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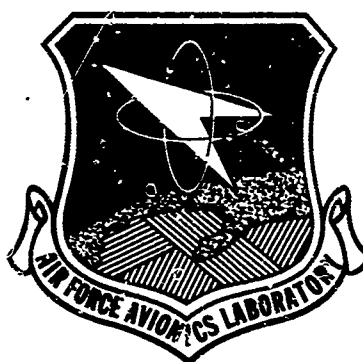
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AD 864957

**TARGET SIGNATURE ANALYSIS CENTER:
DATA COMPILATION
Tenth Supplement**

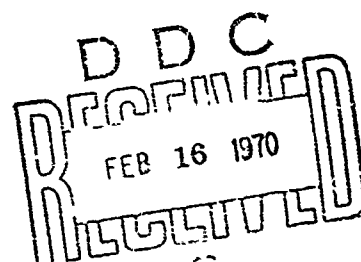
Infrared and Optical Sensor Laboratory
Willow Run Laboratories
Institute of Science and Technology
The University of Michigan
Ann Arbor, Michigan

July 1969



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Air Force Avionics Laboratory
Air Force Systems Command
Wright-Patterson Air Force Base, Ohio



NOTE TO USERS

Target Signature Analysis Center: Data Compilation is a periodically updated publication of the optical and microwave target and background data stored on magnetic tape at the Target Signature Analysis Center established at The University of Michigan and sponsored by the Air Force Avionics Laboratory. Separate volumes are maintained for classified and unclassified data. The compilation is distributed in loose-leaf form so that supplemental publications can be readily integrated in accordance with the established indexing system. The complete publication history of the Target Signature Analysis Center: Data Compilation is summarized in the foreword to the enclosed document.

This present document is the fifth publication of unclassified data and the eleventh publication in the overall compilation. It consists of optical data, revised explanatory text, and composite cross indexes, and is meant to be integrated with the previous unclassified publications. The following suggestions are made for revising the existing unclassified Data Compilation and adding the enclosed material.

- (1) Remove and destroy previously published cover, Notices, title page, Foreword, Abstract, Contents, and List of Figures (all dated January 1969). Insert corresponding new pages, supplied herewith.
- (2) Remove section 2 (Cumulative Subject Cross-Index, pp. 2-1 through 2-9, January 1969) from previously integrated compilation. Insert new section 2 (pp. 2-1 through 2-9, July 1969).
- (3) From section 3 of the compilation, remove pp. 3-27 through 3-30 (January 1969) and insert corresponding pages dated July 1969.
- (4) Following p. 3-31, insert new data sheets in the appropriate subject categories. These may be determined by the alphanumeric code at the top of each data sheet. The alphabetic code indicates the subject category and the numeric suffix indicates the sequence of the data sheet in its appropriate category.
- (5) Remove distribution list from the compilation and insert new distribution list.
- (6) Remove DD form 1473, and replace it with new page supplied herewith.

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DATA COMPILATION
Tenth Supplement**

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FOREWORD

This is the eleventh publication overall and the fifth unclassified publication of the Target Signature Analysis Center: Data Compilation (July 1966). It was prepared at the Willow Run Laboratories, a unit of The University of Michigan's Institute of Science and Technology. The preparation was begun under Air Force Contract AF 33(657)-10974 and continued under Contracts AF 33(615)-3654 and F33615-67-C-1293. The originator's report number is 8492-49-B. The work was administered under the direction of the Air Force Avionics Laboratory, Research and Technology Division, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio, with Mr. William Caulfield as the project engineer.

PUBLICATION HISTORY OF THE TARGET SIGNATURE ANALYSIS CENTER: DATA COMPILATION

<u>Report</u>	<u>Date</u>	<u>ADL Report No.</u>	<u>AD Number (DDC)</u>
Unclassified Publications			
Original Compilation	July 1966	7850-2-B	AD 489 968
Second Supplement	July 1967	8492-5-B	AD 819 712
Fifth Supplement	August 1968	8492-15-B	AD 840 091
Seventh Supplement	January 1969	8492-35-B	AD 856 343
Tenth Supplement	July 1969	8492-49-B	-
Classified Publications			
First Supplement	December 1966	7850-9-B	AD 379 650
Third Supplement	October 1967	8492-12-B	AD 384 874
Fourth Supplement	December 1967	8492-14-B	AD 391 239
Sixth Supplement	November 1968	8492-25-B	AD 394 783
Eighth Supplement	January 1969	8492-43-B	-
Ninth Supplement	July 1969	8492-48-B	-

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ABSTRACT

This supplement to the Target Signature Analysis Center: Data Compilation augments an ordered, indexed compilation of reflectances and radar cross sections of target and background materials. The Data Compilation includes spectral reflectances and transmittances in the optical region from 0.3 to 15 μ and normalized radar cross sections (active) plotted as functions of aspect or depressing angle, at millimeter wavelengths. When available, the experimental parameters associated with each curve are listed to provide the user with a description of the important experimental conditions.

This supplement contains an additional 350 reflectance curves in graphical form. These data were obtained from the Laboratory Measurements Phase of the Target Signature Measurements Program conducted at The University of Michigan and sponsored by the Air Force Avionics Laboratory. The unclassified compilation, including these data, consists of about 4650 curves and 112 tables.

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CUMULATIVE SUBJECT CROSS INDEX

Airfields	AAE 1	Birdsfoot Trefoil	BGC 106
Alclad	AEA 7 (f)AEL 9, 10	Blackberry	BGD 226
Alder	BGD 46	Blacktop	See Asphalt
Alfalfa	BGC 106-111 3133: 45, 52, 53, 57, 62, 65, 67, 77 3135: 1	Bracken Fern	BGC 3
Alkyd	AEM 52, 53, 76, 77, 91	Bramble Briar	BGD 225
Alloys	See Metals	Brass	AEL 6
Alumina	AEA 5, 6 (Also see aluminum oxide)	Brick	AEC 1, 2
Aluminum	AEA 1, 3, 4, 7-9, 55-60 (f)AEL 7, 8	Bridges	AAH 1
Aluminum Alclad	AEA 7 (f)AEL 9, 10	Bromegrass	BGC 12
Aluminum Bronze	AEL 21, 22	Bronze	AEL 50-52
Aluminum Mirror	CJ 9	Buckeye	BGD 302
Aluminum Oxide	AEA 2 CJ 10 (f)AEM 1-3	Buildings	AAA 1, 2 (Also see specif- ic building materials)
Aluminum Paint	AEM 37, 39, 82- 85, 101	Burdock	BGC 146
Aluminum Silicate Paint	AEM 50, 51, 102, 104	Burlap	AED 1-12 AEM 15
Apple	BG 7, 8 BGD 225, 374	Cabbage	BGC 103, 104
Ash	BGD 107, 121 3134: 7	Calabash	BGD 232
Aspen	BGD 258, 261, 376, 382	Calcium Carbonate	BFK 1
Asphalt	AAE 1 AAG 5 AEB 1-4 AEK 1 3290: 7, 29	Calcium Oxide	CJ 11
Bakelite	AEO 3	Calcium Sulfate	BFK 1
Balsam Poplar	BGD 263	Camouflage	AAKA 2 AED 1-5 AEE 1, 2 AEE 1-5 AEM 70
Barium Sulfide	CJ 12	Canvas	AEL 20 BFL 1 (Also see Graphite)
Bark	BGD 9, 12, 51, 71, 196, 225, 227, 229, 231, 233	Carbon (Carbon Black)	AEL 20 BFL 1 (Also see Graphite)
Barley	BGC 31, 35	Cardboard	AEN 1-17
Basalt	BFHD 3, 8	Catalpa	BGD 30-32, 336
Basswood	BGD 56, 68, 345	Caucasian Skin	AAK 1, 2, 4, 5, 7
Beech	BGD 2, 6, 317, 320	Cedar	BGD 122, 123, 358, 404
Bermuda Grass	BGC 35 3133: 13	Cement	AE 1 AFG 1-4
Birch	BGD 47, 51, 342 3134: 7	Ceramic	AER 3
		Ceramic Insulating Felt	(f)CJA 8-25 (Also see fiber- frax)
		Cherry	BGD 226, 227, 230
		Chert	BFHD 3, 5, 7, 8
		Chestnut	BGD 320
		Chinese Pistachio	BGD 33
		Chlorophyll	BGD 328, 329, 358
		Chrome Oxide Paint (Chrome Green)	AEM 18-25
		Chromium (Plating)	AEL 6, 39, 40 (f)AEL 1-6
		Chromium (Pure)	AEL 1

Cinder	AEF 1 3290: 48-50, 52, 53	Crow Foot	BGC 2
Cinder Block	AEF 1	Daisies	BGC 1
Clay	See Soil	Desert	3137: 1-12 (Al- so see Sand)
Clay Loam	BFFA 1-10	Dieffenbachia	BGD 315
Cloth		Diorite	BFHD 3, 9, 10
Burlap	AED 1-12 AEM 15	Dirt	AAG 1-3 AEH 2 AEM 54, 67 (Also see Soil)
Canvas	AEE 1-5 AEM 70	Dogwood	BGD 36-43
Cotton	AAKA 1, 6, 14- 28, 33, 35	Dolerite	BFHD 3, 10
Nylon	AAKA 6, 28-31, 37-93 (f)AAKA 1-6	Dracaena	BGC 145
Orlon	AAKA 31	Duckweed	BGC 2 BH 2
Rayon	AAKA 32, 34, 36	Elm	BG 8 BGD 45, 46, 337-340
Tape	AE 2	Enamel	See Paint
Vinyl	AAKA 6 AEO 2-5	Factories	3201: 1-4
Wool	AAKA 1, 2, 6- 14, 33, 36	Fallow	BG 4
Clothing	AAKA 1-57	Farmhand	3135: 1-8 (Also see Crops and Rural Terrain)
Clover	BGC 68-70, 111, 112	Felsite	BFHD 6, 11
Cobalt	AEL 23	Fern	BGC 181
Cobblestone	AAG 3, 5	Ferric Oxide Paint	AEM 26-37, 82
Cocklebur	BGC 145	Fescue	BGC 56
Coconut Palm	BGD 316, 317	Fiberfrax	CJ 10, 11, 15-32 (f)CJA 8-25
Coffee	BGC 112	Field	AAA 1 BE 3, 4, 11-14 BG 3, 4 BGC 2, 13, 15- 28, 65, 68-70 113, 143 3133: 1-82
Coleus	BGD 304-314		BFDB 1-6
Concrete	AE 1 AEG 1-6 3290: 29, 39, 51		BGD 123-125 3134: 6
	AEL 6, 24, 46, 47 (f)AEL 11-22	Fine Sandy Loam	AET 3
Coral	BFHD 6, 11, 12	Fir	3133: 11, 12, 26, 27
Corn	BGC 35-55, 148, 149, 181-183 3133: 62-64 3135: 1	Fir Board	AAG 5
	BGC 99-102, 159-179 CJ 12 3133: 56, 57	Flags (Weeds)	BGC 3, 4 BFC 3
Cotton	AAKA 1, 6, 14- 28, 33, 35 BGD 235-258, 375, 376, 408, 409	Flagstone	See Vegetation
Cotton (Cloth)		Flax	BGC 56, 57
Cottonwood		Fluorite	BFHD 8
Creosote	AET 1	Foliage	AEM 33
Crops	AAA 1 BE 14 3133: 1-82 3135: 1-8 (Also see specific crops, e.g., Corn, Wheat, etc.)	Foxtail	AEL 19
		Gabbro	BGD 303, 304, 312, 313
		Galvanite	BGD 303
		Galvanized Iron	AEJ 1, 2 CJ 13
		Geranium	AEL 7, 41-44
		Ginkgo Biloba	AEM 37, 100
		Glass	BGD 34
		Gold	
		Gold Paint	
		Goldenrod	

Granite	AE 2	Lava	BFHD 2
	BFHD 2, 4, 5,	Lead Basic Carbonate	
	7, 10	(White Lead)	AEM 9-12, 19-21
Graphite	BFK 2		
Grass	BG 4	Lentil	BGC 113
	BGC 9, 12-31,	Lichens	BG 9
	35, 55, 56, 58-	Lilac	BGD 356, 357
	60, 143, 146-	Lima Beans	BGC 113, 114
	148	Limestone	BFHA 1
	3133: 1-11, 13-		BFHD 4, 7
	24, 29-34, 38-	Linden	BGD 69
	44, 46-49, 52,	Linseed Oil	AEM 52, 89
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	66, 77	Loamy Sand	BFCB 1
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	29, 40, 43, 48,	Lucite	AEO 2
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Ground Targets	See individual	Magnesium	AEL 9, 29
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	Buildings, Air-	Magnesium Citrate	CJ 12
	fields, Person-	Magnesium Oxide	CJ 7, 14
	nel, Roads,		(f)CJA 1-6
	Bridges, Vehi-	Magnolia	BGD 70, 345
	cles, Industrial	Manzanita	BGC 156, 157
	Facilities, etc.	Maple	BGD 72-106,
			345-353, 400,
			402, 403
Haloxylon	BG 8	Marsh	3136: 1-3
Hastelloy	AEL 3, 31, 32	Marsh Grass	3136: 2, 3
Hawthorne	BGD 227	Meadow	See Field
Hay	BG 9 (Also see	Merion Blue Grass	(f)BGCM 1-6
	Straw)	Mesquite	BGD 223
	BGD 51, 52	Metals	
Hazelnut	BGC 99	Alclad	AEA 7
Heather	3134: 7		(f)AEL 9, 10
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Hibiscus	BGD 232, 234		55-60
Hickory	BGD 54		(f)AEL 7-8
Holly	BGD 53	Aluminum Bronze	AEL 21, 22
Hornbean	3122: 1-9	Brass	AEL 6
	BGC 58, 59	Bronze	AEL 50-52
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Inconel	(f)CJA 8-25	Chromium (Pure)	AEL 1
Indian Mallow	AEL 1, 25	Cobalt	AEL 23
Insulating Felt	BGD 44	Copper	AEL 6, 24, 46,
Iron	BGD 228		47
Ironwood	BGD 125, 126,		(f)AEL 11-22
	358, 359	Galvanized Iron	AEL 19
		Gold	AEL 7, 41-44
Juneberry	AEM 66	Hastelloy	AEL 3, 31, 32
Juniper	AAKA 1	Inconel	AEL 2, 3, 8, 45
	AEL 8	Iron	AEL 1, 25
Kaolin	AEL 8	Kovar	AEL 8
Khaki	AEM 89	Magnesium	AEL 9, 29
Kovar	See Water	Molybdenum	AEL 2, 8, 29,
	BGD 126, 127		30, 49, 50
	AEM 15		
Lacquer			
Lake			
Larch			
Laurel			

Nickel	AEL 9, 10, 30, 31, 52, 53	Paint	AEM 13, 14, 16, 17, 78-82, 95- 100, 133-149 (f)AEM 20-39
Palladium	AEL 12, 32, 41	Plastic	AEO 4, 5
Platinum	AEL 10, 11 AEM 105	Uniform (Cloth)	AAKA 2, 6, 28- 30
Rhodium	AEL 11, 12, 46	Vehicle	AE 2
Rusty	AEL 54, 55	Opal	CJ 13
Silver	AEL 12, 13, 37- 40	Oriental Skin	AAK 3
Stainless Steel	AEL 1, 13, 15, 20, 25, 28, 44, 45	Orlon	AAKA 31
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Tantalum	AEL 47-49	Alkyd	AEM 52, 53, 76, 77, 91
Titanium	AEA 6 AEL 3-5, 16-19, 32-35, 45	Aluminum	AEM 37, 39, 82- 85, 101
Unknown	AEL 54, 55	Aluminum Silicate	AEM 50, 51, 102, 104
Zinc	AEL 19	Black	AEM 1, 4, 54, 63, 65, 71, 91- 93, 110, 111 (f)AEM 1-9
Mica	BFK 3	Blue	AEM 3, 4, 54, 55, 120, 121
Mica Paint	AEM 49, 50, 66	Brown	AEM 1, 58, 59
Milkweed	BGC 144	Clear Finishes	AEM 3, 87-90
Millet	BGC 61	Chrome Oxide (Chrome Green)	AEM 18-25
Minerals	BFK 1-3	Dirt Covered	AEM 54, 67
Mint	BGC 144	Driers, Thinners, Mediums	AEM 52, 87-90 (Also see Alkyd, Resin)
Mockernut	BGD 233	Ferric Oxide	AEM 26-37, 82
Molybdenum	AEL 2, 8, 29, 30, 49, 50	Foreign	AALF 1 AEM 86, 87
Moss	BFHD 2 BG 2, 4 BGA 1 BGB 1-3	Gold	AEM 37, 100
Mountain Laurel	BGD 53-55	Green	AALF 1 AEM 12-25, 145, 146
Mountains	See Terrain	Gray	AEM 2, 4, 63, 64, 66, 70, 93, 94, 106-109, 112-120, 125-129
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Mulberry	BGD 353 (f)BGDV 1-6	Metallic	AEM 37-39, 82- 86
Mullein	BGD 341	Mica	AEM 49, 50, 66
Mustard	BGC 104	Olive Drab	AEM 13, 14, 16, 17, 78-82, 95- 100, 133-149 (f)AEM 20-39
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Negro Skin	AAK 1, 3-7	Plastic Laminate	AEM 104, 105
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Nylon	AAKA 6, 28-31 37-93 (f)AAKA 1-6	Primer	AEM 26, 37
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Oats	BGC 62-65 3132: 56, 71, 75, 82		
Olive Drab			
Burlap	AED 3-5		
Canvas	AEE 1		

Resin	AEM 68, 76, 77, 85, 86, 90, 91	Poplar	BGD 262-288, 382, 383
Silver	AEM 101	Porphytic	BFHD 9
Stain	AEM 4	Potassium Nitrate	BFK 2
Tan	AEM 121-125	Potato	BGC 1, 104, 179, 180
Turquoise	AEM 2	Pottery	AER 2
Velvet (3M) Black	(f)AEM 10-19	Primer	AEM 26, 37
Velvet (3M) White	(f)AEM 4-9	Pyrite	BFK 3
White	AEM 5-12, 71-78, 94, 95, 129-133 (f)AEM 10-19	Quartz	BFK 3
Yellow	AEM 60, 61	Quartzite	BFHD 6, 11, 12
Zinc (Galvanite)	AEM 38	Ragweed	BGC 1
Zinc Oxide (Zinc White)	AEM 6-9, 18, 19	Railroad	3135: 7
Palladium	AEL 12, 32, 41	Rayon	AAKA 32, 34, 36
Palm Branch	BGD 411-413	Redbud	BGD 373
Palmetto	BGD 317	Reeds	BGC 65
Paper	AEN 1-17	Reflectance Standards	
Parachutes	AAKA 37-93 (f)AAKA 1-6	Aluminum Mirror	CJ 9
Pararubber	BGD 355, 356	Fiberfrax	CJ 10, 11, 15-32 (f)CJA 8-25
Paulowina	BGD 46	Magnesium Oxide	CJ 7, 14 (f)CJA 1-6
Pavement	3290: 1-5J (Al-20 see Roads)	Velvet Paint (3M) White	(f)AEL 4-9
Pea	BGC 114	Reindeer Moss	BGA 1
Peach	BGD 228, 229	Residential Area	3202: 1, 2
Peanuts	BGC 114-116	Resin Paint	AEM 68, 76, 77, 85, 86, 90, 91
Pear	BGD 226	Rhodium	AEL 11, 12, 46
Pebbles	AFB 1 AEG 1 BFCA 6	Rice	BGC 66
Persimmon	BGD 44	River	See Water
Personnel	See Cloth and Skin	Roads	AAA 1 AAG 1-5 (Also see Pavement and specific road materials, e.g., Asphalt, Cinder, Concrete, Gravel, Dirt, etc.)
Philodendron	BGD 316	Rock	AEK 1 BE 11 BFHD 1
Pigweed	BGC 5	Roofing Materials	AAA 1, 2 AER 1
Pine	BE 8 BGD 127-195, 359, 360, 403-406 3132: 1 3134: 4, 6, 7	Rubber	AEP 1, 2
Pinyon	BGD 121, 122	Rubber Leaf	BGD 106, 353-355
Pitch	AEQ 1	Runway	AAE 1
Plantain	BGC 142	Rust	AE 2 AEL 5
Plastic	AEO 1-5	Rye	BGC 66, 67
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Platinum	AEL 10, 11 AEM 105	Sagebrush	BGD 35
Platinum Paint	AEM 100, 101		
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Podsol	AAG 2 BFA 1-5		
Pond	See Water		

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Sand	See Soil	Rock	AEK 1 BE 11 BFHD 1
Sandstone	BFHD 5	Sand	AEM 67 BE 1-3, 5, 6, 9-11 BFCA 1-14 3131: 1-30 (Also see Desert)
Sandy Loam	See Soil	Sandy Loam	AAG 1 BFDA 1-8 3133: 29-39, 42-46
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Saran	AEM 52	Silt	BFEC 1
Sassafras	BGD 55, 344	Silt Loam	BFEB 1-11
Sauereisen	AE 3	Silty Clay Loam	BFEC 1
Sawdust	AE 2	Sorghum	BGC 9-12
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Shale	BF 17	Squash	BGC 8
Shellac	AEM 90	Stainless Steel	AEL 1, 13, 15, 20, 25, 28, 44, 45
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Siltstone	BFHD 6, 8, 11	Straw	AAA 1, 2 BG 1 BGC 65, 67, 99, 113
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Silty Clay Loam	BFEC 1	String Beans	BGC 141, 142
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Silver Paint	AEM 101	Sugar Bee	BGC 6-8
Skin		Sulphur	BFL 1 CJ 9 (f)CJA 7
Caucasian	AAK 1, 2, 4, 5, 7	Sumach	BGD 33, 34
Negro	AAK 1, 3-7	Sunflower	BGC 1
Oriental	AAK 3	Swamps	See Marsh
Sky	(P)BAB	Sweetgum	BG 5 BGD 291-302, 374
Snow	BH 7-14 3133: 28, 34, 38, 47, 51 3290: 37-39 (f)BGC 1-6	Sweet Potato	BGC 1
Sod		Sycamore	EGD 196-223, 331-372, 407, 408
Sodium Carbonate	BFK 1	Tantalum	AEL 47-49
Sodium Chloride	BFK 2	Tape (Cloth)	AE 2
Sodium Nitrate	BFK 1	Tar	AEQ 1, 2
Sodium Silicate	AEH 2 BFB 2, 3 BFL 1, 2		
Soil			
Clay	BFGC 1-5 3131: 31-43		
Clay Loam	BFFA 1-10		
Cultivated	BFA 1-7 BFDA 6-8 3131: 44-52		
Dirt	AAG 1-3 AEH 2 AEM 54, 67 3290: 52, 53		
Fine Sandy Loam	BFDB 1-6		
Lava	BFHD 2		
Loam	BFEA 1-9		
Loamy Sand	BFCB 1		
Loess	3131: 53-58		

Targets	See Ground Targets and specific types of targets	Aspen	BGD 253-261, 376-382
Tar Paper	AEQ 2	Balsam Poplar	BGD 263
Tarpaulin	(f)AEE 1, 2	Bark	BGD 9, 12, 51, 71, 196, 225, 227, 229, 231, 233
Target Materials	See specific materials such as Asphalt, Brick, etc.	Barley	BGC 31-35
Target Materials (Misc.) . . .	AE 1-3	Basswood	BGD 56, 68, 345
Terra Cotta	AE 1	Beech	BGD 2, 6, 317, 320
Terrain	BE 1-14	Bermuda Grass	BGC 35
Flat	BE 2-7		3133: 13
Hilly	BE 7, 8	Birch	BGD 47, 51, 342
Ice, Water, and Land	3154: 1-3		3134: 7
Mountains	BE 9-11	Birdsfoot Tufoil	BGC 106
	3137: 2, 7-11	Blackberry	BGD 226
Rural	BE 12-14	Bracken Fern	BGC 3
Water and Land	3152: 1	Bramble Briar	BGD 225
Water, Ice, Land, and		Bromegrass	BGC 12
Small Buildings	3303: 1	Buckeye	BGD 303
Wooded	BE 1, 8	Burdock	BGC 146
	BH 9	Cabbage	BGC 103, 104
	3132: 1	Calabash	BGD 232
	3134: 1-7	Catalpa	BGD 30-32, 336
	3136: 3	Cedar	BGD 122, 123, 358, 404
Tile	AER 1-3	Cherry	BGD 226, 227, 230
Timothy	BGC 68-70	Chestnut	BGD 320
Titanium	AEA 6	Chinese Pistachio	BGD 33
	AEL 3-5, 16-19, 32-35, 45	Clover	BGC 68-70, 111, 112
Titanium Dioxide	CJ 11	Cocklebur	BGC 145
Tomato	BGC 104, 105	Coconut Palm	BGD 316, 317
Tourmaline	AEM 67	Coffee	BGC 112
Tree	BE 4	Coleus	BGD 304-314
	BGD 1, 2, 6, 22, 23, 196, 259	Corn	BGC 35-55, 148, 149, 181-183
Tropical Vegetation	BG 1, 5		3133: 62-64
	BGD 2, 106		3135: 1
Truck	AALF 1	Cotton	BGC 99-102, 159-179
Tuff	AE 1		CJ 12
Tulip	BGD 70, 71		3133: 56, 57
Tulip Poplar	BGD 71, 72	Cottonwood	BGD 235-258, 375, 376, 408, 409
Tupelo Gum	BGD 231		BGC 2
Turpentine	AEM 52, 89	Crow Foot	BGC 1
Uniforms	AAKA 1-57	Daisies	BGD 315
Vegetation		Dieffenbachia	BGD 36-43
Alder	BGD 46	D'gwood	BGC 145
Alfalfa	BGC 106-111	D'caena	BGC 2
	3133: 45, 52, 53, 57, 62, 65, 67, 77	D'kweed	BH 2
	3135: 1		BG 8
Apple	BG 7, 8	Elm	BGD 45, 46, 337-340
	BGD 225, 374		3134: 7
Ash	BGD 107, 121	Fallow	BG 4
	3134: 7		

Fern	BGC 181	Milkweed	BGC 144
Fescue	BGC 56	Millet	BGC 61
Field	AAA 1	Mint	BGC 144
	BE 3, 4, 11-14	Mockernut	BGD 233
	BG 3, 4	Moss	BFHD 2
	BGC 2, 13, 15-		BG 2, 4
	28, 65, 68-70,		BGA 1
	113, 143		BGB 1-3
	3133: 1-82	Mountain Laurel	BGD 53-55
Fir	BGD 123-125	Mulberry	BGD 353
	3134: 6		(f)BGDV 1-6
Flax	BGC 3, 4	Mullein	BGD 341
Foxtail	BGC 56, 57	Mustard	BGC 104
Geranium	BGD 303, 304,	Oak	AET 1
	312, 313		BGD 7-29, 320-
Ginkgo Biloba	BGD 303		336, 384-400,
Goldenrod	BCD 34		402
Grass	BG 4		3134: 4
	BGC 9, 12-31,	Oats	BGC 62-65
	35, 55, 56, 58-		3133: 56, 71,
	60, 143, 146-		75, 82
	148	Palm Branch	BGD 411-413
	3133: 1-11, 13-	Pea	BGC 114
	24, 29-34, 38-	Peach	BGD 228, 229
	44, 46-49, 52,	Peanuts	BGC 114-116
	53, 57-61, 63,	Pear	BGD 226
	66, 77	Persimmon	BGD 44
Haloxylon	BG 8	Philodendron	BGD 316
Hawthorne	BGD 227	Pigweed	BGC 5
Hay	BG 9 (Also see	Pine	BE 8
	Straw)		BGD 127-195,
Hazelnut	BGD 51, 52		359, 360, 403-
Heather	BGC 99		406
Hemlock	3134: 7		3132: 1
Hibiscus	BGC 158, 159		3134: 4, 6, 7
Hickory	BGD 232, 234	Pinyon	BGD 121, 122
Holly	BGD 54	Plantain	BGC 142
Hornbean	BGD 53	Plum	BG 7
Ilyas	BGC 58, 59		BGD 227, 230,
Indian Mallow	BGC 158		231, 374
Ironwood	BGD 44	Poplar	BGD 262-288,
Juneberry	BGD 228		382, 383
Juniper	BGD 125, 126,	Potato	BGD 1, 104,
	358, 359		179, 180
Larch	BGD 126, 127	Ragweed	BGC 1
Lentil	BGC 113	Redbud	BGD 373
Lichens	BG 9	Reeds	BGC 65
Lilac	BGD 356, 357	Reindeer Moss	BGA 1
Lima Beans	BGC 113, 114	Rice	BGC 66
Linden	BGD 69	Rubber Leaf	BGD 106, 353-
Locust	BGD 223, 224		355
Madrone	BGD 342, 343	Rye	BGC 66, 67
Magnolia	BGD 70, 345	Rye Grass	3133: 24, 25
Manzanita	BGC 156, 157	Sagebrush	BGD 35
Maple	BGD 72-106,	Sassafras	BGD 55, 344
	345-353, 400,	Sedge	BGC 143
	402, 405		BH 2, 3
Marsh Grass	3136: 2, 3	Selin	BGC 68
Merion Blue Grass	(f)BGCM 1-6	Sorghum	BGC 9-12
Mesquite	BGD 223		

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Soybeans	BGC 116-141 3133: 52, 54, 55, 59, 60, 77- 79	Willow	BGD 289, 290
Sphagnum Moss	BGB 1, 2	Wormwood	BGD 35, 36
Spruce	BGD 195, 196, 361, 406, 407	Yantak	BG 4
Squash	BGC 8	Yucca	BGD 56
Straw	AAA 1, 2 BG 1 BGC 65, 67, 99, 113	Vehicles	AALF 1
String Beans	BGC 141, 142	Velvet Paint (3M) Black	(f)AEM 10-19
Sudan Grass	3133: 8-11	Velvet Paint (3M) White	(f)AEM 4-9
Sugar Beet	BGC 6-8	Vetch	BGC 70
Sumach	BGD 33, 34	Viburnum	BGD 33
Sunflower	BGC 1	Vinyl	AAKA 6 AEO 2-5
Sweetgum	BG 5 BGD 291-302, 374	Virginia Creeper	BGD 232, 375
Sweet Potato	BGC 1	Walnut	BGD 232
Sycamore	BGD 196-223, 361-372, 407, 408	Water	BF 13 BG 2 BGC 65 BH 1-14 3123: 1-15 3136: 2, 3
Timothy	BGC 68-70	Weeds	BG 3 BGC 1 BH 2, 3 3133: 11, 12, 26, 27, 38, 44
Tomato	BGC 104, 105	Wheat	BGC 70-99, 150-156, 3133: 68-70, 80-82 3135: 1
Tree	BE 4 BGD 1, 2, 6, 22, 23, 196, 259	Willow	BGD 289, 290
Tropical Vegetation	BG 1, 5 BGD 2, 106	Wood	AAA 2 AAG 5 AAH 1 AET 1-3
Tulip	BGD 70, 71	Wood Stain	AEM 4
Tulip Poplar	BGD 71, 72	Wool	AAKA 1-2, 6- 14, 33, 36
Tupelo Gum	BGD 231	Wormwood	BGD 35, 36
Vetch	BGC 70	Yantak	BG 4
Viburnum	BGD 33	Yucca	BGD 56
Virginia Creeper	BGD 232, 375	Zinc	AEL 19
Walnut	BGD 232	Zinc (Galvanite) Paint	AEM 38
Weeds	BG 3 BGC 1 BH 2, 3 3133: 11, 12, 26, 27, 38, 44	Zinc Oxide (Zinc White)	AEM 6-9, 18, 19
Wheat	BGC 70-99, 150-156 3133: 68-70, 80-82 3135: 1		

B-14004 Williamson: Night Reconnaissance Subsystem (U), (Final Technical Documentary Report), Martin-Marietta Corp., Orlando, Fla., November 1964, AD 355 324 (CONFIDENTIAL).

Platform: laboratory

Instrument 1: Cary Model 14R spectrophotometer

Quantity measured: ρ_d

Wavelength range: 0.2 to 2.2 μ

Reflectance attachment: integrating sphere

Reflectance standard: $MgCO_3$

Additional reference: 3-11

Comments: see discussion in section 3.2.9.

Instrument 2: Perkin-Elmer normal incidence spectrophotometer

Quantity measured: ρ'

Wavelength range: 0.2 to 0.42 μ

Reflectance attachment: Perkin-Elmer reflectance unit

Reflectance standard: $MgCO_3$

Comments: see discussion in section 3.2.10.

B-14438. Report on Measurement on the Paint of Russian and Danish Warships (U), Research on Camouflage Spectral Analysis (U), Danish Defence Research Board, Copenhagen, Denmark, 1964 (estimated), AD 370 905L (SECRET).

Platform: laboratory

Instrument: Beckman DU spectrophotometer

Quantity measured: reflectance; however, it was not specified whether directional or bidirectional

Wavelength range: 0.4 to 1.15 μ

Reflectance attachment: not specified

Reflectance standard: not specified, but probably MgO as was used in B-11356

Comments: Very little documentation of experimental procedure was given. These data, therefore, should only be used qualitatively.

B-19999. Trytten, Flowers: Reflectance of Target and Background Materials (unpublished data), Willow Run Laboratories of the Institute of Science and Technology, The University of Michigan, Ann Arbor (CONFIDENTIAL).

Platform: laboratory

Instrument: Beckman DK-2 spectrophotometer

Quantity measured: ρ_d , τ_d

Wavelength range: 0.28 to 2.6 μ

Reflectance attachment: integrating sphere

Reflectance standard: MgO for ρ_d , but values of τ_d are absolute

Comments: See discussion in section 3.2.2. For transmittance measurements, the sample was positioned at the entrance ports of the integrating sphere, and MgO was placed at both the sample and reference ports. Thus energy transmitted into a hemisphere was seen by the detector.

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3.5. DATA FORMAT

In order to transfer a data curve from a source document to the Target Signature Library, the curve is first semi-automatically digitized and keypunched on IBM cards. Great care is exercised to preserve all significant details of the original curve except those attributable to instrument noise. Data points are taken in such a way that the new curve formed by connecting the data points with straight lines will duplicate the original curve. In essence, this amounts to taking data points at all significant inflection points on the original curve, so that relatively few data points are required to describe a smooth curve, although many points may be required to describe a highly erratic curve. The keypunched cards are the mechanism for transferring the data to magnetic tape in the Target Signature Library and for printing out data curves in a standard format on a plotting machine.

The header information above each of the data curves includes the curve's identification number, the curve's title, subject codes, and parameter information. The identification number consists of nine characters. The first of these is an alphabetic symbol, and the remaining eight are numeric. The alphabetic symbol is to designate the original source of the data and to differentiate between measurements coordinated under the Air Force Target Signatures Program and those obtained from other sponsored efforts. To date, six different symbols have been defined. These are:

- A = U of M, Willow Run Laboratories
- B = Target Signature Document Library Reports
- C = U of M, School of Natural Resources
- D = National Bureau of Standards
- E = Texas Instruments Incorporated
- F = General Dynamics/Convair

Symbols A, C, D, E, and F are used as the prefix of the identification number only when measurements made by the corresponding agencies have been coordinated under the Target Signatures Measurements Program. When these symbols are used, the next five digits designate a specific sample which has been registered at The University of Michigan. For these, a complete sample description is maintained on file by TSAC. The last three digits in the identification number are used to identify a particular area of the sample of a particular condition of measurement. Thus, for all measurements coordinated directly by TSAC, the following holds true:

- (1) All measurements of the same sample are linked together by ID, regardless of where the measurements were made.
- (2) Parametric studies (such as moisture content, contamination) on the same sample may be readily identified by the last three digits.
- (3) Uniformity of descriptive information is obtained for data on the same samples.

The symbol B is used to identify data taken from reports or data which were obtained prior to the sample registration system. In these cases, the first five digits identify the document from which the data were taken. (Section 3.4 lists the document by the letter B and these five digits.) The last three digits identify a particular curve within the source document.

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The subject code is a group of letters assigned to each curve to permit retrieval by subject. Each letter represents a specific descriptor, and each curve is assigned as many letters and as many codes as are required to describe it adequately. The Target Signature Subject-Code List (table 1-1) explains these codes. As an example, a curve may be described as follows:

Object measured: loam (BFEA)
 Instrumentation: General Electric spectrophotometer (CDB)
 Experimental platform: Laboratory (CED)
 Quantity measured: Directional reflectance with the specular component included in the measurement (DFAA)
 Reflectance standard: MgO (DFCE)
 Spectral interval: 0.4 to 0.7 μ (ECB) and 0.7 to 1.5 μ (ECCA)

The conditions of the experiment, called parameter information, are also listed on the printed header in abbreviated form. This information is derived from the original source when possible. For many of the data, very few parameter entries appear either because the source did not document all of the experimental parameters or because some parameters are not applicable to all measurements, e.g., altitude and range are not parameters for laboratory measurements. Table 3-1 is the key for interpreting this parameter information. Figure 3-18 illustrates the angle parameters pertinent to some measurements.

The optical data in this section are arranged according to the subject code most descriptive of the object or sample measured. Since the Target Signature Subject-Code List contains a large number of specific types of target and background categories, it was necessary in some cases to group the data into somewhat broader categories. These are cross-indexed by subject in section 2.

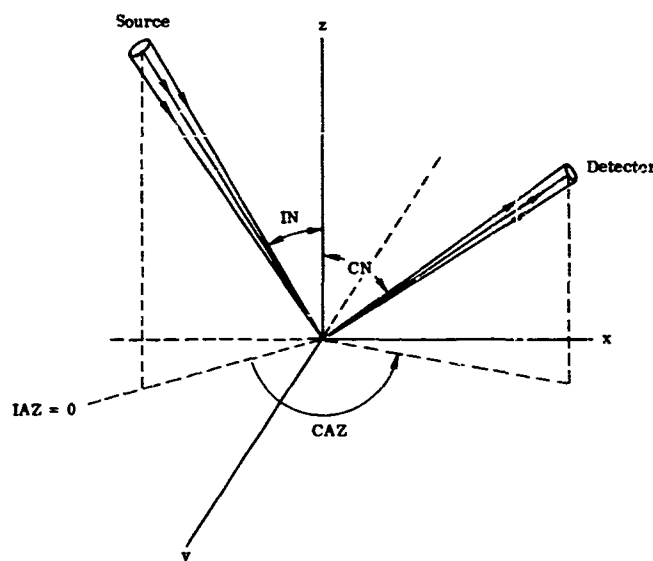


FIGURE 3-18. GEOMETRY FOR SOME SPECIFIED OPTICAL DATA PARAMETERS

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TABLE 3-1. OPTICAL DATA PARAMETERS

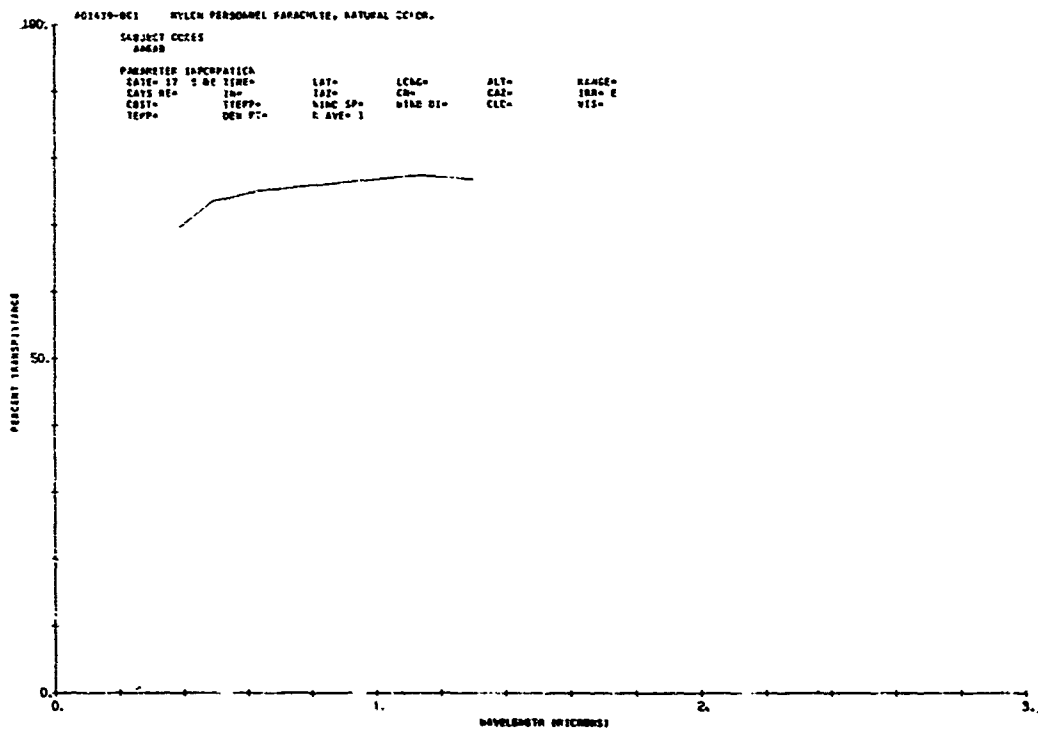
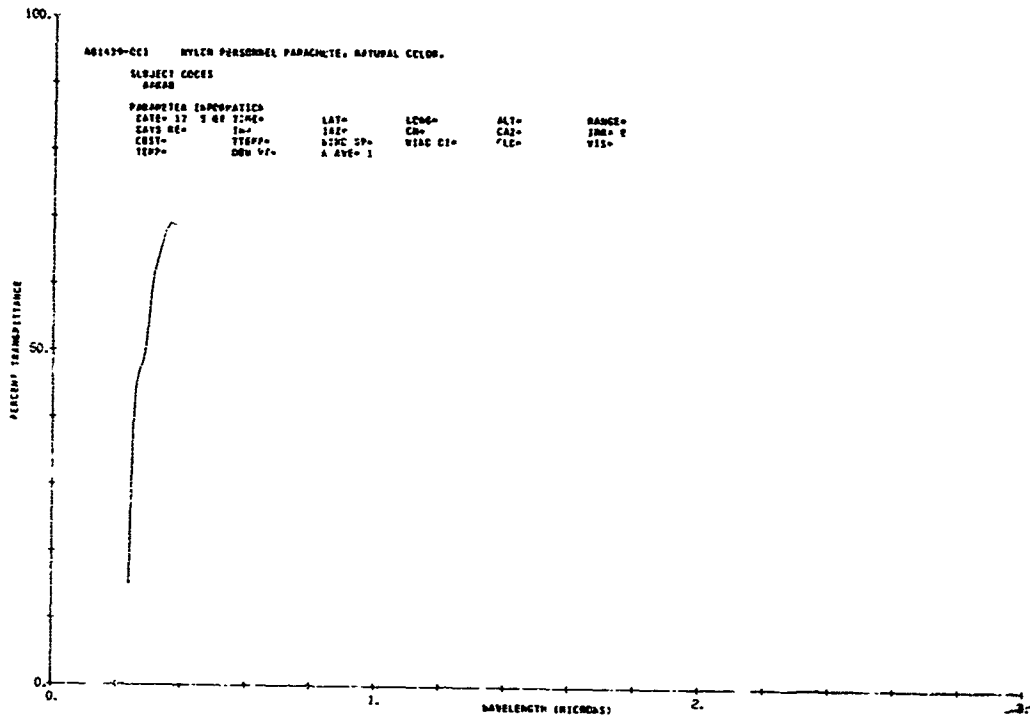
DATE	Date of measurement (day, month, and year)
TIME	Time of measurement (24-hour clock)
LAT	Latitude of measurement (field measurement) or of location at which specimen was collected (laboratory measurement)
LONG	Longitude of measurement or of location at which specimen was collected, as with LAT
ALT	Altitude of experimental platform (thousands of feet)
RANGE	Slant range (thousands of feet)
DAYS RE	Number of days sample had been removed from its natural environment
IN*	Incidence angle (degrees from normal)
IAZ*	Azimuth of incident radiation (degrees)
CN**	Collection angle (degrees from normal)
CAZ**	Azimuth of collection angle (degrees)
IRR	Type of target irradiation coded as follows: - A Sun - B Moon - C Skylight (extended source) - D Laser - E Other artificial point sources
OBST	Obstructions in the air that prevent a clear view of the target, coded as follows: - A Smoke - B Haze - C Dust - D Sand - E Fog - F Drizzle - G Rain - H Snow - I Hail
TTEMP	Temperature of target or measured object (°K)
WIND SP	Average wind speed (mph)
WIND DI	Wind direction
CLI	Total cloud cover coded as follows: - A 0 to 0.1 - B 0.2 to 0.5 - C 0.6 to 0.8 - D 0.9 to 1.0
VIS	Visibility (miles)
TEMP	Temperature of environment (°F)
DEW PT	Dew point temperature (°F)
N AVE	Number of curves or measurements averaged to make up this curve

*These angles are defined only if the major portion of radiation incident on the target comes from a point source, e.g., the sun (see fig. 3-18).

**These angles are defined when the target is observed from one direction (see fig. 3-18).

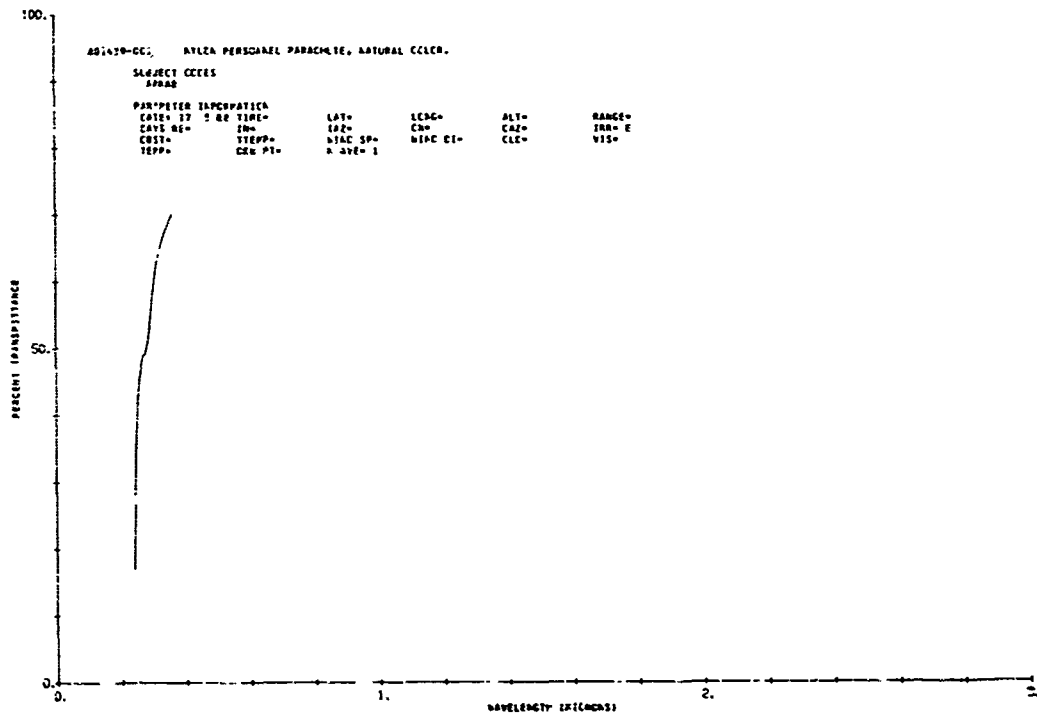
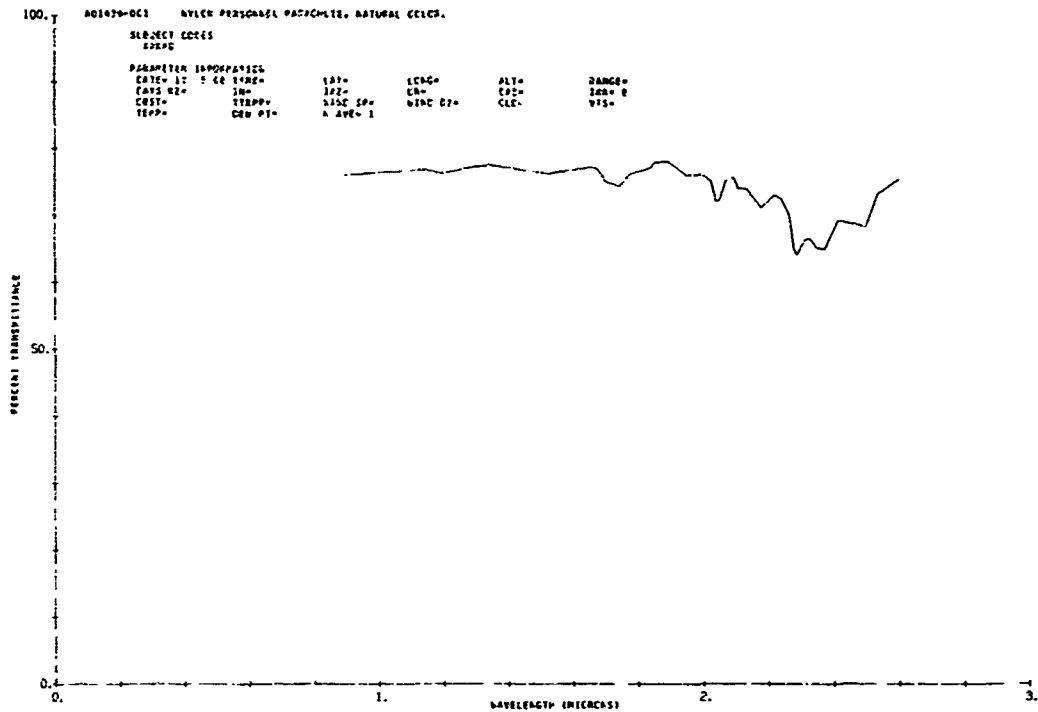
July 1969

AREA 58

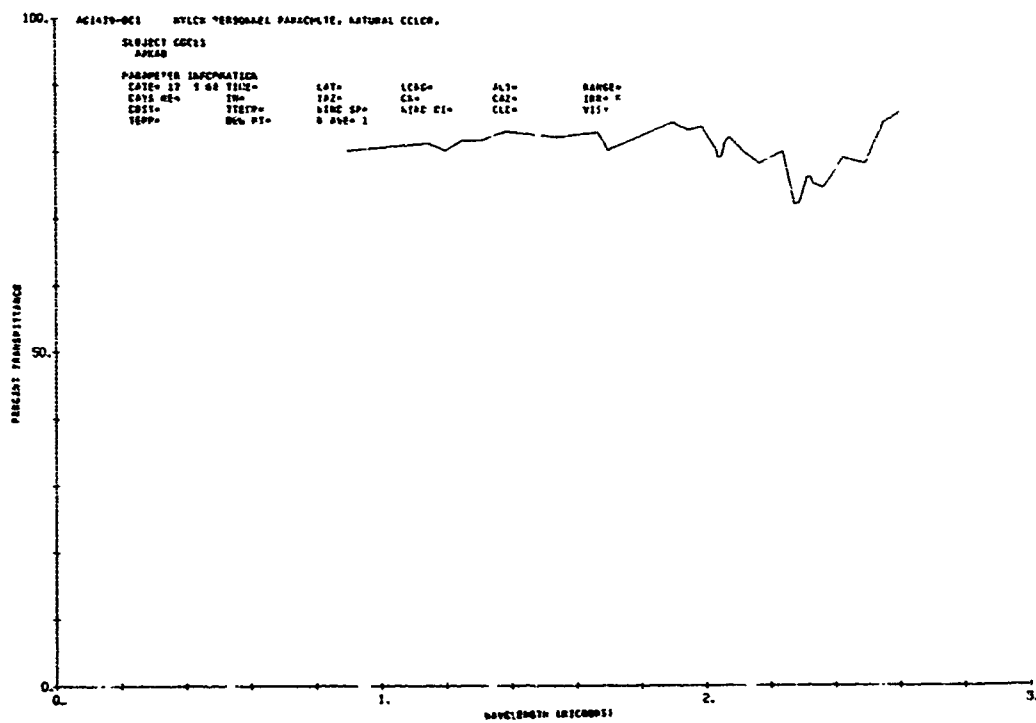
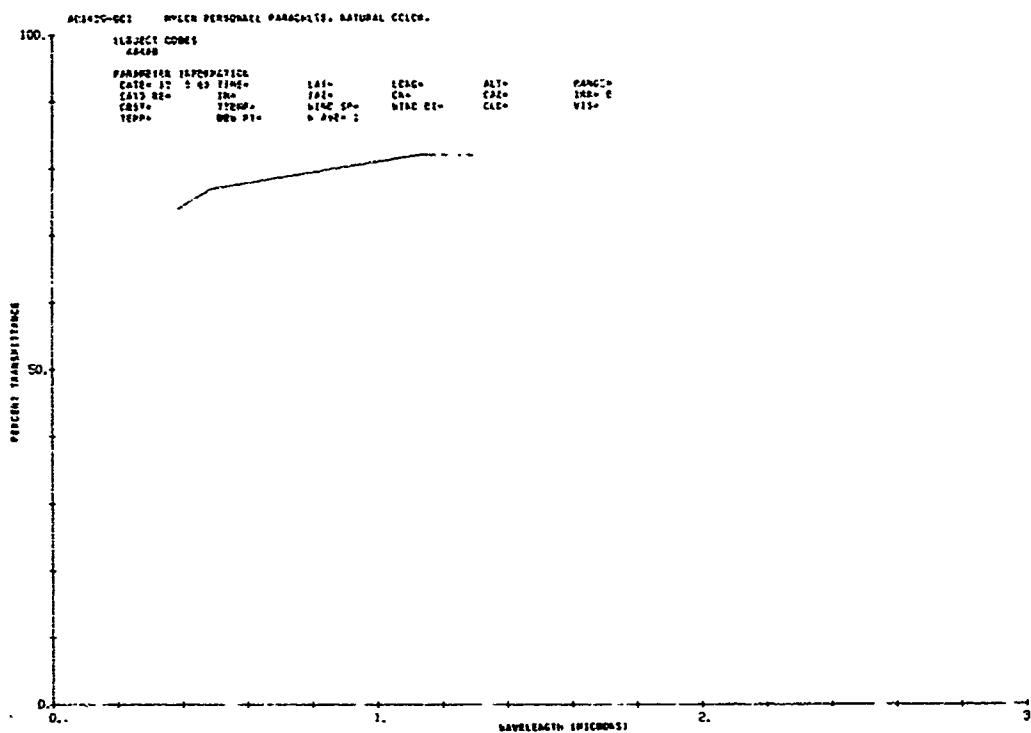


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AAKA 59

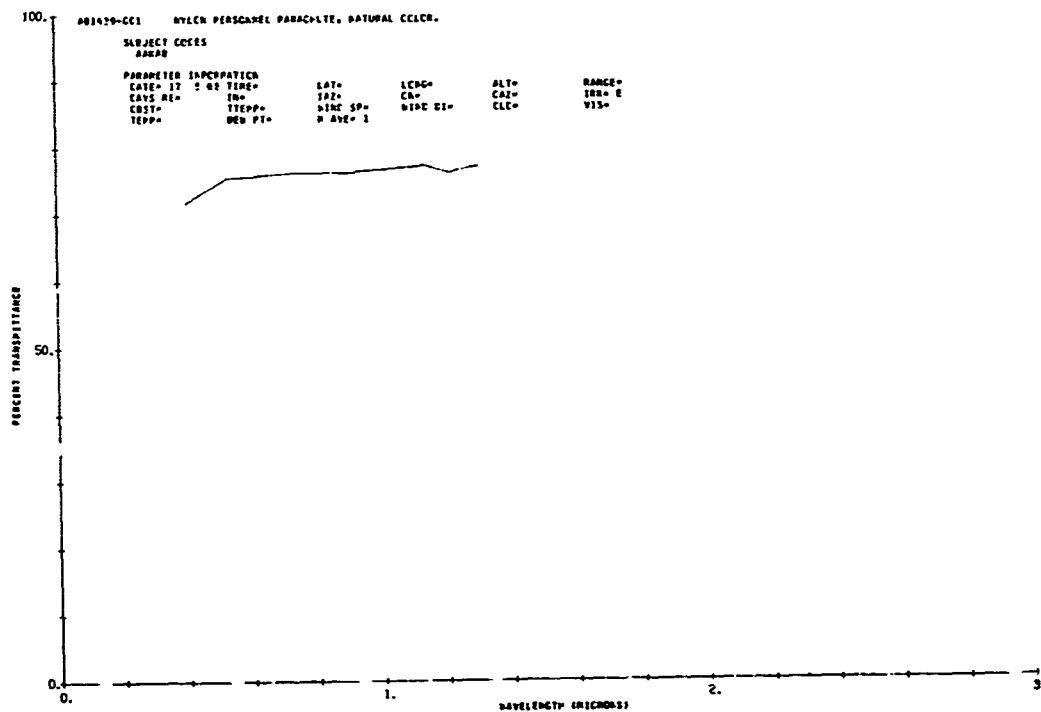
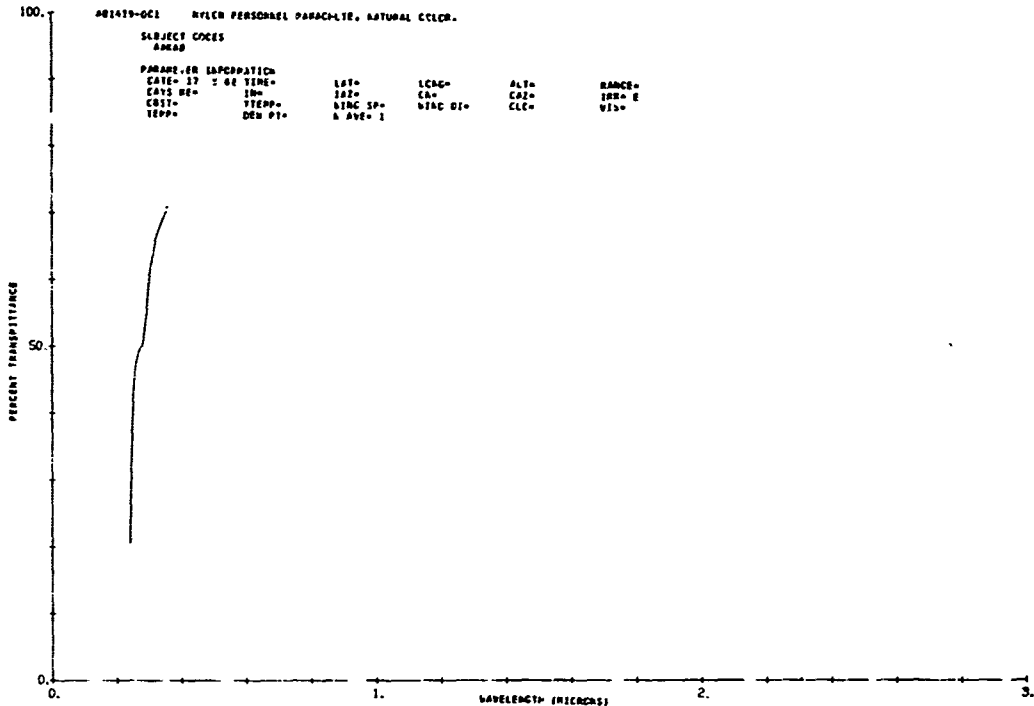


July 1969



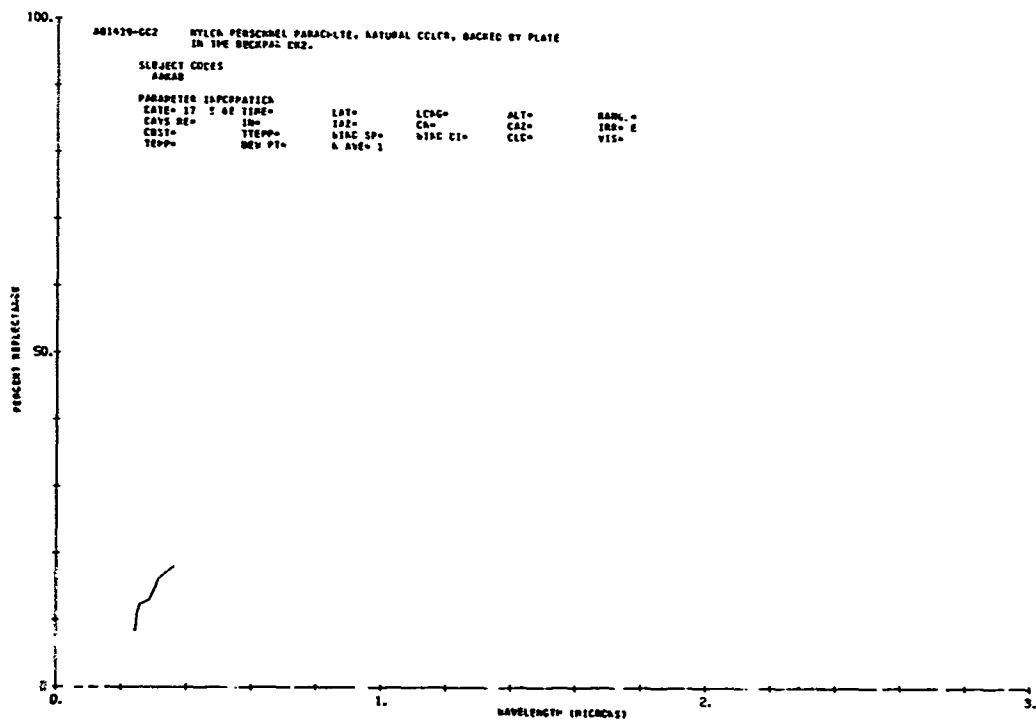
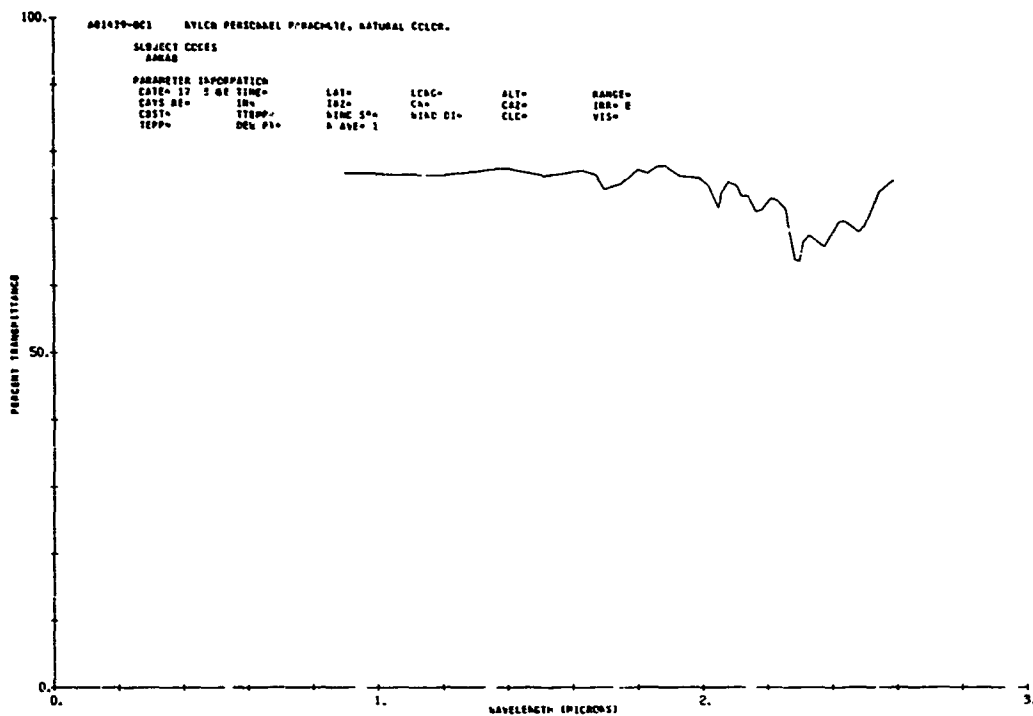
July 1960

AKA 01



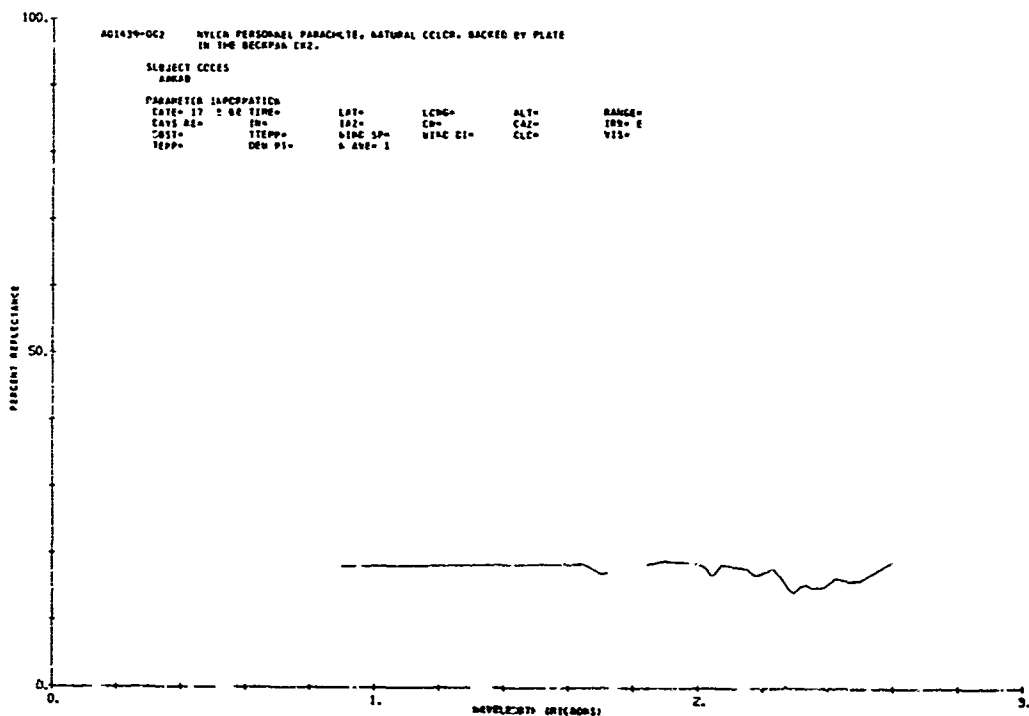
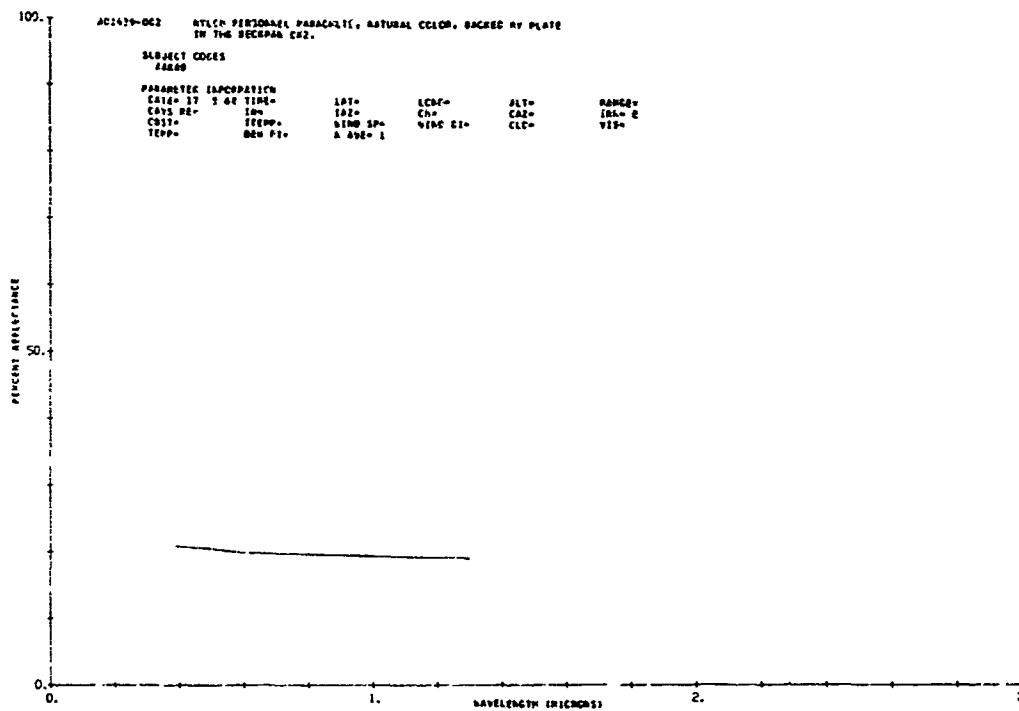
July 1960

AAXA 62



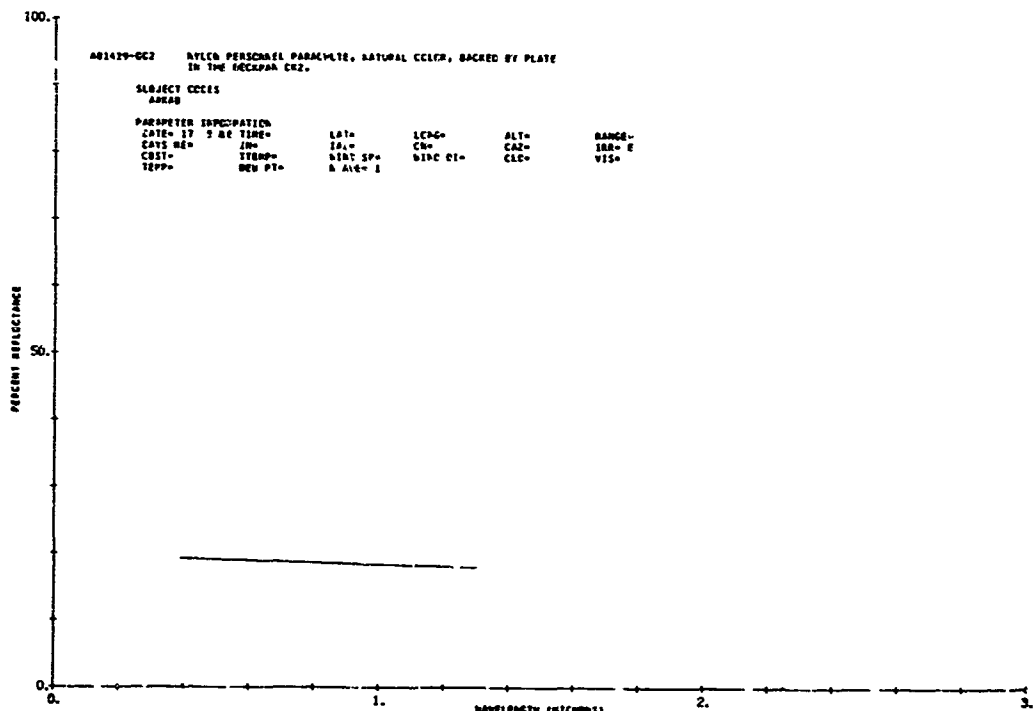
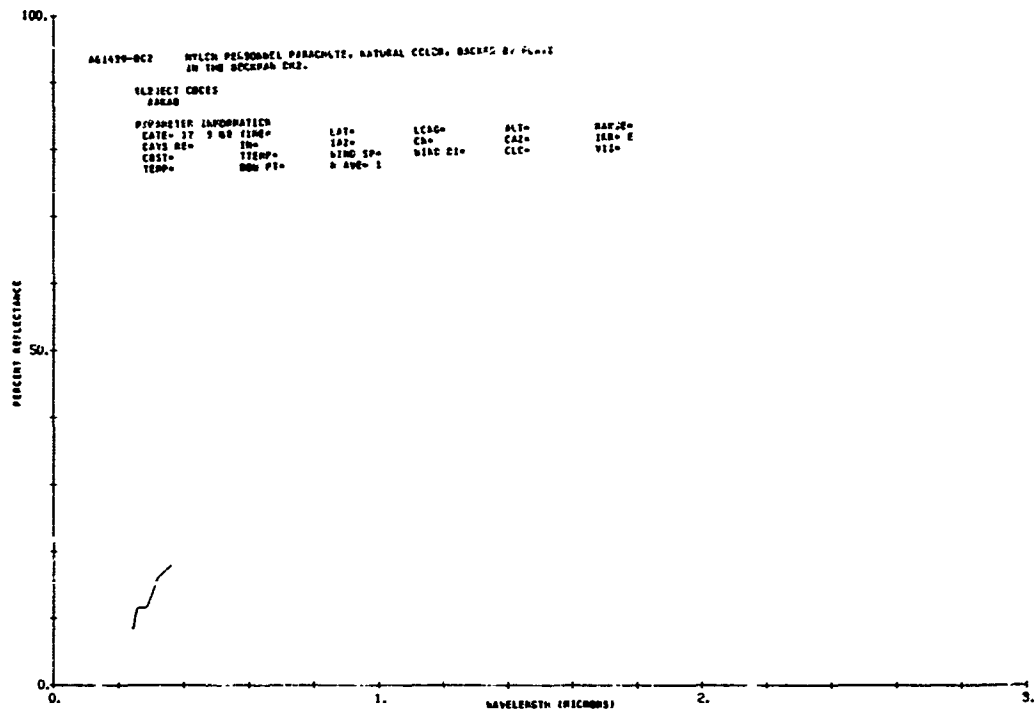
July 1969

AXXA 03



July 1968

AAXA 56



July 1960

100.

401479-002 NYLEN PERSONAL: P=NYCHUTE, NATURAL COLOR, BACKED BY PLATE
IN THE COLOR - CM2.

SUBJECT CODES
APAB

PARAMETER: 1000/1000
CATE= 17
CATE RE= 1
CUST= 1
TEPP= 1

LAT= 1
LON= 1
WIND SP= 1
AVE= 1

LENG= 1
CH= 1
WIND DI= 1
AVE= 1

ALT= 1
CAZ= 1
CLE= 1

RANGE= 1
IRB= 1
VIS= 1

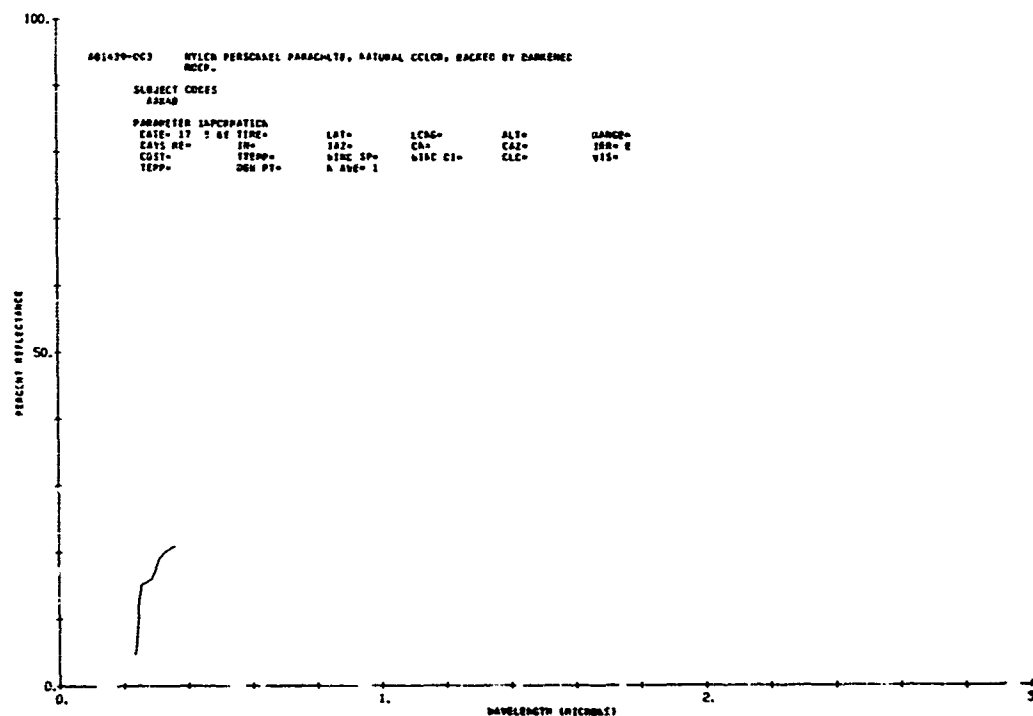
PERCENT REFLECTANCE

50.

0.

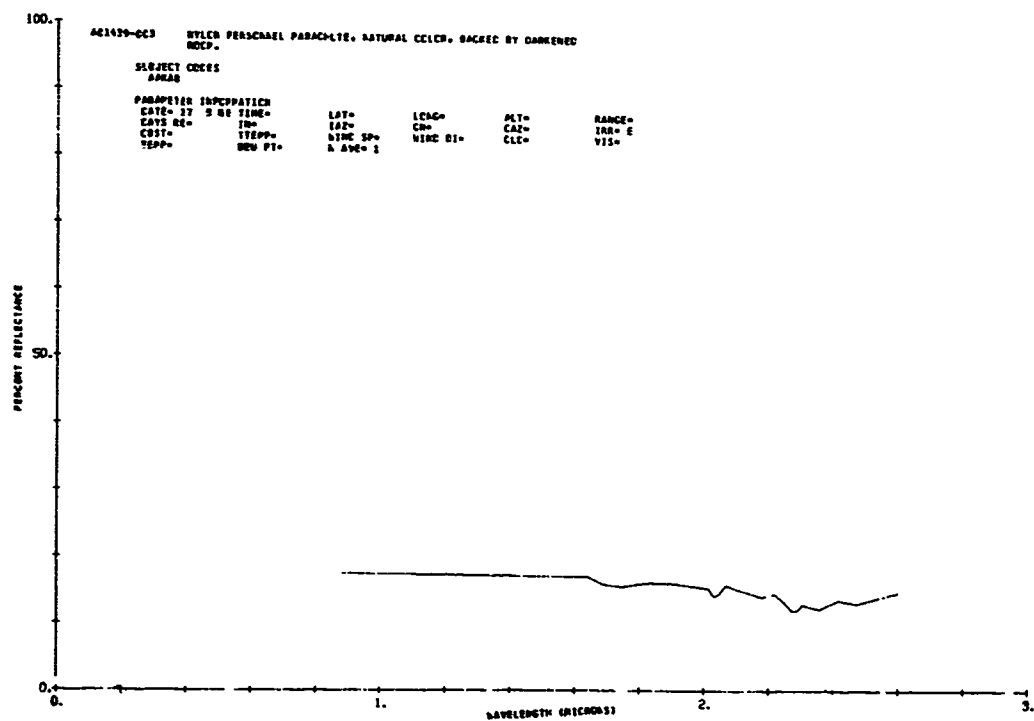
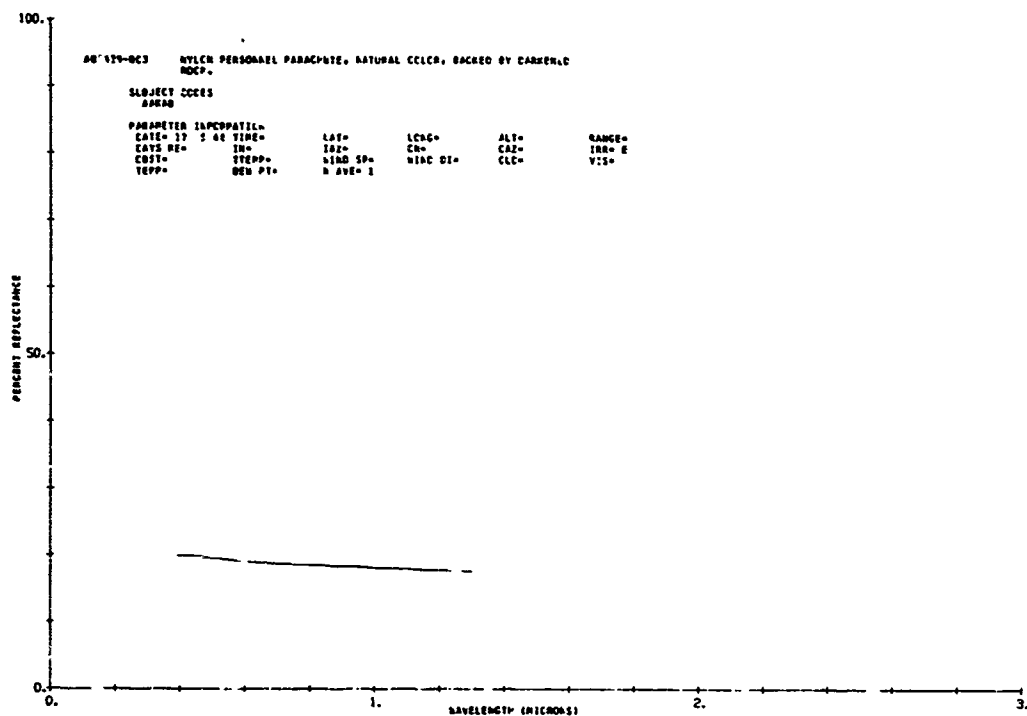
0. 1. 2. 3.

WAVELENGTH (MICRONS)



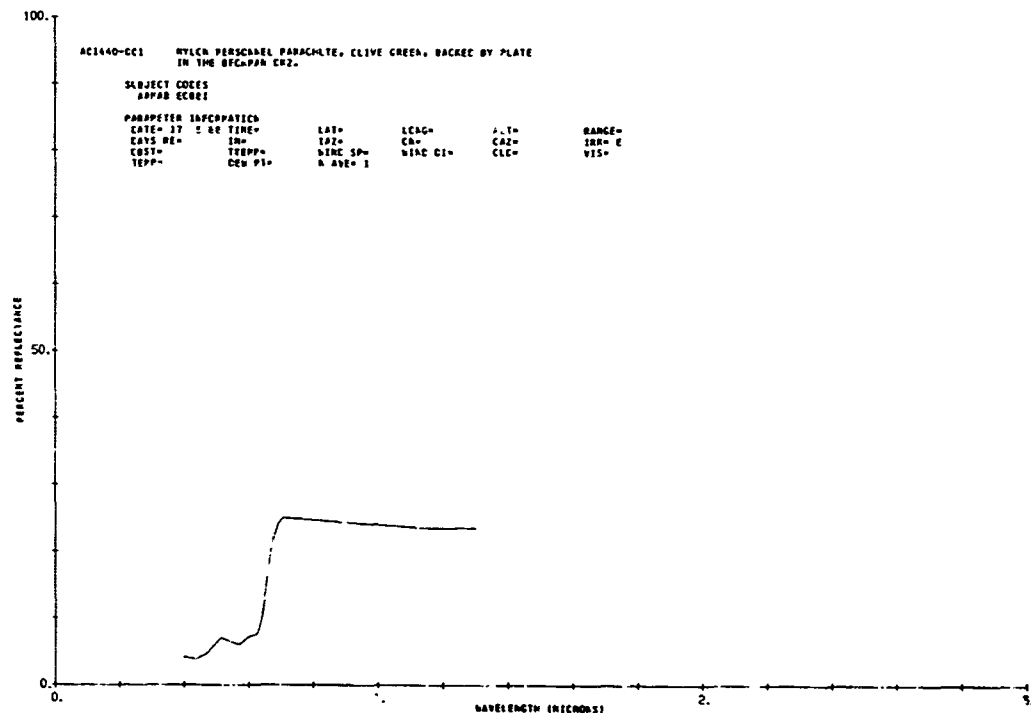
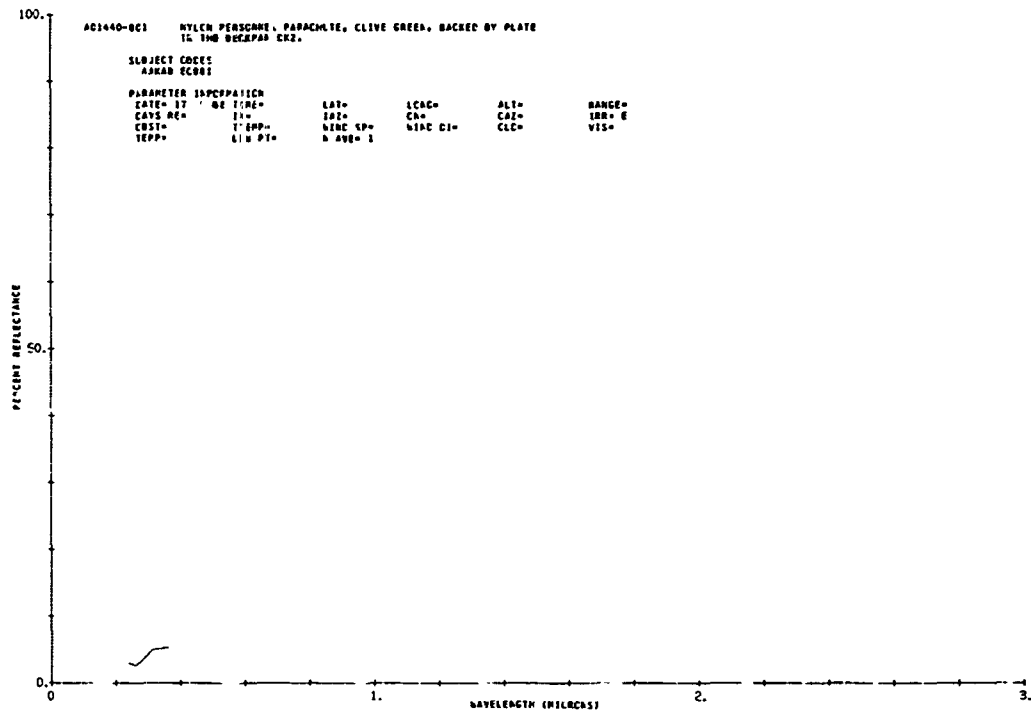
July 1968

AAKA 00



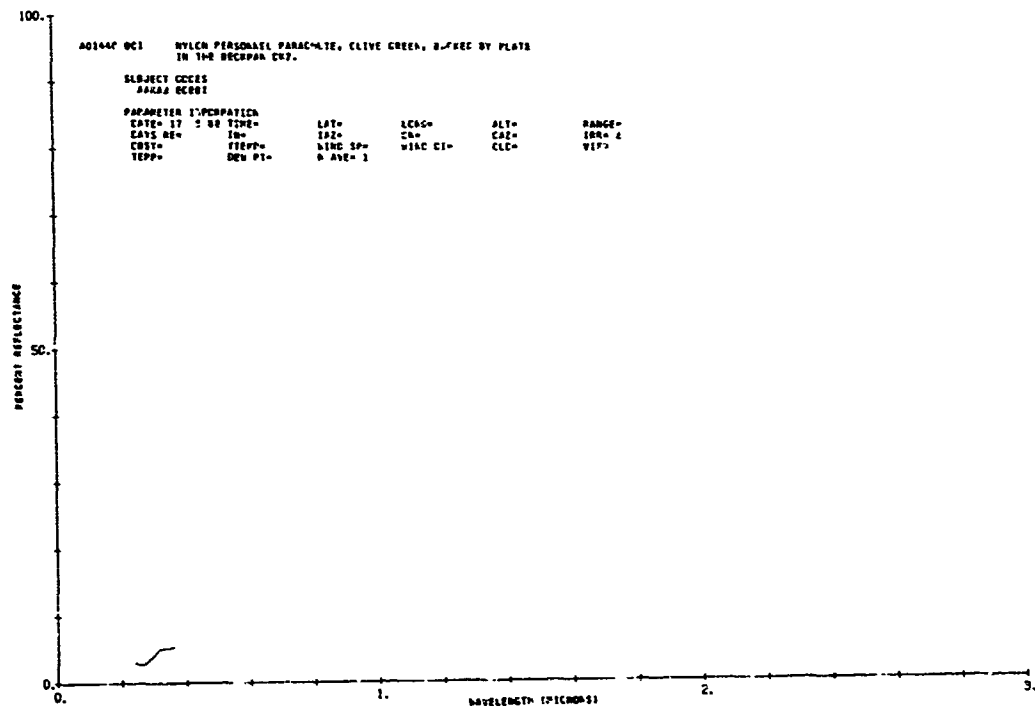
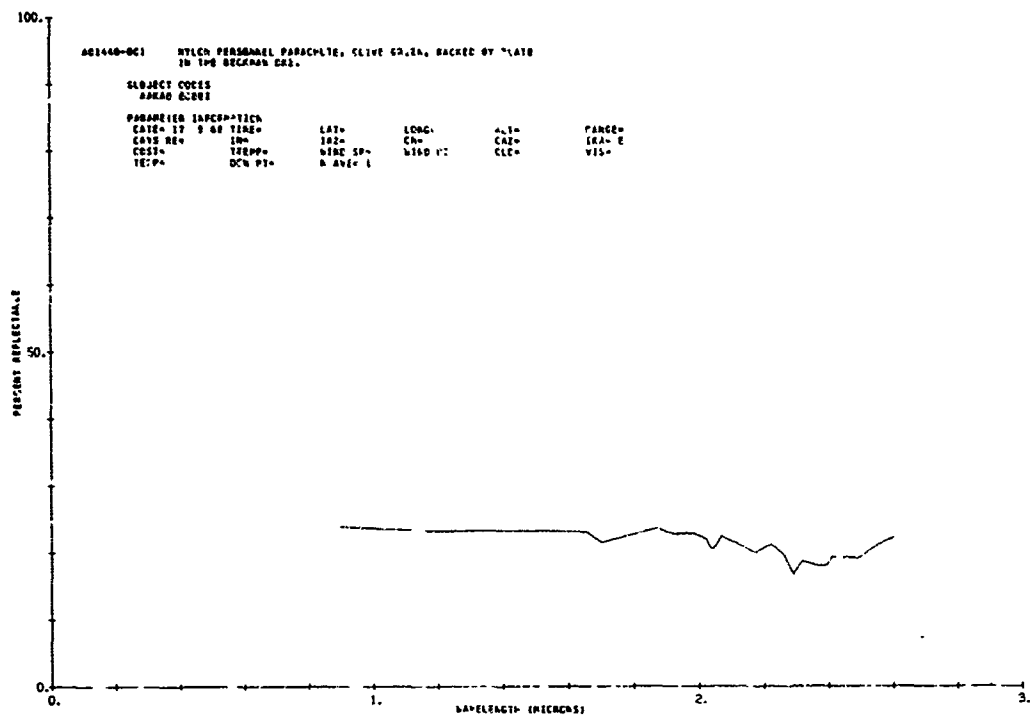
July 1960

AAKA 97



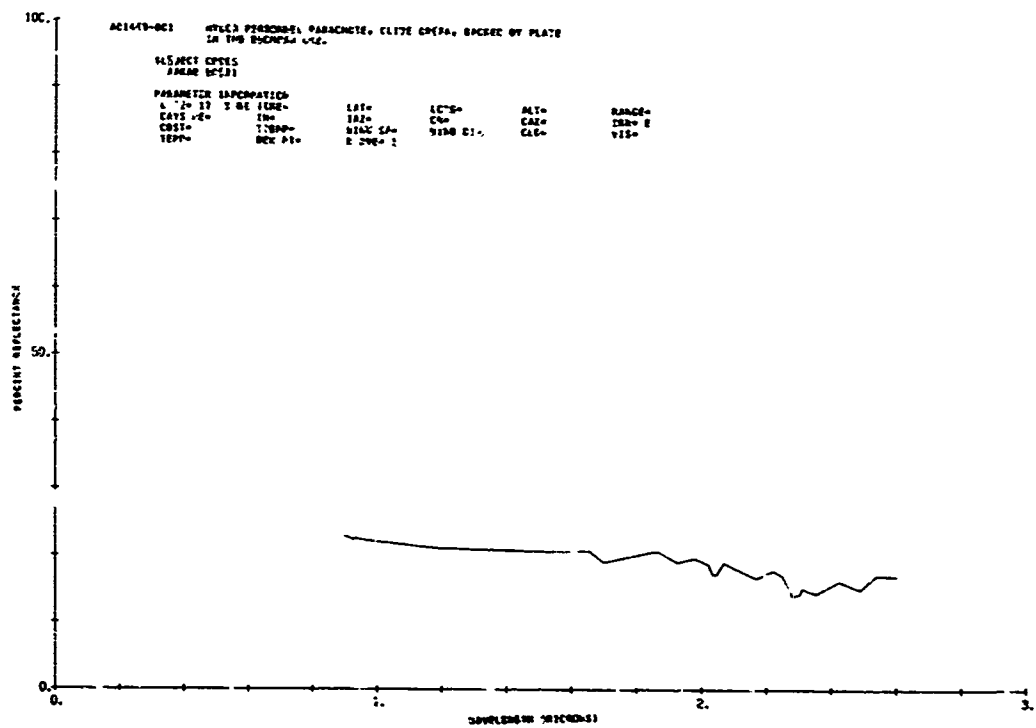
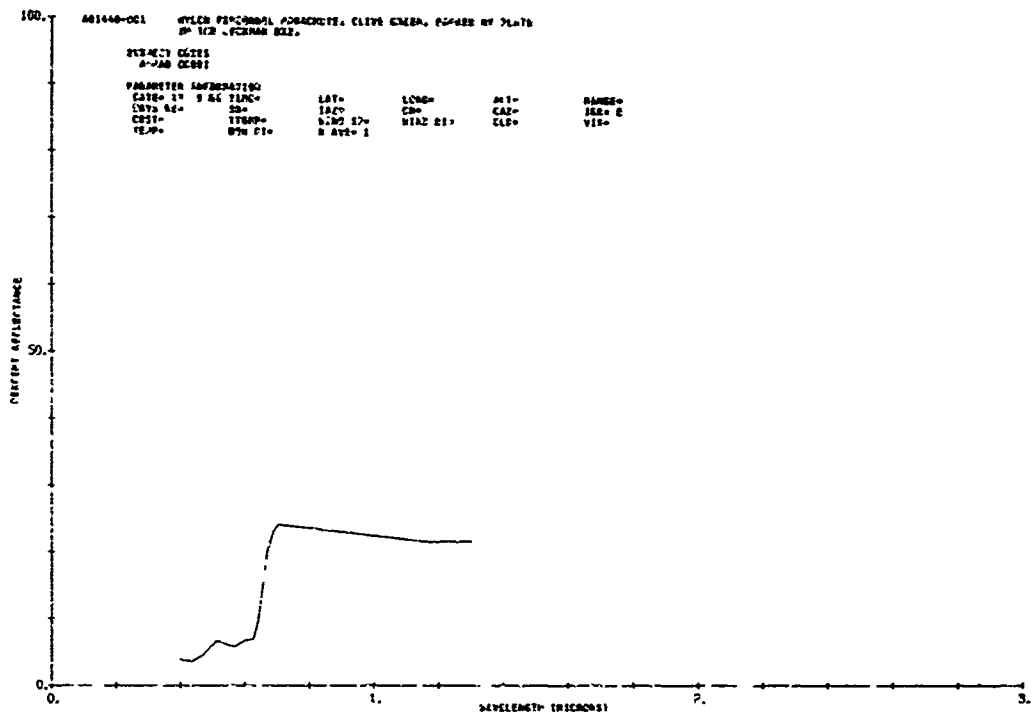
July 1980

ALKA 68



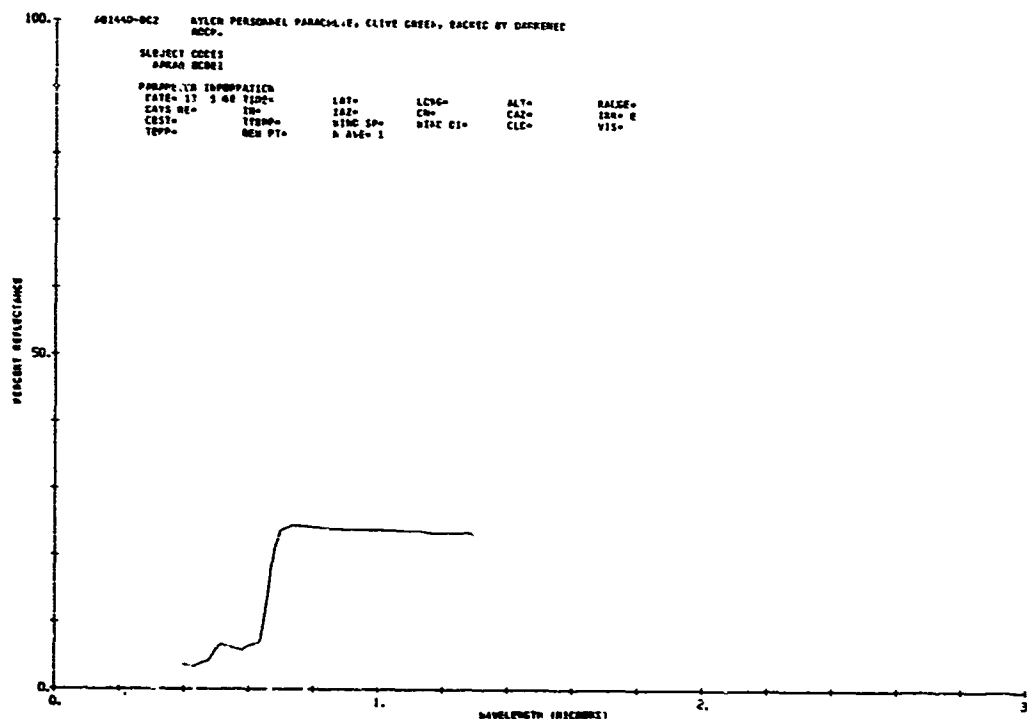
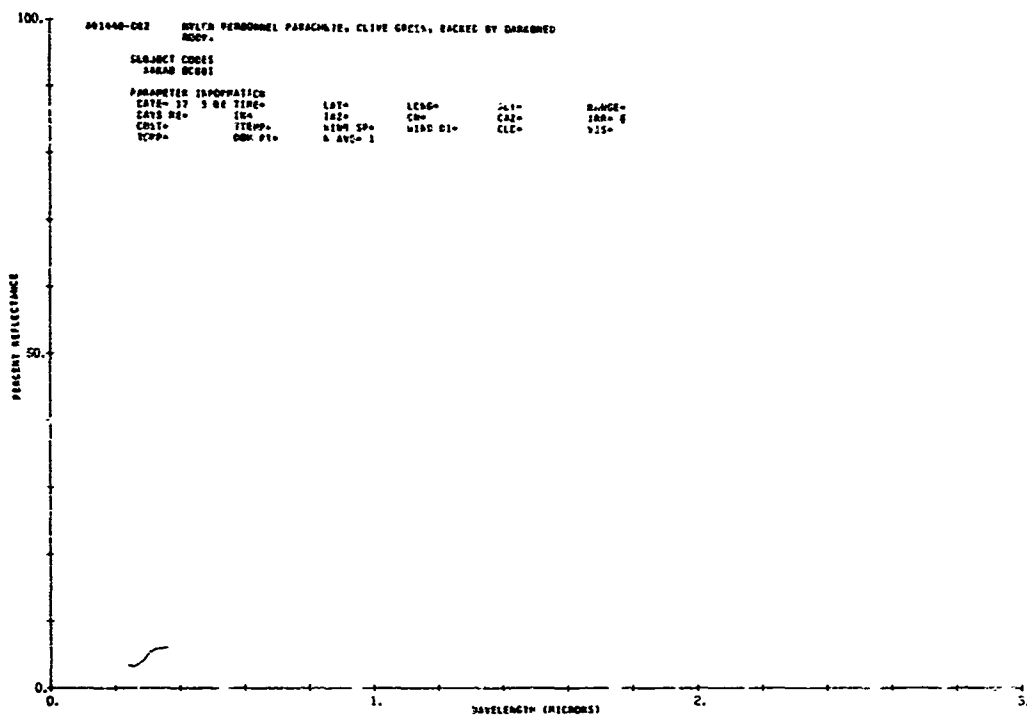
July 1968

A-18A 88



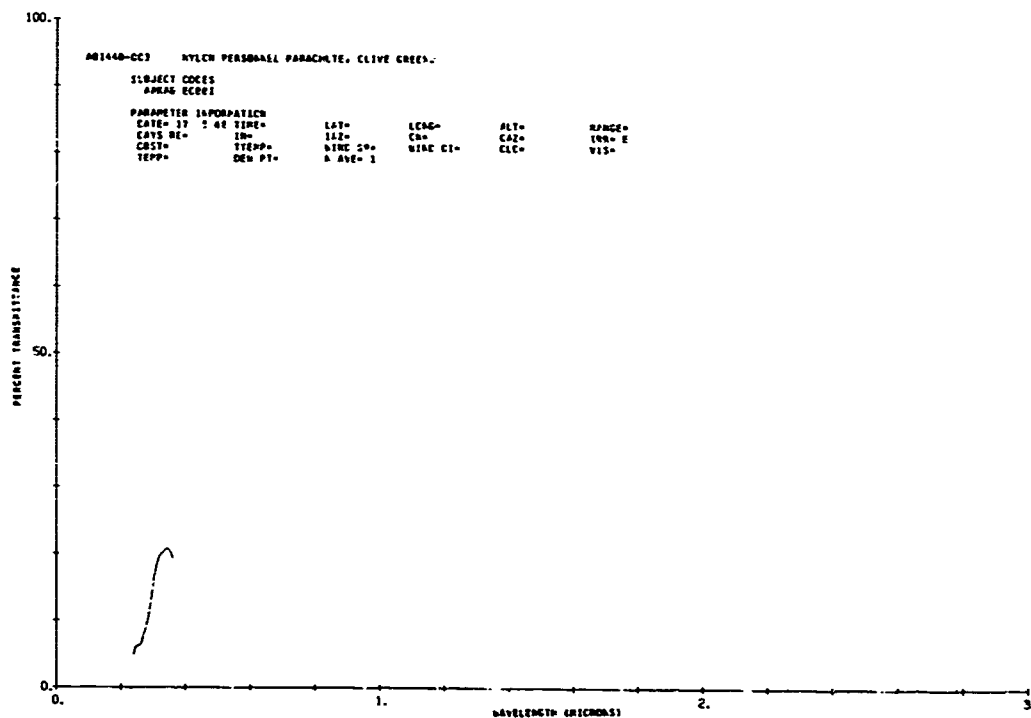
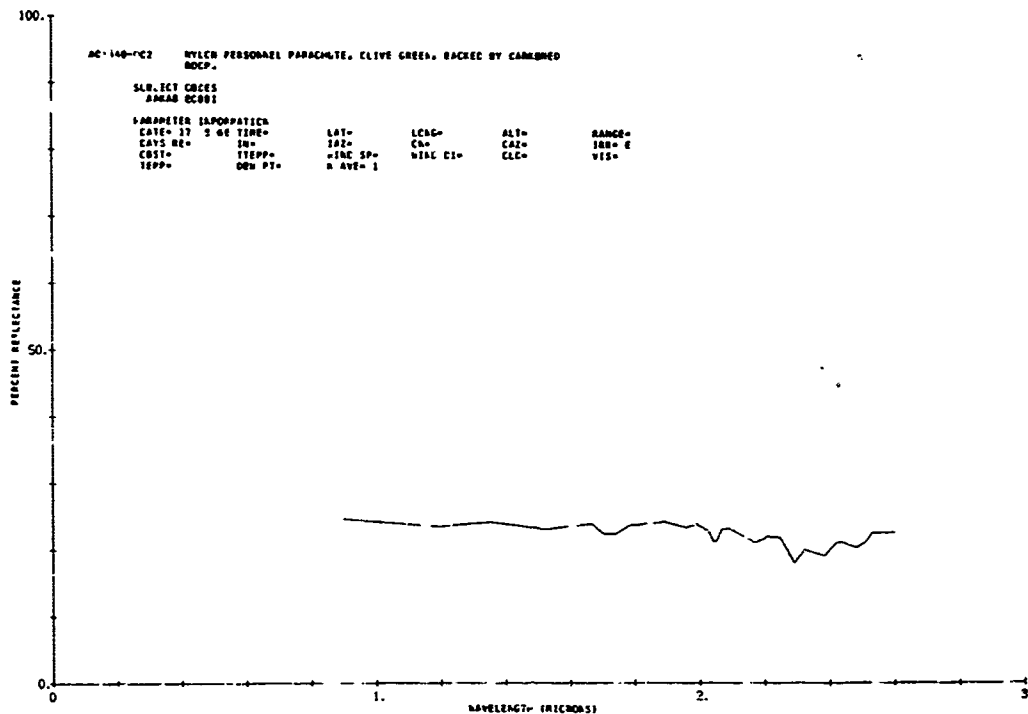
July 1980

AAKA 7G



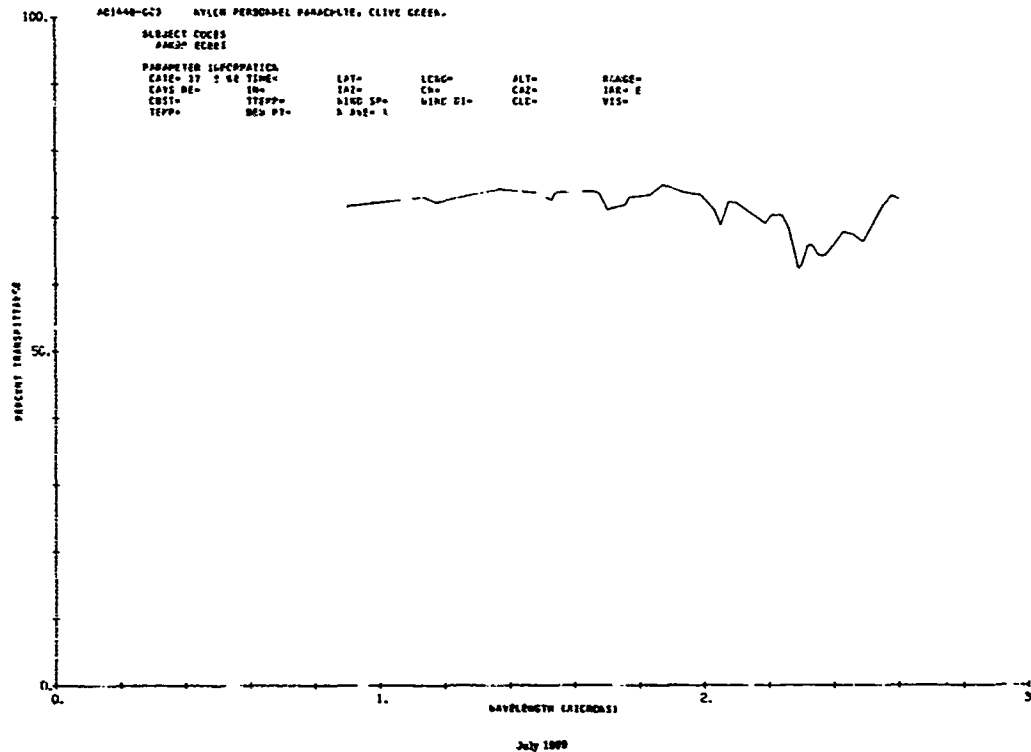
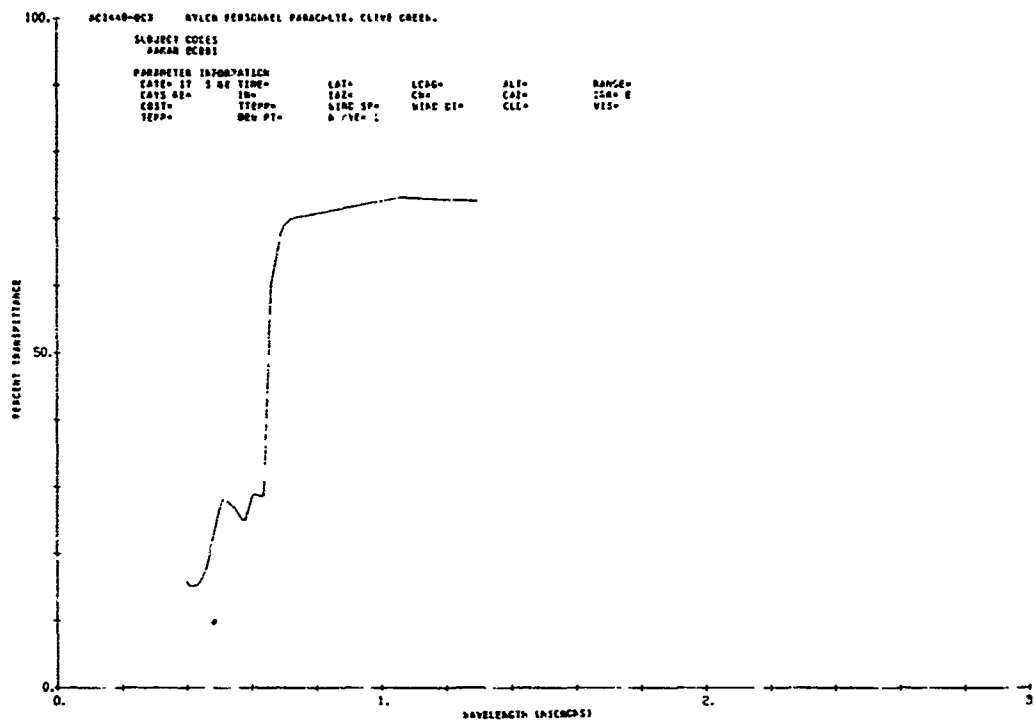
July 1960

AREA 71

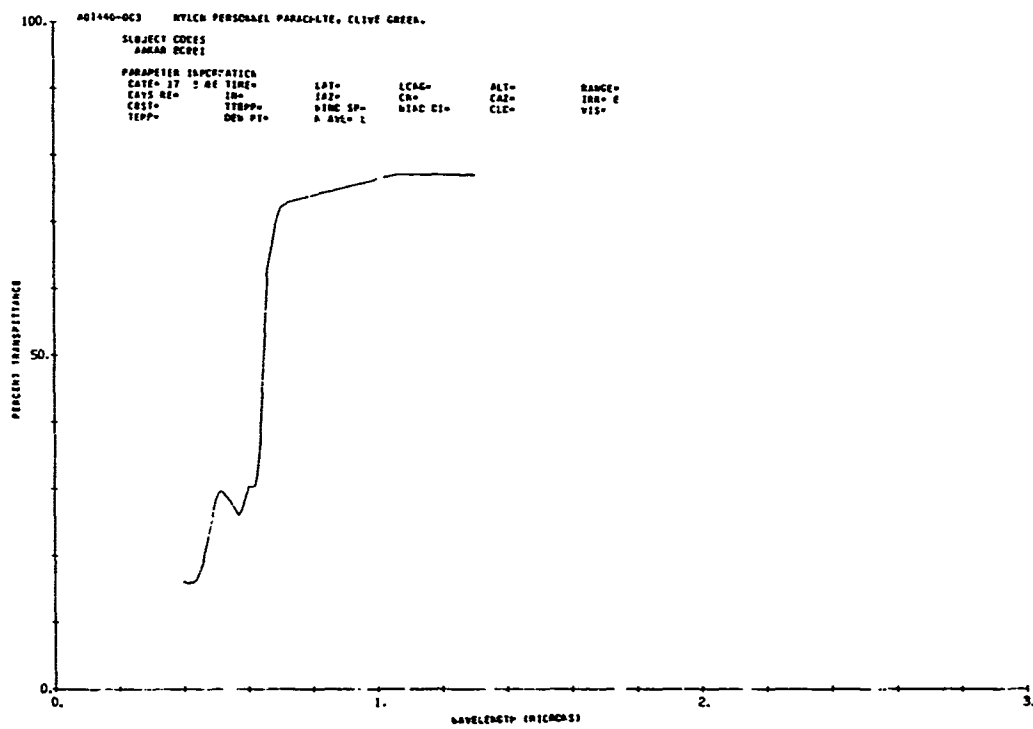
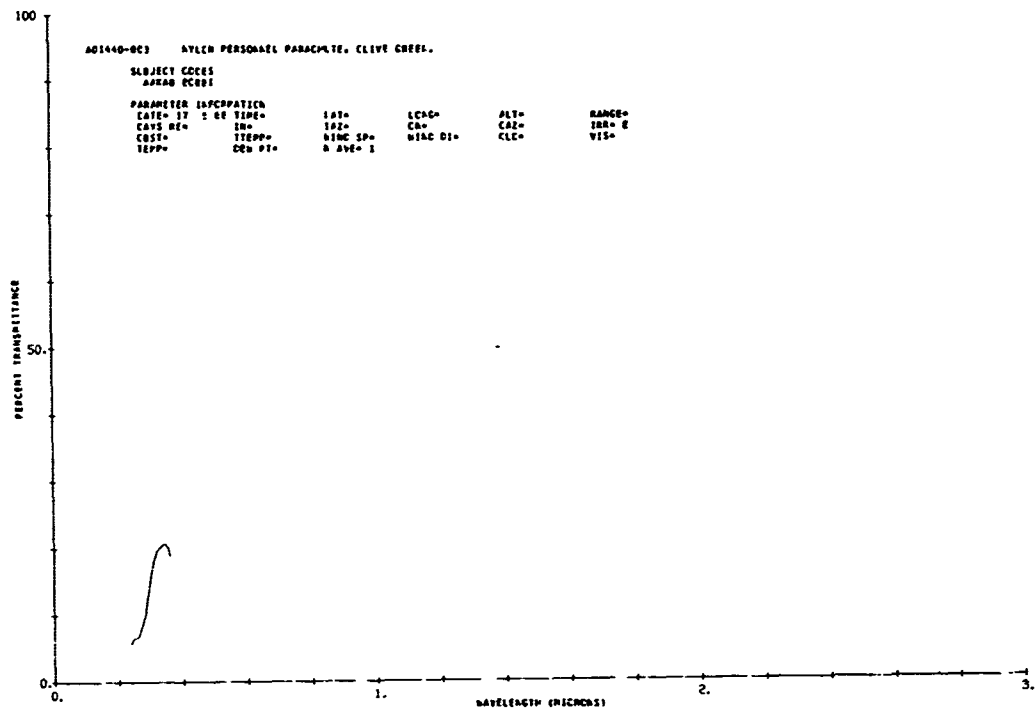


July 1968

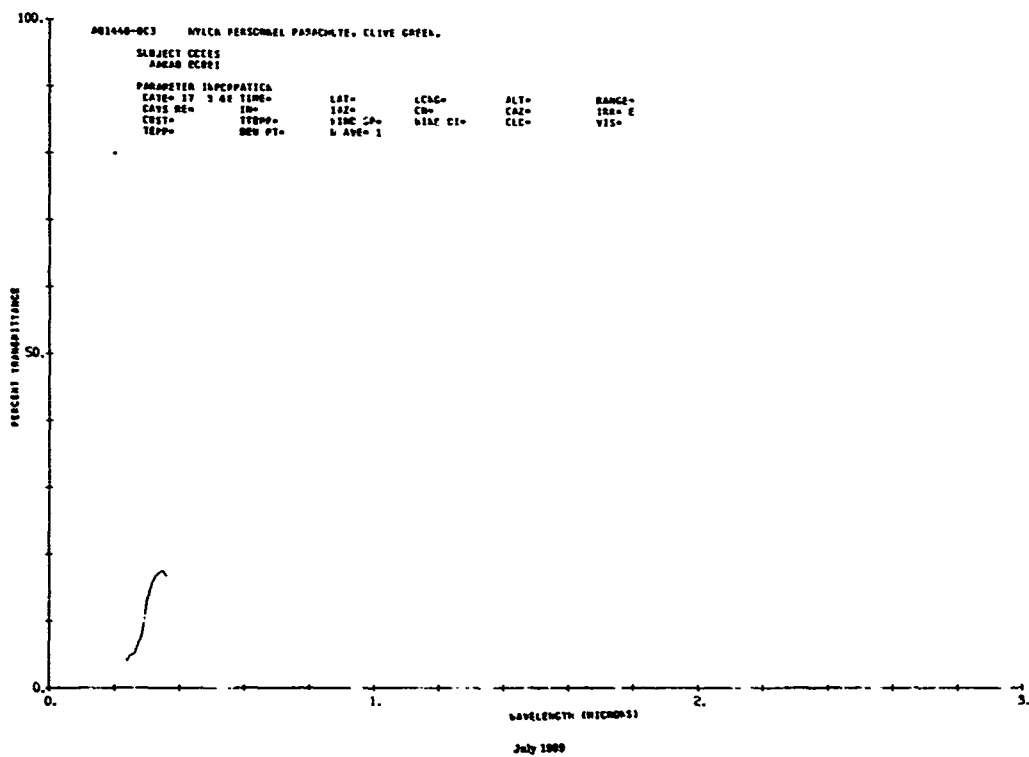
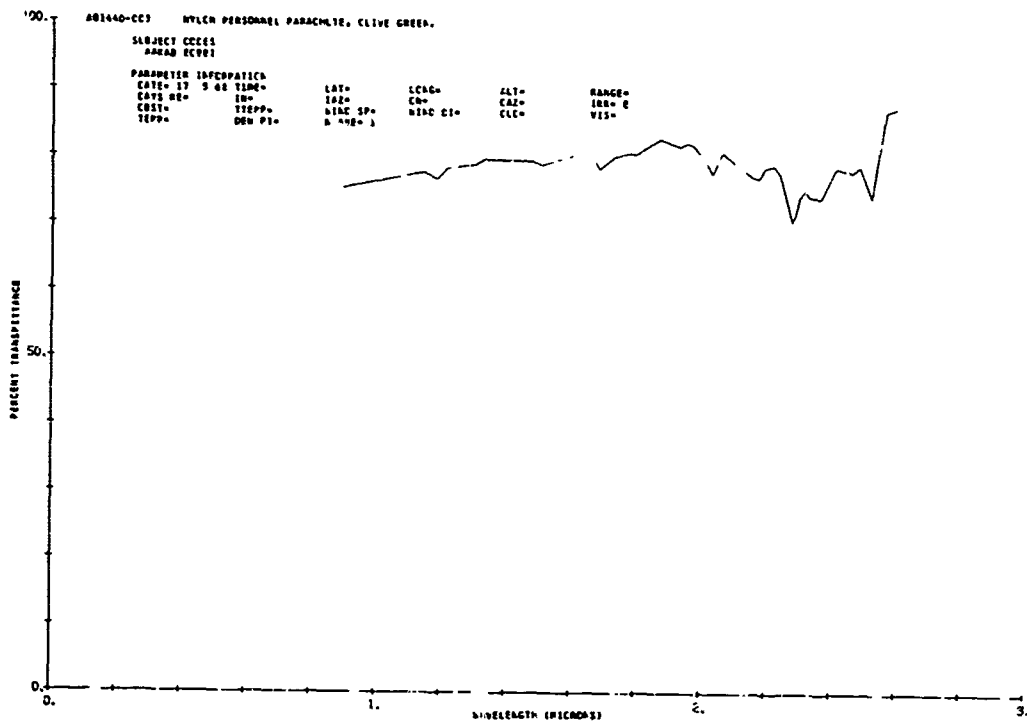
AXXA 73



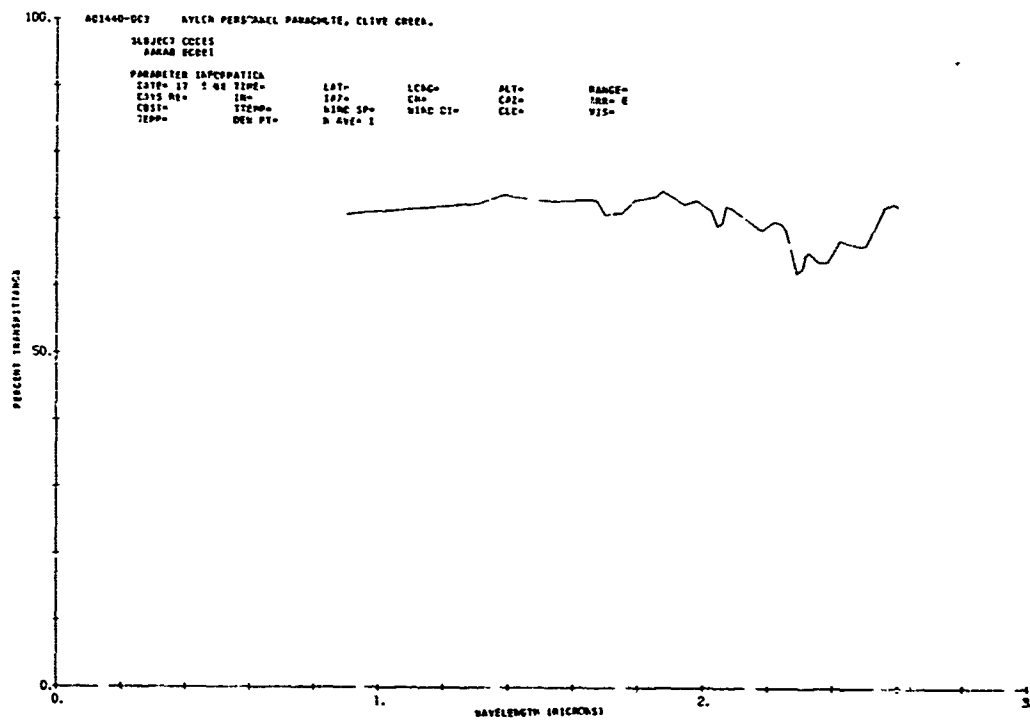
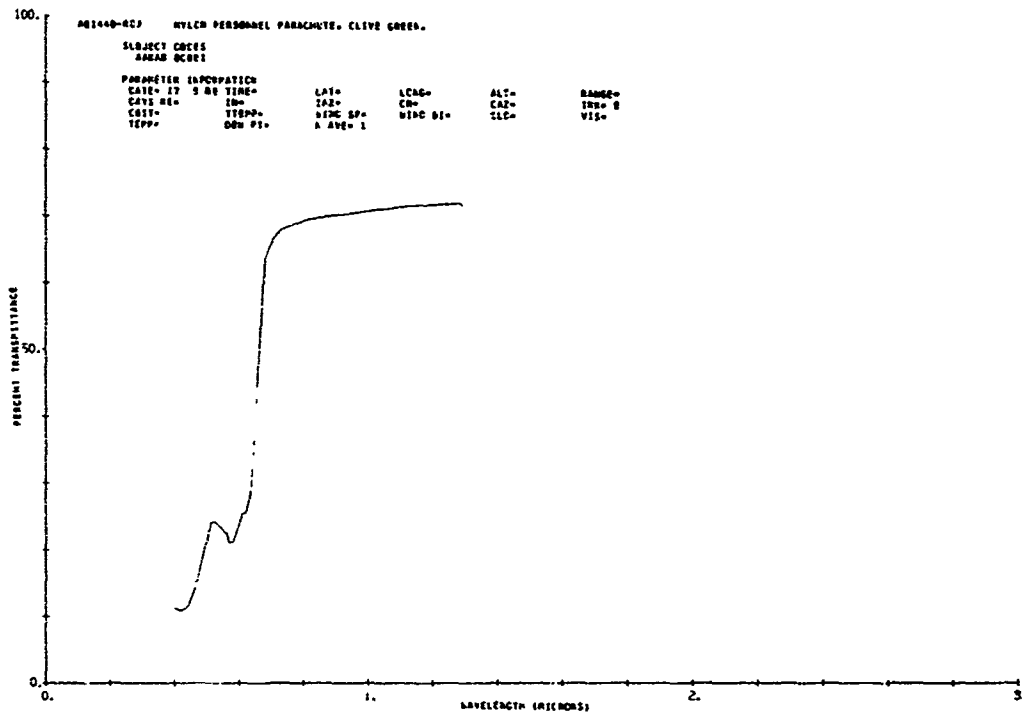
AXXA 73



July 1960

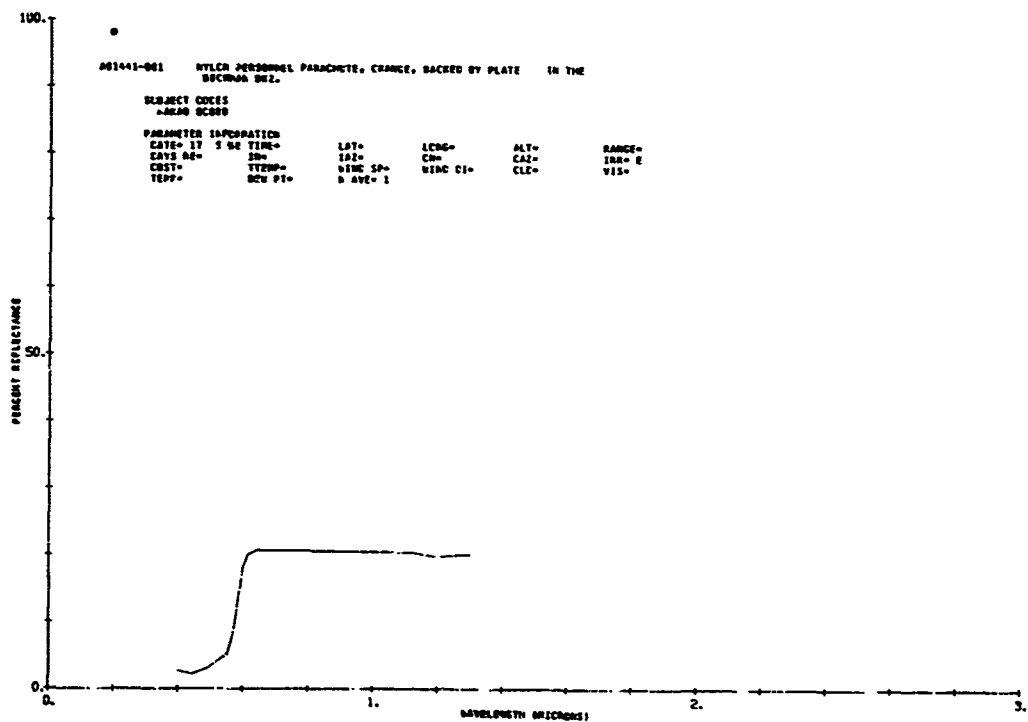
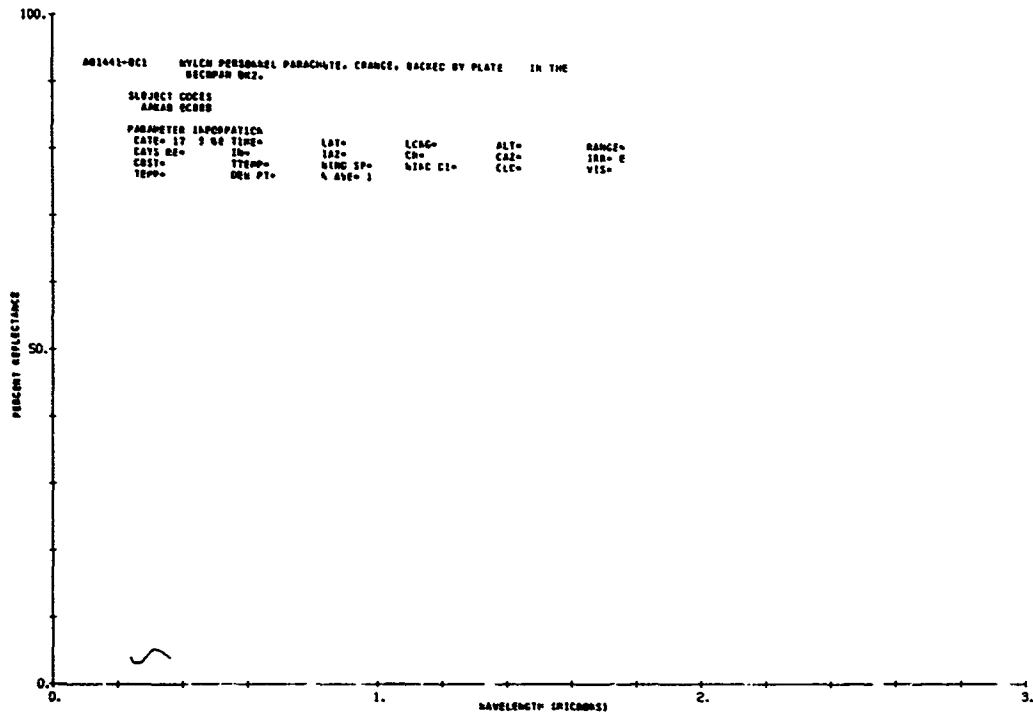


AAJA TS



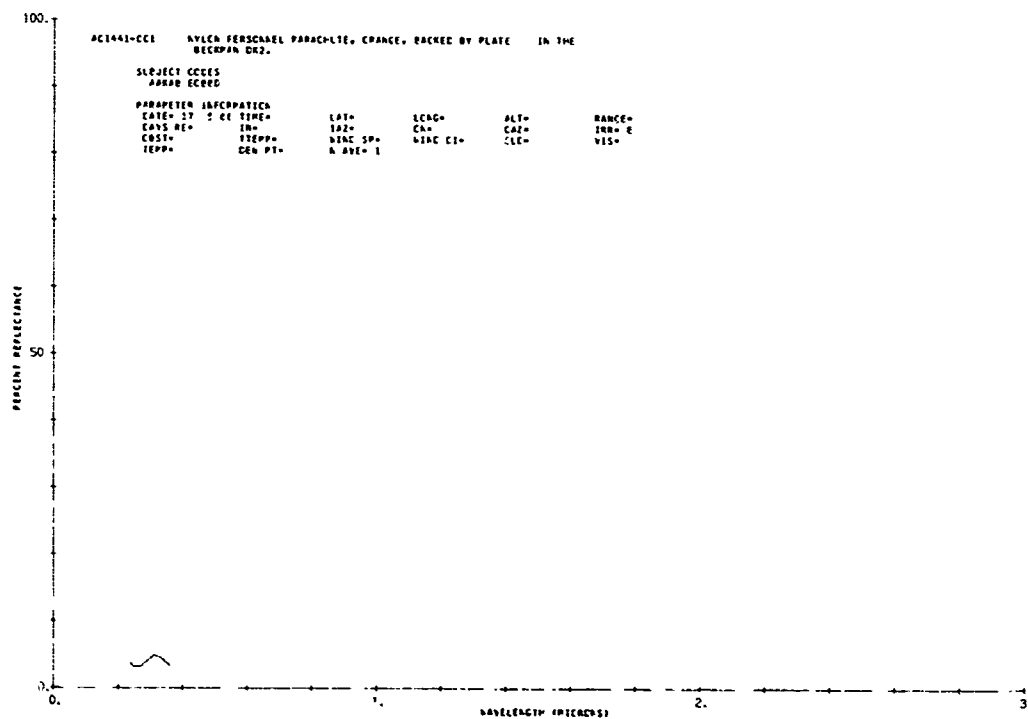
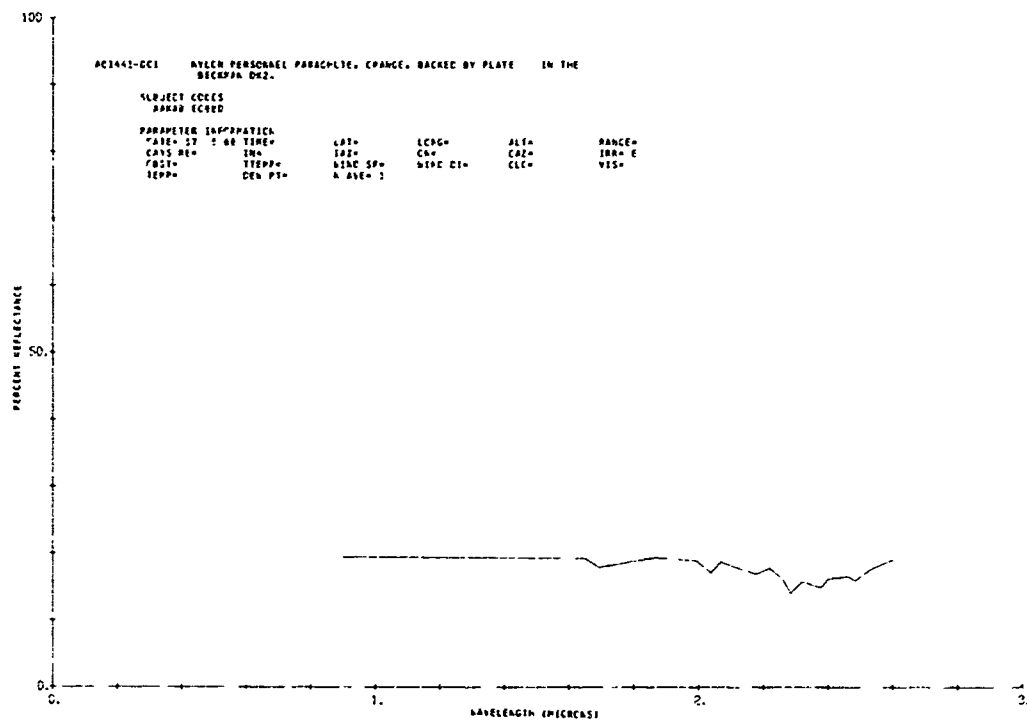
July 1969

AAXA 70



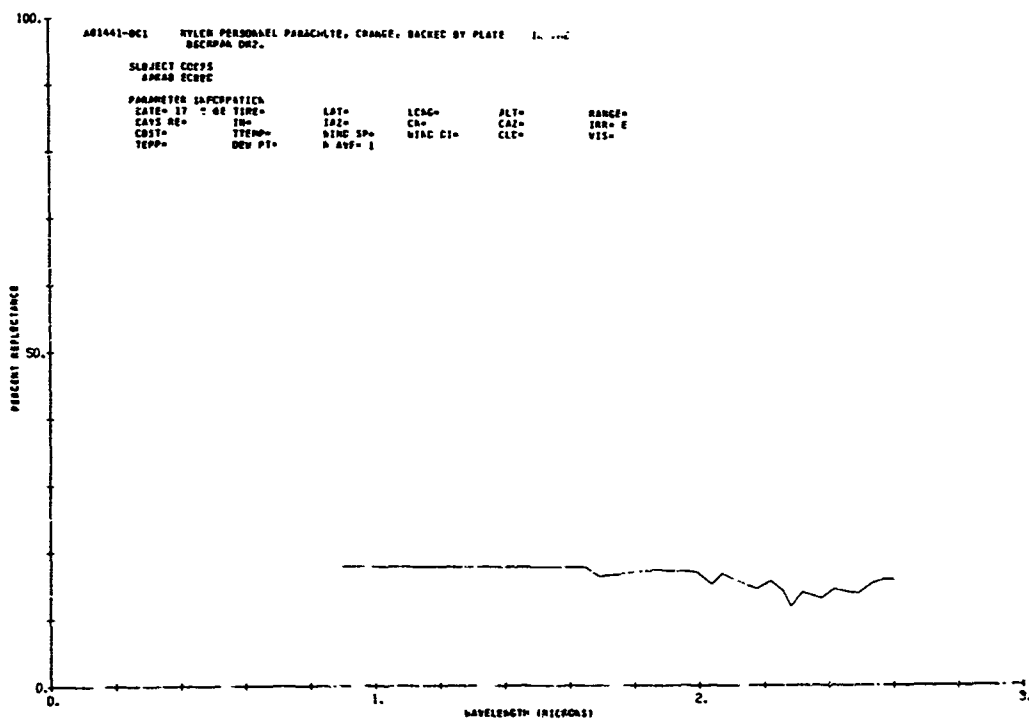
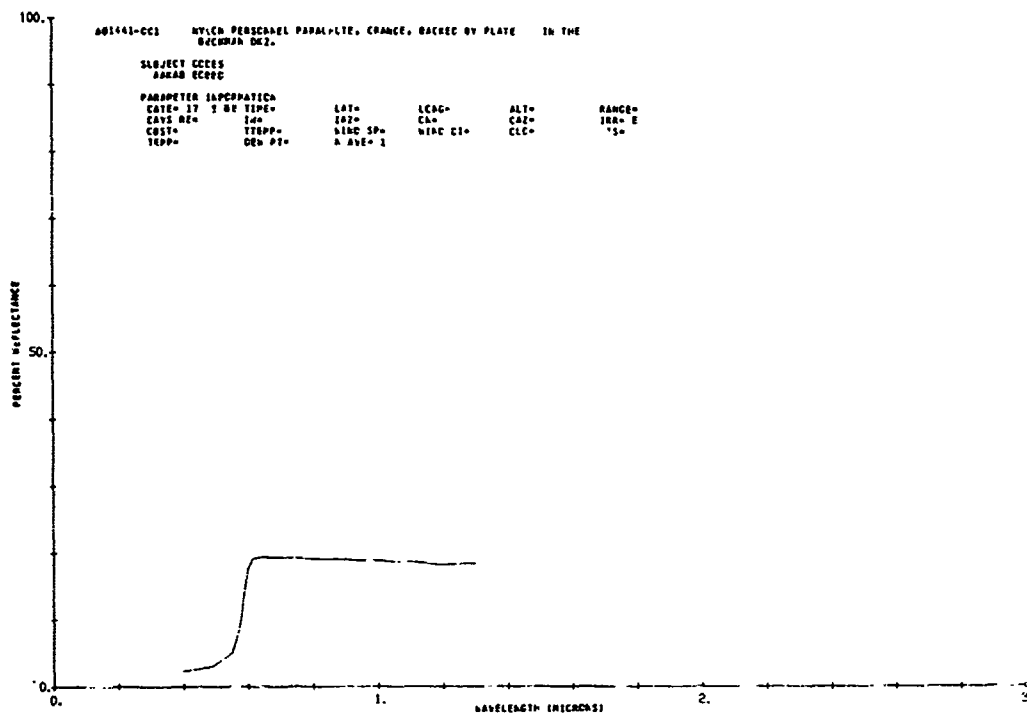
July 1960

AAKA 77



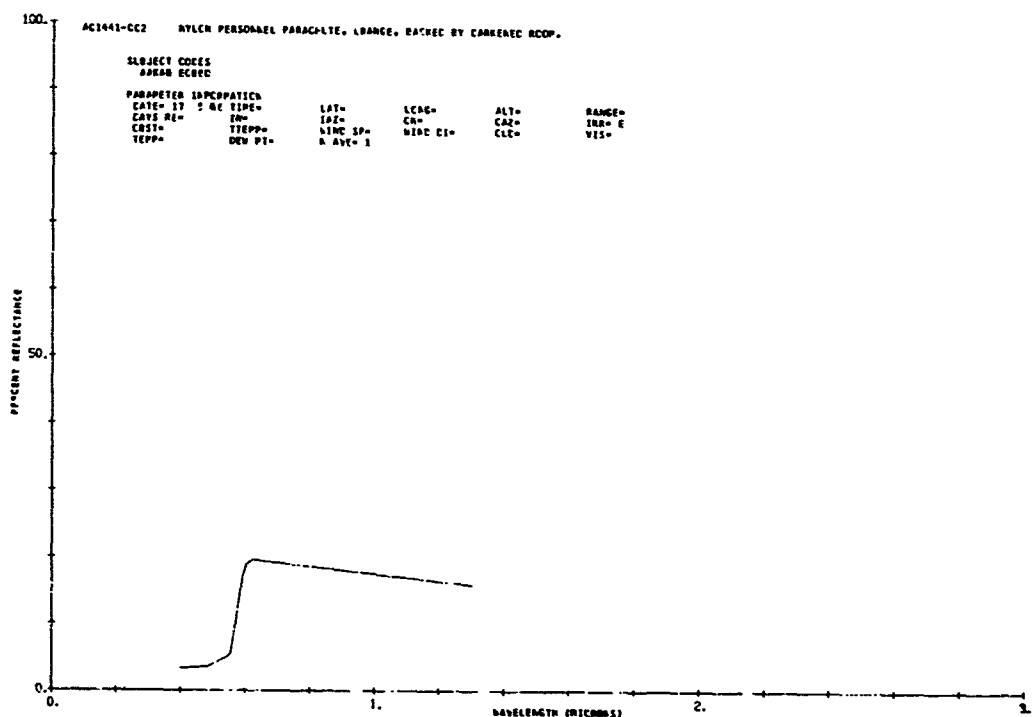
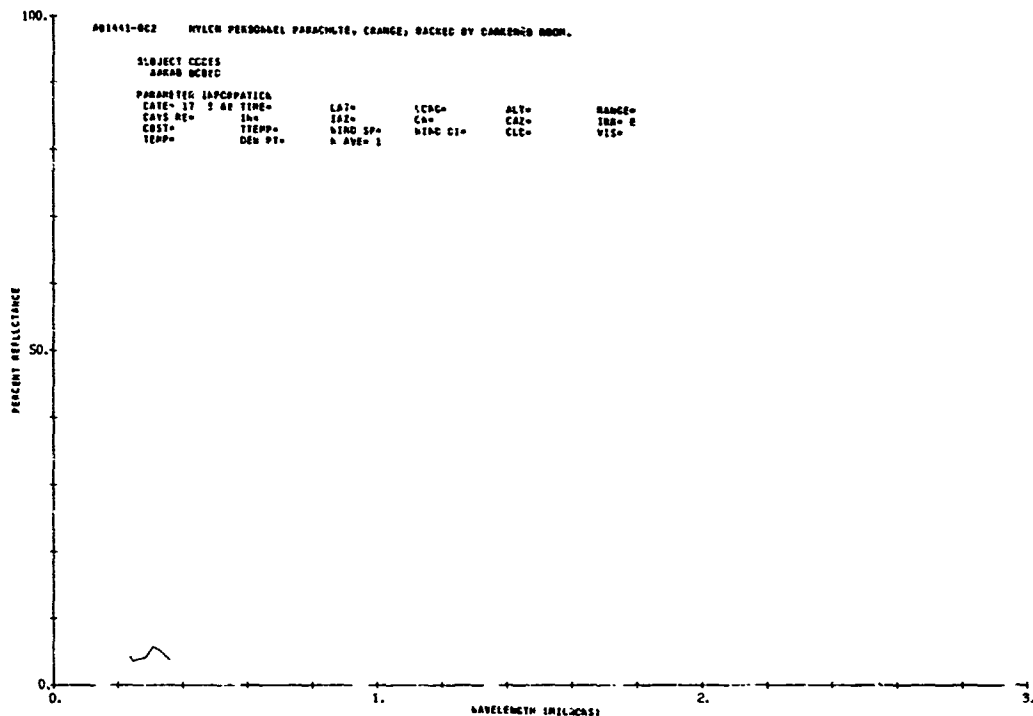
July 1969

AAXA 78



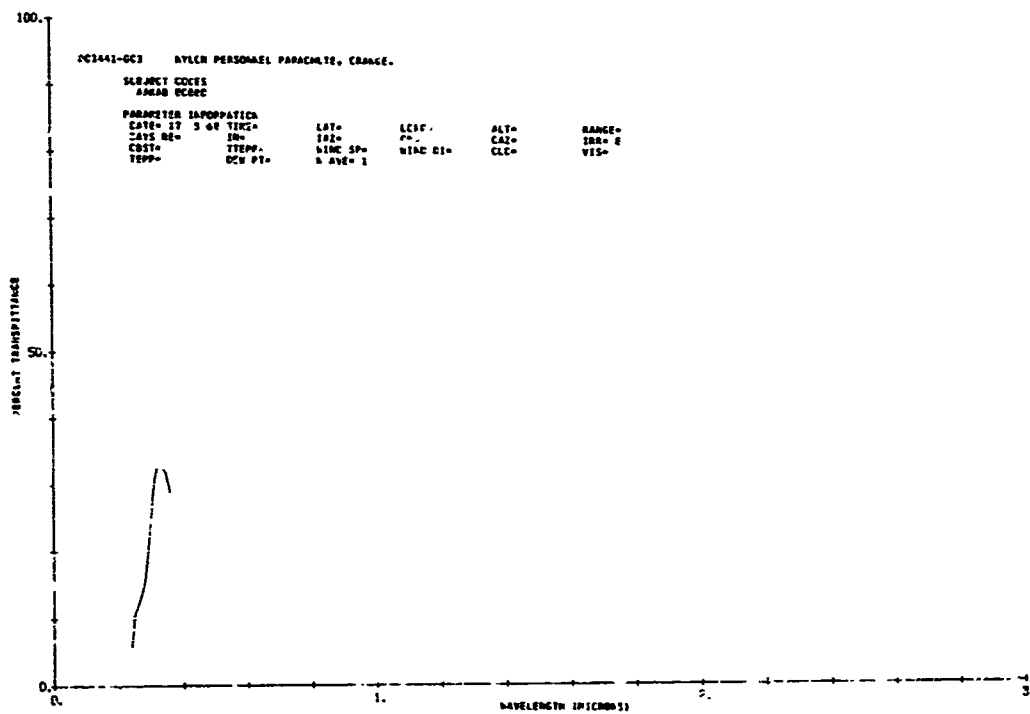
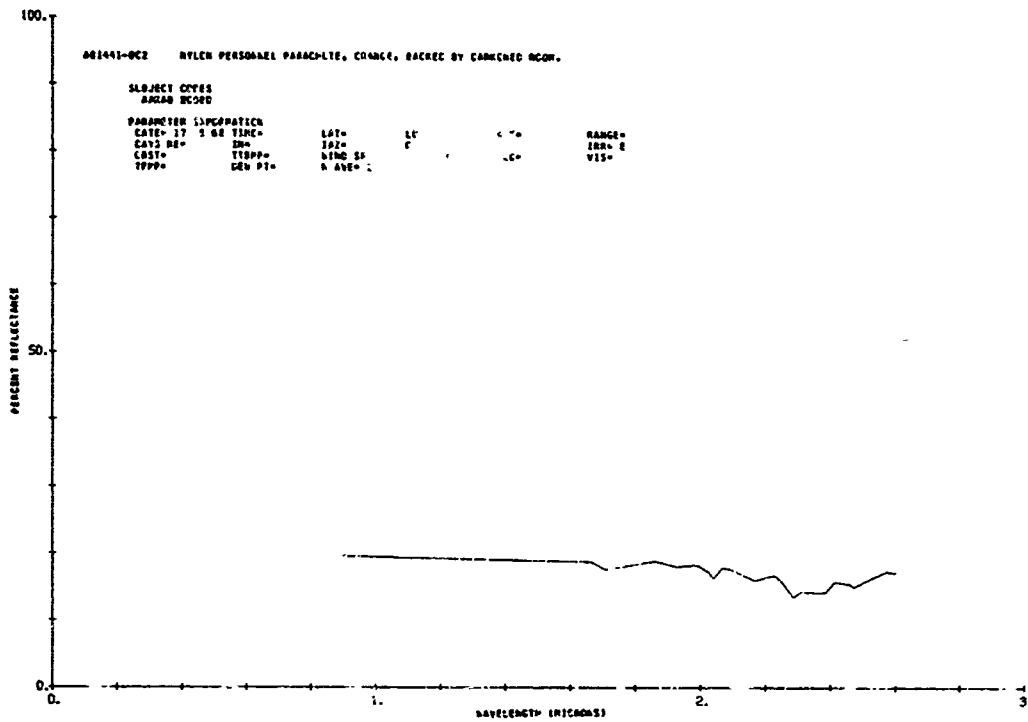
July 1969

AAXA 79

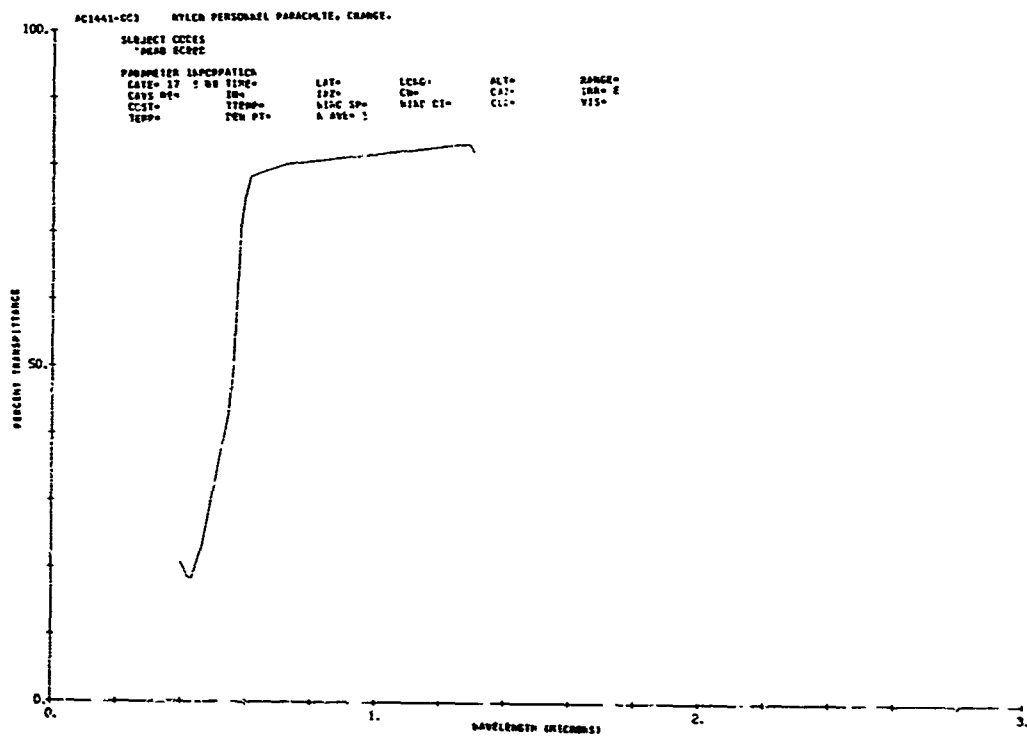
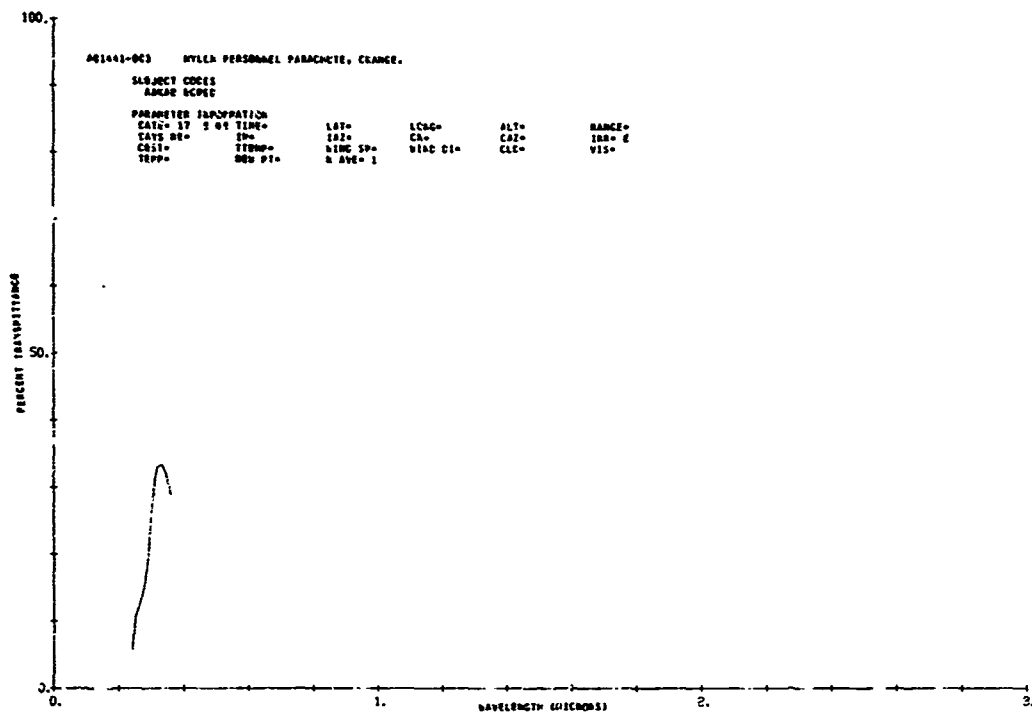


July 1968

AAKA 80

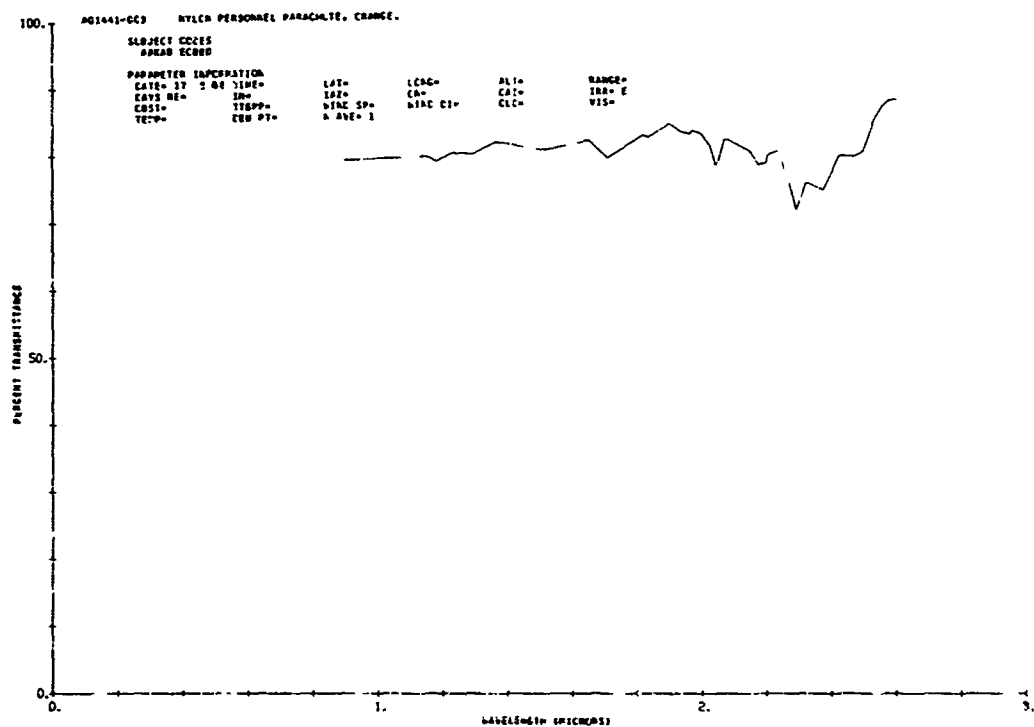
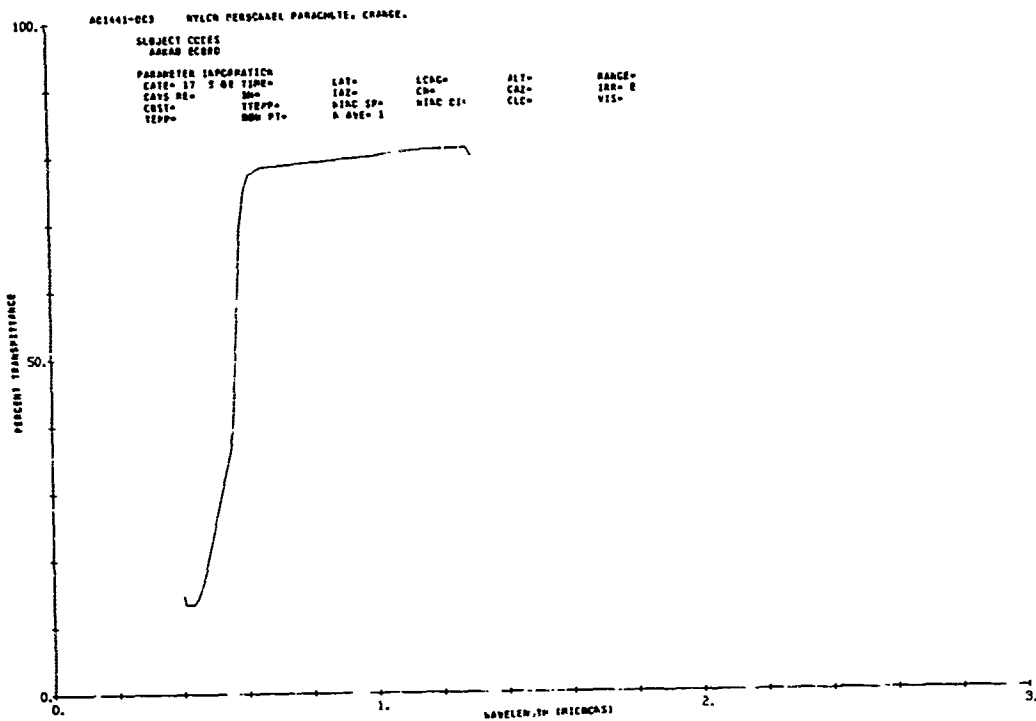


July 1969



July 1999

AAKA M



July 1969

AB1442-0C1 MFLN PERSONNEL PARACHUTE, SAND, BACKED BY PLATEIN THE BECRANAH DCS

SUBJECT CODES
AAG00 DC00F

PARAMETER IDPCPPATSCN
CATE= 17 5 CE TIME= LAT= LCHL= ALT= RANGE=

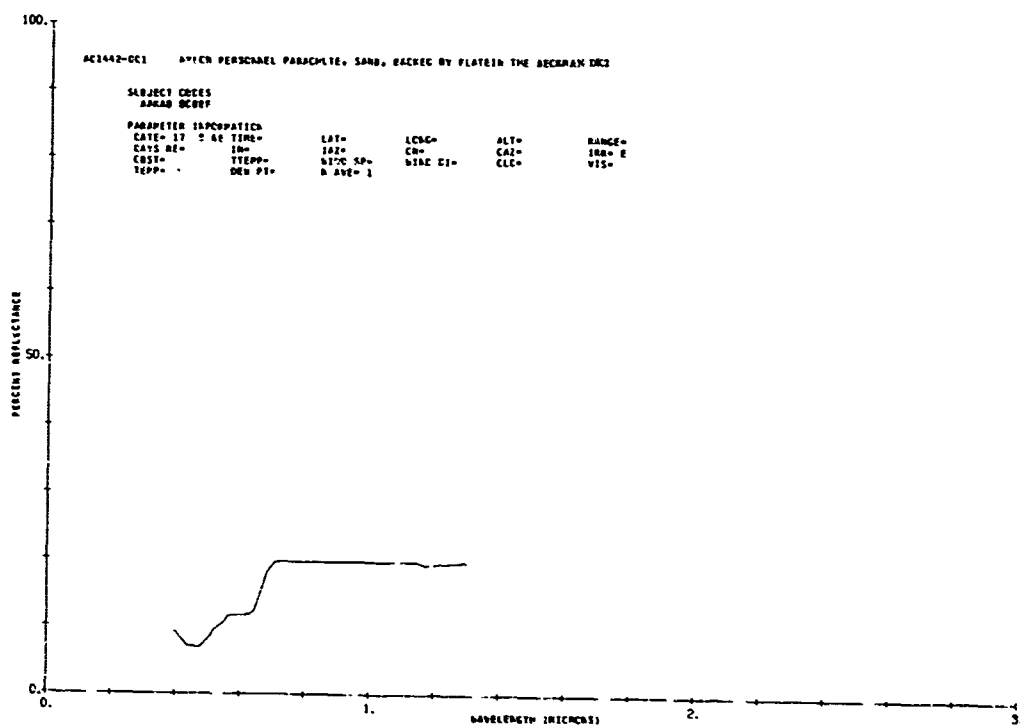
CVTS BE= ID= ID= CH= CAL= IDN= E

COST= STEP= WING SP= WING CI= CLC= VIS=

TEPP= DEN PT= H AVE= 1

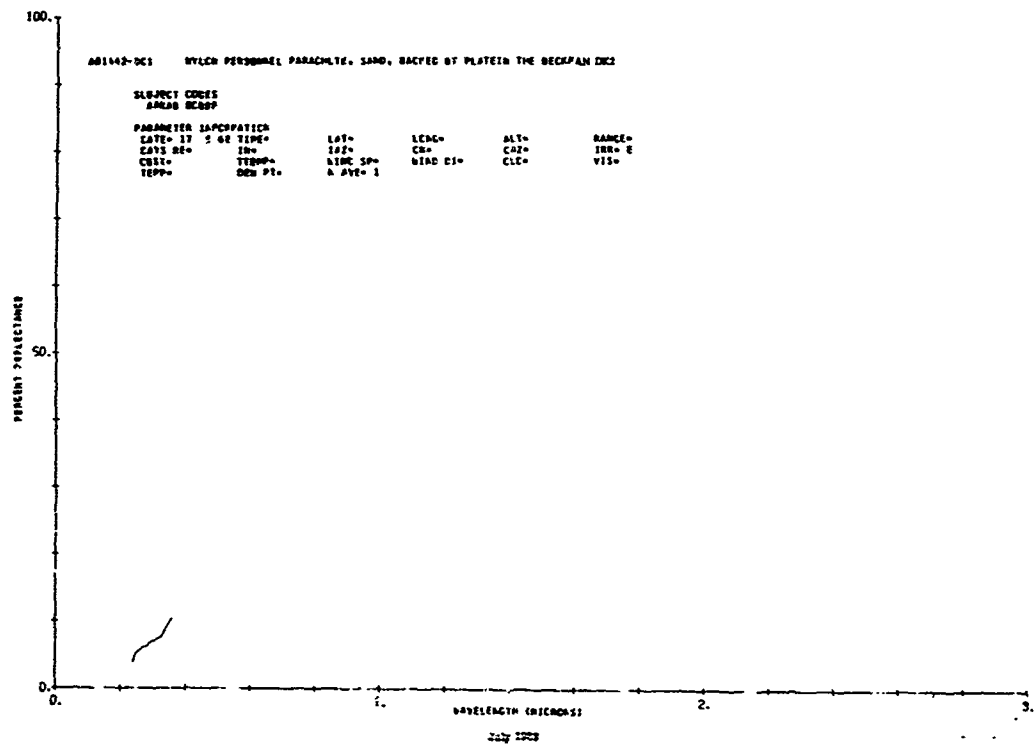
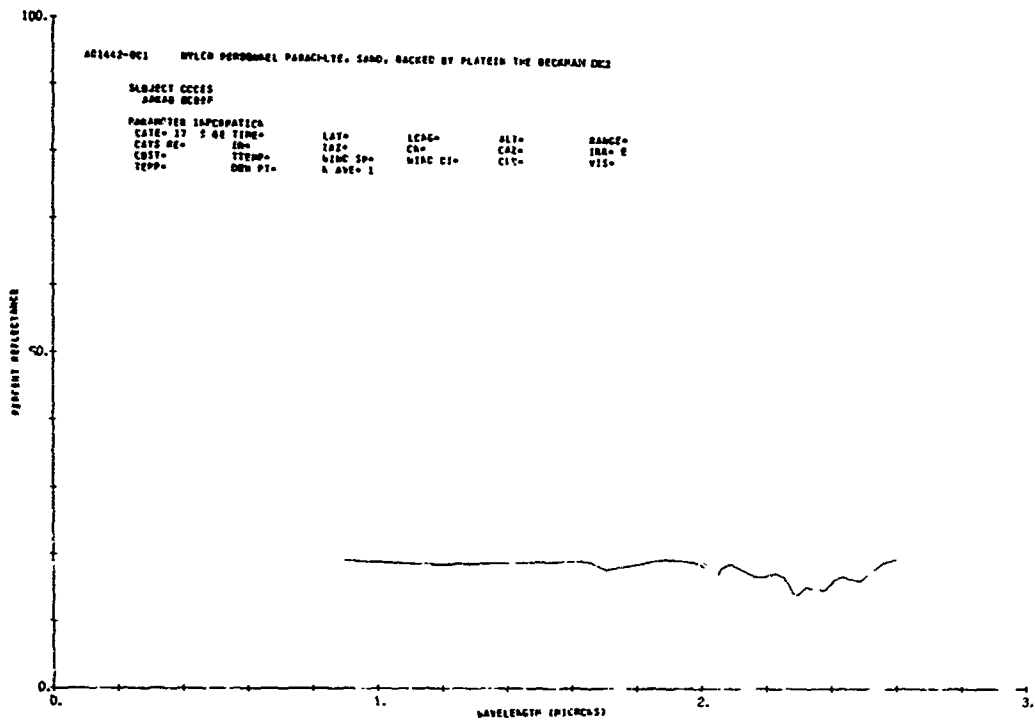
PERCENT REFLECTANCE

WAVELENGTH (MICRONS)

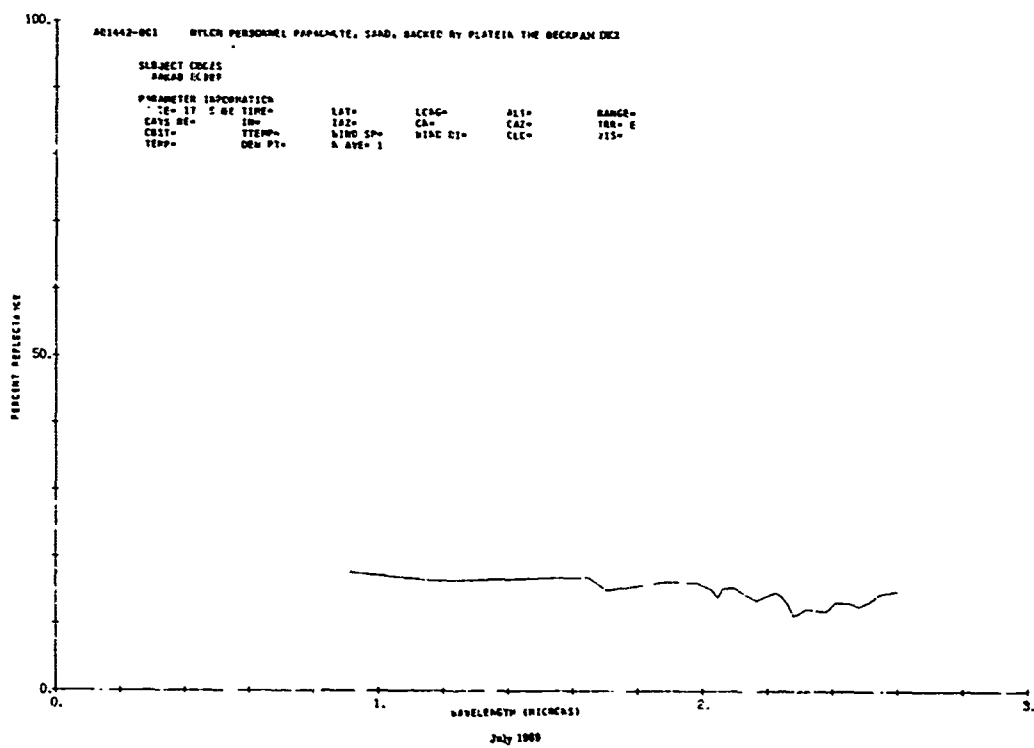
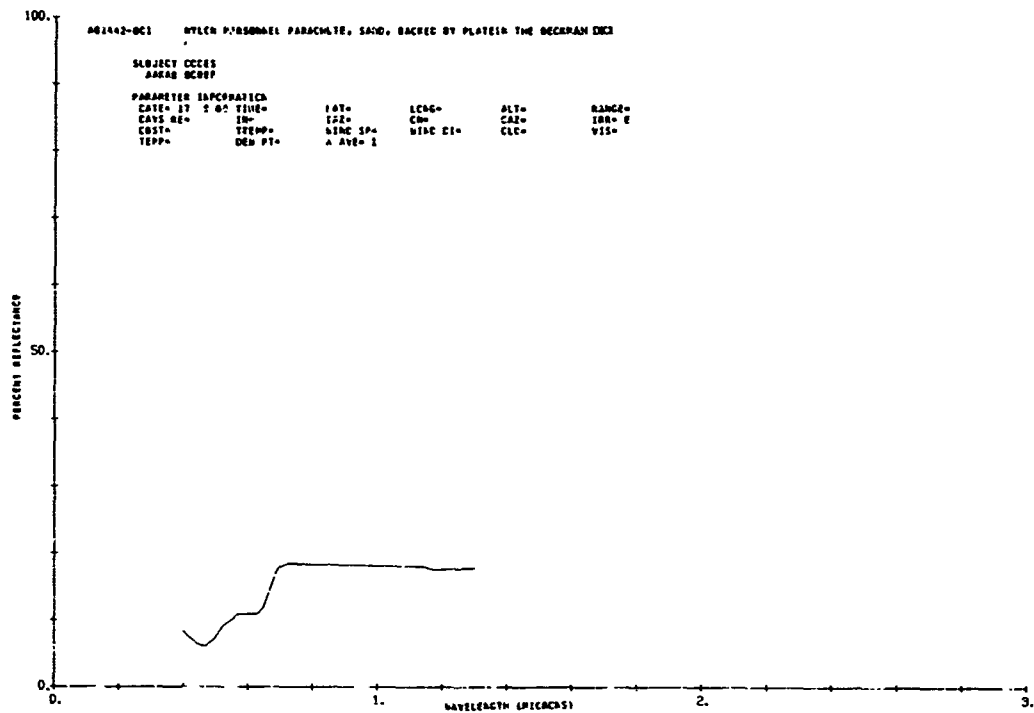


July 1969

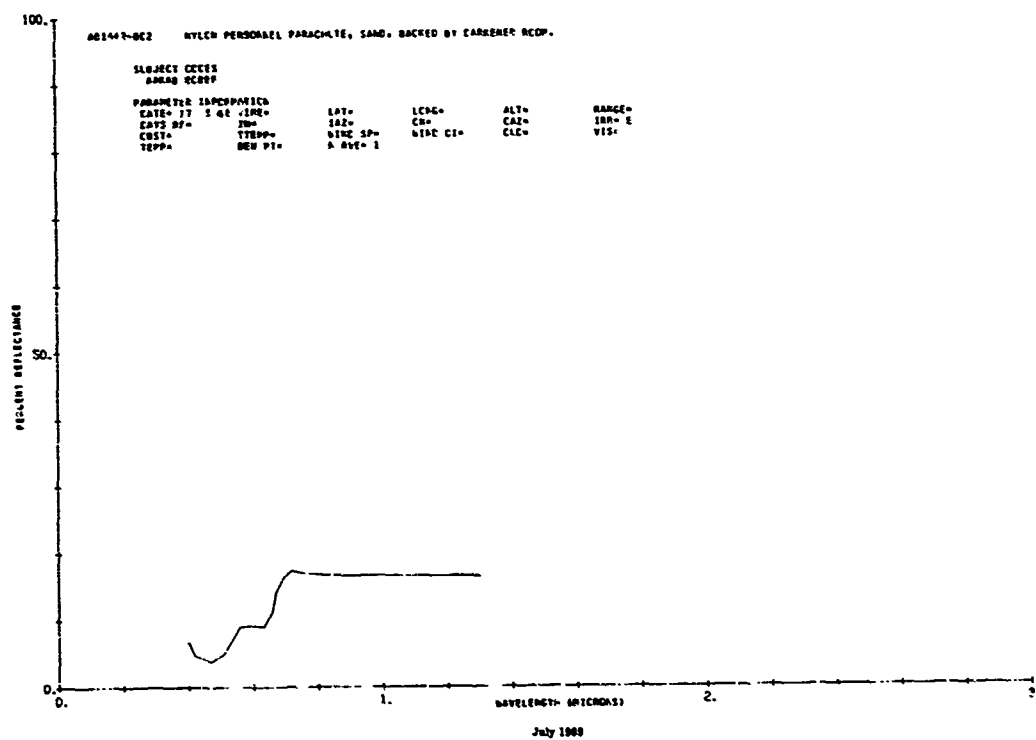
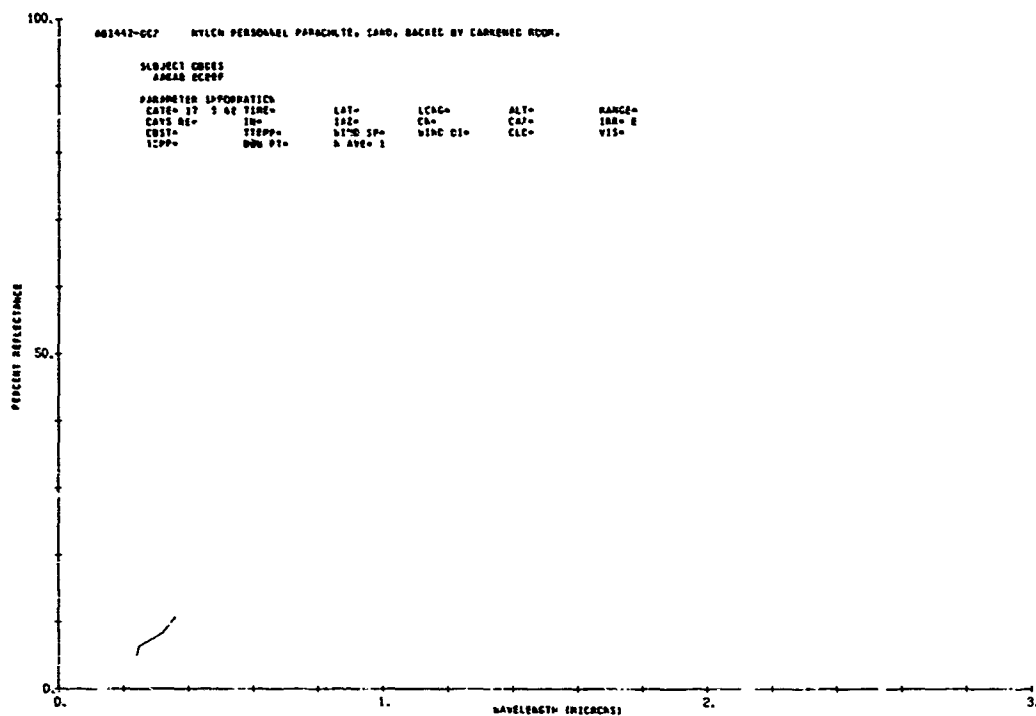
AARA 96



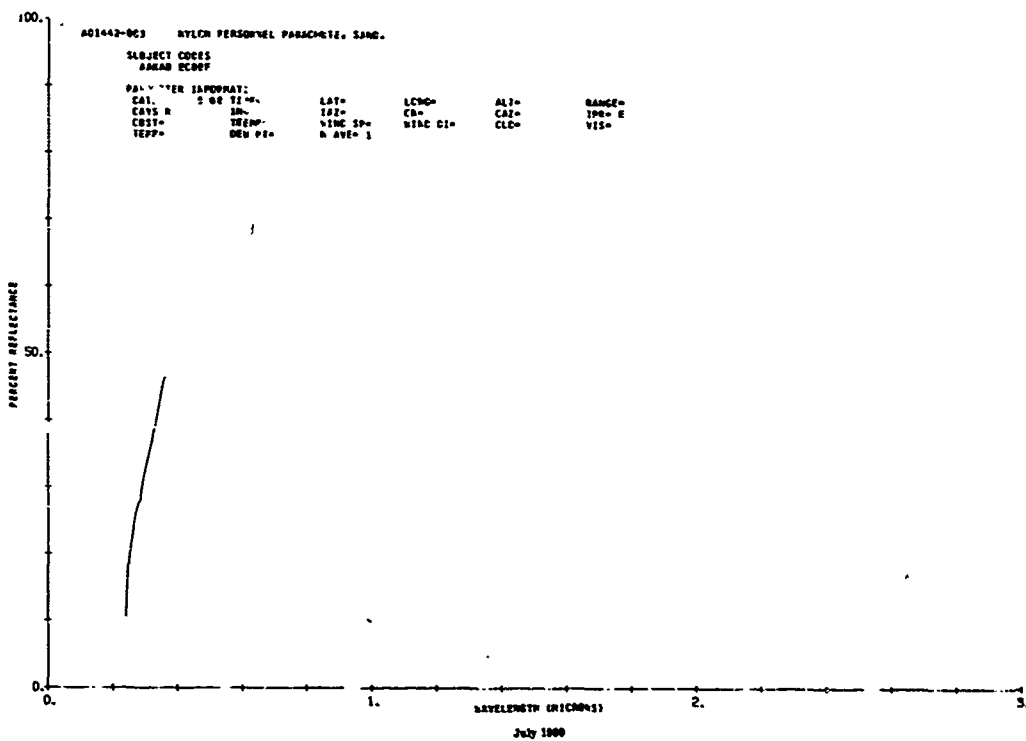
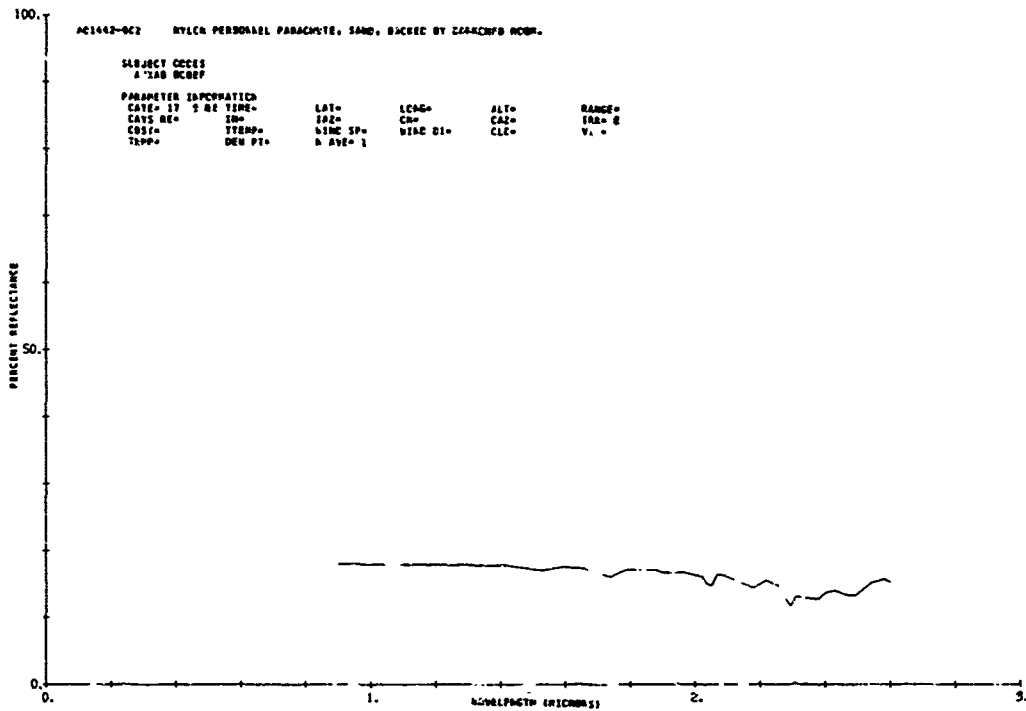
AAXA 87



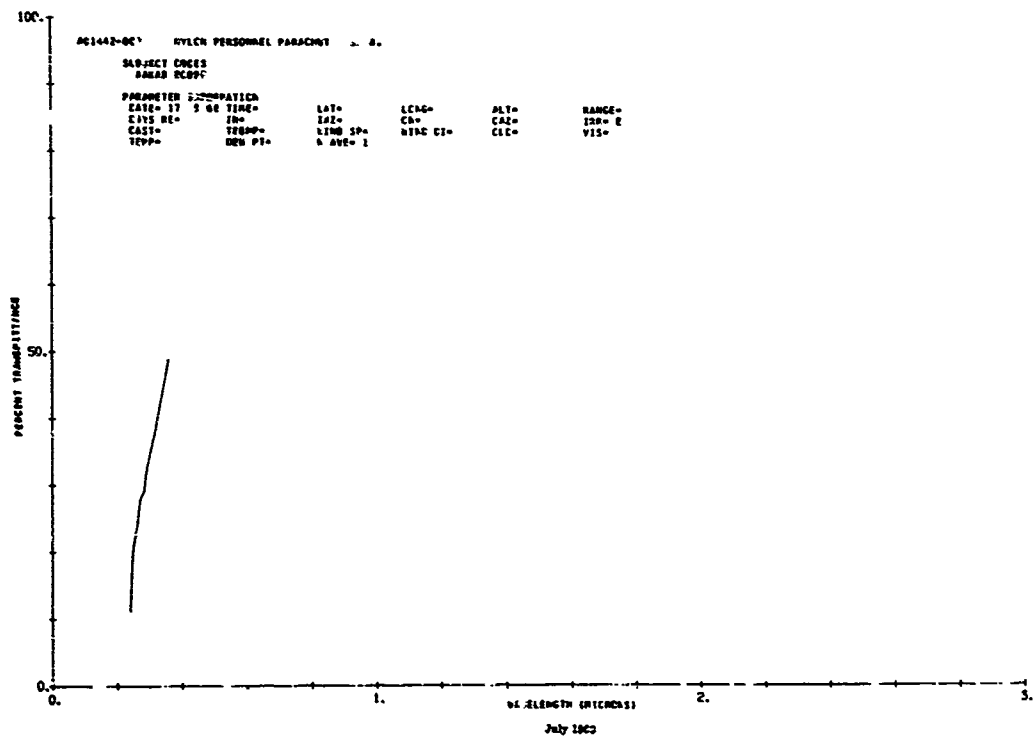
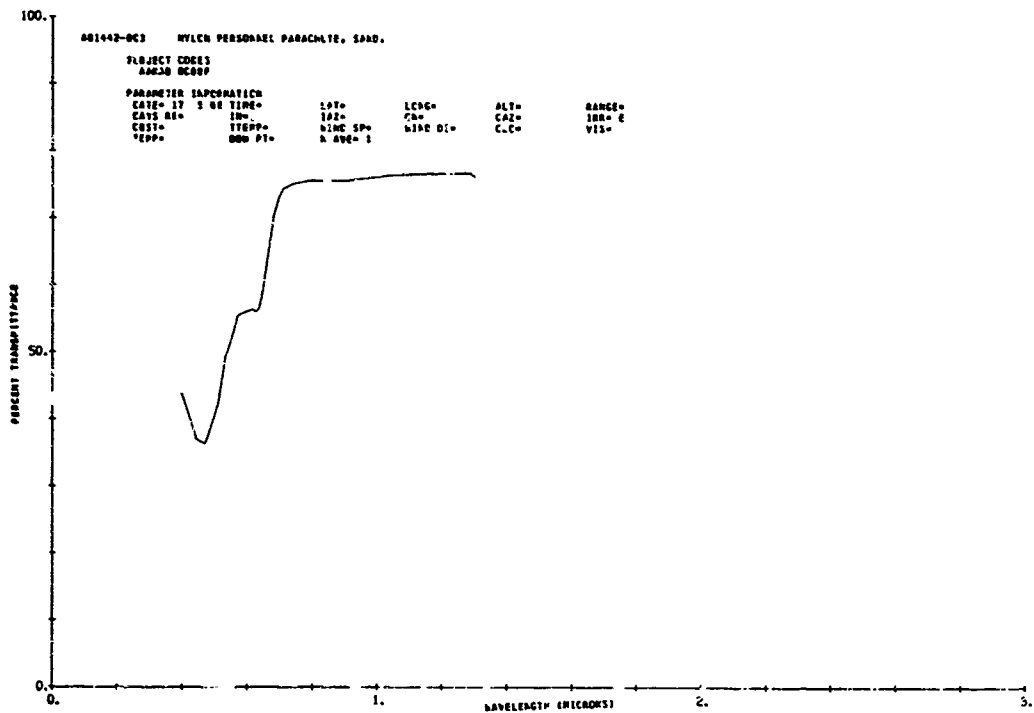
A.2A 86



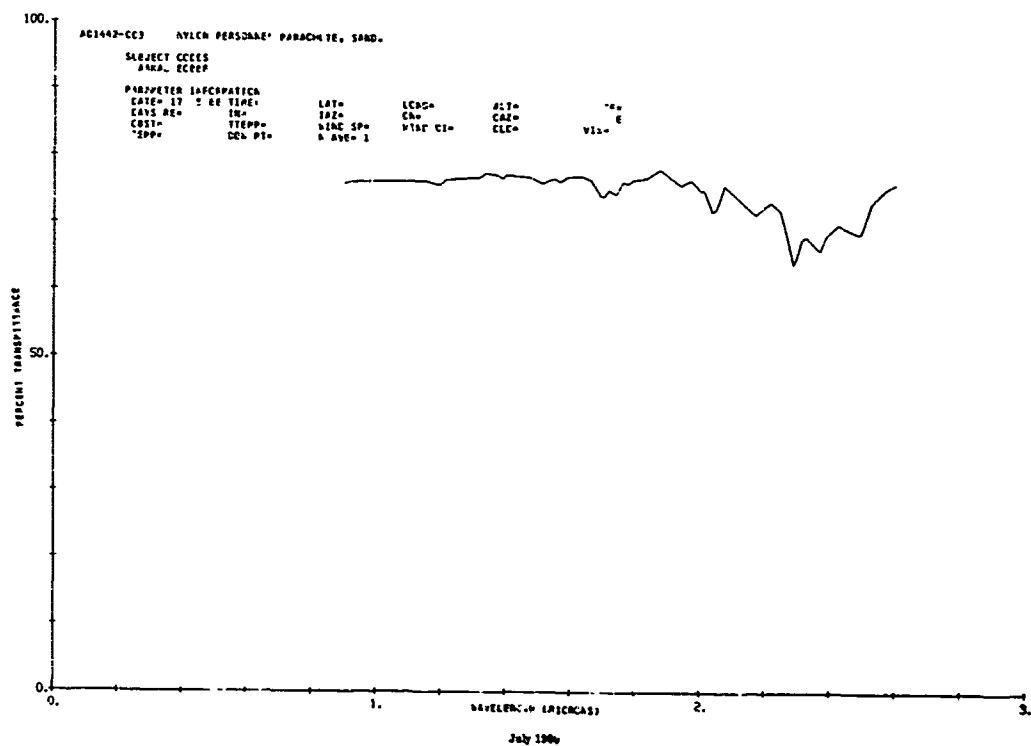
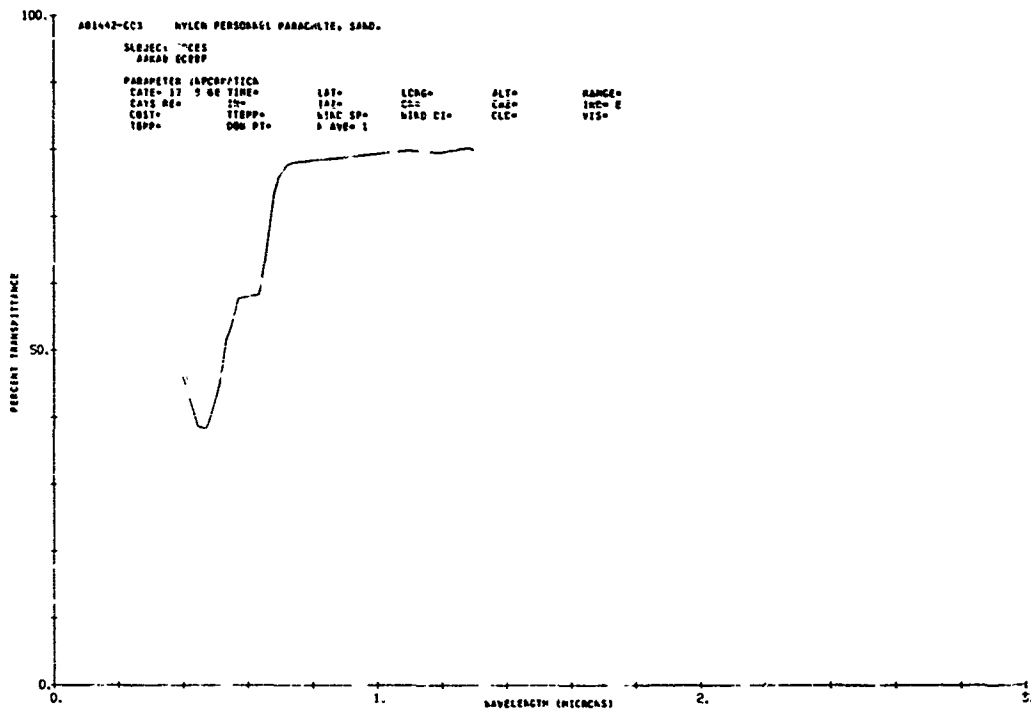
ALFA 88



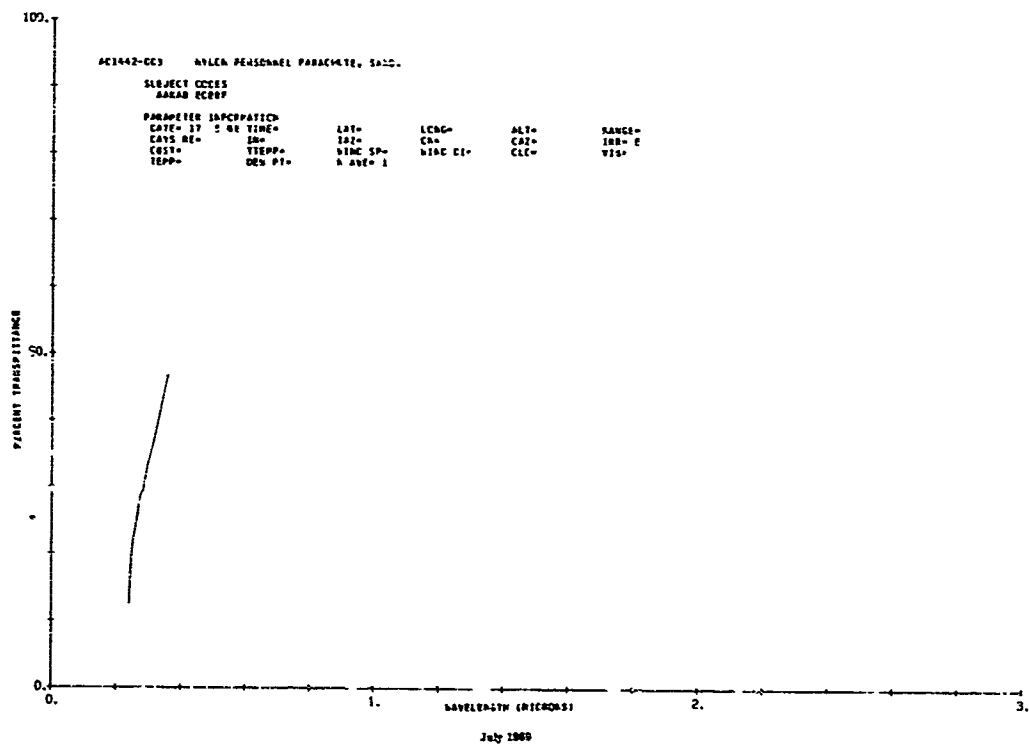
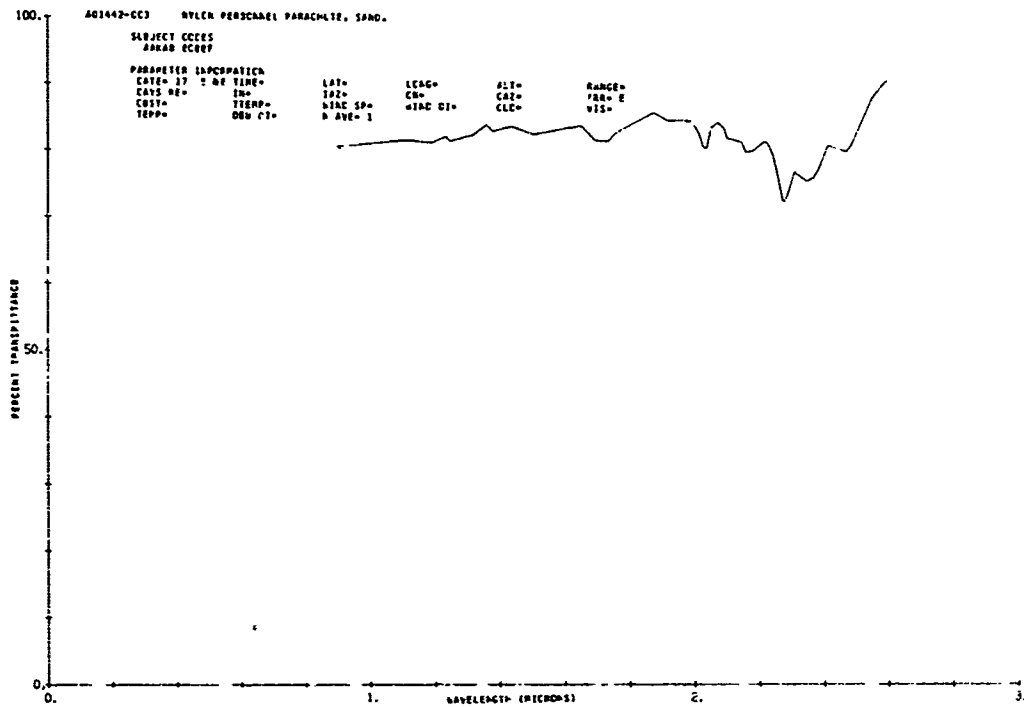
ALSA 90



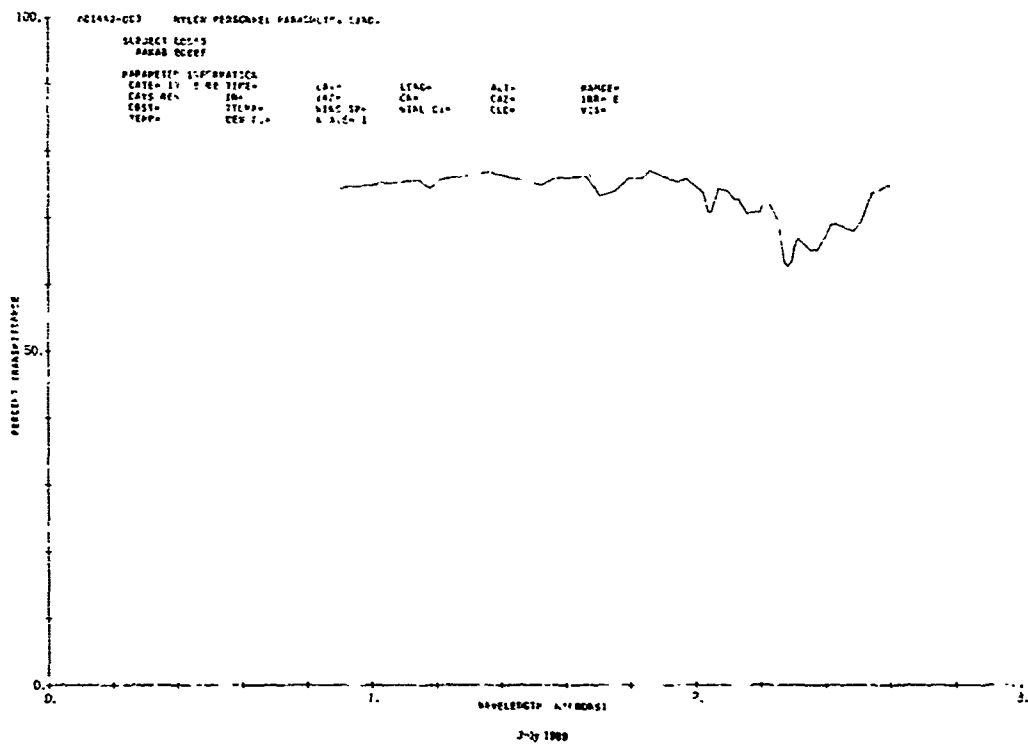
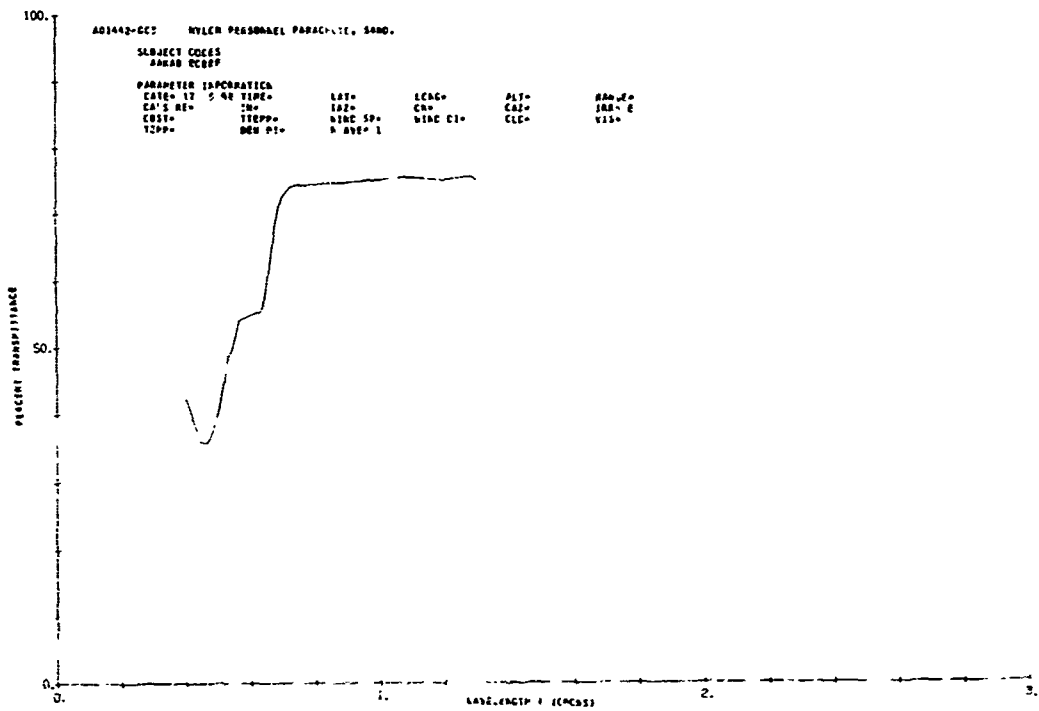
AKA 91



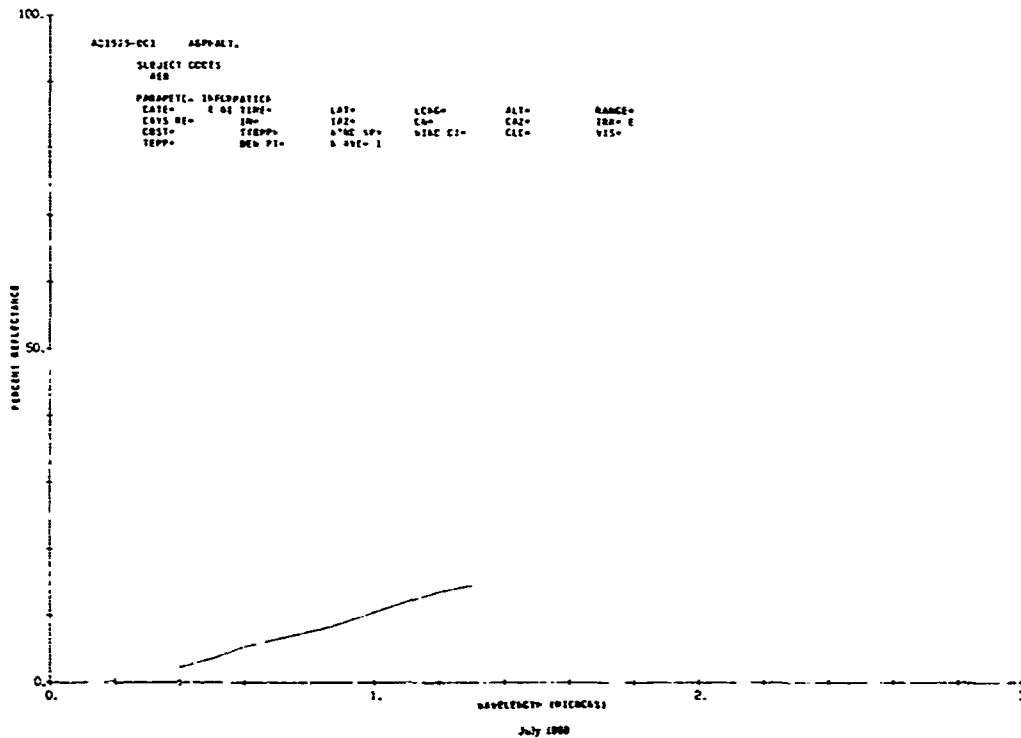
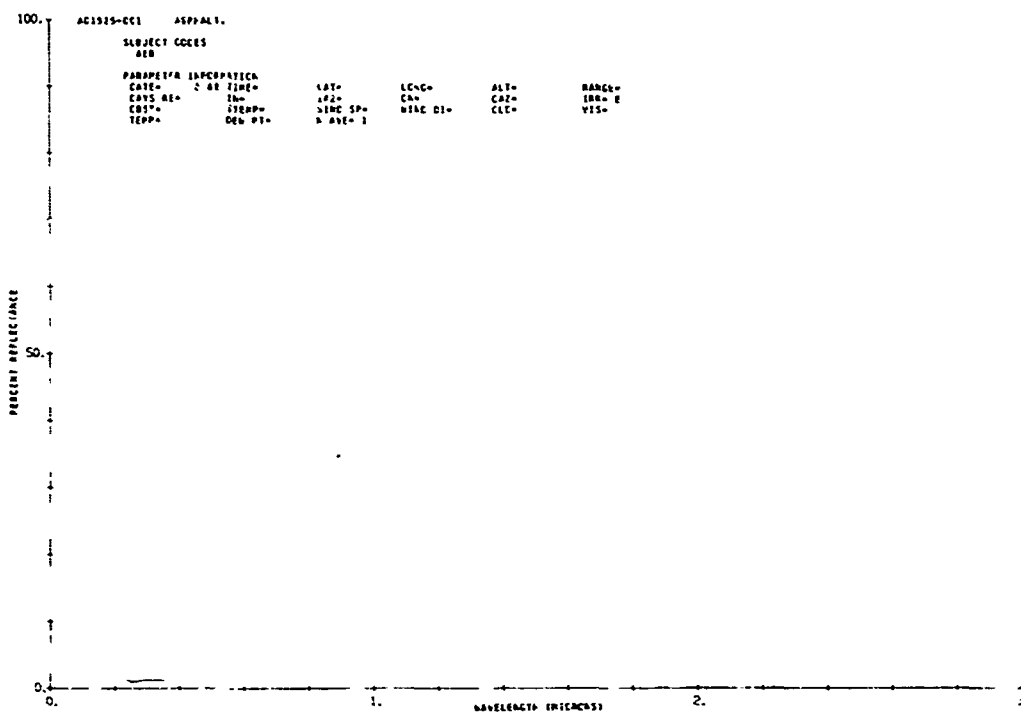
AAKA 92



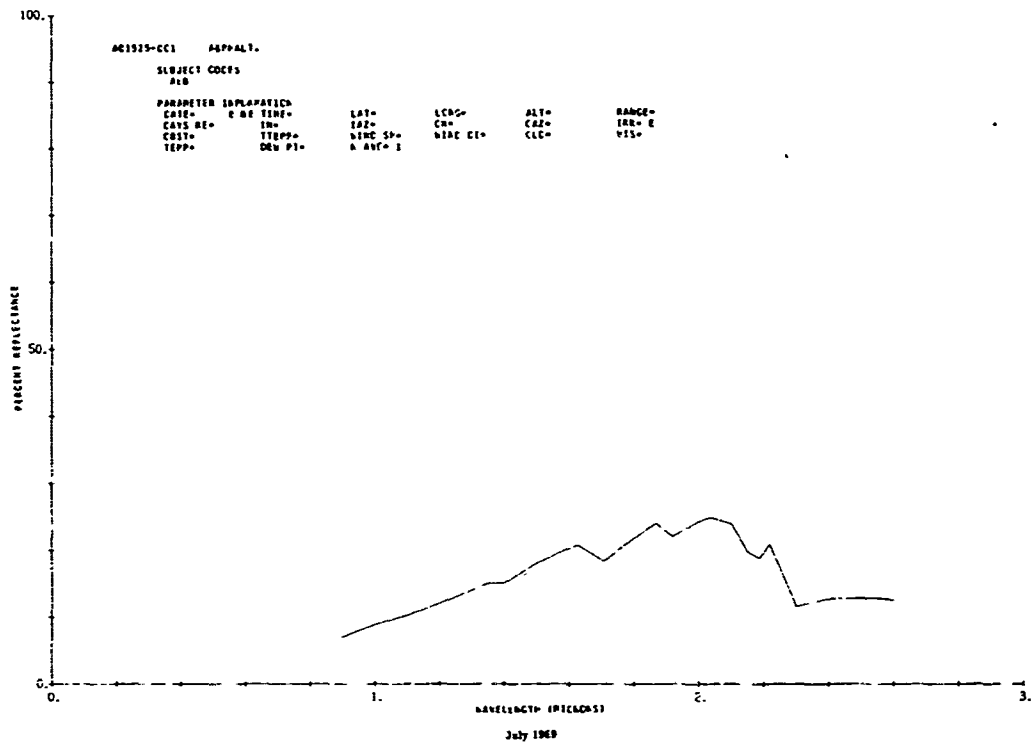
AARA 93



AED 3



ARD 4

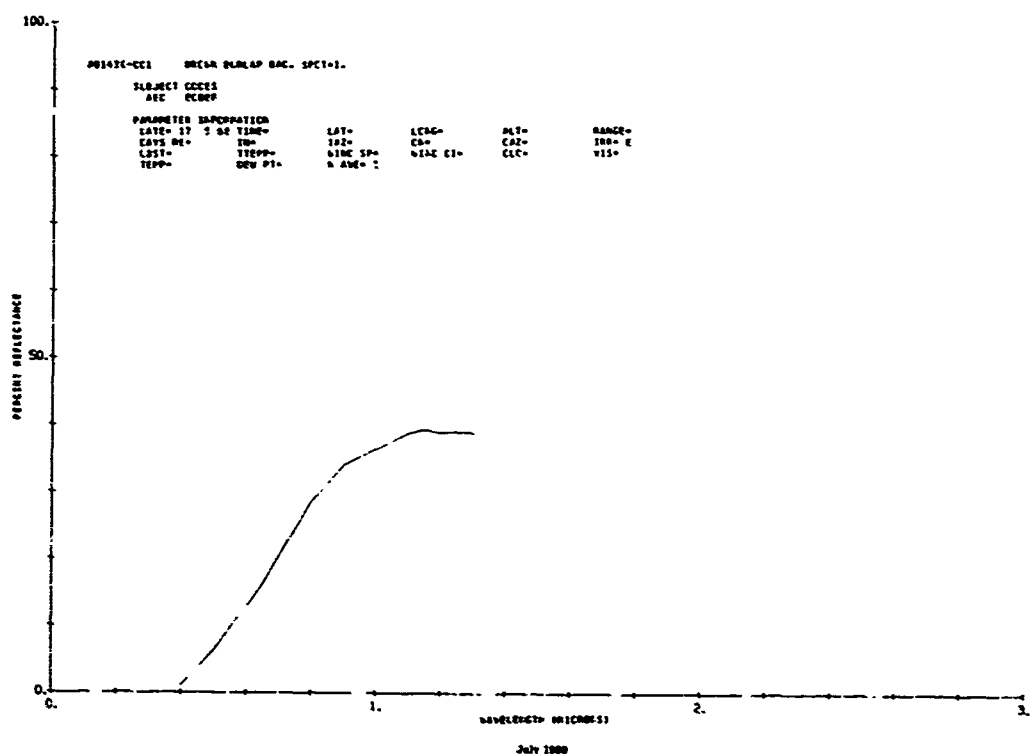


001630-CC1 MACH BLALAP MAG. SPT=1.

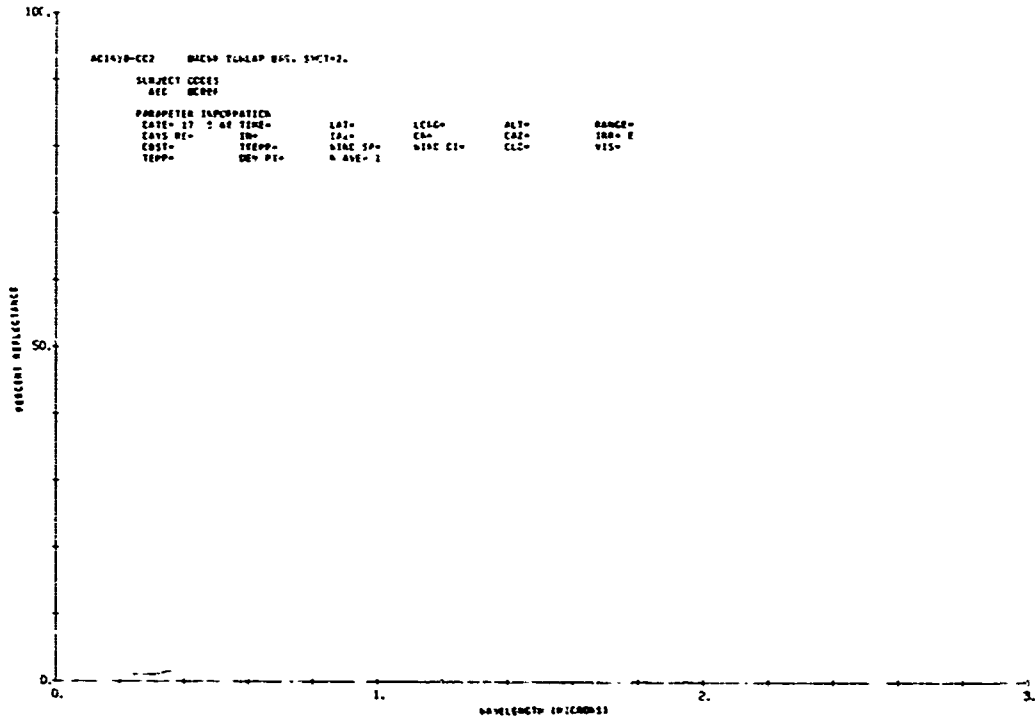
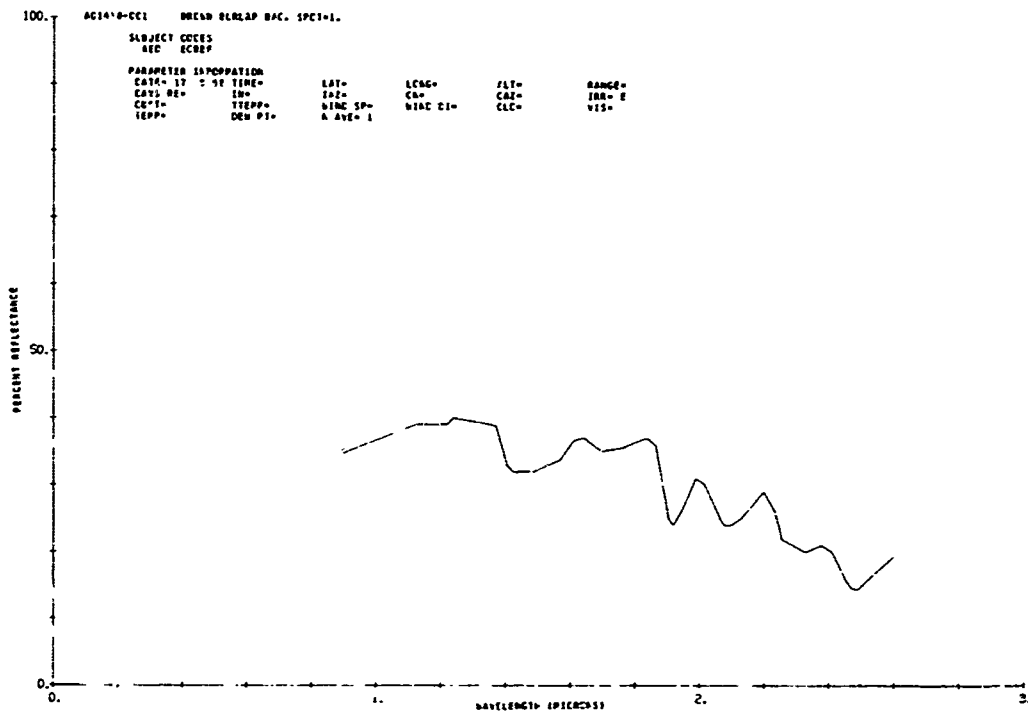
SUBJECT CODES
AID DECP

PARAMETER INFORMATION
DATE= 17 3 89 TIME= LAT= LCAG= ALT= RANGE=
EVS RE= 204 CAL= CH= CAZ= IRR= E
COST= TREP= WIND SP= WIND CL= CLE= VIS=
TEPP= DEL PT= / AX= 1

Wavelength (microns)	Optical Reflectance
0.2	35

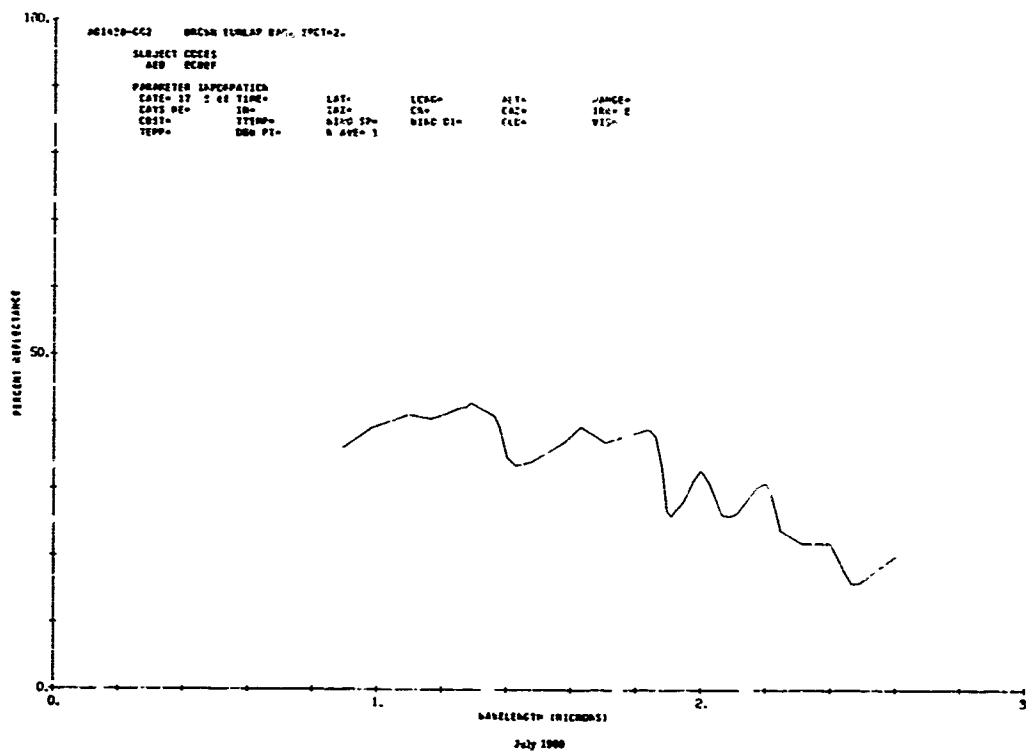
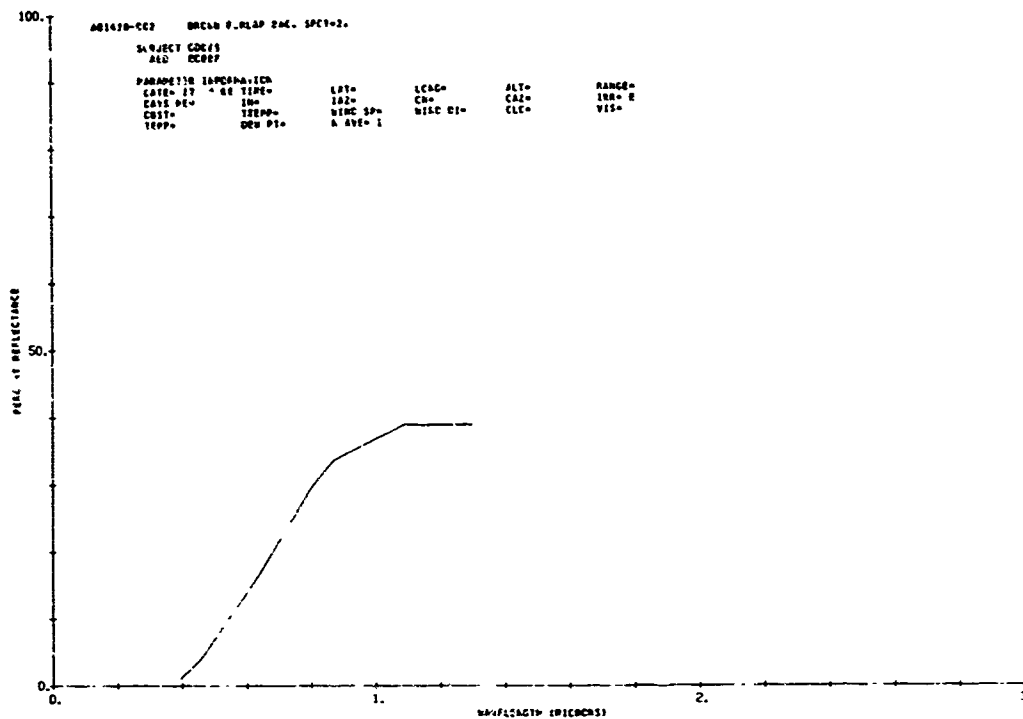


AND 7

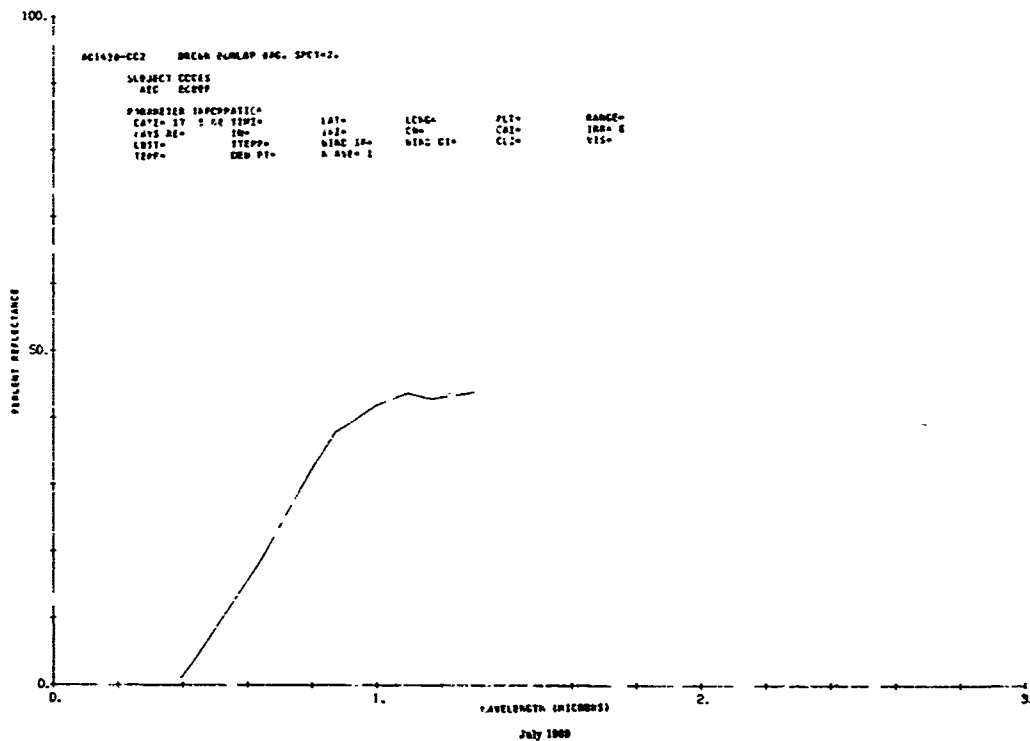
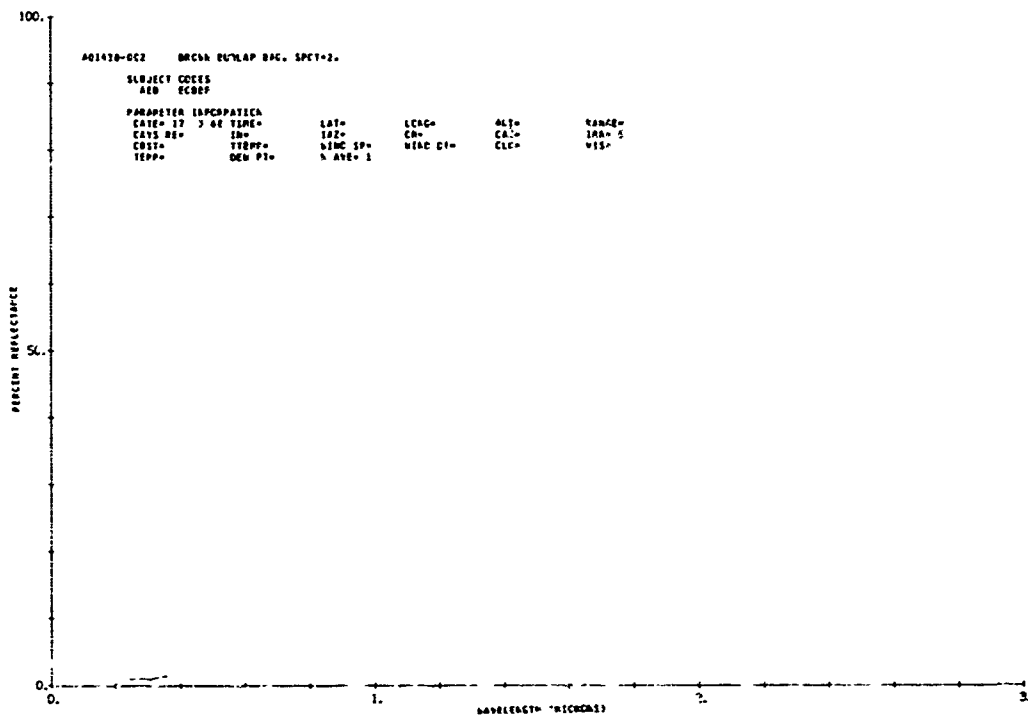


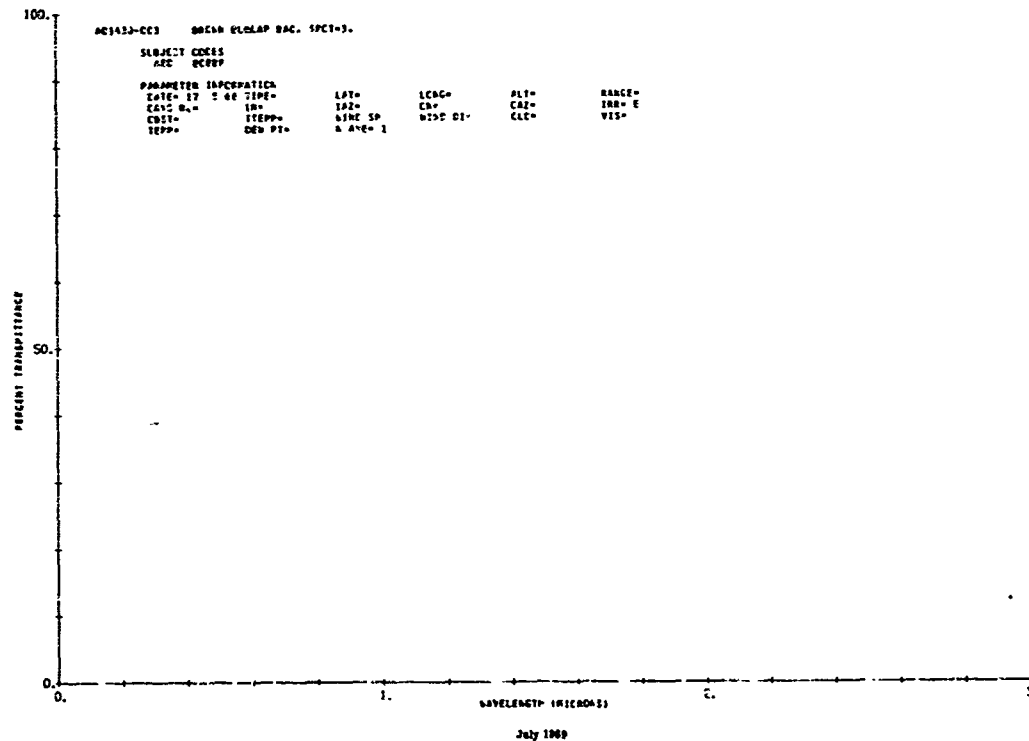
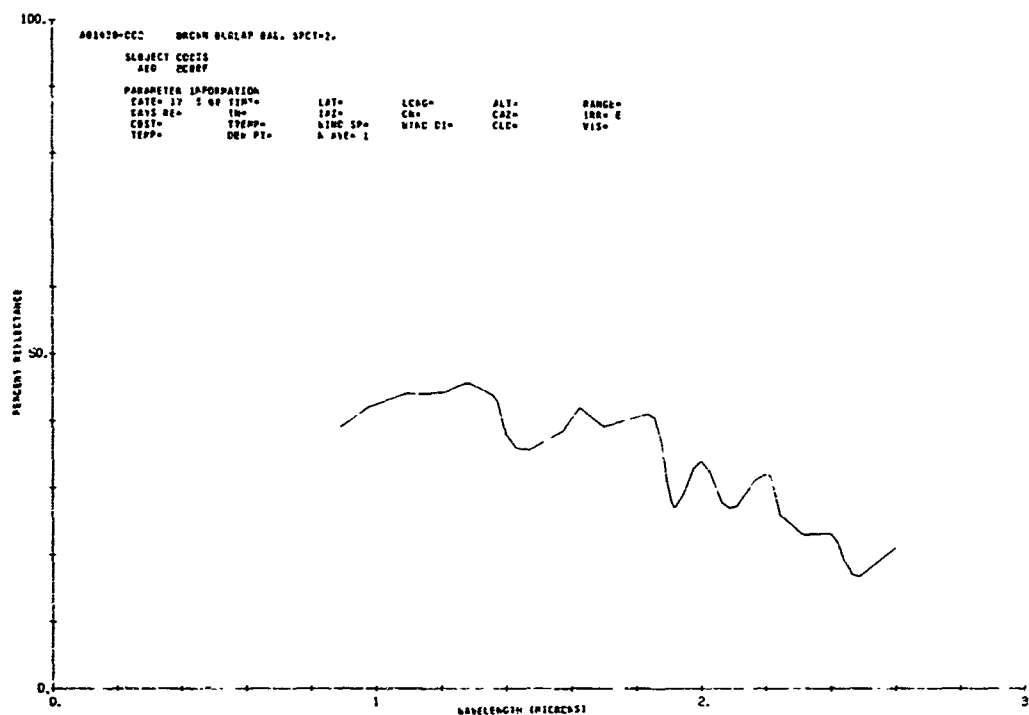
July 1980

AED8

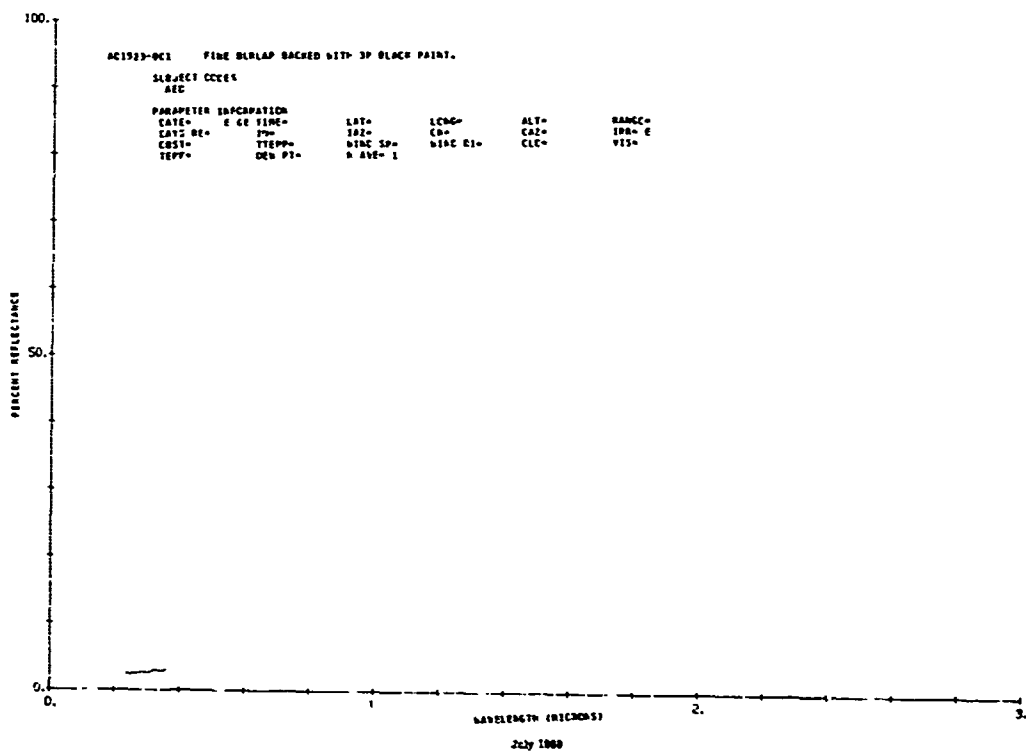
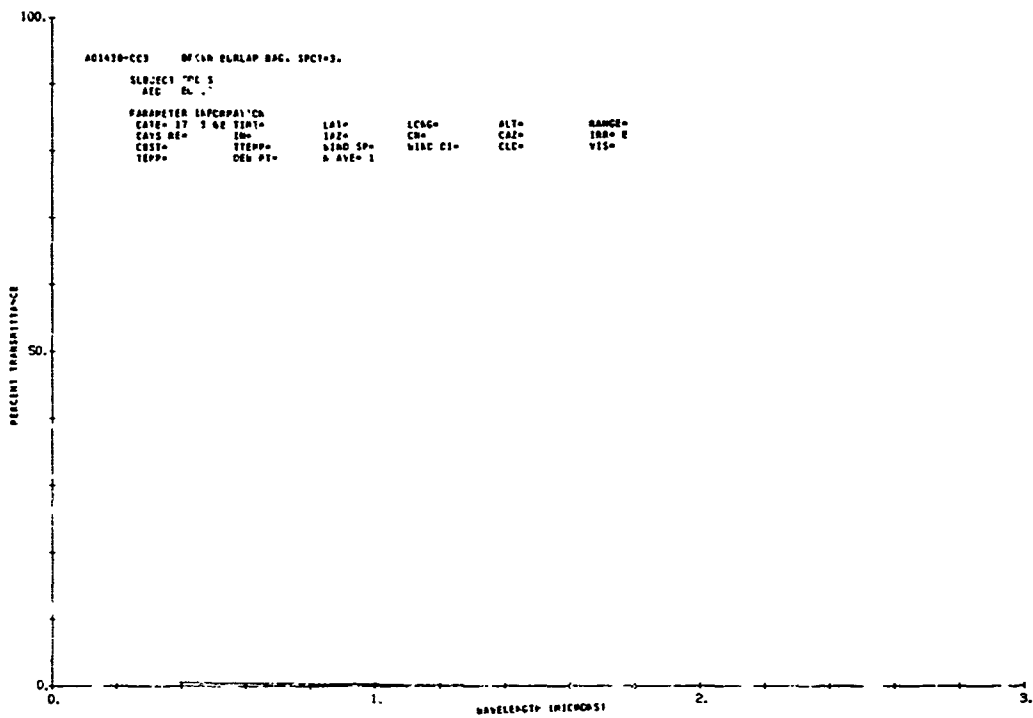


3

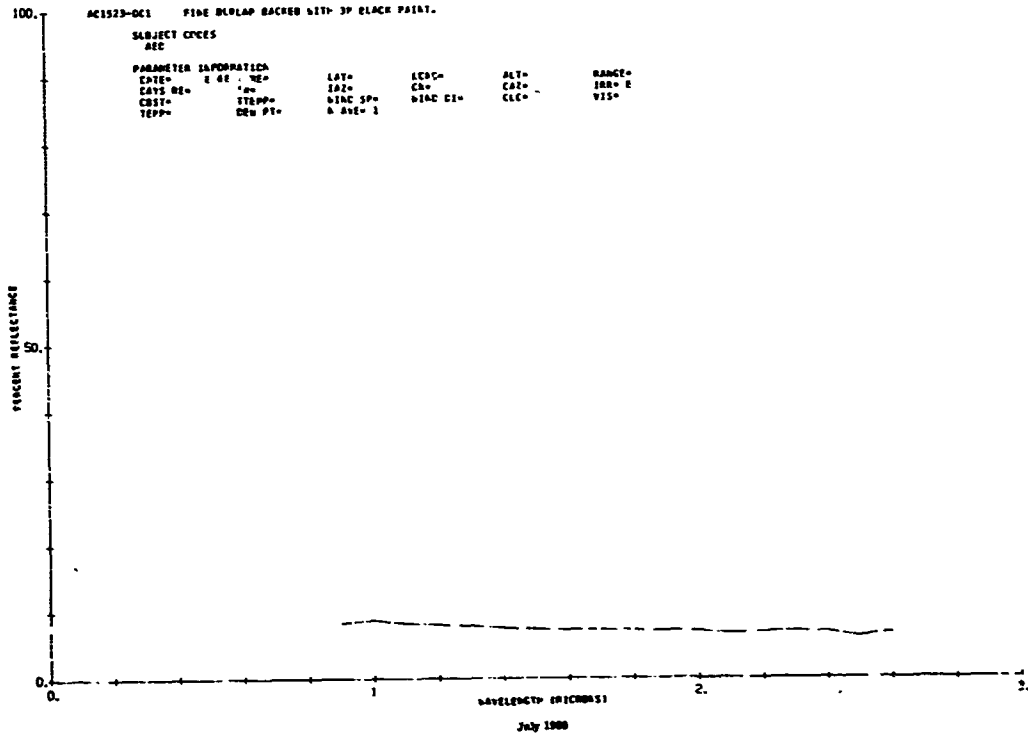
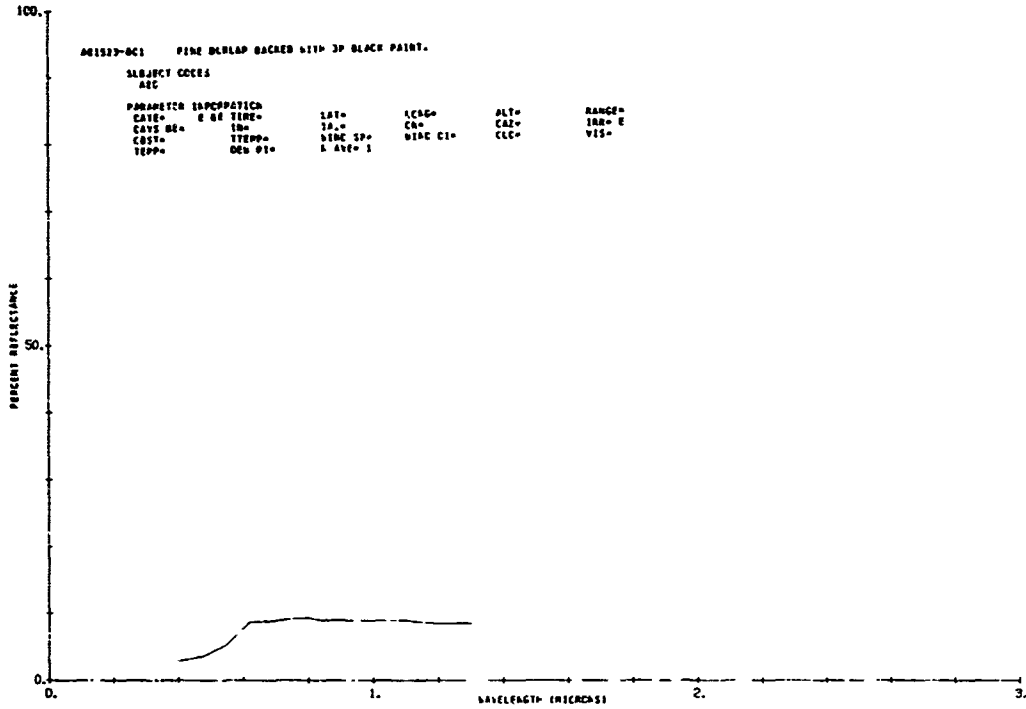




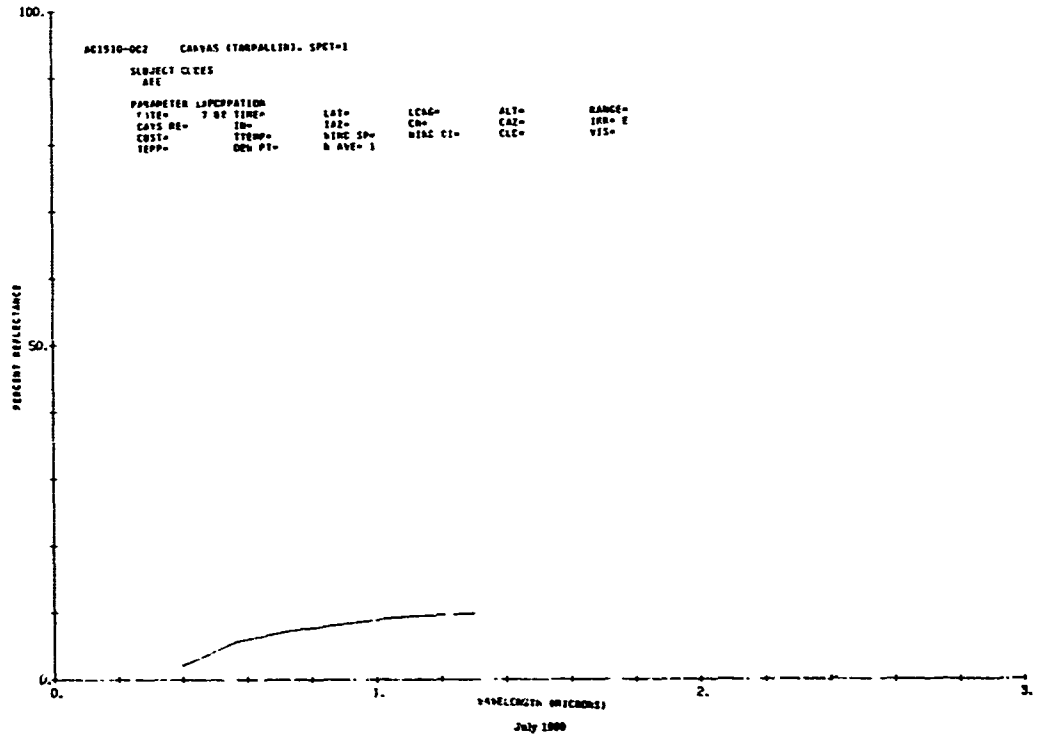
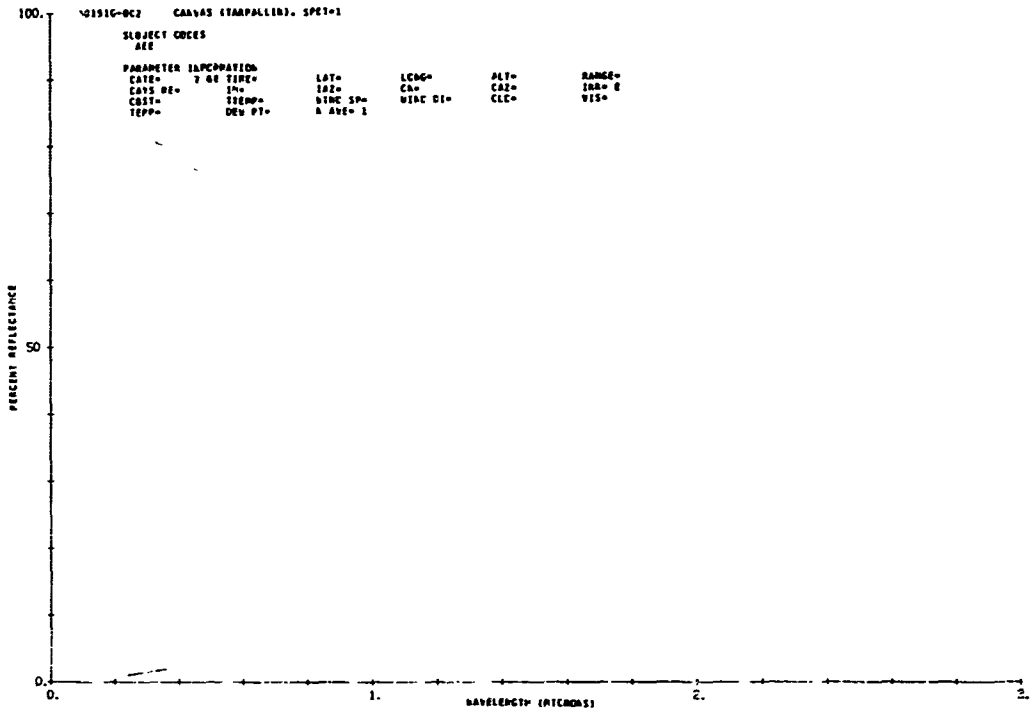
AND 12



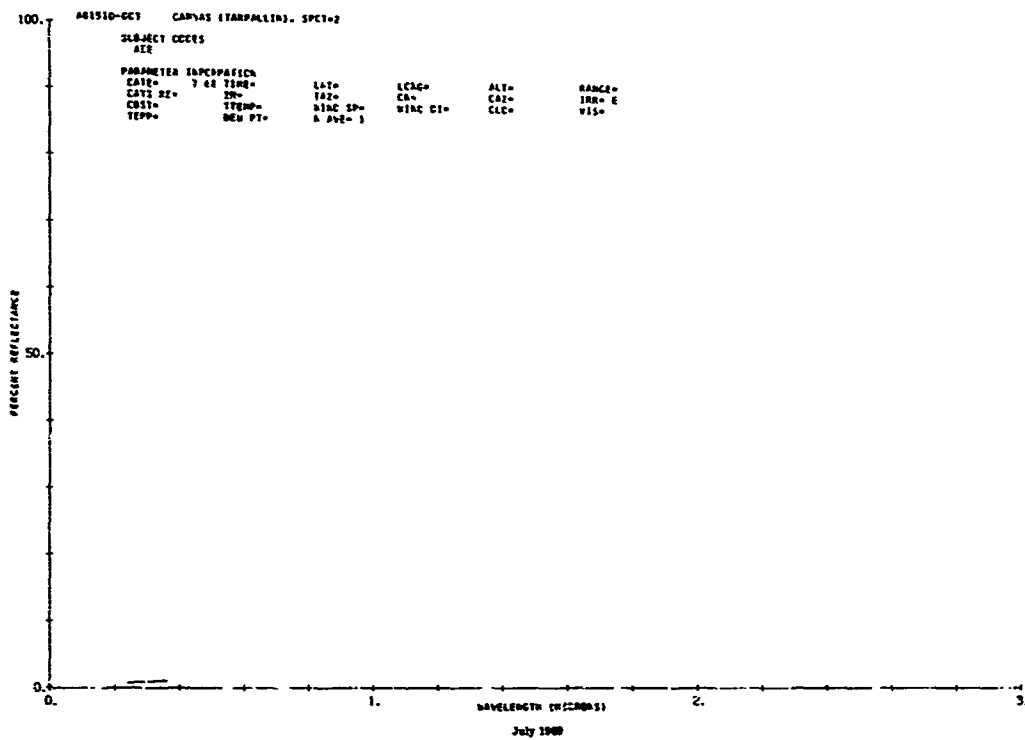
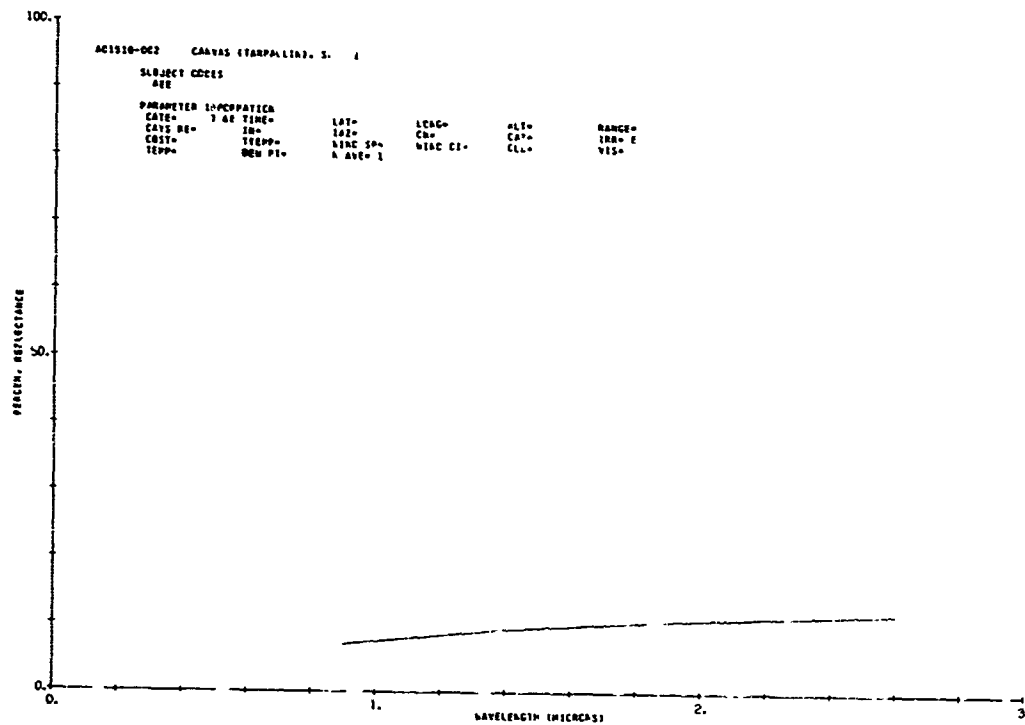
AND 12



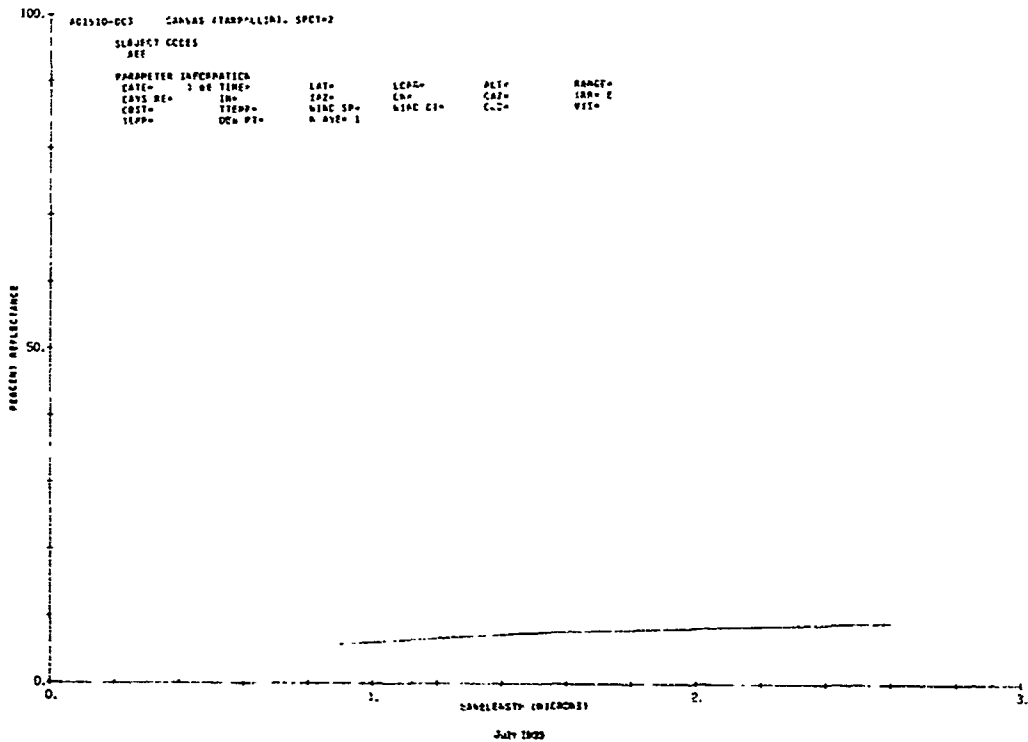
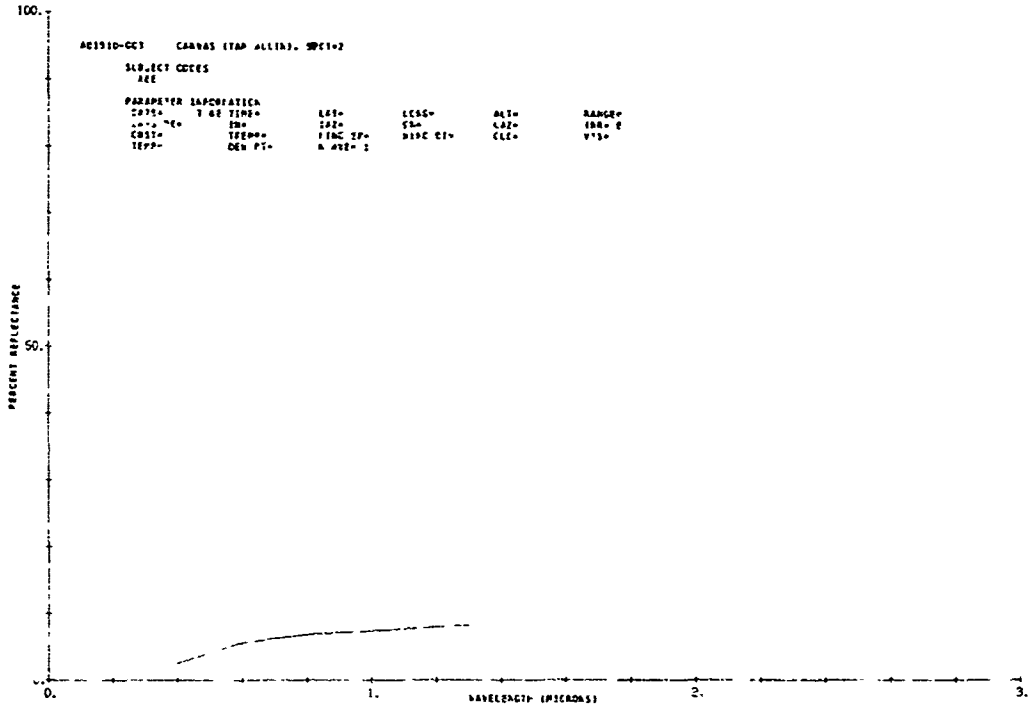
AEE 3



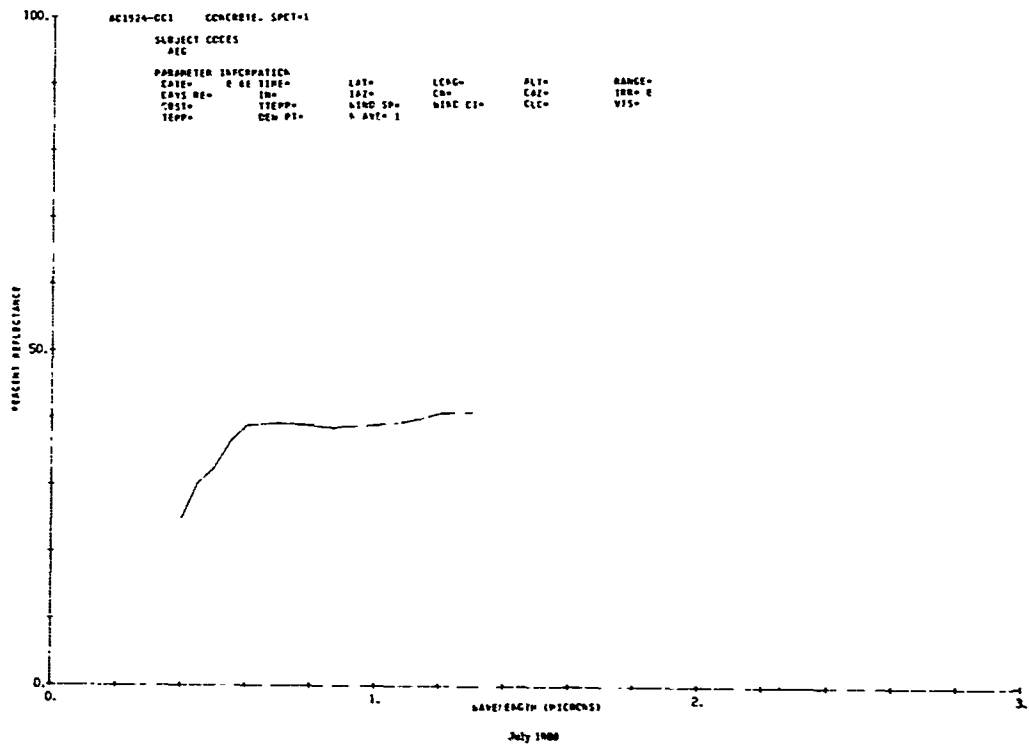
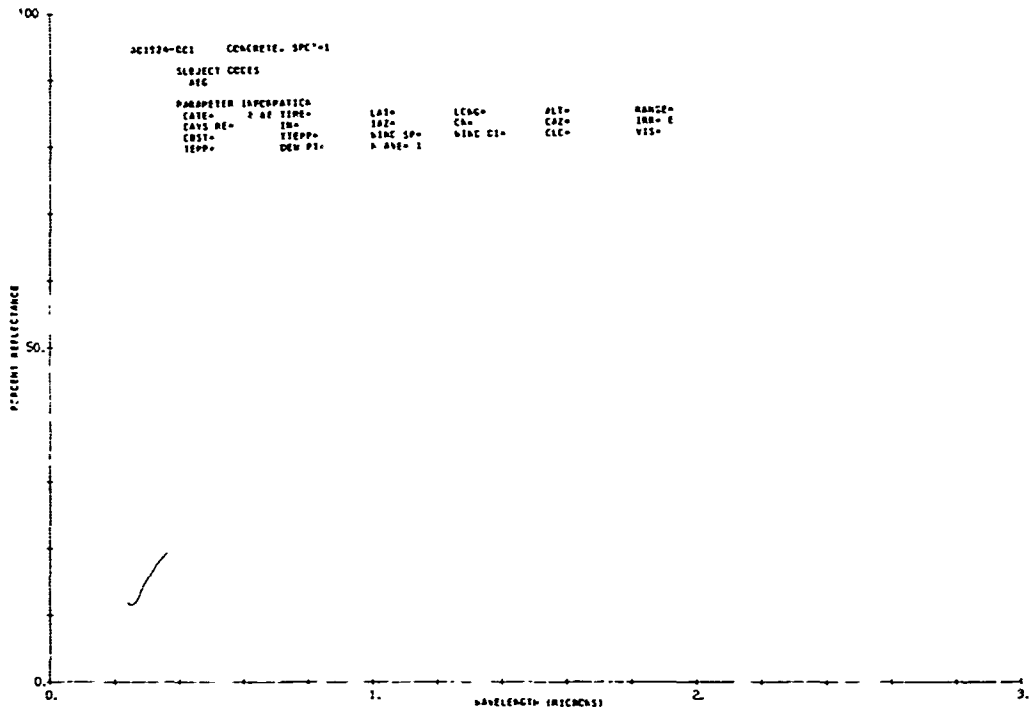
ARE 4



ADD 5



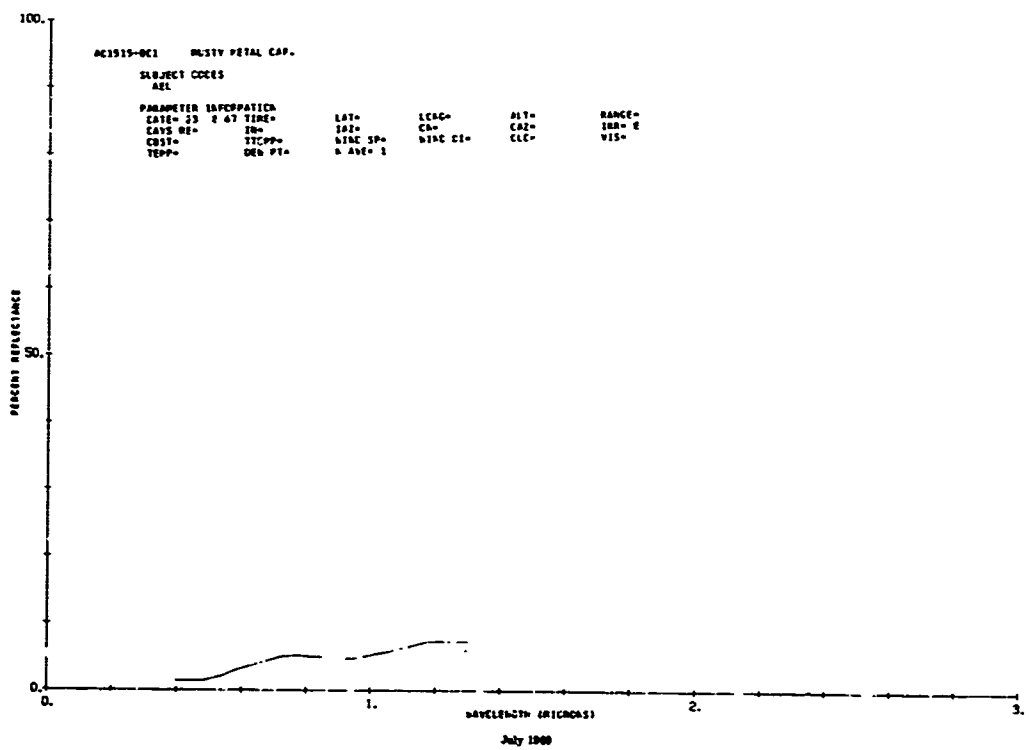
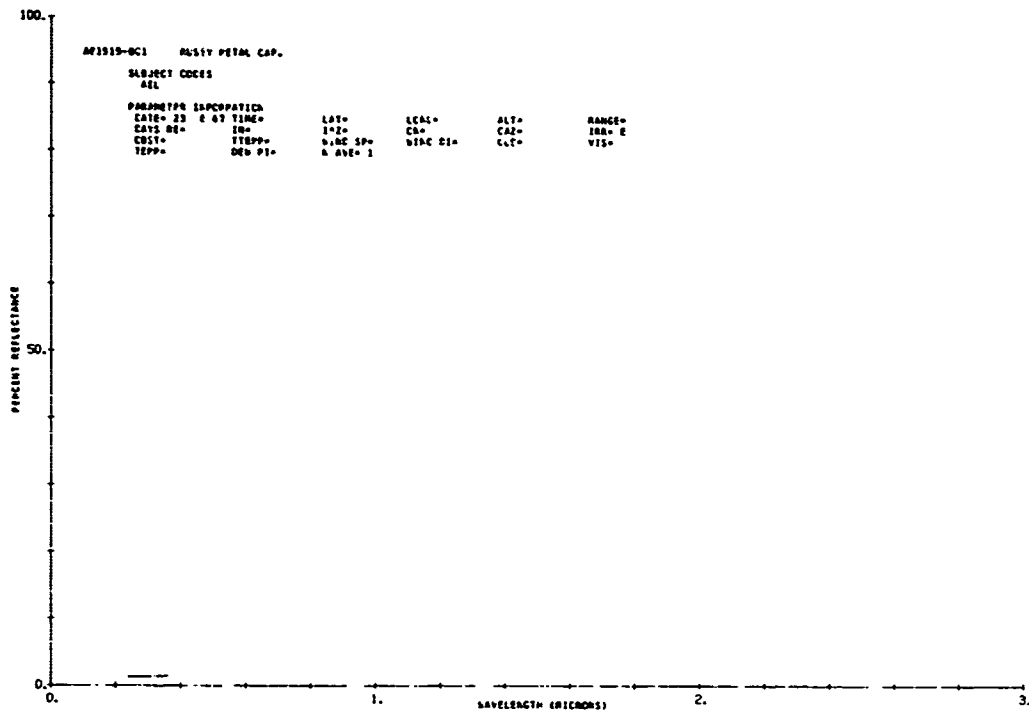
ABG 5



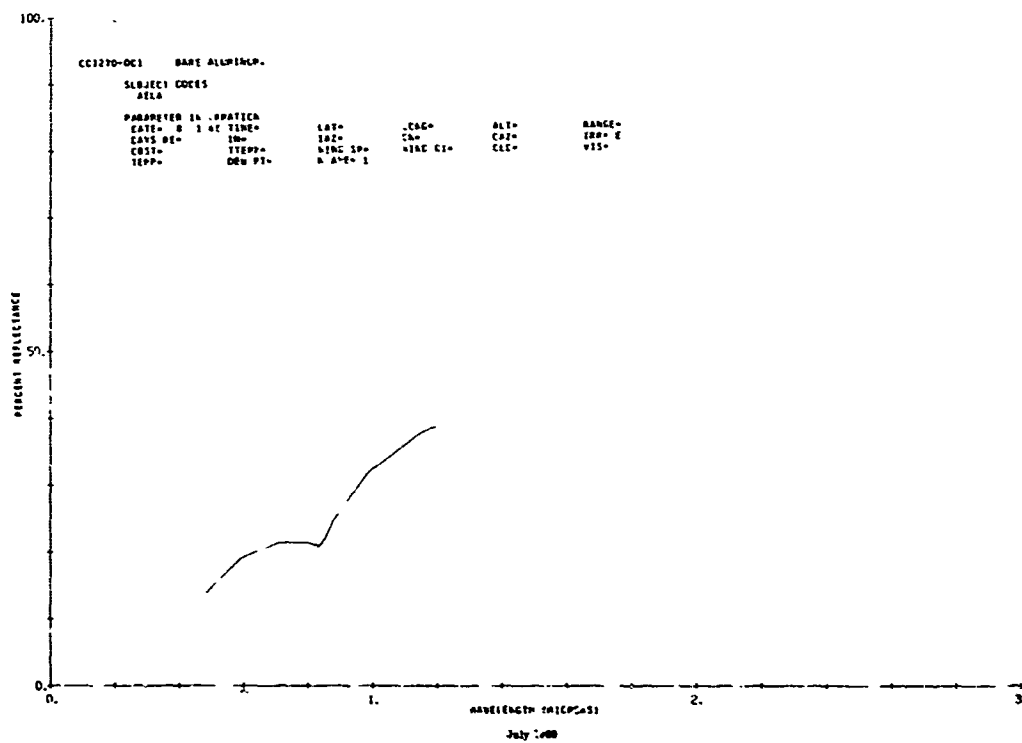
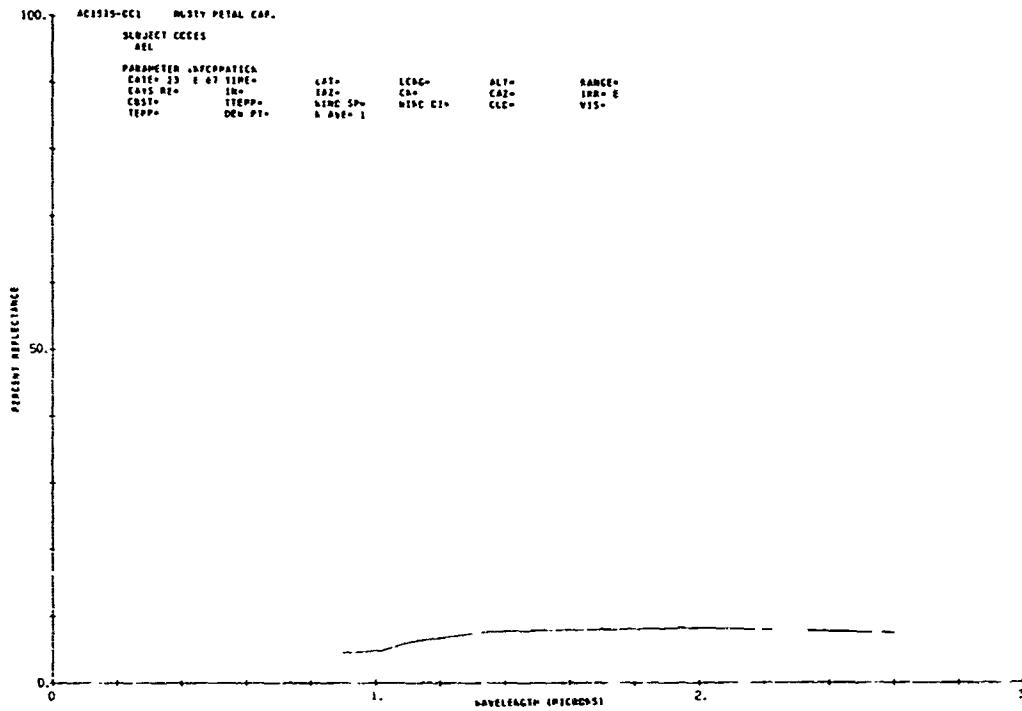
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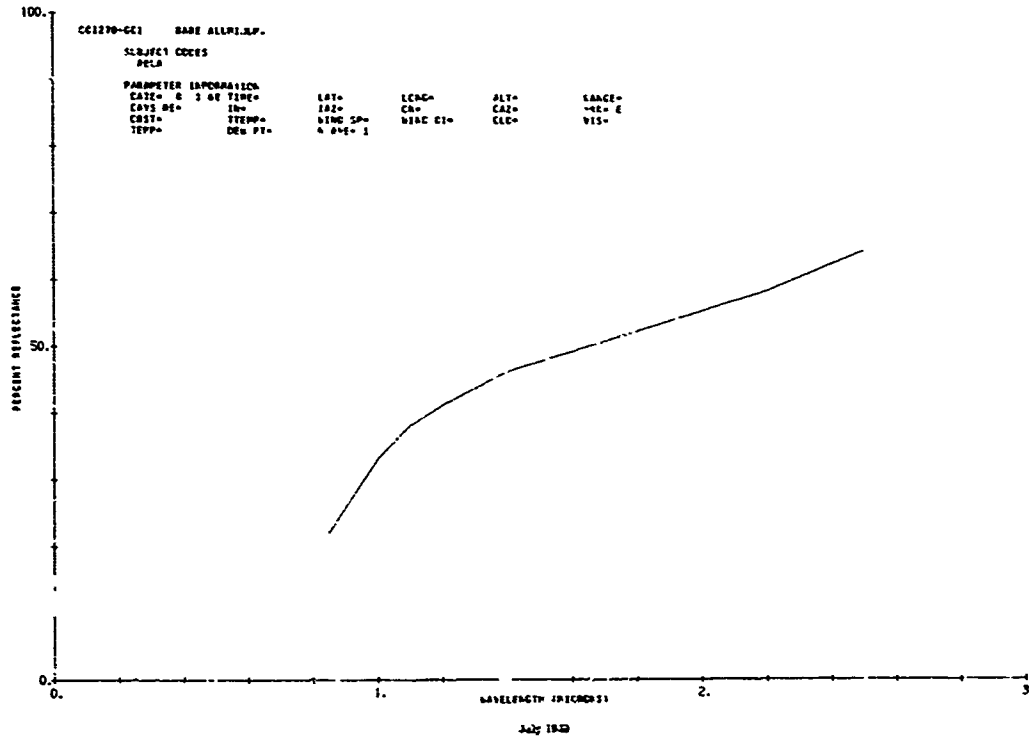
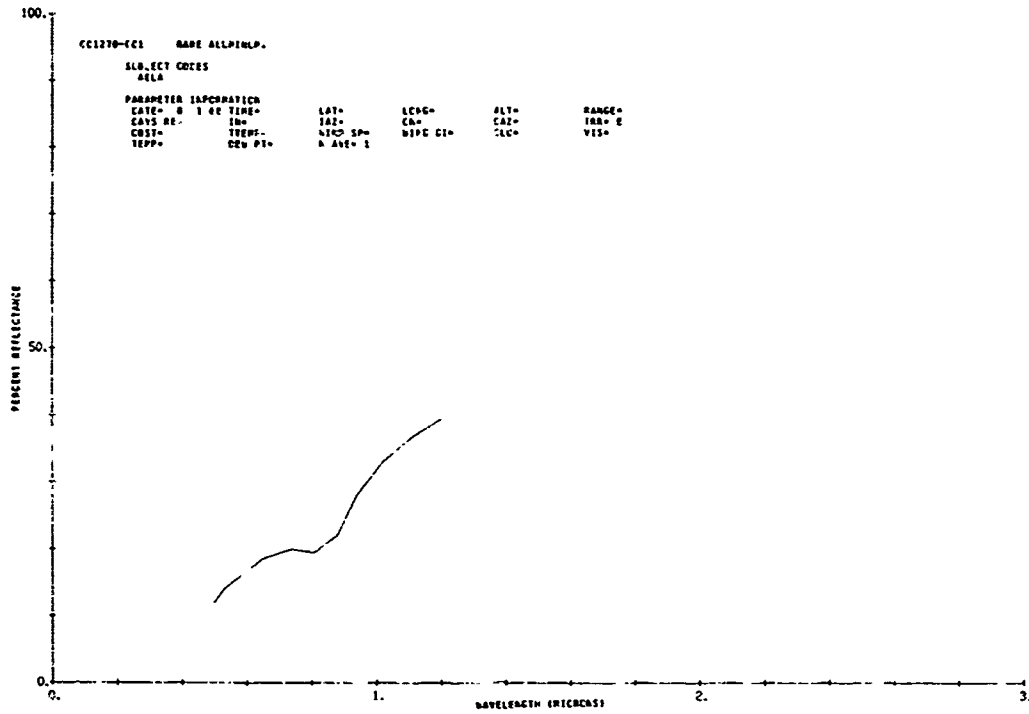
AKL 94



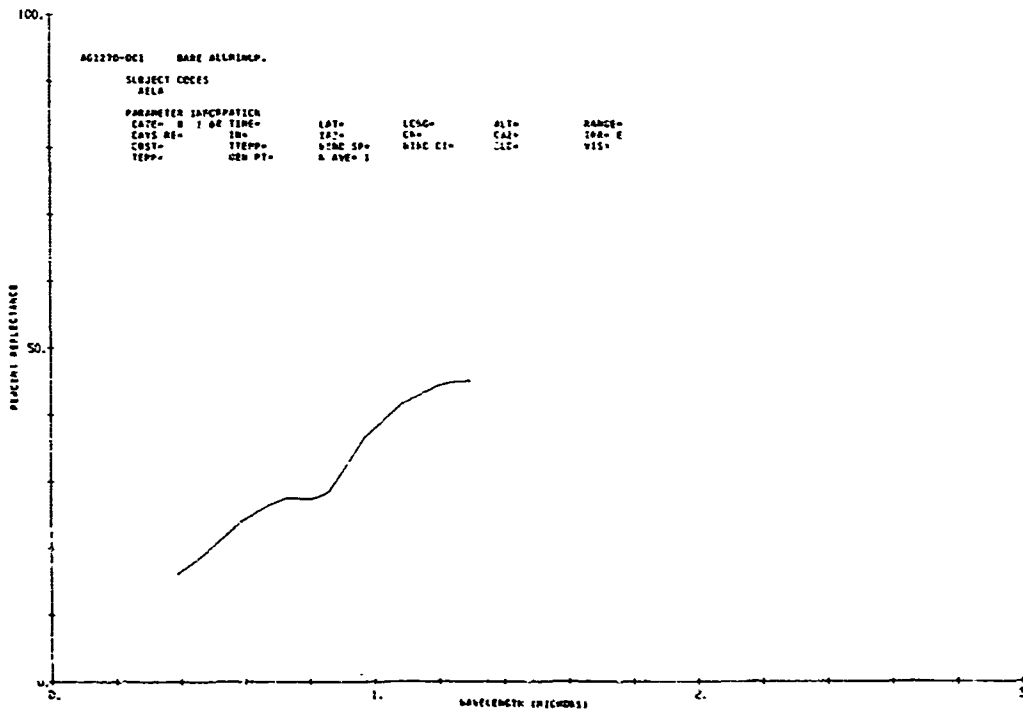
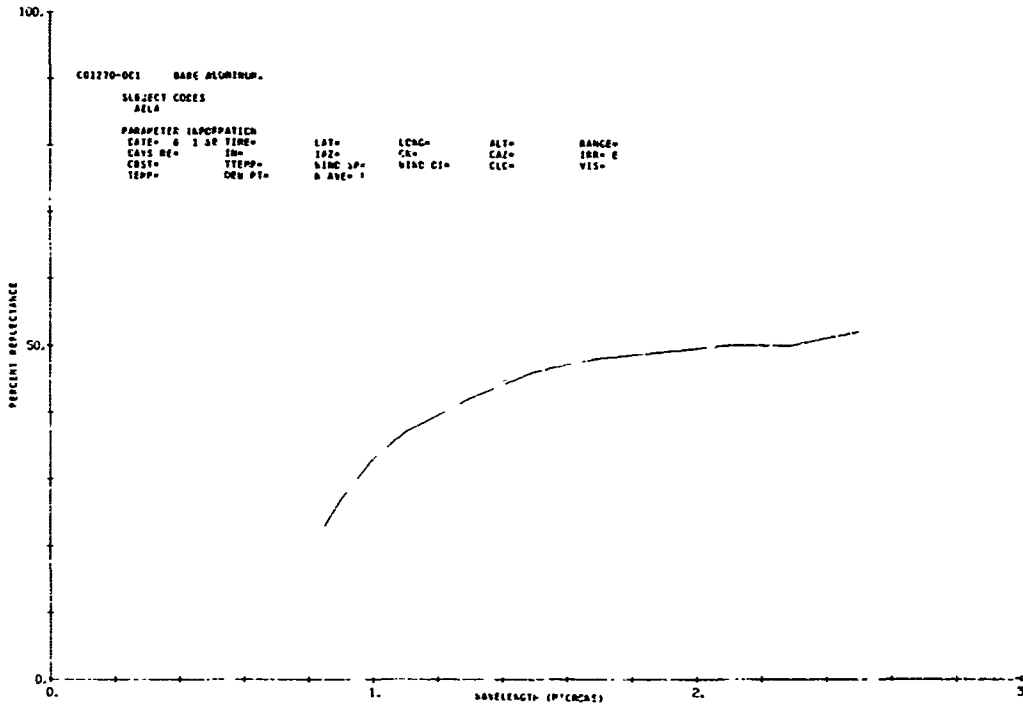
AEL 55



AEL 56

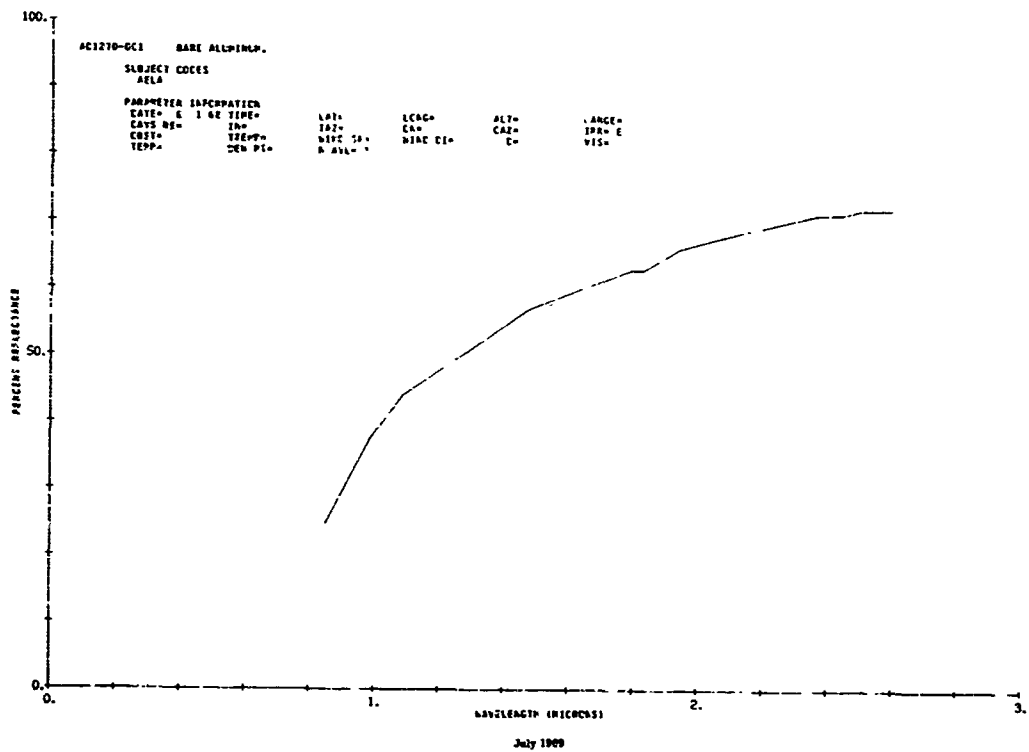
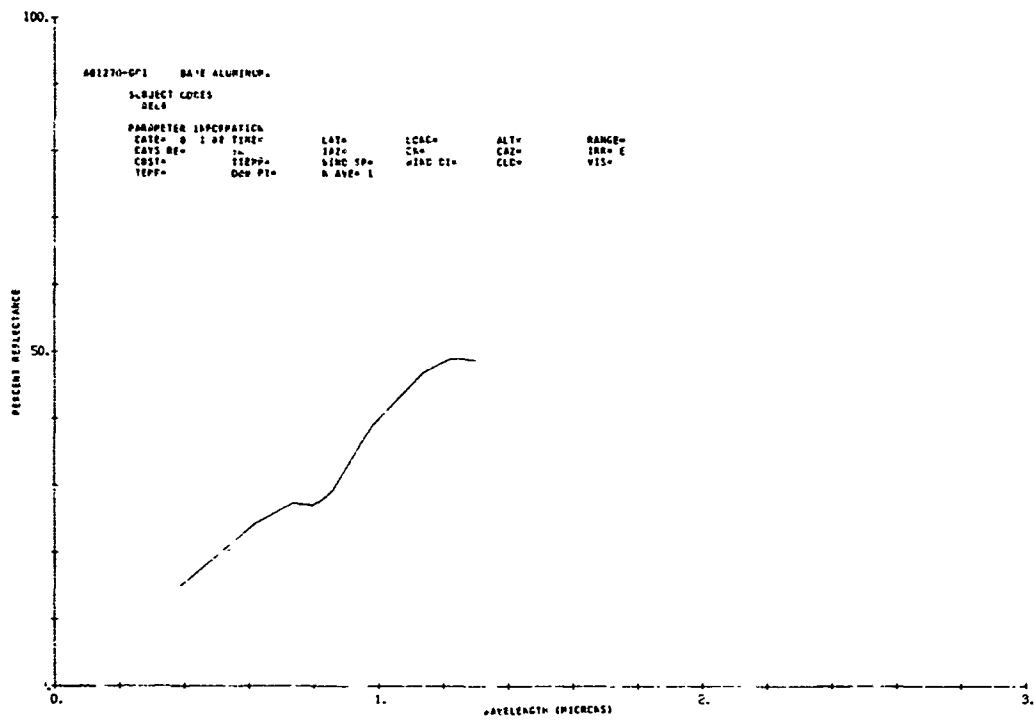


ALL 2

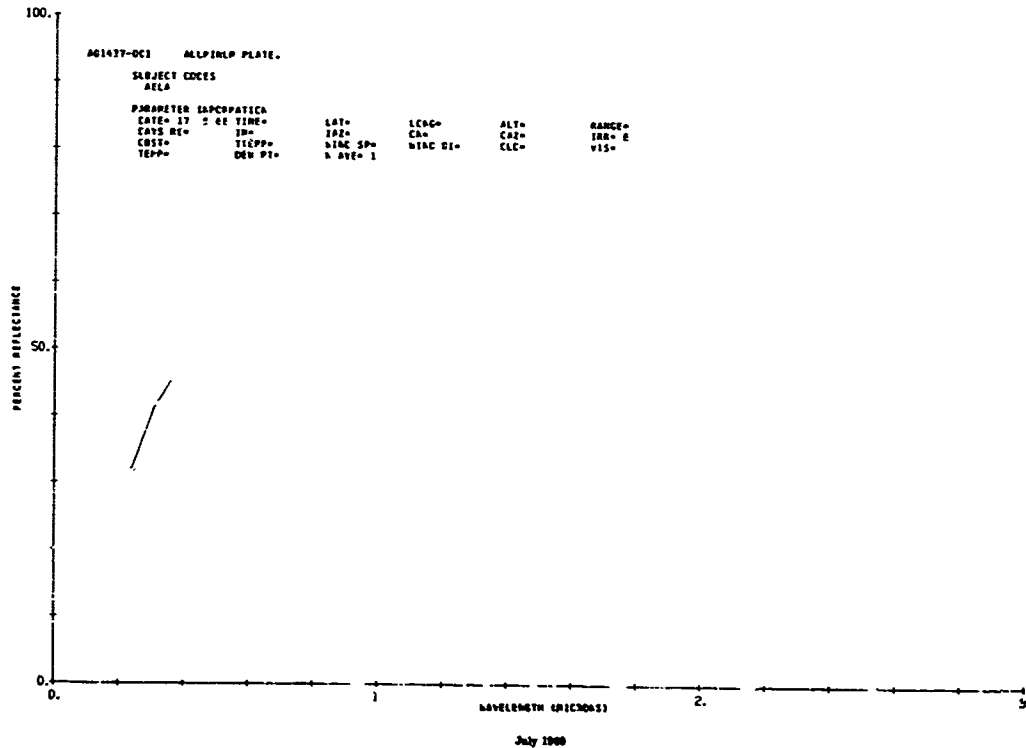
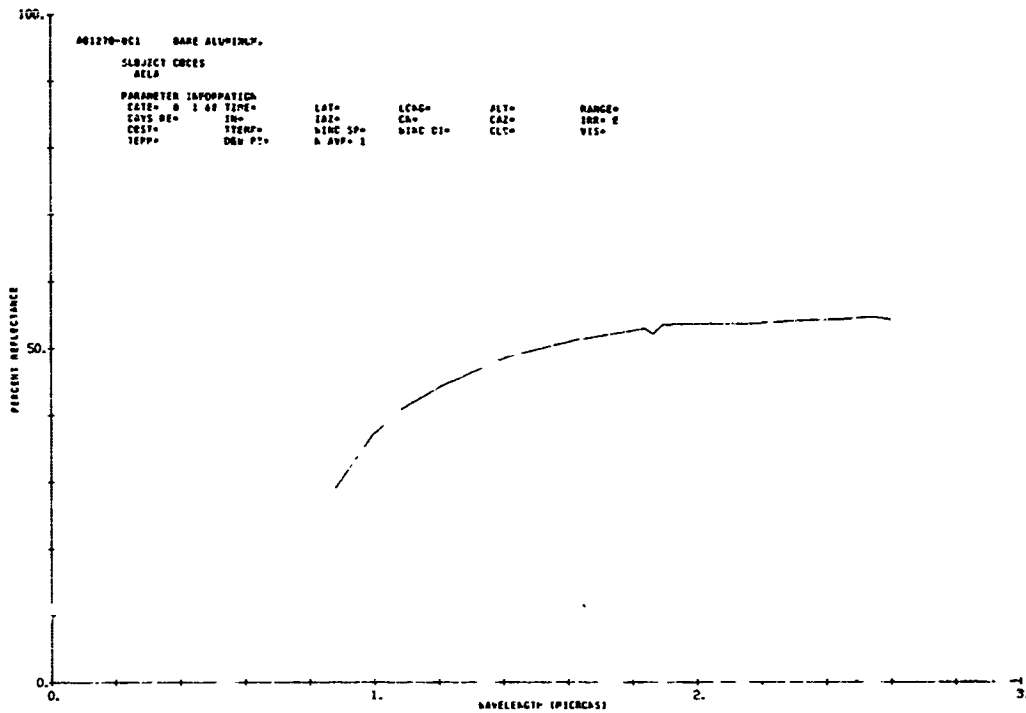


July 18-00

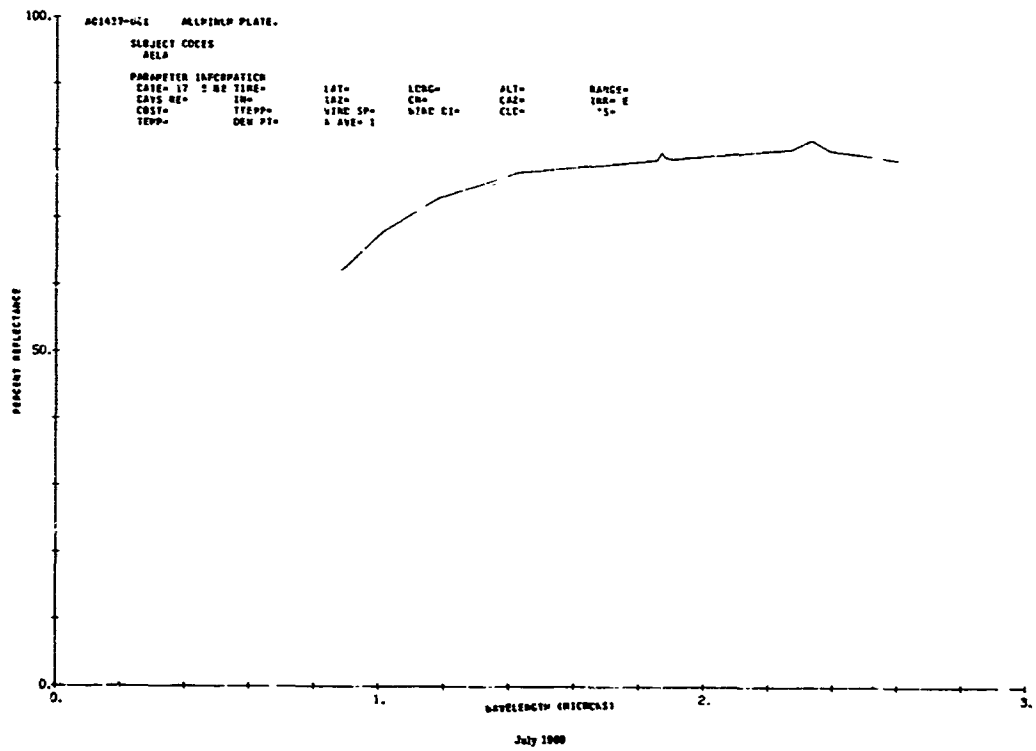
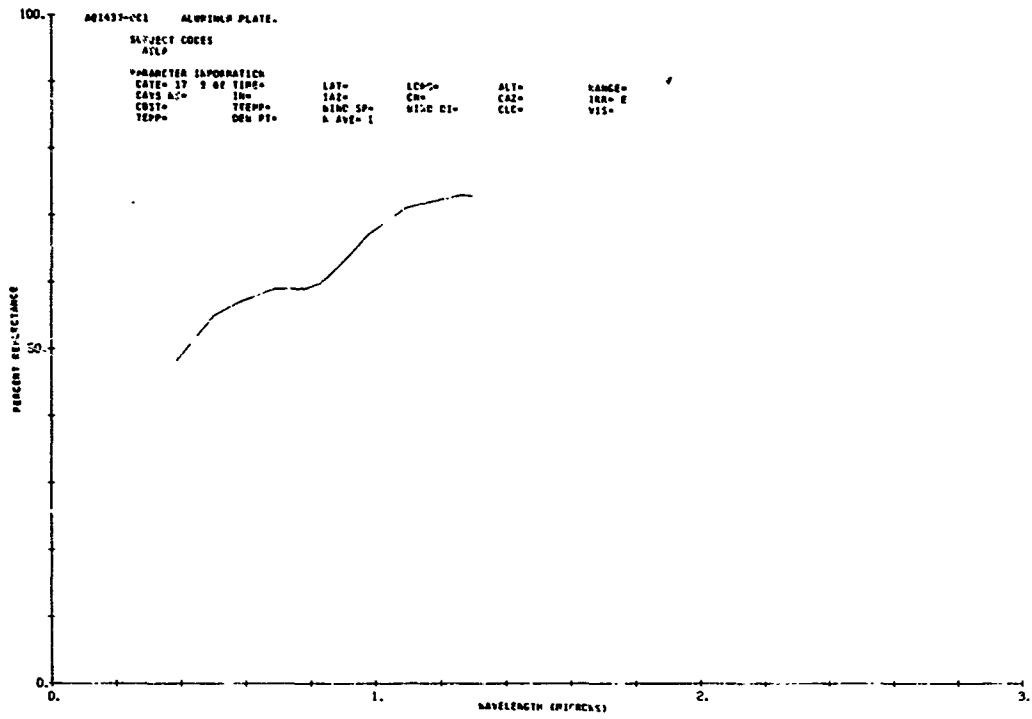
AEL 58



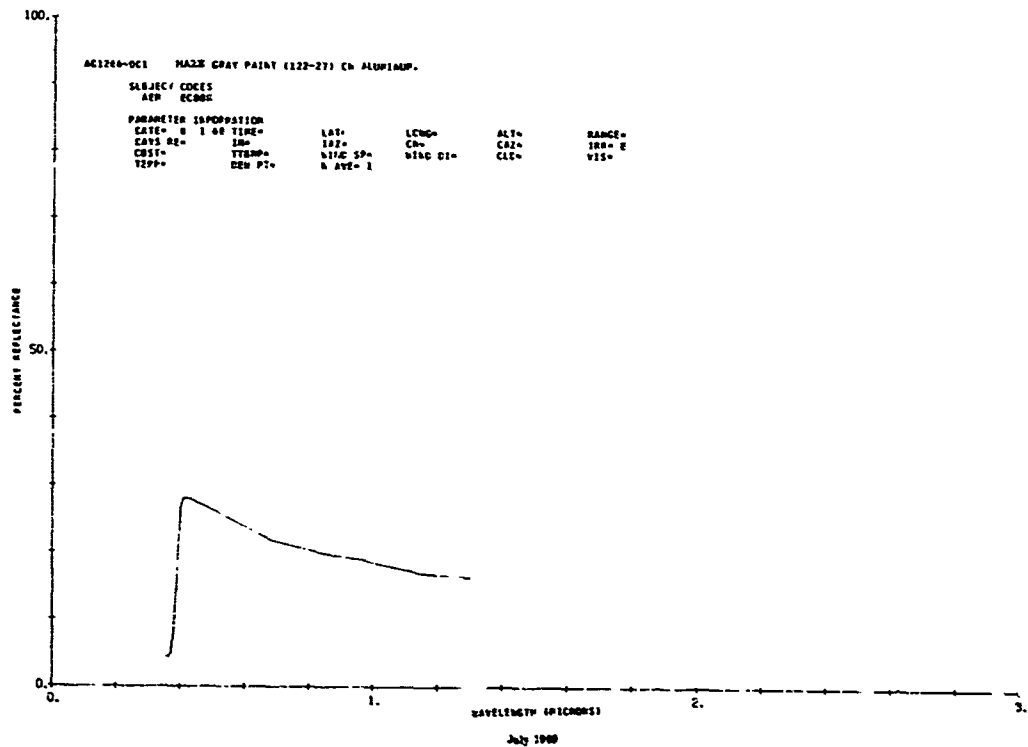
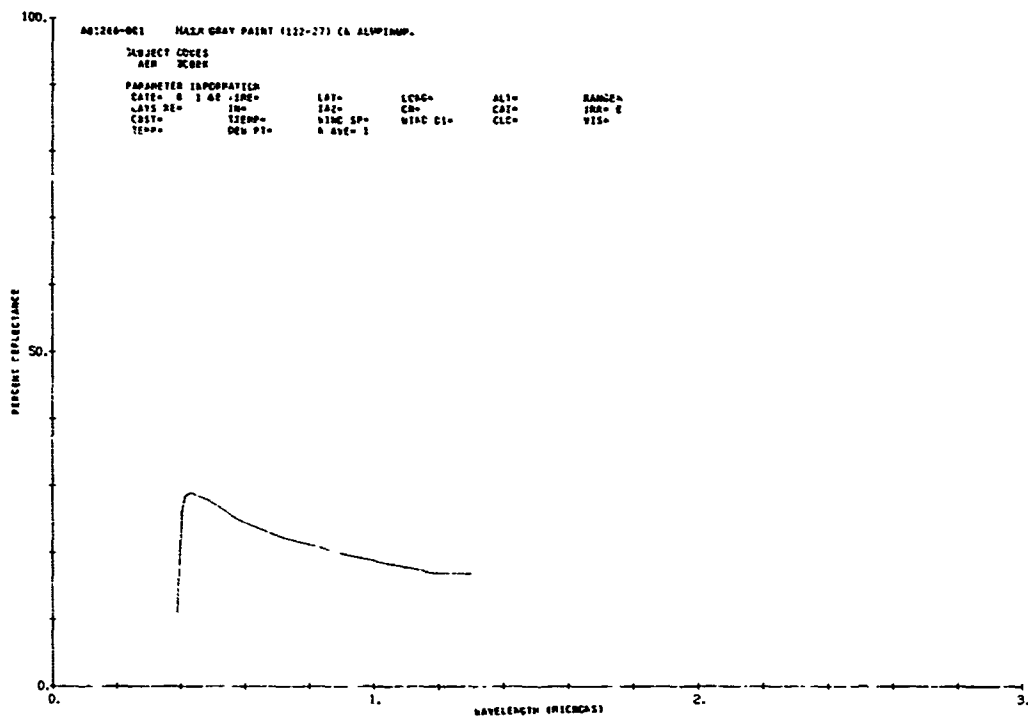
ARL 99



ARL 00



ARM 108



AC1216-DC1 HAZE GRAY PAINT (127-271) EA ALUMINUM.

SUBJECT CODES
SEA RECORD

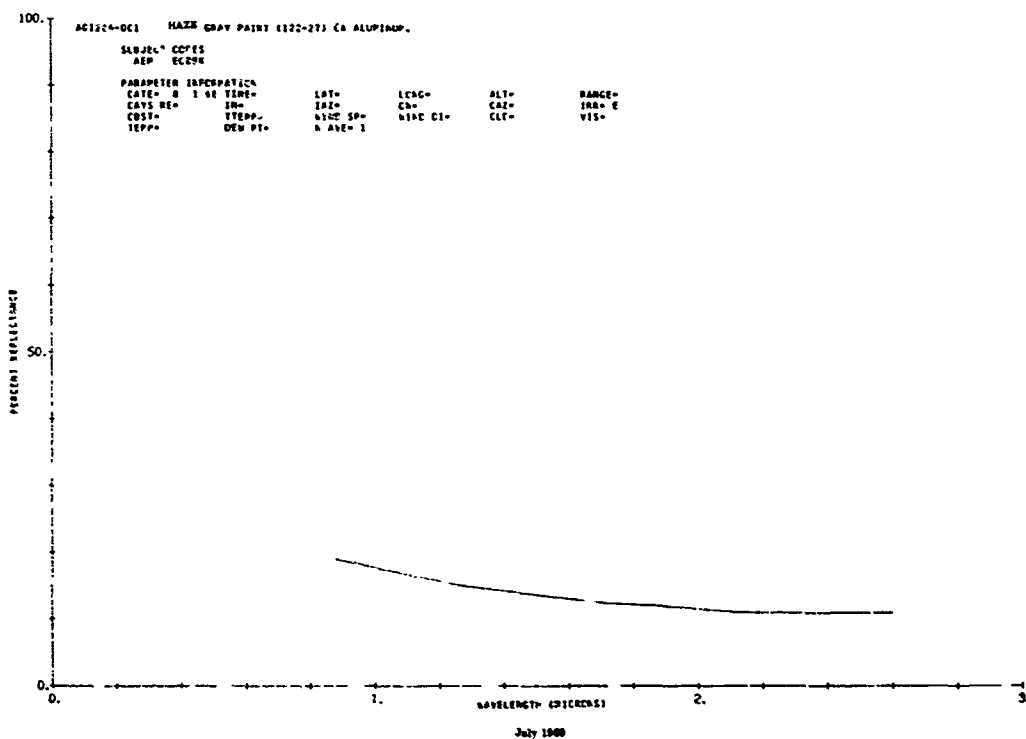
PARAMETER INFORMATION

DATE= 0 1 68 TIME=	LAT=	LCNG=	ALT=	RANGE=
SAVS DE= 100	LON=	CH=	CAZ=	IRX= E
CST= 10000	WIND SP=	WIND DIR=	CLE=	VIS=
TEPP= 00000	SEA DIR=	SEA WAVE=		

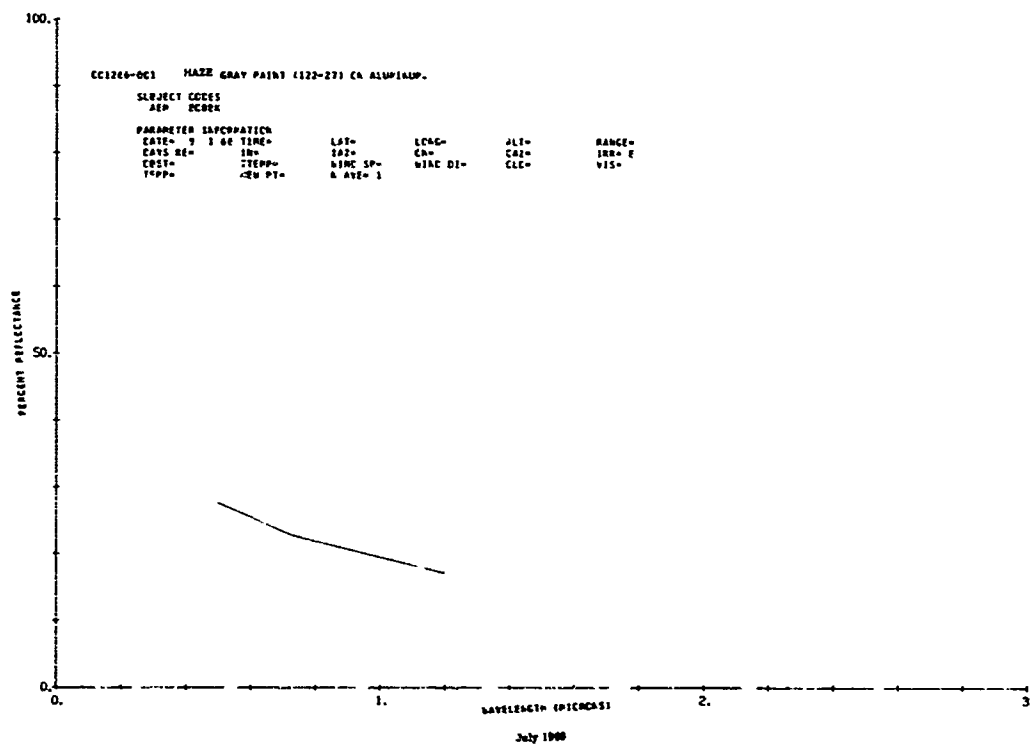
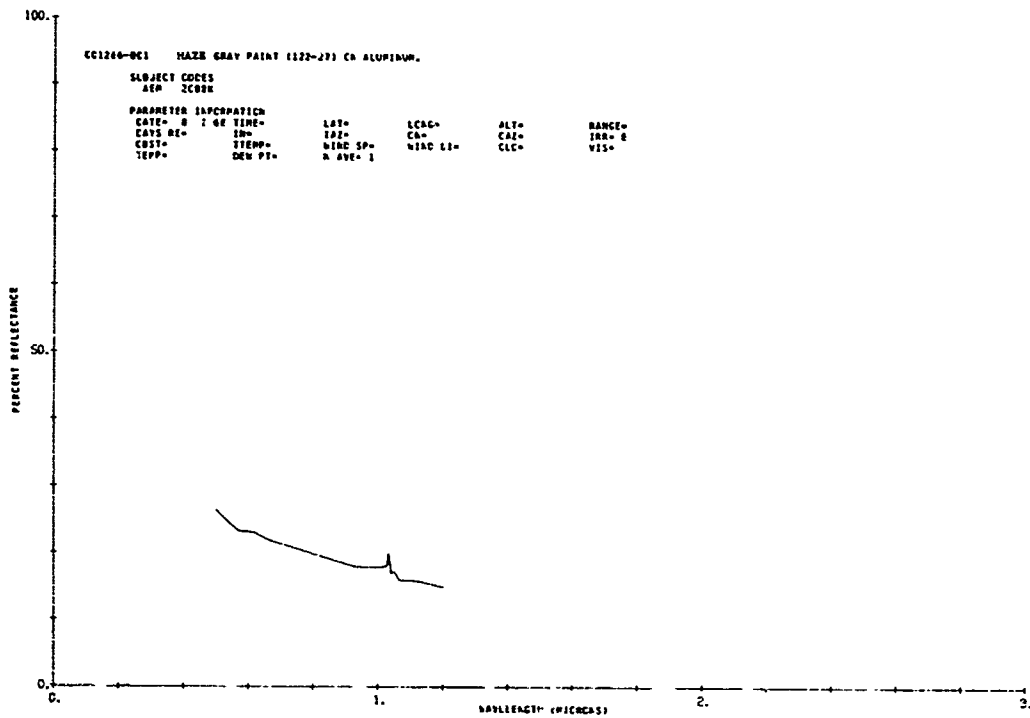
PERCENT REFLECTANCE

WAVELENGTH (MICRONS)

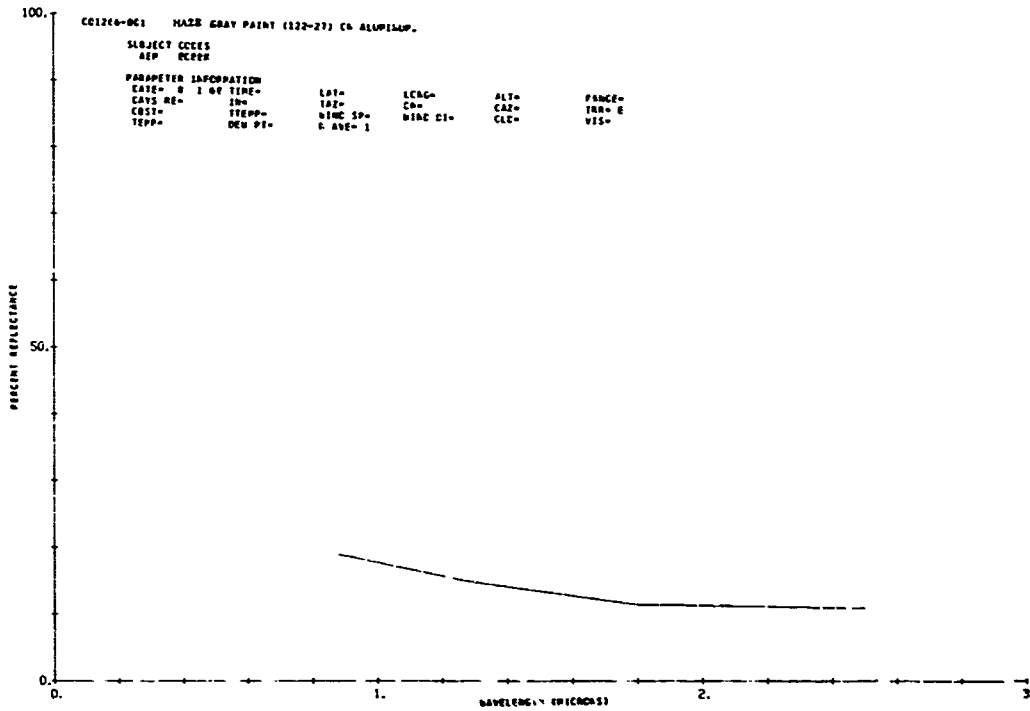
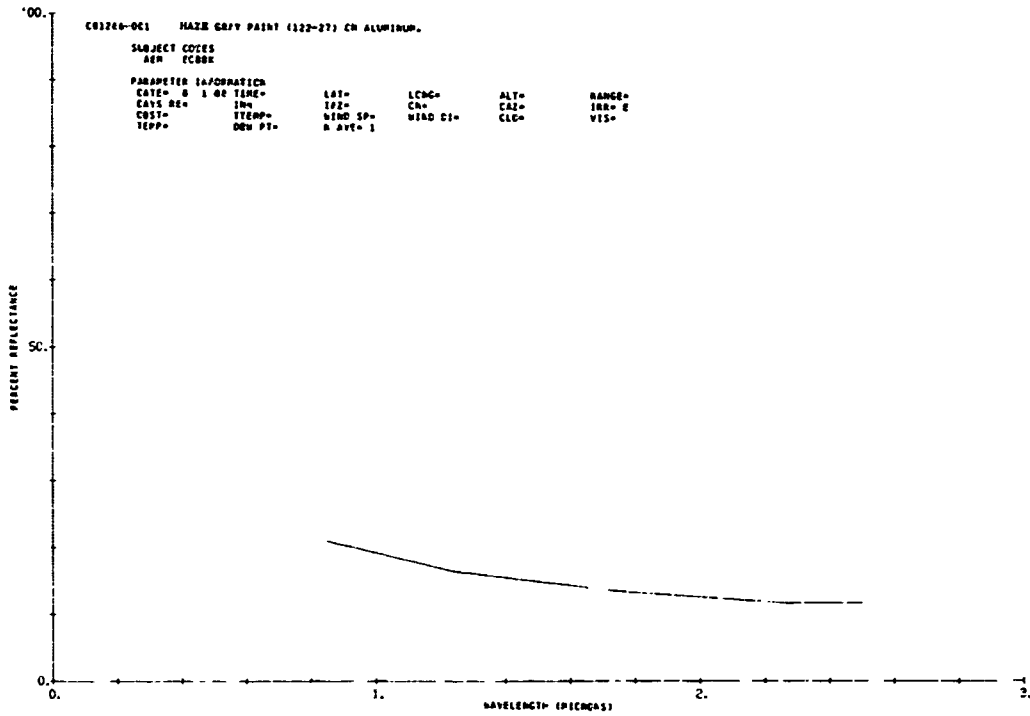
Wavelength (microns)	Percent Reflectance
0.8	85
1.0	75
1.5	55
2.0	40
2.5	30
3.0	15



AXM 100

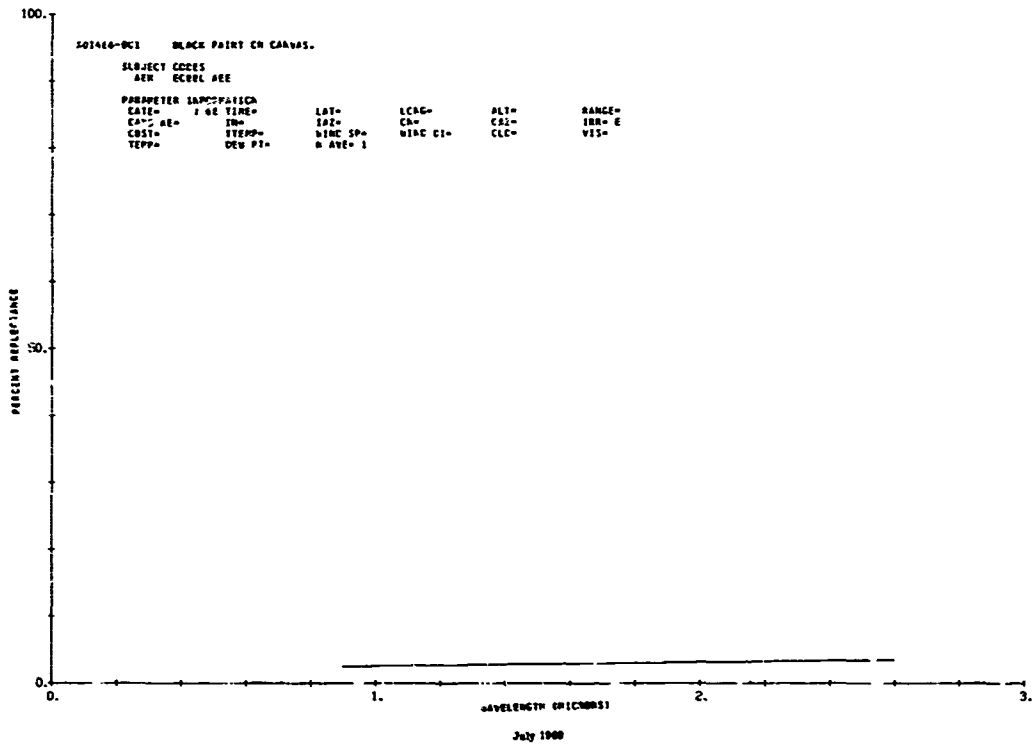
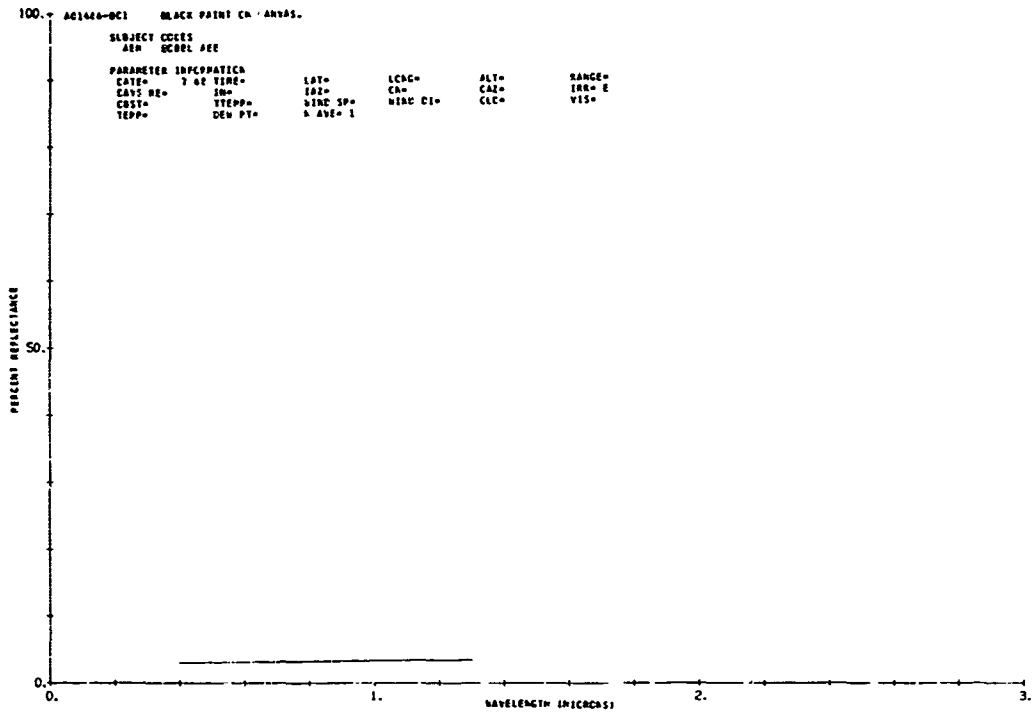


ARM 100

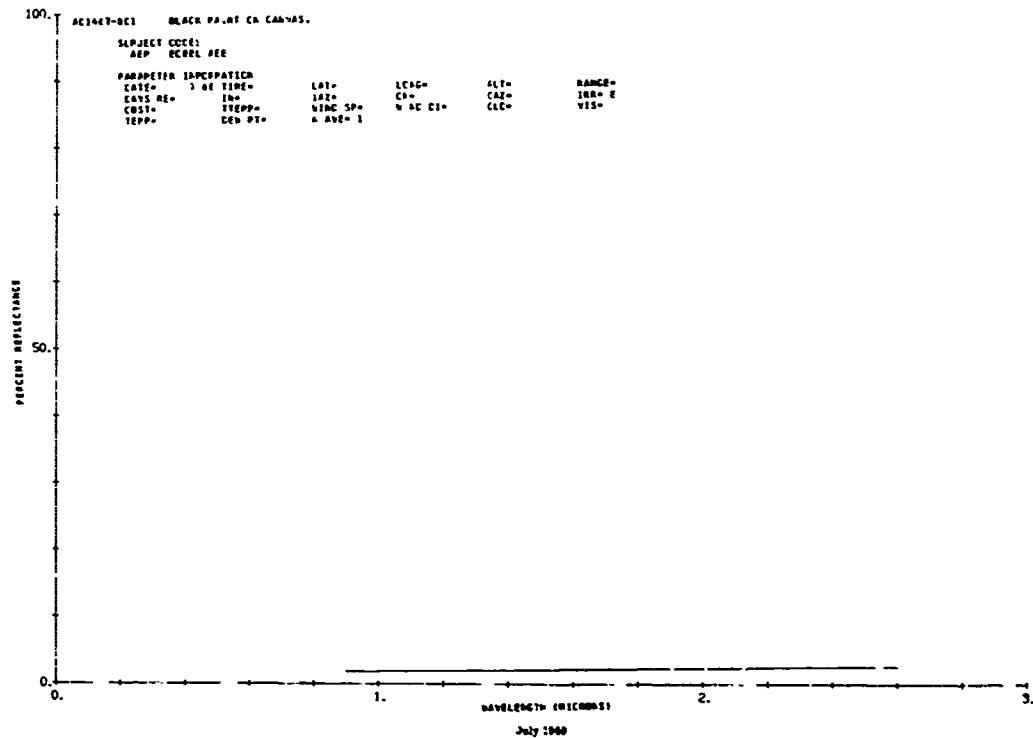
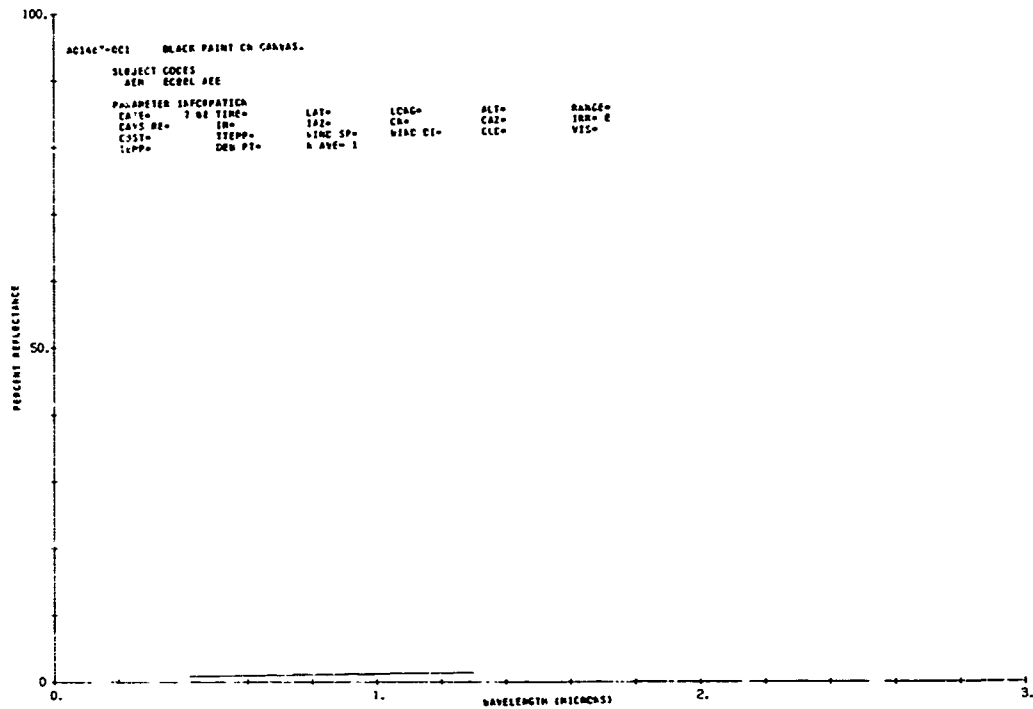


July 1968

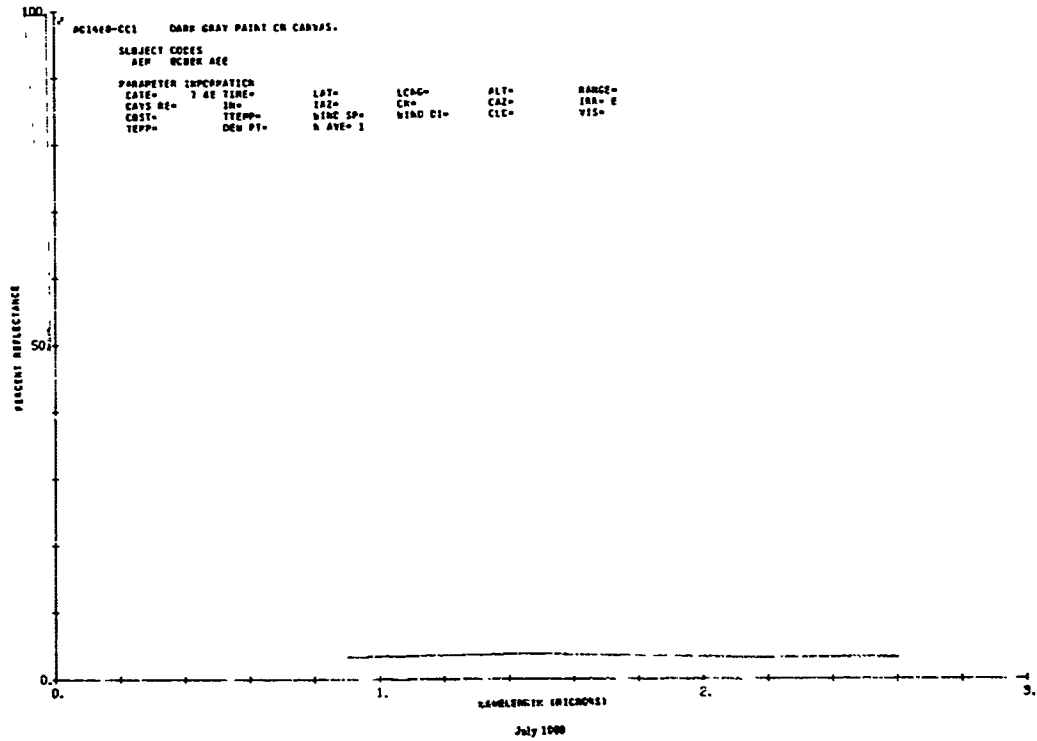
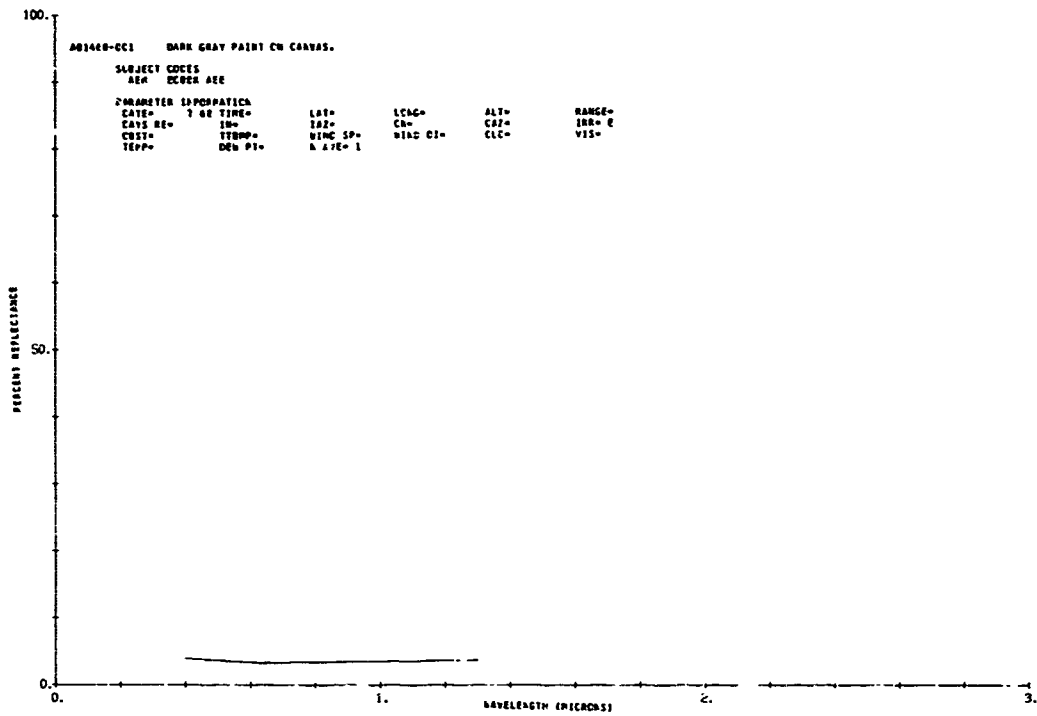
AEM 110*



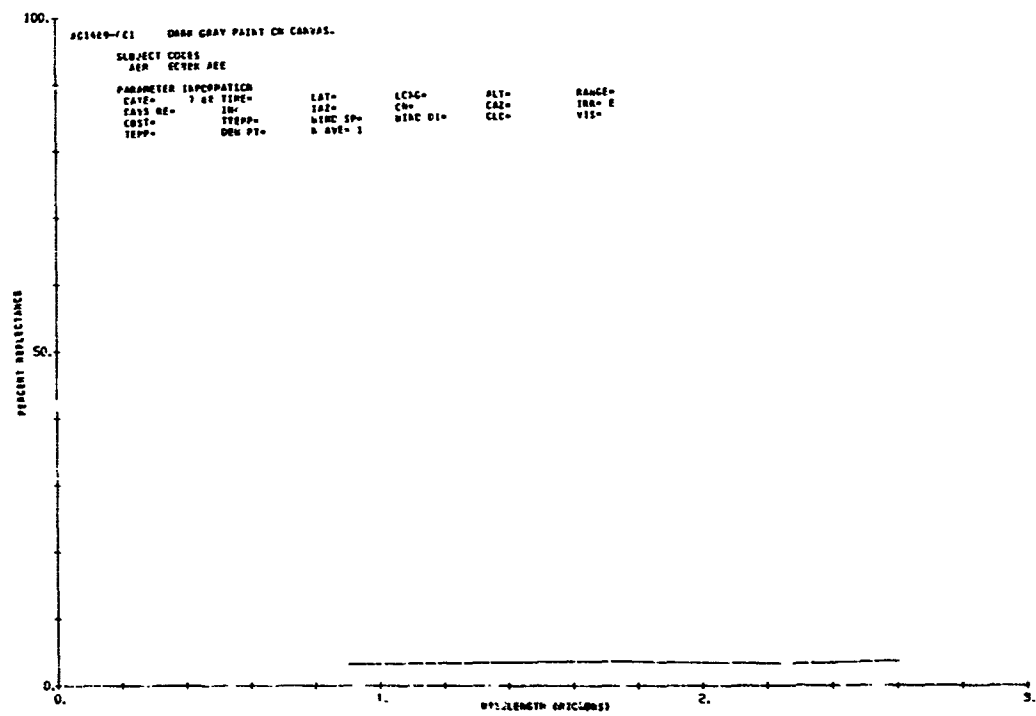
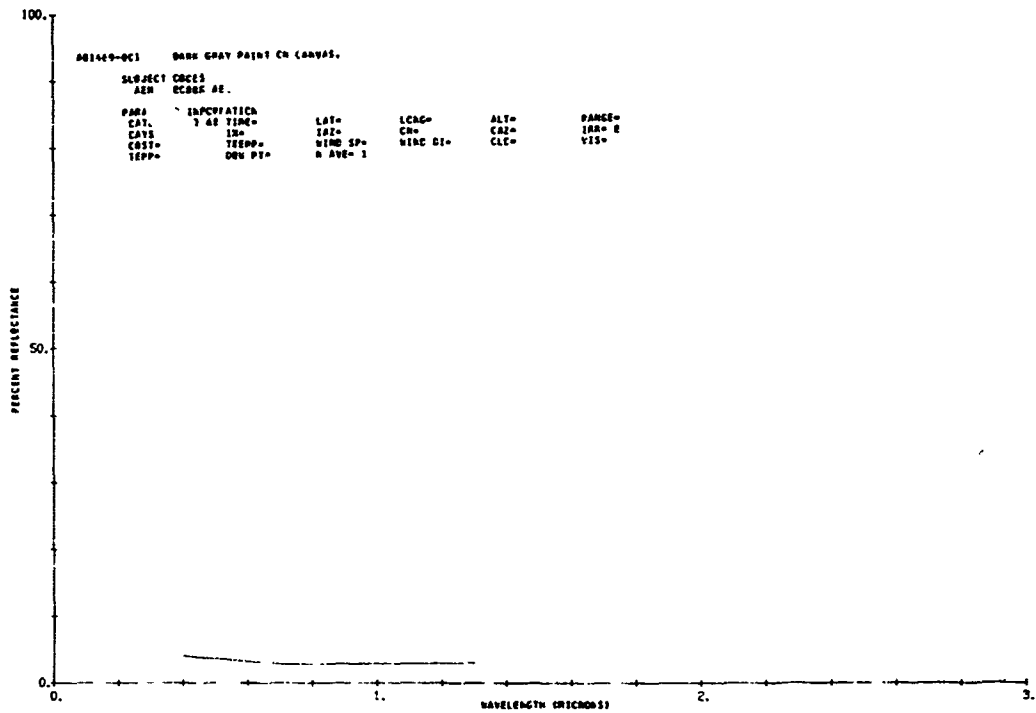
AEM 111



ARM 112

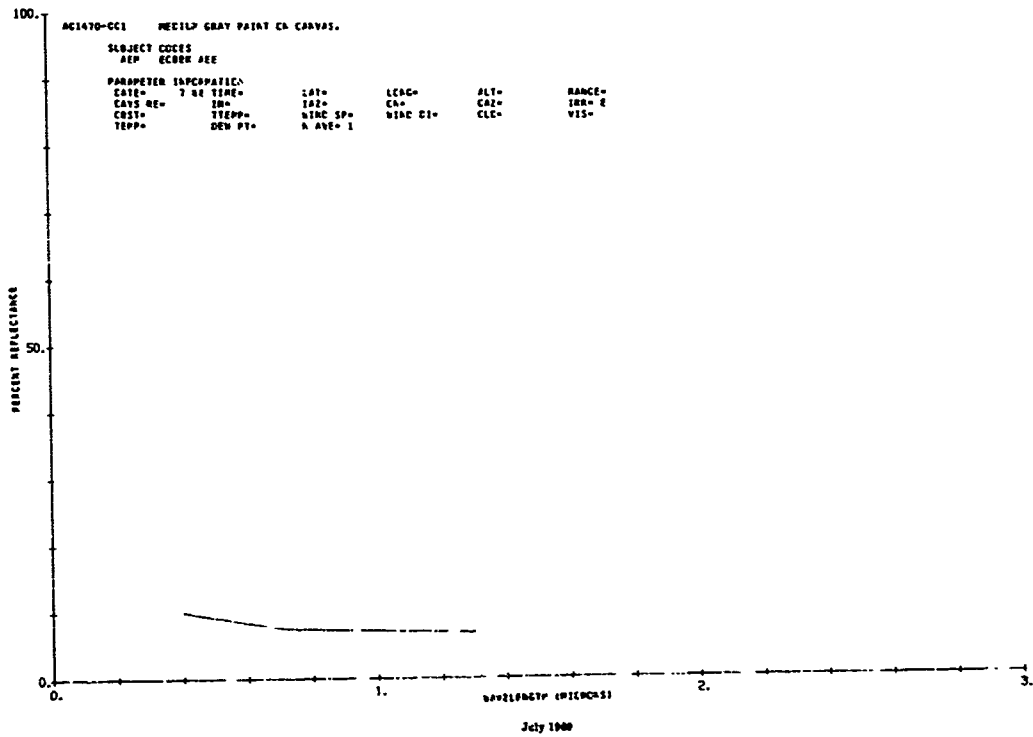
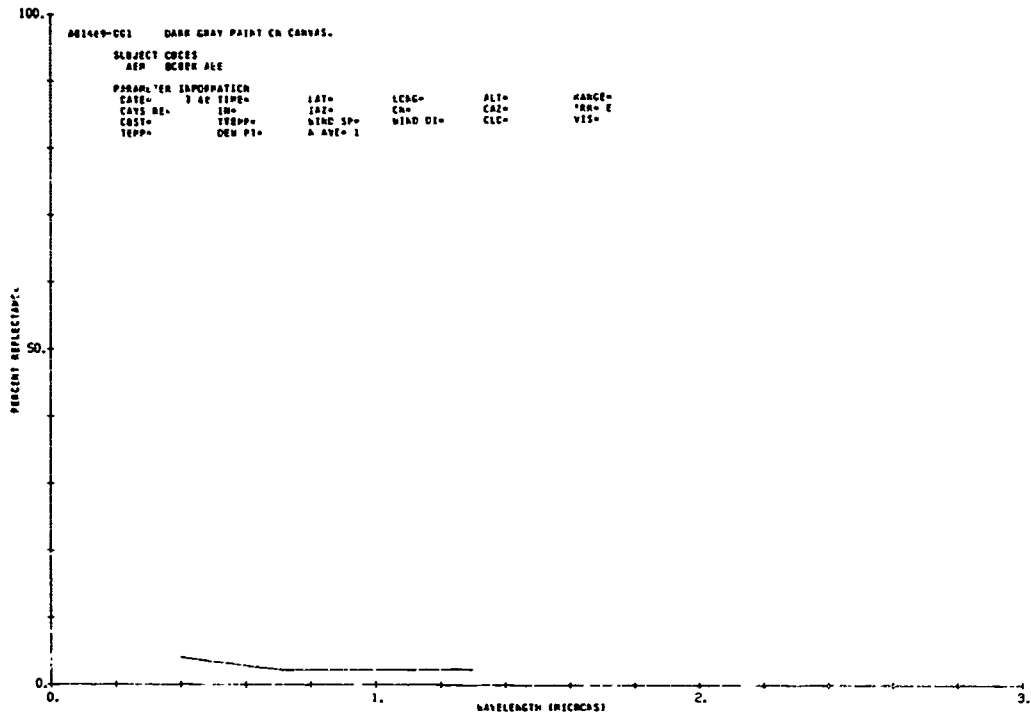


ADM 115

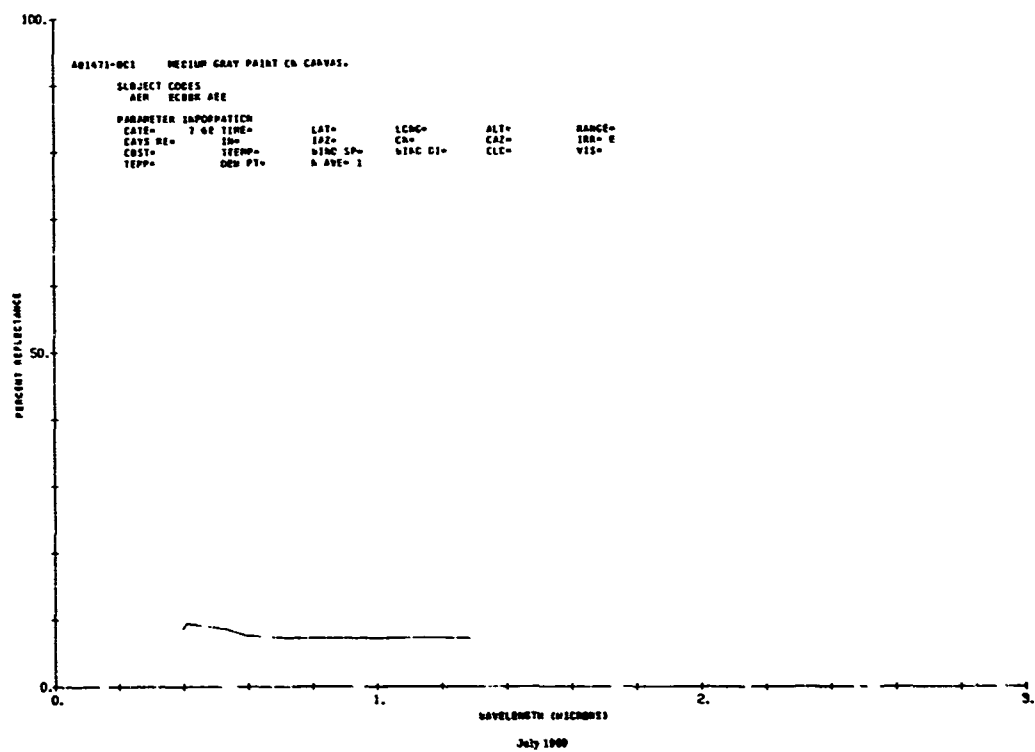
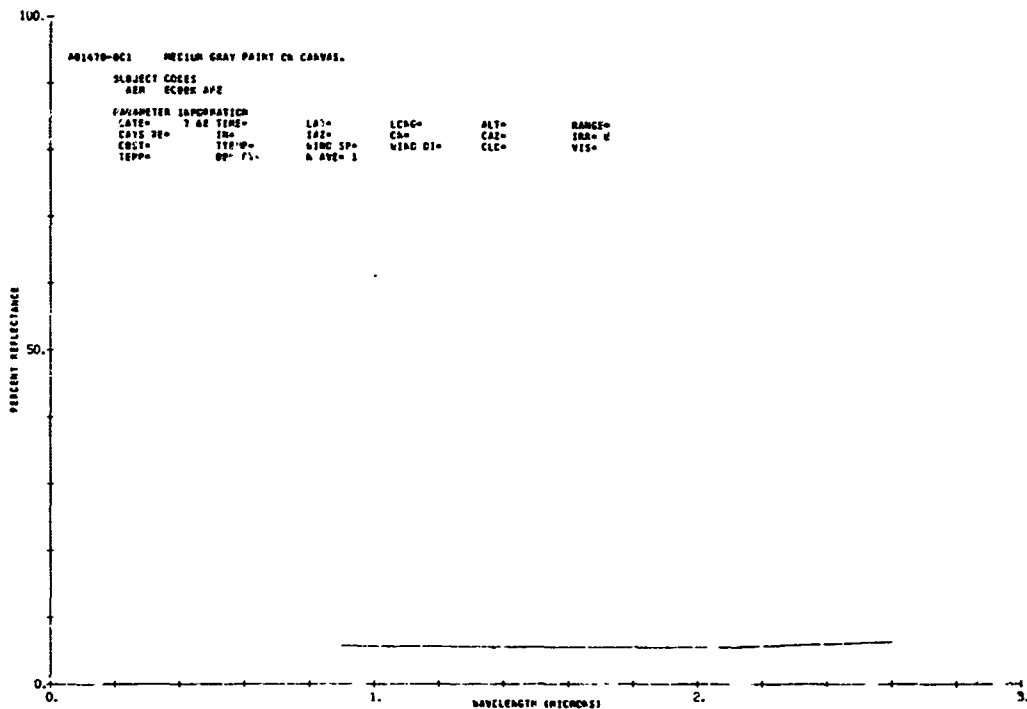


July 1960

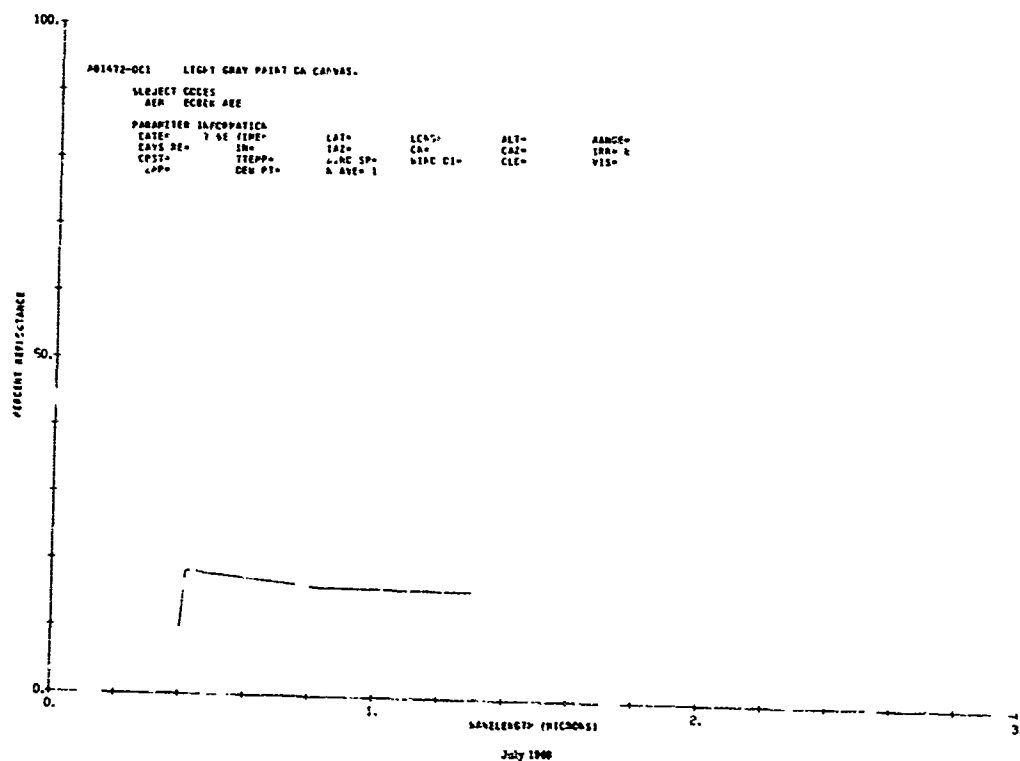
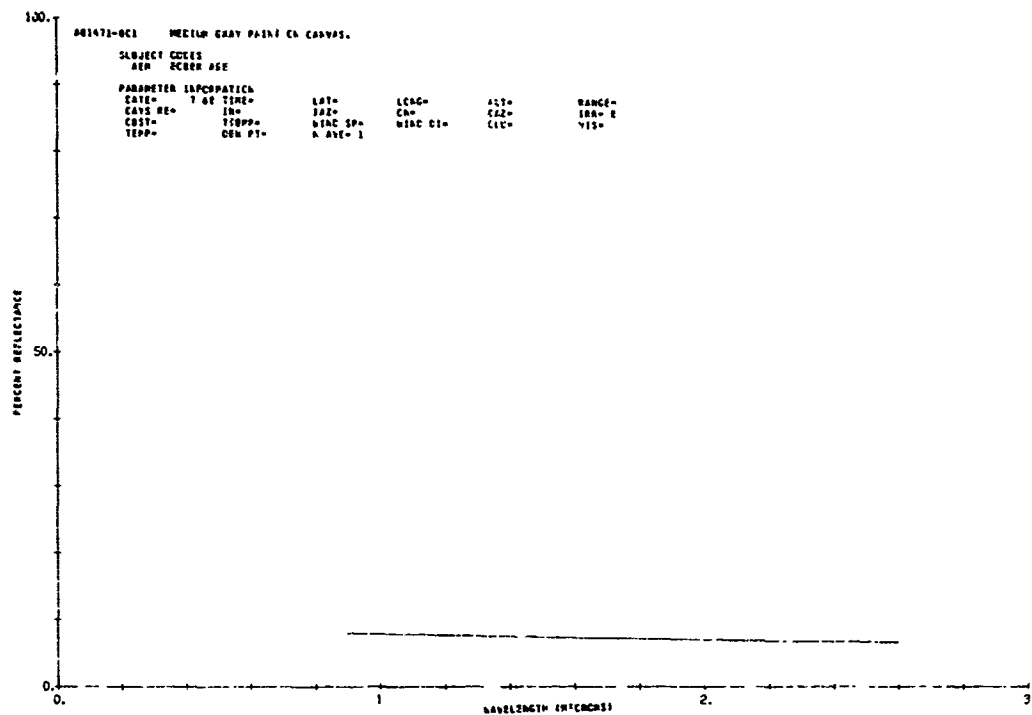
AEM 114



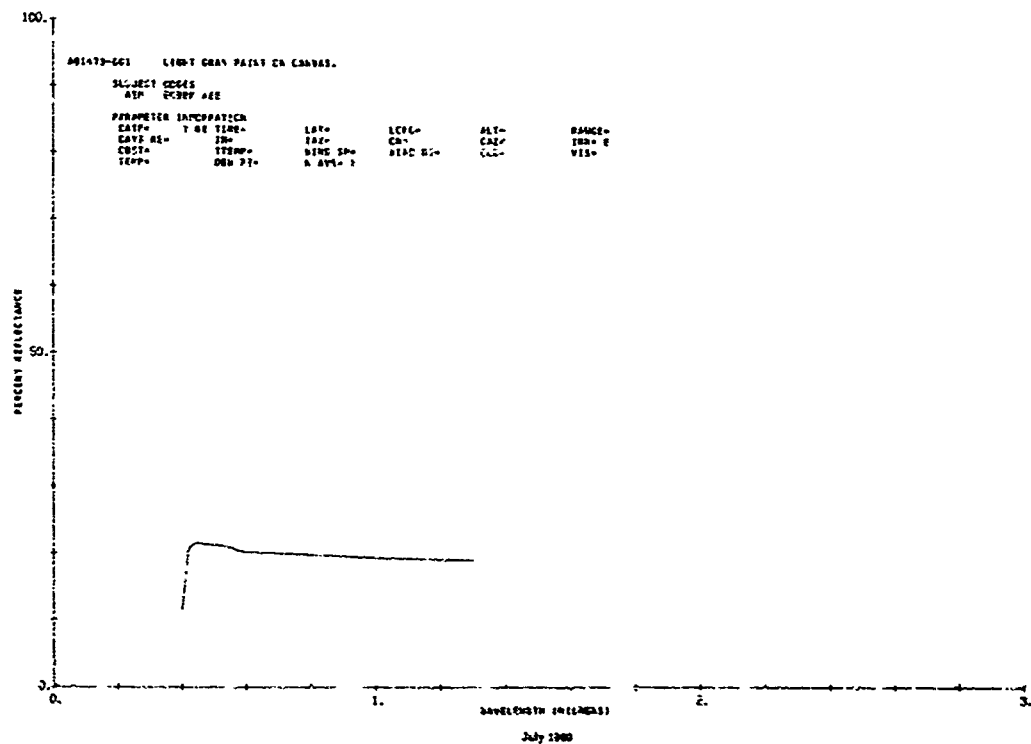
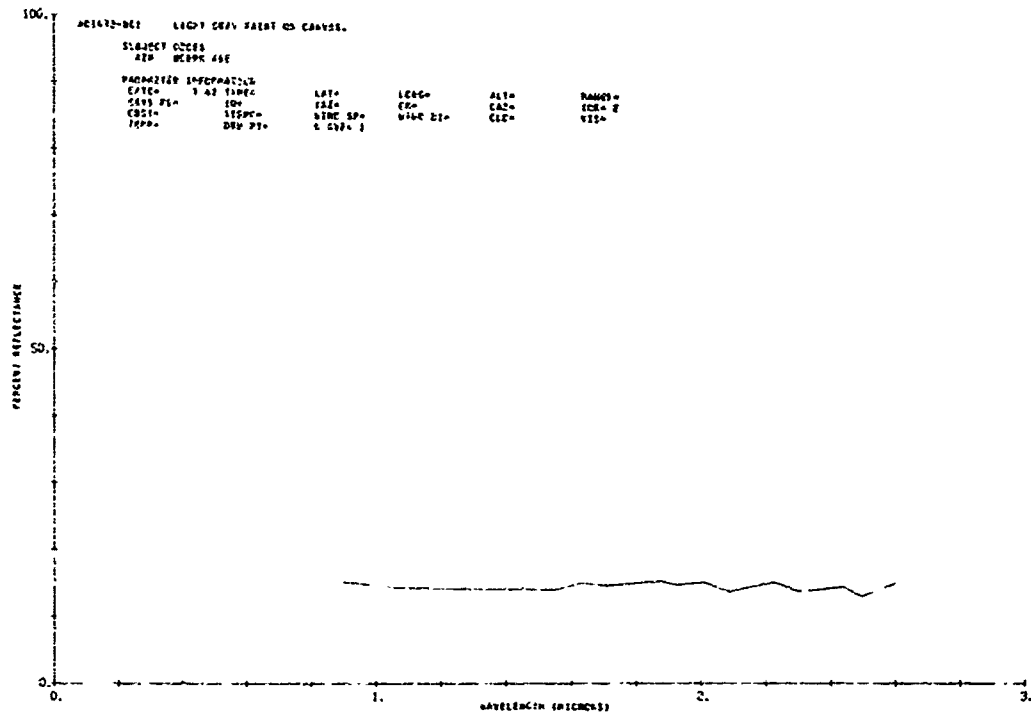
ASM 1 9



AEM 116

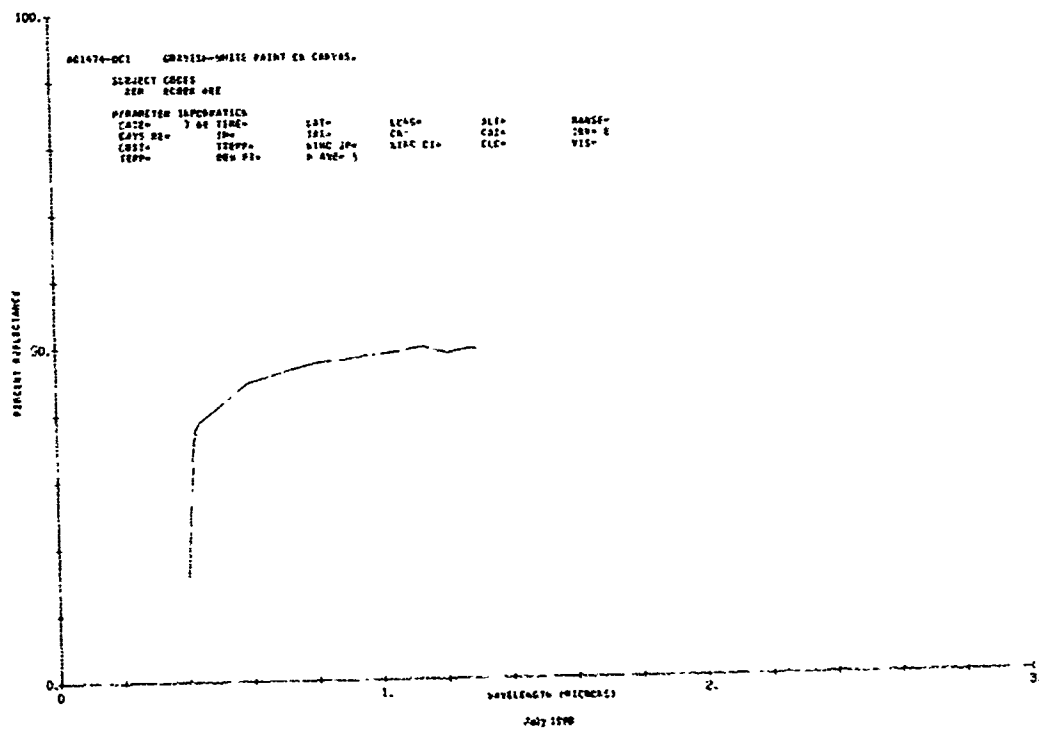
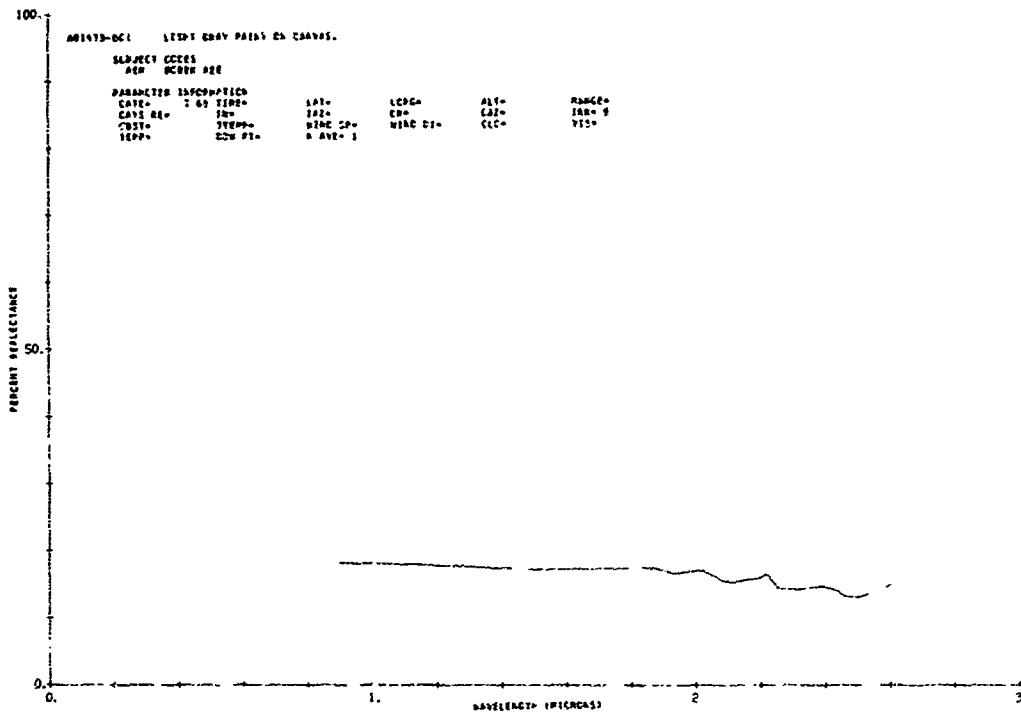


ARM 517

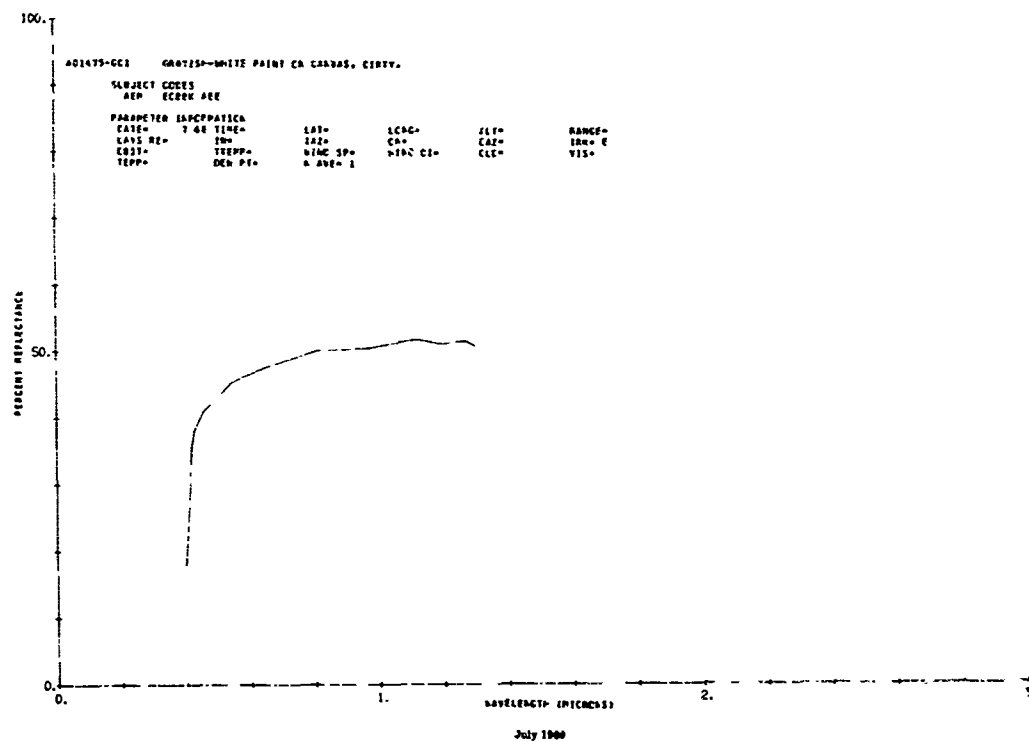
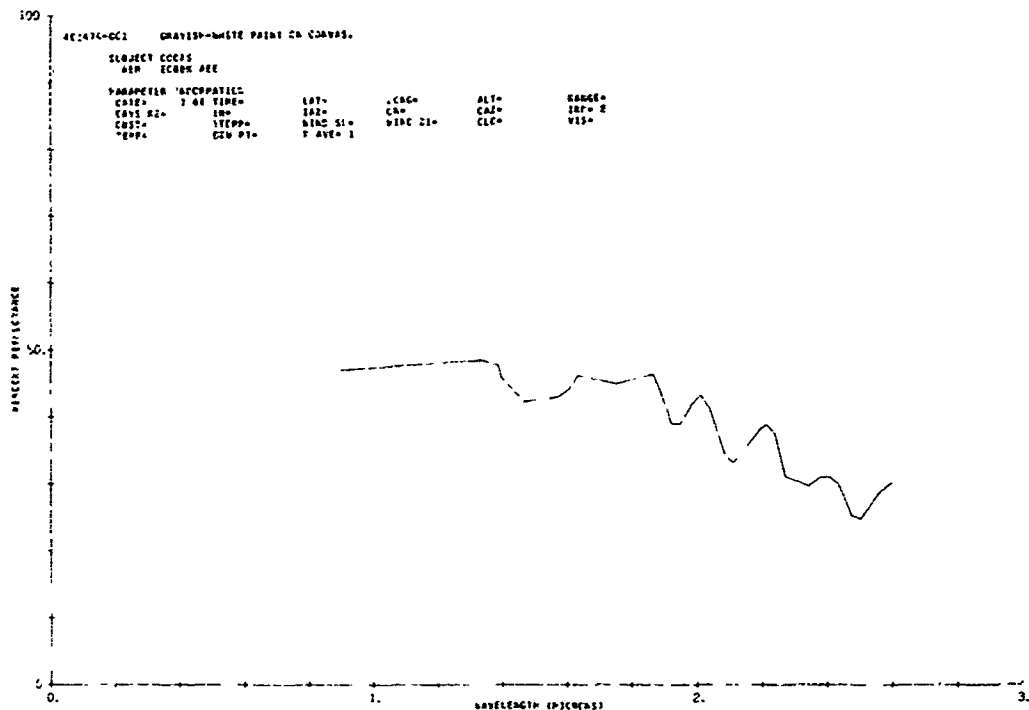


July 1960

ARM 118

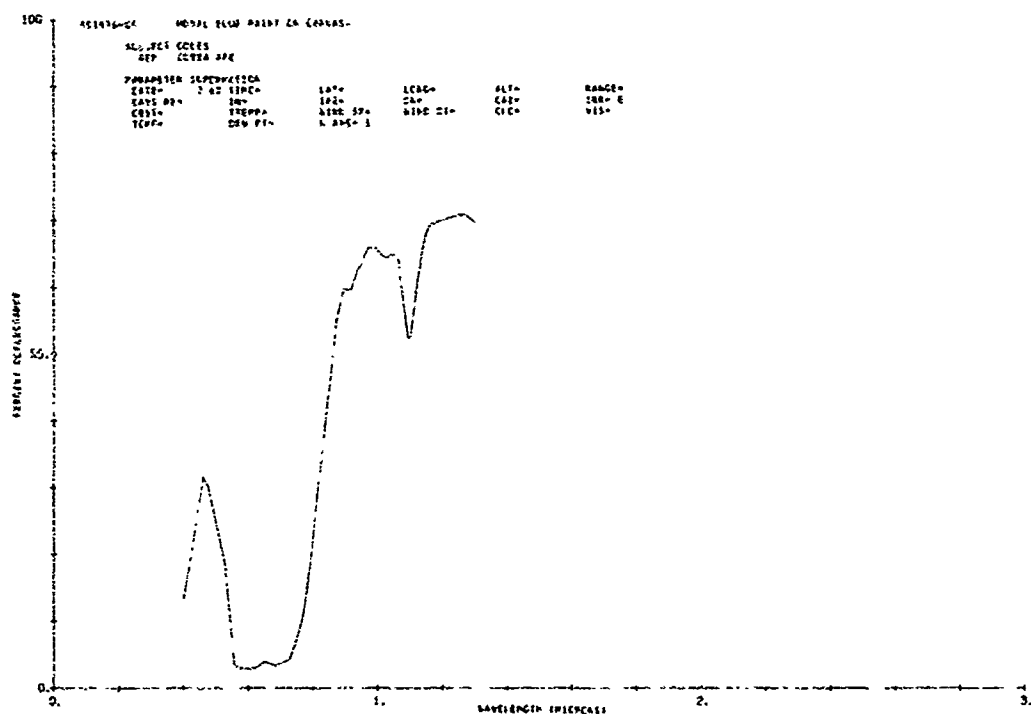
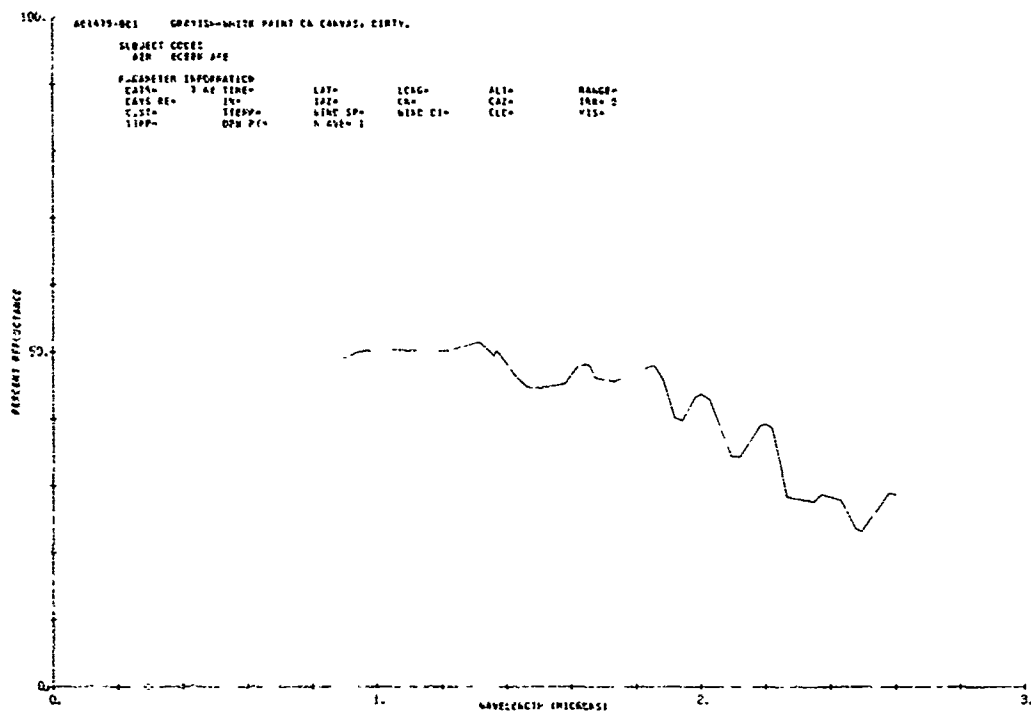


ARM 119



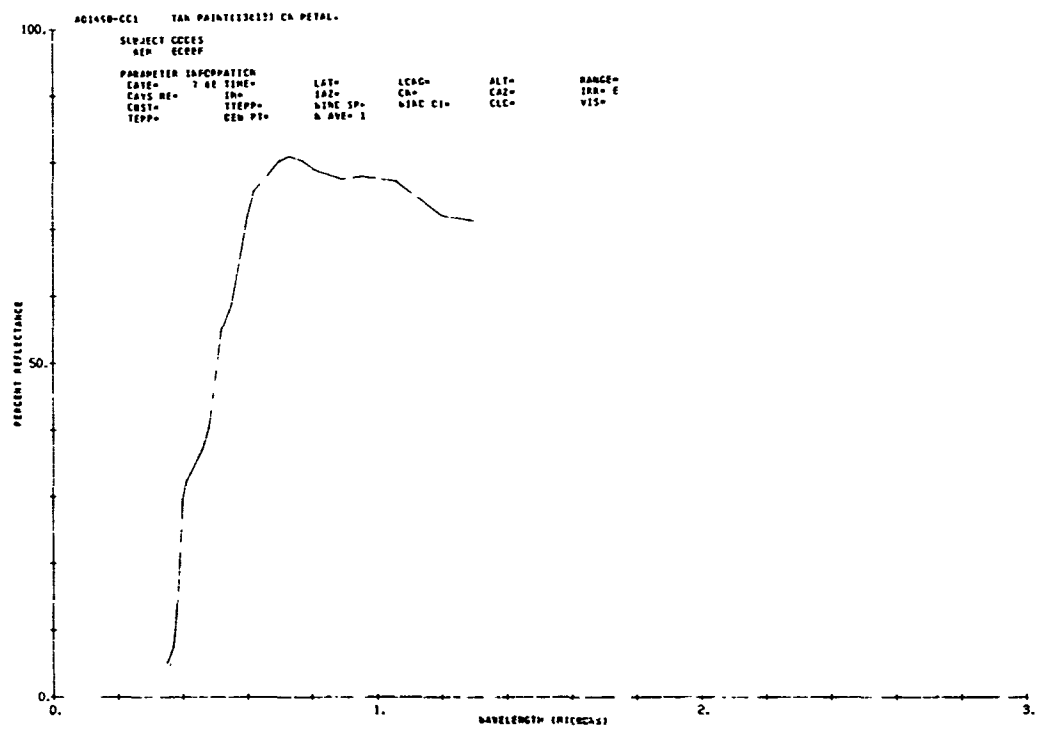
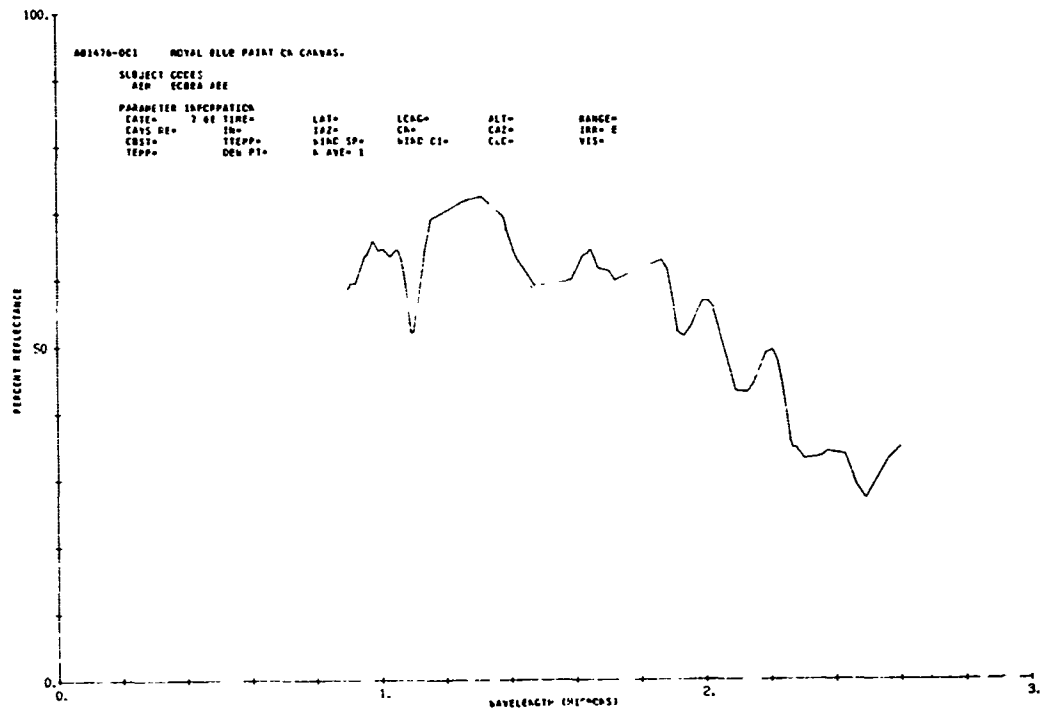
July 1960

AEM 110



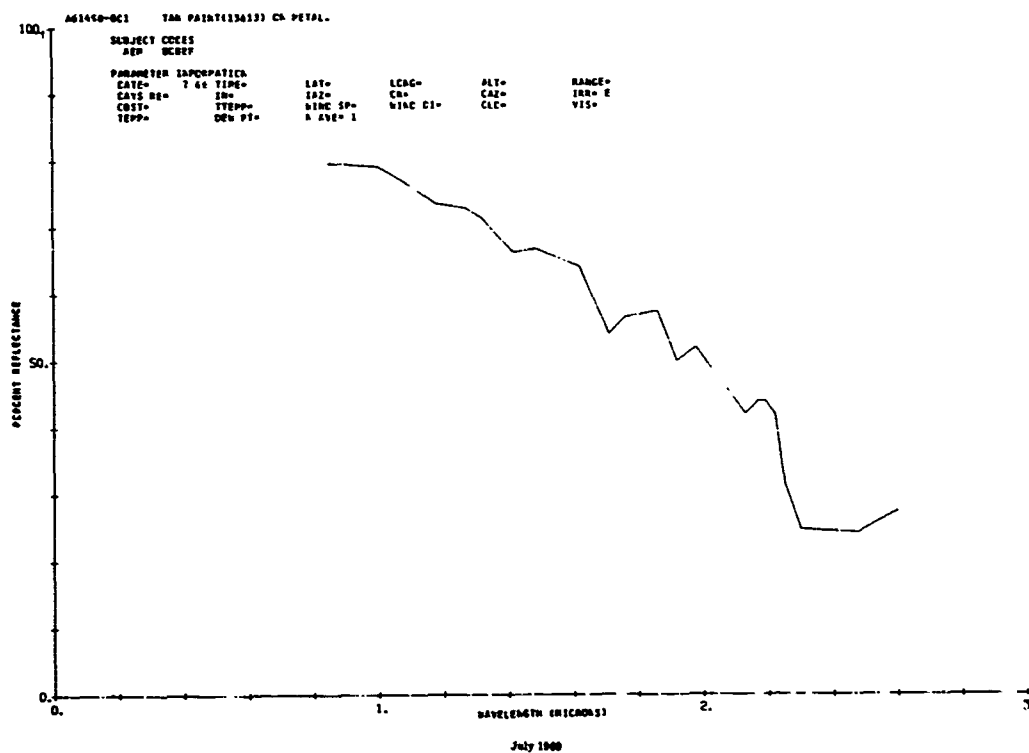
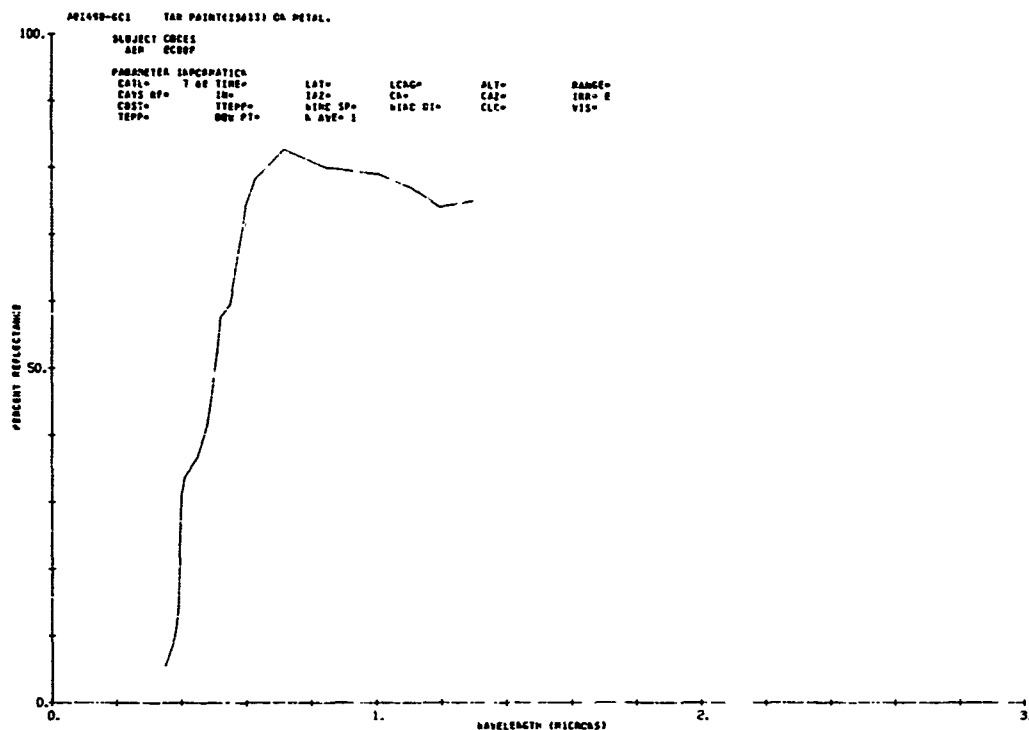
July 1968

AEM 12:



July 1969

ALM 122



150. 001450-001 TAN 00107-130111 CR REVAL.

SUBJECT CODES
ZIP WCDPP

PARAMETER INFORMATION
DATE= 1 04 TIME= 1000
CASS RE= 1000
CMT= T-0000
LEPP= 00J P1= 0 AUG= 1

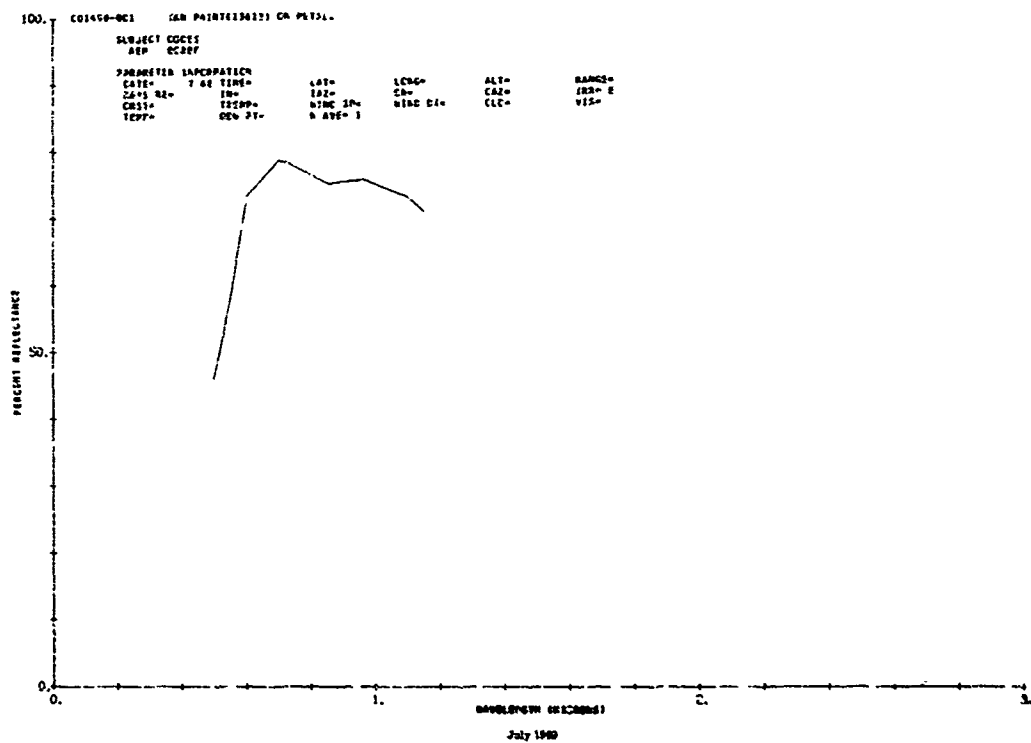
LOT= 1000
LCH= 1000
C= 1000
WIDE DI= 1000
WIDE DI= 1000
WIDE DI= 1000

ALT= 1000
CAZ= 1000
CLD= 1000

RANGE= 1000
SR= E
VIS= 1000

PERCENT REFLECTANCE

WAVELENGTH (MICRONS)



001460-001 LAB PAINT(13412) ON METAL.

SUBJECT CODES
AEN LCC00P

PARAMETER INCOMPATICH
DATE= 1 ON TIME=
EATS BE= 12=
CETS= TEPPO=
TEPP= BOW DT=

LAT= LCAG ALT= RANGE=
SAR= CH= CAL= IRR= R
WAE SP= WAE DI= CLK= VIS=

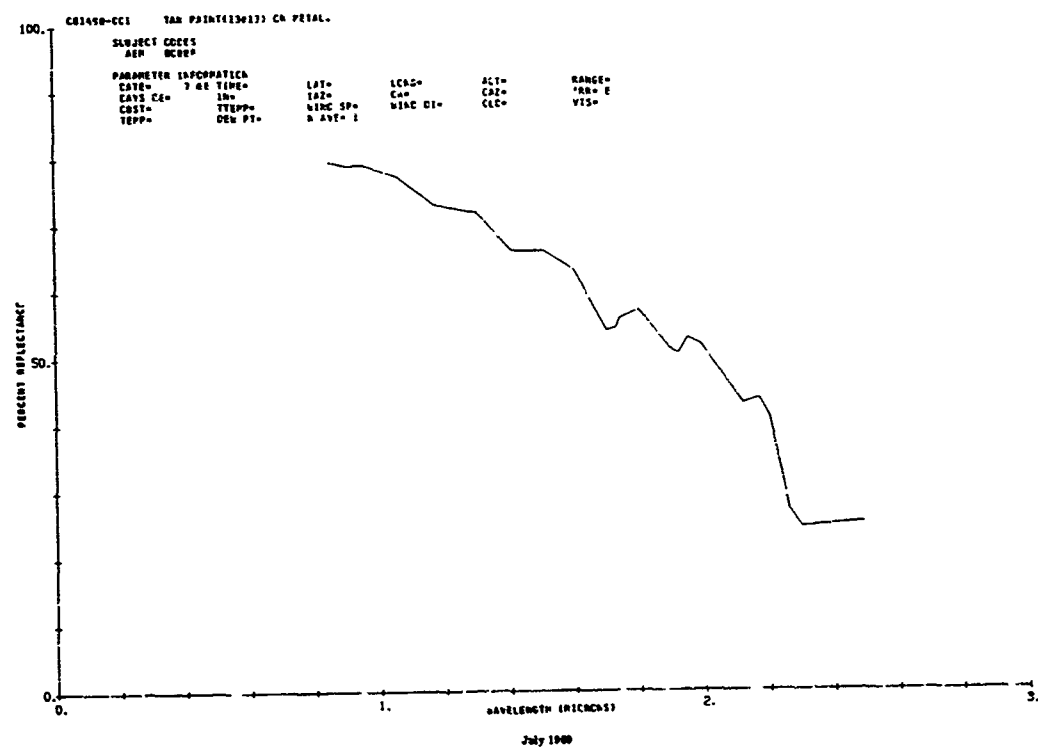
0. 1. 2. 3.

WAVELENGTH (MICRONS)

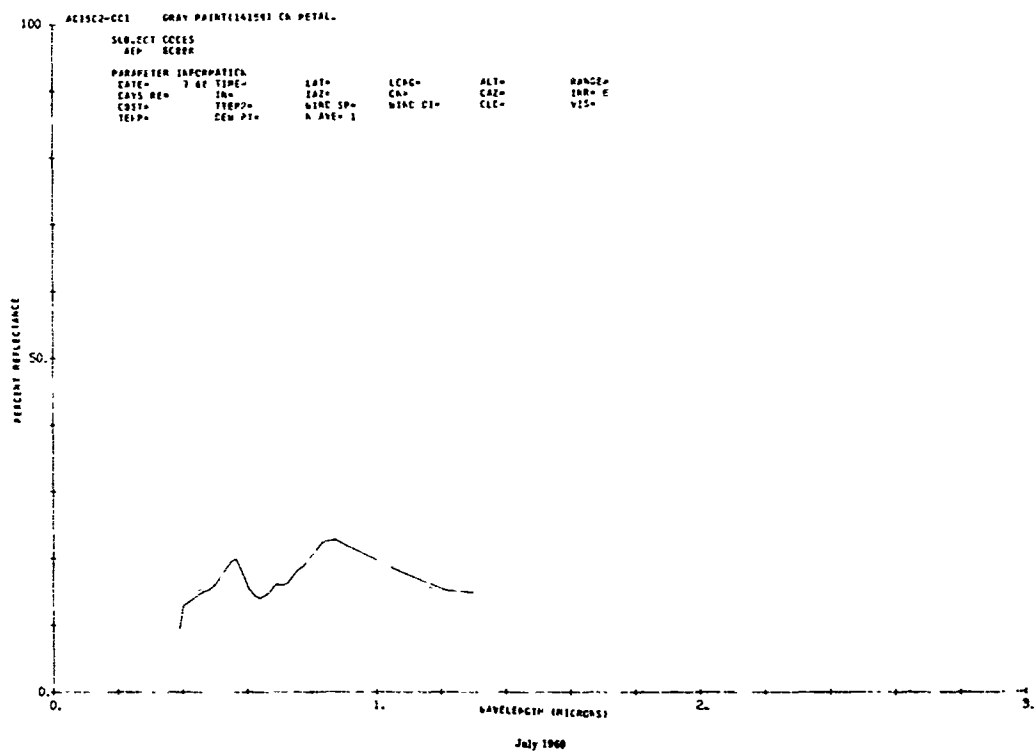
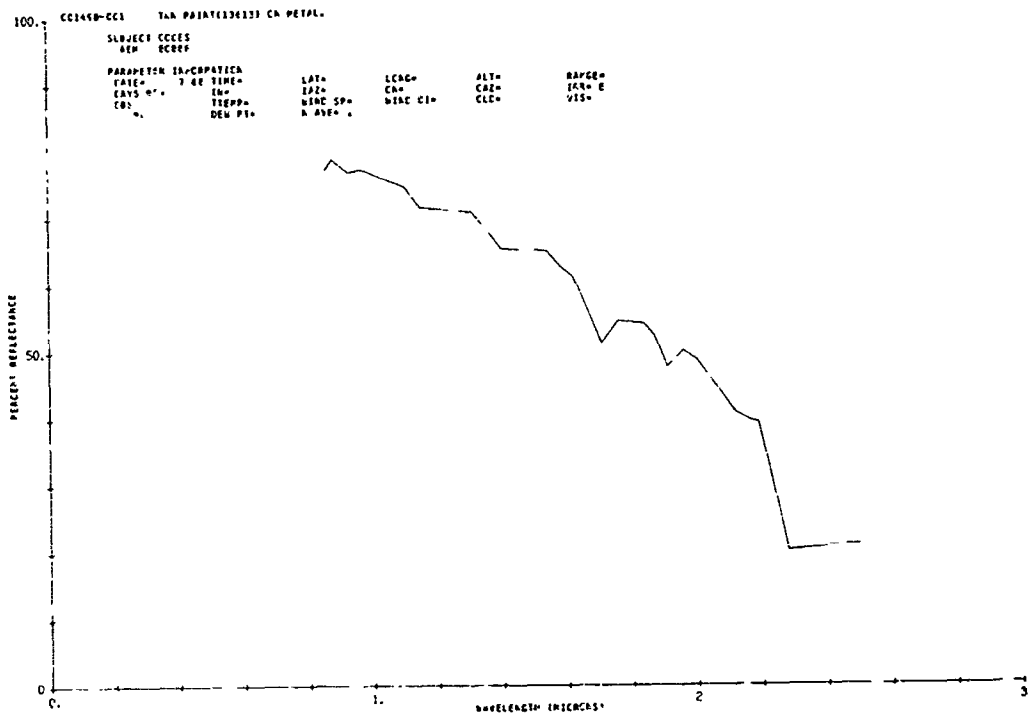
PERCENT REFLECTANCE

0. 50. 100.

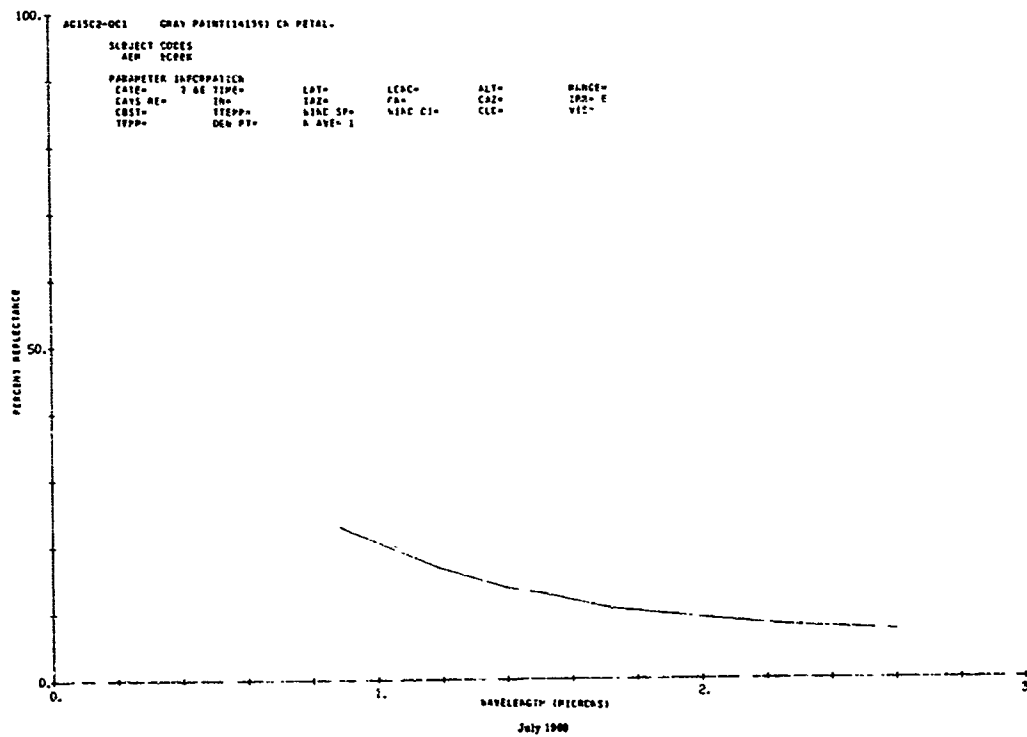
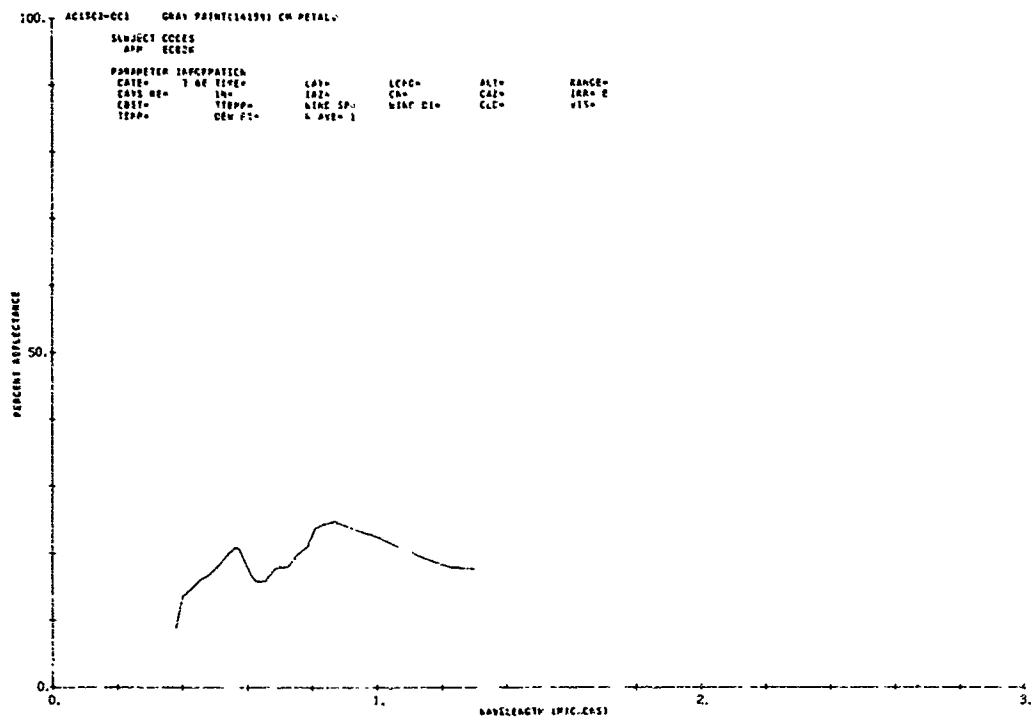
Wavelength (microns)	Percent Reflectance
0.5	50
0.6	65
0.7	75
0.8	85
0.9	82
1.0	80
1.2	78
1.5	75
2.0	65



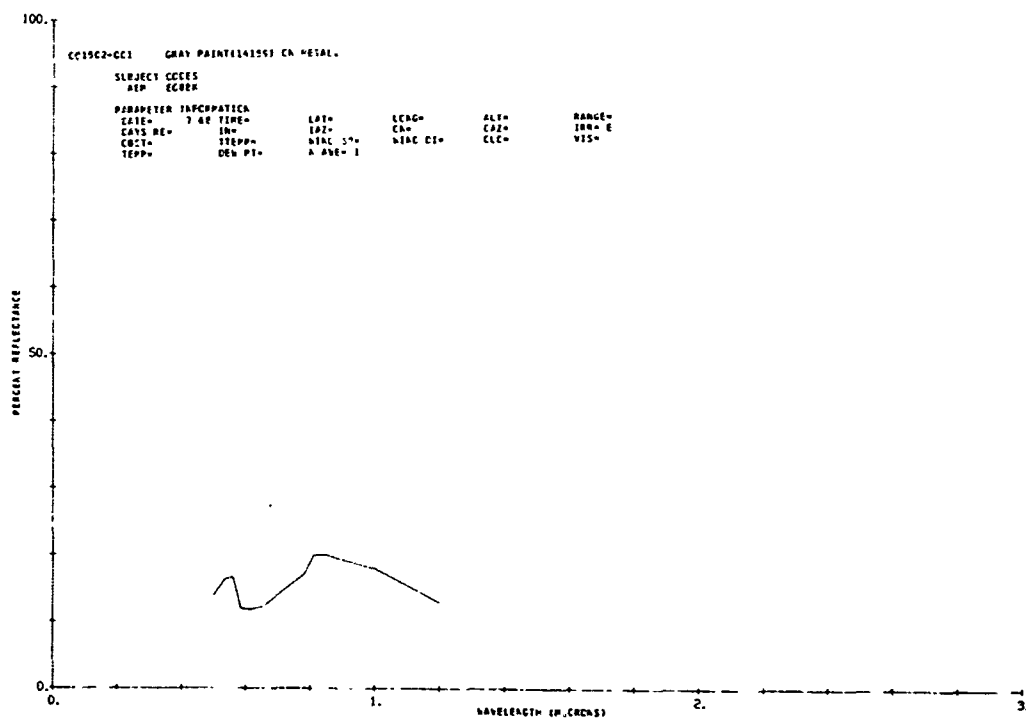
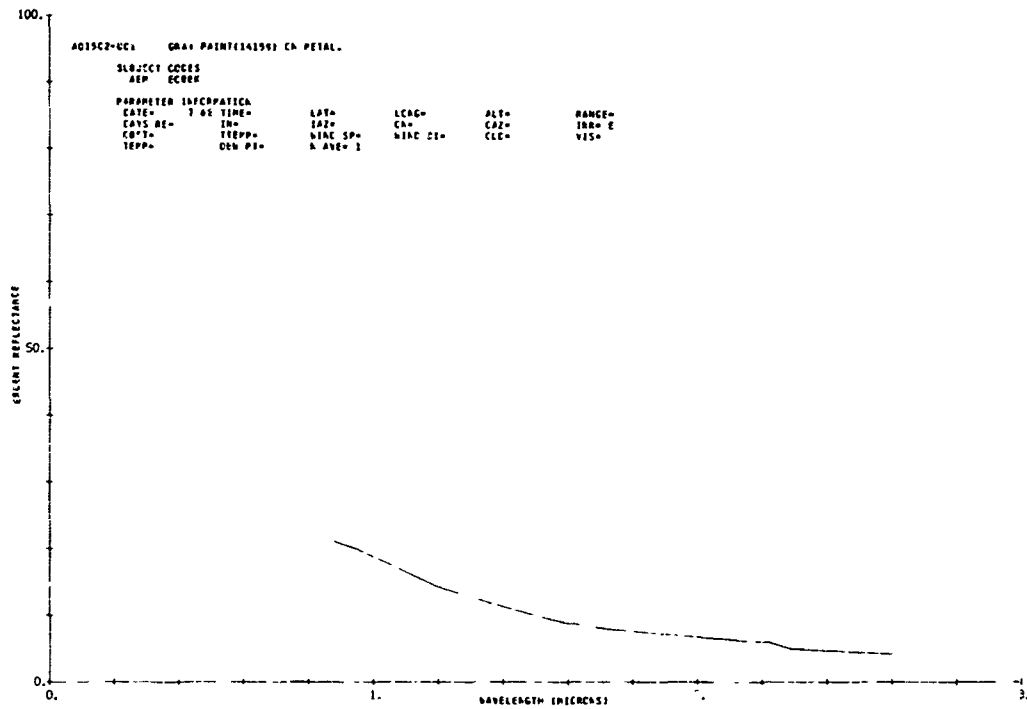
ARM 125



AEM 128

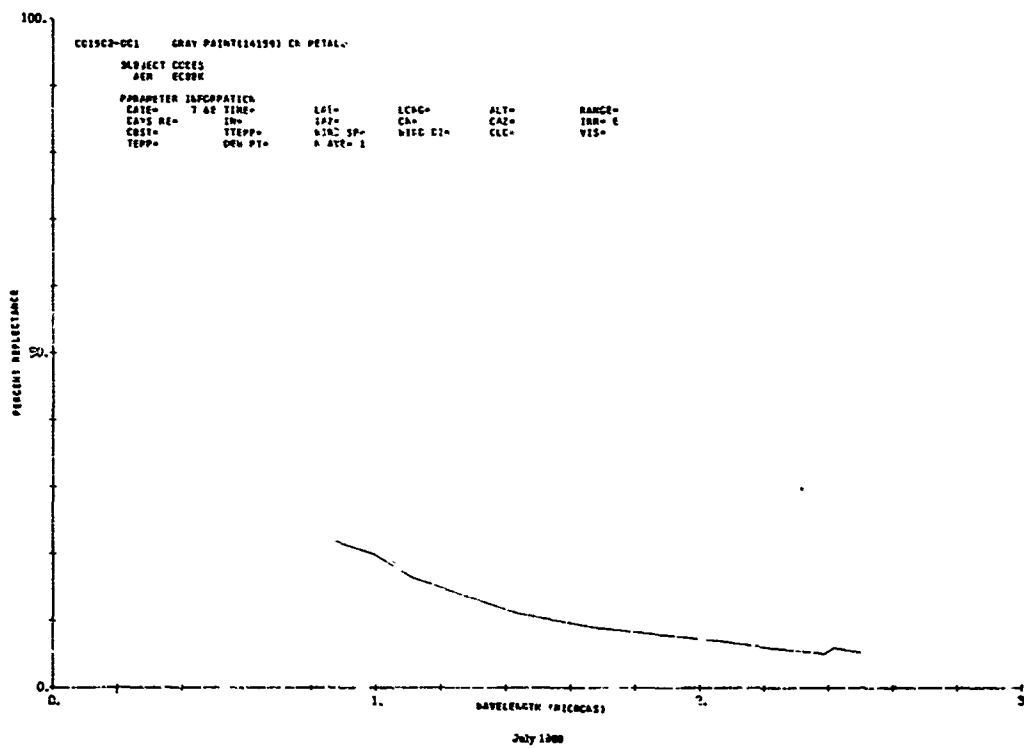
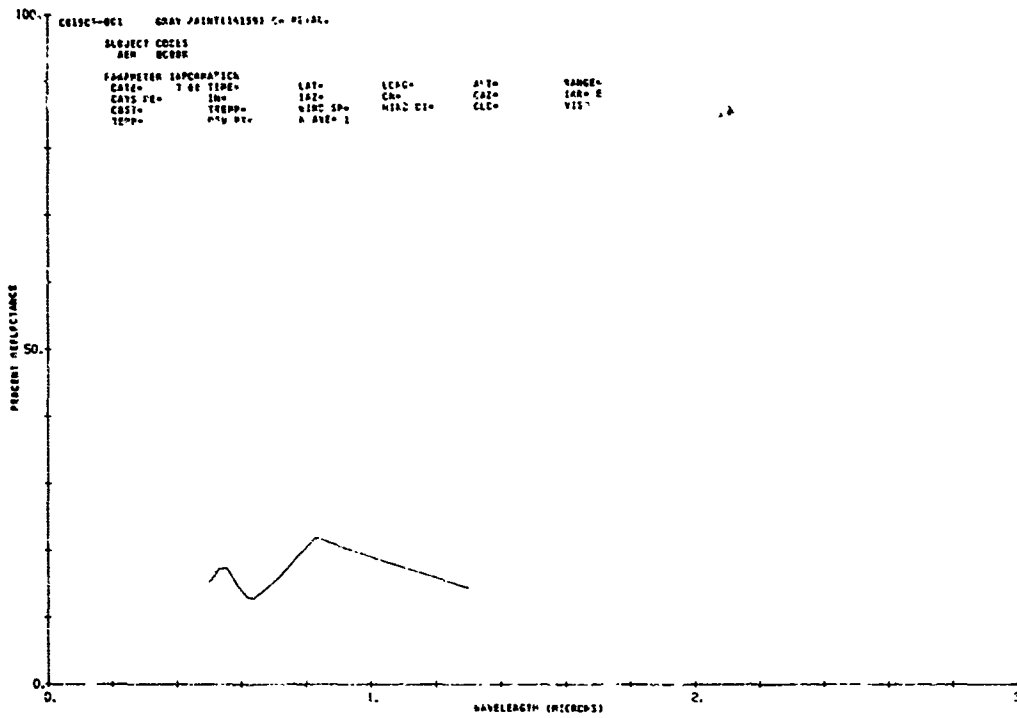


ARM 127

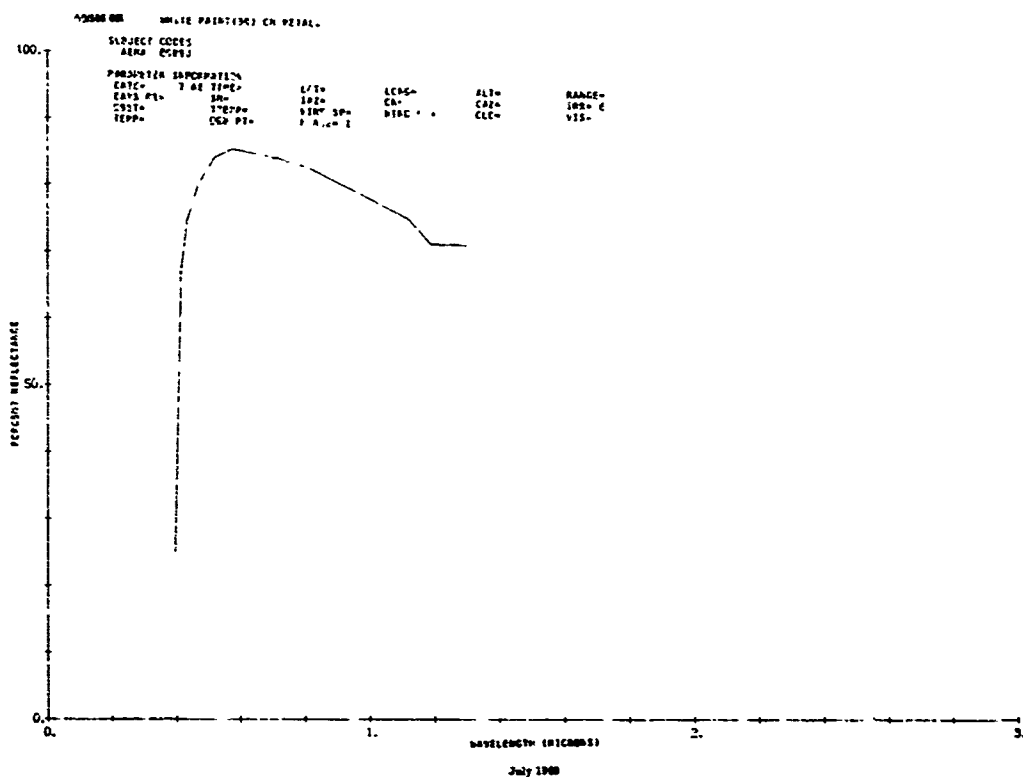
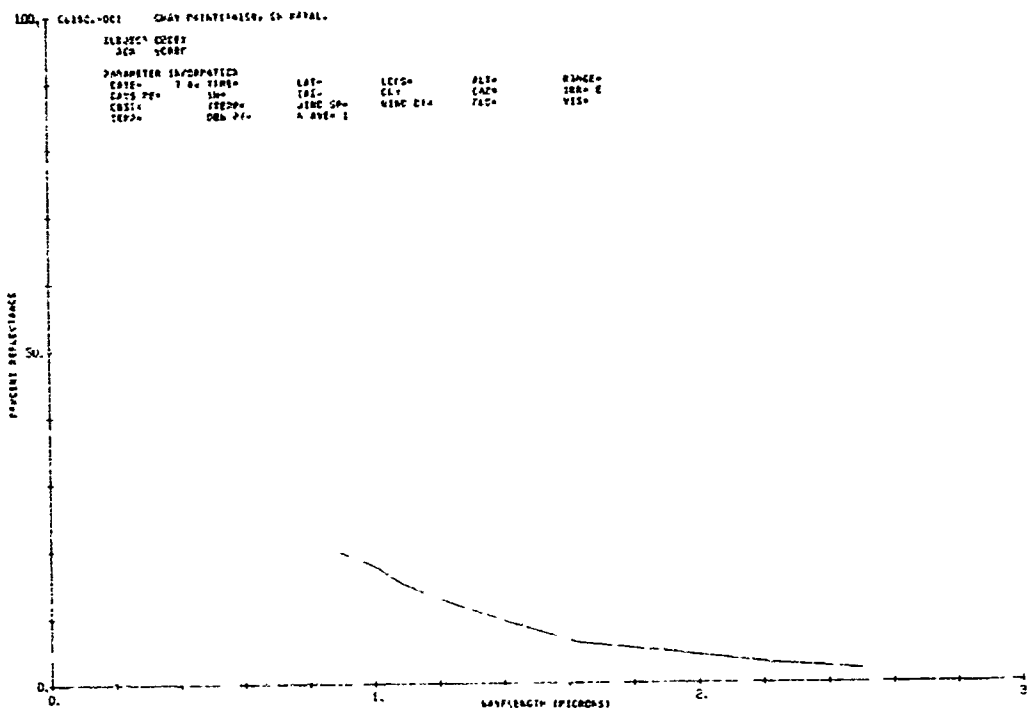


July 1960

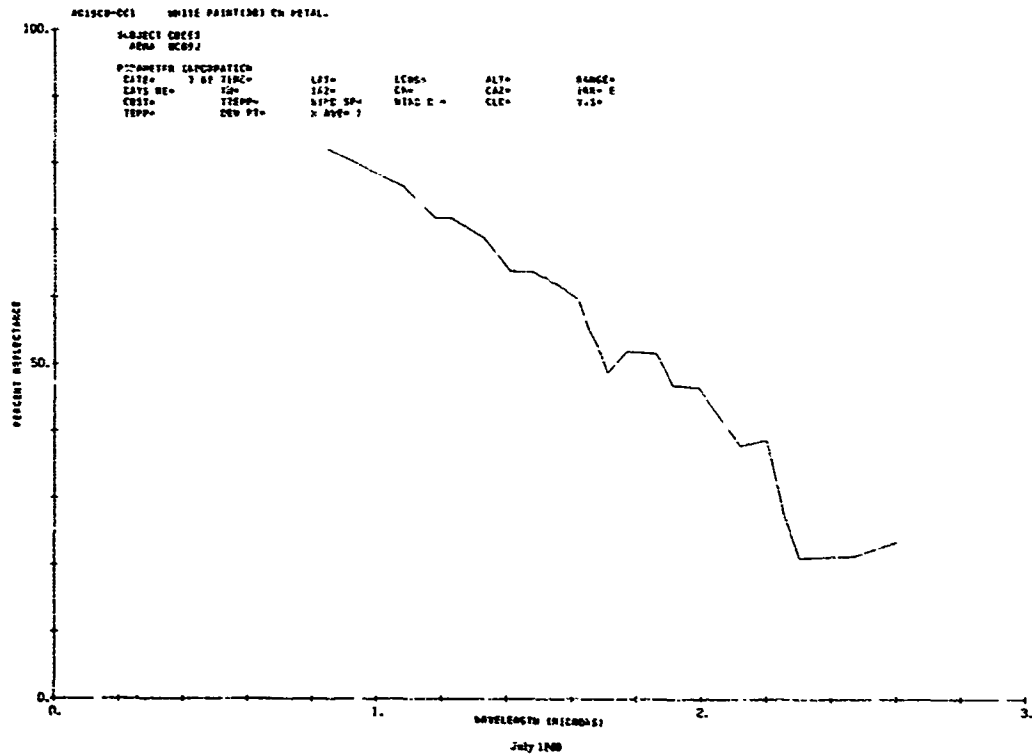
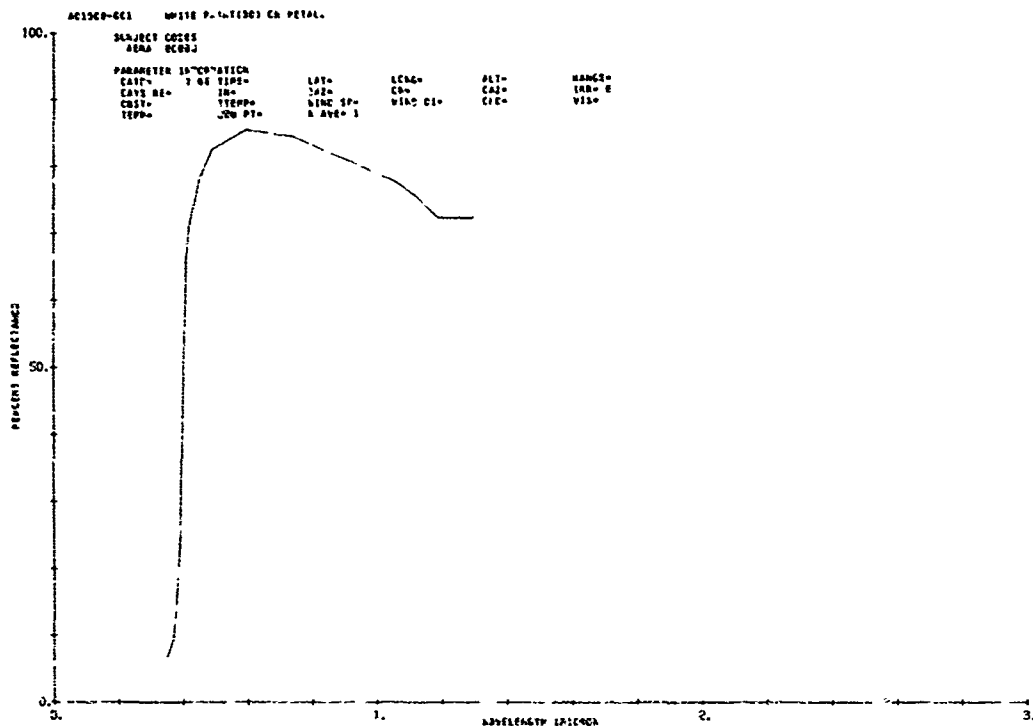
ARM 129



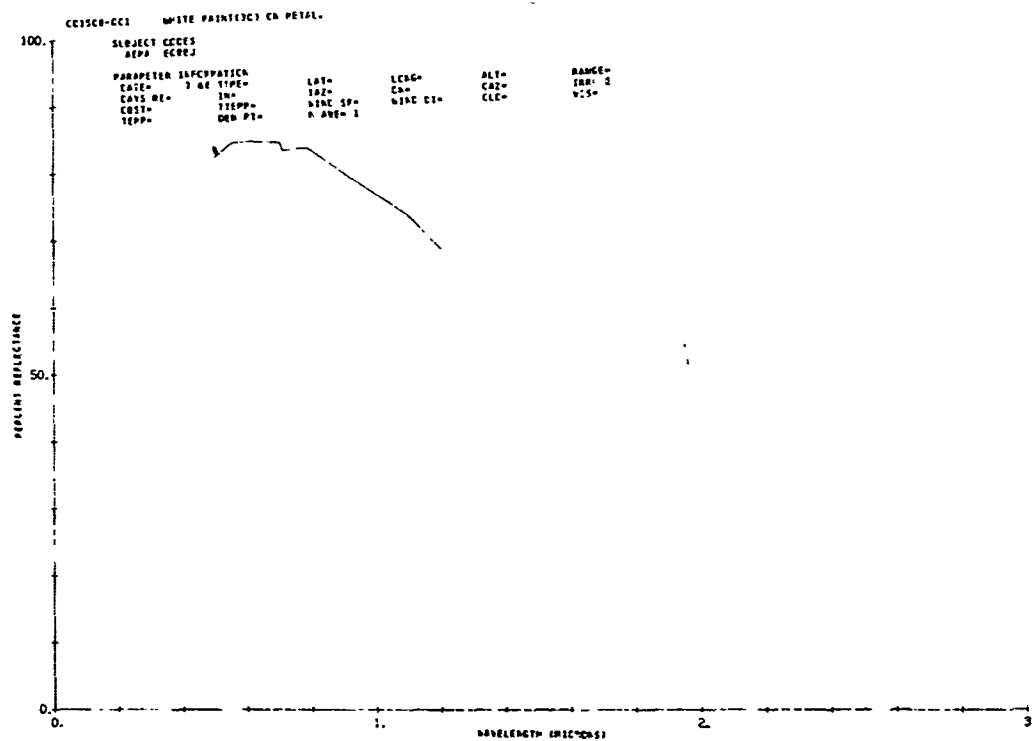
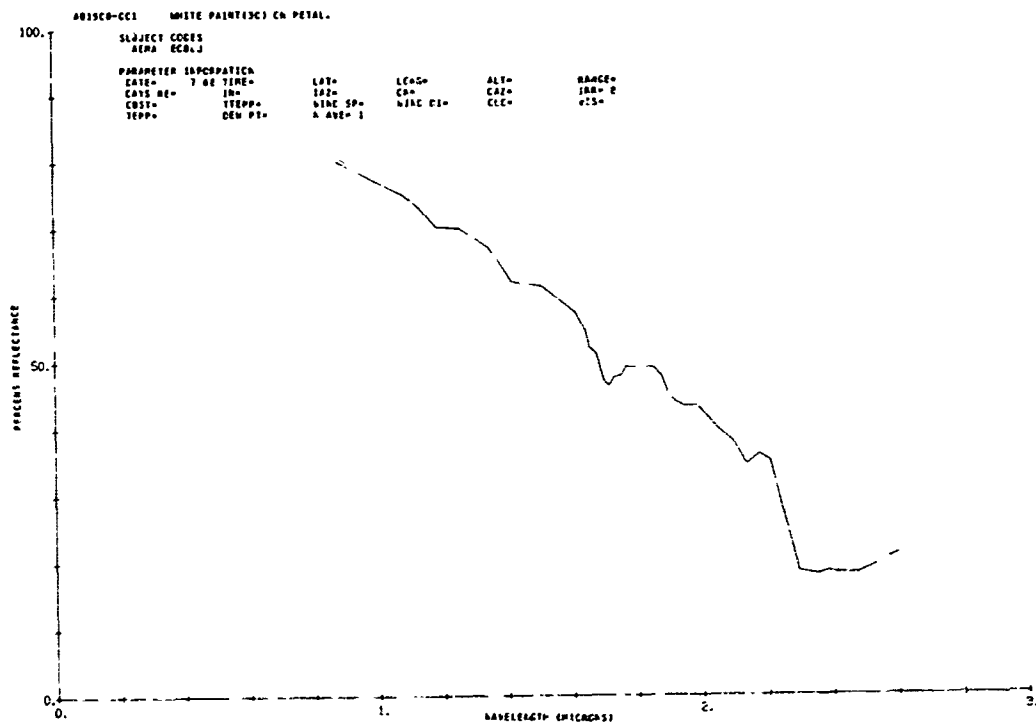
AKK 120



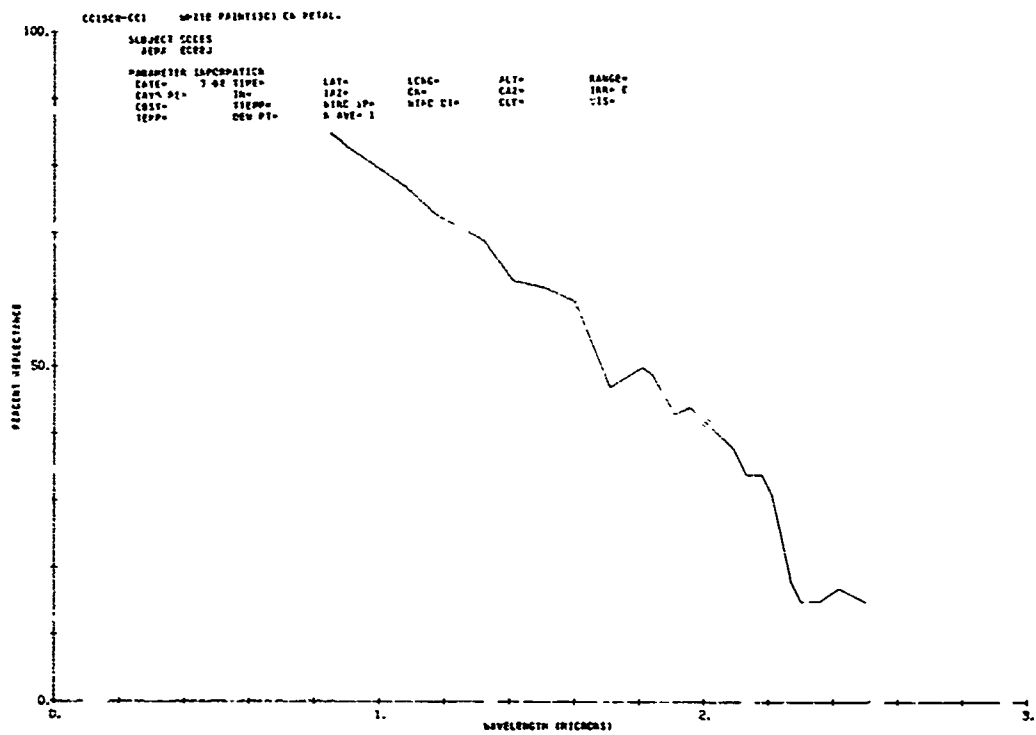
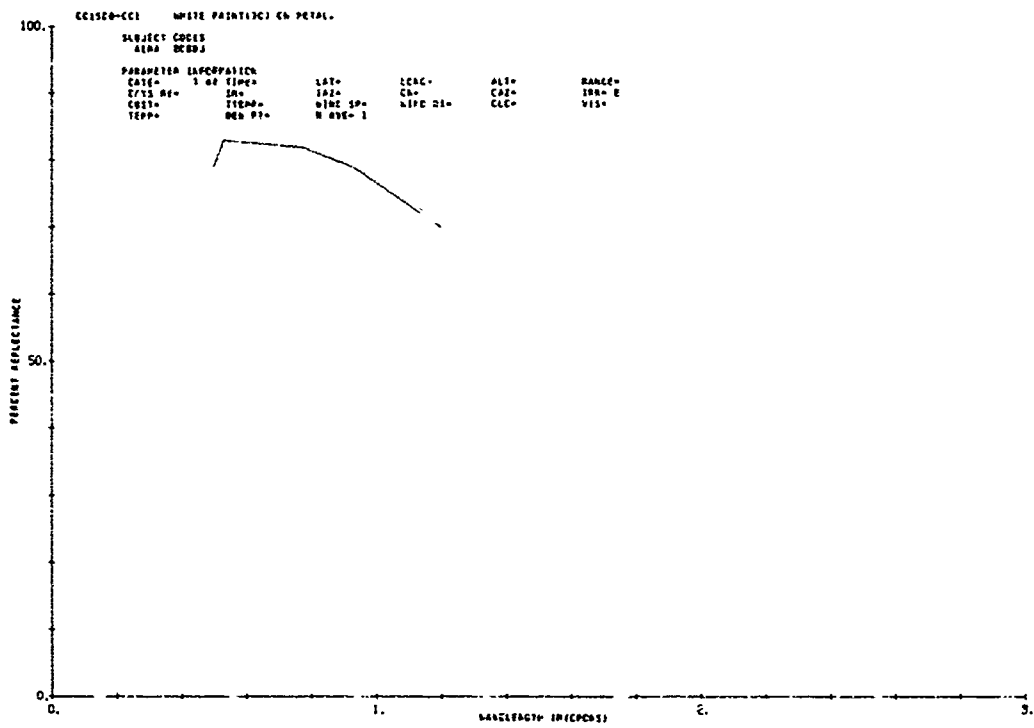
ARM 130



July 1960

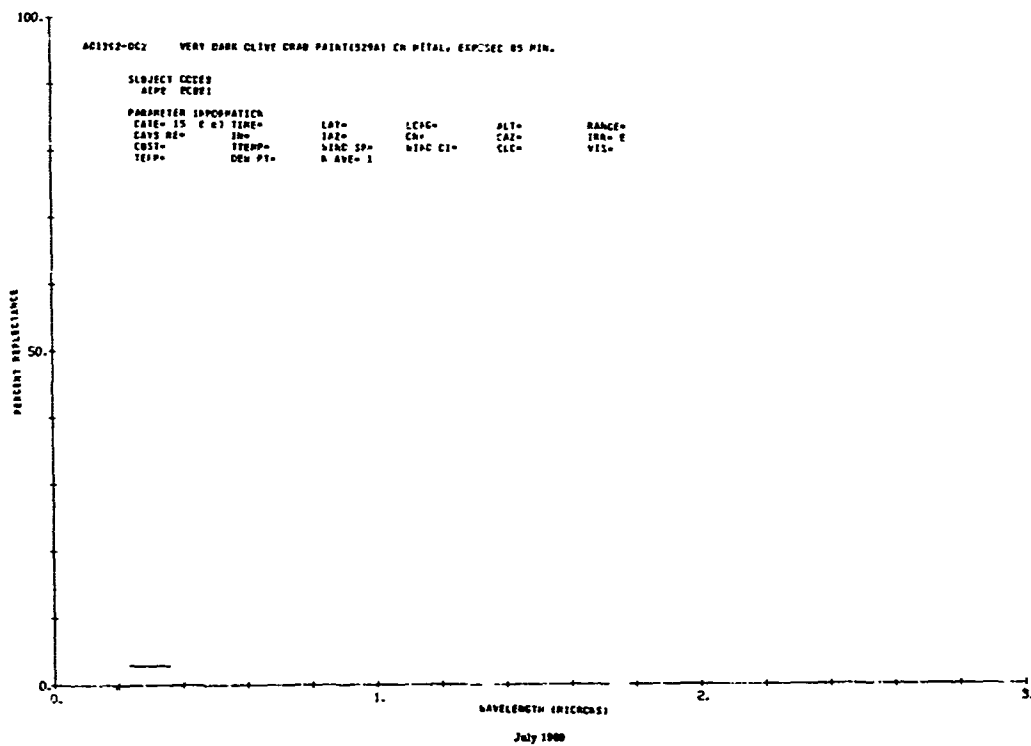
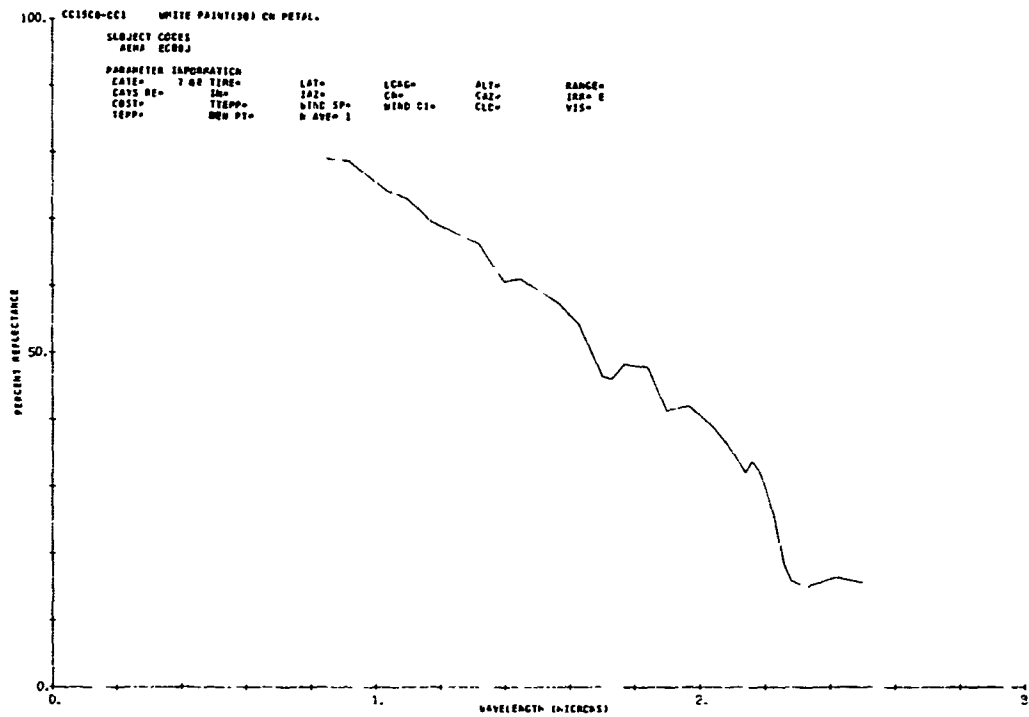


AKM 132

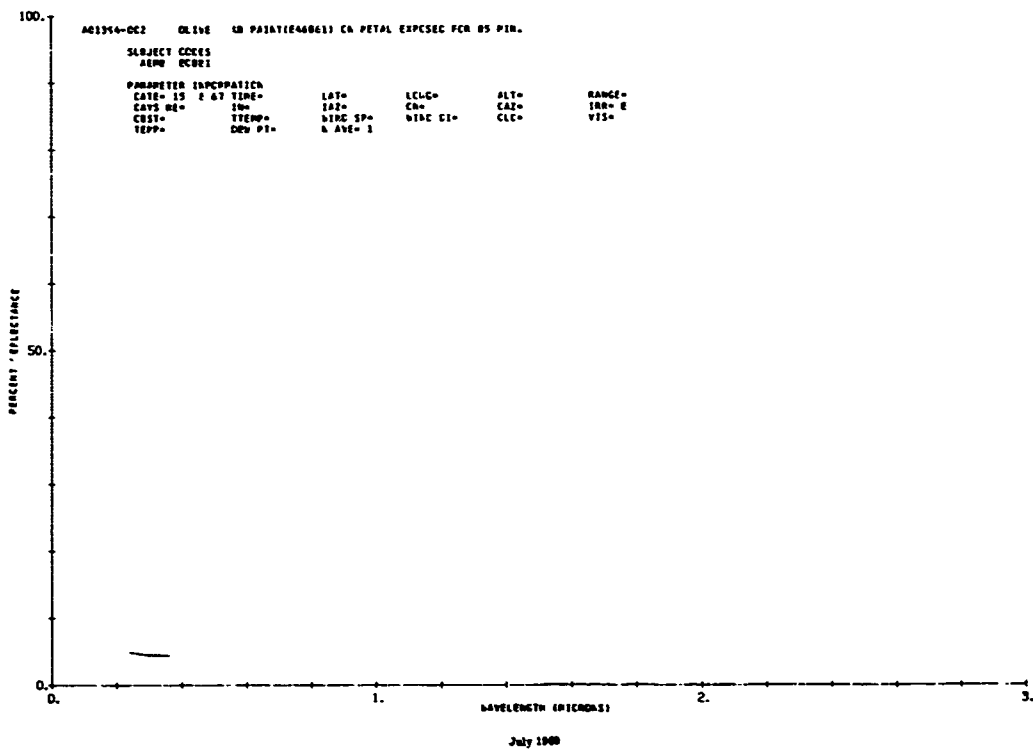
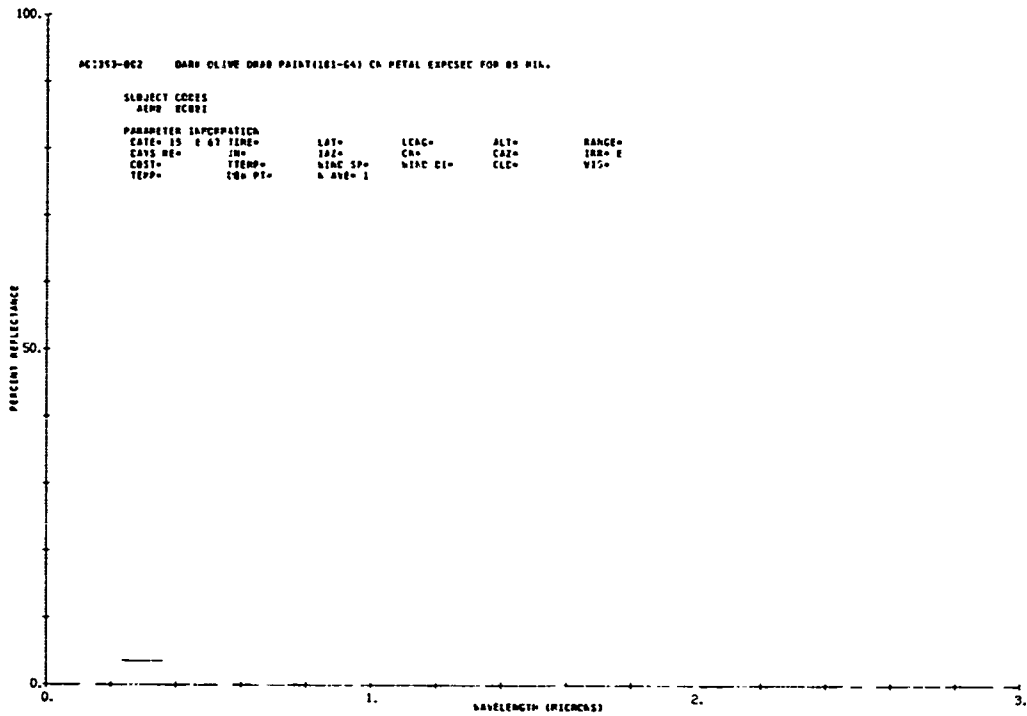


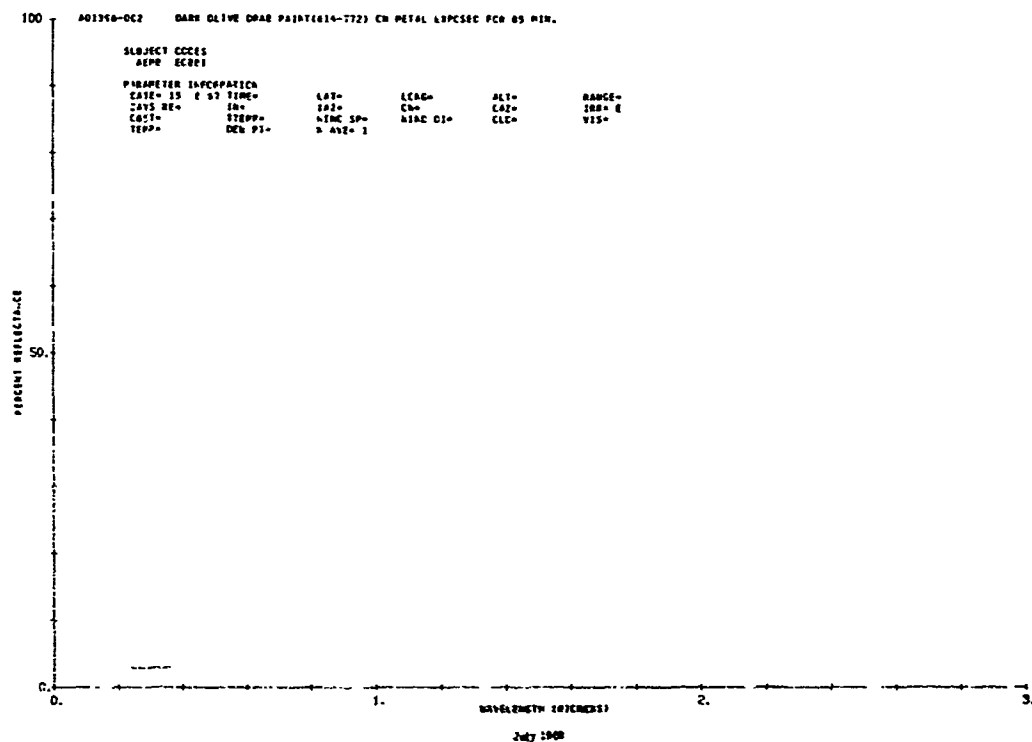
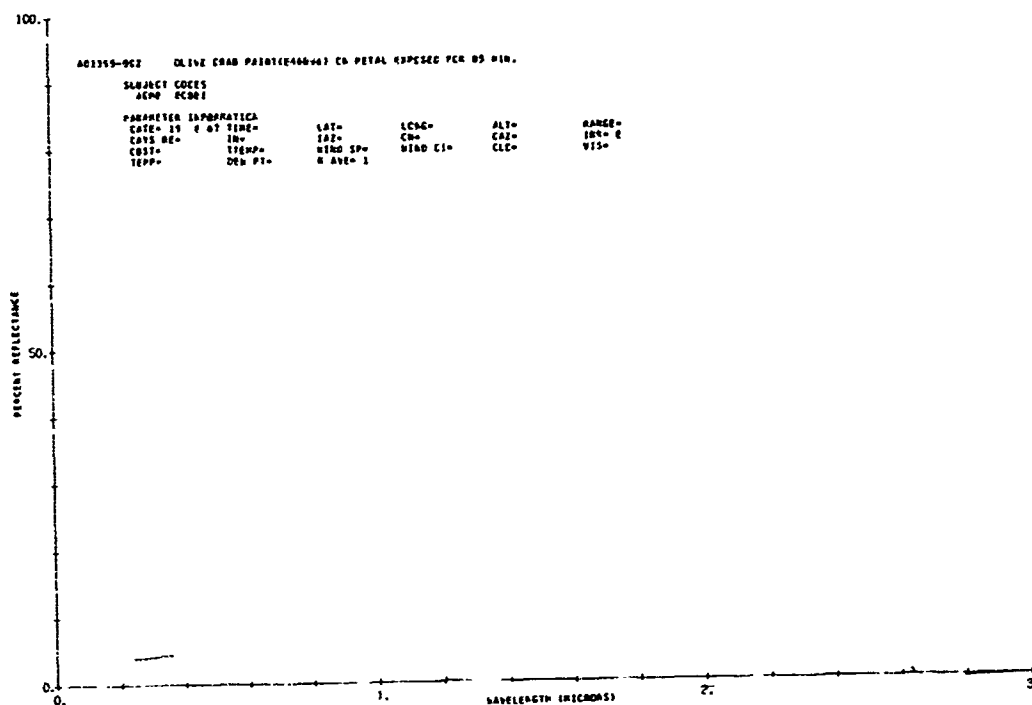
July 1960

ARM 123

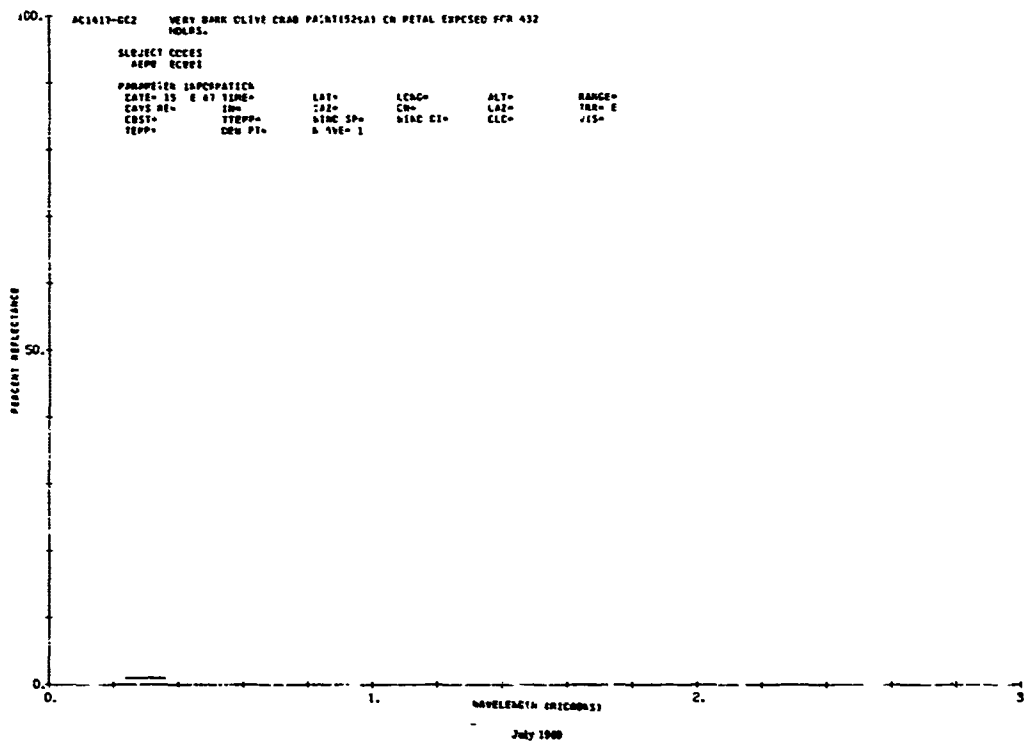
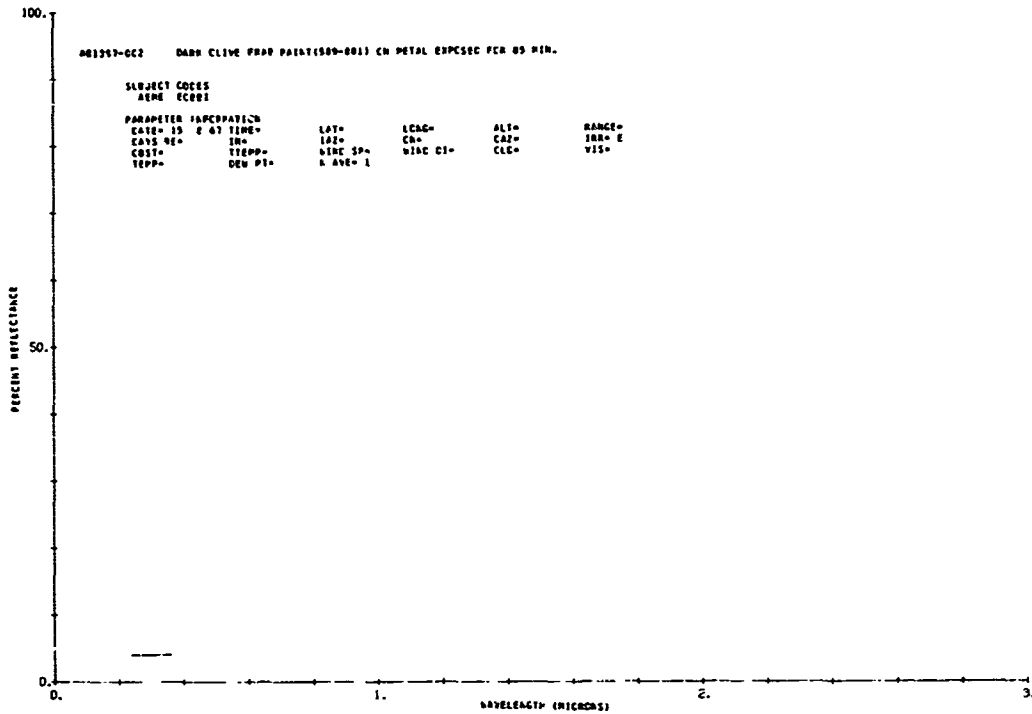


AEM 134



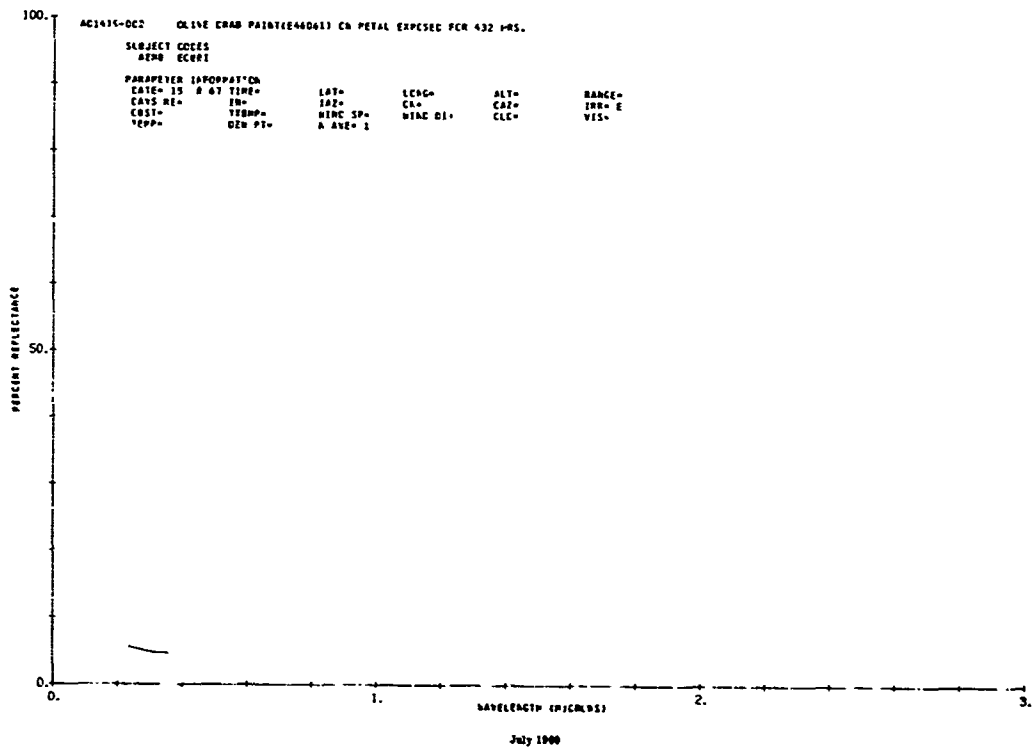
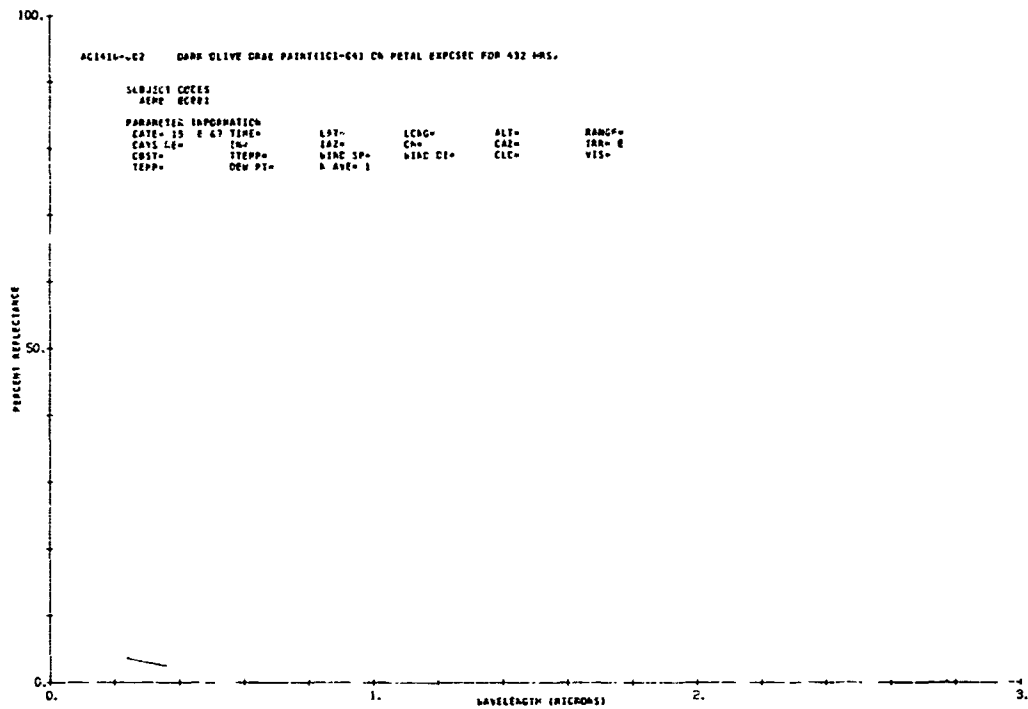


AEM 126



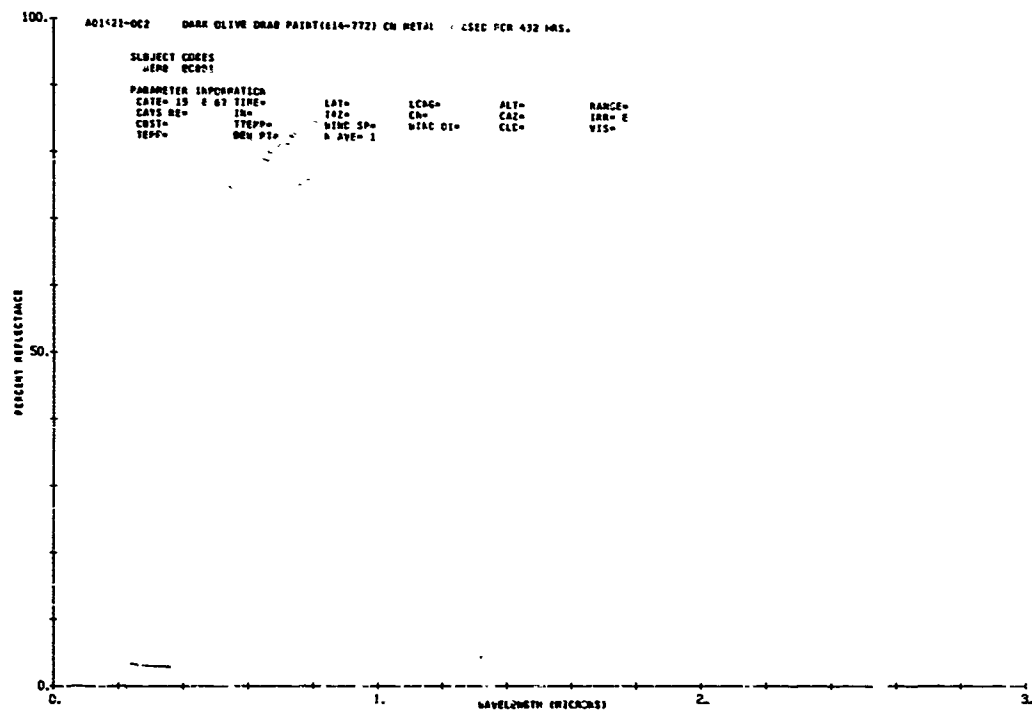
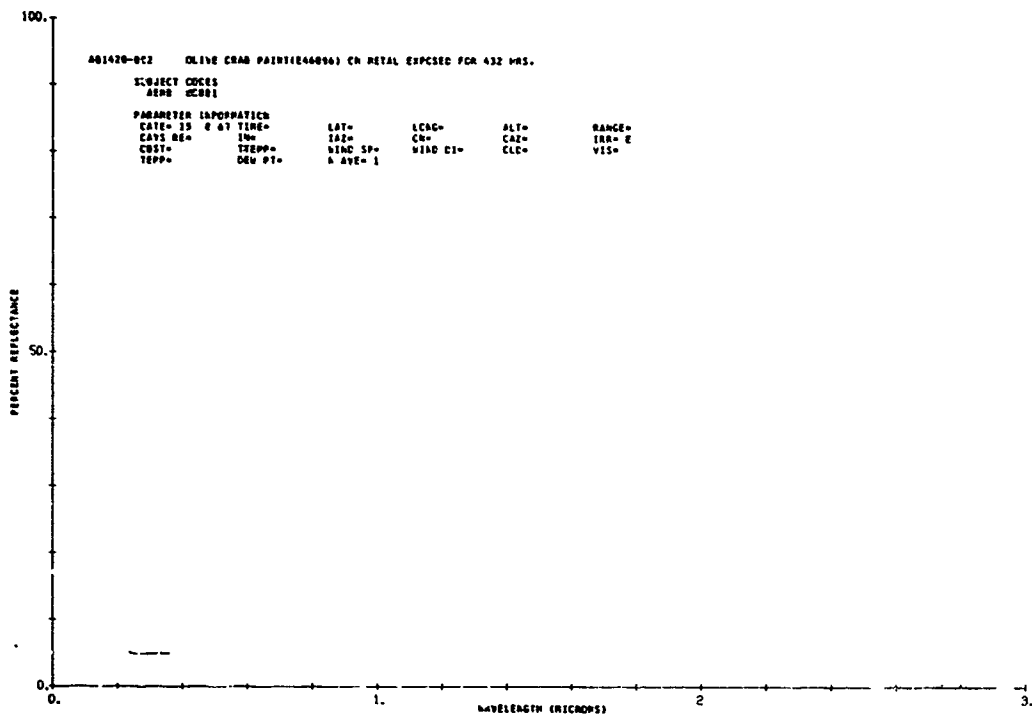
July 1968

ARM 19.



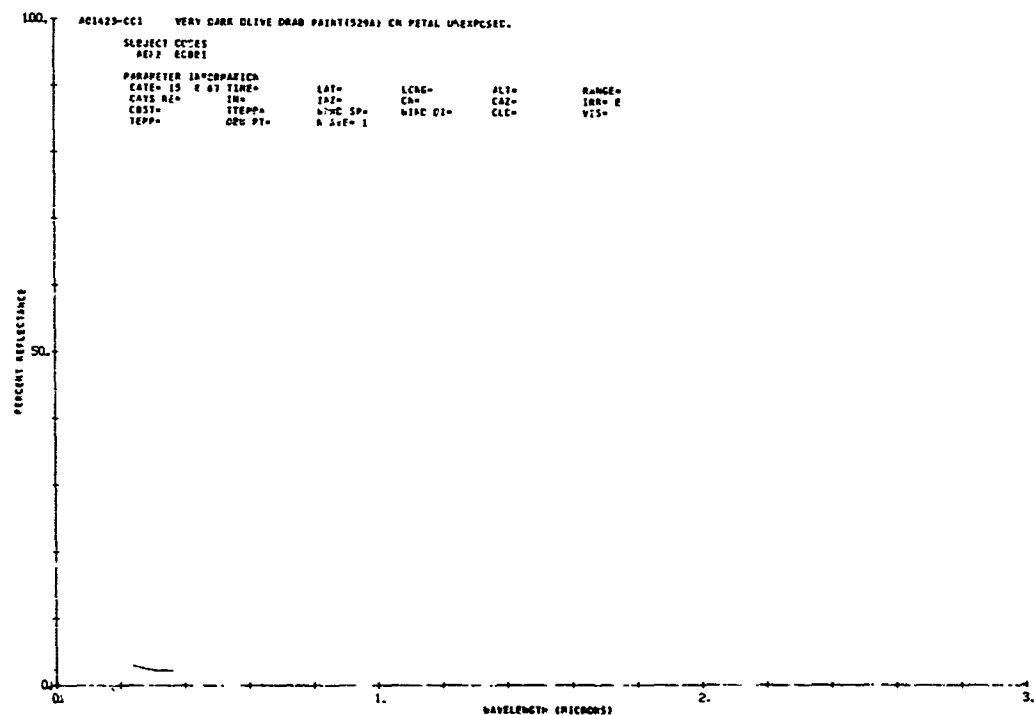
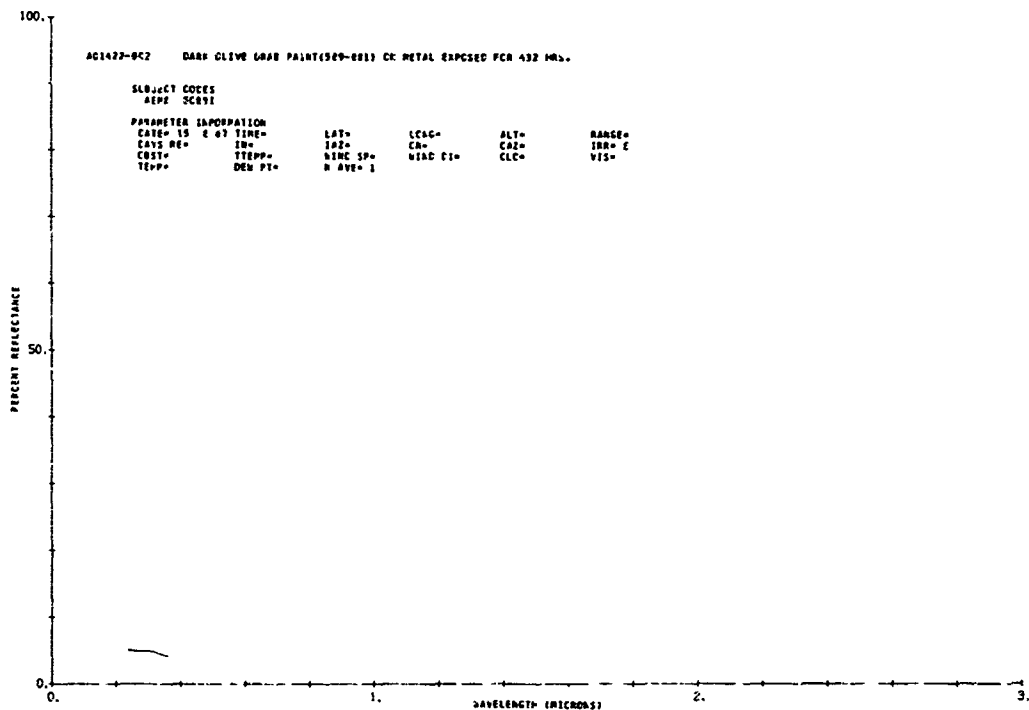
July 1960

ARM 138



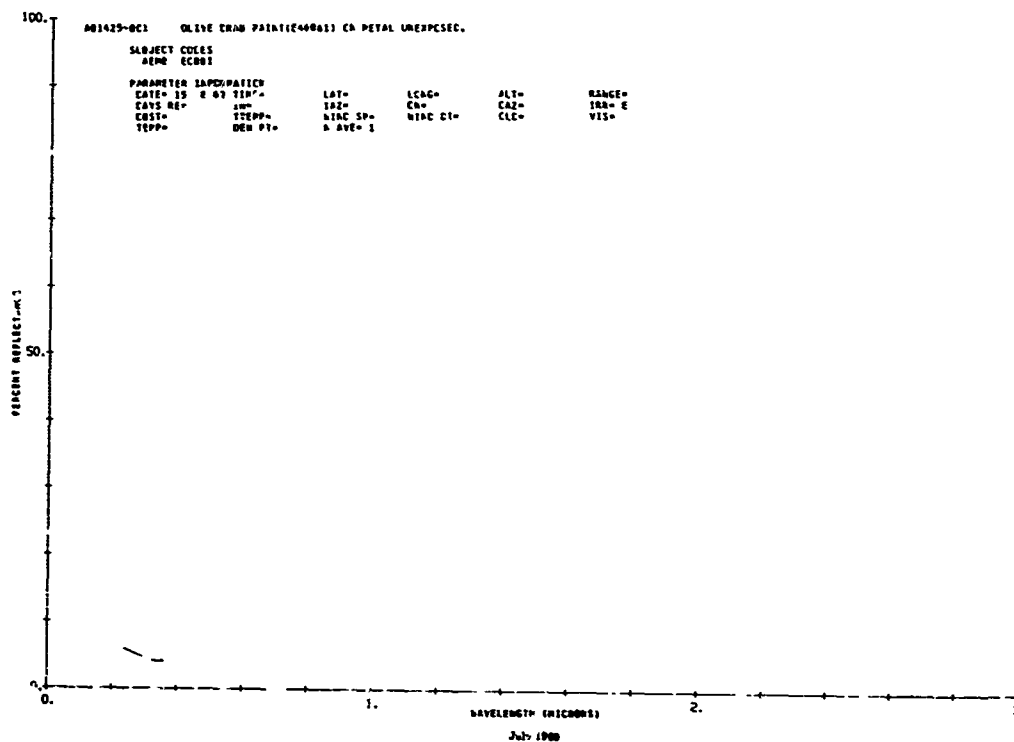
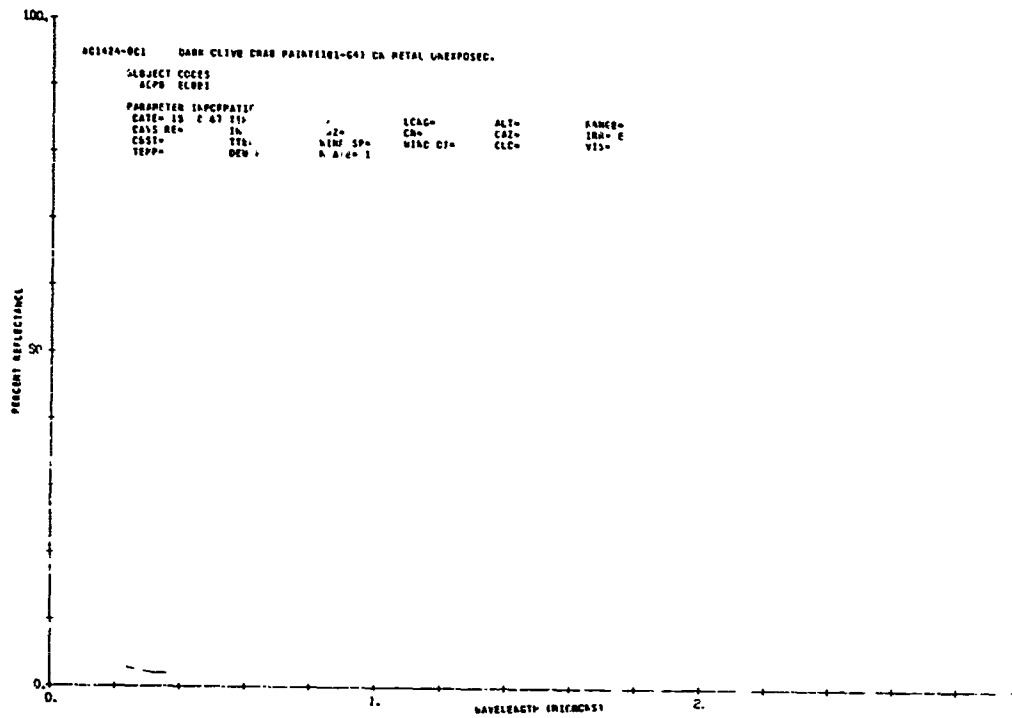
July 1968

ARM 130

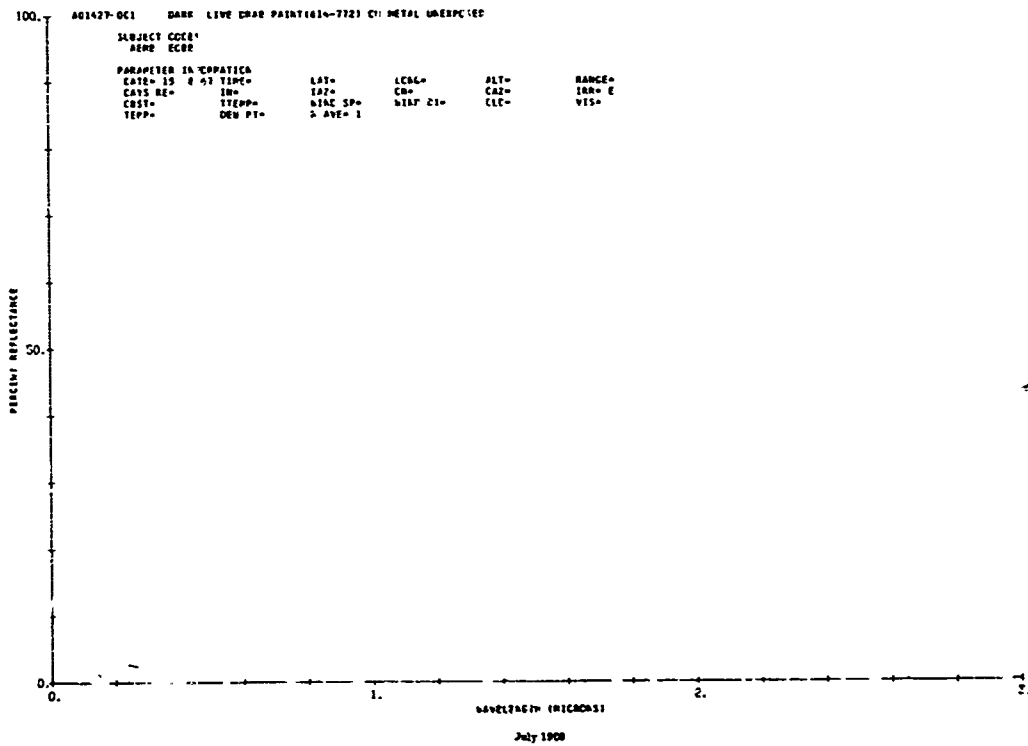
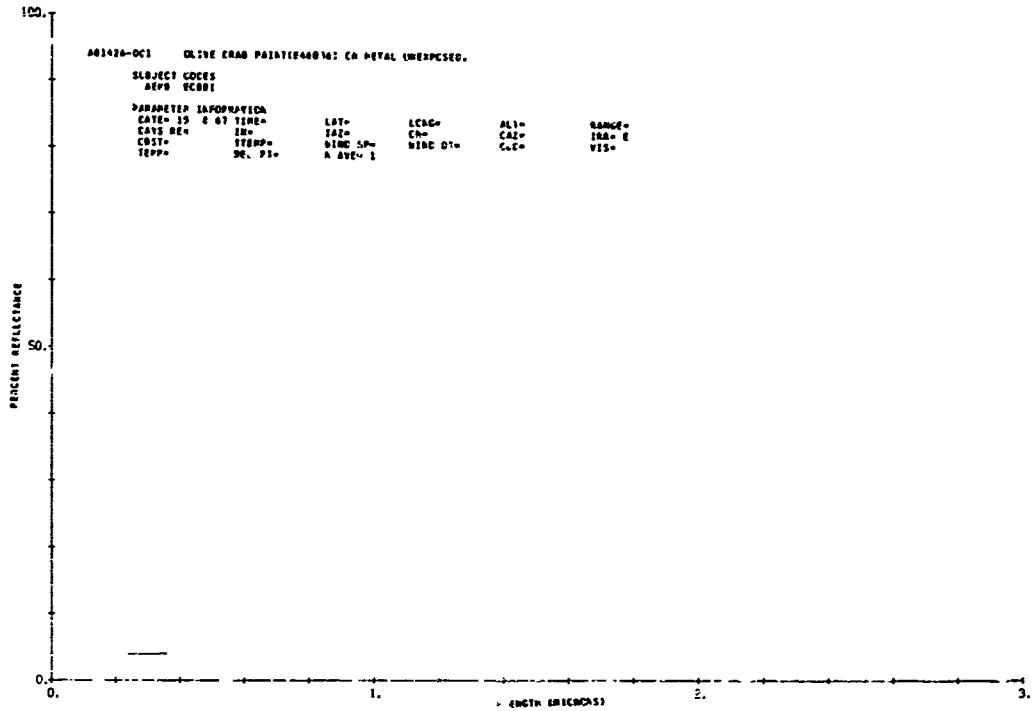


July 1968

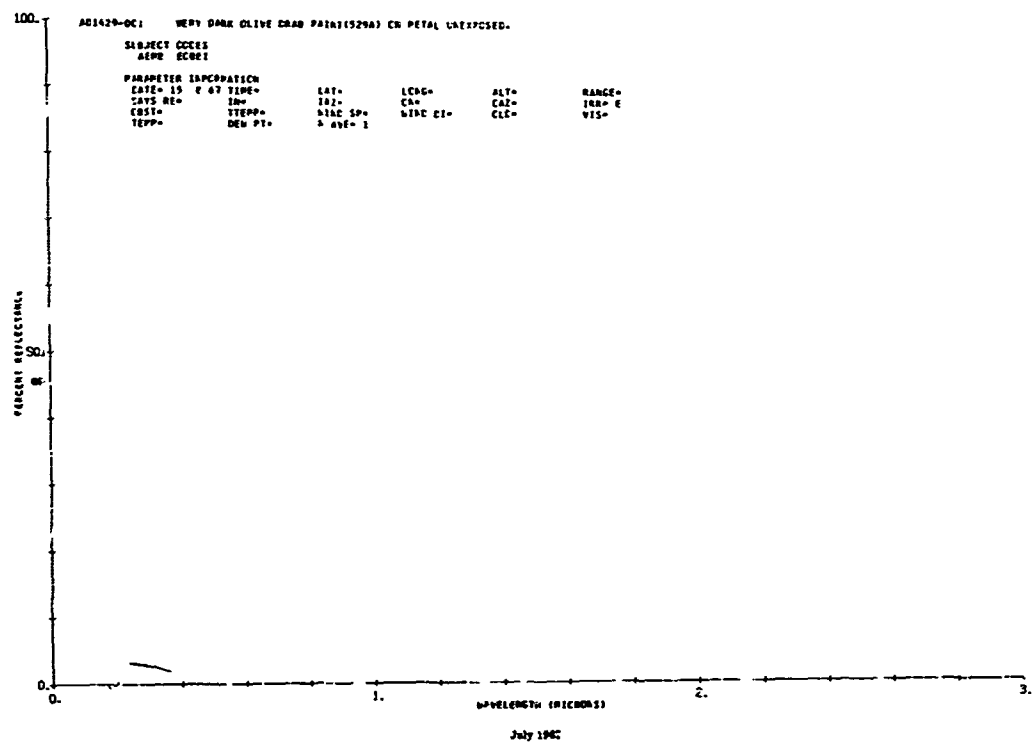
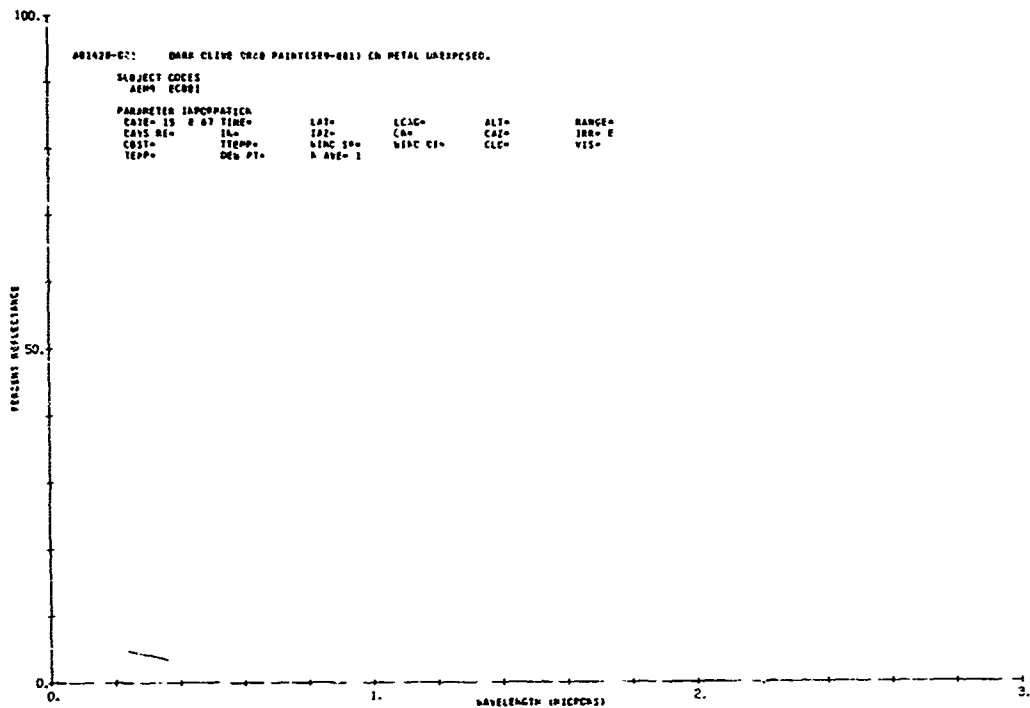
ABSI 140



ARM 141

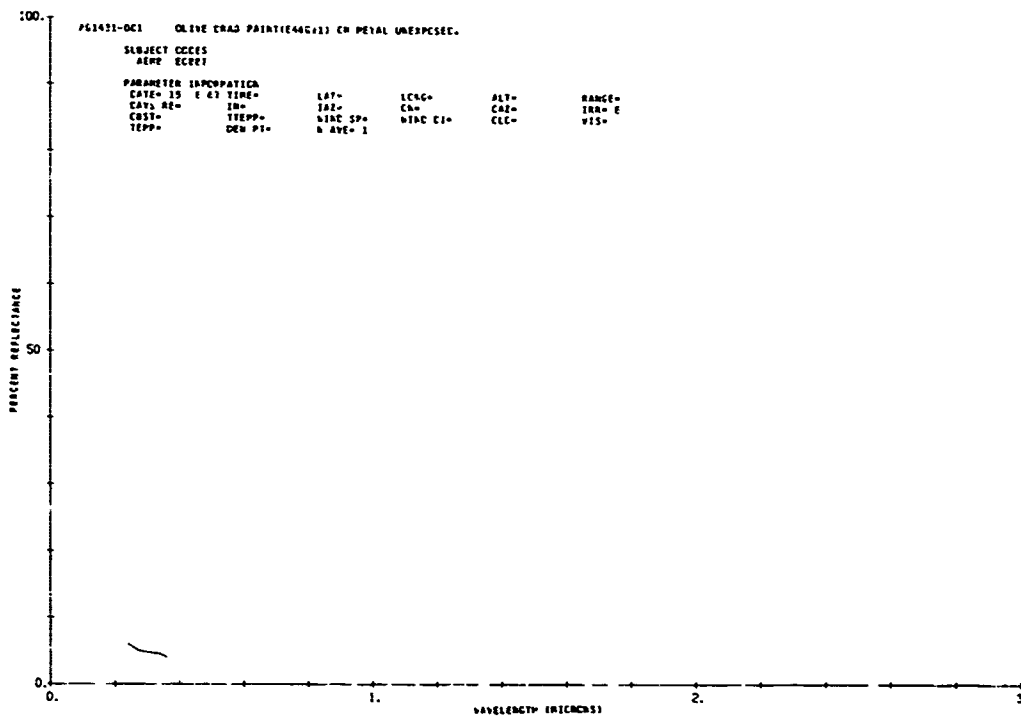
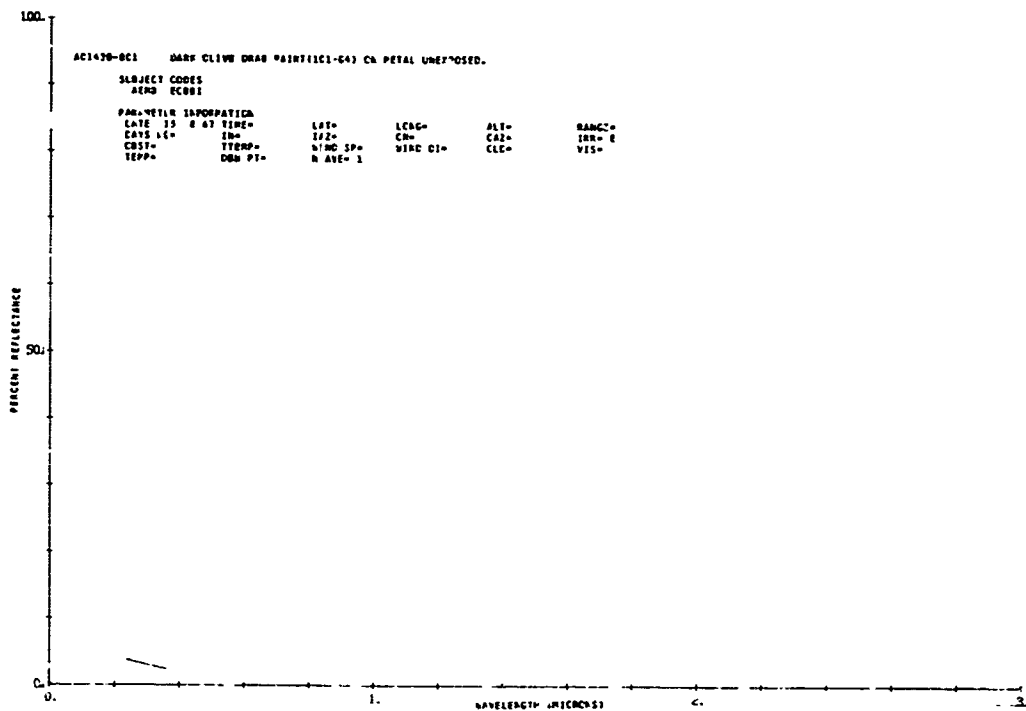


AEM 142

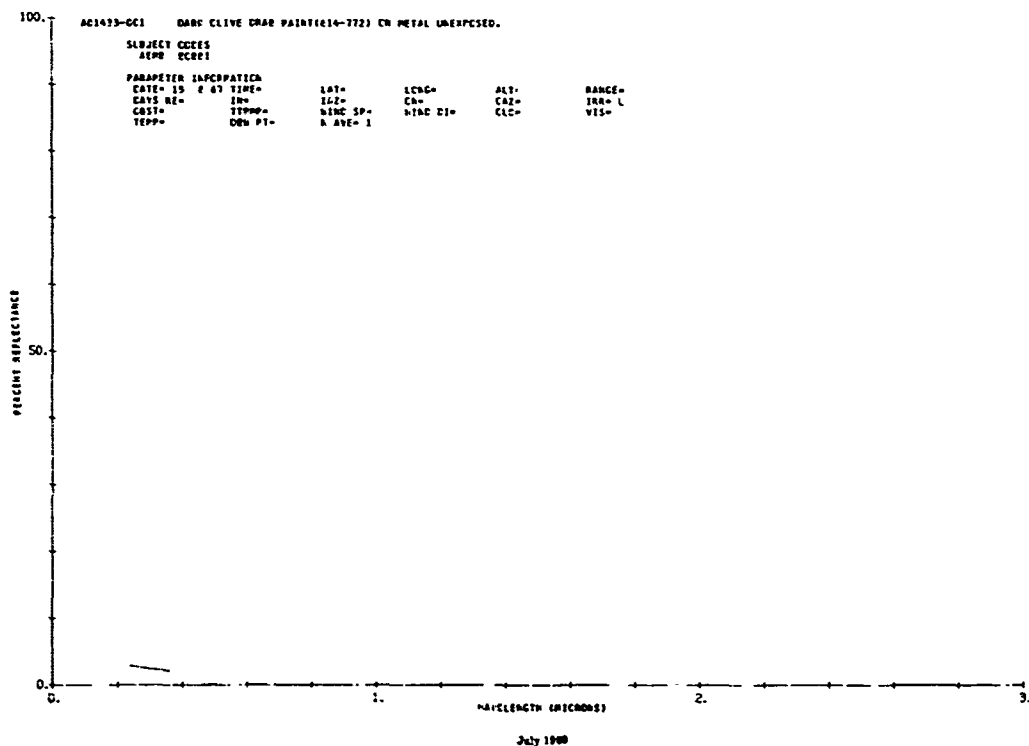
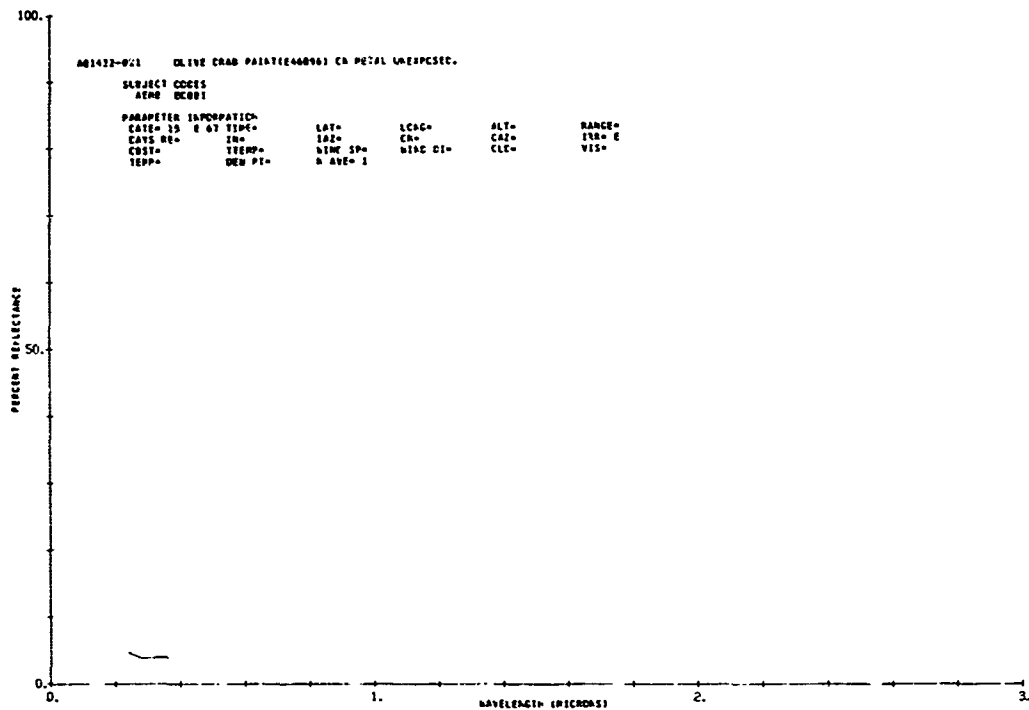


July 1967

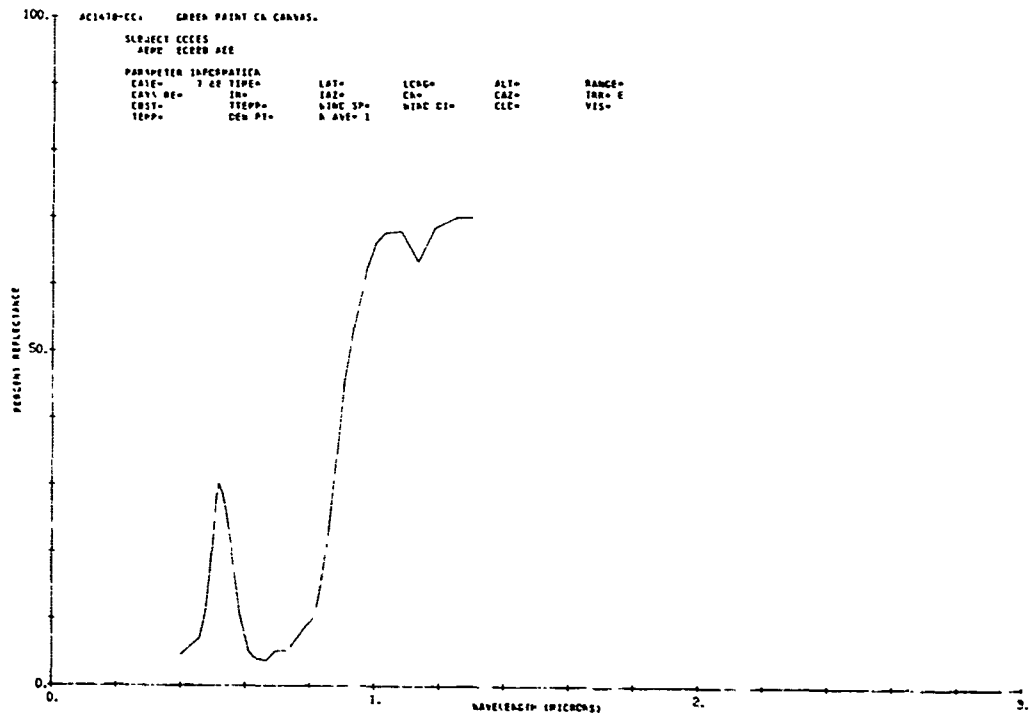
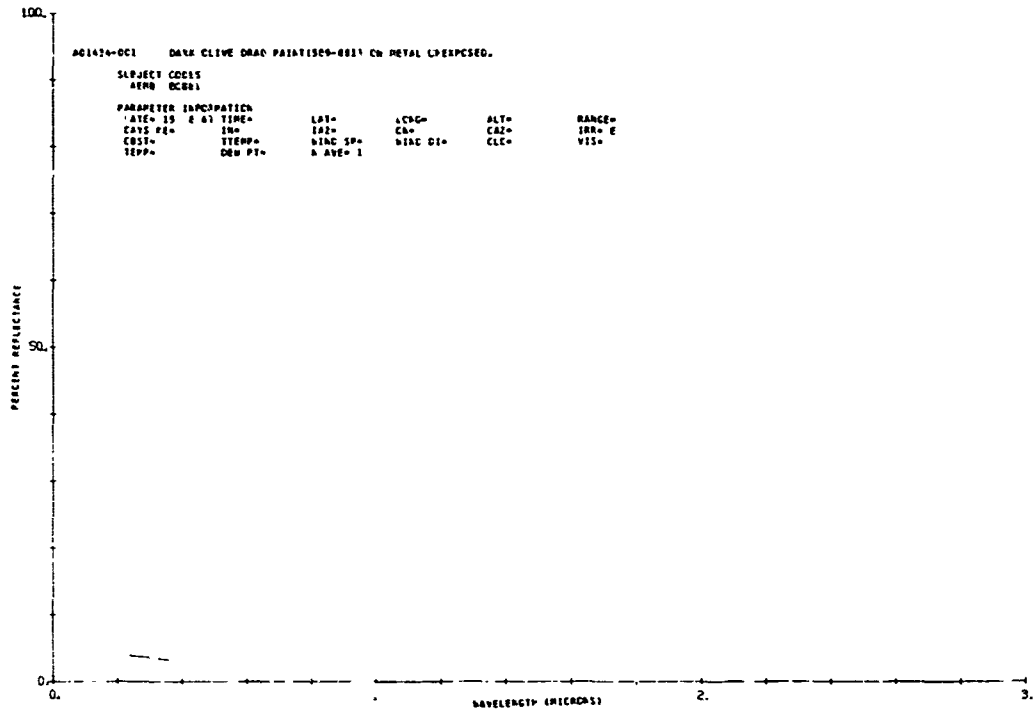
AEM 143



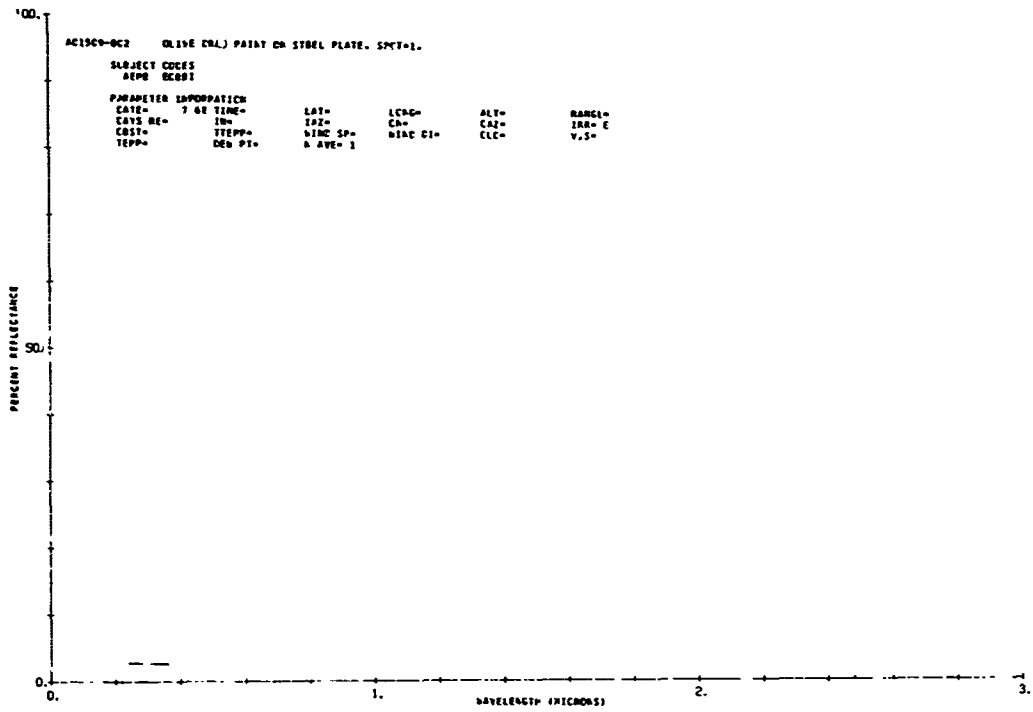
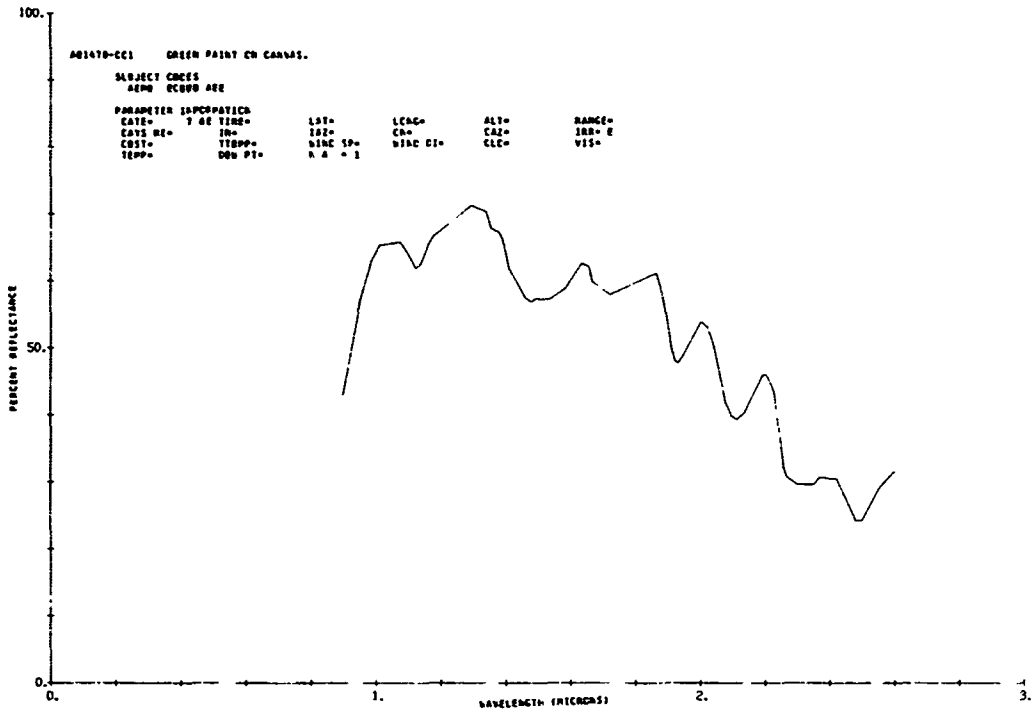
AEM 144



ARM 145

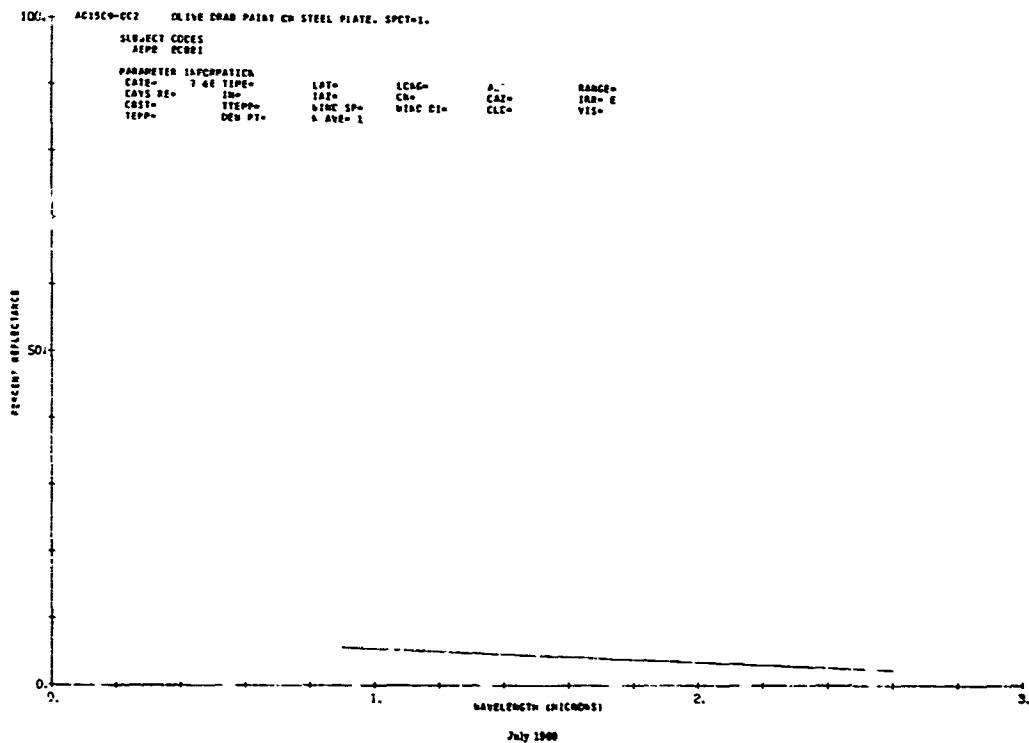
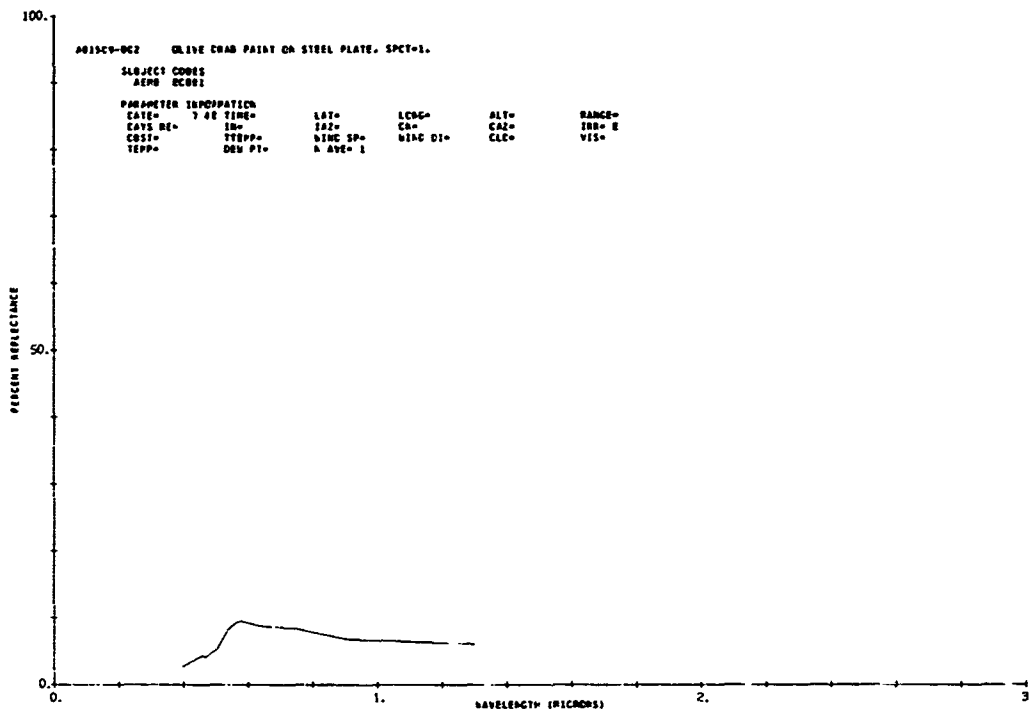


July 1960

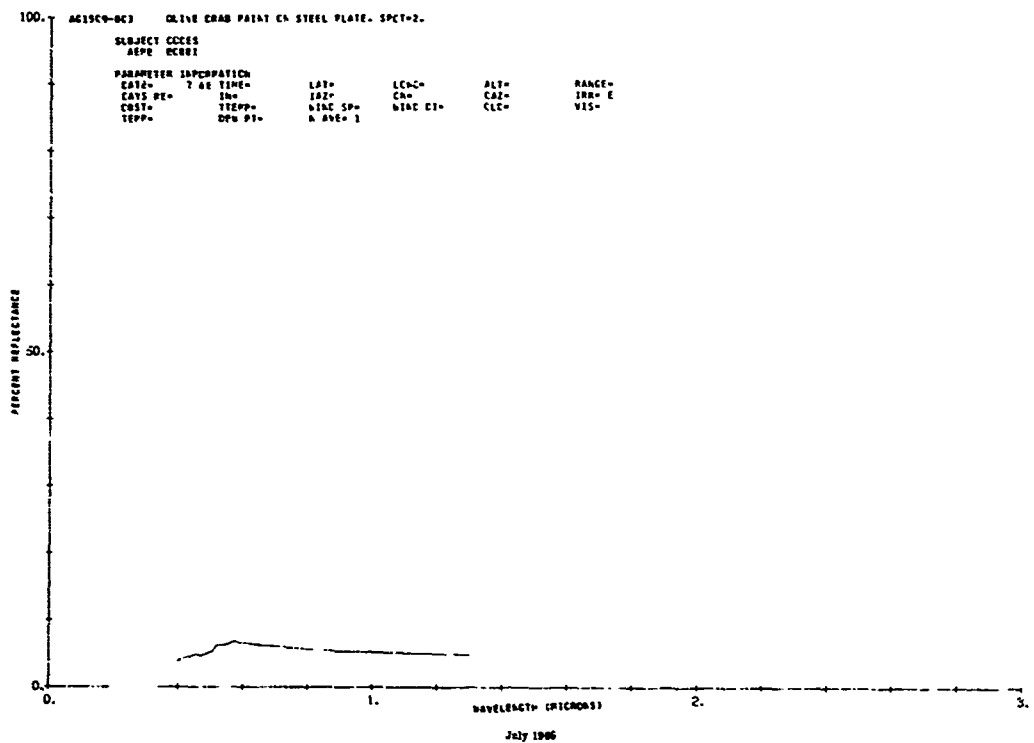
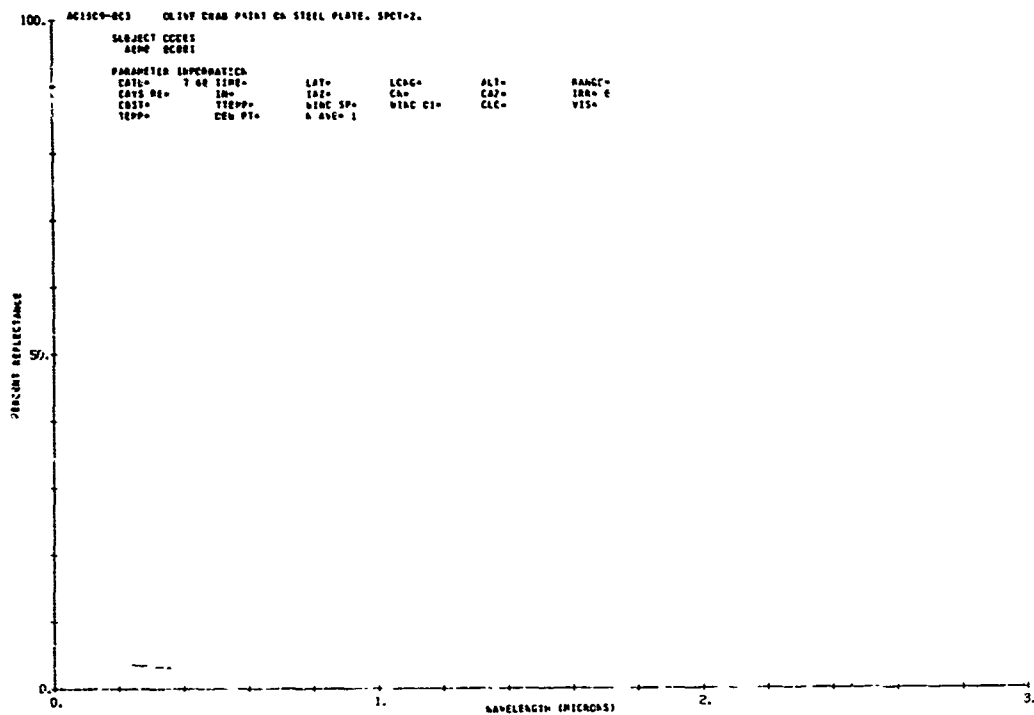
AIM 140

July 1960

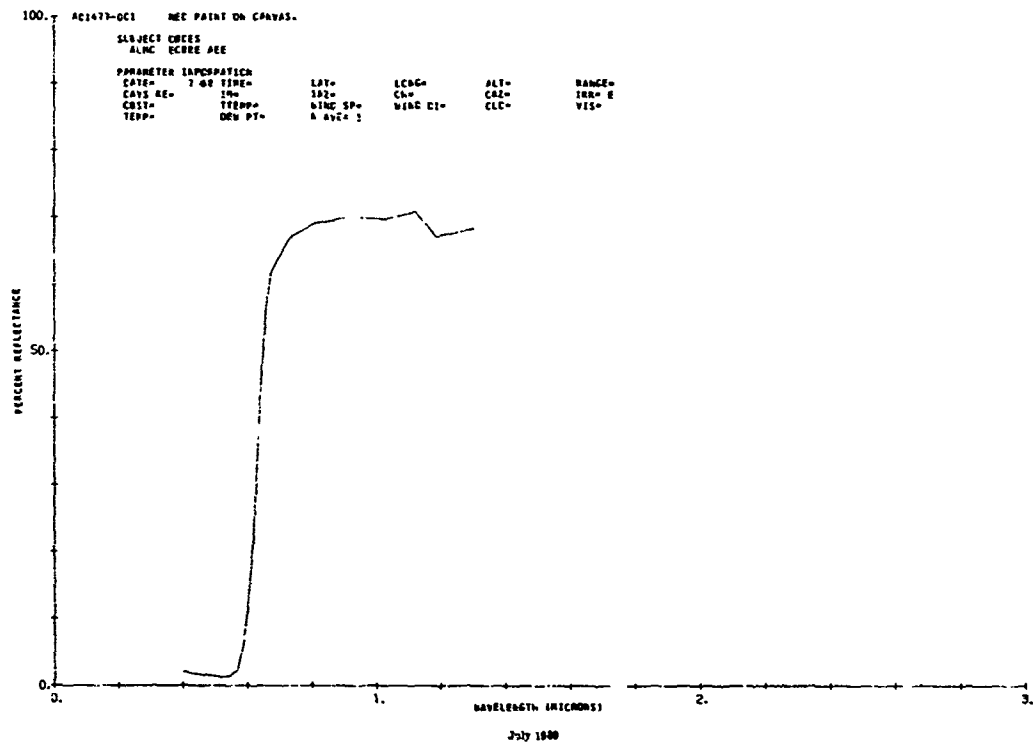
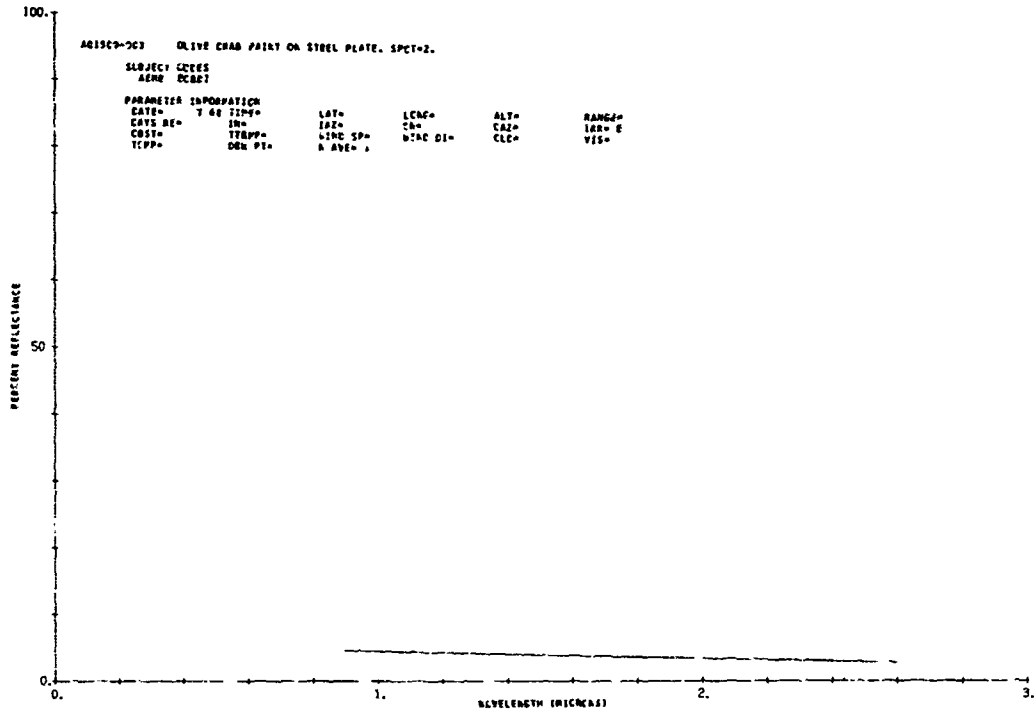
ARM 107



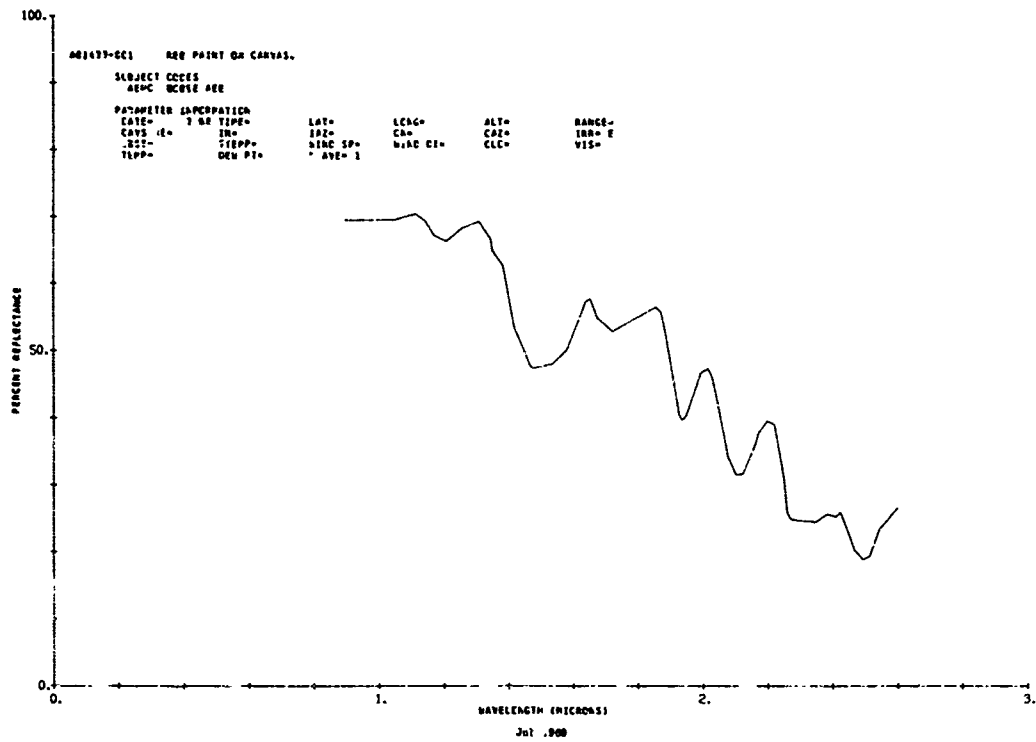
AEM 148



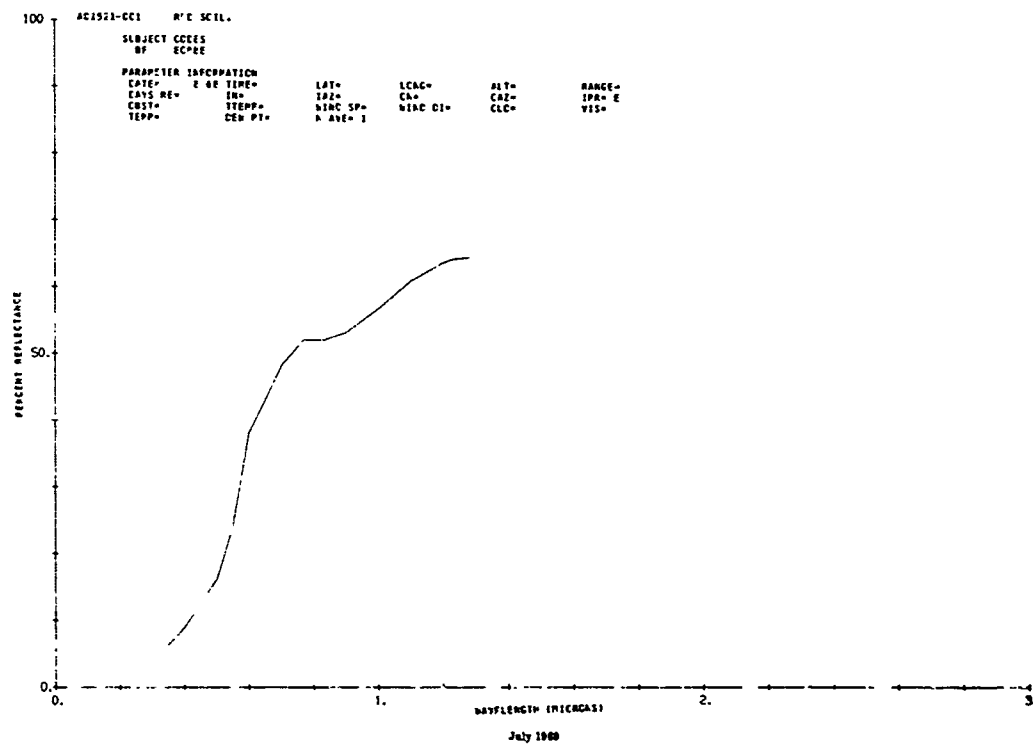
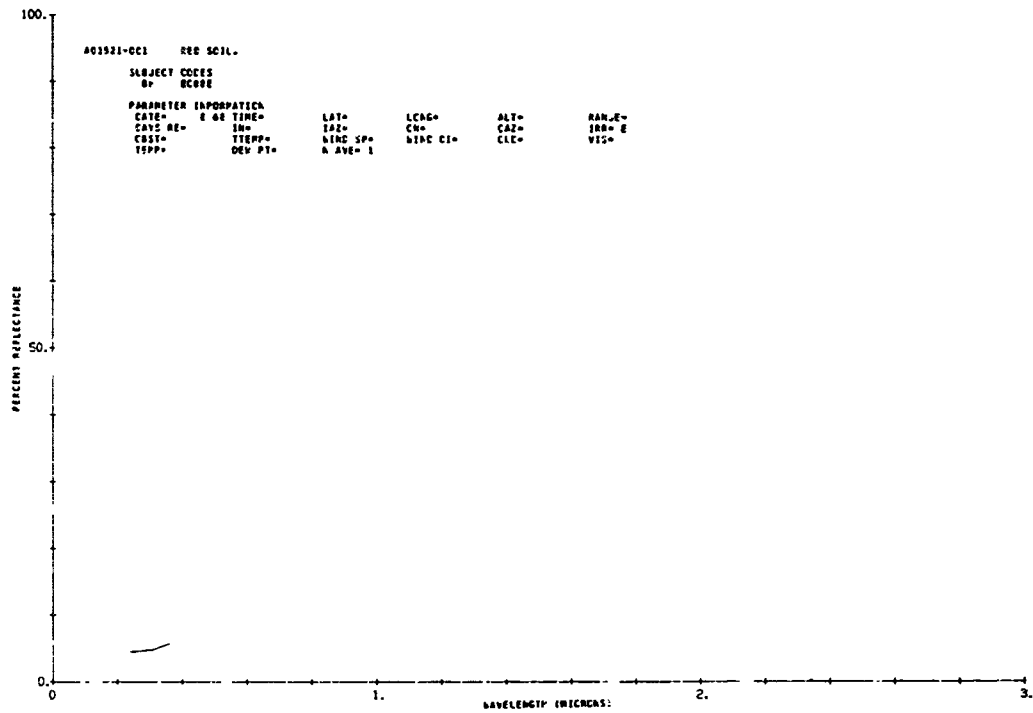
ARM 140



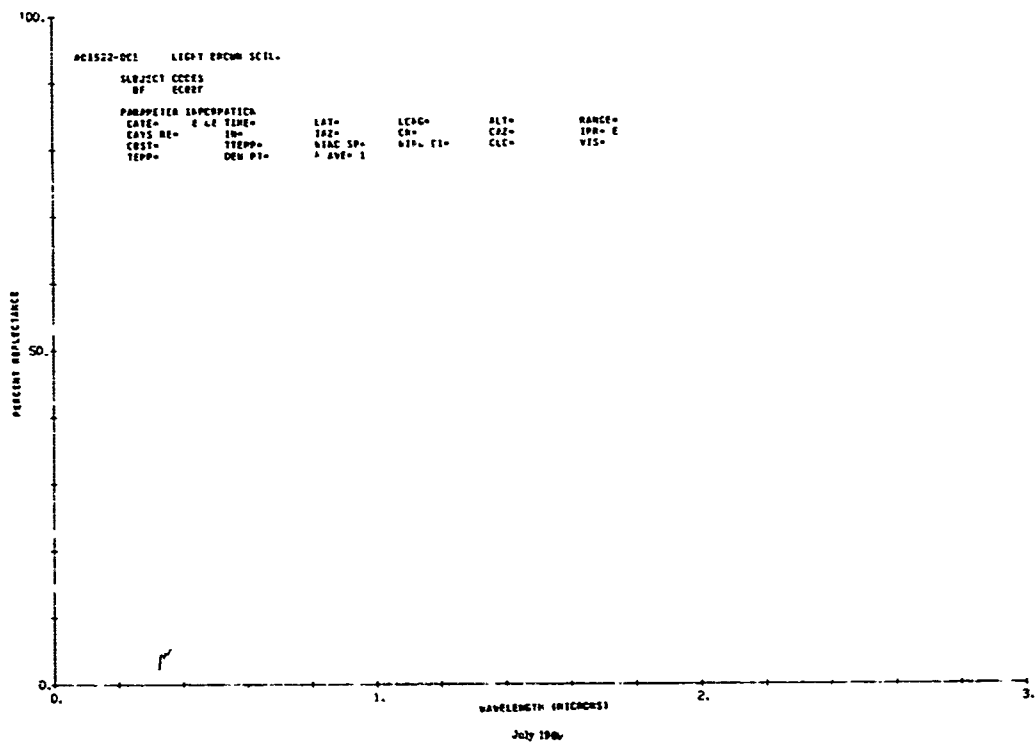
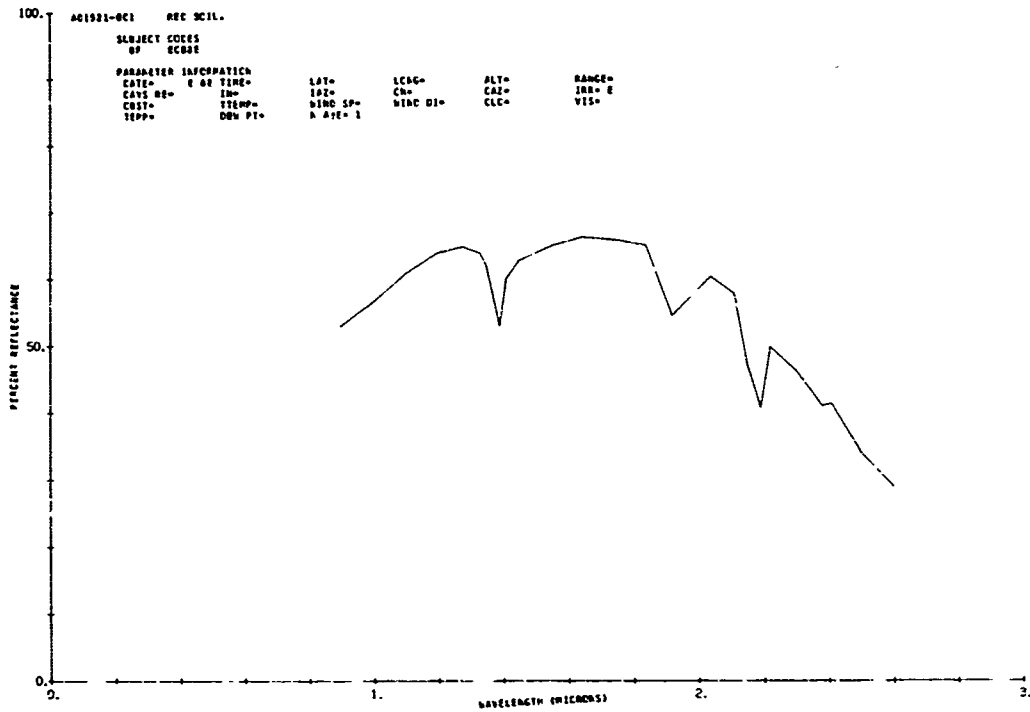
AEM 190



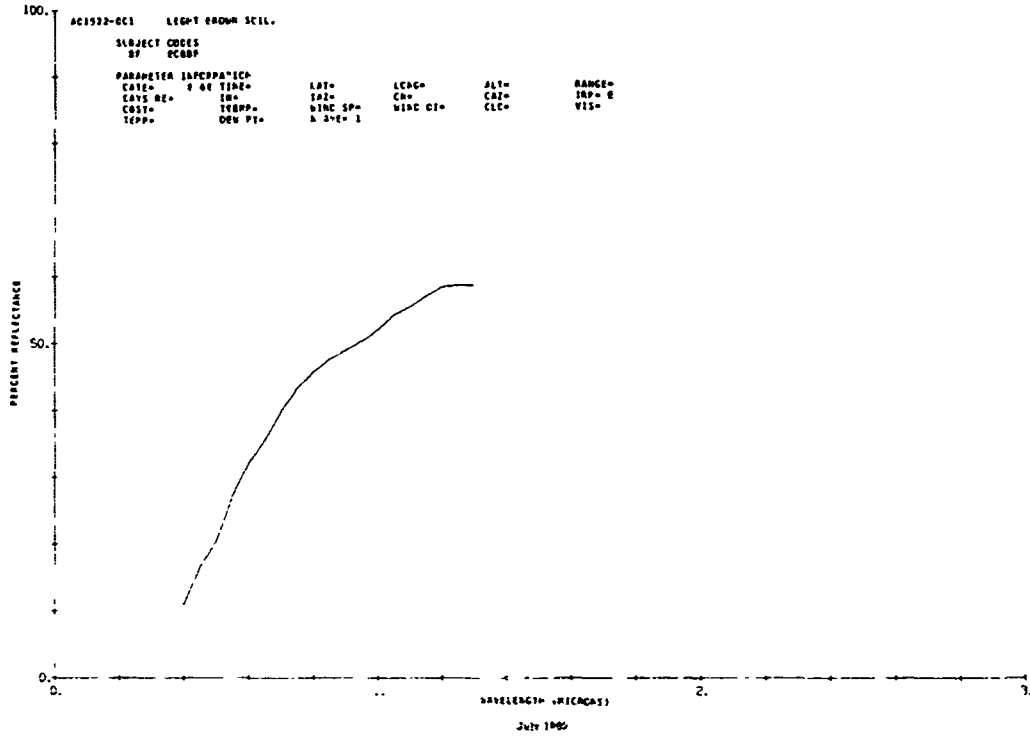
AP 10



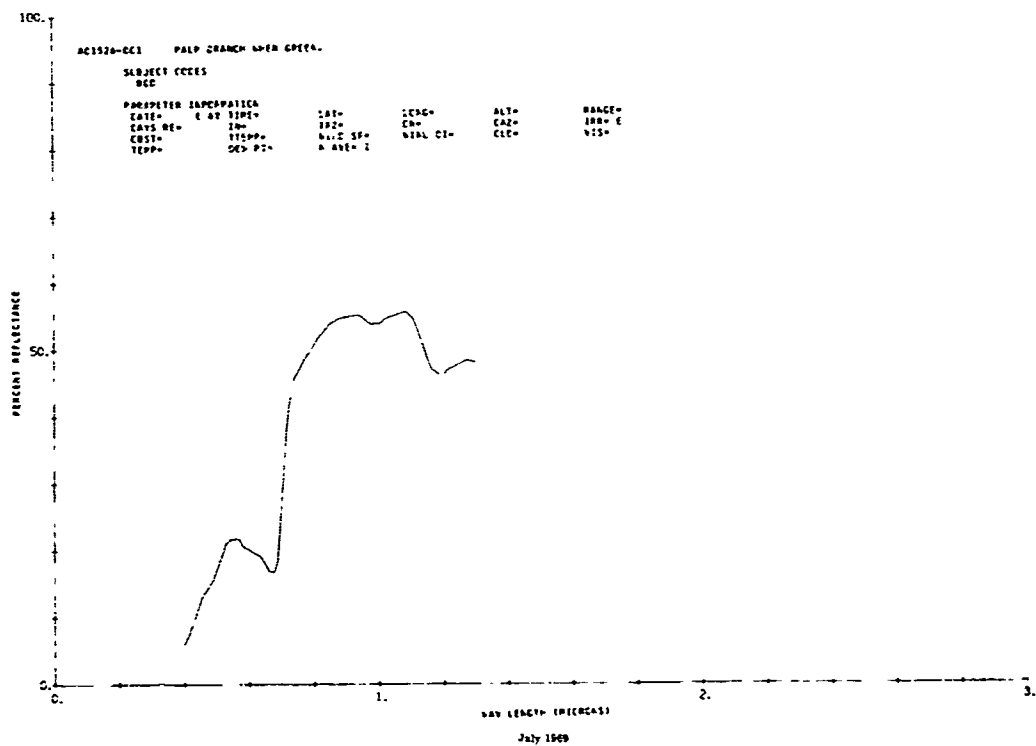
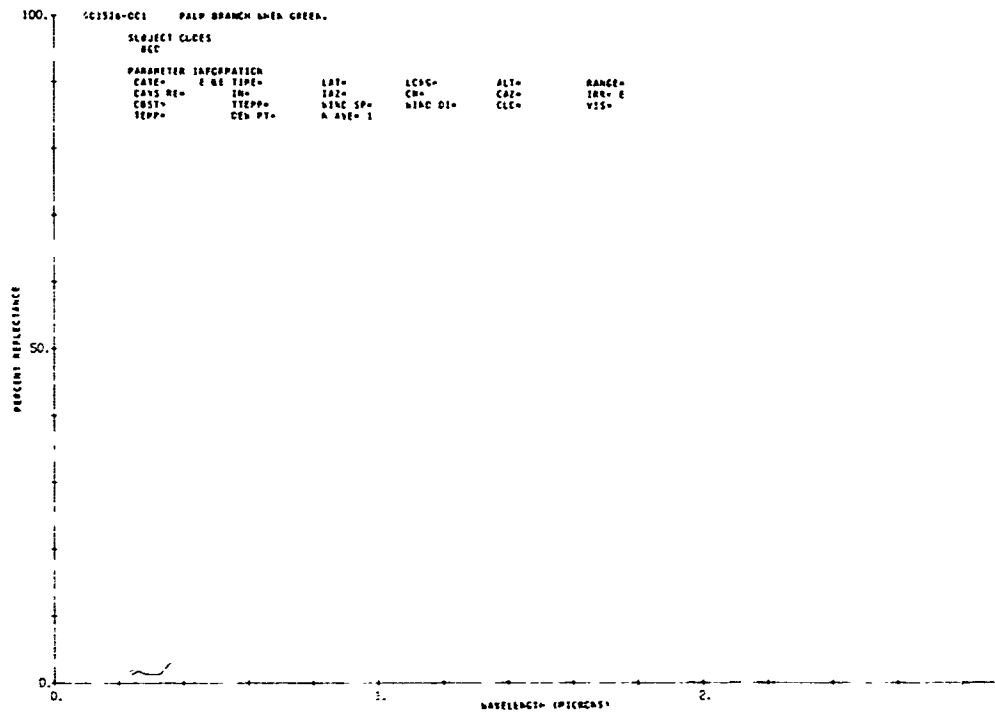
DP 20



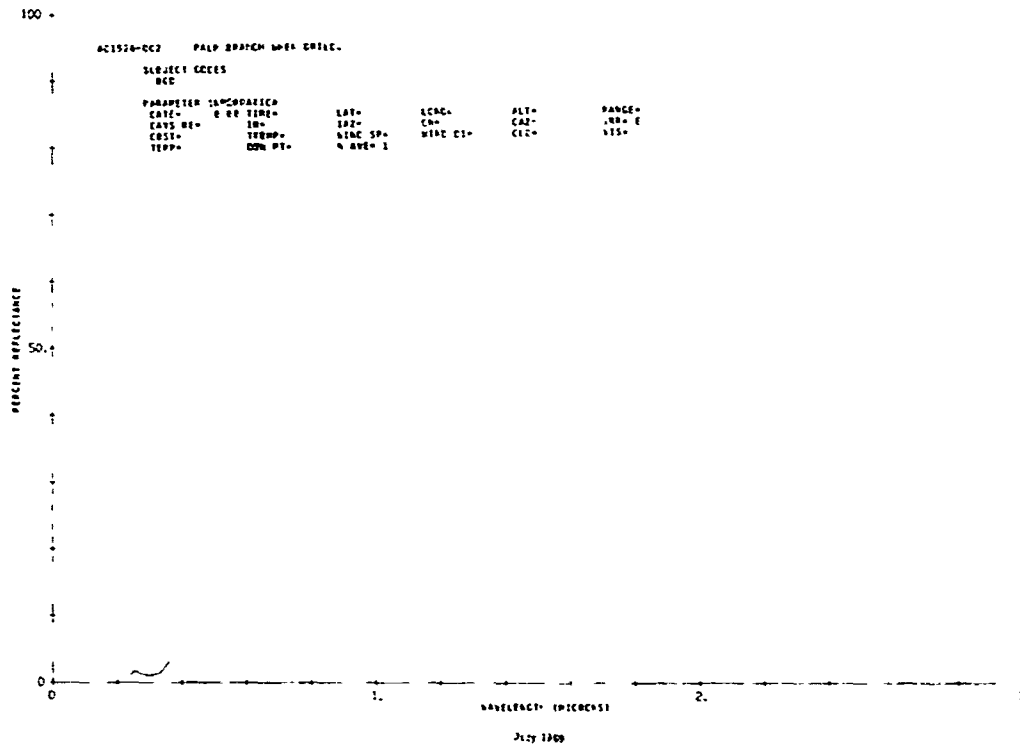
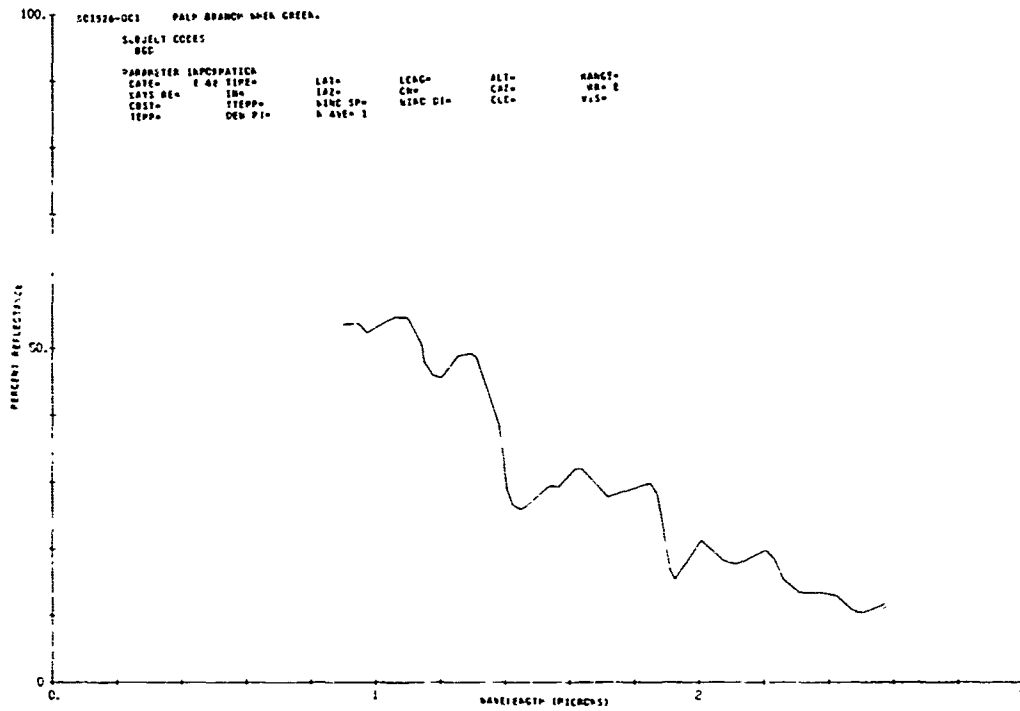
SP 21



SGD 411



BGD 412



100.

M01926-008 PAID BRANCH WHEN OFFER.

SUBJECT CODES
BEC

PARAMETER INFORMATION
DATE= 6 OF TIME= LAT= LONG= ALT=
EYES RE= IN= SRT= CH= CRI= RRG= E
COST= TEMP= WIND SP= WIND DIR= CLC= VIS=
TEPP= DRG PT= N APL= 1

PERCENT REFLECTANCE

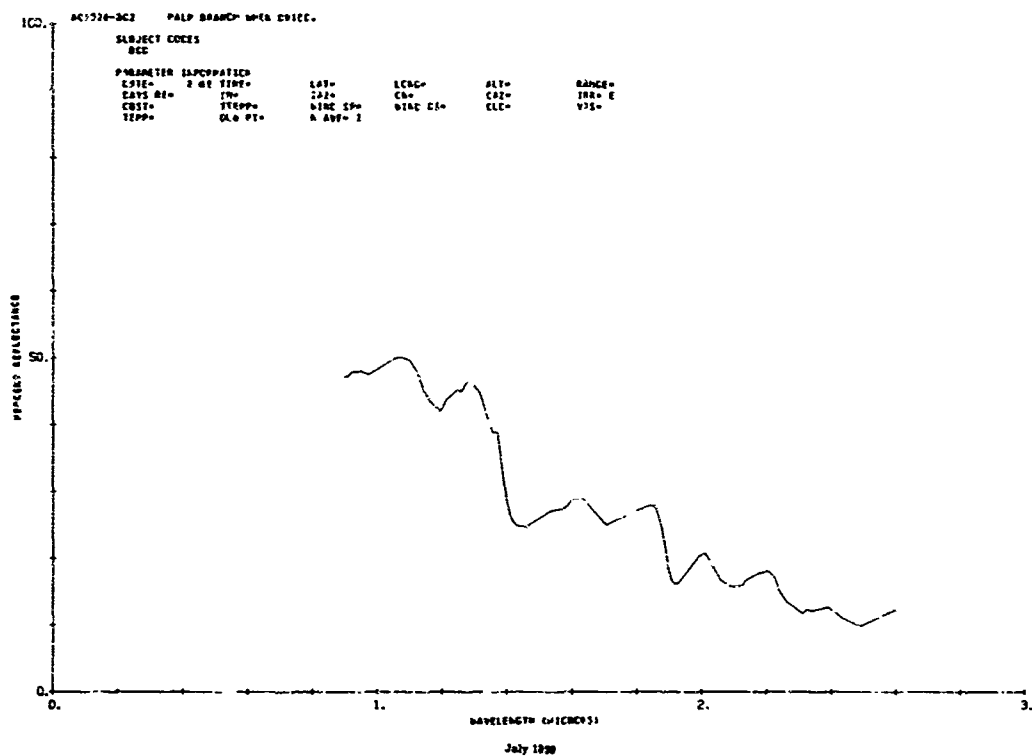
50.

0.

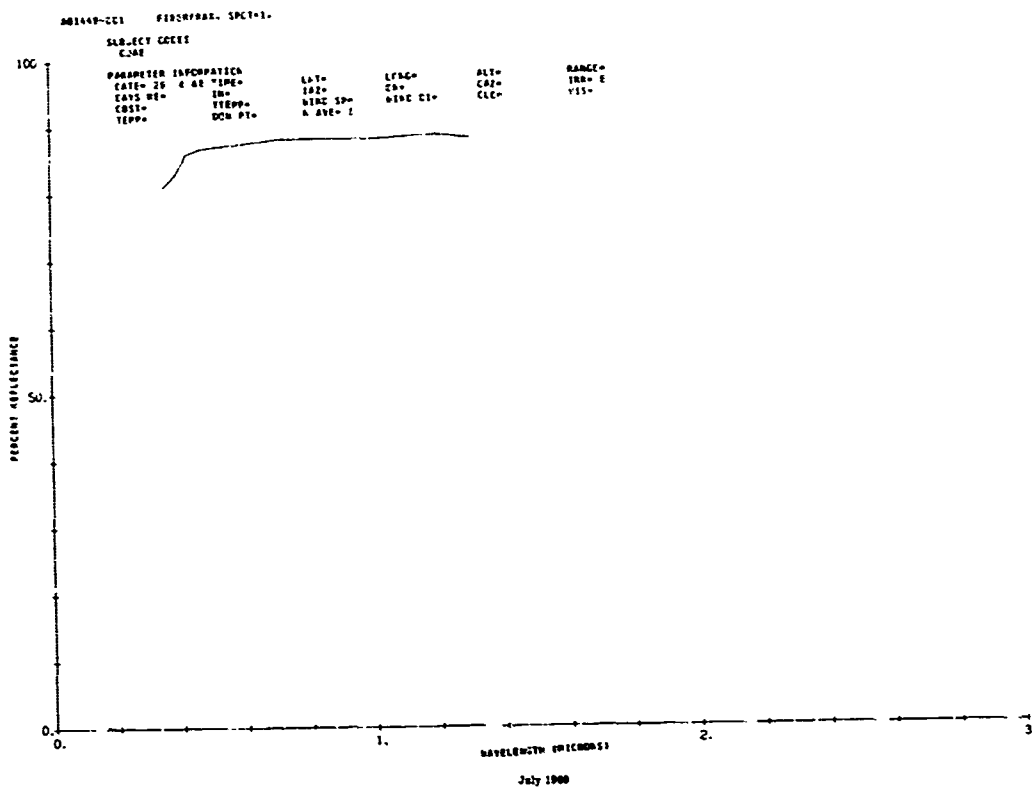
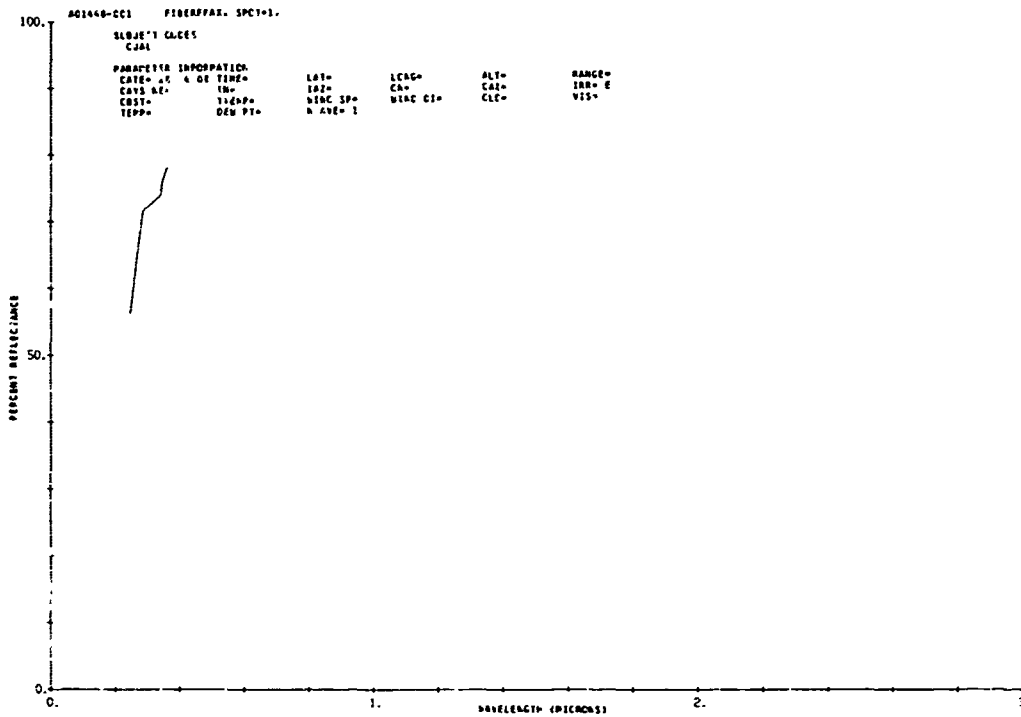
0. 1. 2. 3.

WAVELENGTH (MICRONS)

Wavelength (microns)	Percent Reflectance
0.4	0
0.5	10
0.6	20
0.7	25
0.8	30
0.9	40
1.0	45
1.1	50
1.2	40
1.3	45

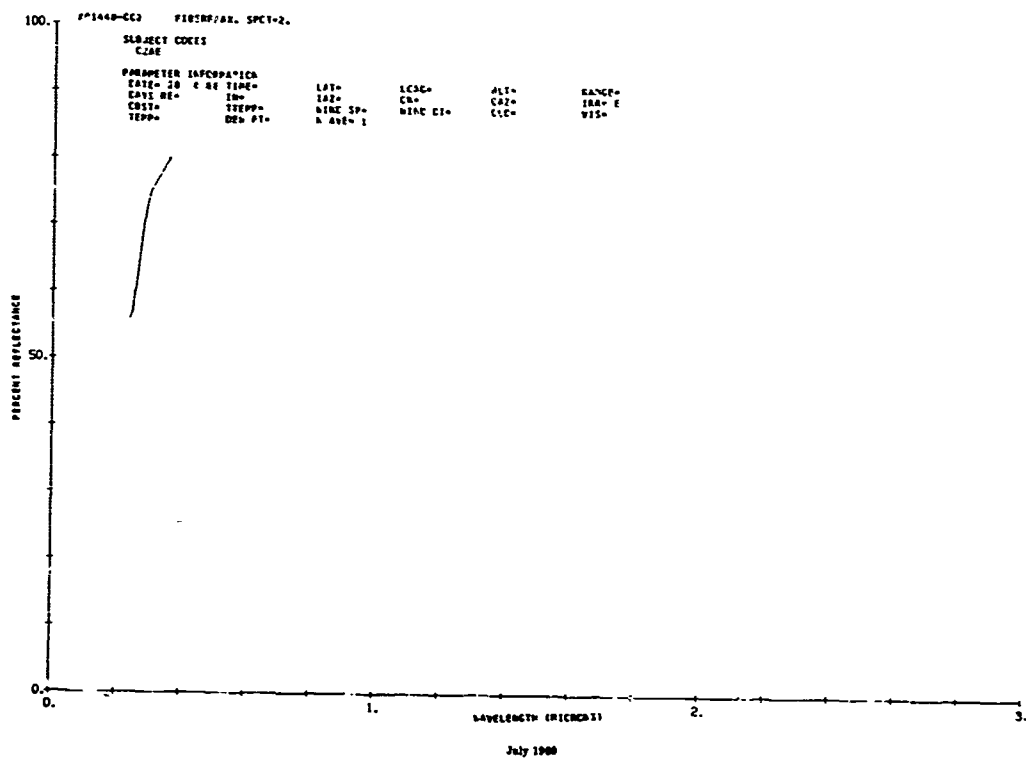
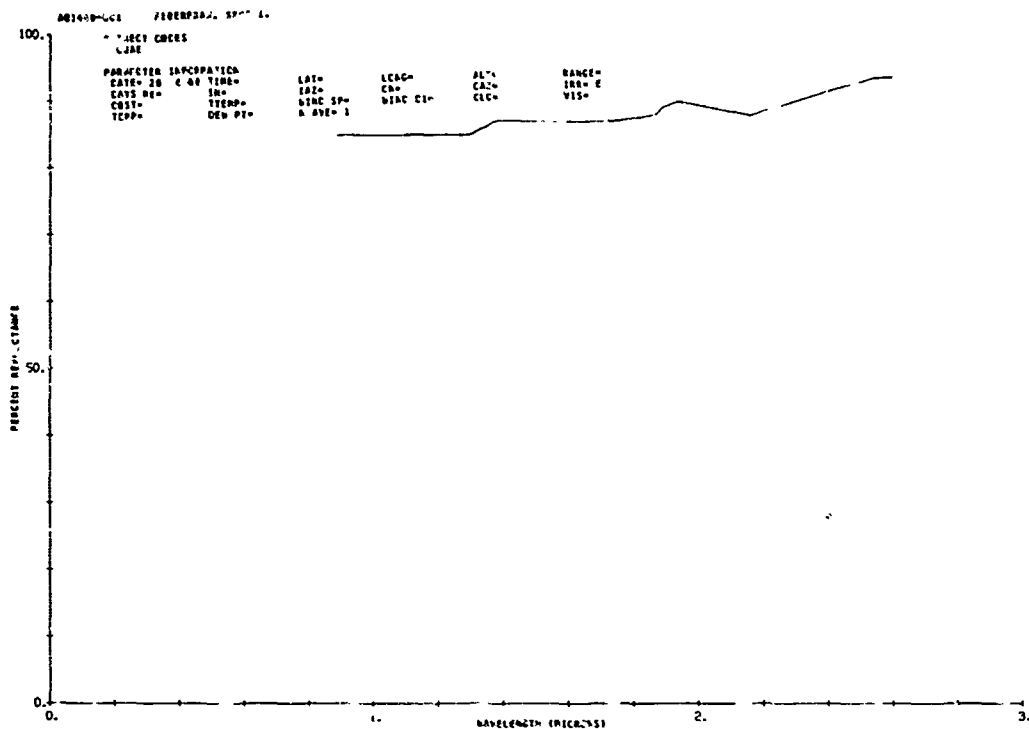


CJ 15



July 1960

CJ 18



CJ 17

AD1448-CE2 FIREHPRAX, SPCT-2.

SUBJECT CODES
CJAE

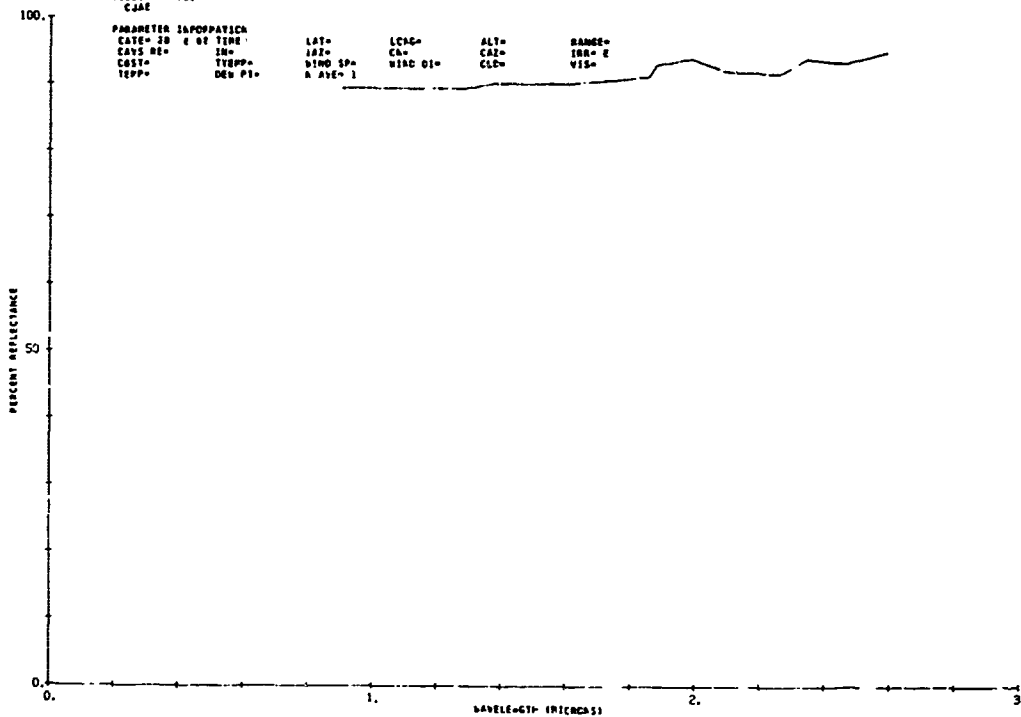
PARAMETER INFORMATION
DATE= 20 4 07 TIME
EAYS RE= 100
COST= TYP= DEN PT=

LAT= 102
WIND SP= 6 AVE= 1

LENG= CH= WIND DI=

ALT= CAL= CLK=

RANGE= 100= E
VIS=



AD1448-CE2 FIREHPRAX, SPCT-2.

SUBJECT CODES
CJAE

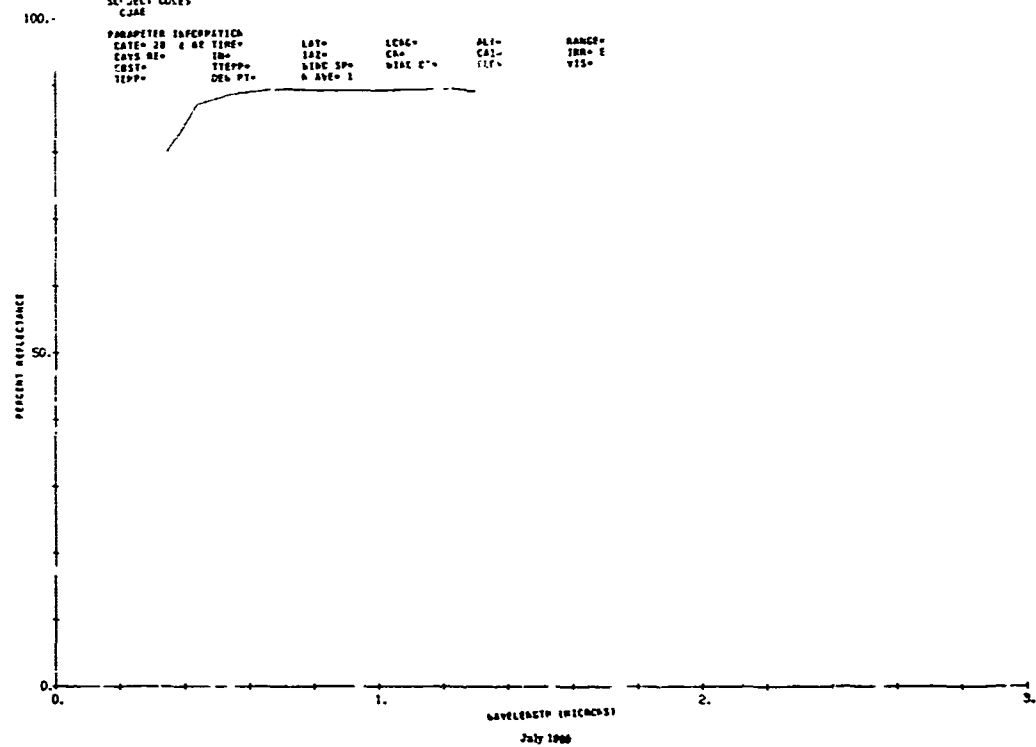
PARAMETER INFORMATION
DATE= 20 4 07 TIME
EAYS RE= 100
COST= TYP= DEN PT=

LAT= 102
WIND SP= 6 AVE= 1

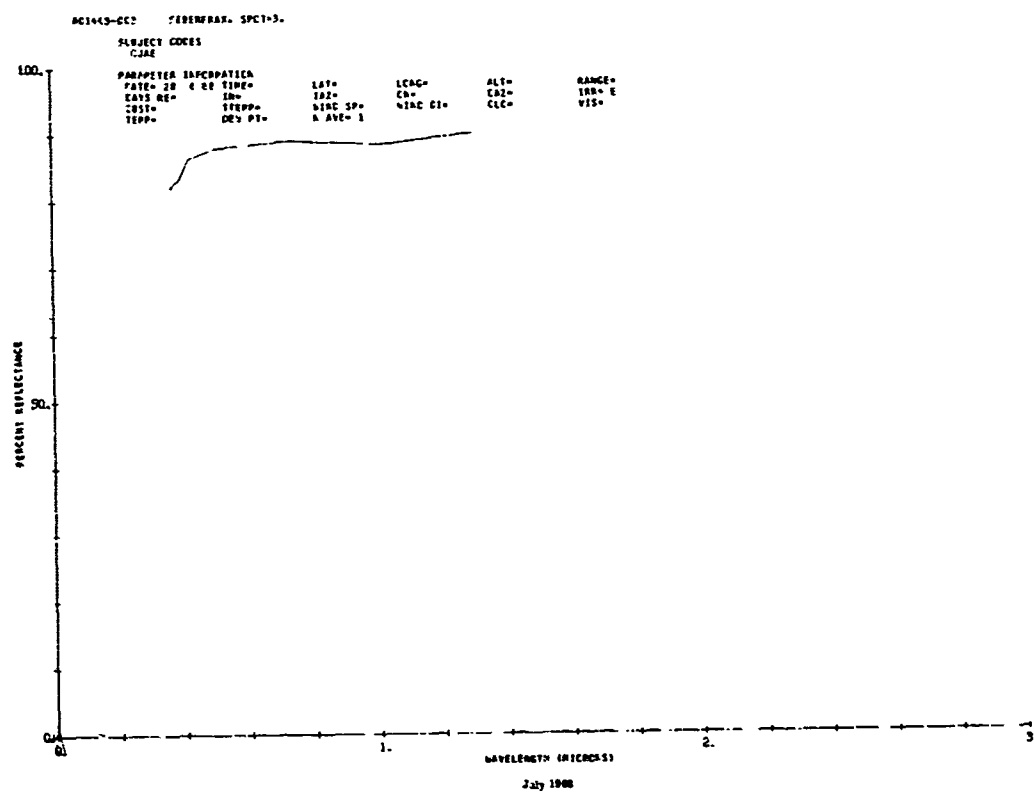
LENG= CH= WIND DI=

ALT= CAL= CLK=

RANGE= 100= E
VIS=



July 1966



CJ 19

AD1440-CC3 FIDERNRAN. SPC1-3.

SUBJECT CC25
CJAE

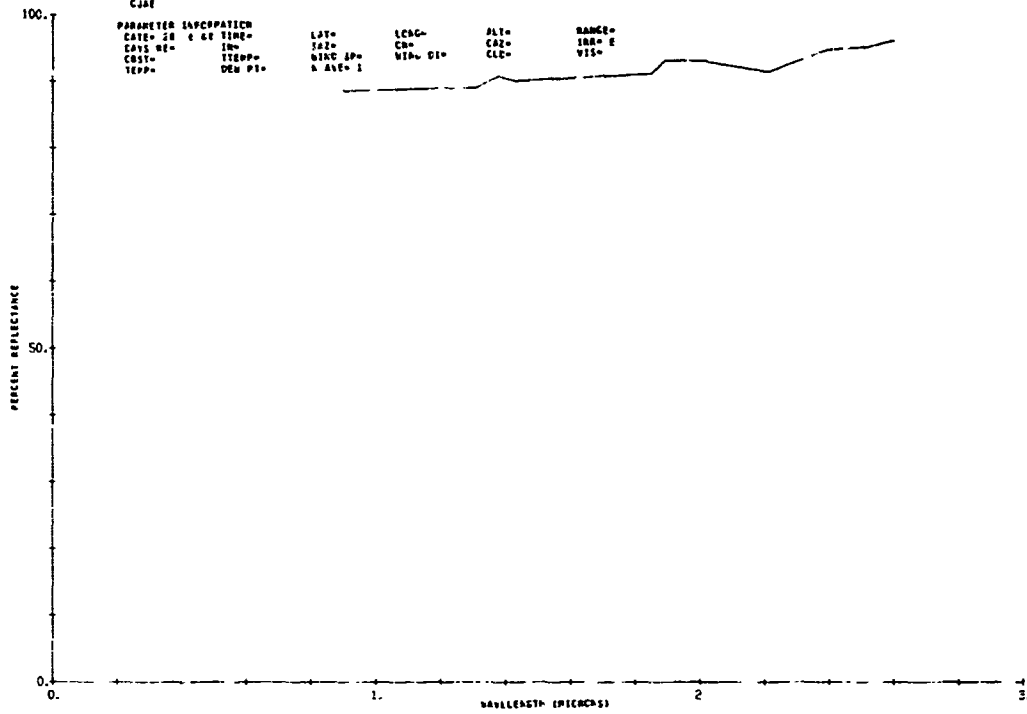
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DATE= 28 6 68 TIME= 1000
COST= 1000000000
TEPP= 1000000000

LOT= 1000
1000 1000
A ALT= 1

LCNG= 1000
1000 1000
A ALT= 1

ALT= 1000
1000 1000
A ALT= 1

RANGE= 1000
1000 1000
A ALT= 1



AD1440-CC4 FIDERNRAN. SPC1-4.

SUBJECT CC25
CJAE

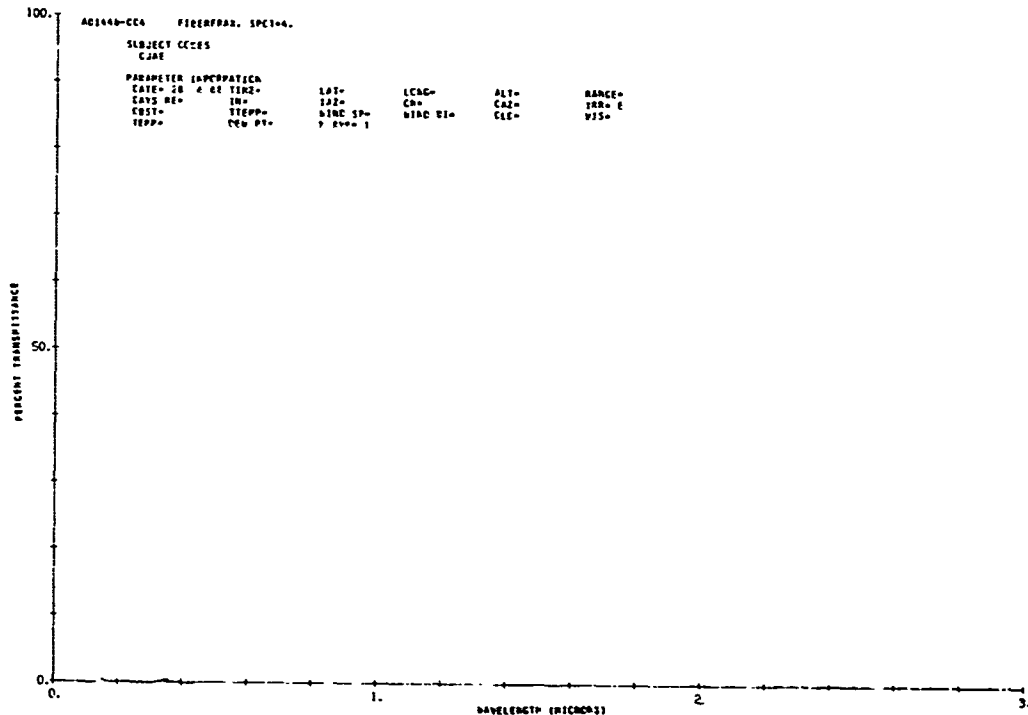
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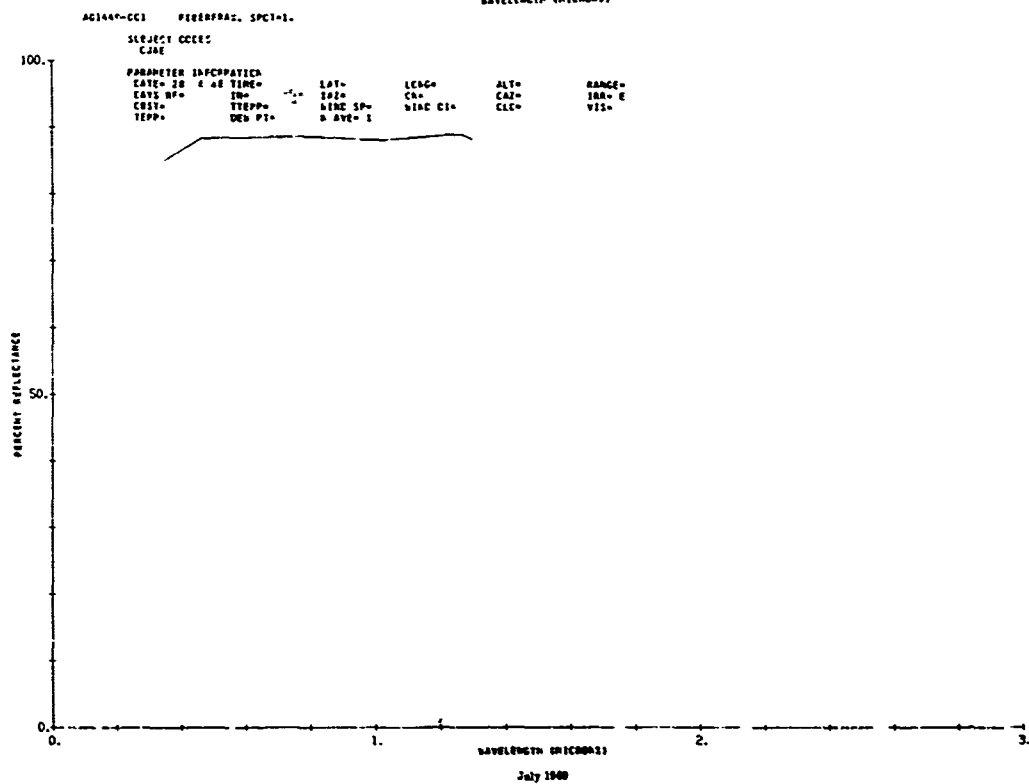
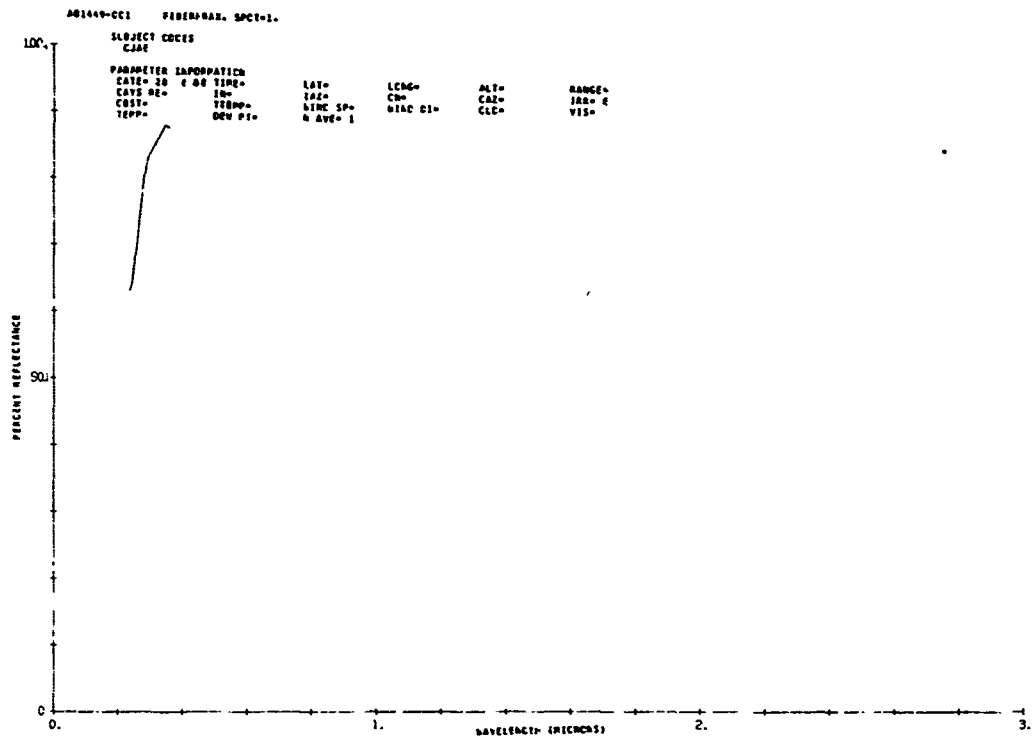
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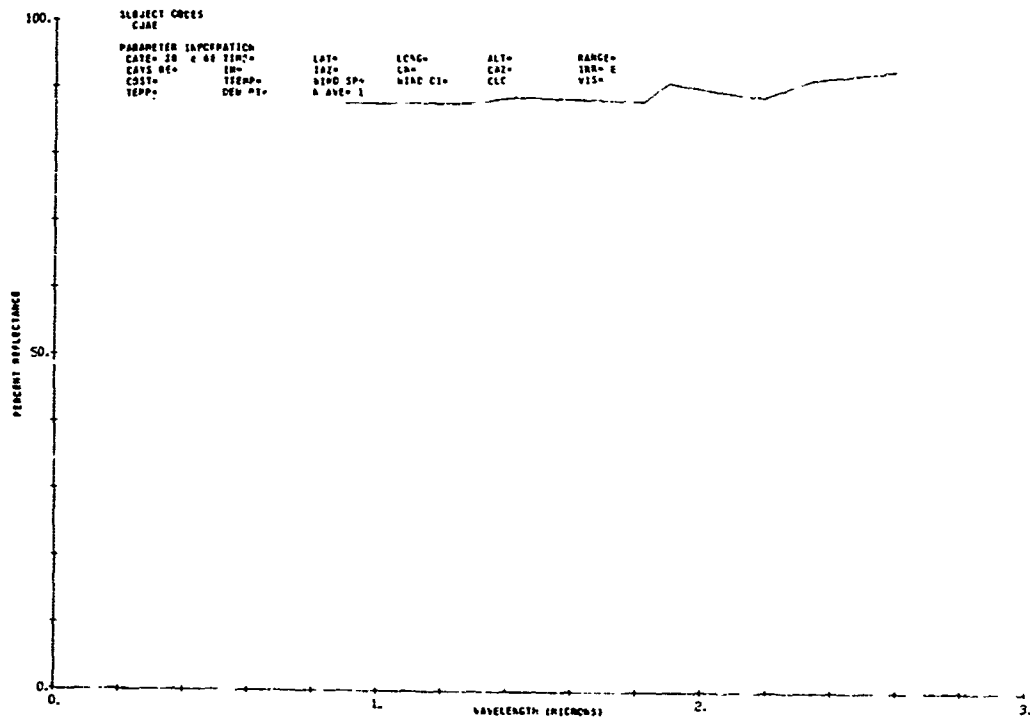
July 1968

CJ 21

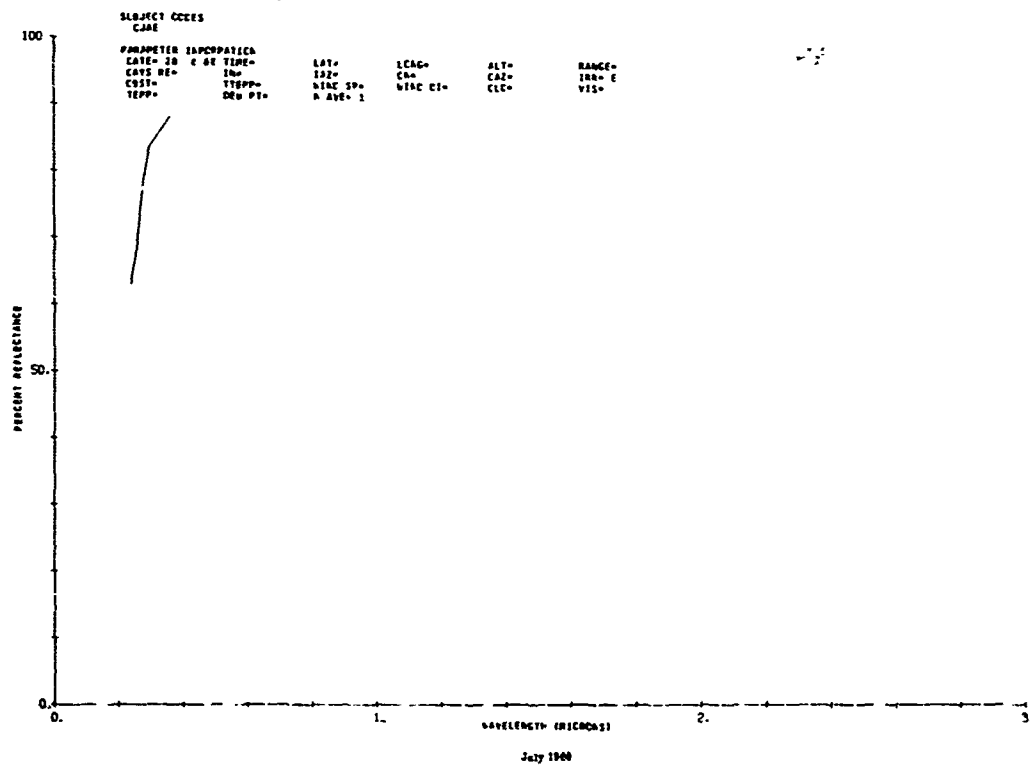


CJ 22

AO1449-CC1 FIDEPFRAX, SPECT-1.



AO1449-CC2 FIDEPFRAX, SPECT-2.



July 1960

CJ 23

AG1449-CC2 FIBERFRAX, SPCT-2.

SUBJECT CODES
CJAE

PARAMETER INFORMATION
CASE= 28 C RE TIME= 10
CATS DE= 10
COST= 10
TEPP= 10
DEM PT= 10

LAT= 10
LON= 10
WIND SP= 10
WIND DIR= 10

LCAG= 10
CA= 10
WIND DIR= 10

ALT= 10
CAZ= 10
ELE= 10

RANGE= 10
IRG= 10
VIS= 10

PERCENT REFLECTANCE

WAVELENGTH (MICRONS)

AG1449-CC2 FIBERFRAX, SPCT-2.

SUBJECT CODES
CJAE

PARAMETER INFORMATION
CASE= 28 C RE TIME= 10
CATS DE= 10
COST= 10
TEPP= 10
DEM PT= 10

LAT= 10
LON= 10
WIND SP= 10
WIND DIR= 10

LCAG= 10
CA= 10
WIND DIR= 10

ALT= 10
CAZ= 10
ELE= 10

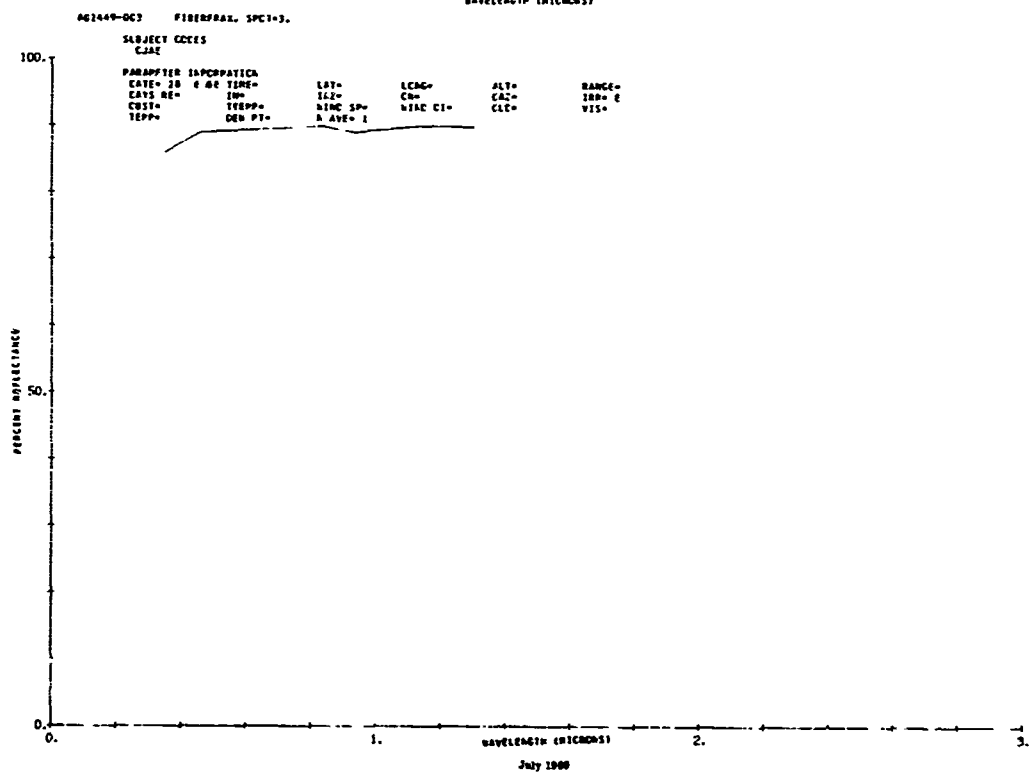
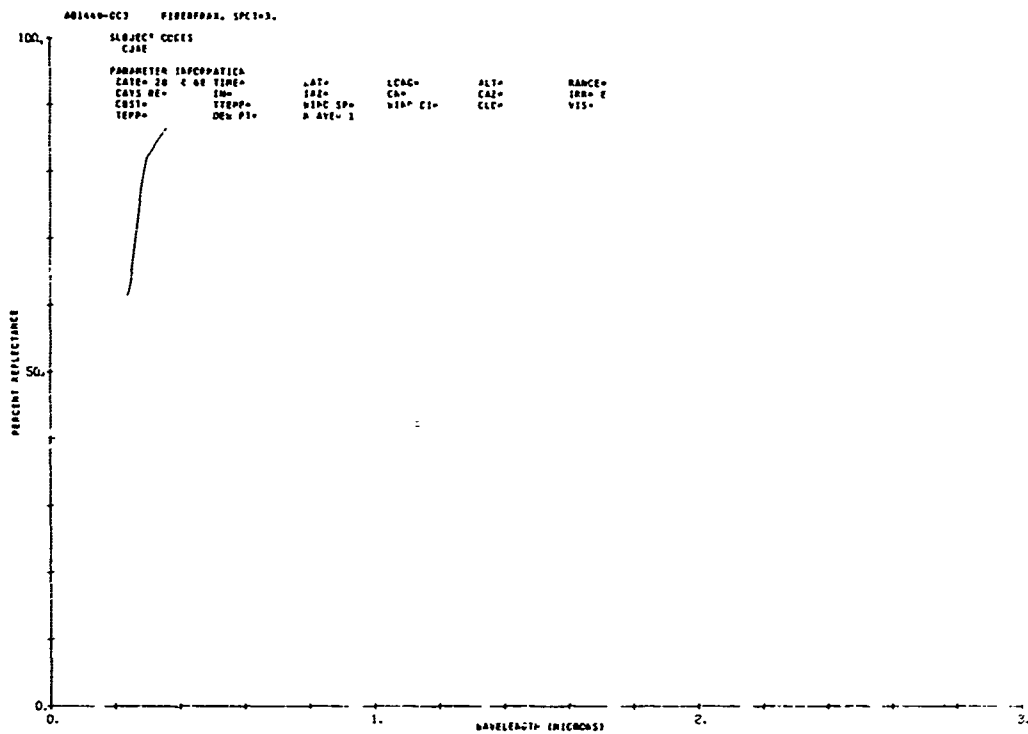
RANGE= 10
IRG= 10
VIS= 10

PERCENT REFLECTANCE

WAVELENGTH (MICRONS)

July 1968

CJ 24



CJ 25

AG1449-003 FIBERPRAS. SPC1-3.

SUBJECT CODES
CJAE

PARAMETER INFORMATION
DATE= 20 0 00 TIME= 1000
ZYS DE= 100
COST= 1000
TEPP= 1000

LAT=

LCAC=

ALT=

RANGE=

121=

CR=

CAZ=

IRB= 2

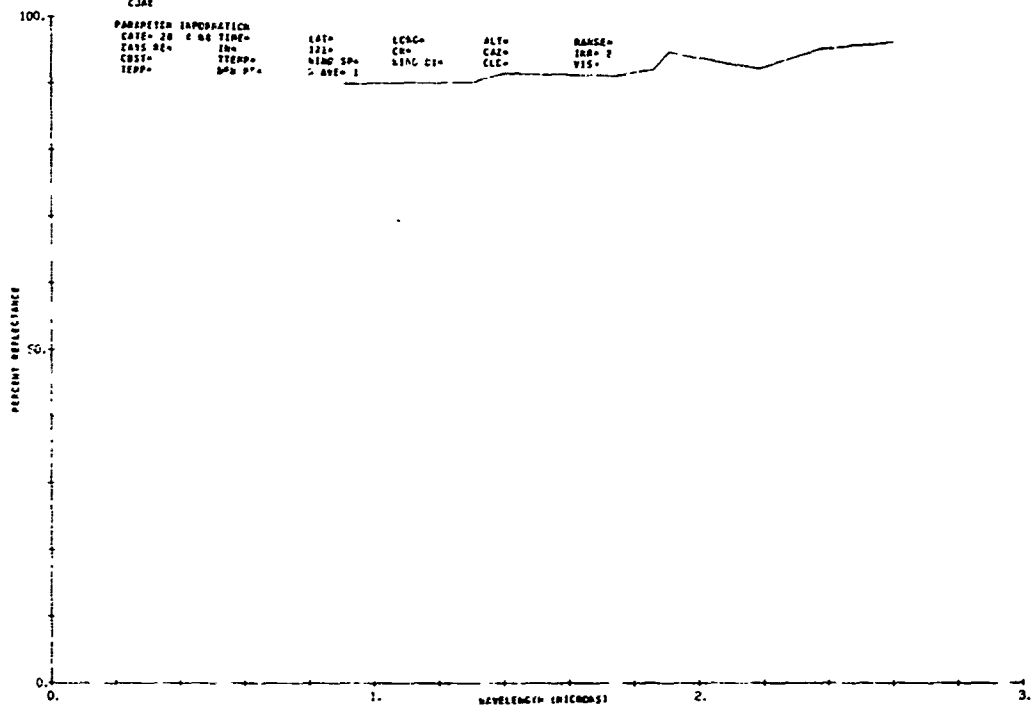
WIND SP=

WIND CL=

CLE=

VIS=

> ARE= 1



AG1449-004 FIBERPRAS. SPC1-1.

SUBJECT CODES
CJAE

PARAMETER INFORMATION
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ZYS DE= 100
COST= 1000
TEPP= 1000

LAT=

LCAC=

ALT=

RANGE=

121=

CR=

CAZ=

IRB= 0

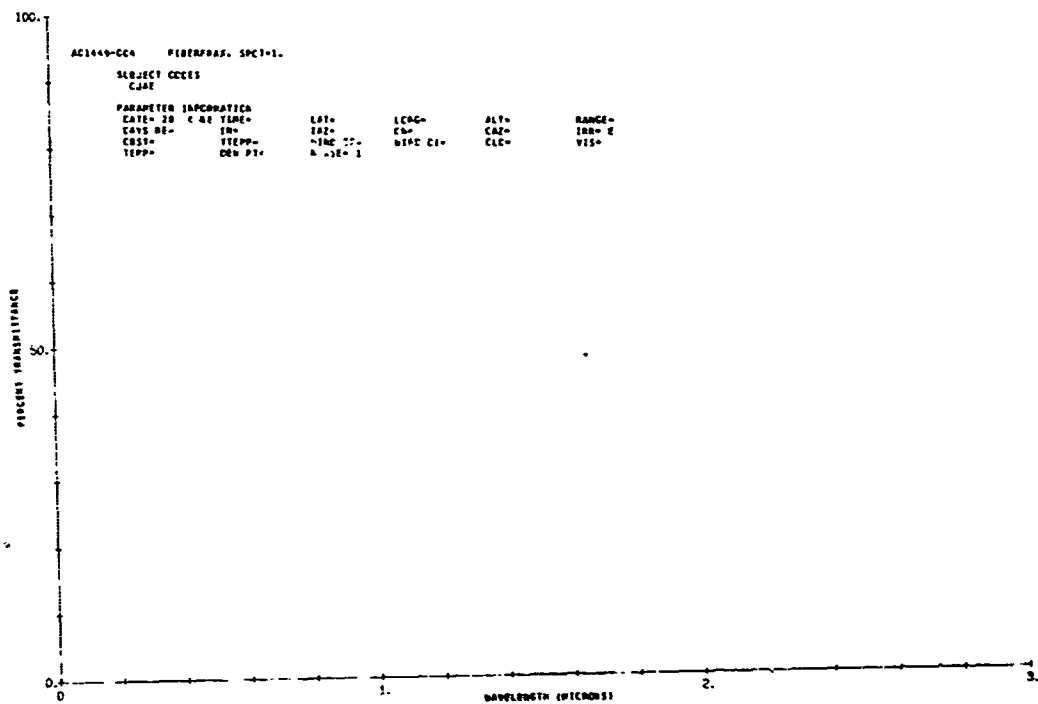
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WIND CL=

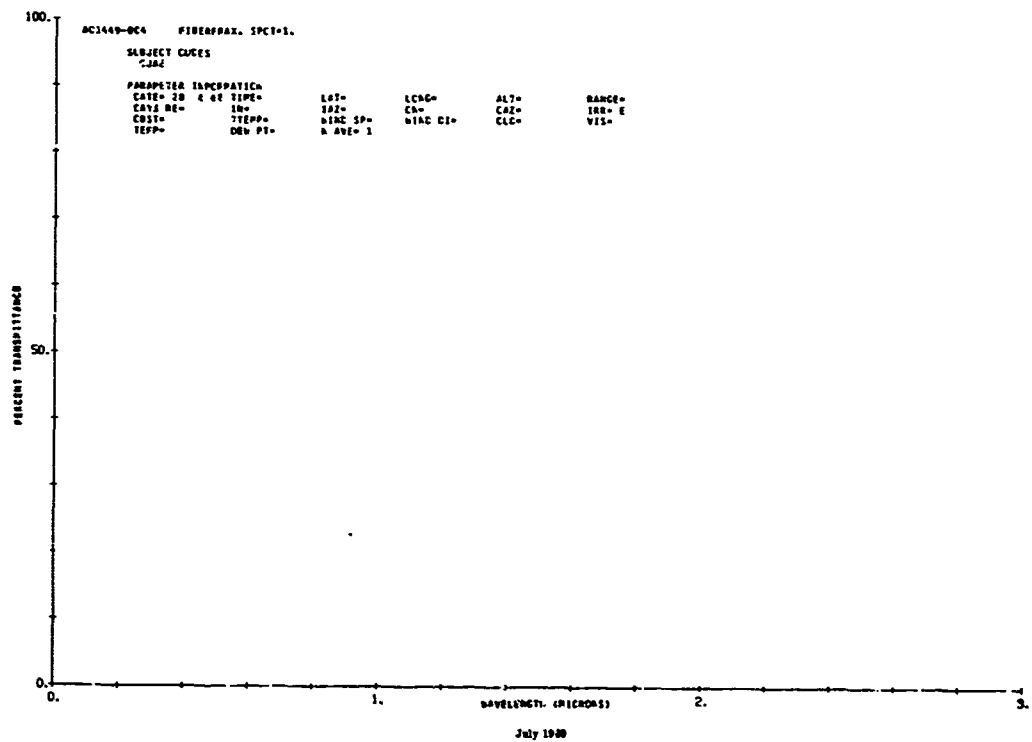
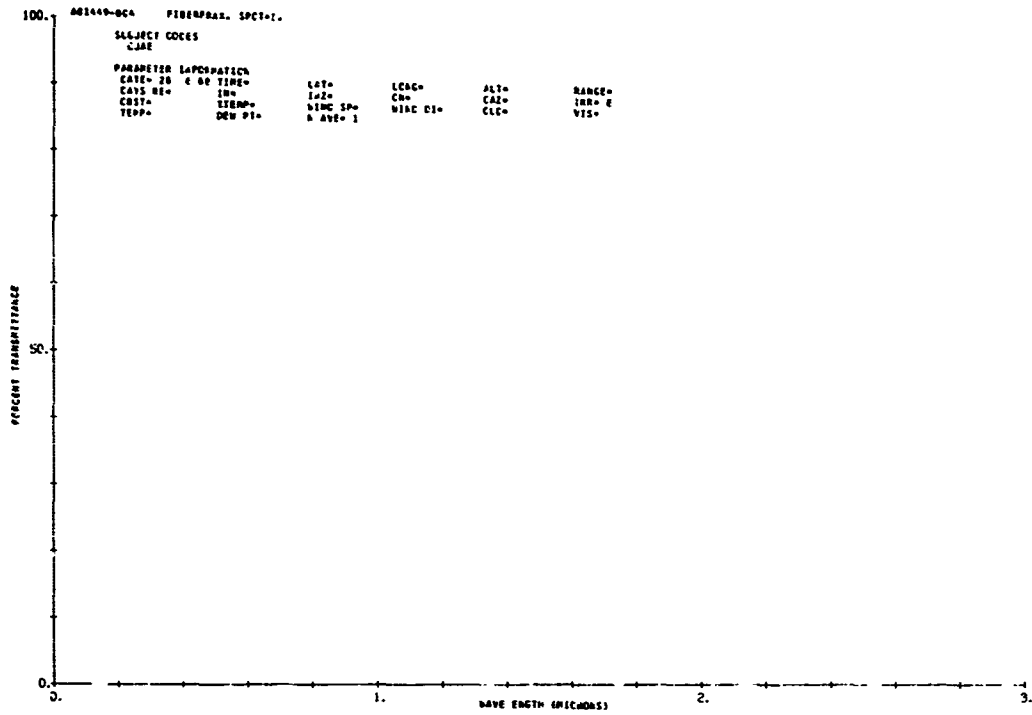
CLE=

VIS=

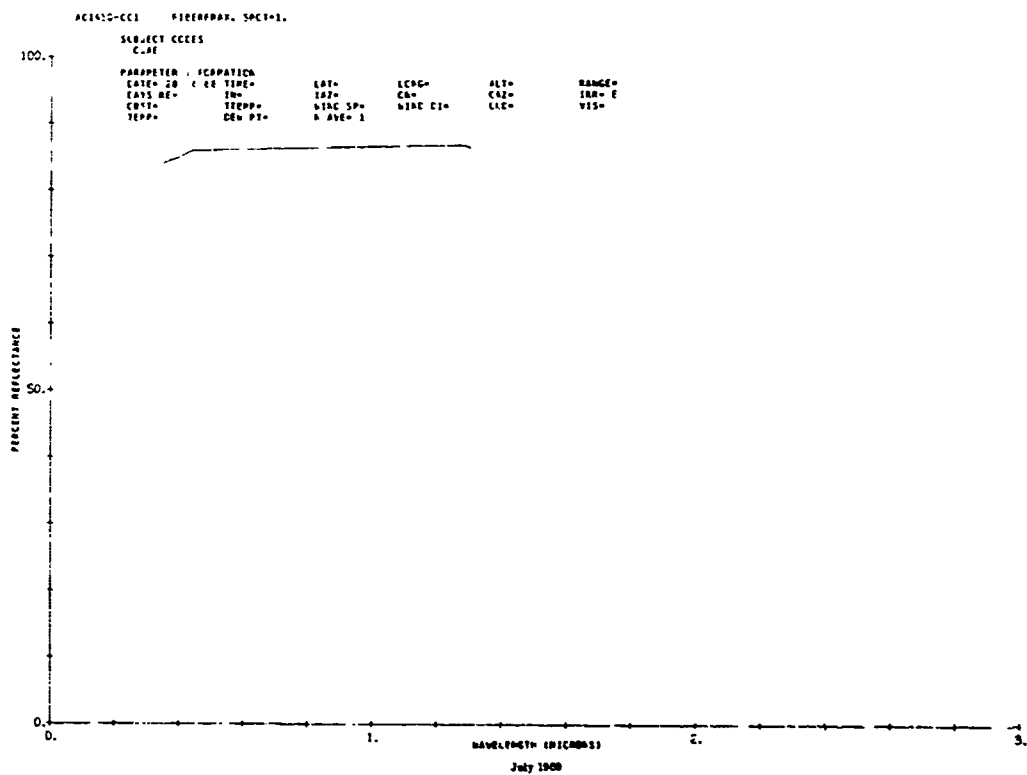
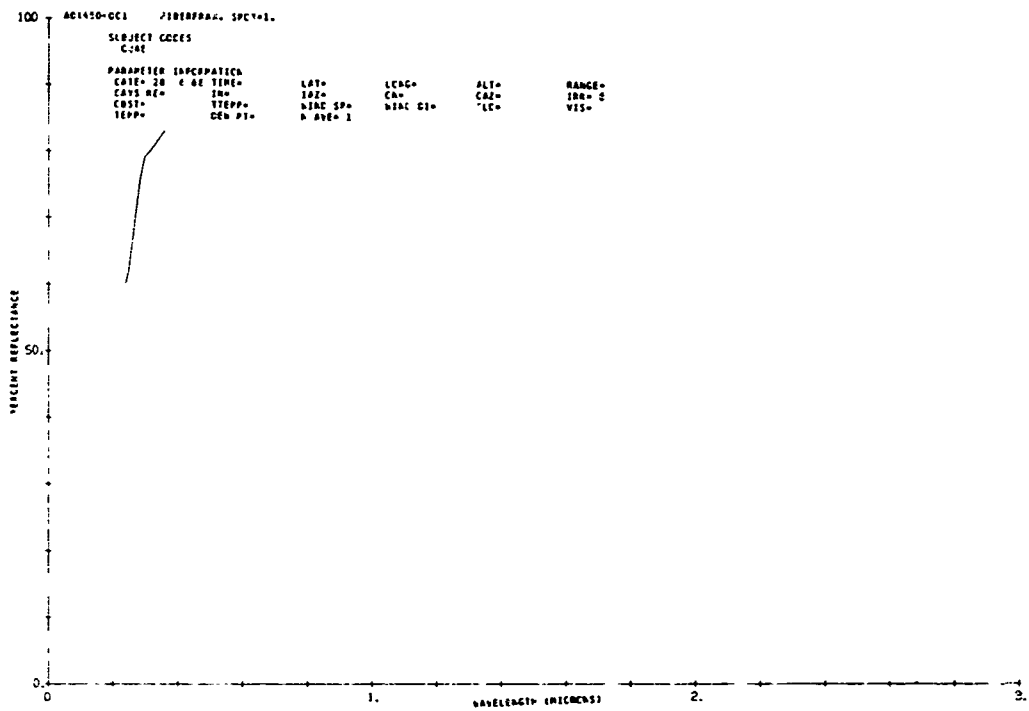
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July 1980

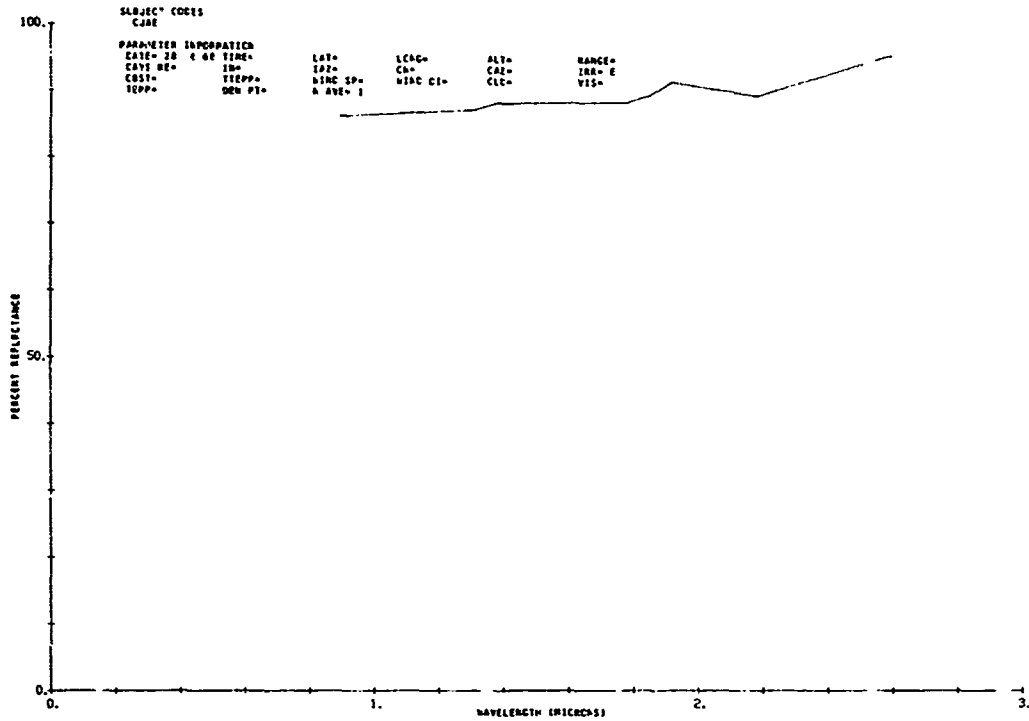


CJ 27

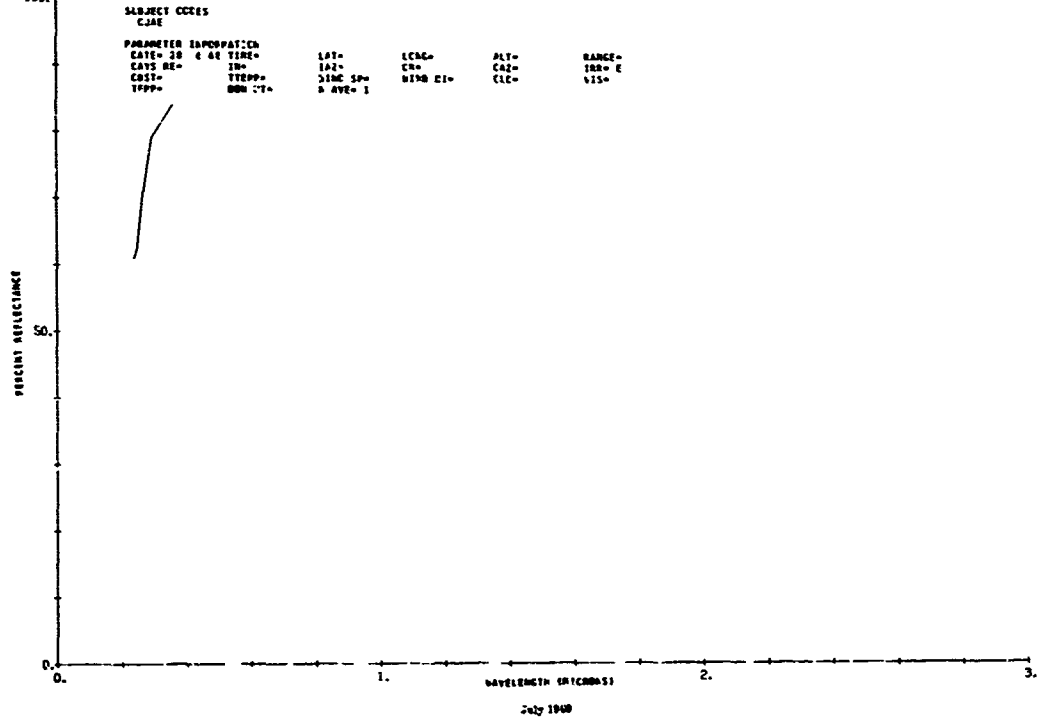


CJ 38

AB1470-001 FIREFRAZ. SPECT-1.



AB1470-002 FIREFRAZ. SPECT-2.



CJ 39

AC1450-002 FIBERFAX. SPCT-2.

SUBJECT CODES

CJAB

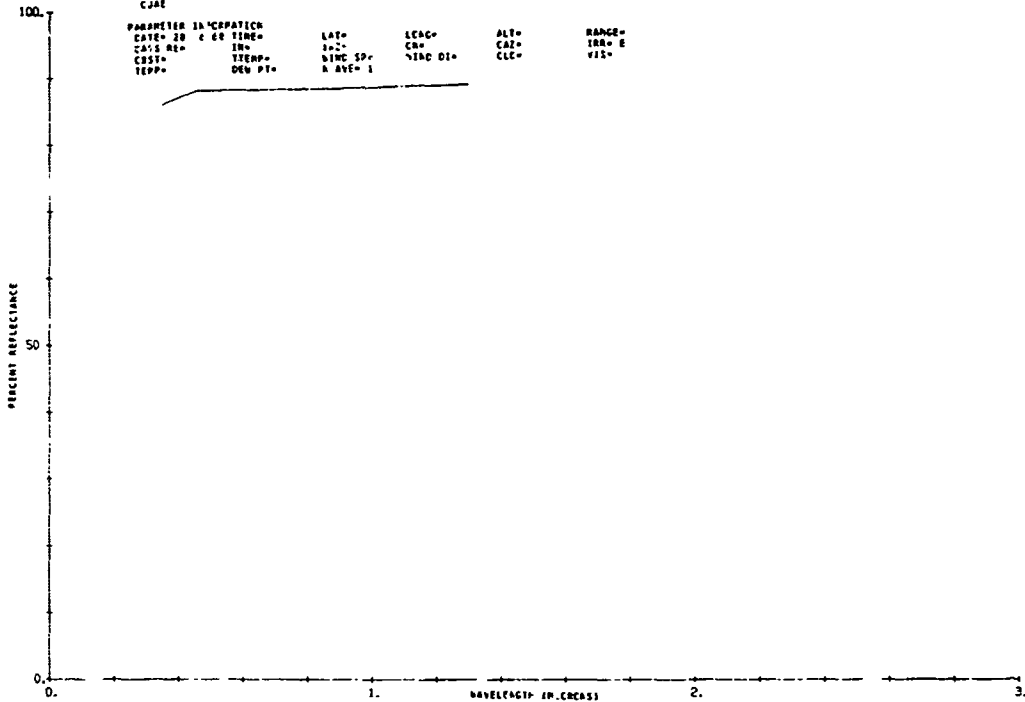
PARAMETER IN COPATECH
CASE 20 4 00 TIME
CASE RE IN
CASEY TEMP
TEMP

LAT
102
WIND SP
WAVE 1

LEAG
CR
WIND DI

ALT
CAZ
CLC

RANGE
IRB E
VIS



AC1450-002 FIBERFAX. SPCT-2.

SUBJECT CODES

CJAB

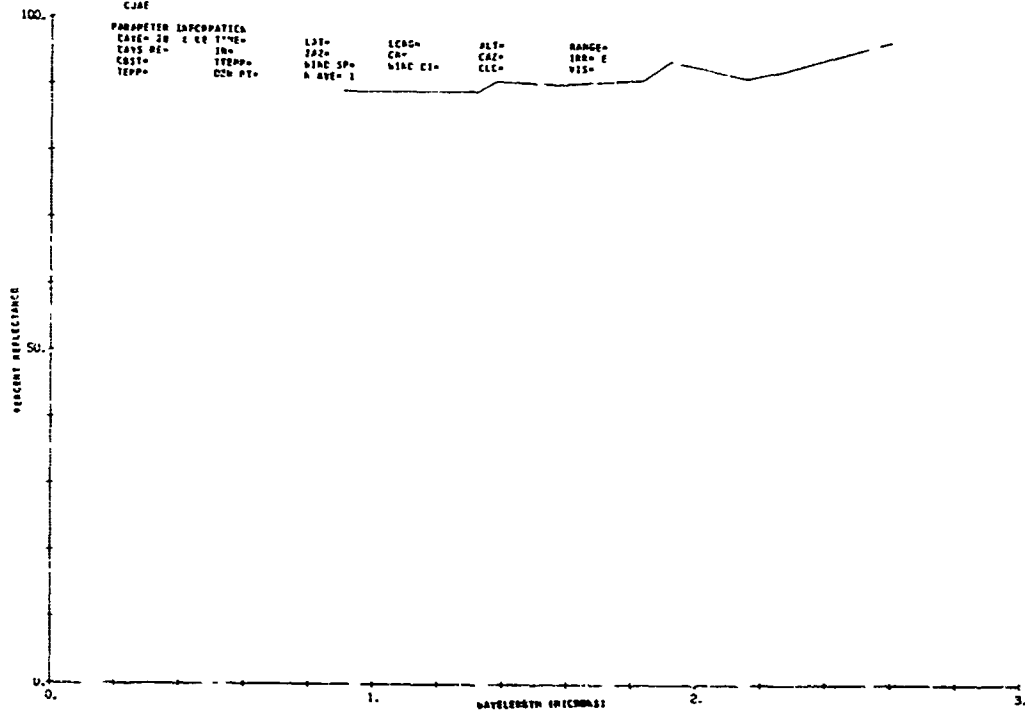
PARAMETER IN COPATECH
CASE 20 4 00 TIME
CASE RE IN
CASEY TEMP
TEMP

LAT
102
WIND SP
WAVE 1

LEAG
CR
WIND DI

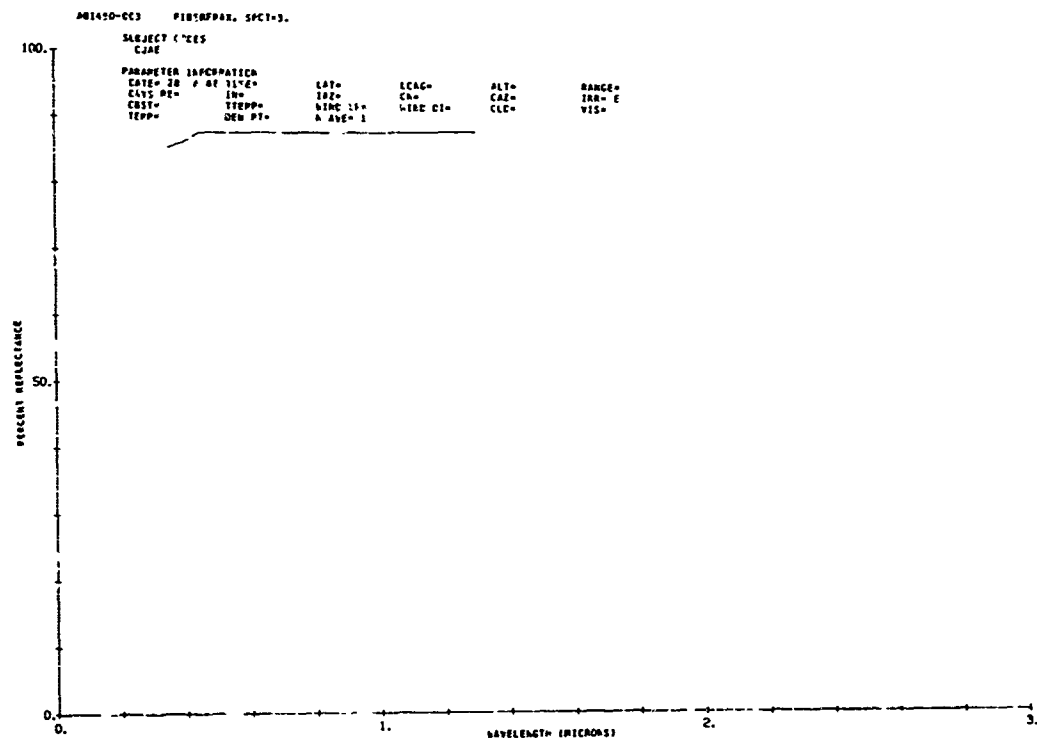
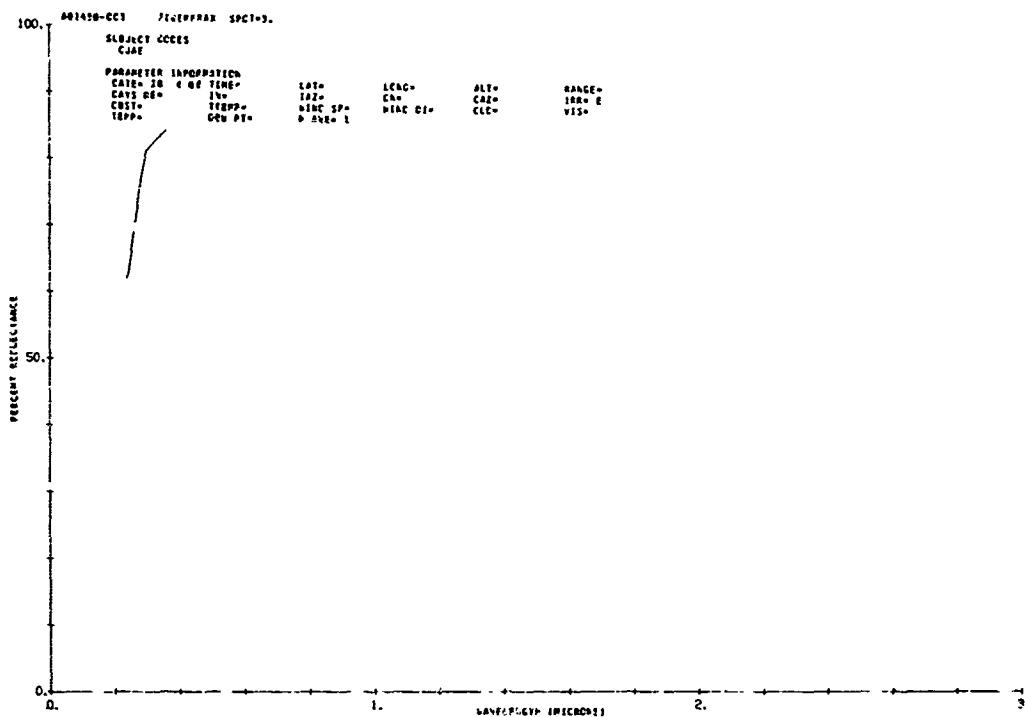
ALT
CAZ
CLC

RANGE
IRB E
VIS

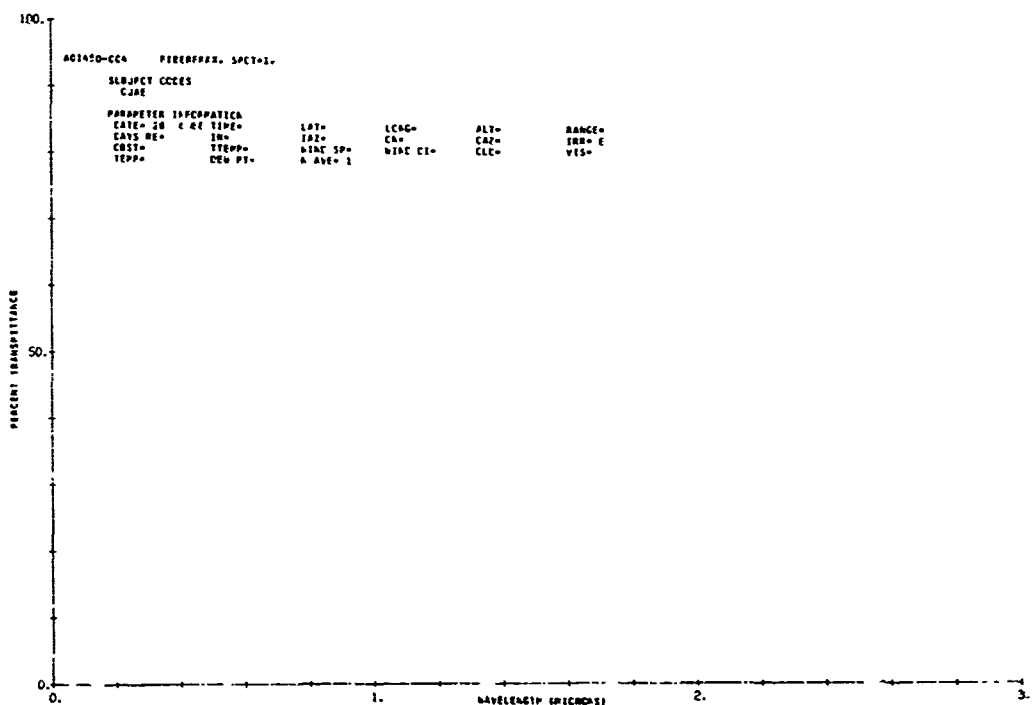
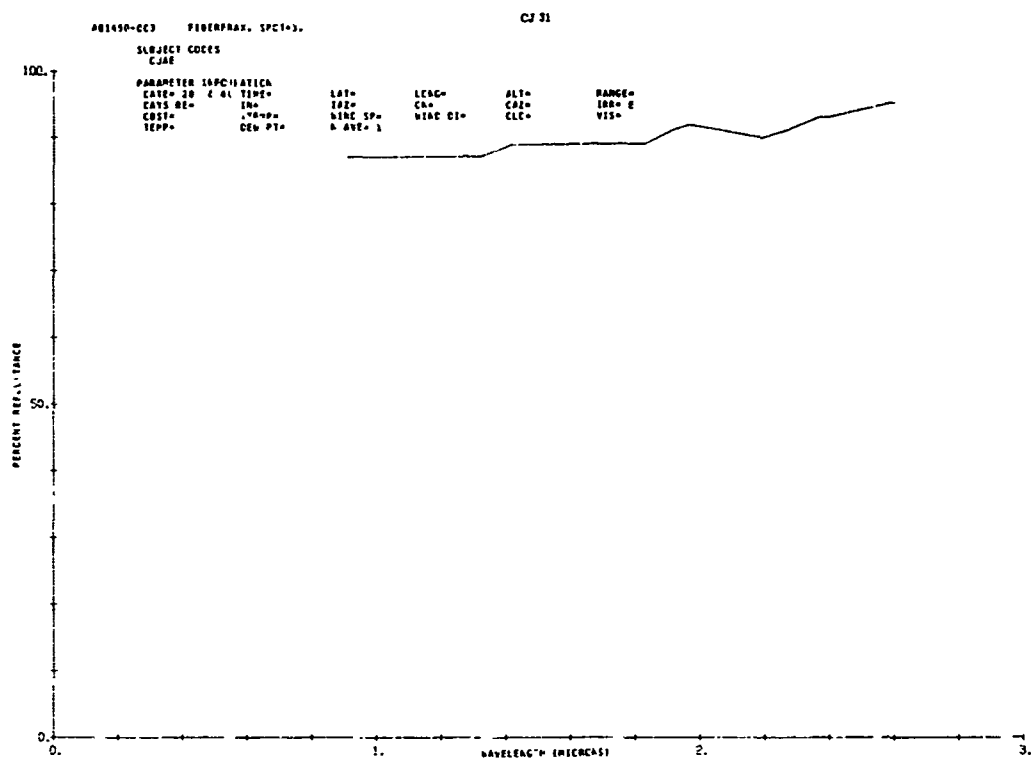


July 1969

CJ 30

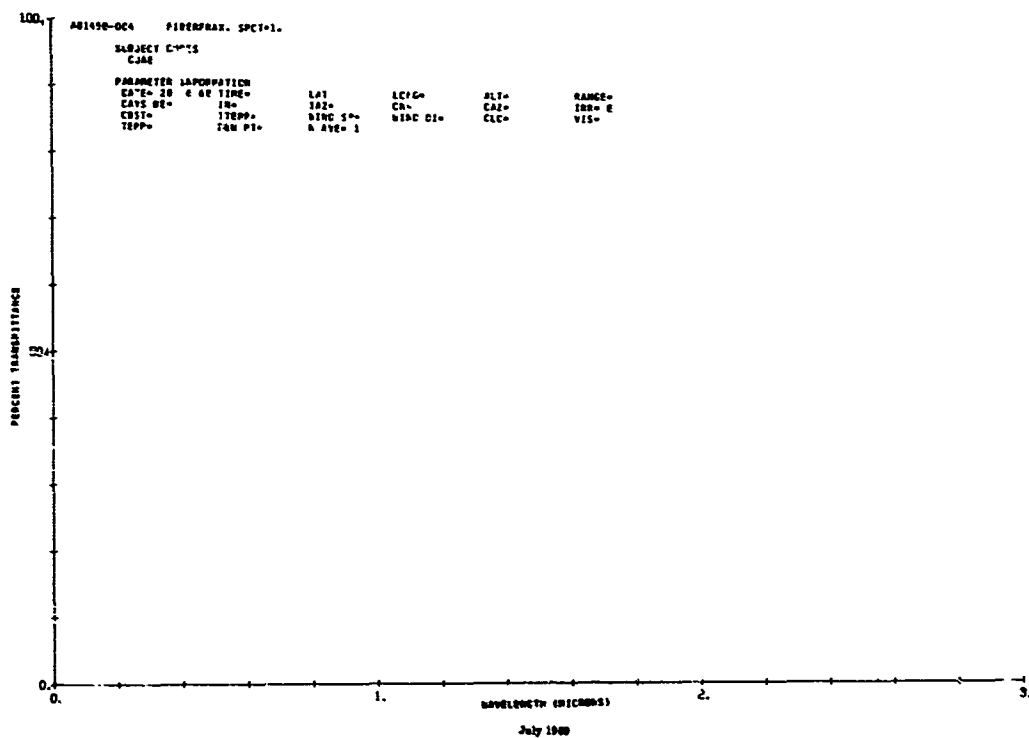
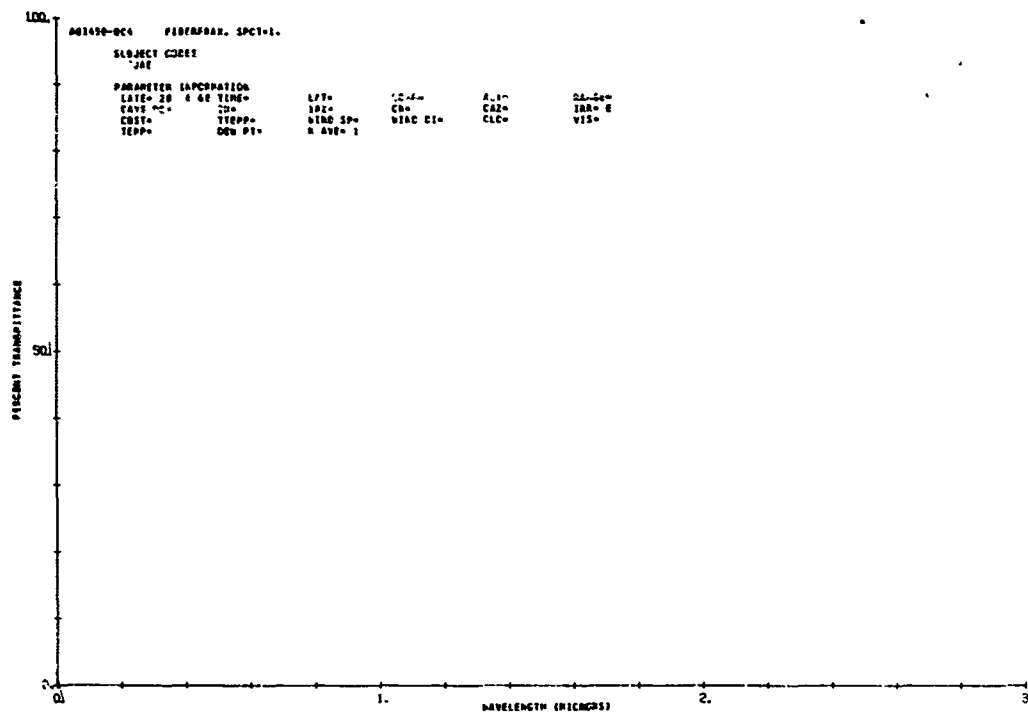


July 1960



July 1960

CJ 22



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Security Classification

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13 ABSTRACT This supplement to the <u>Target Signature Analysis Center: Data Compilation</u> augments an ordered, indexed compilation of reflectances and radar cross sections of target and background materials. The Data Compilation includes spectral reflectances and transmittances in the optical region from 0.3 to 15 μ and normalized radar cross sections (active) plotted as functions of aspect or depressing angle, at millimeter wavelengths. When available, the experimental parameters associated with each curve are listed to provide the user with a descrip- tion of the important experimental conditions. This supplement contains an additional 350 reflectance curves in graphical form. These data were obtained from the Laboratory Measurements Phase of the Target Signature Measurements Program conducted at The University of Michigan and sponsored by the Air Force Avionics Laboratory. The unclassified compilation, in- cluding these data, consists of about 4650 curves and 112 tables.			

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14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Targets Backgrounds Reflectance Optical spectrum Radar Passive microwaves Infrared						

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