BABV
KESIMPULAN

1. Instrument Landing System (ILS) merupakan suatu sistem navigasi udara yang digunakan sebagai pedoman bagi seorang penerbang atau pilot untuk dapat mendaratkan pesawatnya dengan baik. Instrument Landing System (ILS) terdiri dari tiga sistem, yakni :
   a. Localizer : memberi informasi arah pendaratan (kekiri atau kekanan) dari tengah landasan atau senter line pada bidang Horizontal.
   b. Glide Slope : memberi informasi sudut pendaratan 3^0 dari touch down pada bidang Vertikal.
   c. Marker : memberi informasi sisa jarak posisi pesawat terbang sampai ke threshold landasan.

2. Null Reference system adalah suatu sistem glide slope yang dipergunakan di Bandara Halim Perdanakusuma, Jakarta. Sudut glide path yang diinginkan adalah 3^0 maka tinggi antenna sideband adalah 8,67 meter, sedangkan tinggi antenna carrier adalah ½ dari tinggi antenna sideband yaitu 4,33 meter.

3. Besarnya sudut glide path dari permukaan tanah ditentukan oleh tinggi antenna sideband (upper antenna). Semakin besar sudut glide path dari permukaan tanah, maka semakin rendah tinggi antenna sideband maupun antenna carrier.

4. Besar atau kecilnya sudut glide path yang diinginkan sangat mempengaruhi daerah cakupan sudut glide path tersebut. Semakin kecil sudut glide path yang diinginkan , maka daerah cakupannya akan menjadi sempit. Dan sebaliknya

semakin besar sudut glide path yang dinginkan, maka daerah cakupannya luas atau semakin besar.

Sudut glide path diketahui sebesar 3^0. Maka, daerah cakupannya adalah 5.25^0 sampai 1.35^0 pada bidang vertikal. Sedangkan pada bidang horizontal adalah 10 NM (18.5 km).

5. Pada sistem glide slope, sistem komunikasinya passive radionavigation dan propagasinya mengunakan dua cara yaitu dengan gelombang lansung dan gelombang pantulan.

6. Pemilihan sistem dan kategori ILS yang akan digunakan, disesuaikan dengan kondisi pelabuhan udara setempat. Katagori ILS ditentukan menurut kondisi visibility minimum, cuaca, persyaratan landasan dan atas dasar pertimbangan itu pula, maka untuk fasilitas ILS pada pelabuhan udara Halim Perdanakusuma dipakai ILS dengan katagori I.

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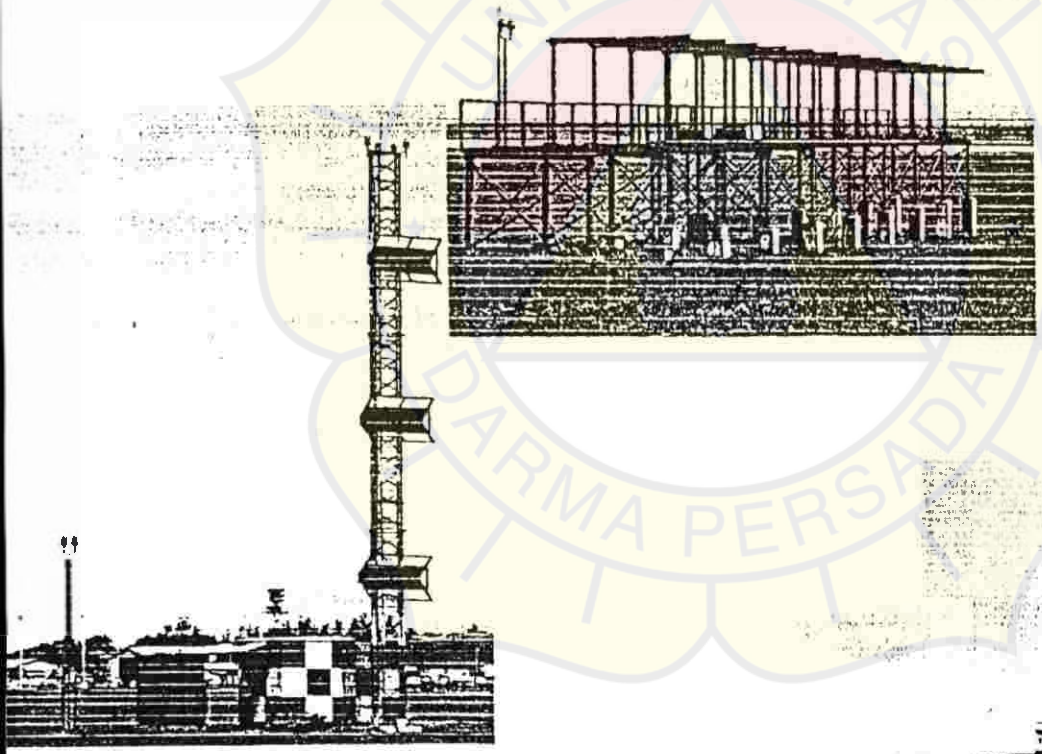
2. Moh. Kamal HS. Ir, Petunjuk Teknis Penempatan dan Pemasangan Fasilitas ILS Direktorat Jendral Perhubungan Udara , Direktorat Fasilitas Elektronika dan Listrik, Jakarta, 1999
3. Myron Kayton, Walter R. Fried, Avionic Navigation System, John Wiley & Son, Inc,1969
4. Sub Direktorat Navigasi Udara, Instrument Landing System (diktat), Direktorat Jendral Perhubungan Udara , Direktorat Fasilitas Elektronika dan Listrik, Jakarta, 1994
5. Suhana, Ir , Shigeki Shoji, Buku Pegangan Teknik Telekomunikasi, PT. Pradnya Paramita, Jakarta, 1994
6. Thoburn C. Lyon, Practical Air Navigation, Jeppesen, Denver, Colorado,1935

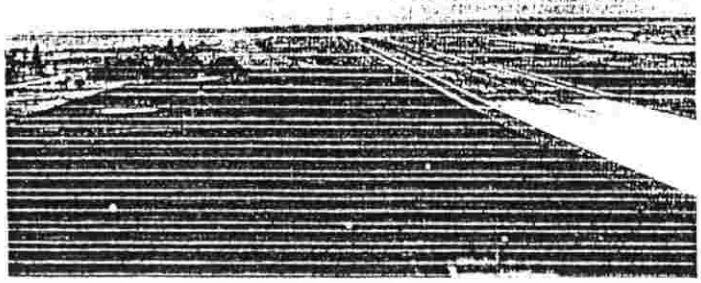
Lampiran

NEC

INSTRUMENT LANDING SYSTEM

NNG-1800 SERIES





NNG-1800 Series ILS

Since 1963, NEC has supplied a number of highly reliable Instrument Landing System (ILS) which have been in operation at major airports in Japan. NEC has also supplied a number of ILSs to several countries, such as Turkey, India, Thailand, Indonesia, Philippines, Bolivia, South Korea and Lao contributing to the development and modernization of Air Traffic Services in these countries.

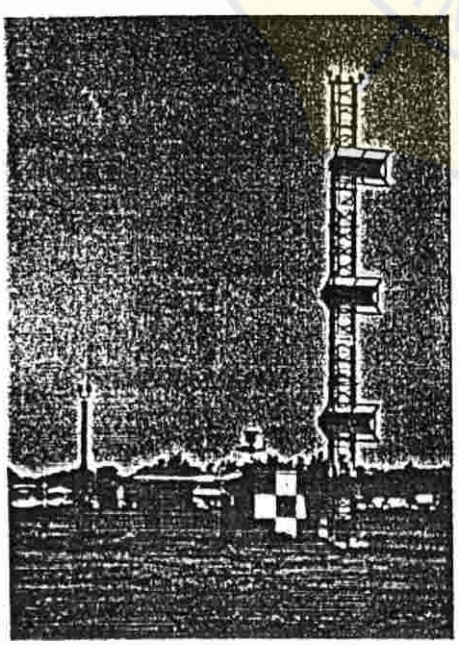
The development of sophisticated technologies and applications of these to the ILS permit the delivery of a high reliable system. NEC's range of services covers feasibility study, definition of operational requirements, design, manufacturing, installation and operation/maintenance and to a total project management, including training and logistical support.

The standard configuration of the NNG-1800 Series ILS is;

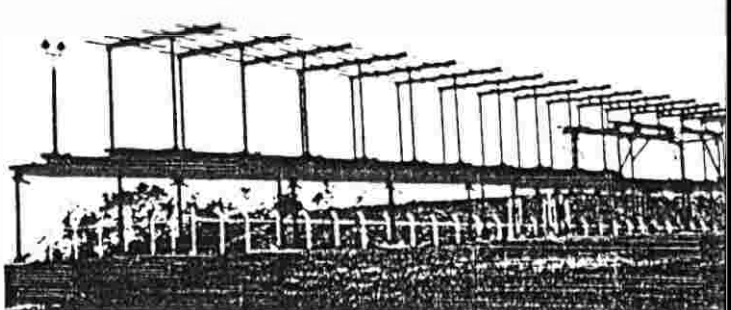
- NNG-1801 Series Localizer (single/dual frequency)
- NNG-1802 Series Glide Path (single/dual frequency)
- NNG-1803 Series Maker Beacon (inner/middle/outer)
- NNG-1804 Remote Control and Status Unit
- NNG-1805 Remote Maintenance Monitoring System
- NNG-1798 Far Field Monitoring System

Features

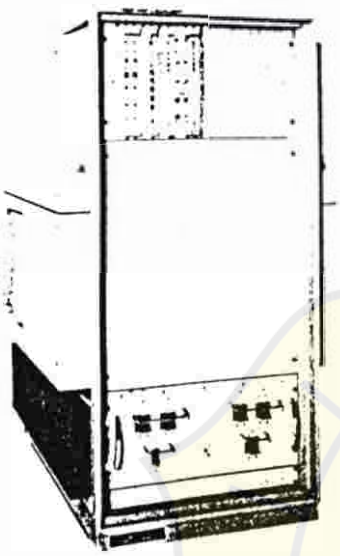
1: Fully meets ICAO Annex 10 Category I and II requiremen
2: Lower price, lighter weight and smaller size than NNG-69 series ILS and one cabinet except antennas
3: Easy maintenance and measurement
   - PC-based Built-In Test Equipment (BITE) for alarm settin measurement and bias correction
   - Optional PC-based Remote Maintenance Monitoring Sy tem (RMMS) for monitoring, control, measurement, lo ging and diagnostics
   - Fail-safe, self-check, calibration and testing capability
4: Advanced digital signal processing technologies
   - Synthesized tuning in operating frequency
   - Digital filters
   - Large-Scale Integrated circuits (LSI)
   - Programmable Logic Devices (PLD)
5: Advanced analogue technologies
   - Electronic modulator using level and phase feed back tec niques
6: Unique micro strip techniques
   - Low SDM-forming power distributors
   - Far-field corrected integral monitors
7: Higher system accuracy
   - Dual-frequency capture-effect localizer and glide path
   - Large carrier ratio for minimizing the affected reflecti signals
   - Extremely precise course and path structure
8: Fully solid-state design for high reliability and stability
9: Remote Control and Monitoring
   - Remote Control and Status Unit (RCSU)
   - Monitor Indicator Unit (MIU) for status display
   - PC-based RMMS
10: Localizer antenna
   - Log Periodic Dipole (LPD) antenna whose aperture c be adjusted to adapt to various sites
   - Common LPD antenna for both single and dual freque system
   - Broad band antenna



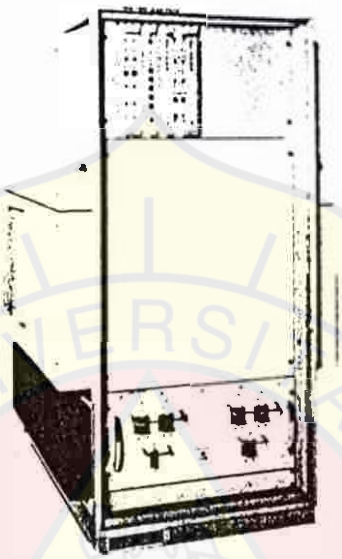
■ M-Array Capture Effect Glide Path Antenna



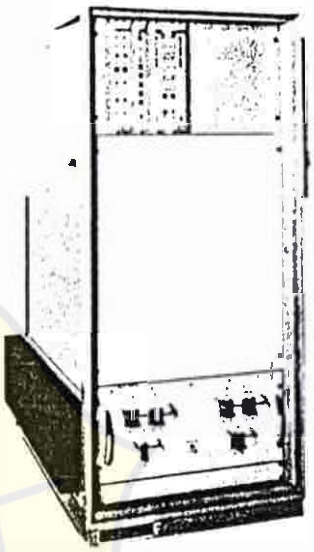
■ Dual frequency wide aperture LPD Localizer Antenna with provision for collocated MLS Azimuth Antenna Installation



■ NNG-1801 Series
Localizer

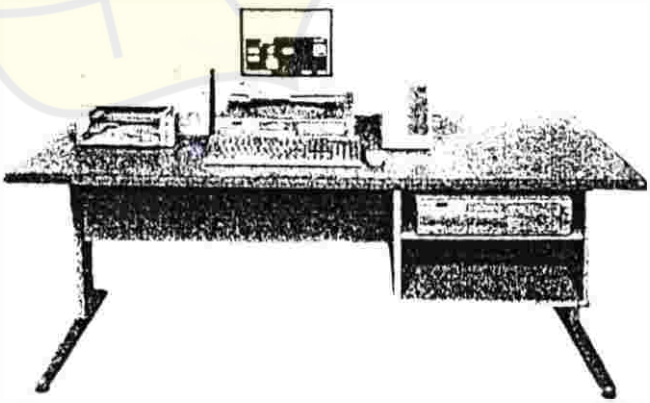


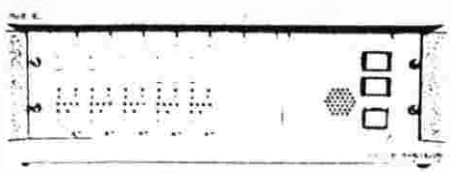
■ NNG-1802 Series
Glide Path



■ NNG-1803 Series
Marker

■ Monitor Indicator Unit (MIU)





■ NNG-1804 Series
Remote Control and Status Unit (RCSU)

■ NNG-1805 Series
Remote Maintenance Monitoring System (RMMS)

formance

ystem	Localizer	Glide Path
ertical coverage	Up to 7°	0.4.5θ (or 0.3θ) to 1.75θ, θ: glide path angle
lorizontal coverage	25NM min. within ± 10° 17NM min. between ± 10° and 35°	10NM min.
ourse width/Glide angle	Adjustable 2.4° to 6°	Adjustable 2° to 4°
learance	180μA min. at ± 10° 150μA min. from ± 10° to ±35°	Below the path: 180μA min. Above the path: 150μA min.
ourse structure	ICAO Annex10, Para. 3.1.3.4	ICAO Annex 10, Para. 3.1.5.4
ransmitter		
requency		
Range	108 to 112 MHz	328.6 to 335.4 MHz
Stability	±0.001% (Channel spacing: 50kHz)	±0.001%
Separation*	8kHz nom*	8kHz nom*
lominal power output	15W	DIR: 5W CL: 0.5W*
arrier power ratio*	13dB at 0°*	10dB*
arrier modulation		
Frequency	90Hz ± 1%, 150Hz ± 1%	DIR: 90Hz ± 1%, 150Hz ± 1%, CL: 150Hz ± 1%*
Depth	Adjustable 18% to 22% (20%: normal)	DIR: Adjustable 37.5% to 42.5% (40%: normal) CL: Adjustable 75% to 95% (90%: normal)*
Total harmonic content	Less than 5%	Less than 5%
Phase lock	3° max.	3° max.
lentification		
Frequency	1,020Hz ± 5Hz	
Depth	Adjustable 5% to 15% (10%: normal)	
Number of letter	5 letters max.	
lonitoring		
ystem	N ar field, Integral	Near field, Integral*
ems	D D M , RF, MOD (o SD M) FREQ D IFF*, ID, DC, PWR	DDM, RF, MOD (or SDM), FREQ DIFF*, CL*, DC, PWR
larm time delay	Adjustable 1 sec. to 10 sec.	Adjustable 1 sec. to 10 sec.
ntenna		
olarization	Horizon ta l	Horizontal
ptions	•Single freq. 14 and 24 element •Dual freq. 20, 22 ,and 24 element*	•Null reference •M-array capture effect*
ement		
ype	Log periodic dipole antenna	3 eleme nt colinear array antenna with corner reflector
VSWR	1.2 max.	1.2 max.
Gain	10dBi min.	13dBi min.
Front to back ratio	28dB min.	20dB min.

ystem	Marker Beacons
overage	ICAO Annex 10, Para. 3.1.7.3
ansmitter	
equency	75MHz
equency stability	±0.001%
ominal power output	Outer: 3W Inner/Middle: 1W
uty cycle	Continuous unattended
odulation	
Frequency	400 ± 1Hz, 1,300 ± 1Hz, 3,000 ± 1Hz
Depth	95% ± 4%
otal harmonic content	Less than 5%
eying	ICAO Annex 10, Para. 3.1.7.5
onitoring	
stem	Integral
ms	RF, MOD, ID, DC, PWR
arm time delay	Adjustable 1 sec. to 10 sec.
ntenna	
larization	Horizontal
pe	Outer: 2 stack-2 element-Yagi antenna Middle: 2 element-Yagi antenna Inner: One wave length antenna with counterpoise
WR	1.2 max.

■ Primary Power	
•Supply	170 V to 265V AC, 50/60Hz or 48VDC nom.
•Power consumption	Single freq. LLZ : 650VA max. Dual freq. LLZ* : 950VA max. Null referenceGP : 550VA max. Capture effect GP* : 600VA max. Marker beacons : 150VA max.
■ Environmental	
•Equipment	10°C to +55°C, Up to 95% RH
•Antenna	−30°C to +70°C, Up to 100% RH
•Wind	Up to 60m/sec.
■ Optional Items	•Remote Maintenance Monitoring System •Stand-by battery with rack •Interconnecting cable kit •Test instruments •Technical training at factory and site •Structure for collocated MLS azimuth antenna installation

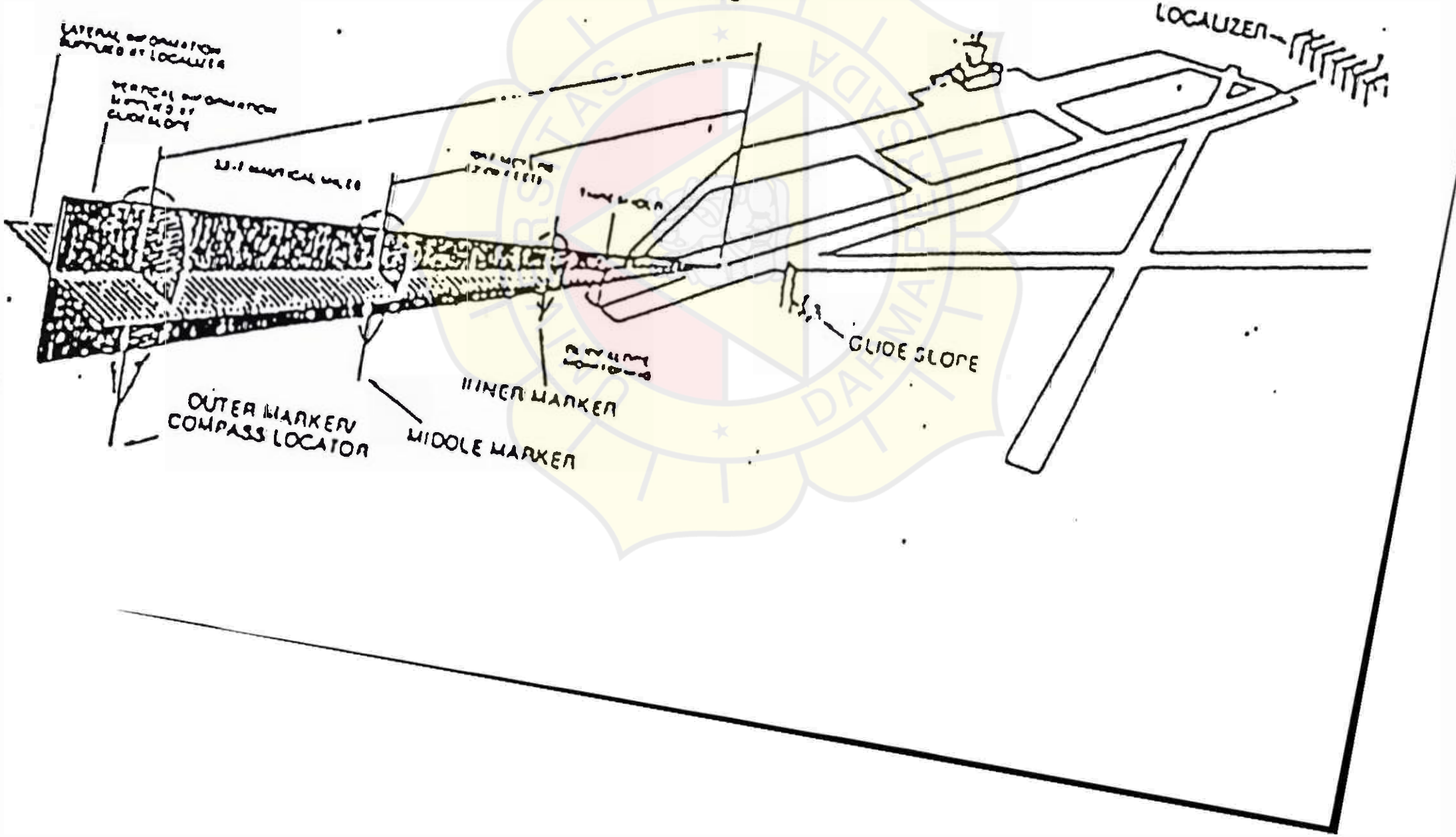
Note: *is applicable to dual frequency system.

o the company's policy of continuous development and improvement,
ght is reserved to change the specifications without notice.

EC

Printed in Japan

ILS


LOCALIZER
GLIDE SLOPE
INNER MARKER
MIDDLE MARKER
OUTER MARKER
COMPASS LOCATOR

2.5 Diagrams (Figures C-7 to C-12 illustrate certain of the standards contained in Chapter 3)

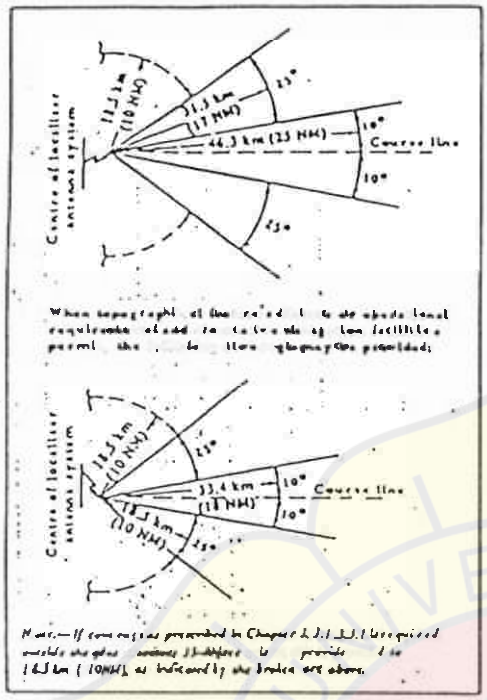


Figure C-7. Localizer coverage with respect to azimuth

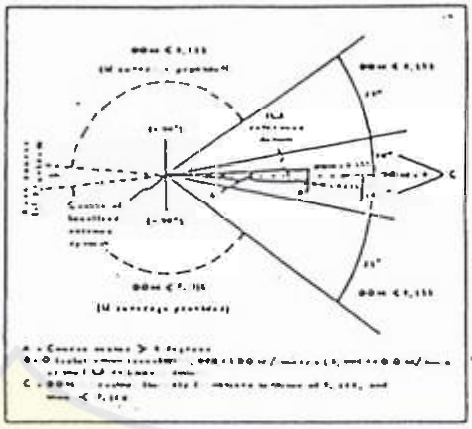


Figure C-9. Difference in depth of modulation and displacement sensitivity

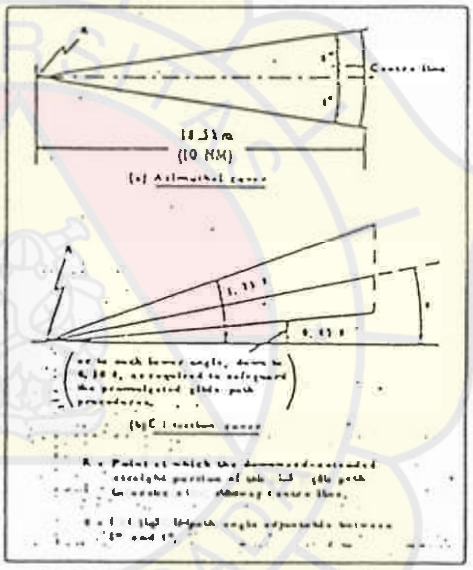
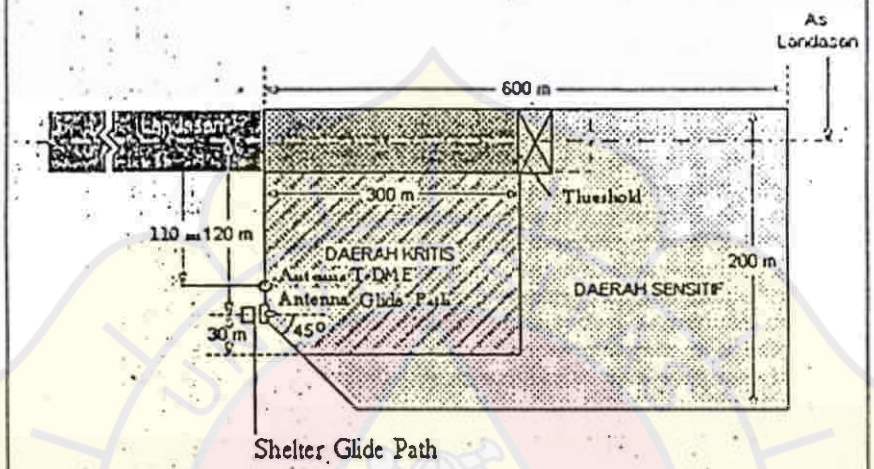


Figure C-10. Glide path coverage

7/11/96

DIREKTORAT JENDERAL PERHUBUNGAN UDARA DIREKTORAT FASILITAS ELEKTRONIKA DAN LISTRIK SUB DIREKTORAT NAVIGASI UDARA	GAMBAR NO. 4	1999/2000
COVERAGE LOCALIZER DAN GLIDE PATH ILS		
SKALA :	DIGAMBAR :	DIPERIKSA :	DISETUJUI :



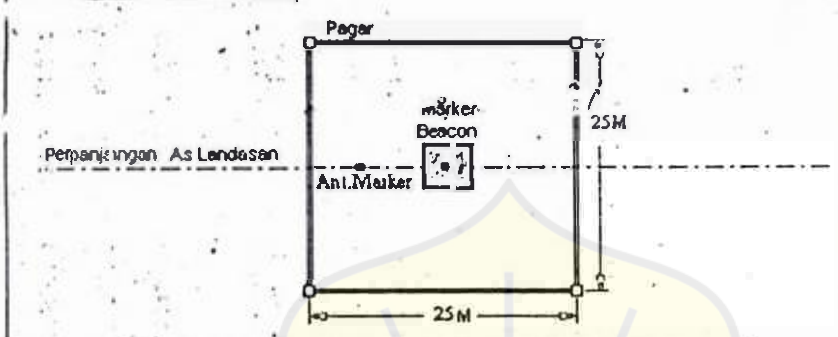
Persyaratanlain:

1. Pada daerah kritis dan daerah sensitif tidak boleh terdapat bangunan dan atau konstruksi lain dari bahan metal serta pepohonan.

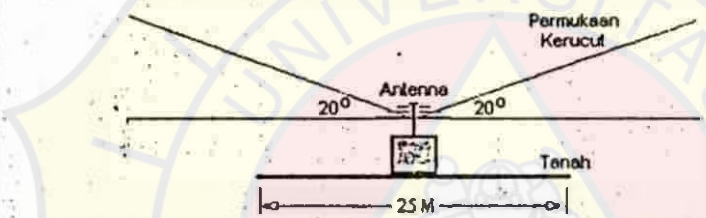
2. Kemiringan shoulder di daerah kritis dan sensitif sama dengan atau lebih kecil dari 1°.

DIREKTORAT JENDERAL PERHUBUNGAN UDARA DIREKTORAT FASILITAS ELEKTRONIKA DAN LISTRIK SUB DIREKTORAT NAVIGASI UDARA	GAMBAR NO. 2	1999/2000
PENEMPATAN ANTENNA GLIDE PATH DAN T-DME		
SKALA:	DIGAMBAR:	DIPERIKSA:	DISETUJUI:

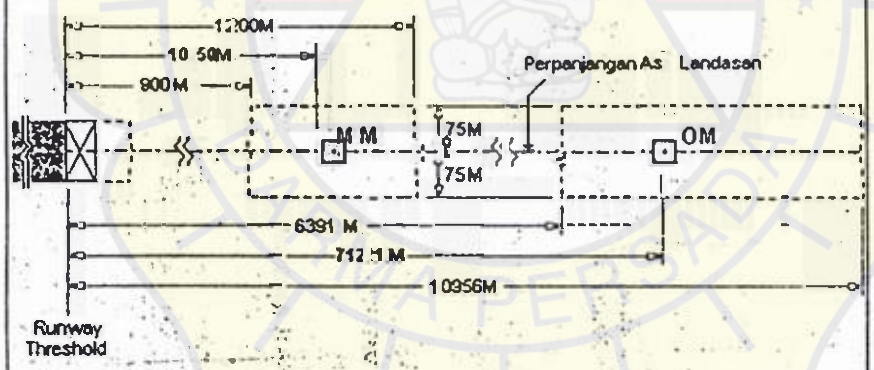
1. LUAS TANAH UNTUK PENEMPATAN MIDDLE MARKER (MM) / OUTER MARKER (OM)



2. PERSYARATAN BATAS -BATAS KETINGGIAN DISEKITAR ILS MIDDLE MARKER (MM) / OUTER MARKER (OM)



3. DAERAH PENEMPATAN ILS MIDDLE MARKER (MM) / OUTER MARKER (OM)



DIREKTORAT JENDERAL PERHUBUNGAN UDARA DIREKTORAT FASILITAS ELEKTRONIKA DAN LSITRIK SUB DIREKTORAT NAVIGASI UDARA	GAMBAR NO : 3	1999/2000
PENEMPATAN MIDDLE MARKER /OUTER MARKER		
SKALA :	DIGAMBAR:	DIPERIKSA : DISSETUJUI:
Dwg No.		

DATA PERALATAN NAVIGASI UDARA YANG TERPASANG

No.

Date:

NO	LOKASI	CONFI GURASI	MEREK / TYPE	INSTA LASI	PENGELOLA	JUMLAH	KETERANGAN
1	YOGYAKARTA	LLZ/GS/MM/OM	WILCOX MARK I	1989	PT. AP – I	1	
2	SOLO	LLZ/GS/MM/OM	WILCOX MARK 0	1996	PT. AP – I	1	
3	SURABAYA	LLZ/GS/MM/OM	SELAG 3000	1985	PT. AP – I	1	
4	BALI	LLZ/GS/MM/DME	NEC NNG691	1990	PT AP – I	1	
5	BANJARMASIN	LLZ/GS/MM/OM	SELAG 3000	1984	PT. AP – I	1	
6	BALIKPAPAN	LLZ/GS/MM/DME	NEC NNG691	1993	PT. AP – I	1	
7	MANADO	LLZ/GS/MM/OM	WILCOX MARK II	1986	PT. AP – I	1	
8	UJUNGPANDANG	LLZ/GS/MM/DME	WILCOX MK I	1981	PT AP – I	2	
9	AMBON	LLZ/GS/MM/DME	WILCOX MARK II/596B	1986	PT. AP – I	1	
10	BIAK	LLZ/GS/MM/DME	SELAG 3000	1984	PT. AP – I	1	
11	MEDAN	LLZ/GS/MM/OM	SELAG 3000	1984	PT. AP – II	1	
12	PEKANBARU	LLZ/GS/MM/DME	WILCOX MARK II	1989	PT. AP – II	1	
13	PALEMBANG	LLZ/GS/MM/OM	WILCOX MARK 10	97	PT. AP – II	1	
14	JAKARTA/HALIM	LLZ/GS/MM/DME	WILCOX MARK II/596B	1984	PT. AP – II	1	
15	JAKARTA/SOE-TA	LLZ/GS/MM/OM	WILCOX MARK II	1989	PT. AP – II	1	
	JAKARTA/SOE-TA	LLZ/GS/MM/OM	WILCOX MARK 10	1996	PT. AP – II	1	
	JAKARTA/SOE-TA	LLZ/GS/MM/OM	THOMCS LS 381	1984	PT AP – II	2	
16	BANDUNG	LLZ/GS/MM/OM	WILCOX MARK II	1992	PT AP – II	1	ACEH
17	PONTIANAK	LLZ/GS/MM/OM	WILCOX MARK 10	1995	PT. AP – II	1	
18	DITJENUD /BE	LLZ/GS/MARKER	SEAG 3000	1984	JENUD DIT	1	(Mock Up)
	DITJENUD /BE	LLZ/GS/MARKER	WILCOX MARK II/596B	1985	N DITJE UD		(Mock Up)
19	BATAM	LLZ/GS/MM/DME	NEC NNG961	1994	BATAM	1	
20	MALANG	LLZ/GS/MM/DME	WILCOX MARK 10/580	1997	DITJENUD	1	
21	PALANGKARAYA	LLZ/GS/MM/DME	NORMAC ASII	1996	DITJENUD	1	
22	JAYAPURA	LLZ/GS/MM/DME	WILCOX MARK II/SI 90	1985	DIT. JENUD	1	
						27 Set	

No

Date

DATA PERALATAN NAVIGASI UDARA YANG TERPASANG "R V R"

NO.	LOKASI	MEREK /TYPE	INSTALASI	PENGELOLA	JUMLAH	KETERANGAN
1	YOGYAKARTA	IMP.PHISIK Skopograph	1989	PT. AP – I	1	
2	SURABAYA	IMP.PHISIK Skopograph	1983/1990	PT. AP – I	1	
3	BANJARMASIN	IMP.PHISIK Skopograph	1985	PT. AP – I	1	
4	MANADO	IMP.PHISIK Skopograph	1986	PT. AP – I	1	
5	UJUNGPANDANG	IMP.PHISIK Skopograph	1988	PT. AP – I	1	
6	AMBON	IMP.PHISIK Skopograph	1986	PT. AP – I	1	
7	BIAK	IMP.PHISIK Skopograph	1985	PT. AP – I	1	
8	MEDAN	IMP.PHISIK Skopograph	1986	PT. AP – II	1	
9	PAKANBARU	IMP.PHISIK Skopograph	1986	PT. AP – II	1	
10	PALEMBANG	IMP.PHISIK Skopograph	1989	PT. AP – II	1	
11	JAKARTA / HALIM	IMP.PHISIK Skopograph	1985	PT. AP – II	1	
	JAKARTA/SOE –TA	IMP.PHISIK Skopograph	1989	PT. AP – II	1	
	JAKARTA/SOE –TA	THOMSON –	1989	PT. AP – II	1	
12	BANDUNG	IMP.PHISIK Skopograph	1989	PT. AP – II	1	
13	PONTIANAK	IMP.PHISIK Skopograph	1985	PT. AP – II	1	
14	DITJENUD / BE	IMP.PHISIK Skopograph	1992	DEJENUD	1	
15	JAYAPURA	IMP.PHISIK Skopograph	1985	DEJENUD	1	
					17 Set	

LEMBAR KONSULTASI BIMBINGAN

TUGAS AKHIR

JURUSAN TEKNIK ELEKTRO

Nama : Edward George Sumarauw

NIM : 97.21.0902

Pembimbing : Ir. Sumulyo Sukandar, M.Sc

Judul : Analisa Penggunaan ILS Khususnya Glide Slope Sebagai Sistem Pendaratan Pesawat

PERTEMUAN KE	TANGGAL	PEMBAHASAN	PARAF PEMBIMBING
Pertama	22-02-2000	Konsultasi penyusunan	
Kedua	06-03-2000	Bab I Pendahuluan	
Ketiga	14-03-2000	Bab II Teori Dasar Navigasi	
Keempat	20-03-2000	Bab III ILS	
Kelima	19-04-2000	Bab IV Analisa	
Keenam	20-07-2000	Bab V Kesimpulan	
Ketujuh	01-08-2000	Konsultasi akhir	
Sinopsis telah disetujui pembimbing			

Persetujuan untuk sidang
Pembimbing

( )

DAFTAR RIWAYAT HIDUP

Saya yang bertanda tangan dibawah ini :

Nama	: EDWARD GEORGE SUMARAUW
Tempat/Tanggal lahir	: Jakarta, 9 Juni 1974
Agama	: Kristen Protestan
Warga negara	: Indonesia
Alamat	: Jl. Dewi Sartika No. 15 Cawang III
	Jakarta – Timur 13630

PENDIDIKAN

1. SD Santo Antonius, Jakarta. tamat tahun 1987.
2. SMP Santo Antonius, Jakarta. tamat tahun 1990
3. STM Santo Yoseph , Jakarta. tamat tahun 1993.
4. Kuliah di Universitas Pancasila, Jurusan teknik elektro. tamat tahun 1996.
5. Kuliah di Universitas Darma persada, Jurusan teknik elektro tahun 1997.

Demikianlah daftar riwayat hidup ini saya buat dengan sebenar-benarnya.

Jakarta, Juli 2000

(Edward George Sumarauw)