

# Karnataka Power Transmission Corporation Limited



## MANUAL FOR MAINTENANCE OF DISTRIBUTION SYSTEM

**KARNATAKA POWER TRANSMISSION  
CORPORATION LIMITED**



**Manual for Maintenance of Distribution System**

Manual No. : KPTCL - 04 / DS  
Issued on : APRIL 2000  
Edition No. : 01.

**Registered Office :**  
Cauvery Bhavan, ,  
Bangalore - 560 009.

**Phone / Fax**  
221 0685.

## FOREWORD

*For an electric utility, the supply of un-interrupted power to its consumers has achieved greater importance now-a-days than ever in the past. Consequent upon the enormous extension of our distribution networks due to rapid load development, the incidence of interruptions in supply has assumed alarming proportions.*

*It has been seen that apart from poor methods of planning, design, construction and bad workmanship, the general neglect of system maintenance can be considered as the main reason for the present unsatisfactory supply position. Whatever little maintenance is done, that too does not bring satisfactory results as neither the staff responsible for maintenance is properly trained, nor any proper maintenance schedules are provided to them for guidance. Although several instructions in this regard have been available from time to time, but a comprehensive manual was not available to Field Staff.*

*Hence this Maintenance Schedule Manual for Distribution System prepared will go a long way to improve service rendered to Consumers.*

*I am confident that these Maintenance Schedules if followed in the field, are sure to bring out improved results by way of reduction in supply interruptions and increase the life of various equipments, cost effectiveness and efficiency of Maintenance Programme of the Corporation.*

**Chairman & Managing Director,**  
Karnataka Power Transmission Corporation Limited

## PREFACE

For any maintenance programme to be satisfactory, there are some prerequisites which must be first ensured. These are :-

- That the system is well planned, properly erected and good quality material has been used.
- That well trained and adequately equipped maintenance staff is provided.
- That proper schedules for testing and maintenance of the system are available.

Here we are concerning ourselves only with the third aspect, i.e., laying of proper maintenance schedules for distribution system. In the absence of proper schedules, the maintenance personnel are at a loss to know what maintenance is to be done, when it is to be done and how it is to be done. Therefore, a code of practice is required setting out for every item of plant and equipment, the intervals between inspections, testing, maintenance and other works to be done, so that the staff has complete knowledge about their work and can make suitable detailed programme. However, the code of practice should not set out either an impossible standard or on the same hand a completely inadequate one.

Keeping the above in view, a working group consisting of the following Members was constituted for the preparation of this Manual. Efforts have been made here to prescribe distribution maintenance schedule suitable to the present system conditions.

- |    |                          |   |  |
|----|--------------------------|---|--|
| 1. | Sri. Lakshmikantha. K.R. | — | Executive Engineer, Ele., Office of the CEE, Major Works, Bangalore. |
| 2. | Sri. Marigowda.          | — | Executive Engineer, Ele., Additional South Division, Bangalore.      |
| 3. | Sri. Basavaraj. D.C.     | — | Executive Engineer, Ele., R & D Centre, Bangalore.                   |
| 4. | Sri. Ramesh. B.S.        | — | Executive Engineer, Ele., West Division, Bangalore.                  |
| 5. | Sri. Nagesh.             | — | Asst. Executive Engineer, Ele., W - 4 Sub-Division, Bangalore.       |
| 6. | Sri. Nafeez Hussaini     | — | Asst. Executive Engineer, Ele., N - 4 Sub-Division, Bangalore.       |
| 7. | Sri. Prakash Kumar. B.T. | — | Asst. Executive Engineer, Ele., R & D Centre, Bangalore.             |

# Maintenance Schedule for Distribution System

Page No.	4
Revisions	RO

The working group after thorough discussions and deliberations came out with the Manual for Maintenance of Distribution System. Further these guidelines were scrutinised by the core-group consisting of the following Engineers:-

1. Sri. Nagaraj. H.L. — Chief Engineer, Electy., R & D Centre, Bangalore.
2. Sri. Chamaraj. A. — Chief Engineer, Electy., TA & QC, Bangalore.
3. Sri. Jagannath Guptha. P.S. — Technical Adviser to Hon'ble Chairman.
4. Sri. Viswanath. Y.K. — Superintending Engineer, Ele., TA & QC, Bangalore.
5. Sri. Sudeendra Kumar. M. — Executive Engineer, Ele., Project, Cauvery Bhavan, Bangalore.
6. Sri. Keshavamurthy. R. — Executive Engineer, Ele., MRT South, Bangalore.
7. Sri. Katagihallimath. K.S. — Executive Engineer, Ele., R & D Centre, Bangalore.
8. Sri. Ramesh. B.M. — Executive Engineer, Ele., R & D Centre, Bangalore.
9. Sri. Basavaraj. D.C — Executive Engineer, Ele., R & D Centre, Bangalore.

I express my sincere thanks to Management for their continued support and encouragement in bringing out this manual.

I thank the members of the working group as well as Core Group for their valuable efforts and suggestions in finalising this document.

This document need not be taken as final and any comments and suggestions for improvement are most welcome based on which it can be continuously updated.

Chief Engineer, Electy.,  
Research & Development Centre, KPTCL,  
K.R.Circle, Bangalore.

## Mission Statement

The Mission of the Karnataka Power Transmission Corporation Limited is to ensure reliable quality power to its customers at competitive prices.

The Karnataka Power Transmission Corporation Limited is committed to achieving this mission through :

- ✓ Encouraging best practices in transmission and distribution.
- ✓ Ensuring high order maintenance of its technical facilities.
- ✓ Emphasising the best standards in customer service.

To be the best electricity utility in the Country, the Karnataka Power Transmission Corporation Limited pledges to optimise its human and technical resources for the benefit of all its customers.



# Maintenance Schedule for Distribution System

Page No.	6
Revisions	RO

## CONTENTS

<input type="checkbox"/>	Introduction .....	8
<input type="checkbox"/>	Distribution Transformers .....	14
<input type="checkbox"/>	11 KV Overhead lines .....	20
<input type="checkbox"/>	11 KV UG system .....	28
<input type="checkbox"/>	LT lines .....	33
<input type="checkbox"/>	Service connections .....	36
<input type="checkbox"/>	Table - I (Fuse Protection and LT Wire Sizes).....	38
<input type="checkbox"/>	Table - II (Size of Grounding Conductors) .....	39
<input type="checkbox"/>	Annexures I - V .....	40
<input type="checkbox"/>	Distribution Transformer History Sheet .....	45
<input type="checkbox"/>	11 KV RMU History Sheet .....	47
<input type="checkbox"/>	List of Tools & Plants required.....	49
<input type="checkbox"/>	List of Consumable Materials required.....	50
<input type="checkbox"/>	Bibliography .....	51

# Maintenance Schedule for Distribution System

Page No.	7
Revisions	RO

## REVISION RECORD

DATE	PAGE NO	REVISION No.	NATURE OF REVISION



## INTRODUCTION

### What Actually Maintenance Is?

The Work of maintenance consists of routine inspection, testing, cleaning and adjustments which are carried out on a piece of equipment in service to avoid its breakdown. Maintenance should not be confused with repair work which is carried out after the breakdown of the equipment in service, to restore it to its working condition and unlike maintenance, cannot be given careful advance planning. In brief, the quantum of any maintenance work will basically cover the following:-

- 1) Inspection.
- 2) Preventive Maintenance.
- 3) Overhauls.

These are further illustrated below :-

#### **Inspection**

It signifies a visual check of equipment without physical disassembly. Periodical inspection of equipments when in operation provides a check on their conditions, reveals the faults and defects which may develop during operation and makes it possible to take timely remedial measures.

#### **Preventive Maintenance**

It signifies the periodical work including operational and any other testing on a piece of equipment to its suitability in service and to maintain it in proper working condition. It is scheduled on the basis of data obtained through inspection and maintenance checks giving priority to the troubles threatening normal operation of the line/equipment.

# Maintenance Schedule for Distribution System

Page No.	9
Revisions	RO

## Overhauls

It signifies preventive maintenance involving major disassemble of the equipments. It is scheduled on the basis of normal life expectancy of the equipment or when the need arises on the basis of data obtained through inspection and maintenance checks.

Following "Inspection", there are two important actions, namely "Reporting" & "Rectification" Unless deferrable for the regular periodic maintenance, any defects observed during the inspection should be rectified within the shortest possible time in order to avoid its development into a major fault. In any case, the observations of inspection should be recorded and reported in a suitable form for follow-up action.

For this purpose, proforma of "Inspection Reports" for various equipments/components of the distribution system have been prepared (Annexure I - V) which can be easily filled up and interpreted by the Field Staff. To facilitate reporting with use of minimum words, the various equipments/components of the distribution system have been divided into the following main heads/chapters:-

1. Distribution Transformers.
2. a) 11 KV Over head Lines (Including 11 KV G.O. Switches)  
b) 11 KV U.G. System (Including RMUs).
3. LT Lines.
4. Service Connections.

These main-heads have been further divided into appropriate sub-heads and all likely defects that can occur on these sub-heads have been described in inspection schedule. For example, the sub-heads for the main head No. 2 A, i.e., (11 KV over head lines) shall be pole, stays crossarms, conductor, insulator, jumpers, G.O. Switch, earthing etc. Then all the likely defects which occur on these equipments have been listed under the inspection programme. For example, consider the case of insulators. The defects listed in inspection programme are:-

# Maintenance Schedule for Distribution System

Page No.	12
Revisions	RO

- 2) The minor defects noticed during inspection itself be attended, wherever possible, and other cases at the earliest possible occasion after chalking out a programme in advance.
- 3) In case of occurrence of any abnormal conditions the equipments should be immediately disconnected from service and matter reported to higher authorities for further instructions.
- 4) Manufacturer's instructions should always be given due consideration while carrying out maintenance of a particular equipment.
- 5) A continuous record of all test results should be maintained.
- 6) Suitable inspection and maintenance charts/history sheets should be maintained giving complete details for all inspection and maintenance work done and further proposed to be done so as to facilitate proper and effective working of the maintenance programmes.
- 7) Required safety precautions/safety devices must be observed/used while carrying out any maintenance works.
- 8) The schedules once adopted should be subjected to periodical review, in the light of previous experience to see if improvements are possible not only to ensure adequate maintenance, but also to reduce costs.

## Off-Schedule Inspection

To maintain the system at the required level of operational reliability, it is essential to further carry out the inspections of the following nature apart from the scheduled inspections already discussed:

### 1) Special Inspections

These inspections are recommended to be made after severe weather conditions, i.e., wind storms, heavy rains and thunder storm, etc., so as to detect any damage or breakage on the line/equipment and to take necessary action.

### 2) Night Inspections

The inspections of this nature are necessary to detect surface leakage, overheated conductor joints and sparking



# Maintenance Schedule for Distribution System

Page No. 13

Revisions RO

switches, etc., as these are not generally visible during the day time.

### **3) Emergency Inspections**

Such inspections are required over a line during its breakdown to locate and identify the cause of trouble as early as possible in order to restore the supply. Separate emergency staff should be kept for this purpose.

### **4) Follow-up Inspections**

These inspections are required over a line following one or more short interruptions on it (though with the supply restored) to locate and identify the cause of interruption and to make estimate of the amount of maintenance required.

### **5) Check Inspection**

These include the inspections carried out by the engineers-in-charge of maintenance, as a check on the conditions of line and the efficiency of the patrolling staff and to point out the defects which could not be noticed by the staff in the first instance.

# Maintenance Schedule for Distribution System

Page No. 14

Revisions RO

## CHAPTER - 1 DISTRIBUTION TRANSFORMERS

### 1.1 RECOMMENDED SCHEDULES FOR INSPECTION

Frequency of Inspection	Equipment / Items to be Inspected	Points to be checked / Noted	Remarks
1	2	3	4
Quarterly	a) Supports	Check for proper supporting and level of the transformer	
Quarterly	b) Connections	Check for tightness of connections	
Quarterly	c) Fuses (HT & LT)	1. Check for tightness & continuity 2. Check for correct ratings	Refer Table - I for fuse ratings.
Quarterly	d) Oil	Check for the leakage of oil 1. From drain off valve 2. From Gaskets 3. From tank leak etc.	In case of appreciable leakage of oil, check up its level and top up, if necessary with tested oil.
Quarterly	e) Bushings	Check for chipped & broken porcelain	
Quarterly	f) Arcing horns	Check for the following: 1. Any damage due to flash over 2. Correct alignment and proper gap adjustment between Arcing rods (Gap 3.2 cm. For 11 KV)	
Quarterly	g) Breather	Check for the following: a) Colour of the silicagel b) Opening of the breathing-in- passage	<b>Colour of the good silicagel is blue</b> Recondition it if the colour has changed. The Silicagel must be roasted in a pan such that the colour changes from Pink to Blue. Refer Table - II for Grounding Conductor Size/Type.
Quarterly	h) Earthing	Check for the following: 1. Tight and intact earth connections of the body & neutral of the transformers 2. Proper size of grounding conductor	
Quarterly	i) Danger Plate & Anti Climbing Devices.	1) Proper supporting of Danger plate at suitable height from the ground level & facing in the right direction. 2) Check whether Anti Climbing Devices are provided or not.	

# Maintenance Schedule for Distribution System

Page No.

15

Revisions

RO

1	2	3	4
Quarterly	j) Explosion vent diaphragm	Check, if cracked or broken	
Quarterly	k) General conditions	Check for general cleanliness and tightness of all bolts and nuts etc.	
Quarterly	l) LT Switch / LT protection kit	Check for the following: 1. If the switch with cover is intact 2. If the cable / switch running hot 3. Signs of overheating / burning on contacts. 4. Size of the LT Leads are of adequate capacity. 5. Proper size of fuse wire. 6. Safety from rain-water etc.	If the Capacity of the Transformer is more than 100 KVA provide LT Distribution Box.
Quarterly	m) Lightning arrestors	Check for the following 1. Broken / damaged porcelain 2. Intact and tight line earth and connection 3. External indication of fused/spark over voltages.	
Quarterly	n) G.O. Switches	Check for the following: 1. For smooth operation. 2. Evidence of over-heating, burning, corrosion/pitting on the switch contacts. 3. Broken or damaged insulators. 4. Proper and tight earth connections. 5. Proper alignment of switch contacts. 6. <b>All the 3 blades are opening and closing simultaneously.</b> 7. Proper and complete fitting of male contacts into the female ones. 8. Arcing horns are intact.	

# Maintenance Schedule for Distribution System

Page No. 16  
Revisions RO

## 1.2 RECOMMENDED SCHEDULES FOR PREVENTIVE MAINTENANCE

**Note** :- The steps already recommended under schedule of inspection should be considered in addition to the points given below :-

Frequency of Maintenance	Equipment / Items where maintenance is to done	Details of maintenance Work to be done	Remarks
1	2	3	4
Half Yearly	a) Connections	1) Tighten connections, replace worn out bolt & nuts.	
Half Yearly	b) Fuses	Replace the old fuses with new ones of right capacity	1) The fuse wires get thinned out with passage of time due to aging effect. 2) For deciding ratings, Refer to Table - I.
Half Yearly	c) Oil level	1) Observe the colour of the oil to have idea of its condition. 2) Check for proper oil level against the gauge glass, top up, if necessary with good tested oil. 3) Stop any leakages	Charge the Transformer Two Hours after Topping up of Oil.
Half Yearly	d) Bushing and Arcing horns	1) Clean off all dirt, paint and other deposits. 2) Examine and replace the cracked/broken or chipped bushings. 3) Examine and replace the damaged Gasket. 4) Adjust the arcing horns for alignment and proper gaps between them.	Gap 3.2 cms for 11 KV bushings.



# Maintenance Schedule for Distribution System

Page No. 17  
Revisions RO

1	2	3	4
Half Yearly	e) Breathers	<ol style="list-style-type: none"> <li>1) Check for condition/colour of silicagel, recondition or replace as necessary.</li> <li>2) Fill the silicagel upto top of the container.</li> <li>3) Open and clean the air-in-passage if choked by paint, dust or otherwise.</li> <li>4) Tighten the lid of breather for air tightness to avoid entry of moist air.</li> </ol>	Ensure always colour of Silica gel is <b>Blue</b> .
Half Yearly	f) Voltage	Measure the voltage during maximum load period & adjust the taps, if required, to ensure proper voltage to the consumers.	
Half Yearly	g) Danger Plate & Anti Climbing Devices.	<ol style="list-style-type: none"> <li>1) Replace the danger plate, if defaced.</li> <li>2) Provide Anti Climbing Devices wherever necessary.</li> </ol>	
Half Yearly	h) General Conditions	Clean off all dirt etc from the body of the transformer and tighten all bolts/nuts etc	
Half Yearly	i) L.T. Switch and L.T. Protection Kit.	<ol style="list-style-type: none"> <li>1) Check load on the LT circuit &amp; replace the LT cable/LT switch by higher capacity one where necessary</li> <li>2) Replace the damaged LT cable with new one of right capacity.</li> <li>3) Examine the switch for smooth operation.</li> <li>4) Recondition the switch.</li> <li>5) Tighten all connections.</li> <li>6) Ensure that the inlet of the cable into the switch is plugged with plastic compound to avoid entry of rainwater.</li> <li>7) Check for loose connection &amp; signs of overheating of conductors at clamp connection to LT protection kit.</li> <li>8) Replace old fuses with new ones of Right type &amp; Capacity &amp; Proper Length.</li> </ol>	<p>If the Capacity of Transformer is more than 100 KVA provide LT Distribution Box.</p> <p>Use 240 Sq. mm LT Cable Leads of Two Runs for 250 KVA and Four Runs for 500 KVA Transformer Centres.</p> <p>For deciding ratings refer to Table - I.</p>

# Maintenance Schedule for Distribution System

Page No.	18
Revisions	RO

1	2	3	4
Quarterly	j) Load Balancing on Phases	1) Check load on three phases with the help of clip-on-ammeter under maximum load conditions and ensure load balancing on all the three phases.	In case of overloaded Transformer reduce the load by transfer of load. Augment the transformer or provide additional transformer if the overload is substantial and constant.
Half yearly	k) G. O.Switch	<ol style="list-style-type: none"> <li>1) Cleanliness:- Clean all dust &amp; other deposits with neat and dry cloth.</li> <li>2) Insulators :- Check for cracks, chipping &amp; other defects, replace where necessary.</li> <li>3) Switch Contacts :- <ol style="list-style-type: none"> <li>a) Check for alignment, adequate contact pressure and smooth operation &amp; adjust where necessary &amp; grease the contacts.</li> <li>b) <b>If One of the contact is faulty replace the G.O.S. immediately.</b></li> <li>c) Examine for burning / over-heating or other damages. Recondition or replace, where necessary.</li> </ol> </li> <li>4) Arcing Horns :- Check if there are intact and replace, if damaged/burnt.</li> <li>5) Mechanism :- Clean, examine and review worn-out parts. Relubricate and check for correct operation.</li> <li>6) Main connections:- Proceed as described under separate heading of "Jumpers".</li> <li>7) Examine General Condition of the conductor and earthwires i.e., for crushed spots, kinks over/under-tensioning etc. and recondition where necessary.</li> <li>8) General :- Check all hardware and tighten, if needed.</li> </ol>	

# Maintenance Schedule for Distribution System

Page No.	19
Revisions	RO

1	2	3	4
Half yearly	l) Earth Testing (Should be done during driest part of the year)	1) Tighten the earth connections of Neutral, Body and L. A. 2) Examine and replace broken earth leads / conductors with proper size. 3) Provide Additional Grounding wherever necessary.	Refer Table - II for Grounding Conductor
Half yearly	m) Lightning Arrestors	Clean and examine insulators for cracks or flashover. Replace, where necessary.	

## 1.3 RECOMMENDED SCHEDULES FOR OVERHAULS

Frequency of Overhauls	Equipment / Items to be Overhauled	Details of the work to be done	Remarks
1	2	3	4
Five Yearly	a) Distribution Transformer	Insulating oil should be filtered and transformer body be repainted.	

## GENERAL GUIDELINES

### 1) 11 KV OVERHEAD LINES :-

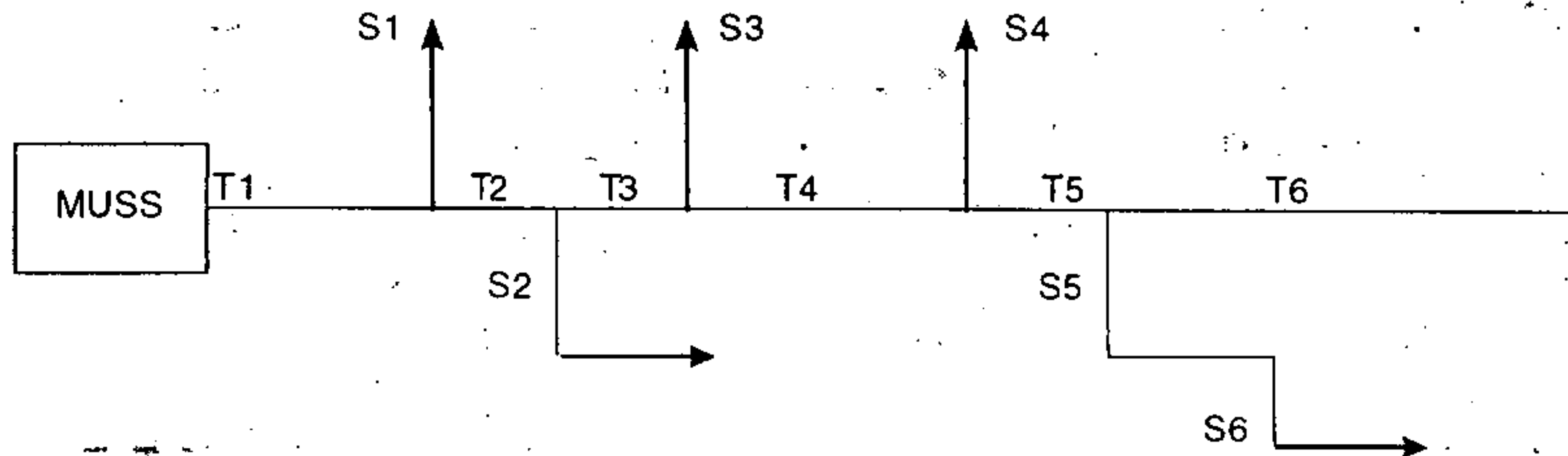
On Account of the existing lengthy lines in our systems it is desirable to bifurcate the lines into different sections namely Trunk Line Sections/Spur Line Sections to follow the maintenance procedures enumerated in the Chapters of the Maintenance Manual for effective/easy implementation.

The General procedures for codification of Line for identification is as follows:-

1) Single line diagram of all the feeders starting from the MUSS/Feeding Point to the end point of the jurisdictional area of the O&M section incorporating the details are to be drawn for identification of the system components :-

- A) Name of the MUSS.
- B) Feeder Name/No.
- C) Trunk Line/Spur Line
  - 1) Name
  - 2) No of poles
  - 3) No of TC's.
- D) Peak load of the feeder.

Example :-



Tn = Trunk Line Section No. N

Sn = Spur Line No. N where N = 1, 2, 3, 4, 5.... Etc.

# Maintenance Schedule for Distribution System

Page No.	21
Revisions	RO

2) Sketch indicating the particulars of Section of the Trunk Line/Spur Line are to be drawn and the poles are to be numbered Tn/1,2,3,.....or Sn/1,2,3,..... starting from 1<sup>st</sup> Pole of the particular Trunk/Spur Line.

The Record of the Particular Trunk Line / Spur Line showing following details shall be prepared :-

## NAME OF THE TRUNK / SPUR LINE .....

Pole Nos.	1	2	3	4	5	6	7	8	9	10	11	12
RCC/PCC/RAIL												
Wooden Pole												
Length of the Pole												
Conductor												
Loose span or not												
No. of joints in span												
Remarks												

### NOTE :-

- In case of Double Circuit, the Pole Numbers have to be prefixed with the Feeder Number.
- Poles at the Transformer Centre are not to be numbered.
- If the length of span is more than 50 mtrs. Provide intermediate poles.
- If No. of Joints in a Span is More than two, replace the Span Conductor.

### 1. 11 KV U.G. SYSTEM :-

Keep record of Cable Route Map of all the Feeders indicating the following details :-

- Sources of Supply.
- Size/Type/Length of the Cable.
- Load Details.
- Location of Joints.
- Details of RMU's and Transformers.

# Maintenance Schedule for Distribution System

Page No. 22  
Revisions RO

## CHAPTER - 2 2A. 11 KV OVERHEAD LINES (INCLUDING 11 KV G.O.SWITCHES)

### 2A - 1. RECOMMENDED SCHEDULES FOR INSPECTION

Frequency of Inspection	Equipment / Items to be Inspected	Points to be inspected	Remarks
1	2	3	4
Quarterly	a) Poles 1) Steel 2) Wood 3) Cement	Check for the following incase of all the 3types of poles: 1) Damaged/broken poles or for ground level erosion and corrosions where the pole is not capable of safely supporting its load. 2) Bowed or leaning poles due to improper guying or overloading 3) Unauthorised attachments such as fencing, aerial wires etc. 4) Poles which are very much exposed to accident due their being near or in common way 5) Condition of foundation.	
Quarterly	b) Stays	Check the following : 1) Correct direction and proper angle of the stays 2) Loose, broken or any other damage done to stays 3) Whether stay insulator is intact/whether stay is properly earthed. 4) If stay - rods are corroded	



# Maintenance Schedule for Distribution System

Page No. 23

Revisions RO

1	2	3	4
Quarterly	a) Cross Arms	<p>Check the following:</p> <ol style="list-style-type: none"> <li>1) If the Cross arms / Clamps have slipped.</li> <li>2) Bending of Cross arms due to uneven tension</li> </ol>	
Quarterly	b) Insulators and Fittings	<p>Check the following :</p> <ol style="list-style-type: none"> <li>1) Broken or chipped porcelain, flash over marks</li> <li>2) Tilted insulators</li> <li>3) Excessive rusting of fittings.</li> </ol>	
Quarterly	c) Conductors	<p>Check the following:</p> <ol style="list-style-type: none"> <li>1) Examine, if severely tied to the insulator/pole/crossarm.</li> <li>2) Proper sag.</li> <li>3) Proximity of trees and other objects including building etc.</li> <li>4) Sufficient clearances between conductors and earthwires, and also from the ground.</li> <li>5) Sufficient clearances from other electric/telephone lines passing along, below or above it.</li> <li>6) If joints in the jumpers and conductors appear alright .</li> <li>7) Broken conductor strands</li> <li>8) Binding wire has not become loose and open.</li> <li>9) All joints and jumpers of aluminum conductor have proper P. G. Clamps.</li> <li>10) More than Two Joints in a Span.</li> <li>11) Loose Spans.</li> </ol>	



# Maintenance Schedule for Distribution System

Page No. 24  
Revisions RO

1	2	3	4
Quarterly	a) Jumpers and other line accessories	<p>Check for the following:</p> <ol style="list-style-type: none"> <li>1) Proper supporting &amp; jointing two ends of the jumpers with P.G. Clamps.</li> <li>2) Sufficient clearance between jumpers on the 3 - phases</li> <li>3) Sufficient clearance of jumpers from metal works/ stays, so as not to swing close enough to strike an arc.</li> <li>4) Provision of proper insulation of jumpers.</li> <li>5) Signs of over-heating and burnings on jumpers and other fittings.</li> <li>6) Loose / Defective Clamps, Jointing Sleeve, Bolt and Nuts etc.</li> </ol>	

## 2A - 2 RECOMMENDED SCHEDULES FOR PREVENTIVE MAINTENANCE

**Note:-** The steps recommended below are to be carried out in addition to already pointed in respect of various equipments under inspection programme.

Frequency of Maintenance	Equipment / Items whose maintenance is required	Details of maintenance work to be done	Remarks
1	2	3	4
Within One Month after inspection (Also before and after Monsoon).	<p>a) Poles</p> <ol style="list-style-type: none"> <li>1) Steel</li> <li>2) Wood</li> <li>3) Cement</li> </ol>	<p>The instructions given below are common to the 3 types of poles:</p> <ol style="list-style-type: none"> <li>1) Replace the damaged / broken poles</li> <li>2) Straighten / make vertical leaning poles by proper guying</li> <li>3) Shift the position of poles exposed to accidents due to their being near or in common way</li> <li>4) Pack and consolidate the foundation soil, where disturbed or eroded.</li> </ol>	

# Maintenance Schedule for Distribution System

Page No.

25

Revisions

RO

1	2	3	4
Annually	a) Stays	<ol style="list-style-type: none"> <li>1) Tighten the loose stays</li> <li>2) Replace the broken / damaged stays and stay - bows.</li> <li>3) Replace the broken stay insulator / recondition the earth.</li> <li>4) Provide Stays wherever required to avoid yielding of poles during monsoon.</li> </ol>	
Annually	b) Cross-arms	<ol style="list-style-type: none"> <li>1) Replace the broken / cracked / bent cross-arms by new ones.</li> <li>2) Bring in position the slipped crossarms / clamps.</li> </ol>	
Annually	c) Insulators	<ol style="list-style-type: none"> <li>1) Clean and check for cracked/chipped and punctured insulators. Replace, where necessary.</li> </ol>	The insulators be checked twice a year preferably before and after monsoons.
Annually	d) Conductors	<ol style="list-style-type: none"> <li>1) Tighten loose bindings and replace</li> <li>2) Examine for corrosion at the joints of conductors and insulators. Clean and renew, where necessary</li> <li>3) Examine closely for broken strands, particularly at insulators, clamps, due to vibration &amp; repair where necessary</li> <li>4) Examine for slipping of conductors from the clamps. Tighten all clamps &amp; fittings.</li> </ol>	
Annually	f) Jumpers and line accessories	<ol style="list-style-type: none"> <li>1) Check for broken or burnt strands of the jumpers &amp; replace where necessary</li> <li>2) Check for proper material &amp; size of the jumpers for the given conductors</li> <li>3) Check for crowding or jumbling of wires and jumpers at the tee-off points and adjust, where necessary.</li> <li>4) Replace the binding wire joints of jumpers by proper P.G. Clamps.</li> </ol>	

# Maintenance Schedule for Distribution System

Page No.	26
Revisions	RO

1	2	3	4
<p>Quarterly</p> <p>(Its maintenance may be done even earlier as the functioning of GOS is generally in disorder and is always a source of trouble).</p>	<p>g) G. O. Switch</p>	<ol style="list-style-type: none"> <li>1) Cleanliness:- Clean all dust &amp; other deposits with neat and dry cloth.</li> <li>2) Insulators :- Check for cracks, chipping and other defects, replace where necessary.</li> <li>3) Switch Contacts :-             <ol style="list-style-type: none"> <li>a) Check for alignment, adequate contact pressure and smooth operation and adjust where necessary.</li> <li>b) Examine for burning / over-heating or other damages. Recondition or replace, where necessary.</li> </ol> </li> <li>4) Arcing Horns :- Check if these are intact and replace, if damaged/burnt.</li> <li>5) Mechanism :- Clean, examine and review worn-out parts. Relubricate and check for correct operation.</li> <li>6) <b>If One of the legs is faulty, replace the G.O.S. immediately.</b></li> <li>7) Main connections :- Proceed as described under separate heading of "Jumpers".</li> <li>8) Examine General Condition of the conductor and earthwires i.e., for crushed spots, kinks over/under-tensioning etc. and recondition where necessary.</li> <li>9) General :- Check all hardware and tighten, if needed.</li> </ol>	

# Maintenance Schedule for Distribution System

Page No. 27  
Revisions RO

1	2	3	4
Every 3 Months (Once before the monsoons and secondly after monsoons — or earlier if necessary)	h) Tree trimming	Cut-off the tree branches where necessary to maintain a minimum clearances of 1.8 m on each side of the line.	

## 2A-3 RECOMMENDED SCHEDULES FOR OVERHAULS

Periodic overhauls are not required for components of 11 KV Line and preventive maintenance at regular intervals is sufficient.

# Maintenance Schedule for Distribution System

## 2-B 11 KV U.G. SYSTEM (INCLUDING CABLE, RMU's)

NOTE :- THESE INSPECTIONS ARE TO BE UNDERTAKEN ONLY UNDER PROPER LINE CLEAR AND DULY OBSERVING ALL SAFETY MEASURES.

### 2-B-1 RECOMMENDED SCHEDULES FOR INSPECTION

Frequency of Inspection	Equipment / Items to be Inspected	Points to be inspected	Remarks
1	2	3	4
Quarterly	a) General Cleanliness	<ol style="list-style-type: none"> <li>1. Examine the Switchgear premises, the doors, locks &amp; OCB for overhaul conditions &amp; general cleanliness.</li> <li>2. Check the RMU for vermin proof, weather proof &amp; water proof.</li> <li>3. Clean the surrounding of the RMU.</li> </ol>	<p>If any defect is noticed take appropriate action immediately.</p> <p>Refer Table - II for Grounding Conductor Size/Type.</p>
Quarterly	b) Auxillary Fuses	Check that the fuses are intact and are of correct rating.	
Quarterly	c) Earthing	Check for tight & proper earthing connections of all metal parts & Electrode.	
Quarterly	d) 11 KV Cable	Observe the Cable route of H.T. U.G. Cable and take precautionary action to prevent damages by external agencies like P & T, Water Supply.	
Quarterly	e) Paint and Danger Plate	<ol style="list-style-type: none"> <li>1. Check for proper supporting of danger plate at suitable height from the ground level and facing in the right direction.</li> <li>2. Check for the following details painted on RMU clearly visible or not.                             <ol style="list-style-type: none"> <li>a. Name of the Incoming and Outgoing Source with reference to Source of Supply &amp; Cable Size.</li> <li>b. Contact Tel. No. and Office incase of Emergency in Bold Letters.</li> </ol> </li> </ol>	



# Maintenance Schedule for Distribution System

1	2	3	4
Quarterly	f) 11 KV Cable at RMU.	<p>Check for the following :-</p> <ol style="list-style-type: none"> <li>1. Tight &amp; intact connections.</li> <li>2. Over all conditions of the cable &amp; end termination.</li> <li>3. Insulation taping of end termination.</li> </ol>	
Quarterly	<p>g) Circuit Breaker</p> <ol style="list-style-type: none"> <li>1. <b>VL/BOCB.</b> <ol style="list-style-type: none"> <li>a. Insulators &amp; Bus bars.</li> <li>b. Contacts.</li> <li>c. O.C.B. Tank</li> </ol> </li> <li>2. <b>VCB.</b> <ol style="list-style-type: none"> <li>a. Insulators.</li> <li>b. Operating Mechanism.</li> <li>c. Interrupters(V.I).</li> </ol> </li> <li>3. <b>On Load Oil Isolator (O.D)</b> <ol style="list-style-type: none"> <li>a. Insulators &amp; Bus-bars</li> <li>b. Contacts.</li> </ol> </li> </ol>	<p>1. Draw out Breaker and Clean Breaker Insulator.</p> <p>2. Clean Bus bar and Bus supporting Insulator.</p> <p>3. Clean Spout Grid inside and outside with petrol.</p> <p>Check operation of the fixed and moving contacts.</p> <p>Examine the following :-</p> <ol style="list-style-type: none"> <li>1. Signs of local heating.</li> <li>2. Any unusual smell/noise.</li> </ol> <p>1. Clean insulated housing switch bushing insulator and all other insulating parts with petrol.</p> <p>2. Clean Bus and cable side spout insulator with petrol.</p> <p>Check lowering and raising operation of the breaker and opening of the shutters.</p> <p>Check for condition of V.I.</p> <ol style="list-style-type: none"> <li>a. Clean bus-bars &amp; bus supporting insulators.</li> <li>b. Check operation of the fixed and moving contacts</li> </ol>	Refer VCB Manual.

# Maintenance Schedule for Distribution System

Page No. 30  
Revisions RO

## 2B-2. RECOMMENDED SCHEDULES FOR PREVENTIVE MAINTENANCE

- Note:-** 1) The steps recommended below are to be carried out in addition to already pointed in respect of various equipments under inspection programme.
- 2) THESE INSPECTIONS ARE TO BE UNDERTAKEN ONLY UNDER PROPER LINE CLEAR AND DULY OBSERVING ALL SAFETY MEASURES.

Frequency of Maintenance	Equipment / Items whose maintenance is required	Details of maintenance work to be done	Remarks
1	2	3	4
Half Yearly or when necessary depending upon the condition of service	a. Cleaning	<ol style="list-style-type: none"> <li>1. Make thorough visual inspection of the entire installation.</li> <li>2. Clean off all dust and other deposits with clean and dry cloth.</li> <li>3. Plug all the unwanted gaps/holes to prevent the entry of Reptiles &amp; Rodents.</li> </ol>	
	b. Auxillary Fuses	Check and renew, where necessary	
	c. Wiring & other connections.	Examine : Wiring and other connections for being intact.	
	d. Earthing	Check leads and tighten connections, if required renew Earthing.	Refer Table - II for Grounding Conductor Size/Type.
	e. CT's	<ol style="list-style-type: none"> <li>1. Examine and clean the bushings.</li> <li>2. Megger test of CT's.</li> </ol>	
	f. Paint and Danger Plate	Paint and repaint the Danger Plate and other details on RMU, if defaced.	
	g. Mechanism	<ol style="list-style-type: none"> <li>1. Check for tightness of all Bolts, Nuts &amp; Screws.</li> <li>2. Check trip plunger &amp; reset correctly.</li> <li>3. Check and lubricate racking mechanism, truck wheels, racking interlocks and other moving parts.</li> </ol> Check operation of tank lowering device and lubricate as necessary.	



# Maintenance Schedule for Distribution System

1	2	3	4
Half Yearly or when necessary depending upon the condition of service	h. Circuit Breaker	1. Top up the Oil, where necessary. 2. Check if the Oil has become thick or Carbonised if so replace the oil.  Check the I.R. Values of Bus-bar and Breaker.  Check fixed and moving contacts and replace if necessary.	<b>Conduct I.R. Value test with all the Insulators in good clean and dry conditions.</b>  The I.R. Values shall not be less than 200 M. Ohm. If the I.R. Values are below the limited value-report immediately to concerned MRT for remedial action.
	1. VL/BOCB		
	a. Oil		
	b. I.R. Values.		
	c. Contacts.		
	2. V.C.B.	Lubricate Operating Mechanism with good quality engine oil.  Check for condition of the V.I.	Refer the Manufacturer's Manual. If any defect is found report the matter to MRT immediately.
	a. Operating Mechanism		
	b. Vaccum interrupters (V.I.)		
	c. I.R. Values.	1. Check I.R. Values of Both Phase to Earth and between contacts of the V.C.B in open condition. 2. Check I.R. Values of Bus Phase to Phase and Phase to Earth.	
	3. On Load Oil Isolator (O.D.)	1. Top up the Oil, where necessary. 2. Check if the Oil has become thick or Carbonised if so replace the oil.	
	a. Oil.		
	b. I.R Values	1. Check I.R. Values of O.D Main Insulators. 2. Check I.R, Values of Bus Bars	

# Maintenance Schedule for Distribution System

Page No.	32
Revisions	RO

1	2	3	4
	c. Circuit Breakers Contacts	<ol style="list-style-type: none"> <li>1. Examine for burning, pitting or other damages to main and arcing contacts</li> <li>2. Clean &amp; grind them with fine sand paper, replace contacts where necessary</li> <li>3. Check for proper contact-wipe and adjust where necessary.</li> <li>4. Check for simultaneous closing and opening of all the contacts.</li> </ol>	
	d. Insulators	<ol style="list-style-type: none"> <li>1. Clean &amp; examine for signs of damage</li> <li>2. Check &amp; replace where necessary.</li> </ol>	
	e. Mechanism	<ol style="list-style-type: none"> <li>1. Check for tightness of all Bolts, Nuts &amp; Screws.</li> <li>2. Check trip plunger &amp; reset correctly.</li> <li>3. Check and lubricate racking mechanism, truck wheels, racking interlocks and other moving parts.</li> <li>1. Check operation of tank lowering device and lubricate as necessary.</li> </ol>	

## **2-B-3 RECOMMENDED SCHEDULES FOR OVERHAULS**

Periodic overhauls are not required for components of 11 KV Line and preventive maintenance at regular intervals is sufficient.

# Maintenance Schedule for Distribution System

Page No. 33  
Revisions RO

## L.T. LINES

### 3.1 RECOMMENDED SCHEDULES FOR INSPECTION

Frequency of Inspection	Equipment / Items to be Inspected	Points to be inspected	Remarks
1	2	3	4
Half Yearly	<p><i>I.</i></p> <p>a) Poles b) Stays c) Cross-arms d) Conductors e) Insulators f) Jumpers</p> <p><i>II.</i> Line</p> <p><i>III.</i> L.T. Feeder Pillar Boxes (FPB's)</p>	<p>Same as recommended for these items in Chapter - 2, Section 2.1.</p> <p>Check the following :-</p> <p>1) LT Line is Single Phase/3 Phase 4 Wire/3 Phase 5 Wire. 2) Conductor used is 4ACSR/ 2ACSR/Rabbit. 3) Length of the LT Line. 4) Loose Span.</p> <p>Check the following :-</p> <p>1. General Condition of the FPB. 2. Over Heating of L.T. Leads. 3. Damage to Lugs. 4. Connections are tight &amp; intact. 5. Check the FPB for vermin proof, weather proof and water proof.</p>	<p>Only 4 Pin Cross-Arms to be used for LT Line Extension.</p> <p>If any defect is noticed take appropriate action immediately.</p>

# Maintenance Schedule for Distribution System

## 3.2 RECOMMENDED SCHEDULES FOR PREVENTIVE MAINTENANCE

**Note:-** The steps recommended below are to be carried out in addition to already pointed in respect of various equipments under inspection programme.

Frequency of Maintenance	Equipment / Items whose maintenance is required	Details of maintenance work to be done	Remarks
1	2	3	4
<p>One to Two yearly (depending upon the volume of the work.)</p> <p>Every 3 Months (Once before the monsoons and secondly after monsoons or earlier if necessary).</p>	<p><i>I.</i></p> <p>a) Poles b) Stays c) Cross-arms d) Conductors e) Insulators f) Jumpers</p> <p><i>II.</i></p> <p>a) Line.</p> <p>b) Tree Trimming.</p>	<p>Same as recommended for these items in Chapter - 2, Section 2.2.</p> <p>1. Convert all Single Phase lines into 3 Phase 4 Wire lines. 2. Replace Conductors of lower capacity by Rabbit Conductors for all Phases and Neutral. 3. Take action to restrict the length of the line to 500 Mtrs. 4. Provide intermediate poles to all Loose Spans.</p> <p>Cut off the tree branches where necessary to maintain a minimum clearances of 1.8 m on each side of the line.</p>	

# Maintenance Schedule for Distribution System

Page No. 35  
Revisions RO

1	2	3	4
Annually	III. L.T. Feeder Pillar Boxes.	<ol style="list-style-type: none"> <li>1. Replace the FPB if deteriorated.</li> <li>2. Take action to replace the damaged L.T. Lead with new one of right Capacity.</li> <li>3. Replace the damaged Lugs.</li> <li>4. Tighten all connections.</li> <li>5. Plug all the unwanted gaps/holes to prevent the entry of Reptiles and Rodents.</li> <li>6. Clean all dust and other deposits with clean and dry cloth.</li> </ol>	

### 3.3 RECOMMENDED SCHEDULES FOR OVERHAULS

Periodic overhauls are not required for components of L.T. Line and preventive maintenance at regular intervals is sufficient.

## CHAPTER-4

### SERVICE CONNECTIONS

#### 4.1 RECOMMENDED SCHEDULES FOR INSPECTION

Frequency of Inspection	Equipment / Items to be Inspected	Points to be inspected	Remarks
1	2	3	4
Two to Three Years (depending upon the volume of the work) OR At the time of Servicing of New Installations or Replacement of Meter—in the same Pole.	a) Pole fittings	<ol style="list-style-type: none"> <li>1) Whether tight and in alignment</li> <li>2) Whether too jumbled up, with numerous services.</li> <li>3) Whether Aerial Fuse Boards are provided to all service connections.</li> <li>4) Whether pole fuse is readily accessible &amp; in a safe position for replacement.</li> <li>5) Whether service wires &amp; pole fuses are distinctly organised so that wires and fuses relating to any service could be distinguished readily.</li> </ol>	<b>No New Installations are to be serviced without providing Fibre Glass Aerial Fuse Boards.</b>
Same as above	b) Service Wires and Cables	Whether all the conductors (Including Neutral) are at a safe distance from each other so as not to strike an arc during high winds.	
Same as above	c) Service Lad in & Meter Board	Check the following :- <ol style="list-style-type: none"> <li>a. Meter is in good running condition.</li> <li>b. Proper capacity of MCB is installed.</li> <li>c. Earthing is as per specifications.</li> </ol>	



# Maintenance Schedule for Distribution System

Page No. 37

Revisions RO

## 4.2 RECOMMENDED SCHEDULES FOR PREVENTIVE MAINTENANCE

**Note:-** The steps recommended below are to be carried out in addition to already pointed in respect of various equipments under inspection programme.

Frequency of Maintenance	Equipment / Items whose maintenance is required	Details of maintenance work to be done	Remarks
1	2	3	4
With in One Month after inspection	a. Pole fittings. b) Service Wire and Cable c) Service lead in & Meter Board	1. Provide separate Fibre Glass Aerial Fuse Boards for each service connections. 2. Replace the broken cutouts and renew the fuse. 3. Readjust the jumpers on the pole, if there is jumbling.	<b>No New Installations are to be serviced without providing Fibre Glass Aerial Fuse Boards.</b>
Same as above		Reset for proper clearance from each other.	
Same as above		1. Replace the Meter by good one if it is faulty. 2. Take action to replace MCB by adequate capacity. 3. Arrange for rectification of Earthing if required.	

## 4.3 RECOMMENDED SCHEDULES FOR OVERHAULS

Periodic overhauls are not required for components of L.T. Line and preventive maintenance at regular intervals is sufficient



TABLE - I

**DISTRIBUTION TRANSFORMERS**

**FUSE PROTECTION AND LT WIRE SIZES**

Capacity in KVA	Full load Amps		Ht side horn gap fuses in SWG	LT Side protection	Normal section area of cables in sq. mm.
	11 KV	433 V			
63	3.00	84.5	35	LT Protection kit	95
100	5.25	133.5	33		185
250	13.13	333.4	23	MCCB of 250 A, 2 Nos. for 250/300 KVA, 4 Nos. for 500 KVA.	240 in 2 Runs for 250/300 KVA, 4 Runs for 500 KVA.
300	15.75	400.5	23		
500	26.26	666.8	20		

**TABLE - II**  
**SIZES OF GROUNDING CONDUCTORS**  
**FOR DISTRIBUTION TRANSFORMERS & RMUS**

Sl. No.	Transformer Rating in KVA	Order of the fault current	Recommended steel conductor type/size
1.	25	200	Guy wire 7/20 i.e., 7 Strands with 8 SWG G. I. Wire.
2.	40	320	Guy wire 7/20 i.e., 7 Strands with 8 SWG G. I. Wire
3.	50	400	Guy wire 7/20 i.e., 7 Strands with 8 SWG G. I. Wire.
4.	63	500	Guy wire 7/20 i.e., 7 Strands with 8 SWG G. I. Wire.
5.	75	600	Guy wire 7 Strands 8 SWG.
6.	100	800	Guy wire 7 Strands 8 SWG.
7.	200	1600	M.S. Strip 25 mm x 6 mm.
8.	250	2000	M.S. Strip 25 mm x 6 mm.
9.	400	3200	M.S. Strip 25mm x 6 mm.
10.	500	4000	M.S. Strip 25 mm x 6 mm.
11.	R.M.U.		M.S. Strip 25 mm x 6 mm.

# Maintenance Schedule for Distribution System

Page No.	40
Revisions	RO

## KARNATAKA POWER TRANSMISSION CORPORATION LIMITED DISTRIBUTION TRANSFORMER INSPECTION REPORT (QUARTERLY)

**ANNEXURE - I**

Name of the Sub-Division ..... Page No. ....  
Name of the O & M Section: ..... Date .....  
Name of the Sub-Station .....  
Name of the Feeder .....

Name of the Transformer Centre/TC Code	
Supports	
Connections	
Fuses(HT & LT)	
Load	
Oil	
Bushings	
Arcing Horns	
Breather	
Barbed Wire, Danger Plate	
LT Distribution Box	
General Condition	
Others	
Remarks	

Signature of the Official .....

Karnataka Power Transmission Corporation Limited

# Maintenance Schedule for Distribution System

Page No.	41
Revisions	RO

## KARNATAKA POWER TRANSMISSION CORPORATION LIMITED

### 11 KV OVERHEAD LINE INSPECTION REPORT (QUARTERLY)

**ANNEXURE - ii**

Name of the Sub-Division .....

Name of the O & M Section .....

Name of the Sub-Station .....

Name of the Feeder .....

Name of the Trunk line/Spur line .....

Page No. ....

Date .....

Pole Nos.														
Pole														
Stays														
Cross arms and Supports														
Insulators														
Conductors														
Jumpers														
G. O. Switches														
No. of Joints in One Span														
Loose Span														
Others														
Remarks														

Signature of the Official .....

Karnataka Power Transmission Corporation Limited

# Maintenance Schedule for Distribution System

Page No.	42
Revisions	RO

**KARNATAKA POWER TRANSMISSION CORPORATION LIMITED**

**11 KV U.G. SYSTEM INSPECTION REPORT**  
**(QUARTERLY)**

**ANNEXURE - iii**

Name of the Sub-Division .....  
Name of the O & M Section .....  
Name of the Sub-Station .....  
Name of the Feeder .....  
Name of the RMU .....

Page No. ....  
Date .....

RMU No.	
Oil	
OCB Tank	
Auxillary Fuses	
C. B. Closing Mechanism	
11 KV Cable	
Paint and Danger Plate	
General Cleanliness	
Remarks	

Signature of the Official .....

**Karnataka Power Transmission Corporation Limited**

# Maintenance Schedule for Distribution System

Page No.	43
Revisions	RO

## KARNATAKA POWER TRANSMISSION CORPORATION LIMITED

### L.T. LINE INSPECTION REPORT

(ANNUALLY)

ANNEXURE - iv

Name of the Sub-Division .....

Name of the O & M Section .....

Name of the Sub-Station .....

Name of the Feeder .....

Name of the T.C. ....

Name of the Trunk line/Spur line .....

Page No. ....

Date .....

Pole Nos.																			
Pole																			
Stays																			
Cross Arms and Supports																			
Conductors																			
Jumpers																			
Loose Span																			
Span having more than 2 joints																			
2 ACSR/ 4 ACSR Conductors(Span Details)																			
Others																			
Remarks																			

Signature of the Official .....

Karnataka Power Transmission Corporation Limited



# Maintenance Schedule for Distribution System

Page No.	44
Revisions	RO

**KARNATAKA POWER TRANSMISSION CORPORATION LIMITED**

## **SERVICE CONNECTION INSPECTION REPORT**

**ANNEXURE - v**

Name of the Sub-Division .....

Name of the O & M Section .....

Name of the Sub-Station .....

Name of the Feeder .....

Name of the T.C./RMU .....

Name of the Trunk line/Spur line .....

Pole No. ....

Page No. ....

Date .....

Pole Fittings														
Fibre Glass Aerial Fuse Boards for each Service Connections														
Service Wires and Cables														
Particulars of Service Connections														
Condition of Meter														
Capacity of MCB														
Condition of Grounding														
Others														
Remarks														

Signature of the Official .....

**Karnataka Power Transmission Corporation Limited**

# Maintenance Schedule for Distribution System

Page No.	45
Revisions	RO

## DISTRIBUTION TRANSFORMER HISTORY SHEET

### PARTICULARS

NAME OF THE TRANSFORMER CENTRE .....

Transformer Sl. No. ....	KVA .....
Make .....	Voltage Ratio .....
Purchase Order No. & Date .....	% Z .....
Installed at .....	Weight (Gross) ..... K.G.
Installed on .....	Weight of Oil ..... K.G.
Warranty period expires on .....	

### TEST RESULTS

Date of Test	Load			Oil	Insulation Resistance		
	R	Y	B		$Y_p$ to E	$Y_s$ to E	$Y_p$ to $Y_s$

### DETAILS OF MOVEMENT

Shifted from (Date)	Reasons for Removal	Received at (Date)	Remarks

Continued on next page

# Maintenance Schedule for Distribution System

Page No. 46  
Revisions RO

## INSPECTION

Date	Connections	Fuses (HT & LT)	Load	Oil	Bushings	Arching Horns	Breather	Earthing	LT Switch/LT Protection Kit	G.O. Switches	Others	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13

## PREVENTIVE MAINTENANCE

Date	Description of Work done

# Maintenance Schedule for Distribution System

Page No. 47

Revisions RO

## 11K V RMU HISTORY SHEET

### PARTICULARS

NAME OF THE RMU .....

Sl. No. ....	C. Ts. ....
Make .....	Breaking Capacity .....
Purchase Order No. & Date .....	
Installed at .....	
Installed on .....	
Warranty period expires on .....	

### TEST RESULTS

Date of Test	Oil	Relay System	Tripping Mechanism

### DETAILS OF MOVEMENT

Shifted from (Date)	Reasons for Removal	Received at (Date)	Remarks

Continued on next page

# Maintenance Schedule for Distribution System

Page No. 48  
Revisions RO

## INSPECTION

Date	Connections	O.C./B/V.C.B.	Oil	Oil Tank	Auxiliary Fuses	Earthings	11 KV Cable at R.M.U.	Tripping Mechanism	General Cleanliness	Paint and Danger Plate	Others	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13

## PREVENTIVE MAINTENANCE

Date	Description of Work done

# Maintenance Schedule for Distribution System

Page No.	49
Revisions	RO

## LIST OF MINIMUM T & P REQUIRED IN EACH O & M UNIT FOR MAINTENANCE OF DISTRIBUTION SYSTEM

1. Rubber Hand Gloves (15 KV Tested)	- 5 Pairs.	22. Mumptees	- 3 Nos.
2. Safety Belts	- 10 Pairs.	23. Morter Pans	- 3 Nos.
3. Rain Coats with Caps	- 6 Pairs.	24. G. I. Buckets	- 3 Nos.
4. Hand Torches (3 celled)	- 3 Nos.	25. Empty Barrel	- 1 No.
5. Hickery Rods 400 Sq. mm)	- 2 Nos.	26. Manual Crimping Tool	- 1 No.(25 Sq.mm to
6. Grounding Rods	- 4 Sets(3rods/Set).	27. Hand Pump	- 1 No.
7. Bamboo Ladders	- 2 Nos.	28. Helmets	- 1 for each Line Man
8. Tong Tester(0 to 1000V)	- 1 No.	29. Miscellaneous items like First Aid Box, Shock Treatment	
9. Nylon Ropes	- 25 Kgs.	Charts, Water Filter, Crimping Tool, Fixograph(Big)	
10. Megger 2.5 KV/5 KV	- 1 No.		
Megger 500 V	- 1 No.		
11. Screw Driver of Sizes 6" to 18"			
12. D. E. Spanners			
13. Screw Spanners	- 1 Set in Tool Kit and		
14. Box Spanners	Bag for each Line Man.		
15. Adjustable Wrinch Spanner			
16. Insulated Cutting Pliers			
17. Hammer 2 lbs. & 8 lbs.	- 1 No.		
18. Hack Saw Frames	- 2 Nos.		
19. Bolt Cutter	- 1 No.		
20. Chain Pulley Block(2 Tonnes)	- 1 No.		
21. Crow Bars	- 3 Nos.		



**MONTHLY REQUIREMENT OF CONSUMABLE MATERIALS**

**FOR EACH O&M UNIT**

1. Cotton Waste.
2. Insulation Tape.
3. Grease
4. Petroleum Jelly.
5. Torch Cells.
6. Dettol.
7. Copper Terminals 240 Sq. mm/95 Sq. mm - 25 Nos. each.
8. Cloth Emery.
9. Hack Saw Blades.
10. P. G. Clamps.
11. RMU Fuses.
12. Fuses(5,10,15,20,30 Amps Ratings) - 1 Roll each.  
100 Amps LT Fuse - 1 Roll (for Rural Areas where LT Distribution Boxes are not provided for T.C's.)

## BIBLIOGRAPHY



"Maintenance Schedule for Distribution System", Technical Report - 2(July 1974), Research Scheme on Power, Central Board of Irrigation and Power, New Delhi.

12  
2011

2011