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89 MTC-20 Table 49. PEHELIHARAAN OLEH PERIODS No. USUT KARTU PEMELIHARAAN PESAVAT TERMINAL TOP. No. TIP ALANAT Ĺą TYPE NOMOR PABRIK ATTACHMENT JENIS PESAVAT TYPE NOMOR MAINTENANCE KODE PREVENTIVE KETEBARGAN PARIP HTC 10 TCL D C. COUNTER DIST TO DIST-KI MARGIN JENIS CHEST MTC 20 KODE PREVENTIVE HAIRTENANCE TGL MTC 10 KETERANGAN PARLP JENIS COUNTER DIST TO DIST KB MARGIN C D

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MTC-60 91 Table 51. PEMELIHARAAN OLEH TOL HLI KTC-20. Ho THE KARTU LANGGANAN TELEX / GENTEX ALANAT ANSWERBACK CODE Lo TIP NAHA LANGGANAN JENIS PESAVAT TYPE NOMOR PABRIK ATTACHHENT TYPE HOMOR PREVENTIVE MAINTENANCE KODE GANGG. TCL MTC 10 KETERANGAN PARAP ARUSDIA CALL DIST T DIST KE MARGIN В C D MTC-60 PREVENTIVE MAINTENANCE TGL MTC 10 KETERALGAL D RUSDIA Call DIST TO DIST KE MARGIN

Table 52. Buku laporan gangguan.

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Table 54. LAPORAN GANGGUAN PERHUBUNGAN TELEGRAP WITEL ...

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

7.1. Objective.

In the maintenance activity of Telegraph and Telex service, measuring sets and tools are one of important means to find out and to recovery the cause of fault, and to keep the good service.

Therefore, it should be noted that in every Telegraph and Telex Station must have minimum stock measuring sets and tools that must have a suitable performance efficiency, and that keep usually it in good condition.

For this purpose, it is necessary to define a certain standard stock value concerning the kind and number of measuring sets and tools, that is "STANDARD STOCK VALUE OF MEASURING SETS AND TOOLS ".

The measuring sets and tools use be kept in good condition for the preparing to various tests and fault clearance. Periodic tests of measuring sets are carried out in the same way as Telegraph and Telex equipments and apparatus, and it's repair, in the case of fault, is concentrated in work shop and maintenance repair center.

7.2. Standard stocked value of measuring sets and tools.

In Table 59 are shown standard stock value of measuring aets and tools according to the numbers of VFT system and Telex subscriber in Telegraph and Telex station in Indonesia, is only temporary until detailed fault data and repair time are taken.

Table 59. Proposed standard stock value of measuring sets and tools

Name of measuring sets and tools—	VFT TEL	477 1 1	lelex subs	
	51 1000	VFT TEL 16 500	VFT TEL 1 1	Terminal
	or	50 1000 or	16 500 or	
Single cerrent test transmitter	3	2	1	
Telepriter signal generator	3	2	1	
Telegraph distortion measuring set	3	2	1	1
Signal analyzer	2	1	1	1
Frequency counter	1	1		
Cathode ray relay tester	1	1	1	
Level meter	2	1	1	
Impedance meter	1	1		
Margin measuring set	2	1	1	
Impulse tester	2	1	1	
V. A. R meter	3	2	1	1
Attenator	1	1		
Filter	1	1		
Test equipment for checking trunk repeater and line terminator	3	2	1	
Test equipment for checking common control	3	2	1	
Tools for Teleprinter				equal for
		Application of the state of the		maintenance personnel
Cleaner	1	1	1	1

.3. Reserved Telex terminal equipments, modules and units of Telex switching and VFT terminal equipment.

.3.1. Objective.

To keep good service of Telegraph and Telex must be reserved spare Telex terminal, modules and units of Telex switching and VFT equipment in good condition in each Telegraph and Telex station.

Spare Telex terminal equipments and modules stock requirements are determined by the following factors:

- Number of terminal equipment and module in service.
- MTBF(Mean time between failure) for the equipment.
- How MTBF is distributed between the various integral terminal and module of equipment.
- Repair time is in case of failure
- Distribution of failure over time.
- -Whether the spares are divided between several storage points.

Also, it base the operation on the following assumtion:

- Supplies are based on central storage in Jakarta.
- Repair time include several days for the trnsportation.
- Mean time to repair is determined on the maintenance characteristics to the system as regards available equipment for the fault finding and how quikly an engineer can reach the station.

Maintenance time can be divided up as follows:

- Time from the discovery of the failure.
- Waiting time for engineer.
- Waiting time for spare terminal equipment or module.
- Net repair time.
- Time for functional testing.

If number of fault exceed the number of reserved terminal equipment module stocked at Telegraph and Telex station, a fault can not be recovered for the lack of reserved Telex terminals or modules. On the other hand, over-stocking of reserved terminal or modules is not good from the economical point of view.

The number and kind of the reserved modules and units are decided by considering their fault rate, the number of existing equipment, repair time, and influence upon service when fault occures. The most proper number of reserved modules and units must be decided so as to keep the risk rate less than the certain value. The practical determination will be made and informed to Telegraph and Telex station from Telegraph and Telex Divition in PERUM TELEKOMUNIKASI.

7.3.2. Reserved Telex terminal equipment.

Concerning the repair and maintenance of Telex terminal equipment it could say that there are many problems:

- Technical level of the adjustment.
- Transportation of Telex terminal equipment or technical personnel.
- Location of the installation Telex terminal equipment in the subscriber's office.

The standard reserved value of Telex terminal equipment for the maintenance and operation in Telegraph and Telex station in Table 60, is only temporary until fault rate and repair time of Telex terminal equipment are taken.

Table 60. Standard reserved value of Telex terminal equipment and units.

Number of	terminal	Number of	Number of
to be main	ntain	reserved terminal	reserved unit
in servi	3e		
		1	
	1	1	_
2 -	- 30	2	1
31 •	- 60	3	1
61 •	- 100	4	1
101 -	- 140	5	1
141 -	- 180	6	1
181 .	- 230	7	1
231.	- 280	8	2
281 -	- 340	9	2
341	- 400	10	2
401	- 460	11	2
461 -	- 530	12	3
531	- 600	13	3
601 -	- 670	14	3
671	- 740	15	3
741	- 820	16	
_			4
821	- 900	17	4
901	- 980	18	4
981 •	- 1060	19	4
		[1] 中国的国际公司、企业的工具	

.3.3. Reserved modules and units of Telex switching and VFT equipment.

Reserved value of spare module for Telex switching equipment system TWK-9 for 500 subscriber's terminal in each Telegraph and Telex station is shown in Table 61, also, reserved value of spare components for VFT terminal equipment system WT-1000 for 3 system of VFT in each Telegraph and Telex station is shown in Table 62.

The former is one of from supplier "Siemens Company", it must be stocked them in good condition, the latter is also one of from same supplier, however, is only spare components, is not provided as the spare modules.

Table 61 . Reserved value of spare module for 500 subscriber's terminal of Telex switching.

		<u>artik ti</u> oleh seri.
Name of module	Number of order	Number of module
l. Dial evaluator, decorder (W-Bw-E)	A1001	1
2. Dial evaluator, processor (W-Bw-A)	A1275	1
3. Line terminating set(C-Ta-M/wSn)	A1274	i
4. Zoner, group A(VZ-A)	A1002	1
5. Zoner, group B(VZ-B)	A1282	l. i
6. Common control A(G-Est-A)	A1271	Ī
7. Common control B(G-Est-B)	A1251	1
8. Commontimer(G-Zt)	A1265	1
9. Electric pulse generator(UG-EL-ITG)	A1001	1
(basic clock generator)		
10. Electric pulse generator(AST-EL-ITG)	E1003	1
(out put stage)		
11. Electric pulse generator(EL-ITG)	E1004	1
(diode card)		
12. Electric pulse generator A(IG-A)	A1178	1
13. Electric pulse generator B(IG-B)	A1311	1
14. Series-parallel/Parallel-series converter	B1098	1
(SPU/PSU B)		
15. Code generator for service signal (TXG-B)	A1283	1
16. COS comparator(KL-VG-A)	A1053	1
17. Commonline termination finder, identifier,	A1274	1
marker, common link finder		
(G-TA-N/w-SU)		***
18. Storage connecting matrix(local), and	A1261	1
storage finder for 4 dial storages		
(SpKO-Wsp-Su)		1.
	1	

Table 62. Reserved value of spare components for 3 system of VFT terminal equipment.

1 BCY 58 V111 5 2 BCY 58 T 2 3 BCY 59 V111 2 4 BCY 65 E V111 2 5 BCY 78 V11 1 1 6 BCY 78 V111 1 2 7 BCY 79 V111 1 1 8 BFX 37 1 1 9 BSX 45-6 1 1 20 2N720A 2 1 11 2N 2896 2 1 2 N 2907A 2 1 13 IN 914 5 1 14 BZX 97/C5V6 1 1 15 BZX 97/C6V2 1 1 16 BZX 97/C6V8 1 1 17 BAY 41 2 1 18 BAY 45 2 1 19 BZX 97/C15 1 1 20 BAW 75 1 1 21 D1/400 1 1 22 BZX 97/C16 1 1 23 BAW 76 1 1 24 G 1 1 25 IC 2 2 26 Lamp 6 2 27 Blende 1 1 28 Lamp cap 1 1 29 Capot 1 1 30 Buchse 2 2 31 Jack 2 2 32 Stecker 3 33 Plug 1 1	Pos	Nomenclature	Quantity for 1~3 sy
2 BCY 58 T 3 BCY 59 V111 2 BCY 65 E V111 2 BCY 78 V11 6 BCY 78 V111 7 BCY 79 V111 8 BFX 37 9 BSX 45-6 10 2N720A 11 2N 2896 12 2N 2907A 13 1N 914 5 BZX 97/C5V6 14 BZX 97/C6V2 16 BZX 97/C6V2 16 BZX 97/C6V8 17 BAY 41 2 BAY 45 19 BZX 97/C15 20 BAW 75 21 D1/400 22 BZX 97/C16 23 BAW 76 24 G 25 IC 26 Lamp 6 C 27 Blende 28 Lamp cap 29 Capot 30 Buchse 32 Stecker 33 Plug 1		nav 59 w111	E
3 BCY 59 V111 2 4 BCY 65 E V111 2 5 BCY 78 V11 1 6 BCY 78 V111 2 7 BCY 79 V111 1 8 BFX 37 1 9 BSX 45-6 1 10 2N720A 2 11 2N 2896 2 12 2N 2907A 2 13 1N 914 5 14 BZX 97/C5V6 1 15 BZX 97/C5V6 1 16 BZX 97/C6V2 1 16 BZX 97/C6V8 1 17 BAY 41 2 18 BAY 45 2 19 BZX 97/C15 1 20 BAW 75 1 21 D1/400 1 22 BZX 97/C16 1 23 BAW 76 1 24 G 1 25 IC 2 26 Lamp 6 27 Blende 1 <t< td=""><td></td><td></td><td></td></t<>			
4 BCY 65 E V111 2 5 BCY 78 V11 1 6 BCY 78 V111 2 7 BCY 79 V111 1 8 BFX 37 1 9 BSX 45-6 1 10 2N720A 2 11 2N 2896 2 12 2N 2907A 2 13 1N 914 5 14 BZX 97/C5V6 1 15 BZX 97/C6V2 1 16 BZX 97/C6V8 1 17 BAY 41 2 18 BAY 45 2 19 BZX 97/C15 1 20 BAW 75 1 21 D1/400 1 22 BZX 97/C16 1 23 BAW 76 1 24 G 1 25 IC 2 26 Lamp 6 27 Blende 1 28 Lamp cap 1 29 Capot 1 30 <td></td> <td></td> <td></td>			
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31 Jack 2 32 Stecker 3 33 Plug 1			2 2
32 Stecker 3 33 Plug 1			2
33 Plug	455.00	Quantitative and the second of the second	3
and the control of th			

At present, spare modules for VFT terminal equipment are not stocked in each Telegraph and Telex station, is only components.

Standard reserved value of VFT system WT-1000's spare modules to be stocked in each Telegraph and Telex station in Table 63, is only temporary until the fault rate and repair times are taken.

Table 63. Standard reserved value of VFT WT-1000 spare modules

Name of VFT module	Number of module
1. FM system transmitter module	
2. FM system receiver module	
3. Line maching module	
4. Service telephon module	
5. Local alarm module	1
6. Test signal generator module	1
7. Level meter module	1
8. Channel test adapter module	1
9. Volt meter module	1
10. Timer module	1
11. Superimposed telegraph module	1
12. Multiple module	1
13. Power supply module	1

Repair works in Telegraph and Telex maintenance.

8.1. Objective.

Repair works in the field of Telegraph and Telex in Indonesia, can be classified for Telex terminal equipment, Telex switching equipment and VFT terminal equipment.

In the case of fault of Terminal equipment, after changing it for the spare terminal equipment repair it's fault terminal equipment at the work shop.

On the other side, in the case of fault of Telex switching and VFT equipment, after testing for looking out the location of fault, immediatelly, must be replaced fault's module or unit, and repair it at the work shop, because basic principle of repair work for Telex switching and VFT terminal equipment, is to consider the minimum interruption of service.

since the adoption of the plug-in mounted system made possible to introduce plug-in module or unit replacement in repair work, faulty equipment can easily be done quikly if there is proper spare module or unit is available. however, itis not effective to repair the faulty module or unit at the work shop of the each Telegraph and Telex station except for the simple repair.

For this purpose, certain standard reserved value of spare modules and measuring sets, and maintenance repair center are considered and made decition to keep the good Telegraph and Telex service in Indonesia.

8.2. Repair works at the work shop of Telegraph and Telex station.

The easy repair works to recovery to good condition the equipment or module of Telex terminal, Telex switching and VFT equipment normally must be done by own maintenance personnel at the work shop of each Telegraph and Telex station.

It should be carried out immediatelly when faulty equipment or module is found, possible items of this repair work at the repair work shop are shown as follows:

- a. Adjustment, decomposition, and easy repair of faulty terminal equipment or it's parts.
- b. Replacement of the spare terminal equipment.
- c. Replacement of the spare terminal equipment.
 d. Replacement of VFT terminal equipment module or unit.
 e. Easy repair of faulty Telex module or unit.
 f. Easy repair of faulty VFT module or unit.

- g. Replacement of fuse, lamp, plug and juck etc.
- h. Repair of cord and connector except the internal of equipment.
- i. Other easy works.

.3. Repair of Telex switching and VFT module and unit.

The repair of the faulty modules and units in each Telegraph and Telex station is difficult and inefficient, because of the circuits of Telex switching and VFT equipment becoming complicated particularly Telex switching and VFT equipment has so many kinds for its quantity that repair work was concentrated in maintenance repair center.

The faulty module and unit is sent directly from a Telegraph and Telex station to the maintenance repair center with a note attached describing the fault. Having been repaired there, it is returned to Telegraph and Telex station with a repair card entering the items repaired. After the received faulty module and unit has been checked and confirmed to be normal, as a rule, it should be returned to the former place.

Modules and parts that have comperatively frequent fault, such as fuse, thermister, modulator, demodulator and so on, are replaced with spare modules or parts, because they have been designned originally so as to be replaced easily. These spare modules and parts are always kept in a reasonable number in consideration of the failure rate and frequency of distribution rates.

- 8.4. Maintenance repair center.
- 8.4.1. Objective.

As previously mentioned, it must have a central stock of spare module and unit, and for this reason it find it expedient to establish a central maintenance repair center at the same place, and it is better to install them in Gambir Telegraph and Telex station in Jakarta. The organization of this repair center is shown in Fig 4.

8.4.2. Function of maintenance repair center.

Repair and maintenance of Telex terminal equipment, Telex switching and VFT terminal equipment are divided between specialist group for each of the following fields:

- Telex terminal equipment.
- Telex switching equipment.
- VFT terminal equipment.

Each of these groups consists of 2 to 4 engineers and technicians, and through their leaders they are responsible for:

- Stocks of spare modules or units.
- Files/indexes of completed repairs, checking and modifications of equipment.
- Fault reports with the information concerning the MTTR and MTBF of the individual sub-modules or units.
- Providing asistance to operations technicians at the Telex switching/VFT terminal station in measurements and repair faults.

The special assignments group is headed by an engineer with long experience of work in the other groups, he is responsible:

- Training of operations technicians in equipment and instrument.
- Preparation of the fault reports.
- Special assignment such as the development of new measuring methods.
- The work shop.
- Supervision of the fitters.

The work shop undertakes work of mechnical nature including repairs.

8.4.3. Organization of Maintenance repair center.

Organization of maintenance repair and stock system is shown in Fig 5 .

Fitters have extensive training in the installation of Telex switching and VFT terminal equipment. A separate group consisting of non-technical personnel is responsible for:

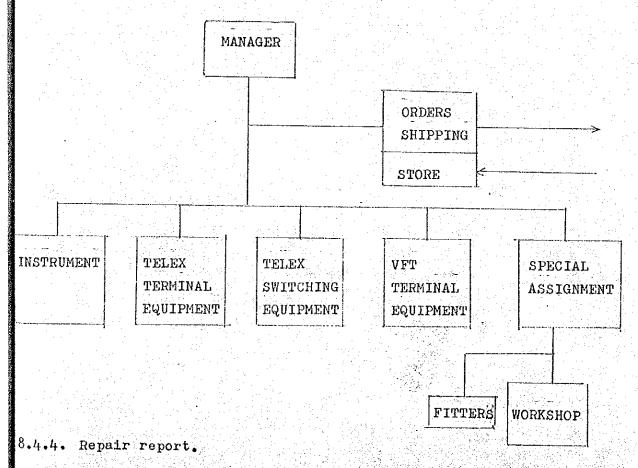
- Orders.
- Receipt of the material
- Packaging
- Despatch of the material

In packing and transportation of the material great importance is attached to the use of special transport cases in order to avoid damage.

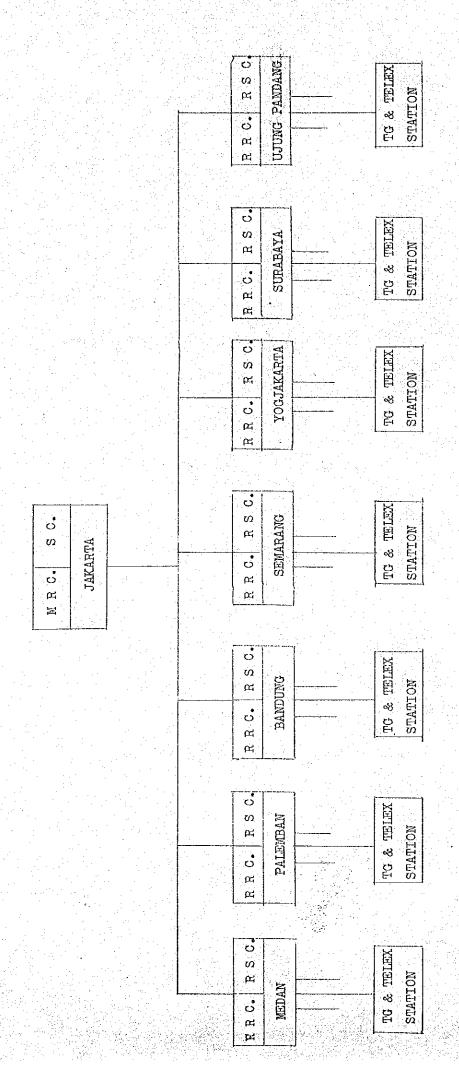
In maintenance repair center must be provided to repair and to maintain as follows:

- Measuring set.
- Instrument for the functional testing.
- Machine tools
- Electric gilding set.
- Air conditioning set

Fig 4. The organization of the maintenance repair center.



Repair request and repair work report to be used for maintenance repair work in maintenance repair center is shown in Table 64.



The organization of maintenance repair and stock system

NOTES: MRC MAINTENANCE REPAIR CENTRE

SC STOCK CENTRE

RRC REGIONAL REPAIR CENTRE

RSC REGIONAL STOCK CENTRE

TABLE 64. REPAIR REQUEST AND REPAIR WORK REPORT

PERUM TELEKOMUNIKASI

Station	Order No.
Issued data	Received data
Issued by	Received by
Name, Number and Locat	ion
Fault's appearance	
Cause of fault	
Description of repair	work
Description of test r	esult
Test data	Performed by Checked by
Remarks	

