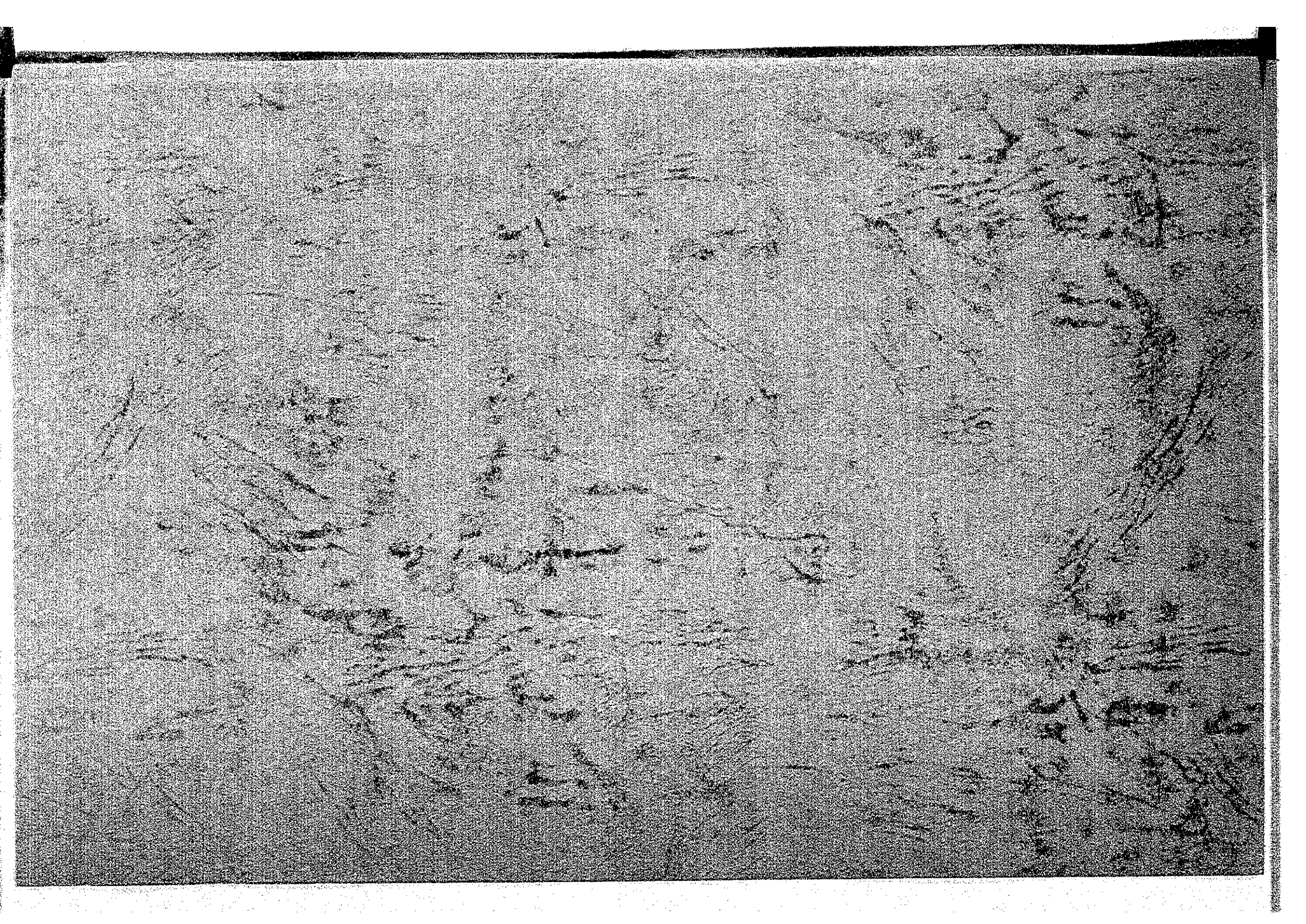
Report By Japanese Telecomunications Mission On Maintenance And Operation

Perum Telekomunikasi Indonesia

April 1977 – April 1979



REPORT BY JAPAN TELECOMMUNICATIONS MISSION
ON MAINTENANCE AND OPERATION
- PERUM TELEKOMUNIKASI INDONESIA -

(Telegraph and Telex Maintenance and Operation)

April 1977 - April 1979

Masami HARAGUCHI
Japan Telecommunications Mission
Telegraph and Telex Expert

General observations on Telegraph and Telex maintenance and operation.

	Paragraph Nos.
1. Maintenance and service level.	
A. Many trouble of local cable in Telegraph and Telex fault data are observed about more than 70 percent of total amount in each Telegraph and Telex station.	2.1 - 2.2 Table 5, 11
B. However, fault rate and service interruption hours do considerably vary by the Telegraph and Telex station, and by the subscribers, maximum fault rate per circuit per month of VFT is 1.032, one of minimum is 0.160. and maximum fault rate per 100subs per month of Telex is 29.52, one of minimum is 7.05.	2.1 - 2.2 Table 5, 11
C. Long duration troubles and many trouble reccurrence caused by local cable are observed, long duration troubles of Telex in Palembang 4 and 5 months.	2.1 - 2.2 Table 13,15,23
2. Preventive maintenance.	
A. Telegraph and Telex station are practising the routine works with different items an periods on same system or equipment.	3.2 Table 20
B. Stations are making the records of routine works in their own manner, in mostly station written down into note-book.	3.3 Table 21-23
C. Recording forms for the routine works are not unified among Telegraph and Telex station on same system or equipment.	3.3 Table 21-23
D. Routine work results are not property evaluated.	
3. Corrective maintenance.	
A. Recording forms for the faults of Telefraph and Telex are not unified among Telegraph and Telex station.	3.3 Table 21-23
B. Telegraph and Telex stations have in-correct entry of fault reception record for the date, terms, condition, cause and restoration of the fault, many blanks in trouble causes and restoration hours are observed.	3.5
C. Fault data of Telegraph and Telex is neither analized nor evaluated.	
D. To repair the fault of Telegraph and Telex in maintained station informed to maintenance station via Regional Office, therefore, it is necessary many duration and un-certainty.	3.6 Fig. 1
4. Maintenance management.	
A. At present, in PERUM TELEKOMUNIKASI don't have standard value of service control and facility qualitative control for Telegraph and Telex.	4.1, 4.2 Table 25, 26
B. Reports in connection of maintenance faults don't send to Headquaters from the field station.	3.4
C. Basic knowledge for the maintenance works and management is observed in sufficient.	

D. Concerning the many trouble of local cable are not informed and handed-over to out-side plant division from Telegraph and Telex Technical division in PERUM TELEKOMUNIKASI, despite of these causes exit in out-side plant in Telegraph and Telex system.

E. As a countermeasure for the power source stop (PLN MATI) must be installed as soon as possible Battery in each Telegraph and Telex station. 2.1, 2.2 Table 10, 16

F. Designation of Telegraph and Telex circuit is not unified among different station.

5. Repair works, and measuring sets, tools and modules administration.

A. Standard stock value of measuring sets, tools, modules for VFT anf Telex switching, and Telex terminal are not regulated. 5.1 - 5.4

B. Reception and supply of the modules and parts of VFT and Telex are not recorded in each Telegraph and Telex station.

C. Practical knowledge for repair works of VFT and Telex switching is observed in-sufficient.

D. Stocked modules and parts are not stored in good condition in each Telegraph and Telex station.

Field observation on Telegraph and Telex maintenance and operation.

1. Present situation of the installation and equipment of VFT and Telex. -Palembang, Dempasar, Surabaya and Bandung-

Destination of VFT circuits, Type and Capacity of VFT and Telex switching equipments in Palembang, Dempasar, Surabaya and Bandung Telegraph and Telex Stations are shown in Table 1,2,3 and 4.

Table 1. ALOKASI KANAL-KANAL VFT, SENTRAL TELEX in Palembang Station.

(As of June, 1978)

JURUSAN	TYPE	KAPASITAS	TERISI	PEMAKAIAN	SISA
JAKARTA-1	WT-1000	24	24	24	0
JAKARTA-2	WT-1000	24	24	20	4
TULUK BEYUNG-1	CIT TGI-120	24	24	14	10
TULUK BEYUNG-2	WT-1000	18	18	9	9
JAMBI	WT-1000	12	12	10	2
BENGKULU	WT-1000	12	12	8	4
LAHAT	WT-1000	6	6	2	4
BATURAJA	WT-1000	6	6	1	5
PANGKAL PINANG	WT-1000	6	6	4	2
TOTAL	-	132	132	92	40

JUMLAH REPEATER = 48
DIPAKAI = 30

KAPASITAS SENTRAL = 500
JUMLAH SAMBUNGAN TELEX = 83

JURUSAN	REPEATER	SISA	BERBAYAR	DINAS/GTX	SISA
JAKARTA	30	18	63	20	417

Table 2. ALOKASI KANAL-KANAL VFT SENTRAL TELEX in DEMPASAR STATION.

(As of May, 1978)

JURUSAN	TYPE	KAPASITAS	TERISI	PEMAKAIAN	SISA
SURABAYA-1	WT-1000	24	12	8	4
SURABAYA-2	OKI	24	24	20	4
JAKARTA	WT-1000	24	12	7	5
KUPANG	WT-1000	12	12	7	5
AMPENAN	WT-1000	12	12	7	5
SINGARAJA	DWT-1	1	1	1	0
RUTENG	DWT-1	1	1	1	0
BIMA	DWT-1	1	1	1	0
TOTAL		99	75	52	23

JUMLAH REPEATER = 14
DIPAKAI = 10

KAPASITAS SENTRAL = 30
JUMLAH SAMBUNGAN TELEX = 45

JURUSAN	REPEATER	SISA	BERBAYAR	DINAS/GTX	DISA
SURABAYA	4/2/4	RPTR OUT = 1 RPTR BOTH= 2 RPTR INC = 1	42	3	35

Table 3. ALOKASI KANAL-KANAL VFT, SENTRAL TELEX
in SURABAYA STATION.

(As of Feb, 1978)

JURUSAN	TYPE	KAPASITAS	TERISI	PEMEKAIAN	SISA
Semarang	NEC	24	24	7	17
Jakarta	WT-1000	84	84	82	2
Jakarta	OKI	24	24	24	0
Jakarta	FM-100	24	24	0	24
Dempasar	OKI	24	24	21	3
Dempasar	WT-1000	24	12	8	4
Malang	WT-1000	24	24	14	10
Gresik	WT-1000	12	12	7	5
Mojokerto	WT-1000	12	12	3	9
Jember	WT-1000	12	12	6	6
Kediri	WT-1000	12	12	6	6
Madium	WT-1000	12	12	4	8
Banyuwangi	NEC	12	6	2	4
Barikpakan	FM-100	24	24	13	11
Pamekasan	DWT-1	1	1	1	0
Bangil	FMWT-IUT	1	1	1	0
Rungkut	FMWT-IUT	1	1	1	0
Banjarmasin	WT-1000	48	32	16	16
U.Pandang	WT-1000	24	12	10	2
JUMLAH		399	353	226	127

JUMLAH REPEATER = 74 KAPASITAS SENTRAL =300
DIPAKAI = 64 JUMLAH SAMBUNGAN TELEX=269

JURUSAN	REPEATER	SISA	BERBAYAR	DINAS/GTX	SISA
JAKARTA	24/4/20	RPTR OUTG=1	254	15	31
DEMPASAR	4/2/4	RPTR BOTH=9	-	-	-
BANJARMASIN	1/1/3		-	-	-

Table 4. ALOKASI KANAL-KANAL VFT, SENTRAL TELEX
in BANDUNG STATION

(As of Aug, 1977)

JURUSAN	TYPE	KAPASITAS	PEMAKAIAN	SISA
JAKARTA	NEC -2	24	17	7
JAKARTA	WT-1000	24	18	6
JAKARTA	WT-1000	24	12	12
CIREBON	WTE -4	24	12	12
TASIK-MARAYA	WTE -5	12	3	9
JUMLAH		108	62	46

JUMLAH REPEATER = 72	KAPASITAS SENTRAL =500
DIPAKAI = 28	JUMLAH SANBUNGAN TELEX=106

JURUSAN	REPEATER	SISA	BERBAYAR	DINAS/GTX	SISA
JAKARTA	28 BOTH	44	85	31	394

2. Present situation of the maintenance and service level, and problems.

2.1 VFT circuits and equipments.

Fault data's analysis of VFT circuits and equipments in Palembang, Dempasar, Surabaya and Bandung Stations (from Jan 1 until Jun 30 1978, in Palembang Station, from Jan 1 until May 31 1978 in Dempasar Station, from Nov 1 until Jan 31 1978 in Surabaya Station, and from Sep 1 until Aug 31 1977 in Bandung Station), and comparison with them of Palembang, Dempasar, Surabaya and Bandung Telegraph and Telex Stations and NTT (Nippon Telegraph and Telephon Public Corporation) are shown in Table 5. (from Survey Report on Palembang Telegraph and Telex Station's maintenance and operation, JTM. Tg/Ka.Tekgrap/12, Survey Report on Dempasar Telegraph and Telex Station's maintenance and operation. JTM.Tg/Ka.Tekgrap/11, Survey Report on Surabaya Telegraph and Telex Station's maintenance and operation. JTM.Tg/Ka.Tekgrap/07, and Survey Report on Bandung Telegraph and Telex Station's maintenanc eand operation. JTM.Tg/Ka. Tekgrap/01).

Table 5. The fault data's analysis of VFT equipment and circuit in Bandung, Surabaya, Dempasar and Palembang Stations, and Comparison with them of in NTT.

Office / Subject	V F T	Terminal	P L N MATI	Others	Transmission	Total
Bandung						
Total	5	1	21	9	73	109
Mean /Bln	0.45	0.09	1.90	0.82	6.64	9.9
Ratio (%)	4.59	0.92	19.27	8.26	66.97	100
Surabaya						
Total	26	29	25	0	261	341
Mean /Bln	8.7	9.7	8.3	0	87.0	113.7
Ratio (%)	7.62	8.51	7.33	0	76.55	100
Dempasar						
Total	0	0	1	0	49	50
Mean /Bln	0	0	0.2	0	9.8	10
Ratio (%)	0	0	2.0	0	98.0	100
Palembang						
Total	1	0	0	0	569	570
Mean /Bln	0.17	0	0	0	94.83	95.0
Ratio (%)	0.18	0	0	0	98.82	100
Fault rate /cct/Bln						
Bandung			0.053		0.107	0.160
Surabaya			0.118		0.385	0.503
Dempasar			0.004		0.188	0.192
Palembang			0.002		1.03	1.032
N T T			0.003	0.008	0.009	0.020

Note 1 ; NTT ; Nippon Telegraph and Telex Public Corporation.

2.1.1 Palembang Station.

Fault data's analysis of the past six monthes of VFT circuits and equipments from January 1 until June 30, 1978 in Palembang Telegraph and Telex Station are shown in Table 7, are only a few fault data.

According to the results of Table 5 and Table 7, it can say that the fault rate of VFT circuits in Palembang Telegraph and Telex Station is higher than one of Dempasar and Bandung Telegraph and Telex Stations, because of many fault rate of Transmission.

Concerning this fault of Transmission, the fault of "Level Down" in VFT circuit are many trouble between Palembang and Lahat, Bengkulu Stations, it must be investigated the cause of " Level Down " in which occurred such numbers of these faults as soon as possible, the number of " Leval Down " faults in VFT circuits are shown in Table 6.it is not understood well from this data, there are the possible solution to this falts " PLN MATI or Junction Cable .

Table 6 . The number of " Level Down" in VFT circuits.

Bln	Destination of VFT circuit							Total
	Lahat	Bengkulu	Pangkal pinang	Baturaja	Jambi	Jakarta	Tuluk	
Jan /1978	0	17	0	0	0	2	1	20
Feb	29	33	4	13	0	1	0	83
Mar	68	50	11	1	1	2	0	123
Apr	37	61	18	8	8	2	2	136
May	86	29	9	0	7	0	4	135
Jun	35	10	6	0	4	4	2	61
Total	255	200	68	22	20	11	9	561

Table . The fault data's analysis of VFT in Palembang Telegraph and Telex Station.

Bln	Causes of the faults				Destination Office				Total	Jam (min)		
	V F T	Trans (Level down)	Micro	Total	Terminal	TWK-9	PLN MATI	Others		Trans	Micro	Destination
Jan /1978	1	20	2	23	0	1	11	3	38	192	247	1661
Feb	0	83	2	85	3	0	11	9	108	1820	450	1885
Mar	0	123	0	123	0	0	20	7	150	1772	0	841
Apr	0	136	7	143	0	0	3	2	148	2152	885	547
May	0	135	0	135	0	0	0	1	136	3438	0	-
Jun	0	61	0	61	0	0	0	1	62	1658	0	215
Total	1	558	11	570	3	1	45	23	642	11032	1582	5149
Mean /Bln	0.17	93.5	1.83	95.0	0.5	0.17	9.0	3.83	107	19.6	143.8	72.5
Ratio(%)	0.16	86.92	1.71	-			11.21		100			

2.1.2 Dempasar Station

The fault data's analysis of the past five monthes of VFT circuits and equipments from January 1 until May 31, 1978 in Dempasar Telegraph and Telex Station are shown in Table 8, are only a few fault data.

Table 8. The fault data's analysis of VFT in Dempasar Station.

Bln	Causes of fault					Total	Duration of fault		
	VFT	Terminal	PLN MATI	Trans	Line		Total	<24 hrs	>24 hrs
Jan /1978	0	0	0	7	12	19	129.30	19	0
Feb	0	0	0	8	0	8	17.30	8	0
Mar	0	0	1	9	3	13	24.30	13	0
Apr	0	0	0	7	0	7	15.30	7	0
May	0	0	0	0	0	3	18.30	3	0
Total	0	0	1	31	18	50	205.30	50	0
Mean /Bln	0	0	0.2	6.2	3.6	10	4.01 /fault	10	0
Ratio (%)	0	0	2	62	36	100	-	100	0

According to the result of Table 5 and Table 8, it can say that fault rate of VFT circuit and equipment im Dempasar Telegraph and Telex Station is less than one of Palembang and Surabaya Telegraph and Telex Stations, especially, VFT, Terminal and PLN MATI's fault rate per circuit and month is only 0.003 faults.

Also, the fault because of commercial power souce stop (PLN MATI) in Bandung and Surabaya Stations occupied approx 10 percents out of total amount of troubles, but, in Dempasar Station, one of PLN MATI is very few troubles, therefore, we can say that present situation of commercial power source is very good condition.

2.1.3 Surabaya Station.

The fault data's analysis of the past three monthes of VFT circuits and equipments from Nov 1 until Jan 31 1978, in Surabaya Telegraph and Telex Station are shown in Table 9, are only a few fault data.

Table 9. The fault data's analysis of VFT in Surabaya Station.

Bln	Causes of faults						Total	Duration of fault	
	VFT	Power (PLN MATI)	Terminal	Cable	Micro	Satte-lite		>24 hrs	<24 hrs
Nov	11	14	10	60	14	12	121	7	114
Dec	8	6	9	68	4	11	106	6	100
Jan	7	5	10	69	10	13	114	5	109
Total	26	25	29	197	28	36	341	18	323
Mean /Bln	8.7	8.3	9.7	65.7	9.3	12.0	113.7	6.0	108
Ratio (%)	7.6	7.3	8.5	57.8	8.2	10.6	100	5.3	94.7

The fault because of commercial power souce stop (PLN MATI) is more than eight faults per a month, according to the observation result, generator is manualy started for PLN MATI in Surabaya Telegraph and Telex Station. A countermeasure should now be considered for this fault,as one of the countermeasure must be installed the battery for floating system operation because its advisable to operate simultaneusly generator as well, futhermore, one has to point out that generator must be automatically started.

As to this fault, by similar reasoning, there are such faults in other Telegraph and Telex Stations which is not installed the Battery for PLN MATI, it should be considered same countermeasure.

2.1.4 Bandung Station.

The fault data's analysis of the past one tear of VFT circuits and equipments from Sep 1 1976 until Aug 31 1977 in Bandung Telegraph and Telex Station are shown in Table 10.

Table 10. The fault data's analysis of VFT in Bandung Telegraph and Telex Station.

Bln	Intra-Office				Others	Trans (open wire micro	Destination Office		Total amount
	VFT	PLN MATI	Ter-minal	Total			VFT & Termi-nal	PLN MATI	
Sep/ 1976	-	1	-	1	-	2	2	-	5
Oct	-	2	-	2	-	5	-	6	13
Nov									
Dec	2	5	-	7	-	6	5	1	19
Jan/ 1977	1	3	-	4	-	3	2	1	10
Feb	1	2	-	3	-	6	5	5	19
Mar	1	2	1	4	1	5	7	1	18
Apr	-	1	-	1	1	7	3	1	13
May	-	1	-	1	-	6	2	2	11
Jun	-	2	-	2	-	8	7	2	19
Jul	-	2	-	2	2	10	-	1	15
Aug	-	-	-	-	5	15	1	1	22
Total	5	21	1	27	9	73	34	21	164
Mean /Bln	0.45	1.90	0.09	2.45	0.81	6.64	3.09	1.90	14.9
Ratio (%)	3.05	12.8	0.60	16.4	5.48	44.5	20.7	12.8	100
MTTR (hour)	3.0	0.09	0.05	-	0.19	1.31	1.22		

According to the VFT fault data, Transmission faults occupied approx fouty-five percent(73 faults) out of 164 total amount of faults. as to this problems, it must be found out the cause and positive preventive method must be taken.

The fault because of commercial power source stop is twenty-one faults out of total amount, according to this observation result,at present, a countermeasure have finished,theBattery already installed for floating operation system in Bandung Station.

.2 Telex switching and Terminal equipment.

Fault data's analysis of Telex circuits, Telex switching and Terminal equipments in Palembang, Dempasar, Surabaya and Bandung Stations (from Jan 1 until Jun 30 1978, in Palembang station, from Jan 1 until May 31 1978 in Dempasar Station, from Jul 1 1977 until Jan 31 1978 in Surabaya Station, and, from Sep 1 1976 until Aug 31 1977 in Bandung Station), and comparison with them of Palembang, Dempasar, Surabaya and Bandung Telegraph and Telex Stations and NTT are shown in Table 11. (from Survey report on Palembang Telegraph and Telex Station's maintenance and operation,JTM.Tg/Ka.Tekgrap/12, Survey Report on Dempasar Telegraph and Telex Station's maintenance and operation, JTM.Tg/Ka.Tekgrap/11, Survey Report on Surabaya Telegraph and Telex Station's maintenance and operation, JTM.Tg/Ka.Tekgrap/07, and, Survey Report on Bandung Telegraph and Telex Station's maintenance and Operation , JTM.Tg/Ka.Tekgrap/01).

Table 11. The fault data's analysis of Telex Switching and Terminal equipment in Bandung, Surabaya, Dempasar and Palembang Stations, and comparison with them in NTT.

Office / Subject	S. W equip	Terminal	V F T	Others	P L N MATI	Trans-mission	Total
Bandung							
Total	25	(5)	3	10	23	252	313
Mean /Bln	2.5	(0.5)	0.3	1.0	2.3	25.2	31.3
Ratio (%)	7.99	-	0.96	3.19	7.35	80.5	100
Surabaya							
Total	7	(22)	3	0	0	327	337
Mean /bln	1.0	(3.1)	0.4	0	0	46.7	48.1
Ratio (%)	2.08	-	0.89	0	0	97.03	100
Dempasar							
Total	2	(5)	0	0	0	30	32
Mean /Bln	0.4	(1.0)	0	0	0	6.0	6.4
Ratio (%)	6.25	-	0	0	0	93.75	100
Palembamg							
Total	1	(38)	0	0	1	33	35
Mean /Bln	0.17	(6.33)	0	0	0.17	5.5	5.84
Ratio (%)	2.85	-	0	0	2.85	94.30	100
Fault rate /100sub/bln							
Bandung		5.75 (+ 1.62 Gentex Terminal)				23.77	29.52
Surabaya		0.52 (20.67 ")				13.37	13.89
Dempasar		0.89 (33.33 ")				13.33	14.22
Palembamg		0.47 (31.65 ")				6.63	7.05
N T T		0.68 (+ 6.60 Telex Terminal)				0.42	1.10

Note : NTT; Nippon Telegraph and Telephon Public Corporation
: Faults in Terminals only for them of Gentex, and Total not included them of Gentex.

2.2.1 Palembang Station.

The fault data's analysis of the past six monthes of Telex circuits, Telex switching and Terminal equipments from January 1 to June 30 1978 in Palembang Telegraph and Telex Station are shown im Table 12.

Table 12. The fault data's analysis of Telex circuit, Telex Switching and Terminal equipment.

Bln	Causes of Faults				Total	Duration of fault (Cable)	
	Swit equip	Ter-minal	Power	Cable		< 2 hari	>3 hari
Jan/ 1978	1	9	1	8(6)	19	2	6
Feb	0	7	0	5(4)	12	0	5
Mar	0	8	0	7(3)	15	1	6
Apr	0	8	0	4(3)	12	1	3
May	0	3	0	6(1)	9	1	5
Jun	0	3	0	3(4)	6	1	2
Total	1	38	1	33(21)	73	6	27
Mean /bln	0.17	6.33	0.17	5.5(3.5)	12.2	1	4.5
Ratio (%)	1.37	52.05	1.37	45.21	100	18.2	81.8

( ) : Carried over's faults from past month.

According to the results of Table 11 and 12 , it can say that fault rate of Gentex Terminal in Palembang Telegraph and Telex Station is more than themof Dempasar, Surabaya and Bandung Stations, on the othre hand, local cable's fault rate per month and 100 subscribers is less than them of Dempasar, Surabaya and Bandung Telegraph and Telex Stations.

But, from the fault record, the subscribers that occurred the long duration fault of Telex service are shown in Table 13 , especially, subscribers number 27138, 27127, 27183, 27112, 27122, 27120, and 27165 are more than one month duration.

Table 13. The subscribers that occurred the long duration fault of Telex service

No of Subscriber	Date detected	Date restored	Duration
27138	27 Oct,1977 16 May,1978	24 Feb,1978 5 Jun,1978	4 Bln 0.5 Bln
27127	19 Oct,1977 22 Mar,1978	20 Jan,1978 -	3 Bln (5 Bln)
27183	19 Dec,1977	11 Mar,1978	3 Bln
27112	13 Dec,1977	-	(8 Bln)
27122	30 Dec,1977 30 Mar,1978	14 Feb,1978 4 Apr,1978	1.5 Bln 4 hari
27120	31 Dec,1977	8 Mar,1978	2.5 Bln
27128	24 Feb,1978	8 Mar,1978	0.5 Bln
27121	22 Mar,1978	13 Apr,1978	0.5 Bln
27165	14 May,1978	-	(3 Bln)

2.2.2 Dempasar Station.

The fault data's analysis of the past five monthes of Telex circuits, Telex switching and Terminal equipments from January to May 31 1978, in Dempasar Telegraph and Telex Station are shown in Table 14.

Table 14. The fault data's analysis of Telex circuits, Telex Switching and Terminal equipments in Dempasar Station.

Bln	Causes of faults					Total	Duration of fault	
	Swit equip	Ter-minal	VFT	Cable Local	Cable Int-loc		< 1 hari	>2hari
Jan/ 1978	0	1	0	9	0	10	2	8
Feb	0	1	0	5	0	6	2	4
Mar	1	2	0	6	0	9	4	5
Apr	1	0	0	5	0	6	4	2
May	0	1	0	5	0	6	4	2
Total	2	5	0	30	0	37	12	25
Mean / Bln	0.4	1	0	6.0	0	7.2	2.4	5.0
Ratio (%)	5.4	13.5	0	81.1	0	100	32.4	67.6

According to the results of Table 11 and 14 , it can say that fault rate of Telex circuits, Telex Switching and Terminal equipments in Dempasar Telegraph and Telex Station is less than them of Bandung Station, espacially, cable's fault rate per month and 100 subscribers is 13 troubles, and in Surabaya Station,approx 40 % out of 359 total amount of troubles are carried over more than for one week, but, in Dempasar Station about 30 % (25/37) out of total amount of troubles are carried over than for two days.

2.2.3 Surabaya Station.

The fault data's analysis of the past seven monthes of Telex circuits, Telex Switching and Terminal equipments from July 1 1977, to Jan 31 1978 in Surabaya Telegraph and Telex Station are shown in Table 15.

Table 15. The fault data's analysis of Telex circuits, Telex Switching and Terminal equipments in Surabaya Station.

Bln	Causes of faults					Total	Duration of fault	
	Swit equip	Ter-minal	VFT	Cable				
				Local	Inter-local		<7 hari	>8 hari
Jul/ 1977	0	1	1	53	6	61	26 (0)	35
Aug	2	1	0	23	6	32	25 (0)	7
Sep	1	6	0	38	1	46	24 (0)	22
Oct	0	4	0	24	0	28	23 (1)	5
Nov	3	3	1	28	1	36	30 (1)	6
Dec	0	4	0	49	2	55	19 (1)	36
Jan/ 1978	1	3	1	94	2	101	69 (1)	32
Total	7	22	3	309	18	359	216 (4)	143
Mean /Bln	1.0	3.1	0.4	44.1	2.6	51.3	30.8	20.4
Ratio (%)	1.9	6.1	0.8	86.1	5.0	100	59	41

() : < 24 hours

From the results of Table 11 and Table 15 , it can say that fault rate in Surabaya Station is less than one of Bandung Station, but, local cable troubles occupied approx more than 80 % out of total amount of troubles in Surabaya Station.

In Surabaya Station, about 40 % (143 faults) out of 359 total amount of troubles are carried over than one week, and approx 60 % (212 faults) out of total amount of faults also are carried over for one day to one week, as to this problems, it must be taken the countermeasure to repair or to hand over within 24 hours as soon as possible.

2.2.4 Bandung Station.

The fault data's analysis of past one year of Telex circuits, Telex Switching and Terminal equipments from Sep 1 1976 to Aug 31 1977, in Bandung Telegraph and Telex Station are shown in Table 16.

Table 16. The fault data's analysis of Telex circuits, Telex Switching and Terminal equipments in Bandung Station,

Bln	Causes of faults							HF	Total
	Swit equip	Ter-minal	VFT	Others	PLN MATI	Cable			
						Local	Int local		
Sep/ 1976	0	2	0	2	1	53	3	0	61
Oct	5	1	0	3	4	13	2	1	29
Nov	-	-	-	-	-	-	-	-	-
Dec	0	0	0	1	7	12	4	0	24
Jan/ 1977	4	0	0	1	3	22	9	1	40
Feb	-	-	-	-	-	-	-	-	-
Mar	1	0	0	1	3	16	21	0	42
Apr	1	0	2	0	1	13	12	0	29
May	2	0	0	0	1	6	1	0	10
Jun	5	0	0	0	1	15	1	0	22
Jul	4	1	0	0	1	12	4	0	22
Aug	3	1	1	2	1	27	4	0	39
Total	25	5	3	10	23	189	61	2	318
Mean /Bln	2.5	0.5	0.3	1.0	2.3	18.9	6.1	0.2	31.8
Ratio (%)	7.9	1.6	0.9	3.1	7.2	59.4	19.2	0.6	100

As described above in VFT, also, in the case of Telex and Terminal faults, cable fault occupied approx eighty percent out of 318 total amount, and mean time of a local cable fault's duration is about more than 4 days, with only a few exception, these cable faults are of the intra-area in Bandung, it is very impotant problem for maintenance management point of view, active preventive method must be taken.

Also, concerning PLN MATI, the fault due to PLN MATI is twenty-two faults out of total amount. a counttermeasure already finished. as the case of Telex faults, inter-local cable fault in point to point service occupied approx 20 % out of total amount,open wire for Sukabumi and Cianjur occupied about more than 50 %, it must be find out the cause and Practical method to improve must be taken.