

POWER GRID COMPANY OF BANGLADESH LTD.



SAFETY MANUAL

	DESIGNATION	SIGNATURE	
PREPARED BY	Deputy General Manager, TSS		
REVIEWED BY	General Manager, Transmission-1		
APPROVED BY	Director Technical		
Document No:	QD-TSS-01	Revision No.: 00	Effective Date: 01/07/06

Foreword

Among our many common needs and goals are the safety and well-being of ourselves, our fellow employees, and the continuing success of our organization, Power Grid Co. of Bangladesh Ltd. (PGCB). To these ends - minimizing human suffering and economic waste-this Safety Manual is dedicated.

The material contained is based on experience of many years achieved by the parent organization BPDB and particularly by the transmission sector and some other Major Electricity utilities of the world in low, high and extra high voltage power system. Incorporated here additional information's and new themes from documents and the Accident Prevention Manual of BPA, (USA) gathered through the Managing Director, PGCB.

The mandatory rules herein express minimum requirements for dealing with the principal hazards inherent in our daily work activities. These and other written requirements neither can nor should provide complete coverage of all work situations. These must be continually reinforced through the sound and nature safety judgments of all workers on each assigned task.

The Safety Manual is divided into two distinct sections:

1. Operating Codes (abb. OC).
2. Safety Practices (abb. SP).

Others are grouped as Miscellaneous. For added awareness, more important things are marked separately. In this time of globalization, PGCB is destined to synchronise its activities with that of rest of the world. To achieve that goal and to make our work force resource personnel and real Professional Engineers, acquaintance with and compliance of national as well as international Safety rules & regulations contained in this Safely Manual would be a binding for us.

Contents

		Page	
GENERAL PROVISIONS		4	
SAFETY COMMITTEE ORGANIZATION CHART		5	
PART-I: OPERATING CODES		6	
Chapter			
	01	Departmental Regulations.	7
	02	Instruction and Standards.	10
	03	Safe Working Practices - General	12
	04	Safe Working Practices Specific Groups.	19
	05	Fire Protection.	23
	06	Division of Responsibility	27
	07	Grounding (Earthing.)	31
	08	Clearing Apparatus for work.	33
	09	HOLD ORDER System.	35
	10	Placing Apparatus in Service	46
	11	Switching	48
	12	Work on Circuit Breaker	51
PART-II: SAFETY PRACTICES			
Chapter			
	01	General Safety Precautions	55
	02	MAD-Minimum Access Distance.	56
	03	Switching	56
	04	Grounding (Earthing	57
	05	Permits-to-Work and Test.	58
	06	Work in sub-stations and switching Stations	59
	07	Work on High Voltage Apparatus	60
	08	Work on Metal-Clad Switchgear Spouts	61
	09	Work on High Voltage Cables and conduits.	62
	10	Testing of High Voltage Apparatus.	65
	11	Insulators on Live Lines-Testing/Washing	65
	12	Preparation for Work on High Voltage Apparatus Containing / Operated by Compressed Air	66
	13	Work in High Voltage equipment Containing (SF ₆) Gas	66
	14	Safety Rules for Work on Medium and Low Voltage Apparatus, Conductors Equipment	67
	15	Safety Rules for Live line Working.	68
	16	Fire protection Equipment and its Auto Control	69

PART –III:	Miscellaneous		
	A	Safety Committee.	71
	B	Treatment for Electric Shock.	75
	C	Reporting on Accident	80
PART- IV:	Cautions Notices/Tags.		82~86
Glossary of special terms			88

General Provisions

1. Duties.

- 1) It is the duty of all persons, who may be concerned with the operation and work of Power Grid Co. of Bangladesh Ltd (PGCB) systems and apparatus, to make themselves thoroughly conversant with the Statutory Requirements and Safety Rules governing any work they may have to undertake on these systems and apparatus, **IGNORANCE TO THE STATUTORY REQUIREMENTS AND RULES WILL NOT BE ACCEPTED AS AN EXCUSE FOR NEGLECT OF DUTY.**
- 2) All persons working on electrical plant should be familiar with the methods of artificial respiration described in part 'Miscellaneous' and practice the same at annual interval.

2. Statutory Regulations and Factories Act.

PGCB is required to comply with the provisions of

- 1) The Electricity Act, 1910 (Act No. ix of 1910)
- 2) The Electricity Rules 1937 and amendments thereof.
- (3) Official Secrets Act (Act No. Ax of 1923)
- 4) The Factories Act 1965 and amendments thereof.

It is the duty of PGCB and contractors to comply with the duty of agent's workmen and persons employed in connections with transmission and use of electrical energy to conduct their work in accordance with the Act and these Regulations. A copy of the Regulations shall be kept posted in each attended substation in the occupation of PGCB.

3. Official Forms.

Forms and documents shall be kept posted, made available for inspection or issued

4. Issue of Safety Rules.

A copy of the appropriate Safety rules shall be given to such employees of PGCB as may be concerned with the operation of, work on, their systems and plant, **EACH EMPLOYEE SHALL SIGN A RECEIPT FOR HIS COPY, WHICH SHOULD BE KEPT IN GOOD CONDITION.** Copies of these Rules shall be available for sub-stations, switching stations and control rooms of PGCB.

5. Failure of Supply.

A failure of supply, from whatever cause, to or from any part of the high voltage systems shall be immediately reported to the Control Engineer. During failures of supply all apparatus, equipment and conductors shall be regarded as being LIVE until isolated.

6. Severe Occurrences and Accidents.

All severe occurrence and electrical accidents on PGCB systems shall be reported immediately to the Control engineer. All dangerous accidents shall be reported in accordance with the PGCB standing instructions.

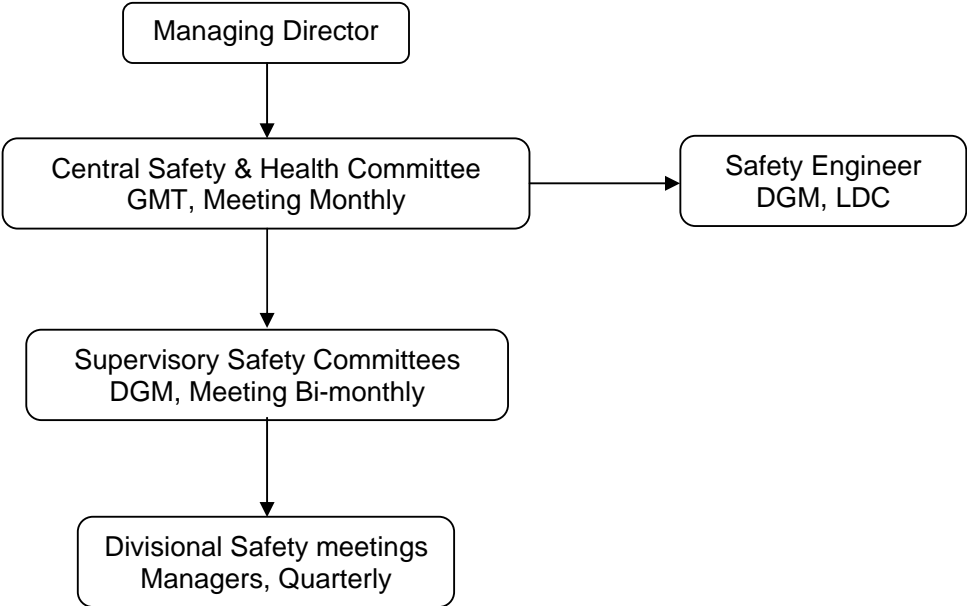
7. Admittance to Sub-Stations.

No person other than Electrical inspector duly appointed by the Govt. of Bangladesh, Persons on duty roster and supervisor with authority shall enter any transforming or switching station permits belonging to, or wholly under the control of PGCB unless in possession of an official pass. Visitors other than contractor/consultants shall be allowed entry only when accompanied by authorized person possessing official pass.

8. Variation of Rules.

In exceptional circumstances the PGCB Rules may vary to such extent as may be authorized in writing by the Safety Engineer of the Company.

SAFETY COMMITTEE ORGANOGRAM



Part-I
OPERATING CODES

Operating Codes

CHAPTER- 01

Departmental Regulations

SECTION 01A. Regulations

01A.01 When personnel from other Departments or outside companies are working in or around properties administered by the PGCB, they shall also be subjected to these Regulations.

01A.02 All employees when on off duty, except in case of sickness, are subject to call whenever the necessity arises.

01A.03 In emergencies, or whenever needed, employees are required to render all possible assistance and remain prepared to work overtime if necessary.

01A.04 Employees on leave of any kind must inform their superiors of their addresses & Telephone No. or such information as will assist locating them readily. Whenever an employee goes on leave his leave address should be put in his leave application.

01A.05 When an employee is unable to work because of sickness, accident or other reason he must take steps to notify his supervisor at the earliest opportunity. He must at the same time advise when he expects to report for duty.

01A.06 Smoking while on duty is discouraged. Smoking, where prohibited & marked as 'No Smoking Area', may result in disciplinary action.

01A.07 The possession, conveyance or use of intoxicating liquors or narcotics while on duty is prohibited.

01A.08 It is prohibited to hold all kinds (not only social) of gatherings in locations near control room, rooms containing live apparatus or high voltage equipment.

01A.09 Any employee reporting for duty or found on duty in an intoxicated condition will be subjected to immediate disciplinary action.

01A.10 Sleeping on duty is not tolerated. Offenders may be severely penalized.

01A.11 Employees on duty are not permitted to be interviewed by agents or solicitors other than those authorized by the PGCB.

01A.12 Any employee must report in person, time of arrival on the job and time of departure from the job in accordance with the established local procedure.

01A.13 Every effort must be made by all employees to prove the cause of occurrence of accidents, service interruptions, operating mistakes or damage to equipment. In case where incident of this nature have occurred, employees are required to submit an immediate and accurate report of the entire occurrence to their immediate superior.

Incidents which did not but might have caused injury to personnel, interruptions to service or damage to equipment, must be reported without delay and in the same detailed manner.

Any intentional concealment of facts, changing of records or other form of deliberate false reporting, may result in disciplinary action which may lead to dismissal.

01A.14 Employee's lockers must be kept clean and orderly and will be subjected to periodic inspection by the supervisor in charge. Lunch boxes must be kept in lockers or otherwise out of sight when not in use.

01A.15 Employee must not furnish information concerning accidents or troubles to non-employees or the press unless authorized to do so by a supervisor in charge or as required by law. All inquiries in such matters should be directed to the Supervisor in charge.

01A.16 Photographs may be taken within PGCB premises only after obtaining authorization from the competent authority.

01A.17 Employees should notify their immediate supervisor of any theft as well as any trespass or encroachment of PGCB property.

01A.18 PGCB employees while working on consumer premises will be required to observe all regulations established by the consumers. This would refer specially to access to property, smoking regulations, and safety rules, PGCB employees are required to advise the consumer.

01A.19 Approved standards, design and methods must be followed and it should be the responsibility of the officer in charge to ensure.

SECTION 01B Co-operation and Courtesy

01B.01 Co-operation is necessary among employees of the Organization as well as between employees and consumers. Personal disliking, prejudice or jealousy must not be allowed to interfere in co-operation on the job.

01B.02 Employees must be courteous and considerate at all times in their dealings with one another. They must be courteous, specially, during telephone conversations.

01 B.03 Employees must remember that in their dealings with consumers, visitors or the public in general, they represent the PGCB and that a courteous manner leaves a lasting and desirable impression.

SECTION 01C Visitors

01C.01 Unauthorized persons coming into a Sub-station are to be met by the operator-in-charge or someone delegated by him and politely referred to the proper person for permission to visit the station. In all cases, visitors, whether PGCB employees or not, must be asked to sign the visitor's book There will be one visitors room in each substation.

01 C.02 Visitors should be treated as guests of PGCB and every courtesy is to be shown by all employees who may come into contact with them.

01C.03 Except in special cases, visiting hours will be from 10:00 A. M. to 2:00 P. M. (daily) Saturday to Thursday.

01C.04 It is the duty of the operator-in-charge to see that visitors, whether PGCB employees or not, are not allowed in the control room or in dangerous sections during trouble or times of stress. It will further be his duty to see that visitors are not allowed to approach dangerous areas, or in any way interfere with operation, and he must take such steps as may be necessary in his judgment to carry out these instructions. Before occurrence of emergencies visitors already inside should be escorted to the visitor's room and be requested to wait till the emergency is over.

011C.05 During emergencies such as wartime, riots, serious plant troubles, epidemics and periods of labour unrest, all usual visitor privileges shall be cancelled for an indefinite period. Under such conditions no person is to be admitted without first producing a valid pass or proving his identity, as an employee. Any special instructions issued on such occasions must be strictly observed.

SECTION 01D Communication System

01D.01 Priority use of all communication channels will be accorded to PGCB personnel as follows-

- 1) Operators
- 2) Others

Politeness and courtesy are of the utmost importance among employees and between the employees and the public whenever use is made of any communication channel.

01D.02 Telephones installed in the stations and offices of PGCB are placed there primarily for transacting PGCB'S business. All telephones as carrier, wireless/VHF/LIHF are reserved for operation purpose only.

01D.03 Telephone must not be used for prolonged or frequent personal conversations. Employees using the telephone system for private long distance calls must make every effort to charge the call to their own personal telephone number or failing this they must notify the person in charge any pay for such calls within 48 hours after receipt of the account. All personal call must be recorded in a register to be kept for the purpose-All personal calls can only be made with the permission of station in charge/operator in charge. Any telephone with an unlisted number is not to be used for personal calls at any time except in extreme emergencies.

01D.04 Objectionable language in any form must not be used when employing any communication channel. THIS IS IMPORTANT.

CHAPTER-02

Instructions And Standards

SECTION 02 Standing instructions

02A.01 The General Regulations form the Standing Instructions of the PGCB. These Regulations must be observed by all employees especially by those of the plant, HV Substations and transmission, System Operations and Load Despatch Centre. Ignorance of these instructions will not be accepted as an excuse for noncompliance.

02B Current Instruction

02B.01 Current Instructions consist of: Standard Instructions (White Form), Standard Operating Instructions (Pink Form), Local Operating Instructions (Yellow Form) and miscellaneous written orders.

02B.02 Standard Instructions are issued from the Company and deal with policies on personnel and other subjects of general concern. They are signed by the Departmental head or other senior official.

02B.03 Standard Operating Instructions are issued by the System Operation and Load Dispatch Centre and deal with restoration of service and routine or special operating conditions.

02B.04 Local Operating Instructions are issued and signed by the station or Divisional Officer and cover operating matters which apply to and concern only the local station or his jurisdiction.

02B.05 Operating orders are signed and issued by supervisors of stations to operators-in-charge of Stations and deal with local matters of loading, switching, shutdowns, limitations and similar items.

02B.06 All Operating Instructions and operating orders must be read immediately on receipt, by all persons affected and initialed to signify that these orders of instructions have been read and understood.

02B.07 All Operating Instructions are to be kept in separate binders at each office head quarter and the station concerned. They must readily be available for reference.

02B.08 Shutdown Arrangement Forms should be used to detail unusual switching procedures.

02B.09 Employees will be periodically examined as to their knowledge of all instructions as they apply to their respective duties.

SECTION 02C Standards

02C.01 PGCB Standards committee comprised of members from appropriate departments of PGCB. The Standard committee has the responsibility to control the issue of information concerning materials, principles of design, and preferred methods of work for use within the PGCB.

02C.02 Approved Standards, as they are issued, will be made available for the use of supervisory staff and other key personnel throughout PGCB. These standards are to be used as a guide for the supply of materials, principles of design as well as construction and maintenance methods.

02C.03 It's the duty of the officer incharge to make sure that personnel under his jurisdiction are familiar with the approved standards as they apply to their works.

02C.04 A post of Safety Engineer not below the rank of DGM should be created & posted under the Chief Executive of PGCB, for proper implementation of the general regulation and standard operating code.

SECTION 02D RIGHT OF WAYS

02D.01 Right of ways, permits which may be necessary for operation and maintenance of the lines (Transmission) should be obtained by PGCB with the assistance of the Magistrate. (The electricity Act 1910 Articles 18 clause 3 and Electricity Rules 1937 and amendments thereof as reference).

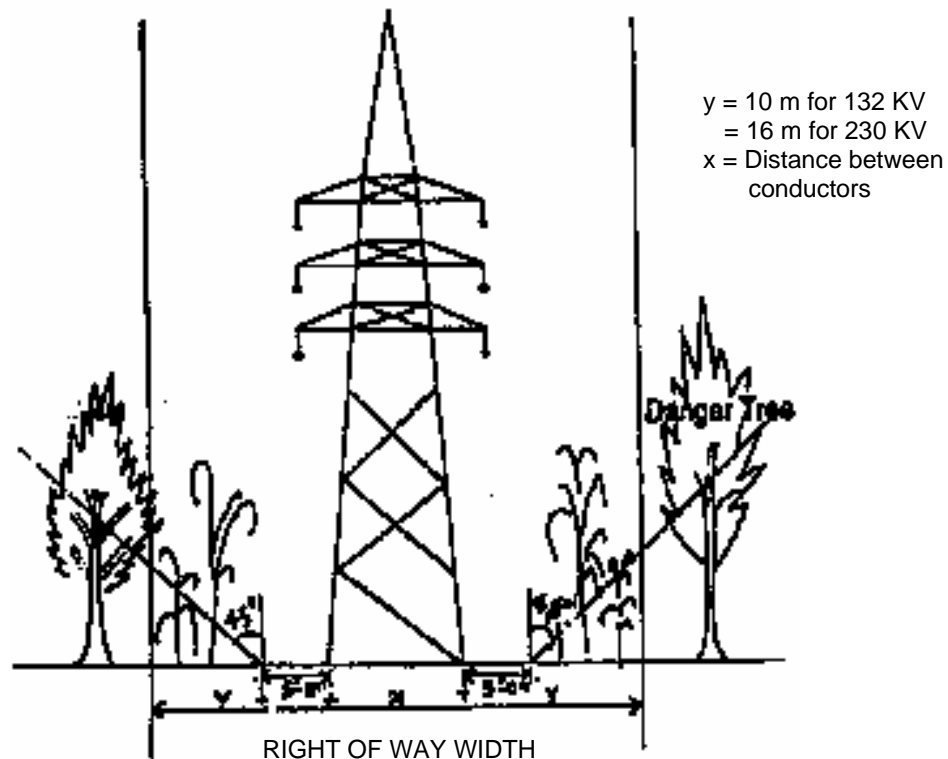
02D.02 All laws, ordinance and requirements of the Republic and local governing bodies, utilities and railways should be complied with in obtaining these documents & should be kept in a permanent file.

SECTION 02E Danger Trees

02E.01 In approximately level terrain trees which would reach within 5 ft (1.524m) of a point underneath the outside conductor are examples of danger trees.

As directed by the Engineer portions of the right of way must be cut so that stumps will not prevent the passage of tractors and trucks along the right of way.

Sketch below indicating danger trees along side, of right of way which should be removed or topped. Permission to do so must first be secured.



CHAPTER-03

Safe Working Practices General

SECTION 03 A. General Rules

03A.01 Every employee must exercise care in the performance of his duties to ensure maximum safety for himself, his fellow employees and the Public.

NO MATTER WHAT WORK IS TO BE PERFORMED, THE FIRST CONSIDERATION MUST BE THE SAFETY OF THE MEN.

03A.02 Horseplay or practical joking will not be tolerated. Any violation of this rule will be treated as a serious offence.

03A.03 Where any work is being carried out which might create a hazard to other employees or to the public, suitable and clearly visible barriers must be installed and, if necessary, an employee stationed as a watchman to provide additional protection.

03A.04 It is the duty of every employee to report to his foreman or immediate superior any unnecessary risk or hazard which exists in the area. Where an immediate hazard exists, he should warn his co-workers of the danger.

03A.05 Two or more employees must be present when an element of danger exists in the work being performed. All precautions must be taken to safeguard the employee.

03A.06 It is the right of every employee to be protected, and he may request any extra protection in methods, additional temporary grounds, equipment or time which in his opinion, is required. If the man in charge is undecided as to the reasonableness of the employee's request for extra protection, he should grant the extra protection, or obtain instructions from his supervisor.

03A.07 When any employee considers himself unqualified, to undertake a job, or believes his interactions will result in danger to himself or his fellow employees or damage to apparatus, he must so advise his immediate supervisor,

03A.08 Personnel must not approach the vicinity of live lines or equipment, unless their duties require them to do so.

03A.09 No employee shall touch or interfere with any electrical conductors or electrical apparatus unless under direct orders from the supervisor in charge.

03A.10 Employee must not use equipment with which they are unfamiliar.

03A.11 The fore man should know at all times the location and nature of all the work being done by his men.

03A.12 Be neat in your work. Do not leave loose materials lying around. Tools, plants, ropes, wires etc., must always be picked up and stored. The job is not complete until this is done. Good housekeeping and safety go together.

03A.13 Stations and Divisional officer must see that the home and office telephone numbers of the following parties are readily available in all control rooms and other central points.

- ❖ Local Fire Brigade
- ❖ Station Security Chief
- ❖ All Local Supervisory Staff
- ❖ Local Hospitals
- ❖ Local Police Station
- ❖ DGM.
- ❖ PGCB head Office.
- ❖ LDC

03A.14 DGM'S are required to see that Work Council or Safety meetings are held regularly, when possible. Prior to undertaking any new project, a special meeting is to be held with those immediately concerned to outline the scope of the project and unusual circumstances and/or special precautions which may be necessary. Meetings should be held after each total or serious accident and the reasons should be analyzed.

03A.15 Nails or other projecting objects, which may endanger employees or other, must be removed or rendered harmless.

03A.16 Hatchways, pits, manholes etc, must be guarded or roped off when the covers have been removed.

03A.17 Compressed air must never be used for cleaning or dusting clothing. When using compressed air, or working in the vicinity of compressed air equipment, extreme care must be exercised that an air jet is not directed towards anyone's body. Fatal accidents have occurred as a result of carelessness when using compressed air. Horseplay with compressed air is strictly forbidden.

03A.18 When using hot lead or solder, safety goggles must be, and every precaution should be taken to prevent spattering. Workmen should not place a cold wet ladle in hot lead or solder, nor pour it on a moist or wet surface. When soldering is being done at a height, care must be taken to prevent solder from falling on persons or equipment below. Safety goggles must also be worn while doing any welding/cutting job.

03A.19 Care must be exercised in handling gasoline and other flammable liquids, When handling such liquid, exposed flames and sources of static electricity such as belt drives, must be avoided. Fumes given off, even in small proportions, can produce a most dangerous explosion.

03A.20 When men are working above or around deep water, a serviceable lifebuoy and /or boat must be available in the immediate area. Life jackets are to be worn where practicable.

03A.21 A diver must always be attended by at least two other employees. The pump supplying air to divers must be kept in good condition at all times.

SECTION 03B Vehicle Operation

03B.01 Employees authorized to operate PGCB vehicles must be familiar with all traffic laws which apply in the territory where the employees drive, and the rules outlined in PGCB instructions.

03B.02 All drivers of PGCB vehicles will be subjected to a 'Driver's test' before being authorized to drive and as frequently thereafter as required.

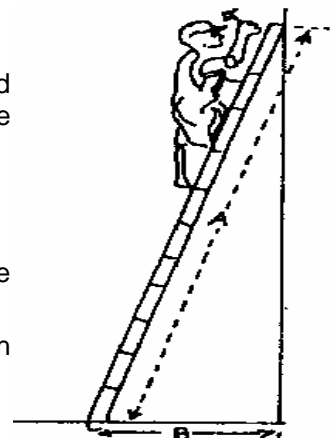
03B.03 Vehicles drivers shall operate vehicles in a safe and courteous manner in order to prevent injury to themselves and others, and to maintain good public relations.

03B.04 Before driving any vehicle, the driver is to make sure the vehicle is in good operating condition.

SECTION 03C Ladders

03C.01 Ladders must be equipped with ladder shoes and must be secured against slipping by at least one of the following methods:

1. Tying or fastening top and bottom.
2. Cross board or hooks, at the top of the rails.
3. In certain instances it may be sufficient to have the bottom or the ladder held by another employee.
4. Types of ladders to be used should be specified with insulation class.



03C.02 The slope of a ladder in use is very important. Straight portable ladders shall be placed at a safe angle to prevent breaking or slipping. The best angle for ladders is about 75 degrees with the horizontal.

The distance "B" should be about one-fourth the ladder length "A". In other words, place the base of the 12-foot ladder 3 feet from the object it leans against. Employees shall face ladders when ascending or descending them and shall have both hands free for use on either rungs or rails.

03C.03 The hoisting rope of extension ladders must be tied in such a manner as to prevent collapse of the ladder in the event that the rung supporting the hook breaks.

03C.04 Ladders must be kept in first class condition and before use, must be inspected for unsound rungs, cracks and splinters in the side rails.

03C.05 Ladders with metal reinforcement must not be used on any work around electric circuits or equipment, and they must not be allowed on PGCB'S property.

03C.06 Care should be exercised in selecting a ladder to make sure it has a suitable length for the particular work involved. Ladders must not be used as a scaffold or platform support.

03C.07 Ladders should be hung vertically for storage. When this is not possible and they are stored in the horizontal position they should be properly supported at intervals to prevent sagging. When not in use they should be protected from the weather.

SECTION 03D Elevated Structures.

03D.01 Any employees required to work on elevated supports such as ladders, scaffolds, **bo sun chairs** etc., must first inspect such support and make they will withstand the strain to which they may be properly subjected. Material must not be allowed to accumulate on such supports. Overloading of such support must be prevented during the progress of the work.

03D.02 Safety belts or harnesses with rope must be used when working on elevated structures, roof, girders, sloping roofs, river crossing carriages, dams or other places where a slip could lead to a serious accident.

03D.03 When working in elevated positions, tools and materials must be so secured that they cannot fall accidentally.

03D.04 Built-up scaffolding must conform to the Bangladesh Building code. Great care must be used in the moving and erection of metal or scaffoldings over two meters in height must have a guard rail 90 cm. high. Overloading must be prevented.

SECTION 03E Trench Excavation

03E.01 When men are required to work in an excavation in soil over 1.5 meter deep and when the depth is greater than the width, shoring is required to prevent killing.

03E.02 Whenever one or more men are working in excavation which exceed two meters in depth, at least one man shall be in attendance outside of the excavation to render assistance in case of need and a ladder must be provided as a means of exit.

03E.03 Material shall not be stored nor vehicles allowed to approach within 1.5 meter from the edge of the trench so that stability of the walls of the trench will not be endangered by vibration.

SECTION 03F Personal and Protective Clothing and Equipment.

03F.01 Finger rings of any kind should not be worn by employees engaged in manual work.

03F.02 Loose clothing must not be worn when work in around moving machinery. A one-piece overall suit is most suitable.

03F.03 Heavy shoes preferably safety shoes, should be worn when operating power lawn movers and when handling heavy material and equipment. Light or sloppy footwear

must not be worn on the job. All rubber boots worn on the job are to be of the safety toe type.

03F.04 Safety hats must be worn by all employees whenever danger from falling tools or other material exists and in all cases when so stipulated by the supervisor in charge.

03F.05 Suitable goggles, guards or shields must be worn by employees while engaged in chipping, spray or overhead painting, grinding, sandblasting, handling of acid or caustic solutions and at all times when there is any likelihood of eye damage from foreign particles, dangerous heat or light rays.

03F.06 Welding goggles or hand shields must be used when doing any electrical welding, gas welding, or acetylene torch work and suitable screens must be placed around the work for the protection of others. A fire extinguisher must be within reach of the welder whenever welding is being carried out.

03F.07 When work involving the use of safety belts is contemplated, no work is to commence until they safety belts of all employees

03F.08 Hand gloves should be worn when doing any electrical works.

SECTION 03G TOOLS AND EQUIPMENT.

03G.01 All tools, equipment and clothing of a workman shall be subject to inspection at any time and if any article is deemed unsafe by the controlling officer or supervisory personnel, its use be discontinued until repaired or replaced.

03G.02 Any tools or equipment and edged tools must be properly protected or stored when not in use.

03G.03 Metallic tapes, metal rules or metal edged rules, are prohibited for general use in generating stations, sub-stations or around any electrical apparatus, When the use of such tools is absolutely necessary they may be used but only with the permission of the work must be carried out under the direct supervision of the supervisor.

03G.04 When a machine or apparatus is equipped with guards and it becomes necessary to remove such guards for maintenance work on the machine itself, the guards must be replaced immediately the work is finished.

03G.05 Two or more men must be employed when carrying long pieces of material such as pipes, hand bars scaffolding, ladders, etc. near switchboard, panels or any live electrical conductor or apparatus so as to eliminate any chance of accidental jarring of relay panels or contact with live Parts. Minimum length requiring these precautions may vary from 1.5 meter to 3 depending on the place of work.

03G.06 Portable lights must be equipped with proper guards and care must be taken to see that guards, lamps plugs and sockets and wires are not defective.

03G.07 Flashlights normally used inside sub-station buildings generating stations must be fully insulated and made of a nonconducting material. In special cases such as line work or outdoor bus inspection a metallic type or higher power portable light may be used.

03G.08 Any electrical apparatus such as small motors, power tools, lamp cords or extension lights which are in an unsafe condition are not to be used.

03G.09 The sides of emery wheels are not to be used unless they are designed for such work and are properly equipped with washers and guards. When changing grinder wheels, the rated r.p.m. of the wheel must correspond with the rated rpm of the tool.

SECTION 03H Switch sticks, Earth sticks and buzz Sticks.

03H.01 Sticks must be of an approved design and inspected before use. Defective sticks must be tagged "Out of order" and reported on a station trouble Report for immediate repairs.

03H.02 Sticks must be stored indoors or in a weatherproof covering outdoors. They must be hung vertically or supported horizontally throughout their entire length. They must have free air space to neighboring walls and must never be left on the floor or ground.

03H.03 Switch sticks, Ground sticks & Buzz sticks should be periodically tested and repaired or replaced if found bad. A duplicate of each type of switch stick must be kept available in the station in case of breakage.

SECTION 03J Wire Ropes/Fibre Ropes

03J.01 Wire rope has almost superseded fiber rope and chains for hoisting and haulage purposes. The type of wire rope to use depends upon the intended use and the degree of flexibility desired.

1. Standard Wire Hoisting Rope consists of 6 by 19 wire strands and a fiber core; made of iron, cast steel, mild plow steel, plow steel, or special plow steel. The breaking strength of standard wire hoisting rope, in tons, is shown in the following tabulation. (The breaking strength may be divided by the factor of safety to obtain the safe load). Safety factor is the ratio of ultimate strength of rope to the safe working load.

Diameter in mm (inches)	Weight per meter in KG	Breaking strength (tons) plow steel
6.35(1/4)	0.148	2.5
9.52(3/8)	0.342	5.5
12.70(1/2)	0.595	9.4
15.87(5/8)	0.937	14.4
19-05(3/4)	1.340	20.6
22.22(7/8)	2.380	28.0
25.40 (1)		36.5

2. Extra-Flexible Wire Hoisting Rope for use with smaller sheaves and drums such as usually found in hoists and derricks, consists of 8 by 19 wire stands and one fiber core. The breaking strength of this rope is approximately 90 percent of the strength of the standard wire hoisting rope given in the preceding tabulation.

3. Special-Flexible Wire Hoisting Rope consists of 6 by 37 wire stands and one fiber core. it is extremely flexible and is specially adapted to high-speed service on cranes or where sheaves are small. The breaking strength is approximately the same as that of standard wire hoisting rope.

Minimum Factors of Safety for Wire rope

Slings	8
Derricks, Cranes	6
Tow Ropes	4

03J.02 Wire ropes are permanently weakened if they are stressed when kinked. To uncoil new wire rope from a reel, the reel should be placed on a spindle and the rope unwound by pulling it out in a straight line.

03J.03 Wire ropes should not be bent around corners when attaching them to a load. Thimbles should always be used when a loop is formed at the end of a wire rope. Lubrication of a wire rope is important.

03J.04 WHEN TO DISCARD WIRE ROPE

6.1 Wire ropes shall be inspected at the time of installation and once each week thereafter, when in use and should be removed from hoisting or load-carrying service when any one of the following conditions exists:

1. When three broken wires are found in one strand of 6 by 7 wire rope.
2. When marked corrosion appears.
3. When wire rope has been idle for 3 months or more and subject to water, moisture, dampness etc. shall be removed from hoisting or load-carrying service.

4. Any wire rope shall be removed from load-carrying service when the number of broken wires found in more than one strand strands amount to more than 4 percent.

03J.05 Fiber ropes are made principally of manila fiber, sisal fiber, and hemp. Constant care and frequent inspection are imperative in the use of rope as the interior fibers may be broken or ground to powder, while the exterior fibers may indicate that the rope is worn but little.

1. Pure manila rope is the strongest and most reliable of the fiber ropes and should be used wherever high tensile strength is required. New manila rope is hard but pliant. It is of yellowish color with a silvery or pearlish luster and has a silky feel when drawn through the hand

2. The breaking strength, working strength. and weight of standard manila rope (3 strand) with safety factor equal to 5 is shown in the following tabulation:

Diameter in mm (inches)	Weight per meter in KG	Strength Breaking KG
6.35(1/4)	0.020	600
12.70(1/2)	0.075	2,650
19.05(3/4)	0.167	5,400
25.04(1.0)	0.270	9,000
31.75(1 1/4)	0.418	13,500
38.10(1 1/2)	0.600	18,500
50.80 (2)	1.080	3,100

03J.06 When a table of strength is not available, an approximation of the working strength of rope may be obtained by squaring the numerator of the diameter in eighths and multiplying by 20. This gives strengths somewhat lower than those given in the table.

1. Sisal rope has about 60 to 70 percent of the strength of manila rope. Good grade sisal rope is yellowish-white, sometimes with a greenish tint,

2. Hemp rope is nearly as strong as manila, and is slightly more resistant to atmospheric deterioration. It is of a dark gray colour and is much softer than manila rope.

03J.07 Wet rope deteriorates rapidly unless dried properly. All fiber ropes are easily damaged by acids and care must be exercised to prevent rope coming in contact with acid.

SECTION 03K Signs and Designations.

03K.01 All equipment, electrical or otherwise, involved in the operation of the system, is to be marked with its proper name and/or number for the purpose of identification.

03K.02 The supervisory staff at every location must make sure that adequate signs and designations kits at all control points for disconnecting switches and that these signs and designations are in accordance with station standards. In particular, attention should be given to adequate designation for switches in cubicles or where two or more control handles are operated from the same switching platform. When switches are mounted in cubicles, designation is required both inside and outside of the cubicle. In case of switch cubicles feeder designations should be clearly written in bold letters both in front and back of the cubicles.

03K.03 Each protection and all lines and switches on relay panels, control panels, and in junction boxes etc. are to be properly identified. This includes current and potential circuits.

03K.04 In the case of air, and water suppliers all valves shall be identified and storage tanks shall be marked with the name of their contents as well as the capacity and /or pressure of each.

03K.05 When people are working on any cable or line fed by any cubicle, caution notices like "Do Not Operate", "Men working etc. Please see appendix-"B" are put temporary on such cubicles after drawing out/lowering the switch in the cubicles.

SECTION 03L Accidents and First Aid.

03L.01 All employees must be thoroughly familiar with first aid practices.

031L.02 All employees must be familiar with PGCB approved methods of respiration (Please see MISCELLANEOUS).

03L.03 At each attended station, first aid kits must be kept readily accessible and properly maintained at all times. The first aid kits to be used should be in accordance with established standards.

03L.04 All PGCB vehicles must carry first aid kits in accordance with established standards.

331L.05 When working far from a vehicle or station where first aid suppliers are not available, the men must carry a first aid kit. Supervisor is responsible for seeing that the contents of these first aid kits are complete and in good condition.

03L.06 At each station or circle the Manager/ Deputy Manager/ Assistant Manager will appoint employees who will be responsible for seeing that contents of the first aid kits are complete, and in good condition. No change is to be made in the first aid equipment, medicines or methods without authorization.

03L.07 All injuries, no matter how slight, must be treated as soon as possible. All major burns must be treated by a doctor eventually. All eye injuries must be treated by a doctor.

03L.08 Treatment of injuries must be carried out by methods shown in the authorized first Aid Handbook and as pre-scribed by the PGCB instructors.

03L.09 All accidents, however slight, must be reported and the appropriate forms completed in accordance with Standard Instructions. All accidents should be investigated immediately after the occurrence and the causes by identified and reported to the person/committee responsible for updating these regulations/Codes.

03L.10 A fatal or serious accident must be reported immediately, by telephone if possible, to the station or Manager or his assistant, who in turn will see that the proper persons are notified. Field accidents are required under the law to be reported to Govt. of Bangladesh in their prescribed proforma within certain period (Format in MISCELLANEOUS).

CHAPTER 04

Safe Working Practices-Specific Group

SECTION 04A. Special Regulations Concerning Operators

04A.01 The first consideration of an operator must be the operation of the station or division under his care and it must take precedence over any other duties assigned to him except those necessary to protect human life.

NO MATTER WHAT WORK IS TO BE PERFORMED,

THE FIRST CONSIDERATION MUST BE THE SAFETY OF THE MEN.

04A.02 Operators must not interchange shifts unless permission has been obtained from the supervisor-in-charge.

04A.03 Operators must not vacate their posts until arrival of their relived unless authorized to do so by the supervisor-in-charge. Any extended delay in relief should be reported to the supervisor-in-charge.

04A.04 Working more than 12 consecutive hours by prearrangement is forbidden. In any case, a relief must be provided as soon as possible after 12 hours of work.

04A.05 Except when special arrangements have been made, an operator must finish his shift, even though his relief comes in early. In the event of station troubles at the time of shift change, the out-going operator will be in charge and will be responsible until the trouble is over or is sufficiently under control to permit handing over to the incoming operator. Records and reports pertaining to such troubles must be completed before the outgoing operator leaves.

04A.06 When changing a shift, incoming and outgoing operators shall sign a daily form recording the time of the transfer of responsibility. Each operator shall sign in the presence of the other, the incoming operator signing last and recording the time on the form. The transfer shall become effective on being signed by the form. The transfer shall become effective on being signed by the incoming operator and before signing, he must be certain that he is familiar with all existing Conditions. The outgoing operator must make certain that the incoming operator is made familiar with all existing conditions.

04A.07 When there are two operators on duty and one wishes to leave the control room, he must advise the other man place or place he intended route through the station and the particular the operators' protection.

04A.08 During times of stress or unusual conditions the operator-in-charge has the right to call upon any employee for help without prior appeal to the man's supervisor. He must however, advise the supervisor at the first opportunity.

04A.09 At night or at any time when supplementary lighting is required operators must carry an approved electric flashlight or lantern when making their rounds of inspection. These flashlights or lanterns must be inspected by the operator at the beginning of the shift and defective ones reported for immediate repair or exchange.

04A.10 The Operator-in-charge, upon taking shift, must make an inspection of the plant and equipment as soon as possible, and make at least one more inspection during the later half of this shift. This is in addition to the usual rounds of inspection by himself or his subordinates.

04A.11 Any condition of apparatus or equipment which in the opinion of the operator, requires immediate attention or repair is to be reported to the supervisor in charge without delay. If service is likely to be affected, the system operator must also be advised immediately.

04A.12 If, in the opinion of the operator-in-charge, the equipment must be taken out of service immediately to avoid serious damage, the operator is authorized to do so, on his own responsibility.

04A.13 In all cases, the operator-in charge must make out a report covering defective or damaged apparatus or unusual conditions occurring during his shift. When reporting troubles, operators must make a clear distinction between actual fact and personal deductions or conclusions.

SECTION 04B Safe Working Practices Electrical Workers

04B.01 Rubber gloves protected by leather gauntlets are to be used for electrical work only where the possibility of leakage or induction presents a hazard which cannot be eliminated by proper grounding, The use of rubber gloves does not replace the use of proper grounding procedures as laid down in this code.

04B.02 All rubber gloves must be tested by an approved testing station prior to issue and every month thereafter. All gloves considered defective and replacement, accompanied by report as to how the gloves become damaged

04B.03 Employees must never use their fingers to test for live circuits of any voltage. Circuits of less than 250 volts may be tested by lamp or other approved safe testing device. Extreme caution must be taken when testing circuits with portable testing equipment.

04B.04 Men working in or on open transformers must remove all objects from their pockets. All tools must be attached to suitable hand lines so that the tools may be withdrawn if accidentally dropped inside the transformers. Before actually removing manhole covers or bushings from a transformer, all materials and tools must first be removed from the top of the transformer or securely tied. Suitable containers must be provided for the material removed from the transformers, It is the responsibility of the man-in-charge to check that all of these precautions are taken.

04B.05 The use of a blow torch acetylene or any open flame, is absolutely prohibited in or on open transformers, without the approval of the superintendent of the division involved

04B.06 When work must be carried out in switch rooms or confined spaces where exit could be obstructed by fire or other occurrence, adequate fire-fighting apparatus must be kept handy and other employee posted where he can be of assistance in case of an emergency.

04B.07 Only full insulated flashlights or extension lamps are to be used when working behind switchboards, bench boards, relay panels, etc.

04B.08 Particular care must be taken to prevent accidental contact of metallic objects such as key chains, metal pencils, belt buckles, wristwatches, metal zippers, necessary tools, etc. with live wires or terminals.

04B.09 After cutting or disconnecting relay or control circuits, the ends of the wires should be taped or otherwise insulated in order to avoid accidental contact with persons other circuited or ground.

04B.10 When working on current transformer secondary circuits for test or removal of instrument, etc. current transformers must be short circuited between the transformer and the location of any work to be done. In no case, should a live current transformer be allowed to become open circuits on the secondary side.

04B.11 The use of blowtorches and open flames should be avoided behind or under switchboards or relay panels,

04B.12 Two or more men must be employed when carrying long pieces of material such as pipes, hand bars, scaffoldings, ladders, etc. near switchboards, panels or any live electrical conductor or apparatus so as to eliminate any risk of accidental jarring of relay panels or contact with live parts. Minimum lengths requiring these precautions may vary from 1.22 meter to 3.04 meters depending on the place of work.

04B.13 Every precaution must be taken to ensure the identification of electrical circuits before cutting or interfering with them in any way.

04B.14 Before any work is started in the vicinity of relay panels or on apparatus equipped with gas detector relays which could cause tripping of this equipment, a HOLD ORDER must first be obtained from the operator in charge. This applies particularly to drilling in relay panels, drilling or chipping concrete or other work which might cause vibration. Dusting of relay covers is not to be carried out without a HOLD ORDER (Permit to work) from the operator in charge.

04B.15 When removing potential transformer fuses of 6600 volts and above and when it is impossible to clear the circuit, an approved stick must be employed. Employees must keep the maximum possible clearance from the live parts.

04B.16 In stations where it is necessary to handle fuses of several different potentials, the fuse sticks or tongs must be positively identified so that there can be no possibility of error in the choice of appliance. After use, the fuse stick or tongs must be returned to the proper rack.

04B.17 A dangerous charge can be retained by static capacitor after it has been disconnected from the normal power source. Before any work is static capacitors, even if equipped with discharge coils, a short circuit and ground must be applied and maintained for the duration of the work. Where fuse sare employed in capacitor installations and work is to be carried out between the fuses and capacitor, the short circuit and ground must be applied on the capacitor side of such fuses.

SECTION 04C Safe working practices: Linemen

04C.01 When attaching his safety strap, the lineman must see that it is placed in such a way that it cannot slop off the pole or tower. The strap snaps must be checked to make sure they are properly in place and the strap tested with the man's weight before releasing his hold with his hands.

04C.02 Two safety straps should never be fastened together to reach around a large pole. An approved extension should be used.

04C.03 When erecting or revolving poles or structures a suitable number of guys and or braces must be attached to the pole or structure in order to prevent uncontrolled movement.

04C.04 All old or weak poles must be guyed or braked before climbing.

04C.05 Linemen must not climb or work on a pole above the bottom of an open ground lead gap if the circuit on the pole is energized. If work is to be carried out above the bottom of the gap then the gap must be bridged metallicly by means of an approved grounding jumper. The jumper must be connected to the groundside first and then connected to the upper end of the gap. When disconnecting the jumper, the upper end must be disconnected first.

04C.06 When climbing poles, the linemen must, when possible, climb on the same side as the ground lead, so that neither his hands nor any part of his body will touch the ground lead.

04C.07 When working in elevated positions material or tools must never be thrown-a bucket or hand line must be used.

04C.08 The practice of leaving spare material temporarily on towers or poles is to be discouraged as much as possible. When it becomes necessary to leave spare material in elevated positions, it must be well secured in place.

04C.09 On poles and structures objects such as long bolts, spikes, etc. which may cause accidents should be cut off or removed.

04C.10 Groundman or others must not stand directly under towers or poles when work is proceeding above.

04C.11 Poles, towers or structures are not to be used to secure guy wires from other poles, etc. without the approval of the superintendent or his foreman.

04C.12 Insulated clips on field telephones or test sets must be kept in good condition at all time. When a test set is to be the lineman must climb part way up the pole to insulate himself from ground when doing this he must keep clear of the ground lead on the pole. Or steel tower lines, when using the test set, rubber gloves must be used if no insulated platform has been provided.

04C.13 When stringing conductors in the immediate vicinity of normally energized circuits, such circuits should be cleared and grounded whenever practicable. When it is impractical to ground circuits in the immediate vicinity of conductor stringing, a Permission For live line Work is required on the energized circuits which are nearby.

04C.14 When new wires must be strung or old wires pulled out, near energized lines, the conductors being worked metal pulleys. It is preferable that pulleys be grounded.

04C.15 When bare wire is run directly off the reel, it shall be run over metal snatch blocks which are grounded and arranged so that the wire makes a positive contact at all times.

04C.16 When stringing wire or cable it must be kept under full positive control at all times and permanent ties made as soon as possible.

04C.17 When pulling wire or cable in the vicinity or energized circuits every effort must be made to avoid bodily contact with the bare conductor being pulled. hand lines must be employed for this operation.

04C.18 Carrying of hand tools on the lineman's body belt is to be discouraged. If it is absolutely necessary to carry them, then, such tool or tools must be securely, tied to the body belt so they cannot accidentally fall down.

CHAPTER 05

Fire Protection

SECTION 05A Organization and Responsibility.

05A.01 It is essential that the employees at each station shall be organized in such a way that the fire extinguishing equipment shall be used to the best advantage and that fire fighting activities shall be carried out with a minimum of confusion.

05A.02 It is the duty of every employee to eliminate fire hazards. In event of fire, an employee must render all possible assistance to extinguish it.

05A.03 The Manager/DM/AM of each Division/station shall nominate chief and deputy fire chief for the station or Division, who will be responsible directly to Manager/DM/AM for performance.

05A.04 The fire protection duties of the Chief Fire Officer are as follows:-

1. To be responsible for the training of the station personnel in the application and operation of each type of fire fighting equipments. This must include the operating staff.
2. To make sure that the proper apparatus is available at the place where fire is likely to occur and that all personnel are acquainted with the location of such equipment and its use.
3. To be responsible for fire fighting equipment being in operating condition at all times and that proper fire protection inspections are made monthly and the fire Inspection, forms completed properly and checked by the Manager/DM/AM having jurisdiction before forwarding to the main office Dhaka.
4. To make sure that fire fighting equipment is not obstructed or hidden by any changes which may take place in the station.
5. To point out to the Manager/DM/AM where fire hazards in unprotected locations exist and make recommendations where necessary.
6. To make sure that safe working practices as regards fire hazards are followed .
7. To take change of fire fighting operations in co-operation with the operator-in-charge.
8. To see that "No Smoking" signs are installed in places where there is danger of explosive gases being present, such as battery and oil storage rooms.
9. To set up actual fire fighting practices at least four times a year to assure that all employees are familiar with the use of fire fighting equipment. In addition, at least six test runs per year must be carried out to assure that proper equipment is available and in working order.
10. If for any reason any fixed fire fighting equipment is removed from service under the authority of a Permit-to-Work (HOLD ORDER) then when it has been returned to service the fire chief must inspect and check the system to ensure that all valves and any other associated equipment are in a proper are in a proper operating position and condition.

05A.05 A layout showing the location of fire fighting equipments must be displayed in a suitable place.

05A.06 In the event that nominated fire officer is away, the operator-in-charge will assume the duties of the fire officer.

SECTION 0513 Precautions Against Fire

05B.01 Rages, either clean or dirty, are to be regarded as distinct fire menace and must only be kept in covered cans or receptacles especially provided for that purpose. Combustible material such as packing boxes, excelsior etc. must not be left lying around but should be disposed of immediately.

05B.02 To prevent the possibility of an explosion, gasoline, benzene, paints and other volatile liquids must not be poured in to station drains. Such liquids must be taken outside, dumped into a properly prepared pit and burned under proper control. They must never be poured down drains.

05B.03 Smoking is not permitted nearer storage or in any oil processing rooms. The use of open flames or sparking devices in such areas is prohibited in order to prevent explosions. Electrical wiring in any oil processing room has to be in perfect condition so that no spark occurs. It should be periodically checked. Smoking is strictly prohibited in this area.

05B.04 Whenever insulating oil is being filtered or handled, a fire extinguisher of proper type must be in the immediate vicinity.

05B.05 All oil hoses must be of an approved type and properly earthed to reduce the accumulation of static electricity when handling oil or other flammable liquids.

05B.06 In general one should always be aware. If static electricity when using a filter press, and the container in which the oil is to be filtered should be carefully earthed.

05B.07 When working near opening or manholes in the tanks of apparatus containing oil such as transformers, oil circuit breakers, regulators, oil such as transformers, oil circuit breakers, regulators, oil storage tanks etc. open flame lights and sparking devices must not be used because of the possibility of gas formation and consequent explosions. Vapour proof extension lamps with guards in proper conditions are to be used.

05B.08 Volatile and flammable liquids including paint solvents are to be stored in proper containers and in appropriate areas or building provided for such storage. When used, the above liquids must be contained in proper safety cans equipped with a flame arrester screen at the filler and at the spout opening, Dispensing plunger cans must be used when cleaning and sponging with flammable liquids. Paints are to be stored in metal storage cabinets.

05B.09 A fire extinguisher must be readily available where flammable liquids are being used.

05B.10 Fuses must not be plugged or replaced by anything except fuse wire of the proper size and suitable capacity. Should fuses continue to blow when inserted this definitely indicates troubles which must be located, isolated and repaired.

SECTION 05C General Rules

05C.01 At all attended stations there must be a distinctive alarm to indicate a fire. This alarm is to be used only in the case of fire drill.

05C.02 No fixed fire fighting equipment may be modified or taken out of service without the knowledge and authorization of the station or Divisional officer, the operator-in-charge and, if possible the fire chief Any modifications or changes to the fire fighting equipment must be entered in the station log.

Whenever work is to be performed on the fixed fire fighting equipment such as the multi tire or sprinkler systems, fire pumps fire alarms or the controls of any of any of the foregoing, a Permit-to Work (HOLD ORDER) must be obtained.

05C.03 Any new equipment or changed condition of old equipment of different methods of using equipment should be promptly explained in local instructions issued by the station or Divisional Officer.

SECTION 05D Procedure in Case of Fire.

05D.01 Any employee becoming aware of a fire on PGCB property will proceed as follows --

1. Sound the fire alarm where possible.
2. Notify the operator-in-charge.

3. Call for assistance immediately from any employee.
4. Call the fire service department only if authorized to do so.
5. Use appropriate fire fighting equipment and direct the fire fighting with the personnel available until relieved by the fire chief or deputy fire chief. Procedures and equipment used must be as outlined in the Fire Fighting Manual.
6. To avoid danger to personnel, no attempt should be made to fight a fire on equipment operating at 400 volts or above without first having the equipment properly de-energized. This does not apply to remotely controlled fire extinguishing equipment which can be operated before the electrical apparatus is cleared.

05D.02 Special equipment such as breathing apparatus and fire protective suits should be used only when strictly necessary and then only be authorized, trained personnel accompanied by another person acquainted with fire fighting practices.

05B.02 When the fire alarm is sounded, all available men must report immediately to the location assigned for this purpose.

SECTION 05E Fire Fighting

05E.01 Periodical inspection/test and demonstration must be carried out. The following check list is furnished to remind of more important things to look for if one is called upon to make fire prevention inspection:

1. Electrical Equipment: Switches, Insulation, Fuses, Earthing.
2. Matches or Smoking: Confined to places permitted. Safety matches only used.
3. Heat Hazards: No combustible material in contact with steam pipes, furnaces, flues etc. Ashes in metal containers.
4. Flammable liquids: Stored in approved places, Safety Cans used, Tanks, Drums and Cans in good order. No leak.
5. Oil and paint: Stored in approved places, No leaks, Dripping properly disposed of
6. Combustible Materials: Stored in approved bins or containers.
7. Only Rags and Waste: All in approved metal receptacles.
8. Gas: No leaks, turned off when not in use.
9. Refuse: In approved Containers, Disposed daily.
10. Lockers and Closets: Kept neat. No accumulation of rubbish.
11. STANDPIPE AND FIRE HOSE. All fire hose shall be kept properly connected to the standpipe at all times, nozzle attached and ready for instant use.
12. FIRE TRUCK. The truck should be in perfect condition to start on instant warning and its tank must be full of water.

Pumps, hose, nozzle and other fixtures must be ready for instant use. Periodical checks and demonstration must be made. All personnel shall be alert and ready for any emergency.

05E.02 Fire Fighting equipment: In place easily accessible, in working order, Sprinkler valves open, Sprinkler head unobstructed, alarms in working order, If Fire Truck, Tank full water, Pumps, Hose-nozzle etc. in proper condition, and personnel alert and ready Refill extinguishers as soon as they are:

- i) CARBON DIOXIDE AND DRY POWDER shall be kept properly filled according to the MANUFACTURER'S specifications and inspected at least annually. Carbon dioxide extinguishers shall be weighed at regular intervals as reprimanded by the manufacturer.
- ii) SODA ACID EXTINGUISHERS shall be inspected periodically and emptied and recharged at least once every 12 months. Each extinguisher shall bear a Card giving the date of the last recharge. Extinguishers of this type shall be used only on free burning fires and under no circumstances on energized electrical equipments.

!!!) FOAM TYPE EXTINGUISHERS are effective for oil fires. They shall not be used to extinguish electrical fires, foam extinguishers shall be emptied and, recharge at least once every year and have card attached showing date of each recharge.

iv) FOG EXTINGUISHERS. Water Under Pressure, when discharged through special nozzles, produces a fog which is very effective in extinguishing all types of fires. As the name implies, the water is in fine spray and not a solid stream. It is especially efficient in extinguishing fires involving transformers, oil switches and burning combustibles near electrical equipment. Before directing fog near energized high-voltage conductors, allow air and scale to clear from system and see that fog, not a solid steam, is produced. Keep clearance of over 3 meter from energized high-voltage conductors up to 132 kilo volts.

SECTION 03F Classification of Fires

05F.01 Classification of fires is the systematic arrangement in classes of the various substances that as fuels produce heat by combustion, as follows:

Class A-Ordinary materials such as wood, paper and textiles. Class B -Flammable liquids such as oils and greases.

Class C-Live electrical equipment

05F.02 Class A Fires: Fires coming under the "A" classification are fires with ordinary materials such as wood, paper, textiles, rubber, rubbish etc. These fires are generally handled best with a good solid stream of water to break up and penetrate the burning material. On most ordinary fires any of the common class A extinguisher which use large percentages of water may be used, such as

Class A Extinguisher: Soda- acid extinguishers, antifreeze pump-tank extinguishers, Calcium chloride extinguishers Foam extinguishers, Loaded steam extinguishers Fire pails.

The action of all the above extinguishers is by cooling the burning substance below its ignition temperature and by excluding of these methods. Some types tend to inhibit oxidation by chemical action.

05F.03 Class B Fires: Flammable/inflammable (identical in meaning) liquids do not themselves burn or explode, but as pointed out previously, the gases or vapors formed when they are heated and evaporated explode; that is, the change of state from liquid to gas must first occur. As long as they are in a liquid state with no vapors being given off there is little or no hazard. For the more volatile liquid, such as gasoline, storage in a closed container is a necessity. In order for any vapor to explode it must have the correct vapor-air ratio, just as in the carburetor of a car. When the engine is choked with gas the mixture is too rich, and fails to ignite. The same hold true in gasoline storage.

The danger is when the gas is being poured from one container to another, thus giving the vapors the chance to mix with the correct amount of air to form an explosive mixture. The same circumstances hold true for all flammable oils when enough heat is present to release vapors from the liquid.

Class B Extinguisher: With the above facts in mind, flammable liquid fires may be fought with any of the following.

Class B extinguisher: Water with a fog nozzle Chemical or mechanical foam Carbon dioxide (CO₂) Dry Chemicals.

Keeping in mind that a flammable liquid is not hazardous as long as it is not hot enough to give off vapors which can mix with the oxygen in air and burn two things can be done: (a) The liquid can be cooled down to the point where no vapors are given off; and (b) The supply of oxygen can be blanketed out. Both of these can be accomplished with any one of the Class B extinguisher listed above some flammable liquids off vapors at temperature ordinarily considered cold for example, gasoline vaporizes at -450 F or Lower.

The use of Water with a fog nozzle works very effectively on a flammable liquid, as it completely covers the burning surface with a fine spray which cools the surface, dilutes the flammable vapors, or emulsifies the flammable readily mix with water will form either a foam or an emulsion having proportion of water.

05F.04 Class C fires: In fighting an electrical fire there are two important things to be taken into consideration: namely, damage to the equipment far beyond what the fire could do, and danger to the individuals fighting the fire. To avoid these two possibilities, de-energize the circuit and use only the types of extinguisher recommended for Class C fires, as follows:

Class C Extinguisher: Carbon tetrachloride/Carbondioxide (CO₂) Dry chemicals water with fog nozzle.

For small electrical fires, such as fires in insulation of cables, windings on motors, etc., any one of the first three class C fire extinguishers may be used before the circuit is de-energized without danger to the operator or to the electrical equipment, due to the fact the extinguishing agent is a non-conductor. De-energize the circuit as soon as possible.

CHAPTER 06

Division of Responsibility

Section 06A Responsibilities of Load Dispatchers and System Operators.

06A.01 The load dispatcher and system operator are responsible for efficiently coordinating the operation of the stations and transmission lines of PGCB high voltage power system (from 132 KV and above) in order to assure continuous and satisfactory service to the customers.

06A.02 the load dispatcher is responsible for allocating loading to all generating stations and for the general safe allocation of load over the interconnected electrical systems. He also responsible for maintaining power interchange over the system, for load frequency control and for general hydraulic and thermal operation in an economic manner.

06A.03 The system operator is responsible for system electrical operation, system voltage and var control, line and equipment loading and the maintenance of service to customers, he has to simultaneously consider continuity, quality and economy while operating the system.

06A.04 The load dispatcher and/or the system operator have jurisdiction over the release of lines or apparatus when such release affects, or might affect, the operation of the system, as outlined in **06A.02**.

06A.05 The load dispatcher and system operator in carrying out their system operating functions are bound by the operating regulations as set forth in this standard operating code.

Section 06B Responsibilities of the operators-in-charge.

06B.01 The shift in charge is responsible to the Manager for the station or division. He must be familiar with these standing instruction or orders which apply to his duties under his supervision.

06B.02 The shift in charge is responsible for the safety of equipment under his supervision and will follow these rules and regulations and must exercise good judgment in case of emergency. When it is apparent that equipment must be taken out of service immediately to avoid serious damage, this should be done without the delay necessary to advise anyone. However, as soon as conditions permit, the supervisor in charge must be notified together with the system operator. In certain instances it may be possible to keep the equipment in service until it can be released with minimum inconvenience to the system service.

06B.03 The Shift in charge is responsible for the enforcement and observance of these Standing Instructions in the station or division under this supervision as far as they affect his duties and the duties of his subordinates. he is also responsible for seeing that any equipment or apparatus is in safe operating condition before it is returned to service.

06B.04 The shift in charge must co-operate with other persons in the application of the rules. Should any conflict or doubt arise as to the division of responsibility outlined in these Regulations the matter must be referred to the operators immediate supervisor.

06B.05 The shift in charge is responsible for safety of people working on feeders to the extent that they should which on or off, earth the feeder on request of foreman in charge of the workers.

Section 06C Responsibilities of the Foremen.

06C.01 Foreman will be held responsible for the general safety of the men under their jurisdiction and must see that all reasonable precautions are taken for their protection.

06C.02 When work is to be done by employees of the Production Organization of equipment located in plants of subsidiary allied or outside companies the Foreman must make himself familiar with the Hold Off system and regulations of these companies and

govern himself accordingly. Understand circumstance the Foreman must see that no work is done under conditions which are contrary to the principles laid down by this standard operating code.

06C.03 Foreman must see that equipment or apparatus released for repair is in a safe condition before returning it to the jurisdiction of the operating staff for service.

06C.04 All foremen are responsible for seeing that all tools safety appliances and equipment used by the men under their supervision are of an approved design and acceptable according to PGCB'S standards where they apply and that they are maintained in good condition at all times. Regular periodic inspections must be made by the foreman of the tools and equipment used and a record of such inspection kept on the forms provided for this purpose.

06C.05 In small stations where there is no Foremen the local supervisor will assume the responsibilities of foreman outlined above.

06C.06 When two more men are working on a job and they are under the immediate direction of a foreman one of the men must be appointed by the supervisor or foreman as "charge hand and the man will then assume the responsibilities of the foreman for that job.

Section 06D Responsibilities of Site-in-charge.

06D.01 When persons are to carry out work where an element of danger may be introduced due to their lack of familiarity with the equipment of working area, a watchman (Site in Charge) will also be employed when work is to be carried out by any group of men where there is an element of danger due to the proximity of live apparatus or other hazards. Manager must issue a list of men authorized to act as watchmen in their station or Division.

06D.02 Under the jurisdiction of the man in charge it is the duty of the watchman to see that.

1. The men under his care do not inadvertently move out of the safe working zone.
2. Dangerous move of men or materials are prevented.
3. All personnel wear appropriate personnel safety equipment.
4. All necessary safeguards are provided and maintained.
5. All hazards are eliminated as far as possible.
6. All hazards which cannot be eliminated are fully explained to the men.
7. Unauthorized personnel do not enter the danger area.
8. He wears an Identification Badge.

06D.03 The Site-in-charge must be on the job before any work is started. If he is called away or has to leave for any reason work must stopped until he has returned or another Site-in-charge is appointed.

06D.04 If the work has been stopped for more than 45 minutes and always after meal periods the watchman must ascertain from the man in charge that he has checked with the operation to see that working conditions have remained uncharged during the interval or that no unusual circumstances have occurred which might render the job more hazardous.

06D.05 When workman has permission to leave his work he must report to the Site-in-charge when leaving and returning.

06D.06 The Site-in-charge must be advised of all changes in location of work and in the number and locations of protective grounds and safeguards.

06D.07 A watchman must not be required to watch more than 10 men at any one time. Under certain circumstances it may be necessary to limit the number to one or two workmen. The number of the men in the gang must not be changed without first notifying

the watchman.

06D.08 The watchman is directly responsible to the Operator in-charge for the safety of the men in so far as all hazards are concerned. The engineer-in-charge must have the work stopped if the watchman considers working conditions too hazardous. Any disagreement at this point must be referred to a higher authority before work is resumed. In the case of immediate or urgent danger the watchman has the authority to stop work instantly.

06D.09 The presence of the watchman does not relieve the man in charge for the safety of his men from his responsibility.

06D.10 When a watchman is required in connection with a HOLD ORDER, the operator and the man in charge are jointly and separately responsible for seeing that a watchman is appointed and the operator must give him the same warnings as to restrictions, limitations, and dangerous features as are given to the holder of the HOLD ORDER. He must be supplied with and must wear an identification badge during his appointment. The Manager must issue a list of men authorized to act as watchmen in their station or Division. A HOLD ORDER will not be issued to men acting as watchmen except in the case where they are the PGCB's representatives on a job being carried out by a contractor, customer or other than Department employees.

Section 06E Responsibilities of Local Supervisors.

06E.01 When the word "supervisor" as here used, refers to the ranking man of a station or Division such as station or DM, AM, J.A.M. or other such employee who exercises local executive or administrative duties delegated by the Manager or the Department.

06E.02 The local superintendent is responsible for efficient station operation and the maintenance of all physical assets under his jurisdiction. All other supervisors under his direction are available to assist him in discharging these responsibilities.

06E.03 It is the duty and responsibility of such supervisors to see that all workmen are familiar with the General Regulations and Standard Operating Code of the Department and that workmen use safe working methods, tools and equipment.

In the case of temporary employees, the Local Supervisor must see that they are properly instructed according to the training manual prepared for this purpose and that they are also made familiar with the General Regulations as applied to their duties.

06E.04 Local Supervisors are responsible for keeping each other and all employees under their jurisdiction informed concerning all matters which may affect the safe and efficient function of the station or Division under their supervision.

06E.05 If it becomes necessary for a Local Supervisor to give orders directly to workmen, he immediately assumes the responsibilities of the Foreman or charge hand. The Local Supervisor must advise the Foreman or charge hand concerning such orders at the earliest opportunity.

06E.06 The station or Division Manager or his representative must make every effort to instruct his men in accident prevention and the importance of continuity of service.

06E.07 In the various chapters throughout this Code, station or System Managers are made responsible for certain approvals or decisions. In the Manager's absence, DM/AM or "supervisor on duty" will assume these responsibilities.

CHAPTER 07

EARTHING (GROUNDING)

SECTION 07 GENERAL

07A.01 Earthing systems are of great importance for protective purposes. Any failure to carry out effective earthing exposes persons to the risk of shock or burn. All metal work which encloses, supports, or otherwise is associated with electrical conductors and apparatus, unless designed to be energized must be connected with earth.

SECTION 07B PERMANENT EARTHING.

07B.01 Permanent Earthing of Equipments shall be as specified in station and Transmission Line Standards.

07B.02 Temporary installations of electrical equipment must be properly earthed in the same manner as permanent equipment.

07B.03 The secondary circuits of low voltage transformers supplying local lighting or power should be earthed as required by the Electricity Act 1910.

07B.04 The casings of all electrically operated tools, weather portable or stationary, must be properly earthed whenever feasible before employees are permitted to operate them.

SECTION 07C TEMPORARY EARTHING

07C.01 special care should be exercised to avoid bodily contact with normally live electrical circuits unit they have been properly earthed.

07C.02 Temporary earthing of electrical equipment, cleared for work, will safeguard employees from electrical shock or burns in the immediate vicinity of the temporary earths.

07C.03 Temporary earthing is to be carried out by means of portable earths (ground or earth sticks) in substation and generating station work, it is permissible to use earth switches if they are at the location of the work.

07C.04 Portable earths (ground or earth sticks) must conform to the specifications in station and Transmission line standards.

07C.05 As far as practical, no man should work at a point where he is out sight of the earths which protect him. When work is to be carried out on transmission lines/distribution lines, protecting earths must be applied on all phases at the immediate location of the work. If this is not possible, the earths must be applied on ail phases on both sides of the work and as close to the work as possible. This applies whether or not earth switches have been used.

07C.06 When it is necessary to cut a line, bus bar, loop, or to repair a broken conductor or damaged loop, earths must be place on all phases on each side of the work and as close as possible to it.

07.CO7 Should there be any switches between the work and the earth point, earths must be applied on the side of the switch or switches adjacent to the work, unless such switch are securely locked in the closed position and a "Men Working" tag attached to the operation control point or points.

07C.08 There must not be any fuses in the circuit between the protecting earths and the location of the work

07C.09 Permanently installed single or double pole earthing switches do not provide completed earthing of there phases circuits, the other conductor or conductors must be earthed as well.

07C.10 Before any apparatus or circuit is earthed for work, it must first be satisfactorily tested for "no voltage" on all phases using an approved device suitable to the voltage in question.

07C.11 When installing temporary earths on transmission lines/distribution lines and other electrical apparatus, the step-by procedure detailed below must be strictly followed:

1. Test each phase for "No voltage"
2. Attach the earth clamp to the earthing point.
3. Securely attach the safety chain loop around the earthing
4. Place the conductor clamp of the earth stick on the conductor using the insulating stick.

When removing temporary earths, the step-by-step procedure detailed below must be strictly followed:

1. Remove the conductor clamp from the conductor using the insulating stick.

Then:

2. Detach the safety chain.
3. Remove the earth safety chain

Caution: Employees must, take care to avoid contact with the bared during the period when they are actually making or breaking the earth connection with the conductor.

07C.12 Employees who are used in the application of temporary earths must be trained and periodically checked concerning their knowledge of the proper method of application and removal of temporary earths (earth sticks).

07C.13 No work must proceed on or near the electrical conductors of any transmission lines/ distribution lines, bus bar, or other electrical apparatus, operating at a nominal voltage of 400 volts or above, unless all conductors have been properly earthed. This does not apply when PERMISSIONS are issued live station work.

07C.14 Insulated cables and certain other electrical apparatus such as heavy current, low voltage equipment, where earths might be more of a hazard than a safety precautions, and/or in cases where it is not practicable to apply proper earths, they may be exempted from these regulations. The station or Divisional officer must issue a local operating instruction, stating clearly, within limits which apparatus under his jurisdiction is exempt from the general earthing regulations must clearly define the precautions which are to be taken.

07C.1 5 Telecommunication Equipment, Relay and other such circuits which are exposed to induced voltage or accidental contact with power circuits must be earthed for work. The station or divisional officer will issue local operating instructions covering the procedures to be used when work is to be done on such circuits.

SECTION 07D Authority and Responsibility of Temporary Earths

07D.01 Any Temporary earth installed by the operator or ordered installed by the operator for permit-to-work purposes must be considered solely under the control of the operator and no one must interfere in any way with these safeguards.

07D.02 If desirable a maintenance man may install additional temporary earths on equipment covered by his permit-to-work in force. Linemen are obliged to install their own temporary earths.

07D.03 The man in charge is responsible on the completion of the job, for the removal or all temporary earths placed by himself or by his orders. All temporary earths must be counted on their installation and removal in order to check that all have been removed.

07D.04 It is in the right of every employee to be protected and he may request additional temporary earths which in his opinion are required if the man in charge is undecided as to the reasonableness of the employee's request of extra protection, he should grant the request for extra protection or obtain instruction from his supervisor.

07D.05 NO MATTER WHAT WORK IS TO BE PERFORMED, THE FIRST CONSIDERATION MUST BE THE SAFETY OF THE MEN.

SECTION 07E Earthing Equipment for use on High Voltage Apparatus:

07E.01 Approved Portable Earthing leads for use as circuit Main Earths.

1. The portable EARTHING leads, that are to be used as CIRCUIT MAIN EARTHING shall be of such a size and design so as to be capable in use of carrying the full rated short circuit earth current if a LIVE circuit, was in error closed on to them at the position where had been applied.
2. The choice of the cross sectional size of such leads will depend on the short circuit levels of the electrical system which they are to be used. However in practical terms the voltage of the electrical system and the rating of the installed switchgear, can generally be used to determine the cross sectional size that will be adequate.
3. The choice of fittings for line, earth end clamps and the length of the leads will depend on the APPARATUS on which the portable EARTHING leads are to be applied.
4. Leads for use in sub-stations with exposed HIGH VOLTAGE conductors shall be of a length suitable to reach from the DEAD conductors to the nearest substation EARTH bar. The line and clamps shall be of a design suitable to enable an effective condition to be made at both ends.
5. Leads for use on wood pole over head lines conductors, shall be of a design suitable for applying a line end clamp to each conductor and effectively terminating at the other end on a junction, from which a lead of sufficient length and size connects to EARTHING rods which can be driven into the earth.
6. If portable EARTHING leads are required as CIRCUIT MAIN EARTHS on steel tower overhead lines, then those specified for use in sub-stations with exposed HIGH VOLTAGE conductors can be used providing that the line end clamps are suitable for applying to the overhead conductors and the earth end clamps are suitable for Connecting to steelwork of the tower.

07E.02 Approved Portable Earthing leads for use as Additional Earths

1. An overhead line circuit which has been DEAD, ISOLATED and EARTHED at each end, can have dangerously high voltages induced onto its conductors from adjacent circuit on a double circuit overhead line or by natural phenomena.
2. The effects of this induced voltage can be completely removed when ADDITIONAL EARTHS are correctly fitted at, or near, the point of work on the conductors. If a break is to be made in the conductors of an overhead line circuit, then ADDITIONAL EARTHS shall first be applied, as dangerously high voltage can occur across the break.
3. The portable EARTHING Leads, that are to be used as ADDITIONAL EARTHS, shall be of such a size and design so as to be capable in use of preventing and induced voltage, at the point of work, on a already EARTHED conductor.
4. The choice of the length of such leads, their cross sectional size and design features, line and earth end clamps shall depend on whether they are to be used on wood pole or steel tower overhead lines.
5. For wood pole line it may be practicable, and operationally prudent, for the same portable EARTHING leads, as specified for CIRCUIT MAIN EARTHS to be used as ADDITIONAL EARTHS.
6. The portable EARTHING leads for use as ADDITIONAL EARTHS on steel tower overhead lines, may be of a smaller cross sectional size than that required for CIRCUIT MAIN EARTHS duties, but shall be of sufficient length to span from the overhead conductors to be steelwork on the body of the tower. The line and earth end clamps shall be of a suitable design for this purpose.

CHAPTER 08

Clearing Apparatus for Work

SECTION 08A Regulations concerning the clearing of Apparatus for work

08A.01 Clearing apparatus for issuing HOLD ORDER (Permit to work) requires the almost care to avoid overlooking some source of back feed in the case of electrical equipment. In the case of mechanical equipment, the possibility of some valve gate or safety block not being in the correct position must not be overlooked.

08A.02 When clearing electrical apparatus for work, it must be isolated from all possible sources of potential by an adequate visible air gap.

08A.03 When clearing transformers or regulators for work or when any work is to be carried out on or around such equipment, special precautions must be taken to see that the gas detector relay trip circuits, thermal trip circuits or other such protective devices are properly blocked before starting any work.

08A.04 Equipment such as circuit breakers, concealed blade disconnects etc. which do not provide a clearly visible air gap, must not be employed as a means of isolation. Isolators incorporated in the mechanism of oil poured or air blast circuit breakers must not be used for this purpose. Some means must be provided to establish an air gap. e.g. open loops removal of bus section, etc.

08A.05 Draw out types of metal clad circuit breakers provides satisfactory isolation when removed.

08A.06 The gaps must be visually inspected to make certain that the circuit is fully open all phases.

08A.07 When a motor or air operated disconnect is used to isolate equipment covered by a HOLD ORDER, the disconnect switch must be blocked positively in the open position where the mechanism is suitable, the disconnection switch must be mechanically disconnected from the motor or air mechanically and blocked and locked in the open position.

All fuses in the control circuit must be removed and/or the source of air supply to the operating mechanism shut off, air in the supply line drained off and the controller tagged. If a disconnect switch can't be blocked positively in the open position, it must not be used to isolate equipment covered by a HOLD ORDER.

08A.08 When clearing electrically remote controlled equipment, all fuses of all control circuits involved must be removed on all legs.

08A.09 In the case if equipment containing stored energy such as compressed spring, compressed air, etc, the energy must be released whenever practicable before a HOLD ORDER is issued.

08A.10 When shutting off pipelines supplying air, oil or water to equipment being cleared, drain valves should be left open.

08A.11 When clearing any apparatus for work, MAN WORKING, tags must be installed on all switch handles, controllers, fuse blocks, valves and all other control gear whose operation affects or might affect the apparatus being cleared for work. Grounding of all cleared electrical apparatus is to be carried out.

08A.12 In all cases when clearing a relay protection for work, reference must be made to the standard and local operating instruction applicable to each location.

08B Protection from HV Back feed.

08B.01 Equipment that is protected by a 'Work Clearance' may be prone to High Voltage back feed. It may occur in a dead bus through LV side of transformer connected to the bus if LV side is connected to a bus fed from other sources also. These things are sometimes overlooked which should be considered seriously for safety of the persons working.

CHAPTER 09

Hold Order System

(Permit To Work) System

SECTION 09A General Description

09A.01 The purpose of the standard HOLD ORDER system is to give protection to employees when working on electrical or other equipment. All types of HOLD ORDER may only be issued by the operator-in-charge.

09A.02 The HOLD ORDER gives authority for definite work to be done on specified apparatus and guarantees that certain conditions will be maintained while this work is being carried out.

09A.03 A HOLD ORDER may be issued in any one of the following forms :

- a) Clearance for work
 1. Written clearance for work
 2. Verbal clearance for work
- b) Permission for work:
 1. Written work and test permit,
 2. Verbal work and test permit,
 3. Verbal Permission for work on live lines
 4. Verbal permission for work on live station equipment.
 5. Verbal Permission for work on relay protections control, metering and communication circuits.

SECTION 09B Regulations concerning the HOLD ORDER system

09B.01 No one is permitted to change, adjust, disturb or in any way interfere with apparatus which is in service or which is being held in reserve and ready for immediate service without the knowledge and permission of the operator-in-charge.

09B.02 Before any work is started on transmission lines, station, equipment or any apparatus including protection, control, metering, communication, fixed fire fighting equipment and pressurized systems, whose shutdown or removal from service affects or might affect the operation of a station or a system, the man in charge must first obtain a HOLD ORDER from the operator-in-charge, irrespective of and in addition to any previous arrangements made or order issued by the operator's supervisors or any other person. No HOLD ORDER will be issued to anyone not directly associated with the station or Division unless special arrangement has been made with the Manager/DM/AM.

09B.03 The applicant for HOLD ORDER must advise the operator as to:

1. The type of HOLD ORDER required.
2. The apparatus to be covered by the HOLD ORDER.
3. The nature of the proposed work.
4. The estimated time of completion.

In addition the applicant must give any other information which is necessary for a complete understanding between himself and the operator.

09B.04 A verbal WORK/TEST PERMIT must not be issued to an operator for subsequent reissue. It must be issued directly to the man in charge of the work.

09B.05 With the exception of a WORK/TEST PERMIT it is permissible for an operator in charge to obtain a verbal HOLD ORDER from the system operator and then to issue subsequent HOLD ORDER to the men in his own station or jurisdiction.

09B.06 Station or Divisional Officer must issue a list of men capable and authorized to receive each type of HOLD ORDER on specified lines and equipment. A copy of this list must be supplied to all operating headquarters having jurisdiction in that area. The operators will issue HOLD ORDER only such authorized persons. The list must be reviewed and if necessary revised every six months.

09B.07 All personnel authorized to take verbal HOLD ORDER by telephone or radio must be supplied with a diagram of the line or apparatus involved, showing the clearance points. When issuing and returning verbal HOLD ORDER they must be repeated back to avoid any misunderstanding.

09B.08 The **DM/AM** of the station or Manager must see that the operation personnel of Divisions/Stations are made familiar with the PGCB'S regulations, concerning the HOLD ORDER system. These Regulations must be strictly adhered to at all times when HOLD ORDER is being issued on the PGCB's equipment.

09B.09 Only one WORK/TEST PERMIT may be issued on any given place of equipment at one time. Special care must be exercised to ensure that the number of HOLD ORDER issued on any one specific place of apparatus is kept to a minimum. NOT more than four HOLD ORDER are to be issued on a specific place of apparatus at the same time unless special arrangements have been made. All HOLD ORDER issued on the same line or place apparatus are to be grouped and recorded in sequence on the station log. Also, appropriate separate operating diagram pins are to be used for each HOLD ORDER.

09B.10 At attended station, the operator, before issuing any HOLD ORDER, must accompany the applicant to the cleared apparatus pointing out the location of all protecting grounds and warn him of any features which are hazardous to personnel or service and which should be guarded against, in the case of remote unattended stations or lines, the same warnings must be given verbally.

09B.11 In the case of a supervisory controlled station, verbal HOLD ORDER are to be used and some of the necessary switching may be required to be done by the applicant under orders of the operator in charge. In these instances, the applicant must be familiar with the equipment concerned, standard and /or local Operating instructions and must adhere strictly to the rules regarding the use of Switching Order Forms. The operator instructions must be followed explicitly.

09B.12 After a HOLD ORDER has been issued, the operating staff must not make use of the specified apparatus until all HOLD ORDER on that apparatus have been properly returned and accepted. For live line and live station work, see Section 09K.

09B.13 Workmen are permitted to transfer from one type of HOLD ORDER to another as often as desired provided the proper procedures, especially the WORK/TEST PERMIT limitations, are always followed and that the limitations and governing conditions of each type of HOLD ORDER are strictly observed.

09B.14 The operator must register in red ink the issuing and return of all HOLD ORDER in the station or office log sheets and log books giving:

1. Time.
2. Name of person to whom the HOLD ORDER was issued.
3. Designation of the apparatus or line and the limiting points between which the HOLD ORDER applies.

In addition, the operator must insert the appropriate pins on his pin diagram indicating the limits of the line or apparatus on which the HOLD ORDER has been given.

09B.15 The operator after issuing a HOLD ORDER may demand its return under urgent or unforeseen circumstances. If the man in charge, to whom the HOLD ORDER was issued, considers the apparatus unsafe for use or his work so advanced that the apparatus cannot be made available for service immediately, then he must refuse to return his HOLD ORDER. The matter must then be referred to the station or Divisional Officer.

09B.16 If, after completion of the work on which a HOLD ORDER has been issued, the holder leaves without returning same to the operator, such holder will be personally responsible for returning the HOLD ORDER properly signed at whatever hour it may be required. If due to accident, sickness or any other reason it is impossible for the holder to return a HOLD ORDER, the apparatus must not be placed in service by the operator, without the approval of the station or Division Officers concerned who will take immediate steps to advise the holder and all other persons concerned.

09B.17 After the work has been completed, the man in charge must notify each of the employees under his charge on that job to remain clear and that he intends to return his HOLD ORDER. The man in charge must see that his own grounds and/or safeguards, if any, are removed but must not interfere with the grounds and/or safeguards, if any installed by the operator or other parties. The HOLD ORDER must then be properly returned to the operator in charge stating the number of temporary grounds installed and removed. No further work must be done unless a new HOLD ORDER is obtained.

09B.18 While a HOLD ORDER is in force the holder of any type of HOLD ORDER must report frequently to headquarters. At least one report should be made every two hours unless other arrangements have been made. While a HOLD ORDER is in force, if the work is discontinued for more than 45 minutes, and always after meal periods, the holder, prior to restarting work, must report to the operator either in person, by telephone or by VHF/Mobile, in order to make certain that no changes have been made in his absence which would make conditions in vicinity of his work more dangerous than before. For live line work HOLD ORDER see Section 09H.

09B.19 With the exception of live line work, a HOLD ORDER must not be issued to allow work to be carried out on an open disconnect or any other type of air break switch has one side alive except when absolutely necessary and then, only with the approval of the station Divisional Officer.

09B.20 If, after all normal precautions have been taken, there still remains an element of danger which requires that the work

be very carefully supervised HOLD ORDER is to be issued except with the approval of the station or district superintendent.

09B.21 When retuning a HOLD ORDER on circuit breakers or disconnecting switches, they must be left in the open position, unless arrangements to the contrary have been made. In returning a HOLD ORDER, the holder must specify the operation of the apparatus involved.

09B.22 When returning any HOLD ORDER the workman must advise the operator of any changes which have been made which might affect the operation of the equipment. Such advice should be made in writing, it possible when necessary with explanatory sketches. Such information must be recorded in the station log and the supervisor in charge advised.

09B.23 When all HOLD ORDER have been properly returned, the operator will remove all ground and safeguards installed by him or the operator on their shifts. He must then see that all tags and danger signs are collected and when possible, make a thorough visual inspection over the area covered by the HOLD ORDER and if desired; take the necessary steps to return the apparatus to normal service.

09B.24 Should the holder's part of a **HOLD ORDER card be lost** or mutilated so that it becomes unreadable, the holder must advise, the operator who will take the corresponding operator's portion and write across it "Workman's stub lost –cancelled Replaced by Card No.". The holder must sign the operator's portion to indicate such was the case. The operator will then make out a new card identical to the original except for the new number. The card will then govern the case.

09B.25 When a watchman is required in connection with a HOLD ORDER, The operator and the man in charge are jointly and separately responsible for seeing that the watchman is appointed and the operator must give him the same warnings as to

restrictions limitations, and dangerous features as are given to the holder of the HOLD ORDER he must be supplied with and must wear a identification Badge during his appointment.

Manager (Divisional Officer) must issue a list of men authorized to act as watchmen in their station or division. HOLD ORDER will not be issued to men acting as watchmen except in the case when they are the PGCB'S representatives on a job being carried out by a contractor, customer or other than Department employees.

0913.26 When HOLD ORDER have been issued on line feeding a particular area no HOLD ORDER will be issued on other circuits feeding the same area if there is danger of jeopardizing service.

SECTION 09C Regulation covering a Written Clearance for Work

09C.01 The written CLEARANCE FOR WORK is to be used at attended stations where the apparatus concerned is under the jurisdiction of the station operator, and when the work to be done does not require that the apparatus be operated or energized during the course of the work and when the original safety precautions taken by the operator will be maintained.

09C.02 It gives authority to the holder to work on the specified apparatus. It is also a guarantee that the apparatus has been taken from service, will remain out of service, cleared for work and that the operator-in-charge has taken all precautions for the protection of men, equipment and service as required by this Code. In the case of apparatus at all stations the operator will be responsible for the closing of ground switches and/or having temporary grounds applied where required by this Code, in the case of transmission lines, the operator will have the live terminations grounded where ground switches have been provided and will advice the applicant whether the line is or is not grounded.

It is the duty of the recipient to apply his own temporary grounds at the location fo the work.

09C.03 The type of card to be employed for a written CLEARANCE FOR WORK is shown in Appendix A. It consists of two portions body and stub, with certain printed instructions and space for definite entries by the operator and the applicant for the

CLEARANCE FOR WORK, each of whom keeps his half of the card while the job is in progress. When issued, the body and stub must bear the same date, time and card number.

09C.04 It is permissible to issue more than one written CLEARANCE FOR WORK at the same time on the same apparatus. When two or more foremen are to work independently on the same equipment, a separate CLEARANCE FOR WORK must be obtained by each Foreman. If however, one foreman is appointed to take complete responsibility for the supervision and safety of all parties, then for all practical purposes there is only one foreman and a single CLEARANCE FOR WORK can be employed.

09C.05 When more CLEARANCE FOR WORK are out on the same or related apparatus and it becomes necessary to make a test or a trial, such testing is only to be carried out after all CLEARANCE FOR WORK have been returned to the operator and cancelled.

SECTION 09D Regulations covering a Verbal CLEARANCE FOR WORK

09D.01 A verbal CLEARANCE FOR WORK is to be employed in connection with work on transmission lines or at unattended or semi-attended stations where the operator has not been qualified to issue HOLD ORDER on equipment remote from an attended station where it is impractical for a written CLEARANCE FOR WORK card to be employed. A verbal CLEARACNE FOR WORK will in general be governed the regulation covering the issue of a written CLEARANCE FOR WORK.

09D.02 To avoid overlooking any verbal CLEARANCE FOR WORK, the operator's section of a CLEARACNE FOR WORK card must be filled in and the holder's stub marked to indicate that a verbal CLEARANCE FOR WORK has been issued to a specific employee. This CLEARANCE FOR WORK card must be retained until the verbal CLEARANCE FOR WORK has been returned.

SECTION 09E Application of HOLD ORDER System to Lines and Line Equipment at Attended Stations when a Combination of Written and Verbal HOLD ORDER Is employed.

09E.01 When it is required to work on lines, line disconnecting switches, line entrances or other apparatus on the lines at an attended station, where the station operator has not complete jurisdiction as to the assuring of CLEARACNE FOR WORK on such equipment, the procedure outlined below will be employed.

09E.02 The employee in charge of the work must apply to the station operator for a written CLEARANCE FOR WORK.

09E.03 The station in charge of the work must apply to the station operator or Divisional Officer/Operator, who has jurisdiction as to HOLD ORDER on that line for verbal CLEARANCE FOR WORK.

09E.04 The System Operator, after having the apparatus prepared for the CLEARANCE FOR WORK, will issue a verbal CLEARANCE FOR WORK to the station operator.

09E.05 The station operator will log the receipt or the verbal CLEARACNE FOR WORK. He will then follow in all respects the procedure with reference to the issuing of CLEARANCE FOR WORK, after which he will issue a written CLEARACNE FOR WORK to the applicant. In addition, the operator will write across the face to both sections of the card.

"VERBAL CLEARANCE FOR WORK on
received from at

09E.06 When the work is finished and CLEARANCE FOR WORK cards have been returned, the station operator will see that all grounds and safeguards, other than those placed under instruction from the system Operator / Divisional Officer, are removed and it is safe to place the line/equipment back in service. The station operator must not interfere with any ground switches closed, or safeguards applied, under instructions from the system operator without their consent.

09E.07 The station operator will then return the verbal CLEARANCE FOR WORK to the operator from whom it was received and log the return of such CLEARANCE FOR WORK.

09E.08 When entering a verbal CLEARAFNCE FOR WORK, the station operator must always advise the system or Divisional Officer/Operator as to the position of all ground switches involved.

SECTION 09F Regulations covering a Written Work Permit

09F.01 The written WORK/TEST PERMIT is to be used at attended stations where the apparatus concerned is under the jurisdiction of the station operator and when the work requires the apparatus to be operated or energized during the course of the work or when the nature of the work is such that the precautions taken by the operator cannot be maintained for the duration of the job.

09F.02 This WORK PERMIT gives authority to the holder to carry out work and tests on specified equipment it guarantees that the holder is the only party working on that equipment and that condition will not be changed by the operator except at the request of the holder.

09F.03 The type of card to be employed for a written WORK PERMIT is shown in Appendix A. It consists or two portion, body and stub, stub, with certain printed instructions and space for definite entries by the operator and the applicant for the

WORK PERMIT each of whom shall keep his half of the card which the job is in progress. When issued, the body and stub must bear the same date, time and card number.

09F.04 A WORK PERMIT must be issued by the system operator or operator in charge directly to the applicant.

09F.05 It is forbidden to issue a WORK PERMIT if the apparatus concerned is already covered by another HOLD ORDER. After a WORK PERMIT has been issued on a place of apparatus, under no circumstances is any other HOLD ORDER to be issued on this same equipment or apparatus.

09F.06 When a WORK/TEST TEST PERMIT is issued, the apparatus must be handed over to the applicant with the same safeguards in place as would apply for a CLEARANCE FOR WORK. The applicant, after he has obtained the WORK/TEST PERMIT grounds and other safeguards as placed by the operator as he considers necessary for the progress of his work in so doing, he automatically relieves the operator of and personally assumes responsibility for any consequences resulting from the removal of such safeguards.

09F.07 In connection with the actual work and tests to be carried out the following limitations will apply:

1. The primary control devices or the apparatus, located in the control room, must be manipulated only by the operator or his delegate.
2. The apparatus worked upon must on no account be allowed to become connected to or in any way involved with other apparatus not covered by the WORK/TEST PERMIT, without the consent of the operator.
3. Request by the holder for changed conditions must be entered on the operator's portion of the WORK/TEST PERMIT.
4. At the request of the holder and at the operator's discretion, the latter will remove the ground and safeguards provided, if that interferes with the work. If the operator refuses the request the matter must be referred to the local superintendent.

SECTION 09G Regulations covering a Verbal WORK/ TEST PERMIT

09G.01 A verbal WORK/TEST PERMIT is to be employed in connection with work on transmission lines or at unattended, or semi-attended substations where the operator has not been qualified to issue HOLD ORDER, on equipment remote from an attended station where it is impractical for a written WORK/TEST PERMIT card to be employed. A verbal WORK/TEST PERMIT will in general be WORK/TEST PERMIT.

09G.02 To avoid overlooking any verbal WORK/TEST PERMIT, the operator's section of a WORK/TEST PERMIT card must be filled in and the holder's stub marked to indicate that a verbal WORK/TEST PERMIT has been issued to a specific employee. This WORK/TEST PERMIT card must be retained until the verbal WORK/TEST PERMIT has been returned.

SECTION 09H. Regulations covering a Verbal Permission for work on or Near Live Lines

09H.01 These regulations are drawn up to cover live line work on lines energized at 66 KV and above. Their express objective is to protect personnel which carrying out this work. If communication is lost with operating personnel during such work, a prolonged outage of an important circuit could easily result. All personnel involved in live line work must realize the importance of continuity of service.

It is imperative that while this work is being performed a channel of direct communication must be set up between the workman in charge and operating headquarters and this communication channel must be maintained throughout the duration of the work if at all possible. If it is impossible to maintain communication with headquarters then special arrangements must be made and the live line must be buzzed at intervals as requested by the operating staff. If a line being buzzed is found dead, an immediate report is to be

made to the operator in charge so as not to delay the restoration of service.

09H.02 Live line work is defined as follows:

1. Hot stick work such as changing insulators.
2. Pole top mirror inspection.
3. Buzzing insulators.
4. Live insulator washing.
5. Resetting poles with the line energized.
6. Inspection of tower tops.
7. Painting tower tops.
8. 1 R drop testing of conductor joints.
9. Work on overhead ground wires.

In brief, live line work includes all work of any kind on energized lines above a point one meter below the bottom cross arm in the case of structures with pin type insulators, or work on any kind above the elevation of the bottom conductor in the case of structures with suspension type insulators. This does not apply to special structures such as river crossings where work may be permitted above the conductors at the discretion of the officer concerned.

09H.03 A verbal PERMISSION FOR LIVE WORK is to be employed when it is desired to on or near an energized line.

09H.04 A verbal PERMISSION FOR LIVE LINE WORK Gives Authorization for specific work on a given line. When verbal PERMISSION FOR LIVE LINE WORK is issued for work on a double circuit tower, a PERMISSION FOR LIVE LINE WORK is issued for work on a double circuit tower, a PERMISSION FOR LIVE LINE WORK must be taken not only on the line being worked on but also on the adjacent line. When a HOLD ORDER has been taken to work on one circuit of a double circuit line, PERMISSION FOR LIVE LINE WORK must also be taken on the adjacent line.

09H.05 For live line maintenance work involving the use of hot line sticks, only one PERMISSION FOR LIVE LINE WORK per line will be granted. Up to four PERMISSION FOR LIVE LINE WORK on the same line may be granted for buzzing and mirror inspections and the other types of live line work.

09H.06 Specific conditions for live line work are:

1. Automatic reclosing features must be blocked on a line which a verbal PERMISSION FOR LIVE LINE WORK is in force.
2. Relay protective features and device must be in service on a line which a verbal PERMISSION FOR LIVE LINE WORK is in force.
3. Live Line Permit for Work tags must be attached to all circuit breaker controllers of the line before a verbal PERMISSION FOR LIVE LINE WORK is issued.
4. Large green pins must be placed on the station and system operating pin diagrams.

Note: The operator issuing the verbal PERMISSION FOR LIVE LINE WORK will notify all other operators concerned that until further notice, the designated line is not to be tested,

5. While live line work is in progress every effort should be made to prevent an automatic outage of the line concerned. For this reason, which such work is in progress, permission should not be granted for work on the line relay protection, the line breaker automatic ground switch or other features or devices associated with the line protection.
6. In the case of an automatic outage of a line on which a verbal PERMISSION FOR LIVE LINE WORK has been issued, the operator must not reclose the line until

the man in charge of the live line work has been contacted and warned to have his men stand clear.

7. During the progress of the work, should there be any evidence to indicate the loss or possible loss of normal potential on the lines or equipment concerned, the foreman or man-in-charge must report to the system operator or operator in charge as quickly as possible. This applies whether or not anything has occurred at the site of the work which might have caused an interruption on the equipment. such delays in the restoration of normal service.
8. When work is to be discontinued for any length of time, the verbal PERMISSION FOR LIVE LINE WORK must be returned and a new verbal PERMISSION FOR LIVE LINE WORK must be obtained before work is resumed. If the job site is left in an abnormal condition, special arrangements must be made to keep in contact with the operator.
9. The holder of a verbal PERMISSION FOR LIVE LINE WORK or his messenger will keep in frequent contact with operator-in-charge. In case where the linemen are out of contact with headquarters, the line must be buzzed at least once every hour and an immediate report made to headquarters if a line is found dead.

09I-09J Refer to the LIVE LINE WORK MANUAL for special precautions covering live line work.

SECTION 09K Regulations covering a verbal Permission for work on or Near Live Station Equipment.

09K.01 These regulations are drawn up to cover work on or near live station apparatus energized from its normal source and connected to the system net work. Live station work is defined as follows:

1. Mirror inspection with hot sticks.
2. Testing live bushings.
3. Washing live bushings and insulators.
4. Phasing checks.
5. Testing for voltage indication, exclusive of voltage testing prior to grounding.

In brief, live station work includes all cases where work is to be done on or near live apparatus operating at 600 volts or above.

09K.02 A verbal PERMISSION FOR LIVE STATION WORK must be obtained when it is desired to work on or near live station apparatus.

09K.03 A verbal PERMISSION FOR LIVE STATION WORK gives authorization for specific work on a given piece of equipment when a verbal PERMISSION FOR LIVE STATION WORK is issued, and there is the possibility of hazard from adjacent apparatus a PERMISSION must also be taken on the adjacent apparatus.

09K.04 When high voltage testing is to be carried out, the area or locality of the test must be properly fenced or roped off and tagged and if in an area of ordinary thoroughfare guards should be stationed to direct traffic and prevent unauthorized persons from passing through the danger area.

09K.05 Temporary high voltage test leads must be distinctly marked with "Danger" signs or other distinctive markers which are clearly visible.

SECTION 09L Regulation covering a verbal permission for Work on Relay Protection, Controls, Metering and Communication Circuits.

09L.01 The above PERMISSION FOR RELAY WORK cover all features of the station wiring including associated circuits external to the station which in any way might affect the operation of the system and are tested as follows:

1. A verbal PERMISSION FOR RELAY WORK, for work on relay protections and associated wiring.

2. A verbal PERMISSION FOR CONTROL WORK, for work on equipment control devices and wiring.
3. A verbal PERMISSION FOR METERING WORK, for work on metering equipment and associated wiring.
4. A verbal PERMISSION FOR COMMUNICATION WORK FOR work on communication and carrier circuits, which are in any way connected to relay protection, control or metering circuits.

09L.02 Before any work is performed on the above mentioned apparatus except the routine changing of meter charts, a verbal PERMISSION FOR RELAY WORK must be obtained from the operator in charge. When such PERMISSIONS are issued it shall be the duty of the operator in charge to notify the system operator and other interested parties.

09L.03 Before issuing a verbal PERMISSION FOR WORK on the above mentioned equipment it is the responsibility of the operator in charge to see that the equipment has been properly blocked so that no unauthorized tripping will take place. It is his further responsibility to see that proper procedure as detailed in Standard and Local Operation Instructions.

09L.04 Before a verbal PERMISSION FOR RELAY WORK is issued for work on a specific protection, the front and back of adjacent relay panels must be covered to prevent accidental tripping by workmen. When relay panels are arranged back to back, the panel opposite one to be worked on must also be covered.

09L.05 When it is necessary to work in relay rooms or adjacent to relay protection panels where no verbal PERMISSION FOR WORK is required, this work may be done only with the authorization or one of the supervisory staff, after the operator in charge has been notified.

Irrespective of the above, before any work is started in the vicinity of relay panels or on apparatus equipped with gas detector relays which could cause tripping of this equipment, a HOLD ORDER must first be obtained from the operator in charge. This applies particularly to drilling metering panels, drilling or chipping concrete or other work which might cause vibration. Dust clearing of relay covers must not to be carried out without a HOLD ORDER from the operator in charge.

09L.06 No work on the above mentioned equipment is to be undertaken without the prior approval of a member of the supervisory staff of the station(s) or division concerned.

09L.07 In the case of a PERMISSION FOR COMMUNICATION WORK on a communication or carrier circuit which is in any way connected to relay protected, control or metering circuits involving two or more station. it is the duty of the operator the PERMISSION to advise the other station or stations concerned and the system operator.

SECTION 09M Men Working Tags

09M.01 These are red colored tags as shown in Part Caution Notices/Tags. These tags are to be installed at all controlling points of apparatus on which a CLEARANCE FOR WORK or a WORK/ TEST PERMIT is being issued and are only to be installed and removed by the operator-in-charge or on his order. If desirable a miniature tag may be used on the bench board controller.

09M.02 Each tag must be initiated and dated by the person installing it.

09M.03 These tags are never to be used as a substitute for the "Live permit for Work", "Danger" "Out of Order", or "Abnormal Conditions" tag.

SECTION 09N Line Permit for Work Tags

09N.01 These are green colored tags as shown in Part Caution Notices/Tags. These tags are to be installed on all circuit breaker controllers of apparatus on which a PERMISSION FOR LIVE LINE WORK or a PERMISSION FOR LIVE STATION WORK is being issued and are only to be installed or removed are by operator in charge or on his

order. If desirable a miniature tag may be used.

09N.02 Each tag must contain installation date & the initial of the person installing it.

09N.03 These tags are to be installed only when a PERMISSION FOR LIVE LINE WORK is being issued and are not to be removed until the PERMISSION has been returned.

SECTION 09P "Danger" signs/Tags

09P.01 These black and red signs shown in Part Caution Notices/Tags, must be used to indicate danger in the immediate vicinity of the point marked. They may be installed by the operator or the work as required. They are to be used only in areas where actual danger exists.

09P.02 Each sign must be initialed and dated by the man installing it.

SECTION 09Q Abnormal Conditions Tags

09Q.01 These blue colored tags as tags as shown in Part Caution Notices/Tags, to be attached to apparatus which do not operate in its normal manner. Such a tag do not prohibit the use of the apparatus marked, it indicates that special caution should be exercised and that the equipment should not be used unless its limitations are understood. If desirable a miniature tag may be used.

09Q.02 This tag may be used by both operators and maintenance men, but must not be placed on any apparatus under the jurisdiction of the operator-in-charge without his consent.

09Q.03 Each tag must be initialed and dated by man installing it.

09Q.04 This tag must not be revived until the abnormal conditions have been corrected and all interested parties notified.

SECTION 09R "Out of Order" Tags

09R.01 These are yellow colored tags as shown in Part Caution Notices/Tags. These are to be used to indicate faulty apparatus, building accessories, or any equipment which must kept out of service because of some defect.

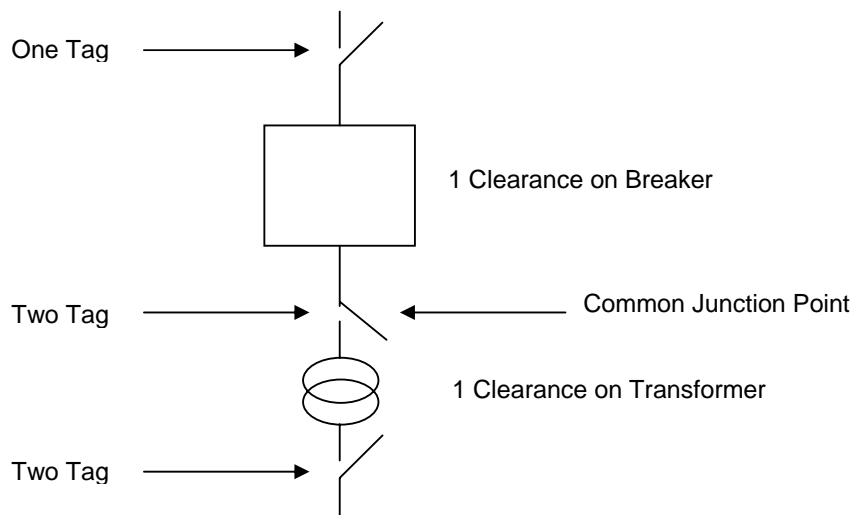
09R.02 This tag may be used by both operators and maintenance men but must not be placed on any apparatus under the jurisdiction of the operator-in-charge without his consent.

09R.03 Each tag must be dated and initiated by the man installing it.

09R.04 This tag must not be removed until the "Out of Order" conditions has been corrected and all interested parties notified.

SECTION 09S Do Not Operate Tags

Each Disconnecting Switch will have individual tags. The tagging of isolating devices that are common junction point between multiple clearances is shown:



SECTION 09T Miniature Tags

09T.01 In the case of bench board and supervisory controls, miniature tags of the type previously outline may be used in a holder of approved design and when using this type of tag, each tag must be initiated and dated by the person installing it.

SECTION 09U Operating Pin Diagrams

09U.01 Operating diagram pins are of different colors and shapes. They are to be used in conjunction with operating pin diagrams at all locations to give operators an indication of the status of the equipment under their jurisdiction.

SECTION 09V PERMITS-TO-WORK/TEST AND MINIMUM ACCESS DISTANCE (MAD)

09V.01 Authority for issue

1. Permit to WORK/ TEST shall only be issued with the sanction of the control engineer. Who shall retain in his custody a written record of the issue of each Permit-to-WORK/ TEST and its cancellation.
2. A Permit to WORK/ TEST shall be issued by the Senior Authorized person under whose supervision the work is initiated before any work is carried out on any apparatus after it has once been connected to and remains part of a high voltage system.
3. A MAD shall be issued by a Senior Authorized Person or an Authorized Person specially authorized to do so. A MAD shall be issued when verbal instructions are not considered sufficient.
4. Excavation Permit A for declaration endorsed by all relevant departments of PGCB issued prior to work permit to the person in charge of the proposed excavations to ensure that all underground services and power cables are identified and safe methods of excavation are followed.

09V.02 Procedure for Issue and Receipt

- 1) A WORK / TEST permit or MAD shall be issued to the person in charge of the work, who after reading its contents shall sign on its receipt and it's duplicate shall be retained to the person issuing the Permit to WORK / TEST or MAD.
2. The person to whom a Permit to WORK/TEST or MAD is issued shall be a Competent Person who shall retain the Permit to WORK/TEST or MAD in his possession at all times whilst work is being carried out.
3. The person in charge to whom a Sanction-of -Test is issued shall be an Authorized Person who shall retain the Sanction for Test in his possession at all times whilst tests are being made.
4. Where more than one working Party is concerned a Permit-to-Work or MAD shall be issued to the Competent Person in charge of each Working Party.

09V.03 Precautions during Progress of Work

1. The apparatus isolated and earthed for work under the terms of a Permit-to-Work shall remain so until the Permit-to-Work has been cleared, returned to a Authorized Person, and cancelled.
2. The apparatus isolated and earthed for testing under the terms of a Sanction-for-Test must not be connected to the system without the sanction of the Control Engineer. The recipient of the Sanction-for-Test will be responsible for co-ordinating all testing operations on the isolated equipment and for ensuring safety during the tests. He may without further reference to the Control Engineer remove and replace earths as necessary and carry out tests including making live the apparatus concerned from a testing supply. This does not mean that the recipient of the Sanction-for-Test must make the tests personally.

9V.04 Procedure for Clearance and Cancellation

1. When work on apparatus for which a Permit to WORK/TEST has been issued is suspended or completed the recipient shall sign the clearance and return the Permit to WORK/TEST to Senior Authorized Person who shall cancel it and inform the Control Engineer.
02. Where more than one Permit to WORK/TEST has been issued for work on High Voltage Apparatus associates with the same Circuit Main Earths the Control Engineer shall ensure that all such Permit to WORK/TEST have been cancelled before the Circuit Main Earths are removed.
03. When work for which a MAD has been issued is suspended or completed the recipient shall sign the clearance and return the MAD for clearance and return the MAD for cancellation to a Senior Authorized Person specially authorized to do so.

CHAPTER10

PLACING APPARATUS IN SERVICE

SECTION 10A Returning Apparatus to Service.

10A.01 Before returning any apparatus to service the operator must be informed of any change which has been made of the equipment and be guided accordingly.

10A.02 In the case of major restrictions the station or division incharge and the system operator must be advised. If necessary, written instructions regarding procedures to be followed will be issued.

10A.03 Generators, Transformers, lines or other Electrical apparatus whose correct operation depends upon Definitely fixed connections, and whose connections may possibly have been altered during the work, must not be placed in service until the necessary phasing, polarity, ratio and continuity checks have been made. When such alterations can affect the paralleling of two individual circuits, this paralleling must be physically proved before the equipments is paralleled in normal operation.

10A.04 When synchrosopes, synchronizing connections or their associated potential transformers have been disturbed or their connections altered, a positive test for "in phase" indication and rotation must be made before they are returned to service.

10A.05 In returning relays to service the procedures as given in standard and local operating Instructions must be followed.

10A.06 Before starting any apparatus after repairs have been carried out, the operator must inspect the equipment to assure himself that all loose material or obstructions between stationery and moving parts have been removed.

10A.07 After being returned to service, all repaired apparatus must be carefully watched for signs of trouble which may be indicated by instruments odor, noise, vibration, overheating or other unusual conditions.

SECTION 10B Placing New Apparatus in Service.

10B.01 New lines or station apparatus must not be placed in service until a thorough inspection and proper tests have been made by the station or testing & commissioning department. Such new apparatus must not be placed in service without the knowledge and approval of the station or testing & commissioning authority concerned the operation-in-charge and the system operator. The time and date of placing new apparatus in service must be accurately recorded.

10B.02 When placing new major power equipment in service for the first time, in attended or unattended stations, it must be kept under close continual observation to ensure that it is operating satisfactorily. This period of observation must be a minimum of 48 hours. Circumstances may dictate a much longer period.

CHAPTER 11

SWITCHING

SECTION 11 A Preparation of a switching programme form.

11A.01 The approved switching order form used in connection with the manual operation of disconnecting switches is as shown in appendix. This form is to be used at a location whenever manual switching is performed.

11A.02 In all stations where two or more operators are on shift together, the operator in charge, makes out the order, which is checked by the assistant operator, using the operating pin diagram. After checking the form, he must initial it, as witness to its correctness.

11A.03 In smaller stations that have only one station attendant on shift or at normally unattended stations having a man sent to do the switching, the order shall be made out from instructions received by telephone or radio. It shall be read back to the person dictating it to ensure its correctness and the man who has completed the switching programme form must perform the switching operation.

11A.04 The switching order form shall list in the proper sequence of operation, each individual maneuver which requires the installation or removal of temporary grounds, the manual operation of disconnecting switches, circuit breakers, potential transformer, switches or relay protection switches which comprise a sequence of operation.

11A.05 When a circuit breaker or motor-operated disconnecter is to be operated from a controller, it is not required that a switching order form be completed. However, when a circuit breaker or motor operated disconnecter operation forms parts of a sequence of operations particularly when manual operations are involved, then it must be included in the switching orders entered on the switching programme form.

11A.06 Before any manual operation of disconnecting switches, the operator in charge must make out a standard switching order form, with the switches listed in proper operation sequence in conformity with the applicable operating instructions. He must state clearly either "Open" or "Close" and give the official designation of each switch.

11A.07 A good number of switching operations may be listed on one form, where large number of operations are required, Additional forms must be made out and numbered in proper sequence.

11A.08 After the switching programme form or forms have been made out, they must be checked by assistant operator where this position exists. Switching orders received by telephone or radio must be entered in the switching order forms and then repeated back to the person giving the order.

SECTION 11 B Switching Procedure.

11B.01 While carrying out the switching operation, the switching programme must be carried out in the standard switching order form by the man doing the Switching so that each operation can be checked and the proper sequence followed.

11B.02 The operation will then go to the first switching on the switching form and if possible check the position of the associated circuit breakers by visual inspection and by local indicating lamps.

11B.03 Being assured that any associated circuit breakers are in the correct position, the operator must then check the official designation and position (open or close) of the disconnecter to be operated against his switching order form.

Note: If it is found that any circuit breaker or disconnecter is not in the correct position according to his switching order form the operator will cease switching and cancel the switching order form. When the cause of the abnormal condition has been discovered and corrected, switching may proceed with switching programme form.

11B.04 Operator must then perform the switching operation as called for on the switching order form. When the operation has been completed, the operator must check that the disconnecter is fully open or close on all phases as called for in the switching order form. Each operation must be off on the switching order form as completed and before proceeding with the next operation.

11B.05 The exact procedure of checking before and after each individual switching operation on the Switching Order Form must be strictly adhered to.

11B.06 Summary of procedure to be followed by the employee carrying out manual operation of disconnecting switches.

1. Make out switching order form.
2. Together with assistant or by telephone or radio check accuracy and sequence orders.
3. Check associated breakers.
4. Note switch designation and position, check with the switch order form.
5. Read first order, perform operation called for.
6. Check position of all phases and the condition of the switch after operation.
7. Mark off completed operation on the switch order form. Read the next order and proceed as above.

SECTION 11 C Precautions Regarding the Operation of Disconnecting Switches.

11C.01 If a disconnecting switch has been closed in error, the switch must be left in the closed position and due to the danger of an arc or system disturbance, no further switching is to be performed until a corrected switching order form has been prepared.

11C.02 If a disconnecting switch has been operated in error, it should be left in the open position and no further switching is to be performed until a corrected switching order form has been prepared. However, if it is obvious that the switch is being operated in error and the arc is not yet broken, it should be re-closed immediately.

11C.03 Circuit breaker signal lights generally give a true indication of the position of the breaker. But sometimes an improper indication does occur. It the accordingly necessary to make a visual inspection of the breaker whenever practical and check associated meters for load and voltage before operating associated disconnecting switches

11C.04 Where the mechanisms of disconnecting switches are accessible to the public, such switches must be kept locked.

11C.05 When closing a stick operated single pole disconnecting switch, the blade should be lined up and then closed deliberately and without hesitation. It should be closed firmly but not slammed.

11C.06 When opening a stick operated single pole disconnecting switch, the blade should be opened slowly until it is determined that no abnormal arcing will result then it should be opened to its full travel in one quick movement.

11C.07 After a stick operated single pole wedge and screw type disconnecting switch has been closed, the wedge should be screwed up firmly but not excessively. Excessive tightening will damage the switch.

11C.08 Do not attempt to interrupt load current on a disconnecting switch or other air break switch, as they are not designed for that purpose, This, of course, does not apply to separating parallel circuits where the current has an alternative path to take and the voltage difference across the gap after the switch has been opened will be relatively small.

11C.09 Tests have shown that at 50 cycles, 400 volts difference of potential will maintain an arc (one foot) 30.58 cm long. Extreme care must be exercised and extra precautions taken, while opening heavy duty disconnecting switches, even where a parallel path is known to exist, since if only a relatively small difference of potential exists across the

gap, when the switch is opening, a serious arc may result. Should any doubt exist in the mind of the operator as to such a switching operation, he must not hesitate to refer the matter to his supervisor, for a decision as to the proper procedure.

11C.10 When it is necessary to open outdoor disconnecting switches to de-energize line of transformer banks during high wind conditions, it must be recognized that a possibility of arcing over between phases exists. If such circumstances, the supervisory staff should be consulted.

11C.11 When operating disconnecting switches indoors, operators should see that switch room doors are left open and clear of obstructions so as to allow the exit in case of trouble, and should not allow themselves or any other person to get in such a position that an electric arc or other trouble would cut off the only means of escape.

11C.12 Rubber gloves protected by leather gauntlets must be worn whenever operating manually operated disconnecting switches and ground switches.

11D Identification of circuits.

11D.01 Proper Marking of the Breakers and Disconnections (Isolators) on the panel boards as well on the equipment is most important in view of accurate operation of the system. When installed new, there is a no. from the manufacturer / constructor (Project) of sub-station in line with that exists on the drawings. It should be co-coordinated with the general numbering given by LDC for central coordination of system operations.

11D.02 Marking on the transmission line help in identifying the lines and circuits during the line maintenance works. Line markings should be easily understandable so that line staff and supervisors can identify easily on which tower or in which span maintenance is to be done.

CHAPTER 12

WORK ON CIRCUIT BREAKERS

SECTION 12A General Precautions

12A.01 Before entering a circuit breaker compartment, all persons must obtain the consent of the operator in charge and be accompanied by the operator, if possible or by a responsible person designated by local instructions.

12A.02 If necessary, measuring, cleaning or other work may be done around a live circuit breaker only with the approval of the incharge, if there is any danger what so ever of contact being made with any live parts to inadvertently operating the breaker. A PERMISSION FOR LIVE STATION WORK must be obtained and a watchman must be appointed.

12A.03 The operator must take the following special precautions before issuing a HOLD ORDER of any type of circuit breaker:

1. If possible, breaker should be open.
2. Remove the D. C. control supply fuses at the controller or the interposing relay panel.
3. Remove the A.C. supply to tank or control cabinet heaters.

12A.04 The following precautions must be taken by the workman in charge after receiving a HOLD ORDER on a circuit breaker.

1. Satisfy himself that the conditions of the HOLD ORDER have been fulfilled.
2. Install mechanical blocking where required, to prevent unauthorized movement of the mechanism.
3. In the case of pneumatically operated breakers shut off the air supply and exhaust the tanks, leaving the exhaust valve open.
4. If possible, operate the trip and close circuits at the breaker itself.
5. Check that the A. C. supply to control cabinet heaters has been removed.

12A.05 The holder of a HOLD ORDER may operate a circuit breaker by hand under the authority of a CLEARANCE FOR WORK but a WORK / TEST PERMIT must be taken out before energizing any circuits or operating the breaker either electrically or pneumatically.

12A.06 Where it is necessary to work in a circuit breaker in a bus chamber. or room which contains two more such breakers, suitable barriers must be taken that material to be used in the work does not block any exit.

12A.07 When work has been completed on a circuit breaker and before returning the HOLD ORDER to the operator in charge, the man in charge of the work must assure himself that all his safeguards such as mechanical blocking and barriers have been removed. He must also make sure that any valves or electric circuits which have been operated in the course of the work are restored to the position in which they were originally received, unless other arrangements have been made.

SECTION 12B Work Inside Oil Circuit Breaker Tanks.

12B.01 When work necessitates going inside an oil circuit breaker, another man must be detailed to stay in the immediate vicinity of the manhole to render any aid that may be required. This outside man must see that no safeguards are removed or changed without the consent of the man inside the tank.

12B.02 The mechanism must not be moved, except on definite instructions from the man in the tank and this man must be warned before any movement is made.

12B.03 Matches, oil or gas lanterns, sparking devices or other open lights must not be used near manholes or inside tanks, because of possible explosion due to the presence of explosive gases. Smoking is strictly prohibited inside a tank.

12B.04 under normal conditions the breaker tank should be vented for at least 15 minutes before the workman enters the tanks. Under abnormal conditions (excessive fault operation, hot oil, etc.) tanks are to be vented by forced air.

SECTION 12C Special Precautions Relating to Minimum-Oil Type Circuit Breaker.

12C.01 An isolating switch incorporated in the Minimum-oil circuit breaker is not acceptable for the purpose of clearing the breaker for work.

12C.02 As the operating springs are under tension in both the open and closed positions of the breaker, extreme care must be taken when adjusting the operating mechanism to avoid accidental operation which may cause physical injury

12C.03 When working on the contacts of these breakers, the stored spring tension should be released by closing and tripping the breaker mechanically, after the control circuit has been opened at the breaker.

12C.04 When it is necessary to dismantle the operating mechanism in the control cabinet the main spring tension should be completely released by means of the ratchet gear.

SECTION 12D Special Precautions Relating to Air Blast circuit Breaker.

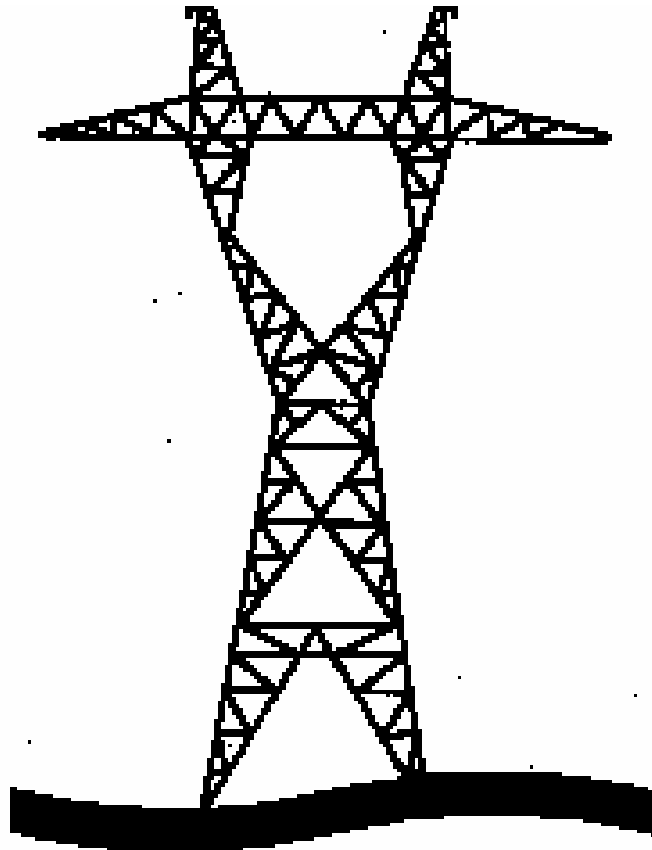
12D.01 All parts of an air blast circuit breaker must be considered as live, with exception of the control cabinet. Exposed live metal parts to these breakers must be painted a brilliant red as a warning. Where it is desirable to indicate voltages, only the extreme top of the breaker is to be painted. Also the word DANGER should be painted in white in some conspicuous place.

12D.02 When it is required to operate an air blast circuit breaker for test, all personnel, in the vicinity should be warned and men working on the breaker ordered to stand clear. Where employees are exposed to the air blasts from the breaker, goggles must be worn.

12D.03 An isolating switch incorporated in the air blast circuit breaker is NOT acceptable for the purpose of clearing the breaker for work.

12D.04 When working on an air blast circuit breaker where an electrical disagreement feature exists, the control switch and disagreement switch must be opened in each phase control cabinet at breaker.

12D.05 Air blast circuit breaker, which has pneumatically operated mechanism, must never be blocked mechanically while pressure remains in the breaker storage tank or tanks. Mechanical blocking may result in personal injury or damage to the breaker.



**It's NOT Dead
If It's NOT Grounded**

Part-II
SAFETY PRACTICES

01 General safety precautions

01.01 Work on High Voltage Apparatus

No person shall carry out work in any description on any part of High Voltage Apparatus unless the parts of the apparatus on which he works are

- a. Dead
- b. Isolated and all practicable steps taken to lock off from live conductors.
- c. Efficiently connected to earth:
 - i) At all points of disconnection of supply to such apparatus, or
 - ii) Between such points and the points(s) of work:
- d. Screened where necessary to prevent Danger and Caution and Danger Notices fixed.
- e. Released for work by the issue of an Electrical Permit-to-Work or sanction-for-Test.
- f. No person shall carry out work of any description on any part of High Voltage Apparatus unless the person is fully conversant with the nature and the extent of the work to be done.

It is the duty of the person issuing the Electrical Permit-to- Work or Sanction-for-Test to ensure that the provisions listed above are complied with. If the senior authorized person is not at the location of the work then the confirmation, that the safety precautions are completed, shall be obtained by the senior authorized person by telephone or radio contact with the responsible Control Engineer. Provided that if the clearances specified in Rule 8.6.1 are maintained, adjustments, cleaning and painting of earthed metal enclosures, and of structures may be carried out from ground level under a Limitation-of-Access. Similar work carried out from above ground level shall be done under and Permit-to-Work. Making live or dead by signal or pre-arranged understanding after agreed interval of time is FORBIDDEN.

01.02 Interference with Conductors/Parts

No person shall touch the insulation which covers or supports a high voltage conductor unless the conductor is dead and earthed.

01.03 Fixing of Notices and Screens

Work shall not be carried out on any High Voltage Apparatus which has been made dead and earthed until Caution Notices have been attached at all points where such apparatus can be made live. Danger Notices shall also be attached to the live apparatus.

Caution Notice, Danger Notice, barriers and screens shall be fixed or moved only under the supervision of and authorized person.

01.04 Safety locks

Safety locks shall be used to lock off all switches at points where the circuit on which work is to be carried out could be energized.

01.05 Safety Keys

Key safes fitted with locks shall be provided at suitable positions for keys which secure switches, barriers, spout shutters, lock-out equipment and other similar devices provided for the protection of men working under an Electrical Permit-to-Work only by a key in the possession of a Senior Authorized Person. The other locks shall be of a type operated by non-interchangeable Keys. Holders of all safe keys are personally responsible for their safe custody. Written receipts must be given by means of an entry made in the station key ledger each time the custody of a key is transferred.

01.06 Work on Towers, Poles and high structures.

All persons working on towers, poles and high structures shall wear and make proper use of a suitable safety belt or harness.

No man shall work alone at any tower or high structure. Before any wood pole is climbed it shall be sound and if the condition of it is doubtful shall be climbed only with the permission of the Competent Person in charge. All old weak poles must be guyed or branched before climbing.

01.07 Work on Apparatus which can be made live from More than One control system.

- a. Before any switching or earthing is carried out or before an Electrical Permit-to-Work or Sanction-for-Test issued for work on apparatus which can be made live from more than one control system the Control Engineer responsible shall communicate with the control Engineer(s) of the other system(s) concerned and the switching and earthing shall be agreed between them.
- b. The conditions of Rule 8.1 shall apply. Key safes shall be provided and the safety keys places therein.
- c. The switching, earthing, deposit of safety keys in key safes and details of any Electrical Permit-to-Work or Sanction-for-Test issued shall be recorded at all centres concerned.

02 Minimum Access Distance (MAD)

02.01 No part of a work's body or any conductive object held by a work shall be closer to energized high voltage parts than the applicable Minimum Access Distance unless an approved barrier is in place. When work is to be performed within the Minimum Access Distance Including the installation and removal of barriers, one of the following must be employed:

- 1. Adequate barriers.
- 2. Use of live line tools.
- 3. Clearance.

02.02 Conductive objects such as insulator support hardware which extend into Mimimum Access Distance may be contacted outside the applicable Minimum Access Distance.

However, such objects must have been installed in accordance with approved design standards and be fixed or limited in movement so that the designed Clearances cannot be reduced.

Power equipment or loads shall not be moved closer than 4.6 meters (15 Feet) to energized circuits unless directed by a Safety Watcher. Approach within the Minimum Access Distance can occur only when the circuit is de-energized, properly tagged and grounded, or approved barriers have been installed.

02.03 The following Table provides Minimum Access Distance, in meters (inches), for phase-to-phase Voltage commonly used on other system. MAD is based upon maximum transient voltages that can be generated during switching.

Minimum Access Distance (MAD)			
Nominal Voltage Phase to Phase	Impulse Voltage	Meters	Inches(Feet)
33 KV	170 KV	0.72	28 (2½)
132 KV	550 KV	1.25	49 (4)
230 KV	930 KV	1.83	72 (6)
500 KV/400 KV	1425 KV	3.21	126 (10½)

02.04 Enclosures Containing High Voltage Apparatus.

Enclosures, chambers, cubicles or cells containing live High Voltage Apparatus shall normally be kept locked and the keys shall be kept locked in a box or cupboard. They shall be removed only by an Authorize Person, except Authorized Person or person acting under his immediate supervision, shall have access to any enclosure, chamber, cubicle or cell in which a live conductor is exposed.

02.05 Towers and Gantries.

Gates and devices to prevent climbing of towers and gantries shall always be kept locked except when they are opened under the instructions of an Authorized Person.

03 Switching

03.01 Operation of Circuit Breakers and Isolators.

No high voltage switching shall be carried out without the sanction of the appropriate Control

Engineer, except for cases of emergency For Switching of grid substations, sanction of load despatcher shall be obtained.

03.02 When a control Engineer requires high voltage switching to be carried out he shall first communicate with the Authorized Person concerned. If the switching is to be carried out by another person not under immediate supervision of the Authorized Person, then the Authorized Person shall instruct the person who is to switch to communicate with the control Engineer to receive direct instructions.

03.03 Before any switching is carried out on a locally controlled system which may affect other system the Control Engineer authorized the switching shall communicate with the Control Engineer (s) of the other system (s) concerned and the switching shall be recorded at all centres concerned.

03.04 Switching to the Control Engineer's instructions, or with his consent shall be carried out without undue delay. All switching, whether to a Control Engineer's instructions or in case of emergency, shall be reported to the Control Engineer as soon as possible after each operation.

03.05 When a switchgear shows any sign of malfunction or distress after operating, its condition shall be reported to the

Control Engineer and it shall be examined before further operation.

03.06 When any Person receives instructions to work on High Voltage. Apparatus but objects to the instructions, he shall report his objections to the Control Engineer who shall then have the matter investigated.

03.07 Telephone or Radio Messages

Every telephone or radio message relating to the operation of the high voltage system shall be written down. Every message shall be repeated in full back to the sender to ensure that the message had been accurately received.

03.08 Recording of Switching.

A record of high voltage switching shall be made in the station logs. The Control Engineer shall record in his log the time and details of all high voltage switching.

03.09 Switching for Test Purposes.

When a section of equipment has been isolated from the main supply system for testing, the Control Engineer may on the form for the Sanction-for-Test give a general sanction for the operation of switches, isolators, earthing switches and earth connections within the isolated, section. And for the application of testing supplies, the person in charge of the testing will then become wholly responsible for complying with these Safety Rules within the isolated section. No switch or isolator connecting the isolated section to the main supply system shall be operated without the direct section of the Control Engineer except those for the agreed testing supplies.

04 Grounding (Earthing)

04.01 Circuit Main Earths.

No high voltage earthing switch shall be operated except to the instructions of the Control Engineer. Only an Authorized Person or competent Person acting under the immediate supervision of Control Engineer shall carry out these operations. Each operation shall be reported to the Control Engineer as soon as possible after completion. Where applicable the location of each connection to earth shall be recorded on the Electrical Permit-to-work or Sanction-for-Test.

04.02 Additional Earths

Additional Earth connections may be attached and moved by Competent Person under Electrical Permit-to-Work

04.03 Equipment for Earthing.

High Voltage apparatus is to be discharged and earthed by the use of earthing switches or special apparatus where provided, or by other approved means.

04.04 Earthing leads for use at generating stations and substations shall have a cross section

of not less than (0.1sq.in) 65mm² copper equivalents. Earthing leads for use on overhead lines shall have a cross section of not less than (0.04sq.in) 25.8mm² copper equivalents. The clamps shall be of an approved type and adequate capacity.

04.05 Earthing leads shall be examined at least every three months and always immediately prior to use.

04.06 Procedure for the use of Earthing Leads

The procedure to be followed when using portable earthing leads shall be as follows:

- a. Check that the circuit is not live and where practicable test by means of a voltage indicator of approved type, THE INDICATOR ITSELF BEING TESTED IMMEDIATELY BEFORE AND AFTER VERIFICATION.
- b. Earthing leads shall be connected to the earth system before being connected to the phases. They must be connected to the phases by means of a pole or other approved apparatus and care must be taken to ensure that good contact is made.
- c. All phases shall be earthed, even if work is to be carried out on one phase only
- d. Earthing leads shall not be applied in any cell or compartment in which there is any exposed metal live at high voltage.
- e. When removing earthing leads at any point, they shall all be disconnected from the phase end before being disconnected from the system.

04.07 Earthing of Metal-Clad Switchgear

For the purpose of earthing metal-clad switchgear approved appliances only be used. THE INSERTION OF THE HAND OR ANY TOOL IN CONTACT SPOUTS FOR THIS PURPOSE IS FORBIDDEN.

Before work is carried out on the withdrawable portion of truck type or metal-clad switchgear, the provisions of Rules 8.1 (a) and (b) shall be first complied with. The apparatus shall then be:

- a. Checked by means of an approved voltage indicator, THE INDICATOR ITSELF BEING TESTED IMMEDIATELY BEFORE AND AFTER THE VERIFICATION.
- b. Discharged to earth (such earth to remain connected unless the apparatus is bodily removed from its normal live position and is disconnected from all possible sources of supply)

04.08 Recording of Earthing

The control Engineer shall record in his log the location and time of application of all circuit main earth connections, and the time of their removal.

05 Permits-to-work and sanctions-for-test.

05.01 Arrangements for issue.

Permits-to-work or sanctions-for-test shall only be issued with the consent of the Control Engineer, who shall retain a copy of each permit and sanction issued, until a senior authorized person has cancelled it.

Work shall not be carried out by person on any high voltage apparatus where technical knowledge or experience is required to avoid danger until an electrical permit-to-work or sanction-for test has been signed and the card copy handed by a senior authorized person to the person in charge of the work. The person in charge of the work shall then read about its contents to the senior authorized person issuing the permit or sanction, and also sign the card copy, and it's duplicate.

If the apparatus is not situated on the premises of PGCB, the senior authorized person shall hand over a pink copy of the electrical permit-to-work to the official responsible for those premises, and obtain his signature on it.

The person in charge to whom an electrical permit-to-work is issued shall be a competent person and the work shall be carried out under his immediate supervision. If work is to be carried out under the immediate supervision of the senior authorized person himself, he shall issue the permit and hold it as the person in charge. It is not permissible for a senior authorized person to issue an electrical permit-to-work to himself and then leaving the site.

An electrical permit or sanction shall be issued to the person in charge of each working party, unless the superintending engineer has authorized an alternative procedure in writing.

The person in charge to whom a Sanction-for-Test is issued shall be a Senior Authorized Person or an authorized Person who has been appointed in writing to receive Sanction-for-Test

05.02 Precautions during Progress of Work

The apparatus isolated and earthed for work under the terms of an Electrical Permit-to-Work shall remain isolated and earthed until the permit has been cleared, returned to a Senior Authorized person, and cancelled.

The apparatus isolated and earthed for testing under the terms of a Sanction-for-Test comes under the temporary control of the man who receives the Sanction. He may operate it in accordance with these rules. He is responsible for co-ordination all such operation in the isolated equipment and for ensuring safety during the tests.

05.03 Procedure for Clearance and Cancellation

After work, for which a permit or sanction has been issued, has been completed or stopped by an Authorized Person, the person in charge the work shall sign the clearance. He shall then immediately return the card to the Authorized Person who shall then obtain the permission of the Control Engineer for cancellation.

06 Work in Sub-stations and Switching stations.

06.01 Safety Clearance to Live Conductors

When work is to be carried out in a sub-station in which there are exposed live high voltage conductors then unless the whole equipment is dead, the section which is made dead for the work to be carried out shall be defined as far as possible by the use of barriers or roping. These shall be arranged so that the minimum clearance from the nearest exposed conductor ground level or platform or access way shall be maintained as stated below

Rated Voltage	Minimum Clearance	
	Metres	Feet
33KV	2.75	9.00
132KV	3.43	11.50
230KV	4.22	14.00
400KV	5.49	18.00

06.02 If the work is such that these clearances are not sufficient to avoid Danger, other suitable arrangements shall be made to provide the degree of safety required.

06.03 At ground or floor level the section shall be distinguished by red flags fixed on separate supports 0.6m (2) to 0.9 apart. The boundary mark shall not be supported by any, structure carrying electrical apparatus or conductors, and shall not carry notice. Danger Notices shall be placed to indicate adjoining High Voltage Apparatus or section clearly.

06.04 Use of Cranes, Ladder and Longer Objects

- a. Ladders shall be of an approved type and not longer than that needed for the work.
- b. Ladders and other long objects shall not be used without the permission of an Authorized Person. The movement and erection of such ladders and objects shall be carried out only under the direct supervision of an Authorized Person. When moved at ground levels they shall be carried only in a horizontal position and as near the ground as practicable.
- c. Portable ladders provided for giving access to fixed ladders shall be locked in position by an Authorized Person while work is being carried out on the structures.
- d. When not in use, all portable ladders within substations or switching stations shall be securely locked to a suitable anchorage.

- e. When not in use, all portable ladders within substations the route to be followed shall be agreed and defined on site by a Senior Authorized person. The equipment shall be connected to the substation earthing system immediately if it is practicable to do.
- f. When cranes or other equipment are taken into or out of a substation, the route to be followed shall be agreed and defined on site by an Authorized Person to an Authorized Person and the equipment shall be erected or moved only within these limits under the supervision of the Authorized Person.

07 Work on High Voltage Apparatus

07.01 No person shall carry out any work on any high voltage Apparatus, unless the following operations are carried out in strict sequence:

- a. The apparatus shall be
 - i) Switched out at all points of supply.
 - ii) Isolated from all points of supply, including voltage and auxiliary transformers and common apparatus may become live.
- b. The carrying out of these operations shall be reported to the control Engineer and further permission received for the carrying out of the subsequent operations.
- c. The apparatus shall then be
 - i) Checked by means of an approved voltage indicator to verify that the circuit is not live. THE INDICATOR ITSELF BEING TESTED BEFORE AND AFTER THE VERIFICATION:
 - ii) Discharged to earth.
 - iii) Efficiently connected to earth at all points of isolation from the supply, including points of isolation from common neutral earthing equipment.
- d. Caution Notices shall be attached at all points where such apparatus can be made live.
- e. Circuit breakers, isolators, spout shutters, control handles and safety devices shall be locked in position by the keys provided for purpose which then be locked in the appropriate key safe.
- f. A Permit-to-work shall then be issued.
- g. Unless the circuit main earths through which the apparatus is connected to earth are close to and visible from the point of works the apparatus shall be efficiently connected to earth by means of Additional Earths at the points of work. When apparatus has been disconnected from all supplies and bodily removed from its normal live position, its conductors shall be discharged to earth. No fixed earths are necessary.
- h. If operations (a) to (e) are carried out at more than one location, the Authorized Person at each location shall lock the safe and retain the key in his possession until he receives instructions from the control Engineer to restore the equipment ready for service. At the location where the Permit-to-work is issued, the senior Authorized Person shall operate the lock reserved for his use and each recipient of a Permit-to-Work shall operate an additional lock and retain the key in his possession until he clears the permit and returns it with the key to Authorized Person. Operations (a) and (b) shall be carried out by an Authorized Person. Operations (c),(d) and (e) shall be carried out by an Authorized Person or a Competent Person acting under his immediate supervision.

07.02 Work on Switchboard/Outdoor Station.

The whole switchboard or outdoor station shall be dead. The section in which work is being carried out should be separated by permanent or removable divisions or screens from adjoining section and distinguished by red flags fixed on separate supports 0.6m (2') to 0.9m (3') inside the safe boundary and not more than 6m (20') apart. The permanent or removable divisions or screens shall remain fixed in position during course of the work. Danger Notices shall be placed to indicate adjoining High Voltage Apparatus or sections clearly.

07.03 Work on Static Capacitors

Work on high voltage static capacitors shall be carried out in accordance with requirements of Rule 07.01 and the following earthing operations shall be carried out under the direct supervision of an Authorized Person in the following sequence:

- a. (i) Apply approved Earth to the capacitor frames.
(ii) Apply approved post or Rack Earths to the common connections of each group of capacitors.
- b. A Permit to Work / Test shall then be issued for the group or groups upon which work or testing is to be carried out. Approved additional earths shall then be applied to the capacitor units at the point of work these earths may be applied or removed only under the direct supervision of an Authorized Person.
- c. Capacitor units shall be short circuited and remain short circuited on removal from the circuit or in cases where earthing is impracticable.

07.04 Remotely/Automatically Controlled Equipment.

Before work is carried out on remotely or automatically controlled equipment such as circuit breakers, isolators, tap changing gear, or air compressors, the automatic or remote control features shall first be rendered in-operative. No work shall be carried out on the controlling equipment, wiring or relays except by an Authorized Person or a competent Person acting under the direct instruction of an Authorized Person.

07.05 Optical Fibers

When working with Fiber Optics, the use of personal protective equipment is required to prevent injury. Eye protection shall be worn when splicing glass fiber. Care should be taken during the cleaving process to protect the eyes and the body from broken glass pieces. Looking into the end of an optical fiber may damage the eye as there may be laser light present which is invisible before touching or coming within the Minimum Access Distance (MAD) of an optical fiber ground wire (OPGW), it must be grounded at that location by either a portable ground or a permanent ground connection.

08 Work on Metal-Clad Switching Spouts.

08.01 Bus bar spouts of Multi-panel switchboards when work to be carried out on bus bar spouts the following operations shall be carried out in strict sequence:

- (a) The section of the bus bars on which work is to be carried out shall be isolated from all points of supply from which it can be made live.
- (b) The isolating arrangements shall be locked so that they cannot be operated and shutters of live spouts locked shut.
- (c) When practicable, the bus bars shall be checked by means of a voltage indicator itself being tested immediately before and after the indicator shall be done on the panel to be earthed with circuit main earths.
- (d) Circuit Main Earths of approved type shall be applied at a panel other than that at which work is to be done, on the isolated section of bus bars. The insertion of the hand or any tool into contact spouts for this purpose is forbidden.
- (e) Caution Notices shall be attached at all points where the bus bars can be made live.
- (f) Circuit breakers, isolators, spout shutters, control handles and safety devices shall be locked in position by the keys provided for the purpose which shall then be locked in the appropriate key safe.
- (g) If operations (a) to (e) are carried out at more than one location the Authorized Person at each location shall lock the safe and retain the key in his possession until he receives instructions from the Control Engineer to restore the equipment ready for service. At the location where the Permit-to-Work is issued the Authorized Person shall operate the lock reserved for his use and each recipient of a Permit-to-Work shall operate an additional lock and retain the key in his possession until he clears the Permit and returns it with the key to an Authorized Person.

- (h) Danger Notices shall be attached (where applicable) on or adjacent to the live apparatus at the limits of the zone in which work may be carried out.
- (i) A Permit-to-Work shall be issued.
- (j) Work on the spouts shall then be done under the personal supervision of Authorized Person who shall prove each spout dead by means of an approved voltage indicator before it is worked on, the indicator itself being tested before and after the verification.

08.02 Feeder Spouts, Voltage Transformer Spouts and Single Panel Bus Bar Spouts.

When work is to be carried out on feeder and voltage transformer spouts or on the spouts of a single and separate panel, the following operations shall be carried out in strict sequence:

- (a) The spouts on which work is to be carried out shall be isolated from all points of supply from which they can be made live.
- (b) The isolating arrangements shall be locked so that they cannot be operated and the shutters of live spouts shall be locked shut.
- (c) Where practicable the spout contacts shall be checked by means of an approved voltage indicator to verify that they are not live, the indicator itself being tested before and after the verification.
- (d) The circuit shall be earthed with approved earthing equipment at the point of work and where practicable at all points of isolation from the supply. For the purposes of earthing metal-clad switchgear approved appliances only shall be used. The insertion of the hand or any tool into contact spouts for this purpose is forbidden.
- (e) Caution Notices shall be attached at all points where the circuit can be made live.
- (f) Circuit breakers, isolators, spout shutters, control handles and safety devices shall be locked in position by the keys provided for the purpose which shall then be locked in the appropriate key safe.
- (g) If operations (a) to (e) are carried out at more than one location the Authorized Person at each location shall lock the safe and retain the key in his possession until he receives instructions from the Control Engineer to restore the equipment ready for service. At the location where the Permit-to-Work is issued, the Authorized Person shall operate the lock reserved for his use and each recipient of a Permit-to-Work shall operate an additional lock and retain the key in his possession until he clears the Permit and returns it with the key to a Authorized Person.
- (h) A Permit-to-Work shall be issued.
- (i) Work on the spouts shall then be done under the Personal supervision of an Authorized Person, who shall remove the earths at the point of work and prove each spout dead by means of an approved voltage indicator, before it is worked on the indicator itself being tested before and after the verification. If the only earths that can be applied to the circuit are those applied in the spouts on which work is to be done and are Circuit Main Earths, then while this work is in progress no other work shall be carried out on the circuit connected to those spouts. In all other cases the requirements of Rule 07.01 shall apply.
- (j) Where the spouts are connected to an overhead circuit on which there is any likelihood of back feed from other sources or dangerous induced voltage, the back feeding source must be switched off and additional earths shall be efficiently connected at the nearest point to the point of work.

09 Work on High Voltage Cables and Conduits

09.01 High Voltage Cables and Conduits.

- (a) No person after receiving a Permit-to-work shall work on any high voltage cable or conduit containing a high voltage cable, unless personally instructed at the point of work by the Authorized Person.
- (b) When any high voltage cable is to be cut the Authorized person, after satisfying himself that the cable has been made dead and identified, shall spike the cable in and

approved manner at the point where the cut is to be made.

- (c) When any high voltage joint or chamber is to be opened in circumstances where it is not desirable to spike the cable entering the joint or chamber, the Authorized person shall prove by use of the appropriate cable route records, supplemented if necessary by an approved cable electrical testing set, that the joint or chamber is associated with the particular cable which has been made dead, and on which it is safe to work. The tests shall be carried out in the presence of the person receiving the Permit to work and shall be witnessed by him.
- (e) When work is to be carried out on cable circuits in proximity to other live circuits and on cable circuits with fully insulated metallic sheaths, special precautions should be taken to avoid danger from induced voltages.

09.02 Single or Multiple Circuit Overhead Lines with all Conductors Dead.

Before any person is allowed to carry out any work on any single or multiple circuit overhead line with all conductors dead, the following operations shall be carried out in strict sequence:

- (a) The line or lines shall be:
 - (i) Switched out at all points of supply including consumers end;
 - (ii) Isolated from all points of supply, including voltage and auxiliary transformers and common neutral earthing equipment from which the apparatus may become live.
- (b) The carrying out of the above-mentioned operations shall be reported to the control Engineer and further permission received for the carrying out of the subsequent operations.
- (c) The conductors shall then be:
 - (i) Discharged to earth.
 - (ii) Efficiently connected to earth at all points of isolation from the supply excluding low and medium voltage connections but including points of isolation from common neutral earthing equipment where applicable, or between such points and the points of work.
 - (iii) Operation (a) and (b) shall be carried out by any Authorized person. Operation (c), (d) and (e) shall be carried out by an Authorized person or a Competent person acting under his immediate supervision.

09.03 Double Circuit Overhead Lines with one Circuit Live

Where work similar to that covered by General Rules has to be carried out on double circuit overhead lines with one of the circuits live the provisions of General Rules shall apply, and the following additional precautions shall be taken.

- (a) The Earthing party under the supervision of the competent person at the point of work shall climb the tower on the dead side and shall efficiently connect to earth each individual conductor on that side. They shall then affix red pennants to the cross arms supporting the live conductor at the junction of these cross arms with the tower body. The conductors shall remain in position, throughout the progress of the work and the earth shall be removed by the Earthing party only after all other members of the working party have descended the tower on completion of the work. While affixing or removing the earths and red pennants, the Earthing party shall be under observation by another person at ground level.
- (b) Work on a tee-off tower shall only be carried out in the presence of an Authorized person and special care shall be taken at terminal and large angle towers.

09.04 Triple Circuit Lines or Towers with one or more other Circuits Live.

Work on any one circuit of triple circuit lines or towers shall not be carried out with either or both the remaining circuits live except under the following conditions:

- (a) The work shall be carried out as provided by Rules 09.02 and 09.06 except that where crossarms support two circuits separated by screens or barriers, red pennants shall be affixed so as to denote the live circuit or circuits.

- (b) Separate means of access shall be provided to each individual circuit.
- (c) Either the conductors on each circuit shall be adequately screened from the two other circuits or the clearances from the nearest point of work to the remaining live circuits shall be not less than those specified in Rule 09.06
- (d) Caution notices shall be attached at all points where such line or lines can be made live.
- (e) Circuit breakers, isolators, spout shutters, control handles and safety devices shall be locked in position by the keys provided for the purpose which shall then be locked in the appropriate key safe.
- (f) Unless the Permit-to-work is to be issued and cancelled at a particular station, then at each station, an Authorized person shall personally check the circuit colours at the point of isolation and report to the Control Engineer. He shall also lock the key safe at that station and retain the key in his possession until he receive instructions from the Control Engineer to restore the equipment ready for service. An Authorized person may then issue the Permit-to-work. When the Permit-to-Work is to be issued and cancelled at a particular station, then at that station, the Authorized Person shall personally check the circuit colours and shall operate the lock reserved for his use and each recipient of a Permit-to-Work shall operate an additional lock and retain the key in his possession until he clears the permit and returns it with the key to the Authorized Person.
- (g) The conductors shall be efficiently connected to earth by the Earthing party at the point (E) of work or at the adjacent tower on each side of the point(s) of work but in no case shall the earths be more than two spans apart. In addition, if conductors are to be broken they shall be connected to earth at each side of and on the same tower, as the point of work, where the break is to be made. These earths shall be applied before the break is made and shall remain in position until the conductors are reconnected or until work is complete.
- (h) When work is to be carried out on lines of all insulated construction and an earthing point is not provided at the point of work. Additional Earths shall be connected at the point of work to an efficient portable earth back driven into the ground. The line shall also be earthed at the nearest line earthing point on either side of the point of work.

09.05 Quadruple circuit Lines with one or more other Circuits Live

Work shall not be carried out on the circuits on one side of a tower unless both these circuits have been switched out, isolated and earthed, as provide by Rules 09.02 and 09.03.

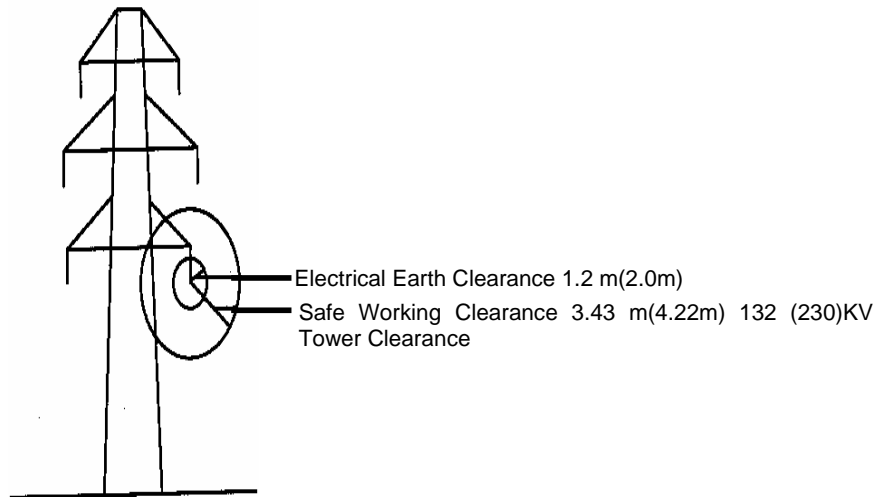
09.06 Towers Carrying Live Conductors

Painting and other work above the anti-climbing devices on the lower portions of towers carrying live conductors shall only be permitted under the following conditions:

- (i) The work shall be carried out under the terms of a Permit to Work.
- (ii) Before anyone is allowed to start work the person in charge at each tower shall define the area to be worked in by removable barriers, roping, red flags or pennants arranged to prevent any person working on the tower nearer than the following distances from any live conductors:-

Rated Voltage	Minimum Clearance	
	Metes	Feet
33KV	2.75	9.00
132KV	3.43	11.00
230KV	4.22	14.00
400KV	5.49	18.00

While doing so the person in-charge shall be under observation by another person at ground level.



132 (230) KV Tower Clearance

(III) No man shall work in such a manner that his arms or any tool extend beyond the limitation fixed under subparagraph (ii) of this Rule.

09.07 Adverse Weather Conditions

(a) In the event of the near approach of lightning storm all work on overhead lines shall cease immediately, and the Control Engineer be informed.

(b) If overhead lines are to be patrolled during the hours of darkness, suitable lighting equipment should be provided.

10 Testing of High voltage Apparatus.

10.01 When any High Voltage Apparatus is to be subjected to voltage before being connected to the high voltage system the Authorized person responsible for applying the test voltage shall ensure that such apparatus is adequately guarded to prevent Danger and that Danger Notices are attached to in conspicuous positions during the period the apparatus may be subjected to voltage. All cables shall be discharged before and after the application of test voltage

10.02 Temporary conductors used for testing purposes shall be of an adequate size and easily visible.

10.03 Test connections shall not be applied in a cell compartment in which there is any exposed metal live at high voltage. (This rule does not exclude the use of approved voltage indicators or approved devices for phasing out circuits)

11 Insulators on Live Lines-Testing/Washing

11.01 Testing of Insulators on live lines shall only be permitted under the following conditions:

- (a) Special care shall be taken at tension, double circuit transposition, tee off and terminal towers in view of the close proximity of live cross-over connections.
- (b) The work shall be carried out under a Sanction-for Test and under suitable weather conditions. Testing shall not be carried out where the humidity is above 70% and shall be discontinued if a thunderstorm approaches.
- (c) All men carrying out such work shall have the Managers written authority and be directly supervised at each tower by an Authorized Person.
- (d) Not more than three men shall climb the tower. One of others shall be responsible for seeing that the others maintain the necessary clearance from live conductors. The second man shall apply the testing apparatus. The third man shall take observations either at conductor level or ground level.

- (e) No tool other than approved testing apparatus shall be taken up the tower.
- (f) The person in charge shall inform the Control Engineer when commencing and finishing the actual work. A line which trips out while such work is known to be in progress shall not be reclosed until the control Engineer has been in communication with the person-in-charge.
- (g) If any circuit breaker controlling the line is fitted for auto reclosing equipment, such equipment shall be rendered inoperative before the Sanction for Test is issued and the fact that this has been done shall be recorded on the Sanction.
- (h) If during the progress of the work the line is found to be dead the person in charge shall immediately communicate with the control Engineer.

11.02 Where special apparatus is provided, washing of live insulators may be carried out provided that the following requirements are complied with:

- (a) The work shall be carried out under the supervision of an Authorized person who shall have the General Manager's written authority.
- (b) The water used shall normally have a specific resistance of not less than 2,000 ohms/cm. cube on 132 KV and 5,000 ohms/cm. cube for 275 KV system. Where the washing system is common to both voltages, water of the higher specific resistance shall be used.
- (c) The jets used shall be such that the water breaks into a spray before reaching the insulator.
- (d) The nozzle of the hose shall be connected to earth by an earthing lead not less than 0.1 sq. in. (65mm²) copper equivalents in cross section and the operator shall wear rubber gloves.
- (e) The operator shall be not less than 6m (20 ft.) away from the insulator being washed and care shall be taken in observing this to see that no other live insulator or live conductor at a lesser distance inadvertently sprayed.
- (f) Water washing shall be discontinued in the event of a local lightning risk.

11.03 The inspection of equipment of live lines shall only be permitted under the following conditions:

- (a) The inspection shall be carried out under a Permit to Work and from within the body of the tower.
- (b) No tool shall be taken up the tower.

12 Preparation for Work on High Voltage Apparatus Containing /Operated by Compressed Air

12.01 In addition to the general requirements of Rule 08.01 the following special precautions shall be taken before any work other than operating adjustments, on High Voltage Apparatus operated by or containing compressed air may be carried out:

- (a) The valves controlling the supply of air to the equipment shall be closed and the air released from the associated receivers and pipe work which shall be left open to atmosphere.
- (b) The valves shall be locked in position by safety locks and the keys shall be placed in the appropriate key safe.
- (c) Caution Notices shall be attached to the valves.
- (d) A Mechanical Permit to work shall be issued to the person to whom the Electrical Permit to work has previously been issued.

12.02 Operating adjustments or inspection of High Voltage Apparatus which do not involve dismantling of any part of the compressed air system may be carried out without a Mechanical Permit to work provided that the requirements of 07.01 are complied with. All such operating adjustments shall be carried out under direct supervision of the Competent Person to whom Permit-to-Work has been issued.

13 Work In High Voltage Equipment Containing Sulfur Hexafluoride (SF₆) Gas

- (a) For any equipment containing sulfur hexafluoride (SF₆) gas the PGCB code of practice must be available at the point of work stating the method of dealing with the gas and associated compounds. The apparatus shall bear an approved notice stating that it contains sulfur hexafluoride.
- (b) In addition to the requirements of Additional Rules the following special precautions shall be taken when any work involves access to any part of the equipment which is or has been in contact with the gas or associated compounds:
 - (i) The apparatus shall be isolated from all sources of the supply of gas, purged in accordance with the PGCB code of practice and the associated receiver(s) and pipework jet open to atmosphere.
 - (ii) The valves shall be locked by safety locks and the keys shall be placed in the appropriate key safe.
 - (iii) Caution Notices shall be attached to the valves.
- (c) Approved protective clothing, respirators, eye shields and safe handling equipment shall be provided and used where danger may arise from the gas or associated compounds in accordance with the PGCB code practice.

14 Safety Rules for Work on Medium and Low Voltage Apparatus, Conductors and Equipment

14.01 General Precautions

The consequences of shock or serious burn from short circuit associated with Medium or Low Voltage systems may be serious, or in some circumstances, fatal. Wherever practicable, therefore, work on Medium and Low Voltage Apparatus, conductors and equipment shall be done while they are dead. When verbal instructions are not considered sufficient a Minimum Access Distance (MAD) shall be issued.

14.02 Work on Dead Apparatus, Conductors and Equipment When work is to be done on dead Medium Voltage Apparatus, conductors or equipment controlled by circuit breaker or switch, the circuit breaker or switch shall be locked off, where practicable and a Caution Notice affixed. The keys shall be kept in a safe place, preferable in the possession of the person in charge of the work and the circuit shall be proved dead by an approved indicator before work is commenced.

14.03 When work is to be done on dead Medium Voltage Apparatus, conductors or equipment, supplied from fuses in a fuse distribution board, the fuses shall be removed and a Caution Notice affixed to the distribution board with a notice specifying the circuit upon which work is in progress. The fuses shall be kept in a safe place, preferable in the possession of the person in charge or the work and the circuit shall be proved dead by an approved indicator before work is commenced.

14.04 Before work is commenced on bare low or medium voltage overhead lines which have been made dead, the lines, including the neutral line, shall be short circuited and where practicable earthed

14.05 Line Crossings

Any overhead line over which another line is to be run shall be made dead or an adequate temporary cradle guard provided during the running out and binding in or conductors on the new work

14.06 Work on Live Apparatus, conductors and Equipment

Work on live Medium or Low Voltage Apparatus, conductors or equipment shall be undertaken only by a competent person.

14.07 Work on Overhead lines

Before any wood pole is climbed it shall be sounded and no pole, the condition of which is doubtful, shall be climbed without the permission of the Competent Person in charge. No person shall climb any pole or tower unless he is wearing and makes proper use of an efficient safety belt and is under observation by a second person who is in attendance, preferable at the

base of the Pole on which work is being done.

15 Safety Rules for Live Line Working

15.01 Live line work shall be under the direct and continuous supervision of an Authorized Person who has received specialized training in the work to be undertaken and is appointed in writing to be responsible for such work.

15.02 Live line work shall be undertaken only by persons who have received appropriate training and are appointed, in writing, to be authorized persons for live line work.

15.03 Live line work shall not be undertaken until the method of working has been planned and written down step by step and explained to all persons to be engaged on the work.

15.04 Live line work shall only be permitted on circuits which have been approved as suitable for this type of work.

15.05 All tools and equipment used for live line work shall be approved, and shall be maintained and used in approved manner.

15.06 The Authorized Person in charge of live line work shall satisfy himself, before work commences, that each member of the team who is to carry out live line work is properly authorized and fully understands the method to be used and the nature and extent of the work to be carried out.

15.07 Before the live line work, commences, the Senior Authorized Person in charge of live line work shall satisfy himself that atmospheric conditions are such that the work can be performed safely.

15.08 The Authorized Person holding the Live Working Certificate shall examine the conditions of all tools and equipment prior to use. He shall ensure that such tools and equipment are marked to indicate the appropriate limit of the safe handling position. If any defect is found or suspected in a live line tools or pieced of equipment it shall not be used.

15.09 Auto-reclose equipment or circuit breakers controlling the circuit concerned shall be rendered, and shall remain inoperative while the HV Live Line Working Certificate is in force. Caution Notices shall be affixed to the auto reclose equipment. The Control Engineer shall not reclose the circuit, in the event of it tripping until he has obtained toe agreement of the Authorized Person in charge of the live line work.

15.10 A channel of communication shall be established between the live line working team and the appropriate Control Engineer before the commencement shall be maintained throughout the period during which live line work is being carried out.

15.11 Before work commences, the Authorized Person who holds an authorization for live line work shall with the consent of the Control Engineer, issue to himself, or the another Authorized Person similarly appointed, an HV Live Line Working Certificate.

15.12 The Authorized Person in charged shall ensure that all persons while engaged in the live line work wear and made proper use of approved protective clothing, safety belts or harnesses and any other necessary safety equipment.

15.13 An approved leakage detector shall be used throughout the duration of the live line work. Live line work shall cease if the approved leakage detector gives and alarm. Work shall not be resumed until conditions giving rise to the alarm have been cleared.

15.14 When displacing live conductors, or near circuits on which live line work is to be carried out precautions shall be taken to avoid danger arising from deduced clearances.

15.15 Where mechanical loading conditions are to be varied during the course of live line work conductors, insulators, fittings and steelwork affected shall be inspected before work commences.

15.16 No vehicle or equipment or any person shall be followed in the near vicinity while work in progress without the sanction of the Authorized person in charge of the live line work.

15.17 No high voltage conductor or connection shall be broken during the course of live line work unless a parallel path of equivalent current carrying capacity has been safely and efficiently connected.

15.18 Where the work for which the HV live line working certificate was issued has not been completed on the day of issue of the certificate, all men shall be withdrawn, and then the certificate shall be cancelled with the consent of the Control Engineer.

15.19 If live line work has to be suspended, due to adverse atmospheric conditions or for any other reason, the Authorized Person holding the HV live line Working Certificate shall immediately inform the control Engineer and shall agree with him whether the HV live line working certificate is to be cancelled.

15.20 If live line work has been suspended for any reason, then before work is recommenced the Authorized person holding the HV line working certificate shall inform the Control Engineer and shall satisfy himself that atmospheric conditions are such that the work can be performed safely and that all tools and equipment are in a safe condition.

15.21 On completion of live line work covered by the live line working Certificate, all men shall be withdrawn and then the certificate cancelled with the consent of the Control Engineer.

16 Fire Protection Equipment and its Auto Control

16.01 General

- (a) Contact with some chemicals used in fire protection equipment may be dangerous and in such cases notices to that effect shall be displayed adjacent to the equipment
- (b) Portable fire fighting equipment shall not be used on electrical apparatus unless such apparatus has been disconnected from the supply.
- (c) Portable CO₂ and any chemical extinguishers may be used in the vicinity of live electrical apparatus provided that in the handling of the extinguishers, safety clearances are maintained. After the discharge of portable CO₂ extinguishers in a confined space, the operator shall leave the space until the precautions set out in (d) have been taken.
- (d) After any fire or after the discharge Of CO₂ extinguishers in an enclosed space, the space shall be thoroughly ventilated before entry or suitable breathing apparatus shall be worn if entry is necessary before the gases have been cleared.

16.02 Automatic Control

- (a) Before work or inspections are carried out in any enclosure protected by automatic CO₂ or other chemical extinguishing equipment the automatic control shall be rendered inoperative and the equipment left on hand control and a notice to this effect shall be attached.
- (b) The automatic controls shall be restored immediately after the persons engaged on the work or inspections have from the protected enclosure.
- (c) Precautions taken to render the automatic control inoperative shall be noted on any Permit-to-Work issued work in the protected enclosure.

Part-III

MISCELLANEOUS

A. Safety Committee

A01 Safety Meeting Structure & Protocol Scope

The intent of this document is to identify the minimum requirement and responsibilities for a safety meeting structure and Protocol that meets the needs of Transmission Field Service.

A02 Structure

MD will appoint central Safety Committee in collaboration with Director (Finance/Technical)

A03 Meeting agenda

The meeting must be held Monthly/Quarterly on a Regular Recurring Schedule.

All members must attend.

Members will bring safety manual to meeting.

Mandatory items-

- All Accident, Incidents & Injuries will be reviewed.
- Items referred to Safety Committee will be discussed & acted Upon.
- Optional items.

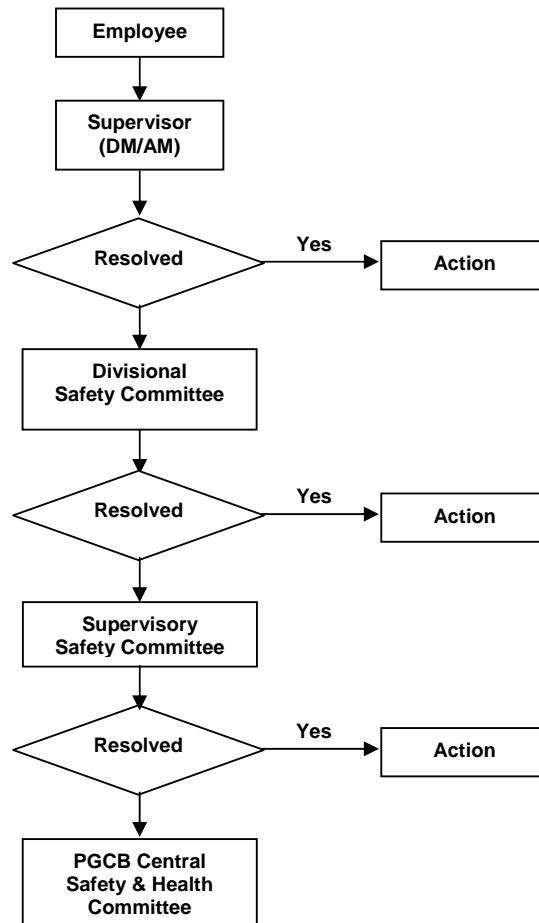
A04 Minimum Meeting Requirements

<u>Committee</u>	<u>Frequency</u>
Central Safety & health Committee	Monthly
Supervisory Committed	Bi-Monthly
Divisional Safety Meeting	Quarterly

A05 Safety Engineer.

A post of 'Safety Engineer' in the rank of DGM will be created to work under the Safety Committee. One engineer in the rank of Deputy Manager of each Grid Division will be trained on Operating Codes and Safety Practices who will follow the instructions of Safety Engineer. He/She would remain responsible for all works and assignments under the respective Division.

A06 Safety Programme Hierarchy



**Work with CARE
Life has no SPARE**

B. Treatment for Electric Shock

B TREATMENT FOR ELECTRIC SHOCK

The intent of this document is to identify the minimum requirement and responsibilities for a safety meeting structure and Protocol that meets the needs of Transmission Field Service.

B01 The following methods should be learnt from a qualified Instructor and practiced regularly.

Immediate and Speedy Action is necessary Free from Contact

Switch off current immediately or send someone to do so. Do not attempt to remove a person from contact with high voltage unless suitable articles insulated for the system voltage are used for this purpose. When attempting to free a person from contact with low voltage use rubber gloves, boots, or mat, or insulated stick, but if these are not available use a loop of rope, cap or coat to drag the person free. Whatever is used should be dry and non-conducting.

After Release

Do not waste time moving him. Lay the patient down on something dry, if possible, and if no sign of breathing can be observed. IMMEDIATELY proceed to promote artificial respiration and someone else for a doctor and ambulance. Do not give up efforts to restore natural breathing until told to do so by a doctor.

Artificial Respiration: Mouth-to-Mouth Method

1) Remove any foreign material- false teeth, vomit, etc. which may cause blockage of the air passages. (See-Figure-1)

ii) To open the air passage tilt the patient's head backwards as far as possible. Use one hand to push the patient's head backwards and the other to pull the jaw forwards. At the same time slightly opening the patient's mouths

!!!) Take a deep breath, place your mouth over the patient's mouth and blow, Seal the patient's nose either by passing your cheek against it or by grasping it with the fingers. (See Figure-3)

iv) Give 6 to 8 quick blows and then continue to inflate the Chest about 10 times per minute. Watch the chest during inflation. It should rise. No movement indicates a blocked airway. If so, check mouth and throat are clear and tilt the head further backwards.

Artificial Respiration: Holger Nielsen Method

I) Lay the patient face down, the arms above the head, the elbows flexed so that one hand rests on the other. Turn the patient's head to one side so that the cheek rests on his uppermost hand. If the hands are injured rest the cheek on a firm pad (See Figure-3)

II) See that the air passages are clear of foreign matter.

iii) Kneel on one knee at the patient's head with the other foot near his elbow. (See Figure-3)

iv) Place your hands on the patient's shoulder blades and rock forward with your elbows straight until your arms are vertical, pressing downwards but not too heavily. This movement should take two seconds. (See Figure-3)

v) Grasp the patient arms just above the elbows and rock your self backwards lifting the elbows above the patient's head (two seconds) (See Figure 4)

vi) Lower arms and transfer your hands to his shoulder blades (See Figure-3)

vii) Repeat total movement at the rate of ten times per minute.

Artificial Respiration: Silvester's Method

i) Remove any foreign matter blocking the airway.

ii) Place casualty on his back with a pad of some kind under his shoulder so that the head falls back fully extended. (See Figure-5)

iii) Kneel at his head-grasp the patient's arms at the wrist - cross them over the lower chest and press to squeeze the air out of the chest (two second) (See Figure-5)

iv) Pull arms upwards and outwards to above the head, stretching the chest (three seconds) (See Figure 6)

v) Repeat the whole movement approximately ten times per minute.

B02 Other injuries

After breathing, priority should be given to controlling bleeding. This is achieved by firm pressure on the wound.

1) Cover with a clean dressing and bandage firmly in place.

11) If bleeding continues and further dressings on top of the first and increase the pressure by bandaging firmly in place.

Burns should be covered with a clean, sterile dressing to exclude air. This dressing should have the bandaged lightly in position. Unless it is dangerous to leave the casualty at the site of the accident expert assistance should be sought before other injuries are treated. If it is necessary to move the casualty, do so with the utmost gentleness carefully supporting any injured parts.

B03 First aid appliances

The first aid appliances provided shall be used only for the purpose intended. A person shall be appointed to be responsible for ensuring that supplies are always available.

B04 SHOCK

Shock is state of collapse or prostration that interferes with normal action or the heart, respiration and circulation. This condition is probably due to derangement or lack or proper balance within the sympathetic nervous system that controls these vital functions. Shock is a serious condition and requires immediate action on the part of the first aider. Shock follows an injuries or emotional disturbances. Symptoms may develop immediately, or in some cases considerable time may elapse before they are noted. The more serious the injury or emotional disturbance, the more severe is the shock.

a) Symptoms. The symptoms of shock are:

1. The face is pale.
2. The skin is cool and clammy with perspiration around the nose, mouth, and forehead.
3. The pulse will be fast and weak.
4. The eyes will lack luster and the pupils may be dilated.
5. Breathing may be shallow and irregular.
6. Dizziness, nausea and vomiting may develop.

b) Dangers or Shock.

1. Shock may cause death.
2. Shock pre-disposes the body to infection, such as pneumonia or wound infection.
3. Shock may lead to amputation of parts of the body due to lack of circulation in the extremities.

c. Prevention and Treatment. First aid attention is the same for the prevention and treatment of shock.

1. Keep the patient lying down flat until you have determined whether or not a head injury is present. If no head injury is present and no fractures of lower extremities exist, elevate the feet or lower the head, whichever is more convenient. If a serious head injury is suspected, keep the patient laying flat

2. Keep the patient warm; conserve body temperature. This can be accomplished by placing a blanket underneath the patient and covering him, according to weather conditions, to maintain normal body heat. Do not cause the patient to be over heated. In cold weather it may be necessary to use artificial heat.

d) Factors which Contributor to Shock. Anything's which causes pain, such as rough handling, improper transportation, continuation of bleeding, exposure to cold or excessive heat, or fatigue, contributors to shock and should be avoided.

REMEMBER
IN ARTIFICIAL RESPIATION TIME IS OF UTMOST IMPORTANCE

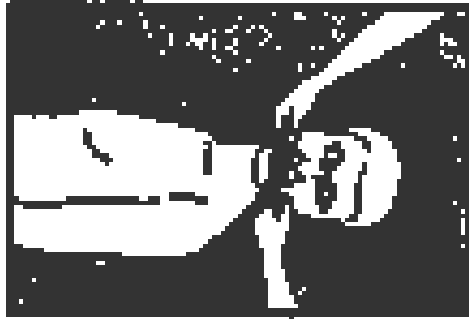


Figure-1



Figure-2

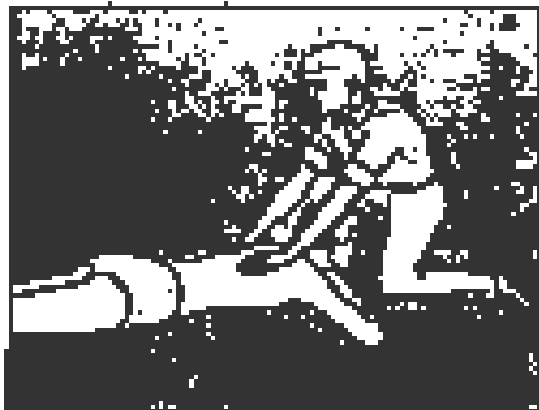


Figure-3



Figure 4



Figure 5



Figure 6

C. REPORTING OF ACCIDENTS

C. REPORTING OF ACCIDENTS:

(Rule 84 of Factories rules 1979)

C01 1. When in any factory there occurs an accident to any person which results in death or such injury that there is no reasonable prospect that he will be able to resume his employment in the factory within 20 days, such accidents shall may be called in all communication as "Fatal" or "Serious", as the case may be, and the Manager of the Factory shall give notice of the occurrence forthwith by telephone, telegram or special messenger to

- a) The Chief Inspector
- b) The Deputy commissioner, c) Inspector,
- d) The Commissioner for Women's Compensation appointed under section 20 or the Workmen's Compensation act, 1923:
- e) In the case of fatal accident only the Officer-in-charge of the police station within the local limits of which the factory is located.

2. Reports by special messenger shall be in Form No. QF-GMD- (Form 18) and those sent by telephone or telegram shall be confirmed within 24 hours by a written report in that Form.

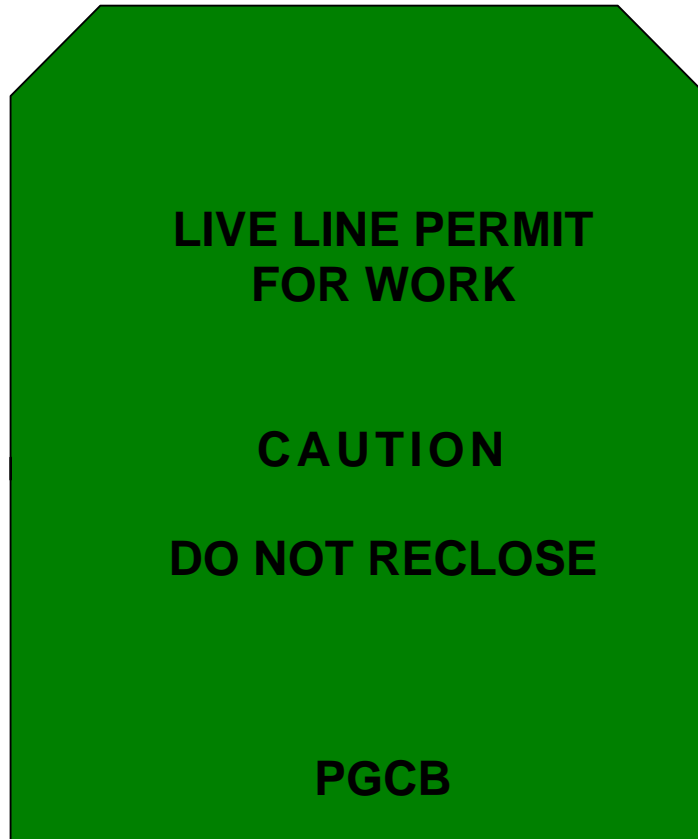
C02 Supplementary Reports or Accidents. (Rule 84 of Factories rules 1979)

1. When an accident which has been reported to the Factory Inspector as either "Serious" or "Minor" afterwards proves to be "Fatal", The Manager shall make the necessary correction in a supplementary report which shall be sent forthwith to the authorities mentioned in clauses (a), (b), (c) and (d) of rule 84.(2) When an accident which has been reported to the chief inspector and Inspector as "Minor" afterwards proves to be "Serious", or when one reported as "Serious" afterwards proves to be "Minor", the manager of the factory shall make the necessary correction in a supplemented in clauses (a), (b), (c) and (d) of rule 84.

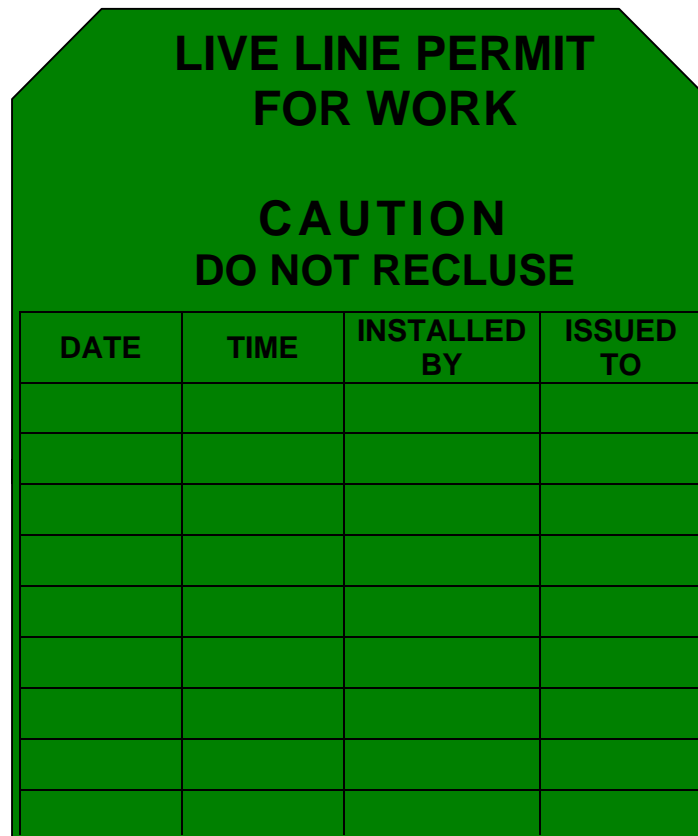
2. A final accident report shall be sent by the Manager to the Chief Inspector and Inspector, in Form No. QF-GMD- (Form 18A) within one month from the date of occurrence of the accident.

Part-IV

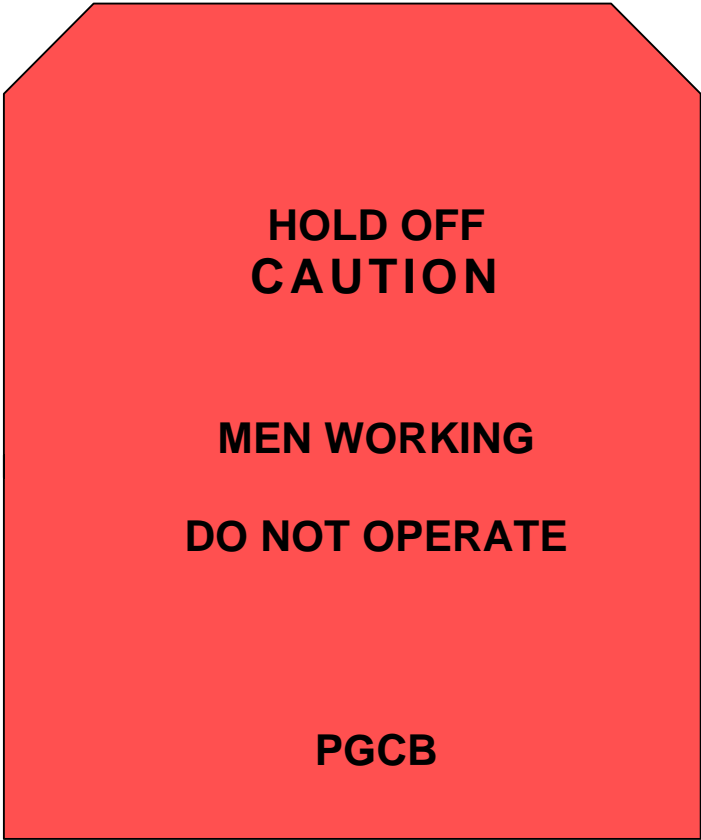
CAUTION NOTICES/TAGS



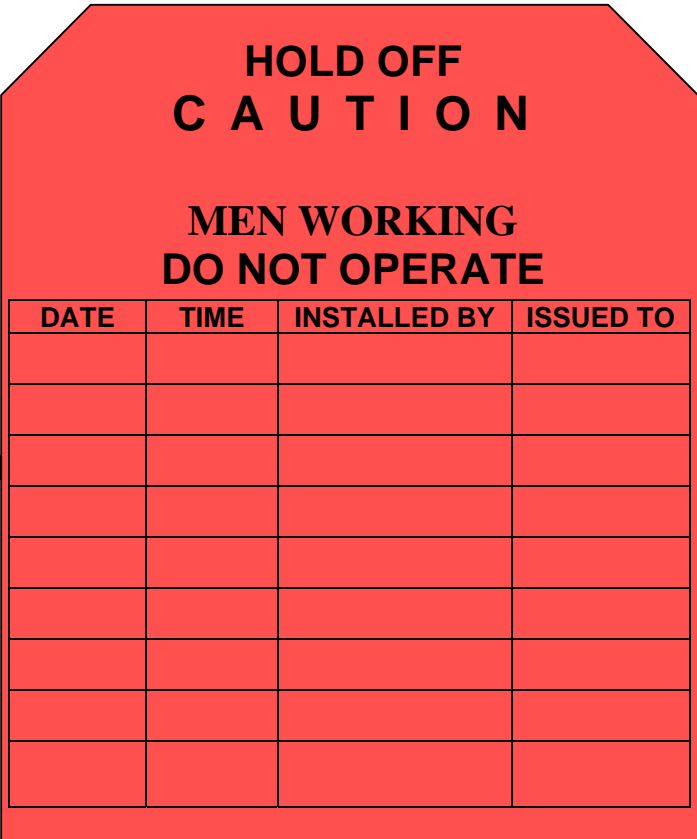
FRONT PAGE OF: CN01



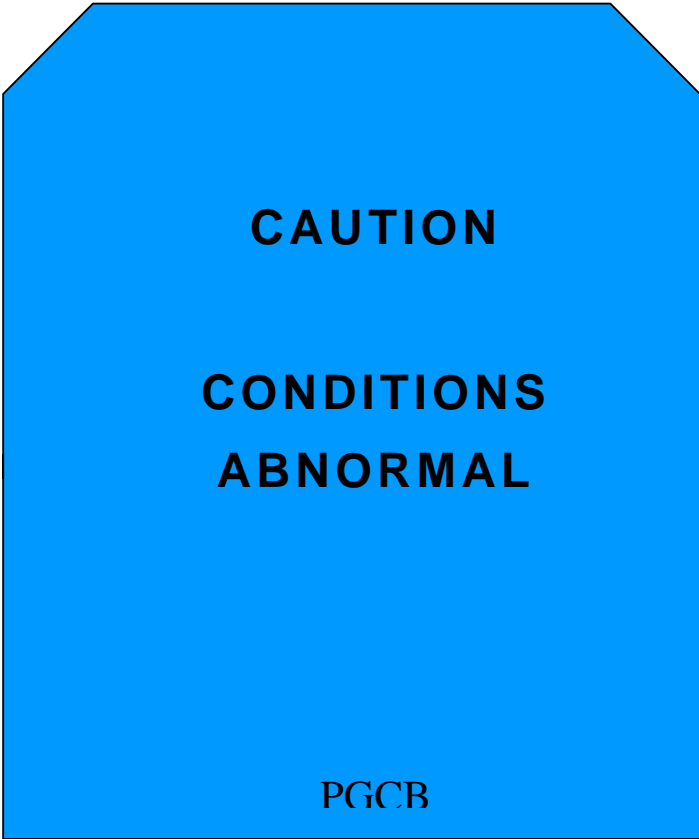
BACK PAGE OF: CN01



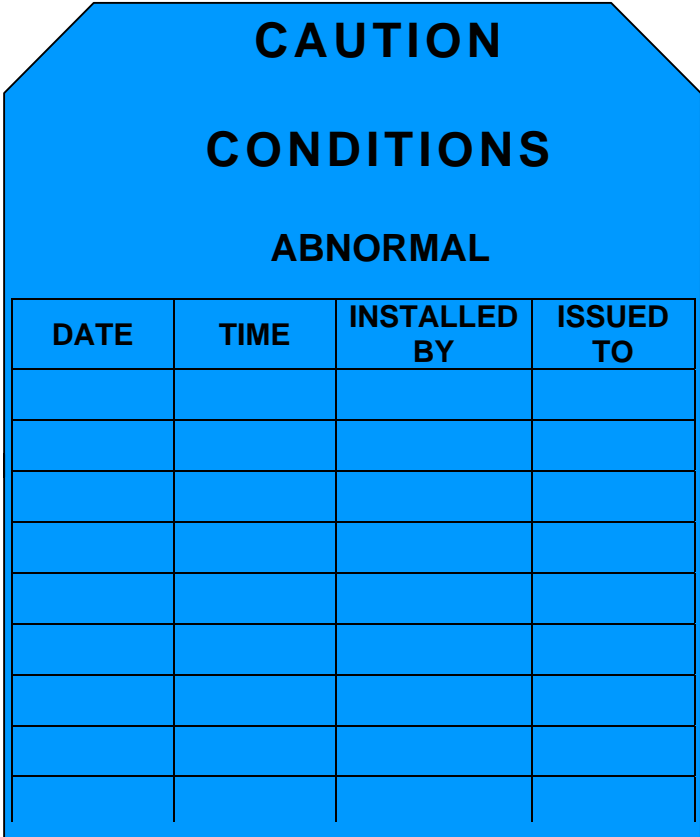
FRONT PAGE OF: CN02



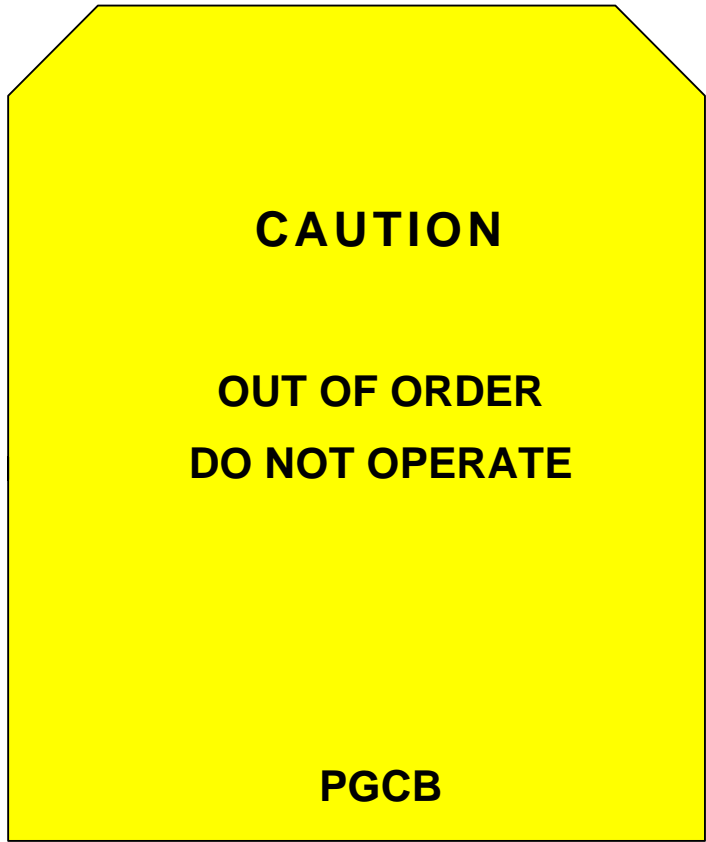
BACK PAGE OF: CN02



FRONT PAGE OF: CN03



BACK PAGE OF: CN03



FRONT PAGE OF: CN04



FRONT PAGE OF: CN04



INSTALLED BY	DATE	INSTALLED BY	DATE	INSTALLED BY	DATE	INSTALLED BY

PGCB

GLOSSARY OF SPECIAL TERMS

Control Engineer	Engineer-in charge of a Shift at Load Dispatch Centre in case of Transmission. Shift-in-charge of System Control Centre will act as Control Engineer in case of 33kV System.
Authorized Person	A competent person adequately trained and possessing technical knowledge and appointed in writing by PGCB to carry out specific operations and/or work on their systems or on apparatus. The certificate of appointment shall state the class of operation and/or work the person in which it applies.
High Voltage Apparatus	Any apparatus, equipment or conductors which are normally operated at a voltage exceeding 400V
Circuit Main Earth	An earth applied on the instruction of the Control Engineer before a Work/Test Permit.
Isolation Memo	A form detailing the circuits to be isolated, which may be used where the apparatus to be controlled by another organization.
Minimum Access	A form issued and cancelled by a Distance (MAD) Authorized Person specially authorized to do so, defining the limits and nature of work which may be carried out in the vicinity of live apparatus. A MAD may be issued where a Work/Test Permit is not applicable and where verbal instructions are not considered sufficient.
Work Test Permit (WTP)	A form of declaration signed and given by an Authorized Person in charge of work to be carried out on any earthed HV apparatus for the purpose of making known to such person exactly what apparatus is dead, isolated from all earth and on which it is safe to work.
HV Live Line Working	A form declaration signed and given by Certificate an Authorized Person, who has been appointed in writing to be responsible for live line work and issued either to himself or to another Authorized person, Similarly Appointed to be in work upon, nature and extent of the Live Line work and method thereby it is to be carried out.
Switching Order	Step-by-step plan to perform switching operations in a specific sequence.
Clearance for Work	Assurance given to a worker by an Authorized Person that (1) specified power system equipment or a transmission line is isolated from the power system, and (2) it will not be ordered energized until that worker report that the equipment or line is ready for service.

Hold order (Hold off)	<p>Permit to work for definite work to be done on specified apparatus and guarantees protection of employees when working on electrical or other equipment, it may be issued in any one of the following way</p> <p>a. Clearance for work-written or verbal</p> <p>b. Permission for work</p> <p style="padding-left: 40px;">-Written/Verbal Work/Test Permit</p> <p style="padding-left: 40px;">-Verbal permission for work on live line/station equipment.</p>
Safety Engineer	<p>Deputy General Manager, Load Despatch Circle will act as Safety Engineer of PGCB. He will act as Member-Secretary to the Managing Director, PGCB.</p>
Divisional Engineer/Officer	<p>Manager-in-charge of Division Viz-, Manager, GMD, Dhaka (East)</p>
Station-in- Charge	<p>Deputy Manager/Asstt. Manager of a Grid Sub-station.</p>