Vicente Megale Filho	3º	Lawyer
11. CFP - PN	Osvaldo Barbosa Penna	3º	Philosophy Degree
12. CFP - PT	Hidralgísio Dias Silva	1º	

5.5 Presentation of SENAI Staff and Names of the Personnel

Afonso Greco	General Director	Dentistry
Antônio Ferreira de Andrade	Planning Assessory Office	Economist, B.E.S, M.A.
Carlos Custódio de Macedo	Head of the Administration and Financial Bureau	Accountant
Geraldo Eustáquio de Souza	Vocational Training Bureau	Economist, B.E.S.
José das Dores Soares	Assistant	Lawyer
Hélio Jacques de Almeida	Consultant	Technical Administrator
Humberto Duarte Nunes	Head od the Purchasing Division	Technical Administrator
Caetano Ramos Ferreira	Head of the Labor Relationship Division	Lawyer
Euler Ioiola da Silva	Head of the Budget and Accounting Division	Economist, B.E.S.
Francisco Nunes Leal	Head of the Odds and Ends Service Division	Business Administration

XVI - CHRONOGRAM OF RESOURCES APPLICATION
NATIONAL CONTRIBUTION (US$)

SPECIFICATION	TECHNICIANS AND/OR INSTRUCTORS		TRAINING		EQUIPMENTS	OTHERS	TOTAL	
	H/M	COST US $	H/M	COST US $			H/M	COST
YEAR 1 (1977)	78	94,800.00	30	28,800,00	50,000.00	-	108	173,600.0
YEAR II (1978)	143	174,000.00	-	-	10,000.00	15,000,00	143	199,800.0
YEAR III (1979)	143	244,800.00	-	-	-	10,000.00	143	254,000.0
T O T A L	364	514,400.00	30	28,800.00	60,000.00	25,000.00	394	628,000.0

XVII FLOW SHEET OF LABOR CARRIED OUT

NATIONAL CONTRIBUTION

(US $)

SPECIFICATION \ YEARS	YEAR I												YEAR II												YEAR III											
	1977												1978												1979											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
1 - Instructors in basic electricity, Electrical technology and electronics (6)																																				
3 shop practice																																				
1 instructor for theory of electrical technology																																				
1 instructor for theory of electronics																																				
1 instructor for theory of laboratory practice																																				
2 - Training																																				
a) Teacher's Training Course																																				
3 - Equipment (annexes)																																				
4 - Unailiable Assets																																				
£ - Odds and Ends																																				
Prepartion of didatic material																																				
Printing teaching material																																				

XVIII - OVERALL FLOW CHART OF RESOURCES APPLICATION
(US $)

SPECIFICATION	Technicians and/or Instructors		Training		Equipments	Others	Total	
	H/M	COST(US $)	H/M in Japan	COST (US $)			H/M	COST (US$)
YEAR I (1977)								
Foreign Resources	-	-	30	45,000.00	Others (*)	-	30	45,000.00
National Resources	78	94,800.00	30	28,800.00	50,000.00	-	108	173,600.00
YEAR II (1978)								
Foreign Resources	48	140,000.00	-	-	Others	-	48	140,000.00
National Resources	143	174,000.00	-	-	10,000.00	15,000.00	143	199,800.00
YEAR III (1979)								
Foreign Resources	12	35,000.00	-	-	Others	-	42	35,000.00
National Resources	143	244,800.00	-	-	-	10,000.00	143	254,800.00
TOTAL								
Foreign Resources	60	175,000.00	30	45,000.00	-	-	90	220,000.00
National Resources	364	514,000.00	30	28.800.00	60,000.00	25,000.00	394	628,000.00
TOTAL	424	689,000.00	60	73,800.00	60,000.00	25,000.00	484	848,200.00

(*) To be showed in the Aditive, after the Japan Technicians Mission, in April, 1977

XIX

CHRONOGRAMER SHEET SHOWING HOW WILL BE THE PROJECT CARRIED OUT BETWEEN BRASIL AND JAPAN TECHNICAL COOPERATION

100 - STAGE I

101 - Preliminary studies

101.1 - Studies with the purpose to provide the best location to the Vocational Training Bureau

101.2 - Local studies carried out directly at the Technical Schools with the purpose to train technicians in electricity and electronics.

- facilities, machinery and equipments
- curriculum structure
- program content
- teachers' upgrading
- structural administration
- most difficult problems identification

102 - Methodology studies

102.1 - Curriculum structure in modules

102.2 - Study of the conception CEU - Continuing Educational Unit and its adaptation to the Brazil situation

102.3 - Programs preparation

102.4 - Specification of school facilities to develop the program in modules

103 - School facilities improvement

103.1 - Estimating of the facilities improvement and equipment specification

103.2 - Shops and laboratories lay-out examination

103.3 - Specification of the working alternatives as well as estimation of graduations every year, taking in consideration the utilization of the avaiable capacity

104 - Human resources

104.1 - Training and administration needs

105 - Administrative and financial organization

105.1 - Structural administration of the Vocational Training Centres

105.2 - Estimated costs for facilities improvement

105.3 - Estimate of the operational costs

105.4 - Program introducing in the actual budget

200 - STAGE II

201 - Project flux

201.1 - To the National Department

201.2 - To Ministry of Education

201.3 - To the SUBIN

201.4 - To the CNRH and IPLAN

201.5 - Foreign Relations Ministry

201.6 - Japan Embassy - JICA

201.7 - Analysis of the project by JICA

300 - STAGE III

301 - Japan Technicians' Job

301.1 - Japan technicians mission

301.2 - Architectural project elaboration

301.3 - Bids for the construction

301.4 - Setting up and facilities preparation to equipments receiving

400 - STAGE IV

401 - Human resources preparation

401.1 - Getting in touch with the Japan Government to send the instructors for training at IVT

401.2 - Sttaf' training in Japan (5)

401.3 - Training of 6 instructors in Brazil (CENAFOR - São Paulo)

500 - STAGE V

501 - Shops and laboratories installation

501.1 - Return of the 5 Brazil technicians

501.2 - 4 Japan technicians mission for installation of the laboratories and equipments setting

502 - Didactic Materials

502.1 - Preparation of didactic materials in modules as to specifications by the programs

502.2 - Preparation of Audio-Visual Materials

503 - Consumer's Materials

503.1 - Getting the course material

503.2 - Getting consumer's materials for administrative support service

504 - Selection of the trainees

504.1 - Test application

504.2 - Organizing the training groups according to modules

600 - STAGE VI

601 - Operation of the electrotechnology and electronics unit

601.1 - Japan technician mission to follow up the development os the school activities during the first year of work

601.2 - Work beginning of the first group (three months)

601.3 - Second group activities beginning (2nd trimester)

601.4 - Third group activities beginning (3rd. trimester)

601.5 - Fourth group activities beginning (4th. trimester)

700 - STAGE VII

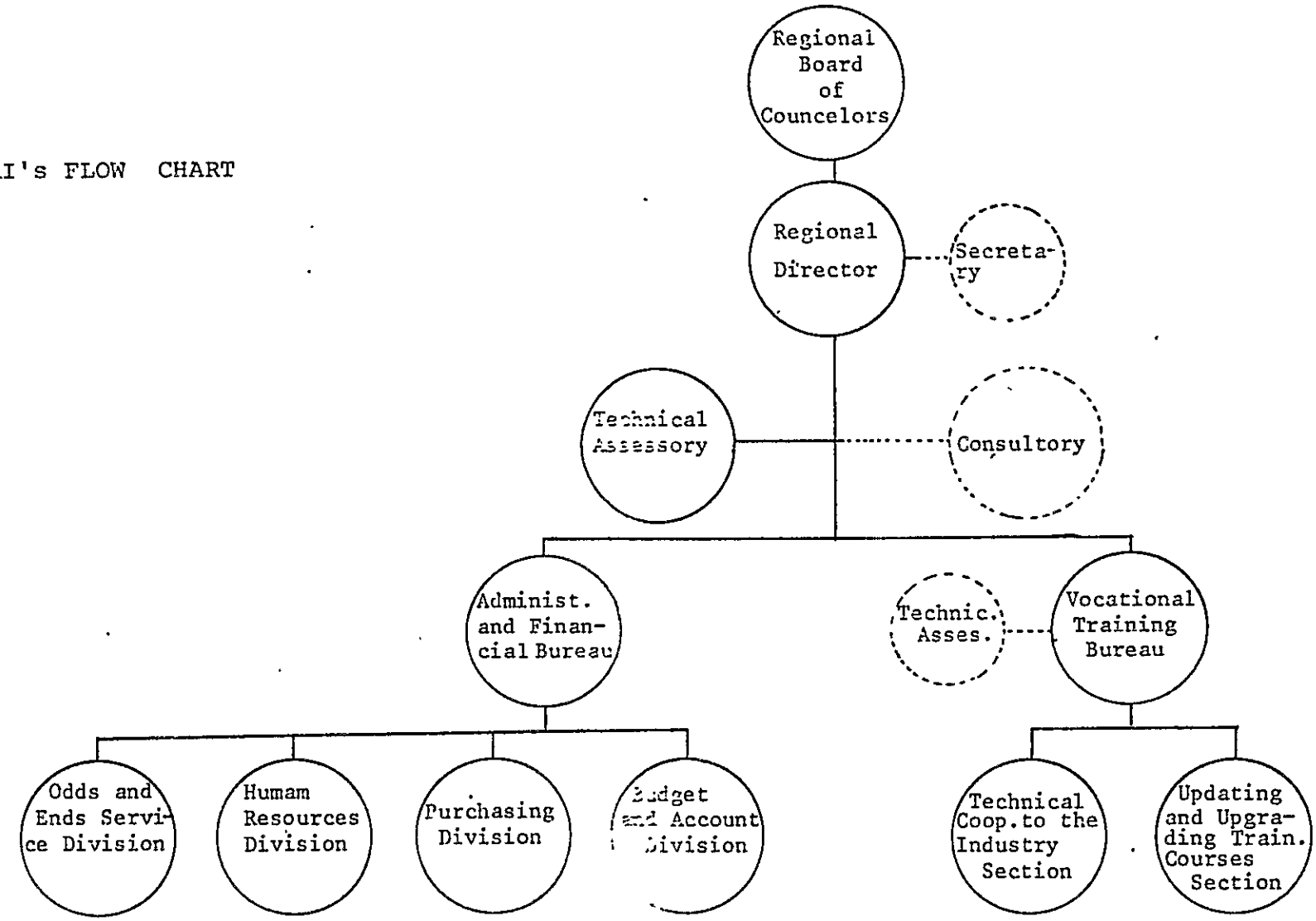
701 - Results'evaluation

701.1 - Evaluation at each trimester final

701.2 - Quality control and process feed-back

ANNEX I

SENAI's FLOW CHART



VOCATIONAL TRAINING BUREAU

VOCATIONAL TRAINING SUB-SYSTEM

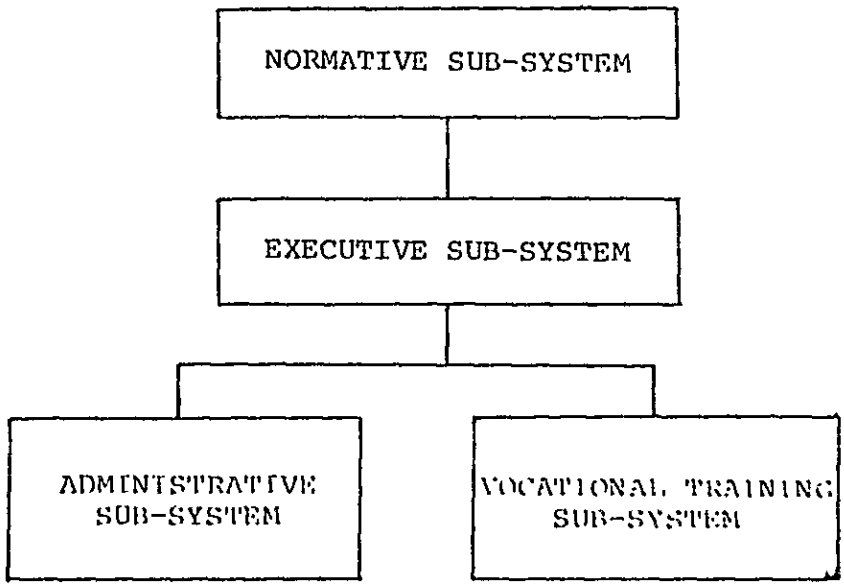
AS SENAI is directly concerned with planning, supervising, controling and evaluating all activities wich make up SENAI's own objectives, its vocational training sub-system is a sub-division of the whole organism. It involves two different systems within its own structure: permanents units and provisional units.

It is up to that Vocational Training Sub-System to put into action the fundamental goals of the Unit, according to the specifications clearly expressed in Art. 1 of the Government Decree nº 494, January, 10, 1962.

> Art. 1 The National Service For Industrial Apprenticeship has as its maind goals:
>
> a - Carry out training at schools st up and supported by the unit or under the form of cooperation to offer industrial training to schools since all enterprises and industries are supposed to do so, since they are under the jurisdiction of SENAT. This is true according to the Constitution as well to the common law.
>
> b - Assist industries and employers for the preparation and carrying out general training programs of the personnel at different levels of skills. Its also SENAI's duty to carry out systematic training on the job.
>
> c - Provide means for labor people (hired workers) over 18 years to complete their professional trainign, giving short duration courses. This aims at upgrading the skill labour learned at work.
>
> d - Provide scholarships for upgrading administration personnel as well as higly skilled workers. This should be done at the companies wich regularly contribute to SENAI in payroll. It should besides that, ofer such opportunities to the SENAI own instructors, teachers, administrators and other emplyess.

As a part of an Unit, the Vocational training Sub-System develop its activities in an integrated form with the others sub-systems of SENAI, being positioned in the organizational context.

ORGANIZATIONAL STRUCTURE


NORMATIVE SUB-SYSTEM
EXECUTIVE SUB-SYSTEM
ADMINISTRATIVE SUB-SYSTEM
VOCATIONAL TRAINING SUB-SYSTEM

1 - The Vocational Training Bureau is the staff responsible to the Sub-System carrying out. Its directly realated to the SENAI Regional Director, from whom receives instructions and often reports to him about its activities.

2 - The Vocational Training Bureau is divided into differents structured and non-structured units.

3 - We may say wich are structured units: DTOE (Technical Cooperation to the Industry Section) and DTOI (Updating and Upgrading Training Courses Section).

4 - We may say wich are non-structured units: SEOMO (Labor Promotion Section), SRA (Information Centre) and SAA (Administrative Support Secretary).

5 - The Vocational Training Bureau must:
a - Plan, supervise, control and evaluate specific activiteis of Vocational Training Sub-System
b - Carry out norms and technical procedures and administrative activities of the Unit itself
c - Advise and supervise specific activities carried out by the Unit
d - Study and analyse special procedures concerning labor organization

6 - DTOI is a sub-division of the Vocational Training Bureau. It is in charge of:
a - Planning and supervising training activities to be developed by the Centres
b - Analyse and suggest new methods, procedures and activities
c - Set norms to the supply and maintenance of the human resources and materials utilized in the Centres
d - Attend the industrial enterprizes throught organization and others SENAI's available materials providing according to DTOE.

7 - DTOE is other division of the Vocational Training Bureau in charge of:
a - Assisting technically the Human Resources Developing of industries programs

b - Provide and prepare human resources and avaialbe materials to most direct requests presented by industries and/or as consequence os immediate needs of labor market.
c - Study and propose new methods, processes and activities, suggesting strategies for its implentation.

8 - It's up to the Vocational Training Centres:

a - Develop teaching and training activities concerned with the development of programs, according to the executive plan set up for operation.
b - Follow the oscillations of the labour market systematically and all enterprizes and indutries within the region under the supervision of the Centres. This aims at collecting data and all necessary information to the study and propositions of modification of methods and activities.
c - Help other Centres of the system with the work and activity concerning directly with the processes and activities.

9 - The Labour Promotion Section is concerned with:
a - Make a precise survey of job opportunities requested by the industries and enterprises
b - Register, advise and follow the skill labour of SENAI graduates.
c - Recruting, selecting, training and direct to work, following skilled personnel at industries.

10 - The Assisting Resources Department should:

a - Follow strictly and make others do so concerning publishing patterns such as formates, drawings, sketching and any other determinations and principles wich may have the purpose of standardizing improving quality and reducing publishing cost.
b - Prepare the printing of the material to be used for teaching or training purposes related to different programs.
c - Prepare the printing of material of other centres of the SENAI of Minas Gerais.
d - Supervise the utilization of audio-visual aids by instructors during their training work.

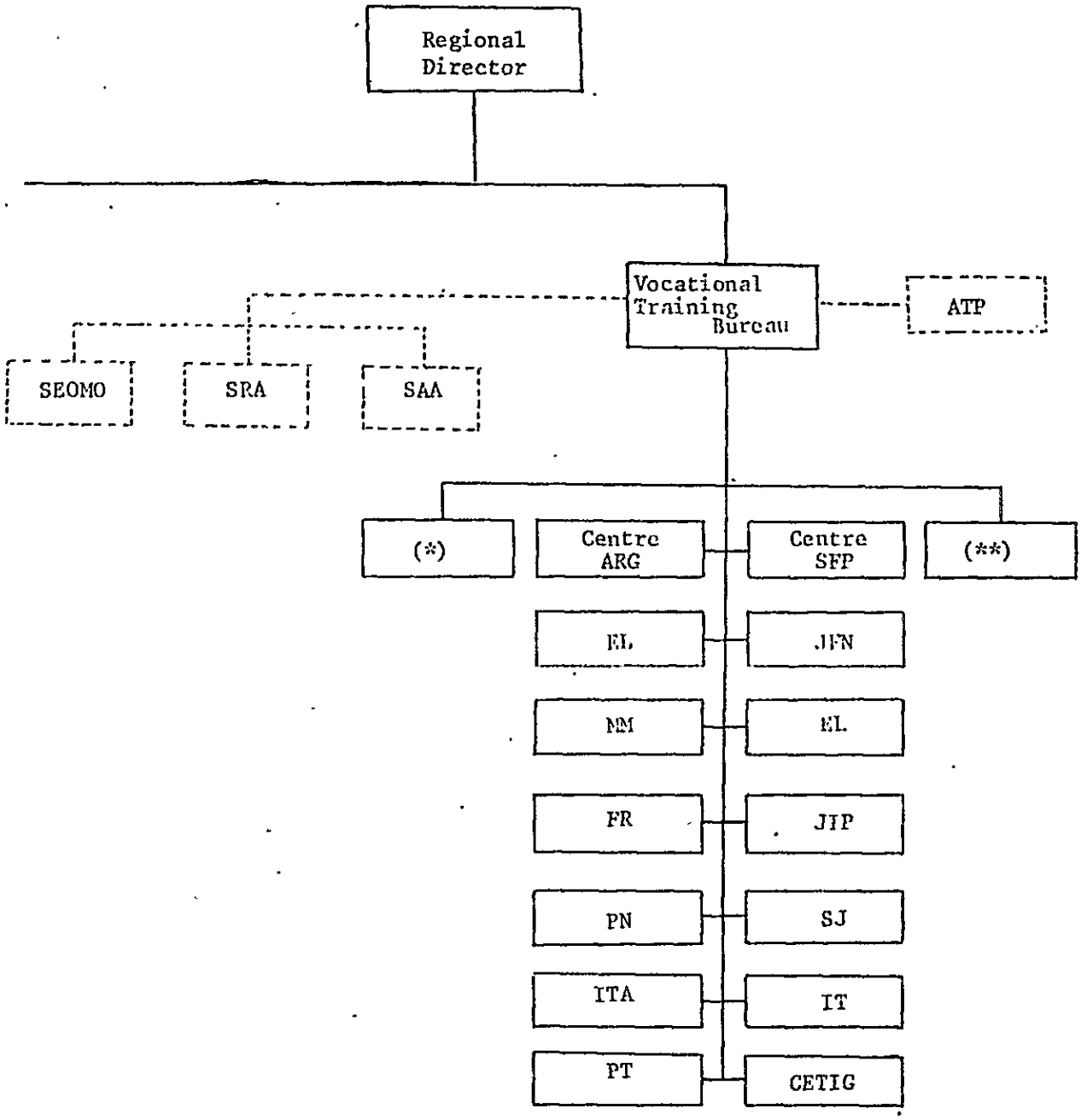
Make survey of new training methods, doing special research and suggest the use of new techniques for the preparation of teaching material and utilization of audio-visual aids.

11 - The Department of Administrative Support should:

a - Carry on duties and services concerning the administration of the Vocational Training Bureau.

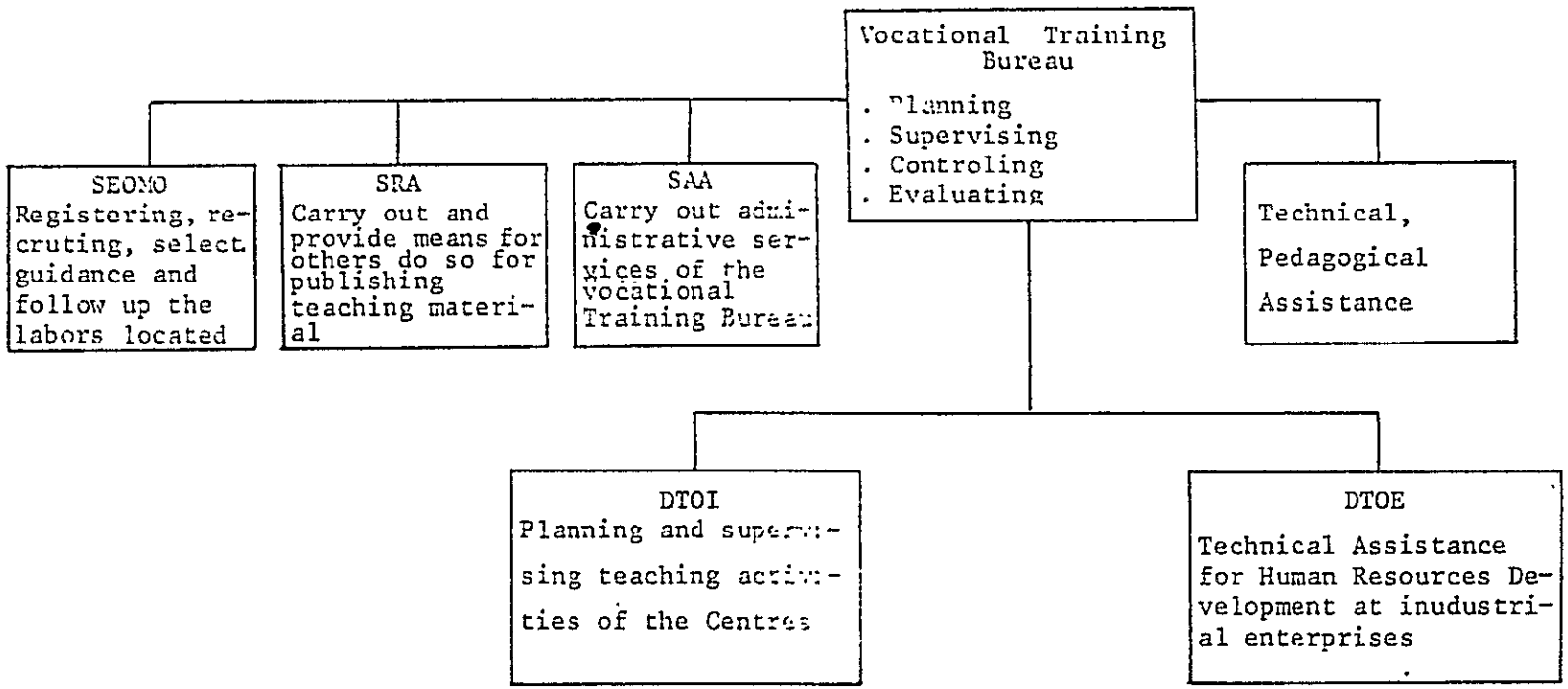
b - Control all documents in and out.

FLOW CHART



(*) Technical Cooperation to the Industry Section

(**) Updating and Upgrading Training Courses Section


Vocational Training Bureau
. Planning
. Supervising
. Controling
. Evaluating
SEOMO
Registering, recruting, select guidance and follow up the labors located
SRA
Carry out and provide means for others do so for publishing teaching material
SAA
Carry out administrative services of the vocational Training Bureau
Technical, Pedagogical Assistance
DTOI
Planning and supervising teaching activities of the Centres
DTOE
Technical Assistance for Human Resources Development at inudustrial enterprises

The work organization within the Operational sub-system of SENAI in Minas Gerais is so organized through PROGRAMS develop in a way to follow PLANS either yearly or/and several times a year.

These are the programs through wich the Operational Sub-System works at this Agency:

1 - UPGRADING PROGRAM

Concept - and organized body of both theoretical and pratical principles from which training can be develop in a methodic and systematic way for youngsters between 14 and 18 years old, aiming ar training them for specific occupations.

The Upgrading Program is sub-divided into three sub-programs as follows:

1.1 Upgrading Sub-Program in a SENAI Centre

This sub-program consists of trade training courses with an approached duration od five semesters. The course may be given as an equivalent to the last years high schoo, level not. It aims at training applicants for industrial jobs or for working at different trades (CAO). Both trainees have at least 4 years junior high school.

The sub-program organization is fully described in the General Regulations of The Vocational Training Centres of SENAI in Minas Gerais.

1.2 Upgrading Sub-Program Within Industries

This Sub-Program involves trade upgrading with three years duration. It may also be given as an equivalent to the last junior high schoolyears. It aims at applicants for trades (CAO) and they must have at leasr 4 years junior high shool level.

The Training Centres under the exeption system are those maintened by enterprizes or companies. They maintain such courses retaining their contribution due to SENAI, as every industry or company is supposed to pay, according to the law under effect.

1.3 In-Service Upgrading Sub-Program

This sub-program involves the systematic training of any youngsters occupation, with relative duration, carried at the working facilities of the industries.

The organization of such program is fully described in the In-Service Upgrading Sub-Program Organizational Manual.

2 - PROFESSIONAL UPDATING PROGRAM

Concept - It's a body of organized contents theoretical and practical principles at junior and senior high school level for youngsters of 16 and grown ups employed or not, under regular or intensive system. It aims at preparing skill labor or semi-skill labor.

According to this conception, it's meant that:

a - Regular System concerns:

The training developing of theoretical principles in terms of immediate knowledge, allowing a considerable number of repetition of each operation.

b - Intensive development of theoretical principles only in terms of immediate knowledge, and the operational training limits a minimal number of repetition of each operation .

The Professional Updating Program is concerned with:

a - Within the Training Centres of SENAI from 13:00 to 22:00 O'clock

a.1 - According to the initiative of the industry itself utilizing its own resources .

a.2 - Through agreements with industrial enterprises. It's up to Regional Direction to fix or establish the conditions

a.3 - Through agreement with government agencies, provided that SENAI should have the right of developing such courses according to certain program and regular conditions as far as its developing structure.

b - Exemption System within the Centres organization

b.1 - As an integrating program of Centres

b.2 - Under the agreement system with government agencies or as a suggestion and initiative of SENAI. It is their responsiblity in this case to supervise and control both the budget and book-keeping.

c - Within thw owun industrial facilities:

c.1 - By request of the enterprises, under the condition that it will depend on SENAI's possiblities of attending the request according to its avaiable resources.

c.2 When it is the case of enterprises dealing with civil construction also under the system of agreement with government agencies.

Observation: Under no circunstance, besides those quoted above, it is possible to carry ou any king of professional updating or upgrading courses within the enterprises, under the SENAI's responsibility.
The program lead as well as the conditions for its materialization (carrying out) will be established through the yearly goals (yearly programs). This will also depend on avaiable resources and according to the policy already established for SENAI to take part in such basic period.

The Professional Updating Program consists of two sub-programs as follows:

2.1 - Professional Updating Sub-Program

this sub-program involves professional updating courses at high school level and aims at reaching youngsters above 16 years and growns ups already employed or not, provided that they can read and write.

2.2 - Professional Updating Sub-Program - Senior Level

This sub-program involves professional updating courses, Senior High School level concerning to youngsters above 14 years and grown ups already employed or not . It requires that they have completed junior high school.

3 - SUPPLY PROGRAM

Concept - An organized body of theoretical and pratical principles aiming at specialization, uodating or bringing up-to-dat the man power of high school students as well as of the SENAI employees. This program aims at improving the knowledge, skills and actitudes level required for fulfilling occupations both of high chool students and SENAI's employees in Minas Gerais.

The Suplly Program involves two sub-program as follows:

3.1 - Supply Sub-Program For Industry Personnel

It involves courses, seminars, in-service training, conferences and so forth. These meanings must the real needs of taz paying enterprises (those enterprises from which SENAI collects taxes). Those needs are neither reported by requests or observed by SENAI itself.

In this way we understand by:

a - Real needs

Real needs those which are relevant concerning to the present condition and the level of knowledge, skills and actitudes so desired to meet the demand of human resources of the enterprise.

a.1 - Reported by direct requests:

We understand those needs which SENAI is aware of by means of mail sent by any enterprise from which SENAI receives taxes. They must be checked by specific means and approprieate procedures for each specific situation.

a.2 - Needs observed by SENAI itself

We understand by dependable needs of an industrial enterprises which are found out by general analysis of labor market.

b - Taxpayer companies

These ate the enterprises which pay SENAI the due tax according to the federal law no. 494, January 10, 1962.

The enterprises quoted below are not included within the above specification:

. the companies which have not paid their due taxes.
. The companies which are exempted from such taxes.
. The companies in process of setting up their installations.

We will talk about those companies regarding their requests since they are not included here.
The content of such su-program as well as the conditions of operation will depend on avaiable resources and the SENAI developing working principles. This is specific in each fiscal year.

3.2 - Supply Sub-Program For SENAI Personnel

This sub-program involves courses, in-service training, conferences developed to meet SENAI's real needs or its own requirements.

We understand under such concept that:

a - Real needs are represented by the difference between the present levelof desired knowledge, skills and actitudes to meet the human resources requirement from SENAI-MG

Such needs are based and identified taking into consideration the evaluation of the personnel job's fulfillment.

b - Requirements.

We understand by that whatsoever is needed such as knowledge skills and actitudes concerning to the fulfillment of specific jobs as they are contained in legal documents.

4 - PROFESSIONAL QUALIFICATION PROGRAM

Concept - This program involves professional training courses senior high school level. That level program involves general as well as professional training, aiming at training technician (plain professional qualification) according to legal requirements. The professional qualification program is divided into three sub-programs as follows:

4.1 - Professional Qualification Program in the SENAI Centres

This sub-program involves courses for training technicians and/or assistant technicians. These courses may be developed by SENAI's own initiative depending on the avaiable or under the system of Central Area School complementary programs.

We understand for:

a - Central Area School complementary programs are specific courses working under system according to which general education is developed. The professional training is given by SENAI.

4.2 - Professional Qualification Sub-Program in Within-Industries Centres

This sub-program involves courses for training technicians and/or assistant-technicians. Such courses are developed by the company which retains the tax payable to SENAI, according to the law. They finance the course with their own allotment.

4.3 - Professional Qualification Sub-Program through schoolarships

This sub-program reffers to that qualificational courses and/or assistant technicians, carryed out in SENAI System Centres located in others States, to their SENAI-MG send candidates in schoolarship program.

5 - TECHNICAL ASSISTANCE

Concept - Different technical services carried out by SENAI for industries or enterprises. This is done by requesting and/or labor force. It is ussually carried ou depending on avaiable resources at the Regional Direction in Minas Gerais.

his technical assistance is divided into two sub-programs as follows:

5.1 - Technical Assistance Sub-Program for Industries Assisting

This program aims at developing specific projects as well as record any important events resulting from other programs already carried out and may be characterized as services for enterprises which pay their taxes to SENAI.

We understand this as follows:

a - Services rendered by SENAI

Different technical services as follows:

a.1 - Carrying out specific survey of needs for developing human resources . This may be by direct requested from enterprises as well as from factors resulting from activities of others programs.

a.2 - Planning and organizing Human Resources Development

a.3 - Orientation for setting up a staff for developing human resources at the enterprise itself.

a.4 - Technical assistance aiming at specializing workers provided that SENAI should have skilled people for such purpose.

b - Tax paying enterprises

Those are the enterprises which really pay SENAI taxes which are due as a result of the law application as specific by the Special Law nc. 494, from January 10, 1962.

This sub-program may be carried out requested by those enterprises not as above specified

5.2 - Technical Assistance Sub-Program According to SENAI and Similar Enterprises

This sub-program aims at developing specific projects as well as recording events thus characteristized as rendering services resulting from specific activities of other programs.

We understand this as follows:

a - Service rendering

Different services of technical aspect such as:

a.1 - Systematic technical assistance to the owns Centres

a.2 - Non-Systematic technical assistance for training purpose to the differents Divisions of the Administrative and Financial Bureau as well as others Regional Officeer even the National SENAI Staff.

a.3 - Technical assistance ro other SENAI Sraffs and similar enterprise aiming at offering special services provided that SENAI should have available resources of skilled personnel.

a.4 - Starting new curricular programs, follow-up and evaluation training purpose programs, methods and training techniques as well as teaching materials and so on.

ANNEX II

SOURCE AND RESOURCE APPLICATION IN 1973/1975

ANNEX II - INCOME AND EXPENDITURE FLOW

DR - SENAI - MG

FLOW \ YEARS	1973	%	1974	%	1975	%
Income from industries	18.440.614	92,65	26.388.635	87,33	39.571.762	87,02
Patrimonial Incomes	130.247	0,65	2.940.593	9,73	3.277.856	7,21
Others	1.333.084	6,70	888.807	2,94	2.625.616	5,77
Total Income	19.903.945	100	30.218.035	100	45.975.234	100
Deflation Rate (Fiscal-Year - 1970)	1,622		2,087		2,665	
Total Income - Real Value	12.271.230		14.479.173		17.063.827	

FLOW CHART OF EXPENDITURE AND CAPITAL

CURRENT EXPENSES

YEARS	NOMINAL AMOUNTS	DEFLATION	REAL AMOUNTS (70 = 100%)
1970	5.684.130	100	5.684.130
1971	7.459.378	1,204	6.195.496
1972	9.752.733	1,409	6.921.741
1973	12.756.980	1,622	7.476.923
1974	19.291.416	2,087	9.243.610
1975	28.985.590	2,665	10.876.394

CAPITAL EXPENDITURE

YEARS	NOMINAL AMOUNTS	DEFLATION	REAL AMOUNTS (70 = 100%)
1970	2.760.551	100	2.760.551
1971	1.323.259	1,204	1.099.052
1972	3.103.181	1,409	2.202.399
1973	2.777.927	1,622	1.712.655
1974	7.147.054	2,087	3.324.558
1975	11.488.023	2,665	4.310.702

ANNEX II - 2 - FORECAST AND RESOURCES APPLICATION

DR - SENAI - MG

1973/1975

RESOURCES FORECAST

	1973	1974	1975
NORMATIVE STAFF	51.760	94.000	119.000
ADMINISTRATIVE STAFF	3.966.340	5.670.000	8.480.000
TRAINING STAFF	14.681.900	24.576.000	37.401.000
TOTAL	18.700.000	50.340.$$$	46.000.000

RESOURCES APPLICATION

	1973	194	195
NORMATIVE STAFF	42.215	68.880	83.502
ADMINISTRATIVE STAFF	3.446.277	5.274.308	7.229.205
TRAINING STAFF	12.046.415	21.097.282	33.160.906
TOTAL	15.534.907	26.438.470	40.473.613

ANNEX III - BUDGET ESTIMATED - SENAI - MG - 1973/1975

BUDGET ESTIMATED

	PROGRAMS	1973				1974				1975			
		Previous Budget	Suplementation	Total	%	Previous Budget	Suplementation	Total	%	Previous Budget	Suplementation	Total	%
00	ADMINISTRATION	8.435.976	3.495.750	11.931.676	63,8	14.742.000	5.270.000	20012.000	65,9	22.012.000	848.750	30.130,750	65,5
01	UPGRADING	5.706.704	390.250	6.096.954	32,6	2.775.000	8.252.000	8.252.000	27,2	10.162.000	1.812.500	11.974.500	26,0
02	VOCATIONAL TRAINING	256.772	40.000	296.778	1,6	615.000	.765.000	1.380.000	4,5	856.000	700.000	1.556.000	3,4
03	UPGRADING AND UPDATING TO THE INUDSTRY PERSONNEL	232.892	65.000	297.892	1,6	453.000	30.000	483.000	1,6	934.000	650.000	1.584.000	3,5
04	SENIOR HIGH SCHOOL TECHNICIANS TRAINING	17.700	9.000	26.700	0,1	61.000	-	61.000	0,3	107.000	-	107.000	0,2
05	UPGRADING AND UPDATING TO SENAI PERSONNEL	50.000	-	50.000	0,3	152.000	-	152.000	0,5	429.000	218.750	647.750	1,4
	TOTAL	14.700.000	4.000,00	18.700.000	100	22.000.000	8.340.000	30.340.000	100	44.500.000	11.500.000	46.000.000	100

BUDGET APPLICATION

	PROGRAMS	1973	%	1974	%	1975	%
00	ADMINISTRATION	-		-		26.777.582	
01	UPGRADING	-		-		10.505.841	
02	VOCATIONAL TRAINING	-		-		1.343.924	
03	UPGRADING AND UPDATING TO THE INDUSTRY PERSONNEL	-		-		945.737	
04	SENIOR HIGH SCHOOL TECHNICAINS TRAINING	-		-		26.805	
05	UPGRADING AND UPDATING TO TO . SENAI PERSONNEL	-		-		.498.672	
	TOTAL		100	-	100	40.098.561	100

ANNEX III

COURSE CHARACTERIZATION

1. Organization of class schedule and modules program for the Technical Training in Electrotechnology and Electronics.

FLUX

A) Modules Composition (1)

1. Training the technician in electrotechnology and Electronics

Period of one trimester / Modules	1º	2º	3º	4º	5º	6º
	M_1	M_4	M_8	M_{10}	M_{14}	M_{23}
	M_2	M_5	M_{19}	M_{12}	M_{15}	M_{25}
	M_3	M_7	M_{20}	M_{13}	M_{16}	M_{26}
	M_5	M_9	M_{21}	M_{17}	M_{18}	M_{27}
	-	M_{11}	M_{30}	M_{24}	M_{22}	M_{32}
		M_{29}	M_{31}	-	M_{28}	-

Option for a courses to be developed in just one shift

Over-all course duration:		1.440 hours
Theoretical lessons	:	528 hours
Laboratory practice	:	288 hours
Shop practice	:	288 hours
Projects	:	336 hours

---

1) The module organization will allow the school working schedule offering enrollments per semester, trimester work or even month's work. This with the present set-up. The trimester enrollment will occupy all labs.

II - Assistant Technicians

1 - Industrial Electronics	(1,2,3,7,10,22) + (especialization in electronics)
2 - Electrical Machines	1,2,3,6,11,12,13,14
3 - B. T. Installations	1,2,3,4,5,7,19,20,24,25,27
4 - A. T. Installations	1,2,3,4,5,6,8,9,15,16,17,18

III - Updating

Areas: Eletrical Machinery

Industrial Electronic

IV - Supply

In any module

V - Upgrading and Updating

1. Electrician
2. Motor Winding Electrician
3. Industrial Electrician
4. Industrial Electronic Technician
5. Maintenance electrician
6. Panel windinf electrician and master switch boxes workers

VI - Intercomplementary

As there are both avaiable laboratory hours in the afternoon, it is possible to offer conditions for special agreements with local schools for complementary professional training (at least 3.000 hours for senior high school)

B) Technical Unit Facilities
Electrotechnology and Electronics

5 classrooms for 36 students: 250 m^2

1 Classroom for projects and designs with capacity for 36 students: 150 m^2

1 Electrical Machine laboratory for 12 students: 120 m^2

1 Electrical laboratory for 12 students: 70 m^2

1 GTP Laboratory for 12 students: 120 m^2

1 Basic electronics laboratory for 12 students: 70 m^2

1 Industrial Electronics laboratory for 12 students: 70 m^2

1 Electricity laboratory for 60 students: 840 m^2

1 Instrumentation Laboratory: 70 m^2

4 Teachers for theoretical instruction

4 Laboratory instructors

3 Shop instructors

2. LABORATORY AND DIDACTIC EQUIPMENTS

ELECTROTECHNOLOGY

Electrical measurement laboratory for teaching purposes. Capacity for 12 students, working individually, doing experiments. This should provide the following texts:

- Measuring current and voltage in D.C. and A.C. network
- Measuring D. C. and A.C. single-phase power
- Measuring resistance through Wheastone and Kelvin bridges using voltmeter, ammeter and potentiometer
- Measuring inductance and capacitance through A.C. bridge
- Use of D.C. potentiometer
- Measuring insulation and ground resistance- Measuring insulation resistance through power factor
- Use of shunts and standard resistors
- Use of phasemeter for power factor
- Use of induction power counter
- Use of instrument transformers
- Use of catode radium oscilloscope
- Use of clamp-on ammeter
- Gauging measurement instruments with both standard cell, and comparation with standard instrument
- Measuring magnetic flux with fluxmeter
- Gauging of induction counter and transformer for TP and TC. measurements
- Gauging location of line lacks

Electricity laboratory for teaching purposes. Capacity for la students working individually doing experiments. This should provide the follOwing tests:

- Mesasuring continous EFM in R-L, R-C, D.C. circuits
- Measuring current, voltage and power in R-L, R-C and RLC in series parallel circuits
- Measuring current, voltage and power in three phase balance circuits: star connection, delta connection, two wattmeter methods, star equivalence and measuring reative power.
- Measuring current, voltage and power in unbalanced three phase cuircuits
- Measuring magnetic flux with fluxmeter
- Measuring characteristic magnetization through permeater
- Measuring core-loss with Epstein apparatus
- Different tests in magnetism and electromagnetism

Electrical Machines Laboratory for teaching purposes. Capacity for 12 students working individually in group of 3. This should provide the following tests.

. Determination of polarity of single-phase and three-phase transformers.

. No.load test and short-circuit test with single-phase and three-phase transformers. Determination of losses, efficienty and secondary voltage variation.

. Measuring OHM winding resistance

. Determination of relation between voltage and turns

. Verification of neutral flowing in star-to-star connection

. Tension test of applied voltage to the dielectric and insulation resistance, dielectric strength of insulating oil.

. Treatment of insulating oil of transformers

. Analysis of the starting current od wound rotor induction motor.

. Direct method test to determine efficiency and characteristics of induction-motor.

. Analysis of power factor variation of induction-motor

. Induction-motor speed variation.

. No-load test with locked motor for determining circuit parameters of equivalent circuits. Drawing a circle diagram.

. Test for determining no-load characteristics in short-circuit and wattless of alternator. Drawing a Poitier diagram.

. Measuring both winding reistance and insulation resistance

. Analysis of wave-shape of an alternator

. Parallelism of alternators and distribution of active and reactive power.

. Starting synchronous motor V. curve working as synchronous condencer

. Variation of F.M. generator in proportion to rotation

- Magnetization of D.C. machine
- Volt-ampere characterisitics of D.C. generators
- Determination of neutral line of D.C. machines
- Starting and speed rating of D.C. motors.
- Speed torque characteristics of D.C. motors
- Determination od efficiency of D.C. machines by direct and indirect methods
- General test with A.C. single-phase commutator. Test with three-phase motors.
- Test of speed rating of SCHRAGE motors
- General test of speed rating by solid devices.

Test laboratory of generation, transmission and distribution in a hydro-electric power station and different substation for teaching purposes. Simulating the operation of an electric system.
This should provide the possibility of both sxperiments and tests as follows:

- Protection of over-current in both single-phse and three-phase circuits, using both reversing time-relay and specific time-relay and induction-relay.
- Protections of transformers using fuses(BUCHHOLZ) relays and alarm thermometer.
- Differential protection for generator and different buses, transformers. Use of differential relays, percentage relays and blocking by harmonics.
- Directional ground protection, rectance, power,impedance and over-current.
- Voltage protection using voltage-relay, lacking-phase relay, and field reversing relay.
- Substation control by transference relay, re-connecting relay, blocking relay, firing relay, make relay and blocking switch.
- Power-system equipment for controls of: stop-stand over speed, under speed, synchronism, winding temperature, and bearing temperature and so on.

Teaching unit with both panels and accessories and devices prepared for easy and immediatr connection. Capacity for 12 students working individually, doing the following practices:

. Connecting simple switches and plugs
. Connecting three-way and four-way switches
. Connecting automatic time switches for stair-way and out-door illumination.
. Connecting electrical buzzers and bells
. Connecting fluorescent fixtures
. Connecting magnetic locks
. Connecting inter-phones
. Connecting electric-pump controllers with float switch
. Connecting electrical water heaters and showers
. Connecting multiple circuits with visual and sound sign

Composed teaching unit with panels, accessories and devices for easy and immediate connections. Cpacity for 12 students working individually with the possibility of doing the following experiments:

. Control of both three-phase A.C. motor and C.C. motors through contactors with short-circuit protection and ever-loads as follows:

- Dicrect starting of C.C. motor e.m.f.c.
- Direct starting of C.C. motor with time relay
- Reversing totation of C.C. motor with inter-locking
- Automatic speed rating of C.C. motor
- Direct starting of three-phase induction motor
- Remote control of induction motor
- Starting three-phase star delta motor
- Starting three-phase motor with auto-transformer
- Starting wound rotor-motor with time relay
- Two-speed switch consequent poles
- Starting satr delta with reversing rotation
- Starting auto-transformerd with reversing rotation
- Starting wound rotor-motor with reversing rotation with time-relay

Composed teaching unit with panels, accessories and devices for easy and immediate connections. Capacity for 12 students working in groups of two with the possibility of doing the following experiments:

. Automatic starting of synchronous motor with squirrel-cage and protection for lacking synchronism.

. Analysis of bracking systems

- with reversing phase
- with C.C. current
- with electromagnet
- with supply of electric power

. Automatic gat drive

. Control of three-floor lift

. Control of overhead traveller

. Multiple control with time relay for traffic light with adjustable cam system relay

. Automatic power-factor adjustment

Composed teaching unit with panels, accessories and devices for easy and immediate connection. Single phase, three phase and C.C. motor with low voltage (around 1 CV) Capacity for 12 students working individually with the possibility of doing the following experients:

. Connecting three phase and s-ngle pahse induction-motor with manual switches for the following situations:

- Start-stop single phase induction-motor
- Reversing rotation of single-phase motor
- Start-stop three-phase induction motor
- Switch of consequent poles of two-peed motor
- Manual startinf of star delta
- Starting with compensating switch
- Starting wound rptor-motor with resistor
- Starting C.C. motor with variable starting resistor
- Reversing C.C. of C.C. motor

Teaching material for individual practice for 12 students groups.
The unit should be set up with: manual winding frame to wind motors;single-phase and three-phase motors for practicing with connection of assembles of windings.

These will be the practices:

- Practicing with both motor coil of different poles and different voltages of single-phase and three phase motor.
- Practicing with connecting motors of different ratings
- Winding rotor of universal motor
- Winding field coil of C.C. motors

3 - LABORATORIES AND TEACHING EQUIPMENTS IN ELECTRONICS

Basic Electronics Laboratory for teaching purposes. Capacity for 12 students working individually, doing experiements, with the possibility of the following tests:

. The oscilloscope as an analysis instrument

. Wiring and testing half-wave rectifiers

. Wiring and testing full-wave rectifiers

. Wiring and testing half-wave doubler

. Wiring and testing half-wave tripler

. Wiring and testing half-wave quadrupler

. Wiring and testing full-wave quadrupler

. Wiring and testing half-wave source

. Wiring and testing full-wave source

. Wiring and testing full-wave doubler

. Determination of characterisitics of the diode tube

. Stabilized source. Wiring and testing

. Testing one-stage doubler

. Testing one-stage amplifier

. Testing complementary symmetry amplifier

. Testing push-pull amplifier

. Testing oscillators with tuned grid plats

. Testing Hartley oscillators

. Testing osvillators with electronic coupling

. Testing Hartley oscillators with electronic coupler

. Testing astable multivibrator

. Testing RF amplifier

. Characteristics of a vacuum-diode. Graphical analysis of voltage X current curves in a vacuum-diode

. Rectifiers. Half-wave and full-wave with C.T. rectifiers. Bridge rectifiers.

. Measuring voltages. Input and output. Determination of efficiency

. Filters. "L" Section filter.

. Measurements. Determination of Ripple

. Characterisitcs curves. Graphical analysis of plate characteristics and vacuum triode transfer

. Polarization. Bias polarization. Automatic polarization by grid leakage

. Tetrode and pentode characterisitcs graphical analysis of tetrode and pentrode curves

. The semi-conductor diode. Characteristics curves. Graphical analysis

. Clipper-circuits

. Clamping circuits

. Half-wave and full-wave rectifiers

. Two-pole transistor polarization. Characteristics curves

. Amplifier. Common grid

. Measuring. Av, Ai, Ap, Zi, Zo. Phase shifting

. Amplifier. Standard cathods

. Measuring: Av, Ai, Ap, Zi, Zo. Phase shifting

. Amplifier. Common catods

. Measuring: Av, Ai, Ap, Zi, Zo. Phase shifting

. Amplifier. Standard plate

. Measuring: Av, Ai, Ap, Zi, Zo. Phase shifting

. Amplifier. Common collector

. Measuring: Av, Ai, Ap, Zi, Zo and phase rotation

. Amplifier. Common emitter

. Measuring: Av, Ai, Ap, Zi, Zo. Phase rotation

. Frequency and phase response of a transistor amplifier

. Two-stage amplifier. Common emitter. Coupling capacitor and direct coupling amplifier

. Sinusoid oscillator. Measuring frequency and put-put amplitude oscillation.

Industrial Electronics Laboratory for teaching purpose.

Capacity for 12 students working individually providing facilities for the following tests:

. Gas tubes. Stabilized source

. The Thyratron. Characteristics. Firing wave. Experimental determination.

. The ignitrin. Characteristics. Experimental determination

. SCR Determination of characteristics

. TRIAC Determination of characteristics

. Thiratron controlled rectifiers. Grid c.c. in thyratron

. Grid thyratron with d.c. voltage rectifiers

. Half-wave controlled rectification with SCR. C.c. control

. Half-wave controlled rectification from 0^{o} to 180^{o}

. Full-wave controlled rectification

. Controlled rectification. Firing and juction and point contact rectifiers

. Speed control of c.c. motor

. Speed control of A.C. motor

. Automatic motor temperature control

. Time relay

. Half-wave three-phase rectifier

. Full-wave three-phase rectifier

. Half-wave hexaphase rectifier

. Hexaphase bridge rectifier

. Converter analysis (efficiency, wave-shape and so on)

. Resistive photoelectric cell

. Analysis and determination of curve X Lux.

. Photovoltaic cells

. Circuit application

. Photo-diode

. Photo-transistor

. Induction heating

. Experimental verification

. Dielectric heating. Experimental verification

. Start-stop control circuit

Instrumentantion Laboratory for teaching purposes. Capacity for 12 students working individually doing experiments. This should provide the following:

- Pressure variation (U Tube) Outlet Reservoir Design in V.-Obs. Calculation of flow level. Calculation, level observation and reservoir flow.
- Drilled plate design
- Graphical characteristics of thermoplate and themistor
- Gauging thermoplate and thermistor. Equipment: stove .refrigeration, Wheatstone bridge. Gauging the pyrometer
- Determination of conductivity of solutions ans solids
- PH determination of both solutions and solids
- Determination os thickness of materials
- Background determination

Computer's laboratory for teaching purposes. Capacity for 12 students working individually, providing the following tests:

. Analysis of an amplifier with negative feed-back through eletric current and determination of the response influence of frequency over input and output impedance

. Analysis of voltage negative feed-back amplifier. Determination of the influence upon input and output impedance and frequency response

. Analysis of an operational amplifier. Gain and impedance

. Anlysis of an additional variables circuit

. Analysis of an integrating cicuit

. The stable multivibrator

. The mono-stable multivibrator

. The double-stable multivibrator

. The inverter

. Gate And.

. Gat Or.

. Gat Nand.

. Gate Nor.

. Double stable multivibrator - Flip-flop

. Stable multivibrator. Free-running

. Single or mono-stable multivibrator. One shot

. RLT - DTL - TTL Families

. Binary Counter Logical Shift Register

Audio-Visual Aids

- Loop film projector
- Film about electricity and electronics
- Slides for teaching purposes about electricity and electronics
- Posters about electricity and electronics (machines, apparatus and devices)
- Transparencies for teaching about electricity and electronics

. Electrical winding frame for transformer coils of automatic pitch for wires from no. 8 to 46 with spiral counter

. Manual winding frame for three-phase and single-phase motor coils with 10 HP

. Heat apparatus with resistance to dry coils of both transformers and motors with 1 m^3

. Benches for machine tests, electrical apparatus and instruments with:

- Three-phase sources - 220 V - 30 A with fuse protection and thermomagnetc. Automatic Control Switch
- D.C. source for the following voltage and current: 6 V - 20 A; 12 V - 20 A; 24 V - 15 A; 48 V - 10 A and 125 V - 5 A, with short circuit protection
- Short-circuit rotor
- Voltmeter, ammeter, ohmeter rating for both D.C. and A.C. values
- Tests of continuity in series

4 - ELECTROTECHNOLOGY TRAINING PROGRAM

INDEX

22	INDUSTRIAL ELECTRONICS I
23	SPECIAL MACHINES
24	DESIGN OF HOME ELECTRICAL INSTALLATIONS
25	CONTROL AND AUTOMATION(SHOP) MASTER SWITCHES
26	SPECIAL CONTROLES (SHOP)·MASTER SWITCHES
27	ELECTRICAL MAINTAINANCE (SHOP)
28	DESIGN OF INFUSTRIAL ELECTRICAL INSTALLATION
29	MECHANICAL DRAWING
30	MECHANICAL DRAWING
31	APPLIED MECHANICS
32	ELEMENTS OF ECONOMY AND LABOR ORGANIZATION

MODULE I - BASIC ELECTRICITY

1 - Electric current
Electric current system. OHM's Law. Resistance. Resistivity. Power and Voltage

2 - Electricity and Heat
Joule effect-Seebech effef. Poiter-Applications

3 - Generator and Receives
Kirchhhoff's Law. Networks

4 - Electrochemistry
Electrotype. Electrolysis Faraday's Law

5 - Electrostatic
General phenomena. Coulomb's Law. Electric field
Gauss and Coulomb's Theorem. Electrostatic induction
Electrostatic machines. Capacity. Condenser

MODULE 2 - MAGNETISM AND ELECTROMAGNETISM

1 - Properties of Magnets
Natural magnets. Artificial magnets. Permanent Magnets.
Atraction Laws and Repel Laws. Coulomb's Principle. Magnetic density

2 - Electric field
Fundamental property. Magnetic induction. Magnetic Flux. Suscetibility. Magnetization. Hysteresis Cicle.

3 - Electromagnetic phenomena

4 - Analysis of A.C. current
A.C. generator. Faraday's and Lenz's Laws. A.C. characteristics. Current P.D.P. (Potential-Difference) and A.C. power

5 - Magnetic circuits
Properties. Series - parallel circuits. Calculation Electromagnets calculation. Coils of excitation measurement

MODULE 3 - ELECTRICAL MEASUREMENTS

1 - General principles about instruments, sensitivity, Precision and errors

2 - Measurement of electrical quantities by Comparison C.C. and A.C. Bridges C.C. and A.C. Potentiometers

3 - Indicator instruments
Electric magnet. Electromagnets. Electrodynamics- Induction. Electrostatics. Vibrating Blades. Electronics instruments

4 - Integrator Instrument
Induction-Power and electrodynamic counter

5 - Galvanometers
C.C. galvanometer. A.C. Ballistic galvanometer

6 - Measuring transformers
Current and voltage transformers

7 - Gauging transformers

MODULE 4 - ELETRIC DRAWING BOTH OF MOTORS AND BUILDING FACILITIES

1 - Standard format and legends, Technical graphical Form, Scales

2 - Electrical symbols
Principal symbols of electro-electronics elements according to ABNT norms. Writing diagrams: units-characteristics of conductors and color codes. Identification of binder clips of both machines and apparatus

3 - Drawing electric diagrams
Multifilar and unifilar assembling diagrams. Block diagrams

4 - Reading and interpreting electric diagrams:
Electric installation for low tension
Motor winding

MODULE 3 - TECHNOLOGY MATERIALS

1 - Materials for conductors
Electric and mechanical properties of conductor materiaks. Specifications according to ABNT-EB-11 and 12

2 - Insulating Materials
Properties of insulatinf materials. Standard test of dielectric strength. Treatment of insulating oils. Porcelain and glass insulators. ABNT tests. EB 9, MB -22, EB-38 and M-211 tests

3 - Magnetic materials
Properties of magnetic materials. Principal alloys, Silicon steel. Oriented steel silicon sheets. Electromagnet materials

MODULE 6 - A. C. CIRCUITS

1 - Single-phase cicuits

A.C. generators and sinewave. Instant value, Root mean square value and mean value. RLC Circuits and electrical ressonance . Complex quantities

2 - Poliphase cicuits

Single-phase, two-phse and three-phase generators. Star connection, delta connection, star and delta star reversing. Three phase active and reactive power measuring, Claculation of short-circuit by methods of symmetrical components

MODULE 7 - GENERAL ELECTRONICS

1 - Thermomic emission
Emission materials technology. Job Function

2 - Vacuum tube diode
Characteristics curves, graphical analysis, rectification

3 - The triode
Characteristics, graphical analysis

4 - Amplifying -action

5 - Tetrodes and Pentodes
Characteristics and circuit application

6 - Semi-conductors
Basic theory. PN junction

7 - The junction diode
Characteristics, circuit applications

8 - The transistor
Basic theory, characteristics, simplified models, polarization and stabilization

MODULE 8 - Electrical Drawing of high Tension and Contactor Master Switches

1 - Electric Symbols
Principal symbols of devices used for high voltage installations and contactor master switches according to ABNT.

2 - Representation od electrical diagrams.
Diagramatic drawing related to working and principles. Electric current circulation diagram and control. Block diagram

3 - Reading and interpreting electric diagrams. High voltage devices. Sub-Station. Master switch and automation

MODULE 9 - TECHNOLOGY OF MATERIALS

1 - Use of electric materials
Resistors measurements for heaters. Fuses measurement. Semi-standard materials for electrical installation both home and industrial installations
Firing and explosion-proof materials

2 - Specification of materials
Relation and classification of both materials, budget and cost

MODULE 10 - GENERAL ELECTRONICS

1 - Basic amplifiers
Voltage and current basic circuit applications.
Gain, current and power

2 - Quality analysis configuration
Equivalent circuit for the common-base amplifier
The common-grid amplifier
The common-emitter amplifier
The common-collector amplifier
The common-plate amplifier

3 - Network analysis
Y-Z-H Parameters

4 - Simplified analysis of transistor amplifiers

5 - Cascade amplifiers
Direct coupling
Capacitor coupling
Transformer coupling

6 - Power amplifiers
Class A, AB, Push-Pull, Complementary symetry

7 - Oscillators
Sinawave shape
Common circuits

MODULE 11 - C.C. MACHINES

1 - C.C. Generator
Operation Principles - e.m.f. - armature reaction. Communtation characteristic test. Paralell association

2 - C.C. Motors
Operation Principle. c.e.m.f. - Speed rating. Torque efficiency. Load characteristics

MODULE 12 - TRANSFORMERS

1 - Operation Principal of transformers
Equivalent circuit. Routing tests. Load characteristics. Three-phase connection using usings benches. Angular displacements. Parallel association and auto-transformers.

MODULE 13 - SYNCHRONOUS MACHINES

1 - Alternators
Operation principles. Armature reaction.
Characteristic tests. Parallel association

2 - Synchronous motors
Operation principles - V. Curves - Synchronous condenser operation. Principal apllications

MODULE 14 - INDUCTION-MOTOR

1 - Operation principles od induction-motor
Rotating field. Equivalent and cicle diagram. Characteristics of motors with squirrel-cage and wound rotor-motor

2 - Operation principles of Single-Phase induction-motor. Starting devices. Principal spplications

MODULE 15 - HIGH POWER DEVICES

1 - Electric Arc
Its characteristics and magnetic blow out

2 - High Tension Switches
Different types - Electrical and mechanical characteristics. Specification. Fuse switch

3 - Braking switches
Different types. Electrical and mechanical characteristics. Specifications and classifications

4 - Re-Connecting Switch devices
Different types - Electrical and Mechanical Characteristics. Specification and applications

5 - Lightining arrester
Different types. Electrical and mechanical characteristics specifications. Applications

6 - Relays
Different types. Electrical and Mechanical characteristics. Specifications. Applications

7 - Capacitors
Characteristics and powe factor correction

8 - Voltage regulator

9 - Telecommunication, telemeter and teleproctetion

10 - Sub-system operation and high-tension protection

MODULE 16 - LINE DISTRIBUTION DIAGRAM

1 - Distribution Line Calculation
Use of diagram. Structure specification,
Conductors. Machanic Stress claculation

MODULE 17 - DESIGN OF NETWORK DISTRIBUTION

1 - Calculation od network distributiom. Graphical analysis of both home and industrial installation. Claculation of voltage drop. Selection of both structure and posts. Mechanic calculation. Use of ABNT and PB-45 Norms.

MODULE 18 - SUB-STATION DESIGN

1 - Calculation of sub-station
Graphical analysis. Short-circuit calculation
Equipment specification. Multipolar diagram.
Master switch control

MODULE 19 - HOME INSTALLATION

1 - Fixing installation of: lamps, plugs, simple switches, three.way, four-way, electric buzzers, bells, eletromagnetic locks, fluorescent lamps, inter-phones and control boards, individual panels to show those item for teaching purposes.

2 - Out-door installation with insulators

3 - Built.in installations in box for teaching purpose

4 - Installation of electric pump with float switch

MODULE 20 - INDUSTRIAL FACILITIES (SHOP)

1 - Installation with manual master-switch for starting both C.C. and A.C. motor for the following tests:

. start-stop single-phase induction-motor

. reversing rotation of single-phase induction-motor

. stop-start of three-phase induction-motor

. reversing rotation od three-phase induction-motor

. two-speed motor switch (DEHLANDER)

. starting switch with star-delta shape

. start balance switch

. starting resistor for wound rotor-motor

. starting resistor for C.C. motor

. reversing rotation of C.C. motor

MODULE 21 - WINDING (SHOP)

1 - Winding small transformers

2 - Winding single-phase and three-phase motor

3 - Winding universal induction-motor

4 - Winding field coil of universal motors

5 - Training stage with connecting A.C. motor several poles, different voltage on panels for teaching purposes.

MODULE 22 - INDUSTRIAL ELECTRONICS I

1 - Gas line motion. Voltage regulation tubes

2 - The thyratron

3 - The ignitron

4 - Silicon controlled rectifier (SCR)

5 - The TRIAC

6 - Controlled rectification. Introduction

MODULE 23 - SPECIAL MACHINES

1 - C. C. special machines, Three-brush generator . Divergent pole generator. Amplying dinamotor

2 - Magnetic amplifier. Induction-oven. Constant current transformer

3 - Low power A.C. motors. Universal motor. Driver wound motor. Reluctance motor. Hysteresis motor. Field-pitch motor. A.C. tachometer.

4 - Master switch for solid state motor. Feeding system of C.C, and A.C, motors. Frequency control. Introduction and inverters.

MODULE 24 - HOME INSTALLATIONS DESIGN

1 - Light Fixtures
Types of lamps ans uses. Fixtures

2 - Design
Complete building installation fixtures.
Installations of apparatus. Unifilar diagram.
Wiring and tubing calculation.
Specification and budget. Input branch calculation.

MODULE 25 - MASTER SWITCH AND AUTOMATION (SHOP)

Installation od motor master switch both by contactors and relays mounted on panels for teaching purposes:

. Direct starting of c.c. motor with e.m.f.c.
. Direct starting of c.c. motor with time-relay
. Reversing rotation of c.c. motor with interlocking. Automatic speed rating of c.c. motor
. Direct starting of three-phase induction-motor
. Remote control of three-phase motor
. Reversing three-phase motor
. Star-delta starting three-phase motor
. autotransformer starting three-phase motor
. starting wound rotor -motor with controlled rheostat with time-relay
. Commuter of consequent poles (two speeds)
. Star-delta starting with reversing rotation
. autotransformer starting with reversing rotation
. starting wound rotor-motor with time-relay. Reversing rotation

MODULE 26 - SPECIAL MASTER SWITCHES (SHOP)

Fixing installation of master switches of machines on panels for teaching purposes.

1 - Starting synchronous motor of squirrel-cage (Leblanc dumper) Lacking synchronous protection

2 - Braking system analysis with reversing phase with c.c. current, with electromagnet and supply of electric power.

3 - Automatic gate drive

4 - Control of three-floor lift

5 - Control of overhead traveller

6 - Multiple control with time-relay for traffic light with adjustable cam-relay

7 - Automatic power-factor adjustment

MODULE 27 - ELECTRIC MAINTENANCE

Repairing both mechanical and electrical motors, networks, counters, relays, master and electric measurement instruments.

MODULE 28 - DESIGN OF INDUSTRIAL INSTALLATION

1 - Design of a small shop with lighting calculation of conductors and master switch devices. Starting and protection. Buses calculation. Master switch and distribution

MODULE 29 - MECHANICAL DRAWING

1 - Drawing specifications
Format, inscriptions, technicla handwriting, scales and drafting instruments.

2 - Technical drawing
Octogonal perspective according to ABNT-NB-8.
Rules of dimension position figures, according to ABNT-NB-13.

3 - Symbols
Machining device-Metal sheet tickness-
Welding-Riveting-Screws and nuts.

MODULE 30 - MECHANICAL DRAWING

1 - Linear Geometrical Drawing
Basic drawings. Fundamental principles of agreement

2 - Cuts
Total cut. Half cut. Partial Cut. Cut indication

3 - Linear perspective
Types. Perspective isometric drawing

4 - Planning
Planning the main solid geometric

MODULE 31 - APPLIED MECHANICS

1 - Solid body static
Bearing reaction. Concentrated leads.
Evenly supported leads

2 - Center of gravity
Specification in both plain and complex figures

3 - Inertia moment
Determination of both plain, regular and irregular figures

4 - Tension, deflection, twisting
Concept and measuring sections

5 - Elements of machines
Brakes-Clutches-Ball Bearings. Belts. Gears.
Concepts and principal applications

6 - Fastering processes
Soldering with lead. Electric welding.
Oxyacelilene welding. Riveting. Screw fastening

7 - Fluid Mechanics
Load loss-Flow - Monometer Height. Turbine

MODULE 32 - ELEMENTS OF ECONOMICS. PRINCIPLES OF LABOOR ORGANIZATION

1 - History of the subject

2 - The first researches. Analysis of labor according to Descartes. Productivity

3 - Production system
Classification. Critical restraint aspects. Shop organization. Merchandise storing. Maintenance

4 - Production control
Planning, follow-up, programming and labor distribution

5 - Cost control
Data. Analysis of cost variation. Balance average, Appropriation criterion.

6 - Organization of working groups
Training head of departments. Transference of responsibility. Leadership. Types of meeting

7 - Communication principles
Basic elements. Problems in communication. Communication inter-enterprise. Reports

8 - Modern planning techniques

9 - Health abd industrial security
General aspects. Principal topics

5 - PROGRAMS FOR UPGRADING COURSES IN INDUSTRIAL ELECTRONICS

INDEX

MODULE I - GENERAL ELECTRONICS I

1 - Feed-Back
Amplifiers with feed-back current and voltage, in series and parallel. Influence frequency response both in input and output impedance

2 - Operational amplifiers
Basic theory. Circuit application. Adder. Integrators

3 - Multivibrators
Stable - Monostable - Bistable

MODULE II - INDUSTRIAL ELECTRONICS II

1 - Control elements

2 - On-off control

3 - Proportional control

4 - Derivational control

5 - Full control

6 - Speed control

7 - Tacho generator

8 - Tachometer

9 - Differential transformer

10 - Magnetic amplifier

11 - Serve-motor

12 - Servo-mechanism

MODULE 3 - INDUSTRIAL ELECTRONICS III

1 - Poliphase rectifier

2 - Power conversor

3 - Industrial application of radiation

4 - Photoelectric devices and applications

5 - Radio-frequency heating

6 - Electrostatic precipitation

MODULE 4 - PROFESSIONAL TRAINING

1 - Rectification
The oscilloscope-rectifier. Circuit concepts and theory. Training stage.

2 - Audio-frequency
Amplifiers. Circuit concept and theory
Training stage

3 - Radio-frequency
Oscillators. RF amplifiers. Technological principles. Training stage

MODULE 5 - INSTRUMENTATION

1 - Symbols
International technical norm convention

2 - Pressure measurement
"U" (goosneck) tube. Absolute pressure.
Barometer pressure, Differential pressure.
Meters

3 - Level measurement
Meters. Measurement methods. Industrial applications

4 - Flow measurement
Theorems: Bernouli, Reinold and Viscosisty
Meters: Venturi's tube. Pilot's tube and so on
V-Channel drilled plate

5 - Temperature measurement
Temperature ratings. Devices or elements.
Thermocouple. Transistors. Optical pyrometer.
Industrial applications

6 - Conductivity measurement
Conductometers. Industrial application

7 - PH Measurement
PH meters. Application

8 - Radioactivity Units. Geiger Muller's detector
Scyntilometers. Proportional counters.
Ionization chamber

MODULE 6 - DIGITAL ELECTRONICS

1 - Introduction to the computer's study

2 - Digital system

3 - Binary Arithmetics

4 - Foundations and Algebric application of "BOOLE"

5 - Codes

6 - Logical circuits

7 - Counters and registering apparatus

8 - Calculation circuits

9 - Information storage

10 - Input and output equipments

11 - Machine language

12 - Instructions

13 - Programming

14 - Types of programming

MODULE 7 - TECHNOLOGY OF ELECTRONIC MATERIAL

1 - Symbols and Codes
ABNT and Symbols

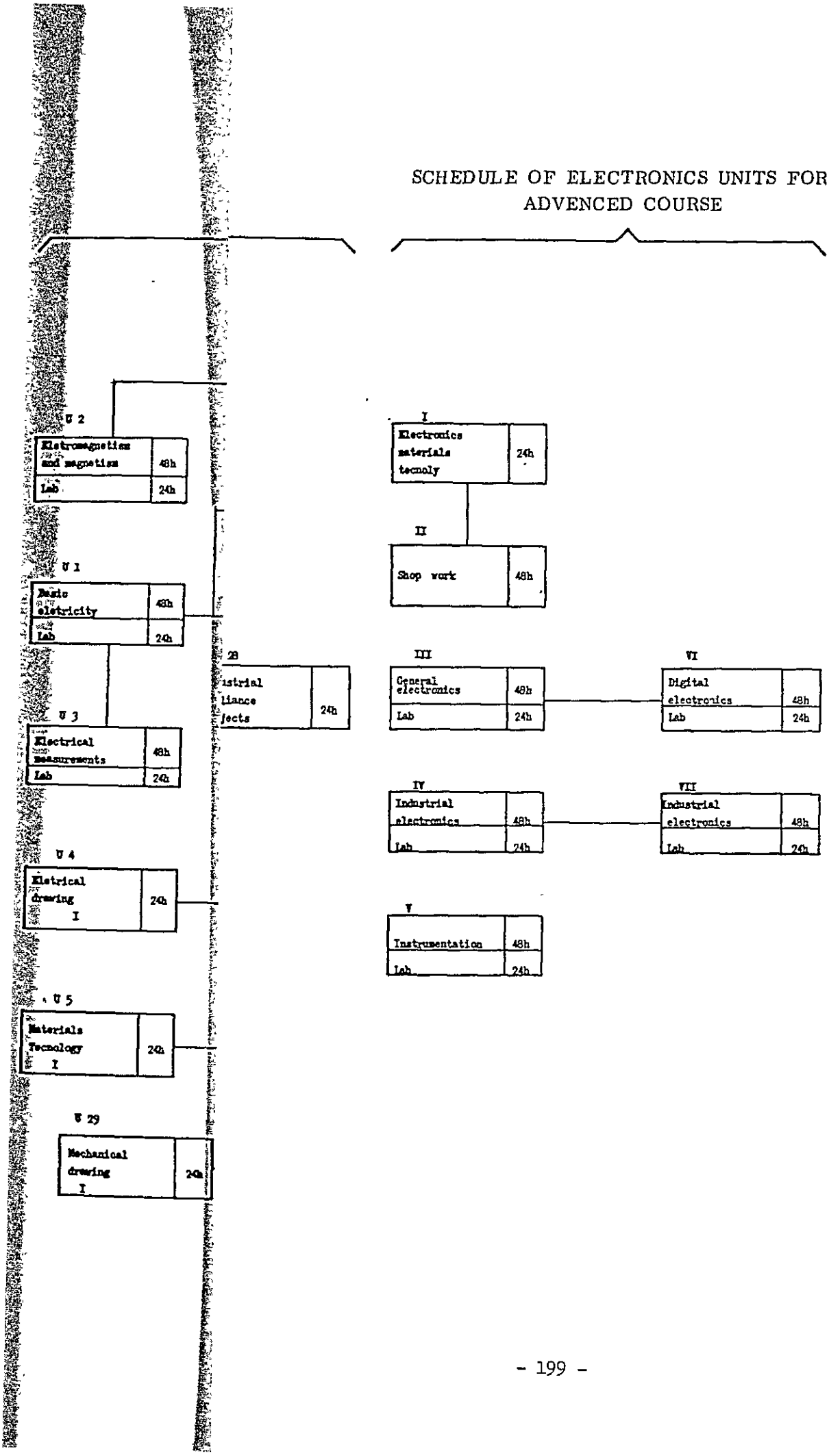
2 - Norms and Wirings
Technical gauges of wiring and assembling equipments. Electronic circuits

3 - Technology of semiconductors
Manufacturing methods of joints. Types of coating

4 - Manufacturing Integrated circuits

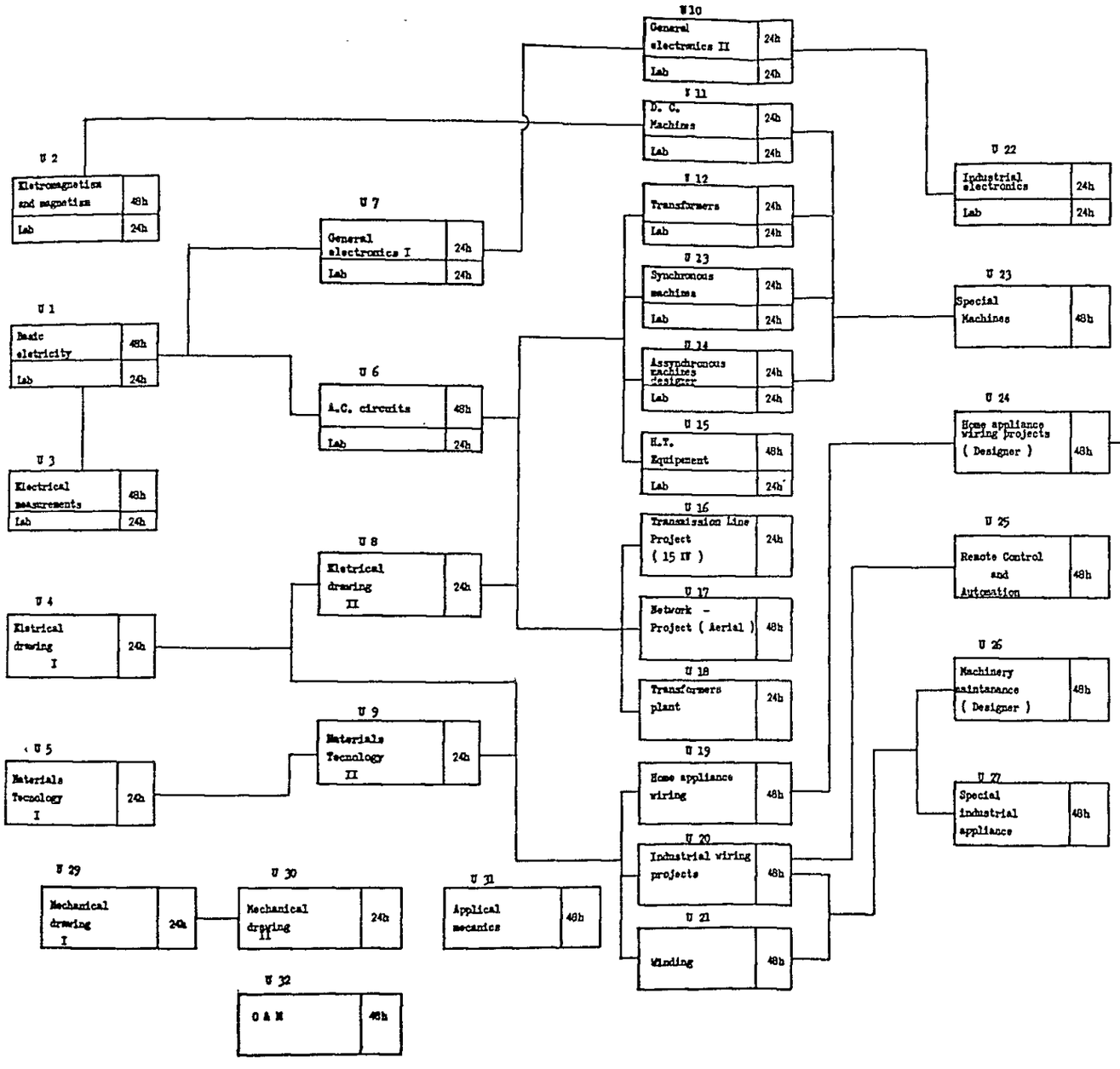
IV - PLANT AND LAY-OUT OF THE ELECTROTECHNOLOGY AND ELECTRONICS UNIT

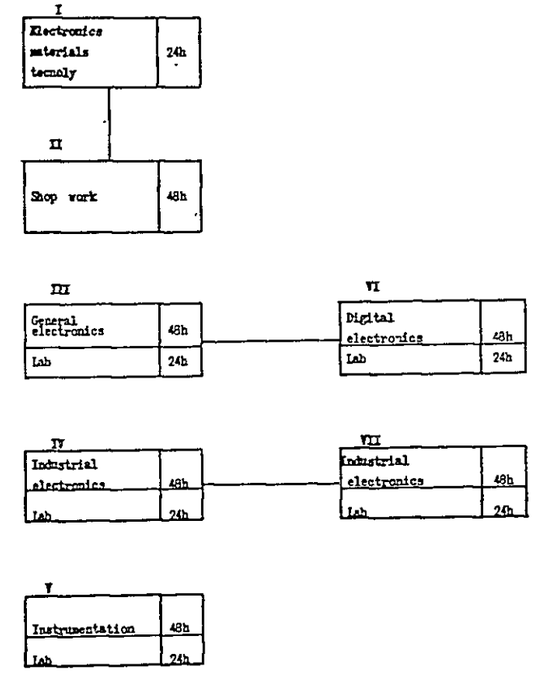
SCHEDULE OF ELECTRONICS UNITS FOR ADVENCED COURSE



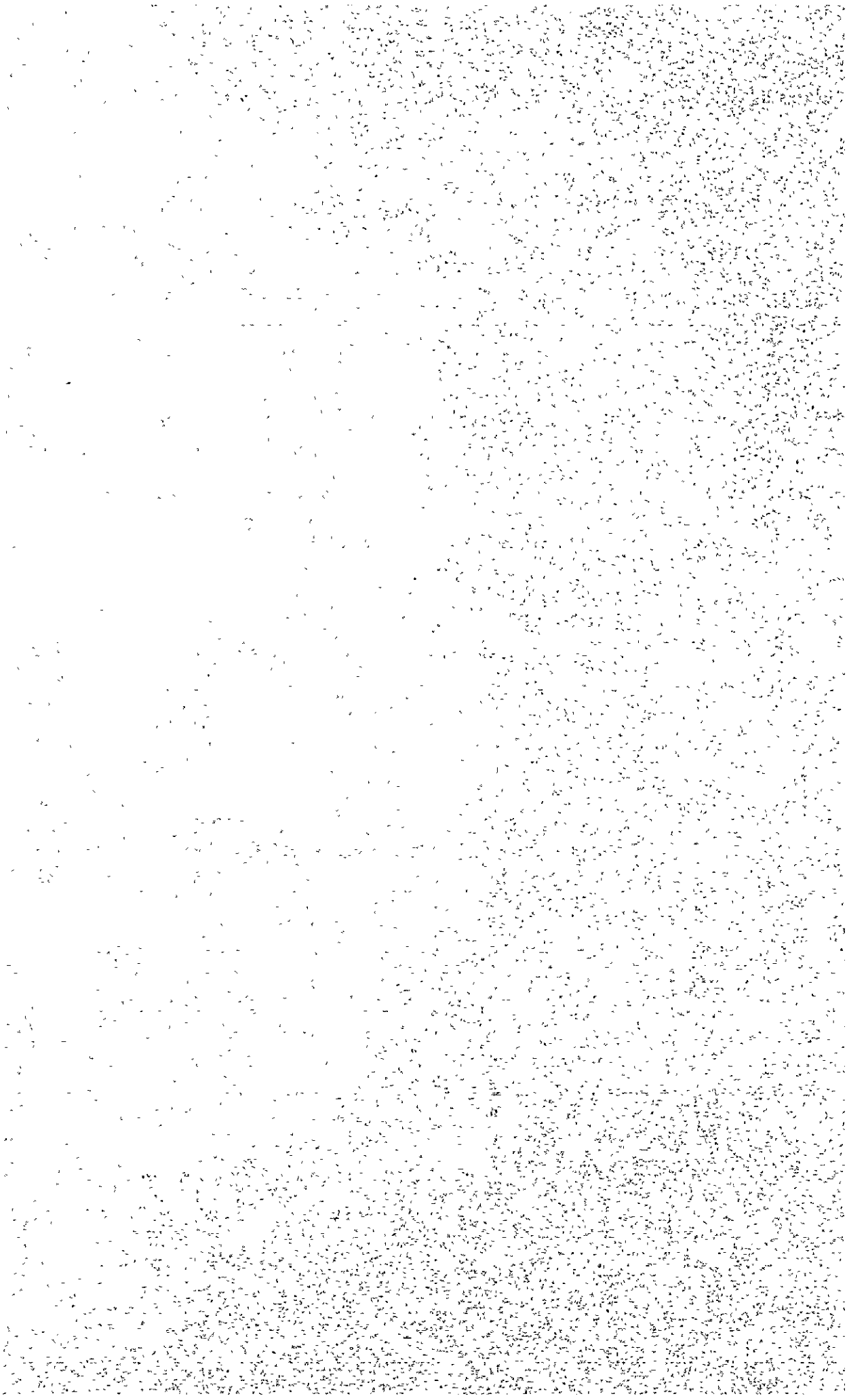
SCHEDULE OF ELECTROCTEHNICS UNITS FOR BASIC COURSE

SCHEDULE OF ELECTRONICS UNITS FOR ADVENCED COURSE





付属資料　2. A_1 A_2 A_4フォーム



Form A. 1

THE TECHNICAL COOPERATION PLAN
BY THE GOVERNMENT OF JAPAN

APPLICATION

By the Government of .....BRAZIL.....

for an expert, i. e, ...field of electrotechnics and electronics.....

to the Government of Japan.

Notes:—This form has been devised for the general guidance of the Government agencies concerned (JAPAN) in order to facilitate the supply of relevant information and data necessary to afford an adequate appreciation of the nature of the technical co-operation required. The careful completion of this application form will avoid much reference back and lead to speedier action.

1. Background Information This section should show as precisely as possible the general nature of the project for which the expert is required, stating whether it comes within the Government's development programme. It is important to indicate whether the project is a new enterprise or whether it was started previously. In the latter case, any assistance received under other technical co-operation programmes(e g. under United Nations auspices) should be stated. With regard to industrial enterprises, some impression of the size is important and the output and number of workers to be employed are useful indications The type of process, make and age of industrial or scientific equipment with which the expert will be concerned should be specified In the case of academic establishments, it is an advantage to know the number of annual intake of students, their level of attainment, numbers and status of existing staff and details of any research facilities and the level of research being undertaken (Copies of brochures, annual reports, financial statements, calendars, syllabus of instruction etc should be attached where applicable).	We beleive that some of the most relevant informations are already mentioned in the item 7 of the Form A 4
2 Specification for the post.*	Two experts (engineers) with major in the field of electrotechnics and one engineer with major in the field of electronics. Two technicians: one with major in electrochnics *
(a) post title	
(b) duties for which the expert will be responsible. These should preferably be listed, and it is important to give as much detail as possible	The following duties for which the experts will be responsible: - To study lay-out of the machine shops and laboratories; to assemble all the laboratories received from Japan; to teach to the brazilian engineers and technicians how to handle with the equipments, tools and all parts of the machines and equipments received; to write with the brazilian technical personnel reading material or manuals about the equipments. (like how to **
(c) authority to whom expert will be responsible	The experts will work according to the main guide lines of the Regional Department and directly orientated by the school technical principal.

* It is essential that full particulars should be given. If the space provided is inadequate, they should be given on a separate sheet.

* and one with major in electronics.

** handle and how to repair them).

2 Specification for the post- *(Contd.)* (*d*) qualification and experience required and approximate age limits (*e*) number of personnel required	The qualification required is that all the experts must to have a good deal of experience in their respective majors and a considerable experience in vocational education and also to be able to communicate in *english or in espanish*. We would prefer engeneers or technicians * We are asking for five experts.
3 **In the case of continuous projects, give name and particulars of understudy or counterpart who is to work with the expert**	Is is not the case.
4. Terms and conditions of appointment: (*a*) *duration* (*b*) actual place of employment, nearest town and post office (*c*) if living accommodation to be provided, state whether furnished or unfurnished,and whether suitable for married man with family: a (i) daily allowance for food if accommodation only provided (ii) daily rate for accommodation and food if neither are provided in kind (*d*) *daily and nightly rates of* subsistence payable when away from base on duty (*e*) are costs of internal travel paid or car provided? (*f*) what leave arrangements are suggested? (*g*) *extent to which free hospital* and medical treatment is to be provided for the expert and his accompanying dependents, if any (*h*) shall the expert be exempted *from the payment of* income tax and charges of any kind imposed on or in connection with any allowances to be remitted from overseas? (i) (i) shall the expert be *exempted from the* payment of customs duties and charges of any kind imposed on or in connection with the importation of equipment,machinery, materials and medical supplies as well as personal and household effects belonging *to the expert* and his family, including one refrigerator, one sewing machine, one radio and other electrical appliances? (ii) In case a car is not *provided to the* expert by the host government, shall the expert be exempted from the payment of customs duties and charges of any kind imposed on or in connection with the importation of a car?	Terms and conditions of appointment - One year for each one. Belo Horizonte, Minas Gerais We will provide living accommodation in furnished house and if necessary large enough for a married man with family. Dailyallwance for food it will be provided if necessary but according to the established rates for all employees and at the present moment the actual rate is about 15,00 US$. ** Daily and nightly rates of subsistence payble when away from the base on duty it will be provided according to the established rates for all employees in the respective year. Cost for internal travel will be paid (or by car if necessary). But car will be offerd only when travelling away from the base - Belo Horizonte Nothing in special. It will be provided free hospital and medical treatment for the expert and his accompanying dependents. It will be advisable that the experts shall be exempted from the payment of income and charges of any kind imposed on or in connection with any allowances to be remitted from overseas. It will be not necessary. It will be not necessary.

* who are on the range of 27 up to 50 years old and who have made the IVT course.

** (But will be payed in brazilian currency money).

4 **Terms and conditions of appointment** (*Contd.*)	
(*j*) does host government undertake to indemnify expert in respect of damages awarded against him for actions performed in the course of his official duties?	It will be provided to the experts a social security that covers all damages awarded against him for actions performed in the ocurse of his official duties.
(*k*) approximate date on which the expert is required to arrive in receiving country	We are planning the starting date on February 1978.
(*l*) any other infomation	
5 Previous steps, if any, to fill the post: If any previous attempt has been made to fill the post from any external source (UN, Specialised Agency or other) please indicate:	- We did not any attempt yet in relatien to this project.
(*a*) to whom application was addressed, with date	
(*b*) result or present stage of negotiations	
(*c*) are other experts working in this area in associated projects or have there been experts working in this field previously? If so, are any reports by these experts available?	
6. Correspondence: Name, postal and telegraphic address of official to whom correspondence regarding this application should be forwarded	Dr. Afonso Greco Av. Afonso Pena, 1500 - 15º andar 30. 000 - Belo Horizonte - MG BRASIL

Signed .....

Date: May 9th, 1977 *on behalf of the Government of* .....BRASIL.....

Afonso Greco

Regional Department - SENAI/MG

Form A. 2

THE TECHNICAL COOPERATION PLAN

BY THE GOVERNMENT OF JAPAN

APPLICATION

By the Government of BRASIL

for the provision of training facilities in JAPAN

Notes:—(*a*) This form has been devised for the general guidance of the Government agencies concerned (Japan) in order to facilitate the supply of relevant information and data necessary to afford an adequate appreciation of the nature of the technical co operation required. The careful completion of an application in this form will avoid much reference back and lead to speedier action.

1. Background Information Please indicate as consisely as possible the general nature of the project, development, training programme, or other scheme which has given rise to the specific request below. The object of the training course being requested should be clearly explained, together with an indication as to how the services of the personnel nominated for training will be subsequently utilized.	The SENAI in Minas Gerais is now expanding one educational unit and after a very careful research and analysis of the economic and industrial development of our State it was made the decision looking for an expansion of a new training center in the field, of eletronics and electrotechnics.We are applying for five places in the following areas: 2 for technicians in the field of electro technics;2 for technicians in the field of electrotechnics;1 for an engineer in the field of electronics or eletrotechnics.And we intend to give opportunity for two ''NICEI'' who is able to speak (1)*
2. Training facilities required: Please indicate as fully as possible:— (*a*) the type of training, subject or course required, i. e., academic training, observation tour or practical attachment. If more than one type of training is required, period in each should be stated	For all the five we suggest the Instructor Training Programme-a six month course offerd by the Institute of Vocational Training at Sagamihara,Kanagawa Prefecture.We are also suggesting that the four technicians should attend subjects related to instructional and educational aid sources and for the engineer who is going to be the school principal we suggest to attend the seminar related to Industrial Training at the Tokyo International Center-Ichigaya. According to our schedule we are planning the starting period for the next September 1977.
(*b*) the standard or level at which the training is to commence and the standard it is desired to attain	The instructor training course it is here in Brasil given at the third level (superior level).But we are more interested in a practical attachment and we very much appreciate if it will be possible for all of them an intership in industries in order to be more aquainted with the new and up to date japonese technology in industry.
(*c*) ultimate purpose or object of the training, and the capacity in which it is intended that the trainees shall be subsequently employed	As it was mentioned before we need to have two kinds of persons:teachers and one school principal.So,we full agree that the best programme for them can be that one offered by the I.V.T.at Kanagawa Prefecture.

(1)* - well the japonese language (two out of five).On the other hand the four techinicians will be teachers and the engineer will be the school principal.

(d) approximate length of training thought necessary for the purpose indicated above	Six month programme.
(e) (where technician-level training is sought) If training facilities in this field and at this level are available in the region, please indicate why training is being sought outside the region.	The main reason is that we have applied for japonese government equipments in the area of electronics and electrotechnics.So we believe that if the equipments and laboratories will come from Japan,we necessarily need to have here people well trained in how to hadle and how to teach using those equipments.Another main reason we are requesting this training programmeis that we beleive that we really need to improve our technology on those fields and we also need to continue with the brasilian experts when the japonese experts return back to Japan.
3. **Trainees:**	
(a) Has candidate(s) for training already been selected? If so, nomination Form A. 3 should be completed and should accompany this application	No.Not yet.
(b) If no candidate has yet been selected, please give the reasons and state when it is expected that the selection will be made. In order to assist in ascertaining whether the training facilities are available or can be specially arranged, please also state—	Because we have on our schedule established for June,considering that we are expecting the Japonese Mission on the next April or May.On the other hand we need to have first an answer from the japonese government about the requested Technical Cooperation.
(i) The proposed educational qualification or standard to be held by the trainee(s)	Two technicians with major in the field of electronics Two technicians with major in the field of electrotechnics One engineer with major in the field of electronics or electrotechnics.
(ii) The nature of the employment and practical experience it is expected the trainee would possess	They will be contracted by SENAI for a full time job and we are requesting at least one year of experience of work in related industry.
(iii) The number of trainees for whom facilities are requested, and whether it is desired that they should all receive training at the same time or in batches at intervals	We are requesting from the japonese government places at the I.V.T. for all the five at the same time.We are now requesting that all of them should necessarely study at the same place such as the International Vocational Training.But if it will be not possible in that one we full agree in placing them in another one or if necessary placing same of them in another city.

4. **Previous efforts to obtain these training facilities:** If application has already been made to the United Nations, the Specialized Agencies, other Technical Assistance programmes direct, or to Governments, or private agencies, please state:—	No.We did not.We had the first contact with the japonese government.
(*a*) date of application	July, 26, 1976.
(*b*) to whom addressed	Dr.Kenzo Yoshida
(*c*) result or present stage of the application	We are waiting an answer from the japonese government about the technical cooperation project.
5. **Correspondence:** Please indicate person and address to which any correspondence regarding this application can be addressed. The telegraphic address and telephone number should also be given	Dr.Afonso Greco Av.Afonso Pena,1500 - 15º Andar Tel.: 224 6400 30.000 - Belo Horizonte - MG. Brasil.

Afonso Greco

Regional Department - SEMAI - MG

Signed: .....

on behalf of the Government of .....

Date: .....

Form A. 4

APPLICATION FOR EQUIPMENT

By the Government of .. .. BRASIL .. .. to the Government of Japan
under the Technical Co-operation Plan for (1) Near and Middle East and Africa, (2)Latin America, or (3) Other Asian Area

Notes.– (1) This form has been devised for the general guidance of co-operating countries in order to facilitate the supply of relevant information and data necessary to afford an adequate appreciation of the nature of the technical assistance required. The careful completion of this application form will avoid much reference back and lead to speedier action.
(2) The requisite number of copies of the Form A4 duly endorsed by the appropriate Foreign Aid Department of the requesting government should be forwarded to the donor government concerned through the appropriate channels.
(3) The equipment to be supplied by the Government of Japan will become the property of the requesting government upon receipt of the shipping documents through the Japanese Embassy. Since the equipment is supplied on C.I.F. basis, it is requested that the recipient government will meet:
(a) customs duties, internal taxes and other similar charges, if any, imposed in respect of the equipment, and
(b) expenses necessary for the transportation, installation, operation and maintenance of the equipment.

1. **Background Information** Please describe as concisely as possible the general outlines of the project for which the equipment is required, indicating whether the latter is (*a*) for use by an expert in the performance of his duties (*b*) for a training scheme of institution or (*c*) for a research institution. If either (*b*) or (*c*) please say whether the equipment is for the establishment of a new institution or the expansion or re-organisation of an existing one (e.g., by the provision of a new department, etc.). The name and exact location of the institution, its approximate cost and the authority responsible for it should be stated. Where appropriate details should be given of the availability of any services required for the operation of the equipment. This would include operation by electricity (i.e. type of current, periodicity, voltage and any variations, phases, frequency etc. and if D.C. is the only current available please give full details), water reticulation or steam gas etc. Details of similar equipment already in use should be given.	All the equipment is required for a training scheme (b) and for research (c) as it will be used for the expansion of one an existing educational unit of SENAI in Mina Gerais. The responsible institution is the National Service for Industrial Apprenticeship - SENAI,Regional Department of the State of Minas Gerais.The Educational Unit is located at Belo Horizonte,the Capital city of the State of Minas Gerais. The approximate cost of new area to be built is US$ 300.000,00. The person responsible for the institution at state level is the Dr.Afonso Greco. Any of the required equipment is available in the country considering that should be adequated to educational ends.
2. **Description of equipment required.** Please give a full description of each item and general specifications where possible. The manufacturer and estimated cost of each item if known together with details of the proposed end use of item should be given. Where applicable, give details of any special packing or tropic proofing required and indicate whether handbooks or instruction data supplied in English will suffice. If appropriate, please indicate any required priorities or phasing of deliveries and advise whether adequate facilities exist for maintenance and servicing of the type of equipment requested. (If lengthy, detailed lists should be annexed; it would be convenient to have separate annexures for (*a*) films; (*b*) books and (*c*) other equipment.)	It is quite difficult to give a full description of each item and general specifications and either the estimate cost considering that we do not have any similar equipment available.But it would be useful at least to estimate approximatly the cost 1.500.000,00 US$.
3 Has this equipment request already been directed to any other Agency or country and if so to whom was it addressed and with what result?	We have any information about it.
4. Has the list of equipment already been disscussed with representatives of the supplying country/ies? If so, please indicate what stage the discussions have reached.	We have not already been discussed with any representatives of supplying countries.
5 Furnish full particulars in respect of— (*a*) Consignee ; (*b*) Official to receive documents and enquiries; and (*c*) Clearing agent at port of entry.	We have not informations at present moment about it.

6. Where equipment is required for use by an expert Please indicate— (*a*) The country or agency from which the expert has been requested or obtained. (*b*) His duties and length of secondment (a reference to the relative Form A 1 will suffice when the expert is being provided by the country to whom the equipment request is addressed). (*c*) What use is proposed for the equipment when the expert's period of secondment terminates? (*d*) By what date is the equipment required?	IT IS NOT THE CASE.
7. Where equipment is required for Training or Research Institutions Please indicate— (a) Nature and standard of training or research to be undertaken (b) Total number of students to be accommodated from within the country or from elsewhere in the Region, the qualifications for admission, the duration of courses, and the annual output of trainees (c) Whether there is already a similar institute(s) in existence in the country. If so, please give details (d) Whether buildings are already available. If not has construction started and when is it expected to be completed? (e) Whether qualified staff to handle the equipment has been recruited or is proposed to be recruited locally. If not is it proposed.— (i) to recruit foreigners under aid programmes? (ii) to train locally recruited personnel abroad in handling equipment? (the reference numbers of any Forms A 1 or A 2 relating to such requests should be quoted) (f) Taking into account the answers to (d) and (e) above, what is the date by which the equipment is required and the date on which training or research work is to commence (g) Whether any assistance in drawing up the Scheme has been obtained from outside experts? (Any specialist reports or Government surveys (e.g., Educational Committee Reports, etc.), bearing on the request should be provided if possible)	a) The training and research to be undertaken are all in the field of electricity and eletronics at technician level and also for skilled workers training. b)The total capacity of the Center is going to be of 500 students and they will come from the whole country. -Qualifications for Admission:considering the characteritics of this educational unit it will be open to students in different educational levels such as;at tecnician level for those who are already completed the 1? years of general education an they want only to be trained for a job in the field of electricity or electronics. But the school will have one special characteristic - we intend to apply the CEU - Continuing Educational Unit System - it means -we will have available several educational units(educational packages)the educational targests we set up according to the students needs or always if possible according also to the labor market needs. There is not a straight direction in order to be followed by the students. They can move from one block to another according to their own interest and abilities they only have to observe the required units to enroll in one elected set.So in this a very flexible system we may give chance also for workers and those who are making a specil research in an industry to come at school and take only one block if they would like to or they are with interest at that time.So the level and duration of the courses and researches will be very flexible.The annual output of trainees may be about 500. c)We believe that experiment is going to be very unique in the country with respect to the CEU - System we are realy very much interested in to apply in this educational unit. d)There are already built only for electricity(not taking into consideration the other buidings for other educational areas)959 m^2 and we intend to built 926m^2.This area to be expanded we are planning to start after the Japonese Mission(if possible in the next April)and after that we will have the details related to the equipments dimensions, eletricity capacity required an so on.And we believe that it will be possible to be (1)*
8. Correspondence Name, Postal and Telegraphic Address of official to whom correspondence regarding this application is to be forwarded	Dr.Afonso Greco Av.Afonso Pena,1500 - 15º Andar 30.000 - Belo Horizonte - Minas Gerais BRASIL

1)* - built up to the end of December/1977.

We are planning to recruit one electronic engineer and four rechnicians in the field of electrotecnics and electronics.And we are also planning that if possible to train them in handling the equipments and all the laboratories in the Institute of Vocational Training (IVT) in Sagamihara,Kanagawa.

Signed . . . . . .

on behalf of the Government of . . . . . .

Date: . . . . . .

Afonso Greco

Regional Department - UNIAI - MG

For use only by Donor Government

Application accepted/rejected/withdrawn

on behalf of the Department of . . . . . .

Date: . . . . . .

We estimate that if possible to train our technical personnel in the second semester of 1977 and to receive at the beggining of 1978 the technical assistence of four japonese experts and all the equipments.

We may provide any other additional informations and reports if required.

付属資料　3.事前調査チームの質問状(英文)

QUESTIONNAIRE ON THE SENAI TECHNICAL TRAINING SCHOOL PROJECT PROPOSED BY THE GOVERNMENT OF THE FEDERATIVE REPUBLIC OF BRAZIL

I. Establishment of the SENAI TECHNICAL TRAINING SCHOOL

1. Background of the proposed project

2. Name of the Technical Training School (Center)

3. Authority to take the full responsibility in concluding the Record of Discussions with the Government of Japan

4. Location

4-1. location

4-2. land owner

4-3. map and area of the site

4-4. construction plan of the buildings

4-5. layout of the buildings and area of the rooms

4-6. owner of the buildings

4-7-1. industrial distribution in and around the city where the school will be established

4-7-2. key industries in and around the city, and number of their employees

4-7-3. main products

4-7-4. demand and supply of manpower

4-8-1. Electric and Electronic Industries and number of their employees in and around the city

4-8-2. main products

4-9. relation between the location of the school and National Economic Development Plan

4-10. supply of electricity, water, gas

5. Training Courses

5-1. Training courses and contents of training

5-2. relation between training courses and regional industries

6. Training Target

6-1. training target

6-2. demand of regional industries

7. Trainees

7-1. application requirements

7-2. recruitment

7-3. selection

7-4. privileges, license of graduates

7-5. employment of graduates

7-6. expense born by Trainees

8. Training period

8-1. training period

8-2. training hours

8-3. opening of the Technical Training School

9. Number of trainees

9-1. Electricity

9-2. Electronics

10. Machinery & equipment

10-1. standard of measures

10-2. frequency, voltage, phase, plug

10-3. repair of foreign machinery, especialy Japanese make, supply of machine parts in Brasil

10-4. supply of training material

10-5. installation engineers

10-6. import limitation

11. Textbook

11-1. available textbooks

11-2. provision of textbooks

12. Teacher, staff

12-1. number and placement plan of teachers

12-2. qualifications

12-3. duties

12-4. Training School for teachers

12-5. treatment

12-6. other staff

13. Organization

13-1. organization of this School

13-2. relation between this School and other Technical Schools.

13-3. future plan of this School

14. Budget

14-1. fiscal year

14-2. construction budget

14-3. operation budget

15. Japanese experts

15-1. duties

15-2. number

15-3. terms

15-4. conditions

II. Education

1. Percentage of school attendance

1-1. elementary school (primary school)

1-2. secondary school (junior high school)

1-3. high school

2. Compulsary education

3. Entrance examination to high school

4. Technical high school

4-1. curriculum

4-2. syllabus

4-3. employment of graduates

4-4. privileges, license of graduates

4-5. facility & equipment

4-6. number of students

4-7. number of technical high schools and its location

III. SENAI

1. Head office

1-1. adress

1-2. organization

1-3. number of officers

1-4. law, No. 4048 in 1942

1-5. long range and medium plan

1-6. Regional Departments

1-6-1. name

1-6-2. location

1-6-3. training courses

1-6-4. number of trainees

2. SENAI in Minas Gerais

2-1. adress

2-2. organization

2-3. training courses and term

2-4. curriculum

2-5. equipment list

2-6. number of teachers

2-7. number of trainees

2-8. trainees entered and graduated

2-9. employment

2-10. application requirements

2-11. recruitment

2-12. selection

2-13. qualification of teachers

2-14. treatment of teachers

2-15. number of officers

IV. Laws and regulations pertaining vocational training

1. Law in which vocational training is provided for

2. Other laws and regulations against

3. Noise, dust, gas which are incidental to the operation of machinery and equipment

4. Structure of machinery and equipment

5. Capacity, wiring system of electric apparatus like motor, switch etc.

6-1. Skill trade test system

6-2. Application requirements

6-3. Privilege of skill trade test holders

V. Labour

1. Labour force population

2. Constitutions of labour force population

3. Working hour

4. Wage

5. Unemployment

6. Demand and supply of manpower in the field of electricity and electronics

VI. Development co-operation by third countries

1. Economic co-operation

1-1. names of projects, names of donor countries

1-2. disbursements

2. Technical co-operation

2-1. student & trainees

2-2. experts & volunteers

2-3. equipment

2-4. technical co-operation project

2-5. agreement between the Governments

VII. National Economic Development Plan

1. National Economic Development Plan

Questionnaire for school

1. Curriculum
2. Syllabus
3. Facility and equipment list
4. Number of students
5. Number of teachers
6. Salary, other treatment of teachers
7. The rate of separation
8. Follow-up of graduates
9. Employment
10. Privileges, license of graduates
11. Schooling expenses
12. Budget

Questionnaire for the Industries

1. Name
2. Adress
3. Number of employee
4. Main machinery and equipment
5. Maintenance
6. Supply of machine and spare parts
7. Main products and bus iness
8. Recruitment (demand and supply)
9. Level of skill and shortage in skilled workers

付属資料 4.質 問 状 解 答

1. Establishment of the SENAI TECHNICAL TRAINING SCHOOL

1.1 - Background of the proposed project

This project was designed to meet the needs of skilled workers and technicians required by Electrical and Electronical Industries. It was developed under the thought it's basic to prepare new workers to enter the labour force and to update skills and knowledge of the workers still engaged.

SENAI's choice for Japan Technical Cooperation has come from the belief Japan technology in the field of electrical and electronic appliances is the most developed in the world.

The great amount of Japanese make equipment in Brazil also justify the choice.

Most of all, it must be mentioned the enthusiastic acceptance the project has got from Brazil Government.

1.2 - Name of Technical Training School (Center)

The project will be known as Electrical and Electronical Vocational Training Center.

4. Location

4.1 - Location

The Electrical and Electronical Vocational Training Center will be located at the Sérgio de Freitas Pacheco Vocational Training School.

Address:

Rua São Jerônimo, 1717
30.000 - Belo Horizonte - MG

4.2 - Land owner

The land belongs to the Minas Gerais State Government and it was given to SENAI for a period of 60 (sixty) years.

4.3 - Map and area of the site

see the enclosed map.

4.4 - Construction plan of the buildings

see the enclosed sheets.

4.5 - Lay out of the buildings and area of the rooms.

see the enclosed charts.

4.6 - Owner of the buildings

All the facilities belong to SENAI - Regional Department of Minas Gerais.

4.7.1 - Industrial distribution in and around the city where the school will be established

Statistical data concerning to this point is not available at the moment. As to say "we know them by heart", but it seems quite insufficient to meet the purposes of the Japanese Mission. Nevertheless, if strictly necessary, we can search for them.

4.7.2 - Key industries in and around the city, and number of their employees

In spite we don't have precise data, key industries in and around Belo Horizonte are mainly of mining, iron and steel, non-metallic

minerals, cement, heavy industries, automobile assembly automobile components, and automobile making, textile.

The total amount of people employed goes up a hundred thousand workers.

4.7.3 - Main products

- pig iron, steel ingots, flat products, plates, clad rolled,
- structural shapes, seamless pipes, drawn products (smooth wire,
- barbed wire), cast iron tubes and accessories
- ores: iron, manganese
- railroad equipment
- roadbuilding machinery
- agricultural machines and implements
- machinery and mechanical heavy equipments
- steel structures
- cement making equipment
- forged stock
- melted iron stock
- textiles
- automobiles

4.7.4 - Demand and supply of manpower

The labour market is increasing day by day in Minas Gerais. A large number of newly established industries has contributed to this. Nevertheless statistical data is not available, we can catch an idea on the whole by watching the demand for new employees in the electric and electronic industry. It forecasts 1.500 new jobs up 1980.

4.8.1 - Electric and electronic industries

see the enclosed data.

4.8.2 - See the enclosed data.

POINTS TO BE DISCUSSED ON MARCH, 30TH

5.1 - Contents of the training courses

· How they were designed

The curricula were designed basically upon the Federal Technical School experience

· What instruments were applied to the design of the contents.

Actually, we applied no special instruments.
We started from the FTS experience on building and updating curricula. Each four years they update their curricula through a very methodic follow-up survey on the graduated students in that period.

· How it was set up the training period

Once more we are supported by the FTS experience on setting-up training periods.

5.2 - Relation between training courses and regional industries

The relationship between training courses and regional industries demand was carefully determined by a very complete analysis of the job requirements.
Actually, we don't have precise statistical data on such a matter, but we tried our best to get the most important information from the available material.
The Regional Institute for Industrial Development (INDI) also provided us with data concerning the projects to be implemented within the next three years in the State.
It is important to say that we visited the most important Electronics and Electrothecnics Industrial Plants in the State of Minas Gerais, let alone Industrial Plants which take on employees for electronical and electrotechnical maintenance.

6. Training target

6.1 - How it was set up the training targets.

We tried to maximize the utilization of the planned facilities and equipment.

6.2 - What is the regional demand for new workers.

10. Choice of equipment

The equipment was chosen considering the planned experiences to be developed within the set-up training curricula.

10.1 - Standard of measures

We have two alternative choices to be done between ISO and DIN standard system. Both of them are largely utilized in this Country.

10.2 - Frequency, voltage, phase and plug

frequency:	60 Hz
voltage:	127/220V
phase:	3 (three)
plug:	circular section plug

10.3 - Repair and supply of machine parts in Brazil.

Repair - We expected the Brazilian trainees to be sent to Japan to be also trained in reparment. In spite we don't have searched yet for specialized repair firms in Brazil, we have great interest that our experts be able to make the repair by themselves.

Supply of machine parts - It should be useful a 5-year replacement sto stock which must be mainly composed by those parts of most rapid wearing off.

10.4 - Supply of training material

It will be provided by SENAI.

10.5 - Installation engineers

We will take on both Brazilian trainees and Japanese experts according to the terms of the agreement to be set up.

10.6 - Import limitation

There are limitations. There are many legal limitations concerning BR import policies but we do hope to overpass most of them in the terms of the agreement to be stablished between Brazil and Japan Governments.

11. Available text books

- Available textbooks - at the level of the planned training courses we don't have available textbooks, mainly concerning the adopted training paths.

- Design of textbooks and other didactical aids -

  SENAI system of preparing textbooks and other didactical aids depends upon constituted teams of both SENAI and Industry experts. Those teams (or groups) are requested to meet SENAI requirements in terms of a previously adopted methodoly.

Textbooks supply system

- Printed textbooks are adressed to the trainees as well as to the teachers and instructors.
  Printing and distribution of textbooks and other didactical aids are to be freely provided by SENAI.

- Theoretical subjects x practice training

  Basically, theoretical subjects are taught at the very moment the trainees need them to develop practical work.

- Actual difficulties to eleborate upavailable textbooks.

  They are to be considered as normal.
  Specialized bibliography is available at the moment. SEMAI has also a strong tradition and experience at textbooks planning and programming.

Ⅲ　S A N A I

I　SENAI本部よりの解答

日本側ミッションとSENAIとの会議の席上でなされた話合いの如く，同ミッションが提出した質問事項中，要請のあった資料について連絡致します。

a）　第1，11，12，14，1.6.3及び1.64の諸項に対しては，同会議にお渡し致しました下記資料でお答え致しました。

- SENAI定款
- 法律集
- 1977年SENAI報告書
- SENAIの組織及び運営（英語）

b）　第1.3項　SENAIの従業員数

9,420人　（本部　DEPARTAMENTO NACIONALを含む）

220人　（DNのみ）

c）　第1.5項　中，長期計画について

第1PDN（同封資料）

SENAIの計画及び評価（同上）

SENAIは長期計画を致しません

d）　第1.6，1.6.1及び第1.62の諸項 地方部局（DEPARTAMENTOS REGIONAIS）の名称及び住所について

同封のSENAI誌第128号（1977年7／9月号）は第2番目の表紙の裏側に要請のあった資料が掲載されてあります。

SERVIÇO NACIONAL DE APRENDIZAGEM INDUSTRIAL
DEPARTAMENTO NACIONAL
AV. NILO PEÇANHA, 50 - 29º ANDAR
RIO DE JANEIRO

Ref. 100/05
Nº 1232

Rio de Janeiro, 06 de abril de 1978

Senhor Consul Geral:

Conforme entendimentos mantidos entre a Missão Japonesa e o SENAI, durante a reunião de 30 do mês próximo passado, tenho o prazer de encaminhar a V.Sa. os dados solicitados no formulário apresentado pela referida Missão:

a) Itens 1, 1.1, 1.2, 1.4, 1.6.3 e 1.6.4 atendidos com a entrega, na referida reunião, dos seguintes documentos:
   - Regimento do SENAI
   - Coletânea de Leis
   - Relatório do SENAI/1977
   - Organização e funcionamento do SENAI (em inglês)

b) O item 1.3 - número de empregados do SENAI
   9.420 (incluíndo o Departamento Nacional - DN)
   220 (apenas o DN)

c) O item 1.5 - plano a longo e médio prazos
   I PDN (documento anexado)
   Planejamento e Avaliação do SENAI (idem)
   O SENAI não trabalha com plano a longo prazo

d) Os itens 1.6, 1.6.1 e 1.6.2 - Departamentos Regionais, nome e endereços.
   A Revista SENAI nº128(julho/setembro/77), em anexo, contém na 2a. contra-capa, os dados solicitados.

Aproveito o ensejo para apresentar a V.Sa. votos de alta estima e distinta consideração.

Saulo Diniz Swerts
Diretor Geral

Excelentíssimo Senhor
Toru Ishii
Consul Geral do Japão
Rio de Janeiro

2. SENAI in Minas Gerais

2.1 - Adress

The Regional Department of SENAI in Minas Gerais is located in Belo Horizonte, where it is its main office.

The adress is:

SENAI - Regional DEPARTMENT OF MINAS GERAIS
Av. Afonso Pena 1.500, 14/15º andares
30.000 - Belo Horizonte - MG
(phone) 224-6400 PABX

2.2 - Organization

On the whole, SENAI in Minas Gerais has the same organizational patterns of the other Regional Departments of the institution in Brazil. It is to say, a Regional Council, a Regional Director, an Operations Division, an Administration Division and a Planning Advisory Staff. In Minas Gerais, SENAI has 14 Vocational Training Centers by its own and more 17 others under agreements with industries.

2.3 - Training courses and term

Training courses are provided in four different programs as follows:

a) Basic Vocational Training (Apprenticeship) - open to people at the age of 14 up 18 years old. It provides basic trade skill in many different occupations, lasting for two years, 2,800 hours, 8 hours a day.

b) Intensive Basic Vocational Training - open to people up 16 years old. It provides basic trade skill at the same trades offered in the above program.

c) Updating Training - open to people engaged to the labour force. The courses offered under this program provide additional skills, supplementary skills and supervisory training in many different trades.

d) Technical Training Course - open to people who has attended the 2nd grade school and who is engaged to the labour force. Candidates must be nominated by their employers. Nominees

attend the courses under schollarship provided by SENAI. The courses last for two years (one year at school and one year at an industrial plant).

2.4 - Curriculum

Marking of training curriculum depends upon the type of course to be undertaken. Generally speaking, curriculum is designed to provide the trainee with training at the skills in the trade he chooses. In addition, it aims at providing related knowledge and fostering the trainee a consciousness proper to a worker.

2.5 - Equipment list

see the enclosed list.

2.6 - Number of teachers

SENAI takes on 456 persons, including teachers and instructors.

2.7 - Number of trainees

In 1977, the available data shows the following numbers:

Graduates

1. Basic Vocational Training (apprenticeship) 874
2. Intensive Basic Vocational 2,400
3. Updating training 2,169
4. Technical Training 77

TOTAL 5,520

The Operations Plan to the year of 1978 forecasts the following numbers:

1. Apprenticeship 2,667
2. Intensive Vocational Training 5,668
3. Updating training 2,556
4. Technical Training (Training in other State) ... None

TOTAL 10,891

2.9 - Employment

According to the data referring the year of 1977, the total amount of people employed by SENAI is 554, 72% engaged to the Vocational Training matters.

2.10 - Application requirements

None of special order. All of them concern to the Labour Laws of Brazil.

2.11 - Recruitment

There are different ways: advertisment in the Newspaper, people who comes to our office looking for an opportunity, etc.

2.12 - Selection

All of the candidates to be employed by SENAI must take an examination. They also have to prove their capability and to meet the requirements of the occupation they want to fulfill.

2.13 - Qualification of teachers

Instructors must have high level of theoretical technical knowledge, trade skill and teaching competence.

2.14 - Treatment of teachers

Refers to the Federal Laws to be satisfied at the moment SENAI celebrates the Labour Contract.

2.15 - Number of officers

Around 110 persons.

質問状解答（仮訳）

I　SENAI職業訓練センター（要請プロジェクト）設置に関して

1　要請プロジェクトの背景

（M／G SENAI解答）　本プロジェクトは電気・電子産業界よりの技能者及びテクニシャンの需要に応ずる為に計画され，新規労働者の事前研修並びに既労働者への最新技術及び知識の付与を基本として進められている。

SENAIの日本への技術協力要請は日本が電気・電子分野で世界で最も進んだ技術を有していることによる。又日本人の多くがブラジルにおいて電気・電子関連機材を製造していることにも本要請理由がある。

本要請はブラジル連邦政府の承認もおりている。

2　プロジェクト名

（M／G SENAI解答）　Electrical and Electronical Vocational Training Center.

3　R／D 締結機関及び全責任者

（労働省解答）　署名者　Oliver Gomes da Cunha.

職　名　Secretário de Mão-de-Obra.

Ministério do Trabalho

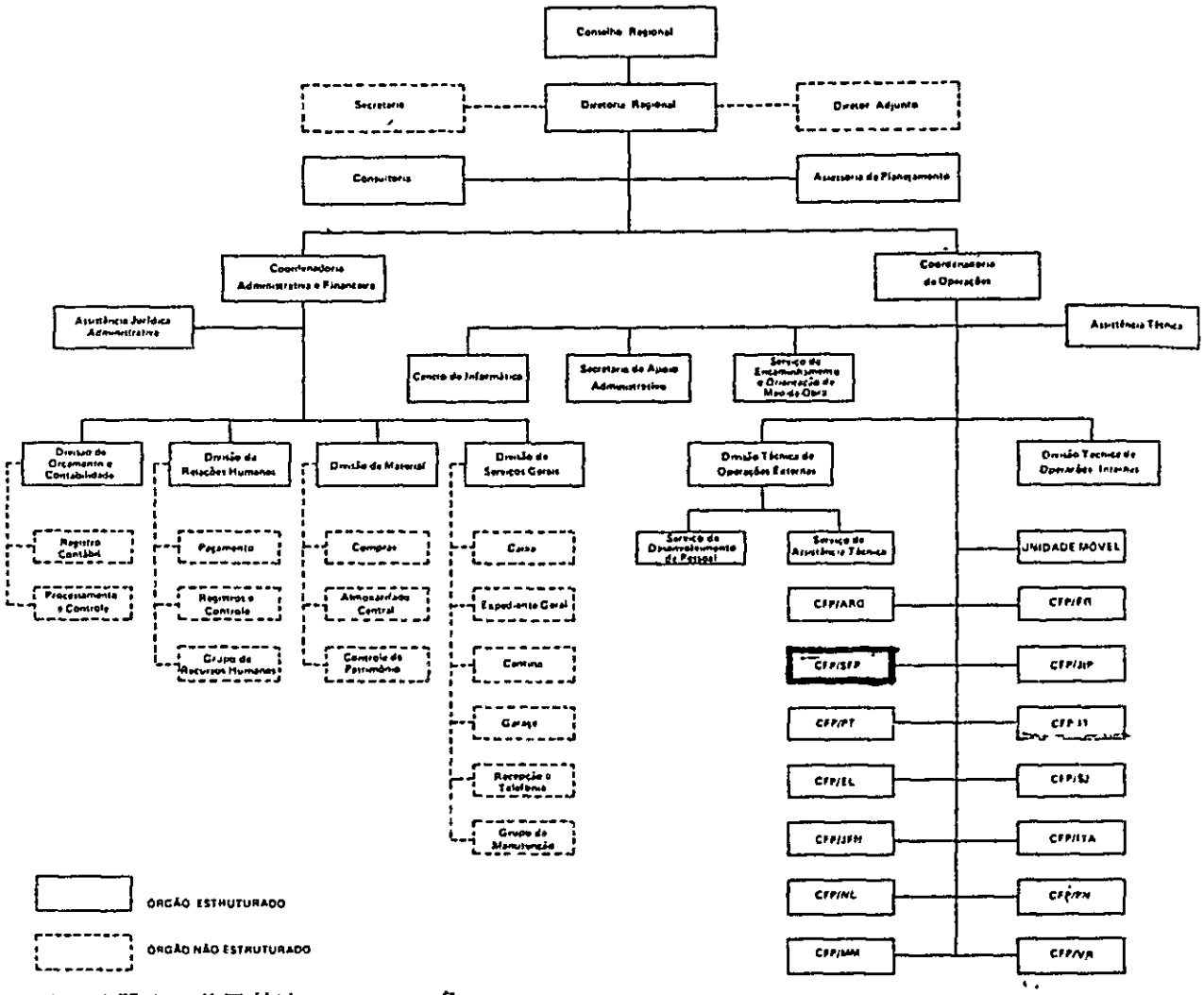
（教育文化省解答）　1976年3月31日より教育文化省より労働省へ移管となった。

（企画庁　〃）　労働　教育文化省両省の合意による。

（外務省　〃）　補足取極（交換公文）によるのが妥当であると思われるので検討致したい。

組織図及び日本人専門家の位置付けを次のとおり考える。

ORGANOGRAMA DO DEPARTAMENTO REGIONAL - 1977



日本人専門家の位置付け	名	職務内容
① D R	AFONSO GRECO	∘ General direction ∘ Planning
② A P	WASHINGTON DE CASTRO	(Economical, Budget construction)
③ C O	GERALDO EUSTAQUIO	∘ Operations ∘ Programming ∘ Textbooks ∘ Teachers Training
④ CFP/SFP	GEPALDO GONCALVES	∘ Execution of the Project

上記①～④に関する協力が日本人専門家の職務となる。

4　設置場所

（M／G SENAI 解答）

4－1所在　　Sérgio de Freitas Pacheco Vocational Training School 内とする。

住所　　Rua São Jerônimo，1717

30,000－Belo Horizonte －MG

4－2土地所有者　ミナスジェライス州政府であるがSENAI M/Gが1970年より60年間の借地をしている。

4－3地図及び面積

別途M／G地図及びプロジェクト建設平面図を受領。

4,800 m^2

4－4建物建設計画

別途建物入札書を受領

建物完成（間仕切りを除く）は53年7月

4－5建物レイアウト及び各部屋面積

プロジェクト建設平面図参照

4－6建物所有者　SENAI M／G

4－7－1プロジェクト周辺産業分布

現在のところ資料はない

4－7－2主な産業及びその従業員数

鉱業，鉄鉱業・セメント・自動車，繊維で全従業員数100000人にのぼる。

4－7－3主な生産物

英文解答参照

4－7－4労働力需給状況

労働市場は日々増大し，新設工場の多くより需要が出ている。正確な統計はないが電気電子分野の新規労働者需要は1980年迄に1500人と予測される。

4－8－1プロジェクト周辺の電気・電子工場とその従業員数

付属資料5を参照

4－9本プロジェクトと開発計画との関係

（受領資料）　第Ⅱ次国家開発計画（1975～1979）

第Ⅱ次国際技術協力計画（1977～1981）

4－10電気・水・ガスの供給状況

問題なし

5　訓練コース
6　訓練目標
7　訓練生
8　訓練期間
9　訓練生数

} 5～9は討議を行なった

10機　材

10－1 計量単位

ＩＳＯ及びＤＩＮを使用

10－2 周波数・電圧・相・プラグ

60サイクル

127／220ボルト

3相

10－3 機材の修理・部品調達

日本における研修により自分の手で修理ができることになろう。消耗品については5年分の部品が必要と思われる。

10－4 教材の調達

ＳＥＮＡＩが負担する。

10－5 据付技術者

ブラジル訓練生及び日本人専門家が協定（R/D）に基づき行なう。

10－6 機材の輸入制限

輸入制限はある，ＢＲ輸入政策により多くの輸入制限があるが日ブの取り極めにより機材のほとんどが無税通関できることを希望する。

（労の答）　教育機材は通関上問題ない

（企の答）　ＣＡＣＥＸで輸入制限品目リストを作成している
ブラジルで生産できるものは，ブラジル側で購入する。

11　教科書

1. 本プロジェクト用教科書は今後作成する。
なお，現在行われている電気科の教科書は付属資料6を参照

2. 教科書は無料で訓練生に配布される。

12 教師及びその他職員

本件は討議を行なった。

13 組　織

Ⅰ－3の解答を参照

14 予　算

14－1 会計年度

1月～12月

14－2 建設予算

付属資料

14－3 運営予算

15 日本人専門家　本件は討議を行なった

Ⅲ SENAI

1 本　部

（SENAI NACIONALより解答）

1－1 所　在　SENAI-DEPARTAMENTO NACIONAL
Av. Nilo Paçanha,50-29.° Andar Rio de Janeiro-RJ
20000 - ZC-P

1－2 組　織

SENAIは意志決定機関と運営機関により構成されている。

意志決定機関は

- NATIONAL COUNCIL　ブラジル全土に関わること
- REGIONAL COUNCIL　担当地域に　〃

により構成されており，NATIONAL COUNCILはREGIONAL COUNCIL の会長，経済界代表，SENAI運営部門会長，及び労働省代表並びに教育文化省工業関係訓練委員会長により構成されている。

運営機関は

- NATIONAL DEPARTMENT－ ブラジル全土
- REGIONAL DEPARTMENT－ 担当地域

により構成されており，それぞれ，NATIONAL COUNCIL及びREGIONAL COUNCILの方針に従がい実際上の訓練計画を実施する。

SENAIはブラジル国22州の中に21のREGIONAL AGENCY（地方局）を有している。

1－3　職員数　本部220人を含むと9,420人である。

1－4　大統領令4048

仮訳　付属資料3を参照

1－5　中期計画　別途　（1976～78）第1期中期計画受領）

1 — 6　地方局　下記のとおり

SENAI

SERVICO NACIONAL DE APRENDIZAGEM INDUSTRIAL

CONSELHO NACIONAL

Thomas Pompeu de Souza Brasil Netto
Presidente

José Antunes
Secretàrio

Endereço: Av.Nilo Peçanha,50-25º andar
Tel. 231-3099

DEPARTAMENTO NACIONAL

Sady Boano Mussoi
Diretor

Paulo Cesar Botelho Junqueira
Diretor-Adjunto

Endereço: Av.Nilo Peçanha,50-29º andar
Tel. 224-0271

DEPARTAMENTOS REGIONAIS

Diretores

ALAGOAS	Leônidas Barbosa Filho Rua Pedro Américo, 18 (Poco) Cx. P. 155 Maceio - AL	PARANA	Gerônimo de Macedo Molli Rua Chile, 1678 Cx. P. 999 Curitiba - PR
AMAZONAS	José Augusto Roque da Cunha Av. Carvalho Leal, 555 Manaus - AM	PERNAMBUCO	Engº Fernando Monteiro de Matos Av. Norte, 539 (Santo Amaro) Recife - PE
BAHIA	Nemésio Diogenes Neto Rua Conselheiro Saraiva, 26 4º e 5º and Cx. P. 664 Salvador - BA	PIAUI	José Màrop Aranha Pinheiro Av. Capitão Claro, 19 Cx. P. 28 Parnaiba - PI
CEARA	Francisco Deusemar Lins Cavalcante Av. Padre Ibiapina, 1280 (Jacarecanga) - Cx. P. 317 Fortaleza - CE	RIO DE JANEIRO	Saulo Diniz Swerts Rua Mariz e Barros, 678 Rio de Janeiro - RJ
ESPIRITO SANTO	Ivan Anacleto Lorenzoni Borgo Av. Beira Mar, 2235 (B.Ferreira) - Cx. P. 683 Vitoria - ES	RIO G.DO NORTE	José Albino de Oliveira Av. Prudente de Morais, 890 Natal - RM
GOIAS	Jefferson Bueno Av. Anhanguera, 3576 Cx. P. 523 Goiania - GO	RIO G. DO SUL	Otto Ernesto Dietrich Av. A. J. Renner, nº 10 (Navegantes) 3º and.- Cx. P. 2130 Porto Alegre - RS

MARANHAO	Railmundo Franco Teixeira Av. Getulio Vargas,2888 Cx. P. 325 São Luis - MA
MATO GROSSO	Afranio Fialho Figueiredo Rua Corsino do Amarante, 396 Cuiaba - MT
MINAS GERAIS	Afonso Greco Ave. Afonso Pena, 1500 14° e 15° and. Belo Horizonte - MG
PARA	Gerson dos Santos Peres Travessa Barão do Triunfo, 2806 Belém - PA
PARAIBA	José Stènio Lopes Rua D. Pedro 11,788 Cx. P. 566 Campina Grande - PB
SANTA CATARINA	Célio Goulart Rua Tenente Silveira,35 g° e 10° and. Florianopolis - SC
SAO PAULO	Paulo Ernesto Tolle Alameda Barão de Limeira Limeira, 539 São Paulo - SP
SERGIPE	José Antonio Azevedo de Freitas Rua Proprià, n° 201 3° and. - Cx. P. 235 Aracaju - SE
DISTRITO FEDERAL	Antonio Fabio Ribeiro SCS - Quadra 6 Edificio Presidente, 4° and. Brasilia - DF

1—6 —3　訓練コース

a) Apprentice ship of youths from 14 to 18 years of age
（１４才～１８才の技能（徒弟）訓練コース）

本コースはＳＥＮＡＩ及び企業におけるon the job 訓練を行なっている。

b) Basic and specialized training of adult workers
（成人既労働者への基礎及び専門訓練コース）

本コースはＳＥＮＡＩ及び関連企業における訓練を行なう。

c) Advanced training of foremen and supervisors
（管理職向上級訓練コース）

企業内における訓練及びＳＥＮＡＩにおける訓練を行なう。

d) Training of medium-level technicians and technical assistance　（中級テクニシャン向訓練コース）

ＳＥＮＡＩ及び企業において行なう。

e) Advanced training of technical and managerial worker
（技術管理者向上級コース）

f) Training and specialization of instructors teachers and vocational training orientation staff

2 SENAI in M/G （ミナスジェライスSENAIより解答）

2－1 所在

SENAI - REGIONAL DEPARTMENT OF MINAS GERAIS
Av. Afonso Pena 1.500, 14/15º andares
30.000 - Belc Horizonte - MG
(phone) 224-6400 PABX

2－2 組 織 本解答のⅠ－3参照

2－3 訓練コース

a) Basic Vocational Training (Apprentice ship)
（基礎技能訓練コース）

—14才～18才の訓練生に対する基礎的技能訓練

2年間，2800時間 1日8時間

b) Intensive Basic Vocational Training
（集中基礎職業訓練コース）

—16才以上の訓練生に対するa）と同じ訓練

c) Updating Training
（最新技術訓練コース）

—既労働者に対する付加技能訓練

d) Technical Training Course
（技術訓練コース）

—セカンドグレド卒（11年教育終了者）の雇用契約済で企業より推せんのある者を対象とする。

2年間（1年はSENAIで1年は企業内で訓練）

2－4 カリキュラム

別途資料4参照

2－5 機材リスト

現在電気部門に在る主な機材リストは下記のとおり

Equipments (or sets of equipments) which are found in SENAI electrical laboratory

QUANTITY	SPECIFICATION	FULL PRICE (Cr$)
1	Rovemak Band Saw	61.800,00
2	Bench Drill Press (16 mm)	13.640,00
1	Electrical Emery Board	3.380,00
1	Bench Emery Board	630,00
1	Winding Frame	12.200,00
1	Hidraulic Forgiving Press (15 ton)	2.100,00
3	Security Bench with two vises	3.960,00
24	Bench for Wiring Motors with Test Panel and Tool Window	48.000,00
6	Industrial Installation Panel	72.049,00
2	Industrial Installation Panel with Equipment for teaching purposes for automation	24.683,00
1	Buffing Machine	5.000,00
18	Three Phase-inductiron Motor	6.384,00
1	Wood Benches for Turing Wires	6.800,00
1	Central Connection Panel	7.150,00
	TOTAL	267.776,00

2－6　教師の数　　教師及び指導員の合計は４５６人

2－7　訓練生の数

１９７７年の卒業生数

1 Basic Vocational Tlaining	874人
2 Intensine Basic Vocational	2,400
3 Updating training	2,169
4 Technical Training	77
計	5,520

1978年の計画数		
1		2,667
2	上記と同じ	5,668
3		2,556
4	(現在他の州で研修中)	0
		10,891

2－9　就　職　　1977年においては，SENAIに雇用された者は554人で72%が職業訓練関係に従事している。

2－10 入学資格　　特になし。ブラジル労働法による。

2－11 募集方法　　新聞等

2－12 選考方法　　SENAIに雇用される入学生は試験がある。

2－13 教師の資格

指導員としての理論的技術的高度な知識を要する

2－14 教師の待遇

連邦法による

2－15 職員数　　110人