Present situation and problems of Telegraph and Telex maintenance works, records and reports, and fault handling.

3.1 Present situation of Telegraph and Telex maintenance works.

According to the investigation of maintenance works concerning VFT circuits and equipments, Telex Switching and Terminal equipments performing items in Gambir Jakarta, Bandung, Surabaya and Dempasar Telegraph and Telex Stations are shown in Table 17.

3.2 Problems of Telegraph and Telex maintenance works.

From Table 17, although it can not definitely conclude this, because cerrected data is small, the general tendency is understood Telegraph and Telex preventive and corrective maintenance activities in Telegraph and Telex Stations.

3.2.1 Problems of preventive maintenance.

A. Terminal equipments.
a. It is considered necessary to decide the working items must be carried out in preventive maintenance activities.
b. In addition, certain standard records should be defined as soon as possible.

B. VFT equipments and circuits.
a. Working items that must be performed in VFT equipments and circuits preventive maintenance are voltage, current, level, frequency, margin, distortion and noise etc.
b. It must be considered necessary to unify the records of VFT equipments and circuits preventive maintenance activities which are recorded in every sations.

c. Telex switching equipment.
a. It is necessary to establish the maintenance standard procedure and to decide the working items of preventive maintenance activities for Telex Switching equipment of TWK-9 and TWK-D.

3.2.2 Problems of corrective maintenance.

It is considered necessary to decide the standard records for corrective maintenance works of Terminal equipments, VFT equipments and circuits, and Telex switching equipments as soon as possible as follow :

i. fault reception record for VFT, Terminal and Telex switching.
ii. fault card for VFT, Terminal and Telex switching.
iii. fault analysis and statistic record for VFT, Terminal and Telex switching.
iv. monthly maintenance report for VFT, Terminal and Telex switching.
v. extra-ordinary failure report .

Table 17. Performing items in the maintenance works in Gambir, Bandung and Surabaya Stations

			Gambir st, Jakarta	Bandung st	Surabaya st
Preventive maintenance	Terminal equipment			a) margin b) start-stop distorsi c) motor speed	a) margin b) distorsi c) kecepatan motor d) counter
	V F T	Equipment	FM WF120/WST-24/WTK-U/DWT a) distorsi b) frekwensi c) level VFT-NEC a) tegangan b) arus c) level	VFT -KANAL a) distorsi -kirim, terima	WT-1000 a) tegangan b)level, k.t c) distorsi k.t VFT-NEC a) tegangan
		Circuit	a) level b) frekwensi c) noise	TELEX TRUNK LINE a) distorsi LANGGANAN TELEX a) distorsi b)margin	a) level b) distorsi
	Telex switching		TWK-9 a) pengetesan dial code storage b) pengetesan perbandingan COS c) pengetesan TA dan rate meter d) pengetesan metering pulse selecter e) pengamatan kwalitas pelayanan f) programing sub's telex	TWK-9	TW -39
Corrective maintenance	Terminal equipment				
	V.F.T.	Equipment			
		Circuit			
	Telex switching				

3.3 Existing record in Telegraph and Telex maintenance activities.

Existing records in Telegraph and Telex maintenance activities in Gambir Jakarta, Bandung, Surabaya, Dempasar and Palembang Telegraph and Telex Stations are shown im Table 18.

At present, although there are many forms of them im the Engineering Instructions (Vol. 1 - 4) of PERUM TELEKOMUNIKASI, another various kinds of records and reports are used according to demand and category in each Telegraph and Telex Stations as show in Table 19.

a. Records of the faults for the preventive and corrective maintenace must be recorded into the uniform papers, because of very easy to hand over the faults, and to analyse the causes of the faults.

b. Also, it is not enough the records of the preventive maintenance for Telex switching equipment, VFT equipment and Telex Terminals.

c. It must be estableshed the report concerning the corrective maintenance periodically to the Regional Office and to Headquarters from the field stations.

Table 18.Existing records in Gambir, Bandung, Surabaya and Denpasar Stations.

Existing records in Engineering Instruction of PERUMTEL	Existing records in Gambir Bandung, Surabaya and Denpasar Stations	Records in NTT
(A) Terminal		
(a) Preventive	(a) Preventive	(a) Preventive
* Kartu pemeliharaan preventip pesawat-pesawat telepriter (MODEL TGP MTC-22)	* MTC-22 (SB), (DPR) Kecepatan moter, Distorsi, Margin.	
* Kartu pemeliharaan preventip pesawat-pesawat Morse (MODEL TGP MTC-23)	* Buku (SB) Counter, Margin, Distortion.	
(b) Corrective	(b) Corrective	(b) Corrective
* Kartu pemeliharaan korektip pesawat-pesawat terminal telegrap (MODEL TGP MTC-20)	* Laporan pemeliharaan pesawat terminal telegrap (GB) * Buku Gangguan (SB), (BDG), (DPR), (GB) * Pemeliharaan dan perbaikan pesawat TG (BDG)	* Fault and repair card * Fault transaction book * Fault analysis record
(B) Telegraph Transmission		
(a) Preventive	(a) Preventive	(a) Preventive
* Pemeliharaan rutin pengukuran distorsi dan margin langganan telex (MODEL TGP MTC-80)	* Laporan pengukuran transmissi telegrap. - Noise, Level, Frekwensi- (GB)	* Routine test of attenuation frequency
* Pemeliharaan rutin pengukuran distorsi start-stop saluran telex interlocal(MODEL TGP MTC-81)	* MTC-83. (SB), (BDG) - Distorsi,Kirim dan Terima.-	* Routine test of overload of VFT
* Pemeliharaan rutin pengukuran distorsi dan margin pada sirkit lokal hubungan PTP (MTC-82)	* Buku (SB), (DPR) - Level S, R (3 hari sekali)- -Distorsi isochronous total-	* Routine test of non-liner distortaon
* Pemeliharaan rutin pengukuran distorsi kanal-kanal telegrap sistem VFT (MODEL TGP MTC-83)	* MTC-80,81 Distorsi, Margin langganan dan saluran Telex.	* Routine test of signal/noise ratio
		*Routine test of carrier level and level variation
(b) Corrective	(b) Corrective	(b) Corrective
	* Buku gangguan (SB), (BDG), (DPR) * Harap bantuan Sdr,untuk pemeliksaan perbaikan saluran langganan Telex Sebagai beriket (GB)	* Fault and repair card for Telex circuit * Fault transaction book for Telex circuit * Fault analysis record for Telex circuit * Fault and repair card for VFT circuit * Fault transaction book for VFT circuit * Fault analysis record for VFT circuit

(c) Telegraph Transmission Equipment

(a) Preventive

* Pengukuran rutin FM VFT NEC(MODEL TGP MTC-46)
  - Tegangan, Arus, Level-
* Pengukuran rutin WTK V/K(MODEL TGP MTC-47)
  - Tegangan, Frekwensi, Arus, Level-
* Pengukuran rutin WT-1000.
  -
* ARQ MUX (MODEL TGP MTC-55).

(a) Preventive

* Pemeliksaan routin VFT(FMWT-120/WTS-24/ WTK-V/DWT).(GB)
  -Cacad isochronous, ST-SP, Kebeceran-
* Pemeliksaan routin (VFT/NEC) (GB)
  -Voltage, Ampere, Level-
* MTC-41. (SB)
  -Tegangan masuk,sirkit transmission, sirkit telegrap dan alarm-
* MTC-46. (SB)
  -Tegangan ,-21. -60V(tiap hari)-
* Buku , Tegangan.WT-1000, NEC dan OKI(SB)
  - TEg,Jda, 130, 20, 12. Tegangan masuk 220, 21, 60. TEGJALA danTGP, 60, 6.-

(a) Preventive

(b) Corrective

* Karut pemeliharaan korektip pesawat transmissi telegrap (MODEL TGP MTC-40).
* Catatan penyimpagan dan gangguan (MODEL TGP MTC-)

(b) Corrective

* Buku (SB), (BDG), (DPR)
  -Section hours, fault condition, procedure-

(b) Correctime

* Fault and repair card for VFT equipment
* Fault transaction book for VFT equipment
* Fault analysis record of VFT equipment

(D) Telex Switching Equipment

(a) Preventive

* Buku pemeliharaan preventip sentral TW-39. (MODEL TGP MTC-62)
* Daftar rencana pemeliharaan sentral TW-39. (MODEL TGP MTC-63)
* Kartu langganan Telex/GTX(MODEL TGP MTC).

(a) Preventive (GB)

* Pengetesan dial code strage, TWk-9.
* Pengetesan perbandingan COS,TWK-9.
* Pengetesan TA dan Rate meter, TWK-9
* Pengetesan metering pulse selector, TWK-9.
* PPengetesan kwalitas pelayanan, TWK-9.
* Laporan gangguan sentral TWK-9.
* Programming subscriber Telex.
* Buku (DPR) - Rate meter, Selector-

(a) Preventive

(b) Corrective

(b) COrrective

* Buku (SB), (BDG), (DPR), (GB)
  - Tgl Tenganggu, Selasai gangg, Keteranya-
* Laporan gangguan Sentrl Telex (GB)

(b) Corrective

* Fault and repair card
* Fault transaction book
* Fault analysis record

(E) General

(a) Preventive

* Kartu pemeliharaan kebersihan ruangan (MODEL TGP MTC -15)
* Kartu pemeliharaan kebersihan peralatan teknik (MODEL TGP MTC-16)
* Kartu catatan kelembaban udara dan temperatur (MODEL TGP MTC-17)

(b) Corrective

* Daftar MODEL TGP MTC untuk bidang teknik telegrap (MODEL TGP MTC-00)
* Buku laporan gangguan (MODEL TGP MTC-01)
* Bon perbaikan Telegrap(MODEL TGP MTC-11)
* Bon gangguan Telegrap (MODEL TGP MTC-10)

(a) Preventive

* Daily work record (GB)

(b) Corrective

Table 19. Existing records in Telegraph and Telex maintenance works.

Subject			Maintenance records
Preventive	Terminal		a. Kartu pemeliharaan preventip pesawat terminal telegrap(MTC-20)
	VFT	Equipment	Pengukuran rutine WT-100 a. Pengukuran tegangan b. Pengukuran tegangan lokal c. Pengukuran distorsi isochronous kanal VFT d. Pengukuran distorsi start-stop antar kanal VFT e. Pengukuran level tiap kanal f. Pengukuran level kirim dan terima pada FLE 1000 g. Pengukuran frekwensi kirim tiap kanal VFT(FA.FZ) h. Pengukuran frekwensi terima tiap kanal VFT(FA/FZ) i. Pengukuran frekwensi tengah kirim/terima j. Pengukuran lampu signal alarm Pengukuran rutine FM VFT-NEC a. Pengukuran tegangan b. Pengukuran arus telegrap lokal c. Pengukuran tegangan alarm tiap kanal d. Pengukuran level kirim dan terima tiap 6 kanal e. Pengukuran level kirim dan terima tiap kanal f. Pengukuran output level dari group carrier oscillator g. Pengukuran level pada group modem h. Pengukuran level pada saluran kirim dan terima i. Pengukuran alarm circuit
		Circuit	a. Pemeliharaan rutine pengukuran distorsi dan margin pada circuit lokal hubungan point to point (MTC-82) b. Pemeliharaan rutine pengukuran distorsi Kanal-kanal telegrap sistem VFT (MTC-83)
	Telex switching		a. Pengetesan TA dan rate meter b. Pengetesan metering pulse selector c. Pengetesan perbandingan COS d. Pengetesan dial code storage(WSP) e. Pengetesan pulsa-pulsa zone f. Pengetesan pulsa-pulsa(time pulse) g. Pengetesan matrix h. Pengetesan distorsi langgunan(MTC-80) i. Pengetesan alarm dan sistem j. Pengetesan polar relay k. Pengetesan tegangan dan arus telegraP
Corrective	Terminal		a. Kartu pemeliharaan korektip pesawat terminal telegrap (MTC-21)
	VFT	Equipment	a. Kartu pemeliharaan korektip pesawat transmissi telegrap (MTC-40)
		Circuit	a. Harap bantuan Sdr. untuk pemeliksaan/perbaikan saluran langgunan
	Telex switching		a. Kartu langgunan Telex/Gentex (MTC-60) b. Laporan gangguan sentral
	General		a. Buku laporan gangguan (MTC-01) b. Buku gangguan telegrap (MTC-10)

3.4 Existing reports in Telegraph and Telex maintenance and service.

Existing reports in Telegraph and Telex maintenance and service in PERUM TELEKOMUNIKASI as follow :

A. Operation Telegrap MIS - SP - 4

Service	Standard performance
1) Waktu tempuh TTGM biasa	
a. Hubungan langsang Jakarta	6 Jam
b. Hubungan langsang luar Jakarta	6 Jam
c. Hubungan transit Jakarta	24 Jam
d. Hubungan transit luar Jakarta	24 Jam
2) Waktu tempuh TTGM segera	
a. Hubungan langsang Jakarta	3 Jam
b. Hubungan langsang luar Jakarta	3 Jam
c. Hubungan transit Jakarta	12 Jam
d. Hubungan transit luar Jakarta	12 Jam
3) CACAD	0 %
4) Kemungkinan tidah sampai sialamat (Non teknis)	20 %
5) Waktu tempuh pengataran	
a. Pengantaran di Jakarta	2 Jam
b. Pengantaran diluar Jakarta	2 Jam
c. Telegram yang menginap	10 %

B. Telex MIS - SP - 5

service	Standard performance
1) Banyaknya gangguan/100 langguan telex/bulan	10 gangguan
2) Cacad (telex)	20 %
3) Kemungkiran tidah mendapat hubungan telex	25 %
4) Waktu tunggu untuk menjadi langguan telex	

C. Laporan bulan Model Telegrap - 1

1) Pegawai
2) Instalasi
3) Perhubungan
4) Gangguan terhadap perhubungan
5) Pemeliharaan dan perbaikan terhadap pesawat
6) Tenaga listrik
7) Gambar lay out instalasi
8) Kendaraan
9) Gedung dan ruangan
10) Usul-usul
11) Daftar inventarias pesawat telegrap
12) Daftar perhubungan telegrap

3.5 Problems concerning existing records and reports.

To sumarize from Table 19 is as follow, it can expressed as problems. One thing which it would like to mention at this stage is to be abridged the records of preventive in NTT with only a few exception.

A. It shold be defined that it must be made corrective records for each category as follows :
   a. Fault and repair card.
   b. Fault transaction record
   c. Fault analysis and statistic record
   d. Monthly maintenance report
   e. Extra-ordinary failure report
   By this prupose, it must be amended following records.
   a. Kartu pemeliharaan korektip pesawat-pesawat terminal telegrap (MODEL TGP MTC-20)
   b. Kartu pemeliharaan korektip pesawat transmissi telegrap (MODEL TGP MTC-40)
   c. Kartu pemeliharaan korektip sentral TW-39 (MODEL TGP MTC-61)
   d. Kartu laporan gangguan (MODEL TGP MTC-01)
   e. Bon perbaikan Telegrap (MODEL TGP MTC-10)

B. It could be abolition on the following preventive records in general in Engineering Instruction of PERUM TELEKOMUNIKASI as follows : because it is not considered necssary to record them and they are very complicated.
   a. Kartu pemeliharaan kebersihan ruangan (MODEL TGP MTC-15)
   b. Kartu pemeliharaan kebersihan perelatan teknik (MODEL TGP MTC-16)
   c. Kartu cacatan kelembaban udara dan tempatur (MODEL TGP MTC-17)
   Therefore, it abolish " DAFTAR PETUNJUK Nomor-Nomor kode gangguan untuk pencatatan gangguan bidang teknik telegrap (MODEL TGP MTC-02) " in the Engineering Instruction of PERUM TELEKOMUNIKASI (Vol.1 UMUM TELEGRAP).

C. Also, MODEL TGP MTC-11 could be abolished because MODEL TGP MTC-11 could be abolished un-necessary factor in them, for example, concerning Kode A, B, C and D etc, instead of it, it could be used MTC-10. Therefore, it abolish " Daftar Petunjuk Nomor-Nomor Kode untuk Pencatatan Jenis Gangguan Telegrap " in the Engineering Instruction of PERUM TELEKOMUNIKASI (Vol.1 UMUM TELEGRAP).

D. It could be made the abolition on the Laporan Bulan Model Telegrap-1, but, it be used the " Laporan Tahun Model Telegrap-1". Instead of Laporan Bulan Model Telegrap-1, it shall propose to use the following monthly maintenance report :
   a. Fault analysis record & monthly maintenance report of Telex switching equipment.
   b. Fault analysis record & monthly maintenance report of Terminal equipment.
   c. Fault analysis record & monthly maintenance report of VFT equipment and circuit.
   d. Maintenance service control report of Telex and VFT.
   e. Facility qualitative control report of VFT, Terminal and Telex switching equipment.
   f. Extra-ordinary failure report of Telex and VFT.

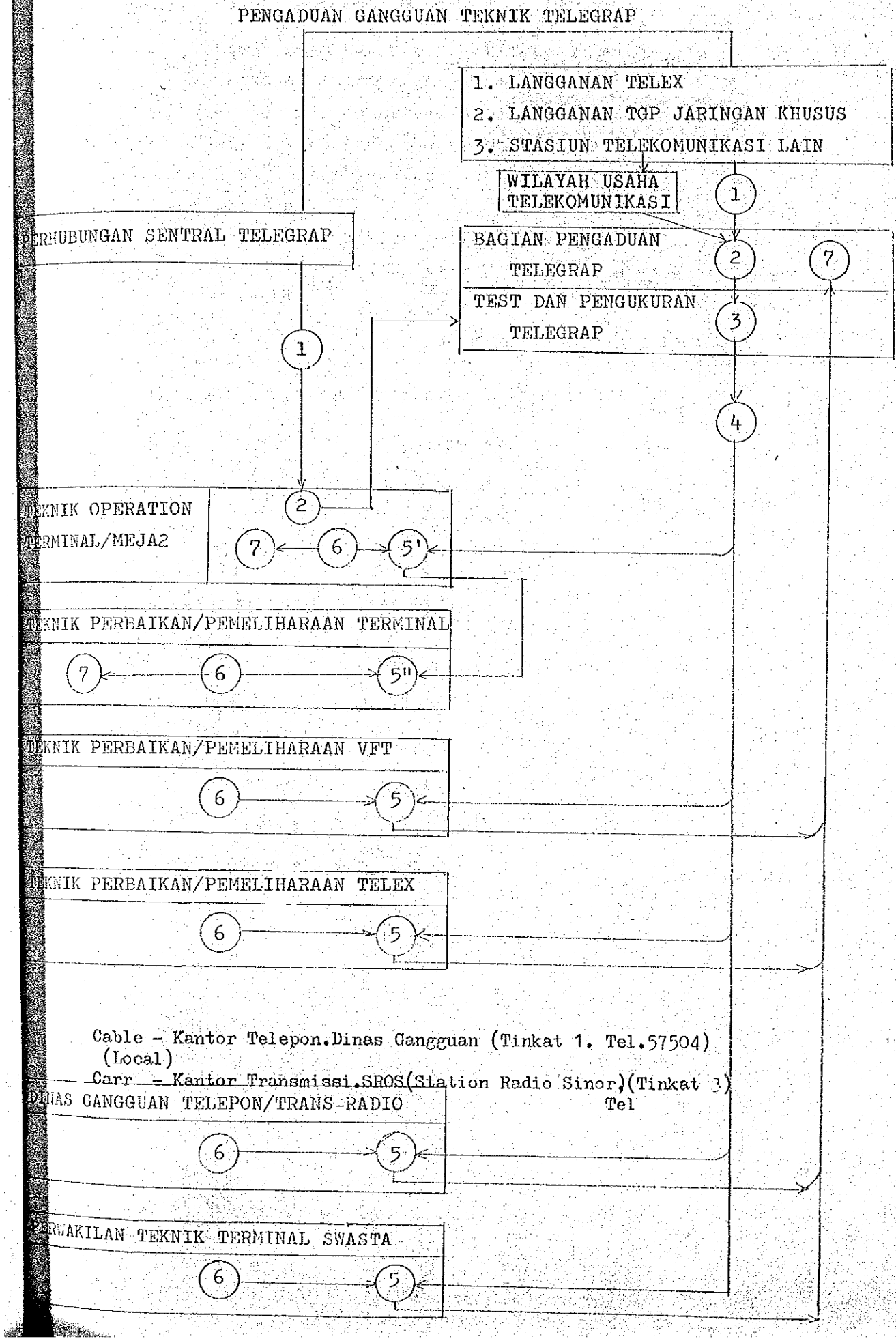
3.6 Existing fault handling method and problems.

As an example of the existing fault handling method in Telegraph and Telex maintenance activity, one of Bandung Telegraph and Telex Station is shown in Fig 1, also, this fault handling method as follow :

Penjelasan

a. Pengaduan gangguan per Telex/Telegrap
b. Pencatatan laporan gangguan
c. Pengetesan pendahuluan dari laporan gangguan
d. Hasil pengetesan dilaporkan kebagian teknik sesuai dengan hasil pengetesan pendahuluan per Telex/Telegrap
e. Perbaikan
f. Perbaikan yang bisa diatasi oleh teknik operation
g. Perbaikan yang tida bisa diatasi oleh petugas teknik operation (Sementara menunggu perbaikan, diganti pesawat cadangan)
h. Menentukan gangguan dan pemeliharaan preventip
i. Pencatatan hasil perbaikan

Fig 1. SISTEM PENYELESAIAN GANGGUAN TEKNIK TELEGRAP &TELEX (BANDUNG)



PENJELASAN

1. Pengaduan gangguan per Tlx/Tlp.
2. Pencatatan laporan gangguan.
3. Pengetesan pendahuluan dari laporan gangguan.
4. Hasil pengetesan dilaporkan kebagian teknik sesuai dengan hasil pengetesan pendahuluan per Tlx/Tlp.
5. Perbaikan

5' Perbaikan yang bisa diatasi oleh teknik operation.

5" Perbaikan yang tida bisa diatasi oleh petugas teknik operation.
(Sementara menunggu perbaikan, diganti pesawat cadangan)

6. Menentukan gangguan dan pemeliharaan preventip.
7. Pencataan hasil perbaikan.

4. Present situation and problems in Telegraph and Telex maintenance management.

4.1 Maintenance service control for Telex and VFT.

At present, in Telegraph and Telex service in Indonesia, has not fixed maintenance srevice standard and facility qualitative control value for Telex, Telegraph and VFT network and equipment.

But, it is necessary to define a certain temporary maintenance standard and facility qualitative comtrol value for Telegraph and Telex service amd maintenance in Indonesia in order to be developed a stable enterprise and service.

Therefore, it must be determined these pre-set maintenance standard value for Telex, Telegraph and VFT from the past fault data of transmission, equipments of Telex switching and VFT, terminal equipment, and power suspension etc, in Bandung, Surabaya, Dempasar and Palembang Telegraph and Telex Stations.

4.1.1 Telex.

Fault data and ratio per a month per 100 Telex subscribers of Telex switching and Terminal equipments in Bandung, Surabaya, Dempasar, Palembang Telegraph and Telex Stations and NTT (Nippon Telegraph and Telephon Public Corporation), and comparison with them of NTT are shown in Table 20.

As a basis of calculating for fault per a month per 100 subscribers of Telex switching equipment TWK-9, is shown in Table 21, fault analysis of Telex switching equipment TWK-9 in Kota 1, Kota 2 Jakarta, Medan 1 and 2, Kebeyoran Jakarta, Palembang, Bandung, Semarang, Menado, Amboina, and Pakanbaru Telegraph and Telex Stations.

Also, duration of fault and it's ratio in Telex switching and Terminal in Surabaya, Dempasar and Palembang Telegraph and Telex Stations are shown in Table 23.

From thr results of these fault data, it can say that the maintenance situation and service quality are unstableness, unbalance and many difference in each Telegraph and Telex Stations. therefore, maintenance control and management must be adopted and performed for Telegraph amd Telex maintenance activities as soon as possible.

4.1.2 Telegraph and VFT circuit.

Fault data and ratio per a month per 1 Telegraph and VFT circuit of Telegraph Terminal and VFT equipment in Bandung, Surabaya, Dempasar and Palembang Telegraph and Telex Stations and NTT, and comparison with them of NTT are shown in Table 22.

Duration of the fault and it's ratio on VFT equipment and circuit in Surabaya and Dempasar Telegraph and Telex Stations are shown in Table 24.

Table 20. The fault data per 100 subscribers per month Telex Switching and Terminal equipment in Bandung, Surabaya, Dempasar and Palembang Stations, and comparison with them in NTT.

Office	Subject	F.Y	VFT	S.W	Terminal	PLN MATI	Other	Unknown	Trans	Total	Control Valu
Bandung	Fault	1977	0.28	2.36	(1.62)	2.17	0.94	-	23.77	29.52	-
	Ratio (%)	"	0.95	7.99	-	7.35	3.18	-	80.52	100	
Surabaya	Fault	1978	0.15	0.37	(20.67)	-	-	-	13.37	13.89	-
	Ratio (%)	"	1.08	2.66	-	-	-	-	96.26	100	
Dempasar	Fault	1978	-	0.89	(33.33)	-	-	-	13.33	14.22	-
	Ratio (%)	"	-	6.25	-	-	-	-	93.75	100	
Palembang	Fault	1978	-	0.21	(31.65)	0.21	-	-	6.63	7.05	-
	Ratio (%)	"		2.98	-	2.98	-	-	94.04	100	
Mean value	Fault	-	0.14	0.91	(15.84)	0.52	0.23	-	16.03	17.89	-
	Ratio (%)	-	0.78	5.10	-	2.91	1.29	-	89.90	100	
NTT	Fault	1975	0.01	0.14	6.76	Misope 0.03	0.06	0.56	0.94	8.06	20
	Ratio (%)	"	0.10	1.70	83.90	0.40	0.80	7.00	6.10	100	—
"	Fault	1976	0.03	0.11	6.60	0.03	0.05	0.46	0.42	7.68	20
	Ratio (%)	"	0.30	1.40	85.90	0.40	0.60	5.90	5.50	100	—

Note 1 : Unit of fault ; Numbers/Month/ 100 Subsvribers.

2 : Maintenance of Telex Terminal in Indonesia by Maintenance contractor, therefore, ( ) in Terminal only for them of Gentex, and Total not included them of Gentex. In Japan by NTT-self.

Table 21. Fault analysis of Telex Switching Equipment TWK-9.
(1978)

Module	Kota -1	Kota -2	Keba-yoran	Medan -1	Medan -2	Palem-bang	Ban-dung	Sema-rang	Menado	Ambo-ina	Pakan-baru	Total
ue	3	2	5		1	1	3	1			3	19
ue	2		1			1		3				7
sp				1			1	1			1	4
A					1		2					3
ue-Su/ gu-Bm											3	3
IC			1					1				2
atrix CK/ZK/MK								1	1			2
ate-meter							1			1		2
pu/Psu				1							1	2
sp-Ka							1					1
-Est										1		1
E-ITG						1						1
a-Uw-uZus									1			1
-Bw-E											1	1
Total fault	5	2	7	2	2	3	8	7	2	2	9	49
W apacity	500	500	500	1000		500	500	500	100	100	500	4200
ubscriber	317	123	126	205		107	142	143	23	22	12	1220
ault/ 00 subs/ onth	0.13	0.13	0.46	0.16		0.23	0.47	0.40	0.72	0.75	6.25	0.33

Table 22. The fault data per 1 circuit per month of VFT equipment and circuit in Bandung, Surabaya, Dempasar and Palembang Stations, and comparison with them in NTT.

Office	Subject	F . Y	Intra-office	Unknown	Trans-mission	Total	Control value
Bandung	Fault	1977	0.004	0.013	0.107	0.160	-
	Ratio (%)	"	25.00	8.120	66.88	100	-
Surabaya	Fault	1978	0.118	-	0.385	0.503	-
	Ratio (%)	"	23.46	-	76.54	100	-
Dempasar	Fault	1978	0.004	-	0.188	0.192	-
	Ratio (%)	"	2.090	-	97.91	100	-
Palembang	Fault	1978	0.002	-	1.030	1.032	-
	Ratio (%)	"	0.200	-	99.80	100	-
Mean	Fault	-	0.058	0.003	0.43	0.49	-
	Ratio (%)	-	11.84	0.600	87.56	100	-
N T T	Fault	1974	0.004	0.009	0.010	0.024	0.30
	Ratio (%)	"	16.6	39.5	43.9	100	-
"	Fault	1975	0.003	0.008	0.009	0.020	0.30
	Ratio (%)	"	16.4	40.4	43.2	100	-
"	Duration of fault (min)	1974	0.36	0.53	1.07	1.96	15
	Ratio (%)	"	18.4	26.9	54.7	100	-
"	Duration of fault (min)	1975	0.44	0.61	0.92	1.97	15
	Ratio (%)	"	22.5	30.8	46.7	100	-

Note 1 ; NTT : Nippon Telegraph and Telephon Public Corporation
2 ; Unit of fault : Number/Month/1 Circuit.

Table 23. Duration of fault and it's ratio in Surabaya, Dempasar and Palembang Stations.(Telex Switching and Terminal)

Office	Subject	Toatl	< 1 hari	< 7 hari	>7 hari
Surabaya	Fault	359	4	212	143
	Ratio (%)	100	1.12	59.05	39.83
Dempasar	Fault	37	12	25	
	Ratio (%)	100	32.4	67.6	

		Total	< 2 hari	>3 hari
Palembang	Cable fault	33	6	25
	Ratio (%)	100	18.2	81.8

Table 24. Duration of fault and it's ratio in Surabaya and Dempasar Stations (VFT equipment and circuit).

Office	Sub-ject	Total	< 1 hari	> 2 hari
Surabaya	Fault	341	323	18
	Ratio (%)	100	94.7	5.3
Dempasar	Fault	50	50	0
	Ratio (%)	100	100	0

4.1.3 Service control value for Telex, Telegraph and VFT circuit.

Here, it describe an experimental study of the last fault data in Bandung, Surabaya, Dempasar and Palembang Telegraph and Telex Stations, and it shall be try to determine pre-set standard service control value in Telegraph and Telex service.

In the present situation, where a proper standard service control value can not be found, from the above experimental fault data in the past, but, fault data are very scattered,it determine pre-set standard service control value for Telex, Telegraph and VFT circuit, the fact that does not prevent temporary practical usage is suspected.

For the determination fixed stnadard service control value, more detailed data and further investigation is necessary, and they are test trial under the condition to the actual service and maintenance, therefore, in spite of the service restriction, these pre-set standard service control value must be study and and arrange according to the result of running test trial in the field stations, and must be continue invesgating applicability of them.

Pre-set standard service control value for Telex, Telegraph and VFT circuit are shown in Table 25 , these pre-set service control value, comparison of the pre-set standard service control value with the standard control value in NTT (Nippon Telegraph and Telephon Public Corporation), agree approximately with those.

Table 25. Pre-set service control value in PERUMTEL, and service control value in NTT in Telegraph and Telex.

Control Subject		Pre-set Value PERUMTEL		Control Value N T T		Control Unit	Control	Control
		Value	Unit	Value	Unit	Measured	Period	Station
TELEX & Gentex	Reported Fault	10	numbers	20	numbers	100 sub /month	Annual	Telex Switching Station
	Fault Duration	24	hours	-	minutes	each sub	Annual	"
	Recu-rrence	3	times	3	times	each sub /month	Annual	"
Tele-graph & VFT circuit	Reported Fault	0.3	numbers	0.3	numbers	1 cct /month	Annual	Circuit control station
	Fault Duration	60	minutes	15	minutes	each cct	Annual	"
	Recu-rrence	3	times	3	times	each cct /3 months	Annual	"

4.2 Facility qualitative control

In a similar way of thinking of maintenance service control, facility qualiyayive control for each equipment or apparatus of Telegraph, Telex and VFT is necessary for the Telegraph and Telex maintenance and operation.

But, at present, it does'nt have enough the fault data concerning the equipment and apparatus of Telegraph, Telex and VFT, therefore, maintenance control and administration for the equipments and apparatus of Telex, Telegraph and VFT are not adequate.

In order that the function and operation of Telegraph, Telex and VFT equipment and apparatus, it must be gathered more fault data for each equipment and apparatus of Telegraph, Telex and VFT, and must analysis of them, from this results of analysis it must be considered the countermeasure for these faults.

Although, in PERUM TELEKOMUNIKASI does'nt have the fault data of the equipment and apparatus of Telegraph, Telex and VFT, pre-set facility qualitative control subject are in Table 26, also, as a reference, facility qualitative control subject and it's value in NTT (Nippon Telegraph and Telephon Public Corporation) are shown in Table 27 .

Table 26. Proposed facility qualitative control value in PERUMTEL.

Facility classification		Control value		Control Group	Control Period
		Value	Unit		
VFT	WT - 1000	0.12	1 sys/month	Station	Annual
	FM - VFT - NEC	"	"	"	"
	VFT - OKI	"	"	"	"
Telex Switching (TWK-9)	TWK - 9 SWITCHING (100 T)	0.5	100T/Month	Station	Annual
	TA				
	Aue				
	Oue				
	Wsp				
	TA - Su				
	TA - An				
	TA - Id				
	B - BW				
	Sub-Classifi facility				
	Sa - Uw				
	AUe - Su				
	OUe - Su				
	USp - Su				
	Storage connec-matrix				
	W - Bw				
	G - Est				
	G - Zt				
	IG				
	Rate - Metering				
	Tx - G				
Telex Switching (TWK-D)	Trunk repeater				
	Mode evaluator				
	Register matrix				
	Repeater matrix				
	Common control				
Telex Terminal	T - 100	0.15	1 set/month	Station	Annual
	Lo - 133	"	"	"	"
FAX					

Table 27. Facility qualitative control value in NTT.

Facility classification		Control value		Control Group	Control Period
		Value	Unit		
VFT	VT - 24 - Tr	0.12	1 sys/month	Station	Annual
	Vt - 8 - Tr	0.09	"	"	"
Telex Switching	LRF	0.05	1 frame/month	Station	Annual
	SWF	0.05	"	"	"
	#1 - CONC	0.43	100 unit/month	"	"
	#2 - CONC	0.09	"	"	"
	TRK	1.29	100 cct/month	"	"
	TLR.NG	0.06	1 frame/month	"	"
	MKR	0.06	"	"	"
	REG.SED	0.78	100 unit/month	"	"
	OTHERS	0.29	1 frame/month	"	"
Telex Terminal	#3 - TELEX SUB	0.15	1 set/month	Station	Annual
FAX	VF - 4	0.53	1 set/month	Station	Annual
	VF - 5	0.35	"	"	"

5. Present measuring sets and tools in Telegraph and Telex Station.

5.1 General.

In the maintenance activities of Telegraph and Telex , measuring sets and tools are one of important means to find out and to recovery the causes of fault, and to keep in good condition.

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

5.2 Stocked measuring sets and tools.

The kind and stocked value of the measuring sets and tools in Palembang, Dempasar, Surabaya and Bandung Telegraph and Telex Stations are shown in Table 28, (them of Palembang, Dempasar, Surabaya and Bandung Telegraph and Telex Stations from the Study report amd proporsal of the repair works on Telegraph and Telex faults, JTM.Tg/Ka.Tekgrap/05, and Survey report on Bandung, Surabaya, Dempasar and Palembang Telegraph and Telex Station's maintenance and operation, JTM.Tg/Ka.Tekgrap/01, 07, 11 and 12).

Table 28. DAFTAR PERNCIAN ALAT-ALAT YANG ADA.

NAMA ALAT-ALAT	Banyakanya			
	Bandung	Surabaya	Dempasar	Palembang
TGP distortion measuring set	1	1	1	1
Distortion meter	1	1	1	1
Signal distortor	1	1	1	1
Normal current test signal-gent	1	1	-	-
Signal current test meter	1	1	-	-
Signal generator	1	1	1	1
Transmitter test meter	1	-	-	-
Signal analyzer	-	1	1	1
Test ocsillater	1	-	-	-
Frequency counter	1	1	1	1
Pulse time meter	1	1	1	1
Level meter	1	1	1	1
Mili ampere meter	7	-	1	-
VW meter	-	-	1	-
VAR meter	-	2	2	2
Multi-tester	-	-	1	-
Meggar 500 V	-	2	-	1
GW/LW tester	-	-	1	-
Cathode ray relay tester	1	1	1	1
Polariting relay checker	1	-	-	-
Rectifier	4	-	1	2
Tool for Teleprintor	3	2	-	
GS PS RPT meter	1	-	1	
PS test set	1	-	1	
Trunk repeater and line terminator	-	1	-	
Common control tester	-	1	-	

As seen from this Table 28 , it can say that the kind and stocked value of measuring sets are provided enought by PERUM TELEKOMUNIKASI, besides, stocked value of them must be considered according to the number of VFT system or number of Telex subscribers, but, special attention should be paid to keep in good condition these measuring sets and tools.

For the purpose of reference, standard stocked value of measuring sets and tools in NTT are shown in Table 29 .

Table 29 . Standard stocked value of measuring sets and tools in NTT.

Name of measuring set and tool	VFT No of sys				Terminal	Telex No of subs		
	51 ≤	16 ≤ 50	6 ≤ 15	1 ≤ 5		1000 ≤	500 ≤ 1000	1 ≤ 500
a. Distortion measuring set	3	2	1	1				
b. ST-SP distortion measuring set						1	1	1
c. Code generator	3	2	1	1				
d. Signal generator						1	1	1
e. Signal analyzer	3	2	1	1				
f. Margin measuring set	3	2	1			1	1	1
g. Level meter	1	1						
h. Impulse tester						2	1	1
i. Impedance meter	1	1						
j. Attenator	2	2	1	1				
k. Filter	1	1	1					
l. V.A.R meter	3	2	1	1	1	2	1	1
m. Megger	1	1	1	1		2	1	1
n. Mili-second meter					1			
o. Tools for wire-spring						1	1	1
p. Tools for wrapping						1	1	1
q. Tools for Teleprinter					equal for maintenance personnel			
r. Cleaner	1	1	1	1	1	1	1	1
s. Electric dril	1	1	1	1	1	1	1	1

In comparison of Table 28 with Table 29 , it can say that be nealy provided sufficient measuring sets in Bandung, Surabaya, Dempasar and Palembang Stations.

At present, in PERUM TELEKOMUNIKASI, as does'nt have detailed fault and repair time except them of Bandung, Surabaya, Dempasar and Palembang Telegraph and Telex Stations concerning Telegraph and Telex maintenance , from the " Survey report on Bandung, Surabaya, Dempasar and Palembang Telegraph and Telex Station's maintenance and operation " fault rate concerning Terminal, Telex switching and VFT terminal equipment except them of cable and PLN MATI are nearly comparable with them of NTT.

5.3 Reserved Telex terminal equipment.

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

- technical level of adjustment.
- transportation of the terminal equipment or technical personnel
- location of the installation in the subscriber's office.

In Indonesia, PERUM TELEKOMUNIKASI maintains terminal equipment only for Gentex subscriber's terminal equipments, as a example, at present, the number of existing Gentex terminal equipments and reserved in Bandung Telegraph and Telex Station are shown in Table 30 .

Table 30 . Existing Telex terminal in Bandung Station.

	Number of subscriber	maintain by	
		PERUMTEL	Private Company
Number in service	98	33	65
Number of spare	-	5	-

As a reference, the standard reserved value of Telex terminal equipment for maintenance and operation in NTT are shown in Table 31 .

Table 31 . Standard reserved value of Telex terminal in NTT.

Number of terminal in service	Number of spare terminal
1 - 18	1
19 - 25	2
26 - 60	3
61 - 90	4
91 - 120	5
121 - 155	6
156 - 190	7
191 - 230	8
231 - 265	9
266 - 300	10
301 - 335	11
336 - 370	12
370 - 410	13
411 - 455	14
456 - 480	15
481 - 540	16
541 - 620	17
621 - 700	18
701 - 780	19
781 - 860	20

As compared Table 30 with Table 31 , it can say that existing stocked value of Telex Terminal equipment in Bandung Telegraph and Telex Station is over stocked, but, only one of them is in good condition.

From the Survey report on Bandung Telegraph and Telex Station's maintenance and operation, fault rate of Telex terminal equipment are comparable with one of NTT except the fault of cable and stop of power source (PLN MATI).

As compared fault rate of Telex Terminal equipment in Bandung Station with that of NTT is comparable, but, it decrease the stock value of Telex Terminal equipment and from the economical point of view provide spare units shown as follow :

- Keyboard unit
- Transmitter unit
- Receiver unit
- Printer unit
- Drive system unit
- Speed control unit.

5.4 Reserved modules and parts of VFT and Telex.

Reserved modules and parts of VFT, Telex switching and Terminal in Surabaya Station are shown in Table 32 and Table 33.

Table 32. Daftar perncian alat-alat yang ada

Nama alat-alat	Banyakaya
Conecting plug NEC	22
Fuse 0.5 A / P 305	22
Fuse 2A / P 320	4
Jack Ts tv. 13 B	3
Socket 42327-fg-c-2	2
Lam sil 0.06 A	21
Fuse 1.3A/P313	8
Lamp 2 GW	4
Lamp 2 TB.W	2
Plug c-1 TYPE	14
Cabel Test	1
Re frima 450 TCR	1
Egaipf GA 241 FJ serie 37	1
Fuse 0.3A /P 303	6
Fuse 5A /P 350	4
Pofentio meter 2 K ohm rel wd 165	1
Cuprox E150 275 kc 0.6 k 11/1	2
Cuprox V30C 130 kc 0.6 k21/2	3
Cuprox B30C 250 kc 0.6 k22/1	2
Cuprox E.125C 80 kc 0.6 k11/8	2
Klemmen stnok 5x2 draad	8
Relay ftan oki type up HBA103	5
Fuse 5 A	22
Lampu 3A - Pu 30	-
Lampu 24 Volt 2 watt	6
Lampu Neon BNF-3 (PUTIH)	12
Lampu NEON BNF-3	156
Lampu fuji S2/v1/5 watt	2
Trafo crel t,64 9 TEN/125 2/12	6
Viting lamp 9010/250V	5
Rec channel kompl 9T BV5618	1
Coil FG BV 21/177 K	1
Chokes jon receiven 9T BV 122 1/27	5
Eco - 0123 Siemens/UPF	2
Mutten Ebonit UFT	8
Elco 50 - uif 350/385 V	1
Lampu dos 71 4c2 32 B3	6
Elco 32 UF/350v(pen pti)	8
Condensator 2 uf 160v siemens	14
Condensator 4 uf 160v siemens	7
Elco 1000uf 100/110V	1
Condensator ACG 2835 k 160v	4
Condensator BB 4506-B20-B	9
Yuling steker (kuning)WTS 24	6
" (hitam) "	89
Relay trel 63a TBU 3302/36	5
Ampli jien 9T BU 5626/19/VI	1
Sender fs sk/mo/sto 5132/7	1
Sender fsk/ms/sto 5132/7	1
Sender fs sk/ms/sto 5132/7	1
Plug	1
Switch variable	3
Spring contact stups	4
Stop kontack	8
Teggle switch	2
Fuse holden	8
Neon lamp osram 45V	8
Fuse holden sedang	5
Fuse holden variable	5

Table 33 . Daftar Perncian Alat-Alat Yang Ada

NAMA ALAT-ALAT	BANYAKANYA
Automatic fuse 0.75 A	156
" " 1.5 A	164
" " 3 A	21
" " 6 A	29
Relay 9H TB V 7860/208	2
Small Tfn lamp fg lp 18c	88
" " 18a	172
" " 18c	10
Signal lamp colso less Fg lp 09f	4
" red fg lp 69 c at	7
" withe fg lp 109c ws	22
" Nellow fg lp 109c ge	55
" Green fg lp 69c gn	14
Group selektor 9 fs sk 3221/1	22
GW selektor cord	2
LW selektor cord fg ltg 17B	5
Relay J fg rls 93c f bv 7870/209	4
Relay V 9T Bv 301/674	2
Plug cord Tl fd	2
Punch button	8
Pusk button fg sk 381b	8
Wyper selekton uw	48
Wyper contac set pg sehw	5
Kleem Siemens fg ak 1042 Telex	2
" fg 148 m	2
" Kabel UFT Telex	64
Cuprox Siemens 560 c 156 kc 06 ohm	1
" B9DC 300 kcl.36 22/3	2
" V 75 c90 kc 06 c 21/5	1
" Z60 c150 1 kc 0.6 11/4	1
Magnet coil	13
Coil fg Bv 14/51 0.22 cul	15
Contact spring (No.Index. 371d, 371b, 371f, 371ax, 371ah, 371a, 55a, 60124, 60125)	18
Recdi jien	1
Pui plate	2
Small cirenil breken T switch 30 a/23	8
Radio Interference Supresco	-
Zecering 5/250	-
" 10/250	36
" 6/250	97

At present, stocked value of spare modules for Telex switching equipment TWK-9 for 500 subscribers in Bandung Telegraph and Telex Station are shown in Table 34 , also, stocked value of spare components for VFT terminal equipment WT-1000 for 3 system of VFT in Bandung Telegraph and Telex station are shown in Table 35.

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 34 . Stocked value of spare modules for Telex switching equipment in Bandung Station.

Name of module	No of module
1. Dial evaluator, decorder(W-Bw-E)	1
2. Dial evaluator, processor(W-Bw-A)	1
3. Line terminating set(C-Ta-M/wSn)	1
4. Zoner group A(VZ-A)	1
5. Zoner group B(VZ-B)	1
6. Common control A(G-Est-A)	1
7. Common control B(G-Est-B)	1
8. Common timer(G-Zt)	1
9. Electric pulse generator(UG-EL-ITG) (basic clock generator)	1
10. Electric pulse generator(AST-EL-ITG) (out-put stage)	1
11. Electric pulse generator(EL-ITG) (diode card)	1
12. Electric pulse generator A(IG-A)	1
13. Electric pulse generator B(IG-B)	1
14. Series-Parallel/Parallel-Series converter (SPU-PSU B)	1
15. Code generator for service signal(TXG-B)	1
16. COS comparator(KL-VG-A)	1
17. Common line termination finder, identifier, marker, commonlink finder(G-TA-N/w-SU)	1
18. Storage-connecting matrix(local) and storage finder for 4 dial code storages(SpKO-Wsp-Su)	1

Table 35 . Stocked value of spare components for VFT terminal in Bandung Station.

Pos	Nomenclature	Quantity for 1-3 sys
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
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	1
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	2
24.	G	1
25.	IC	2
26.	Lamp	6
27.	Blende	1
28.	Lamp cap	1
29.	Capot	1
30.	Buchse	2
31.	Jack	2
32.	Stecker	3
33.	Plug	1
34.	Lamp extracter	1

6. Telegraph distortion in Indonesia.

6.1 Telegraph distortion test method .

Following test on Telegraph distortion of VFT circuits and Terminal equipments according to the request of Bagian Teknik Telegrap, PERUM TELEKOMUNIKASI betwwen Bandung and Gambir, Jakarta, Semarang, Tasikmaraya,Telegraph and Telex Stations was made on Feb 7, 1978.

Main condition and measuring set, code used in this test are as follows :

Data : Feb 7, 1978

Test station : Bandung, Gambir Jakarta, Semarang, Tasikmaraya.

Measuring set : Code generator type PW-205c. (ANDO)
Code distortion measuring set type TGK-25 (ANDO)
Telegraph distortion measuring set (SIEMENS)

Code : 1:1

VFT set : WT - 1000 and VFT NEC.
Frequency
Level

6.2 Test route

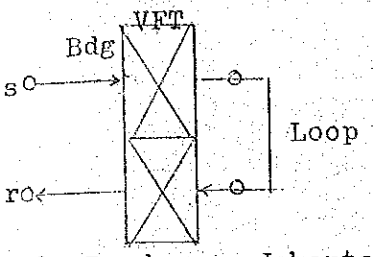
The routes of Telegraph distortion test are shown in Table 36 and in Fig 2. Transmission lines in this test were used on transmission path of micro-wave, cable and sattelite, and in repeater station, repeated by direct current from receiving line to sending line in VFT terminal equipments.

Table 36. The routes of Telegraph distortion test.

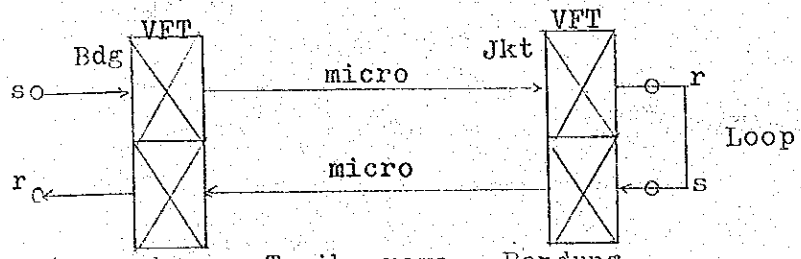
Test route	Sending Station	Repeater Station	Receiving Station	Number of Section
Route 1	Bandung	-	Bandung	0
Route 2	Bandung	Jakarta	Bandung	2
Route 3	Bandung	Yasikmaraya	Bandung	2
Route 4	Bandung	Jakarta-Semarang-Jakarta	Bandung	4
Route 5	Semarang	Jakarta	Bandung	2

Fig 2. The routes of Telegraph distortion test.

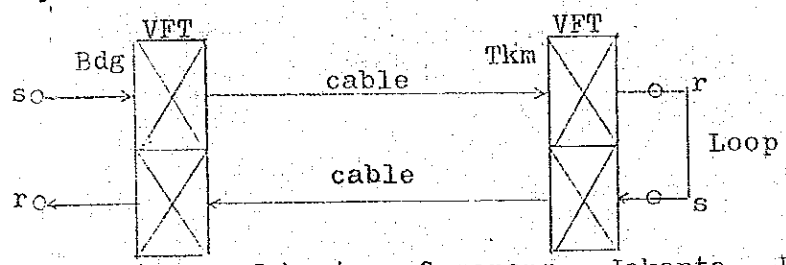
Route 1. Bandung - Bandung



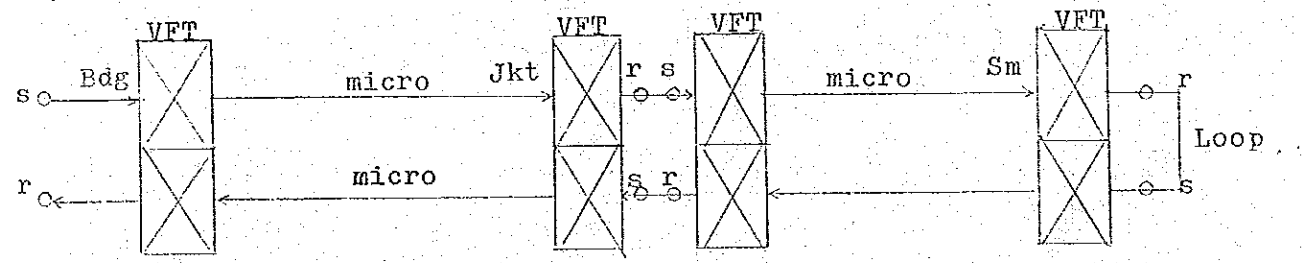
Route 2. Bandung - Jakarta - Bandung



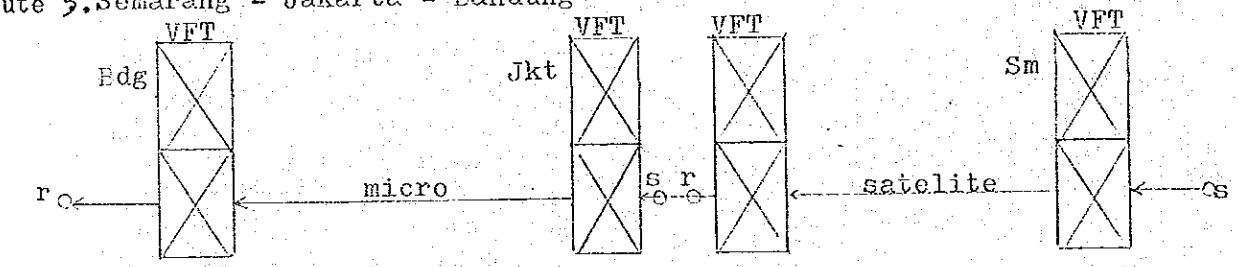
Route 3. Bandung - Tasikmaraya - Bandung



Route 4. Bandung - Jakarta - Semarang - Jakarta - Bandung



Route 5. Semarang - Jakarta - Bandung



Note : Bdg : Bandung
Jkt : Jakarta
Tkm : Tasikmaraya
Sm : Semarang

6.3 Summary of test results.

The results obtained in this telegraph distortion test are shown in Table 37, and, as a propose of reference, standard limits of transmission quality to be applied in planning international point to point telegraph communications and and switched networks using start-stop apparatus (at 50 bauds) are shown in Table 38 from the recommendation R 57 of CCITT. (reference : Recommendation R 50, R 51, R 57, R 58, and R 75).

Table 37. The results of Telegraph distortion test.

Route / Measuring set	1	2	3	4	5
Siemens	1	4	5	20	5
Ando -	0	0	0	22	6
Ando -	1	4	5	0	2

Note. Unit : %
\+ : Leading
\- : Trailing

Table 38. Standard limits of Transmission quality.

Number of channels in tandem within the trunk circuit(excluding the local section at each end)	Limit of the degree of isochronous distortion on standardized text	Limit of the degree of inherent st-sp distortion, in service on standardized text
1	10 %	8 %
2	18 %	13 %
3	24 %	17 %
4	28 %	21 %
5	-	25 %

As a result of the comparison Table 37 with Table 38 , test results are within the value of CCITT Recommendation except for the one of 4 sections. It quoted from Recommendation R 50 and R53 as follows : that should be established and maintained in such a manner that the degree of isochronous distortion will not exceed 28 %, whether they are equipped with regenerative repeaters or not; that the degree of isochronous distortion in service of an international VFT channel on the standardized text should not exceed 10 %, and that the degree of inherent st-sp distortion, in service conditions, on standardized text, should not exceed 8 %.

A conclution of this telegraph distortion test can not be drown due to an insufficient number of test sample, within the limits of this test, it can say as follows :

a. Futher test routes and channels must be increased.
b. It is necessary in futher test for the case of 5 sections, because there are the communication of 5 sections in Telex service in Indonesia.
c. It needs to use standardized text, and to record frequency and level of sending and receiving.

Futher Telegraph and Telex distortion test including the condition described above will be carried out in the future in co-operation with Telegraph and Telex Stations, Regional Office and Headquarters of PERUM TELEKOMUNIKASI.

Also, telegraph test records are shown in Table 39, 40, 41 and 42, which performed by PERUM TELEKOMUNIKASI on Micro-wave routes between Palembang and Teluk Betung Telegraph and Telex Stations in June, 1977, is only for one-section.

Table 39. Telegraph distortion test record

Station A : Teluk Betung
Station B : Palembang
Location : WTG - 1000/ 2, 6
Rack No : WTE - I
System No : WT - 1000/ FM - 120
Date : 1 June, 1977

CHANNAL	Transmitter				Receiver			
	Frequency		Level		MEAS. Ec		Level	
	+	-	+	-	1/1/2/2	Test.	+	-
101	390	450	-41,20	- 41,20	1 %	3%	-41,4	-41,9
102	510	570	-41,5	- 41,5	1%	3%	-41,5	-41,6
103	630	690	-41,5	- 41,4	1%	3%	- 40,3	-40,5
104	750	810	-42,2	- 42,2	1%	2%	-40,4	-41,5
105	870	929	-41,9	- 41,9	2%	3%	-40,4	-41,5
106	990	1050	-41,8	- 41,7	2%	3%	-39,9	-41,1
107	1110	1170	-41,6	- 41,5	2%	3%	-39,3	-40,6
108	1229	1290	-41,6	- 41,6	1%	3%	-39,2	-41,1
109	1350	1409	-41,6	- 41,6	2%	3%	-39,1	-40,7
110	1470	1530	-41,7	- 41,7	1%	3%	-39,2	-41,1
111	1590	1640	-41,4	- 41,4	1%	4%	-39,3	-41,6
112	1710	1770	-41,3	- 41,3	1%	3%	-39,0	-41,2
113	1829	1888	-41,9	- 41,9	1%	2%	-39,5	-41,6
114	1948	2009	-42,0	- 41,9	1%	2%	-39,6	-41,7
115	2069	2129	-42,0	- 42,0	1%	3%	-39,8	-42,4
116	2189	2249	-42,1	- 42,1	1%	4%	-40,1	-43,0
117	2309	2369	-41,6	- 41,6	1%	3%	-40,6	-43,4
118	2429	2490	-41,6	- 41,6	1%	2%	-40,9	-44,0
119	2549	2609	-41,6	- 41,5	1%	3%	-41,4	-43,8
120	2669	2729	-41,4	- 41,3	1%	3%	-41,3	-44,4
121	2788	2849	-41,4	- 41,3	1%	3%	-41,0	-45,3
122	2910	2970	-41,3	- 41,3	1%	3%	-41,0	-44,5
123	3028	3089	-41,3	- 41,2	1%	3%	-40,9	-44,3
124	3129	3210	-41,1	- 41,1	1%	4%	-41,7	-45,8

Table 40 . Telegraph distortion test recors

Station A : Teluk Betung.
Station B : Palembang
Location : WTG - 1000/ 2, 6
Rack No : WTE - II
System No : WT - 1000/FM - 120
Date : 1 June, 1977

CHANNAL	Transmitter				Receiver			
	Frequency		Level		MEAS. Fc		Level	
	+	-	+	-	1/1/2/2	Test.	+	-
101	390	450	-41,7	-41,6	2%	3%	-40,2	-40,8
102	510	570	-41,7	-41,6	1%	2%	-40,0	-40,8
103	630	690	-41,3	-41,3	1%	3%	-39,4	-40,3
104	750	810	-42,0	-42,0	1%	4%	-39,5	-40,5
105	870	930	-41,8	-41,8	1%	3%	-39,8	-40,9
106	990	1050	-41,4	-41,4	1%	4%	-39,0	-40,4
107	1110	1170	-41,8	-41,7	1%	3%	-39,0	-40,2
108	1229	1289	-41,7	-41,7	1%	3%	-38,8	-40,3
109	-	1409	-	-41,5	1%	2%	-38,9	-40,5
110	1470	1530	-41,8	-41,8	1%	3%	-38,6	-40,1
111	1590	1649	-41,8	-41,7	1%	4%	-39,2	-41,2
112	1769	1770	-41,7	-41,7	1%	4%	-38,8	-40,8
113	1829	1889	-41,7	-41,7	1%	3%	-39,2	-41,6
114	1949	2009	-42,1	-42,0	1%	3%	-39,5	-41,7
15	2069	2128	-42,1	-42,1	1%	4%	-39,4	-41,8
116	2188	2249	-41,7	-41,7	1%	3%	-40,2	-42,1
117	2309	2369	-41,8	-41,7	1%	3%	-40,1	-42,6
118	2428	2488	-42,1	-42,1	1%	4%	-40,6	-43,2
19								
20								
21								
22								
23								
24								

Catatan : Utk ch.9 bag. transmtternya rusak hingga polariteit (+) tidah keluar.

Table 41. Telegraph distortion test record.

Station A : Palembang
Station B : Teluk Betung
Location : Rack WTG 2, 6
Rack No :
System No :
Date : 1 June, 1977

CHANNAL	Transmitter				Receiver			
	Frequency		Level		MEAS. Er.		Level	
	+	-	+	-	1/1/2/2	Test	+	-
1	390	450	-41	-41	2 %	3 %	-40,6	-43,6
2	510	570	-40,9	-40,9	1	2	-40,7	-40,7
3	630	690	-41,3	-41,3	1	2	-39,6	-39,7
4	750	810	-42	-42	2	2	-40,1	-40,3
5	870	930	-41,4	-41,4	2	2	-39,6	-39
6	990	1050	-41,2	-41,2	1	2	-39,2	-39,5
7	1110	1170	-41,1	-41,1	1	2	-39	-39,6
8	1230	1290	-41,2	-41,2	1	2	-38,7	-39,2
9	1350	1380	-41,1	-41,1	1	2	-38,6	-39,4
10	1470	1530	-41,3	-41,3	2	2	-38,2	-38,9
11	1590	1650	-41,5	-41,5	1	2	-38,2	-39,3
12	1710	1770	-41	-41	1	2	-38	-39
13	1830	1890	-41,7	-41,7	1	1	-38,8	-39,6
14	1950	2010	-41,2	-41,2	2	2	-39,4	-40,1
15	2070	2130	-41,6	-41,6	2	3	-38,6	-40,1
16	2190	2250	-41,7	-41,7	2	2	-39,8	-40,8
17	2310	2370	-41,6	-41,6	2	3	-40	-41,5
18	2430	2490	-41,6	-41,6	2	3	-40,2	-41,8
19	2550	2610	-41,6	-41,6	2	3	-40,2	-41,8
20	2670	2730	-41,4	-41,4	2	3	-39,7	-41,9
21	2790	2850	-41,2	-41,2	3	3	-39,6	-42
22	2910	2970	-41,1	-41,1	2	4	-39,8	-42,3
23	3030	3090	-41,3	-41,3	3	4	-39,3	-42
24	3150	4210	-41	-41	3	4	-40,2	-44,4

Catatan : Line maching module Send level : - 22 db
Rcv level : - 5 db

Table 42 . Telegraph distortion test record.

Station A : Palembang.
Station B : Teluk Betung
Location : WTG Rack 2, 6
Rack No :
System No : TK II
Date 2 June, 1977

CHANNAL	Transmitter				Receiver			
	Frequency		Level		MEAS. Nr.		Level	
	+	-	+	-	1/1/2/2	Test.	+	-
1	390	450	-41,4	-41,4	2%	2 %	-41,6	-41,6
2	510	570	-41,4	-41,4	3	4	-41,4	-41,2
3	630	690	-41,2	-41,2	2	3	-40,7	-41
4	750	810	-41,6	-41,6	2	2	-40,9	-40,9
5	870	930	-41,8	-41,8	1	3	-41,2	-41,6
6	990	1050	-41,1	-41,1	2	2	-40,9	-41,9
7	1110	1170	-41,6	-41,6	2	2	-40,6	-40,8
8	1230	1290	-41,3	-41,3	2	3	-40,6	-41
9*)	1350	1410	-41,1	-41,1	20	18	-40,8	-41,2
10	1470	1530	-41,4	-41,4	2	3	-41,2	-41,3
11	1590	1650	-41,6	-41,6	2	3	-40,1	-41,8
12	1710	1780	-41,6	-41,6	1	2	-41	-41,7
13	1830	1890	-41,6	-41,6	2	3	-41,3	-42
14	1950	2010	-41,5	-41,5	2	2	-41,9	-43,1
15	2070	2130	-41,9	-41,9	2	4	-41,7	-43
16	2190	2250	-41,6	-41,6	2	3	-42,6	-43
17	2310	2370	-41,2	-41,2	2	4	-43	-44,3
18	2430	2490	-41,2	-41,2	2	3	-43,6	-45,1
19								
20								
21								
22								
23								
24								

Catatan : Distorsi terima PG besar karena and module di TK un-ok.
Line maching module Send level : 21.5 db
Rcv level : 4.5 db