

List of principal recommendations.

|   | Paragraph Nos         |
|---|-----------------------|
| General principle of Telegraph and Telex maintenance works.   |                       |
| Tg-1. General principle - purpose, Classification and application of maintenance works - for Telegraph and Telex maintenance and operation are defined. | 0401<br>1.2 - 1.8     |
| Maintenance organization and structure in Telegraph and Telex.  |                       |
| Tg-2. Designation of I.S.T.C.s and S.T.C.s, and its function are proposed.  | 0402<br>2.2 - 2.3     |
| Tg-3. Proposals are made for organization, responsibility and numbering on fault handling of Telegraph and Telex.                                       | 0402<br>2.4.2 - 2.4.3 |
| Tg-4. Naming, method, functions and designation of the stations on Telegraph and Telex circuit control are proposed.                                    | 0402<br>2.4.4         |
| Corrective maintenance in Telegraph and Telex system.   |                       |
| Tg-5. Classification and kind of the fault on Telegraph and Telex.  | 0410<br>3.1 - 3.2     |
| Tg-6. Codes of the fault for Telegraph and Telex are set up.  | 0410<br>3.3           |
| Tg-7. Proposals are made for the fault handling method on Telegraph and Telex maintenance, and mentioned technical terms to be used.                    | 0410<br>3.4.2 - 3.4.3 |
| Routine works in Telegraph and Telex system.  |                       |
| Tg-8. Method and kind of the routine works for Telegraph and Telex are defined.   | 0420<br>4.1 - 4.2     |
| Tg-9. Routine work items and periods for VFT terminal and Telex switching equipment are discussed.  | 0420<br>4.3 - 4.5     |
| Maintenance management for Telegraph and Telex system.  |                       |
| Tg-10. Objective and function of service control and facility qualitative control on Telegraph and Telex maintenance are defined.                       | 0430<br>5.1 - 5.4     |
| Tg-11. Proposals are made for the measurement of the performance on Telegraph and Telex service control and facility qualitative control.               | 0430<br>5.5           |
| Tg-12. Maintenance control reports for Telegraph and Telex are discussed.   | 0430<br>5.7, 5.12     |
| Tg-13. Control and action for Telegraph and Telex maintenance control are proposed.   | 0430<br>5.8           |
| Tg-14. Pre-set standard control value for the service control and facility qualitative control are discussed.   | 0430<br>5.9 - 5.10    |

Records and reports in Telegraph and Telex maintenance.

- Tg-15. Necessary factors and kind for Telegraph and Telex records and reports are defined. 0440  
6.2 - 6.3
- Tg-16. Records to be witten down in Telegraph and Telex maintenance works are prepared, and set up. 0440  
6.4

Measuring sets, tools and modules in Telegraph and Telex maintenance.

- Tg-17. Proposals are made for measuring sets and tools to be reserved in Telegraph and Telex station. 0460  
7.2
- Tg-18. Reserved Telex terminal and modules for the Telegraph and Telex maintenance and operation in Telegraph and Telex station are recommended. 0460  
7.3

Repair works in Telegraph and Telex maintenance.

- Tg-19. Repair works at the work shop in each Telegraph and Telex station are defined. 0470  
8.2
- Tg-20. Proposals are made for the function, organization and repair report in Telegraph and Telex maintenance repair center. 0470  
8.4

3

Recommendations and Engineering Instructions on  
Telegraph and Telex maintenance and operation.

|       |  | page |
|-------|--|------|
| 0401- | 1. General principle of Telegraph and Telex maintenance works.                           | 1    |
|       | 1.1. Introduction.   | 1    |
|       | 1.2. Purpose of the maintenance works.   | 1    |
|       | 1.3. Classification of the maintenance works.  | 1    |
|       | 1.4. Preventive maintenance works.   | 2    |
|       | 1.5. Corrective maintenance works.   | 2    |
|       | 1.6. Statistical qualitative maintenance.  | 3    |
|       | 1.7. Application of maintenance method.  | 3    |
|       | 1.8. General items of the maintenance works.   | 4    |
| 0402- | 2. Maintenance organization and structure in Telegraph and Telex.                        | 5    |
|       | 2.1. General.  | 5    |
|       | 2.2. Organization and structure.   | 5    |
|       | 2.3. I.S.T.C.s and S.T.C.s in Telegraph and Telex system in Indonesia.                   | 8    |
|       | 2.4. Fault control in Telegraph and Telex system.  | 11   |
|       | 2.4.1. Objective.  | 11   |
|       | 2.4.2. Organization, designation and responsibility.                                     | 11   |
|       | 2.4.3. Marking and numbering for for the control and test station.                       | 12   |
|       | 2.4.4. Naming and control of Telegraph and Telex circuit.                                | 12   |
| 0410- | 3. Corrective maintenance in Telegraph and Telex system.                                 | 17   |
|       | 3.1. Classification of fault of Telegraph and Telex.                                     | 17   |
|       | 3.2. Kind of fault of Telegraph and Telex.   | 17   |
|       | 3.3. Codes of the faults for Telegraph and Telex.  | 18   |
|       | 3.4. Fault handling method in Telegraph and Telex system.                                | 21   |
|       | 3.4.1. Objective.  | 21   |
|       | 3.4.2. Fault handling method.  | 21   |
|       | 3.4.3. Technical terms using in the fault handling method of Telegraph and Telex system. | 21   |
| 0420- | 4. Routine works in Telegraph and Telex system.  | 25   |
|       | 4.1. Method of routine works.  | 25   |
|       | 4.2. Kind of routine works for Telegraph and Telex.                                      | 25   |
|       | 4.2.1. Teleprinter.  | 26   |
|       | 4.2.2. Telegraph transmissin.  | 27   |
|       | 4.3. Routine work items and periods in Telegraph and Telex system.                       | 29   |
|       | 4.3.1. Test items of the preventive maintenance in system TWK-9.                         | 31   |
|       | 4.3.2. Test items of the treventive maintenance in system WT-1000.                       | 36   |
| 0430- | 5. Maintenance management for Telegraph and Telex system.                                | 41   |
|       | 5.1. Objective.  | 41   |
|       | 5.2. Kind of maintenance control.  | 41   |
|       | 5.3. Maintenance service control.  | 41   |
|       | 5.4. Facility qualitative control.   | 41   |
|       | 5.5. Measurement of the performance.   | 42   |
|       | 5.6. Extra-ordinary failure control.   | 42   |
|       | 5.7. Maintenance report for Telegraph and Telex maintenance control.                     | 42   |
|       | 5.8. Control and action for Telegraph and Telex maintenance control.                     | 43   |
|       | 5.8.1. Control and action for maintenance service control.                               | 43   |
|       | 5.8.2. Control and action for facility qualitative control.                              | 44   |
|       | 5.8.3. Control and action for extra-ordinary failure control.                            | 45   |
|       | 5.9. Pre-set standard service control value for Telex, Telegraph and VFT circuit.        | 46   |

|       |        |   |     |
|-------|--------|---|-----|
|       | 5.10.  | Facility qualitative control.   | 48  |
|       | 5.11.  | Extra-ordinary failure control.   | 49  |
|       | 5.12.  | Reporting.  | 49  |
| 0440- | 6.     | Records and reports in Telegraph and Telex maintenance.   | 53  |
|       | 6.1.   | Objective.  | 53  |
|       | 6.2.   | Necessary factors in records and reports.   | 53  |
|       | 6.3.   | Kind of necessary and typical records and reports.  | 54  |
|       | 6.4.   | Recording and reporting forms.  | 54  |
| 0460- | 7.     | Measuring sets, tools and modules in Telegraph and Telex maintenance.                               | 99  |
|       | 7.1.   | Objective.  | 99  |
|       | 7.2.   | Standard stocked value of measuring sets and tools.   | 99  |
|       | 7.3.   | Reserved Telex terminal equipment, modules and units of Telex switching and VFT terminal equipment. | 101 |
|       | 7.3.1. | Objective.  | 101 |
|       | 7.3.2. | Reserved Telex terminal.  | 102 |
|       | 7.3.3. | Reserved modules and units of Telex switching and VFT equipment.                                    | 103 |
| 0470- | 8.     | Repair works in Telegraph and Telex maintenance.  | 106 |
|       | 8.1.   | Objective.  | 106 |
|       | 8.2.   | Repair works at the work shop of Telegraph and Telex station.                                       | 106 |
|       | 8.3.   | Repair of Telex switching, VFT modules and units.   | 107 |
|       | 8.4.   | Maintenance repair center.  | 107 |
|       | 8.4.1. | Objective.  | 107 |
|       | 8.4.2. | Function of maintenance repair center.  | 107 |
|       | 8.4.3. | Organization of maintenance repair center.  | 108 |
|       | 8.4.4. | Repair report.  | 108 |

## General principle of Telegraph and Telex maintenance works.

### 1.1. Introduction.

This is a general principle of the maintenance standard procedure for the preventive and corrective maintenance works, and maintenance control on Telegraph and Telex circuits and equipments which should be used as a guide to carry out the maintenance and operation works by maintenance staff or personnel of PERUM TELEKOMUNIKASI in Indonesia.

### 1.2. Purpose of the maintenance works.

The purpose of the maintenance of Telegraph and Telex is to maintain and establish Telegraph and Telex circuits and equipments at a reasonable maintenance cost with an accepted quality of service. In practice, however, Telegraph and Telex circuit and equipment consist of various kind such as Telegraph transmission system, Telex switching system and Terminal equipment etc, in Indonesia.

Telegraph and Telex circuit and equipment's maintenance is directly connected to life time problems of different types of Telegraph and Telex equipment and circuit and depend directly to the components used in equipments, from the economic point of view, the total maintenance cost should not exceed a certain amount if operation is to remain within reasonable economic limits.

Telegraph and Telex circuit and equipment's design is for international working based on international conditions to allow international co-operation. In principle, the use of a single standardized system within an operating area reduces the number of different types of modules and equipments, tools and spare parts that are needed. In addition, the training of maintenance personnel and maintenance organization itself are both simplified.

### 1.3. Classification of the maintenance works.

Basic maintenance works in Telegraph and Telex is to repair the each fault thoroughly when it happened, so that not cause the same fault again. However, for the equipment which might give a momentous influence on Telegraph and Telex network, it is necessary to prevent the fault occurrence by performing the routine checks and tests before they affect on Telegraph and Telex service.

Since the methods of maintenance works will vary in compliance with the kind of Telegraph and Telex equipments or facilities, it is important to select the most effective and economical maintenance method after considering the special feature of equipments and circuits.

Maintenance works in attended Telegraph and Telex station, includes various jobs which can be classified into two categories are as follows.

#### Operative work

1. Fault reception and supervision of Telegraph and Telex circuit and equipments.
2. Control of Telegraph and Telex circuits.
3. Fault removal.
4. Test of Telegraph and Telex circuits.
5. Planning of test works and fault clearance of Telegraph and Telex circuits and equipments.

#### Maintenance work

1. Test of Telegraph and Telex equipments.
2. Repair works of Telegraph and Telex equipments.
3. Planning of equipment tests and fault clearance of Telegraph and Telex equipments.

If these jobs were each assigned for a specialist, work efficiency might be very low to work division-loss. Therefore, diversification of abilities by one person is indispensable for the maintenance improvement.

The diversification can be realized smoothly in accordance with the above classification which has been based on circuit and equipments units. For instance, in a small-scale station, organization may consist of an operation group. Personnel who belongs to the operation group have to perform fault reception, control, failure disposition and test of Telegraph and Telex circuit. Such administrative jobs as the planning of test and fault control may be assigned to the administrative staff in the same group. In the same way, personnel of a maintenance group are assigned all kind of jobs concerned with equipments.

In a large scale station, the diversification system is not entirely practical and same extent of specialization is necessary. For example, the operative work may be divided Telegraph and Telex circuit operation.

At what scale the work should be divided into plural section is a difficult question and solution may differ according to the administration principles of the organization involved.

In general, the classification of maintenance works are considered as follow.

#### 4. Preventive maintenance works.

Preventive maintenance is to perform the routine check and tests periodically regardless of any indication of faults. Faults can be found and corrected at the early stage before it develops and causes equipments and circuits to become actually failed.

This method is to prevent the fault occurrence they affect on Telegraph and Telex service by performing the tests, checks, replacement and adjustment on the scheduled basis. This preventive maintenance is appropriate method for the plants of which kind are few, and quantity are little. Practically, is applied in the case of fault occurrence is surely expected or for the check of deterioration of circuit and equipment. The accidental faults except one which might give a serious influence on Telegraph and Telex network are not object of this preventive maintenance, but, will be dealt by corrective maintenance works.

#### 5. Corrective maintenance works.

Corrective maintenance is the action taken to repair the Telegraph and Telex circuits and equipments which already ceased to operate. Very few technicians practice the preventive maintenance. therefore, in order to upgrade the Telegraph and Telex maintenance and service, more emphasis should be put on preventive maintenance works.

Corrective maintenance work comprise the search for and repair of faults after they have had a noticeable effect on the service, these faults are detected by Telegraph and Telex maintenance and operational personnels, as a results or alarms. This method is applied for the circuit and equipment which their faulty rate is small and their influence on Telegraph and Telex network is a little.

At present, the reliability of Telegraph and Telex circuit and equipment are so increased by adoption of stand-by module, circuit and equipment that even their facilities are very important themselves, this maintenance method can be applied for those equipment and circuit.

#### 6. Statistical qualitative maintenance.

Combines the desirable features of both preventive and corrective maintenance works. At present, there is a trend away from preventive maintenance toward a modern form of corrective maintenance based on statistical fault analysis.

Surveillance of Telegraph and Telex circuit and equipment is performed by use of specific supervisory apparatus, statistics and service assessments on the day to day, short and longterm basis. Management is guided by the information thus produced in the planning and utilization of resources whilst service difficulties are recognized and rectified by maintenance staff.

Fault investigation are only made when service performance deteriorates below a predetermined specified Action limit or Grade of Service. This grade of service is defined by the maintenance administration for various major components of the Telegraph and Telex network, as an optimum level taking into consideration both the economics of maintenance provision and the acceptability of Telegraph and Telex service to the subscriber.

Statistical qualitative necessitates the establishment of data collection and analysis facilities to oversight the Telegraph and Telex network grade of service and initiate corrective action as required.

#### 7. Application of maintenance method.

Actually, maintenance work of Telegraph and Telex is combined of preventive and corrective maintenance, and the frequency of periodical routine work and test of preventive maintenance should be kept as minimum as possible. The items and frequency of procedure laid down in the routine maintenance schedule are based on based on past experience, therefore, the items and frequency of periodical routine tests must be continuously analyzed when the previous fault results indicate a need more or few routine tests.

In general, preventive maintenance work requires more expense and personnel because of the need of more frequent routine tests than required by the corrective maintenance based on statistical analysis, therefore, it is urgently necessary to establish the limit value of maintenance service control and facility qualitative control for Telegraph and Telex in order to introduce the Statistical qualitative maintenance control.

8. General items of maintenance works.

The purpose of maintenance works is to keep the normal maintenance and operation's condition of Telegraph and Telex equipments and circuits continuously able to provide the required service quality. Continuous and dependable operation of Telegraph and Telex circuit and equipment requires constant attention on the part of maintenance personnel and staff. Many faults of Telegraph and Telex equipment and circuit can be avoided by the use of well designed equipment and part, and conscientiously applied maintenance work schedule.

Most maintenance works should be written down into the records, and maintenance records should be reported for immediate review and analyse by qualified maintenance personnel who will take immediate corrective actions. To keep the normal operation of Telegraph and Telex circuit and equipment on a continuous basis without the interruption of service, the following items of the maintenance works should be scheduled and carried out.

- a. Supervision works.
- b. Routine check and test.
- c. Handling of fault.
- d. Repair work.
- e. Records and reports
- f. Inspection test.



# Maintenance organization and structure in Telegraph and Telex,

## 1. General.

Maintenance activity in Telegraph and Telex Station should be directed by same responsible officer for the whole system. In addition, the number of personnel assigned to a Telegraph and Telex station should be a minimum from not only the economic point of view, but also forestall faults caused by assignment of excess maintenance personnel to a Telegraph and Telex Station.

The necessary information for the maintenance activity, such as fault reception, supervision, result of testing complaints, etc., should be analyzed by statistical method and required action should be taken immediately for the faults removal and fault control.

The operational and maintenance activity of Telegraph and Telex system is executed in cooperation with other stations comprising the system, and all maintenance work be done at the Telegraph and Telex Station without interruption of service. For the above mentioned reason, the maintenance organization on the whole of a Telegraph and Telex System or station should be controlled by a maintenance organization system.

## 2.2. Organization and structure.

It is desirable that faults affecting communication between stations international Telex or Telegraph networks should be reported and cleared as quickly as possible.

It is necessary to unify the essential action to be taken and methods to be employed for the locating and clearing faults. For this purpose, it is necessary to determine the essential testing equipment which is to be provided at Telex or Telegraph switching centers responsible for the locating and clearing faults.

- a. It is necessary to set up Telex switching and testing centers (S.T.C.s) as defined by the following :  
Telex switching centers equipped with measuring apparatus for the testing telex subscribers and public station lines and equipment and also, telegraph channels.
- b. Each Telex subscriber and each public station in the general switching service should have access to an S.T.C for the purpose of reporting faults and co-operating in tests.
- c. The international Telex switching and testing center (I.S.T.C.s) are the S.T.C.s which are also international line-head offices.
- d. All S.T.C.s should be subscribers to the Telex network, both for the purpose of receiving fault reports and for Telex communication for maintenance purpose. They should also be provided with a telephon exchange line.
- e. Each S.T.C should be responsible for co-ordinating action in locating and clearing faults on all station lines connected to the Telex switching and on all Telex trunk circuits for which it is nominated as the controlling office. It should also co-operate with other S.T.C.s in locating faults on connections established through two or more exchanges. It should carry out a preliminary location of faults by finding out whether they affect Telex channels, switching apparatus. The faults are then accurately located by the engineers responsible for each part of the Telex circuit and the S.T.C. co-operate with them for this purpose.

It may assume the direction of the fault-location procedure should be disagreement between these services. Internationally, it is responsible to the S.T.C.s of other countries with which it has Telex communication. The organization and structure of the liaison between technical services is shown in Fig 1. The S.T.C.s must check that the performance given by the equipment involved in the Telex service, switching equipment and apparatus, is satisfactory.

The staff employed at S.T.C.s should be selected with a view to avoiding language difficulties and should be conversant with all types of Telegraph equipment used in the Telex switching network, i.e. Automatic or manual switching equipment, v.f. Telegraph equipment, telegraph machines and regenerative repeaters. The staff need not necessarily be fully competent to maintain all these items of equipment, but should have sufficient knowledge of them to be able to form an appreciation of the effect that faults on any of them may have on a switched connection. In addition, the staff of I.S.T.C.s should have some general knowledge of the types of equipment used in the countries to which they are connected, particularly of the signalling conditions which

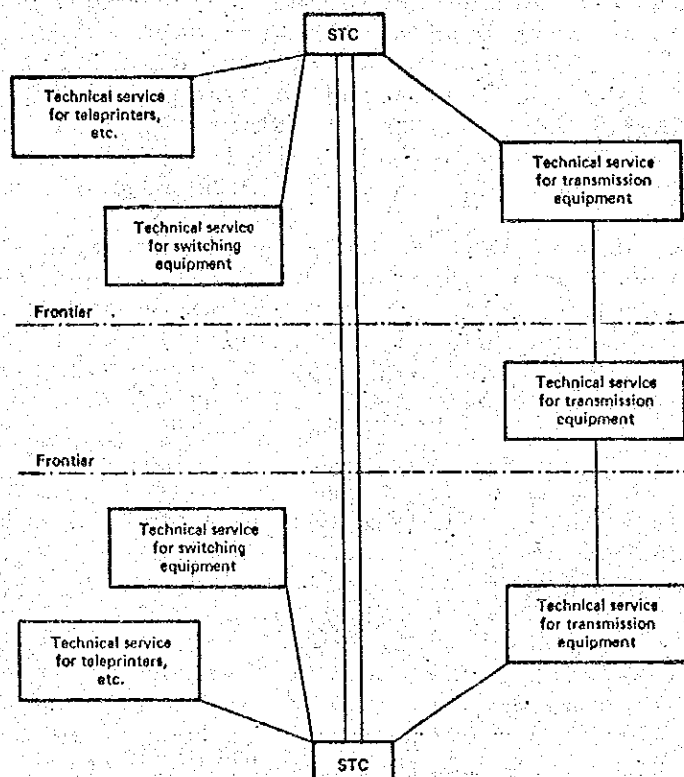


Fig 1. Maintenance organization in Telegraph and Telex

- g. Each S.T.C should be provided with the following measuring equipment :

A 50 start-stop distortion meter.

A test transmitter for generating undistorted 50-baud st-sp signals.  
Apparatus to measure the modulation rate of teleprinters at a distance.

Apparatus for measuring the speed and pulse rate of dials, where appropriate.

Apparatus for measurement of the condition of direct current lines, for example, continuity, resistance, insulation.

The arrangements for access to established connection for making test measurements should be such as not to cause interruption or reduce the quality of transmission.

Considering that some administration have found it desirable to have available at the S.T.C other items of apparatus to expedite the cleaning of faults, all administrations are invited to consider the utility of these devices, namely :

Apparatus for measuring teleprinter margin.

Recording distortion meters for testing established connections.

Apparatus for measuring continuously, periodically and automatically, the distortion on subscriber's lines and apparatus.

- h. The following procedure or reporting, locating and clearing faults should be adopted: faults should be reported to the S.T.C concerned by the subscribers or operators who have experienced difficulty in operation. In the same way, it would be useful, in order to give the S.T.C.s a full picture of the situation, that the maintenance engineers should inform them of faults noted during the periodic maintenance operations. Faults should preferably be signalled by teleprinter, if their nature does not preclude this procedure.

A reference number should be give by S.T.C to the subscriber or service notifying the fault. This number can then be quoted in any subsequent enquires as to the progress of fault clearance. On account of the difficulties that may arise in the detection, care should be taken in each country to see that the national section of the communication, including subscriber's lines and apparatus, are not involved before approaching the S.T.C of the corresponding country.

Complete holding of a connection which is reported to be faulty should be avoided. The S.T.C notified of a fault should therefore begin by ascertaining that it is not located in the national section of the communication and for this purpose should, if necessary, approach the other S.T.C.s of others country concerned in the circuit. The S.T.C of the distant country is then advised and, in turn, checks the national section routed over its network. The international section of the communication is not checked until the terminal section of telegraph circuit have been defitely exonerated. The S.T.C.s in different countries will communicate with one another, either directly or via their I.S.T.C.s as determined by the administrations concerned.

If tests of the two local ends fail to reveal any fault condition, the S.T.C should report the fault to it's I.S.T.C which will decide what further action, if any, is necessary. As a rule, isolated fault report would not justify a test of all trunk circuits on a route, and it would be assumed that the condition giving rise to the fault would be cleared on the next routine adjustment. If however, several fault were received, some of which might have been due to a faulty circuit on a particular route, then a special routine test of all the circuits on the route might be justified.

4.3. I.S.T.C.s and S.T.C.s in Telegraph and Telex system in Indonesia.

From Recommendation R. 90 C.C.I.T.T, the International Switching and Testing Centers ( I.S.T.C.s ) and Switching and Testing Center ( S.T.C.s ) of the maintenance works in Telegraph and Telex system in Indonesia are shown in Table 1, and Fig 2.

Fig. 2. I.S.T.C.s and S.T.C.s in Teletype and Telex system in Indonesia

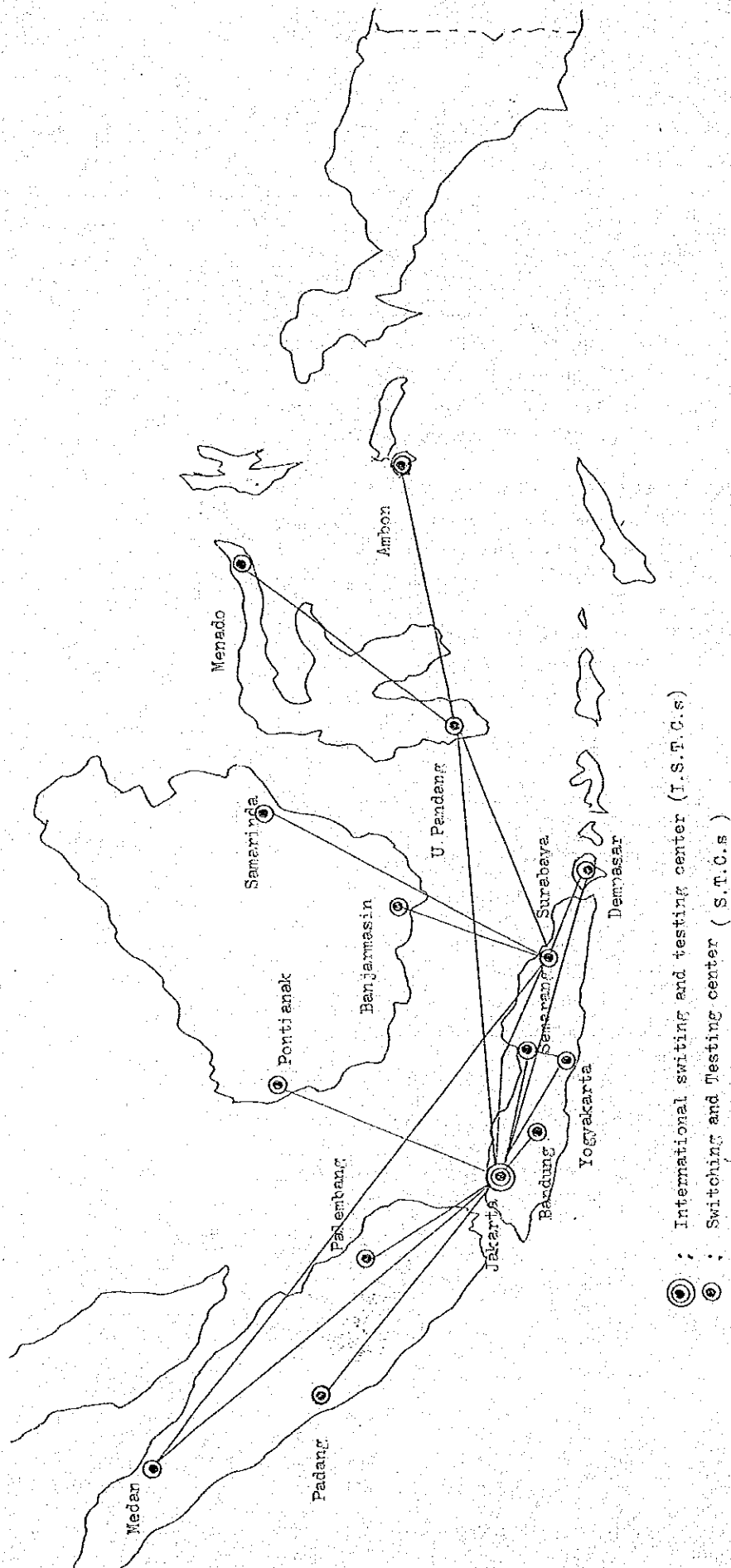


Table 1. List of I.S.T.C.s and S.T.C.s in Telegraph and Telex in Indonesia.

| I.S.T.C.s           | S.T.C.s     | Sub-station  |
|---------------------|-------------|--|
| Gambir<br>(Jakarta) | Gambir      | Kota 1, Kota 2, Jatinegara, Kebayoran Baru, Cempaka putih, Bogor, Tangerang, Serang, Pakan Baru, Palangkanya, Soraako, Jayapura, Rengat, Maraeke, Blak, Tambagapura, Kepong, ( Surabaya, Medan, U.pandang, Semarang, Palembang, Bandung, Yogyakarta, Padang, Denpasar, Samarinda, Pontianak, ) |
|                     | Surabaya    | Jember, Balikpapan, Gresik, Tulungagung, Ponorogo, Bondawoso, Bojonegoro, Pasuruan, Elitar, Pamekasan, Banyuwangi, Situbondo, ( Medan, U.pandang )   |
|                     | Medan       | Banda Aceh, Tanjungpinang, Sibolga, Belawan, Pematangsitar, Padangsidempuan, Langsa, Kisaran, Sabang,  |
|                     | U.Pandang   | Palu, Sorong, Kendari, Parepare, Donggala, Mandai, ( Manado, Ambon )   |
|                     | Semarang    | Kudus, Solo, Pakalongan, Tegal, Cepu, Salatiga, ( Yogyakarta )   |
|                     | Palembang   | Tiluk Fetung, Bengkulu, Jambi, Pangkal pinag, Panjang, Eaturaja, Lahat, Metro,   |
|                     | Bandung     | Cirebon, Tasikmalaya, Cimahi, Puruwakarta, Garut, Cianjur, Sukatumi,   |
|                     | Yogyakarta  | Perwokerto, Cilacap, Kebuman, Perworejo, Mogelang,   |
|                     | Padang      | Lukit Tinggi, Sungai Penuh,  |
|                     | Banjarmasin | Banjarbaru, Kandangan,   |
|                     | Denpasar    | Singaraja, Sunbawa, Bima, Ampenan,   |
|                     | Samarinda   | Tanakan  |
|                     | Pontianak   | Singkawang   |
|                     | Manado      | Eitung   |
| Ambon               | Terhat      |  |

#### 4. Fault control in Telegraph and Telex system.

##### 4.1. Objective.

At present, when a Telegraph and Telex circuit and equipment become out of order, the engineer or technician in the Telegraph and Telex station concerned will check and locate point of failure, if he knows that the failure occurred is in his responsible section, he will go and repair.

As he finds out that there is no cause of the fault in his responsible section, he may notify to the adjacent station and that station will repeat what he has been doing. This way of the trouble shooting is time consuming and inefficiency, in order to effectively carry out the function of maintenance works and fault processing. It is necessary to clarify the relation between each Telegraph and Telex stations, in other word " Fault control system " should be set up.

Fault control system consist of fault control station and controlled station ( Test station ), fault control station must have power of direct any test station to locate the faults and to perform the routine test, it is necessary that each fault test station must be controlled by fault control station to perform maintenance works and to repair the faults, the repair works of fault itself is in the responsibility of each station.

This fault control is necessary to perform good and systemalized maintenance work of VFT, Telegraph and Telex circuits and equipments. In generally, the higher ranked Telegraph and Telex station controls other test stations, therefore, whenever there is a fault or routine test, the station which recognized this fault must inform or cooperate to the fault control station concerned.

The fault control station is set up in every circuit and equipment respectively, and the organization in which the control station and test station are contained as follows.

##### 4.2. Organization, designation and responsibility.

As is mentioned above, fault control system consist of fault control and test station. Telegraph and Telex station which have telegraph and telex circuit and equipment are designated control and test station.

###### A. Fault control station.

The higher ranked station of two Telegraph and Telex stations on Telegraph and Telex circuits or in maintenance area is called fault control station, the section between the above two or more stations is called the control section.

The control station has the right and responsibility of instructing and making recommendations on fault control, control station controls test station to repair the fault and to perform the routine test.

###### B. Fault test station.

The lower ranked station of two Telegraph and Telex stations on the Telegraph and Telex circuits or in the maintenance area is called fault test station, the section between the above two or more section is called the control section.

The test station help and cooperate to control station to repair the faults and perform routine test.

### 3. Marking and numbering for the control and test stations.

Marks and numbers are given to all the stations designated in Table 2 titled " Designation of stations ".

#### A. Rank mark.

Four kinds of marks are given as the first letter of the code to all of stations according to the rank of stations.

A : National Center : Jakarta  
 B : Regional Center : Surabaya, Medan, U.Pandang.  
 C : District Center : Semarang, Palembang, Bandung, Yogyakarta, Padang, Dempasar, Banjarmasin, Samarinda, Pontianak, Menado, Ambon.  
 D : End station : about 90 stations all over the country.

#### B. Area mark.

Fifteen kinds of marks are given as the second letter of the code to all of stations according to the regional order with respect to Telegraph and Telex transmission.

| Region     | Mark | Region      | Mark |
|------------|------|-------------|------|
| Jakarta    | J    | Padang      | S    |
| Surabaya   | K    | Banjarmasin | T    |
| Medan      | L    | Dempasar    | U    |
| U.Pandang  | M    | Samarinda   | V    |
| Semarang   | N    | Pontianak   | W    |
| Palembang  | P    | Menado      | X    |
| Bandung    | Q    | Ambon       | Y    |
| Yogyakarta | R    |             |      |

Note : 1. Letter "O" is not used to avoid mistake occurred by zero.  
 2. Letter "I" is used for International Gate.

#### C. Serial number.

Serial number is given, as a rule, to the stations according to the importance along route. Usually, "O" is the leading station within the close area of the region.

Table of the codes for all the stations are given as in Table 2. For example., "CQ OO" is to Bandung.

"C" : is the rank mark for the district center.

"Q" : is area mark which also indicate that the station is in area of Bandung.

"OO" : is serial number.

### 4. Naming and control of Telegraph and Telex circuit.

#### A. Objective.

When a VFT, Telegraph and Telex circuit become failure, engineers or technicians in both terminal stations concerned will check and repair the point of failure, in that case, to do the fault processing, it is necessary to call " Name of circuit" and it's fault repair work must carry out according to the Fault processing procedure.

Also, preventive and corrective maintenance being done must recorded the name of circuit in the recording and reporting forms, to keep as future reference.



## B. Naming of VFT circuit.

First letter of name of circuit is given, as a rule, the higher ranked station name(control station) of two Telegraph and Telex terminal station on the Telegraph and Telex circuit, also, second letter is given the lower ranked station name(controlled station) of two Telegraph and Telex stations on the VFT, Telegraph and Telex circuit. In a similar way of thinking, third letter is given number of system (VFT), and fourth letter is given number of Telegraph and Telex channel.

For example : Jk - Bd, 02 - 07

is to a VFT circuit between Jakarta and Bandung, number of system.2, and number of channel, 7.

This circuit control method and naming of Telegraph and Telex circuit, are necessary in order that preventive and corrective maintenance's function be most effective.

## C. Method of circuit control.

For instance, if a circuit between Jakarta " AJ 00 " and Bandung " CQ 00 " is out of order, Jakarta station should be fault circuit control station because Jakarta's code " AJ 00 " which is lower alphabet than " CQ 00 ".

Circuit control station Jakarta has the right to do everything to fix the circuit trouble as soon as possible. Controlled station Bandung should help and cooperate to fix the circuit trouble.

## D. Functions of fault circuit control.

The following functions are given to circuit control station to control the related circuits.

- a. To accept complaints, and to direct test station concerned to make trouble repair. To inform trouble complaints the restoration of Telegraph and Telex circuits.
- b. To establish schedule and to perform routine tests or other tests in each station to allow the least interruption to the operating circuit.
- c. In the case of extra-ordinary fault occurrence, circuit control station must investigate the time of occurrence, location of cause, scale of fault, expected time of restoration, the name and number of fault circuit.  
To report them to the related Regional station and Headquarters, and to direct the necessary performance to allow the least interruption to service.
- d. To perform the maintenance control on circuit facility in accordance with the method of maintenance control system.
- e. To arrange fault data, makes analysis on cause of faults for improvement of circuit reliability.  
To point out the circuit which needs inspection test as a result of fault analysis, and recommend the test station concerned to perform inspection test.
- f. To check the progress of fault repair work on Telegraph and Telex circuits.
- g. To prepare periodical reports for Regional Station and Headquarters.

Table 2. Designation of control station.

14

| Control Station | Controlled Station | Mark and Number | Number of Channel (VFT) | Data of Installation | Telex Switching               |
|-----------------|--------------------|-----------------|-------------------------|----------------------|-------------------------------|
| Jakarta         | (Gambir)           | AJ 00           | 1976/1976               |                      | TWK 9(3000)<br>TWKD2A.2B.ZAGE |
|                 | Kota 1             | DJ 01           | 72/72                   |                      | TWK 9( 500)                   |
|                 | Kota 2             | DJ 02           | 72/72                   |                      | TWK 9( 500)                   |
|                 | Jajinegara         |                 | 72/0                    | Dec 1977             | TWK 9( 400)                   |
|                 | Kebayoran Baru     |                 | 72/0                    | Dec 1977             | TWK 9( 500)                   |
|                 | Cempaka Putih      |                 | 48/0                    |                      | TWK 9( 400)                   |
|                 | Bogor              |                 | 12/12                   |                      |                               |
|                 | Tangerang          |                 | 12/0                    | Jun 1978             |                               |
|                 | Serang             |                 | 12/0                    | Jun 1978             |                               |
|                 | Surabaya           | BK 00           | 378/108                 | Dec 1978             | TWK 9(1500)<br>TWKD 2A        |
|                 | Medan              | BL 00           | 384/78                  | Dec 1978             | TWK 9(2000)<br>TWKD 2A        |
|                 | U.Pandang          | BM 00           | 104/48                  | Dec 1978             | TWK 9( 500)<br>TWKD 2A        |
|                 | Semarang           | CN 00           | 72/48                   |                      | TWK 9( 500)                   |
|                 | Palembang          | CP 00           | 48/                     | Dec 1978             | TWK 9( 500)                   |
|                 | Bandung            | CQ 00           | 90/90                   |                      | TWK 9( 500)                   |
|                 | Yogyakarta         | CR 00           | 70/24                   | Dec 1977             | TWK 9( 300)                   |
|                 | Padang             | CS 00           | 70/30                   | Dec 1977             | TWK 9( 500)                   |
|                 | Dempasar           | CU 00           | 12/12                   | Dec 1977             | TWK 9( 300)                   |
|                 | Samarinda          | CT 00           | 60/36                   | Jun 1978             | TWK 9( 300)                   |
|                 | Pontianak          | CW 00           | 48/24                   | Dec 1978             | TWK 9( 200)                   |
|                 | Ambon              | CY 00           | /18                     |                      | TWK 9( 100)                   |
|                 | Pakan Baru         |                 | 90/30                   | Dec 1977             |                               |
|                 | Banda Aceh         |                 | /24                     |                      | TWK 9( 100)                   |
|                 | Tanjingpinang      |                 | /                       |                      | TWK 9( 100)                   |
|                 | Rengat             |                 | 6/0                     | Dec 1977             |                               |
|                 | Palangkanya        |                 | 6/6                     |                      |                               |
|                 | Soroako            |                 | 6/6                     |                      |                               |
|                 | Jayapura           |                 | 36/24                   | Dec 1977             | TWK 9( 100)                   |
|                 | Maraeke            |                 | 6/6                     |                      |                               |
|                 | Biak               |                 | 6/6                     |                      |                               |
| Tembagapura     |                    | 6/6             |                         |                      |                               |
| Kepang          |                    | 6/6             |                         |                      |                               |
| Surabaya        | (Selatan)          | BK 00           | 648/96                  | Dec 1978             | TWK 9(1000)<br>TWKD 2A        |
|                 | Dempasar           | CK 01           | 78/36                   | Dec 1978             | TWK 9( 300)                   |
|                 | Jember             | Dk 02           | 54/12                   | Dec 1978             |                               |
|                 | Balipakan          |                 | 48/24                   | Jun 1978             | TWK 9( 200)                   |
|                 | Gresik             |                 | 12/12                   |                      |                               |
|                 | Tulungagung        |                 | 6/0                     | Dec 1978             |                               |
|                 | Ponorogo           |                 | 6/0                     | Dec 1978             |                               |
|                 | Bondawoso          |                 | 6/0                     | Dec 1978             |                               |
|                 | Bojonegoro         |                 | 6/0                     | Dec 1978             |                               |
|                 | Pasuruan           |                 | 6/0                     | Dec 1978             |                               |
|                 | Blitar             |                 | 6/0                     | Dec 1978             |                               |
|                 | Pamekasan          |                 | 6/0                     | Dec 1978             |                               |
|                 | Banyuwangi         |                 | 6/6                     |                      |                               |
|                 | Situbondo          |                 | 6/0                     | Dec 1978             |                               |
|                 | Medan              | BL 00           | 12/                     | Dec 1978             |                               |
|                 | U.Pandang          | BM 00           | 12/12                   | Dec 1978             |                               |
|                 | Semarang           | CN 00           | /12                     |                      |                               |
|                 | Banjarmasin        | CT 00           | /36                     | Dec 1978             |                               |
|                 | Malang             |                 | /24                     |                      |                               |
|                 | Madium             |                 | /12                     |                      |                               |
| Mo.jokerto      |                    | /12             |                         |                      |                               |
| Kediri          |                    | /12             |                         |                      |                               |

|            |                 |       |          |          |                        |
|------------|-----------------|-------|----------|----------|------------------------|
| Medan      |                 | BL 00 | 492/24   | Dec 1977 | TWK 9(2000)<br>TWKD 2A |
|            | Banda Aceh      | DL 01 | 30/      | Dec 1977 | TWK 9( 100)            |
|            | Tanjingpinang   | DL 02 | 24/      | Dec 1977 | TWK 9( 100)            |
|            | Sibolga         |       | 12/12    |          |                        |
|            | Belawan         |       | 12/12    |          |                        |
|            | Pematangsiatar  |       | 6/6      |          |                        |
|            | Padangsidempuan |       | 6/0      | Dec 1977 |                        |
|            | Langsa          |       | 6/0      | Jun 1978 |                        |
|            | Kisaran         |       | 6/0      | Jun 1978 |                        |
| Sabang     |                 | 6/0   | Jun 1978 |          |                        |
| U.Pandang  |                 | BM 00 | 228/126  | Dec 1978 | TWK 9( 500)<br>TWKD 2A |
|            | Menado          | CM 01 | 30/18    | Dec 1977 | TWK 9( 100)            |
|            | Palu            | CM 02 | 24/12    | Dec 1978 | TWK 9( 100)            |
|            | Ambon           |       | 24/12    | Dec 1977 | TWK 9( 100)            |
|            | Sorong          |       | 16/12    |          | TWK 9( 100)            |
|            | Kendari         |       | 12/12    |          |                        |
|            | Parepare        |       | 12/0     | Dec 1978 |                        |
|            | Donggala        |       | 6/0      | Dec 1978 |                        |
|            | Mandai          |       | /12      |          |                        |
| Semarang   |                 | CN 00 | 162/162  |          | TWK 9( 500)            |
|            | Kudus           | DN 01 | 24/24    |          |                        |
|            | Solo            | DN 02 | 24/12    |          |                        |
|            | Pekalongan      |       | 18/18    |          |                        |
|            | Tegal           |       | 12/12    |          |                        |
|            | Cepu            |       | 6/0      | Dec 1977 |                        |
|            | Salatiga        |       | 6/6      |          |                        |
|            | Yogyakarta      |       | /12      |          |                        |
| Palembang  |                 | CP 00 | 162/102  | Dec 1977 | TWK 9( 500)            |
|            | Tuluk Betung    | DP 01 | 60/48    | Dec 1977 |                        |
|            | Bengkulu        | DP 02 | 12/12    |          |                        |
|            | Jambi           |       | 12/12    |          |                        |
|            | Pangkal Pinang  |       | 6/6      |          |                        |
|            | Panjang         |       | 6/0      | Dec 1977 |                        |
|            | Baturaja        |       | 6/6      |          |                        |
|            | Lahat           |       | 6/6      |          |                        |
|            | Metro           |       | 6/0      | Dec 1977 |                        |
| Bandung    |                 | CQ 00 | 138/90   | Dec 1977 | TWK 9( 500)            |
|            | Cirebon         | DQ 01 | 24/24    |          |                        |
|            | Tasikmaraya     | DQ 02 | 12/12    |          |                        |
|            | Cimahi          |       | 6/6      |          |                        |
|            | Puruwakarta     |       | 6/6      |          |                        |
|            | Garut           |       | 6/6      |          |                        |
|            | Cianjur         |       | 6/0      | Dec 1977 |                        |
|            | Sukabumi        |       | 6/6      |          |                        |
| Yogyakarta |                 | CR 00 | 112/24   | Dec 1977 | TWK 9( 300)            |
|            | Perwokerto      | DR 01 | 12/0     | Dec 1978 |                        |
|            | Cilacap         | DR 02 | 12/12    |          |                        |
|            | Kebuman         |       | 6/0      | Dec 1977 |                        |
|            | Perworejo       |       | 6/6      |          |                        |
|            | Mogolang        |       | 6/6      |          |                        |
| Padang     |                 | CS 00 | 90/30    | Dec 1977 | TWK 9( 500)            |
|            | Bukit Tinggi    | DS 01 | 12/0     | Dec 1977 |                        |
|            | Sungai Penuh    | DS 02 | 6/0      | Dec 1977 |                        |

|             |   |       |       |          |             |
|-------------|---|-------|-------|----------|-------------|
| Banjarmasin | Banjarbaru<br>Kandangan                 | CT 00 | 90/36 | Dec 1977 | TWK 9( 200) |
|             |   | DT 01 | 10/0  | Jun 1978 |             |
|             |   | DT 02 | 6/0   | Jun 1978 |             |
| Dempasar    | Singaraja<br>Sunbawa<br>Bima<br>Ampenan | CU 00 | 78/36 | Dec 1978 | TWK 9( 300) |
|             |   | DU 01 | 6/0   | Jun 1978 |             |
|             |   | DU 02 | 6/0   | Jun 1978 |             |
|             |   |       | 6/0   | Jun 1978 |             |
| Samarinda   | Tanakan                                 | CV 00 | 66/36 | Jun 1978 | TWK 9( 300) |
|             |   | DV 01 | 6/6   |          |             |
| Pontianak   | Singkawang                              | CW 00 | 54/24 | Dec 1978 | TWK 9( 200) |
|             |   | DW 01 | 6/0   | Jun 1978 |             |
| Menado      | Eitung                                  | CX 00 | 30/18 | Dec 1977 | TWK 9( 100) |
|             |   | DX 01 | 6/0   | Dec 1977 |             |
| Ambon       | Termat                                  | CY 00 | 24/12 | Dec 1977 | TWK 9( 100) |
|             |   | DY 01 | 12/6  | Dec 1977 |             |

## Corrective maintenance in Telegraph and Telex system.

### 3.1. Classification of fault of Telegraph and Telex.

The fault of Terminal equipment, VFT equipment and circuit, and Telex switching equipment are classified by the disclosure of faults and fault's condition as follows :

- A. Complaint fault.
  - a. Fault found and informed through by the operator in Telegraph and Telex station.
  - b. Fault found and informed through by the subscribers of Gentex and Telex.
- B. Fault found by maintenance staff or personnel in Telegraph and Telex station.
  - a. Fault found through maintenance staff or personnel in performing their maintenance works.
  - b. Fault found by an alarm.

### 3.2. Kind of fault in Telegraph and Telex system.

The kind of fault in Terminal equipment, VFT equipment and circuit, and Telex switching equipment are shown as follows :

- A. Terminal equipment.
 

|                                |                            |
|--------------------------------|----------------------------|
| a. Perubahan motor speed       | Motor speed variation      |
| b. Key board tidak baik        | Key-board no good          |
| c. Penerima tidak baik         | Receiver no good           |
| d. Perforator tidak baik       | Perforator no good         |
| e. Answer back code tidak baik | Answer-back code no good   |
| f. Control unit tidak baik     | Operating unit no good     |
| g. Power supply tidak baik     | Power source no good       |
| h. Garble setak                | Erratum(character missing) |
- B. VFT equipment and circuit.
 

|                             |                      |
|-----------------------------|----------------------|
| a. Perubahan level          | Level variation.     |
| b. Level naik/lebih tinggi  | Level built-up.      |
| c. Level turun/lebih rendah | Level drop.          |
| d. Carrier jatuh            | Carrier stop.        |
| e. Noise                    | Noise                |
| f. Putus-putus              | Interruption         |
| g. Tidak ada arus           | No current           |
| h. Putus                    | Disconnection        |
| i. Tanah                    | Ground               |
| j. Isolasi tidak baik       | Insulation no good   |
| k. Distorsi telegrap        | Telegraph distortion |
| l. Gangguan                 | Interference         |
- C. Telex switching.
 

|                          |                      |
|--------------------------|----------------------|
| a. Out-going tidak baik  | Out-going no good    |
| b. In-coming tidak baik  | In-coming no good    |
| c. Sambungan tidak baik  | Connection no good   |
| d. Hubungan tidak baik   | Transmission no good |
| e. Release tidak baik    | Release no good      |
| f. Pengiriman tidak baik | Transmission stop.   |
- D. General.
 

|                         |                         |
|-------------------------|-------------------------|
| a. Salah mengoperasikan | Mis-operation           |
| b. Test getui           | Test OK ( TOK)          |
| c. Test selesai         | Test come clear ( TCC ) |

### 3.3. Codes of the fault for Telegraph and Telex.

In the maintenance records, cords of the fault are used in it in order to classify the fault location, fault equipment and system, and fault treatment etc, but according to " DAFTAR PETUNJUK nomor-nomor kode gangguan untuk pencatatan gangguan" in Volume 1 " UMUM TELEGRAP " , they are too complicated to write down and analyse into the maintenance records in each Telegraph and Telex Station.

Therefore, it simplify these further and Classification of codes is shown in Table 3, List of the cords is shown in Table 4.

Table 3, Classification of codes.

| DAFTAR ISI |                                     |        |
|------------|-------------------------------------|--------|
| 1.         | Kwalifikasi pelapor                 | Kode A |
| 2.         | Sistem dan peralatan yang terganggu | Kode B |
| 3.         | Lokasi gangguan                     | Kode C |
| 4.         | Cara mengatasi gangguan             | Kode D |

Table 4. List of the cords.

|        |  |  |
|--------|--|--|
| Kode A | 1.<br>2.<br>3.<br>4.<br>5.   | Langguna tlx/LC<br>Operator tgp/Superv phb tgp<br>Petugas teknik operation<br>Petugas teknik preventip<br>Petugas sentral lain   |
| Kode B | 101.<br>102.<br>103.<br>104.<br>105.<br>106.<br>107.<br>108.<br>109.<br>110.<br><br>201.<br>202.<br>203.<br>204.<br>205.<br>206.<br>207.<br>207.<br>208.<br>209.<br>210.<br><br>301.<br>302.<br>303.<br>304.<br>305.<br>306.<br>307.<br>308.<br>309.<br>310.<br><br>401.<br>402.<br>403.<br>404.<br>405.<br>406.<br>407.<br>408.<br>409.<br>410.<br><br>501.<br>502.<br>503.<br>504.<br>505.<br>506.<br>507.<br>508.<br>509.<br>510. | WT-100<br>WT-1000<br>VFT NEC<br>VFT OKI<br>VFT Speech+1<br>VFT Speech+3<br>TAN-100<br>TAN-1000<br>ARQ<br>Per VFT lainnya<br><br>TWK-9 A/D<br>TWK-D2 A<br>TWK-D2 B<br>Z A G E<br>TLX POSISI<br><br><br><br>TW-39<br>Peral, switching, lainnya<br><br>Teleprinter T-100<br><br>LO-133<br>Pesawat TD<br>Pesawat keyboard perforator<br>Pesawat printerlain<br>Pesawat morse transmitter<br>Pesawat morse perforator<br>Pesawat lainnya<br>Pesawat terminal lain<br><br>Pesawat modem 6/12<br>Pesawat modem 24<br><br><br><br><br><br><br>Rectifier, PSA-sentral<br><br><br>Accu |

|        |  |  |
|--------|--|--|
|        | 601.<br>602.<br>603.<br>604.<br>605.<br>606.<br>607.<br>608.<br>609.<br>610.<br><br>000. | Saluran lokal<br><br>Sal interlokal<br><br>Sistem transmissi m.w./sattelite/kabellant<br><br>Gangguan catu daya  |
| Kode c | 301.<br>302.<br>303.<br>304.<br>305.<br>306.<br>307.<br>308.<br>309.<br>310.             | Tape transmitter attachment<br>Reperforator attachment<br>Power/RCU<br>Motor<br>Keyboard/transmitter<br>Receiver<br>Printing unit/carriage<br>Answerback-unit<br>Cord-plug |
|        |  | Switching, VFT, Data<br>Sebutkan nomor module yang rusak<br>untuk kode BGXX, kode C=00   |
| Kode D | 01.<br>02.<br>03.<br>04.<br>05.<br>06.<br>07.<br>08.<br>09.<br>10.                       | Ganti pesawat/sistem<br>Ganti module<br>Ganti apaare parts<br>Penyetelan<br>Membersihkan pesawat/pelumasan<br><br><br><br>Sebab gangguan tidak diketahui                   |



## Fault handling method in Telegraph and Telex system.

### 1. Objective.

Normally, there is a standard practice of observing the operating conditions of any equipment in order to keep it in the best of operating condition all the time.

The engineer and Technicians must check the values of current, voltage, level, Margin and distortion to see that these values are working at their " Standard efficiency " or Standard value ".

A Telegraph and Telex equipment whose mechanism deviates from that of " Standard value " eventhough it may continue to be in operating order, should immediatelly be termed " out of order " or "failure " and engineers and technicians must immediatelly find out the cause of these faults, make the corrections and treat these faults according to the " Fault handling mehtod "

### 2. Fault handling method.

From a point of view described above, fault handling method is necessary in order to perform the treatment of fault in accordance with a certain regulation for the circuit and equipment fault of Telegraph and Telex. This is, from the reception of fault till the treatment the fault, but to perform efficient fault handling method can not be accomplished unless there is good cooperation between fault control and test station (controled station), control and controled section, and the operators and engineers, technicians.

Although, there is the fault handling method in Vol.1 of Engineering Instruction of PERUM TELEKOMUNIKASI, it simplify this further and is shown in Fig 3. Main treatment of this fault handling method in an order manner is shown bellow :

- a. Pengaduan gangguan per Telex/Telepon
- b. Pencatatan Laporan gangguan pada MTC-01.
- c. Laporan MTC-01 per Telex/Telepon.
- d. Pencatatan Laporan MTC-10.
- e. Laporan MTC-10 per Telex/Telepon
- f. Pencatatan Laporan MTC-20, 40, 60, 61,
- g. Perbaikan
- h. Pemindahan hasil peyelesaian pada Kartu pemeliharaan MTC-20, 40, 60, 61.
- i. Penjetasan kesatahan Telex/Telepon
- j. Menemukan gangguan atau pemeliharaan preventip atau dinas operasional.
- k. Pemindahan hasil penyelesaian pada kartu pemeliharaan MTC-10.
- l. Pemindahan hasil penyelesaian pada kartu pemeliharaan MTC-01.

### 3. Technical terms using in the fault handling method of Telegraph and Telex system.

It must be necessary to unify the technical terms using for fault handling method between fault control and controled station, telephon station or carrier station, and inner-station of Telegraph and Telex station concerning the fault of Telex terminal equipment, Telex switching equipment, and VFT circuit and terminal equipment.

Unified mainly technical terms are shown in Table 5 concerning Telex terminal equipment, Telex switching equipment, and VFT circuit and terminal equipment.

Table 5 . Technical terms using for fault handling method.

## VFT circuit and equipment

|                                 |                                     |
|---------------------------------|-------------------------------------|
| Perubahan level                 | Level variation                     |
| Level naik/Lebih tinggi         | Level up                            |
| Level turun/Lebih rendah        | Level drop                          |
| Carrier jatuh                   | Carrier stop                        |
| Noise                           | Noise                               |
| Putus-putus                     | Interruption                        |
| Match tidak bagus               | Equqlization no good                |
| Tidak ada arus                  | No current                          |
| Garble setak                    | Error (erratum)                     |
| Putus                           | Disconnection<br>(breaking of wire) |
| Crosstalk                       | Crosstalk                           |
| Tanah                           | Ground                              |
| Gangguan                        | Interferece                         |
| Isolan <sup>si</sup> tidak baik | Insulation no good                  |
| Reversal                        | Reversal                            |

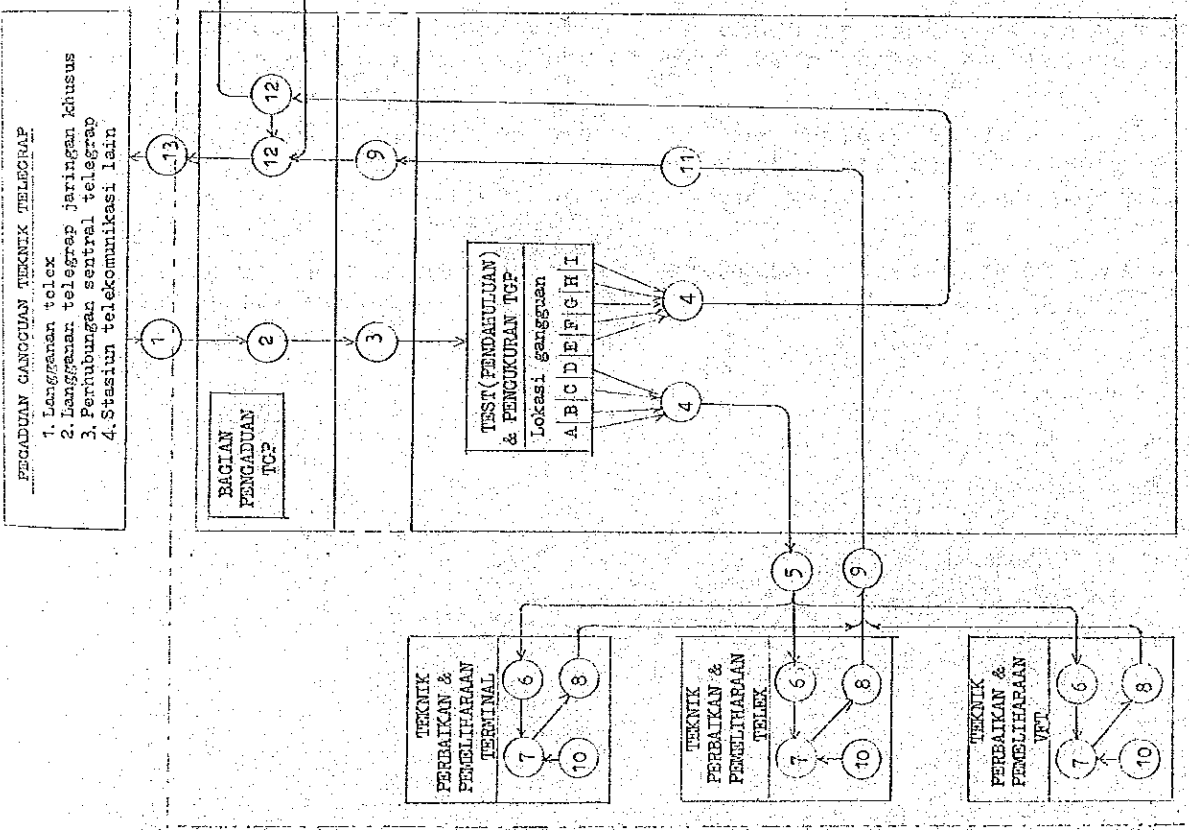
## Telex switching and terminal equipment

|                             |                                    |
|-----------------------------|------------------------------------|
| Out-going tidak baik        | Out-going no good<br>(originating) |
| In-coming tidak baik        | In-coming no good<br>(terminating) |
| Sambungan tidak baik        | Connection no good                 |
| Hubungan tidak baik         | Transmission no good               |
| Release tidak baik          | Release no good                    |
| Pengiriman berhenti         | Transmission stop                  |
| Answerback code tidak baik  | Answerback code no good            |
| Motor tidak baik            | Motor no good                      |
| Keyboard tidak baik         | Key-board no good                  |
| Penerima tidak baik         | Receiver no good                   |
| Auto-transmitter tidak baik | Automatic-transmitter no<br>good   |
| Perforator tidak baik       | Perforator no good                 |
| Control unit tidak baik     | Operating unit no good             |

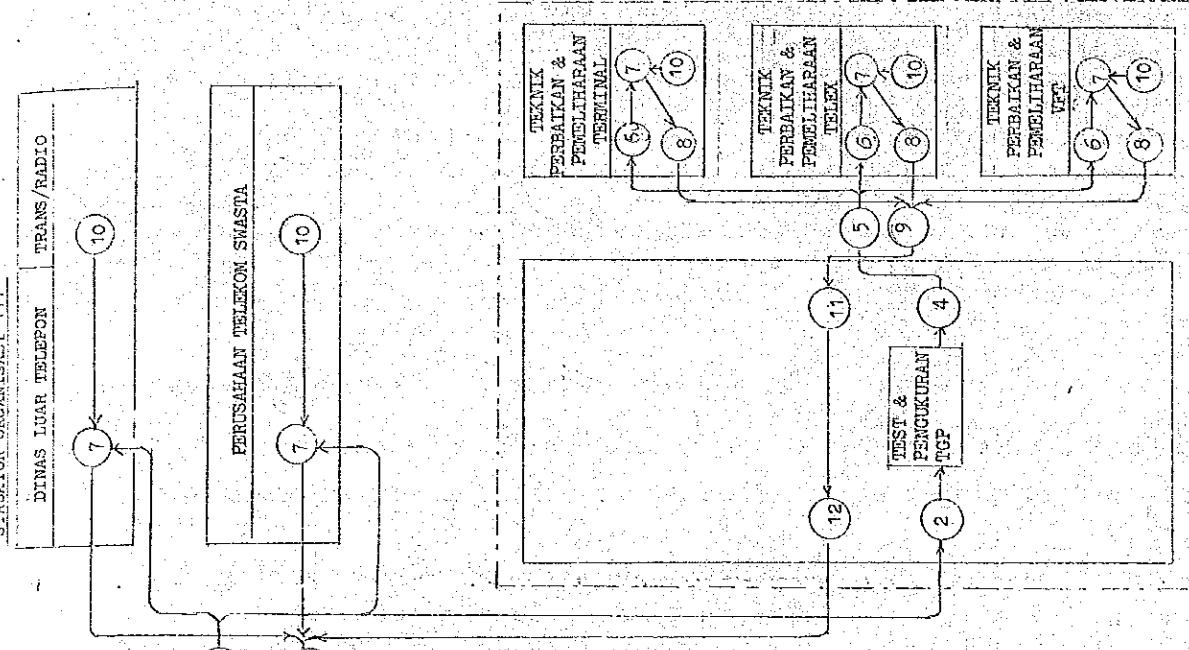
## General

|                         |   |
|-------------------------|---|
| Power supply tidak baik | Power-source no good                      |
| Terjadinya gangguan     | Occurance of trouble                      |
| Kembali ke normal       | Restoration(back to normal)               |
| Penggantian             | Replacement(removal)                      |
| Nomor kanal dan sistem  | System designation and<br>channel number. |

**STRUKTUR ORGANISASI 111**



STRUKTUR ORGANISASI 111



STRUKTUR ORGANISASI 11

1. Penanganan gangguan terlix/tlp
2. Pencatatan Laporan Gangguan pada MTC-01
3. Laporan MTC-01 per TLX/TLP
4. Pencatatan Laporan MTC-11
5. Laporan MTC-11 per TLX/TLP
6. Pencatatan Laporan MTC-20.40. 60. 61
7. Perbaikan
8. Pemindahan hasil penyelesaian pada Kartu Pemeliharaan MTC-20,40,60,61
9. Penjetasan kesetahan TLX/TLP
10. Menemukan gangguan atau Penerimaan Preventip atau Dinas operasional
11. Pemindahan hasil penyelesaian pada Kartu Pemeliharaan MTC-11
12. Pemindahan hasil penyelesaian pada Kartu Pemeliharaan MTC-01
13. Laporan penyelesaian TLX/TLP

**STRUKTUR ORGANISASI 1 & 11**

- A. Gangguan swt Terminal Tgp
- B. Gangguan swt Transmisi Tgp
- C. Gangguan swt Switching Tgp

**STRUKTUR ORGANISASI 111**

- A. Gangguan swt Terminal Swasta
- B. Gangguan saturan/kabel
- C. Gangguan Transmisi/Radio

Routine works in Telegraph and Telex system.

1. Method of routine works.

Routine checks and tests of Telegraph and Telex circuits and equipments should be conducted according to the following steps at fixed periods in order to maintain Telegraph and Telex circuits and equipments in normal operational condition, and to correct by adjustment or replacement of the fault module or part with spare as required after confirming the real cause. Schedule of the routine checks and tests should be planned and performed, it will be determined by the responsible station of Telegraph and Telex station from the maintenance standard procedure and the results of past maintenance works.

Routine check and test's data carried out in Telegraph and Telex Station must be recorded into the preventive records and confirmed by the responsible station. If any check and test's results show abnormal condition, it must be analyzed and after confirming the cause the fault will be corrected. The data measured before and after adjustment or replacement should be written down into the preventive records.

2. Kind of routine works for Telegraph and Telex.

General routine check and test in Telegraph and Telex system as follows:

- a. Check all the pilot lamp, fuses, alarm lamp and indicator for the proper condition.
- b. Check all keys, plugs and switches for their proper condition.
- c. Test and measure the specified test and check items of Telegraph and Telex, and period indicated into the preventive records.
- d. Results of the routine checks and tests should be recorded into the records and it must be confirmed by the responsible station.
- e. If any troubles are found out during check or tests, it should be recorded into the records, and it must be reported to the responsible station.
- f. As a result of the routine tests, if the inspection or special test should be carried out, the responsible station must be planned and performed, and inspection test results must be recorded into the inspection records.
- g. Cleaning of floor, outside of the equipment, test desk and measuring set.

## 2.1. Teleprinters.

## Maintenance stage.

The most suitable organization has been proved by world-wide experience to divide into three stages.

- a. The periodic and regular routine inspection and maintenance of the equipment on site, intended to keep it in good operating condition and to remove in advance any potential cause of trouble or breakdown.
- b. The rectification, at a selected major repair center, of actual or potential maintenance troubles too serious to be corrected during routine maintenance.
- c. The regular complete overhaul of the machines at the selected major repair center and their restoration to an effectively "as new" condition.

## A. Stage "A" maintenance - periodic maintenance.

This should be carried out at the regular intervals laid down by the manufacturer as suitable for each particular type of machine, except where experience proves that abnormally adverse climatic or other conditions make necessary an increase in the frequency of such maintenance. Suggested in a monthly visit. In a case, once the frequency has been determined it must be regularly applied, and appropriate individual machine record cards should be kept, properly marked up following each maintenance visit to that effective supervision can be exercised.

## Lubrication.

The operating life of Teleprinters can be prolonged, and maintenance attention and overhaul costs reduced, if lubrication is adequately and regularly applied. It is important, therefore, that this subject be given full consideration and the following recommendation effectively applied. Instructions covering lubrication are given in manufacturer's instruction booklets with respect to various Teleprinter modules, and if lubrication is carried out in accordance with these instructions, a satisfactory condition should result in terms of operating life and maintenance attention.

It is considered that, with suitable experience and trained personnel, routine maintenance on a machine should not occupy more than two hours per visit, and effectively carried out should leave the machine in such a condition as to ensure its faultless operation until the next visit. Should however, any trouble occur between visits, the mechanic responsible for stage "A" maintenance should, in the first instance, visit the machine and correct it if, after correctly diagnosing the fault and using the spares at his disposal, he can do so within one hour. The date and time and the nature and the cure, any particulars of any spare parts fitted, should be noted on the machine record card.

If, however, full and correct repair of the fault cannot be achieved within an hour, the machine, with its record card, should be passed to "B" maintenance.

## B. Stage "B" maintenance - the correction of major faults.

This covers the rectification of the teleprinter when any breakdown or difficulty has occurred which can not be rectified by the personnel carrying out the routine maintenance, owing to their lack of the necessary knowledge or the lack of appropriate facilities or spare parts.

21

The rectification should aim at locating, correctly diagnosing and rectifying the cause of the trouble in the first instance. When this rectification has been made the machine should be generally cleaned, checked and lubricated. The machine record card, which should accompany the machine, should be endorsed accordingly. The success of the normal routine maintenance can, to some extent, be gauged by the degree to which this second stage of the maintenance is called into use.

C. Stage "C" maintenance - periodic overhaul.

This covers the withdrawal from service of machine after definite periods of operation, as laid down by the manufacture for each type of machine, subject to such modification to these periods as local experience may determine.

Any machine, however, which from it's record card, is shown to have required stage "B" maintenance to an abnormal extent, should be subjected to stage "C" maintenance prior to the completion of it's normal span. Complete overhaul should be carried out only at selected center where fully experienced personnel and full testing facilities are available and should be such that the overhauled machine has an operating performance and immunity from trouble equivalent to that of a new machine. The process consists of the complete dismantling of the units into units, and the subsequent dismantling of the units into piece-parts. All worn parts whose condition adversely affects the operation of the machine should then be replaced. After the cleaning and reassembly of the units, with new parts where necessary, they should be inspected and tested before final assembly into complete machines.

2. Telegraph transmission.

A. Periodicity of maintenance measurement on international VFT systems.

- A. Maintenance measurements are carried out international voice frequency telegraph channels once every three months ( once every six months for 50-baud channels spaced 240 Hz ).
- B. there is no need to carry out measurements more frequency on channels making up long circuits or circuits used in switching network.
- c. When it is observed that the number of malaadjustments is too high, supplementary measurements would be performed by agreements between administrations concerned.

B. Maintenance measurements on VFT system.

- A. Maintenance measurements and any necessary adjustments of amplitude -modulated v.f. channels should be made in the following order :
  - a. The power supply voltage.
  - b. The value of the frequency transmitted to line by the channel.
  - c. The output level of each send filter in condition Z and A.
  - d. The output level of each send filter after the control current has been interrupted.
  - e. The out put level of each receive filter in condition Z.
  - f. The degree of distortion with symmetrical 1/1 or 2/2 signals. the measurements and adjustments may be first carried out on local and then on line, or on line only, so as to minimize the degree of distortion.
  - g. The receiving relay if any (if the results obtained at point f should make this desirable).
  - h. The threshold of the receiver.
  - i. The degree of distortion, in accordance with the method described in Recommendation R.5 and bearing in mind part A of Recommendation R.74.

- B. Maintenance measurements and any necessary adjustments of frequency modulation v.f. telegraph channels should be made in the following order.
- a. The power supply voltage.
  - b. The values of the frequencies transmitted to line by the channels.
  - c. The frequency emitted after the control current has been interrupted.
  - d. The output levels of each send filter for the characteristic frequencies A and Z.
  - e. The output levels of each receive filter for the characteristic frequencies A and Z, if possible.
  - f. The frequency drift, if the channel is used for this measurement.
  - g. The degree of distortion with symmetrical 1/1 or 2/2 signals, the measurement and adjustment should be first carried out on local and on line, or on line only, so as to minimize the degree of distortion.
  - h. The receiving relay, if any.
  - i. The threshold of the receiver.
  - j. The degree of distortion, in accordance with the method described in Recommendation R.5 and bearing in mind part A of Recommendation R.74.

The measurement referred to in f must be carried out to check, where necessary, whether is any frequency drift on the voice frequency telegraph bearer circuit by measuring the pilot frequency when the system is operated with one, otherwith, administrations should agree to measure a characteristic frequency at the output of the line for mutually determined channel.

The result of this measurement will be compared with the result of the measurement made when this frequency is sent, the difference will show any drift due to transmission on the v.f. system bearer circuit.

- C. Unless otherwise specified, the measurements should be effected at the nominal modulation rate of the channel (50, 100, or 200 baud).

However, if a 100-baud channel is operated with a rate of 50 bauds, in accordance with Recommendation R.35 bis, the measurements should be effected at the rate of 50 bauds and adjustments made if the limits mentioned for 50 bauds in Recommendation R.57 are no longer respected.

- D. The results of the measurements made on the international channels should be exchanged directly by Telegraph and Telephon between the measuring station, at the request of one of these stations.
- E. Since maintenance work is a cause of interference on circuits in service, maintenance measurements would be made outside busy hours as far as possible.
- F. When maintenance measurements are carried out on circuits in operation, every precaution would be taken according to Recommendation R.76 to avoid disturbance.

## 4.3. Routine work items and periods in Telegraph and Telex system.

Routine work items and it's periods for Telex Terminal, Telex switching equipment and VFTcircuit and equipment are shown in Table 6 .

Table 6 . Routine work items and periods in Telegraph and Telex system.

| subject                   | Routine work item   | Period   |
|---------------------------|---|----------|
| Terminal equipment        | a. Membersihkan tutup pesawat   | 1 week   |
|                           | b. Membuang kelebihan olie dan gemuk yang memempel pada bagian pesawat  | 1 week   |
|                           | c. Membersihkan kontak kirim dan maknit penerima  | 1 month  |
|                           | d. Memeriksa commutator pada motor dan sikat arang (carbon brush)   | 1 month  |
|                           | e. Memeriksa dan membersihkan governor slip ring dan kontak governor.   | 1 month  |
|                           | f. Memberikan perlumasan superlunya   | 1 month  |
|                           | g. Memeriksa dan mengatur motor dengan tuning fork atau speed indicator sesuai dengan syarannya                                   | 1 week   |
|                           | h. Mengukur tahanan isolasi kawat signal dan tahanan isolasi kawat tenaga dan nilai yang diukur harus lebih besar dari 5 meg-ohm. | 3 months |
|                           | i. Mengukur distorsi st-sp kirim serta margin penerima bila perlu mengadakan pengaturan superlunya.                               | 3 months |
|                           | j. Memeriksa dan mengukur kontak piring pemilih pada remote control unit.   | 3 months |
| Telex switching           | a. Pengetesan Dial Code Storage (WSp)   | 2 months |
|                           | b. Pengetesan Local-Repeater (OUe)  | 3 months |
|                           | c. Pengetesan alarm   | 3 months |
|                           | d. Pengetesan Zoning  | 3 months |
|                           | e. Pengetesan Trunk-Repeater (AUe)  | 6 months |
|                           | f. Pengetesan Metering pulse selector (ZIG)   | 6 months |
|                           | g. Pengetesan Pembanding kelas  | 6 months |
|                           | h. Pengetesan printed Service Signal (Tx-G)   | 6 months |
|                           | i. Pengetesan TA dan Rate-meter   | 6 months |
|                           | j. Pengetesan Arus Saluran dan distorsi Langganan   | 6 months |
|                           | k. Pengetesan Time out-Circuit  | 6 months |
|                           | l. Pengetesan Matrix (EK-ZK-MKA)  | 1 year   |
|                           | m. Pengetesan Matrix (EK-ZK-MKO)  | 1 year   |
|                           | n. Pengetesan Matrix (WSp-KA)   | 1 year   |
|                           | o. Pengetesan Matrix (WSp-Ko)   | 1 year   |
|                           | p. Pengukuran Tegangan Sentral  | 6 months |
| r. Observation of Failure | -   |          |



VFT  
equipment  
and  
circuit

Pengukuran rutine WT-1000.

|  |          |
|--|----------|
| a. Pengukuran tegangan catu  | 1 month  |
| b. Pengukuran tegangan output module TSV1000.  | 1 month  |
| c. Pengukuran signal alarm level   | 1 month  |
| d. Pengukuran level kirim pada modul TSD 1000  | 1 month  |
| e. Pengukuran level terima pada modul TSD 1000   | 1 month  |
| f. Pengukuran tegangan lokal kirim   | 3 months |
| g. Pengukuran tegangan lokal terima  | 3 months |
| h. Pengukuran distorsi isochronous antar kanal di kedua stasiun tersedia alat-alat ukur      | 3 months |
| i. Pengukuran distorsi isochronous antar kanal alat-alat ukur hanya tersedia di satu stasiun | 3 months |
| j. Pengukuran distorsi st-sp antar kanal alat-alat ukur hanya tersedia di satu stasiun       | 3 months |
| k. Pengukuran frekwensi kirim pada modul TSD 1000  | 1 year   |
| l. Pengukuran frekwensi terima pada modul TSD 1000   | 1 year   |

Pengukuran FM VFT(NEC)

|  |          |
|--|----------|
| a. Pengukuran tegangan                                   | 1 month  |
| b. Pengukuran arus telegrap lokal                        | 1 month  |
| c. Pengukuran tegangan alarm tiap kanal                  | 1 month  |
| d. Pengukuran alarm circuit                              | 1 month  |
| e. Pengukuran level kirim dan terima tiap 6 kanal        | 3 months |
| f. Pengukuran level kirim dan terima tiap kanal          | 3 months |
| g. Pengukuran output level dari group carrier oscillator | 3 months |
| h. Pengukuran level pada group modem                     | 3 months |
| i. Pengukuran level pada saluran kirim dan terima        | 3 months |

### 4.3.1. Test items of the Preventive Maintenance in System TWK - 9.

Test items of the preventive maintenance in System TWK-9 of Telex Switching in Telegraph and Telex Stations are shown as follows :

- a. Pengetesan Dial Code Storage ( WSp ).
- b. Pengetesan Trunk - Repeater ( AUe ).
- c. Pengetesan Metering Pulse Selector ( ZIG ).
- d. Pengetesan Matrix ( EK - ZK - MKA ).
- e. Pengetesan Matrix ( EK - ZK - MKO ).
- f. Pengetesan Matrix ( WSp - KA ).
- g. Pengetesan Matrix ( WSp - KO ).
- h. Pengetesan Local - Repeater ( OUe ).
- i. Pengetesan Z<sup>ny</sup>oling.
- j. Pengetesan Pembanding Kelas.
- k. Pengetesan Printed Service Signal ( Tx - G ).
- l. Pengetesan TA dan Rate - Meter.
- m. Pengetesan Arus Saluran dan Distorsi Langganan.
- n. Pengetesan Alarm.
- o. Pengetesan Time out - Circuit.
- p. Pengukuran Tegangan Sentral.
- r. Observation of Failure.

Measuring sat, Model, Interval of test and Test time in Maintenance tests.

Alat -ukur, Model, Interval, Waktu pengetesan and Petugas in each Preventive maintenance tests are shown as follows :

1) Pengetesan Dial Code Storage

- a. Alat - ukur : Test H-29.  
Teleprinter tanpa RCU.  
Pesawat test.  
Stop watch
- b. Model : DT.1 & DT.1A
- c. Interval : 2 bulan.
- d. Waktu pengetesan : Traffic rendah/Hari libur/Malam hari.
- e. Petugas : 2 orang.

2) Pengetesan Trunk - Repeater

- a. Alat - ukur : Test H-29.  
Teleprinter tanpa RCU.  
Pesawat test.
- b. Model : DT.2
- c. Interval : 6 bulan.
- d. Waktu pengetesan : Traffic rendah/Hari libur/Malam hari.
- e. Petugas : 3 orang.

3) Pengetesan Metering Pulse Selector

- a. Alat - ukur : Test H-29.  
Teleprinter tanpa RCU.  
Pesawat test  
Stop watch.
- b. Model : DT.3
- c. Interval : 6 bulan.
- d. Waktu pengetesan : Traffic rendah/Hari libur/Malam hari.
- e. Petugas : 3 orang.

4) Pengetesan Matrix( EK - ZK - MKA )

- a. Alat-ukur : Test H-29.  
Teleprinter tanpa RCU.  
Pesawat test.
- b. Model : DT.4
- c. Interval : 1 tahun
- d. Waktu pengetesan : Malam hari/Hari libur.
- e. Petugas : 2 orang.