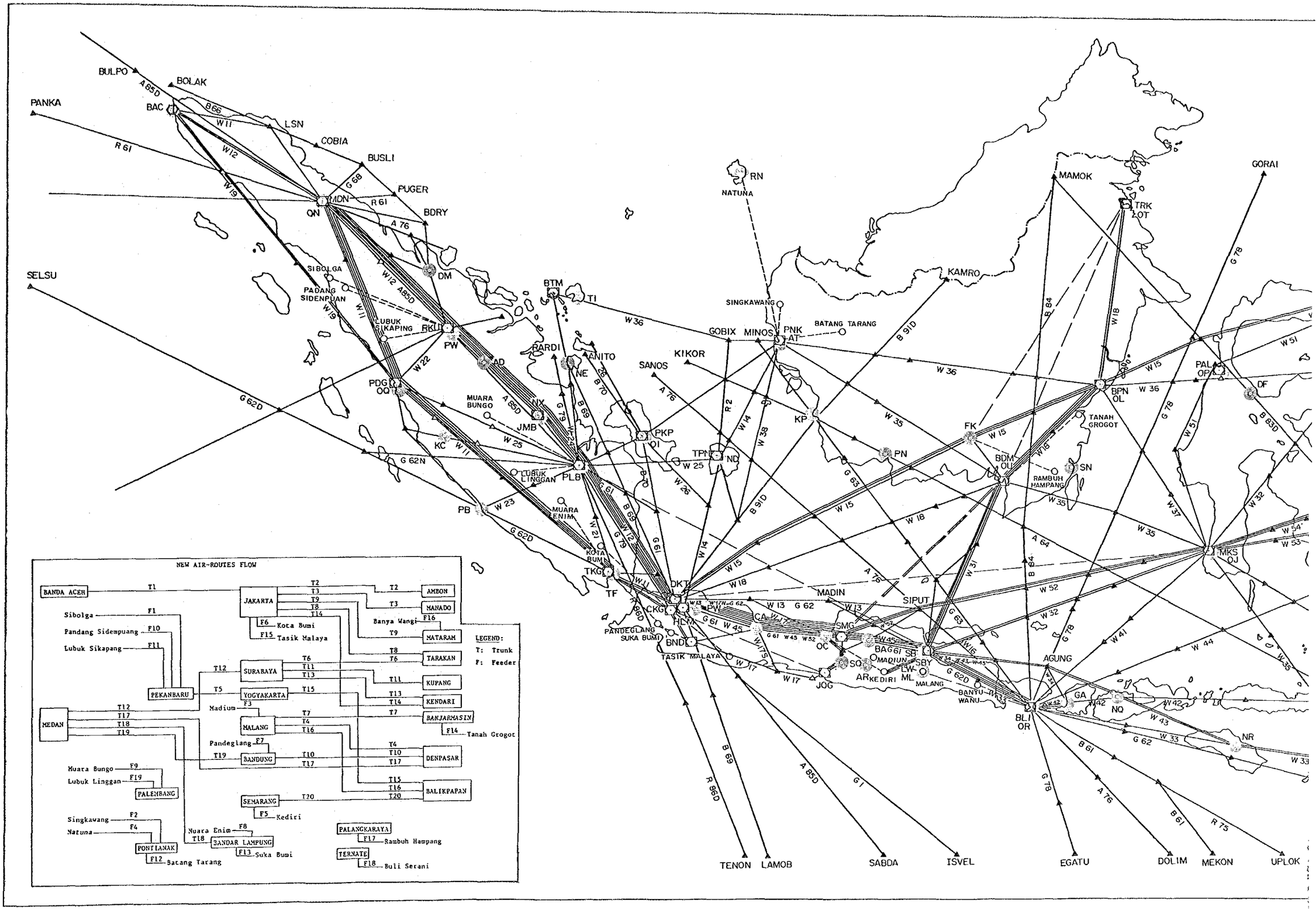


NEW AIR-ROUTES FLOW

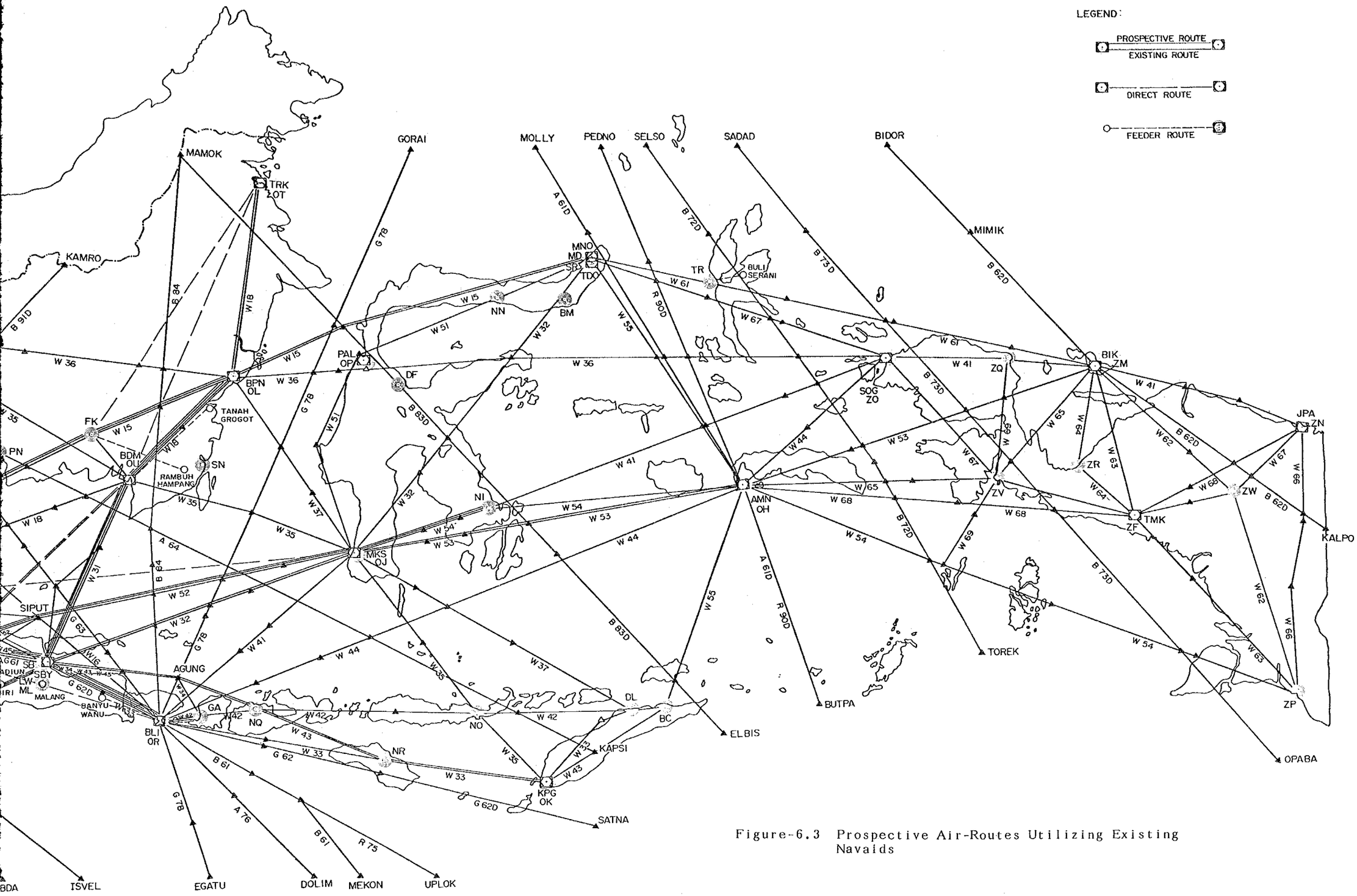


Figure-6.3 Prospective Air-Routes Utilizing Existing Navaids

interpreted as follows.

A flight destined to Jakarta from Banda Aceh will fly on Airway W19 up to Padang, and thereafter on Airway W11 up to the final destination of Cenkareng via Tanjung Karang by the aid of Navaids of NZ/500W(Banda Aceh), OQ/500W(Padang) and TF/500W. The flight distance on this route is 980NM against the direct distance of 976NM. The Navaids concerned to this route should be replaced by new ones sooner or later.

(50) Similarly, the F16 line of Table-6.16 which concerns the potential feeder route, for example, can be interpreted as follows.
A flight destined to Mataram from Banyu Wangi where the airports currently exist but not provided with Navaides shall reach Airway W33 after taking off the Banyu Wangi airport. The flight will fly on that W33 up to Denpasar and, thereafter on W42 up to the final destination of Mataram by the aid of existing Navaid of GA/500W(Mataram). The flight distance on this route corresponds to 146NM against the direct distance of 126NM. No additional Navaids are considered to be required at Banyu Wangi, because the VFR(Visual Flight Rule) may be adaptable until establishing W33 in the early stage. The old NDB/GA be replaced.

(51) In Table-6.17, the list of the existing NDBs is shown. In connection with these NDBs, a tentative replacement schedule has been worked out and summarized in Table-6.18. The schedule is prepared based on NDBs Improvement Program of DGAC as shown in Table-6.19. Some of NDBs should be powered up to 1KW or more due to functional importance. The replacement is better to start as early as possible, since some of existing NDBs have been introduced in 1970s and their parts are mostly no longer on production.

Table-6.17 List of Existing NDB

NDB. HIGH RANGE (HR) 1 KW

NO.	KANWIL I	HR	NO.	KANWIL II	HR	NO.	KANWIL III	HR	NO.	KANWIL IV	HR	NO.	KANWIL V	HR	NO.	KANWIL VI	HR
1.	MEDAN	X	1.	POKTIANAK	P	1.	BAKJARMASIN	X	1.	UJ. PANDANG	X	1.	BIAK	X	1.	DENPASAR	X
2.	BANDA ACEH	P	2.	PK. PINANG	P	2.	BALIKPAPAN	P	2.	MANADO	X	2.	MERAUKE	X	2.	KUPANG	X
			3.	TG. PANDAN	P	3.	PLK. RAYA	X	3.	AMBON	X						

NDB. MEDIUM RANGE (MR) 500 W

NO.	KANWIL I	MR	NO.	KANWIL II	MR	NO.	KANWIL III	MR	NO.	KANWIL IV	MR	NO.	KANWIL V	MR	NO.	KANWIL VI	MR
1.	BANDA ACEH	X	1.	PALEMBANG	X	1.	SURABAYA	X	1.	PALU	X	1.	JAYAPURA	X	1.	MATARAM	X
2.	PADANG	X	2.	PONTIANAK	X	2.	BANJARMASIN	P	2.	GORONTALO	X	2.	TIMIKA	X	2.	MAUMERE	X
3.	PEKANBARU	X	3.	PK. PIKAHG	X	3.	BALIKPAPAN	X	3.	KENDARI	X	3.	SORONG	X	3.	WAINGAPU	X
4.	P. BATAM	X	4.	BD. LAMPUNG	X	4.	SEMARANG	P	4.	LANGGUR	P	4.	MANOKWARI	X	4.	DILLI	X
5.	RENGAT	X	5.	JAMBI	X	5.	YOGYAKARTA	X	5.	BULA	P	5.	WAMENA	X	5.	SUMBAWA BESAR	X
6.	TG. PINANG	X	6.	BANDUNG	X	6.	SURAKARTA	X	6.	TAPIR	P	6.	NABIRE	X			
7.	SIBOLGA	X	7.	TG. PANDAN	X	7.	TARAKAN	X				7.	FAK - FAK	X			
8.	NATUNA	X	8.	BENGKULU	P	8.	KOTABARU	P									
			9.	JKT - HPK	X	9.	PANGKALAMBUM	P									
			10.	KIBON	P												
			11.	PURWAKARTA	X												

NDB. LOW RANGE (LR) 100 W

NO.	KANWIL I	LR	NO.	KANWIL II	LR	NO.	KANWIL III	LR	NO.	KANWIL IV	LR	NO.	KANWIL V	LR	NO.	KANWIL VI	LR
1.	PADANG *)	X	1.	PALEMBANG *)	X	1.	SURABAYA *)	X	1.	MANADO *)	X	1.	WAGHETE	X	1.	BIMA	X
2.	MEULABOH	X	2.	BANDUNG *)	X	2.	BALIKPAPAN *)	X	2.	TERNATE	X	2.	MULIA	X	2.	BAU CAU	X
3.	T.B. KARIMUN	X	3.	JKT - SOETA	X	3.	SEMARANG *)	X	3.	POSO	X	3.	ENAROTALI	X	3.	WAIKA BUBAK	X
4.	SINABANG	X	4.	BENGKULU	X	4.	SAMARINDA	X	4.	KOLAKA	X	4.	TANAH MERAH	X	4.	RUTENG	X
5.	TAPAK TUAN	X	5.	SINGKAWANG II	X	5.	KOTA BARU	X	5.	MAMUJU	X	5.	SERUI	X	5.	LARANTUKA	X
6.	GN. SITOLI	X	6.	PUTUSIBAU	X	6.	PANGKALANBUN	X	6.	MAKALE/TORAJA	X	6.	SARMI	X	6.	ATAMBUA	X
7.	PRAPAT	X	7.	SINTANG	X	7.	BUNTOK	X	7.	MASAMBA	X	7.	TEMINABUAN	X	7.	NAIKULE	
8.	PD. SIDEMPUAN	X	8.	KETAPANG	X	8.	TANAH GROGOT	X	8.	BAU - BAU	X	8.	IKAKWATAN		8.	LABUHAN BAJO	X
9.	LHUK SEUMAWE	X	9.	PALOH/LIKU	X	9.	TIONG OHANG	X	9.	RAHA/MUNA	X	9.	KEPI		9.	ENDEH	X
10.	LHOK SUKON	X	10.	NANGAPINOH	X	10.	SUMENEP	X	10.	TOLI - TOLI	X	10.	MINDIPTANAH	X	10.	KALABAI	X
11.	TEBING TINGGI		11.	SUNGAI PENUH	X	11.	MUARA TEWEH	X	11.	LUWUK	X	11.	OKABA		11.	ROTE	X
12.	SIPORA	X	12.	KUALA TUNGKAL	X	12.	SAMPIT	X	12.	TAHUNA	X	12.	KOKONAO	X	12.	SAWU	X
13.	MENTAWAI		13.	MUKO - MUKO	X	13.	LONGBAWAN	X	13.	KOTA MOBAGO	X	13.	MOANAMANI		13.	BALAWA	X
14.	BENGKALIS		14.	BUNGO TEBO		14.	LONG NAWANG	X	14.	KAO	X	14.	WASIOR		14.	LUNYUK	X
15.	DUMAI		15.	CIREBON	X	15.	TG. REDEP	X	15.	GALELA	X	15.	BOKONDINI	X	15.	OBCCUSSI	X
			16.	PENDOPO		16.	CILACAP	X	16.	MELANGGOANE	X	16.	OKSIBIL	X	16.	SUAE	X
						17.	SENIPAH	X	17.	LANGGUR	X	17.	SIEENKOL	X	17.	VIQUEQUE	X
						18.	TG. SELOR	X	18.	NAMLEA	X	18.	IJAPABRA				
						19.	TG. SANIAN	X	19.	MOROTAI	X	19.	RAIMANA	X			
						20.	LONG AMPUNG		20.	SOROAKO	X	20.	MUTING	X			
									21.	TALIABU							
									22.	AMAHAI	X						
									23.	LABUHA	X						
									24.	BANDA MAIRA	X						
									25.	MANGOLE	X						
									26.	SANANA	X						
									27.	SAUMLAKI	X						
									28.	DOBO	X						
									29.	JAILOLO							

NOTE: *) NDB-LR = FUNCTIONAL KIND: LOCATOR

Table-6.18 Navaids (NDB) Replacement Plan (Tentative)

LEGEND: 1 KW, 500 KW, 100 KW

NOTE:
Ideal Coverage — 1 KW: 200 NM; 500 W: 150 NM; 100 W: 60 NM

	RELATED ROUTES	NAVAIDS(NDB) LOCATION	IDENT.	PRESENT POWER(W)	1987/1988	1988/1989	1989/1990	1990/1991
1	T1	BANDA ACED	NZ	500				
2	T1	PADANG	OQ	"				
3	T1·4·14·16·20 F1·11·15	PEKANBARU	NW	"				
4	T1·17 F4·10	BANDAR LUMPUNG	TF	"				
5	T2·4·10·12 T14·16	SEMARANG	OC	"				
6	T2	AMBON	OH	2.5 K				
7	T3·5·8·15 T18·19	BALIKPAPAN	OL	500				
8	T3	MANADO	MD	2.5 K				
9	T3	"	SR	80(LOC)				
10	T4·15	YOGYAKARTA	OF	500				
11	T4·15	SOLO	SO	"				
12	T5·8·18.19 F17	BAJARMASIN	OU	2.5 K				
13	T5·8	TARAKAN	OT	500				
14	T6·7·10.14 T16	CIREBON	CA	100				
15	T6·7·10·14 T16	BLORA	SB	500				
16	T6·7·10·13 T14·15·18	SURABAYA	BA	"				
17	T6·F4	MATARAM	GA	"				
18	F1	SIBOLGA	SK	"				
19	F2·5·13	PONTIANAK	AT	"				
20	F5	NATUNA(RANAI)	RN	"				
21	T11	KUPANG	OK	2.5 K				
22	T11·12	KENDARI	NI	500				
23	T13·14	WAINGAPU	NR	"				
24	T17	SUMBAWA	NQ	"				
25	T20.F8	BANDUNG	OY	"				
26	T20·F8	"	YY	100(LOC)				
27	F18	TERNATE	TR	80(LOC)				
28	See APPENDIX 2(03)	PANGKALAN BUN	ON	100				

REMARKS

* KENDARI is better powered up to 1 KW for more navigational reception over the wide body of water to the east.
* WAINGAPU is also better powered up to 1 KW for a likely one way flow of traffic in future, which might necessiate a double track airway structure.
* PANGKALANBUN should be powered up to 1 KW to make routes for pioneer airfields scattered in the northern area of Kalimantan Barat. In this connection, refer to APPENDIX 2 (03).
* MANADO(SR - 80 W) is added as a suggestion to be replaced by 100 W.

Numbers of NDB to be replaced, and AMS and AFS to be newly installed BY 2004:

Facilities / Routes	NDB Power (W)	NDB No.of Station		VHF(AMS) 50W or 30W No.of Station	RTT(AFS) dx 500W No.of Station	RTT(AFS) 100W No.of Station
Trunk	1K	7		7	5	
	500	13	23			
	100	3				
Feeder	1K	2				19
	500	3	5			
Total	1K	9				19
	500	16	28	7	5	
	100	3				

TRUNK + FEEDER BY YEARS

Years	NDB Power (W) 1K	500	100	NDB No.of Station		VHF(AMS) 50W or 30W No.of Station	RTT(AFS) dx 500W No.of Station	RTT(AFS) 100W No.of Station
1987/1988		1		1	By 1994	4	4	10
1988/1989	4	1	1	6				
1989/1990	5	10	2	17	By 2004	3	1	9
1990/1991	1	3		4				
Total	10	15	3	28		7	5	19

Note: 19 feeder airports are assumed to need RTT (100W) by 1994, however, 4 of them have not existed as shown in PART II Table-6. They are better phased into 1995-2004. While, 5 airports related to feeder routes are for 1995-2004, thus totaling 9 airports are to be provided with RTT (100W) in 1995-2004. NATUNA is, however, better provided with RTT (500W).

Table-6.19 NDB's Important Program of DGAC

NO.	LOCATION	PLAN FOR INSTALLATION	CLASS	OUT PUT POWER (WATT)	REMARKS
1.	Banda Aceh	1988/1989	HR	1 KW	HR: High range
2.	Padang	1989/1990	MR	500 W	MR: Medium range
3.	Bandar Lampung	1989/1990	MR	500 W	LR: Low range
4.	Pekanbaru	1989/1990	MR	500 W	
5.	Semarang	1989/1990	MR	500 W	
6.	Ambon	1989/1990	HR	1 KW	
7.	Balikpapan	1988/1989	HR	1 KW	
8.	Manado	1988/1989	HR	1 KW	
9.	Solo	1989/1990	MR	500 W	
10.	Yogyakarta	1989/1990	MR	500 W	
11.	Banjarmasin	1988/1989	MR	500 W	
12.	Tarakan	1990/1991	MR	500 W	
13.	Cirebon	1989/1990	LR	100 W	
14.	Blora	1990/1991	MR	500 W	
15.	Surabaya	1989/1990	MR	500 W	
16.	Mataram	1990/1991	MR	500 W	
17.	Pangkalan Bun	1990/1991	MR	500 W	
18.	Kendari	1988/1989	MR	500 W	
19.	Kupang	1989/1990	HR	1 KW	
20.	Waingapu	1989/1990	MR	500 W	
21.	Sumbawa	1989/1990	MR	500 W	
22.	Bandung	1989/1990	MR	500 W	
		1989/1990	LR	100 W	
23.	Pontianak	1989/1990	HR	1 KW	
24.	Ternate	1989/1990	LR	100 W	
25.	Sibolga	1989/1990	MR	500 W	
26.	Natuna	1987/1988	MR	500 W	
	All Class IV & V Airport	1989 - 1994	LR	100 W	

(52) Newly inaugurated flights should follow in line with implementation of replacing NDBs. New flights without or a few stopovers would make not only traffic flow congestion different from the existing ones, but also traffic volume rise on the Trunk routes. NDBs being collocated with VORs to give an aircraft no-directional beacon signal have an independent function. When either of NDBs or VOR comes inoperative because of maintenance shutdown or other natures of cause, the both pay a supplemental role to each other to give a navigational guidance to an aircraft, though the signal accuracy of the former is inferior to that of the latter. Therefore, the replacement of NDBs has to precede the inauguration of the new routes.

(53) Installation of LLZ, G/S and MM for a water based airport is not realistic. VOR may be provided if suitable land terrain is available at an appropriate distance on the extension line of runway centerline. DME is better to be located with VOR, because Decision Height will often subject to change due to the fluctuation of water surface. VFR flight is desirable for this type of airport.

(54) As to the communication system,Banda Aceh, Tarakan and Kendari have no TWR(control tower) , but have FIS(Flight Information Service) with one VHF transmitter and receiver. A FIS gives an aircraft just an information services but not positive control clearance. To cope with increasing aircraft traffic, it is important that they are provided with TWR to give more positive control. Therefore, FIS should be switched to TWR, and TMA (Terminal Approach Control) in the TWR collocated with Aerodrome Control Console, for which one more VHF frequency is needed at each airport;

-Banda Aceh (1994) TWR, 1 VHF(30W)

TMA, 1 VHF(50W)

-Tarakan (1994) TMA, 1 VHF(50W)

-Kendari (2004) TMA, 1 VHF(50W)

These VHFs shall be provided with at least one set of transmitter and receiver.

(55) In addition,Ambon, Mataram, Bandung, Kupang and Bandar Lampung have TWR and TMA with dual VHF transmitter and receiver, but not have TMA. Mataram, Bandung and Bandar Lampung are also desirable to be provided with one more VHF frequency in Aerodrome Control Console so as to be a backup frequency.

- Mataram (2004), 1 VHF (30W) in TWR
- Bandung (1994), - do -
- Bandar Lampung (2004), - do -

(56) The existing airports to be linked with likely new feeder airports are not necessary to provide new frequency, except Mataram. Mataram is to be provided with 1 VFR (30W) frequency in the TWR by the year 2004.

(57) Some airports such as Tarakan and Kendari are equipped with only 2 RTF(Radio Telephony), and Bandung with 2 UHF RTF. They should be provided with 1 duplex RTT (Radio Teletypewriter). Needless to say, most of new feeder airports have not equipped with AFS, except Sibolga and Natuna (Ranai). They should be provided with commercial telephone circuits to link with the existing airports. If no commercial line is available or its operability is deemed to be unreliable,RTT of 100W is recommended to be provided.

(58) RTF is the system using HF-ISB (Independent Sideband), functionability of which is poor by nature. Leased LTT(Landline Teletypewriter) circuits or microwave circuits on VHF is better to improve AFS status and the

services will be provided at reasonable price. The present AFS,however, are still being operated on HF at many places. If the ceno-developing airports are provided with VHF LLT or microwave circuits, it will be inharmonious for the fore-running airports. Thus, it is recommended to be provided at Tarakan and Kendari that RTT (Radio Tele-typewriter) on SSB (Single Sideband) so devised to have reciprocal functions of radio telephony and tele-typewriter. Another scrutiny is needed for AFS network all over the country so as to make it harmonious.

(59) ERAG (Extended Range Air-Ground) system have been under plan to install at Banjarmasin and Baikpapan. If these plans are materialized, VHF AMS coverage will be so much improved to cover the existing communication blind area in Kalimantan, leaving Irian Jaya. The problem of ERAG will supersede the demand forecast, therefore, its coverage should be extended more by installing at Biak and Sorong.

6.03.3 Approximate Cost

(60) Approximate cost estimate herewith is related with Navaids (NDB), VHF control/communications and aeronautical Fixed Services, which are considered desirable to be replaced or newly installed. Cost estimates are based on the following assumptions.

- All the costs have been determined in 1987 Dec. prices and in Rupiah.
  Exchange rate are set U.S.$ 1 = Rp 1,700 = Yen 132.00
- Prices of NDB and VHF transmitter & receiver include equipment itself, antenna and instruments materials needed.
- AFS such as RTT (Radio telephony) includes equipment itself, transmitter & receiver, antenna and

instruments materials needed, but excluding control console and power supply.

(61) DGAC's improvement plan of NDBs depicted in Table-6.19, is scheduled to be implemented in 1987 - 1991. The cost is approximately estimated by item and year, derived from the said Table, and is presented in Table-6.20. The cost estimated amounts to about 18,500 millions Rupiah for the trunk routes and 4,500 millions Rupiah for feeder routes, totaling to about 23,000 million Rupiah. While, the other facilities of AMS and AFS for trunk route are to be implemented by 1994, for which the cost will come up to about 3,900 millions Rupiah for trunk route and 3,300 millions Rupiah for feeder route by 2004, totaling 7,200 millions Rupiah approximately. Besides, it should be noted that the provision of aeronautical equipment requires a further scrutinization at site by site, because they are often subject to the conditions of geography, topography, meteorology, power supply, etc.

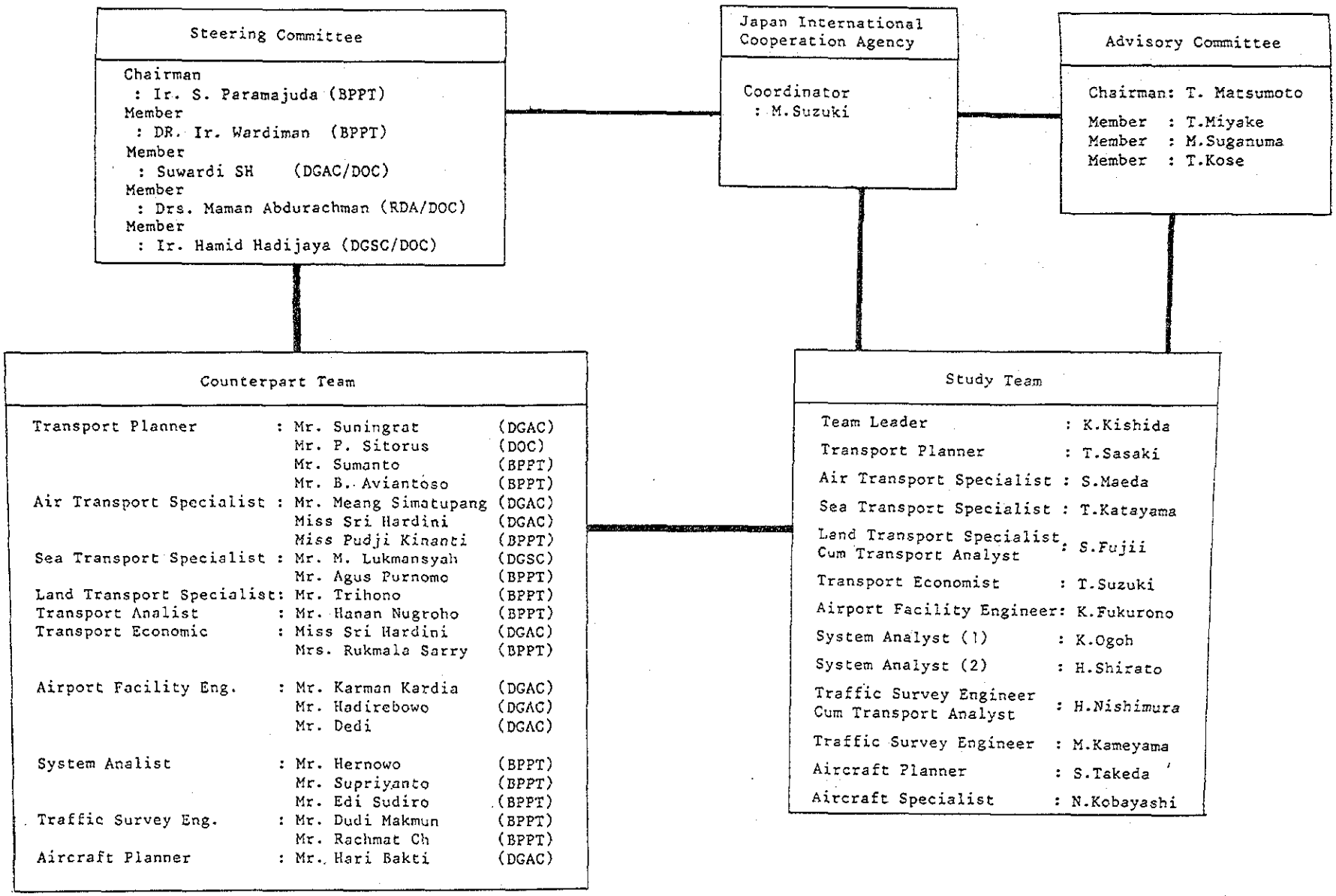
Table-6.20 Cost Estimate

Note: Exchange Rate @ Dec., 1983
U.S.$1.00=Rp.1,700=¥132.00

		NAME OF LOCATION	NAVAIDS (NDB) IDENT.	NAVAIDS (NDB) WATTS (W) REPLACED TO	NAVAIDS (NDB) UNIT PRICE (Rupiah)	AERONAUTICAL MOBILE SERVICES VHFxl (50W or 30W)	AERONAUTICAL MOBILE SERVICES PROVIDED FOR	AERONAUTICAL FIXED SERVICES dx RIT (500W)	AERONAUTICAL FIXED SERVICES RIT (100W)	REMARKS
TRUNK ROUTE	1	BANDA ACEH	NZ	1K	633.2	69.3	TMA(50W)			NDB Power:
		"				69.3	TWR(30W)			1 kW (HR: High Range)
	2	PADANG	OQ	500	607.2					500W (MR: Medium Range)
	3	BANDAR LAMPUNG	TF	500	"	69.3	TWR(30W)			100W (LR: Low Range)
	4	PEKANBARU	NW	500	"					VHF Power:
	5	SEMARANG	OC	500	"					50W(TMA) or 30W(TWR)
	6	AMBON	OH	1K	632.2					Price is same
	7	BALIKPAPAN	OL	1K	"					
	8	MANADO	MD	1K	"					
		"	SR	100	132.0					
	9	SOLO	SO	500	607.2					
	10	YOKGAYKARTA	OF	500	"					
	11	BAJARMASIN	OU	500	"					
	12	TARAKAN	OT	500	"	By 1994 69.3	TMA(50W)	554.4		dx RIT (500W)
	13	CIREBON	CA	100	132.0					may be substituted by
	14	BLORA	BA	500	607.2					150W, which is cheaper
	15	SURABAYA	SB	500	"					price
	16	MATARAM	GA	500	"	69.3	TWR(30W)	554.4		Need site evaluation
	17	KENDARI	NI	1K	633.2	69.3	TMA(50W)	554.4		NDBs of KENDAR, WAINGA
	18	KUPANG	OK	1K	"					TERNATE and PANGKALAN
	19	WAINGAPU	NR	1K	"					better be powered up
	20	SUMBAWA	NQ	1K	"					to 1 kW (See Replacem
	21	BANDUNG	OY	500	607.2	69.3	TWR(30W)	554.4		Schedule)
		"	YY	100	132.0					
		TOTAL			12,748.0	485.1		2,217.6		= 15,450.7
FEEDER ROUTE	22	PONTIANAK	AT	1K	633.2			554.4		
	23	TERNATE	TR	1K	"					
	24	SIBOLGA	SK	500	607.2	1995				
	25	NATUNA (RANAI)	RN	500	"					
	26	PANGKALAN BUN: Other 19 likely feeder airports	ON	1K	633.2	2004			66.0x19	4 out of 19 feeder airports have not existed. They will be phased to after 1995 till 2004
		TOTAL			3,114.0			554.4	1,254.0	= 4,922.4
SUB TOTAL					15,862.0	485.1		2,772.0	1,254.0	= 20,373.1
Miscellaneous					7,137.9	218.3		1,247.4	564.3	= 9,167.9
GRAND TOTAL					22,999.9	703.4		4,019.4	1,818.3	= 29,541

APPENDIX

LIST OF APPENDIX



Appendix 1.1 Organization Chart of the Study

Table-A3.1(1) Zone Code Table(1) - SUMATERA

SUMATERA (Primary Zone Code : 1)

ZONE CODE	PROVINCE	KABUPATEN/KOTAMADYA	KECAMATAN	AIRPORT NAME
1	D.I. ACEH	SABANG .		MAIMUN SALEH/SABANG.
2	D.I. ACEH	ACEH BESAR, PIDIE, BANDA ACEH.	(SIGLI)	BLANGBINTANG
3	D.I. ACEH	ACEH UTARA, ACEH TIMUR	(MUARA DUA,LANGSA),LHOKSEUMAWE,(K.SIMPANG)	LHOK SEUMAWE, LHOK SUKON
4	D.I. ACEH	ACEH BARAT	JOHAN PAHLAWAN, (MEULABOH).	CUT NYAK DIEN/MEULABOH
5	D.I. ACEH	ACEH BARAT	TAPAH SEL, SIMEULU BRT/TMR/TENG	LASIKIN/SINABANG
6	D.I. ACEH	ACEH TENGAH		
7	D.I. ACEH	ACEH TENGGARA	(KUTACANE)	
8	D.I. ACEH	ACEH SELATAN	ACEH SELATAN DARATAN, (TAPAK TUAN)	RASIAN/TAPAKTUAN
9	D.I. ACEH	ACEH SELATAN	PULAU BANYAK	
10	SUMATERA UTARA	BINJAI, T.TINGGI, T.BALAI, MEDAN, KARO, DELAWAN.	(P.BRANDAN,GEBANG,BRASTAGI)	POLONIA/MEDAN
		LANGKAT, DELI SERDANG, ASAHAN.		
11	SUMATERA UTARA	DAIRI	(SINDI KALANG)	
12	SUMATERA UTARA	SIMALUNGUN, PEMATANGSIANTAR	SIANTAR,PARAPAT	SIBISA/PRAPAT, PABATU
13	SUMATERA UTARA	LABUHAN BATU	RANTAU PRAPAT	
14	SUMATERA UTARA	TAPANULI UTARA, SIBOLGA	(TARUTUNG),BALIGE,NAINGGOLAN.AMBARITA	PINANGSORE/SIBOLGA
15	SUMATERA UTARA	TAPANULI SELATAN, TAPANULI TENGAH.		AEKGODANG/P.SIDEMPUAN
16	SUMATERA UTARA	NIAS	IDANOGAWO	BINAKA/GUNUNG SITOLI
17	SUMATERA UTARA	NIAS	PULAU BATU	
18	SUMATERA BARAT	PASAMAN	LUBUK SIKAPING	
19	SUMATERA BARAT	AGAM, L.P.KOTA, TANAH DATAR ,PAYA KUMBUH.	(BUKIT TINGGI, PAYAKUMBUH, P. PANJANG),	
			(BATU SANGKAR).	
20	SUMATERA BARAT	SOLOK, SAWAHLUNTO, KODYA SOLOK	(SIJUNJUNG,SITIUNG)	
21	SUMATERA BARAT	PESISIR SELATAN, PADANG, KODYA PADANG, PARIAMAN.	(PAINAN), TELUK BAYUR,	TABING/PADANG
22	SUMATERA BARAT	PADANG PARIAMAN	SIBERUT, MUARA SEKABALUAN, SAGARI.	SIBERUT/ MUARA SIBERUT.
23	SUMATERA BARAT	PADANG PARIAMAN	SIPORA, PAGAI UTARA, PAGAI SELATAN	ROKOT/ SIPORA.
24	R I A U	BENGKALIS		
25	R I A U	PEKANBARU, KAMPAR		SIMPANGTIGA/P. BARU
26	R I A U	INDERAGIRI HULU		JAPURA/RENGAT
27	R I A U	KEP. RIAU	KEP. RIAU, KEP. LINGGA, SINGKEP, SENAYANG	SEIBATI,BATAM,DABO/SINGKEP
				KIJANG/TJ. PINANG
28	R I A U	INDERAGIRI HILIR		
29	R I A U	KEP.RIAU	KEP. ANAMBAS,(NATUNA)	
30	J A M B I	TANJUNG JABUNG, BATANGHARI, JAMBI		SULTAN TAHA/JAMBI
31	J A M B I	BUNGOTEBO, SOROLANGUN, BANGKO		PASIRMAYANG/MUARA BUNGU
32	J A M B I	KERINCI		DEPATI PARBO/SUNGAI PENUH.
33	SUM. SELATAN	MUSI ULU RAWAS	(LUBUK LINGGAU)	MUSI BLOCK/ LUBUK LINGGAU
34	SUM. SELATAN	MUSI BANYU ASIN, PALEMBANG	(SEKAYU)	TALANGBETUTU/PALEMBANG
35	SUM. SELATAN	OGAN KOMERING ILIR		
36	SUM. SELATAN	LEMATANG ILIR OGAN TENGAH, O.K. ULU	(MUARA ENIM, PRABU MULIH, BATU RAJA)	
37	SUM. SELATAN	LAHAT		KUALATUNGKAL
38	SUM. SELATAN	BANGKA, PANGKAL PINANG	(SUNGAI LIAT)	PANGKAL PINANG
39	SUM. SELATAN	BELITUNG	(TANJUNG PANDAN)	BULUH TUMBANG/TANJUNGPANDANG
40	BENGKULU	BENGKULU, B.UTARA, B.SELATAN, REJANG LEBONG		P.KEMILING/BENGKULU,MUKOMUKO
41	LAMPUNG	LAMPUNG UTARA	(KOTA BUMI)	

Table-A3.1(2) Zone Code Table(2) - JAWA/BALI

JAWA/BALI (Primary Zone Code : 2)

ZONE CODE	PROVINCE	KABUPATEN/KOTAMADYA	KECAMATAN	AIRPORT NAME
43	DKI.JAKARTA	JAK.SEL,JAK.TIMUR,JAK.BARAT,JAK.UTARA,JAK.PUSAT		SOEKARNO-HATTA, HALIM PERDA-NA KUSUMA,KEMAYORAN/ JAKARTA
44	JAWA.BARAT	SERANG,LEBAK,PADEGLANG	RANGKAS BITUNG, CILEGON	
45	JAWA.BARAT	TANGERANG	BATU CEPER	BUDIARTO/ CURUG.
46	JAWA.BARAT	BOGOR,KODYA BOGOR	(DEPOK), SAWANGAN, PARUNG, CIOMAS CITEUREP,CIBINONG,CIMANGGIS	
47	JAWA.BARAT	KRAWANG, BEKASI		
48	JAWA.BARAT	SUBANG, PURWAKARTA	JATI LUHUR	
49	JAWA.BARAT	SUKA BUMI,KOTAMADYA SUKA BUMI	PARUNG KUDA,PELABUHAN RATU	
50	JAWA.BARAT	CIANJUR		
51	JAWA.BARAT	BANDUNG,SUMEDANG,KODYA BANDUNG	PADALARANG,LEMBANG,PACET,UJUNG BERUNG BATU JAJAR	H. SASTRANEGARA/BANDUNG
52	JAWA.BARAT	INDRAMAYU, KUNINGAN, MAJALENGKA,CIREBON ,KOTAMADYA CIREBON		
53	JAWA.BARAT	TASIK MALAYA,GARUT,CIAMIS	BANJAR,PANGANDARAN,CIKAJANG	
54	JAWA.TENGAH	BREBES,TEGAL,PEMALANG,KODYA TEGAL		
55	JAWA.TENGAH	PEKALONGAN,BATANG,KENDAL,TEMANGGUNG,DEMAK,SEMARANG KODYA SALATIGA,KODYA SEMARANG	AMBARAWA	A. YANI/SEMARANG
56	JAWA.TENGAH	CILACAP,BANYUMAS,PURBALINGGA	CILACAP, PURWOKERTO, PURBOLINGGO.	TTNGGUL WULUNG/ CILACAP, WI-RASABA/ PURWOKERTO.
57	JAWA.TENGAH	KEBUMEN,PURWOREJO,WONOSOBO,BANJAR NEGARA,MAGELANG.		
58	JAWA.TENGAH	KOD.MGL.,JEPARA,KUDUS,GROBONGAN,BLORA,REMBANG,PATI		CEPU
59	JAWA.TENGAH	WONOGIRI,SUKOHARJO,KLATEN, BOYOLALI,SRAGEN,KARANG ANYAR,KODYA SURAKARTA	(SOLO)	ADISUMARNO/SOLO
60	DI YOGJAKARTA	BANTUL,SLEMAN,GUNUNG KIDUL,KULON PROGO ,KODYA YOGYAKARTA		ADISUCIPTO/YOGYA
61	JAWA.TIMUR	MAGETAN,KODYA MADIUN,MADIUN,NGANJUK,NGAWI, BOJONEGORO,TUBAN	MADSPATI	
62	JAWA.TIMUR	TULUNG AGUNG,TRENGGALEK,PACITAN,PONOROGO,KEDIRI KODYA KEDIRI		
63	JAWA.TIMUR	LAMONGAN,GRESIK,KODYA SURABAYA,SIDOARJO,KODYA PASU RUAN,PASURUAN,MOJOKERTO,KODYA MOJOKERTO,JOMBANG	GRESIK,GEDANGAN,WARU	JUANDA/SURABAYA.
64	JAWA.TIMUR	BANGKALAN,SAMPANG,PAMEKASAN,SUMENEP	KALI ANGET,KANAL, TANAH MERAH	TRUNOJOYO/SUMENEP.
65	JAWA.TIMUR	PROBOLINGGO,KODYA PROBOLINGGO,LUMAJANG,KODYA MALANG,MALANG,BLITAR,KODYA BLITAR	BATU, SINGOSARI,LAWANG,WLINGI	
66	JAWA.TIMUR	BANYUWANGI,SITUBONDO,BONDOWOSO,JEMBER	ASEM BAGUS,BESUKI,PANARUKAN,MUNCAR	
67	BALI	JEMBRANA,BULELENG,TABANAN,BANGLI,GIANYAR,BADUNG,		NGURAH RAI/DENPASAR

Table-A3.1(3) Zone Code Table(3) - NUSA TENGGARA

NUSA TENGGARA (Primary Zone Code : 3)

ZONE CODE	PROVINCE	KABUPATEN/KOTAMADYA	KECAMATAN	AIRPORT NAME
68	NUSA TGG BARAT	LOMBOK BARAT,LOMBOK TENGAH,LOMBOK TIMUR		SELAPARANG/AMPENAN(MATARAM).
69	NUSA TGG BARAT	SUMBAWA		SUMBAWA BESAR, LUNYUK
70	NUSA TGG BARAT	DOMPU,BIMA		S. SALAHUDIN/BIMA
71	NUSA TGG TIMUR	MANGGARAI	RUTENG	LABUHAN BAJO, SATAR - TACIK/ RUTENG.
72	NUSA TGG TIMUR	SIKA,NGADA	BAJAWA,ENDE	BAJAWA, ENDE
73	NUSA TGG TIMUR	FLORES TIMUR	TANJUNG BUNGA,LARANTUKA,NULUNG GITUNG	WAIOTI/MAUMERE, LARANTUKA
74	NUSA TGG TIMUR	FLORES TIMUR	ADONARA TIMUR,SOLOR BARAT,SOL OR TIMUR,BUYASARI,OMESURI,LLE APE,ATADEI,LEBATUKAN,WAGANU TUNG	
75	NUSA TGG TIMUR	ALOR		ALOR
76	NUSA TGG TIMUR	SUMBA BARAT		WAIKABUKA/TEMBULAKA
77	NUSA TGG TIMUR	SUMBA TIMUR		MAUHAU/WAINGAPU
78	NUSA TGG TIMUR	KUPANG	SABU BARAT	SABU
79	NUSA TGG TIMUR	KUPANG	RATE TIMUR,LOBALAIN.ROTE BARAT LAUT.ROTE BARAT DAYA	ROTE
80	NUSA TGG TIMUR	KUPANG	AMPOANG UTARA.AMPOANG SELATAN	
81	NUSA TGG TIMUR	KUPANG	FATULEU,KUPANG TIMUR,,AMARASI KUPANG TENGAH	PENFUI/KUPANG
82	NUSA TGG TIMUR	TIMOR TENGAH-SEL.TIMOR TENGAH-UTARA	SOE.KEFAMENANU	
83	NUSA TGG TIMUR	BELU	ATAMBUA	ATAMBUA
84	TIMOR TIMUR	LAUTEM.VIQUEQUE.BAUCAU.MANATUTO		BAUCAU/ BAUCAU.
85	TIMOR TIMUR	LIQUECA.ERMERA.AILEU,DILI		KOMORO/DILLI
86	TIMOR TIMUR	AINARO.MANUFANI		
87	TIMOR TIMUR	MALIANA.COVALIMA		

Table-A3.1(4) Zone Code Table(4) - KALIMANTAN

KALIMANTAN (Primary Zone Code : 4)

ZONE CODE	PROVINCE	KABUPATEN/KOTAMADYA	KECAMATAN	AIRPORT NAME
88	KALI BARAT	SAMBAS	(SINGKAWANG),SAMBAS	PALOH, SINGKAWANG II
89	KALI BARAT	PONTIANAK,KODYA PONTIANAK	MEMPAWAH HILIR	SUPADIO/PONTIANAK
90	KALI BARAT	SANGGAU	KAPUAS	
91	KALI BARAT	KAPUAS HULU	PUTUS IBAU	PUTUSSIBAU/ PUTUSSIBAU.
92	KALI BARAT	SINTANG	SINTANG	NANGAPINOH, SUSILO/ SINTANG.
93	KALI BARAT	KETAPANG	MATAN HILIR UTARA	KETAPANG
94	KALI TENGAH	BARITO UTARA	(MUARA TEWEH),TEWEH TENGAH	MUARATEWEH.
95	KALI TENGAH	BARITO SELATAN	(BUNTOK),DUSUN SELATAN	BUNTOK/ SANGGO.
96	KALI TENGAH	KAPUAS	SELAT	
97	KALI TENGAH	KODYA PALANGKA RAYA	PAHANDUT,BUKIT BATU	PANARUNG/PALANGKARAYA
98	KALI TENGAH	KOTA WARINGIN TIMUR	(SAMPIT)	SAMPIT
99	KALI TENGAH	KOTA WARINGIN BARAT	(PANGKALAN BUN)	PANGKALAN BUN
100	KALI SELATAN	TABALONG,HULUSEI TENGAH,HULUSEI SELATAN.TAPIN	TANJUNG,AMUNTAI TENGAH,BARABAI,	
		BARITO KUALA	TAPIN UTARA,BAKUMPAI,KANDANGAN.	
101	KALI SELATAN	KOTA BARU	SATUI,KUSANHILIR,KUSANHULU.BATU LICIN	
			KELUPANG SELATAN,KELUPANG HULU,'	
			KELUPANG TENGAH,KELUPANG UTARA,	
			SAPANAKAN,PANUKAN SELATAN.PANUKAN UTARA	
102	KALI SELATAN	KOTA BARU	PULAU LAUT,P.LAUT TIMUR,PULAU LAUT SEL,	STAGEN/KOTABARU
			PULAU SEBUKU,PULAU LAUT UTARA	
			PULAU LAUT BARAT	
103	KALI SELATAN	BANJAR,TANAH LAUT,KODYA BANJAR MASIN	(MARTA PURA,BANJAR BARU)	LONG BAWANG. SYAMSUDIN -
				NOOR/ BANJARMASIN.
104	KALI TIMUR	BULONGAN	PESO,MENTARANG,LUMBIS,KALINAU	TANJUNG HARAPAN
			SESAYAP LONG PUJUNGAN,SEBAKUNG,	
			KERAYAN	
105	KALI TIMUR	BULONGAN	LONG PUJANGAN	LONG APUNG/LONG BAWANG.
106	KALI TIMUR	BULONGAN	TARAKAN NUNUKAN	TARAKAN
107	KALI TIMUR	BERAU	TANJUNG REDEP	KALIMARAU/TANJUNG REDEP
108	KALI TIMUR	KUTAI	(TENGGARONG)	DATAHDAWAI
109	KALI TIMUR	KODYA SAMARINDA		TEMINDUNG/SAMARINDA
110	KALI TIMUR	KODYA BALIK PAPAN		SEPINGAN/ BALIKPAPAN.
111	KALI TIMUR	PASIR	TANAH GROGOT	TANAH GROGOT, SENIPAH

Table-A3.1(5) Zone Code Table(5) - SULAWESI

SULAWESI (Primary Zone Code : 5)

ZONE CODE	PROVINCE	KABUPATEN/KOTAMADYA	KECAMATAN	AIRPORT NAME
112	SULAWESIUTARA	SANGIR TALAUD	RAWIS,BEO,ESSANG,MANGATUNITU, LIRUNG,KENDANG,TAHUNA	MELANGGOANE
113	SULAWESIUTARA	SANGIR TALAUD	TAGULADANG,SIAU TIMUR,SIAU BAR AT,TAMAKA,TABUKAN TIMUR,TABU KAN TENGAH,TABUKANSELATAN,TAB URUAN,MANUSA.	TAHUNA
114	SULAWESIUTARA	MINA HASA,KODYA MANADO	(TONDANO, MANADO)	SAM RATULANGI/MANADO
115	SULAWESIUTARA	BOLAANG MONGONDOW	(KOTAMU BAGU)	BOLAANG MONGONDOW/KOTAMOBAGU
116	SULAWESIUTARA	GORON TALO,KODYA GORON TALO	(LIMBOTO,GORONTALO)	JALALUDIN/ GORONTALO.
117	SULAWESITENGAH	TOLI-TOLI		TOLI-TOLI
118	SULAWESITENGAH	DONGGALA		MUTIARA/PALU
119	SULAWESITENGAH	POSO	POSO KOTA,POSO PESISIR,BUNGKU	POSO
120	SULAWESITENGAH	POSO	AMPANA KOTA,BORANE,UNA-UNA	
121	SULAWESITENGAH	BANGGAI	BALANTAK,BAGAMANA,KINTOM BATUI,BUNTA,LUWUK	LUWUK
122	SULAWESITENGAH	BANGGAI	BULAGI,LIANG,BANGGAI	
123	SULAWESI SEL	LUWU	(PALOPO)	SORODAKO, MALILI, MASAMBA
124	SULAWESI SEL	MAMUJU		MAMUJU
125	SULAWESI SEL	TANA TORAJA,MAJENE,POLEWALI MEMASA		TANA TORAJA/MAKALE
126	SULAWESI SEL	ENREKANG,PINRANG.SINDERENG RAPPANG		
127	SULAWESI SEL	SOPPENG.BONE		
128	SULAWESI SEL	JANE PANTO,TAKALAR,GOWA,MAROS,PANGKAJENE		HASANUDDIN/U.PANDANG
129	SULAWESI SEL	BANTA ENG.BULU KUMBA,SINJAI		
130	SULAWESI SEL	SELAYAR		
131	SULAWESI TENGG	KENDARI		W. MONGONSIDI/KENDARI
132	SULAWESI TENGG	KOLAKAKA		/KOLAKA
133	SULAWESI TENGG	BUTON	POLEANG,RUBIA	
134	SULAWESI TENGG	BUTON	LEEO	/BUTON/BAUBAU
135	SULAWESI TENGG	BUTON	LASALIMU,WANGI-WANGI	
136	SULAWESI TENGG	MUNA	KAMBARA, WARUKU, LASIHAO	
137	SULAWESI TENGG	MUNA	EREKE	KOSAMBI/RAHA

Table-A3.1(6) Zone Code Table(6) - MALUKU

MALUKU (Primary Zone Code : 6)

ZONE CODE	PROVINCE	KABUPATEN/KOTAMADYA	KECAMATAN	AIRPORT NAME
138	MALUKU	MALUKU UTARA	MOROTAI SELATAN,MOROTAI UTARA	MOROTAI
139	MALUKU	MALUKU UTARA	JAILOLO,KAO,SAHU,IBU,LOLODA,TABELO,GALELA	G.MALOMO/GALELA, KAO/KUABANG
140	MALUKU	MALUKU UTARA	KOTA TERNATE,PULAU TERNATE,MAKAN,KAYOA	BABULLAH/TERNATE
141	MALUKU	HALMA HERA TENGAH		
142	MALUKU	MALUKU UTARA	BACAN,KEPULAUN BACAN	LAABUHA
143	MALUKU	MALUKU UTARA	OBI,KEPULAUAN OBI	
144	MALUKU	MALUKU UTARA	PULAU GEBE	
145	MALUKU	MALUKU UTARA	P.MANGGANE	MANGOLE
146	MALUKU	MALUKU UTARA	P.TALI ABU	TALIABU
147	MALUKU	MALUKU TENGAH	P.BURU	NAMLEA
148	MALUKU	MALUKU TENGAH	BOANO,P.KELANG,P.MANIPA,MASOHI	AMAHAI
			P.SERAM),KEP SAPARUA	
149	MALUKU	AMBON,KODYA AMBON		PATIMURA/AMBON
150	MALUKU	MALUKU TENGAH	P,SERAM(KOBI,TEHARU,WARU)	
151	MALUKU	MALUKU TENGAH	KEP.SERAM LAUT,P.PANJANG,P.	
			GORONG,MANAWOKA	
152	MALUKU	MALUKU TENGAH	KEPULAUAN BANDA	BANDANEIRA
153	MALUKU	MALUKU TENGGARA	KEP KAI	LANGGUR/DUMATUBUN
154	MALUKU	MALUKU TENGGARA	P.YANDENA	
155	MALUKU	MALUKU TENGGARA	KEP.TENGGARA	
156	MALUKU	MALUKU TENGGARA	P.WETAR	
157	MALUKU	MALUKU TENGGARA	KEP.ARU	

Table-A3.1(7) Zone Code Table(7) - IRIAN JAYA

IRIAN JAYA (Primary Zone Code : 7)

ZONE CODE	PROVINCE	KABUPATEN/KOTAMADYA	KECAMATAN	AIRPORT NAME
158	IRIAN JAYA	SORONG	WAGIO SEL,WAGIO UTARA	
159	IRIAN JAYA	SORONG	SALAWATI	
160	IRIAN JAYA	SORONG	MISOOL	
161	IRIAN JAYA	SORONG	MAKBONE,SORONG,BERAUR,TEMINABU	JEFFMAN, TINABUHAN, INAN -
			AN,SAUSAPUR,AIFAT,AYA MARU,AITI	WATAN/ SORONG.
			NYO,INAM WATAN,SEGET	
162	IRIAN JAYA	MANOKWARI	AMBARBAKEN,ARANSRARI,MANOKWARI	RENDANI/MANOKWARI
			KEMBAR,WARMARE ANGGI	
163	IRIAN JAYA	MANOKWARI	BABO,WINDESI,BINTUNI,MERDEI,	IJAHABRA, BINTUNI
			WASIOR,RANSIKI	
164	IRIAN JAYA	FAK-FAK	KOKAS,FAK-FAK	FAK-FAK
165	IRIAN JAYA	FAK-FAK	KAIMANA,TELUK ENTA,T.ARGUNI	KAIMANA
166	IRIAN JAYA	FAK-FAK	AKIMUGA,MIMIKA TIM,MIMIKA BAR	TIMIKA, KOKONAO
167	IRIAN JAYA	PANIAE	SUGAPA,MOMEYO,PANIAE TIM,NAFAN	NABIRE,WASIOR,MOANAMANI
			NABINE,KAMU.UWAPA,MAPIA,PANIAE	
			BARATT,TIBI,YANUR	
168	IRIAN JAYA	PANIAE	ILU,MULIA.SINAK,BIOGA,ILAGA	WAGHETE,ENAROTALI,MULIA
169	IRIAN JAYA	YAPEN WAROPEN	WAROPEN BAWAH,WAROPEN ATAS	
170	IRIAN JAYA	YAPEN WAROPEN	YAPEN SEL,YAPEN TIM,YAPEN BAR	SERUI
171	IRIAN JAYA	JAYA PURA	PONTAI TIMUR,TOR ATAS,SARMI.	SARMI
			PONTAI BARAT,MAMBRAMO HILIR.	
			MAMBRAMO TENGAH,MAMBRAMO HULU	
172	IRIAN JAYA	JAYA PURA	JAYA PURA UTARA,JAYA PURA SEL	SENTANI/JAYAPURA
			AMBEPURA,SENTANI,DEPAPRE,DEMTA	
			GENYEM,KEMTUK GRESI,ARSO,WARIS,	
			BANGGO,UNURUMUM GUAH,KAUREH,	
			WEB,SENGGI	
173	IRIAN JAYA	JAYA WIJAYA	KIWIROK,OKSIBIL,ABMISIBIL	OKSIBIL
174	IRIAN JAYA	YAYA WIJAYA	KURIMA,BAKONDINI,KURULU,WAMENA,	WAMENA/JAYAWIJAYA, BOKONDINI
			ASOLOSIWA,KELILA,TIONG,MANSKI	
			KARUBAGA	
175	IRIAN JAYA	MERAUKE	ABATS,ATSY,SAWA ERMA	
176	IRIAN JAYA	MERAUKE	CITAK-METAK,JAIR,ASGON,OBAA,	KEPI
			NAM BOI,EDERA,PIRI HAPUN	
177	IRIAN JAYA	MERAUKE	WARAPONA,MINDIP TANAH,KAUH.	TANAHMERAH,MINDIPTANAH
			MANDOBO	
178	IRIAN JAYA	MERAUKE	MERAUKE,MUTING	MOPAH/ MERAUKE.
179	IRIAN JAYA	MERAUKE	OKABA	OKABA
180	IRIAN JAYA	MERAUKE	KIMAAN	
181	IRIAN JAYA	BIAK NUMFOR		FRANS KAISIEPO/BIAK

Table-A3.2(1) Present Passenger OD Table of the Air Transport in 1984

O \ D	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	433	777	5	4	0	0	0	1218
JAWA/BALI	777	1840	101	453	256	16	21	3465
NUSA TENGGARA	5	101	131	0	11	0	0	248
KALIMANTAN	4	453	0	566	27	0	0	1049
SULAWESI	0	256	11	27	256	47	31	627
MALUKU	0	16	0	0	47	40	14	117
IRIAN JAYA	0	21	0	0	31	14	250	316
TOTAL	1218	3465	248	1049	627	117	316	7040

Table-A3.2(2) Present Passenger OD Table of the Sea Transport in 1984

D O	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	450	2305	1	9	8	1	0	2773
JAWA/BALI	2305	11325	142	185	240	26	20	14244
NUSA TENGGARA	1	142	265	1	4	1	0	414
KALIMANTAN	9	185	1	32	78	2	0	306
SULAWESI	8	240	4	78	220	37	25	611
MALUKU	1	26	1	2	37	38	11	116
IRIAN JAYA	0	20	0	0	25	11	44	101
TOTAL	2773	14244	414	306	611	116	101	18565

Table-A3.3 Present Cargo OD Table of the Air Transport in 1984

O \ D	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	7601	15936	232	66	0	0	0	23835
JAWA/BALI	15936	26174	2516	10830	8369	565	539	64929
NUSA TENGGARA	232	2516	1448	0	168	0	0	4364
KALIMANTAN	66	10830	0	9446	302	0	0	20644
SULAWESI	0	8369	168	302	6338	1455	964	17596
MALUKU	0	565	0	0	1455	612	193	2825
IRIAN JAYA	0	539	0	0	964	193	16437	18133
TOTAL	23835	64929	4364	20644	17596	2825	18133	152326

Table-A3.4(1) Future Passenger OD Table of the Air Transport in 1994

D O	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	536	1069	5	5	0	0	0	1615
JAWA/BALI	1069	2815	126	593	338	20	27	4987
NUSA TENGGARA	5	126	133	0	11	0	0	275
KALIMANTAN	5	593	0	634	30	0	0	1262
SULAWESI	0	338	11	30	292	50	34	755
MALUKU	0	20	0	0	50	40	14	124
IRIAN JAYA	0	27	0	0	34	14	259	334
TOTAL	1615	4987	275	1262	755	124	334	9351

Table-A3.4(2) Future Passenger OD Table of the Sea Transport in 1994

O \ D	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	641	3199	2	12	11	1	0	3866
JAWA/BALI	3199	15299	196	247	325	36	29	19331
NUSA TENGGARA	2	196	370	1	5	1	0	574
KALIMANTAN	12	247	1	42	105	3	0	409
SULAWESI	11	325	5	105	299	52	35	831
MALUKU	1	36	1	3	52	55	16	165
IRIAN JAYA	0	29	0	0	35	16	64	144
TOTAL	3866	19331	574	409	831	165	144	25321

Table-A3.4(3) Future Passenger OD Table of the Air Transport in 2004

O \ D	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	701	1522	6	6	0	0	0	2235
JAWA/BALI	1522	4361	160	803	460	24	34	7364
NUSA TENGGARA	6	160	138	0	13	0	0	317
KALIMANTAN	6	803	0	751	36	0	0	1596
SULAWESI	0	460	13	36	349	55	38	949
MALUKU	0	24	0	0	55	40	14	134
IRIAN JAYA	0	34	0	0	38	14	271	357
TOTAL	2235	7364	317	1596	949	134	357	12951

Table-A3.4(4) Future Passenger OD Table of the Sea Transport in 2004

O \ D	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	888	4286	2	15	15	2	1	5209
JAWA/BALI	4286	19822	258	316	424	49	39	25194
NUSA TENGGARA	2	258	496	1	6	2	0	765
KALIMANTAN	15	316	1	53	135	4	0	524
SULAWESI	15	424	6	135	392	70	49	1090
MALUKU	2	49	2	4	70	77	23	227
IRIAN JAYA	1	39	0	0	49	23	93	205
TOTAL	5209	25194	765	524	1090	227	205	33215

Table-A3.5(1) Future Cargo OD Table of the Air Transport in 1994

O \ D	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	8819	21940	236	73	0	0	0	31068
JAWA/BALI	21940	43279	2738	14266	10863	637	663	94387
NUSA TENGGARA	236	2738	1584	0	179	0	0	4738
KALIMANTAN	73	14266	0	10033	319	0	0	24692
SULAWESI	0	10863	179	319	6762	1463	1002	20589
MALUKU	0	637	0	0	1463	640	211	2951
IRIAN JAYA	0	663	0	0	1002	211	16904	18781
TOTAL	31068	94387	4738	24692	20589	2951	18781	197206

Table-A6.1 Questionnaires for the Airport Facility Survey

(I) General Condition of Airport and Air Traffic:

Item \ Grade	4	3	2	1
1. Service Commencement (Year)	10 > X	10 - 20	20 - 30	30 < X
2. Distance to City/Town (km)	30 - 20	60 - 30	60 < X	20 > X
3. Land Size of Airport (ha)	200 < X	200 - 130	130 - 70	70 > X
4. Elevation of Airport (m)	12 < X	12 - 6	6 - 3	3 > X
5. Air Service Formation	Primary	Secondary	Tertiary	Access, Feeder
6. Air Service Regularity	Int'l & Dom, Scheduled	Dom, Scheduled	Dom, Non-Scheduled	GA/Non-Scheduled
7. Flight Operation Hour (hur)	10 < X	10 - 6	6 - 3	3 > X
8. Number of Airport Staff (man)	100 < X	100 - 50	50 - 10	10 > X

(II) Maximum Operation Aircraft and Airport Facility:

Item \ Grade	4	3	2	1
1. Maximum Operation Aircraft	Wide body jet	Ord. jet	Ord. Plane	Small Plane
2. Runway Length (m)	3,000 < X	3,000 - 1,800	1,800 - 800	800 > X
3. Passenger Terminal Bldg. (m^2, 10^3)	20 < X	20 - 5	5 - 2	2 > X
4. Cargo & Other Ancillary Bldg (m^2, 10^3)	6 < X	6 - 3	3 - 1	1 > X
5. Elect. & Mech. Service Utilities	Good	Fair	Bad	Worst
6. Airport Navigation Aids	IFR/ High Qlt'y	IFR/ Ord. Qlt'y	VFR/ High Qlt'y	VFR/ Ord. Qlt'y

(III) Air Flight Services:

Item \ Grade	4	3	2	1
1. Number of Operation Air Route	12 < X	12 - 6	6 - 3	3 > X
2. Int'l and Dom. Pax Demand (10^3, man)	300 < X	300 - 100	100 - 20	20 > X
3. Int'l and Dom. Cargo Demand (10^3, ton)	50 < X	50 - 10	10 - 1	1 > X
4. Number of Aircraft Movement (10^3)	100 < X	100 - 30	30 - 3	3 > X

(IV) Natural Characteristic:

Item \ Grade	4	3	2	1
1. Topography	Flatly	Hilly	River Bed	Swamp, Mount, Coast
2. Foundation Condition	Very Hard	Hard	Soft	Very Soft
3. Ground Water Level (m)	10 < X	10 - 5	5 - 1	1 > X

Table-A3.5(2) Future Cargo OD Table of the Air Transport in 2004

O \ D	SUMATERA	JAWA/BALI	NUSA TENGGARA	KALIMANTAN	SURAWESI	MALUKU	IRIAN JAYA	TOTAL
SUMATERA	10793	31871	246	86	0	0	0	42995
JAWA/BALI	31871	74526	3199	19756	15108	775	848	146082
NUSA TENGGARA	246	3199	1691	0	185	0	0	5322
KALIMANTAN	86	19756	0	11158	353	0	0	31352
SULAWESI	0	15108	185	353	7308	1504	1079	25538
MALUKU	0	775	0	0	1504	682	212	3173
IRIAN JAYA	0	848	0	0	1079	212	17888	20027
TOTAL	42995	146082	5322	31352	25538	3173	20027	274489

Table-A6.2 PROVISIONAL SPECIFICATION OF RUNWAY IMPROVEMENT
(EXTENSION AND OVERLAY)

( ) ..... Assumed

(DESIGN DATE: Feb.26,'88)

No.	Requested Seat	Requested Runway, L x W (m)	Max. T-O Weight (t)	Runway Extension (cm)		Runway Overlay (cm)	Similar Aircraft
				Conc. Slab	Base & Sub-Base Course	Conc. Slab	
1.	10	500 x 18	2.73	20	51	9	BN-2A
2.	20	800 x 23	5.67	20	51	9	DHC-6
3.	35	1,100 x 30	14.40	20	51	9	CN-235
4.	50	1,400 x 30	20.41	20	51	9	F-27
5.	70	1,800 x 45	28.00	(30)	51	(22)	(Future)
6.	100	2,000 x 45	40.00	(30)	51	(22)	(Future)
7.	150	2,400 x 45	44.45	30	51	22	DC-9
8.	225	2,800 x 45	160.00	(35)	51	(27)	(Future)
9.	340	2,900 x 45	270.00	(35)	51	(27)	(Future)
10.	510	2,900 x 45	377.84	38	51	30	B-747-300

General Notes: 1) Proposed seat and runway length without width and designated (.) max. T-O weight will be offered by SJAC (The Society of Japanese Aerospace Companies, Inc.).

2) Min. width of runway conforms to ICAO Recommendation.

3) Criteria of concrete pavement in step of this pre-master planning will be required based on the field CBR 2% and K75 = 1.8 kg/cm³ to be supposed to the natural ground condition of Indonesia by the Consultant.

4) An aircraft to be subjected, is referred to current aircraft to be possessed in Indonesia.

Table-A6.3 ROUGH UNIT PRICE OF RUNWAY IMPROVEMENT BY AIRPORT CIVIL ENGINEER
(PER METER FOR EXTENSION AND OVERLAY)

(DESIGN DATE: Feb.26,'88)

Description \ Improvement	UNIT PRICE OF RUNWAY EXTENSION (Rp.)						UNIT PRICE OF RUNWAY OVERLAY (Rp.)					
Number of Seat	510	225 - 340	70 - 150	35 - 50	20	10	510	225 - 340	70 - 150	35 - 50	20	10
Runway, L x W (m)	2,900 x 45	2,800 x 45 2,900 x 45	1,800 x 45 2,000 x 45 2,400 x 45	1,100 x 30 1,400 x 30	800 x 23	500 x 18	2,900 x 45	2,800 x 45 2,900 x 45	1,800 x 45 2,000 x 45 2,400 x 45	1,100 x 30 1,400 x 30	800 x 23	500 x 18
1) Earth Work	1,265,000	1,265,000	1,265,000	1,265,000	630,000	655,000	190,000	190,000	190,000	190,000	95,000	98,000
2) Drainage Work	133,000	133,000	133,000	141,000	66,000	69,000	20,000	20,000	20,000	21,000	10,000	10,000
3) Pavement Work	4,320,000	4,140,000	3,870,000	2,206,000	1,691,000	1,324,000	2,687,000	2,515,000	2,292,000	876,000	671,000	525,000
4) Road Work	465,000	465,000	465,000	465,000	465,000	465,000	-	-	-	-	-	-
5) Civil Miscellaneous Work	927,000	900,000	860,000	697,000	428,000	377,000	435,000	410,000	375,000	176,000	117,000	95,000
6) Land Acquisition and Compensation	387,000	387,000	387,000	387,000	194,000	194,000	-	-	-	-	-	-
7) Total	7,497,000 ($ 4,410)	7,290,000 ($ 4,288)	6,980,000 ($ 4,106)	5,161,000 ($ 3,036)	3,474,000 ($ 2,044)	3,084,000 ($ 1,814)	3,332,000 ($ 1,960)	3,135,000 ($ 1,844)	2,877,000 ($ 1,692)	1,263,000 ($ 743)	893,000 ($ 525)	728,000 ($ 428)

General Notes:

1) Rough unit price mentioned above, is estimated based on the provisional specification of runway improvement,

2) Existing field condition be supposed as follows.
   . flatly and silty clay . ground water level, < -3 m
   . elevation of airport reference point, > 6 m

3) Ground improvement (Rp. 52,000/m^3) and/or Sub-drainage system (Rp. 120,000/m) be added to above unit price, if any.

4) For independent grasping of the rough cost of proposed airport regardless of the scope of work, be referred to the recent some airport development projects in the south-east asia between 1981 and 1987, and the fluctuating rate of unit price with engineering construction material be accounted to 6% up per year.

5) The exchange rate as of Dec. 1987, is employed on U.S.$ 1.00 is equal to Rp. 1,700.00 and Yen 132.00.

Table A6.4 Standard of Airfield Facility Recommended by ICAO

CATEGORIZATION OF AIRPORT			A	B	C	D	E
STANDARD LENGTH OF RUNWAY			>= 2,100 m	~ 1,500 m	~ 900 m	~ 750 m	~ 600 m
RUNWAY	WIDTH		>= 45 m		L1 >= 30 m	>= 23 m	>= 18 m
	MAXIMUM LONGITUDINAL SLOPE		1 %			2 %	
	MAXIMUM TRANSVERSE SLOPE		1.5 %			2 %	
LANDING STRIP	LENGTH		(RUNWAY LENGTH) + MORE THAN 120 m			(RUNWAY LENGTH) + MORE THAN 60 m	
	WIDTH	FOR INSTRUMENT RUNWAY	>= 300 m				
		FOR NON-INSTRUMENT RUNWAY	>= 150 m			>= 80 m	>= 60 m
	WIDTH GRADING AREA AND REMOVAL OF OBSTRUCTION	FOR INSTRUMENT RUNWAY	>= 150 m				
		FOR NON-INSTRUMENT RUNWAY	>= 150 m		>= 120 m	>= 80 m	>= 60 m
	MAXIMUM LONGITUDINAL SLOPE OF GRADING AREA		1.5 %	1.75 %		2 %	
	MAXIMUM TRANSVERSE SLOPE	L2 INSIDE OF GRADING AREA	2.5 %			3 %	
		OUTSIDE OF GRADING AREA	5 % UPSLOPE FROM EDGE OF GRADING AREA TO OUTSIDE				
TAXIWAY	WIDTH		>= 23 m		L3 >= 15 m	>= 10 m	>= 7.5 m
	MAXIMUM LONGITUDINAL SLOPE		1.5 %			3 %	
	MAXIMUM TRANSVERSE SLOPE		1.5 %			2 %	
MAXIMUM CLEARANCE BETWEEN EDGE OF TAXIWAY AND FIXED OBSTRUCTION			38 m	30 m	26 m	18 m	16 m
MINIMUM CLEARANCE BETWEEN EDGE OF TAXIWAY AND EDGE OF RUNWAY		FOR INSTRUMENT RUNWAY	150 m				
		FOR NON-INSTRUMENT RUNWAY	75 m	73 m		36 m	29 m
MINIMUM CLEARANCE BETWEEN EDGE OF TAXIWAYS			62 m	52 m	43 m	27 m	23 m

NOTE : L1 : 45 m WIDTH WILL BE PROPOSED FOR THE WIDEBODY AND LARGEBODY AIRCRAFT.
L2 : 75 m WIDTH FROM CENTER LINE OF RUNWAY WILL BE PROPOSED FOR EACH SIDE, AND POSSIBLE OF MAX. SLOPE 5 % WITHIN 3 m FROM RUNWAY AND STOPWAY.
L3 : 23 m WIDTH WILL BE PROPOSED FOR WIDE WHEEL INTERVAL AND HIGH SPEED EXIT TAXING IN THE TAXIWAY.

Table-A6.5 Standard of Sea Air Station Facility

CLASSIFICATION / DESCRIPTION			I	II	III	REMARKS
ANNUAL PASSENGER DEMMAND			> 400,000	400,000 ~ 60,000	< 60,000	
LANDING WATER-WAY	LENGTH		1,000 m			
	DEPTH OF WATER		> 3 m			AT LOW TIDE
	WIDTH		. MORE THAN 255 m FOR INSTRUMENT . MORE THAN 65 m FOR NON-INSTRUMENT			AT LOW TIDE
	NUMBER AND FORM		TARGET > W.C 95%	. >95% ..., ONE WATER WAY . <95% ..., TRIANGLE		W.C ... WIND COVERAGE
RADIUS OF REVOLUTION			RADIUS >70m FOR NON-INSTRUMENT WATER WAY			
TAXING WATER WAY	LAYOUT		TYPE OF HIGH-SPEED EXIT	TYPE OF "T" OR "Y"	TYPE OF "I"	
	WIDTH		75 m			AT LOW TIDE
	DEPTH OF WATER		> 3 m			AT LOW TIDE
VISUAL AIDS OF AIR STATION			INSTRUMENT OR NON-INSTRUMEN APPROACHES		NON-INSUMENT APPROACH	
CONDITION OF SEA SURFACE			MAXIMUM 3			GRADE OF WAVES/S.S3, WAVES HEIGHT = 1.5 m
SLIPWAY OF LOADING			WIDTH > 20 m, SLOPE <1/10, TIP OF WATER DEPTH> 2.8 m			
PARKING AREA	LOADING SPACE		LAND	LAND OR WATER SRFACE		
	NIGHT-STAY SPACE		LAND		_____	
	PARKING SPACE		LAND	LAND OR WATER SURFACE		
PARKING FORMATION			SELF-IN, SELF-OUT	SELF-IN & SELF-OUT		
GUIDANCE OF SPOT-IN			MARKING	MARKING OR BUOY		
FIXING FORMATION OF PARKING			WHEEL BREAKING CHOKE	WHEEL BREAKING, CHOKE OR BUOY		
AIRCRAFT OPERATION SERVICES	FUEL SUPPLYING		HYDRANT	REFUELER	_____	
	LAND SERVICE EQUIPMENT		GROUND SERVICE EQUIPMENT		_____	
	CABIN SERVICE EQUIPMENT		GROUND SERVICE EQUIPMENT		_____	
	BOARDING FOR PASSENGER		PAX STEP	PAX STEP OR PIER		
	LOADING FOR CARGO		GROUND SERVICE EQUIPMENT	GROUND SERVICE EQUIPMENT OR PIER LOADING EQUIPMENT		
METHOD OF MAINTENANCE FOR AIRCRAFT			PARKING APRON	PARKING APRON/LAND		
AIR TRAFFIC CONTROL SERVICES	AIR TRAFFIC SERVICES		AIRPORT OPERATION CONTROL			
	OPERATION HOUR OF AIR STATION		12 HOURS	10 - 8 HOURS (DAY-TIME)		
	AIR TRAFFIC CONTROL EQUIPMENT		AIR GROUND, RADIO & RADER	AIR-GROUND, RADIO		
AIRCRAFT NAVIGATION	METHOD OF AIR FLIGHT OPERATION		I F R		V F R	
	AIR TRAFFIC SYSTEM		ADF or VOR			
	AIR NAVIGATION AIDS		VOR / DME		N D B	
LANDING APPROACH			ASR, SSR, ADF, VOR		V F R	
OBSTACLE LIMITATION SURFACE	INSTRUMENT APPROACH SURFACE		LENGTH = 2,000 m, WIDTH OF INSIDE : I = 255 m, V = 5 m, WIDTH OF OUTSIDE : I = 1,200 m, V = 750 m, SLOPE : I = 1/50, V = 1/20			
	TRANSITIONAL SURFACE		SLOPE : 1/7			
	INSIDE HORIZONTAL SURFACE		RADIOUS : 1,000 m, HEIGHT from W.L = 45 m			

Table-A6.6 ROUGH COST ESTIMATE FOR RECONSTRUCTION OF RUNWAY IMPROVEMENT AND NEW CONSTRUCTION OF AIRPORT
(SCINARIO - A)

(DESIGN DATE: Feb.26,'88)

		Number of Seat and Unit Price per meter			1994				2004			
					Runway Extension		Runway Overlay		Runway Extension		Runway Overlay	
		Number of Seat	Extension	Overlay	Q'ty (m)	Amount ($)	Q'ty (m)	Amount ($)	Q'ty (m)	Amount ($)	Q'ty (m)	Amount ($)
Reconstruction of Runway Improvement by the Airport Civil Engineer	Major National Airport	510	$ 4,410	$ 1,960	2,345	10,341,450	6,355	12,455,800	4,150	18,301,500	7,450	14,602,000
		225 - 340	$ 4,288	$ 1,844	8,960	38,420,480	22,240	41,010,560	13,165	56,451,520	23,535	43,398,540
		70 - 150	$ 4,106	$ 1,692	-	-	-	-	-	-	-	-
		30 - 50	$ 3,036	$ 743	-	-	-	-	-	-	-	-
		20	$ 2,044	$ 525	-	-	-	-	-	-	-	-
		10	$ 1,814	$ 428	-	-	-	-	-	-	-	-
		Sub.Total:			11,305	48,761,930	28,595	53,466,360	17,315	74,753,020	30,985	58,000,540
	National Airport	510	$ 4,410	$ 1,960	-	-	-	-	-	-	-	-
		225 - 340	$ 4,288	$ 1,844	-	-	-	-	-	-	-	-
		70 - 150	$ 4,106	$ 1,692	11,325	46,500,450	28,075	47,502,900	13,290	54,568,740	33,510	56,698,920
		35 - 50	$ 3,036	$ 743	-	-	-	-	-	-	-	-
		20	$ 2,044	$ 525	-	-	-	-	-	-	-	-
		10	$ 1,814	$ 428	-	-	-	-	-	-	-	-
		Sub.Total:			11,325	46,500,450	28,075	47,502,900	13,290	54,568,740	33,510	56,698,920
	Regional Airport	510	$ 4,410	$ 1,960	-	-	-	-	-	-	-	-
		225 - 340	$ 4,288	$ 1,844	-	-	-	-	-	-	-	-
		70 - 150	$ 4,106	$ 1,692	-	-	-	-	-	-	-	-
		35 - 50	$ 3,036	$ 743	9,995	30,344,820	22,405	16,646,915	12,850	39,012,600	22,150	16,457,450
		20	$ 2,044	$ 525	1,090	2,227,960	5,310	2,787,750	820	1,676,080	3,980	2,089,500
		10	$ 1,814	$ 428	-	-	-	-	-	-	-	-
		Sub.Total:			11,085	32,572,780	27,715	19,434,665	13,670	40,688,680	26,130	18,546,950
	Total:				33,715	127,835,160	84,385	120,403,925	44,275	170,010,440	90,625	133,246,410

New Construction of Proposed Airport in the potential new air route	Fac. Type	Unit Cost (10^3)	Q'ty	Amount (10^3)	Fac. Type	Unit Cost (10^3)	Q'ty	Amount (10^3)
	A/Cat-IV	$ 12,210	-	$ -	A/Cat-IV	$ 12,210	1	$ 12,210
	B/Cat-IV	$ 11,010	2	$ 22,020	B/Cat-IV	$ 11,010	2	$ 22,020
	C/Cat-V	$ 4,450	1	$ 4,450	C/Cat-V	$ 4,450	-	$ -
	Total:		3	$ 26,470 (10^3)	Total:		3	$ 34,230 (10^3)

Table-A6.7 ROUGH COST ESTIMATE FOR RECONSTRUCTION OF RUNWAY IMPROVEMENT AND NEW CONSTRUCTION OF AIRPORT
(SCINARIO - B)

(DESIGN DATE: Feb.26,'88)

		Number of Seat and Unit Price per meter			1994				2004			
					Runway Extension		Runway Overlay		Runway Extension		Runway Overlay	
		Number of Seat	Extension	Overlay	Q'ty (m)	Amount ($)	Q'ty (m)	Amount ($)	Q'ty (m)	Amount ($)	Q'ty (m)	Amount ($)
Reconstruction of Runway Improvement by the Airport Civil Engineer	Major National Airport	510	$ 4,410	$ 1,960	-	-	-	-	-	-	-	-
		225 - 340	$ 4,288	$ 1,844	-	-	-	-	300	1,286,400	2,500	4,610,000
		70 - 150	$ 4,106	$ 1,692	-	-	-	-	-	-	-	-
		35 - 50	$ 3,036	$ 743	-	-	-	-	-	-	-	-
		20	$ 2,044	$ 525	-	-	-	-	-	-	-	-
		10	$ 1,814	$ 428	-	-	-	-	-	-	-	-
		Sub.Total:			-	-	-	-	300	1,286,400	2,500	4,610,000
	National Airport	510	$ 4,410	$ 1,960	-	-	-	-	-	-	-	-
		225 - 340	$ 4,288	$ 1,844	-	-	-	-	-	-	-	-
		70 - 150	$ 4,106	$ 1,692	2,455	10,080,230	10,345	17,503,740	4,510	18,518,060	21,890	37,037,880
		30 - 50	$ 3,036	$ 743	-	-	-	-	-	-	-	-
		20	$ 2,044	$ 525	-	-	-	-	-	-	-	-
		10	$ 1,814	$ 428	-	-	-	-	-	-	-	-
		Sub.Total:			2,455	10,080,230	10,345	17,503,740	4,510	18,518,060	21,890	37,037,880
	Regional Airport	510	$ 4,410	$ 1,960	-	-	-	-	-	-	-	-
		225 - 340	$ 4,288	$ 1,844	-	-	-	-	-	-	-	-
		70 - 150	$ 4,106	$ 1,692	-	-	-	-	-	-	-	-
		35 - 50	$ 3,036	$ 743	1,950	5,920,200	2,850	2,117,550	2,935	8,910,660	6,465	4,803,495
		20	$ 2,044	$ 525	150	306,600	650	341,250	1,095	2,238,180	4,505	2,365,125
		10	$ 1,814	$ 428	-	-	-	-	-	-	-	-
		Sub Total:			2,100	6,226,800	3,500	2,458,800	4,030	11,148,840	10,970	7,168,620
	Total:				4,555	16,307,030	13,845	19,962,540	8,840	30,953,300	35,360	48,816,500

New Construction of Proposed Airport in the potential new air route	Fac. Type	Unit Cost (10^3)	Q'ty	Amount (10^3)	Fac. Type	Unit Cost (10^3)	Q'ty	Amount (10^3)
	A/Cat-IV	$ 12,210	-	$ -	A/Cat-IV	$ 12,210	-	$ -
	B/Cat-IV	$ 11,010	1	$ 11,010	B/Cat-IV	$ 11,010	1	$ 11,010
	C/Cat-V	$ 4,450	-	$ -	C/Cat-V	$ 4,450	-	$ -
	Total:		1	$ 11,010 (10^3)	Total:		1	$ 11,010 (10^3)

Table-A6.8 STANDARD COST OF NEW AIRPORT FACILITY (CATEGORY/CLASS-IV and V, 2004)

No.	STANDARD COST ESTIMATION Engineering Construction Item		Airport Fac, Type-A/IV Quantity	Amount (10^3)	Airport Fac, Type-B/IV Quantity	Amount (10^3)	Airport Fac, Type-C/V Quantity	Amount (10^3)	Remarks
I.	Civil Works:								
	1. Earth Work	(m^3)	1,000,000	Rp. 2,680,000	1,000,000	Rp. 2,680,000	600,000	Rp.1,609,000	. None ground improvement . 50 ha, cut & fill/ave.T. = 2.0 m/Cat-IV . 30 ha, cut & fill/ave.T. = 2.0 m/Cat-V
	2. Drainage Work	(m^2)	500,000	Rp. 275,000	500,000	Rp. 275,000	300,000	Rp. 166,000	. Storm drainage & distributions
	3. Pavement Work	(m^2)	95,800	Rp. 9,906,000	91,800	Rp. 9,492,000	30,450	Rp.3,149,000	. Thickness: 71 cm (± 28")/Cat-IV & V
	4. Land-Side Service Road Work	(m)	1,000	Rp. 650,000	1,000	Rp. 650,000	500	Rp. 326,000	. Paved road
	5. Car Parking Area Work	(m^2)	1,400	Rp. 138,000	700	Rp. 69,000	350	Rp. 35,000	. Paved area
	6. Civil Miscellaneous Work	(set)	1	Rp. 684,000	1	Rp. 659,000	1	Rp. 265,000	
	7. Temporary Construction Work	(set)	1	Rp. 430,000	1	Rp. 416,000	1	Rp. 167,000	. Mobilization & preparatory work
	Sub Total:			Rp.14,763,000		Rp.14,241,000		Rp.5,717,000	Note: Civil work will add following cost, if any. 1) Ground Improvement per m^3: Rp.52,000 (STD) 2) Sub-drainage system per m: Rp.120,000 (STD)
II.	Building and Service Equipments:								
	1. Passenger Terminal Building	(m^2)	1,400	Rp. 1,971,000	700	Rp. 986,000	350	Rp. 493,000	. RC structures
	2. Cargo Terminal Building	(m^2)	250	Rp. 158,000	200	Rp. 128,000	150	Rp. 95,000	. Metal structures
	3. Supporting Ancillary Building	(m^2)	360	Rp. 329,000	240	Rp. 189,000	220	Rp. 166,000	. RC structures
	4. Interior and Exterior Equipments	(set)	1	Rp. 369,000	1	Rp. 196,000	1	Rp. 113,000	. includes GSE
	Sub Total:			Rp. 2,827,000		Rp. 1,499,000		Rp. 867,000	
III.	Utility Works and Installations:								
	1. Elect. Power Supply	(kVA)	500	Rp. 1,190,000	500	Rp. 1,190,000	250	Rp. 595,000	
	2. Lightings and Communications	(set)	1	Rp. 180,000	1	Rp. 180,000	1	Rp. 90,000	. except field lightings and tele-comm, (navaids).
	3. Water Supply and Treatment Plant	(ton/month)	1.08	Rp. 124,000	0.54	Rp. 62,000	0.27	Rp. 31,000	
	4. Sanitary Sewer and Treatment Plant	(ton/month)	4.66	Rp. 164,000	2.33	Rp. 82,000	1.17	Rp. 41,000	
	5. Sanitary Sewage Collector and Solid Waste Incinerator	(set)	1	Rp. 18,000	1	Rp. 17,000	1	Rp. 9,000	
	6. Fuel Supply and Storaged Tank	(kℓ)	(by Fuel Enterprise)		(by Fuel Enterprise)		(by Fuel Enterprise)		
	7. Information, Auditory and Other Service Equipments	(set)	1	Rp. 504,000	1	Rp. 461,000	1	Rp. 231,000	
	Sub Total:			Rp. 2,180,000		Rp. 1,992,000		Rp. 997,000	
IV.	Land Acquisition and Compensation:								
	1. Acquisition, Lease and Easement	(m^2)	1,000,000	Rp. 983,000	1,000,000	Rp. 983,000	500,000	Rp. 492,000	
V.	Grand Total:			Rp.20,753,000		Rp. 18,715,000		Rp.8,073,000	

GENERAL NOTES:

1) The study base of cost estimate has referred to the recent some airport development projects in the south-east asia between 1981 and 1987.

2) The fluctuating rate of unit price has accounted to 6% up per year.

3) The exchange rate as of Dec. 1987 has employed that U.S.$ 1.00 is equal to Rp. 1,700.00 and Yen 132.00.

4) Air navigation equipments of air route and airport are excluded.

Table-A6.9 STANDARD COST OF SEA AIR STATION
(Pre-Master Plan Phase)

I. Design Requirement: (by the standard of sea air station)

For the rough cost estimate of sea air station, the design requirement will be specified preliminarily as follows.

1) Annual Passenger Demand : less than 60,000
(proposed demand: max. 50,000)

2) Classification of Sea Air Station: Class-III

3) Location of Air Station:

. Inland Sea, Depth of Water at low tide = min. 3 m
. Wind Coverage ..... Target > 95%

4) Aircraft Navigation System:

. Method of Air Flight ..... VFR
. Air Traffic System ..... ADF or VOR
. Air Navaids ..... NDB
. Landing Approach ..... VFR

5) Operation Area:

a) Approached Water Surface for Lanidng and Take-off ..... 1,000 m x 450 m = 45 ha

b) Approached Water Surface for Taxing ..... 2,000 m x 75 m = 15 ha

c) Terminal Area at Land-side .... 150 m x 150 m = 2.25 ha

II. Rough Cost Estimate:

(Work Item)	(Q'ty)	(Amount, 10^3)	
1. Civil Works:			
1) Earth Work	33,000 m³	Rp.	86,600
2) Drainage Work	22,500 m²	Rp.	12,000
3) Pavement Work	8,400 m²	Rp.	868,600
4) Road Work	100 m	Rp.	6,400
5) Car Parking Work	700 m²	Rp.	69,000

(Work Item)	(Q'ty)	(Amount, 10^3)
6) Civil Miscellaneous Work	1 set	Rp. 52,000
7) Temporary Const. Work	1 set	Rp. 33,000
Sub Total:		Rp. 1,127,600
2. Bldg. and Service Equipments:		
1) Passenger Term'l	950 m^2	Rp. 1,337,500
2) Cargo Term'l	150 m^2	Rp. 95,000
3) Ancillary Bldg.	220 m^2	Rp. 166,000
4) Interior and Exterior Equip't	1 set	Rp. 113,000
Sub Total:		Rp. 1,711,500
3. Utility Work and Installations:		
1) Elect. Utility & Equipment	1 set	Rp. 1,027,500
2) Mech. Utility & Equipment	1 set	Rp. 467,000
Sub Total:		Rp. 1,494,500
4. Land Acquisition and Compensation:		
1) Sea-Side	600,000 m^2	Rp. 589,800
2) Land-Side	22,500 m^2	Rp. 22,200
Sub Total:		Rp. 612,000
5. Total Cost:		Rp. 4,945,600 (10^3) (US$ 2,909,176)

Note:

Air navigation equipment of air route and air station are excluded, these rough cost will be estimated by the air navids section.

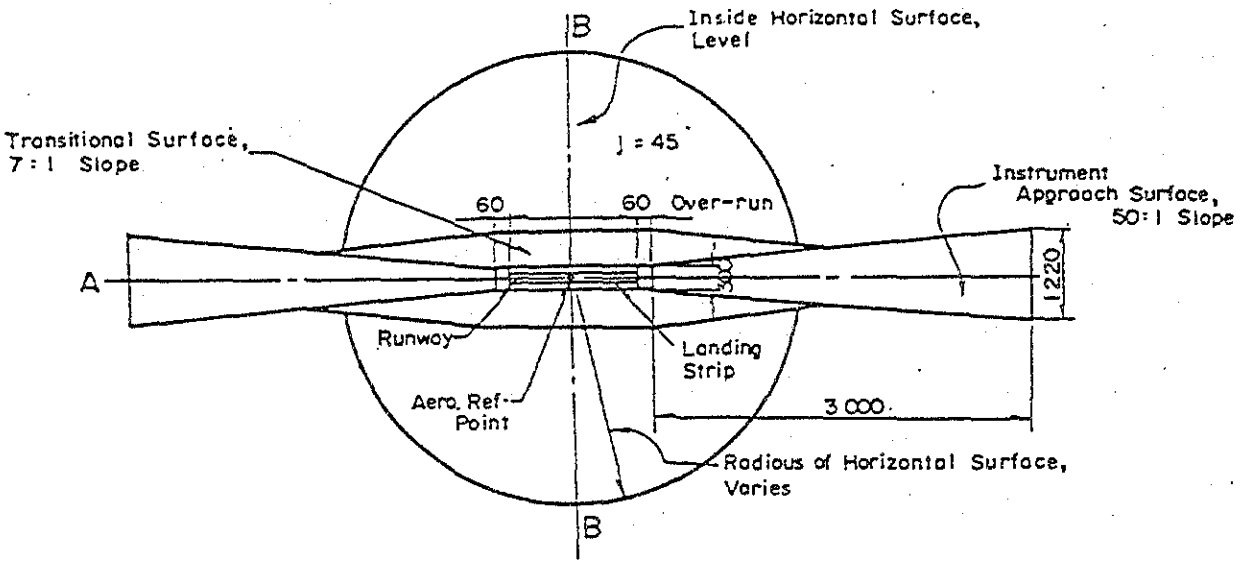
Table-A6.10 TOTAL ROUGH COST OF ENGINEERING CONSTRUCTION
(FOR RUNWAY IMPROVEMENT AND NEW AIRPORT)

LEGEND: M.N ... Major National R ... Regional
N ..... National $ ... U.S.$

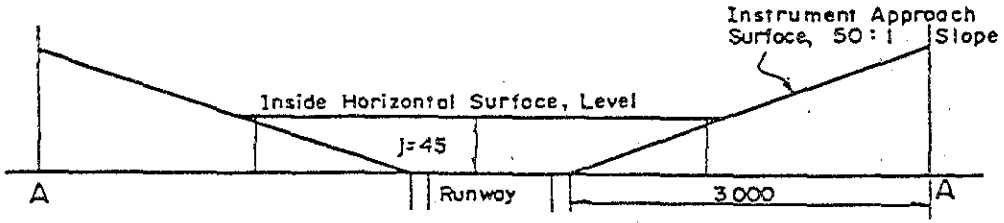
(DESIGN DATE: Feb.26,'88)

DESCRIPTION	SCINARIO - A					
	1994			2004		
	Quantity (m)	Amount ($)	No. of Airport	Quantity (m)	Amount ($)	No. of Airport
Runway Extension	33,715	127,835.16$^{10^3}$	M.N + N + R = 14 + 19 + 35 = 68	44,275	170,010.44$^{10^3}$	M.N + N + R = 17 + 23 + 34 = 74
Runway Overlay	84,385	120,403.93$^{10^3}$		90,625	133,246.41$^{10^3}$	
New Airport	3	$ 26,470.00$^{10^3}$		3	$ 34,230.00$^{10^3}$	
Total Amount	U.S.$ 274,709.09$^{10^3}$			U.S.$ 337,486.85$^{10^3}$		

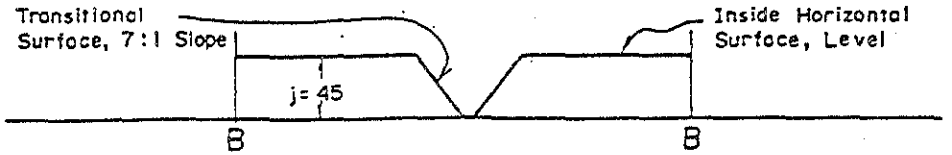
DESCRIPTION	SCINARIO - B					
	1994			2004		
	Quantity (m)	Amount ($)	No. of Aircraft	Quantity (m)	Amount ($)	No. of Aircraft
Runway Extension	4,555	16,307.03$^{10^3}$	M.N + N + R = 0 + 6 + 5 = 11	8,840	30.953.30$^{10^3}$	M.N + N + R = 1 + 13 + 15 = 29
Runway Overlay	13,845	19,962.54$^{10^3}$		35,360	48,816.50$^{10^3}$	
New Airport	1	$ 11,010.00$^{10^3}$		1	$ 11,010.00$^{10^3}$	
Total Amount	U.S.$ 47,279.57$^{10^3}$			U.S.$ 90,779.80$^{10^3}$		



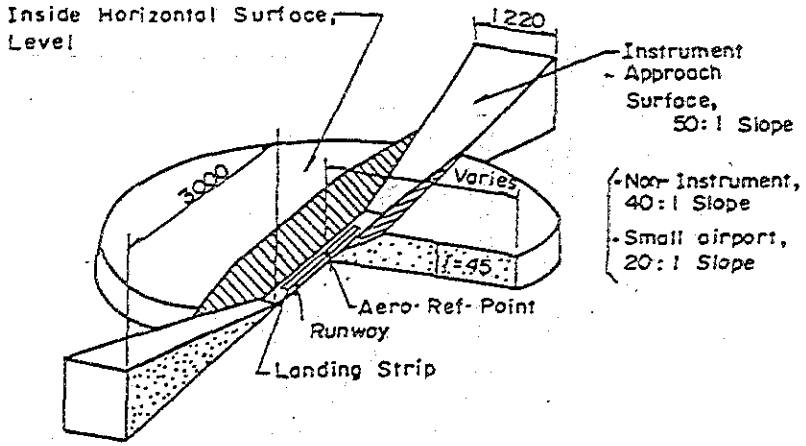
PLAN



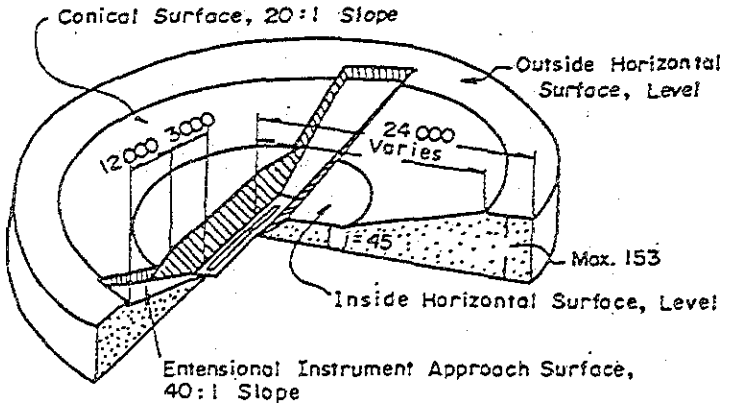
SECTION A–A



SECTION B–B



SECTIONAL PLAN – (1)
(Instrument Runway)

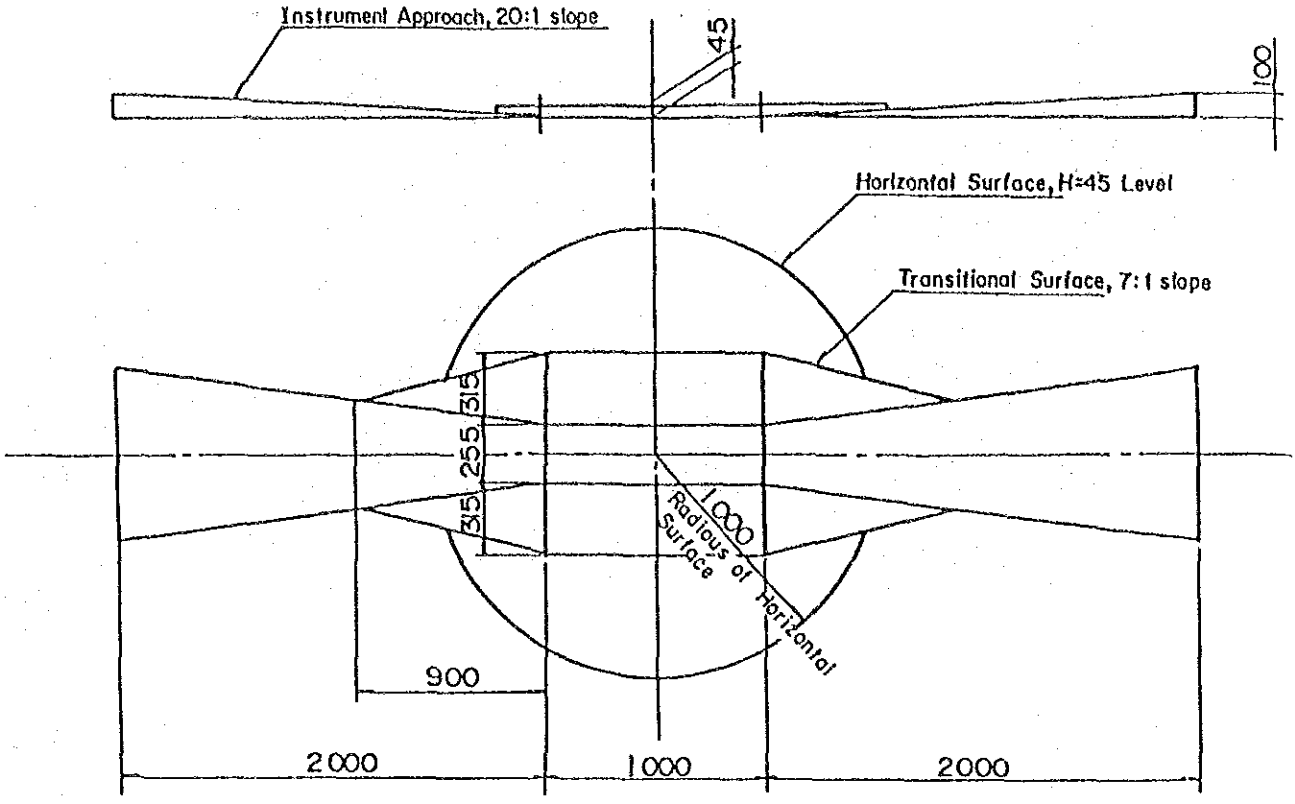


SECTIONAL PLAN – (2)
(Instrument/ Precision Runway)

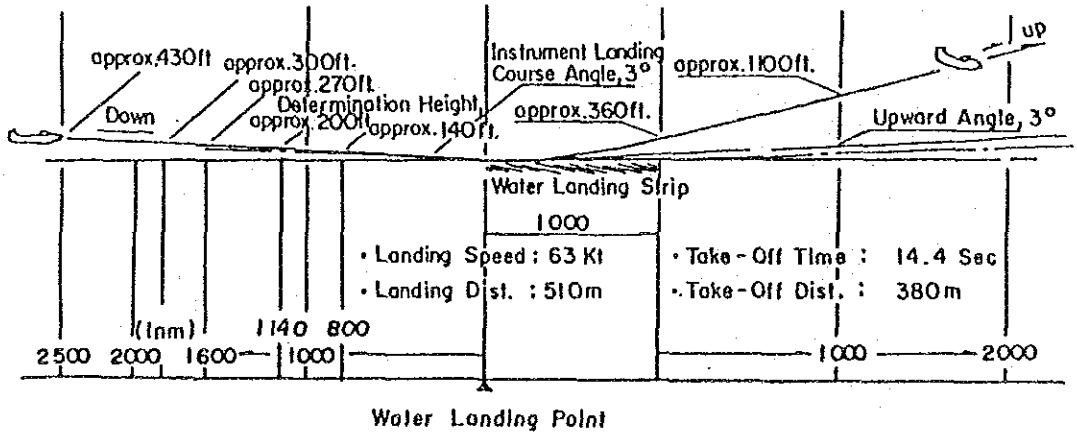
Figure-A6.1 Site Requirement of Air Operation-Obstacle Limitation Surface

(LAND AIR STATION)

Note : Dimensional limits (Approach Standards) for non-instrument runway will be given into airport category covers local, trunk, continental and international.



OBSTACLE LIMITATION SURFACE (m)



TAKE-OFF AND LANDING PATERN (m)

Figure-A6.2 Site Requirement of Air Operation

(SEA AIR STATION)

APPENDIX TO SECTION 6

(2) SUPPLEMENTARY DESCRIPTION ON NAVAIDS

1. NDB (NON DIRECTIONAL RADIO BEACON)

In connection with the description of Paragraph (27) of Section 6, the following examples are herein delineated for reference.

(01) PANGKALANBUN NDB (PN, 238 KHZ) of 100 watt should be replaced by the one of 2 kW or more (VOR is more preferable), with a DME collocated. This provision will give big impact to the services for pioneer airports which scatters in the area east to Pontianak, northern territory of Kalimantan Barat.

(02) In addition to that, this new power NDB will give more accuracy to a flight en route A 464, G 463 and W15, all of which have long route distance, thus making the protected airspaces of these routes compact.

(03) Also, this will avail direct flights from SEMARANG and/or SURABAYA. Then, feeder routes will be established to some specific fixes near to the pioneer airports mentioned above. The fixes, OMEGA and ROTAN along the W36 can be used as the IFR clearance limits, beyond which VFR flights are recommended when weather condition of the destination airport are good for VMC (Visual Meteorological Condition). Minimum En-Route Altitude (MEA) to the fixes are to be 8,000 ft, taking the heights of REG. SCHWANTER into account(Refer to Figure-A6.3). The fixes will be able to extend to point nearer to a group of pioneer airport beyond the OMEGA and ROTAN through flight calibration, thus the serviceability will increase more.

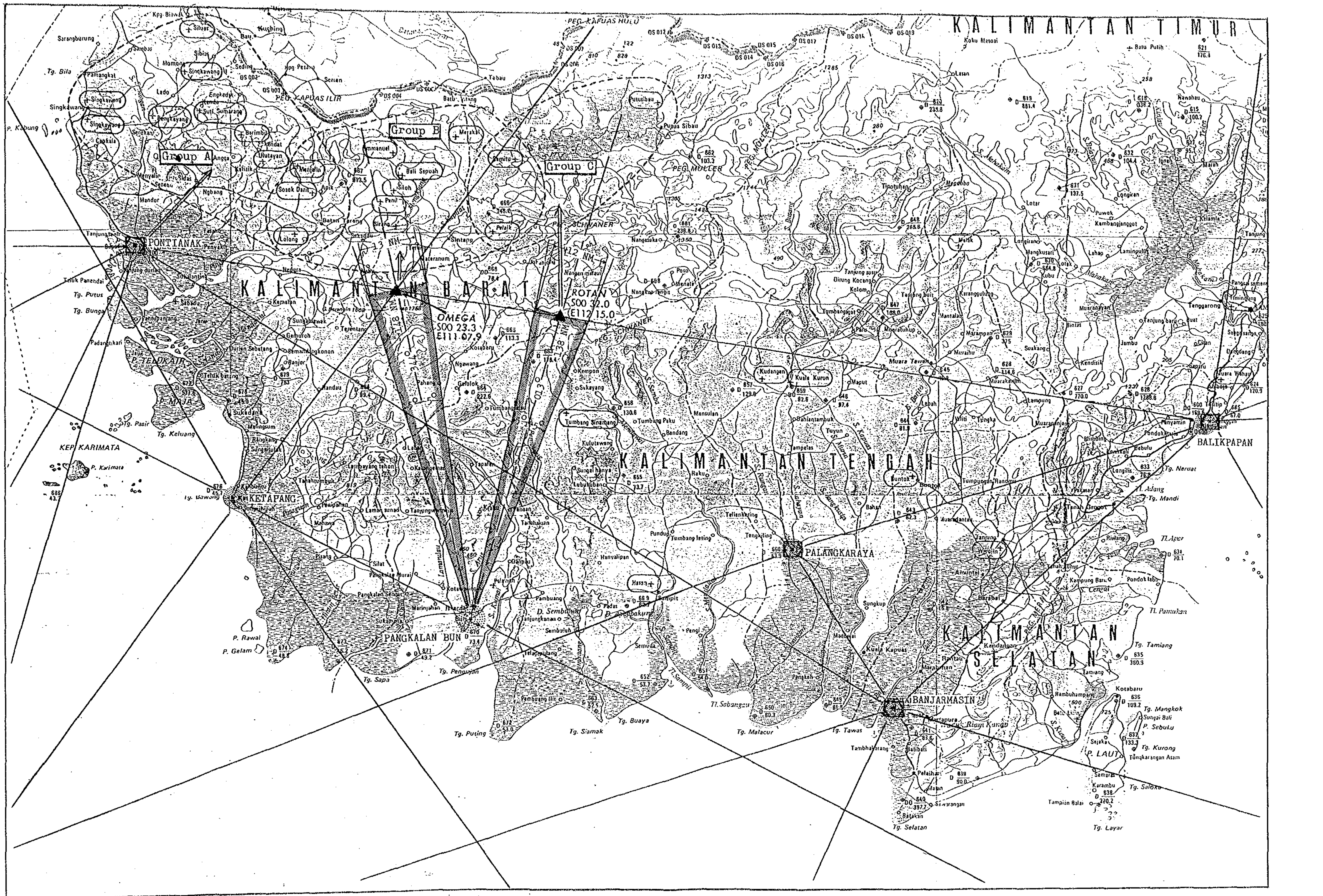


Figure-A6.3 OPERATIONAL COORDINATE IN REGARD TO PANGKALANBUN AND PONTIANAK

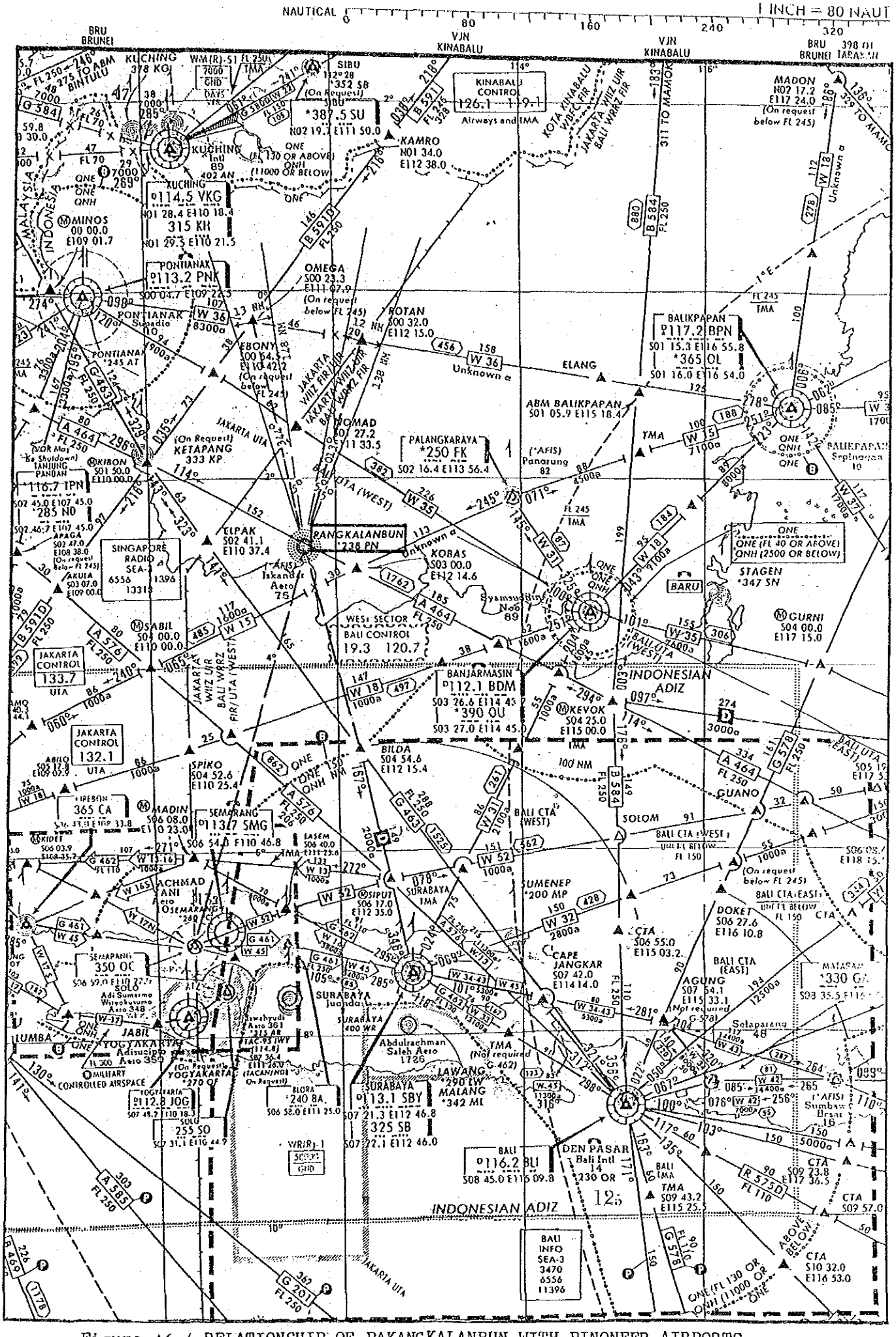


Figure-A6.4 RELATIONSHIP OF PAKANGKALANBUN WITH PINONEER AIRPORTS IN NORTHERN TERRITORY OF KALIMANTAN BARAT AND PONTIANAK AND WITH AIRPORTS IN JAWA

(04) Provisions of such feeder routes from a newly replaced NDB/DME at PN will activate passenger movements from those pioneer airports through a circuit-flight connecting some airports. If this circuit-flight be done in conjunction with PONTIANAK, it would be more beneficial. PONTIANAK NDB(AT 245/500 W) can be remained the same.

(05) The similar practices as mentioned above can be applied in some other areas such as Irian Jaya.

2. RADIO LINE OF SIGHT

In connection with the description of Paragraph (28) of Section 6, some supplemental discussions are made as under.

(06) Figure-A6.5 shows an ideal Radio Line of Sight (LOS). The far boundary of the diagram is limited by the earth curvature., An aircraft, however, receives VOR/DME signal depending on the aircraft altitude, the higher altitude, the longer LOS.

(07) In case of Ujung Pandang/HASANUDDIN NAVAID, approximately 80 NM long mountain range is situated on the northeast, east and south east at a distance of 11-16 NM from the sites. This situation makes the area between azimuth 0 - 185 critical. °Air route W32, W41, W54, W53, W37, W35 and the direct route comes through HASANUDDIN (MKS, 114.5MHZ). An aircraft flying at the lower altitude, 10,000 ft on the critical area mentioned above will neither receive the VOR/DME SIGNAL, nor can be identified by radar beyond the distance of 22-43 NM from the airport(Refer to Figure-A6.7).

(08) In case of Manado NAVAID, the NAVAID (MNO, 114.2MHZ) at the airport is surrounded by mountains all ways around

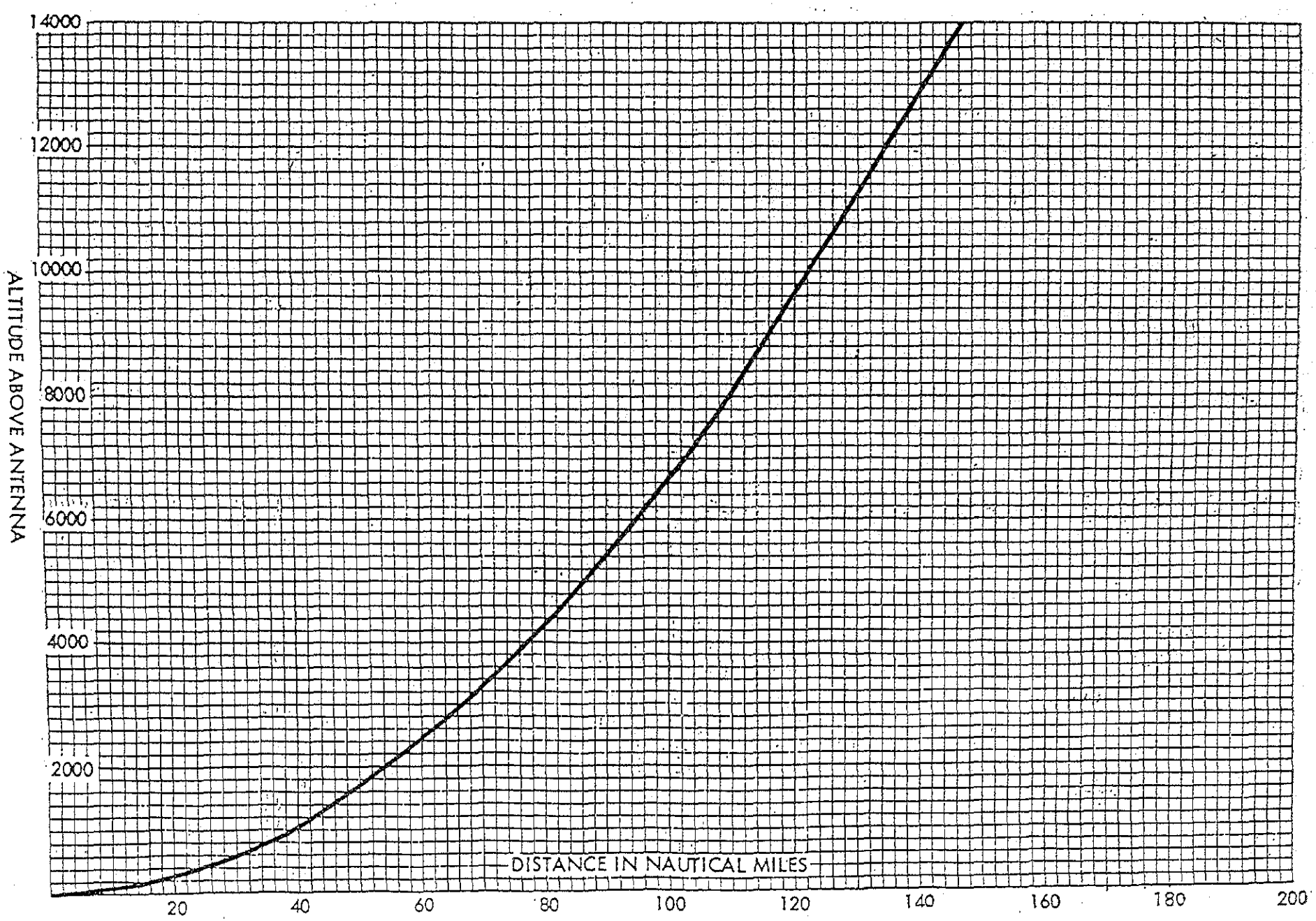


Figure-A6.5 RADIO LINE-OF-SIGHT CHART

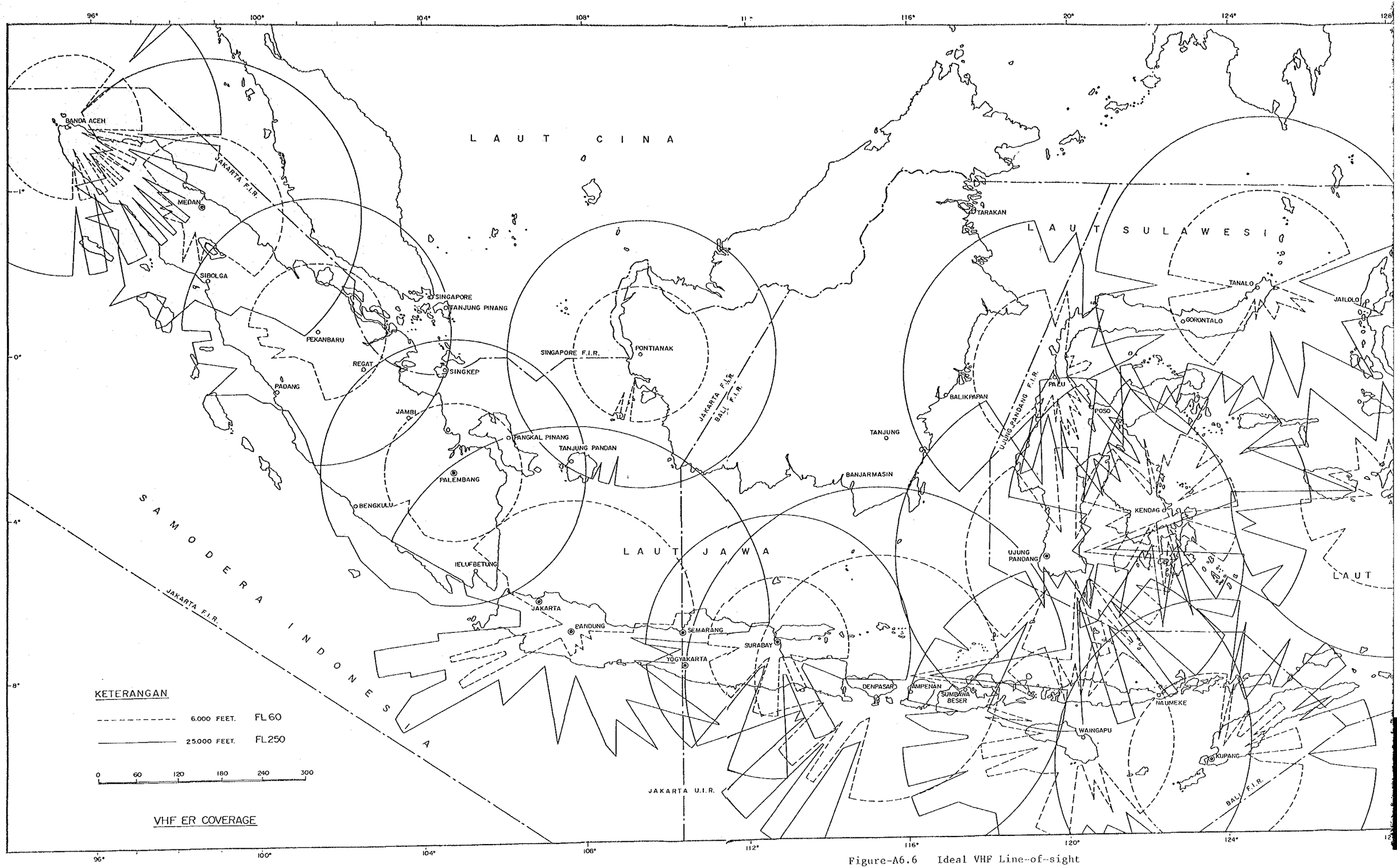


Figure-A6.6 Ideal VHF Line-of-sight

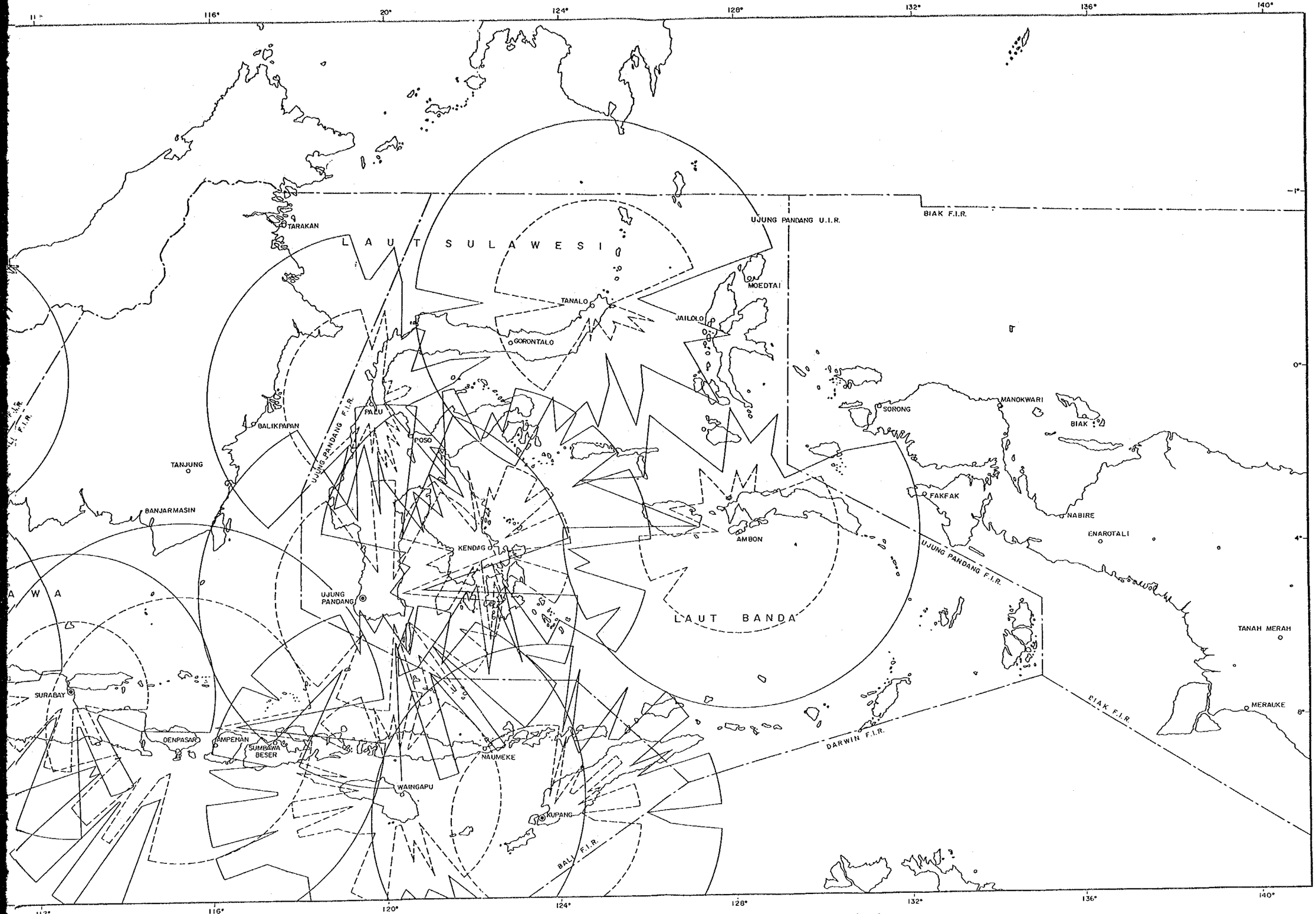


Figure-A6.6 Ideal VHF Line-of-sight

360o azimuth since the airport is at the basin. The high mountain range is situated on the east south and south west right behind the airport. Air routes W61, W67, W55, W32, W51 and W15 have been using MNO. An aircraft flying at the altitude of 10,000 ft on the W61, W67, W55 and W32 will not receive the VOR/DME signal and cannot be identified by radar beyond the distance of 40 - 60 NM from the airport(Refer to Figure-A6.7).

(09) In case of routes W51 and W15 is assumably better than the other routes and the receptionable distance of VOR/DME and radar will be 80 - 100 NM. Given that the NAVAIDS be on the conditions described above, the W32 linking MKS to MNO is the most feasible to improve its functionability by installing an VOR (100 w)/DME (1 KW) at the fix which intersect with the international route B83D linking SE Asia to Darwin. The coordinates of this fix are S 02 25.6 , E 121 39.9 on the higher terrain nearby the town WASU, being accessible by a coastal highway running by the town(Refer to Figure-A6.8).

(10) The provision of the new VOR/DME at the fix improve especially the southwestern side (distance, 203 NM) of the W32 toward MKS, but not the northeastern side toward MNO (distance 309 NM) because MNO signal receptionability on the W32 is critically poor. However, this discrepancy can be solved if the NDB MOLAIT (BOLANGMONGONDOW), 392 KHZ/100 W, which is reportedly turned off, is resumed to turn on and replaced by the one of power 500 W.

(11) In this respect, another solution may be found as follows. In stead of VOR/DME, a NDB of power 2.5 KW or more collocated with DME (1 KW) can be installed. Though accuracy of NDB is less than that of VOR, the coverage of its signal is more than that of VOR. The provision of a NDB will also improve an operationability of an aircraft en-

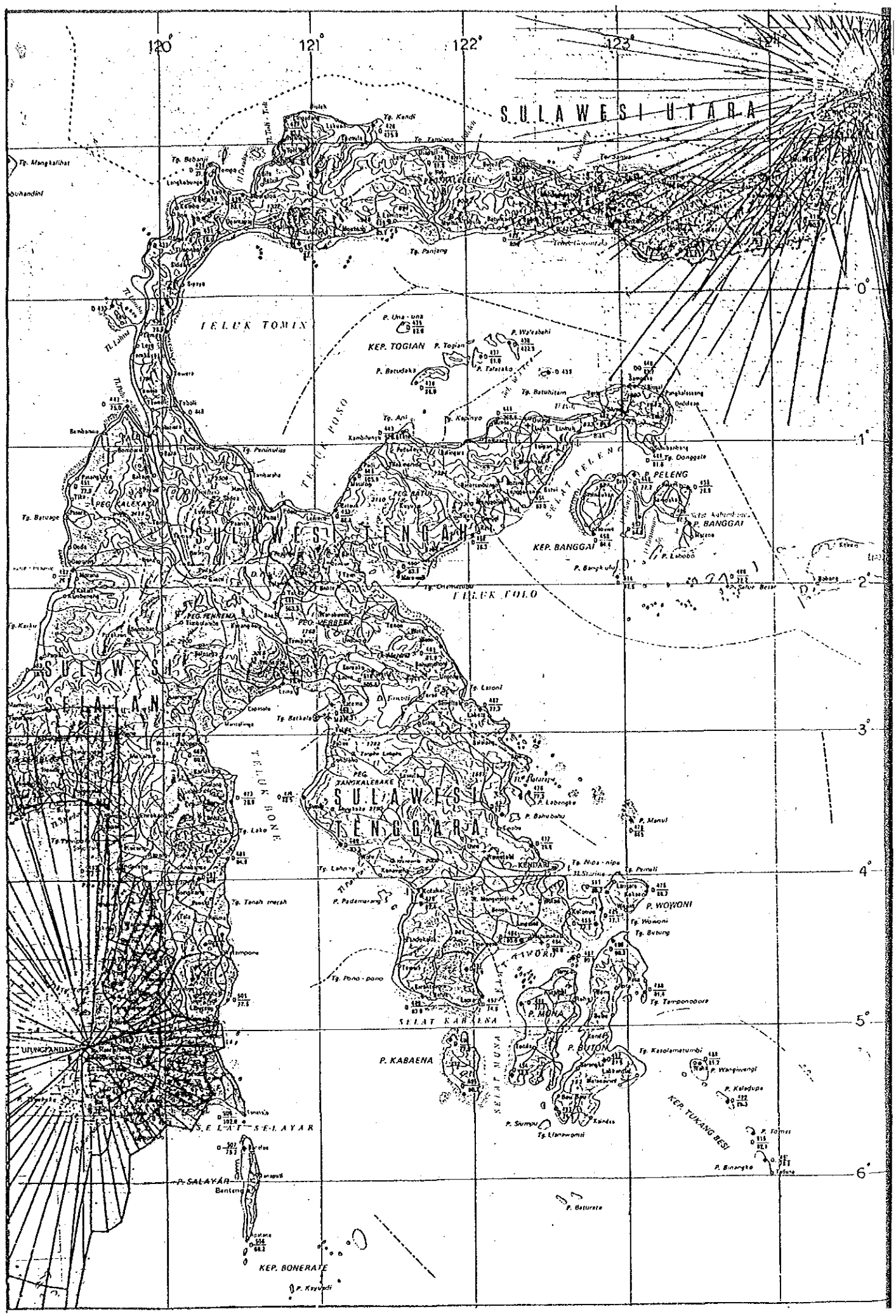


Figure-A6.7 LINE OF SIGHT, UJUNGPANDANG AND MANADO

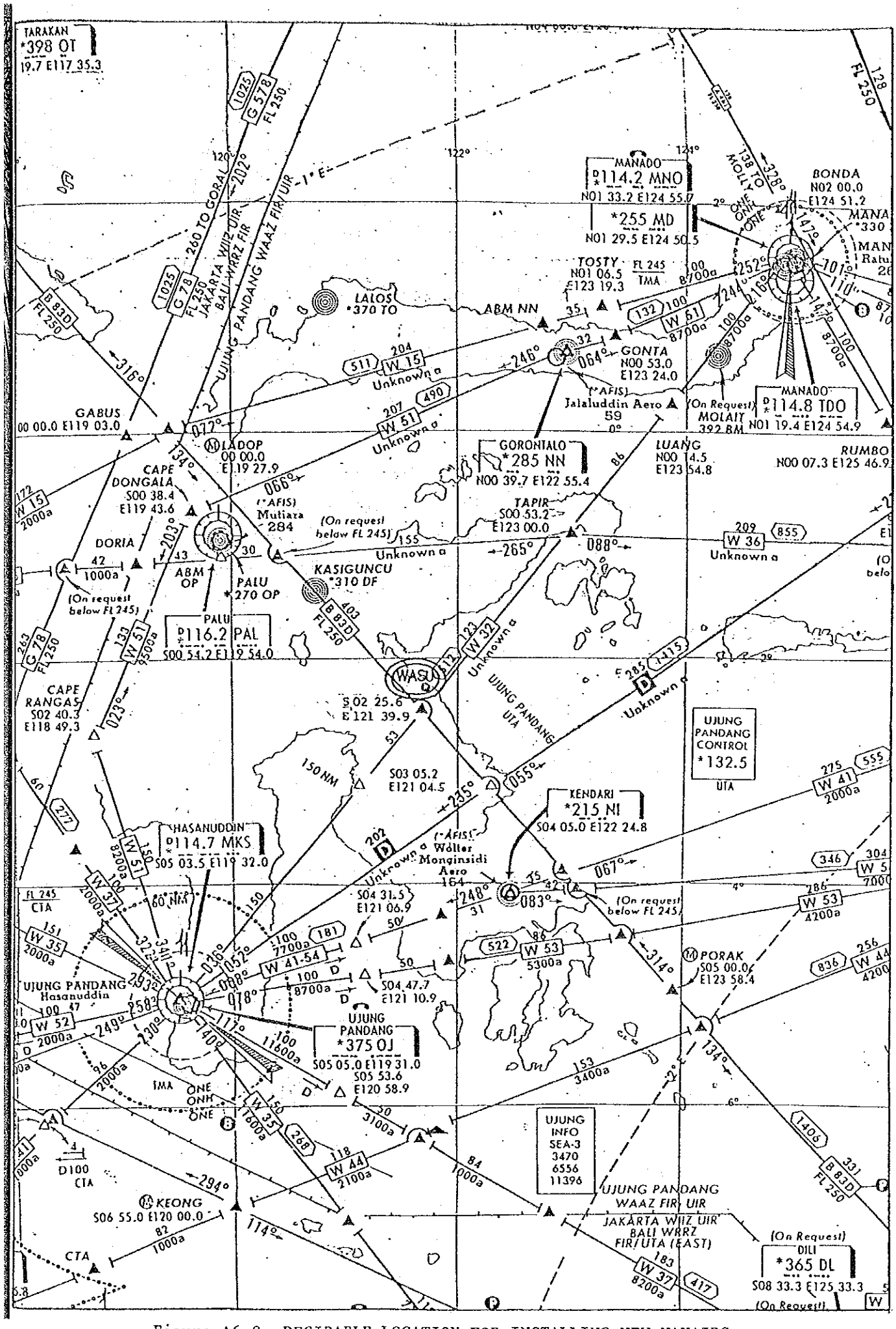


Figure-A6.8 DESIRABLE LOCATION FOR INSTALLING NEW NAVAIDS

route W32. Needless to say, provision of either VOR or NDB at the said fix will give a great impact on the international route B83D, namely, reduce the protected airspace of the routes W32 and B83D making an altitude change of and aircraft flying not only on these air routes but on other routes crossing the route B83D more accurate.

3. AIR CORRIDOR

(11) In this respect, it is recommended that the air-corridor through two (2) military training areas near the YOGYAKARTA Airport should be improved. The one is located with the circle of 25 NM centered on the YOGYAKARTA NDB (OF/ 270 KHZ) site and the other with the circle of 20 NM centered on the SOLO NDB (SO/ 255KHZ) site. The corridor is established connecting the following fix, NDB and/or VOR.

- Fix PURWO (S 0710.7, E 110. 50.0)
- SOLO NDB (S 0731.1, E 110. 44.9)
- YOGYAKARTA VOR/DME (S 07 48.2, E 110.18.3)
- Fix JABIL (S 0751.8, E 110. 01.8)

The air routes intersect at the fix PURWO from four directions, SEMARANG NDB (OC/ 350 KHZ), SEMARANG VOR/DME (SMG/113.7 MHZ), the fix LASEM and BLORA NDB (BA/240 KHZ). (Refer to Figure-A6.9)

(12) The corridor is identified to be as the following:

- The width of the corridor is only 5 NM, being 2.5 NM on each side of the centerline.

- The configuration of the corridor is bent at each NAVAIDS and the fix mentioned above, thus an aircraft might overshoot when turning and conflict with an maneuvering in the training area.

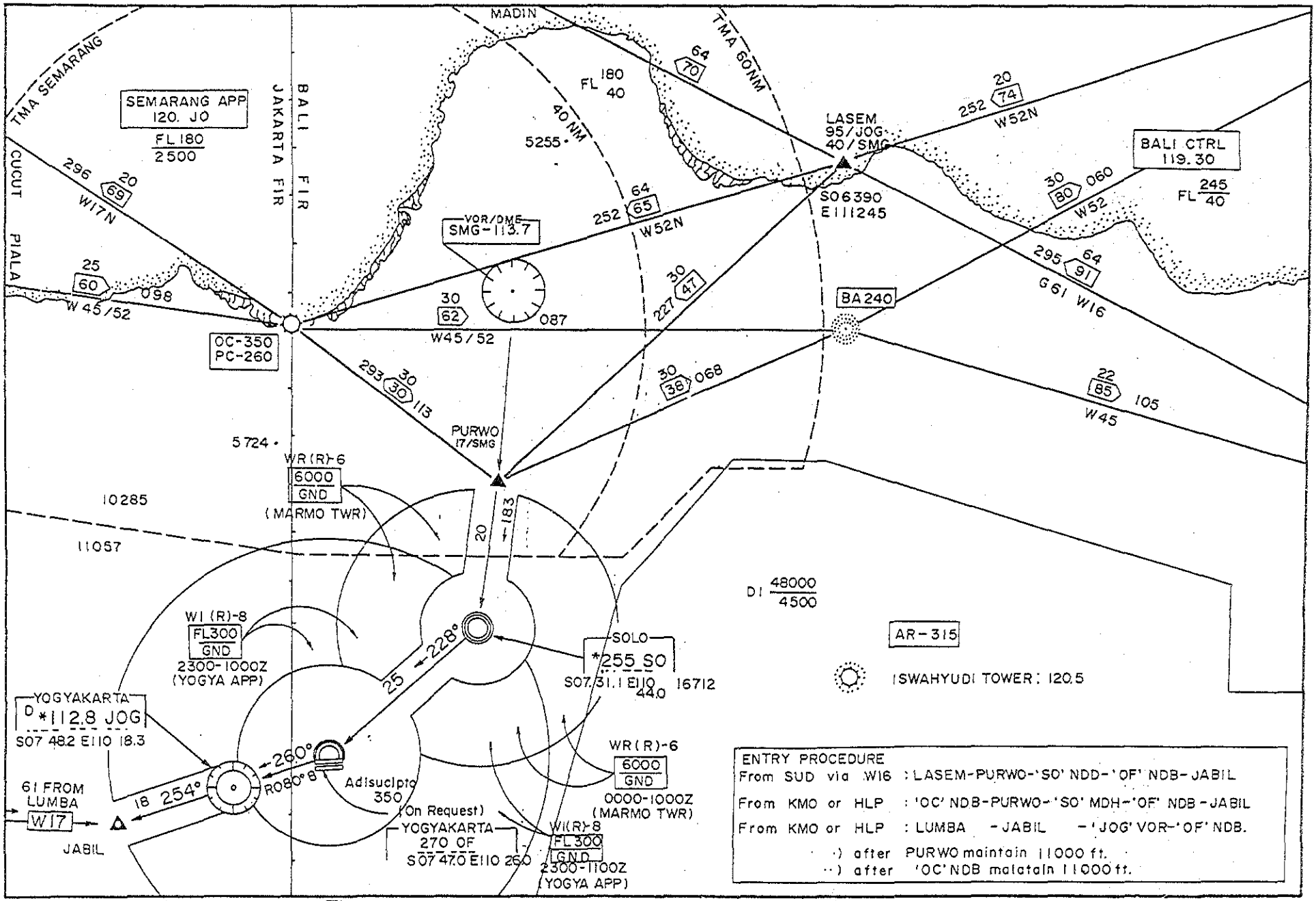


Figure-A6.9 AIR CORRIDOR IN TRAINING AREA

To solve such problem, the following two practices delineated in Paragraphs (13) and (14) are conceivable.

(13) The first conceivable practice is;

a. The width of the corridor should be widen up to 10 NM with 5 NM on each side of the centerline, taking into account the accuracy of NAVAIDS mentioned in Paragraph (18)of Section 6 (Refer to Figure-A6.10(1) to A6.10(4)).
If the accuracy of 5o is achieved, the width of 10 NM will be at the distance of 57.15 NM from the NAVAID site. While, if the accuracy of VOR is 10o and that of NDB is 15o in Indonesia as said beforehand, the width of 10 NM will be at the distances of 28.35 NM and 18.66 NM, respectively.
From this consideration, SOLO NDB should be replaced by VOR. Because the distance between SOLO NDB and the fix PURWO is 20 NM, which is more than 18.66 NM, then the width of the corridor beyond 18.66 NM has to be tapered at the angle of 15 .

b. Also, new VOR (SOLO) and the existing YOGYAKARTA VOR should be collocated with TACAN (VORTAC)so that a military maneuvering in the adjacent training area can use TACAN radials and distances. This will avoid deviation of training aircraft into the corridor.

c. Since the air routes from SEMARANG NDB (CO), SEMARANG VOR(SMG)< LASEM and BLORA NDB (BA) are bent at the fix PURWO, leading fix points should be specified before the PURWO so that an aircraft can initiate a turning so as to establish an intersection right on the centerline of the corridor , 010 of SO/255 KHZ. This is to avoid deviation of a civil aircraft into training area.

I. ATS ROUTES DEFINED BY TWO VORS

1. ATS Route with a distance of 92 NM or less between VORs

A. When COP is established at the midpoint between VORs.
(Figure 1, 2 and 3)

The protected airspace encompassed by the lines of 4 NM, on both sides, from and parallel to the route centerline.

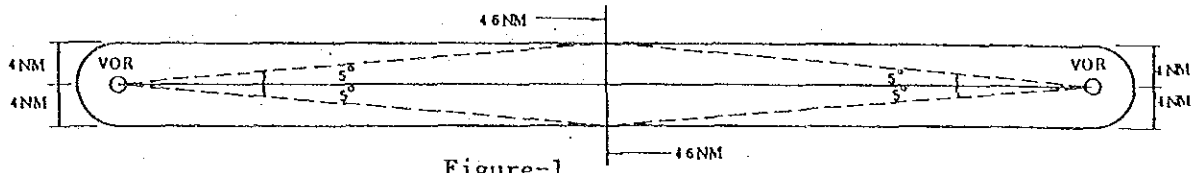


Figure-1

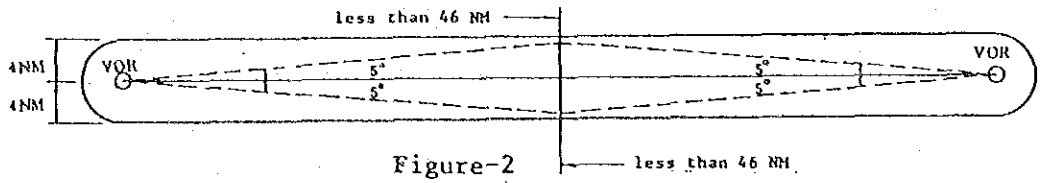


Figure-2

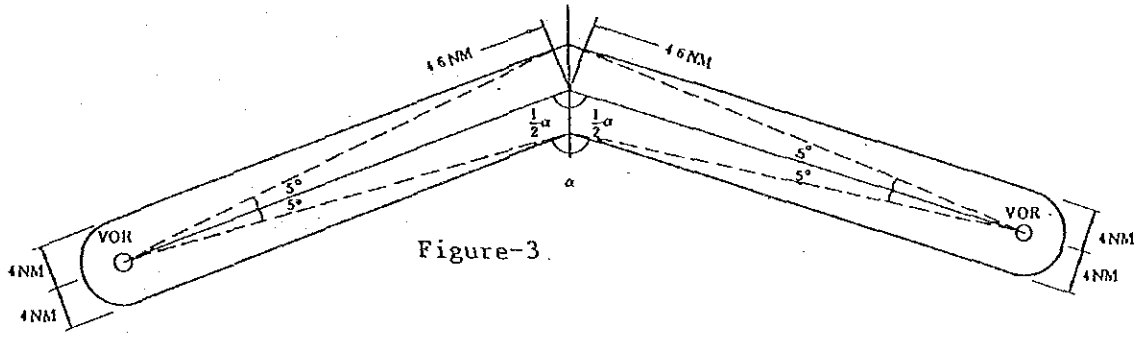


Figure-3

B. When COP is not established at the midpoint between VORs.

a. When the distance on each side between COP and VORs is 46 NM or less.
(Figure 4 and 5)

The protected airspace encompassed by the lines of 4 miles, on both sides, from and parallel to the route centerline.

Figure-A6.10(1) AIR ROUTE STRUCTURE EXTRACTED FROM JAPAN'S CRITERIA

II. ATS ROUTES DEFINED BY A VOR AND A NDB

1. ATS Route with a distance of 114 NM or less between VOR and NDB

A. When COP is established at the midpoint between VOR and NDB. (Figure 12)

Portion 1

The protected airspace on the side of NDB;

Airspace encompassed by the lines of 5 NM, on both sides, from and parallel to the route centerline to a distance of 57 NM from the NDB where a COP is to be established.

Portion 2

The protected airspace on the side of VOR;

Airspace encompassed by the lines of 4 NM, on each side, from and parallel to the route centerline to a distance of 46 NM from the VOR, and airspace beyond 46 NM to the COP encompassed by the lines of both sides connecting the VOR and both points where the on the width-lines of the NDB route where the COP is to be established.

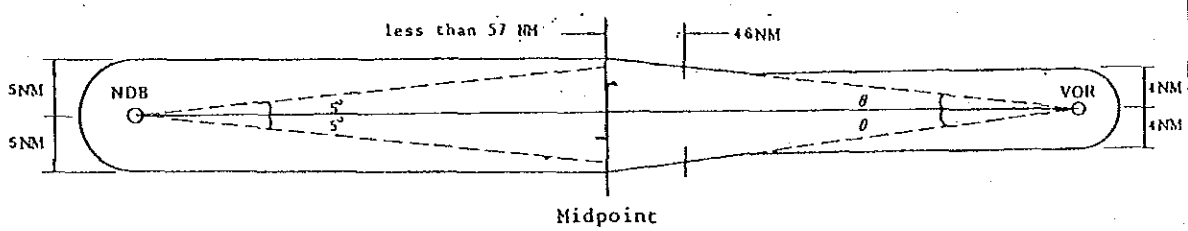


Figure-12

Note: In this case, if there is no special necessity for setting a COP at the midpoint of the segment, it is desirable to shift the COP to the points on NDB side to where the lines extended at a 5 degree-angle from the VOR reach at the width of 5 NM on both sides from the route centerline. (Figure 13)

Figure-A6.10(2) AIR ROUTE STRUCTURE EXTRACTED FROM JAPAN'S CRITERIA

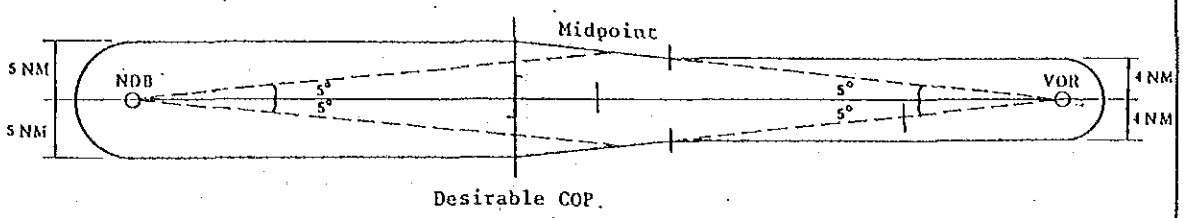


Figure-13

B. When COP is not established at the midpoint between VOR and NDB.

a. When an airspace on the side of NDB is longer than the one on the side of VOR.
(Figure 14 and 15)

Portion 1

The protected airspace on the side of NDB;

Airspace encompassed by the lines of 5 NM, on both sides, from and parallel to the route centerline to a distance to 57 miles from the NDB, and thereafter in an airspace beyond 57 NM, diverging at a 5 degree-angle to both points perpendicular to the route centerline where a COP is to be established.

Portion 2

The protected airspace on the side of VOR;

Airspace encompassed by the lines of 4 NM, on both sides, from and parallel to the route centerline and airspace encompassed by the lines connecting the VOR and both points where the route-width at the COP is determined by the portion 1.

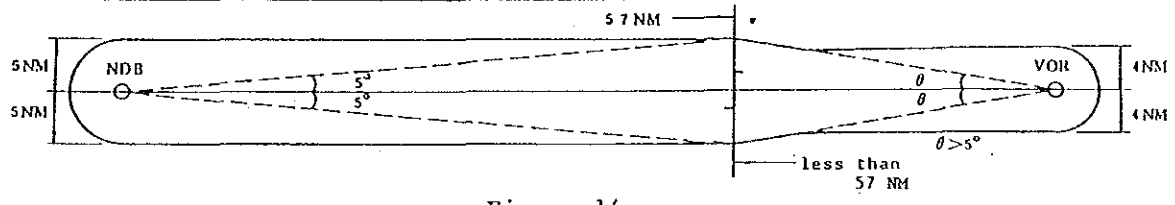


Figure-14

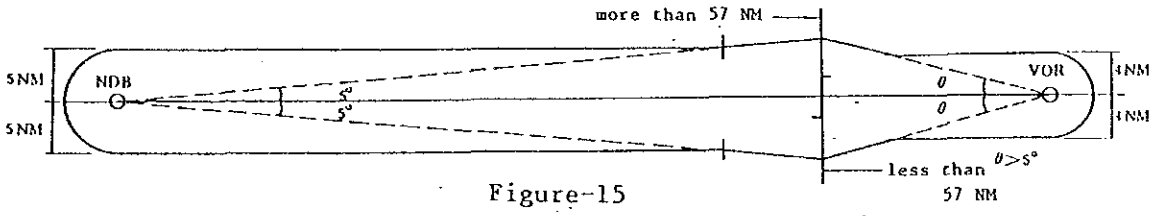


Figure-15

Figure-A6.10(3) AIR ROUTE STRUCTURE EXTRACTED FROM JAPAN'S CRITERIA

If an airspace beyond the maximum valid coverage of a Component Radio Facility is within coverage of ARSR or radio communication, and radar advisories on flight course is available by an air traffic control agency. * ARSR: Air Route Surveillance Radar	Airspace encompassed by the following lines: 1. Lines extended on both sides at a 5 degree angle from the Component Radio Facility. 2. Lines tapered off at a 30 degree angle from both points where the distance of 20 NM or less, along the airway, inside of the coverage of ARSR or radio communication intersect with the width-lines of the airway.

(Figure 26 and 27)

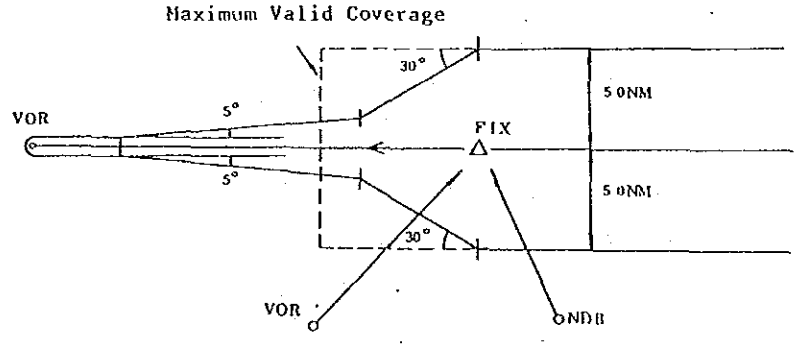


Figure-26

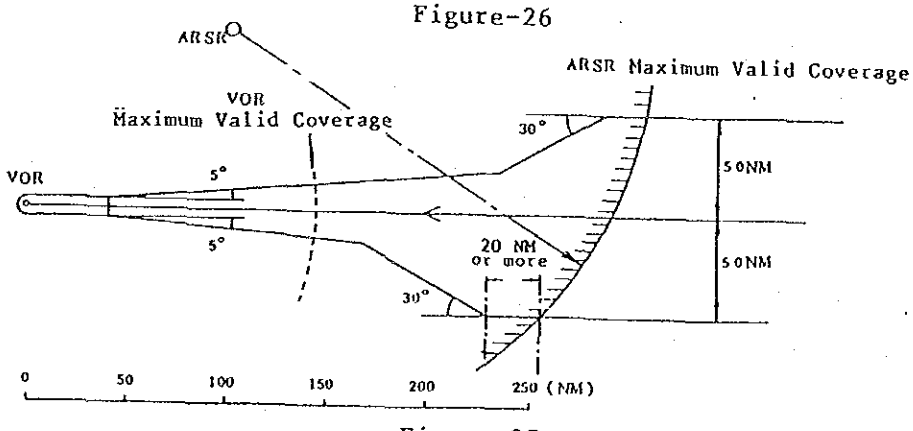


Figure-27

Figure-A6.10(4) AIR ROUTE STRUCTURE EXTRACTED FROM JAPAN'S CRITERIA

These leading fix points are recommended to be set as follows:

a. SEMARANG NDB (CO) to PURWO : approx. 2 NM ahead of PURWO
b. LASEM to PURWO: approx. 1 NM ahead of PURWO
c. BLORA NDB(BA) to PURWO: approx. 2 NM ahead of PURWO.

These points should be specified by radials of the new SOLO VOR with TACAN distances, and

d. SEMARANG VOR (SMG) to PURWO: 1 NM ahead of PURWO, namely 16 NM from SMG DME:
when a pilot initiated turning and switch to SOLO VOR frequency. The above mentioned figures are derived from Figure-A6.11.

Some discrepancies are found as bellow:

- The bearing of the route between OC and PURWO is shown as 289o - 109o in the AIP but 293o - 113o in the GARUDA NAV.Chart.
- The fix PURWO is described as " ECHO" in the AIP.
- The bearing and distance between in PURWO(ECHO) and SO are shown as 190o- 010o, 20 NM in the AIP, but 191o- 011o, 21 NM in the GARUDA Chart.

These differences should be rectified.

(14) The second solution to cope with the problem of the air space mentioned in Paragraph (13).
Off YOGYAKARTA, there is ample air space over the high sea where it is available to establish a military training area. YOGYAKARTA VOR has to be collocated with TACAN as mentioned in Paragraph (13)b. VOR radials and TACAN distance arcs

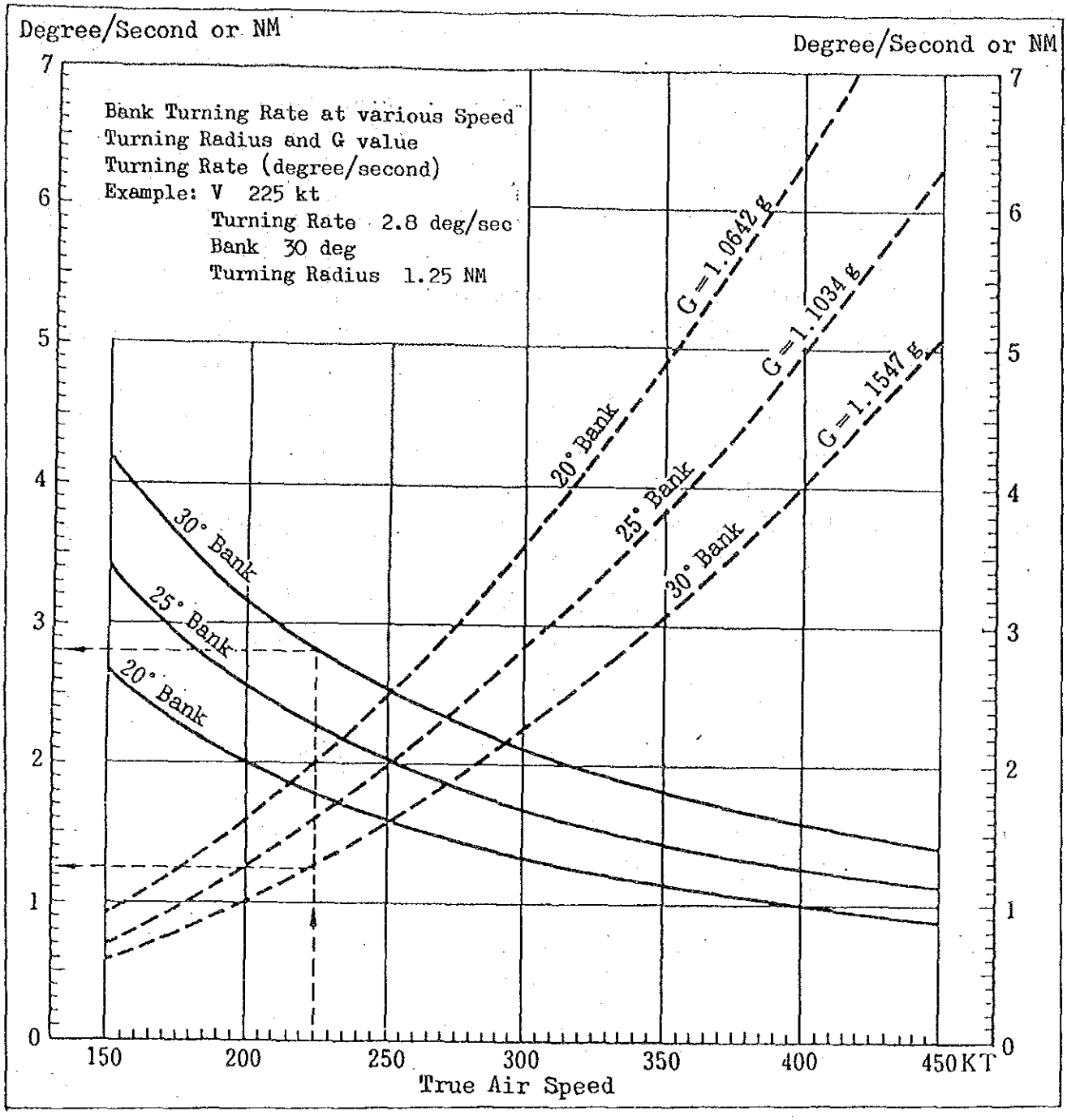


Figure-A6.11 SPEED, TURNING RADIUS, BANK, TURNING RATE and GRAVITY MALTIPLE

can specify the training area, encompassed by YOG VOR D 15NM and D 60NM and R-242oand R-126o, as shown in Figure-A6.12. Configuration of this type of training area has the advantages as the following:

a. A military aircraft in the training area can always refer to VOR radials and TACAN distance signals so that the aircraft do not deviate out of the area, thus protect the air routes by the training area.
b. The disbanded existing training area can be utilized for rehabilitating the air space around YOGYAKARTA and SOLO and their environment.
c. These areas being a famous tourism center, the relocation of the training area will stimulate the tourism attraction, because SIDs and STARs (Departure & Arrival procedures) of both airports can be improved.
d. A prospective direct route for BALI, the other tourism center, will be established to ease the present heavy traffic conditions of the JOGYAKARTA - DENPASAR route and reduce the distance.

A consideration has to be taken as to set up separation with the G 1 route. For this purpose, a cross reference fix (JOG VOR TAC R-220o, D 93NM) should be specified on the G 1. Thus, the width of the route can be 25 NM on each side of the route. The outer ARC D 60 NM is to be specified by adding more than 5 NM buffer zone to the route width. Figures of radials and distances have to be calibrated by a flight test.

The same application can be also made in establishing training areas for both ISWAHYUDI and MALANG air bases, since the abundant air space exists off the coast to G 1. Corridor should be established with specified altitudes below minimum entrant altitudes (MEA) of the airways, which

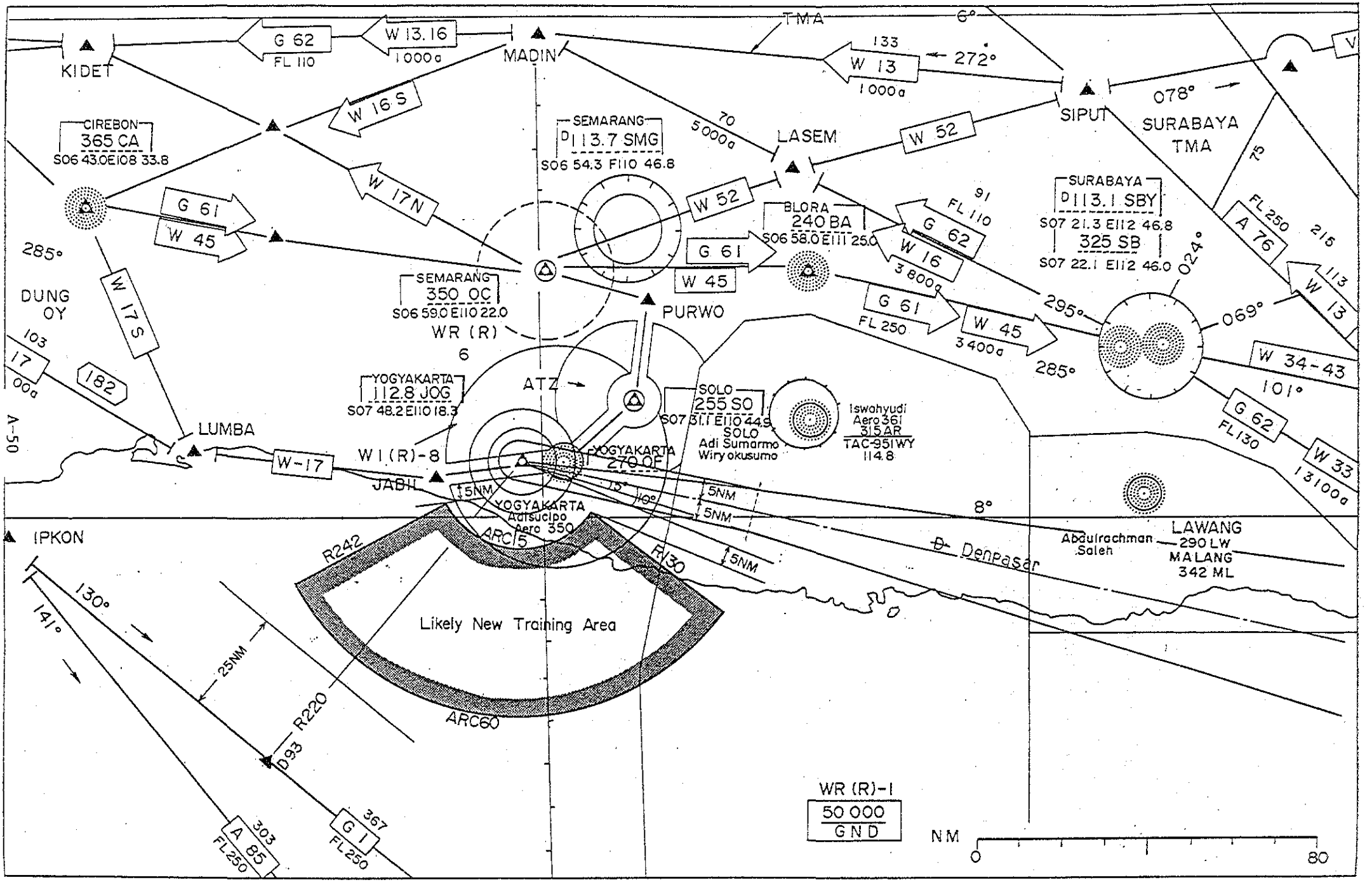


Figure-A6.12 TRAINING AREA REHABILITATION PLAN

have existed or is a suggested direct route YOGYAKARTA - DENPASAR, for the coming in-and-out training aircraft between the bases and these training areas. It is also conceivable that the joint use of the training areas is available for an up-grade civil pilot training, when the areas are not in use by a military aircraft.