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ABSTRACT

The education and training provision set out in this recommendation are designed to develop suitable entrants to electricity boards for responsibilities as engineers in generation and transmission in Great Britain. The first objective is therefore to provide the trainee with the knowledge necessary to undertake a specific appointment immediately after training in the operation and maintenance or the development and construction aspects of generation, or in transmission. From such appointments he will develop both in confidence and in ability, and it is to be expected that trainees who have undertaken studies in engineering to degree or equivalent level may quickly gain sufficient experience to make them suitable for wider responsibilities. Thus a second objective must be to provide a wider understanding of the principles and practice of generation and transmission, together with supervisory and management techniques which will, as an engineer's career develops, enable him to build up knowledge and experience in whichever field of generation or transmission he enters. The layout of the recommendation follows the same lines as that for recommendation 31 (CE 001 038) dealing with technical training. Typical programs for professional engineering training in generation and transmission are given in the appendix. (Author/DS)

Recommendation 30: Professional Engineering Training in Generation and Transmission

note on terminology

In the title and text of the recommendation the term "generation" is used generically to denote both the operation and maintenance functions and the development and construction functions. Where the term "generation (operation and maintenance)" is used it encompasses also the work of associated technical service departments.

foreword

The Board's recommendation 5, on the training of student engineering apprentices, issued in April, 1968, made provision for the training of generation and transmission engineers through a number of alternative patterns of education and training. The education provision led in some cases to a degree or diploma, and in others to a qualification such as a Higher National Certificate. The programmes of practical training were adapted in length to the patterns of "thick" and "thin" sandwich courses and to studies by block or day release, but had a similar content, based on the best current training practices within the industry.

The Board regarded recommendation 5 as an interim statement of its policy in this sector but decided that a more fundamental and detailed consideration of the training needs of the various categories of engineers within the industry was required, based on an analysis of the duties and responsibilities of each group of engineers, and of the knowledge and skills implicit in carrying out the various elements of their work.

This recommendation is the result of such consideration applied to engineers qualified to degree level. Its provisions are based on an analysis of the work of engineers employed in:

i) Power stations and associated technical service departments

ii) Departments responsible for the development and construction of power stations

iii) Transmission districts and associated technical service departments.

Typical programmes of training, with related syllabuses, have been drawn up for each of these three areas of work and are published separately.

The Board has produced a complementary recommendation, No. 31, on technician engineering training, and that together with the present recommendation will supersede the sections of recommendation 5 that refer to generation and transmission engineers.

recommendation on professional engineering training in generation and transmission

the responsibilities of generation and transmission engineers

1. These engineers collectively have responsibility for the development and construction of power plant and the operation and maintenance of generation and transmission plant and equipment which supply electricity in bulk to distribution systems and certain large customers. Various factors influence the planning of their training, amongst the most important of which are the following:

a) Reliability of supply coupled with maintaining the highest possible plant availability, particularly of modern plant having high unit replacement cost.

b) The degree to which development, construction, operation and maintenance are interlinked, and the need therefore for engineers to have a broad base of knowledge applicable to this range of work, as well as more detailed knowledge and skill in the sector for which they are initially being trained.

c) The interdependence of professional engineering competence with managerial skill in the achievement of efficiency at minimum cost.

d) The safety of staff and public.

aims The education and training provisions set out in this recommendation are designed to develop suitable entrants to electricity boards for responsibilities as engineers in generation and transmission. The first objective is therefore to provide the trainee with the knowledge necessary to undertake a specific appointment immediately after training in the operation and maintenance or the development and construction aspects of generation, or in transmission. From such appointments he will develop both in confidence and in ability, and it is to be expected that trainees who have undertaken studies in engineering to degree or equivalent level may quickly gain sufficient experience to make them suitable for wider responsibilities. Thus a second objective must be to provide a wider understanding of the principles and practice of generation and transmission, together with supervisory and management techniques, which as an engineer's career develops will enable him to build up knowledge and experience in whichever field of generation or transmission he enters.

recruitment and entry qualifications

3. Recruitment will be mainly from the following sources:

a) Young people with passes at the Advanced level of the General Certificate of Education, or at the "H" grade of the Scottish Certificate of Education, including in each case mathematics and/or physics, and supported by good Ordinary Level Certificates; the essential requirement being that they are qualified for entry to either a degree course or a Higher National Diploma course in an appropriate branch of engineering. Applicants who have gained an Ordinary National Diploma in engineering or in technology (engineering) at a technical college may also be considered within this group. Such entrants will normally be aged 17 years and upwards. Where applicants have been away from studies for more than two years, special provision may have to be made for their attendance at a refresher course.

b) Graduates in engineering of universities and colleges in the United Kingdom.

c) Holders of a Higher National Diploma or College Diploma of comparable standard.

Entrants in categories (b) and (c) will normally be aged 21 years and upwards.

4. In addition to those referred to in paragraph 3(a) it is to be expected that a number of trainees from technical training schemes with lower entry qualifications will reach a sufficiently high standard in the examination for the Ordinary National Certificate in engineering to justify consideration for transfer to studies for a degree or diploma in engineering and to the professional training outlined in this recommendation. In such cases individual programmes of training should be drawn up taking full account of previous experience.

length and pattern of education and training

5. Before taking up his first appointment, the engineering trainee must have satisfactorily completed the practical training prescribed in this recommendation, and should have obtained a degree, diploma or equivalent. These two requirements may be covered in a number of ways, e.g.:

a) A thin sandwich course in which periods of academic study of about six months' duration are interleaved with similar periods of practical training.

b) A thick sandwich course in which a three year full-time degree course is both preceded and followed by periods of practical training, each of up to a year in length. Some training may with advantage be given during vacations.

c) Practical training end-on to a degree or diploma course. The length of training will be 18 months to two years but where trainees have previously gained relevant experience it should be nearer 18 months.

6. In each of these combinations of education and training the overall time required is a minimum of $4\frac{1}{2}$ years, with some possible extension to meet special circumstances.

educational courses

7. Trainees will normally study either electrical or mechanical engineering, according to where their interest lies. Those who aim at appointments in generation may follow either discipline, but those whose interests are in transmission will normally study electrical engineering. In some cases one of the multi-disciplinary engineering courses may be appropriate. It is evident that they must follow educational courses appropriate to their academic attainments on entry, and to the arrangement of education and training which they are following. Their needs can be defined as follows:

a) Trainees on sandwich courses either thick or thin should, where they are qualified to do so, follow a course leading to a degree in engineering giving them exemption from the examination of the Council of Engineering Institutions. Alternatively they should study for a Higher National Diploma in an appropriate branch of engineering and, where their performance during the course justifies it, should follow this with further study for the part II examination of the Council of Engineering Institutions. Where, as is the case in the first year of a thick sandwich student's training, there is a long period between the end of studies at school and the start of the degree course, students should be granted day release for attendance at a local college so that they can consolidate and extend their knowledge of mathematics and relevant sciences.

b) Those who join a training scheme after graduation can normally be assumed to have already completed their essential studies. They should however be allowed the further provision outlined in paragraph 8.

c) Those who join after gaining a Higher National Diploma should, where their record of performance justifies it, be given opportunity to study for full professional qualifications.

8. Young engineers should be encouraged to continue to study after their formal education has been completed. Such study may begin during the latter part of their training courses. Electricity boards should advise on the most appropriate subjects to follow and where necessary may extend facilities for study beyond the end of the formal training scheme, under their provisions for career development. The industry's correspondence courses will frequently be suitable, and many colleges provide short courses at post graduate or comparable level, e.g. CNAA Diploma Courses, in subjects relevant to the future work of generation and transmission engineers; for example, more specialist aspects of engineering, or techniques associated with the planning and control of engineering work.

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training

9. The broad objectives of professional training in generation and transmission engineering have been stated in paragraph 2. It is to be recognised however that the training of an engineer in the sense of continuing to increase his knowledge, skill and experience, extends throughout his working life and that from time to time during his career, particularly when taking up a new appointment, he should be given facilities to attend courses in new aspects of his work, or refresher courses to enable him to bring his knowledge up to date. To some extent therefore the division between initial training, as covered by this recommendation, and later development training is arbitrary and it is recommended that electricity boards ensure close integration between the provisions of the recommendation and those of their career development scheme.

10. For this reason the recommendation has kept the length of training as short as practicable, recognising that the early appointments of engineers are necessarily under the close supervision of more experienced members of the profession

11. The training schemes can be divided into three phases. The first is general and common to both sectors of generation and to transmission; the second and third concentrate on one of these three areas of work. The arrangement may be shown diagrammatically as follows:

General training	Stage I Training in generation (operation and maintenance)	Stage II Training in generation (operation and maintenance)
	Stage I Training in generation (development and construction)	Stage II Training in generation (development and construction)
	Stage I Training in transmission	Stage II Training in transmission

12. Through the systematic analysis of the work of generation and transmission engineers to which reference has been made, it is possible to sub-divide these stages and to identify a number of areas in which it is essential to provide opportunity for entrants to gain knowledge and experience during training. These form the major areas of a training programme and can be summarised as follows:

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general training

Induction and related knowledge
Workshop practice
Power plant familiarisation; an introduction to generation including station unit operation and to transmission.
Maintenance; power plant and transmission plant.

Stage I

generation training (operation and maintenance)

Operation, fossil fuel and nuclear plant.

Control systems and instrumentation.

Maintenance, mechanical, electrical, and instrumentation and control.

Power station design and construction.

Power plant engineering.

Electrical protection systems.

System operation.

Computer applications.

Training in association with manufacturers of power plant.

Aspects of management including work study, work planning, costing and control.

Stage II

Directed objective training in generation (operation and maintenance).

	Stage I
generation training (development and construction)	Operation, fossil fuel and nuclear plant.
	Control systems and instrumentation.
	Electrical protection systems.
	Power station planning, design and construction.
	Erection and installation.
	Production, inspection and test.
	System operation.
	Computer applications.
	Training in association with manufacturers of power plant.
	Project in power plant engineering.
	Aspects of management including work study, project programming, contract and financial control.
	Stage II
	Directed objective training in generation (development and construction).

Stage I

transmission training

Operation and maintenance of plant and equipment.

Transmission plant, protection, telecommunications and measurement equipment.

Power system design and construction.

System operation.

Power system engineering.

Distribution engineering.

Computer applications.

Training in association with manufacturers of power plant.

Aspects of management including work study, work planning, costing and control.

Stage II

Directed objective training in transmission work.

Tests, appraisals and projects will be introduced at suitable points throughout the programme.

13. The content of training for each of these components (both formal and on-job) has been derived from the analysis of work. The syllabus for each formal course or period of on-job training indicates the objectives and content of the aspect of training concerned, the training methods that are appropriate, the duration, and the location in which it should be given. Implicit in this training is the importance of developing an understanding of human and industrial relationships.

14. The programme for any particular training scheme operated by electricity boards should be compiled by combining the syllabuses in a suitable order to fit in with academic studies and the availability of sufficient numbers of trainees for formal courses. The notes of guidance which form appendix I illustrate how this could be done for generation or transmission, with particular reference to school leavers, but boards may vary this according to local circumstances. The grouping of the training components set out in appendix I and summarised in paragraphs 11 and 12, and their content, have been developed from an analysis of current engineering posts. This range of duties may alter as a result of technological advance and/or organisational change and it is recognised that the training programme should reflect such developments as they occur. The programme is in fact structured in such a way that components can be regrouped to meet different engineering employment patterns should these be introduced. Whatever changes are made there must as far as possible be a logical progression through the training components.

formal and on-job training

15. A significant feature of the training specified is the proportion of formal training required, which is approximately 40% of the training time in the first two phases. In this way it is possible to utilise the skill the young people concerned will have already developed in acquiring knowledge through formal studies, and to keep the brisk pace to their programme which is essential if their abilities are to be extended and their interest maintained. Problems of sufficient numbers to form viable groups are likely to arise within an electricity board and may be met by combination with other groups of trainees within the board, by arrangements between regions, or by arrangements on a national basis. Experimentation in ways of providing formal training other than in a conventional classroom setting should maintain the principles of planned sequence, concentration of instruction and adequate attention from a tutor.

16. On-job training however is an essential complement to formal training. This is partly because certain equipment and processes cannot be satisfactorily simulated, but more particularly because it is essential for the trainee to get the feel of "real" situations and to have direct contact with staff whom he may expect to supervise later in his career. It is important during such on-job training that the trainee participates in the situation as far as possible, rather than watches it, and such participation may frequently be in association with a junior supervisor. It will normally be most effectively achieved by attaching the trainee to an engineer who may allocate him to different jobs.

17. Nonetheless it is inevitable that some time will be spent in observation and this must be made as purposeful as possible. The trainee's approach should be analytical, ie. he should find out and record such facts as what is being done and why, the job method used, the sequence of events and the time taken; he should deduce what are the critical points for supervising engineers to check. He should be required to discuss his findings with experienced engineers and from time to time produce written reports. Individual and group projects may be introduced into the programme at appropriate points.

18. Most formal courses in technical work should include visits to power stations and other installations, and there will usually be merit in including locations where construction and commissioning are in progress as well as those where plant is in operation. In addition, trainees in generation (development and construction) spend periods of on-job training in contact with power station operation and maintenance, and trainees in generation (operation and maintenance) should if possible spend at least one period of on-job training in a location where construction and commissioning is in progress.

safety

19. Safety is a vital aspect of the work of an engineer in the industry, and instruction in relevant aspects must be built into every phase of his training. The importance of the safety of the public and of craftsmen and others working under his direction, as well as of himself, must become so much a part of his approach to his work as to permeate his thinking and be habitual in his actions. The bearing of physical fitness on safety, particularly for engineers closely associated with field work, should be borne in mind; in this connection trainees should be encouraged to participate in sport and similar activities.

self-development

20. Every encouragement should be given to the engineering trainee to broaden his education by reading both in and around his subjects. Facility in speaking and writing is important to a supervising engineer. As part of their programme therefore trainees should be required to prepare papers on agreed topics for presentation to their colleagues. They should be encouraged to take an active part in the student section of a professional institution and in the cultural life of the community in which they are resident.

the administration and monitoring of training

21. From the basic programmes in generation and transmission set out in this recommendation electricity boards should develop an individual programme for each trainee. These programmes should be developed in close collaboration between senior engineers and education and training staff, and administered by a nominated person, preferably an engineer, who normally should be on the staff of the officer responsible for education and training. His duties will include:

a) Drawing up an individual programme for each trainee in advance of his needs.

b) In consultation with the trainee, adjusting these programmes from time to time in the light of his progress and needs and of local variation in the experience that can be provided.

c) Keeping in close touch with the training which the trainee is currently undertaking and, at intervals of not more than three months, discussing with him the work he has been doing to check that he has a thorough understanding of it.

d) Receiving reports from the heads of the departments of the electricity board in which each of his trainees has been working, from leaders of the formal courses he has attended, and from the college at which the trainee has been undertaking his academic studies and, in consultation with them, taking any necessary action. Liaison with college staff visiting students undergoing industrial training and with industrial tutors visiting colleges.

e) Preparing an annual written review of each trainee's progress and development, based primarily on reports from the departments in which he has been working, the engineer's observations of the trainee and quarterly discussions with him, and college reports of progress on academic studies. The review should include observations on the aims and interests relevant to his future career that the trainee has expressed.

22. At each working unit of the electricity board, to which trainees are attached, management should nominate an engineer to take local responsibility for acting as a mentor to the trainees attached to his unit. He should be a qualified engineer and of sufficient seniority and experience to cover the whole of the unit's activities. His duties will include placing trainees with appropriate members of his unit's staff, checking that they are gaining the correct experience and preparing reports on progress. It is expected that training will be given to engineers to assist them to fulfil training duties as outlined above.

23. It is important that measures are taken to assess and record each trainee's progress through his training so that remedial action can be taken to correct any gaps in his knowledge and that a systematic feedback of information is established from which the various components of the training programmes can be evaluated.

24. Formal courses will usually include practical exercises, either written or manual, which will in themselves show how the trainee is progressing; and if necessary these can be supplemented by more formal tests. For the on-job training feedback will be obtained from exercises and written reports from trainees, and from reports from engineers under whom they have carried out their on-job training.

typical programmes for professional engineering training in generation and transmission

appendix I

1. The sequence diagrams which follow illustrate the combination of the various syllabuses into training programmes for trainees taking (a) the generation (operation and maintenance) option, (b) the generation (development and construction) option, (c) the transmission option. The items have been sequenced in a logical order which should act as a general guide to electricity boards. In practice, such considerations as the necessity of accommodating educational release requirements or of making a sufficient number of trainees available for formal courses, or the availability of vacancies for on-job training in small departments, may make some re-arrangement necessary.

2. The diagram should be interpreted as follows:

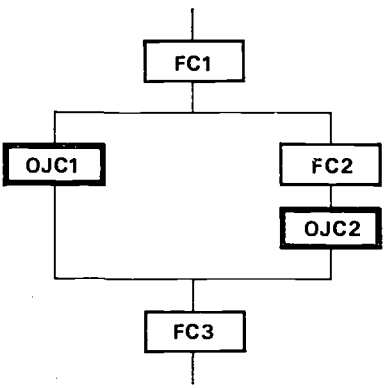
a) The sequence of training assignments flows from top to bottom.

b) Trainees are required to take all components. Where parallel paths are shown, these indicate alternatives of sequence and not of content.

c) All input components must be completed before the next component is begun.

d) A thin line box indicates a formal (or off-job) component.

e) A heavy line box indicates an on-job component.



For example:

The sequence of training components shown above indicates that:

i) Components FC1, FC2 and FC3 are formal components, while OJC1 and OJC2 are on-job components.

ii) FC1 must be completed before OJC1 or FC2 can be started.

iii) After completion of FC2, OJC2 can be started. If FC2 is taken before OJC1 it can be followed by either OJC1 or OJC2.

iv) Both OJC1 and OJC2 must be completed before FC3 can be started.

3. This example programme is particularly applicable to trainees following thin sandwich courses, and will need adaptation for graduate and diploma entrants or for those following thick sandwich courses.

4. The following principles should be taken into account in making modifications.

i) The trainee should be sufficiently advanced in his theoretical studies to gain full benefit from a training assignment and due account should be taken of the consultation which takes place between industry and college.

ii) Formal training in a topic should precede on-job training apart occasionally from short introductory periods on site.

iii) Whilst syllabuses for formal courses in discrete subjects have been developed, in some circumstances there may be advantage in grouping and integration.

iv) Tests, appraisals and projects should be interspersed at suitable stages throughout the programme.

v) In the case of graduate and diploma trainees any relevant engineering and administrative experience gained before going up to university or college, or during vacations, may be considered in lieu of items in the example programme.

vi) The greater maturity of graduate and diploma trainees will allow some flexibility in the length of their training programme.

5. In addition to the formal instruction in safety and accident prevention included in the induction course and the course on safety, emphasis should be placed on the relevant safety and health precautions during each stage of on-job training. In connection with formal training in safety the requirements of the Training Board's recommendation 20, on the electrical training of apprentices to meet Factories Act requirements, must be fully met.

6. In view of the changeover to metric units which, in common with British industry as a whole, will be taking place in electricity supply between the present time and 1975, electricity boards should ensure that all trainees covered by this recommendation are given training in the aspects of S.I. units, metric threads and fastenings, and the consequential changes in specifications and standards of materials and components, that are applicable to their future work. Electricity boards should bear in mind that for many years to come equipment manufactured to both Imperial and metric specifications will be in use, and that trainees must therefore be familiar with both systems and with appropriate methods of conversion.

7. The duration of each element of training is the best estimate that can be made of the time required by engineering trainees of normal ability but with no previous industrial experience. The times given should be regarded as flexible and some revision may prove necessary as electricity boards gain experience in operation.

8. Lists of the components of Directed Objective Training are included. In all cases the formal course Introduction to Management forms one component, and the remainder of the programme for trainees in each stream should normally be as follows:

a) Generation (operation and maintenance). One of the following alternative groups of syllabuses:

   i) Power Station Operation and Maintenance (Fossil Fuel) : Formal course in Fossil Fuel Generation.

   ii) Power Station Operation and Maintenance (Nuclear) : Formal courses in Principles of Nuclear Generation and in Nuclear Generation (Magnox). It is anticipated that at a later stage it will be necessary to develop a course to meet the needs of trainees likely to be employed in Advanced Gas Cooled Reactor (AGR) Stations.

   iii) Technical and Scientific Services: Formal courses in Fossil Fuel Generation and/or in Principles of Nuclear Generation and Nuclear Generation (Magnox).

b) Generation (development and construction). One of the three alternative syllabuses in
   Project Management and Station Design
   Plant Construction
   Plant Engineering

c) Transmission. The syllabus for Directed Objective Training in Transmission.

general training

	Time (weeks)		Syllabus Code
	Formal	On-job	
1 Induction, Related Knowledge and Safety	1	—	GF1
2 Workshop Practice	12	—	GF2
3 Power Station Plant I	2	—	GF3
4 Power Station Unit Operation	—	3	GOJ1
5 Power Station Plant II	2	—	GF3
6 Electrical Plant and Transmission Systems	3	—	GF4
7 Safety	1	—	GF5
8 Power Plant Maintenance	—	6	GOJ2
9 Transmission Plant Operation and Maintenance	—	3	GOJ3
Total	21	12	

stage I training generation (operation and maintenance)

		Time (weeks)		Syllabus Code
		Formal	On-job	
1	Power Plant Operation	2	—	GF6
2	Power Station Unit Operation II	—	5	GOJ1
3	Power Station Operation	—	5	GOJ4
4	Computer Applications	1	—	GF7
5	Power Station Instrumentation and Control Systems	3	—	GF8
6	Electrical Protection Systems	1	—	GF9
7	Technical Aspects of Power Plant Maintenance	—	6	GOJ5
8	Introduction to Work Study	1	—	GF10
9	Work Planning, Costing and Control	2	—	GF11
10	Power Station Work Planning and Organisation	—	6	GOJ6
11	Training in Association with Manufacturers of Power Plant	4	—	GF12
12	System Operation	—	3	GOJ7
13	Nuclear Power Station Operation and Maintenance	—	2	GOJ8
14	Power Station Design and Construction	2	—	GF13
15	Power Plant Engineering	—	8	GOJ9
16	Project Work in Power Plant Engineering	—	8–12	GOJ10
	Totals	16	43–47	

stage II training generation (operation and maintenance)

	Time (weeks)		Syllabus Code
	Formal	On-job	
1 Power Station Operation and Maintenance (Fossil fuel)	—	12	GDOT1
2 Power Station Operation and Maintenance (Nuclear)	—	12	GDOT2
3 Technical or Scientific Services	—	12	GDOT3
4 Introduction to Management	2	—	GF14
5 Fossil Fuel Generation	3	—	GF15
6 Principles of Nuclear Generation	4	—	GF16
7 Nuclear Generation (Magnox)	5	—	GF17

Totals 5 or 11 12

(see paragraph 8 of appendix I)

stage I training generation (development and construction)

		Time (weeks)		Syllabus Code
		Formal	On-job	
1	Power Plant Operation	2	—	GF6
2	Power Station Unit Operation II	—	5	GOJ1
3	System Operation	—	3	GOJ7
4	Computer Applications	1	—	GF7
5	Introduction to Work Study	1	—	GF10
6	Power Station Instrumentation and Control Systems	3	—	GF8
7	Electrical Protection Systems	1	—	GF9
8	Principles of Nuclear Generation	4	—	GF16
9	Nuclear Power Station Operation and Maintenance	—	2	GOJ8
10	Design Drawing Office Practice	—	4	GOJ16
11	Power Station Design, Construction and Environmental Control	3	—	GF23
12	Project Programming	1	—	GF24
13	Training in Association with Manufacturers of Power Plant	4	—	GF12
14	Production, Inspection and Test	—	4	GOJ17
15	Contract and Financial Control	1	—	GF25
16	Power Station Planning	—	4	GOJ18
17	Power Station Design	—	6	GOJ19
18	Project Work in Power Plant Engineering	—	8–12	GOJ10
19	Site Construction Work	—	12	GOJ20
	Totals	21	48–52	

stage II training generation (development and construction)

		Time (weeks)		Syllabus Code
		Formal	On-job	
1	Project Management and Station Design		14	GDOT5
2	Plant Construction (Mechanical, Electrical or Control and Instrumentation)		14	GDOT6
3	Plant Engineering		14	GDOT7
4	Introduction to Management	2		GF14
	Totals	2	14	

(see paragraph 8 of appendix I)

stage I training
transmission

		Time (weeks)		Syllabus Code
		Formal	On-job	
1	Introduction to Work Study	1	—	GF10
2	Computer Applications	1	—	GF7
3	Work Planning, Costing and Control	2	—	GF11
4	Electrical Protection Systems	1	—	GF9
5	Telecommunications Systems	1	—	GF18
6	Engineering and Work Planning Aspects of Power System Operation and Maintenance	—	14	GOJ11
7	Measurements Equipment	1	—	GF19
8	Measurements	—	4	GOJ12
9	Power System Design and Construction	2	—	GF20
10	Protection and Telecommunications Applications	2	—	GF21
11	Transmission Construction	—	6	GOJ13
12	Distribution Engineering	2	—	GF22
13	Power System Engineering	—	8	GOJ14
14	Project in Power System Engineering	—	8–12	GOJ15
15	System Operation	—	3	GOJ7
16	Training in Association with Manufacturers of Power Plant	4	—	GF12
	Totals	17	43–47	

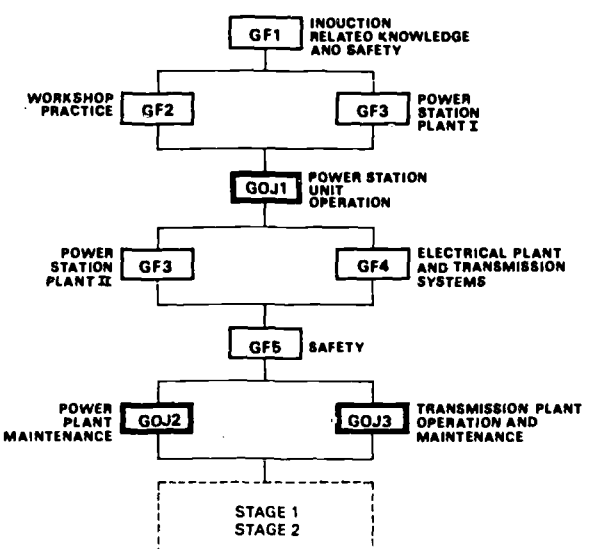
stage II training
transmission

		Time (weeks)		Syllabus Code
		Formal	*On-job*	
1	Directed Objective Training in Transmission	—	14	GDOT4
2	Introduction to Management	2	—	GF14
	Totals	2	14	

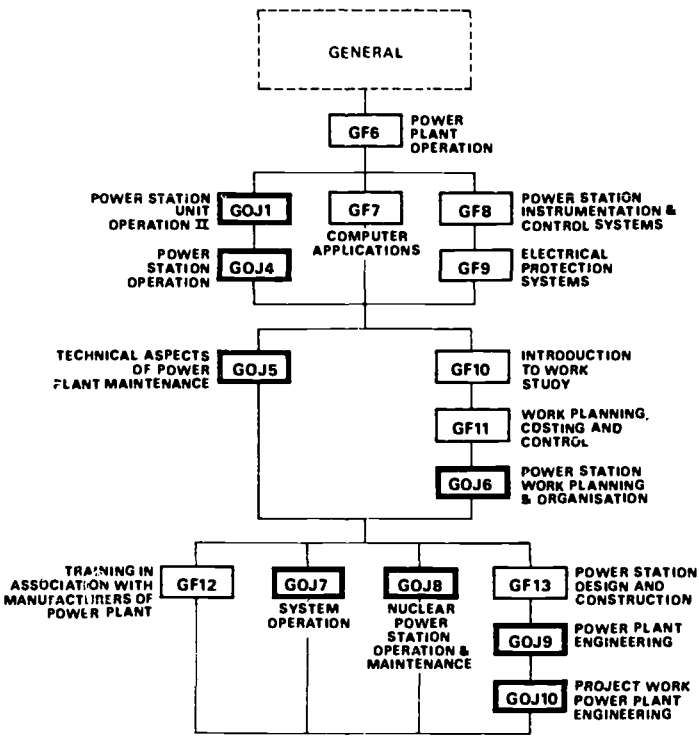
sequence of training components generation

(operation and maintenance)

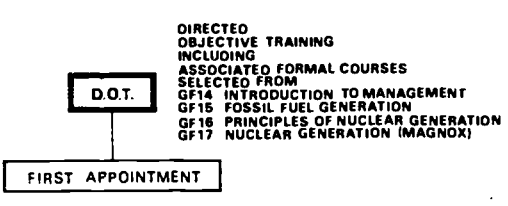
general



stage I



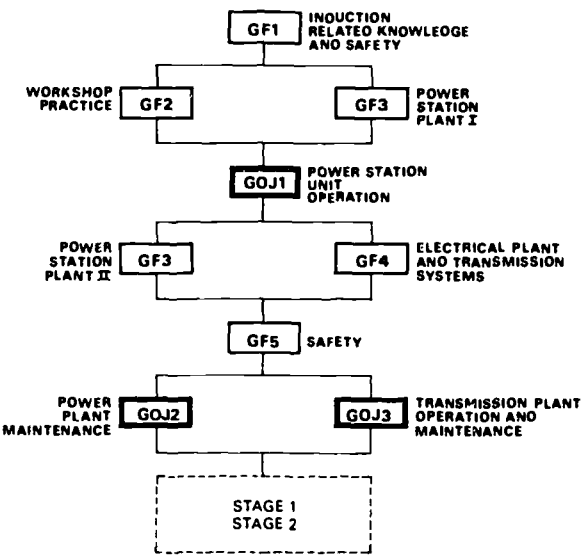
stage II



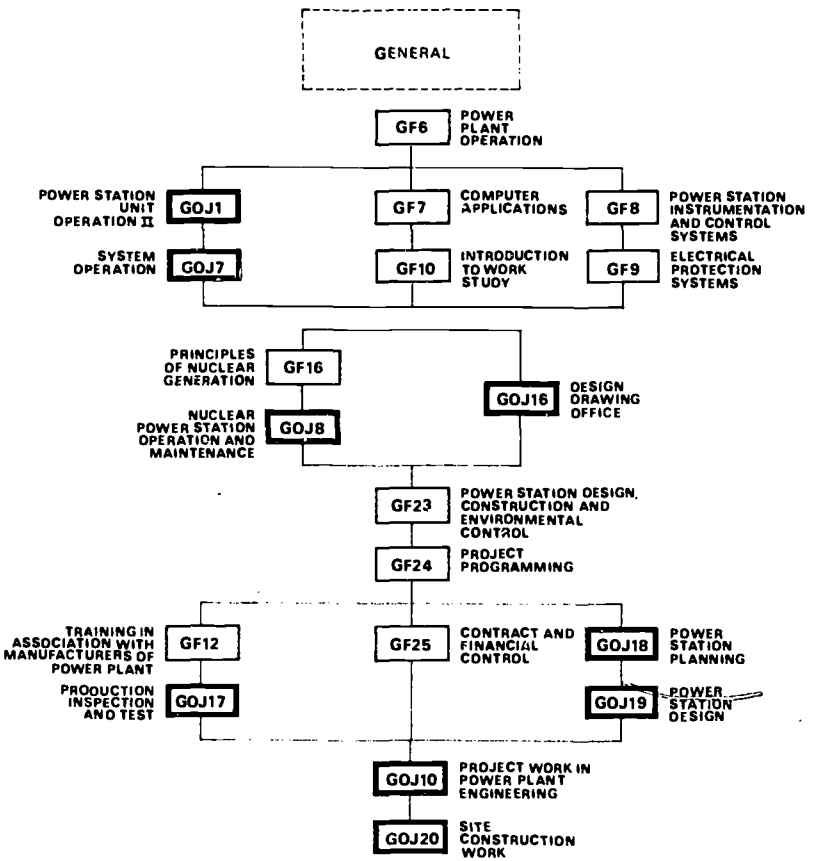
sequence of training components generation

(development and construction)

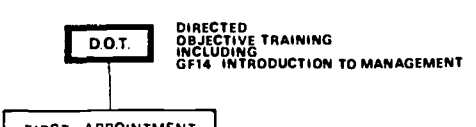
general



stage I

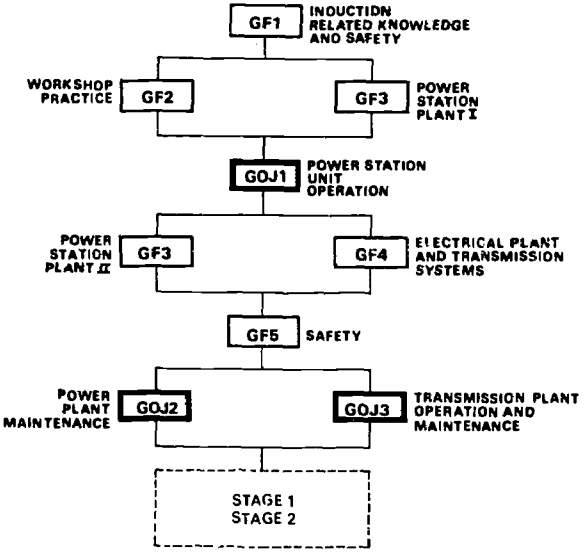


stage II

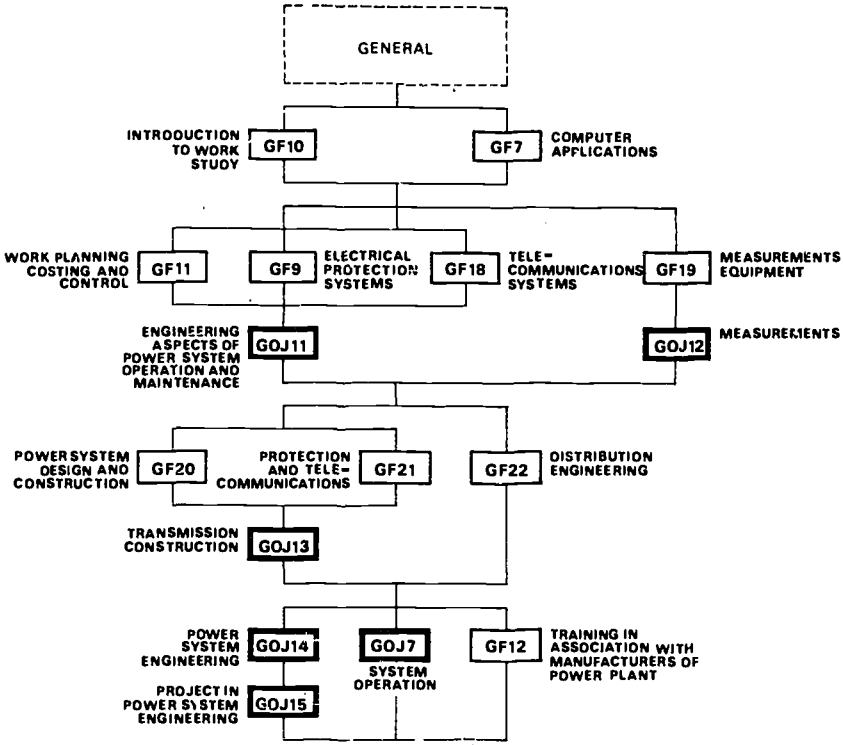


sequence of training components transmission

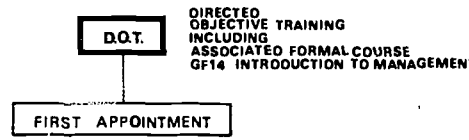
general



stage I



stage II



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