LIGHT SHIP SWBS WEIGHT GROUP STUDY REPORT

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REPRODUCED AT GOVERNMENT EXPENSE

Introduction

A study was undertaken to examine the relationships between three digit SWBS weight groups in groups 2, 3, 5, and 6, and various characteristics of a ship displacing less than 3600 tons. Of particular interest, was a comparison of real ship data (i.e., data obtained from ships already built, already under construction, or of sufficiently detailed design as to make their weight reports reliable) to the algorithmns currently being used in the SESDOC program to predict group weights.

Background

The eleven ships used as the database for this study are shown in Table 1. These ships range from the 135 LT SES-110 to the 3585 LT FFG-7 (Olive Hazard Perry). With the exception of the SES-110, all of the ships are combatants and all except the 3KSES and PCM have been built. The PCG-612 is a ship which was built specifically for the Royal Saudi Naval Forces. The PG-92, FF1049, FF1059, and PF-103 are all older ships which have not benefitted from the latest in lightweight materials and technology. However, they were still considered useful for this study.

Two basic types of plots were created using these ship's data; SWBS group weight vs. ship displacement and SWBS group weight vs. the SESDOC algorithmn's driving variable (see Table II). Only a few of the SESDOC algorithmns were plotted since there was limited information readily available on SESDOC variables such as ship volume, complement breakdown (number of CPO's, etc.), and installed kW.

Plot Description

In the plots which follow, a set of symbols is used to indicate the data points which belong to each ship. These are shown in Table I along with the displacement of each ship.

The plots of Section I show the algorithmns from SESDOC (indicated by the dashed lines) and the corresponding points from the database. These plots compare data obtained from SESDOC with "real world" ship's data.

Section II plots contain curves which were drawn to represent a reasonable approximation of real data. These are not arithmetic curve fits. They were included only to indicate the trend the data appears to follow.

Section III contains those plots which were originally intended for Section II, but could not be used. These plots either contained too little data or too scattered data to be able to determine a trend.

Problems Encountered

A major problem in collection of data involved older ships data being recorded in the old BSCI weight groups. The BSCI groups were more general than the current SWBS weight groups, so one BSCI group might encompass as many as eleven SWBS groups. There being no way to break the BSCI group down into SWBS groups, plots of the BSCI groups were made using the older BSCI data and the appropriate combinations of SWBS data (see sections II and III). While this is not directly comparable to the SESDOC algorithmns, they can still provide information as to the trends of group combinations.

Obtaining data on ship volumes also proved to be difficult. The NAVSEA technical data bank did not contain volume data. Most of the data obtained was gotten from individuals in SEA 501 who happened to have reports with the needed infomation. It was suggested that the Arrangements Branch (SEA 55W1) might have volume information available, but there was not sufficient time during the course of this study to find out. Any future investigation should check this source.

Conclusions and Recommendations

With the data collected thus far, it appears that the vast majority of the SESDOC algorithmns are valid approximations of SWBS group weights. A few are somewhat optimistic (Group W583, for example), but generally the algorithmns are, if anything, conservative estimates (see Group W651).

A great deal more study should be done to refine the algorithmns even though they look quite good now. With only eleven ships in the database and a great lack of other data (volumes, etc.), this study has only begun the work needed to document SESDOC's accuracy or determine other useful algorithmns. With proper documentation and refinement, the SESDOC algorithmns could prove to be an invaluable design tool.

TABLE 1 - Ship Indicator Symbols and Displacements

SHIP	SYMBOL	DISPLACEMENT
SES-110	△	135
PCG-612	□	680
3KSES	○	3021
PCM	▽	560
PHM-1	⌂	231
PHM-3	◇	231
PG-92	⌂	242
FF-1059	▽	2931
FF-1049	▽	2511
PF-103	▷	1106
FFG-7	◁	3585

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AGEH-1 = H1
PCH-1 = H2
PHM-1 = H3
JEFF A = H4
ROHR 10/76 = H5
BELL 5/75 = H6
BELL 3/76 = H7
MXSES = H8
SES 100A = H9
LSES = H10
LOCK 2K = H11
PGH 2 = H12

DLG 26 = D1
DLGN 35 = D2
DE 1057 = D3
DLGN 38 = D4

PF 105 = P1
PGM 94 = P2
PCG 612 = P3
PGG 511 = P4

FFG 7 = F1

CVN 67 = C1
CVN 68/69 = C2

LPH 12 = L1
LHA 4 = L2
LST 1179 = L3
LSD 37 = L4
LPD 13 = L5
LCU 1646 = L6
LKA 117 = L7

TAGOR 16 = A1
AE 35 = A2
AS 40 = A3
AD 37 = A4

VOLUME $\times 10^{-6}$

TABLE 2 - SESDOC Equations For Weight

SWBS GROUP	SESDOC EQUATION
331	= 0.00739 VOLA
332	= 0.02678 COMP
511	= 0.02 COMP
512	= 0.028 COMP
513	= 0.075 VSH
514	= 0.4 + 0.025 VOLA + 0.07 COMP
531	= 0.036 $COMP^{1.1045}$
533	= 0.03077 COMP
556	= 1 + 0.025 VOLA
581	= 0.0085 VOLA
582	= 0.00001 VOLA
583	= 0.015 COMP
593	= 0.04 VOLA
622	= 0.0134 VOLA
625	= 0.60 + 0.00001 VLSS
635	= 0.036 VOLA
637	= 0.018 VOLA
641	= 0.32 NOFF
644	= 0.01444 COMP
651	= 0.085 COMP
652	= 0.0075 COMP
664	= 0.022 VOLA
671	= 0.024 VOLA

VOLA = SHIP VOLUME (ft^3/1000)

COMP = COMPLEMENT

VSH = VOLUME OF SIDEHULLS (ft^3/1000)

VLSS = VOLUME OF SUPERSTRUCTURE (ft^3/1000)

NOFF = NUMBER OF OFFICERS

REPRODUCED AT GOVT EXPENSE

REFERENCES

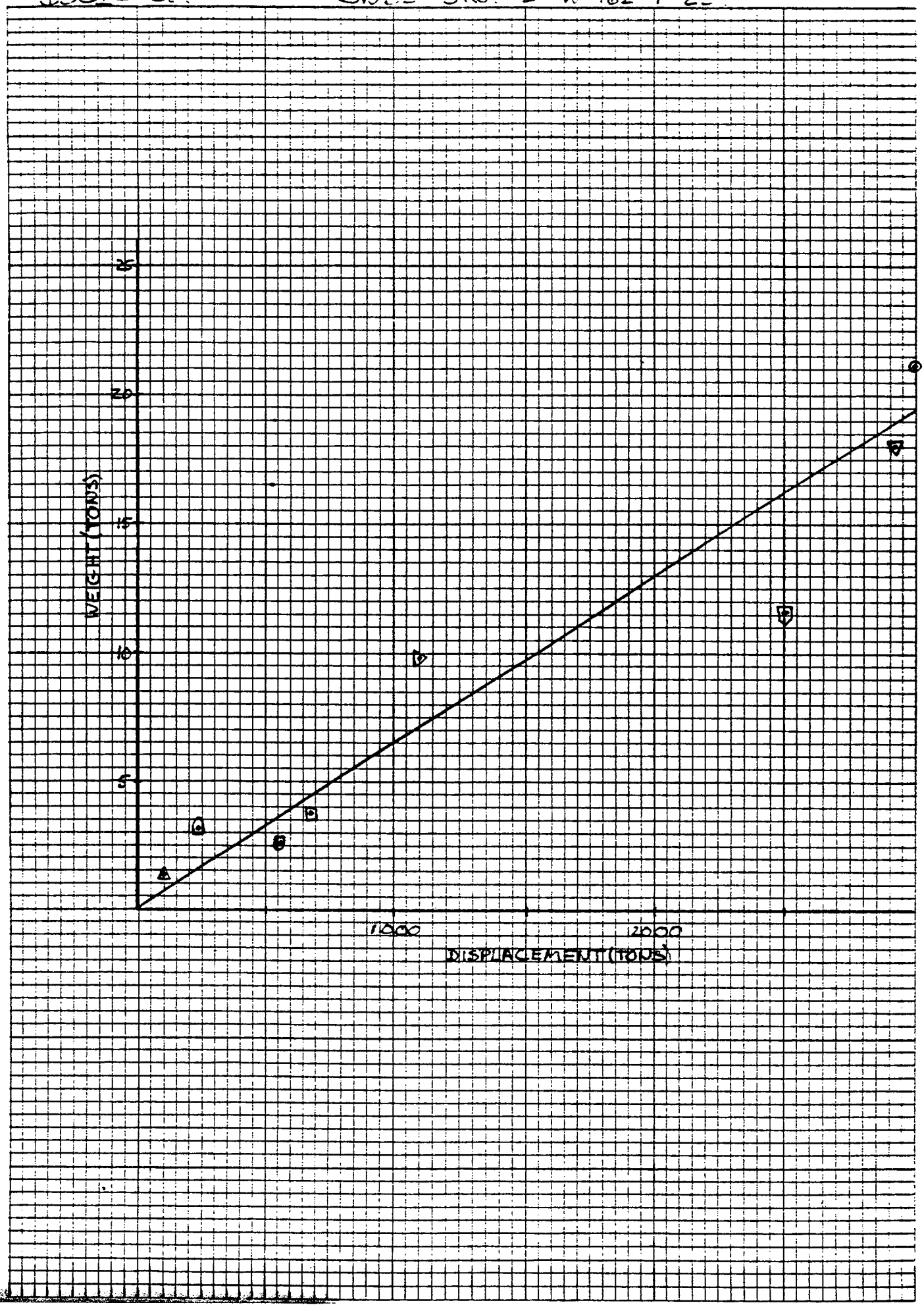
1. "Shipwork Breakdown Structure," The Naval Ship Engineering Center, NAVSEA 0900-LP-039-9010 (1 Aug 1977).
2. SES-110 Final Weight Report
3. "PCG/PGG Data Package", PMS 304-10 (19 Feb 1981).
4. Estimated Weight Report for 3KSES
5. Calculated Weight Report for PCM
6. Final Weight Report for PHM-1 and PHM-3
7. Final Weight Report for PGM-92
8. Final Weight Report for DE-1059
9. Final Weight Report for DE-1049
10. Final Weight Report for PF-103
11. Final Weight Report for FFG-7

SECTION I

SESDOC Algorithmn Plots

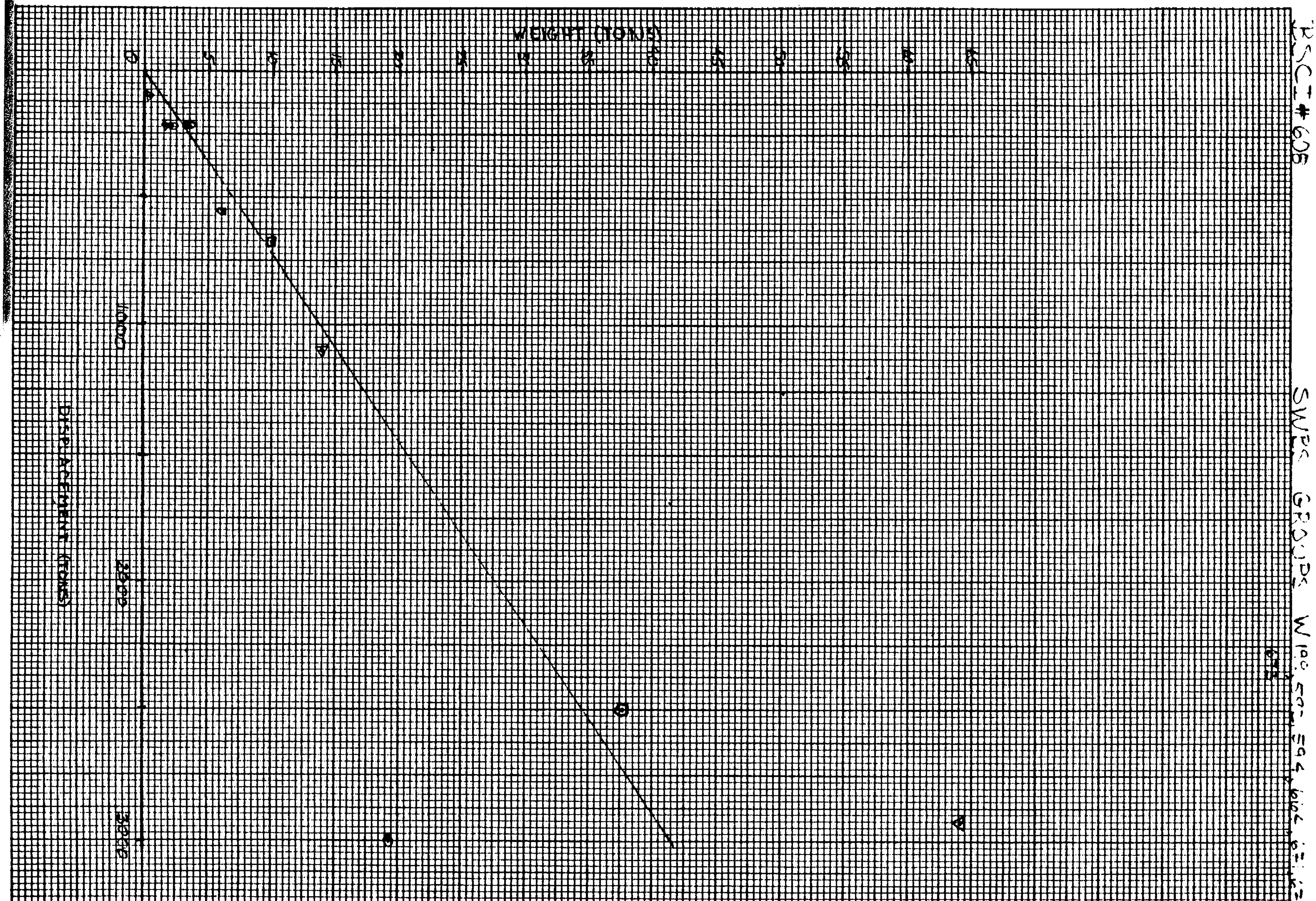
PSCI = 20°

SWBS GROUPS W 162 + 25°



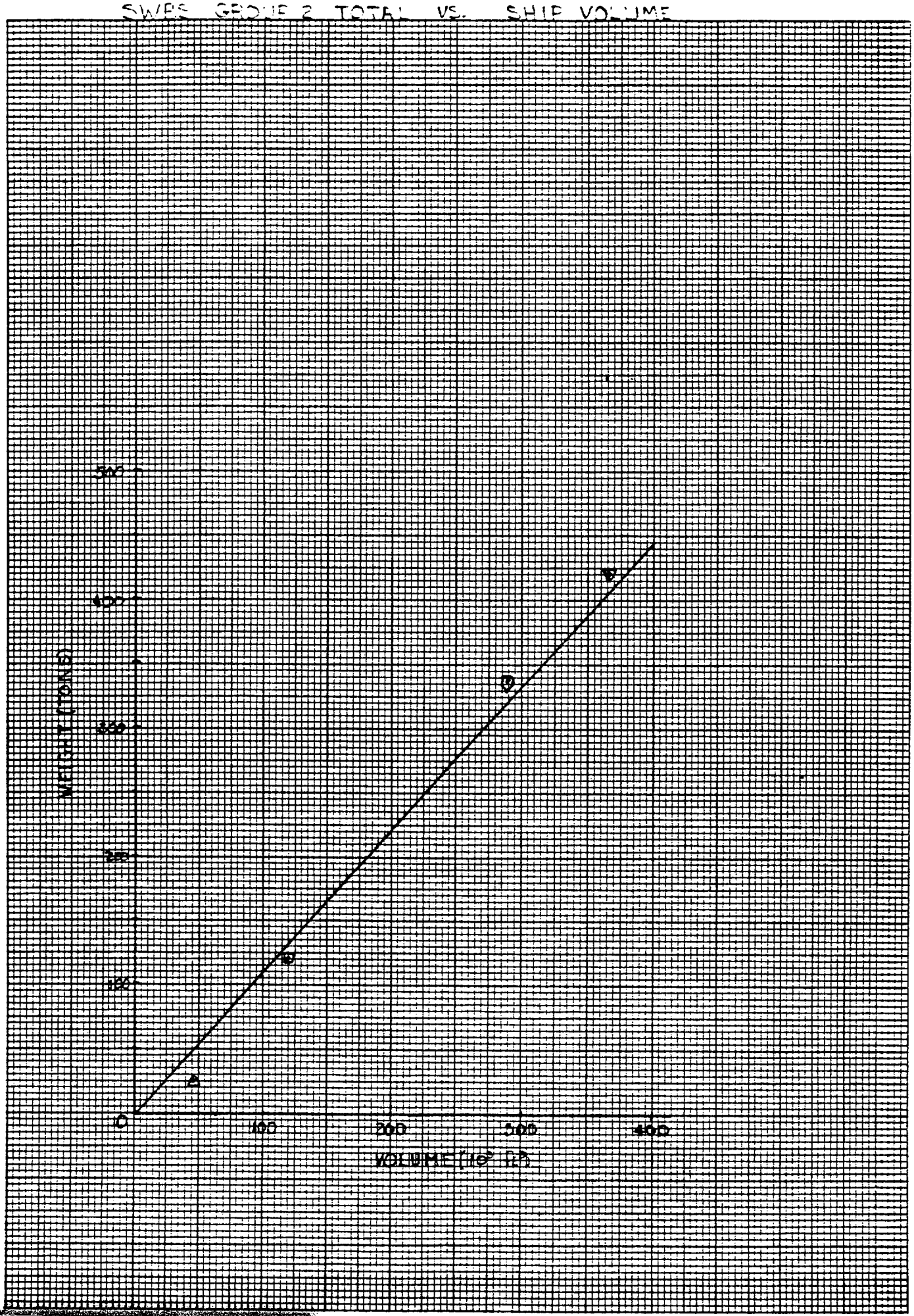
FRANKLIN 10 X 10 TO 1 INCH
10TH INCH HEAVY

FPI-MI - 20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED



SECTION II

Real Ship Data Trend Plots



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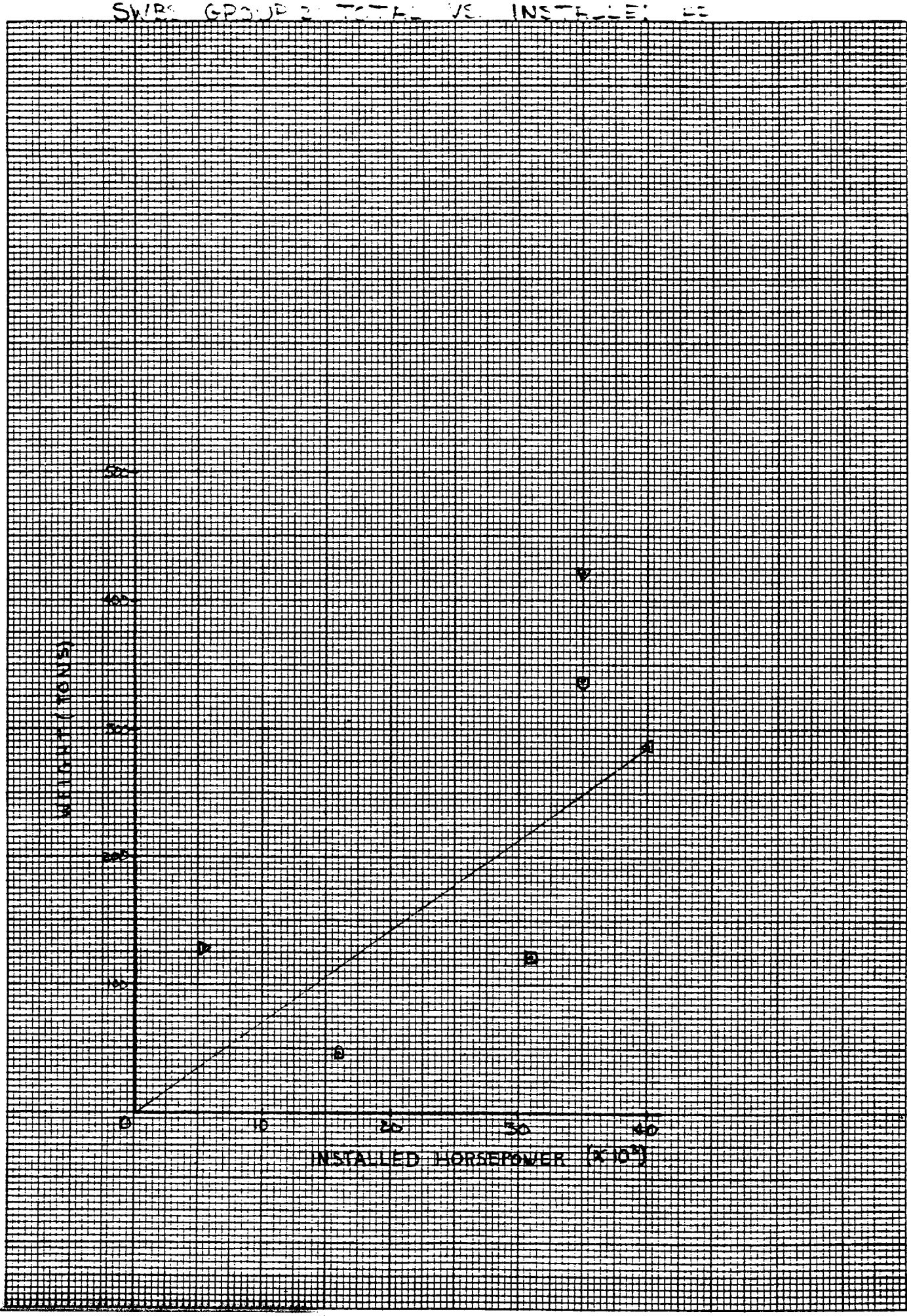
KEUFFEL & ESSER CO.
20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE HEAVY ACCENTED

SWBS GROUP 2 TOTAL VS. INSTALLED HP

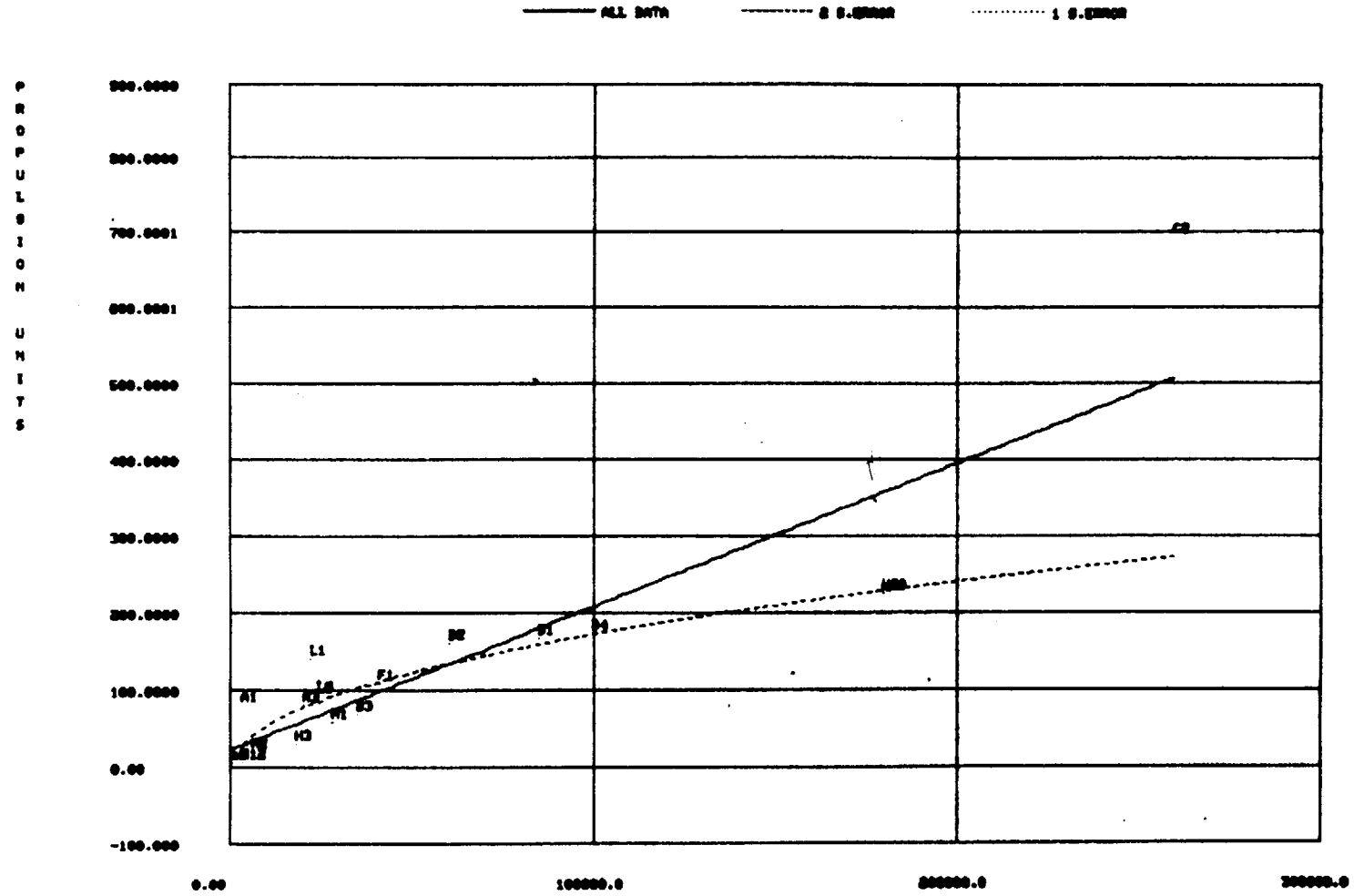


EPI MI. 20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

REPRODUCED AT GOVERNMENT EXPENSE

TO CONTINUE, TYPE CONTINUE
S CONTINUE

PROPULSION UNITS (230-242) VS SHP



SHP

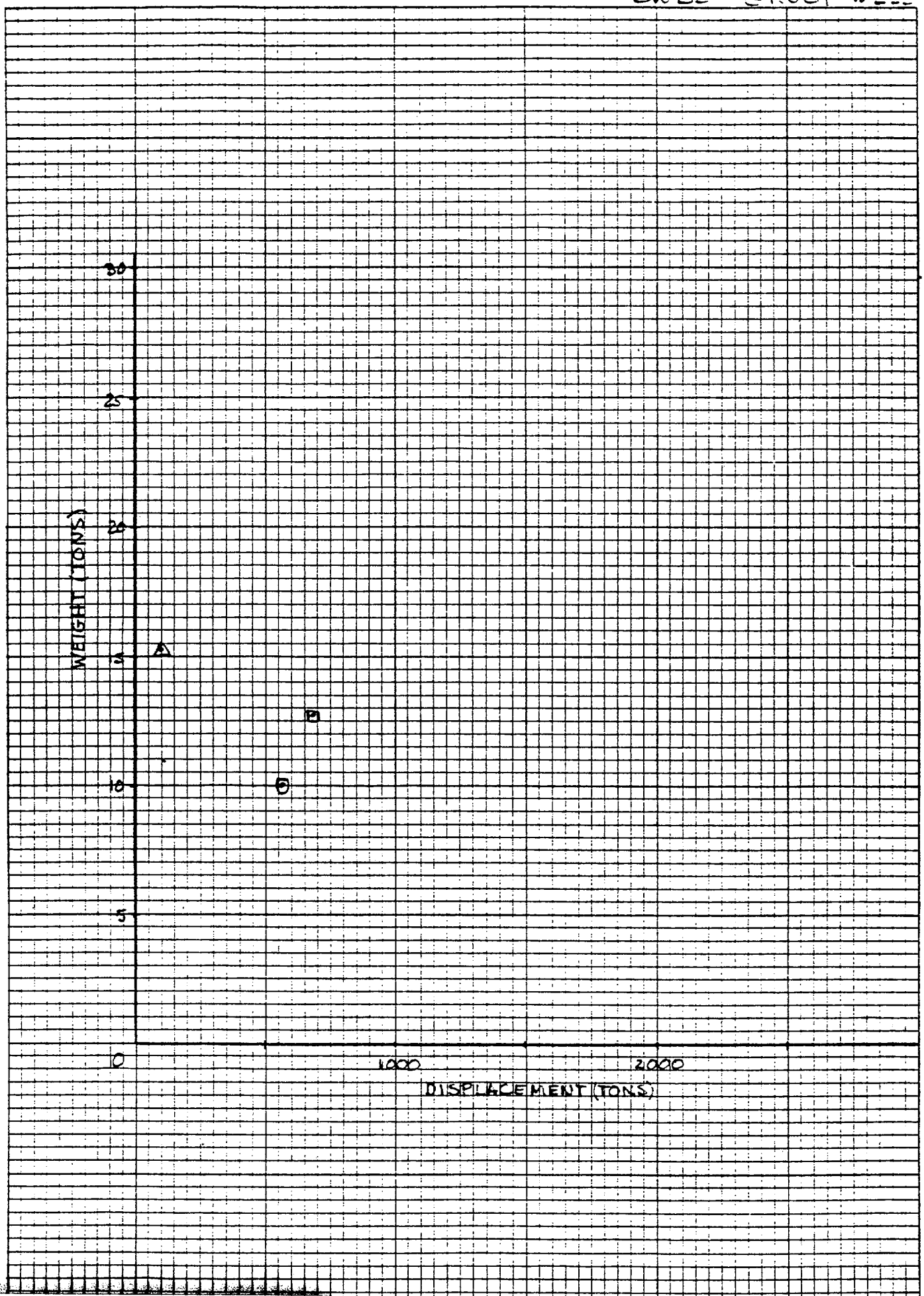
$W230 = 23.671 + 0.00164\ SHP^{1.010}$

$= -6.610 + 0.833\ SHP^{0.442}$

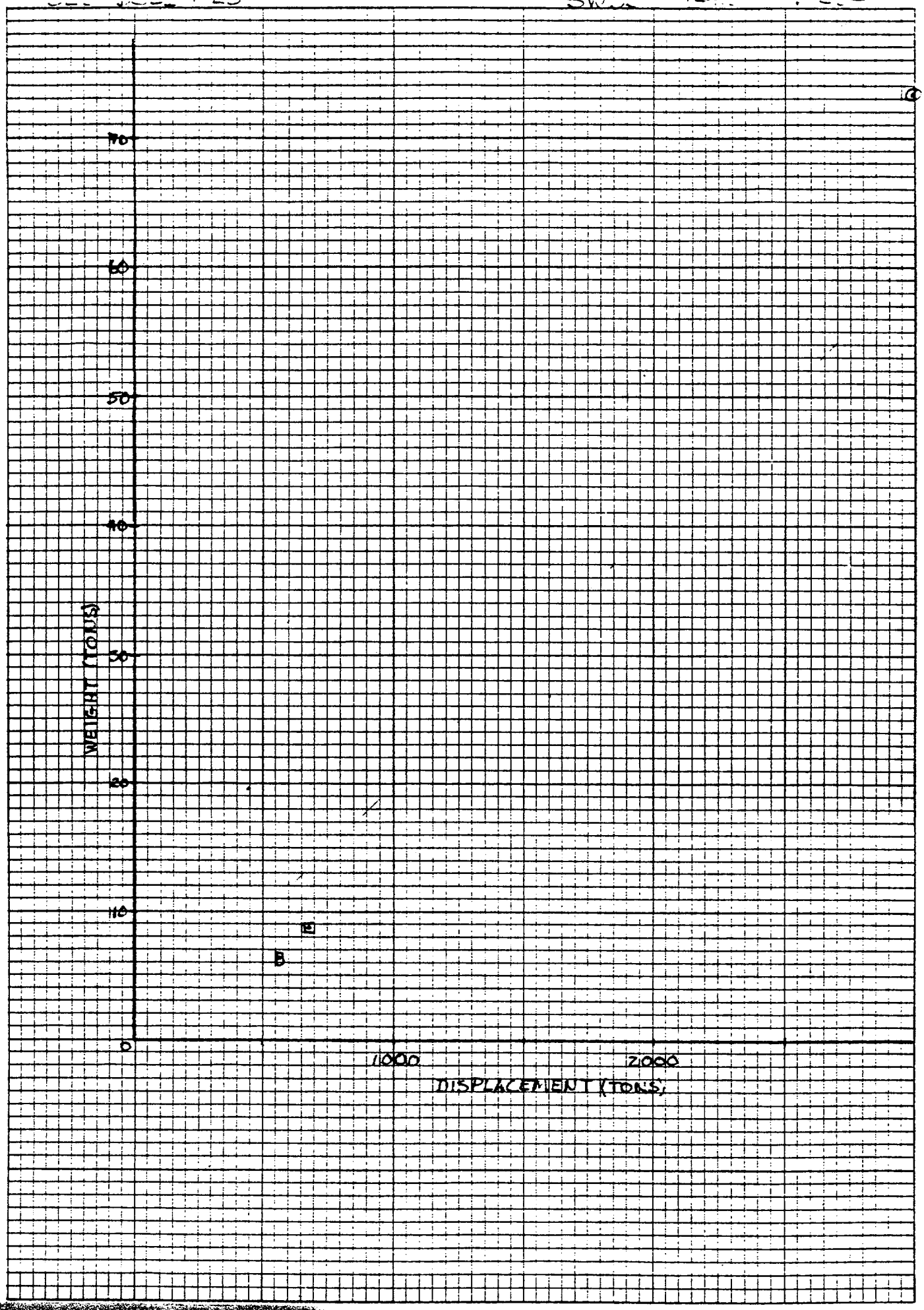
WT 233 Propul Int Comb Engines.

WT 234 GT

SWBS GROUP W233



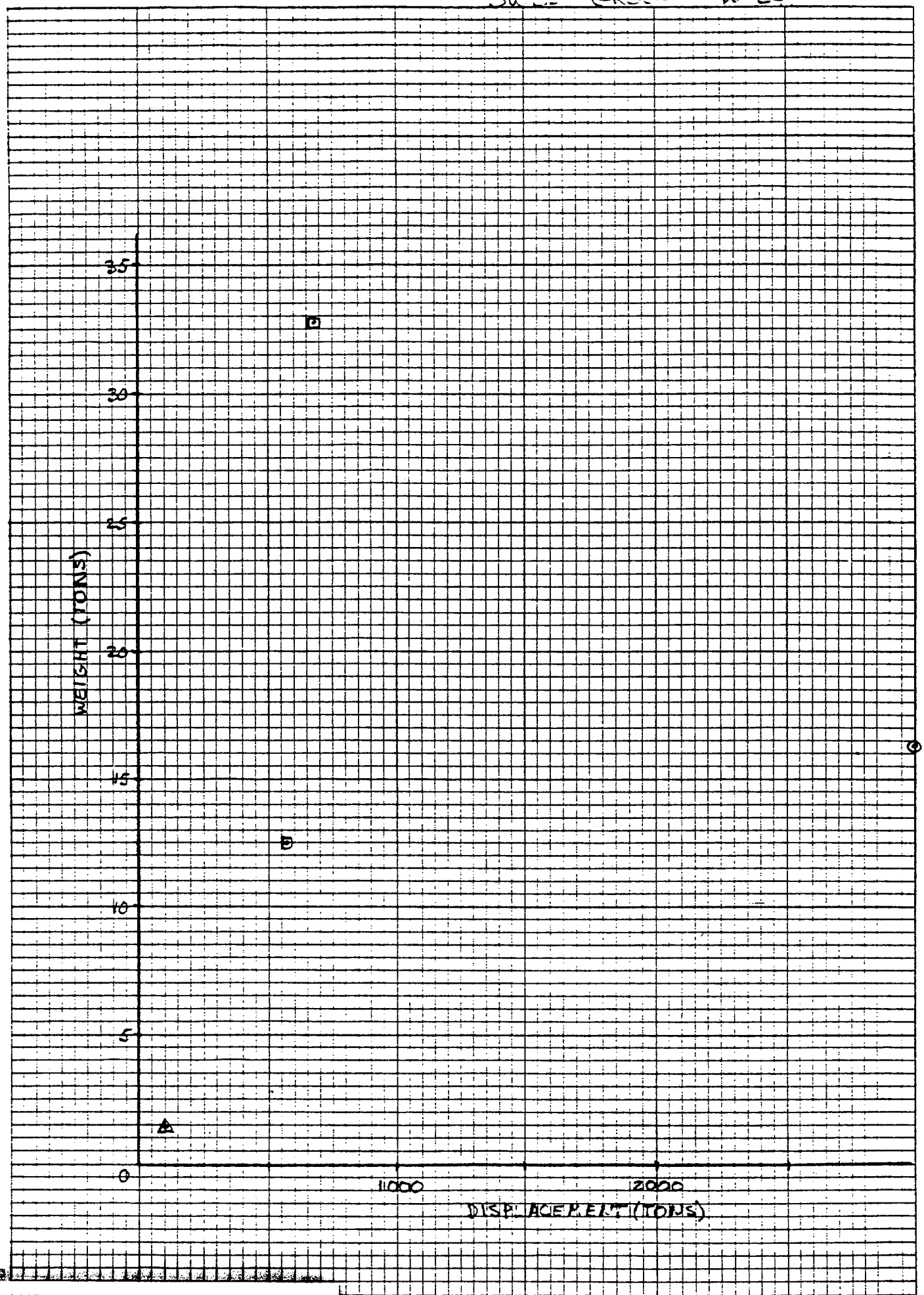
 INTERNAL COMBOS. ENGS



1234 GAS TURBINES

W241 REDUCTION GEARS

SURFACE GROUP W 24'

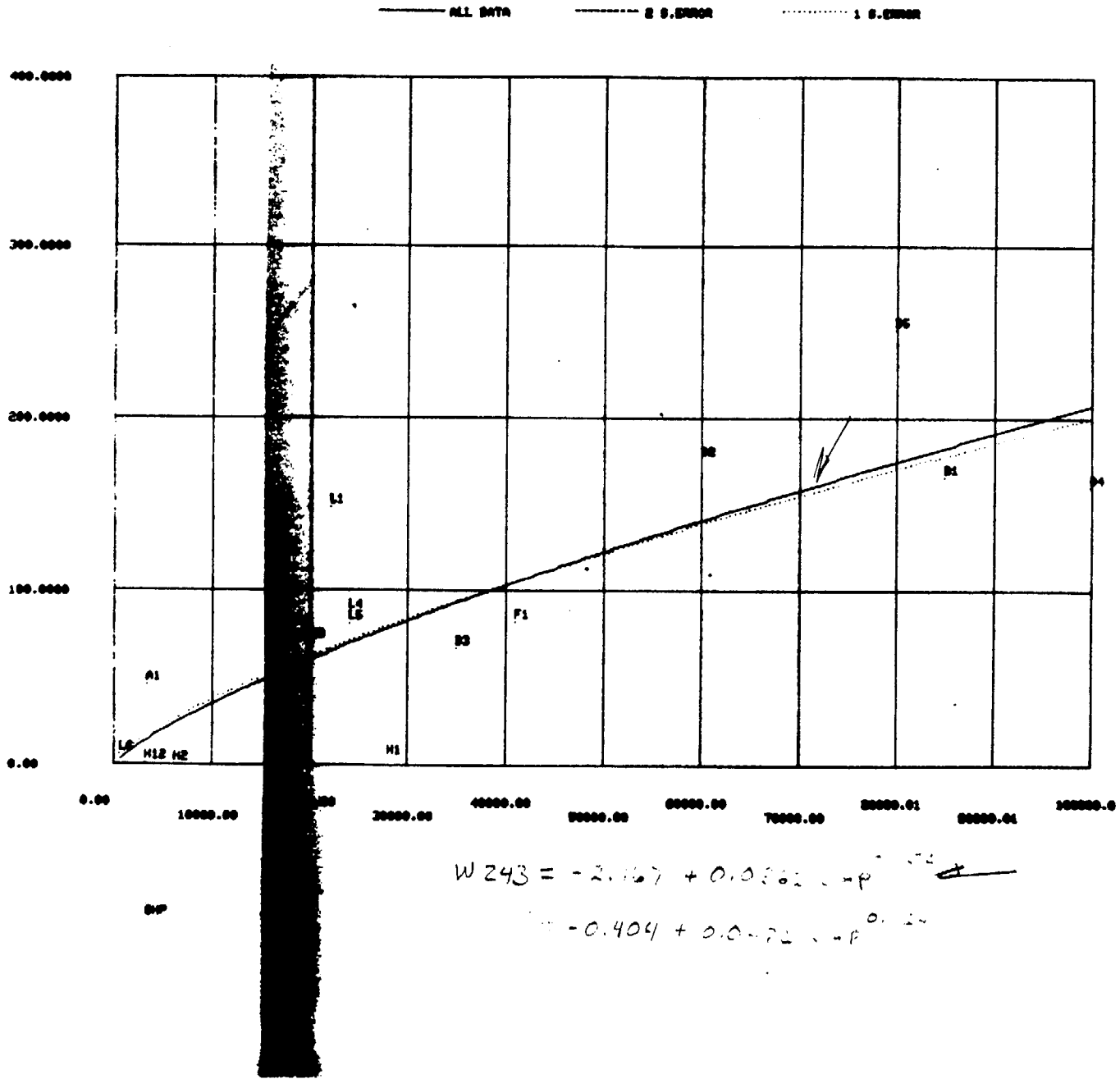


REDUCTION GEARS

REPRODUCED AT GOVERNMENT EXPENSE

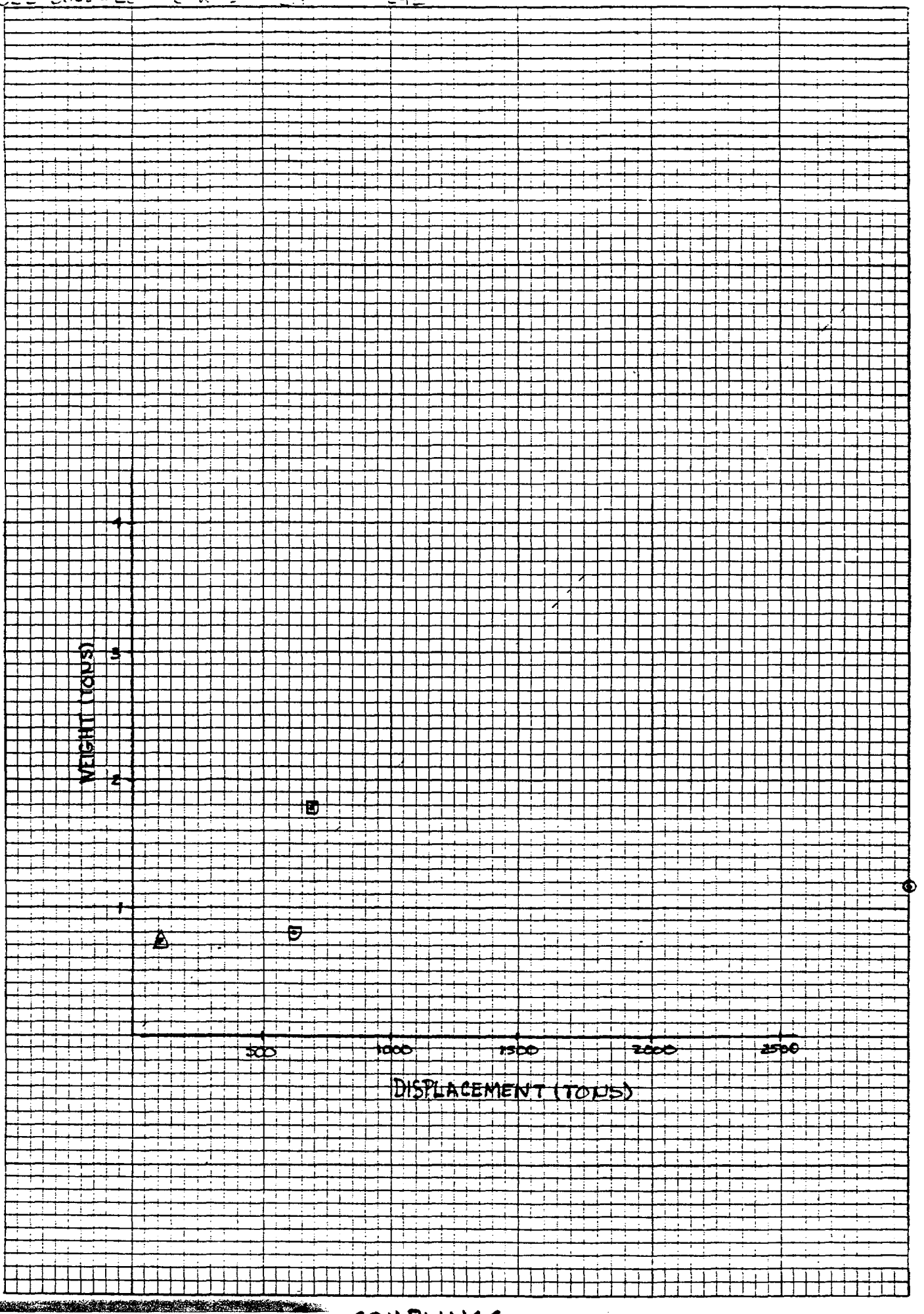
9 CONTINUE

TRANSMISSION AND PROP SYS (243-248) US SHP

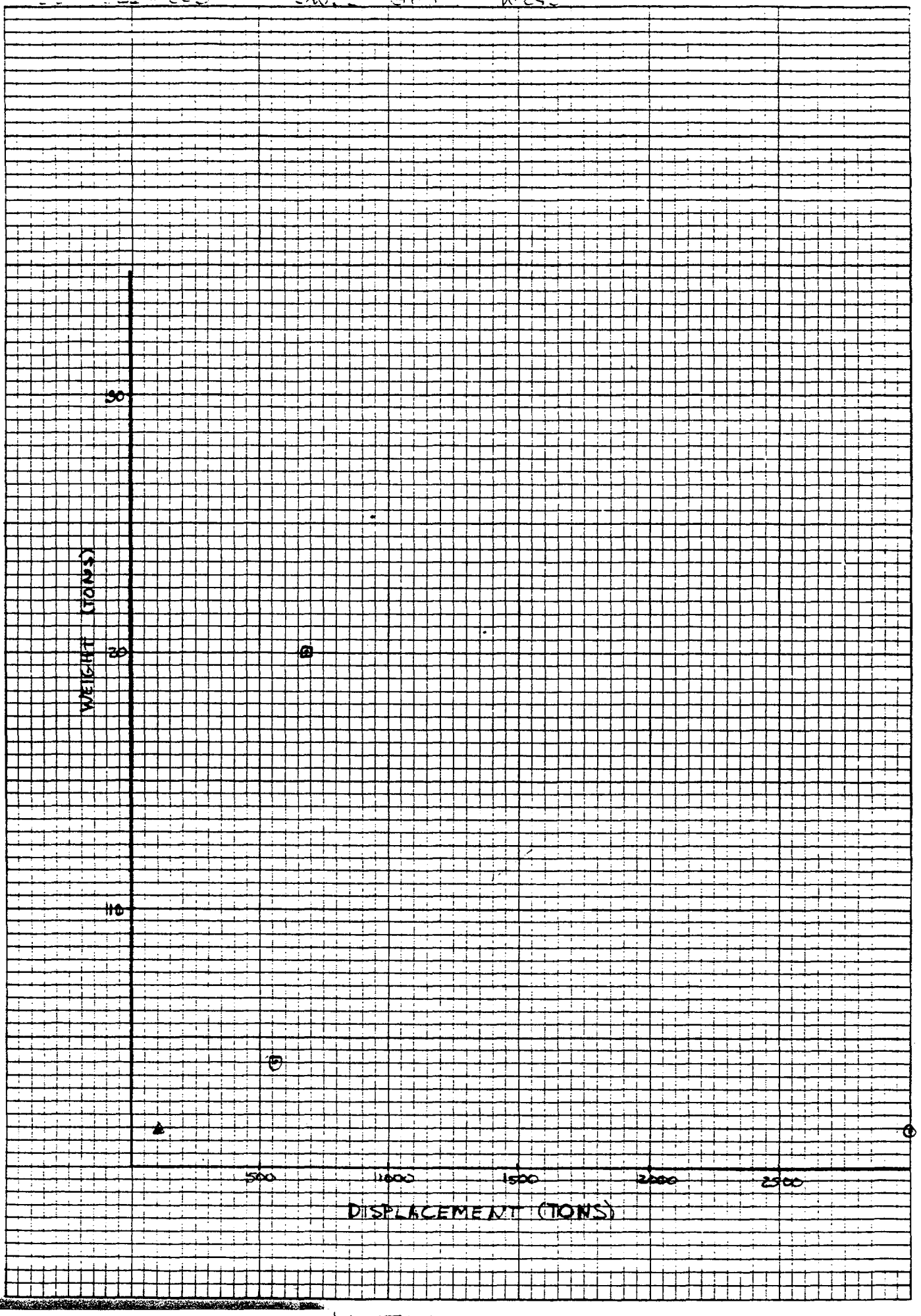


$$W_{243} = -2.\ldots + 0.0\ldots \cdot P^{\ldots}$$

$$= -0.404 + 0.0\ldots \cdot P^{0.\ldots}$$



COUPLINGS



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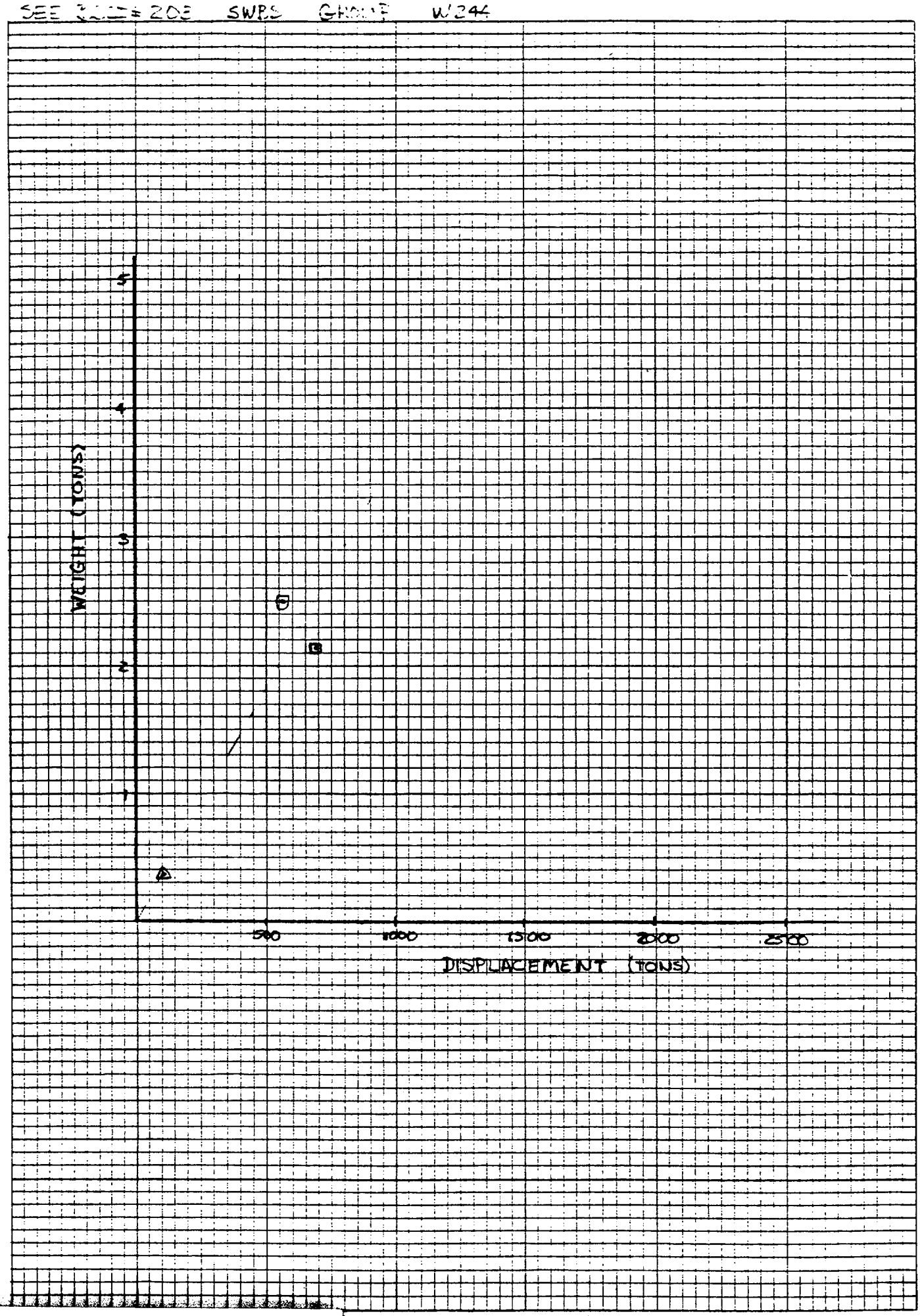
10TH LINE HEAVY

LIFTING

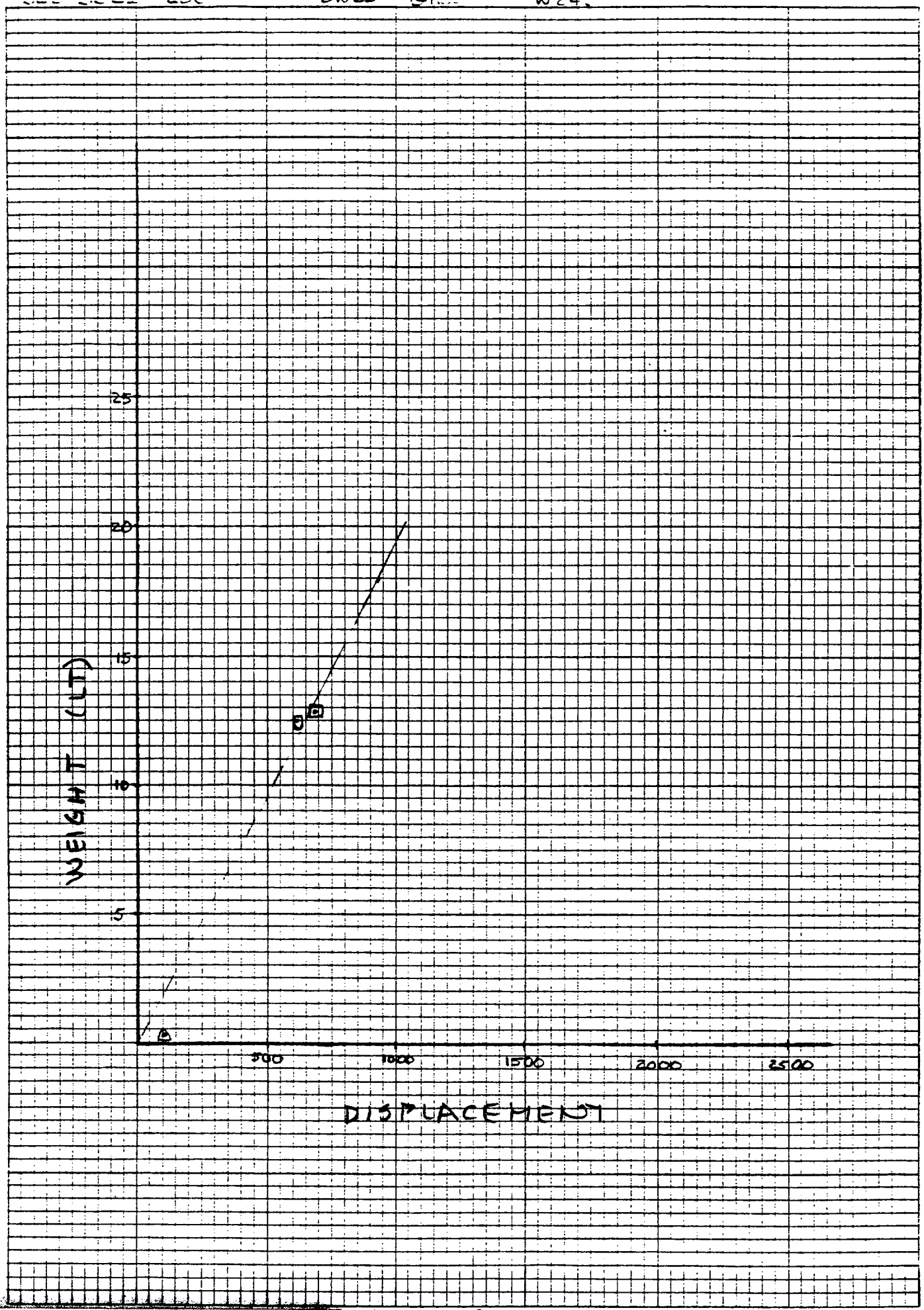
SEE [illegible] SWRS GRAPH W/24



PRINTED IN U.S.A. 10 X 10 TO 1 INCH
10 TO INCH HEAVY

SHAFT BEARINGS

SEE SHEET # 203 SWBS GROUP W245



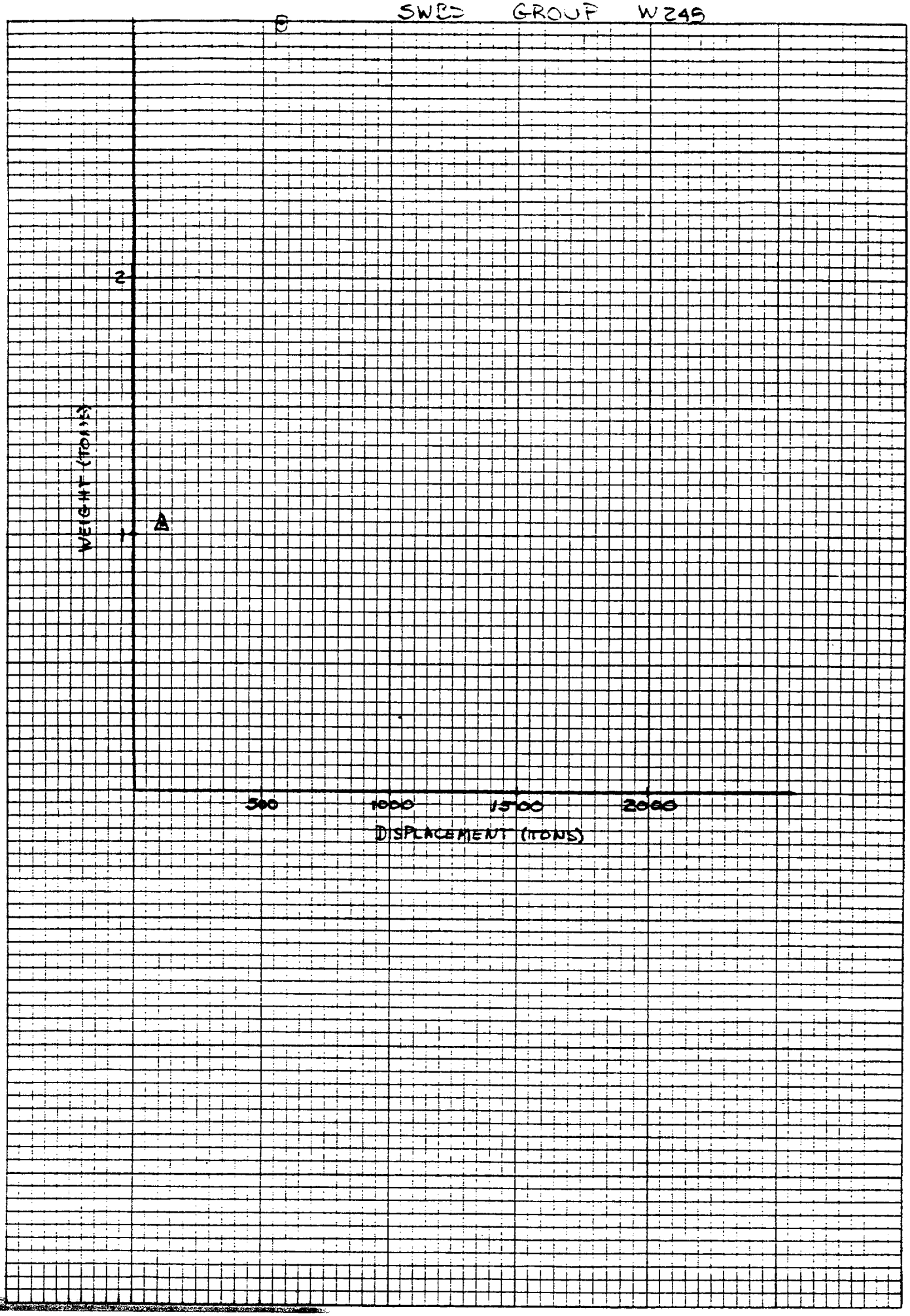
10 PULSORS

RELEASED AT GOVERNMENT EXPENSE

FILLOW 10 X 10 TO 1 INCH
10111 LINE HEAVY

W248 LIFT SYSTEM

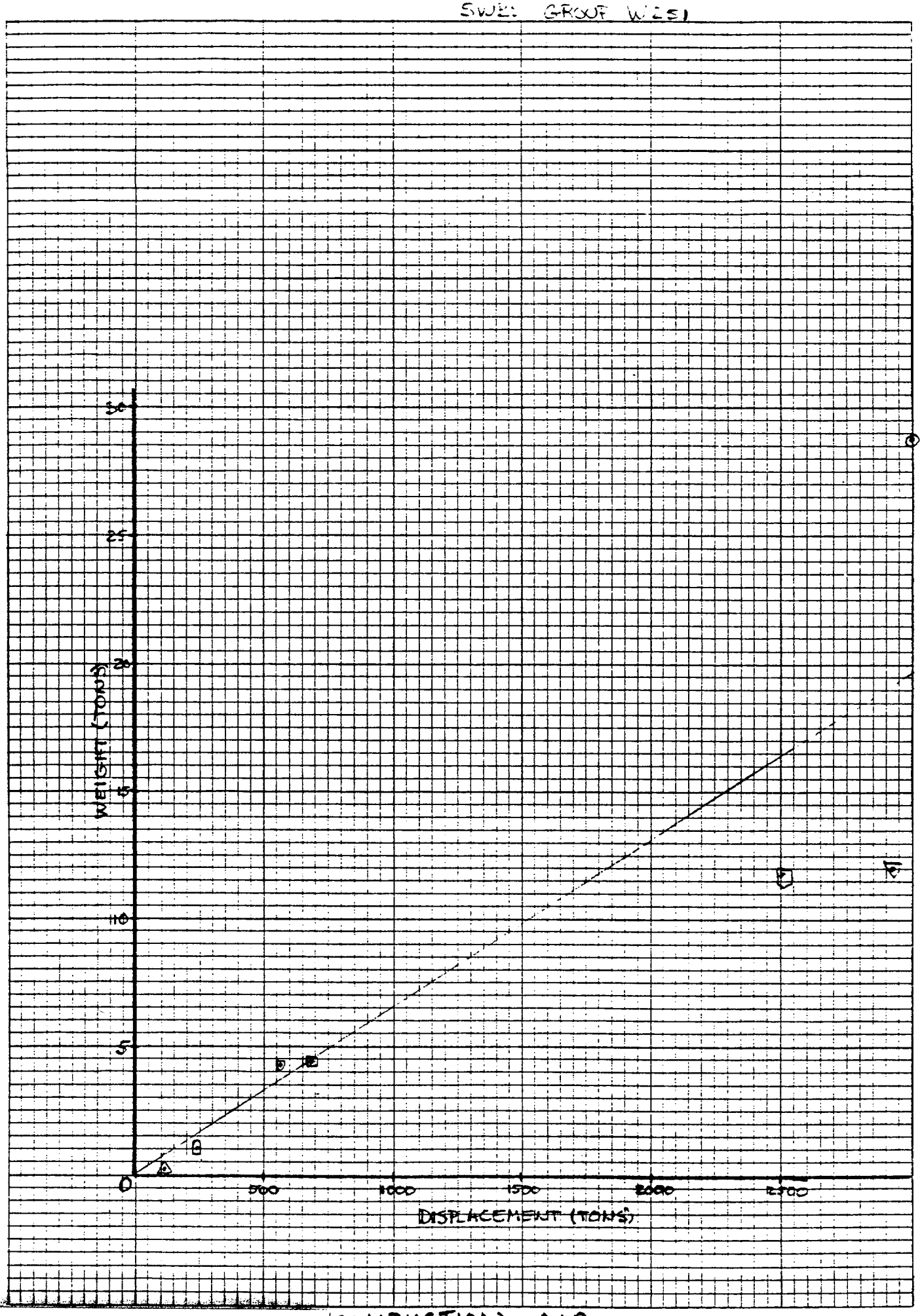
SWBS GROUP W249



EUGENE DIETZGEN CO.
PRINTED IN U.S.A.
10 X 10 TO 1 INCH
WITH LINE HEAVY

LIFT SYS

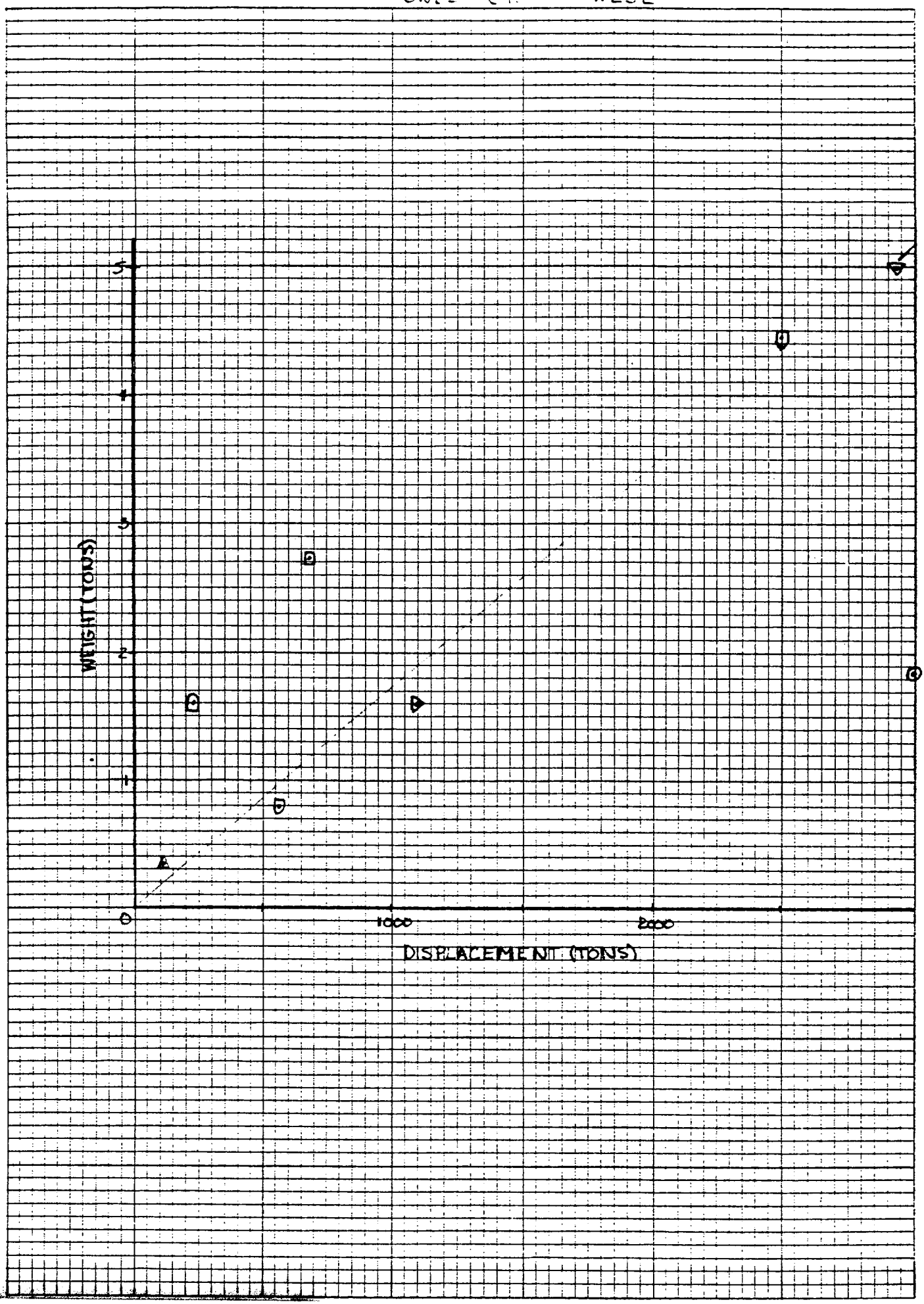
SWBS GROUP WEIGHT



REPRODUCED AT GOVERNMENT EXPENSE

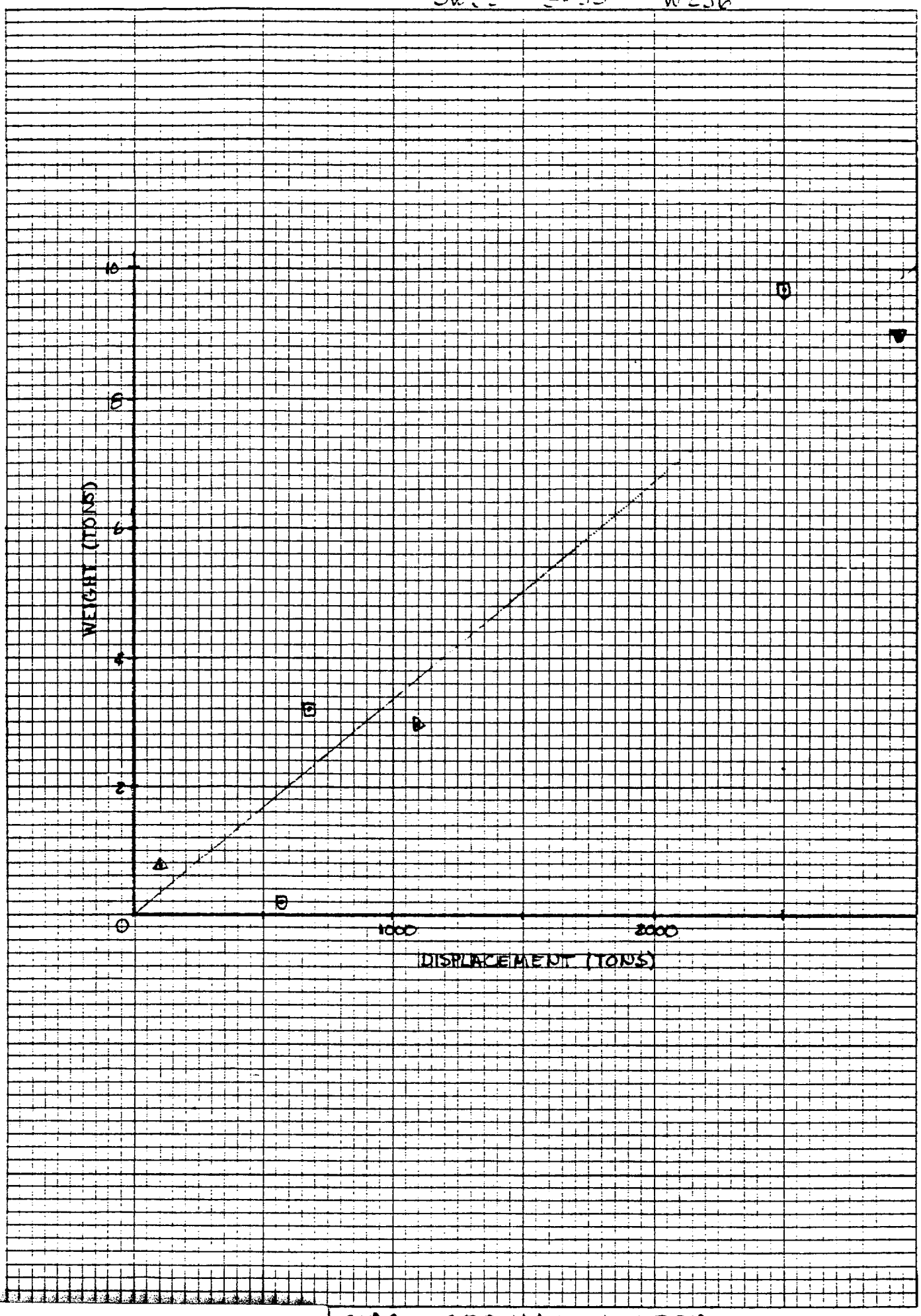
COMBUSTION AIR

SWBS GP. 12 W252



PROPUL CONTROL

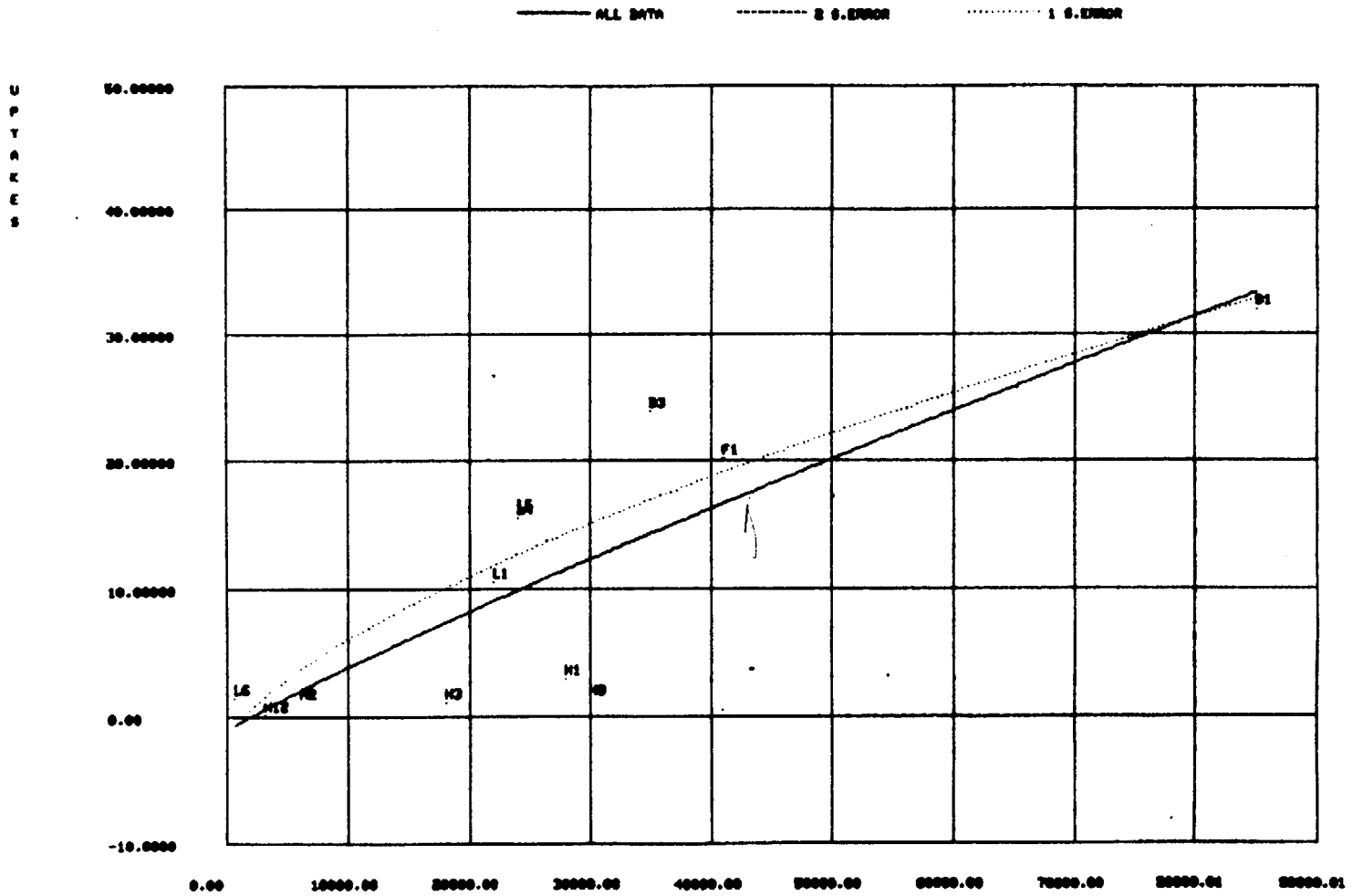
SWBS GROUP W25



CIRC + COOLING WATER

TO CONTINUE, TYPE CONTINUE
S CONTINUE

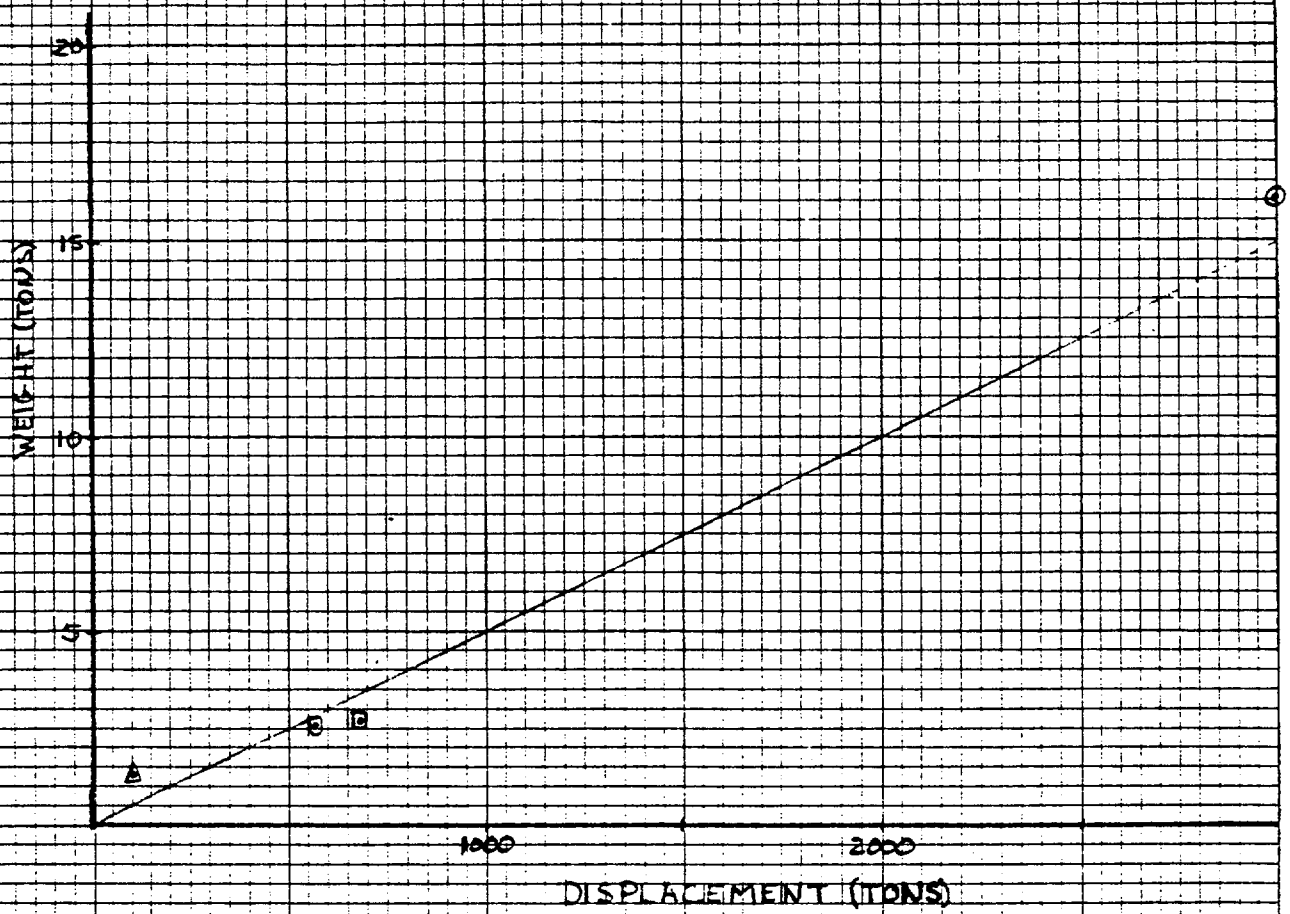
UPTAKES (259)



W259 = -1.126 + 0.00118 SHP^2.928

SHP

SEE [illegible] SWBS GROUP W 25



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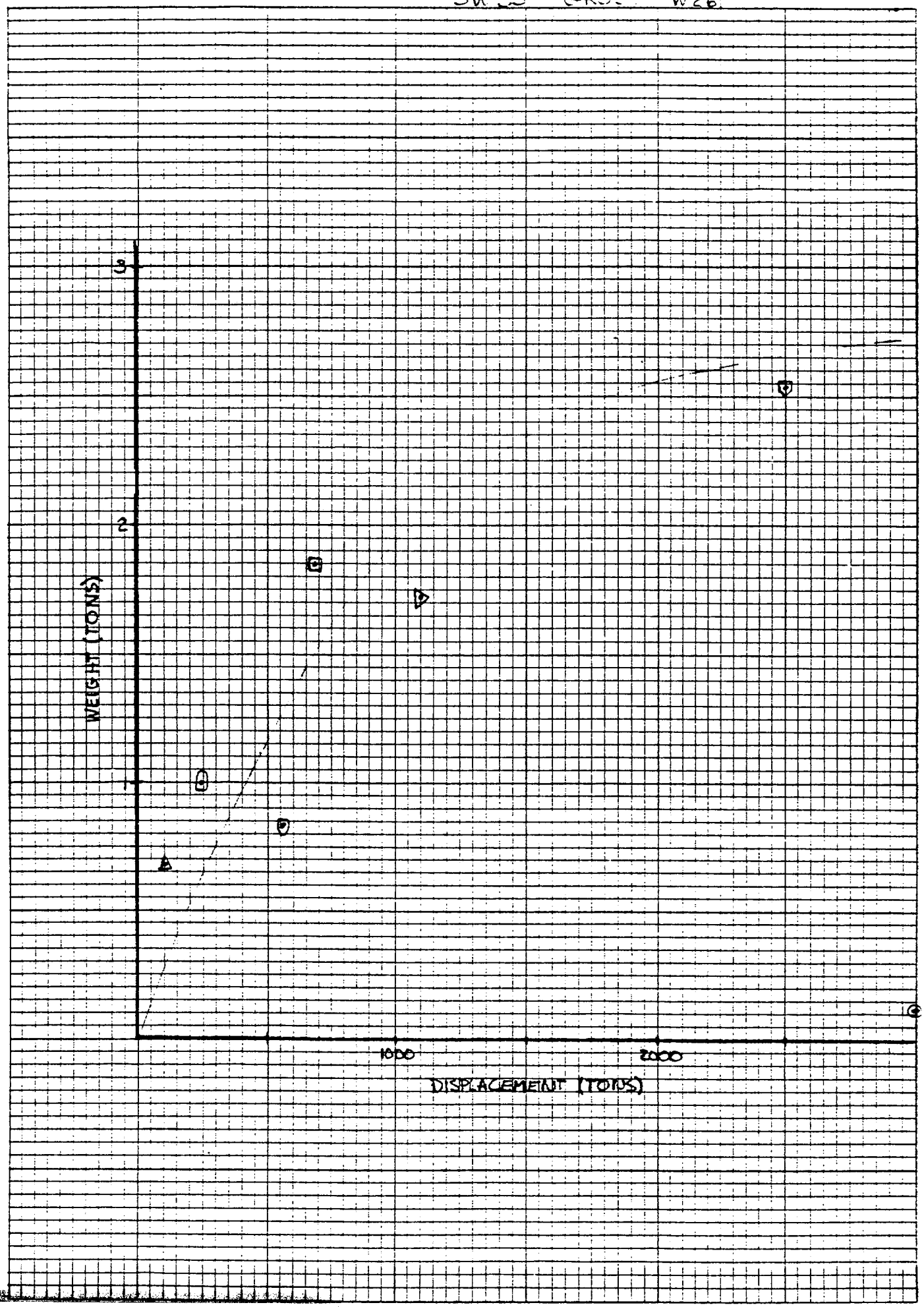
KEUFFEL & ESSER CO.
MADE IN U.S.A.

UPTAKES

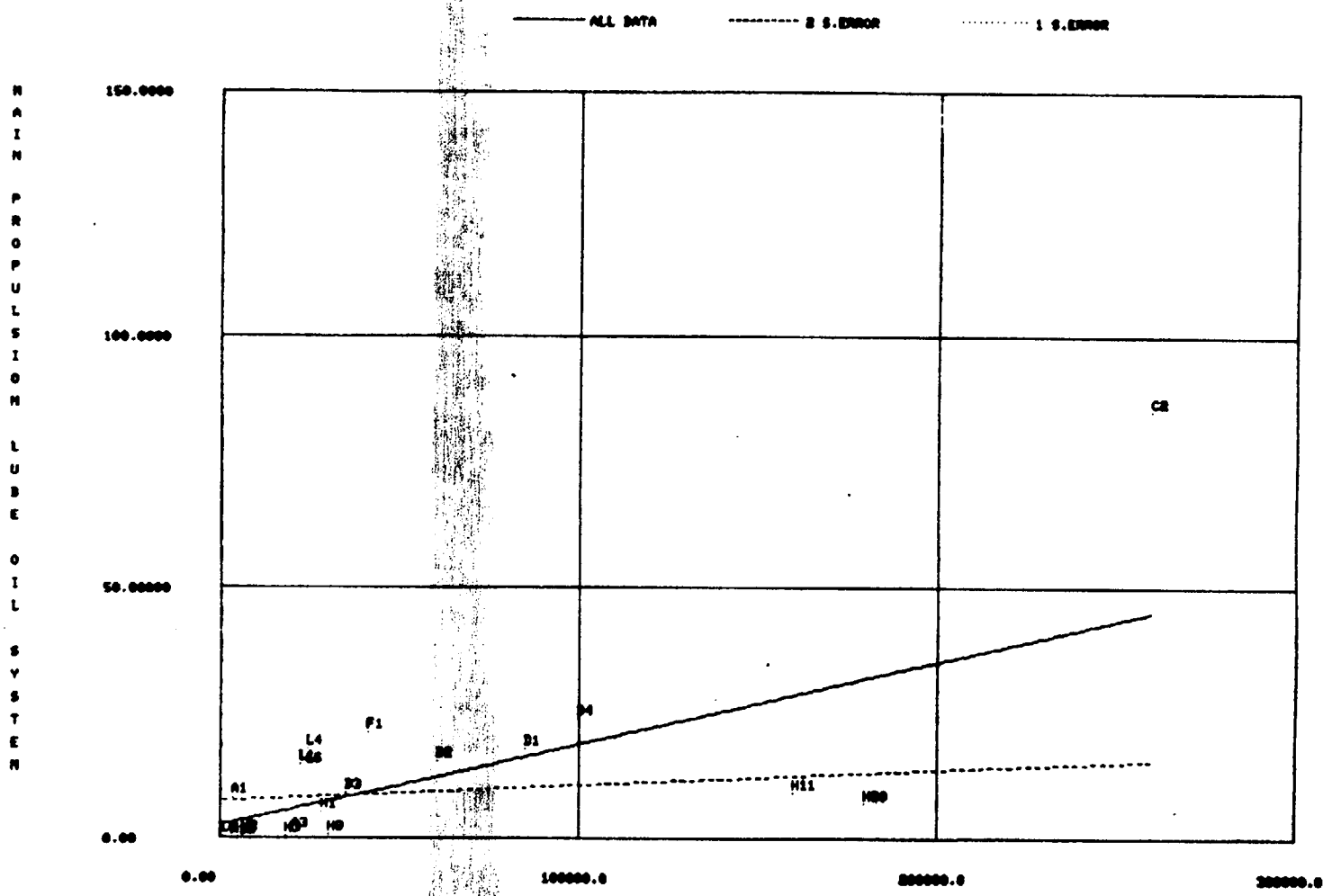
SWBS GROUP W26



DEL SERVICE SYS

TO CONTINUE, TYPE CONTINUE
0 CONTINUE

MAIN PROPULSION LUBE OIL SYSTEM (868-884)



SHP

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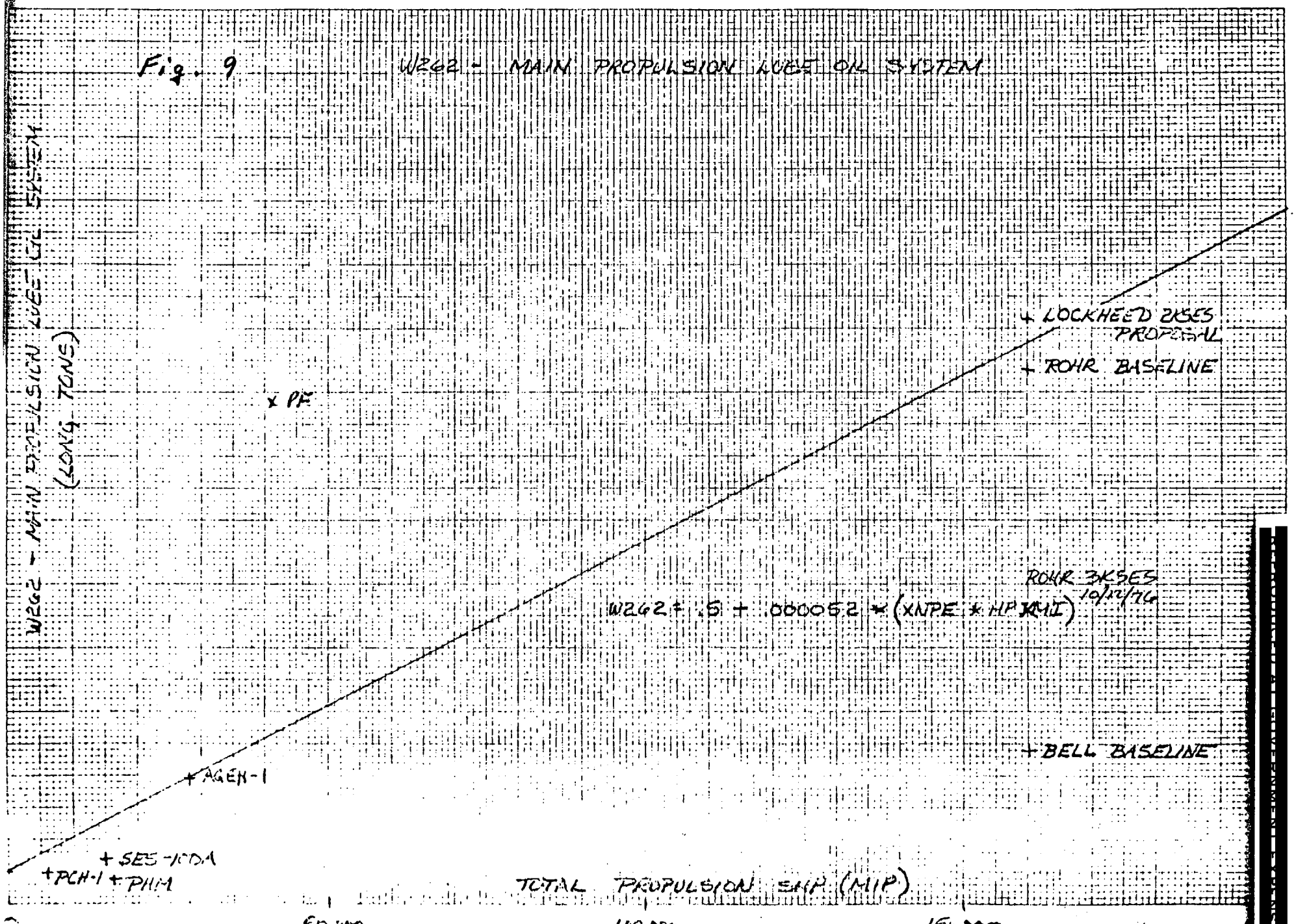
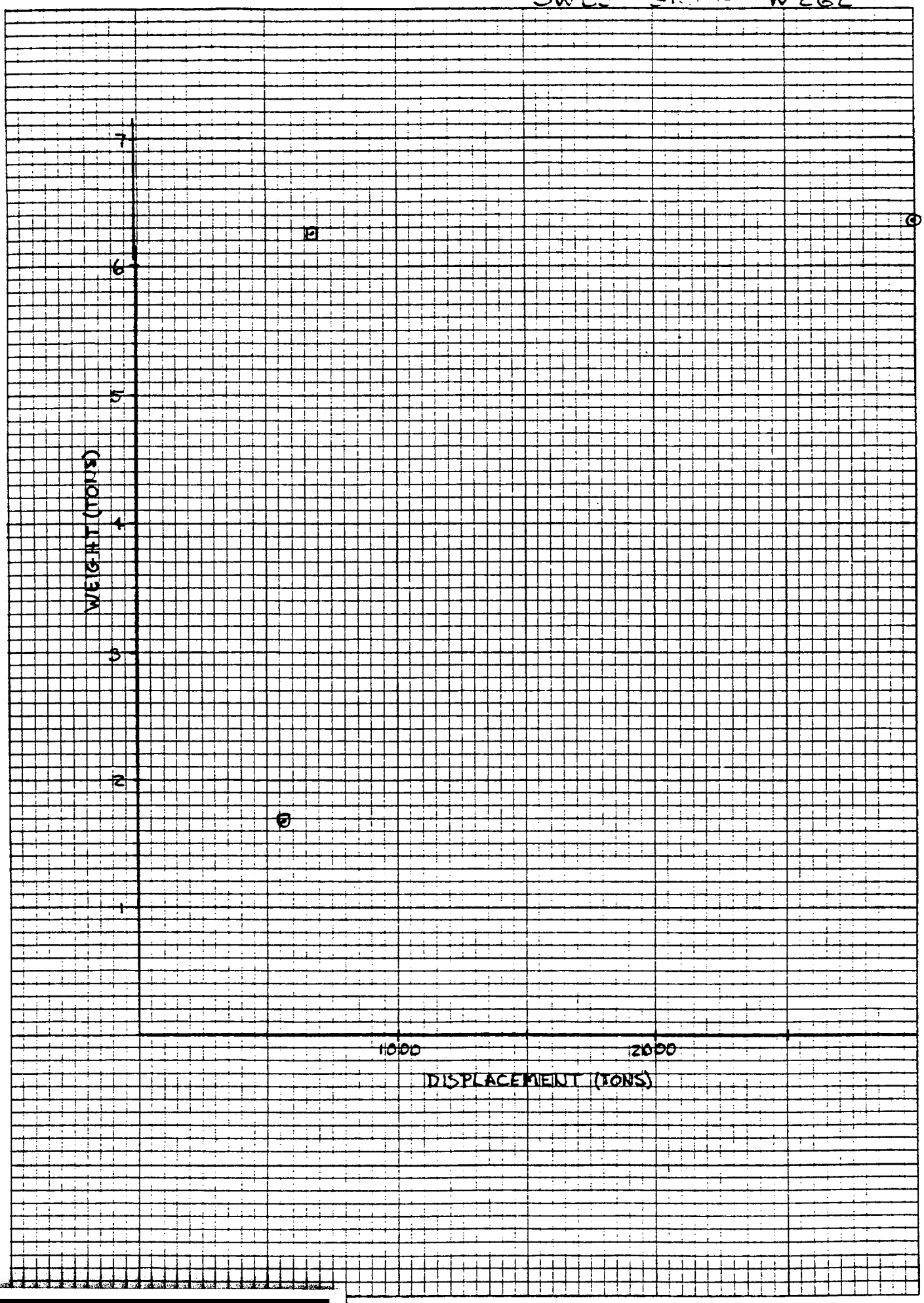
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

Fig. 9

W262 - MAIN PROPULSION LUBE OIL SYSTEM

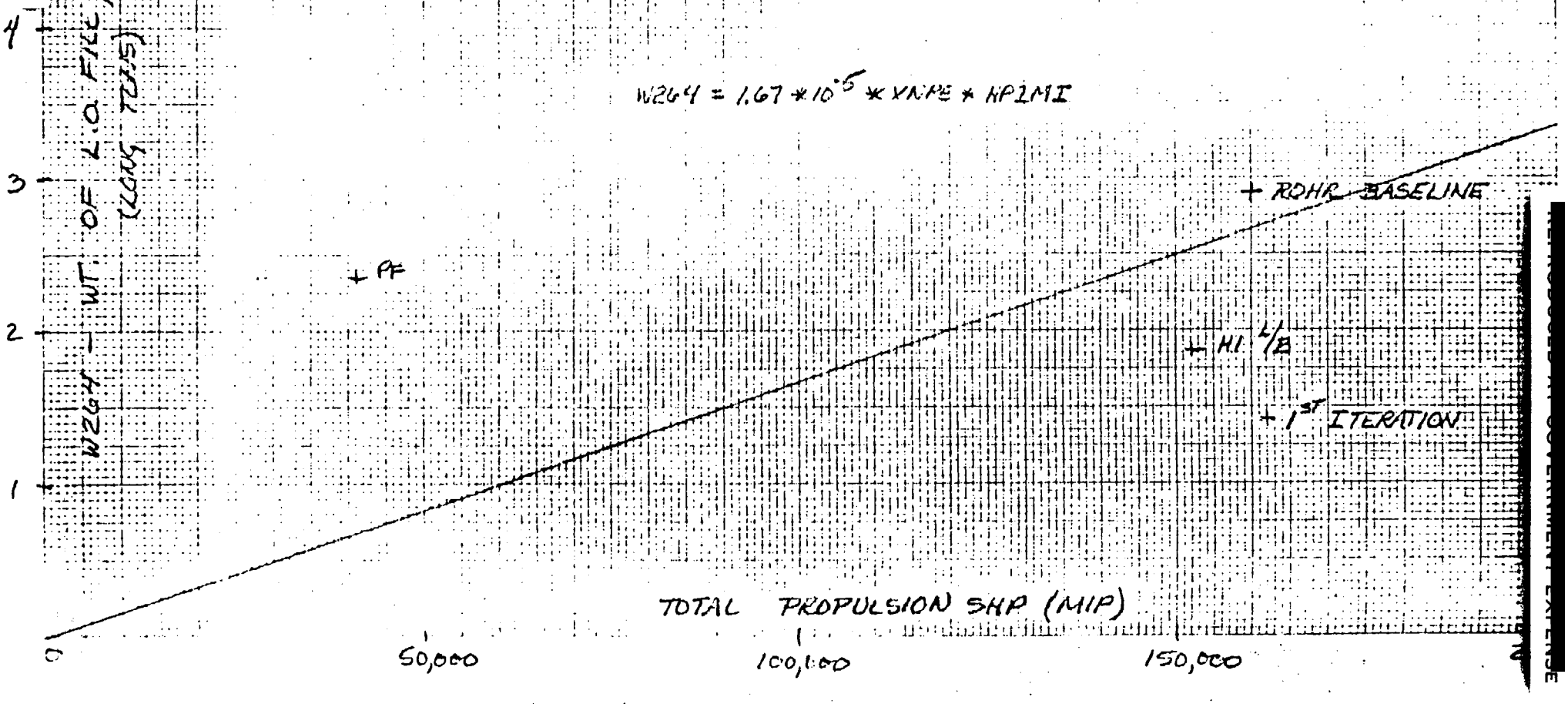


SWBS GROUP W262

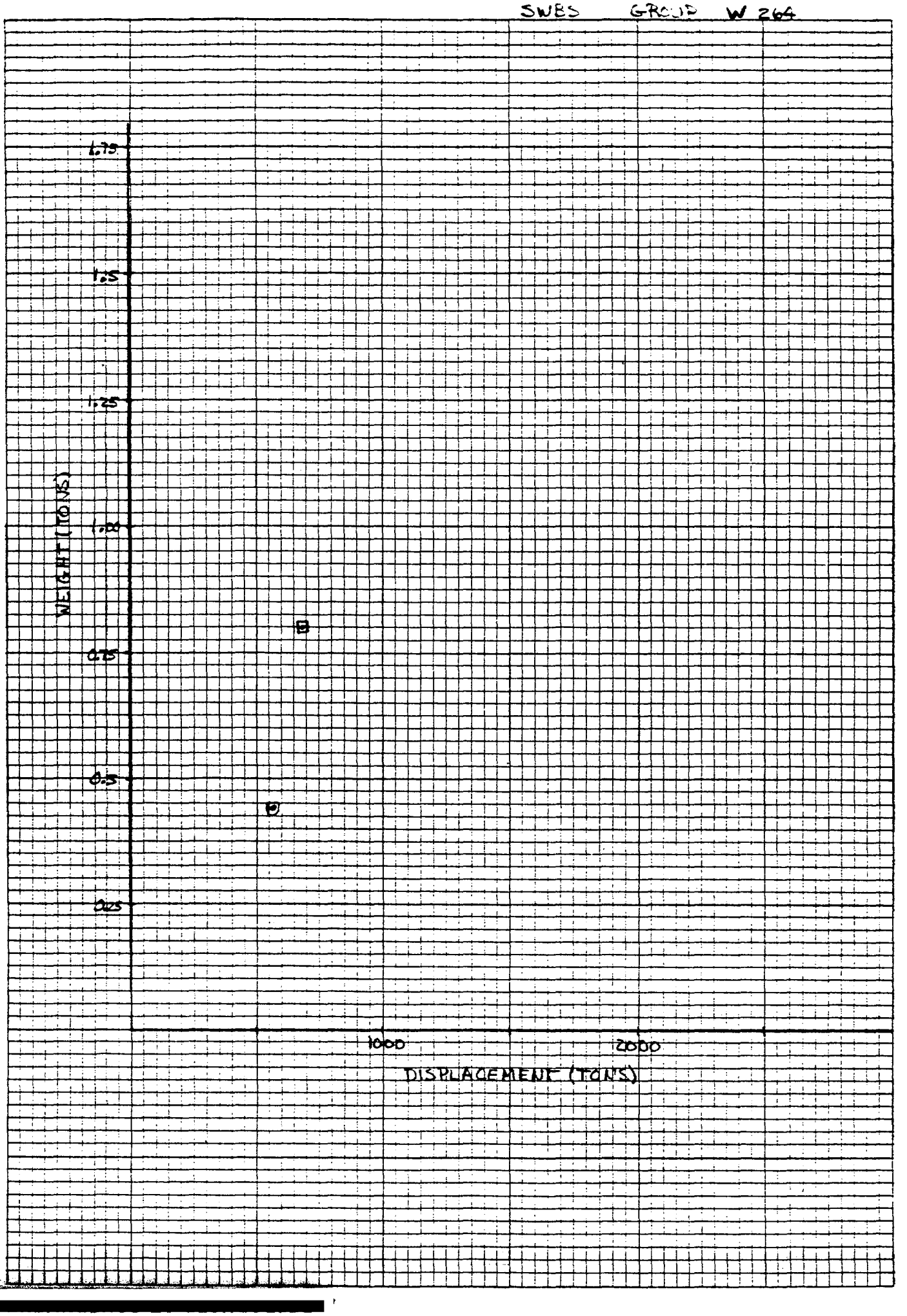


EPSILON 10 X 10 TO 1 INCH
10TH LINE HEAVY

Fig. 10 W264 - L.O. FILL, TRANSFER, & PURIF. SYSTEM



SWBS GROUP W 264



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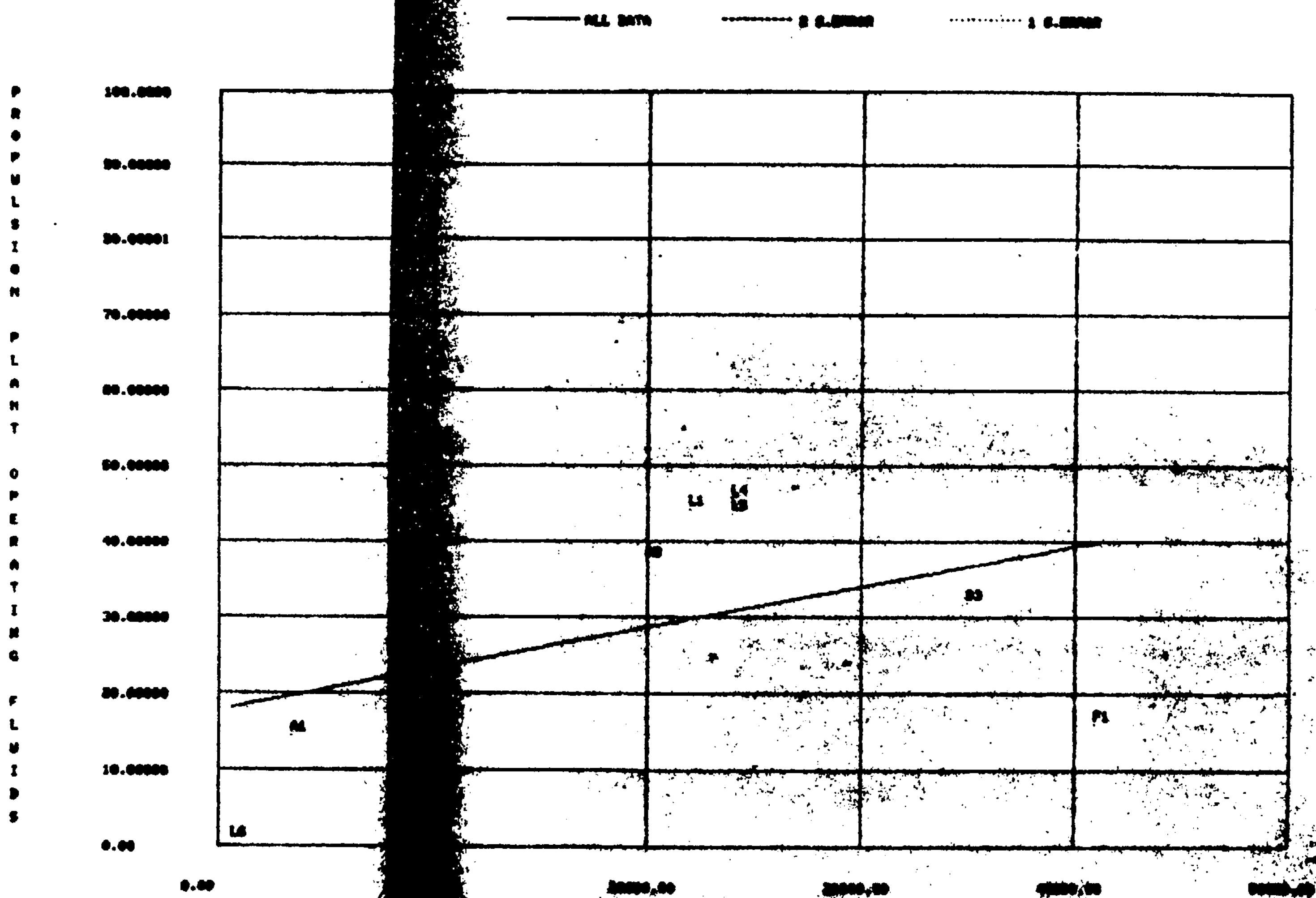
359-10 X 10 TO 1 INCH
10TH LINE HEAVY

TO CONTINUE, TYPE CONTINUE

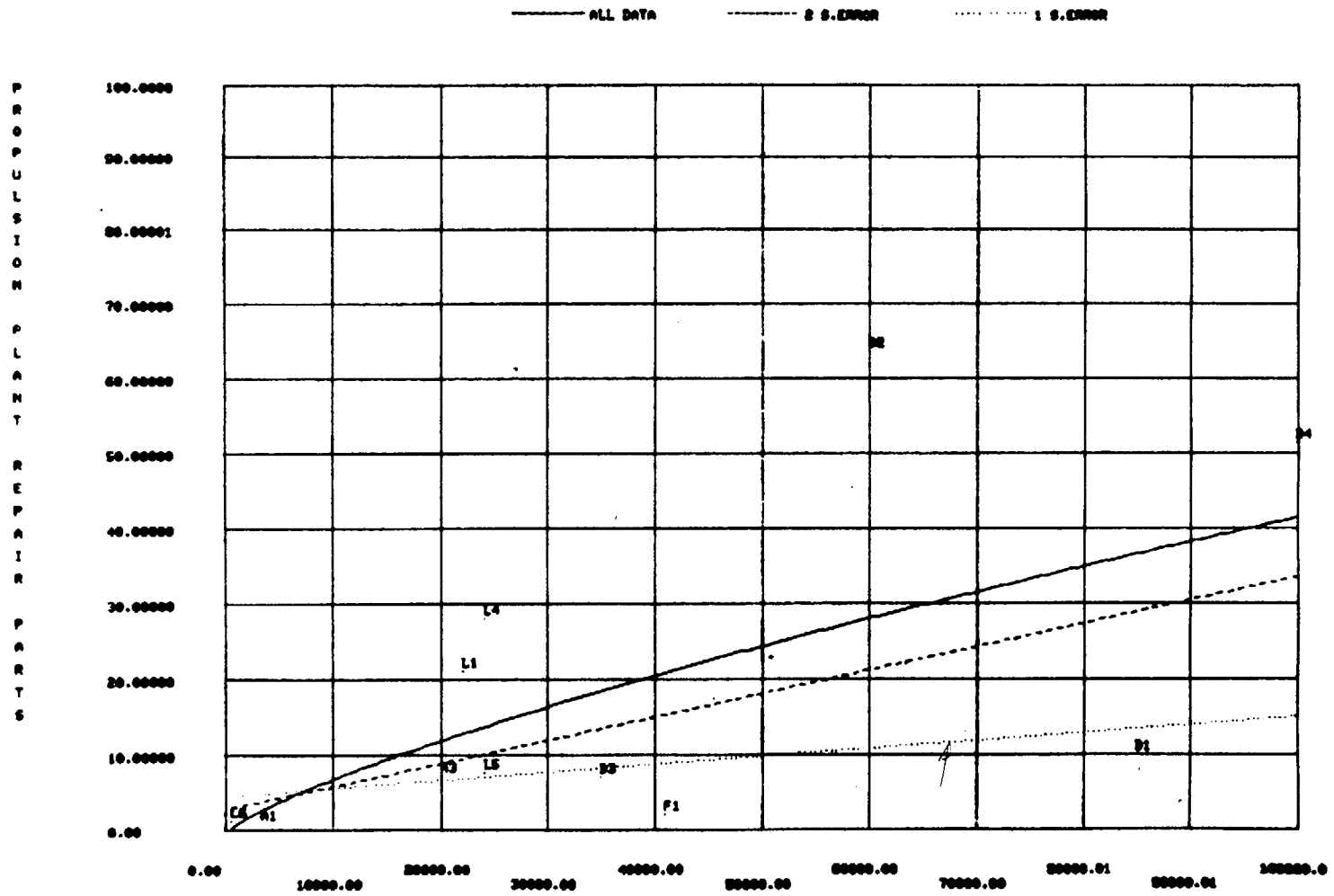
0 CONTINUE



W[illegible] = 17.802 + 0.000[illegible] SHP [illegible] 0.989

TO CONTINUE, TYPE CONTINUE
S CONTINUE

PROPULSION PLANT REPAIR PARTS (299)



$W299 = -0.614 + 0.00$ [illegible]

: [illegible]

: [illegible]

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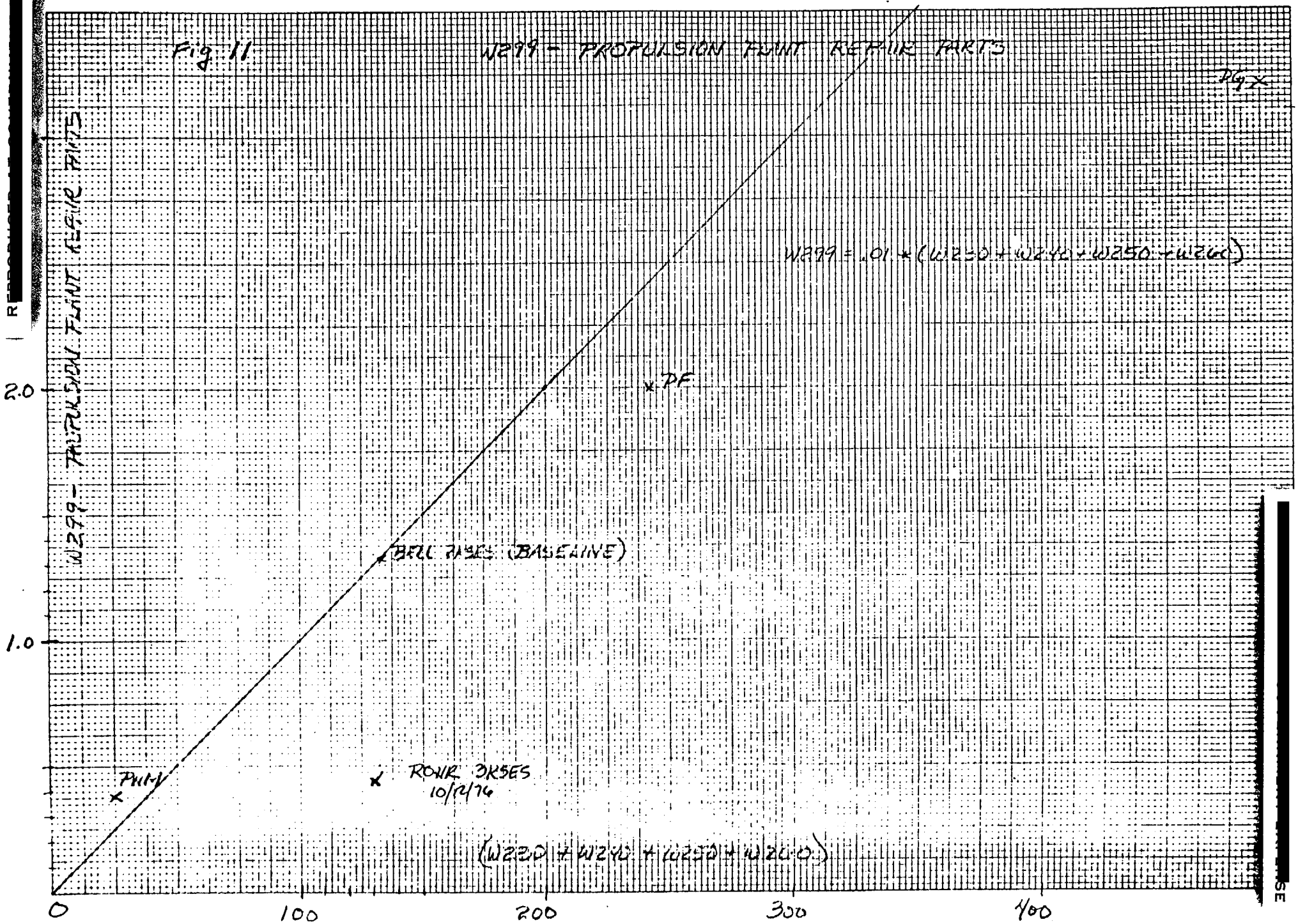
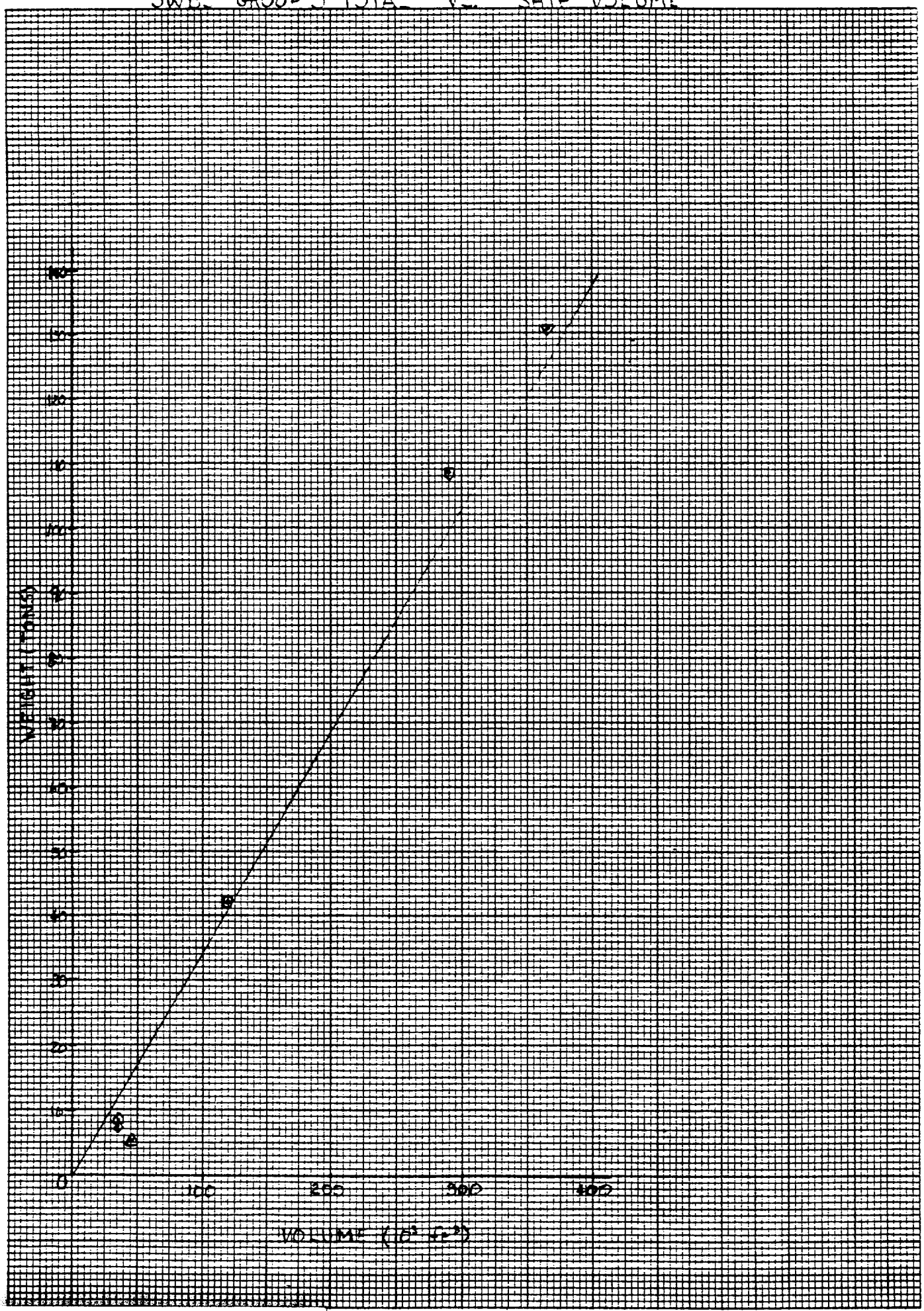
TRACING PAPER NO. 1227-10
CROSS SECTION-10X10 TO 1 INCH
AQUABEE
MADE IN USA

H1 4/B

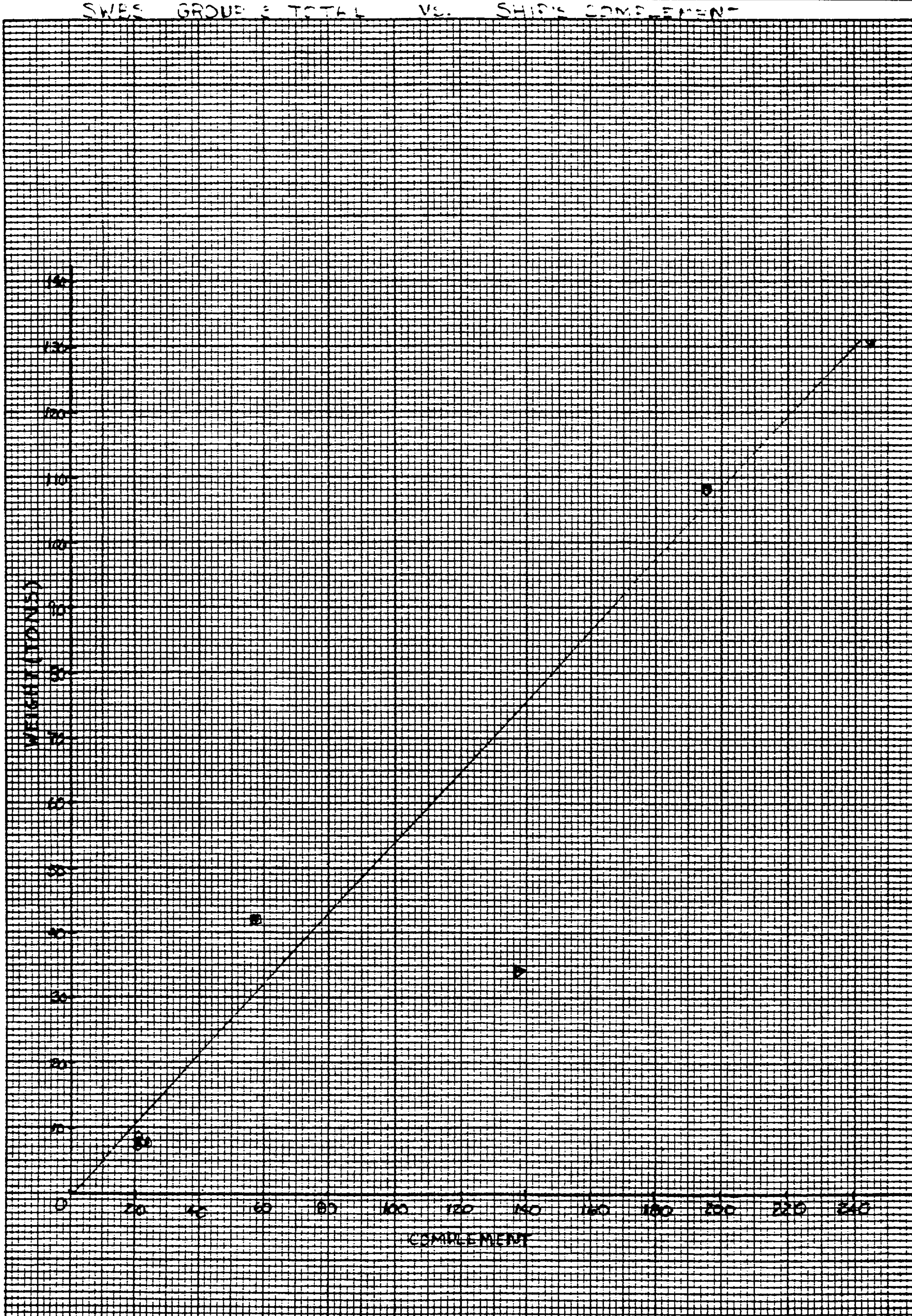
Fig. 11 W279 - PROPULSION FLUID REPAIR PARTS





EPI MF. 20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

SWBS GROUP 8 TOTAL VS. SHIP'S COMPLEMENT



FPI MI 20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

REPRODUCED AT GOVERNMENT

311 Ship Service Power Generation ✓

$$W311 = K311 * KWI$$

where $K311 = .0075$ lt/KW

(K311 is a constant based on [redacted] hydrofoil data for gas turbine generators.)

KWI = Installed KW

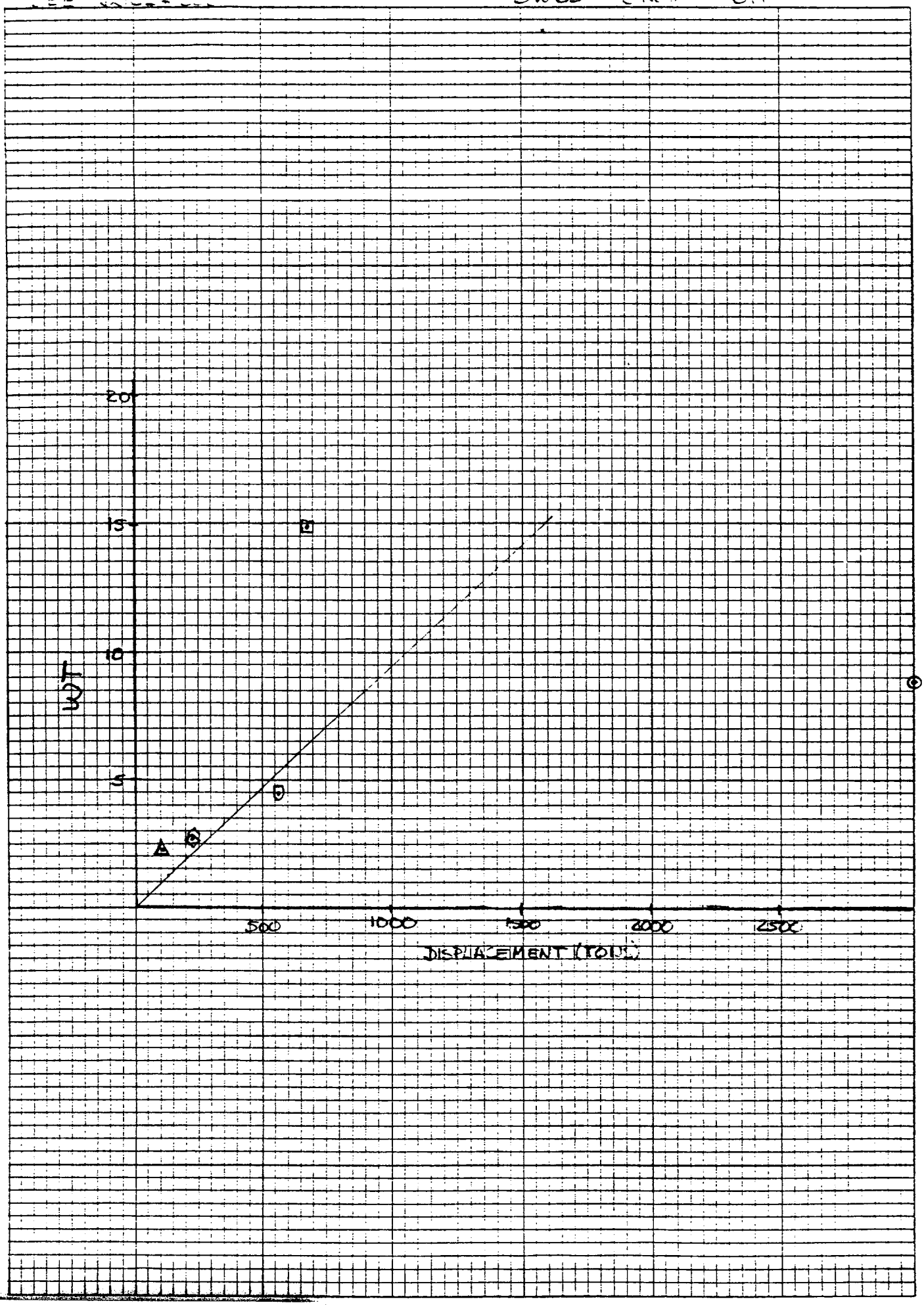
Algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

SEE [illegible]

SWBS GROUP 311



PRINTED IN U.S.A. 10 X 10 TO 1 INCH
10TH LINE HEAVY

313 Batteries and Service Facilities ✓

$W313 = K313 * KWI$

where $K313 = .0003746$ M/KW (ASSET)

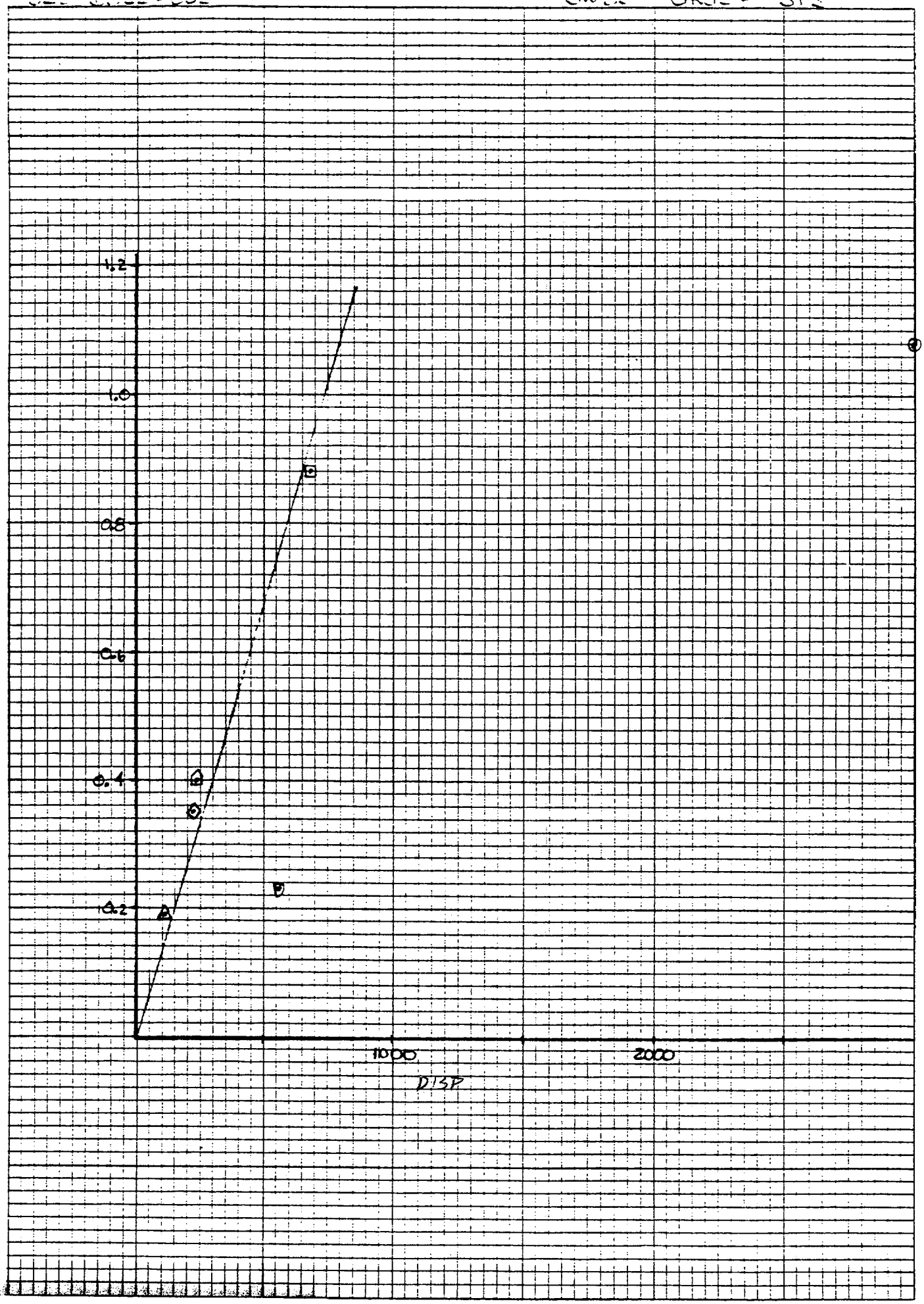
KWI = Installed KW

The Algorithm is also from ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

SEE [illegible] 302

SWEA GROUP 313



EPI-LOG 10 X 10 TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

ITTERIES

314 Power Conversion Equipment

$W314 = K314 * KWI$

where $K314 = .0024$ lt/Kw

(K314 is a constant based on hydrofoil return data.)

KWI = Installed KW

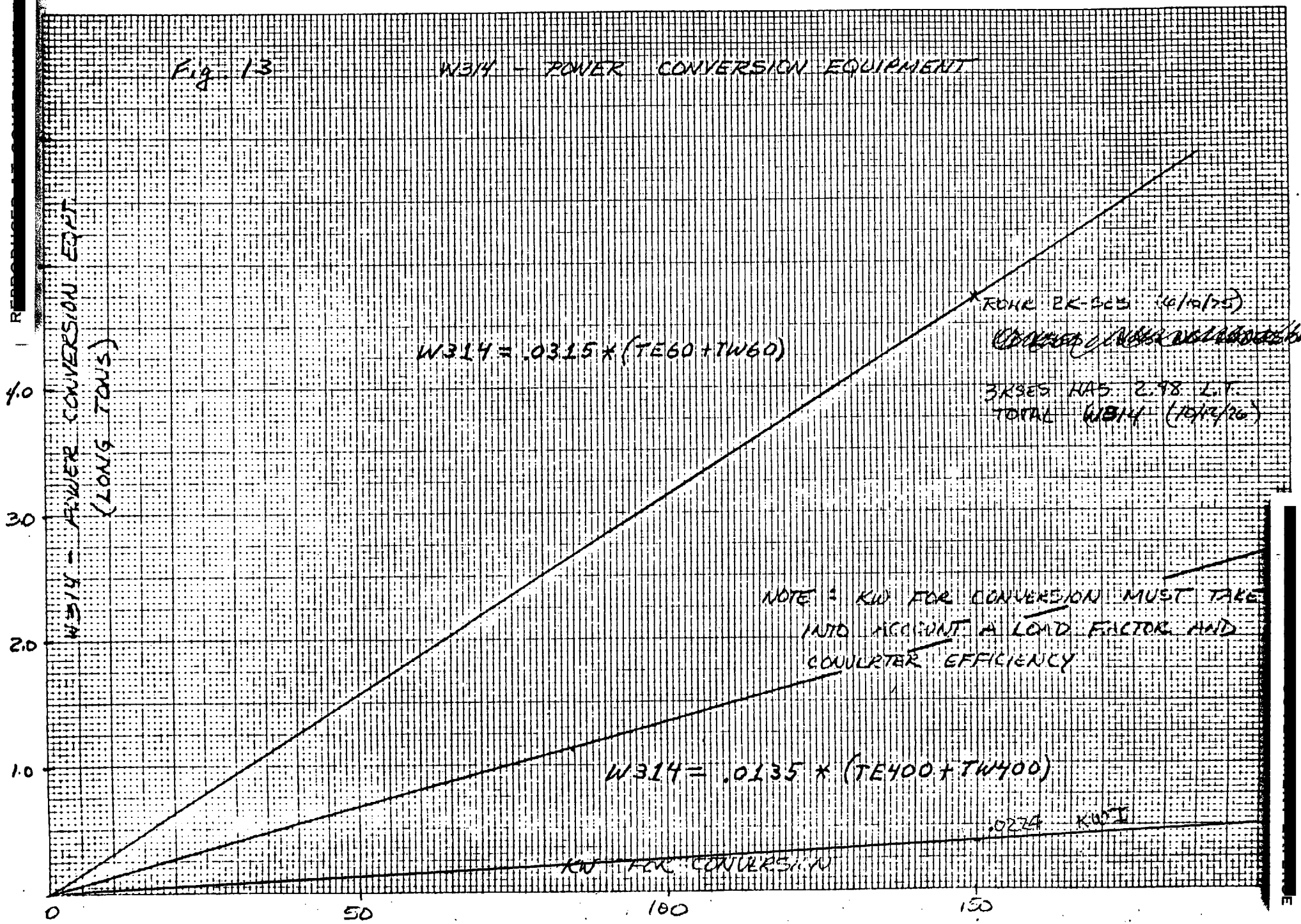
Then

The algorithm is the same as ASSET.

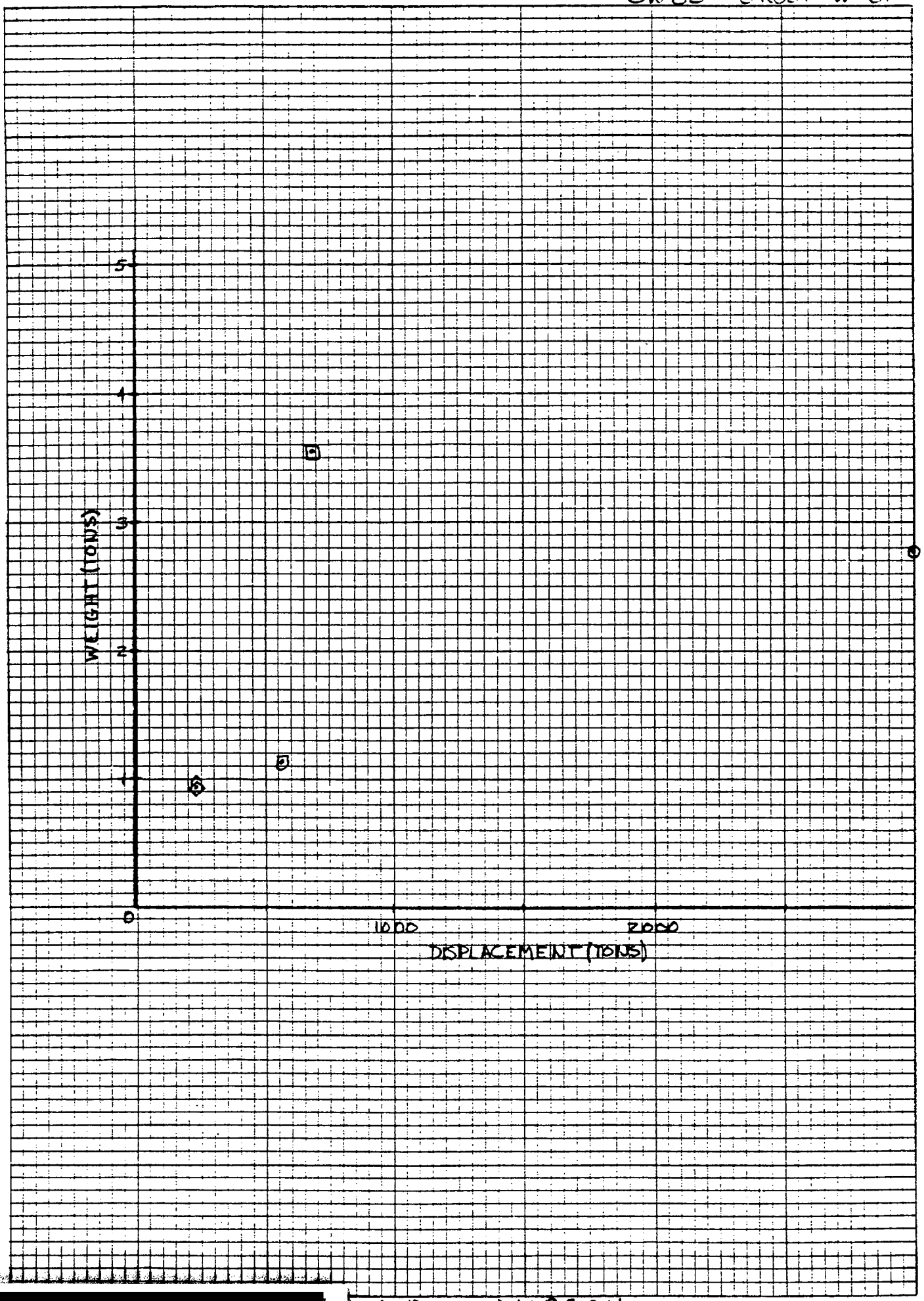
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

DRAWING PAPER NO. 1200-10
TRACING PAPER NO. 1227-10
CROSS SECTION-10X10 TO 1 INCH
AQUABEE
MADE IN USA

Fig. 13 W314 - POWER CONVERSION EQUIPMENT



SWBS GROUP W 312



EPSILON 10 X 10 TO 1 INCH
10TH LINE HEAVY

[redacted] POWER CONVERSION

321 Ship Service Power Cable ✓

$W321 = K321 * KWI + L321 * VOLA$

where $K321 = .0034$ lt/kw + $L321 = .0123$ lt/ft^3

(These constants are based on return data from Hydrofoils and SESs.)

KWI = Installed KW, kw

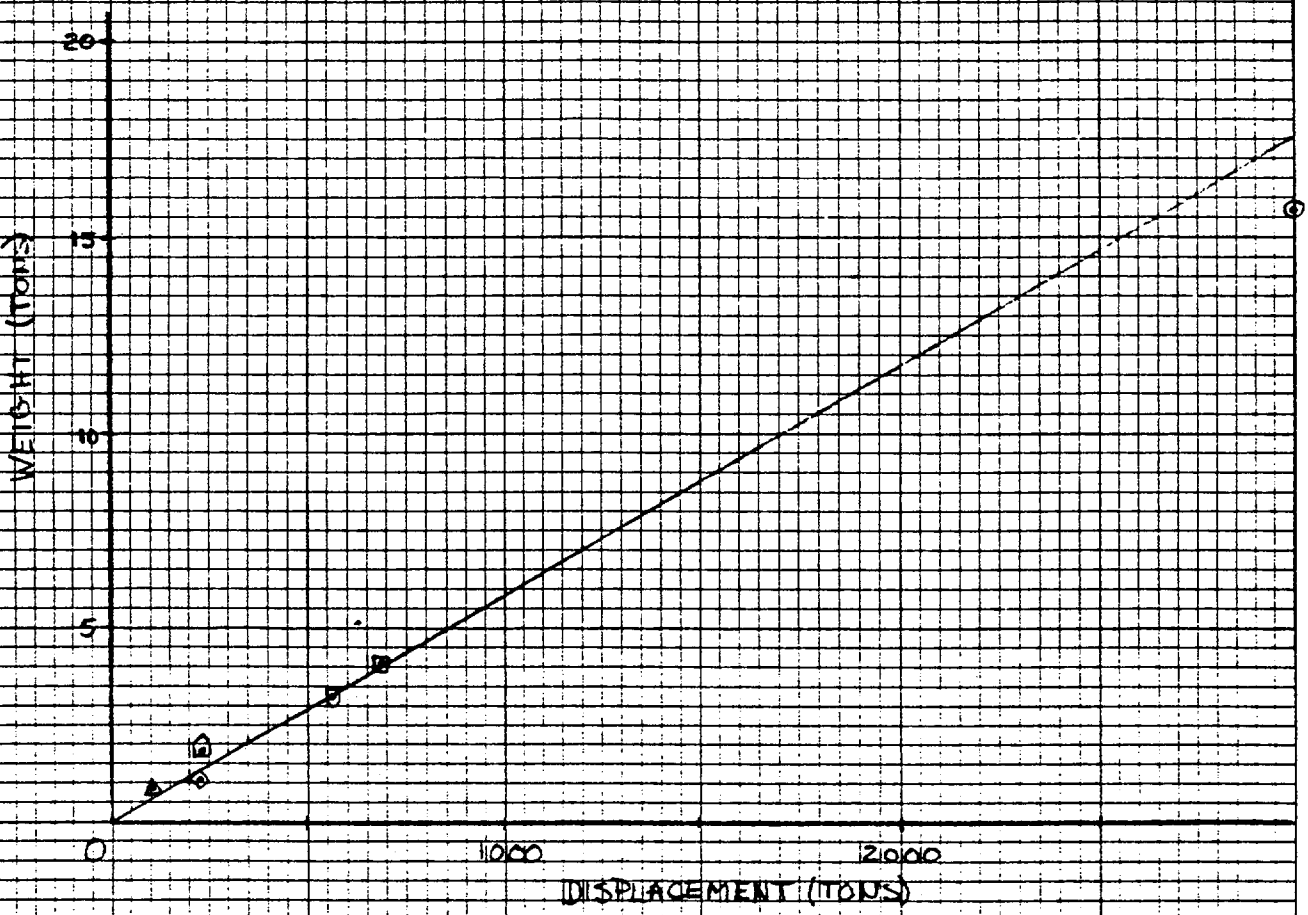
VOLA = Total Volume * 10^{-3}, ft^3

The algorithm is based on the SES Design Manual.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

SEE ESCI-302

SWBS GROUP W 321



PRINTED IN U.S.A.
10 X 10 TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

POWER CABLE

323 Casualty Power Cable ✓

$W323 = K323 * W321$

where $K323 = .0346$ (SES Design Manual)

$W321$ = Ship Service Power Cable, lb

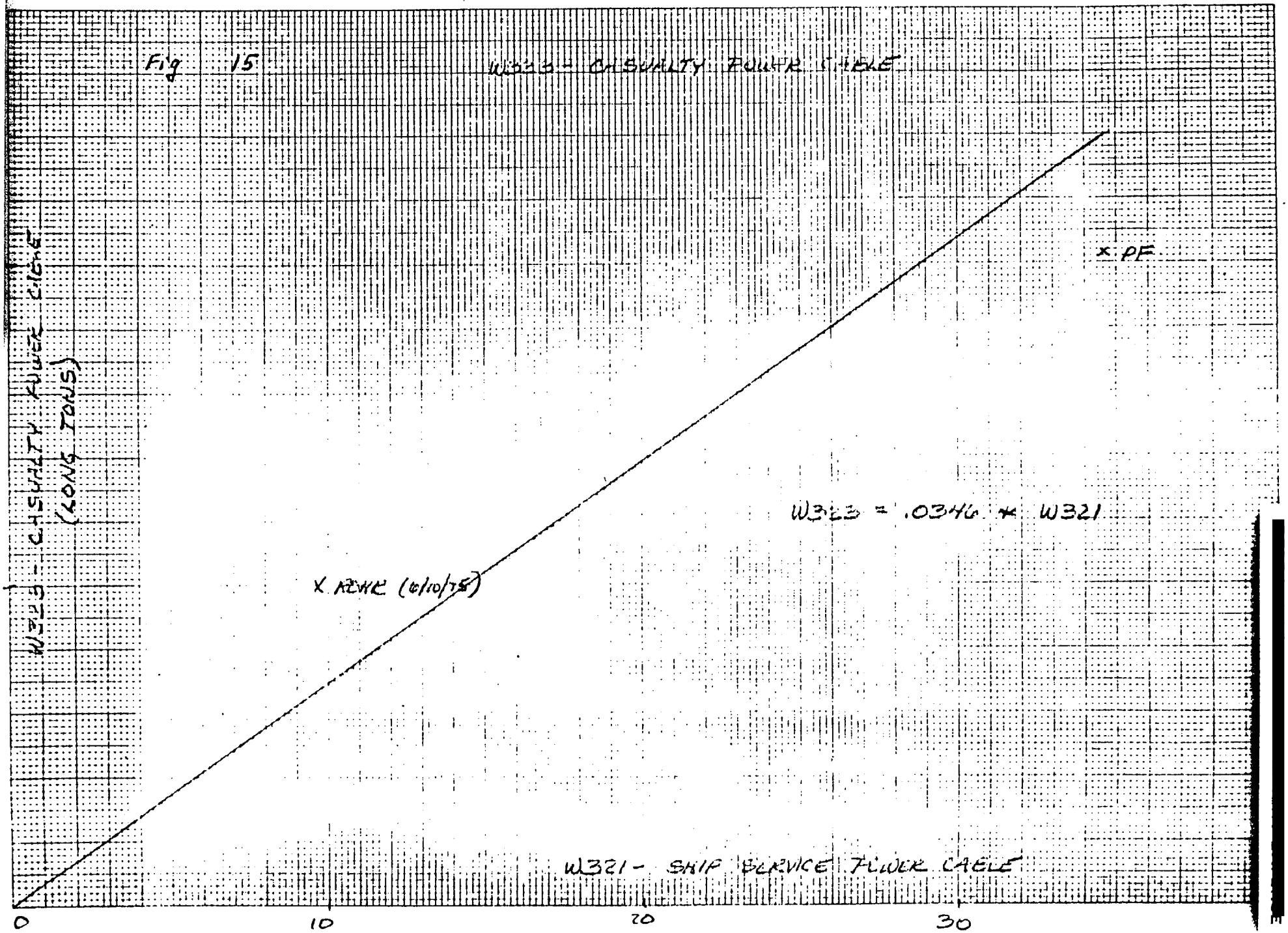
The algorithm is also from the SES Design Manual.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

DRAWING PAPER NO. 1280-10
TRACING PAPER NO. 1227-10
CROSS SECTION-10X10 TO 1 INCH
AQUABEE
MADE IN USA

Fig 15



324 Switchgear and Panels ✓

$$W324 = K324 * KWI$$

where $K324 = .0035$ lb/kw

(K324 is a constant based on return weights for hydrofoils and SESs.)

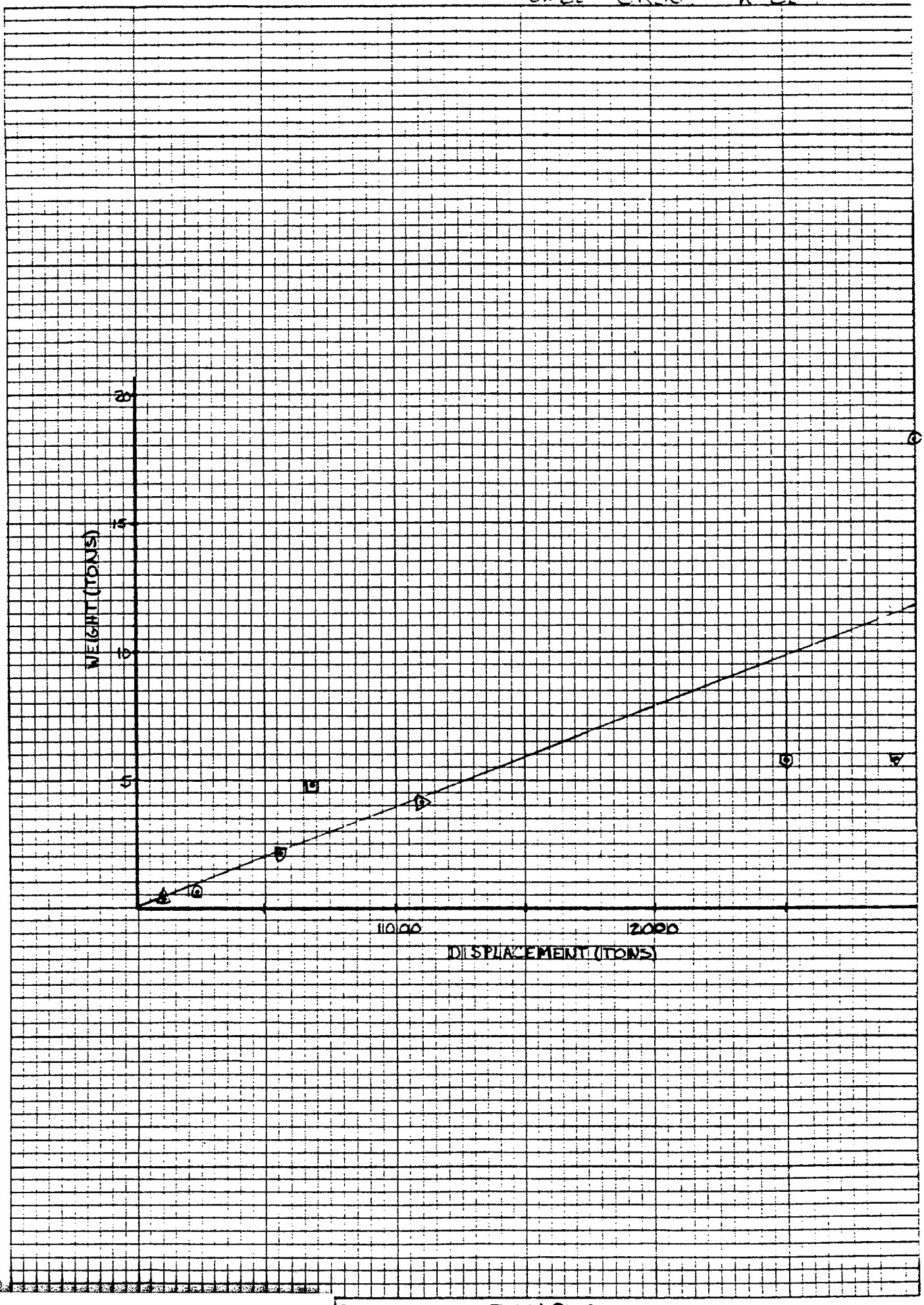
KWI = Installed KW, kw

The Algorithm is the same as ASSET.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP II 3.4



FRISCHMAN 10 X 10 TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

SWITCHGEAR & PANELS

331 Lighting Distribution ✓

$$W331 = K331 * VOLA$$

where $K331 = .0074$ ~~lbf~~/ft^3

(K331 is a constant determine from return data of hydrofoil and SESs.)

VOLA = Total Volume $* 10^{-3}$, ft^3

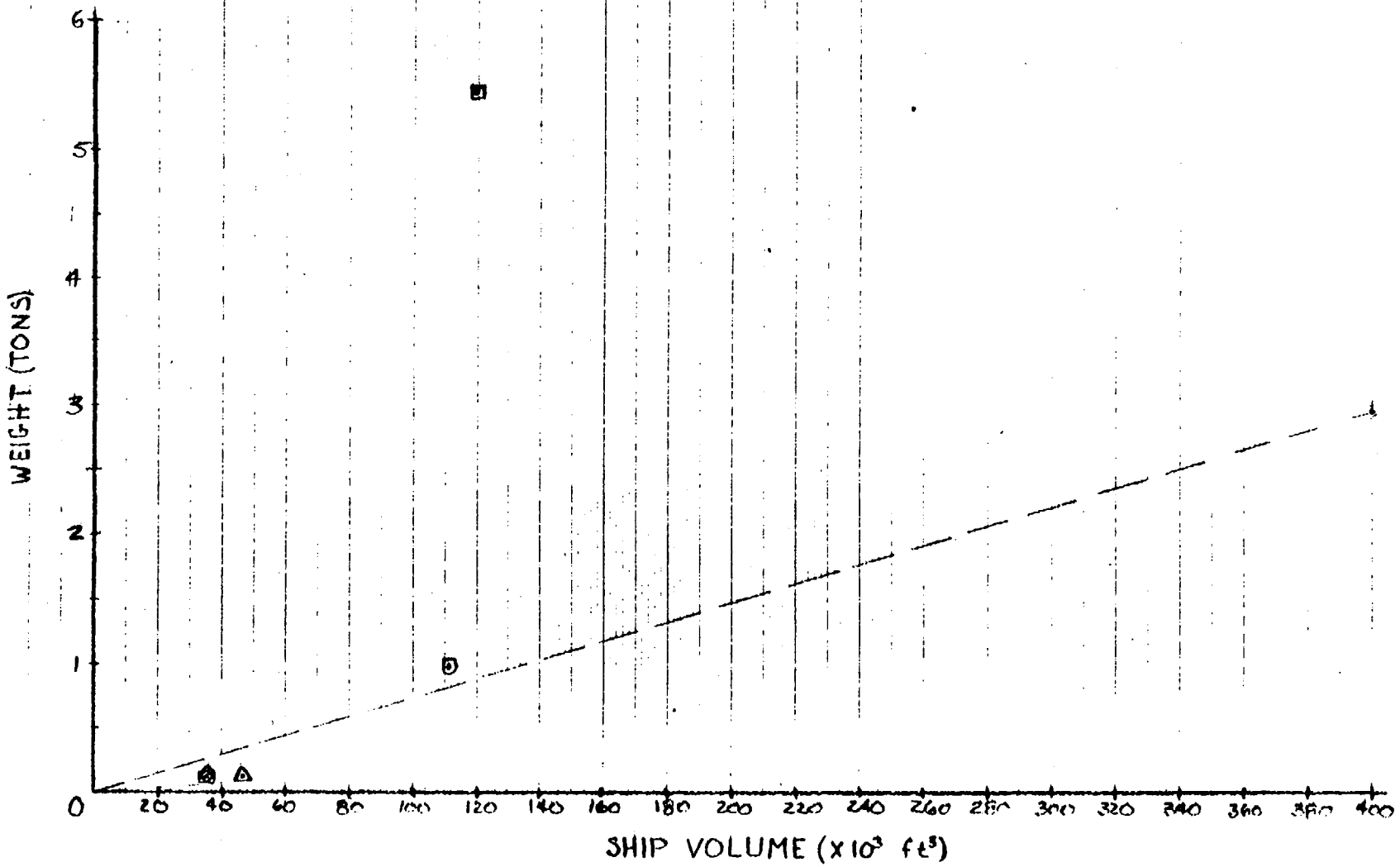
The algorithm is the same as ASSET and SES Design Manual

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

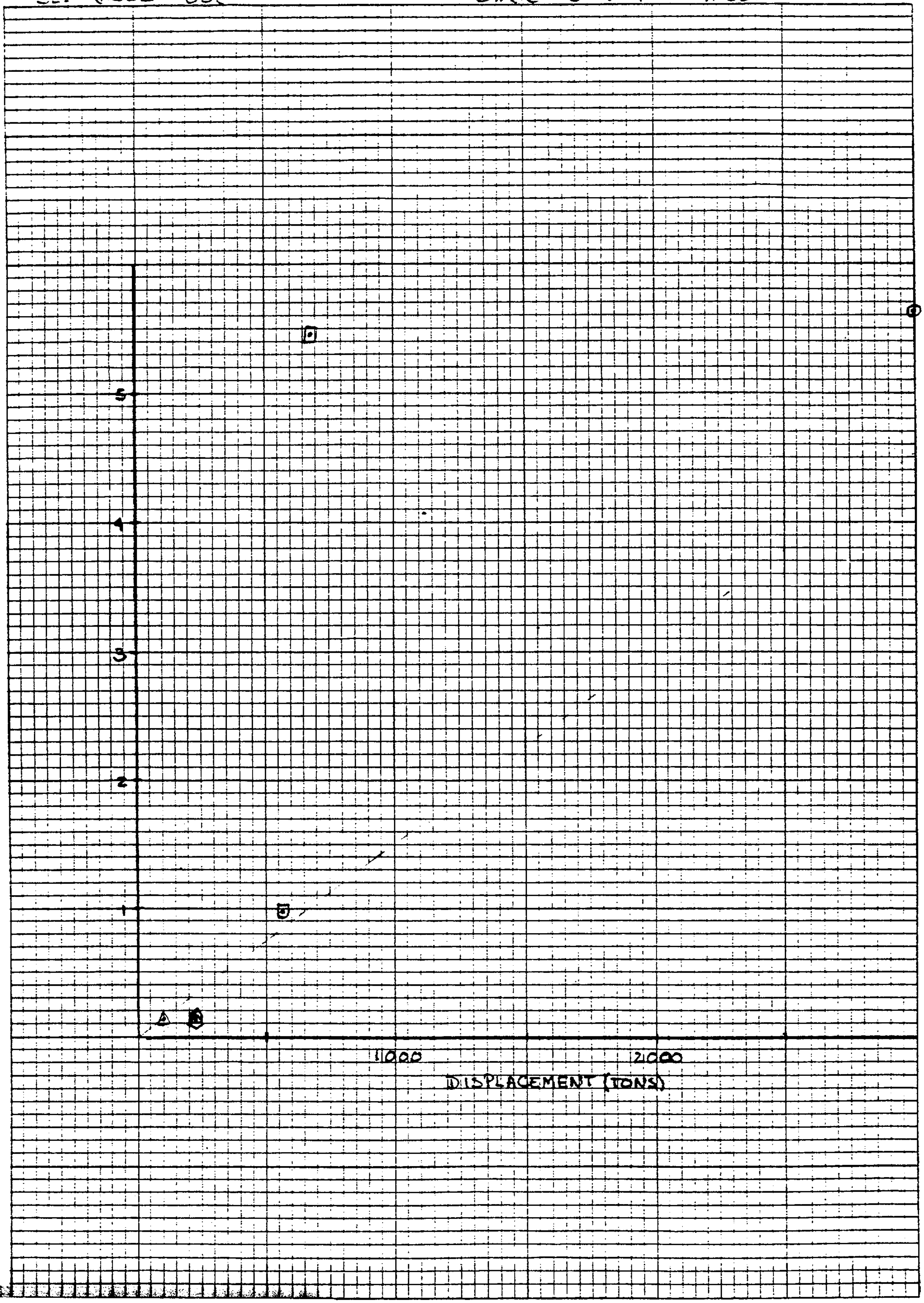
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W 331 LIGHTING DISTRIBUTION



SEE ... SWSS GROUP



REPRODUCED AT GOVERNMENT EXPENSE

HTING DISTRIBUTION

332 Lighting Fixtures ✓

$W332 = K332 * ACOM$

where $K332 = .027$

(K332 is a constant driven from returns weights of hydrofoils and SESs.)

ACOM = Total accommodations

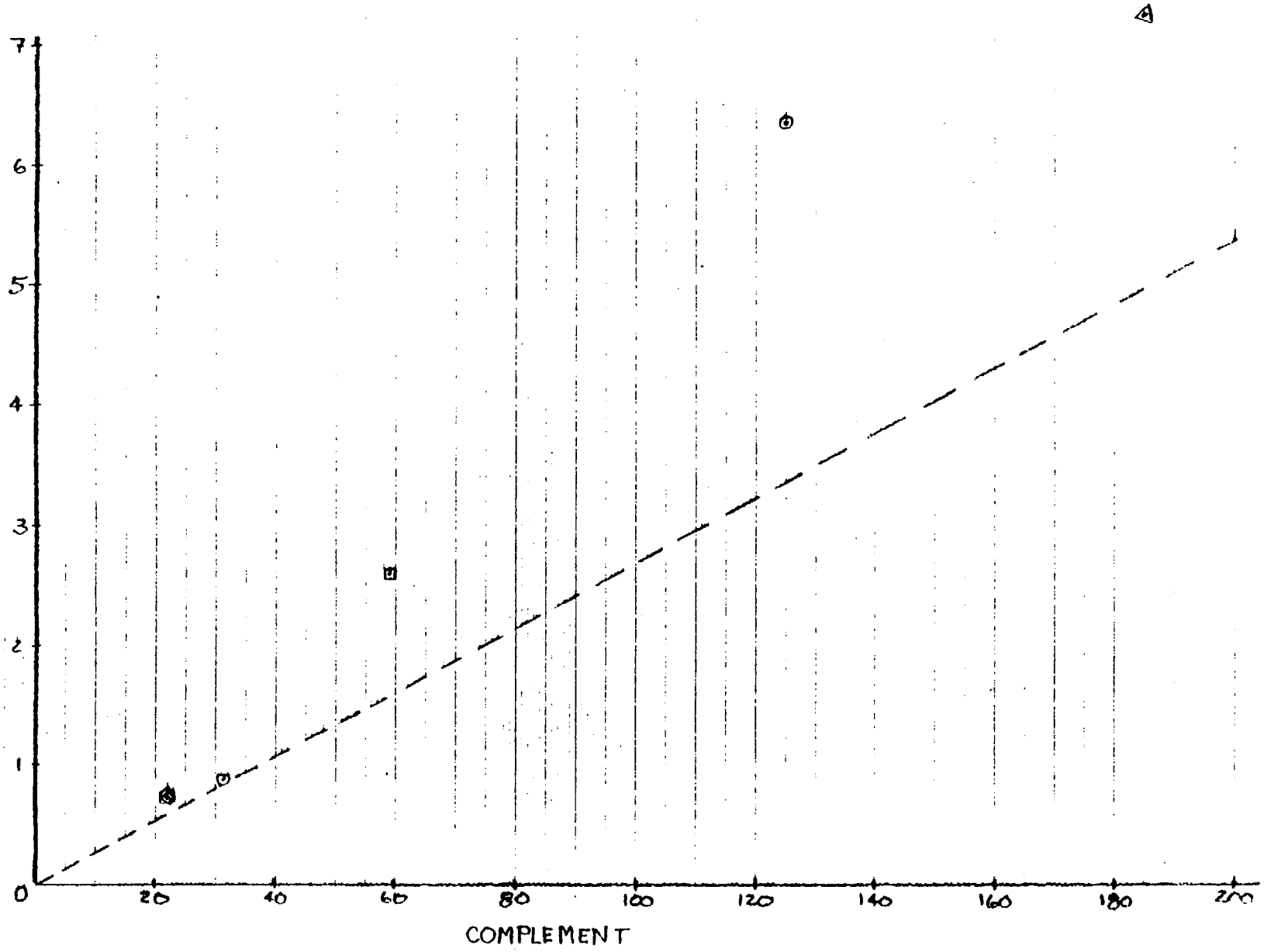
This algorithm is the same as SES Design Manual.

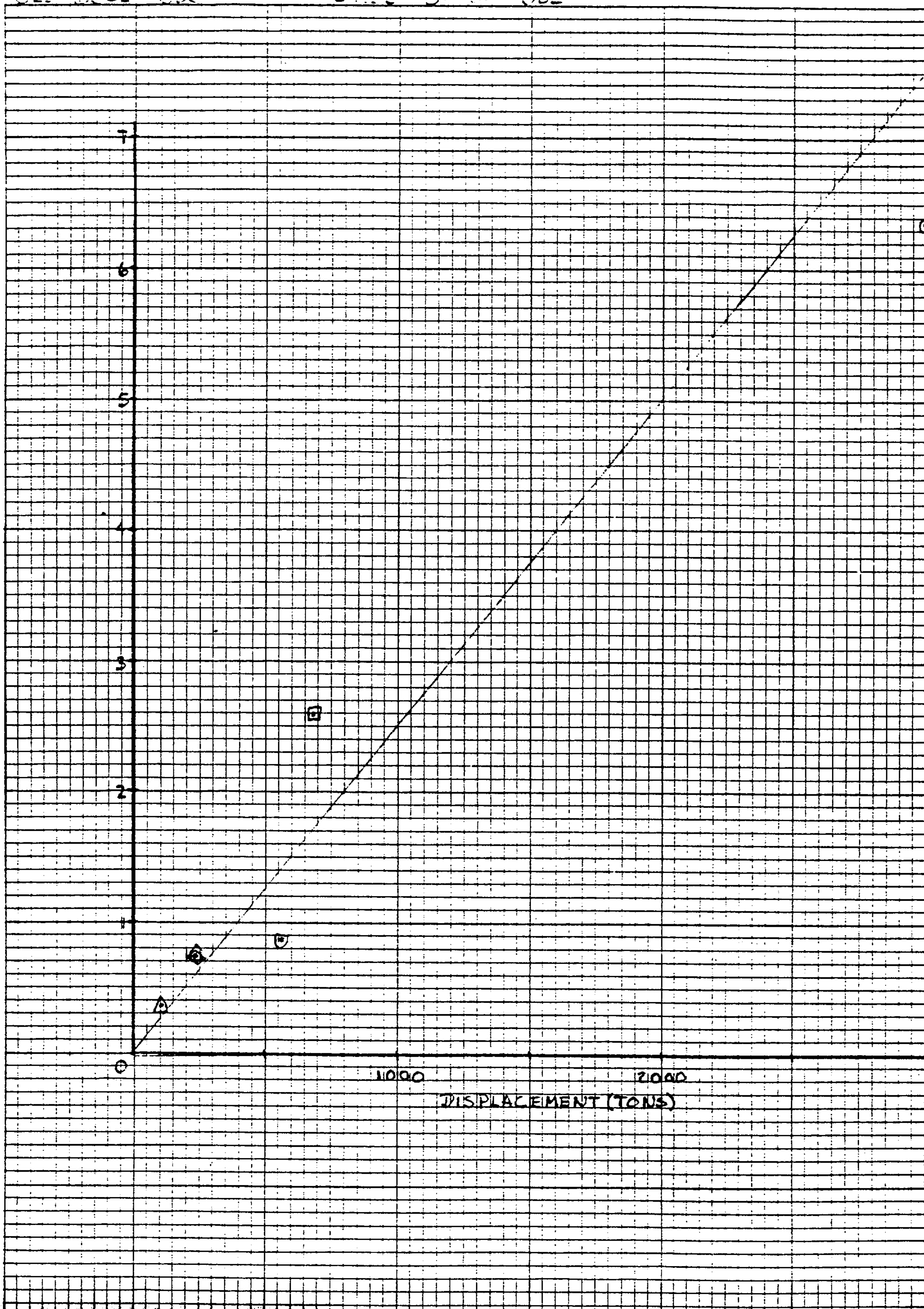
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

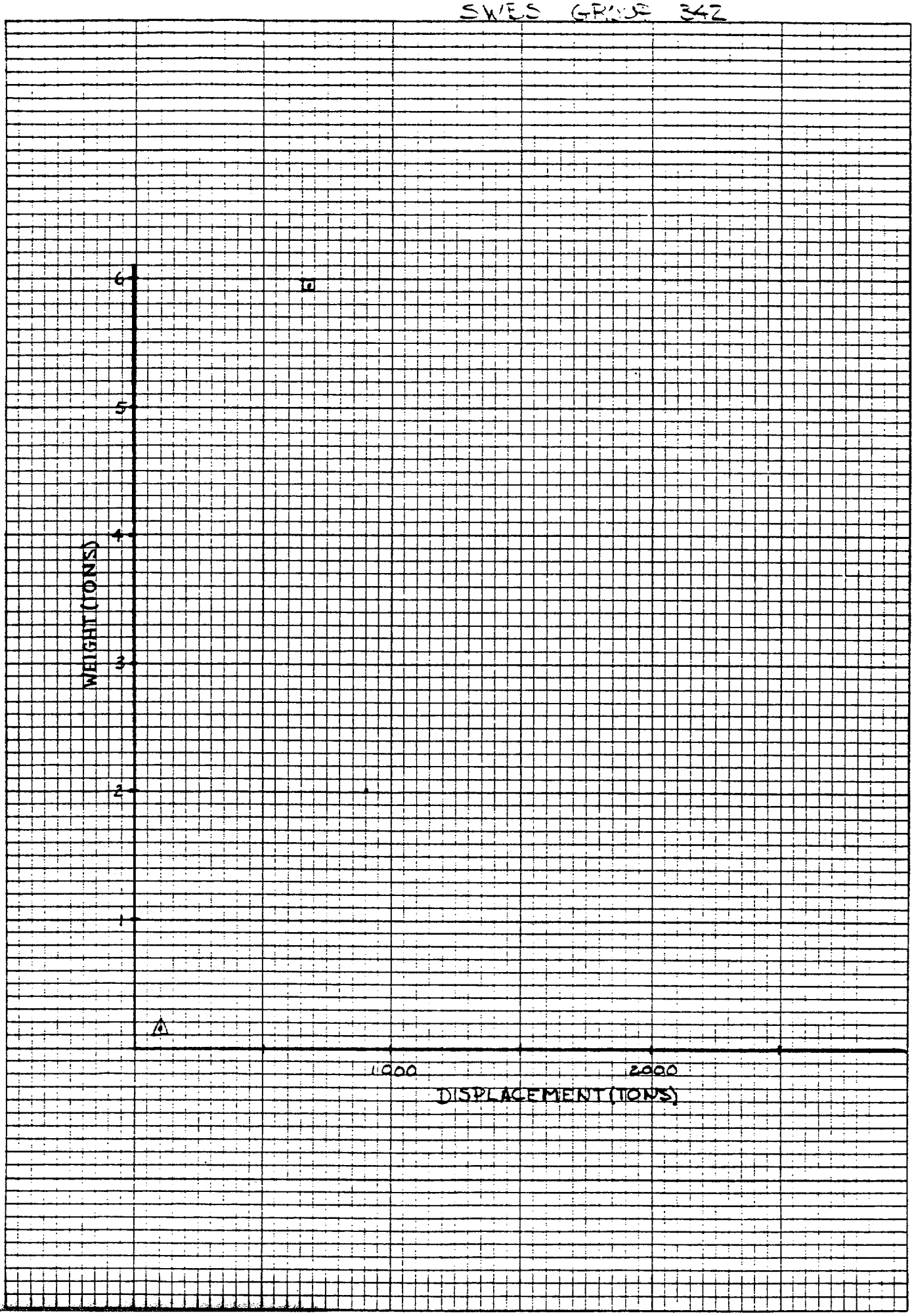
SWBS GROUP W332 LIGHTING FIXTURES





REPRODUCED AT GOVERNMENT EXPENSE LIGHTING FIXTURES

SWES GRADE 342



REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

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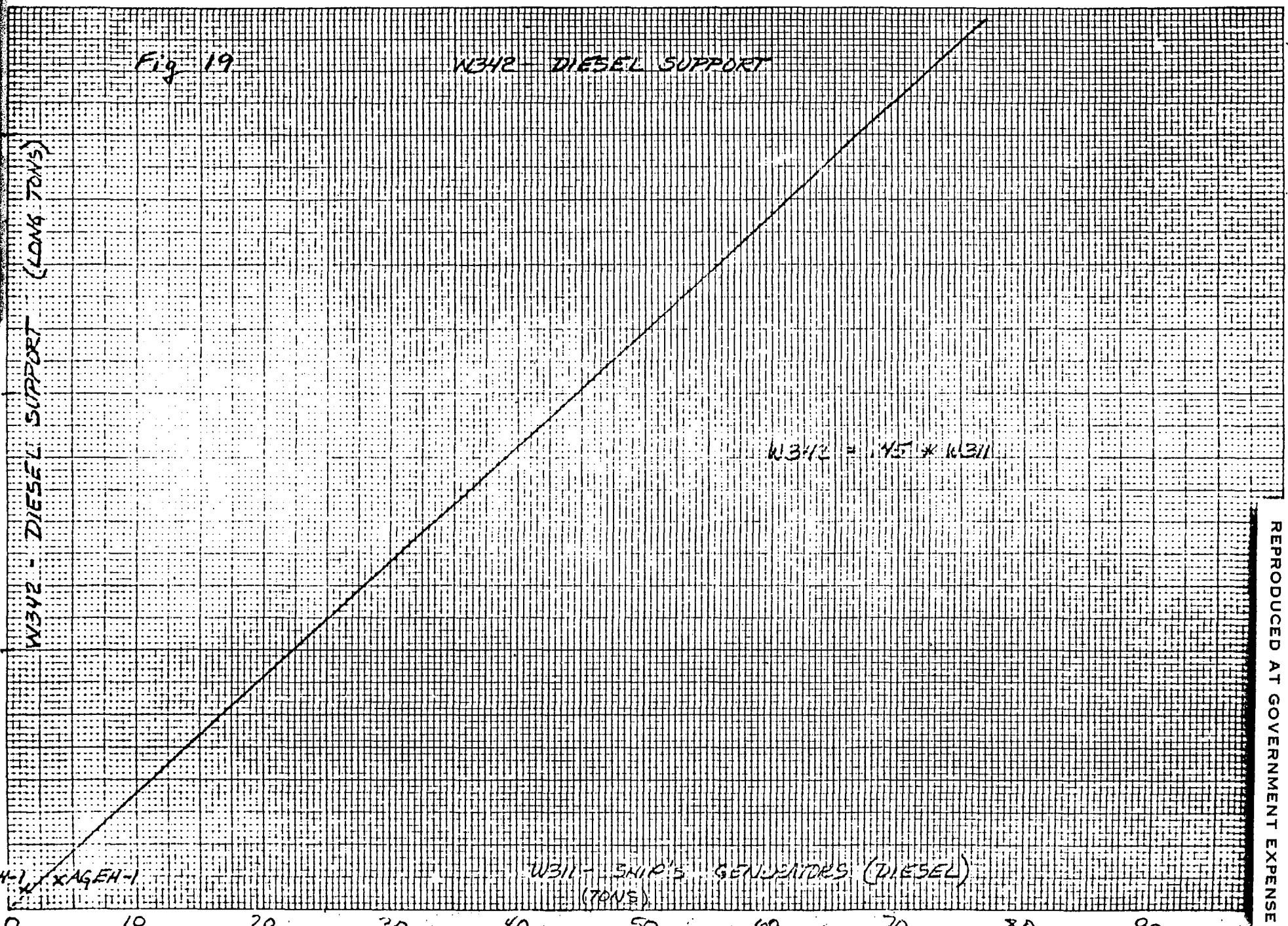
CROSS SECTION - 10X10 TO 1 INCH
AQUABEE
MADE IN USA

PF X

Fig 19 W342 - DIESEL SUPPORT



REPRODUCED AT GOVERNMENT EXPENSE

343 Turbine Generator Support System ✓

$W343 = K343 * KWI$

where K343 = .0061 lbt/KW (ASSET)

KWI = Install KW, kw

Algorithm is also the same as ASSET

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

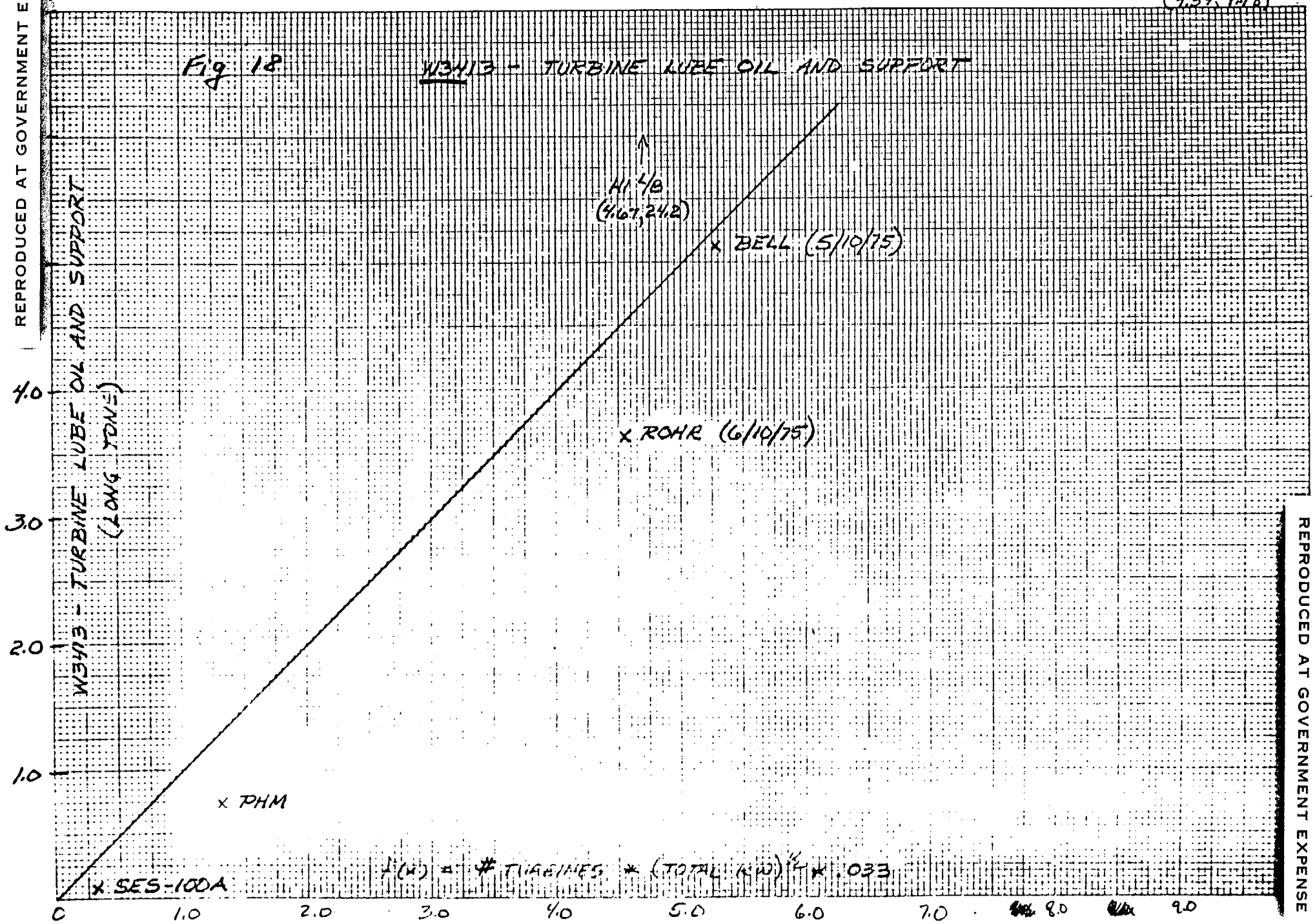
DRAWING PAPER NO. 1200-10
TRACING PAPER NO. 1227-10
CROSS SECTION-10X10 TO 1 INCH
AQUABEE
MADE IN USA

REPRODUCED AT GOVERNMENT EXPENSE

ROHR 3KSES
(9.39, 9.78)

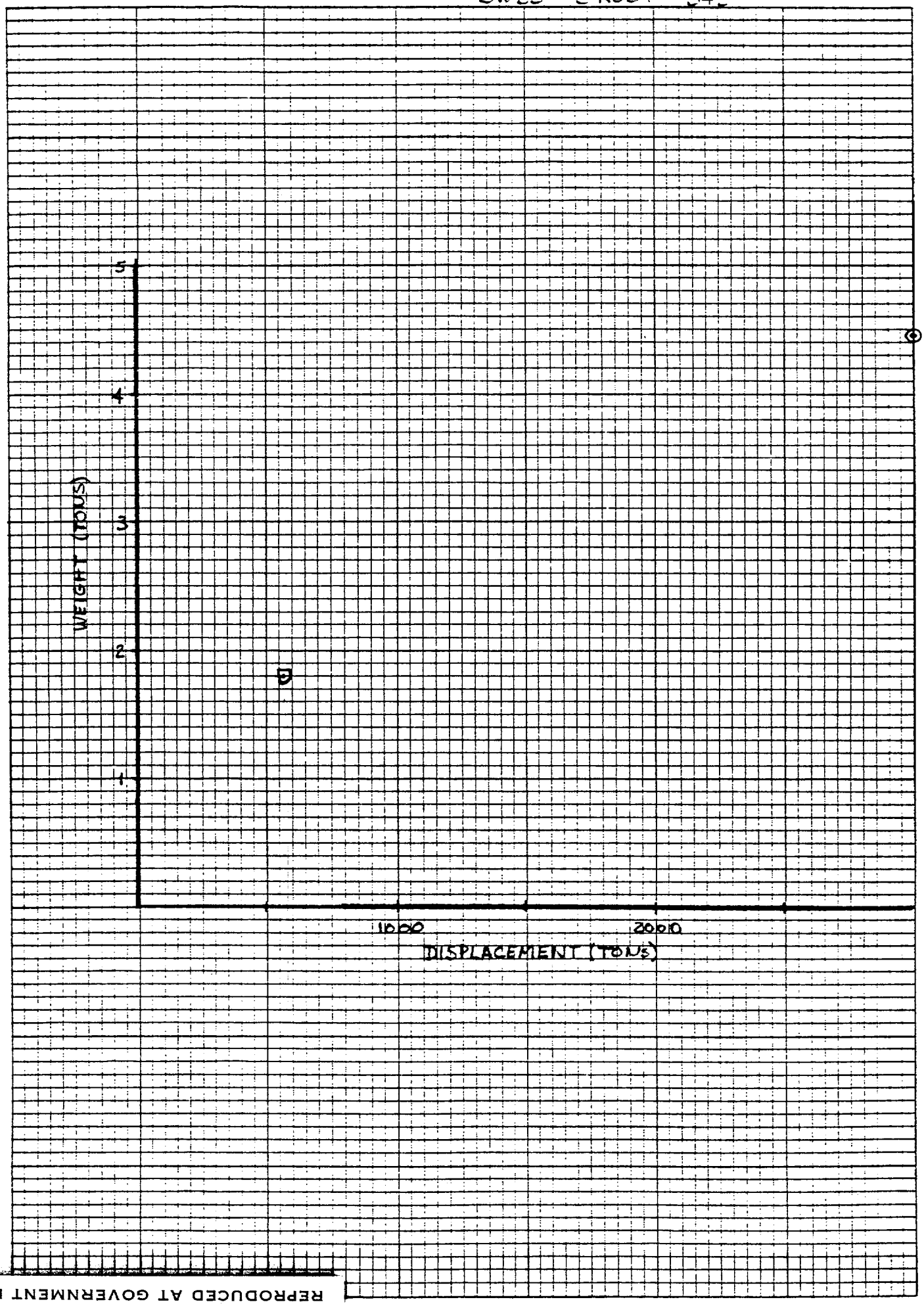
Fig 18

W3413 - TURBINE LUBE OIL AND SUPPORT



REPRODUCED AT GOVERNMENT EXPENSE

SWES GROUP 543



PRINTED IN U.S.A. TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

398 Electric Plant Operating Fluids ✓

$$W398 = K398 * KWI$$

where K398 = .002 lb/KW

(K398 is derived from return weights on hydrofoils and SESs.)

KWI = Installed KW, KW

The Algorithm is the same as ASSET.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

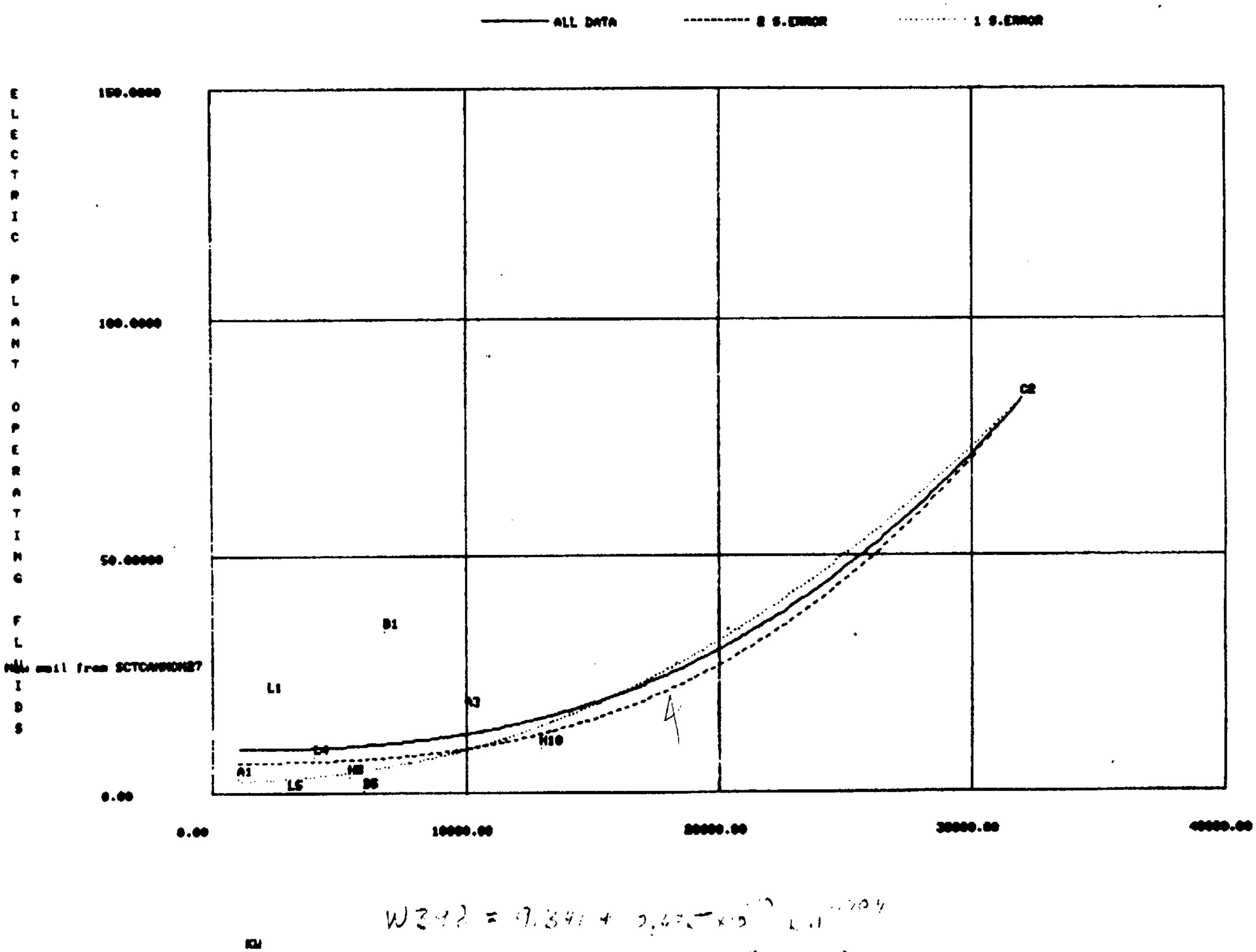
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

TO CONTINUE, TYPE CONTINUE

$ CONTINUE

ELECTRIC PLANT OPERATIG FLUIDS (398)



W398 = 9.341 + [illegible] KW [illegible]

= [illegible] KW [illegible]

= 2. [illegible] KW 2.150

REPRODUCED AT GOVERNMENT EXPENSE

399 Electric Plant Parts and Special Tools

W399 = K399 × KWI

where K399 = .001 lt/kw

(K399 is based on return weights of hydrofoils and SESs.)

KWI = Installed KW, ww

The Algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

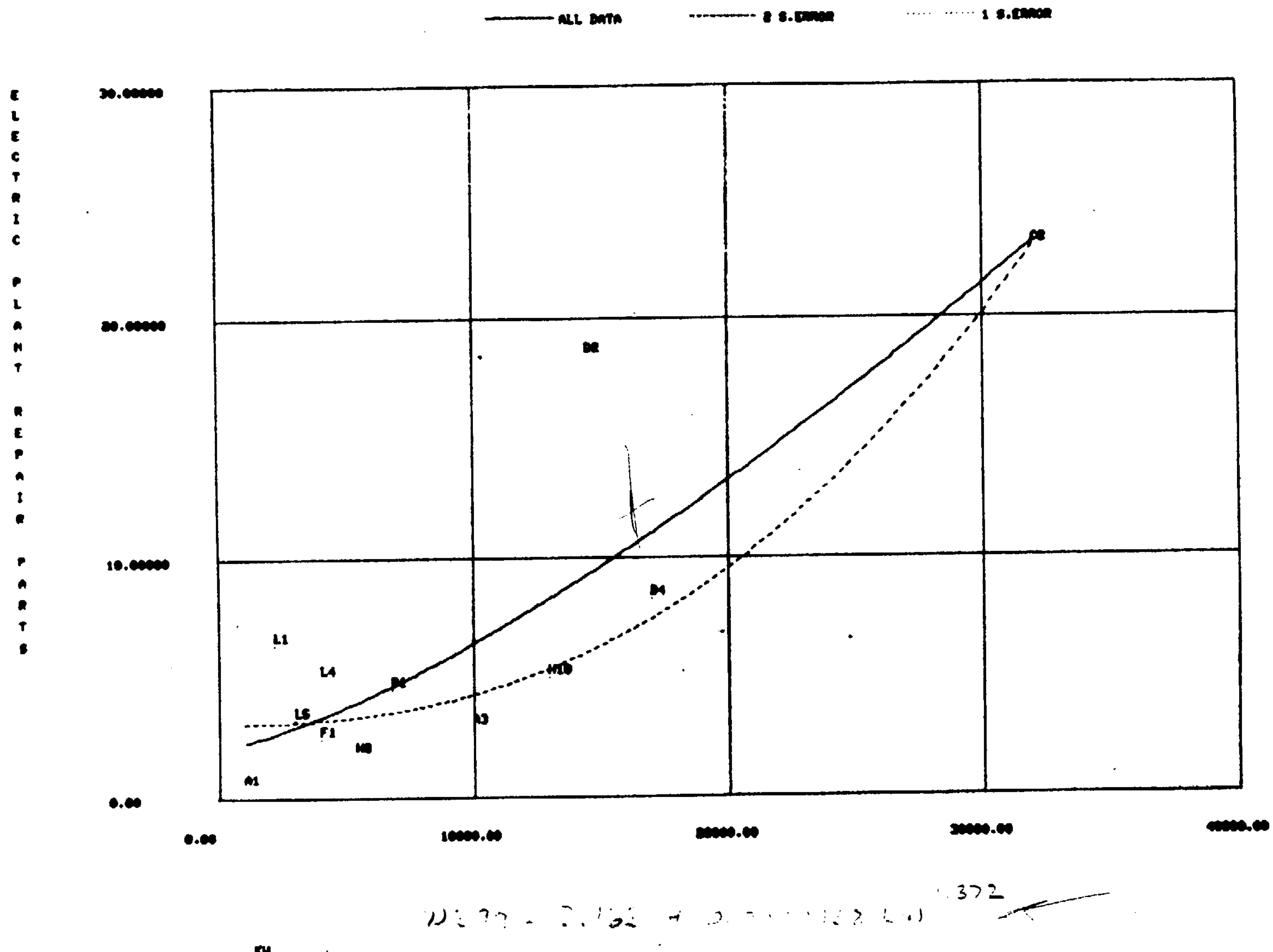
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

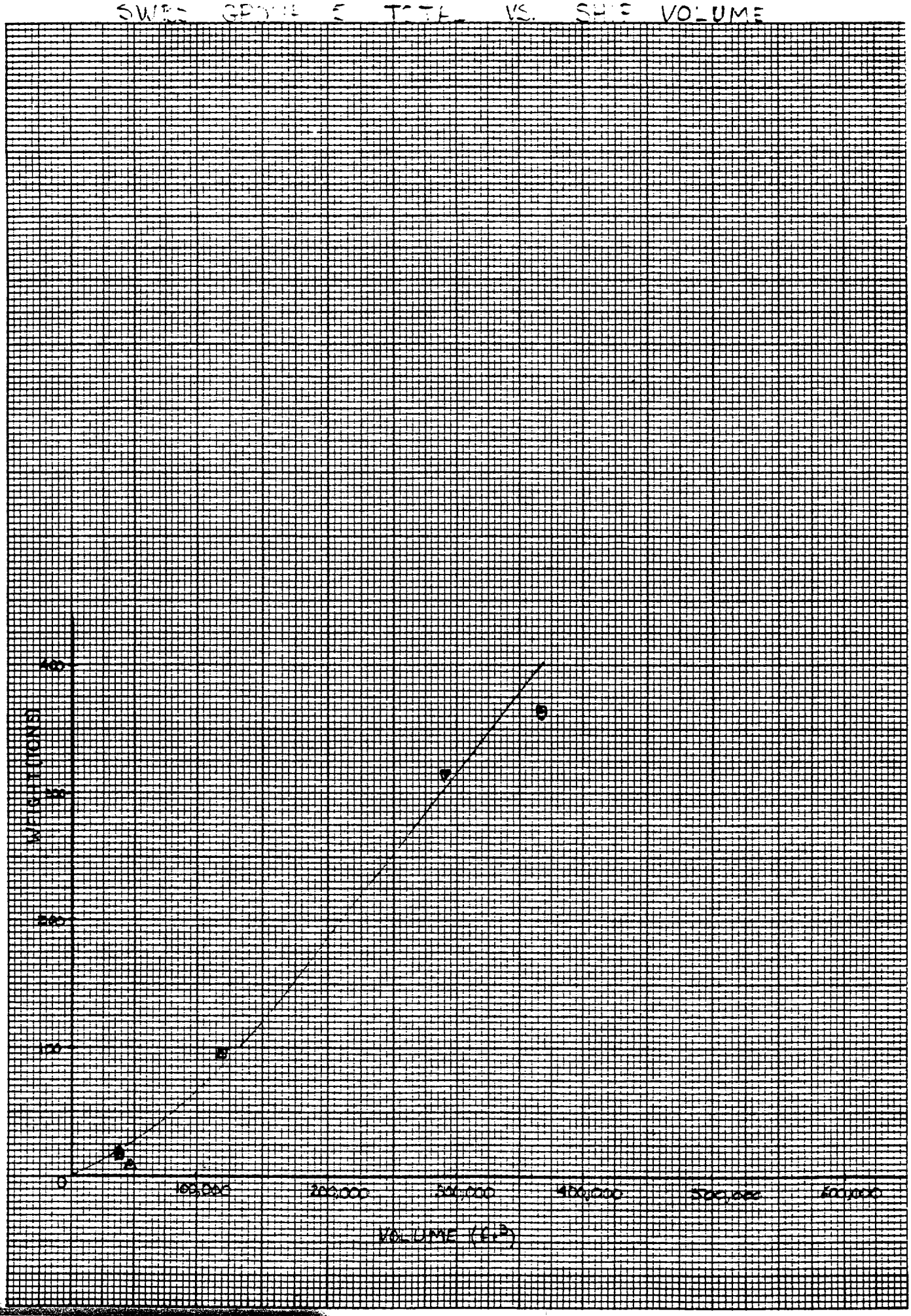
TO CONTINUE, TYPE CONTINUE

S CONTINUE

ELECTRIC PLANT REPAIR PARTS (399)



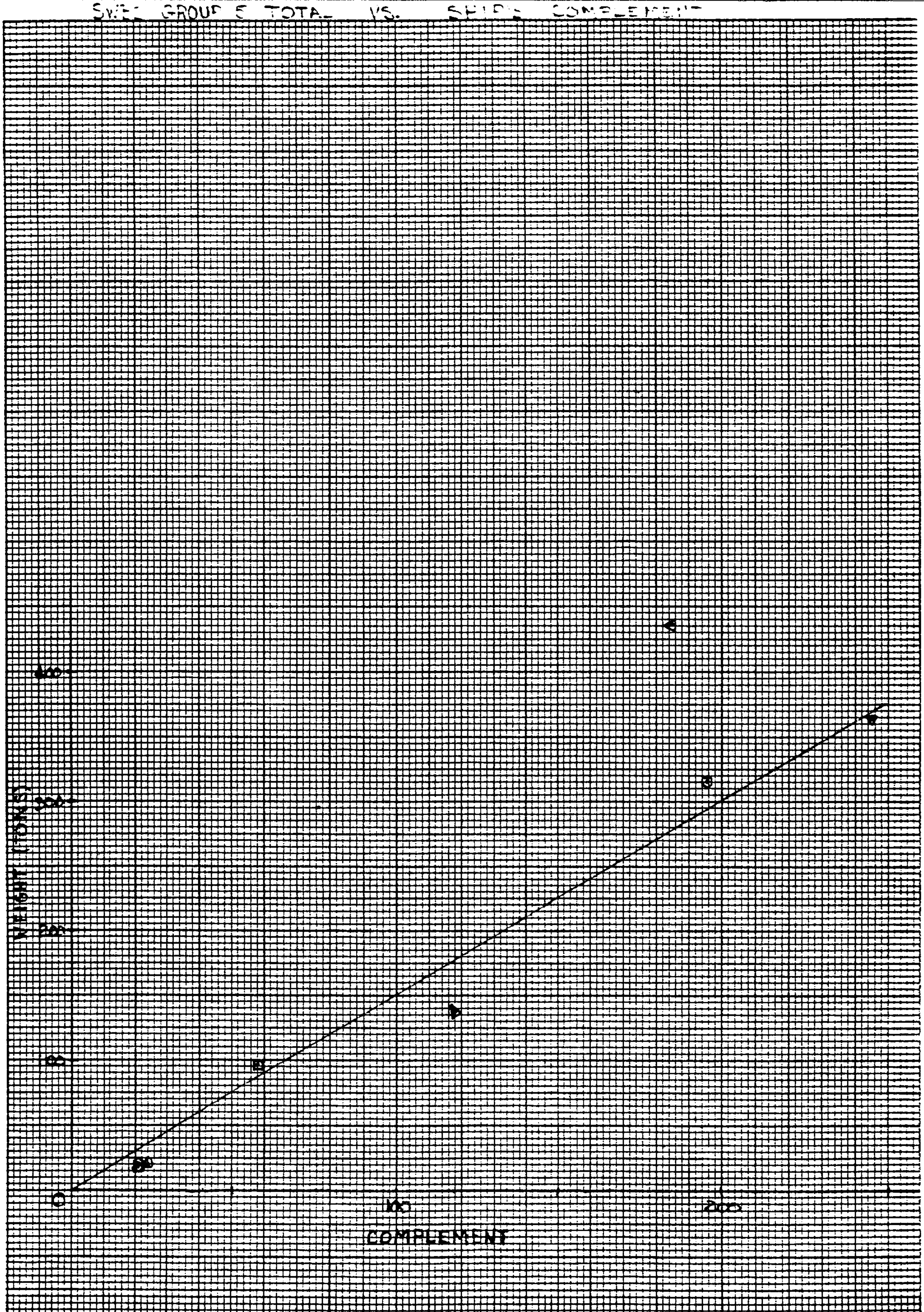
REPRODUCED AT GOVERNMENT EXPENSE



FP1.MT - 20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP 5 TOTAL VS. SHIP'S COMPLEMENT



FPI MI-20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

REPRODUCED AT GOVERNMENT EXPENSE

✓511 Compartment Heating

$W511 = K511 \times$ [redacted] $VOLA$ ✓

where $K511 = .002$ lt/ft³ ✓

(K511 is based on return duct data from hydrotools and SESs.)

~~ACOM = Number of accommodations~~
VOLA = Total volume $\times 10^{-3}$, ft³

The Algorithm is ~~based~~ same as ASSET.

ITEM
EC → EA

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

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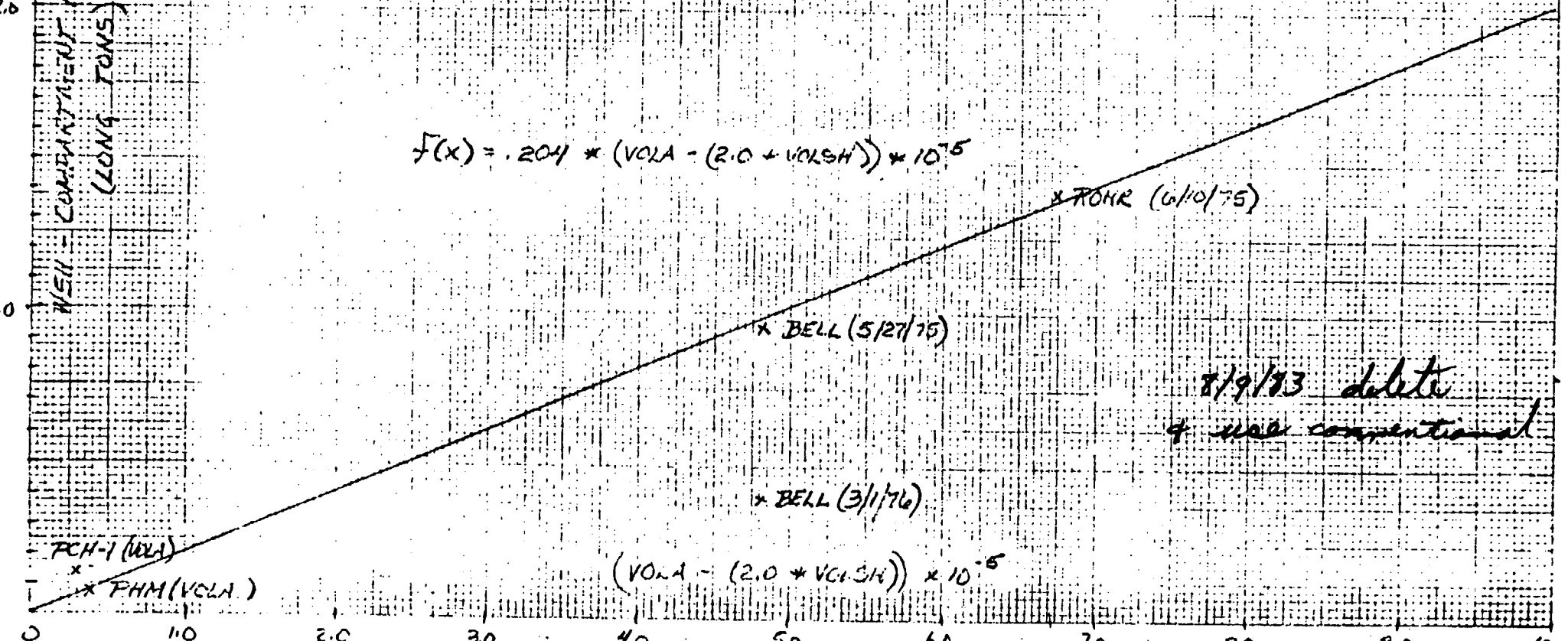
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

Fig 20

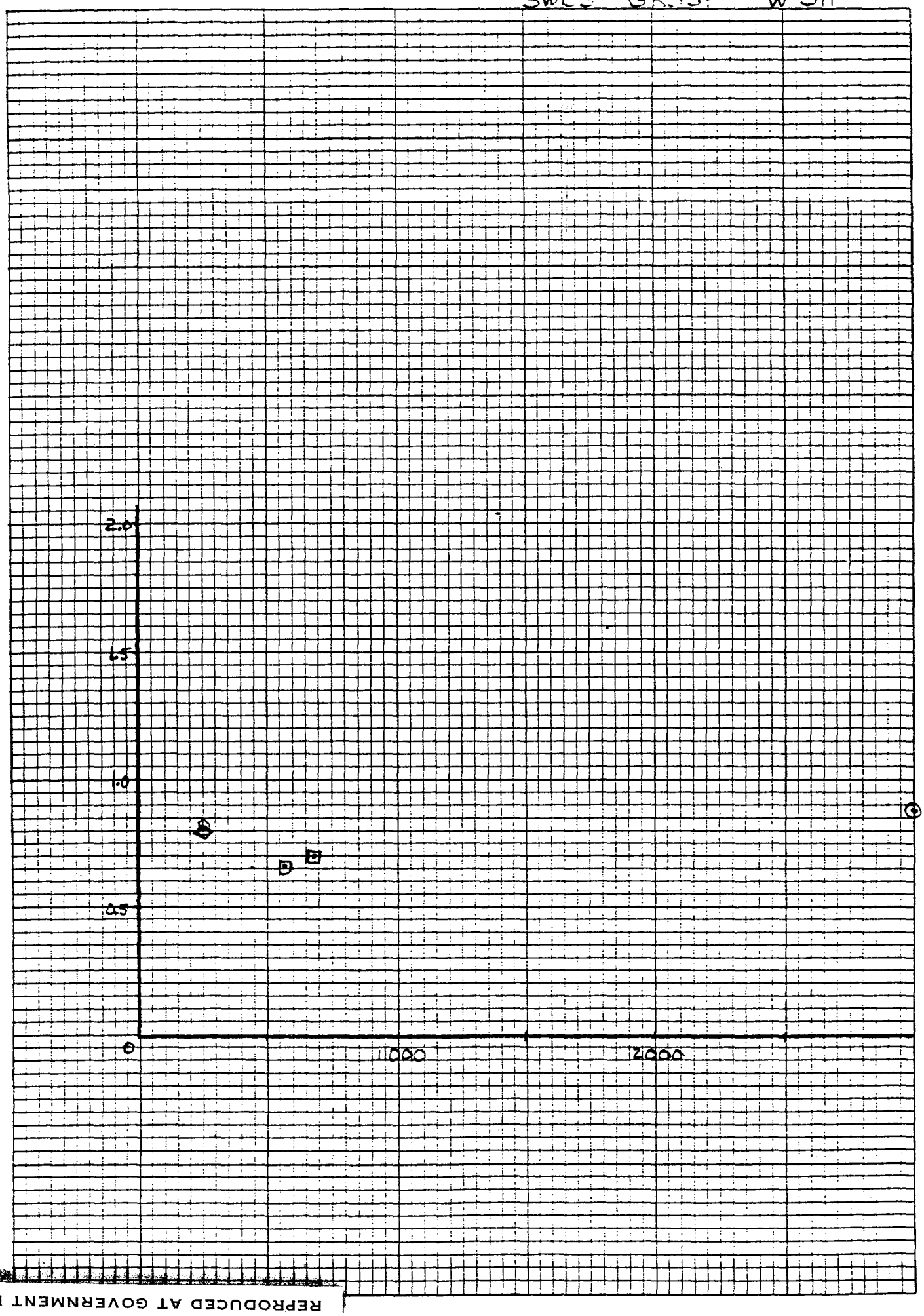
WSII - COMPARTMENT WEIGHTING

X WI 4/6



8/9/83 delete
4 was conventional

SWES GROUP W 511



KEUFFEL & ESSER CO. MADE IN U.S.A.
359-10 X 10 TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

✓512 Ventilation System

WS12 = KS12 * [redacted] VOLA ✓

where KS12 = [redacted] .01 lt/ft^3 ✓

(KS12 is based on return data from hydrostats and SBSs.)

VOLA = Total Volume * 10^{-3}, ft^3

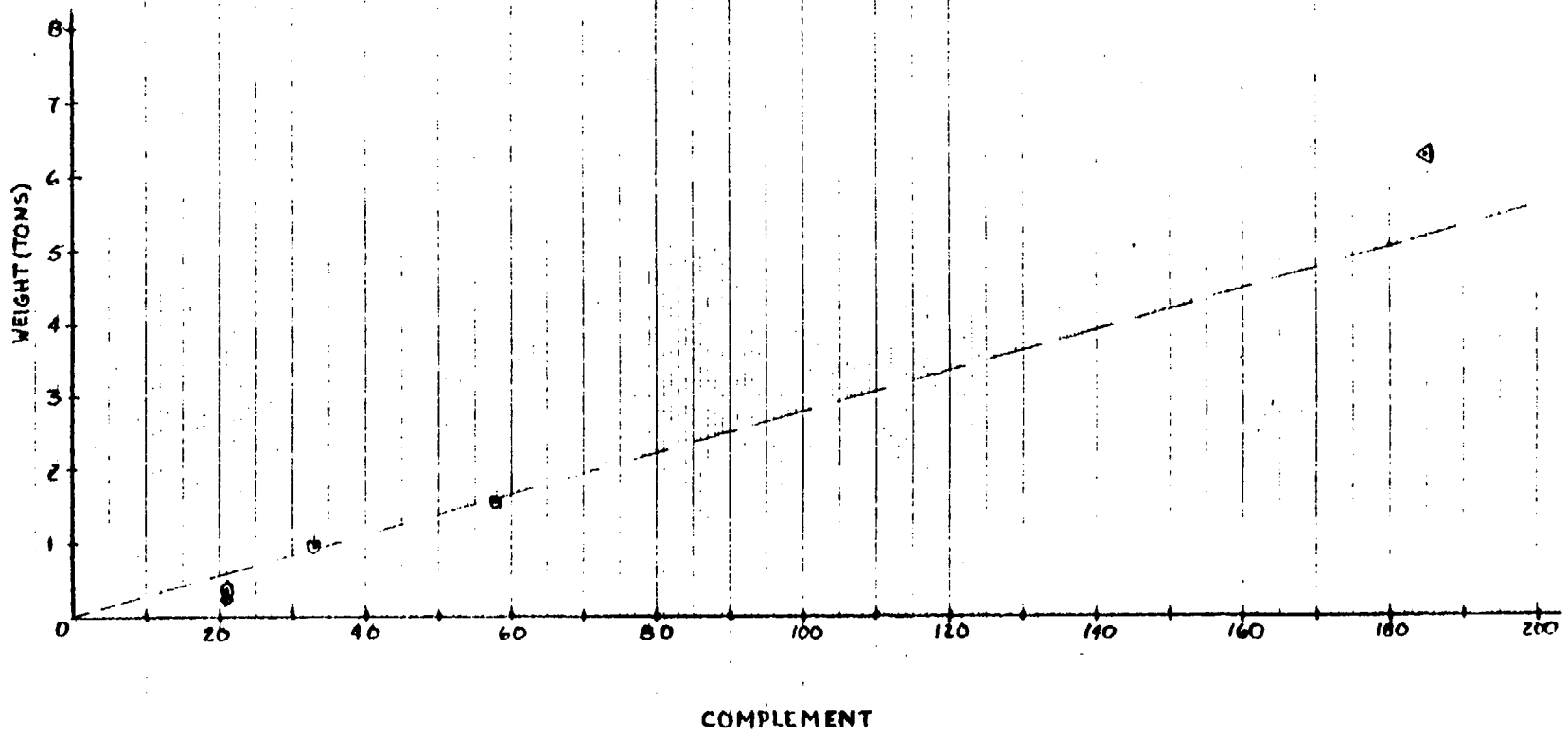
The algorithm is the same as ASSET

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.389 200 SHEETS 5 SQUARE
NATIONAL

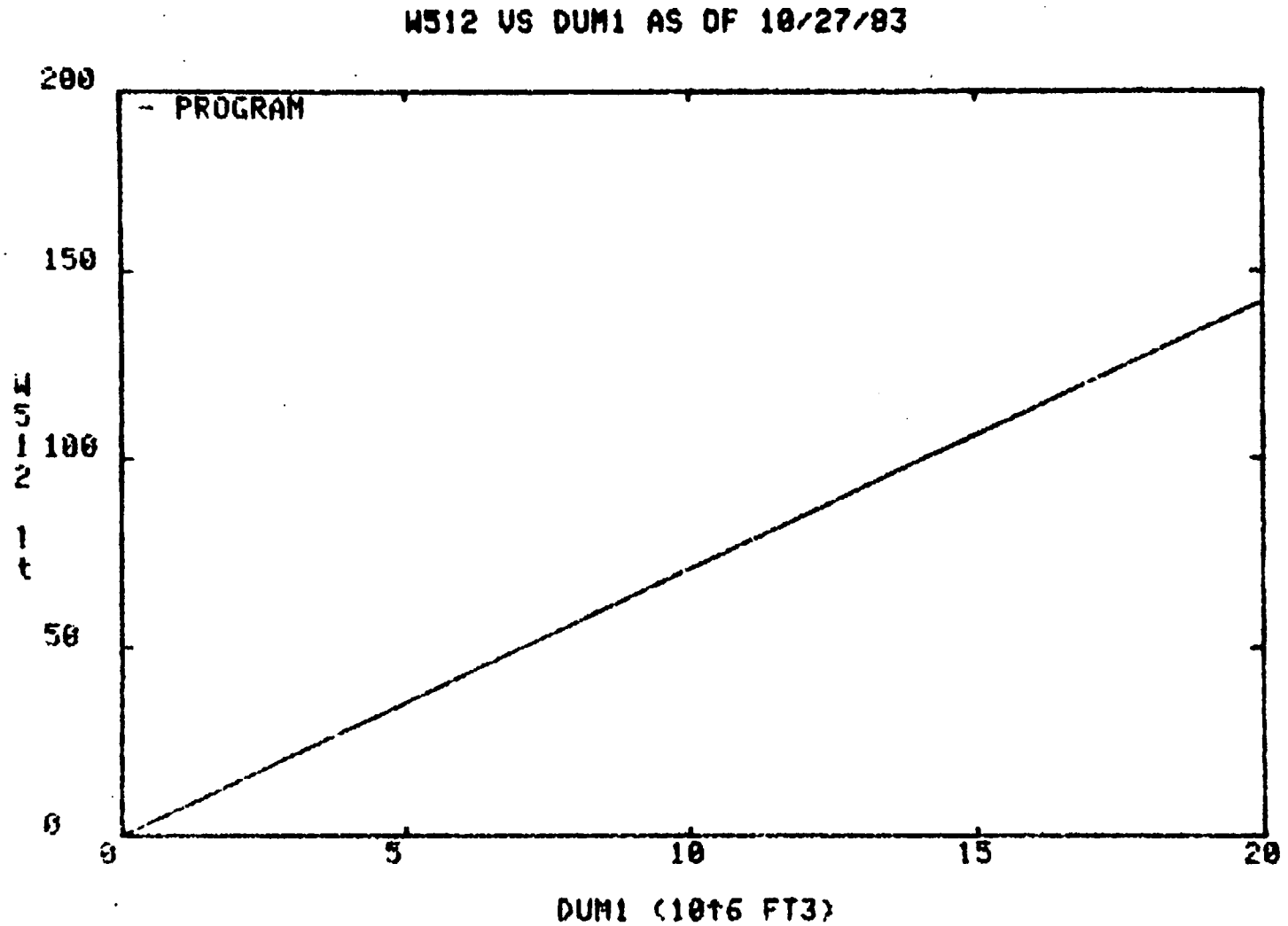
REPRODUCED AT GOVERNMENT EXPENSE

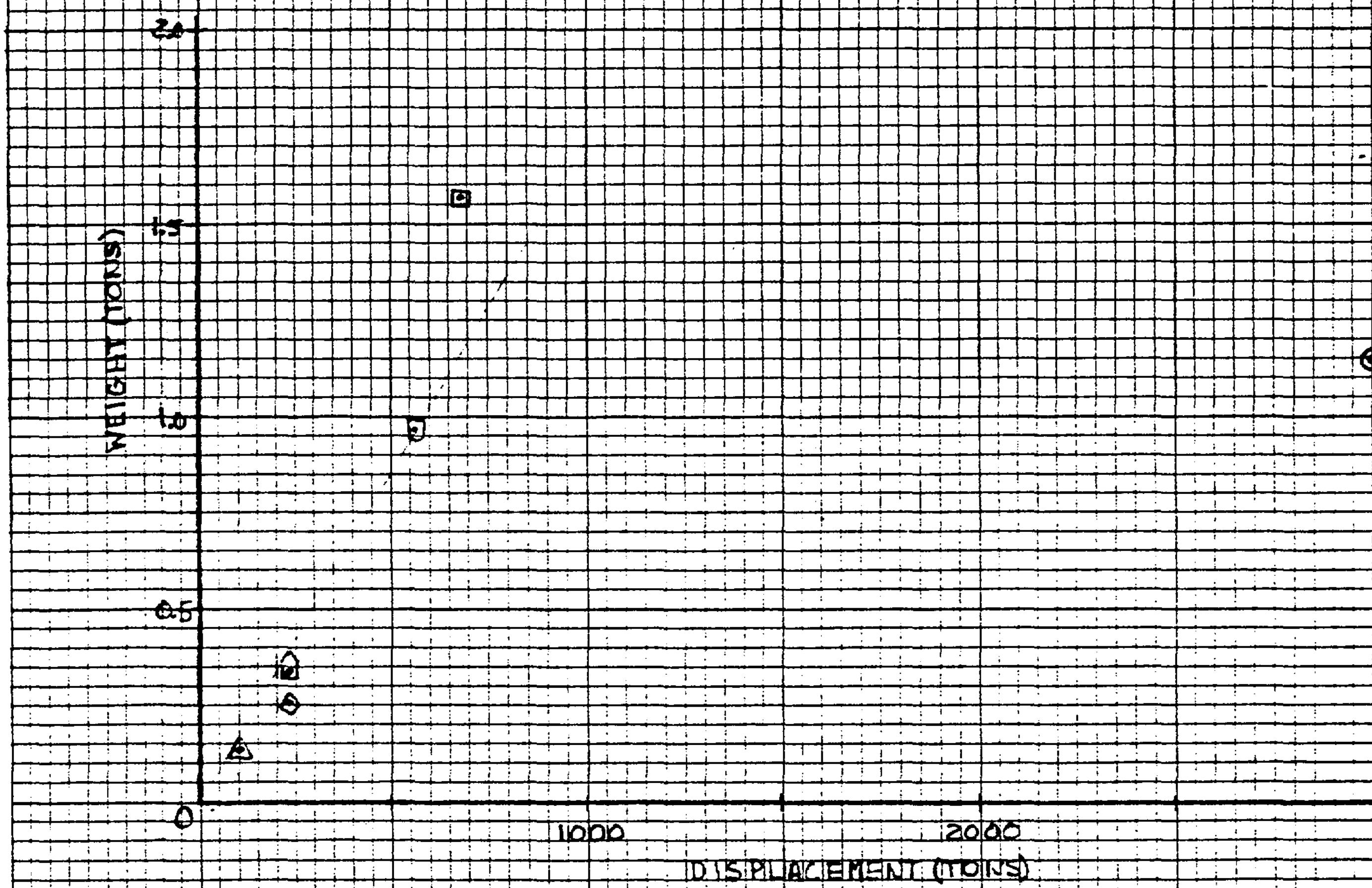
REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W512 VENTILATION SYSTEM



REPRODUCED AT GOVERNMENT EXPENSE





REPRODUCED AT GOVERNMENT EXPENSE

513 Machinery Space Ventilation System

WS13 = KS13 * VOLA

Where KS13 = .008 lt/ft3

(KS13 is a constant based on return data from hydrofoils and SESs.)

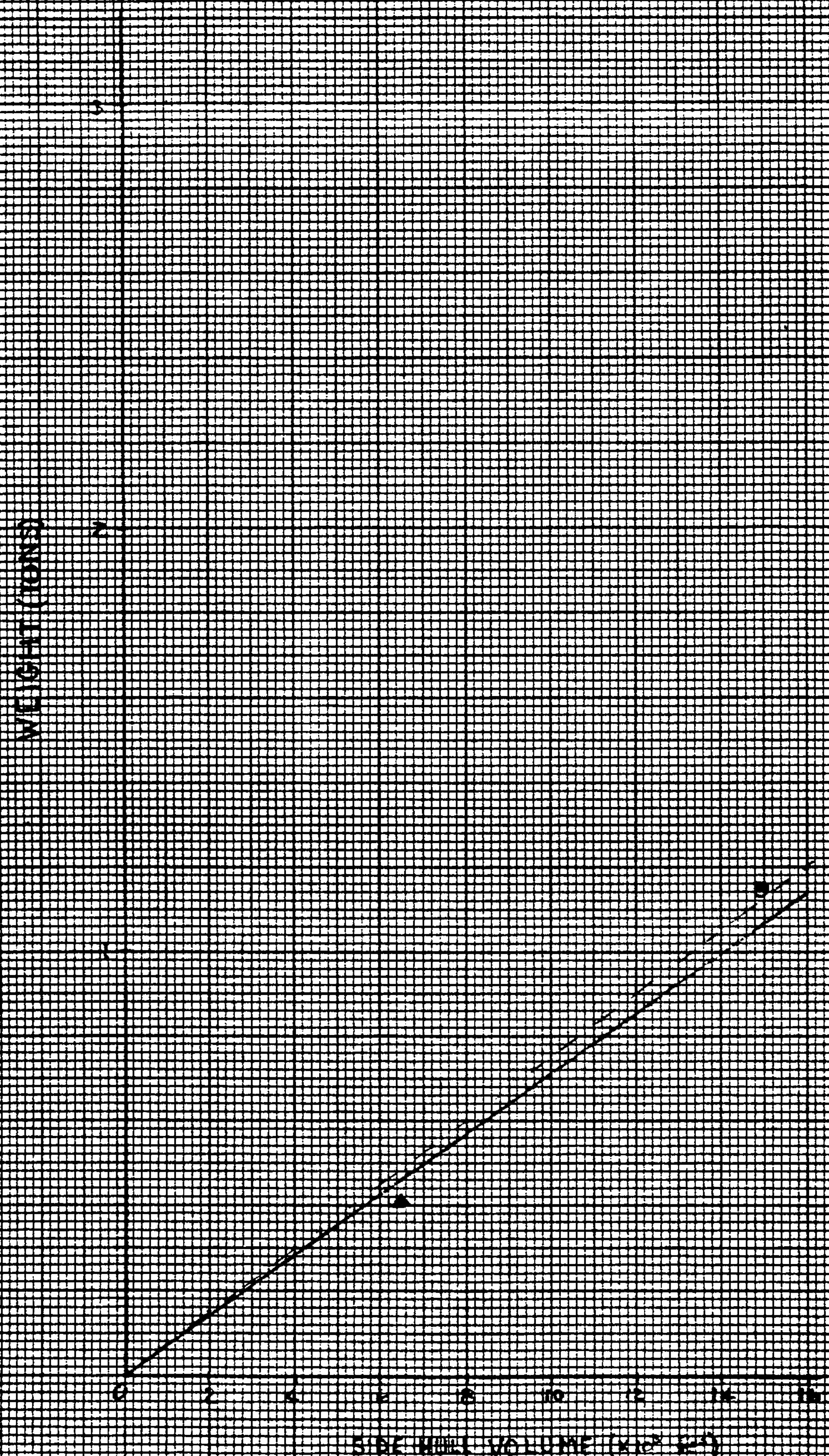
VOLA = Total Volume * 10^{-3}, ft3

The algorithm is the same as ASSET.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

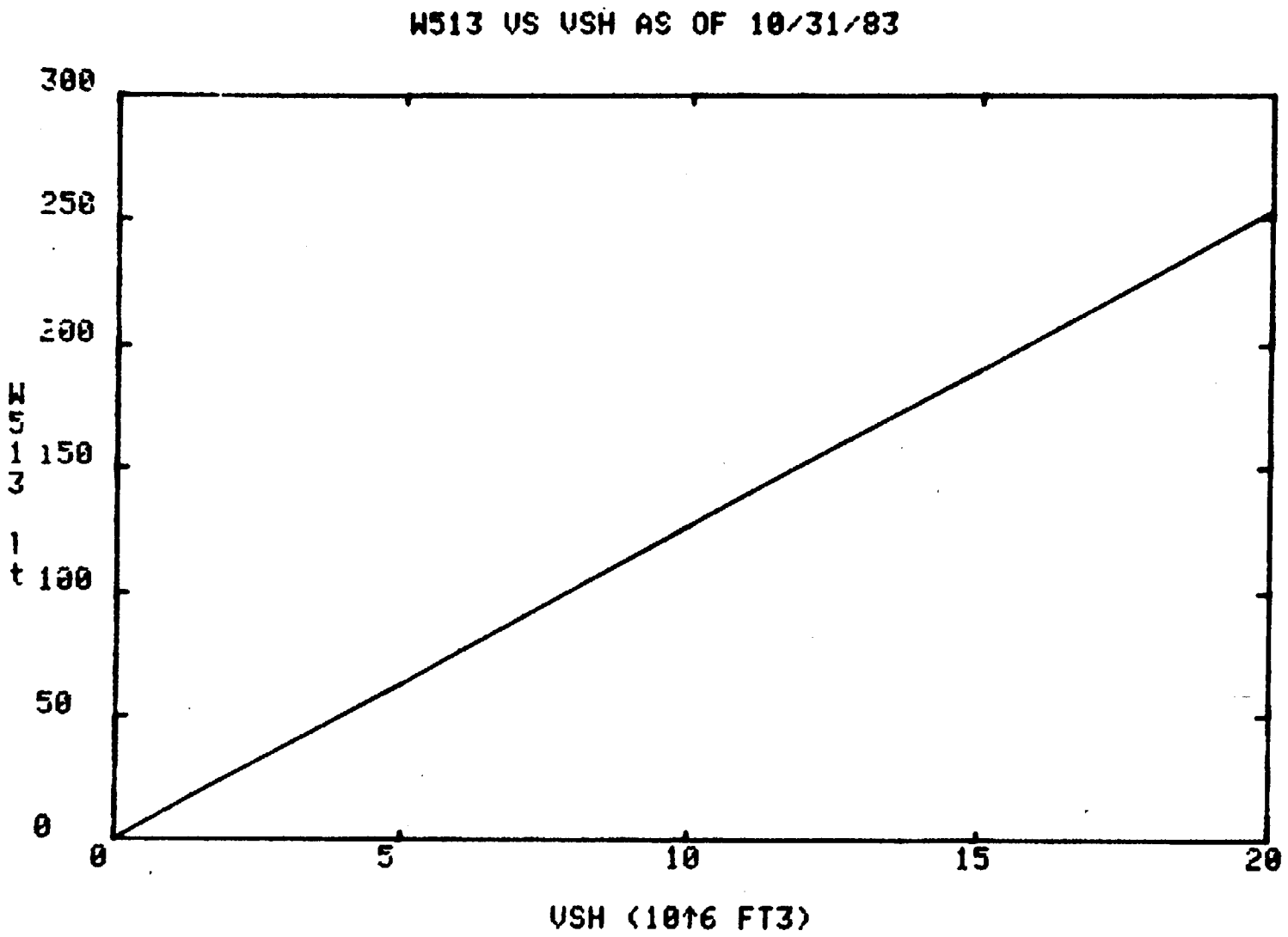
MACHINERY SPACE VENTILATION SYSTEM SWBS GROUP W513



FPI MI. 20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

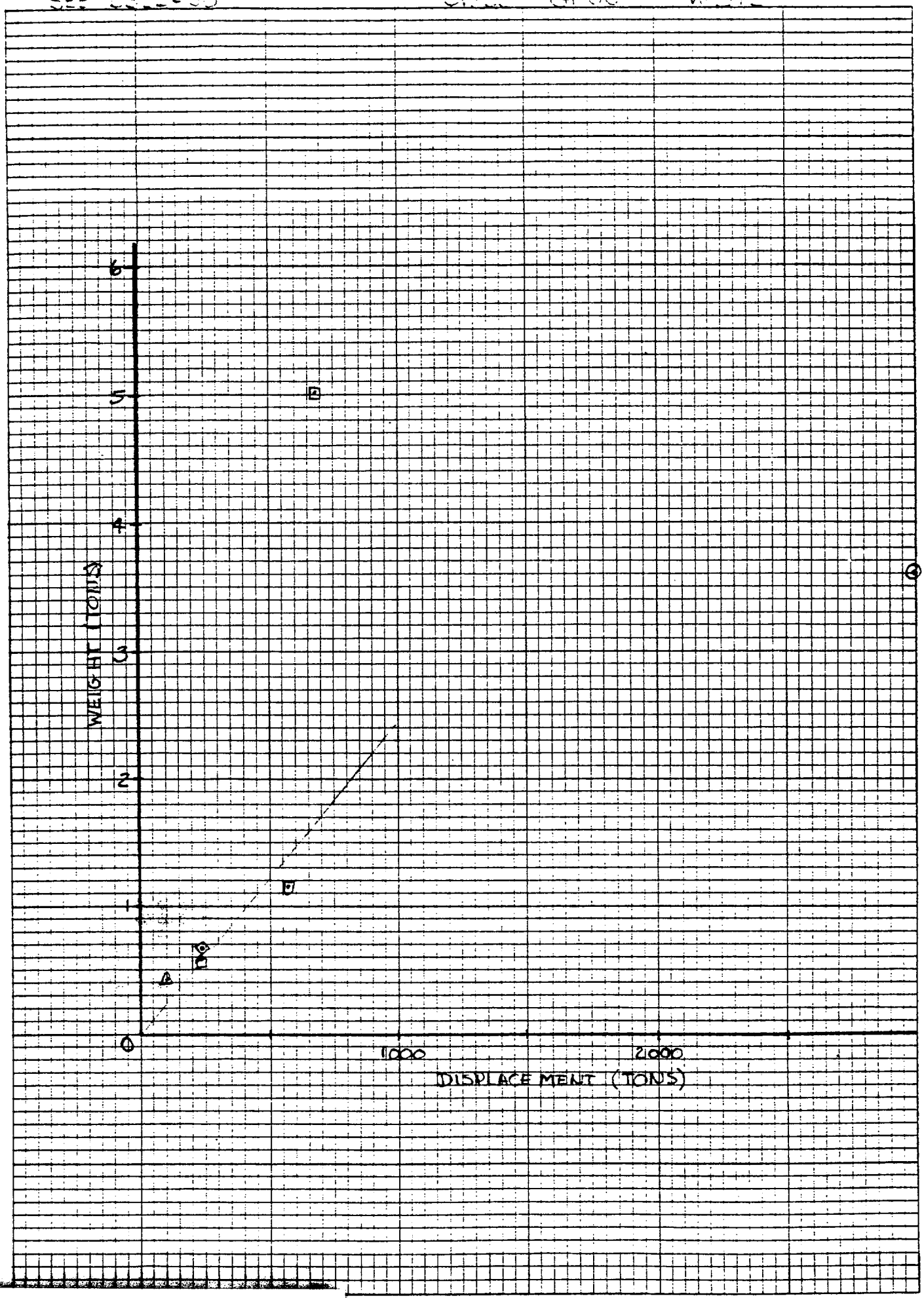
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE



SEE PAGE 50

SMALL GROUP W/ 5 12



EUROPEAN 10 X 10 TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

/S14 Air Condition System

WS14 = KS14 + LS14 * VOLA + MS14 * ACOM ✓

where KS14 = .1 lt, LS14 = .025 $\frac{lt}{ft^3}$ + MS14 = .07 lt ✓

(These constants are based on return weights of hydrofoil and SESs.)

VOLA = Total volume * 10^{-3}, ft3

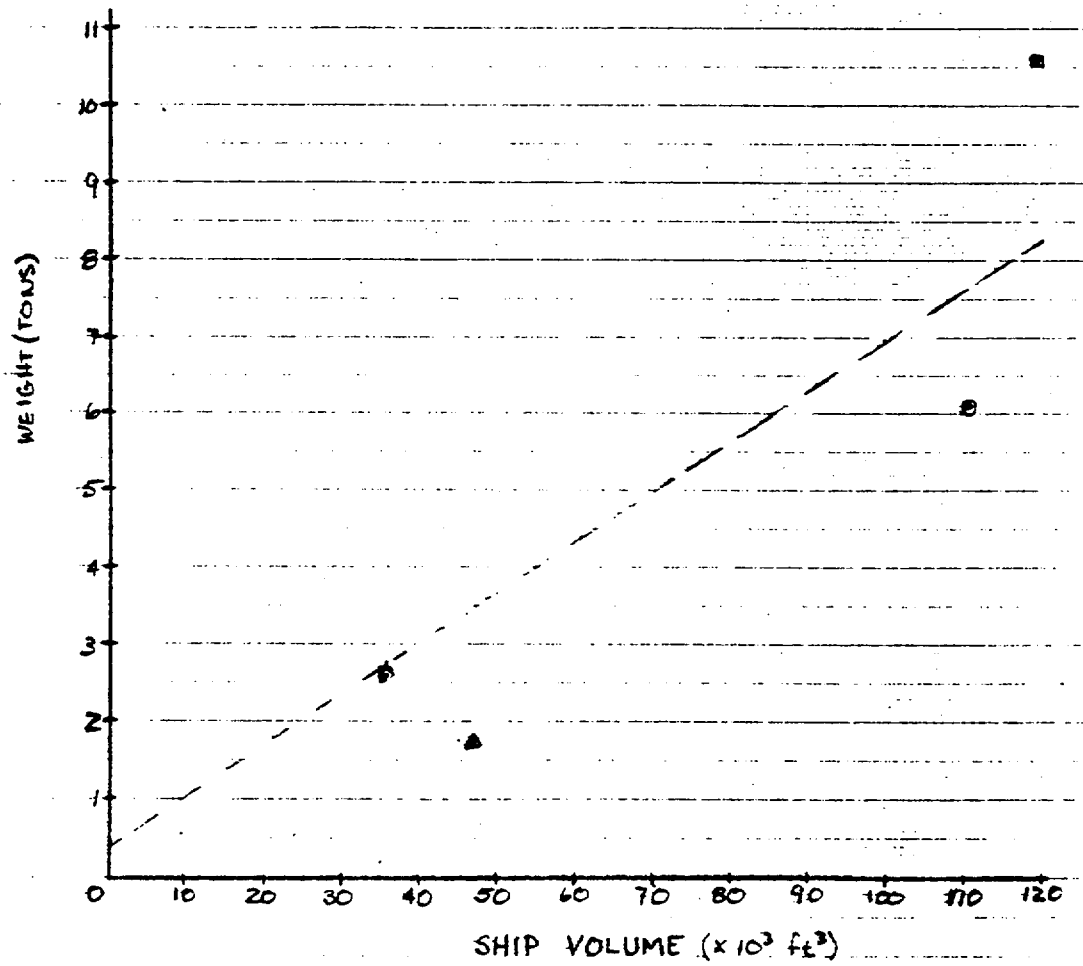
NCOM = Number of Accommodations

The algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

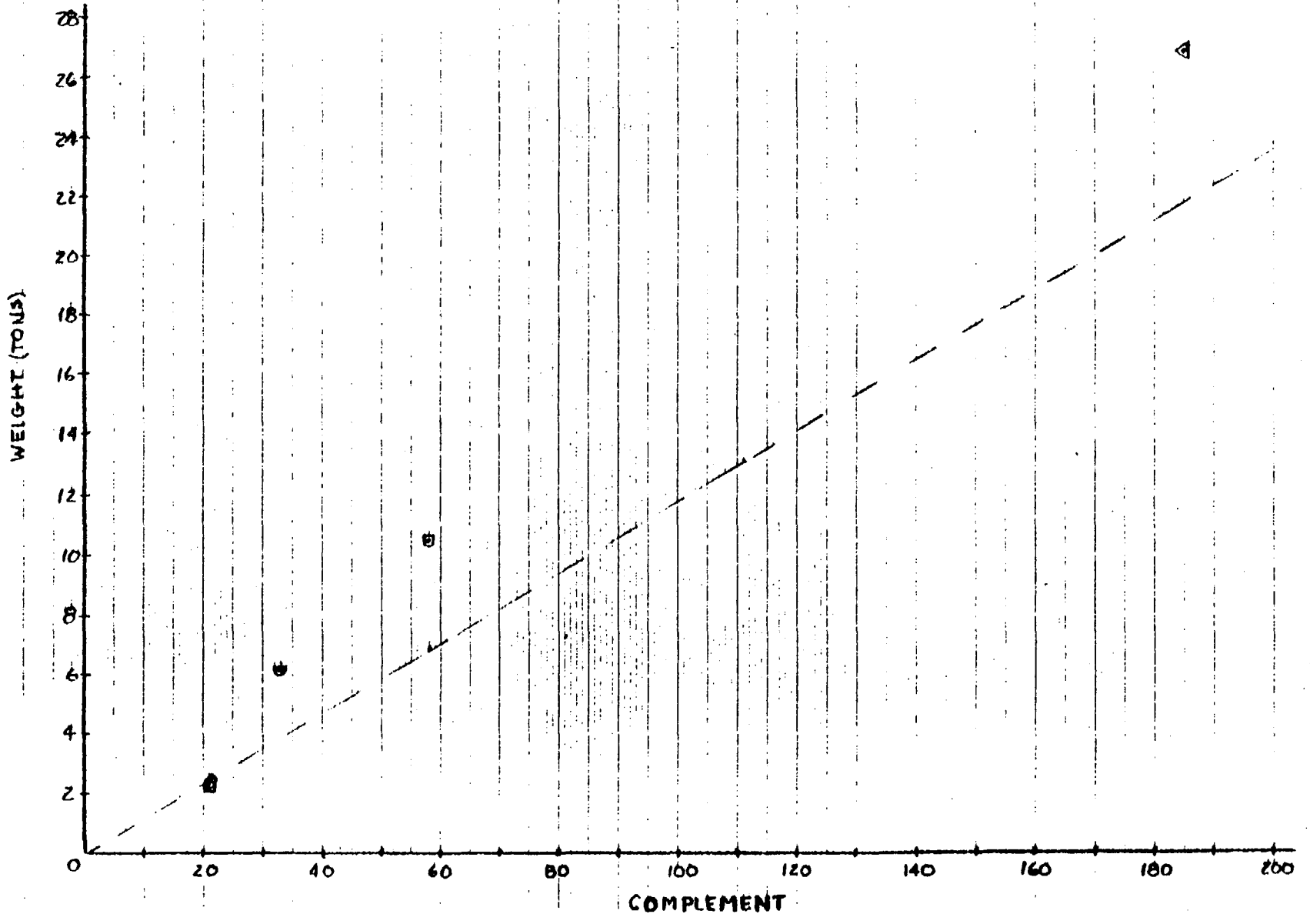
AIR CONDITIONING SWBS GROUP W514



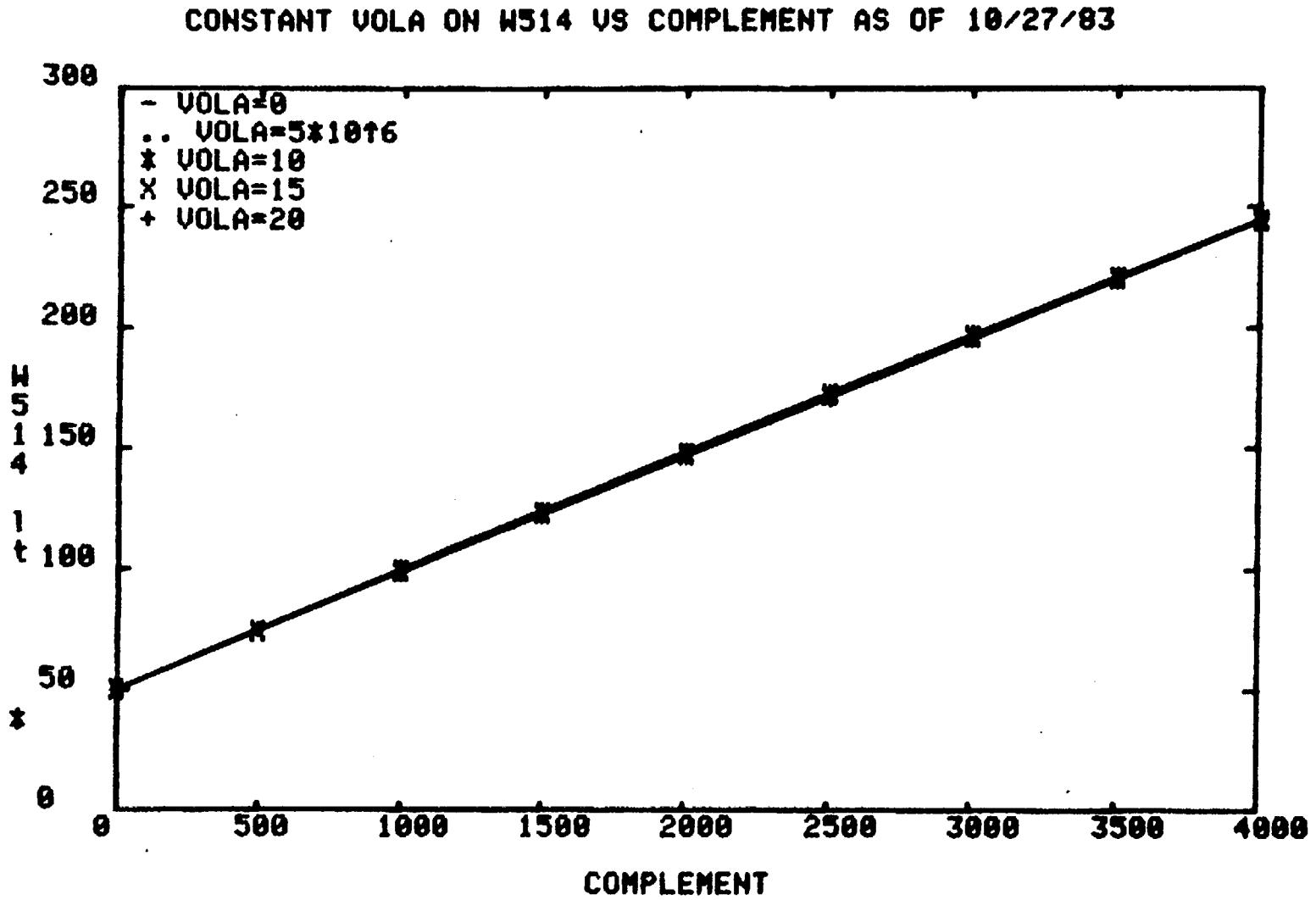
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

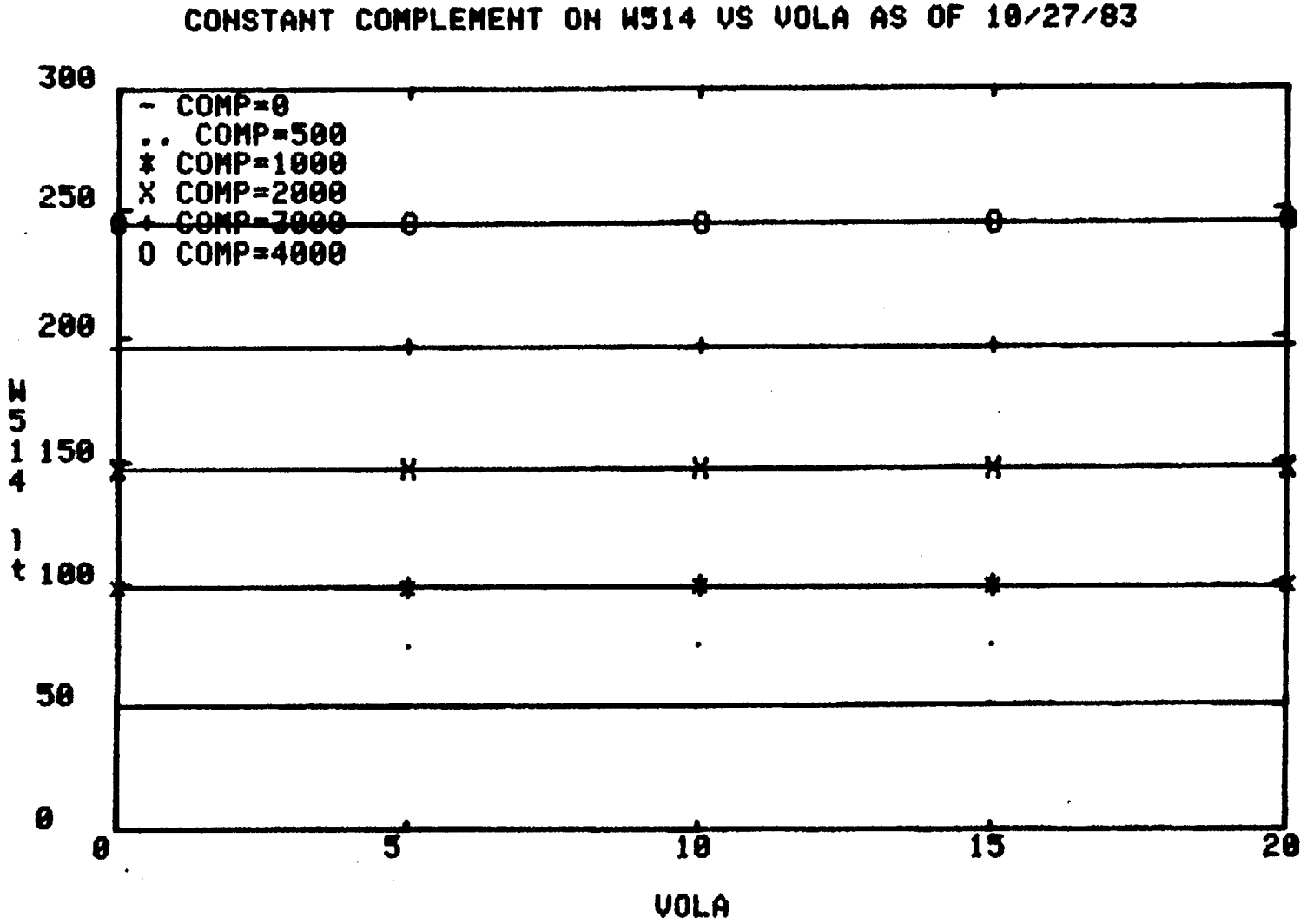
SWBS GROUP W514 AIR CONDITIONING



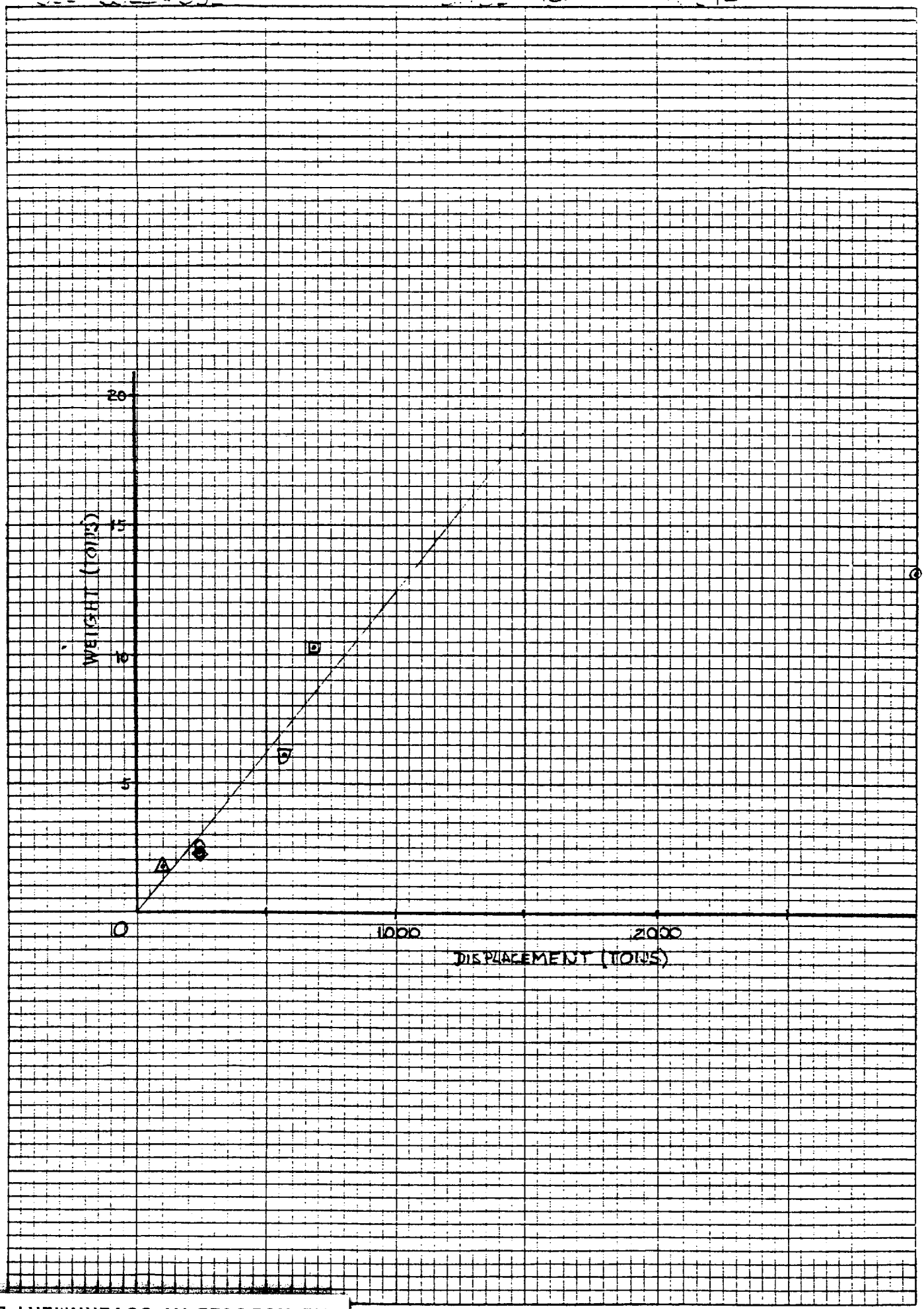
REPRODUCED AT GOVERNMENT EXPENSE



REPRODUCED AT GOVERNMENT EXPENSE



SEE [illegible] #502



EUREKA 10 X 10 TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

✓516 Refrigeration System

WS16 = K516 * ACOM ✓

where K516 = .0083 lt ✓

(K516 is a constant based on victum data for hydrofoils and SESs).

ACOM = Number of accommodation

TLe ~~nto~~

The algorithm is the same as ASSET. ✓

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

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CROSS SECTION-10X10 TO 1 INCH
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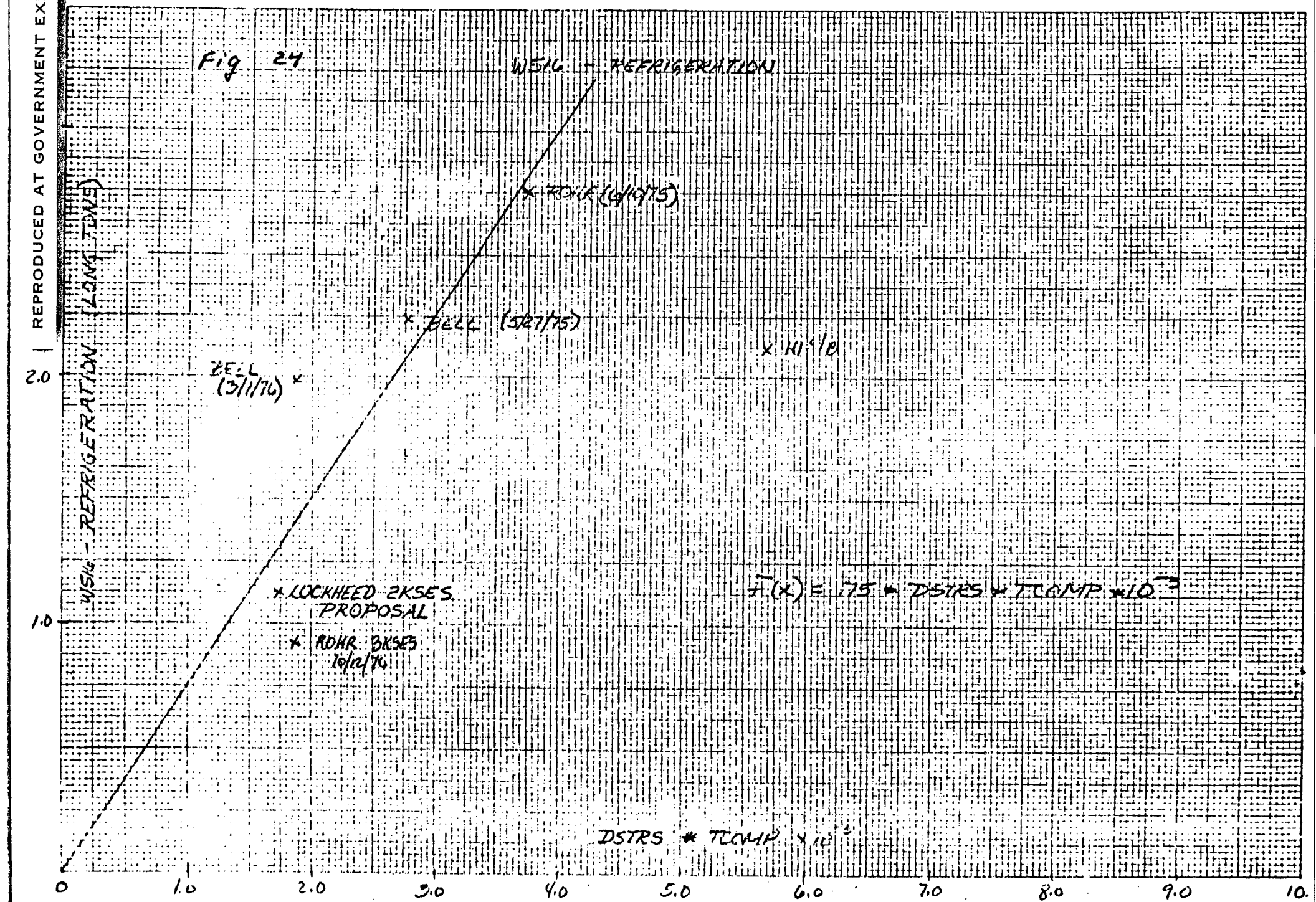
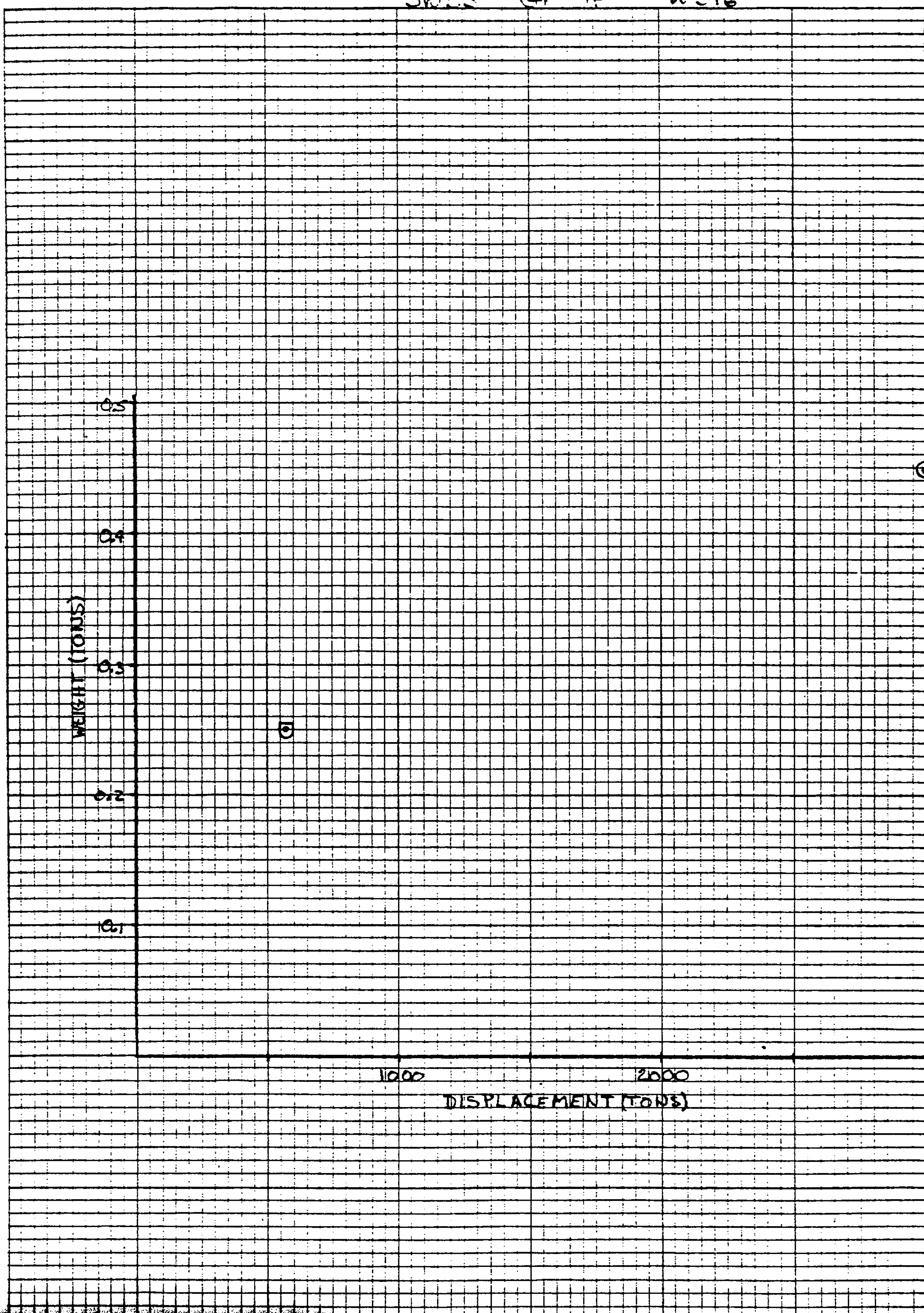
REPRODUCED AT GOVERNMENT EXPENSE

Fig 24



SWES W516



REPRODUCED AT GOVERNMENT EXPENSE

521 Firemain + Sea Water Flushing System.

$W521 = K521 \times VOLA$ ✓

where $K521 = .007$ lbf/ft3 ✓

(K521 is a constant based on return data of hydrofoils and SES's.)

VOLA = Total volume $\times 10^{-3}$, ft3

This Algorithm is the same as ASSET, ✓

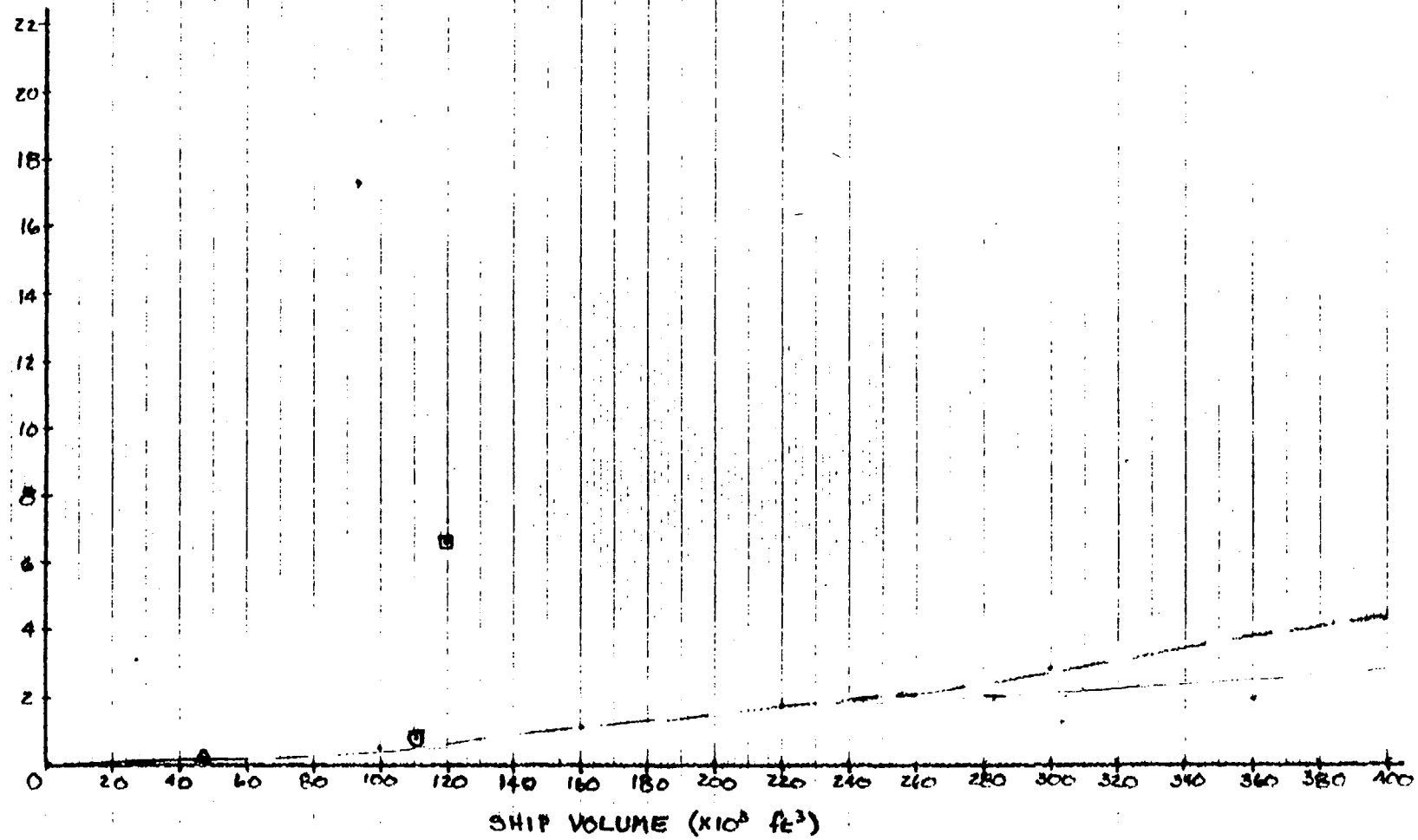
ITEM
EC→EA

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

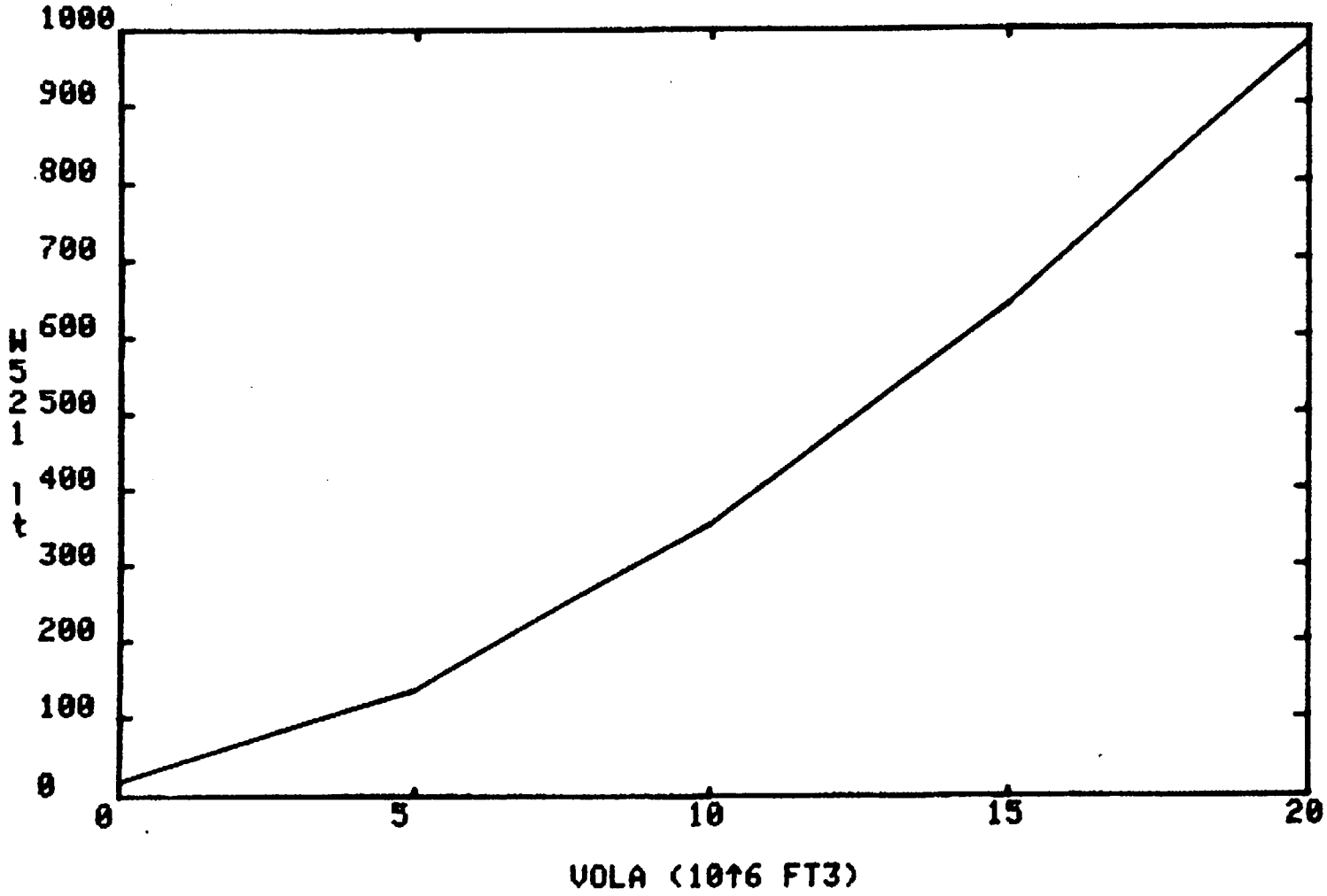
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W521 FIREMAN AND FLUSHING SYSTEM



REPRODUCED AT GOVERNMENT EXPENSE



522 Sprinkler System

$WS22 = KS22 * VOLA$

where $KS22 = 4 * 10^{-3}$ lt/ft3

(KS22 is a constant based on return weight of hydraulic fluid and SES's)

VOLA = Total Volume $* 10^{-3}$, ft3

42:381 50 SHEETS 5 SQUARE
42:382 100 SHEETS 5 SQUARE
42:389 200 SHEETS 5 SQUARE
NATIONAL

INSERT
COW
LIST
ITEM
LV

REPRODUCED AT GOVERNMENT EXPENSE

5241 Auxiliary Sea Water System

WS24 = KS24 * VOLA

where KS24 = .002

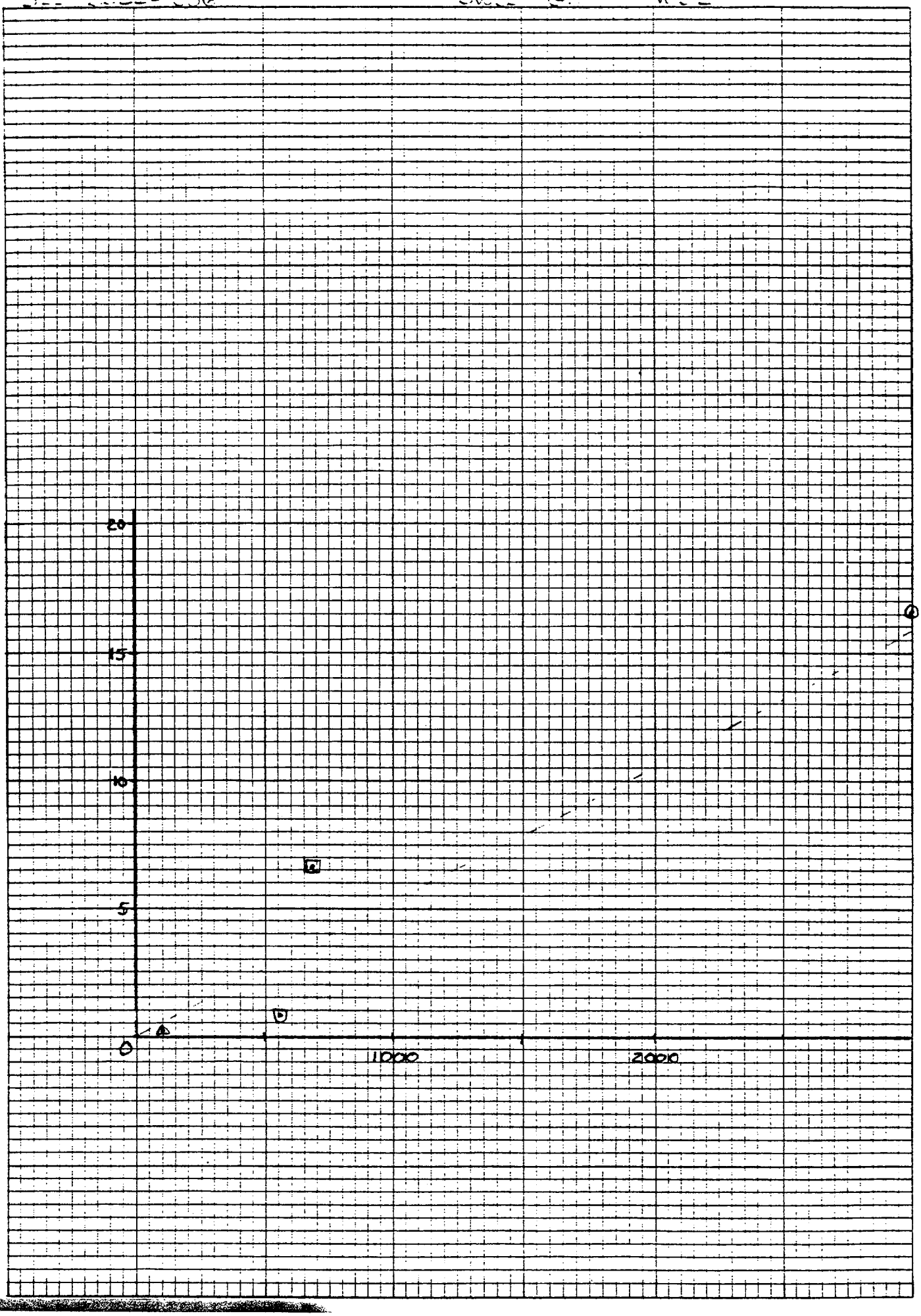
(KS24 is a constant based on return depths from hydrofoils and SES's.)

VOLA = Total Volume $\times 10^{-3}$, ft 3

The algorithm was created for this data base.

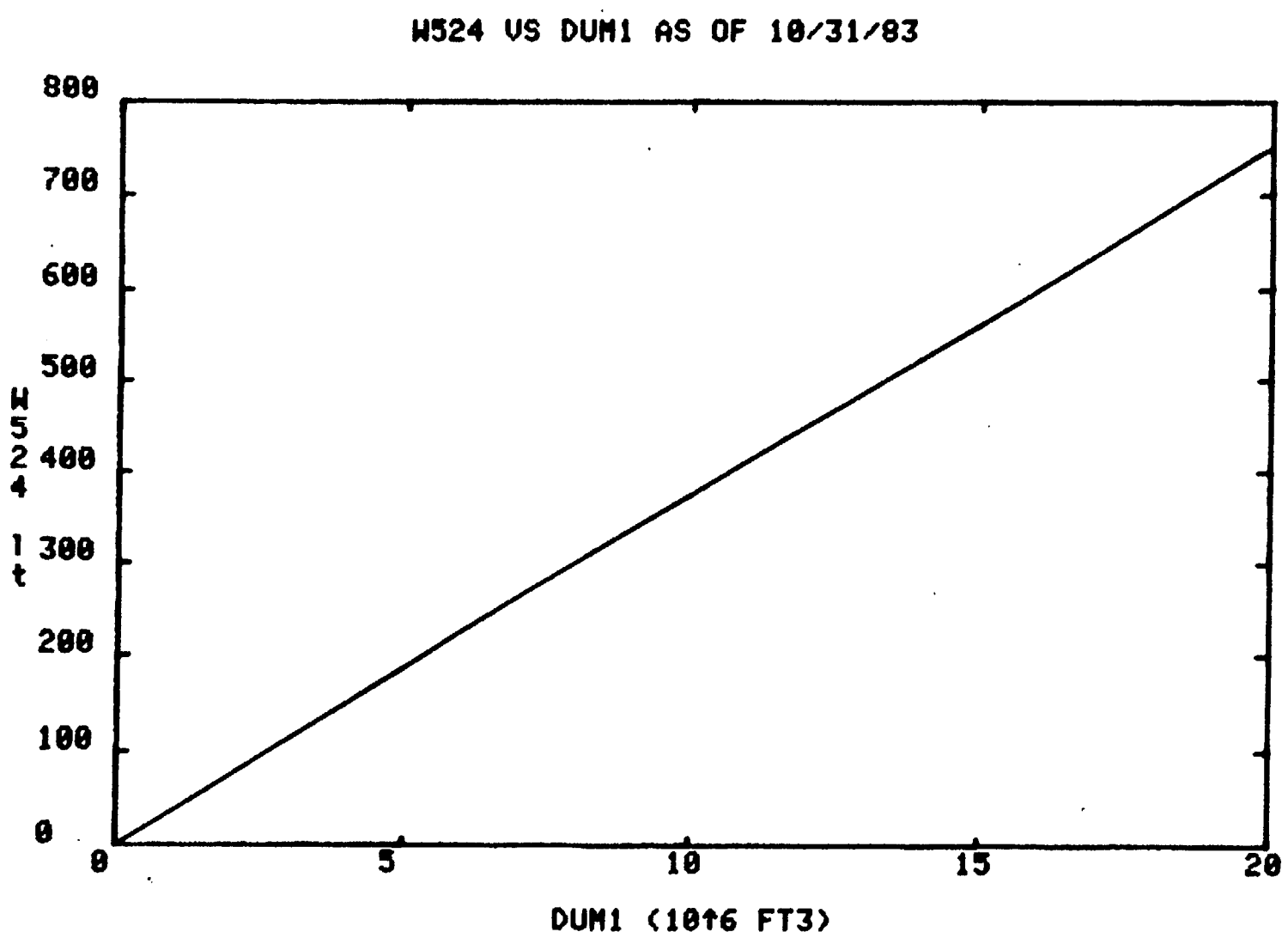
42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

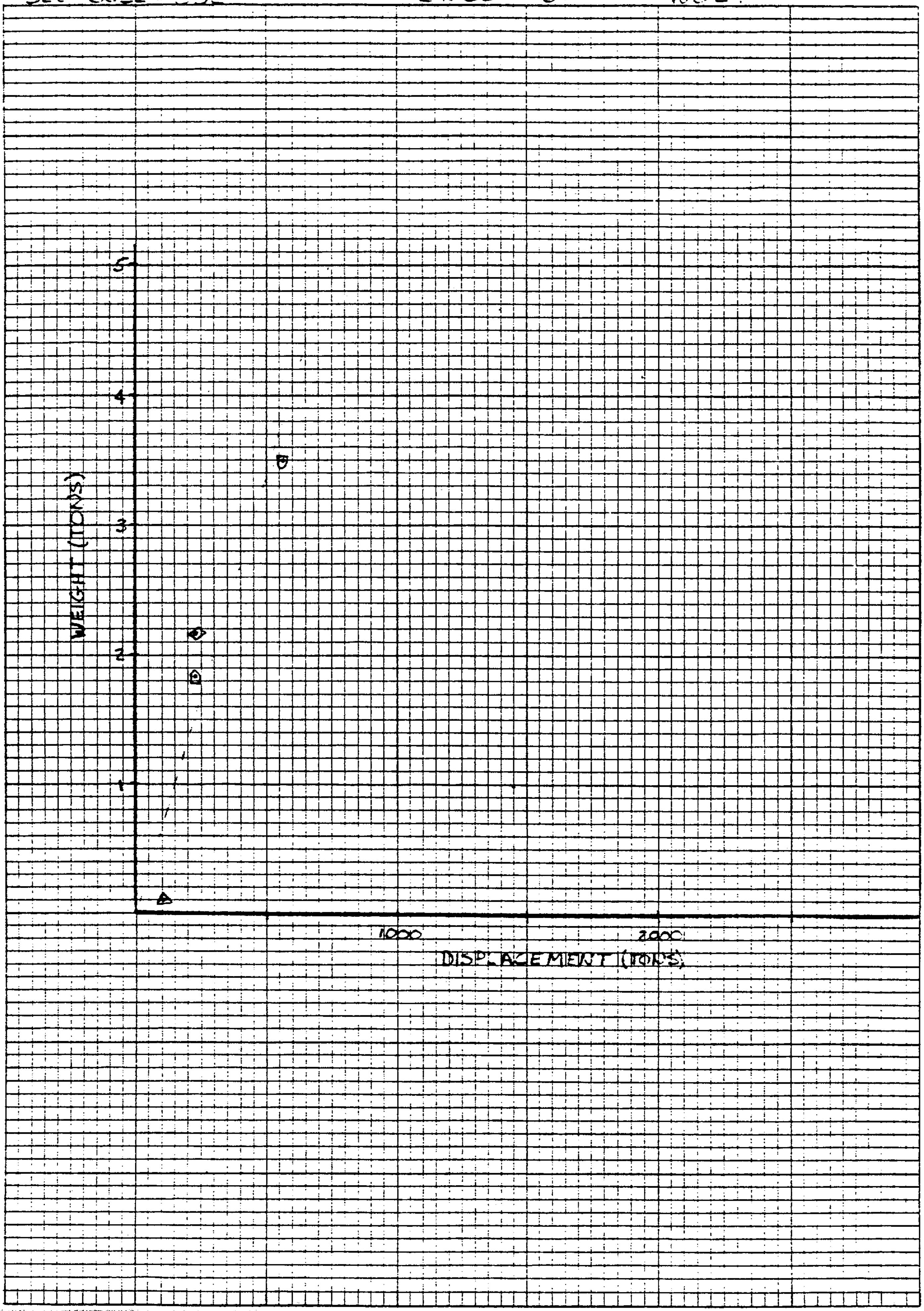


REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE



SEE [illegible] # 532 SW[illegible] G[illegible] W524



REPRODUCED AT GOVERNMENT EXPENSE

J526 Scuppers + Deck Drain.

$$WS26 = K526 * LCULE * BOA \checkmark$$

where $K526 = 1.15 \times 10^{-5}$ lt/ft^3 ✓

(K526 is a constant based on return data from hydrostatics and SES's.)

LCULE = Curb run length, ft

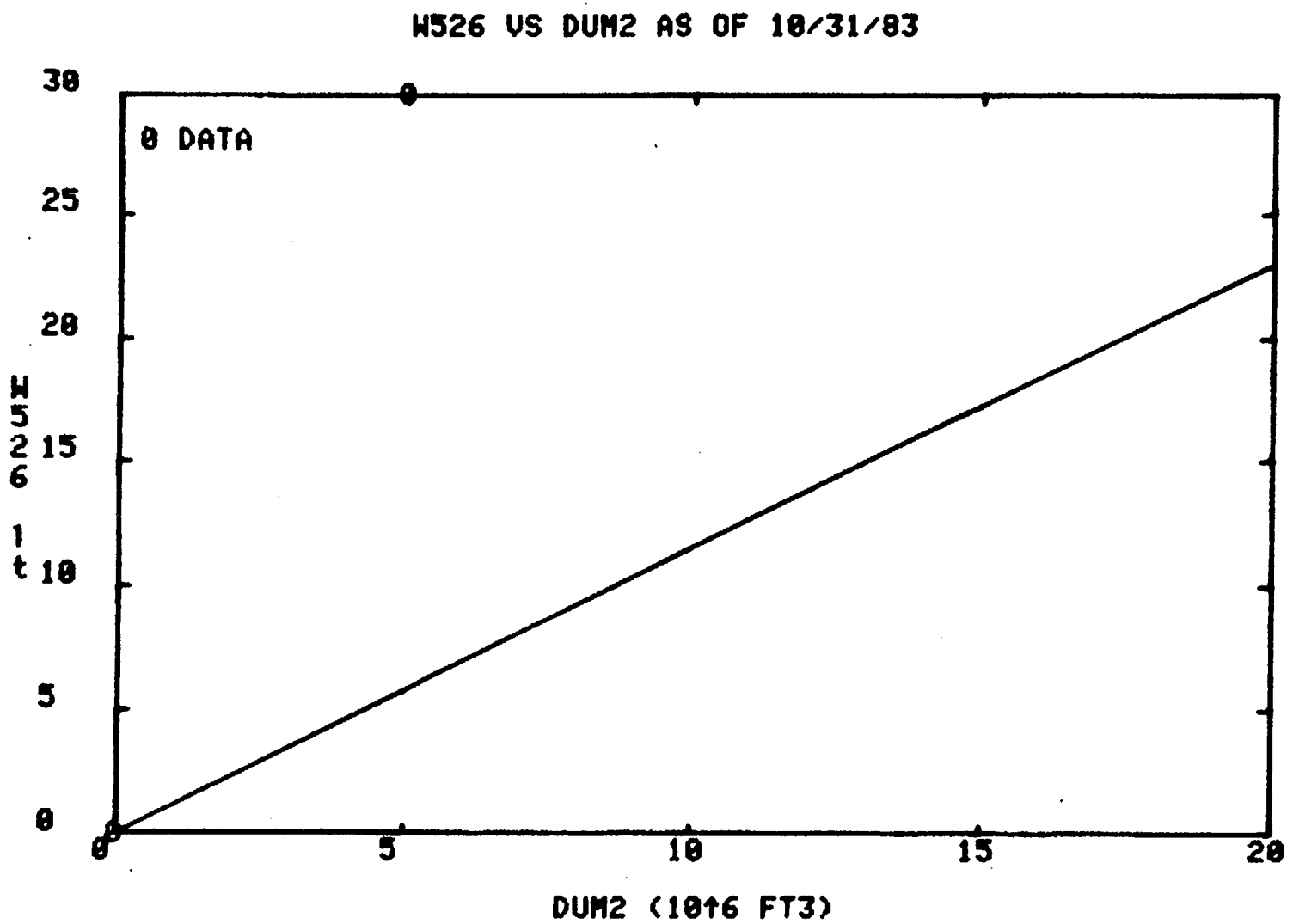
BOA = Beam Overall, ft

The algorithm is the same as ASSET.

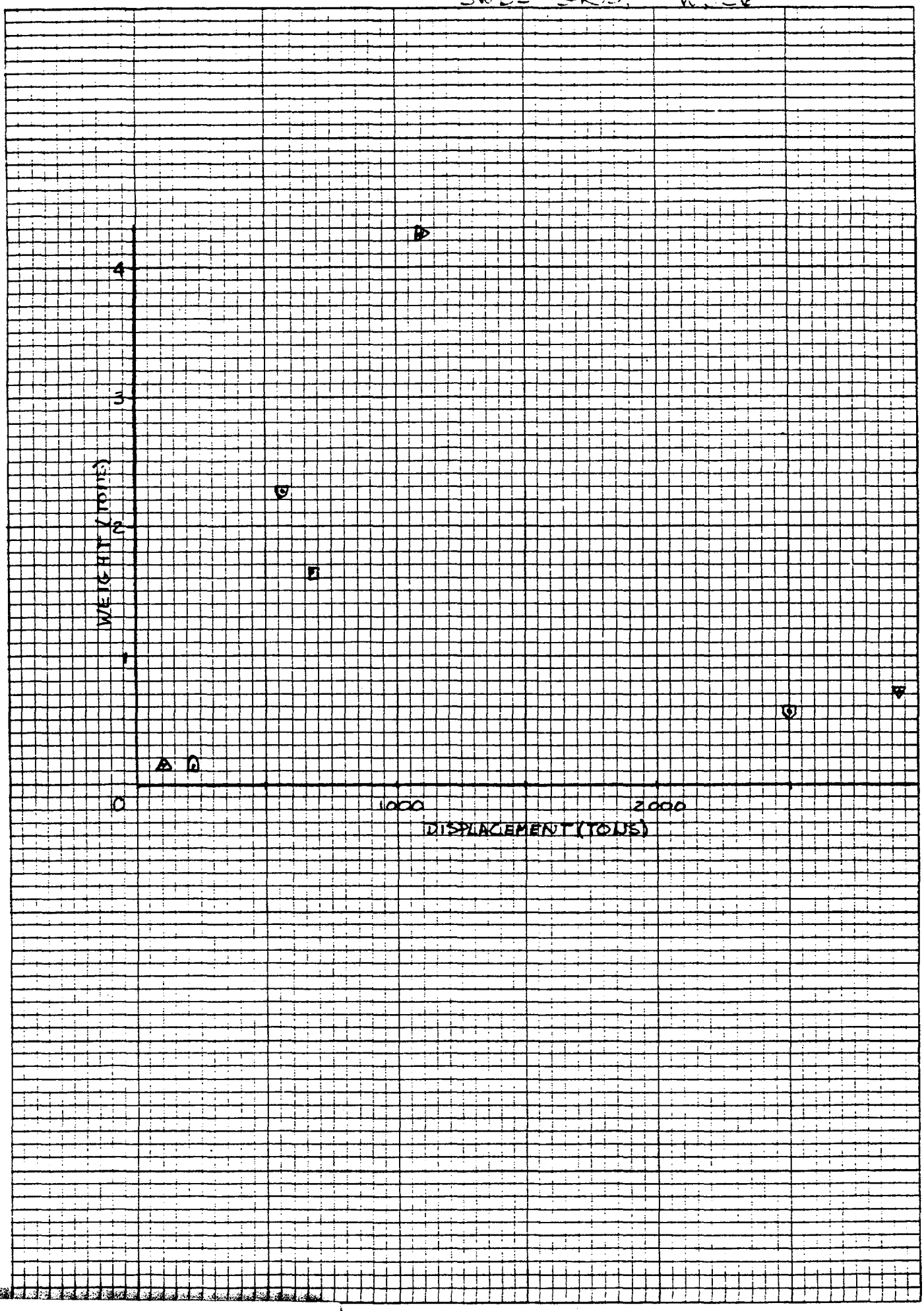
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE



SWBS GROUP WEIGHT



KEUFFEL & ESSER CO.
10 X 10 TO 1 INCH
10 IN. HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

528 Plumbing Drainage

WS28 = KS28 * VOLA

where KS28 = .014 lb/ft3 V

(KS28 is based on return data from hydrofoils and SES's)

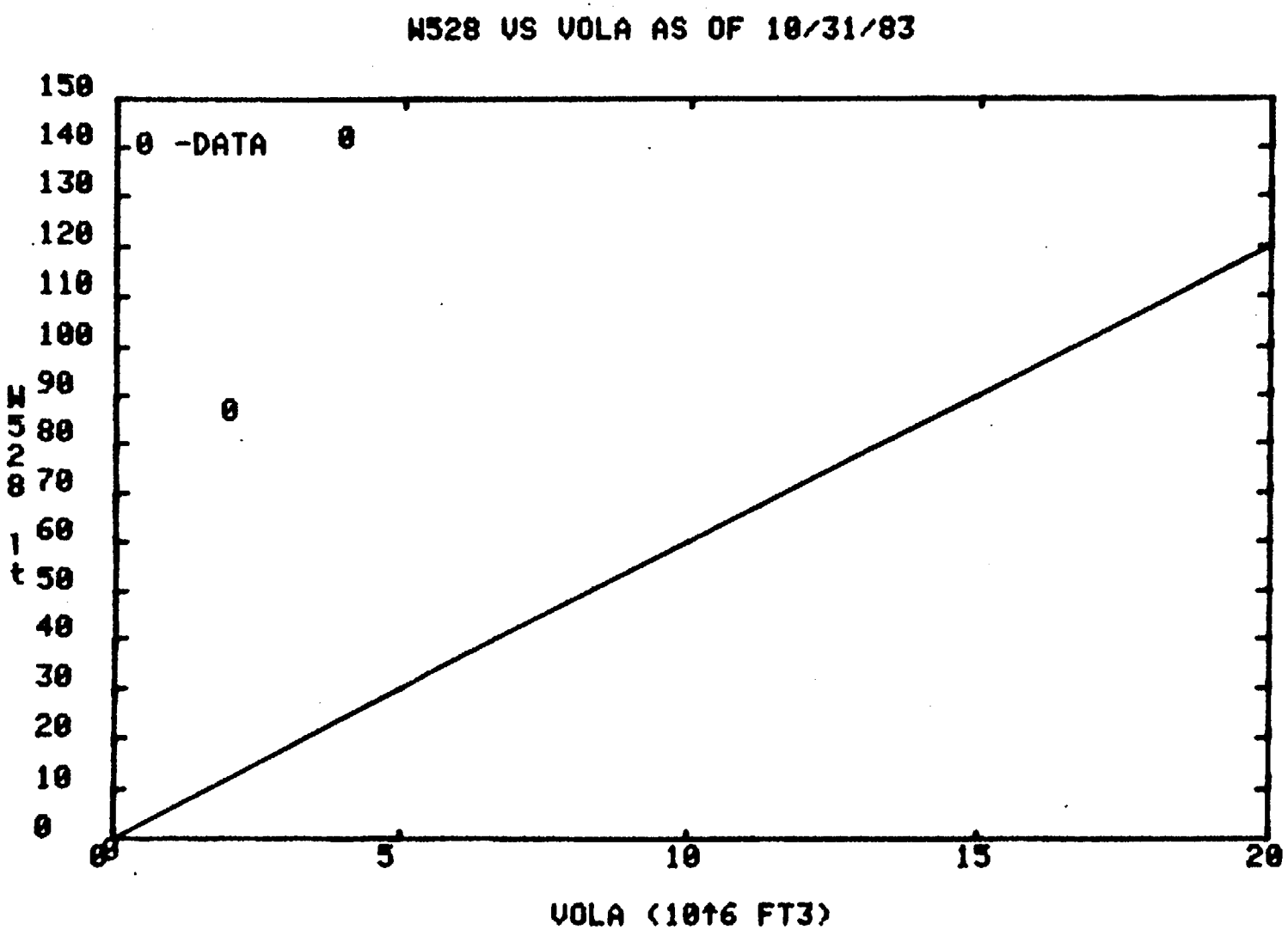
VOLA = Total volume x 10^{-3}, ft3

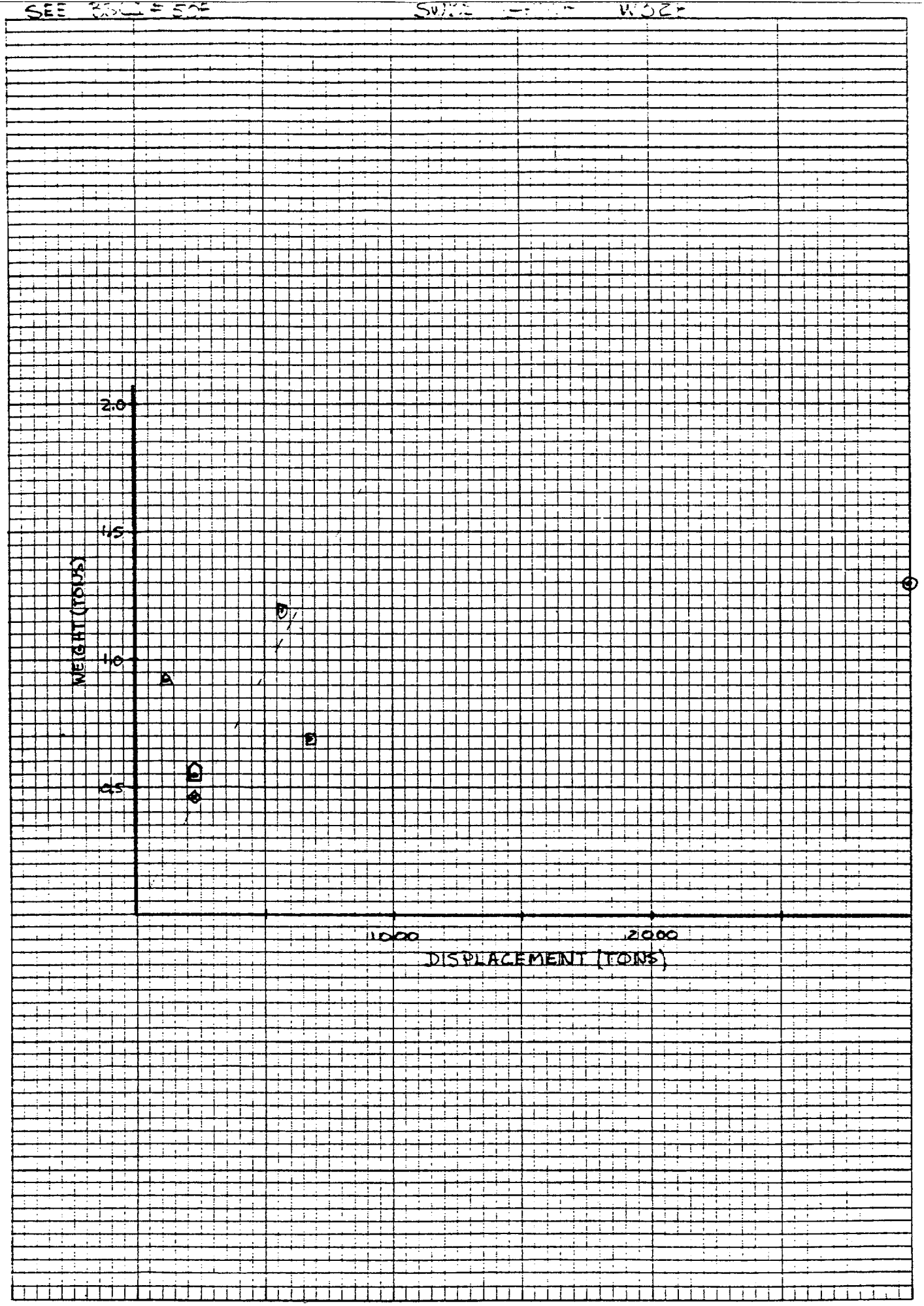
This algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE





PLUMBING + DRAINAGE

REPRODUCED AT GOVERNMENT EXPENSE

✓529 Drainage + Ballasting System

$$WS29 = KS29 * VOLA \checkmark$$

where $KS29 = .0045$ lt/ft³ ✓

(KS29 is ~~based~~ a constant based on return data of hydrofoils and SESs).

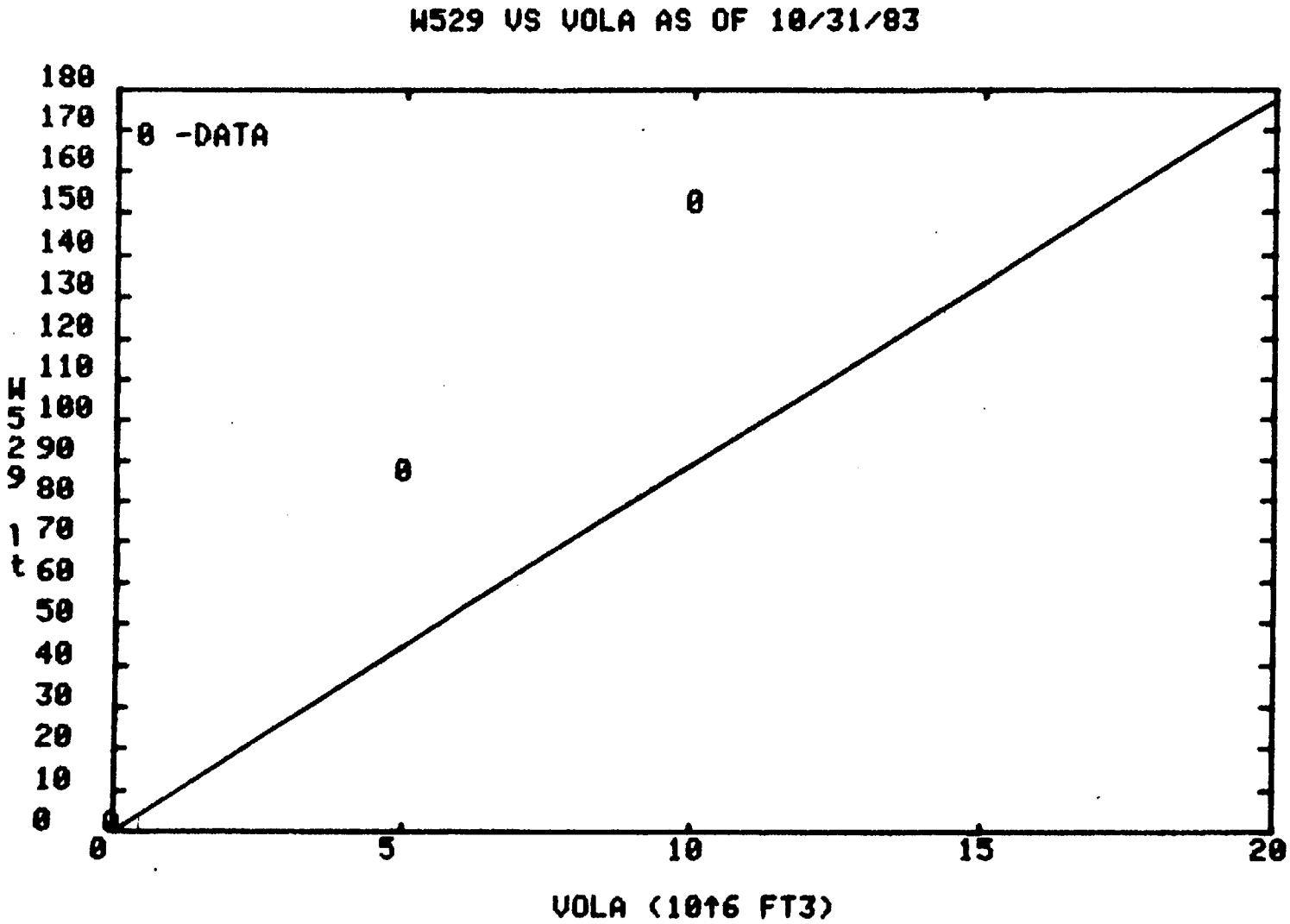
VOLA = Total volume $* 10^{-3}$, ft³

This algorithm is the same as ASSET. ✓

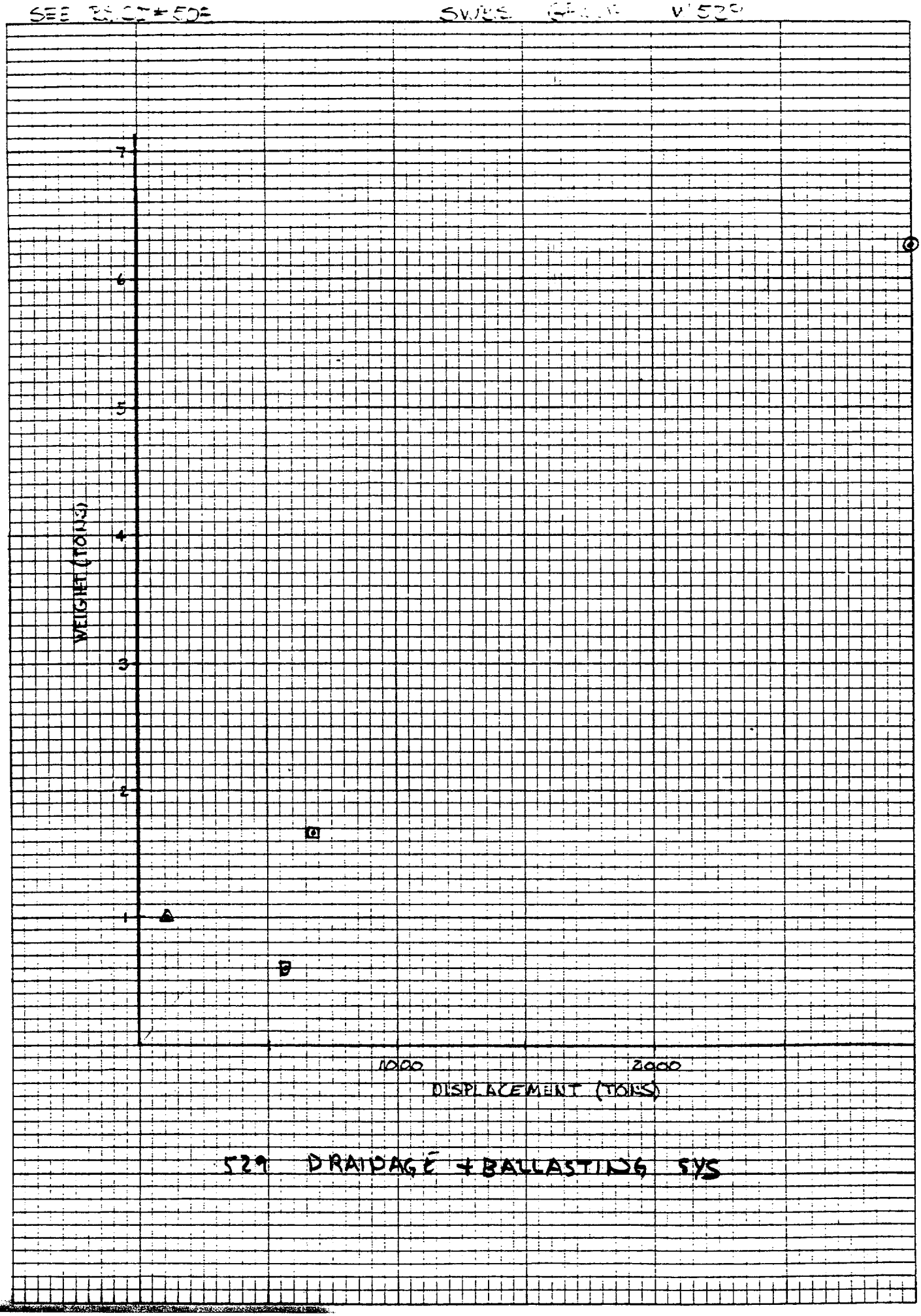
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE



SEE SHEET 529 SWBS GROUP V 529



529 DRAINAGE + BALLASTING SYS

REPRODUCED AT GOVERNMENT EXPENSE

√531 Distilling Plant

$$WS31 = .^{KS31} * ACOM$$ ✓

where KS31 = .054 lt ✓

(KS31 is a constant based on return data of hydrofoils and SESs.)

ACOM = Number of Accommodations

This algorithm is the same as ASSET. ✓

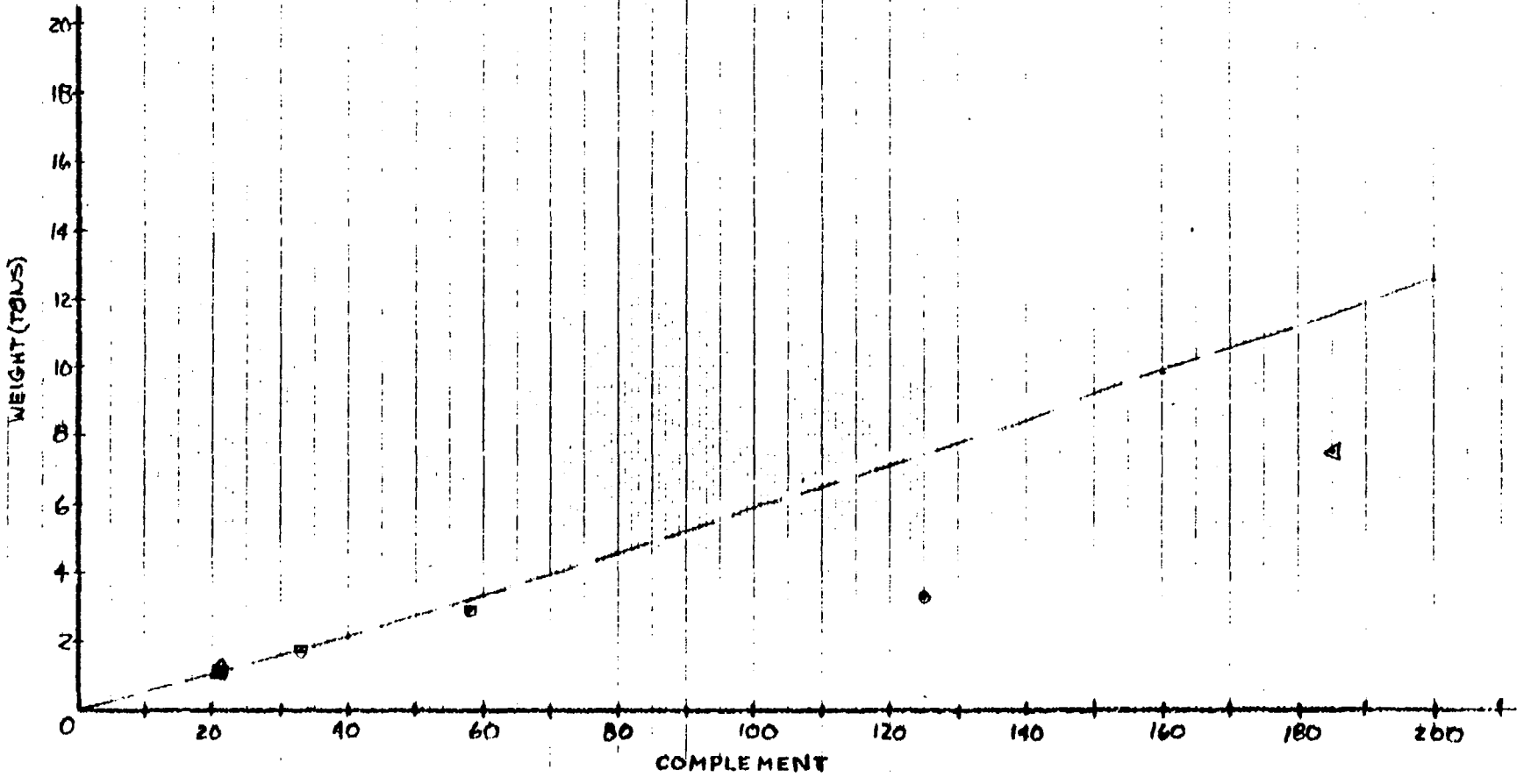
ITEM
EC→EA

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

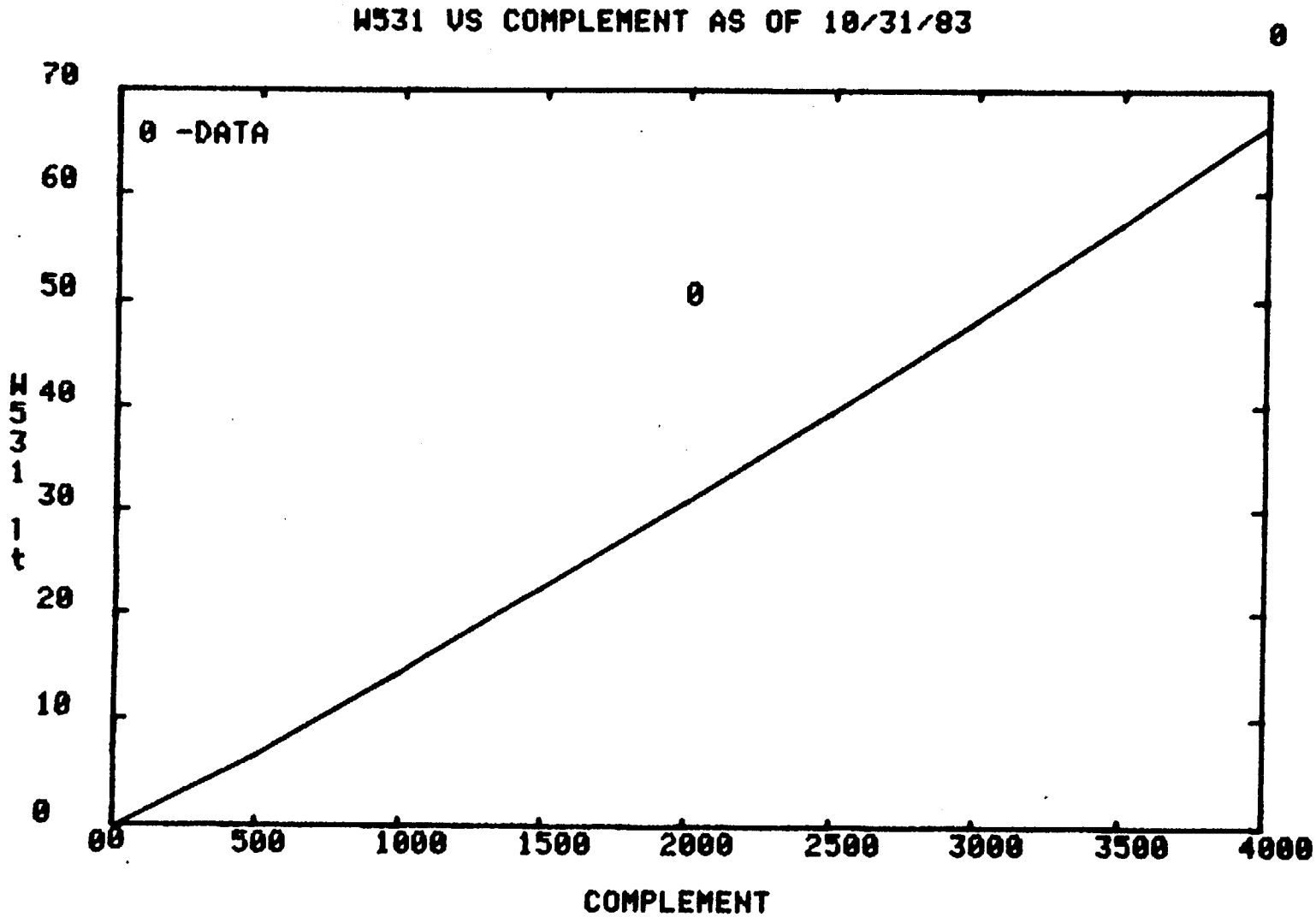
REPRODUCED AT GOVERNMENT EXPENSE

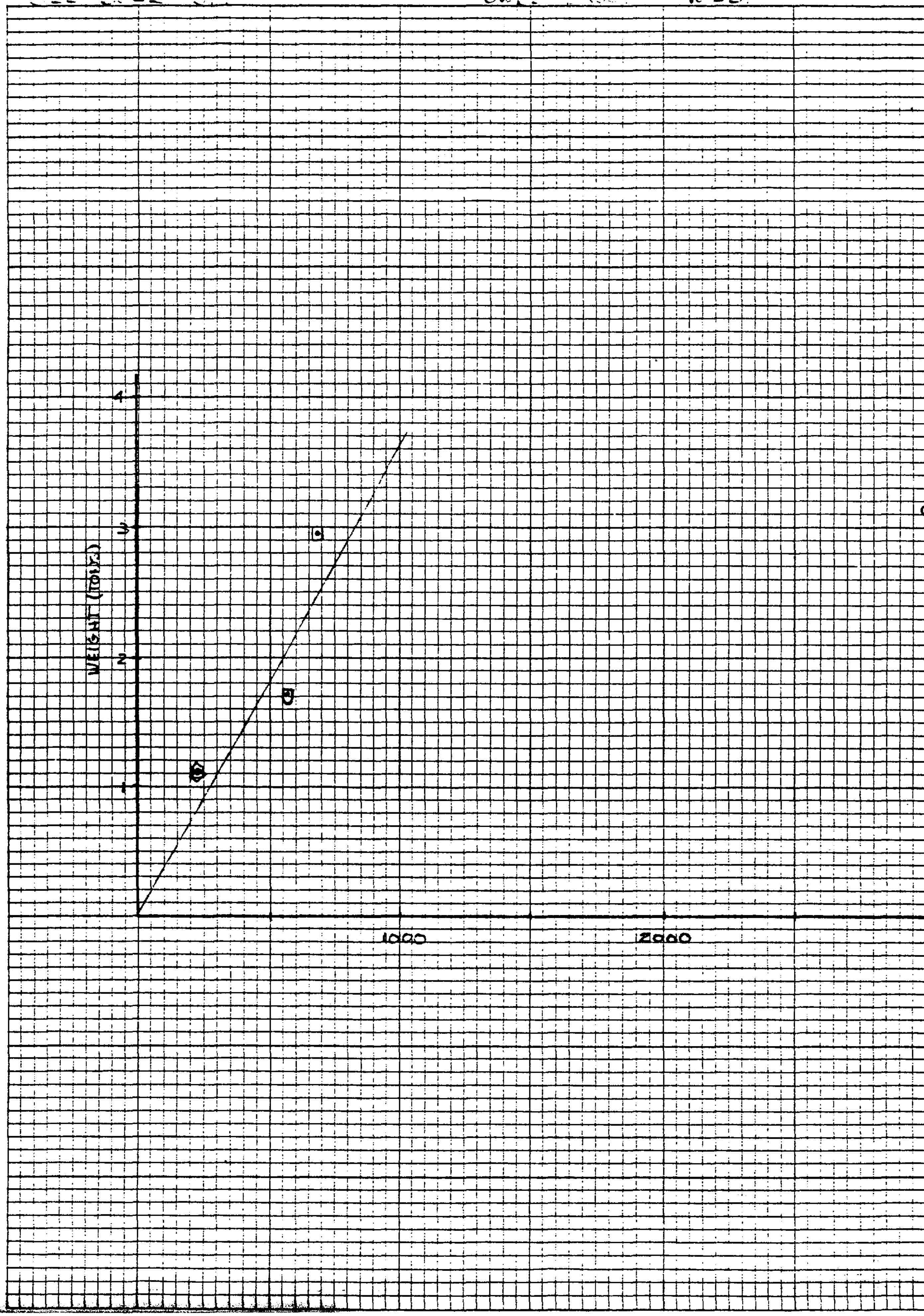
REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W531 DISTILLING PLANT



REPRODUCED AT GOVERNMENT EXPENSE





REPRODUCED AT GOVERNMENT EXPENSE

S32 Cooling Water

WS32 = KS32 * W400

where KS32 = .04 [redacted] (ASSET)

W400 = Command + Surveillance Weight, lbf

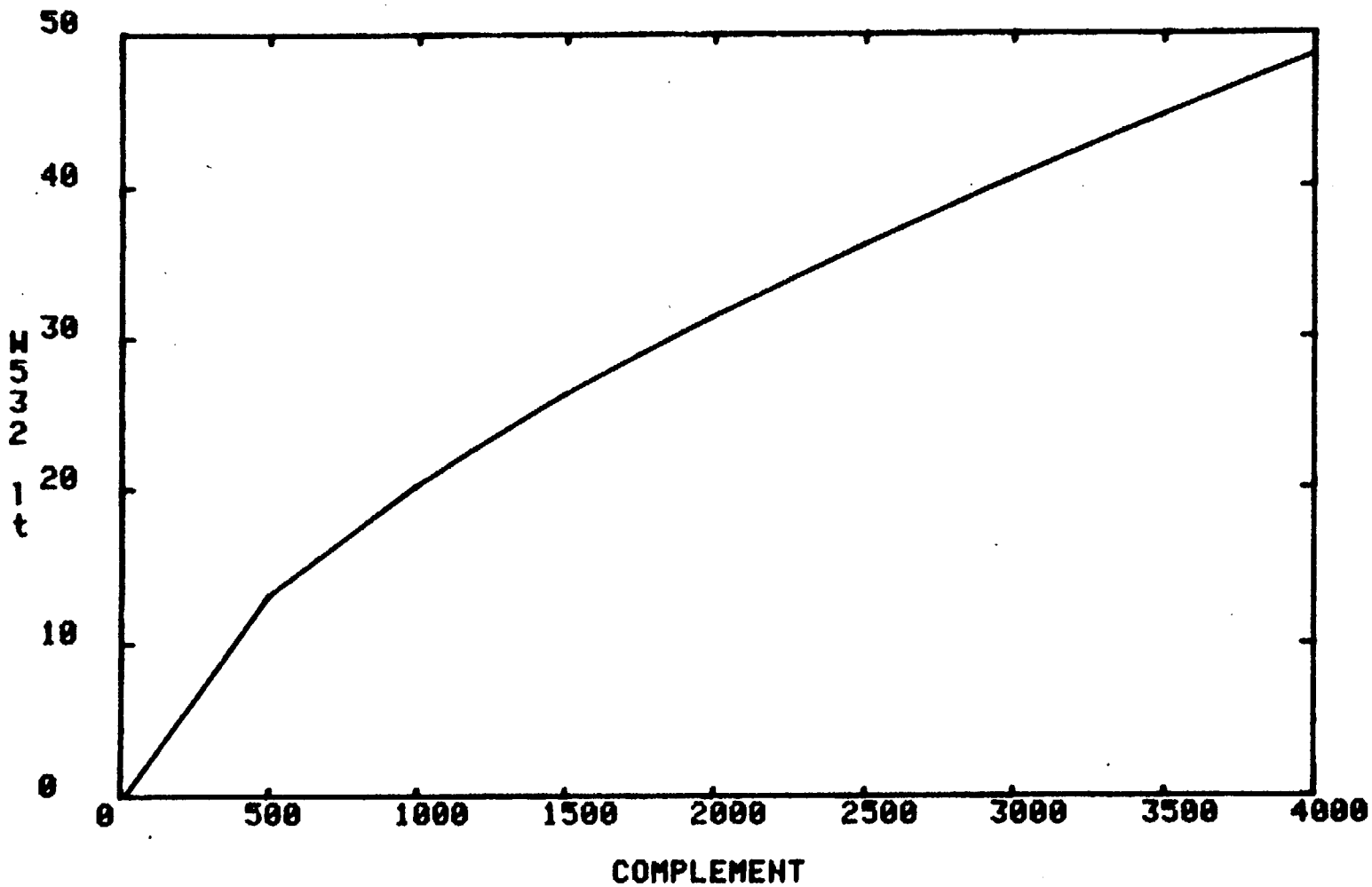
This algorithm is the same as ASSET,

ITEM EC-EA

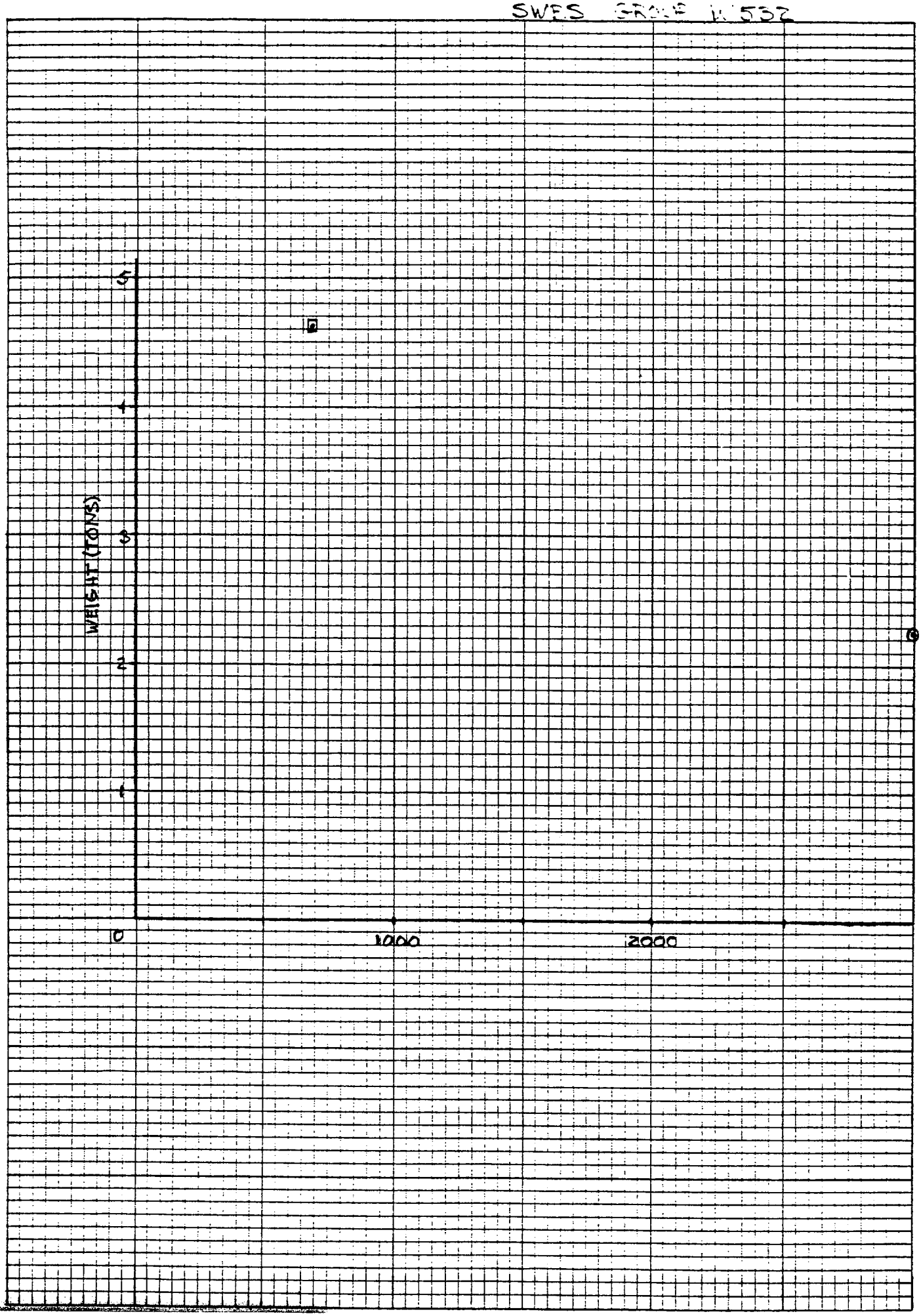
REPRODUCED AT GOVERNMENT EXPENSE

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE



SWES GRADE K 532



EPSILON 10 X 10 TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

S33 Potable Water

W533 = K533 × ACOM

where K533 = .03 lt (~~ESSET~~

#COM = Number of Accommodations

The algorithm is ~~the~~ the same as ASSET,

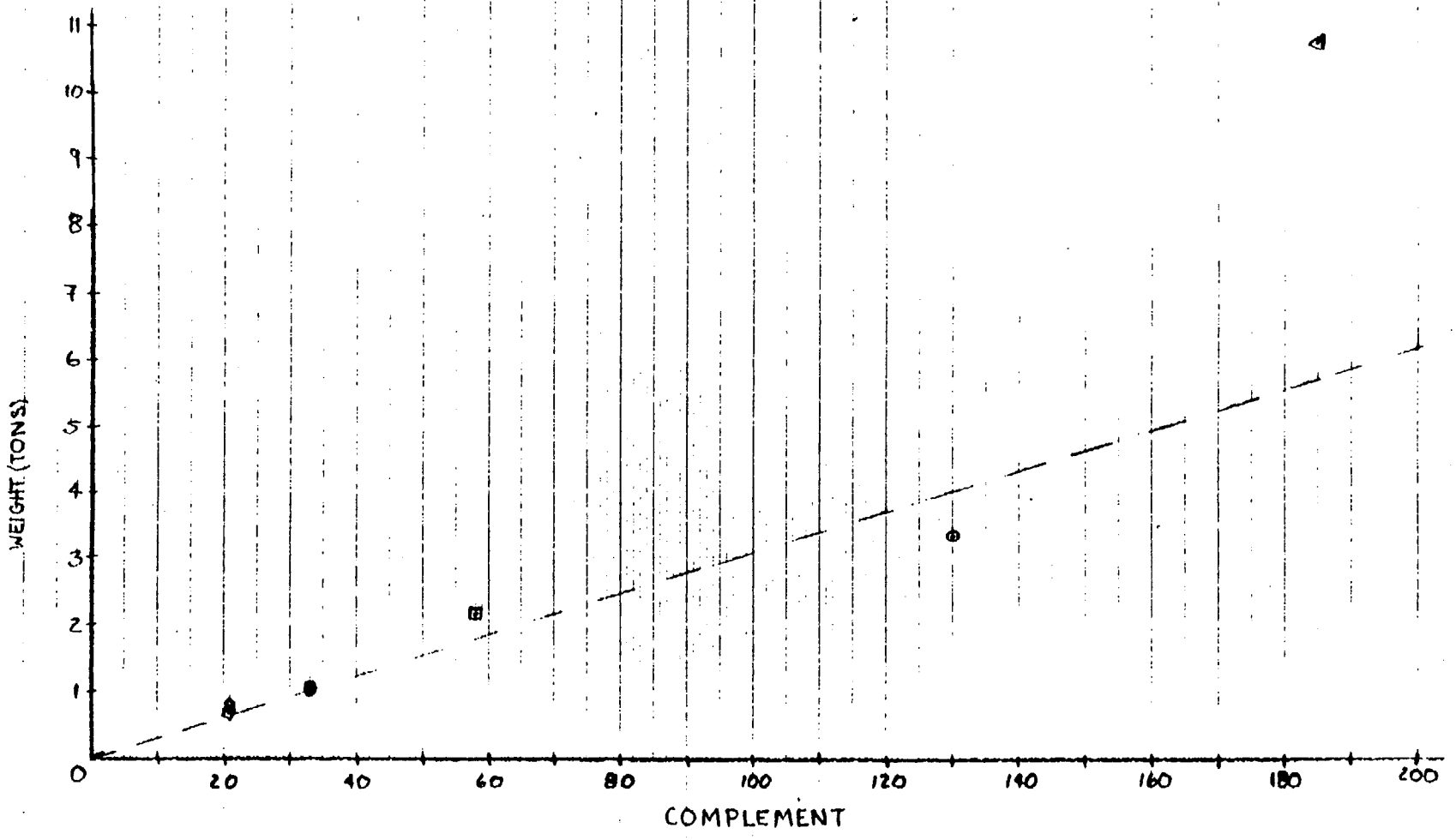
~~The constant~~ (K533 is a constant based on return data of hydrofoils and SWSs.)

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

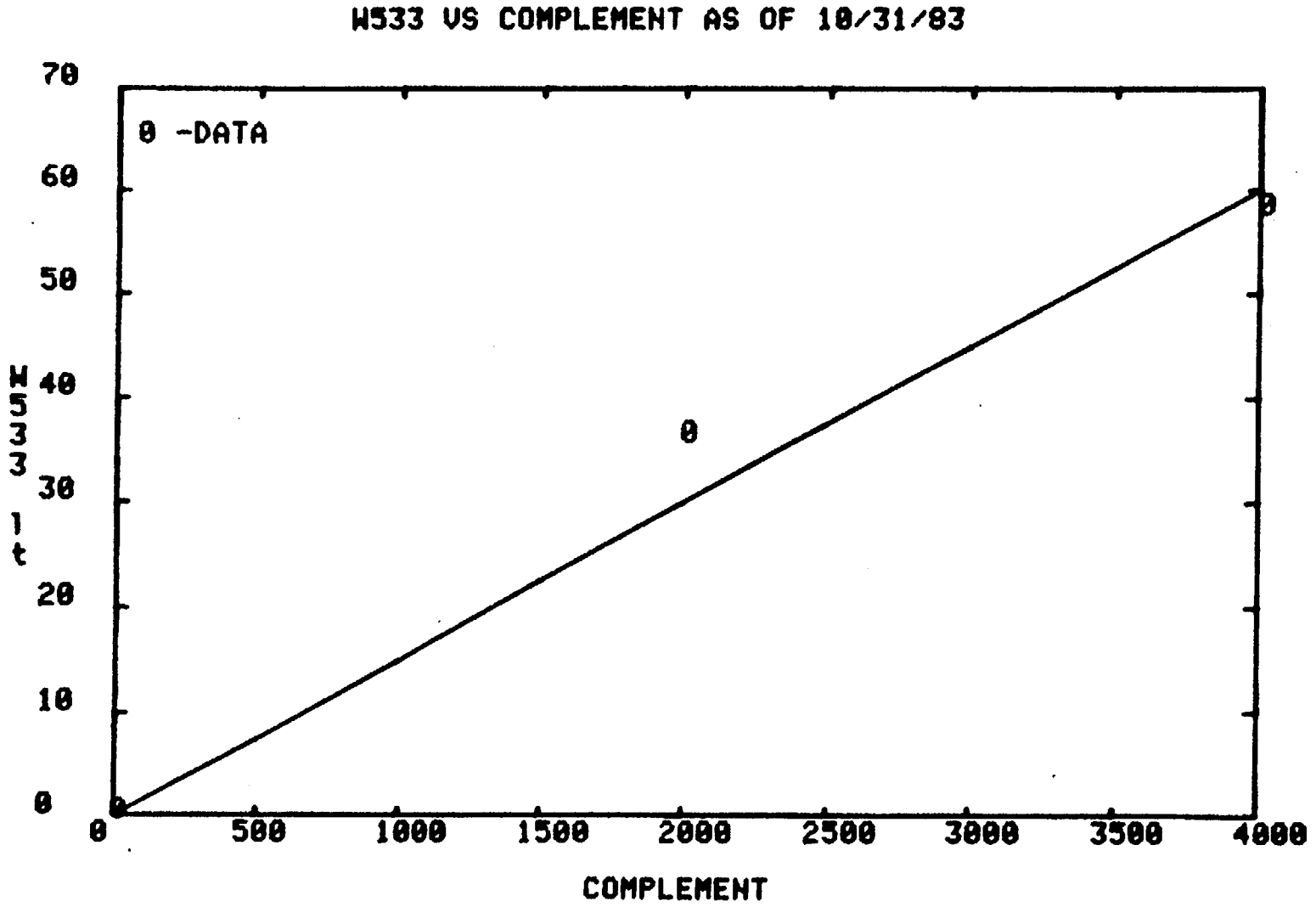
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W533 POTABLE WATER



REPRODUCED AT GOVERNMENT EXPENSE



SEE [illegible] = 500 SWBS GROUP W532

PRINTED IN U.S.A. 10 X 10 TO 1 INCH
WITH THE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

✓S41 Ship Fuel & Fuel Compensating System

WS41 = KS41 • WF41 ✓

where KS41 = .05 V

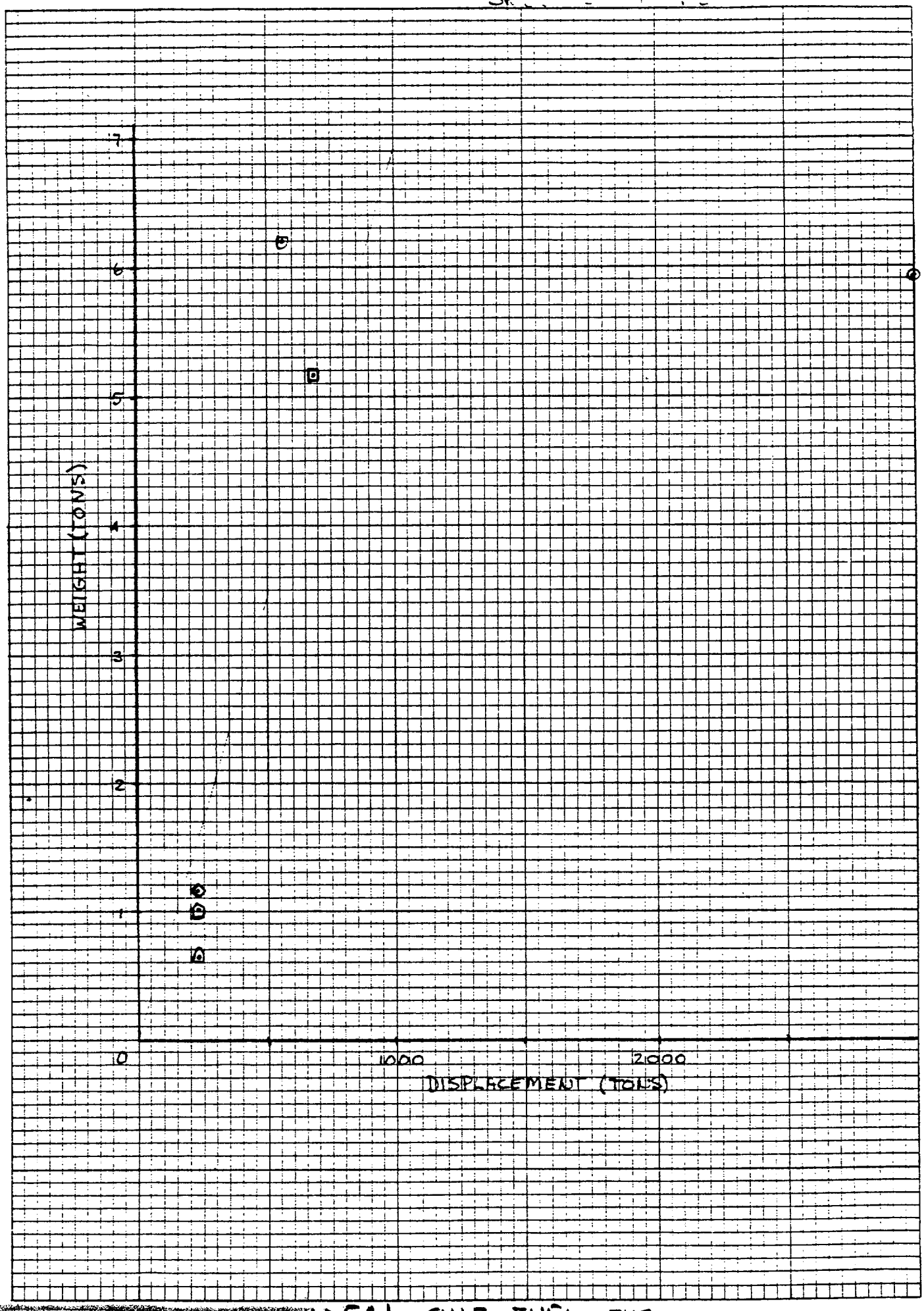
(KS41 is a constant based on return data from hydrofoils and SESs.) ✓

WF41 = Endurance Fuel Load, lt

The algorithm is the same as ASSET. ✓

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE



541 SHIP FUEL SYS

REPRODUCED AT GOVERNMENT EXPENSE

✓ 542 Aviation + General Purpose Fuels

WS42 = KS42 * WF42 ✓

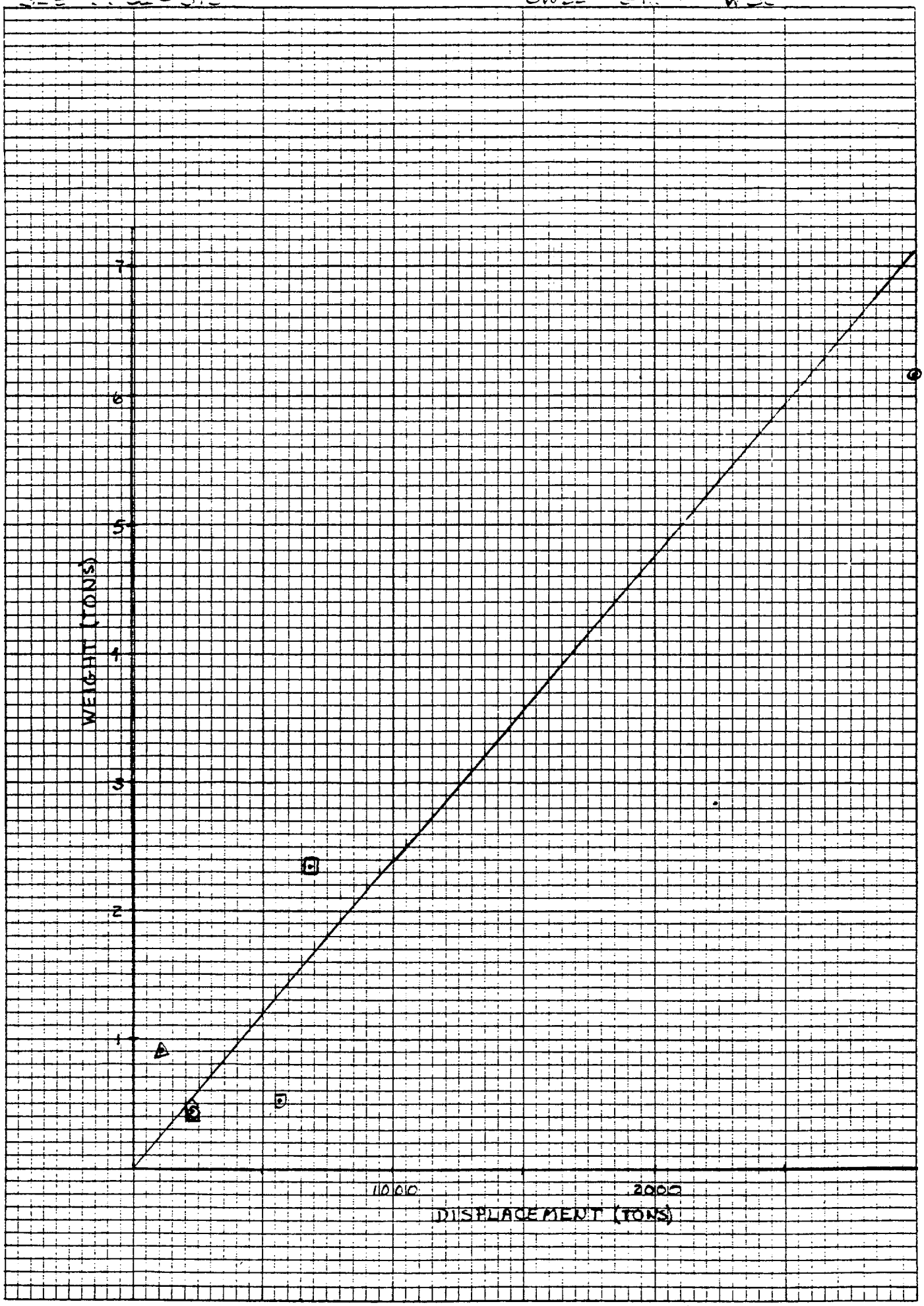
where KS42 = .049 ✓ (ASSET) ✓

WF42 = Aviation Fuel Load, clt

The algorithm is the same as ASSET, ✓

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE



COMPRESSED AIR SYS

REPRODUCED AT GOVERNMENT EXPENSE

SS1 Compressed Air System

$WSS1 = KSS1 \cdot VOLA$

where $KSS1 = .0244 \frac{lb}{ft^3}$ (ASSET)

$VOLA$ = Total Volume $* 10^{-3}$, ft^3

The algorithm is same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 383 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

SSS Fire Extinguishing System

$W_{SSS} = KSSS * VOLA$

where $KSSS = .027$ lb/ft^3 (ASSET)

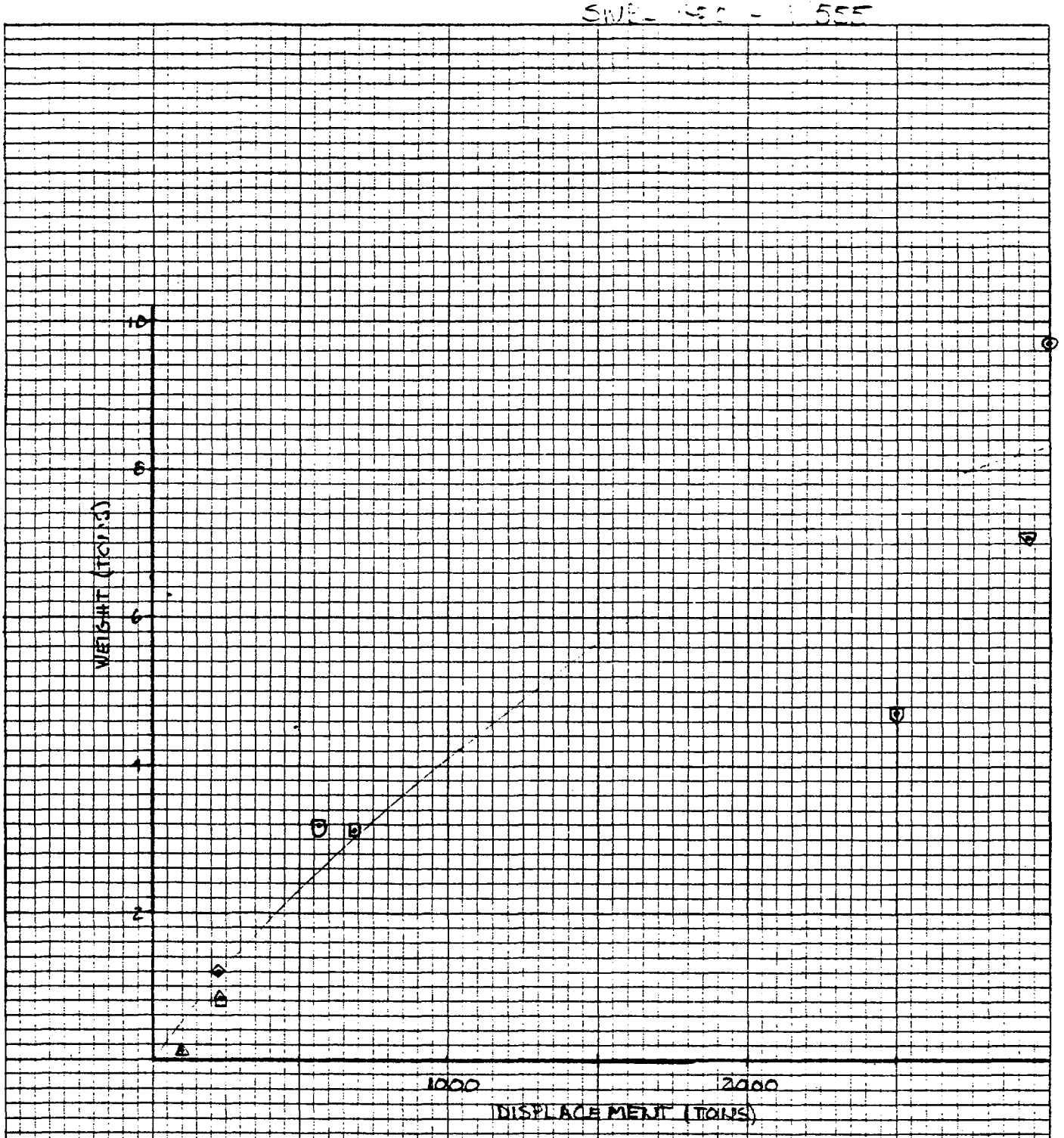
$VOLA$ = Total Volume $* 10^{-3}$, ft^3

The algorithm is the same as ASSET.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

SWL - 555



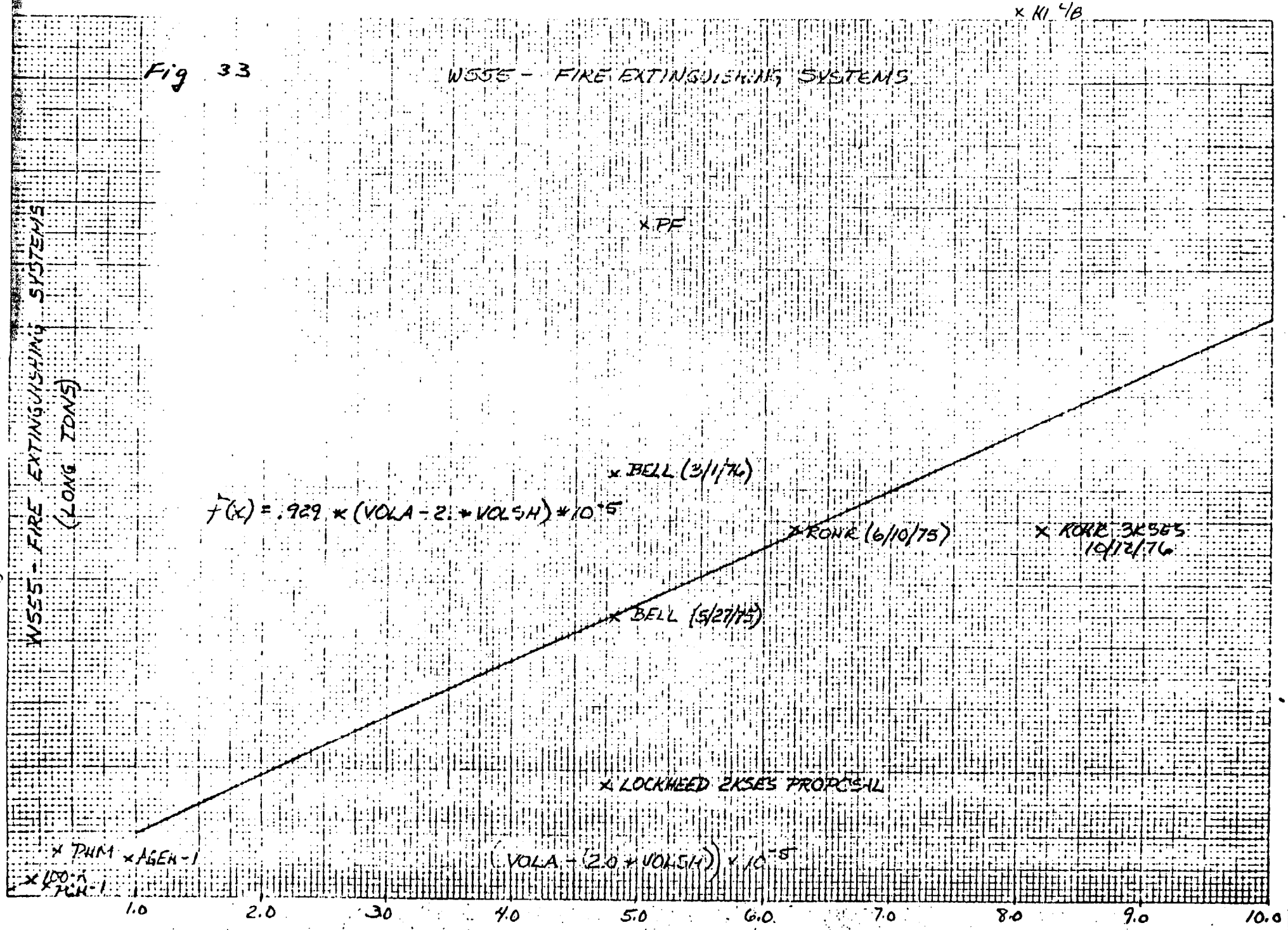
W555 FIRE EXTINGUISHING SYS

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

Fig 33

WSSS - FIRE EXTINGUISHING SYSTEMS



REPRODUCED AT GOVERNMENT EXPENSE

PAUSE 'PRESS (RETURN) TO CONTINUE'

SUBS 555 FIRE EXTINGUISHING SYSTEMS'(BSCI 507)

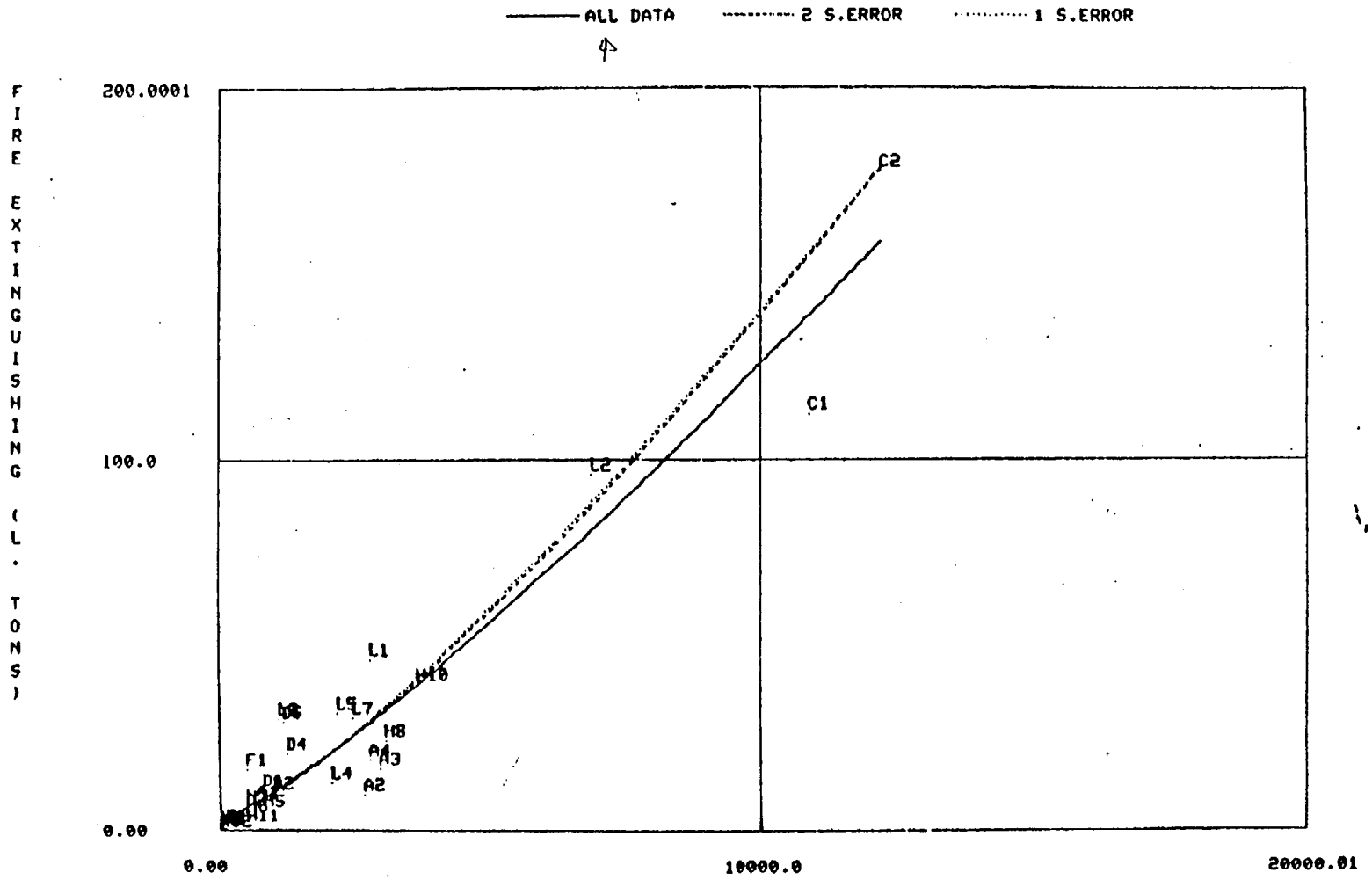


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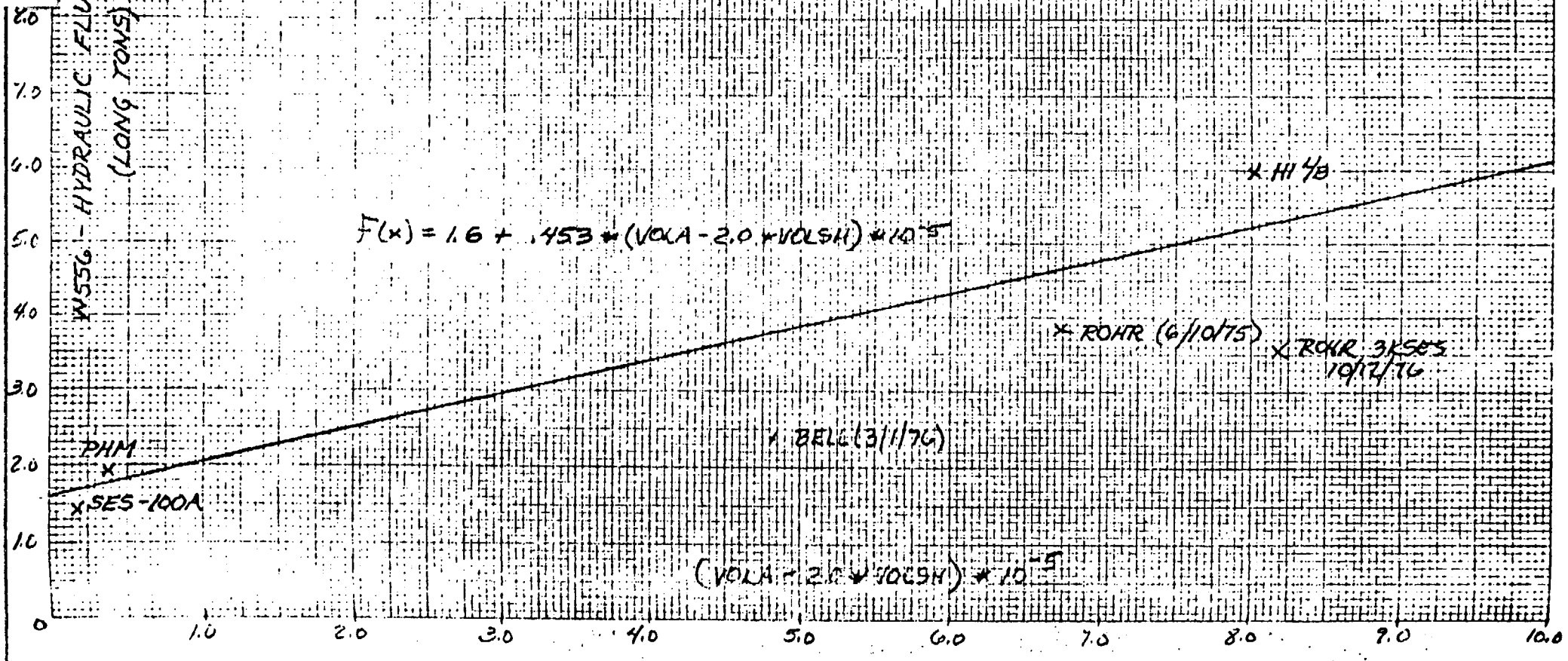
Fig 34

W556 - HYDRAULIC FLUID SYSTEM



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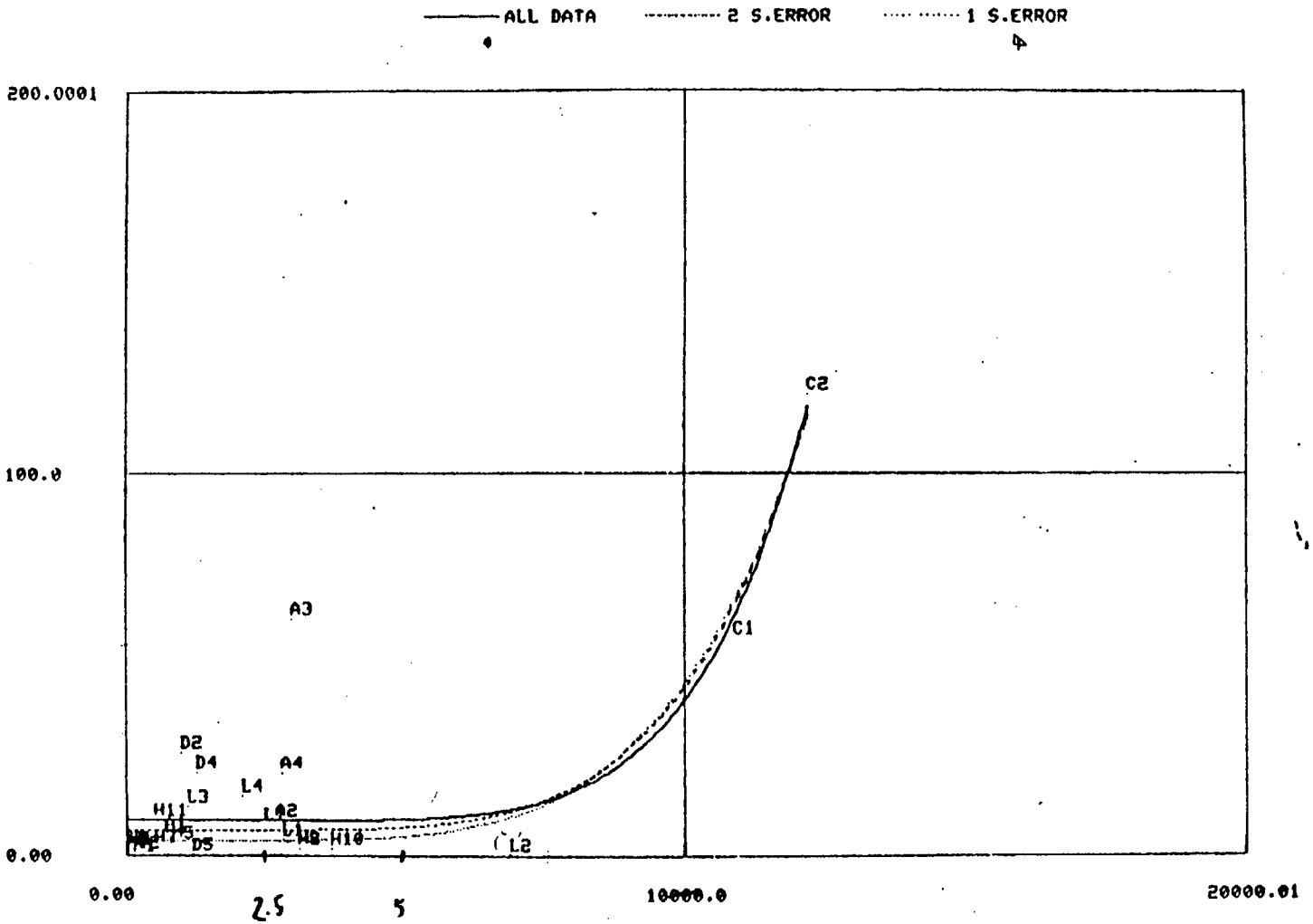
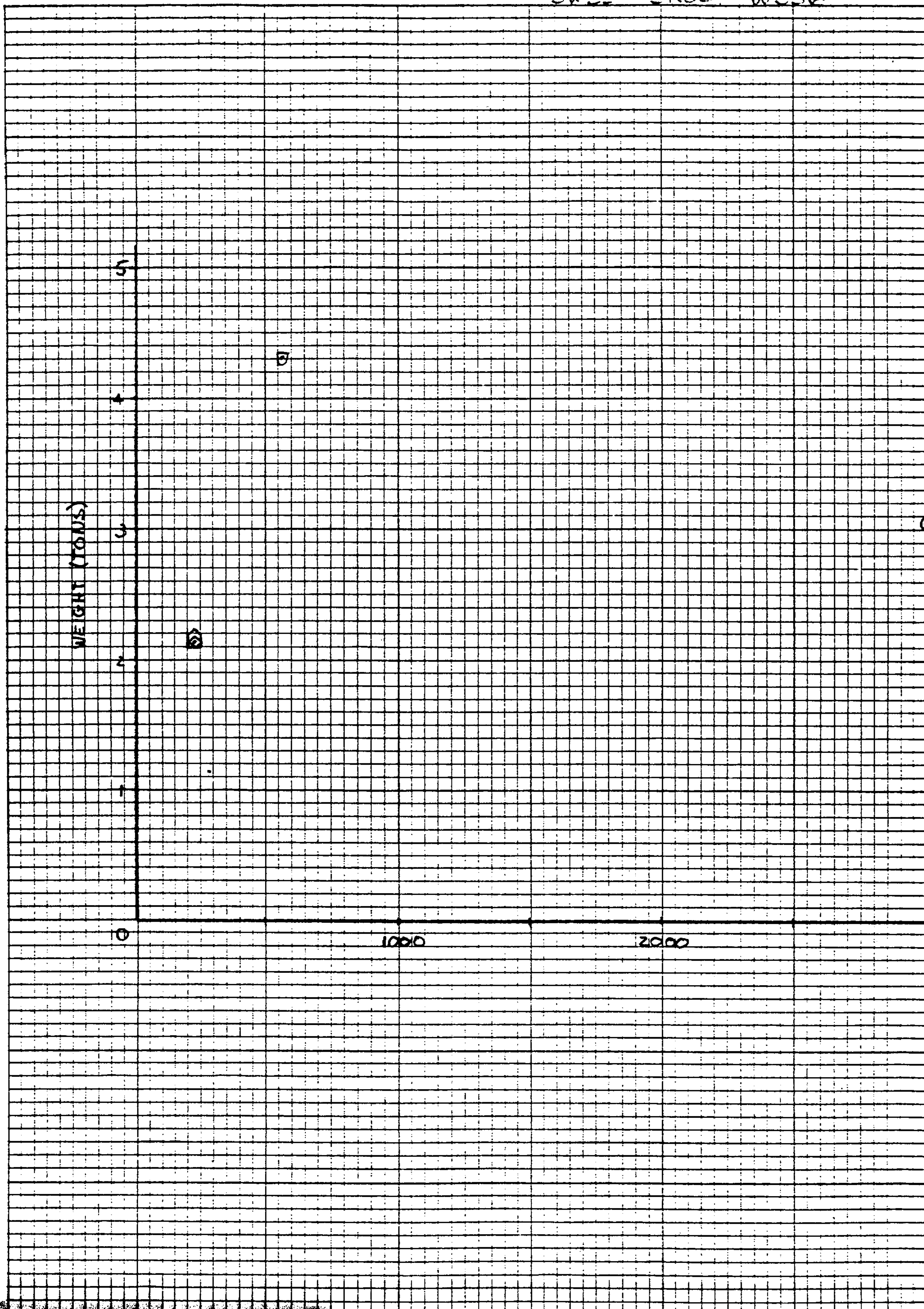
SUBS 556 HYDRAULIC FLUID SYSTEM (BSCI 516)

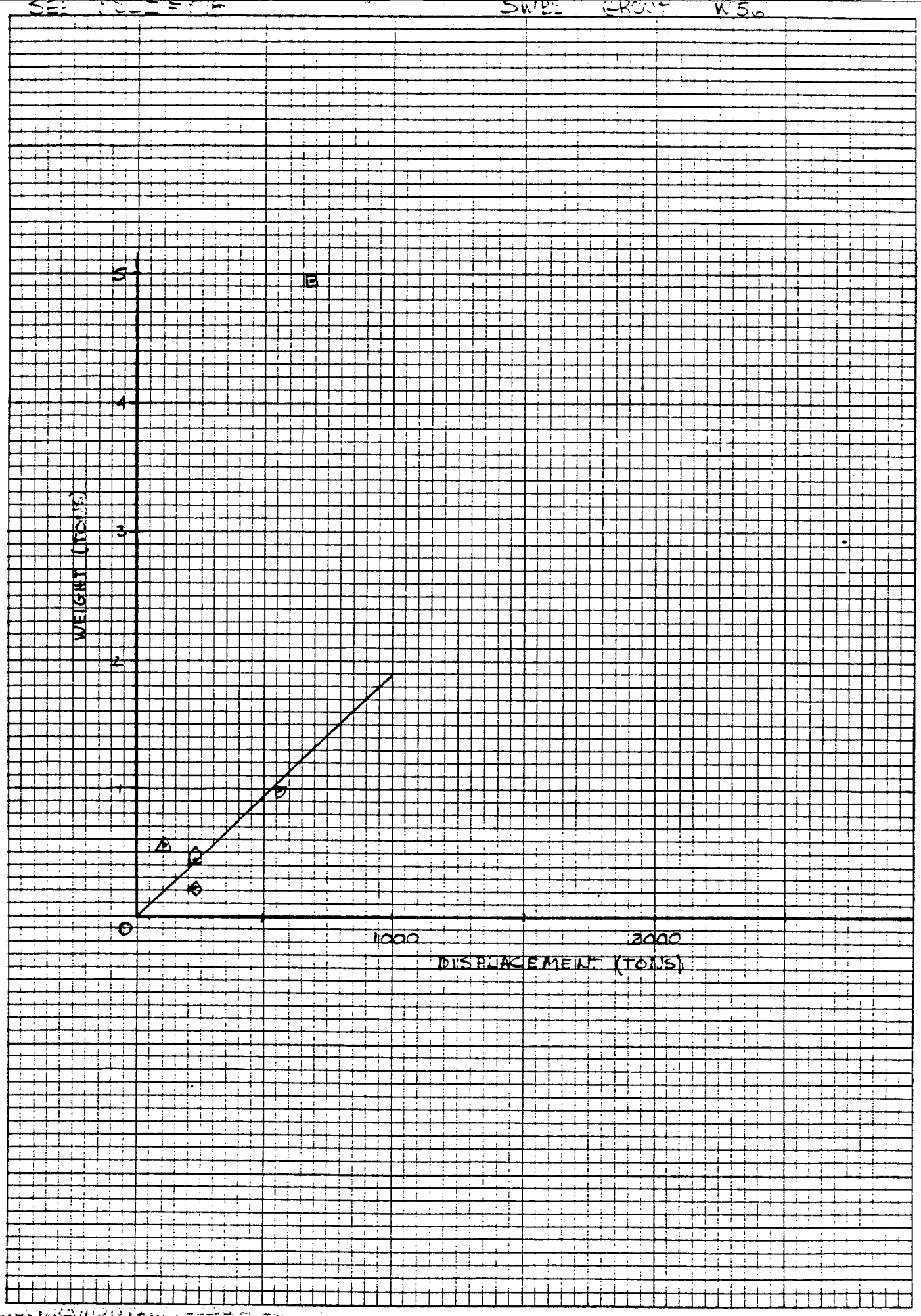


$\times 10^{-6}$

SWES GROUP W556



REPRODUCED AT GOVERNMENT EXPENSE



REPRODUCED AT GOVERNMENT EXPENSE

SG1 Steering Systems ✓

$$WSG1 = KSG1 * VOLA$$

where $KSG1 = .0075\ lb/ft^3$

(KSG1 is a constant based on return weight of hydrofoils and SESs.)

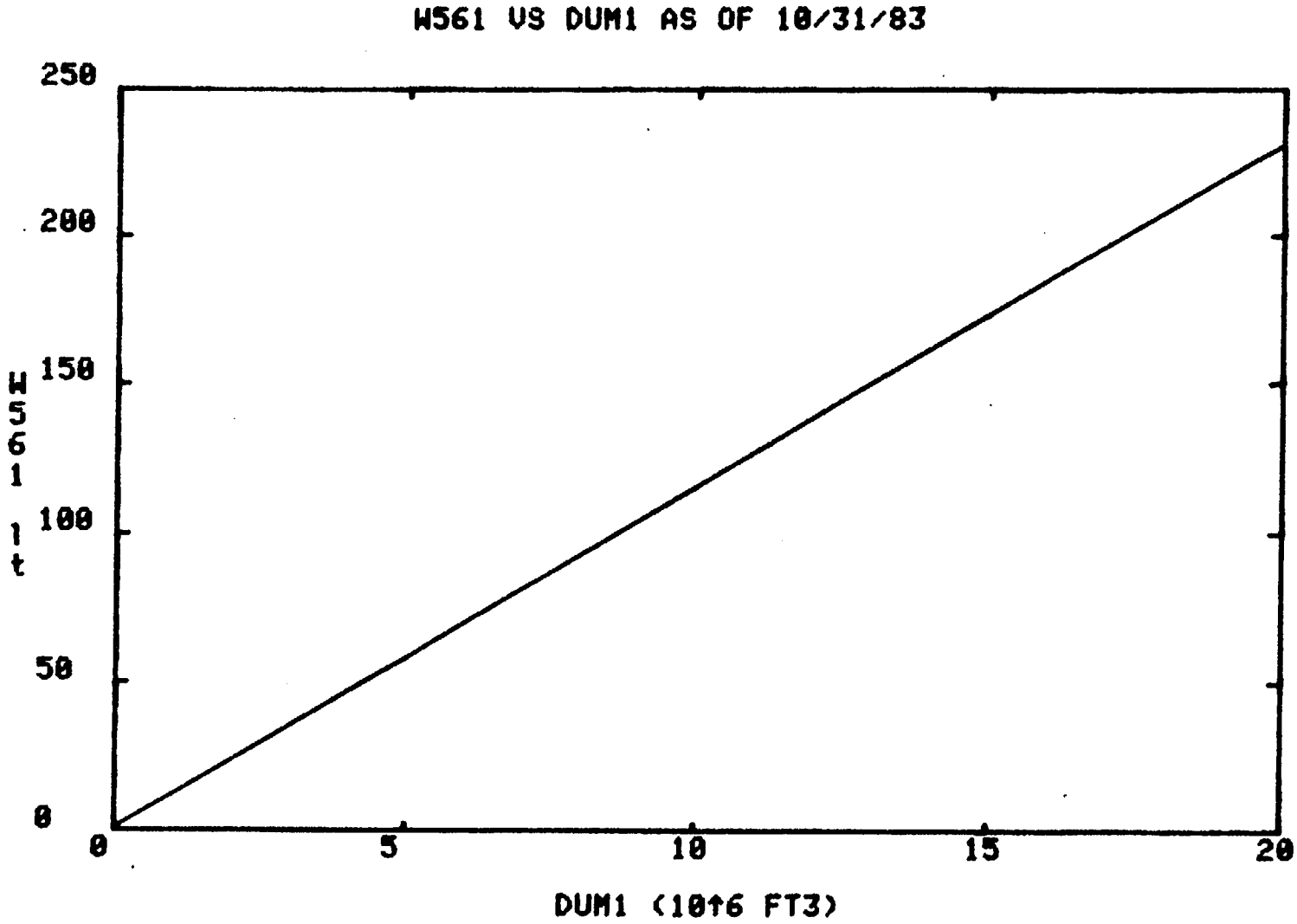
$$VOLA = \text{Total volume} \times 10^{-3},\ ft^3$$

This algorithm is ~~the same as~~ based on weight resolution of CONFORM designs.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE



SG2 Rudder

$WSG2 = KSG2 * VOLA$

where $KSG2 = .0079 \frac{lb}{ft^3}$

(KSG2 is a constant based on retrimulation of hydrofoils and SBSs.)

$VOLA$ = Total Volume $* 10^{-3}$, ft^3

The algorithm is based on SG1 algorithm.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS 561/2/8 STEERING MANEUVERING (BSC1 518/9)

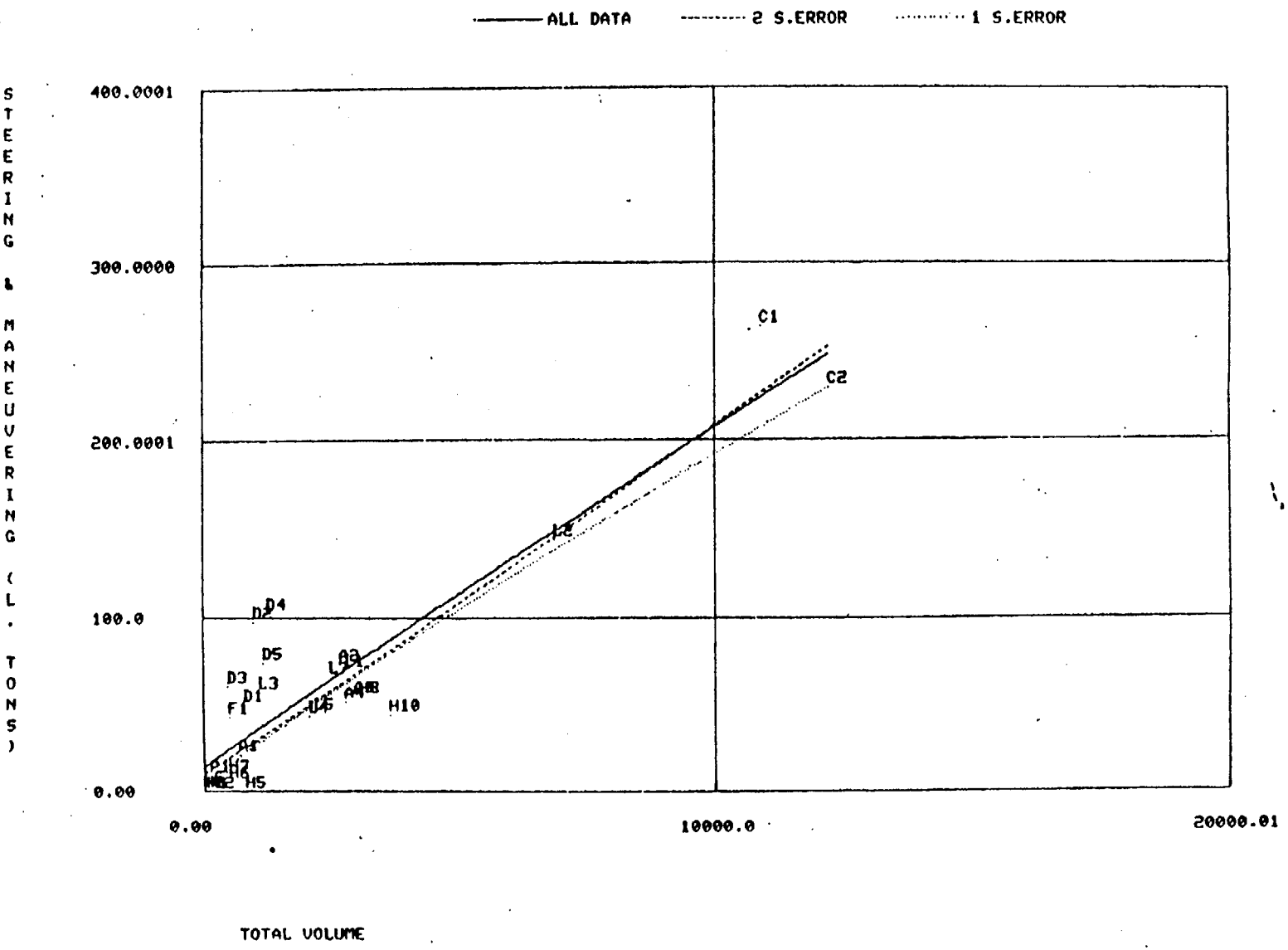


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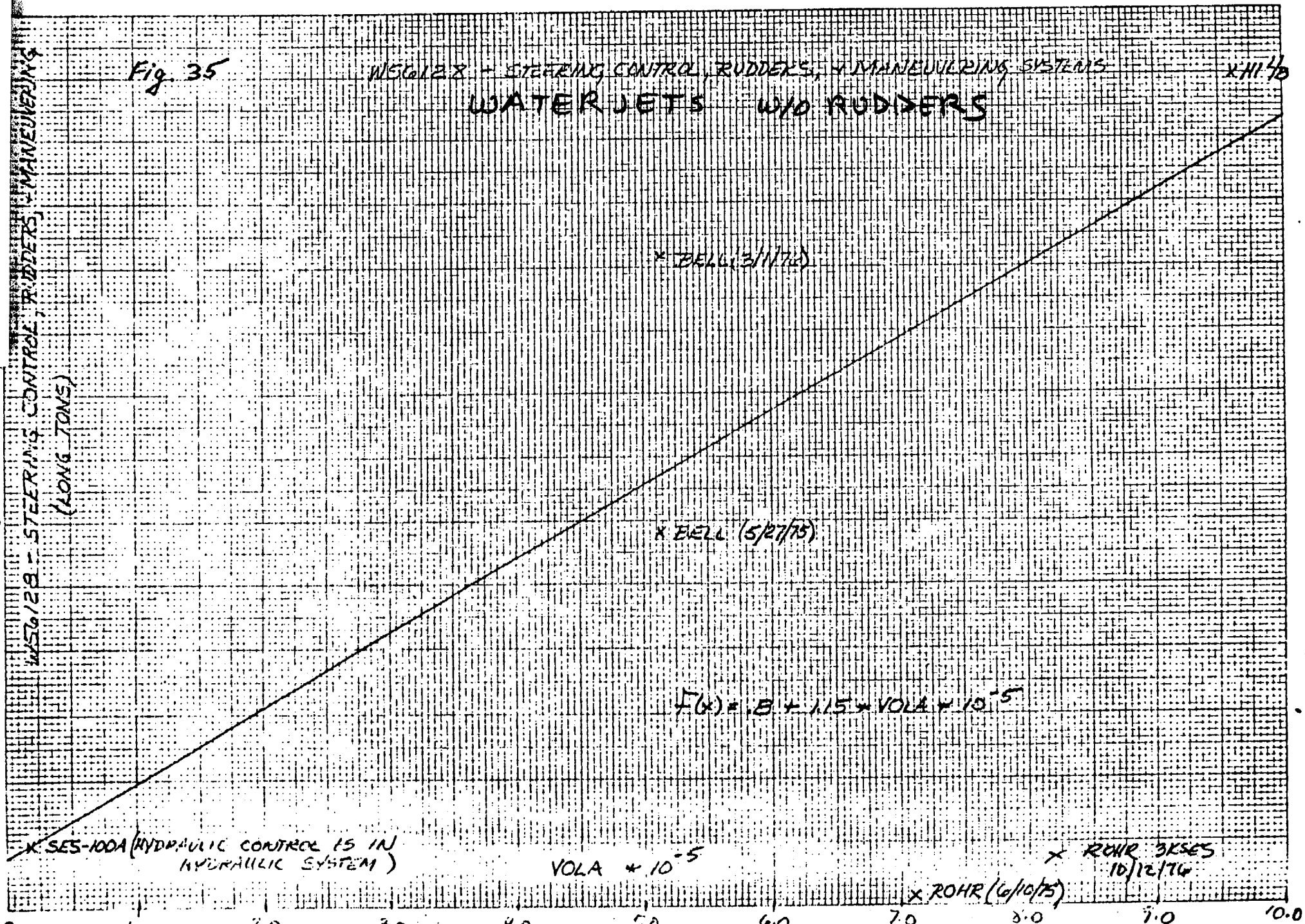
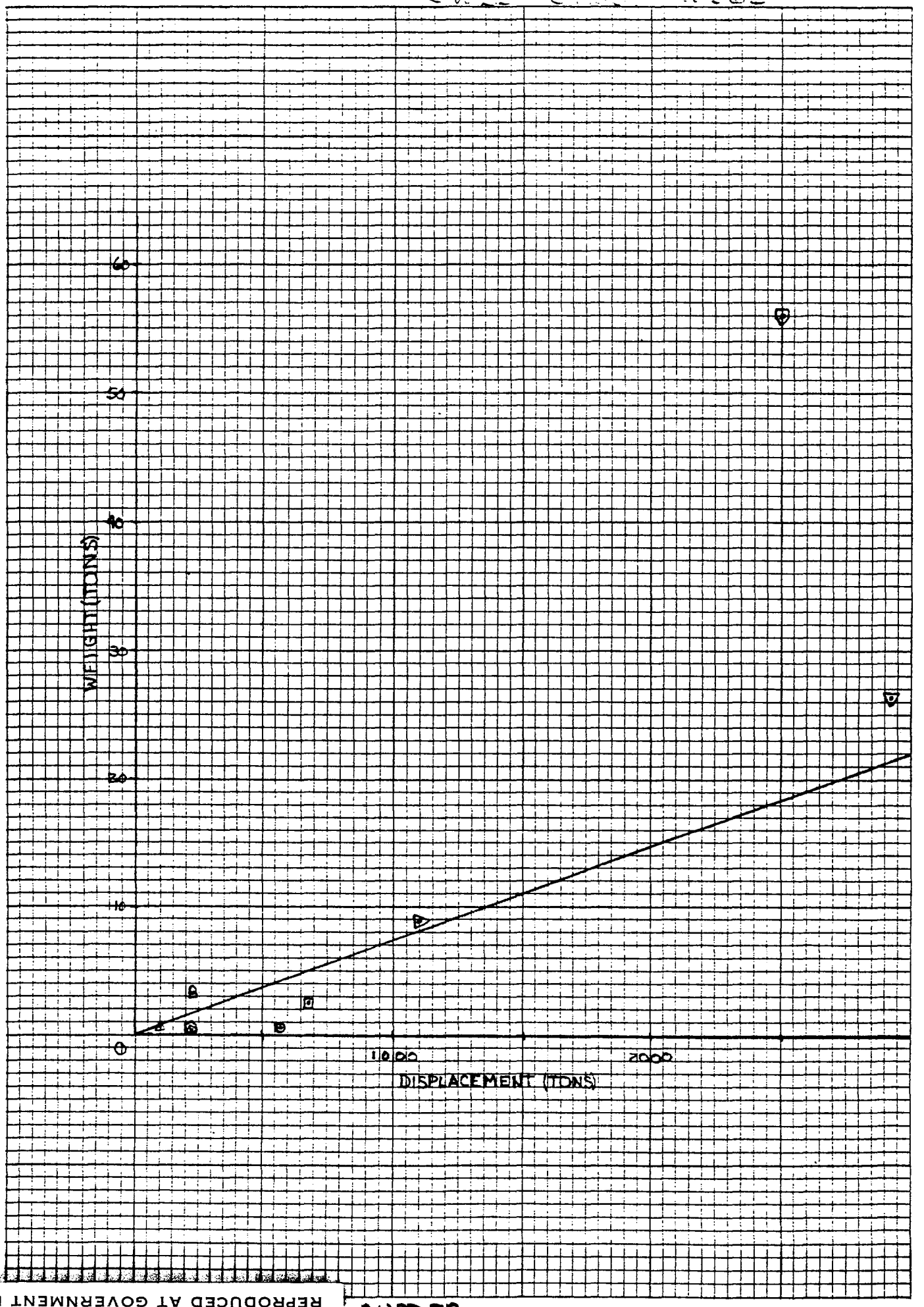
Fig. 35

WSC6128 - STEERING CONTROL, RUDDERS, & MANEUVERING SYSTEMS

WATERJETS W/O RUDDERS





RUDDER

REPRODUCED AT GOVERNMENT EXPENSE

EPSILON 10 X 10 TO 1 INCH
10TH LINE HEAVY

571 Replenish at SEA ✓

WS71 = KS71 * VOLA

where KS71 = 6.25×10^{-3} lt/ft^3

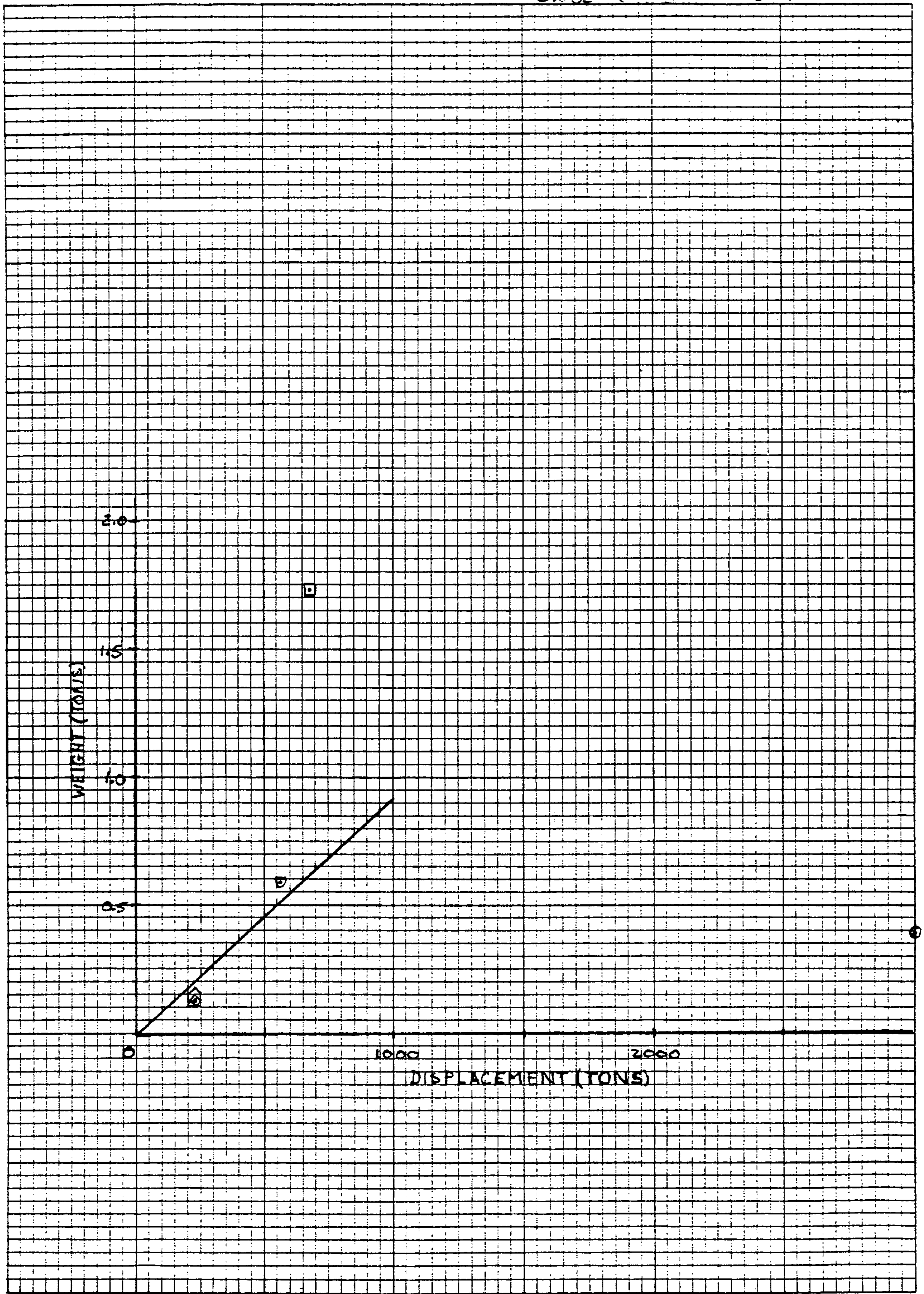
(KS71 is ~~based on~~ a constant based on return data of hydrofoils and SES's)

VOLA = Total Volume * 10^{-3}, ft^3

The algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE



REPLENISHMENT AT SEA

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

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CROSS SECTION-10X10 TO 1 INCH
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Fig 39

WS71 - REPLENISHMENT AT LCF

X BELL 5/27/75

ROHR 3K565
V.C. = 1339
WS71 = 2.9
(6/12/76)

$f(x) = .00058 * WF00$

X WS71

X ROHR (6/10/75)

WS71 - REPLENISHMENT AT LCF (LONG TONS)

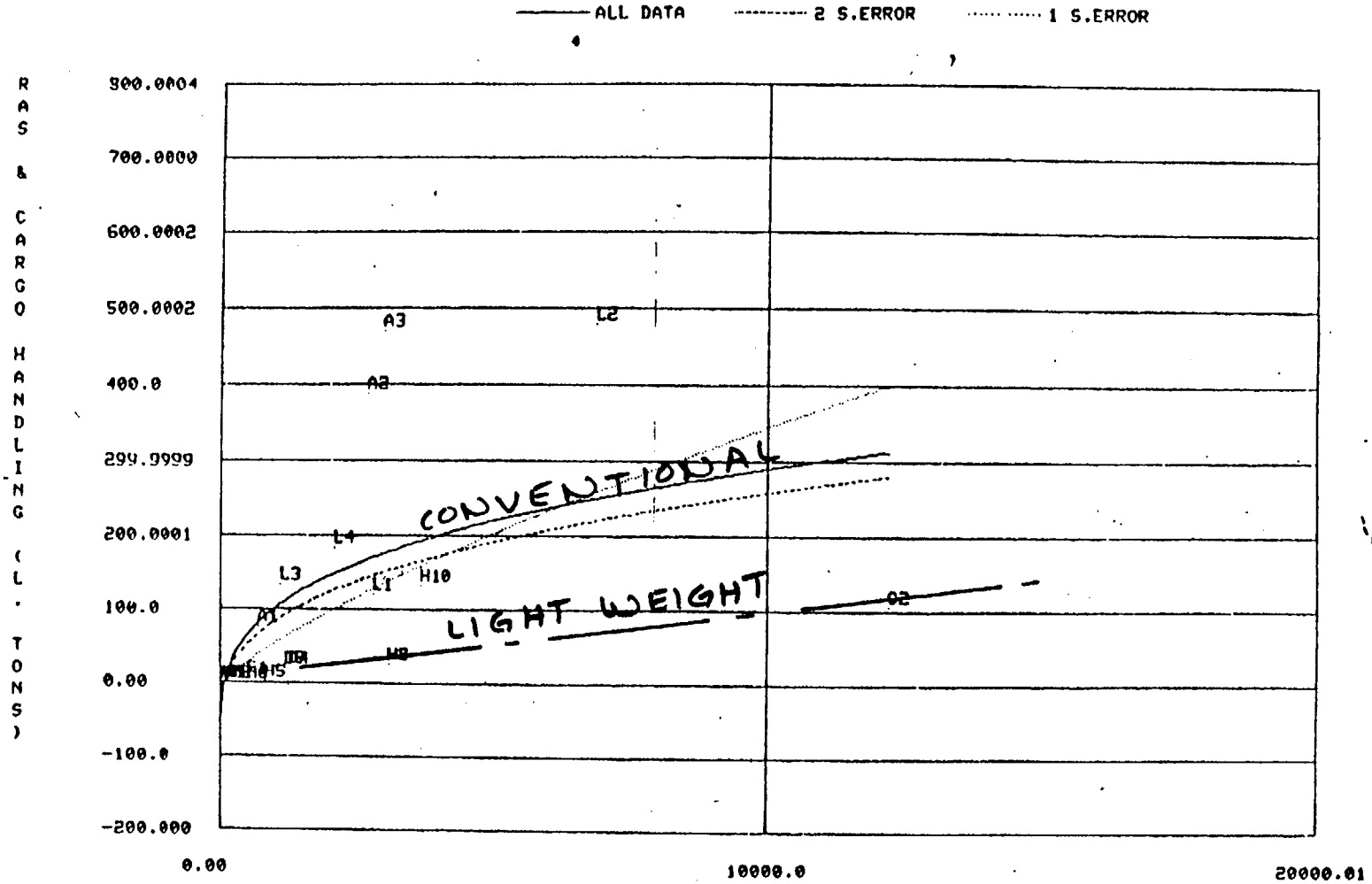
.5

VARIABLE LOADS (LONG TONS)

0 100 200 300 400 500 600 700 800 900 1000

REPRODUCED AT GOVERNMENT EXPENSE

SWBS 571/3/4 RAS & CARGO HANDLING (BSCI 528)



V572 Ship Stowage + Equipment Handling

$WS72 = KS72 * VOLA$

where $KS72 = 6.25 \times 10^{-3}$ lt/ft^3

(KS72 is a constant based on return data from Hydrofoils and SES's.)

VOLA = Total Volume $* 10^{-3}$, ft3

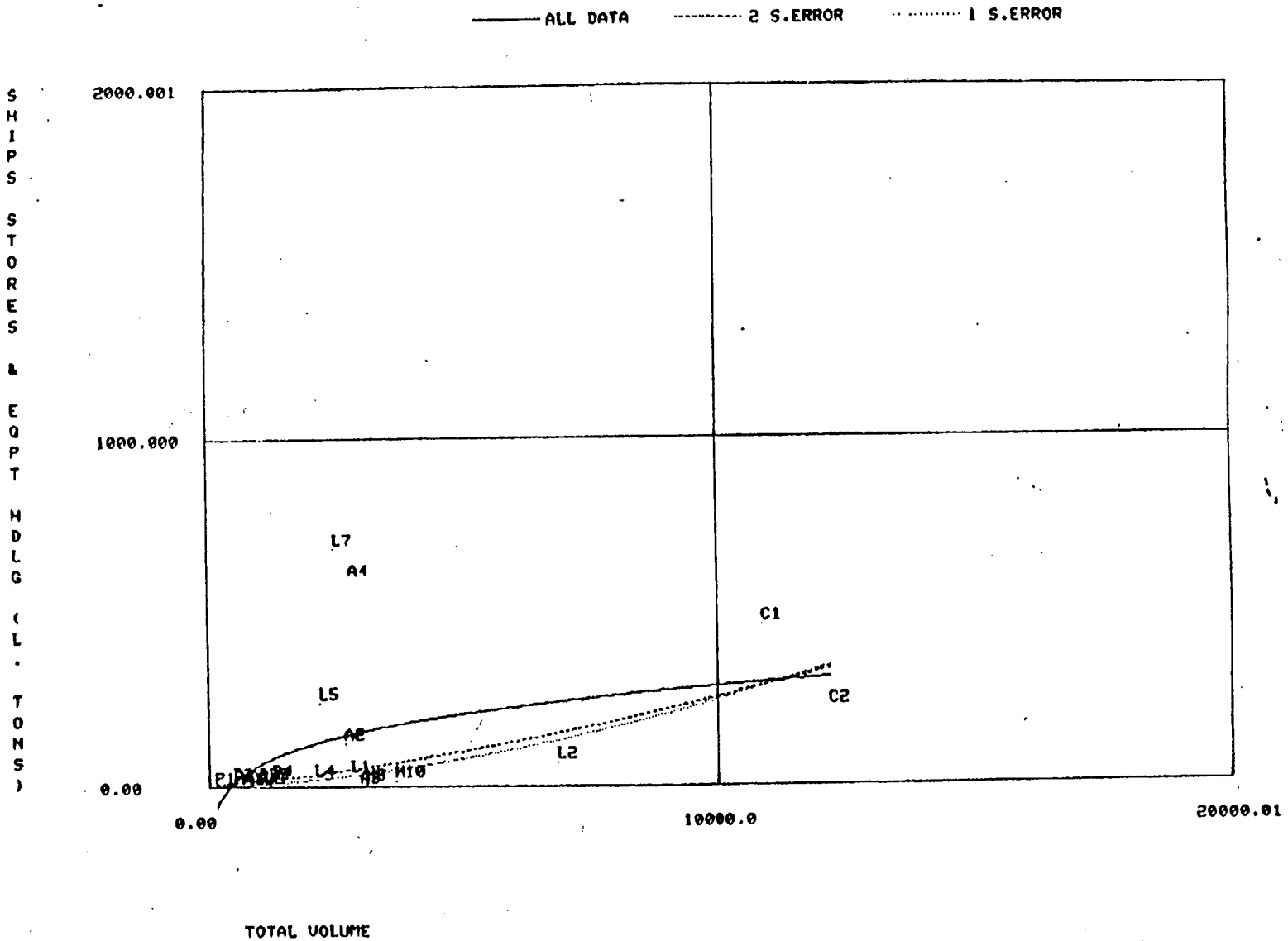
The algorithm is the same as ASSET.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

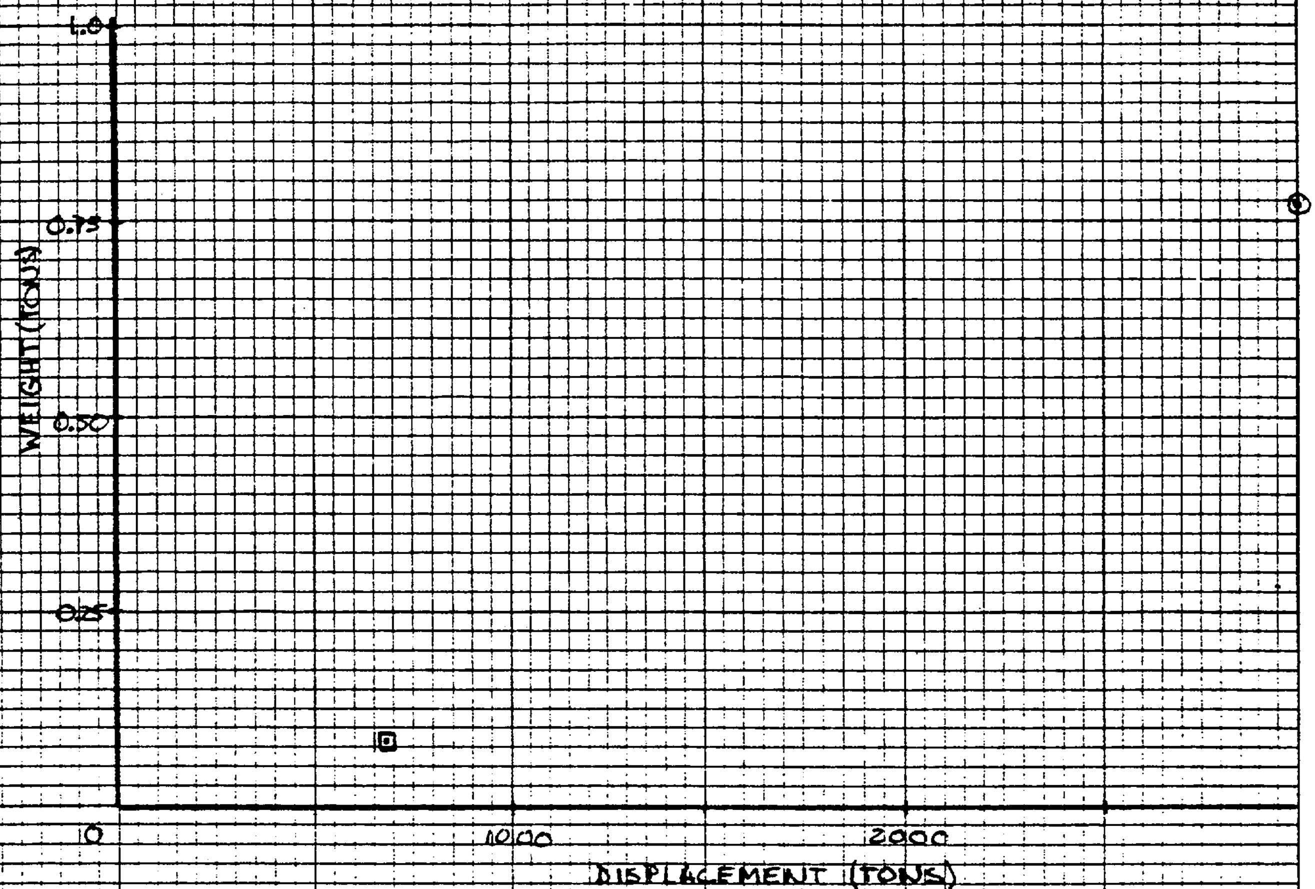
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS 572 SHIPS STORES & EQPT HANDLING (BSCI(521)



SWES GROUP WS72



REPRODUCED AT GOVERNMENT EXPENSE

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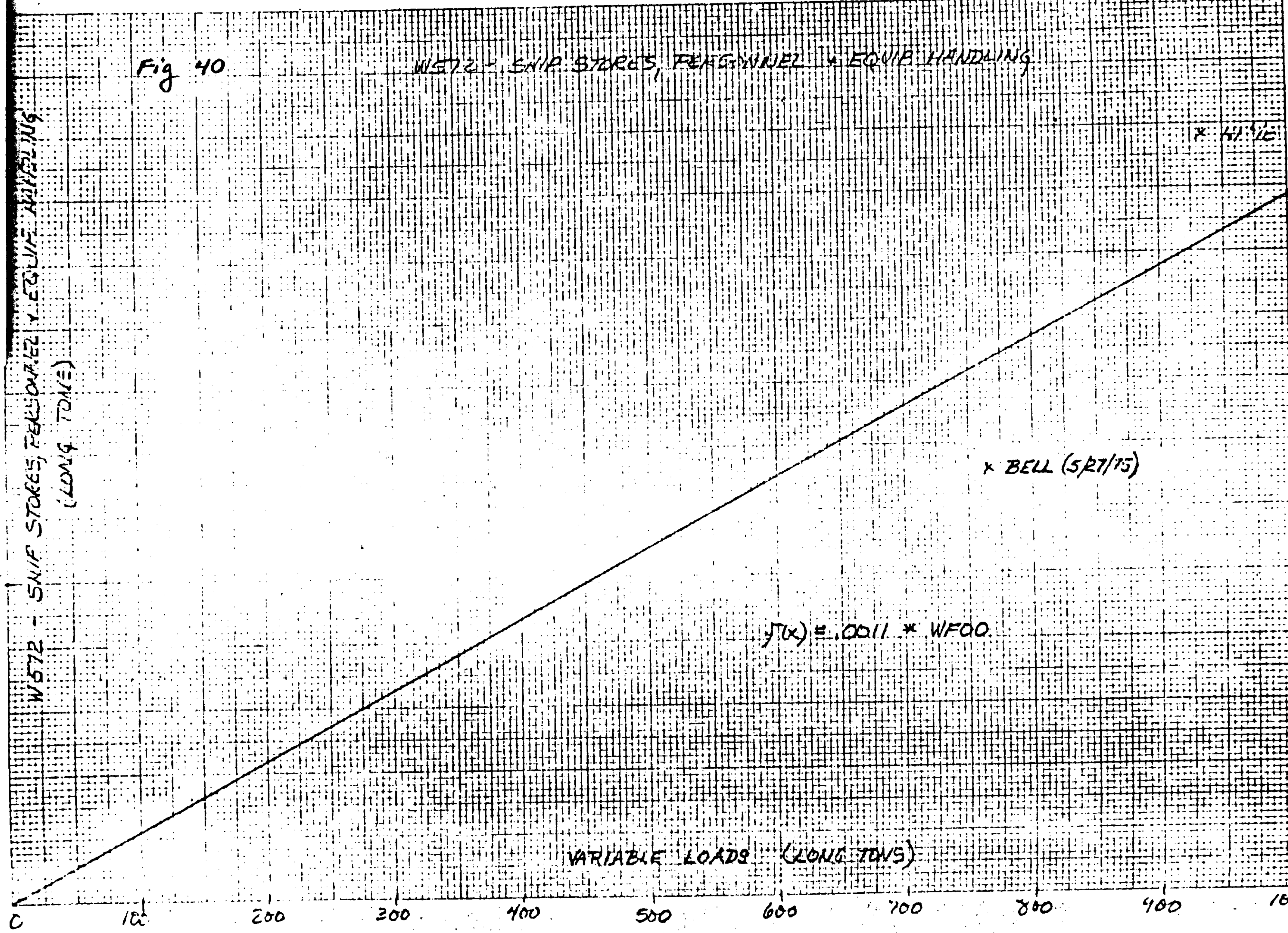


REPRODUCED AT GOVERNMENT EXPENSE

S81 Anchor Handling + Stowage Systems

$$W_{S81} = KS81 \times VOLA$$

where $KS81 = .01$ lbt/ft3

(KS81 is a constant based on returned data from hydrofoils and SESs.)

VOLA = Total Volume $* 10^{-3}$, ft3

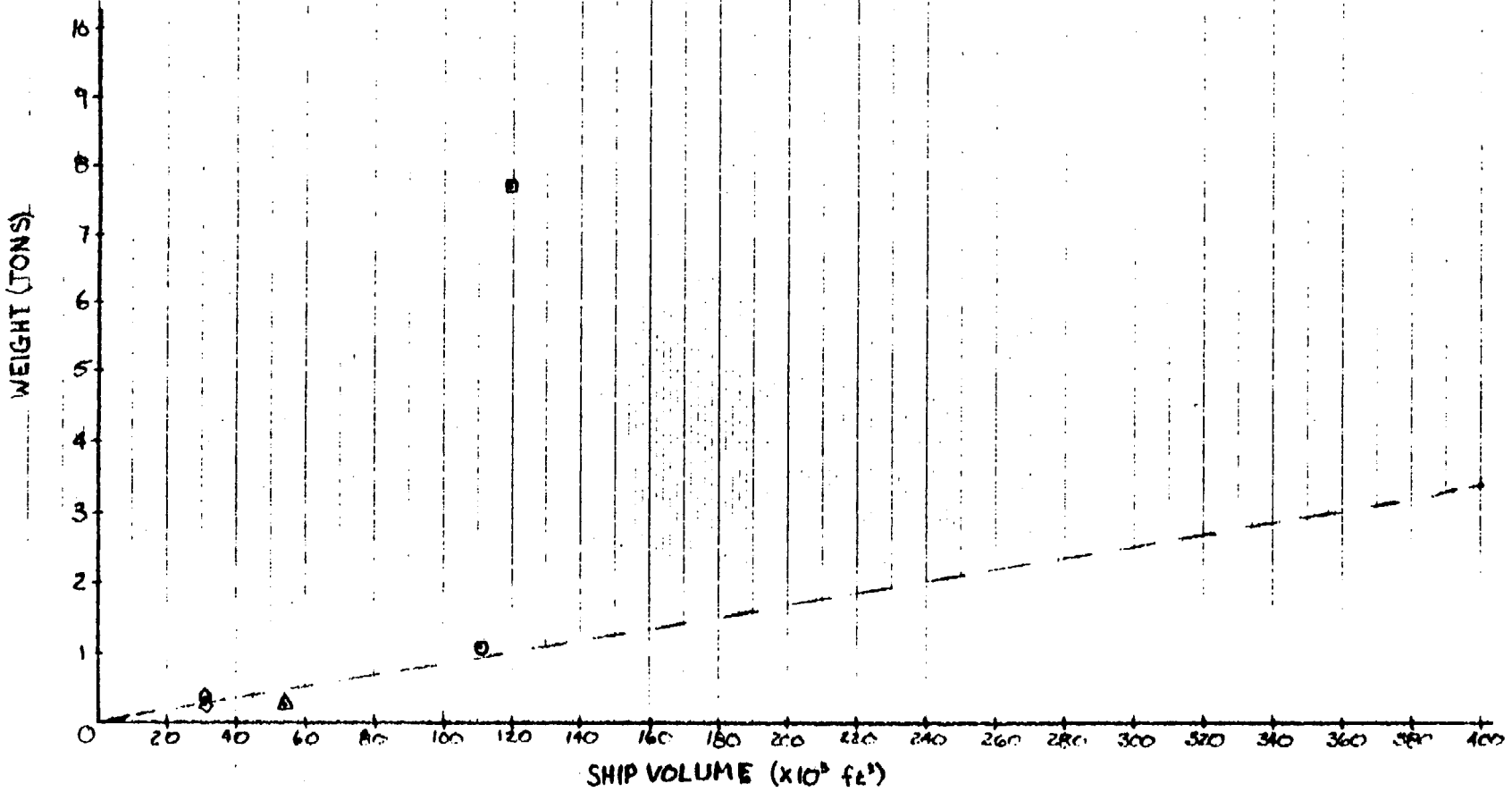
The algorithm is the same as ASSET

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W5B1 ANCHOR HANDLING AND STOWAGE SYSTEMS



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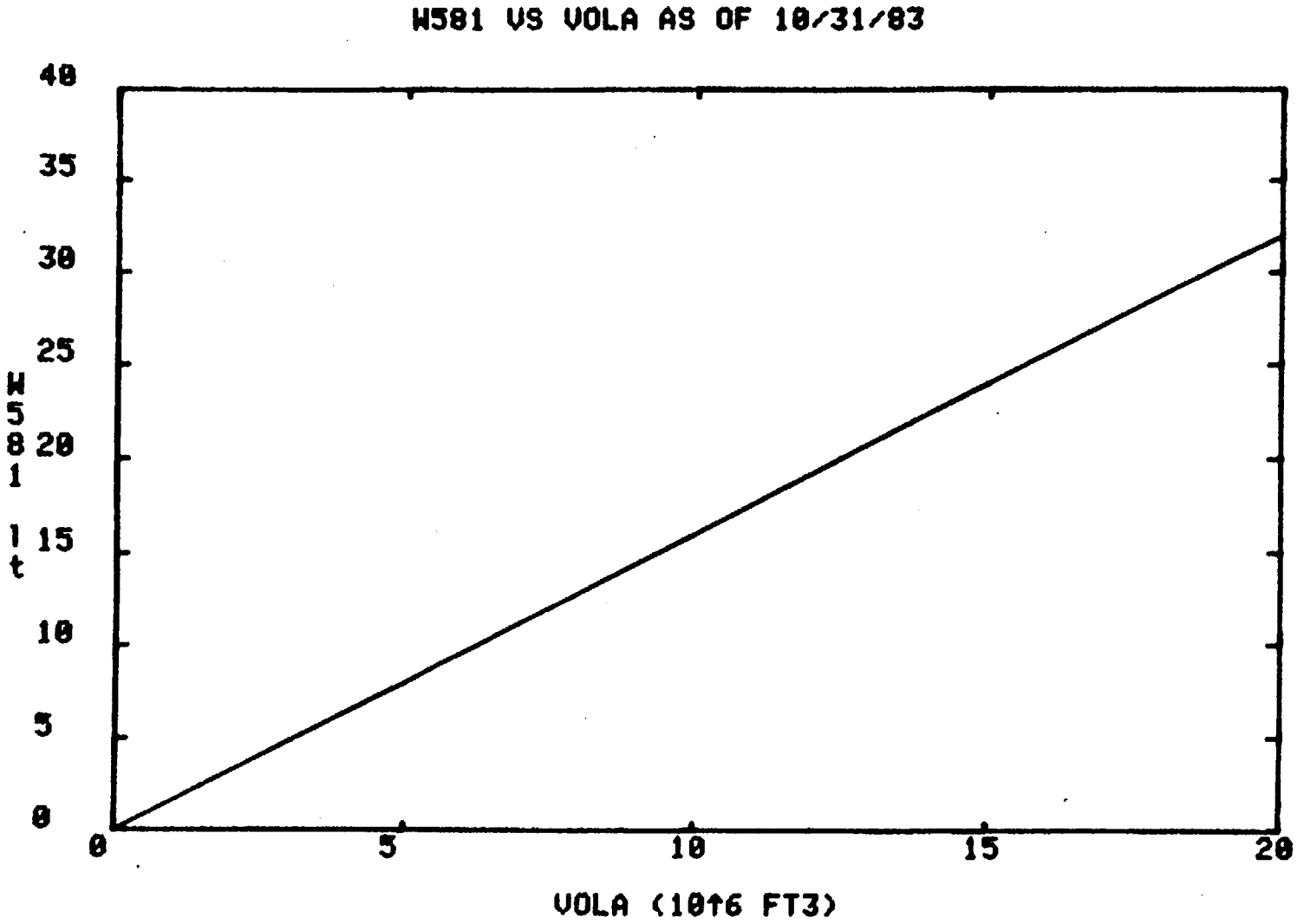
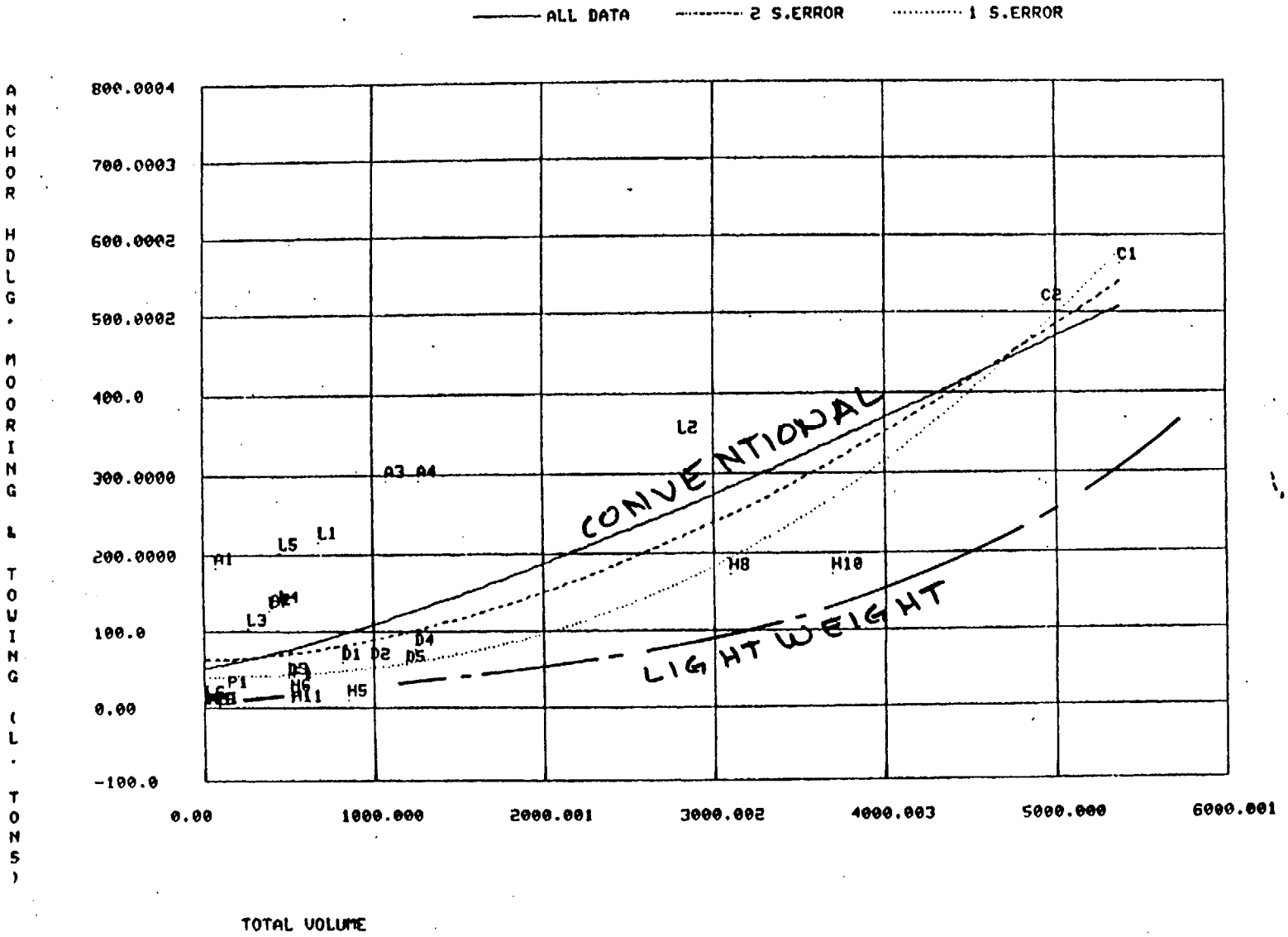


REPRODUCED AT GOVERNMENT EXPENSE

SWBS 581/2 ANCHOR HANDLING, MOORING & TOWING (BSCI 520)



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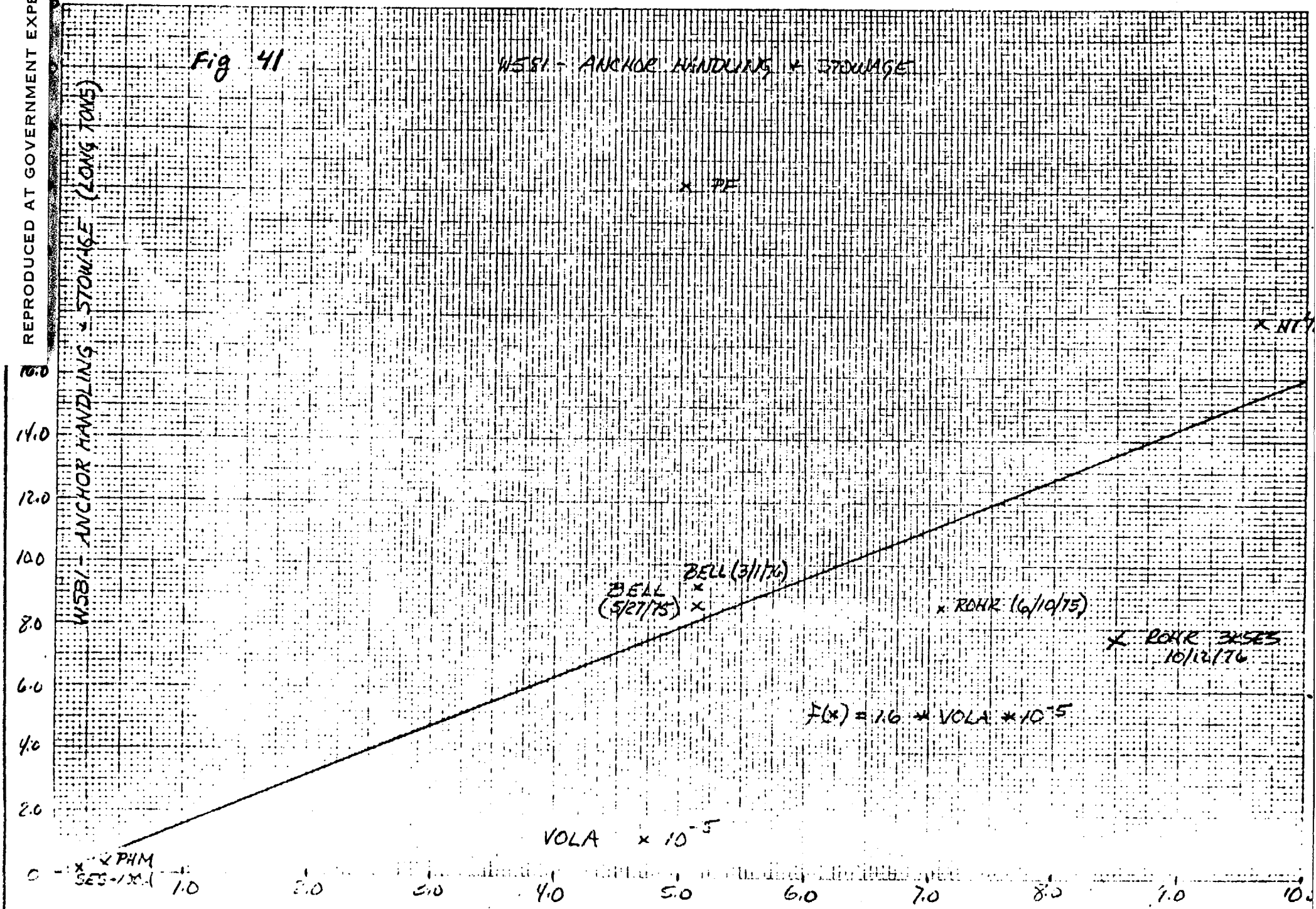
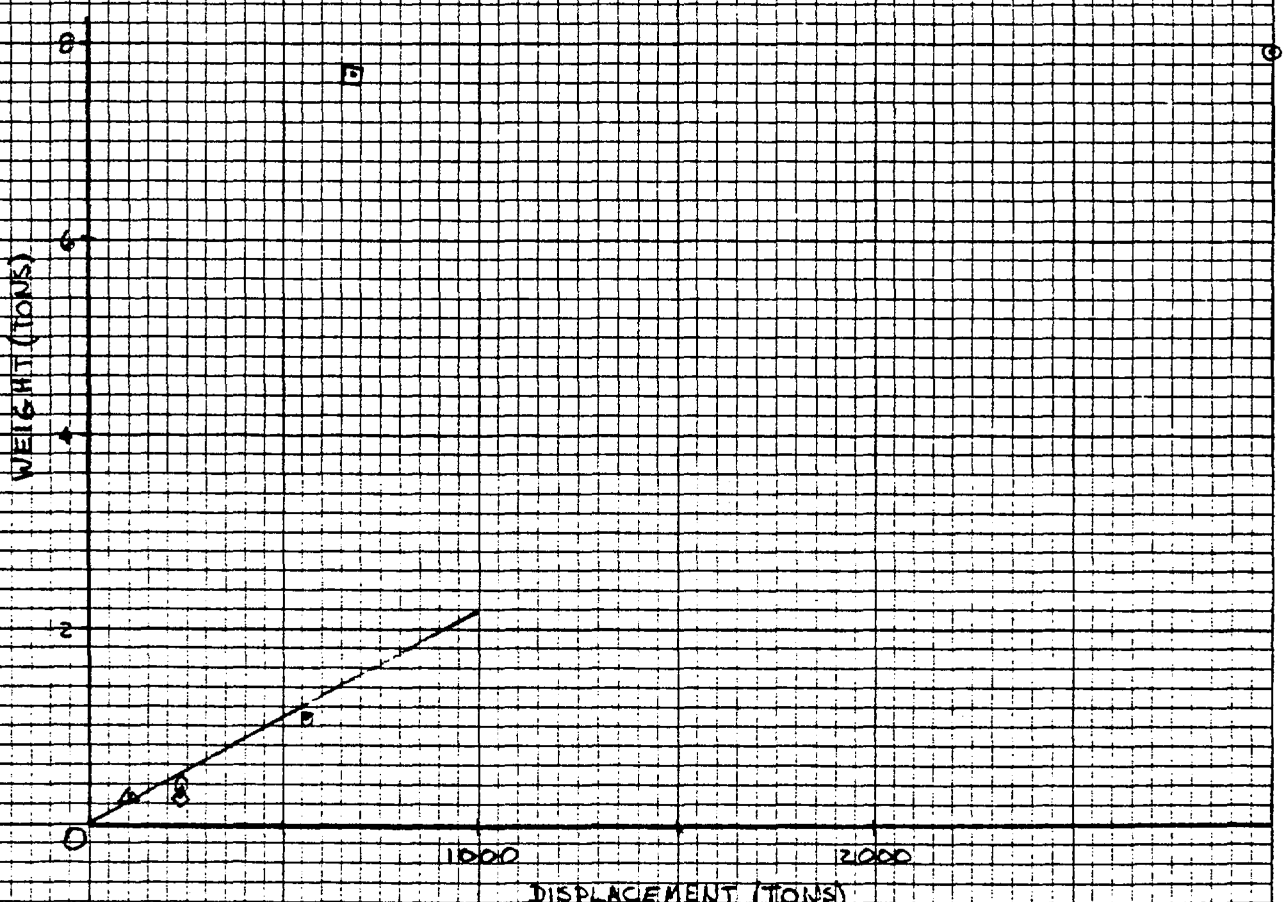
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

Fig 41



SEE [illegible] 520

SWBS GROUP 58[illegible]



REPRODUCED AT GOVERNMENT EXPENSE

S82 Mooring + Towing System

$$W582 = KS82 * VOLA$$

where $KS82 = .01$ lt/ft^3

(KS82 is a constant based on return weight of hydrofoils and SES.)

VOLA = Total Volume $* 10^{-3}$, ft^3

The algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

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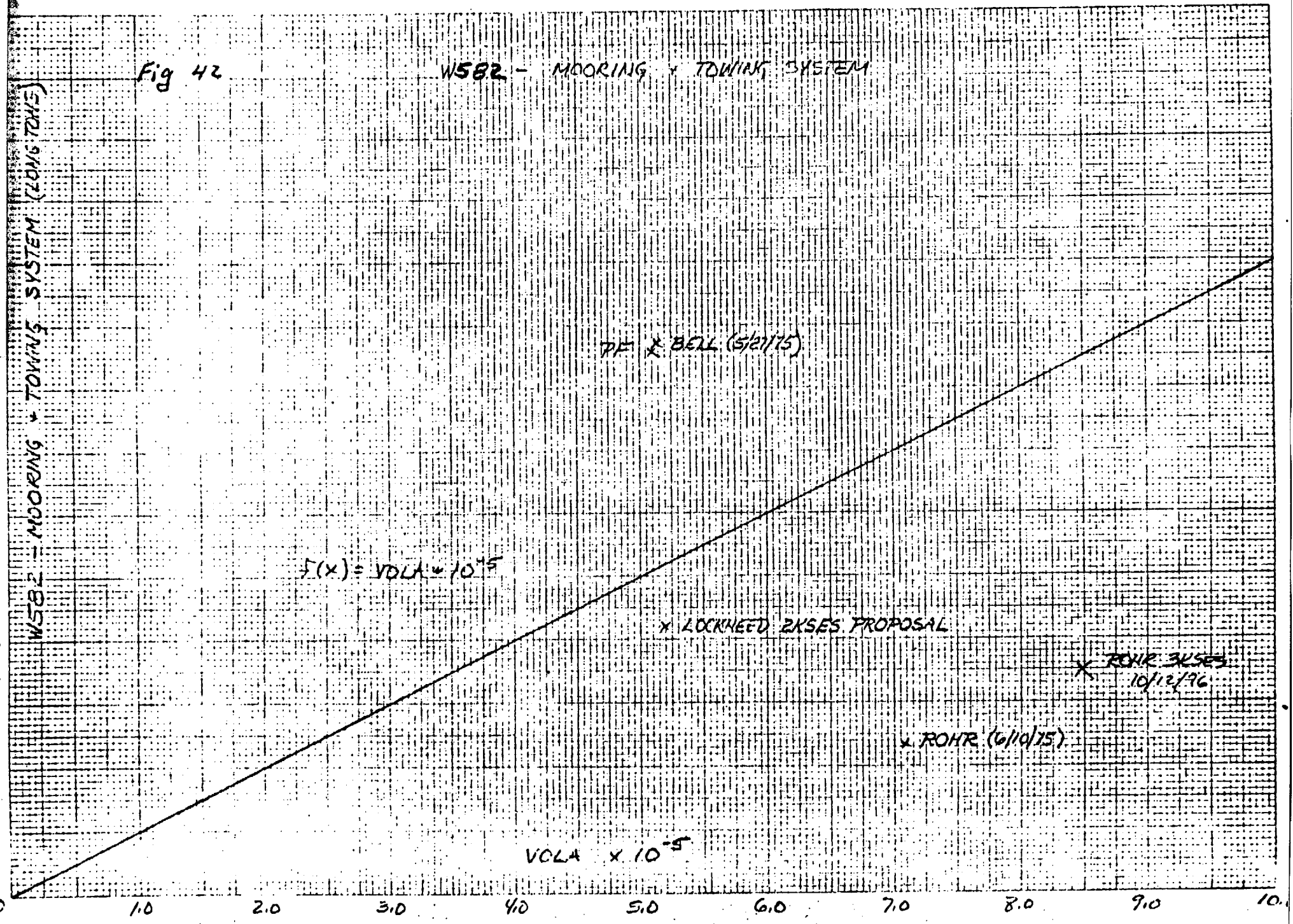
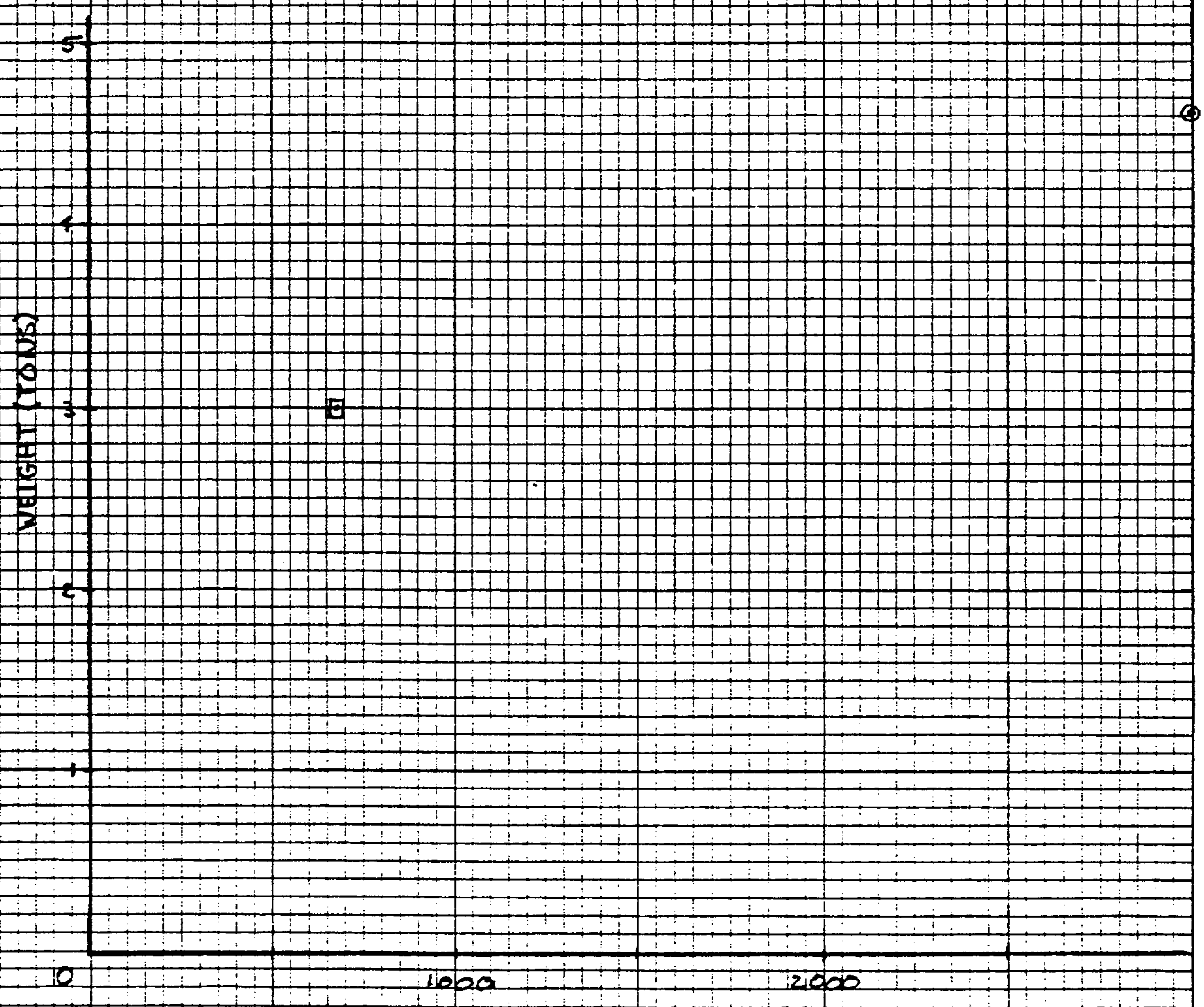
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

Fig 42

W582 - MOORING + TOWING SYSTEM



SWEI GROUP W592



REPRODUCED AT GOVERNMENT EXPENSE

✓583 Boat Handling + Stowage Systems

$W_{583} = K_{583} * A_{COM}$

Where $K_{583} = .015$ lb

(K583 is a constant based on retrofit data of hydrofoils and SESs.)

A_{COM} = Number of Accomodations

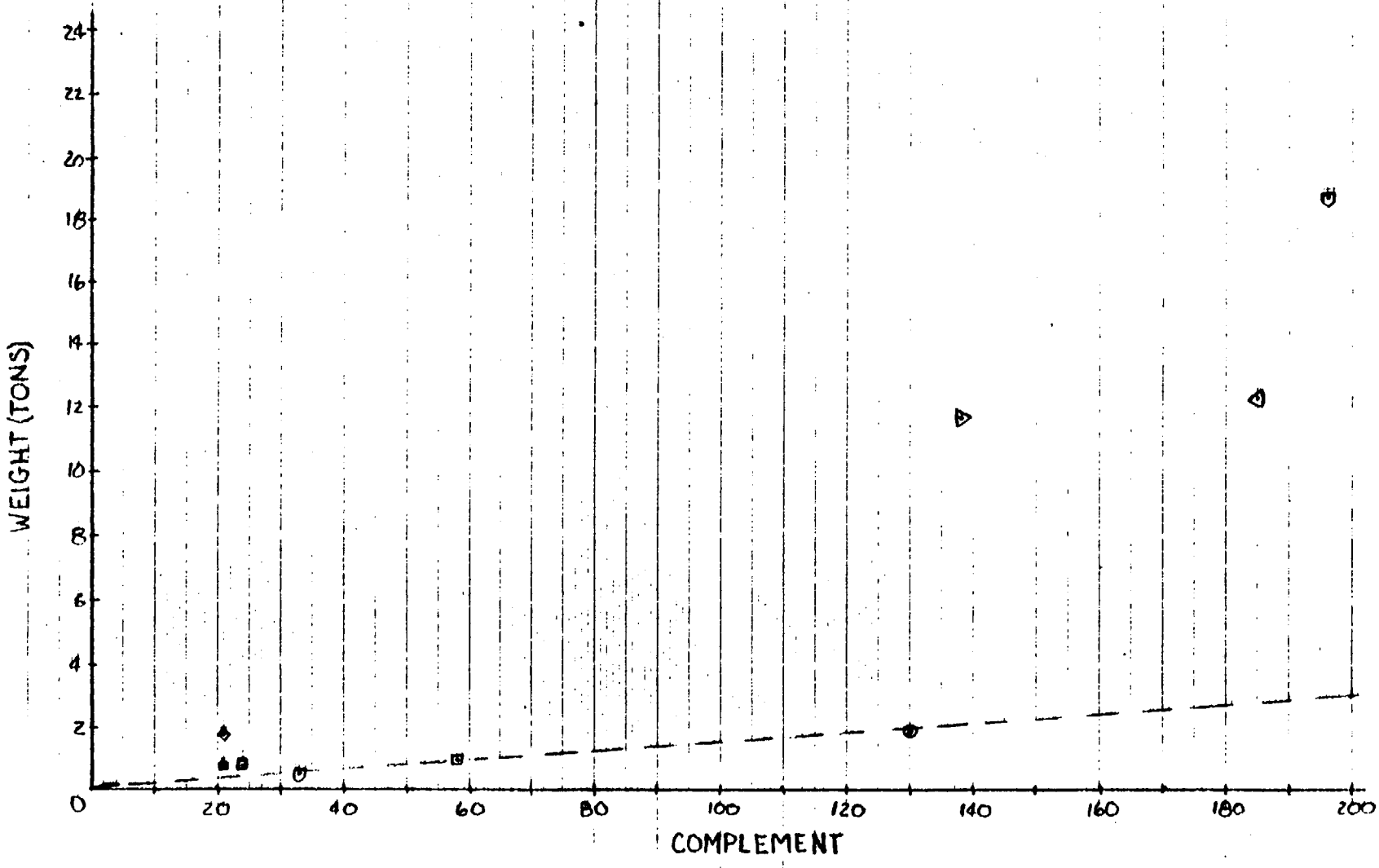
The algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

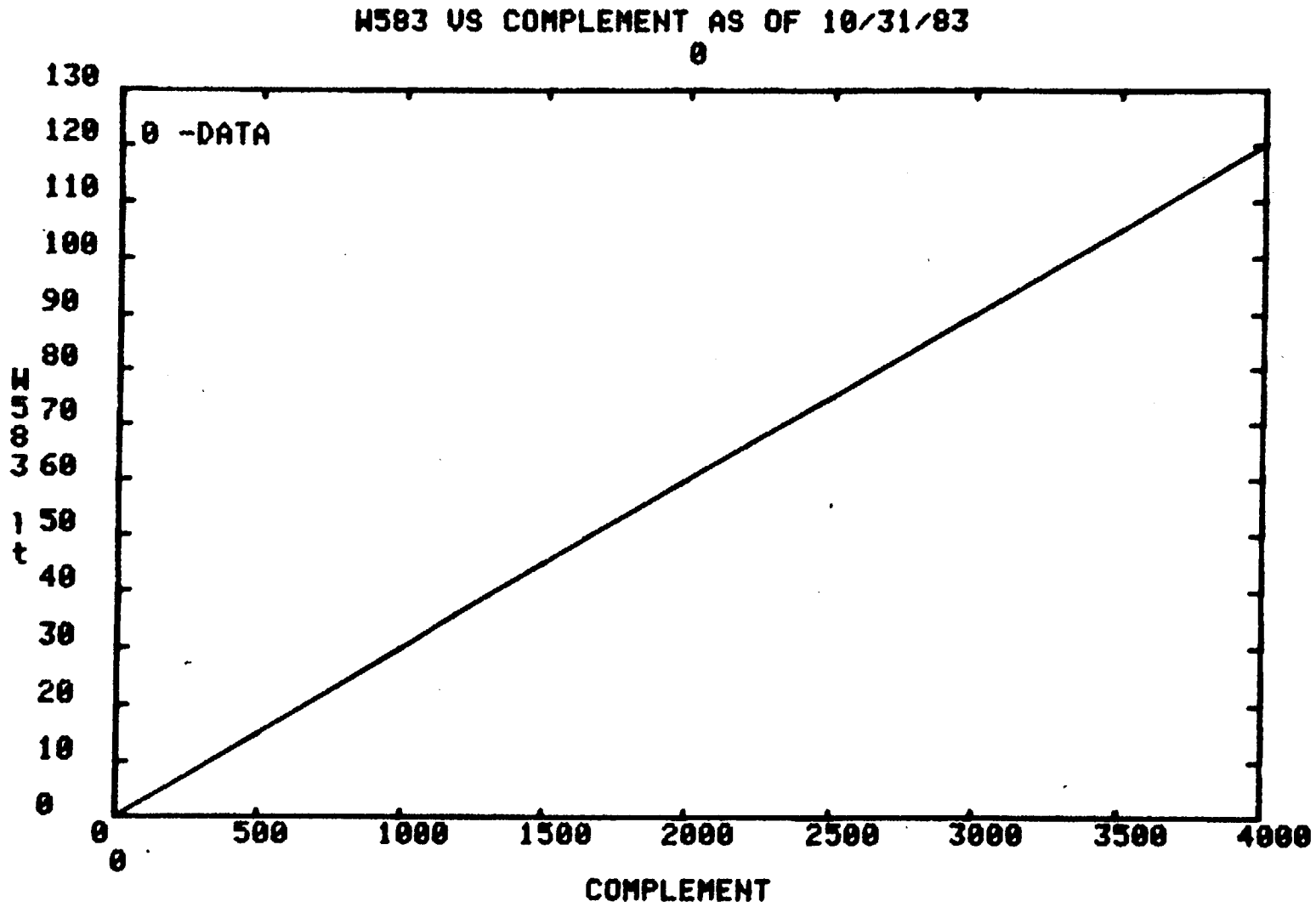
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W583 BOATS, BOAT HANDLING AND STOWAGE SYSTEMS



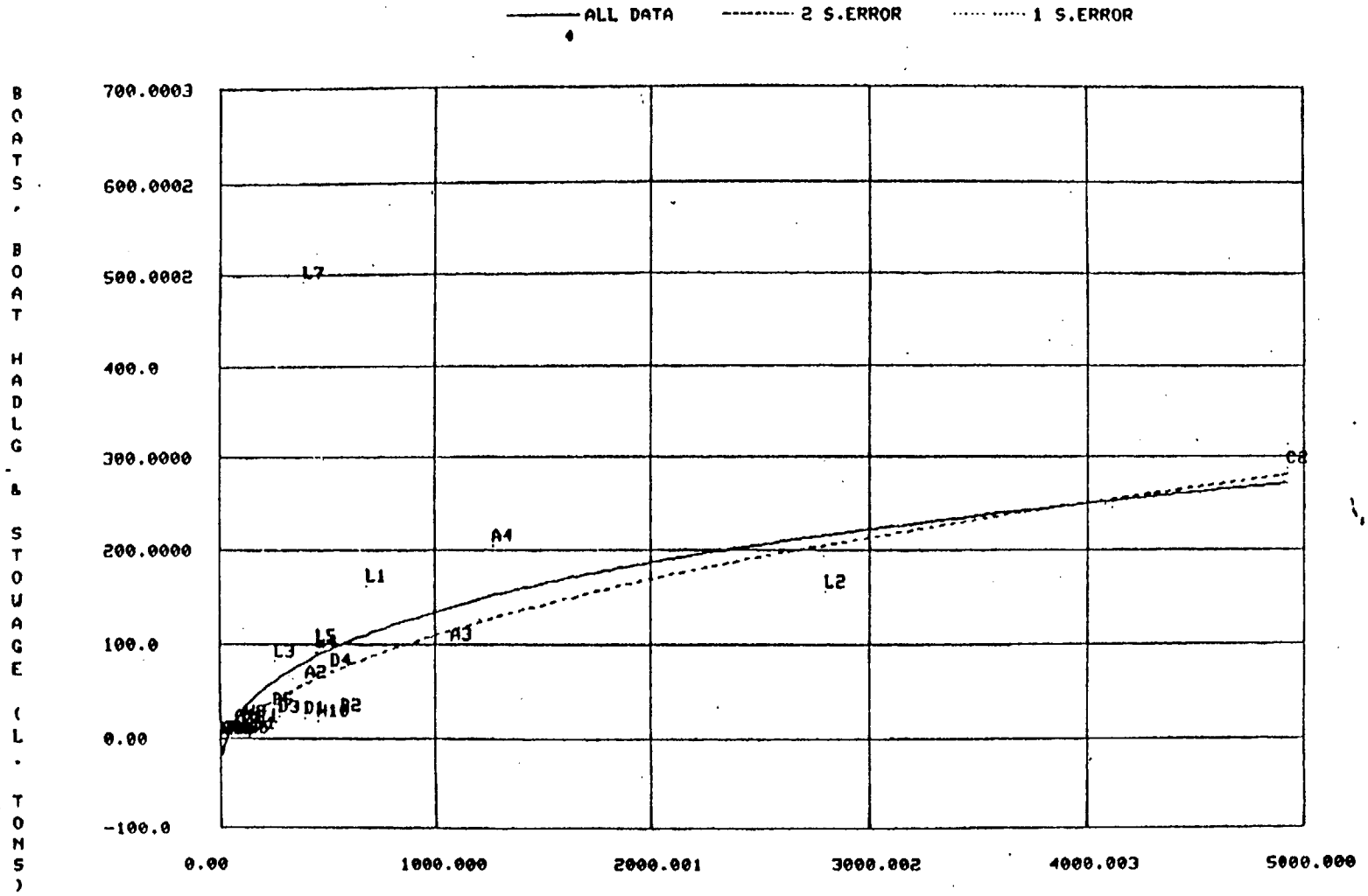
REPRODUCED AT GOVERNMENT EXPENSE



REPRODUCED AT GOVERNMENT EXPEN

PAUSE 'PRESS <RETURN> TO CONTINUE'

SWBS 583 BOATS, BOAT HANDLING AND STOWAGE (BSCI 601)



✓593 Environmental Pollution Control System

WS93 = KS93 * ACOM

where KS93 = .04 lt

(KS93 is a constant based on return data from hydrofoils and SESs.)

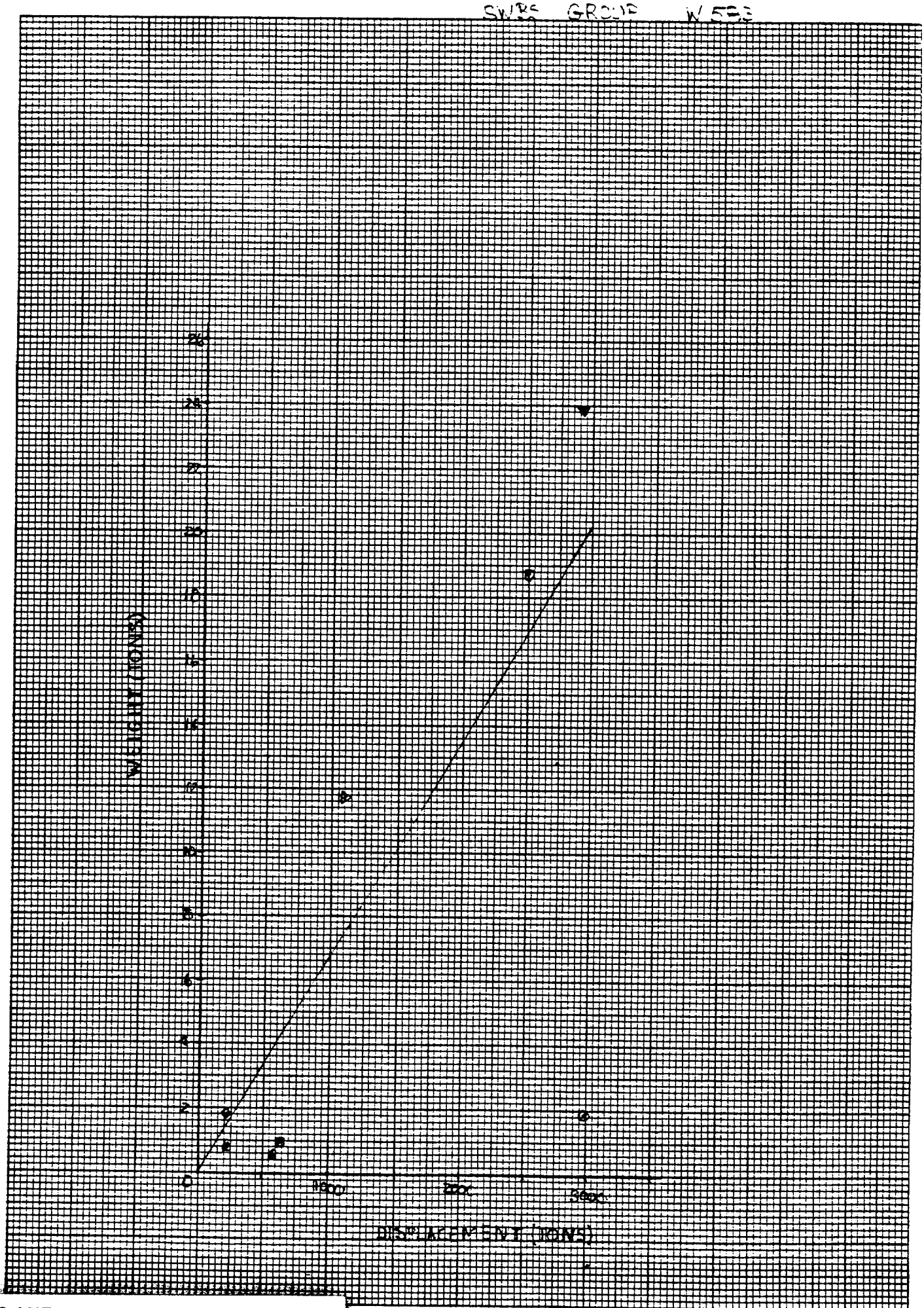
ACOM = Number of accommodations

The algorithm is the same as ASSET.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

SWRS GROUP W 523

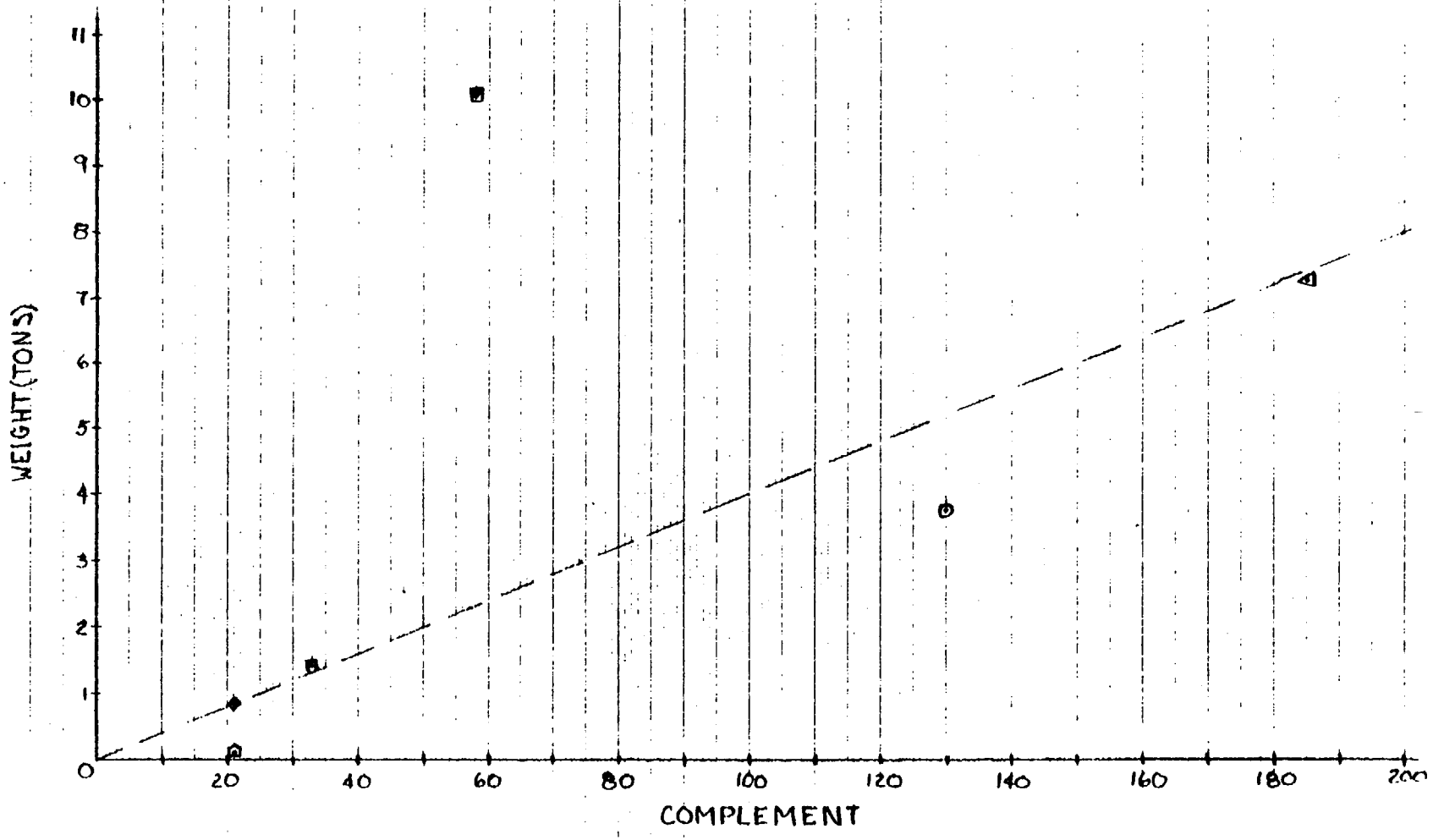


EPI-MI-20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

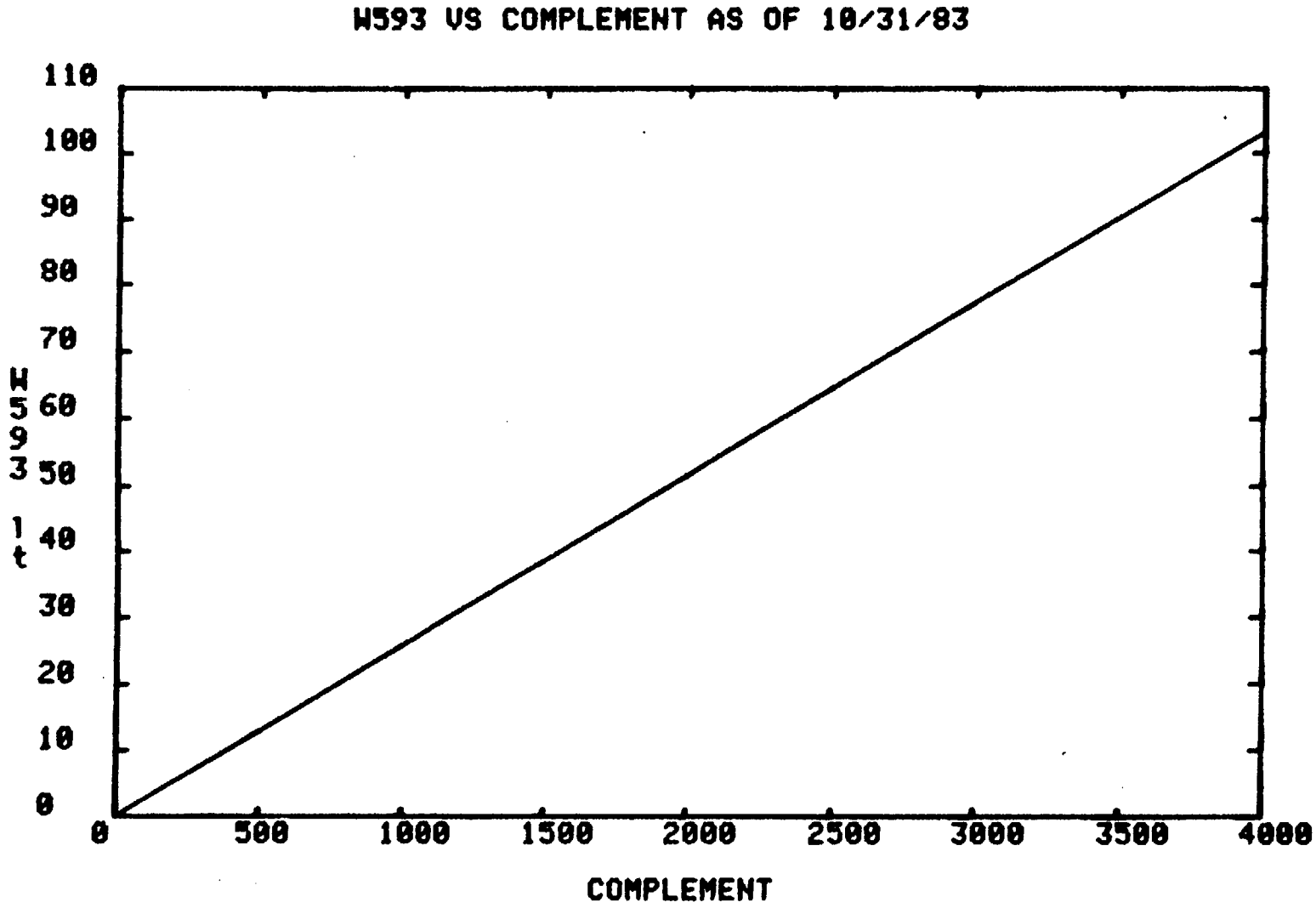
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W593 ENVIRONMENTAL AND POLLUTION CONTROL SYSTEMS



REPRODUCED AT GOVERNMENT EXPENSE



REPRODUCED AT GOVERNMENT EXPENSE

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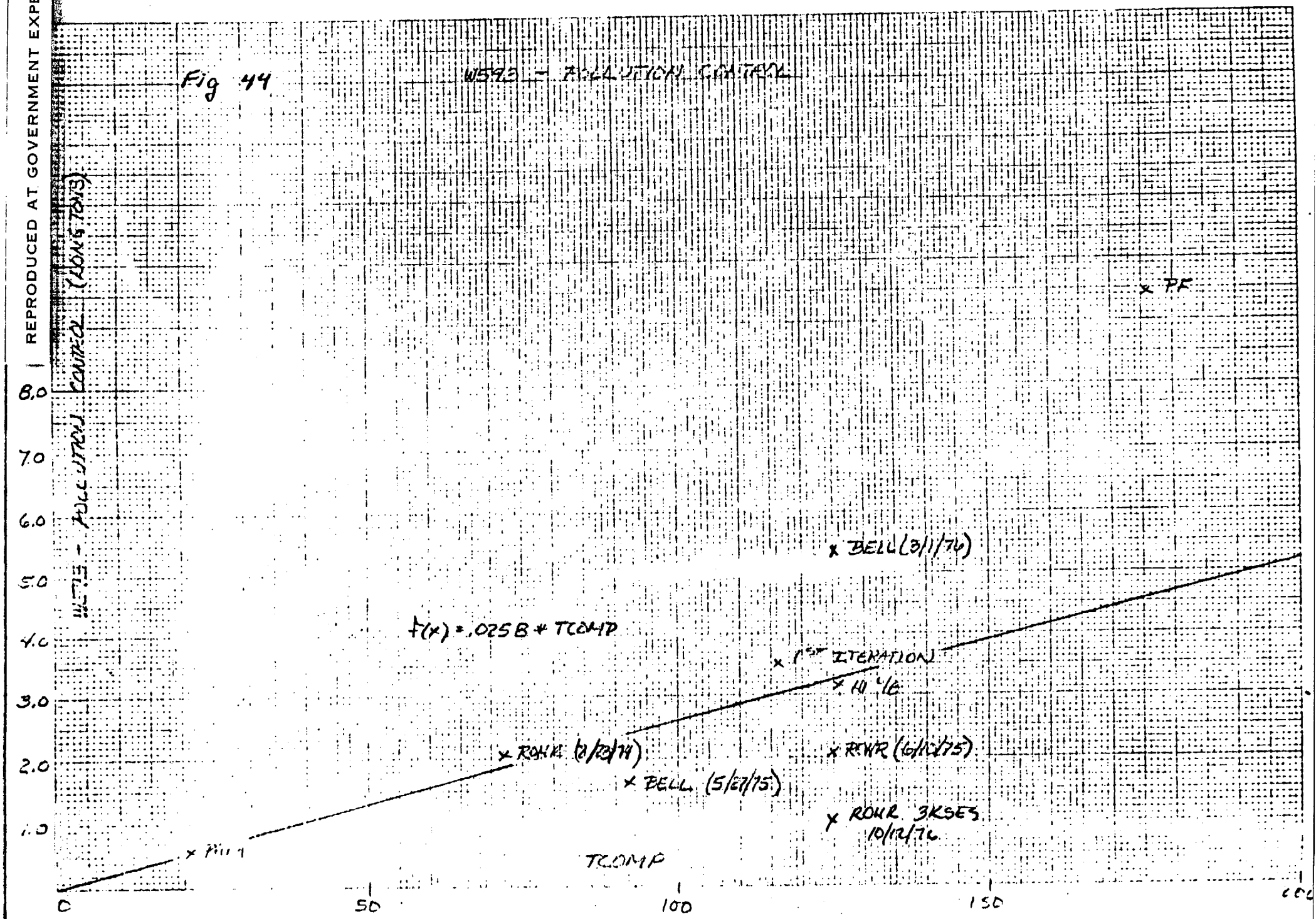
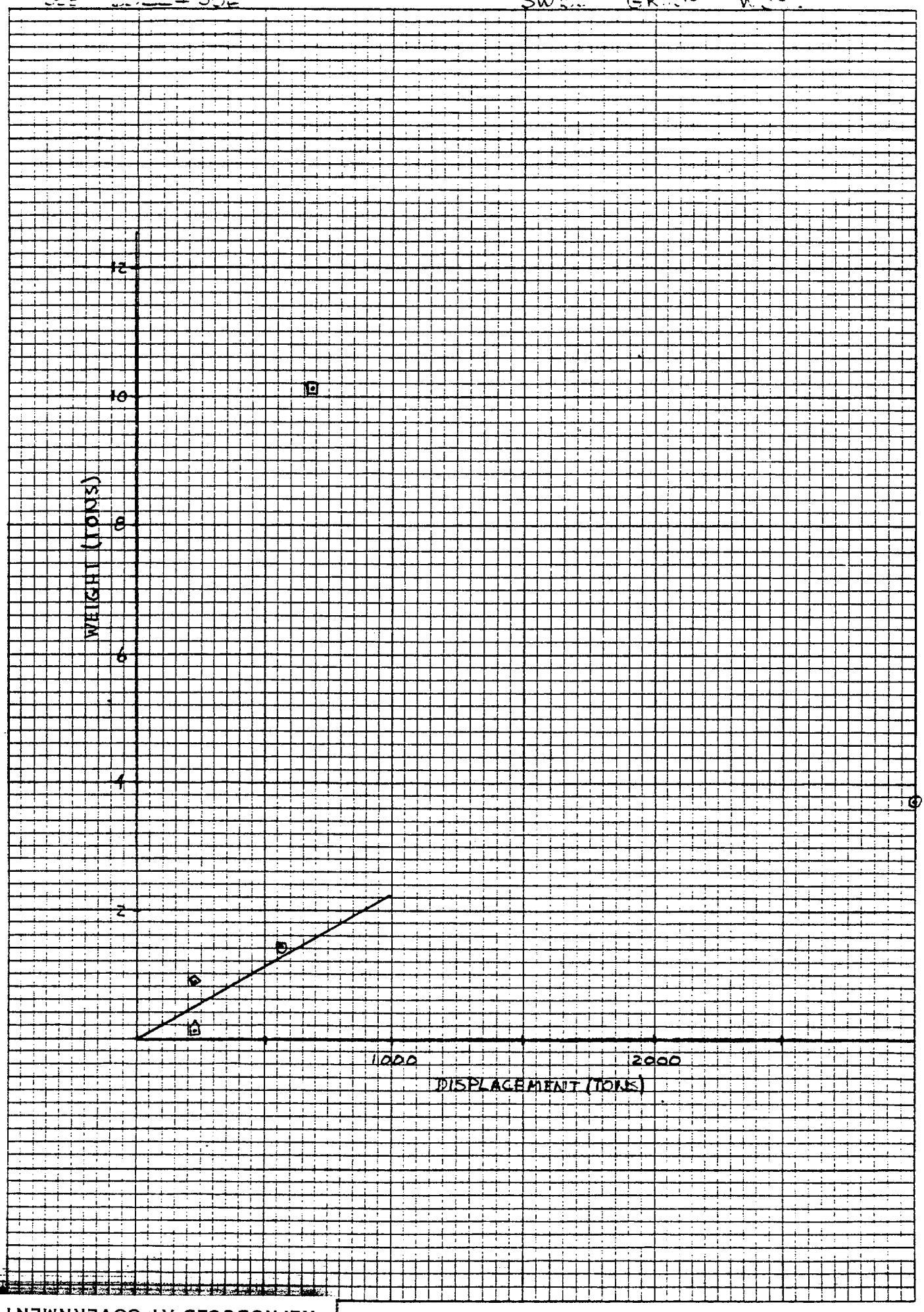
Fig 44

W543 - FULLERTON CANYON



SEE SHEET ± 50%

SWBS GROUP WEIGHT



KEUFFEL & ESSER CO.
PRINTED IN U.S.A.
10 X 10 TO 1 INCH
10TH INF HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

598 Auxiliary System Operating Fluids

$W598 = K598 * (W500 - W598 - W599)^{**} L598$

where $K598 = .0177$ * $L598 = 1.23$ (ASSET)

~~**~~ · W500 = Auxiliary System Weight, lb

W598 = Auxiliary Systems Operating Fluid Weight, lb

W599 = Auxiliary Systems Repair Parts + Tools, lb

The algorithm is the same as ASSET

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

✓599 Auxiliary System Repair Parts + Tools

$$WS99 = KS99 * (WS00 - WS98 - WS99)$$

where $KS99 = 5.8 \times 10^{-3}$. (ASSET)

WS00 = Auxiliary System Weight, lb

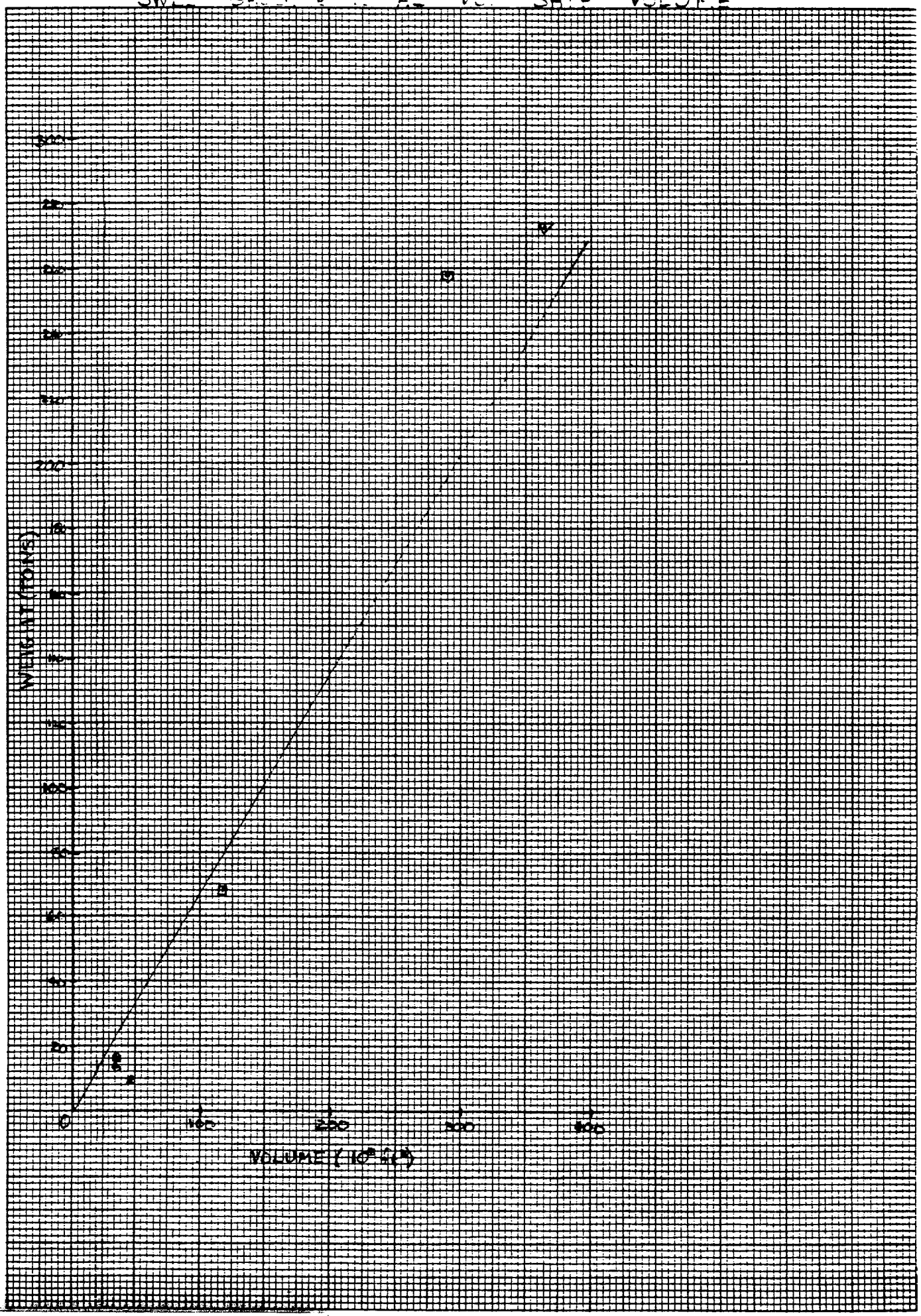
WS98 = Auxiliary System Operating Fluid Weight, lb

WS99 = Auxiliary System Repair Parts + Tools Weight, lb

The algorithm is the same as ASSET.

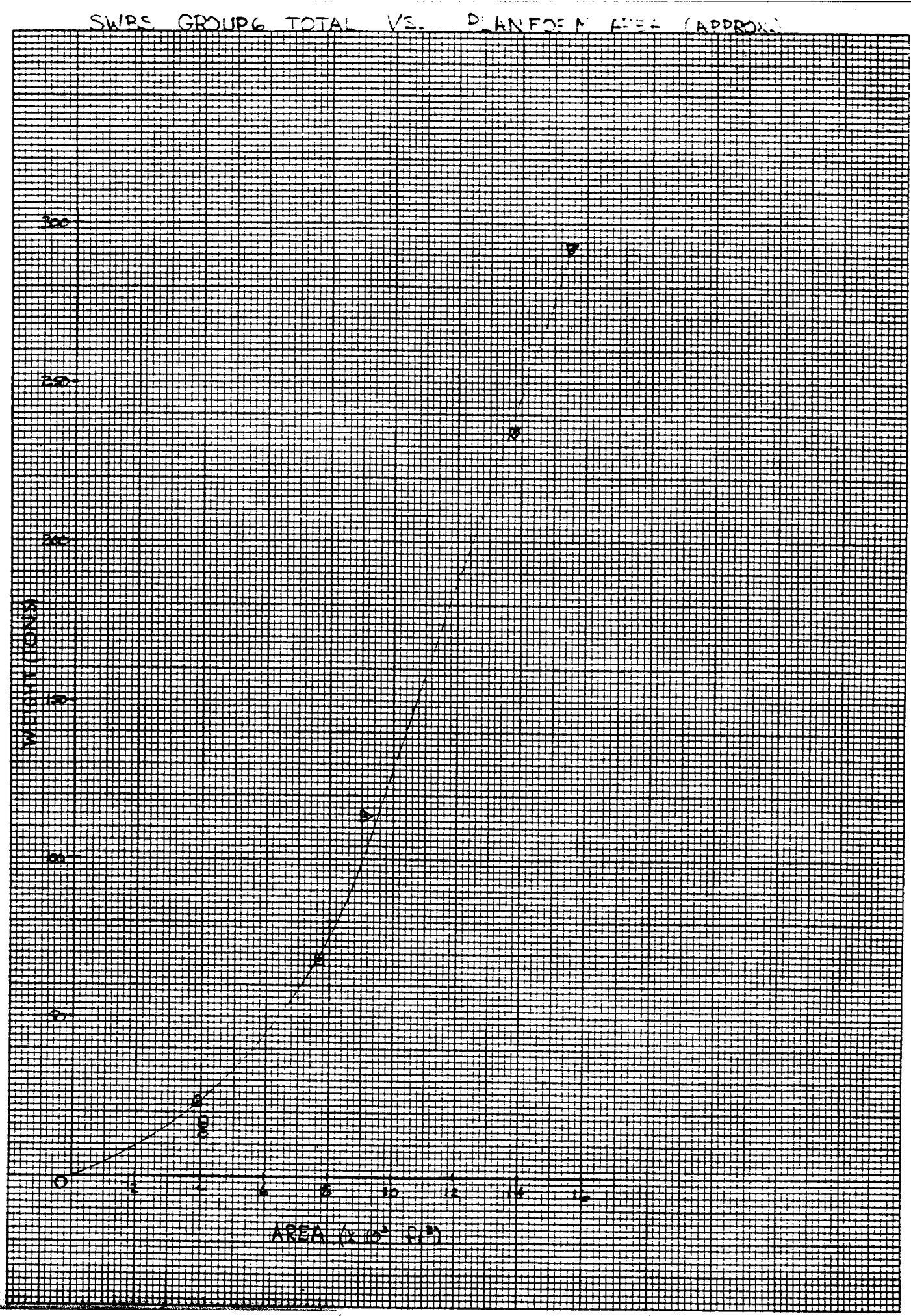
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE



EPI MI 20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

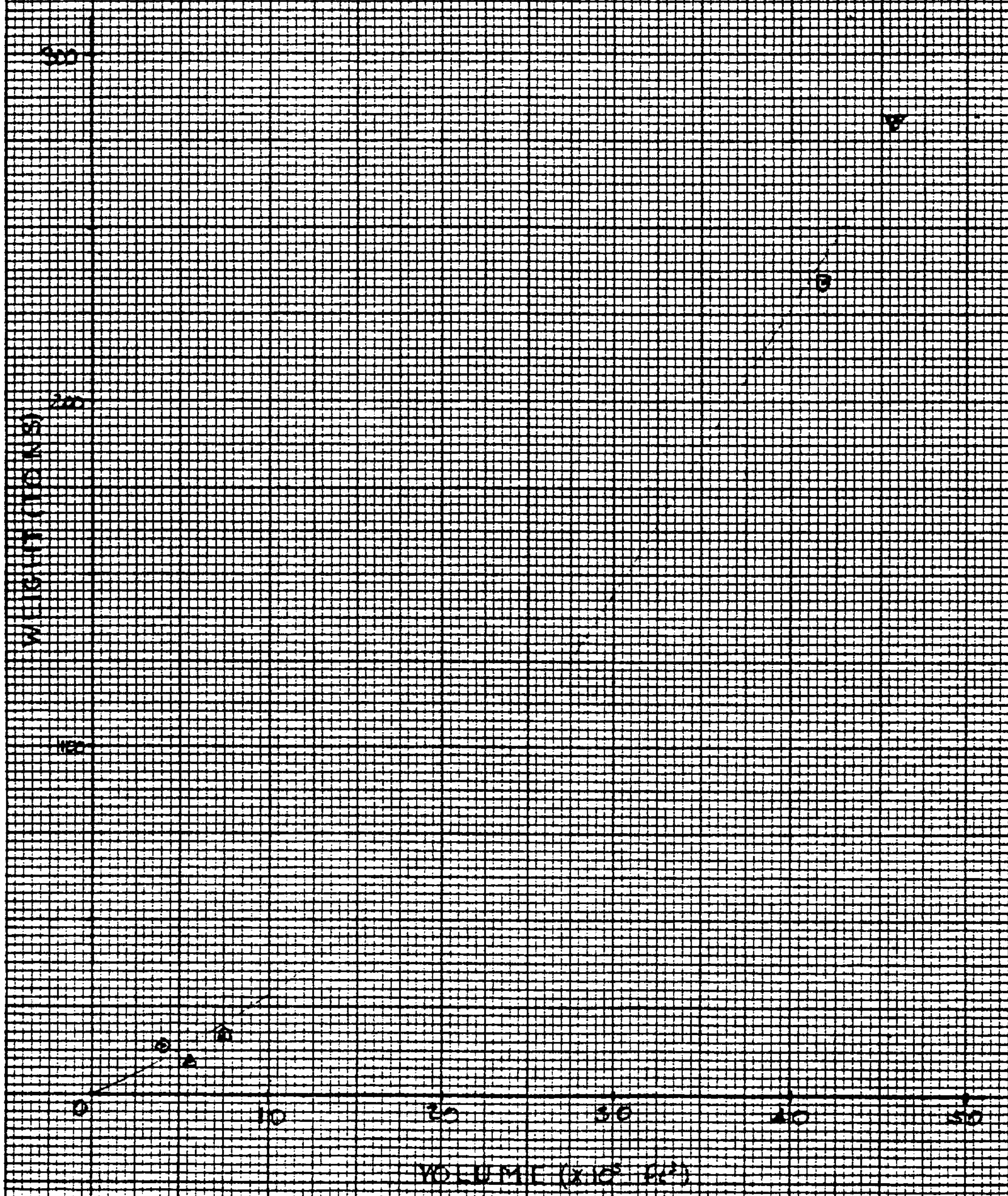
REPRODUCED AT GOVERNMENT EXPENSE



FOLMI 20 X 20 TO 1 INCH
5TH, 10TH AND 70TH LINE PROGRESSIVELY ACCENTED

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP 6 TOTAL VS. SUPERSTRUCTURE VOLUME



FPI.MI 20 X 20 TO 1 INCH
5TH, 10TH AND 20TH LINE PROGRESSIVELY ACCENTED

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

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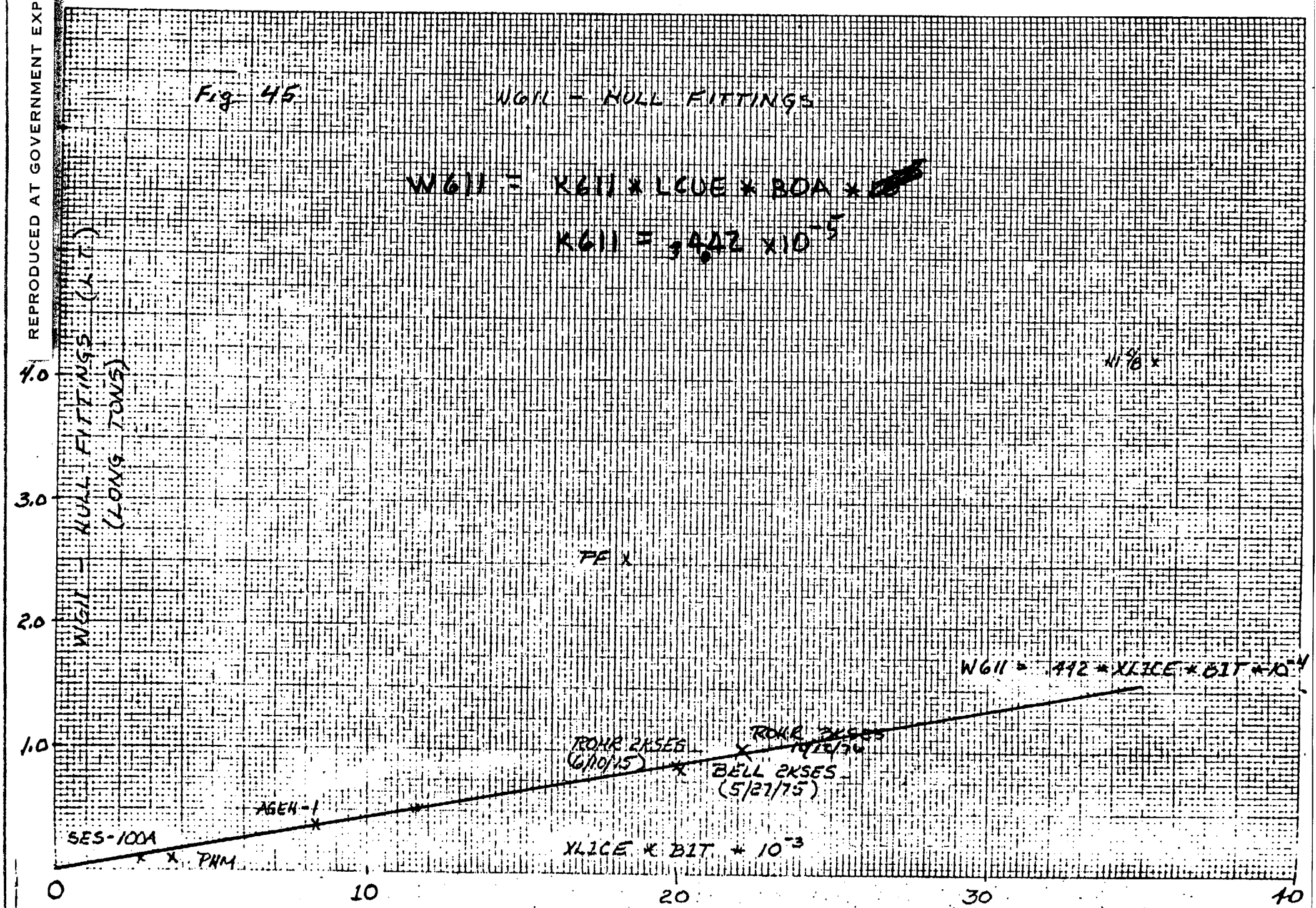
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

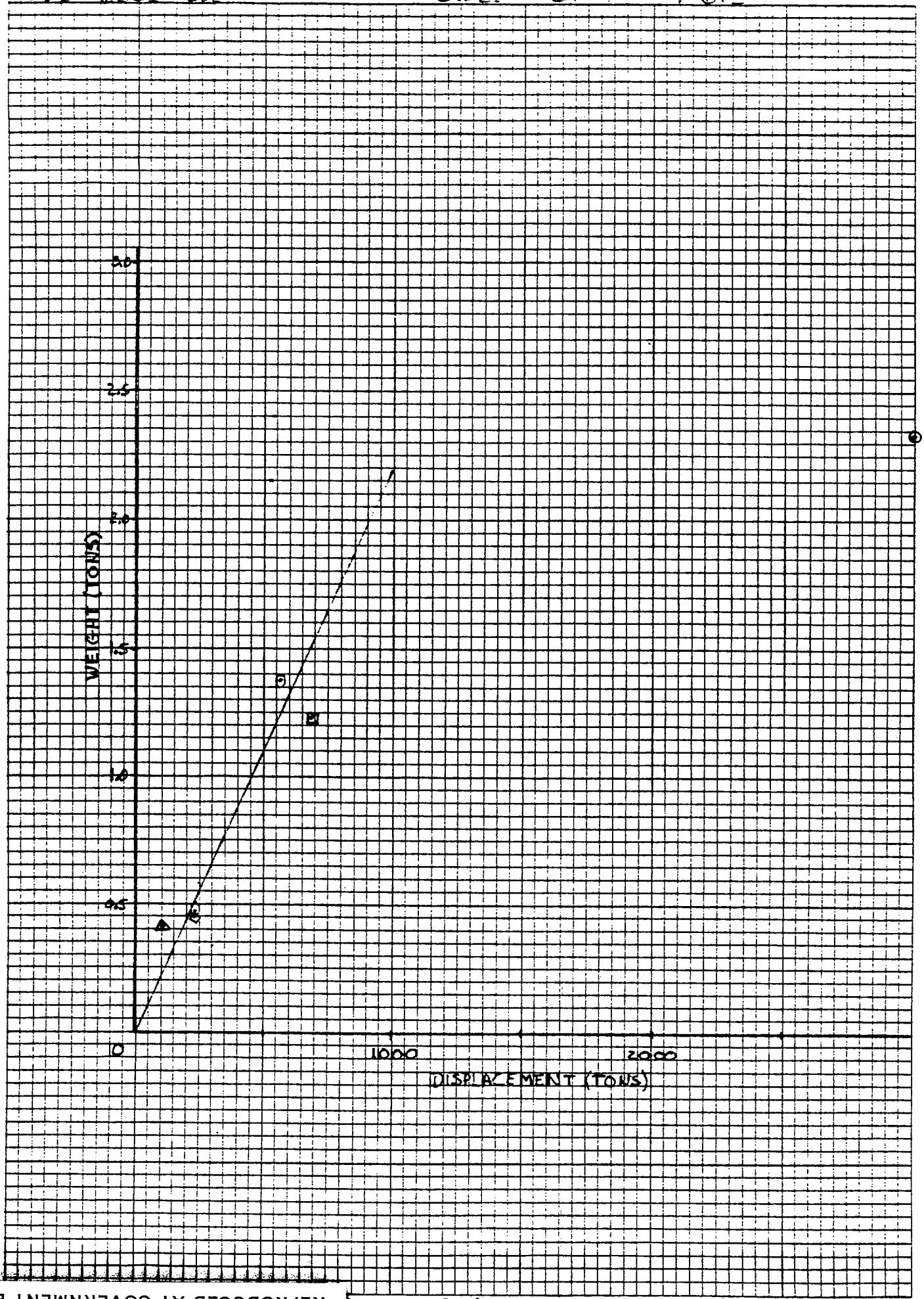
Fig- 45 WG11 - HULL FITTINGS

$$W611 = K611 * LCUE * BOA * \text{[illegible]}$$

$$K611 = 3.442 \times 10^{-5}$$



SEE SHEET 622 SWEET GRADE 1612



FRANKLIN 10 X 10 TO 1 INCH
10TH LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

RAILS, STANCHIONS, LIFELINES

611 Hull Fitting

$WG11 = KG11 * LCUE * BOA$

where $KG11 = 4.42 \times 10^{-5}$ lt / ft²

(KG11 is a constant based on returns data from hydrofoils and SESs)

LCUE = Cushion Length, ft

BOA = Beam overall, ft

Algorithm is same as ASSET and SES Design Manual.

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

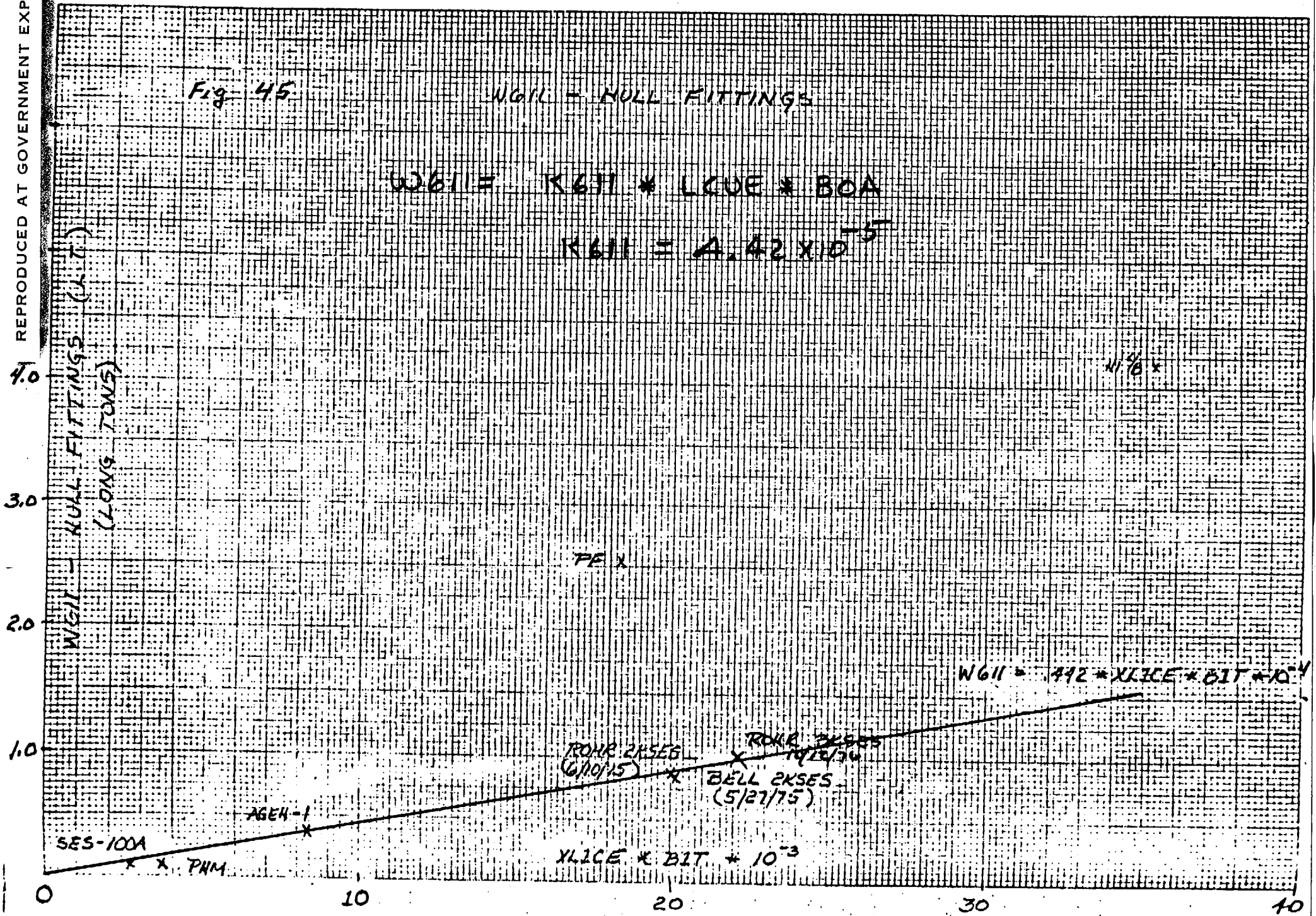
REPRODUCED AT GOVERNMENT EXPENSE

TRACING PAPER NO. 1217-10
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

Fig 45 WGIL - HULL FITTINGS

$$W611 = K611 * LCUE * BOA$$

$$K611 = 4.42 \times 10^{-5}$$



G12 Rails, Stanchions + Lifelines

$W_{G12} = K_{G12} * LCUE * BOA$

where $K_{G12} = 1.2 \times 10^{-4}$ lt / ft²

(KG12 is a constant based on return data from hydrofoils and SESs.)

LCUE = Cushion Length, ft

BOA = Beam overall, ft

Algorithm is same as ASSET and SES Design Manual.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
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REPRODUCED AT GOVERNMENT EXPENSE

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CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

Fig 46

WG12 - RAILS, STANCHIONS, LIFELINES

$$WG12 = KG12 * LCUE * BOA$$

$$KG12 = 1.2 * 10^{-4}$$

x PE

WG12 - RAILS, STANCHIONS, LIFELINES (LONG TONS)

4.0
3.0
2.0
1.0

0
10
20
30
40

$KG12 = 1.2 \times 10^{-4}$

x 10/15/74
x ROHR 3KSES 10/12/76

$WG12 = .75 * XLICE * BIT * 10^{-4}$

x BELL 2KSES (5/27/75)
+ ROHR 2KSES (6/10/75)

x AGENT-1

x SES-100A

$XLICE * BIT * 10^{-3}$

613 Rigging and Canvas

$$W_{613} = K_{613} * LCUE * BOA$$

where $K_{613} = 1.15 \times 10^{-5}$ lbt/ft^2

(K_{613} is a constant based on return data from hydrofoils and SESs)

LCUE = Cushion Length, ft

BOA = Beam Overall, ft

Algorithm is the same as [redacted] the SES Design Manual.

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

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TRACING PAPER NO. 1837-101
CROSS SECTION-10X10 TO 1 INCH
AGUADEC
MADE IN USA

Fig 47

W613 = RIGGING + CANVAS

$W613 = 1.15 \times 10^{-3} * LCOE * BOA$

× ROKR RK-SES
× RONR 3K SES
10/12/76

RH13K 10/5/79

X F(x) = .0115 * X42CE * BIT * 10^{-3}

× RI46

× PF

× AGER-1

XL1CE * BIT * 10^{-3}

W613 = RIGGING + CANVAS (LONG TONS)

.5

0 10 20 30

621 Non Structural Bulkheads

$W621 = K621 * VOLA$

$K621 = .175 * 10^{-1}$

$VOLA = TOTAL\ VOL * 10^{-3}$

BASED ON ASSET FORMULA

COEFFICIENT BASED ON SMALLER SHIPS & USE OF NOMEX

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

DRAWING PAPER NO. 1200-101
TRACING PAPER NO. 1227-101
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

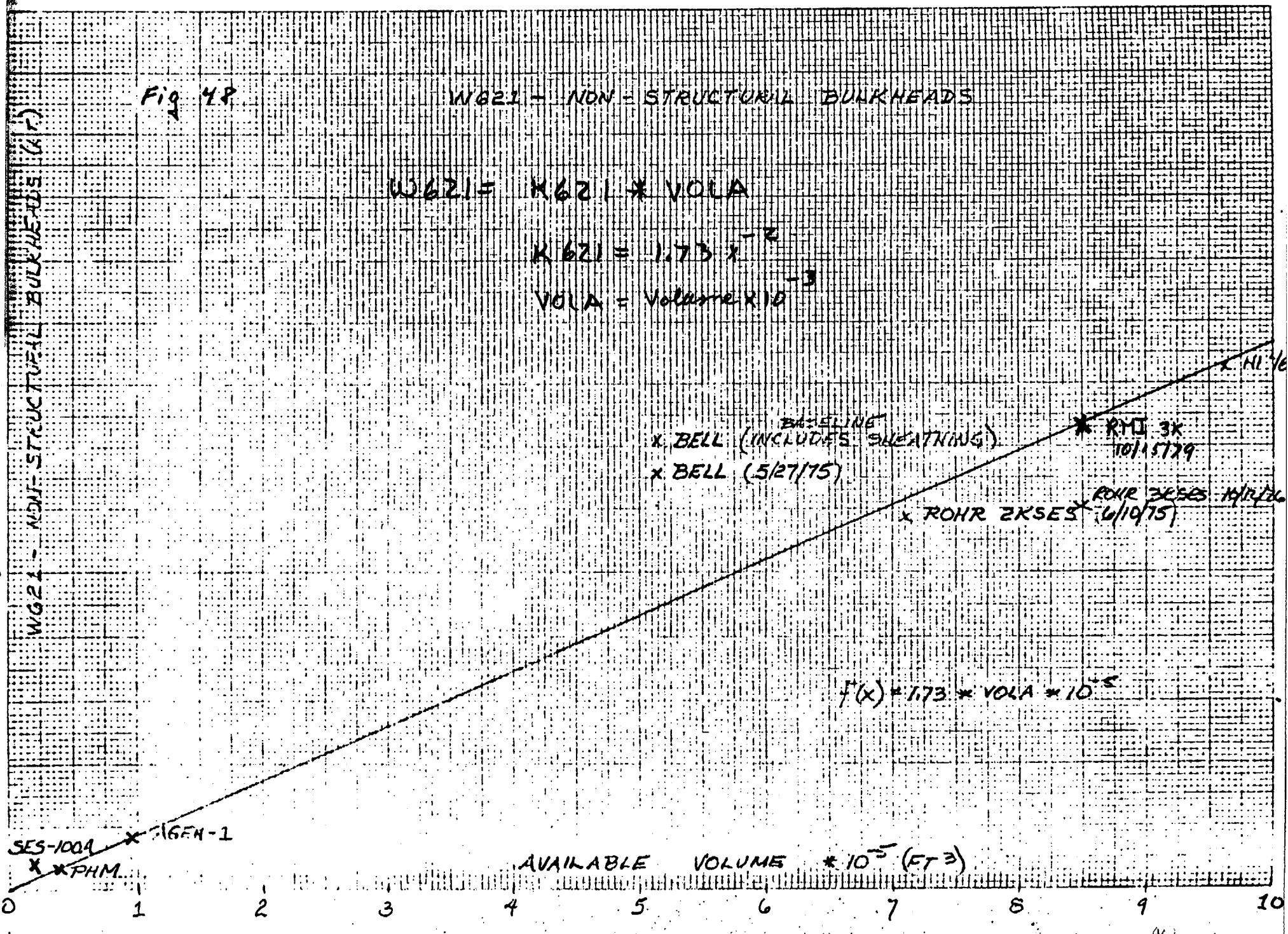
Fig 48

W621 - NON-STRUCTURAL BULKHEADS

$$W621 = K621 * VOLA$$

$$K621 = 1.73 \times 10^{-5}$$

$$VOLA = Volume \times 10^{-3}$$



622 FLOOR PLATES + GRATINGS

$$W622 = K622 * VOLA$$

$$K622 = .134 \times 10^{-1}$$

VOLA = TOTAL VOLUME / 1000

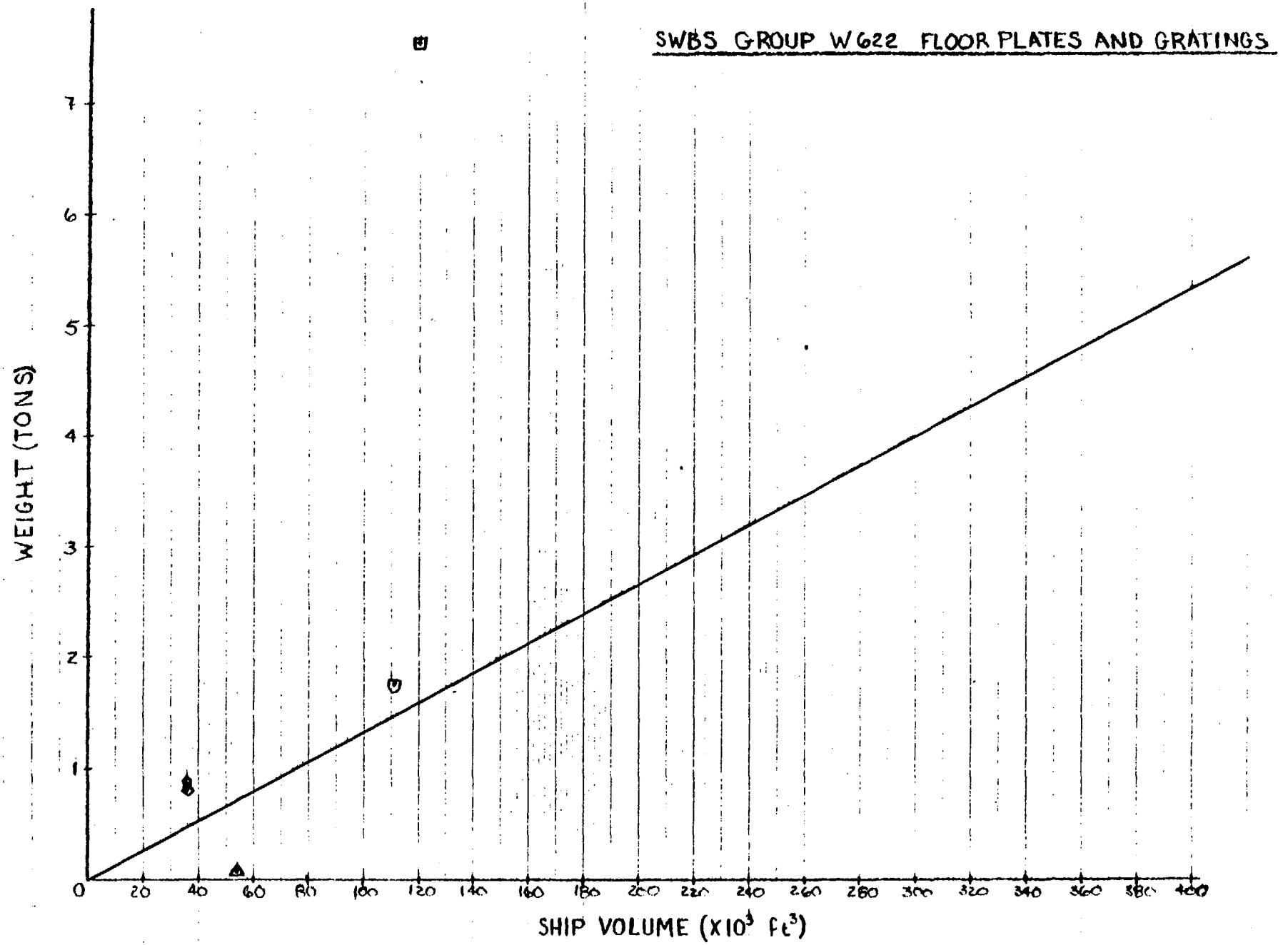
SAME FORMULA AS ASSET.

COEFFICIENT IS FIT OF SMALLER SHIP DATA.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE



623 Ladders

$$WG23 = [redacted] \times VOLA$$

where $K623 = .3\ lt$ + $LG23 = .0033\ lt/ft^3$

(These constants are obtained from return data for hydrofoils and SES's.)

VOLA = [redacted] Total Volume $\times 10^{-3}, ft^3$

This algorithm is based on SES Design Manual.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

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REPRODUCED AT GOVERNMENT EXPENSE

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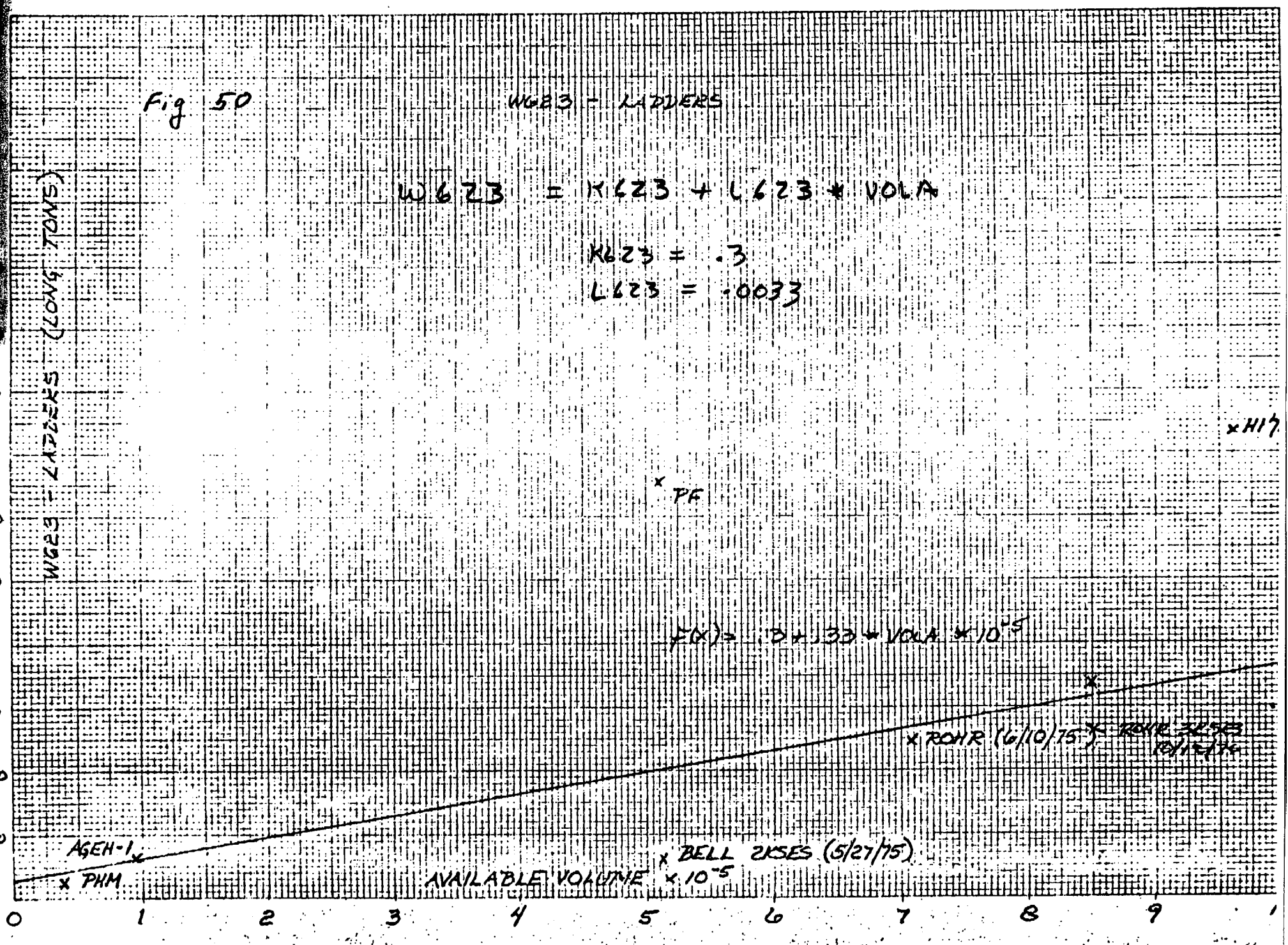
Fig 50

WGB3 - LADDERS

$$WGZ3 = KGZ3 + LGZ3 * VOLA$$

KGZ3 = .3

LGZ3 = .0033



624 Non-Structural Closures

$$W624 = K624 + L624 * VOLA$$

where $K624 = .16$ lbs and $L624 = .$ [redacted] $\times 10^{-3}$ $\frac{lbs}{ft^3}$

(These constants are based on return data for hydrofoils & SLESs.)

$VOLA$ = Total Volume [redacted] $\times 10^{-3}$, ft^3

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

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TRACING PAPER NO. 1227-10
CROSS SECTION-10X10 TO 1 IN.
MADE IN USA

Fig 5.1

WG24 - NON-STRUCTURAL ENCLOSURES

$WG24 = K624 + L624 * VOLA$

$K624 = .16$

$L624 = .286 \times 10^{-2}$

WG24 - NON-STRUCTURAL BULKHEADS (LONG TONS)

1.0

PHM

AGEH-1

ROHR (6/10/75)

BELL (5/27/75)

ROHR 3K565 10/12/76

$F(X) = .16 + .286 * VOLA * 10^{-5}$

AVAILABLE VOLUME $\times 10^{-5}$

0 1 2 3 4 5 6 7 8 9

625 Airports, Fixed Portlights + Windows

$W_{625} = K_{625} * VLSS$

where $K_{625} = .048$ lt/ft^3

(K625 is a constant based on return data for hydrofoils and SESs.)

VLSS = Superstructure Volume * 10^{-3}, ft^3

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

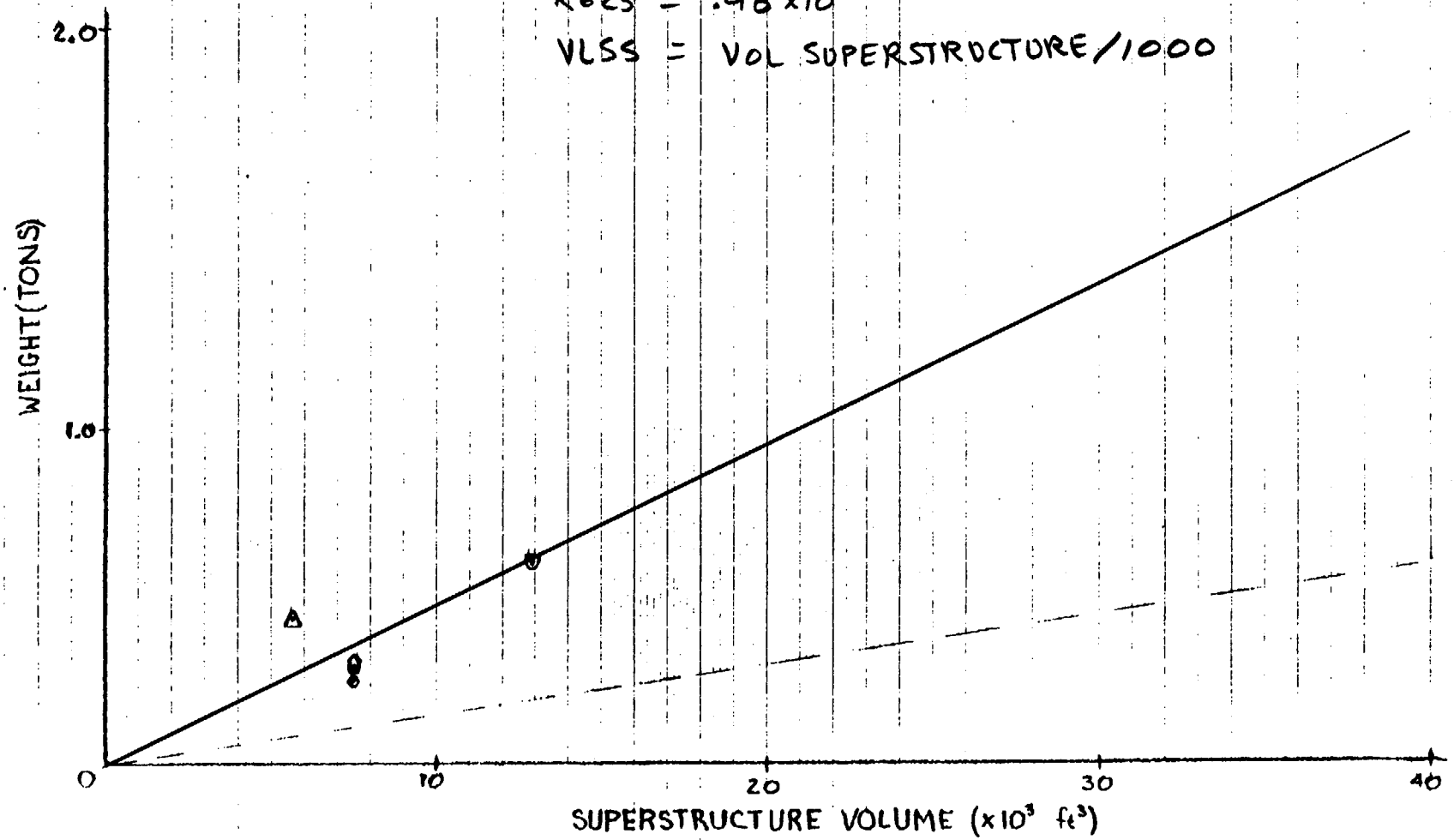
REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W625 AIRPORTS, FIXED PORTLIGHTS, AND WINDOWS

$$W625 = K625 * VLSS$$

$K625 = .48 \times 10^{-1}$

VLSS = VOL SUPERSTRUCTURE/1000



631 Painting

$$WG31 = K631 * VOLA$$

where $K631 = .0185$ lt/ft3

(K631 is a constant based on return weights from hydrofoils and SESs.)

$VOLA$ = Total Volume $\times 10^{-3}$, ft3

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.3R9 200 SHEETS 5 SQUARE
NATIONAL

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REPRODUCED AT GOVERNMENT EXPENSE

Fig 53

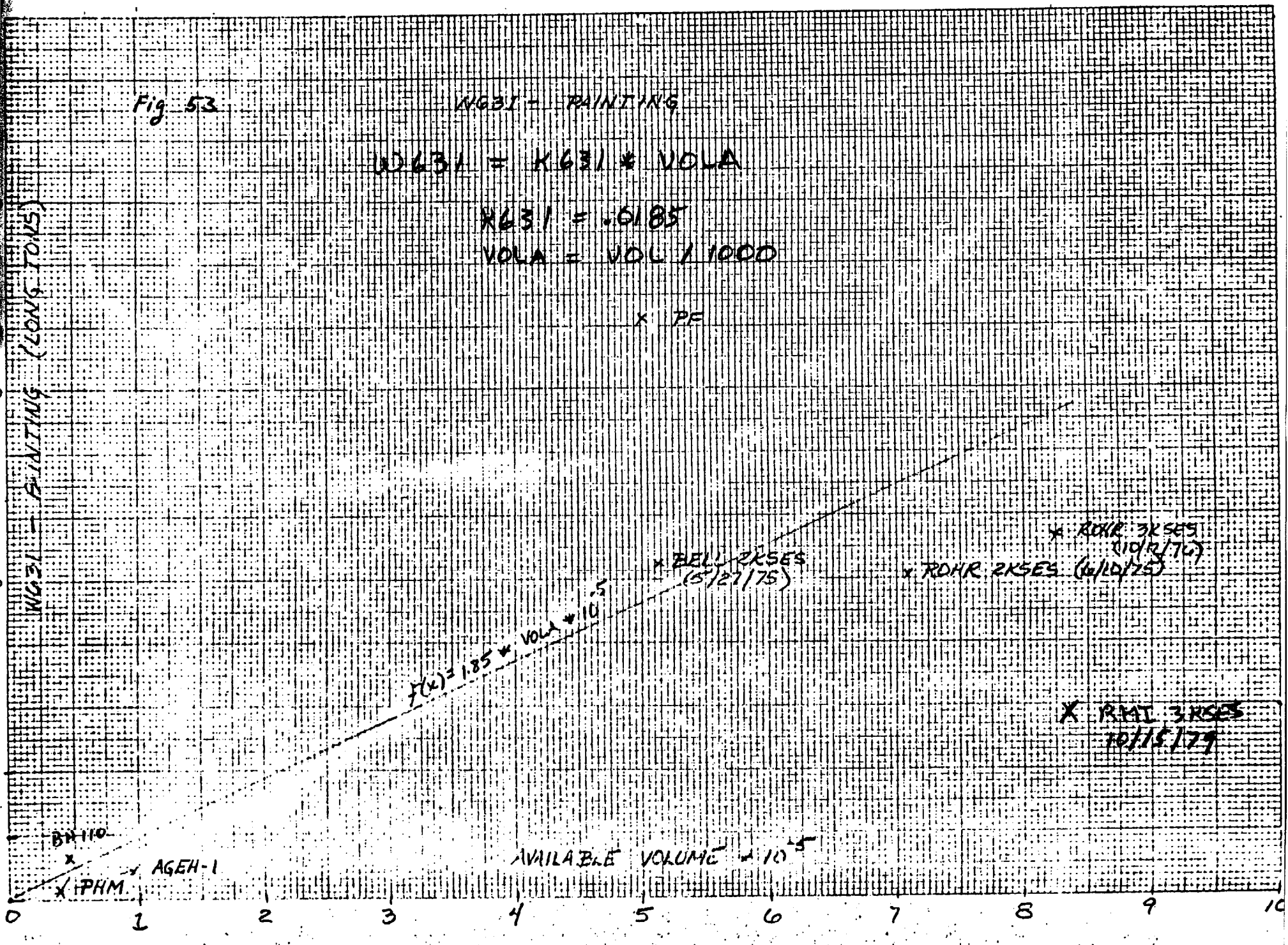
WG31 - PAINTING

$$WG31 = KG31 * VOLA$$

$$KG31 = .6185$$

$$VOLA = VOL / 1000$$

X PE



633 Cathodic Protection

$$W_{633} = K_{633} * VOLA$$

where $K_{633} = .0032$ lt/ft^3

(K_{633} is a constant obtain from return data of hydrofoils and SESs.)

VOLA = Total Volume * 10^{-3}, ft^3

Algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

634 Deck Covering

$W634 = K634 * VOLA$

where $K634 = .032$ lt/ft^3

(K634 is a constant obtained from various data from hydrofoils and SES's.)

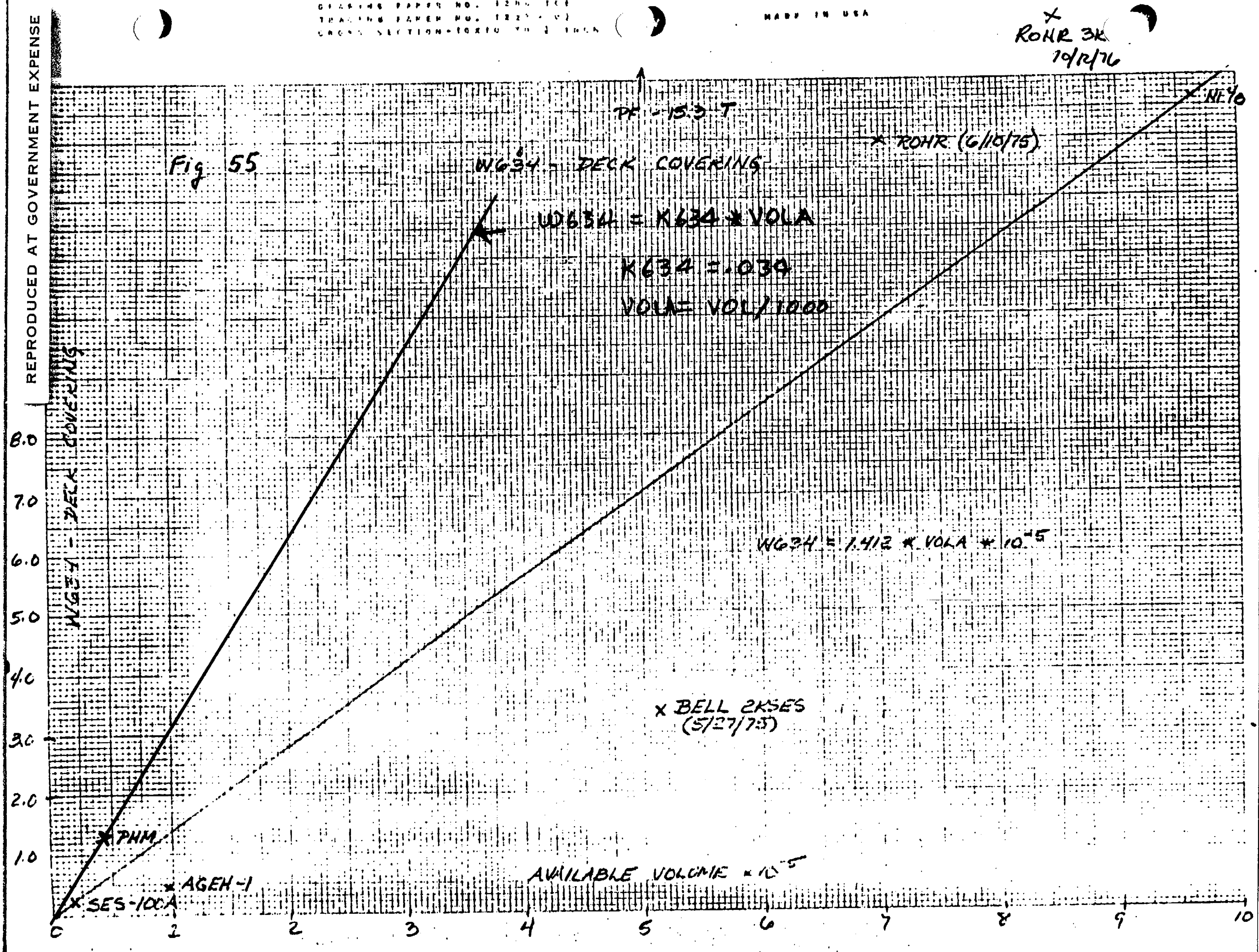
$VOLA$ = Total Volume $\times 10^{-3}$, ft^3

Algorithm is the same as ASSET and SES Design Manual.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE



635 Hull Insulation

$WG35 = KG35 \times VOLA$

where $KG35 = .036$ lt/ft^3

(KG35 is a constant obtain from return data for hydrofoils and SESs.)

$VOLA$ = Total Volume $* 10^{-3}$, ft3

Algorithm based on SES Design Manual.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

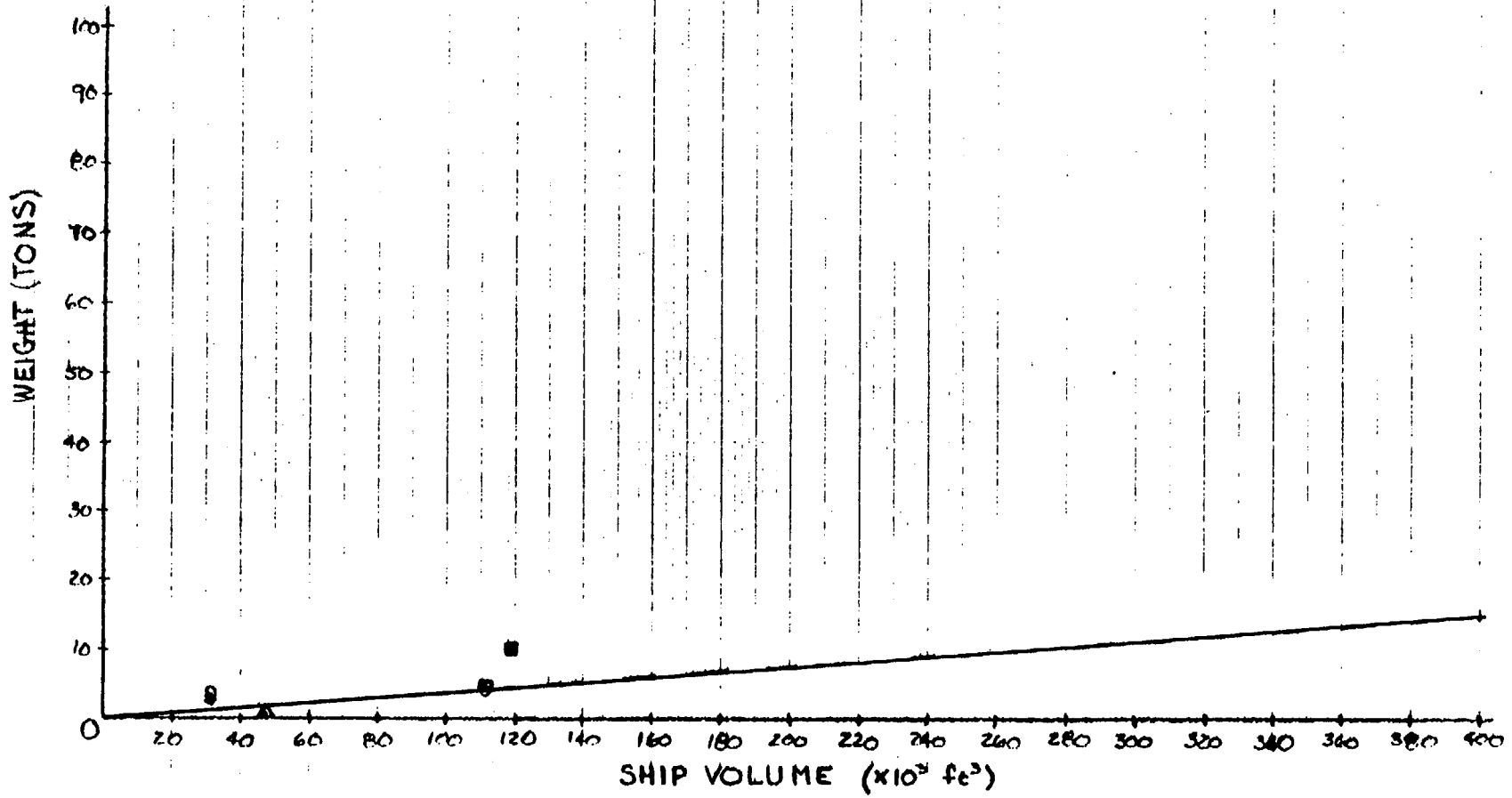
REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W635 HULL INSULATION

$$W635 = K635 * VOLA$$

$K635 = .036$

$VOLA = VOL/1000$



636 Hull Damping

$$W636 = K636$$

where K636 = Weight defined ~~by~~ in the combat suite.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

637 Sheathing

$WG37 = K637 * VOLA$

where $K637 = .027$ lb/ft^3

(K637 is constant obtain from return data for hydrofoils.)

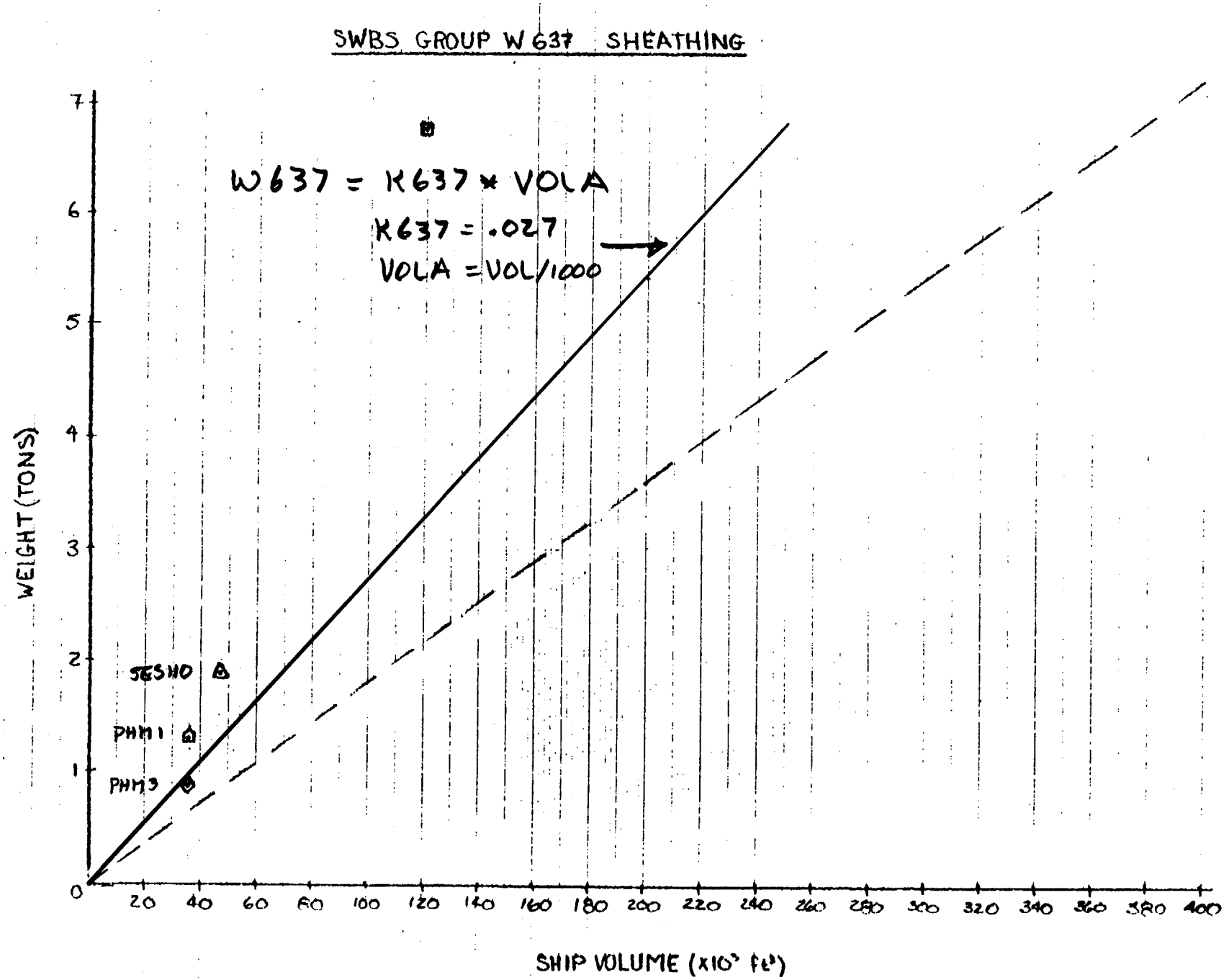
VOLA = Total Volume $* 10^{-3}$, ft^3

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W637 SHEATHING



638 Refrigerated Spaces

WG38 = K638 * ACOM

where K638 = .0159 lt/person

(K638 is a constant based on return data for hydrofoils and SESs.)

ACOM = Accommodations

This algorithm is ~~based~~ same as ASSET and SES Design Manual.

AND LARGER THAN PHM

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

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REPRODUCED AT GOVERNMENT EXPENSE

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TRACING PAPER NO. 1217-101
CROSS SECTION-10X10 TO 1 INCH
AGUADEL
MADE IN USA

Fig 58

W025 - REFRIGERATED SPACES

$W_{638} = K_{638} * ACOH$

$f(x) = .0159 * TCOMP$

W638 - REFR/STERATED SPACES (LONG TONS)

2.0

1.0

0

100

TCOMP

× PF

× HI 76

× 1ST ITERATION
× 3KSES RMI
10/15/79

× RCHR
(8/23/74)

NOTE: BELL 2KSES HAS NO WEIGHT ALLOWANCE FOR THIS WEIGHT GROUP

RCHR × 3KSES
10/2/74

641 Officer Berthing + Messing Spaces

$W641 = K641 * NOFF$

where $K641 = .032$ lt [redacted]

(K641 is a constant based on return data from hydrofoils and SESs.)

NOFF = Number of Officer Accommodations
= 1.1 KOFF (Number of Officers)

This algorithm is the same as ASSET and SES Design Manual.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

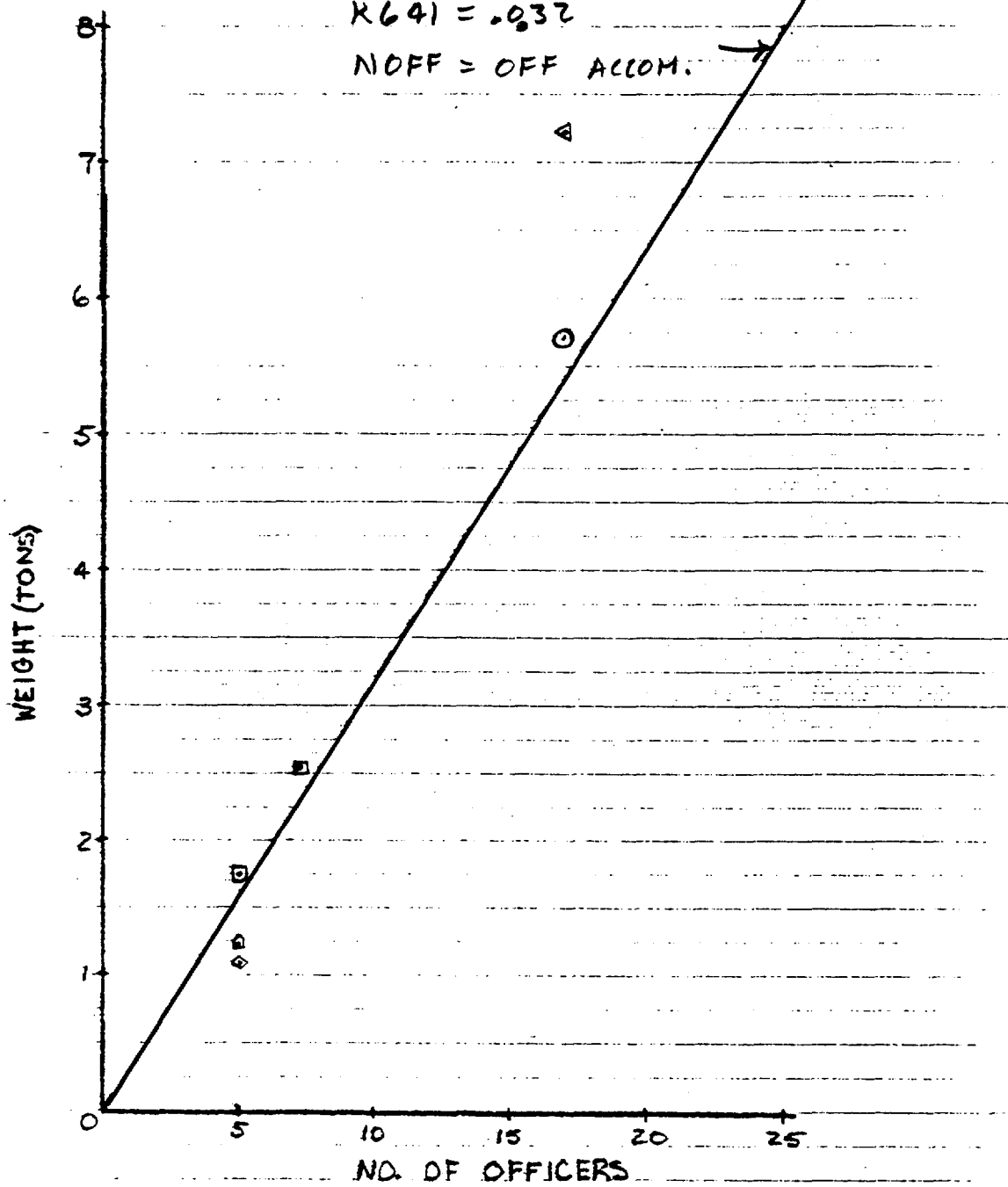
REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W641 OFFICER BERTHING AND MESSING SPACES

$W641 = K641 * NOFF$

$K641 = .032$

NOFF = OFF ACCOM.



REPRODUCED AT GOVERNMENT EXPENSE

642 Non Commisioned Officer Berthing & Messing

$W642 = K642 * NCPO$

where $K642 = .153$ lt

(K642 is a constant obtain from the return data of hydrofoils and SESs.)

NCPO = Number of CPO Accomodation
= 1.1 KCPO (Number of CPO)

Algorithm is the same as ASSET and SES Design Manual.

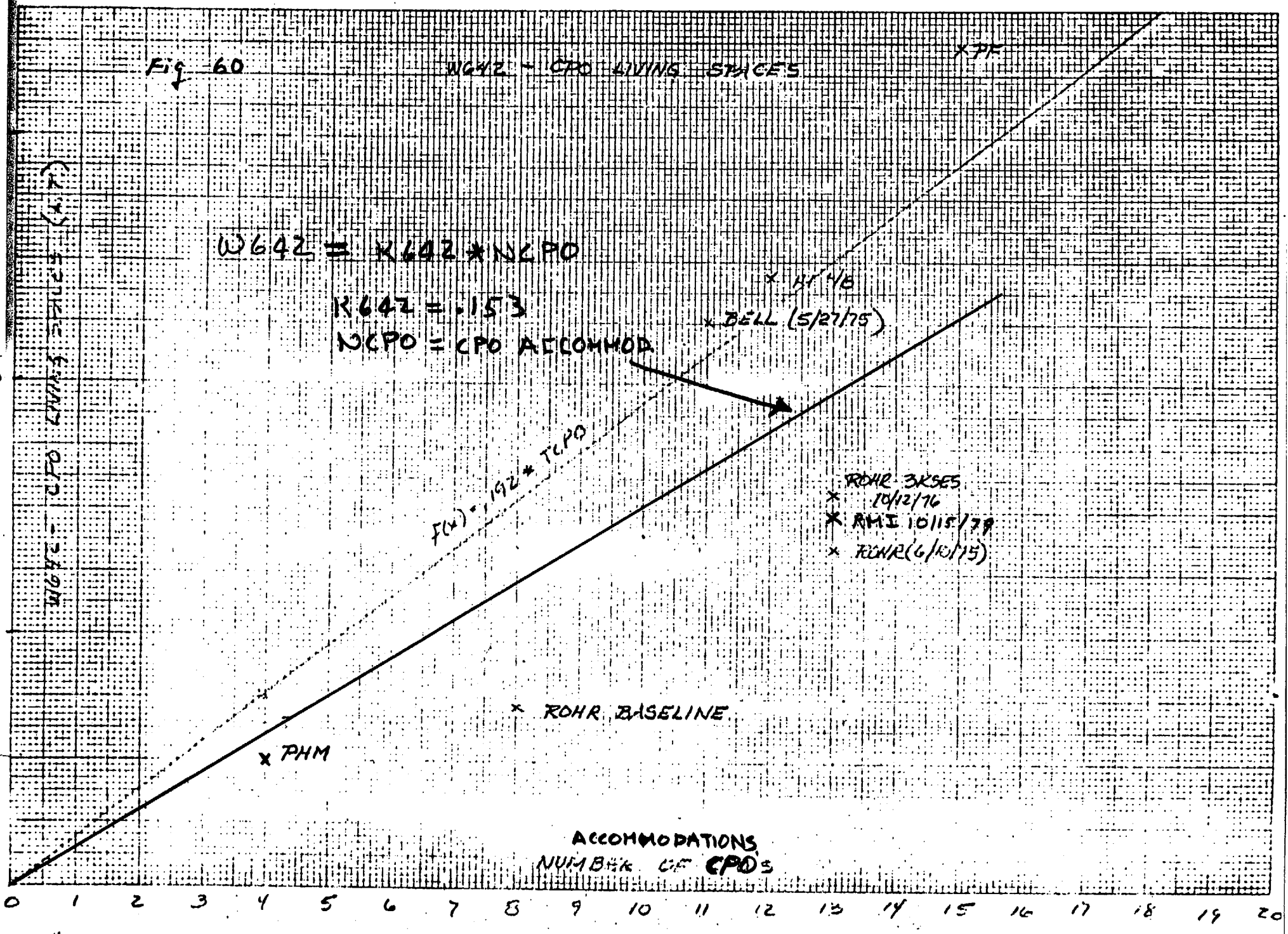
Exceeds PHM stats.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

DRAWING PAPER NO. 1220-10
TRACING PAPER NO. 1227-10
CROSS SECTION-10X10 TO 1 INCH
AGUADEX
MADE IN USA



643 Enlisted Personnel Berthing + Messing

$W643 = K643 * NENL$

where $K643 = .083$ lt

(K643 is a constant obtain from the return weights of hydrofoil and SESs).

NENL = Enlisted Accomodation

~~$W = KENL$~~

$= 1.1 * KENL$

KENL = Number of Enlisted

The Algorithm is the same as ASSET and SES Design Manual.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

TRACING PAPER NO. 1227-101
CROSS SECTION-10X10 TO 1" INCH
MADE IN USA

Fig 61

W643 = ENLISTED PERSONNEL STORES

NOTE:
CNO2 USES $Y = .083 * TENL$ FOR OLD HABITABILITY STANDARDS AND $Y = .14 * TENL$ T/O, FOR NEW STANDARDS

$W643 = K643 * DENL$

$K643 = .083$

DENL = ENLISTED ACCOM

$Y(+) = .14 * TENL$

$Y(+) = .083 * TENL$

× PE

× BELL (5/27/75)

× HLY-6

ROHR 3K563 10/12/74

× ROHR (6/10/75)

× ROHR (8/23/74)

× PHM

W643 = ENLISTED PERSONNEL STORES (LONG TONS)

15.0

10.0

5.0

0

50

100

150

NUMBER OF ENLISTED MEN

644 Sanitary Space + Fixtures

$$W644 = K644 * ACOM$$

Where K644 = .0144 lt

(K644 is a constant obtain from the return data of hydrofoils and SESs.)

ACOM = Number of Accommodations

This Algorithm is same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

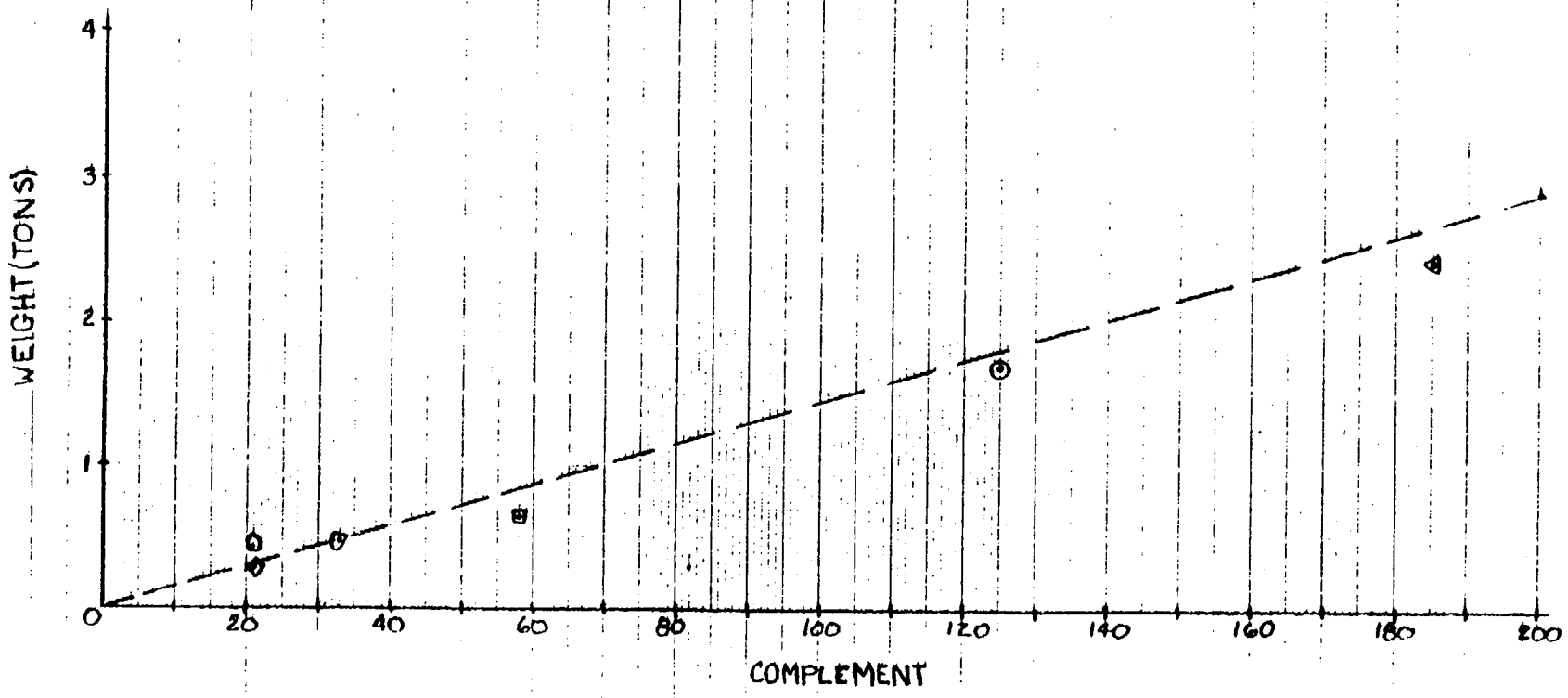
REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W644 SANITARY SPACES AND FIXTURES

$$W644 = K644 * ACOM$$

K644 = .0144

ACOM = ACCOMMODATIONS



645 Leisure + Community Spaces

$W645 = K645 \times ACOM$

where $K645 = 0$

(Based on ASSET, $K645 = 0$ when $ACOM < 150$)

ACOM = Number of Accommodation

ASSET algorithm is used.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

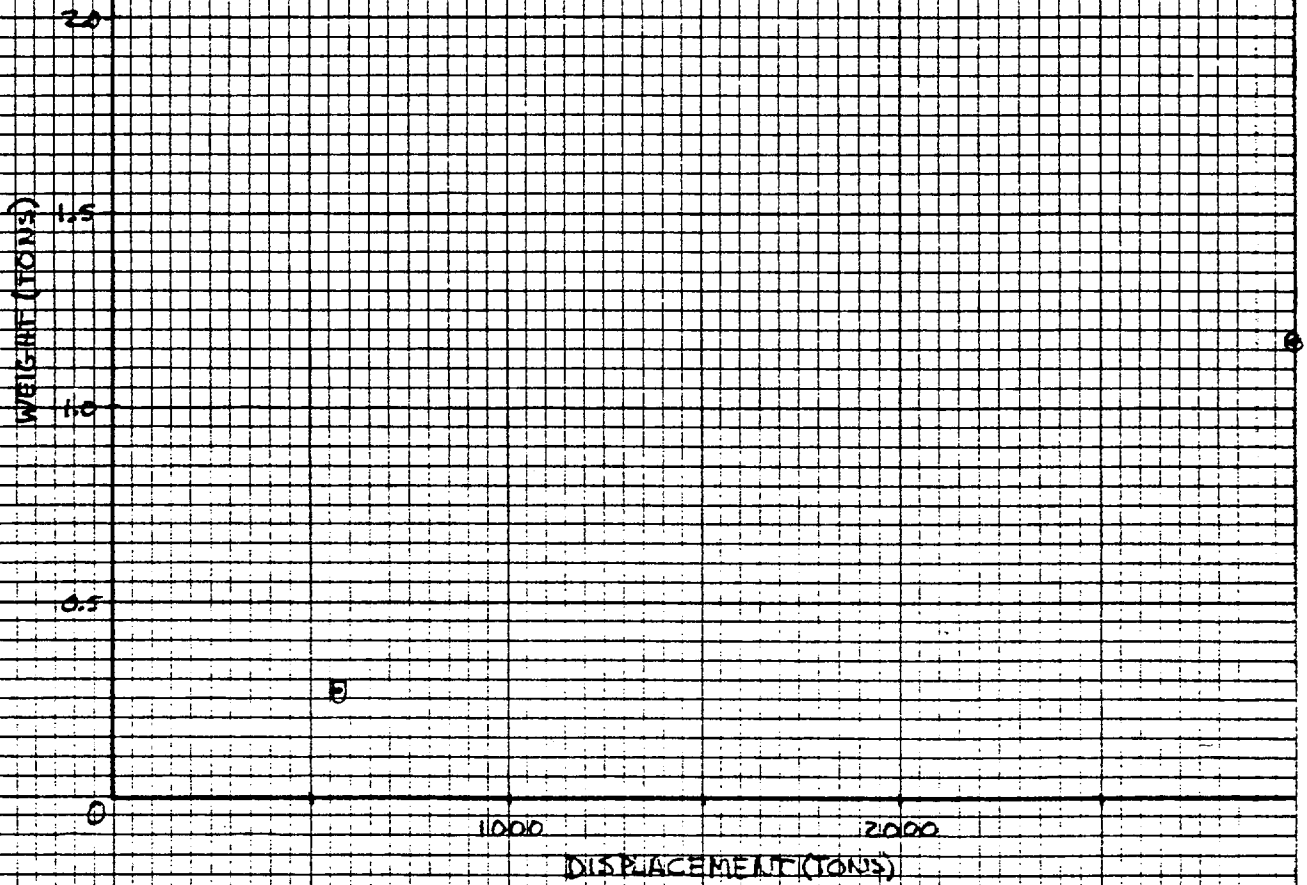
REPRODUCED AT GOVERNMENT EXPENSE

LEISURE SPACES SWBS GROUP W645

$W_{K645} = K_{L645} + K_{K645} * A_{COM}$

$L_{645} = 0$ for $A_{COM} \leq 1500$

$K_{645} = 0$ " "



EUROPEAN 10 X 10 TO 1 INCH
10 IN LINE HEAVY

REPRODUCED AT GOVERNMENT EXPENSE

651 Commissary Spaces

$$W651 = [redacted]^{K651} * ACOM + [redacted] * L651 * [redacted]$$

~~K651 is~~ (These constants are based on return weights of hydrofoils and SESs.)

where K651 = .035 & L651 = .999

ACOM = Number of Accommodations

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

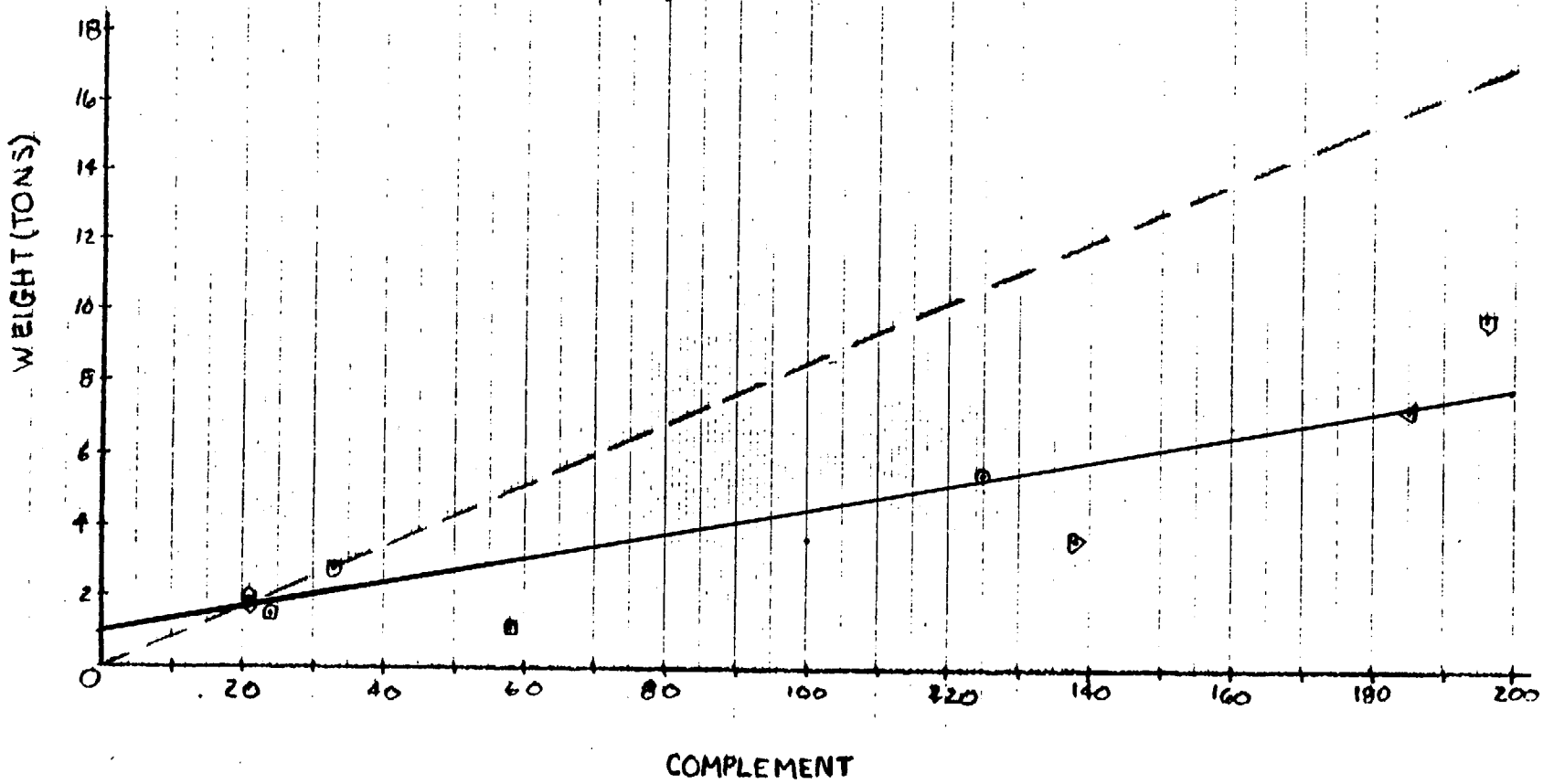
REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W651 COMMISSARY SPACES

$W651 = L651 + K651\ ACOM$

$L651 = .99$

$K651 = .035$



652 Medical Space

$$W652 = K652 * ACOM$$

where $K652 = .005$ lt

(K652 is a constant based on return data for hydrofoil and SES's data only valid where ACOM < 150.)

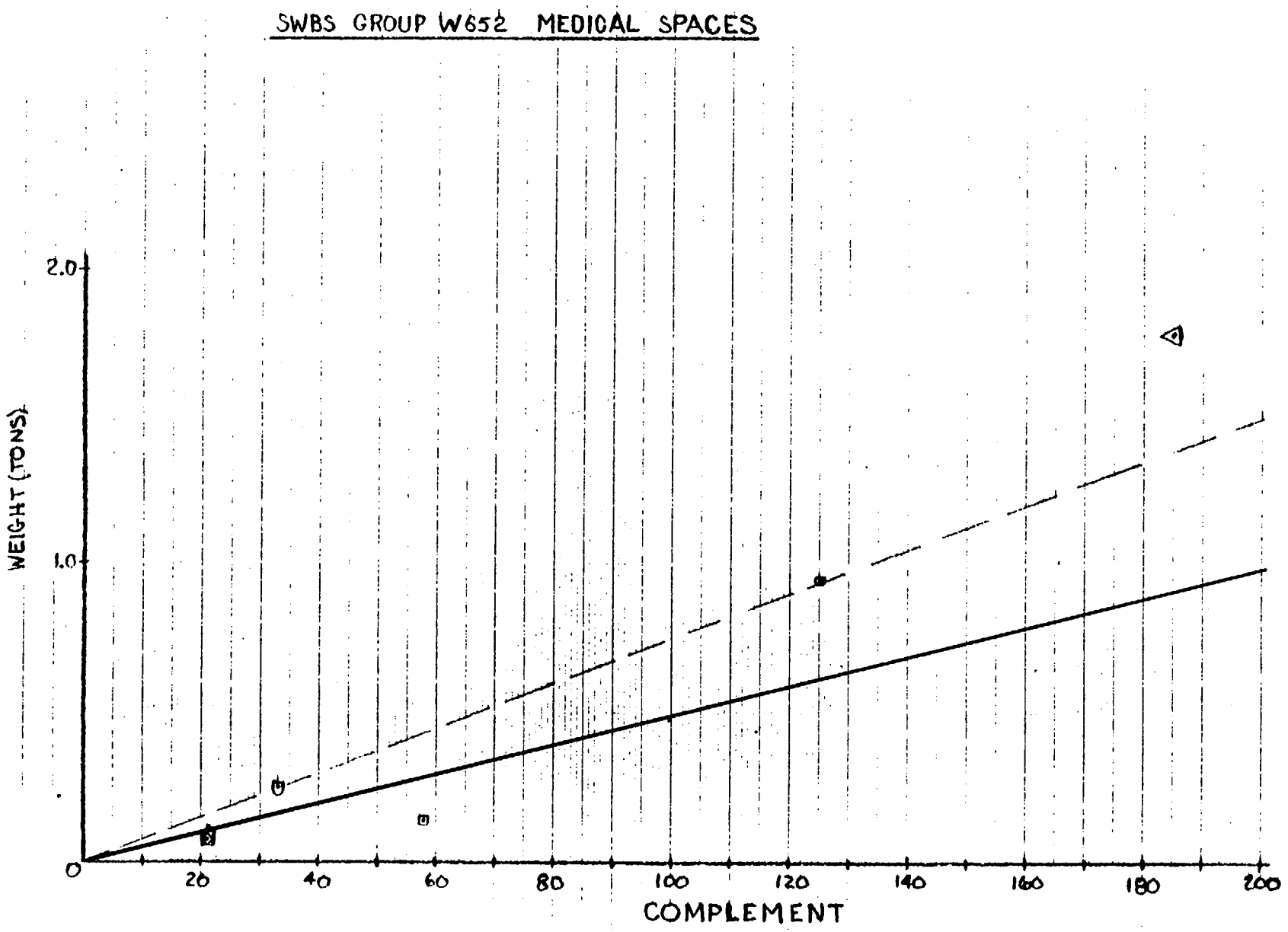
ACOM = Number of Accommodations

The Algorithm is ~~based on~~ the same as SES Design Manual.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE



654 Utility Space

$$W654 = K654 \cdot ACOM$$

where $K654 = .004$ SES Design Manual

* ACOM = Number of Accommodations

This algorithm is from the SES Design Manual

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

DRAWING PAPER NO. 1200-10
TRACING PAPER NO. 1222-10
CROSS SECTION-10X10 TO 1 IN
AQUA
MADE IN USA

Fig 65

WQ54 + UTILITY SPACES

$f(x) = .004 * TCOMP$

× BELL (5/27/75)

× RHI 3KSGS 10/15/79

ROHR 3KSGS 10/12/76 × 41 1/2

× ROHR (6/10/75)

WQ54 + UTILITY SPACES (SHOT SHOT)

TCOMP

0 50 100 150 2c

.1 .2 .3 .4 .5 .6 .7 .8

655 Laundry Space

$$WGSS = KGSS * ACOM$$

where $KGSS = .01$

(KGSS is based SES-200 weight return data.)

ACOM = Number of Accommodations

The algorithm is the same as ASSET and SES Design Manual.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

DRAWING PAPER NO. 1200-101
TRACING PAPER NO. 1227-101
CROSS SECTION-10X10 TO 1 INCH
AGUAPAC
MADE IN USA

Fig #6

$W_{655} = K_{655} \times A_{COM}$

$K_{655} = .01$

W_{655} = WASTE - LAUNDRY SPACES (LONG TONS)

A_{COM} = COMMERCIAL SPACE (1000 SQ FT)

$W_{655} = K_{655} \times A_{COM} \times H1 \times PF$

$H1 = 4/3$

$PF = 1.0$

$F(x) = .01 * TUCHP$

4.0
3.0
2.0
1.0

0
50
100
150
200

TUCHP

× SES 200

× RONR (8/23/74)

× BELL (5/27/75)

× RCHR (6/10/75)

× 10/2/76 RMH 3K 10/13/76

656 Trash Disposal Space

$$W_{656} = .^{K_{656}}\blacksquare\blacksquare\blacksquare 3 * A_{COM}$$

where $K_{656} = .0033$ lb

(K_{656} is based of return data of hydrofoils and SES's.)

A_{COM} = Number of Accommodation

Algorithm is the same as SES Design Manual

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

DRYDING PAPER NO. 1180-101
TRACING PAPER NO. 1127-101
CROSS SECTION-10 X 10 TO 1 INCH
MADE IN USA

Fig 67

WESG = TRASH DISPOSAL SPACES

NOTE: BOTH BELL + ADAM HAVE INCORPORATED THIS WT. GROUP INTO "COMMODITY SPACES"

$\bar{T}(X) = .0033 * TCOMP$

× HUMB.

× PF

TOTAL COMPLEMENT

.8
.7
.6
.5
.4
.3
.2
.1

0 50 100 150 2

661 Officer

$W661 = K661 * ACOM$

where $K661 = .02833$ ASSET

ACOM = Number of Accommodation

Algorithm is from ASSET.

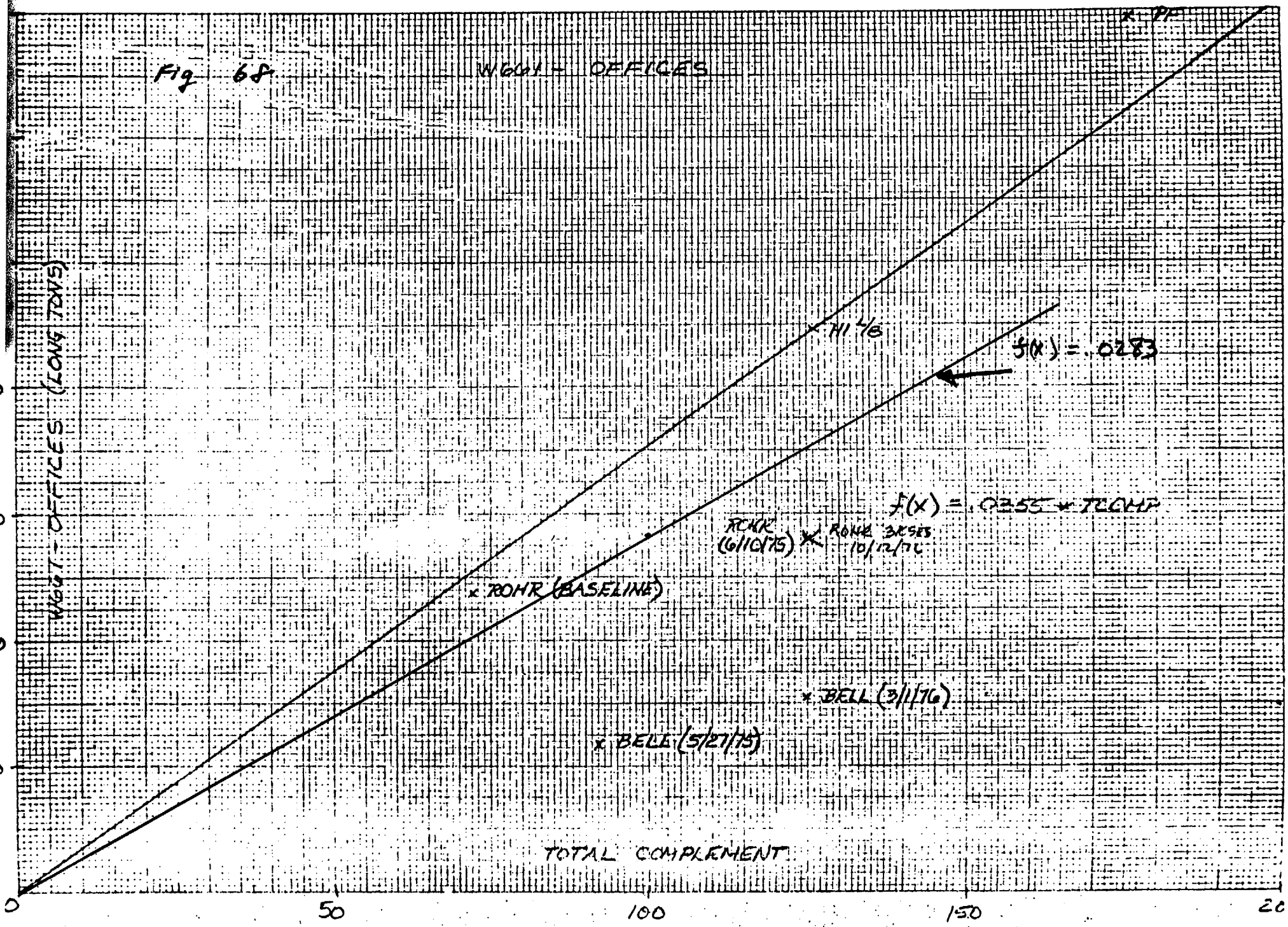
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

DRAWING PAPER NO. 1500-101
TRACING PAPER NO. 1527-101
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

Fig 68



662 Machinery Control Center Furnishing

$W_{662} = K_{662} \times HPT$

where $K_{662} = 2.5 \times 10^{-5}$ lb/hp (ASSET)

HPT = Total horsepower

Algorithm is from ASSET,
AND FITS PHM

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

663 Electronic Control Center Furnishings

$$W663 = K663 * VOLA$$

where $K663 = .0103 \frac{lb}{ft^3}$ (ASSET)

$VOLA$ = Total Volume $* 10^{-3}$, ft^3

Algorithm is the ASSET equation.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

664 Damage Control Stations

$$W664 = K664 * VOLA + L664$$

where $K664 = .0034 \frac{lt}{ft^3}$ & $L664 = .35 lt$

(These constants were obtained from return data for hydrofoils and SESs.)

VOLA = Total Volume $* 10^{-3}$, ft3

Algorithm is the same as ASSET,

K664 from ASSET

L664 for PHM match

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

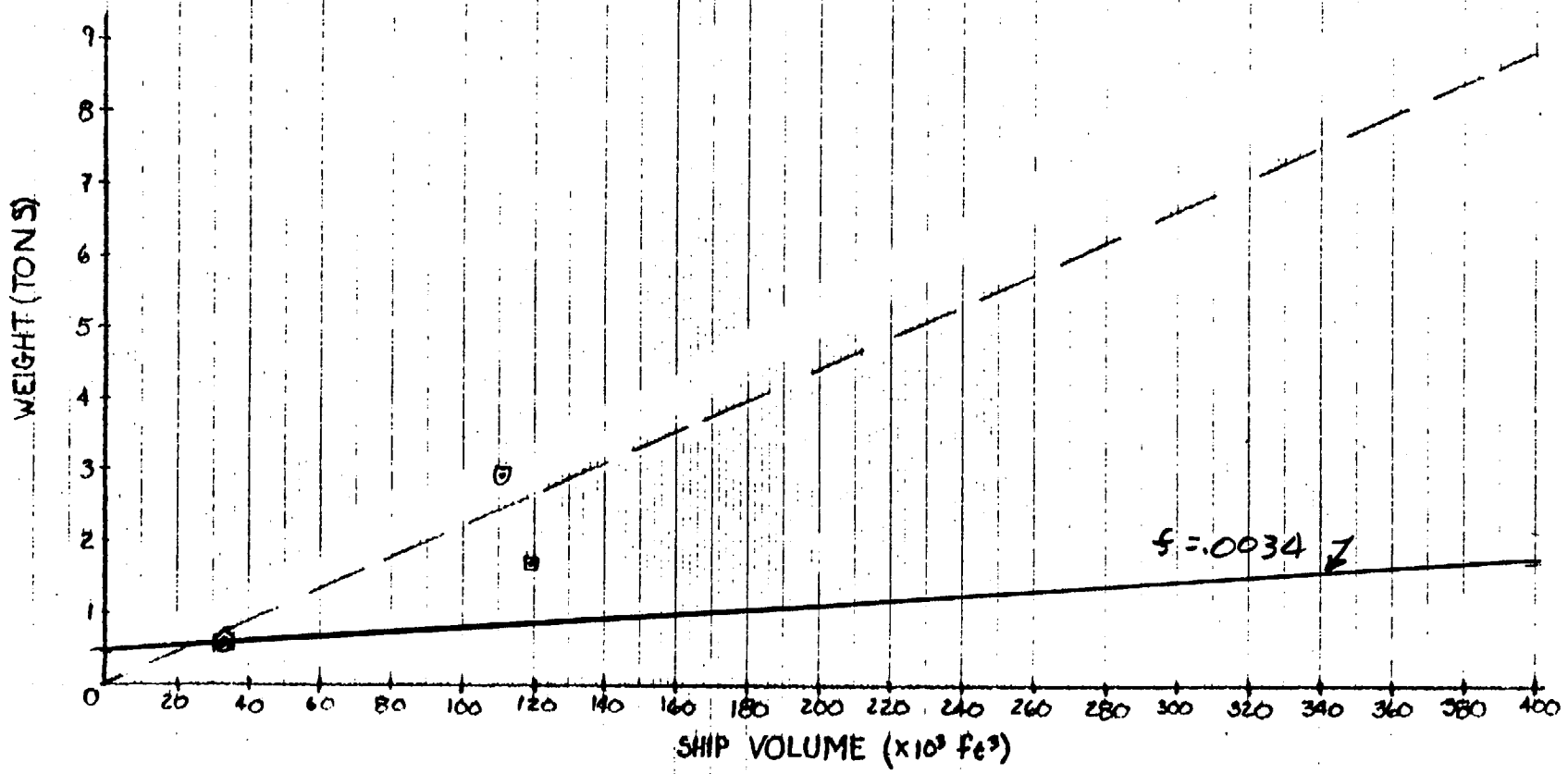
REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

SWBS GROUP W 664 DAMAGE CONTROL STATIONS

$$W664 = K664 * VOLA + L664$$

$$K664 = .0034$$



6GS Workshops, Lmbs and Test Areas

$$WGGS = KGGS \times VOLA$$

where $KGGS = .001625$ lbf/ft^3 (ASSET)

$VOLA$ = Total Volume $\times 10^{-3}$, ft3

This algorithm is from ASSET,

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

G71 Lockers + Special Storage

$$WG71 = KG71 * ACOM$$

where $KG71 = .017$ lt

(KG71 is a constant based on return data from hydrofoils and SESs.)

ACOM = Number of Accommodations

The algorithm is the same as ASSET.

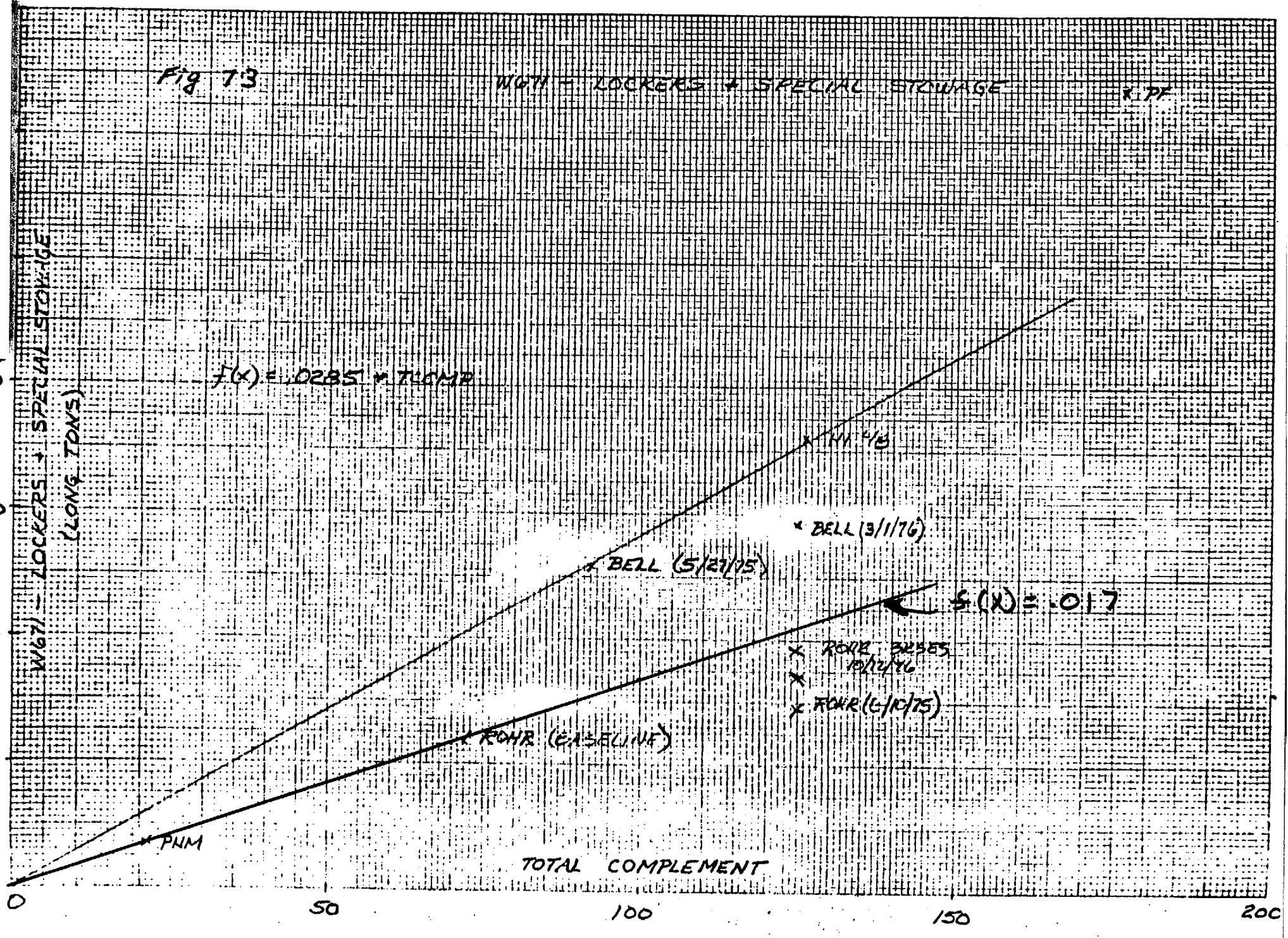
42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

REPRODUCED AT GOVERNMENT EXPENSE

DRAWING PAPER NO. 10-101
TRACING PAPER NO. 1837-101
CROSS SECTION-10X10 TO 1 INCH
MADE IN USA

Fig 73



672 Storerooms and Issue Rooms

$W672 = K672 * ACOM$

where $K672 = .086$ lbs (ASSET)

ACOM = Number of Accommodations

Algorithm is from ASSET.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

698 Outfit + Furnishing Operating Fluids

$W_{698} = $ ~~6.57×10^{-4}~~ $K_{698} (W_{600} - W_{690})$

where $K_{698} = 6.57 \times 10^{-4}$ lt (ASSET)

$W_{600} - W_{690}$ = Summation of Outfit + Furnishing Weight except W_{698} and W_{699}

The algorithm is same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

699 Outfit and Furnishing Repair Parts + Special Tools

$W_{699} = K_{699} * (W_{600} - W_{690})$

where $K_{699} = 6.667 \times 10^{-3}$ [redacted] (ASSET)

$W_{600} - W_{690}$ = Total Outfitting and Furnishing Weights minus W_{698} and W_{699}

Algorithm is the same as ASSET.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 383 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F 11 Ship Officien

$WF11 = KF11 * NF11$

where $KF11 = .179$ lt per person

$NF11 = KOFF$ = Number of Officers

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F12 Ship Non Commissioned Officers

$WF12 = KF12 * NF12$

where $KF12 = .147$ lt per person

$NF12 = KCPO \equiv$ Number of CPO

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F13 Ship Enlisted Personnel

$WF13 = KF13 * NF13$

where $KF13 = .1103$ lt per person

$NF13 = KENL$ = Number of enlisted personnel

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F21 Ship Ammunition

$$WF21 = KF21$$

where KF21 = Weight of Ship Ammunition

Input Constant obtained from ~~C.A.~~ design requirements

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F 22 Ordinance Delivery Systems Ammunition

$$WF22 = KF22$$

where KF 22 = Weight of Ordinance Delivery System Ammunition

Input constant obtained from design requirements.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F 23 Ordinance Delivery System

$WF23 = KF23$

where $KF23$ = Weight of Ordinance Delivery System

Input constant ~~from~~ obtain from design requirements.

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F 24 Ordinance Repair Parts (Ship Ammo)

$WF24 = KF24$

where $WF24$ = Weight of Ordinance Repair Parts (Ship Ammo)

Input constant obtain from design requirements.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F 25 Ordinance Repair Parts (Ord. Ammo)

$WF25 = KF25$

where $KF25$ = Weight of Ordinance Repair Parts (Ord. Ammo)

Input constant obtain from design requirements

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F 26 Ordinance Delivery System Support Equipment

$WF26 = KF26$

where $KF26$ = Weight of Ordinance Delivery System Support Equipment

Input Constant obtain from design requirements.

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

F29 Special Mission Related Systems and Expendables

$WF29 = KF29$

where $KF29$ = Weight of Special Mission Related Systems and Expendables

Input constant obtain from design requirements.

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

F 31 Provisions + Personnel Stores

$$WF31 = NF10 * (CF30 * NSDD + CFCO * NSDC + CFMO * NSDF + DFCO * NSDG)$$

where $NF10$ = Complement = $NF11 + NF12 + NF13$

$NF11 = KOFF$ = Number of Officers

$NF12 = KCPO$ = Number of CPO

$NF13 = KENL$ = Number of Enlisted Personnel

$CF30 = .00143$

$CFCO = .000736$

$CFMO = .000496$

$DFCO = .000173$

} Asset Constants

where

CF30 is for dry stores
CFCO is for chill stores
CFMO is for frozen stores
DFCO is for stock and clothes

And

$NSDD$ = Number of dry store days
$NSDC$ = Number of chill store days
$NSDF$ = Number of frozen store days
$NSDG$ = Number of general store days

F32 General Stores

$WF32 = NF10 * (DF30 * NSDG + DF32)$

where $NF10 = NF11 + NF12 + NF13$

$NF11 = KOFF$ = Number of Officers

$NF12 = KCPO$ = Number of CPOs

$NF13 = KENL$ = Number of Enlisted Personnel

$DF30 = .000472$ } ASSET Constants for general stores.

$DF32 = .0049$ }

$NSDG$ = Number of General Store Days

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

F42 JP-5 (Aircraft Fuel)

WF42 = Aircraft Fuel = F42A

Input constant obtain from design requirements

42.381 50 SHEETS 5 SQUARE
42.382 100 SHEETS 5 SQUARE
42.389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F46 Lubricating Oil

$WF46 = KF46 * (HPT + 1.34\ KWI)$

where $KF46 = .00018$ Based on DDG-51

HPT = Total Horsepower, hp

KWI = Installed Ship Service Power, kw

42 381 50 SHEETS 5 SQUARE
42 382 100 SHEETS 5 SQUARE
42 389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT EXPENSE

F 52 Fresh Water

$WF52 = KF52 * ACOM$

where $KF52 =$ [redacted] $.032$ based on PHM

(8.6 gallons per [redacted] accommodation)

ACOM = Number of Accommodation

$= 1.1 \times NF10$

$NF10 = NF11 + NF12 + NF13$

$NF11 = KOFF$ = Number of Officers

$NF12 = KCPO$ = Number of CPO

$NF13 = KENL$ = Number of Enlisted Personnel

42-381 50 SHEETS 5 SQUARE
42-382 100 SHEETS 5 SQUARE
42-389 200 SHEETS 5 SQUARE
NATIONAL

REPRODUCED AT GOVERNMENT

665

~~664~~ Workshop, Lab & Test Areas

W665 = K665 * VOLA

where K665 = 0.01625

ASSET (for all but CGV)

W665 = K665 [illegible]

Where K665 = 25

CGV RESOLUTION (for CGV only)

671 Lockers & Special Stowage

W671 = K671 * VOLA

where K671 = 0.0085

NAVSEA DATA FIT

672 Store Rooms & Issue Rooms

W672 = K672 * COMP

where K672 - 0.192

ASSET

698 Outfit & Furnishings Operative Fluids

W698 = K698 * W650

where K698 = 0.05

SES DESIGN MANUAL

699 Outfit + Furnishings Spare Parts

W699 = K699 * (W600 - W698 - W699)

where K699 = 0.02

SES DESIGN MANUAL

REPRODUCED AT GOVERNMENT EXPENSE

VARIABLE [illegible]

SWBS #	DESCRIPTION	ACTUAL DATA	SES ALG	[illegible] ALG
F11	SHIPS OFFICERS	4.1	4.1	4.1
F12	SHIPS [illegible]	4.0	4.0	4.0
F13	SHIPS ENLISTED MEN	27.6	27.6	27.6
F21	[illegible]	1613	161.3	161.3
F22	ORDINANCE DEL SYS. AMMO	0.0	0.0	0.0
F23	ORDINANCE DEL. SYS.	18.6	18.6	18.6
F26	" " "SUPPORT EQUIP	18.7	18.7	18.7
F31	PROVISIONS + PERSONNEL STORES	39.5	40.9	40.9
F32	GENERIC [illegible]	13.2	7.6	7.6
F41	[illegible]	1524.0	1524.0	1524.0
F42	JP-5	100.0	100.0	100.0
F46	LUBRICATING OIL	20.0	25.0	
F51	SEAWATER	0.0	0.0	0.0
F52	FRESH WATER	52.2	52.2	52.2
F55	SANITARY TANK LOAD	6.0	6.0	6.0
F00	TOTAL LOADS	1989	1990	1990

[redacted]

VARIABLE LOADS FIX

SWBS #	DESCRIPTION	ACTUAL DATA	SES ALG	MODIFIED ALG
F11	SHIPS OFFICERS	4.1	2.9	2.9
F12	SHIPS [illegible] OFFICER	2.9	2.4	2.4
F13	SHIPS ENLISTED MEN	26.6	19.3	19.3
F21	S+P AMMUNITION	91.8	91.8	91.8
F22	ORDINANCE DEL. SYS. AMMO	0.0	0.0	0.0
F23	[illegible]	0.0	0.0	0.0
F26	SMALL CAL. A.	0.0	0.0	0.0
F31	PROVISIONS & PERSONNEL STORES	35.2	31.1	31.1
F32	GENERAL STORES	7.9	5.8	5.8
F41	DIESEL FUEL	798.8	798.8	798.8
F42	JP-5	0.0	0.0	0.0
F46	LUB. OIL	6.6	12.1	12.1
F51	SEAWATER	0.0	0.0	0.0
F52	[illegible]	44.9	36.0	36.0
F55	SANITARY TANK LIQUIDS	5.0	4.1	4.1
F00	TOTAL LOADS	1024	1004	1004

REPRODUCED AT GOVERNMENT

F 32 General Stores

WF 32 = DF 30 × NF 10 where DF30 = .024
ASSET

F 46 Lubricating Oil

WF 46 = KF46 × HPT where KF46 = .00025

F 52 Fresh Water

WF 52 = KFS2 × COMP where KFS2 = .149

FSS Sanitary Tank Liquid

WFSS = KFSS × COMP where KFSS = .017

REPRODUCED AT GOVERNMENT

VARIABLE LOADS CGV

SWBS #	DESCRIPTION	ACTUAL DATA	SES ALG	MODIFIED ALG
F 11	SHIPS OFFICERS	16.8	16.6	16.6
F 12	SHIPS NONCOMMISSIONED OFFICERS	9.8	9.6	9.6
F 13	SHIPS ENLISTED MEN	103.1	103.0	103.0
F 21	SHIP AMMUNITION	523.9	523.9	523.9
F 22	ORDINANCE DELIVERY SYSTEMS AMMUNITION	400.0	400.0	400.0
F 23	ORDINANCE DELIVERY SYSTEMS	173.2	173.2	173.2
F 26	ORDINANCE DELIVERY SYSTEMS SUPPORT EQUIPMENT	103.2	103.2	103.2
F 31	PROVISIONS & PERSONNEL STORES	200.2	149.0	149.0
F 32	GENERAL STORES	47.9	27.8	27.8
F 41	DIESEL FUEL	2685.1	2685.1	2685.1
F 42	JP-5	700.0	700.0	700.0
F 46	LUBRICATING OIL	33.8	34.5	34.5
F S1	SEA WATER	0.0	0.0	0.0
F S2	FRESH WATER	189.5	189.8	189.8
F S5	SANITARY TANK LIQUID	19.2	21.6	21.6
F00	Total Loads	5206	5137	5137

[redacted]

VARIABLE LOADS DDG

SWBS #	DESCRIPTION	ACTUAL DATA	SCS ALG	ADDITIVE ALG
F11	SHIPS OFFICERS	4.1	3.2	3.2
F12	SHIPS NONCOMMISSIONED OFFICERS	3.2	2.1	2.1
F13	SHIPS ENLISTED MEN	27.1	28.4	28.4
F21	SHIP AMMUNITION	200.9	200.9	200.9
F27	ORDINANCE DELIVERY SYSTEMS MISSILE	0.0	0.0	0.0
F23	ORDINANCE DELIVERY SYSTEMS	0.0	0.0	0.0
F26	ORDINANCE DEL. SYS SURFACE EQUIP	0.0	0.0	0.0
F31	PROVISIONS & PERSONNEL STORES	39.5	39.7	39.7
F32	GENERAL STORES	13.2	7.4	7.4
F41	DIESEL FUEL	1199.2	1199.2	1199.2
F42	JP-5	67.1	62.1	62
F50	LUBRICATING OIL	20.0	25.0	25.0
F51	SEA WATER	52.6	54.6	54.6
F52	FRESH WATER	45.9	50.5	50.5
F53	SANITARY TANK LIQUID	21.6	5.8	5.8
F00	TOTAL LOADS	1691	1679	1679

REPRODUCED AT GOVERNMENT EXPENSE

VARIABLE LOADS ALGORITHM

F11 Ship Officers

$WF11 = KF11 * NF11$ where $NF11 = NOFF/1.1$

$KF11 = .179$

ASSET

F12 Ship Noncommissioned Officers

$WF12 = KF12 * NF12$ where $NF12 = NCPO/1.1$

$KF12 = .147$

ASSET

F13 Ship Enlisted Personnel

$WF13 = KF13 * NF13$ where $NF13 = NENL/1.1$

$KF13 = .103$

ASSET

F31 Provision and Personnel Stores

$WF31 = NF10 * (CF30 * NSDD + CFCO * NSDC + CFMO * NSDF + DFCO * NSDG)$

where $NF10 = NF11 + NF12 + NF13$

$CF30 = .00125$ $NSDD = 45$

$CFCO = .000736$ $NSDC = 30$

$CFMO = .000494$ $NSDF = 45$

$DFCO = .000625$ $NSDG = 45$

ASSET