

QC
Auro
C-105
P/WT/20
Vol. I

QC X
Auro
CF105
P-WT-20
V. I

(23)

FILE IN VAULT

C-105 P/WIND TUNNEL/20
DERIVATIVES AND ZERO VALUES
ANALYZED VOLUME I
LONGITUDINAL STABILITY AND CONTROL
Copy No. 1 June 1954.

UNCLASSIFIED



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ANALYSE

TO
A

DATE

Dec. 7, 1992

Report no.: QCX - AVRO - CF105- P-WT-20 V.1

has been downgraded to: _____

de-classified

by (Name): Michel W. Drapeau

(Dept): A/DND Coordinator, Access to Information

Date: Dec. 7, 1992

R. Auger
Signature



45114

12416802



UNCLASSIFIED

A. V. ROE CANADA LIMITED
MALTON - ONTARIO

TECHNICAL DEPARTMENT (Aircraft)

AIRCRAFT: C-105

REPORT NO. P/W.T./20

FILE NO.

NO OF SHEETS: _____

TITLE:

DERIVATIVES AND ZERO VALVES

VOLUME I

LONGITUDINAL STABILITY AND CONTROL

confirmed as:
 Classification ~~cancelled~~ / changed to: UNCLASSIFIED
 By authority of: DRDA 7/DARFT 5-8/DAS Eng 6-4-5
 Date: 5 Nov 1992
 Signature: *S. Aubrey*
 Unit / Rank / Appointment: DSYS 3, Secretary CRAD HQ DRP

PREPARED BY _____ DATE June 54

CHECKED BY _____ DATE _____

SUPERVISED BY _____ DATE _____

APPROVED BY _____ DATE _____

ISSUE NO	REVISION NO	REVISED BY	APPROVED BY	DATE	REMARKS

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. P/W.T./20

SHEET NO. 1

AIRCRAFT:

PREPARED BY

DATE

J. Clark

June 54

CHECKED BY

DATE

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INDEX

<u>1. Lift</u>	<u>Section</u>
1. C_{Lq}	1. Clean aircraft 1.1.1
	2. Effects of tank and brakes 1.1.2
	3. Effect of sideslip 1.1.3
2. $C_{L\delta}$	1. Clean aircraft 1.2.1
	2. Effects of tank and brakes 1.2.2
	3. Effect of sideslip 1.2.3
	4. Non-linearities 1.2.4
3. q_0	1. Clean aircraft 1.3.1
	2. Effects of tank and brakes 1.3.2
	3. Effect of sideslip 1.3.3
<u>2. Pitching Moment</u>	
1. a.c.	1. Clean aircraft 2.1.1
	2. Effects of tank and brakes 2.1.2
	3. Effect of sideslip 2.1.3
2. $C_{M\delta}$ at constant q	
	1. Clean aircraft 2.2.1
	2. Effects of tank and brakes 2.2.2
3. $C_{M\delta}$ at constant C_L	
	1. Clean aircraft 2.3.1
	2. Effects of tank and brakes 2.3.2
	3. Effect of sideslip 2.3.3
4. c.p.	1. Clean aircraft 2.4.1
	2. Effects of tank and brakes 2.4.2
	3. Effect of sideslip 2.4.3
5. C_{M0}	1. Clean aircraft 2.5.1
	2. Effects of tank and brakes 2.5.2
	3. Effect of sideslip 2.5.3
6. $\Delta\delta$ <u>Trim due to tanks and brakes</u>	
	1. Fuselage brakes 2.6.1
	2. Fin brakes 2.6.2
	3. Fuselage brakes and tank 2.6.3

TECHNICAL DEPARTMENT (Aircraft)

REPORT NO. P/W.T./20

SHEET NO. 2

AIRCRAFT:

PREPARED BY

DATE

J. Clark

June 54

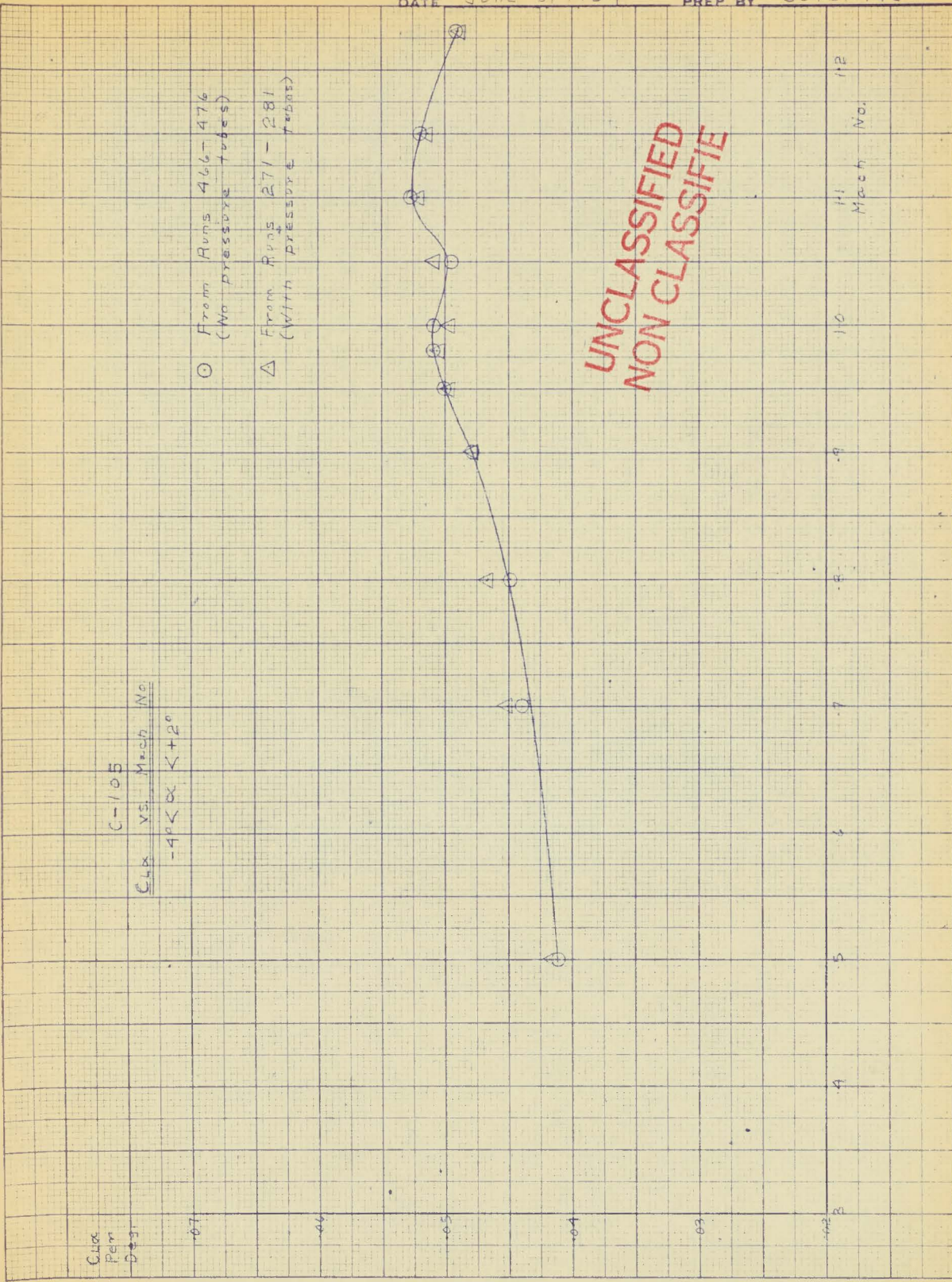
CHECKED BY

DATE

INDEX

<u>3. Elevator Hinge Moment</u>		<u>Section</u>
1. CH ₀	1. Clean aircraft	3.1.1
	2. Effect of brakes	3.1.2
2. CH ₁	1. Clean aircraft	3.2.1
	2. Non-linearities	3.2.2
	3. Effect of brakes	3.2.3
3. CH ₂	1. Clean aircraft	3.3.1
	2. Non-linearities	3.3.2
	3. Effect of brakes	3.3.3

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C-105

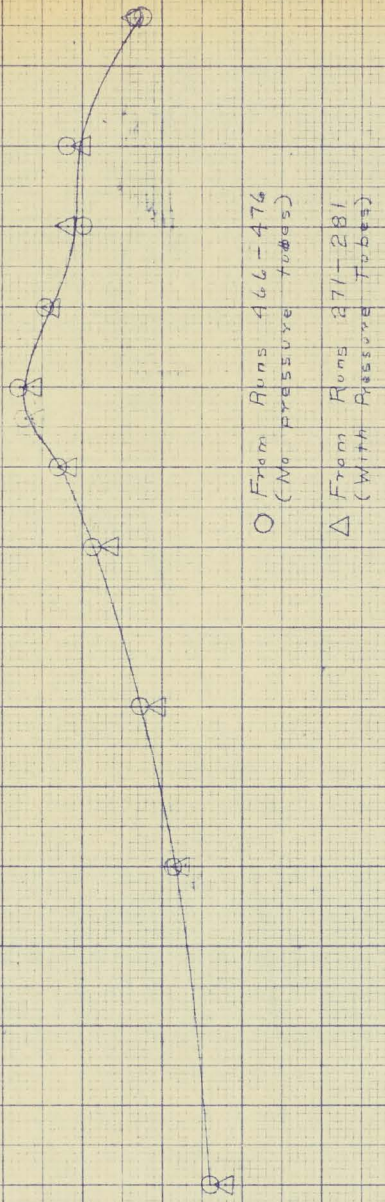
$C_{L\alpha}$ VS. Mach No.

$-4^\circ < \alpha < +2^\circ$

959 13. KUTLIFE & ESSER CO.
10 x 10 to the 1/2 inch, 8th lines accented.
MADE IN U.S.A.

C-105
C_{Lα} vs. Mach No.
 $+2^\circ < \alpha < 12^\circ$

C_{Lα}
Del.



○ From Runs 466-476
(No Pressure Tubes)

△ From Runs 271-281
(With Pressure Tubes)

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10
Mach No.
11
12

3-477 20-11-54
10-10-54
10-10-54

AIRCRAFT
A. U. W.

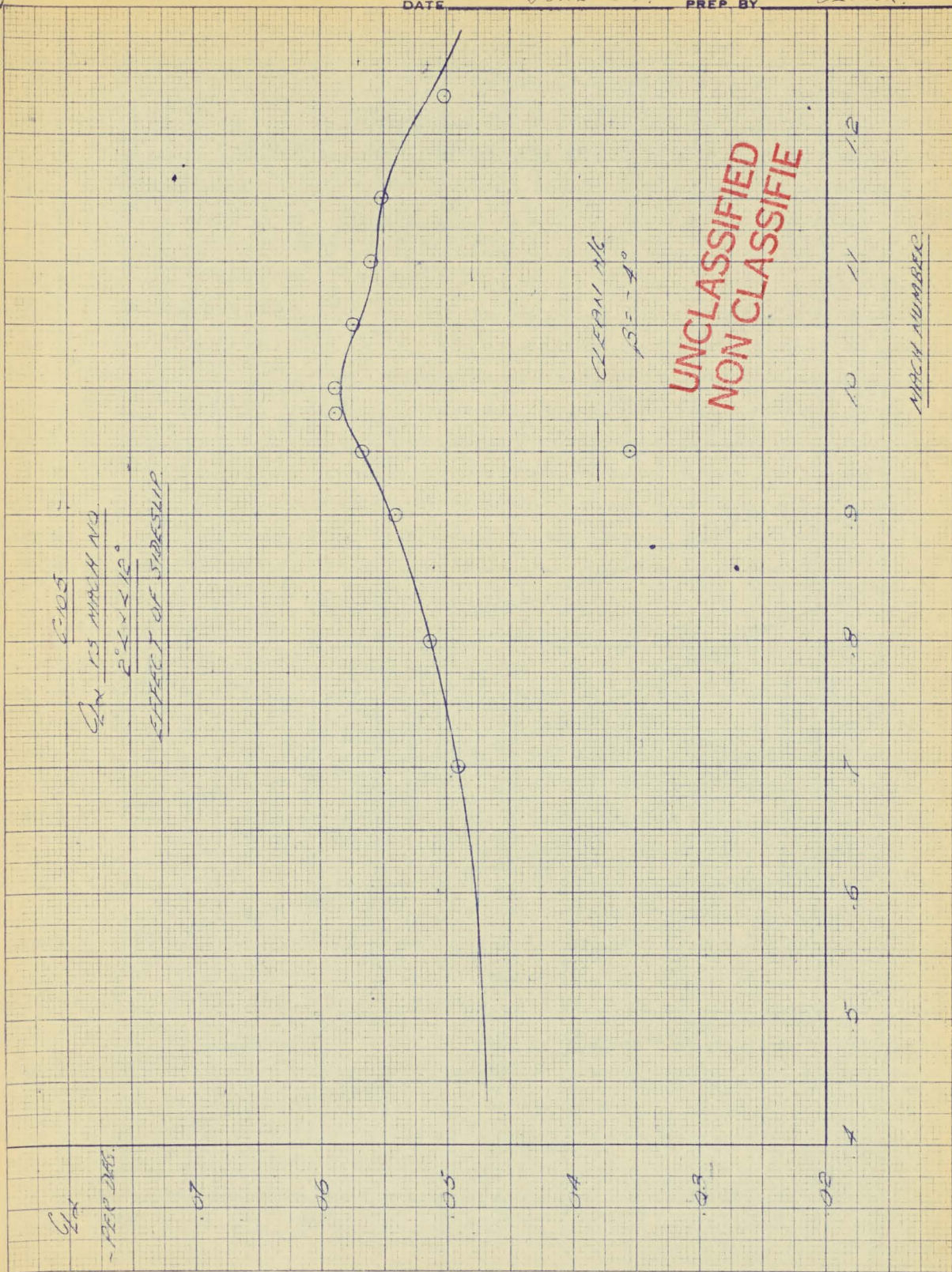
COMPONENT

SHEET No. 1.13.2.

REPORT No. P/W.T/20

DATE JUNE 54.

PREP BY CLARK.



SALES AND SERVICE
BY THE U.S. GOVERNMENT
MADE IN U.S.A.

1.22.1

APRIL 30/54

P/4.T./20

S. K. K. K.

C105

CORNELL H.T. TESTS APR 52.

$\delta_B = 20^\circ$

C_L vs δ_e

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MACH No $C_L/1$

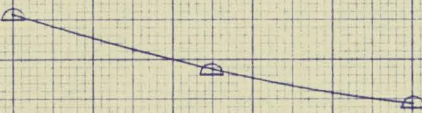
5 \square

9 \triangle

98 \square

100 \triangle

123 \diamond



$\delta_e = 0^\circ \quad -5^\circ \quad -10^\circ$

509-12 FEUPLE & SIBBES CO
10 S. 18th ST. MILWAUKEE WIS. 53233
MADE IN U.S.A.

1.2.2.3.

P/W.T./20

April 30/54

J. Kintkowski

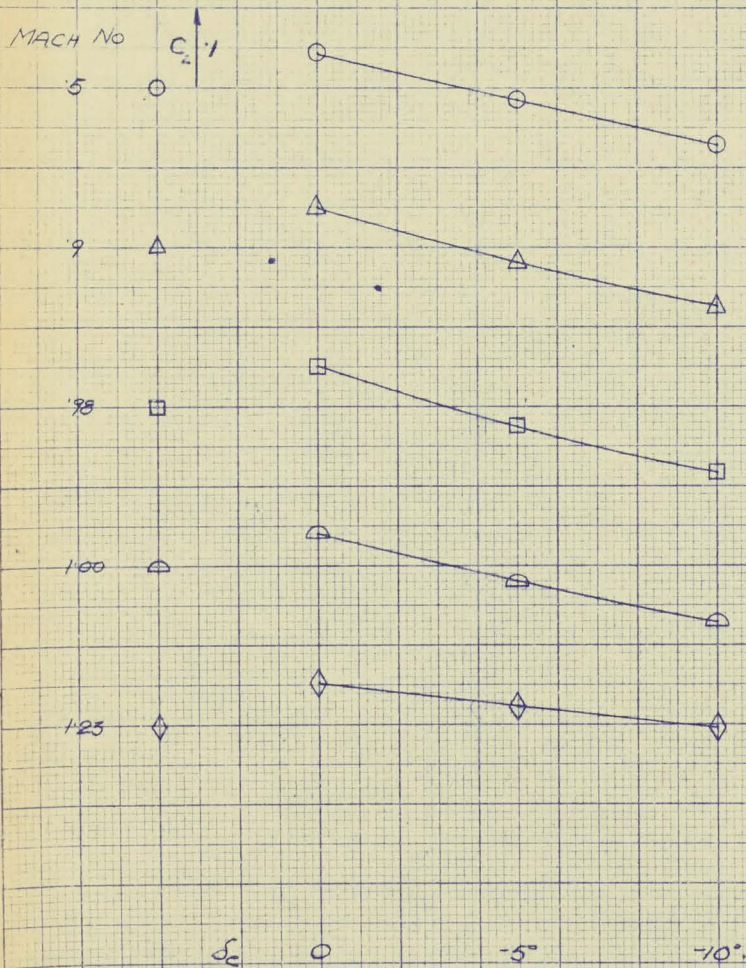
C105

CORNELL N.T. TESTS APR 54.

$\delta_B = 60^\circ$

C_L vs δ_c

UNCLASSIFIED
NON CLASSIFIE

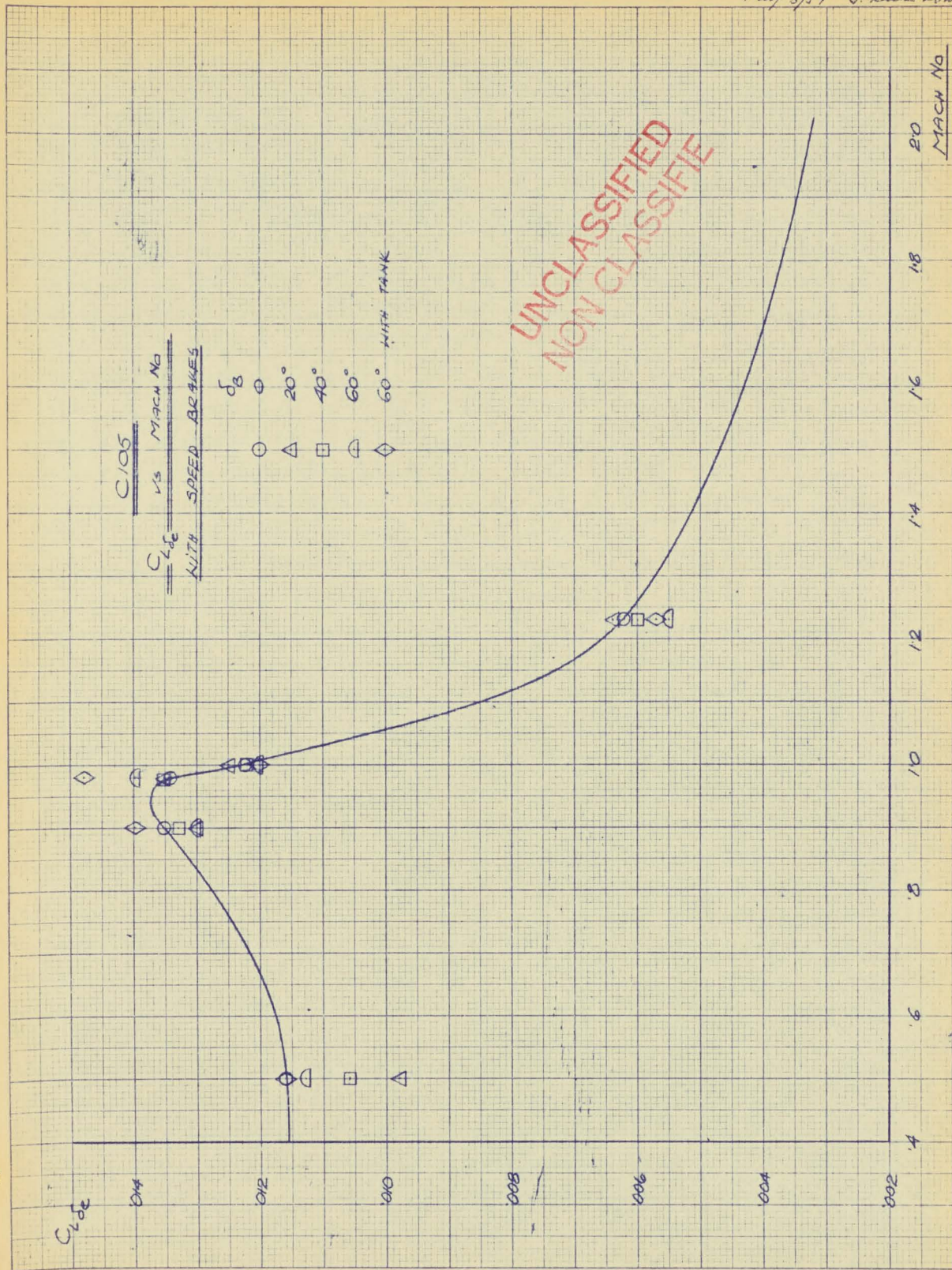


130 12 REUPTEL ESSEX 4 0
16 10 10 10 10 10 10 10
MADE IN U.S.A.

1.22.5.

P/W.T./20.

May 3/54 J. Kuznetsov



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C105

CORNELL W.T. TESTS APR. 59

C_L vs δ_e

CONF B24

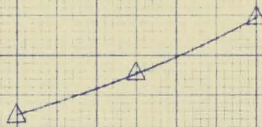
$\beta = -4^\circ$

UNCLASSIFIED
NON CLASSIFIED

MACH NO

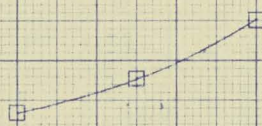
9

△



98

□



123

◇



-10°

-5°

0

AIRCRAFT
A. U. W.

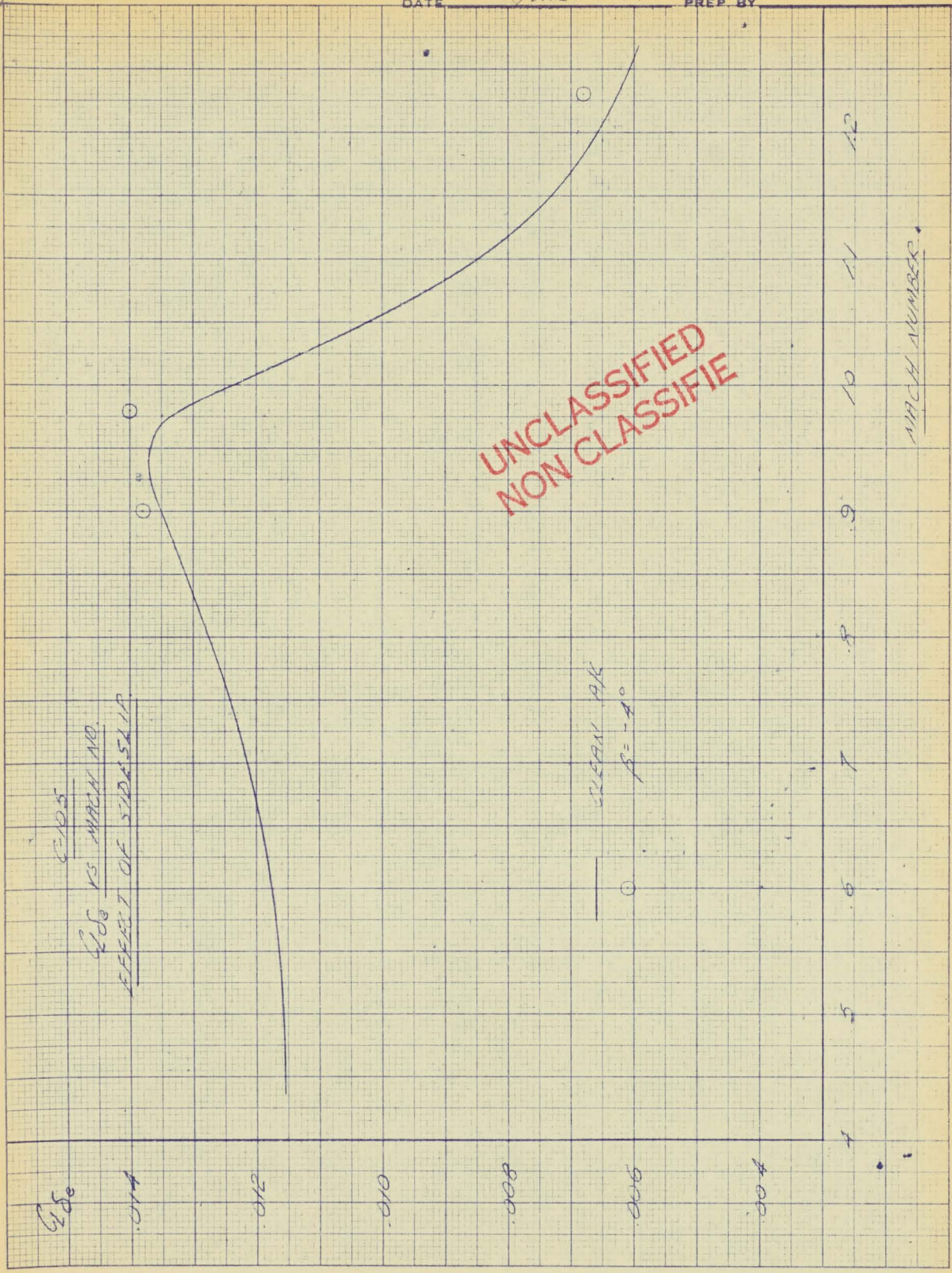
COMPONENT

SHEET No. 1232

REPORT No. P/NF/20

DATE JUNE 54

PREP BY CLARK



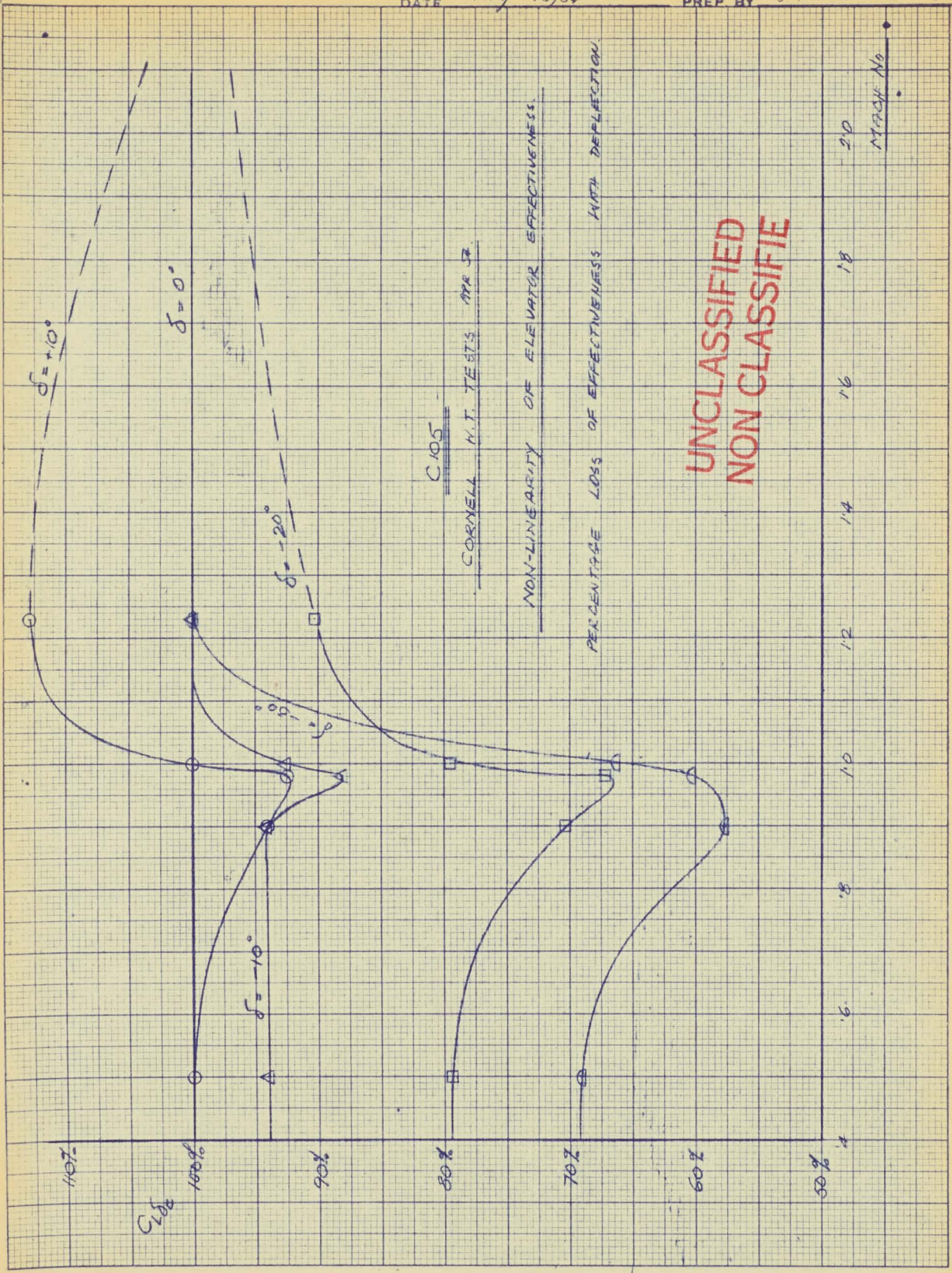
UNCLASSIFIED
NON CLASSIFIE

C-105
Q00 VS ARCH NO
EFFECT OF SIDE SLIP

CLEAN PK
 $\beta = -4^\circ$

ARCH NUMBER

5942 KLECK, A ESCUE CO
10 x 10 to 10 x 12 inch, 50 lbs weight
MADE IN U.S.A.



C105
CORNELL M.T. TESTS APR 52

NON-LINEARITY OF ELEVATOR EFFECTIVENESS
PERCENTAGE LOSS OF EFFECTIVENESS WITH DEFLECTION

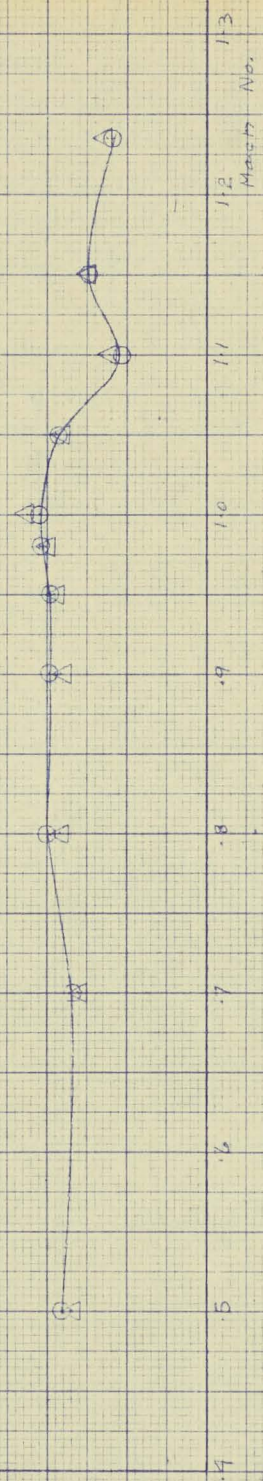
UNCLASSIFIED
NON CLASSIFIED

MACH No

10-1012-10 10 to 10 1/2 inch 50 lines around
MADE IN U.S.A.

C-105
 α_o vs. Mach No.
 Runs 466-476 No Pressure Tubes.
 Runs 271-281 with Pressure Tubes.

α_o
 +2°
 +1°



UNCLASSIFIED
 NON CLASSIFIE

15-472 KEUFER & ESSER CO.
 10 - 10 TO THE 1/2 INCH 516 THIS ACCORD
 MADE IN U.S.A.

AIRCRAFT
A. U. W.

COMPONENT

SHEET No. 1321

REPORT No. 7/11/20

DATE JUNE 54

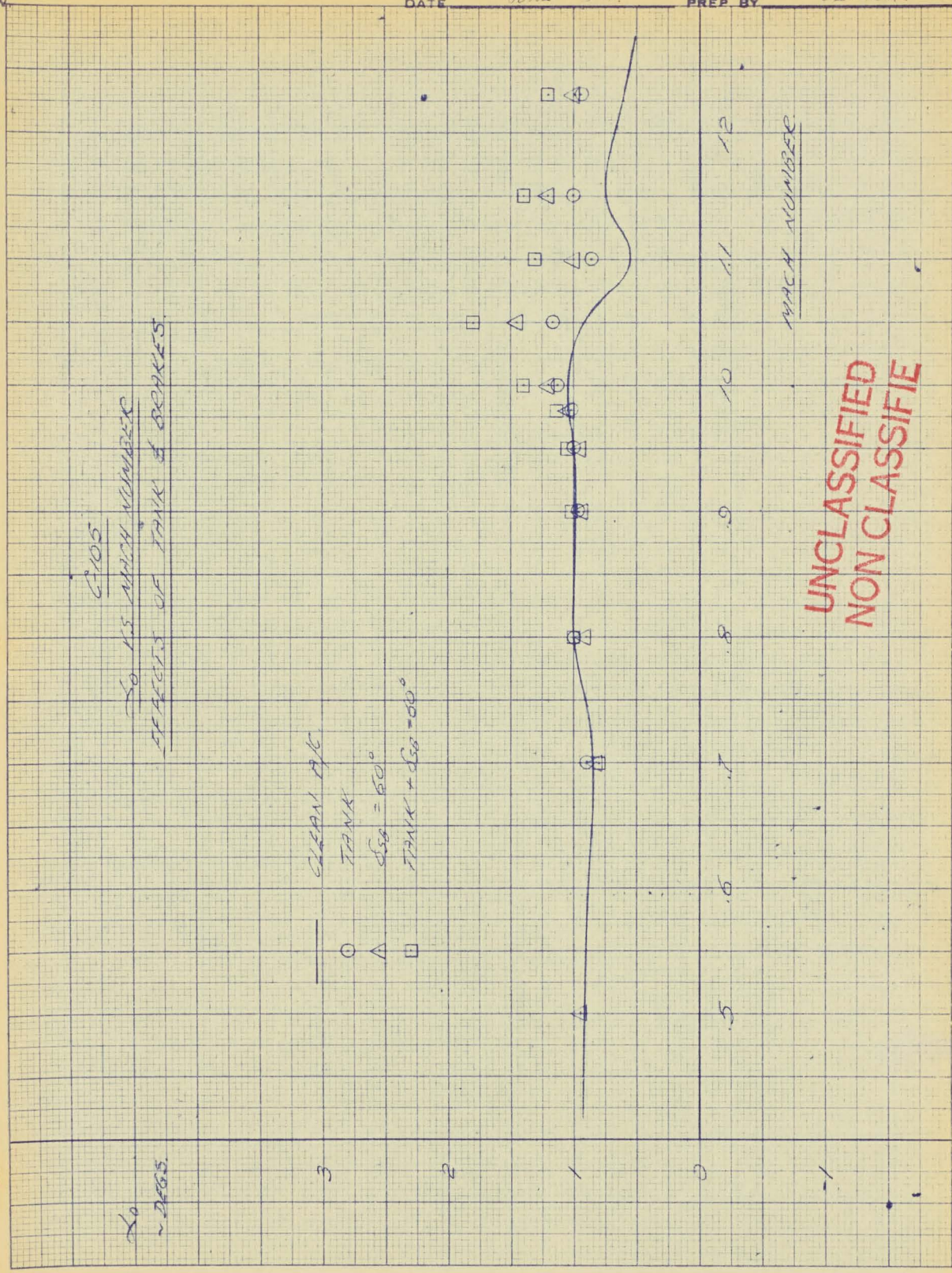
PREP BY CRANK

AS 12 KEUFFEL & ESSER CO.
16 x 10 to the 15 inch, 50 times actual.
MADE IN U.S.A.

C105
So 1.5 INCH NUMBER
EFFECTS OF TANK & BEAKS.

CLEAN O/E
TANK
 $\delta_{50} = 60^\circ$
TANK + $\delta_{50} = 60^\circ$

○
△
□



UNCLASSIFIED
NON CLASSIFIED

AIRCRAFT

COMPONENT

SHEET No. 1.33.1.

REPORT No. P/NT/20.

A. U. W.

DATE JUNE 51.

PREP BY CLARK.

2105
No. 15 WIND NO
EFFECT OF STRASLIP

CLEAN AIR
30-40

Xo
- DIFFS.

3

2

1

0

-1

5 .6 .7 .8 .9 10 11 12

MARCH NUMBER

UNCLASSIFIED
NON CLASSIFIE

5945 17-11-51
11-11-51
MADE IN U.S.A.

APRIL 1954

C. A. L. WIND TUNNEL TESTS

A.C. POS'N. vs. M

CONFIG. - BRVST.

$\delta_{SB} = 40^\circ$

A.C. POS'N
% MAC

.5

.4

.3

.2

.1

0

.5

.6

.7

.8

.9

1.0

1.1

1.2

1.3

M

UNCLASSIFIED
NON CLASSIFIE

C105
AERODYNAMIC CENTRE
EFFECT OF SIDESLIP

a.c.
% MAC

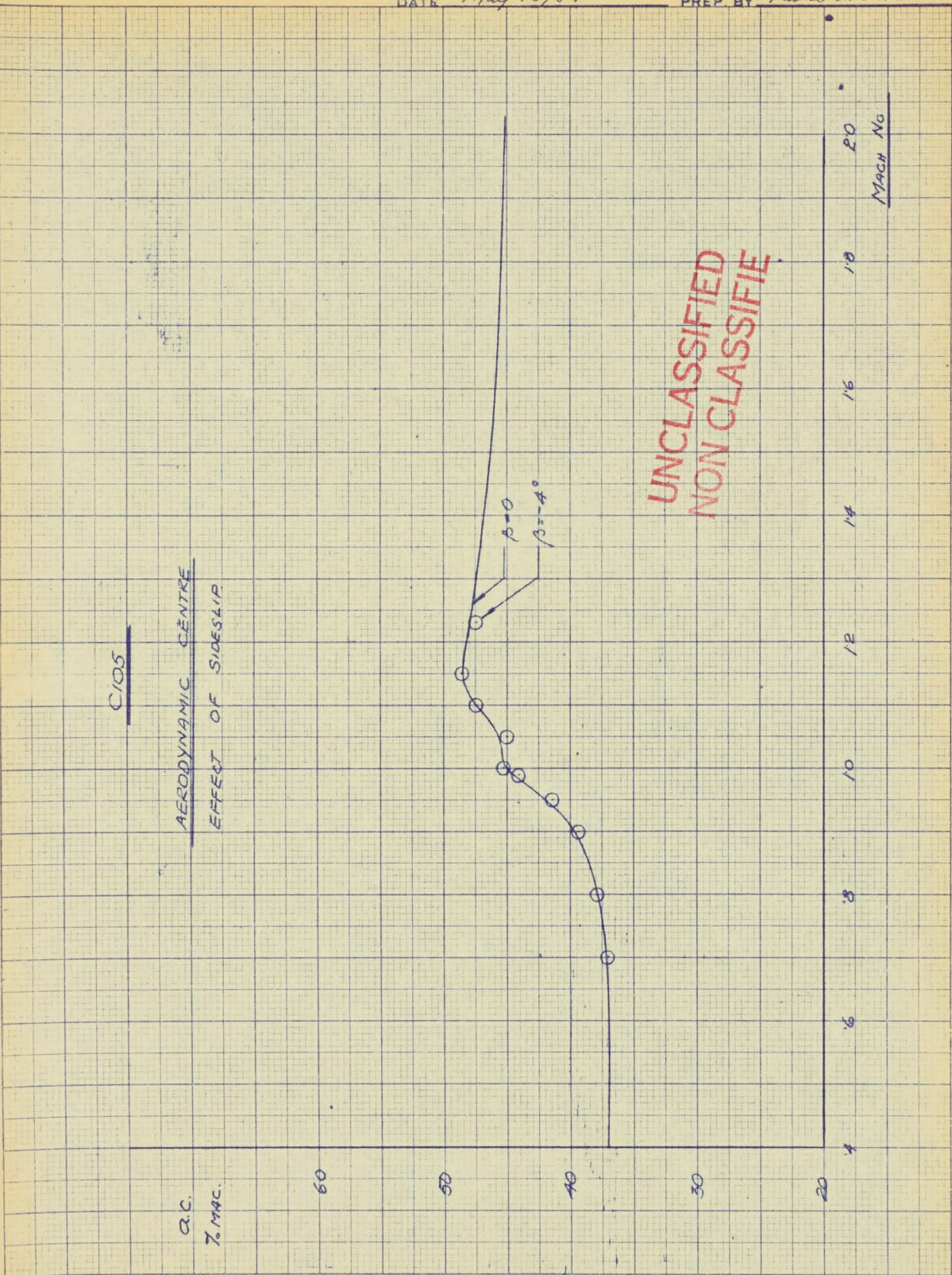
60
50
40
30
20

20
18
16
14
12
10
8
6
4

Mach No

UNCLASSIFIED
NON CLASSIFIE

$\beta = 0$
 $\beta = -4^\circ$

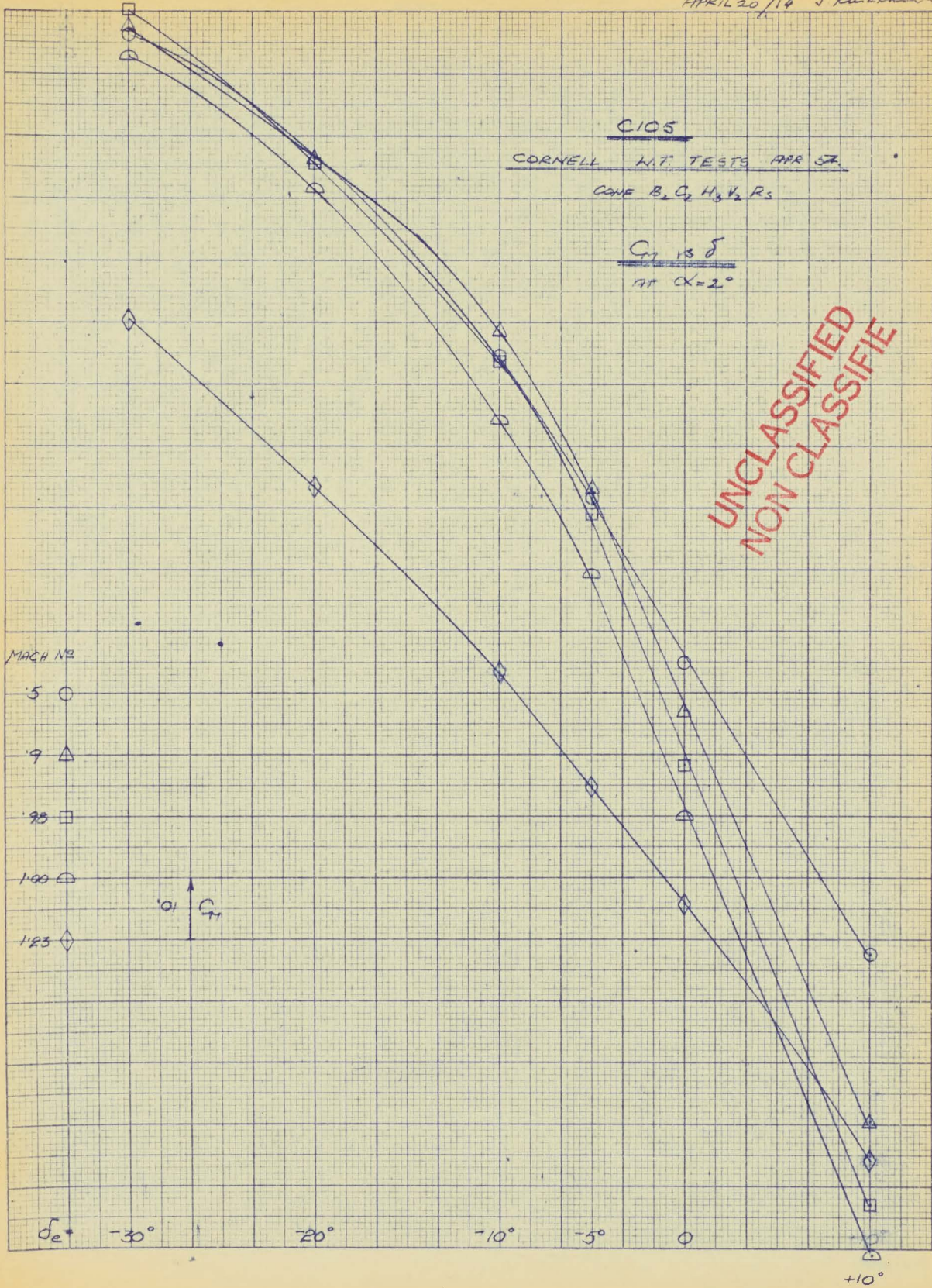


FORM 12, 10-54, KURTZ & FISHER CO.
100 x 100 to the inch, 50 lines accuracy
MADE IN U.S.A.

221.1

P/W.T./20

APRIL 20/74 J. Kowalchuk



59-12 KEMPTEL & ESSER CO.
 10 x 10 to 10 x 12 inch, 50 lines, uncoated.
 MADE IN U.S.A.

AIRCRAFT
A. U. W.

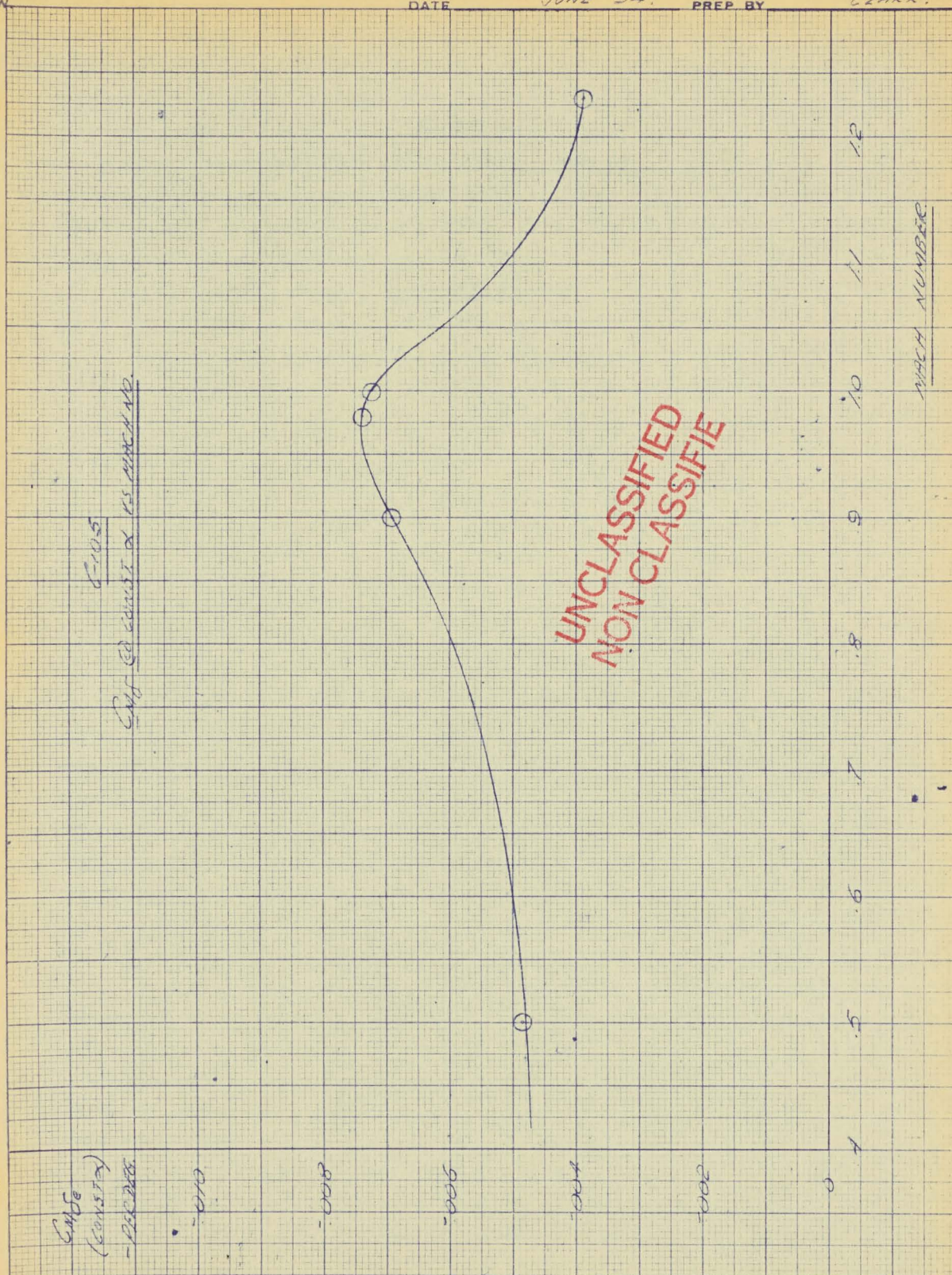
COMPONENT

SHEET No. 2.2.1.2.

REPORT No. P/W.T/20

DATE JUNE 54.

PREP BY CLARK.



UNCLASSIFIED
NON CLASSIFIED

33-12 KODAK SAFETY FILM
10 x 10 (100) SAFETY FILM
MADE IN U.S.A.

350-12 KEUFFEL & ESSER CO.
10 X 10 TO 100 X 100 inch, 5lb film acetate.
MADE IN U.S.A.

C105

CMS AT CONST. α VS MACH No
WITH SPEED BRAKES

CMS
CONST.

9478

9479

9480

9481

CLEAN 9/6

$\circ \delta_s = 60^\circ$

$\Delta \delta_s = 60^\circ$ WITH TANK

UNCLASSIFIED
NON CLASSIFIE

MACH No

4

6

8

10

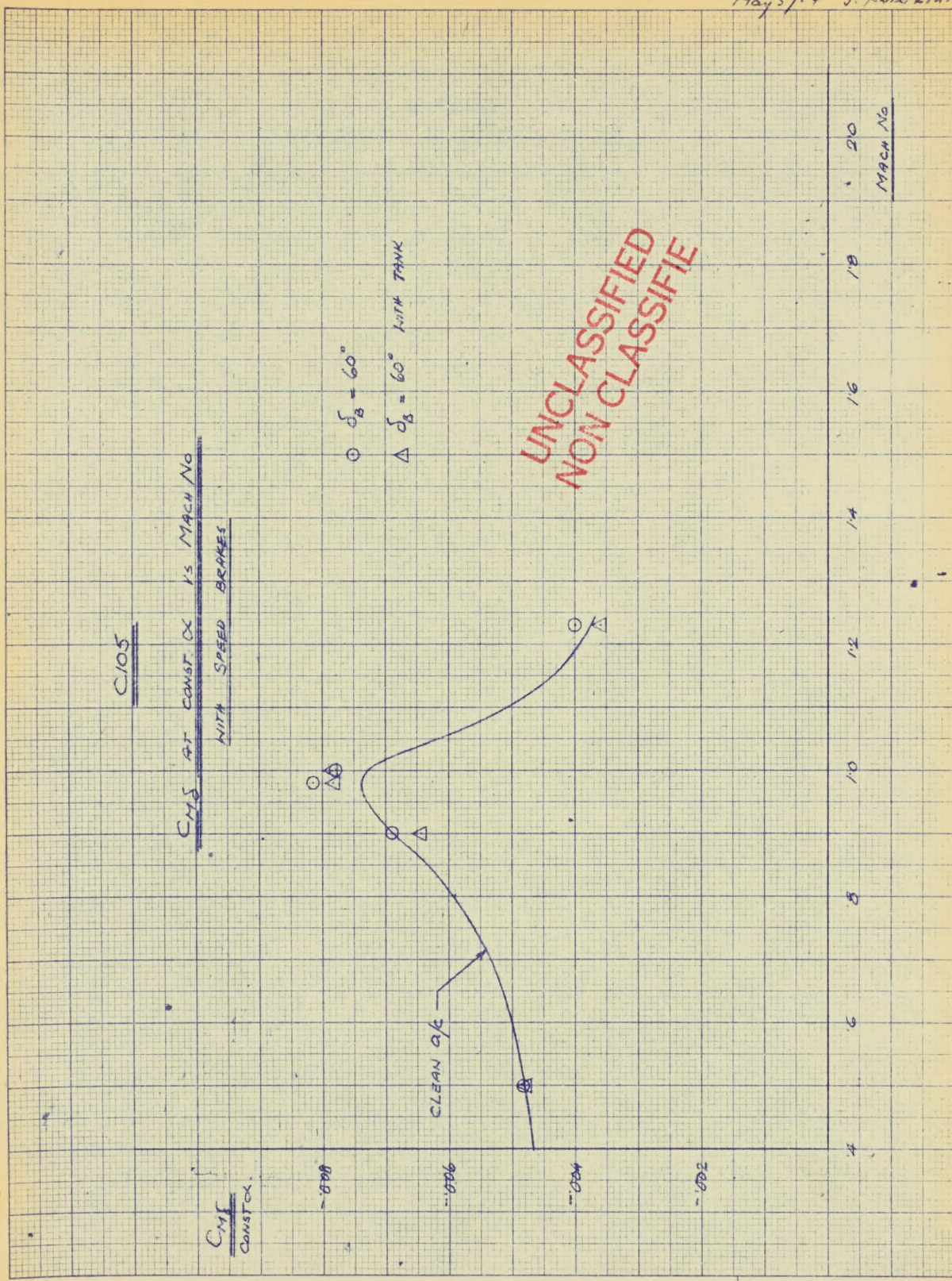
12

14

16

18

20



AIRCRAFT
A. U. W.

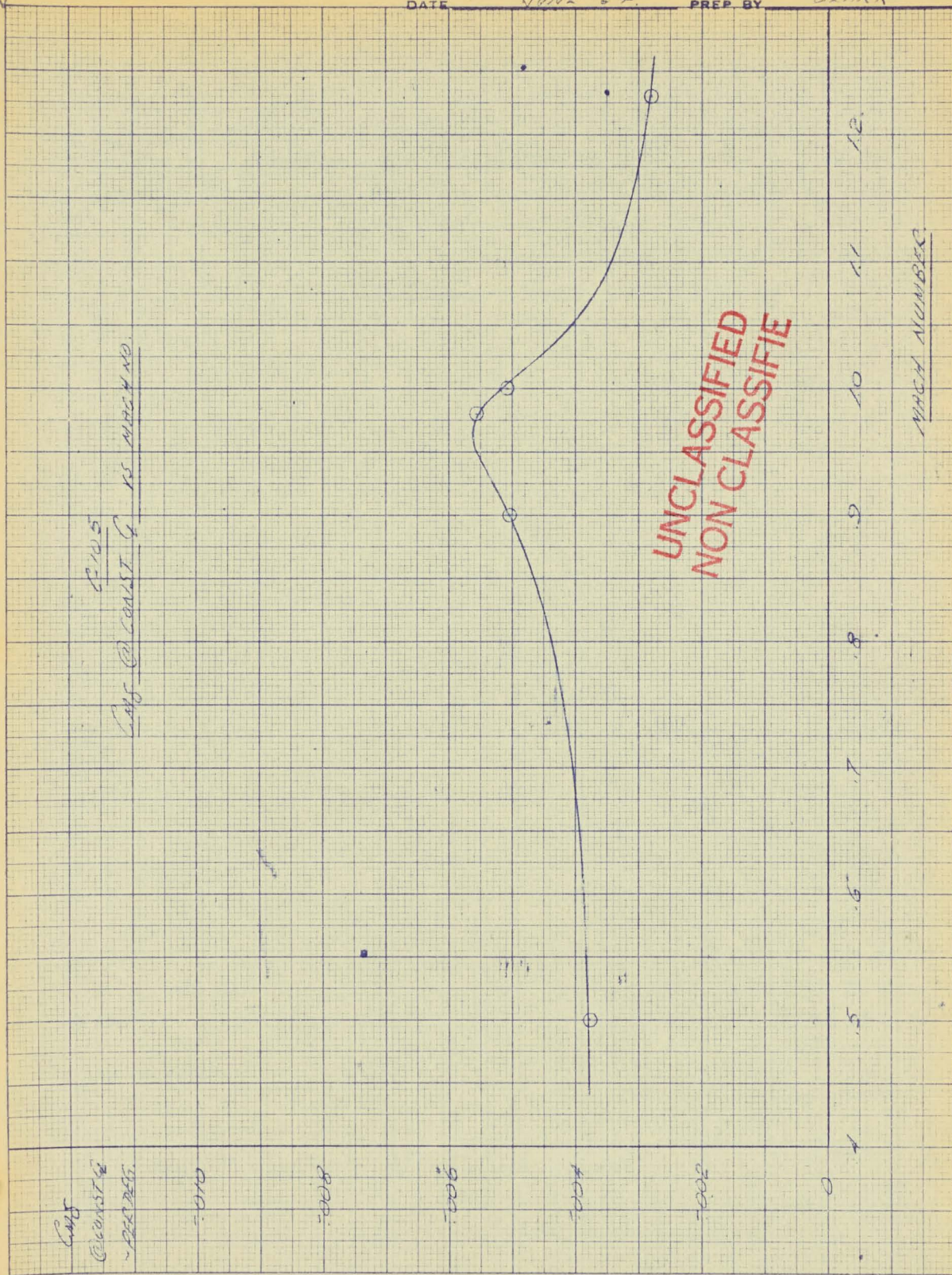
COMPONENT

SHEET No. 23.1.2

REPORT No. 21NT/20

DATE JUNE 54.

PREP BY CLARK



UNCLASSIFIED
NON CLASSIFIE

2105
CAF @ CAST G 15 MARCH 40.

CAF
CAST G
15 MARCH 40.

910-

800-

700-

600-

500-

0

MACH NUMBER

10% TO 100% REPRODUCIBLE BY THE U.S. GOVERNMENT
WHEN ORDERED FROM THE NATIONAL BUREAU OF STANDARDS
WASHINGTON, D.C. 20540

2321.

P/W.T./20

May 3/54 J. Knattorick

C105

CORNELL W.T. TESTS APR 57

CONF. BRS

$\delta_B = 60^\circ$

C_M vs δ

AT $C_L = 1$

UNCLASSIFIED
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MACH No

⊕ .5

△ .9

□ .98

⊖ 1.00

◇ 1.23

↑ C_M

δ_e

-10°

-5°

0

AIRCRAFT
A. U. W.

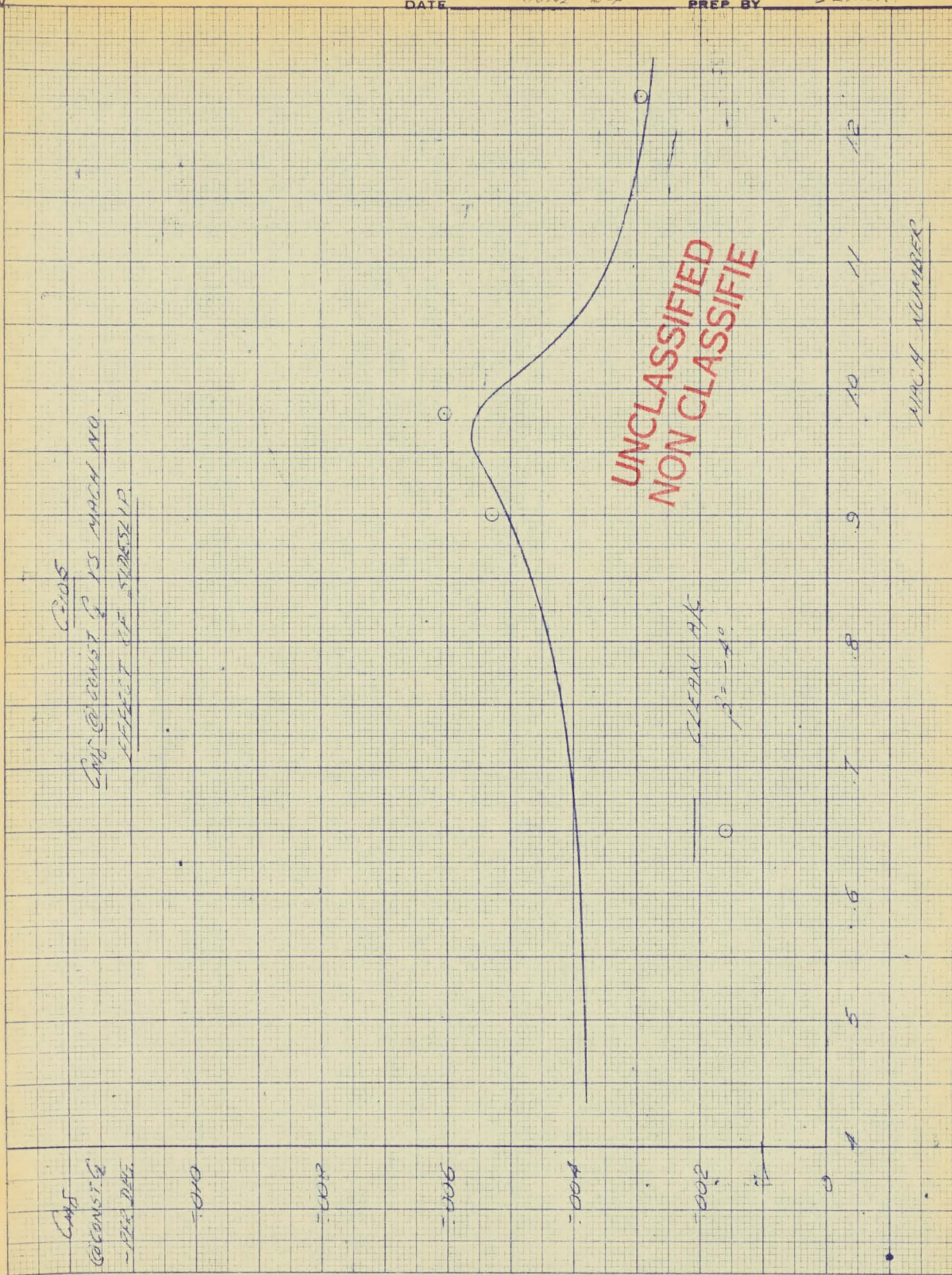
COMPONENT

SHEET No. 2332

REPORT No. P/N. 7/20

DATE JUNE 54

PREP BY CLARK



CLIFT
@ CONSTANT Q
- EFFECT OF SPEED

CLIFT
@ CONSTANT Q
- EFFECT OF SPEED

-0.40

-0.80

-1.00

-1.00

-0.02

AIRCRAFT
A. U. W.

COMPONENT

SHEET No. 2432

REPORT No. P/N/T/20

DATE JUNE 54

PREP BY CLARK

C₁₀₅
ELEVATOR CP POSITION
VS. SPEED OF STROKE

CP
VS. RATE

100

80

60

40

4

5

6

7

8

9

10

11

12

CLEAN AIR

0 β = -7 (FROM CP = RC - $\frac{C_{m0} \rho V^2}{20}$)

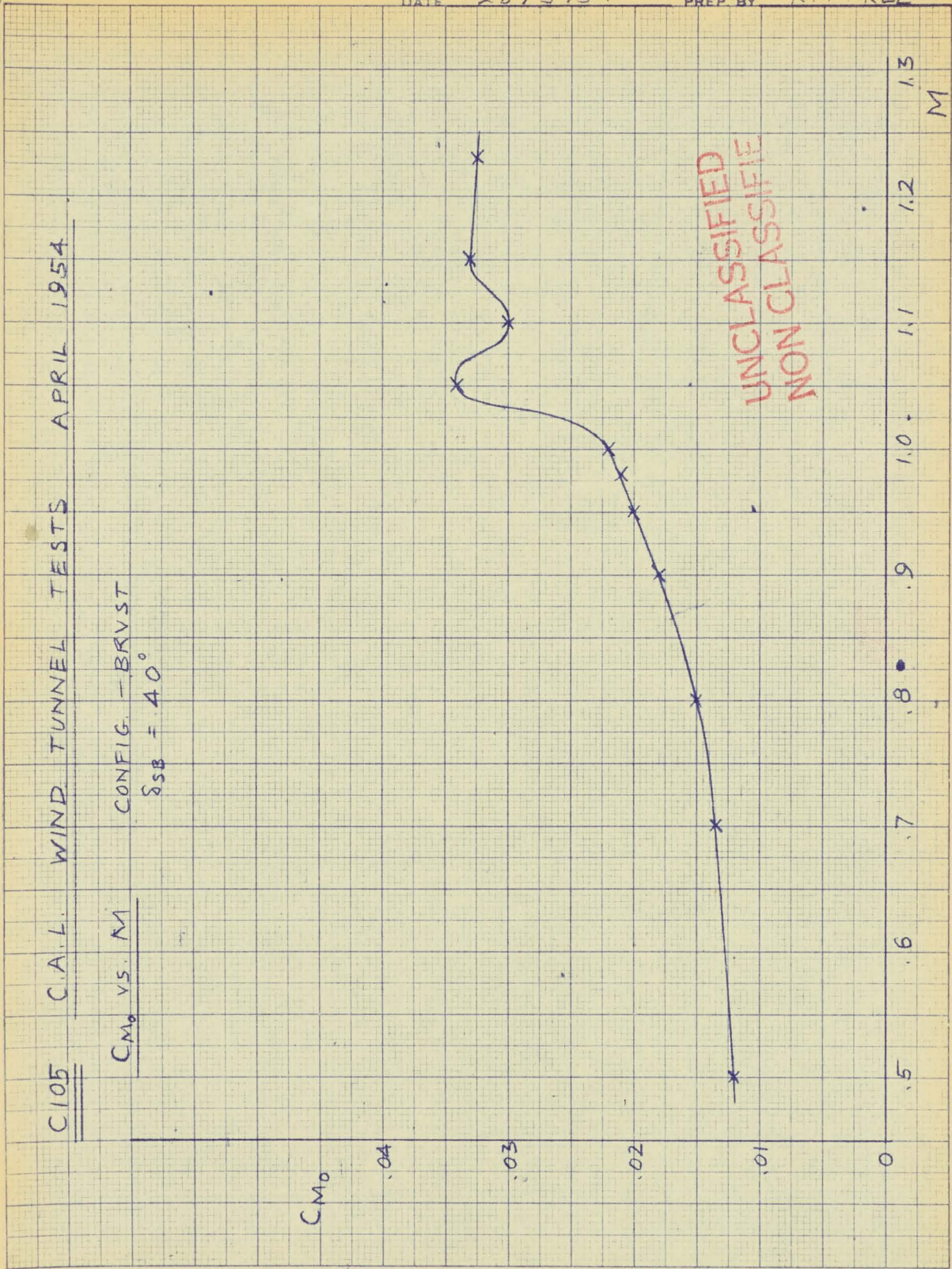
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ARCH NUMBER

C105 C.A.L. WIND TUNNEL TESTS APRIL 1954

C_{M_0} vs. M

CONFIG. - BRVST
 $\delta_{SB} = 40^\circ$



UNCLASSIFIED
NON CLASSIFIED

C105

C_{M0} vs. Mach No
AFFECT OF SIDESLIP

C_{M0}

03

02

01

0

4

6

8

10

12

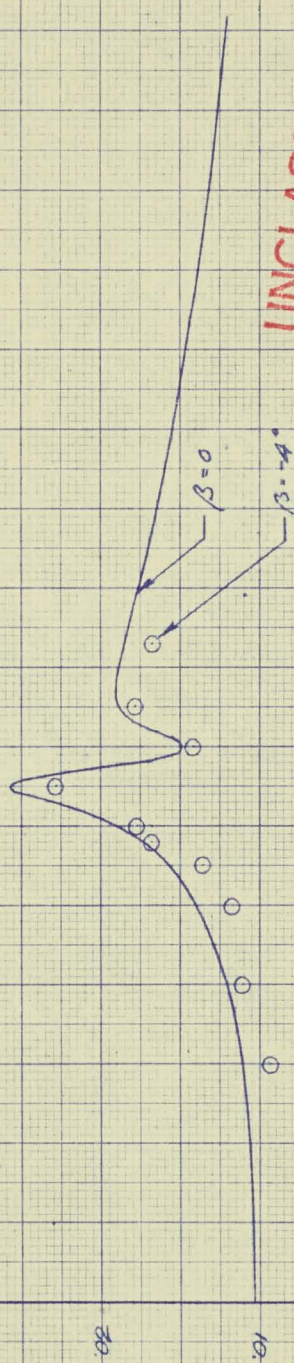
14

16

18

20

MACH No.



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C105

$\Delta \delta_{TRIM}$ FIN SPEED BRAKES.

C.G. = 20%

$M = 47000 \text{ LB}$

$\delta_{FB} = 50^\circ$

$\Delta \delta_{TRIM}$

8°

7°

6°

5°

4°

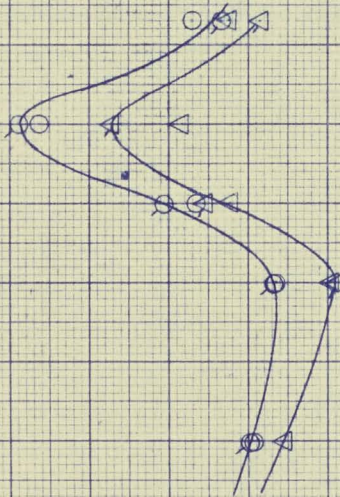
3°

2°

1°

SEA LEVEL { ○ FROM DERIVATIVES
○ FROM DIRECT PLOTS

60000 FT { △ FROM DERIVATIVES
△ FROM DIRECT PLOTS



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MACH No

2.0

1.8

1.6

1.4

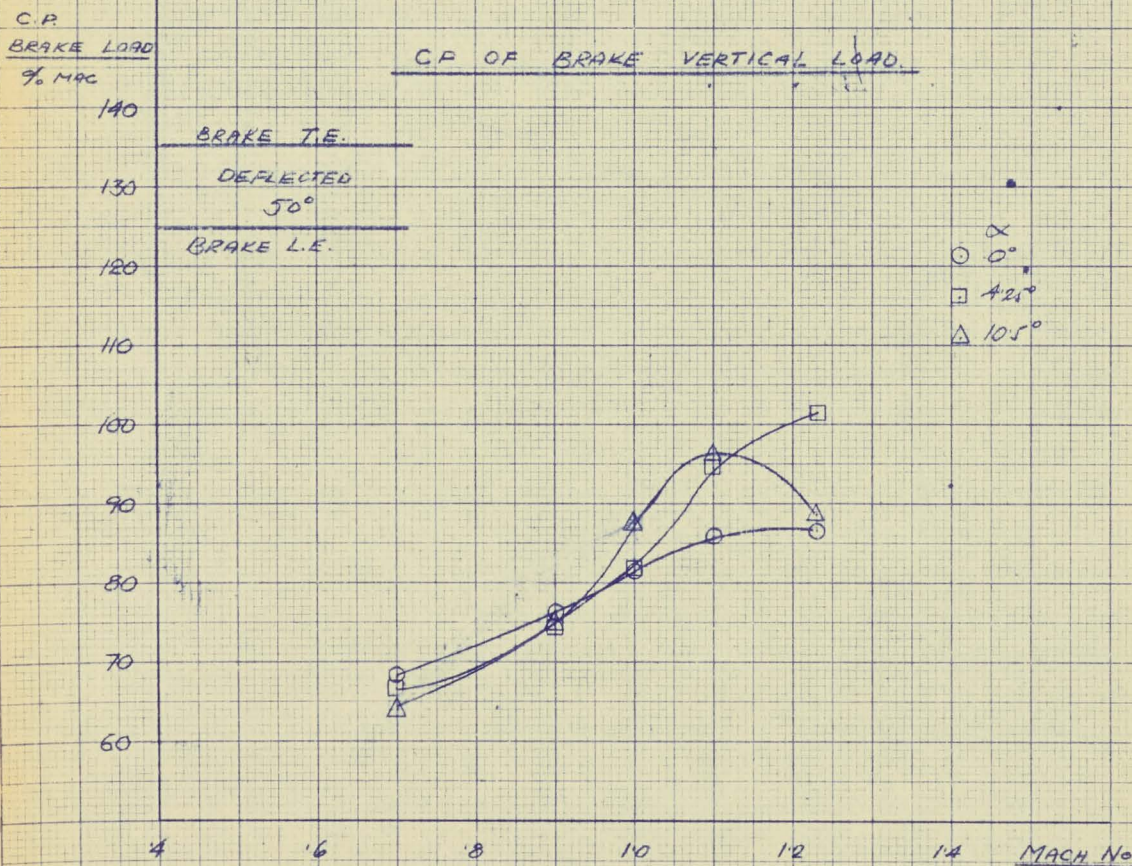
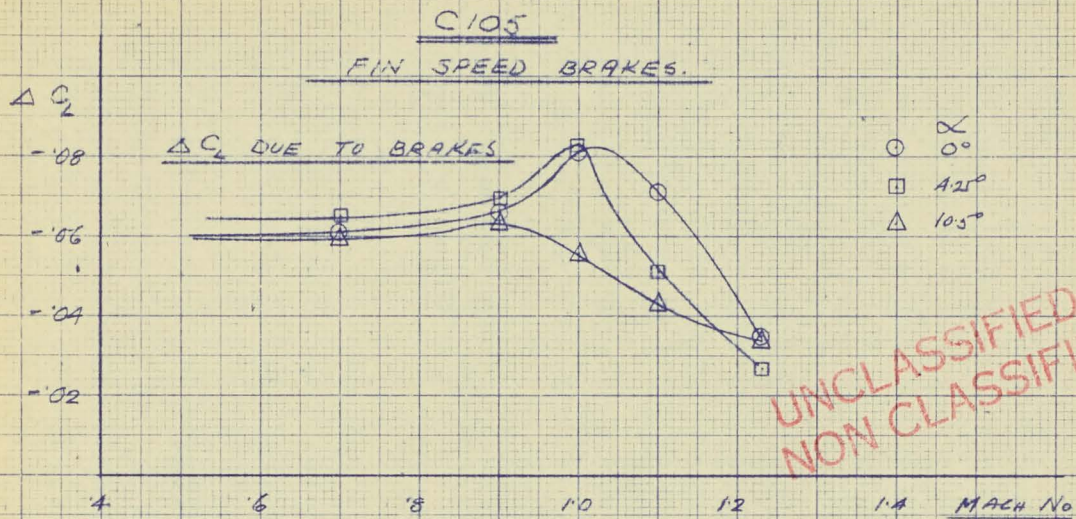
1.2

1.0

.8

.6

.4



30-12-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000

AIRCRAFT C105
A. U. W.

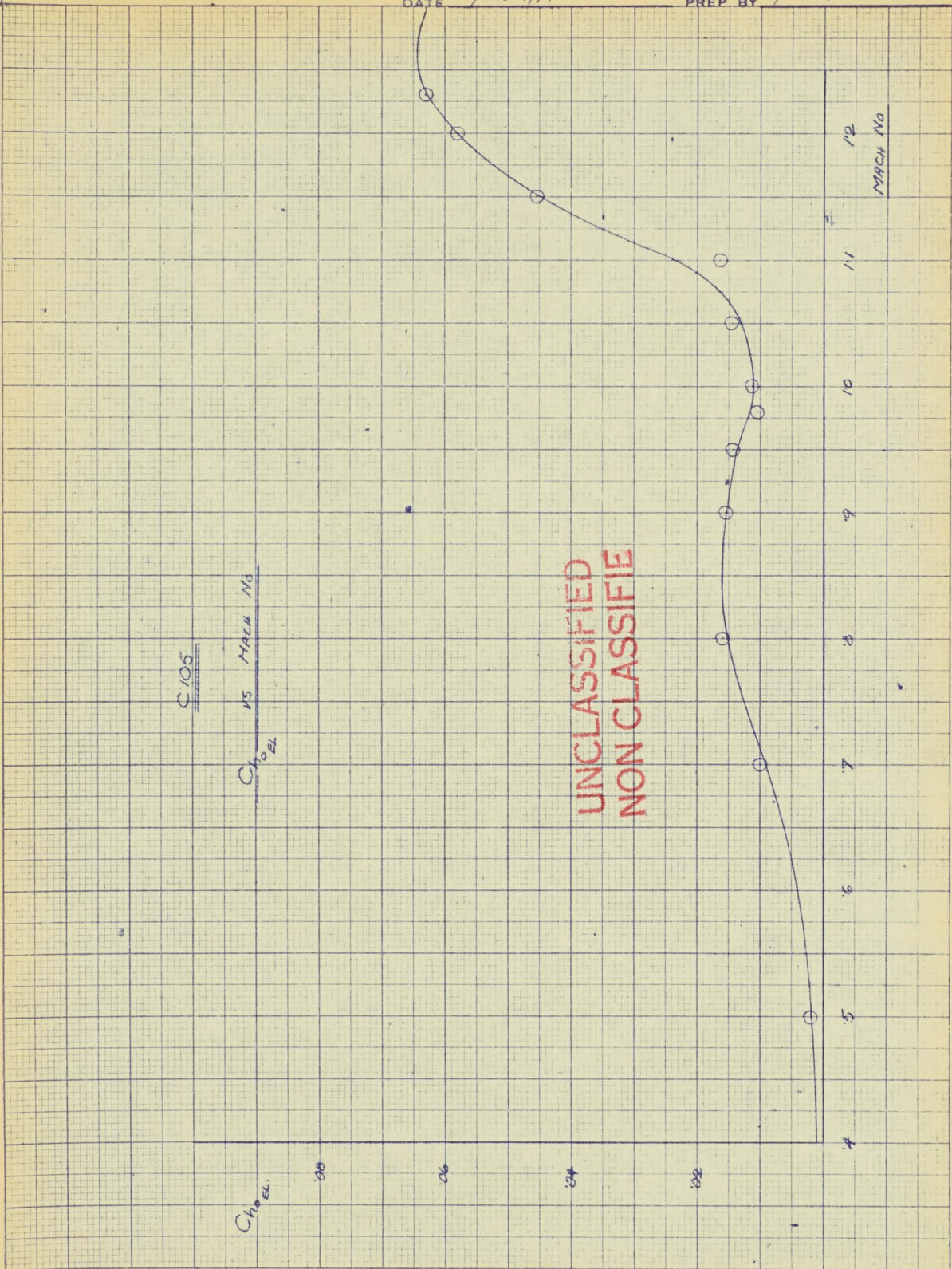
COMPONENT

SHEET NO. 31.1.1.

REPORT NO. P/4.T/20

DATE June 9/14

PREP BY [Signature]



159-12 KEUFFEL & ESSER CO.
10 x 10 to 100 x 12 inch, 50 lines accurate.
MADE IN U.S.A.

UNCLASSIFIED
NON CLASSIFIED

① - $\delta_B = 60^\circ$

C105

C_{D0} ELEVATOR
WITH SPEED BRAKES

C_{D0} EL.

.08

.06

.04

.02

6

8

10

12

14

16

18

20

MARCH No

CLEAN A/C

AIRCRAFT C105
A. U. W.

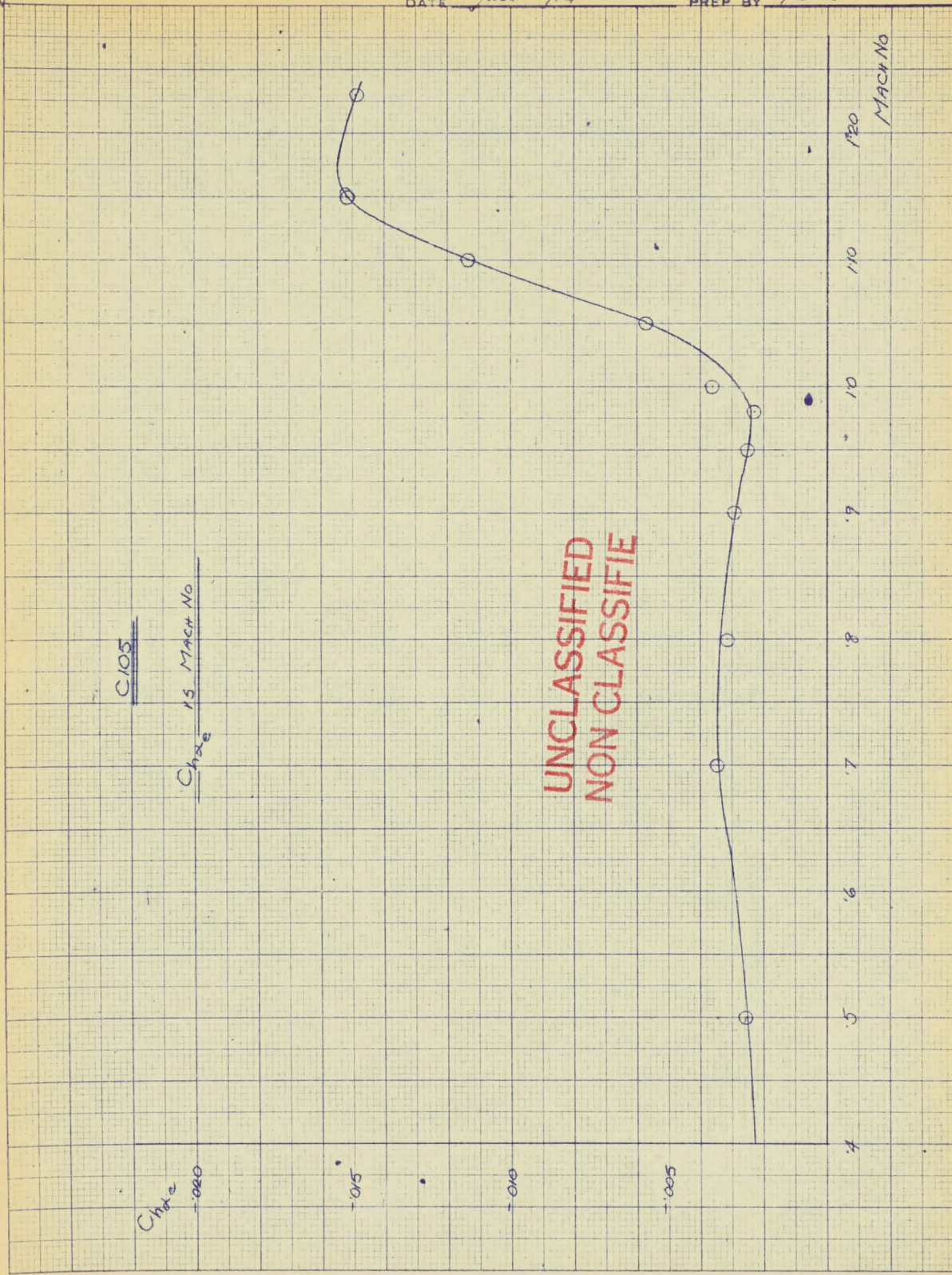
COMPONENT

SHEET No. 3.2.1.1.

REPORT No. P/H.T./20

DATE June 9/74

PREP BY Knauth



C105

Chord vs Mach No

Chord
0.020

0.015

0.010

0.005

FORM 1746 REUFFEL & ERBER CO
10 x 10 to the 1/2 inch grid lines assembly
MADE IN U.S.A.

C105
 CORNELL W.T. TESTS APR 57
 NON-LINEARITY OF ELEVATOR HINGE MOMENT

Choke
 Choke/

40
 30
 20
 10

4

6

8

100

12

14

16

18

20

MACH No

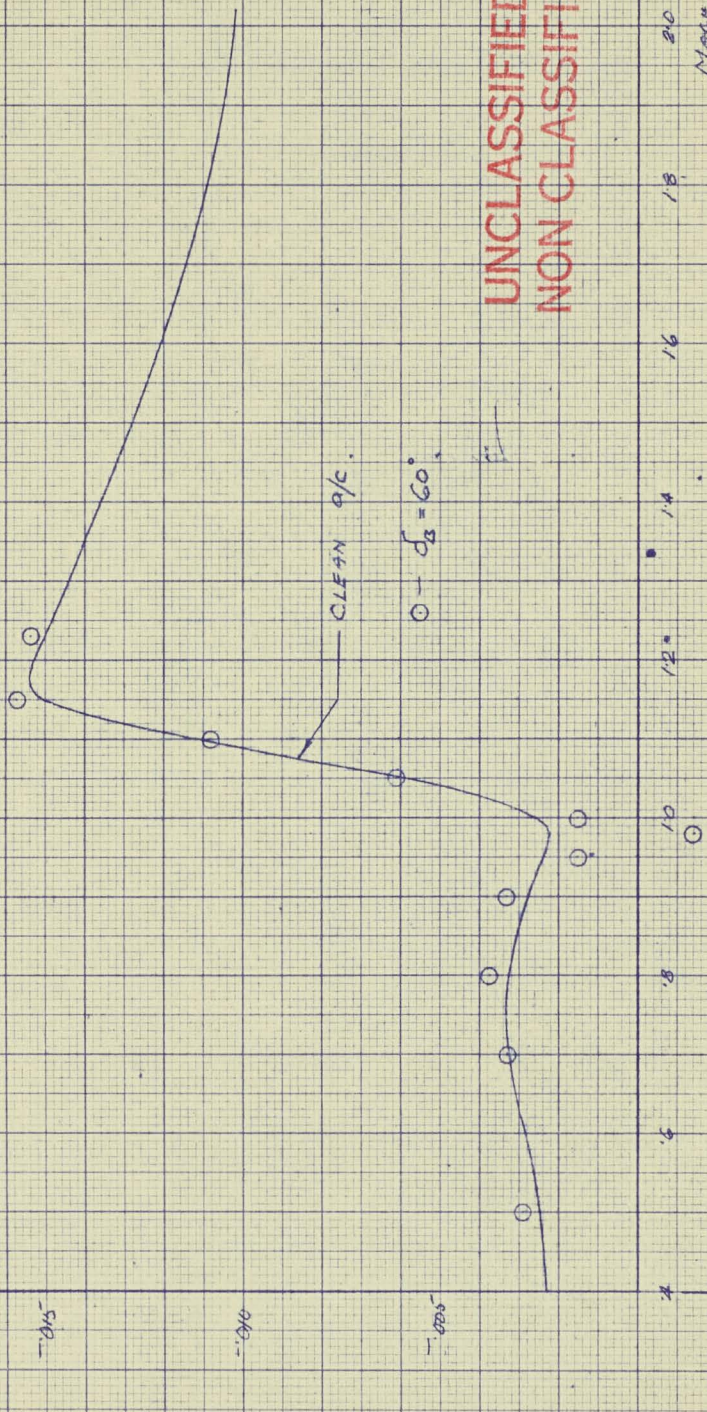
UNCLASSIFIED
 NON CLASSIFIED

$\alpha = 12^\circ$
 $\alpha = 20^\circ$
 $\alpha = 16^\circ$

35472 KEUTEEL & ESSER CO.
 10 x 10 to the 1/2 inch, 5/16 lines, accented.
 MADE IN U.S.A.

C105

CLAX ELEVATOR
WITH SPEED BRAKES.



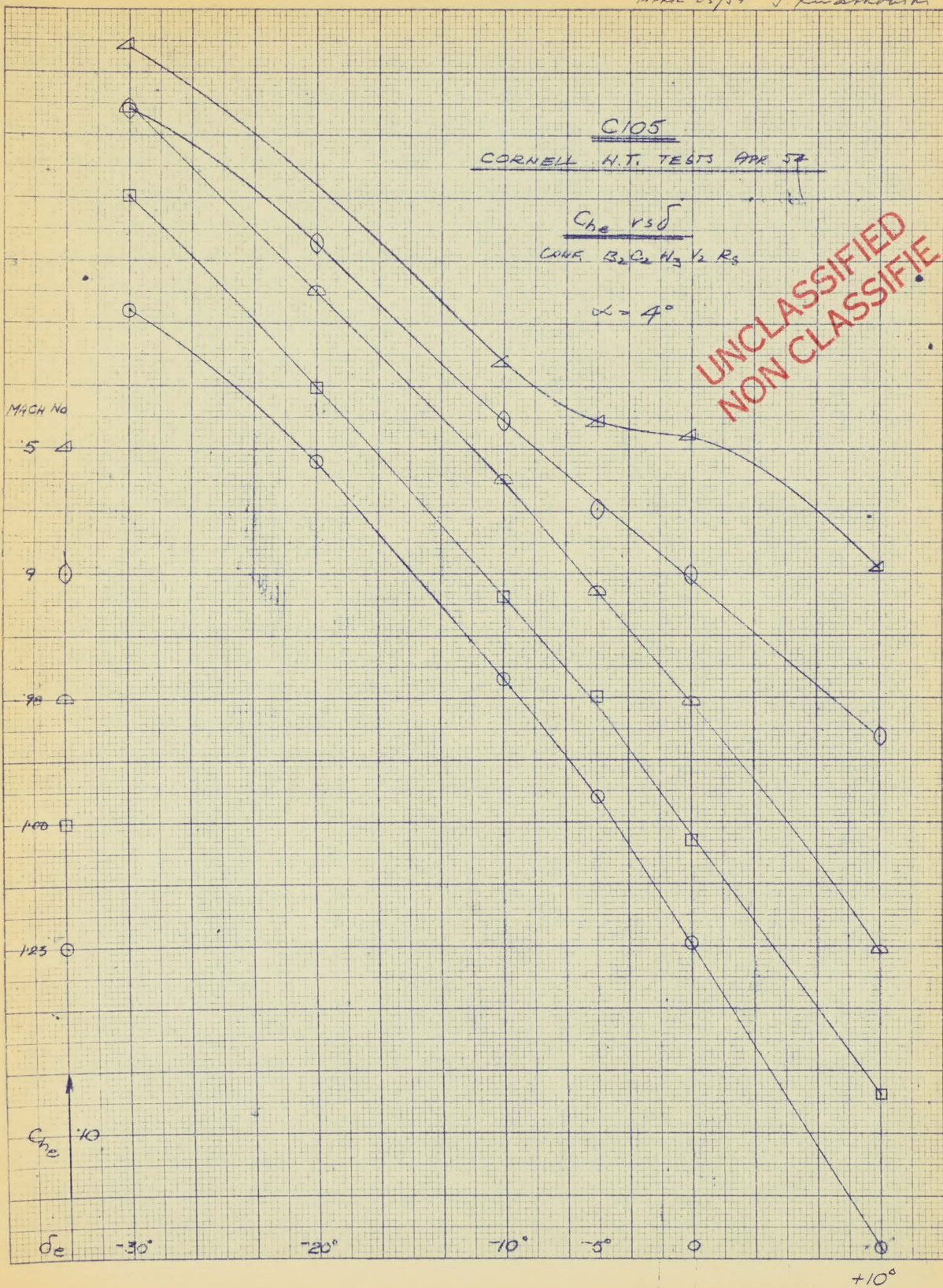
UNCLASSIFIED
NON CLASSIFIE

Mach No

3.3.13.

P/H.T./20

APRIL 23/54 J. Kniatkowski



UNCLASSIFIED
NON CLASSIFIE

AIRCRAFT C105
A. U. W.

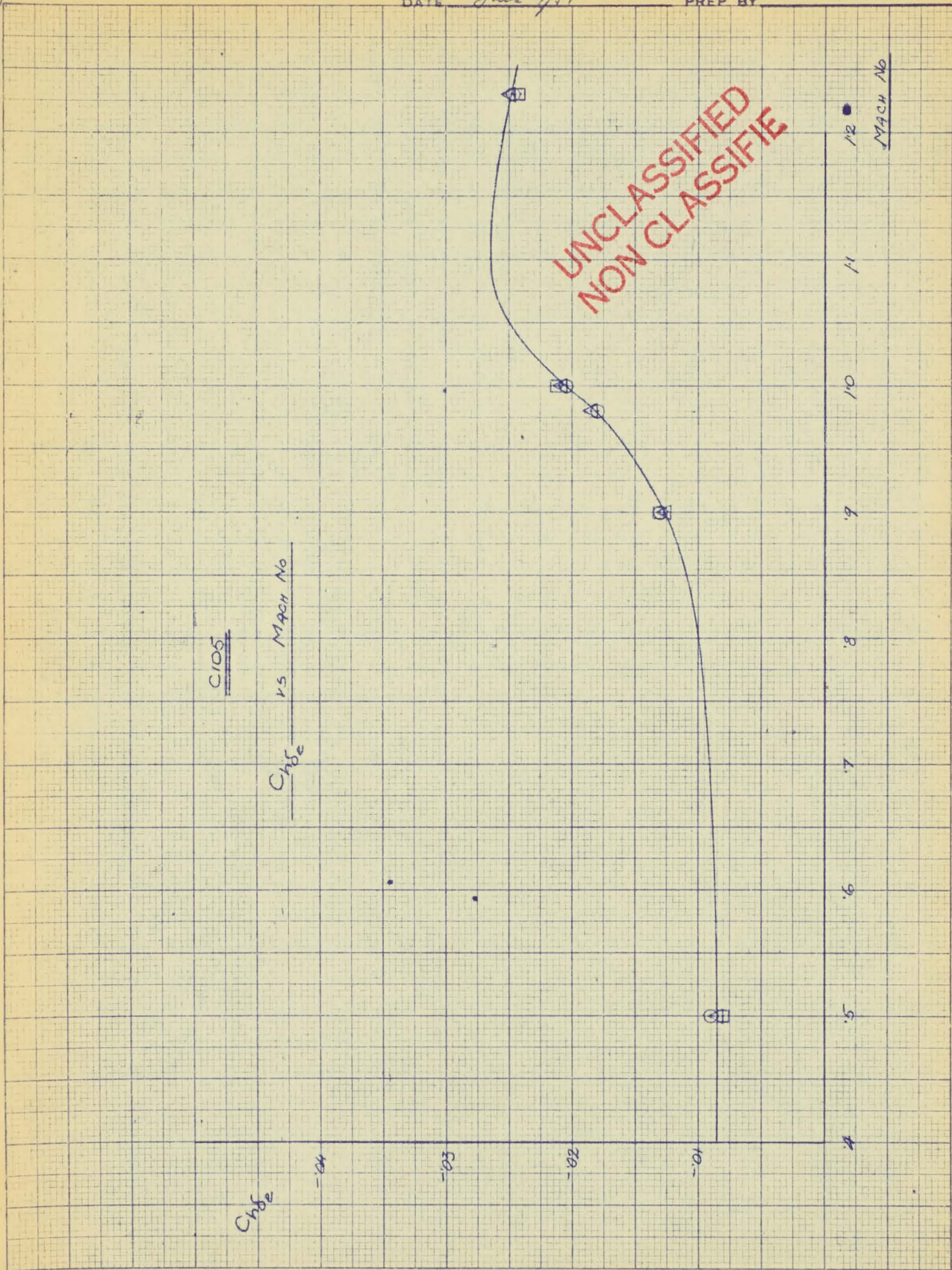
COMPONENT

SHEET NO. 3314

REPORT NO. P/W.T./20

DATE June 9/54

PREP BY K. A. Blonstein



UNCLASSIFIED
NON CLASSIFIE

C105

vs Mach No

C_{105}

C_{105}

-04

-03

-02

-01

4

5

6

7

8

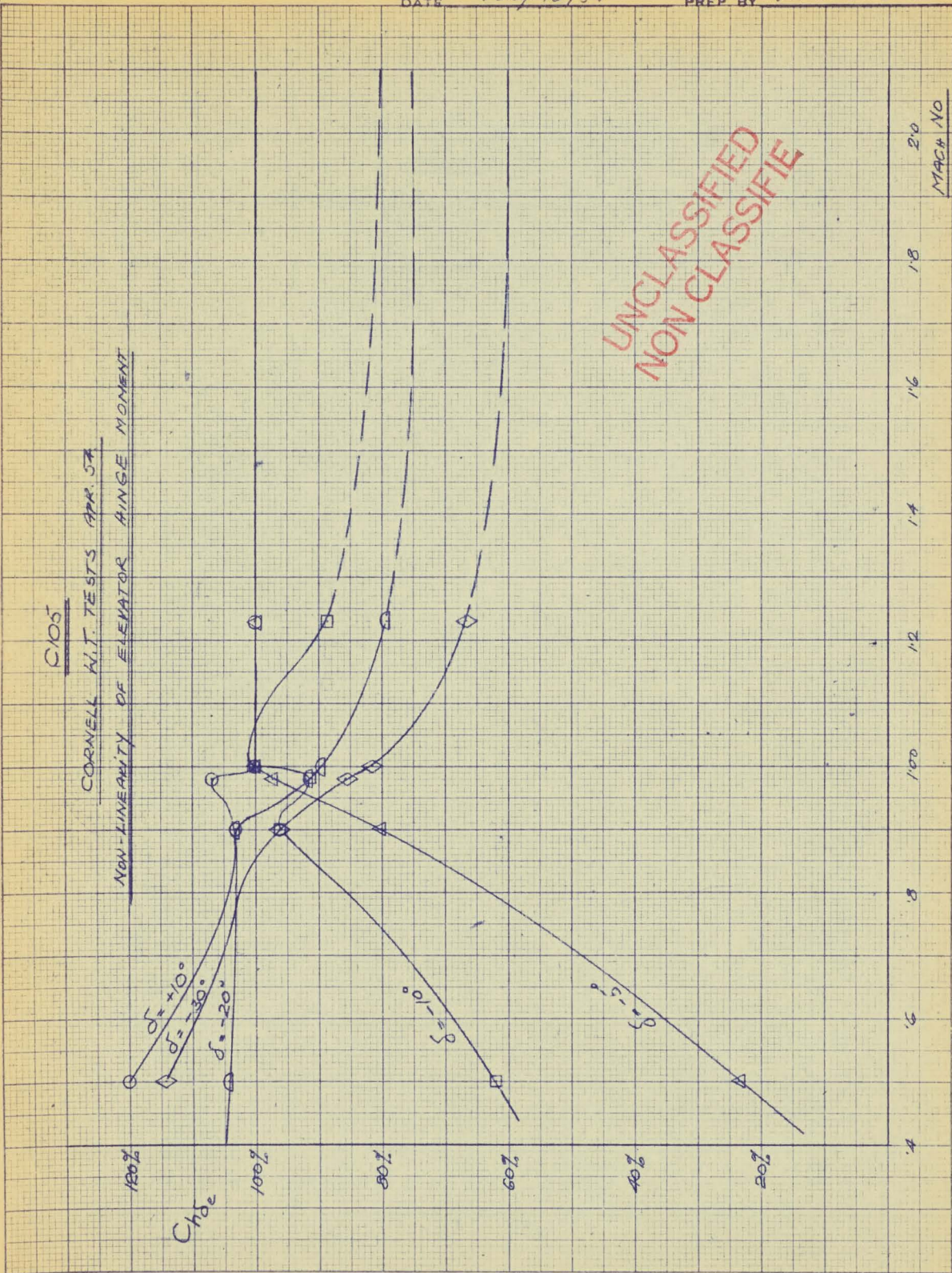
9

10

11

12

Mach No



UNCLASSIFIED
NON CLASSIFIE

MAC# NO
2.0

1.8

1.6

1.4

1.2

1.00

0.8

0.6

0.4

C-105
CORNELL W.T. TESTS APR. 57.
 CONF. BRS
 C_{he} vs δ
 $\alpha = 2^\circ$
 $\delta_2 = 60^\circ$

UNCLASSIFIED
 NON CLASSIFIED

MACH No

6 Δ

9 \circ

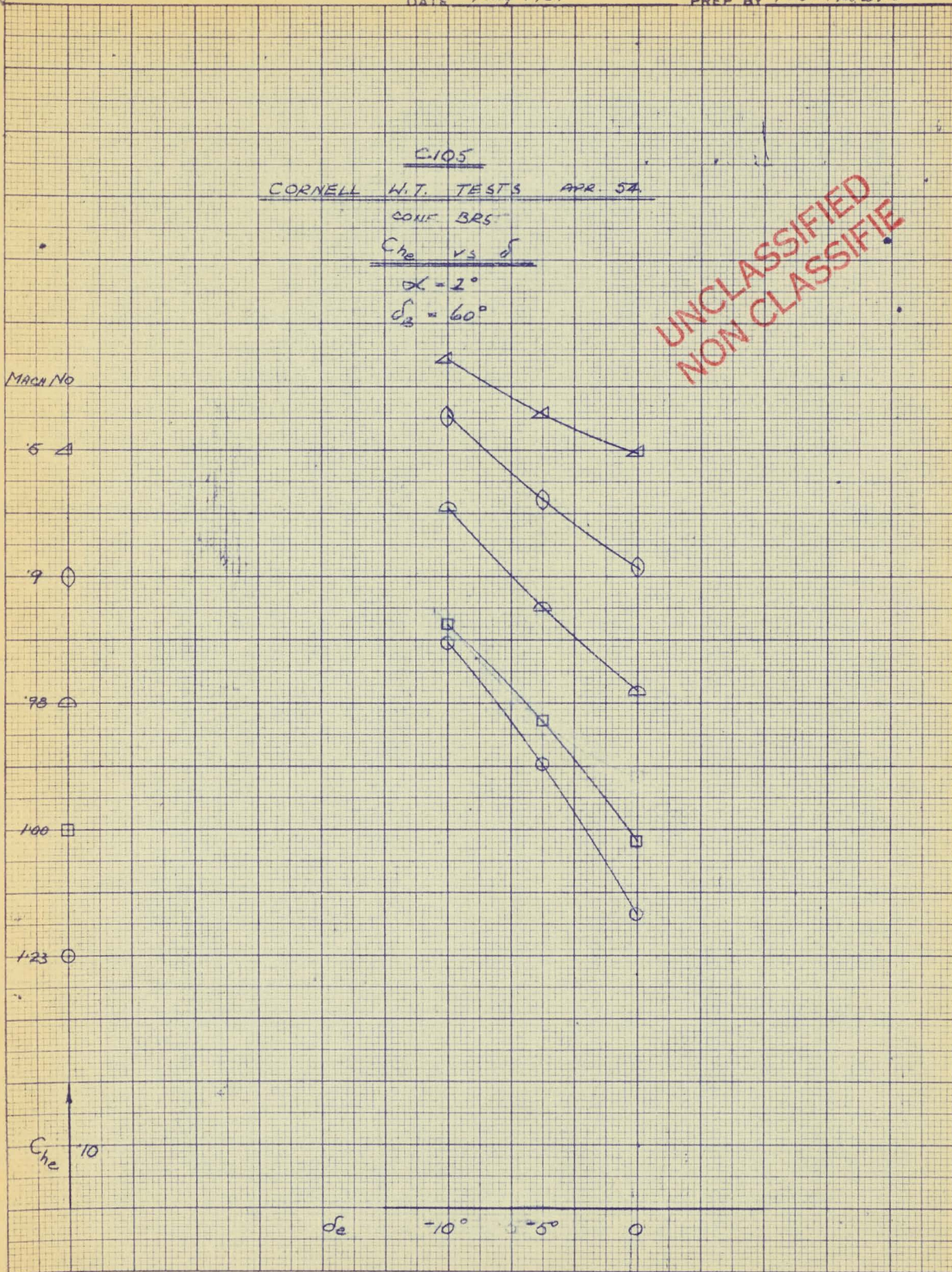
98 \triangle

100 \square

123 \oplus

C_{he} 10

δ_e -10° 5° 0



100% REPRODUCIBLE BY RAND CORP.
 1010 THE UNIVERSITY MICROFILMS
 SERIALS ACQUISITION DEPARTMENT
 ANN ARBOR, MICHIGAN 48106

