

2.
2.1

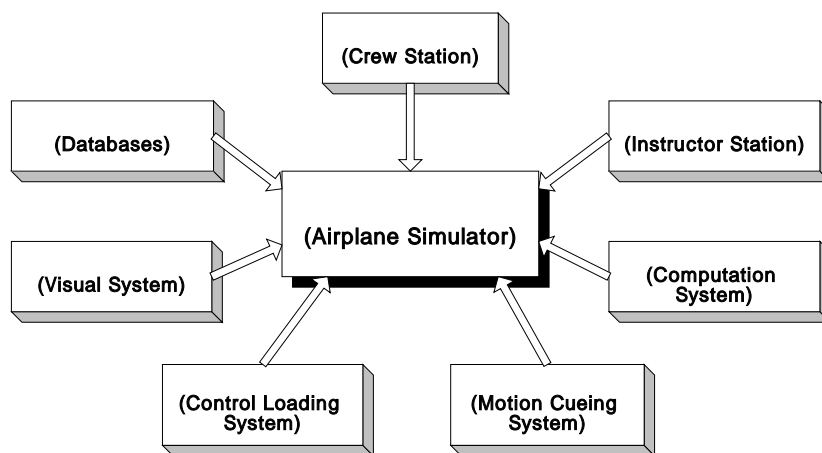
가 가

가

2.2

가

7



< 1 >

2.3

FFS(Full Flight Simulator), FTD(Flight Training Devices) 가 . FFS ,
 , . FFS 가
 가 가 .
 , FTD(Flight Training Devices)
 . FTD
 가

FTD

[38].

FFS	* / * * * * * * * (Motion System) * 가 * * (Control Loading)
FTD	* * * * * * * 가

< 1> FFS FTD (: , “ , 9 , 2001)

ACS	Air Combat Simulator	AST	Avionics System Trainer
AVT	Audio Visual Trainer	CBT	Computer Based Trainer
CMS	Combat Mission Simulator	CPT	Cockpit Procedures Trainer
CST	Crew Station Trainer	ES	Engineering Simulator
FFS	Full Flight Simulator	FMS	Full Mission Simulator
FTD	Flight Training Device	IFT	Instrument Flying Trainer
MS	Mission Simulator	MT	Maintenance Trainer
OFT	Operational Flight Trainer	PTT	Part Task Trainer
TFS	Tactical Flight Simulator	UTD	Unit Training Device
WST	Weapon System Trainer	WTT	Weapon Tactics Trainer

< 2>

(: Jane's Simulation and Training Systems Ninth Edition 1996-97, Glossary)

3.

3.1

1930

. 1934

(U.S. Army Air Corps)

5

가

가

Edwin A. Link

Newark

가

가

. Edwin A. Link

가

가

6 Link

< 2>

Trainer

Link Trainer

[38].

1931 9 29

(US Patent No. 1,825,462)

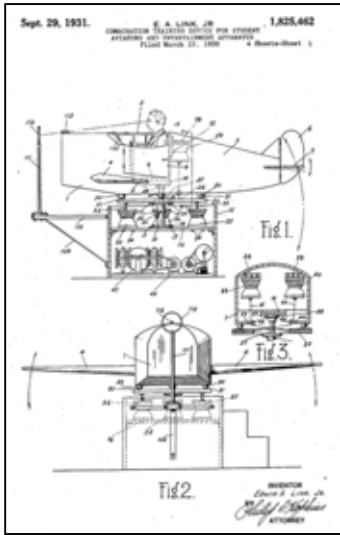
Link Trainer

1920

가

Edwin A. Link

[6].



< 3> Link Trainer
1,825,462

Trainer

500,000

Link Trainer

[63]. Link Trainer

" "

Link Trainer

1935

Link

Link Trainer

2

[6]. 2

Link Trainer

. Blue Box

10,000 가

가

가

, 60

[54].

3.2

3.2.1

Frost & Sullivan “

(North American Commercial and Military Flight Simulation

Markets)”

2000

24

2007 37 가
가 가 Frost &
Sullivan 가 Brooks Lieske
(Commuter Airline)
가 가

가 가 가 가

가 가 가 가

9.11

가 . 2001 AIA(Aerospace Industries Association)
2001 20 가
2002 56 , 2003 67 가

[58].

가
(가 ; Fee-For-
Service Program) . Full Flight Simulator Flight Training Device

10 20

가 . 2004

. Frost & Sullivan “
Training and Simulation Markets)”
2008 47

(U.S. Military

가

가 가

가

가

가

. 가

가 가

가

Frost & Sullivan

가 Jerry

Weltsch

. Jerry Weltsch

(Interoperability)

가

가

가

가

. Jerry Weltsch

가

. Jerry Weltsch

가

가

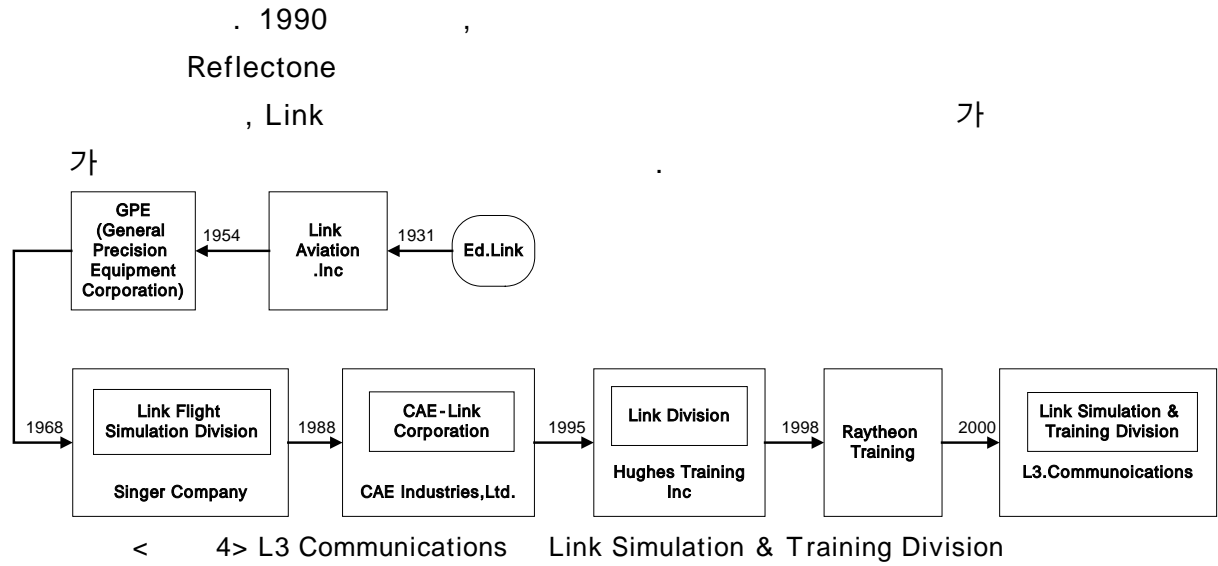
가

가

5 10

L-3

Communications



Lockheed Martin Information Systems(LMIS), L-3 Communications Link Simulation and Training(LS&T), Thales Training and Simulation(TT&S), CAE, FlightSafety International,Inc.

MultiGen Paradigm,Inc., Evans & Sutherland Computer Corporation, Silicon Graphics,Inc. STN Atlas Elektronik GmbH

Lockheed Martin Corporation L-3 17.1%

Frost & Sullivan 11.4%

CAE Lockheed Martin Corporation L-3 4.1%

1/3

CAE BAE

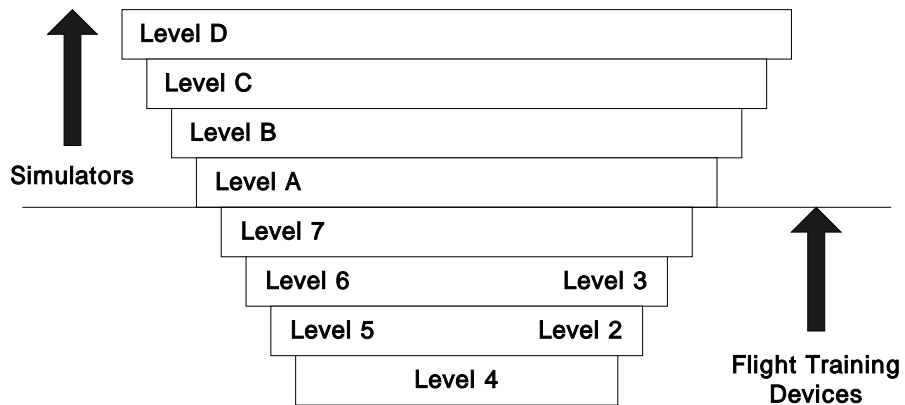
BAE Systems simulation and training division(Reflectone) 2001 4
 가 (CAE
 Simulation –USA) [38][57].

3.3

(FAA) 가

. FAA가
 FFS(Full Flight Simulator) FTD(Flight Training Device) 2가
 가 1991
 (Advisory Circular) Flight
 Simulator AC 120-40B , Flight Training Device
 AC 120-45A . AC 120-63

Airplane Simulation Capability



< 5> FAA (: , “ &
 ”, , 2002)

Flight Training Device 7 3 (Level 1 ~ 3)
 가 4 (Level 4 ~ 7)
 . FAA Flight Training Device 가
 가 , Level 5
 Level 6 Level 7

4.
4.1
4.1.1

[21], UH-1H
 1979 . 1999 2000 AH-1S,
 UH-60 가 . 1979 UH-1H
 가
 AH-1S, UH-60
 , 6
 가 ,
 1500 12,000 ,
 85% 가 [4].
 80 FTD
 , 90 OFT
 KAI FTD F-5 CPT가 1998
 가
 FTD

	T-59	F-16	KF-16	F-4	F-5	KT-1	
	OFT	OFT	OFT	FTD	FTD	OFT	FTD
	95	93	97	89	98		2000
	FFS	TFS	WTT	CPT	CPT	FFS	CPT
	Link-Miles	CAE	Hughes	CAE-Link	KAI	KAI	KAI
				3CH CRT	CRT		

< 4> (: , “ , 9 , 2001)

1980
 GAT III (1983) B747-200 (1984)
 B747-400, B747-200, B777, A330,
 A300-600, B737-800, F100 ,

B777 - 200

		Computer	Motion	Visual	Level
B747-200	CAE	VAX 11/780	6	VITAL IV /4w	1984
MD-82	CAE	VAX 11/780	6	VITAL IV /6w	1987
A300-600	TTS	Could 3267	6	VITAL IV	1988
B747-400	CAE	Encore MultiSEL	6	SPX500/W150	FAA LD/1990
B727-200	Singer-Link	PDP 11/55	6	DIG/3w	1990
Cheyenne V	FSI	Concurrent Micro	6	Vital VII/4w	LC/1992
Citation II	FSI	P-E 3262	4	VDS-1000/2w	FAA LC/1993
Fokker 100	CAE	VAX 4500	6	Vital VII/M150	MOT L3/1994
A330-300	TTS		6		LD/1998
A330-300	TTS		6		LD/1998
B747-400	CAE	IBM 6000	6	MaxVue	1998

< 5> () (“Flight Simulator Census Update 2001”, AIR, Inc., 2001)

가
 , 1999 가

Flightsafety Boeing Training International (FSB)
 가

		Computer	Motion	Visual	Level
B747-200	CAE	VAX 11/780	6	Vital IV/4w KMOT	FAA LC/1983
Fokker 100	CAE	VAX 4500	6	Vital IV/4w KMOT	FAA LD/1993
B737-700/800	CAE	IBM 6000	6	MaxVue + KMOT	FAA LD/2001

< 6> Flightsafety Boeing Training International – Korea Training Center () (“Flight Simulator Census Update 2001”, AIR, Inc., 2001)

B737 B747-400, B767-300ER, A320

		Computer	Motion	Visual	Level
B737-300/400/500	TTS	Encore MultiSEL	6	SPX500/W150	FAA LC/1991
B747-400	CAE	IBM 6000	6	MaxVue/150i	FAA LC/1994
B767-300ER	CAE	IBM 6000	6	MaxVue/150i	FAA LC/1995
A320	CAE	IBM 6000	6	MaxVue	LD/2001

< 7>

(“Flight Simulator Census Update 2001”,

AIR, Inc., 2001)

4.1.2

-91 FTD(Flight Training Device)

1991

-91 FTD

-91 FTD

4

FTD Level A

[19].

80

가

가

KTX-1 Flight Simulator

KTX-1

1990

KT-1

T-41B

T-37C

1988

1991

12

12

KTX-1 #01

10

2,000

가

KT-1

가

()가

1992

11

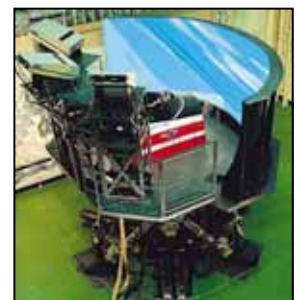
, KTX-1

1996

12

8

가



< 6> KTX-1

. KTX-1 KTX-1
 / , , ,
 . KTX-1 6
 Spherical Screen 150° x 40°
 KTX-1 FAA AC 120-40B Level C
 [3].

KT-1 Flight Simulator

1996 5 , KTX-1 04 가
 1997 1
 . 1997 1 1998 12
 KTX-1 05 가
 1999 가 2000
 KTX-1
 X(Experimental) KT-1
 KT-1
 KAI 1990
 5
 200° x 60° 7
 FAA Level C
 가
 KT-1
 가 .



< 8 > KT-1

(Engineering Simulator)



< 9 > KARI

가
Top-Level [9].

4.2 (Regularity)

(Simulator)

(2002.11.9)

“ ()”

[27].

가 가

4.3

Map)

(Patent

가

10

가

5.

5.2

가

3

가

1)

- Modeling & Simulation

-

-

2)

-

3)

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5.2.1

Modeling & Simulation

(Defense Modeling and Simulation Office; DMSO)

1990

, , 가,
. DMSO 가

Modeling & Simulation

가

가

(KIDA)

Modeling & Simulation

가

Constructive

Simulation

. Virtual Simulation

STRICOM(Simulation, Training, and Instrumentation Command), NAWCTSD (Naval Air Warfare Center Training Systems Division), TSPG(US Air Force Training Systems Product Group) [42].

Modeling & Simulation

Modeling

& Simulation

1980 Image Generator

가

Project (Air Force Aeronautical Systems Center ; AFASC)

2851 (: F33657-86-C-0182)

3

3 가

1987

가

가

(Scene Correlation)

가 (production capability)

SIF

(Standard Simulator Data Base Interchange Format ; SIF) . SIF

(Mil-Std-1821, 1993 6 17)

1992 11 , 1993 12 I/ITSEC
(Interservice/Industry Training Systems Conference)

Project 2851

. SIF

, 3가 (Virtual, Constructive, Live
Simulation) 가 SEDRIS
. SEDRIS(Synthetic Environments
Data Representation and Interchange Specification)

(a)

(b)

(d) , ,

(c)

[31].

SEDRIS 가 Virtual, Constructive, Live Simulation 가

SEDRIS Modeling & Simulation GIS 가 가



, , ,

가

가

가

Modeling & Simulation

가

Modeling & Simulation

Modeling & Simulation

Modeling & Simulation

Modeling & Simulation

가

5.2.2



1950

(KIST)

, 1966

가

60

2

가

, 가

, 가

가가

가

가

가 가

가

가

가

가

5.2.3



1990

가

가

1990

가

가가

가

IMF

T-50

KT-1

가

가

가

가

가

가 가

10 가



가 99 %
Chip Level Maintenance, Adjustment, DB
Alignment, Replacement가 가
[22].

가

, 가

가

가

6.

1978

,
가

가,

가

3

가

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가

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가 ,

4

() 99

,
가

2002

가 ()
가
가 ()
가
10
가
가
가
가
3

References

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- [6] , “ (2)”, 10 , 2002
- [7] , “ ”, 1991 , 1991
- [8] , “가 ”, HCI 2000 , 2000
- [9] , “ ”, ,

- [10] , “ ”,
 , 1999
- [11] , “KARI ”,
 , 1999
- [12] , “ ”, 16
 1 , 1997
- [13] , “ ”,
 , 1999
- [14] , “ ”,
 7 5 , 2000
- [15] , “ ”, 1995
- [16] , “ ”, 9
 , 2001
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 , 27 , 4 , pp. 143-149, 1999. 6.
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 , 27 , 2 , pp. 134-140, 1999. 4.
- [20] , “ ”, 30 , 7 , pp.
 150-162, 2002.8.
- [21] , “ ”, 25 2 , 1998
- [22] , “ ”, 23 , 5 , 1995,
 10.
- [23] , “ & ”, , 2002
- [24] , “ ”, 8
 , 2000
- [25] , “ ”,
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 2 , 1999
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