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HEADQUARTERS
AIR MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, DAYTON, OHIO
ENGINEERING DIVISION
MEMORANDUM REPORT ON

No. of Pages 5

MCREXM/RWS/bjw

Date 23 September 1948

SUBJECT: Acryloid #855 as a Viscosity Index Improver in Specification AN-O-9, Grade 1010 Oil

OFFICE MATERIALS LABORATORY Contract or Order No.

SERIAL No. MCREXM-M5404 Expenditure Order No. 601-301

A. PURPOSE

1. To determine the effect of various concentrations of Acryloid #855 on the viscosity and viscosity index of Specification AN-O-9, grade 1010 oil.

B. FACTUAL DATA

2. The Power Plant Laboratory has undertaken an investigation to determine the effect of pour point depressants and viscosity index improvers in present specification oils. The Materials Laboratory has initiated a program to aid in their selection of the most effective additives.

3. Two samples of different Specification AN-O-9, grade 1010 oils were mixed with varying amounts of Acryloid #855 to give acryloid concentrations of from 1% to 5%.

4. Viscosities at 210°F, 100°F, and -40°F were conducted on these samples and the viscosity index of each sample was calculated.

5. The Acryloid #855 was 55.9% acryloid by weight plus 44.1% XCT White Oil. Hence, blends of Specification AN-O-9, grade 1010 oil and XCT White Oil were prepared, the amount of white oil added being equal to that added to AN-O-9 oil with the addition of the Acryloid #855. Viscosities were run on these samples in order that the effect of the acryloid alone might be determined. These data are given in Table I, Appendix 1.

6. Results of these tests are listed in Table II and shown in Figures 1 to 4 of Appendix 1.

C. CONCLUSIONS

7. Acryloid #855 raises markedly the viscosity index of Specification AN-O-9, grade 1010 oil.

8. The Acryloid #855, in raising the viscosity index, seems to reach a maximum effect at an acryloid concentration of 3 to 4%.

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9. The acryloid raises the entire viscosity level with small viscosity increases at the higher temperatures and substantial increases at -40°F.

10. The effect of the white oil (added with the Acryloid #855 solution) on the viscosity index of Specification AN-O-9, grade 1010 oil, is negligible and may be disregarded for the purposes of this test, although the effect on viscosity is quite marked.

D. RECOMMENDATIONS

11. None. Data merely submitted.

Distribution:
Chief of Staff, USAF
Director, Research & Development,
Deputy Chief of Staff, Material

MAGR-CD (4)

MCID (1) "Hold"

MCREXP3

Prepared by R. W. SNEED

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Approved by J. B. JOHNSON
Chief, Materials Laboratory
Engineering Division

Concurrence:

NACA TN-1540
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APPENDIX I, TABLE I

EFFECT OF XCT WHITE OIL ON VISCOSITY CHARACTERISTICS OF SPECIFICATION AN-O-9 OIL

Oil (Spec. AN-O-9, grade 1010)	% XCT White Oil	Viscosity (cs) at Temperatures 210°F	Viscosity (cs) at Temperatures 100°F	Viscosity (cs) at Temperatures -40°F	Viscosity Index
Submitted by General Electric Company					
Contractor - The Texas Company	None	2.49	10.15	2850.0	59.3
"	.79	2.47	10.04	2711.9	68.5
"	1.6	2.45	9.87	2590.4	70.8
"	2.4	2.42	9.68	2521.8	69.7
"	3.2	2.39	9.55	2382.0	67.3
"	3.9	2.38	9.45	2287.4	66.6
Submitted by Republic Aviation Corp.					
Contractor - Esso Standard Oil Co.	None	2.56	10.61	2918.9	69.7
"	.79	2.54	10.40	2897.3	72.6
"	1.6	2.53	10.36	2727.4	71.6
"	2.4	2.51	10.17	2629.0	71.3
"	3.2	2.47	9.97	2478.9	71.3
"	3.9	2.45	9.95	2453.0	68.1

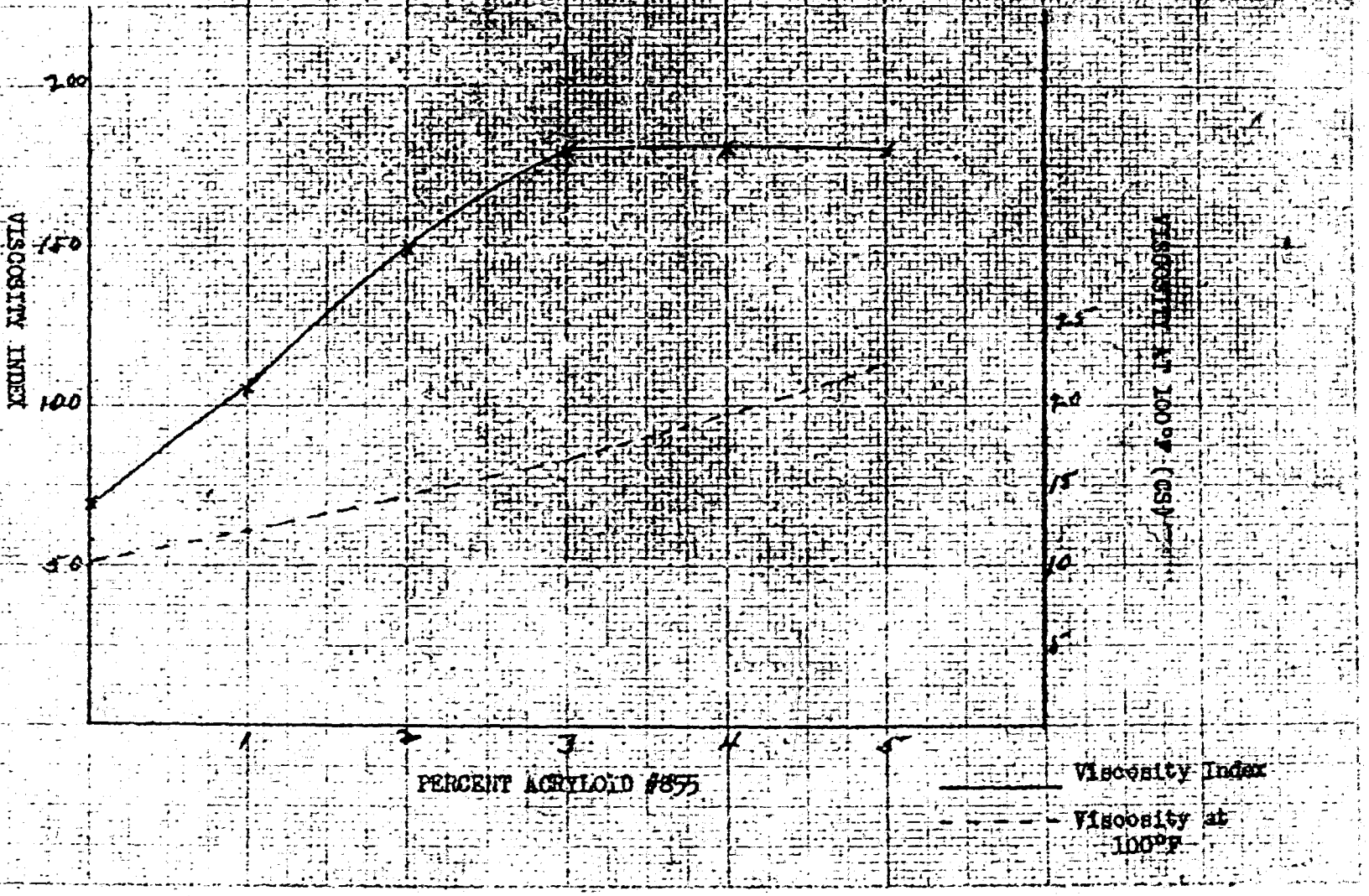
APPENDIX 1, TABLE II

RESULTS OF TESTS ON SPECIFICATION AN-O-9, GRADE 1010 OIL PLUS ACRYLOID #855 SOLUTION

Oil (Spec. AN-O-9, grade 1010)	% Acryloid #855	Viscosity (cs) Temperatures 210°F	100°F	-40°F	Viscosity Index
Submitted by General Electric Company					
Contractor - The Texas Company	None	2.49	10.15	2850.0	69.3
"	1% + .79% White Oil	2.94	12.08	3128.0	105.1
"	2% + 1.6% White Oil	3.53	14.21	3478.5	146.7
"	3% + 2.4% White Oil	4.16	16.54	3802.1	178.2
"	4% + 3.2% White Oil	4.89	19.63	4372.8	180.5
"	5% + 3.9% White Oil	5.71	22.46	4810.4	179.4
Submitted by Republic Aviation Corp.					
Contractor - Esso Standard Oil Co.	None	2.56	10.61	2918.9	69.7
"	1% + .79% White Oil	3.05	12.49	3302.6	114.0
"	2% + 1.6% White Oil	3.62	14.72	3701.4	151.0
"	3% + 2.4% White Oil	4.30	17.48	4233.4	175.7
"	4% + 3.2% White Oil	5.04	20.17	4498.2	180.2
"	5% + 3.9% White Oil	5.99	23.69	5097.3	177.5

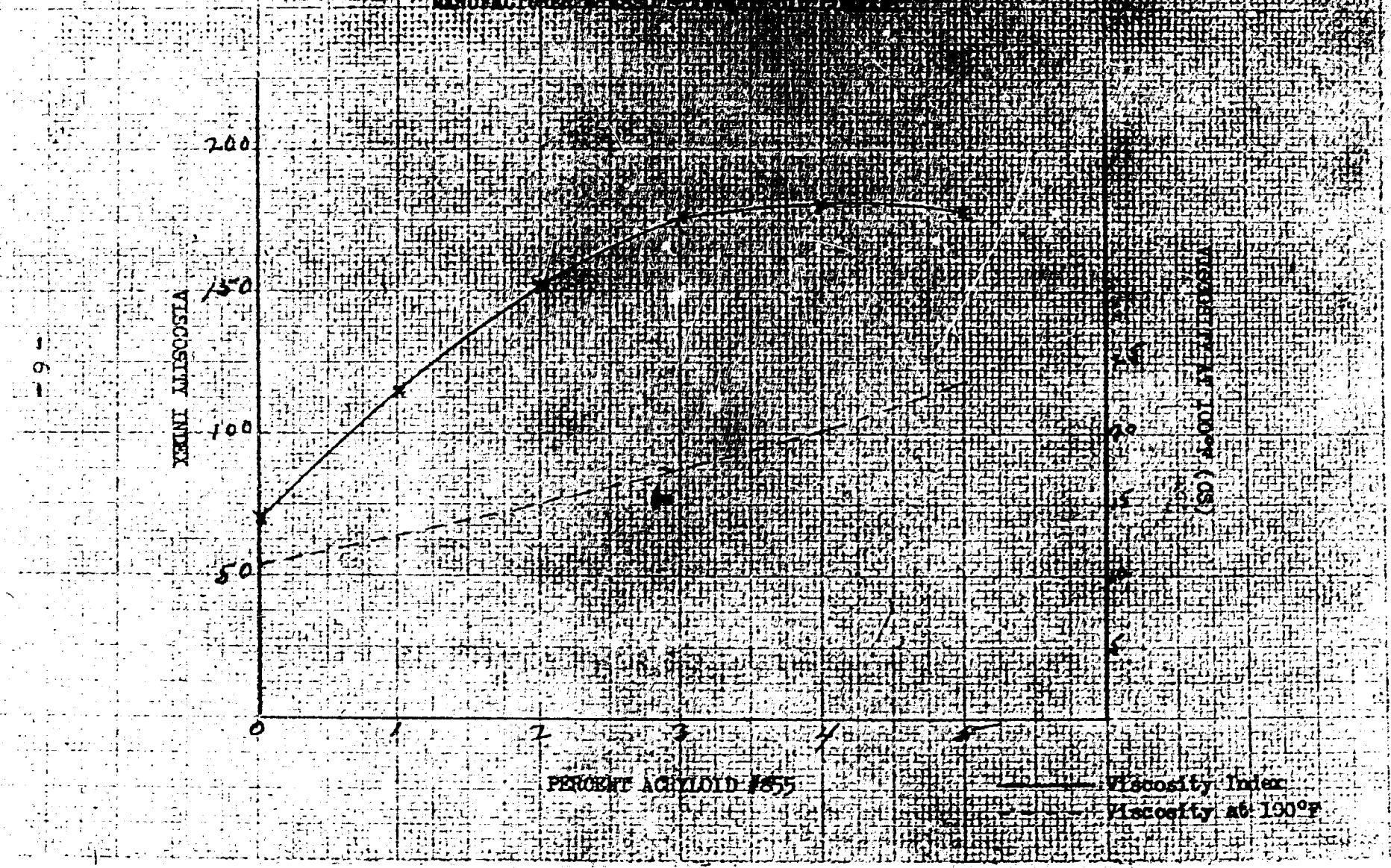
APPENDIX 1.

VISCOSITY INDEX VS % ACRYLOID #855 ADDED
FOR
SPECIFICATION AN-O-9, GRADE 1010 OIL SUBMITTED BY GENERAL ELECTRIC CORP.
MANUFACTURER - THE TEXAS COMPANY



VISCOSITY INDEX OF [illegible]

SPECIFICATION AN-O-9 OIL, GRADE 2010 [illegible] AMERICAN CYANAMID CO.
MANUFACTURED BY [illegible]



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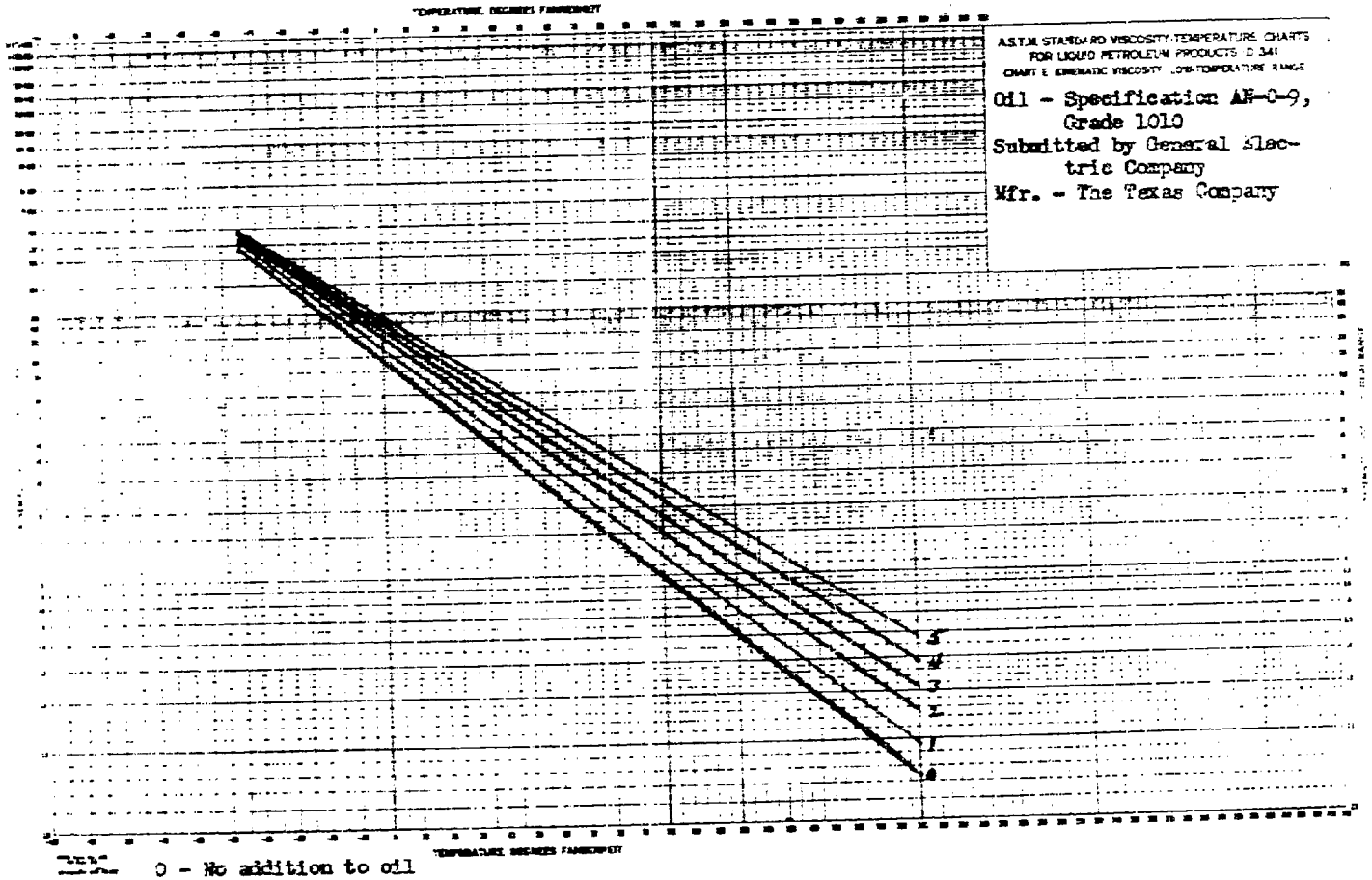
APPENDIX 1, FIGURE 3



0 - No addition to oil
1 - 1% #855 Acryloid added
2 - 2% #855 Acryloid added
3 - 3% #855 Acryloid added
4 - 4% #855 Acryloid added
5 - 5% #855 Acryloid added

[redacted]
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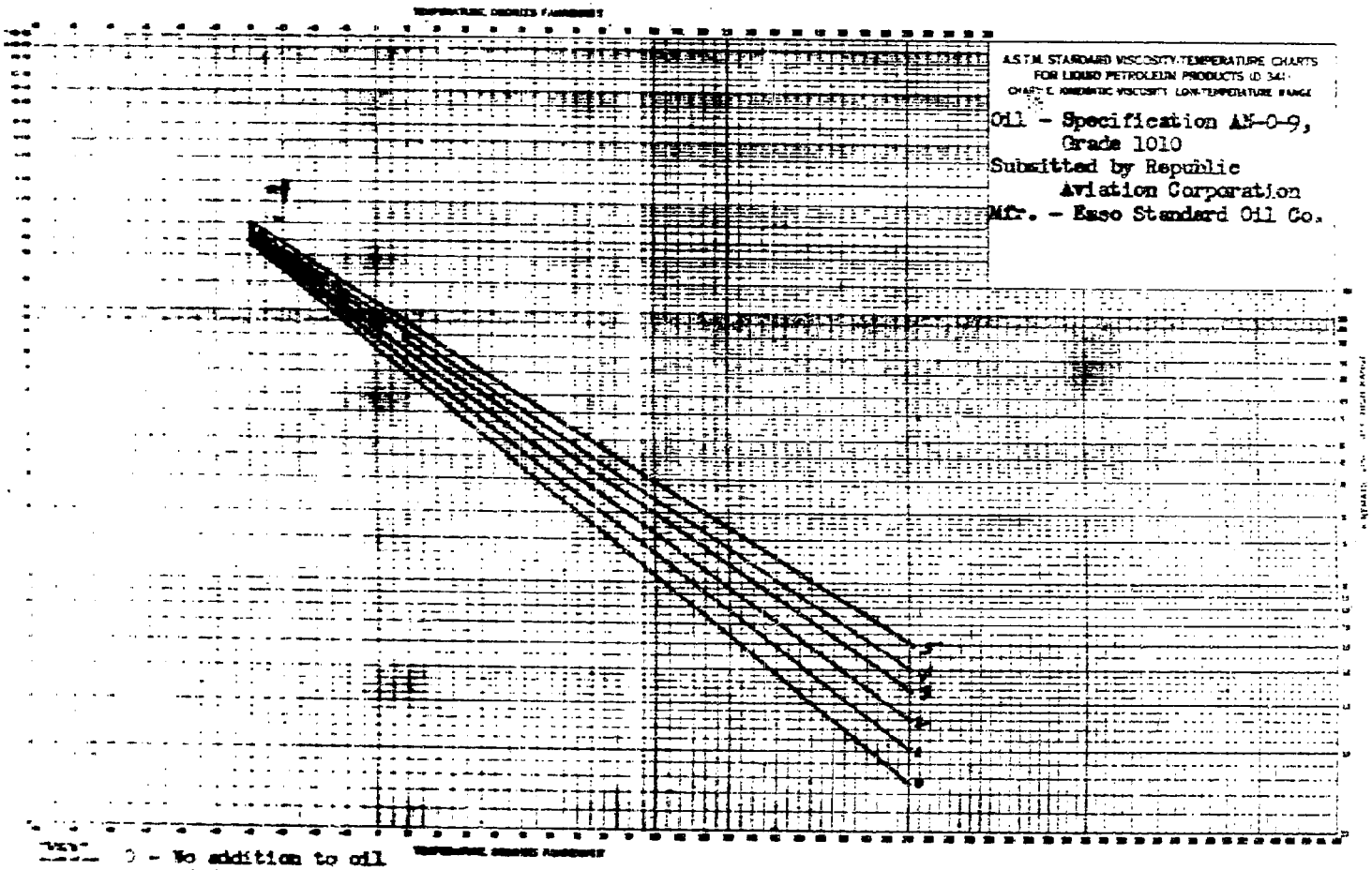
APPENDIX 1, FIGURE 4



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TITLE: Acryloid #855 as a Viscosity Index Improver in Specification AN-O-9, Grade 1010 Oil

AUTHOR(S): Sneed, R. W.

ORIGINATING AGENCY: Engineering Division, AMC

PUBLISHED BY: Air Materiel Command, Wright-Patterson Air Force Base, Dayton, O.

ATI- 39909

REVISION: (None)

ORIG. AGENCY NO.: MCREXM-M5404

PUBLISHING AGENCY NO.: (Same)

DATE	DOC. CLASS.	COUNTRY	LANGUAGE	PAGES	ILLUSTRATIONS
Sept '48	Unclass.	U.S.	Eng.	8	tables, graphs

ABSTRACT:

Study was made to determine the effect of various concentrations of Acryloid #855 on the viscosity and viscosity index of specification AN-O-9, grade 1010 oil. Two samples of different specification AN-O-9, grade 1010 oils were mixed with varying amounts of Acryloid #855 to give acryloid concentrations of from 1% to 5%. Viscosities at 210°F, 100°F, and -40°F were conducted on these samples and the viscosity index of each sample was calculated. It was concluded that Acryloid #855 raises markedly the viscosity index of AN-O-9, grade 1010 oil, and in doing so, seems to reach a maximum effect at an acryloid concentration of from 3% to 4%.

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DIVISION: Fuels and Lubricants (12)

SECTION: Liquid Lubricants (5)

SUBJECT HEADINGS: Lubricant additives (56700); Lubricants - Viscosity (56780)

ATI SHEET NO.: R-12-5-13

Air Documents Division, Intelligence Department
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AIR TECHNICAL INDEX

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