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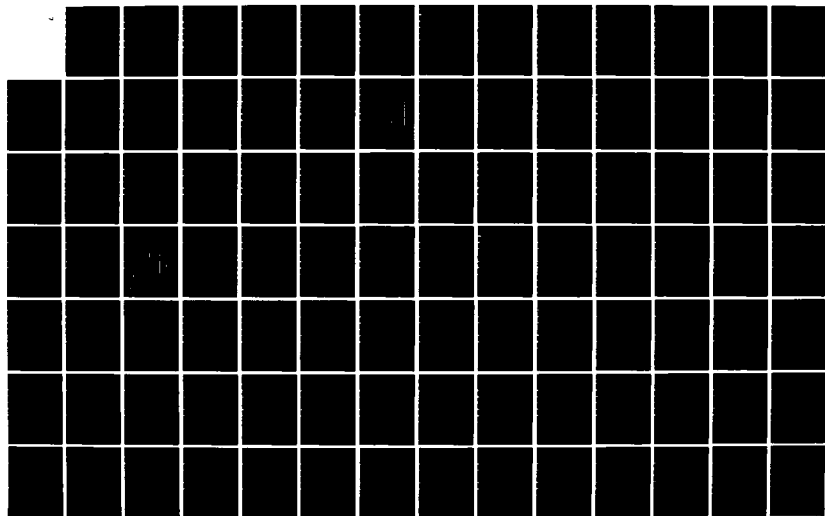
STANDARDIZATION PLAN FOR FIBER OPTICS OPTIONAL PHASE
VOLUME 2(U) INFORMATION GATEKEEPERS INC BOSTON MA 1984
F84686-82-C-1585

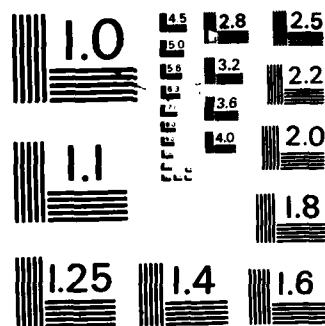
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

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FINAL REPORT

Appendices to Optional Phase

VOLUME II

submitted under Air Force Contract F04606-82-C-1505

to

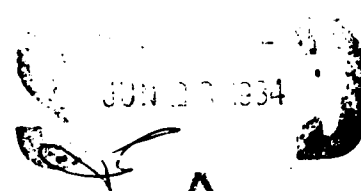
Sacramento ALC/PM
McClellan Air Force Base

By

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and

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(617) 778-1442



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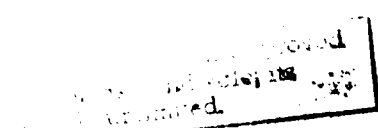


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A-1

APPENDIX 1
SAMPLE OF SYSTEMS DATABASE

System 008: Ground Launch Cruise Missile (GLCM)

Organization: JCMP Office

Status: Ongoing (5 year) Procurement Process

of Systems: 320 FO Cable Links

Contact #1: Ltc. Muhn

Address: JCM-G-40

JCMP

Washington

Phone: 202-692-2977

DC 20363

Autovon: 8-225-2977

Contact #2:

Address:

Phone:

Autovon:

Contact #3:

Address:

Phone:

Autovon:

Contractor #1: McDonald Astronautics

Prime Contact: W. Holden

Second Contact:

Address: P.O. Box 576

Building 106; Level 3 C-5

St. Louis

MO

Phone: 314-232-4491

Responsibility:

Contractor #2: General Dynamics Convair Division

Prime Contact: G. Miyashiro

Second Contact:

Address: 5001 Kearny Villa Road

San Diego

CA 92138

Phone: 714-277-8900 X3957

Responsibility:

Contractor #3: Sperry Univac

Prime Contact: W.W. Davis

Second Contact: Tony Lancett

Address: P.O. Box 3525 MS Y 2A01

St. Paul

MN 55165

Phone: 612-456-3815

Responsibility:

System 027: TAOC-85; Modular Control Element (MCE) Air Force Version

Organization: ESD

Status:

of Systems: 6 Marine; 182 Air Force

Contact #1: Ltc. McNammara

Address: ESD/DCB-MC

Hanscom AFB

Phone: 617-861-4195

MA 01731

Autovon: 8-478-4195

Contact #2: Lt. M. Williams

Address: SM-ALC/MMARA

McLellan AFB

Phone: 916-643-4850

CA 95652

Autovon: 8-633-4850

Contact #3: Capt. John Olmstead

Address: ESD/TCRB

Phone: 617-861-4957

Autovon: 8-478-4957

Contractor #1: Litton Industries Electron Tube Division

Prime Contact:

Second Contact:

Address: 7225 Shoup Avenue

Canoga Park

Phone: 213-716-1886

CA

Responsibility:

Contractor #2: ITT EOPD

Prime Contact: D. Moeller

Second Contact:

Address: 7635 Plantation Road

P.O. Box 7065

Roanoke

Phone: 703-563-0371

VA 24019

Responsibility:

Contractor #3:

Prime Contact:

Second Contact:

Address:

Phone:

Responsibility:

System 029: AN/GRC-206

Organization: SM-ALC

Status:

of Systems: 434

Contact #1: J. Poston

Address: SM-ALC/MMC-REA

Phone: 916-643-4850

Autovon: 8-633-4850

Contact #2: M. Ware

Address: SM-ALC/MMC-REA

Phone: 916-643-4850

Autovon: 8-633-4850

Contact #3: W. Foemmel

Address: SM-ALC/MMC-REA

Phone: 916-643-4850

Autovon: 8-633-4850

Contractor #1: Magnavox; Government Industries Electr. Co.

Prime Contact: G. Sutton (Purchasing Manager)

Second Contact:

Address: 1313 Production Road

Fort Wayne

IN 46808

Phone: 219-429-5737

Responsibility: Both local & remote FO cables provided to connect WRSC's & VASC to the interface equip.

Contractor #2: Magnavox; Government Industries Electr. Co.

Prime Contact: R. Aderholt

Second Contact:

Address: TC 10A2; Department 662

1313 Production Road

Fort Wayne

IN 46808

Phone: 219-429-6498

Responsibility:

Contractor #3: Magnavox; Government Industries Electr. Co.

Prime Contact: B. Beitman

Second Contact:

Address: Building 16; Department 635

1313 Production Road

Fort Wayne

IN 46808

Phone: 219-429-6498 or 6615

Responsibility:

System 039: Tactical Generic Cable Replacement

Organization: RADC

Status: To be completed 3/85 (Connector); 11/84 (Mud Box)

of Systems:

Contact #1: T. Ross (Mud Box Version)

Address: RADC/DCLW

Griffiss AFB

Phone: 315-330-4092

NY 13441

Autovon: 8-587-4092

Contact #2: F. Chiffy (Connector Version)

Address: RADC/DCLW

Griffiss AFB

Phone: 315-330-4092

NY 13441

Autovon: 8-587-4092

Contact #3:

Address:

Phone:

Autovon:

Contractor #1: TRW EORC

Prime Contact: R.W. Landgraff (Program Manager)

Second Contact:

Address: El Segundo Blvd

El Segundo

CA

Phone: 213-536-1100

Responsibility:

Contractor #2: GTE Communications Systems Division

Prime Contact: Joseph Caggiano (Program Manager)

Second Contact:

Address: 77 A Street

Needham Heights

MA 02194

Phone: 617-449-2000 X3920

Responsibility:

Contractor #3:

Prime Contact:

Second Contact:

Address:

Phone:

Responsibility:

System 040: Multi-Purpose Transceiver (MFOX)

Organization: RADC

Status: Product Study Phase 8/83-2/84; Final Report 2/86

of Systems:

Contact #1: F. Chiffy (RCA Version)

Address: RADC/DCLW

Griffiss AFB

Phone: 315-330-4092

NY 13441

Autovon: 8-587-4092

Contact #2: J. Brodock (GTE Version)

Address: RADC/DCLW

Griffiss AFB

Phone: 315-330-4092

NY 13441

Autovon: 8-587-4092

Contact #3:

Address:

Phone:

Autovon:

Contractor #1: GTE Communications Systems Division

Prime Contact: Joseph Caggiano (Program Manager)

Second Contact:

Address: 77 A Street

Needham Heights

MA 02194

Phone: 617-449-2000 X3920

Responsibility:

Contractor #2: RCA

Prime Contact: AA Valorani (Manager Tactical Communications)

Second Contact: Dr. Donald J. Channin (Research Leader)

Address: RCA Defense Electronic Products

Defense Communications Systems Division

Camden

NJ 08102

Phone: 609-338-2232

Responsibility: (see above)

Contractor #3:

Prime Contact:

Second Contact:

Address:

Phone:

Responsibility:

APPENDIX 2
ALPHABETICAL SYSTEM LIST

FIBER OPTIC SYSTEM LIST

060 A-6E
148 A-7 ALOFT AIRBORNE LIGHT OPTICAL FIBER TECHNOLOGY
020 ADVANCED DIGITAL OPT. CONT. SYS. (ADOCS)
061 ADVANCED INTEGRATED DISPLAY
021 ADVANCED INTEGRATED DISPLAY SYSTEM (AIDS)
019 AEGIS
125 AFTS (AF)
164 AIMS MK XII IFF
023 AIR TRAFFIC CONTROL
149 ALL OPTICAL PHONE
152 ANALOG FIBER OPTIC MODEM
011 AN/ALQ-99 FOR EF-111 AIRCRAFT
122 AN/ALQ-125
062 AN/ALR-74 PASSIVE RADAR
063 AN/APY-2 (E3A) RADAR (AWACS)
030 AN/ASR
007 AN/AVR-2
167 AN/AYK-15
168 AN/AYK-43
169 AN/AYK-44
121 AN/EPN 81
162 AN/EPN 81 EC
005 AN/FAC-1; AN/FAC-2; AN/FAC-2A; AN/FAC-3
010 AN/FAC-2B
015 AN/FPN-47 RADAR
045 AN/FPN-62
031 AN/FPN-63 (PREC. APPR. RADAR)
064 AN/FRC-171
117 AN/GPN-22 RADAR
160 AN/GRC-201
029 AN/GRC-206
066 AN/GYQ-21
024 AN/MPN-XX

067 AN/MSQ-T13
165 AN/PAQ-4
068 AN/PPS-18 LINKS
033 AN/SPN-25 (TACT. AIR CTRL/NAVY)
032 AN/SPN-28 (MICRO LANDING SYS)
034 AN/SPN-42 (TRAINER-CARRIER)
070 AN/SPS-10
072 AN/SPS-40
046 AN/SPS-48C(V)
016 AN/SPS-52C
069 AN/SPS-55
128 AN/TAC-1
073 AN/TPN-17
013 AN/TPN-19
009 AN/TPQ-36 (FIRE FINDER)
006 AN/TPS-32 RADAR
044 AN/TPS-43E RADAR (FORRK) FIBER OPTIC REMOTE RADAR KIT
156 AN/TRC-170
074 AN/TSC-86
042 AN/TYC-39
154 AN/TTC-42
123 AN/TYQ-25
075 ANALOG/DIGITAL FO COMMUNICATIONS SYSTEM
018 ARAB REPUBLIC OF EGYPT OPER CTR (ARE-OC)
137 ARIADNE/FODS (FIBER OPTIC DISTRIBUTION SYSTEM)
129 ASOC (AIR SUPPORT OPERATIONAL CENTER)
035 ATC (AIR TRAFFIC CONTROL) SURVIVABILITY
076 AUTOMATIC TEST EQUIPMENT
001 AV8-B HARRIER
049 BEAM ERROR MEASUREMENT SYSTEM
077 BETA PROGRAM BATTLE FIELD ANTICIPATION TARGET ACQUISITION
079 BROADBAND ELECTRO-OPTICAL SYSTEM (BEDS) KSFC
022 BROADBAND LOCAL NETWORK

056 BROADBAND LOCAL NETWORK
078 BROADBAND OPTICAL FIBER DATA SYSTEM (MSFC)
059 CAPE CANAVERAL DATA LINK
158 CNCE
080 DATA VOICE COMM. SYS. (DVCS)
081 DEFENSE METEOROLOGICAL SATELLITE PROGRAM (CLASSIFIED)
120 DEFENSE SATELLITE COMMUNICATION SYSTEM (DSCS)
028 DELAYED LIGHTNING SYSTEM
170 DIGITAC
153 DIGITAC FIBER OPTIC SYSTEM
124 DIGITAL FO TRANSMISSION TELEPHONE SYSTEM
082 EFFICIENT FIBER OPTIC MULTIPLEXING TECHNIQUES PROGRAM
132 EIFEL FOLLOW ON
083 ELECTRONIC DOCUMENT NETWORK
085 F-14 - PROBABLY VISUAL SYSTEMS
086 F-15 - PROBABLY VISUAL SYSTEMS
150 F-16 HEADUP DISPLAY UNIT
043 FO AUTOMATED COMMUN. SWITCH
087 FO LINEAR DATA BUS
088 FO MULTIPOINT FAMILY PROGRAM
092 407L SEE AN/TPS-43E, AN/TSQ-93, AN/TSQ-92
089 FO SENSOR SYSTEM (FOSS)
090 FO TRANS. TEST UNIT (FOTTU)
144 FIBER OPTIC (INFORMAL ARRAY LINK (FOCAL))
037 FIBER OPTIC SONAR LINK (FOSL) FORMERLY EXTERNAL LIGHTWEIGHT
143 FIBER OPTIC SONAR LINK (FOSL) FORMERLY EXTERNAL LIGHTWEIGHT CABLE
SYSTEM (ELCS)
037 FIBER OPTIC TRANS. SYS.
036 FLEET AIR CONTROL SURVEILLANCE FACILITY
091 FLEXIBLE INTERCONNECT PROGRAM RADC/GRIFFISS (F1)
099 FOTS (LD)
100 FOTS (LH)
140 FOX TRAINING KITS

146 FREE SWIMMING VEHICLES
126 GLCM PACER FRAME (NAVY)
093 GLOBAL DATA BUS
127 GPS
008 GROUND LAUNCH CRUISE MISSILE
171 GUN FIRE CONTROL SYSTEM (GFCS)
094 HIGH ENERGY LASER SYSTEMS AFWL
134 INDIRECT CIS (COMBAT IDENTIFICATION SYSTEM)
113 IROC
118 JAM RESISTANCE SECURE COMMUNICATION SYSTEM (JRSC) OR SURE COMM
119 JRSC GROUND TERMINALS
025 KOREAN IMPROVEMENT PROGRAM (KIPS)
097 LASER FENCE
141 LDFOCS II LOCAL DISTRIBUTION FIBER OPTIC CABLE SYSTEM
098 LINEAR FO DATA BUS
137 LOG LAN
003 LTA SYS ARSENAL CUT COM
012 LOG LAN
LOGISTICS LOCAL AREA NETWORK
084 MAGIC
139 MAGIC REMOTE TERMINAL
026 MAINSITE DATA ACQUISITION SYSTEM
142 MARINE CORPS FIBER OPTIC DATA BUS
065 MARSHALL SPACE FLIGHT CENTER DATA LINK
159 MD-1026 GM
101 MICROWAVE LANDING SYSTEM
102 MINE NEUTRALIZATION SYSTEM PROJECT
095 MISSILE PAYOUT LINK PROGRAM
103 MISSILE TEST LINK
040 MULTI PURPOSE TRANSCEIVER (MFOX)
104 MX MISSILE C3
105 NAMESITE
106 NETWORK CONSOLIDATION PROGRAM INSTALLED AT GOLDSTONE, CA
017 NORAD CHEYENNE MOUNTAIN SYSTEM

096 OASIS
107 OE 273 (V) URN TACAN
166 OJ-389 (V) G
131 PACAF
109 P3C (UPDATE III)
108 PACER SPEAK SEE AN/GRC-206
138 PEACEKEEPER C3
014 RADS/PNVS
110 REGAL TORPEDO PROJECT
058 REMOTE MONITORING OF SATELLITE DATA
157 RMC (TD-1234)
155 SD-3865
111 SEEKING SIMULATED LASER TARGETS
051 SHIPBOARD TACAN FIELD CHANGE
145 SHIPBOARD SYSTEM MULTIPLEX/DEMULTIPLEX SYSTEM
041 SINGLE AUDIO SYSTEM (SAS)
057 SINGLE FIBER MULTIPLEX SYSTEM
112 SINGLE SUBWSCRIBER TERMINAL (SST)
113 SOLAR POWER SATELLITE PHASE REFERENCE DISTRIBUTION SYSTEM
147 SONOBUOY CABLE
038 STATE OF THE ART MEDIUM TERMINAL
052 SUB. ADV. COMBAT SYSTEM (SUBACS)
053 TACTICAL FIRE C2
114 TACS PART OF 407L SEE AN/TPS-43E
048 TACTICAL COMMUNICATION CONTROL FACILITY (TCCF)
039 TACTICAL GENERIC CABLE REPLACEMENT (TGCR)
027 TAOC-85 MODULAR CONTROL ELEMENT (MCE)
002 T1 INTERFACE FOR COMMUNICATION
063 TEMPEST
054 TS/SPG-51C (RECEIVER/TRANSMITTER GROUP)
130 ULANA
115 ULTRAVIOLET TRANSMITTING OPTICAL DEVICES
047 UNDERSEA DATA COMMUNICATION LINK PROGRAM

050 UNIVERSAL DIGITAL COMMUNICATION NETWORK DIGITAL DATA DISTRIBUTION
SYSTEM (JOHN HOPKINS UNIVERSITY)
004 VANDENBURG MX TEST SITE TRANSMISSION SYSTEM
136 VAULT PROGRAM
116 VORTAC NAVIGATIONAL EQUIPMENT (FAA) FIBER OPTICS BEING PROPOSED
135 WEAPON STORAGE & SECURITY SYSTEM (WS3)
151 XM-1 TANK

APPENDIX 3

AIR FORCE AND DOD FIBER OPTIC RESEARCH

AND DEVELOPMENT PROGRAMS

Contents

1. Military Fiber Optics R & D Summary
2. Interservice joint efforts
3. WDM Efforts in the Military
4. Military Funding for R & D
5. Fiber Optics Program transitions through Development (6.1-6.4)
6. Army Program Roadmaps
7. Air Force Program Roadmaps
8. Navy Program Roadmaps
9. RADC 6.2 and 6.3 Programs
10. List of Ongoing 6.1 Programs
11. List of Ongoing 6.2 Programs
12. List of Ongoing 6.3 Programs
13. Status of Air Force Related 6.4 procurement programs.
14. Proposed Air Force Programs
15. Non-DOD Programs
 - a. FAA
 - b. NASA

1. Military Fiber Optics R & D Summary

MILITARY FIBER OPTIC R&D SUMMARY

	AIR FORCE	ARMY	NAVY
6.1	LONG WAVELENGTH NUCLEAR EFFECTS WDM DEVICES COUPLERS FLUORIDE GLASSES		SENSOR SYSTEMS FLUORIDE GLASSES
6.2	BUS SYSTEMS WAVELENGTH DIVISION MUX (WDM) INTRUSION RESISTANCE (IROC) RF REMOTING, DIRECT RF	BIDIRECTIONAL ADAPTER AIR LAYABLE/EXPENDABLE CABLE ← WDM SECURE DIG. VIDEO CONF	LONG WAVELENGTH SOURCE & DET HIGHSTRENGTH UNDERSEA FIBERS TERMINATION OF PLASTIC CLAD FIBERS TETHERED & TOWED SUBMERSIBLE CABLE ← GUIDED TORPEDOES ←
6.3	26-PAIR CABLE REPLACEMENT ↔ MULTIPURPOSE TRANSCIEVERS FLEXIBLE INTRACONNECT SINGLE FIBER COMM SYSTEMS	26-PAIR REPLACEMENT (JOINT) MISSILE PAYOUT SYSTEM ← FIELD EXPEDIENT SPLICE CONNECTOR DEVELOPMENTS CABLE DEVELOPMENTS	NUCLEAR HARD CABLES HIGH SPEED AIRCRAFT DATA BUS (10Mbps) SHIPBOARD VIDEO DATA BUS SHIPBOARD RADAR CABLE & CONNECTOR DEVELOPMENTS
6.4	MODULAR CONTROL ELEMENT (MCE) FY '85 POM	LONG HAUL SYSTEM, 64 Km	TAOC-85 MARINE AIR OPERATIONS GROUND/SEA LAUNCHED CRUISE MISSILES
PROD	AN/GRC-206 TACTICAL RADIO AN/TPS-43E RADAR REMOTING	AN/TYC-39 SWITCH	AN/FAC-2 DIGITAL LINK (20 Mbs)

2. Interservice Joint Efforts

INTERSERVICE JOINT EFFORTS

CABLES & CONNECTORS

Title	Services	Type of Coordination
1. Fiber Optic Nuclear Hard Cable (FY-83) (6.2)	Army/AF	Information/Financial/Contractual
2. Fractional dB Connector (FY-83) (6.2)	Army/AF	Information/Financial/Contractual
3. Concentric Core Optical Fiber Dev. (FY-80) (6.2)	Army/AF	Information/Financial
<u>SOURCES & DETECTORS</u>		
1. High Performance Long Wavelength APD (FY-78) (6.2)	Army/AF	Information
2. InGaAsP Laser & PIN-FET Monolithic Chips (FY-82) (6.2)	AF/Navy	Information/Contractual
3. Army/AF MMT Programs on Long Wavelength LED's & PIN FETS. (MMT) (FY-83)	Army/AF	Information/Financial/Contractual
4. Common transmit/receive module development (Planned Post 83) (6.2)	Army/AF/Navy	Information/Financial/Contractual
<u>RADIATION EFFECTS</u>		
Radiation Effects on Optical Fibers (FY-80) 6.1/6.2	Army/AF/Navy	Information/Financial/Contractual

Title	Services	Type of Coordination
1. Joint Standards for Tactical Fiber Optic Cable (81) 2. Joint Standard for Tactical Fiber Optic Tactical Connector 3. Participation in EIA, R-60 SAE with DESC	<u>STANDARDS</u>	
	Army/AF/DESC	Information/Joint Preparation
	Army/AF/DESC	Information/Joint Preparation
	Army/AF/Navy	Information/Active Participation
1. 26 pair cable replacement (6.3) a. Contract (82) b. MITRE (81) 2. Duplex Single Fiber Communication System (6.3) (FY-83) 3. Common transceiver development (Proposed) 4. Local Dist FO Data Bus for Distributed C.P. - (TAOC-85) 6.3 (Proposed - 83)	<u>APPLICATIONS (THROUGH 6.3)</u>	
	Army/AF	Information/Financial/Contractual
	Army/Marine	Information/Contractual
	Army/AF	Information/Contractual
	Army/AF/Navy	Information/Financial/Contractual
Semi-conductor Laser Gyro 6.2 (79)	<u>SENSORS</u>	
	AF/Navy	Information/Financial/Contractual
Linear Optical Displacement Transducer System 6.2 (79)	Army/Navy	Information/Financial/Contractual

3. WDM Efforts in the Military

WDM EFFORTS IN MILITARY

Application Area	Services	Description
1. Bidirection (one fiber) 2 Wavelength Systems		
A. Under Sea Bidirectional link for TORPEDO and Under Sea Sensors	Navy	2 wavelength bidirectional link for fiber guide TORPEDO (.82 - 1.06 μ m) Long Range (R)
B. Bidirectional link for Fiber guided missile	Army	2 wavelength bidirectional link for fiber guided missile - R = 10 km (.82 - 1.06 μ m) 1st G. (1.2 - 1.3 μ m) 2nd Gen.
C. Bidirectional links for ground Tactical Communication Systems	Army/AF	2 wavelength bidirectional link for ground tactical communicati. R = 10 km - 1.2-1.3 μ m
2. Point to Point $\angle$ 4 Wavelength multiplexed systems		
A. Study of 4 Color mux. for Avionics Application	AF	Study feasibility of 4 λ mux for Avionics application
B. Multi-Wavelength multicoupler	Army	Fabrication of optically coupled and electrically coupled 4 channel coupler for Tactical Ground Point to Point Communication systems
C. WDM Concave Gratings using three LED sources	AF	Inhouse effort to develop 3 λ coupler/decoupler using LED's
D. WDM diffraction grating for 4 λ mux	AF (MITRE)(IRD)	Component development of Mux/Demux to achieve low loss-low crosstalk mux
3. Data Bus Multiple λ (8-12 wavelength) Couplers		
A. Bus Multiplex Efficient multiplex effort	AF	Study plus hardware to build 8-12 user multi λ data bus system

4. Military Funding for R & D

MILITARY FUNDING FOR 6.1,6.2,6.3 RESEARCH AND DEVELOPMENT

(\$000)

		<u>82</u>	<u>83</u>	<u>84</u>	<u>85</u>
Cables and Connectors	6.1	-	-	-	-
	6.2	971	837	240	-
	6.3 + MMT	-	330	750	-
Sources and Detectors	6.1	900	870	1020	-
	6.2	1385	1100	1200	-
	6.3 + MMT	750	490	1950	-
Radiation Effects	6.1	300	120	120	120
	6.2	410	400	400	300
	6.3	79	100	100	100
Applications	6.1	-	-	-	-
	6.2	9,900	12,800	10,400	9,700
	6.3	5,300	14,800	18,400	7,100
Sensors	6.1	1,600	1,200	950	TBD
	6.2	3,500	3,400	2,400	1,800
	6.3	6,600	9,400	9,000	8,300
Secure Fiber		Unavailable			
Standards		N/A			

MILITARY FINDING FOR RESEARCH AND DEVELOPMENT
=====

	TOTAL (\$K)			
	82	83	84	85
6.1	2,800	2,800	2,110	TBD
6.2	16,166	18,537	14,650	11,800
6.3 + MMT	12,729	25,120	30,200	15,500
TOTAL	30,695	45,847	46,910	27,300

MILITARY FIBER OPTICS APPLICATIONS TOTALS

	82	83	84	85
GROUND BASED	6.264	16.977	11.55	6.375
AIRBORNE	.100	.204	.500	.800
SHIPBOARD	.950	2.08	1.43	1.26
SUBMARINE	8.56	11.56	10.9	8.4
UNDERSEA	.565	.940	.215	.292
GRAND TOTAL	16.519	31.76	24.595	17.127

PROGRAM FUNDING

<u>GROWNDBASE</u>	<u>82</u>	<u>83</u>	<u>84</u>	<u>85</u>
ARMY	4.478	12.05	10.55	5.35
NAVY	.100	1.00	1.00	1.00
AIRFORCE	1.686	3.927	7.5	4.0

=====

AIRBORNE

ARMY	0.05	-	-	-
NAVY	.741	1.213	2.640	2.640
AIRFORCE	.130	.204	.500	.800

=====

SHIPBOARD

NAVY	.950	2.08	1.43	1.26
------	------	------	------	------

=====

UNDERSEA

.565	.940	.215	.292
------	------	------	------

=====

SUBMARINE

8.56	11.56	10.9	8.4
------	-------	------	-----

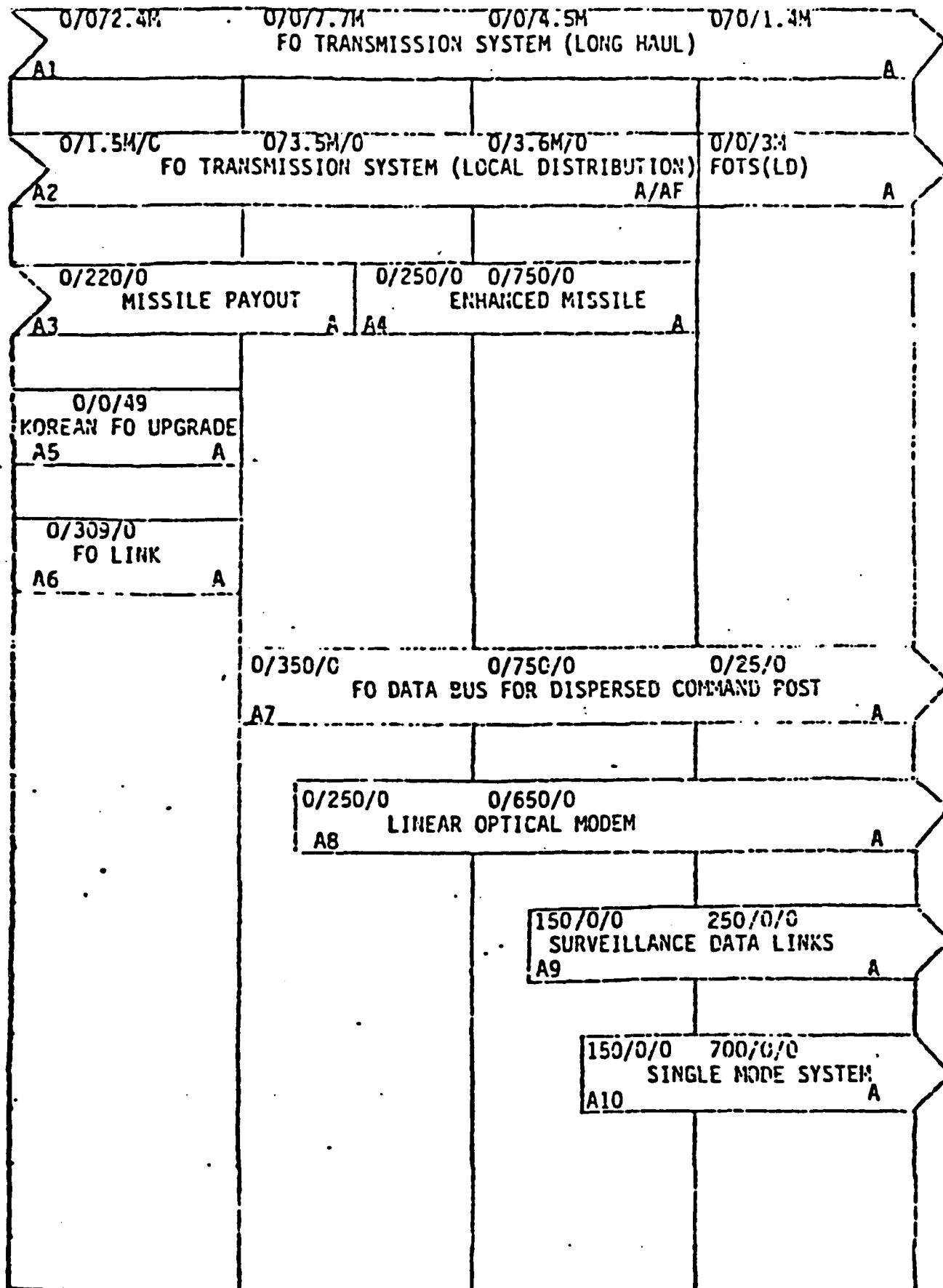
5. Fiber Optics Program transitions through Development (6.1-6.4)

FO PROGRAM TRANSITIONS THROUGH DEVELOPMENT (6.1 → 6.4)

Title	Services	Level of Development and Date	
1. Air layable FO Cable Assembly Package	Army	6.2 → 6.3	FY-82
2. MMT Program for Ruggedized Tactical FO Cable	Army	6.2 → MMT	FY-80
3. MMT for Ruggedized FO Cable plus Connector (Assembly)	Army	6.2 → MMT	FY-84
4. Fundamental developments and studies of Optical-Acoustic Materials	Navy	6.1 → 6.2	FY-82
5. Long Wavelength Sources and Detectors	Army/Navy/AF	6.2 → MMT (More than one effort)	FY-83-84
6. Investigation of Basic Radiation effects Mechanisms	Army/Navy/AF	6.1 → 6.2 (More than one effort)	FY-82-84
7. Development of nuclear hard cable	Army	6.1 → 6.2	FY-83
8. Fiber Optic Missile Payout	Army	6.2 → 6.3	FY-81
9. 26 pair Cable replacement	Army/AF	6.2 → 6.3	FY-82
10. Long Haul FO Cable	Army	6.3 → 6.4	FY-81
11. Diplex Single fiber Communications System	Army/AF	6.2 → 6.3	FY-82/83
12. Air Support Operations Center Fiberization	AF	6.3 → Production	FY-82
13. FO cable for AN/TYC-39 Switch	Army	6.3 → Production	FY-81
14. Hydraulic Pressure Sensor	Navy	6.2 → 6.3	FY-82
15. Fiber Optic Sensor System	Navy	6.2 → 6.3	FY-83

6. Army Program Roadmaps

GROUND BASED (ARMY)



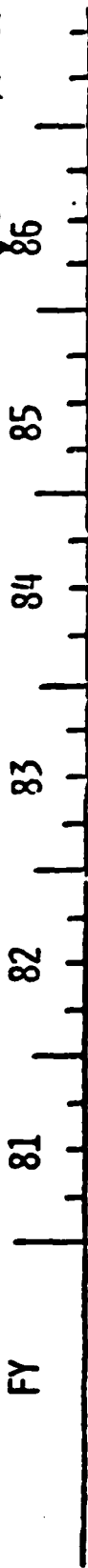
ARMY FIBER OPTIC PROGRAM

○ CONTRACT AWARD

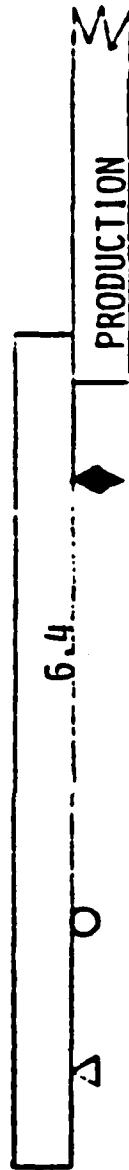
△ ROC

◁ START DT/OT I

◆ START DT/OT II



FOTS (LONG HAUL)
ATACS



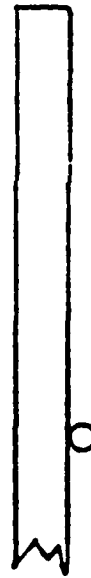
FOTTU (HSCDM)
HSCS



FO FOR INVENTORY
SYSTEMS



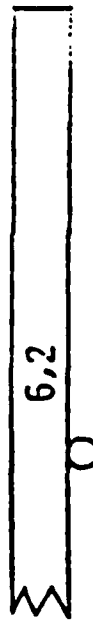
FIELD EXPEDIENT
SPLICE



NUCLEAR HARD FO



CONNECTORS



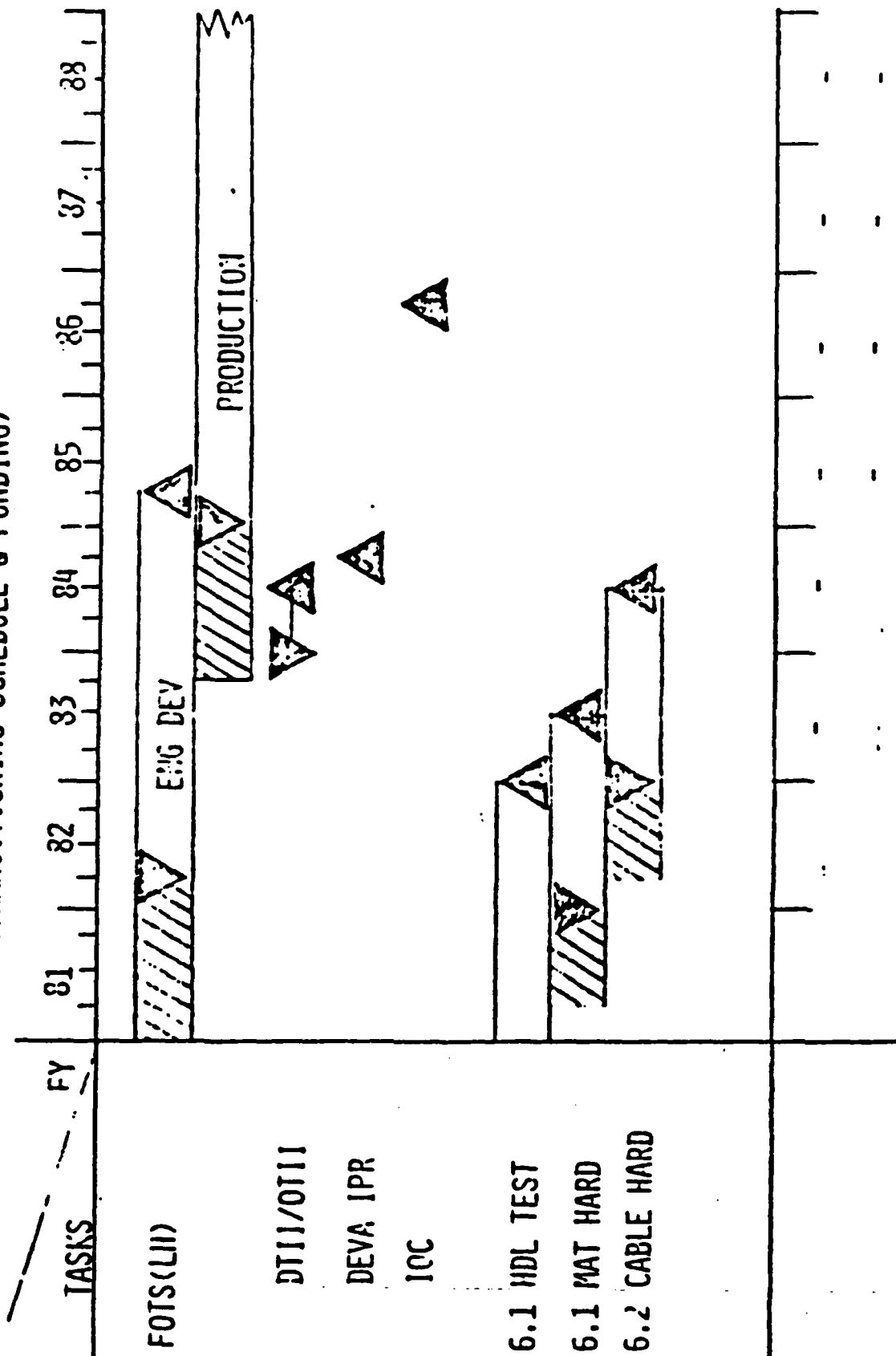
FW3T



APPLIES TO FOTS LONG HAUL,
FOTTU AND FO FOR INVENTORY
SYSTEMS

NUCLEAR HARDENED FIBER OPTIC PROGRAM

(TRANSITIONING SCHEDULE & FUNDING)



FIBER OPTIC CABLE CONNECTORS

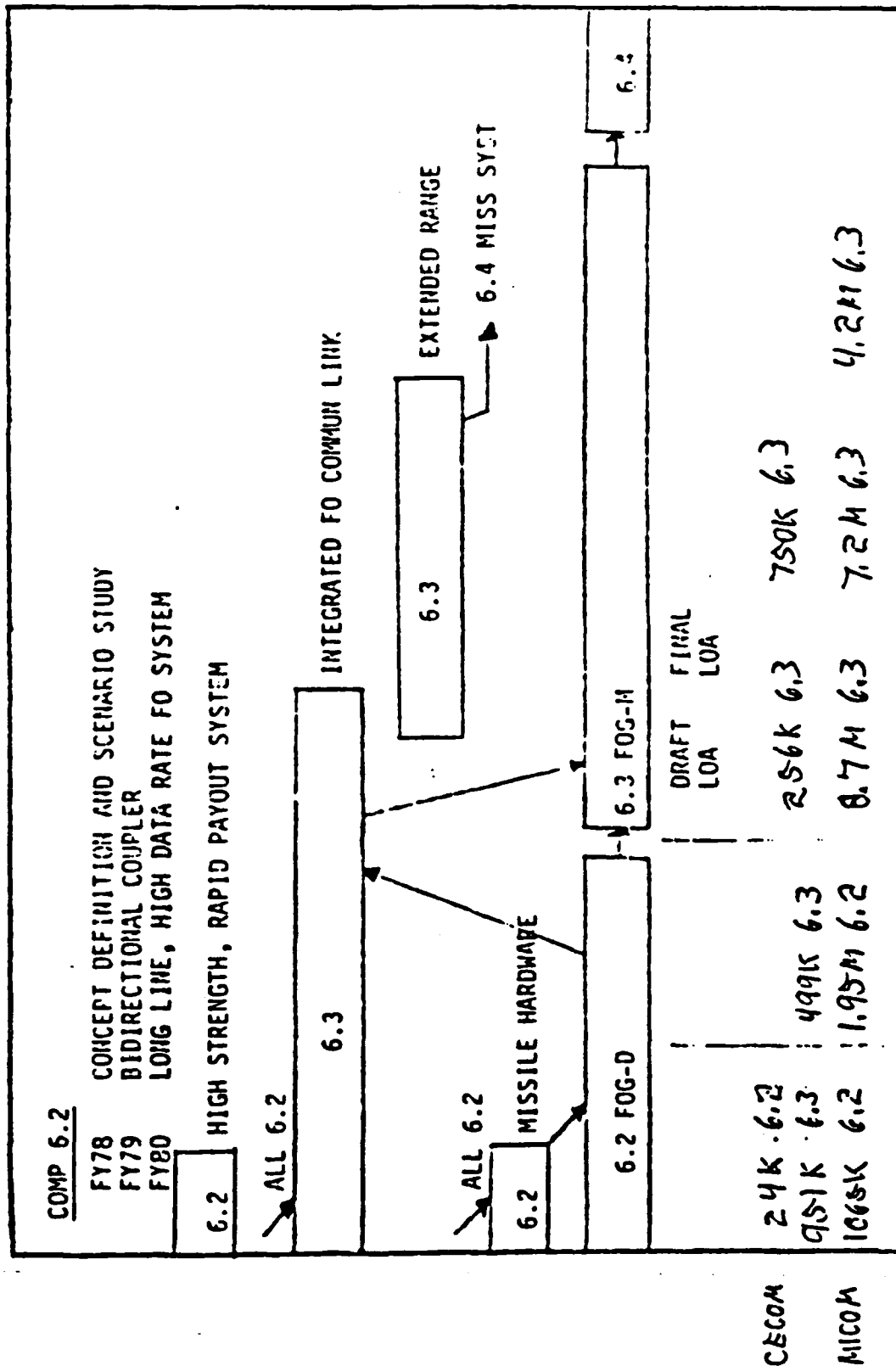
PROGRAM SCHEDULE

FISCAL YEAR	80	81	82	83	84	85	86	87	88	89
CALENDAR YEAR	80	81	82	83	84	85	86	87	88	89
BHR		104.5K								
TRI		114.3K								
ITT-CANION		157.1K								
NOT AWARDED EXPANDED BEAM										
MITRE										
	150K	125K	220K	25K						

LONG HAUL FO FOR INVENTORY SYSTEMS

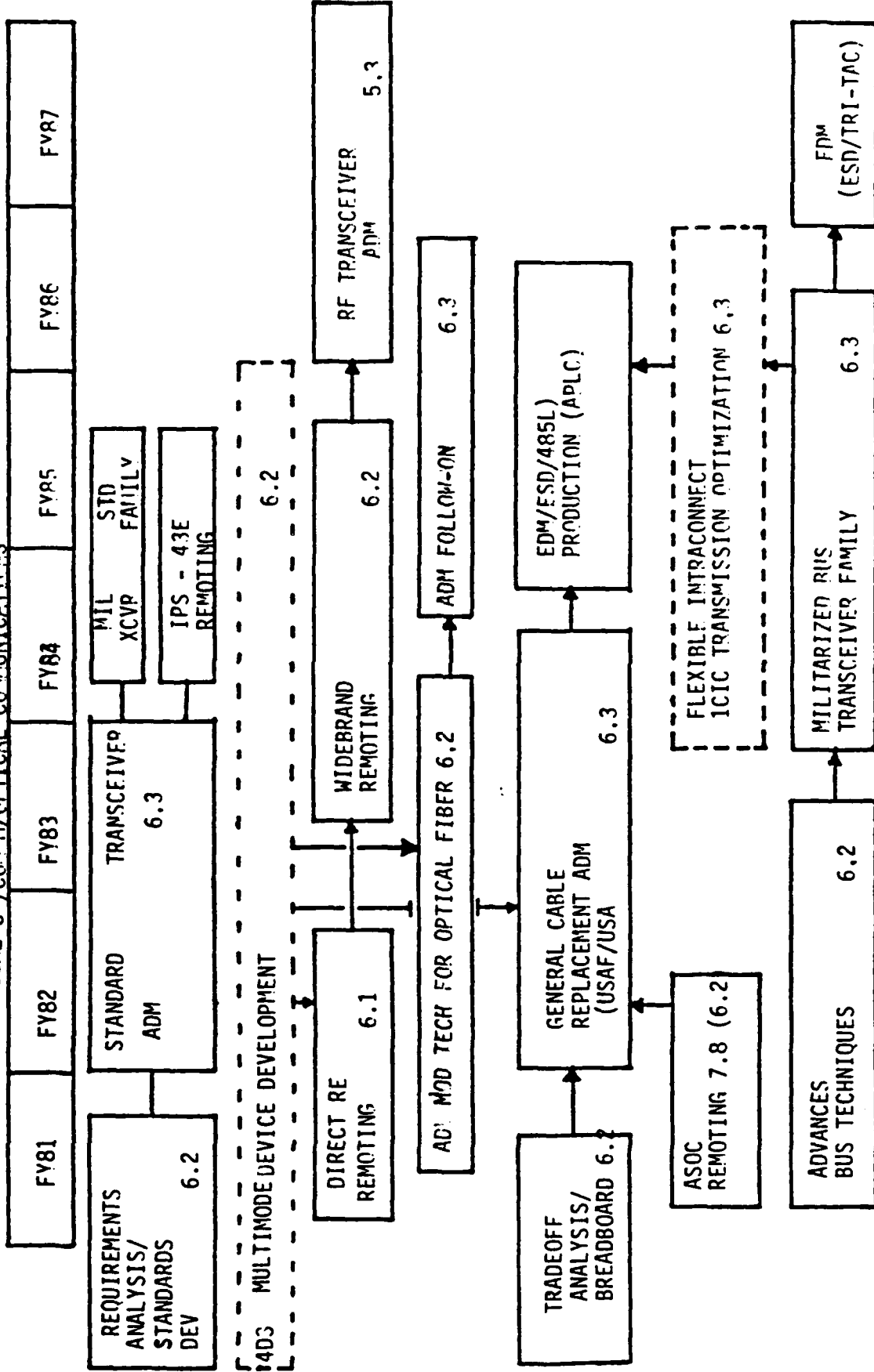
FIBER OPTIC MISSILE SYSTEM

81 82 83 84 85



7. Air Force Program Roadmaps

TACTICAL C3/CQM/OPTICAL COMMUNICATIONS

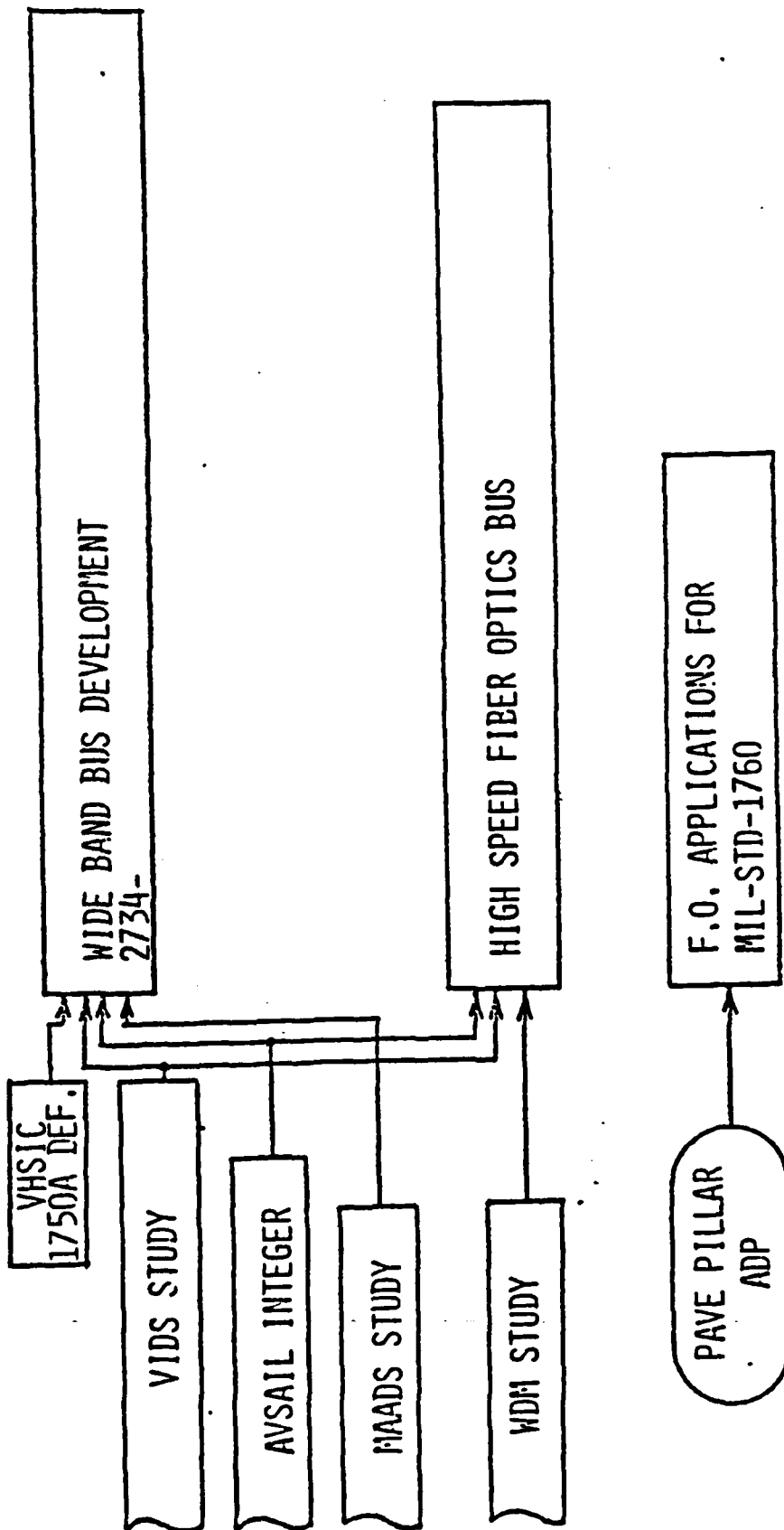


GROUND BASED (AF)

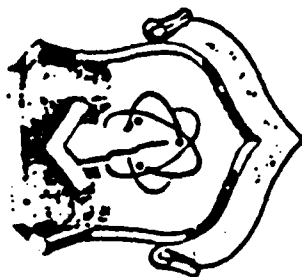
0/5000 AF(1)	TACTICAL GENERIC CABLE REPLACEMENT (ADM)	AF
	900/1200/300 MULTIPOINT F.O. TRANSCEIVER (ADM) AF(2)	AF
351/2400 AF(3)	FIBER OPTIC MULTIPOINT FAMILY	AF
0/9200 AF(4)	FLEXIBLE INTRACONNECT	AF
	0/650 SINGLE DUPLEX OPTICAL COMM. AF(5)	AF
450/750/64 AF(6)	RF FIBER OPTIC LINKS	AF
115/0 AF(7)	ASOC FIBER OPTIC LINKS	AF
	427/450 WIDEBAND FIBER OPTIC LINKS AF(8)	AF
110/0 AF(9)	HYBRID ARRAY RADAR	AF
226/0 AF(10)	SDDE	AF
434/1000 AF(11)	EFFICIENT MUX TECHNIQUES FOR F.O.	AF

AIRBORNE ROADMAP (AIR FORCE)

FY82		FY83		FY84		FY85	
AF1	23/0/14	AF2	74/0/0	AF3	0/0/0	AF4	0/19/0
	WAVELENGTH DIV. MUX STUDY		VIDEO INFORMATION DIST. SYSTEM STUDY		F.O. AVSAIL INTEGRATION (IN-HOUSE)		DIGITAC II
						0/100/0	
						0/500/0	
						0/800/0	
						HIGH SPEED BUS DEVELOPMENT	
						AF5	



AIR FORCE AVIONICS WIDEBAND DATA BUSS

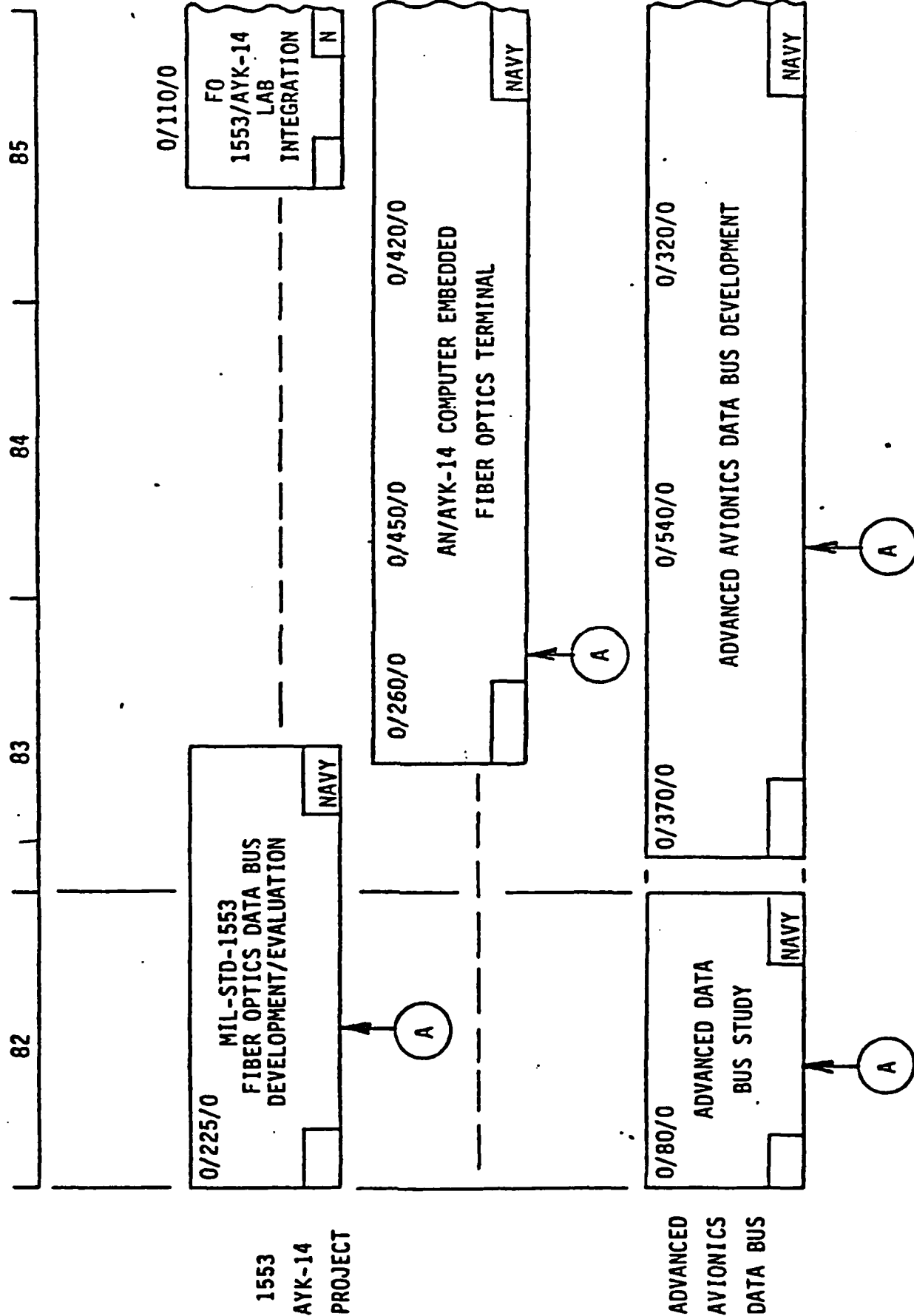


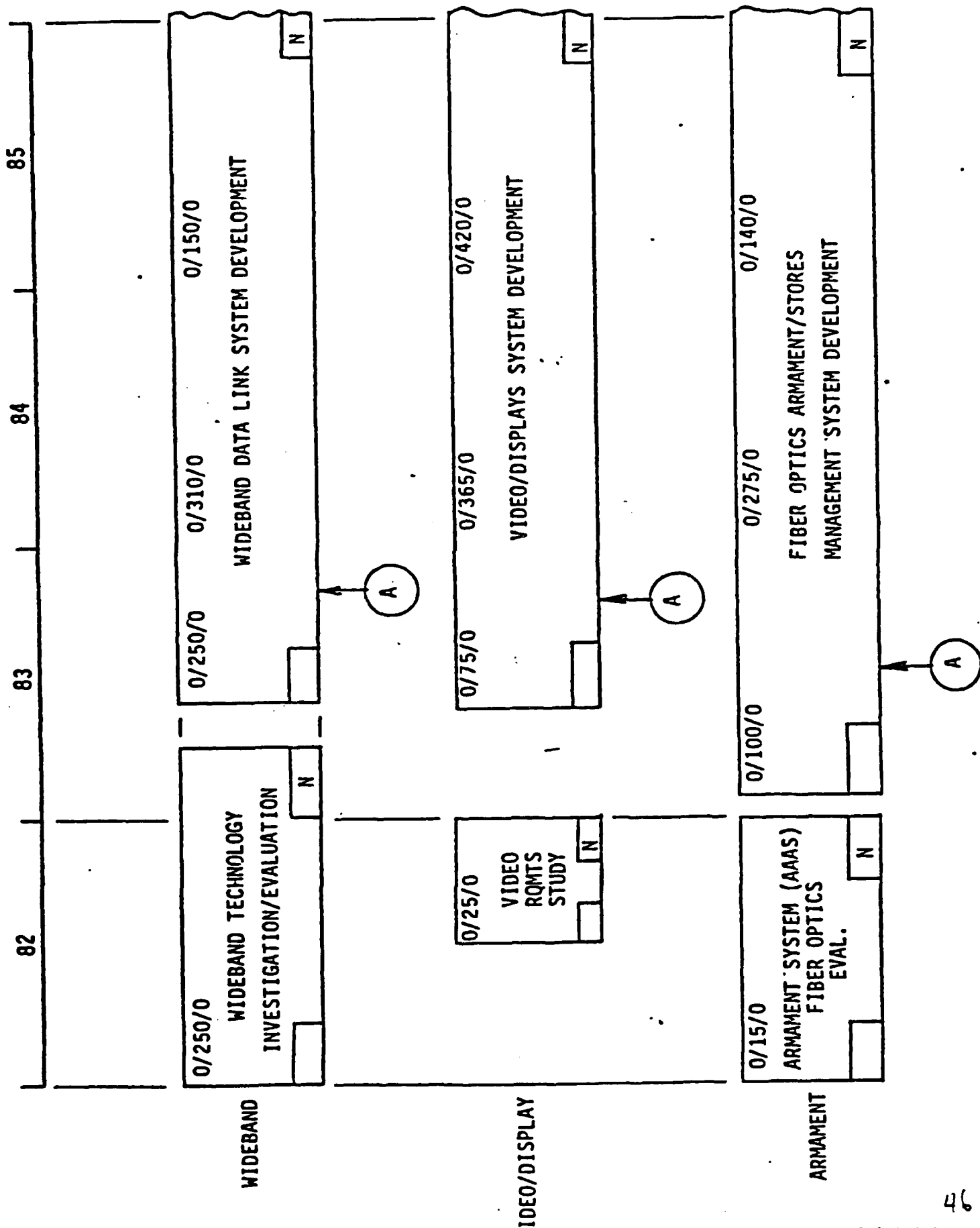
PROPOSED AFWL/NTCO OPTICAL COMMUNICATIONS HARDENING PROGRAMS

JON/TITLE	FY83	FY84	FY85	FY86	FY87	REMARKS
AFWL EXP #701 INTEGRATION	30K	430K	15K	5K		INHOUSE/PO
HIOC ³ 'S EXPERIMENT	25K	25K	280K	165K	10K	CONTRACT
FO LINK RAD T&E	10K	20K	25K	25K	50K	INHOUSE
FO SUPPORT (AFW)						CONTRACT/HH
FUNDS // ADDITIONAL AF RDT&E FUNDING //// NASA //// AFWL SD						

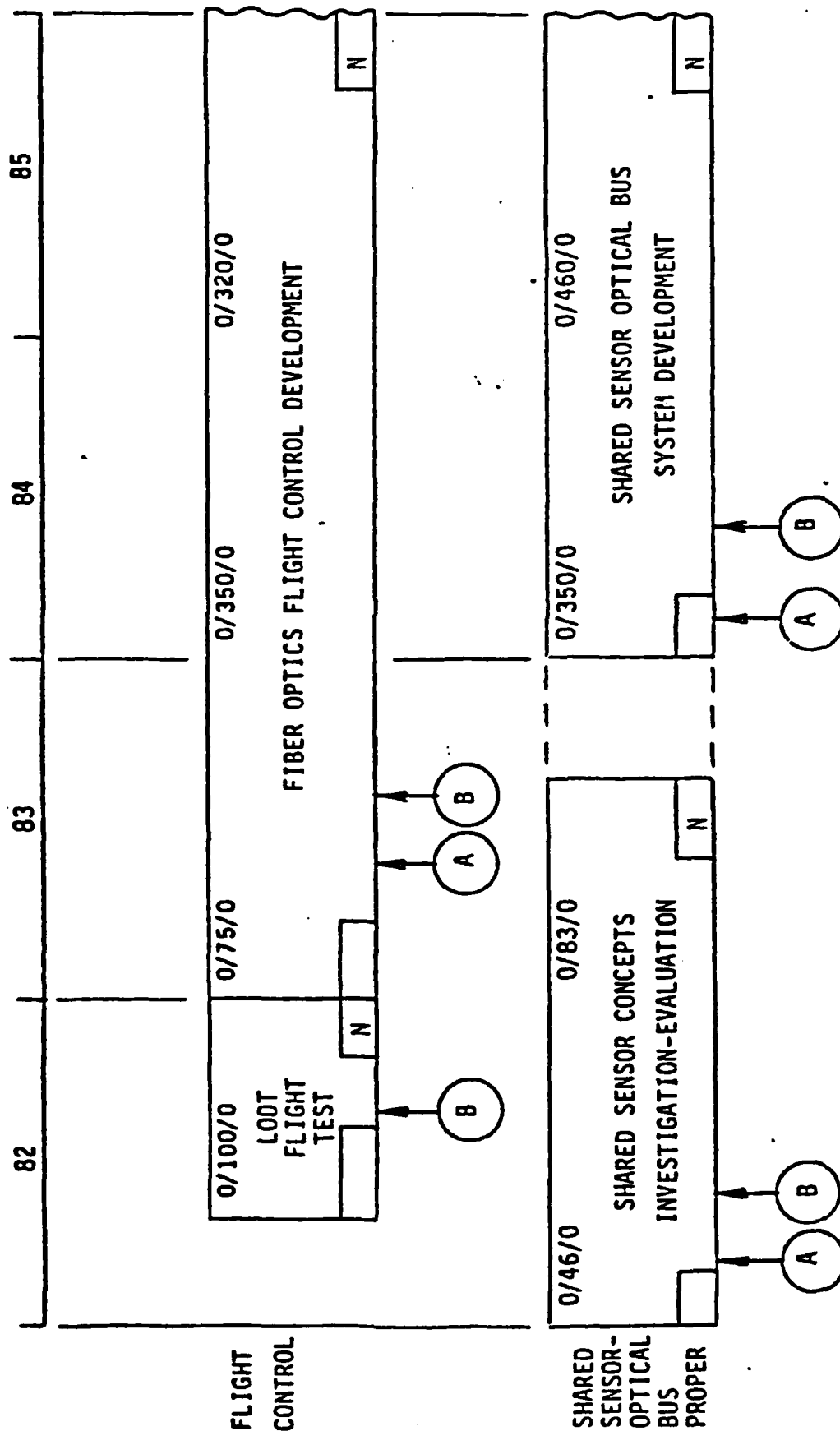
8. Navy Program Roadmaps

AIRBORNE (NAVY)





AIRBORNE (NAVY)



AIRBORNE (NAVY)
RELATED TECHNOLOGY PROGRAMS

82	83	84	85
A			
	194/0/0	390/0/0	512/0/0
	580/0/0		
FIBER OPTICS TECHNOLOGY - COMPONENTS FOR AIRBORNE INFORMATION TRANSFER SYSTEMS			
			N
B			
	181/0/0	110/0/0	145/0/0
	120/0/0		
FIBER OPTICS TECHNOLOGY - SENSORS FOR AVIONICS APPLICATIONS			
			N

Navy Landbased - Fixed (Strategic)

82

0/45K/0

GFCS F.O. System

N-1

Navy

83

0/0/10K

N-2

0/0/1.0M

NAS F.O. Interconnect System

0/0/1.0M

0/01.0M

Navy

84

85

0/0/10K

N-3

AN/FAC-2A F.O. Sys Supp

Navy

Shipboard

82	83	84	85
0/0/50K N-1	0/0/450K AEGIS SHIPBOARD FIBER OPTICS APPLICATIONS	0/0/400K	0/0/300K Navy

250K/0/0 N-2	250K/0/0 EMPLOYMENT OF F.O. FOR EMI CONTROL	210K/0/0 Navy
-----------------	--	------------------

300K/0/0 N-3	300K/0/0 F.O. FOR SINGLE AUDIO SYSTEM	250K/0/0 Navy
-----------------	--	------------------

900K/0/0 11-4	1.08M/0/0 Single Mode Optical Technology	480K/0/0 500K/0/0 Navy
------------------	---	------------------------------

Submarine

82 83 84 85

0/1.2M/0

0/2.5M/0

0/2.6M/0

0/2.1M/0

Fiber Optic Sonar Link

N-1

Navy

6.3M/0/700K

8.4M/0/400K

7.95M/0/350K

6.3M/0/0

FOSS Program Id#

DN 080095

DN 080327

DN 080096

DN 180291

DN 080097

DN 880309

N-2

Navy

360K/0/0

260K/0/0

0/1/0

0/1/0

Sub COMM-BUOY/Special Techniques

N-3

Navy

Navy-Undersea



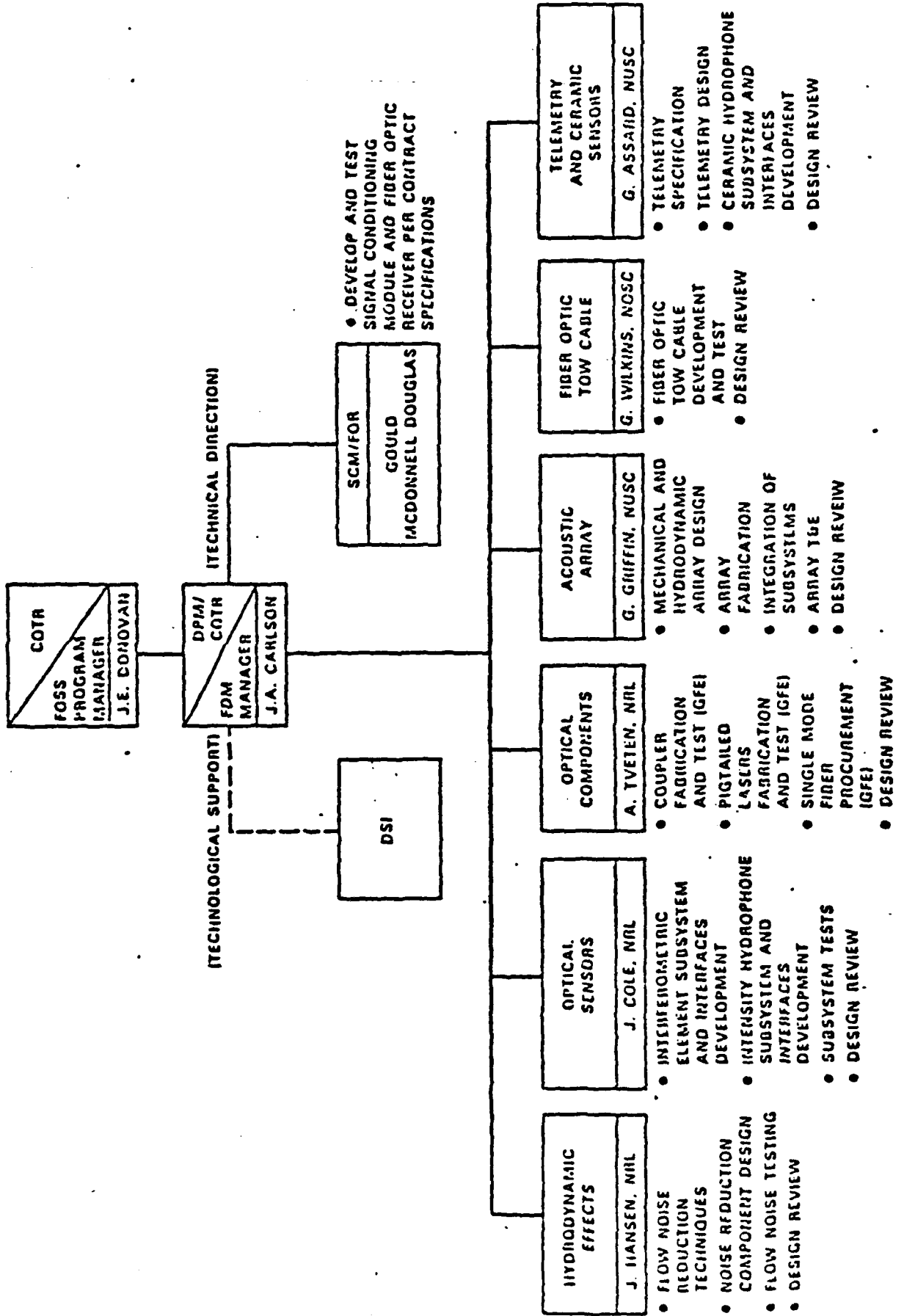
125K/0/0	135K/0/0
N-1	Navy
F.O. Distributed System	

200K/0/0	595K/0/0
N-2	Navy
"Long Haul" E-O Data Links	

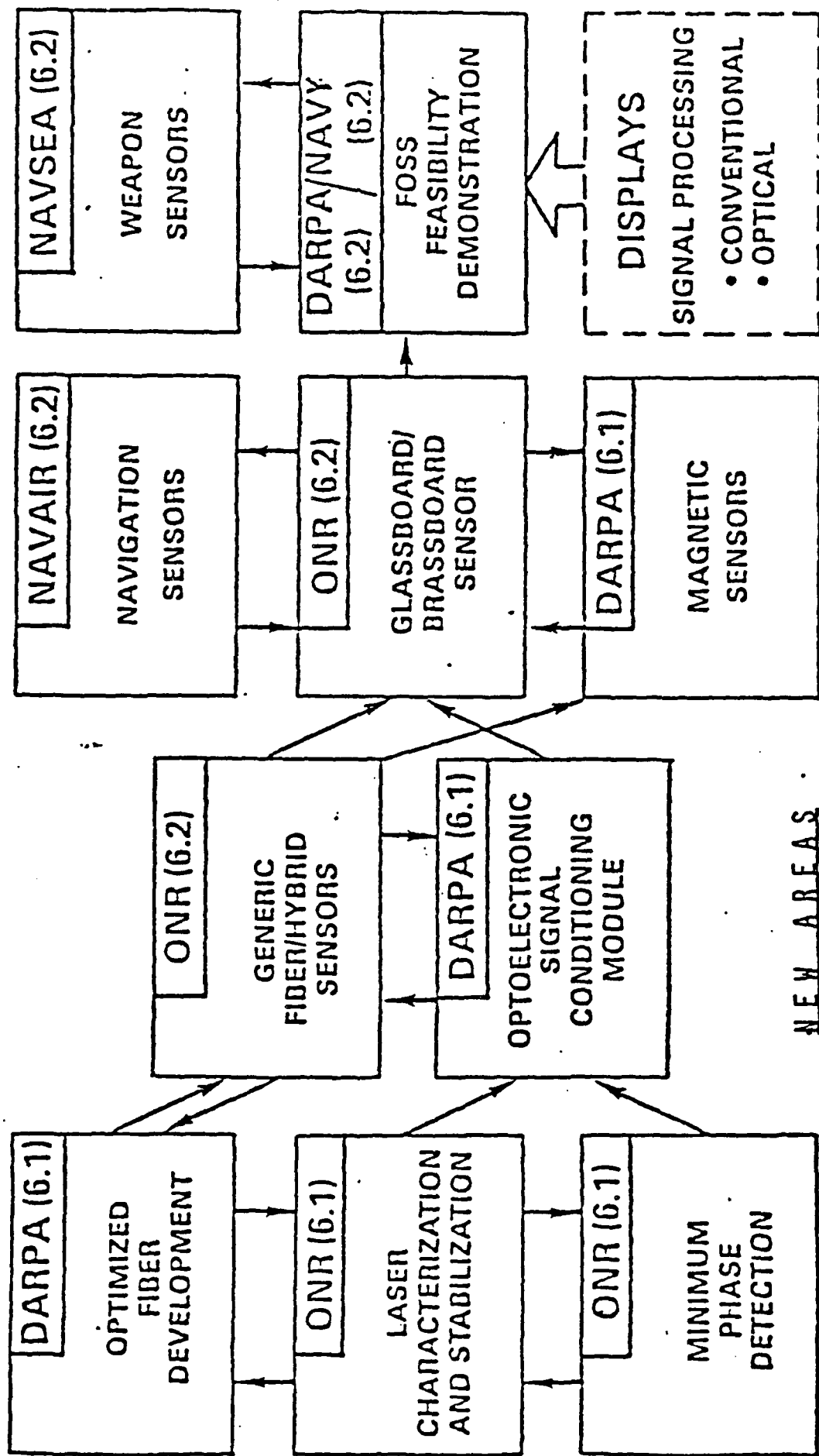
205K/0/	209.4K/0/0	215K/0/0	292K/0/0
N-3	Navy		
F.O. Torpedo Guidance Link			

35K/0/0	1/0/0
N-4	Navy
Fiber Optic Sensors in Torpedo Technology	

FOSS FDM ORGANIZATIONAL RESPONSIBILITY



FOSS PROGRAM STRUCTURE



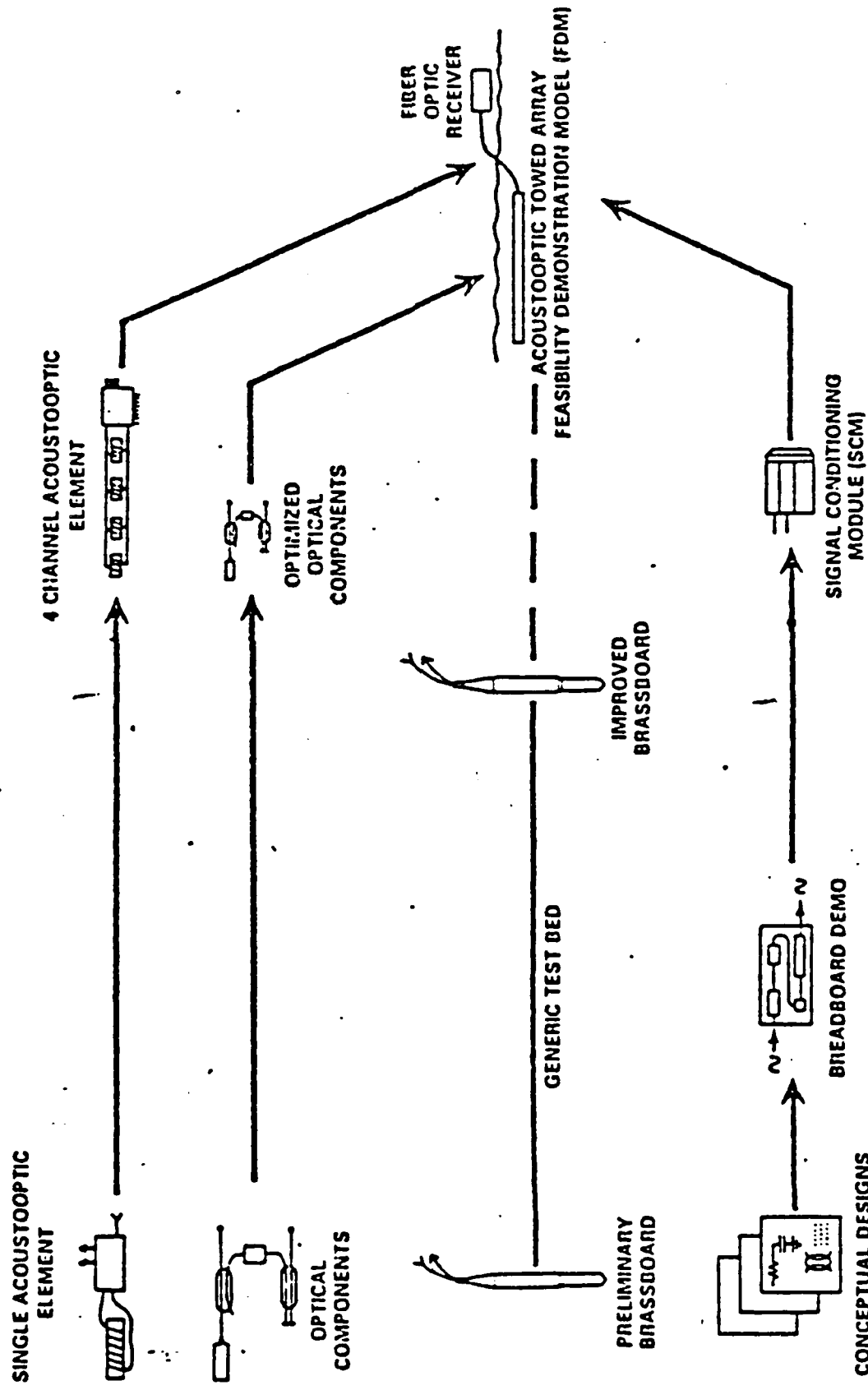
NEW AREAS

HYDRODYNAMIC EFFECTS [ONR 6.1/6.2, NAVSEA 6.2]

UNDERSEA CABLES & TELEMETRY [NAVELEX 6.2]

ACOUSTIC RANGES [NAVSEA 6.2]

FOSS ACOUSTOOPTIC COMPONENT DEVELOPMENT



1981

1982

1983

9. RADC 6.2 and 6.3 Programs

FIBER OPTICS SYSTEMS -USA-

PROGRAM NAME SPONSOR/DEVELOPER	PARAMETERS	BENEFITS	SOURCE/DET	FIBER/CABLE	CONNECTORS	STATUS/AVAIL.
Tactical Generic Cable Replacement, Mud Box Version /RADC (DC)/TRW	6.3 kilometers 26 channel voice and data traffic - field ruggedized 20 mbps	13:1 weight savings 20:1 cable volume reduction - flexible equipment siting - no ground loops	LED/PIN $\lambda = 1300\text{nm}$	Seicor 2 fiber tactical cable	TBD	Oct 82/April 84 Product will then be tested
Tactical Generic Cable Replacement, Connector Version /RADC (DC)/GTE	6.3km 26 channel voice and data traffic - field ruggedized 20 mbps	13:1 weight savings 20:1 cable volume reduction - flexible equipment siting - no ground loops	LED/PIN $\lambda = 1300\text{nm}$	Seicor 2 fiber tactical cable	Hughes 2 fiber tactical connector	Sep 82/Nov 84 Product will then be tested
Multipurpose Fiber Optics Transceiver ADM/RADC (DC) /RCA/GTE (dual award)	- various bit rates - various link lengths - various analog bandwidth requirements	- standardized links for strategic and tactical operating environments - cost reduction via volume	LED/PIN $\lambda = 1300\text{nm}$	Applications Environment Dependent	Applications Environment Dependent	Aug 83/Feb 84 Study phase dual award product in Feb 84 Then single 18 month hardware follow on progr
ASOC Fiber Optic Links /RADC (DC)/ RADC (DC)	2 kilometers 24 channel voice and data traffic for radios - field ruggedized - PCM/TDM	- cable weight and volume reduction - interim to Tactical Generic Cable Replacement Program Product	LED/PIN $\lambda = 820\text{nm}$	TBD	Hughes 2 fiber tactical connector	9 links built a tested - FY84 contract initiation for production mode

FIBER OPTICS SYSTEMS -USA-

PROGRAM NAME

SPONSOR/DEVELOPER	PARAMETERS	BENEFITS	SOURCE/DET	FIBER/CABLE	CONNECTORS	STATUS/AVAIL.
Single Fiber Duplex Optical Communications System/RADC (DC)/TBD	• WDM • long wavelength • 8km link length • 20mbps	• single fiber tactical comm link • single fiber connector • further weight and volume savings in cable area • easier fiber optic cable field repair	LED/PIN $\lambda = 1300, 1500\text{nm}$	TBD	TBD	18 month Contractual Award Oct 83
Flexible Intra-Connect /RADC (DC) /Martin Marietta	• 4096 port local area network • 5km link length • T1 rate compatible	• standardized High Integrity C3 Local area network	LED/PIN $\lambda = 1300\text{nm}$	Application Environment Dependent	Application Environment Dependent	User demonstration ongoing
Multiwavelength Wideband Bus /RADC (DC)/TBD	• 5 λ WDM bus • long wavelength • 5km link length	• rate segregation of users • most flexible architectural latitudes available in fiber optic based local area network	LD/PIN $\lambda > 1100\text{nm}$	Application Environment Dependent	Application Environment Dependent	• FY84 start • Mid CY86 Completion

FIBER OPTICS SYSTEMS -USA-

PROGRAM NAME

SPONSOR/DEVELOPER	PARAMETERS	BENEFITS	SOURCE/DET	FIBER/CABLE	CONNECTORS	STATUS/AVAIL.
RF Fiber Optic Link /RADC (DC)/Harris	- direct modulation 1km with connectors - single mode fiber	- direct signal remoting at RF carrier over fiber - no down conversion	ILD/APD $\lambda=840nm$	Fujikura	Danf-Single mode single fiber connectors	Link tested and delivered final report to be delivered
RF Fiber Optic Links /RADC (DC)/ILO Inc.	3 links, narrowband, analog, with center RF carrier frequencies near 3, 5 and 8 GHz.	- direct signal remoting at RF carrier fiber - no down-conversion	ILD/TBD operating wavelength TBD	Single Mode/TBD	Single Mode	June 83 Award 18 month to product completio
Millimeter Fiber Optic Links /RADC (DC)/TBD	3 Links narrowband, analog with center carrier frequencies near 22, 36, and 44 GHz.	replacement of conventional millimeter wave waveguide with fiber optics for architectural advantages in remoting and terminal equipment structure.	ILD (external modulator) /TBD	Single Mode/TBD	Single Mode	FY84 Award 30 month program

FIBER OPTICS SYSTEMS -USA-

PROGRAM NAME

SPONSOR/DEVELOPER	PARAMETERS	BENEFITS	SOURCE/DET	FIBER/CADLE	CONNECTORS	STATUS/AVAIL.
Wideband Fiber Optic Links/ RADC (DC)/TBD	• 2 links with .5 to 6 GHz and 2.0 to 12 GHz bandwidth respectively. • 1km length	• wideband signal routing via fiber with all advantages of fiber over conventional waveguides	LD, external modulator, PIN or APD	Single Mode Fiber /TBD	Single Mode, Single Fiber	Nov 83 Contract Award, 24 month program
Hybrid Array Optical Link /RADC (OC)/Boeing	• laser based WDM link operating at 3.1 to 3.6 GHz for sub array element control and signal transmission	• high resolution array control and adaptability	LD/APD $\lambda = 850\text{nm}$	Single Mode/TBD	Single Mode	Product available early FY84.

10. List of Ongoing 6.1 Programs

LIST OF ONGOING AF 6.1 EFFORTS

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	QUANTUM WELL DEVICES (LASERS APD'S) (THIN, MULTI-LAYER STRUCT, HIGH TEMP, COEF, STABLE, LOW NOISE)	61102F (AFCSR+ DARPA) 30 MOS, \$500K	ROCKWELL INT'L RESEARCH LAB START FY'83
RADC/ES	EXTERNAL MODULATION FOR HIGH SPEED ANALOG APPLIC (E.G. DIRECT RF)	61102F (AFCSR) 12 MOS, \$200K	LINCOLN LAE + OPEN BID CONTRACT
RADC/ES	PLANAR COUPLER (MONOLITHIC T'S & STARS)	61102F (AFCSR) 2 YRS, \$200K	TRW, STARTED ON 6/82 C.2 IN FY '84
RADC/DC	DIRECT RF REMOTING (<u>NARROW-BAND</u> DIRECT MODULATION)	61101F (LDF) 1 YR, \$100K	HARRIS AY '82
RADC/ES	HIGH QUALITY INDIUM PHOSPHIDE (IN P) CRYSTAL DEVELOPMENT (APPLIC: LONG A LASER, LED'S, APD'S, PIN-FET'S)	61102F (AFOSR) 36 MOS, \$300K	LINCOLN LAB + IN-HOUSE
RADC/ES	ZN SE-GE HETEROJUNCTIONS	61102F (AFOSR) 1 YR, \$60K	XEROX

LIST OF ONGOING AF 6.1 EFFORTS (CONTINUED)

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	LASER ANNEALING	61102F (AFOSR) 1 YR, \$80K	UNIV OF CAL SANTA BARBARA + IN-HOUSE
RADC/ES	TEMP DEPENDENCE OF IN GA AS P LASER THRESHOLD CURRENT	61102F (AFOSR) 1 YR, \$35K	DUKE UNIV
RADC/ES	MELT-GROWTH III-V COMPONENTS (INP)	61102F (AFOSR) 1 1/4 YRS, \$82K	MIT + IN-HOUSE
RADC/ES	CHEM & KINETICS OF VPE SYSTEMS	61102F (AFOSR) 2 1/2 YRS, \$150K	UNIV OF FLA
RADC/ES	OPTICAL STUDY OF FLUORIDE GLASSES	61102F (AFOSR) 2 1/2 YRS, \$200K	OKLAHOMA STATE UNIV + IN-HOUSE

LIST OF ONGOING AF G.1 EFFORTS (CONTINUED)

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	BE F ₂ OPTICAL FIBERS	61102F (AFOSR) 2 YRS, \$100K TRI-SERVICE \$900K TOTAL. 1/2 SHARE \$300K, \$200K DIRECTLY FROM AFOSR	COMING
RADC/ES	METALLIC HALIDE OPTICAL GLASSES	61102F (AFOSR) 3 YRS, \$350K	RPI + IN-HOUSE

11. List of Ongoing 6.2 Programs

LIST OF ON GOING 6.2 PROGRAMS

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LIST OF ONGOING AF 6.2 EFFORTS

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	LOW THRESHOLD LONG λ LASERS (LOW-DRIVER POWER)	62702F 24 MOS, \$200K	LINCOLN LAB CONTRACT
RADC/DC	WDM MUX	62702F 24 MOS, \$600K	HARDWARE 6/83
RADC/DC	WIDEBAND BUS TECHNOLOGIES	62702F 24 MOS, \$450K	HARDWARE 6/83
RADC/DC	DIRECT RF REMOTING BREADBOARD 2, 4, 8 GHz EXP MODELS	62702F 1 YR, \$100K 18 MOS, \$400K	HARRIS COMPLETED 6/82 FOLLOW ON FY 83 OPEN BID
RADC/DC	WIDEBAND RF LINK 6-12 GHz BW	62702F 18 MOS \$400K	PROBABLY HUGHES OR TRW CONTRACT AWARD 6/83

LIST OF ONGOING AF 6.2 EFFORTS (CONTINUED)

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/DC	CONNECTOR STANDARDS	62702F 12 MOS, \$200K	MITRE CONTRACT
RADC/DC	LOW LOSS TACT CONNECTOR	62702F 24 MOS, \$400K (AF) (CO-FUNDED WITH US ARMY)	EITHER TRW, BELL, ITT, HUGHES
RADC/DC	COMMON FO MODULE (TRI-SERVICE INITIATIVE)	62702F 36 MOS, \$1.5M (AF) (PROPOSE EQUAL AMOUNTS BY ARMY & NAVY)	OPEN INITIATE FY '85
RADC/DC	MULTIWAVELENGTH BUS	62702F 24 MOS, \$750K	INITIATE FY '84 ITT OR OTHER
RADC/ES	AL GA AS LONGWAVELENGTH DETECTOR	62702F 1 YR, \$100K	ROCKWELL

LIST OF ONGOING AF 6.2 EFFORTS (CONTINUED)

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	LONGWAVELENGTH DETECTORS	62702F 2 YR, \$100K (CANADIAN JOINT FUNDING FOR ANOTHER \$100K)	RCA LTD + IN-HOUSE
RADC/ES	FIBER OPTIC CONNECTOR	62702F 1 YR, \$200K	MIPR TO ARMY BELL NORTHERN
RADC/ES	VARIABLE TIME DELAY WITH FIBER OPTICS	62702F \$100K OVER CEILING	
RADC/ES	LOW THRESHOLD LASER	62702F 1 YR, \$100K	LINCOLN LAB
RADC/ES	WAVELENGTH MUX	62702F, \$100K OVER CEILING	OPEN BID + IN-HOUSE

LIST OF ONGOING AF 6.2 EFFORTS

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	HERMETIC COATING OF OPTICAL FIBER	62702F 2 YRS. \$66K (TRISERVICE FUNDING EQUAL PORTION FROM ARMY & NAVY FOR A TOTAL OF \$200K)	SPECTRAH
RADC/ES	1 X 14 MAGNETO-OPTIC SWITCH FOR MULTIMODE FIBER SWITCHING	62701F 1 YR. \$100K OVER CEILING	SPERRY UNIVAC

12. List of Ongoing 6.3 Programs

LIST OF ONGOING AF G.3 EFFORTS

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	IROC ENG'G MODELS (TEST BED)	63726F, \$150K 33401F, \$250K 33401G, \$300K TOTAL \$700K 24 MOS	STARTED 1/82 HUGHES + IN-HOUSE EFFORT (ESD IS TRI-SERVICE LEAD)
RADC/DC	GENERIC 26-PAIR CABLE REPLACEMENT	63726F 30 MOS, \$5M (INCL \$1.2M FROM ARMY)	DUAL AWARD 9/82 GTE, TRW
RADC/DC	MULTIPURPOSE FO TRANSCEIVER (STANDARD XCEIVER FAMILY)	63726F 24 MOS, \$2.5M	AWARD 3/83
RADC/DC	SINGLE FIBER OPTICAL COMM SYSTEM (DUAL WAVELENGTH, BIDIRECTIONAL XMISSION OVER SINGLE FIBER)	63726F 18 MOS, \$750K	AWARD 3/83

FUTURE PROGRAMMED AF 6.3 EFFORTS

OF
SHEET NO
JOB NO

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/DC	BUS TRANSCEIVER FAMILY	63726F 41 MOS, \$4.9M	AWARD 5/85
RADC/DC	OPTICAL MULTIPLEXER (WDM SYSTEMS)	63726F 41 MOS, \$5M	AWARD, 5/85
RADC/DC	RF REMOTING (DIRECT RF TRANSMISSION)	63726F 48 MOS IN POM YEARS, \$4M	AWARD, 10/85
RADC/DC	WIDEBAND FO COMM SYSTEM	63726F 24 MOS IN POM YEARS, \$2M	AWARD, 10/87
RADC/DC	COMMON MODULE DEV	63726F 24 MOS IN POM YEARS, \$2M	AWARD, 10/87

SUBJECT

DATE

CHRD BY

BY

RECOMMENDED OR PROPOSED AF 6.1 EFFORTS

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	CHEMICAL VAPOR DEPOSITION (CVD) OF METAL FLUORIDE PREFORMS (OBJECTIVE: ULTRA PURE GLASS)	61102F (AFOSR) 24 MOS, \$300K	IN-HOUSE + CORNING (START LATE FY '83 OR '84)
AFOSR	UNIVERSITY PROGRAM	61102F \$500K	E.G. STEVENS, PINY, MIT
RADC/ES	CHEMICAL DURABILITY OF HEAVY METAL FLUORIDE GLASSES (HMFGE'S)	61102F (AFOSR) 24 MOS, \$150K	UNIVERSITY PROGRAM START FY '84
RADC/ES	MAGNETIC PROPERTIES OF HMFGE'S	61102F (AFOSR) 24 MOS, \$150K	UNIVERSITY PROGRAM START FY '86

13. Status of Air Force Related 6.4 Procurement Programs

STATUS OF AF-RELATED FIBER OPTIC 6.4 AND PROCUREMENT PROGRAMS (FIXED SYSTEMS)

<u>AGENCY</u>	<u>SYSTEM</u>	<u>NUMBER</u>	<u>DISTANCE</u>	<u>CABLE</u>	<u>STATUS</u>
AF BMO	MX MISSILE	180	2/70 KM	UP TO 8 FIBER	GTE 2/80
SHAPE (ESD/TCF-1)	RING, SPOKE, RESTORAL	X	2 KM, 1 KM	6 & 4 FIBER	BELG. RFP 5/81
SM ALC	SAT TERMINAL	X	X	13 FIBER	QRC, INSTL'D 3/81
SM ALC	SAT TERMINAL	X	X	48 FIBER	QRC, 0-3/82
ESD/SC	BERLIN ATC	2 DUAL LINKS	2 KM MAX	4 FIBER	PROCURED 2/82
DCA	ANMCC	2 DUAL LINKS	1 KM MAX	4 FIBER	RFP 0-1/83
SATCOMA (ESD/TCJ)	NABS	80	2 KM MAX	6 FIBER (50 μ M)	RFP FY '83
AF/SD	DDP	1 PLANNED	2-3 KM	4 FIBER (50 μ M)	NOSC FY'83
AF/SD (AFSC)	SCF	X	<300 M PT-TO-PT	VARIOUS	SCF'S CONTR'S

STATUS OF AF-RELATED FIBER OPTIC 6.4 AND PROCUREMENT PROGRAMS (MOBILE SYSTEMS)

<u>AGENCY</u>	<u>SYSTEM</u>	<u>NUMBER</u>	<u>DISTANCE</u>	<u>CABLE</u>	<u>STATUS</u>
ARMY CECOM	TYC-39 SWITCH	27 SYSTEMS	100 FEET	6 FIBER (50 μ M)	GTE, 3/78
MARINES (AF)	TAOC 85 (MCE)	6+ (182)	2 KM	4 FIBER (50 μ M)	LITTON, 10/79
SM ALC	GRC 206 RADIO	434 UNITS	2 KM MIN	2 FIBER (50 μ M)	MAGNAVOX, 11/80 PROD
JCMPO (MDAC)	GLCM	320 CABLES	300 M	6 FIBER (100 μ M)	UNIVAC, 3/80, PROD
ARMY-CECOM	LONG HAUL	10 FSED	64 KM	2 FIBER (50 μ M)	ITT/SIL, 7/82
SM ALC	TPS-43E RADAR	X	X	4 FIBER	QRC FY '83 CONTRACT
SM ALC	ASOC RADIOS	X	X	2 FIBER (50 μ M)	QRC FY '84 CONTRACT
MARINES/NAVELEX	TPS-32 RADAR	5	6 KM	4 FIBER	ITT GILFILLAN
TRITAC (ESD/TCJ)	TRC-170, GMF	100'S	6 KM MAX	2 FIBER (50 μ M)	MITRE, REQ '83/84
MARINE/NAVELEX	MATCALS	X	2 KM MAX	6 FIBER	UNIVAC, 10/82 PROD
ESD/OCN	TPN-19	X	5 KM	2 FIBER (50 μ M)	DENKO LABS 10/82

STATUS OF AF-RELATED FIBER OPTIC 6.4 AND PROCUREMENT PROGRAMS
(MOBILE SYSTEMS)

<u>AGENCY</u>	<u>SYSTEM</u>	<u>NUMBER</u>	<u>DISTANCE</u>	<u>CABLE/CONN</u> <u>50/100/125 M</u>	<u>STATUS</u>
ARMY CECOM	TYC-39 SWITCH (26-PAIR/F.O.)	2 SHELTERS 27 SYSTEMS	100 FEET	6 FIBER CABLE HUGHES (50 μ M)	GTE, MAR 78
MARINE CORPS- NAVELEX	TAOC 85 (RADAR D. DATA, D. VOICE) (AF VERSION, THE MCE)	6+ UNITS 182 UNITS	2 KM	4 FIBER CABLE HUGHES (50 μ M)	LITTON, OCT 79 6.4
SM ALC	GRC 206 RADIO	434 UNITS	2 KM MIN	2 FIBER CABLE ITT CANYON (50 μ M)	MAGNAVOX, NOV 80 PRODUCTION
JCMPO (MDAC)	GLCM	320 CABLES	300 M	6 FIBER CABLE (100 μ M HUGHES	SPERRY UNIVAC, MAR 80 PRODUCTION

STATUS OF AF-RELATED FIBER OPTIC 6.4 AND PROCUREMENT PROGRAMS (CONTINUED)
(MOBILE SYSTEMS)

<u>AGENCY</u>	<u>SYSTEM</u>	<u>NUMBER</u>	<u>DISTANCE</u>	<u>CABLE/CONN</u> <u>50/100/125 M</u>	<u>STATUS</u>
ARMY-CECOM	ARMY LONG HAUL	10 FSED	6/8 KM 64 KM	2 FIBER CABLE ITT/STL (50 M)	ITT/STL, JUL 82 6.4
SM ALC	TPS-43E R4DAR (2, 1C-COAX WIRES TO 2, 2-FIBER PAIRS,	X	X	4 FIBER, HUGHES	CRC FY '83 CONTRACT PE 27536F
SM ALC	ASOC RADIGS (MUD BOX	X	X	2 FIBER, HUGHES (50 M)	CRC FY '84 CONTRACT PE 27536F
MARINE CORPS- NAVELEX	TPS-32 RADAR	5	6 KM	4 FIBER, HUGHES	ITT GILFILLAN
TRITAC (ESD/TCJ)	TRC-170, GNF (TERMINAL REMOTING FROM OP CENTERS)	100'S	6 KM MAX	2 FIBER (50 M)	NITRE, REQ '83/84

STATUS OF AF-RELATED FIBER OPTIC G.4 AND PROCUREMENT PROGRAMS (CONTINUED)
(MOBILE SYSTEMS)

<u>AGENCY</u>	<u>SYSTEM</u>	<u>NUMBER</u>	<u>DISTANCE</u>	<u>CABLE/COHN</u>	<u>STATUS</u>
MARINE CORPS- NAVELEX	MATCALS (F.O. UPGRADE/ RETROFIT)	X	2 KM MAX	6 FIBER	SPERRY UNIVAC, OCT 8 PRODUCTION
ESD/OCN	TPN-19 TACT LANDING SYSTEM (REMOTING OPS CENTER FROM TACT CONTROL TOWER, 26 PAIR TO 2 FIBERS, LED SOURCES)	X	5 KM (5, 1 KM LENGTHS) (NO REPEATERS)	2 FIBER, JTT (5C4 M) HUGHES CONNECTORS	LENKO LABS ROCKVILLE, MD, OCT 82

STATUS OF AF-RELATED FIBER OPTIC 6.4 AND PROCUREMENT PROGRAMS
(FIXED SYSTEMS)

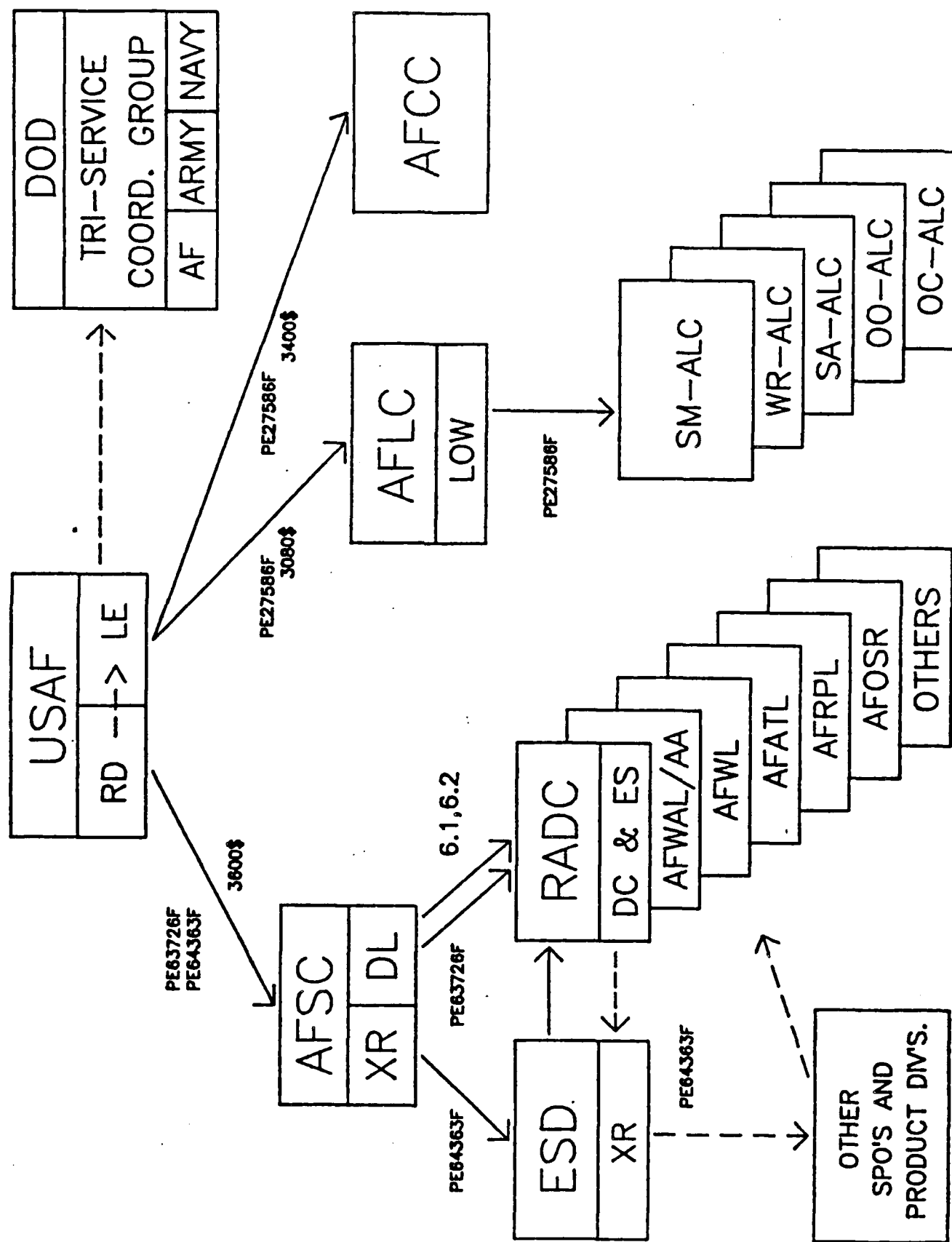
<u>AGENCY</u>	<u>SYSTEM</u>	<u>NUMBER</u>	<u>DISTANCE</u>	<u>CABLE</u>	<u>STATUS</u>
AF BMO	MX MISSILE (DENSE PACK) (VANDENBERG AFB, PROTOTYPE) (UP TO 102 NODES)	180km TOTAL	2/70 km	8 FIBER OR LESS (9.6, 16, 48 KBS PLUS VOICE)	GTE, FEB 80
NATO SHAPE VIA AF/ESD/ TCF-1 (MITRE)	RING & SPOKE RESTORAL	X X	2 km 1 km	6 FIBER CABLE 4 FIBER CABLE	BELGIUM M.O.D. RFP, MAY 81
SM ALC	SAT TERMINAL	X	X	13 FIBER	ORC, INSTALLED 3/81
SM ALC	SAT TERMINAL	X	X	48 FIBER	ORC, 3RD QTR 82
ESD/SC	BERLIN AIR TRAFFIC CONTROL	2 DUAL LINKS	2 km MAX	4 FIBER	AFLC/AFCC PROCURED FEB 82
DCA	ANMCC	2 DUAL LINKS	1 km MAX	4 FIBER	RFP 1ST QTR 83

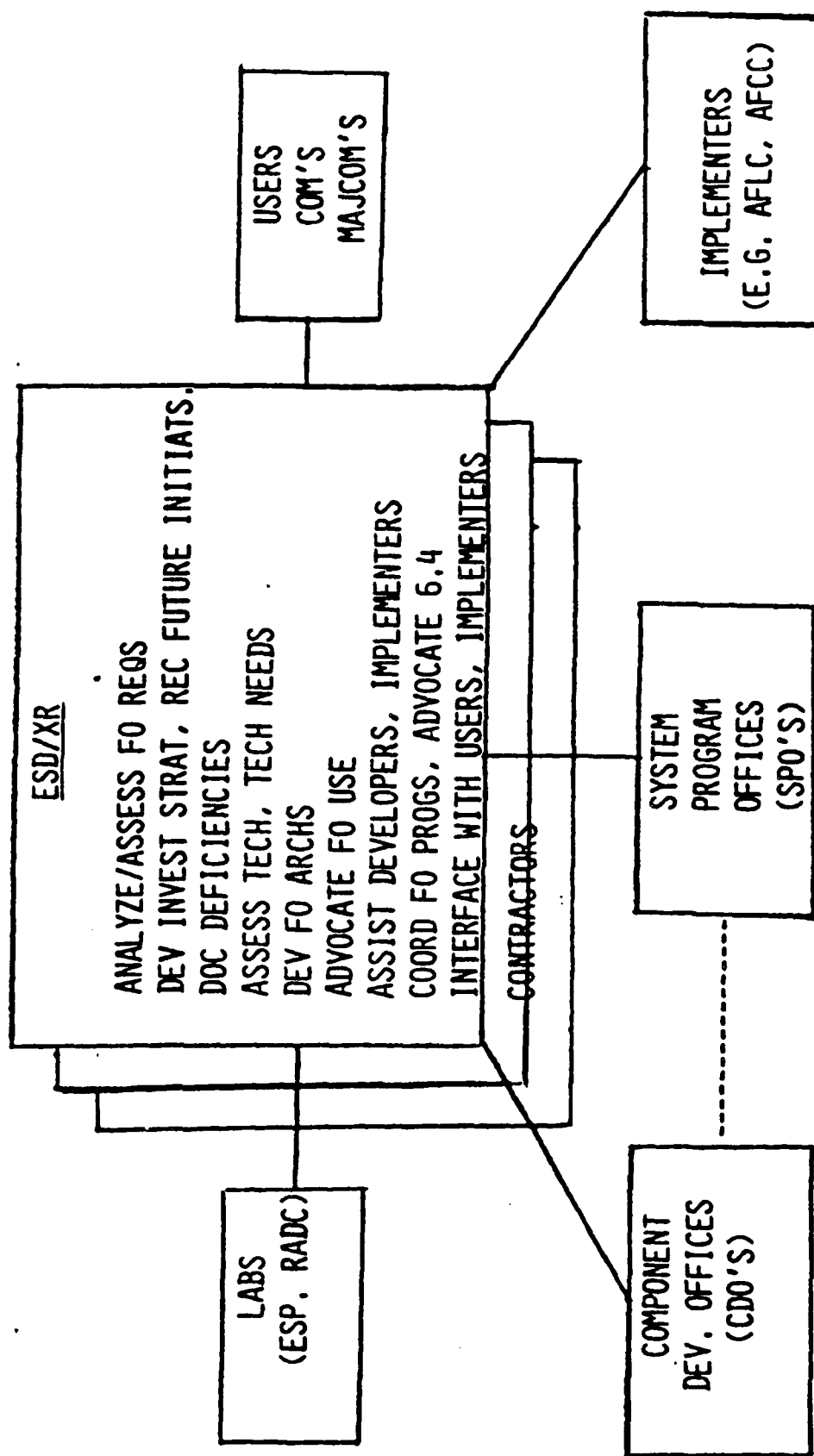
STATUS OF AF-RELATED FIBER OPTIC 6.4 AND PROCUREMENT PROGRAMS (CONTINUED)
(FIXED SYSTEMS)

<u>AGENCY</u>	<u>SYSTEM</u>	<u>NUMBER</u>	<u>DISTANCE</u>	<u>CABLE</u>	<u>STATUS</u>
SATCOMA VIA ESD/TCJ (GMF) MITRE	NABS (NATO AIRBASE SATCOM) (REMOTING RF FROM IF PORTIONS OF SATCOM TERMINAL)	80 TER- MINALS	2 KM MAX	6 FIBER (50 μ M)	RFQ FY '83
AF/SD	DEFENSE DISSEMIN- NATION PROGRAM (DDP) (SAT TERMINAL FOR AN/TSC-86)	1 PLANNED	2 KM NOMINAL 3 KM MAX	4 FIBER (50 μ M)	NOSC STUDY & IMPLEMENTATION FY '83
AF/SD (AFSC)	SATELLITE CONTROL FACILITY (SCF) (SECURITY A DRIVER) (INTER FACILITY-RF) (INTRA FACILITY-DATA)	X	<300 M PT TO PT	VARIOUS COMMERCIALY AVAIL F.O.'S LAYED IN ARMORED CONDUITS	SCF'S ASSOCIATE CONTRACTORS

14. Proposed Air Force Programs

F.O. ORGANIZATIONAL RELATIONSHIPS





ORGANIZATIONAL RELATIONSHIPS

64363F/3600

85

86

87

88

89

PLANNING
AFSC/ESD/ASD/SD/AD

PE
63726F

STANDARD TRANSCEIVER
EDM

PE
63726F

BUS TRANSCEIVER LAN
DEVELOPMENT

PE
63726F

SINGLE FIBER COMM SYS
EDM

PE
33401F

INTRUSION RESISTANT OPTICAL
COMM EDM

PE
63726F

DIRECT RF
REMOTING

NUCLEAR EFFECTS BASELINE TESTING

PE
63726F

OPTICAL
MUX FAMILY

RESEARCH, EXPLORATORY AND ADVANCED DEVELOPMENT NEEDS

6.1

COMPREHENSIVE UNIVERSITY PROGRAM IN FO PHYSICS, PROPAGATION, MONOLITHIC/STRIP STRUCTURES, MODE COUPLING, RADIATION, TRANSITIONS, COUPLERS, SWITCHES, PHYSICAL PHENOMENA (E.G. THE EFFECTS OF VIBRATION ON FIBERS, CONNECTORS, ETC.), SOURCE/ DETECTOR COUPLING, F.O. SENSOR ANALYSIS.

ADDITIONAL WORK ON BETTER GLASS CHEMISTRY AND PHENOMENOLOGY FOR HMFG'S

PRESENT FUNDING APPROX \$.75M PER YEAR, RECOMMEND ADD'L \$.8M-\$.1.3M PER YEAR

6.2

SUPER LONG WAVELENGTH FO HMFG FIBERS, SOURCES, DETECTORS

WDM: SOURCES (LEDs, LASERS), MUX/DEMUX (CROSS TALK AND INSERTION LOSSES ARE MAJOR PROBLEM)

RAD EFFECTS

MONOLITHIC INTEGRATION

PLANAR COUPLERS

SPECIAL IROC CABLE

SWITCHING

PRESENT FUNDING BUILDS FROM \$1.5M TO \$3M PER YEAR, RECOMMEND ADDITIONAL MINIMUM \$.5M PER YEAR. REALLY NEED MORE.

RESEARCH, EXPLORATORY AND ADVANCED DEVELOPMENT NEEDS (CONTINUED)

6.3

LOCAL POWER SOURCES FOR TACTICAL REPEATERS:

SELF-CONTAINED, LONG-LIFE PRIME POWER SOURCES OR OTHER REMOTE POWER MEANS.

MEASUREMENT STANDARDS:

FO DEVELOPMENT HAMPERED BY LACK OF MEASUREMENT STANDARDS. PERFORMANCE CANNOT ACCURATELY BE MEASURED UNTIL STANDARDS DEVELOPED.

ADDITIONAL FUNDING OF EXISTING 6.3 PROGRAMS STARTING IN FY '85 WILL ACCEL.

OUT-YEAR (>85) 6.3 PROGRAMS

CONCERNS WITH EXISTING AND PROPOSED PROGRAMS

- . NOT MUCH AF R&D INTEREST IN DIRECT FO SWITCHING.
- . NO SPACE APPLICATIONS, ALMOST NO MISSILE APPLICATIONS
- . MINIMAL A/B APPLICATIONS
- . NO WORK ON WIDEBAND ATMOSPHERIC OPTICAL LINKS CAPABLE OF BRIDGING DIFFICULT (FOR FO) TERRAINS

PRESENT PROGRAM HAS \$28.8M FY83-89, RECOMMEND ADDING \$8.6M

RECOMMENDED OR PROPOSED AF 6.2 EFFORTS

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	SUPER RADIANT LED'S (LONG λ OPH FOR LAN'S)	62702F OR LDF 12 MOS, \$200K	OPEN BID (PREFER LASARTRON, INC)
RADC/ES	SUPER LONG FIBERS (2-5 μ m) (METAL FLUORIDE)	62702F OR LDF 12 MOS, \$150K	COULD START ANY TIME, OPEN BID
RADC/ES	DEV. OF HEAVY METAL FLUORIDE GLASS (HMFG)	62702F 36 MOS, \$600K	CORNING, ETC.
RADC/ES	WAVELENGTH MUX & DEMUX WITH LED SOURCES (VARIABLE λ LED'S) (FOR WDM)	62702F OR LDF 18 MOS, \$200K	OPEN BID
RADC/ES	RAD EFFECTS ON SILICA FIBERS	62702F, OR LDF 12 MOS, \$200K	RECOMMENDED BY TRI SERVICE FOR OPEN BID
RADC/ES	MONOLITHIC INTEG OF EMITTERS & DETECTORS (PIN-FET) (INTEGRATE DRIVER/LASER/MODULATOR OR DETECTOR/1ST STAGE PREAMP)	62702F OR LDF 24 MOS, \$500K	COULD START ANY TIME, OPEN BID

RECOMMENDED OR PROPOSED AF 6.2 EFFORTS (CONTINUED)

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/ES	PLANAR COUPLER (MONOLITHIC T'S AND STARS)	62702F OR LDF 12 MOS, \$150K	TRI
RADC/ES	CONCENTRIC CORE FO CABLE FOR IROC	62702F OR LDF 12 MOS, \$150K	ITT OR CORNING
RADC/ES	SOURCES & DETECTORS FOR SUPER LONG X MISSION	62702F OR LDF 24 MOS, \$300K	COULD START ANY TIME, OPEN BID
RADC/ES	MULTI λ LASER SOURCES FOR WDM	62702F 12 MOS, \$200K	OPEN BID
RADC/ES	TOUGHENING & STRENGTHENING OF HMFGE'S	62702F OR LDF 24 MOS, \$200K	OPEN TO UNIVERSITIES OR INDUSTRY

PROPOSED AF 6.3 EFFORTS

<u>AGENCY</u>	<u>TOPIC</u>	<u>FUNDING</u>	<u>STATUS</u>
RADC/DC	DEVELOPMENT OF MEASUREMENT STANDARDS (FOR CABLES, COUPLERS CONNECTORS, SOURCES, DETECTORS, SWITCHES, ETC.)	63726F ON GOING, \$300K/YEAR	SOLE SOURCE, AWARD TO NBS AS SOON AS POSSIBLE
RADC/DC	ACCELERATION OF FUTURE PROGRAMMED 6.3 EFFORTS	63726F ADDING \$1M/YR STARTING IN FY '85. WILL ACCELERATE FUTURE PROGRAMS BY 1 YEAR	PROPOSED
RADC	SELF CONTAINED, LONG-LIFE PRIME POWER SOURCES OR OTHER MEANS OF POWERING REPEATERS WITHOUT WIRES	63726F ADD \$0.3M/YR STARTING IN FY 84	

RECOMMENDED 6.4 PROGRAMS

- * COMPONENTS FOR REMOTING XMTER & RECEIVER
- * COMPONENTS FOR GROUND BASED LAN'S
- † COMPONENTS FOR HIGH CAPACITY A/B FO BUSSES
- * IROC EDM
- * MIL. STD. TRANSCEIVER FAMILY
- * GENERIC 26 PAIR CABLE REPLACEMENT
- * FO SENSOR DEVELOPMENT
- * COMPONENTS FOR MIL. COMPUTER/COMPUTER LINKS
- * COMPONENTS FOR SINGLE FO COMM. SYSTEM
- * COMPONENTS FOR DIRECT RF
- * COMPONENTS FOR STD. CONNECTORS, SPLICES, FO CABLES
- * NUCLEAR EFFECTS TESTING & EVAL.

TOTAL FUNDING INITIALLY RECOMMENDED FOR FY'84-89 PERIOD = \$101M

CONCERN:

- . NO SPACE OR MISSILE APPLICATIONS

*FUNDED IN PE64363F POM	TOTAL
†PARTIALLY FUNDED IN PE64363F POM	\$77.6M

RECOMMENDED 6.4 PROGRAM ON
COMPONENTS FOR REMOTING TRANSMITTERS AND RECEIVERS FROM OPERATIONS CENTERS

DEVELOP & ADAPT COMPONENTS FOR REMOTING RADIO/RADAR/SATCOM/MICROWAVE TRANSMITTERS & RECEIVERS FROM OPERATION CENTERS. WILL UTILIZE AND ADAPT DEVELOPMENTS OF OTHER EFFORTS SUCH AS MIL. STD. TRANSCEIVER FAMILY & GENERIC 26 PAIR CABLE REPL. (INCLUDES TRANSCEIVERS AND MULTIPLEXERS)

SOME APPLICATIONS IDENTIFIED TO DATE:

SATELLITE CONTROL FACILITY (SCF) - TRANSF MOBILE GROUND STATION (TMGS)

GMF - REMOTING OF SAT. TERM. FOR NABS

CSOC

DDP (GROUND TERMINAL)

DSP - (MOBILE GROUND TERMINAL)

TRI-TAC APPLICATIONS (DUAL COAX REPLACEMENTS)

AN/TPS-68

TACTICAL WX RADAR

RECOMMENDED 6.4 PROGRAM ON
COMPONENTS FOR GROUND BASED LOCAL AREA F.O. NETS (LAN'S)
SPECIFIC TO PARTICULAR SYSTEM INTERFACES

DEVELOP OR ADAPT FO TRANSCEIVERS, COUPLERS (STARS & TAPS), SWITCHES TO THE REQS. OF LOCAL AREA NETS. UTILIZE WHEREVER POSSIBLE DEVELOPMENTS OF OTHER EFFORTS SUCH AS THE MIL. STD. TRANSCEIVER FAMILY. POTENTIAL FO LAN USERS IDENTIFIED TO DATE ARE:

FLEXIBLE INTRACONNECT (FI) (PROPOSED STANDARD) FOR C³I CENTERS
WIS (BOTH FIXED BASE & MOBILE/TRANSPORTABLE)

BASE COMMUNICATIONS

USREDCOM COMMAND CENTER

TRI TAC SHELTERS (BEYOND TYC-39 E.G. CNCE, CSCE, ETC.)

NMC (FI APPLICATION) + CSSR (COMM SYSTEM SEGMENT REPLACEMENT)

SPADOC

CSOC

SAC COMMAND CENTER UPGRADE & HERT

MAC COMMAND CENTER

AIR FORCE LOGISTIC COMMAND & CENTERS

PEACE KEEPER

RECOMMENDED 6.4 PROGRAM ON
COMPONENTS FOR HIGH CAPACITY AIRBORNE F.O. BUSSES

DEVELOP NEW COMPONENTS OR ADAPT AVAILABLE COMPONENTS TO AIRBORNE FO BUSES FOR CARRYING NAV, COMM, CONTROL, INTEL, SENSOR, DISPLAY, WEAPONS DEL., STORES MGMT, IDENT., C³, ETC. DATA ON HIGH AND MEDIUM PERF. A/C.

POTENTIAL APPLICATIONS INCLUDE:

A-10 IMPROVEMENTS

E-3A

F-111 RETROFIT (AFLC)

F-15 IMPROVEMENTS

E-4B

F-16 IMPROVEMENTS

NEW PROGRAMS LIKE ASPJ & ATARS

WILL PERFECT TECHNIQUES DEVELOPED UNDER THE PAVE PILLAR PROGRAM, 63253F. BOTH AVIOPTICS AND PAVE PILLAR DEVELOPMENTS WILL HAVE TO BE INTEGRATED INTO THIS PROGRAM. F.O. COMPONENTS WILL HAVE TO BE COMPATIBLE WITH MIL STANDARD 1760 SPECS FOR CONNECTORS AND WIRES (PYLON APPLIC.). WHEN RETROFIT, APPROACH WILL BE TO INSTALL FO BUS REPLACEMENTS AS AIRCRAFT ARE SCHEDULED FOR MAJOR OVERHAULS. MIL STD 1773 IS THE FO BUS SPEC. TO BE MET.

RECOMMENDED 6.4 PROGRAM ON
INTRUSION RESISTANT OPTICAL CABLE (IROC)

IROC WILL BE READY TO TRANSITION TO EDP IN FY '84. (ESD IS TRI-SERVICE LEAD.)

AD-A142 396

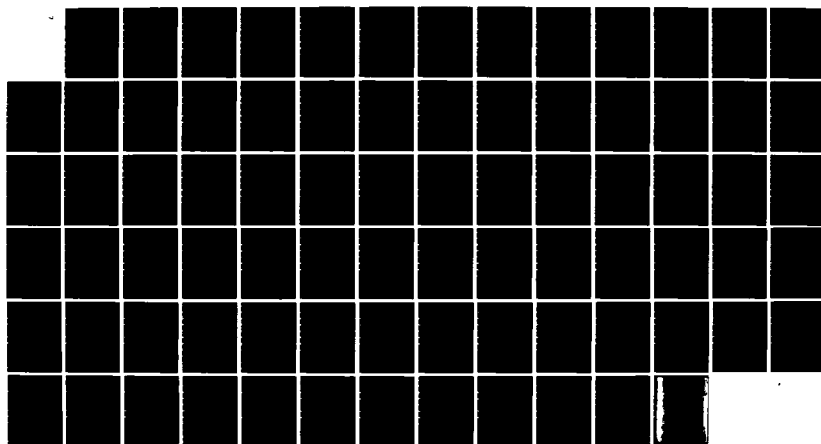
STANDARDIZATION PLAN FOR FIBER OPTICS OPTIONAL PHASE
VOLUME 2(U) INFORMATION GATEKEEPERS INC BOSTON MA 1984
F04606-82-C-1505

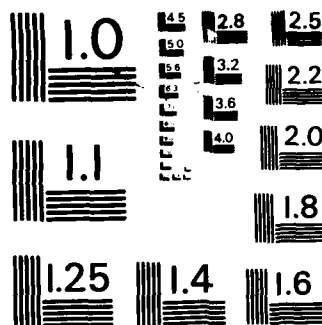
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

RECOMMENDED 6.4 PROGRAM ON
MIL STANDARD TRANSCEIVER FAMILY

DEVELOP HIGH CAPACITY (HIGH SPEED DIGITAL AND WIDEBAND ANALOG) FIBER OPTICS
TRANSCEIVERS WITH DATA RATES UP TO 100 MBS APPLICABLE TO BOTH LANS AND POINT-
TO-POINT APPLICATIONS DISCUSSED PREVIOUSLY.

RECOMMENDED 6.4 PROGRAM ON
GENERIC 26 PAIR CABLE REPLACEMENT PROGRAM

A 30 MONTH DUAL 6.3 AWARD HAS JUST BEEN MADE. (1 SEP 82). THIS TAKES THE PROGRAM TO 28 FEB 85 (FY '85). RADC ESTIMATES WILL BE READY FOR MANUFACTURING PROTOTYPE IN FY 85. SM/ALC REQUIRES SUCH A PROTOTYPE AND PRODUCTION DOCUMENTATION PRIOR TO PROCUREMENT. THE REQUIRED EDM FOR PRODUCTION PROTOTYPE, TEST AND PRODUCTION DOCUMENTATION CAN BE INITIATED IN FY '85.

THE ARMY IS EXPECTED TO PARTICIPATE IN THIS PROGRAM.

RECOMMENDED 6.4 PROGRAM ON
COMPONENTS FOR MILITARIZED COMPUTER TO COMPUTER LINKS.

ALTHOUGH LOW SPEED COMPUTER/COMPUTER LINKS ARE ACCOMPLISHED WITH LAN'S;
THERE ARE CERTAIN PROGRAMS WHERE HIGH-SPEED DIRECT COMPUTER/COMPUTER
FO LINKS ARE CALLED FOR, E.G. COBRA JUDY. THE DEVELOPMENT OF PECULIAR INTERFACES
FOR SPECIFIC COMPUTER TO COMPUTER BUSSING WILL BE REQUIRED. THIS INCLUDES ARRAY,
ASSOCIATIVE, AND PARALLEL PROCESSORS.

RECOMMEND 6.4 PROGRAM ON

F.O. SENSOR DEVELOPMENT.

NO EDM PROGRAM IN FO SENSORS HAS BEEN PROGRAMMED BY THE AIR FORCE. THE NAVY HAS AN EXTENSIVE PROGRAM THAT WE CAN TAP INTO. THE FOREMOST AF APPLICATION APPEARS TO BE IN FO LASER GYROS. DEVELOPMENT OF EDM VERSIONS OF THIS INSTRUMENT SHOULD BE PROJECTED. (2 DIFFERENT APPROACHES ARE NOW BEING PURSUED BY AFAL AND AFATL).

RECOMMENDED 6.4 PROGRAM ON
COMPONENTS FOR SINGLE FIBER OPTICAL COMMUNICATIONS SYSTEM.

EDM DEVELOPMENT OF MULTIPLEXERS DEMULTIPLEXERS AND OTHER COMPONENTS NEEDED TO PROVIDE DUAL WAVELENGTH, BIDIRECTIONAL TRANSMISSION OVER A SINGLE FIBER. THIS INCLUDES INTERFACES FOR REPLACING EXISTING DUAL FIBER SYSTEM WITH SINGLE FIBERS AS WELL AS FOR NEW INSTALLATIONS. THE PRESENT ADM WILL BE COMPLETE BY 1 OCT 1984.

THE SPECIFIC TRANSITIONS FROM DUAL TO SINGLE FIBER WILL THEN BE ACCOMPLISHED UNDER THE OTHER SPECIFIC EDM PROGRAMS.

RECOMMENDED 6.4 PROGRAM ON
COMPONENTS FOR DIRECT RF REMOTING.

DEVELOPMENT OF UNIQUE WIDEBAND MULTIWAVELENGTH BUSSES, FIBERS, SOURCES, DETECTORS, TRANSCEIVERS AND ASSOCIATED WAVELENGTH DIVISION MULTIPLEXING DEVICES REQUIRED TO OPERATE WITH 1, 12, AND EVENTUALLY 18 GHZ RF SIGNALS WITH A POTENTIAL TO 60 GHZ.

POTENTIAL APPLICATIONS:
VIDEO FOR INTEL APPLICATIONS
ANTI ARM SIGNALS
PHASED ARRAYS
REMOTING XMTRS FROM ANTENNAS
RF FREQ & SOURCE MANAGEMENT

RECOMMENDED 6.4 PROGRAM ON
DEVELOPMENT OF STANDARD CONNECTORS, SPLICES, FIBER OPTIC CABLES.

THE ARMY HAS THE LEAD IN THIS AREA. IT IS PROPOSED THAT THE AF TAKE APPROPRIATE ADVANTAGE OF ARMY DEVELOPMENTS. IF AF FINANCIAL SUPPORT IS NEEDED IT WILL HAVE TO BE MIPR'D TO CECOM IN THE OUT YEARS. (THE AIR FORCE HAS BEEN A PARTICIPANT IN 6.2, 6.3 PROGRAMS.)

WE ARE STILL LOOKING FOR BETTER WAYS TO DO IT; WOULD WELCOME CANDIDATES.

RECOMMENDED 6.4 PROGRAM ON
NUCLEAR EFFECTS TESTING & EVALUATION.

THE TRI-SERVICE COORDINATING GROUP RECOMMENDED INCREASED SPENDING ON NUCLEAR EFFECTS TESTING INCLUDING NOT ONLY CABLES BUT SOURCES, DETECTORS, CONNECTORS, SWITCHES, COUPLERS, AND MULTIPLEXERS. DEVELOPMENT OF TEST PROCEDURES FOR PRODUCTION TESTING AND EVALUATION OF EXISTING FO ARE REQUIRED.

A JOINT SERVICE TACTICAL & STRATEGIC NUCLEAR THREAT SCENARIO TO DETERMINE ACCEPTABLE TEST RADIATION LEVELS IS A REQUISITE.

15. Non-DOD Programs

- a. FAA
- b. NASA

NON - DOD AGENCIES INVOLVED IN FIBER OPTICS SYSTEM

- NASA

- FAA

F.A.A.
=====

MICROWAVE ENDING SYSTEM (MLS)
=====

- \$90 MILLION AWARD TO HAZELTINE
- 172 MLS SYSTEMS
- POTENTIAL \$2 BILLION MARKET OVER NEXT 15 years (2000 possible items)

NASA CONTACTS IN FIBER OPTICS

Prepared by

Information Gatekeepers, Inc.
138 Brighton Avenue
Boston, MA 02134

<u>NASA CENTER</u>	<u>NAME</u>	<u>PHONE NUMBER</u>	<u>SUBJECT</u>	<u>CONTRACTOR</u>
Kennedy Space Center	M. Padgett	(305)823-3842	Single Mode Fiber Optics Cable Evaluation	Siecor
	M. Padgett	(305)823-3842	Fiber Optics Terminal Equipment	
	T. Herring	(305)823-3843	Mux/Demux Digital and Analog Development	
	M. Padgett	(305)823-3842	Fiber Optics Liquid Leak Sensor	
	C. Bell	(305)867-4412	Fiber Optics Cable Communications	General Cable
	C. Bell	(305)823-4412	FDM Mux/Demux Development	EMR Corp.
Marshall Space Flight Center	D. Thomas	(205)872-5603	100 Megabit/Sec Fiber Optics Bus	OA0 Corp., ITT-EOPD
			Other - Interbuilding Communication Links	

<u>NASA CENTER</u>	<u>NAME</u>	<u>PHONE NUMBER</u>	<u>SUBJECT</u>	<u>CONTRACTOR</u>
Langley Research Center	Leonard Clark	(804)827-3704	LDEF (Shuttle) Fiber Optics Experiment	JPL, AFWL & Cert/Onera-Derts
	N. D. Murray	(804)827-3535	Information Network Architecture Research (Adaptive Node Self-Correcting/Repairing Network)	Battelle Memorial Institute
	M. Beatty	(804)827-3535	Information Network Architecture Research (Smart Optical Nodes for Computer Networks)	Battelle Memorial Institute
	H. D. Hendricks	(804)827-3418	Optical Bus Components for Information Networks	American Holographic, RCA, LaRC
	J. Larry Spencer	(804)827-3418	MIL-STD-1773 Fiber Optic Data Bus	Boeing Aerospace Co.
	Leonard Clark } Harry Fuller }	(804)827-2596/ 3585	Terminal Configured Vehicle Control Mode Panel and Data Bus	Boeing Commercial Airplane Co.
	Daniel J. Crawford	(804)827-3418	Flight Simulation Signal Distribution Network	Control Data Corp.
	H. D. Hendricks	(804)827-3418	InGaAsP Semiconductor Lasers	RCA, Princeton
	C. J. Magee	(804)827-3418	Monolithic Integrated Laser Transmitter-Photodetector Receiver	RCA, Princeton
	H. D. Hendricks	(804)827-3418	Different Wavelength CDH-AlGaAs Lasers	
	K. T. Looney	(804)827-3535	Integrated Optic Data Processors	Battelle Memorial Institute

<u>NASA CENTER</u>	<u>NAME</u>	<u>PHONE NUMBER</u>	<u>SUBJECT</u>	<u>CONTRACTOR</u>
Langley Research Center (cont'd)	J. L. Spencer	(804)827-3601	A Planar Rowland Grating Demultiplexer for Wavelength Division Multiplexing	Hughes Research Laboratory
	W. L. Kitchen	(804)827-3581	Remotely Actuated Fiber Optics Connector For LSST	R.I., HRL
	J. H. Cantrell	(804)827-3418	In Situ Optical Fiber Sensor For Composite Strain And Acoustic Emission	Grant: VPI - R. Klans
			Miscellaneous: F.O. Bus Standards, Stereo Photography, F.O. Tachometer - Jet Engine, Combustion Spectra, Data Links, Pressure Sensors, Optical Data Processing, Integrated Optics	
Jet Propulsion Laboratory	George F. Lutes	(213)792-6210	Fiber Optic Frequency Reference Distribution	
	George C. Lagomarsini	(213)792-5246	Fiber Optics Data Experiment	
	Willis Gross	(213)792-4455	Fiber Optics Gyro Rotation Sensor	
	A. R. Johnston	(213)792-4054	Data Transmission & Processing Optical Processing Materials And Devices	
	T. J. Bicknell	(213)792-2523	Synthetic Aperture Radar Optical Processor	
	J. B. Breckinridge	(213)792-6785	Parallel Optical Processor	

<u>NASA CENTER</u>	<u>NAME</u>	<u>PHONE NUMBER</u>	<u>SUBJECT</u>	<u>CONTRACTOR</u>
Ames Research Center	John Goebel	(415)448-6525	Nonlinear Infrared Fibers	Grant: Stanford University - R. Feigelson
	Ronald C. Kauffman	(415)448-6215	Wind Tunnel - Computer Links	Spectronics, Belden
	Tim Healey Terry L. Grant }	(415)448-6526	Fiber Optics Data Bus Coding	
Johnson Space Center	H. O. Erwin	(713)525-2872	Optical Communications For Space Application	Codenoll, H.P., OIS
	H. O. Erwin	(713)525-2872	Optical Scanning & Tracking	Codenoll, H.P., OIS
	M. Engert	(713)525-2872	Miscellaneous: Phase Control of Antenna Arrays, Liquid Level, Temperature and Pressure Sensors, Fiber Optics Terminal	
Goddard Space Flight Center	H. Lopez	(301)344-8523	Interbuilding Optical Fiber Communications	Pending
	T. Miller	(301)344-6531	Fiber Optics Bus System	Sperry (Minneapolis)

<u>NASA CENTER</u>	<u>NAME</u>	<u>PHONE NUMBER</u>	<u>SUBJECT</u>	<u>CONTRACTOR</u>
Lewis Research Center	R. Baumbick	(216)294-6136	Rare Earth Temperature Sensor	United Technologies Research Center
	R. Baumbick	(216)294-6136	Optical Control of Actuators	United Technologies Research Center
			Fabry-Perot Temperature Sensor	OPCOA, Inc.
			Other: Optical Data Processing - University of Ohio, Carnegie-Mellon University	

INTRODUCTION

This report on Fiber Optics Military Research and Development Programs was based on an analysis of research and development summaries obtained from the Defense Technical Information Center (DTIC).

It contains fiber optics programs by each of the services, DOD and NASA. There are many programs that are not included in the DTIC system. However, this analysis provides useful information on the centers of fiber optics research in the Department of Defense and the types of research being pursued.

AIR FORCE

DEPARTMENT

PROGRAMS

Space Division	1
Air Force Armament Laboratory	2
Avionics Laboratories	2
Flight Dynamics Laboratory	2
RADC	17
AFOSR	2
AF Human Resource Laboratory	1
AFCC	1

<u>ARMY</u>	<u>PROGRAMS</u>	<u>NASA</u>	<u>PROGRAMS</u>
ARRADCOM	1	JPC	3
CECOM	3	Langley	1
ERADCOM	7	Johnson	1
ETL-TD-E	1	Johnson	1
MICOM	2	Ames	1
MIRADCOM	1		
AVRADCOM	7		
DARCOM	14		
Army Human Engineering Laboratories	1		

NAVY

DEPARTMENT

PROGRAMS

Naval Research Laboratory	49
Naval Air Systems Command	1
Naval Air Engineering Center	1
Naval Airtest Center	1
U.S. Naval Avionics Center	1
Naval Ocean Systems Center	18
Naval Underwater System Center	5
Naval Electronic Systems Center	1
Naval Material Command	1
Naval Ordnance Station	1
David Taylor Naval Ship R & D	
Naval Weapons Center	1

ARMY

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
Avradcom	Acoustic Distribution and Optical Det.	Avradcom		09/82
Cecom	Fluoropolymer barriers to stress corrosion in optical fibers	Cecom		09/84
Erادcom	Avradcom	Erادcom		Cont.
Erادcom	Dielectric Mats for Signal Processing and Detection	Erادcom		09/84
Erادcom	Low temperature vapor phase oxidation of Metallo-organic for silica fiber preforms	Cecom		12/83
ETL-TD-E	Advance Gyro Tech. Adaption	ETL-TD-E		09/82
Micom	Fiber Optic Guidance	Micom		09/82
Miradcom	Fiber Optic Guidance	Miradcom		Cont.
Avradcom	Test of Optical Slipring	Avradcom		Cont.
NASA Ames	Advance Flight Controls	Avradcom		Cont.
Boeing (Philadelphia)	Assessment Advance Flight Controls	Avradcom	95,505	01/82
Boeing Airplane Company	Optical-Fluidic Servovalve	Avradcom	118,793	11/83
California Institute of Technology	Phase Conjugate Optics	Darcom	120,000	08/82

ARMY (cont'd)

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
University of California at Berkeley	III-V Semiconductors for Optics & Microwave Application	Darcom	76,033	06/83
University of California at Irvine	Integrated Optic Modules	Darcom	76,540	04/84
Environmental Research Institute Ann Arbor, Michigan	Image Data Transfer	Darcom	50,000	06/83
Harris Corporation	Fiber Optic Telephone	Cecom	93,127	09/83
Eradcom	Wide-Band Radiation Toleration Linkage Response Fiber Optic Signal Link	Eradcom		09/81
Eradcom	Radiation Hard Fiber Optic Link	Eradcom		12/85
Eradcom	Radiation Hard Fiber Optic	Eradcom		10/83
Eradcom	NT Cart	MDRDC		05/83
Hebrew University, Jerusalem	Rare Search Chalcongenide Glasses	Darcom	30,000	11/80
University of Minnesota	Wavelength-coded Image Transfer	Darcom	101,311	01/84
U. S. Naval Avionics Center	Fiber Optic Connector Device	Avradcom		Cont.
NOSC	Remotely Piloted Dune Buggy	Army-Human Engineering Laboratory		Cont.
Opterecom	High Speed Long Range Optic Fiber Payout Development	Micom	158,202	09/82
Parker Hannifin Corporation	Optical Servovalve	Avradcom	73,988	06/82

ARMY (cont'd)

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
Rockwell International	Ingapas by Metal-organic Chemical Vapor Disposition	Darcom	70,000	05/82
South Methodist University	Injection Laser Structure Des.	Darcom	38,518	04/83
Sperry Flight System	Optical Servovalve	Avradcom	75,890	04/82
Sperry Rand	Fiber Optic Switch Using Magnetically Altered Gratings	Darcom	50,298	07/82
New York State University	Physical Chemistry of High Polymers	Darcom	39,956	05/84
Research Foundation, State University of New York	Light Scattering & Spectroscopic Studies of Polymerization	Darcom	75,642	01/85
Tetratech	Fiber Optic Data Link	Meradcom	133,895	11/82
University of Utah	Organometallic Vapor Phase Epitaxial Growth	Darcom	76,260	07/83
Vanderbilt University	Relationship between Radioactive Sensitive & Rendox Equilibria	Darcom	79,850	05/83
Varian Association	Development of 0.9 Micron	Eradcom	140,000	06/82
University of Wisconsin at Milwaukee	Holographic Displacement Tensor	Darcom	31,990	07/83

AIR FORCE

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
Aerospace	Laser & E.O.	Space Systems Division	254,000	Cont.
Air Force Amament Laboratory	A/C Store Interface	AFAL		1989
Air Force Avionics Laboratory	Fiber Optic Avsail Integration	AFWAL/AA		09/83
Air Force WAL/FI	Applications to Helmet Mounted Displays			
American Holographic Inc.	WDM	RADC	89,000	03/83
California Institute of Technology	Thin Film Optical Device and Quantum Electronics	AF/OSR/SSS	256,759	11/80
UCLA - Santa Barbara	Laser Annealing	RADC	6,000	08/84
Canadian Commercial Corporation	Fiber Optic Techniques for Displays	AF/Human Resource Laboratory	60,000	08/83
1842 Reg. Scott Air Force Base	Consultive Engineering	EGG (AFCC)		09/82
Galileo Electro-Optics Corporation	ZR Fluoride Based Fiber Optics	RADC	110,017	08/82
H. H. Aerospace Des. Company	Opt. Comm. Analysis	RADC	30,000	09/79
Harris Corporation (c/o)	RF Fiber Optic Link	RADC	89,902	12/82
Harris Corp. (Government Systems)	SAC Fiber Optic Network Expansion	RADC	130,200	03/82

AIR FORCE (cont'd)

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
Honeywell Corporation	Digital IH. Control System Advisory Technology	AFWAL/FI	1,298,950	10/82
Hughes Research Laboratory	Phase Congugate Optics	RADC	50,000	09/82
ITT Def. Comm.	Fiber Optic Multipoint Family	RADC/ Telecom Branch	240,000	06/83
ITT Electro-Optical Production Division	Effective Multiplexing Techniques for Fiber Optics	RADC/ Telecom Branch	217,000	02/84
Lear Siegler, Inc.	1.3 Micron Technical Investigation	AF Armament Laboratory	18,879	05/83
McDonnell Douglas Astronautics	Fiber Optic Sensor Components	AFWAL/AA	201,000	01/84
NOSC	Fiber Optic Application Engineering Manual	USAF Scott AFB		09/82
RADC	Verona Annex Fiber Optics	RADC/Telecom Branch		09/82
RADC	Fund Studies in Optical Materials	RADC Electromag. Mat. Tech.		09/82

AIR FORCE (cont'd)

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
RADC	Development of Optic Materials	RADC/ Electronam. Mat. Tech.		09/90
RADC	Fiber Optic Complete Reliability Survey	RADC Engineering Branch		03/82
RADC	Optic Fiber Subsystem Destination Test & Evaluation	RADC E.O. Dev. Tech.		09/82
Sperry Research C & R	Multimode Optical Switches	RADC E.O. Dev. Tech.		08/81
Stamford University	Development Growth Techniques for EM Crystals	RADC	55,058	09/84
TRW, Inc.	Fiber Coupler	RADC	35,000	05/83

NAVY

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
Bolt, Beranek & Newman	Fiber Optic Array Program	ONR/DON	85,910	Cont.
Bolt, Beranek & Newman	Foss: AD Hydrophone Modeling	NRL Acoustics Division		02/83
EOTEC Corporation	Development of HGH. Young's Modulus Glass Coating	NRL Acoustics Division		02/83
Gould, Inc.	Polariz-Preserv. Evanscent Wave Coupling	NRL-Optic Science Division		01/83
Honeywell Corporation	Net. Coating Fiber Optic Sensors	NRL Acoustics Division		02/83
Honeywell Corporation	Net. Coating Fiber Optic Sensors	NRL Acoustics Division		09/83
Honeywell Corporation	Fiber Optic Sensor Research	NRL-Foss		02/83
Howard University	Paman Spectroscopy	ONR-DON	50,000	Cont.
Hughes Aircraft Company	Infrared Single Crystal Fibers	NRL-OSD		11/82
Hughes Research Laboratory	Foss: Improved Fiber For Acoustic Sensitivity	NRL Acoustics Division		02/83
Hughes Research Laboratory	Los Loss Optic Fiber	ONR	96,691	Cont.

NAVY (cont'd)

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
ITT EOPD	Single Mode Coupler Device	NRL/OSD		10/82
University of Massachusetts at Amherst	Material Supply Technique: Lifetime of Optical	ONR	12,328	Cont.
3M Company	Optical Glass Fibers	ONR/ONN	98,286	05/83
DOC/NBS	Glasses for Fiber Optic Sensors	NRL Acoustics Division		Cont.
Naval Air Engineering Center	Fiber Optic Test Area	NASC		09/85
Naval Air Test Center	CGSE Propulsion Out of Production Aircraft Programs	NAVAIR- SYSCOM		Cont.
NOSC-Environmental Science Department	Optical Cabler FOU Towed Arrays	NRL Acoustics Division		10/84
NOSC	Shipboard Voice System	NSEA		10/86
NOSC	Fiber Optic Data Bus. FOC ICS	NUSC		09/83
NOSC	Flexible Fiber Optic Ureterscope	ONR		08/83
NOSC	Fixed Arrays	NELX		Cont.
NOSC	Fiber Optic Distributed System	NELX		10/84
NOSC	Fiber Optic Missile Guidance	NCND/ONT		09/83
NOSC	Advanced Status Advanced Display (SAD)	NAIR		09/82

NAVY

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
Bolt, Beranek & Newman	Fiber Optic Array Program	ONR/DON	85,910	Cont.
Bolt, Beranek & Newman	Foss: AD Hydrophone Modeling	NRL Acoustics Division		02/83
EOTEC Corporation	Development of HGH. Young's Modulus Glass Coating	NRL Acoustics Division		02/83
Gould, Inc.	Polariz-Preserv. Evanscent Wave Coupling	NRL-Optic Science Division		01/83
Honeywell Corporation	Net. Coating Fiber Optic Sensors	NRL Acoustics Division		02/83
Honeywell Corporation	Net. Coating Fiber Optic Sensors	NRL Acoustics Division		09/83
Honeywell Corporation	Fiber Optic Sensor Research	NRL-Foss		02/83
Howard University	Paman Spectroscopy	ONR-DON	50,000	Cont.
Hughes Aircraft Company	Infrared Single Crystal Fibers	NRL-OSD		11/82
Hughes Research Laboratory	Foss: Improved Fiber For Acoustic Sensitivity	NRL Acoustics Division		02/83
Hughes Research Laboratory	Los Loss Optic Fiber	ONR	96,691	Cont.

NAVY (cont'd)

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
NOSC	Manual Techniques for Fiber Optics	NCND		09/82
NOSC	Fiber Optic Interconnect Support for JCMPD	NELIX		09/83
NOSC	Conceptual Study of Optical Cable Deployment System	NUSC		Cont.
Naval Ordnance Station	Signal Transfer Subsystem for Aircrew Escape System	NASC		09/85
NRL-OSD	Fiber Optic Technology	NASC		Cont.
NRL-Acoustics Division	Fiber Acousto Optics	NRL-Non-Space Focus Program		Cont.
NRL-OSD	IR Fiber Drawing & Characterization	ONR		10/83
NRL-OSD	Composition of Infrared Glasses	ONR		10/82
NRL-ETD	Fluoridation of Optic Fiber Material	ONR		09/83
NRL-OSD	Single Mode Optical Technology	NESC		Cont.
NUSC	Towed Array Without Coupling TOWAC	NMC		10/83
NUSC	Optical Sensor Studies	NRL		10/82
NUSC	Fiber Optic Payout Link	NSSC-SCT		Cont.
NUSC	Acousto-Optical Transduction Technology	NMC		09/84

NAVY (cont'd)

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
NAVCC	Advance Aircraft Armament System (AAAS)	NASC		09/83
ORI, Inc.	Application Fiber Optic Sensor System	ONR	98,582	Cont.
Phoenix Corporation	Magnetic Sensor Research	NRL-OSD		07/83
Rensselaer Polytechnic Institute	Material Supply Technology	ONR	40,000	Cont.
Sachs/Freeman Associates	Chemical Research on Optic Fibers	NRL		02/83
Sachs/Freeman Associates	Acousto-Optic Sensor Development	NRL		02/83
Sachs/Freeman Associates	Fiber Optic & Millimeter Wave Material	NRL		09/83
Sachs Freeman Associates	Ultrasonic Optic Fiber Sensors	NRL		03/83
Scientific Research Center	Theoretical Studies of Low Loss Fibers	NRL		11/82
Stamford University	Laser Drawing of Optical Fibers	NRL-OSD		09/84
New York State University	Glass Water Reactions	ONR	40,000	Cont.
Vanderbilt University	Magnetic Measurement of Cardiac	ONR	49,981	Cont.
Tetra Technology	Fiber Optic Switching	ONR	98,000	Cont.
Tracor, Inc.	E/M Optic Fiber	ONR	39,835	Cont.
TRW, Inc.	Single Mode Fiber Optic, Star Couplers	NRL		02/83
Not Assigned	Fiber Optic Test Area	NASC		09/85

DOD

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
NOSC	High Re. Undersea Fiber Optic Repeater	DARPA		09/85
NOSC	Impacts of Fiber Optics on Undersea Communications	DARPA		Cont.
NOSC	Fiber to Channel Waveguide Coupler Device	NSA		06/83
NOSC	Fiber Optic Interface Standard	NSA		09/82
NRL-FOSS	FOSS: Program Management	Deferred Advance Research Project		Cont.

NASA

<u>CONTRACTOR</u>	<u>R & D</u>	<u>SPONSOR</u>	<u>\$ AMOUNT</u>	<u>COMPLETION</u>
Jet Propulsion Laboratory	Data Transfer & Process Research	Jet Prop. Lab.		
Jet Propulsion Laboratory	Advance Guidance & Control Components	Jet Prop. Lab.		
Jet Propulsion Laboratory	Precision Pointing & Tracking System (PPTS)	Jet Prop. Lab.		
NASA	Integration & Interfacing Technology Generic	NASA		
NASA	Shuttle Systems/Other STS	NASA		
NASA	NASA End to End Data System	NASA		
NASA	Nonlinear Infrared Fiber Optics	NASA		
NRL/SSD	Development of Electrographic Cameras	NASA		Cont.

APPENDIX 4
STANDARD AND SPECIFICATION LISTING

001. Equipment Performance Specifications for Digital F.O. Modems

Number: EPS-82-0016
Organiz'n: 1842 EEG/EEICS
Scott AFB; IL 62225
Individual: Ken Becker
Phone: 618-256-4591
Issue Date: 4/15/83
Autovon: 638-4591

002. Equipment Performance Specifications for Analog F.O. Modems

Number: EPS-82-016B
Organiz'n: 1842 EEG/EEICS
Scott AFB; IL 62225
Individual: Ken Becker
Phone: 618-256-4591
Issue Date: 4/15/83
Autovon: 638-4591

003. Equipment Performance Spec for T1 Multiplexer Terminal Equipment (Draft)

Number: EPS-82-006
Organiz'n: 1842 EEG/EEICS
Scott AFB; IL 62225
Individual: Ken Becker
Phone: 618-256-4591
Issue Date: 1/10/83
Autovon: 638-4591

004. Equipment Performance Spec for T3 Multiplexer Terminal Equipment (Draft)

Number: EPS-83-006
Organiz'n: 1842 EEG/EEICS
Scott AFB; IL 62225
Individual: Ken Becker
Phone: 618-256-4591
Issue Date: 8/29/83
Autovon: 638-4591

005. Equipment Performance Spec for T1 Carrier Span Line Equipment (Draft)

Number: EPS-82-007
Organiz'n: 1842 EEG/EEICS
Scott AFB; IL 62225
Individual: Ken Becker
Phone: 618-256-4591
Issue Date: 1/10/83
Autovon: 638-4591

006. Fiber Optic Tranceiver Spec.

Number:
Organiz'n: RADC
Individual: Frank Chiffy
Phone:
Issue Date:
Autovon:

007. Military Spec. Connectors (Fiber Optic)

Number: MIL-C-85044
Organiz'n: Naval Air Engineering Center
Code 93
Lakehurst; NJ 08733
Individual:
Phone:
Issue Date: 1/17/77
Autovon:

008. Military Spec. Cables; Fiber Optics General Spec for Metric

Number: DOD-C-85045
Organiz'n: Naval Air Engineering Center
Code 93
Lakehurst; NJ 08733
Individual:
Phone:
Issue Date: 2/16/79
Autovon:

**009. Military Spec. Cables; Fiber Optics; Type I; Class 2; Composition A;
Attenuation Range A; Single Fiber**

Number: DOD-C-85045/1
Organiz'n: Directorate of Electronic Support
Attention: AFALD/PTS
Gentile AFS; OH 45444
Individual:
Phone:
Issue Date: 11/10/81

Autovon:

**010. Military Spec. Cables; Fiber Optics; Type I; Class 2; Composition A;
Attenuation Range A; Heavy Duty**

Number: DOD-C-85045/2
Organiz'n: Directorate of Electronic Support
Attention: AFALD/PTS
Gentile AFS; OH 45444
Individual:
Phone:
Issue Date: 11/10/81

Autovon:

011. Fiber Optic Modem Specs.

Number:
Organiz'n: Quality Assurance-RADC
Prep. for Delivery - RADC
Individual:
Phone:
Issue Date:

Autovon:

012. Interim Fiber Optics Cable Spec. Rev. B

Number: PR NO.C-2-2118
Organiz'n: RADC
Individual: Tom Ross
Phone:
Issue Date: 2/17/81

Autovon:

013. Interim Fiber Optics Connector Spec. Rev. B

Number: PR NO.C-2-2118
Organiz'n:
Individual:
Phone:
Issue Date: 2/17/81

Autovon:

014. Military Standard Fiber Optics Test Methods and Instrumentation

Number: MIL-STD-1678
Organiz'n: Engineering Spec. & Stds. Dept.
Naval Air Engineering Center
Lakehurst; NJ 08733
Individual:
Phone:
Issue Date: 12/17/76

Autovon:

015. Specification for the Design Construction and Testing of Advanced Marine Optical Fiber Cables (AEGIS Program Spec)

Number: PMS-400-XYX-1
Organiz'n: Naval Seas Systems Command (Navships)
Dept. of the Navy
Washington; DC 20362
Individual:
Phone:
Issue Date: 5/8/83

Autovon:

**016. Procurement Specification for a Fiber Optic Cable System (POCS)
(System to Replace CX-11230)**

Number:
Organiz'n: U.S. Naval Electronics Command
(Navelex)
Washington; DC 20363
Individual:
Phone:
Issue Date:

Autovon:

017. Namesite Fiber Optic Hardware Specs. for the Manufacture; Installation; and Test of this F.O. Data Communications System

Number:
Organiz'n: Army Communications Command
Ft. Hauchuca; AZ 85613
Individual: Richard Hotchkiss
Ft. Hauchuca; AZ
Phone: 602-538-6041
Issue Date: Autovon:

018. AN/GRC-206; Radio Set Spec. for the Performance; Design and Development of the GRC-206 (includes F.O. Interconnection Sys.)

Number: MMC 76-014E
Organiz'n: Directorate of Material Management
CEM Management Division (MMC)
Sacramento ALC; McClellan AFB; CA
Individual: Autovon:
Phone:
Issue Date: 1/15/82

019. Specifications and Operational Instructions of the AN/FAC-2A Fiber Optic Communications System

Number: NOSC TM-258
Organiz'n: Naval Ocean Systems Center
San Diego; CA
Individual: Autovon:
Phone:
Issue Date: 1/2/79

020. Standard Test Procedures For Fiber Optic Fibers; Cables; Transducers; Connecting and Terminating Devices

Number: EIA Standard RS-455
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 3/80

021. Cable Flexing For Fiber Optic Connectors (FOTP-01)

Number: EIA Standard RS-455-01
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

022. Impact Test Measurements (FOTP-02)

Number: EIA Standard RS-455-02
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

023. Temperature Cycling (Thermal Shock) (FOTP-03)

Number: EIA Standard RS-455-03
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

024. Fiber Optic Conn. Temp. Life (FOTP-04)

Number: EIA Standard RS-455-04
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

025. Humidity Test Procedure for Fiber Optic Connecting Devices (FOTP-05)

Number: EIA Standard RS-455-05
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: 6/83

026. Cable Retention Test Procedure for Fiber Cable Interconnecting Devices (POTP-06)

Number: EIA Standard RS-455-06
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

027. Test Procedure for Fiber Optic Bundle Connector Insertion Loss (FOTP-09)

Number: EIA Standard RS-455-09
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83



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032. Cable Acceleration (FOTP-18)

Number: EIA Standard RS-455-18
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

033. Measurement of Change in Optical Transmittance (FOTP-20)

Number: EIA Standard RS-455-20
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

034. Air Leakage (FOTP-23)

Number: EIA Standard RS-455-23
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

035. Impact Testing of Fiber Optic Cables and Cable Assemblies (FOTP-25)

Number: EIA Standard RS-455-25
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

Number: EIA Standard RS-455-26
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: 6/83

Number: EIA Standard RS-455-27
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: 6/83

Number: EIA Standard RS-455-28
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: 6/83

Number: EIA Standard RS-455-29
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: 6/83

040. Frequency Domain Measurement of Multimode Optic Fiber Information Transmission Capacity (FOTP-30)

Number: EIA Standard RS-455-30
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: 6/83

041. Fiber Tensile Proof Test Method (FOTP-31)

Number: EIA Standard RS-455-31
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: 6/83

042. Fiber Optic Circuit Discontinuities (FOTP-32)

Number: EIA Standard RS-455-32
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: 6/83

043. Fiber Optic Cable Tensile Loading and Bending Test (FOTP-33)

Number: EIA Standard RS-455-33
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: 6/83

044. Fiber Optic Connector Dust (Fine Sand) Test (FOTP-35)

Number: EIA Standard RS-455-35
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Auto von:
Issue Date: 6/83

045. Twist Test for Fiber Optic Cable Assemblies (FOTP-36)

Number: EIA Standard RS-455-36
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Auto von:
Issue Date: 6/83

046. Fiber Optic Cable Bend Test Low and High Temperature (FOTP-37)

Number: EIA Standard RS-455-37
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Auto von:
Issue Date: 6/83

047. Fiber Optic Cable Wicking Test (FOTP-39)

Number: EIA Standard RS-455-39
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Auto von:
Issue Date: 6/83

Number: EIA Standard RS-455-46
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

Number: EIA Standard RS-455-50
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Auto von:
Issue Date: 6/83

Number: EIA Standard RS-455-54
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

051. Methods for Measuring the Coating Geometry of Optical Fibers (FOTP-55)

Number: EIA Standard RS-455-55
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

052. Fluid Penetration Test for Filled Fiber Optic Cable (FOTP-82)

Number: EIA Standard RS-455-82
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

053. Cable to Interconnecting Device Axial Compressive Loading (FOTP-83)

Number: EIA Standard RS-455-83
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

054. Jacket Self-Adhesion (Blocking) Test for Fiber Optic Cable (FOTP-84)

Number: EIA Standard RS-455-84
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 6/83

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055. Fiber Optic Cable Jacket Shrinkage (FOTP-86)

Number: EIA Standard RS-455-86
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone:
Issue Date: 6/83
Autovon:

056. Fiber Optic Cable Jacket Elongation and Tensile Strength (FOTP-89)

Number: EIA Standard RS-455-89
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone:
Issue Date: 6/83
Autovon:

057. Gas Flame Test for Special Purpose Fiber Optic Cable (FOTP-99)

Number: EIA Standard RS-455-99
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone:
Issue Date: 6/83
Autovon:

058. Fiber Optic Connector Terminology

Number: EIA Standard RS-440
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone:
Issue Date: 5/78
Autovon:

46

059. Standard Optical Waveguide Fiber Material Classes

Number: EIA Standard RS-459
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 4/81

060. Standard Optical Waveguide Fiber Types

Number: EIA Standard RS-458
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: 5/81

061. General Specifications for Fiber Optic Connectors

Number: EIA Standard RS-475
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street NW
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date:

062. Multiport Coupler Specification

Number:
Organiz'n: Defense Electronics Supply Center
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491 Autovon: 986-5491
Issue Date: Final Issue 11/1/81

063. Specifications on Splices (Fusion; Mechanical; Chemical)

Number:
Organiz'n: Defense Electronics Supply Center
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Final Issue 11/1/83
Autovon: 986-5491

064. Specifications on Sources

Number:
Organiz'n: Defense Electronics Supply Center
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Final Issue 11/1/83
Autovon: 986-5491

065. Specifications on Detectors

Number:
Organiz'n: Defense Electronics Supply Center
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Final Issue 11/1/83
Autovon: 986-5491

066. Specifications on Tools (Scribes; Crimping; Cutoff) Initial Draft

Number:
Organiz'n: Air Force 85; WP AFB
Individual:
Phone:
Issue Date: Draft 1/84; Final Issue 1/85
Autovon:

067. Specifications for a Bulkhead Penetrator

Number:
Organiz'n: Defense Electronics Supply Center
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Final Issue 11/1/83

Autovon: 986-5491

068. Specifications for a Hull Penetration Device

Number:
Organiz'n: Defense Electronics Supply Center
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Final Issue 11/1/83

Autovon: 986-5491

069. Specifications for a Cable/Harness Assembly

Number:
Organiz'n: Defense Electronics Supply Center
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Final Issue 11/1/83

Autovon: 986-5491

070. Specification for SMA Style Fiber Optic Connectors

Number:
Organiz'n: Air Force 85; WP AFB
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Draft 1/84; Final Issue 1/85

Autovon: 986-5491

071. Specifications for Huges Multichannel Connectors

Number:
Organiz'n: Air Force 85; WP AFB
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Draft 1/84; Final Issue 1/85
Autovon: 986-5491

072. Specifications for Repeater Devices

Number:
Organiz'n: Air Force 85; WP AFB
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Draft 1/84; Final Issue 1/85
Autovon: 986-5491

073. Specifications for Microscope & Microscope Kit

Number:
Organiz'n: Air Force 85; WP AFB
Individual: Dick Shade
DESC-EMD
Dayton; Ohio 45444
Phone: 513-296-5491
Issue Date: Draft 1/84; Final Issue 1/85
Autovon: 986-5491

074. Cable Flammability Test (FOTP-7)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone:
Issue Date: UNKNOWN
Autovon:

075. Radiant Power Measurements (FOTP-8)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

076. Cable Atmospheric Contamination Resistance (FOTP-19)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

077. Mating Durability (FOTP-21)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

078. Ambient Light Susceptibility (FOTP-22)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
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Washington; DC 20006
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Phone: Autocon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

087. Procedure to Measure Nuclear Radiation Effects on Optical Waveguides (FOTP-49)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

088. Pulse Distortion Measurement of Multimode Glass Optical Fiber Information Transmission (FOTP-50)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

089. Method for Measuring Temperature Dependence of Attenuation for Optical Waveguide Fiber (FOTP-52)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

090. Insertion Loss Measurement for Long-Length; Graded Index Optical Fibers (FOTP-53)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

091. Test Method for Evaluating Fungus Resistance of Optical Waveguide Fiber (FOTP-56)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

092. Fiber End and Fiber Bundle Terminus Preparation (FOTP-57)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

093. Core Diameter Measurement; Refractive Index Profile Method (FOTP-58)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

094. Optical Time-Domain Reflectory (FOTP-59)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

095. Fiber Length by Time-of-Flight Measurement (FOTP-60)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

096. Nuclear Thermal Blast Resistance (FOTP-61)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

097. Bending Loss (FOTP-62)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

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098. Torsion (FOTP-63)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

099. Vibration (FOTP-64)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

100. Flexing (FOTP-65)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

101. Abrasion (FOTP-66)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

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Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Auto von:
Issue Date: UNKNOWN

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Organiz'n: Electronic Industries Assoc.; Engineering Dept.
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Washington; DC 20006
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Issue Date: UNKNOWN

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Issue Date: UNKNOWN

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Issue Date: UNKNOWN

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Organiz'n: Electronic Industries Assoc.; Engineering Dept.
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Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

110. Fluid Immersion (FOTP-75)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: UNKNOWN

111. Atmospheric Contamination (FOTP-76)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: UNKNOWN

112. Flammability (FOTP-77)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: UNKNOWN

113. (Unassigned) (FOTP-78)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: UNKNOWN

114. (Unassigned) (FOTP-79)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

115. (Unassigned) (FOTP-80)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

116. Compound Flow (Drip) Test for Filled Fiber Optic Cable (FOTP-81)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

117. Fiber Optic Cable Twist Test (FOTP-85)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

118. Fiber Optic Cable Knot Test (FOTP-87)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: UNKNOWN

119. Fiber Optic Cable Bend Test (FOTP-88)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: UNKNOWN

120. Fiber Optic Cable Jacket (FOTP-90)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: UNKNOWN

121. Fiber Optic Cable Twist-Bend Test (FOTP-91)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual: Phone: Autovon:
Issue Date: UNKNOWN

122. Fiber Optic Cable Stuffing Tube Compression (FOTP-94)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

123. Absolute Optic Power Test for Optical Fibers and Cables (FOTP-95)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

124. Fiber Optic Cable Storage Temperature Test (FOTP-96)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

125. Fiber Optic Cable Solar Radiation (Ultra Violet) Resistance Test (FOTP-97)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

126. Fiber Optic Cable Freezing Test (FOTP-98)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

127. Gas Leakage Test for Fiber Optic Cable (FOTP-100)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

128. Fiber Optic Cable Accelerated Oxygen Aging (FOTP-101)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

129. Water Pressure Cycling (FOTP-102)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

130. Buffered Fiber Bend Test (FOTP-103)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

131. Fiber Optic Cable Cyclic Flexing Test (FOTP-104)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

132. Marking Durability (FOTP-105)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

133. Fiber Adhesion (FOTP-106)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

134. Return Loss (FOTP-107)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

135. Mud Test (FOTP-108)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

136. Reference Point Temperature (FOTP-109)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

137. Verification of Type of Fiber Optic Transmitter (FOTP-110)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

138. Verification of Type of Fiber Optic Connector (FOTP-111)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

139. Power Supply Current(s) (FOTP-112)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

140. Digital Fiber Optic Terminal Devices General Measurement Requirements (FOTP-113)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

141. Data Input Current(s) (FOTP-114)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

142. Control Input Current(s) (FOTP-115)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

143. Data Output Voltage(s) (FOTP-116)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

144. Optical Output Power (FOTP-117)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

145. Output Propagation Delay (FOTP-118)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

146. Optical Sensitivity and Dynamic Range (FOTP-119)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

147. Optical Power Output (FOTP-120)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

148. Output Propagation Delay (FOTP-121)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

149. Effective Optical Responsitivity and RMS Output Noise Voltage (FOTP-122)

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autovon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

Number: EIA Standard
Organiz'n: Electronic Industries Assoc.; Engineering Dept.
2001 Eye Street
Washington; DC 20006
Individual:
Phone: Autocon:
Issue Date: UNKNOWN

154. Fiber Optic System and Component Specifications - Fiber Optic Communications System OFFUTT AFB

Number: NOSC TM-258
Organiz'n: Naval Ocean Systems Center
San Diego; CA 92152
Individual: Phone: Autovon:
Issue Date: 1/2/79

155. Statement of Work for USAF Tactical and Control System (TACS) 407L

Number: SM-ALC (MMC) 82-0053B
Organiz'n: Sacramento Air Logistics Center
Radar Engineering Unit
McClellan AFB; CA 95652
Individual: Phone: Autovon:
Issue Date: 5/4/83

156. Fiber Optic Transmission (Long Haul) FOTS (LH)

Number: CR-CS-0051-001
Organiz'n: Army Tactical Communications System
Individual: Phone: Autovon:
Issue Date:

157. Purchase Description for Fiber Optic Cable System (POCS)

Number:
Organiz'n: U.S. Naval Electronics Command
Navelex
Washington; DC 20363
Individual: Phone: Autovon:
Issue Date:

158. AFCC Technical Report; Prototype Fiber Optic System to Remote Tracals Radars - Final Report

Number: 1842EEG-EEIT TR83-16-EZ
Organiz'n: 1842 Electronic Engineering Group
Scott Air Force; IL 62225
Individual: Jacob A. Radcliff
Kenneth E. Becker
Phone: Autovon:
Issue Date: 6/30/83

159. Configuration Item Product Fabrication Spec. for AN/TPN-19 Improvements Program - Request and Acknowledge Coordination System

Number: 404L-701-5106 Code Ident 25512
Organiz'n: Mission Support Systems OC
Electronics Systems Division ESD/OCN-3
Hanscom AFB; MA 01731
Individual: CMSGT J. Gallant
Phone: Autovon:
Issue Date: 6/22/83

160. Transmission of TRI-TAC Groups Over a Fiber Optic Cable - Configuration Control Document

Number: ICD-01812
Organiz'n: Joint Tactical Communications SYSTEM
Fort Monmouth; NJ
Individual: Phone: Autovon:
Issue Date: 8/31/83

161. Fiber Optic Transmission System (long haul) FOTS (LH) Description

Number:
Organiz'n: Project Manager
Army Tactical Communications Systems; Cecom
Ft. Monmouth; NJ 07703
Individual: Phone: Autovon:
Issue Date: 10/83

162. AV-88 Cable Specification

Autovon:

163. Avionics Data Bus

Autovon:

164. Prime Item Development for Western Space and Missile Center (WSMC)
Fiber Optic Transmission Set. VAFB CI 0042045

Autovon:

165. Prime Item Development Specification for Launch Support Building (LSB)
Fiber Optic Transmission Set. VAFB CI 0042044

Autovon:

**166. Prime Item Development Spec. for Installation and Checkout Facility (ICF)
Fiber Optic Transmission Set. VAFB CI 0042042**

Number: S-M-X-42042
Organiz'n: Ballistic Missile Office
Individual:
Phone:
Issue Date: 7/14/82

Autovon:

167. Fiber Optic Cable Plant VAFB CI 0042046

Number: S-M-X-42046
Organiz'n: Ballistic Missile Office
Individual:
Phone:
Issue Date: 7/14/82

Autovon:

**168. Missile Assembly Building (MAB) Fiber Optic Transmission Set.
VAFB CI 0042043**

Number: S-M-X-42043
Organiz'n: Ballistic Missile Office
Individual:
Phone:
Issue Date: 7/14/82

Autovon:

**169. Integrated Test Facility (ITF) Fiber Optic Transmission Set.
VAFB CI 0042041**

Number: S-M-X-42041A
Organiz'n: Ballistic Missile Office
Individual:
Phone:
Issue Date: 2/17/82

Autovon:

170. Automated Sampled Data Instrumentation System (ASDIS) Transmission Group
CI 0042137

Number: S-M-X-42137

Organiz'n:

Individual:

Phone:

Autovon:

Issue Date:

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