MODAL COUPLING PROCEDURES ADAPTED TO NASTRAN ANALYSIS OF THE 1/8-SCALE SHUTTLE STRUCTURAL DYNAMICS MODEL

Volume II — Supporting Data

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ABSTRACT

A dynamic substructuring analysis, utilizing the component modes technique, of the 1/8 scale Space Shuttle Orbiter finite element model is presented. The analysis was accomplished in 3 phases, using NASTRAN RIGID FORMAT 3 (Level 15.5.1), with appropriate Alters, on the IBM 360-370 (Model 165). The Orbiter was divided into 5 substructures, each of which was reduced to interface degrees of freedom and generalized normal modes. The reduced substructures were then coupled in Phase 2 to yield the first 23 symmetric free-free orbiter modes. The eigenvectors in the original grid point degree of freedom lineup were then recovered in Phase 3. A comparison is then made with an analysis which was performed with the same model using the direct coordinate elimination approach under NASA contract NAS 1-10635-12 (Reference 1). Eigenvalues were extracted using the inverse power method.

Appendix B4
PLOTS OF SYMMETRIC COMPONENT MODES/PHASE I ANALYSIS MODEL II FUSELAGE

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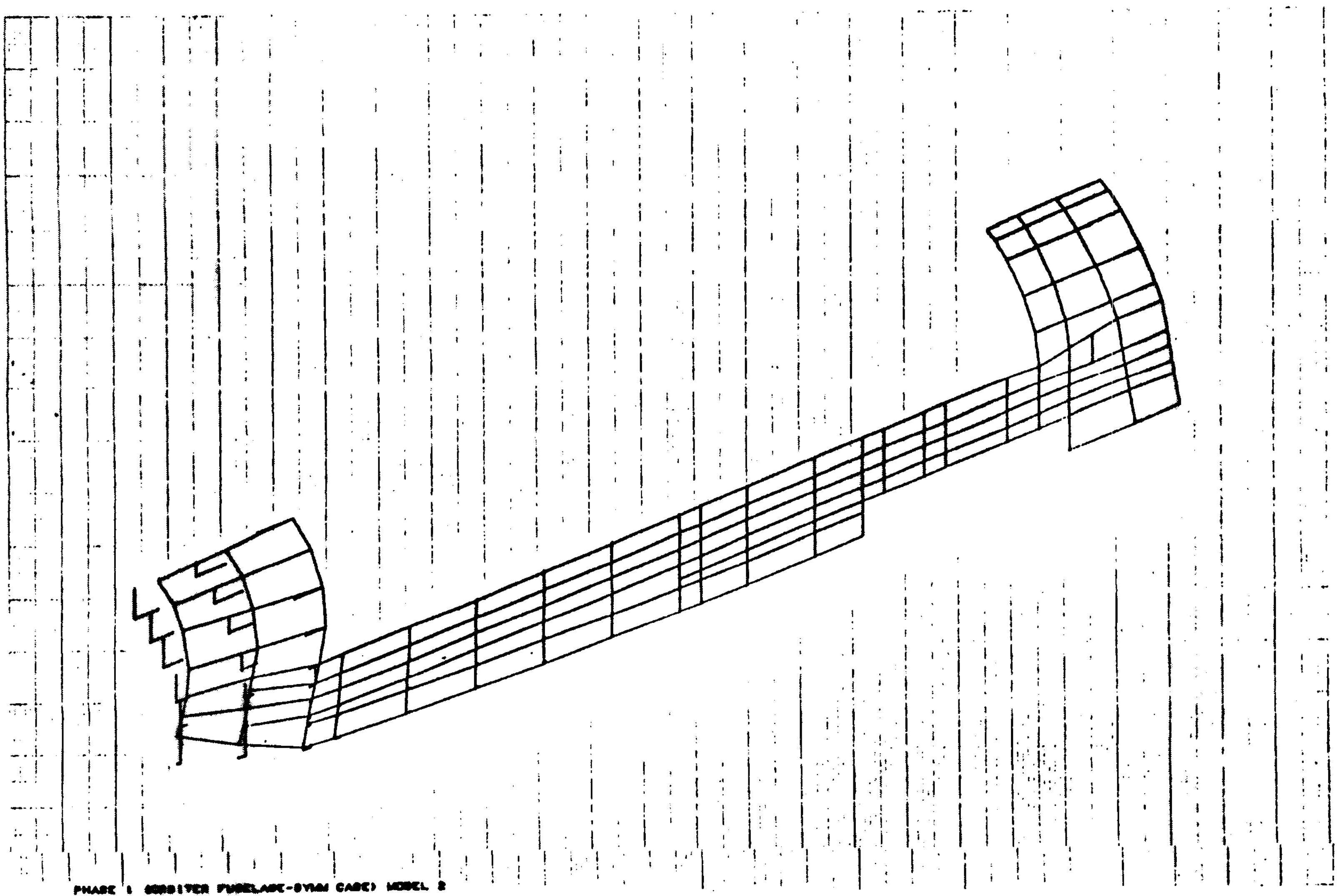

PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
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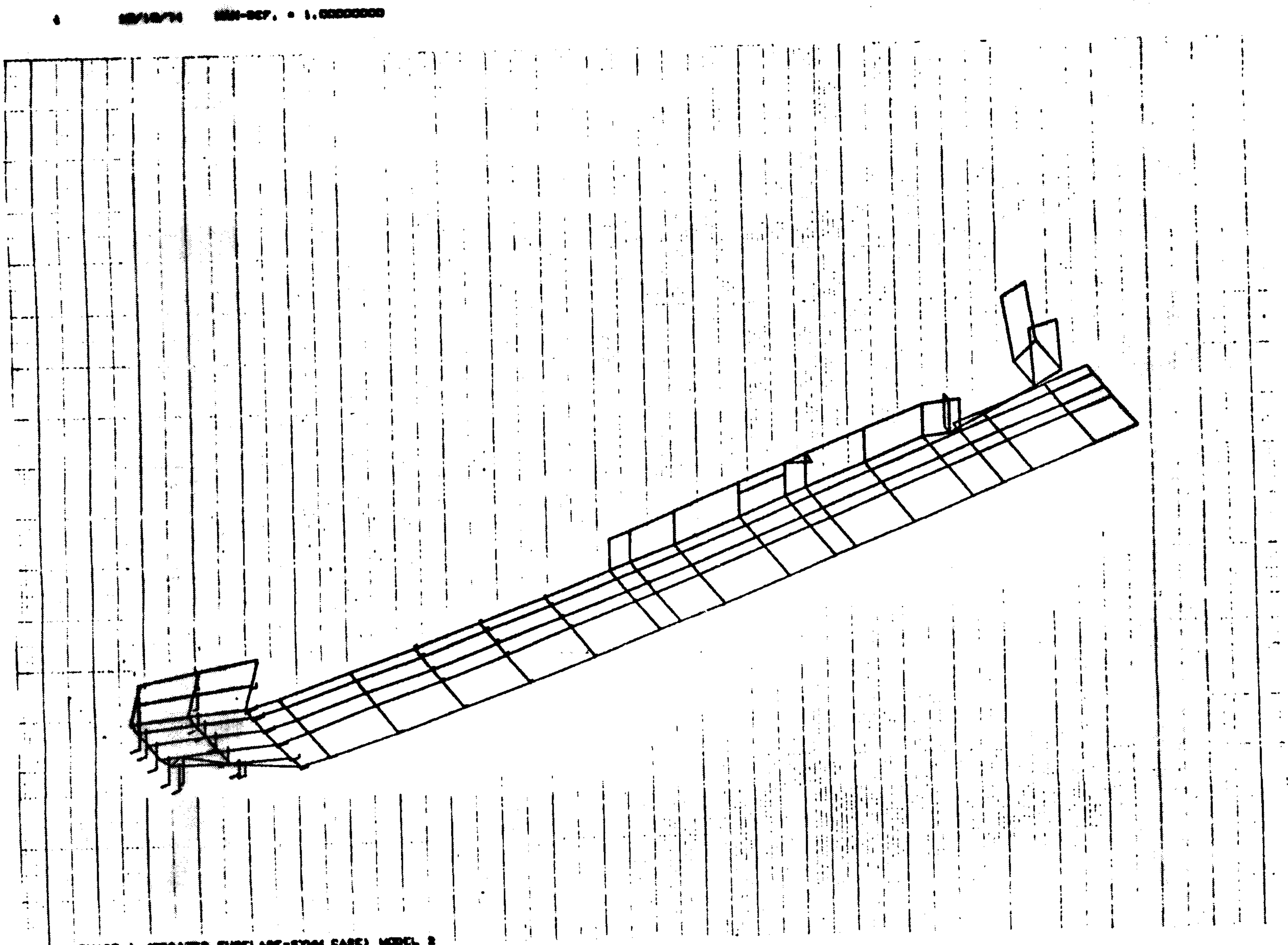
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 1 MODE 1 FREQ. 88.40704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MODAL DEFOR. SUBCASE 1 MODE 1 FREQ. 89.40704

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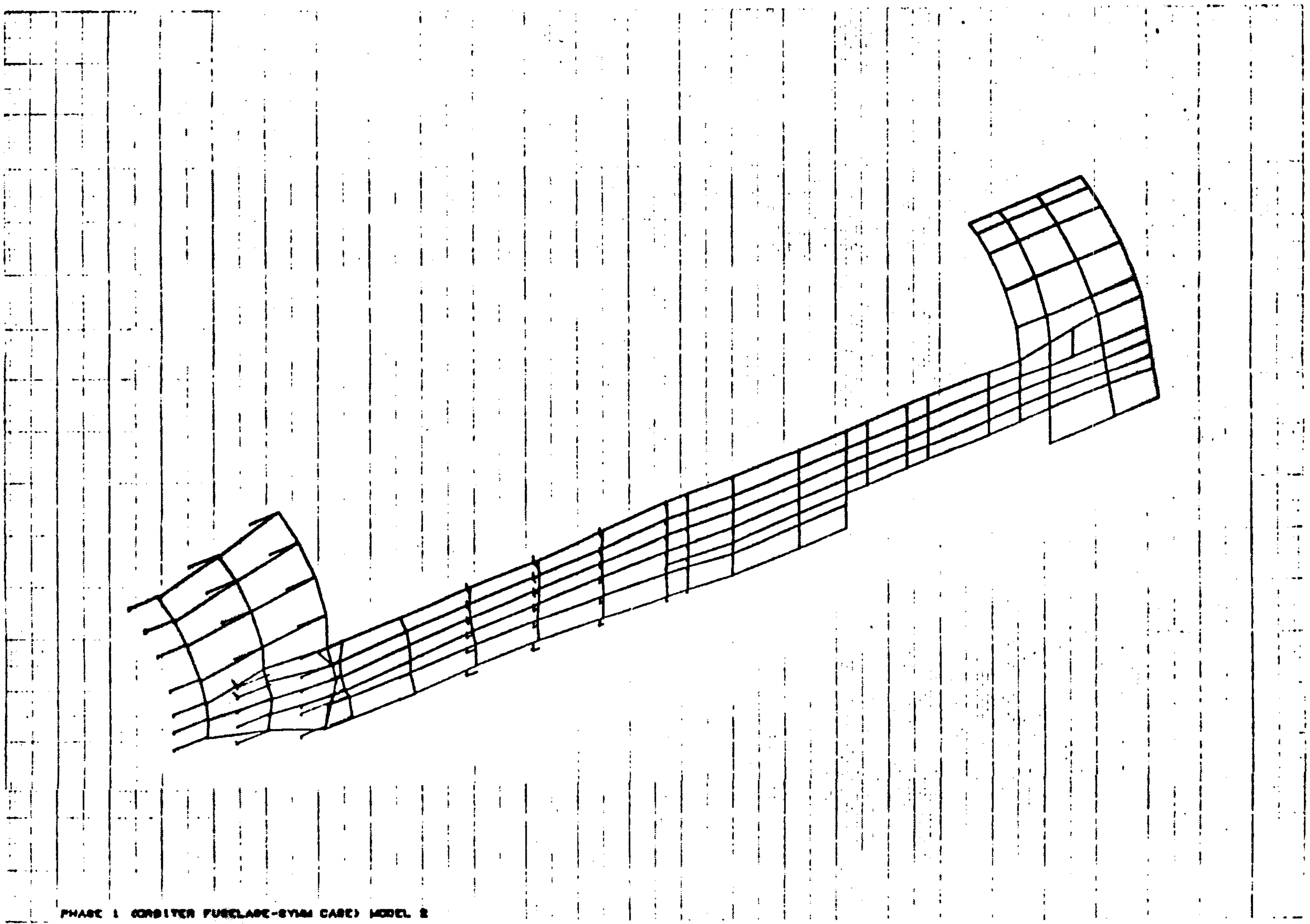

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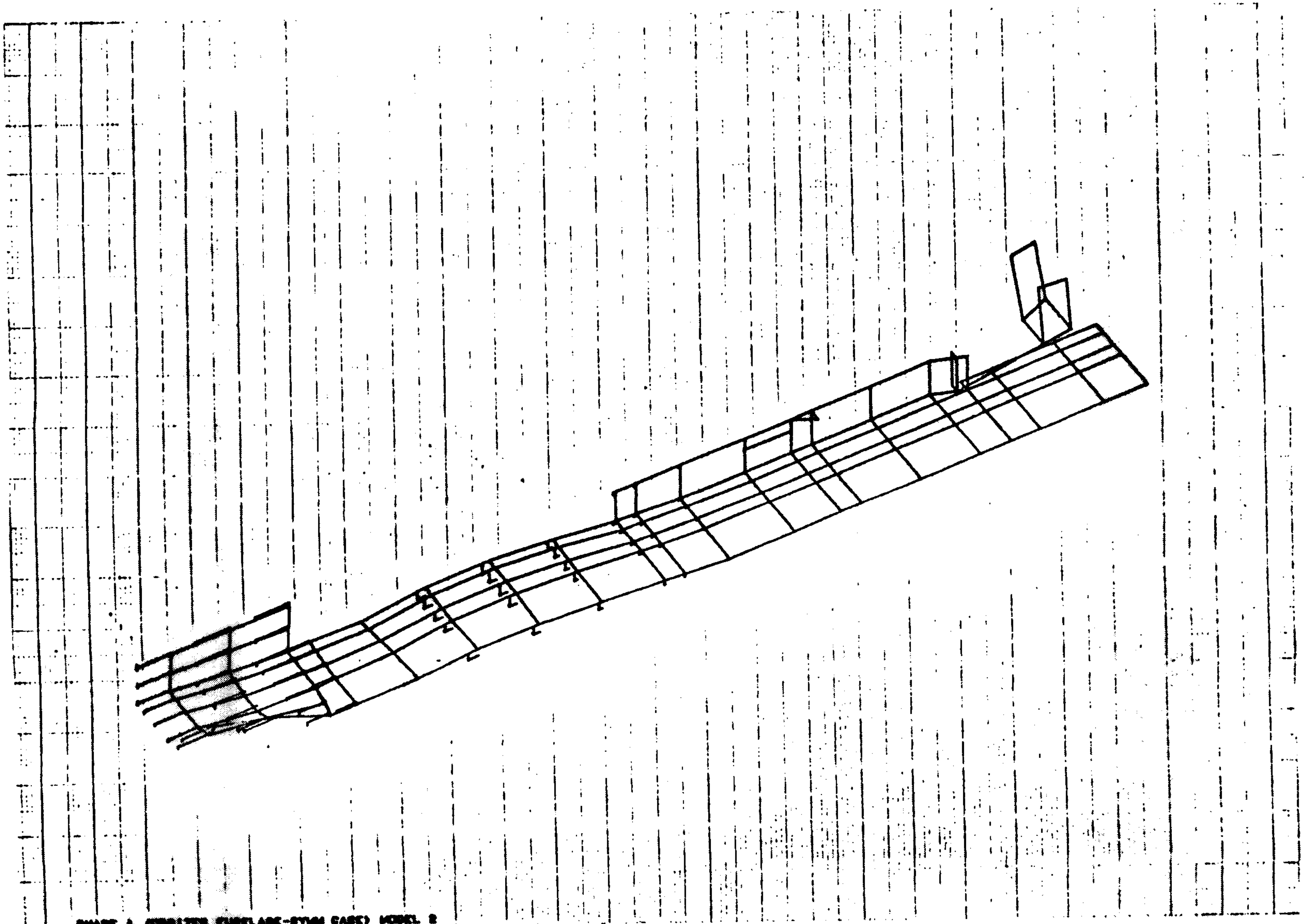

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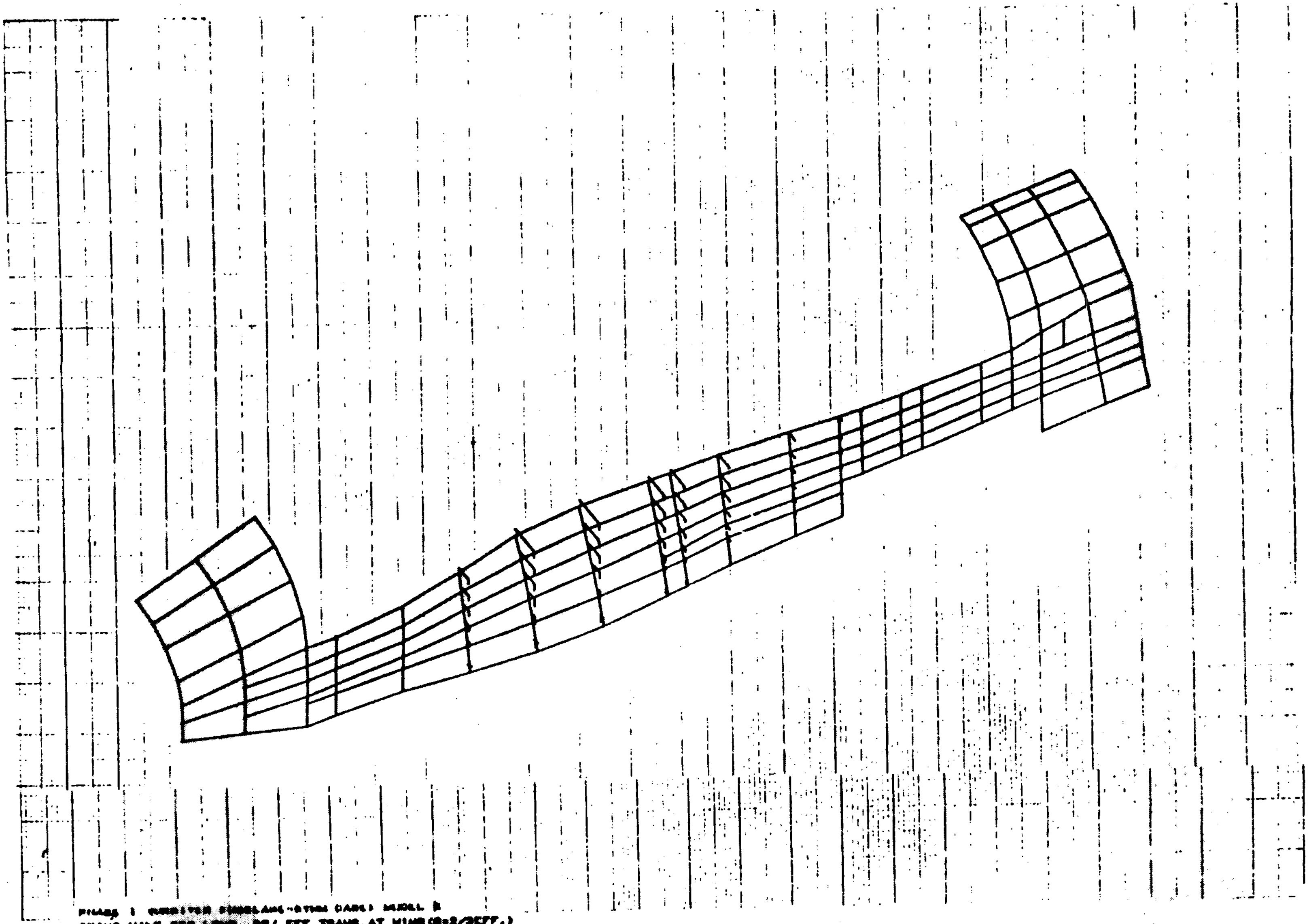

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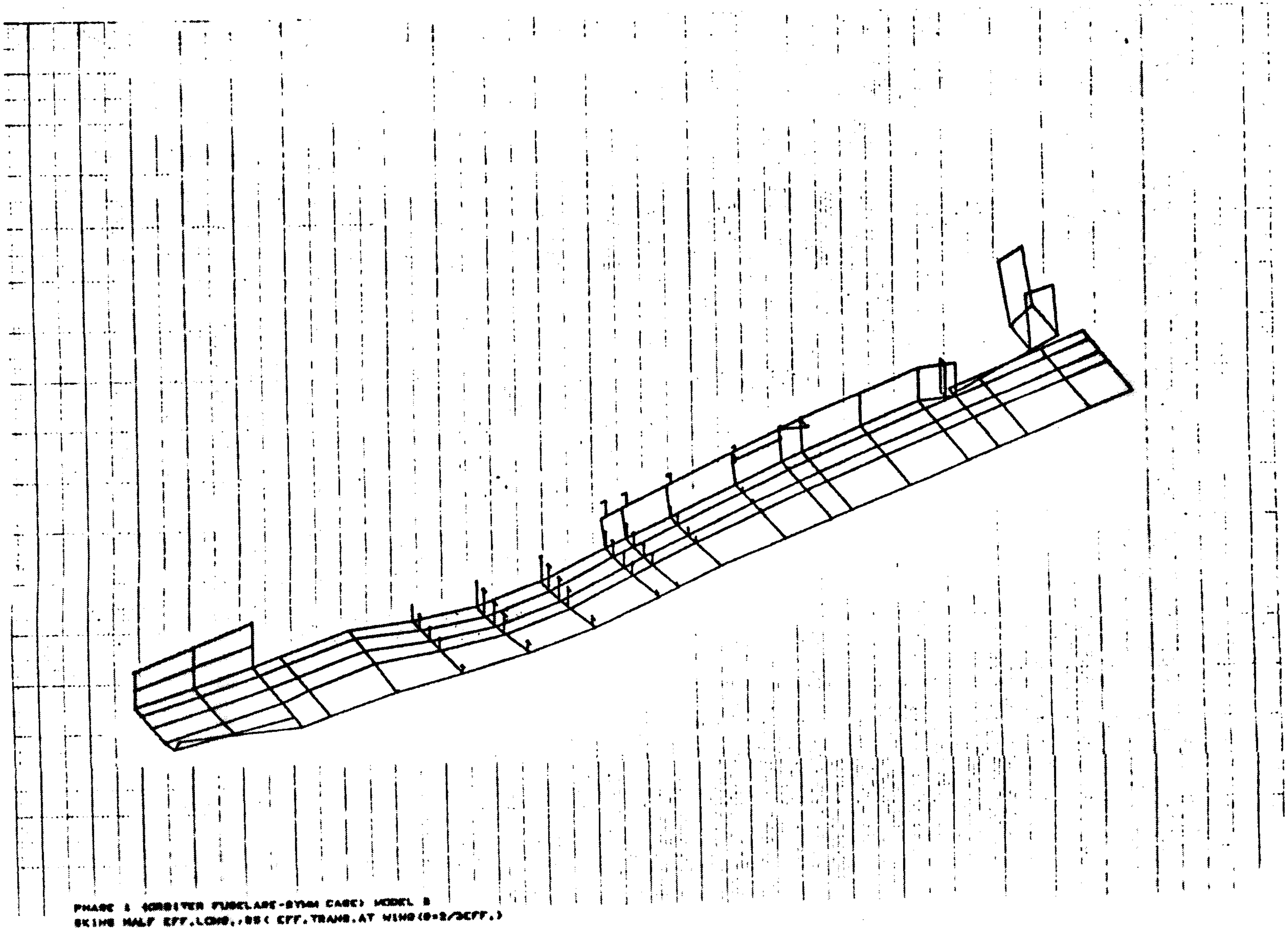

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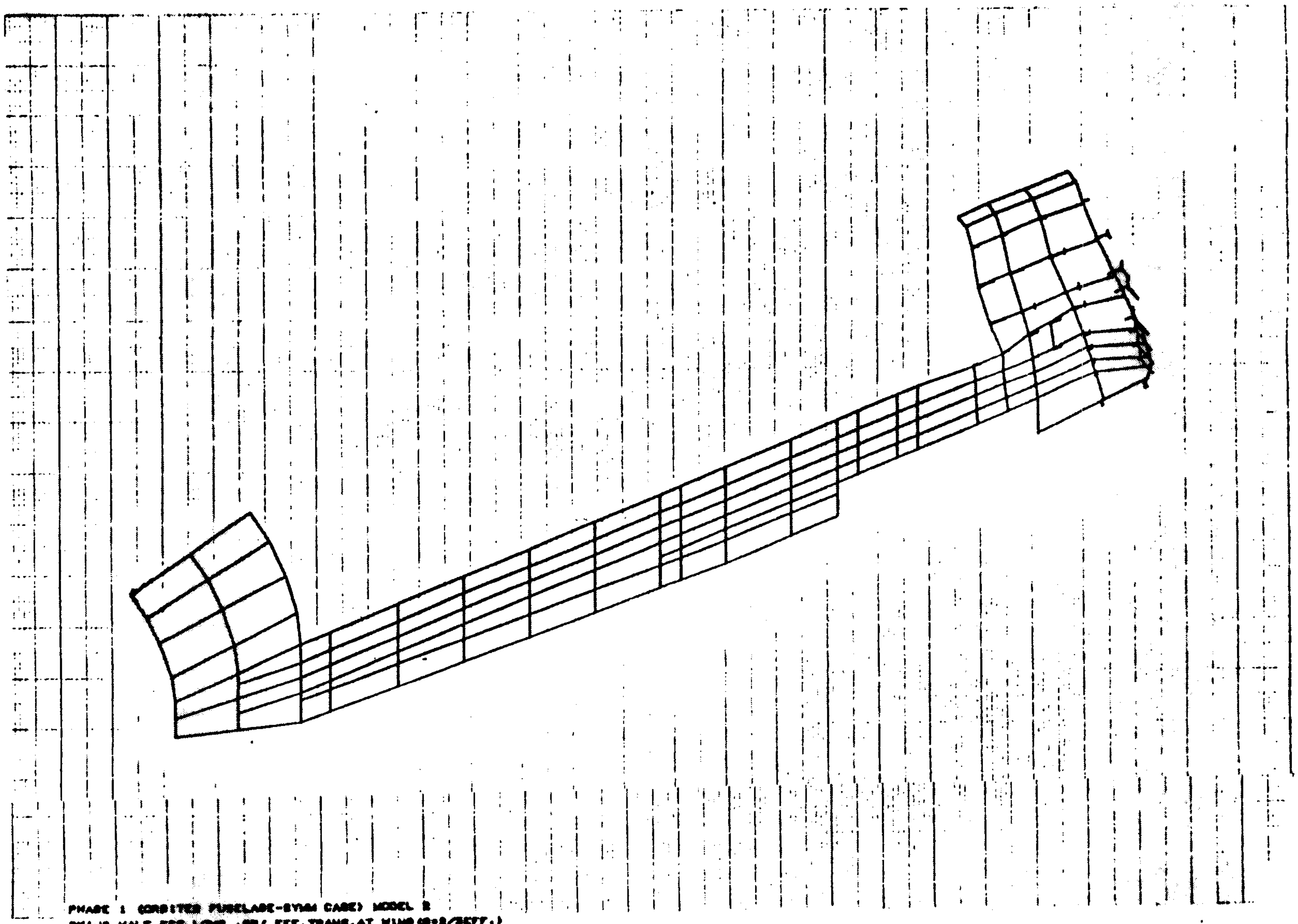

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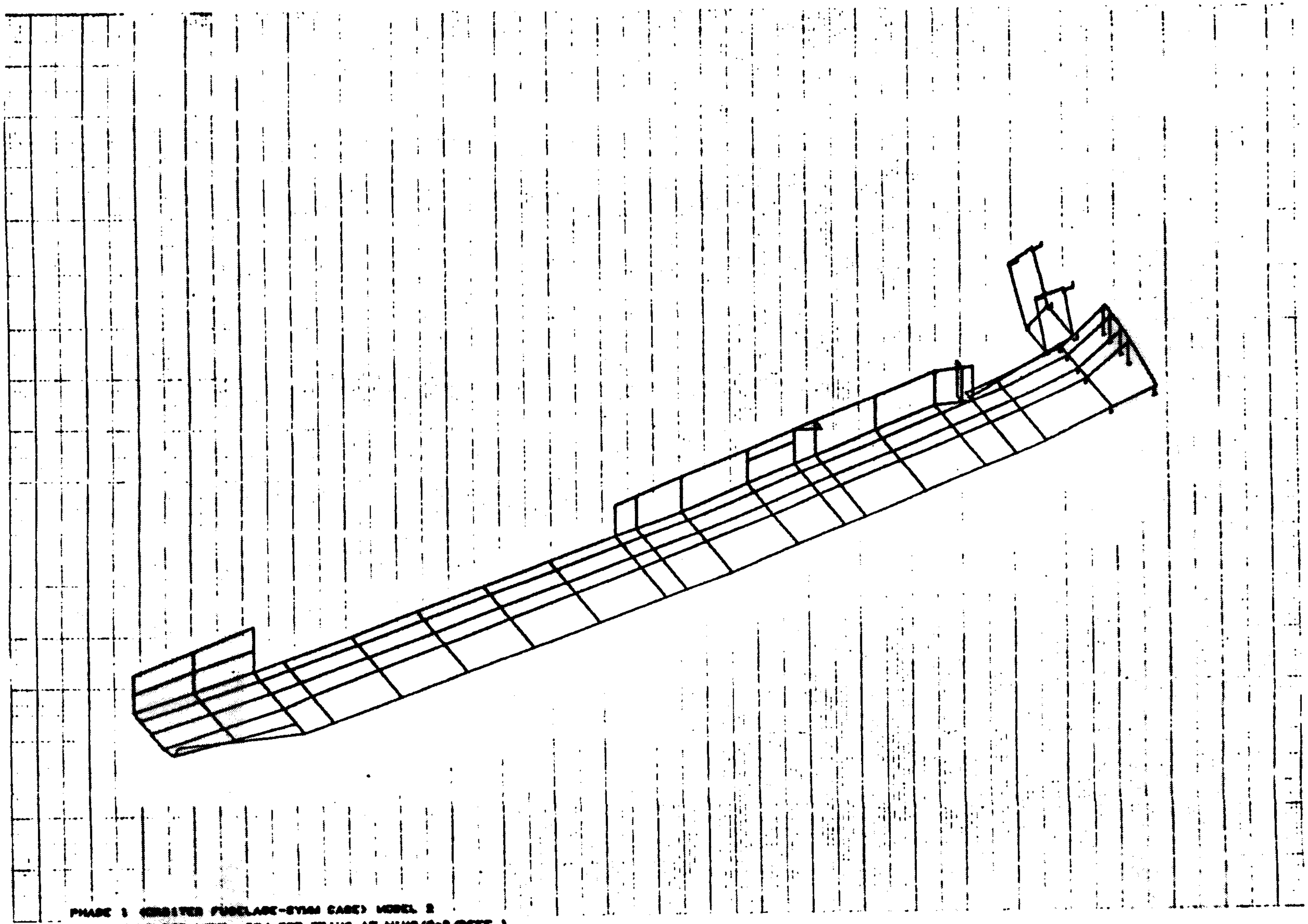

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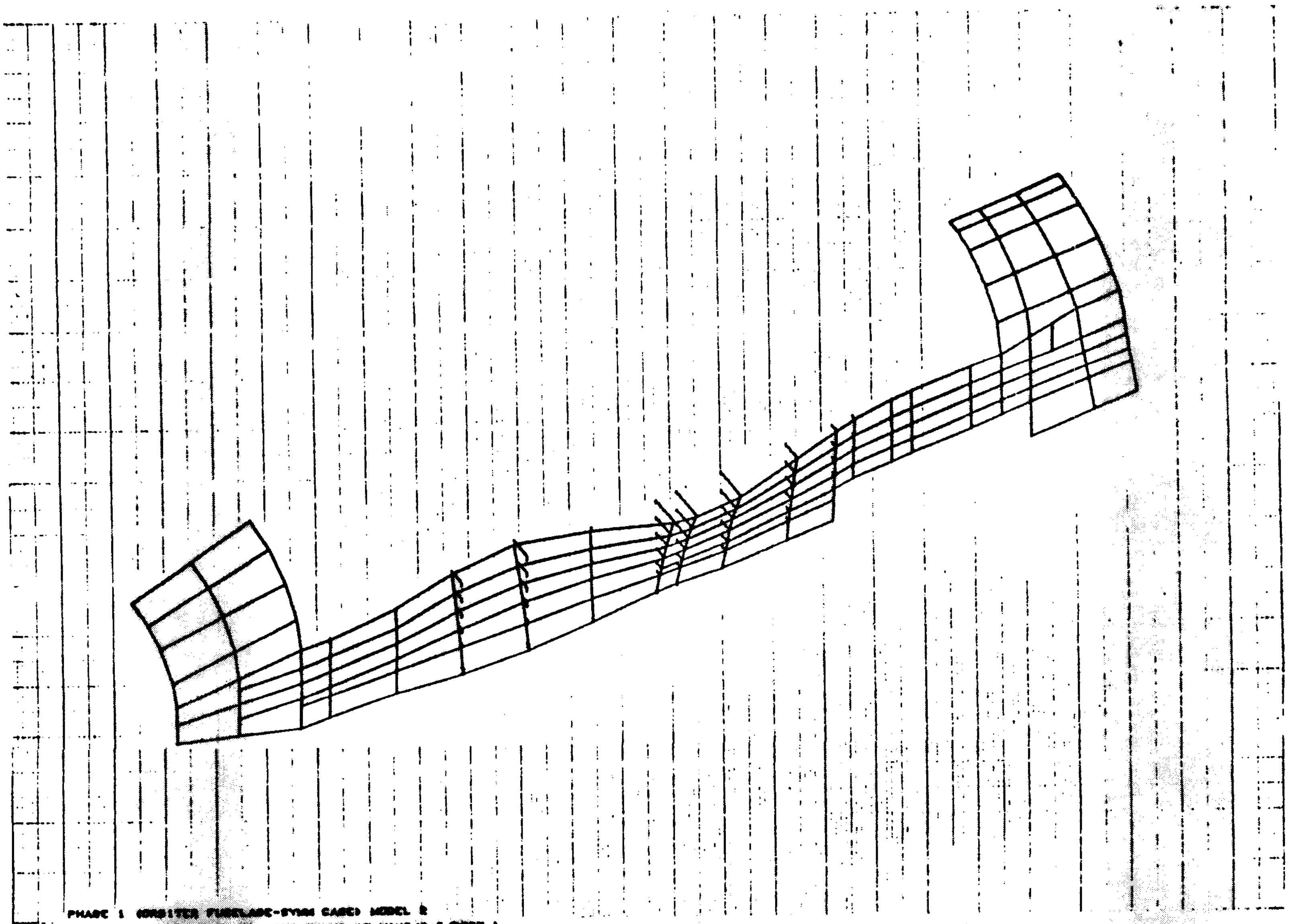

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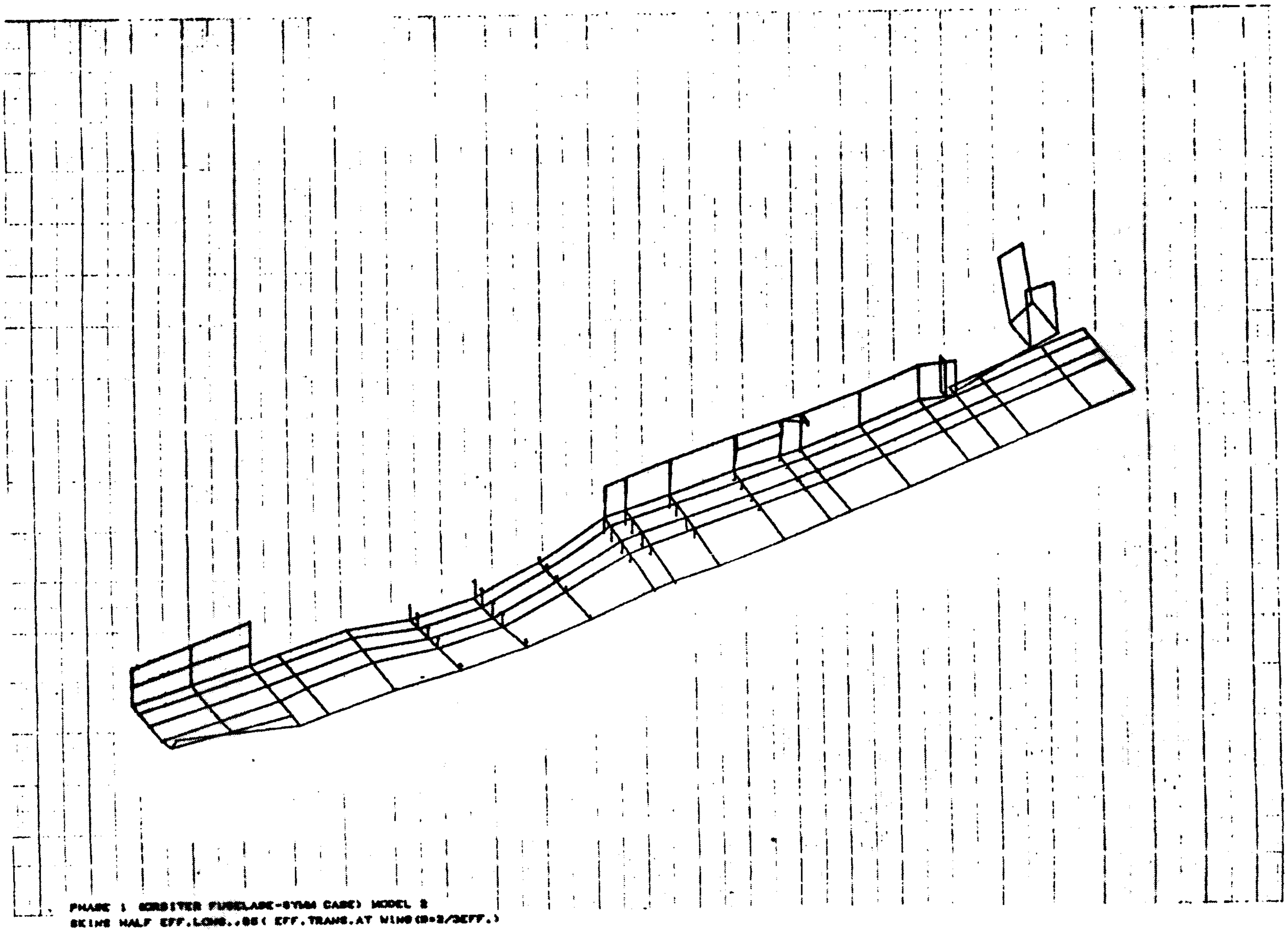

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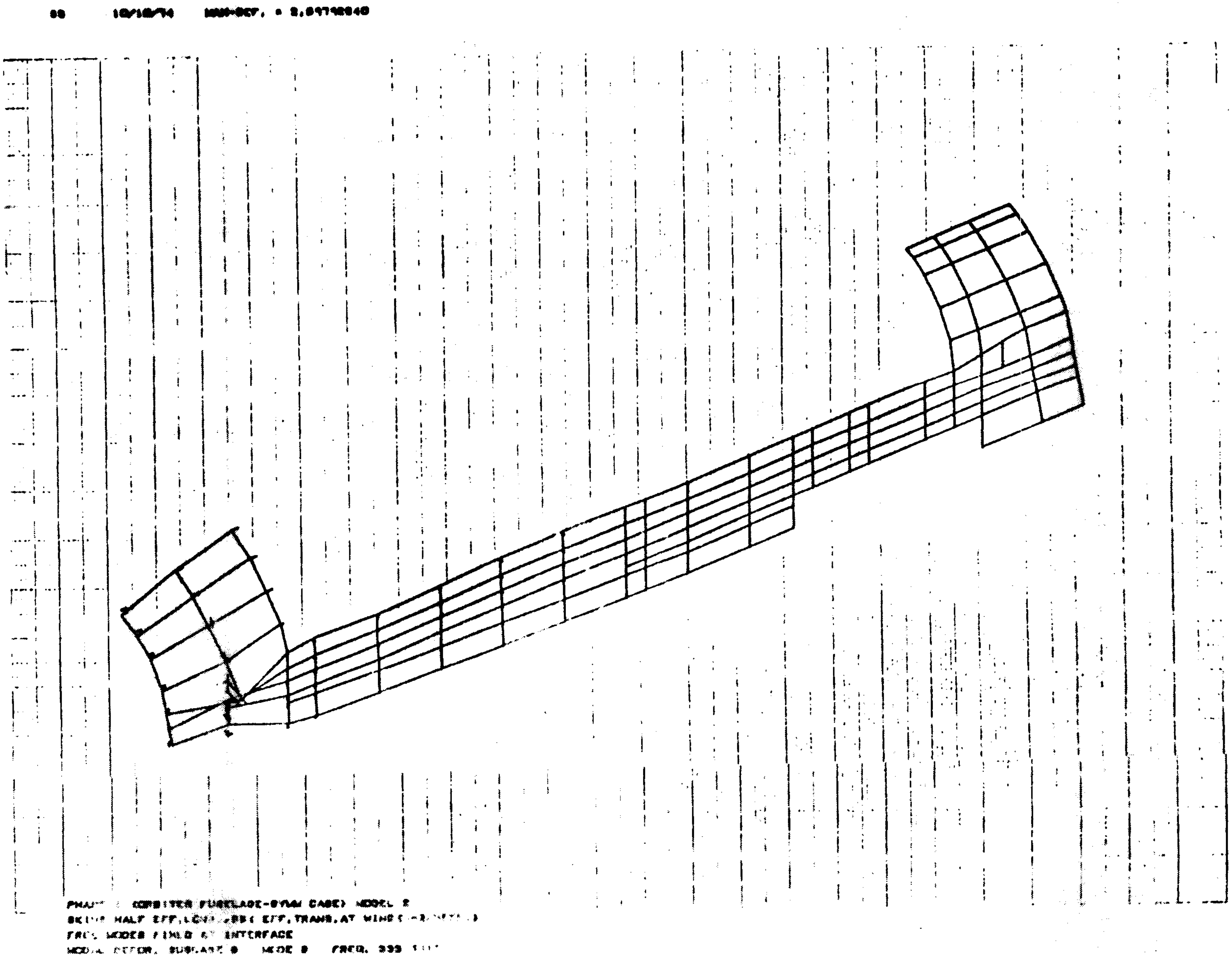

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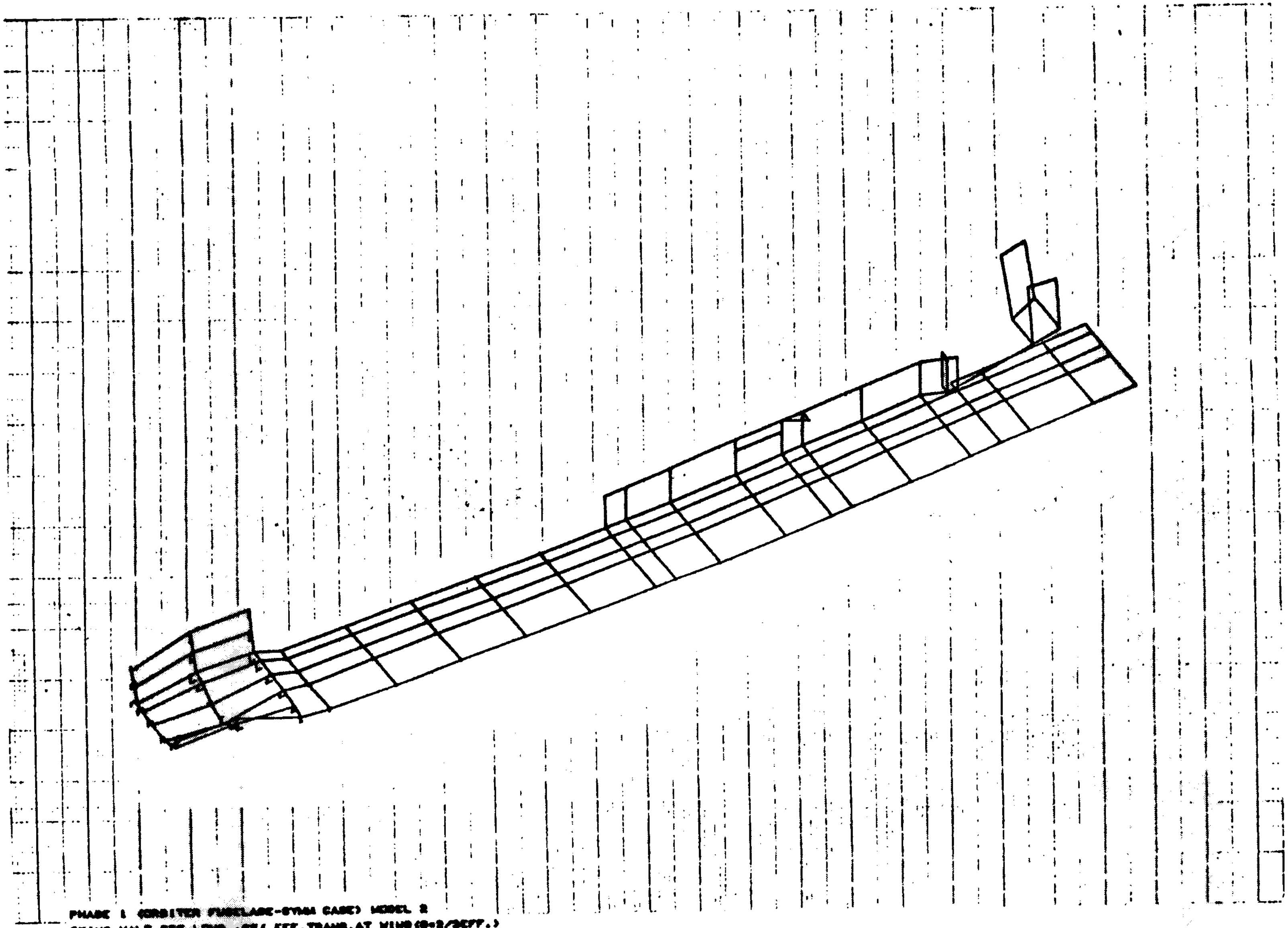

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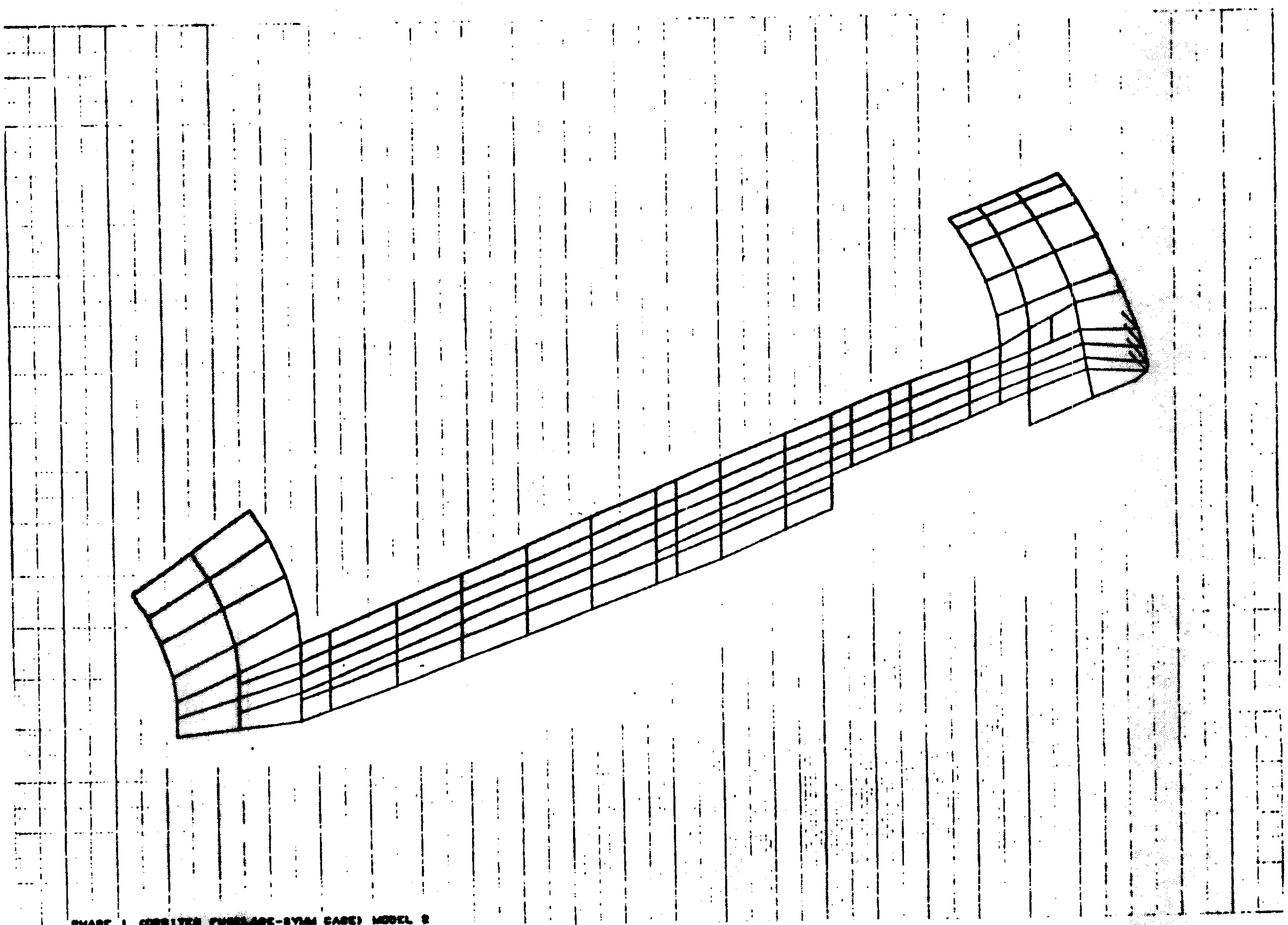

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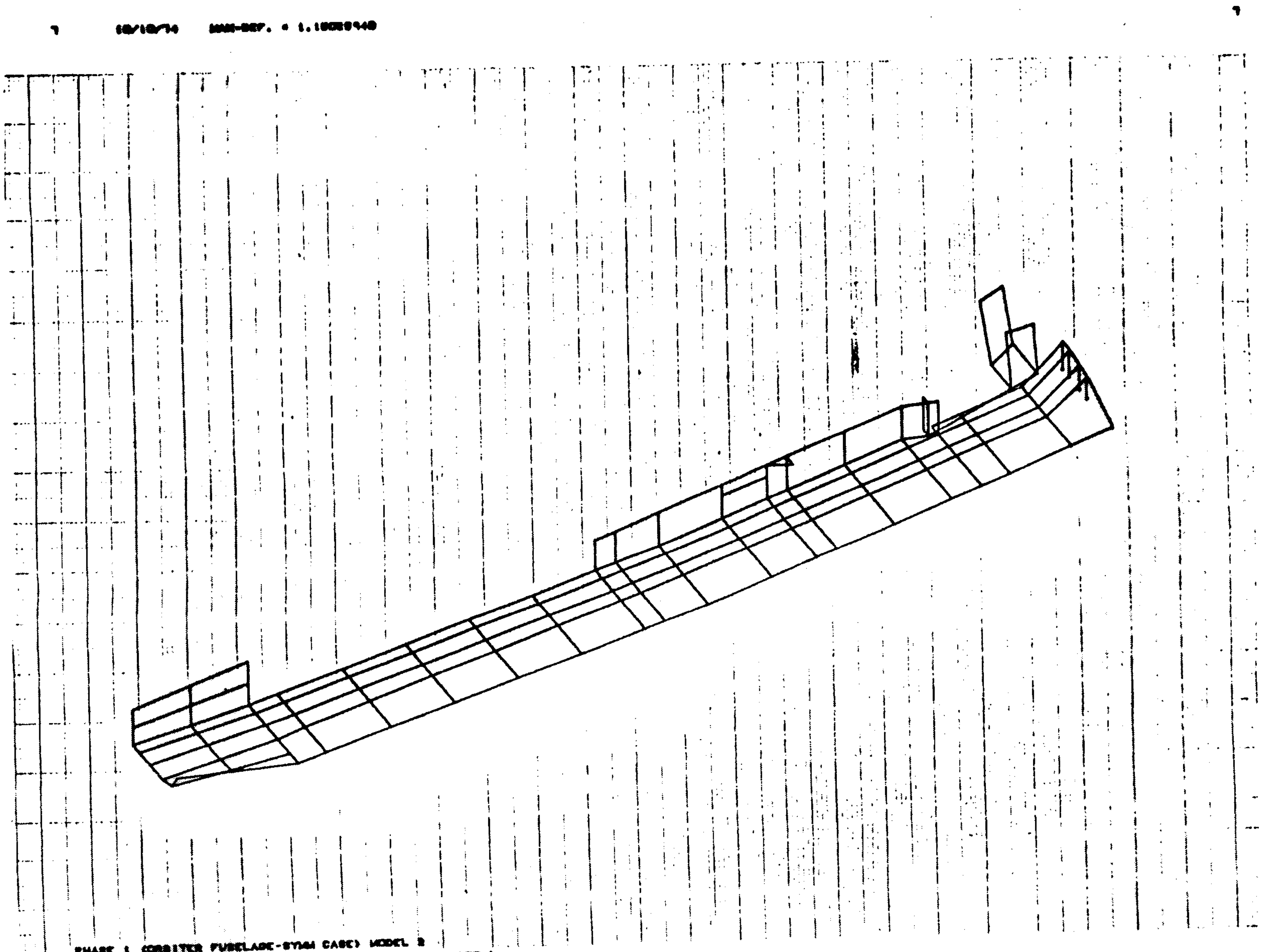

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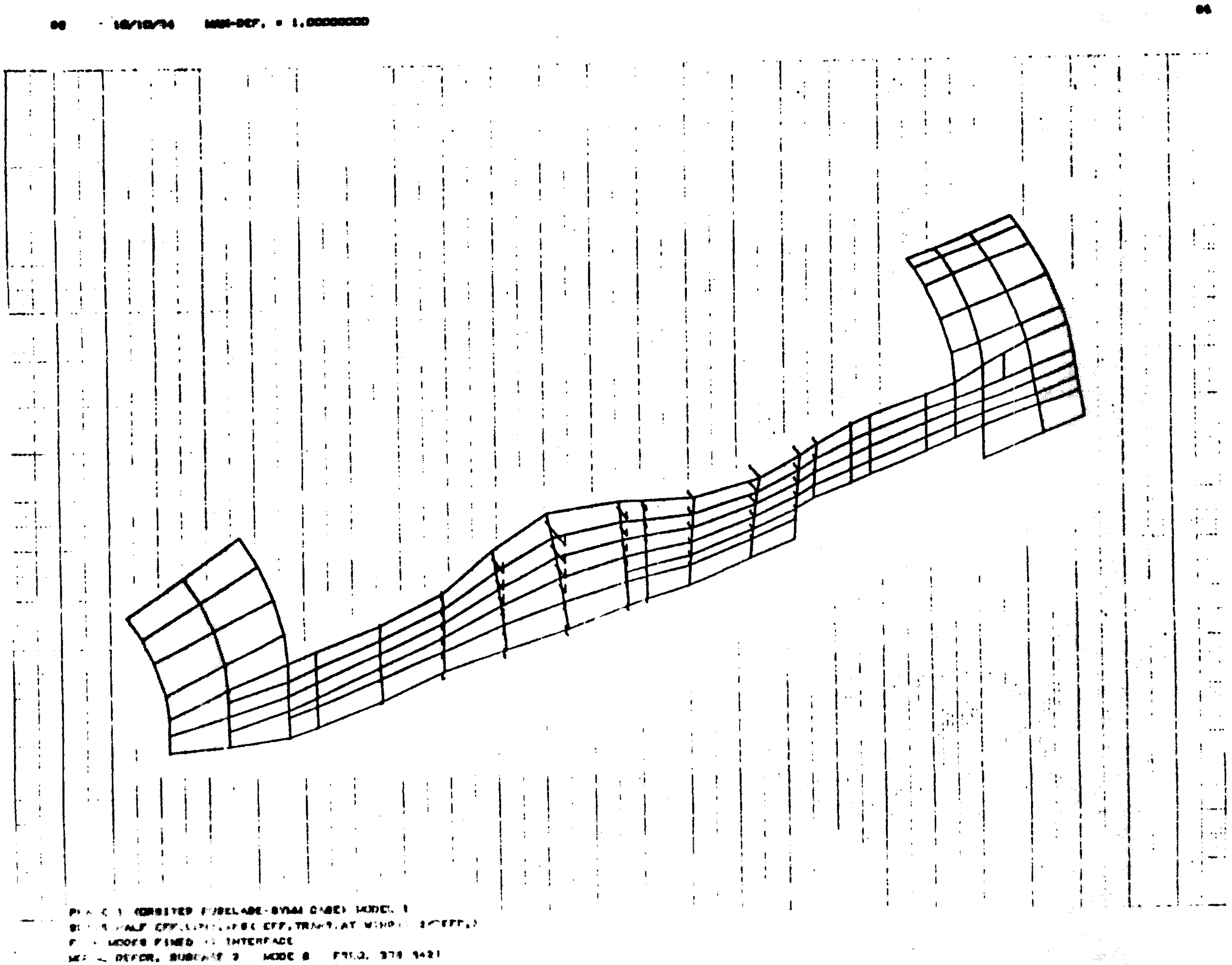
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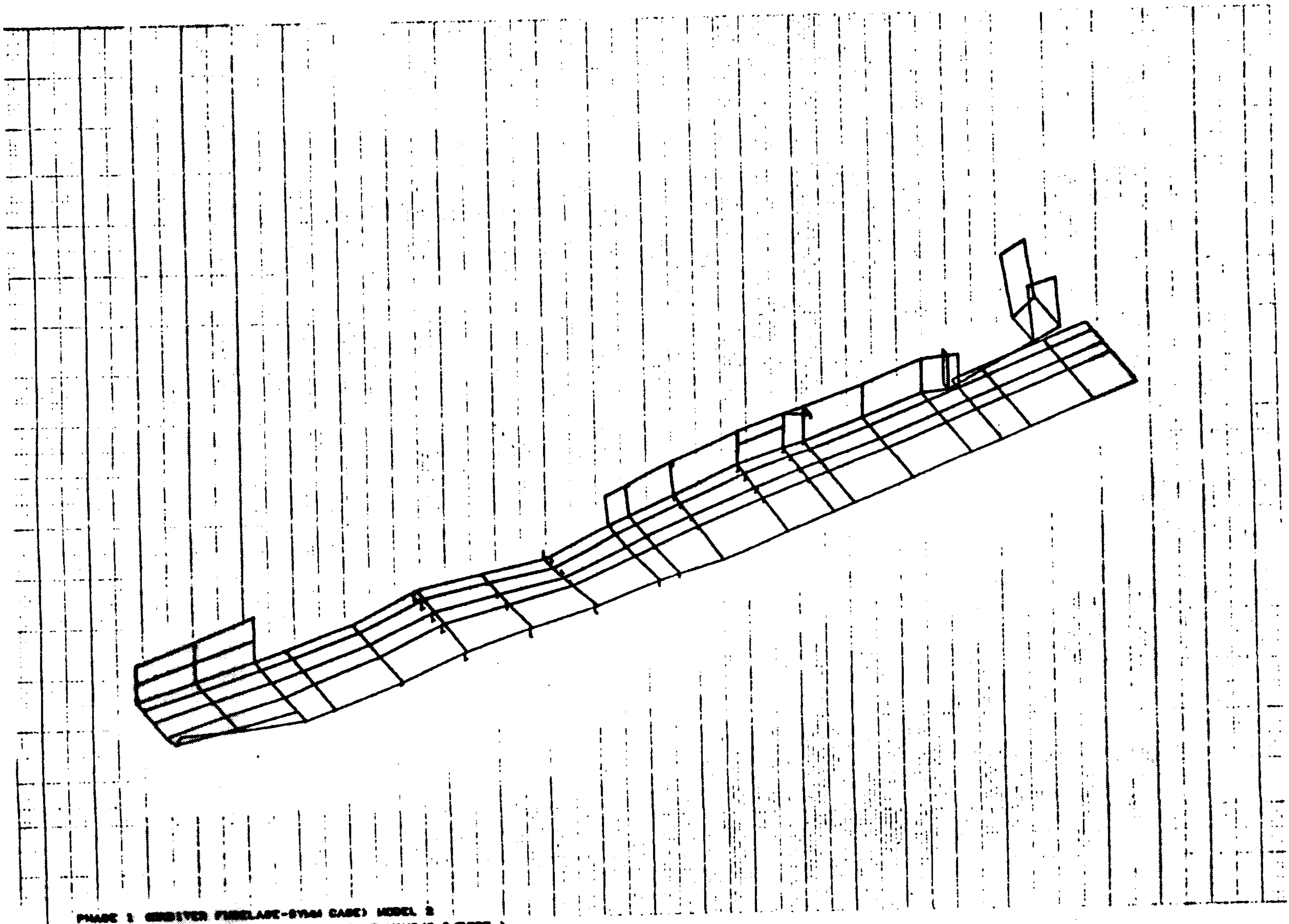
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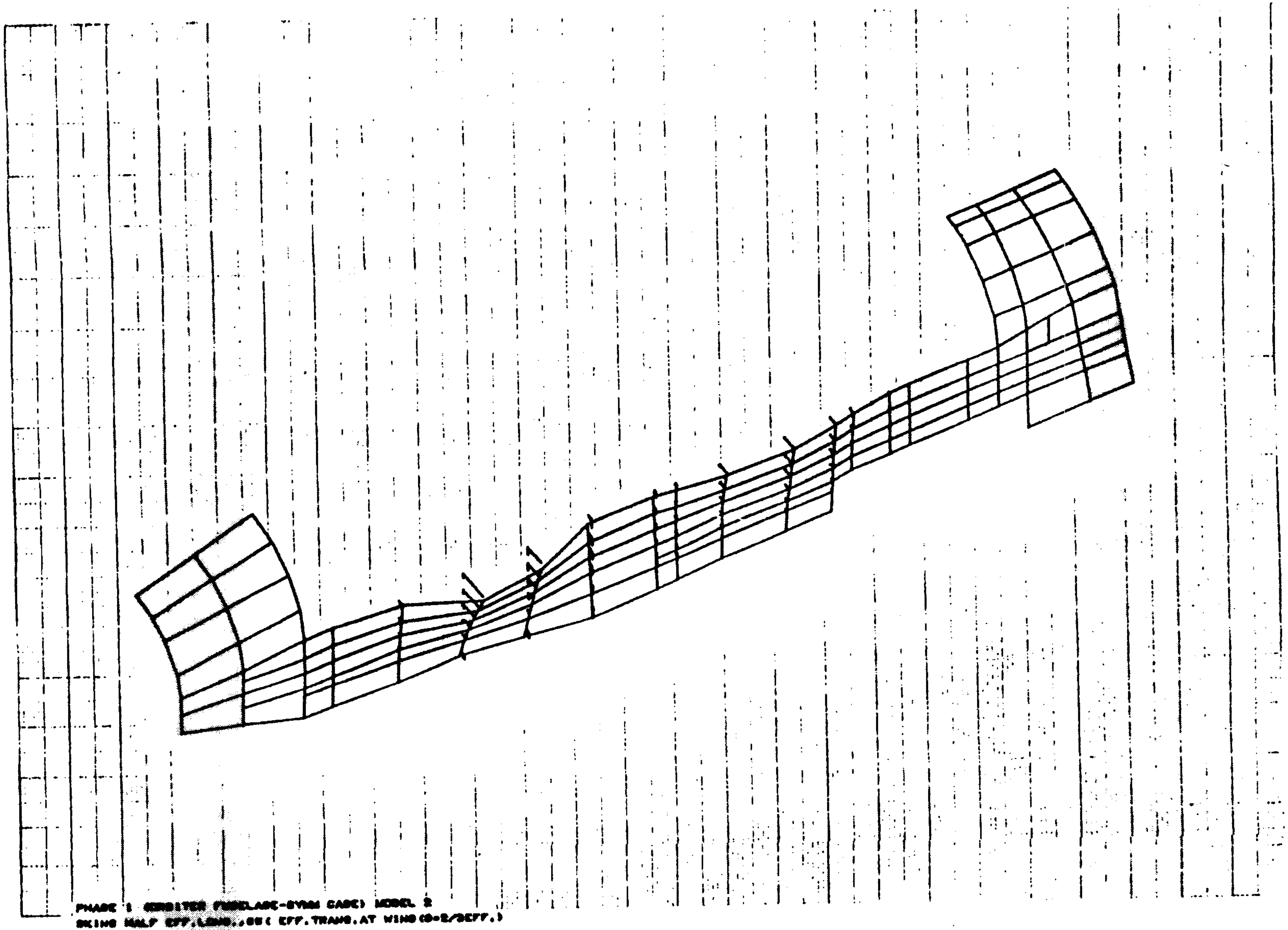

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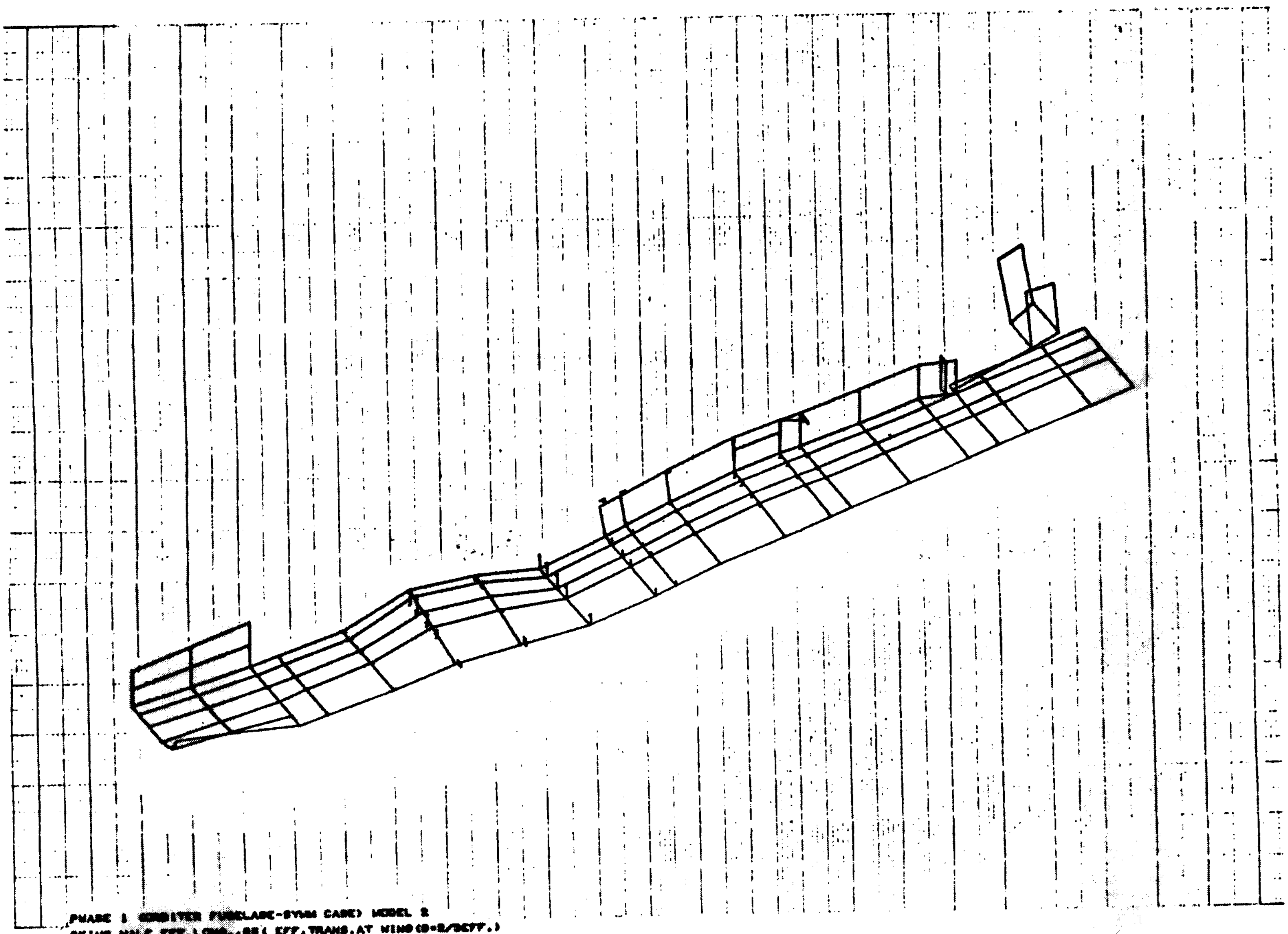

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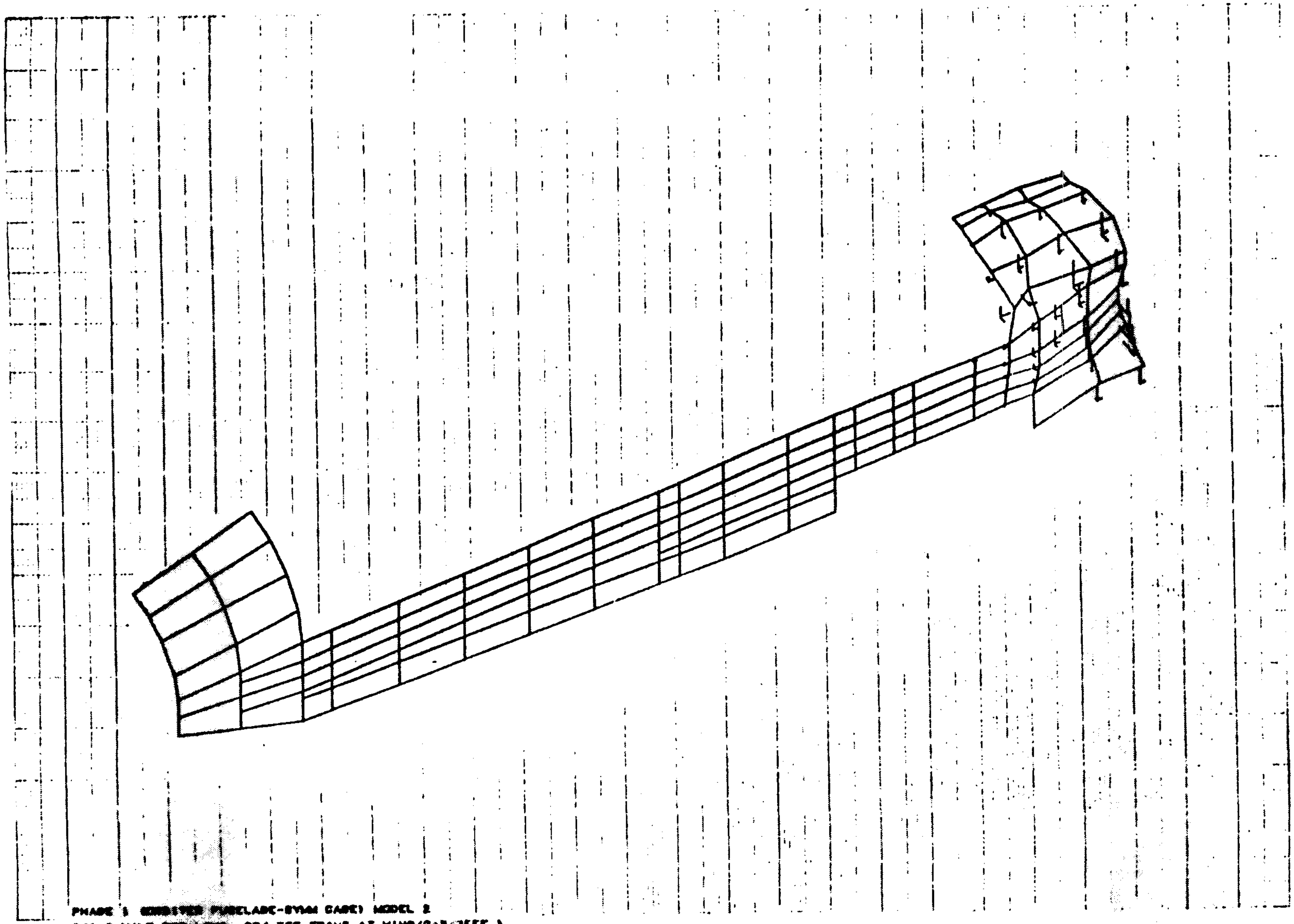

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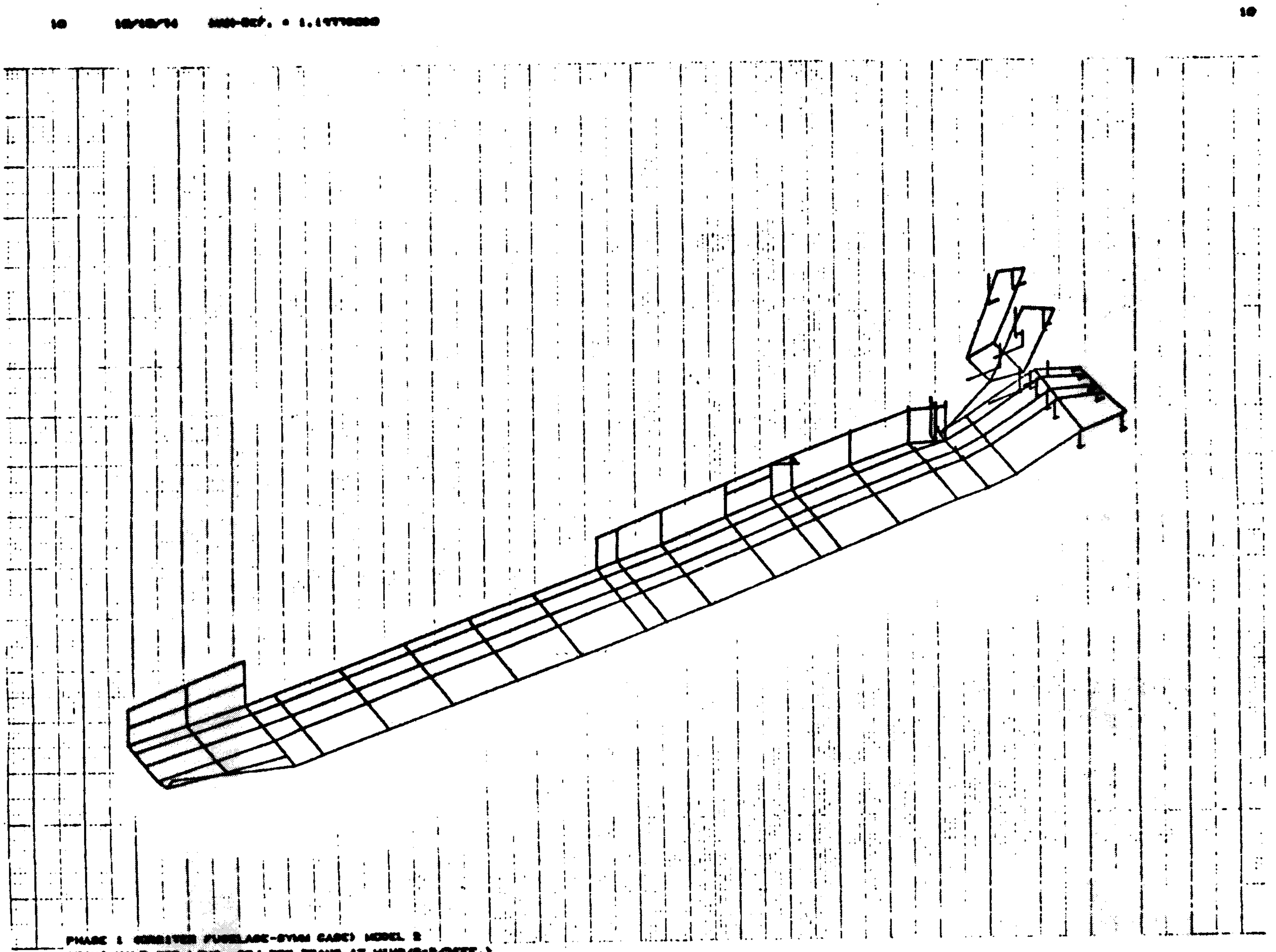
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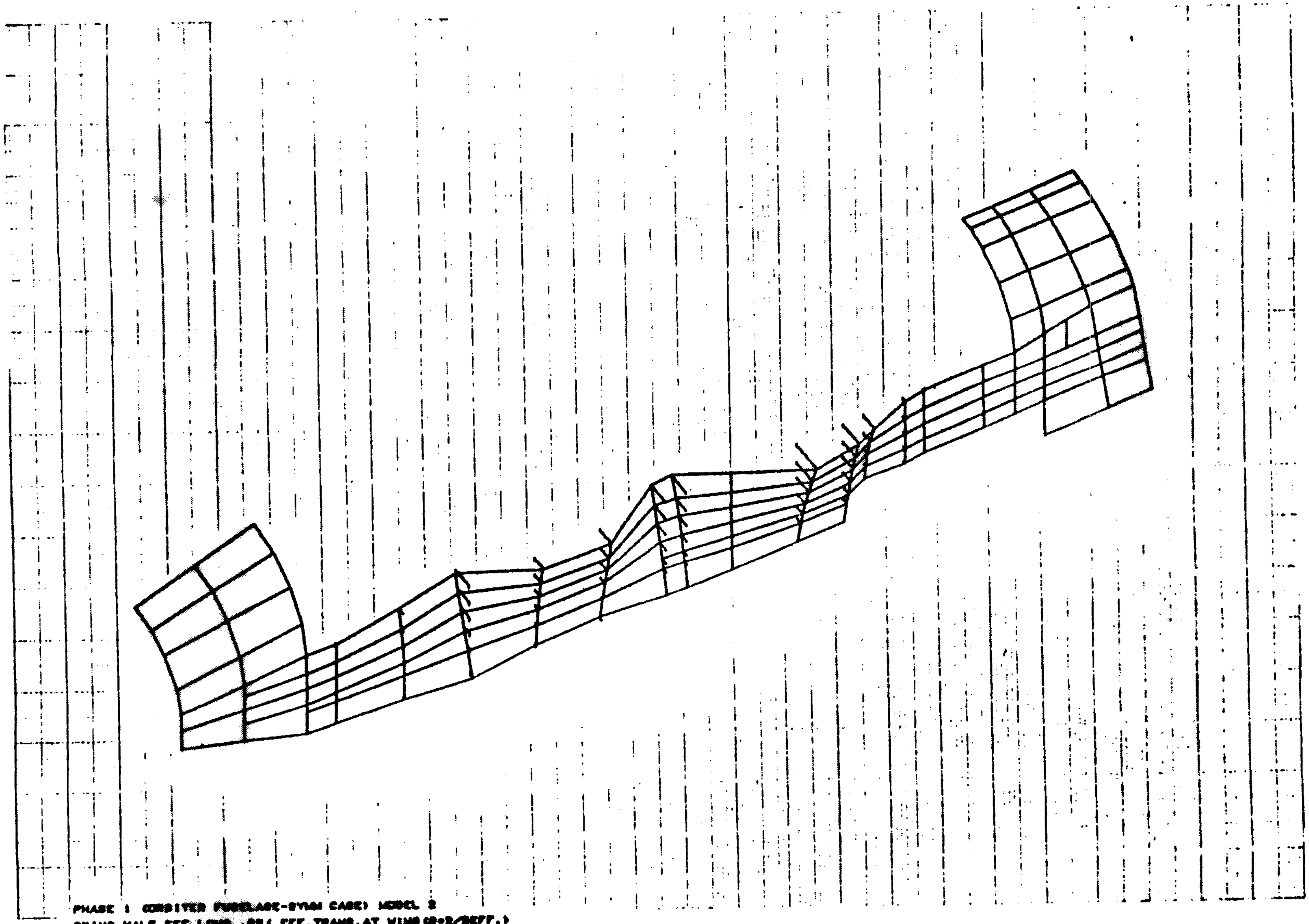

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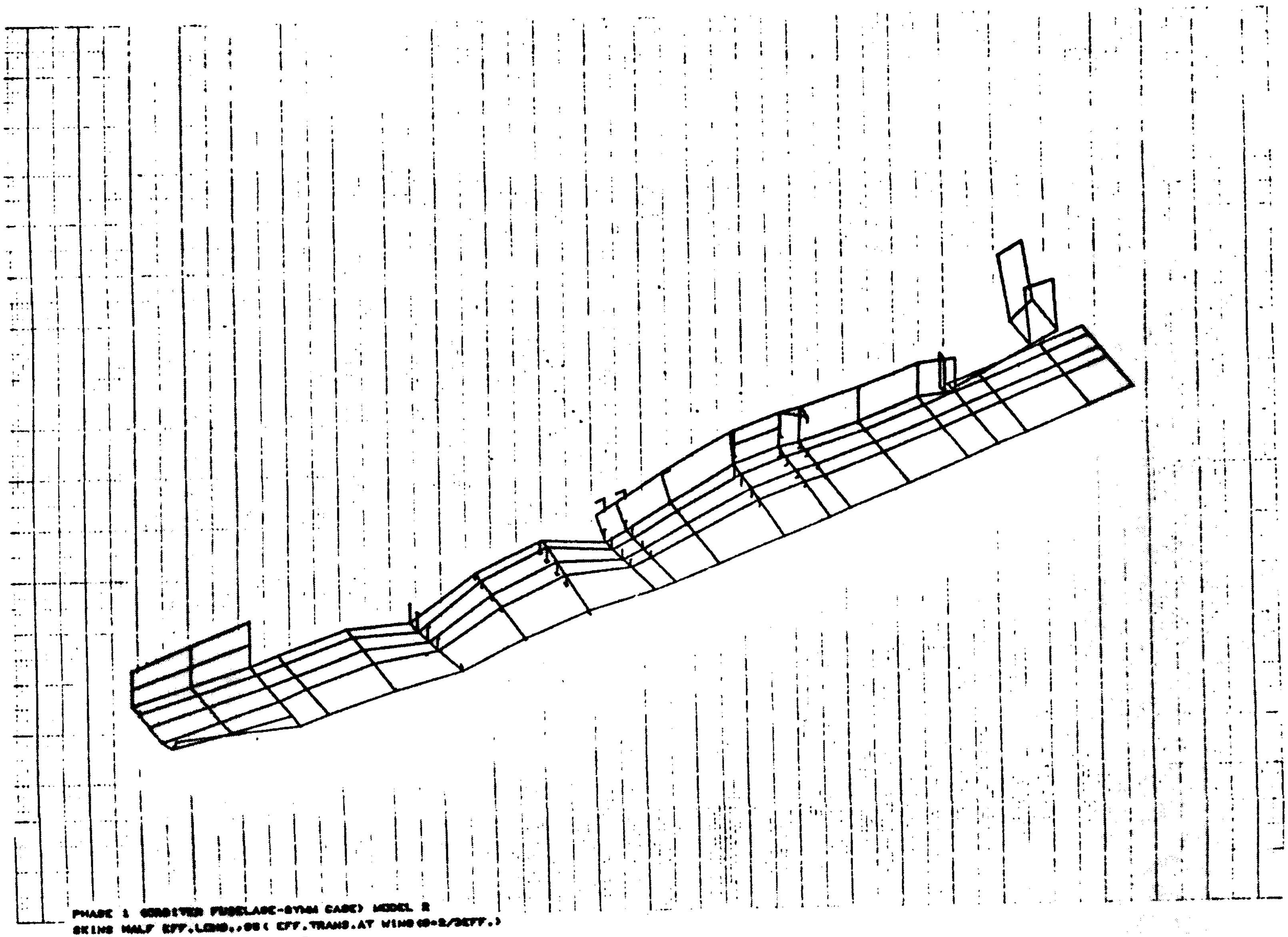

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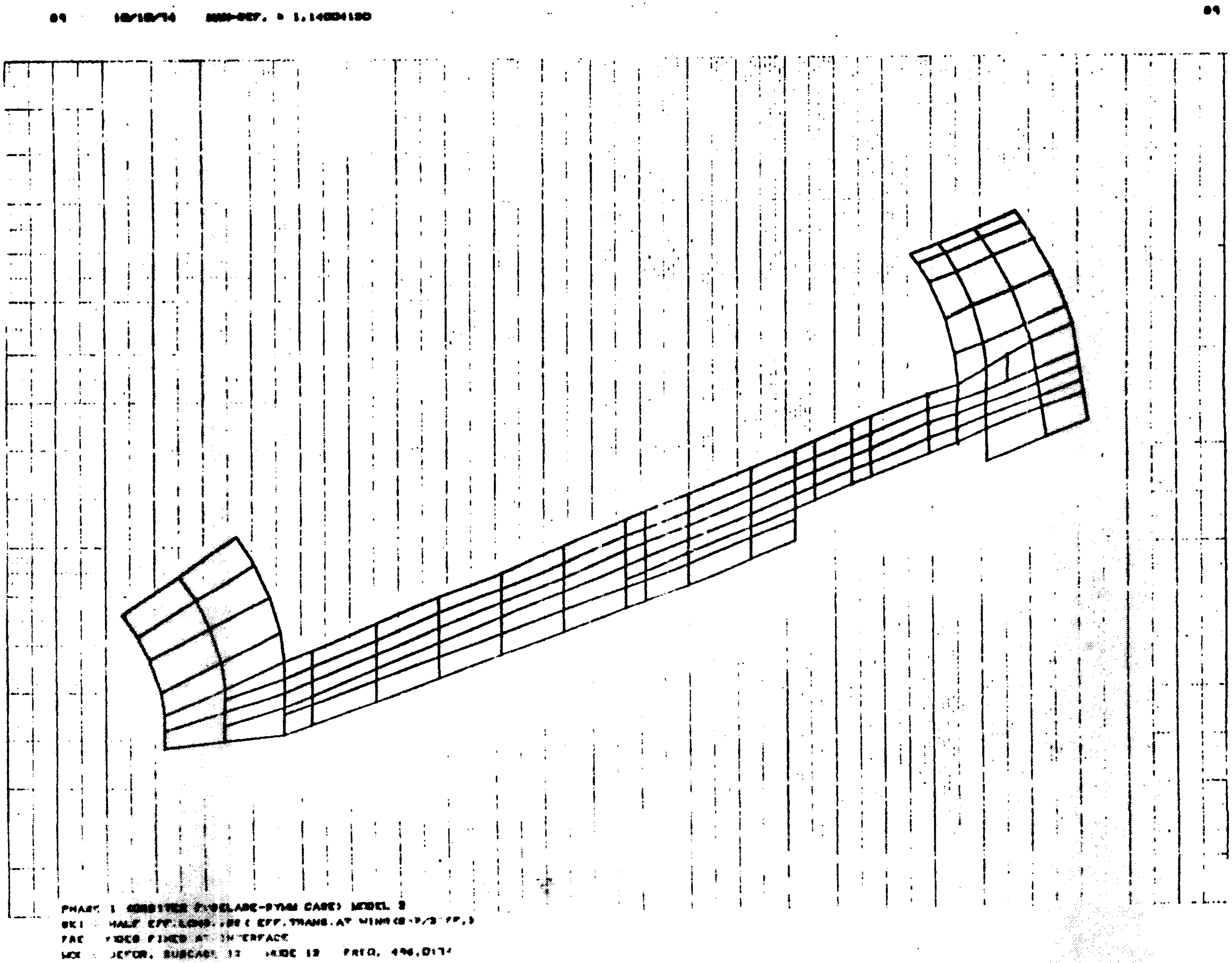
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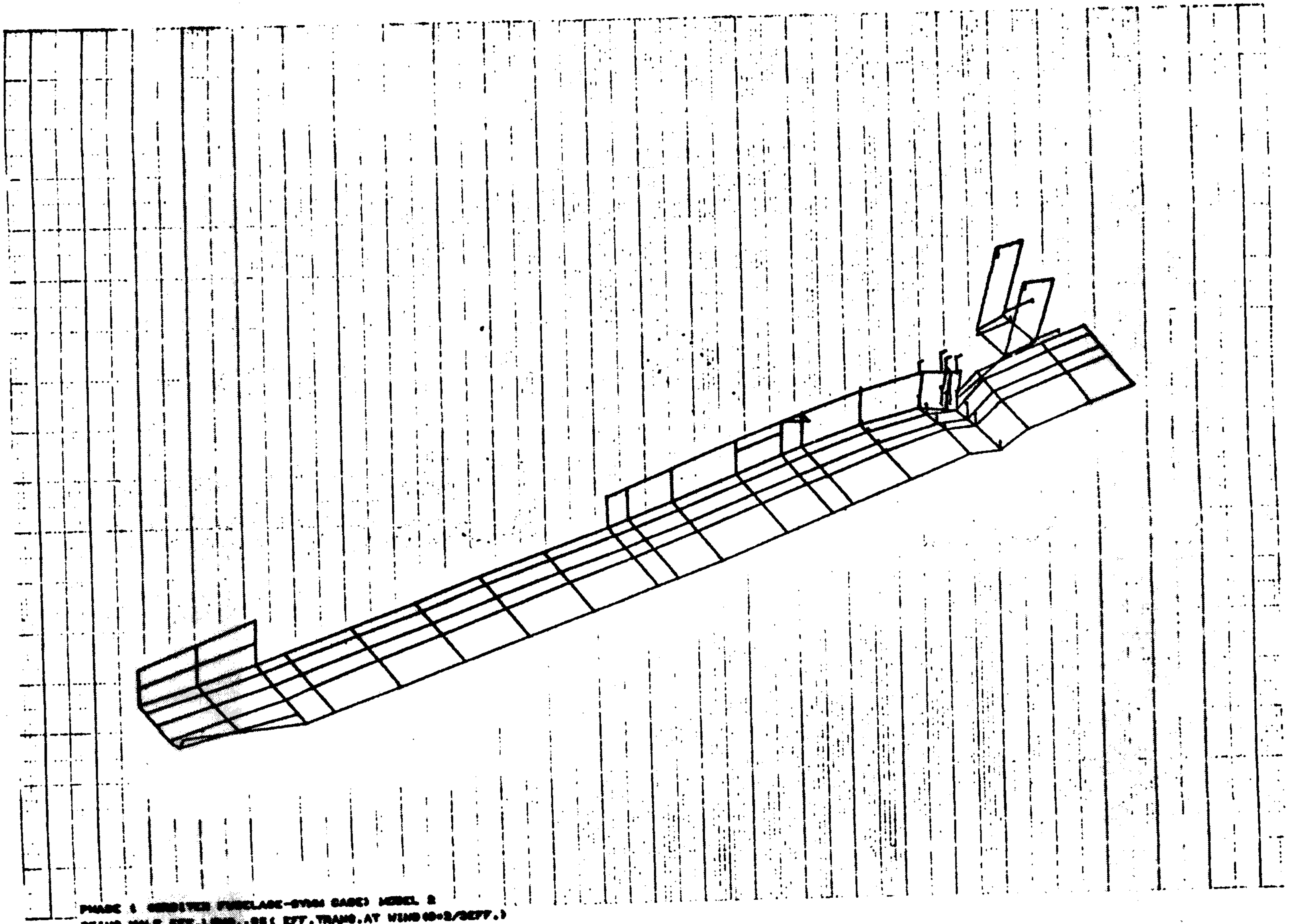

PHASE 1 (MODIFIED FUSELAGE-SYMM CASE) MODEL 2
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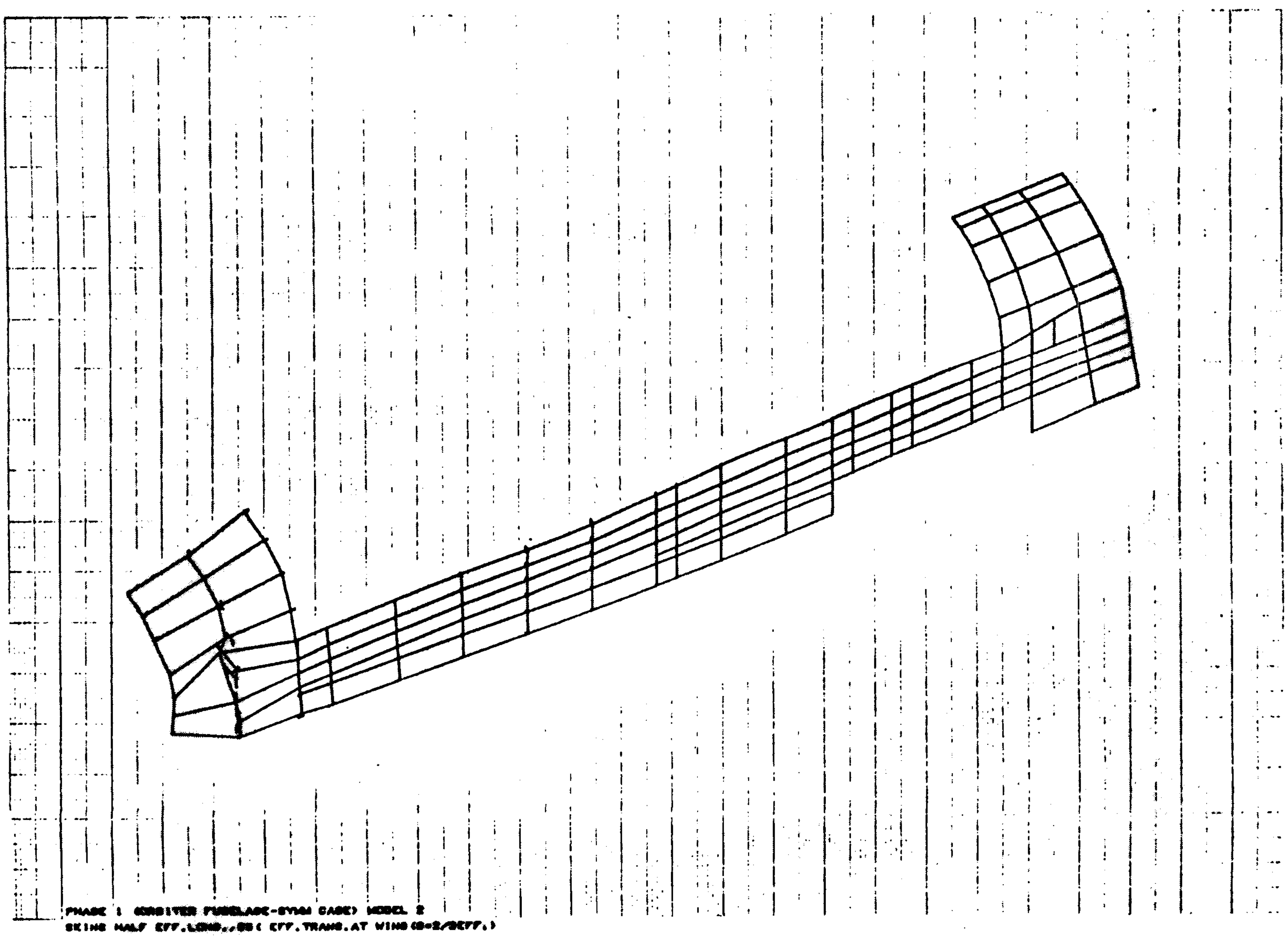

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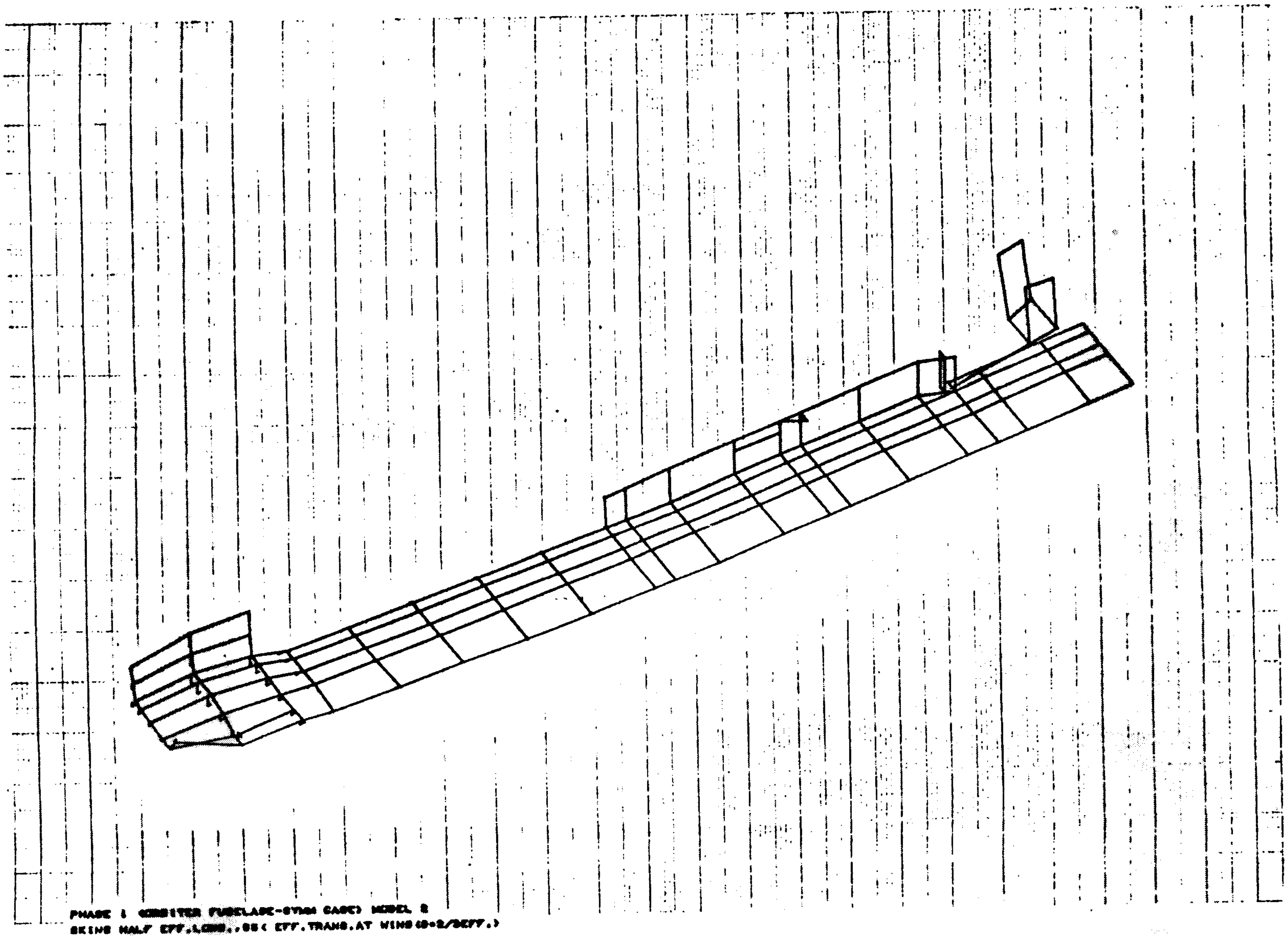

PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
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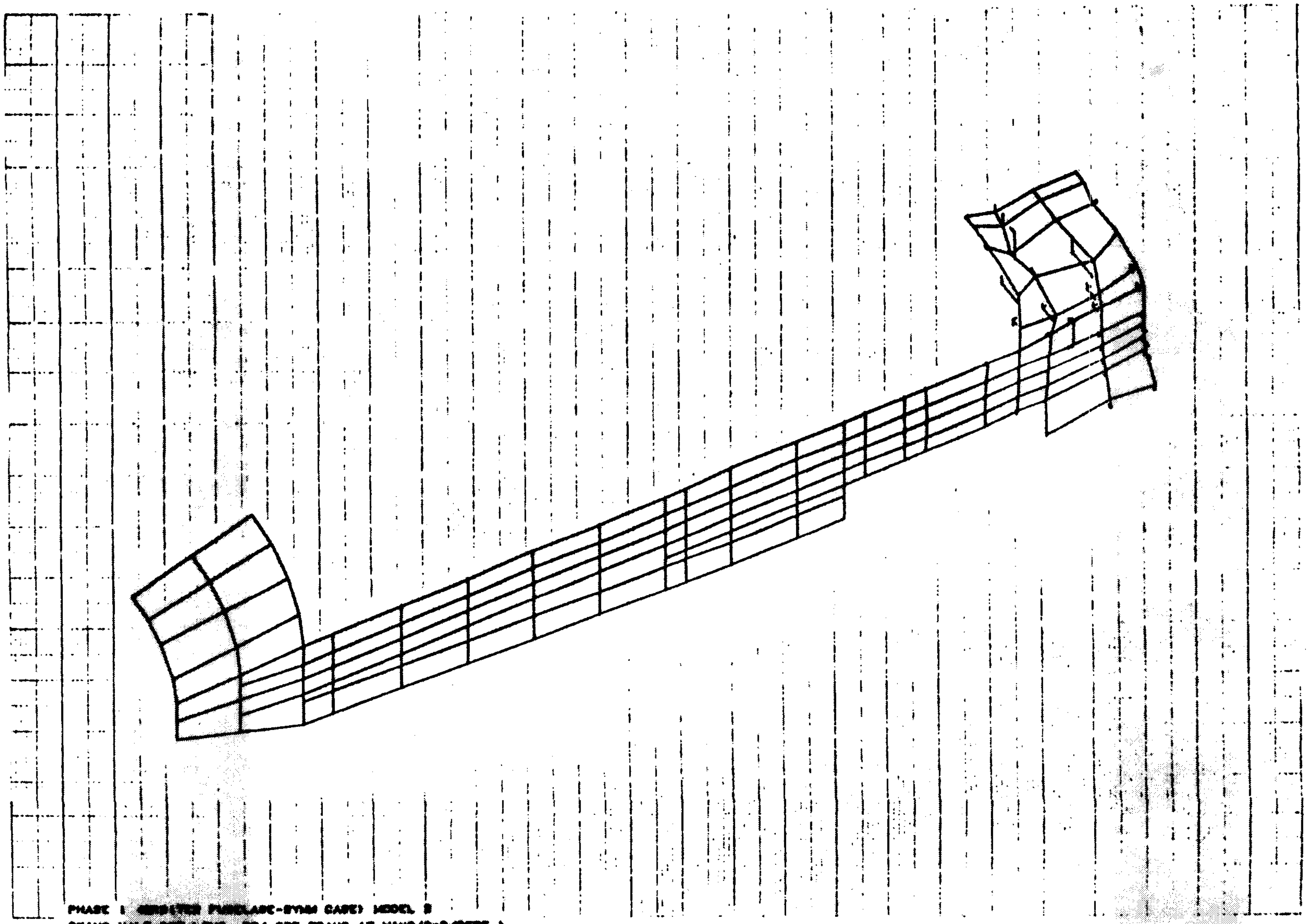

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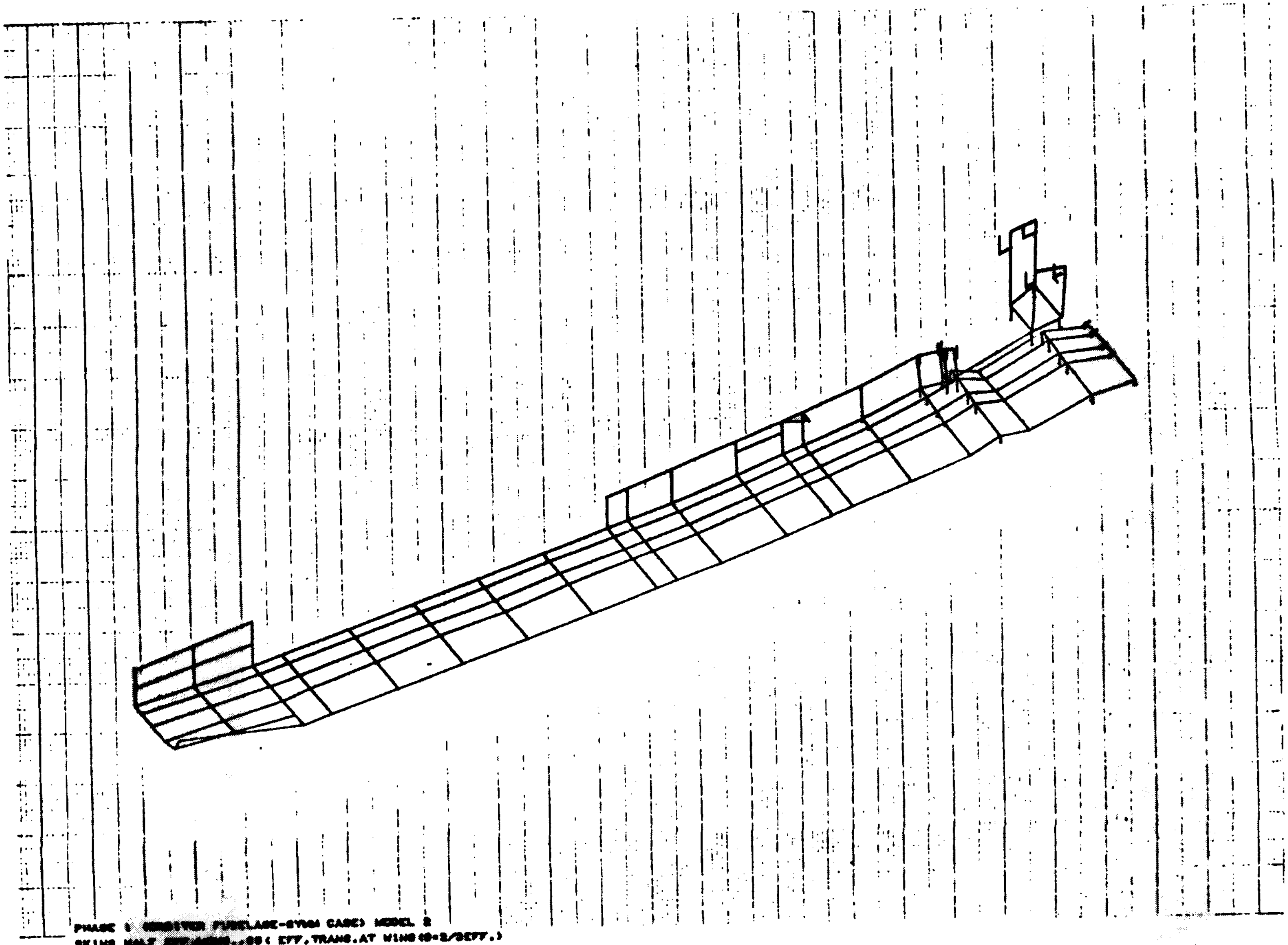

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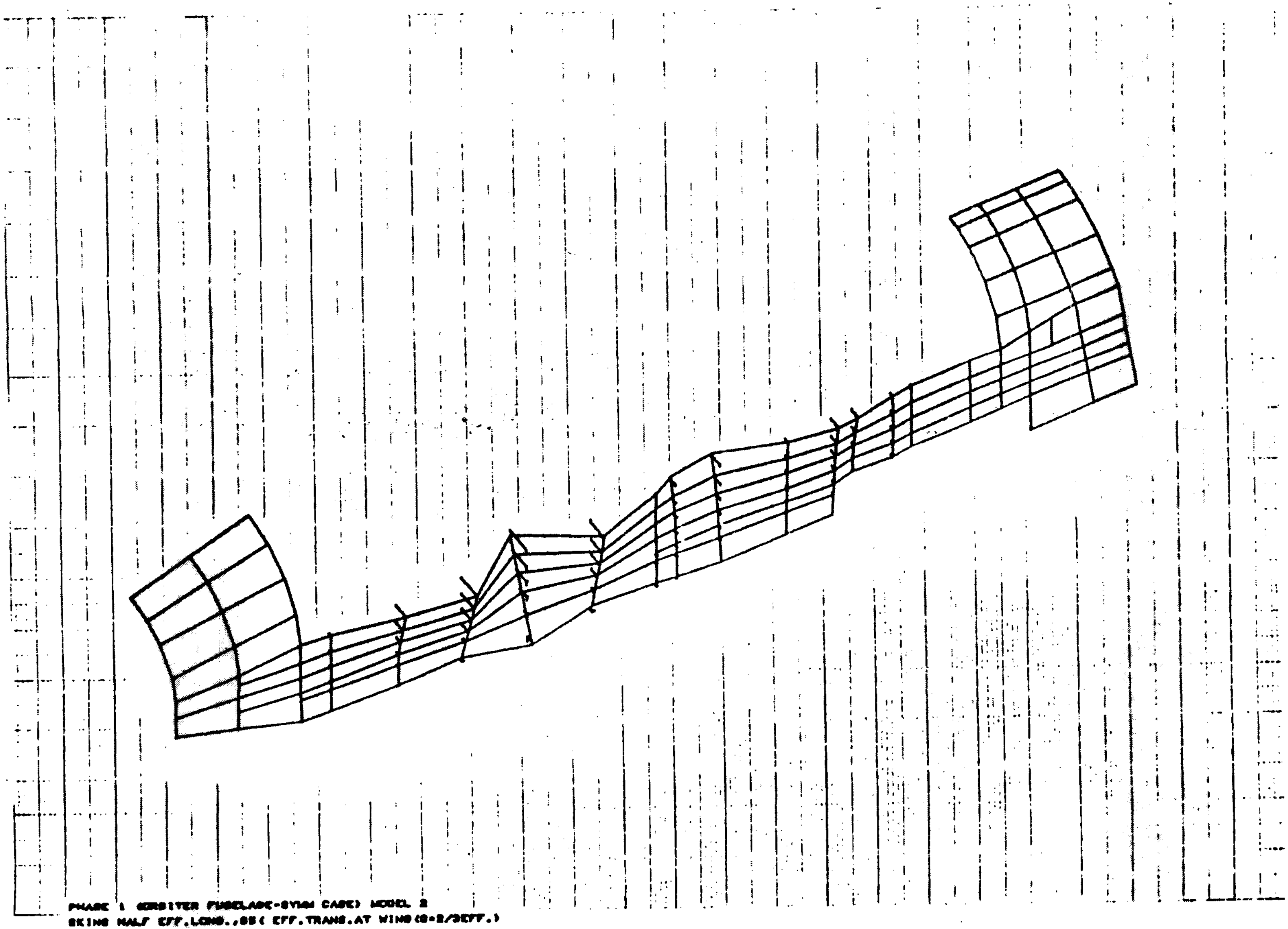

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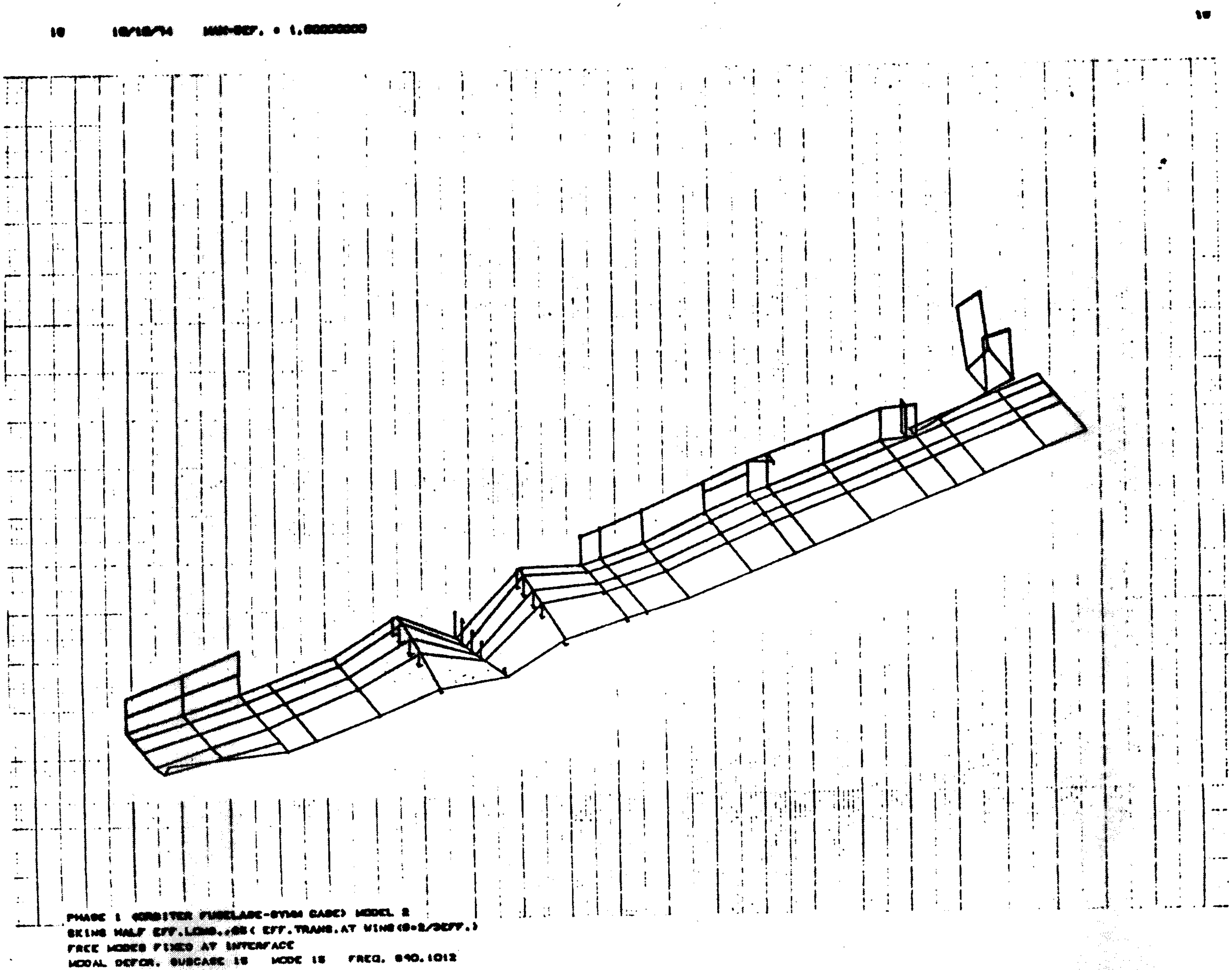10 10/10/74 MAX-DEF. = 1.00000000
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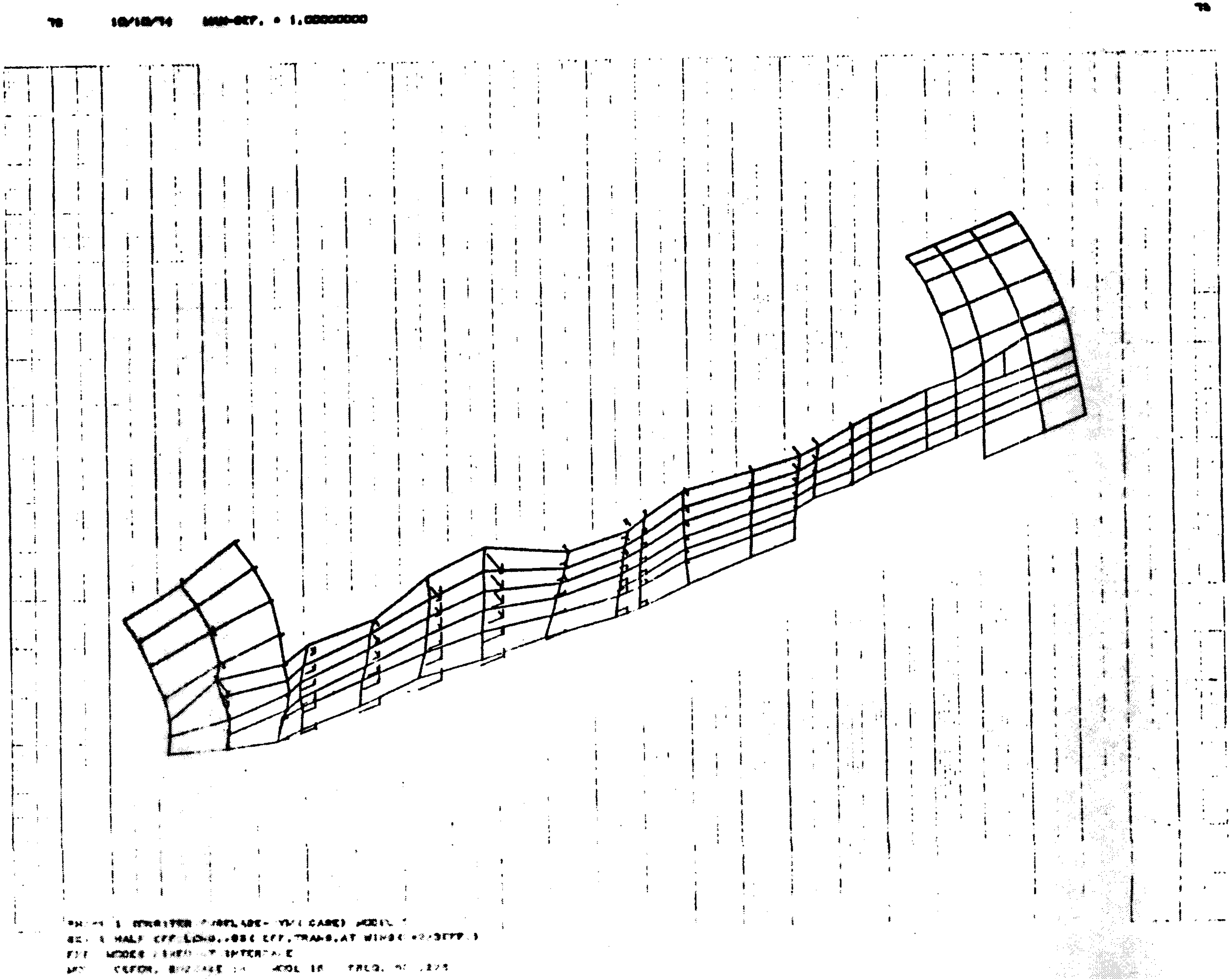
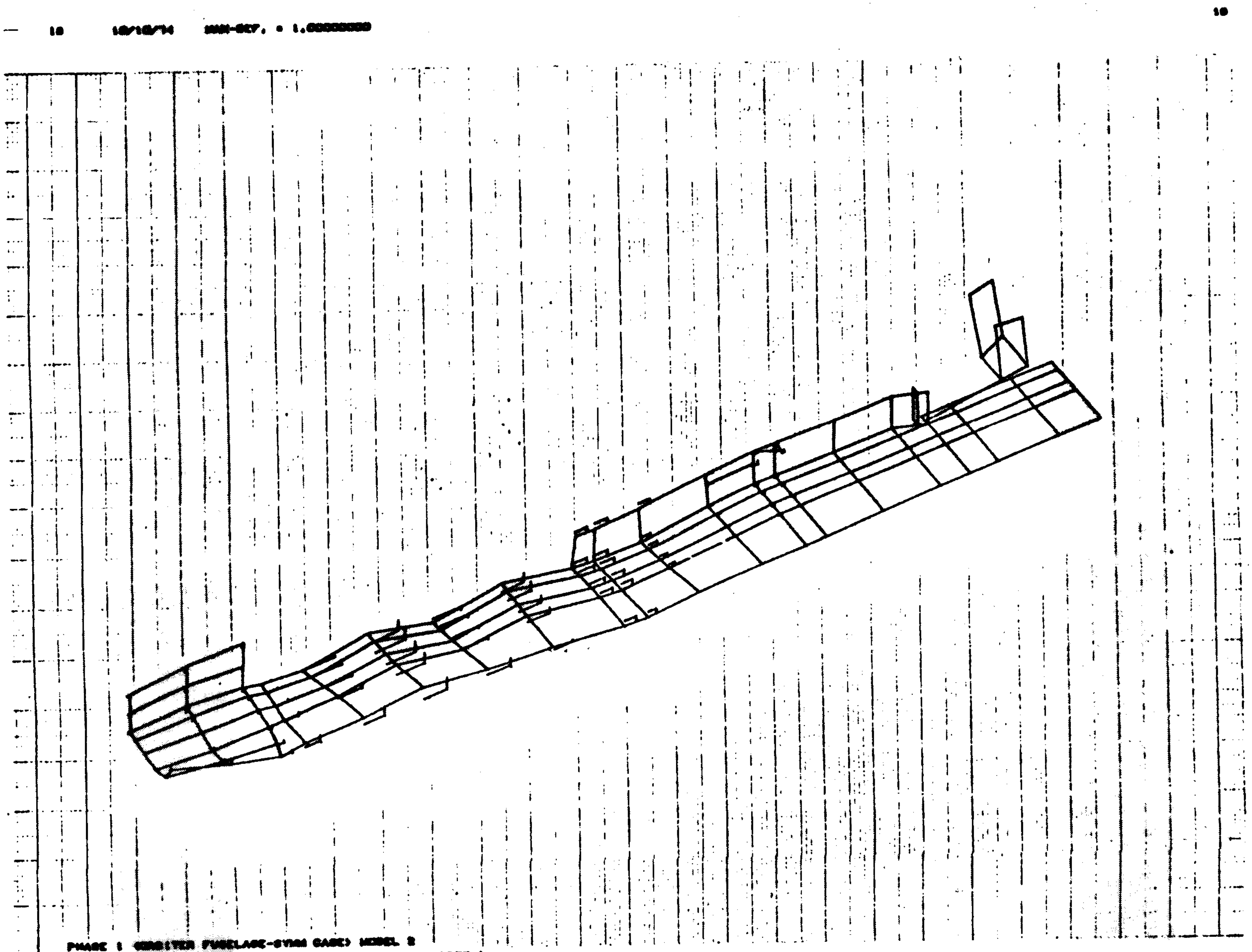
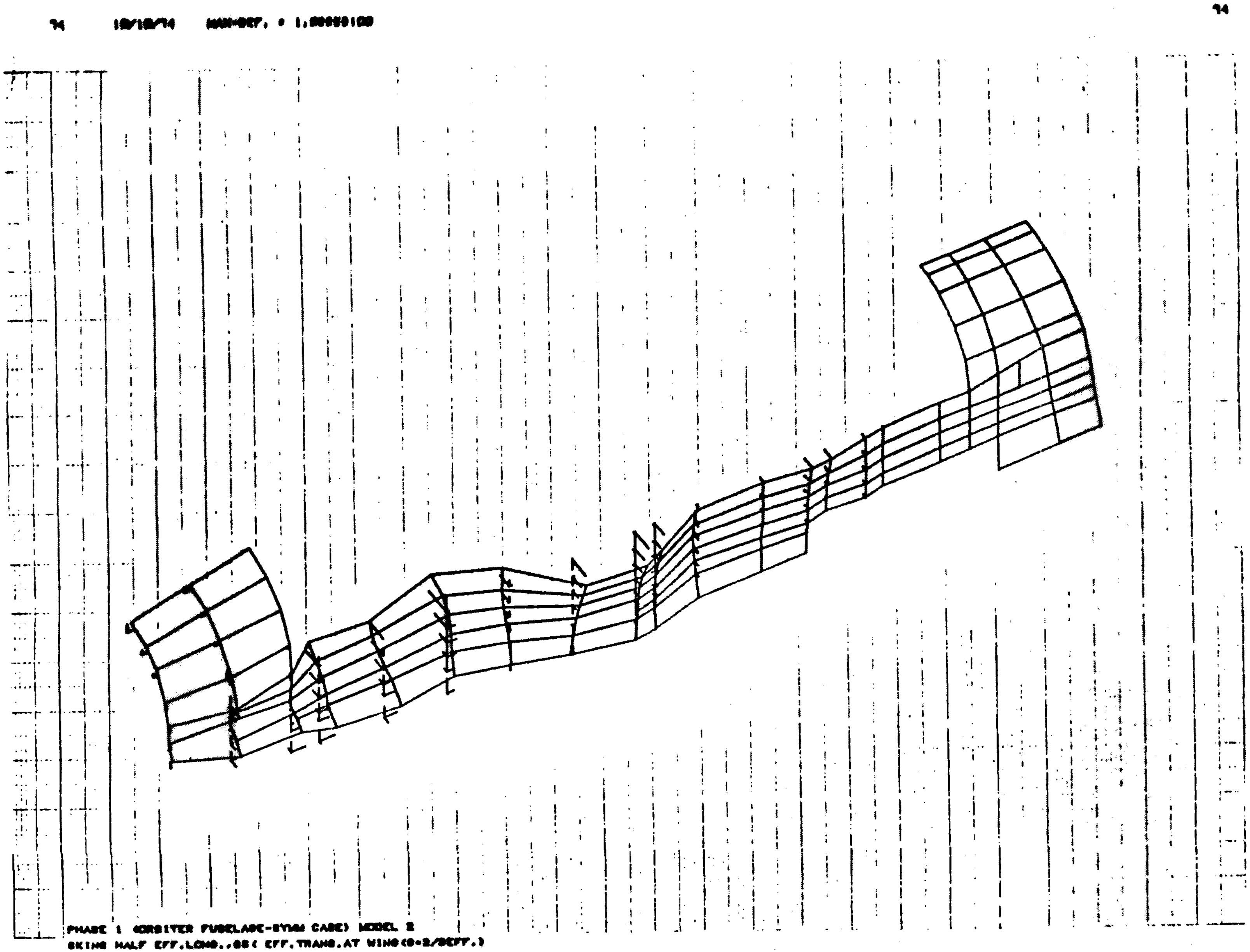

78
[illegible] 1 STRINGER FUSELAGE- [illegible] CASE) MODEL [illegible]
[illegible] HALF [illegible] TRANS. AT WING [illegible]
[illegible] MODES [illegible] INTERFACE
[illegible] DEFORM. [illegible] MODE 18 FREQ. [illegible]


10
10/16/74
MAX-DEF. = 1.00000000
10

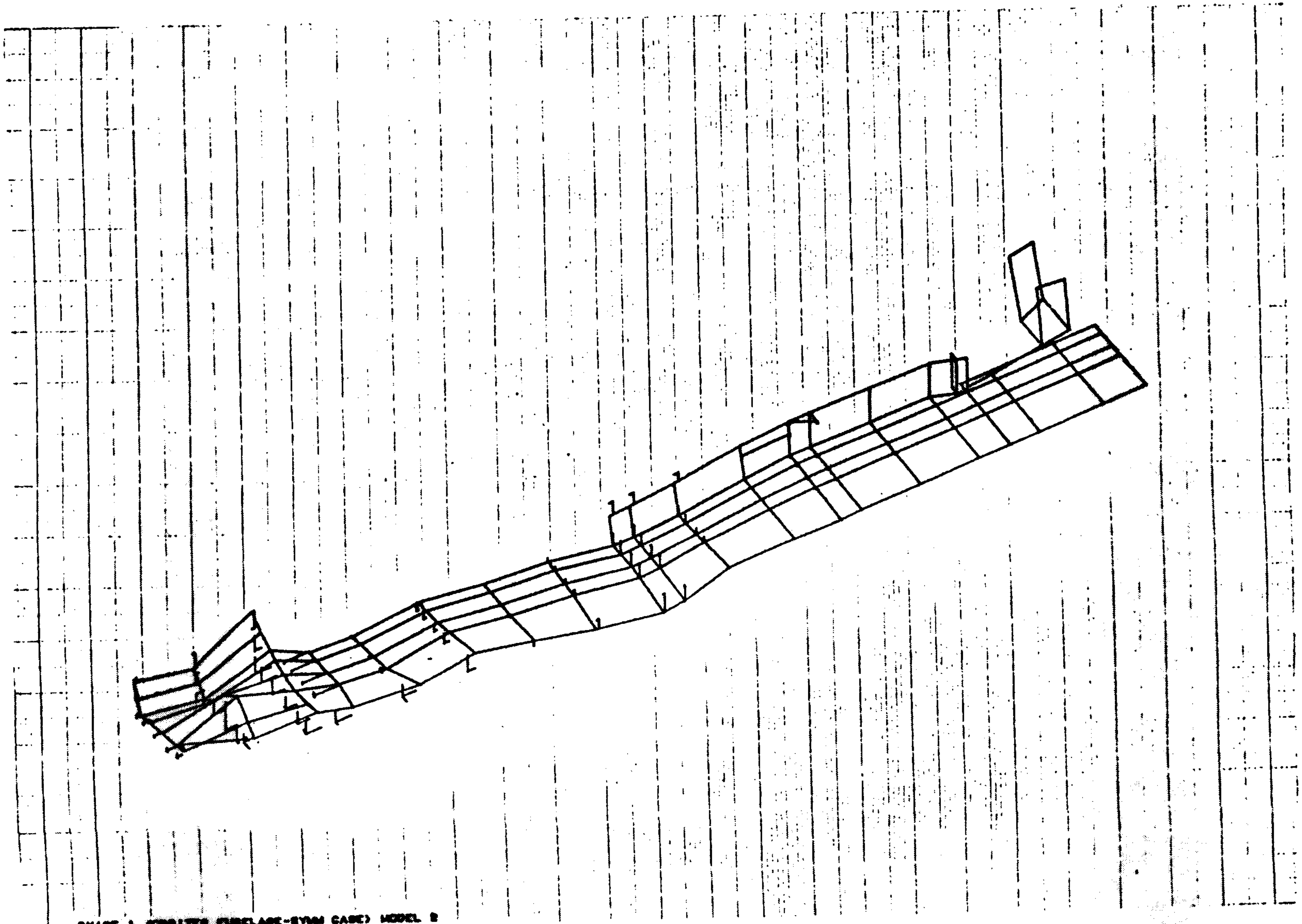
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,OS(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 10   MODE 10   FREQ. 001.2207


74 10/18/74 MAX-DEF. = 1.00000+00
74

PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.08(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 17 MODE 17 FREQ. 633.8001

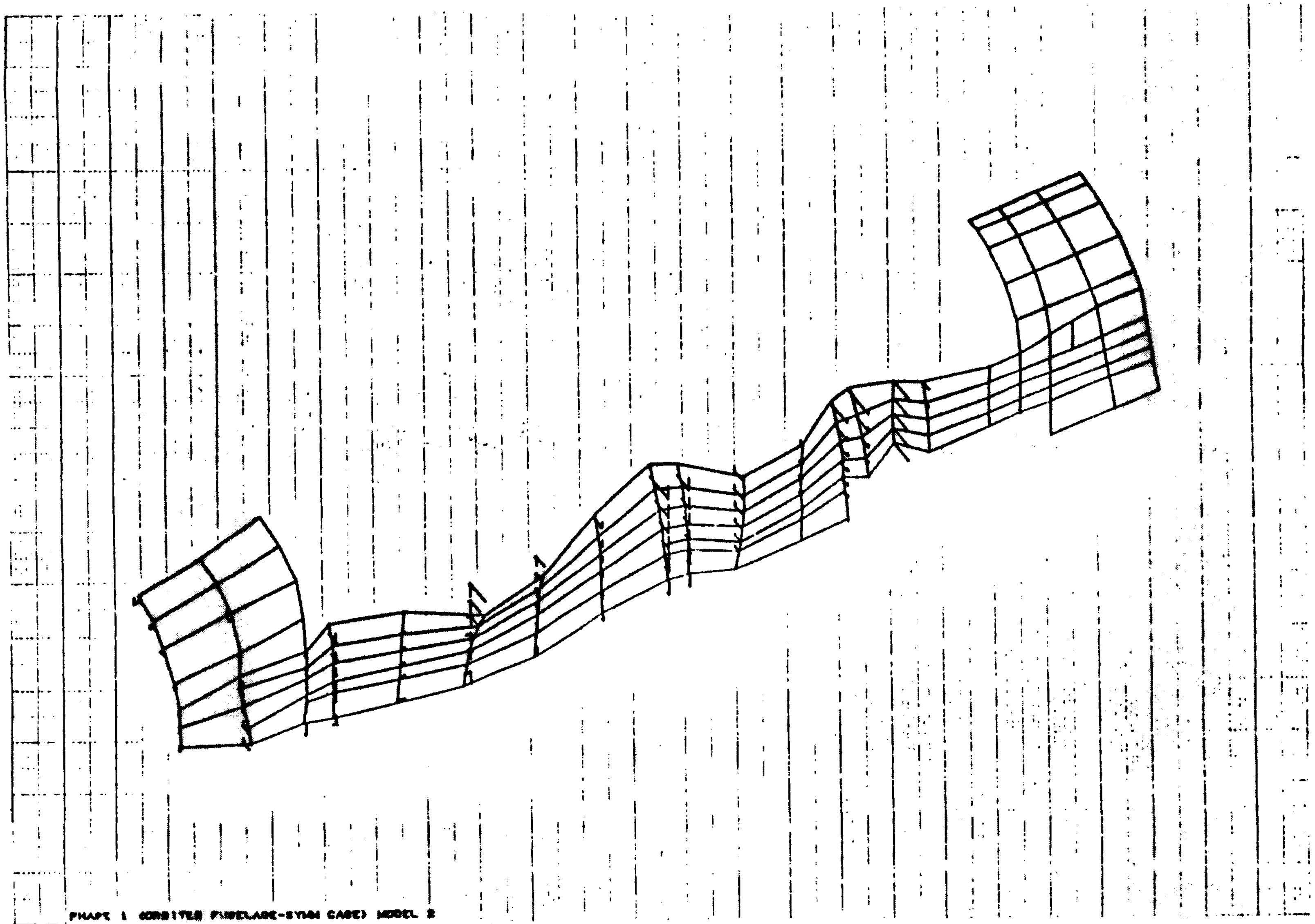
17 10/10/74 MAX-DEF. = 1.00000E+00

17



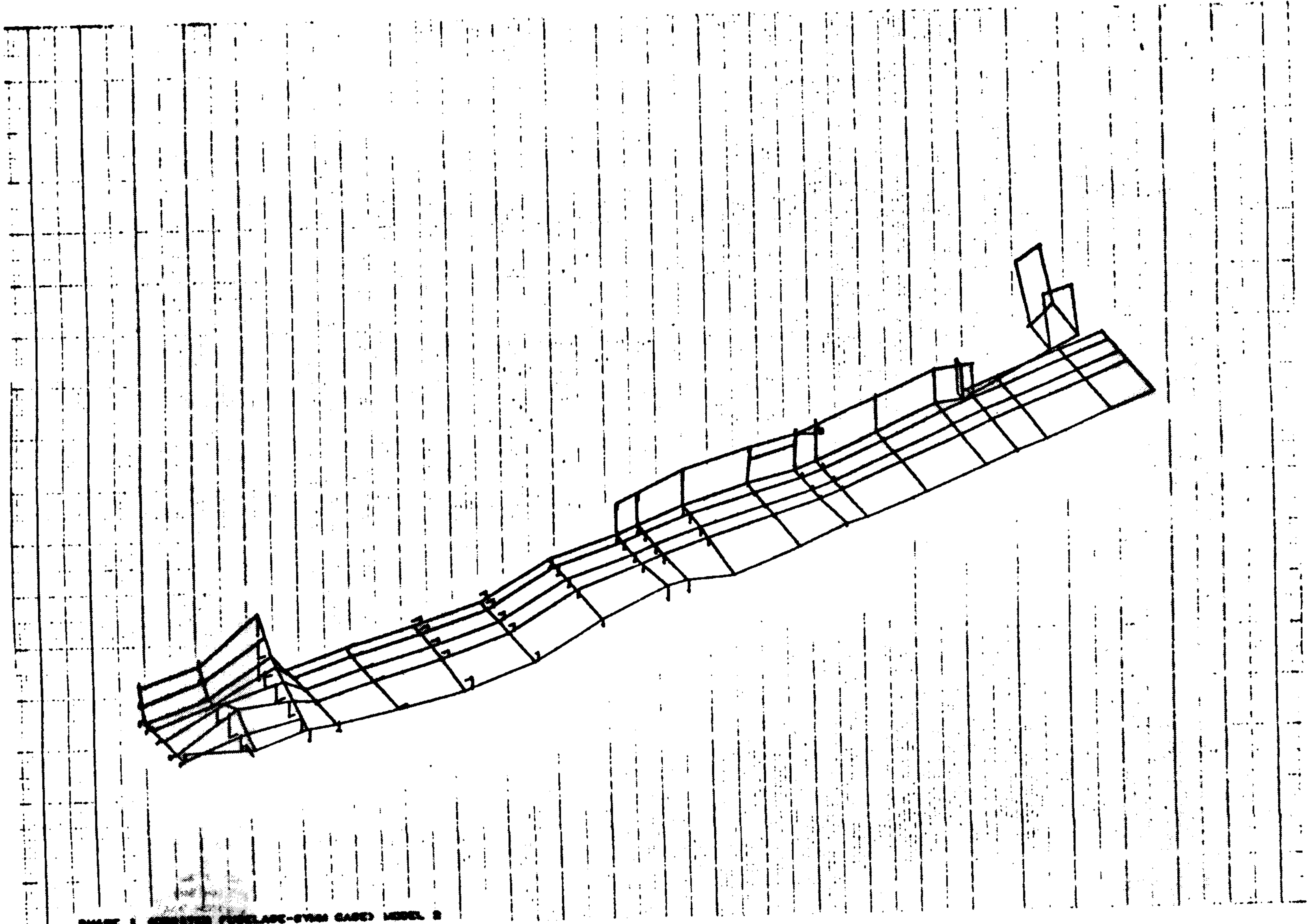
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,85(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 17 MODE 17 FREQ. 833.8001

76   10/18/74   MAX-DEF. = 1.00100010



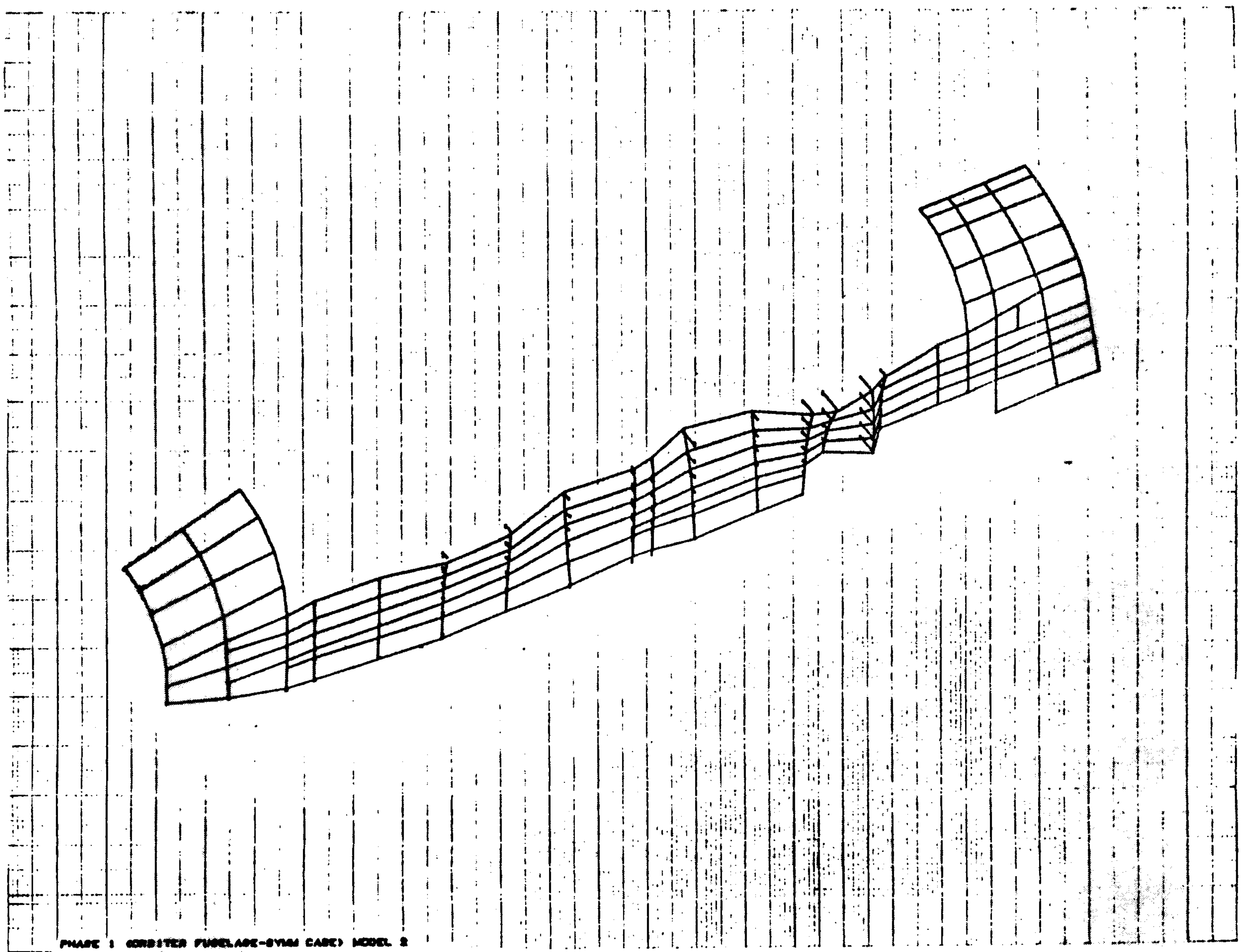
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(S-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 19   MODE 19   FREQ. 870.3820

18 10/10/74 MAX-DEF. = 1.00[illegible]

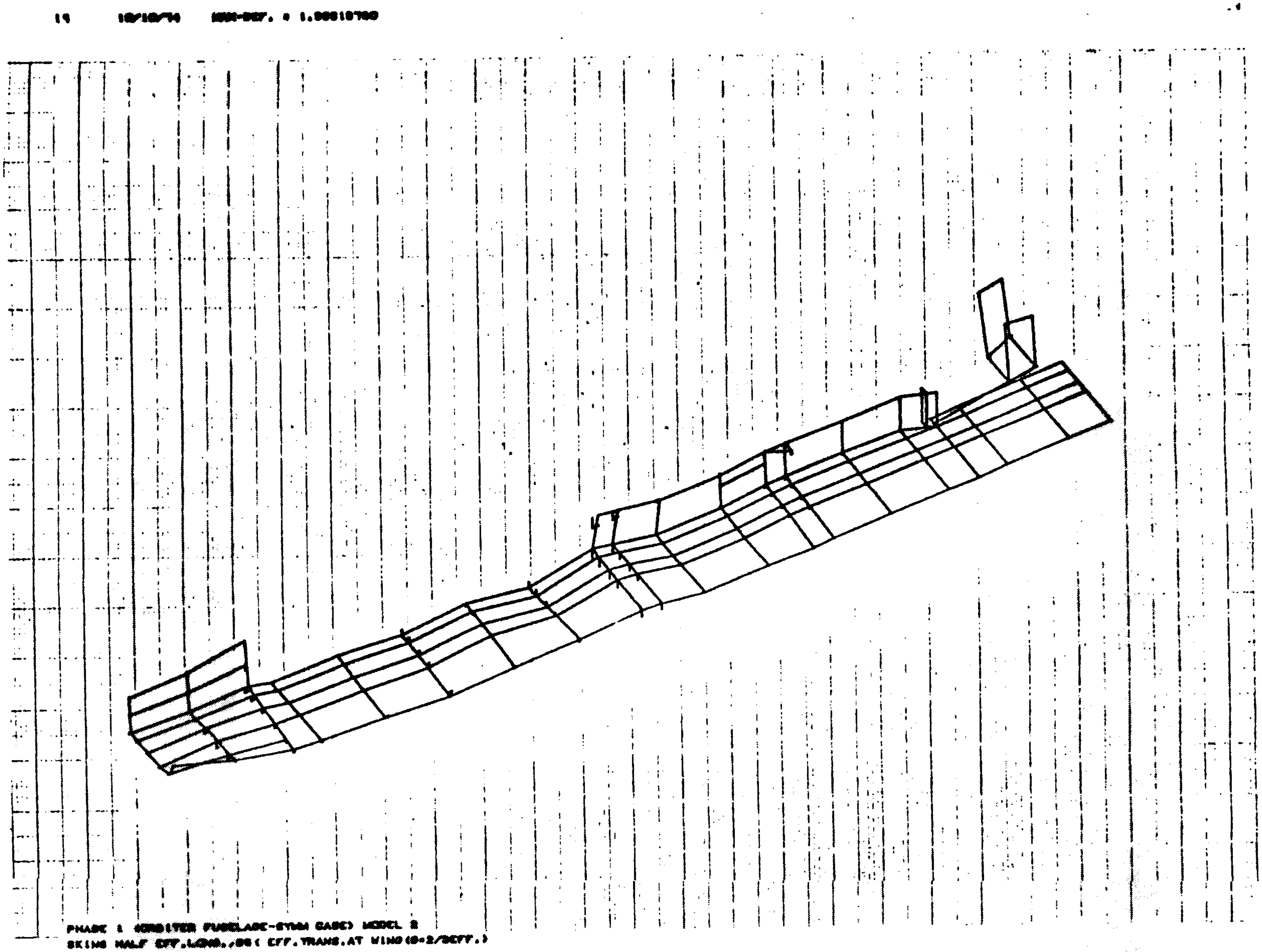


PHASE 1 [illegible] FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.06(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 070.2020

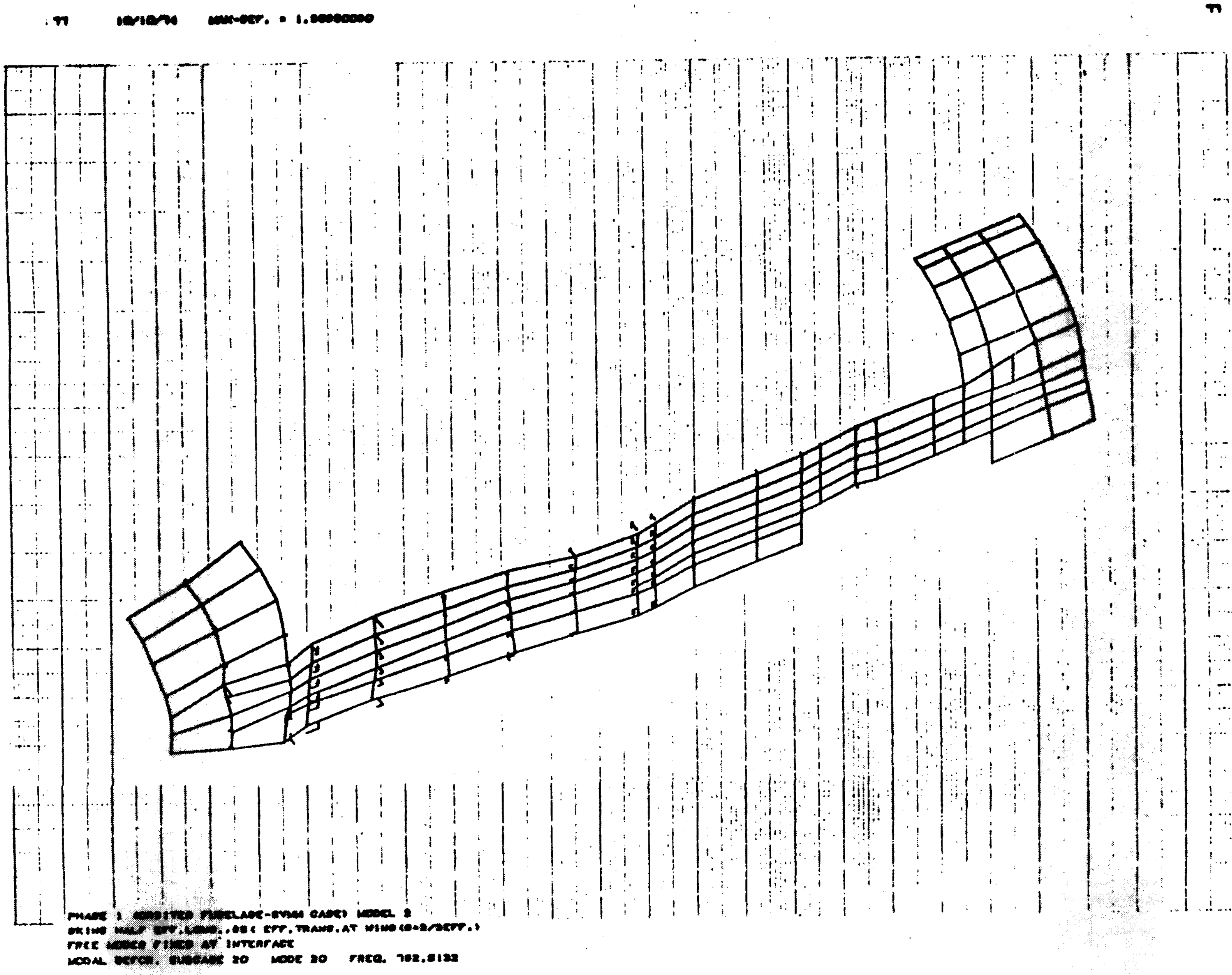
76 10/10/74 MAX-DEF. = 1.30618790



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 19 MODE 19 FREQ. 808.8300

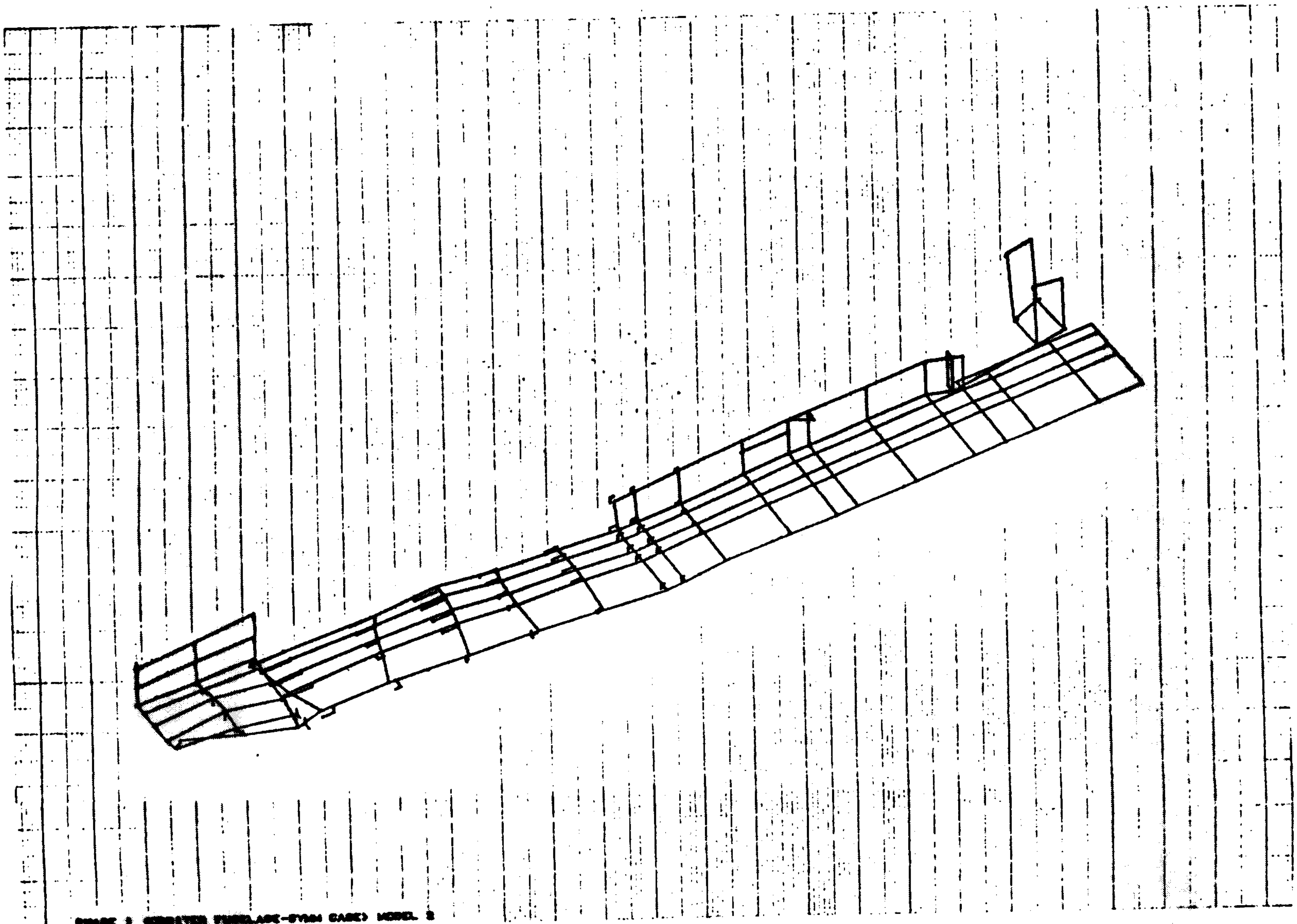

19 10/18/74 MAX-DEF. = 1.00018700

PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,86(EFF.TRANS.AT WING(B-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 19 MODE 19 FREQ. 088.0300


.TT 10/18/74 MAX-DEF. = 1.00000000
PHASE 1 COMPOSITE FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG..05(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFCN. SUBCASE 20 MODE 20 FREQ. 782.8132

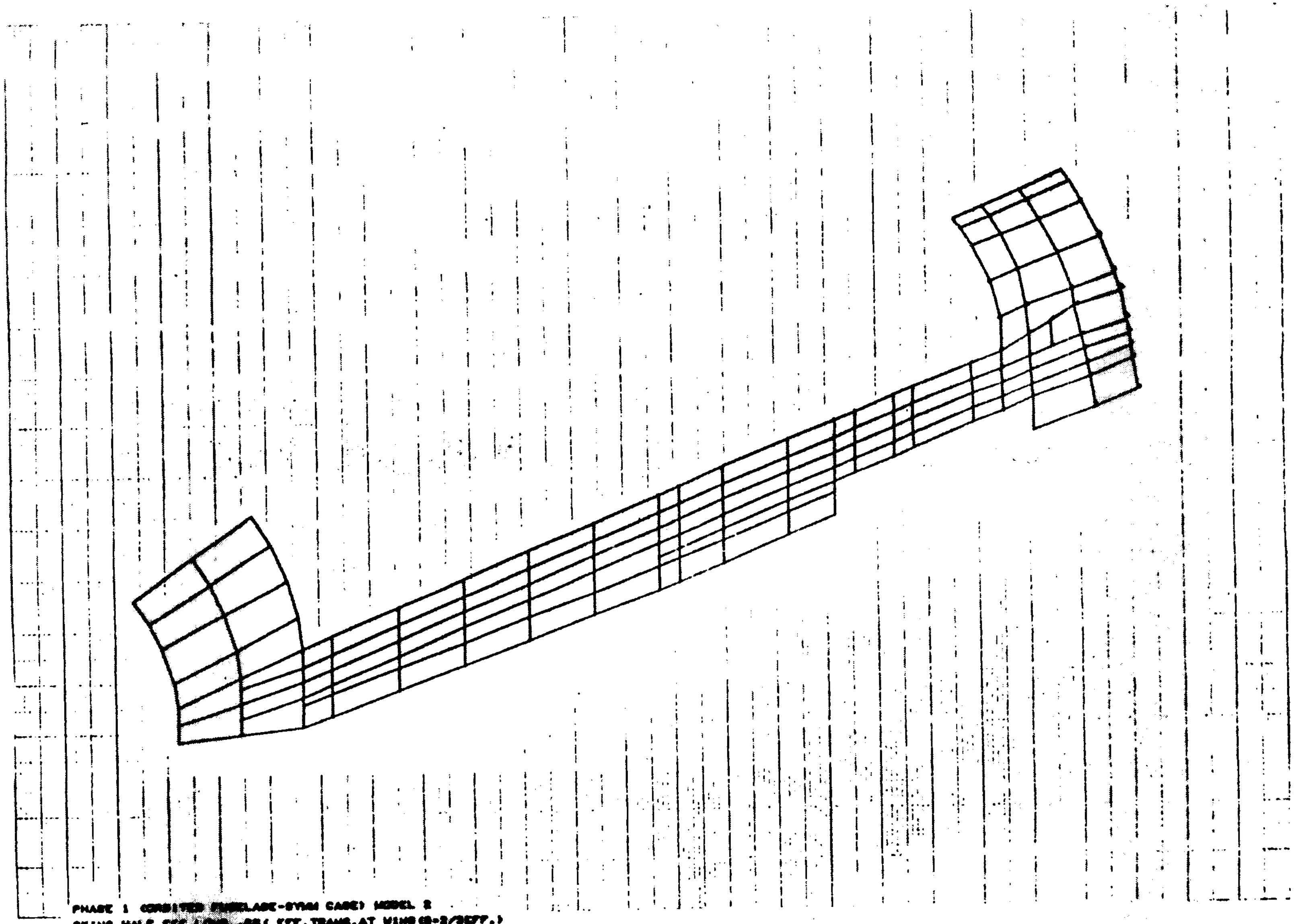
20 10/10/74 MAX-DEF. = 1.00000000

30



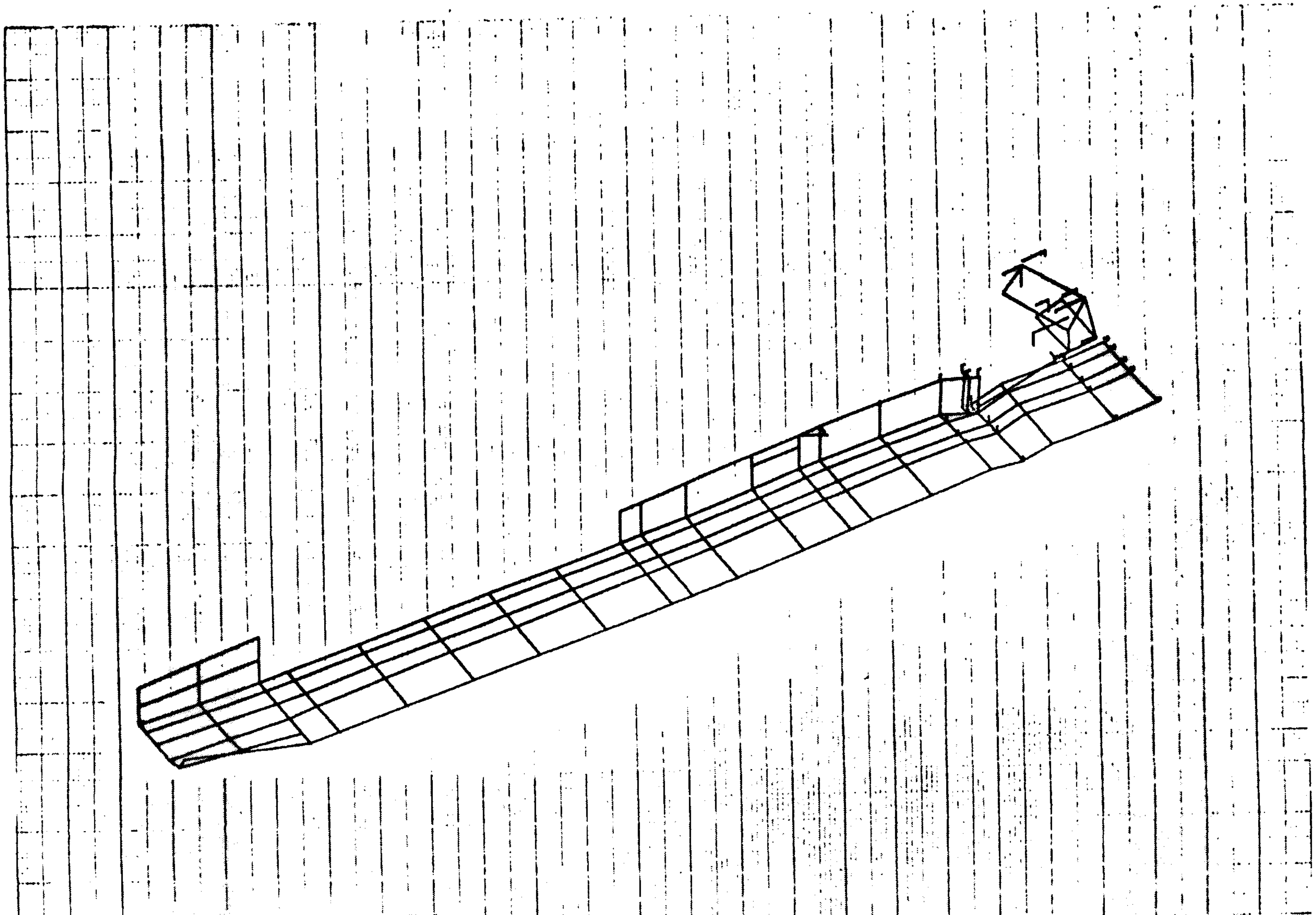
PHASE 1 ORBITER FUSELAGE-(SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.55(EFF.TRANS.AT WINGS=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 20 FREQ. 102.8132

10/10/74   MAX-DEF. = 1.17848[illegible]

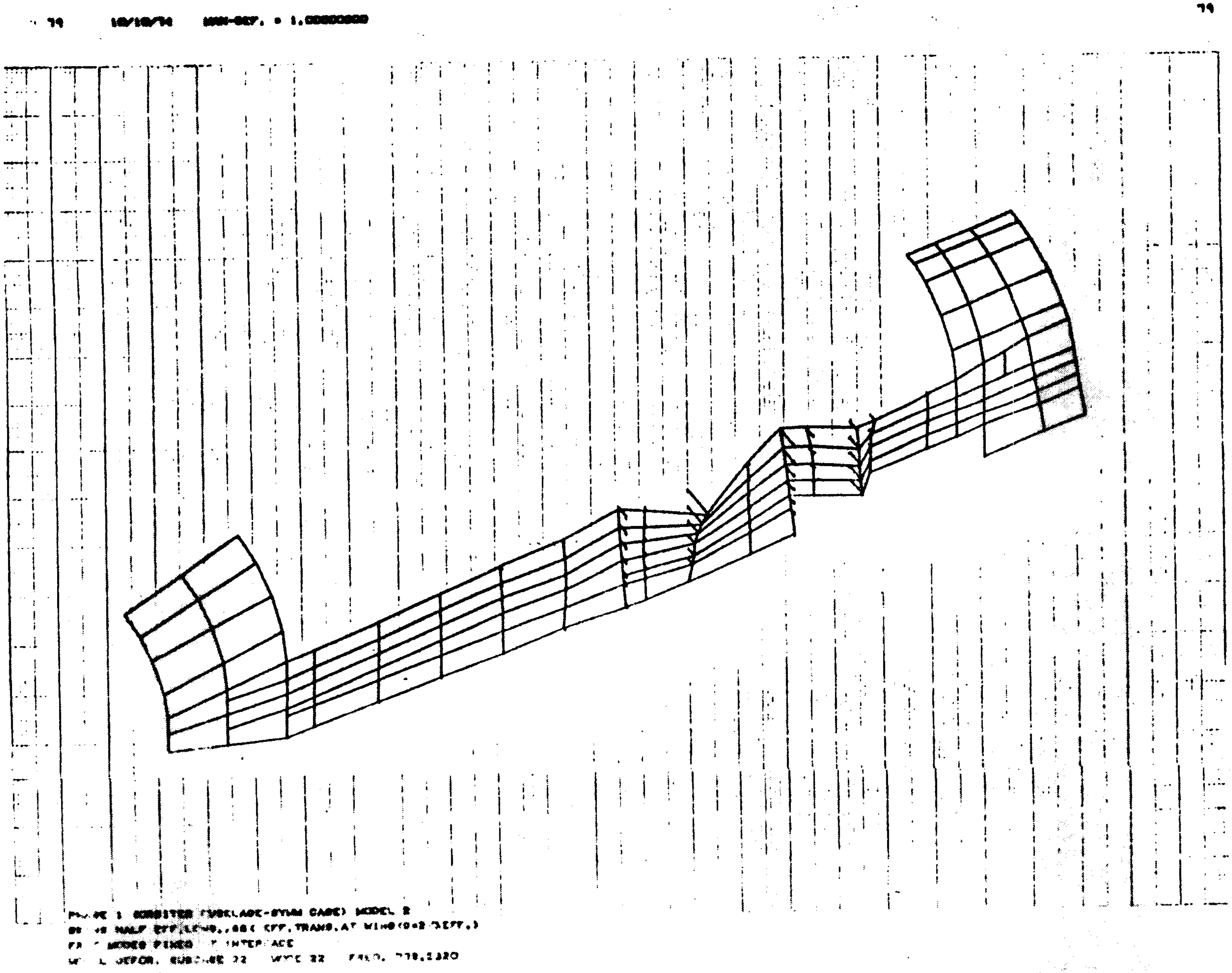


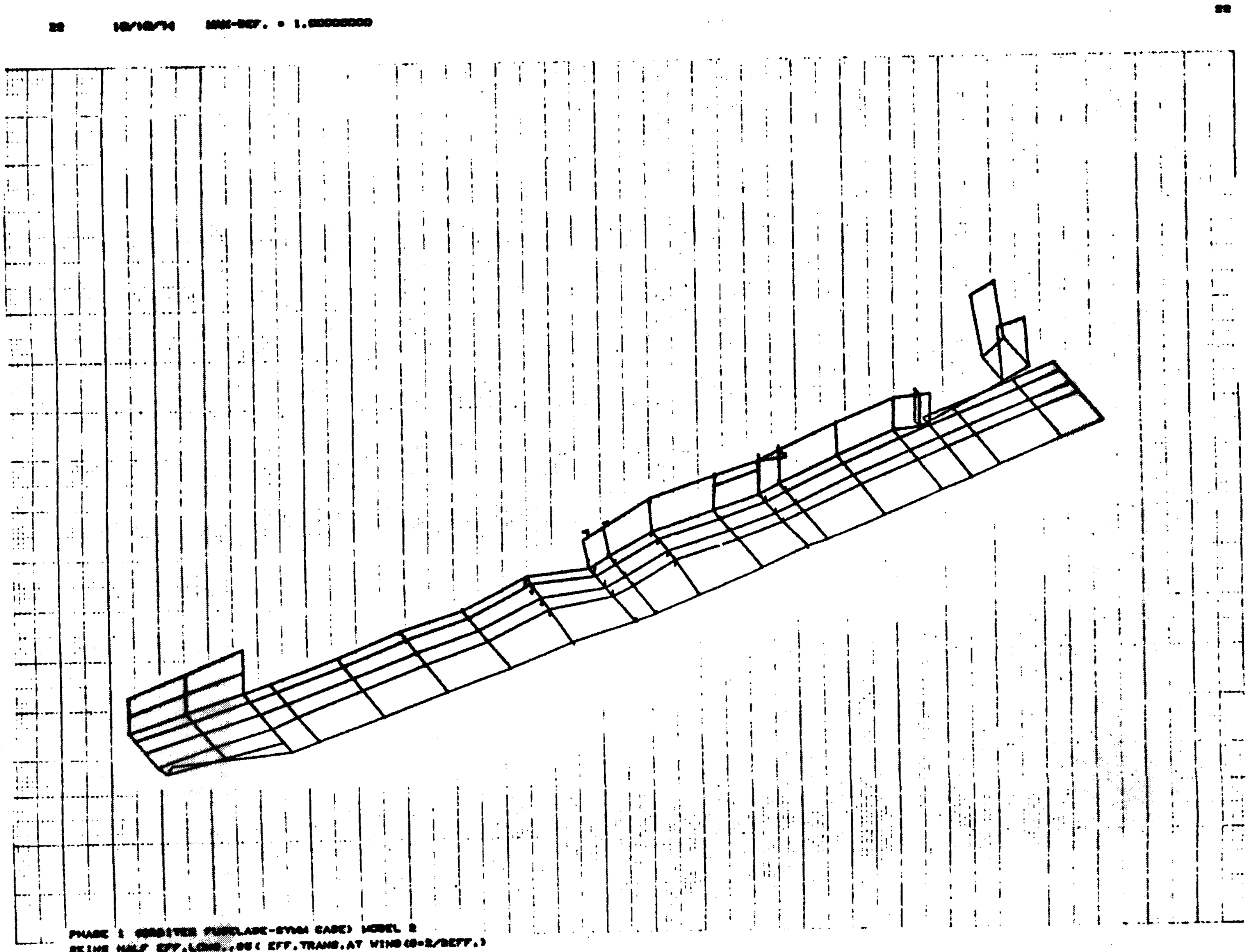
PHASE 1 (COMBINED FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.66(EFF.TRANS.AT WING(B-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 21   MODE 21   FREQ. 789.2308

21 10/10/74 MAX-DEF. = 1.17240820

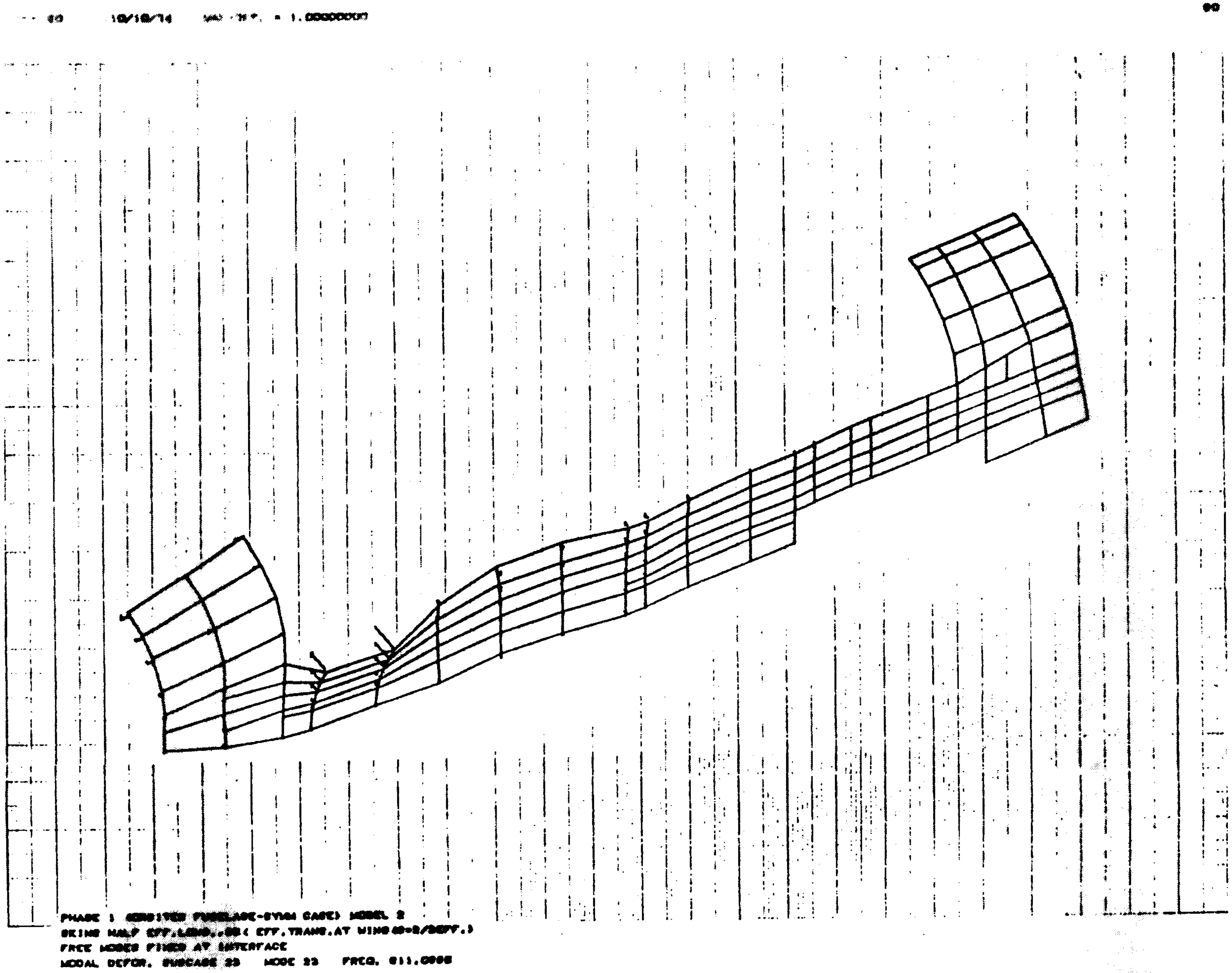


PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 3
SKINS HALF EFF.LONG.,BS(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 21 MODE 21 FREQ. 784.2308


79
10/10/74
MAX-DEF. = 1.00000000
79
PHASE 1 ORBITER (FUSELAGE-SYM CASE) MODEL 2
[illegible] HALF OFF, LOAD, .88(OFF, TRANS. AT WING(0+2 DEFF.)
FR [illegible] MODES FIXED [illegible] INTERFACE
[illegible] L DEFOR. SUBCASE 22 MODE 22 FREQ. 778.2320

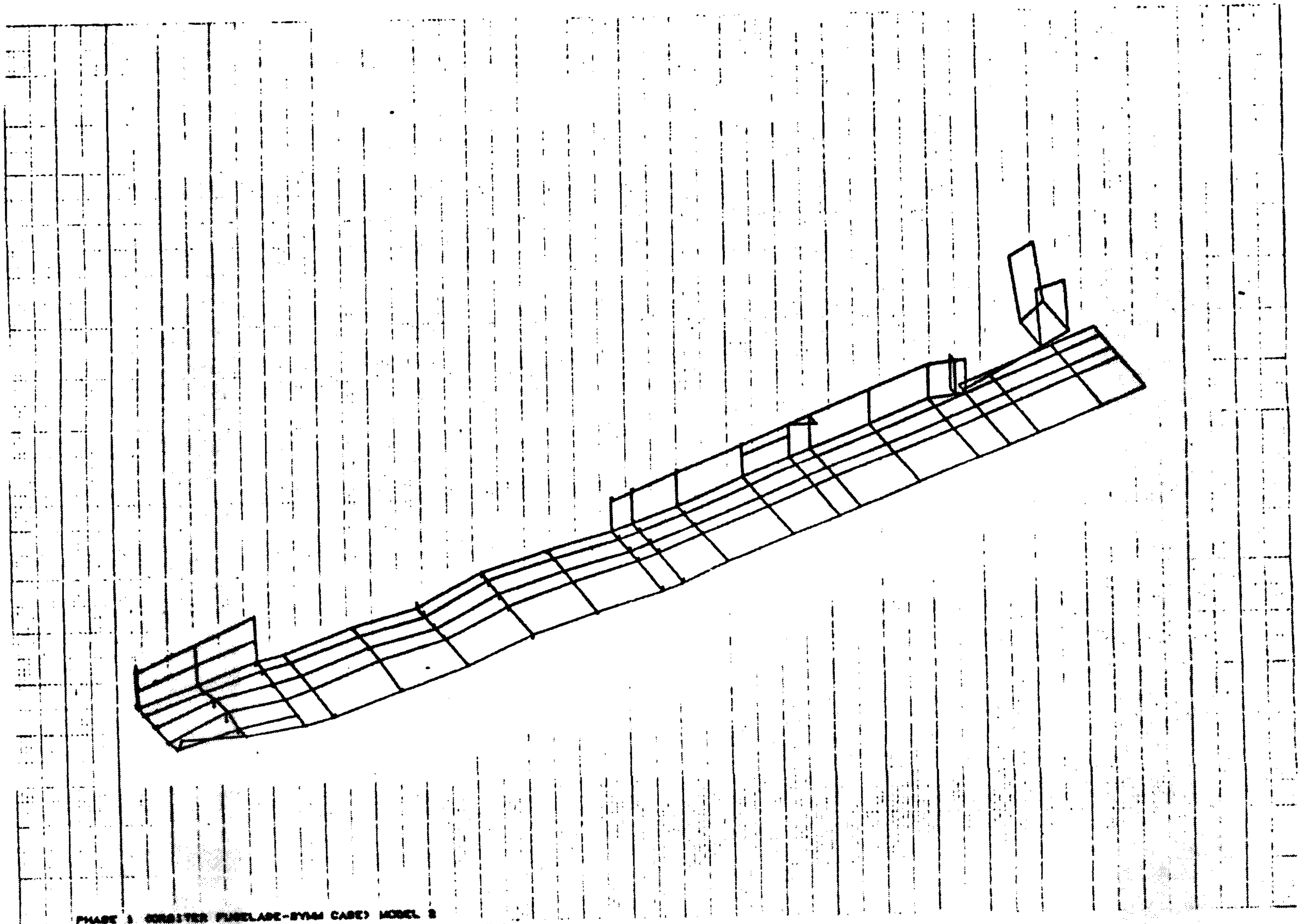

22
10/10/74
MAX-DEF. = 1.00000000
22

PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(S=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 22   MODE 22   FREQ. 778.3320

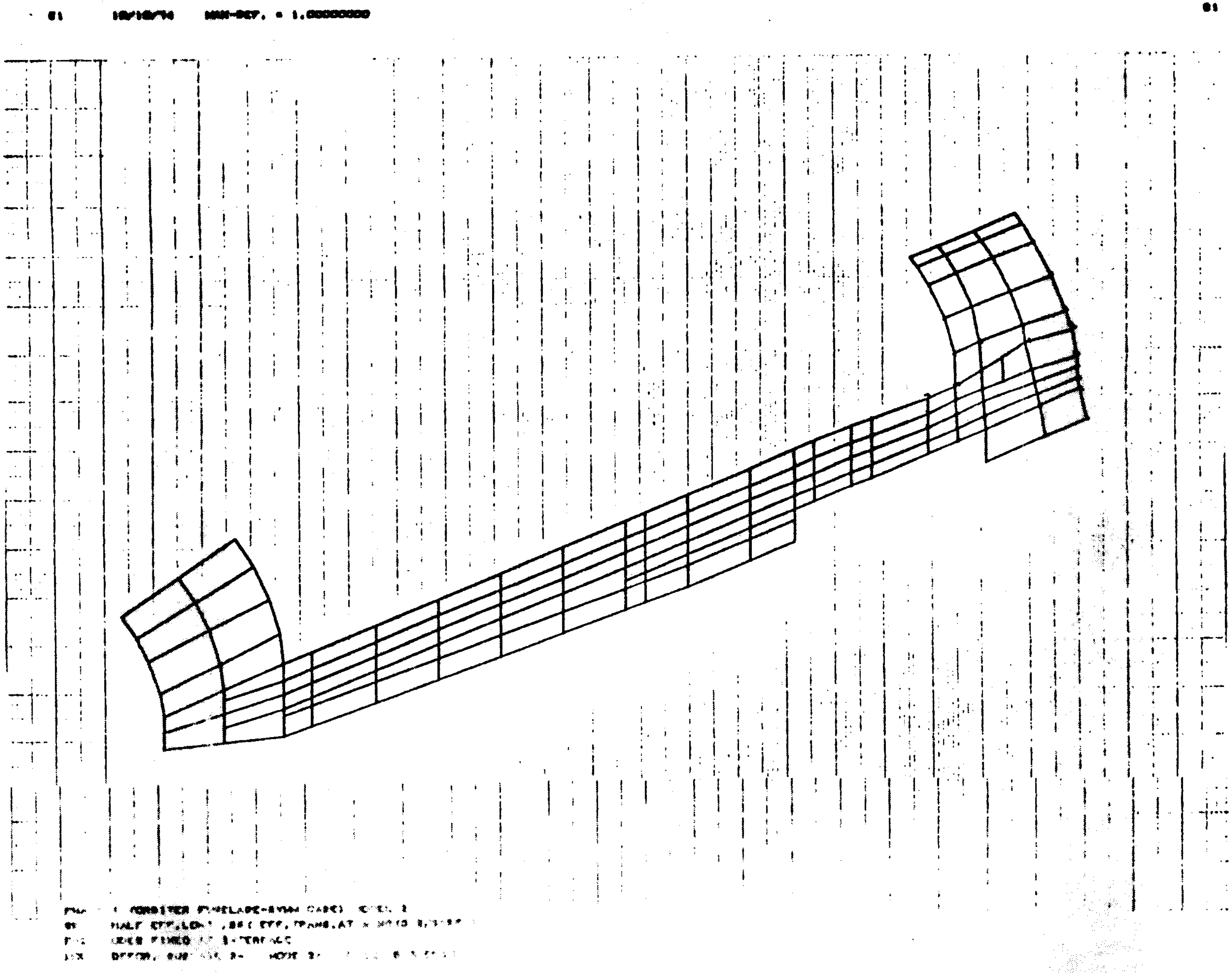

-- 80 10/18/74 MAX DEF. = 1.00000000
90
PHASE 1 ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.88(EFF.TRANS.AT WING 40-2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 23 MODE 23 FREQ. 611.0005

20 10/10/74 MAX-DEF. = 1.00000000

20

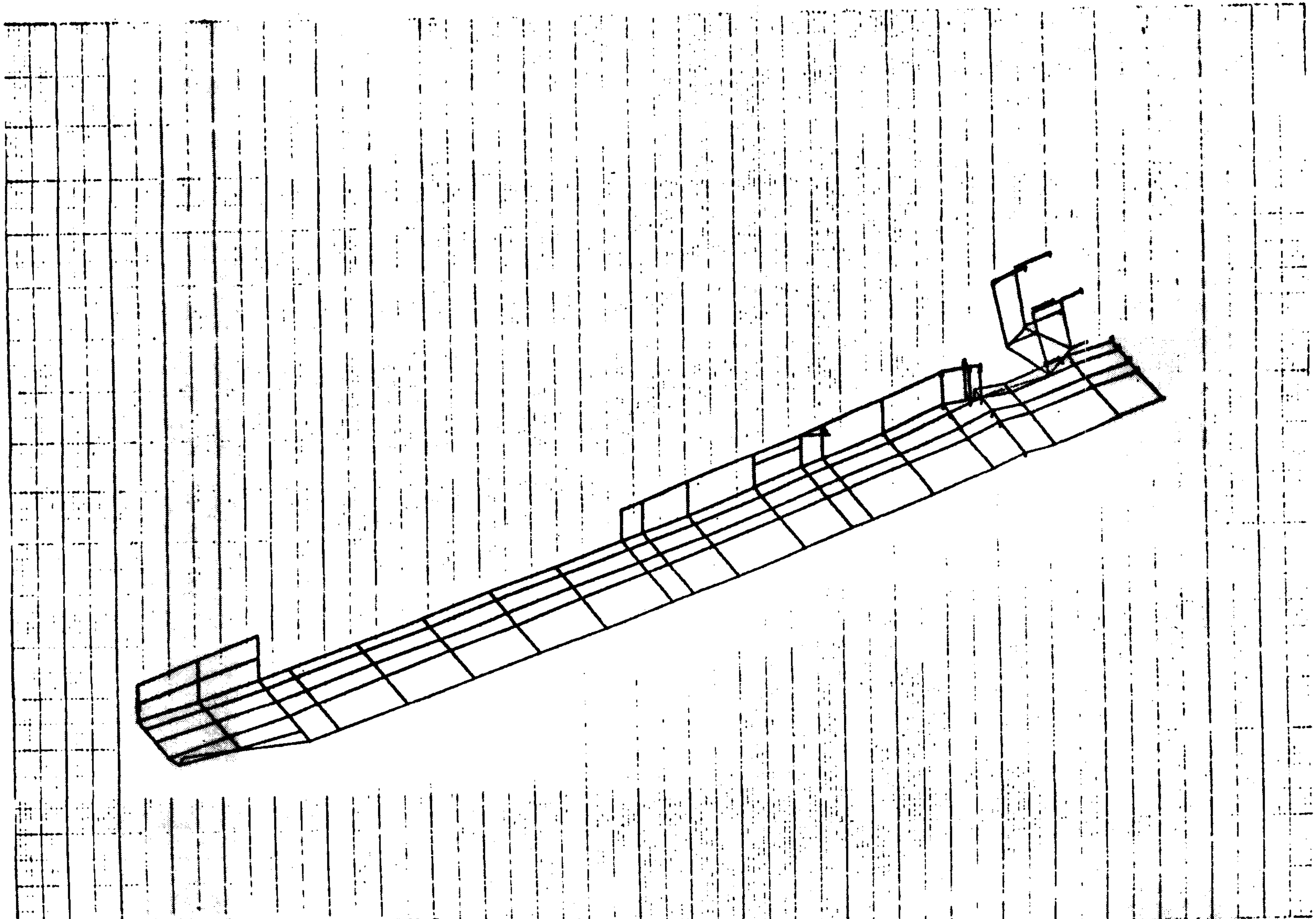


PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,85(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 23 MODE 23 FREQ. 811.0805

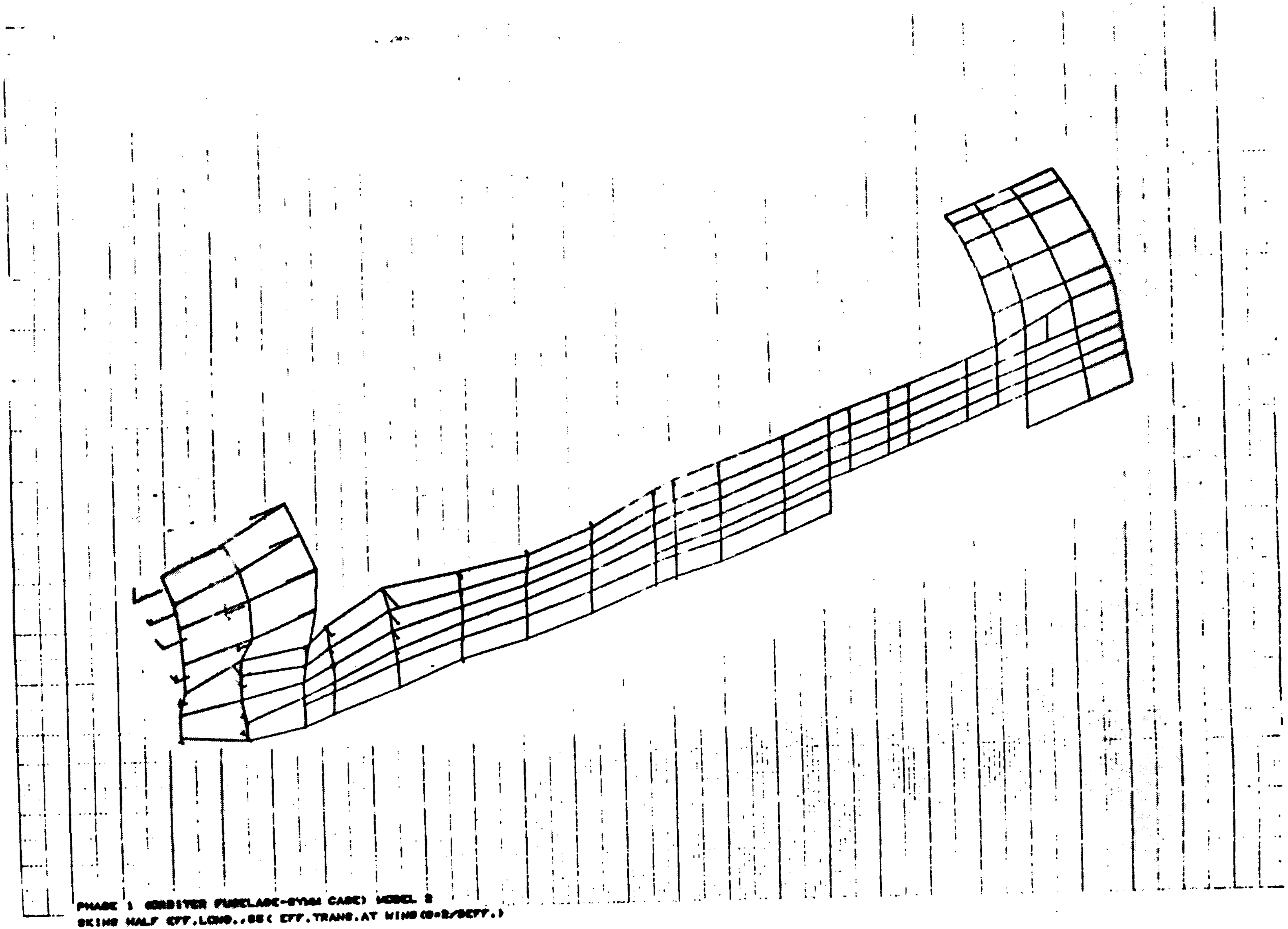

61
10/10/74 MAX-DEF. = 1.00000000
61
ORBITER FUSELAGE-SYMM CASE)
HALF STF, .88 (STF, TRANS. AT
FIXED
DEFOR, SUB
MODE

24 10/10/74 MAX-DEF. = 1.0000000

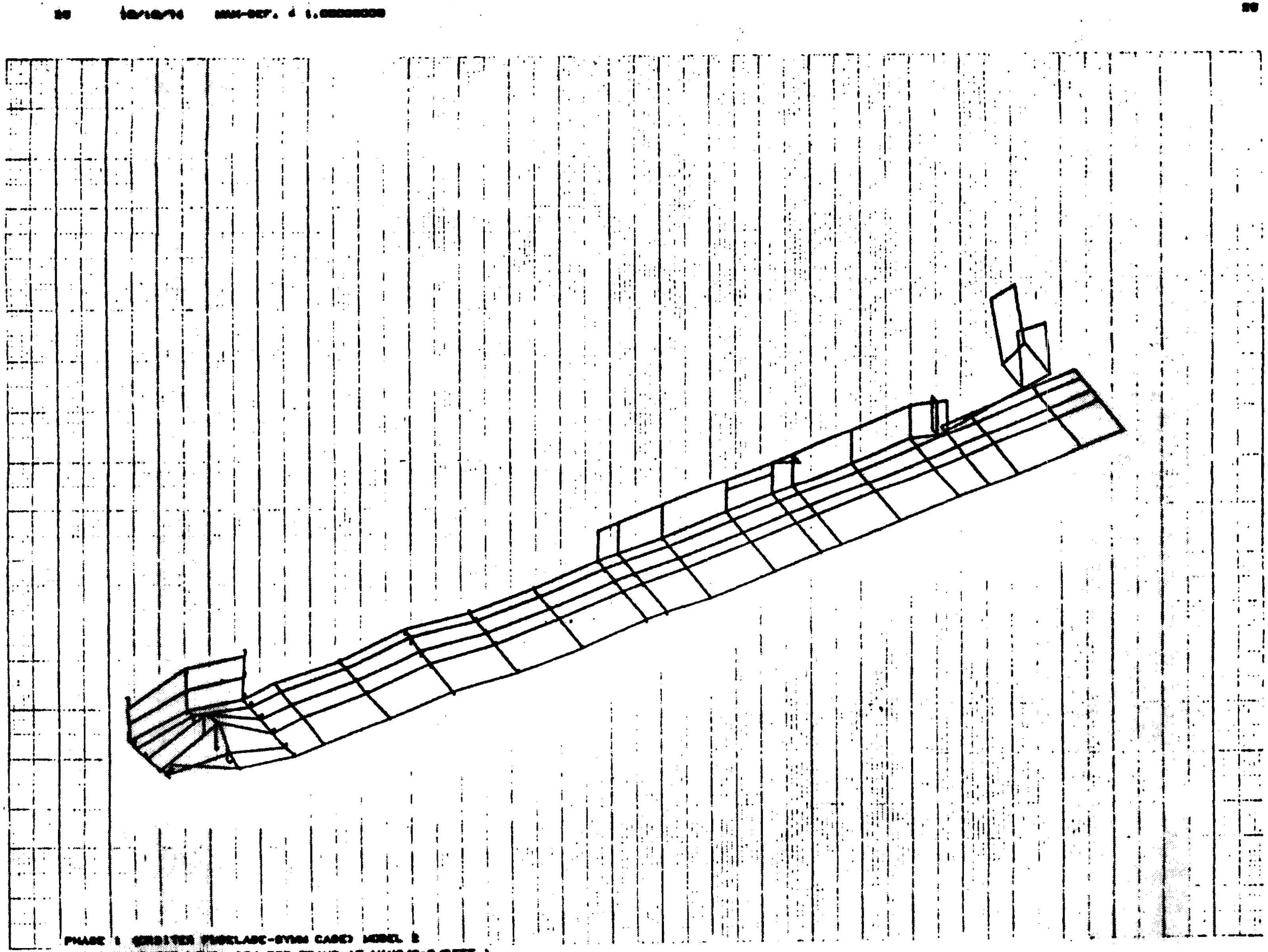
24



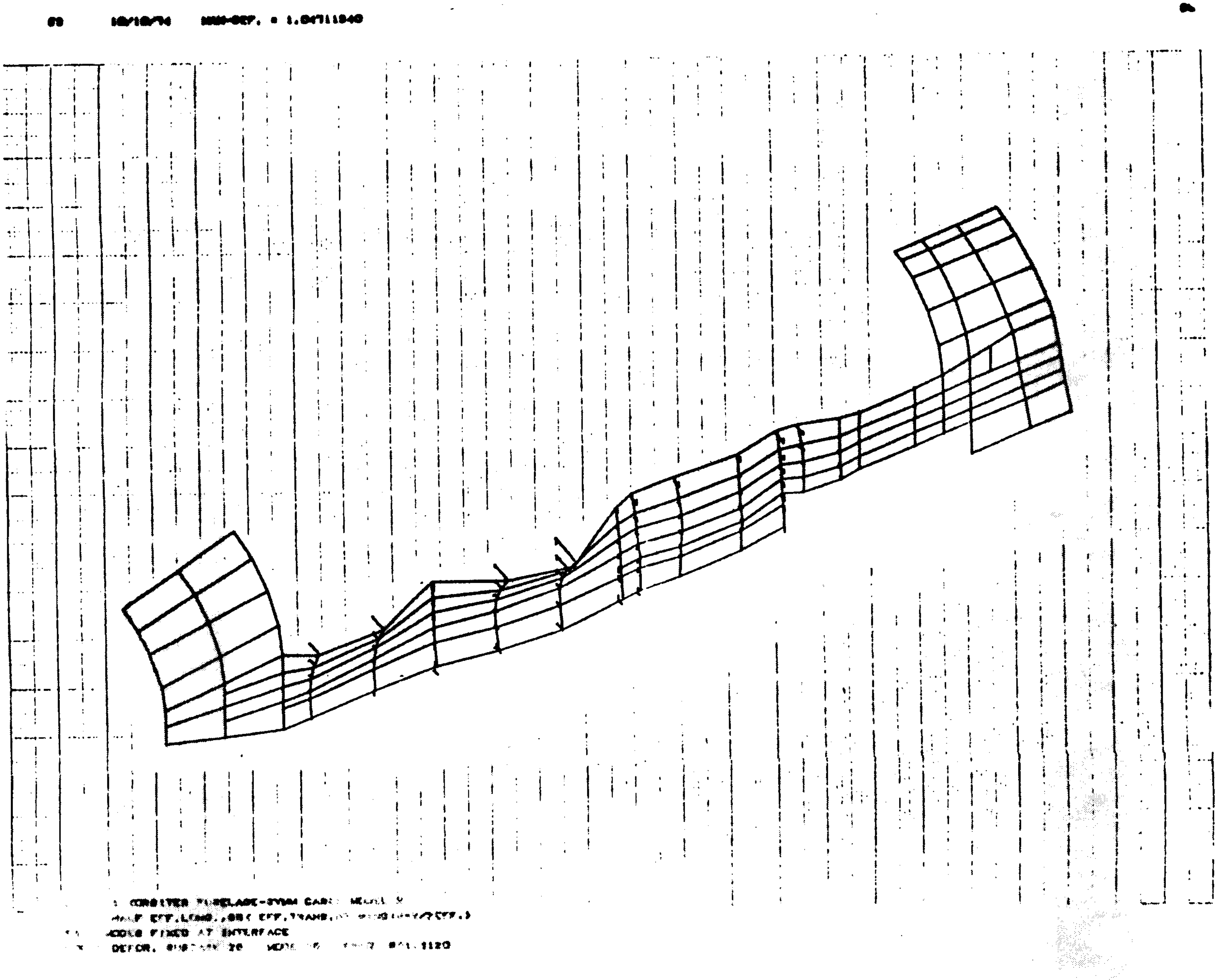
PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(0+2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 24 MODE 24 FREQ. 039.0069



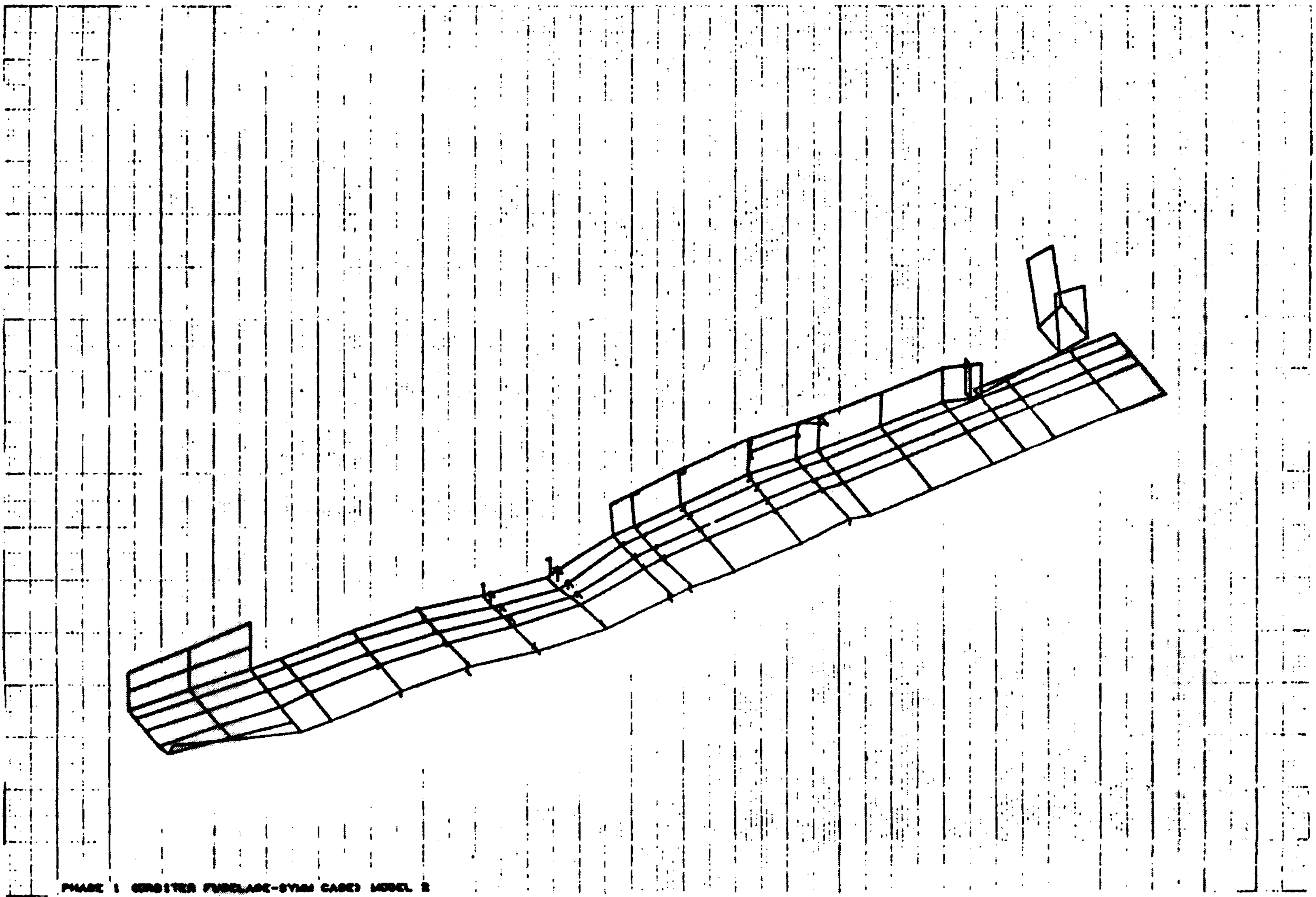
PHASE 1 (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,85(EFF.TRANS.AT WING (B=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 26 MODE 25 FREQ. 648.7732


28
10/10/74
MAX-DEF. = 1.00000000
28

PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 28 MODE 28 FREQ. 048.7732


08 10/18/74 MAX-DEF. = 1.04711540
[illegible] ORBITER FUSELAGE-SYMM CASE [illegible]
HALF EFF. LONG., 80% EFF. TRANS., [illegible]
NODES FIXED AT INTERFACE
DEFOR. [illegible] 20 MODE [illegible] .1120

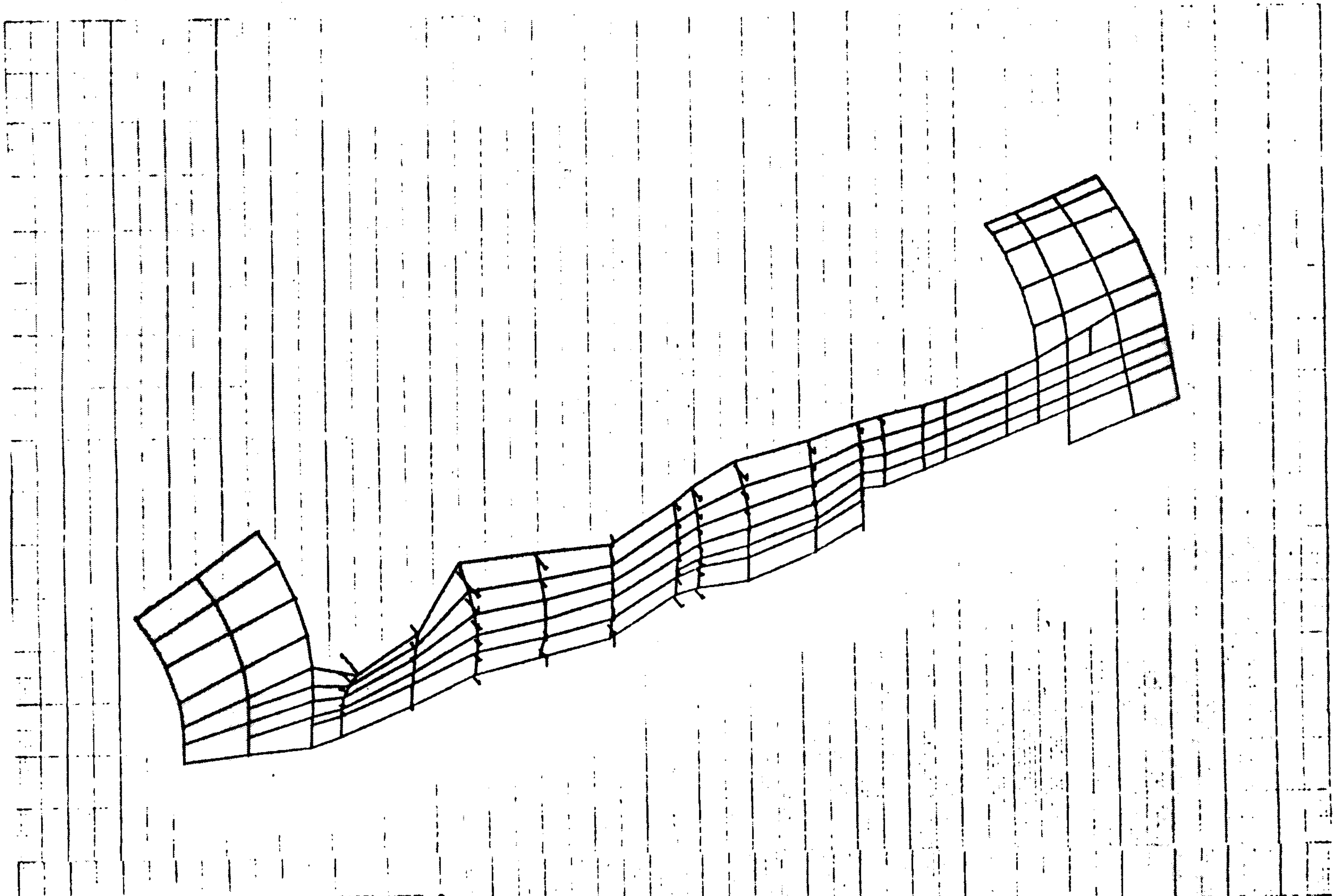
20   10/18/74   MAX-DEF. = 1.04711340



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.88(EFF.TRANS.AT WING(B=2/3EFF.)
FREE MODES FOUND AT INTERFACE
MODAL DEFOR., SUBCASE 20   MODE 20   FREQ. 891.4120

B4 10/18/74 MAX-DEF. = 1.00000000

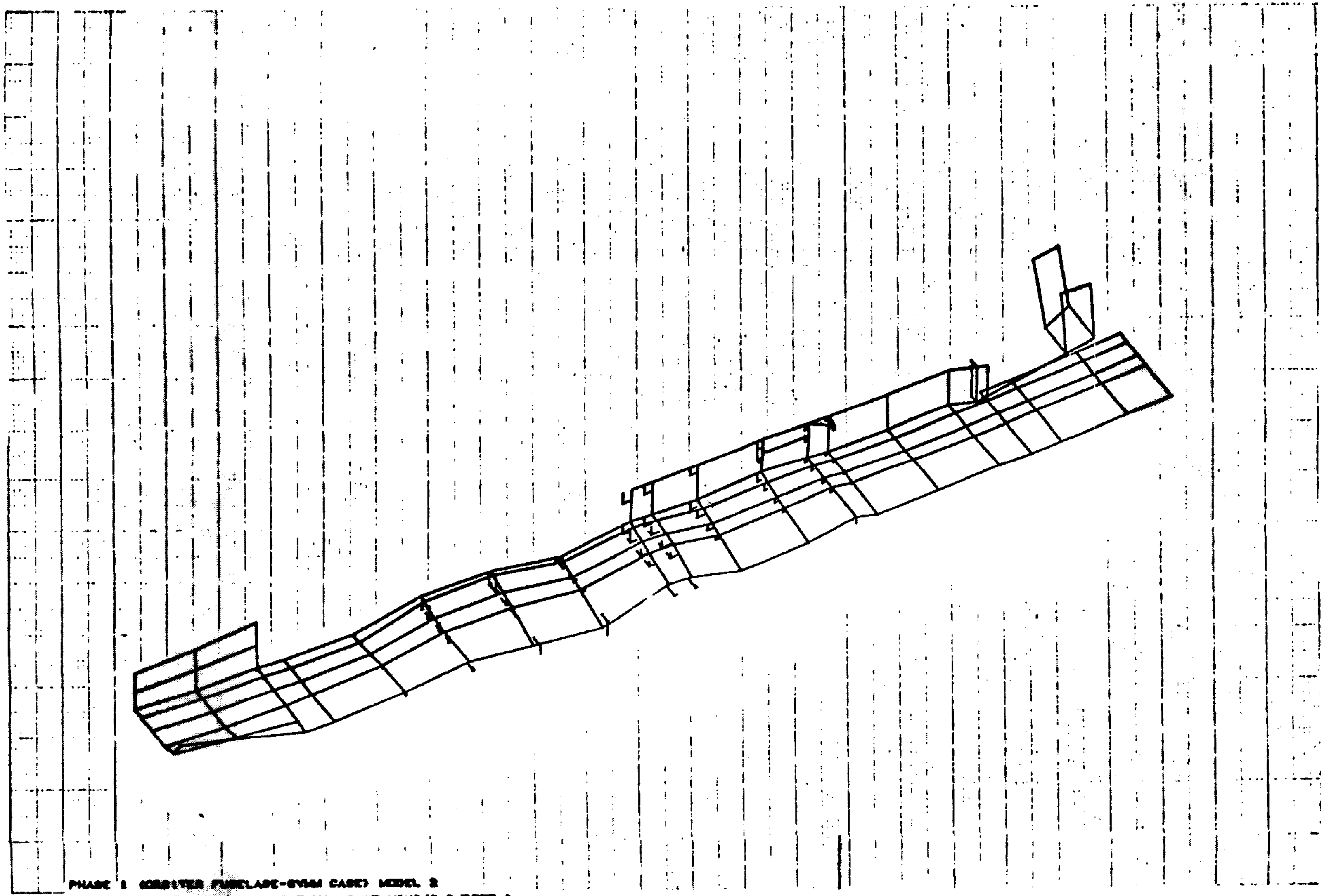
B4



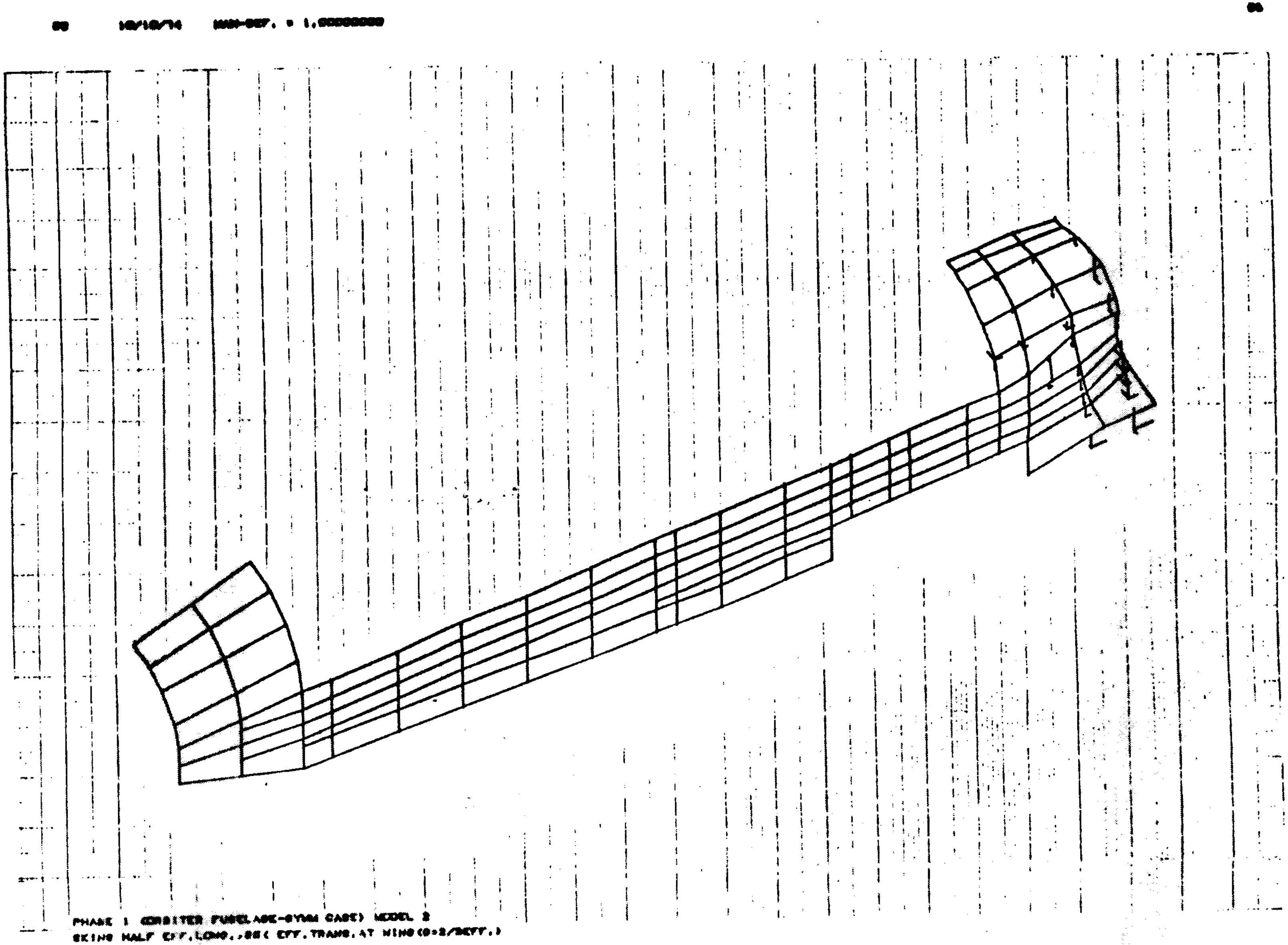
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(G=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 27 MODE 27 FREQ. 926.8684

27 10/10/94 MAX-DEF. = 1.00000000

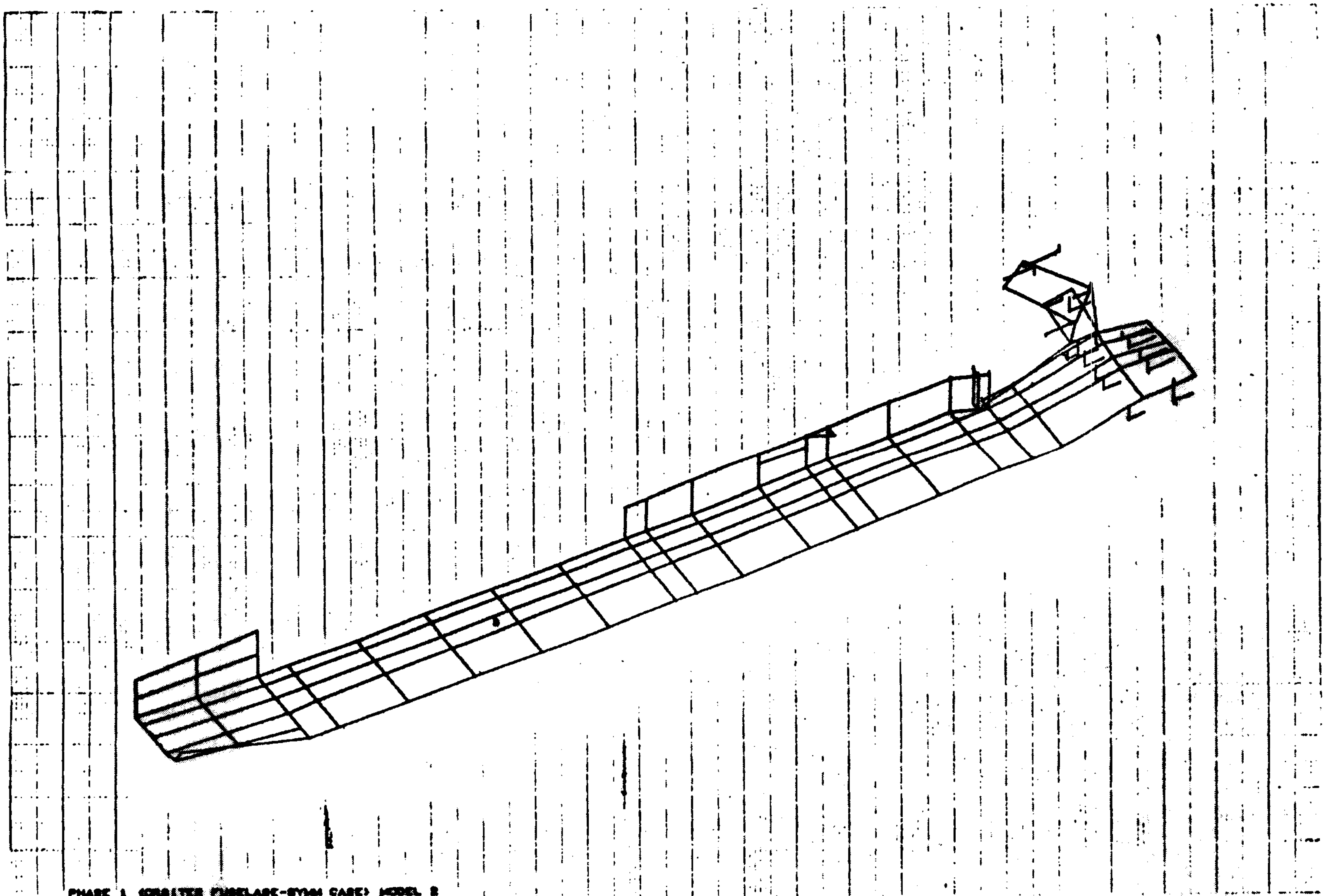
27



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,0S(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 27 MODE 27 FREQ. 928.8884

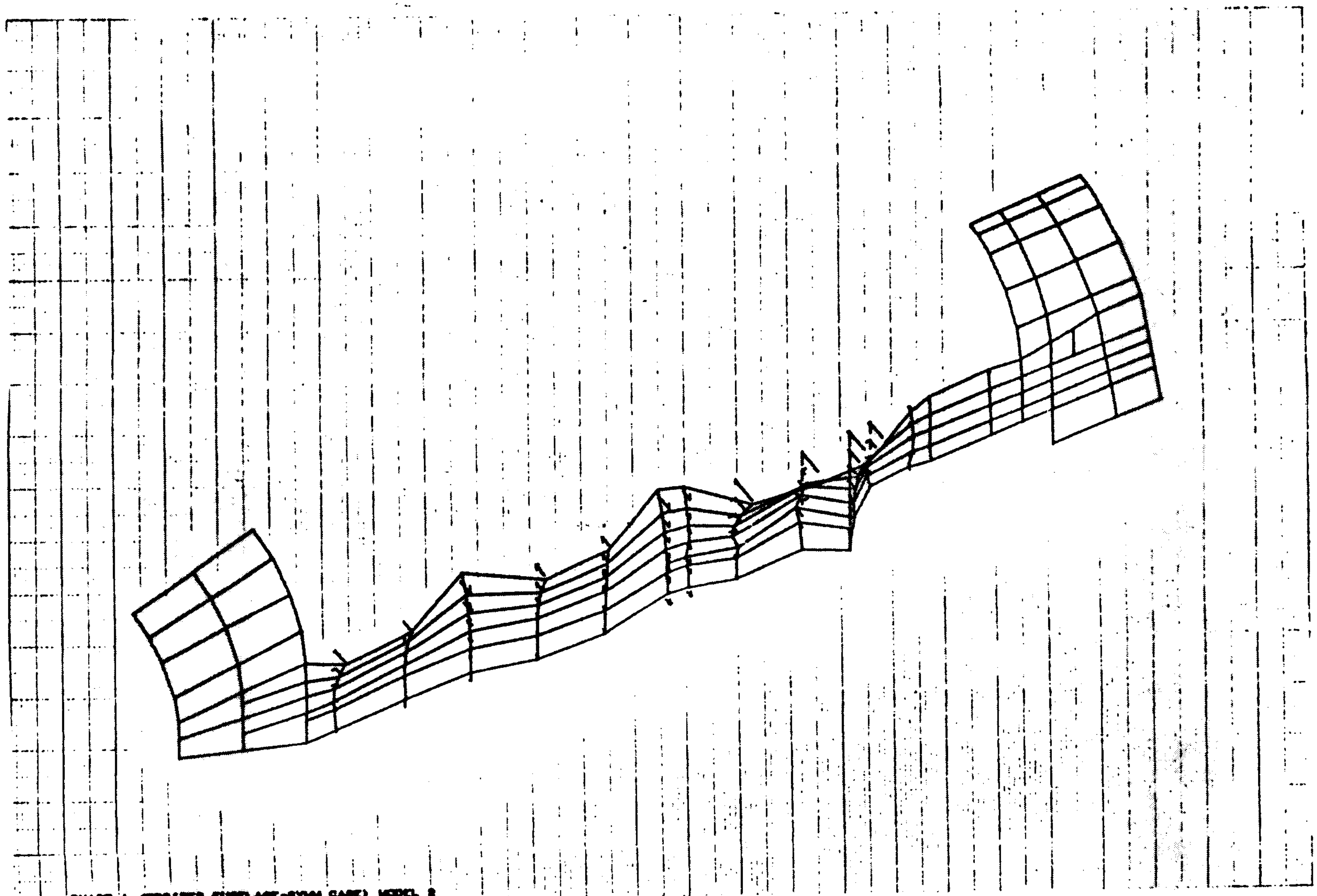

88
10/18/74
MAX-DEF. = 1.00000000
88

PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.,LONG.,.85(EFF.,TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 28 MODE 28 FREQ. 947.8051


20
10/10/74
MAX-DEF. = 1.0000000
20

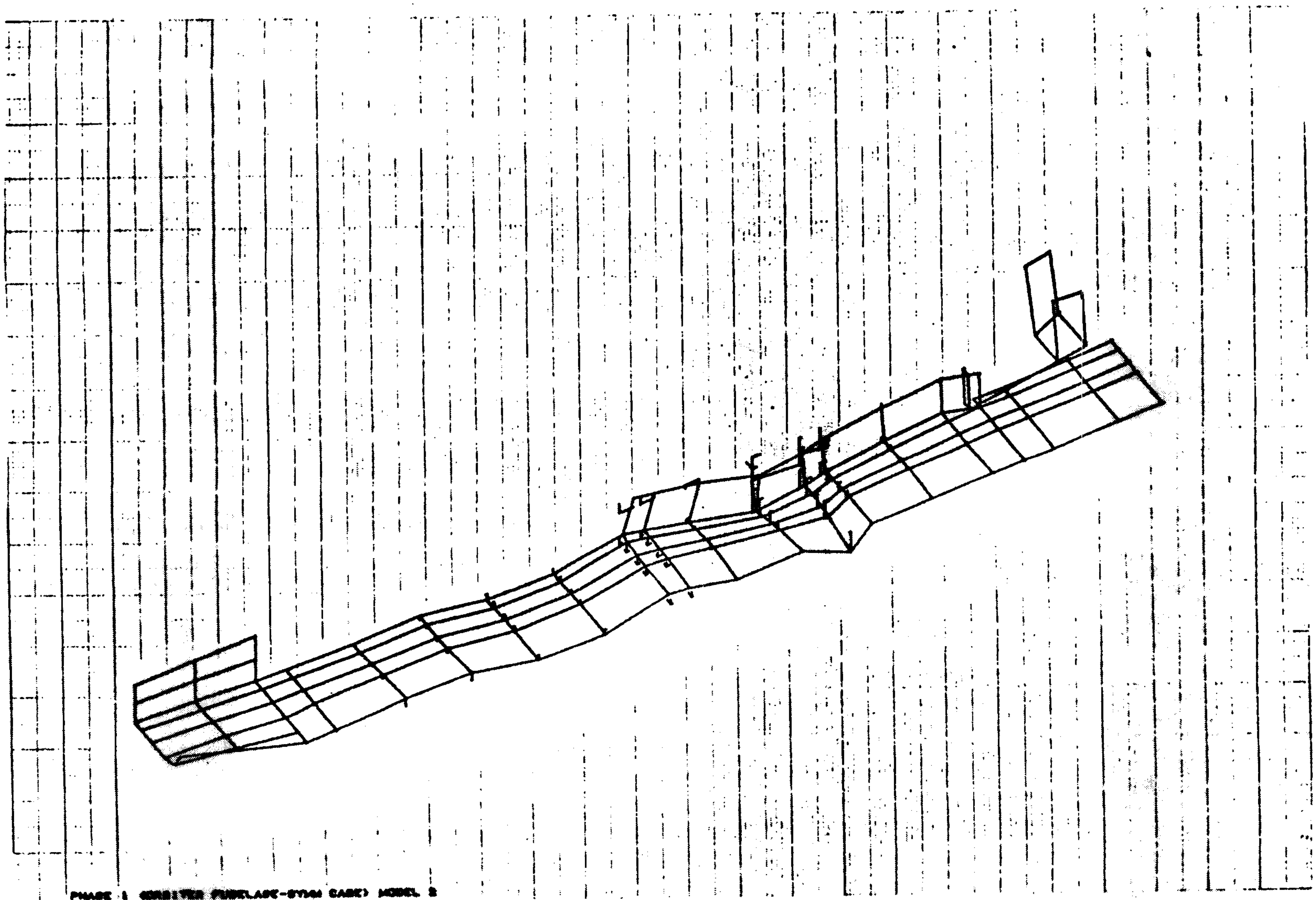
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(B=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 28 MODE 28 FREQ. 947.0081

[illegible] 10/10/74 MAX-DEF. = 1.[illegible]



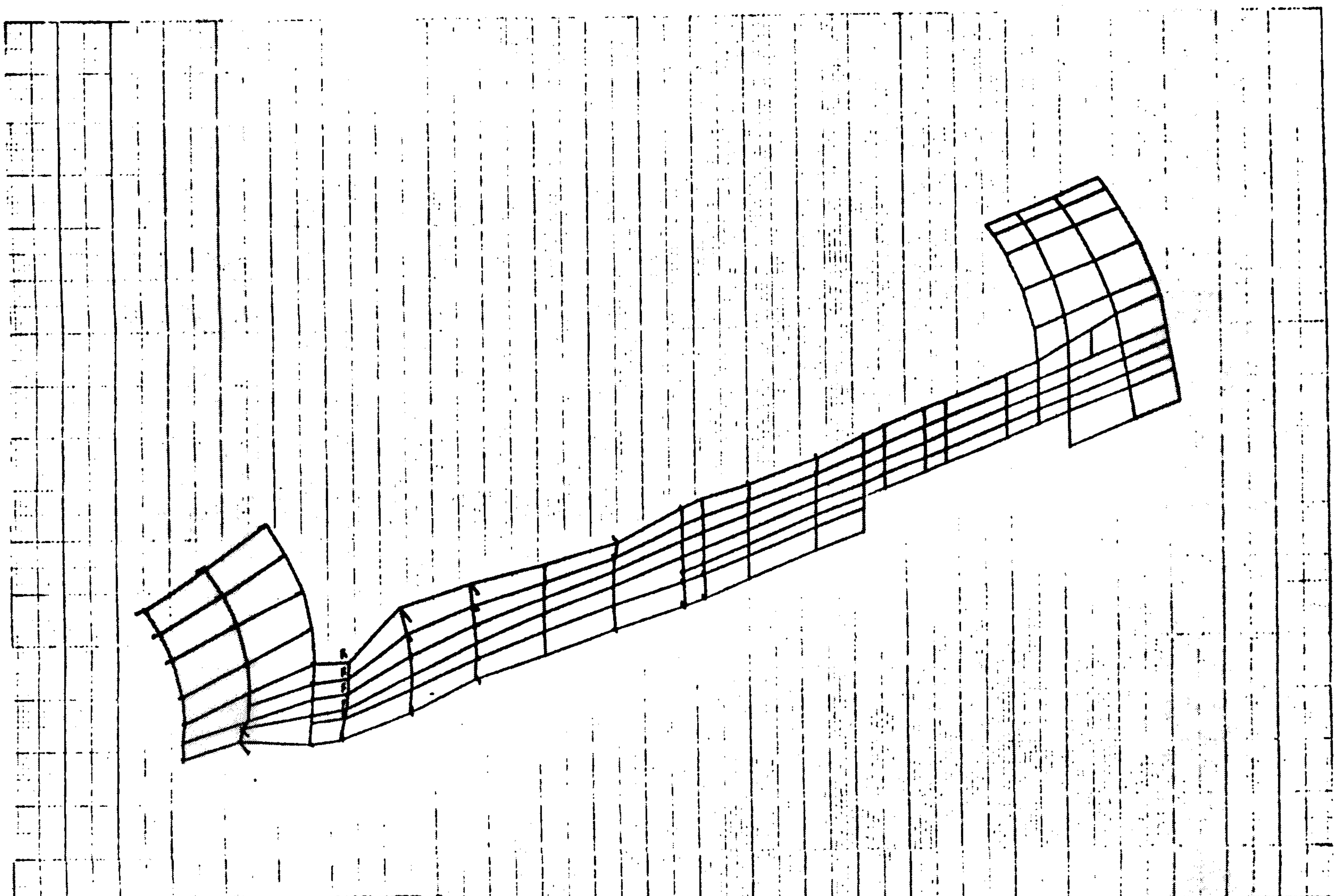
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,85(EFF.TRANS.AT WING(S=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 29 MODE 29 FREQ. 988.8289

29   10/18/74   MAX-DEF. = 1.00000190



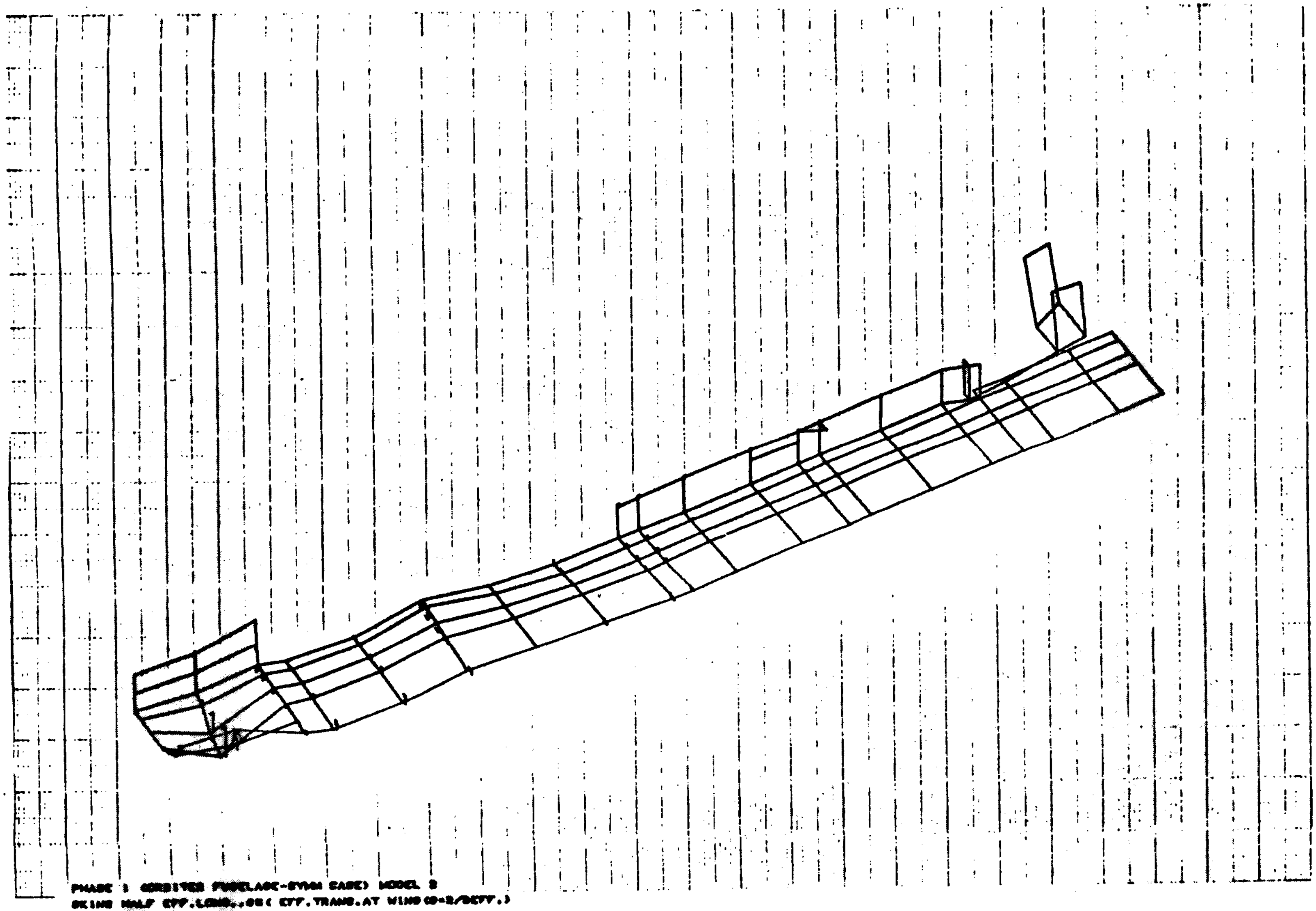
PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(D-2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 29   MODE 29   FREQ. 485.5289

67 10/10/74 MAX-DEF. = 1.04902000



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(G=2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 30 MODE 30 FREQ. 990.8988

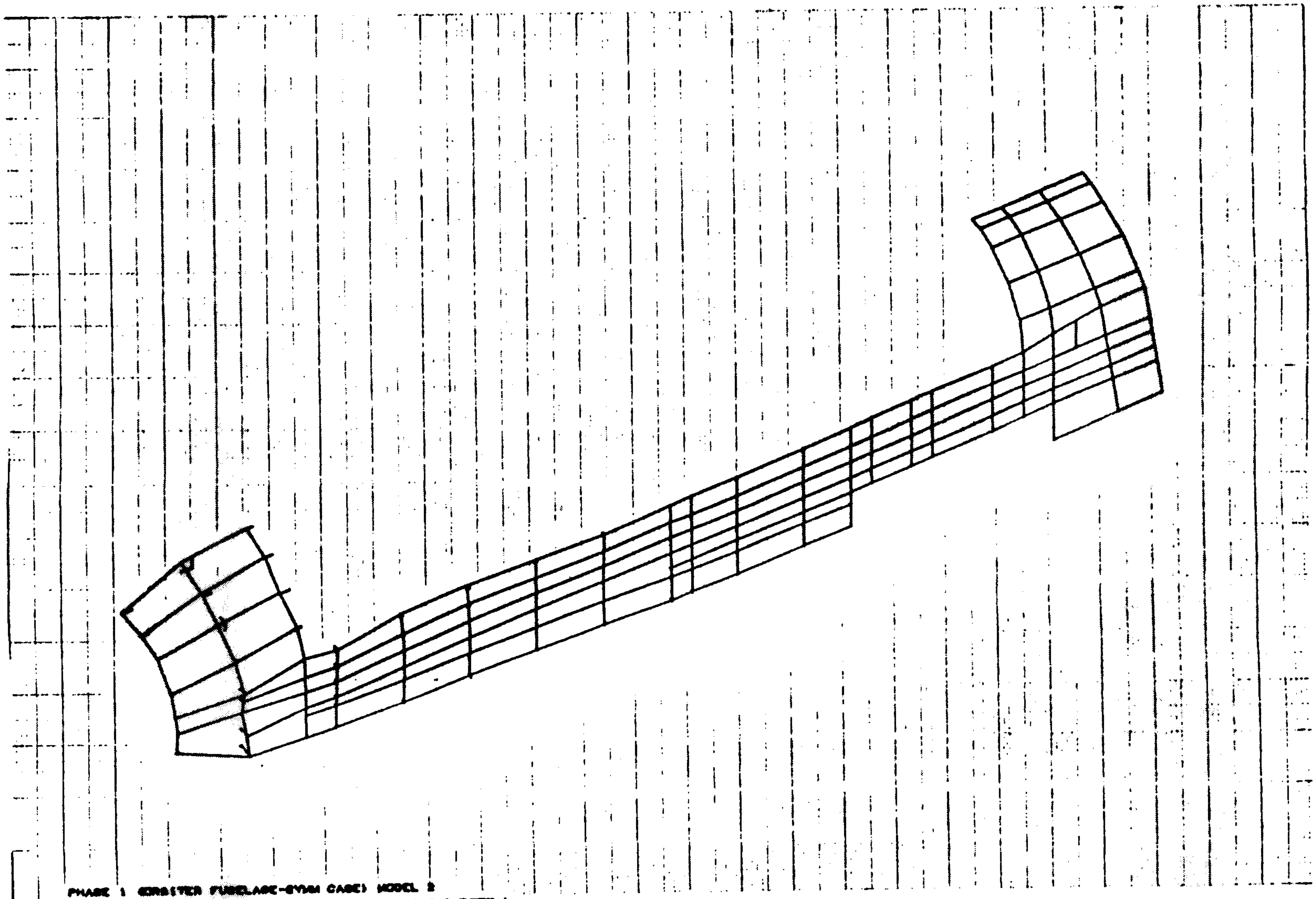
30 10/10/74 MAX-DEF. = 1.0[illegible]



PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.08(EFF.TRANS.AT WING(0-2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 30 MODE 30 FREQ. 998.5988

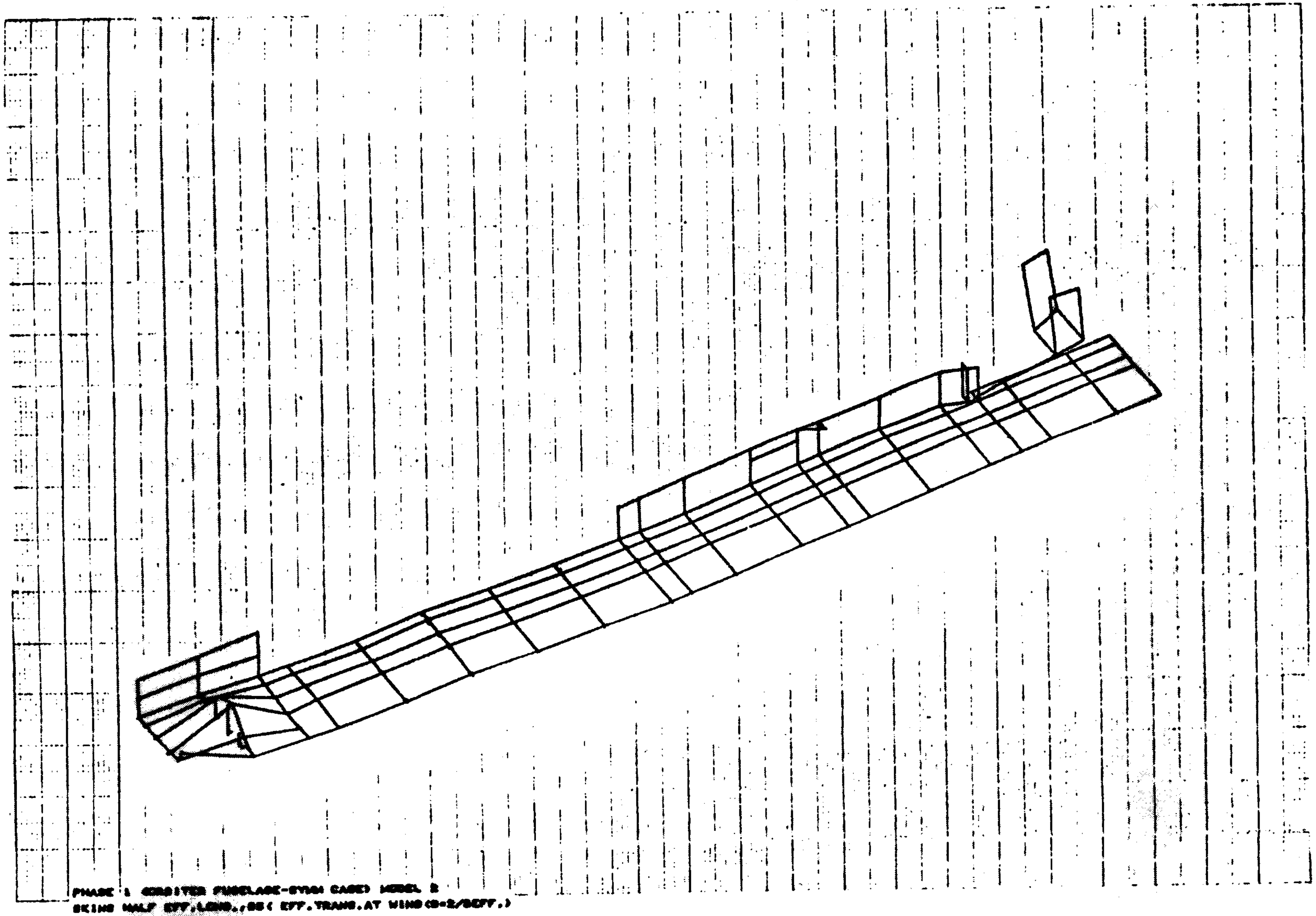
68 10/18/74 MAX-DEF. = 2.10091000

68



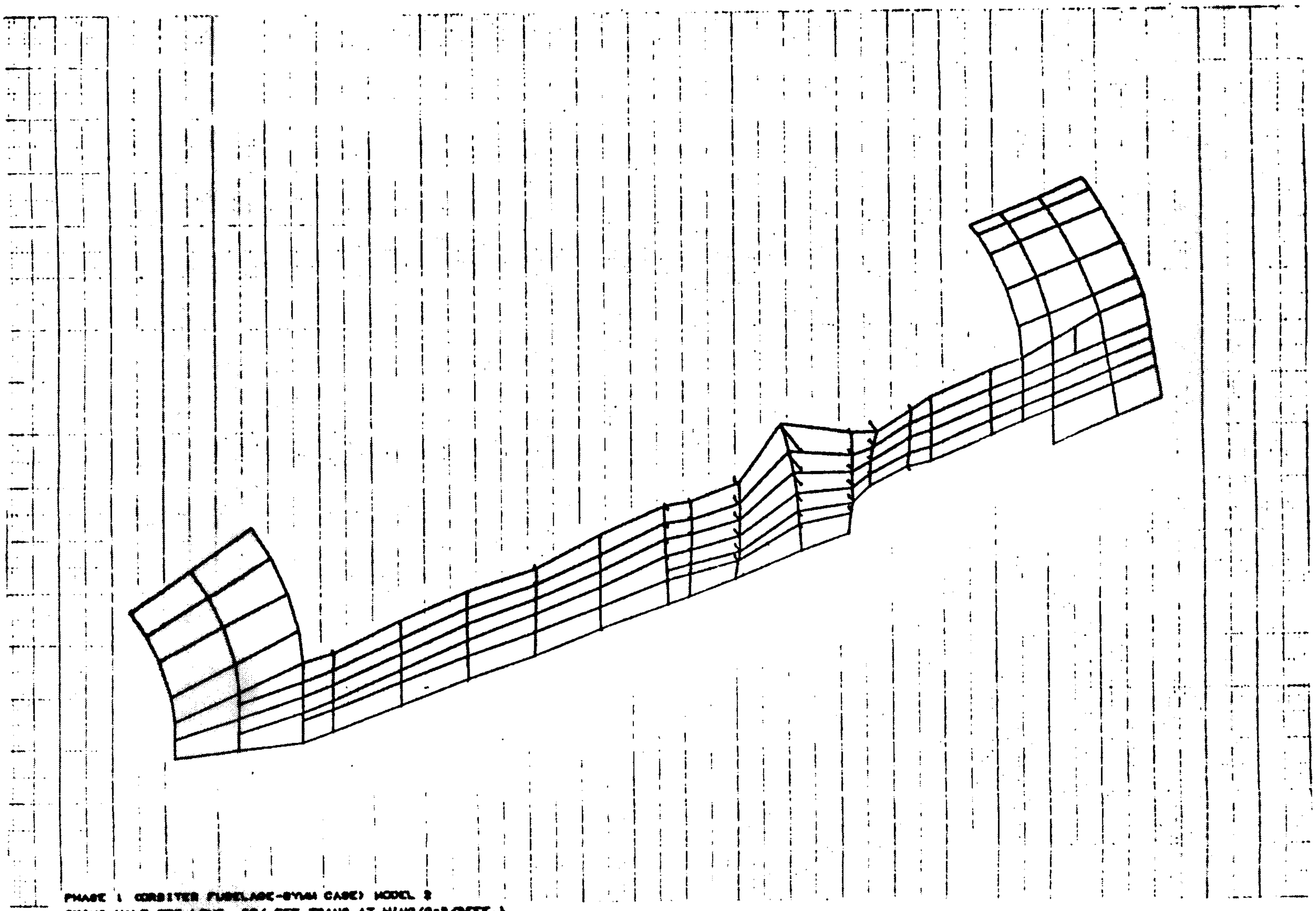
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(S=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 31 MODE 31 FREQ. 1018.917

31 10/10/74 MAX-DEF. = 2.10091000 31

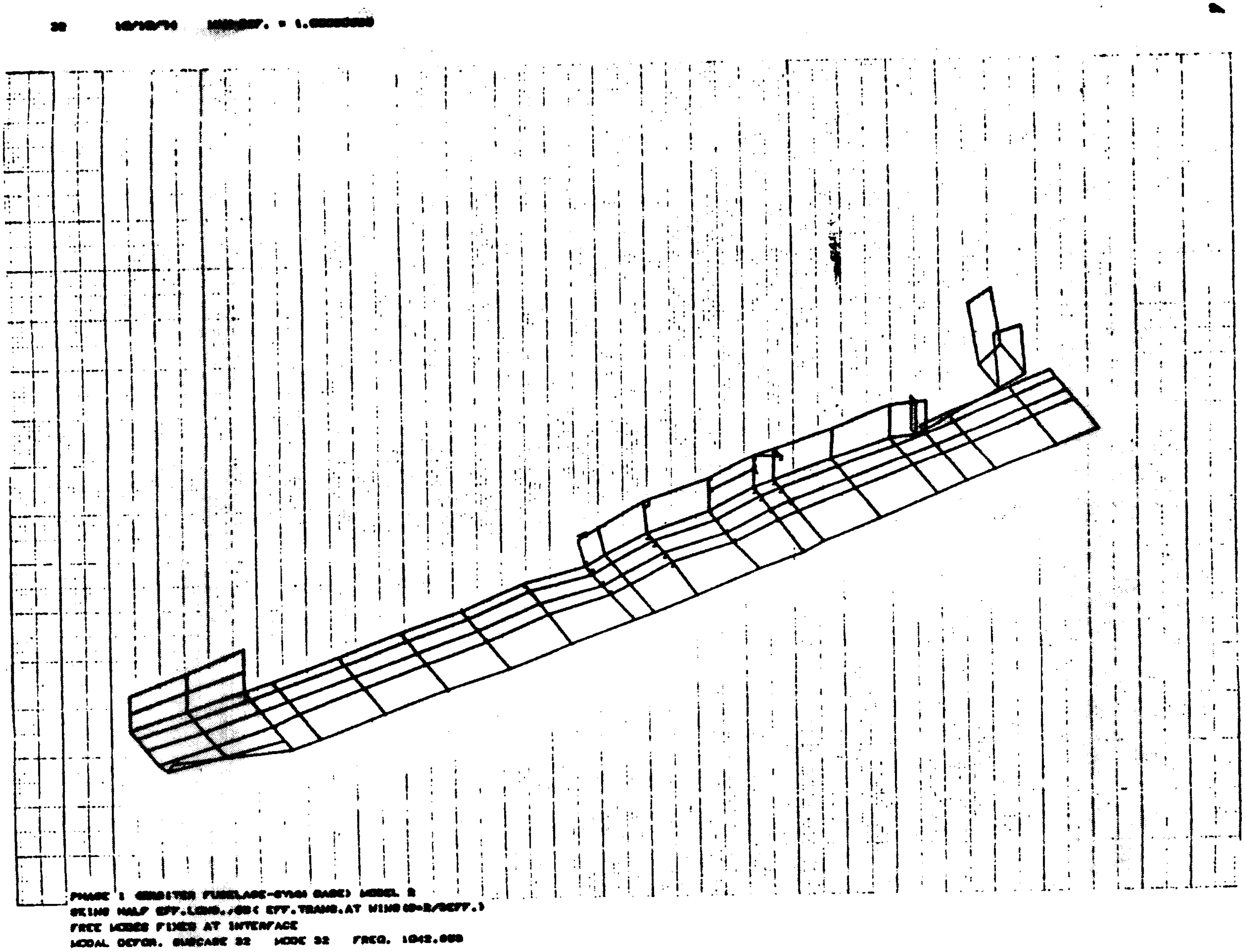


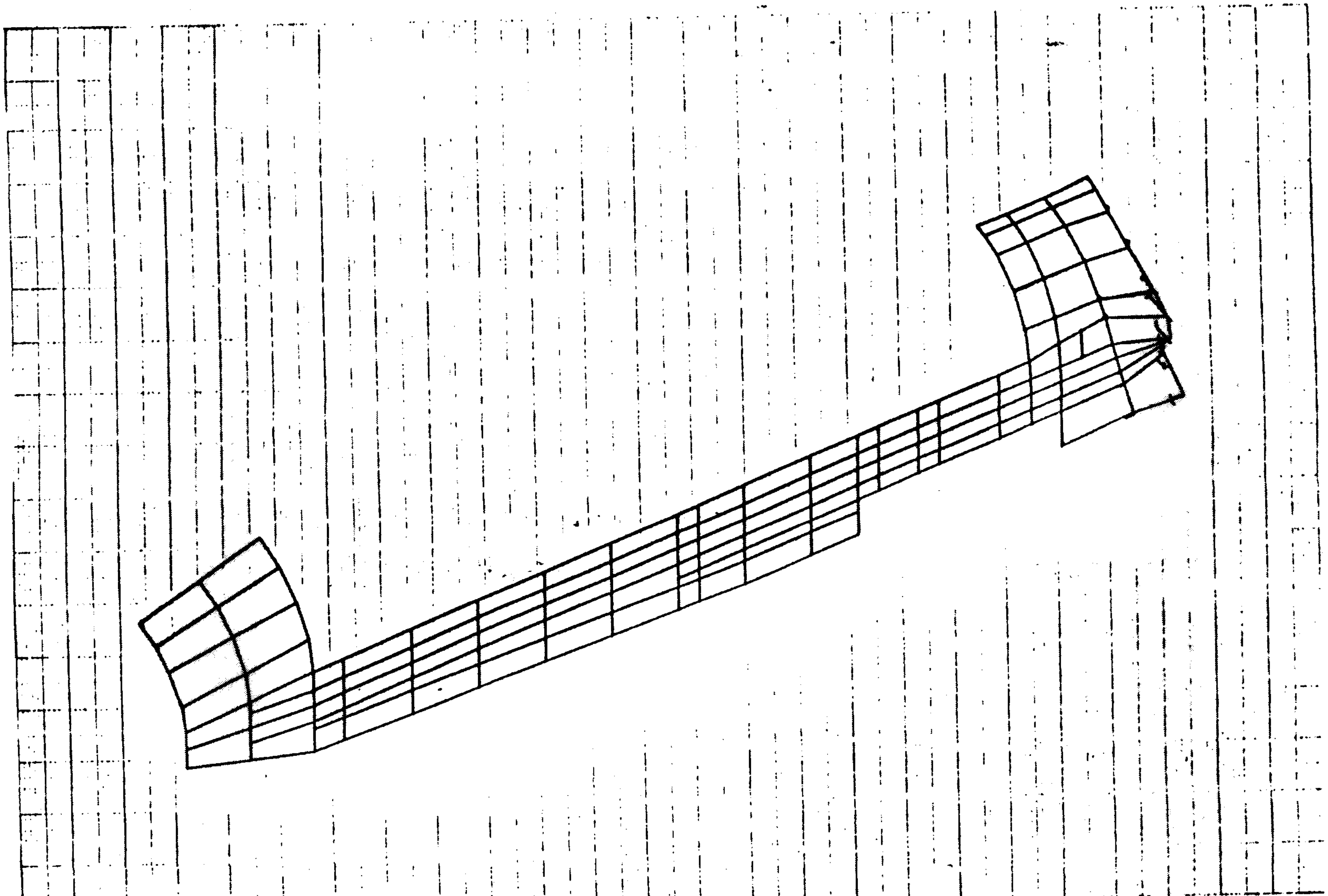
PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(G=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 31 MODE 31 FREQ. 1016.917

69 10/10/74 MAX-DEF. = 1.00000000



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(S=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 32 MODE 32 FREQ. 1042.853

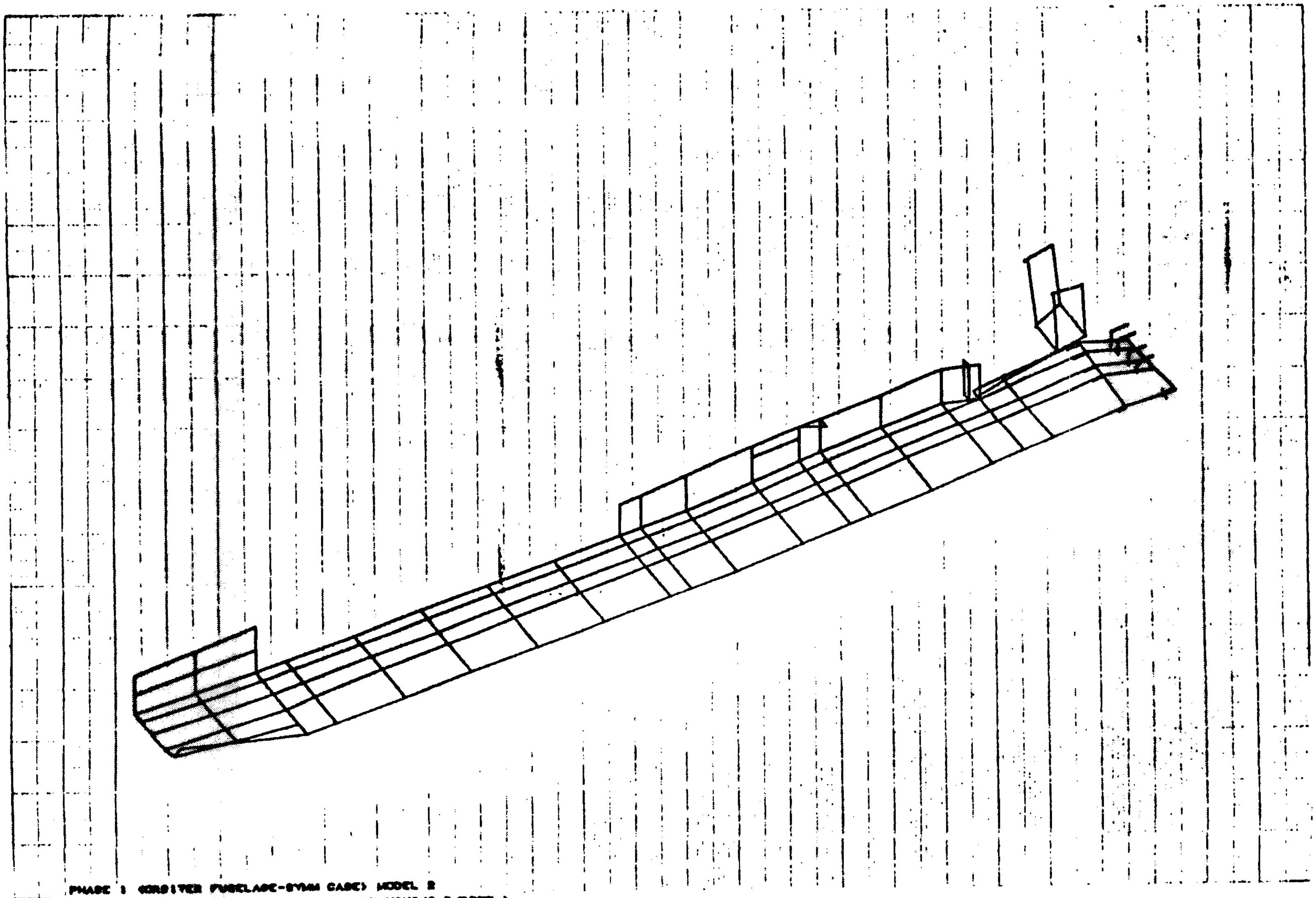

38 10/10/74 MAX-DEF. = 1.000000
PHASE 1 ORBITER FUSELAGE-(YAW CASE) MODEL 2
SKINS HALF EFF.LONG.,ODE EFF.TRANS.AT WING(O=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 32 MODE 32 FREQ. 1042.000


10/18/74 MAX-DEF. = 1.00000000

PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKING HALF EFF.LONG.,.88(EFF.TRANS.AT WING(0.2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 33 MODE 33 FREQ. 1050.401

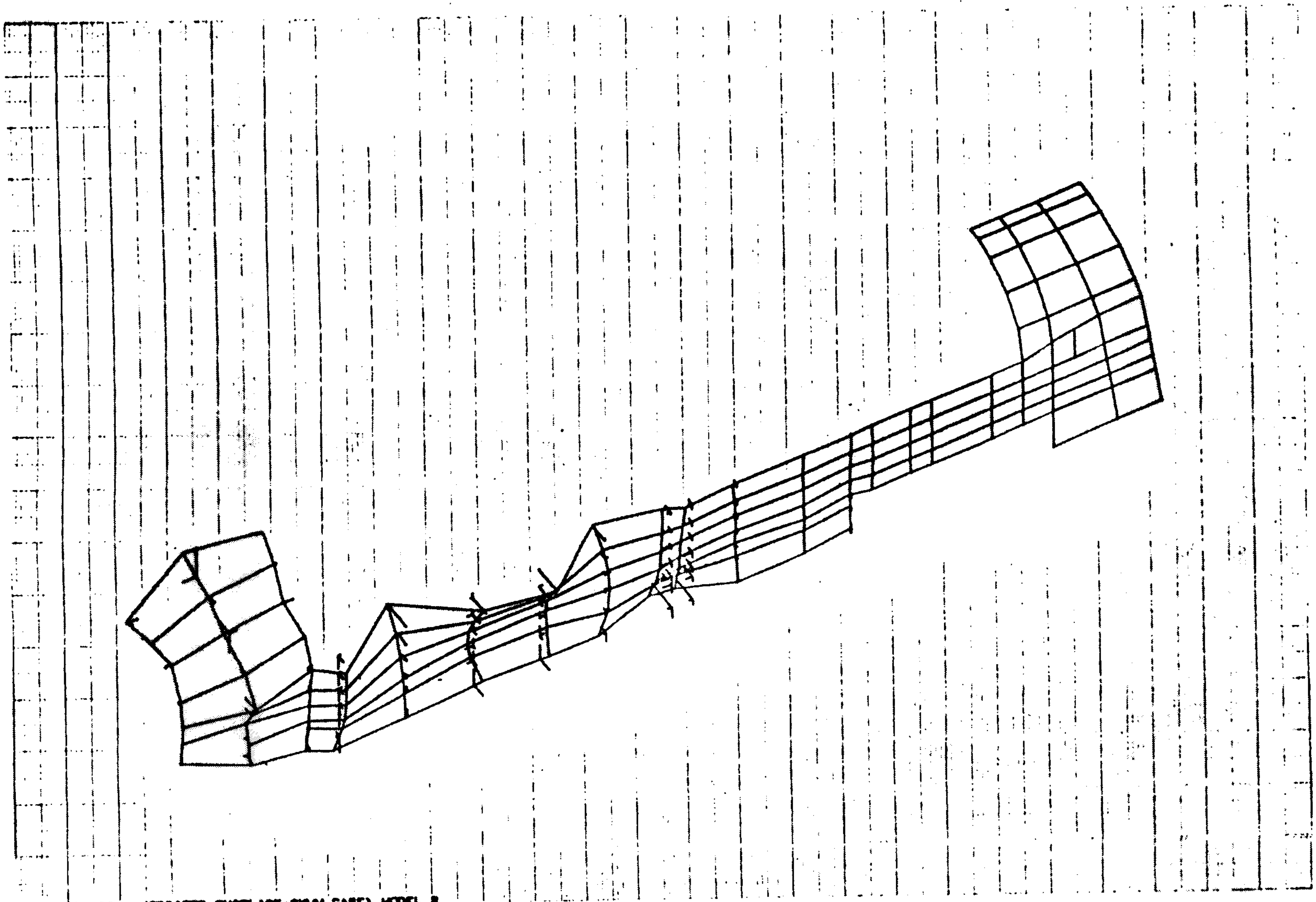
38 10/10/74 MAX-DEF. = 1.00000000

38

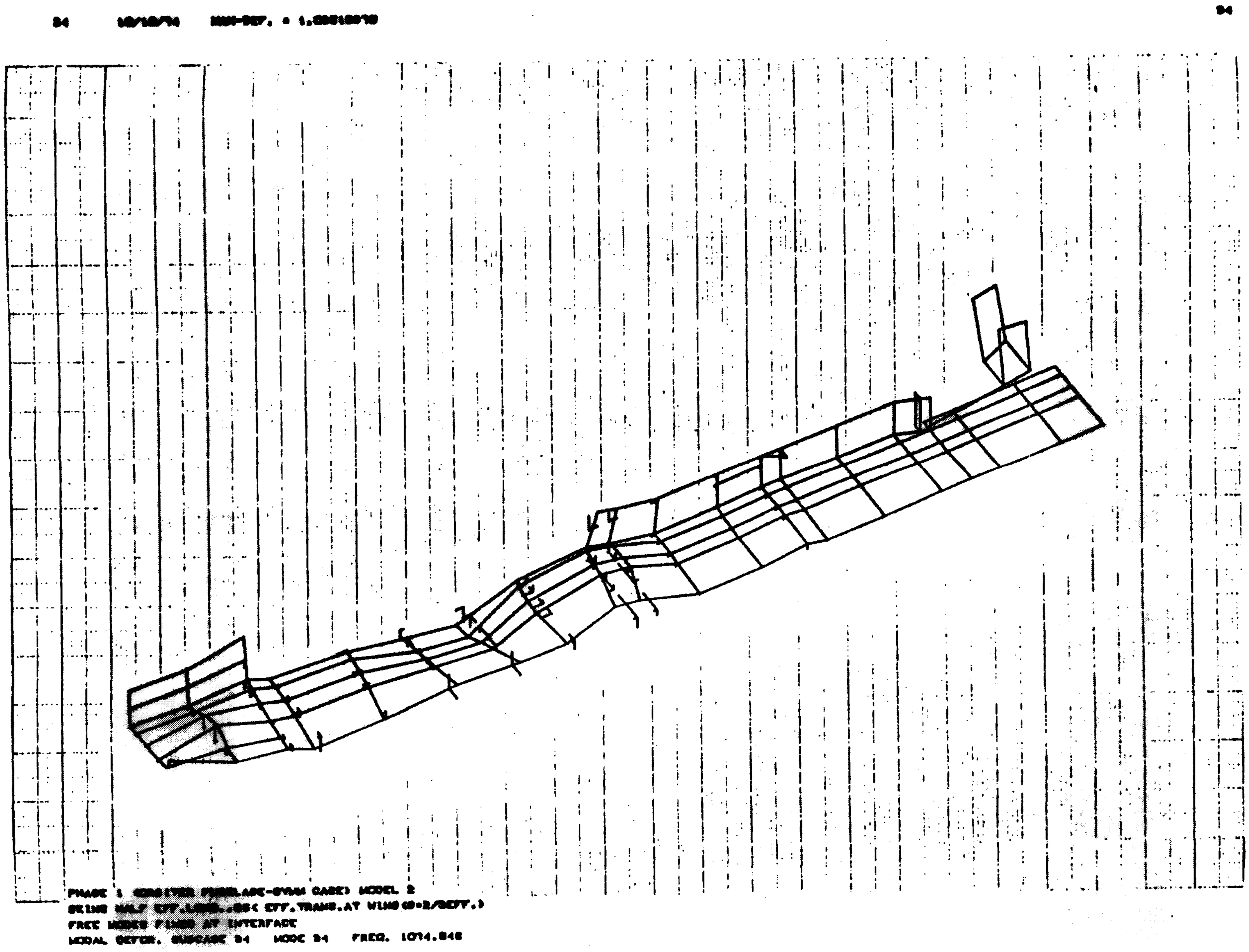


PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 33 MODE 33 FREQ. 1080.401

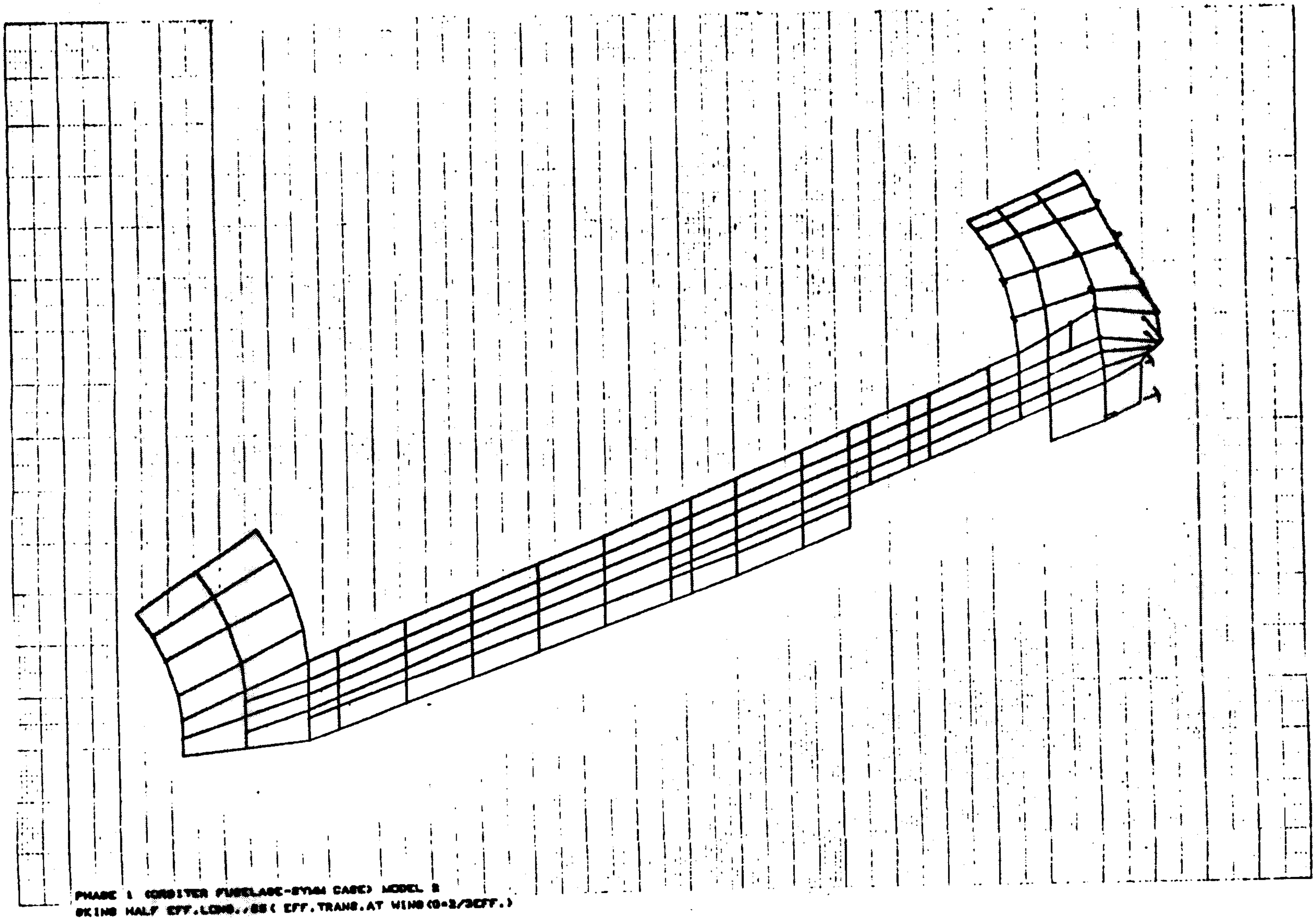
1 10/18/74 MAX-DEF. = 1.[illegible]



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.08(EFF.TRANS.AT WING(S=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 34 MODE 34 FREQ. 1074.848


34 10/10/74 MAX-DEF. = 1.[illegible]
34
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.[illegible].05(EFF.TRANS.AT WING(B=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 34 MODE 34 FREQ. 1074.848

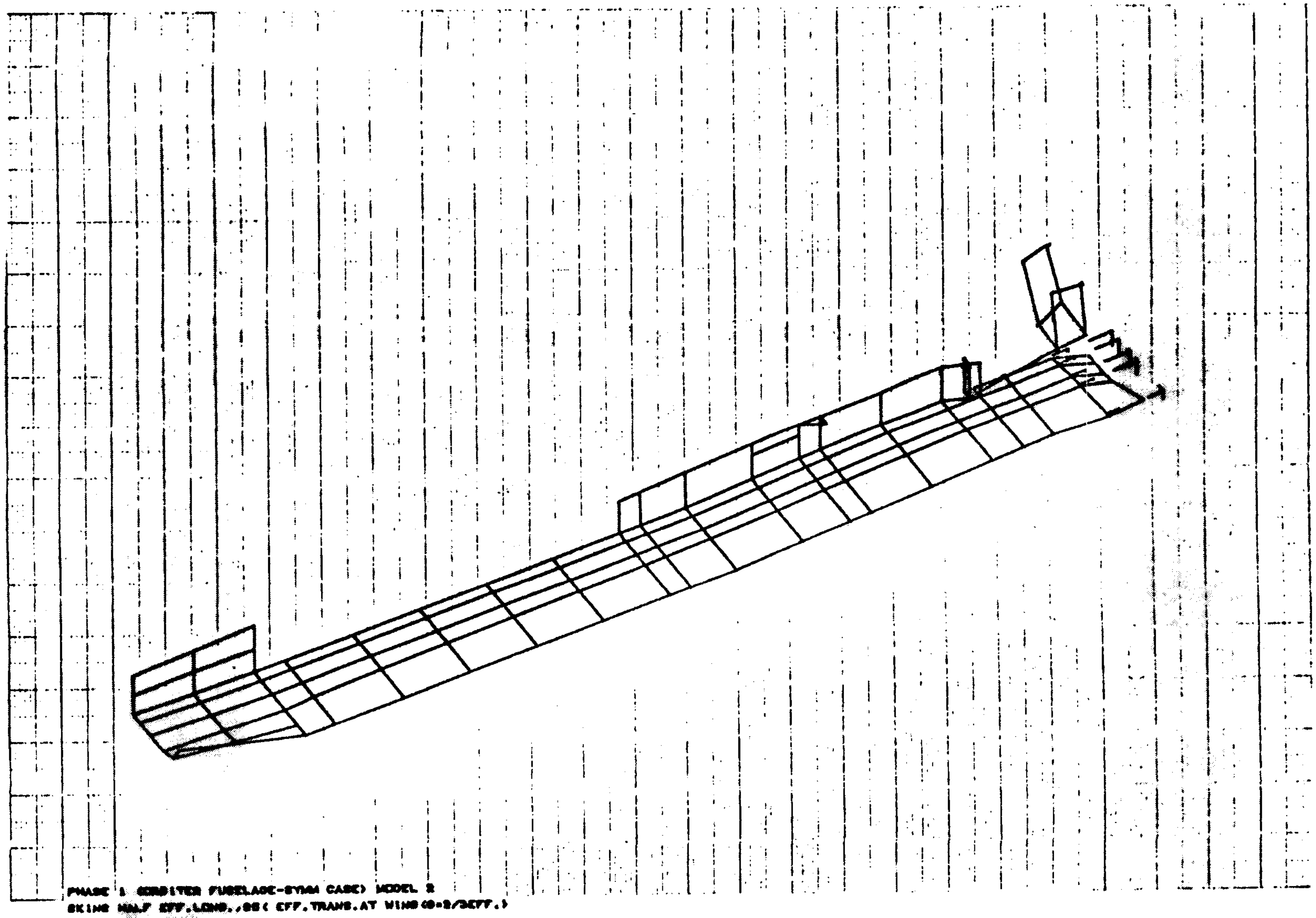
8 10/18/74 MAX-DEF. = 1.[illegible]



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 8
SKINS HALF EFF.LONG.,55(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 35 MODE 35 FREQ. 1055.555

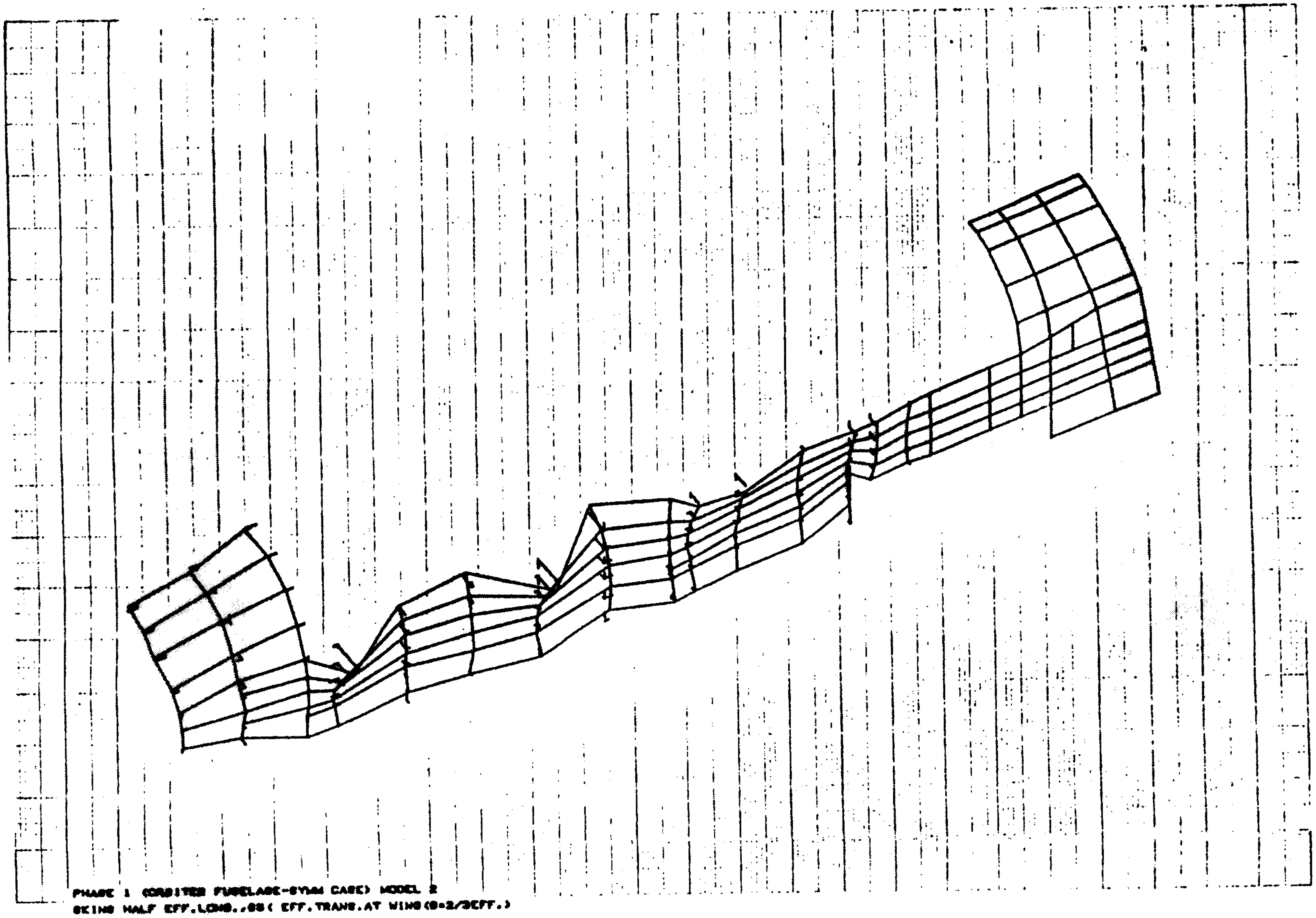
38 10/10/74 MAX-DEF. = 1.00000000

38



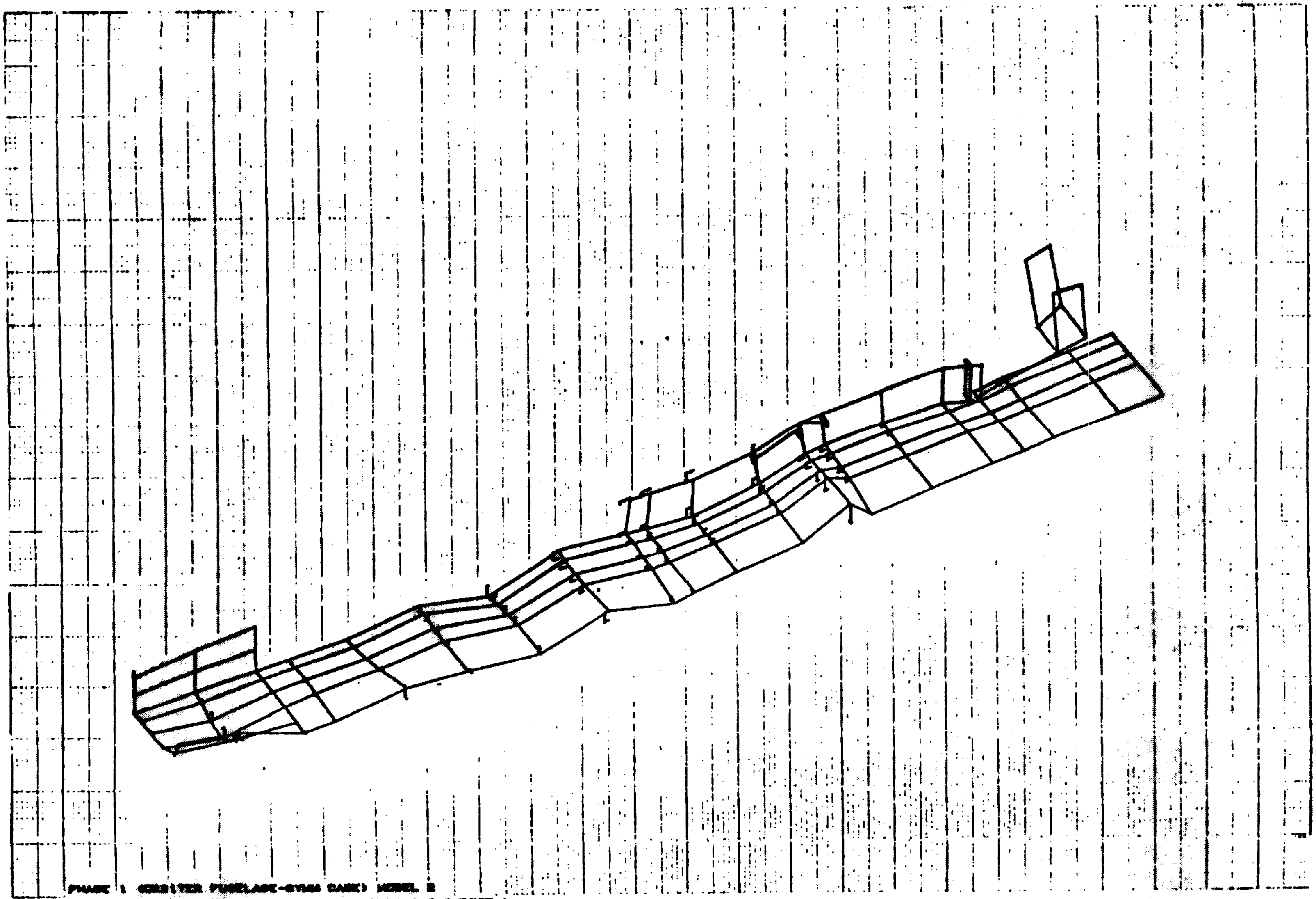
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.08(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 38 MODE 38 FREQ. 1088.008

9 10/18/94 MAX-DEF. = 1.00000000



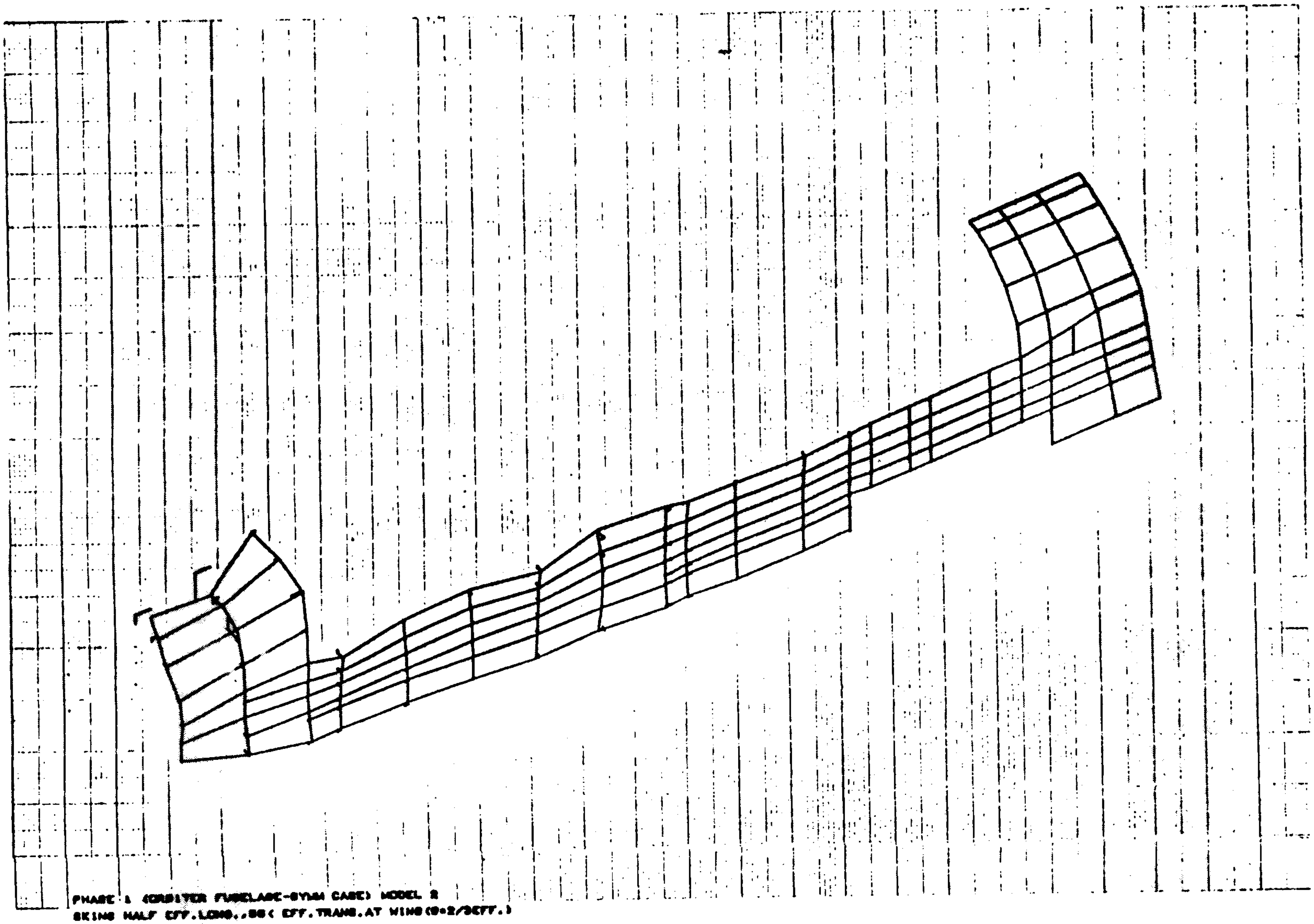
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,0S(EFF.TRANS.AT WING(S=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 30 MODE 30 FREQ. 1137.187

30 10/18/74 MAX-DEF. = 1.0000000



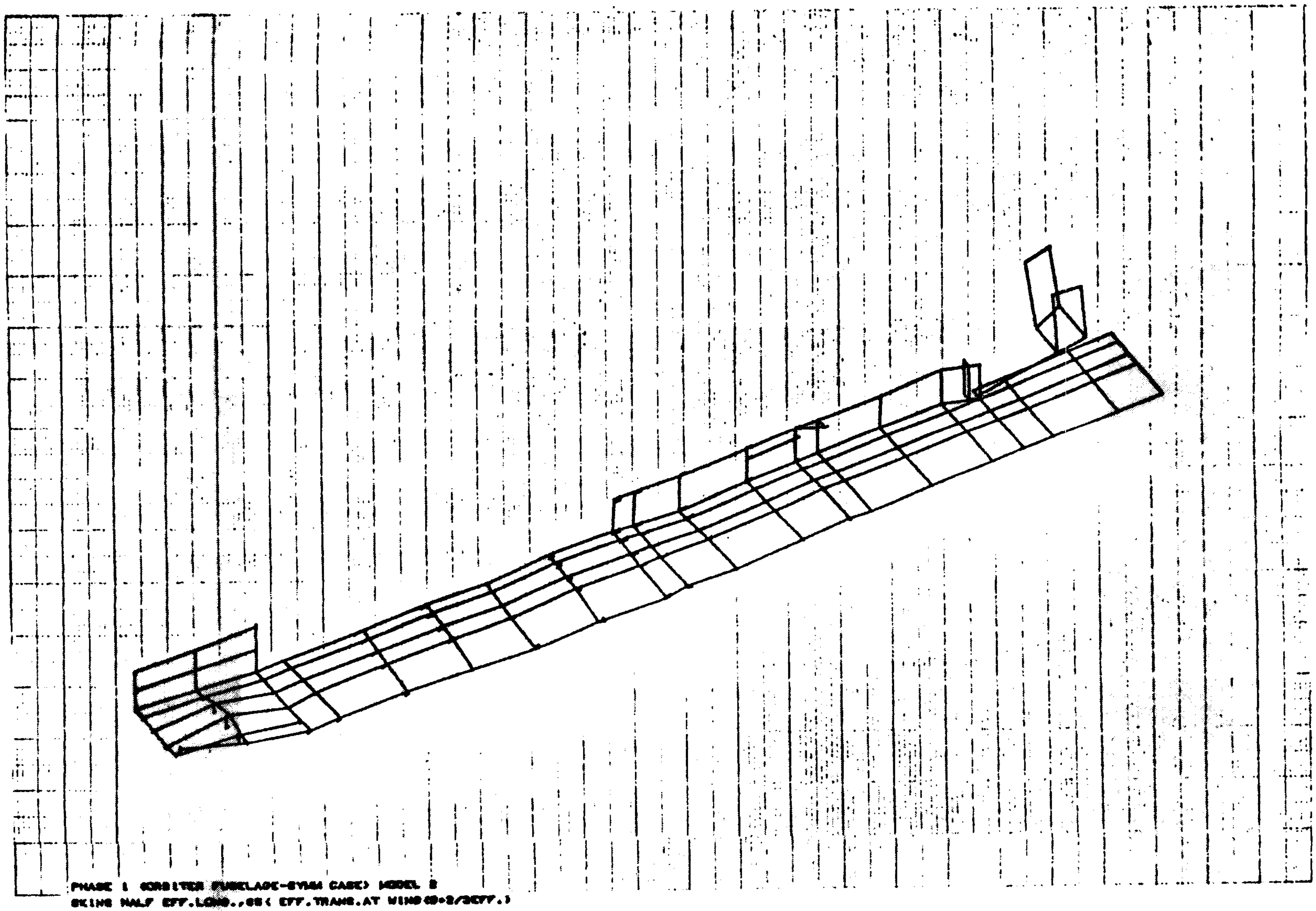
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.0%(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 30 MODE 30 FREQ. 1137.187

4 10/12/74 MAX-DEF. = 2.50716100

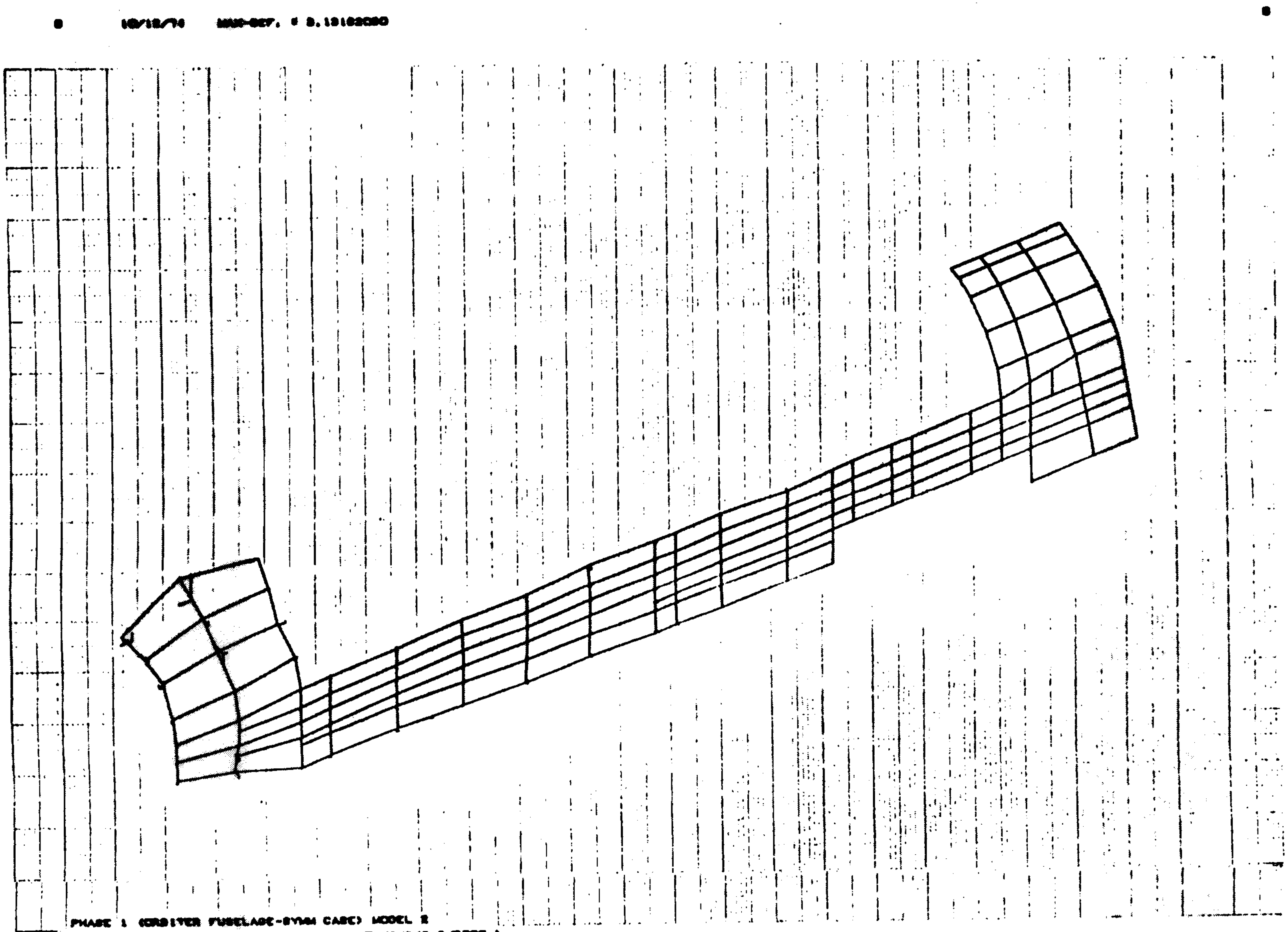


PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.5& EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 37 MODE 37 FREQ. 1140.540

37 10/18/74 MAX-DEF. = 2.28716160 37

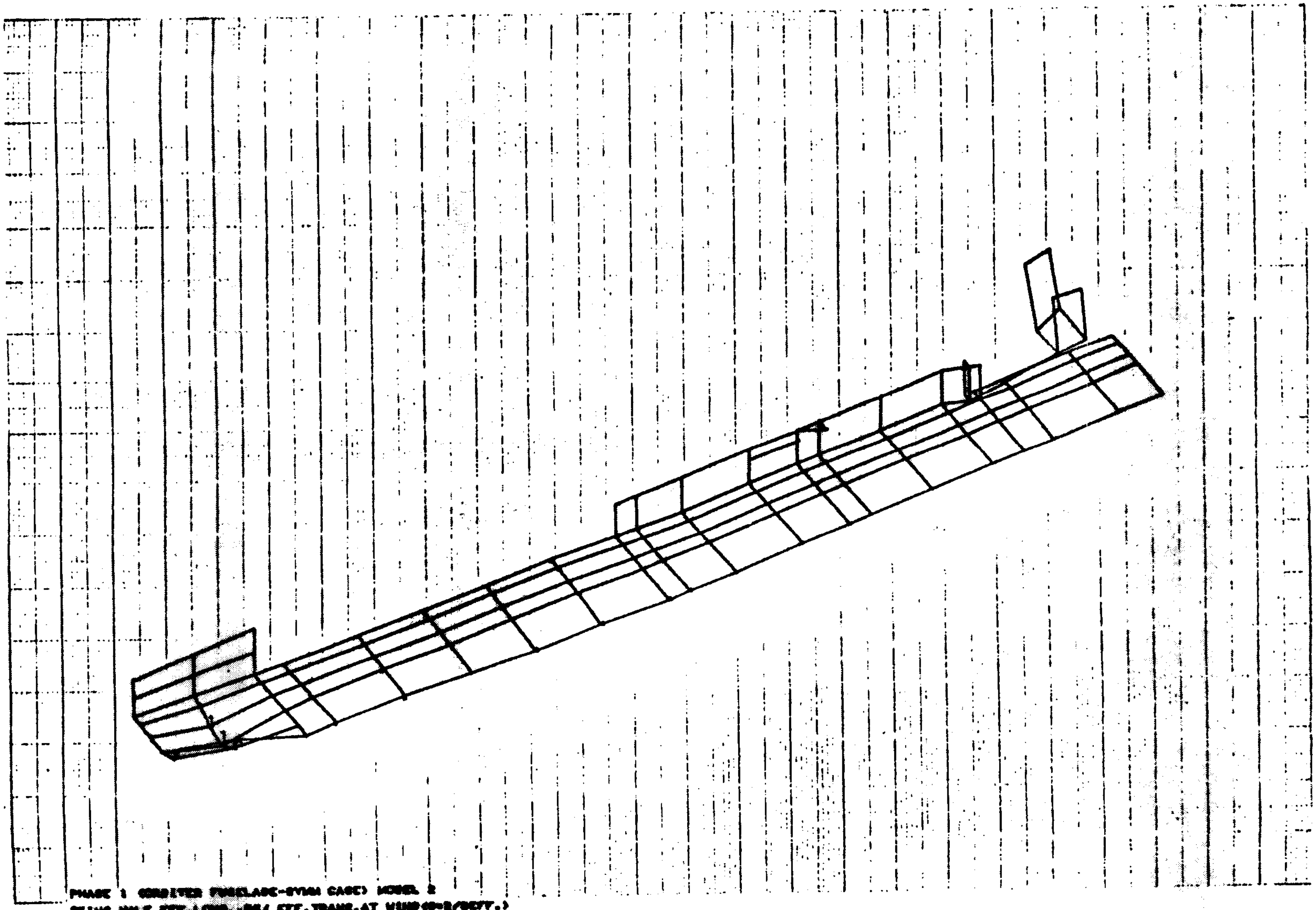


PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.65(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 37 MODE 37 FREQ. 1140.840


10/12/74 MAX-DEF. = 3.13162080

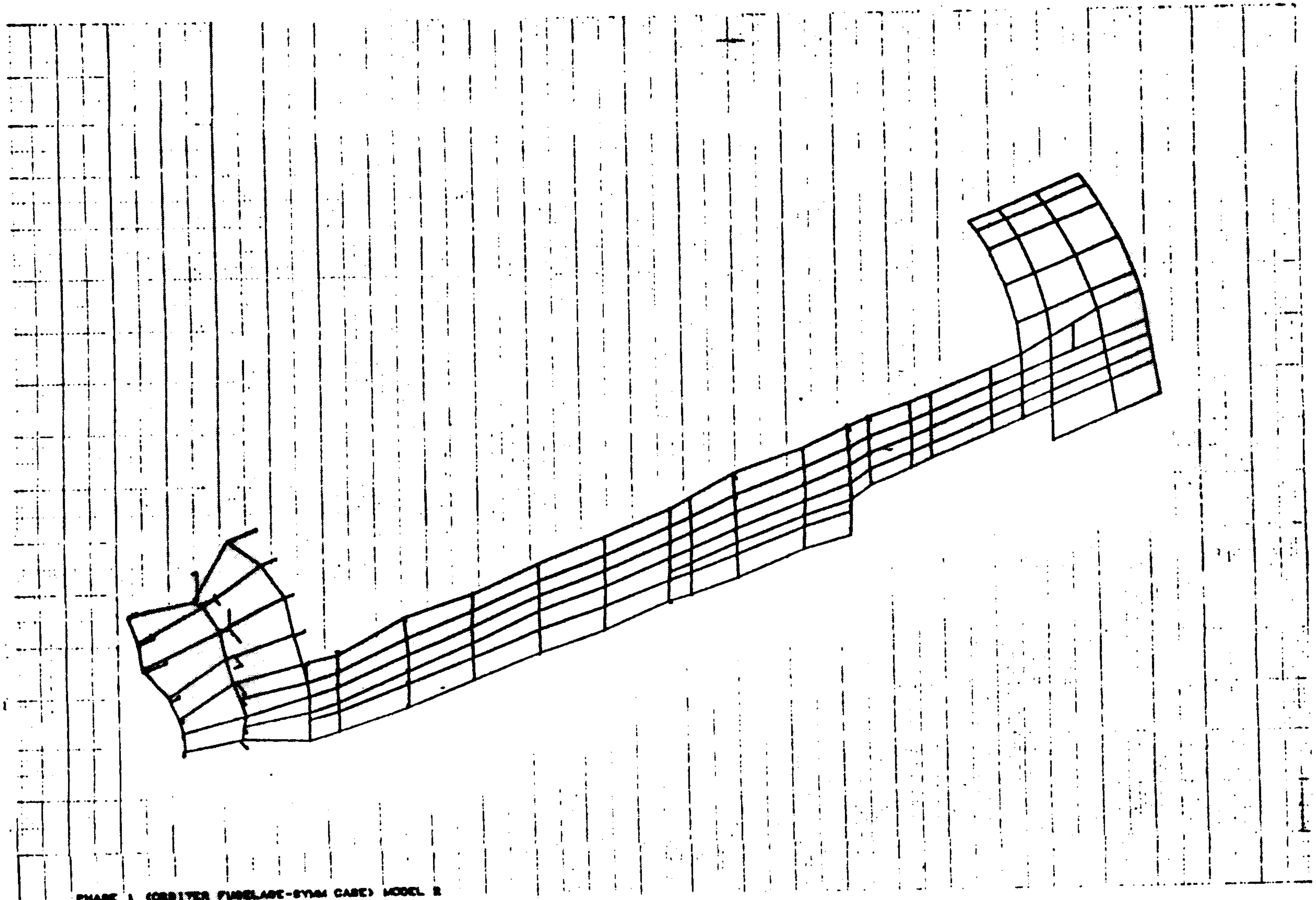
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,88(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 38 MODE 38 FREQ. 1154.862

38   10/10/74   MAX-DEF. = 0.15100000   38



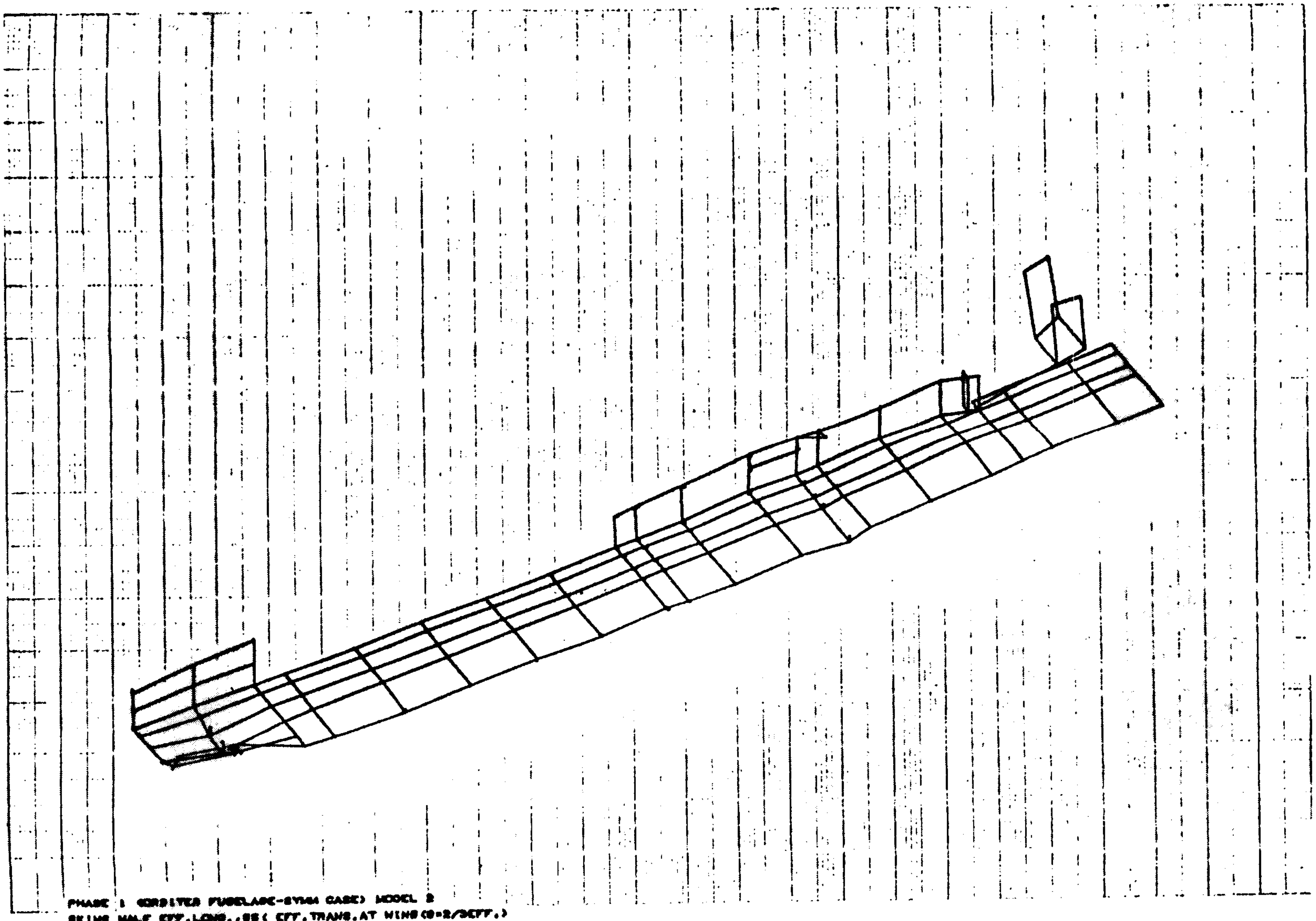
PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.25(EFF.TRANS.AT WING(0=2/EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 38   MODE 38   FREQ. 1164.082

[illegible]



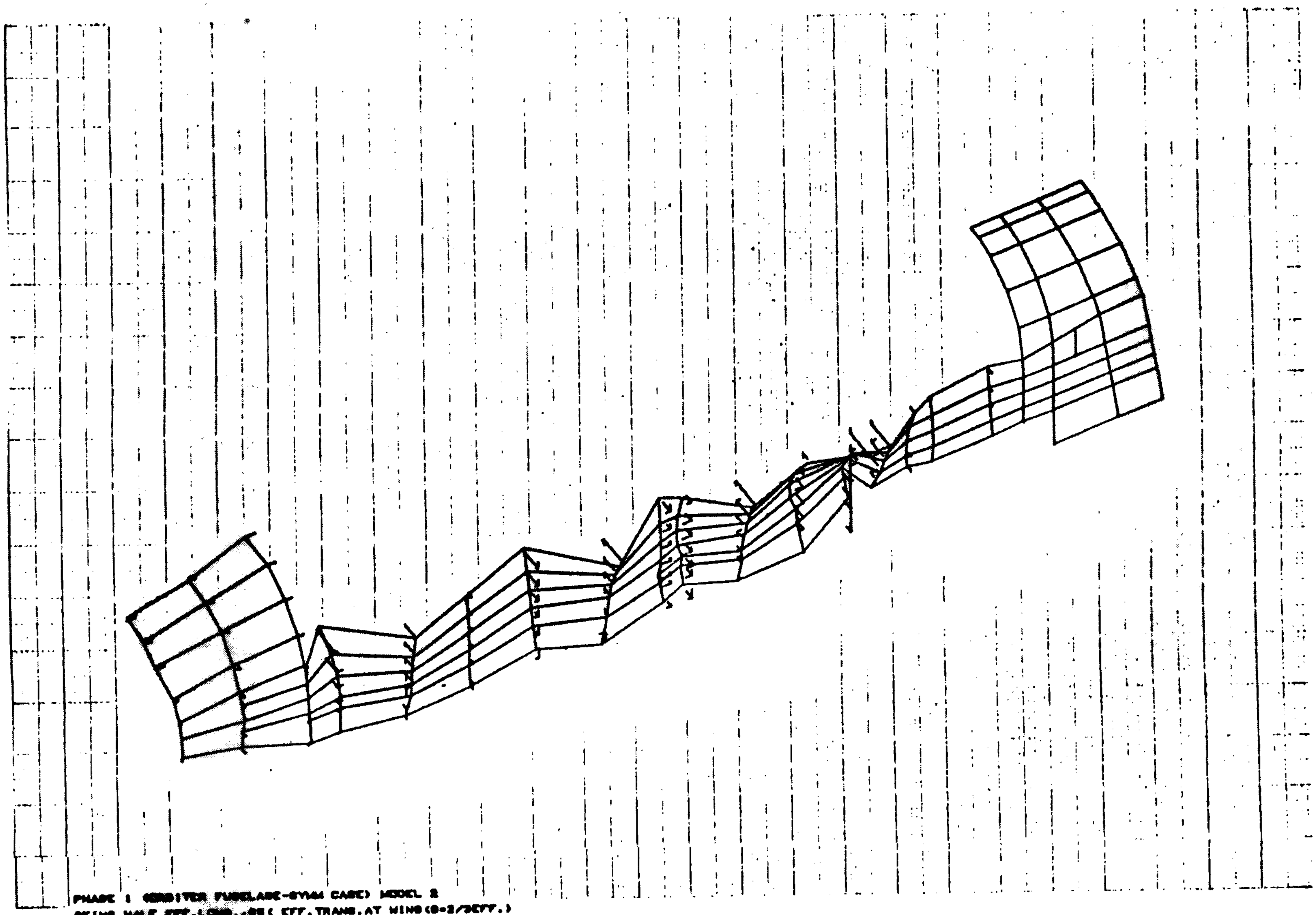
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.88(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 39 MODE 39 FREQ. 1160.379

39   10/10/74   MAX-DEF. = 1.20176120



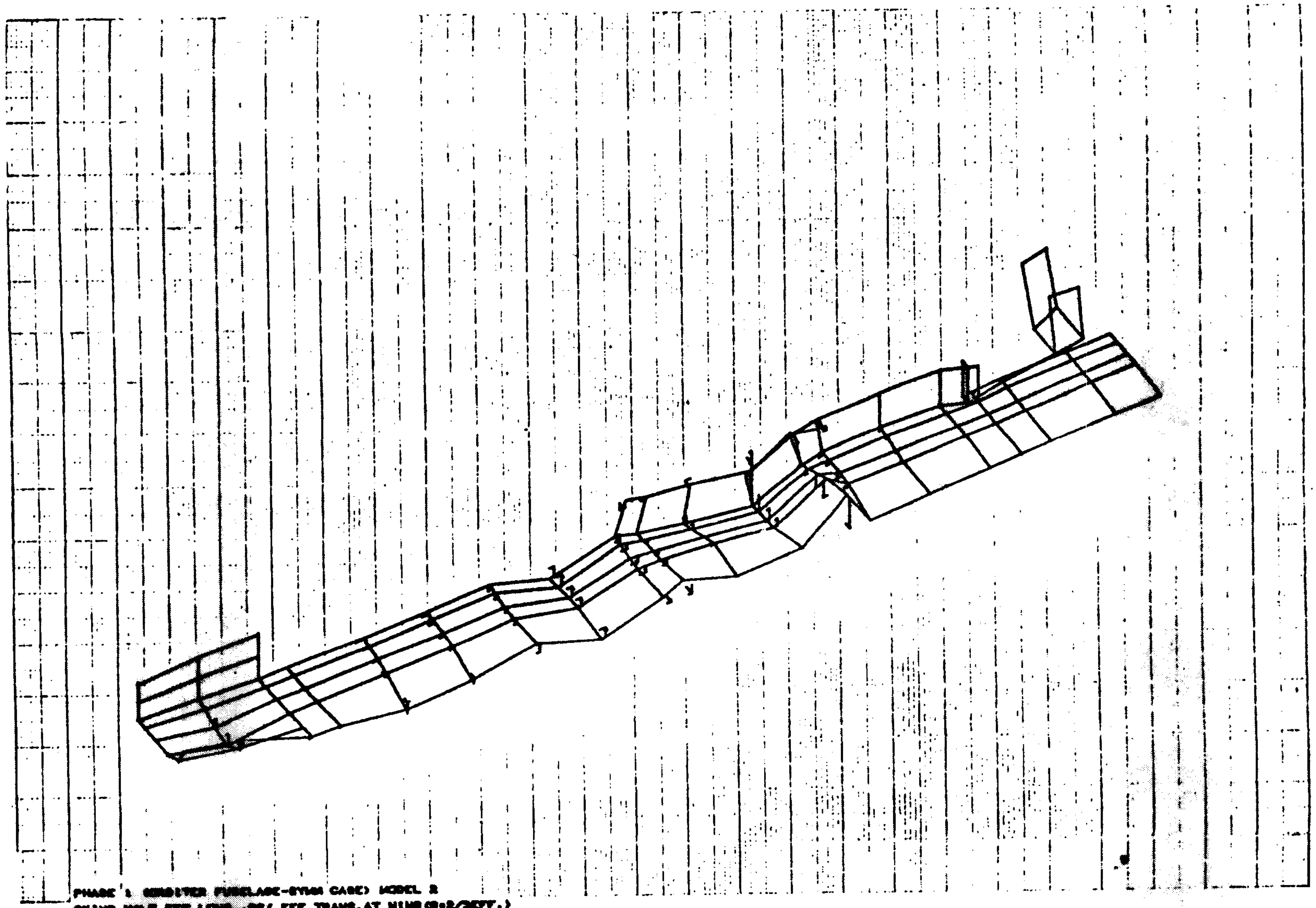
PHASE 1 ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.55(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 39   MODE 39   FREQ. 1160.379

9 10/18/74 MAX-DEF. = 1.0000000



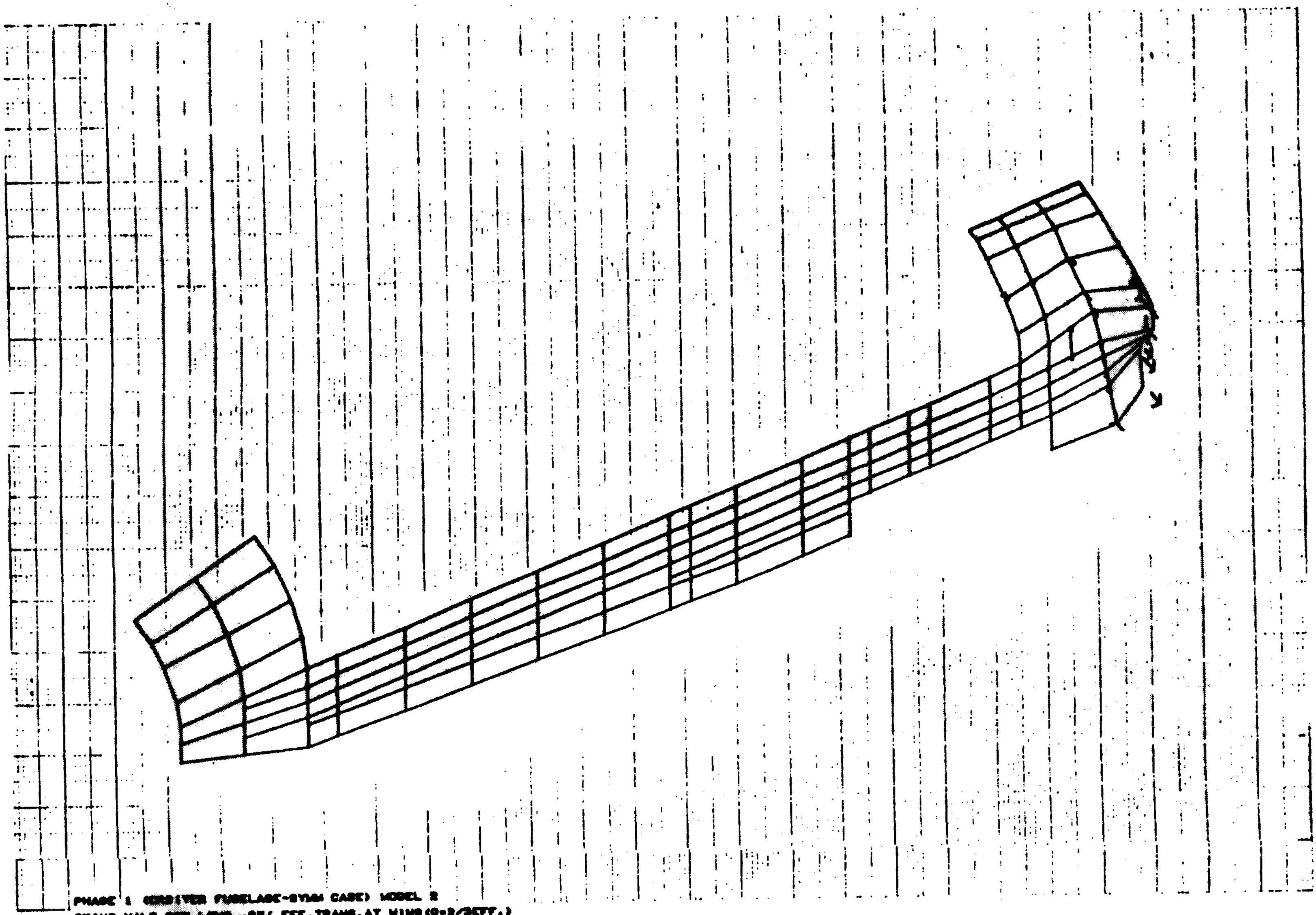
PHASE 1 (ORBITER FUSELAGE-SYM CASE) MODEL 2
BEING HALF EFF.LONG.,.05(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 40 MODE 40 FREQ. 1179.880

40 10/10/74 MAX-DEF. = 1.00000000



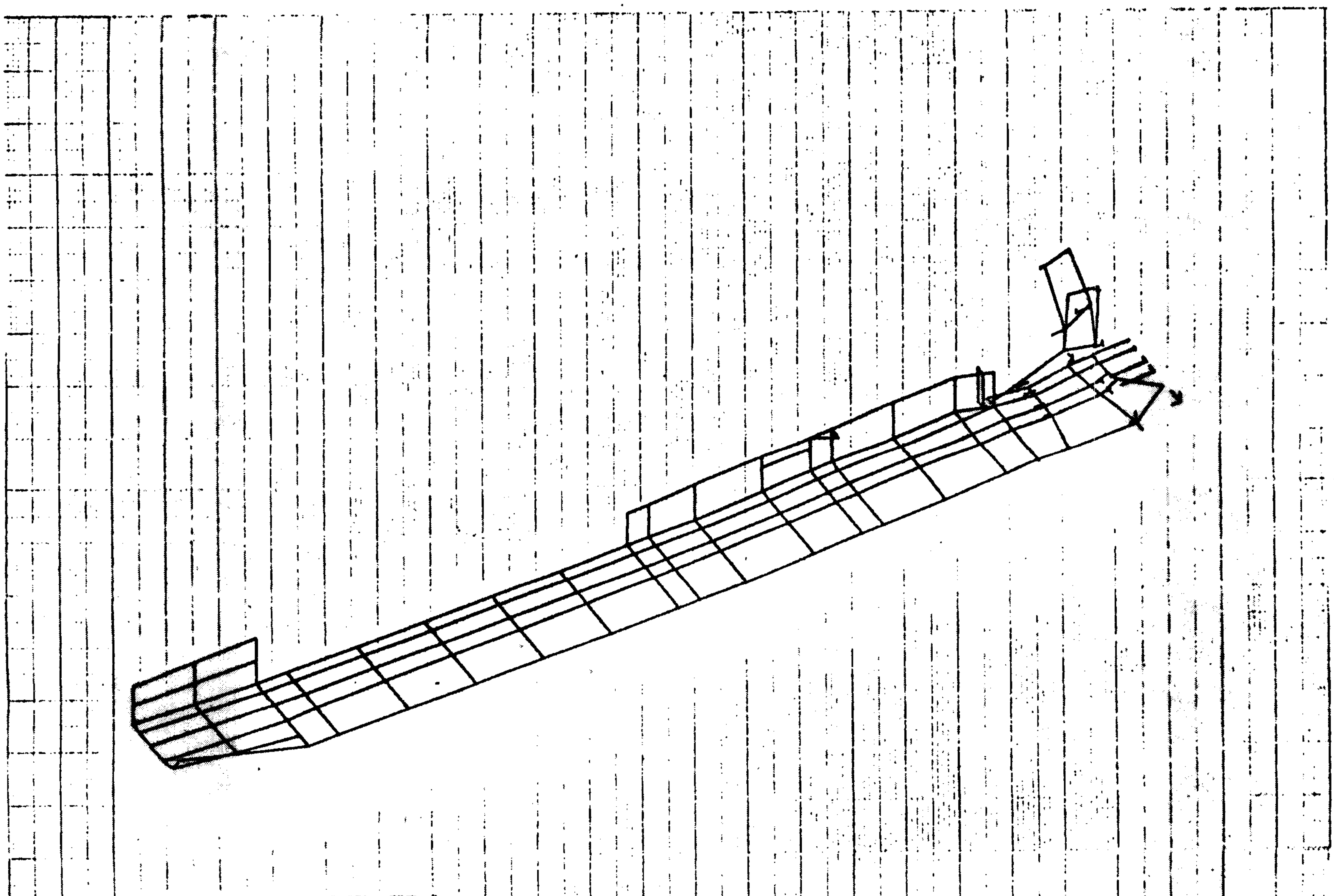
PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.06(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 40 MODE 40 FREQ. 1179.880

6 [illegible] MAX-DEF. = 1.[illegible]

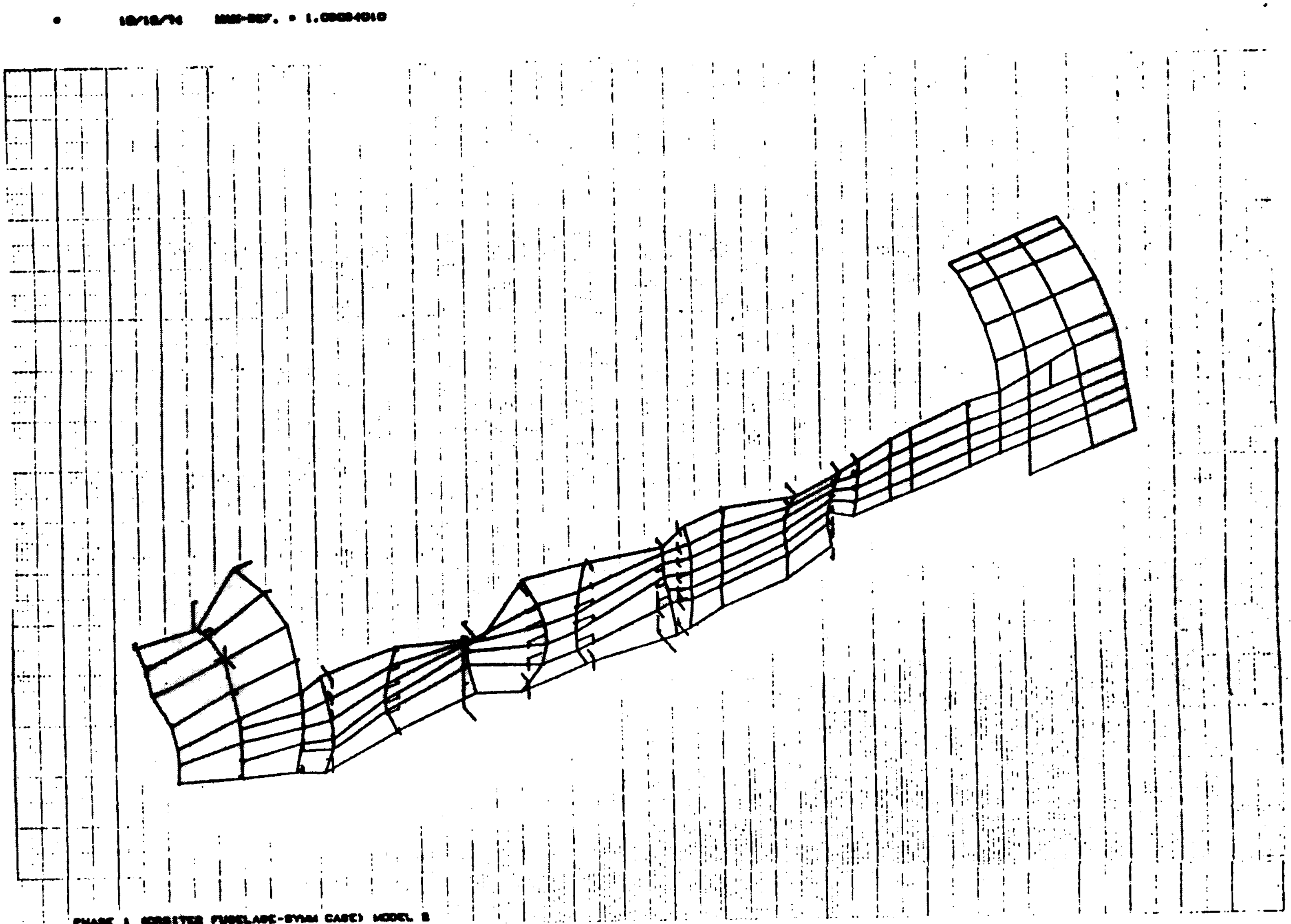


PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 41   MODE 41   FREQ. 1107.302

41 10/10/74 MAX-DEF. = 1.200[illegible] 41

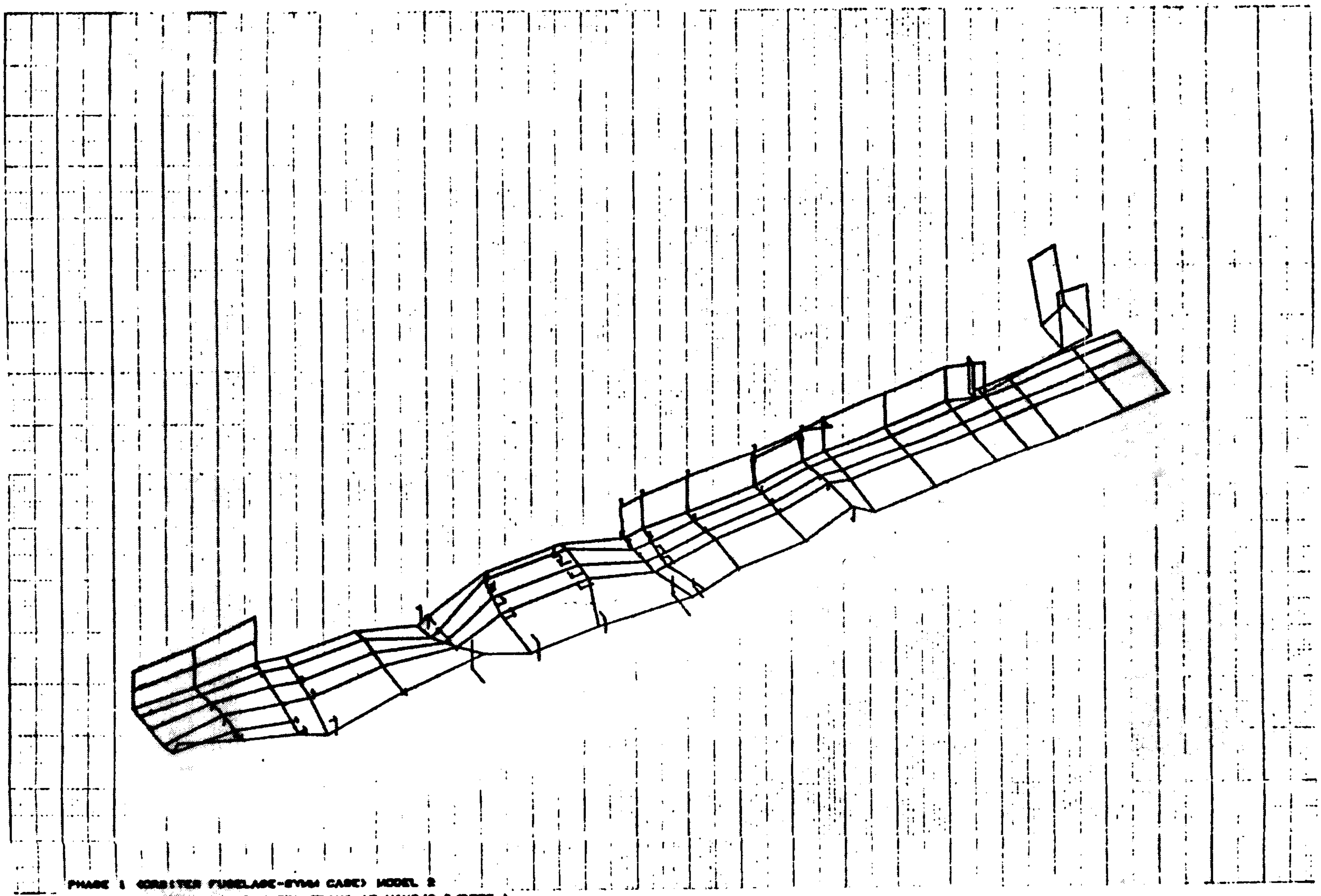


PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 41 MODE 41 FREQ. 1107.302

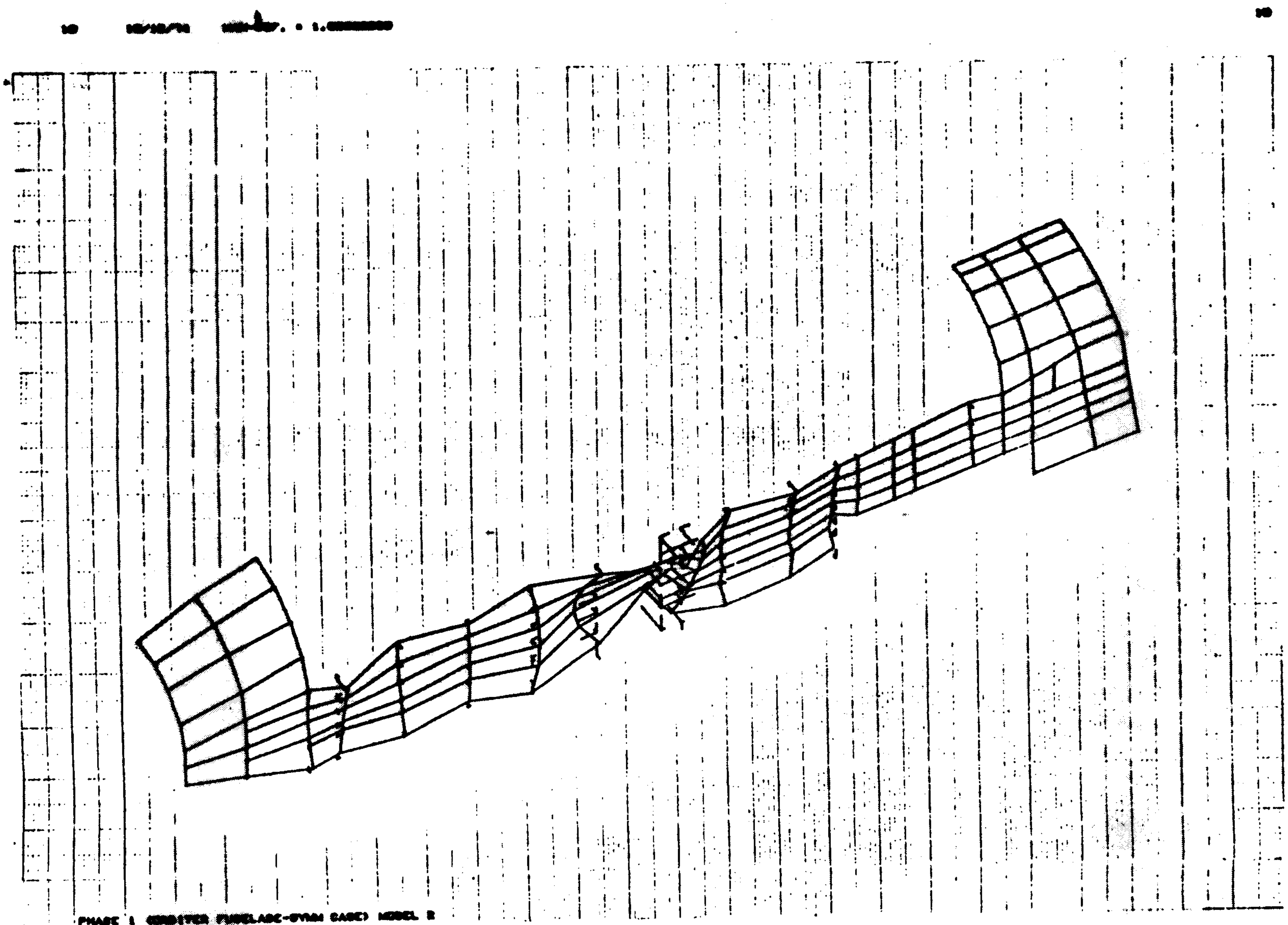

10/18/74 MAX-DEF. = 1.08084010

PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL B
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(G=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 42 MODE 42 FREQ. 1208.887

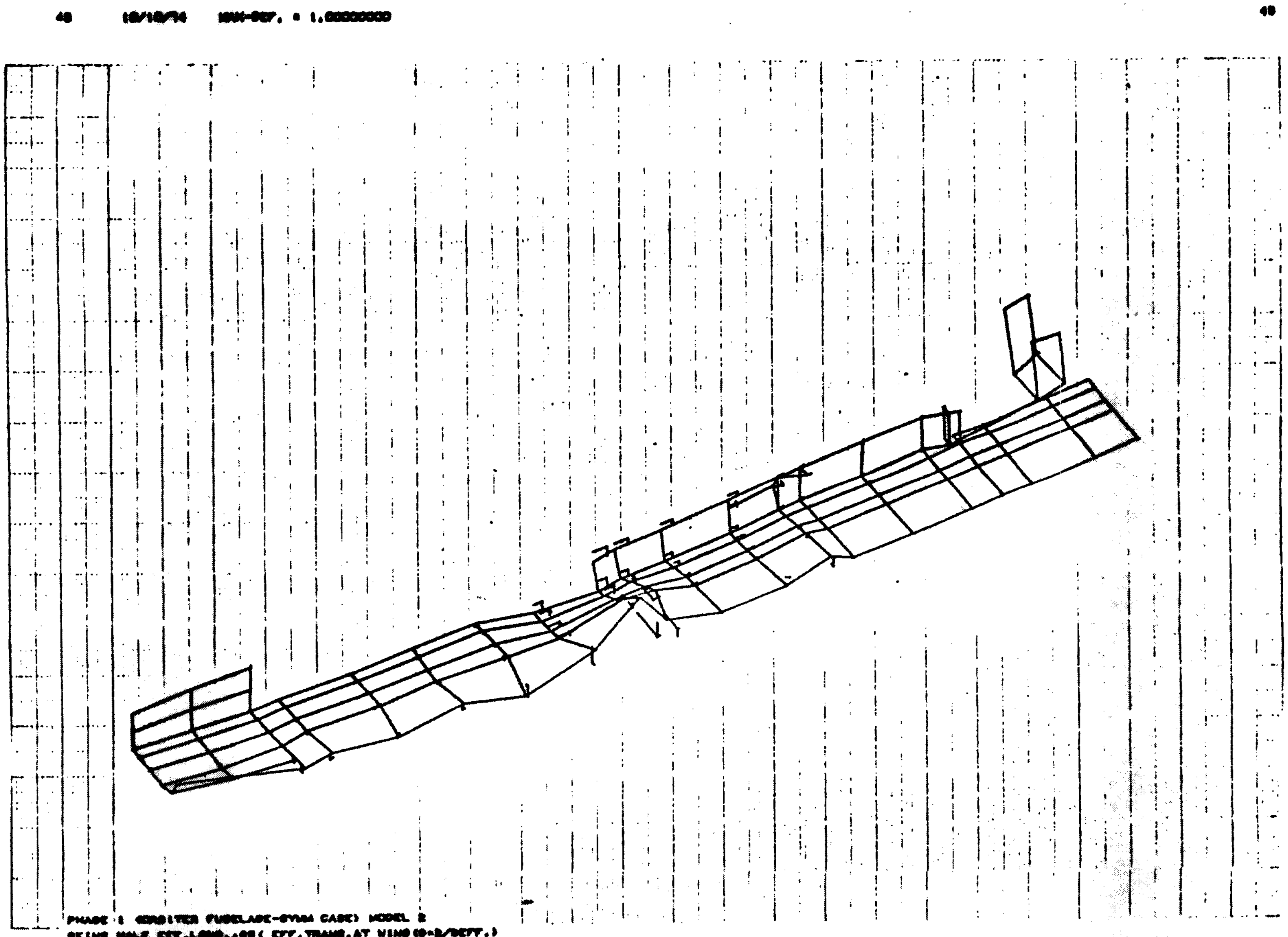
42   10/18/74 . MAX-DEF. = 1.0000+010   42



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,05(EFF.TRANS.AT WING(G=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 42   MODE 42   FREQ. 1208.887

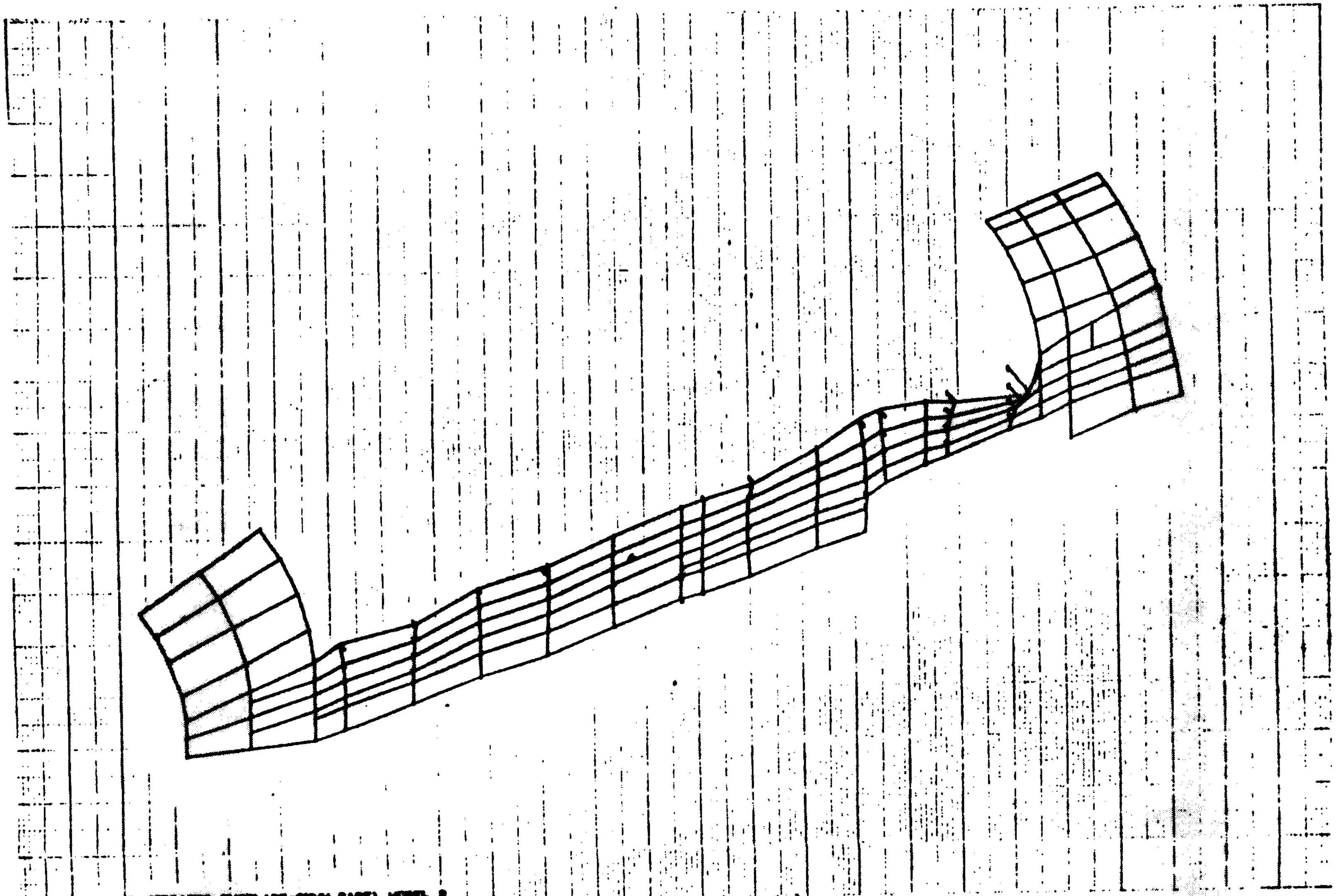


PHASE 1 (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,0%(EFF.TRANS.AT WING(B=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 43 MODE 43 FREQ. 1254.131


48
10/18/74
MAX-DEF. = 1.00000000
48

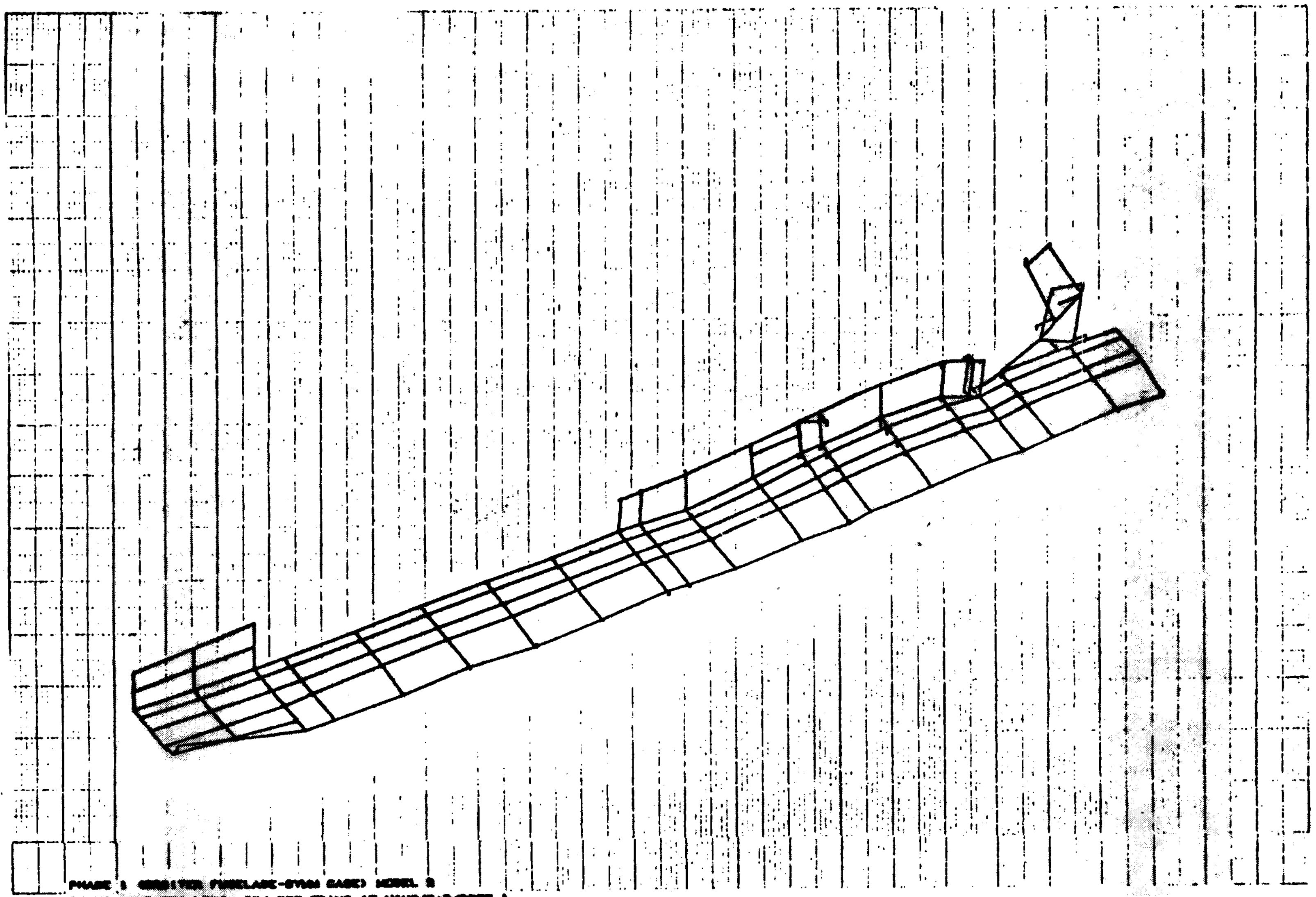
PHASE 1 ORBITER FUSELAGE-(SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,05(EFF.TRANS.AT WING(0-2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 43 MODE 43 FREQ. 1264.131

11 [illegible] MAX-DEF. = 1.[illegible]

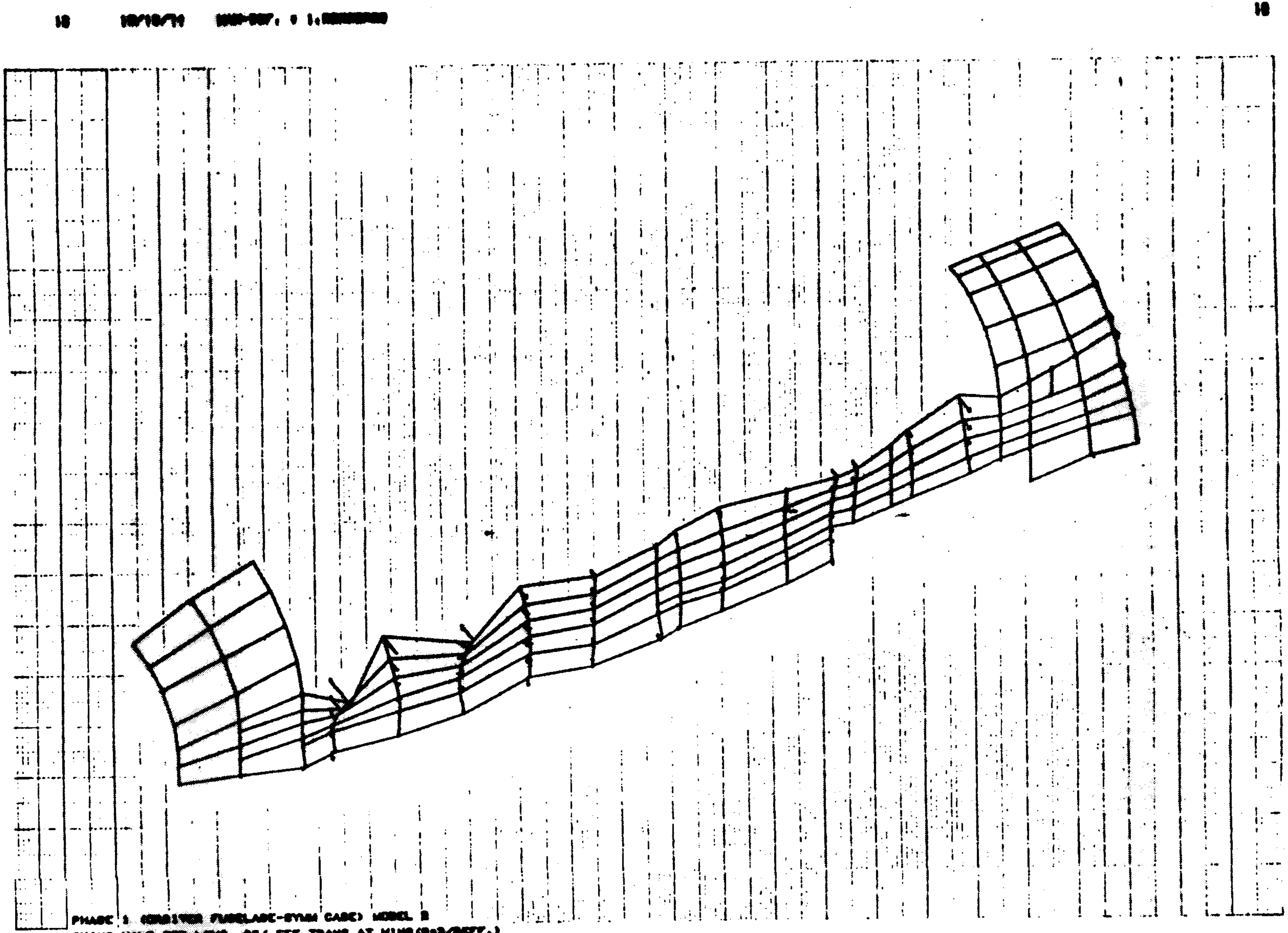


PHASE 1 (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.08(EFF.TRANS.AT WING(S=2/SEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 44 MODE 44 FREQ. 1271.000

44 [illegible] MAX-DEF. = 1.[illegible] 44



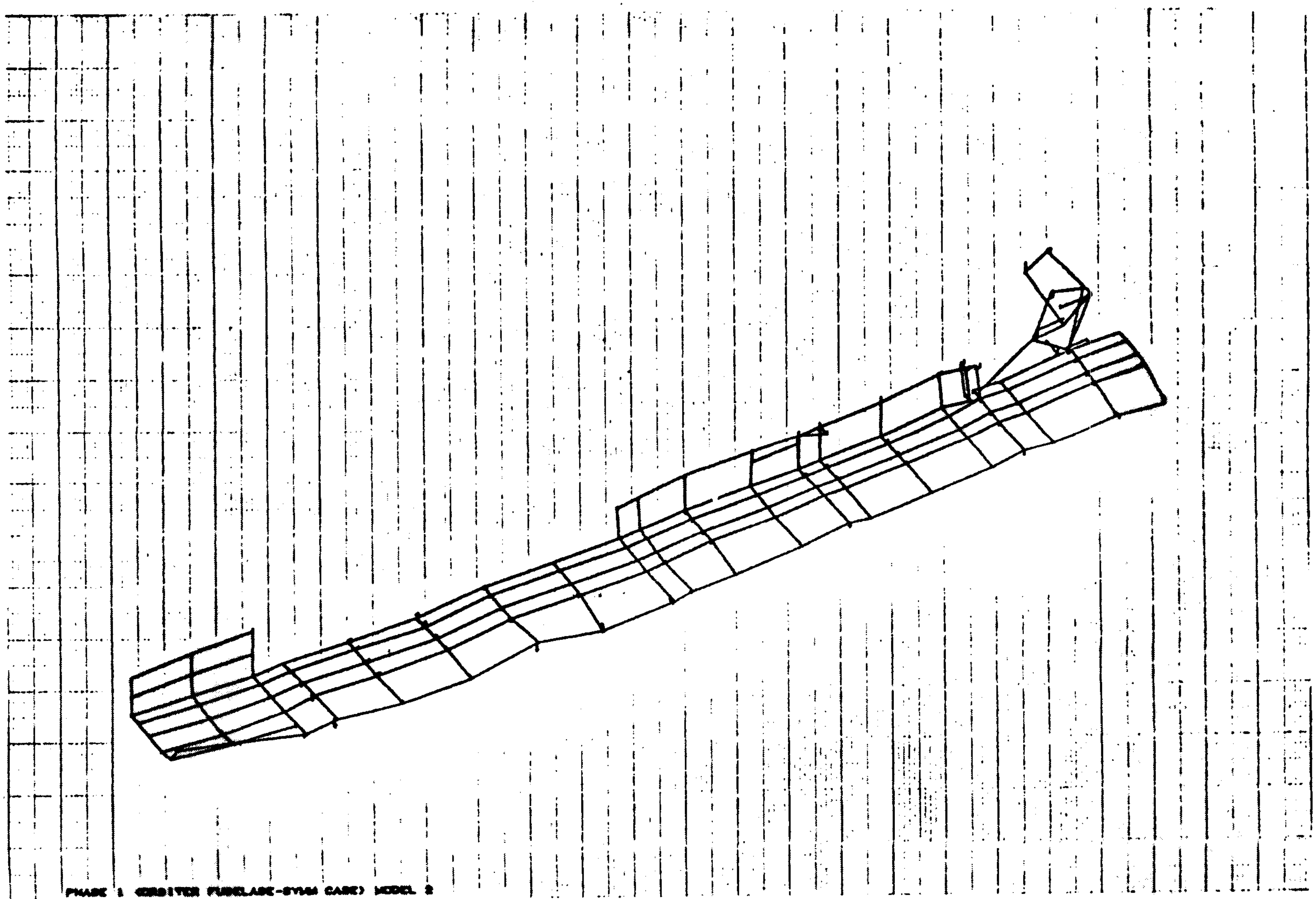
PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WINDOWS=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBMODE 44 MODE 44 FREQ. 1271.800



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 45 MODE 45 FREQ. 1282.997

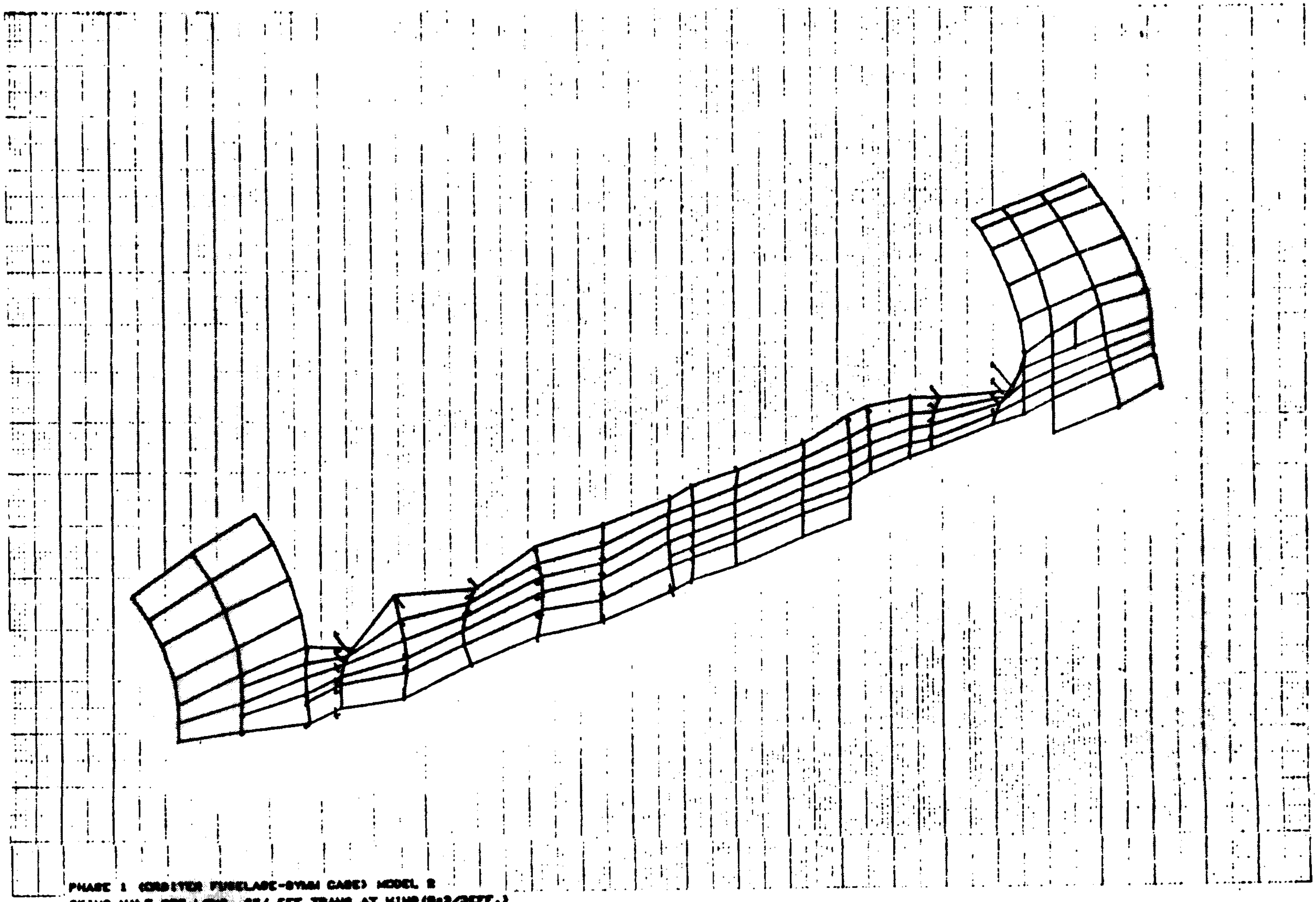
48 10/10/74 MAX-DEF. = 1.00000000

48



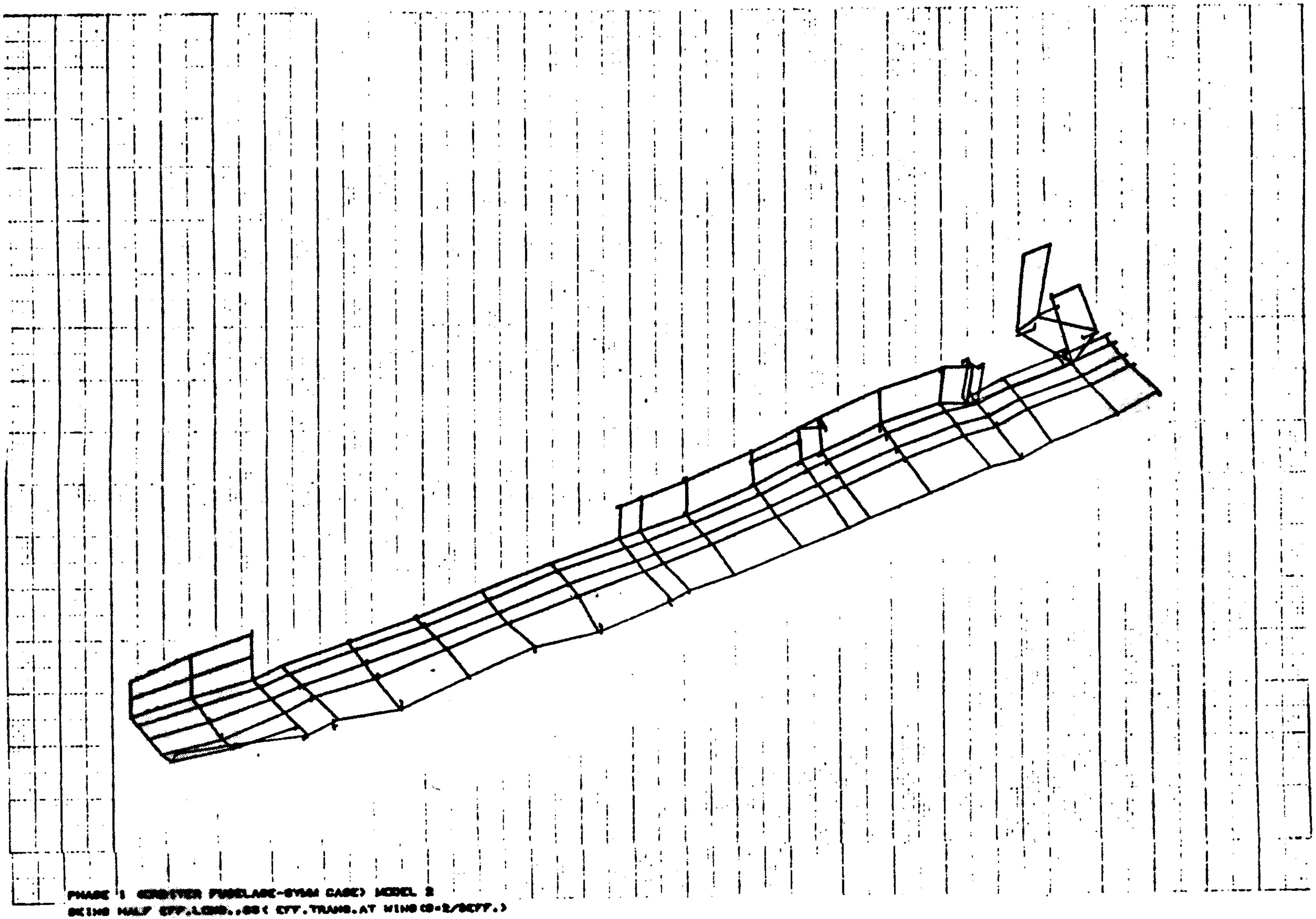
PHASE 1 ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 48 MODE 48 FREQ. 1282.997

10   10/18/74   MAX-DEF. = 1.00000000   10

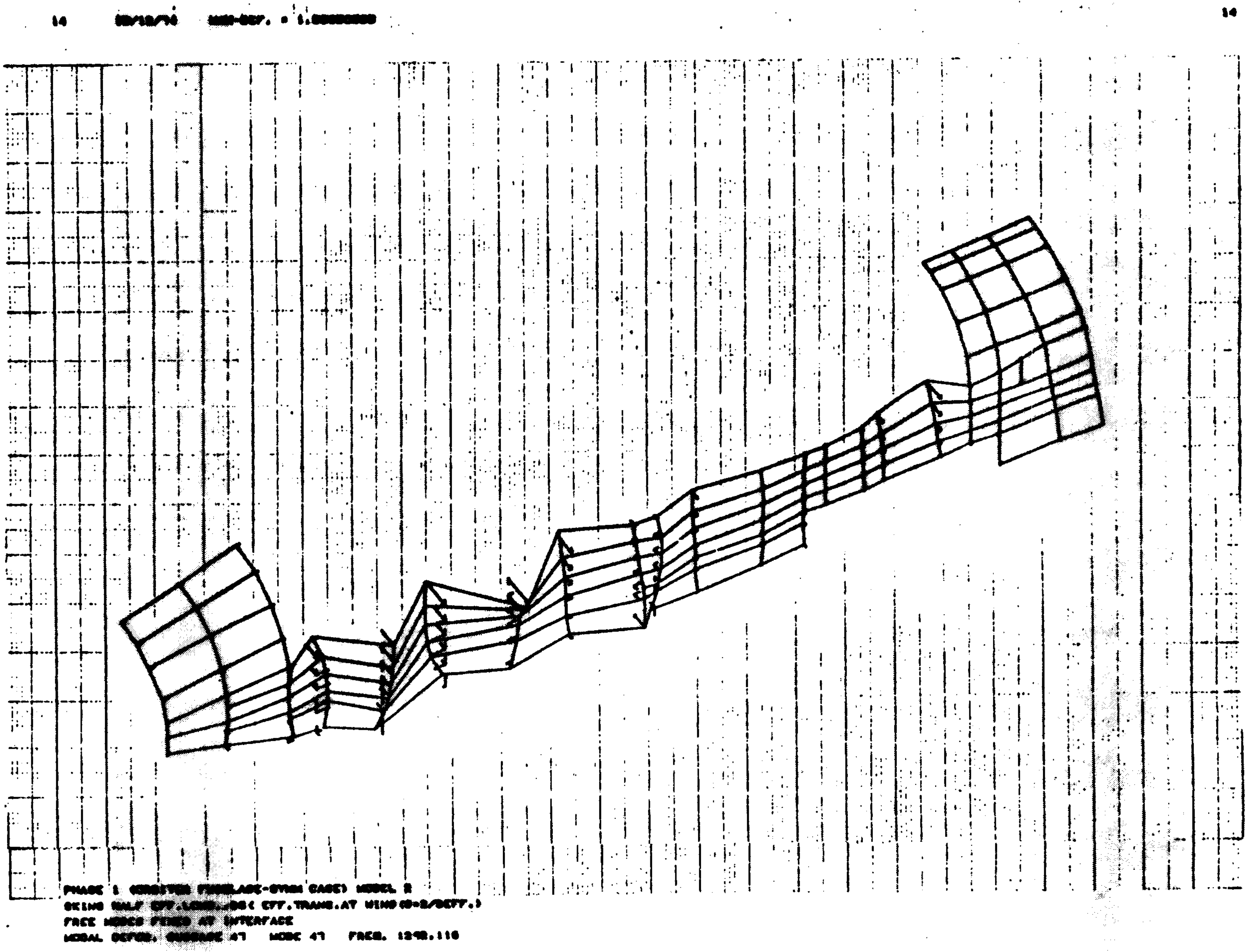


PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.55(EFF.TRANS.AT WING(S=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 46   MODE 46   FREQ. 1287.893

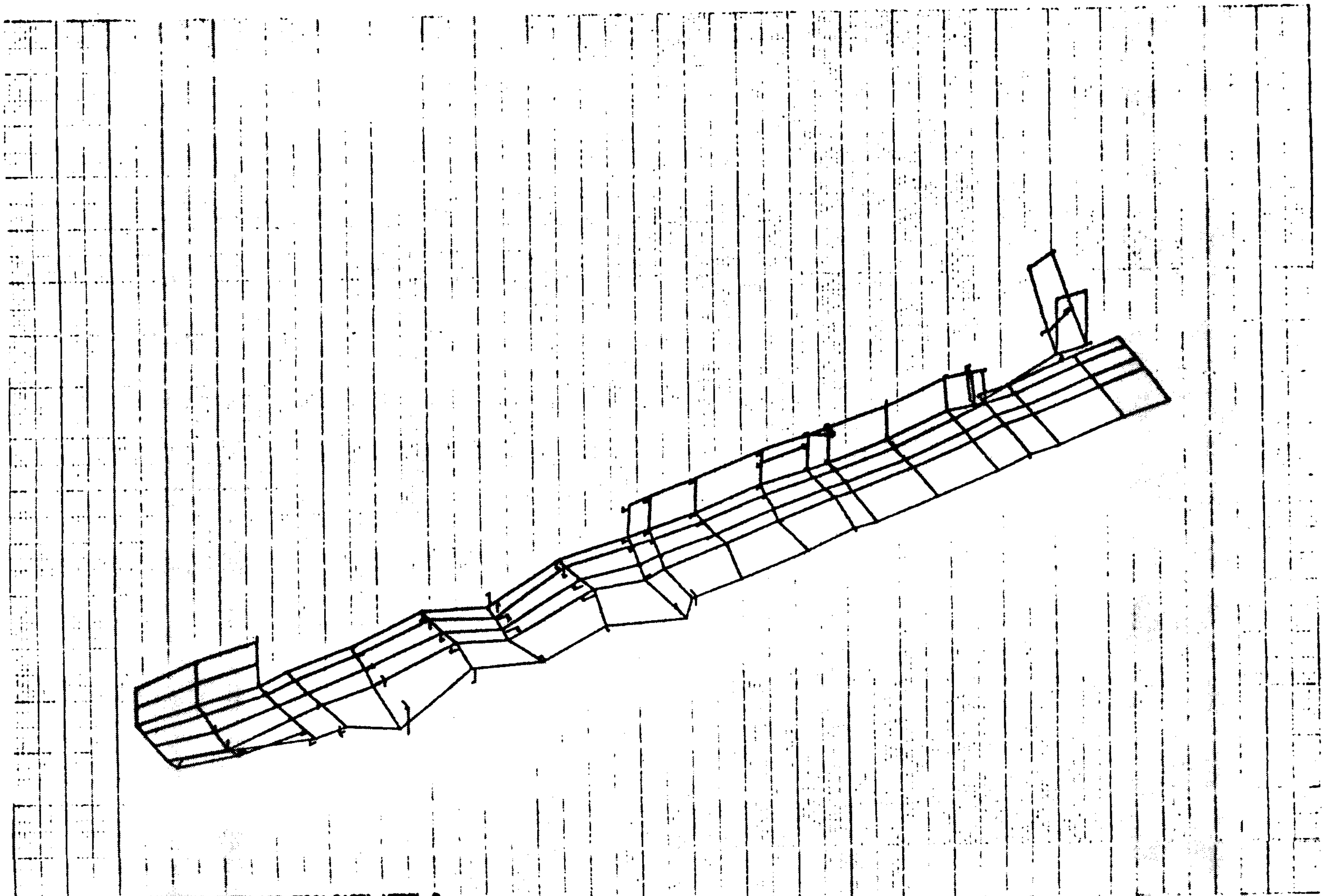
46   10/10/74   MAX-DEF. = 1.00000000   46



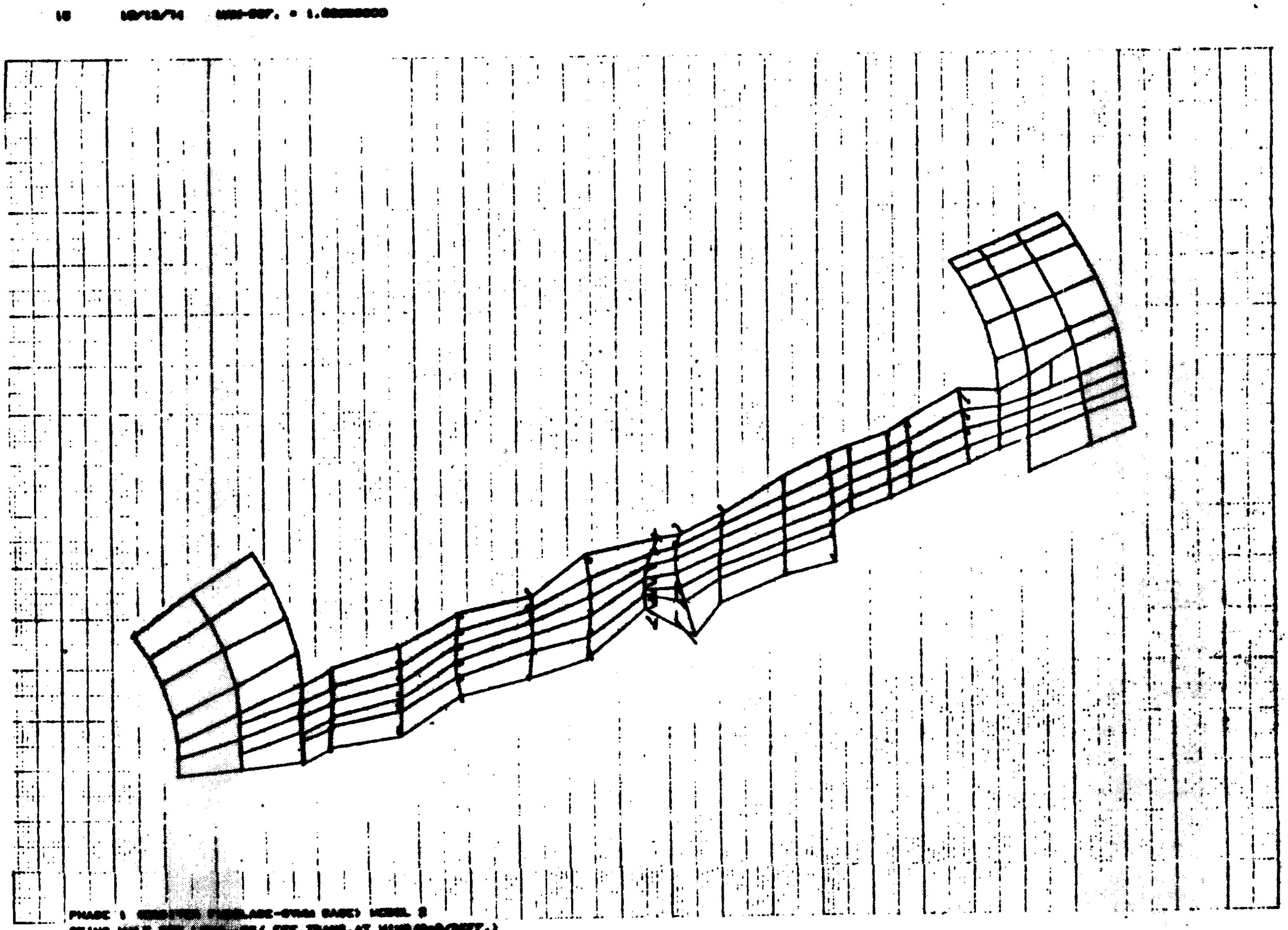
PHASE 1 ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.65(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 46 MODE 46 FREQ. 1287.693


14 [illegible] MAX-DEF. = 1.[illegible]
14
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKIN HALF EFF.[illegible](EFF.TRANS.AT WING(E=2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. [illegible] 47 MODE 47 FREQ. 1298.118

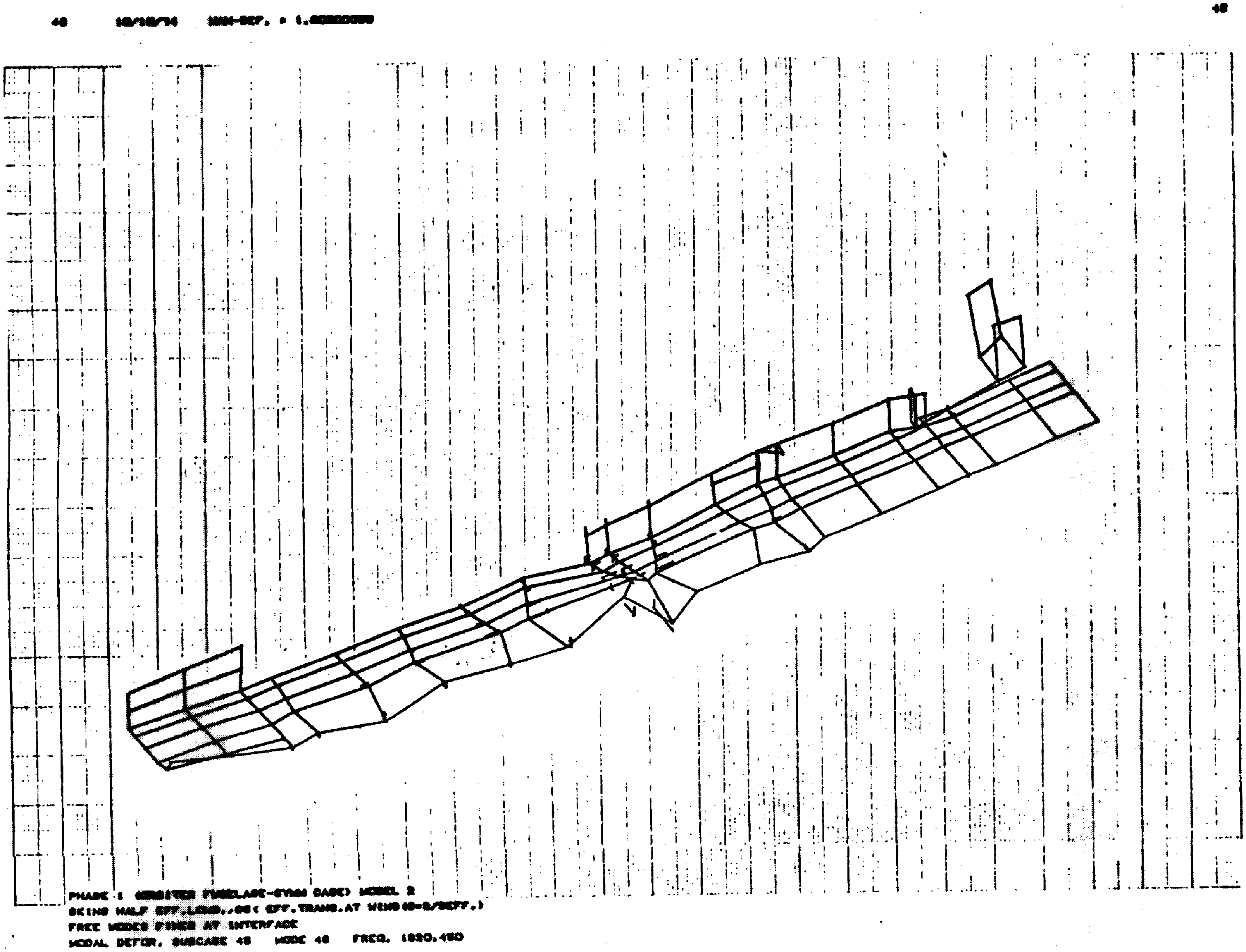
47 10/18/74 MAX-DEF. = 1.00000000

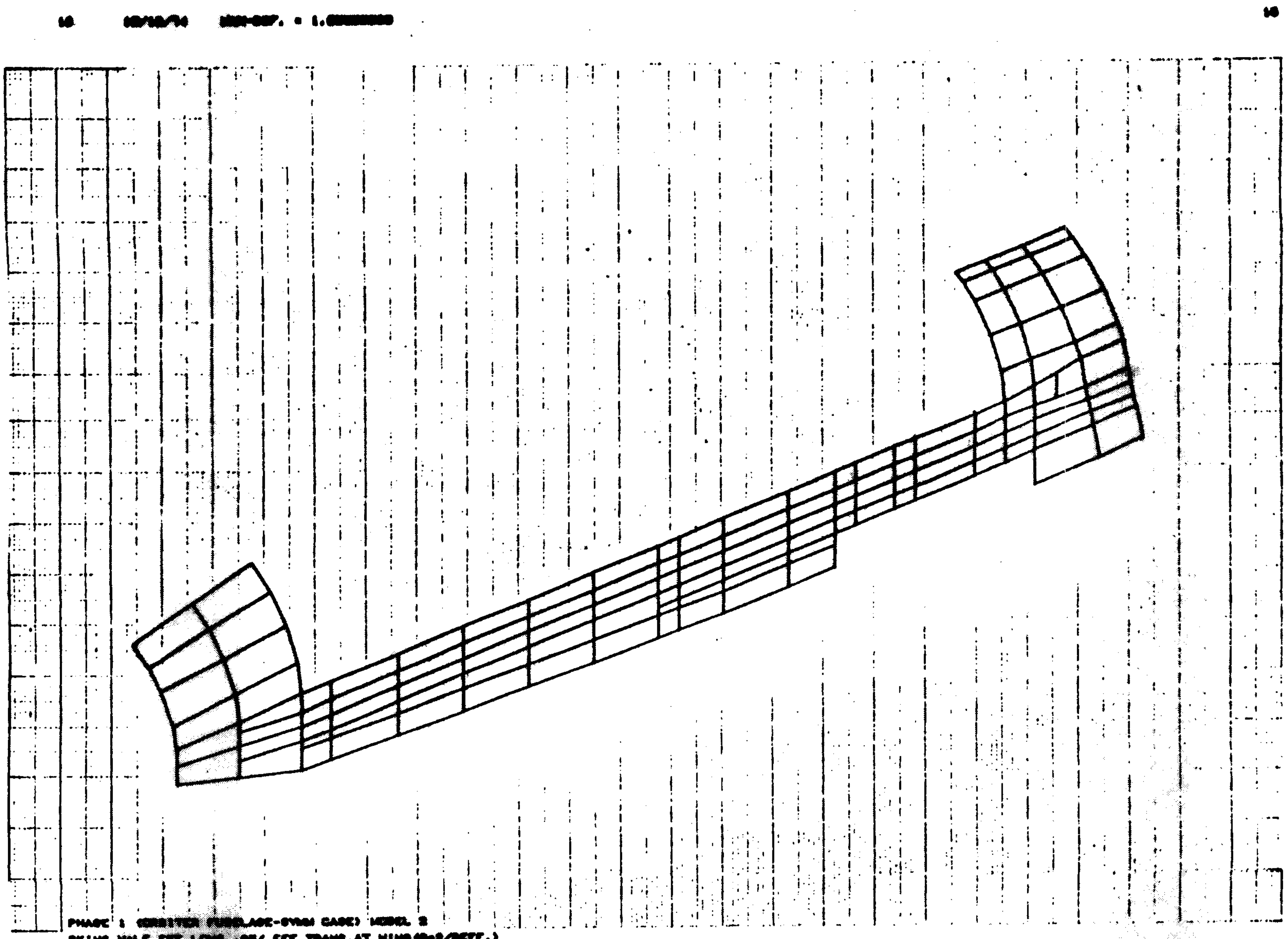


PHASE 1 (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 48 MODE 47 FREQ. 1242.116


15 10/10/74 MAX-DEF. = 1.[illegible]

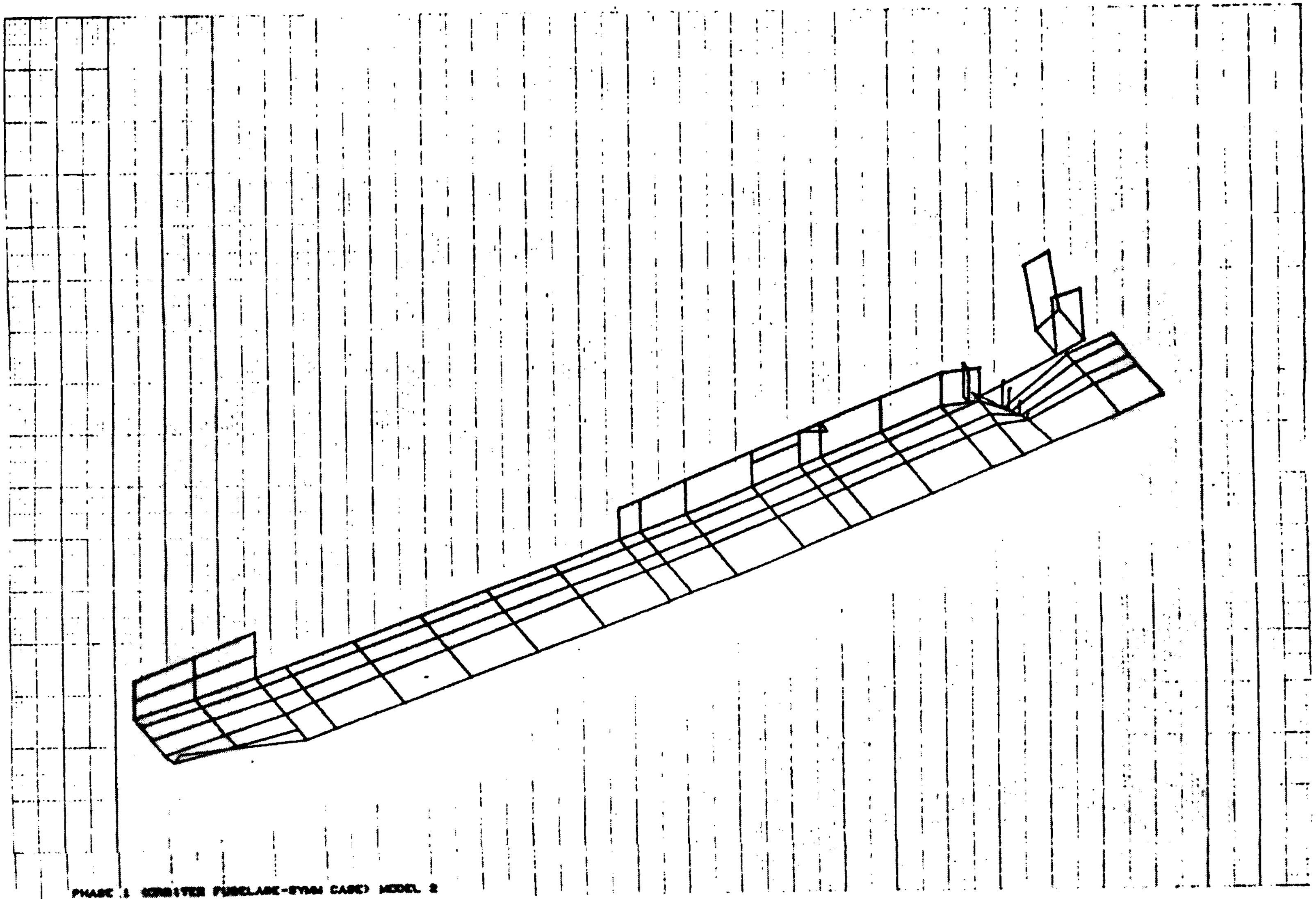
PHASE 1 [illegible] [illegible]LAGE-(VAM BASE) MODEL 3
SKINS HALF EFF.[illegible](EFF.TRANS.AT WING[illegible])
FREE MODES FIXED AT INTERFACE
MODAL SUPER. [illegible] 40 MODE 40 FREQ. 1000.400


48 10/18/74 MAX-DEF. = 1.00000000
48
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.06(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 48 MODE 48 FREQ. 1920.450

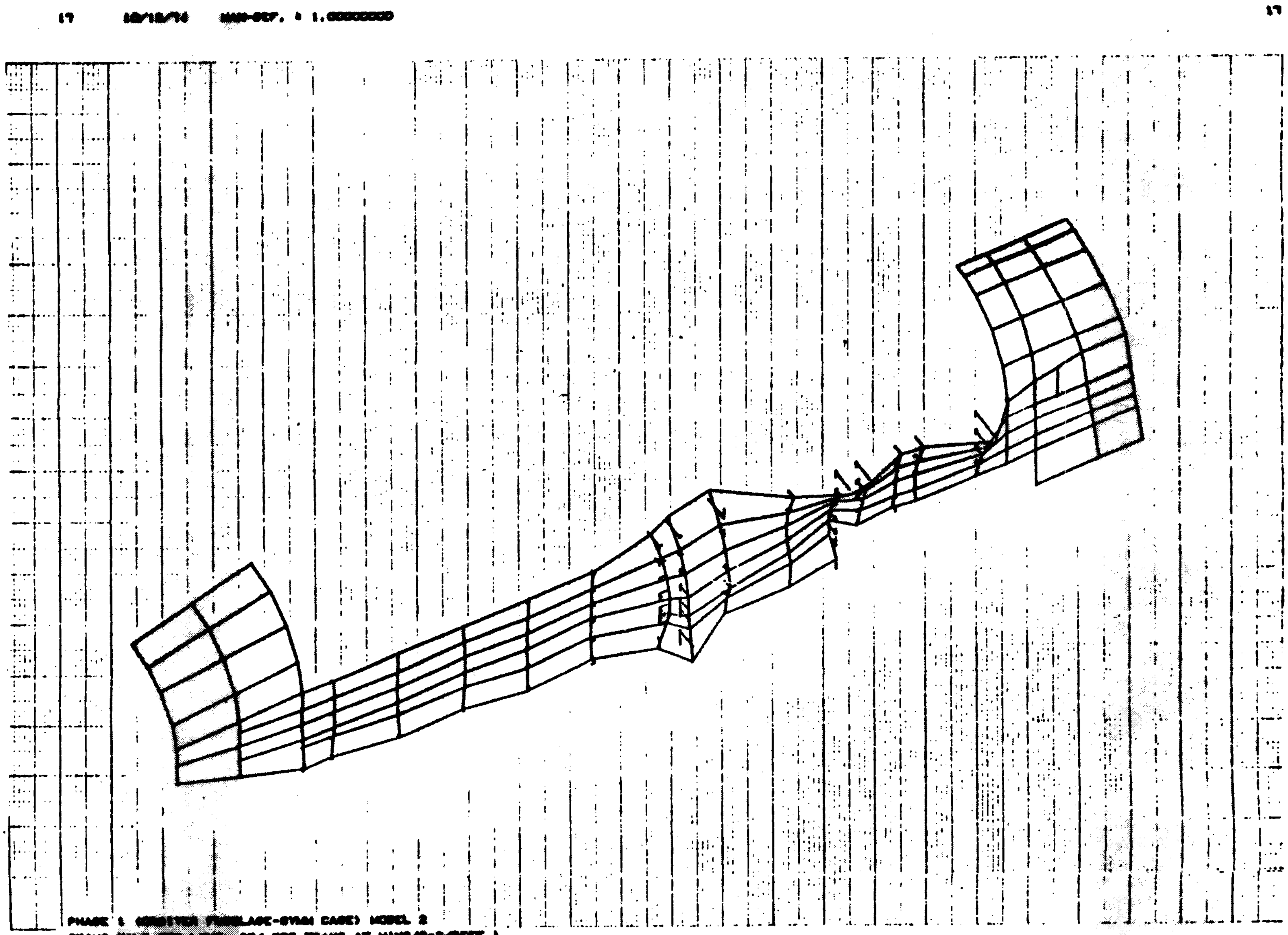

18 10/18/74 MAX-DEF. = 1.000000
18

PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(B=2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 49 MODE 49 FREQ. 1384.711

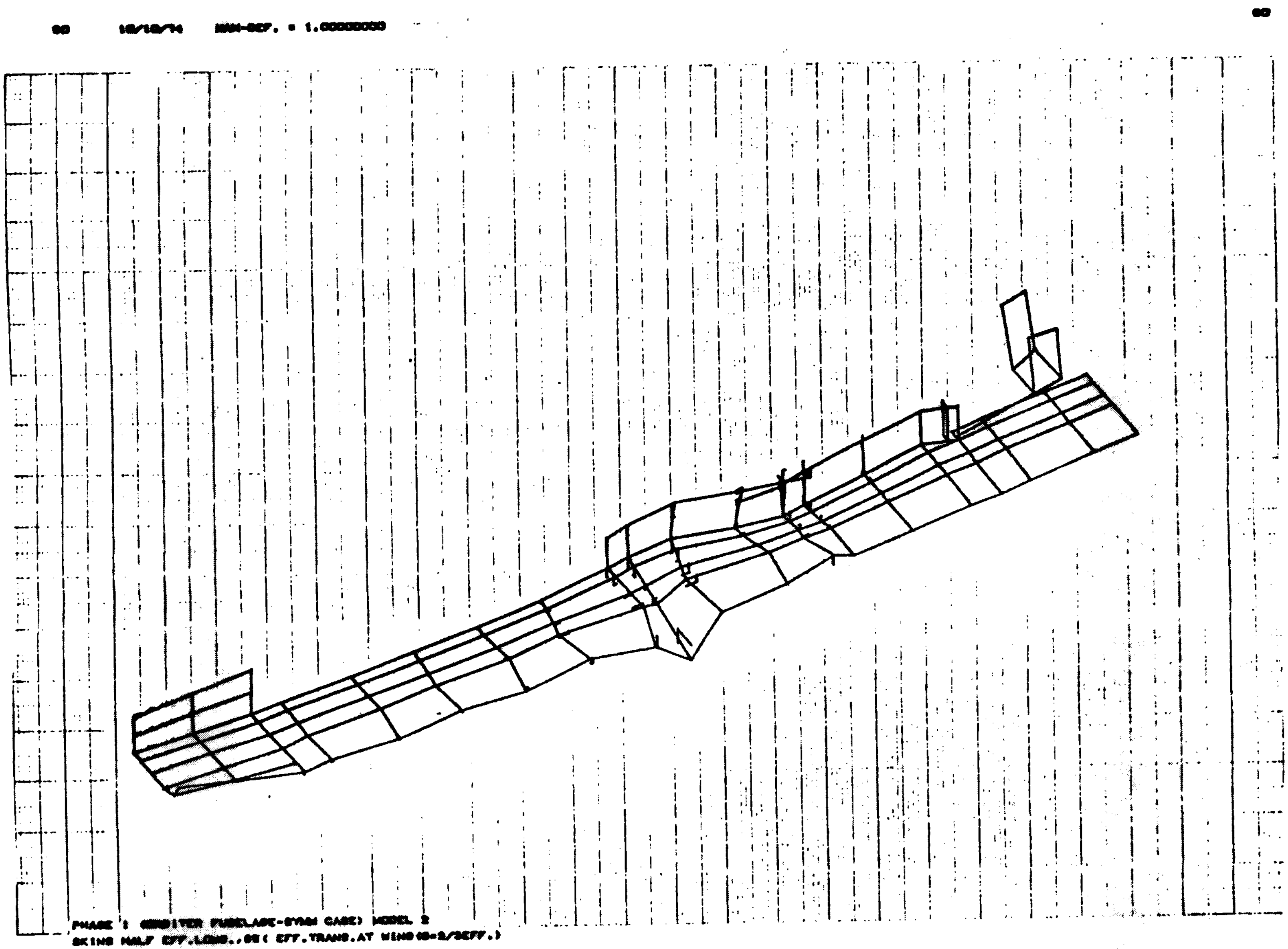
49   10/10/74   MAX-DEF. = 1.00000000   49



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,05(EFF.TRANS.AT WING(B=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 48   MODE 49   FREQ. 1364.711

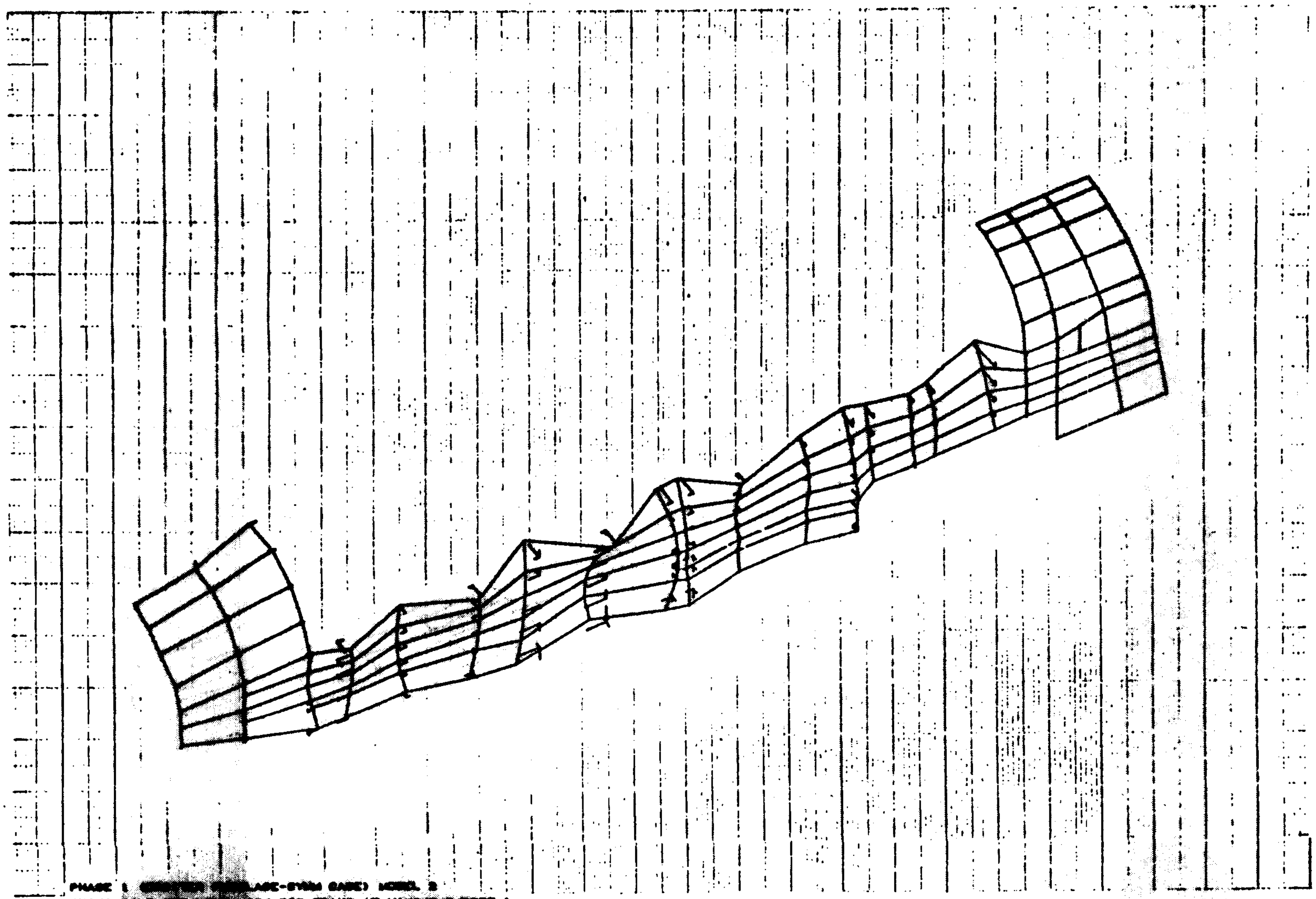

17
10/18/74
MAX-DEF. = 1.0000000
17

PHASE 1 ([illegible] FUSELAGE-SPAN CASE) MODEL 2
SKIN HALF EFF.LONG.,.05(EFF.TRANS.AT WING(B-2/SEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 60 MODE 60 FREQ. 1362.040


80 10/10/74 MAX-DEF. = 1.00000000
80

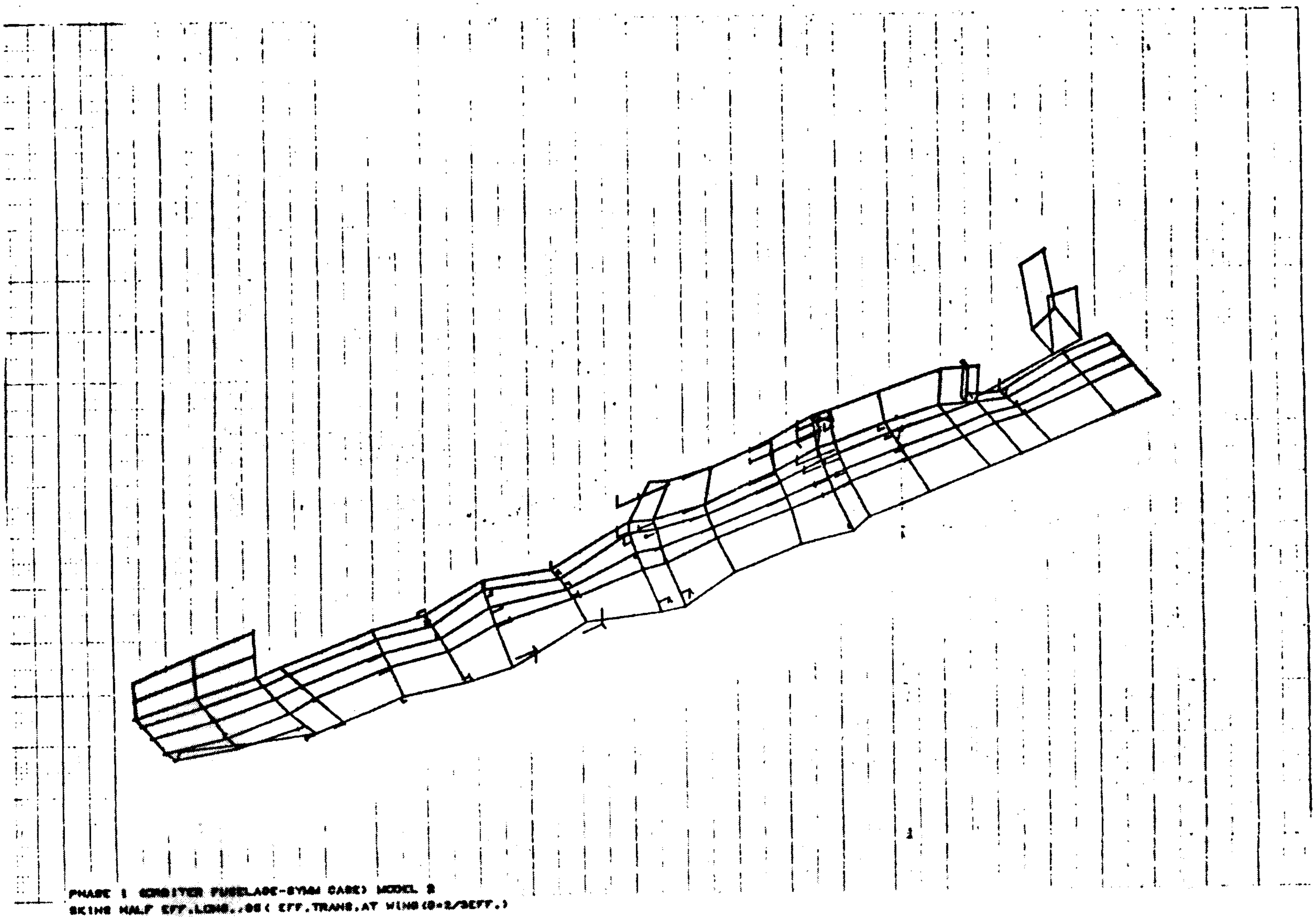
PHASE 1 ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,0E(EFF.TRANS.AT WING(B-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 45 MODE 80 FREQ. 1362.073

10 10/18/74 MAX-DEF. = 1.[illegible]



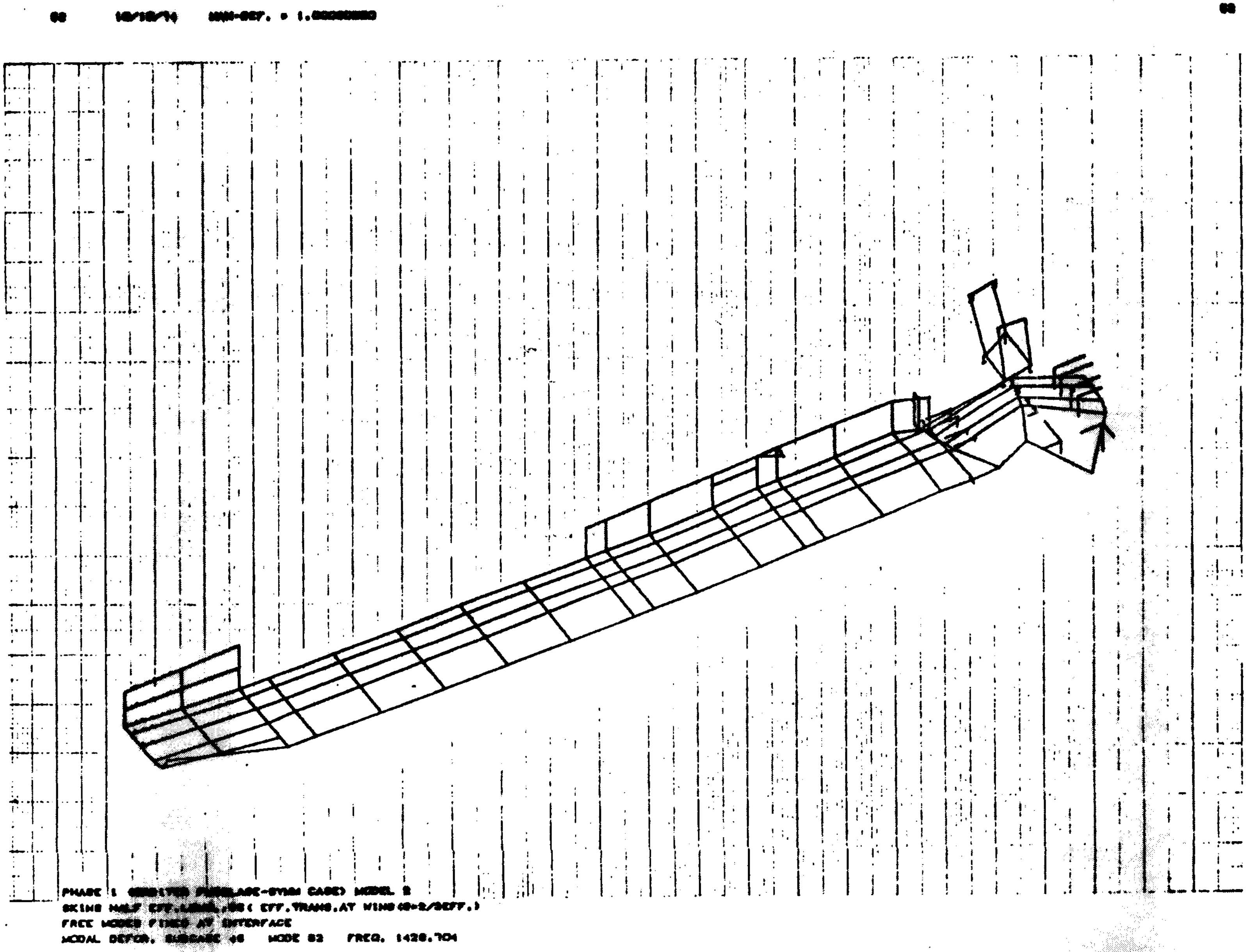
PHASE 1 [illegible] [illegible]LAGE-SYMM CASE) MODEL 3
SKINS HALF EFF.[illegible](EFF.TRANS.AT WIND[illegible]/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. [illegible] 51 MODE 51 FREQ. 1300.907

81 10/10/74 MAX-DEF. = 1.00000000



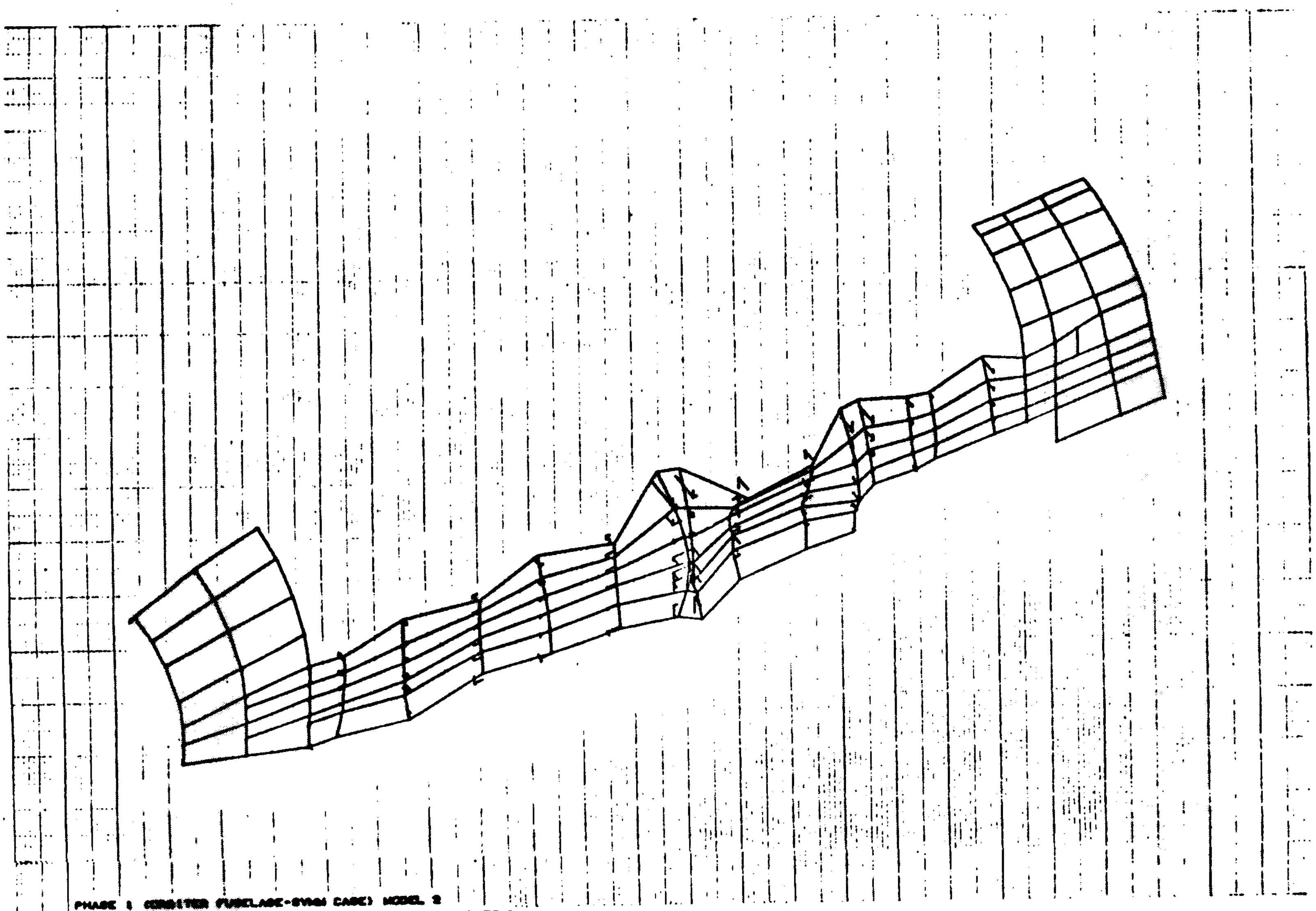
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(S=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 45 MODE 81 FREQ. 1383.907

68 10/18/74 MAX-DEF. = 1.[illegible]



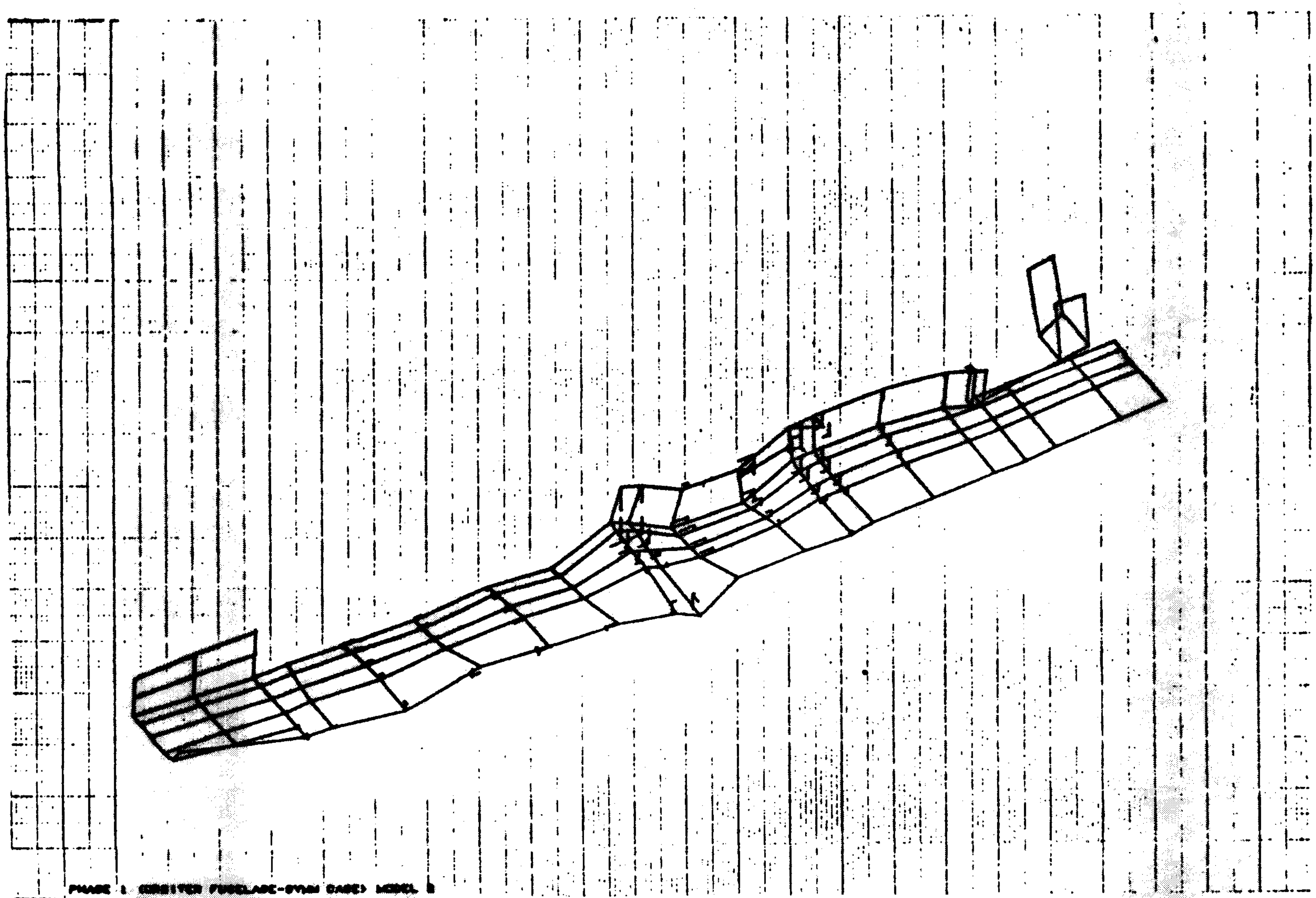
PHASE 1 (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.[illegible],[illegible](EFF.TRANS.AT WING(G=2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 46 MODE 82 FREQ. 1428.704

20 10/18/74 MAX-DEF. = 1.00000000



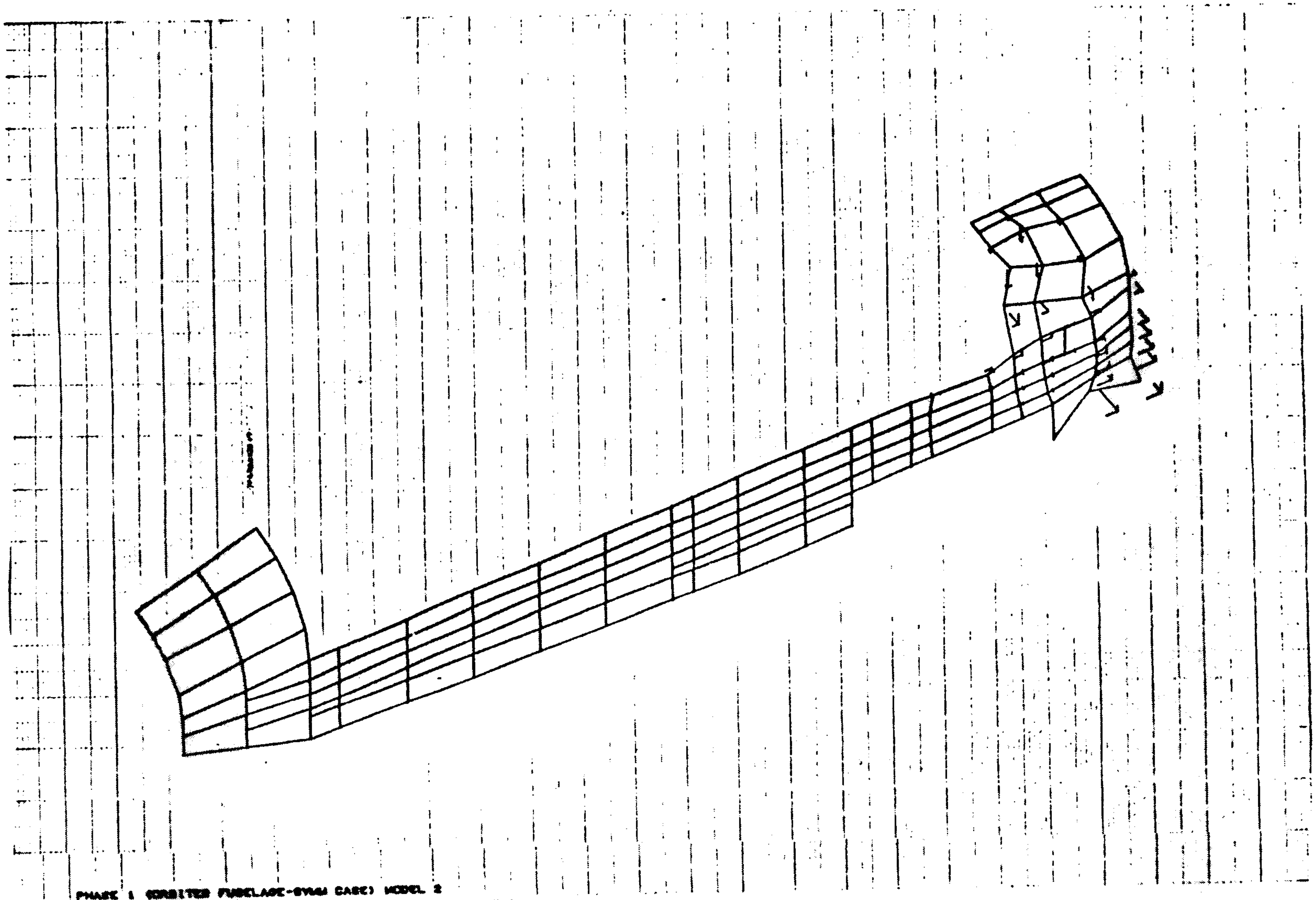
PHASE 1 ORBITER (FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(G=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 63 MODE 63 FREQ. 1482.181

[illegible] [illegible] MAX-DEF. = 1.[illegible]

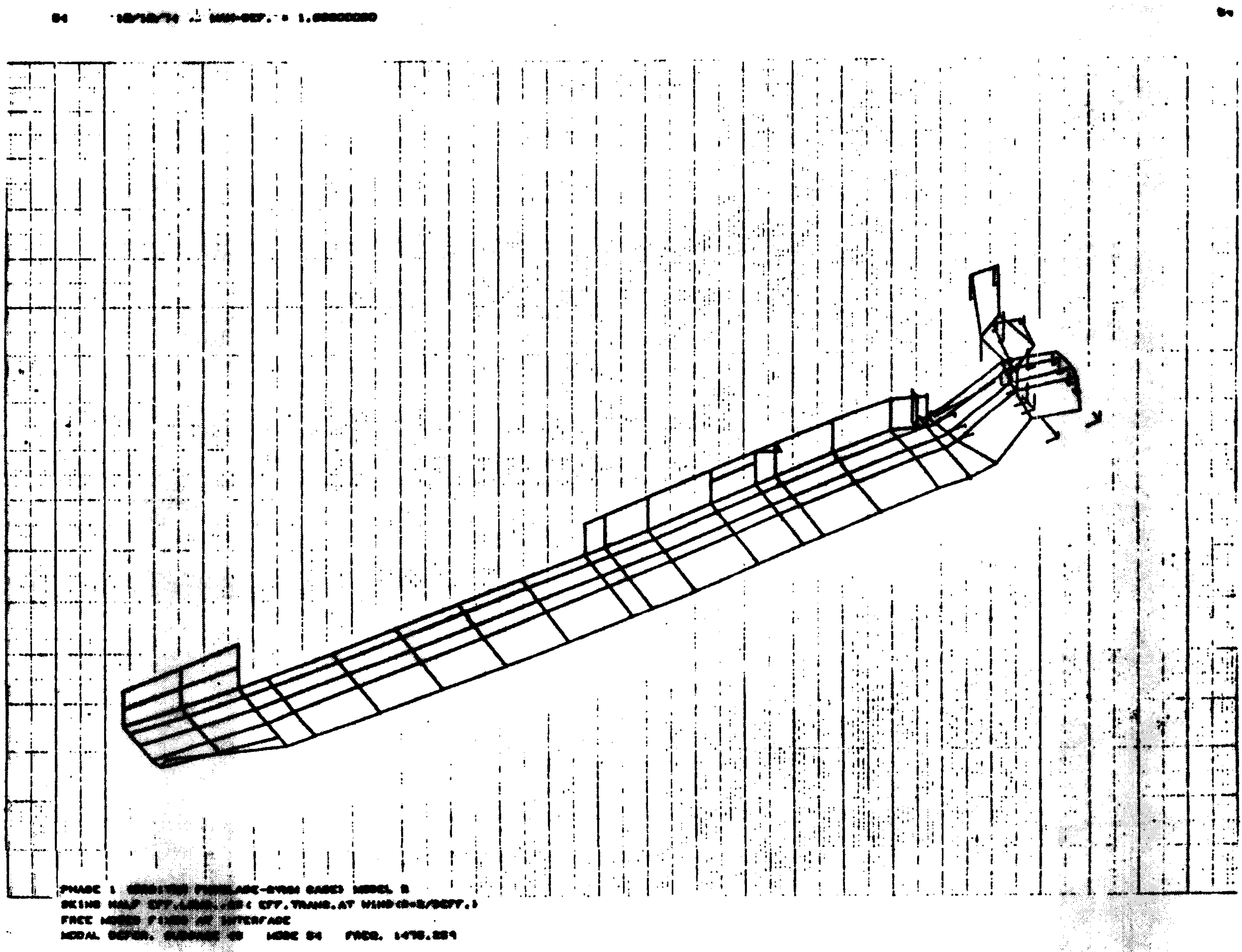


PHASE 1 ORBITER FUSELAGE-(SYM CASE) MODEL [illegible]
SKING HALF EFF.LONG.,05(EFF.TRANS.AT WINGS=2/DEFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 48 MODE 53 FREQ. 1482.151

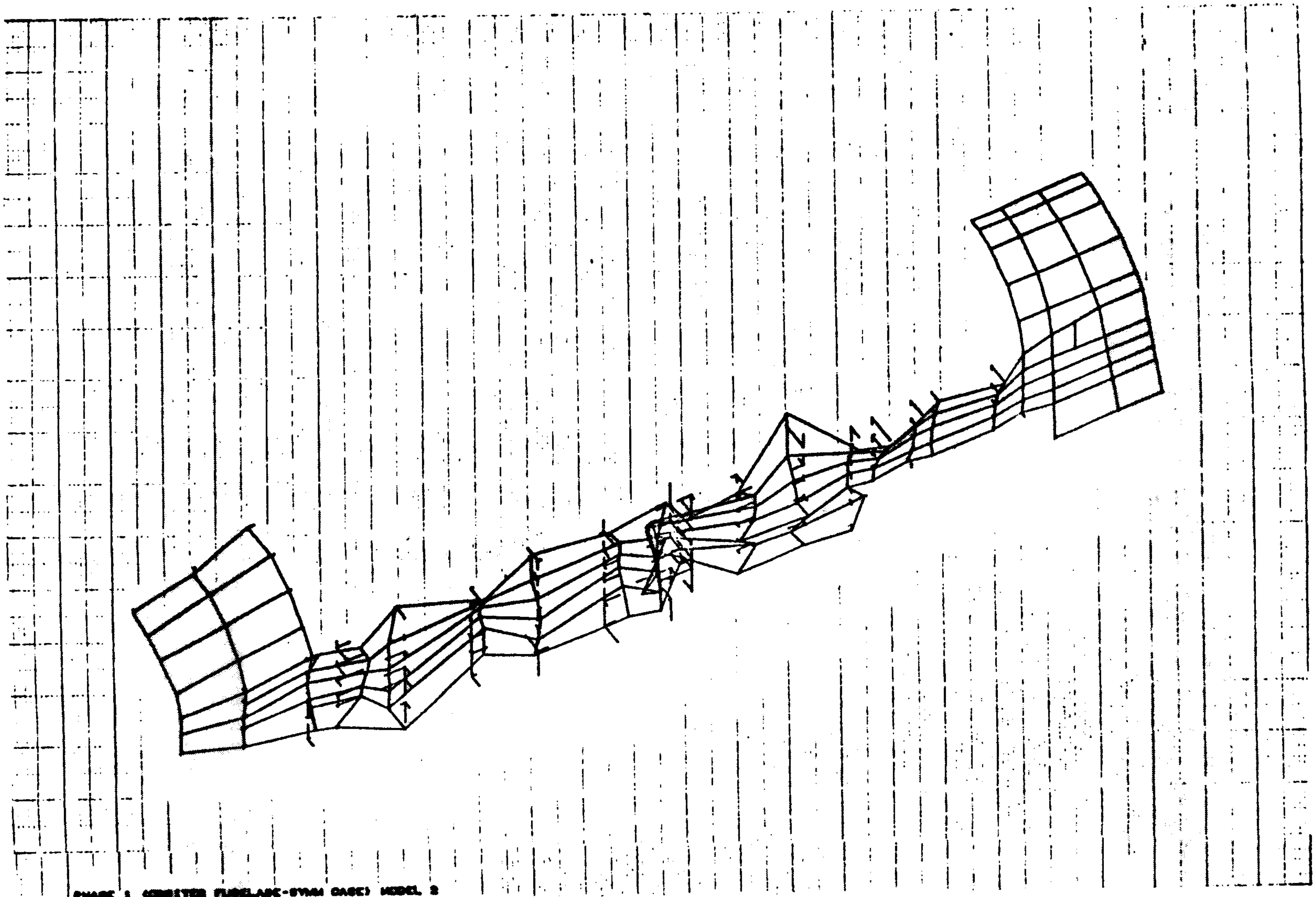
21   10/12/74   MAX-DEF. = 1.0000000



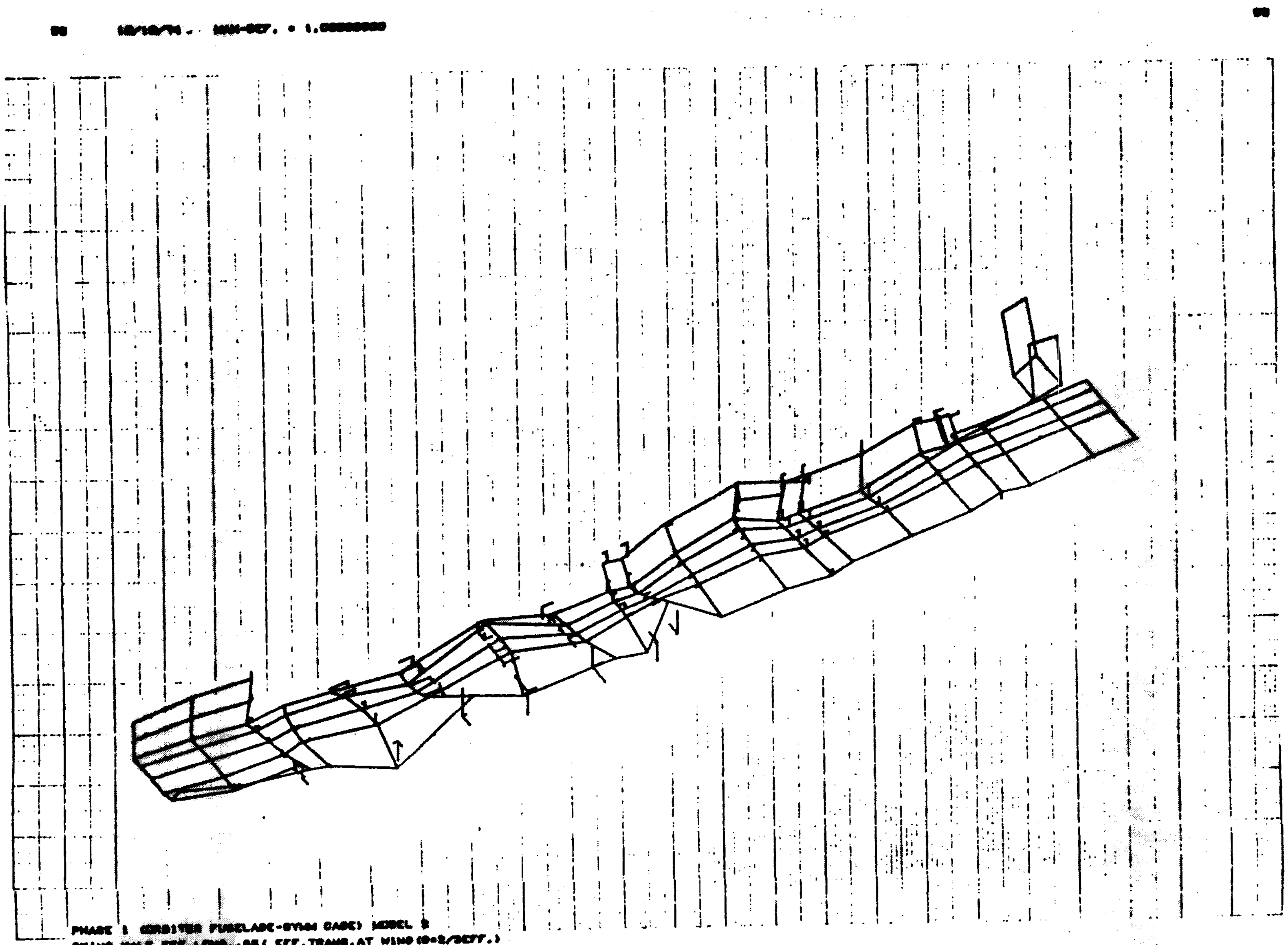
PHASE 1 (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,0S(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 54   MODE 54   FREQ. 1478.259


54 10/10/74 MAX-DEF. = 1.00000000
54
PHASE 1 [illegible] FUSELAGE-SYSM CASE3 MODEL B
SKINS HALF EFF.[illegible](EFF.TRANS.AT WIND(S=2/DEFF.)
FREE [illegible] FIXED AT INTERFACE
MODAL DEFOR. [illegible] MODE 54 FREQ. 1476.289

38 10/18/74 MAX-DEF. = 1.00000000 32



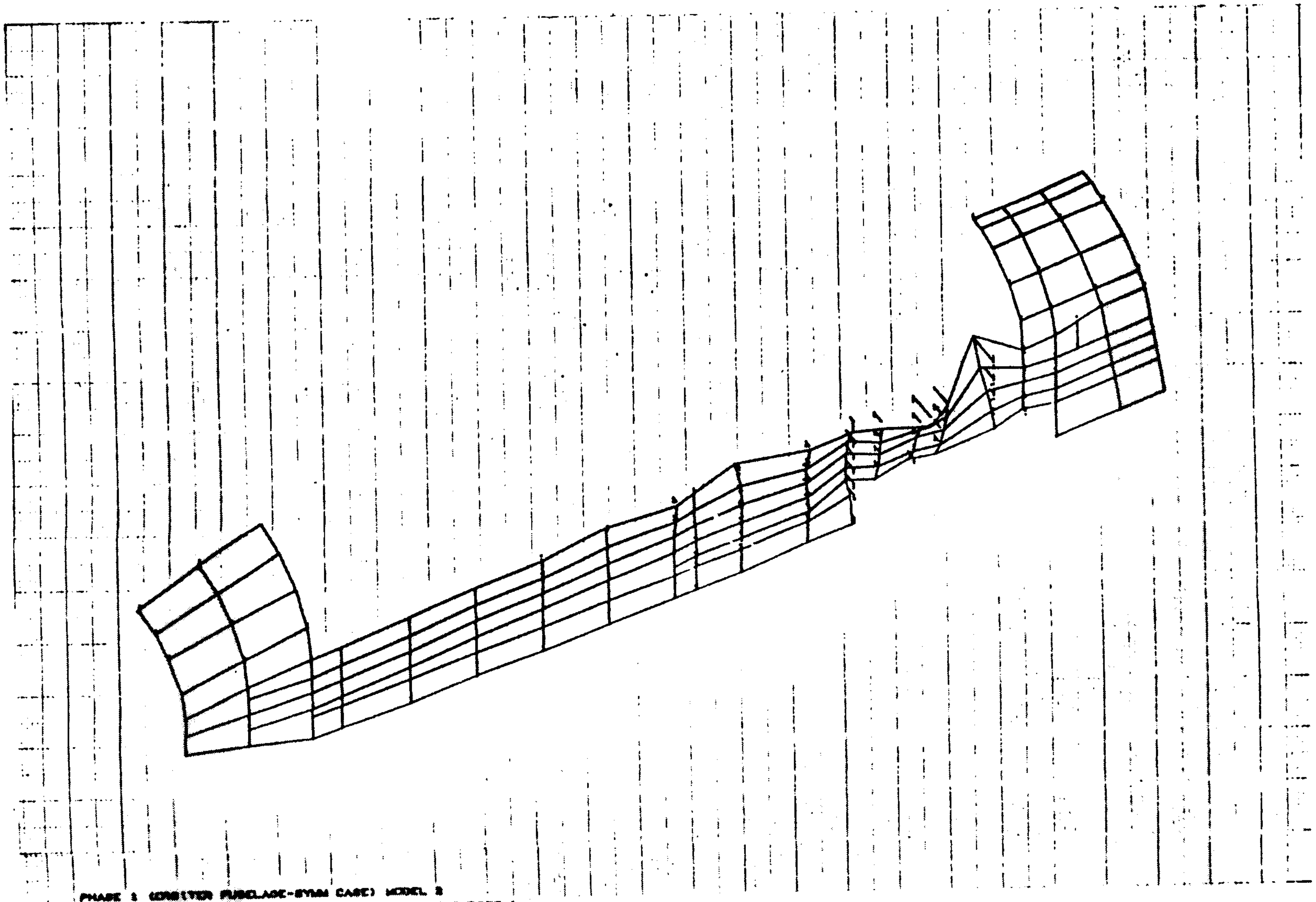
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 55 MODE 55 FREQ. 1483.441


10/10/74 . MAX-DEF. = 1.00000000

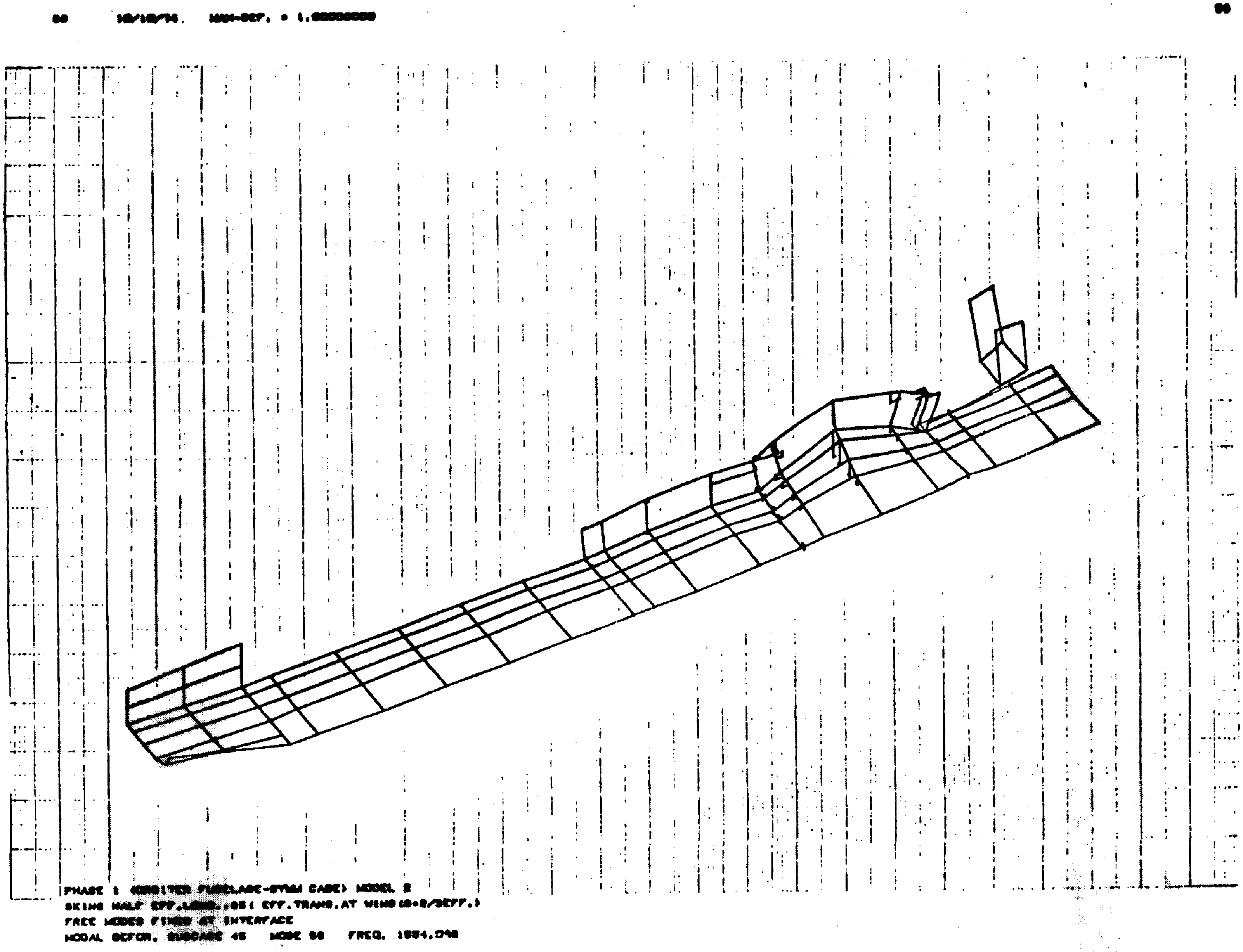
PHASE 1 ORBITER FUSELAGE-(SYMM CASE) MODEL 3
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING (0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 45   MODE 65   FREQ. 1483.441

23 10/18/74 MAX-DEF. = 1.00000000

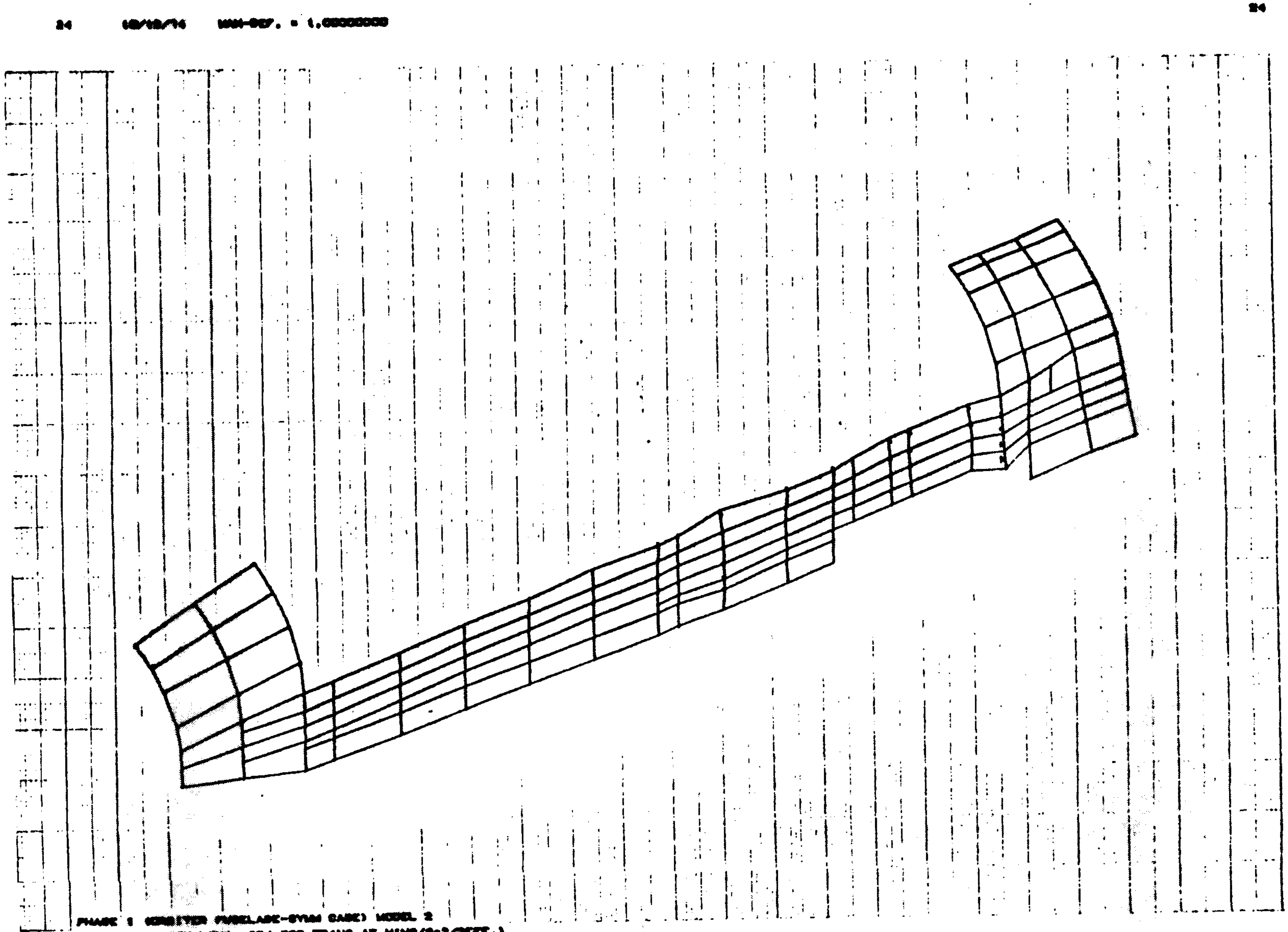
88



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 3
SKINS HALF EFF.LONG.,88(EFF.TRANS.AT WING(8*2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 56 MODE 56 FREQ. 1654.098

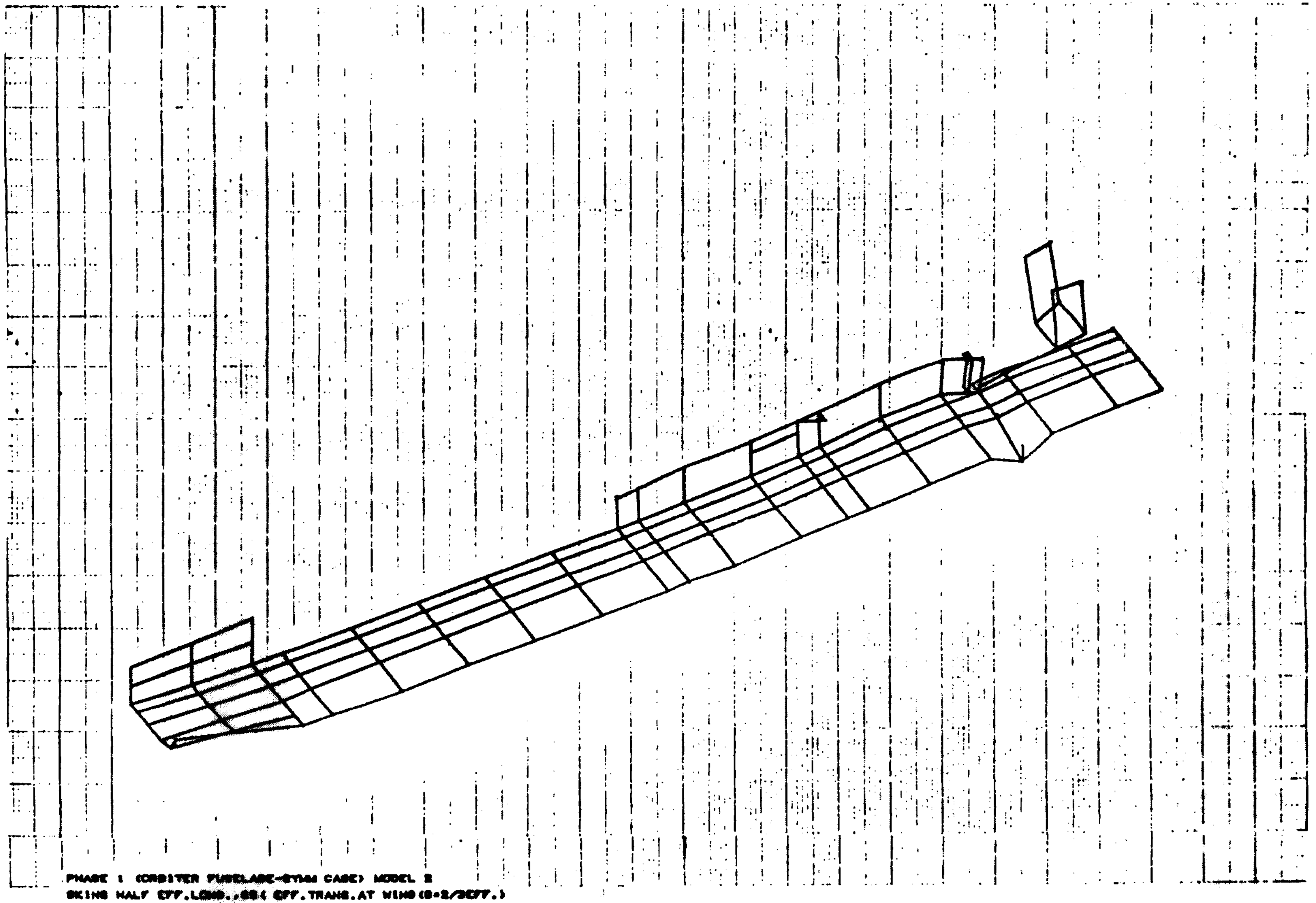

50 10/18/74. MAX-DEF. = 1.00000000
50
PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(D=2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 45 MODE 50 FREQ. 1984.098

24 10/18/74 MAX-DEF. = 1.0000000



PHASE 1 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.86(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 87 MODE 87 FREQ. 1871.140

57 10/18/74: MAX-DEF. = 1.00000000 57



PHASE 1 (ORBITER FUSELAGE-SYAM CASE) MODEL 2
SKINS HALF EFF.LONG.,.88(EFF.TRANS.AT WING(0-2/3EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 48 MODE 57 FREQ. 1571.148

Appendix B5
INPUT BULK DATA/PHASE I ANALYSIS: MODEL II WING

```
                                        C A S E    C O N T R O L    D E C K    E C H O
            CARD
            COUNT
              1      TITLE = PHASE 1 %ORBITER WING¤
              2      SUBTITLE = 9/10/74 %COVERS 85 PERCENT EFF.¤
              3      MAXLINES = 30000
              4      METHOD  = 2
              5      MPC = 3000
              6      SUBCASE 1
              7      MODES    = 20
              8      LABEL     = FREE MODES FIXED AT INTERFACE
              9      OUTPUT
             10      VECTOR = ALL
             11      OUTPUT%PLOT¤
             12      SET 1  = INCLUDE 3101 THRU 3125
             13      SET 2  = INCLUDE 3201 THRU 3227
             14      SET 3  = INCLUDE 3301 THRU 3352
             15      SET 4  = INCLUDE 3401 THRU 3478,3501 THRU 3536,3582
             16      SET 5  = INCLUDE 3601 THRU 3664
             17      SET 6  = INCLUDE 3701 THRU 3766
             18      SET 7  = SHEAR
             19      PLOTTER CALCOMP 765,105
             20      AXES   =MY,X,Z
             21      VIEW   = 30.0,60.0,0.0
             22      MAXIMUM DEFORMATION 10.0
             23      FIND  SCALE,ORIGIN 2,SET 7
             24      PLOT MODAL DEFORMATION 1 THRU 20,SET 7,ORIGIN 2,SHAPE,VECTOR XYZ
             25      BEGIN BULK

*** USER INFORMATION MESSAGE 207, BULK DATA NOT SORTED,XSORT WILL RE-ORDER DECK.
```

```
9/10/74 %COVERS AS PERCENT EFF.8

                                    S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2   ..   3   ..   4   ..   5   ..   6   ..   7   ..   8   ..   9   ..  10  .
    1-        CONROD  3582    3574    3624    3100    .15
    2-        CONROD  3629    3601    3651    3600    .125
    3-        CONROD  3630    3605    3655    3600    .001
    4-        CONROD  3631    3609    3659    3631    .017
    5-        CONROD  3632    3613    3663    3632    .061
    6-        CONROD  3633    3617    3667    3632    .061
    7-        CONROD  3634    3621    3671    3634    .028
    8-        CONROD  3729    3602    3652    3729    .173
    9-        CONROD  3730    3606    3656    3601    .096
   10-        CONROD  3741    3610    3660    3731    .065
   11-        CONROD  3742    3614    3664    3632    .061
   12-        CONROD  3733    3618    3668    3632    .061
   13-        CONROD  3734    3622    3672    3634    .028
   14-        CORD2R  3000    0       .0      .0      .0      .0      3.5     47.83   &C3000
   15-        &C3000  100.0   3.5     47.83
   16-        CORD2R  3001    0       -81.5681.0      35.5985 -80.2278.0      57.5136 &C3001
   17-        &C3001  66.25   0.0     40.432
   18-        CORD2R  3002    3001    245.7536-16.463111.0003 245.7536-13.75  24.0514 &C3002
   19-        &C3002  300.    -16.4631 11.0003
   20-        CROD    3401    3401    3017    3021    3402    3401    3018    3022
   21-        CROD    3403    3403    3021    3121    3404    3403    3022    3122
   22-        CROD    3405    3403    3017    3117    3406    3403    3018    3118
   23-        CROD    3407    3403    3017    3113    3408    3403    3018    3114
   24-        CROD    3409    3409    3121    3221    3410    3409    3122    3222
   25-        CROD    3411    3409    3117    3217    3412    3409    3118    3218
   26-        CROD    3413    3409    3113    3213    3414    3409    3114    3214
   27-        CROD    3415    3409    3113    3209    3416    3409    3114    3210
   28-        CROD    3417    3417    3221    3321    3418    3417    3222    3322
   29-        CROD    3419    3417    3217    3317    3420    3417    3218    3318
   30-        CROD    3421    3417    3213    3313    3422    3417    3214    3314
   31-        CROD    3423    3417    3209    3309    3424    3417    3210    3310
   32-        CROD    3425    3417    3209    3305    3426    3417    3210    3306
   33-        CROD    3427    3427    3321    3421    3428    3427    3322    3422
   34-        CROD    3429    3427    3317    3417    3430    3427    3318    3418
   35-        CROD    3431    3427    3313    3413    3432    3427    3314    3414
   36-        CROD    3433    3427    3309    3409    3434    3427    3310    3410
   37-        CROD    3435    3427    3305    3405    3436    3427    3306    3406
   38-        CROD    3437    3427    3305    3401    3438    3427    3306    3402
   39-        CROD    3439    3439    3421    3521    3440    3439    3422    3522
   40-        CROD    3441    3439    3417    3517    3442    3439    3418    3518
   41-        CROD    3443    3439    3413    3513    3444    3439    3414    3514
   42-        CROD    3445    3439    3409    3509    3446    3439    3410    3510
   43-        CROD    3447    3439    3405    3505    3448    3439    3406    3506
   44-        CROD    3449    3439    3401    3501    3450    3439    3402    3502
   45-        CROD    3451    3451    3521    3571    3452    3451    3522    3572
   46-        CROD    3453    3451    3517    3567    3454    3451    3518    3568
   47-        CROD    3455    3451    3513    3613    3456    3451    3514    3614
   48-        CROD    3457    3451    3509    3609    3458    3451    3510    3610
   49-        CROD    3459    3451    3505    3605    3460    3451    3506    3606
   50-        CROD    3461    3451    3501    3601    3462    3451    3502    3602

                                                   SEPTEMBER 26, 1974   NASTRAN  2/ 1/73     PAGE     7
    PHASE 1 XORBITER WING
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```
9/10/74 %COVERS AS PERCENT EFF.R

                                        S O R T E D   B U L K   D A T A   E C H O
       CARD
       COUNT      .   1   ..   2   ..   3   ..   4   ..   5   ..   6   ..   7   ..   8   ..   9   ..  10  .
         51-      CROD    3463    3463    3619    3621    3464    3463    3624    3622
         52-      CROD    3465    3463    3617    3619    3466    3463    3618    3620
         53-      CROD    3467    3463    3613    3617    3468    3463    3614    3618
         54-      CROD    3469    3463    3609    3613    3470    3463    3610    3614
         55-      CROD    3471    3463    3605    3609    3472    3463    3606    3610
         56-      CROD    3473    3463    3601    3605    3474    3463    3602    3606
         57-      CROD    3475    3451    3571    3621    3476    3451    3572    3622
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         59-      CROD    3501    3501    3021    3022    3515    3515    3121    3122
         60-      CROD    3502    3501    3017    3018    3516    3515    3117    3118
         61-      CROD    3503    3501    3113    3114    3517    3515    3321    3322
         62-      CROD    3504    3501    3221    3222    3518    3515    3317    3318
         63-      CROD    3505    3501    3217    3218    3519    3515    3313    3314
         64-      CROD    3506    3501    3213    3214    3520    3515    3309    3310
         65-      CROD    3507    3501    3209    3210    3521    3515    3521    3522
         66-      CROD    3508    3501    3305    3306    3522    3515    3517    3518
         67-      CROD    3509    3501    3421    3422    3523    3515    3513    3514
         68-      CROD    3510    3501    3417    3418    3524    3515    3509    3510
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         73-      CROD    3527    3527    3621    3622    3528    3528    3619    3620
         74-      CROD    3529    3527    3617    3618    3532    3528    3605    3606
         75-      CROD    3530    3527    3613    3614    3533    3528    3601    3602
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         77-      CROD    3535    3515    3571    3572    3536    3515    3567    3568
         78-      CROD    3601    3601    3021    3121    3602    3601    3121    3221
         79-      CROD    3603    3601    3221    3321    3604    3601    3321    3421
         80-      CROD    3605    3601    3421    3521    3606    3601    3521    3571
         81-      CROD    3607    3601    3571    3621    3614    3608    3567    3617
         82-      CROD    3608    3608    3017    3117    3609    3608    3117    3217
         83-      CROD    3610    3608    3217    3317    3611    3608    3317    3417
         84-      CROD    3612    3608    3417    3517    3613    3608    3517    3567
         85-      CROD    3615    3608    3113    3213    3616    3608    3213    3313
         86-      CROD    3617    3608    3313    3413    3618    3608    3413    3513
         87-      CROD    3619    3608    3513    3613    3620    3620    3209    3309
         88-      CROD    3621    3620    3309    3409    3622    3620    3409    3509
         89-      CROD    3623    3620    3509    3609    3624    3624    3305    3405
         90-      CROD    3625    3624    3405    3505    3626    3624    3505    3605
         91-      CROD    3627    3627    3401    3501    3628    3627    3501    3601
         92-      CROD    3635    3635    3017    3021
         93-      CROD    3636    3636    3217    3221    3637    3636    3213    3217
         94-      CROD    3638    3636    3209    3213    3639    3636    3417    3421
         95-      CROD    3640    3636    3413    3417    3641    3636    3409    3413
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         97-      CROD    3644    3635    3619    3621    3645    3635    3617    3619
         98-      CROD    3646    3635    3613    3617    3647    3635    3609    3613
         99-      CROD    3648    3635    3605    3609    3649    3635    3601    3605
        100-      CROD    3650    3650    3017    3113    3651    3650    3113    3209


PHASE 1 %ORBITER WINGU                              SEPTEMBER 26, 1974   NASTRAN  2/ 1/73    PAGE     8
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9/10/74 XCOVERS AS PERCENT EFF.H

                              S O R T E D   B U L K   D A T A   E C H O
        CARD
        COUNT      .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
         101-      CROD    3652    3650    3200    3305    3653    3650    3305    3401
         102-      CROD    3654    3600    3117    3121    3655    3600    3113    3117
         103-      CROD    3656    3600    3317    3321    3657    3600    3313    3317
         104-      CROD    3658    3600    3309    3313    3659    3600    3305    3309
         105-      CROD    3660    3600    3517    3521    3661    3600    3513    3517
         106-      CROD    3662    3600    3509    3513    3663    3600    3505    3509
         107-      CROD    3664    3600    3501    3505
         108-      CROD    3701    3601    3022    3122    3702    3601    3122    3222
         109-      CROD    3703    3601    3222    3322    3704    3601    3322    3422
         110-      CROD    3705    3601    3422    3522    3706    3601    3522    3572
         111-      CROD    3707    3601    3572    3622
         112-      CROD    3708    3608    3018    3118    3709    3608    3118    3218
         113-      CROD    3710    3608    3218    3318    3711    3608    3318    3418
         114-      CROD    3712    3608    3418    3518    3713    3608    3518    3568
         115-      CROD    3714    3608    3568    3618
         116-      CROD    3715    3608    3114    3214    3716    3608    3214    3314
         117-      CROD    3717    3608    3314    3414    3718    3608    3414    3514
         118-      CROD    3719    3608    3514    3614    3720    3620    3210    3310
         119-      CROD    3721    3620    3310    3410    3722    3620    3410    3510
         120-      CROD    3723    3620    3510    3610    3724    3624    3306    3406
         121-      CROD    3725    3624    3406    3506    3726    3624    3506    3606
         122-      CROD    3727    3627    3606    3602    3728    3627    3602    3602
         123-      CROD    3735    3635    3014    3022
         124-      CROD    3736    3636    3218    3222    3737    3636    3214    3218
         125-      CROD    3738    3636    3310    3314    3739    3636    3418    3422
         126-      CROD    3740    3636    3414    3418    3741    3636    3410    3414
         127-      CROD    3742    3636    3406    3410    3743    3636    3402    3406
         128-      CROD    3744    3635    3624    3622    3745    3635    3618    3624
         129-      CROD    3746    3635    3614    3618    3747    3635    3610    3614
         130-      CROD    3748    3635    3606    3610    3749    3635    3602    3606
         131-      CROD    3750    3650    3018    3114    3751    3650    3114    3210
         132-      CROD    3752    3650    3210    3306    3753    3650    3306    3402
         133-      CROD    3754    3600    3118    3122    3755    3600    3114    3118
         134-      CROD    3756    3600    3318    3322    3757    3600    3314    3318
         135-      CROD    3758    3600    3310    3314    3759    3600    3306    3310
         136-      CROD    3760    3600    3518    3522    3761    3600    3514    3518
         137-      CROD    3762    3600    3510    3514    3763    3600    3506    3510
         138-      CROD    3764    3600    3502    3506    3765    3600    3574    3572
         139-      CROD    3766    3600    3572    3574
         140-      CSHEAR  3101    3101    3017    3117    3121    3021
         141-      CSHEAR  3102    3101    3117    3217    3221    3121
         142-      CSHEAR  3103    3101    3113    3213    3217    3117
         143-      CSHEAR  3104    3101    3217    3317    3321    3221
         144-      CSHEAR  3105    3101    3213    3313    3317    3217
         145-      CSHEAR  3106    3101    3209    3309    3313    3213
         146-      CSHEAR  3107    3101    3317    3417    3421    3321
         147-      CSHEAR  3108    3101    3313    3413    3417    3317
         148-      CSHEAR  3109    3101    3309    3409    3413    3313
         149-      CSHEAR  3110    3101    3305    3405    3409    3309
         150-      CSHEAR  3111    3101    3417    3517    3521    3421

PHASE 1 ORBITER WING                          SEPTEMBER 26, 1974   NASTRAN  2/ 1/73     PAGE     9
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9/10/74 SCOVERS 85 PERCENT EFF.H

                                    S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
  151-        CSHEAR  3112    3101    3413    3513    3517    3417
  152-        CSHEAR  3113    3101    3409    3509    3513    3413
  153-        CSHEAR  3114    3101    3405    3505    3509    3409
  154-        CSHEAR  3115    3101    3401    3501    3505    3405
  155-        CSHEAR  3116    3101    3517    3617    3621    3521
  156-        CSHEAR  3117    3101    3513    3613    3617    3517
  157-        CSHEAR  3118    3101    3509    3609    3613    3513
  158-        CSHEAR  3119    3101    3505    3605    3609    3509
  159-        CSHEAR  3120    3101    3501    3601    3605    3505
  160-        CSHEAR  3121    3121    3617    3667    3671    3621
  161-        CSHEAR  3122    3121    3613    3663    3667    3617
  162-        CSHEAR  3123    3121    3609    3659    3663    3613
  163-        CSHEAR  3124    3121    3605    3655    3659    3609
  164-        CSHEAR  3125    3121    3601    3651    3655    3605
  165-        CSHEAR  3201    3101    3018    3118    3122    3022
  166-        CSHEAR  3202    3101    3118    3218    3222    3122
  167-        CSHEAR  3203    3101    3114    3214    3218    3118
  168-        CSHEAR  3204    3101    3218    3318    3322    3222
  169-        CSHEAR  3205    3101    3214    3314    3318    3218
  170-        CSHEAR  3206    3101    3210    3310    3314    3214
  171-        CSHEAR  3207    3101    3318    3418    3422    3322
  172-        CSHEAR  3208    3101    3314    3414    3418    3318
  173-        CSHEAR  3209    3101    3310    3410    3414    3314
  174-        CSHEAR  3210    3101    3306    3406    3410    3310
  175-        CSHEAR  3211    3101    3418    3518    3522    3422
  176-        CSHEAR  3212    3101    3414    3514    3518    3418
  177-        CSHEAR  3213    3101    3410    3510    3514    3414
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  179-        CSHEAR  3215    3101    3402    3502    3506    3406
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  182-        CSHEAR  3218    3101    3510    3610    3614    3514
  183-        CSHEAR  3219    3101    3506    3606    3610    3510
  184-        CSHEAR  3220    3101    3502    3602    3606    3506
  185-        CSHEAR  3221    3121    3618    3668    3672    3622
  186-        CSHEAR  3222    3121    3614    3664    3668    3618
  187-        CSHEAR  3223    3121    3610    3660    3664    3614
  188-        CSHEAR  3224    3121    3606    3656    3660    3610
  189-        CSHEAR  3225    3121    3602    3652    3656    3606
  190-        CSHEAR  3226    3101    3574    3624    3622    3572
  191-        CSHEAR  3227    3101    3518    3618    3624    3574
  192-        CSHEAR  3301    3301    3017    3021    3022    3018
  193-        CSHEAR  3302    3301    3021    3121    3122    3022
  194-        CSHEAR  3303    3301    3017    3117    3118    3018
  195-        CSHEAR  3304    3301    3017    3113    3114    3018
  196-        CSHEAR  3305    3301    3121    3221    3222    3122
  197-        CSHEAR  3306    3301    3117    3217    3218    3118
  198-        CSHEAR  3307    3301    3113    3213    3214    3114
  199-        CSHEAR  3308    3301    3113    3209    3210    3114
  200-        CSHEAR  3309    3301    3221    3321    3322    3222

PHASE 1 YORDITER WINGH                          SEPTEMBER 26, 1974   NASTRAN  2/ 1/73   PAGE   10
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9/10/74 %COVERS 85 PERCENT EFF.#

                                     S O R T E D   B U L K   D A T A   E C H O
CARD
COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
  201-       CSHEAR  3310    3301    3217    3317    3318    3218
  202-       CSHEAR  3311    3301    3213    3313    3314    3214
  203-       CSHEAR  3312    3301    3209    3309    3310    3210
  204-       CSHEAR  3313    3301    3209    3305    3306    3210
  205-       CSHEAR  3314    3301    3321    3421    3422    3322
  206-       CSHEAR  3315    3301    3317    3417    3418    3318
  207-       CSHEAR  3316    3301    3313    3413    3414    3314
  208-       CSHEAR  3317    3301    3309    3409    3410    3310
  209-       CSHEAR  3318    3301    3305    3405    3406    3306
  210-       CSHEAR  3319    3301    3305    3401    3402    3306
  211-       CSHEAR  3320    3301    3421    3521    3522    3422
  212-       CSHEAR  3321    3301    3417    3517    3518    3418
  213-       CSHEAR  3322    3301    3413    3513    3514    3414
  214-       CSHEAR  3323    3301    3409    3509    3510    3410
  215-       CSHEAR  3324    3301    3405    3505    3506    3406
  216-       CSHEAR  3325    3301    3401    3501    3502    3402
  217-       CSHEAR  3326    3301    3521    3671    3672    3522
  218-       CSHEAR  3327    3301    3517    3667    3668    3518
  219-       CSHEAR  3328    3301    3513    3613    3614    3514
  220-       CSHEAR  3329    3301    3509    3609    3610    3510
  221-       CSHEAR  3330    3301    3505    3605    3606    3506
  222-       CSHEAR  3331    3301    3501    3601    3602    3502
  223-       CSHEAR  3332    3301    3619    3621    3622    3624
  224-       CSHEAR  3333    3301    3617    3619    3624    3618
  225-       CSHEAR  3334    3301    3613    3617    3618    3614
  226-       CSHEAR  3335    3301    3609    3613    3614    3610
  227-       CSHEAR  3336    3301    3605    3609    3610    3606
  228-       CSHEAR  3337    3301    3601    3605    3606    3602
  229-       CSHEAR  3338    3338    3217    3221    3222    3218
  230-       CSHEAR  3339    3338    3213    3217    3218    3214
  231-       CSHEAR  3340    3338    3209    3213    3214    3210
  232-       CSHEAR  3341    3338    3417    3421    3422    3418
  233-       CSHEAR  3342    3338    3413    3417    3418    3414
  234-       CSHEAR  3343    3338    3409    3413    3414    3410
  235-       CSHEAR  3344    3338    3405    3409    3410    3406
  236-       CSHEAR  3345    3338    3401    3405    3406    3402
  237-       CSHEAR  3346    3346    3621    3671    3672    3622
  238-       CSHEAR  3347    3346    3617    3667    3668    3618
  239-       CSHEAR  3348    3346    3613    3663    3664    3614
  240-       CSHEAR  3349    3346    3609    3659    3660    3610
  241-       CSHEAR  3350    3346    3601    3651    3652    3602
  242-       CSHEAR  3351    3301    3571    3621    3622    3572
  243-       CSHEAR  3352    3301    3567    3617    3618    3568
  244-       EIGR    2       INV     10.0    1200.   30                      1.-3    6EIG2
  245-       EEIG2   MAX                                     0       456
  246-       GRDSET          0
  247-       GRID    3017            162.0   -61.58  51.5
  248-       GRID    3018            162.0   -61.58  49.0
  249-       GRID    3021            170.75  -61.58  51.5
  250-       GRID    3022            170.75  -61.58  49.0
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9/10/74 XCOVERS 88 PERCENT EFF.#

                                                S O R T E D   B U L K   D A T A   E C H O
           CARD
           COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
            251-        GRID    3113                    153.375 -54.046751.5
            252-        GRID    3114                    153.375 -54.046748.4487
            253-        GRID    3117                    162.0   -54.046751.5
            254-        GRID    3118                    162.0   -54.046748.4487
            255-        GRID    3121                    170.75  -54.046751.5
            256-        GRID    3122                    170.75  -54.046748.4487
            257-        GRID    3209                    144.75  -46.513451.5
            258-        GRID    3210                    144.75  -46.513447.8975
            259-        GRID    3213                    153.375 -46.513451.5
            260-        GRID    3214                    153.375 -46.513447.8975
            261-        GRID    3217                    162.0   -46.513451.5
            262-        GRID    3218                    162.0   -46.513447.8975
            263-        GRID    3221                    170.75  -46.513451.5
            264-        GRID    3222                    170.75  -46.513447.8975
            265-        GRID    3305                    135.0   -37.007251.5
            266-        GRID    3306                    135.0   -37.007247.2743
            267-        GRID    3309                    144.75  -37.007251.5
            268-        GRID    3310                    144.75  -37.007247.2743
            269-        GRID    3313                    153.375 -37.007251.5
            270-        GRID    3314                    153.375 -37.007247.2743
            271-        GRID    3317                    162.0   -37.007251.5
            272-        GRID    3318                    162.0   -37.007247.2743
            273-        GRID    3321                    170.75  -37.007251.5
            274-        GRID    3322                    170.75  -37.007247.2743
            275-        GRID    3401                    125.5   -29.7   51.5
            276-        GRID    3402                    125.5   -29.7   46.6672
            277-        GRID    3405                    135.0   -29.7   51.5
            278-        GRID    3406                    135.0   -29.7   46.6672
            279-        GRID    3409                    144.75  -29.7   51.5
            280-        GRID    3410                    144.75  -29.7   46.6672
            281-        GRID    3413                    153.375 -29.7   51.5
            282-        GRID    3414                    153.375 -29.7   46.6672
            283-        GRID    3417                    162.0   -29.7   51.5
            284-        GRID    3418                    162.0   -29.7   46.6672
            285-        GRID    3421                    170.75  -29.7   51.5
            286-        GRID    3422                    170.75  -29.7   46.6672
            287-        GRID    3501                    125.5   -21.1   51.5
            288-        GRID    3502                    125.5   -21.1   46.0378
            289-        GRID    3505                    135.0   -21.1   51.5
            290-        GRID    3506                    135.0   -21.1   46.0378
            291-        GRID    3509                    144.75  -21.1   51.5
            292-        GRID    3510                    144.75  -21.1   46.0378
            293-        GRID    3513                    153.375 -21.1   51.5
            294-        GRID    3514                    153.375 -21.1   46.0378
            295-        GRID    3517                    162.0   -21.1   51.5
            296-        GRID    3518                    162.0   -21.1   46.0378
            297-        GRID    3521                    170.75  -21.1   51.5
            298-        GRID    3522                    170.75  -21.1   46.0378
            299-        GRID    3567                    162.0   -17.425 51.5
            300-        GRID    3568                    162.0   -17.425 45.7689

   PHASE 1 XORBITER WING                           SEPTEMBER 24, 1974  NASTRAN 2/ 1/73   PAGE   12
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9/10/74 %COVERS AS PERCENT EFF.II

                                     S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT       .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
  301-      GRID    3571            170.75  -17.425 51.5
  302-      GRID    3572            170.75  -17.425 45.7689
  303-      GRID    3574    0       165.25  -17.425 45.7689 3000    456
  304-      GRID    3601            125.5   -13.75  51.5
  305-      GRID    3602            125.5   -13.75  45.5
  306-      GRID    3605            135.0   -13.75  51.5
  307-      GRID    3606            135.0   -13.75  45.5
  308-      GRID    3609            144.75  -13.75  51.5
  309-      GRID    3610            144.75  -13.75  45.5
  310-      GRID    3613            153.375 -13.75  51.5
  311-      GRID    3614            153.375 -13.75  45.5
  312-      GRID    3617            162.0   -13.75  51.5
  313-      GRID    3618            162.0   -13.75  45.5
  314-      GRID    3619            165.25  -13.75  51.5
  315-      GRID    3621            170.75  -13.75  51.5
  316-      GRID    3622            170.75  -13.75  45.5
  317-      GRID    3624    0       165.25  -13.75  45.5    3002    456
  318-      GRID    3651            125.5   -12.5   51.5
  319-      GRID    3652            125.5   -12.5   45.5
  320-      GRID    3655            135.0   -12.5   51.5
  321-      GRID    3656            135.0   -12.5   45.5
  322-      GRID    3659            144.75  -12.5   51.5
  323-      GRID    3660            144.75  -12.5   45.5
  324-      GRID    3663            153.375 -12.5   51.5
  325-      GRID    3664            153.375 -12.5   45.5
  326-      GRID    3667            162.0   -12.5   51.5
  327-      GRID    3668            162.0   -12.5   45.5
  328-      GRID    3671            170.75  -12.5   51.5
  329-      GRID    3672            170.75  -12.5   45.5
  330-      MAT1    3100    10.566          .3      .1
  331-      MAT1    3101    6.0276          .3      .1
  332-      MAT1    3600    10.566          .3      0.0
  333-      MAT1    3601    17.8766         .3      0.0
  334-      MAT1    3631    20.4266         .3      0.0
  335-      MAT1    3632    21.066          .3      0.0
  336-      MAT1    3644    22.0566         .3      0.0
  337-      MAT1    3729    12.6166         .3      0.0
  338-      MAT1    3731    21.066          .3      0.0
  339-      MPC     3000    3567    1       1.0     3517    1       -.5             EMC3567X
  340-      EMC3567X        3617    1       -.5
  341-      MPC     3000    3571    1       1.0     3521    1       -.5             EMC3571X
  342-      EMC3571X        3621    1       -.5
  343-      MPC     3000    3574    3       8.75    3568    2       -0.40139        EMC3574A
  344-      EMC3574A        3566    3       -5.46533 3572   2       -0.23719        EMC3574B
  345-      EMC3574B        3572    3       -3.24133
  346-      MPC     3000    3619    2       6.75    3617    2       -5.5            EM3619Y
  347-      EM3619Y         3621    2       -3.25
  348-      OMIT1   1       3113    3114    3117    3118    3121    3122
  349-      OMIT1   1       3305    3306    3309    3310
  350-      OMIT1   1       3313    3314    3317    3318    3321    3322

PHASE 1 SUBMITTER WINCH                                 SEPTEMBER 26, 1974   NASTRAN 2/ 1/73   PAGE    13
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9/10/74 XCOVERS AS PERCENT EFF.0

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                                          S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
   351-       OMIT1   1       3505    3506    3509    3510    3501    3502
   352-       OMIT1   1       3513    3514    3517    3518    3521    3522
   353-       OMIT1   1       3568    3574    3572
   354-       PARAM   GRDPNT  0
   355-       PARAM   TPNAME  WINGP1
   356-       PARAM   WTMASS  .002588
   357-       PROD    3401    3600    .029                    .0016
   358-       PROD    3403    3600    .031                    .0016
   359-       PROD    3409    3600    .034                    .0016
   360-       PROD    3417    3600    .037                    .0016
   361-       PROD    3427    3600    .040                    .0016
   362-       PROD    3439    3600    .043                    .0016
   363-       PROD    3451    3600    .046                    .0016
   364-       PROD    3463    3600    .048                    .0016
   365-       PROD    3501    3600    .100                    .0
   366-       PROD    3515    3600    .03                     .0
   367-       PROD    3527    3600    .06                     .0
   368-       PROD    3528    3600    .14                     .0
   369-       PROD    3600    3600    .001
   370-       PROD    3601    3601    .044
   371-       PROD    3608    3601    .088
   372-       PROD    3620    3601    .092
   373-       PROD    3624    3601    .096
   374-       PROD    3627    3601    .048
   375-       PROD    3635    3601    .08
   376-       PROD    3636    3601    .16
   377-       PROD    3650    3601    .06
   378-       PSHEAR  3101    3101    .02     .0
   379-       PSHEAR  3121    3100    .02     .0
   380-       PSHEAR  3301    3100    .032    .0135
   381-       PSHEAR  3338    3100    .032    .0
   382-       PSHEAR  3346    3100    .125    .0
   383-       SUPORT  3624    3       3651    13      3652    123     3655    13
   384-       SUPORT  3656    123     3659    123     3660    123     3663    123
   385-       SUPORT  3664    123     3667    123     3668    123     3671    123
   386-       SUPORT  3672    123
              ENDDATA
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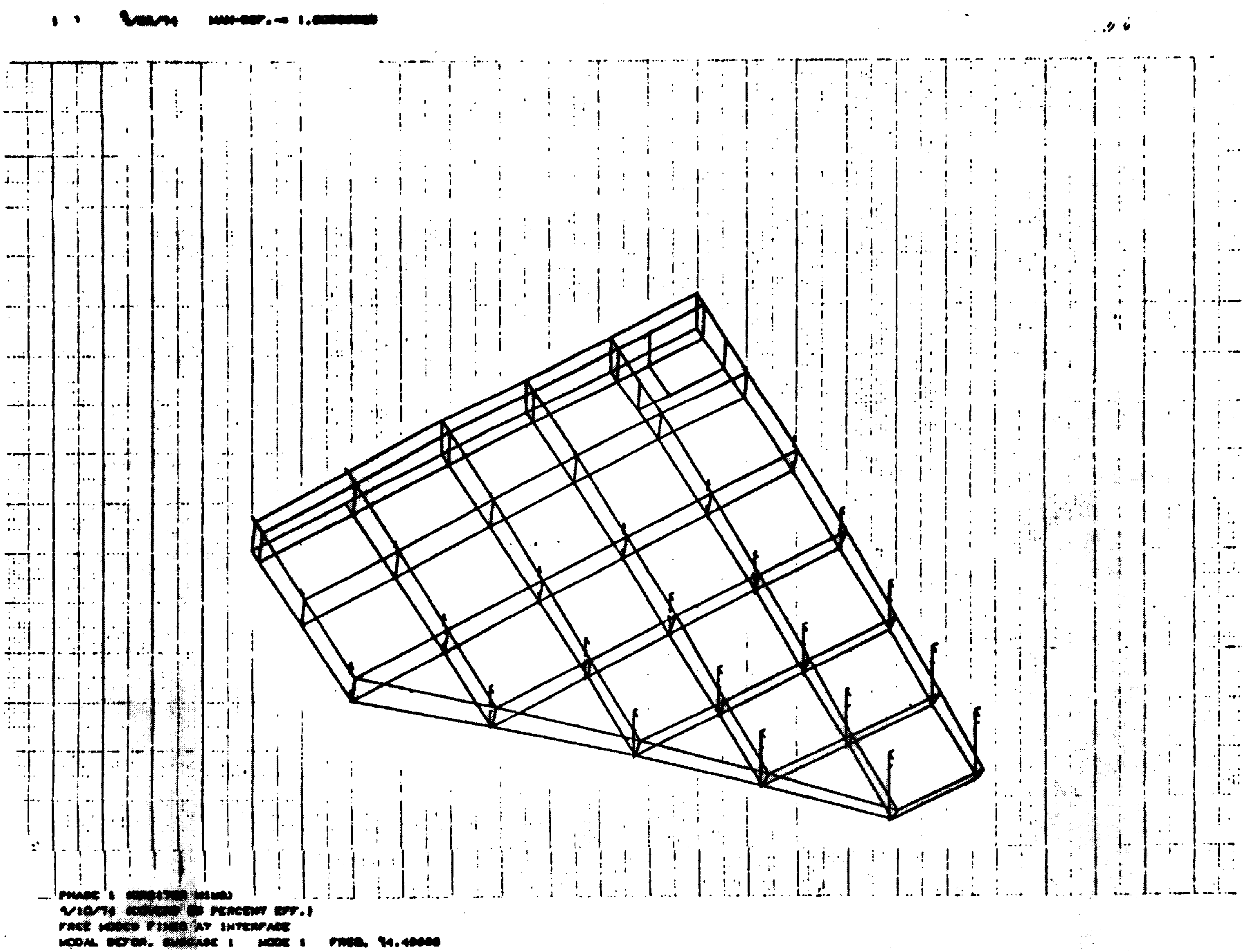
Appendix B6
PLOTS OF COMPONENT MODES/PHASE I ANALYSIS MODEL II WING



1 1 9/10/74 MAX-DEF. = 1.000000
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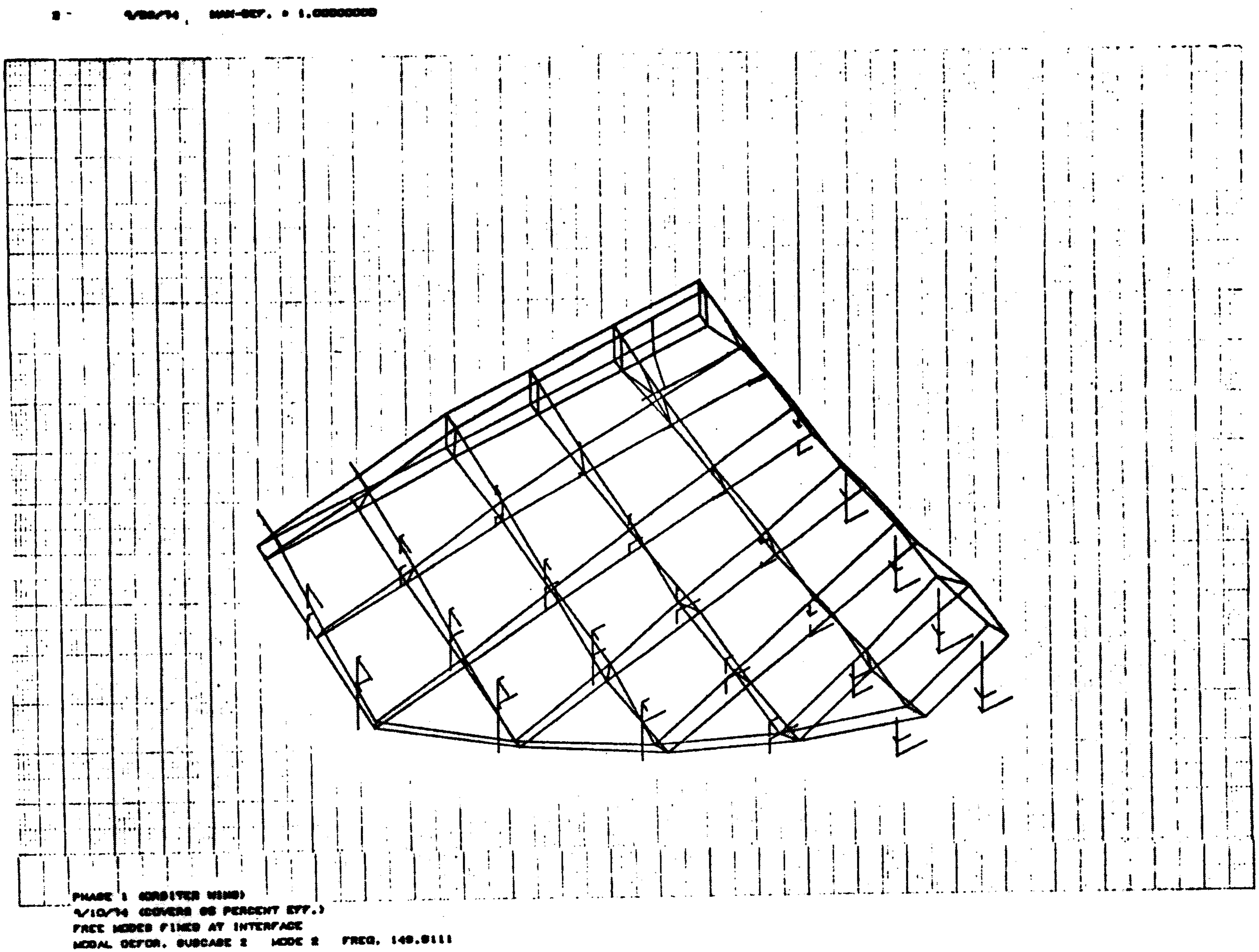
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 1 MODE 1 FREQ. 14.40000


8 - 9/26/74, MAX-DEF. = 1.00000000
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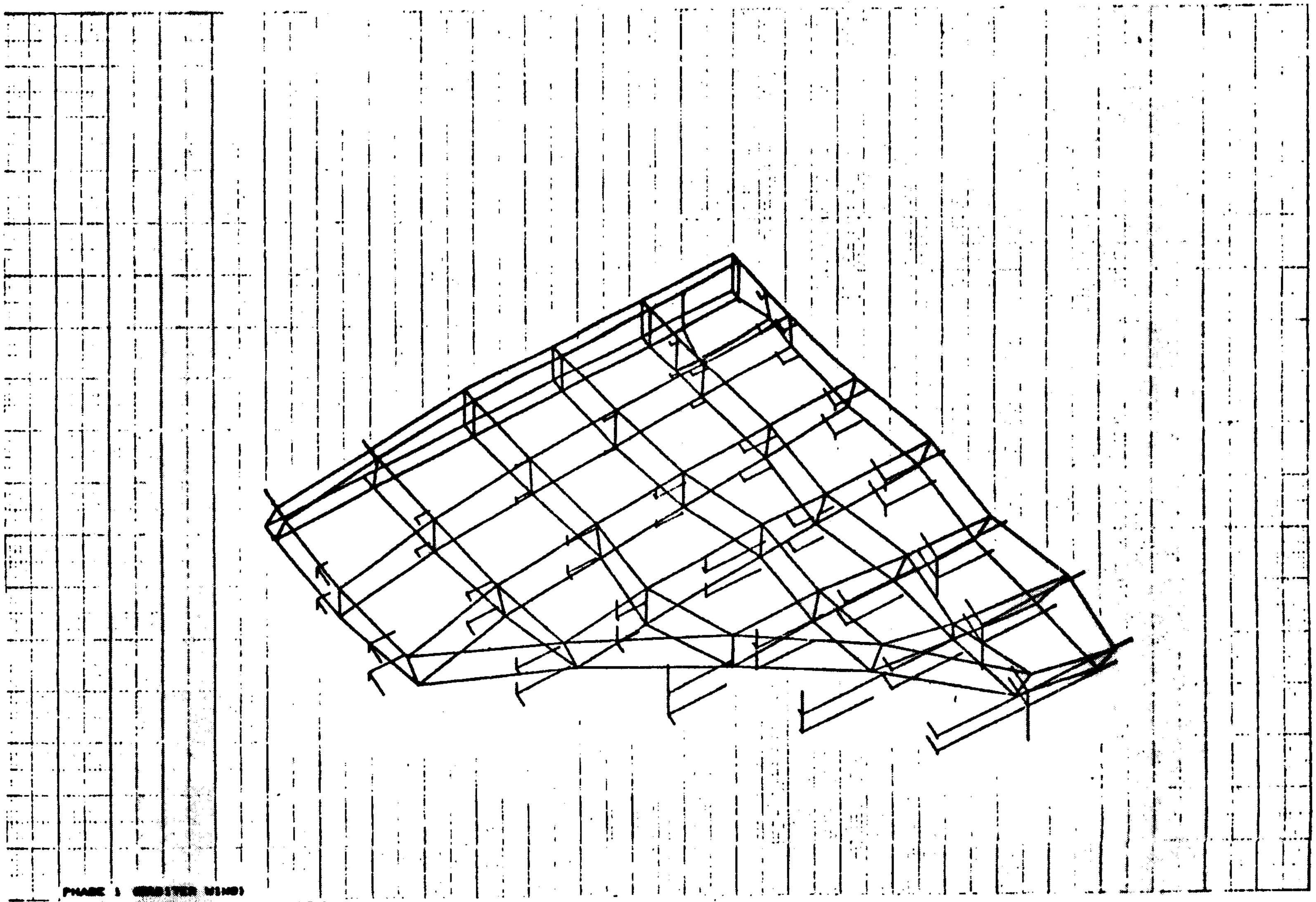
9/10/74 (COVERS 95 PERCENT EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 2 MODE 2 FREQ. 149.8111

2 9/09/74 MAX-DEF. = 1.00000000



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9/10/74 (COVERS 95 PERCENT EFF.)
FREE MODES FIXED AT INTERFACE
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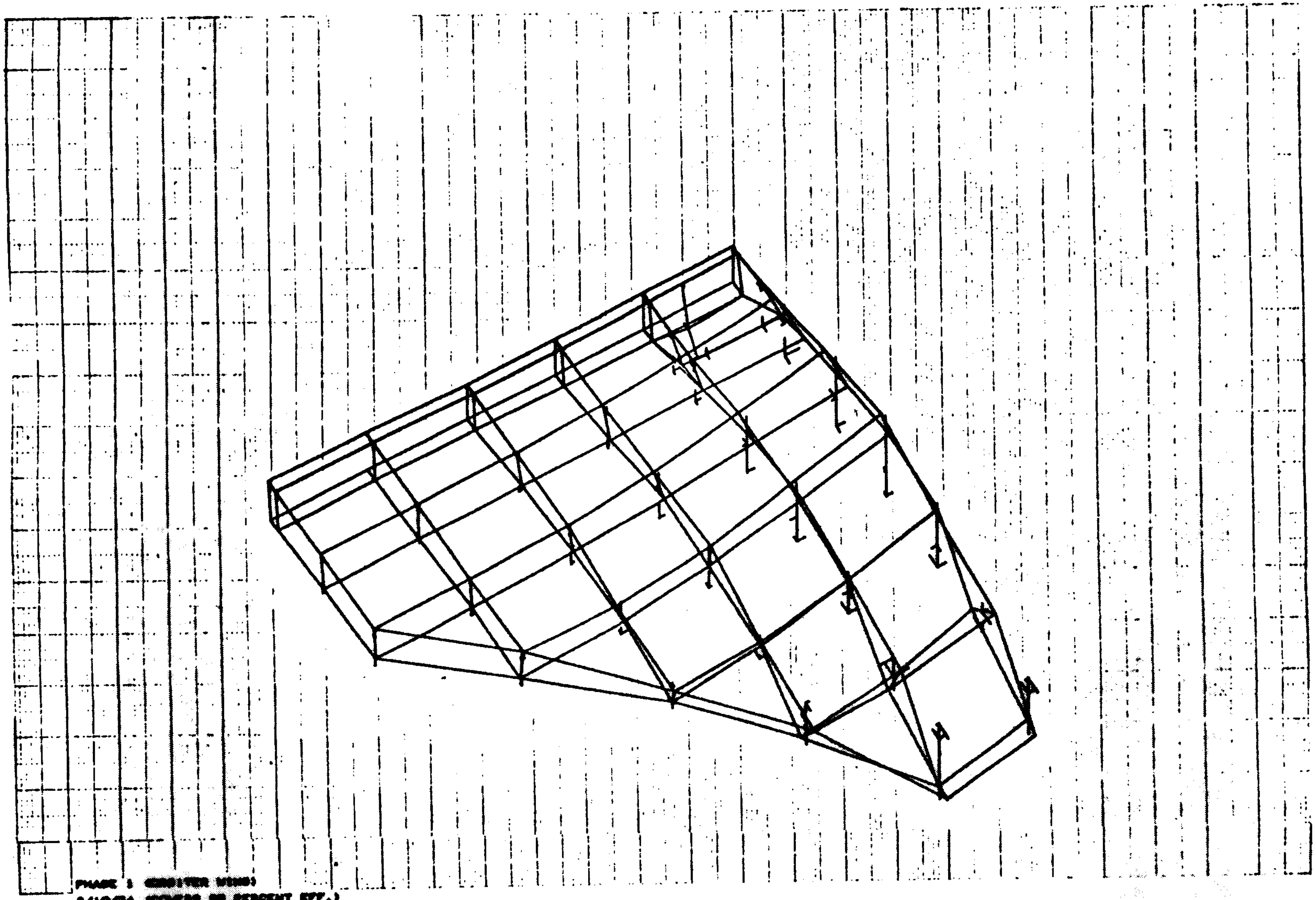
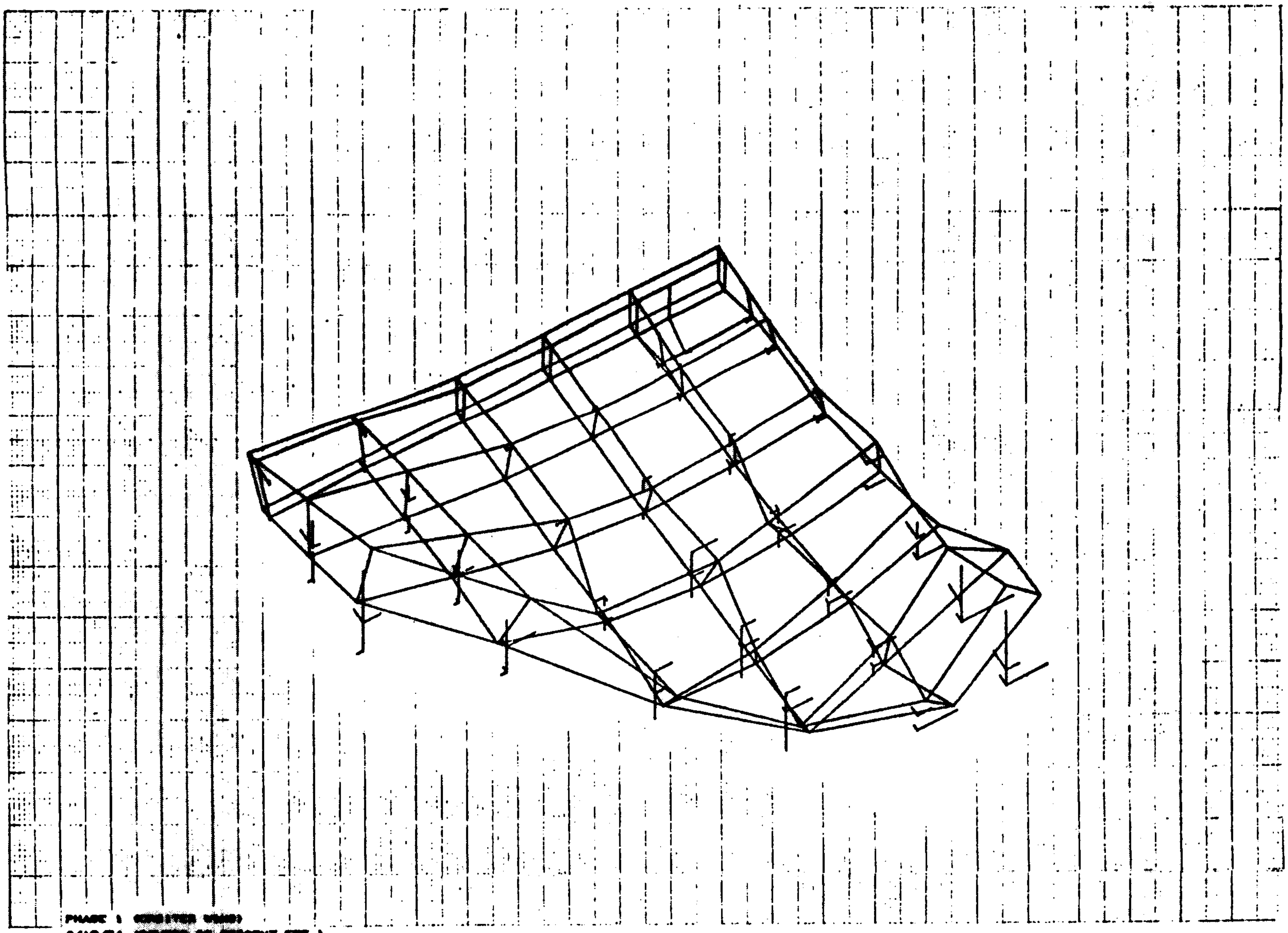
4   9/26/74   MAX-DEF. = 1.0000000



PHASE 1 (ORBITER WING)
9/10/74 (COVERS 80 PERCENT EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 4   MODE 4   FREQ. 249.5049

···· 8 9/09/74 MAX-DEF. = 1.0000000



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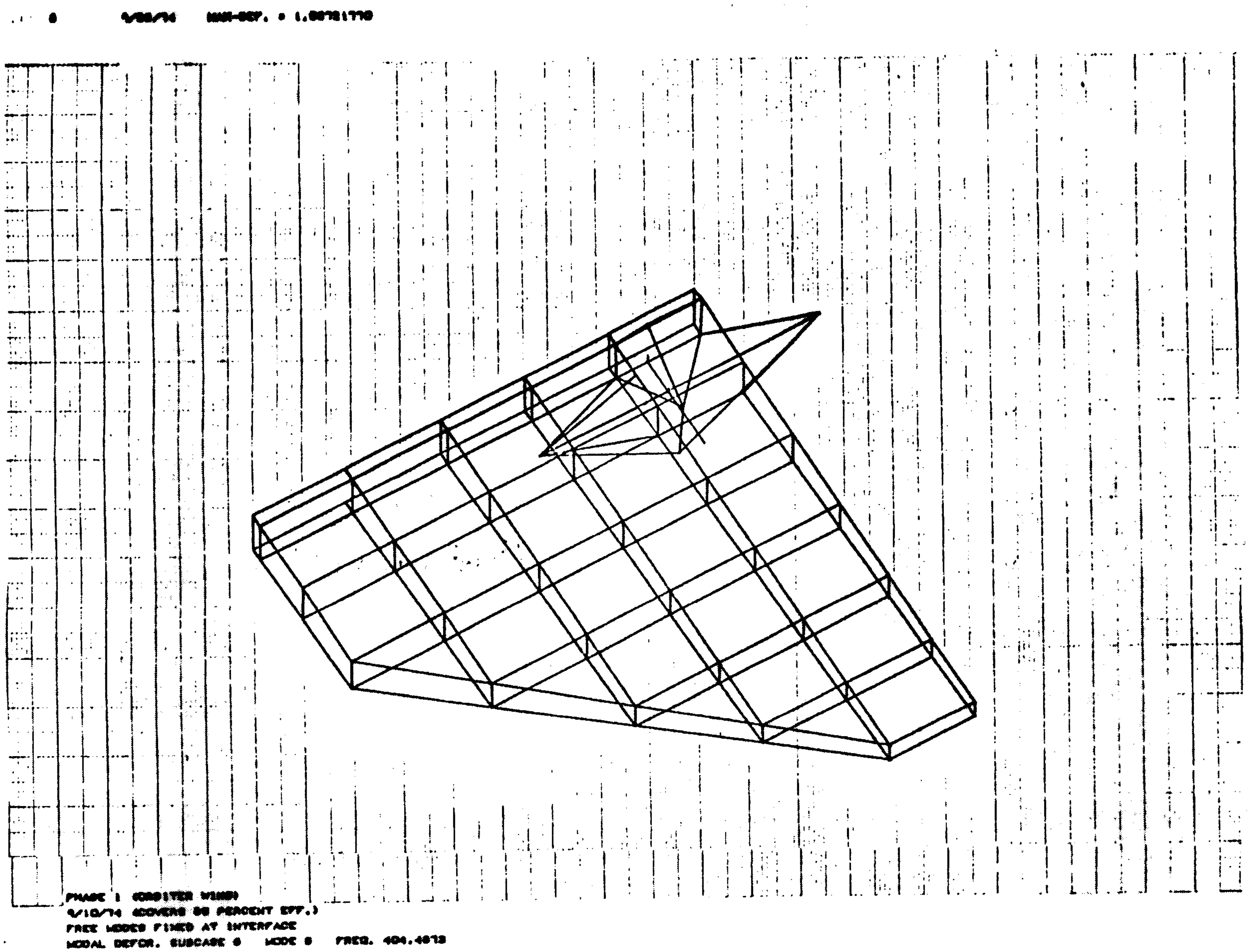
6 9/08/74 MAX-DEF. = 1.08781770
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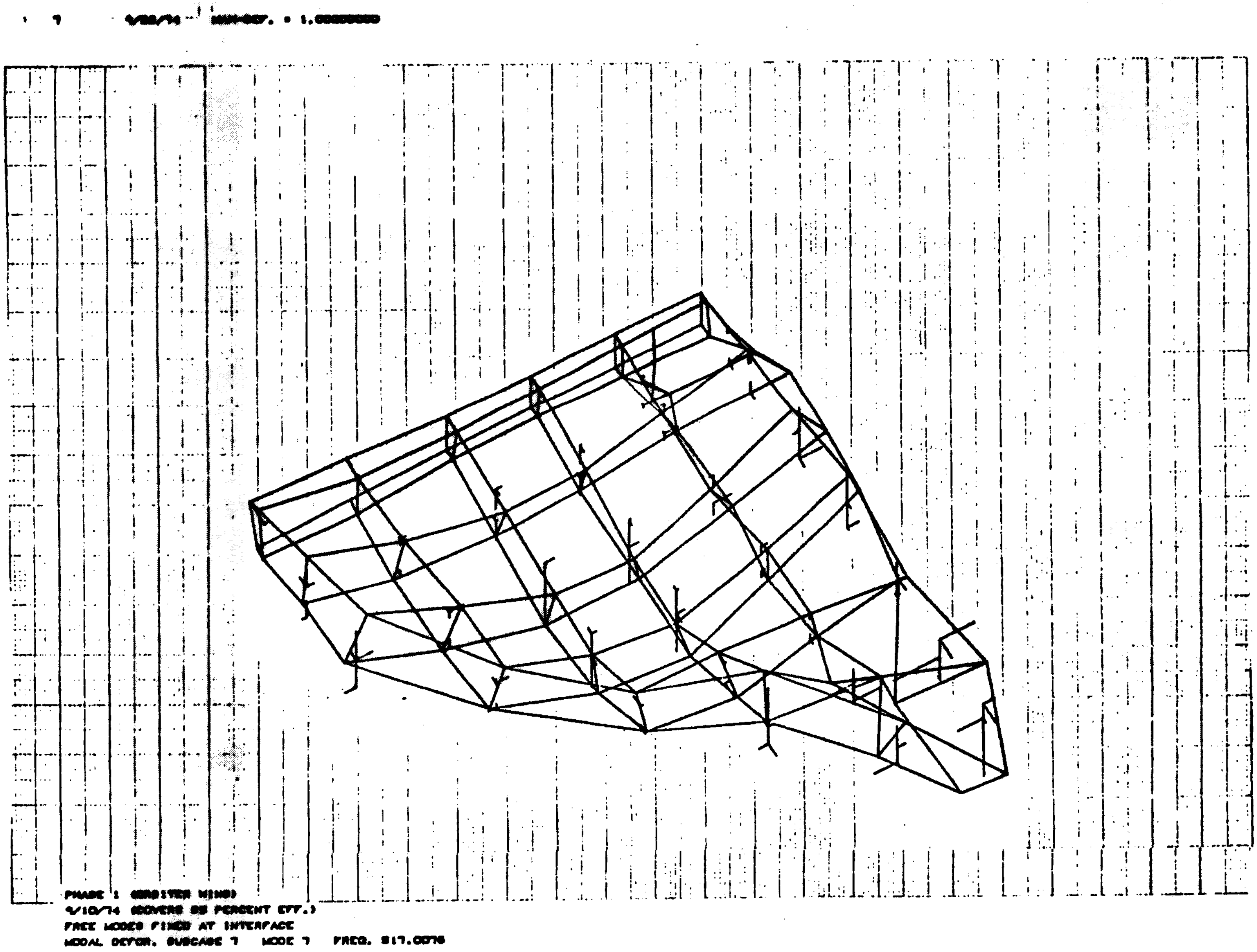
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FREE MODES FIXED AT INTERFACE
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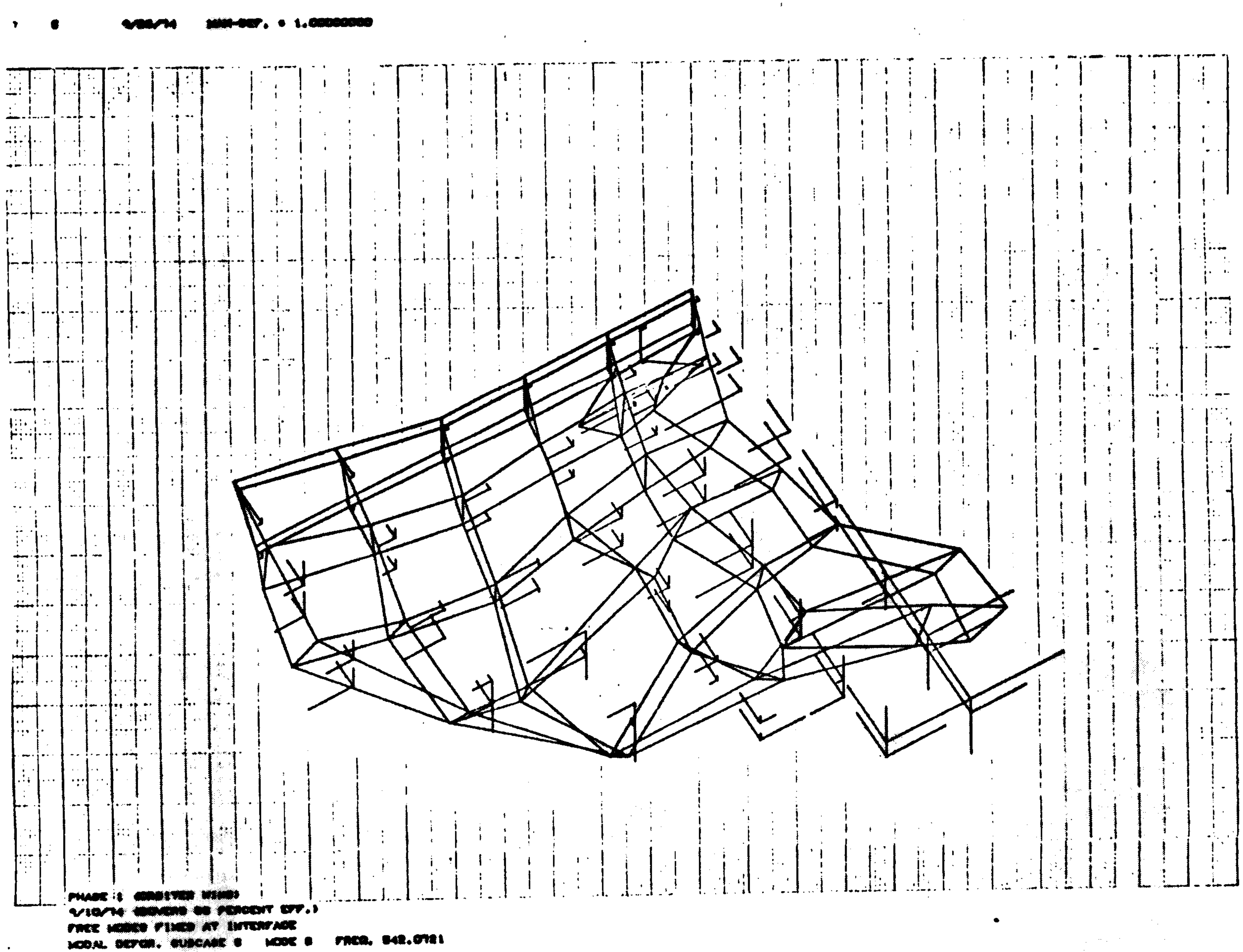
7 8 9/26/74 MAX-DEF. = 1.00000000
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FREE MODES FIXED AT INTERFACE
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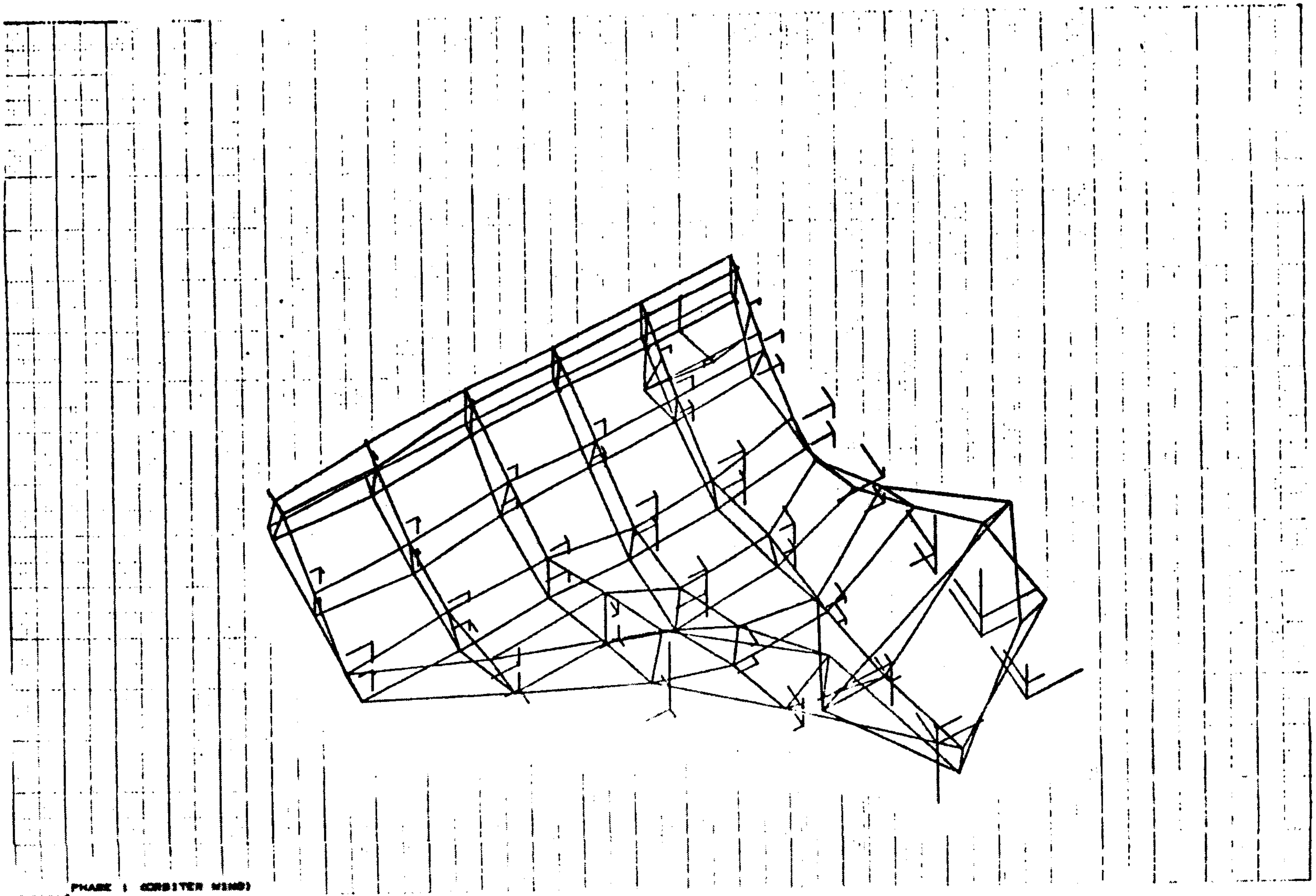

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9/10/74 (COVERS 88 PERCENT EFF.)
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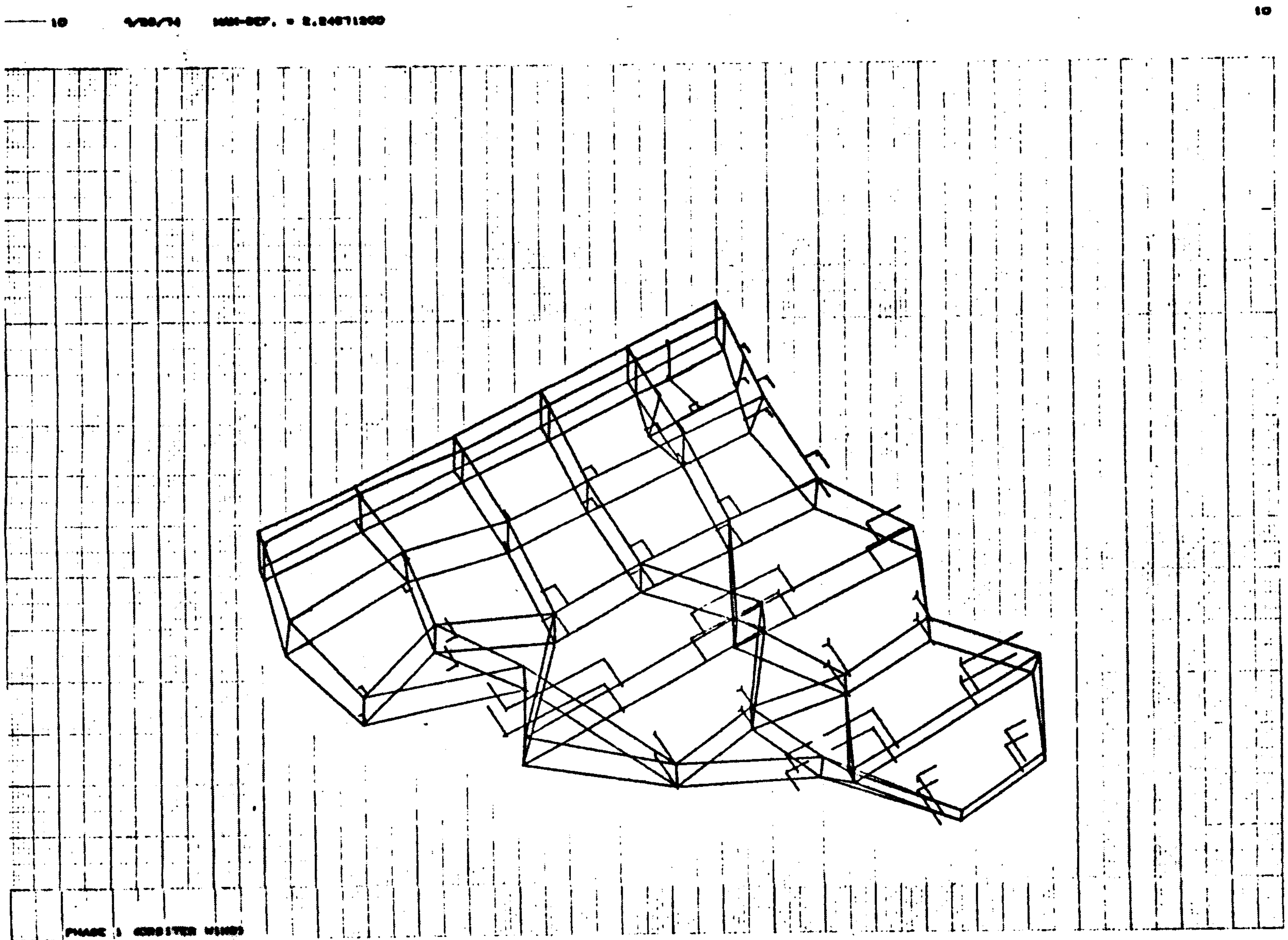

10 9/30/74 MAX-DEF. = 2.24871200
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PHASE 1 ORBITER WING
9/10/74 (COVERS 85 PERCENT EFF.)
FREE MODES FIXED AT INTERFACE
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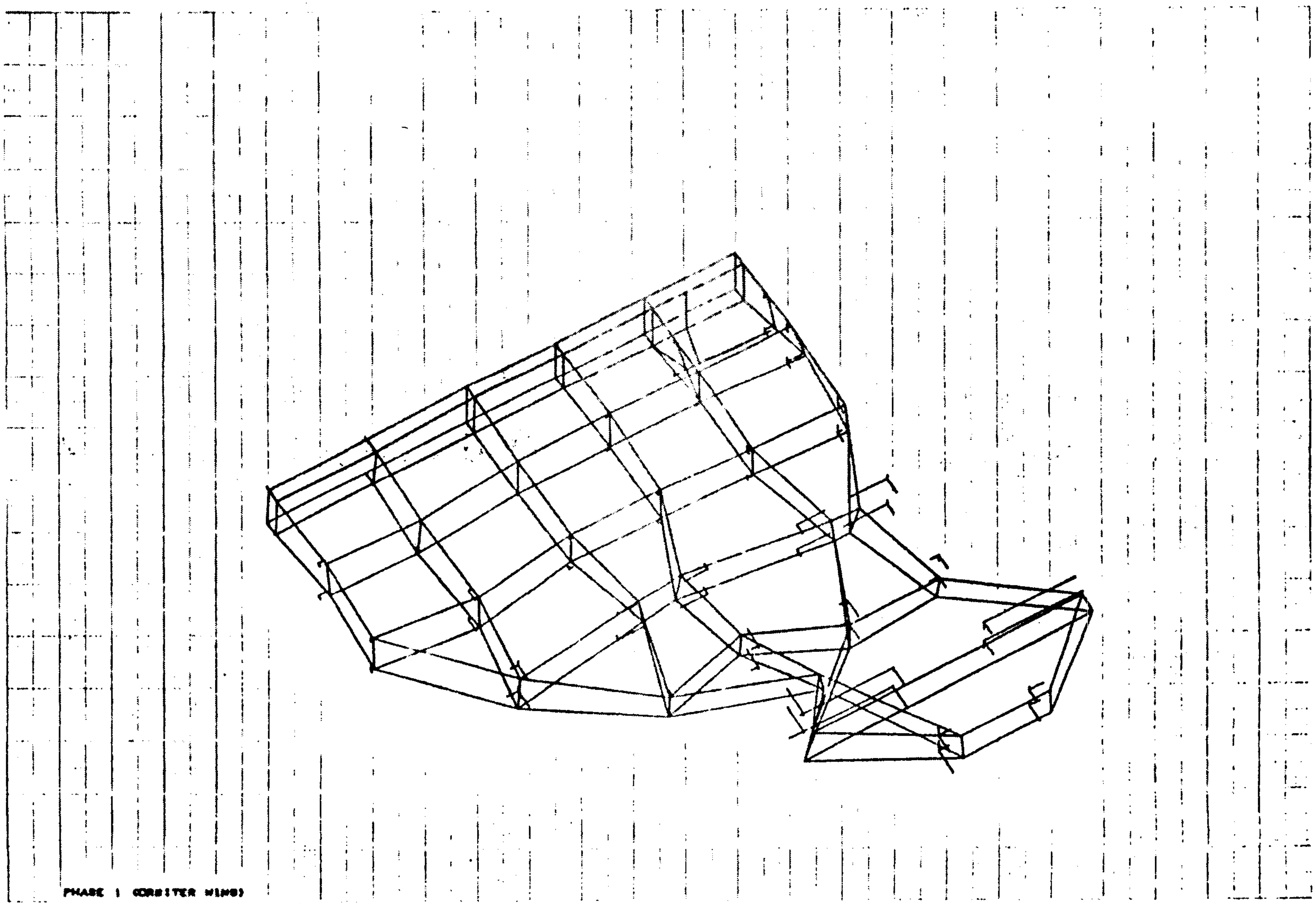

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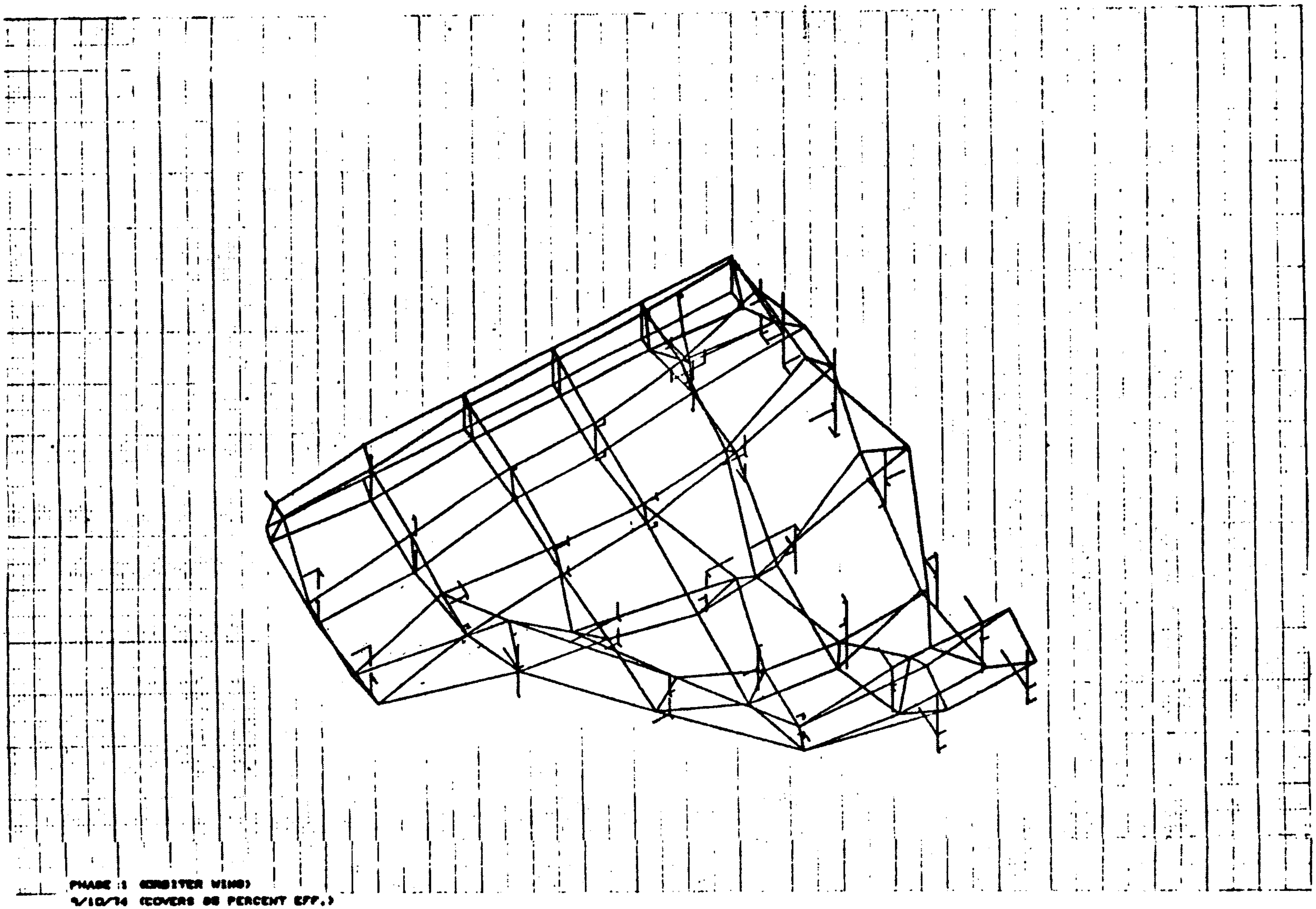

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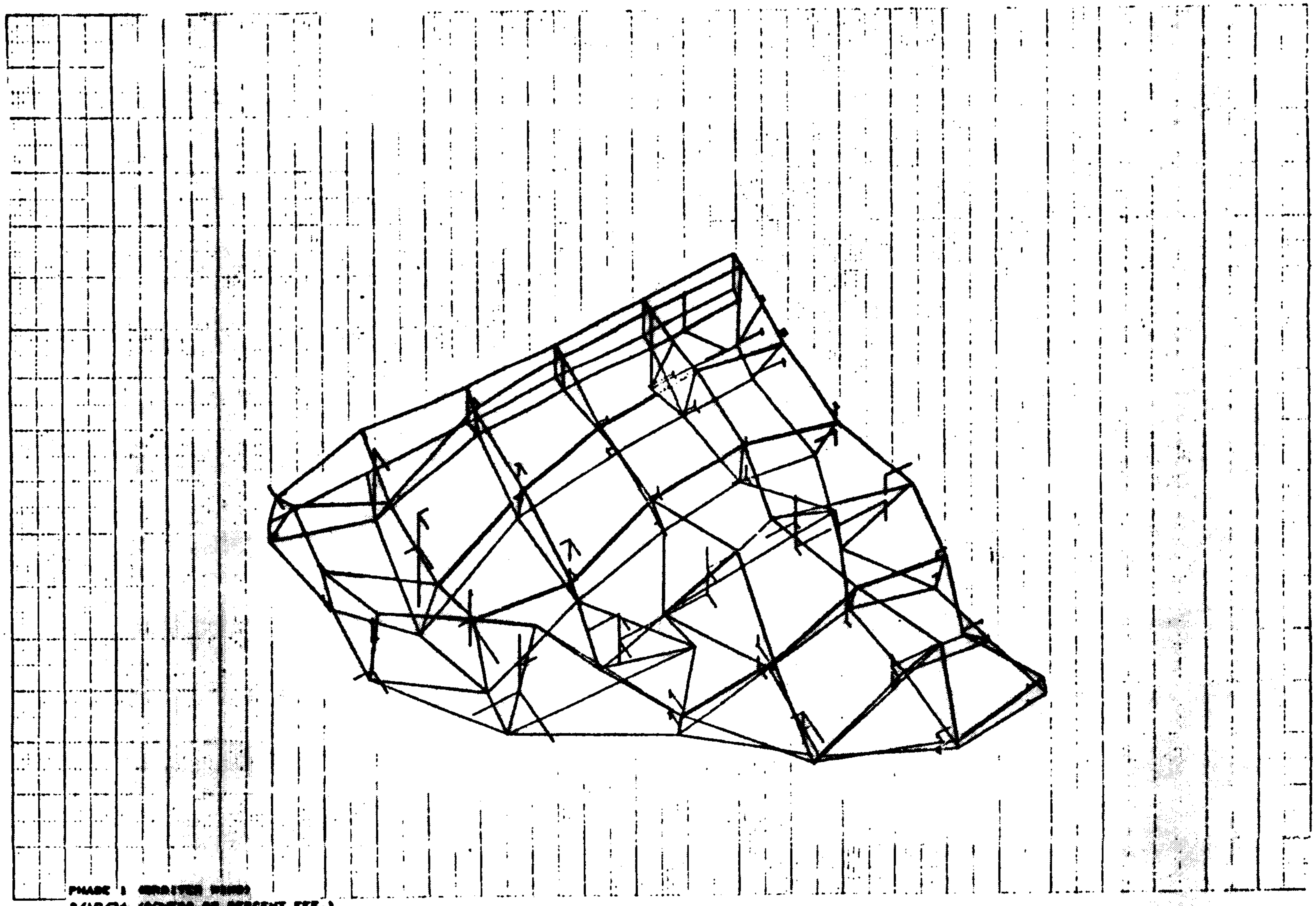
MODAL DEFOR. SUBCASE 12 MODE 12 FREQ. 848.1908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9/10/74 (COVERS [illegible] PERCENT EFF.)
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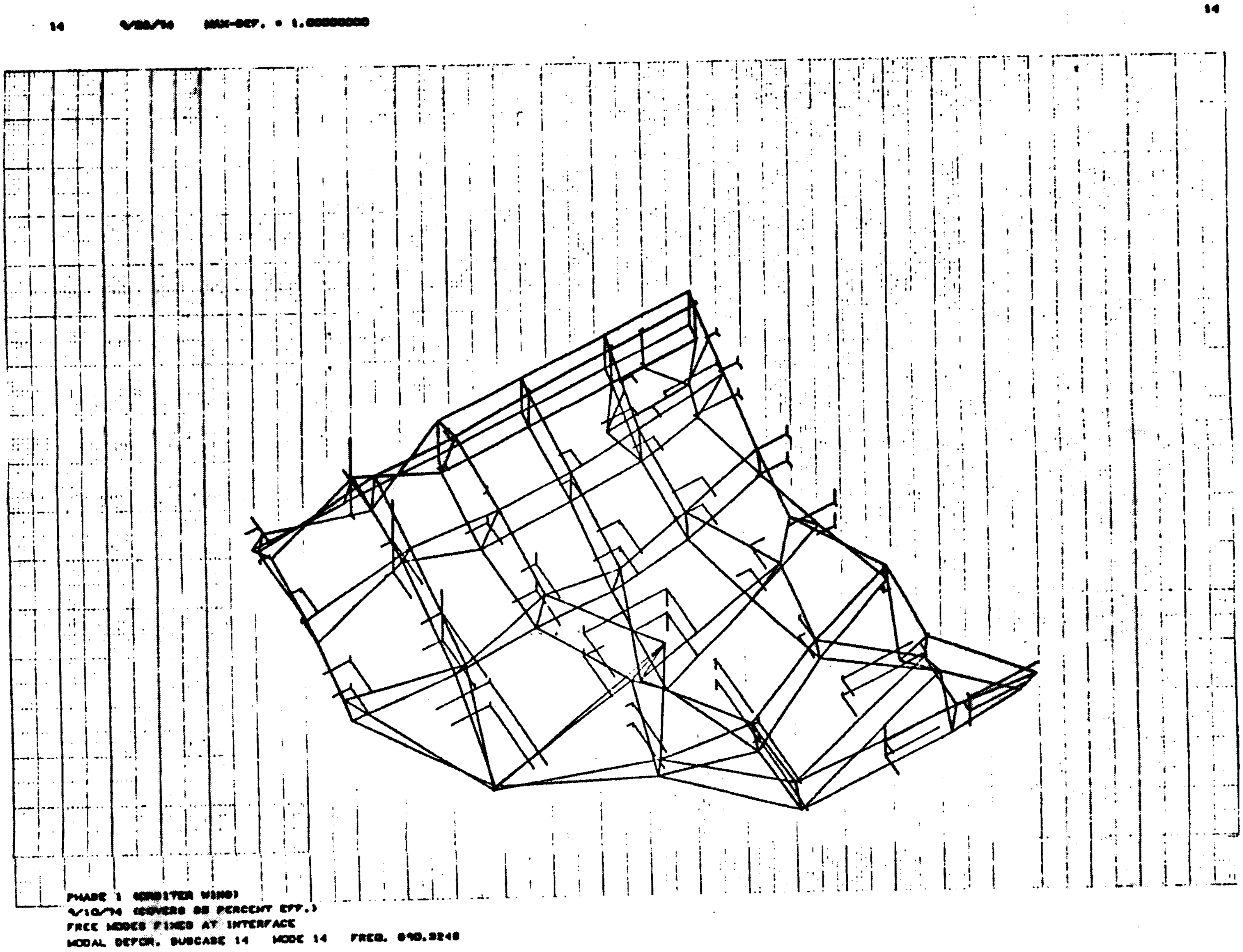
14 9/[illegible]/74 MAX-DEF. = 1.00000000
14
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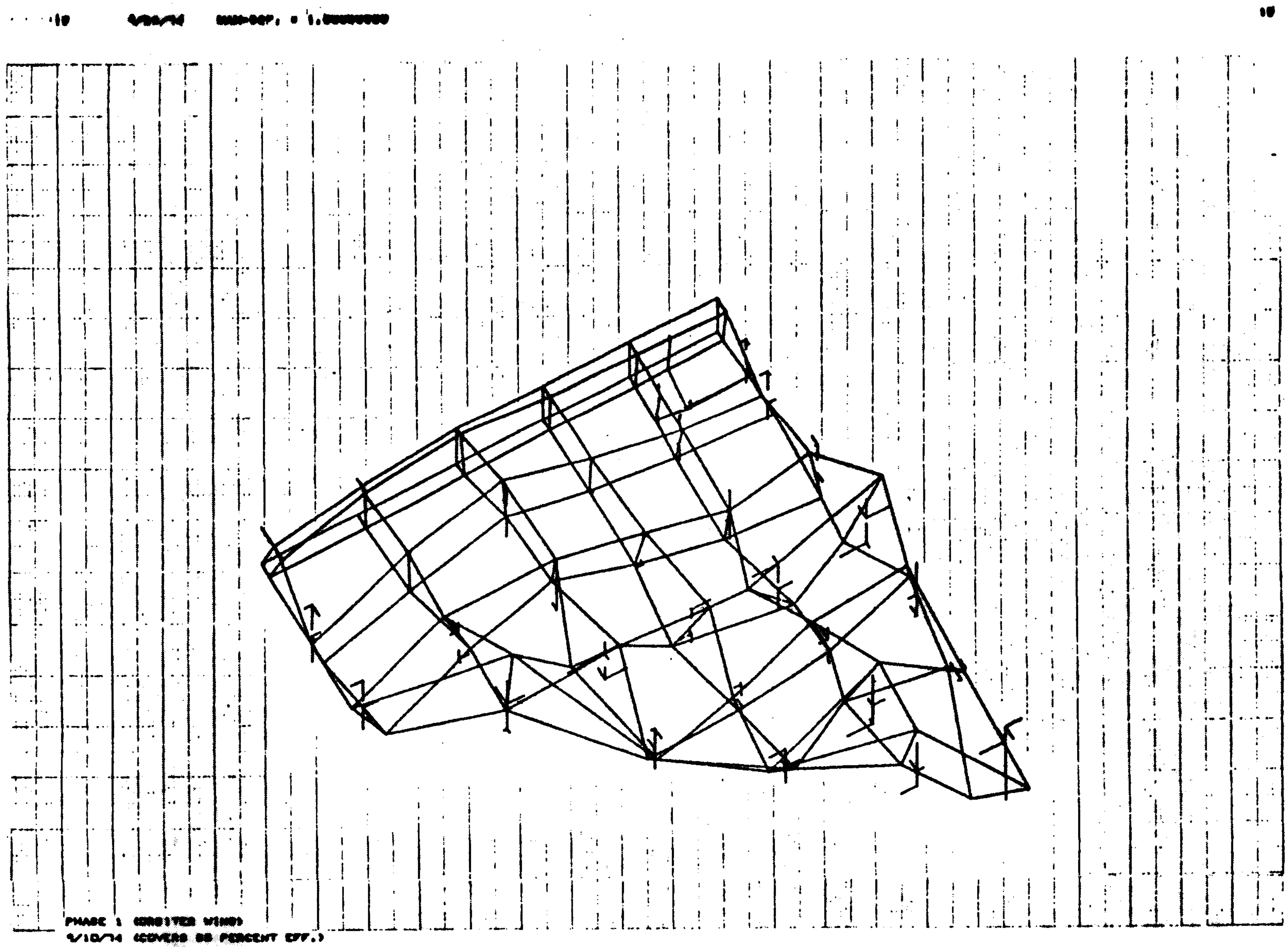
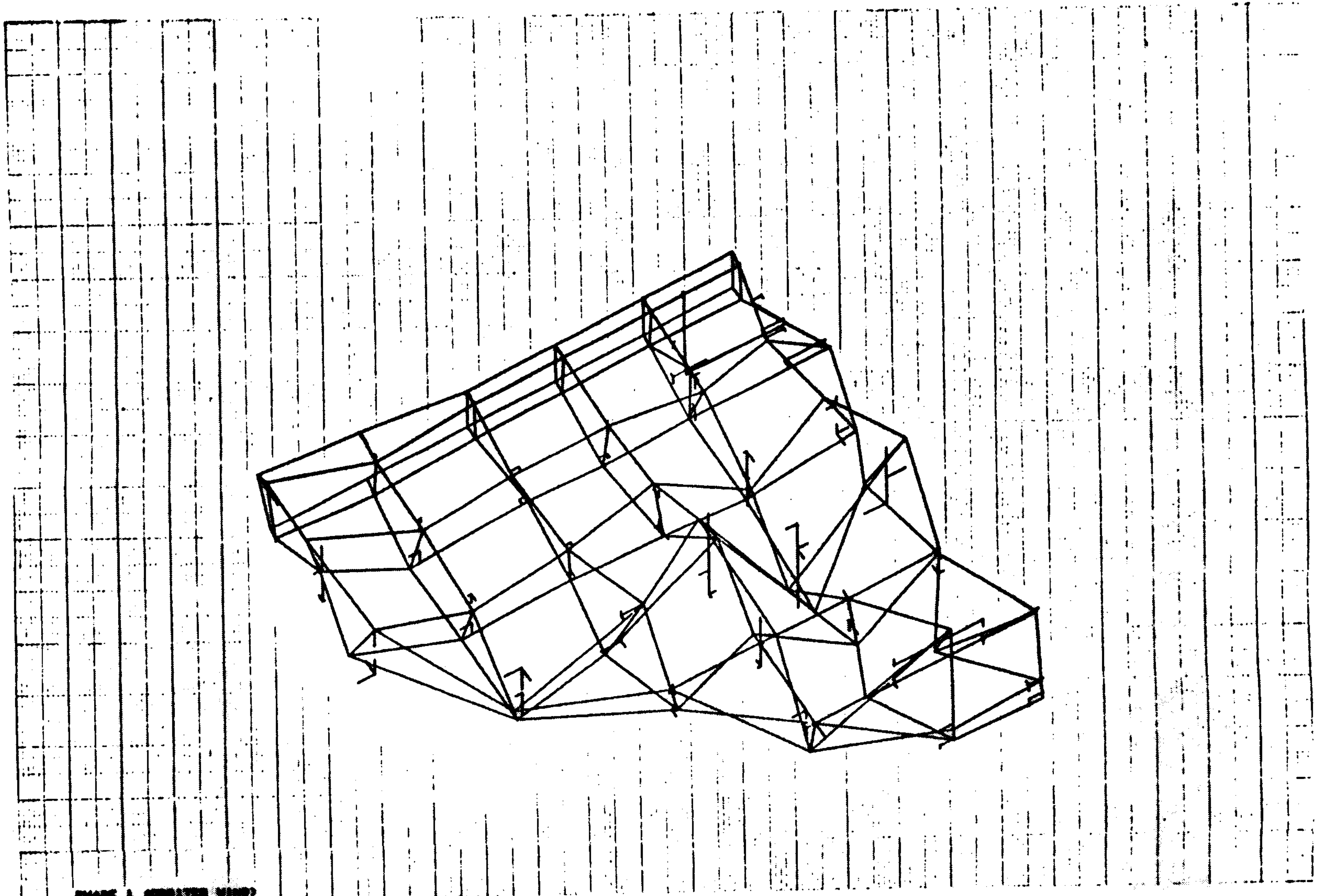
9/10/74 (COVERS 88 PERCENT EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 14 MODE 14 FREQ. 090.3248


19
9/20/74
MAX-DEF. = 1.00000000
19

PHASE 1 (ORBITER WING)
9/10/74 (COVERS 88 PERCENT EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 15 MODE 15 FREQ. 784.7748

10 9/20/74 MAX-DEF. = 1.00000000



PHASE 1 [illegible] WING)
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MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. [illegible]

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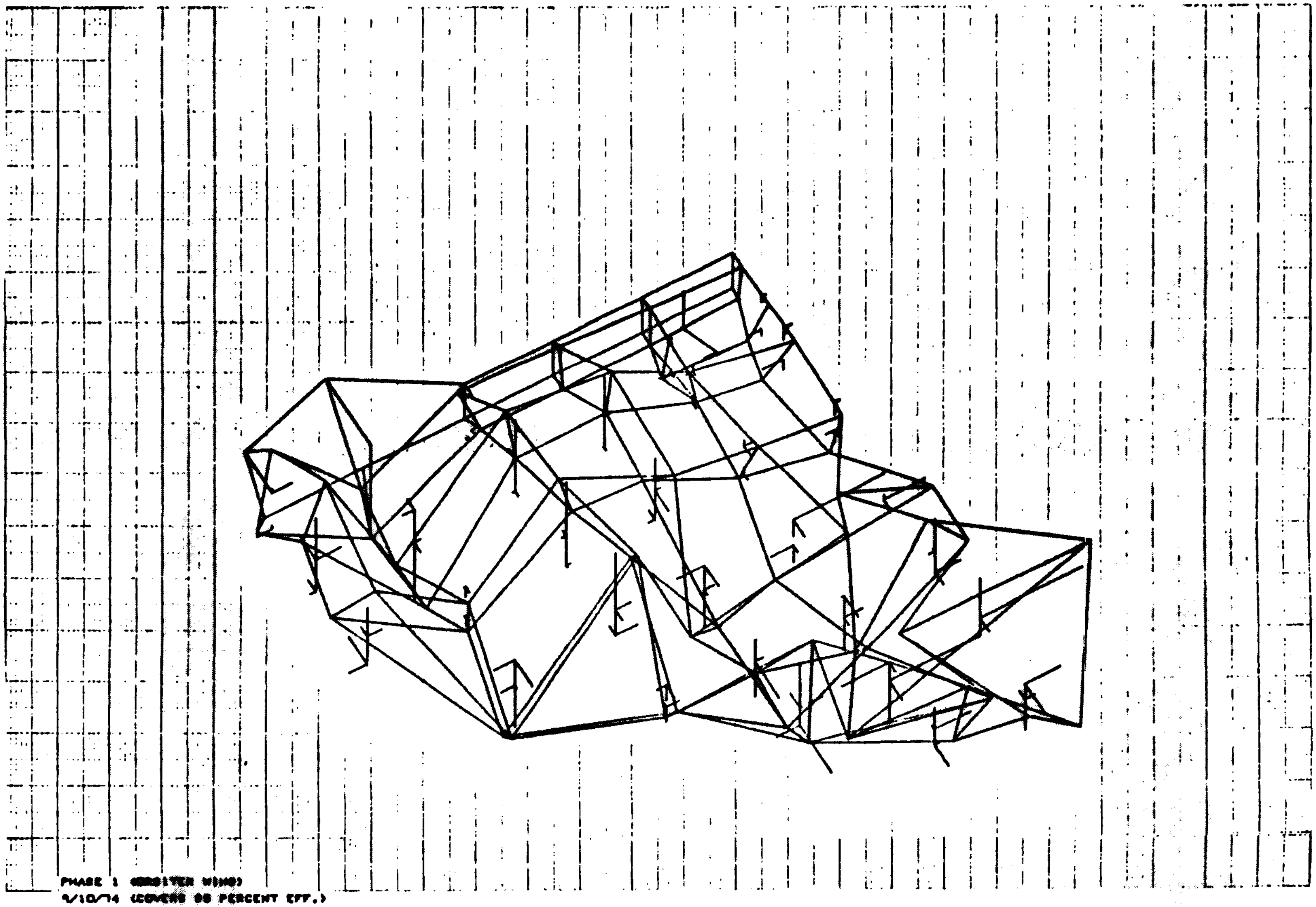

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9/10/74 (COVERS 90 PERCENT EFF.)
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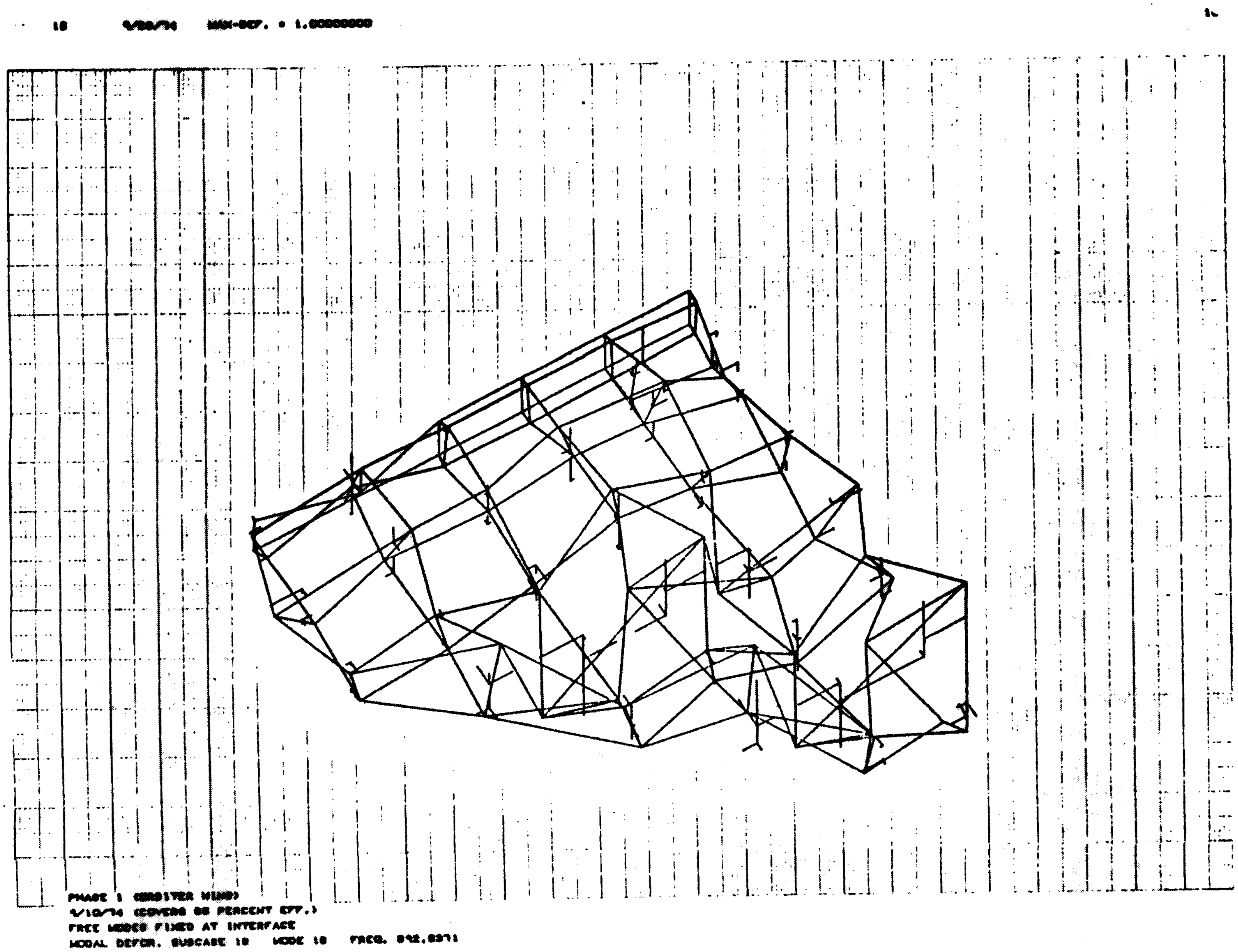
18 4/30/74 MAX-DEF. = 1.00000000
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4/10/74 (COVERS 85 PERCENT EFF.)
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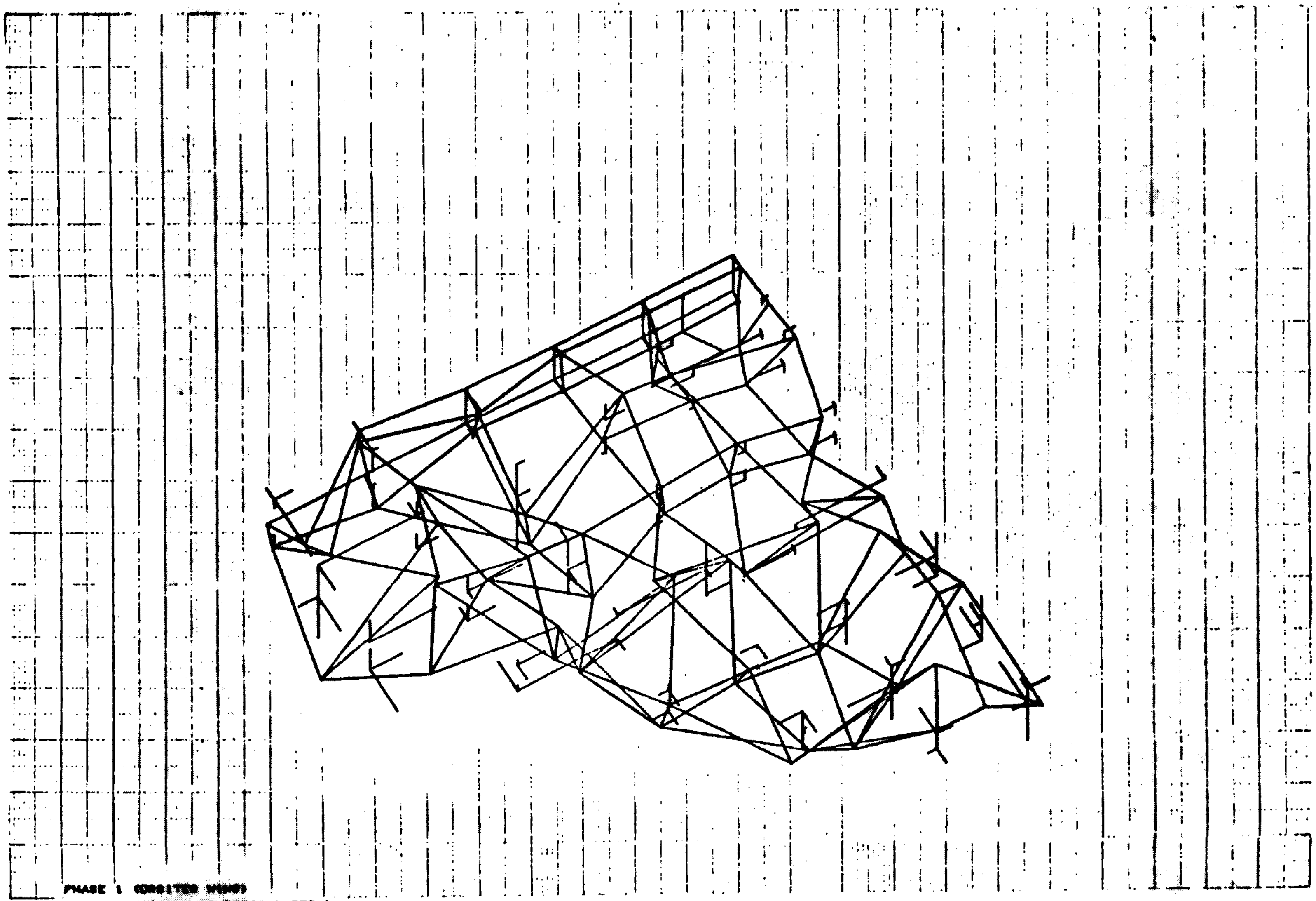
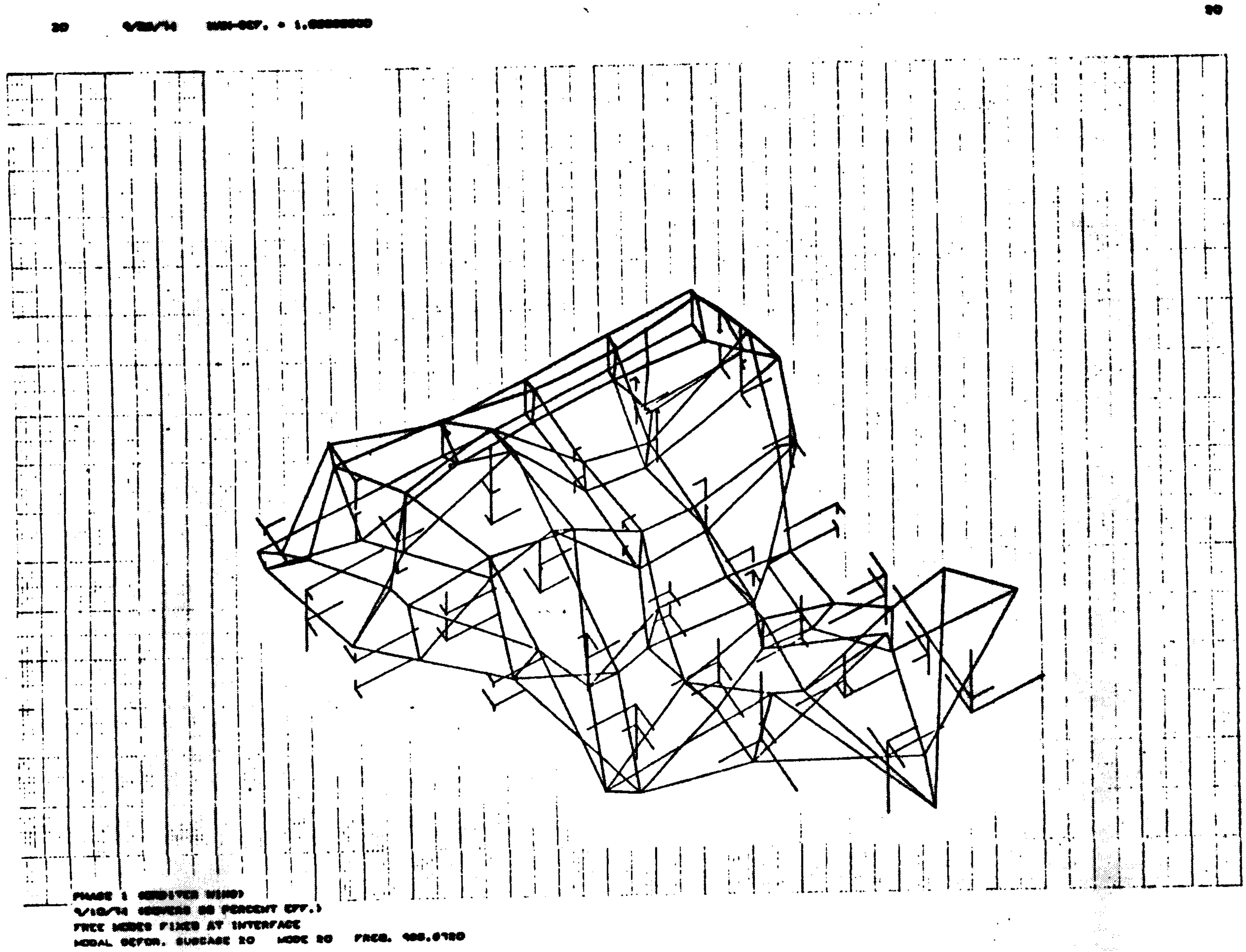
19



PHASE 1 (ORBITER WING)
9/10/74 (COVERS 98 PERCENT EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 19 MODE 19 FREQ. 970.8140


20 9/23/74 MAX-DEF. = 1.0000000
20
PHASE 1 [illegible] WING)
9/10/74 [illegible] 50 PERCENT EFF.)
FREE MODES FIXED AT INTERFACE
MODAL DEFORM. SUBCASE 20 MODE 20 FREQ. 485.6780

Appendix B7
INPUT BULK DATA/PHASE I ANALYSIS: MODEL II CARGO DOORS

```
PHASE 1                                                SEPTEMBER  27, 1974   NASTRAN  2/ 1/73     PAGE       5
ORBITER DOORS,SYM CASE(WITH STRAPS)

                                       C A S E    C O N T R O L    D E C K    E C H O
          CARD
          COUNT
            1         TITLE = PHASE 1
            2         SUBTITLE = ORBITER DOORS,SYM CASE(WITH STRAPS)
            3         MPC   = 4000
            4         SPC   = 4001
            5         METHOD   = 2
            6         MAXLINES = 30000
            7         OUTPUT
            8         VECTOR   = ALL
            9         SUBCASE 1
           10         LABEL    = FREE MODES FIXED AT INTERFACE
           11         MODES    = 20
           12         OUTPUT(PLOT)
           13         SET 1   = QDMEM2,BAR
           14         SET 2   = INCLUDE 4201 THRU 4232
           15         SET 3   = INCLUDE 4241 THRU 4272
           16         SET 4   = INCLUDE 4001 THRU 4032,4081 THRU 4088
           17         SET 5   = INCLUDE 4301 THRU 4340
           18         SET 6   = INCLUDE 4041 THRU 4072,4091 THRU 4098,4145 THRU 4168
           19         SET 7   = INCLUDE 4341 THRU 4374
           20         PLOTTER CALCOMP 765,105
           21         AXES    =MY,X,Z
           22         VIEW    = 30.0,45.0,0.0
           23         MAXIMUM DEFORMATION 5.0
           24         FIND  SCALE,ORIGIN 1,SET 1
           25         PLOT MODAL DEFORMATION 1 THRU 20,SET 1,SHAPE,VECTOR XYZ
           26         BEGIN BULK

 *** USER INFORMATION MESSAGE 207, BULK DATA NOT SORTED,XSORT WILL RE-ORDER DECK.
```

```
PHASE 1                                                        SEPTEMBER  27, 1974   NASTRAN  2/ 1/73     PAGE      6
ORBITER 30385.SYM CASE(WITH STRAPS)

                                                     S O R T E D   B U L K   D A T A   E C H O
              CARD
              COUNT      .   1  ..   2   ..   3   ..   4   ..   5   ..   6   ..   7   ..   8   ..   9  ..  10  .
                 1-      BAROR            4381                          .0          1.0          .0          1
                 2-      CBAR      4381                 4019    4029
                 3-      CBAR      4382                 4029    4049
                 4-      CBAR      4383                 4049    4069
                 5-      CBAR      4384                 4069    4079
                 6-      CBAR      4385                 4079    4099
                 7-      CBAR      4386                 4099    4119
                 8-      CBAR      4387                 4119    4129
                 9-      CBAR      4388                 4129    4149
                10-      CBAR      4389                 4149    4169
                11-      CBAR      4391     4391        4032    4034    .0          1.0          .0          1
                12-      CBAR      4392     4391        4062    4064    .0          1.0          .0          1
                13-      CBAR      4393     4391        4112    4114    .0          1.0          .0          1
                14-      CBAR      4394     4391        4152    4154    .0          1.0          .0          1
                15-      CORD2R    4015     0           64.0    .0      62.5        64.0        -8.8389 71.3309 &CS4015
                16-      &CS4015    200.0      0.0         62.5
                17-      CQDMEM2 4101     4101        4011    4013    4023        4021        0.0
                18-      CQDMEM2 4102     4101        4013    4015    4025        4023        0.0
                19-      CQDMEM2 4103     4101        4015    4017    4027        4025        0.0
                20-      CQDMEM2 4104     4101        4017    4019    4029        4027        0.0
                21-      CQDMEM2 4105     4101        4031    4033    4043        4041        0.0
                22-      CQDMEM2 4106     4101        4033    4035    4045        4043        0.0
                23-      CQDMEM2 4107     4101        4035    4037    4047        4045        0.0
                24-      CQDMEM2 4108     4101        4037    4029    4049        4047        0.0
                25-      CQDMEM2 4109     4101        4051    4053    4073        4071        0.0
                26-      CQDMEM2 4110     4101        4053    4055    4075        4073        0.0
                27-      CQDMEM2 4111     4101        4055    4057    4077        4075        0.0
                28-      CQDMEM2 4112     4101        4057    4049    4079        4077        0.0
                29-      CQDMEM2 4117     4101        4081    4083    4093        4091        0.0
                30-      CQDMEM2 4118     4101        4083    4085    4095        4093        0.0
                31-      CQDMEM2 4119     4101        4085    4087    4097        4095        0.0
                32-      CQDMEM2 4120     4101        4087    4079    4099        4097        0.0
                33-      CQDMEM2 4121     4101        4101    4103    4123        4121        0.0
                34-      CQDMEM2 4122     4101        4103    4105    4125        4123        0.0
                35-      CQDMEM2 4123     4101        4105    4107    4127        4125        0.0
                36-      CQDMEM2 4124     4101        4107    4099    4129        4127        0.0
                37-      CQDMEM2 4129     4101        4131    4133    4143        4141        0.0
                38-      CQDMEM2 4130     4101        4133    4135    4145        4143        0.0
                39-      CQDMEM2 4131     4101        4135    4137    4147        4145        0.0
                40-      CQDMEM2 4132     4101        4137    4129    4149        4147        0.0
                41-      CQDMEM2 4133     4101        4151    4153    4163        4161        0.0
                42-      CQDMEM2 4134     4101        4153    4155    4165        4163        0.0
                43-      CQDMEM2 4135     4101        4155    4157    4167        4165        0.0
                44-      CQDMEM2 4136     4101        4157    4149    4169        4167        0.0
                45-      CROD      4001     4001        4001    4003    4041        4001        4011        4013
                46-      CROD      4002     4001        4003    4005    4042        4001        4013        4015
                47-      CROD      4003     4001        4005    4007    4043        4001        4015        4017
                48-      CROD      4004     4001        4007    4009    4044        4001        4017        4019
                49-      CROD      4005     4001        4021    4023    4045        4001        4031        4033
                50-      CROD      4006     4001        4023    4025    4046        4001        4033        4035
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                                        S O R T E D   B U L K   D A T A   E C H O
   CARD
   COUNT      .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
    51-       CROD    4007    4001    4025    4027    4047    4001    4035    4037
    52-       CROD    4008    4001    4027    4029    4048    4001    4037    4029
    53-       CROD    4009    4001    4041    4043    4049    4001    4051    4053
    54-       CROD    4010    4001    4043    4045    4050    4001    4053    4055
    55-       CROD    4011    4001    4045    4047    4051    4001    4055    4057
    56-       CROD    4012    4001    4047    4049    4052    4001    4057    4049
    57-       CROD    4013    4001    4071    4073    4053    4001    4081    4083
    58-       CROD    4014    4001    4073    4075    4054    4001    4083    4085
    59-       CROD    4015    4001    4075    4077    4055    4001    4085    4087
    60-       CROD    4016    4001    4077    4079    4056    4001    4087    4079
    61-       CROD    4017    4001    4091    4093    4057    4001    4101    4103
    62-       CROD    4018    4001    4093    4095    4058    4001    4103    4105
    63-       CROD    4019    4001    4095    4097    4059    4001    4105    4107
    64-       CROD    4020    4001    4097    4099    4060    4001    4107    4099
    65-       CROD    4021    4001    4121    4123    4061    4001    4131    4133
    66-       CROD    4022    4001    4123    4125    4062    4001    4133    4135
    67-       CROD    4023    4001    4125    4127    4063    4001    4135    4137
    68-       CROD    4024    4001    4127    4129    4064    4001    4137    4129
    69-       CROD    4025    4001    4141    4143    4065    4001    4151    4153
    70-       CROD    4026    4001    4143    4145    4066    4001    4153    4155
    71-       CROD    4027    4001    4145    4147    4067    4001    4155    4157
    72-       CROD    4028    4001    4147    4149    4068    4001    4157    4149
    73-       CROD    4029    4001    4161    4163    4069    4001    4171    4173
    74-       CROD    4030    4001    4163    4165    4070    4001    4173    4175
    75-       CROD    4031    4001    4165    4167    4071    4001    4175    4177
    76-       CROD    4032    4001    4167    4169    4072    4001    4177    4179
    77-       CROD    4081    4081    4002    4004    4091    4081    4012    4014
    78-       CROD    4082    4081    4004    4006    4092    4081    4014    4016
    79-       CROD    4083    4081    4006    4008    4093    4081    4016    4018
    80-       CROD    4084    4081    4008    4010    4094    4081    4018    4020
    81-       CROD    4085    4081    4162    4164    4095    4081    4172    4174
    82-       CROD    4086    4081    4164    4166    4096    4081    4174    4176
    83-       CROD    4087    4081    4166    4168    4097    4081    4176    4178
    84-       CROD    4088    4081    4168    4170    4098    4081    4178    4180
    85-       CROD    4145    4145    4022    4024    4153    4145    4072    4074
    86-       CROD    4146    4145    4024    4026    4154    4145    4074    4076
    87-       CROD    4147    4145    4026    4028    4155    4145    4076    4078
    88-       CROD    4148    4145    4028    4030    4156    4145    4078    4080
    89-       CROD    4149    4145    4042    4044    4157    4145    4092    4094
    90-       CROD    4150    4145    4044    4046    4158    4145    4094    4096
    91-       CROD    4151    4145    4046    4048    4159    4145    4096    4098
    92-       CROD    4152    4145    4048    4050    4160    4145    4098    4100
    93-       CROD    4161    4145    4122    4124    4165    4145    4142    4144
    94-       CROD    4162    4145    4124    4126    4166    4145    4144    4146
    95-       CROD    4163    4145    4126    4128    4167    4145    4146    4148
    96-       CROD    4164    4145    4128    4130    4168    4145    4148    4150
    97-       CROD    4301    4301    4001    4002    4341    4301    4011    4012
    98-       CROD    4302    4302    4003    4004    4342    4302    4013    4014
    99-       CROD    4303    4302    4005    4006    4343    4302    4015    4016
   100-       CROD    4304    4302    4007    4008    4344    4302    4017    4018
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                                   S O R T E D   B U L K   D A T A   E C H O
CARD
COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
  101-       CROD    4305    4301    4009    4010    4345    4301    4019    4020
  102-       CROD    4306    4301    4021    4022    4346    4301    4031    4022
  103-       CROD    4307    4302    4023    4024    4347    4302    4033    4024
  104-       CROD    4308    4302    4025    4026    4348    4302    4035    4026
  105-       CROD    4309    4302    4027    4028    4349    4302    4037    4028
  106-       CROD    4310    4302    4029    4030
  107-       CROD    4311    4301    4041    4042    4350    4301    4051    4042
  108-       CROD    4312    4302    4043    4044    4351    4302    4053    4044
  109-       CROD    4313    4302    4045    4046    4352    4302    4055    4046
  110-       CROD    4314    4302    4047    4048    4353    4302    4057    4048
  111-       CROD    4315    4302    4049    4050
  112-       CROD    4316    4301    4071    4072    4354    4301    4081    4072
  113-       CROD    4317    4302    4073    4074    4355    4302    4083    4074
  114-       CROD    4318    4302    4075    4076    4356    4302    4085    4076
  115-       CROD    4319    4302    4077    4078    4357    4302    4087    4078
  116-       CROD    4320    4302    4079    4080
  117-       CROD    4321    4301    4091    4092    4358    4301    4101    4092
  118-       CROD    4322    4302    4093    4094    4359    4302    4103    4094
  119-       CROD    4323    4302    4095    4096    4360    4302    4105    4096
  120-       CROD    4324    4302    4097    4098    4361    4302    4107    4098
  121-       CROD    4325    4302    4099    4100
  122-       CROD    4326    4301    4121    4122    4362    4301    4131    4122
  123-       CROD    4327    4302    4123    4124    4363    4302    4133    4124
  124-       CROD    4328    4302    4125    4126    4364    4302    4135    4126
  125-       CROD    4329    4302    4127    4128    4365    4302    4137    4128
  126-       CROD    4330    4302    4129    4130
  127-       CROD    4331    4301    4141    4142    4366    4301    4151    4142
  128-       CROD    4332    4302    4143    4144    4367    4302    4153    4144
  129-       CROD    4333    4302    4145    4146    4368    4302    4155    4146
  130-       CROD    4334    4302    4147    4148    4369    4302    4157    4148
  131-       CROD    4335    4302    4149    4150
  132-       CROD    4336    4301    4161    4162    4370    4301    4171    4172
  133-       CROD    4337    4302    4163    4164    4371    4302    4173    4174
  134-       CROD    4338    4302    4165    4166    4372    4302    4175    4176
  135-       CROD    4339    4302    4167    4168    4373    4302    4177    4178
  136-       CROD    4340    4301    4169    4170    4374    4301    4179    4180
  137-       CSHEAR  4201    4201    4001    4003    4004    4002
  138-       CSHEAR  4202    4201    4003    4005    4006    4004
  139-       CSHEAR  4203    4201    4005    4007    4008    4006
  140-       CSHEAR  4204    4201    4007    4009    4010    4008
  141-       CSHEAR  4205    4201    4021    4023    4024    4022
  142-       CSHEAR  4206    4201    4023    4025    4026    4024
  143-       CSHEAR  4207    4201    4025    4027    4028    4026
  144-       CSHEAR  4208    4201    4027    4029    4030    4028
  145-       CSHEAR  4209    4201    4041    4043    4044    4042
  146-       CSHEAR  4210    4201    4043    4045    4046    4044
  147-       CSHEAR  4211    4201    4045    4047    4048    4046
  148-       CSHEAR  4212    4201    4047    4049    4050    4048
  149-       CSHEAR  4213    4201    4071    4073    4074    4072
  150-       CSHEAR  4214    4201    4073    4075    4076    4074
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                                                          SEPTEMBER  27, 1974   NASTRAN  2/ 1/73      PAGE     9
PHASE 1
ORBITER X0388.SYM CASE(WITH STRAPS)

                                    S O R T E D   B U L K   D A T A   E C H O
   CARD
   COUNT       .   1   ..   2   ..   3   ..   4   ..   5   ..   6   ..   7   ..   8   ..   9   ..  10   .
    151-       CSHEAR  4215    4201    4075    4077    4078    4076
    152-       CSHEAR  4216    4201    4077    4079    4080    4078
    153-       CSHEAR  4217    4201    4091    4093    4094    4092
    154-       CSHEAR  4218    4201    4093    4095    4096    4094
    155-       CSHEAR  4219    4201    4095    4097    4098    4096
    156-       CSHEAR  4220    4201    4097    4099    4100    4098
    157-       CSHEAR  4221    4201    4121    4123    4124    4122
    158-       CSHEAR  4222    4201    4123    4125    4126    4124
    159-       CSHEAR  4223    4201    4125    4127    4128    4126
    160-       CSHEAR  4224    4201    4127    4129    4130    4128
    161-       CSHEAR  4225    4201    4141    4143    4144    4142
    162-       CSHEAR  4226    4201    4143    4145    4146    4144
    163-       CSHEAR  4227    4201    4145    4147    4148    4146
    164-       CSHEAR  4228    4201    4147    4149    4150    4148
    165-       CSHEAR  4229    4201    4161    4163    4164    4162
    166-       CSHEAR  4230    4201    4163    4165    4166    4164
    167-       CSHEAR  4231    4201    4165    4167    4168    4166
    168-       CSHEAR  4232    4201    4167    4169    4170    4168
    169-       CSHEAR  4241    4201    4011    4013    4014    4012
    170-       CSHEAR  4242    4201    4013    4015    4016    4014
    171-       CSHEAR  4243    4201    4015    4017    4018    4016
    172-       CSHEAR  4244    4201    4017    4019    4020    4018
    173-       CSHEAR  4245    4201    4031    4033    4024    4022
    174-       CSHEAR  4246    4201    4033    4035    4026    4024
    175-       CSHEAR  4247    4201    4035    4037    4028    4026
    176-       CSHEAR  4248    4201    4037    4029    4030    4028
    177-       CSHEAR  4249    4201    4051    4053    4044    4042
    178-       CSHEAR  4250    4201    4053    4055    4046    4044
    179-       CSHEAR  4251    4201    4055    4057    4048    4046
    180-       CSHEAR  4252    4201    4057    4049    4050    4048
    181-       CSHEAR  4253    4201    4081    4083    4074    4072
    182-       CSHEAR  4254    4201    4083    4085    4076    4074
    183-       CSHEAR  4255    4201    4085    4087    4078    4076
    184-       CSHEAR  4256    4201    4087    4079    4080    4078
    185-       CSHEAR  4257    4201    4101    4103    4094    4092
    186-       CSHEAR  4258    4201    4103    4105    4096    4094
    187-       CSHEAR  4259    4201    4105    4107    4098    4096
    188-       CSHEAR  4260    4201    4107    4099    4100    4098
    189-       CSHEAR  4261    4201    4131    4133    4124    4122
    190-       CSHEAR  4262    4201    4133    4135    4126    4124
    191-       CSHEAR  4263    4201    4135    4137    4128    4126
    192-       CSHEAR  4264    4201    4137    4129    4130    4128
    193-       CSHEAR  4265    4201    4151    4153    4144    4142
    194-       CSHEAR  4266    4201    4153    4155    4146    4144
    195-       CSHEAR  4267    4201    4155    4157    4148    4146
    196-       CSHEAR  4268    4201    4157    4149    4150    4148
    197-       CSHEAR  4269    4201    4171    4173    4174    4172
    198-       CSHEAR  4270    4201    4173    4175    4176    4174
    199-       CSHEAR  4271    4201    4175    4177    4178    4176
    200-       CSHEAR  4272    4201    4177    4179    4180    4178
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                                     S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT     .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
  201-     EIGR    2       INV     1.0     2000.   30                              1.-3    &EIG2
  202-     &EIG2   MAX
  203-     GRID    4001    0       64.0    .0      75.0    0               456
  204-     GRID    4002    0       64.0    .0      73.0    0               1456
  205-     GRID    4003    0       64.0    -4.7835 74.0465 0               456
  206-     GRID    4004    0       64.0    -4.0181 72.2007 0               1456
  207-     GRID    4005    0       64.0    -8.8389 71.3389 4015            456
  208-     GRID    4006    0       64.0    -7.4247 69.9247 0               1456
  209-     GRID    4007    0       64.0    -11.548567.2835 0               456
  210-     GRID    4008    0       64.0    -9.7007 66.5181 0               1456
  211-     GRID    4009    0       64.0    -12.5   62.81   0               456
  212-     GRID    4010    0       64.0    -10.5   62.5    0               1456
  213-     GRID    4011    0       64.0    .0      75.0    0               456
  214-     GRID    4012    0       64.0    .0      73.0    0               1456
  215-     GRID    4013    0       64.0    -4.7835 74.0465 0               456
  216-     GRID    4014    0       64.0    -4.0181 72.2007 0               1456
  217-     GRID    4015    0       64.0    -8.8389 71.3389 4015            456
  218-     GRID    4016    0       64.0    -7.4247 69.9247 0               1456
  219-     GRID    4017    0       64.0    -11.548567.2835 0               456
  220-     GRID    4018    0       64.0    -9.7007 66.5181 0               1456
  221-     GRID    4019    0       64.0    -12.5   62.81   0               4
  222-     GRID    4020    0       64.0    -10.5   62.5    0               1456
  223-     GRID    4021    0       78.0    .0      75.0    0               456
  224-     GRID    4022    0       78.0    .0      73.0    0               1456
  225-     GRID    4023    0       78.0    -4.7835 74.0465 0               456
  226-     GRID    4024    0       78.0    -4.0181 72.2007 0               1456
  227-     GRID    4025    0       78.0    -8.8389 71.3389 0               456
  228-     GRID    4026    0       78.0    -7.4247 69.9247 0               1456
  229-     GRID    4027    0       78.0    -11.548567.2835 0               456
  230-     GRID    4028    0       78.0    -9.7007 66.5181 0               1456
  231-     GRID    4029    0       78.0    -12.5   62.81   0               4
  232-     GRID    4030    0       78.0    -10.5   62.5    0               1456
  233-     GRID    4031    0       78.0    .0      75.0    0               456
  234-     GRID    4032    0       78.0    -12.5   63.10   0               246
  235-     GRID    4033    0       78.0    -4.7835 74.0465 0               456
  236-     GRID    4034    0       78.0    -12.5   62.00   0               246
  237-     GRID    4035    0       78.0    -8.8389 71.3389 0               456
  238-     GRID    4037    0       78.0    -11.548567.2835 0               456
  239-     GRID    4041    0       93.28   .0      75.0    0               456
  240-     GRID    4042    0       93.28   .0      73.0    0               1456
  241-     GRID    4043    0       93.28   -4.7835 74.0465 0               456
  242-     GRID    4044    0       93.28   -4.0181 72.2007 0               1456
  243-     GRID    4045    0       93.28   -8.8389 71.3389 0               456
  244-     GRID    4046    0       93.28   -7.4247 69.9247 0               1456
  245-     GRID    4047    0       93.28   -11.548567.2835 0               456
  246-     GRID    4048    0       93.28   -9.7007 66.5181 0               1456
  247-     GRID    4049    0       93.28   -12.5   62.81   0               4
  248-     GRID    4050    0       93.28   -10.5   62.5    0               1456
  249-     GRID    4051    0       93.28   .0      75.0    0               456
  250-     GRID    4053    0       93.28   -4.7835 74.0465 0               456
```

```
                                S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2   ..   3  ..   4   ..   5   ..   6   .   7  ..   8  ..   9  ..  10  .
  251-        GRID    4055    0           93.28   -8.8389 71.3389 0       456
  252-        GRID    4057    0           93.28   -11.548567.2835 0       456
  253-        GRID    4062    0           102.12  -12.5   63.10   0       246
  254-        GRID    4064    0           102.12  -12.5   62.00   0       246
  255-        GRID    4069    0           102.12  -12.5   62.81   0       4
  256-        GRID    4071    0           107.92  .0      75.0    0       456
  257-        GRID    4072    0           107.92  .0      73.0    0       1456
  258-        GRID    4073    0           107.92  -4.7835 74.0485 0       456
  259-        GRID    4074    0           107.92  -4.0181 72.2007 0       1456
  260-        GRID    4075    0           107.92  -8.8389 71.3389 0       456
  261-        GRID    4076    0           107.92  -7.4247 69.9247 0       1456
  262-        GRID    4077    0           107.92  -11.548567.2835 0       456
  263-        GRID    4078    0           107.92  -9.7007 66.5181 0       1456
  264-        GRID    4079    0           107.92  -12.5   62.81   0       4
  265-        GRID    4080    0           107.92  -10.5   62.5    0       1456
  266-        GRID    4081    0           107.92  .0      75.0    0       456
  267-        GRID    4083    0           107.92  -4.7835 74.0485 0       456
  268-        GRID    4085    0           107.92  -8.8389 71.3389 0       456
  269-        GRID    4087    0           107.92  -11.548567.2835 0       456
  270-        GRID    4091    0           122.56  .0      75.0    0       456
  271-        GRID    4092    0           122.56  .0      73.0    0       1456
  272-        GRID    4093    0           122.56  -4.7835 74.0485 0       456
  273-        GRID    4094    0           122.56  -4.0181 72.2007 0       1456
  274-        GRID    4095    0           122.56  -8.8389 71.3389 0       456
  275-        GRID    4096    0           122.56  -7.4247 69.9247 0       1456
  276-        GRID    4097    0           122.56  -11.548567.2835 0       456
  277-        GRID    4098    0           122.56  -9.7007 66.5181 0       1456
  278-        GRID    4099    0           122.56  -12.5   62.81   0       4
  279-        GRID    4100    0           122.56  -10.5   62.5    0       1456
  280-        GRID    4101    0           122.56  .0      75.0    0       456
  281-        GRID    4103    0           122.56  -4.7835 74.0485 0       456
  282-        GRID    4105    0           122.56  -8.8389 71.3389 0       456
  283-        GRID    4107    0           122.56  -11.548567.2835 0       456
  284-        GRID    4112    0           129.0   -12.5   63.10   0       246
  285-        GRID    4114    0           129.0   -12.5   62.00   0       246
  286-        GRID    4119    0           129.0   -12.5   62.81   0       4
  287-        GRID    4121    0           137.2   .0      75.0    0       456
  288-        GRID    4122    0           137.2   .0      73.0    0       1456
  289-        GRID    4123    0           137.2   -4.7835 74.0485 0       456
  290-        GRID    4124    0           137.2   -4.0181 72.2007 0       1456
  291-        GRID    4125    0           137.2   -8.8389 71.3389 0       456
  292-        GRID    4126    0           137.2   -7.4247 69.9247 0       1456
  293-        GRID    4127    0           137.2   -11.548567.2835 0       455
  294-        GRID    4128    0           137.2   -9.7007 66.5181 0       1456
  295-        GRID    4129    0           137.2   -12.5   62.81   0       4
  296-        GRID    4130    0           137.2   -10.5   62.5    0       1456
  297-        GRID    4131    0           137.2   .0      75.0    0       456
  298-        GRID    4133    0           137.2   -4.7835 74.0485 0       456
  299-        GRID    4135    0           137.2   -8.8389 71.3389 0       456
  300-        GRID    4137    0           137.2   -11.548567.2835 0       456
```

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                                   S O R T E D   B U L K   D A T A   E C H O
   CARD
   COUNT     .  1  ..  2  ..  3  ..  4  ..  5  ..  6  ..  7  ..  8  ..  9  ..  10  .
    301-     GRID    4141    0        153.375 .0      75.0    0       456
    302-     GRID    4142    0        153.375 .0      73.0    0       1456
    303-     GRID    4143    0        153.375 -4.7835 74.0485 0       456
    304-     GRID    4144    0        153.375 -4.0181 72.2007 0       1456
    305-     GRID    4145    0        153.375 -8.8389 71.3389 0       456
    306-     GRID    4146    0        153.375 -7.4247 69.9247 0       1456
    307-     GRID    4147    0        153.375 -11.548567.2835 0       456
    308-     GRID    4148    0        153.375 -9.7007 66.5161 0       1456
    309-     GRID    4149    0        153.375 -12.5   62.81   0       4
    310-     GRID    4150    0        153.375 -10.5   62.5    0       1456
    311-     GRID    4151    0        153.375 .0      75.0    0       456
    312-     GRID    4152    0        153.375 -12.5   63.10   0       246
    313-     GRID    4153    0        153.375 -4.7835 74.0485 0       456
    314-     GRID    4154    0        153.375 -12.5   62.00   0       246
    315-     GRID    4155    0        153.375 -8.8389 71.3389 0       456
    316-     GRID    4157    0        153.375 -11.548567.2835 0       456
    317-     GRID    4161    0        166.5   .0      75.0    0       456
    318-     GRID    4162    0        166.5   .0      73.0    0       1456
    319-     GRID    4163    0        166.5   -4.7835 74.0485 0       456
    320-     GRID    4164    0        166.5   -4.0181 72.2007 0       1456
    321-     GRID    4165    0        166.5   -8.8389 71.3389 4015    456
    322-     GRID    4166    0        166.5   -7.4247 69.9247 0       1456
    323-     GRID    4167    0        166.5   -11.548567.2835 0       456
    324-     GRID    4168    0        166.5   -9.7007 66.5161 0       1456
    325-     GRID    4169    0        166.5   -12.5   62.81   0       4
    326-     GRID    4170    0        166.5   -10.5   62.5    0       1456
    327-     GRID    4171    0        166.5   .0      75.0    0       456
    328-     GRID    4172    0        166.5   .0      73.0    0       1456
    329-     GRID    4173    0        166.5   -4.7835 74.0485 0       456
    330-     GRID    4174    0        166.5   -4.0181 72.2007 0       1456
    331-     GRID    4175    0        166.5   -8.8389 71.3389 4015    456
    332-     GRID    4176    0        166.5   -7.4247 69.9247 0       1456
    333-     GRID    4177    0        166.5   -11.548567.2835 0       456
    334-     GRID    4178    0        166.5   -9.7007 66.5161 0       1456
    335-     GRID    4179    0        166.5   -12.5   62.81   0       456
    336-     GRID    4180    0        166.5   -10.5   62.5    0       1456
    337-     MAT1    4100    10.566           .3      .1
    338-     MAT1    4200    10.566           .3      .0
    339-     MPC     4000    4011    1        1.0     4001    1       -1.0
    340-     MPC     4000    4011    2        1.0     4001    2       -1.0
    341-     MPC     4000    4013    1        1.0     4003    1       -1.0
    342-     MPC     4000    4015    1        1.0     4005    1       -1.0
    343-     MPC     4000    4015    2        1.0     4005    2       -1.0
    344-     MPC     4000    4017    1        1.0     4007    1       -1.0
    345-     MPC     4000    4019    1        1.0     4009    1       -1.0
    346-     MPC     4000    4019    3        1.0     4009    3       -1.0
    347-     MPC     4000    4032    1        1.0     4029    1       -1.0            &4032X
    348-     &4032X          4029        5    -.29
    349-     MPC     4000    4032    3        1.0     4029    3       -1.0
    350-     MPC     4000    4032    5        1.0     4029    5       -1.0
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PHASE 1                                                    [illegible] 2[illegible], 1974   NASTRAN  2/ 1/73    PAGE    13
ORBITER [illegible] SYM_CASE(WITH TRAPS)

                                     S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
   351-     MPC     4000    40[illegible]                  [illegible]  1       -1.0            $4062X
   352-     $4062X          4059                 [illegible]  [illegible]  3    -1.0
   353-     MPC     [illegible]  [illegible]      1         [illegible]  5       -1.0
   354-     MPC     [illegible]  [illegible]                [illegible]  4119 1  -1.0
   355-     MPC     4000    4112     1          [illegible]                                     $4112X
   356-     $4112X          4117     3          [illegible]  4117    3       -1.0
   357-     MPC     [illegible]  [illegible]  1  [illegible]  4114    5       -1.0
   358-     MPC     4000    4112     6          1.0      4149    1       -1.0            $4152X
   359-     MPC     4000    4152     1          1.0
   360-     $4152X          4147     5          [illegible]
   361-     MPC     4000    4152     3          1.0      4139    3       -1.0
   362-     MPC     4000    4152     5          1.0      4149    5       -1.0
   363-     MPC     4000    4161     1          1.0      4171    1       -1.0
   364-     MPC     4000    4161     2          1.0      4171    2       -1.0
   365-     MPC     4000    4163     1          1.0      4173    1       -1.0
   366-     MPC     4000    4165     1          1.0      4175    1       -1.0
   367-     MPC     4000    4165     2          1.0      4175    2       -1.0
   368-     MPC     4000    4167     1          1.0      4177    1       -1.0
   369-     MPC     4000    4169     1          1.0      4179    1       -1.0
   370-     MPC     4000    4169     3          1.0      4179    3       -1.0
   371-     OMIT1   3       4012     4022       4042     4072    4092    4122    4142
   372-     OMIT1   3       4162
   373-     OMIT1   5       4034     4064       4114     4154
   374-     OMIT1   23      4014     4016       4018     4020
   375-     OMIT1   23      4024     4026       4028     4030
   376-     OMIT1   23      4044     4046       4048     4050
   377-     OMIT1   23      4074     4076       4078     4080
   378-     OMIT1   23      4094     4096       4098     4100
   379-     OMIT1   23      4124     4126       4128     4130
   380-     OMIT1   23      4144     4146       4148     4150
   381-     OMIT1   23      4164     4166       4168     4170
   382-     OMIT1   56      4019     4029       4049     4069    4079    4099    4119
   383-     OMIT1   56      4129     4149       4169
   384-     PARAM   GRDPNT  0
   385-     PARAM   TPNAME  DOFSP1
   386-     PARAM   WTMASS  .002588
   387-     PDAF    4381    4100     .56        .006     .004            .0              $ST1
   388-     PDAF    4391    4100     .035                .002            .0              $ST2
   389-     $ST1
   390-     $ST2            1.0
   391-     PQDMEM2 4101    4100     .016       .0
   392-     PROD    4001    4200     .034       .0       .0      .0088
   393-     PROD    4081    4200     .011       .0       .0      .0
   394-     PROD    4145    4200     .022       .0       .0      .0
   395-     PROD    4301    4200     .016       .0       .0      .0
   396-     PROD    4302    4200     .032       .0       .0      .0
   397-     PSHEAR  4201    4200     .032       .0
   398-     SPC     4001    4001     2                   4012    2
   399-     SPC     4001    4002     2                   4172    2
   400-     SPC     4001    4021     2                   4031    2
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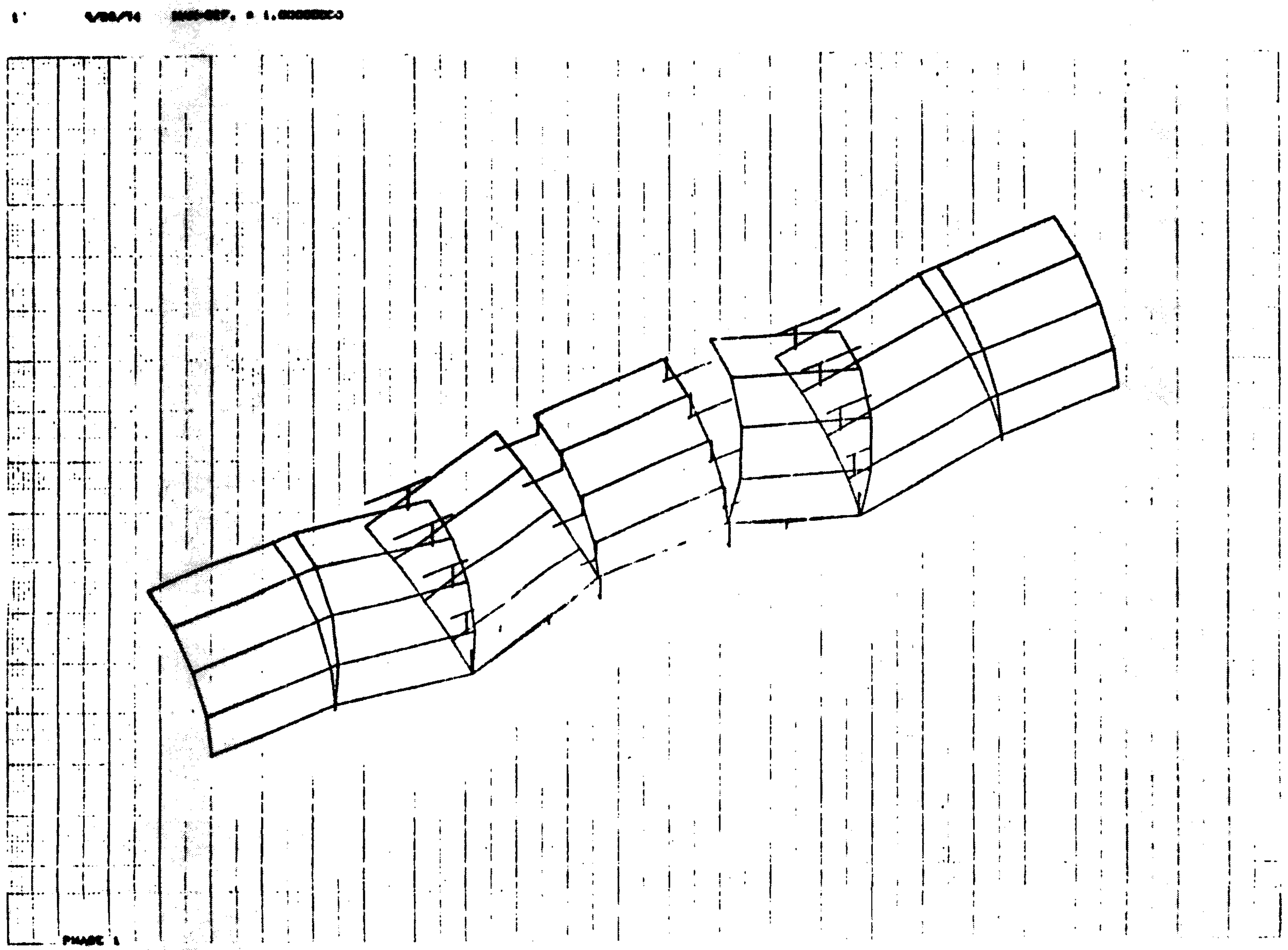
PHASE 1                                                        SEPTEMBER  27, 1974   NASTRAN  2/ 1/73     PAGE     14
ORBITER 30335.SYM CASE(WITH STRAPS)

                                              S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT      .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
  401-      SPC     4001    4022    2                       4042    2
  402-      SPC     4001    4041    2                       4051    2
  403-      SPC     4001    4071    2                       4081    2
  404-      SPC     4001    4072    2                       4092    2
  405-      SPC     4001    4091    2                       4101    2
  406-      SPC     4001    4121    2                       4131    2
  407-      SPC     4001    4122    2                       4142    2
  408-      SPC     4001    4141    2                       4151    2
  409-      SPC     4001    4171    2                       4162    2
  410-      SPC     4002    4001    1                       4001    3
  411-      SPC     4002    4002    3                       4172    3
  412-      SPC     4002    4011    3                       4012    3
  413-      SPC     4002    4021    1                       4021    3
  414-      SPC     4002    4022    3                       4042    3
  415-      SPC     4002    4031    1                       4031    3
  416-      SPC     4002    4041    1                       4041    3
  417-      SPC     4002    4051    1                       4051    3
  418-      SPC     4002    4071    1                       4071    3
  419-      SPC     4002    4072    3                       4092    3
  420-      SPC     4002    4081    1                       4081    3
  421-      SPC     4002    4091    1                       4091    3
  422-      SPC     4002    4101    1                       4101    3
  423-      SPC     4002    4121    1                       4121    3
  424-      SPC     4002    4122    3                       4142    3
  425-      SPC     4002    4131    1                       4131    3
  426-      SPC     4002    4141    1                       4141    3
  427-      SPC     4002    4151    1                       4151    3
  428-      SPC     4002    4161    3                       4162    3
  429-      SPC     4002    4171    1                       4171    3
  430-      SUPORT  4002    3       4172    3
  431-      SUPORT  4004    23      4006    23      4008    23      4010    23
  432-      SUPORT  4034    13      4064    13      4114    13      4154    13
  433-      SUPORT  4174    23      4176    23      4178    23      4180    23
            ENDDATA
```

Appendix B8
PLOTS OF SYMMETRIC COMPONENT MODES/PHASE I ANALYSIS MODEL II CARGO DOORS

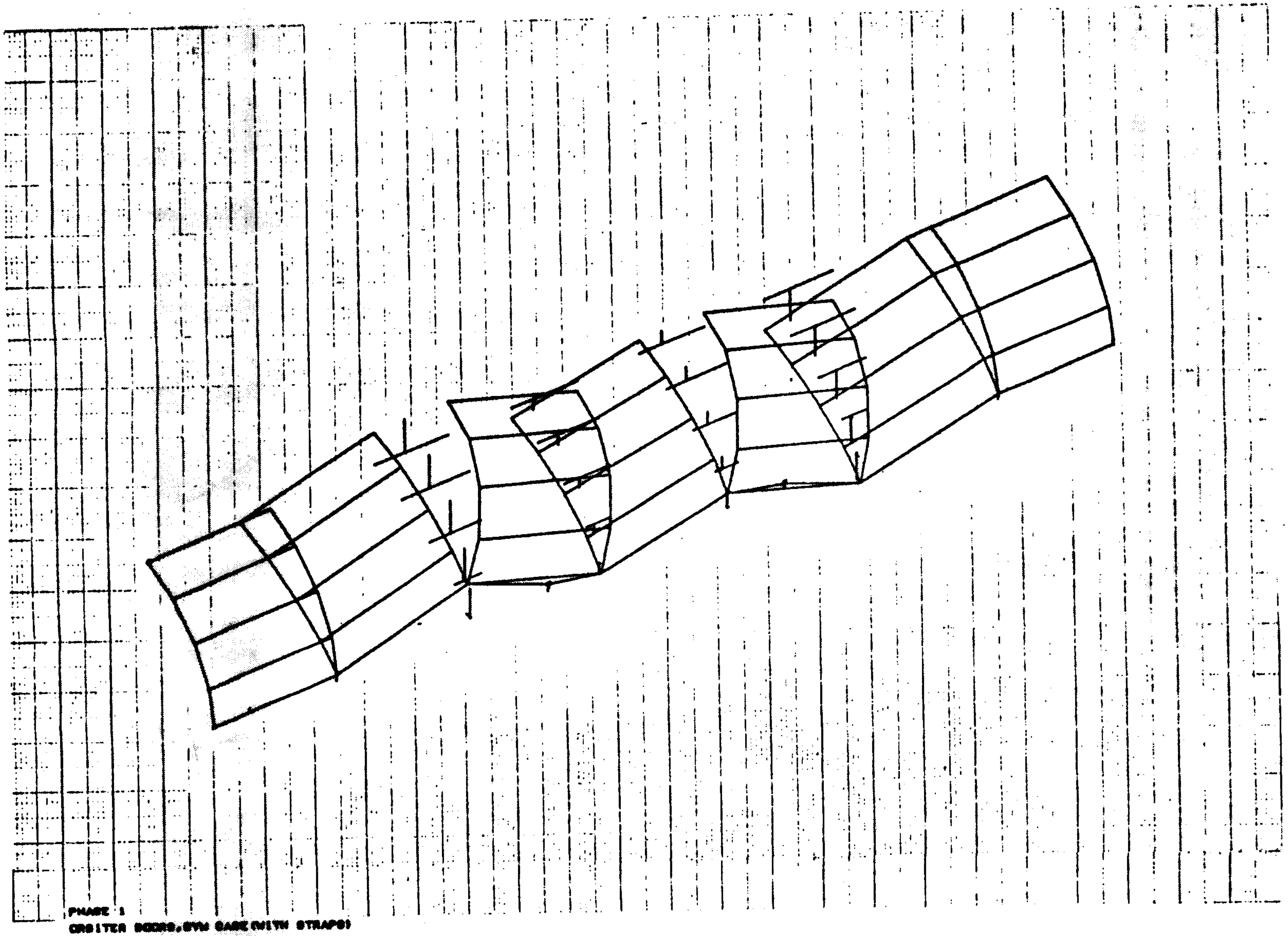


1   5/08/74   MAX-DEF. = 1.000000E0

PHASE 1
ORBITER BOOMS,SYM BASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 1   MODE 1   FREQ. 47.82908

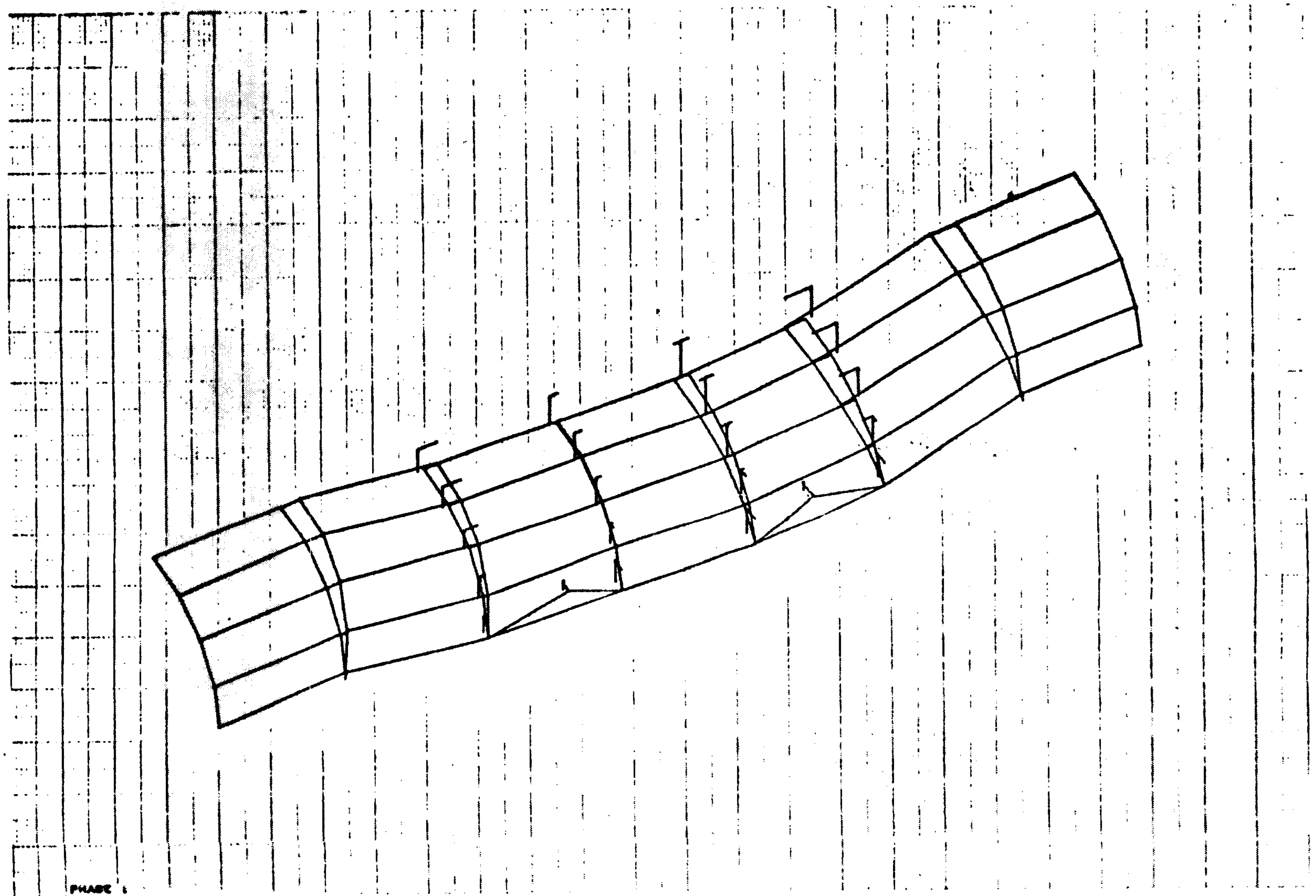
8 4/26/74 MAX-DEF. = 1.00000000

8

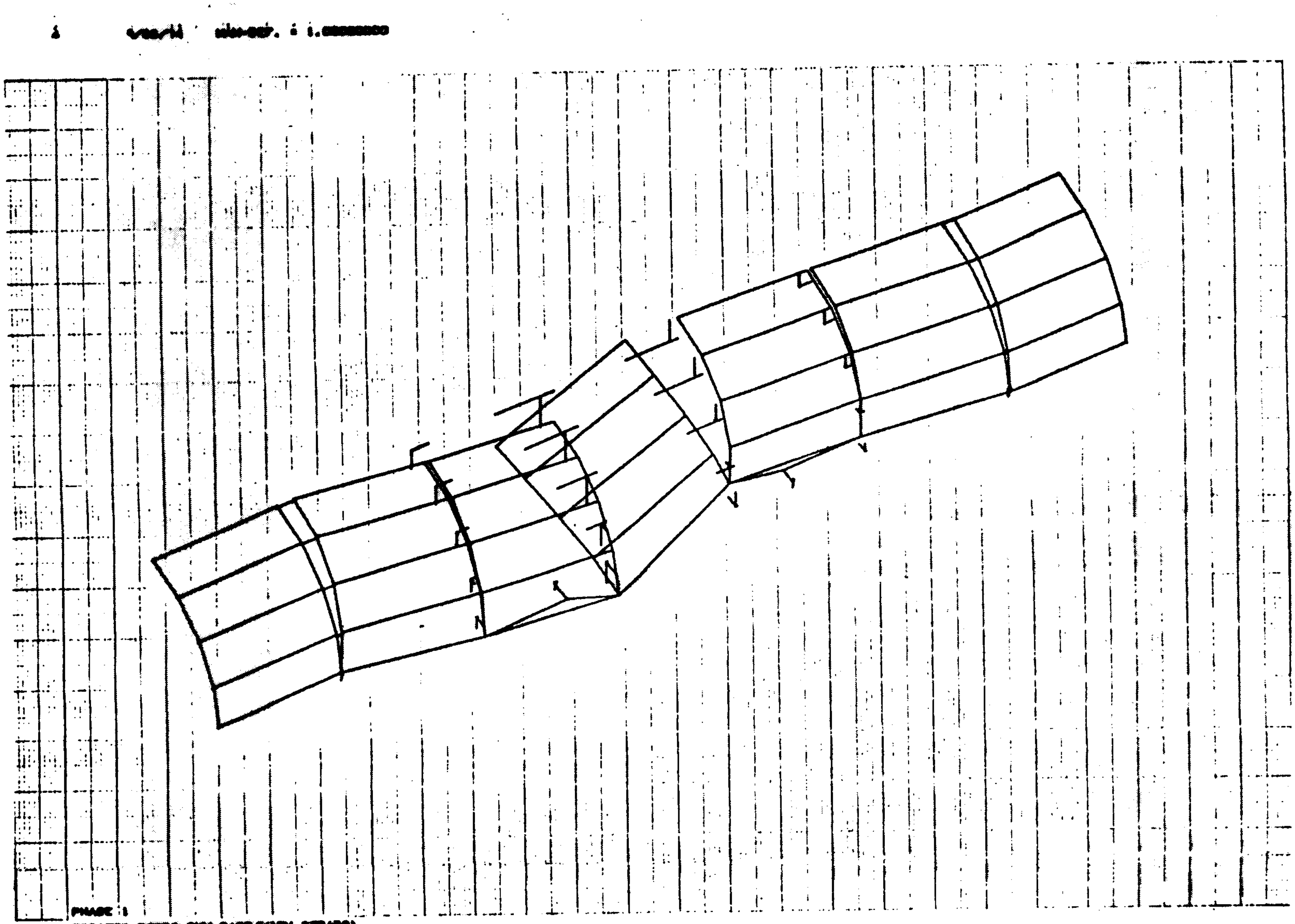


PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 2 MODE 2 FREQ. 33.33960

[illegible]

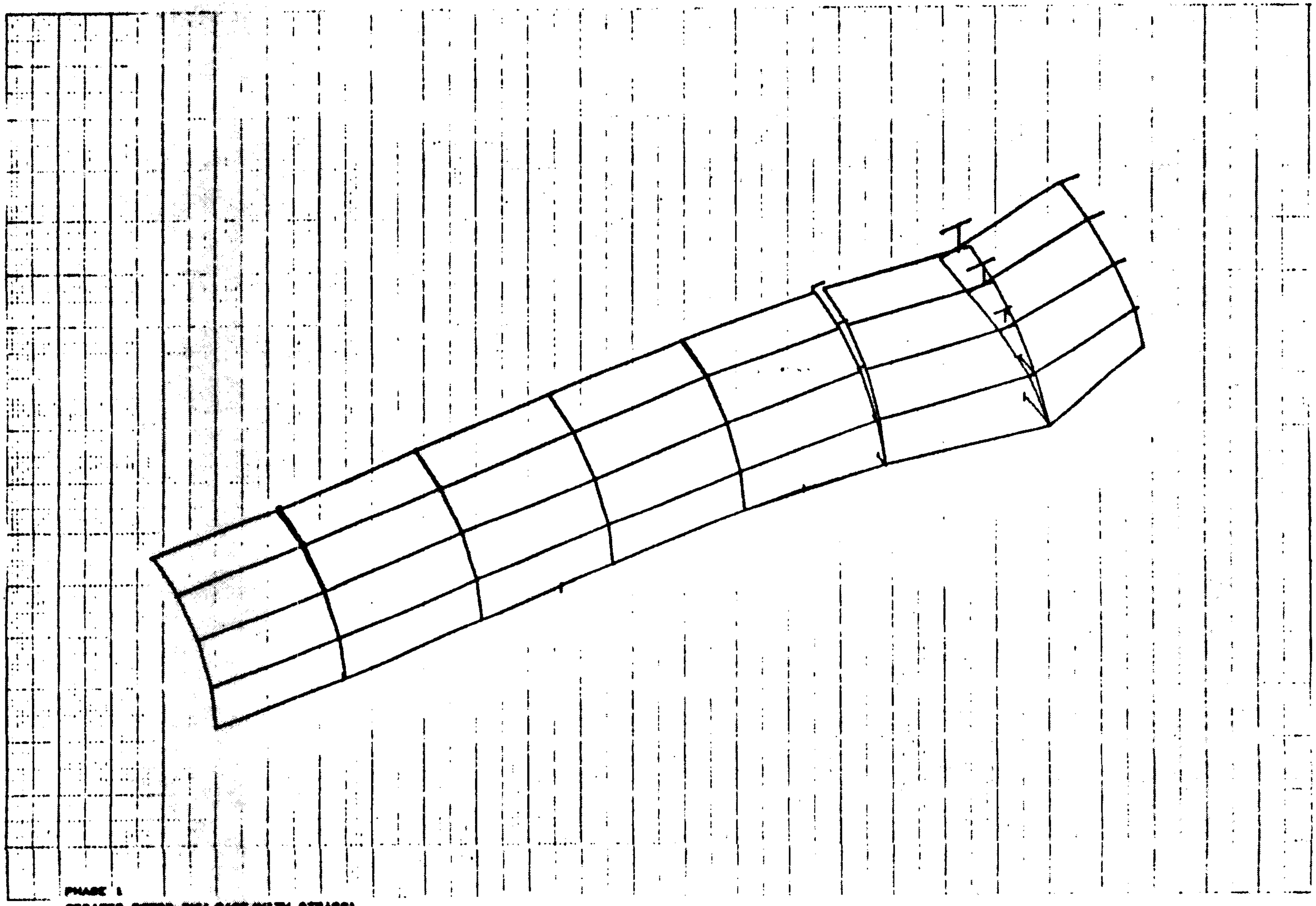


PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 3 MODE 3 FREQ. 1.46263


[illegible] [illegible] MAX-DEF. = 1.0000000

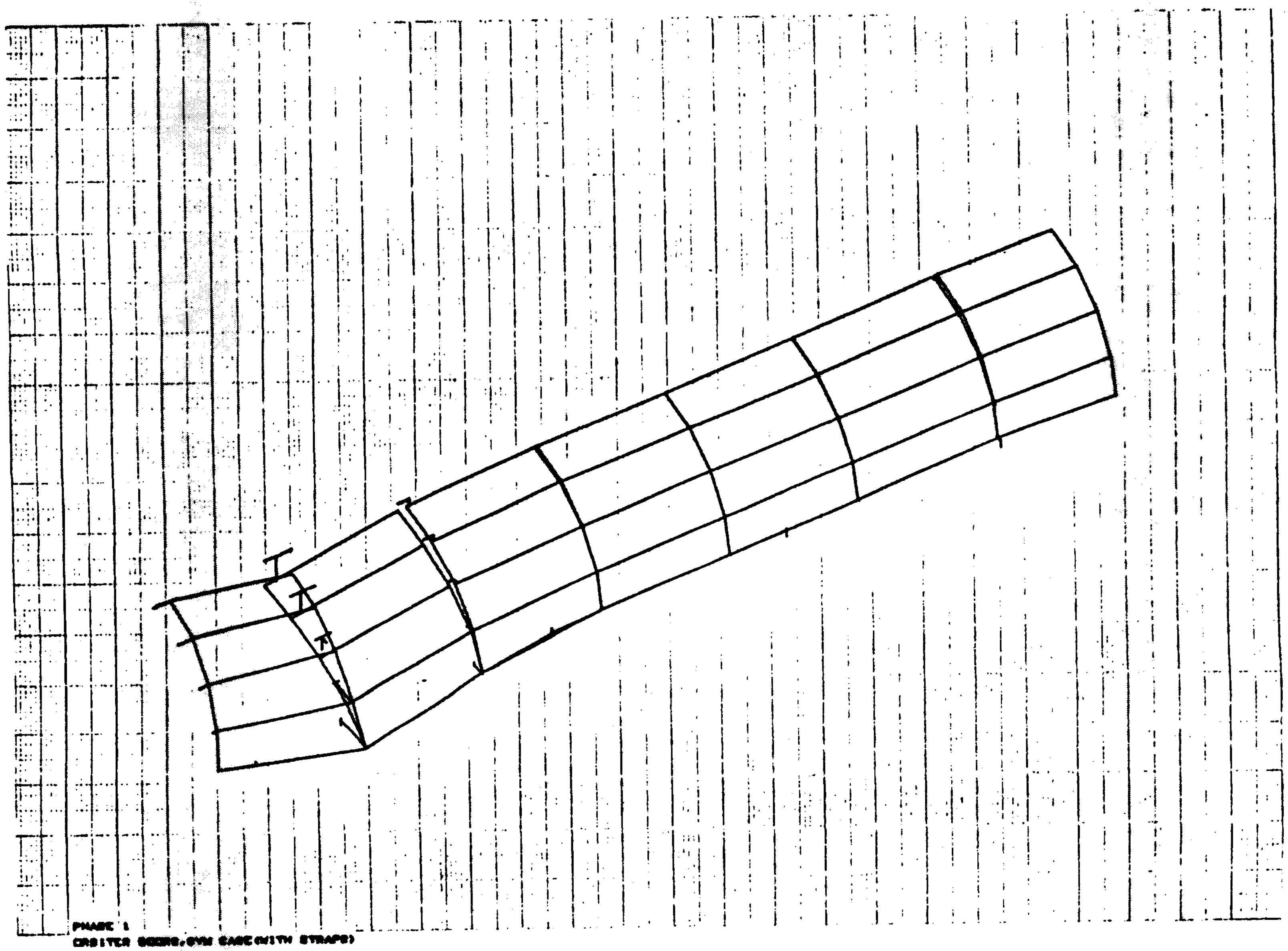
PHASE 1
ORBITER DOCKG.SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 4 MODE 4 FREQ. 69.91000

8 [illegible] MAX-DEF. = [illegible]

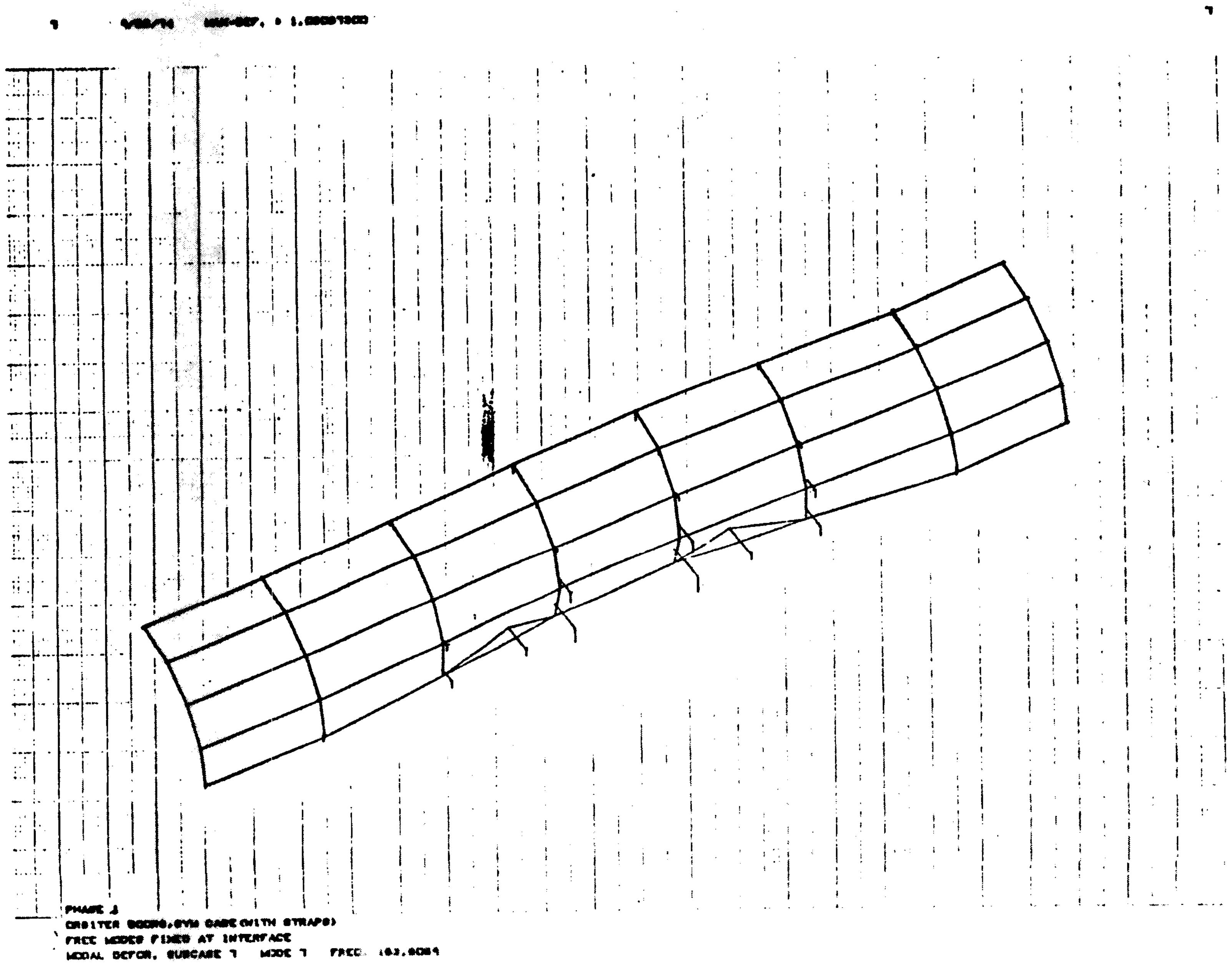


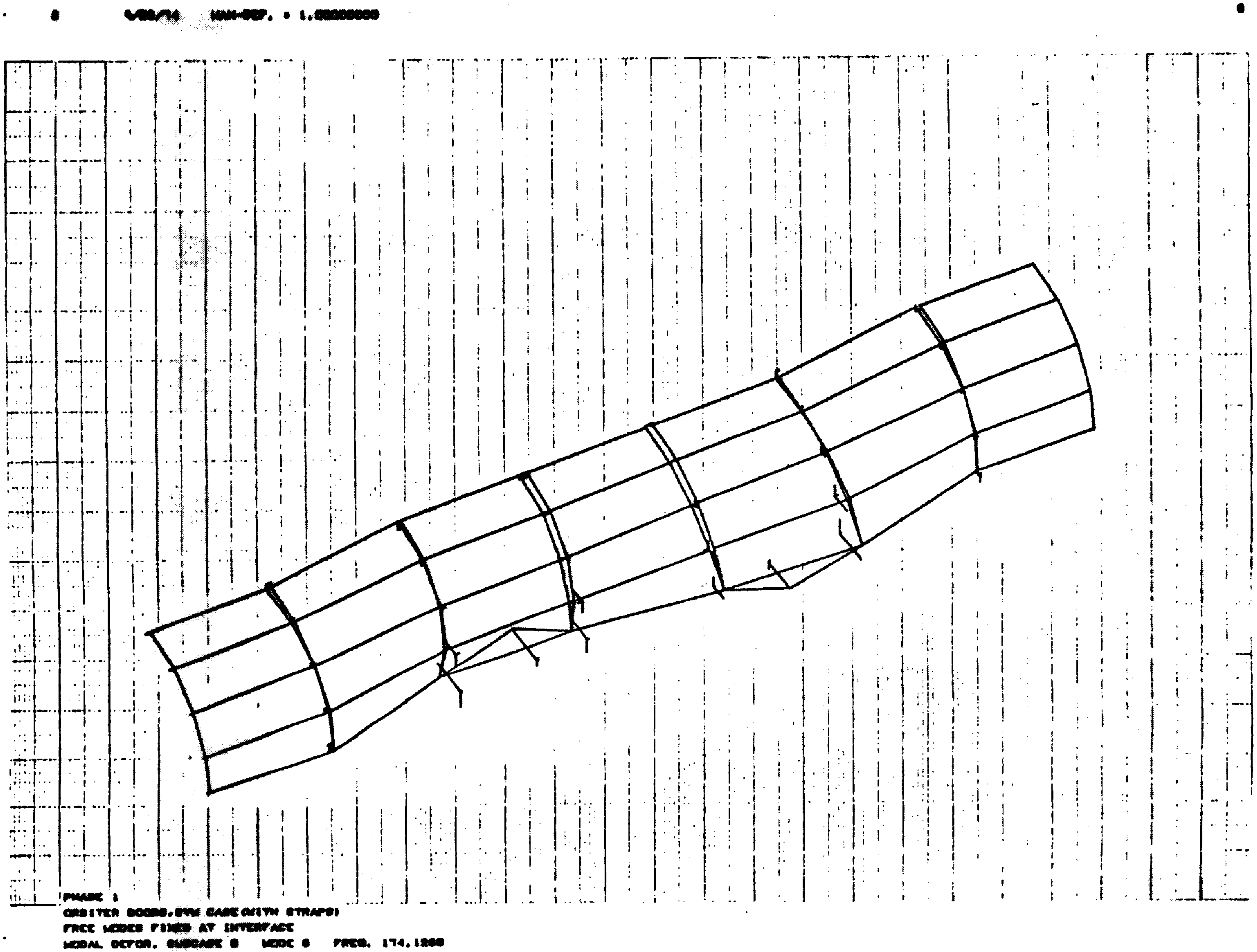
PHASE 1
ORBITER [illegible]. SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 190.8909

8 [illegible] MAX-DEF. = 1.[illegible]

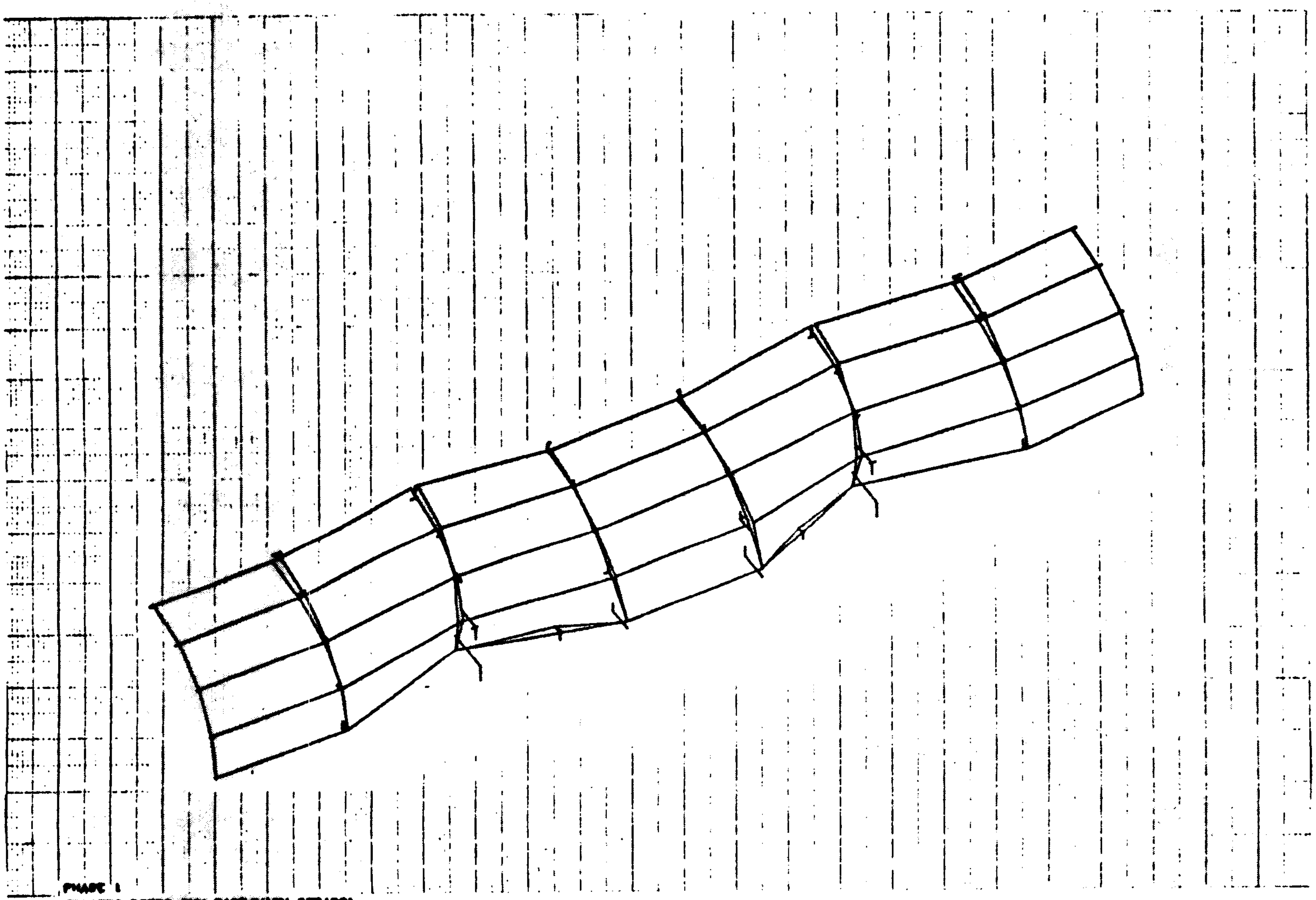


PHASE 1
ORBITER [illegible],SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 6 MODE 6 FREQ. 130.9874

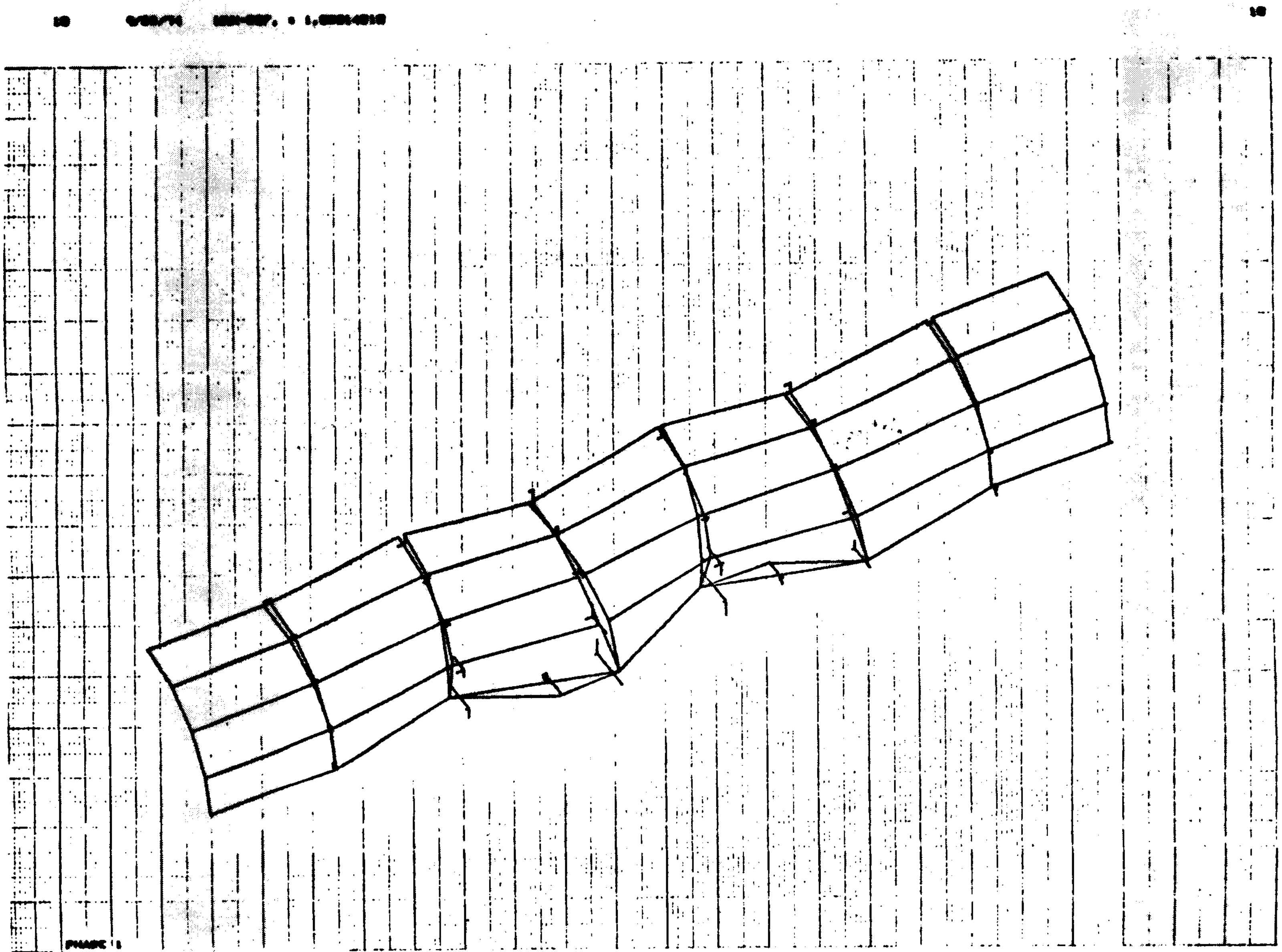
[illegible] MAX-DEF. = 1.00000000
PHASE 2
ORBITER [illegible], SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 7 MODE 7 FREQ. 102.9059


6/28/74 MAX-DEF. = 1.00000000
PHASE 1
ORBITER DOCKING,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 174.1200

[illegible] MAX-DEF. = 1.[illegible]

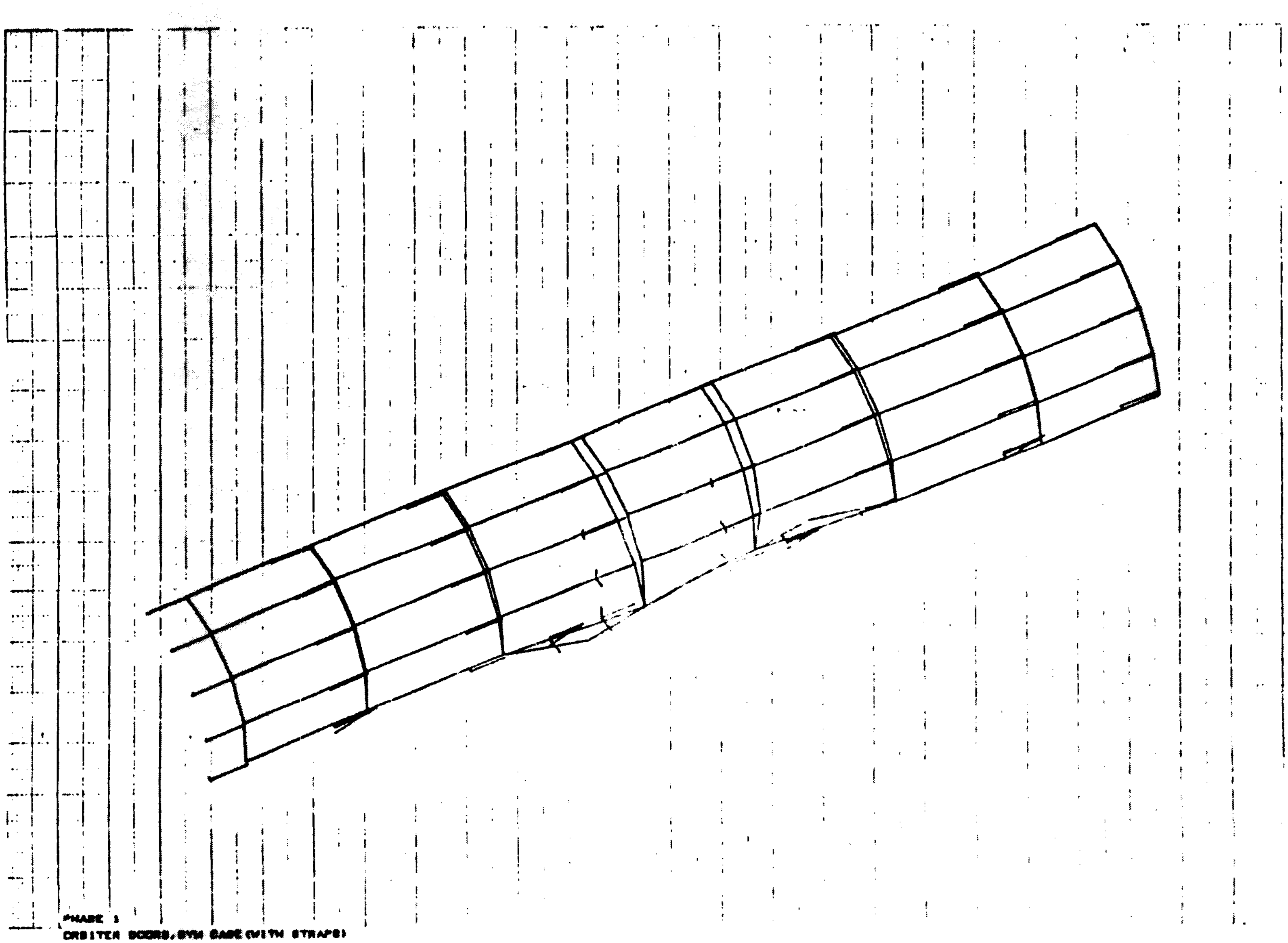


PHASE 1
ORBITER DOORS,EVA CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 9 MODE 9 FREQ. 190.8847

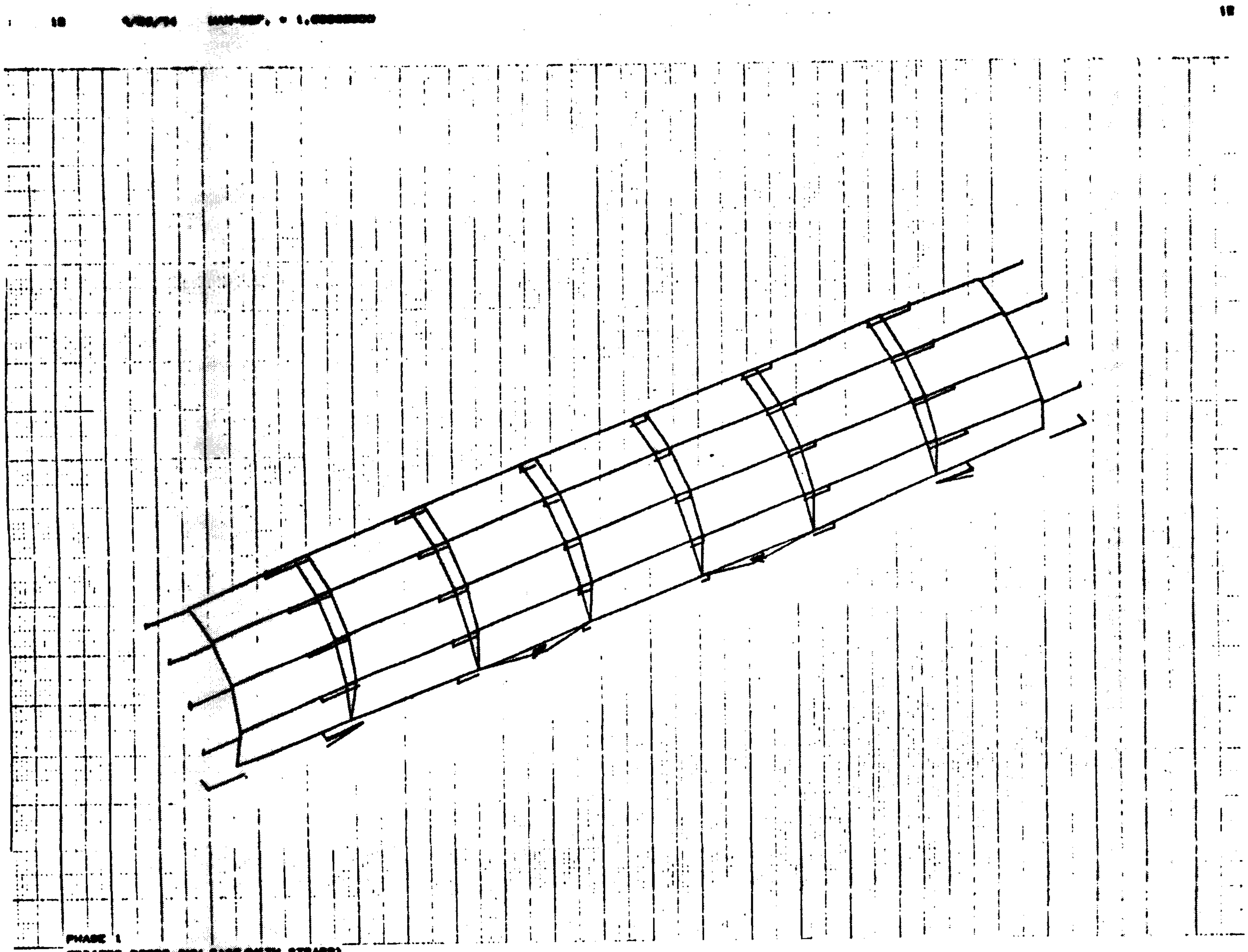

10 9/08/74 MAX-DEF. = 1.[illegible]
10

PHASE 1
ORBITER DOORS,FWD BASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 10 MODE 10 FREQ. 225.9748

11 ---- [illegible] MAX-DEF. = 1.00000000 11

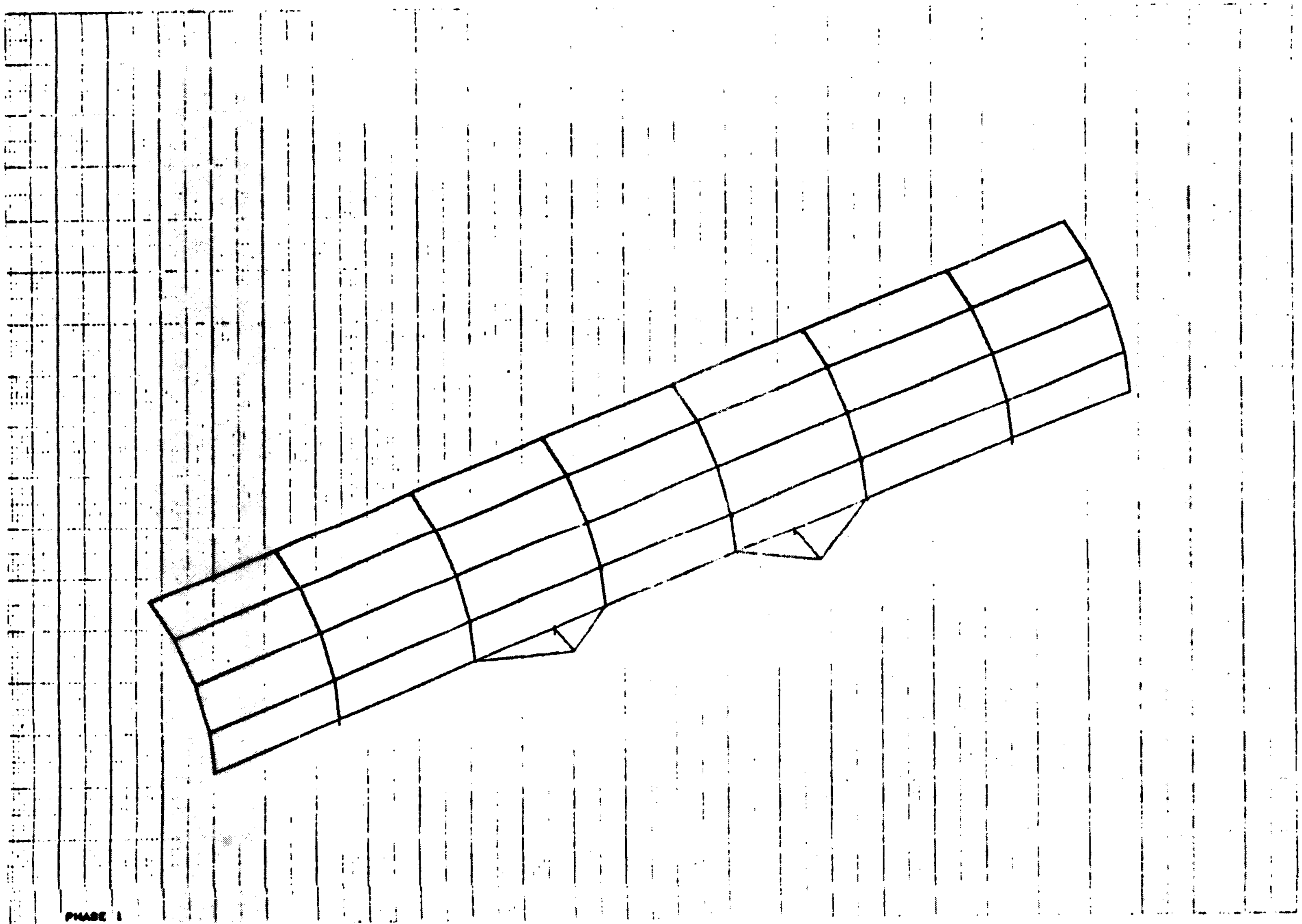


PHASE 1
ORBITER DOORS, SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 11 MODE 11 FREQ. 314.8916

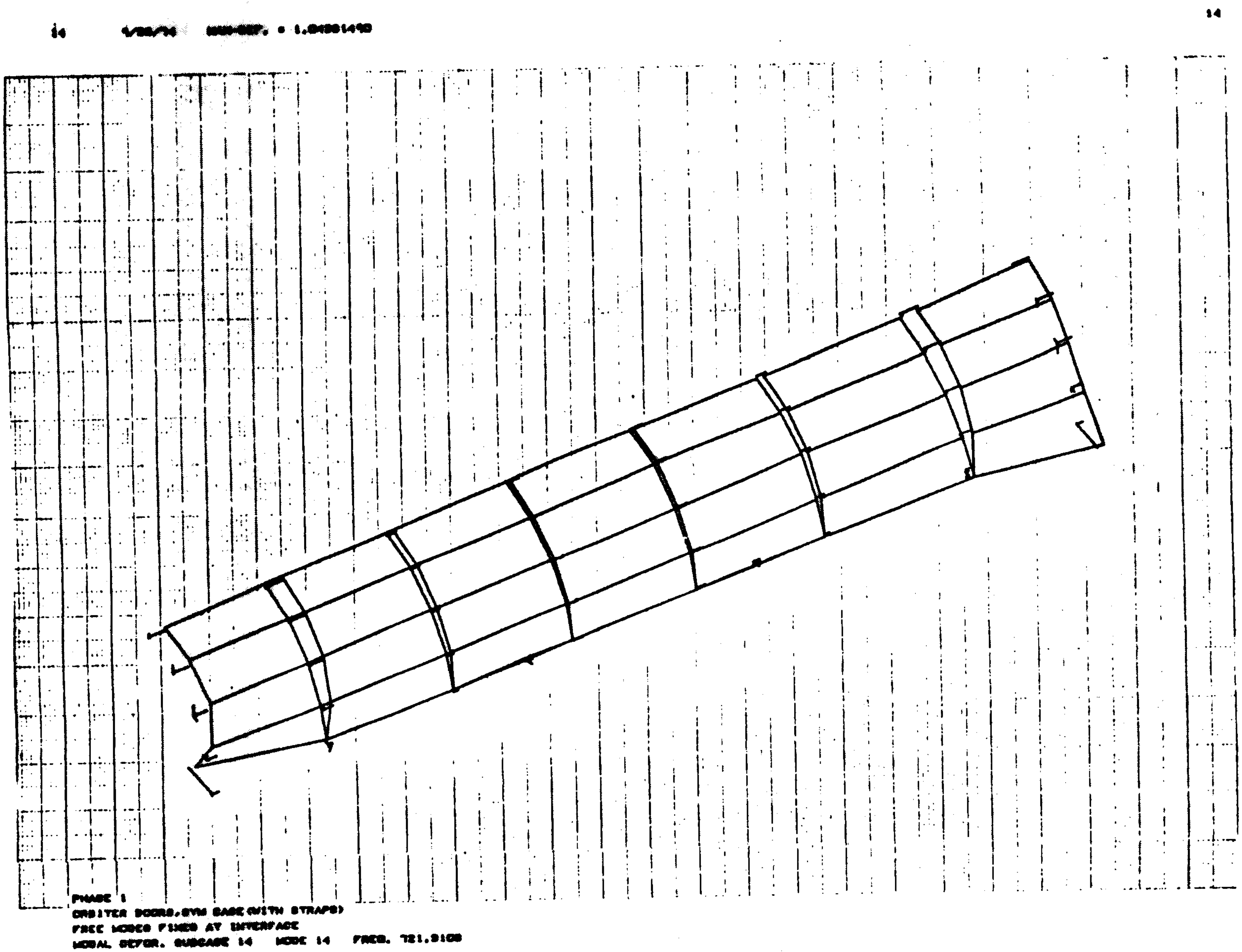

18
[illegible]
MAX-DEF. = 1.0000000
18

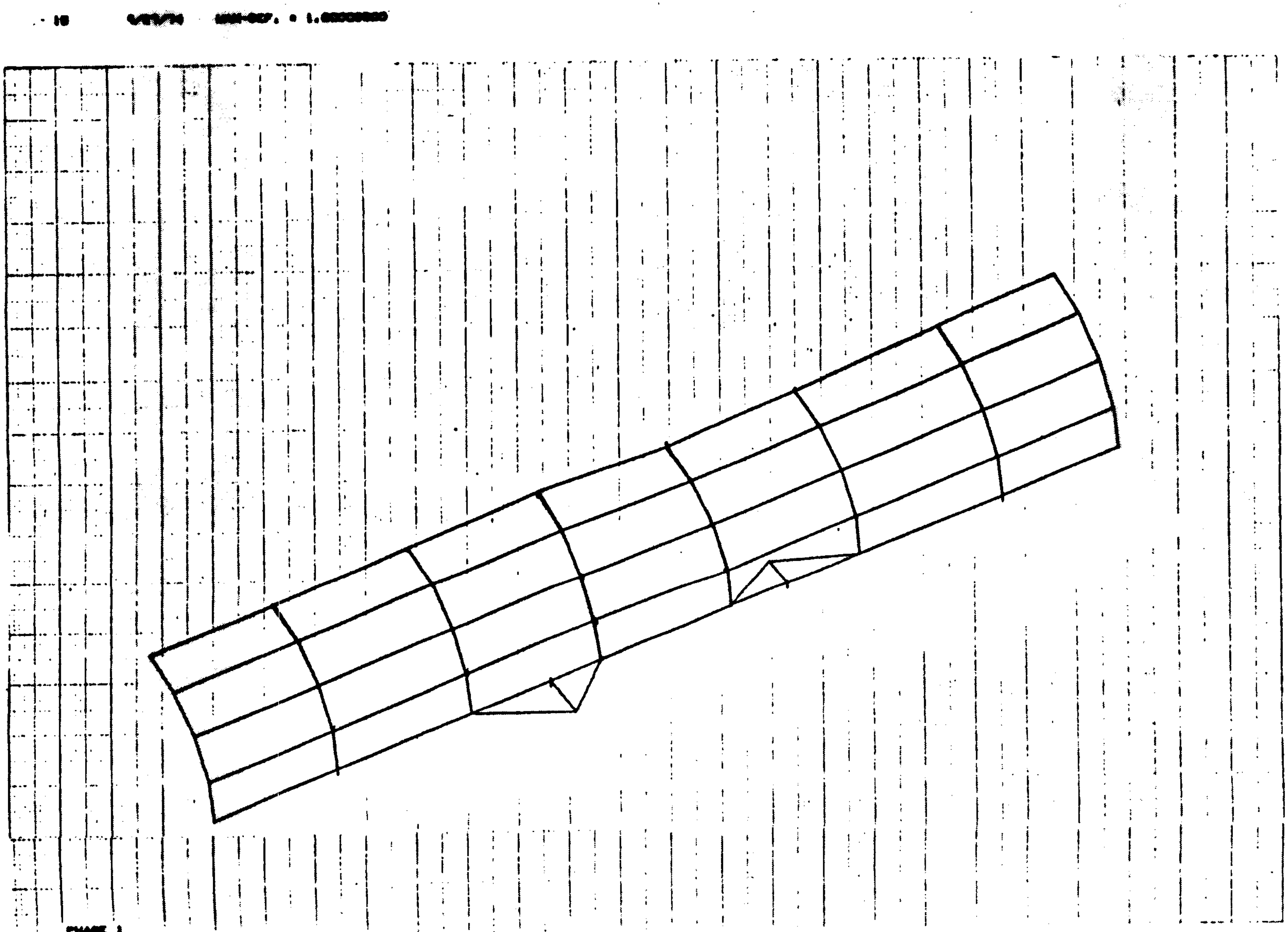
PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 477.3878

18   9/28/74   MAX-DEF. = 1.0000000



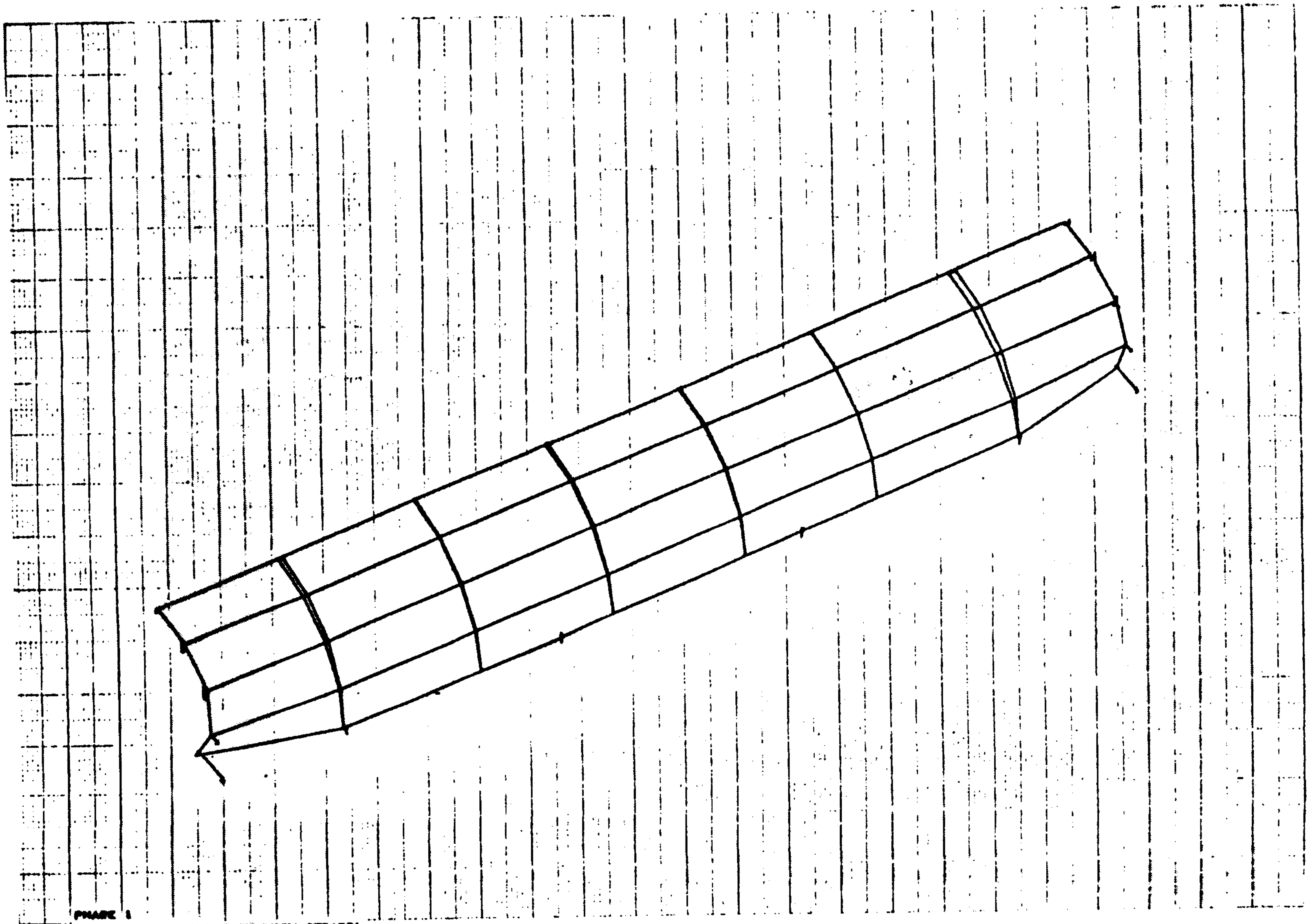
PHASE 1
ORBITER [illegible],SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 13   MODE 13   FREQ. 660.9091


14 4/28/94 MAX-DEF. = 1.04881490
14
PHASE 1
ORBITER DOORS, SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 14 MODE 14 FREQ. 721.9108



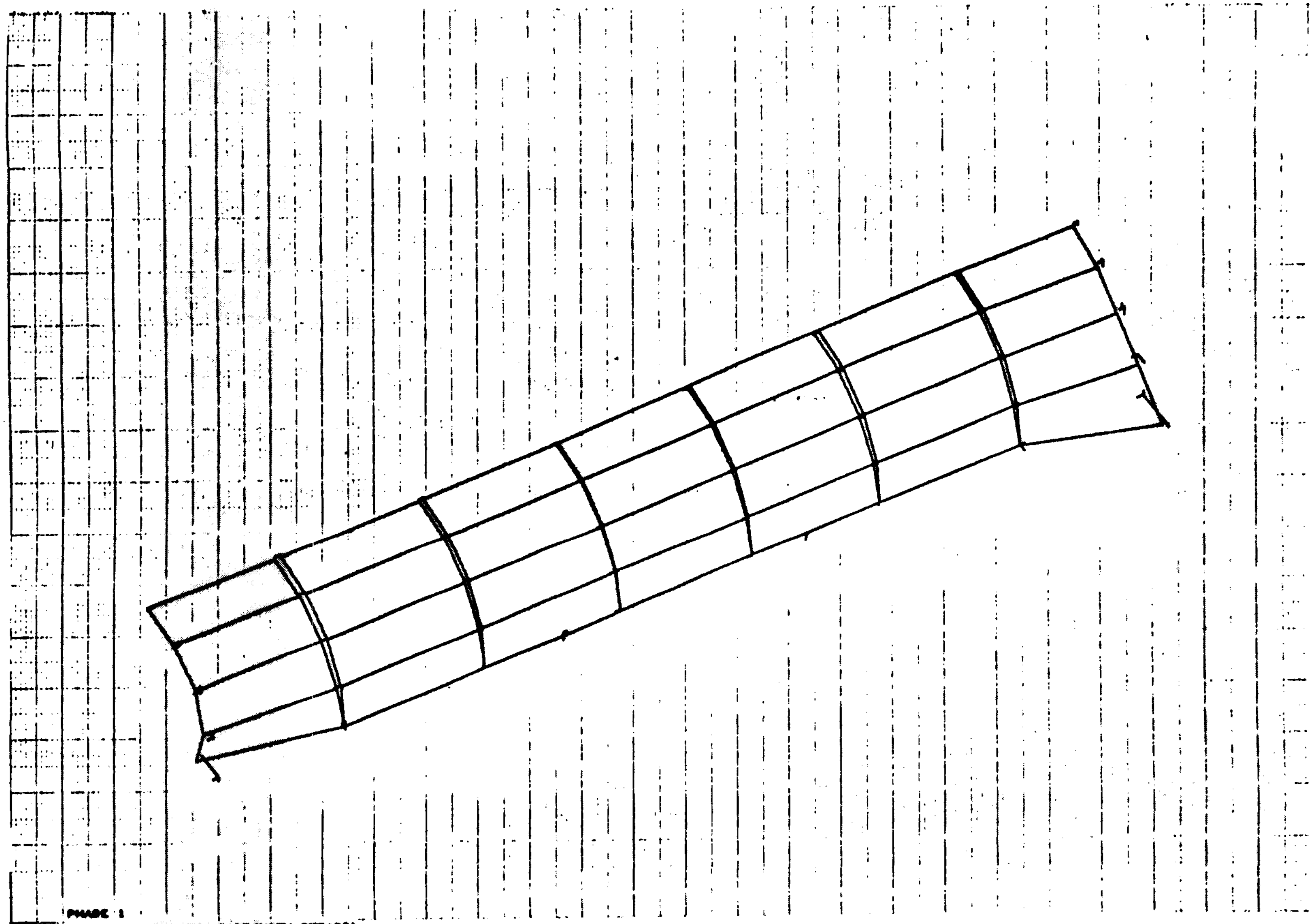
PHASE 1
ORBITER DOORS, SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 790.3848

10 9/20/74 MAX-DEF. = 1.08977690

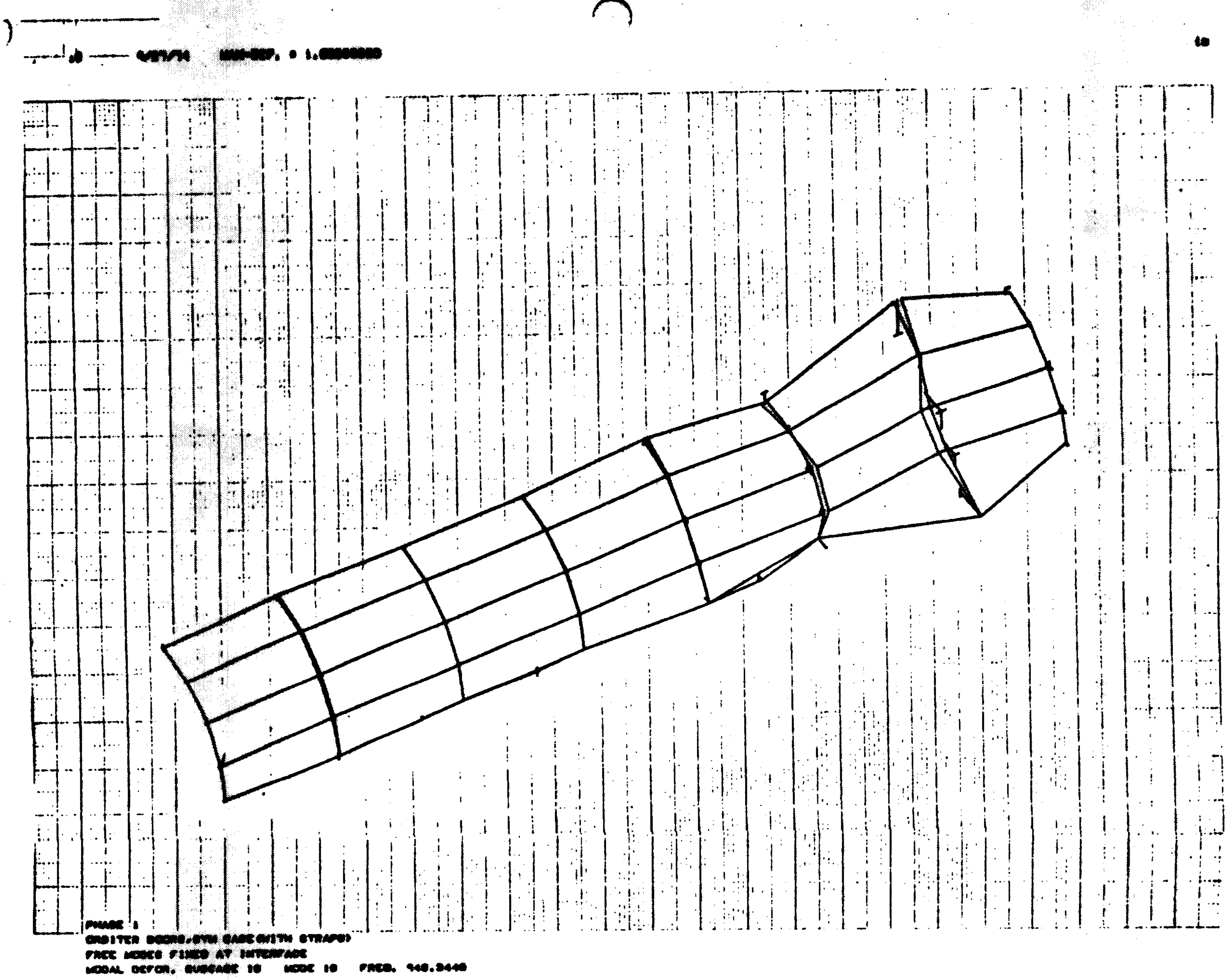


PHASE 1
ORBITER DOORS, SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 790.0907

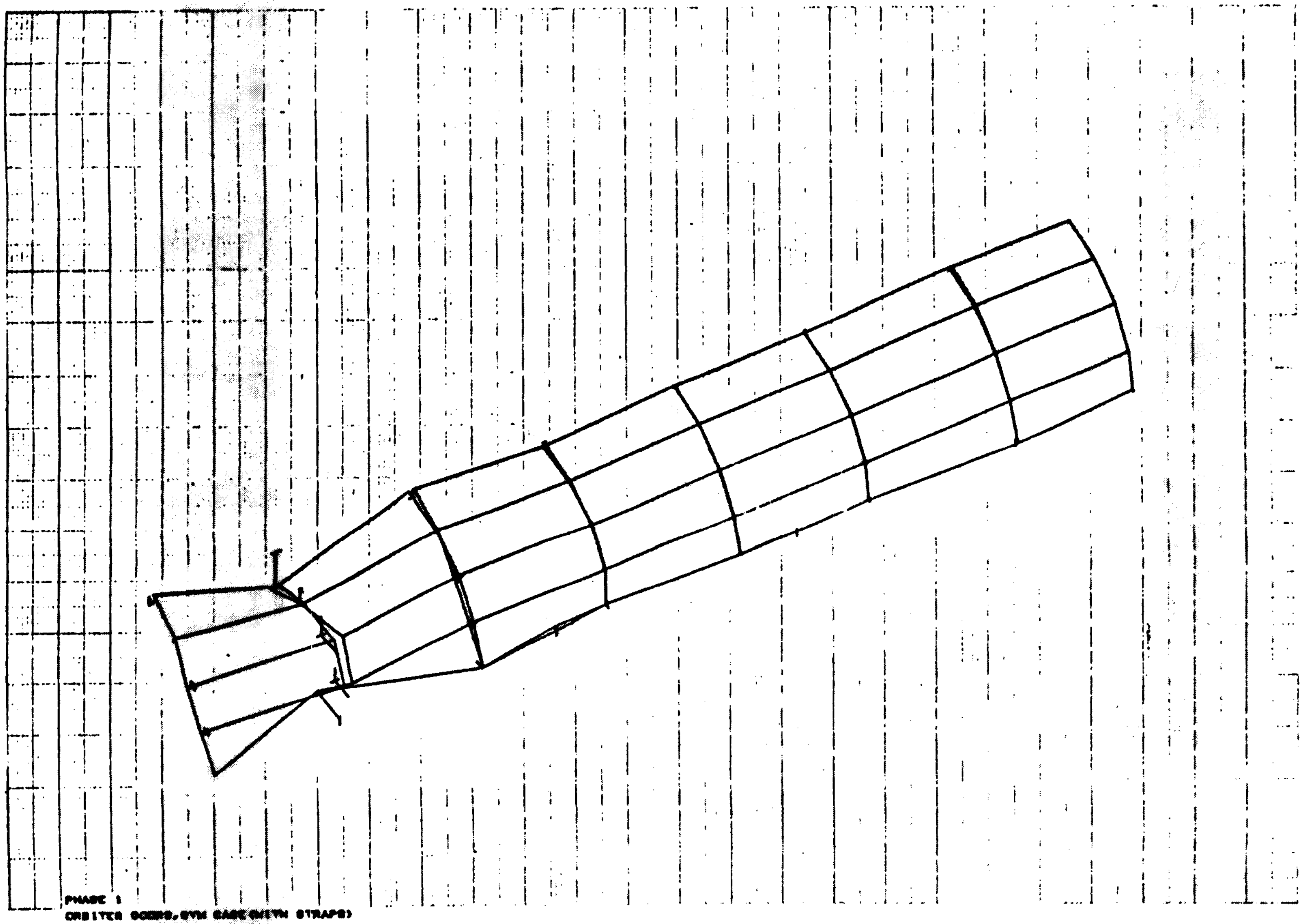
17   [illegible]   MAX-DEF. = 1.0000000   17



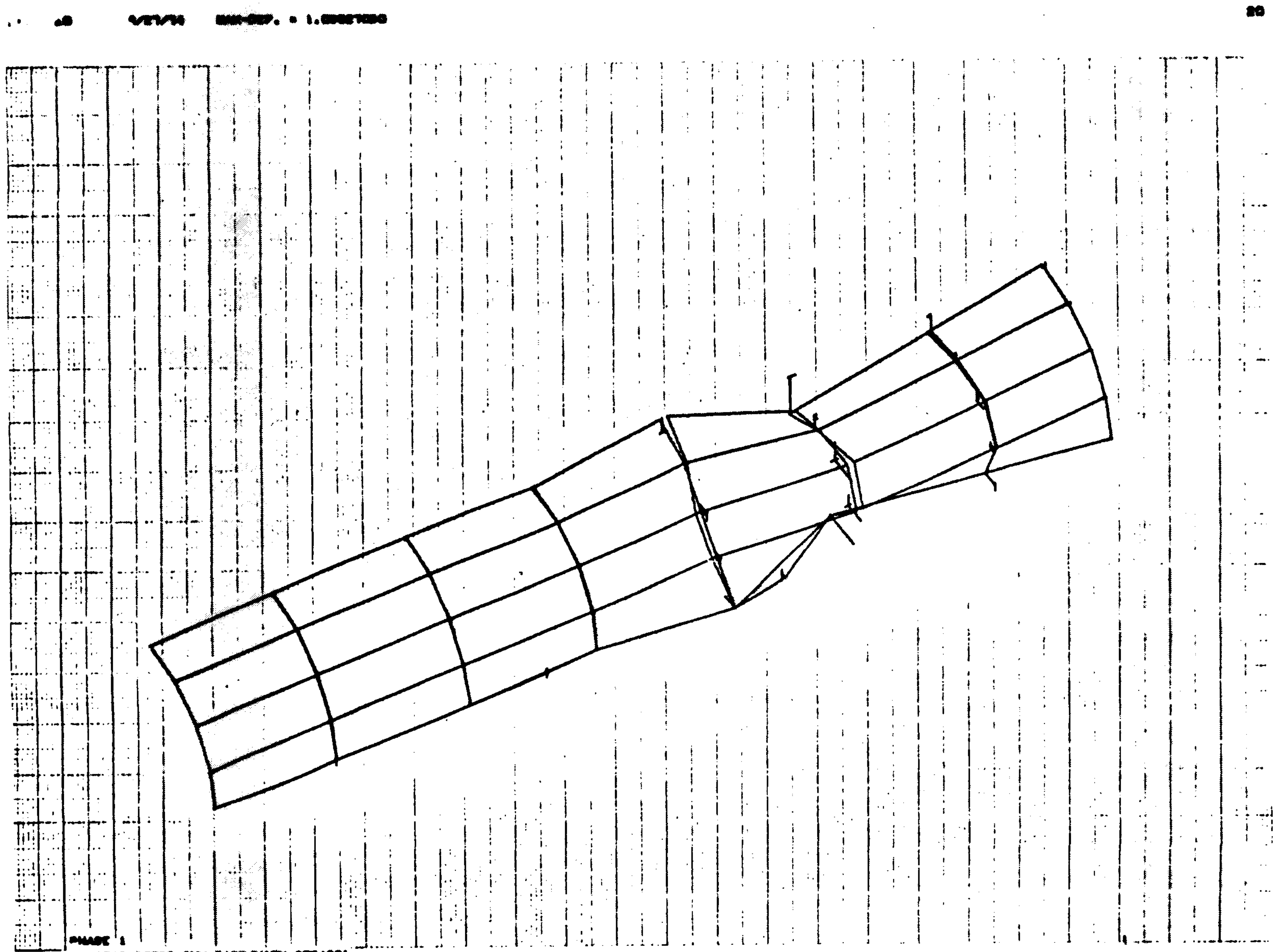
PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 17   MODE 17   FREQ. 029.4071


PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 948.3440

14 [illegible] [illegible] = [illegible] 19



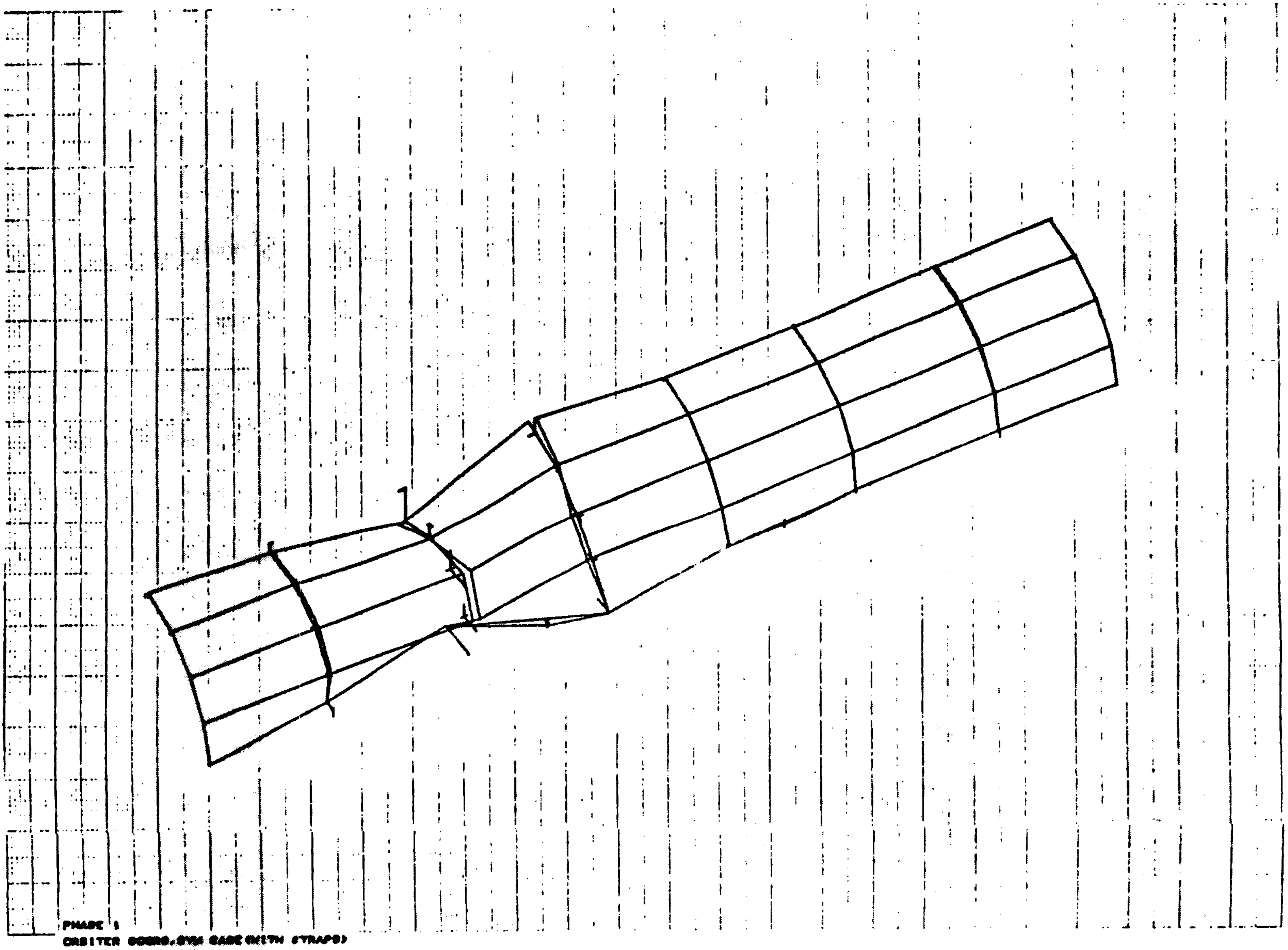
PHASE 1
ORBITER [illegible],SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 19 MODE 19 FREQ. 949.0820



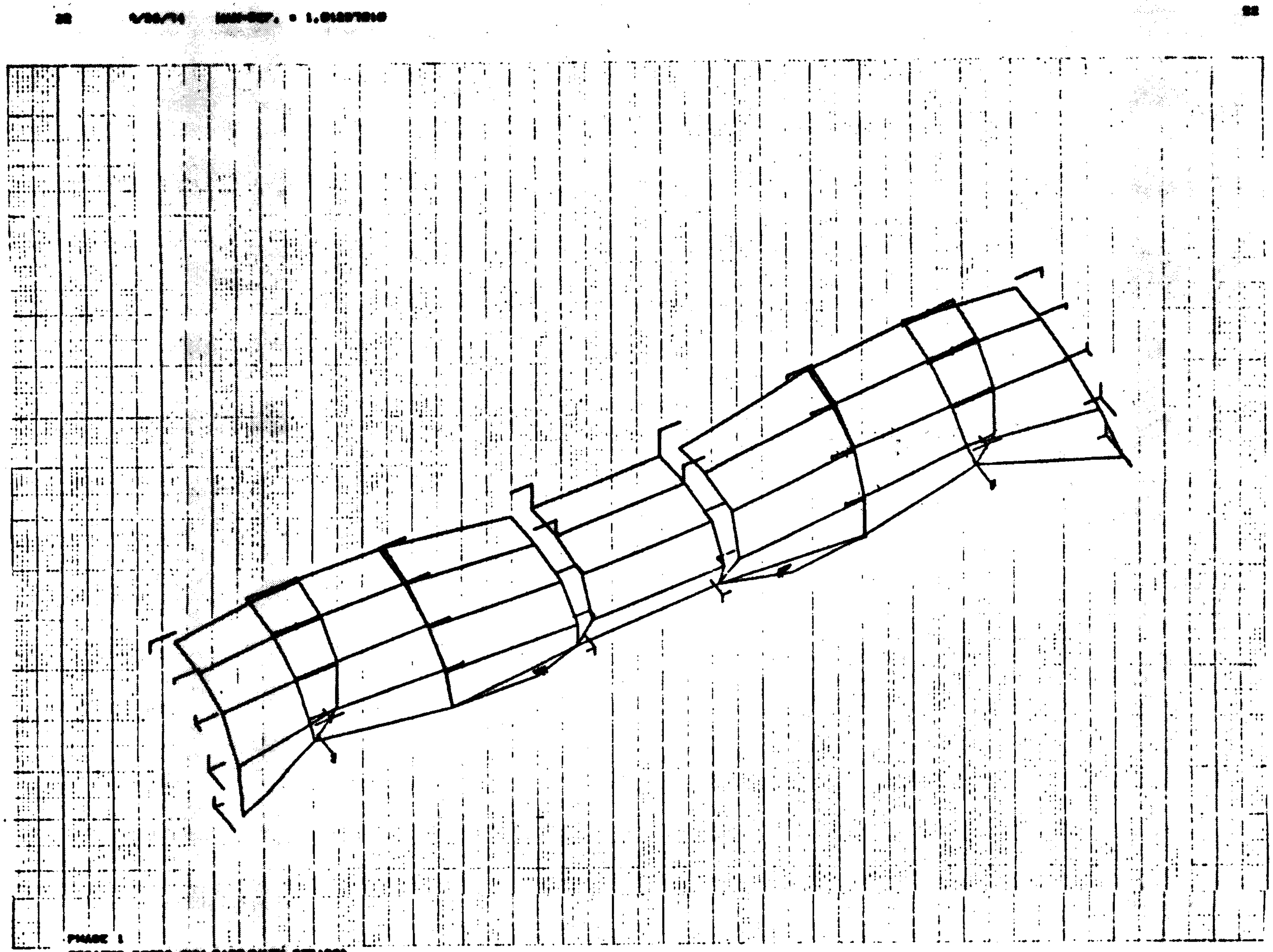
PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 20 FREQ. [illegible].1029

21 9/26/74 MAX-DEF. = 1.0000000

21

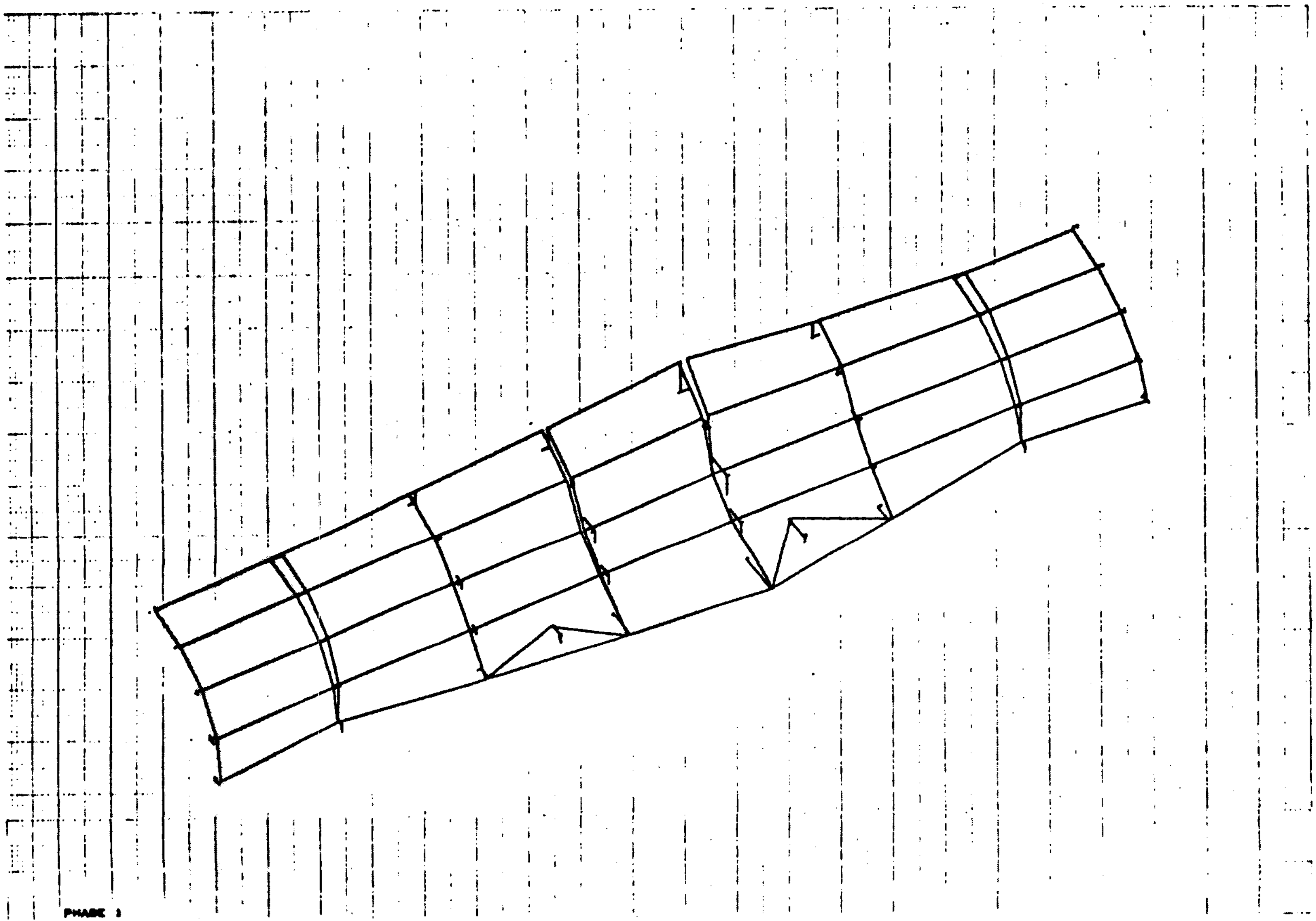


PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 21 FREQ. 980.0000



PHASE 1
ORBITER [illegible] BASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 22 FREQ. 978.2198

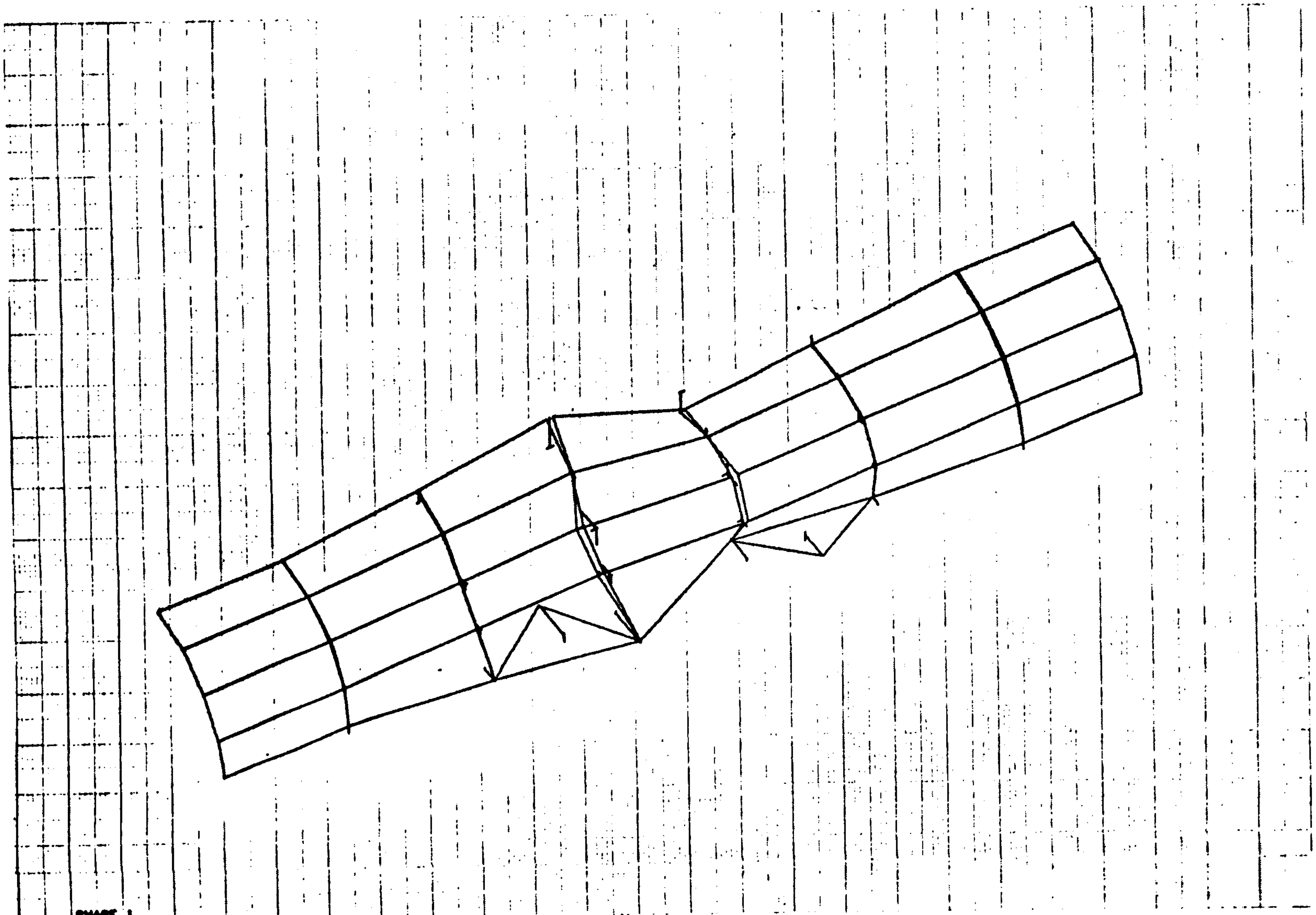
-8 9/27/74 MAX-DEF. = 1.07608660 23



PHASE 1
ORBITER DOORS, SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 23 FREQ. 998.7070

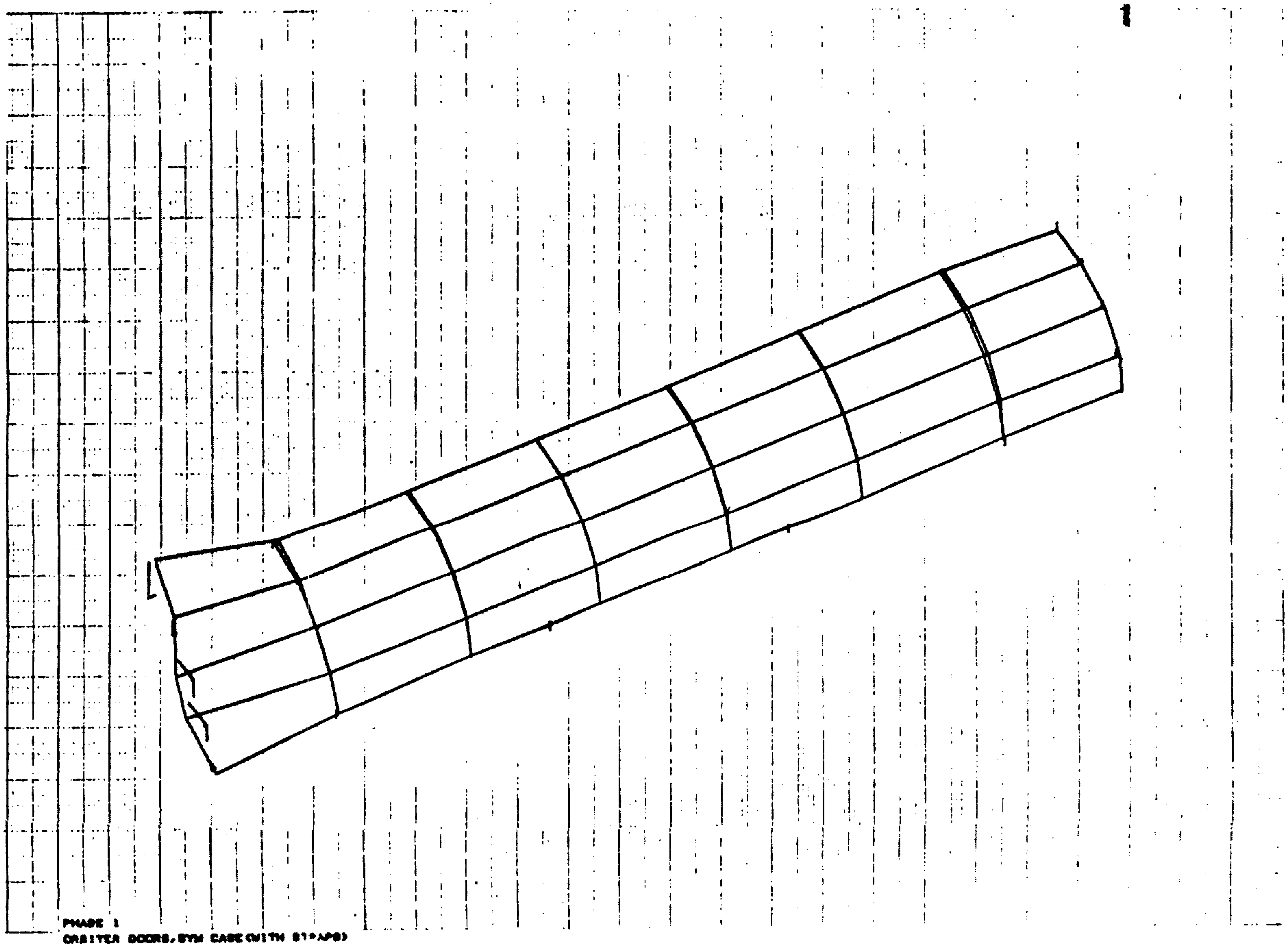
64 4/23/74 MAX-DEF. = 1.04788790

24

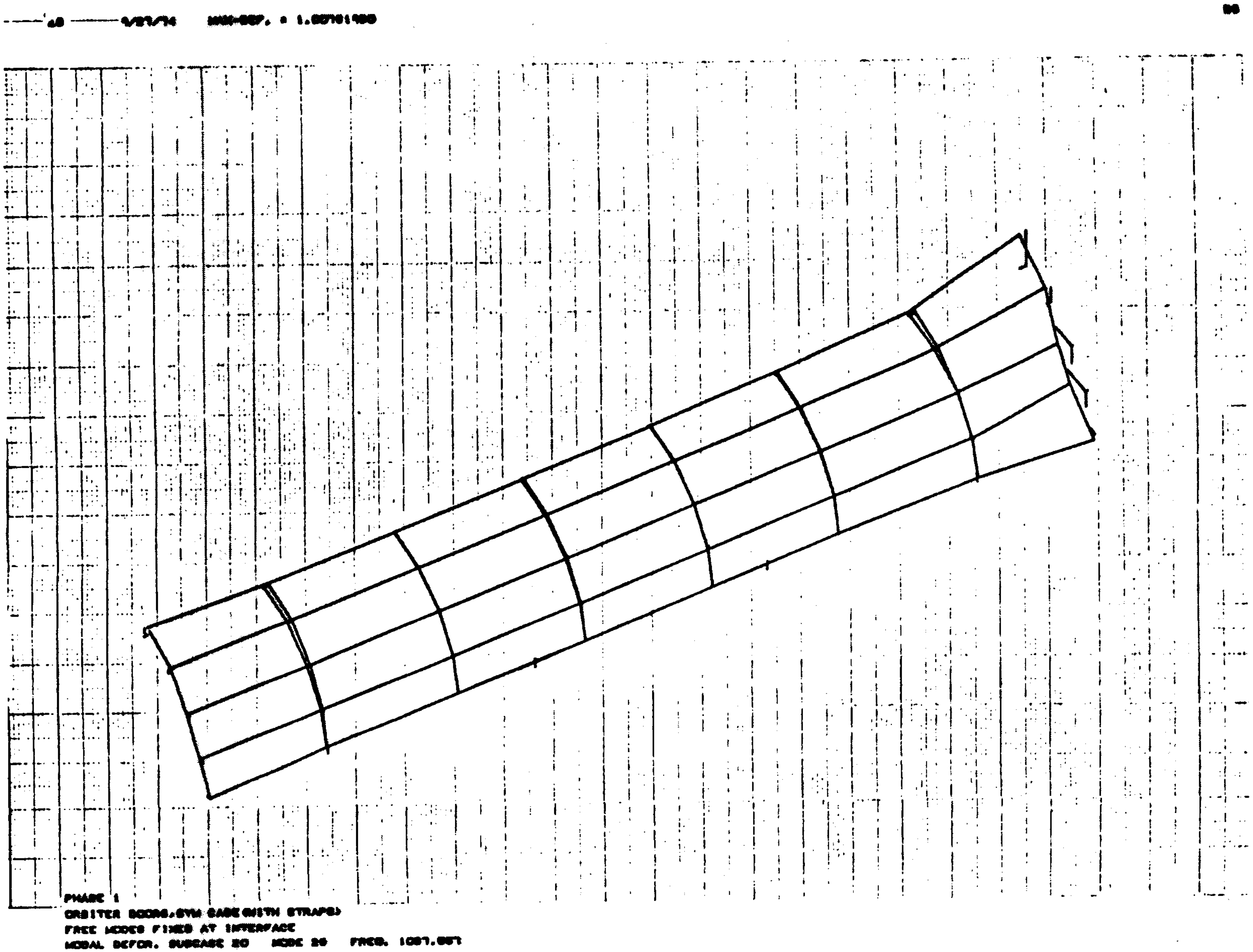


PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 24 FREQ. 1018.229

48   9/27/74   MAX-DEF. = 1.00769440   26

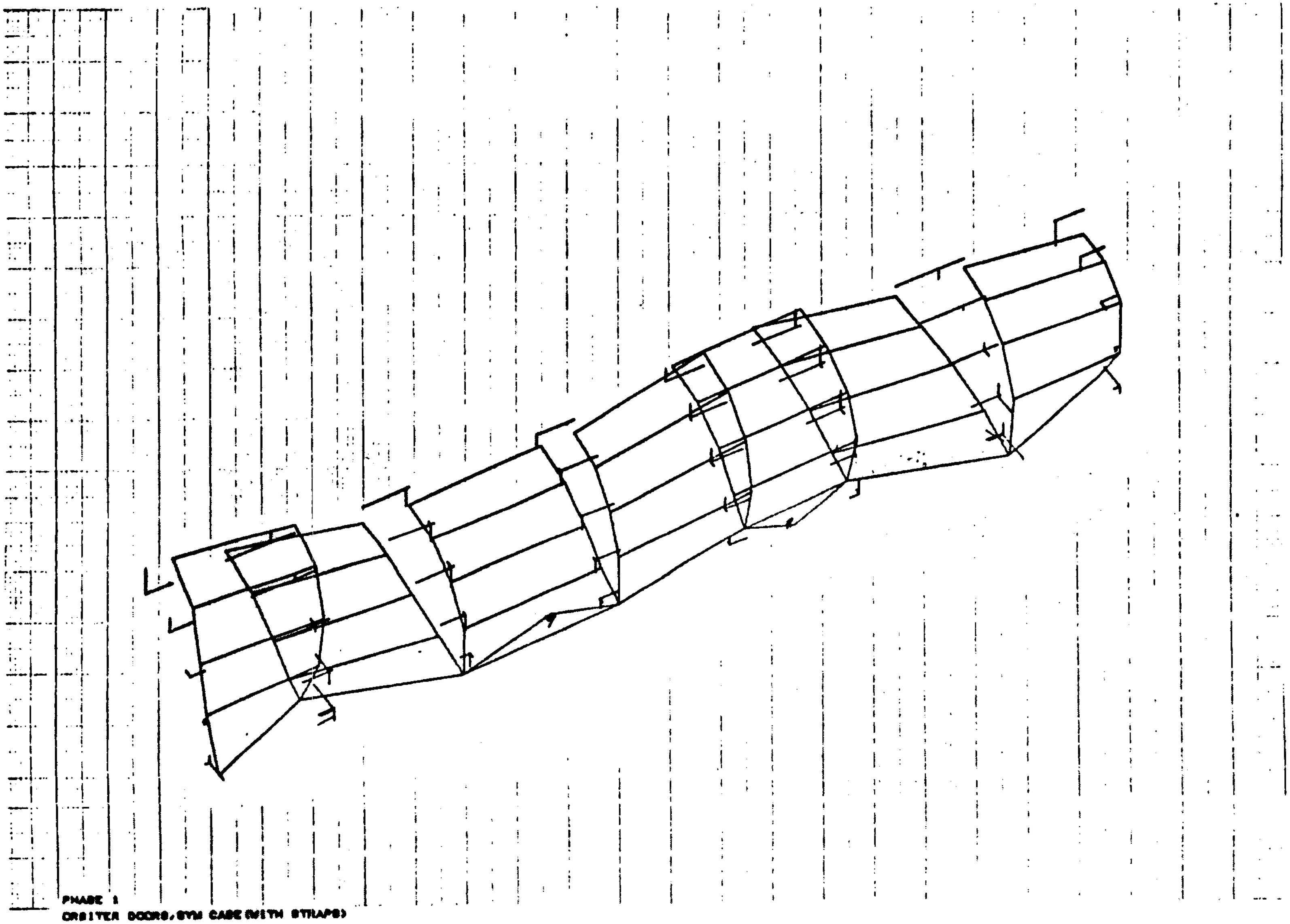


PHASE 1
ORBITER DOORS, SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20   MODE 26   FREQ. 1084.818

48 9/27/74 MAX-DEF. = 1.00701400
[illegible]
PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 26 FREQ. 1007.007

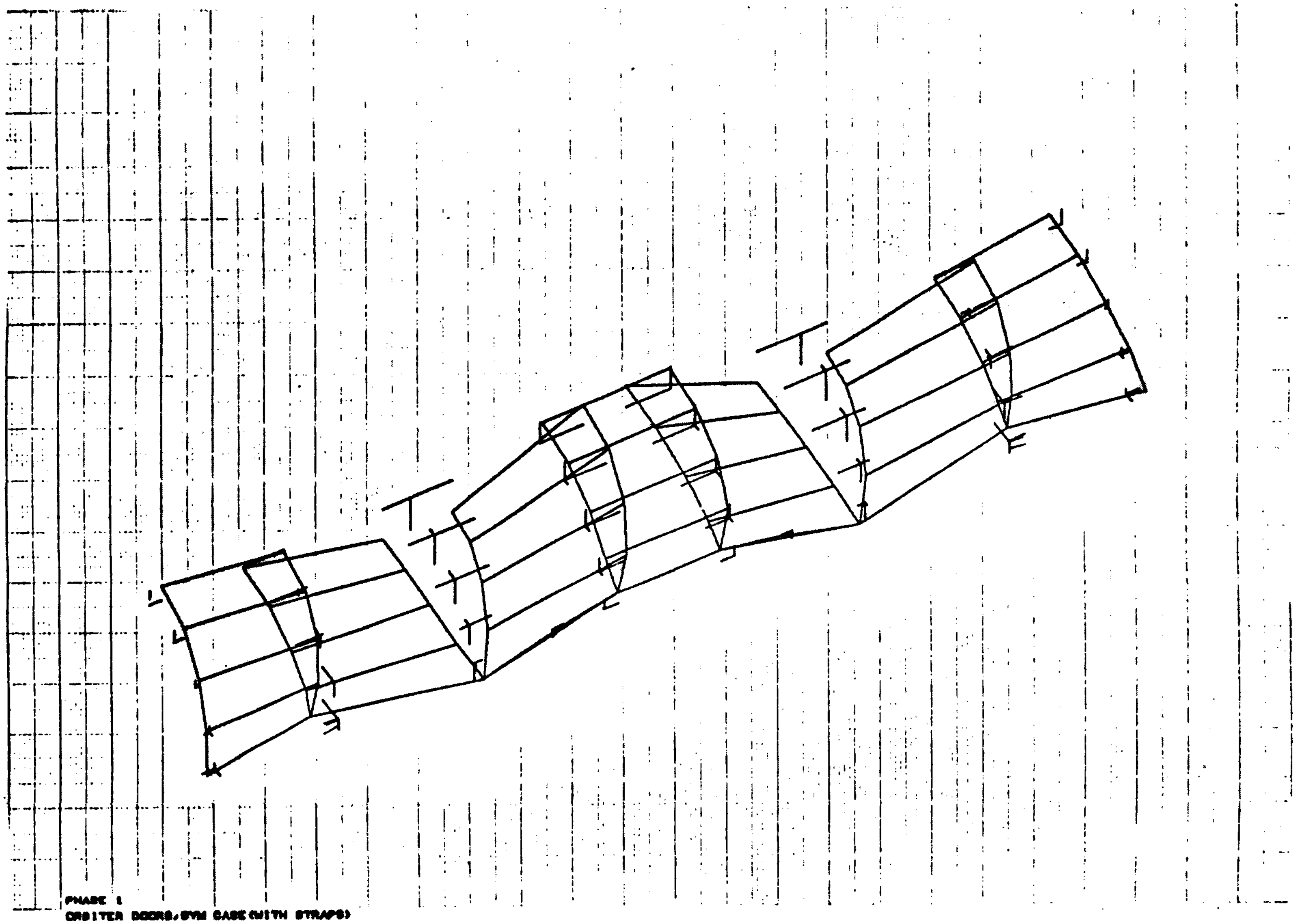
43 9/27/74 MAX-DEF. = 1.00000000

27



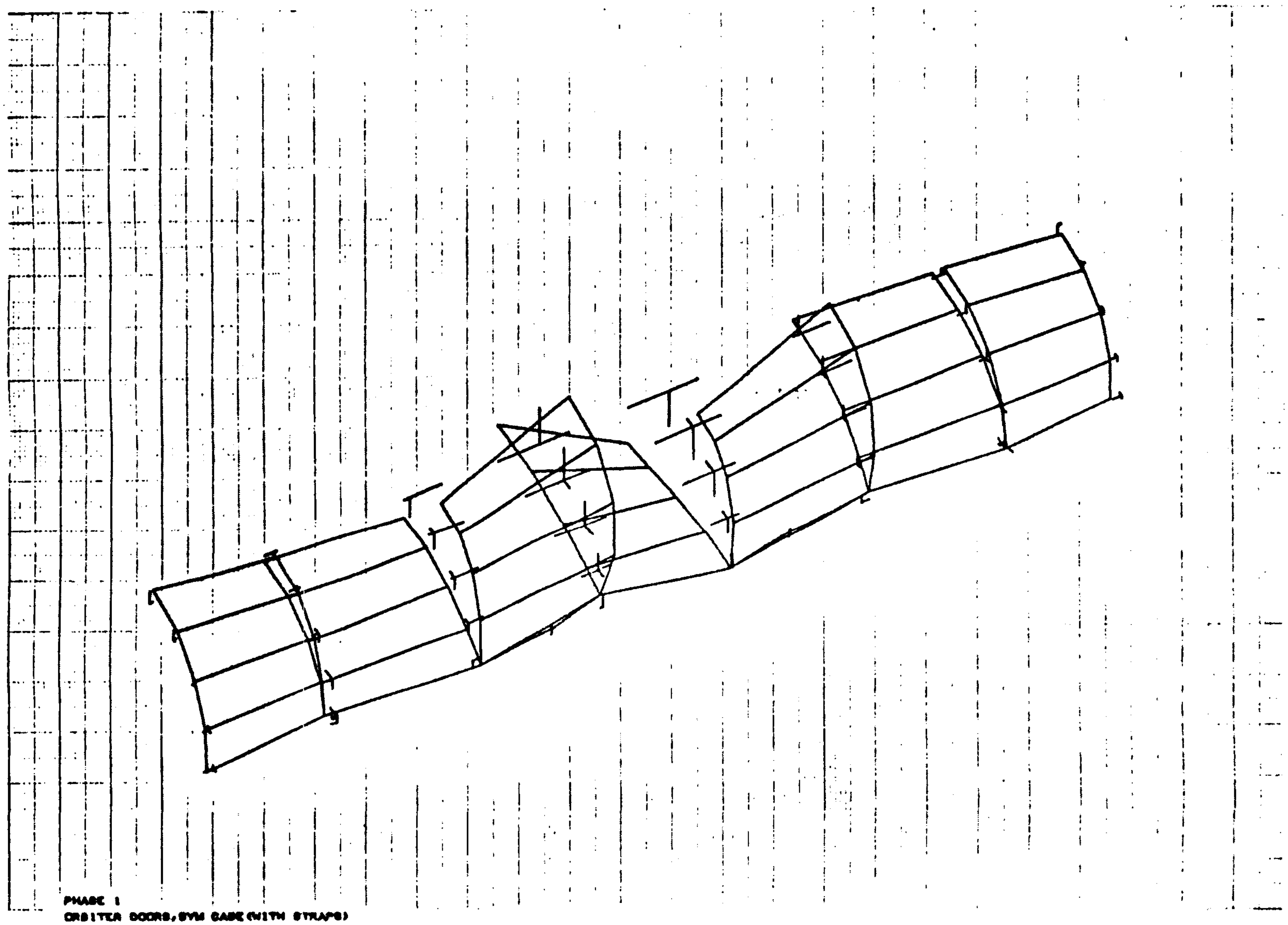
PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 27 FREQ. 1100.499

48 9/27/74 MAX-DEF. = 1.00000000

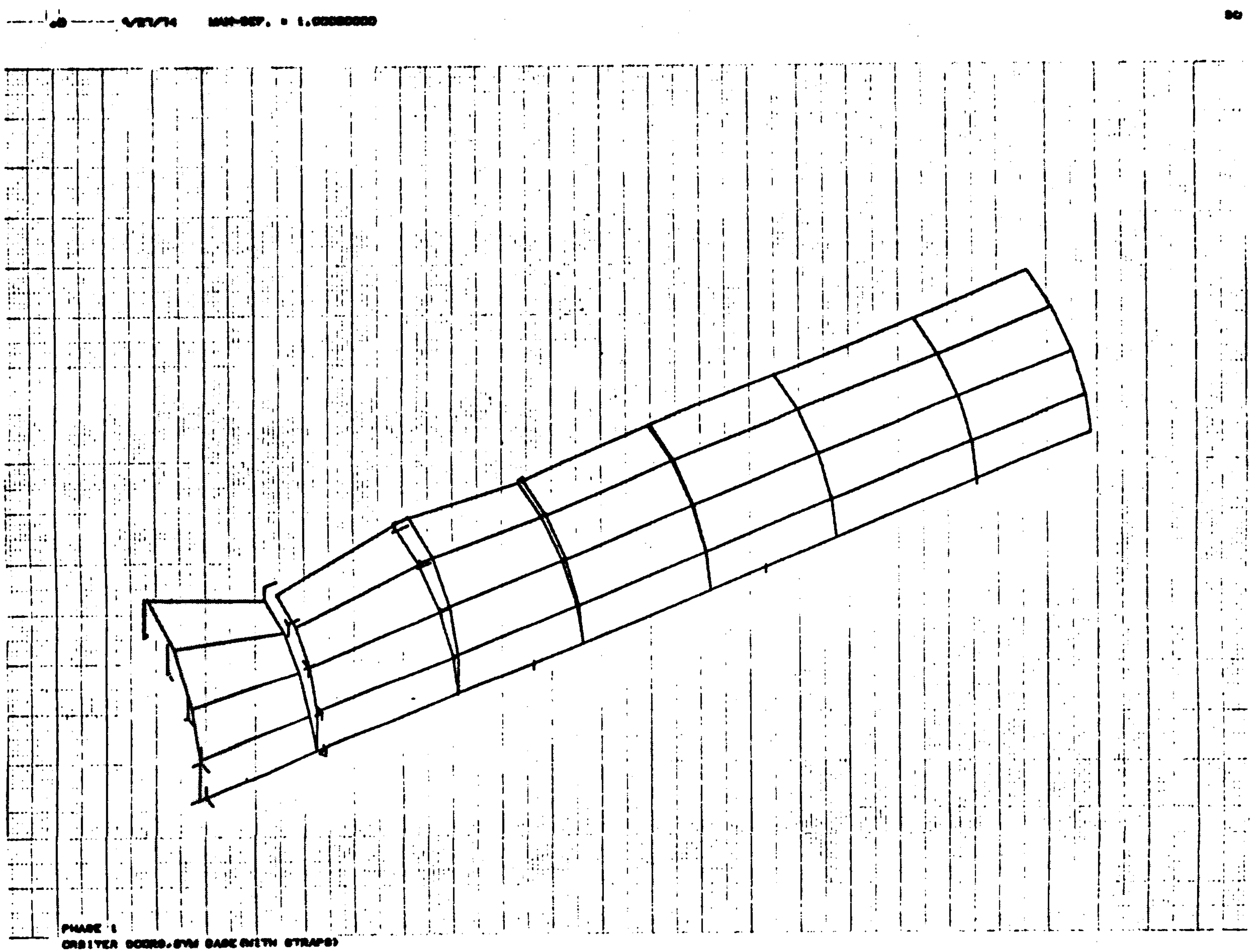


PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 28 FREQ. 1979.084

64 4/27/74 MAX-DEF. = 1.00000000 29



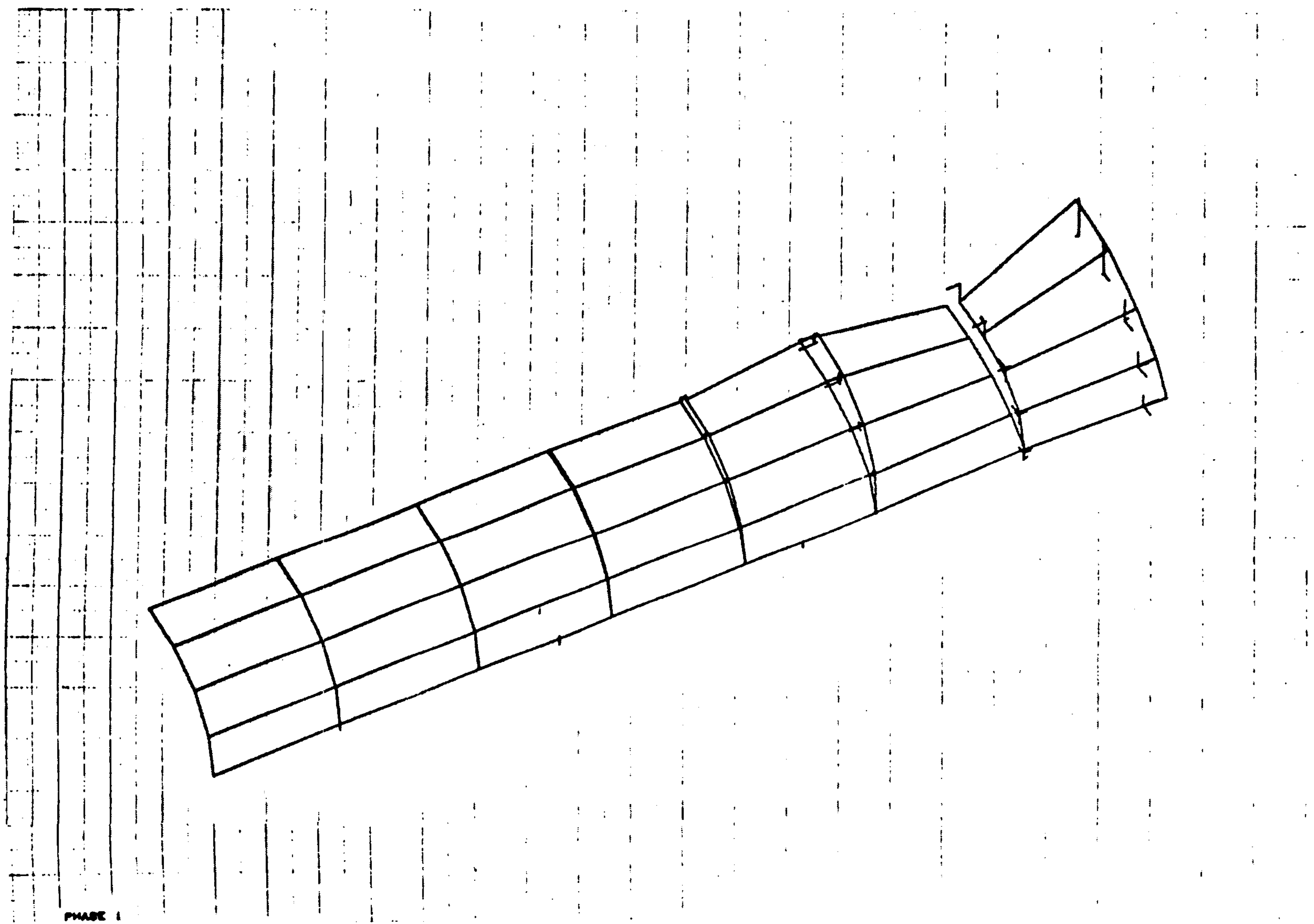
PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 29 FREQ. 1516.442



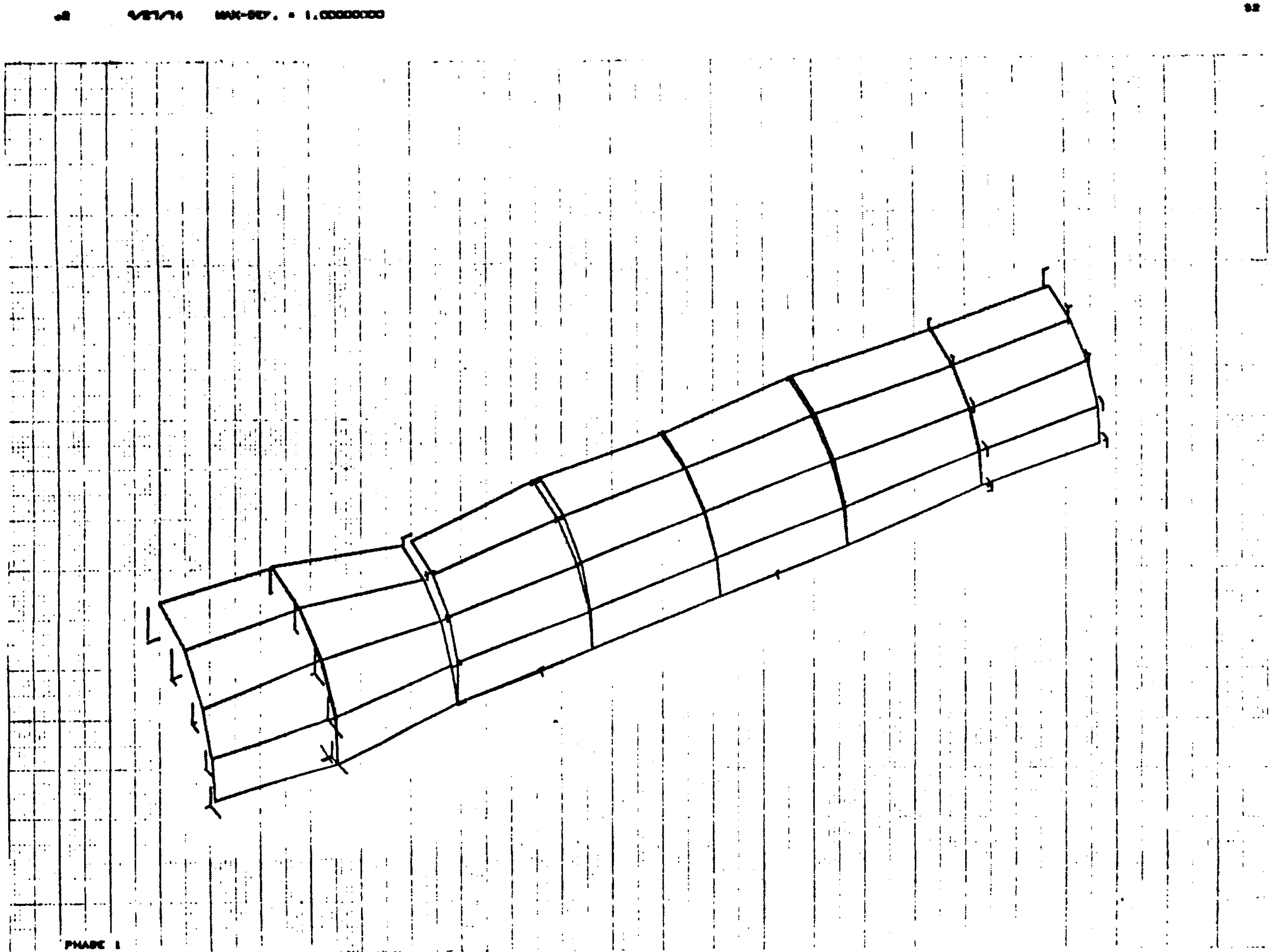
9/27/74 MAX-DEF. = 1.00000000
30

PHASE 1
ORBITER COORD.SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 30 FREQ. 1599.000

41 9/27/74 MAX-DEF. = 1.00000000 31



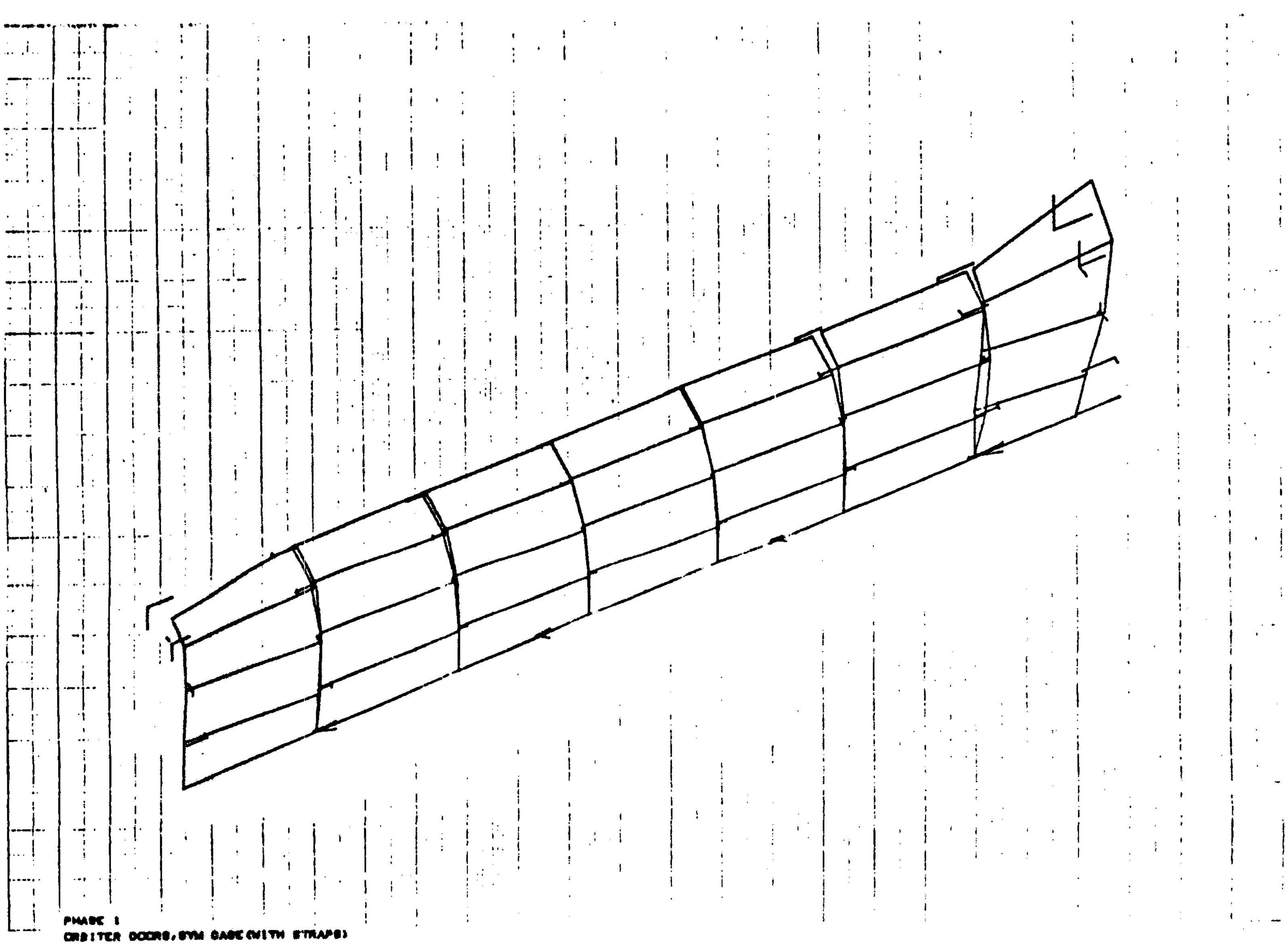
PHASE I
ORBITER DOORS, SYM CASE (WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 31 FREQ. 1004.36



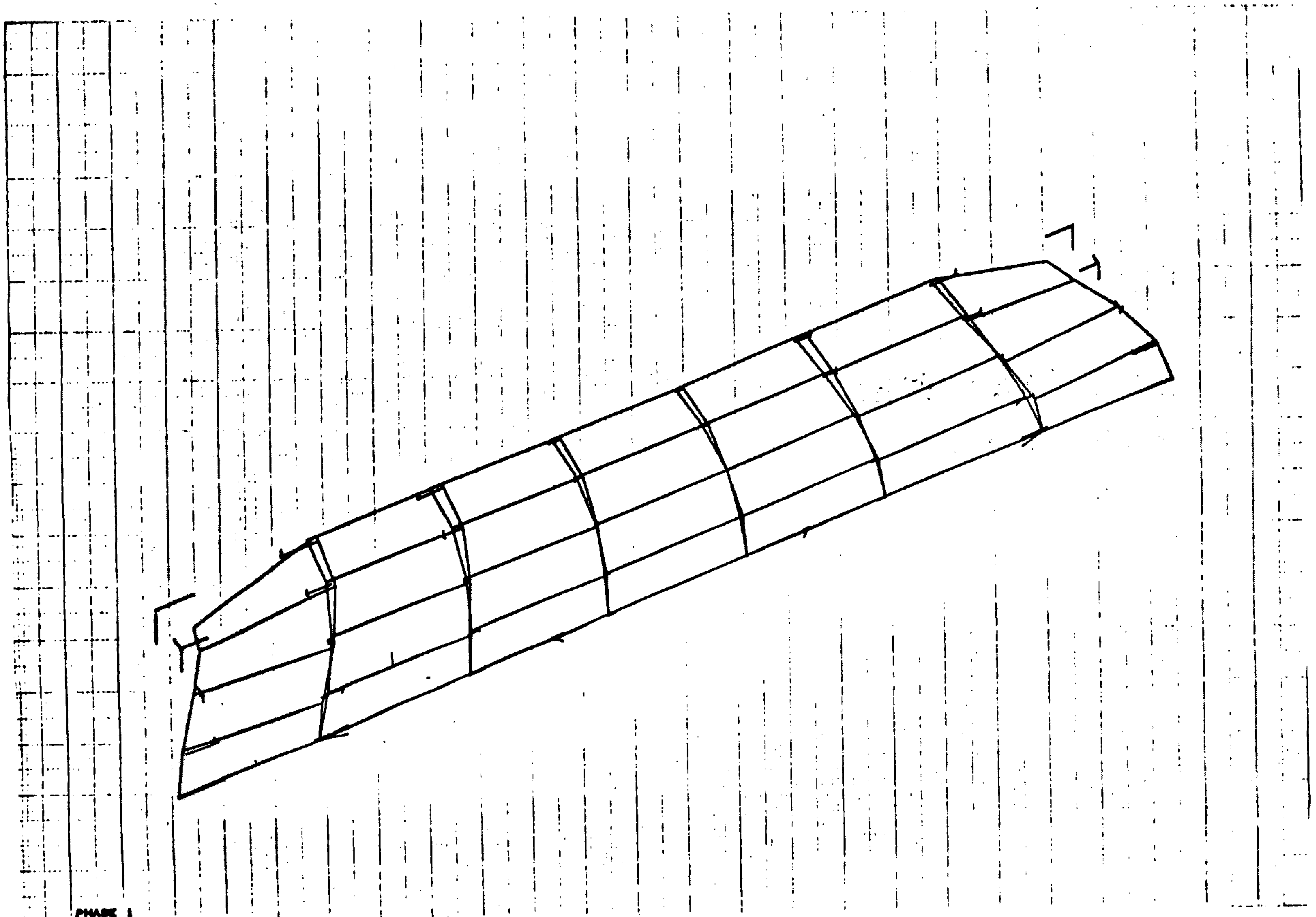
-8
9/27/74
MAX-DEV. = 1.00000000
32

PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 32 FREQ. 1660.928

84 9/27/84 MAX-DEF. = 1.00000E+00

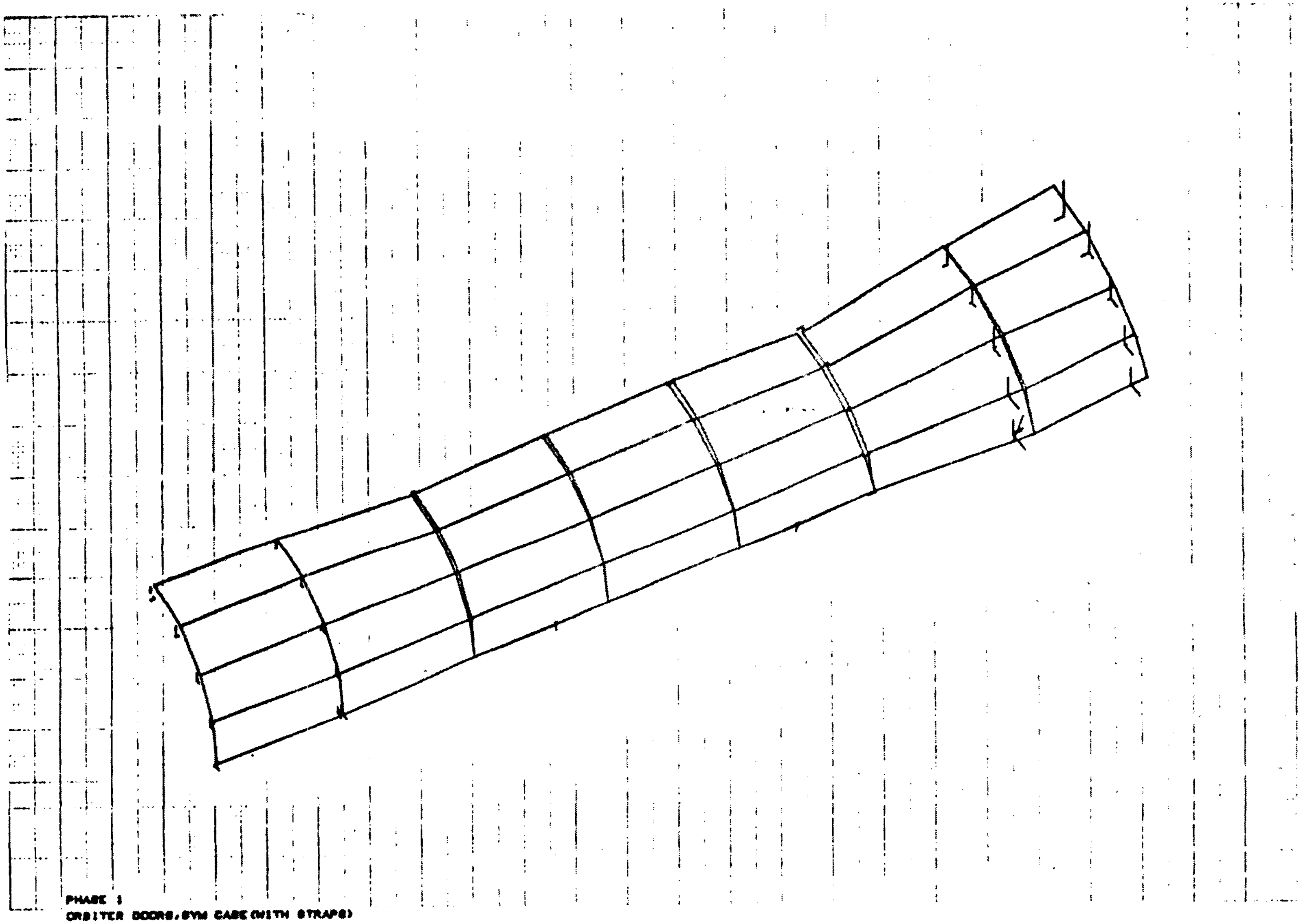


PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 84 FREQ. 2027.848


d6 [illegible] MAX-DEF. = 1.00000000
98

PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 36 FREQ. 2045.494

40 9/27/74 MAX-DEF. = 1.00000000 84



PHASE 1
ORBITER DOORS,SYM CASE(WITH STRAPS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 20 MODE 33 FREQ. 1662.771

Appendix B9
INPUT BULK DATA/PHASE I ANALYSIS: MODEL II FIN

```
                                        C A S E    C O N T R O L    D E C K    E C H O
                 CARD
                 COUNT
                   1      TITLE # PHASE 1
                   2      SUBTITLE # FIN-SYMM XWITH SPRINGSH
                   3      MPC     # 4451
                   4      SPC   # 4401
                   5      METHOD   # 1
                   6      MAXLINES # 30000
                   7      VECTOR   # ALL
                   8      SUBCASE 1
                   9      LABEL      # FREE MODES FIXED AT INTERFACE
                  10      MODES     # 20
                  11      OUTPUTXPLOTX
                  12      SET 61 # INCLUDE 4401 THRU 4424
                  13      SET 62 # INCLUDE 4431 THRU 4452
                  14      SET 63 # INCLUDE 4461 THRU 4529
                  15      PLOTTER CALCOMP 765.105
                  16      AXES    #MY.X.Z
                  17      VIEW    # 45.0.30.0.0.0
                  18      MAXIMUM DEFORMATION 2.0
                  19      FIND  SCALE.ORIGIN 62.SET 61
                  20      PLOT MODAL DEFORMATION 1 THRU 20.SET 61.ORIGIN 62.SHAPE.VECTOR XYZ
                  21      BEGIN BULK

 *** USER INFORMATION MESSAGE 207. BULK DATA NOT SORTED.XSORT WILL RE-ORDER DECK.
```

```
PHASE 1                                                       OCTOBER 10, 1974   NASTRAN  2/ 1/73     PAGE     6
FIN-SYMM &WITH SPRINGS&

                                             S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2   ..   3   ..   4   ..   5   ..   6   ..   7   ..   8   ..   9   ..  10  .
    1-        CELAS2  11      4350.   4461    3       4471    3
    2-        CELAS2  12      4350.   4469    3       4473    3
    3-        CELAS2  13      65500.  4465    3       4472    3
    4-        CONM1   4400    4400    0       3.000   .0      3.000   .0      .0      &CM1
    5-        &CM1       3.000   0.0     0.0     0.0     1.5630  0.0     0.0     0.0  &CM2
    6-        &CM2       0.0     13.225  0.0     0.0     0.0     0.0     0.0     12.79
    7-        CONROD  4490    4401    4411    4401    .036                    .0026
    8-        CONROD  4491    4402    4412    4401    .019
    9-        CONROD  4492    4405    4415    4401    .026                    .0016
   10-        CONROD  4493    4406    4416    4401    .019
   11-        CONROD  4494    4409    4419    4401    .036                    .0026
   12-        CONROD  4495    4410    4420    4401    .019
   13-        CONROD  4496    4411    4421    4401    .037                    .0026
   14-        CONROD  4497    4412    4422    4401    .023
   15-        CONROD  4498    4415    4425    4401    .027                    .0016
   16-        CONROD  4499    4416    4426    4401    .023
   17-        CONROD  4500    4419    4429    4401    .037                    .0026
   18-        CONROD  4501    4420    4430    4401    .023
   19-        CONROD  4502    4421    4431    4401    .040                    .0026
   20-        CONROD  4503    4422    4432    4401    .027
   21-        CONROD  4504    4425    4435    4401    .030                    .0016
   22-        CONROD  4505    4426    4436    4401    .027
   23-        CONROD  4506    4429    4439    4401    .040                    .0026
   24-        CONROD  4507    4430    4440    4401    .027
   25-        CONROD  4508    4431    4441    4401    .042                    .0026
   26-        CONROD  4509    4432    4442    4401    .032
   27-        CONROD  4510    4435    4445    4401    .032                    .0016
   28-        CONROD  4511    4436    4446    4401    .032
   29-        CONROD  4512    4439    4449    4401    .042                    .0026
   30-        CONROD  4513    4440    4450    4401    .032
   31-        CONROD  4514    4441    4451    4401    .044                    .0026
   32-        CONROD  4515    4442    4452    4401    .037
   33-        CONROD  4516    4445    4455    4401    .040                    .0072
   34-        CONROD  4517    4446    4456    4401    .037
   35-        CONROD  4518    4449    4459    4401    .044                    .0026
   36-        CONROD  4519    4450    4460    4401    .037
   37-        CONROD  4520    4451    4461    4401    .026                    .0026
   38-        CONROD  4521    4452    4462    4401    .068
   39-        CONROD  4522    4455    4465    4401    .120                    .0100
   40-        CONROD  4523    4456    4466    4401    .040
   41-        CONROD  4524    4459    4469    4401    .026                    .0026
   42-        CONROD  4525    4460    4470    4401    .068
   43-        CONROD  4526    4461    4463    4400    .072
   44-        CONROD  4527    4463    4465    4400    .072
   45-        CONROD  4528    4465    4467    4400    .150
   46-        CONROD  4529    4467    4469    4400    .072
   47-        CORD2R  4412    0       166.5   .0      75.0    181.0   .0      87.5    &C4412
   48-        &C4412  200.0      0.0     75.0
   49-        CORD2R  4413    0       166.5   -2.0    75.0    166.5   -0.84   87.5    &C4413
   50-        &C4413  200.0     -2.0     75.0
```

```
                                        S O R T E D   B U L K   D A T A   E C H O
CARD
COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
   51-       CORD2R  4416    0               176.1253.0      75.0    183.3422.0      87.5    &C4416
   52-       &C4416  200.0      0.0      75.0
   53-       CORD2R  4420    0               182.3663.0      75.0    186.8   .0      87.5    &C4420
   54-       &C4420  200.0      0.0      75.0
   55-       CQDMEM2 4401    4401    4401    4403    4413    4411    0.0
   56-       CQDMEM2 4402    4401    4403    4405    4415    4413    0.0
   57-       CQDMEM2 4403    4401    4405    4407    4417    4415    0.0
   58-       CQDMEM2 4404    4401    4407    4409    4419    4417    0.0
   59-       CQDMEM2 4405    4401    4411    4413    4423    4421    0.0
   60-       CQDMEM2 4406    4401    4413    4415    4425    4423    0.0
   61-       CQDMEM2 4407    4401    4415    4417    4427    4425    0.0
   62-       CQDMEM2 4408    4401    4417    4419    4429    4427    0.0
   63-       CQDMEM2 4409    4401    4421    4423    4433    4431    0.0
   64-       CQDMEM2 4410    4401    4423    4425    4435    4433    0.0
   65-       CQDMEM2 4411    4401    4425    4427    4437    4435    0.0
   66-       CQDMEM2 4412    4401    4427    4429    4439    4437    0.0
   67-       CQDMEM2 4413    4401    4431    4433    4443    4441    0.0
   68-       CQDMEM2 4414    4401    4433    4435    4445    4443    0.0
   69-       CQDMEM2 4415    4401    4435    4437    4447    4445    0.0
   70-       CQDMEM2 4416    4401    4437    4439    4449    4447    0.0
   71-       CQDMEM2 4417    4401    4441    4443    4453    4451    0.0
   72-       CQDMLM2 4418    4401    4443    4445    4455    4453    0.0
   73-       CQDMEM2 4419    4401    4445    4447    4457    4455    0.0
   74-       CQDMEM2 4420    4401    4447    4449    4459    4457    0.0
   75-       CQDMEM2 4421    4401    4451    4453    4463    4461    0.0
   76-       CQDMEM2 4422    4401    4453    4455    4465    4463    0.0
   77-       CQDMEM2 4423    4401    4455    4457    4467    4465    0.0
   78-       CQDMEM2 4424    4401    4457    4459    4469    4467    0.0
   79-       CROD    4461    4461    4401    4403
   80-       CROD    4463    4461    4403    4405
   81-       CROD    4465    4461    4405    4407
   82-       CROD    4467    4461    4407    4409
   83-       CROD    4469    4461    4401    4402
   84-       CROD    4470    4461    4405    4406
   85-       CROD    4471    4461    4409    4410
   86-       CROD    4472    4472    4411    4412
   87-       CROD    4473    4472    4421    4422
   88-       CROD    4474    4472    4431    4432
   89-       CROD    4475    4472    4441    4442
   90-       CROD    4476    4472    4451    4452
   91-       CROD    4477    4472    4415    4416
   92-       CROD    4478    4472    4425    4426
   93-       CROD    4479    4472    4435    4436
   94-       CROD    4480    4472    4445    4446
   95-       CROD    4481    4472    4455    4456
   96-       CROD    4482    4472    4419    4420
   97-       CROD    4483    4472    4429    4430
   98-       CROD    4484    4472    4439    4440
   99-       CROD    4485    4472    4449    4450
  100-       CROD    4486    4472    4459    4460
```

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                                        S O R T E D   B U L K   D A T A   E C H O
            CARD
            COUNT       .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
             101-       CROD    4487    4487    4461    4462
             102-       CROD    4488    4487    4465    4466
             103-       CROD    4489    4487    4469    4470
             104-       CSHEAR  4431    4431    4401    4402    4404    4403
             105-       CSHEAR  4432    4431    4403    4404    4406    4405
             106-       CSHEAR  4433    4431    4405    4406    4408    4407
             107-       CSHEAR  4434    4431    4407    4408    4410    4409
             108-       CSHEAR  4435    4435    4401    4402    4412    4411
             109-       CSHEAR  4436    4435    4411    4412    4422    4421
             110-       CSHEAR  4437    4435    4421    4422    4432    4431
             111-       CSHEAR  4438    4435    4431    4432    4442    4441
             112-       CSHEAR  4439    4435    4441    4442    4452    4451
             113-       CSHEAR  4440    4435    4451    4452    4462    4461
             114-       CSHEAR  4441    4435    4405    4406    4416    4415
             115-       CSHEAR  4442    4435    4415    4416    4426    4425
             116-       CSHEAR  4443    4435    4425    4426    4436    4435
             117-       CSHEAR  4444    4435    4435    4436    4446    4445
             118-       CSHEAR  4445    4435    4445    4446    4456    4455
             119-       CSHEAR  4446    4435    4455    4456    4466    4465
             120-       CSHEAR  4447    4435    4409    4410    4420    4419
             121-       CSHEAR  4446    4435    4419    4420    4430    4429
             122-       CSHEAR  4449    4435    4429    4430    4440    4439
             123-       CSHEAR  4450    4435    4439    4440    4450    4449
             124-       CSHEAR  4451    4435    4449    4450    4460    4459
             125-       CSHEAR  4452    4435    4459    4460    4470    4469
             126-       EIGR    1       INV     1.0     4000.   30                              1.-3    +EIG2
             127-       +EIG2   MAX
             128-       GRID    4400    0       184.1   .0      88.5
             129-       GRID    4401    0       181.0   -0.84   87.5    0       456
             130-       GRID    4402    0       181.0   .0      87.5    0       456
             131-       GRID    4403    0       182.1711-0.84   87.5    0       456
             132-       GRID    4404    0       182.1711.0      67.5    0       456
             133-       GRID    4405    0       183.3422-0.84   87.5    0       456
             134-       GRID    4406    0       183.3422.0      67.5    0       456
             135-       GRID    4407    0       185.0711-0.84   87.5    0       456
             136-       GRID    4408    0       185.0711.0      87.5    0       456
             137-       GRID    4409    0       186.8   -0.84   87.5    0       456
             138-       GRID    4410    0       186.8   .0      87.5    0       456
             139-       GRID    4411    0       179.26  -0.9792 86.0    0       456
             140-       GRID    4412    0       179.26  .0      86.0    4412    456
             141-       GRID    4413    0       180.8006-0.9792 86.0    4413    456
             142-       GRID    4415    0       182.4762-0.9792 86.0    0       456
             143-       GRID    4416    0       182.4762.0      86.0    4416    456
             144-       GRID    4417    0       184.3721-0.9792 86.0    4413    456
             145-       GRID    4419    0       186.268 -0.9792 86.0    0       456
             146-       GRID    4420    0       186.268 .0      86.0    4420    456
             147-       GRID    4421    0       176.94  -1.1648 84.0    0       456
             148-       GRID    4422    0       176.94  .0      84.0    4412    456
             149-       GRID    4423    0       178.9732-1.1648 84.0    4413    456
             150-       GRID    4425    0       181.3215-1.1648 84.0    0       456
```

```
                                        S O R T E D   B U L K   D A T A   E C H O
  CARD
  COUNT       .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
   151-       GRID    4426    0               181.3215.0      84.0    4416    456
   152-       GRID    4427    0               183.4400-1.1648 84.0    4413    456
   153-       GRID    4429    0               185.5586-1.1648 84.0    0       456
   154-       GRID    4430    0               185.5586.0      84.0    4420    456
   155-       GRID    4431    0               174.04  -1.3968 81.5    0       456
   156-       GRID    4432    0               174.04  .0      81.5    4412    456
   157-       GRID    4433    0               176.689 -1.3968 81.5    4413    456
   158-       GRID    4435    0               179.6781-1.3968 81.5    0       456
   159-       GRID    4436    0               179.6781.0      81.5    4416    456
   160-       GRID    4437    0               182.275 -1.3968 81.5    4413    456
   161-       GRID    4439    0               184.6716-1.3968 81.5    0       456
   162-       GRID    4440    0               184.6716.0      81.5    4420    456
   163-       GRID    4441    0               171.14  -1.6288 79.0    0       456
   164-       GRID    4442    0               171.14  .0      79.0    4412    456
   165-       GRID    4443    0               174.4048-1.6288 79.0    4413    456
   166-       GRID    4445    0               178.4347-1.6288 79.0    0       456
   167-       GRID    4446    0               178.4347.0      79.0    4416    456
   168-       GRID    4447    0               181.1099-1.6288 79.0    4413    456
   169-       GRID    4449    0               183.7851-1.6288 79.0    0       456
   170-       GRID    4450    0               183.7851.0      79.0    4420    456
   171-       GRID    4451    0               168.82  -1.8144 77.0    0       456
   172-       GRID    4452    0               168.82  .0      77.0    4412    456
   173-       GRID    4453    0               172.5774-1.8144 77.0    4413    456
   174-       GRID    4455    0               177.28  -1.8144 77.0    0       456
   175-       GRID    4456    0               177.28  .0      77.0    4416    456
   176-       GRID    4457    0               180.1776-1.8144 77.0    4413    456
   177-       GRID    4459    0               183.0757-1.8144 77.0    0       456
   178-       GRID    4460    0               183.0757.0      77.0    4420    456
   179-       GRID    4461    0               166.5   -2.0    75.0    0       456
   180-       GRID    4462    0               166.5   .0      75.0    4412    456
   181-       GRID    4463    0               170.75  -2.0    75.0    4413    456
   182-       GRID    4465    0               176.1253-2.0    75.0    0       456
   183-       GRID    4466    0               176.1253.0      75.0    4416    456
   184-       GRID    4467    0               179.2458-2.0    75.0    4413    456
   185-       GRID    4469    0               182.3663-2.0    75.0    0       456
   186-       GRID    4470    0               182.3663.0      75.0    4420    456
   187-       GRID    4471    0               166.5   -2.0    75.0    0       12456
   188-       GRID    4472    0               176.1253-2.0    75.0    0       12456
   189-       GRID    4473    0               182.3663-2.0    75.0    0       12456
   190-       MAT1    4400    10.5E6                  .3      .1
   191-       MAT1    4401    10.5E6                  .3      .0
   192-       MPC     4449    4412    1               1.0     4411    1       -.652940        &MC4412A
   193-       &MC4412A        4411    3               .75741
   194-       MPC     4449    4416    1               1.0     4415    1       -.866025        &MC4416A
   195-       &MC4416A        4415    3               .50
   196-       MPC     4449    4420    1               1.0     4419    1       -.942470        &MC4420A
   197-       &MC4420A        4419    3               .33429
   198-       MPC     4449    4422    1               1.0     4421    1       -.652940        &MC4422A
   199-       &MC4422A        4421    3               .75741
   200-       MPC     4449    4426    1               1.0     4425    1       -.866025        &MC4426A
```

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PHASE 1                                                      OCTOBER 10, 1974   NASTRAN  2/ 1/73   PAGE   10
FIN-SYMM %WITH SPRINGS%

                                       S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT      .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
  201-      £MC4426A         4425    3       .50
  202-      MPC     4449    4430    1       1.0     4429    1       -.942470        £MC4430A
  203-      £MC4430A         4429    3       .33429
  204-      MPC     4449    4432    1       1.0     4431    1       -.652940        £MC4432A
  205-      £MC4432A         4431    3       .75741
  206-      MPC     4449    4436    1       1.0     4435    1       -.866025        £MC4436A
  207-      £MC4436A         4435    3       .50
  208-      MPC     4449    4440    1       1.0     4439    1       -.942470        £MC4440A
  209-      £MC4440A         4439    3       .33429
  210-      MPC     4449    4442    1       1.0     4441    1       -.652940        £MC4442A
  211-      £MC4442A         4441    3       .75741
  212-      MPC     4449    4446    1       1.0     4445    1       -.866025        £MC4446A
  213-      £MC4446A         4445    3       .50
  214-      MPC     4449    4450    1       1.0     4449    1       -.942470        £MC4450A
  215-      £MC4450A         4449    3       .33429
  216-      MPC     4449    4452    1       1.0     4451    1       -.652940        £MC4452A
  217-      £MC4452A         4451    3       .75741
  218-      MPC     4449    4456    1       1.0     4455    1       -.866025        £MC4456A
  219-      £MC4456A         4455    3       .50
  220-      MPC     4449    4460    1       1.0     4459    1       -.942470        £MC4460A
  221-      £MC4460A         4459    3       .33429
  222-      MPC     4449    4462    1       1.0     4461    1       -.652940        £MC4462A
  223-      £MC4462A         4461    3       .75741
  224-      MPC     4449    4466    1       1.0     4465    1       -.866025        £MC4466A
  225-      £MC4466A         4465    3       .50
  226-      MPC     4449    4470    1       1.0     4469    1       -.942470        £MC4470A
  227-      £MC4470A         4469    3       .33429
  228-      MPC     4450    4401    1       1.0     4400    1       -1.0            £MC4401X
  229-      £MC4401X         4400    5        1.0     4400    6       -0.84
  230-      MPC     4450    4401    2       1.0     4400    2       -1.0            £MC4401Y
  231-      £MC4401Y         4400    4       -1.0     4400    6        3.1
  232-      MPC     4450    4401    3       1.0     4400    3       -1.0            £MC4401Z
  233-      £MC4401Z         4400    4        .84     4400    5       -3.1
  234-      MPC     4450    4402    1       1.0     4400    1       -1.0            £MC4402X
  235-      £MC4402X         4400    5        1.0     4400    6        0.0
  236-      MPC     4450    4402    2       1.0     4400    2       -1.0            £MC4402Y
  237-      £MC4402Y         4400    4       -1.0     4400    6        3.1
  238-      MPC     4450    4402    3       1.0     4400    3       -1.0            £MC4402Z
  239-      £MC4402Z         4400    4        .00     4400    5       -3.1
  240-      MPC     4450    4403    1       1.0     4400    1       -1.0            £MC4403X
  241-      £MC4403X         4400    5        1.0     4400    6       -0.84
  242-      MPC     4450    4403    2       1.0     4400    2       -1.0            £MC4403Y
  243-      £MC4403Y         4400    4       -1.0     4400    6        1.9289
  244-      MPC     4450    4403    3       1.0     4400    3       -1.0            £MC4403Z
  245-      £MC4403Z         4400    4        .84     4400    5       -1.9289
  246-      MPC     4450    4404    1       1.0     4400    1       -1.0            £MC4404X
  247-      £MC4404X         4400    5        1.0     4400    6        0.0
  248-      MPC     4450    4404    2       1.0     4400    2       -1.0            £MC4404Y
  249-      £MC4404Y         4400    4       -1.0     4400    6        1.9289
  250-      MPC     4450    4404    3       1.0     4400    3       -1.0            £MC4404Z
```

```
FIN-SYMM *WITH SPRINGS*

                                              S O R T E D   B U L K   D A T A   E C H O
           CARD
           COUNT      .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
            251-      EMC4404Z          4400    4         .00     4400    5      -1.9289
            252-      MPC     4450      4405    1       1.0       4400    1      -1.0              EMC4405X
            253-      EMC4405X          4400    5         1.0     4400    6      -0.84
            254-      MPC     4450      4405    2       1.0       4400    2      -1.0              EMC4405Y
            255-      EMC4405Y          4400    4        -1.0     4400    6       0.7578
            256-      MPC     4450      4405    3       1.0       4400    3      -1.0              EMC4405Z
            257-      EMC4405Z          4400    4         .84     4400    5      -0.7578
            258-      MPC     4450      4406    1       1.0       4400    1      -1.0              EMC4406X
            259-      EMC4406X          4400    5         1.0     4400    6       0.0
            260-      MPC     4450      4406    2       1.0       4400    2      -1.0              EMC4406Y
            261-      EMC4406Y          4400    4        -1.0     4400    6       0.7578
            262-      MPC     4450      4406    3       1.0       4400    3      -1.0              EMC4406Z
            263-      EMC4406Z          4400    4         .00     4400    5      -0.7578
            264-      MPC     4450      4407    1       1.0       4400    1      -1.0              EMC4407X
            265-      EMC4407X          4400    5         1.0     4400    6      -0.84
            266-      MPC     4450      4407    2       1.0       4400    2      -1.0              EMC4407Y
            267-      EMC4407Y          4400    4        -1.0     4400    6      -.9711
            268-      MPC     4450      4407    3       1.0       4400    3      -1.0              EMC4407Z
            269-      EMC4407Z          4400    4         .84     4400    5       0.9711
            270-      MPC     4450      4408    1       1.0       4400    1      -1.0              EMC4408X
            271-      EMC4408X          4400    5         1.0     4400    6       0.0
            272-      MPC     4450      4408    2       1.0       4400    2      -1.0              EMC4408Y
            273-      EMC4408Y          4400    4        -1.0     4400    6      -.9711
            274-      MPC     4450      4408    3       1.0       4400    3      -1.0              EMC4408Z
            275-      EMC4408Z          4400    4         .00     4400    5       0.9711
            276-      MPC     4450      4409    1       1.0       4400    1      -1.0              EMC4409X
            277-      EMC4409X          4400    5         1.0     4400    6      -0.84
            278-      MPC     4450      4409    2       1.0       4400    2      -1.0              EMC4409Y
            279-      EMC4409Y          4400    4        -1.0     4400    6      -2.7000
            280-      MPC     4450      4409    3       1.0       4400    3      -1.0              EMC4409Z
            281-      EMC4409Z          4400    4         .84     4400    5       2.7
            282-      MPC     4450      4410    1       1.0       4400    1      -1.0              EMC4410X
            283-      EMC4410X          4400    5         1.0     4400    6       0.0
            284-      MPC     4450      4410    2       1.0       4400    2      -1.0              EMC4410Y
            285-      EMC4410Y          4400    4        -1.0     4400    6      -2.7000
            286-      MPC     4450      4410    3       1.0       4400    3      -1.0              EMC4410Z
            287-      EMC4410Z          4400    4         .00     4400    5       2.7
            288-      MPC     4450      4413    2       2.2162    4411    2      -1.66843          EMC4413A
            289-      EMC4413A          4411        3   .15463    4415        2  -1.53430          EMC4413B
            290-      EMC4413B          4415        3   .142356
            291-      MPC     4450      4417    2       1.0       4415    2      -.497861          EMC4417A
            292-      EMC4417A          4415        3   .046201   4419        2  -.497861          EMC4417B
            293-      EMC4417B          4419        3   .046201
            294-      MPC     4450      4423    2       4.3815    4421    2      -2.33625          EMC4423A
            295-      EMC4423A          4421        3   .21690    4425        2  -2.02450          EMC4423B
            296-      EMC4423B          4425        3   .187874
            297-      MPC     4450      4427    2       1.0       4425    2      -.497861          EMC4427A
            298-      EMC4427A          4425        3   .046201   4429        2  -.497861          EMC4427B
            299-      EMC4427B          4429        3   .046201
            300-      MPC     4450      4433    2       5.8381    4431    2      -3.17546          EMC4433A
```

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PHASE 1                                                         OCTOBER  10, 1974   NASTRAN  2/ 1/73   PAGE   12
FIN-SYMM *WITH SPRINGS*

                                      S O R T E D   B U L K   D A T A   E C H O
   CARD
   COUNT      .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
    301-       &MC4433A        4431       3       .294682 4435        2    -2.63767          &MC4433B
    302-       &MC4433B        4435       3       .244775
    303-       MPC     4450    4437   2          1.0      4435   2         -.497861          &MC4437A
    304-       &MC4437A        4435       3       .046201 4439        2    -.497861          &MC4437B
    305-       &MC4437B        4439       3       .046201
    306-       MPC     4450    4443   2          7.2947   4441   2         -4.01266          &MC4443A
    307-       &MC4443A        4441       3       .372375 4445        2    -3.25083          &MC4443B
    308-       &MC4443B        4445       3       .301677
    309-       MPC     4450    4447   2          1.0      4445   2         -.497861          &MC4447A
    310-       &MC4447A        4445       3       .046201 4449        2    -.497861          &MC4447B
    311-       &MC4447B        4449       3       .046201
    312-       MPC     4450    4453   2          8.46     4451   2         -4.68248          &MC4453A
    313-       &MC4453A        4451       3       .444534 4455        2    -3.74133          &MC4453B
    314-       &MC4453B        4455       3       .347195
    315-       MPC     4450    4457   2          1.0      4455   2         -.497861          &MC4457A
    316-       &MC4457A        4455       3       .046201 4459        2    -.497861          &MC4457B
    317-       &MC4457B        4459       3       .046201
    318-       MPC     4450    4463   2          9.6253   4461   2         -5.35230          &MC4463A
    319-       &MC4463A        4461       3       .496694 4465        2    -4.23182          &MC4463B
    320-       &MC4463B        4465       3       .392713
    321-       MPC     4450    4467   2          1.0      4465   2         -.497861          &MC4467A
    322-       &MC4467A        4465       3       .046201 4469        2    -.497861          &MC4467B
    323-       &MC4467B        4469       3       .046201
    324-       MPCADD  4451    4449    4450
    325-       OMIT1   3       4412    4416    4420    4422    4426    4430    4432
    326-       OMIT1   3       4436    4440    4442    4446    4450    4452    4456
    327-       OMIT1   3       4460    4462    4466    4470
    328-       PARAM   GRDPNT  0
    329-       PARAM   TPNAME  FINSP1
    330-       PARAM   WTMASS  .002588
    331-       PDUMLM2 4401    4400    .02     .0
    332-       PROD    4461    4400    .034    .0      .0      .0
    333-       PROD    4472    4401    .034    .0      .0      .0
    334-       PROD    4487    4400    .064    .0      .0      .0
    335-       PSHEAR  4431    4400    .04     .0
    336-       PSHEAR  4435    4400    .032    .0
    337-       SPC     4401    4400    246
    338-       SPC     4402    4400    135
    339-       SPC1    4401    2       4412    4416    4420    4422    4426    4430    &SPS1
    340-       &SPS1    4432    4436    4440    4442    4446    4450    4452    4456   &SPS2
    341-       &SPS2    4460    4462    4466    4470
    342-       SPC1    4402    13      4412    4416    4420    4422    4426    4430    &SPA1
    343-       &SPA1    4432    4436    4440    4442    4446    4450    4452    4456   &SPA2
    344-       &SPA2    4460    4462    4466    4470
    345-       SUPORT  4461    12      4463    1       4465    12      4467    1
    346-       SUPORT  4469    12      4471    3       4472    3       4473    3
               ENDDATA
```
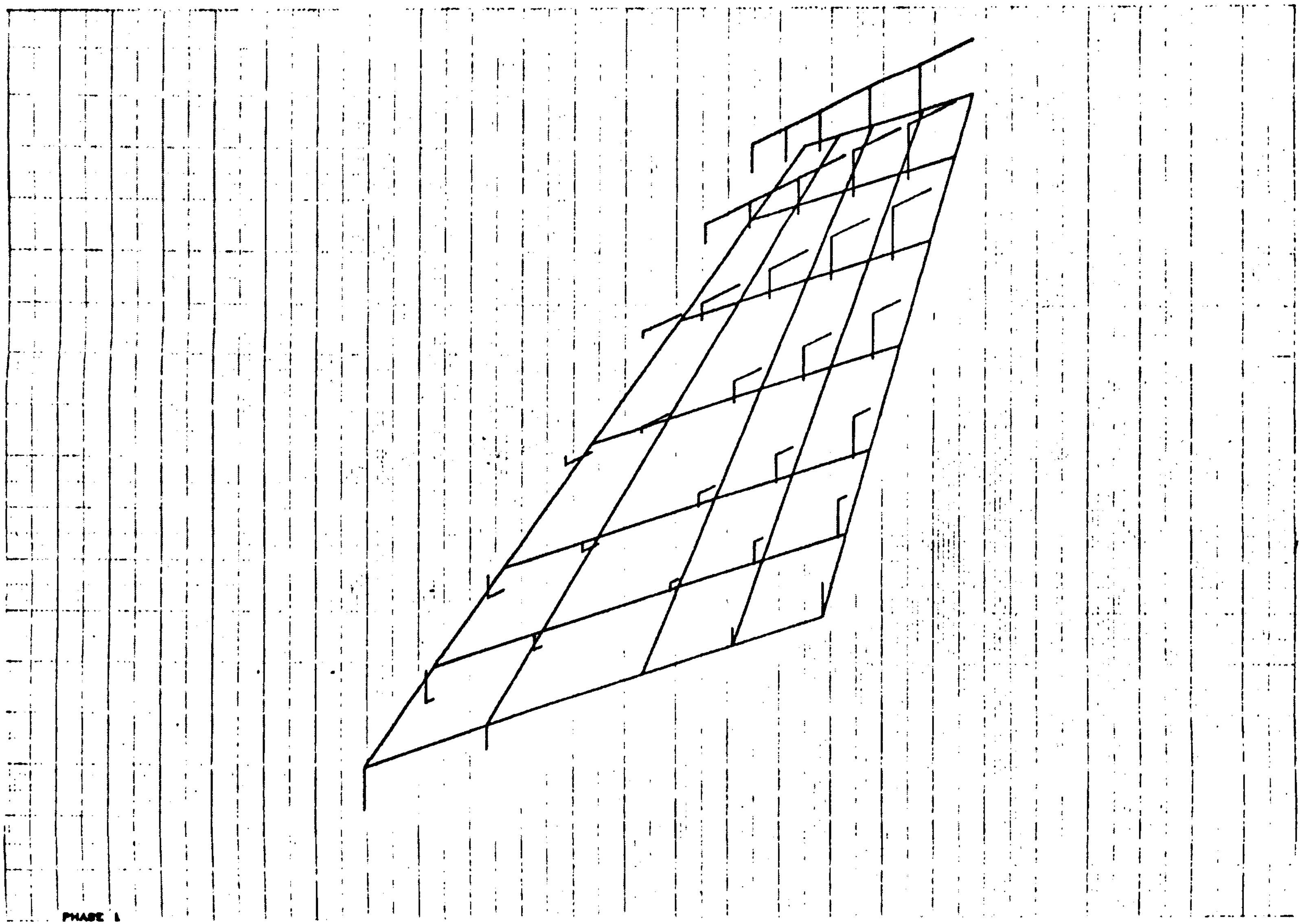
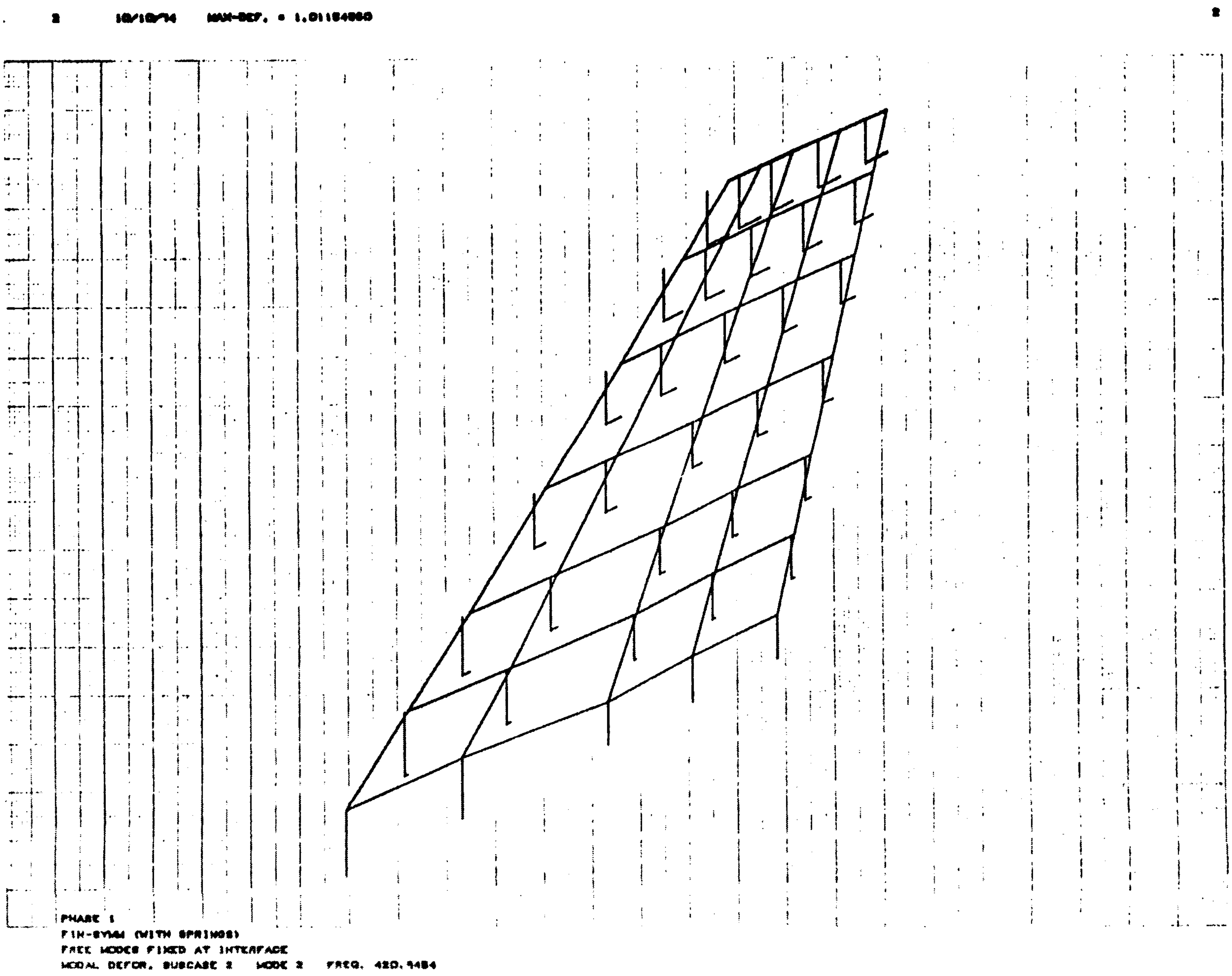

Appendix B10

PLOTS OF SYMMETRIC COMPONENT MODES/PHASE I ANALYSIS
MODEL II FIN

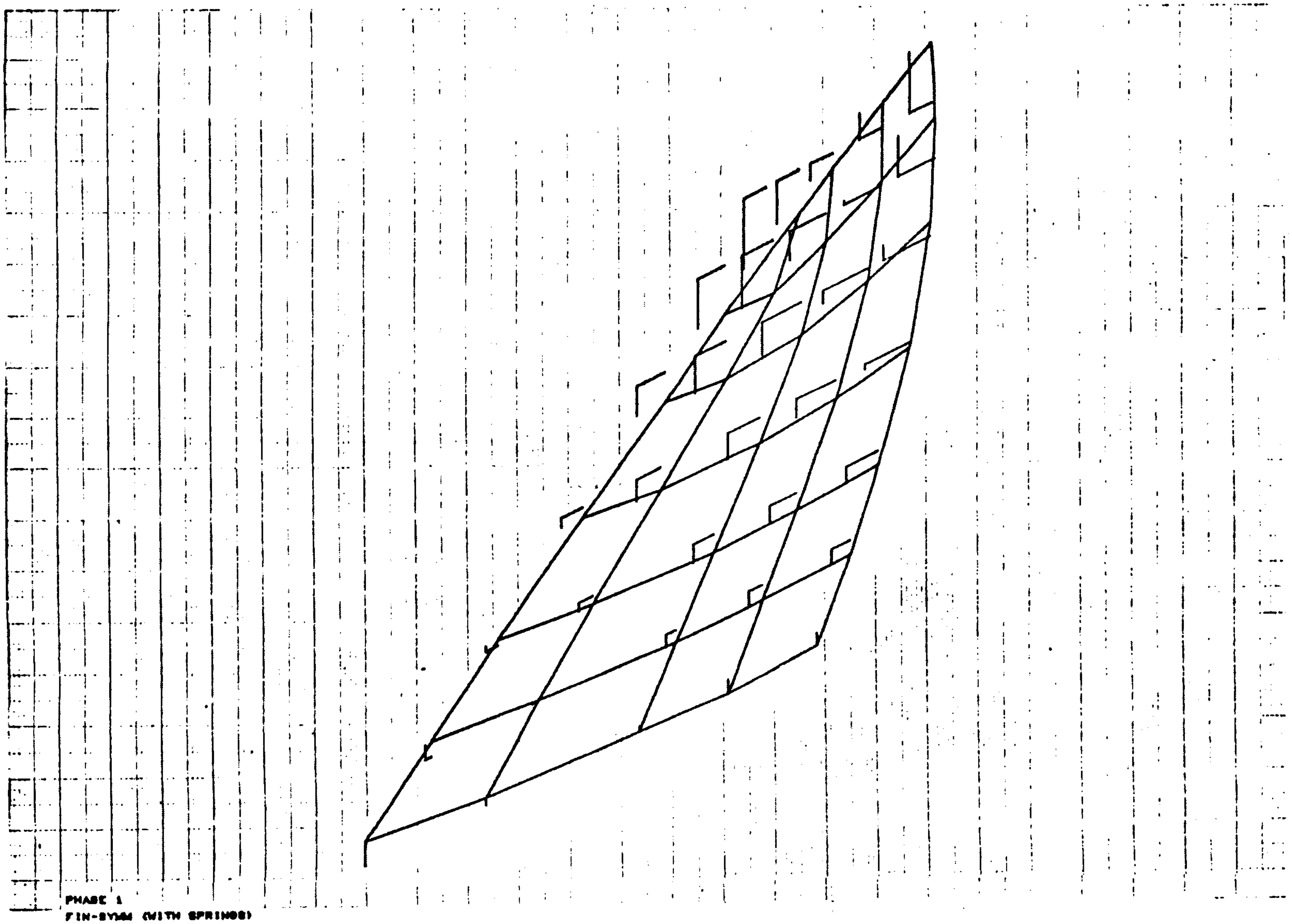
1 10/10/74 MAX-DEF. = 1.00000000



PHASE 1
FIN-SYMM (WITH SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 1 MODE 1 FREQ. 77.89192

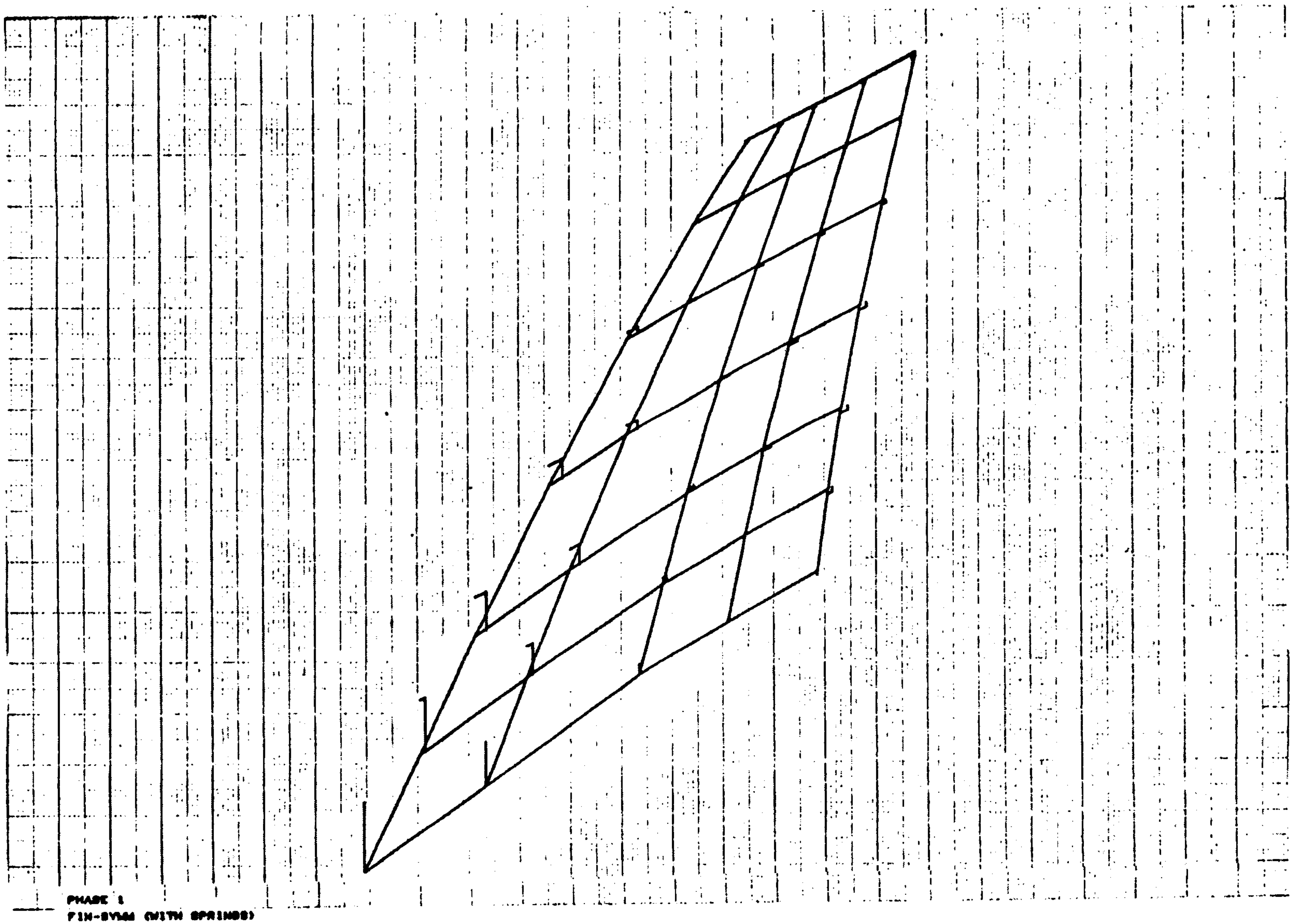

2 10/10/74 MAX-DEF. = 1.01154860
2
PHASE 1
FIN-SYMM (WITH SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 2 MODE 2 FREQ. 420.9484

3 10/10/74 MAX-DEF. = 1.21823780

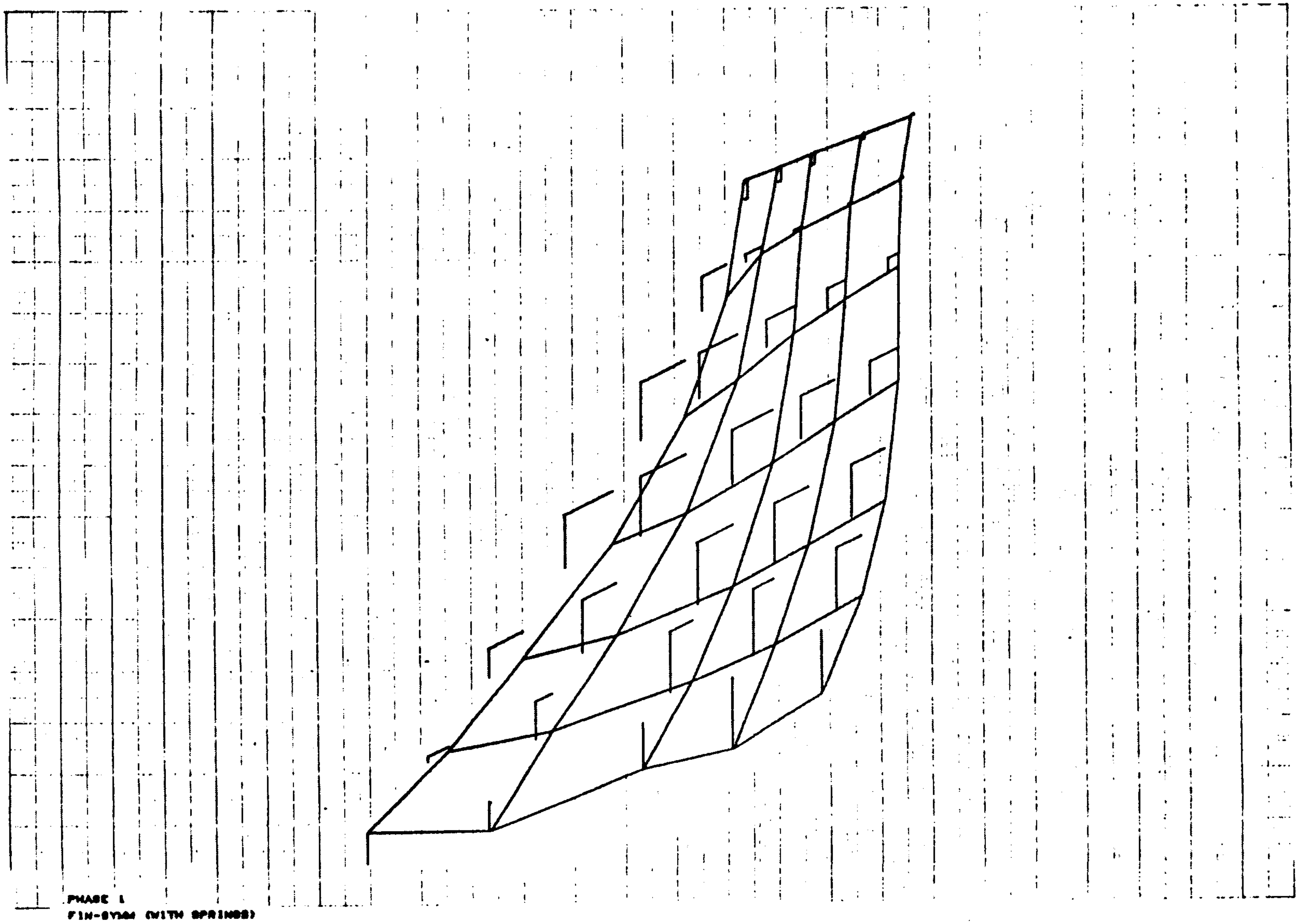


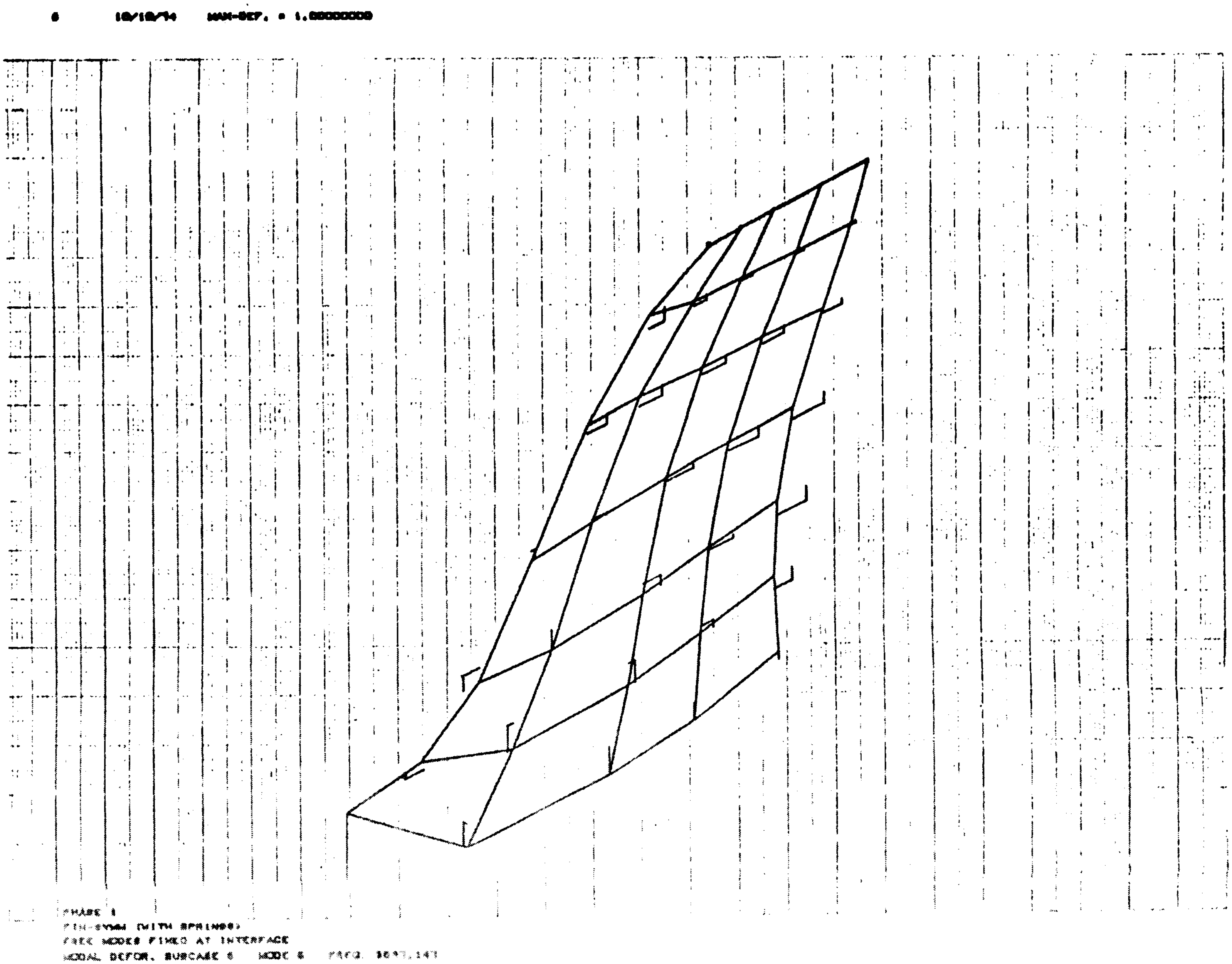
PHASE 1
FIN-SYMM (WITH SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 3 MODE 3 FREQ. 1281.477

4 10/10/74 MAX-DEF. = 1.00000000

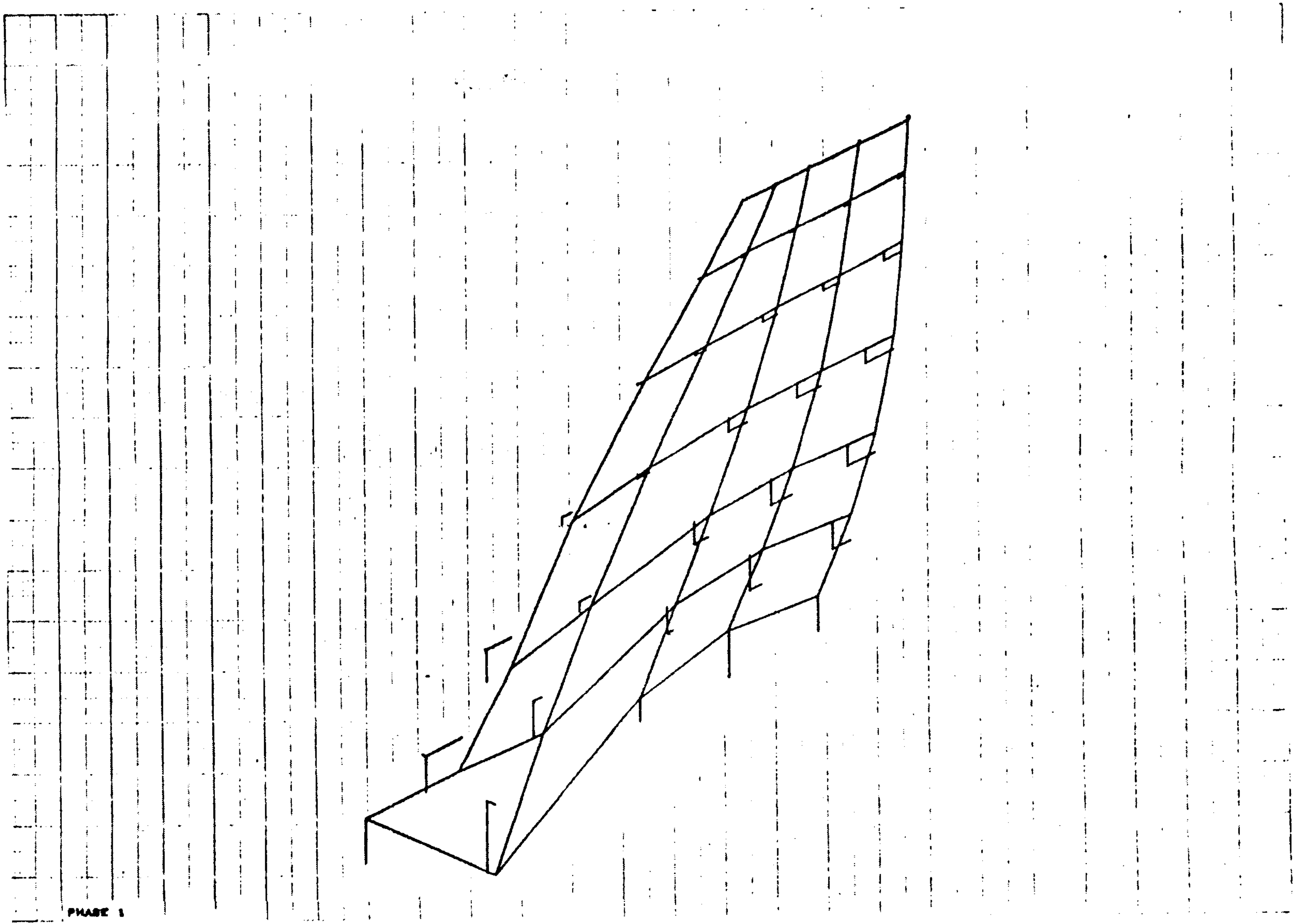


PHASE 1
FIN-SYMM (WITH SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 4 MODE 4 FREQ. 1000.982


10/10/74 MAX-DEF. = 1.00828920
PHASE 1
FIN-SYMM (WITH SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 5 MODE 5 FREQ. 2457.646


6 10/10/74 MAX-DEF. = 1.00000000
PHASE 1
FIN-SYMM (WITH SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 6 MODE 6 FREQ. [illegible]

9 10/10/74 MAX-DEF. = 0.99146808



PHASE 1
FIN-SYMM (WITH SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 7 MODE 7 FREQ. 4280.924

Appendix B11
INPUT BULK DATA/PHASE I ANALYSIS: MODEL II PAYLOAD

```
PHASE 1                                                       SEPTEMBER 24, 1974  NASTRAN  2/ 1/73   PAGE     5
ORBITER PAYLOAD.SYMM CASE %WITH SUPPORT SPRINGS¤

                                      C A S E    C O N T R O L    D E C K    E C H O
               CARD
               COUNT
                 1        TITLE # PHASE 1
                 2        SUBTITLE # ORBITER PAYLOAD.SYMM CASE %WITH SUPPORT SPRINGS¤
                 3        MPC     # 4891
                 4        SPC   # 4881
                 5        METHOD   # 1
                 6        VECTOR   # ALL
                 7        SUBCASE 1
                 8        LABEL      # FREE MODES FIXED AT INTERFACE
                 9        MODES    # 20
                10        OUTPUT
                11        OUTPUT%PLOT¤
                12        SET 1   # ALL
                13        PLOTTER CALCOMP 765.105
                14        AXES    #MY.X.7
                15        VIEW    # 30.0.20.0.0.0
                16        MAXIMUM DEFORMATION 5.0
                17        FIND  SCALE,ORIGIN 2,SET 1
                18        PLOT MODAL DEFORMATION 1 THRU 20.SET 1.ORIGIN 2.SHAPE.VECTOR XYZ
                19        BEGIN BULK


 *** USER INFORMATION MESSAGE 207. BULK DATA NOT SORTED.XSORT WILL RE-ORDER DECK.
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PHASE 1                                                                 SEPTEMBER  24, 1974   NASTRAN  2/ 1/73    PAGE      6
ORBITER PAYLOAD.SYMM CASE %WITH SUPPORT SPRINGS%

                                              S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
    1-        CBAR    4882    4882    4882    4883    .0      1.0     .0      1
    2-        CBAR    4883    4882    4883    4884    .0      1.0     .0      1
    3-        CBAR    4884    4882    4884    4885    .0      1.0     .0      1
    4-        CBAR    4885    4882    4885    4886    .0      1.0     .0      1
    5-        CBAR    4886    4882    4886    4887    .0      1.0     .0      1
    6-        CBAR    4887    4882    4887    4888    .0      1.0     .0      1
    7-        CBAR    4888    4882    4888    4889    .0      1.0     .0      1
    8-        CBAR    4889    4882    4889    4890    .0      1.0     .0      1
    9-        CELAS2  14      23150.  4881    3       4880    3
   10-        CELAS2  15      32250.  4891    3       4893    3
   11-        CONM2   14881   4881    0       .24
   12-        CONM2   14882   4882    0       .74                             &M4882
   13-        &M4882   25.13                                                  &M4883
   14-        CONM2   14883   4883    0       .0
   15-        &M4883   40.85                                                  &M4884
   16-        CONM2   14884   4884    0       .0
   17-        &M4884   40.85                                                  &M4885
   18-        CONM2   14885   4885    0       .0
   19-        &M4885   44.08                                                  &M4886
   20-        CONM2   14886   4886    0       .0
   21-        &M4886   40.85                                                  &M4887
   22-        CONM2   14887   4887    0       .0
   23-        &M4887   37.63                                                  &M4888
   24-        CONM2   14888   4888    0       .0
   25-        &M4888   38.16                                                  &M4889
   26-        CONM2   14889   4889    0       .0
   27-        &M4889   36.28                                                  &M4890
   28-        CONM2   14890   4890    0       1.47
   29-        &M4890   23.24
   30-        CONM2   14891   4891    0       .17
   31-        CONM2   14892   4892    0       1.24
   32-        EIGR    1       INV     10.0    4000.   20                      1.0-4   &EIG1
   33-        &EIG1    MAX
   34-        GRID    4880    0       78.0    .0      51.933  0       12456
   35-        GRID    4881    0       78.0    .0      51.933  0       456
   36-        GRID    4882    0       78.0    .0      62.5    0
   37-        GRID    4883    0       87.5    .0      62.5    0
   38-        GRID    4884    0       97.0    .0      62.5    0
   39-        GRID    4885    0       106.5   .0      62.5    0
   40-        GRID    4886    0       117.5   .0      62.5    0
   41-        GRID    4887    0       125.5   .0      62.5    0
   42-        GRID    4888    0       135.0   .0      62.5    0
   43-        GRID    4889    0       143.25  .0      62.5    0
   44-        GRID    4890    0       151.875 .0      62.5    0
   45-        GRID    4891    0       151.875 -10.125 56.7    0       456
   46-        GRID    4892    0       151.875 .0      51.5    0       456
   47-        GRID    4893    0       151.875 -10.125 56.7    0       12456
   48-        MAT1    4882    10.566          .3      .1
   49-        MPC     4891    4881    1       1.0     4882    1       -1.0            &M4881FX
   50-        &M4881FX        4882    5       10.567
```

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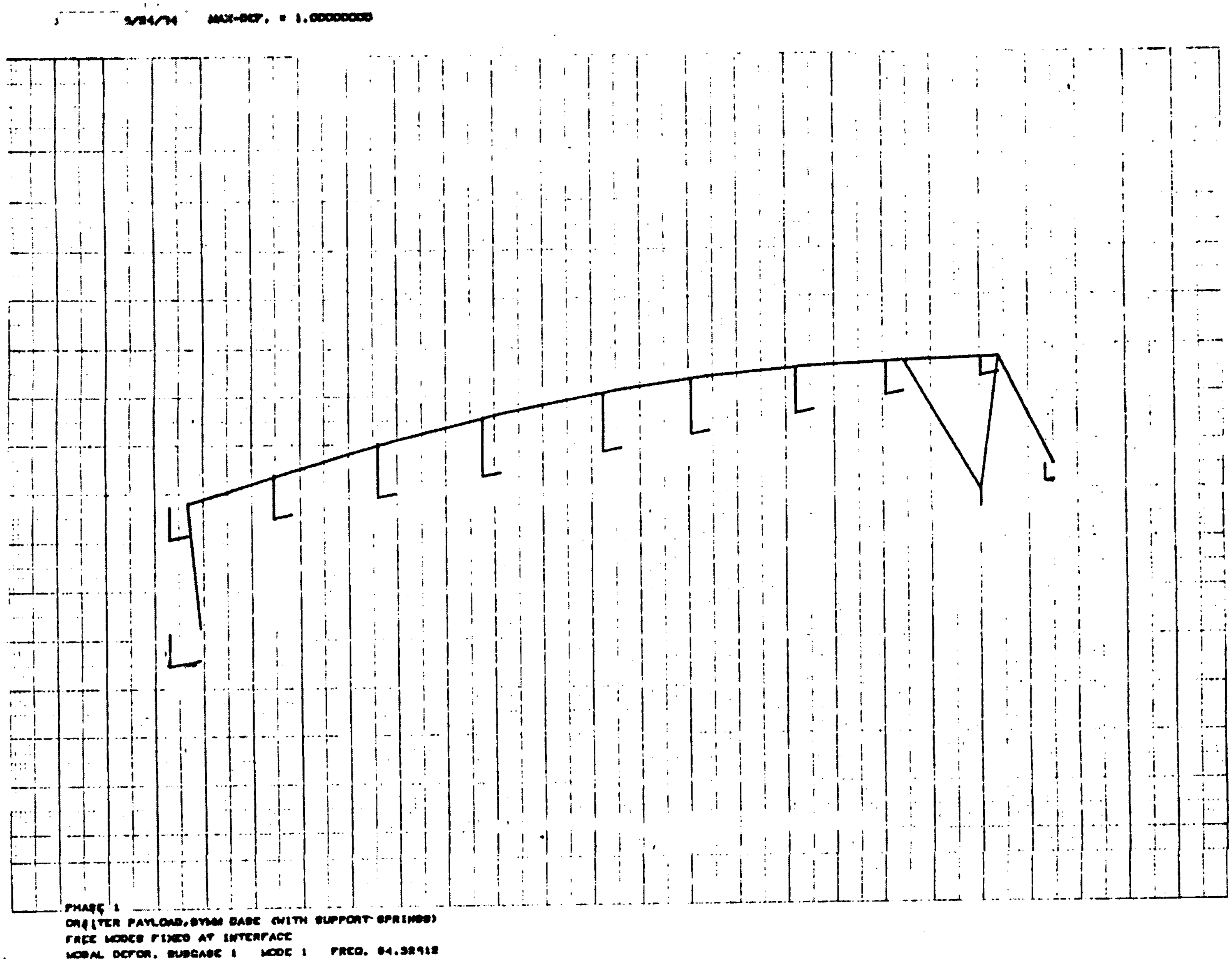
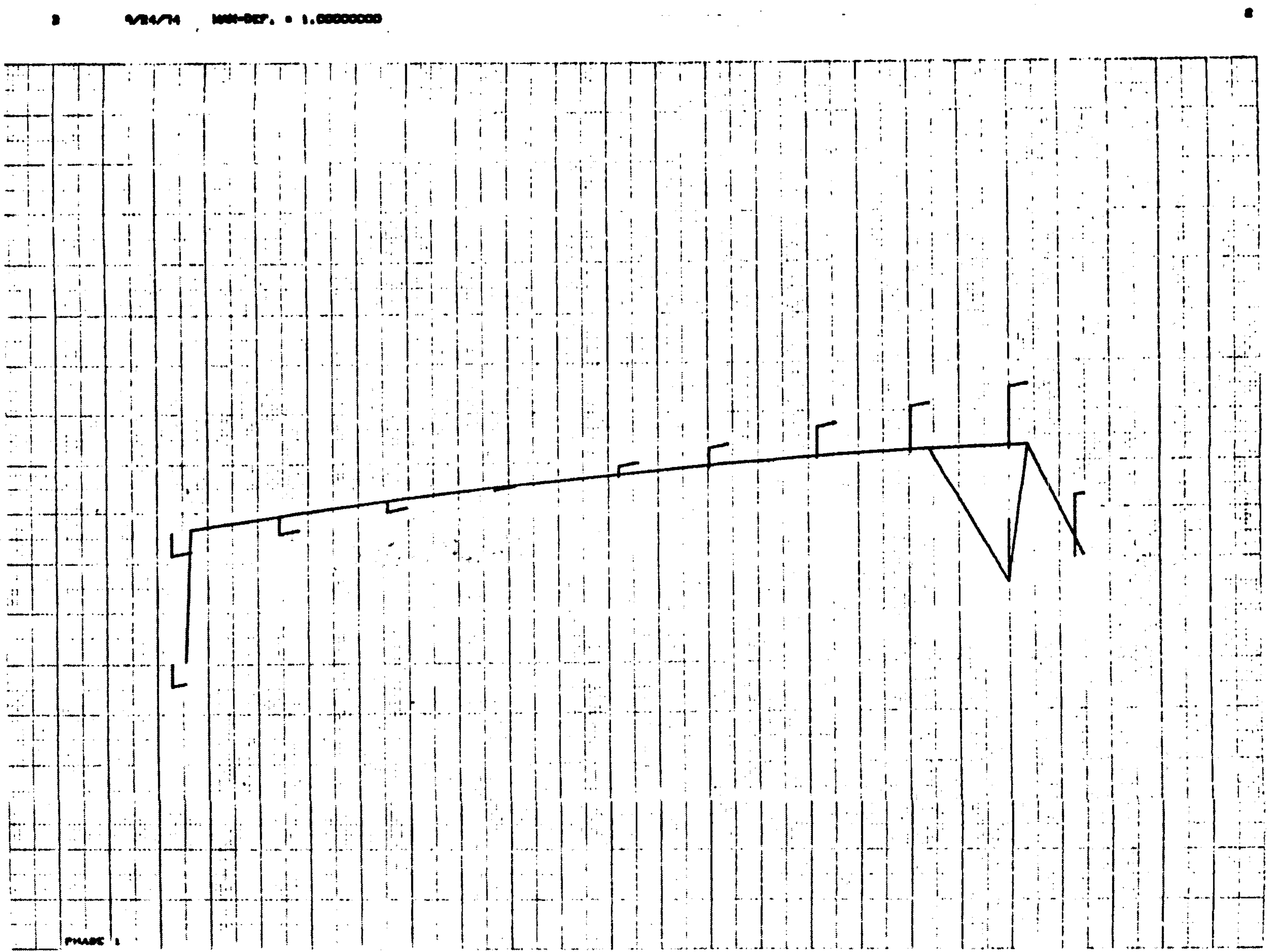
PHASE 1                                                    SEPTEMBER 24, 1974  NASTRAN  2/ 1/73   PAGE     7
ORBITER PAYLOAD.SYMM CASE XWITH SUPPORT SPRINGSR

                                          S O R T E D   B U L K   D A T A   E C H O
   CARD
   COUNT         .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
     51-         MPC     4891    4882    3               1.0     4881    3       -1.0
     52-         MPC     4891    4889    1               1.0     4890    1       -1.0
     53-         MPC     4891    4889    3               1.0     4890    1       -.78409         &M4889FZ
     54-         &M4889FZ         4891           3       -1.0     4892           1        .78409
     55-         MPC     4891    4889    5               1.0     4890    1       -.09091         &M4889MY
     56-         &M4889MY         4892           1        .09091
     57-         MPC     4891    4890    3               1.0     4891    3       -1.0
     58-         MPC     4891    4890    5               1.0     4890    1       -.09091         &M4890MY
     59-         &M4890MY         4892           1        .09091
     60-         MPC     4891    4891    1               1.0     4890    1       -.47273         &M4891FX
     61-         &M4891FX         4892           1       -.52727
     62-         MPC     4891    4891    2               1.0     4892    2       -.52727         &M4891FY
     63-         &M4891FY         4890           2       -.47273
     64-         MPC     4891    4892    3               1.0     4891    3       -1.0
     65-         PARAM   COUPMASS1
     66-         PARAM   GRDPNT  0
     67-         PARAM   IPNAME  PAYSP1
     68-         PARAM   WTMASS  .002588
     69-         PBAR    4882    4882    5.775   21.87   23.23   31.00   .245
     70-         PLOTEL  4891    4881    4882
     71-         PLOTEL  4892    4889    4892
     72-         PLOTEL  4893    4890    4892
     73-         PLOTEL  4894    4890    4891
     74-         SPC     4881    4881    2               4892    2
     75-         SPC1    4881    246     4882    THRU    4890
     76-         SUPORT  4880    3       4893    3       4892    1
                 ENDDATA
```

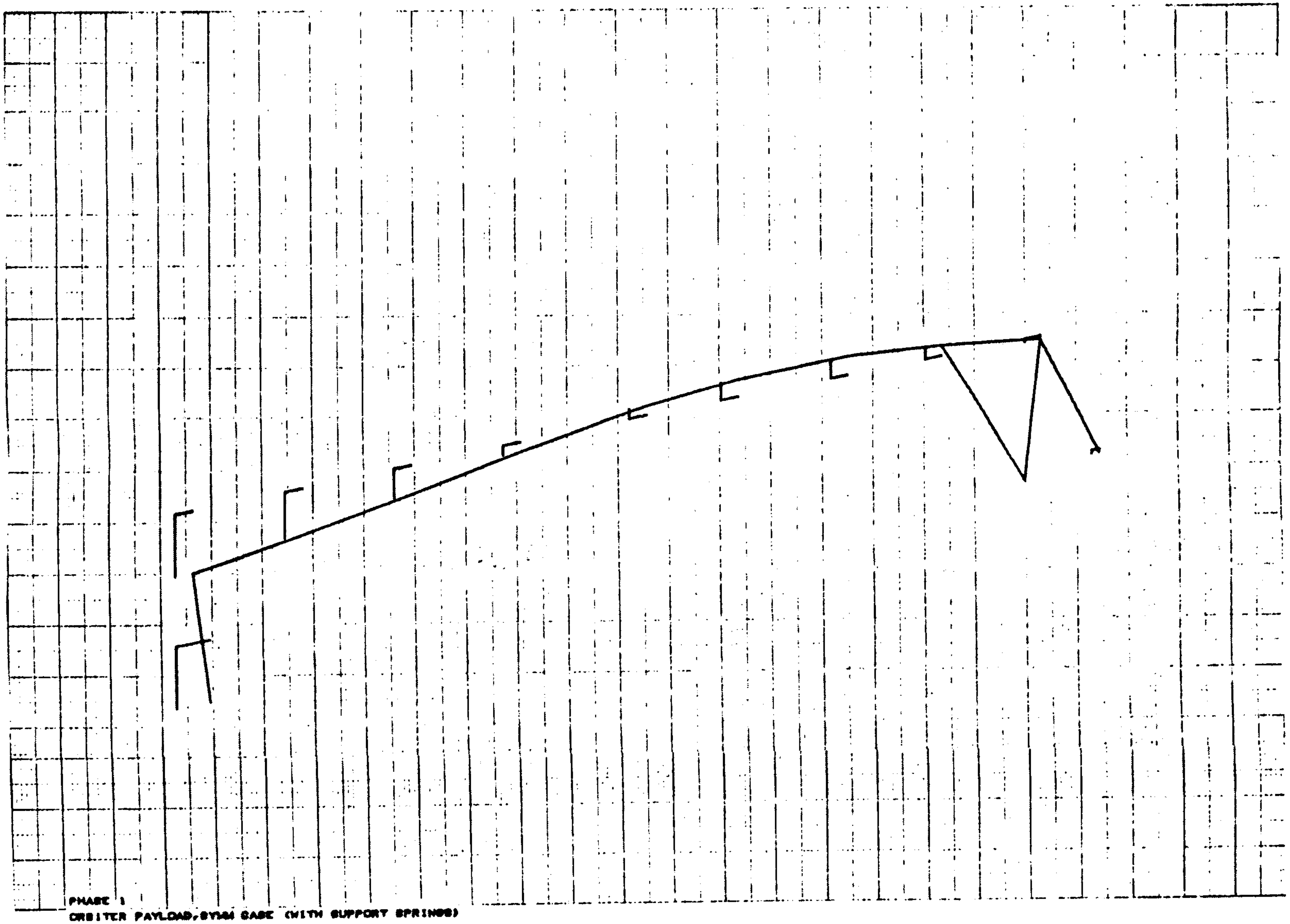
Appendix B12
PLOTS OF SYMMETRIC COMPONENT MODES/PHASE I ANALYSIS MODEL II PAYLOAD


5/24/74 MAX-DEF. = 1.00000000
PHASE 1
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 1 MODE 1 FREQ. 84.32912



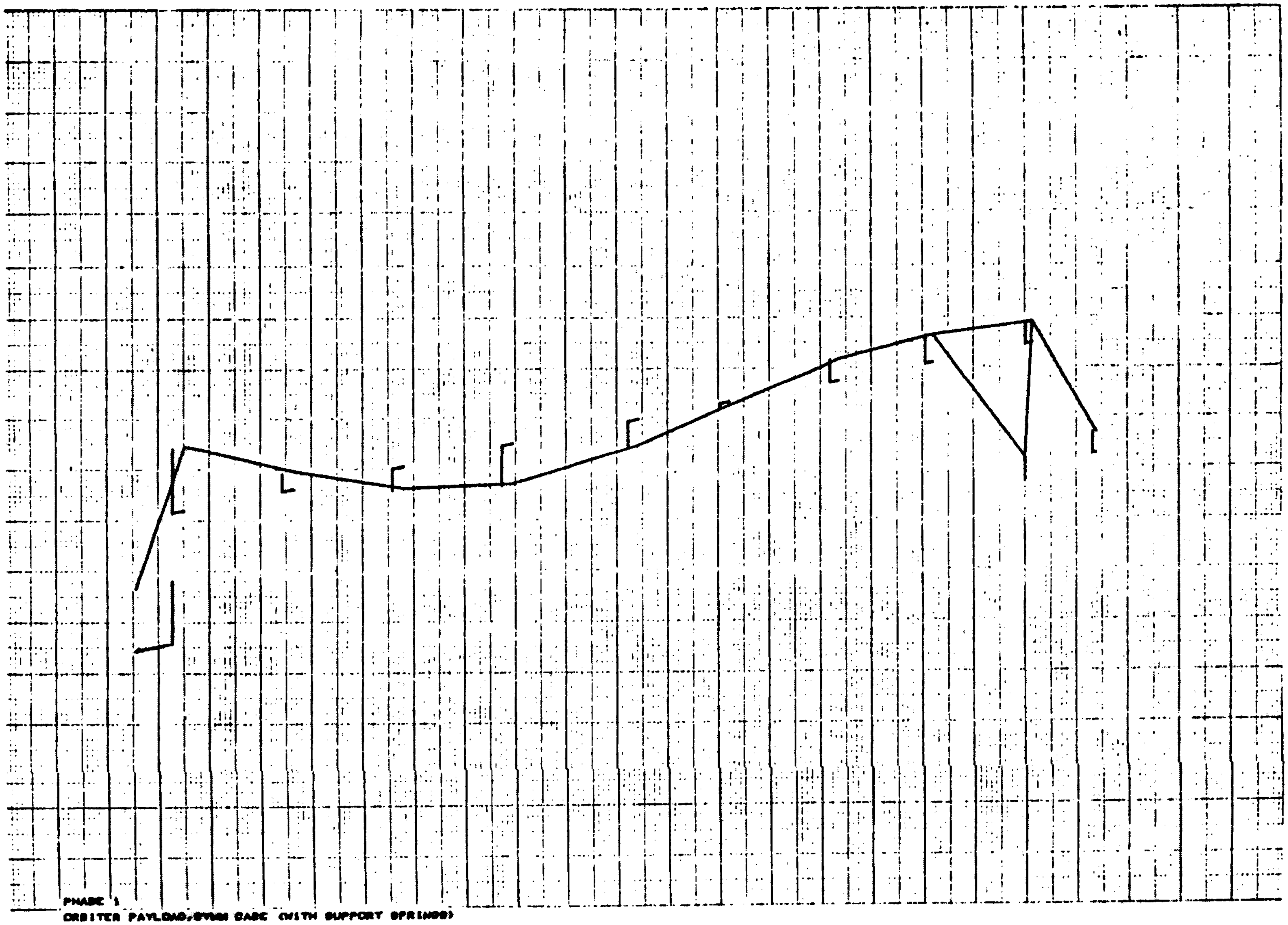
PHASE 1
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPR(N08))
FREE NODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 2 MODE 2 FREQ, 131.2371

8 9/24/74 MAX-DEF. = 1.00000000 8



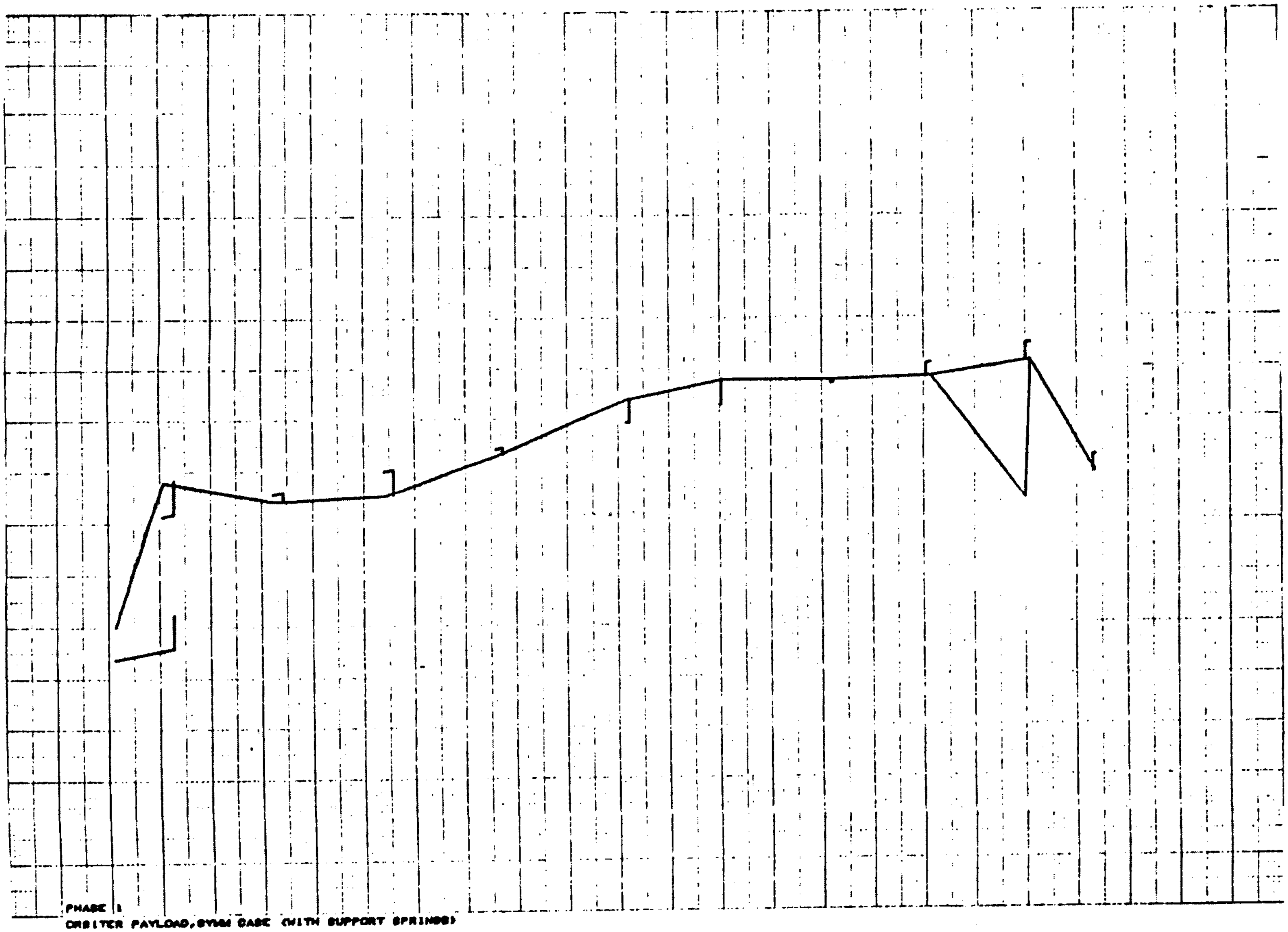
PHASE 1
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 3 MODE 8 FREQ. 183.3422

4 9/24/74 MAX-DEF. = 1.00000000 4



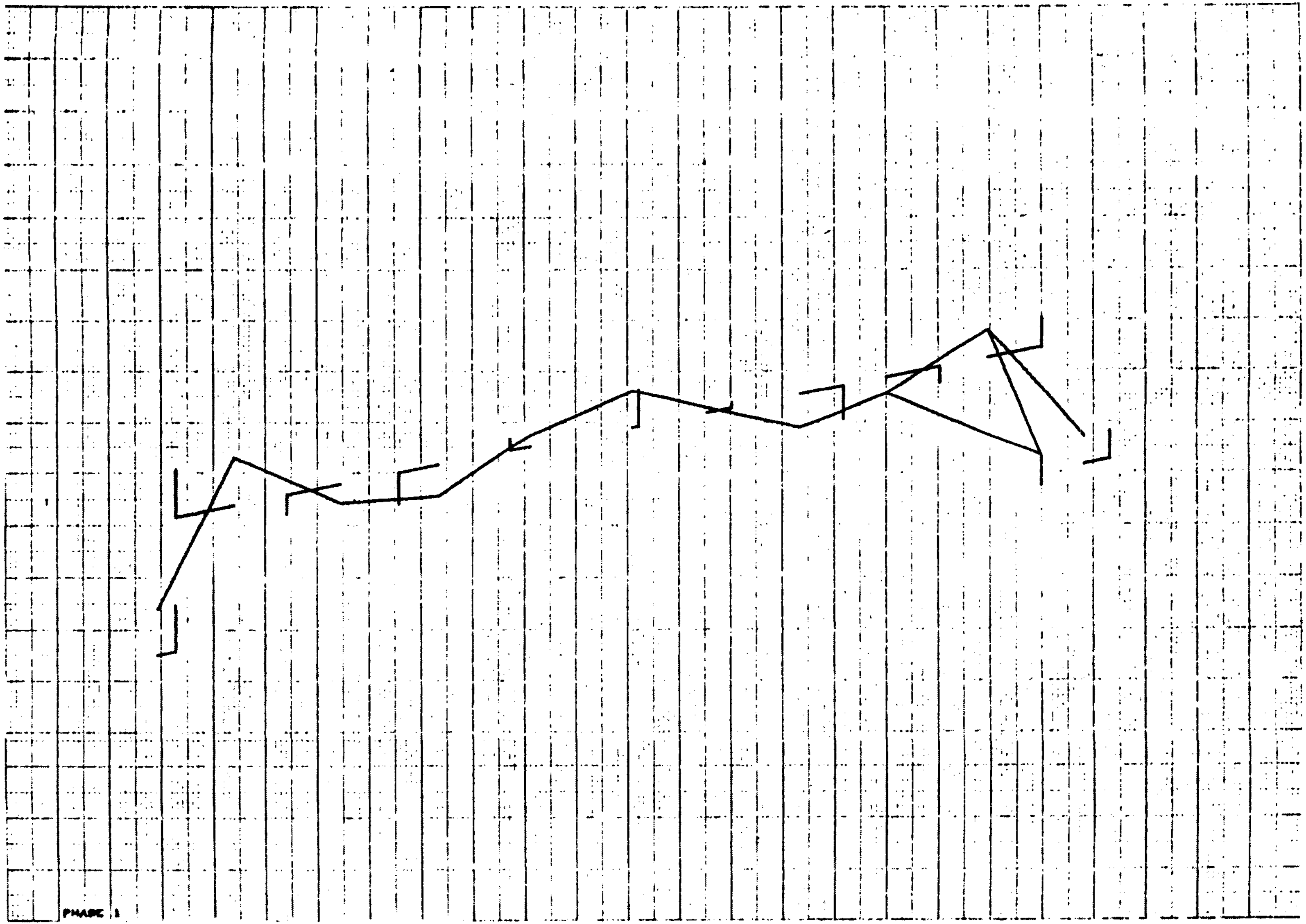
PHASE 1
ORBITER PAYLOAD/SYSTEM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 4 MODE 4 FREQ. 372.9890

8 —— 9/24/74 MAX-DEF. = 1.00976180



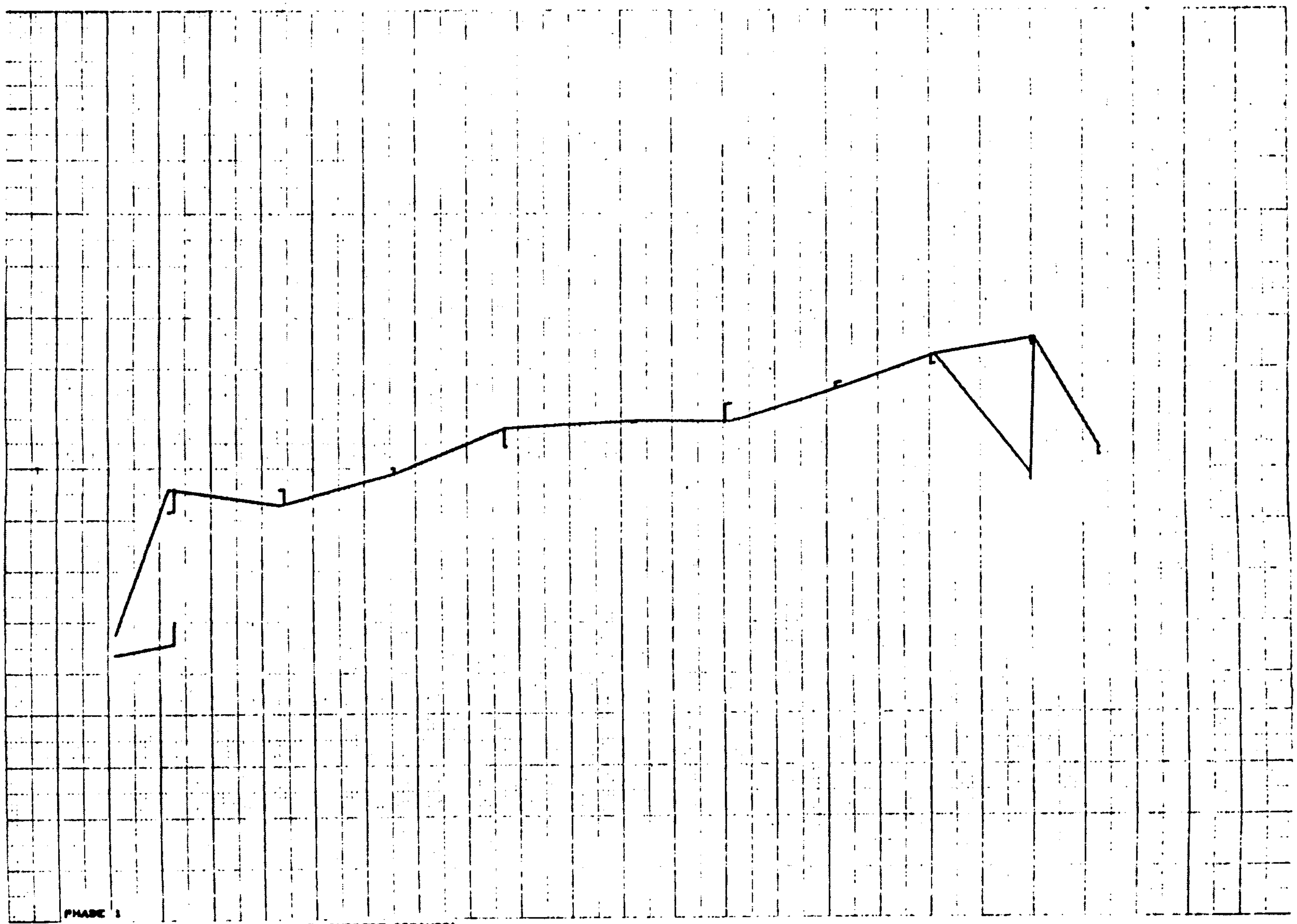
PHASE 1
ORBITER PAYLOAD,SYM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 602.0280

9/24/74   MAX-DEF. = 1.00000000

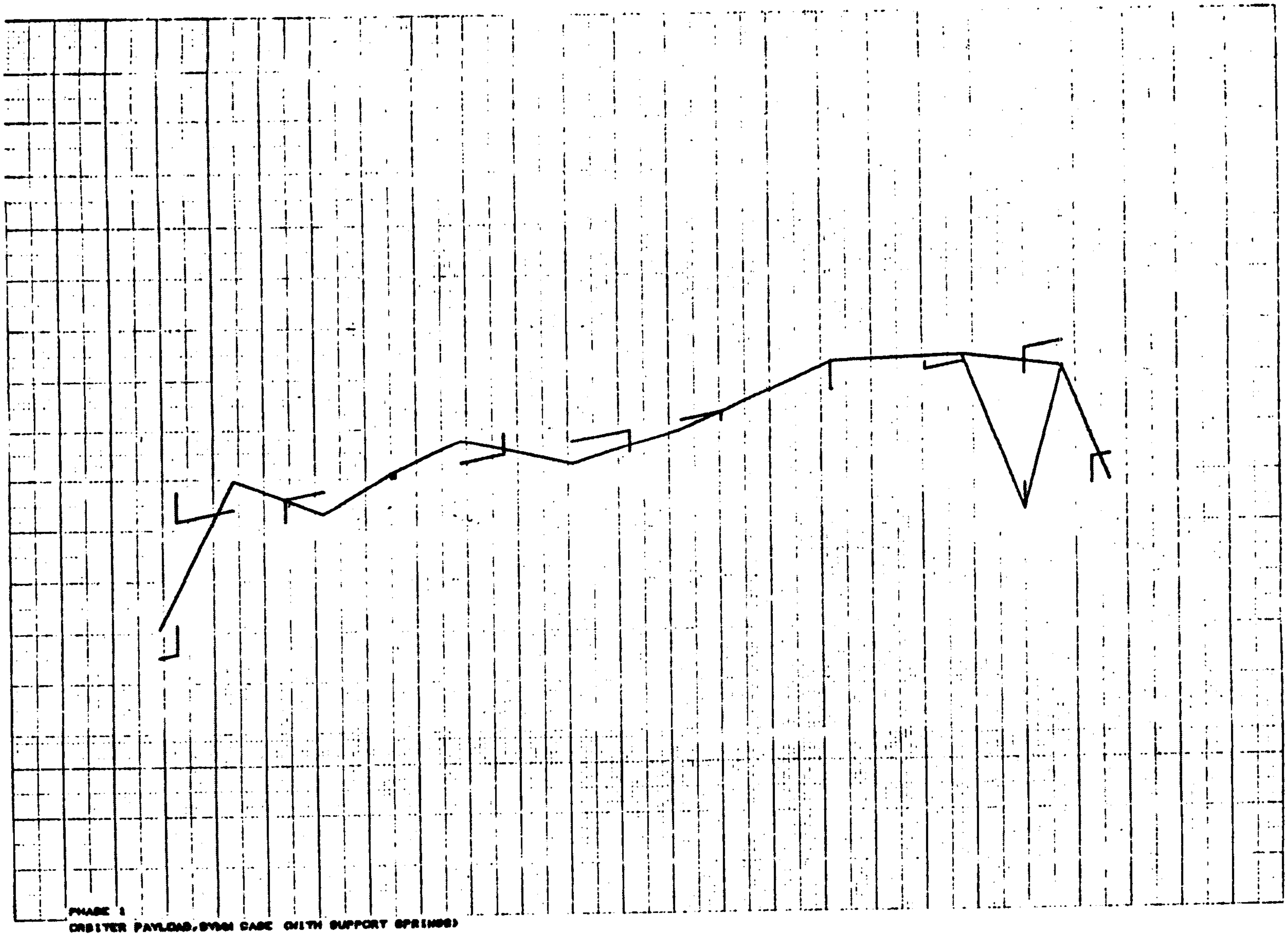


PHASE 1
ORBITER PAYLOAD,SYMM BASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 8   MODE 8   FREQ. 1114.812

9 9/24/74 MAX-DEF. = 2.07798400

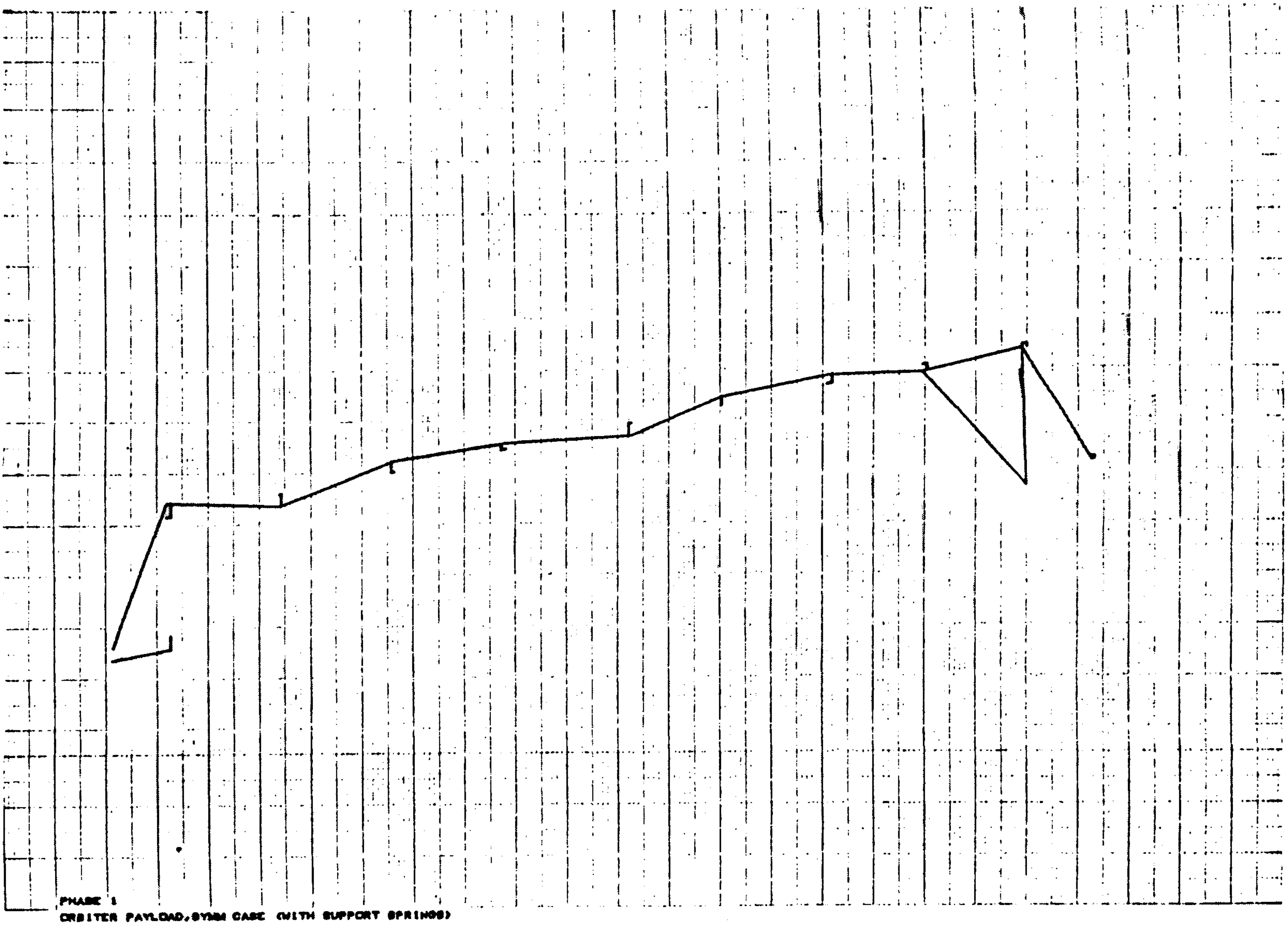


PHASE 1
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 7 MODE 7 FREQ. 1880.378



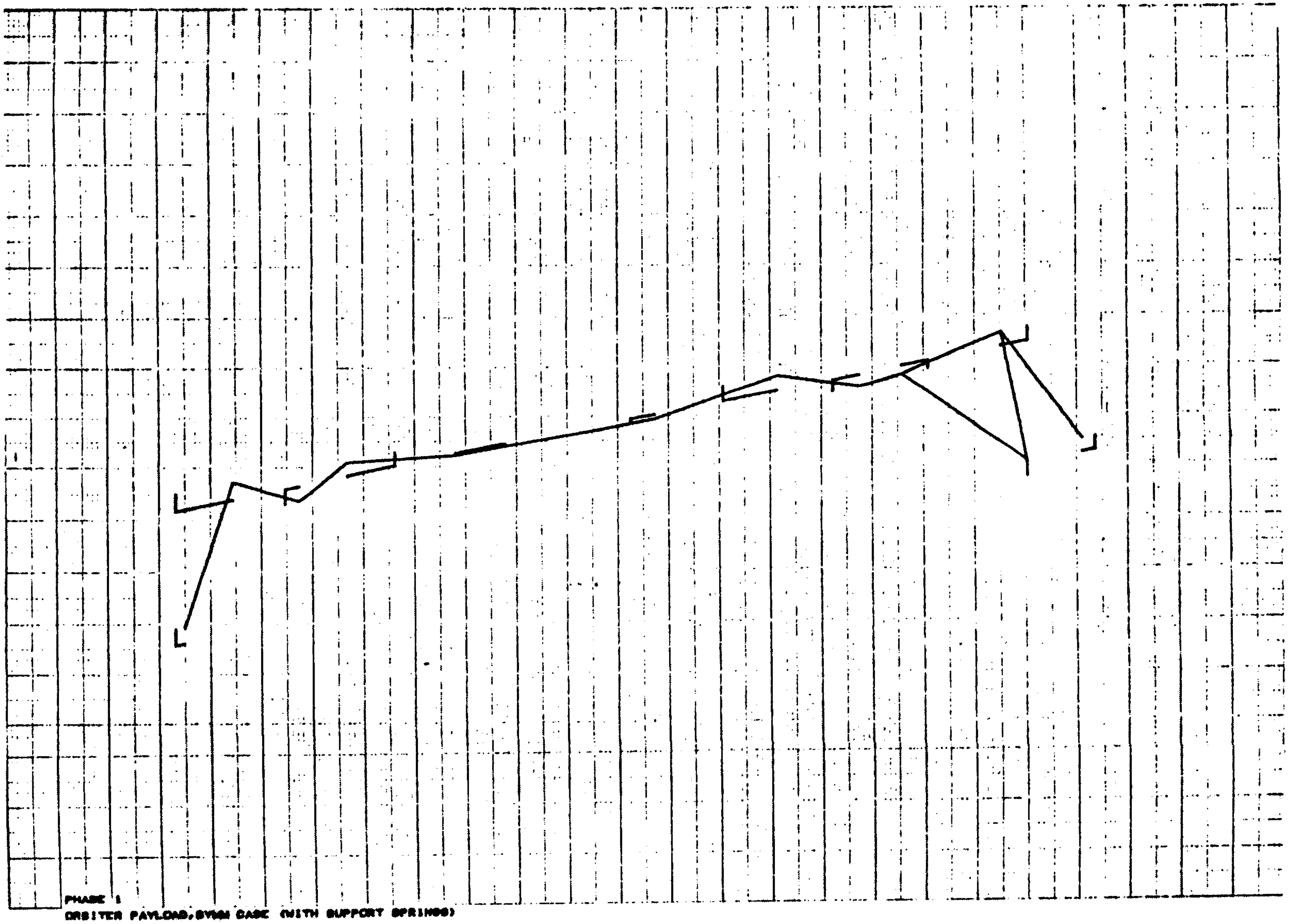
PHASE 1
ORBITER PAYLOAD,SYSM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 2202.892

9/24/74 MAX-DEF. = 4.88220480



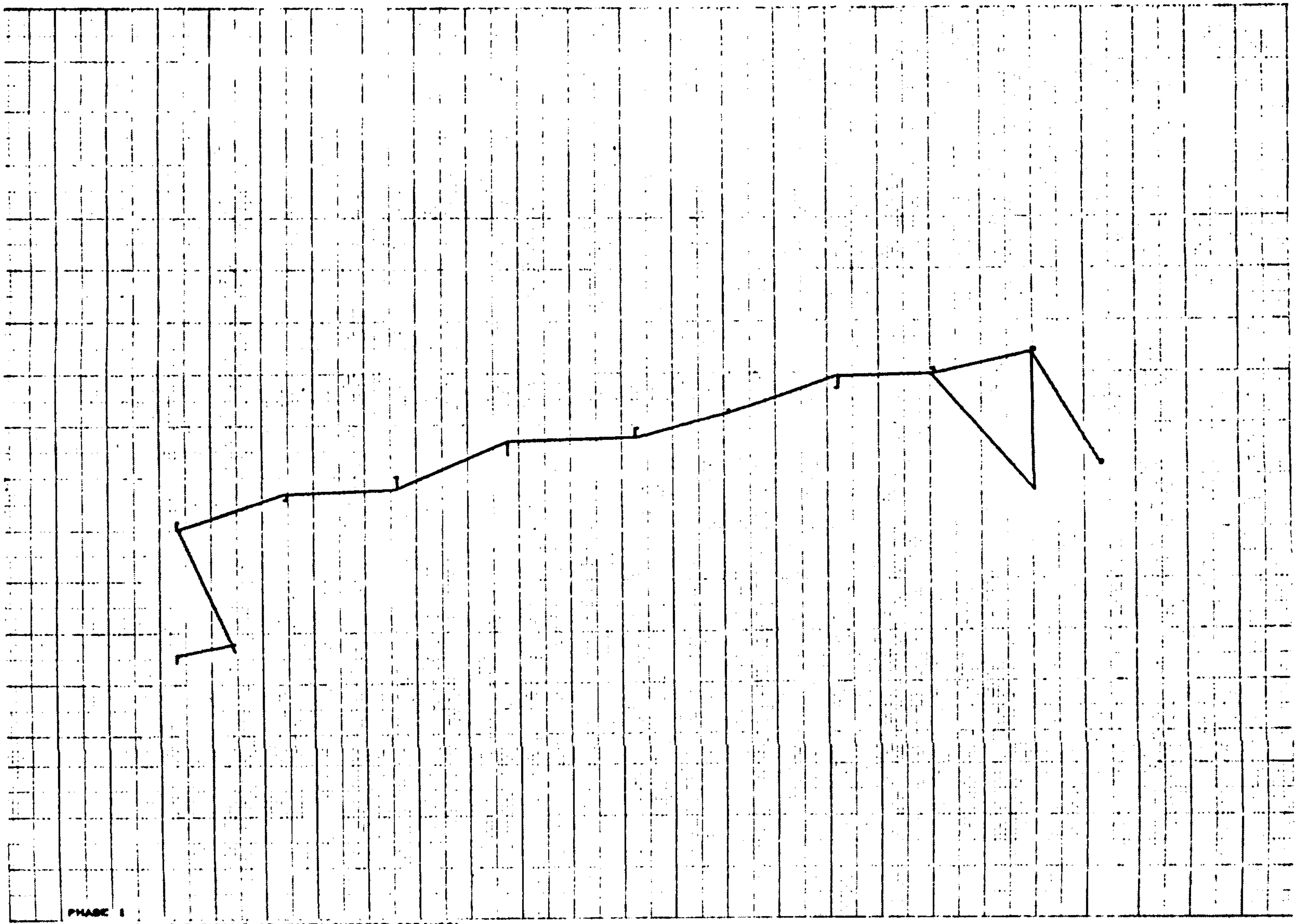
PHASE 1
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 9 MODE 9 FREQ. 2492.022

10 9/24/74 MAX-DEF. = 1.00000000 10



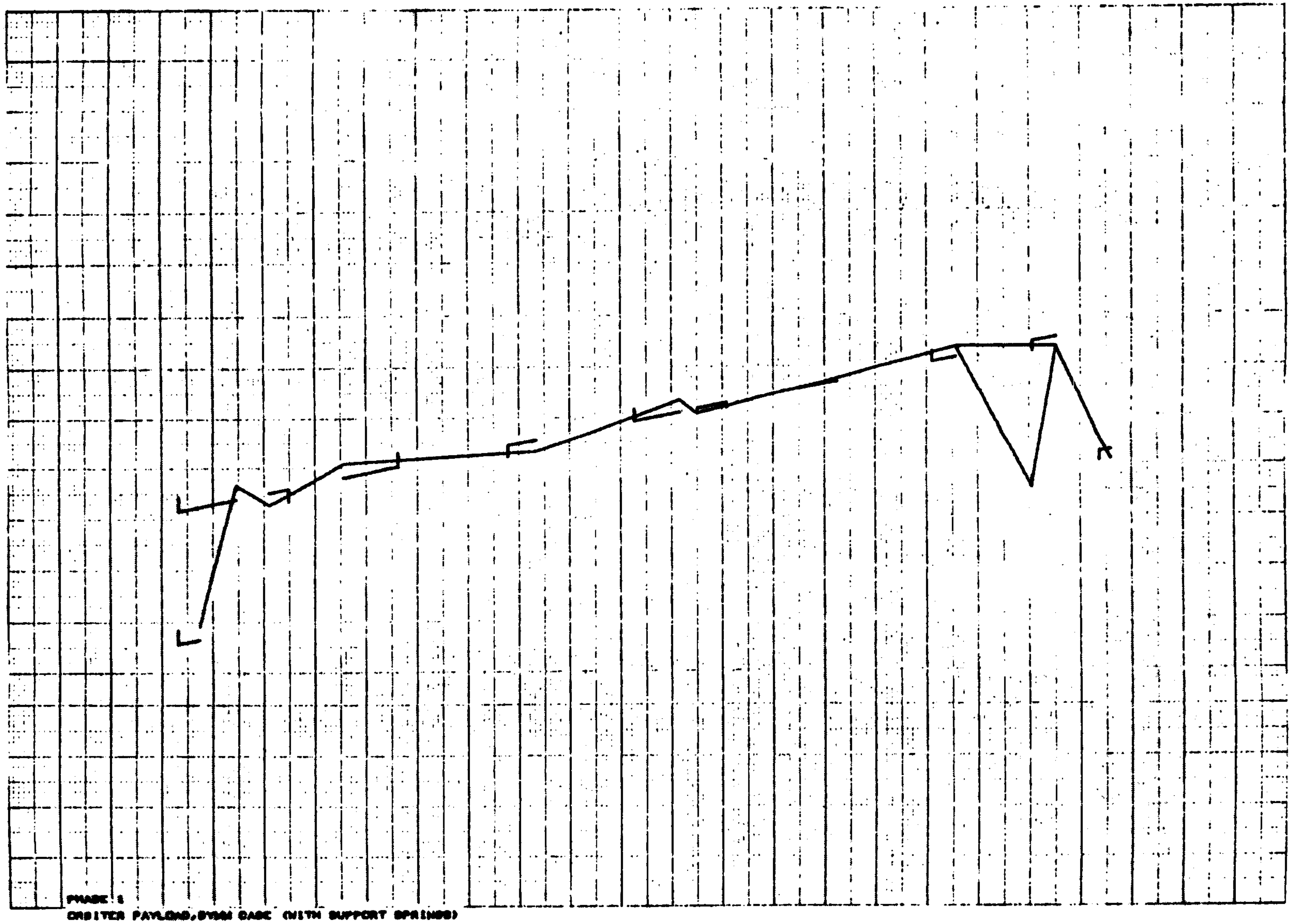
PHASE 1
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 3354.813

11 9/24/74 MAX-DEF. = 0.00942920



PHASE I
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR. SUBCASE 11 MODE 11 FREQ. 3064.768

12 4/24/74 MAX-DEF. = 1.0000000 12



PHASE 1
ORBITER PAYLOAD,SYSM CASE (WITH SUPPORT SPRINGS)
FREE MODES FIXED AT INTERFACE
MODAL DEFOR, SUBCASE 12 MODE 12 FREQ. 4022.578

Appendix B13

INPUT BULK DATA/PRE-PHASE 2 COPY RUN AND PHASE 2 ANALYSIS: MODEL II ORBITER

```
                                                                          OCTOBER  17, 1974   NASTRAN  2/ 1/73     PAGE       1

              N A S T R A N   E X E C U T I V E   C O N T R O L   D E C K   E C H O

       ID TAPE COPYS
       APP     DMAP
       TIME    5
       DIAG    14
       BEGIN   $ CONSOLIDATE SYMM, PHASE 1 TAPES ONTO 1 TAPE FOR PHASE 2
       (SEE NASTRAN SOURCE PROGRAM COMPILATION FOR LISTING OF DMAP SEQUENCE)
       END
       CEND
```

```
SYM TAPE COPY RUN                                          OCTOBER  17, 1974   NASTRAN  2/ 1/73    PAGE     2
CONSOLIDATE PHASE 1 TAPES ONTO 1 TAPE FOR PHASE 2

                                     C A S E    C O N T R O L    D E C K    E C H O
                 CARD
                 COUNT
                   1      TITLE     =SYM TAPE COPY RUN
                   2      SUBTITLE  =CONSOLIDATE PHASE 1 TAPES ONTO 1 TAPE FOR PHASE 2
                   3      BEGIN BULK

*** USER INFORMATION MESSAGE 207, BULK DATA NOT SORTED.XSORT WILL RE-ORDER DECK.
```

```
CONSOLIDATE PHASE 1 TAPES ONTO 1 TAPE FOR PHASE 2

                                   S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT     .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
    1-     DMI       CPGIDO    0         2         1         2                   607       1
    2-     DMI       CPGIDO    1         554       1.0       1.0       1.0       1.0       1.0       &DORI1
    3-     &DORI1    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &DORI2
    4-     &DORI2    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &DORI3
    5-     &DORI3    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &DORI4
    6-     &DORI4    1.0       1.0       1.0       1.0       1.0       1.0
    7-     DMI       CPGIFI    0         2         1         2                   607       1
    8-     DMI       CPGIFI    1         589       1.0       1.0       1.0       1.0       1.0       &FINI1
    9-     &FINI1    1.0       1.0
   10-     DMI       CPGIFU    0         2         1         2                   607       1
   11-     DMI       CPGIFU    1         469       1.0       1.0       1.0       1.0       1.0       &FUSI1
   12-     &FUSI1    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &FUSI2
   13-     &FUSI2    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &FUSI3
   14-     &FUSI3    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &FUSI4
   15-     &FUSI4    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &FUSI5
   16-     &FUSI5    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &FUSI6
   17-     &FUSI6    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &FUSI7
   18-     &FUSI7    1.0       1.0       1.0       1.0
   19-     DMI       CPGIPA    0         2         1         2                   607       1
   20-     DMI       CPGIPA    1         596       1.0       1.0       1.0       1.0       1.0       &PAYI1
   21-     &PAYI1    1.0       1.0       1.0       1.0       1.0       1.0          1.0
   22-     DMI       CPGIWI    0         2         1         2                   607       1
   23-     DMI       CPGIWI    1         526       1.0       1.0       1.0       1.0       1.0       &WNGI1
   24-     &WNGI1    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &WNGI2
   25-     &WNGI2    1.0       1.0       1.0       1.0       1.0       1.0       1.0       1.0       &WNGI3
   26-     &WNGI3    1.0       1.0       1.0       1.0       1.0       1.0       1.0
   27-     DMI       CPGRDO    0         2         1         2                   607       1
   28-     DMI       CPGRDO    1         313       .0        .0        1.0       .0        .0        &DORR1
   29-     &DORR1    319       0.0       1.0       1.0       325       0.0       1.0       1.0       &DORR2
   30-     &DORR2    331       0.0       1.0       1.0       337       0.0       1.0       1.0       &DORR3
   31-     &DORR3    343       1.0       0.0       1.0       349       1.0       0.0       1.0       &DORR4
   32-     &DORR4    355       1.0       0.0       1.0       361       1.0       0.0       1.0       &DORR5
   33-     &DORR5    367       0.0       0.0       1.0       373       0.0       1.0       1.0       &DORR6
   34-     &DORR6    379       0.0       1.0       1.0       385       0.0       1.0       1.0       &DORR7
   35-     &DORR7    391       0.0       1.0       1.0
   36-     DMI       CPGRFI    0         2         1         2                   607       1
   37-     DMI       CPGRFI    1         397       1.0       1.0       .0        .0        .0        &FINR1
   38-     &FINR1    403       1.0       0.0       0.0       409       1.0       1.0       0.0       &FINR2
   39-     &FINR2    415       1.0       0.0       0.0       421       1.0       1.0       0.0       &FINR3
   40-     &FINR3    427       0.0       0.0       1.0       433       0.0       0.0       1.0       &FINR4
   41-     &FINR4    439       0.0       0.0       1.0
   42-     DMI       CPGRFU    0         2         1         2                   607       1
   43-     DMI       CPGRFU    1         2         1.0       1.0       8         1.0       1.0       &FUSR1
   44-     &FUSR1    13        0.0       1.0       1.0       19        0.0       1.0       1.0       &FUSR2
   45-     &FUSR2    25        0.0       0.0       1.0       31        0.0       0.0       1.0       &FUSR3
   46-     &FUSR3    37        0.0       0.0       1.0       43        1.0       0.0       1.0       &FUSR4
   47-     &FUSR4    46        0.0       1.0       0.0       49        1.0       0.0       1.0       &FUSR5
   48-     &FUSR5    52        0.0       1.0       0.0       55        1.0       1.0       1.0       &FUSR6
   49-     &FUSR6    61        1.0       0.0       1.0       67        1.0       0.0       1.0       &FUSR7
   50-     &FUSR7    70        0.0       1.0       0.0       73        1.0       1.0       1.0       &FUSR8
```

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SYM TAPE COPY RUN                                                    OCTOBER  17, 1974   NASTRAN  2/ 1/73     PAGE      4
CONSOLIDATE PHASE 1 TAPES ONTO 1 TAPE FOR PHASE 2

                                               S O R T E D   B U L K   D A T A   E C H O
      CARD
      COUNT      .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
        51-      &FUSR8    79       1.0      0.0      1.0      85       1.0      1.0      1.0      &FUSR9
        52-      &FUSR9    91       1.0      1.0      1.0      97       0.0      0.0      1.0      &FUSR10
        53-      &FUSR10  103       0.0      0.0      1.0     109       1.0      0.0      0.0      &FUSR11
        54-      &FUSR11  115       1.0      1.0      1.0     121       1.0      0.0      0.0      &FUSR12
        55-      &FUSR12  127       1.0      1.0      1.0     133       0.0      0.0      1.0      &FUSR13
        56-      &FUSR13  139       0.0      0.0      1.0     145       1.0      0.0      1.0      &FUSR14
        57-      &FUSR14  148       0.0      1.0      0.0     151       1.0      1.0      1.0      &FUSR15
        58-      &FUSR15  157       1.0      1.0      1.0     163       1.0      0.0      0.0      &FUSR16
        59-      &FUSR16  169       0.0      1.0      1.0     175       0.0      1.0      1.0      &FUSR17
        60-      &FUSR17  181       0.0      1.0      1.0     187       0.0      0.0      1.0      &FUSR18
        61-      &FUSR18  193       0.0      1.0      1.0     199       1.0      1.0      1.0      &FUSR19
        62-      &FUSR19  205       1.0      1.0      1.0     211       1.0      1.0      1.0      &FUSR20
        63-      &FUSR20  217       1.0      0.0      0.0     223       1.0      1.0      1.0      &FUSR21
        64-      &FUSR21  229       1.0      1.0        1.0
        65-      DMI      CPGRPA  0        2        1        2                 607      1
        66-      DMI      CPGRPA  1        445      .0       .0       1.0      .0       .0       &PAYR1
        67-      &PAYR1   451       0.0      0.0      0.0     457       1.0      0.0      0.0      &PAYR2
        68-      &PAYR2     463     0.0      0.0      1.0
        69-      DMI      CPGRWI  0        2        1        2                 607      1
        70-      DMI      CPGRWI  1        235      .0       .0       1.0      .0       .0       &WING1
        71-      &WING1   241       1.0      0.0      1.0     247       1.0      1.0      1.0      &WING2
        72-      &WING2     253     1.0      0.0      1.0     259       1.0      1.0      1.0      &WING3
        73-      &WING3   265       1.0      1.0      1.0     271       1.0      1.0      1.0      &WING4
        74-      &WING4     277     1.0      1.0      1.0     283       1.0      1.0      1.0      &WING5
        75-      &WING5     289     1.0      1.0      1.0     295       1.0      1.0      1.0      &WING6
        76-      &WING6     301     1.0      1.0      1.0     307       1.0      1.0      1.0
                 ENDDATA
```

```
         N A S T R A N   S O U R C E   P R O G R A M   C O M P I L A T I O N
CARD  DMAP-DMAP INSTRUCTION
 NO.
   1  BEGIN  $ CONSOLIDATE SAMM PHASE 1 TAPES ONTO TAPE FOR PHASE 2
   2  $            INCLUDE PARTITION VECTORS FOR MERGING
   <  INPUTT1 /KRRFU,KIIFU,MRRFU,MIRFU,MIIFU/C,N,-3/C,N,1/C,N,FUSSP1
   3  INPUTT1 /DIFU,DRFU,,,/C,N,0/C,N,1 $
   4  OUTPUT1 KRRFU,KIIFU,MRRFU,MIRFU,MIIFU//C,N,-1/C,N,0/C,N,ORBTSP2
   5  OUTPUT1 DIFU,DRFU,CPGRFU,CPGIFU,//C,N,0 $
   6  INPUTT1 /KRRWI,KIIWI,MRRWI,MIRWI,MIIWI/C,N,-3/C,N,2/C,N,WINGP1
   7  INPUTT1 /DIWI,DRWI,,,/C,N,0/C,N,2 $
   8  OUTPUT1 KRRWI,KIIWI,MRRWI,MIRWI,MIIWI//C,N,0 $
   9  OUTPUT1 DIWI,DRWI,CPGRWI,CPGIWI,//C,N,0 $
  10  INPUTT1 /KRRDO,KIIDO,MRRDC,MIRDO,MIIDO/C,N,-3/C,N,3/C,N,DCRSP1
  11  INPUTT1 /DIDO,DRDO,,,/C,N,0/C,N,3 $
  12  OUTPUT1 KRRDO,KIIDO,MRRDO,MIRDO,MIIDC//C,N,0 $
  13  OUTPUT1 DIDO,DRDO,CPGRDO,CPGIDO,//C,N,0 $
  14  INPUTT1 /KRRFI,KIIFI,MRRFI,MIRFI,MIIFI/C,N,-3/C,N,4/C,N,FINSP1
  15  INPUTT1 /DIFI,DRFI,,,/C,N,0/C,N,4 $
  16  OUTPUT1 KRRFI,KIIFI,MRRFI,MIRFI,MIIFI//C,N,0 $
  17  OUTPUT1 DIFI,DRFI,CPGRFI,CPGIFI,//C,N,0 $
  18  INPUTT1 /KRRPA,KIIPA,MRRPA,MIRPA,MIIPA/C,N,-3/C,N,5/C,N,PAYSP1
  19  INPUTT1 /DIPA,DRPA,,,/C,N,0/C,N,5 $
  20  OUTPUT1 KRRPA,KIIPA,MRRPA,MIRPA,MIIPA//C,N,0 $
  21  OUTPUT1 DIPA,DRPA,CPGRPA,CPGIPA,//C,N,0 $
  22  END
       **NO ERRORS FOUND - EXECUTE NASTRAN PROGRAM**
```

```
PHASE 2                                                   OCTOBER  17, 1974   NASTRAN  2/ 1/73    PAGE     6
ORBITER SYMM CASE

                                         C A S E   C O N T R O L   D E C K   E C H O
         CARD
         COUNT
          1         TITLE # PHASE 2
          2         SUBTITLE # ORBITER SYMM CASE
          3         MPC      # 21
          4         SPC      # 11
          5         METHOD   # 1
          6         VECTOR   # ALL
          7         SUBCASE 1
          8         LABEL    # FREE FREE MODES
          9         MODES    # 30
         10         BEGIN BULK

 *** USER INFORMATION MESSAGE 207, BULK DATA NOT SORTED,XSORT WILL RE-ORDER DECK.
```

```
                                            S O R T E D   B U L K   D A T A   E C H O
  CARD
  COUNT      .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
     1-      CORD2R  1       0       -81.5683.0      35.5985 -80.2278.0      57.5135 +C1
     2-      +C1     68.25   0.0     49.432
     3-      CORD2R  3001    0       -81.5683.0      35.5985 -80.2278.0      57.5135 +C3001
     4-      +C3001  -68.25  0.0     49.432
     5-      CORD2R  3002    3001    245.7536-16.463111.0003 245.7536-13.75  26.9514 +C3002
     6-      +C3002  300.    -16.4531 11.0001
     7-      CORD2R  4413    0       166.5   -2.0    75.0    166.5   -0.86   87.5    +C4413
     8-      +C4413  233.0   -2.0    75.0
     9-      EIGR    1       INV     0.0     200.    30                      1.0-4   +EIG1
    10-      +EIG1   MAX
    11-      GRID    229     0       64.0    -10.5   62.5    0       1456
    12-      GRID    232     0       64.0    -9.7007 66.5181 0       1456
    13-      GRID    235     0       64.0    -7.4247 69.9247 0       1456
    14-      GRID    238     0       64.0    -4.0181 72.2007 0       1456
    15-      GRID    241     0       64.0    .0      73.0    0       1456
    16-      GRID    301     0       68.25   .0      49.432  1       1456
    17-      GRID    506     0       78.0    .0      51.933  0       1456
    18-      GRID    519     0       79.0    -12.5   62.5    0       246
    19-      GRID    760     0       102.12  -12.5   62.5    0       246
    20-      GRID    1105    0       125.5   -12.5   45.5    0       456
    21-      GRID    1115    0       125.5   -12.5   51.5    0       2456
    22-      GRID    1161    0       129.0   -12.5   62.5    0       246
    23-      GRID    1205    0       135.0   -12.5   45.5    0       456
    24-      GRID    1212    0       135.0   -12.5   51.5    0       2456
    25-      GRID    1405    0       144.75  -12.5   45.5    0       456
    26-      GRID    1410    0       144.75  -12.5   51.5    0       456
    27-      GRID    1505    0       150.375 -9.2480 56.7    0       12456
    28-      GRID    1506    0       150.375 -12.5   56.7    0       12456
    29-      GRID    1516    0       150.375 .0      51.5    0       3456
    30-      GRID    1605    0       153.375 -12.5   45.5    0       456
    31-      GRID    1606    0       153.375 .0      51.5    0       3456
    32-      GRID    1610    0       153.375 -12.5   51.5    0       456
    33-      GRID    1613    0       153.375 -9.2480 56.7    0       12456
    34-      GRID    1614    0       153.375 -12.5   56.7    0       12456
    35-      GRID    1618    0       153.375 -12.5   62.5    0       246
    36-      GRID    1705    0       162.0   -12.5   45.5    0       456
    37-      GRID    1710    0       162.0   -12.5   51.5    0       456
    38-      GRID    1820    0       165.25  .0      45.5    1       3456
    39-      GRID    1823    0       166.5   -10.5   62.5    0       1456
    40-      GRID    1827    0       166.5   -9.7007 66.5181 0       1456
    41-      GRID    1831    0       166.5   -7.4247 69.9247 0       1456
    42-      GRID    1833    0       166.5   .0      73.0    0       1456
    43-      GRID    1835    0       166.5   -4.0181 72.2007 0       1456
    44-      GRID    1838    0       166.5   -2.0    75.0    0       456
    45-      GRID    1905    0       170.75  -12.5   45.5    0       456
    46-      GRID    1918    0       170.75  -12.5   51.5    0       456
    47-      GRID    1926    0       170.75  -2.0    75.0    0       23456
    48-      GRID    2041    0       176.125 -2.0    75.0    0       456
    49-      GRID    2114    0       182.366 -2.0    75.0    0       456
    50-      GRID    2624    0       165.25  -13.75  45.5    3002    12456
```

```
                                   S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
   51-        GRID    3651    0               125.5   -12.5   51.5    0               2456
   52-        GRID    3652    0               125.5   -12.5   45.5    0               456
   53-        GRID    3655    0               135.0   -12.5   51.5    0               2456
   54-        GRID    3656    0               135.0   -12.5   45.5    0               456
   55-        GRID    3659    0               144.75  -12.5   51.5    0               456
   56-        GRID    3660    0               144.75  -12.5   45.5    0               456
   57-        GRID    3663    0               153.375 -12.5   51.5    0               456
   58-        GRID    3664    0               153.375 -12.5   45.5    0               456
   59-        GRID    3667    0               162.0   -12.5   51.5    0               456
   60-        GRID    3668    0               162.0   -12.5   45.5    0               456
   61-        GRID    3671    0               170.75  -12.5   51.5    0               456
   62-        GRID    3672    0               170.75  -12.5   45.5    0               456
   63-        GRID    4002    0               64.0    .0      73.0    0               1456
   64-        GRID    4004    0               64.0    -4.0181 72.2007 0               1456
   65-        GRID    4006    0               64.0    -7.4247 69.9247 0               1456
   66-        GRID    4008    0               64.0    -9.7007 66.5181 0               1456
   67-        GRID    4010    0               64.0    -10.5   62.5    0               1456
   68-        GRID    4034    0               78.0    -12.5   62.0    0               2456
   69-        GRID    4054    0               102.12  -12.5   62.0    0               2456
   70-        GRID    4114    0               129.0   -12.5   62.0    0               2456
   71-        GRID    4154    0               153.375 -12.5   62.0    0               2456
   72-        GRID    4172    0               166.5   .0      73.0    0               1456
   73-        GRID    4174    0               166.5   -4.0181 72.2007 0               1456
   74-        GRID    4176    0               166.5   -7.4247 69.9247 0               1456
   75-        GRID    4178    0               166.5   -9.7007 66.5181 0               1456
   76-        GRID    4180    0               166.5   -10.5   62.5    0               1456
   77-        GRID    4461    0               166.5   -2.0    75.0    0               3456
   78-        GRID    4463    0               170.75  -2.0    75.0    4413            23456
   79-        GRID    4465    0               176.1253-2.0    75.0    0               3456
   80-        GRID    4467    0               179.2459-2.0    75.0    4413            23456
   81-        GRID    4469    0               182.3663-2.0    75.0    0               3456
   82-        GRID    4471    0               166.5   -2.0    75.0    0               12456
   83-        GRID    4472    0               176.1253-2.0    75.0    0               12456
   84-        GRID    4473    0               182.3663-2.0    75.0    0               12456
   85-        GRID    4880    0               78.0    .0      51.933  0               12456
   86-        GRID    4881    0               78.0    .0      51.933  0               12456
   87-        GRID    4892    0               151.875 .0      51.5    0               3456
   88-        GRID    4893    0               151.975 -10.125 55.7    0               12456
   89-        MPC     3010    3651    1               1.0     1115    1               -1.0
   90-        MPC     3010    3651    3               1.0     1115    3               -1.0
   91-        MPC     3010    3652    1               1.0     1105    1               -1.0
   92-        MPC     3010    3652    2               1.0     1105    2               -1.0
   93-        MPC     3010    3652    3               1.0     1105    3               -1.0
   94-        MPC     3010    3655    1               1.0     1212    1               -1.0
   95-        MPC     3010    3655    3               1.0     1212    3               -1.0
   96-        MPC     3010    3656    1               1.0     1205    1               -1.0
   97-        MPC     3010    3656    2               1.0     1205    2               -1.0
   98-        MPC     3010    3656    3               1.0     1205    3               -1.0
   99-        MPC     3010    3659    1               1.0     1410    1               -1.0
  100-        MPC     3010    3659    2               1.0     1410    2               -1.0
```

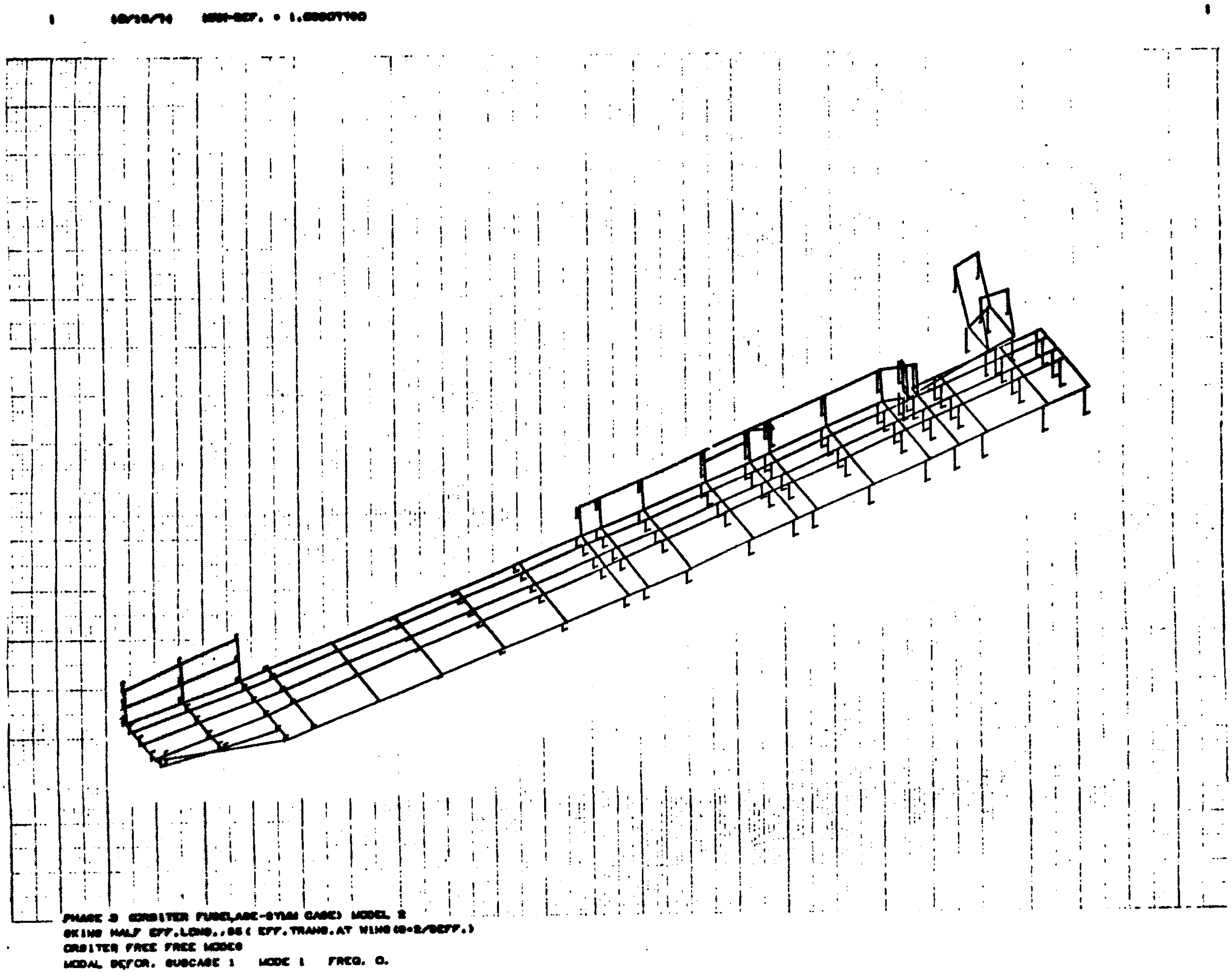
```
                                        S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        . 1 .. 2 .. 3 .. 4 .. 5 .. 6 .. 7 .. 8 .. 9 .. 10 .
  101-        MPC     3010    3659    3               1.0     1410    3               -1.0
  102-        MPC     3010    3660    1               1.0     1405    1               -1.0
  103-        MPC     3010    3660    2               1.0     1405    2               -1.0
  104-        MPC     3010    3660    3               1.0     1405    3               -1.0
  105-        MPC     3010    3663    1               1.0     1610    1               -1.0
  106-        MPC     3010    3663    2               1.0     1610    2               -1.0
  107-        MPC     3010    3663    3               1.0     1610    3               -1.0
  108-        MPC     3010    3664    1               1.0     1605    1               -1.0
  109-        MPC     3010    3664    2               1.0     1605    2               -1.0
  110-        MPC     3010    3664    3               1.0     1605    3               -1.0
  111-        MPC     3010    3667    1               1.0     1710    1               -1.0
  112-        MPC     3010    3667    2               1.0     1710    2               -1.0
  113-        MPC     3010    3667    3               1.0     1710    3               -1.0
  114-        MPC     3010    3668    1               1.0     1705    1               -1.0
  115-        MPC     3010    3668    2               1.0     1705    2               -1.0
  116-        MPC     3010    3668    3               1.0     1705    3               -1.0
  117-        MPC     3010    3671    1               1.0     1918    1               -1.0
  118-        MPC     3010    3671    2               1.0     1918    2               -1.0
  119-        MPC     3010    3671    3               1.0     1918    3               -1.0
  120-        MPC     3010    3672    1               1.0     1905    1               -1.0
  121-        MPC     3010    3672    2               1.0     1905    2               -1.0
  122-        MPC     3010    3672    3               1.0     1905    3               -1.0
  123-        MPC     4010    4004    2               1.0     238     2               -1.0
  124-        MPC     4010    4004    3               1.0     238     3               -1.0
  125-        MPC     4010    4006    2               1.0     235     2               -1.0
  126-        MPC     4010    4006    3               1.0     235     3               -1.0
  127-        MPC     4010    4008    2               1.0     232     2               -1.0
  128-        MPC     4010    4008    3               1.0     232     3               -1.0
  129-        MPC     4010    4010    2               1.0     229     2               -1.0
  130-        MPC     4010    4010    3               1.0     229     3               -1.0
  131-        MPC     4010    4034    1               1.0     519     1               -1.0    +M4034X
  132-        +M4034X         518     5               0.5
  133-        MPC     4010    4034    3               1.0     519     3               -1.0
  134-        MPC     4010    4064    1               1.0     760     1               -1.0    +M4064X
  135-        +M4054X         750     5               0.5
  136-        MPC     4010    4064    3               1.0     760     3               -1.0
  137-        MPC     4010    4114    1               1.0     1161    1               -1.0    +M4114X
  138-        +M4114X         1161    5               0.5
  139-        MPC     4010    4114    3               1.0     1161    3               -1.0
  140-        MPC     4010    4154    1               1.0     1618    1               -1.0    +M4154X
  141-        +M4154X         1618    5               0.5
  142-        MPC     4010    4154    3               1.0     1618    3               -1.0
  143-        MPC     4010    4174    2               1.0     1935    2               -1.0
  144-        MPC     4010    4174    3               1.0     1935    3               -1.0
  145-        MPC     4010    4176    2               1.0     1931    2               -1.0
  146-        MPC     4010    4176    3               1.0     1931    3               -1.0
  147-        MPC     4010    4178    2               1.0     1927    2               -1.0
  148-        MPC     4010    4178    3               1.0     1927    3               -1.0
  149-        MPC     4010    4180    2               1.0     1923    2               -1.0
  150-        MPC     4010    4180    3               1.0     1923    3               -1.0
```

```
                                            S O R T E D   B U L K   D A T A   E C H O
 CARD
 COUNT        .   1  ..   2  ..   3  ..   4  ..   5  ..   6  ..   7  ..   8  ..   9  ..  10  .
  151-        MPC     4011    4002    3               1.0     241     3       -1.0
  152-        MPC     4011    4172    3               1.0     1833    3       -1.0
  153-        MPC     4012    4002    2               1.0     241     2       -1.0
  154-        MPC     4012    4172    2               1.0     1833    2       -1.0
  155-        MPC     4410    4461    1               1.0     1839    1       -1.0
  156-        MPC     4410    4461    2               1.0     1838    2       -1.0
  157-        MPC     4410    4463    1               1.0     1926    1       -1.0
  158-        MPC     4410    4465    1               1.0     2041    1       -1.0
  159-        MPC     4410    4465    2               1.0     2041    2       -1.0
  160-        MPC     4410    4467    1               1.0     2041    1       -0.5            EM4467X
  161-        EM4467X         2114            1       -0.5
  162-        MPC     4410    4469    1               1.0     2114    1       -1.0
  163-        MPC     4410    4469    2               1.0     2114    2       -1.0
  164-        MPC     4410    4471    3               1.0     1838    3       -1.0
  165-        MPC     4410    4472    3               1.0     2041    3       -1.0
  166-        MPC     4410    4473    3               1.0     2114    3       -1.0
  167-        MPC     4810    4893    3               1.0     1505    3       -.36516         EM48937A
  168-        EM48937A        1535            3       -.13484 1613            3       -.36516 EM48937B
  169-        EM48937B        1614            3       -.13484
  170-        MPC     4811    4880    3               1.0     506     3       -1.0
  171-        MPC     4811    4892    1               1.0     1516    1       -0.5            EM4892X
  172-        EM4892X         1606            1       -0.5
  173-        MPC     4812    4881    2               1.0     506     2       -1.0
  174-        MPC     4812    4892    2               1.0     1516    2       -0.5            EM4892Y
  175-        EM4892Y         1606            2       -0.5
  176-        MPCADD  21      3010    4010    4410    4810    4011    4911
  177-        MPCADD  22      3010    4010    4410    4810    4012    4912
  178-        PARAM   NOSUB   6
  179-        PARAM   TPNAME  ORBTSP2
  180-        SPC1    11      2       241     301     506     1516    1606
  181-        SPC1    11      2       1900    1833    4002    4172
  182-        SPC1    11      2       4881    4892
  183-        SPC1    12      1       1516    1606    1900    4892
  184-        SPC1    12      3       241     301     506     1833    4002
  185-        SPC1    12      3       4172    4880
  186-        SPOINT  11001   THRU    11057
  187-        SPOINT  12001   THRU    12029
  188-        SPOINT  13001   THRU    13035
  189-        SPOINT  14001   THRU    14007
  190-        SPOINT  15001   THRU    15012
  191-        SUPORT  301     3       1900    1       3624    3
              ENDDATA
```

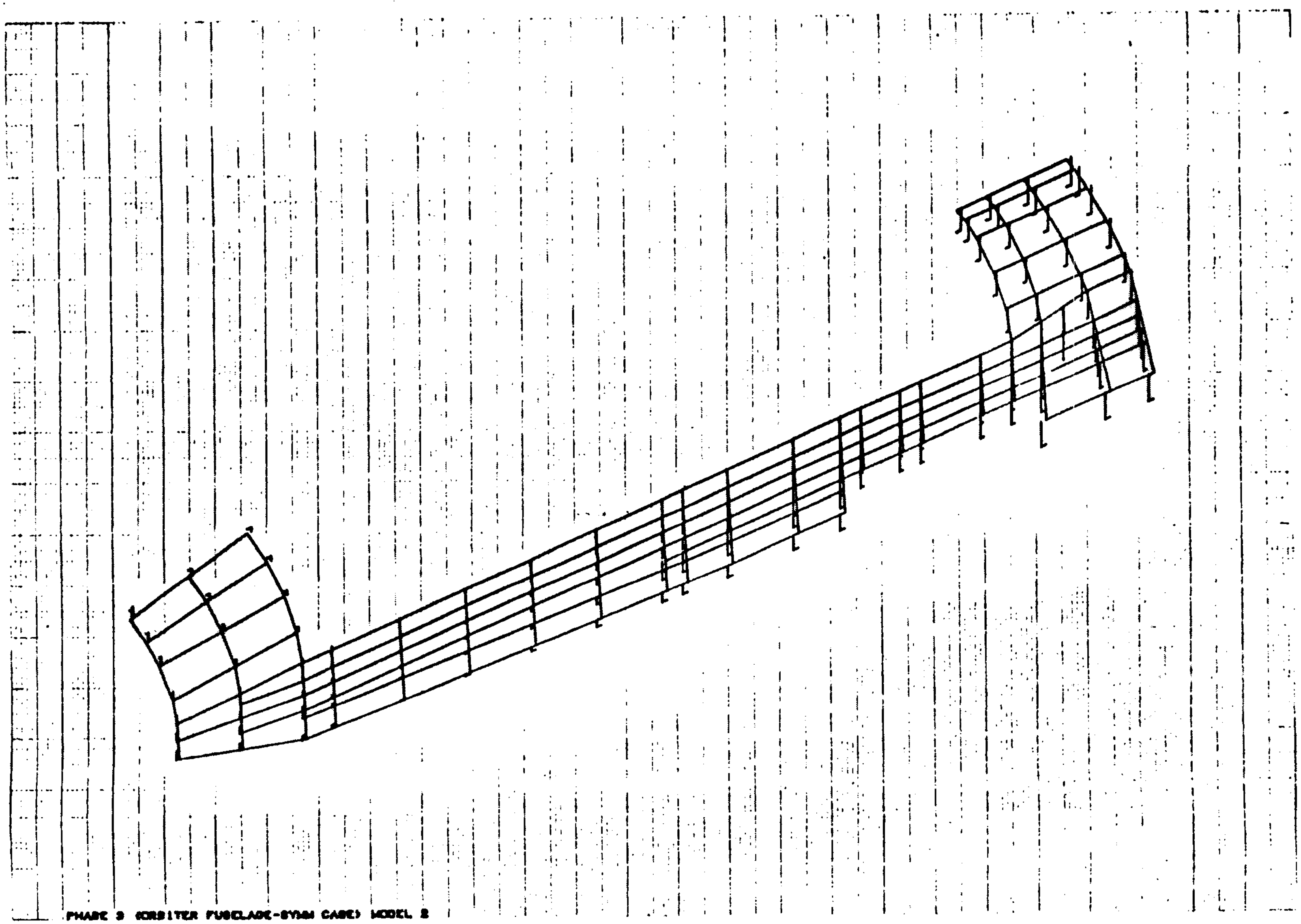
Appendix B14

INPUT & PLOTS/PHASE 3 ANALYSIS: MODEL II FUSELAGE SYMMETRIC FREE-FREE ORBITER MODES

```
PHASE 3 %ORBITER FUSELAGE-SYMM CASE¤ MODEL 2           OCTOBER  18, 1974   NASTRAN  2/ 1/73    PAGE     6
SKINS HALF EFF.LONG..85% EFF.TRANS.AT WING%G#2/3EFF.¤

                                    C A S E   C O N T R O L   D E C K   E C H O
            CARD
            COUNT
              1       TITLE # PHASE 3 %ORBITER FUSELAGE-SYMM CASE¤ MODEL 2
              2       SUBTITLE # SKINS HALF EFF.LONG..85% EFF.TRANS.AT WING%G#2/3EFF.¤
              3       MAXLINES # 50000
              4       VECTOR        # ALL
              5       SUBCASE 1
              6       LABEL     # ORBITER FREE FREE MODES
              7       MODES # 23
              8       OUTPUT%PLOT¤
              9       SET 40 # INCLUDE 2200 THRU 2293,2630 THRU 2647,2656 THRU 2659,
             10                        2706 THRU 2708,2717,2699
             11       SET 41 # INCLUDE 2600 THRU 2629,2646 THRU 2655,2700 THRU 2705
             12       SET 42 # INCLUDE 2300 THRU 2432
             13       PLOTTER CALCOMP 765,105
             14       AXES    #MY,X,Z
             15       VIEW    # 30.0,45.0,0.0
             16       MAXIMUM  DEFORMATION 5.0
             17       FIND SCALE,ORIGIN 40,SET 40
             18       PLOT MODAL DEFORMATION 1 THRU 23,SET 40,SHAPE,VECTOR XYZ
             19       PLOT MODAL DEFORMATION 1 THRU 40,SET 23,SHAPE,VECTOR XYZ
             20       BEGIN BULK
                                                       23        42

                      PARAM   TPNAME2   ORBTSP2

                      ENDDATA
```

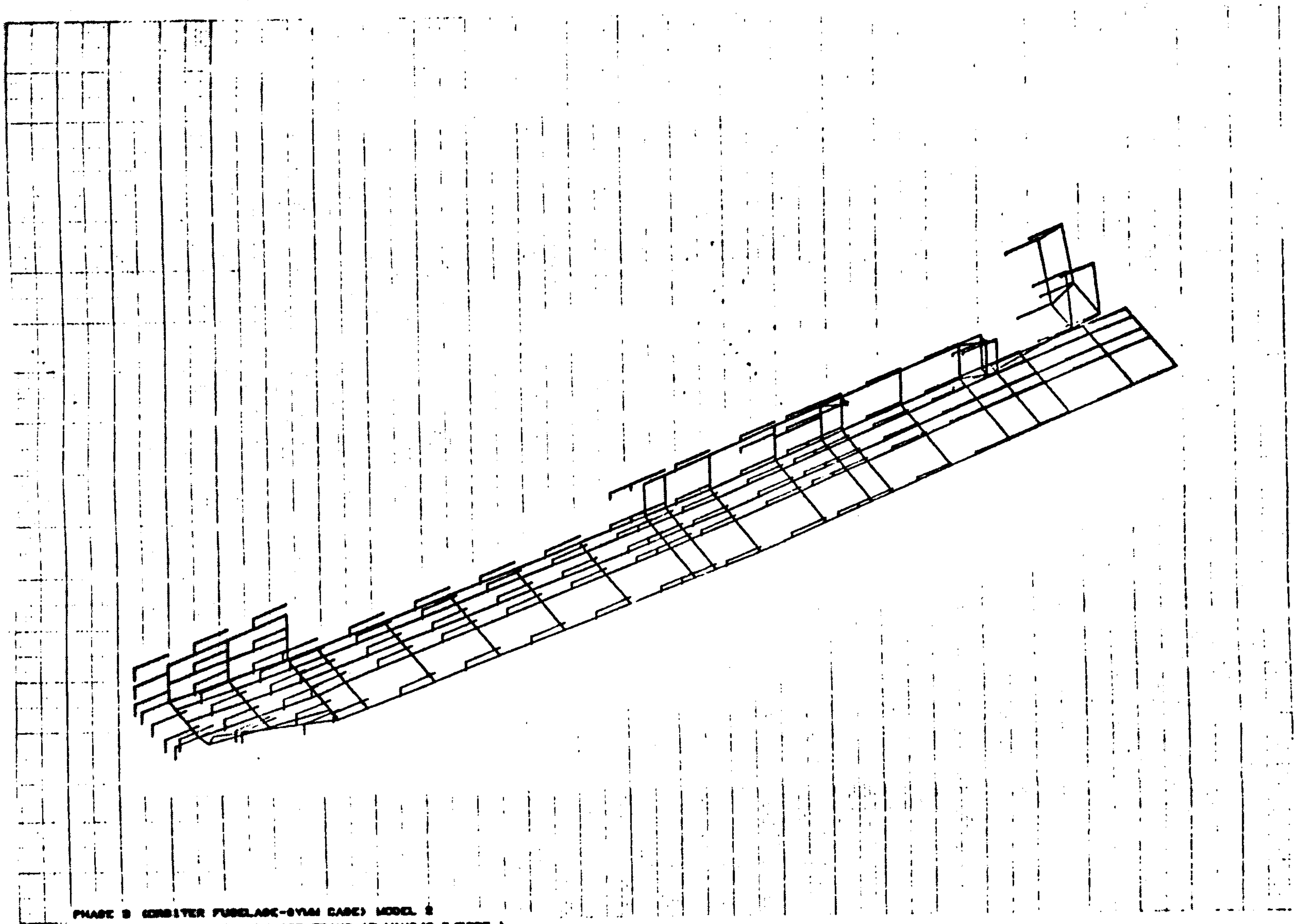

1   10/18/74   MAX-DEF. = 1.00000+00
PHASE 3 (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 1   MODE 1   FREQ. 0.

10/19/74   MAX-DEF. = 1.00007100



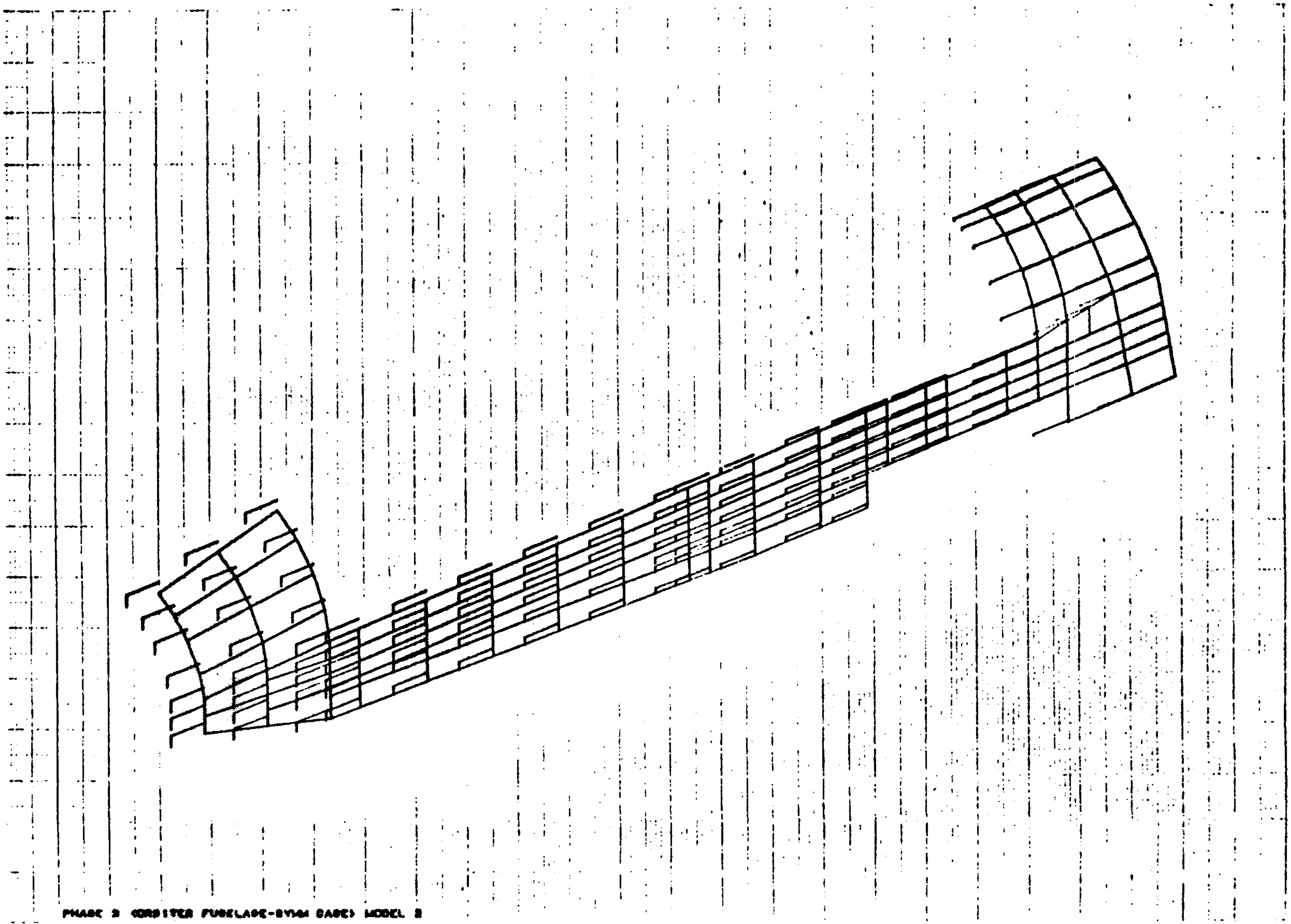
PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 1   MODE 1   FREQ. 0.

— 2   10/10/74 , MAX-DEF. = 0.99818590   2



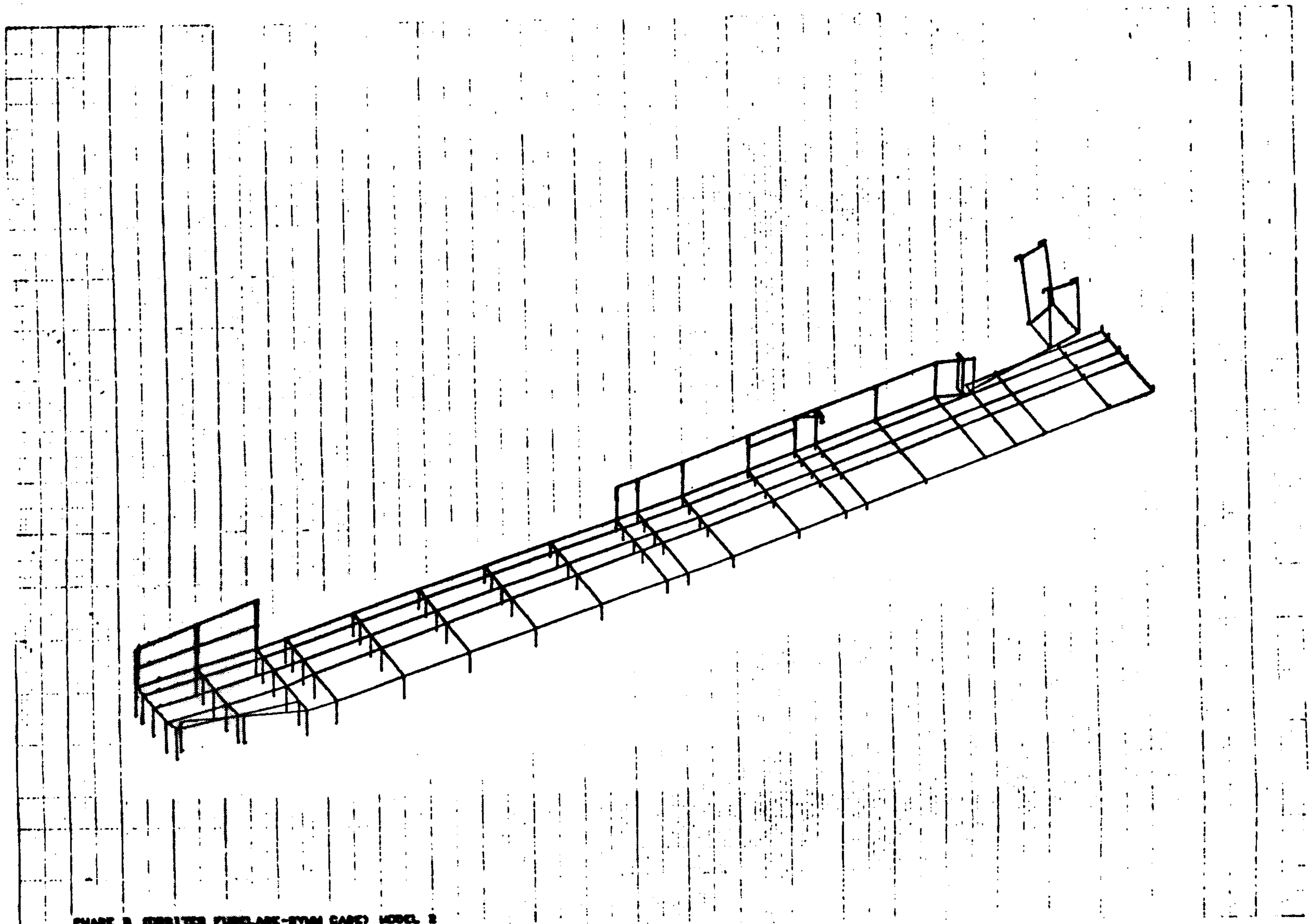
PHASE B (ORBITER FUSELAGE-BEAM CASE) MODEL 2
SKINS HALF EFF.LONG.,65(EFF.TRANS.AT WING(S-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 2   MODE 2   FREQ. O.

8 10/19/74 MAX-DEF. = 0.99813030



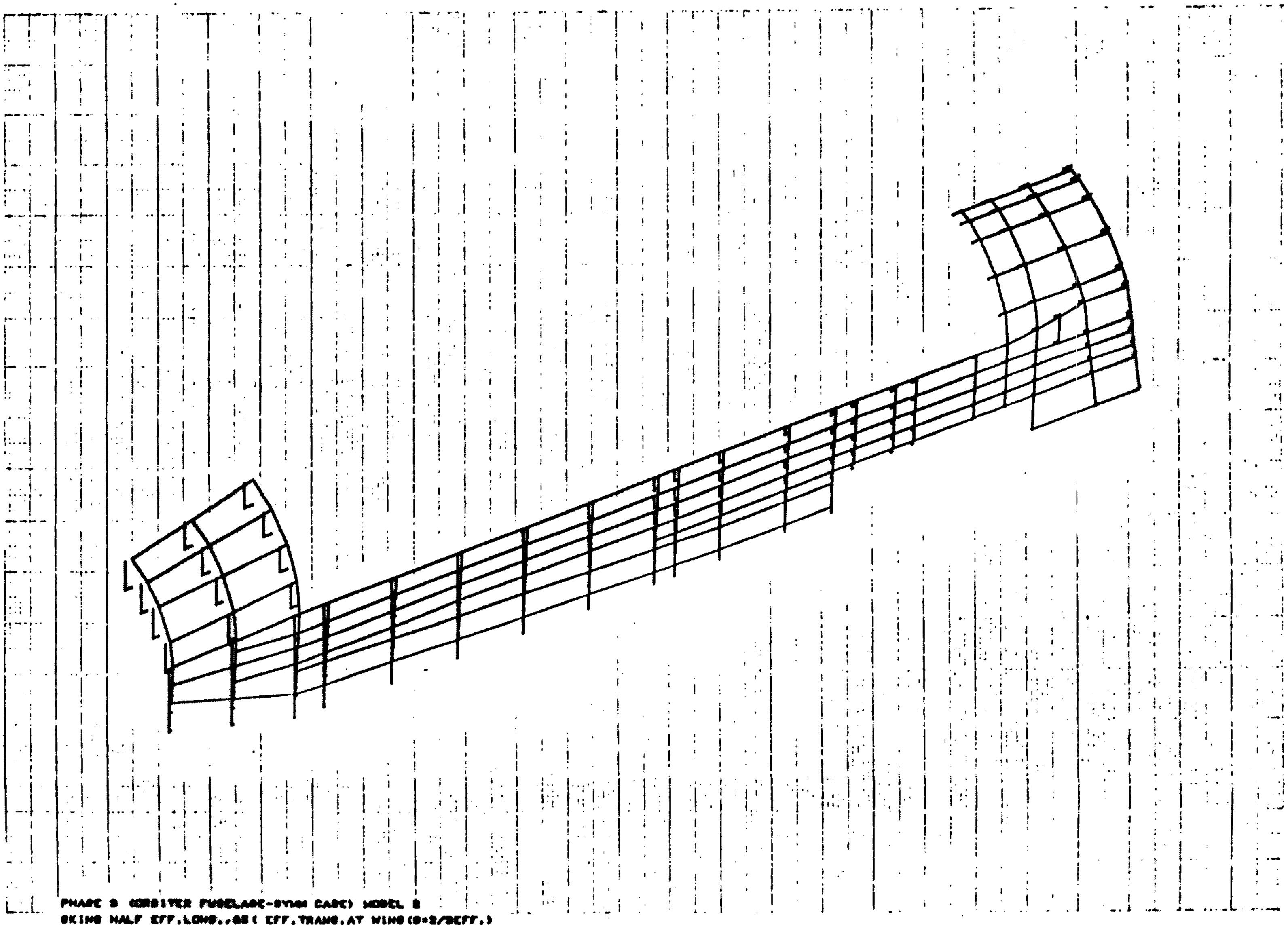
PHASE 2 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SC(EFF.TRANS.AT WING(G=2/3EFF.)
(TS)[illegible]EN FREE FREE WAVES
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 0.

3   10/18/74 . MAX-DEF. = 1.17887010



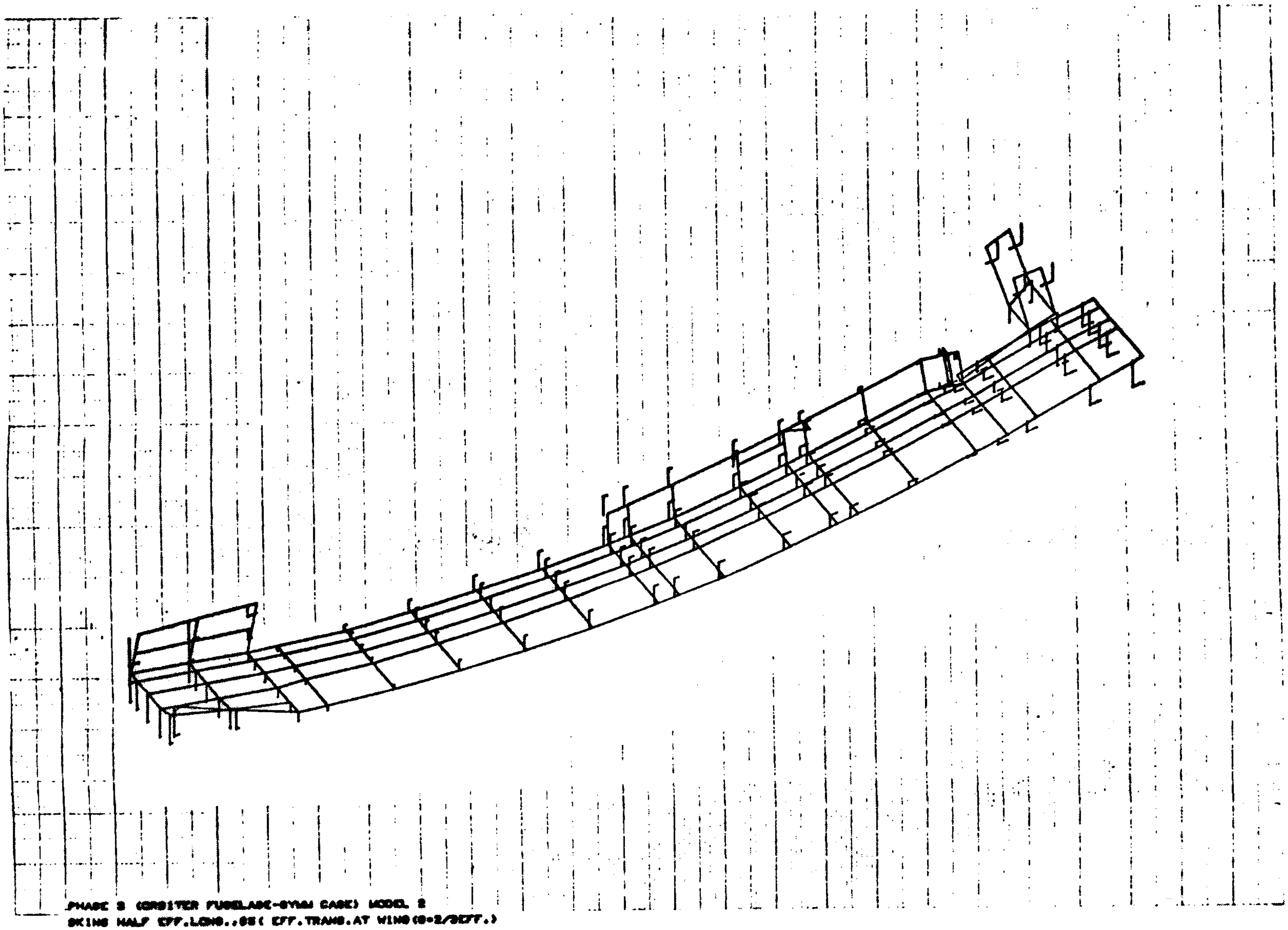
PHASE B (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(S=2/SEFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 3   MODE 3   FREQ. 0.

3 10/14/71 MAX-DEF. = 1.17037010

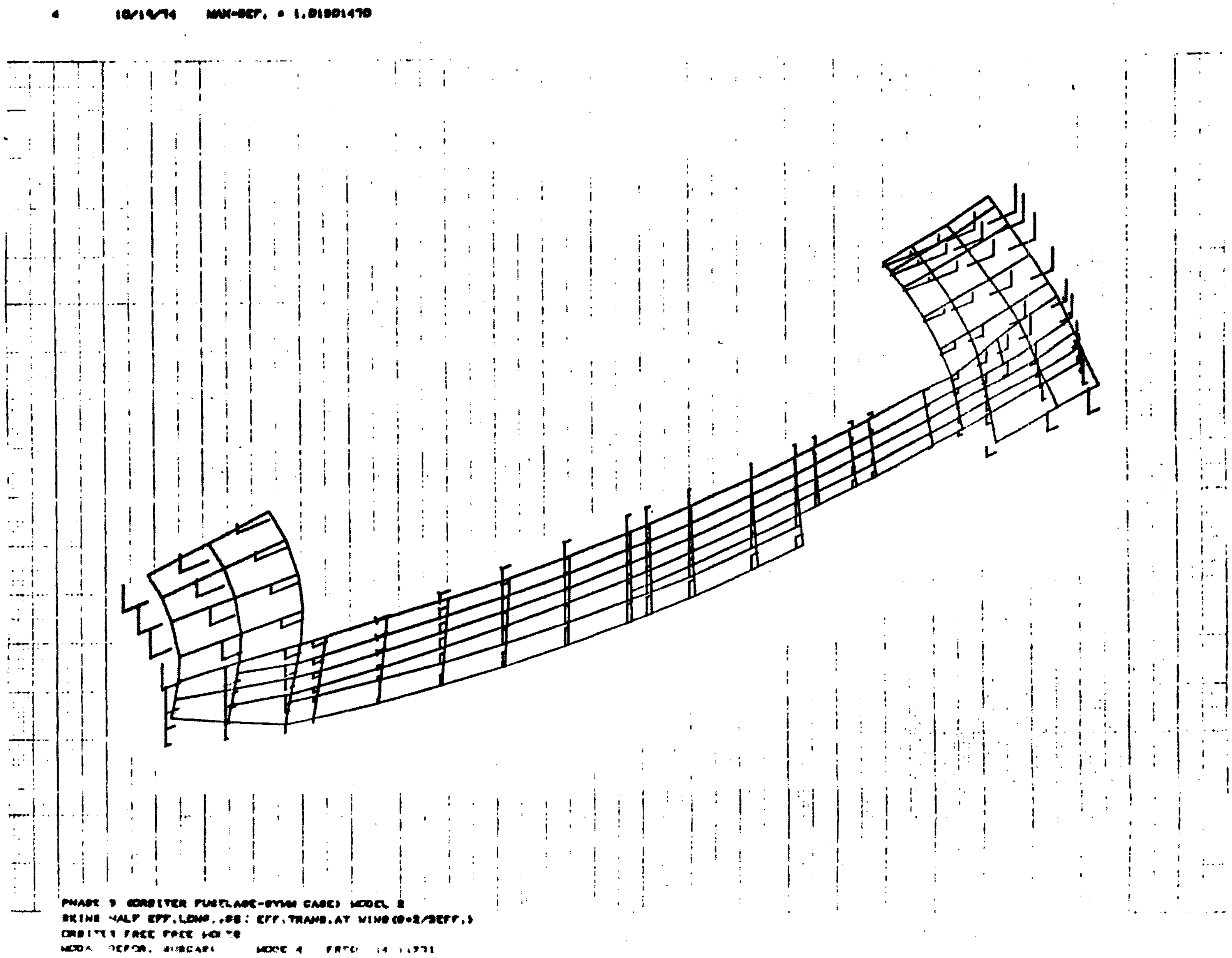


PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.88(EFF.TRANS.AT WING(S=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 3 MODE 3 FREQ. 0.

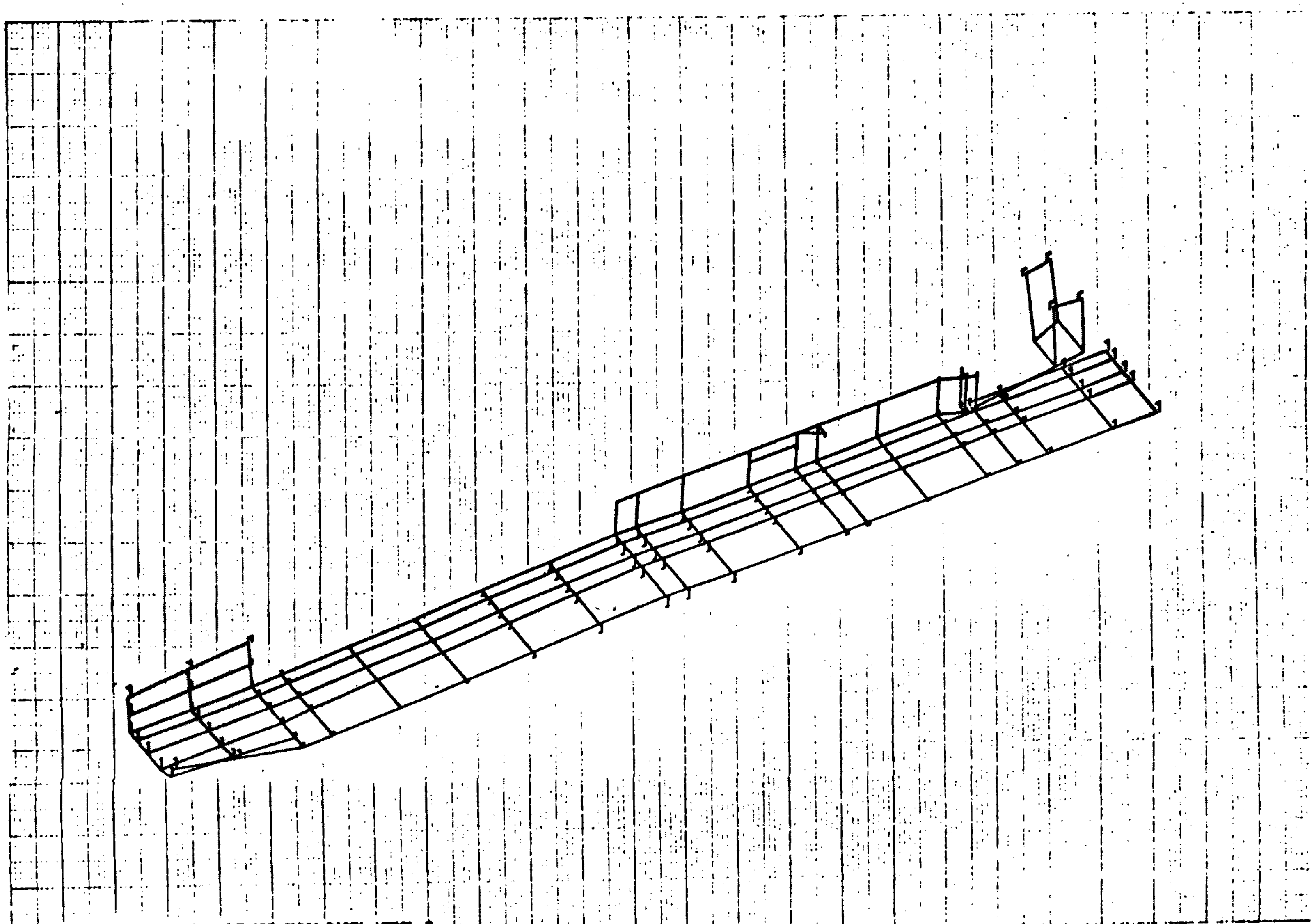
4   10/18/74.   MAX-DEF. = 1.01301470   4



PHASE B (ORBITER FUSELAGE-DYNAM CASE) MODEL 2
SKINS HALF EFF.LONG.,.88(EFF.TRANS.AT WING(B=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 4   MODE 4   FREQ. 44.11371

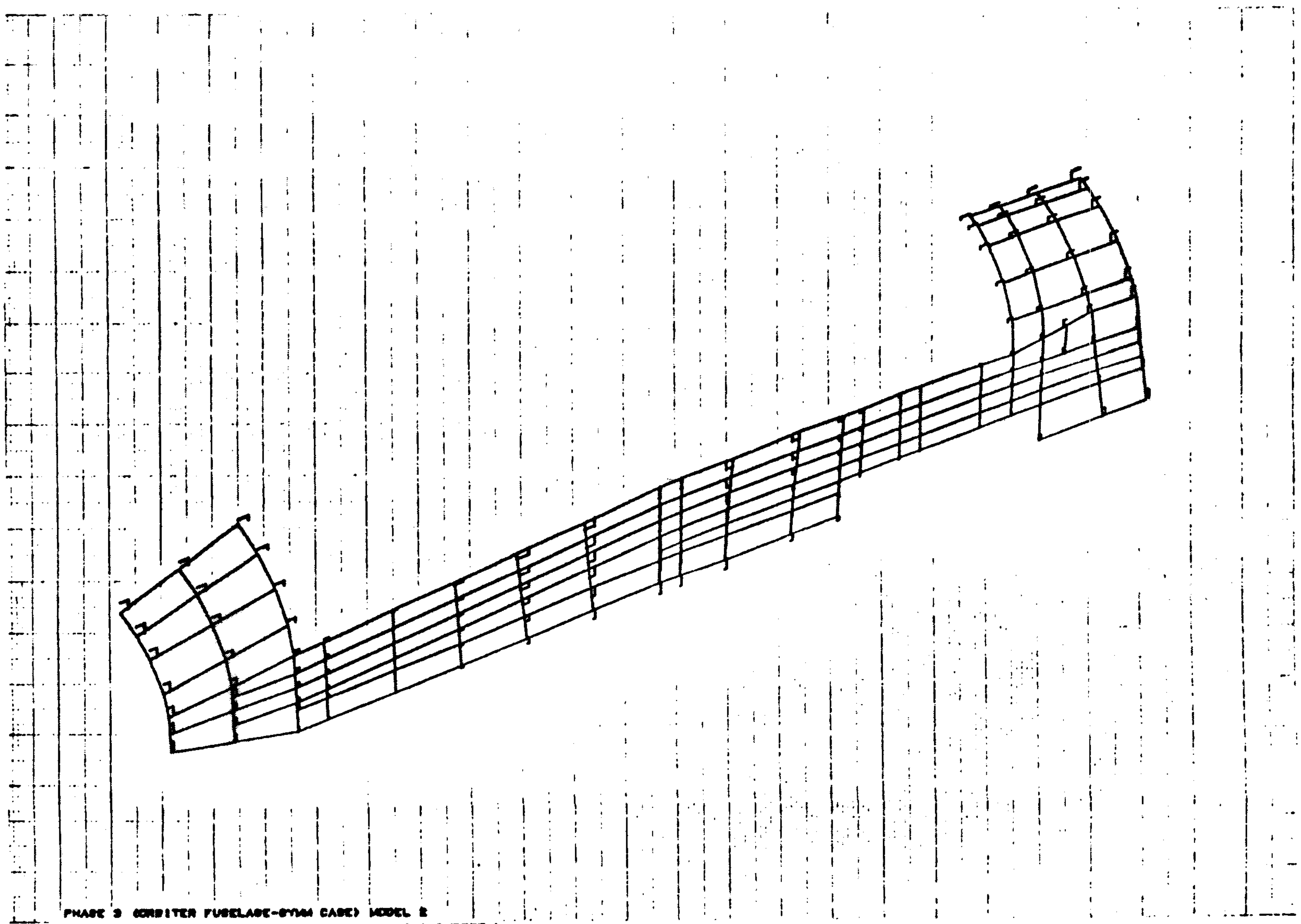

4 10/19/74 MAX-DEF. = 1.01801470
PHASE 9 (ORBITER FUSELAGE-SYMM CASE) MODEL 8
SKINS HALF EFF.LONG.,.88; EFF.TRANS.AT WING(B=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE MODE 4 FREQ 14.11771

8 10/16/74 MAX-DEF. = 0.01718481



PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(S-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 46.33690

8   10/15/74   MAX-DEF. = 0.01718981



PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.88(EFF.TRANS.AT WING(S=2/3EFF.)
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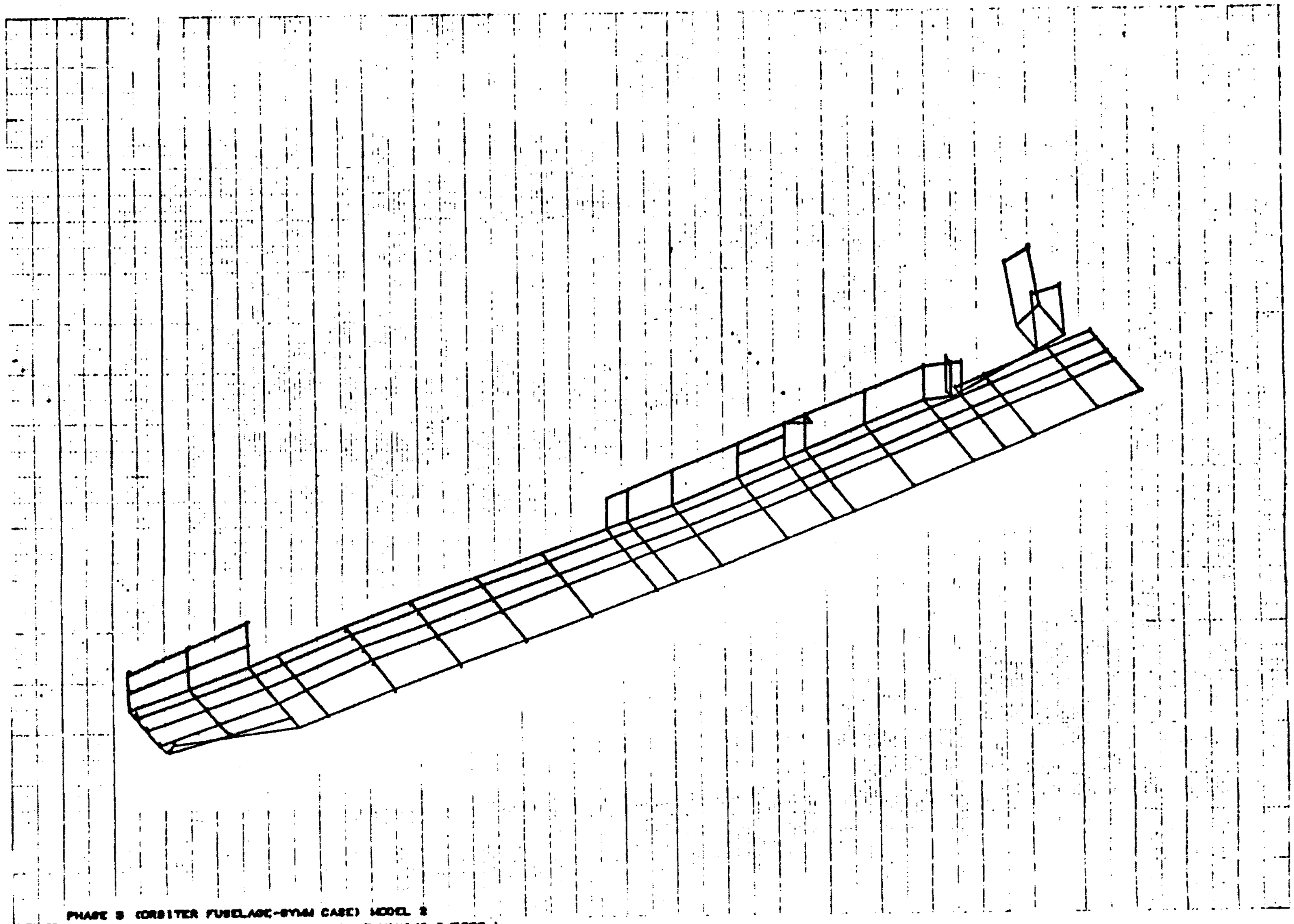
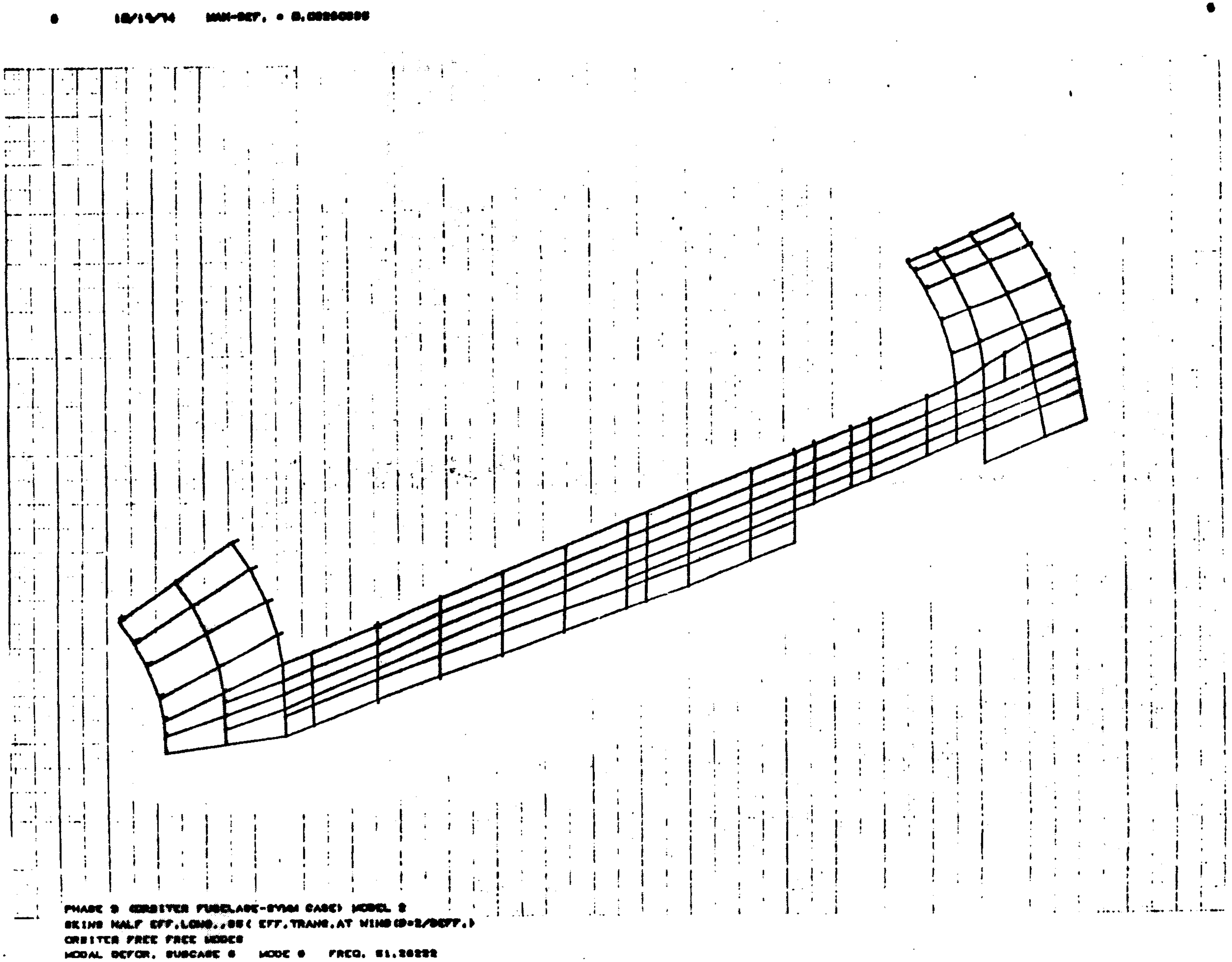
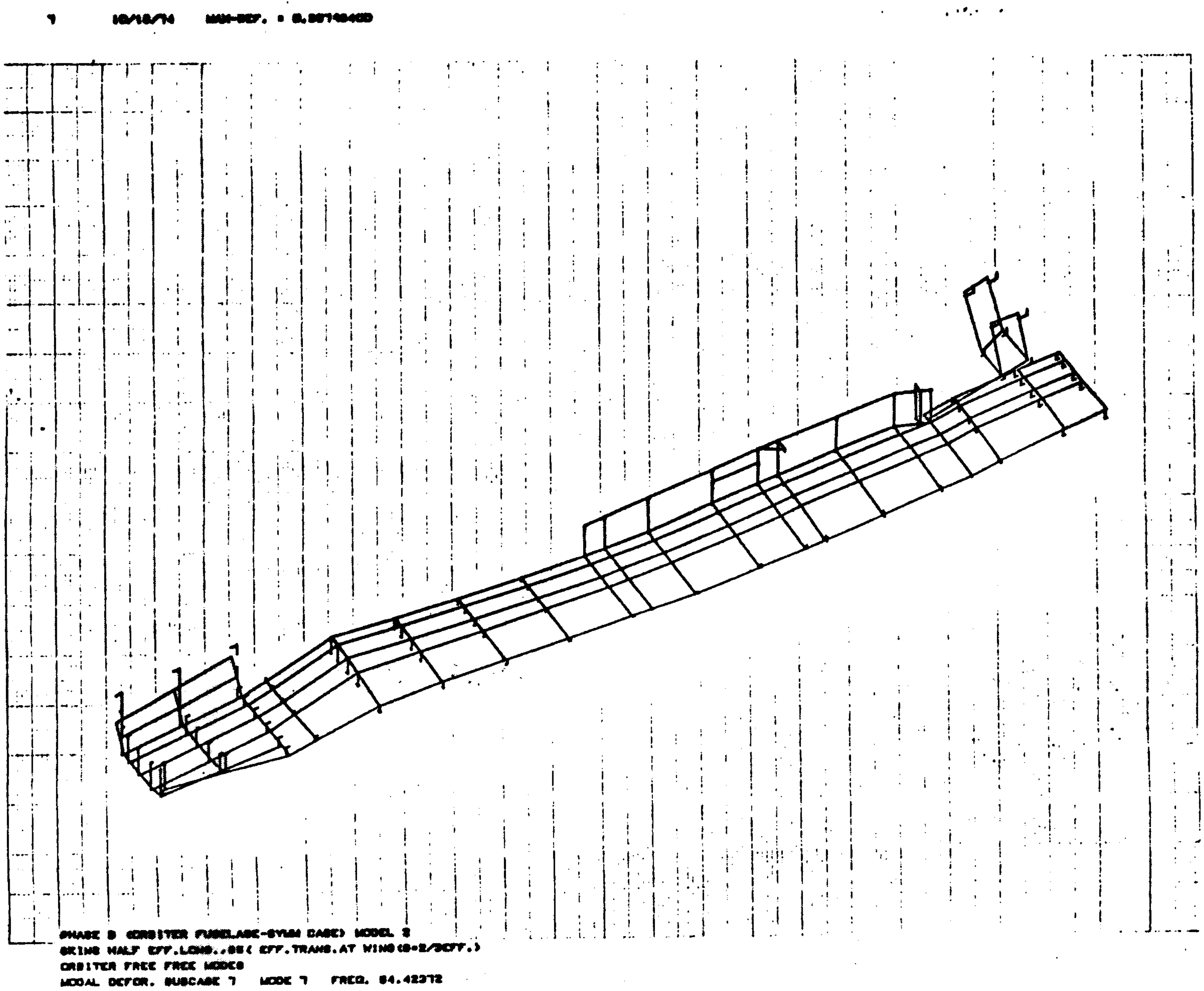
MODAL DEFOR. SUBCASE 8   MODE 8   FREQ. 45.33890

8
10/18/74
MAX-DEF. = 0.08890808

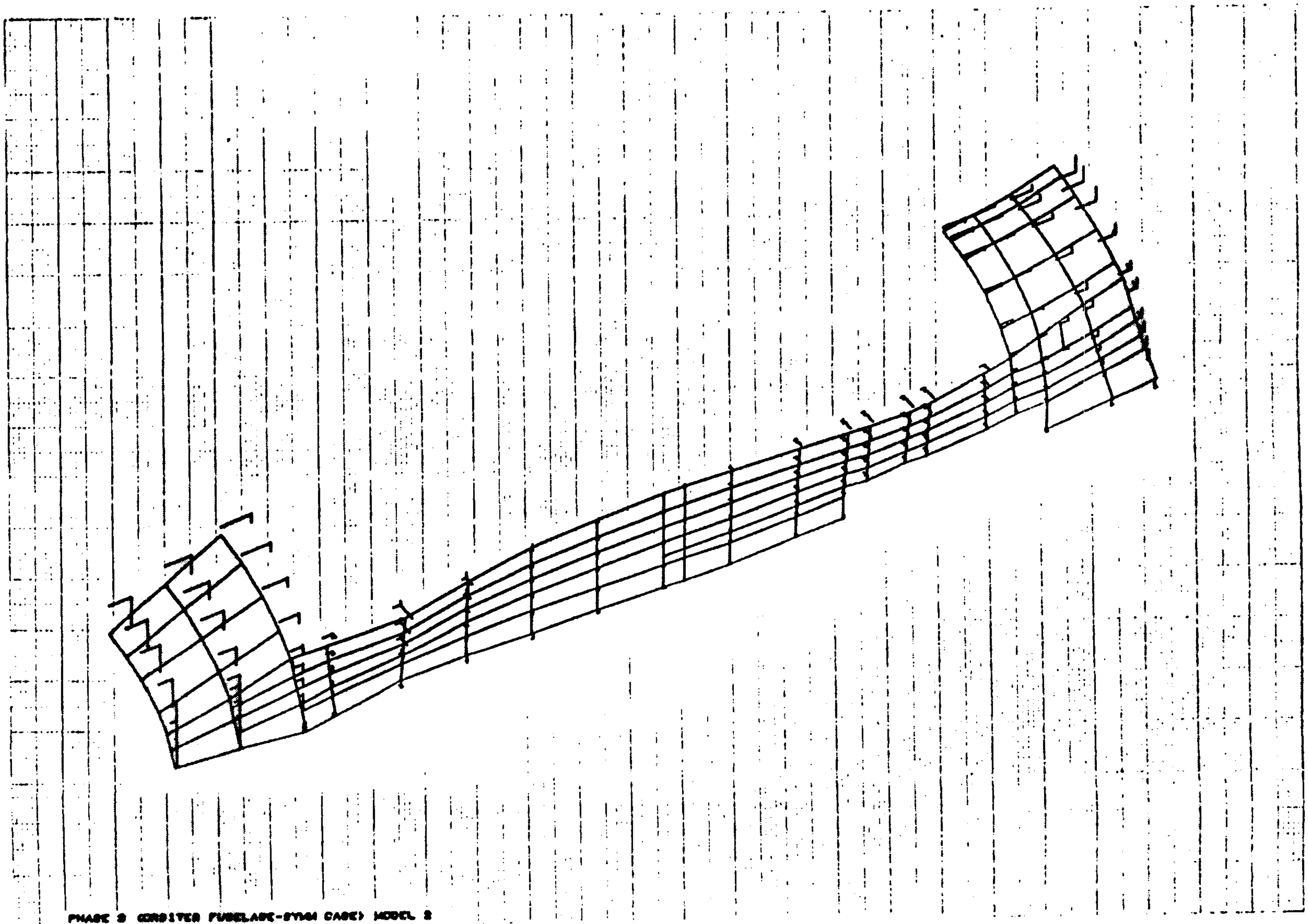


PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(S=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 6 MODE 6 FREQ. 51.20222


10/15/74 MAX-DEF. = 0.08860888
PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.55(EFF.TRANS.AT WING(D=2/DEFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 6 MODE 6 FREQ. 51.28282

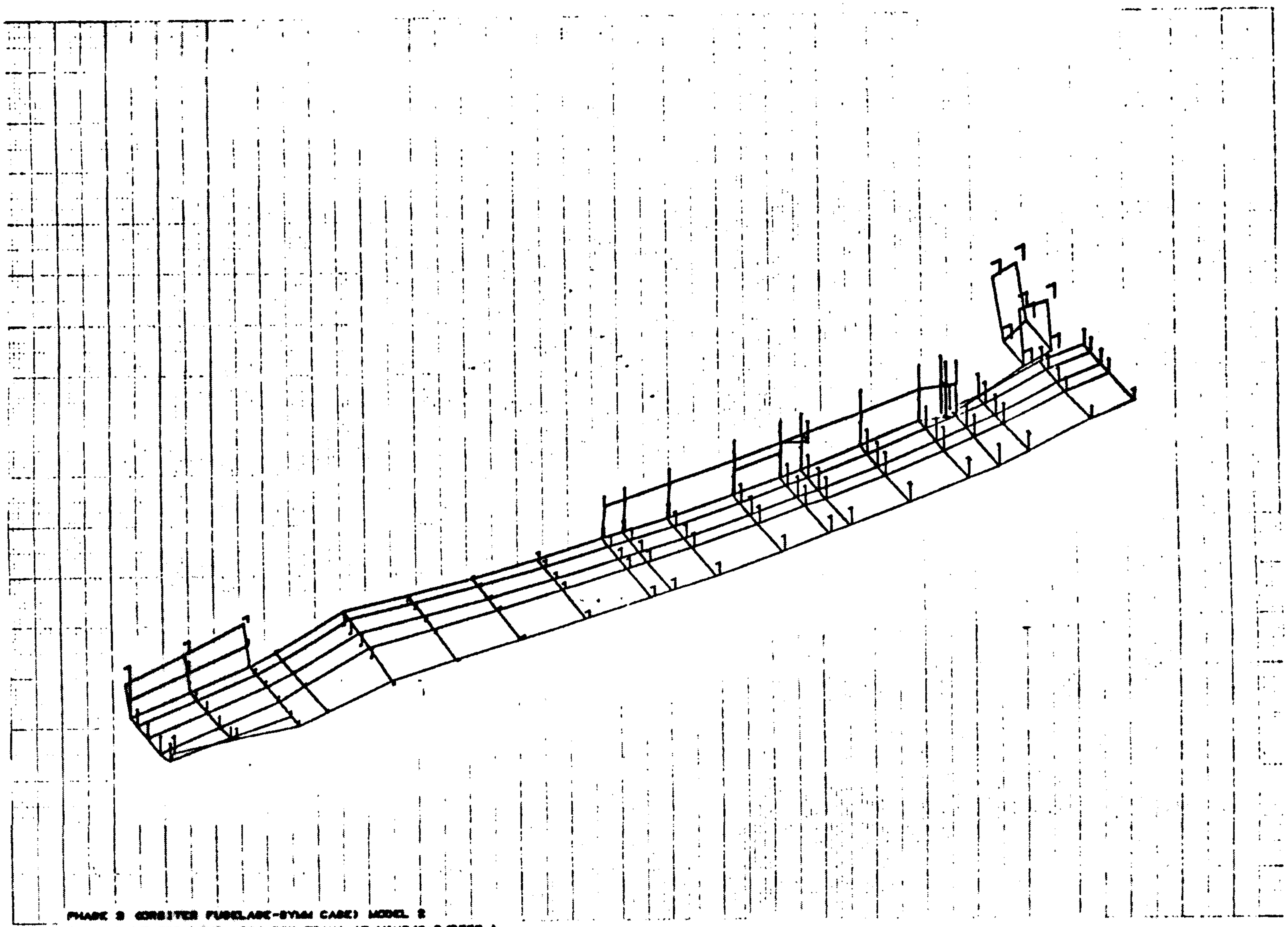

7 10/18/74 MAX-DEF. = 0.30718400
PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG..85(EFF.TRANS.AT WING(8-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 7 MODE 7 FREQ. 54.42372

1   10/19/74 -- MAX-DEF. = 0.38719400



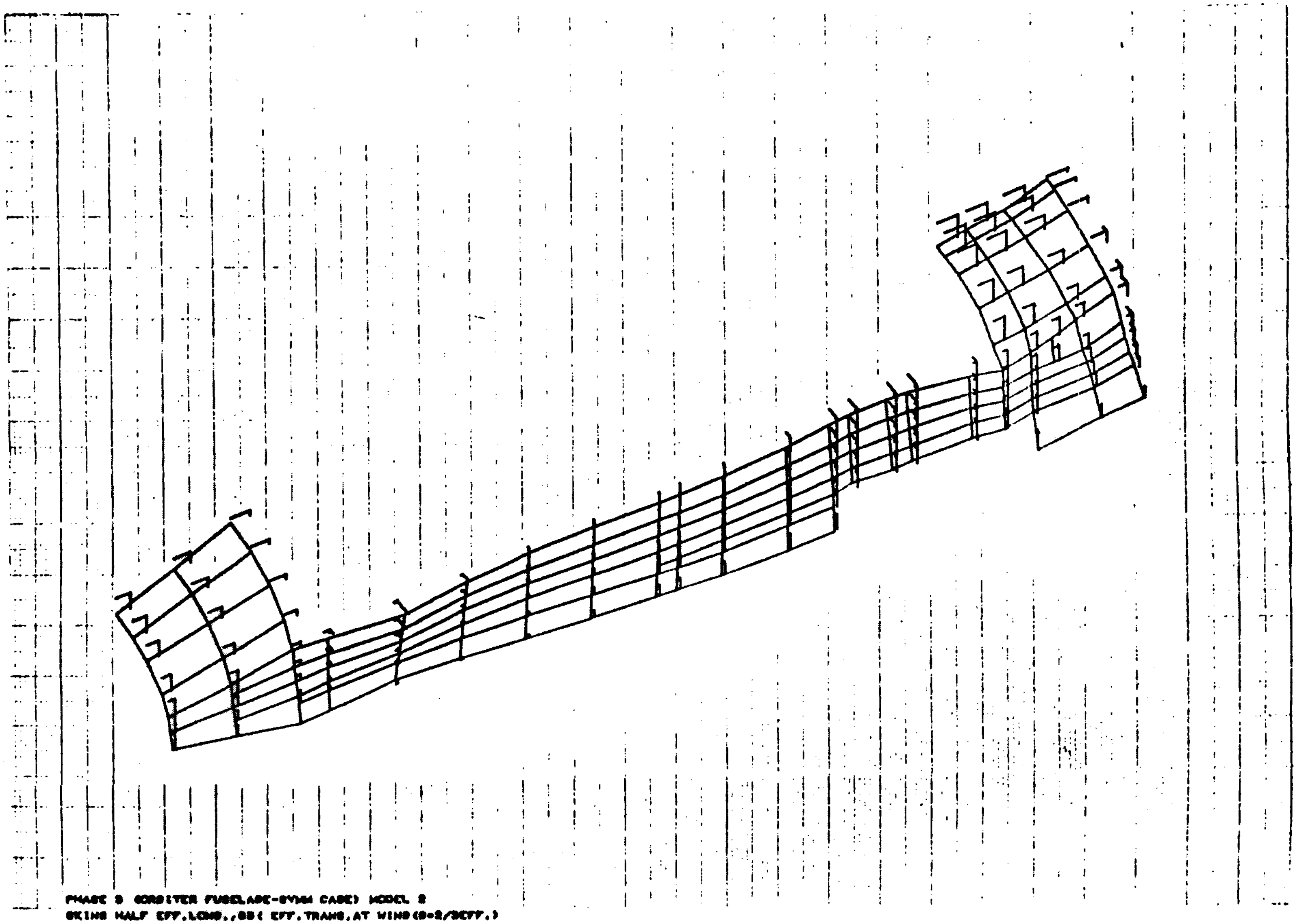
PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 7   MODE 7   FREQ. 34.42372

76   10/18/74   MAX-DEF. = 0.30008180

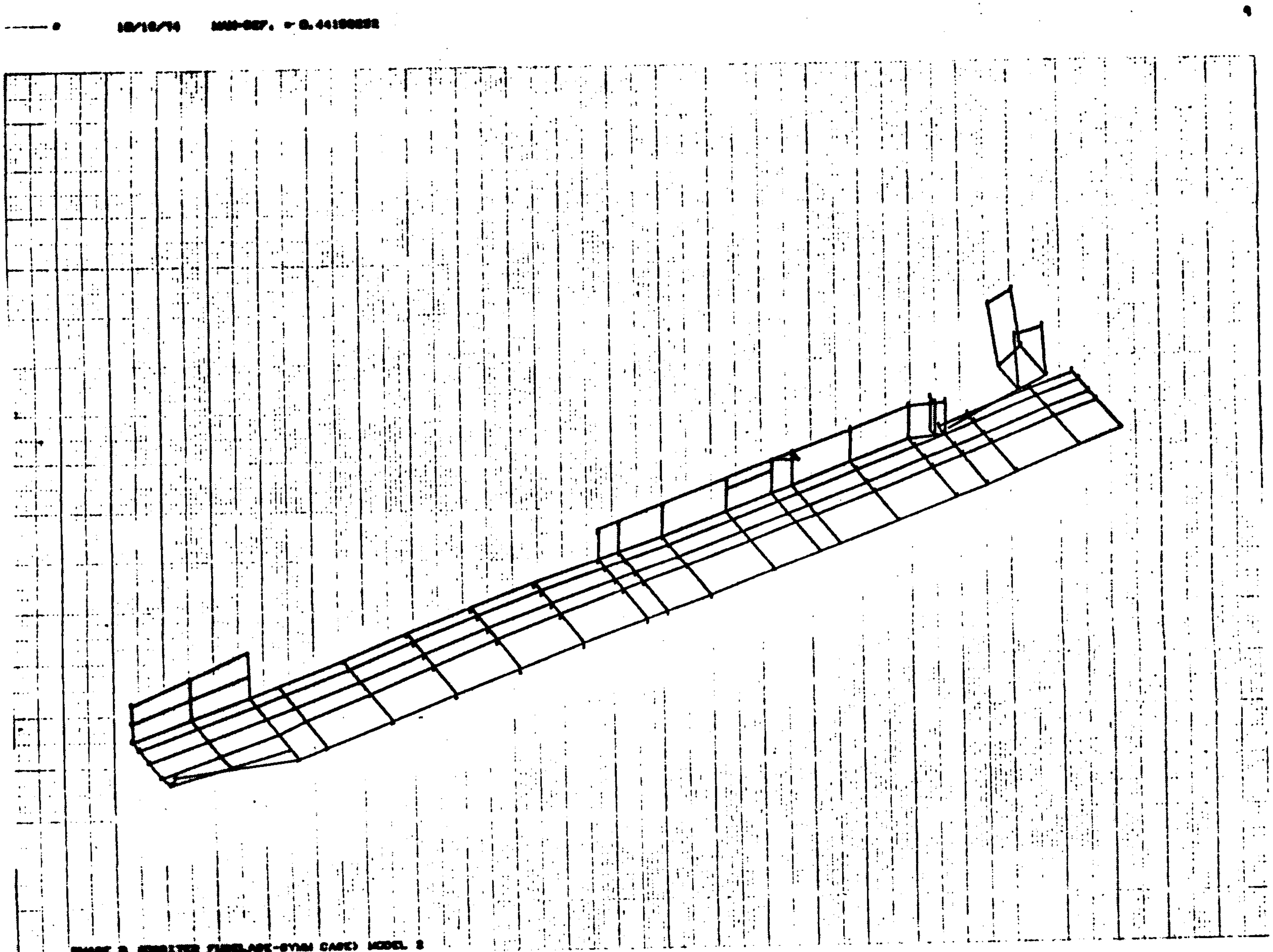


PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(S=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 8   MODE 8   FREQ. 62.71884

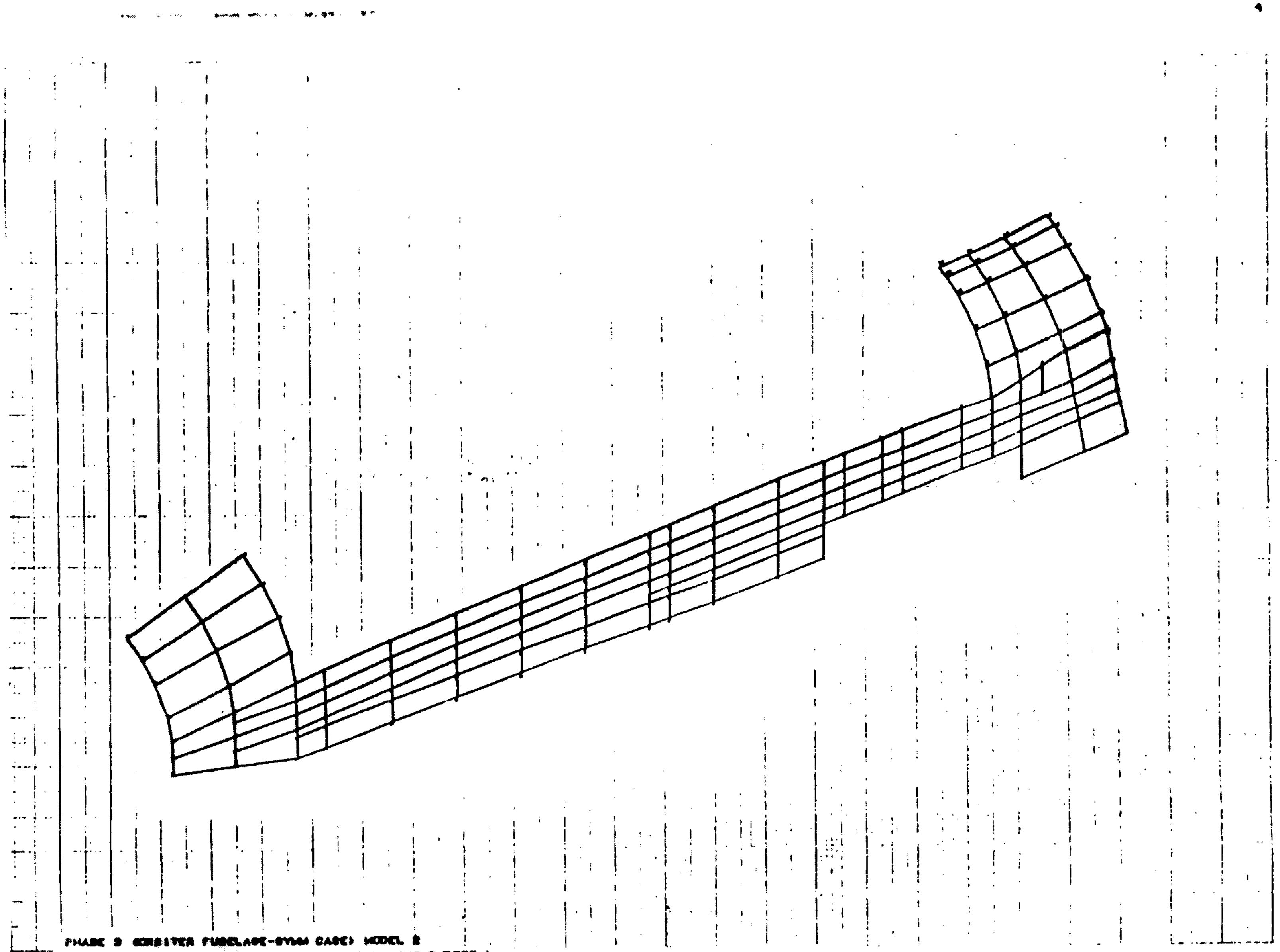
8 10/19/74 MAX-DEF. = 0.20802180



PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(0=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR, SUBCASE 8 MODE 8 FREQ. 62.71884

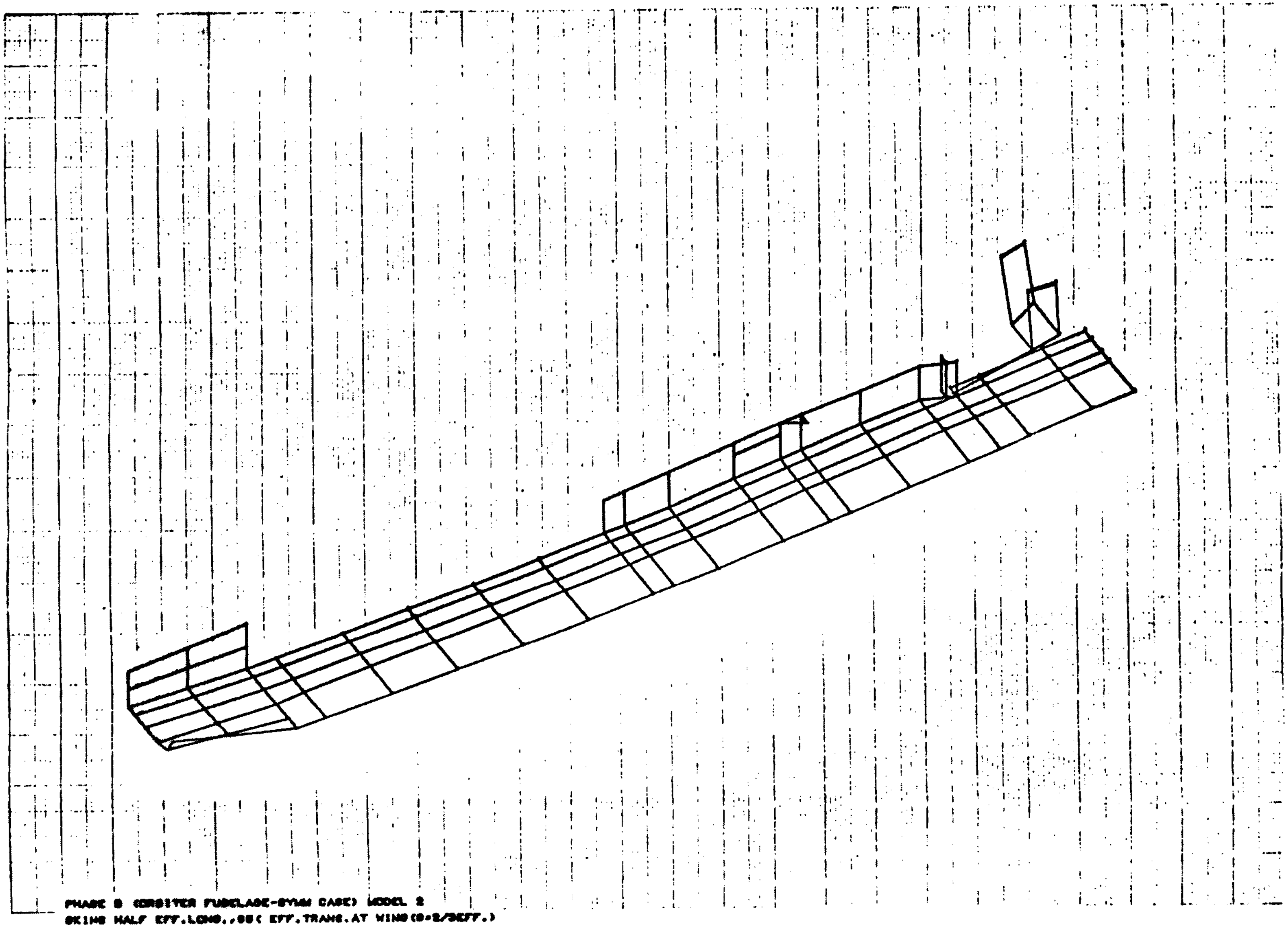

10/16/74 MAX-DEF. = 0.44156652

PHASE B ORBITER FUSELAGE-(SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,65(EFF.TRANS.AT WING(B=2/BEFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 9 MODE 9 FREQ. 56.88881

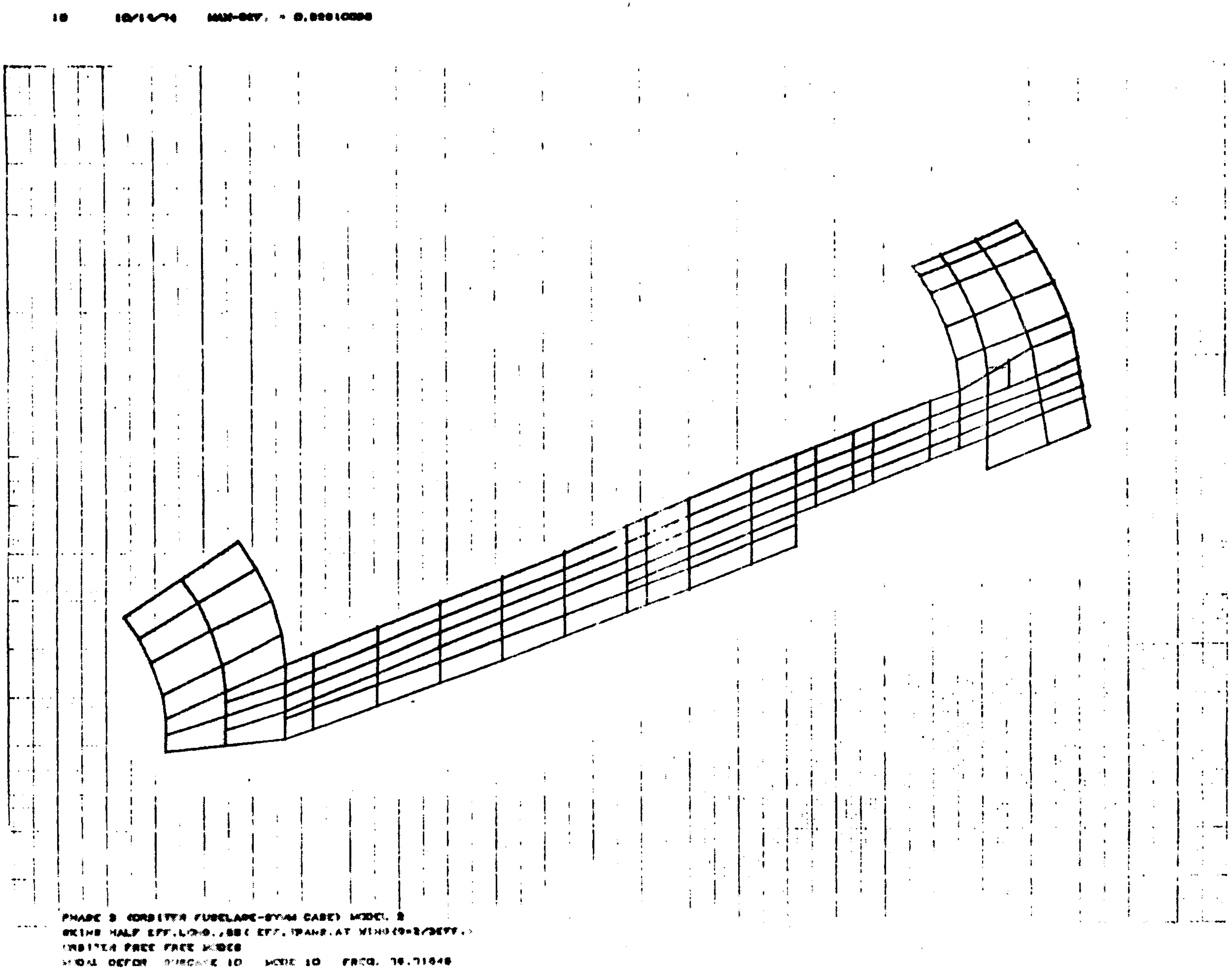


PHASE 2 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(S=2/DEFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 9 MODE 9 FREQ. 08.00001

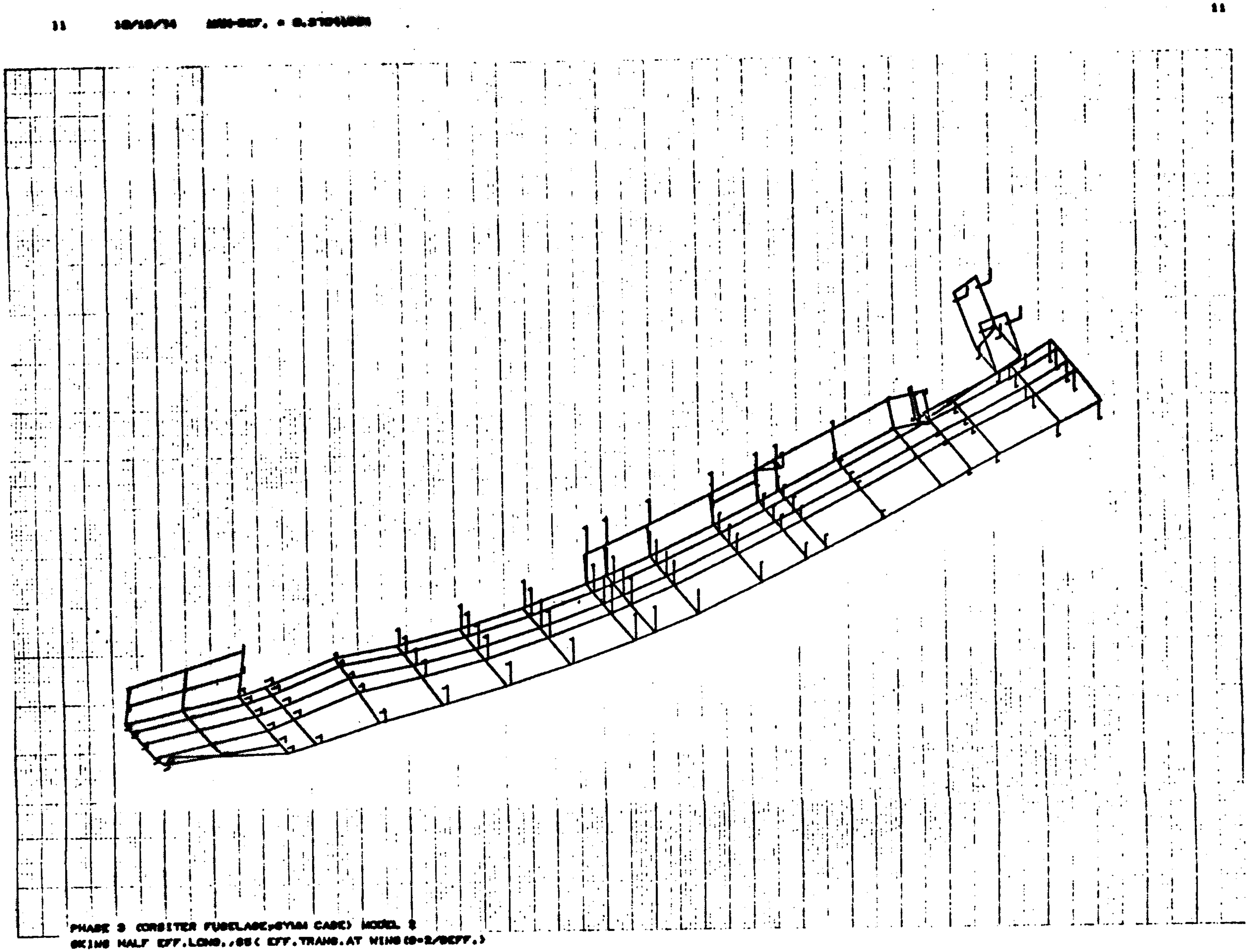
10 10/16/74 MAX-DEF. = 0.88810000



PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.88(EFF.TRANS.AT WING(S=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 76.71648


10 10/16/74 MAX-DEF. = 0.22810000
PHASE B (ORBITER FUSELAGE-STAB CASE) MODEL 2
SKINS HALF EFF.LONG.,SEC EFF.TRANS.AT WING(0=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR SUBCASE 10 MODE 10 FREQ. 19.71848

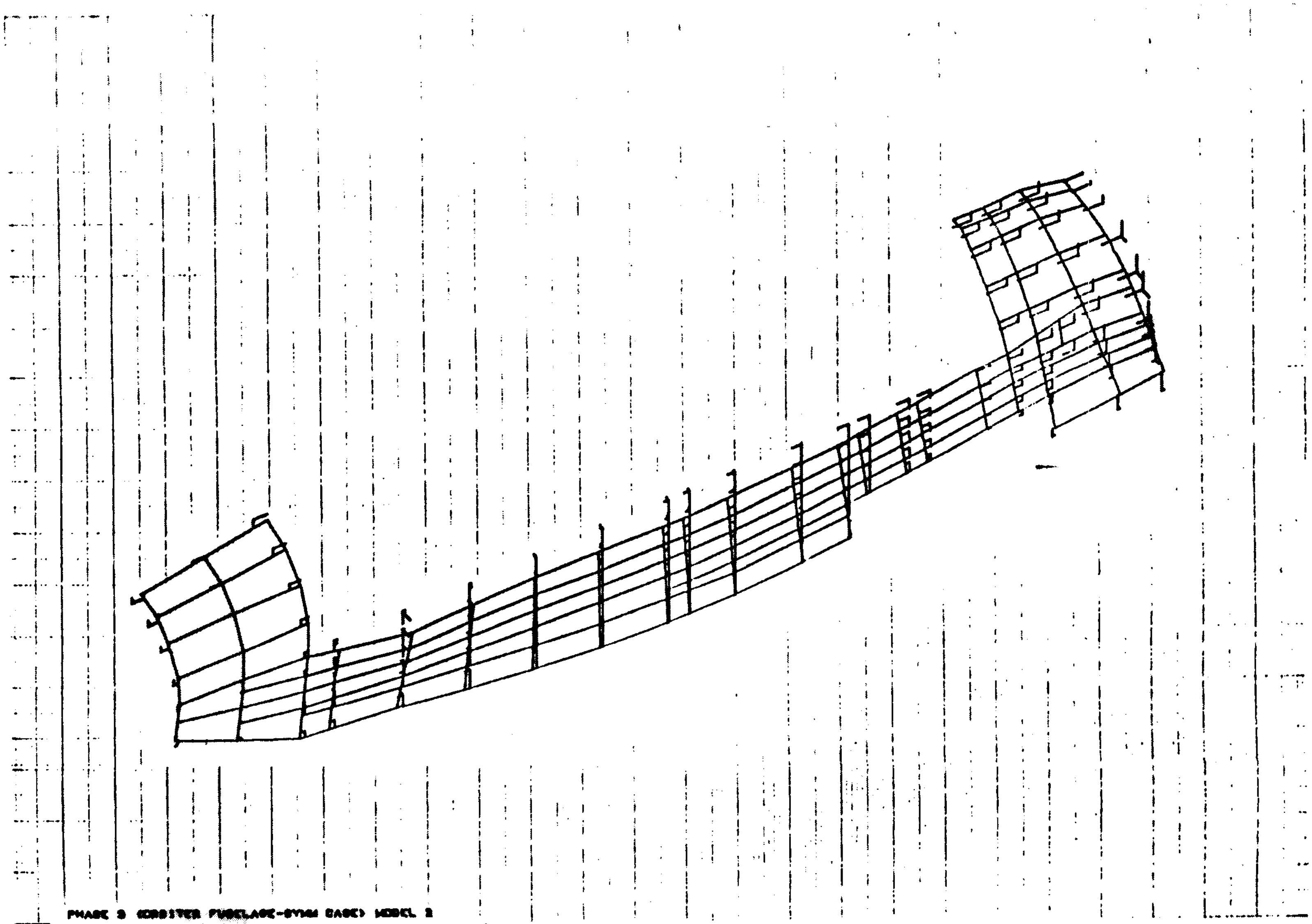
11 10/10/74 MAX-DEF. = 0.[illegible]



PHASE 3 (ORBITER FUSELAGE,SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 11 MODE 11 FREQ. 63.11106

11   10/15/74   MAX-DEF. = 0.87091804

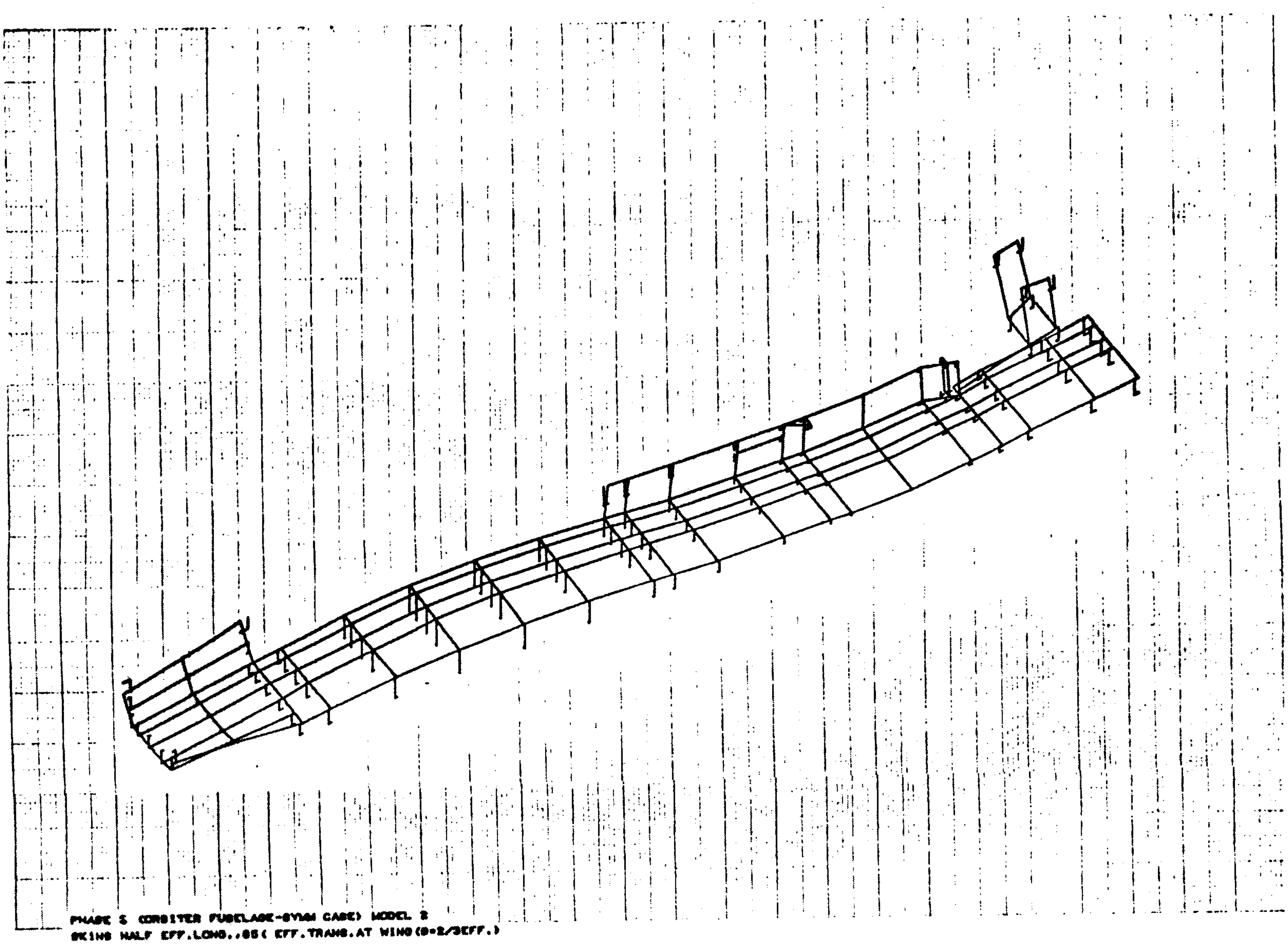
11



PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(B=2/BEFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 11   MODE 11   FREQ. 83.11188

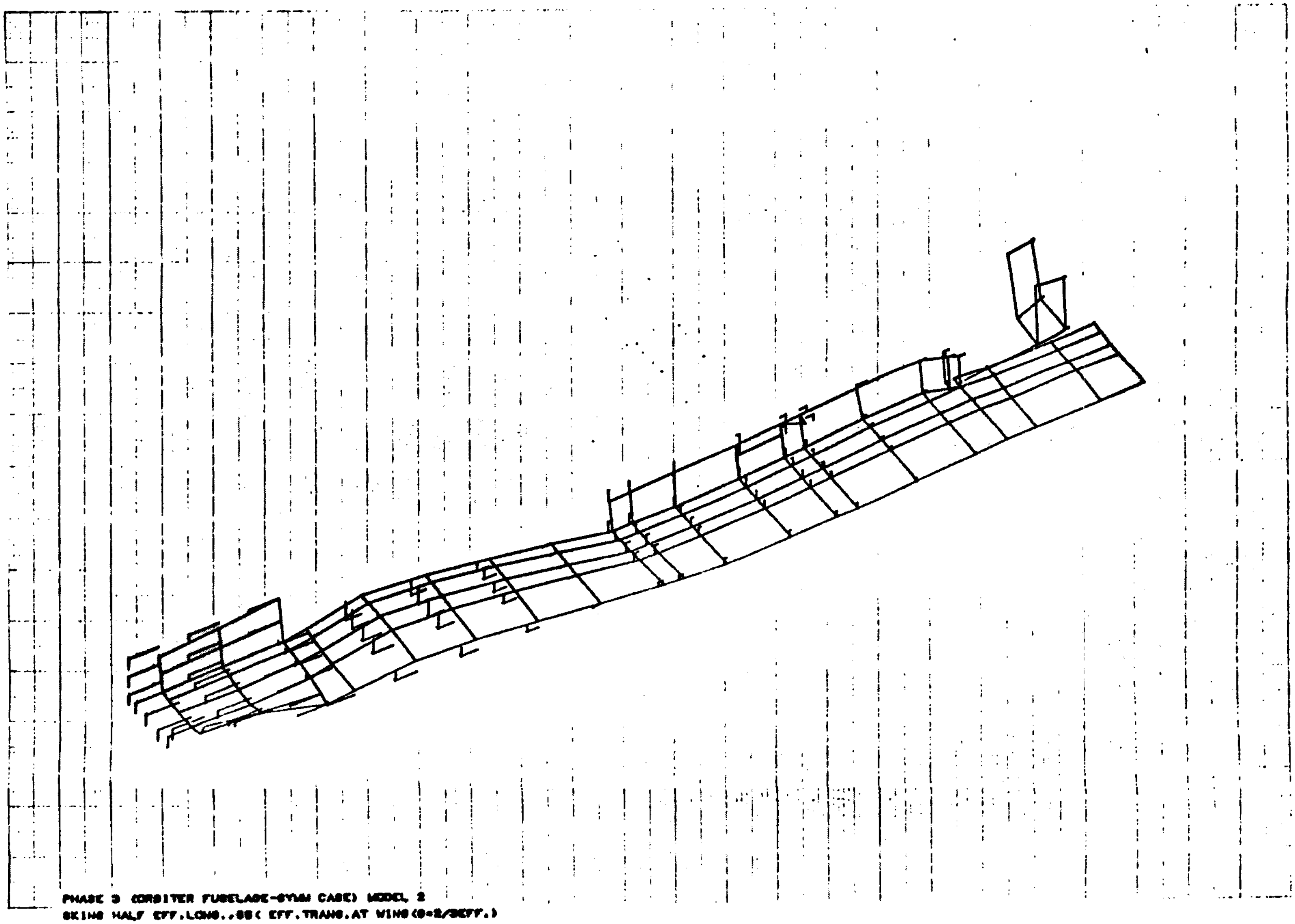
12 10/18/74 MAX-DEF. = 0.94110788

12



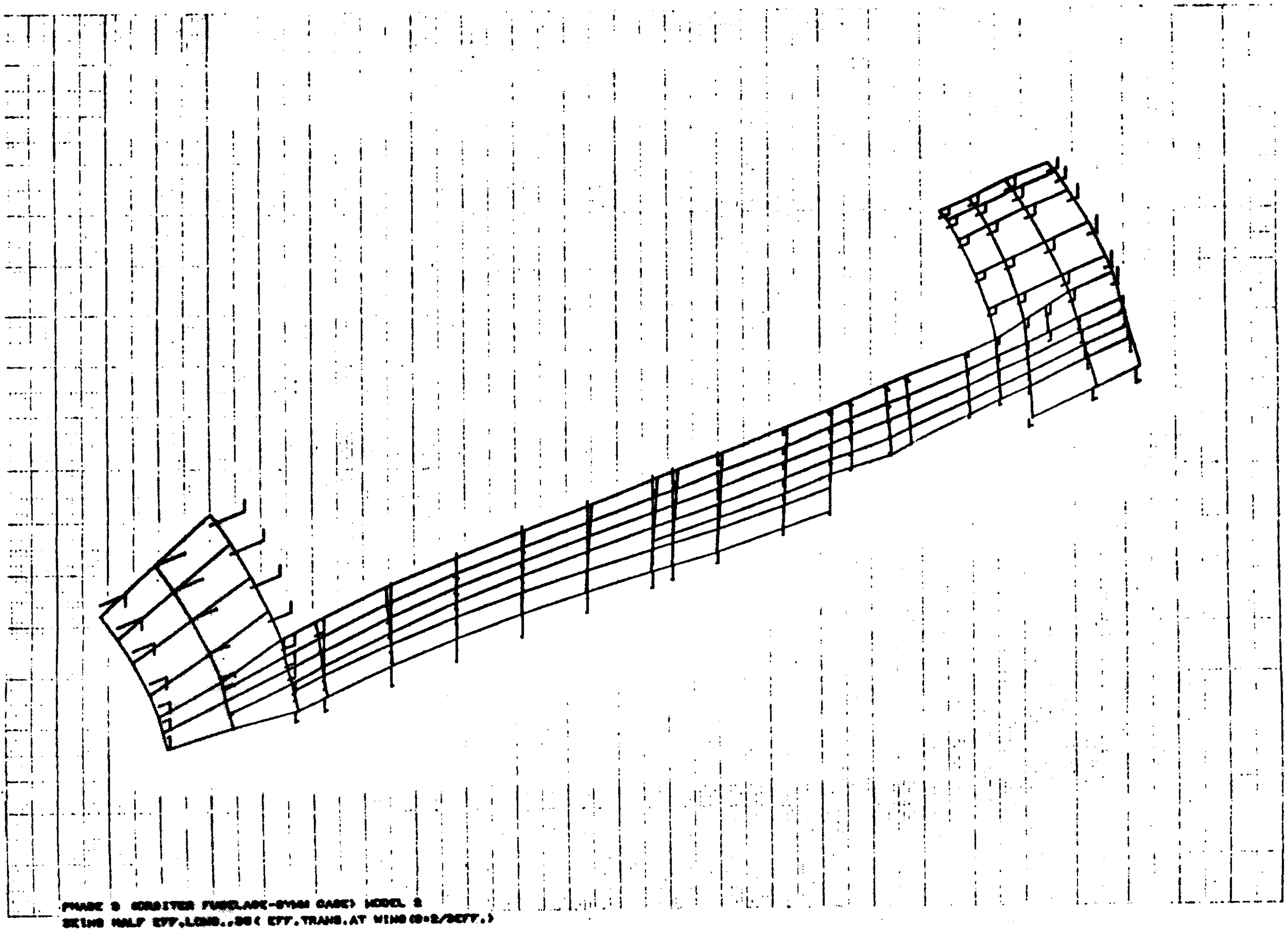
PHASE 5 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,85(EFF.TRANS.AT WING(B=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 12 MODE 12 FREQ. 104.7841

13   10/18/74   MAX-DEF. = 1.00002760



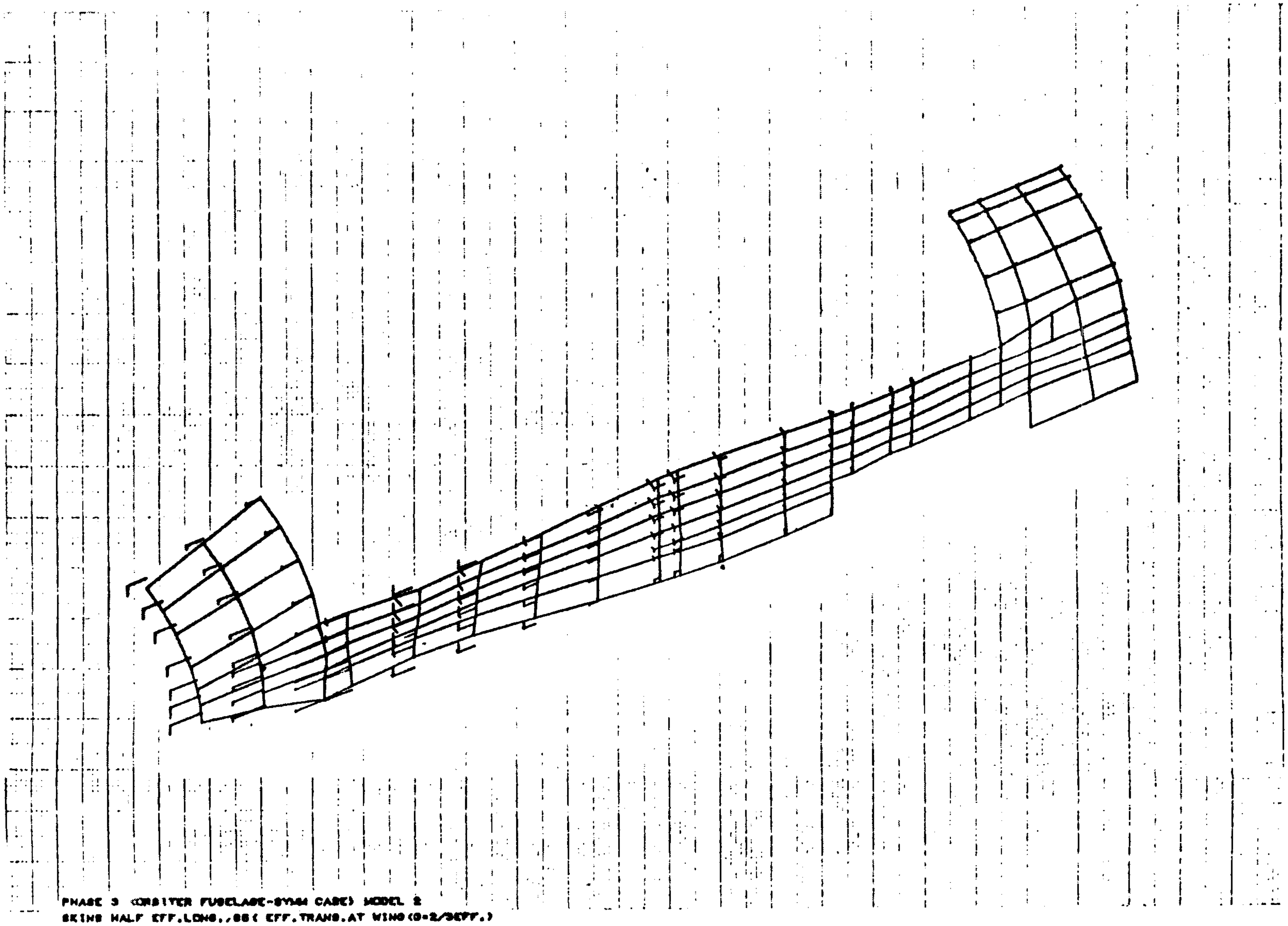
PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(S=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 13   MODE 13   FREQ. 115.8278

12   10/19/74   MAX-DEF. = 0.44146708   12



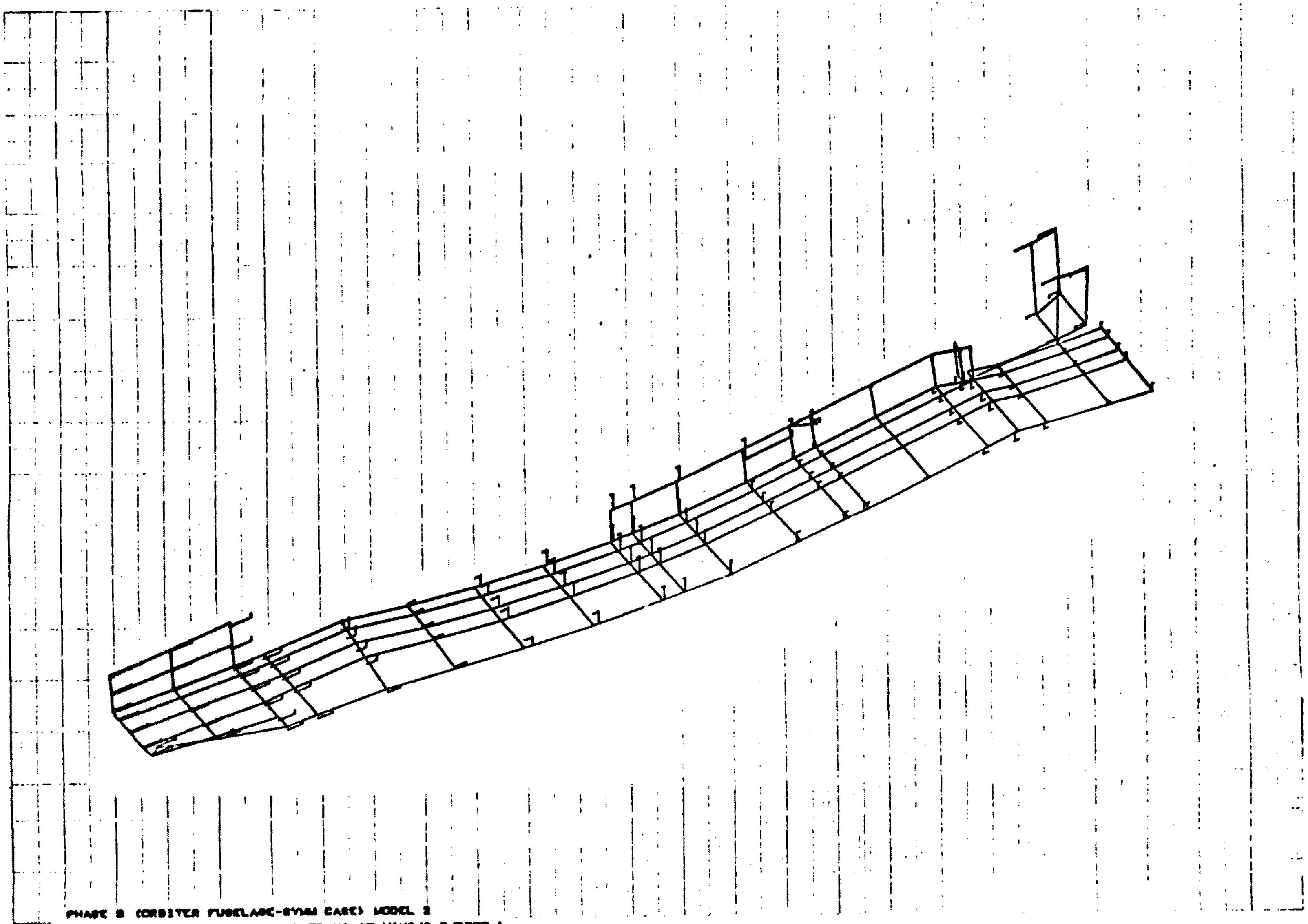
PHASE B ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,50(EFF.TRANS.AT WING(B=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 12   MODE 12   FREQ. 104.7841

18 10/19/74 MAX-DEF. = 1.09482780 18



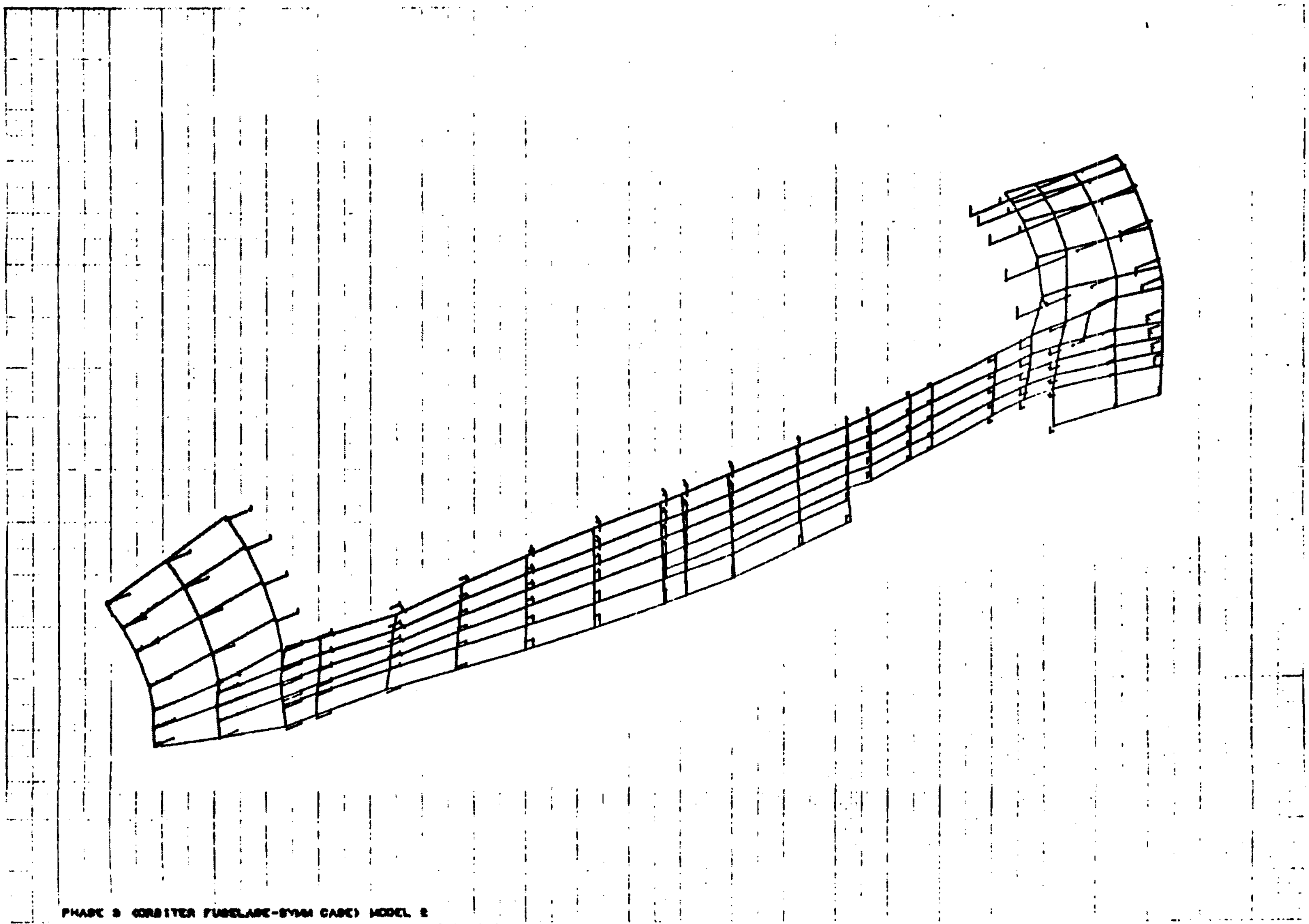
PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.66(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 13 MODE 13 FREQ. 116.8278

14 10/18/74 MAX-DEF. = 0.58416432 14



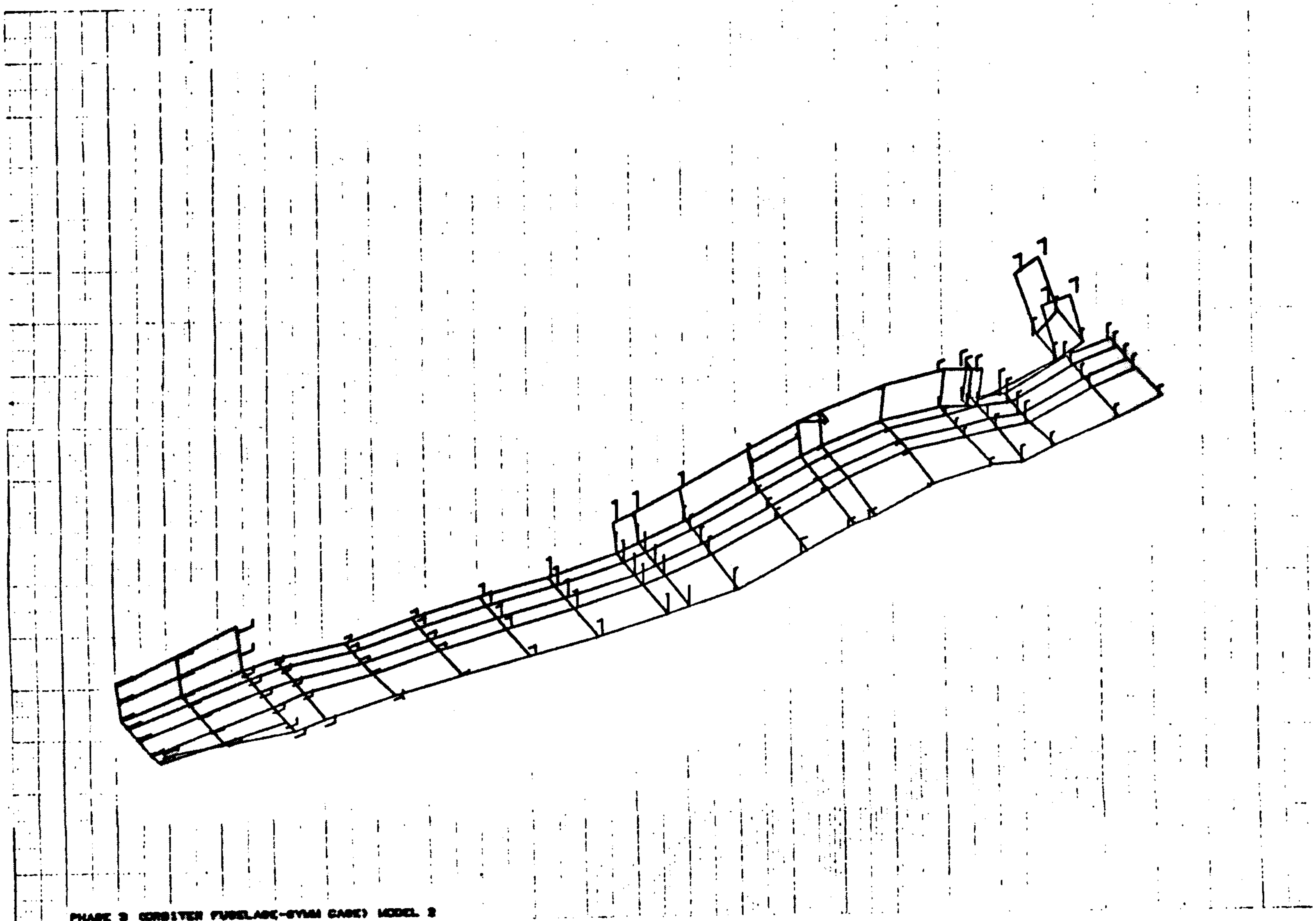
PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(G=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 14 MODE 14 FREQ. 122.2084

14 10/19/74 MAX-DEF. = 0.50418492 14



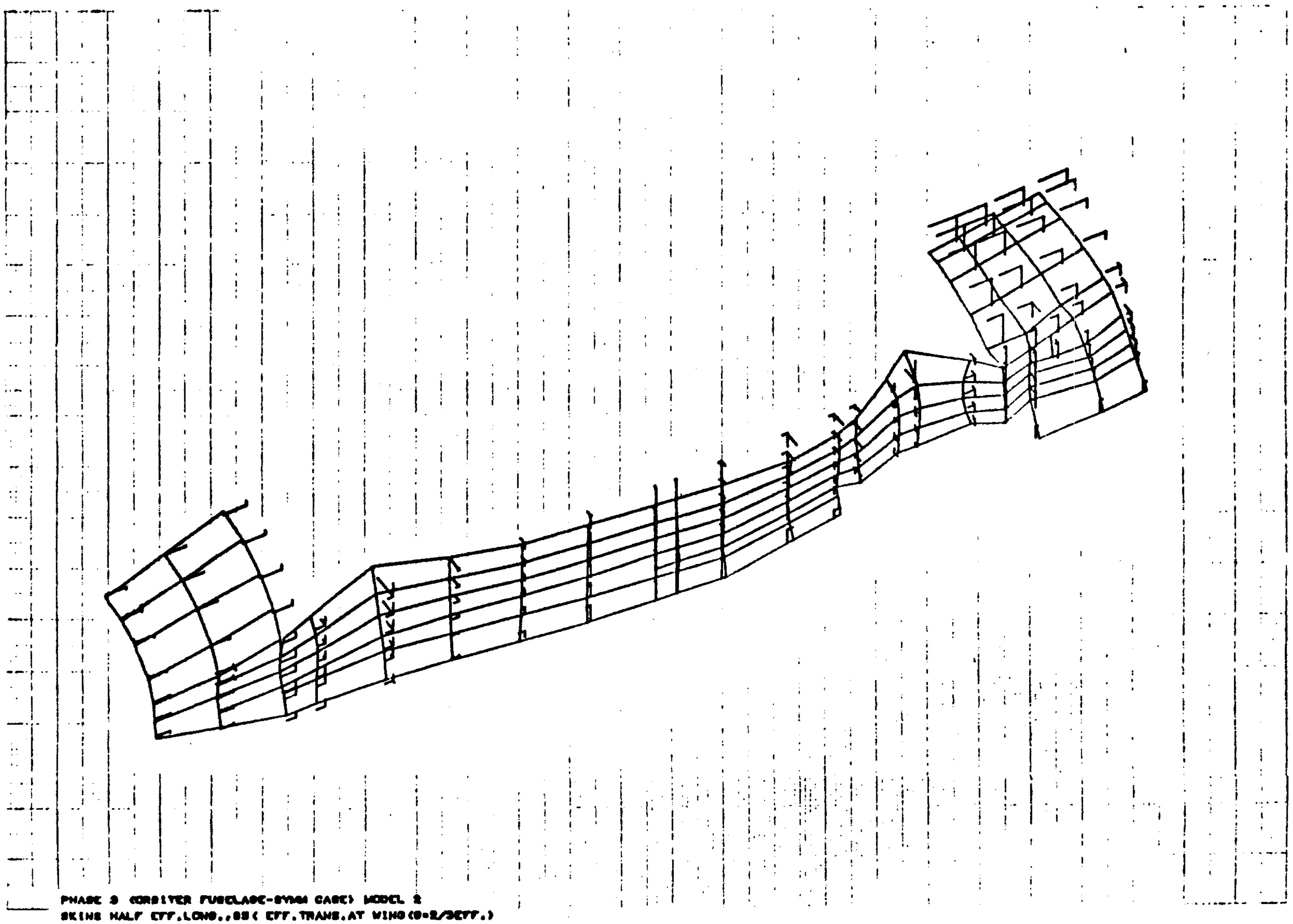
PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(0+2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 14 MODE 14 FREQ 122.2054

15 10/18/74 MAX-DEF. = 0.007[illegible] 19



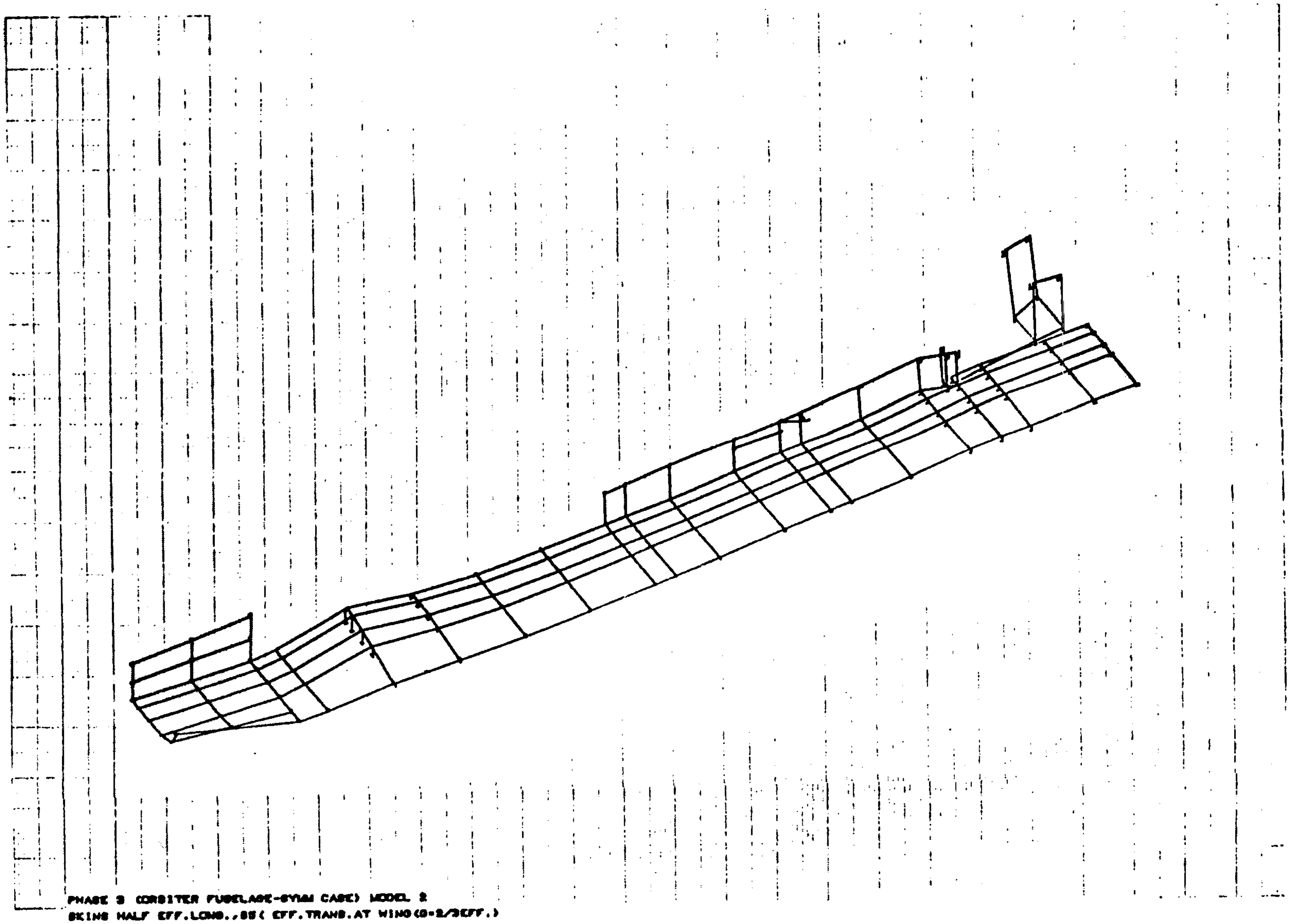
PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.65(EFF.TRANS.AT WING(B-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 15 MODE 15 FREQ. 129.9431

15   10/19/74   MAX-DEF. = 0.00719808



PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,85(EFF.TRANS.AT WING(B=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 15   MODE 15   FREQ. 129.9431

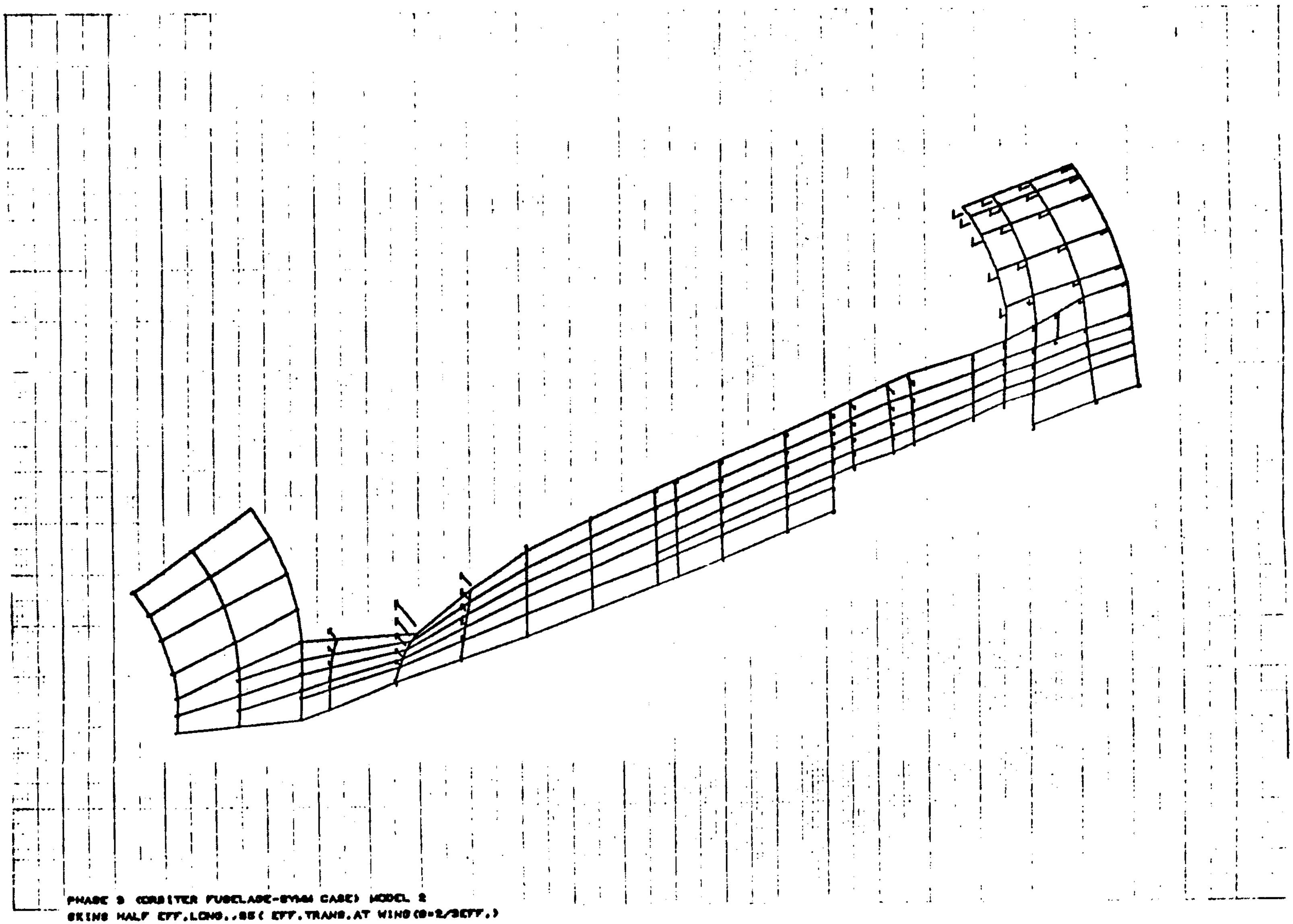
16 10/18/74 MAX-DEF. = 0.08731669



PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(S=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 16 MODE 16 FREQ. 130.2633

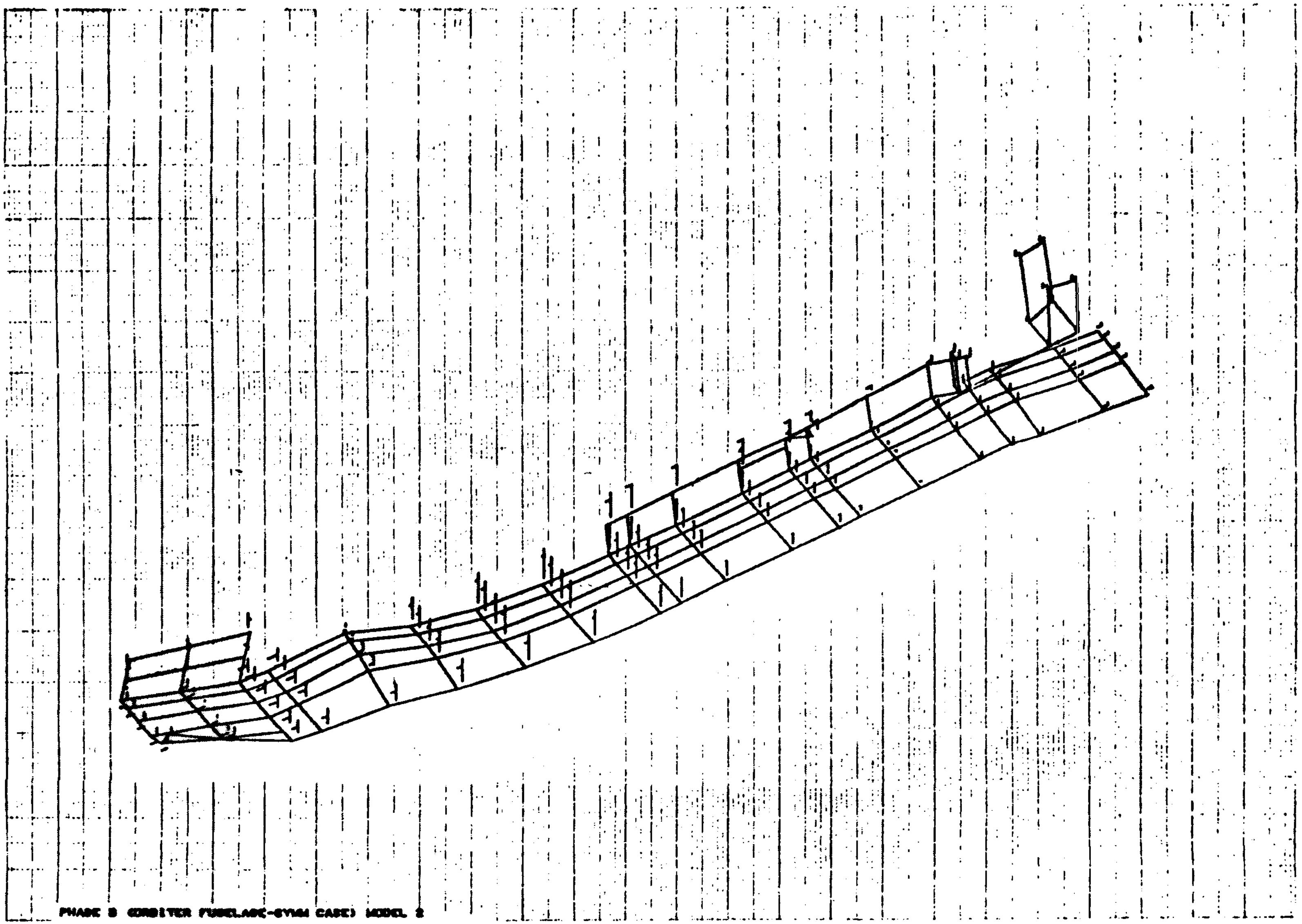
16 10/14/74 MAX-DEF. = 0.08731889

16



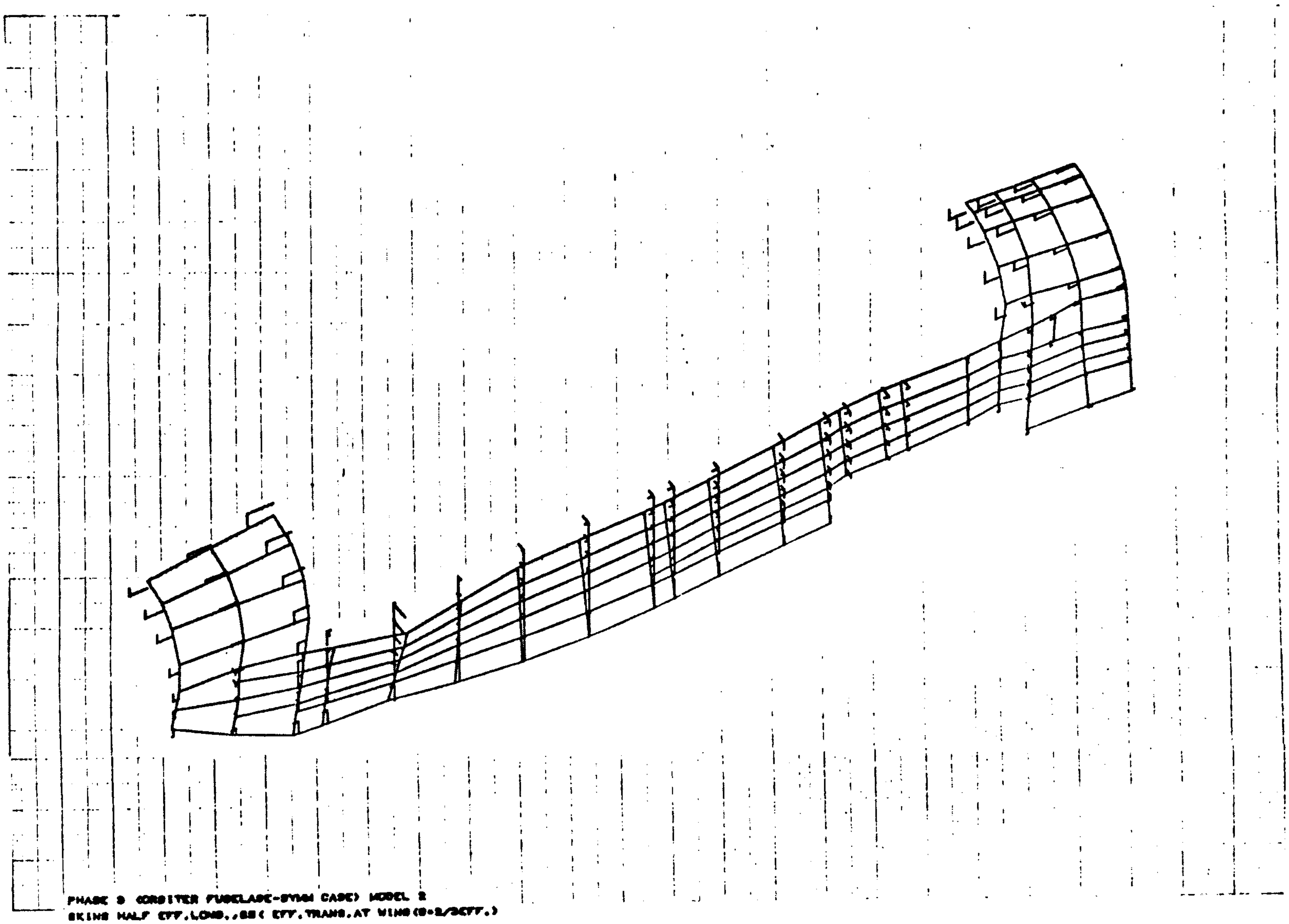
PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(S=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 16 MODE 16 FREQ. 130.2833

17 [illegible] MAX-DEF. = [illegible] 17

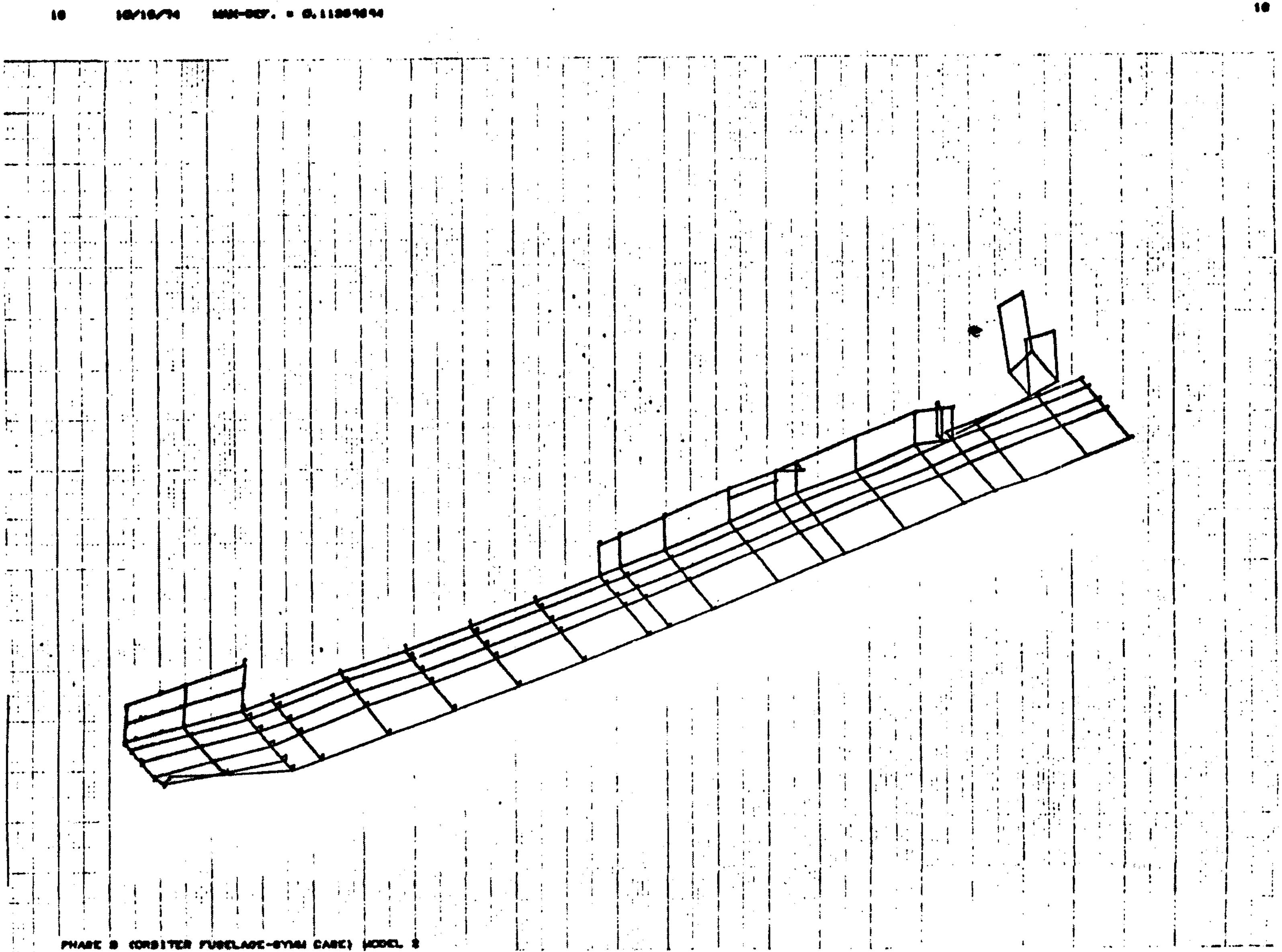


PHASE B ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 17 MODE 17 FREQ. 142.1368

17 10/19/74 MAX-DEF. = 0.37098848 17



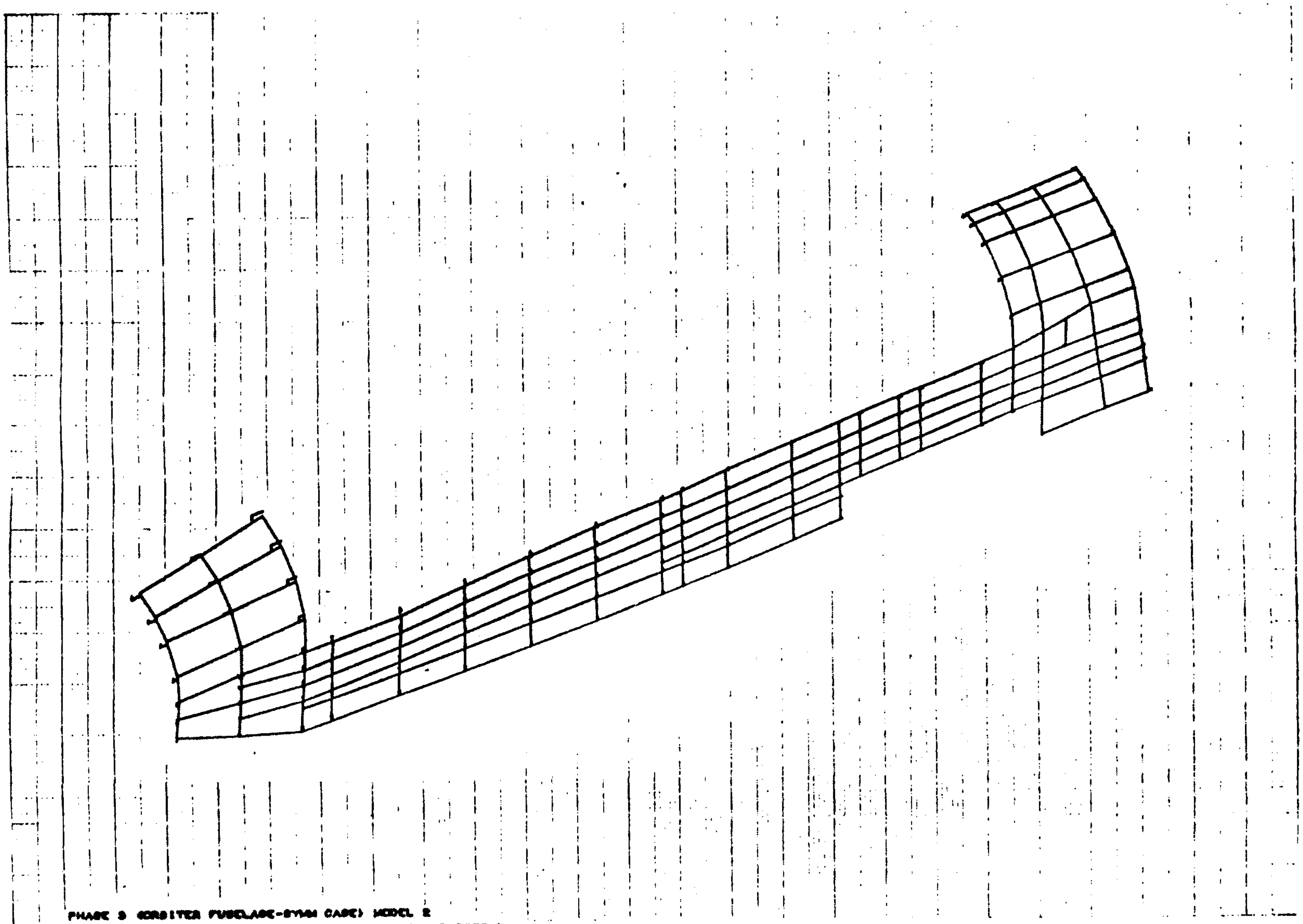
PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,SS(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 17 MODE 17 FREQ. 142.1388


10 10/16/74 MAX-DEF. = 0.11369694
10

PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.65(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 159.8369

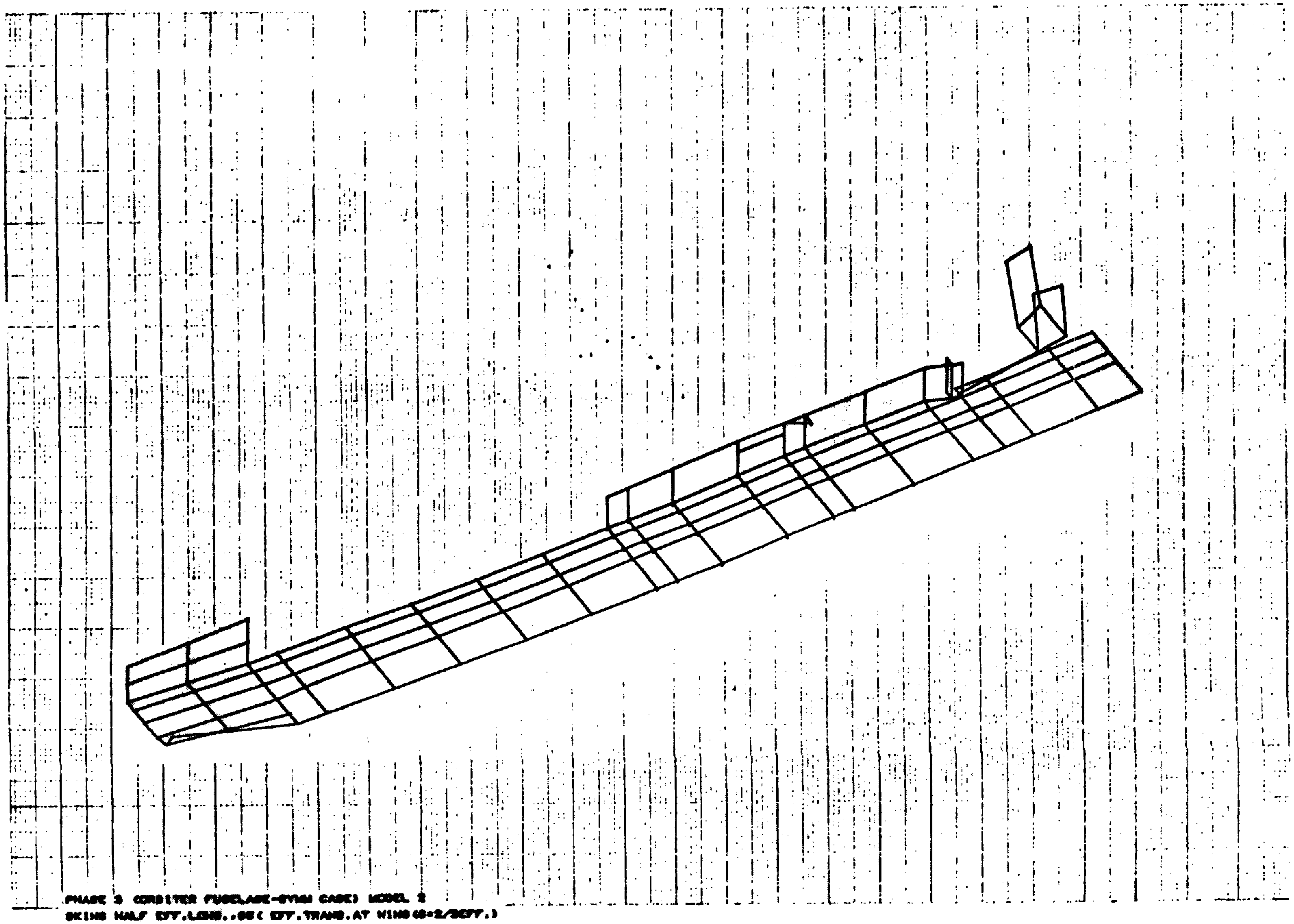
18 10/19/74 MAX-DEF. = 0.11069894

18



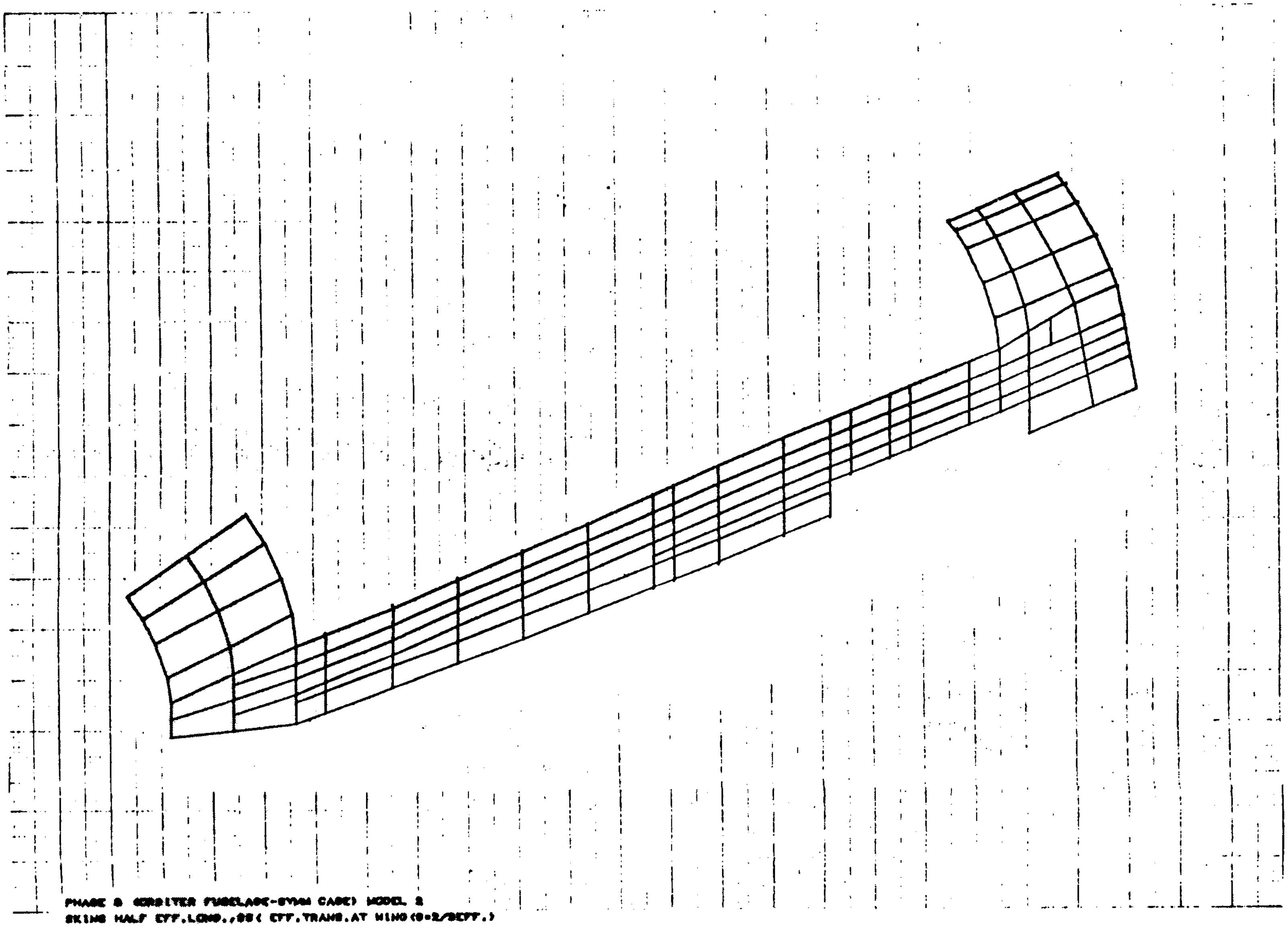
PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,0%(EFF.TRANS.AT WING(0-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 159.0369

19 .10/16/74 MAX-DEF. = 0.14918880 19

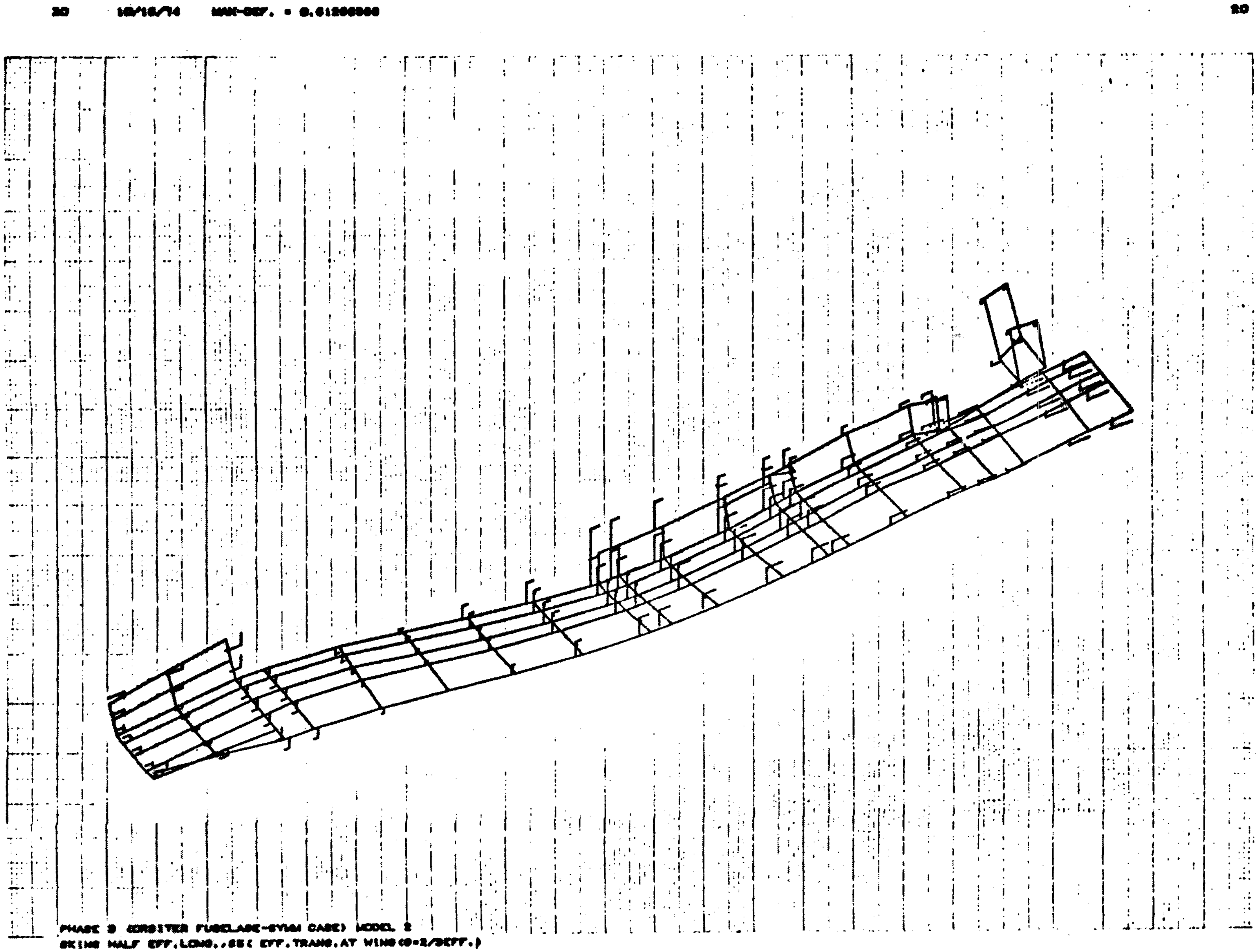


PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING(G=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 19 MODE 19 FREQ. 100.3082

19   10/14/74   MAX-DEF. = 0.19810290

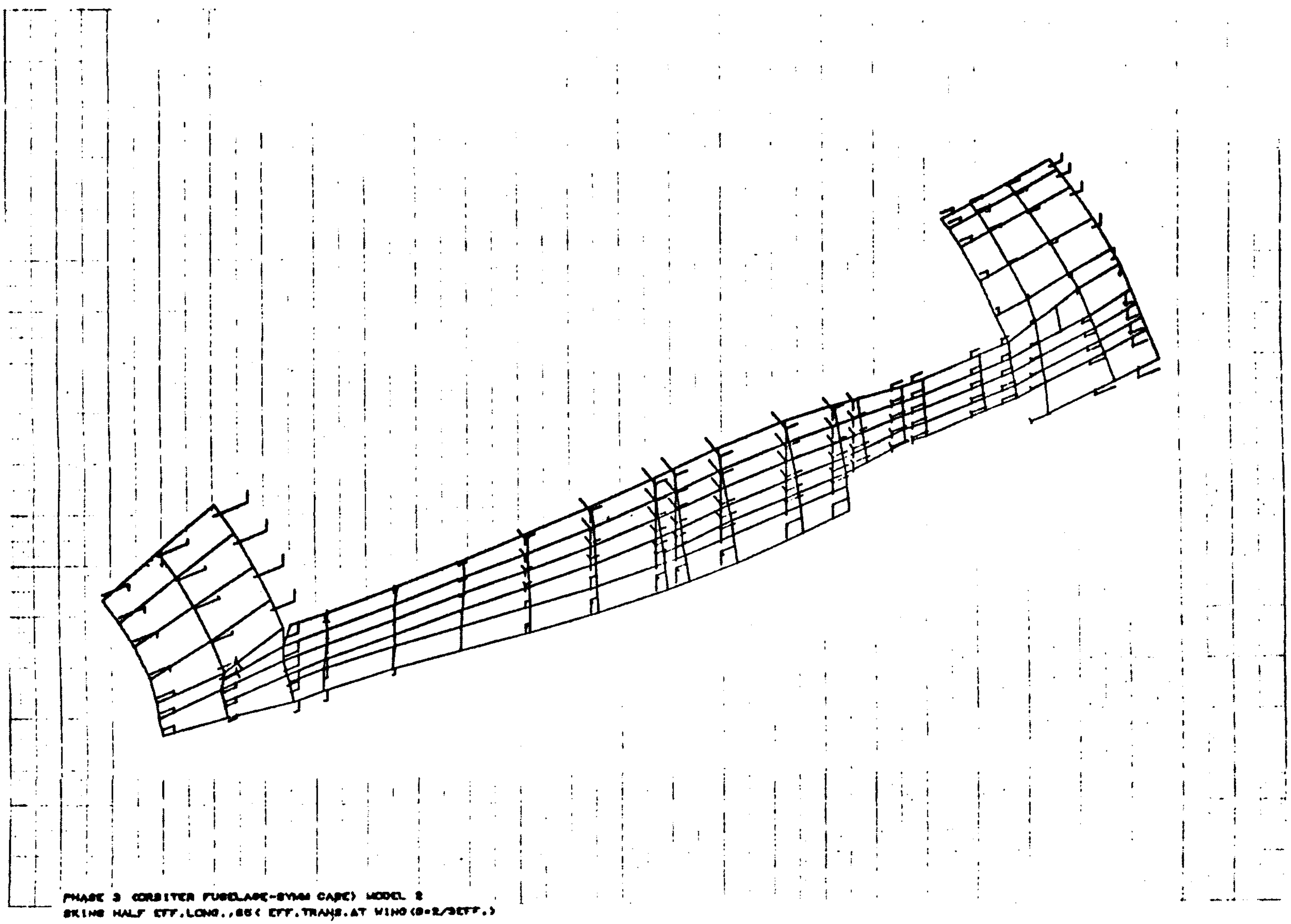


PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,95(EFF.TRANS.AT WING(0=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR, SUBCASE 19   MODE 19   FREQ. 100.2002


20 10/16/74 MAX-DEF. = 0.01200000
20

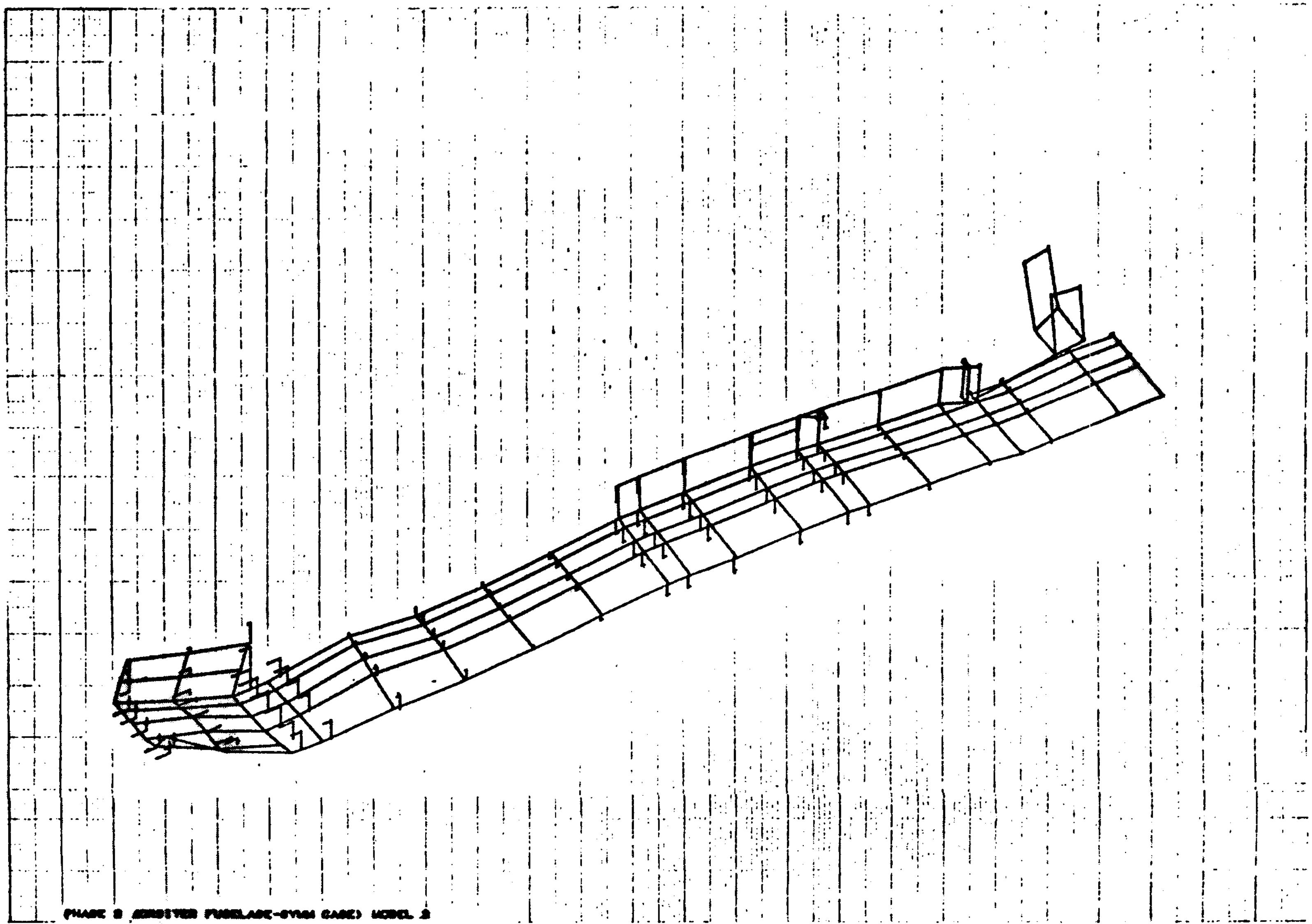
PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.65(EFF.TRANS.AT WING(B=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 20 MODE 20 FREQ. 171.7384

20 10/19/74 MAX-DEF. = 0.01200388 20

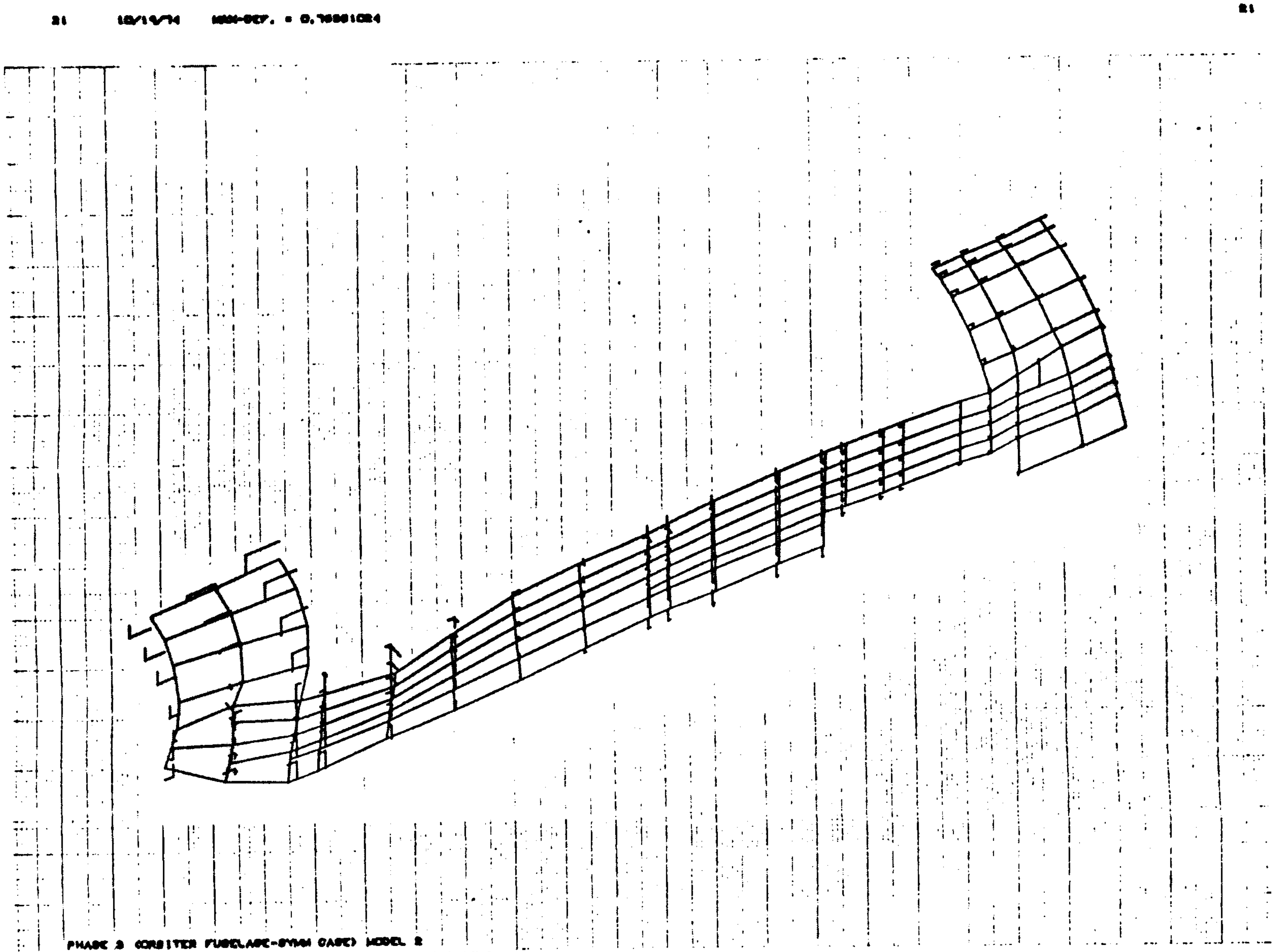


PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.85(EFF.TRANS.AT WING (B-2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 20 MODE 20 FREQ. 171.7384

21 . 10/10/74 MAX-DEF. = 0.7[illegible] 21



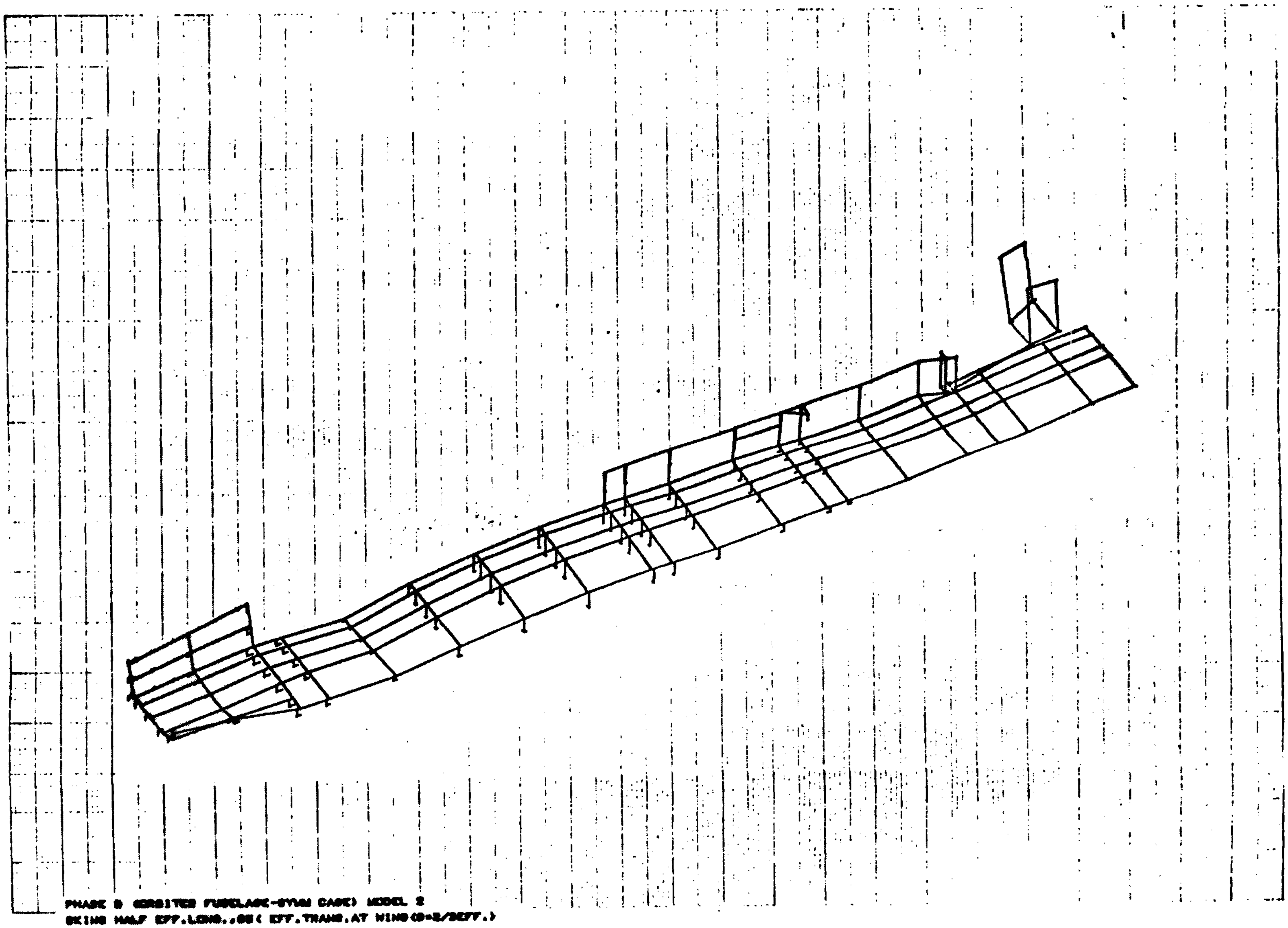
(PHASE B ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.50(EFF.TRANS.AT WINGS=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 21 MODE 21 FREQ, 106.4590


21 10/19/74 MAX-DEF. = 0.76881024
21

PHASE 2 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,85(EFF.TRANS.AT WING(0=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 21 MODE 21 FREQ. 166.4590

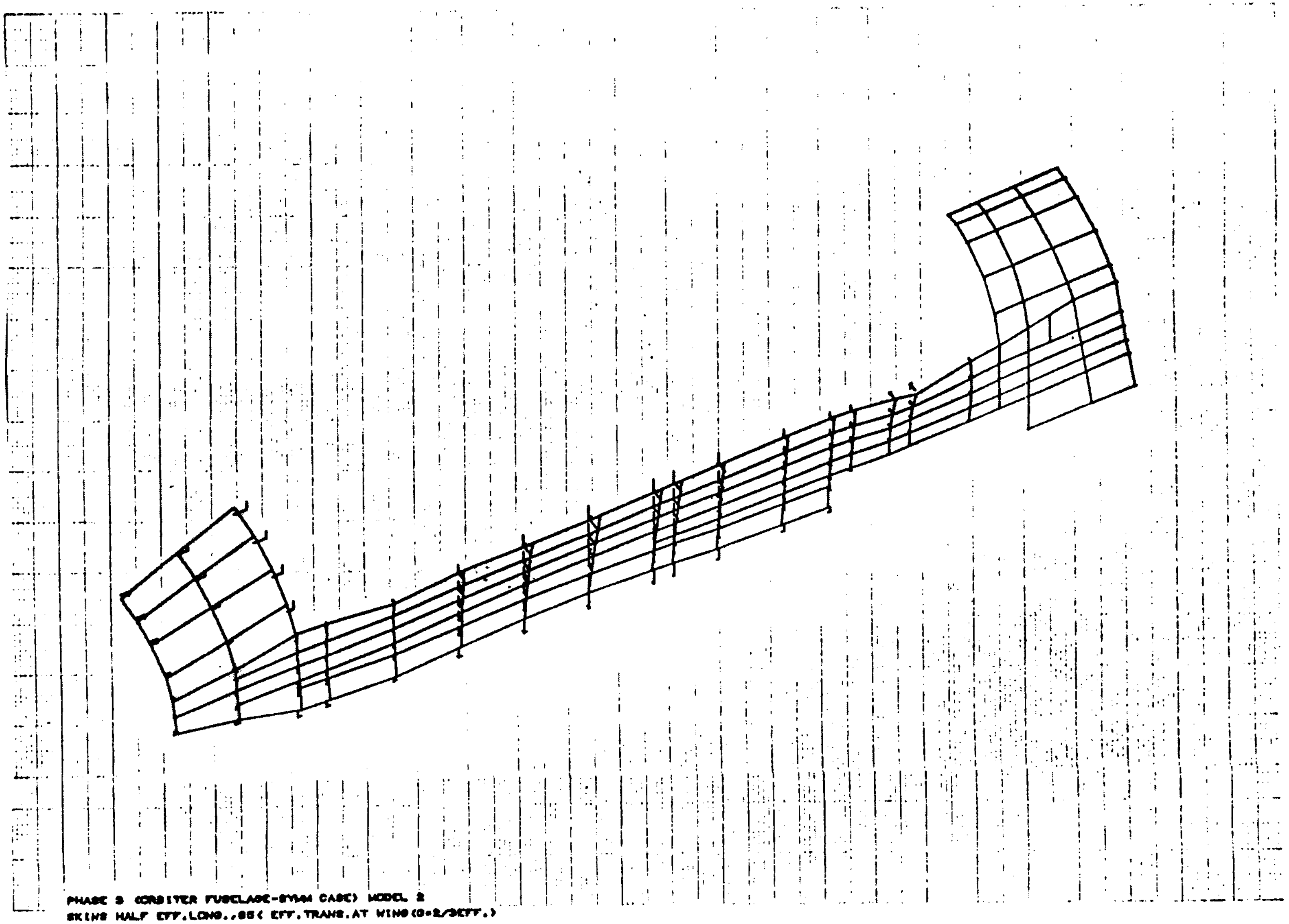
22 . 10/16/74 MAX-DEF. = 0.02112981

22

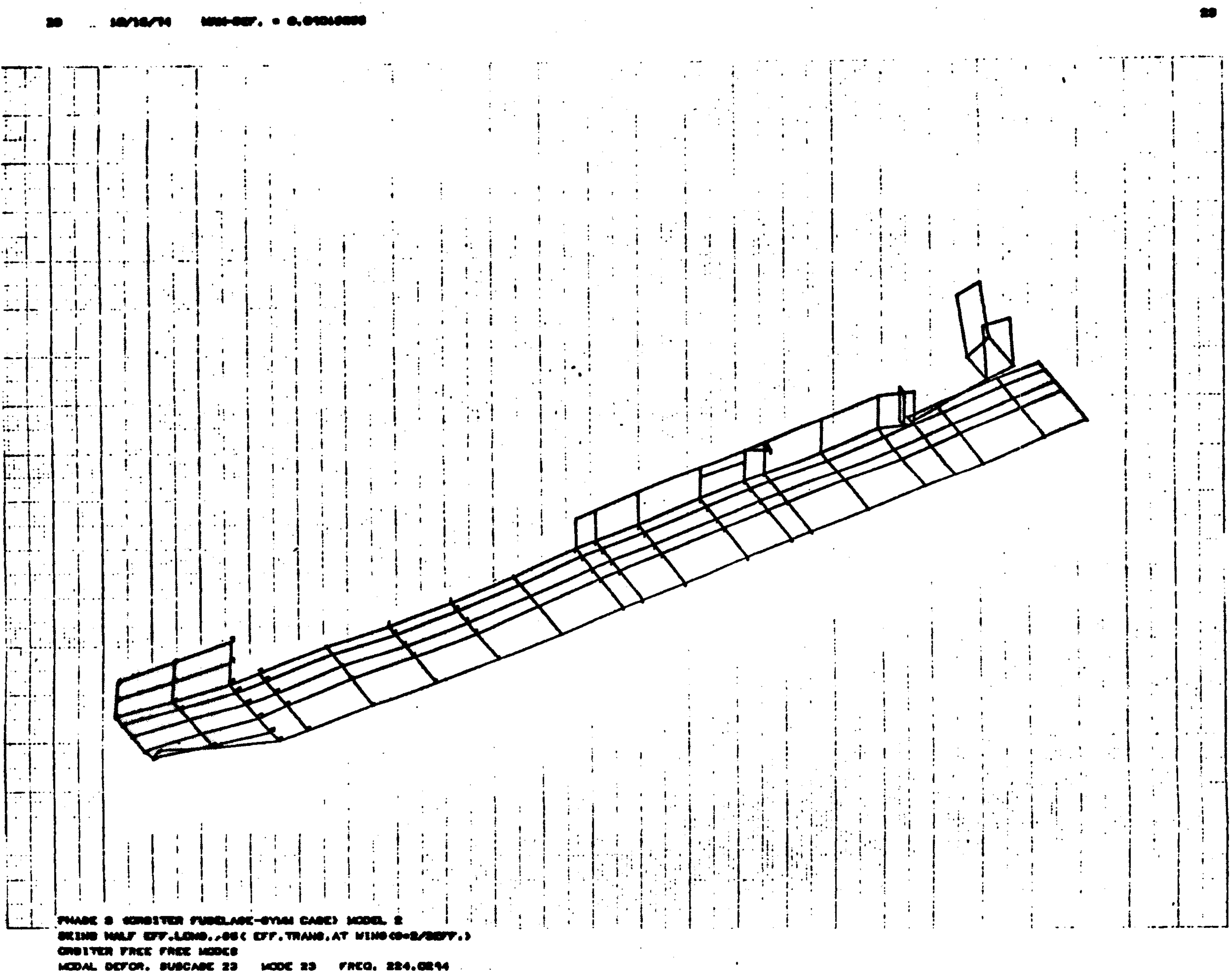


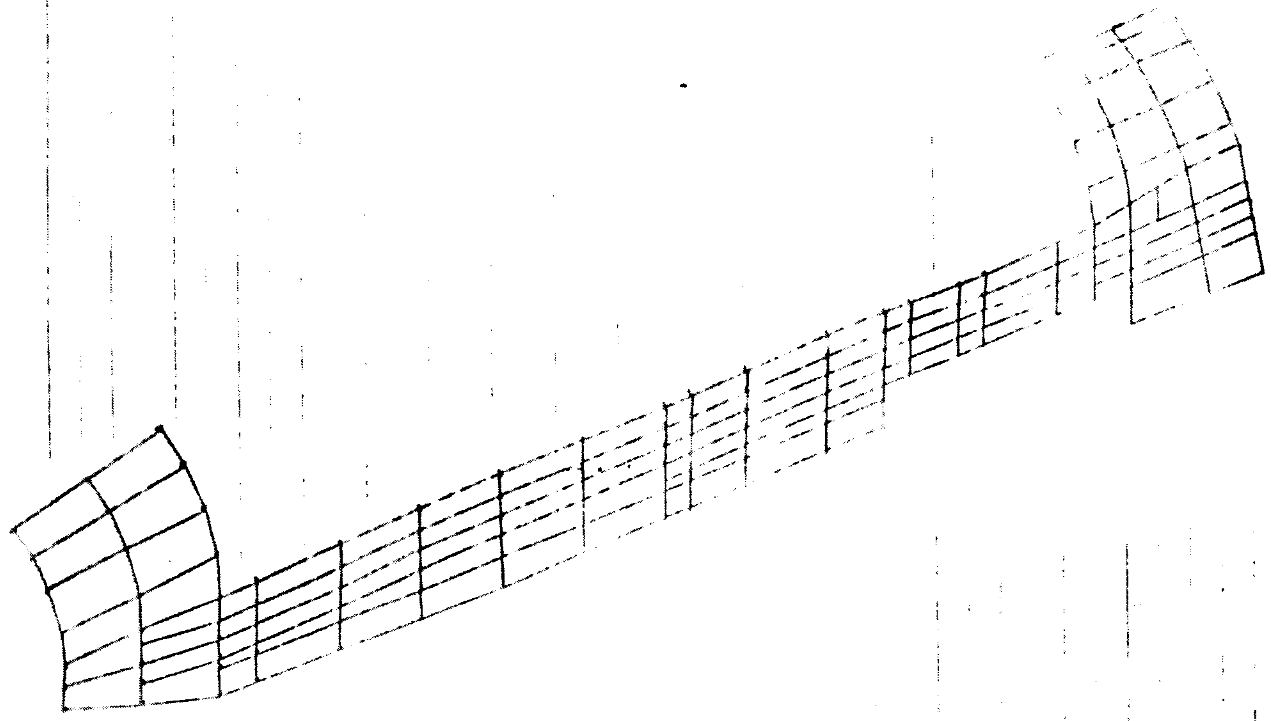
PHASE B (ORBITER FUSELAGE-SYM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(B=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 22 MODE 22 FREQ. 190.2383

22   10/19/74   MAX-DEF. = 0.08112921   22



PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,85(EFF.TRANS.AT WING(G=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 22   MODE 22   FREQ. 190.2363


20 10/16/74 MAX-DEF. = [illegible]
20
PHASE B (ORBITER FUSELAGE-SYMM CASE) MODEL 2
SKINS HALF EFF.LONG.,.05(EFF.TRANS.AT WING(S=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 23 MODE 23 FREQ. 224.0294



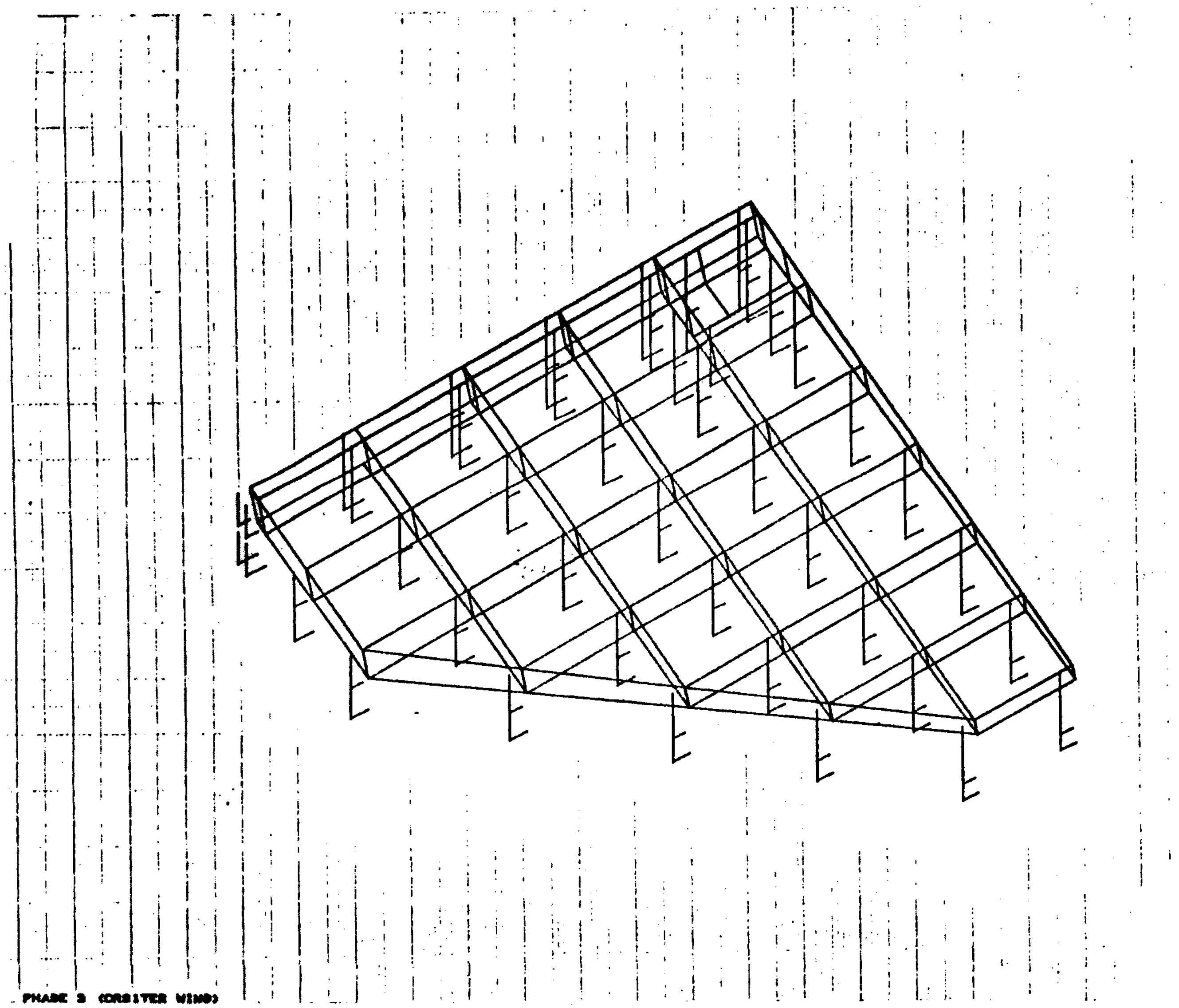
PHASE 3 (ORBITER FUSELAGE-SYMM CASE) MODEL 3
SKINS HALF EFF,LONG.,.85(EFF,TRANS.AT WING(0=2/3EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 23 MODE 23 FREQ. 224.0844

Appendix B15

INPUT & PLOTS/PHASE 3 ANALYSIS: MODEL II WING SYMMETRIC FREE-FREE ORBITER MODES

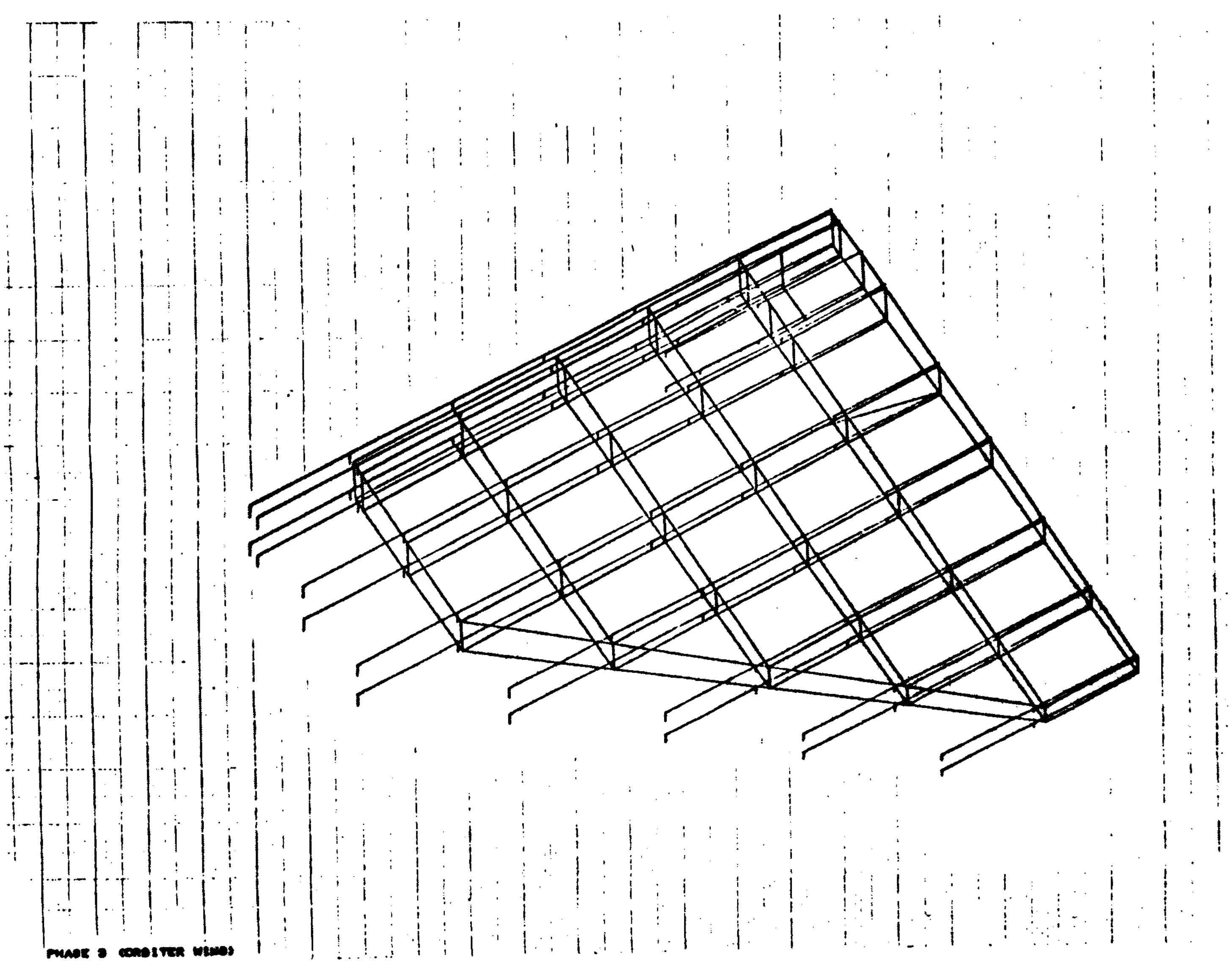
```
PHASE 3 %ORBITER WING%                                              OCTOBER  18, 1974   NASTRAN  2/ 1/73   PAGE     6
9/10/74 %COVERS 65 PERCENT EFF.%

                                 C A S E    C O N T R O L    D E C K    E C H O
 CARD
 COUNT
   1          TITLE # PHASE 3 %ORBITER WING%
   2          SUBTITLE # 9/10/74 %COVERS 65 PERCENT EFF.%
   3          MAXLINES # 50000
   4          SUBCASE 1
   5          LABEL     # ORBITER FREE FREE MODES
   6          MODES    # 23
   7          OUTPUT
   8          VECTOR   # ALL
   9          OUTPUT%PLOT%
  10          SET 1   # INCLUDE 3101 THRU 3125
  11          SET 2   # INCLUDE 3201 THRU 3227
  12          SET 3   # INCLUDE 3301 THRU 3352
  13          SET 4   # INCLUDE 3401 THRU 3478,3501 THRU 3536,3582
  14          SET 5   # INCLUDE 3601 THRU 3664
  15          SET 6   # INCLUDE 3701 THRU 3766
  16          SET 7   # [illegible]
  17          PLOTTER CALCOMP 765,105
  18          AXES    #MY,X,Z
  19          VIEW    # 30.0,60.0,0.0
  20          MAXIMUM DEFORMATION 10.0
  21          FIND  SCALE,ORIGIN 2,SET 7
  22          PLOT MODAL DEFORMATION 1 THRU 23,SET 7,ORIGIN 2,SHAPE,VECTOR XYZ
  23          BEGIN BULK


              PARAM   TPNAME2   ORBTSP2


              ENDDATA
```

1 10/18/74 MAX-DEF. = 0.00814780

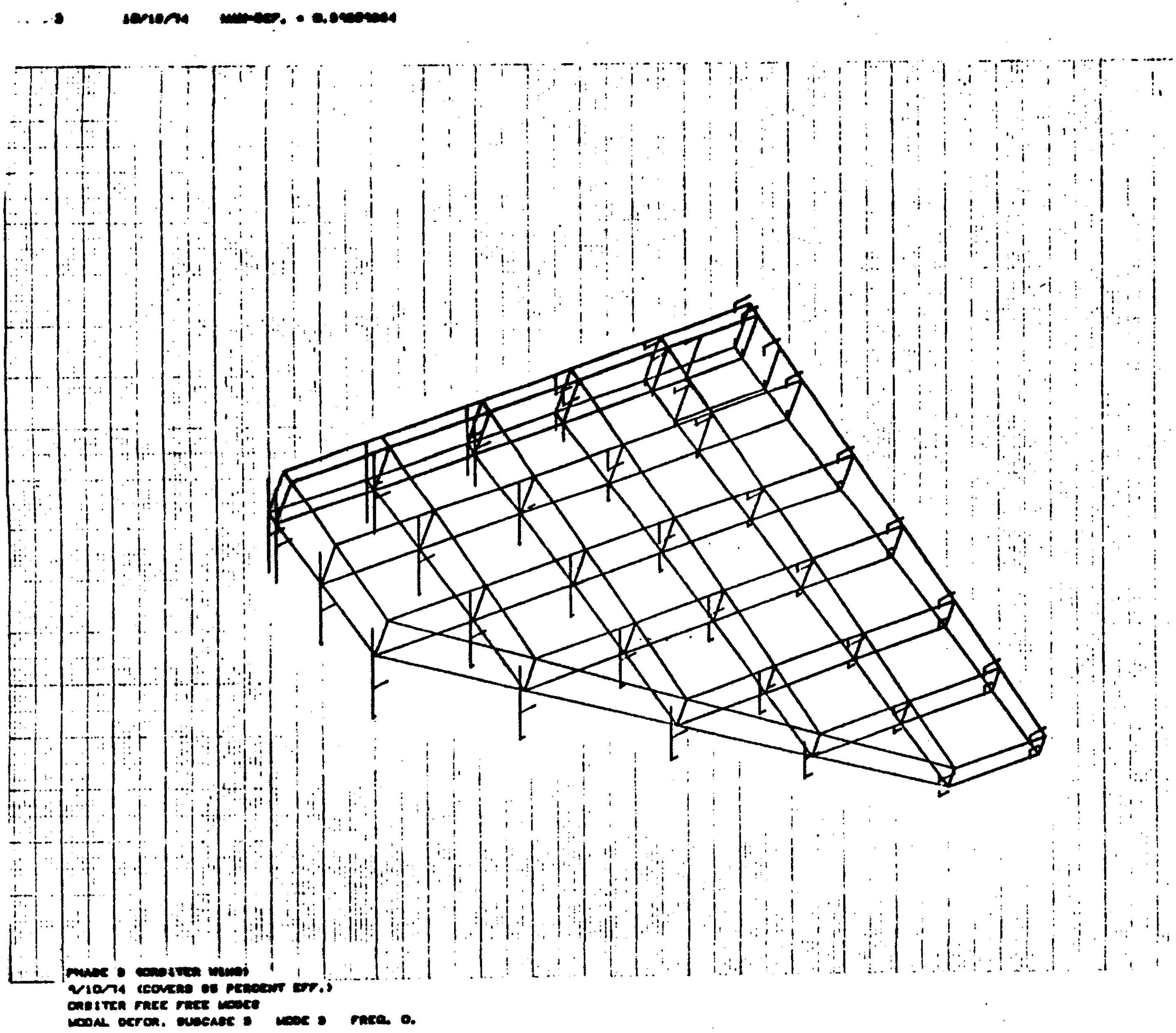


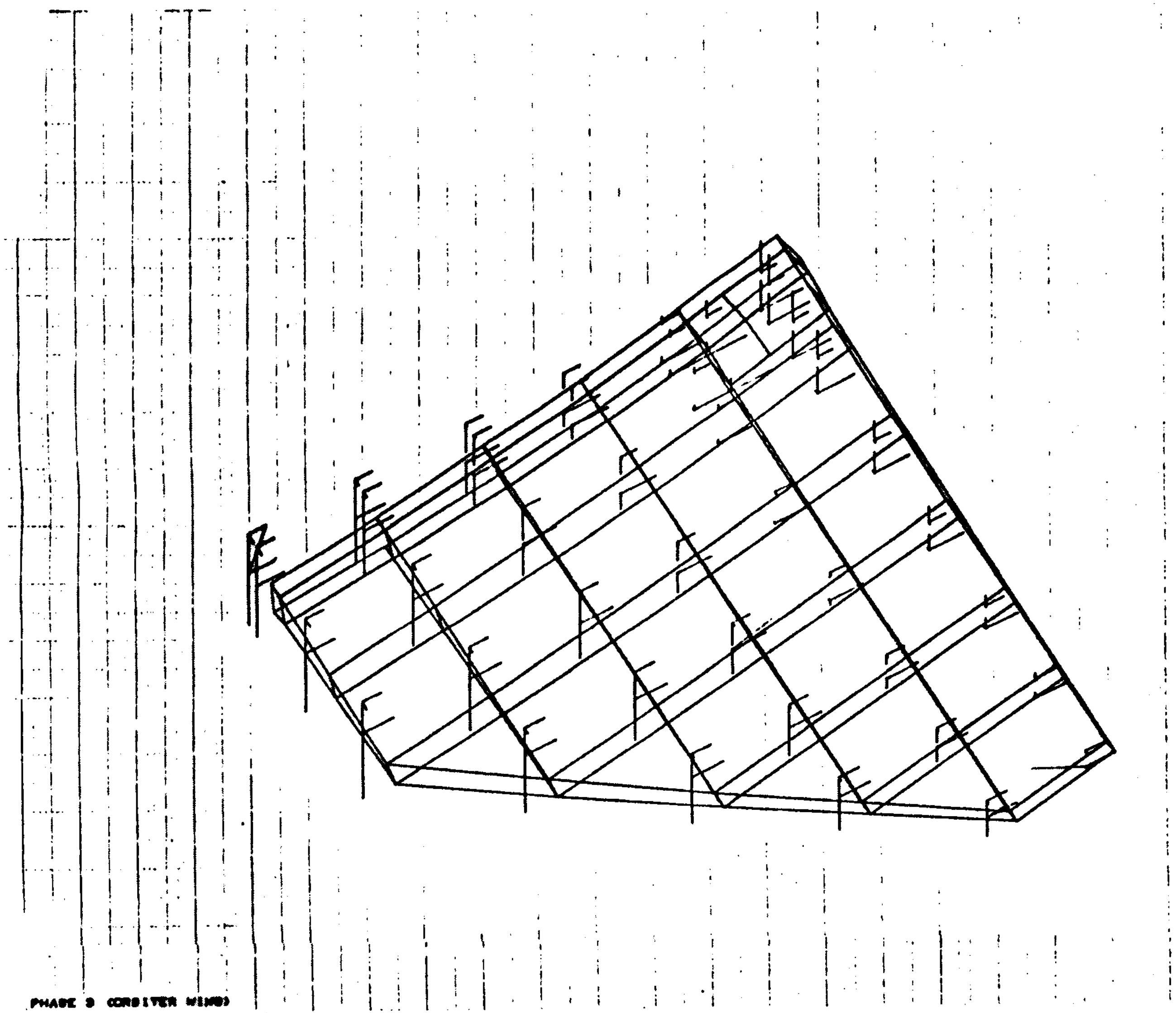
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 95 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 1 MODE 1 FREQ. 0.

1.2 . 10/18/74 MAX-DEF. = 0.99819804

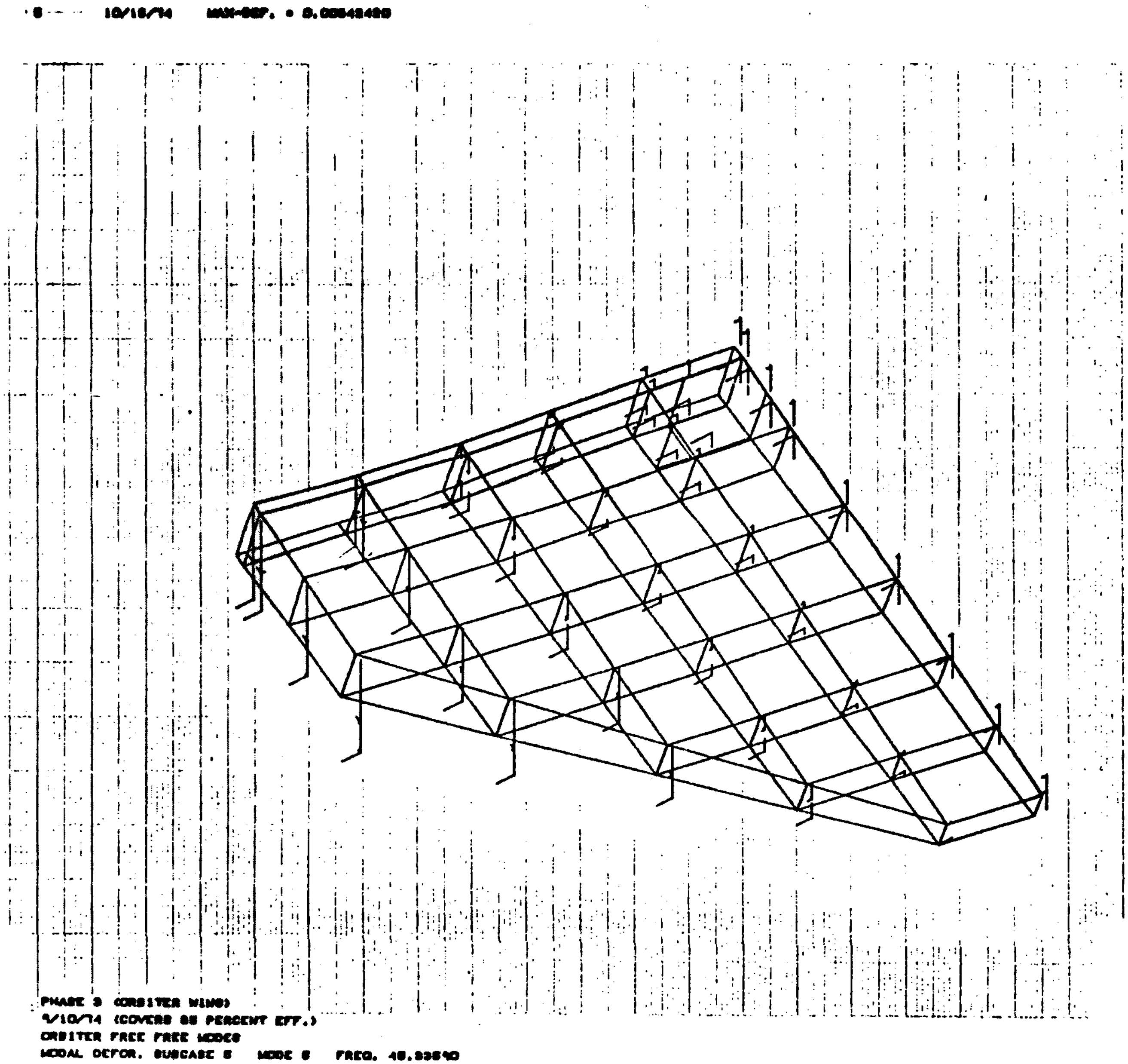


PHASE B (ORBITER WING)
9/10/74 (COVERS 85 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 2 MODE 2 FREQ. O.

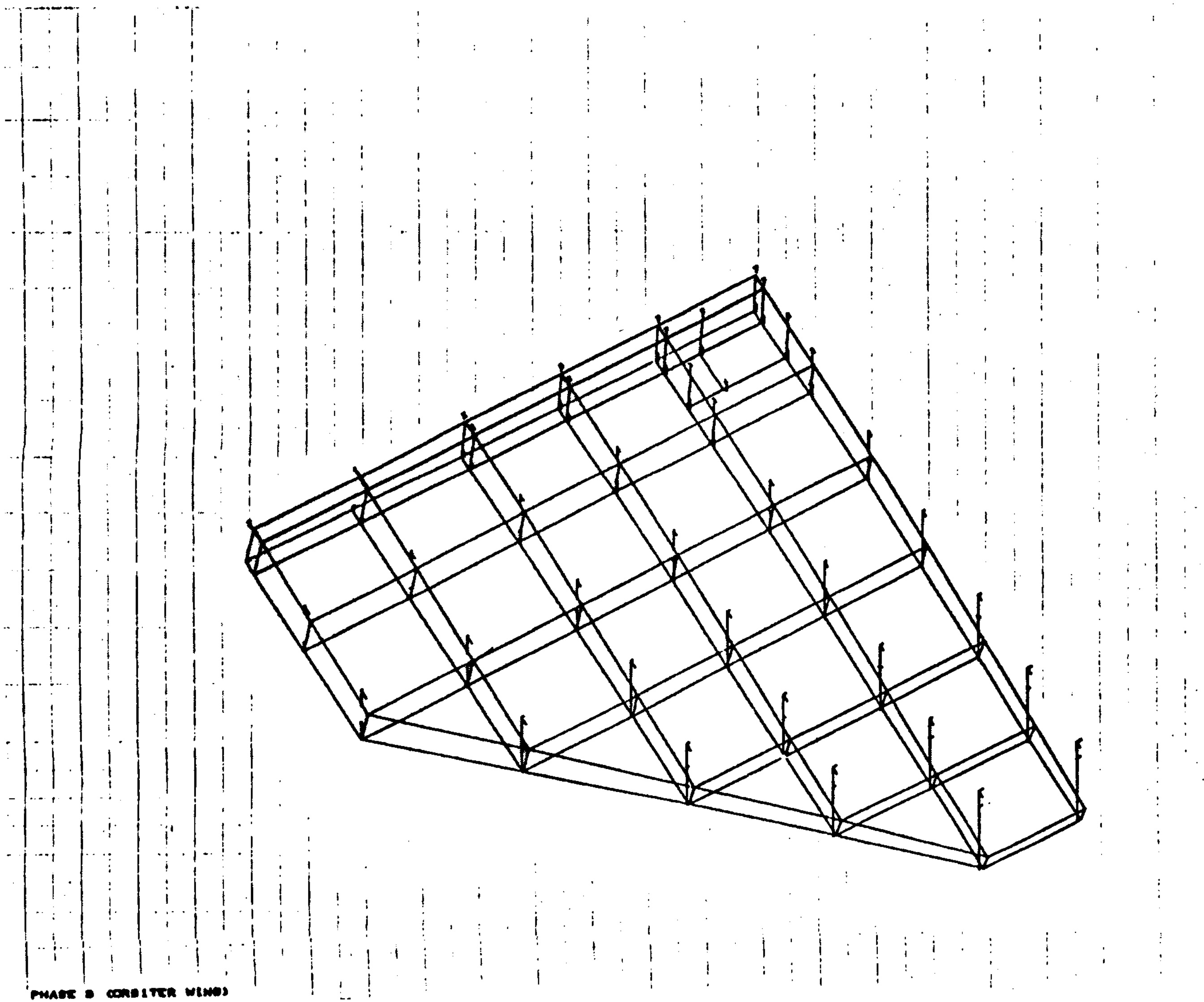

3 10/18/74 MAX-DEF. = 0.[illegible]
PHASE B (ORBITER WING)
9/10/74 (COVERS 85 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 3 MODE 3 FREQ. 0.



4 10/18/74 MAX-DEF. = 0.01778118
PHASE B (ORBITER WING)
9/10/74 (COVERS 88 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 4 MODE 4 FREQ. 44.11371

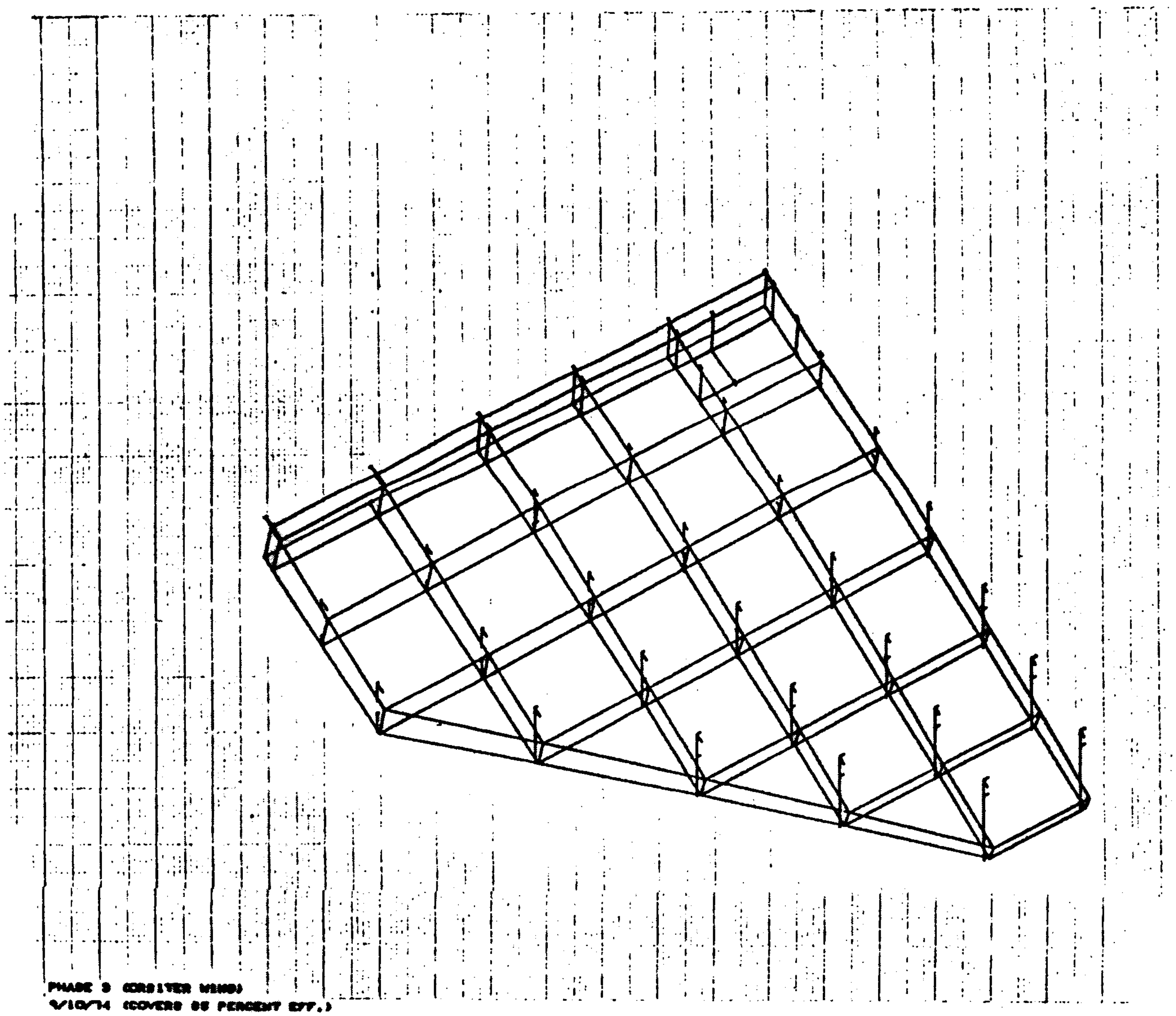

6 10/18/74 MAX-DEF. = 0.00542420
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 85 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 6 MODE 6 FREQ. 48.33590

6 10/18/74 MAX-DEF. = 0.00208898



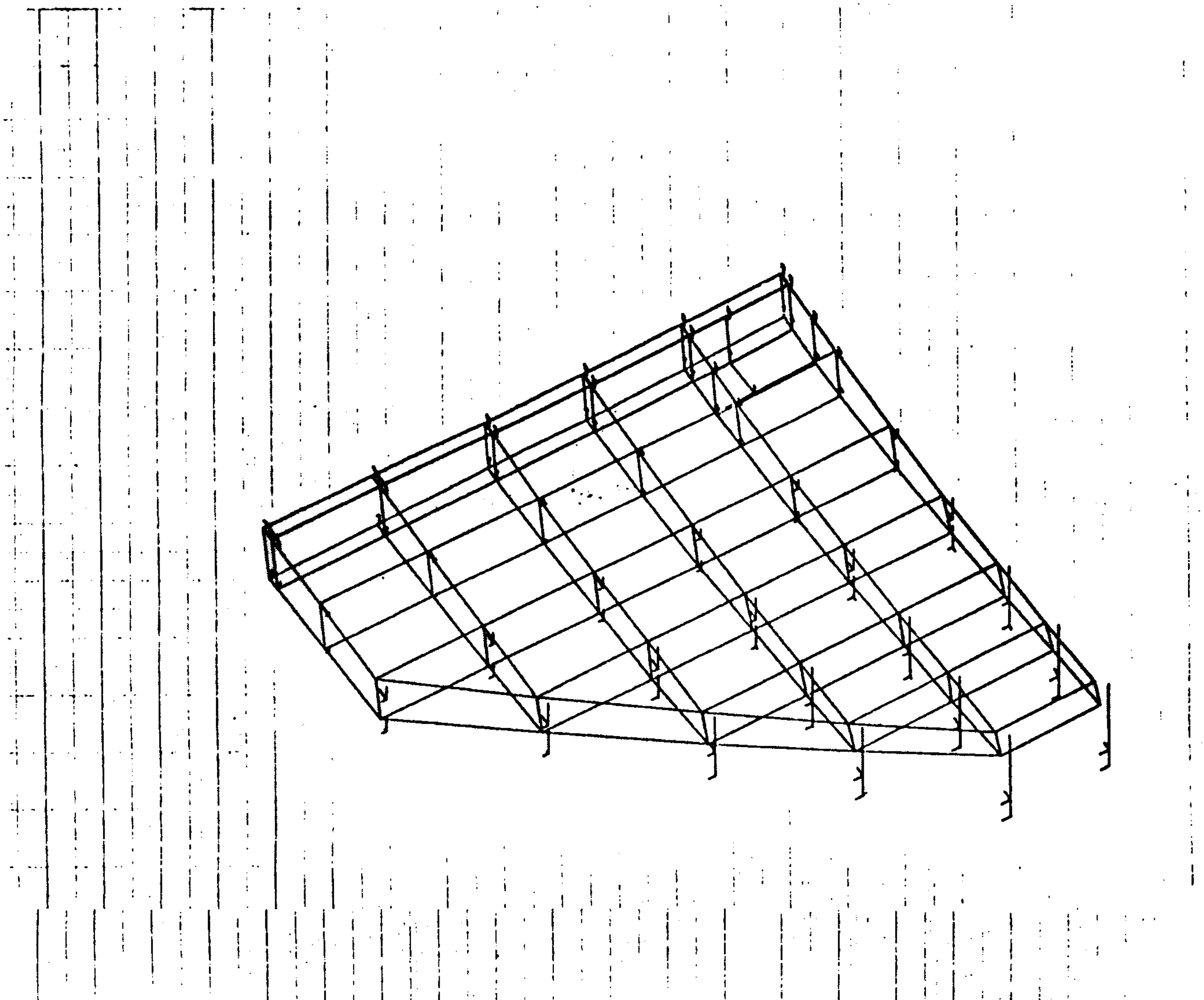
PHASE B (ORBITER WING)
9/10/74 (COVERS 85 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 6 MODE 6 FREQ. 81.20222

7 10/10/74 MAX-DEF. = 1.00147080

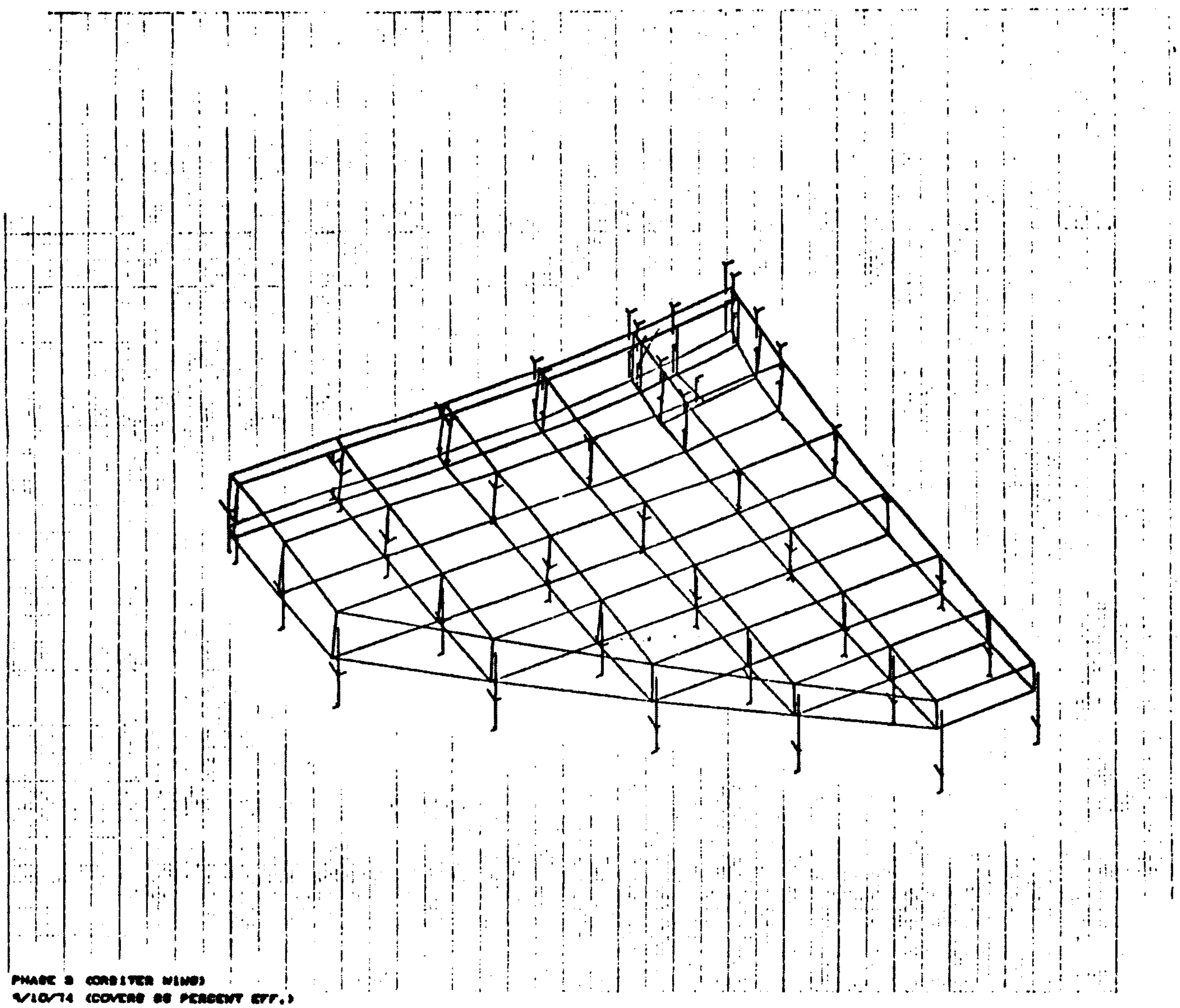


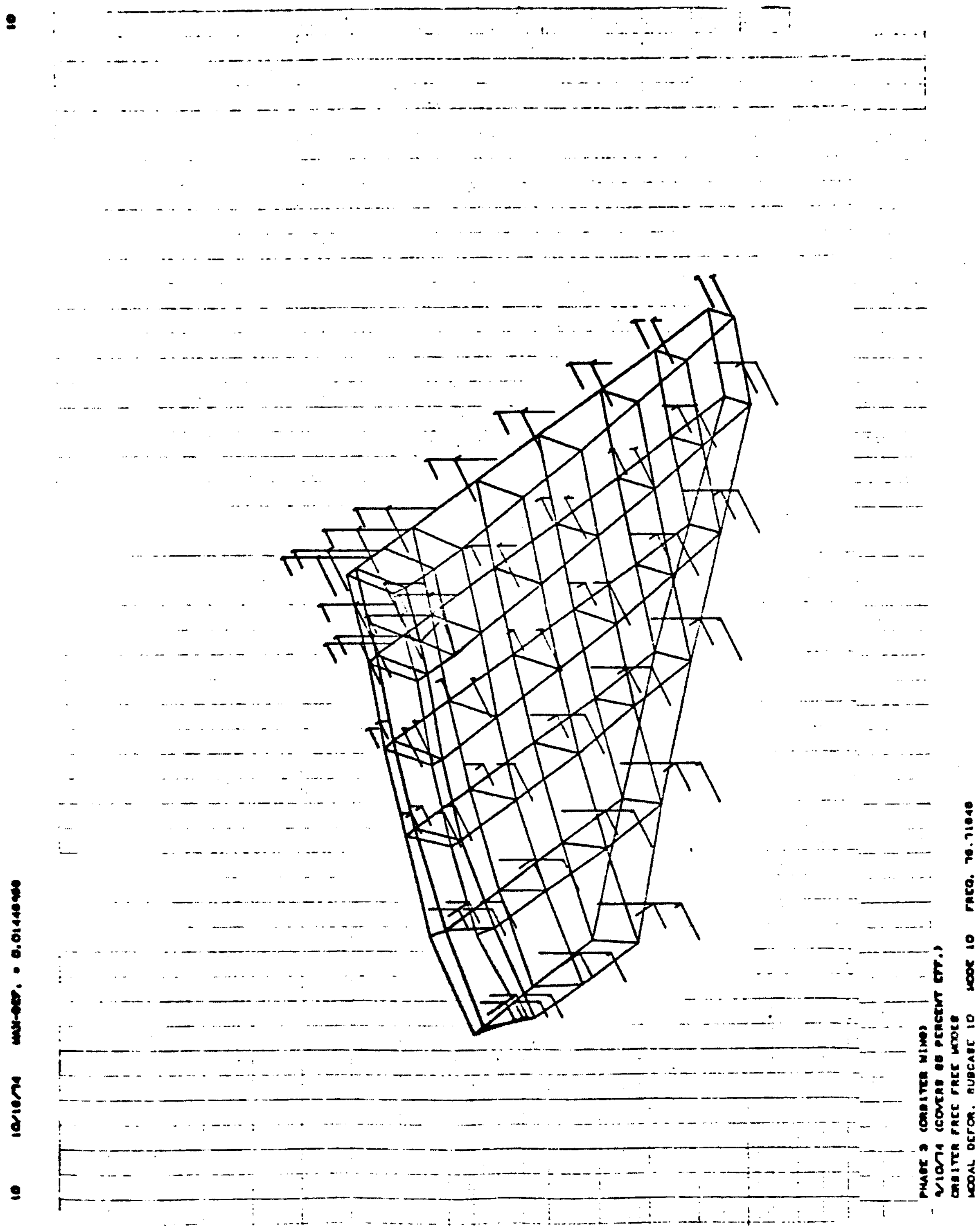
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 85 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 7 MODE 7 FREQ. 84.42372

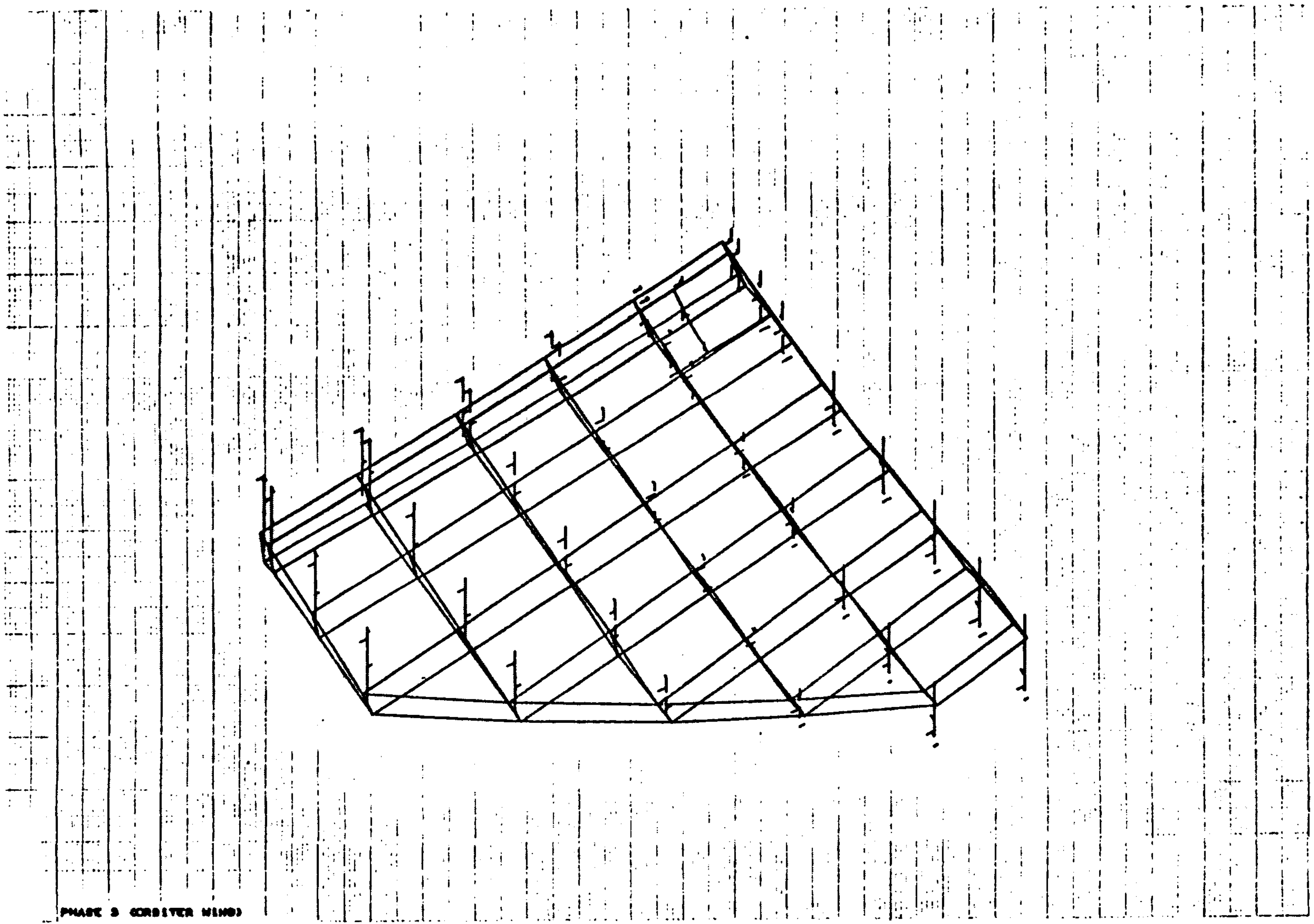
6 10/18/74 MAX-DEF. = 1.37476180



PHASE 3 (ORBITER WING)
4/10/74 (COVERS 88 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 6 MODE 6 FREQ. 62.71664

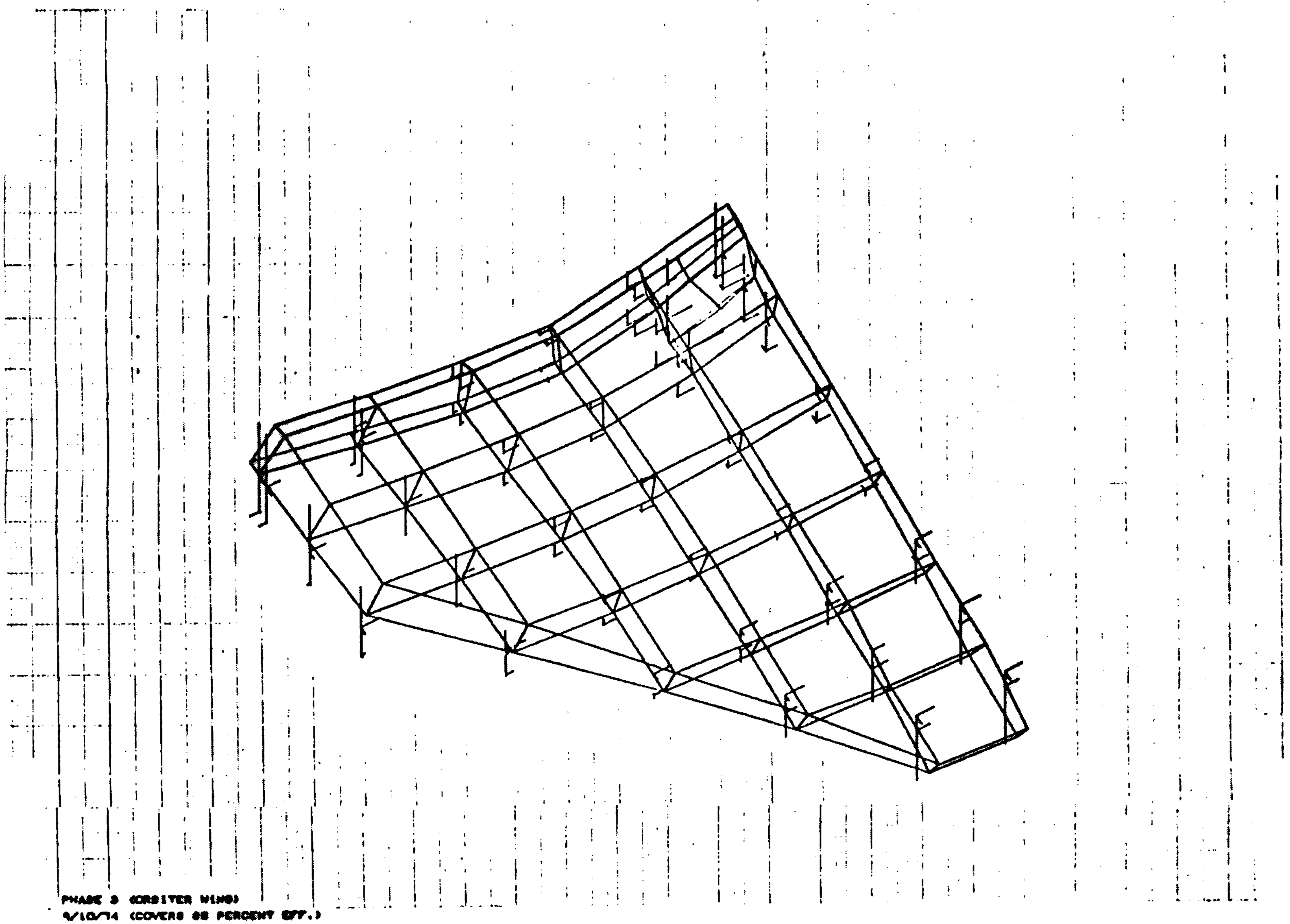
• —— 10/18/74 MAX-DEF. = 0.10582499
PHASE B (ORBITER WING)
9/10/74 (COVERS 80 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 9 MODE 9 FREQ. 00.00001


10 10/16/74 MAX-DEF. = 0.01448
10
PHASE 3 (ORBITER WING)
6/10/74 (COVERS 85 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 76.71648


11 10/18/74 MAX-DEF. = 0.44971008
11
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 85 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 11 MODE 11 FREQ. 83.11100

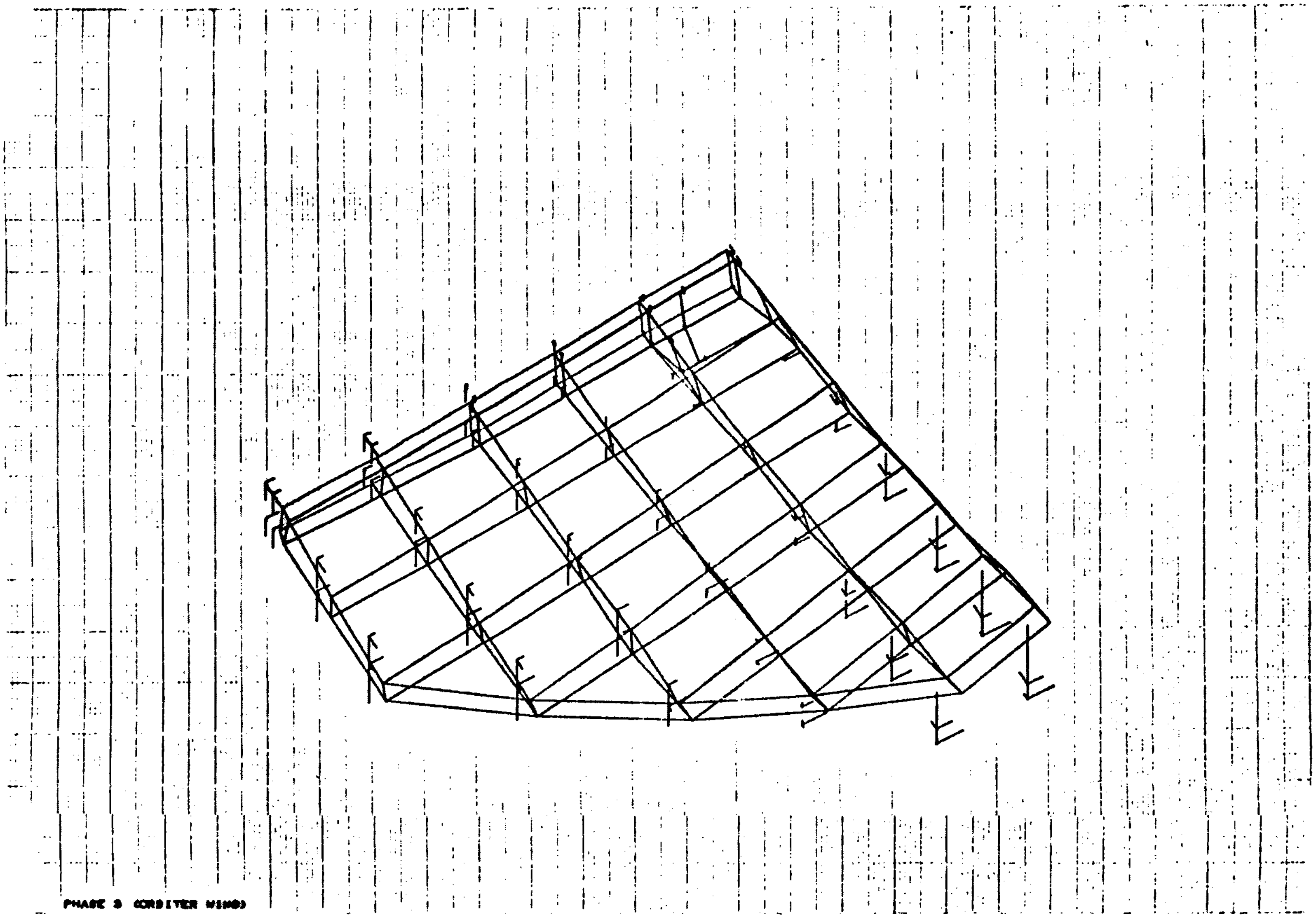
12 10/18/74 MAX-DEF. = 0.09418944

12



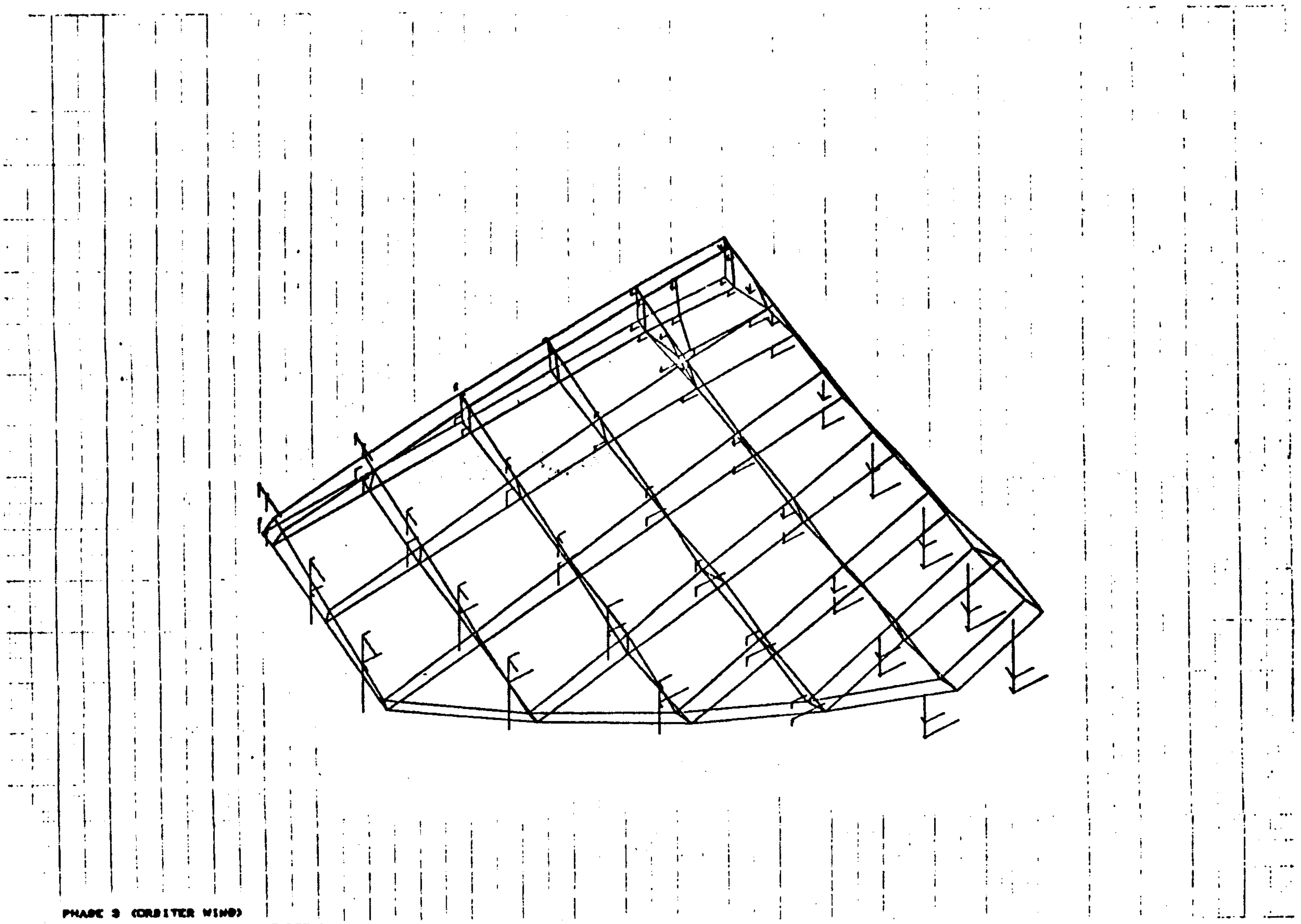
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 88 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 12 MODE 12 FREQ. 104.7841

19 10/10/74 MAX-DEF. = 0.79761120 19



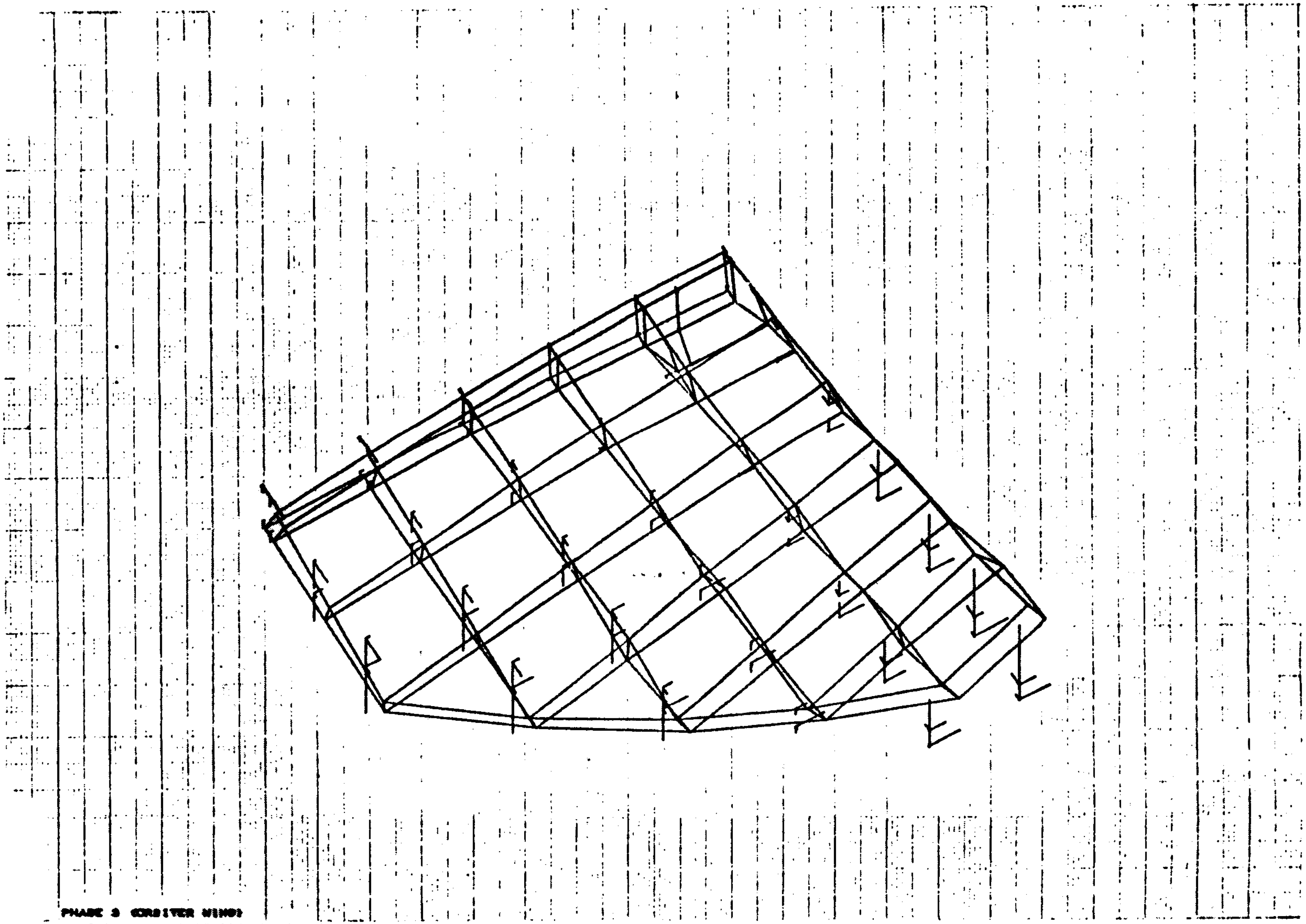
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 80 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 13 MODE 13 FREQ. 118.8270

14 10/18/74 MAX-DEF. = 1.17871780 14

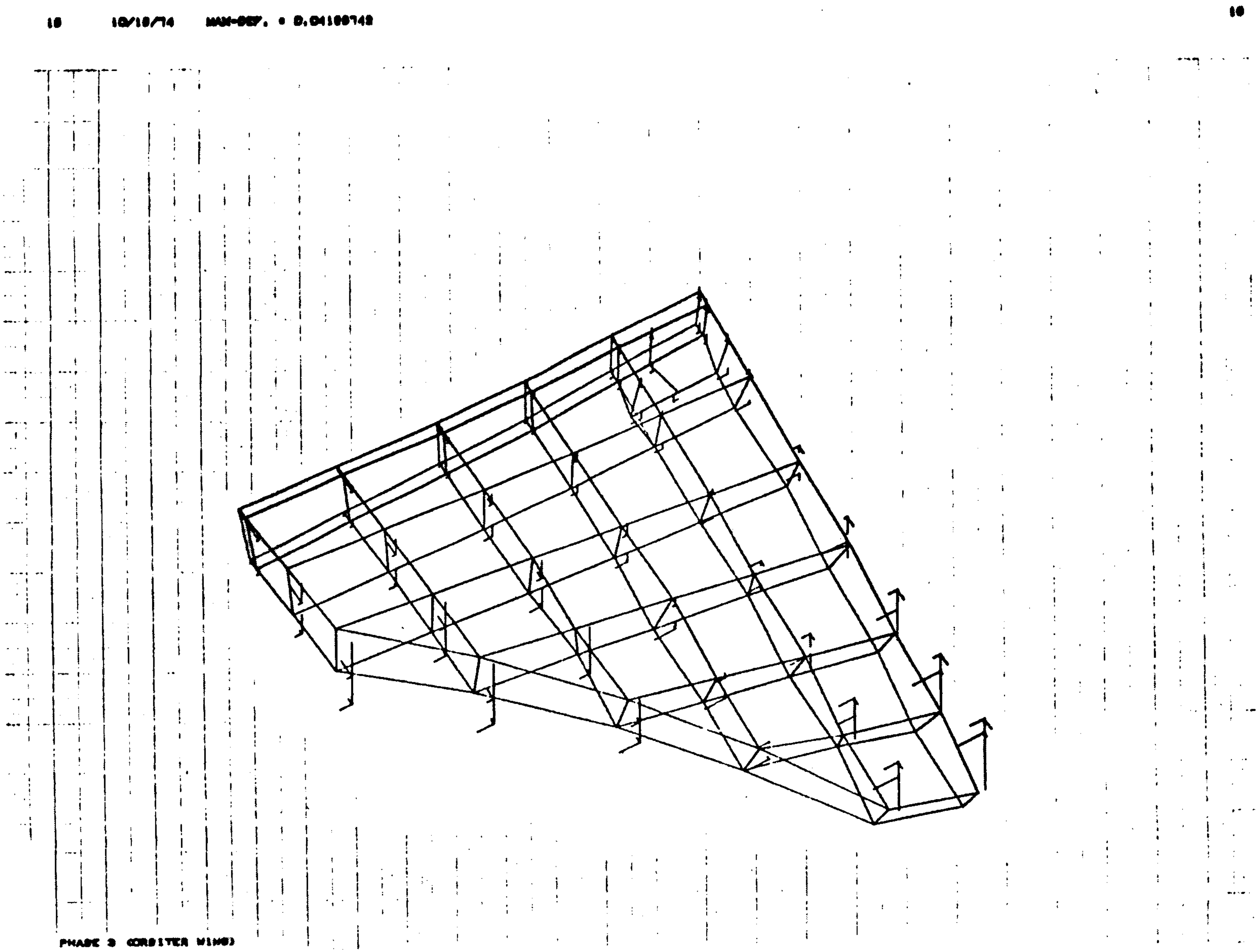


PHASE 3 (ORBITER WING)
9/10/74 (COVERS 85 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 14 MODE 14 FREQ. 122.2084

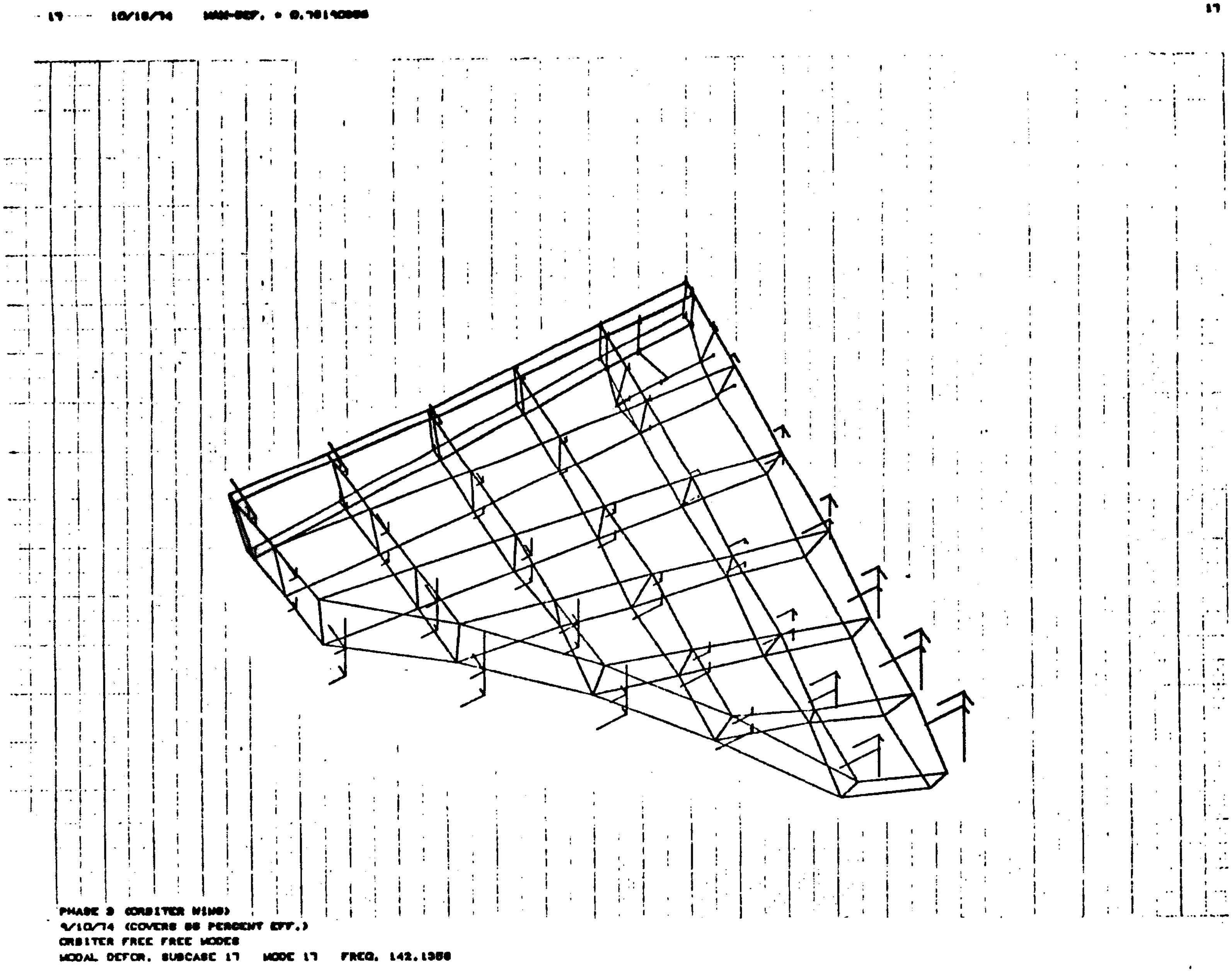
18 10/16/74 MAX-DEF. = 0.04870000

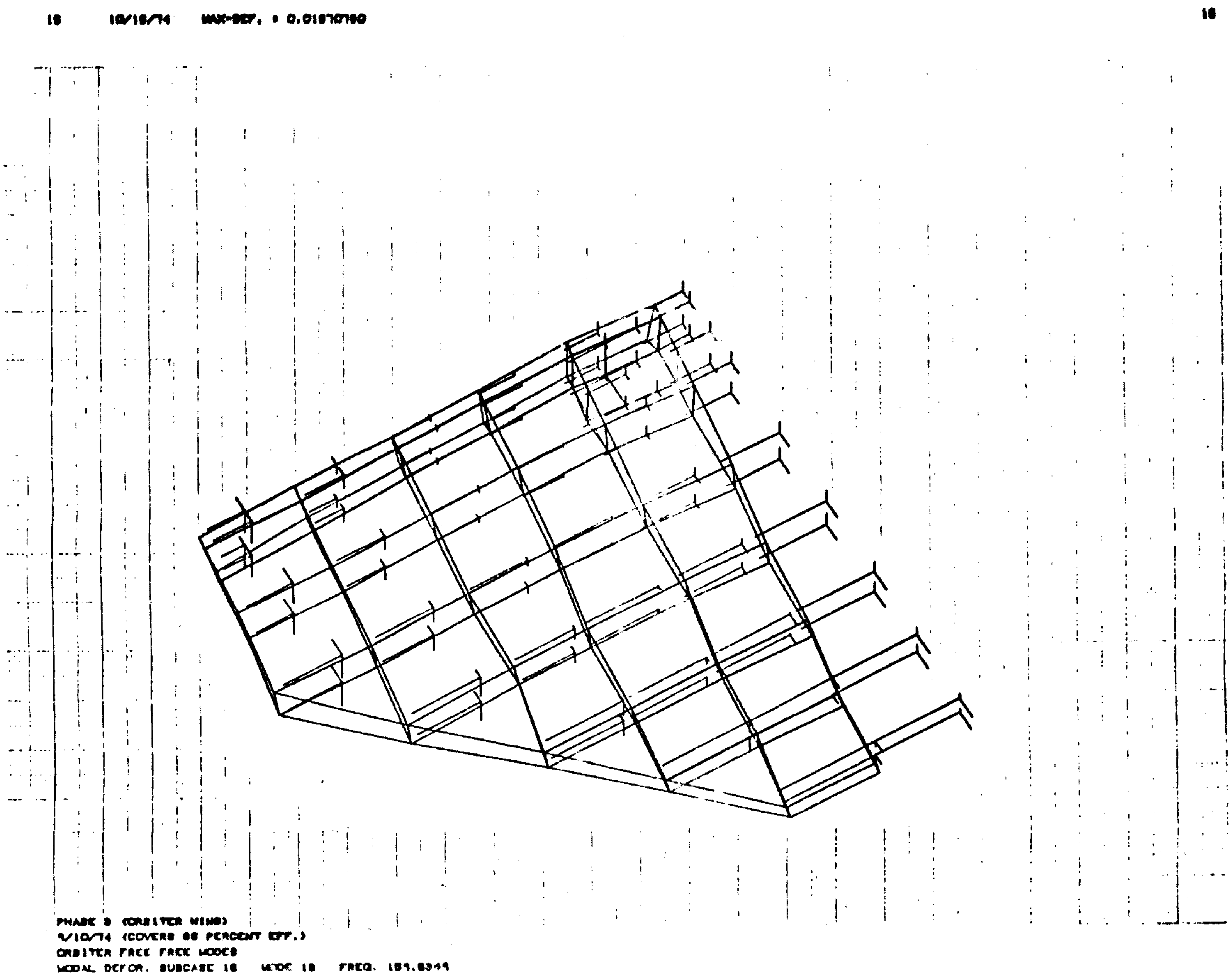


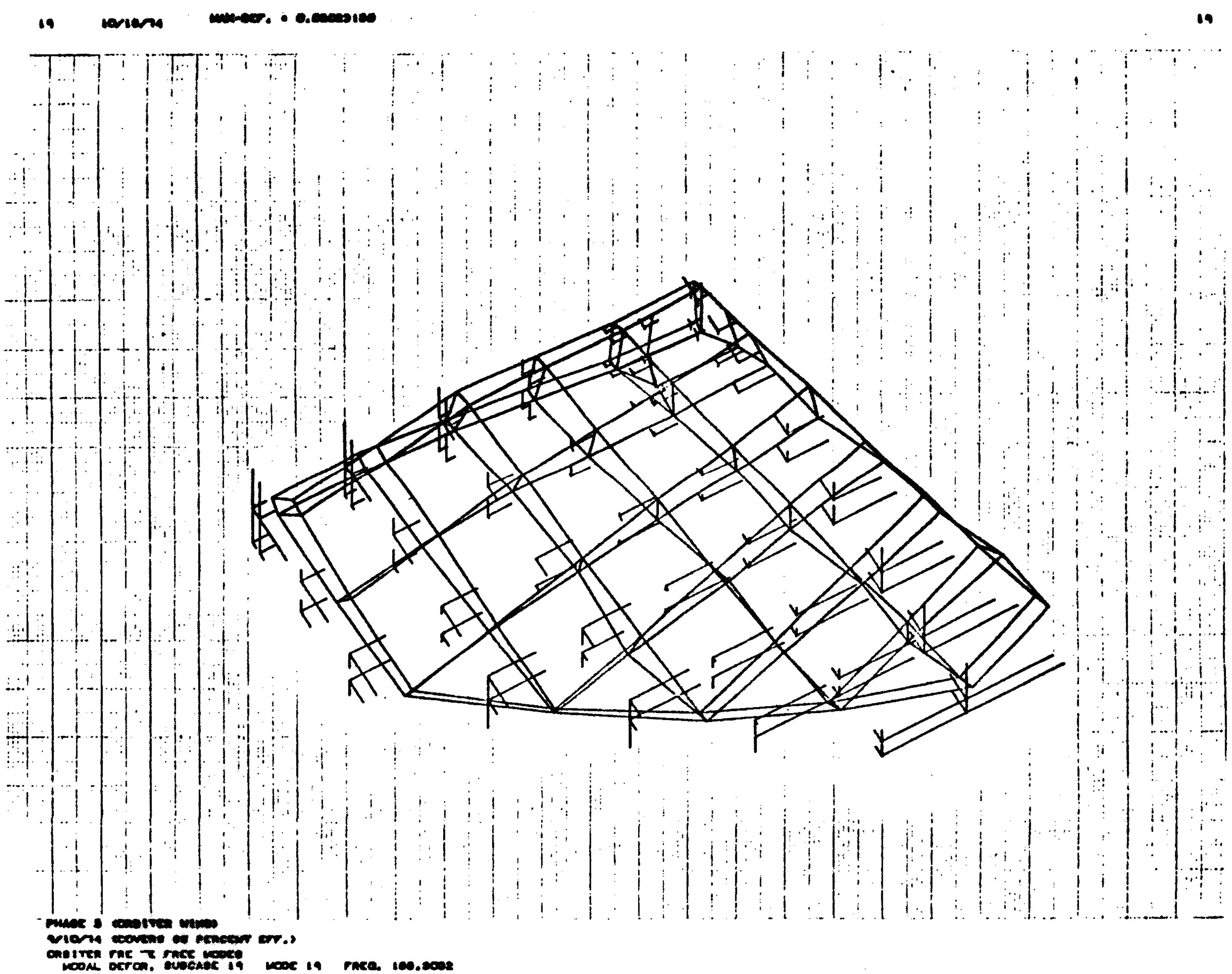
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 88 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 124.9431


18 10/18/74 MAX-DEF. = 0.04108748
18

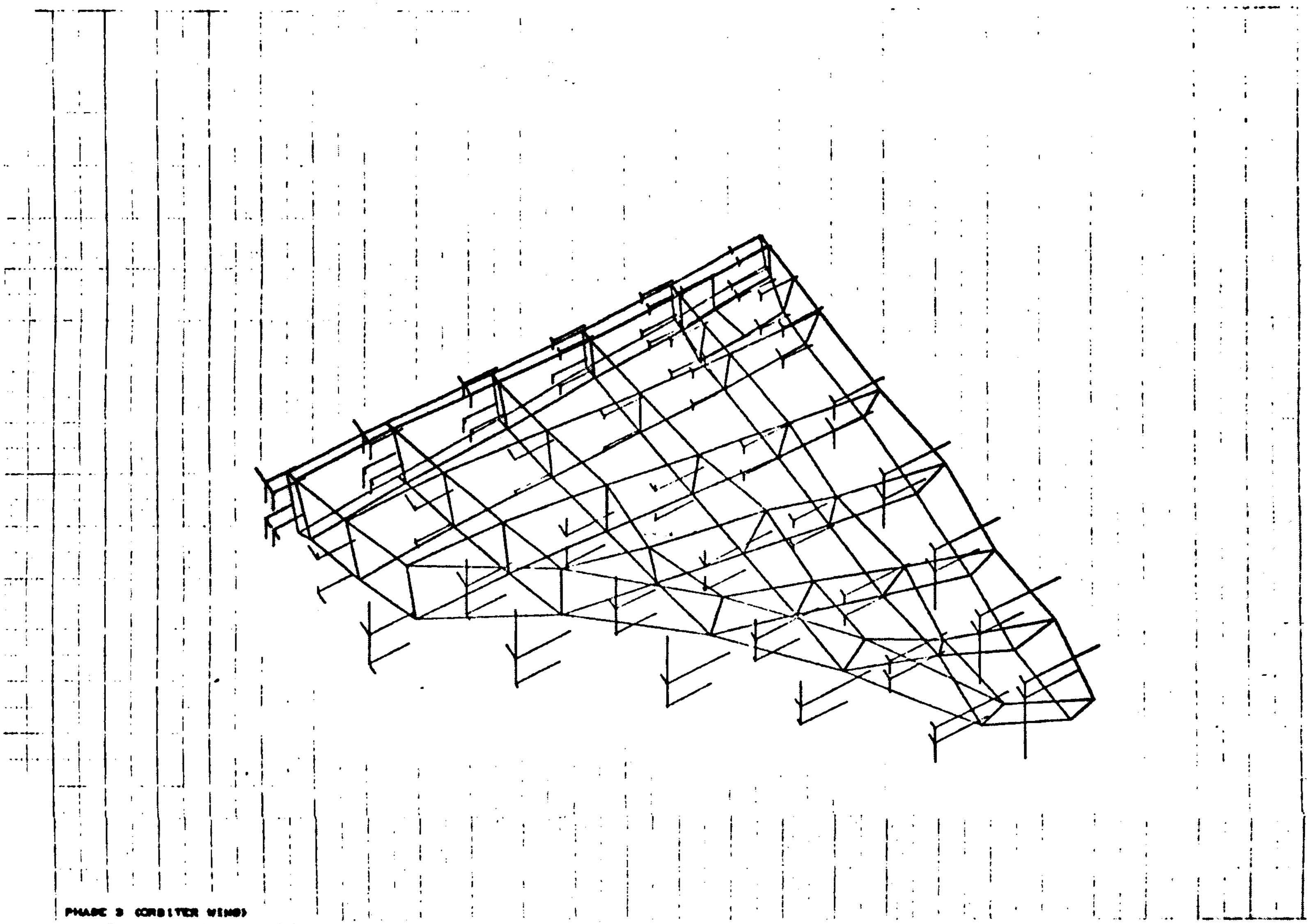
PHASE B (ORBITER WING)
9/10/74 (COVERS 60 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 130.2833


17 10/18/74 MAX-DEF. = 0.76190000
17
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 88 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 17 MODE 17 FREQ. 142.1358


18
10/18/74
MAX-DEF. = 0.01870780
18
PHASE 3 (ORBITER WING)
9/10/74 (COVERS 88 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 159.8349


19
10/18/74
MAX-DEF. = 0.00083100
19
PHASE B (ORBITER VIEW)
9/10/74 (COVERS 90 PERCENT EFF.)
ORBITER FRE 'E FREE MODES
MODAL DEFOR. SUBCASE 19 MODE 19 FREQ. 100.3082

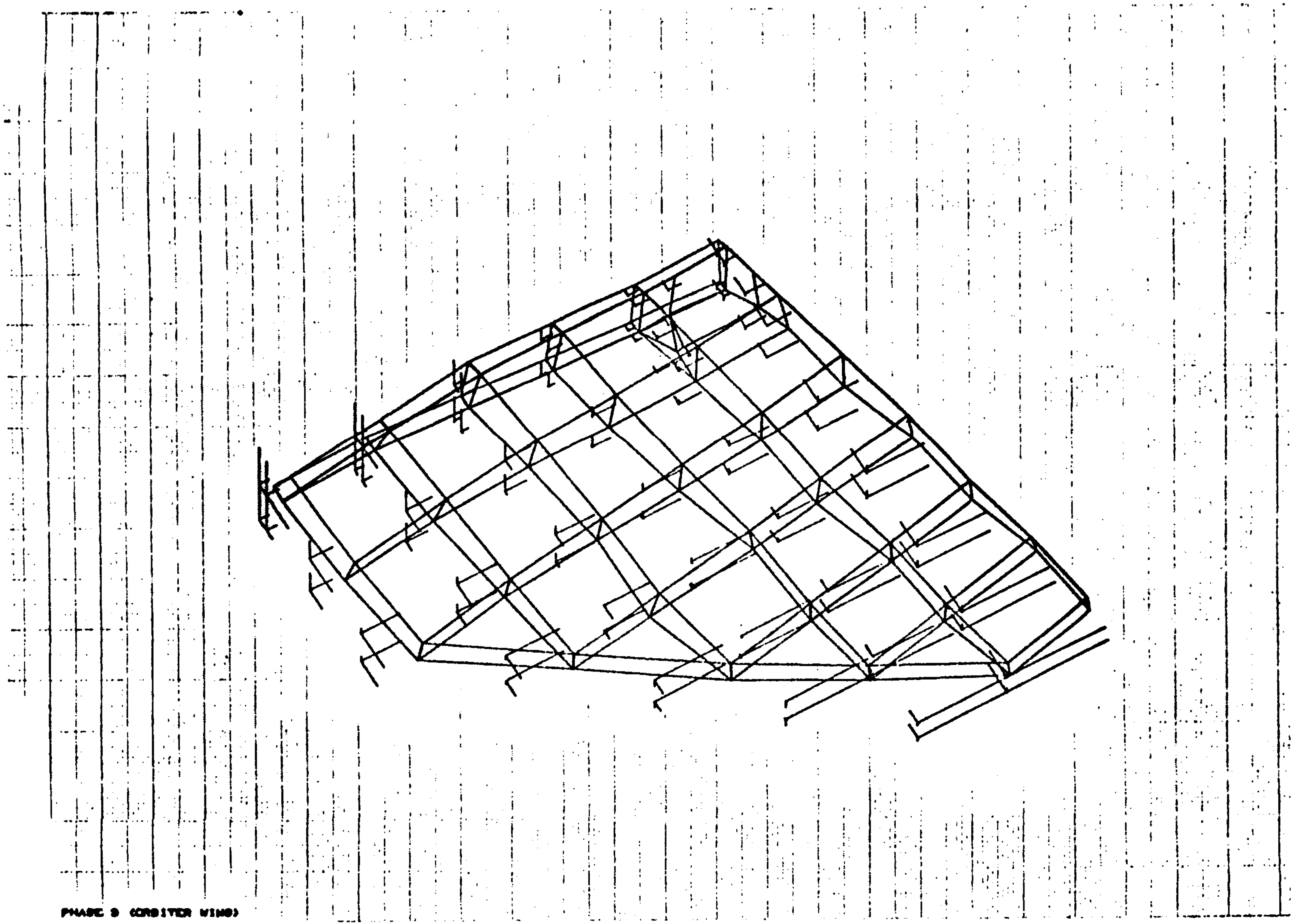
20 10/18/74 MAX-DEF. = 1.21043820 20



PHASE 3 (ORBITER WING)
9/10/74 (COVERS 66 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 20 MODE 20 FREQ. 171.7394

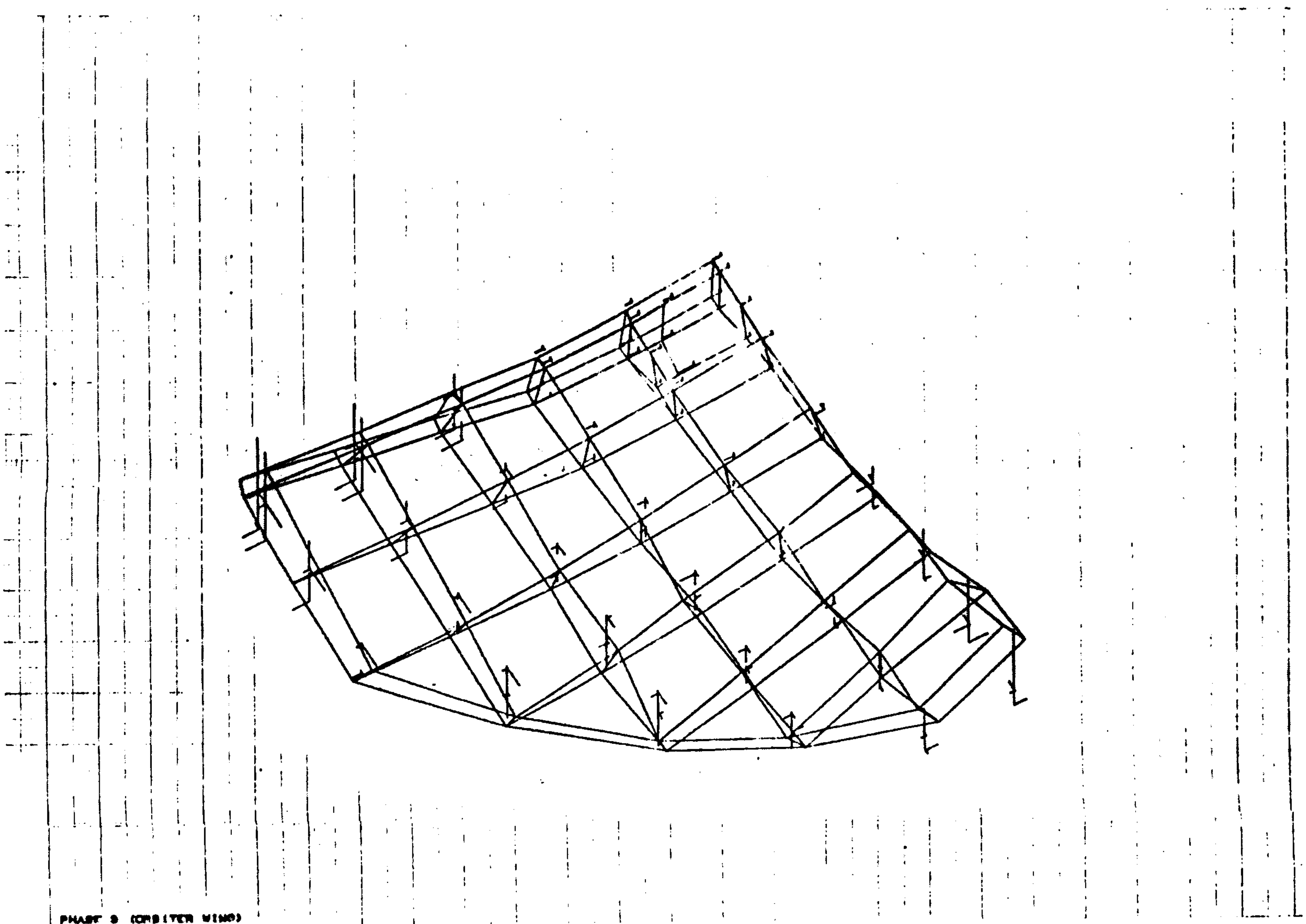
21 10/18/74 MAX-DEF. = 0.09119830

21

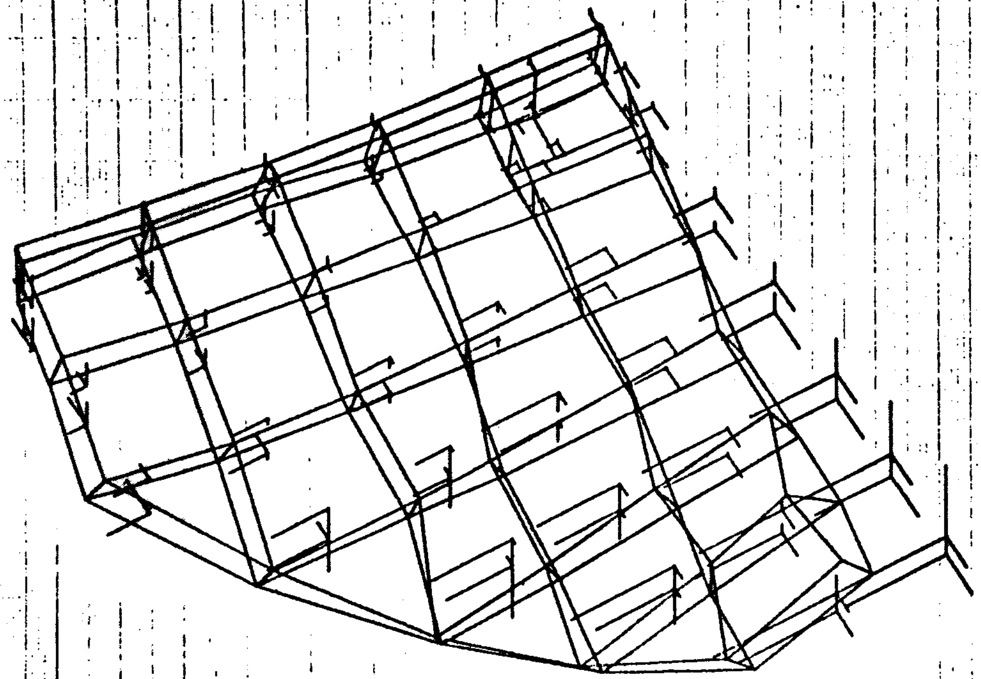


PHASE B (ORBITER WING)
9/10/74 (COVERS 66 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 21 MODE 21 FREQ. 106.4590

22 10/18/74 MAX-DEF. = 0.00817118



PHASE B (ORBITER WING)
5/10/74 (COVERS 80 PERCENT EFF.)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 22 MODE 22 FREQ. 140.236)



30 10/10/74 4
20

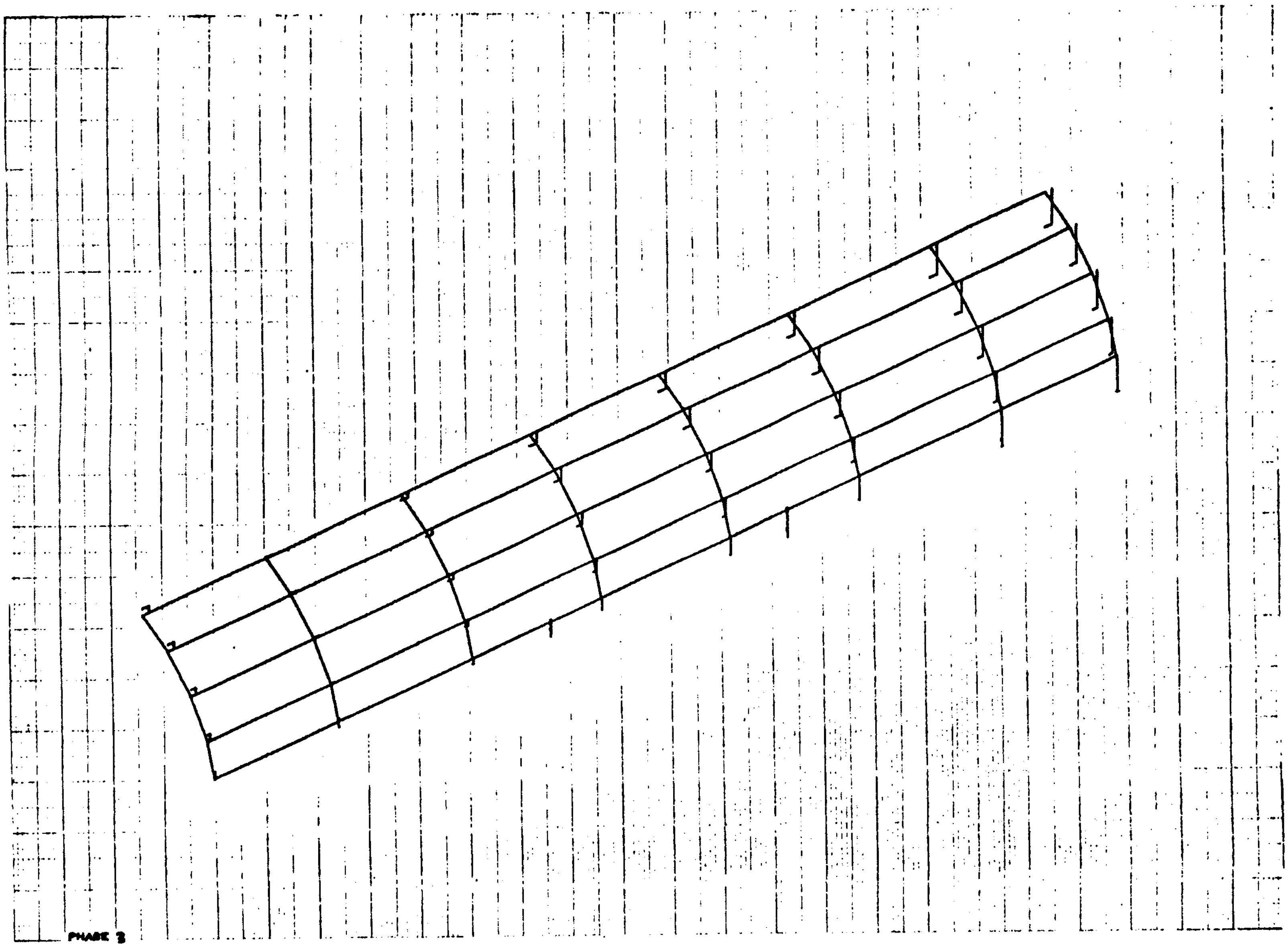
PHASE B ORBITER WING)
9/10/74 (C[illegible] [illegible] MODE 20 FREQ. 224.0244
ORBITER FREE FREE MODES
MO

Appendix B16

INPUT & PLOTS/PHASE 3 ANALYSIS: MODEL II CARGO DOORS SYMMETRIC FREE-FREE ORBITER MODES

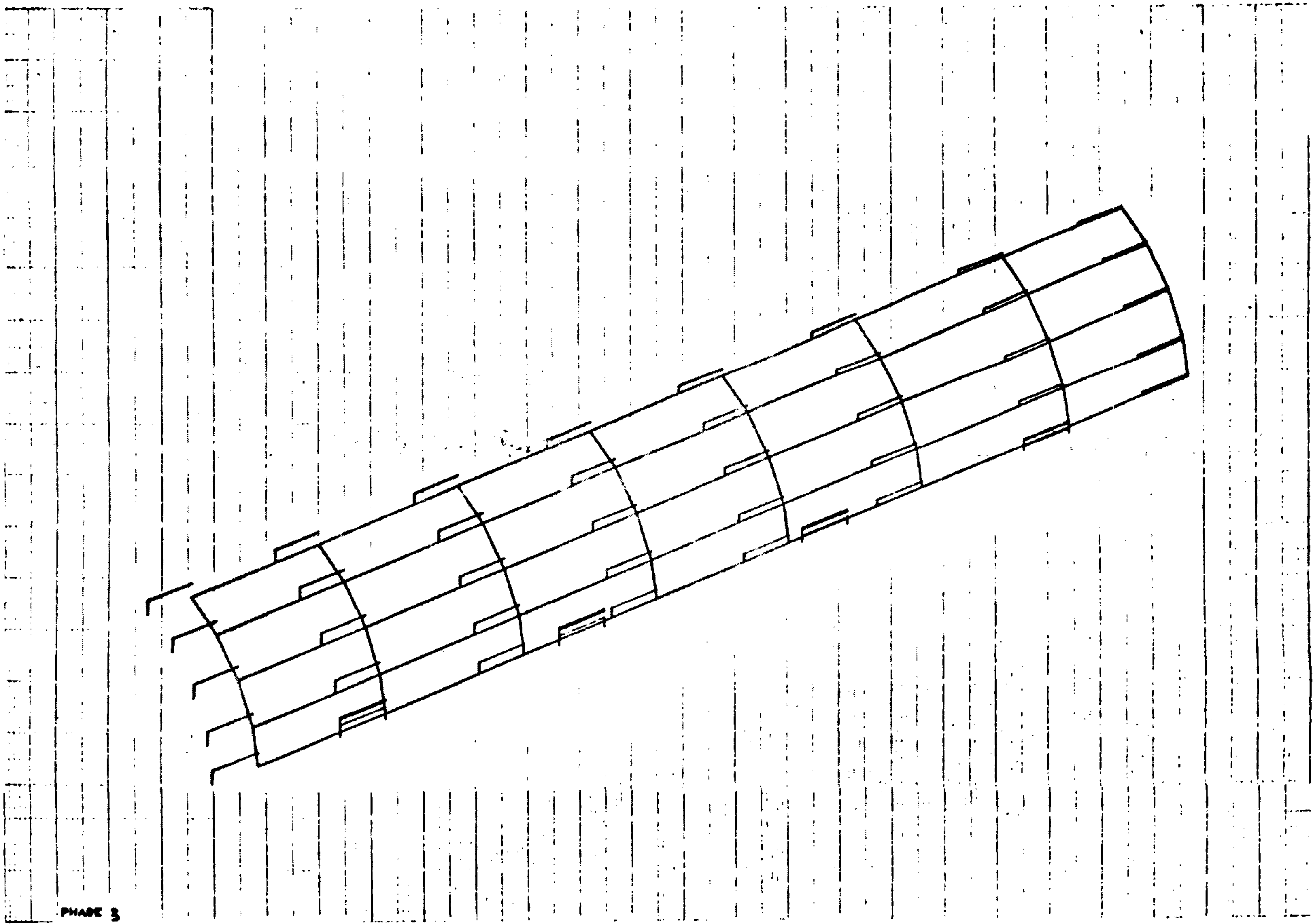
```
ORBITER DOORS.SYM CASE%WITH STRAPSR

                                   C A S E   C O N T R O L   D E C K   E C H O
 CARD
 COUNT
   1        TITLE # PHASE 0 3
   2        SUBTITLE # ORBITER DOORS.SYM CASE%WITH STRAPSR
   3        MAXLINES # 50000
   4        VECTOR  # ALL
   5        SUBCASE 1
   6        LABEL     # ORBITER FREE FREE MODES
   7        MODES     # 23
   8        OUTPUT%PLOT)
   9        SET 1   # QDMEM2,BAR
  10        SET 2   # INCLUDE  4201 THRU 4232
  11        SET 3   # INCLUDE  4241 THRU 4272
  12        SET 4   # INCLUDE  4001 THRU 4032,4061 THRU 4088
  13        SET 5   # INCLUDE  4301 THRU 4340
  14        SET 6   # INCLUDE  4041 THRU 4072,4091 THRU 4098,4145 THRU 4168
  15        SET 7   # INCLUDE  4341 THRU 4374
  16        PLOTTER CALCOMP 765,105
  17        AXES     #MY,X,Z
  18        VIEW     # 20.0,45.0,0.0
  19        MAXIMUM DEFORMATION 5.0.
  20        FIND  SCALE,ORIGIN 1,SET 1
  21        PLOT MODAL DEFORMATION 1 THRU 23,SET 1,SHAPE,VECTOR XYZ
  22        BEGIN BULK

            PARAM   TPNAME2  OL UP2


            ENDDATA
```

. 4 1. 10/10/74 MAX-DEF. = 0.84449180

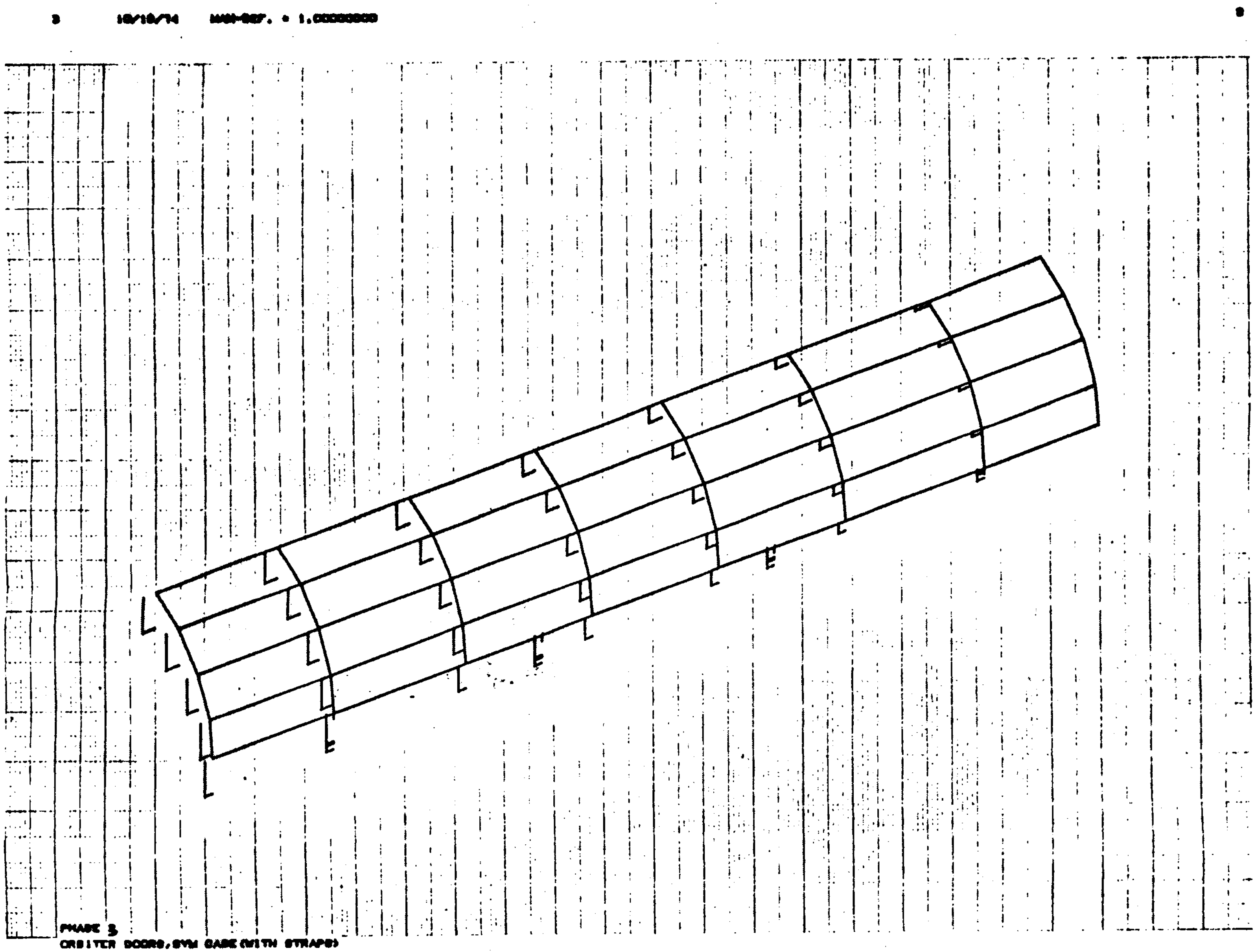


PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 1 MODE 1 FREQ. 0.

2 10/18/74 MAX-DEF. = 0.95108812 2

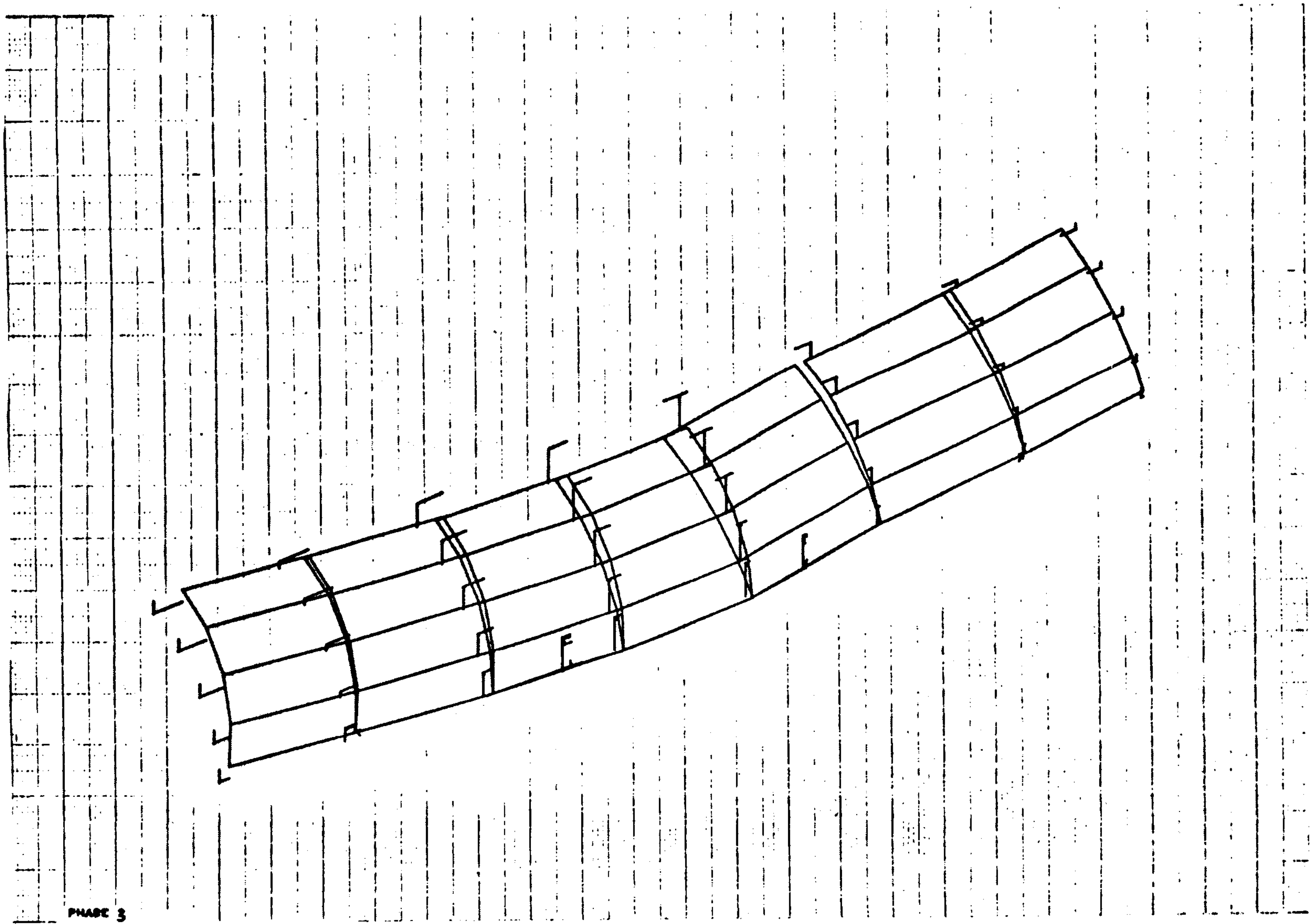


PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 2 MODE 2 FREQ. 0.

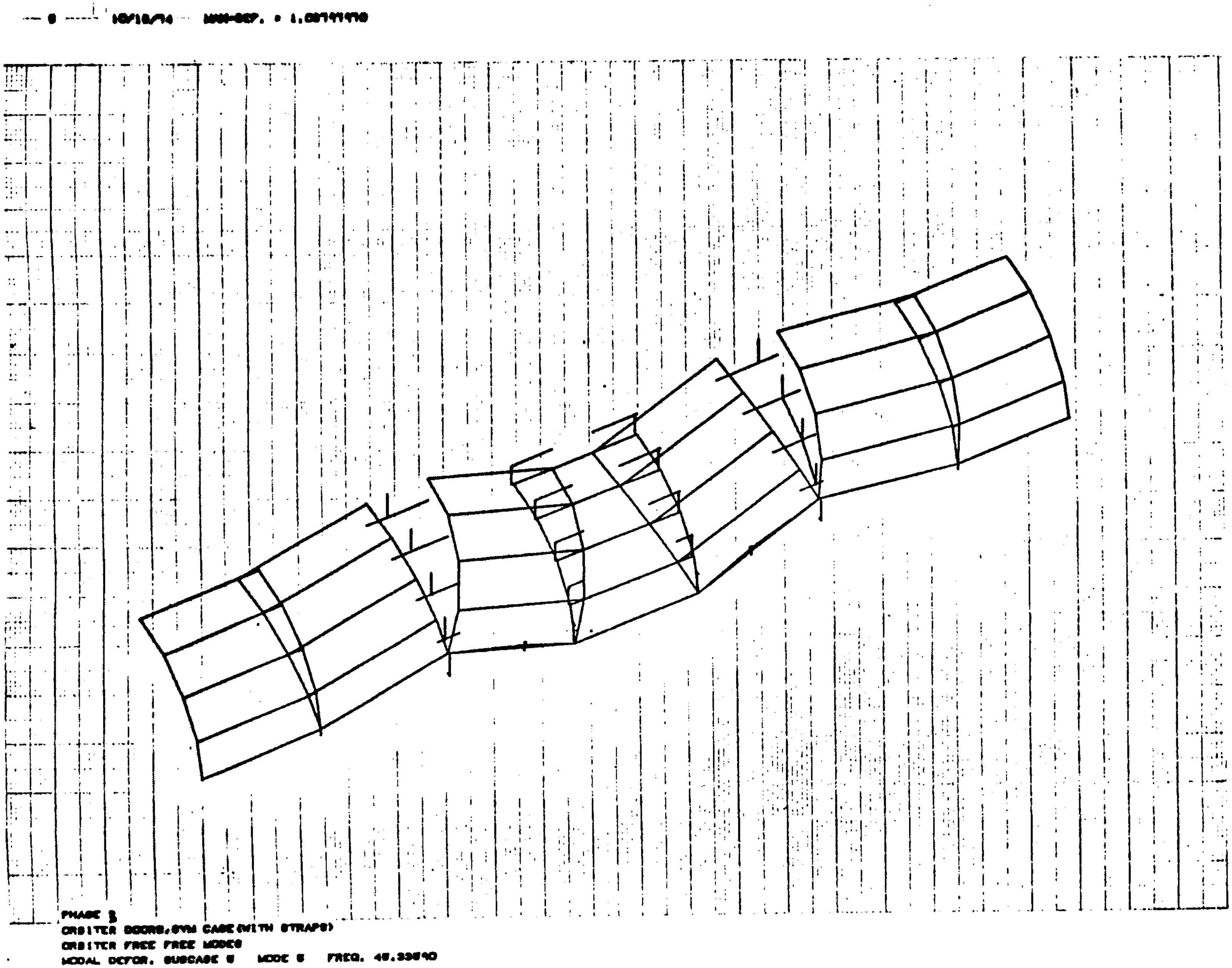

3 10/18/74 MAX-DEF. = 1.0000000
8

PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 3 MODE 3 FREQ. 0.

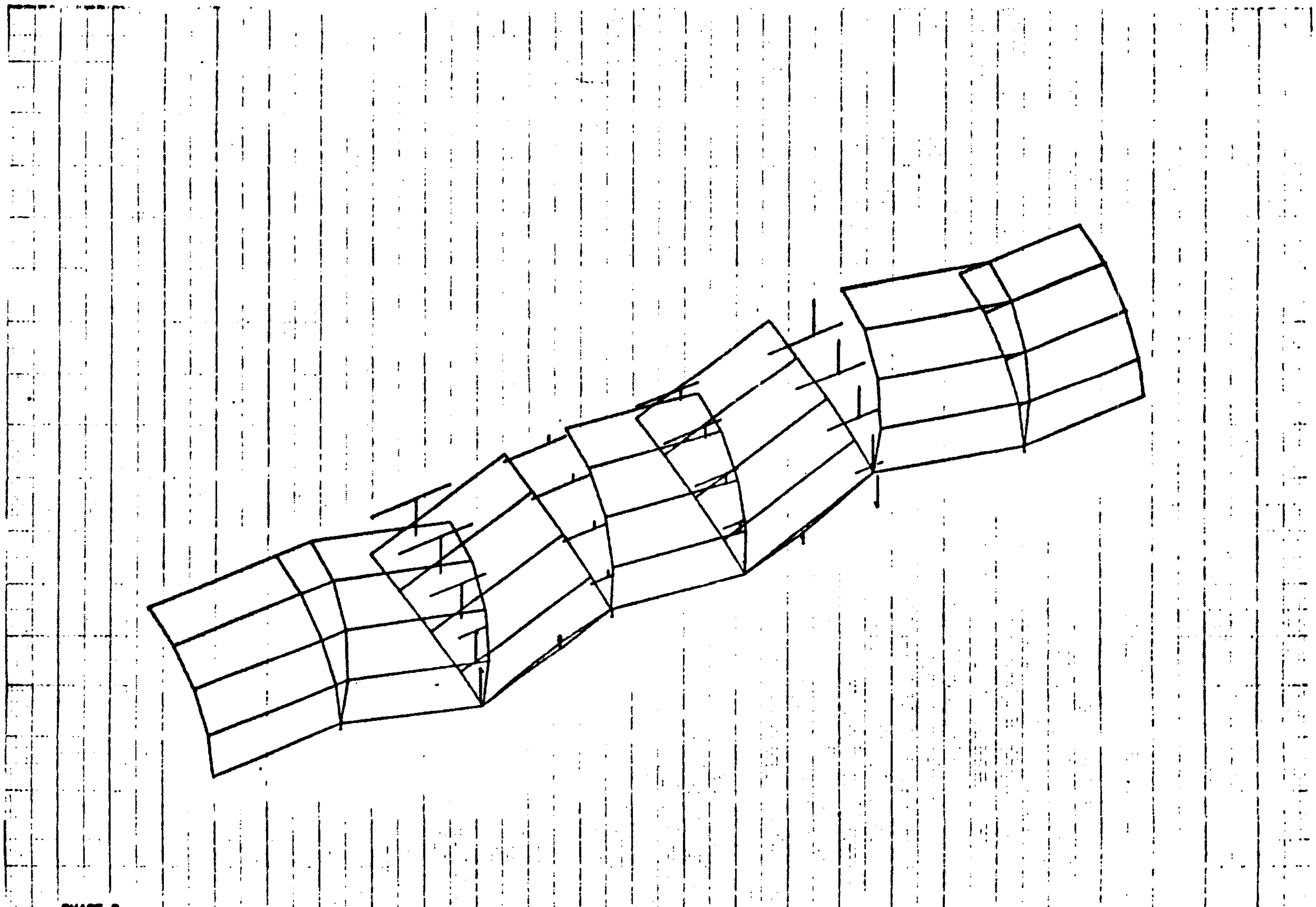
4 10/18/74 MAX-DEF. = 0.45700000



PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 4 MODE 4 FREQ. 44.11371

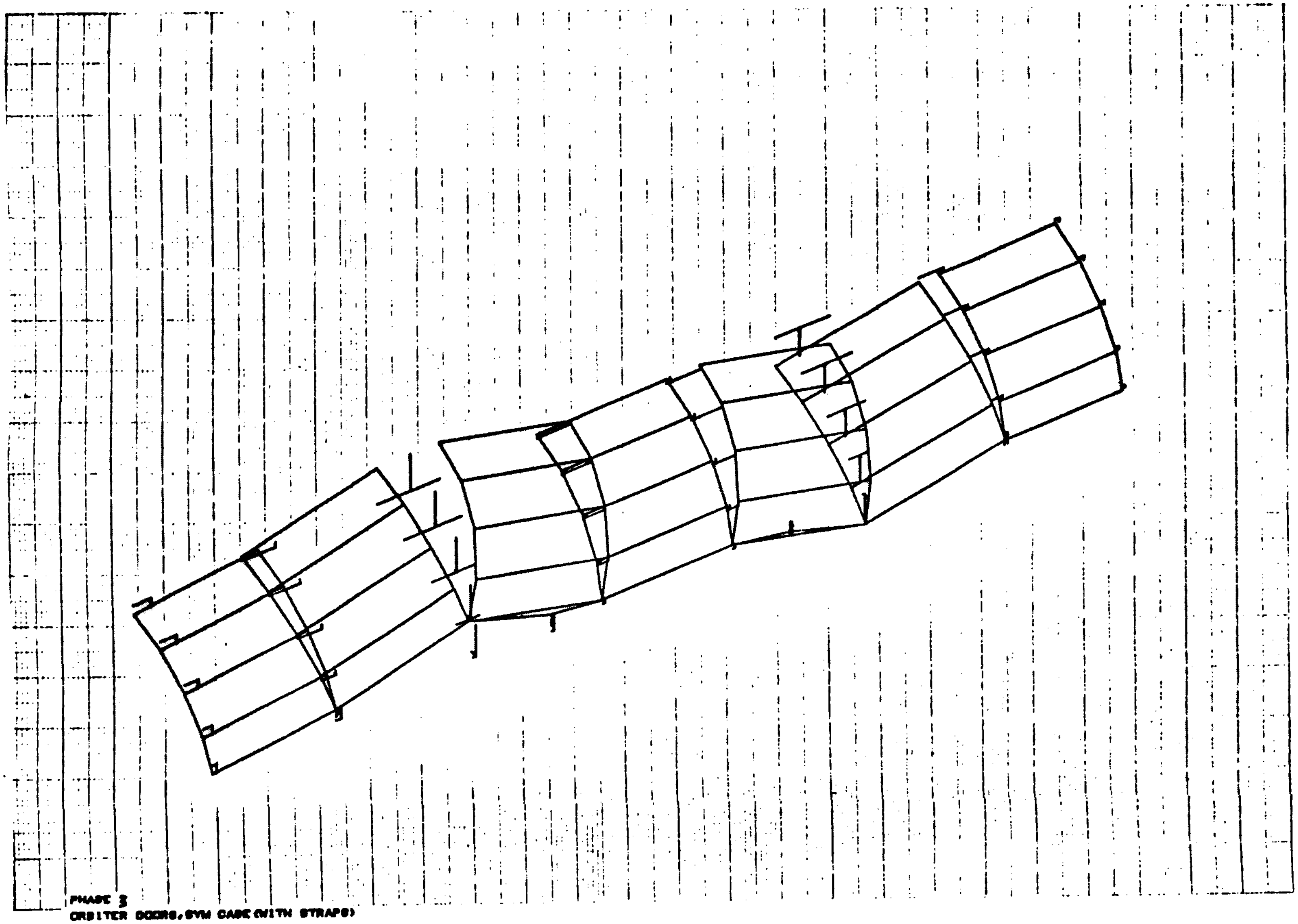

— 0 — 10/18/74 MAX-DEF. = 1.08799970
PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 5 MODE 5 FREQ. 45.33590

10/10/74 MAX-DEF. = 1,00100100



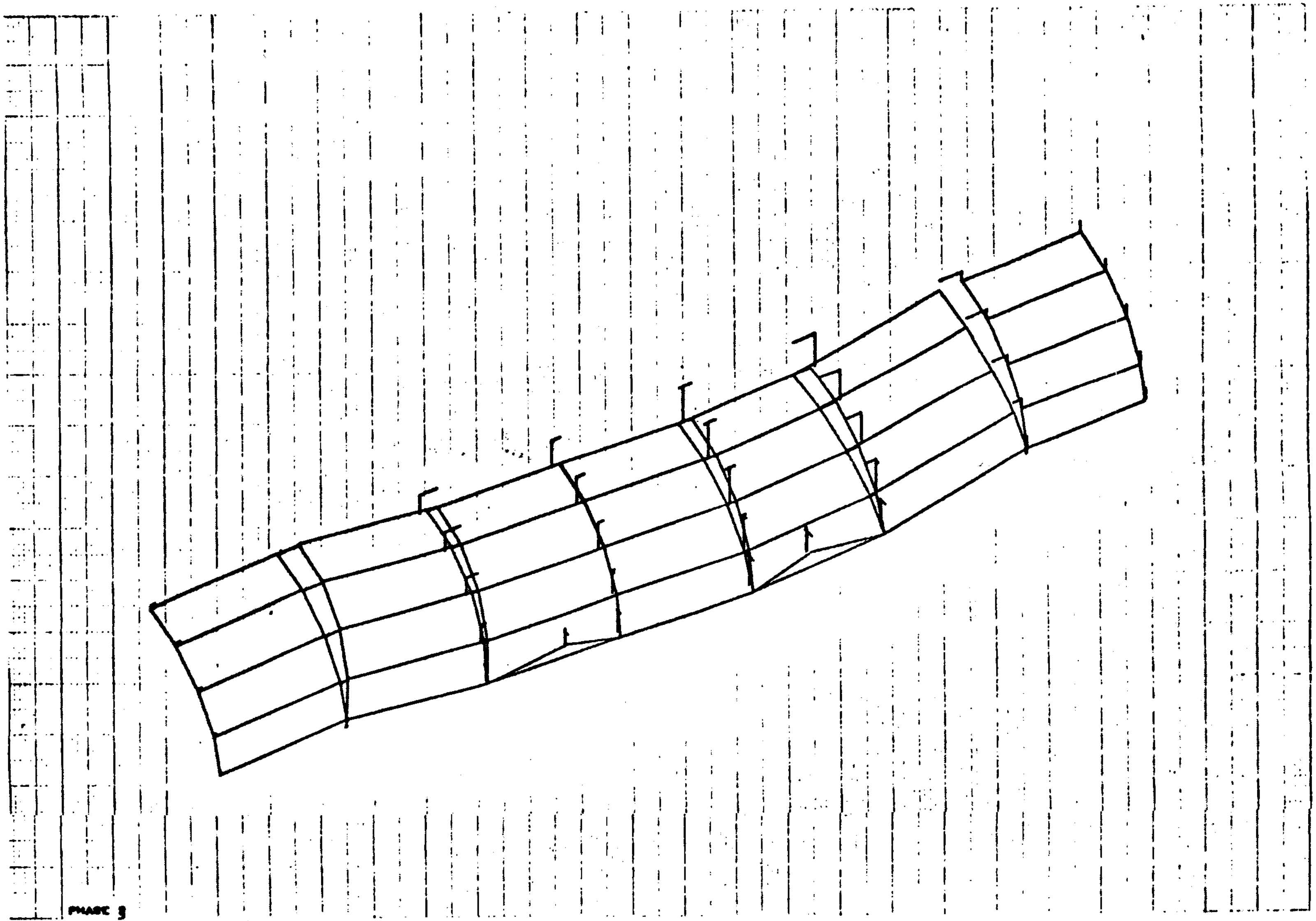
PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR, SUBCASE 6 MODE 6 FREQ. 61.20222

7 10/18/74 MAX-DEF. = 0.46891904



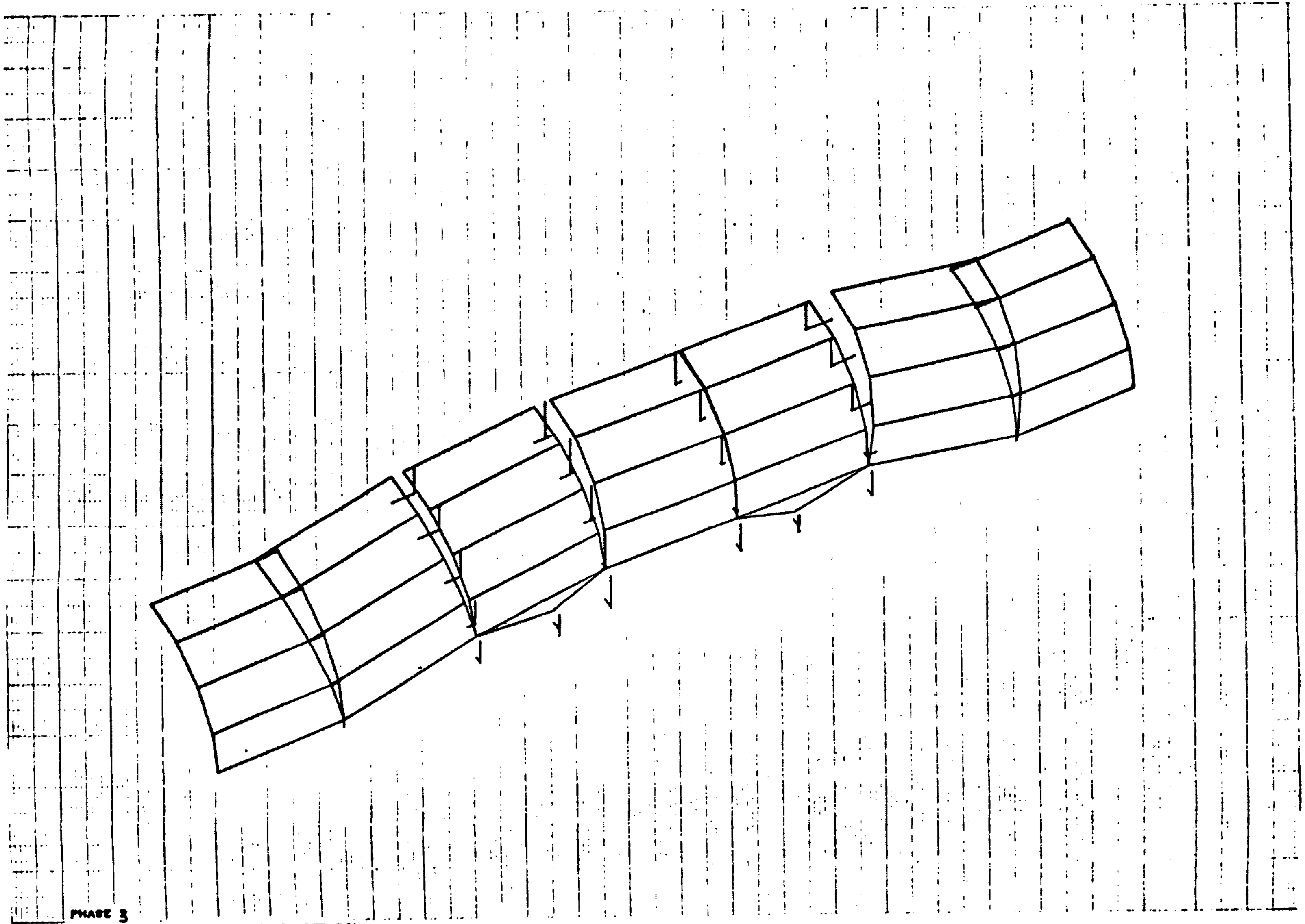
PHASE 3
ORBITER DOORS, SYM CASE (WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 7 MODE 7 FREQ. 54.42372

8 10/18/74 MAX-DEF. = 0.78288088



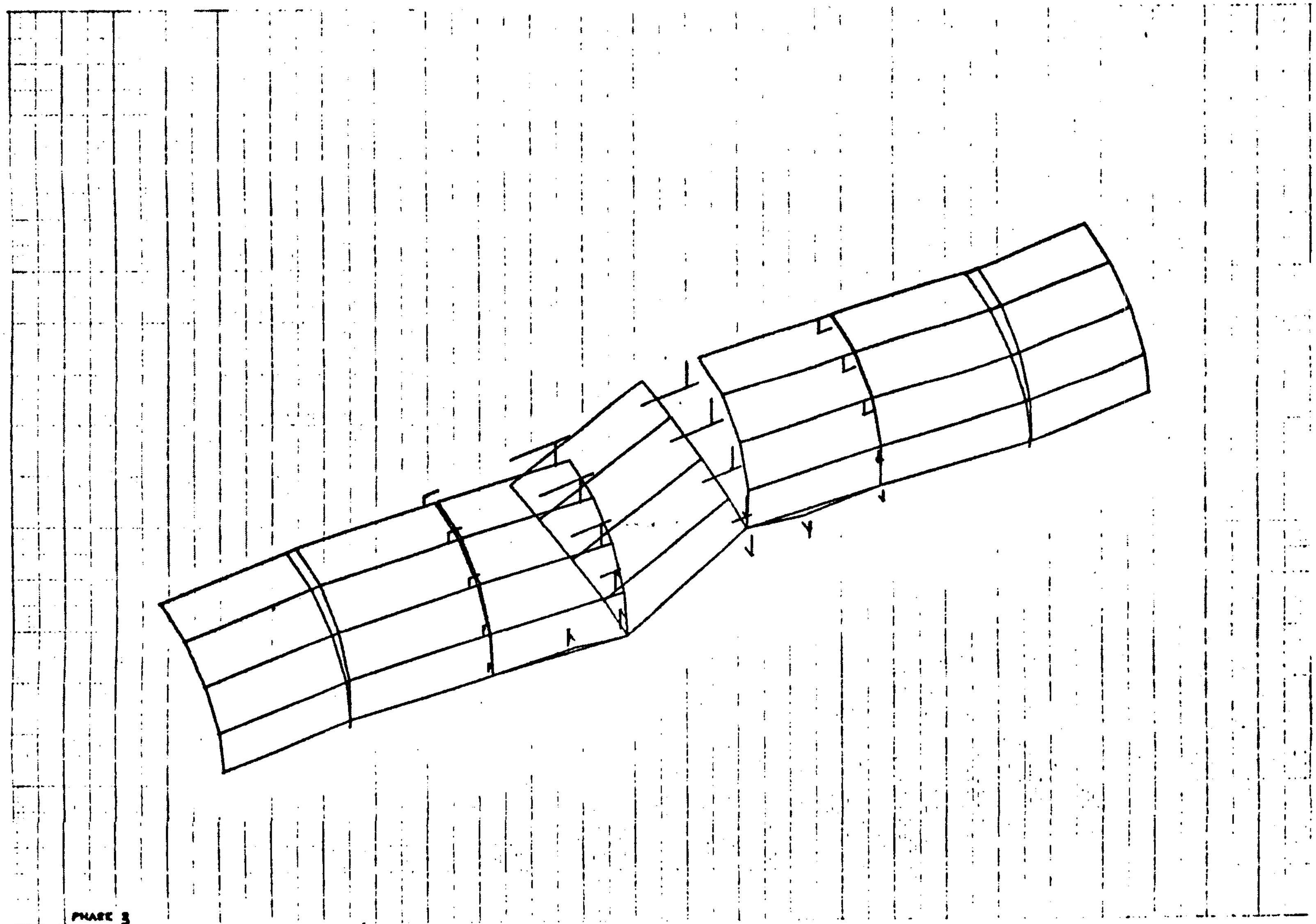
PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 82.71884

10/18/74   MAX-DEF. = 1.87822700



PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 9   MODE 9   FREQ. 86.88881

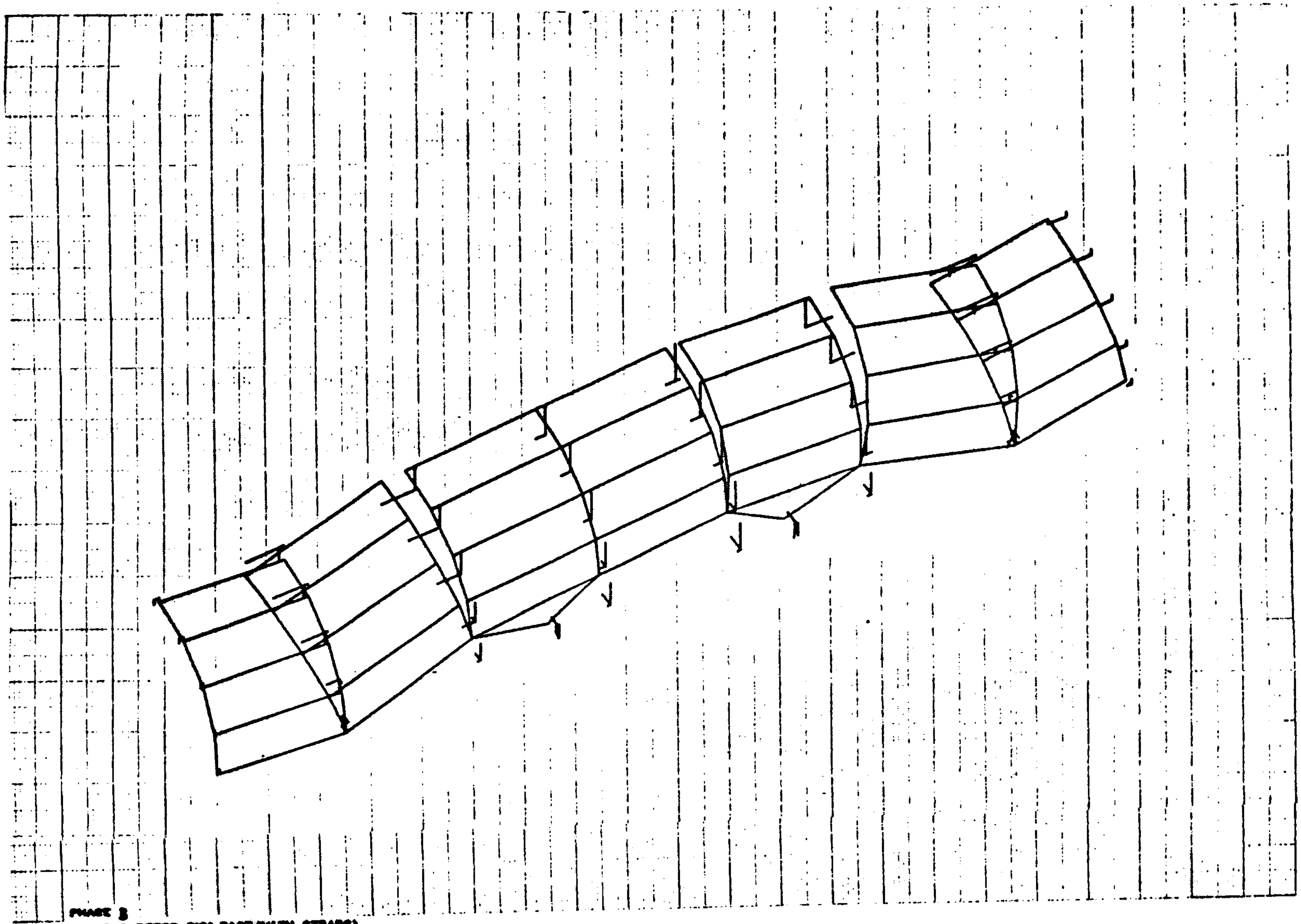
10 10/18/74 MAX-DEF. = 1.49414770 10



PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 78.71848

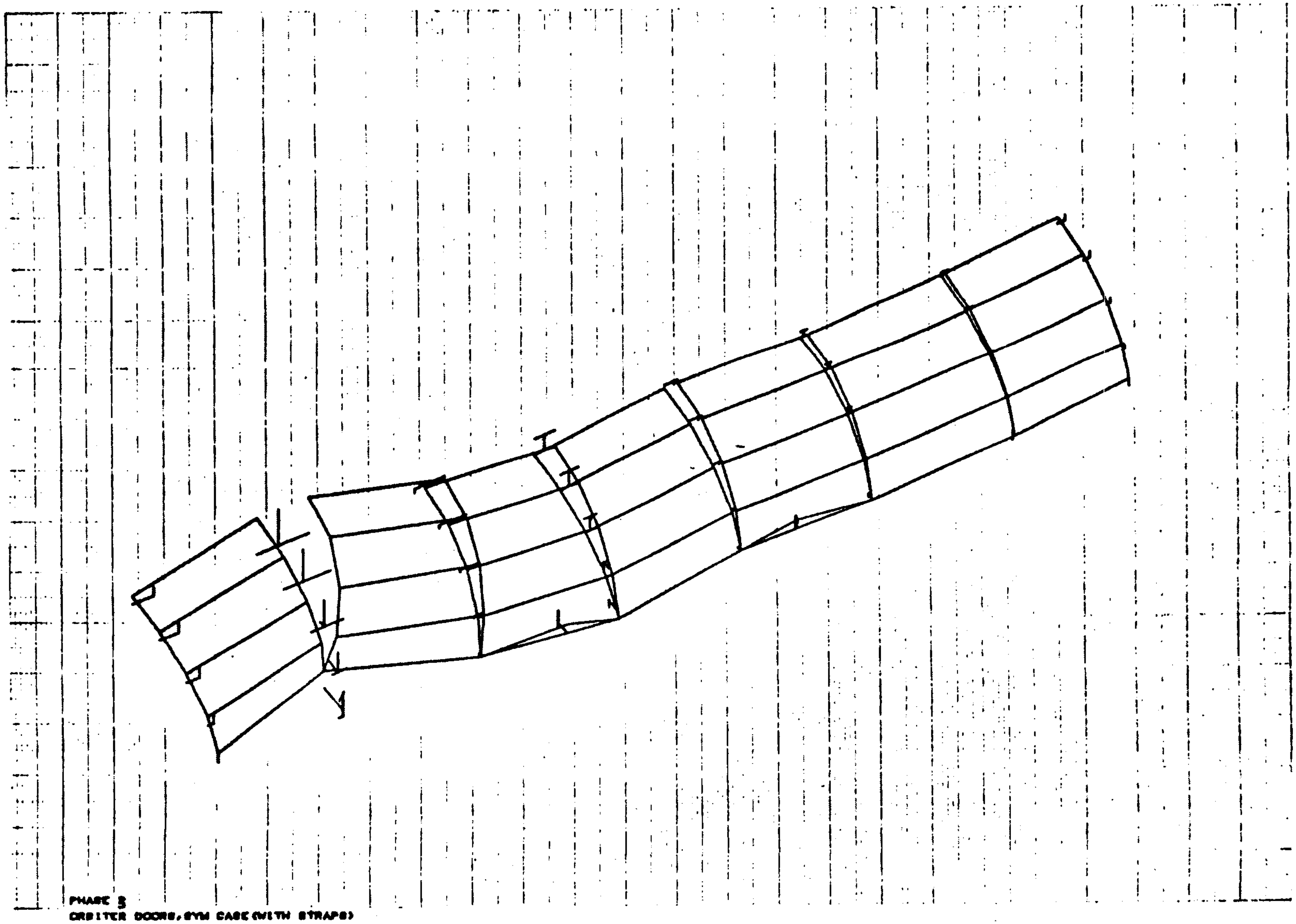
11 10/18/74 MAX-DEF. = 0.00348480

11



PHASE B
ORBITER BOOST,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR, SUBCASE 11 MODE 11 FREQ. 83.11180

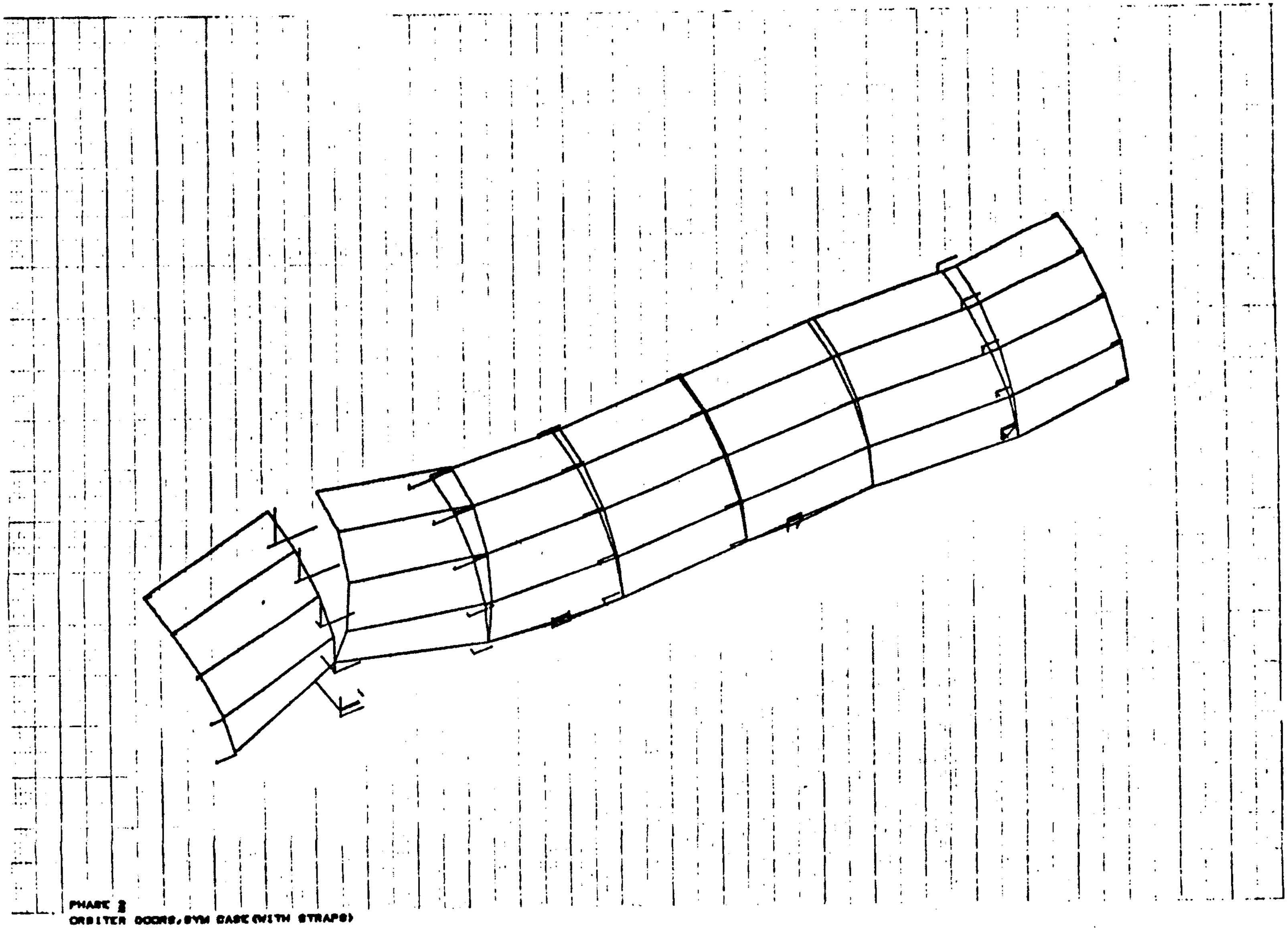
12 10/18/74 MAX-DEF. = 1.48880000



PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 12 MODE 12 FREQ. 104.7641

13 10/18/74 MAX-DEF. = 1.04863740

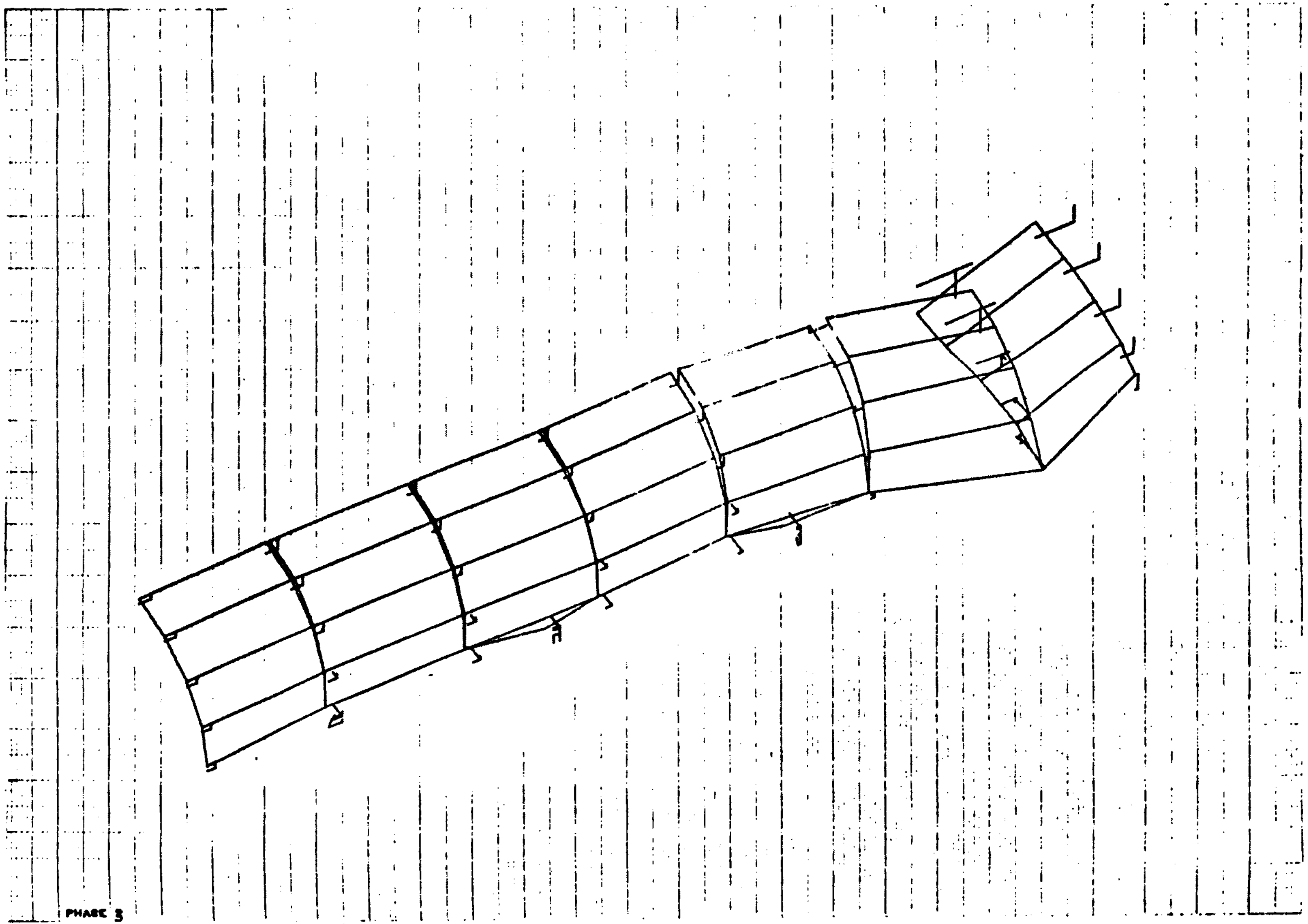
13



PHASE 2
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 13 MODE 13 FREQ. 118.8278

14 10/18/74 MAX-DEF. = 0.44420664

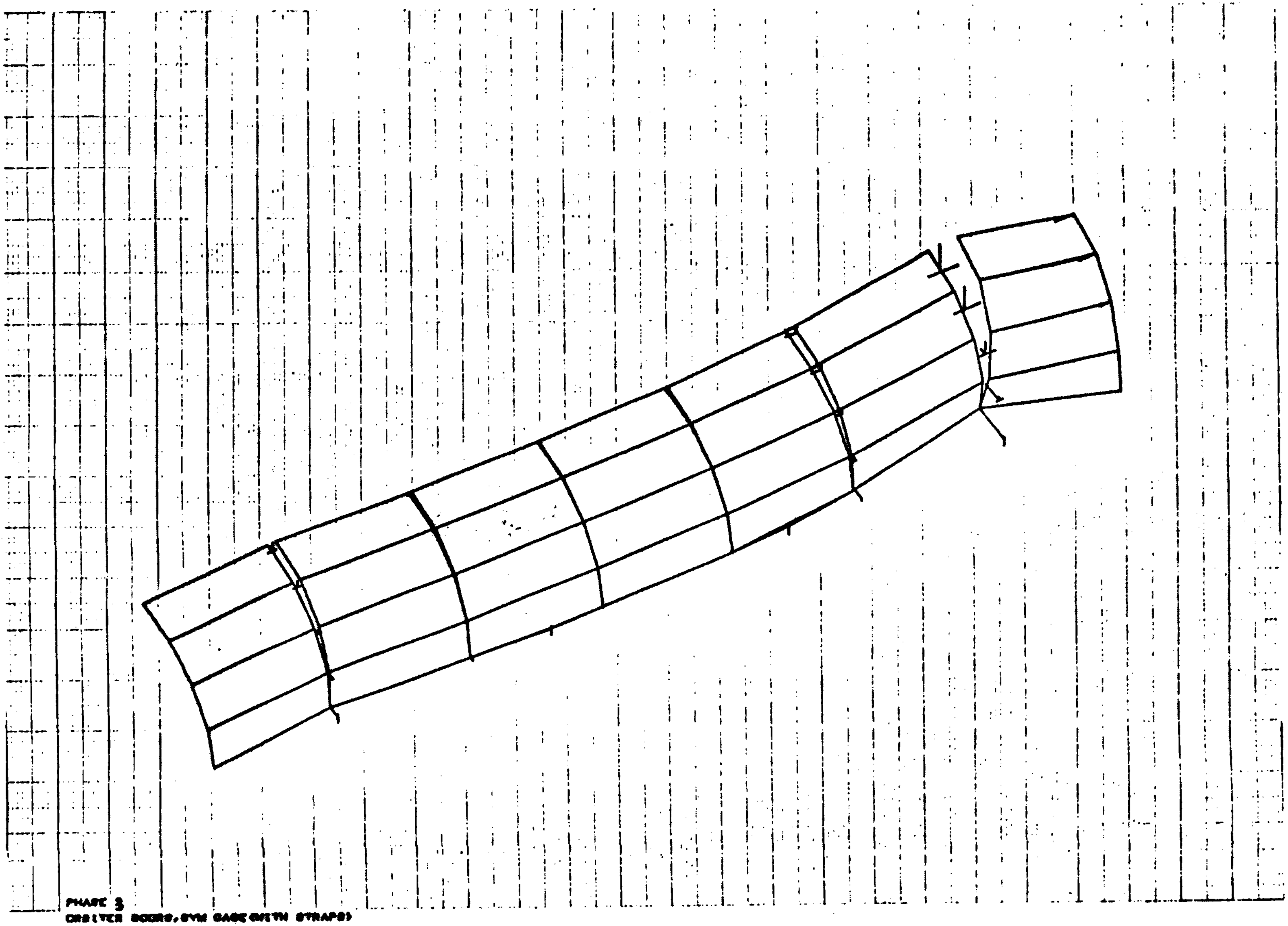
14



PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 14 MODE 14 FREQ. 128.2064

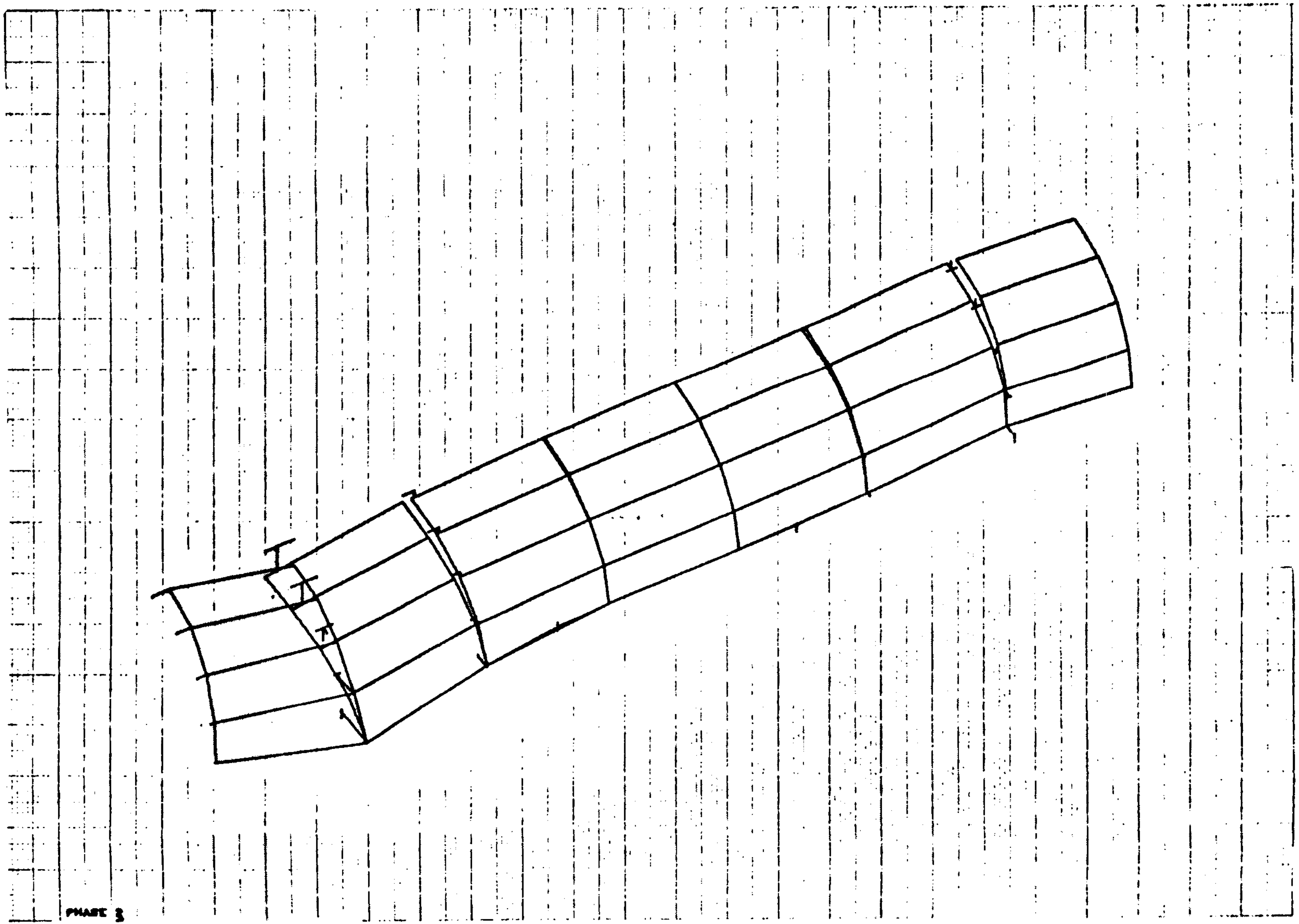
10 -- 10/18/74 MAX-DEF. = 1.00000000

10



PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 129.9481

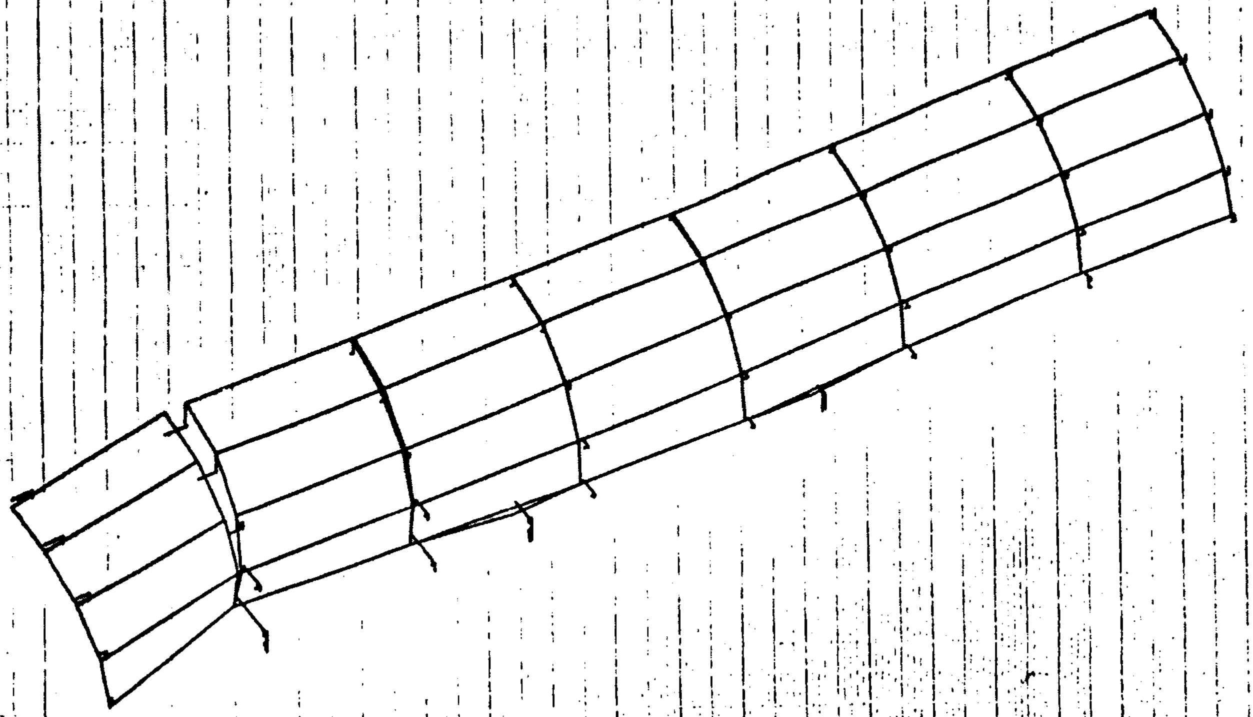
18 10/18/74 MAX-DEF. = 1.00814890 18



PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR, SUBCASE 18 MODE 18 FREQ. 180.2033

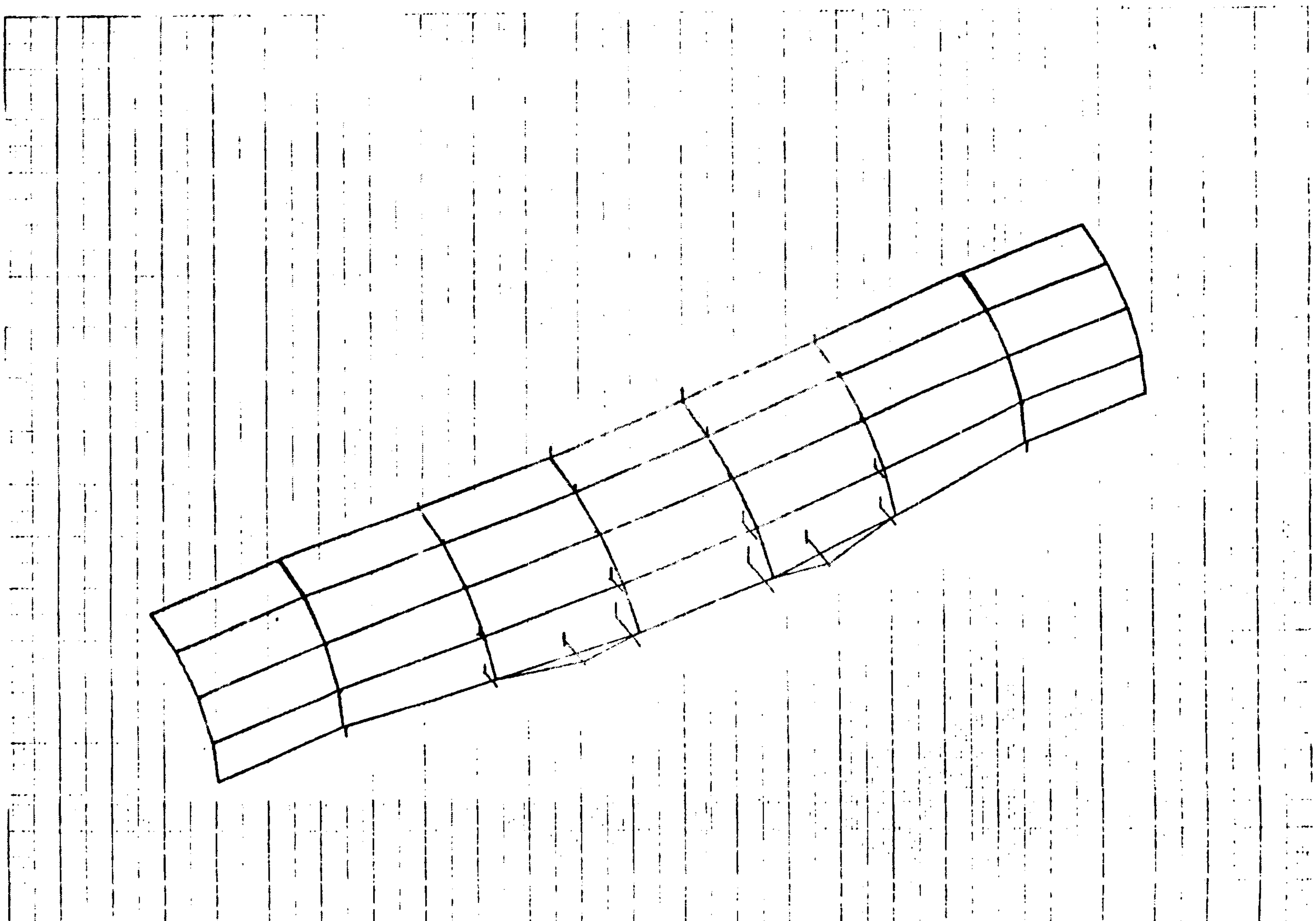
17 10/18/74 MAX-DEF. = 1.01817840

17

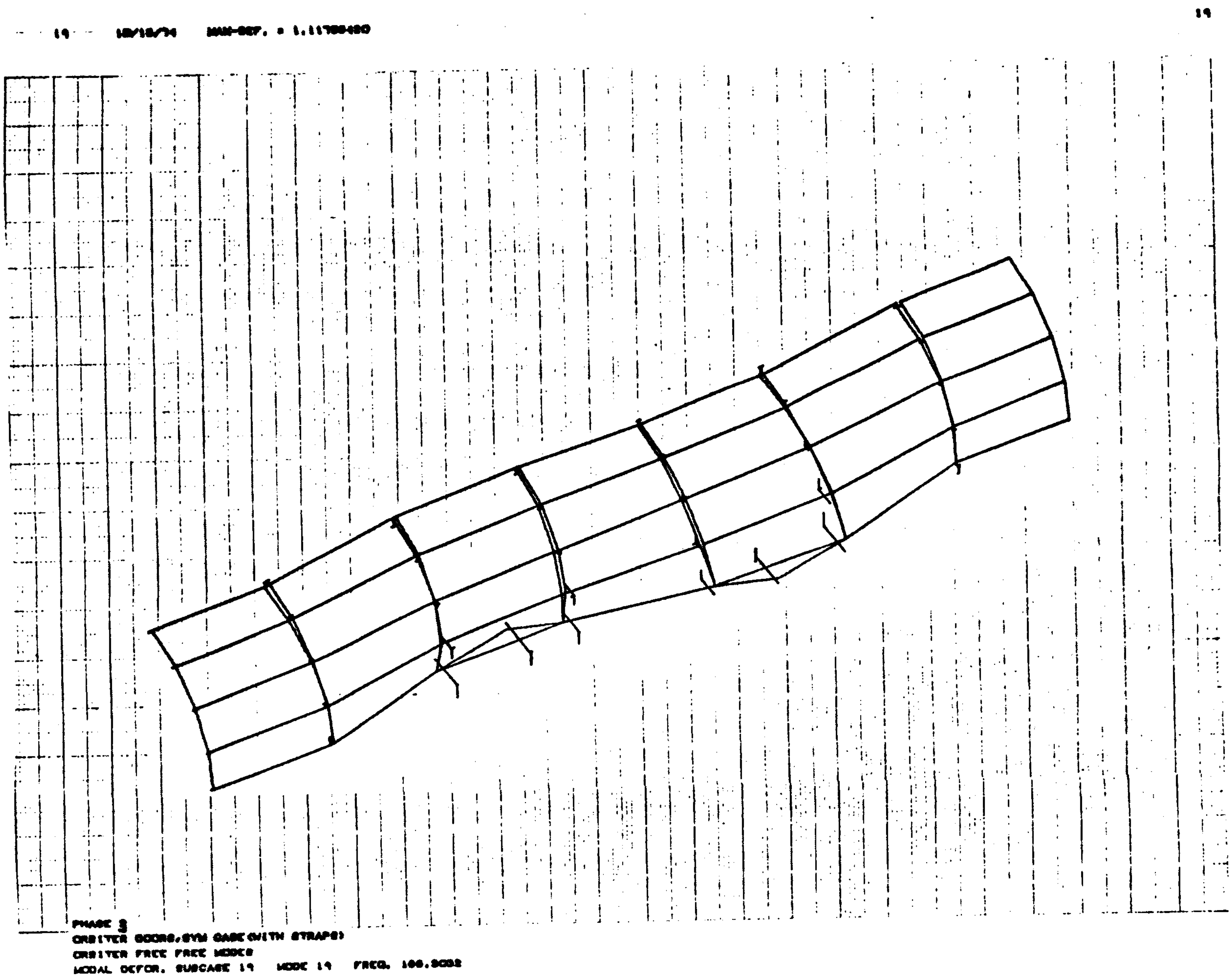


PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 17 MODE 17 FREQ. 142.1388

18 10/18/74 MAX-DEF. = 1.08820890 18

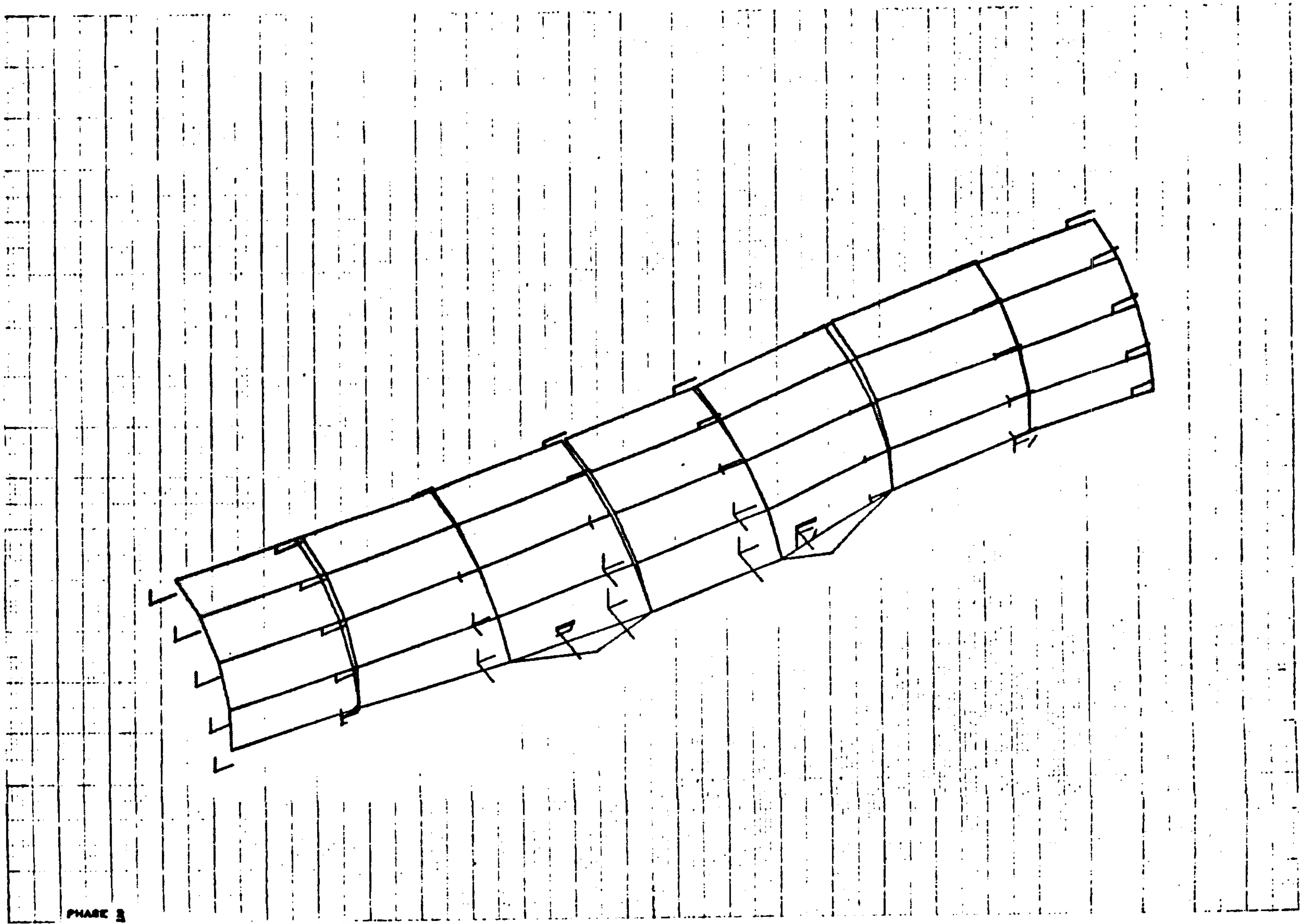


PHASE 3
ORBITER DOORS, SYM CASE (WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 159.0369

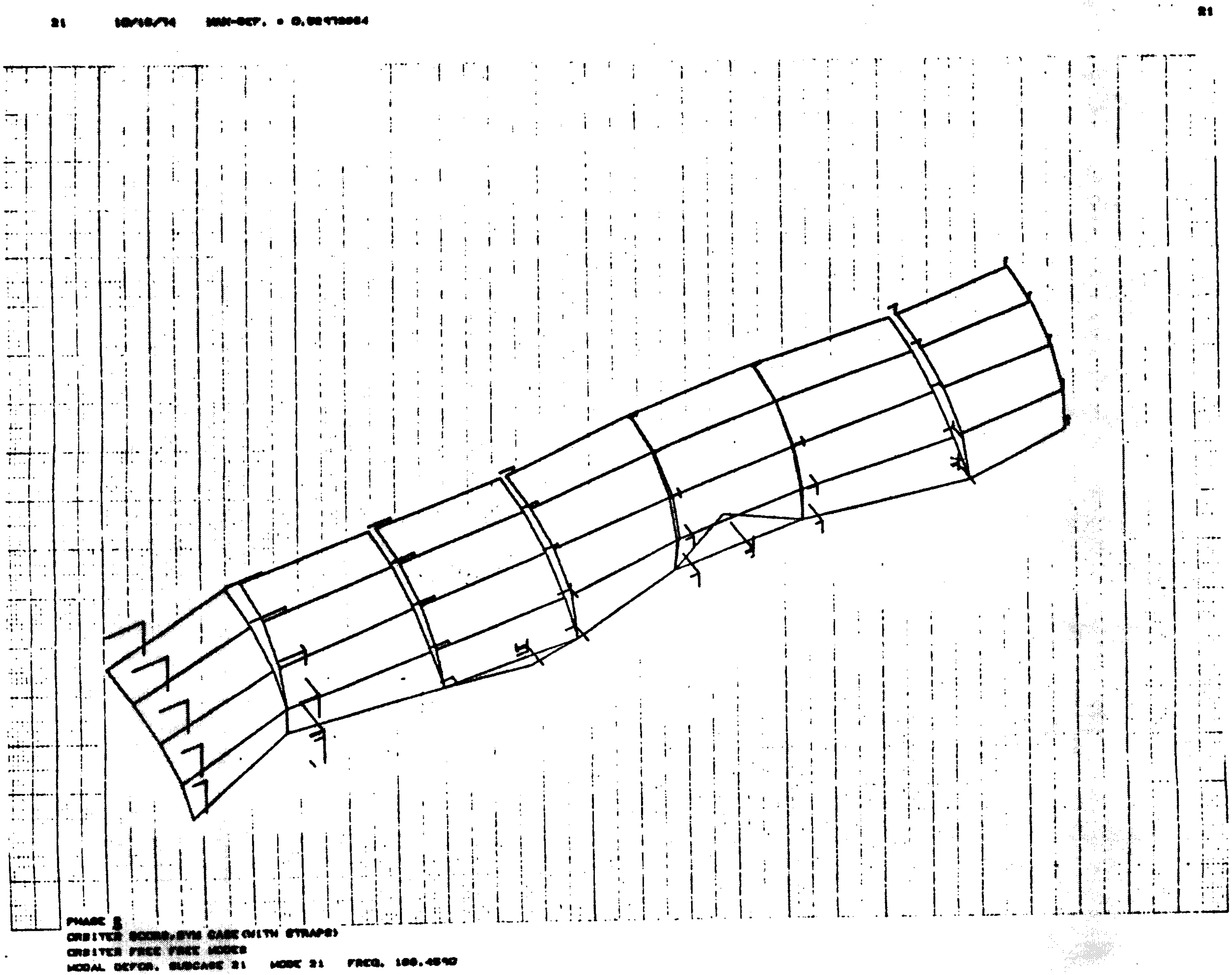

19   10/18/74   MAX-DEF. = 1.11780480
19
PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 19   MODE 19   FREQ. 100.9002

60 10/18/74 MAX-DEF. = 0.0[illegible]

20

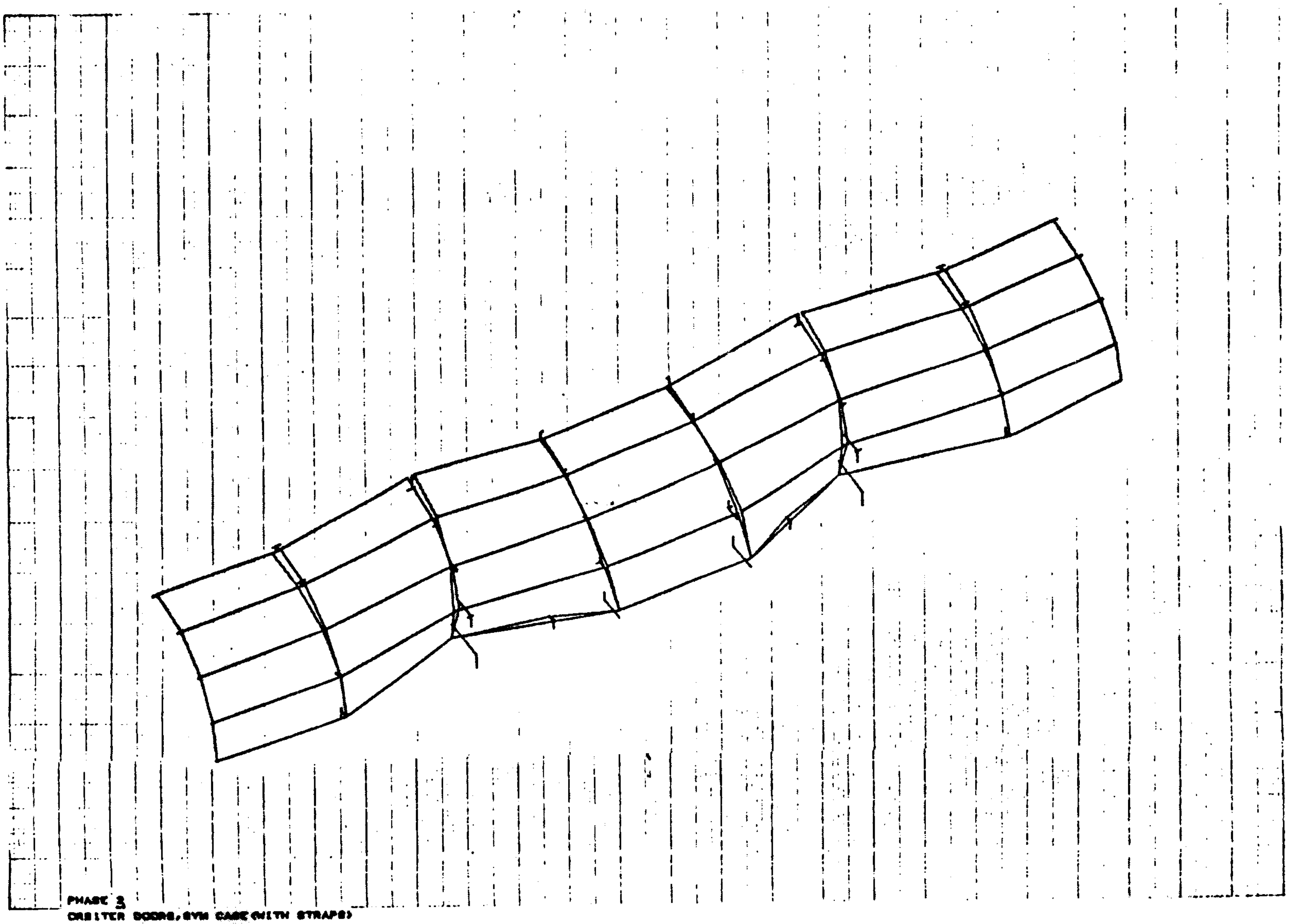


PHASE 2
ORBITER DOORS, SYM CASE (WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 20 MODE 20 FREQ. 171.7384


21
10/18/74
MAX-DEF. = 0.02478864
21
PHASE B
ORBITER BOOMS,SYM CASE (WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 21   MODE 21   FREQ. 188.4590

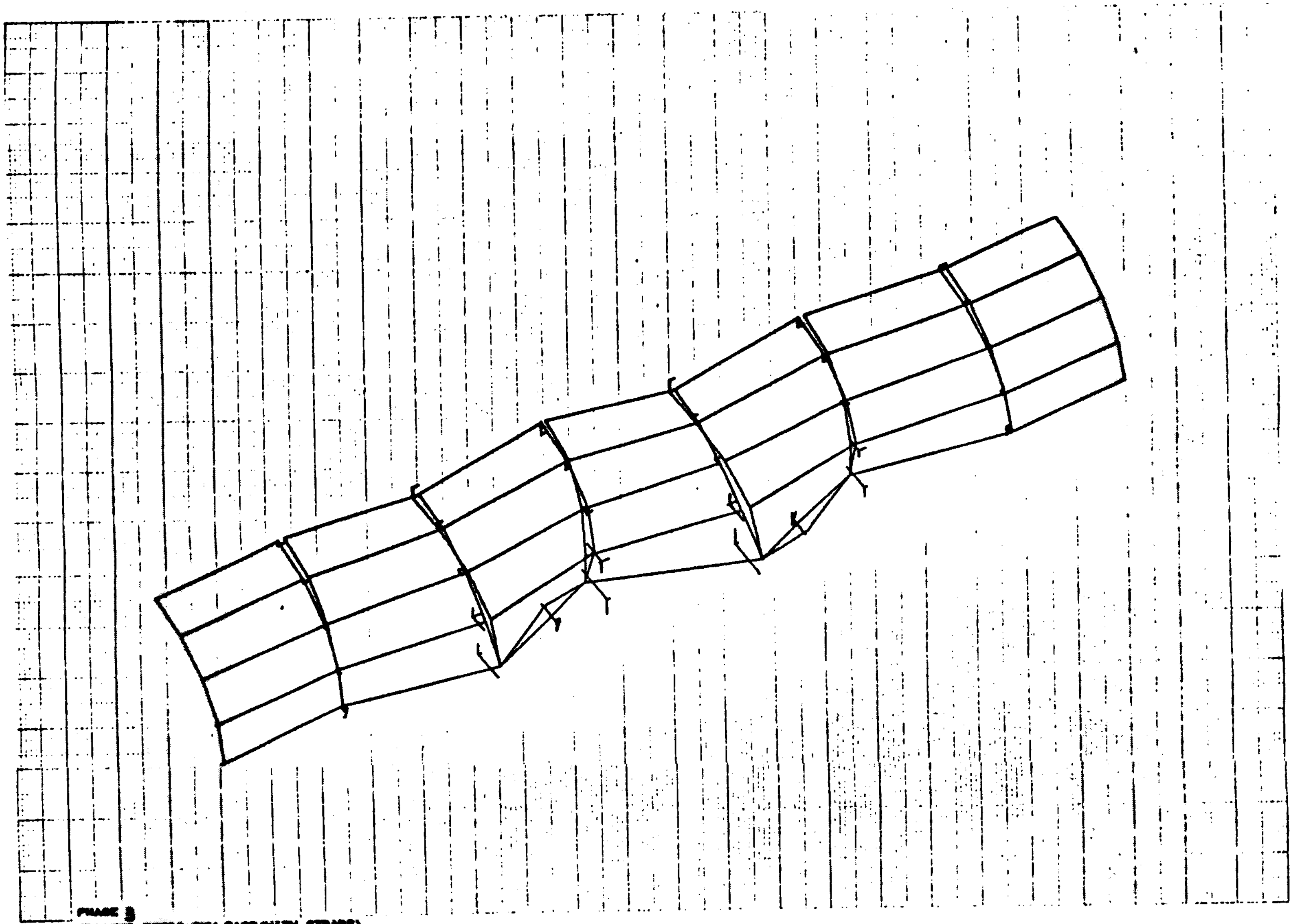
22 10/18/74 MAX-DEF. = 1.02796860

22



PHASE 3
ORBITER DOORS,SYM CASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 22 MODE 22 FREQ. 190.2283

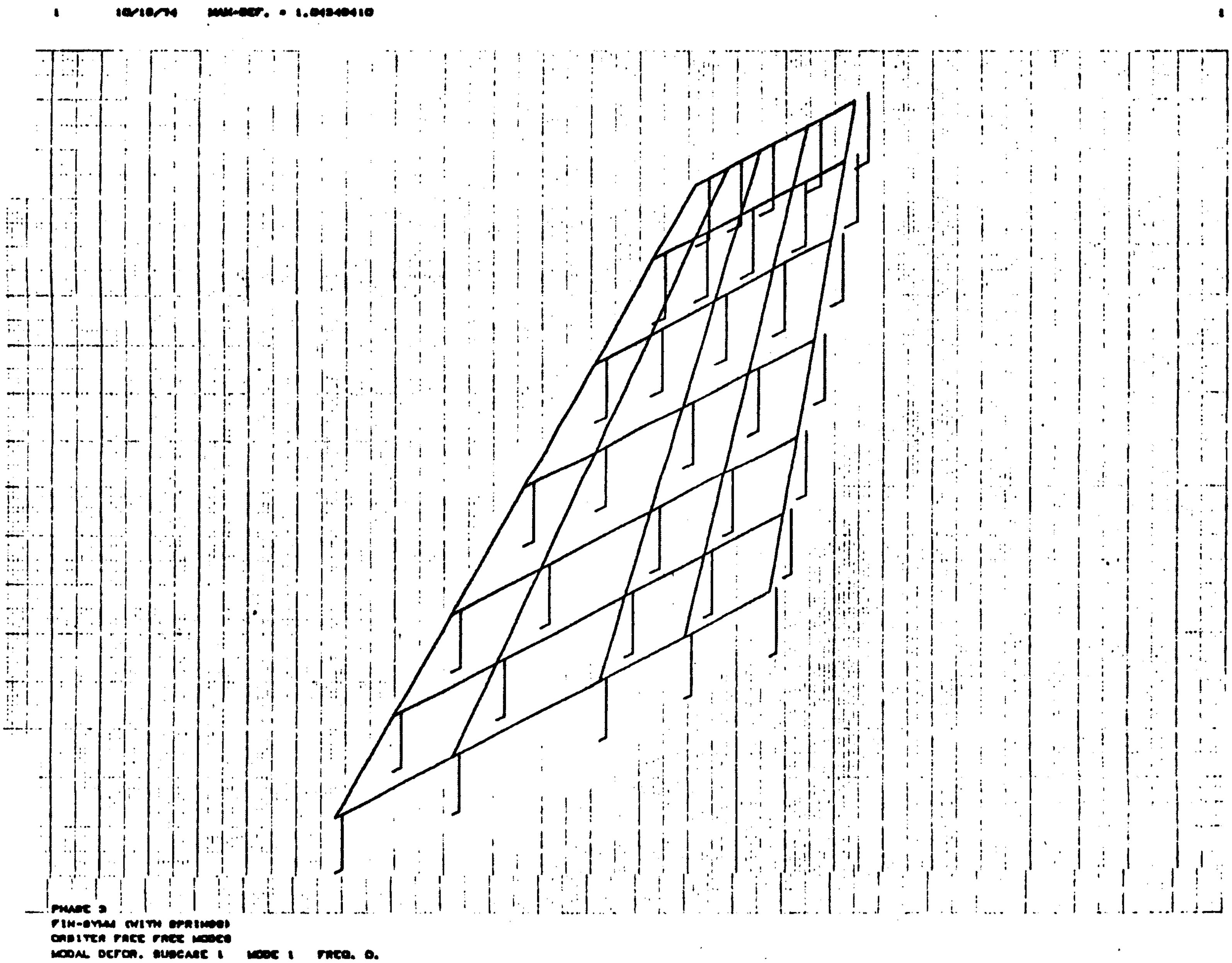
---- 23 --- 10/18/74 MAX-DEF. = 1.00000910



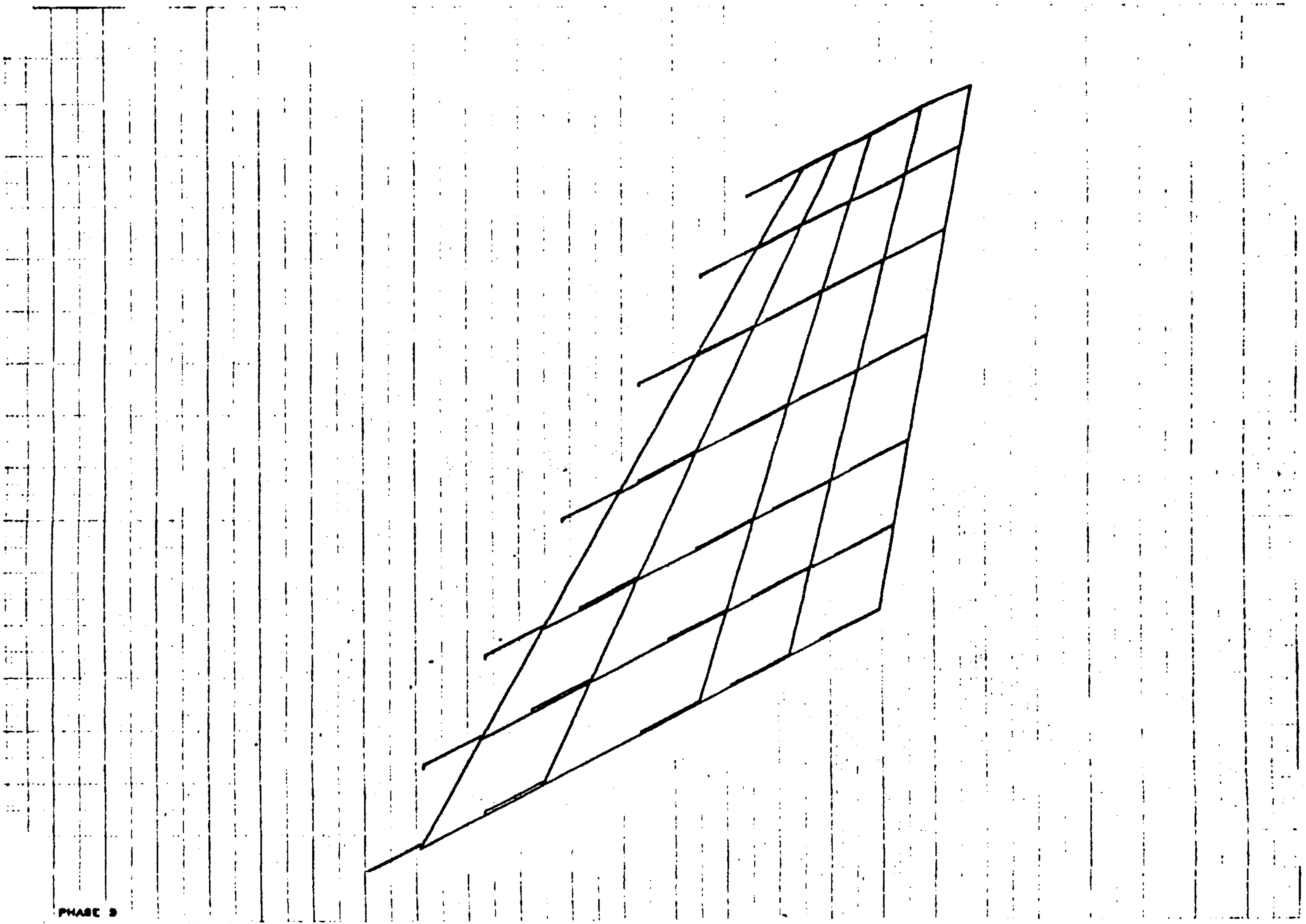
PHASE 3
ORBITER DOORS,SYM BASE(WITH STRAPS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 23 MODE 23 FREQ. 224.0294

Appendix B17
INPUT & PLOTS/PHASE 3 ANALYSIS: MODEL II FIN SYMMETRIC FREE-FREE ORBITER MODES

```
PHASE 3                                                           OCTOBER  18, 1974   NASTRAN  2/ 1/73    PAGE     6
FIN-SYMM XWITH SPRINGSH

                                        C A S E    C O N T R O L    D E C K    E C H O
           CARD
           COUNT
             1        TITLE # PHASE 3
             2        SUBTITLE # FIN-SYMM XWITH SPRINGSH
             3        MAXLINES # 30000
             4        VECTOR  # ALL
             5        SUBCASE 1
             6        LABEL      # ORBITER FREE FREE MODES
             7        MODES    # 23
             8        OUTPUT%PLOTH
             9        SET 61 # INCLUDE 4401 THRU 4424
            10        SET 62 # INCLUDE 4431 THRU 4452
            11        SET 63 # INCLUDE 4461 THRU 4529
            12        PLOTTER CALCOMP 765,105
            13        AXES    #MY,X,Z
            14        VIEW    # 45.0,30.0,0.0
            15        MAXIMUM DEFORMATION 2.0
            16        FIND  SCALE,ORIGIN 62,SET 61
            17        PLOT MODAL DEFORMATION 1 THRU 23,SET 61,ORIGIN 62,SHAPE,VECTOR XYZ
            18        BEGIN BULK


                      PARAM    TINAME2    ORBTSP2


                      ENDDATA
```

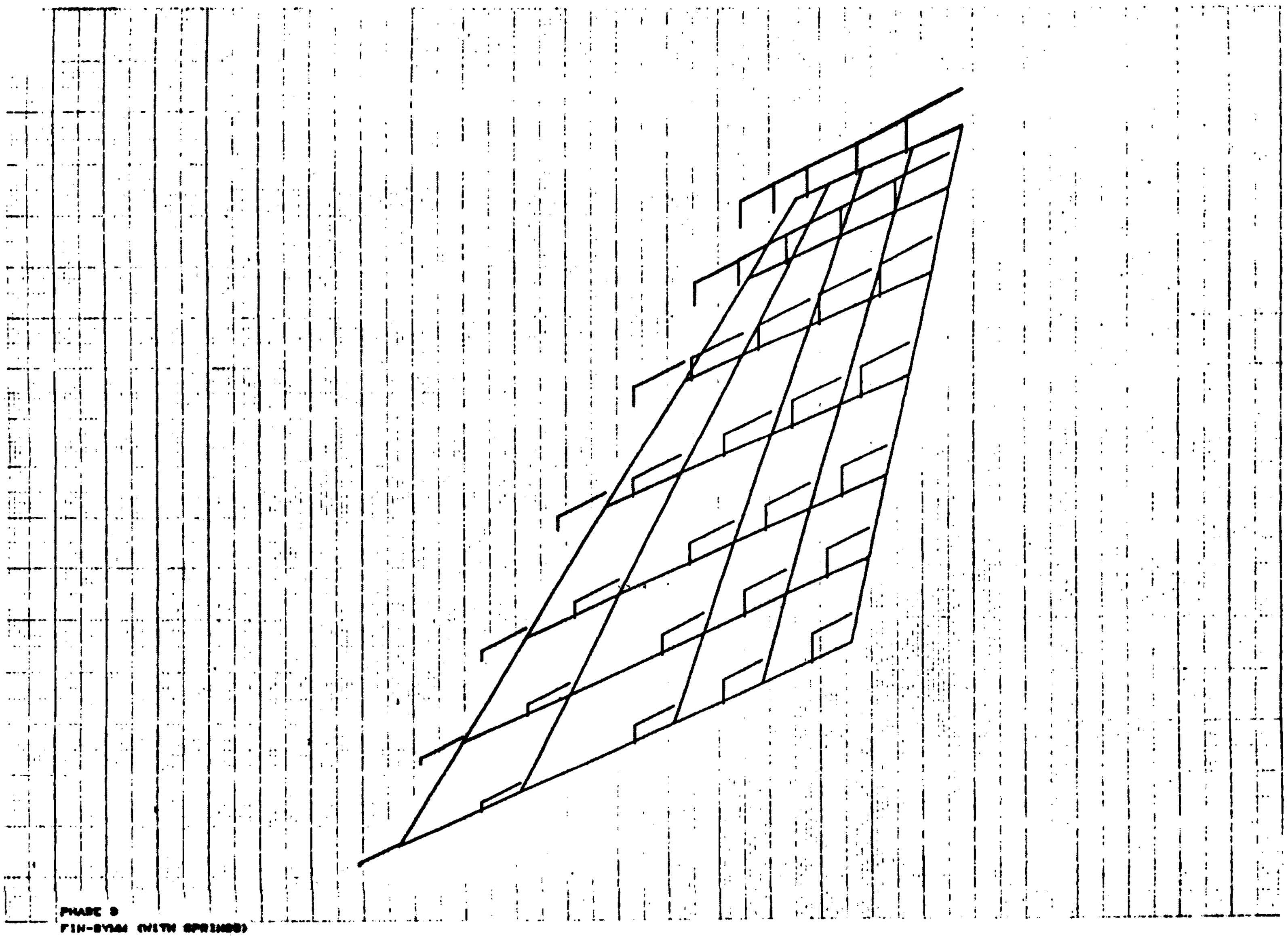

1 10/18/74 MAX-DEF. = 1.04348410 1
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 1 MODE 1 FREQ. 0.

2 10/18/74 MAX-DEF. = 0.91401E00 2



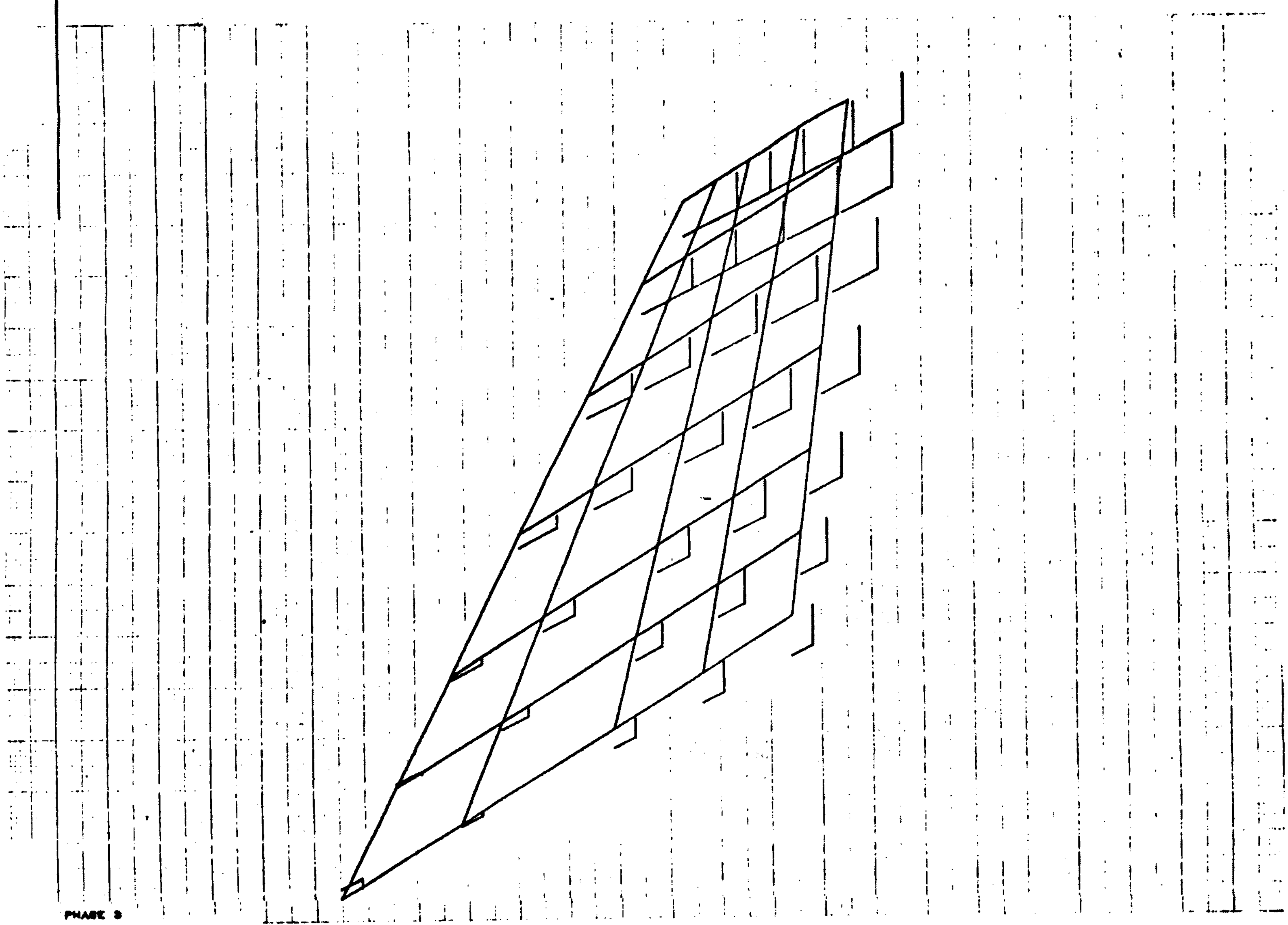
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 2 MODE 2 FREQ. 0.

3 10/18/74 MAX-DEF. = 0.42480084



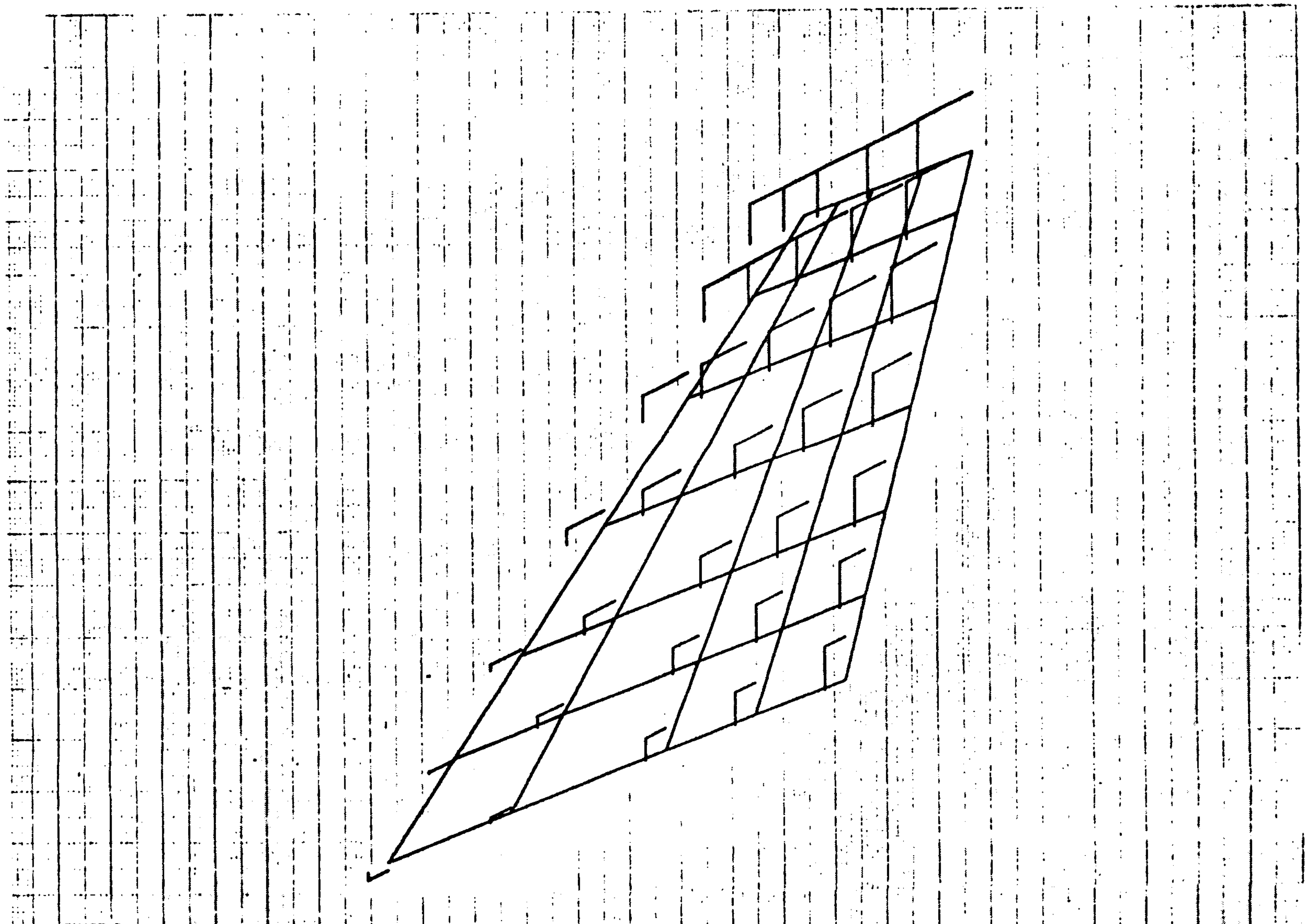
PHASE B
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 3 MODE 3 FREQ. 0.

4 10/10/74 MAX-DEF. = 2.90842820

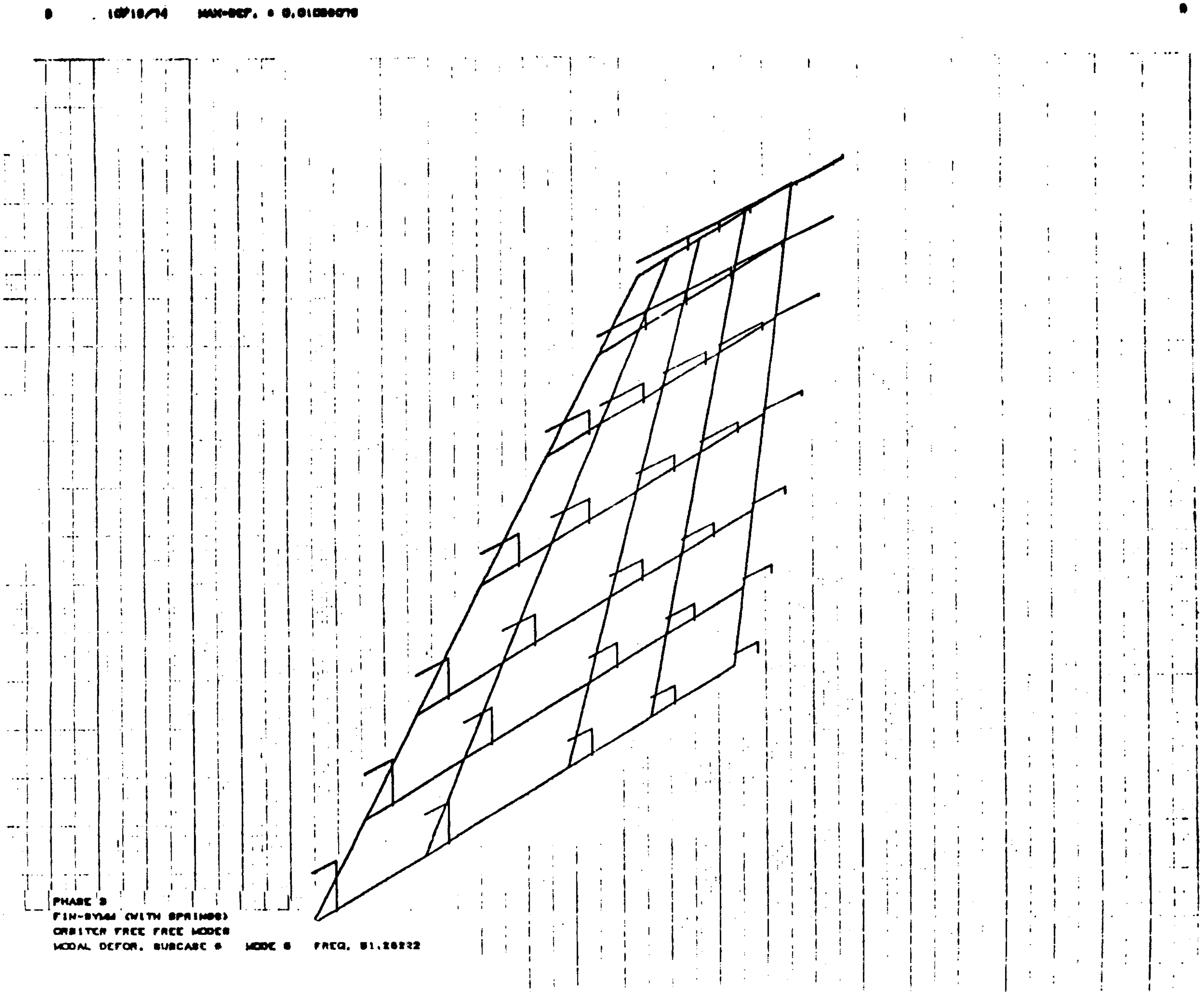


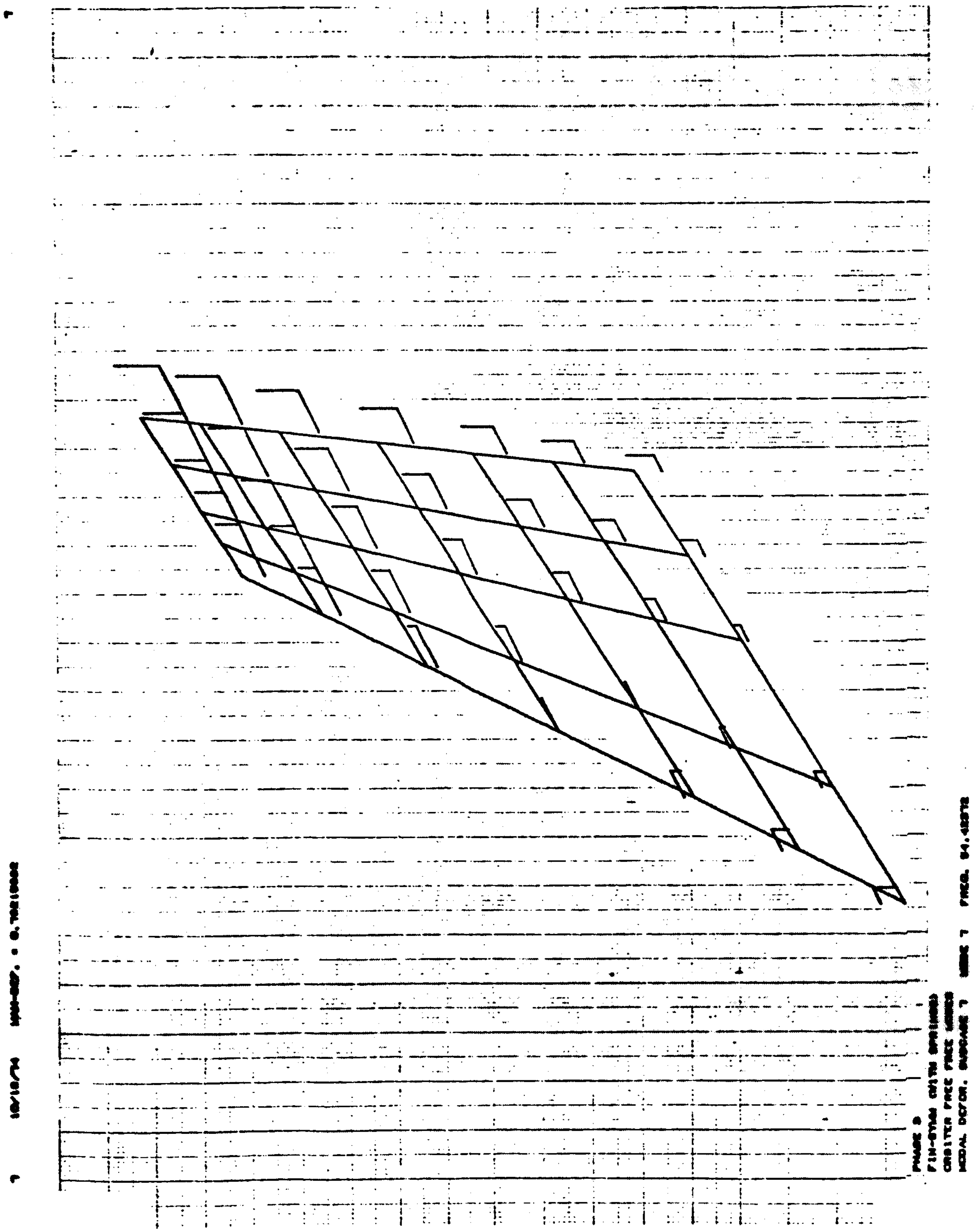
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 4 MODE 4 FREQ. 44.11871

10/18/74 MAX-DEF. = 0.01246845

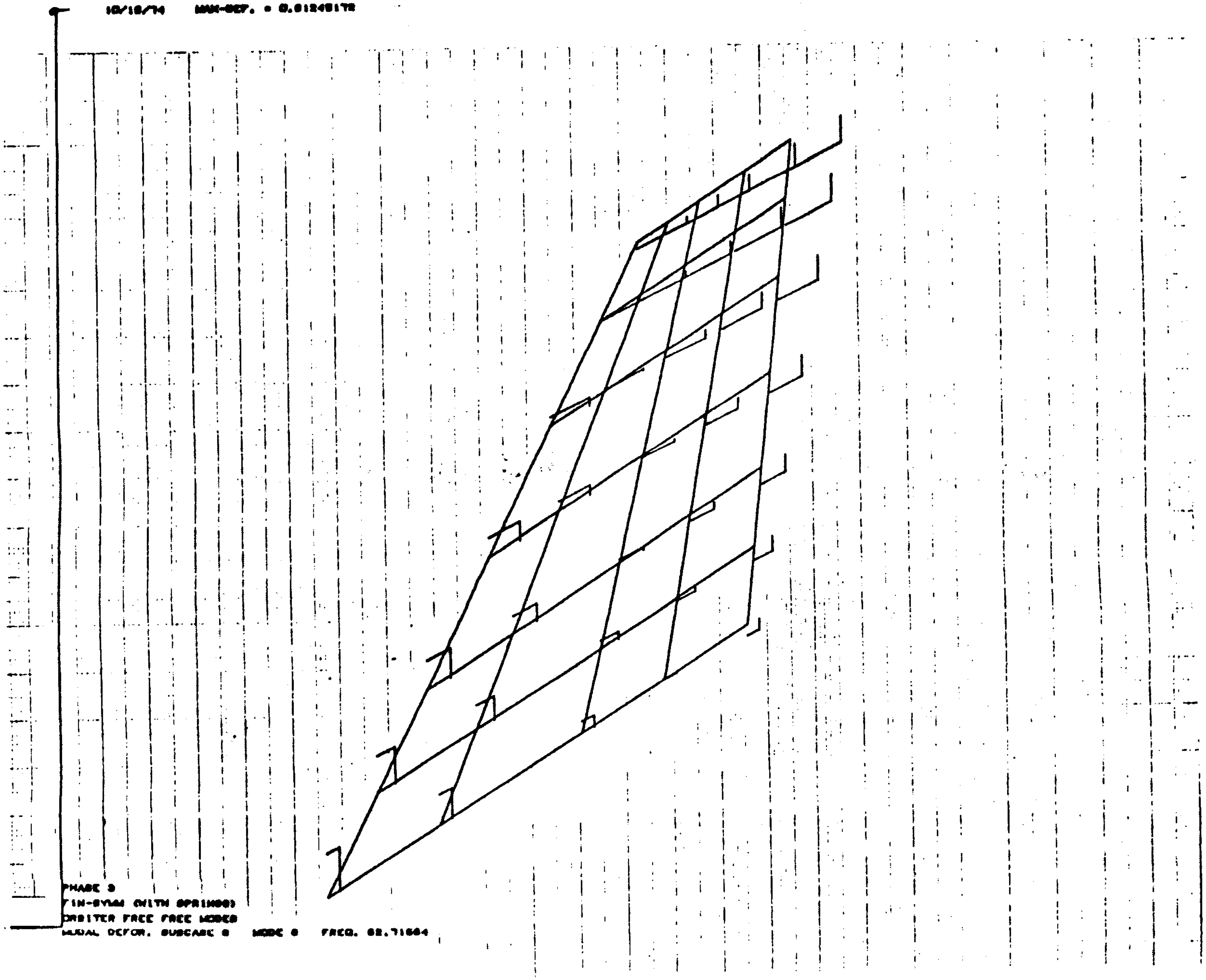


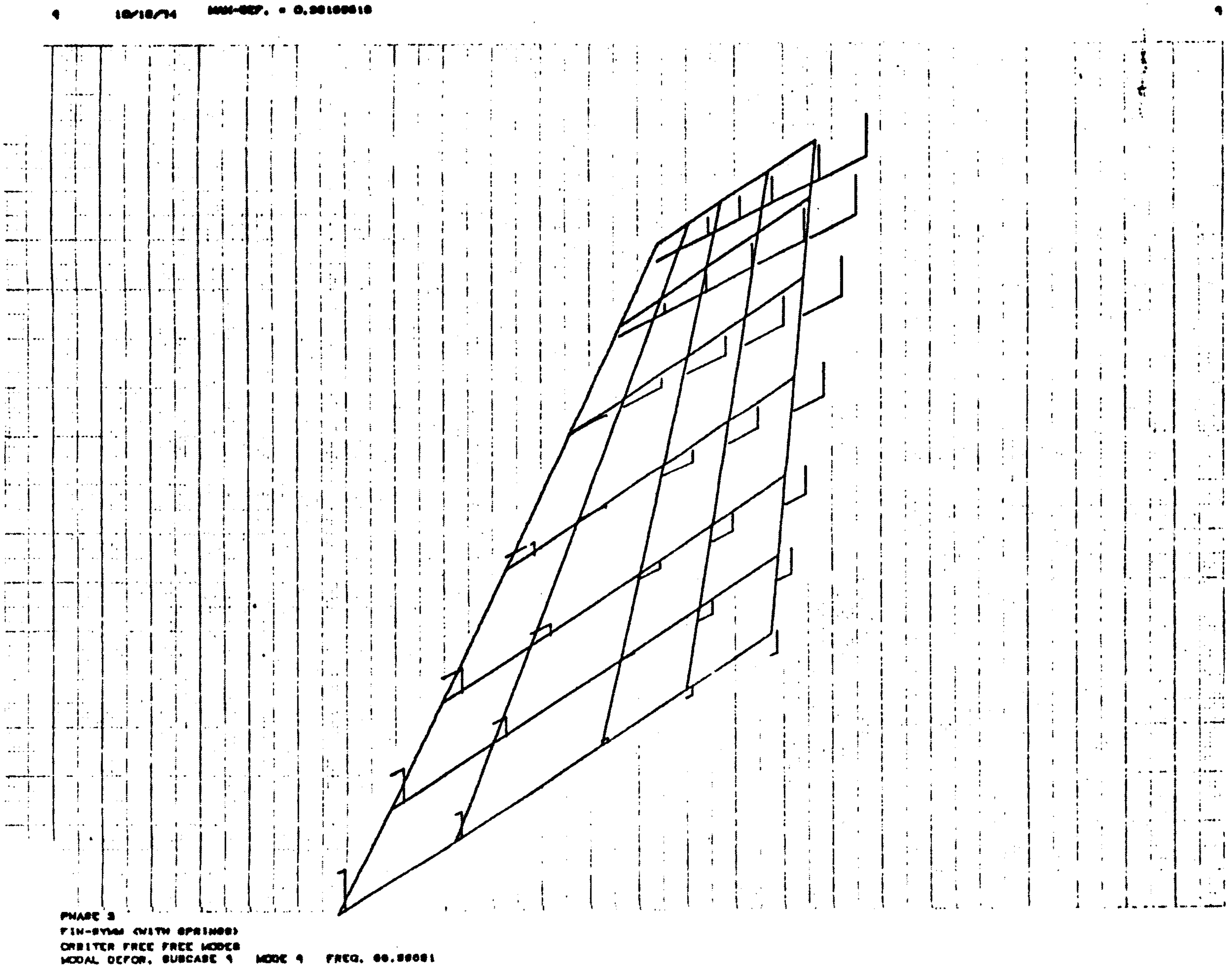
PHASE 3
FIN-SYM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 48.33640

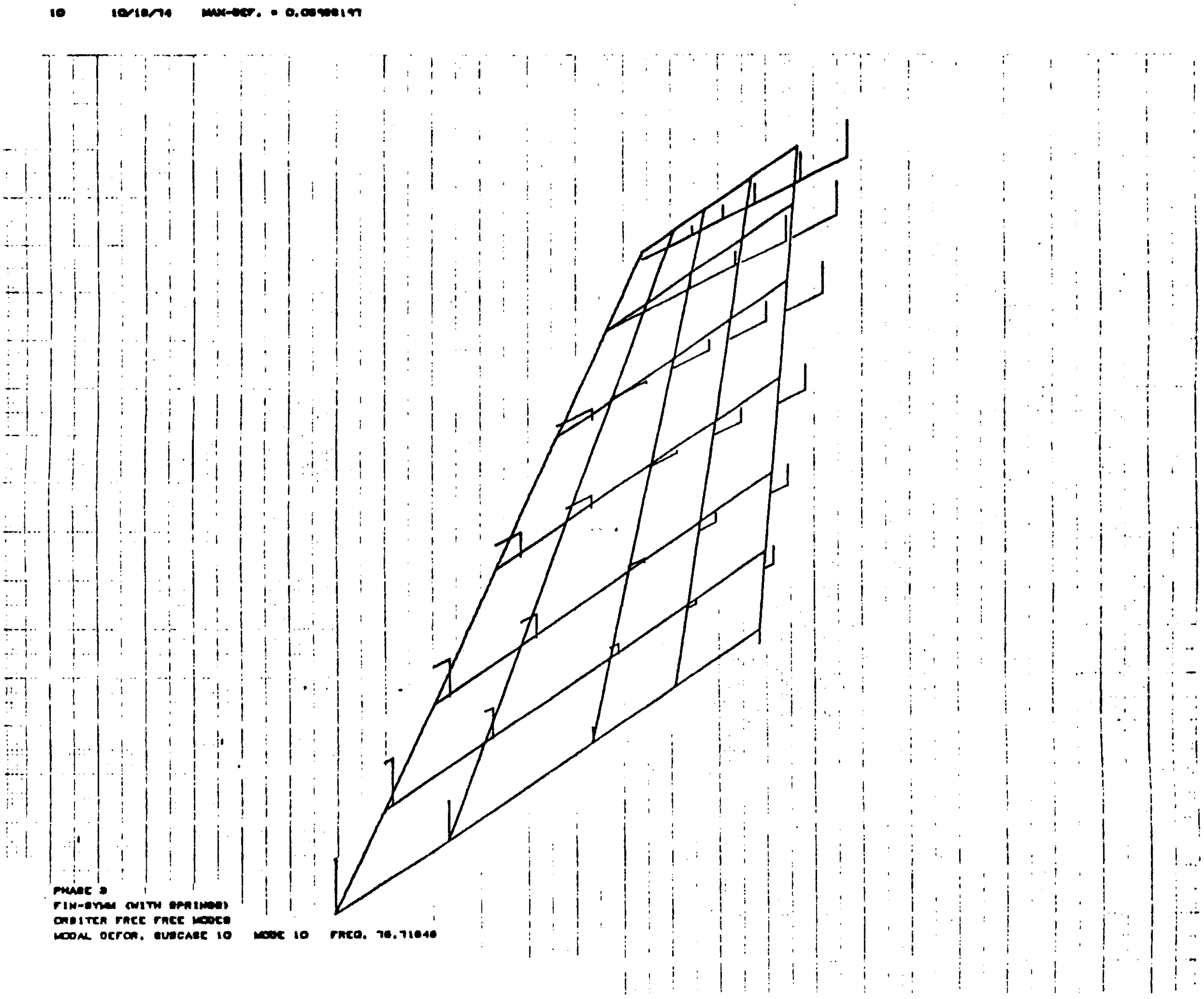

8 . 10/18/74 MAX-DEF. = 0.01080078
PHASE 3
FIN-BYAM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 6 MODE 6 FREQ. 51.28222

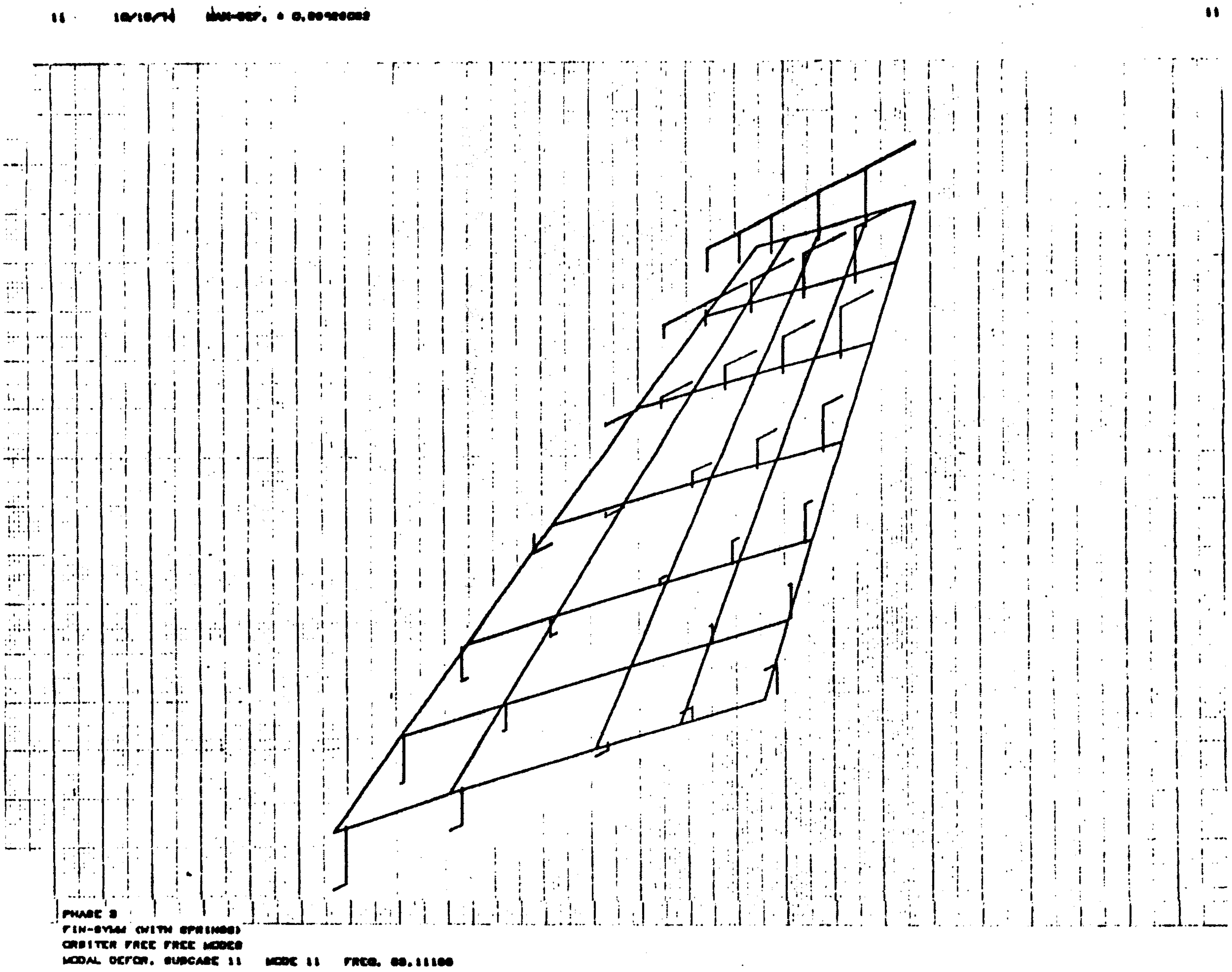


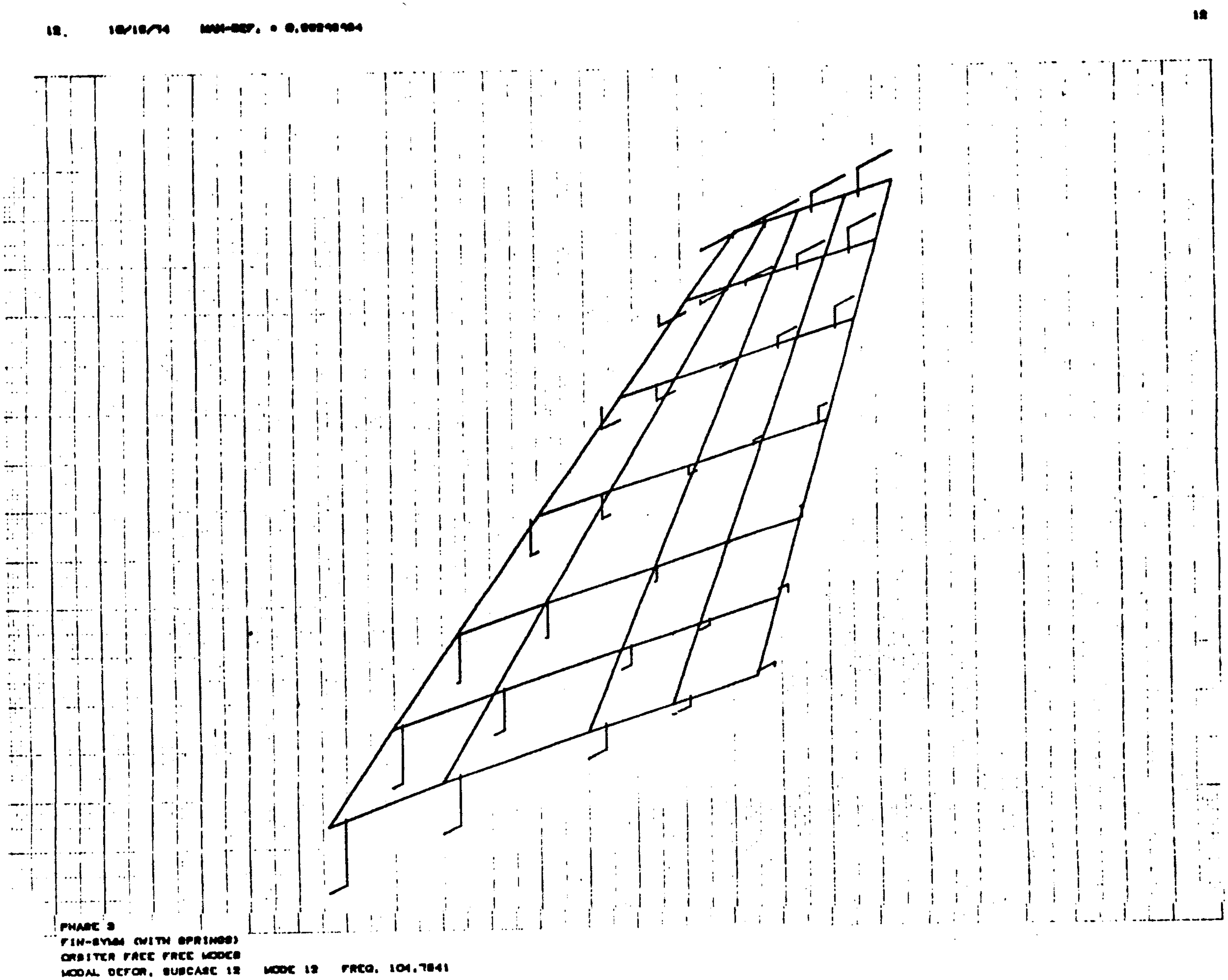
10/18/74 MAX-DEF. = 0.7821986
PHASE 3
FIN-STAB (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DC/DR. SUBCASE 7 MODE 7 FREQ. 54.43972

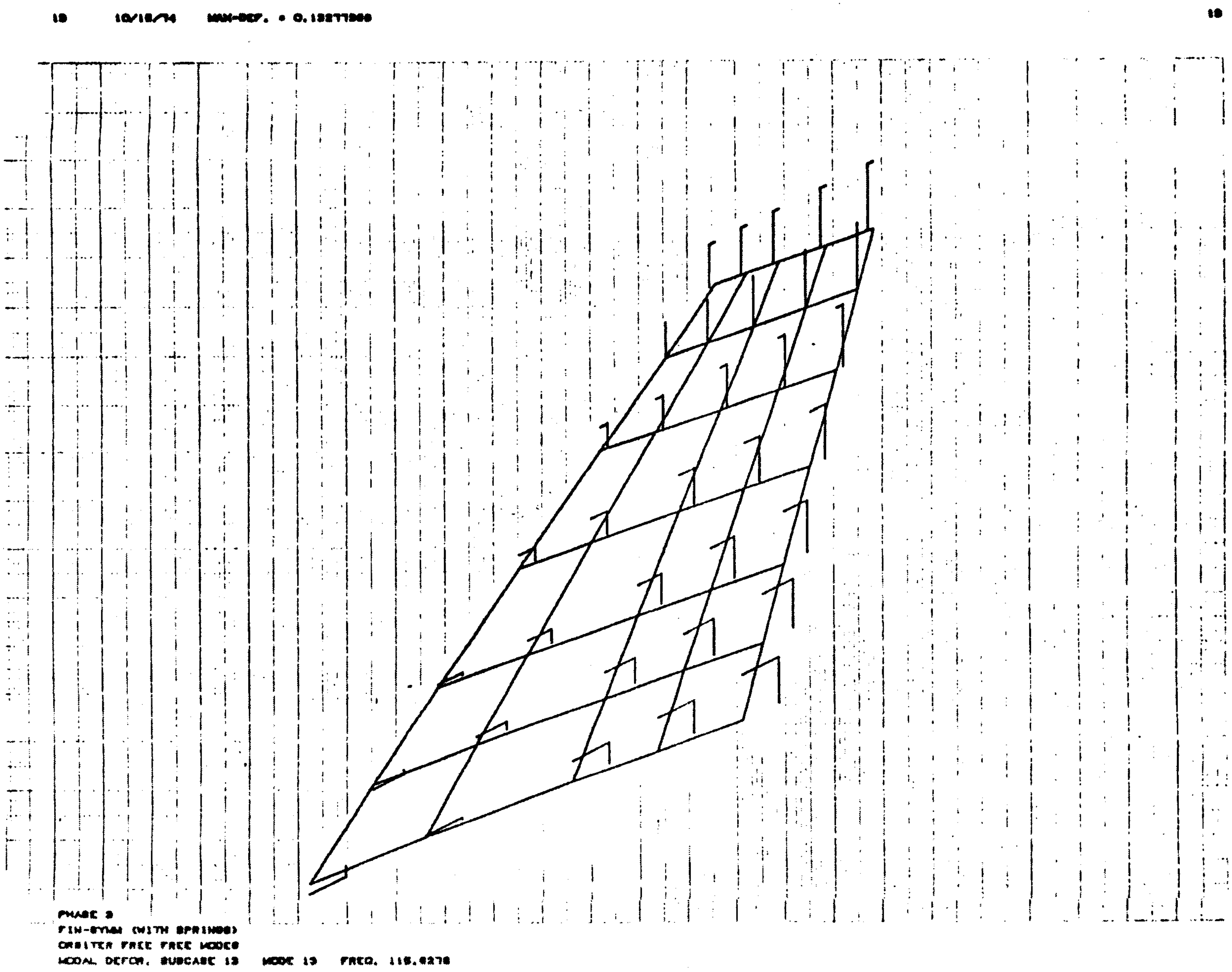

10/18/74 MAX-DEF. = 0.01248172
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 62.71684

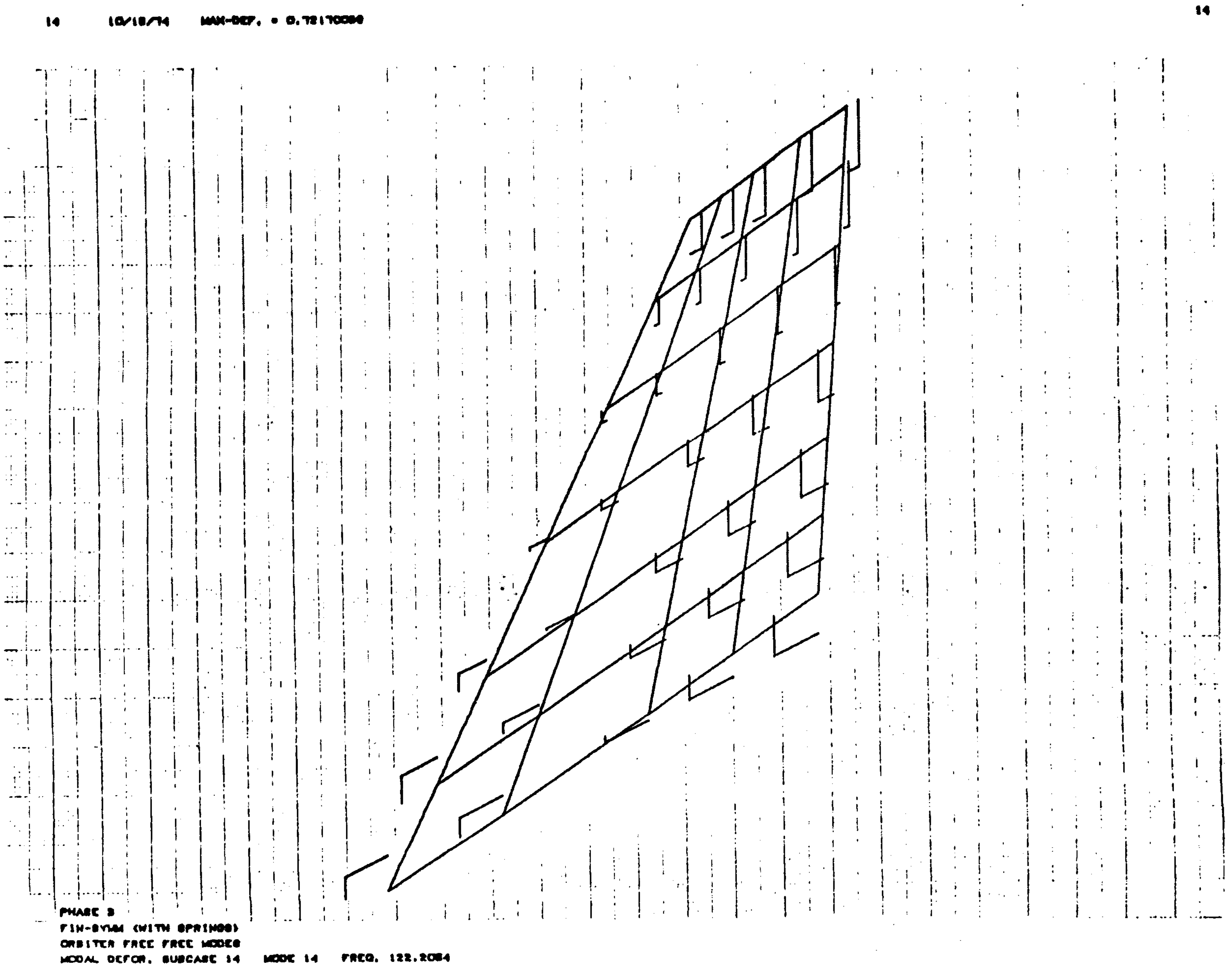

4
10/18/74
MAX-DEF. = 0.38188818
4
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR, SUBCASE 4
MODE 4
FREQ. 88.88081

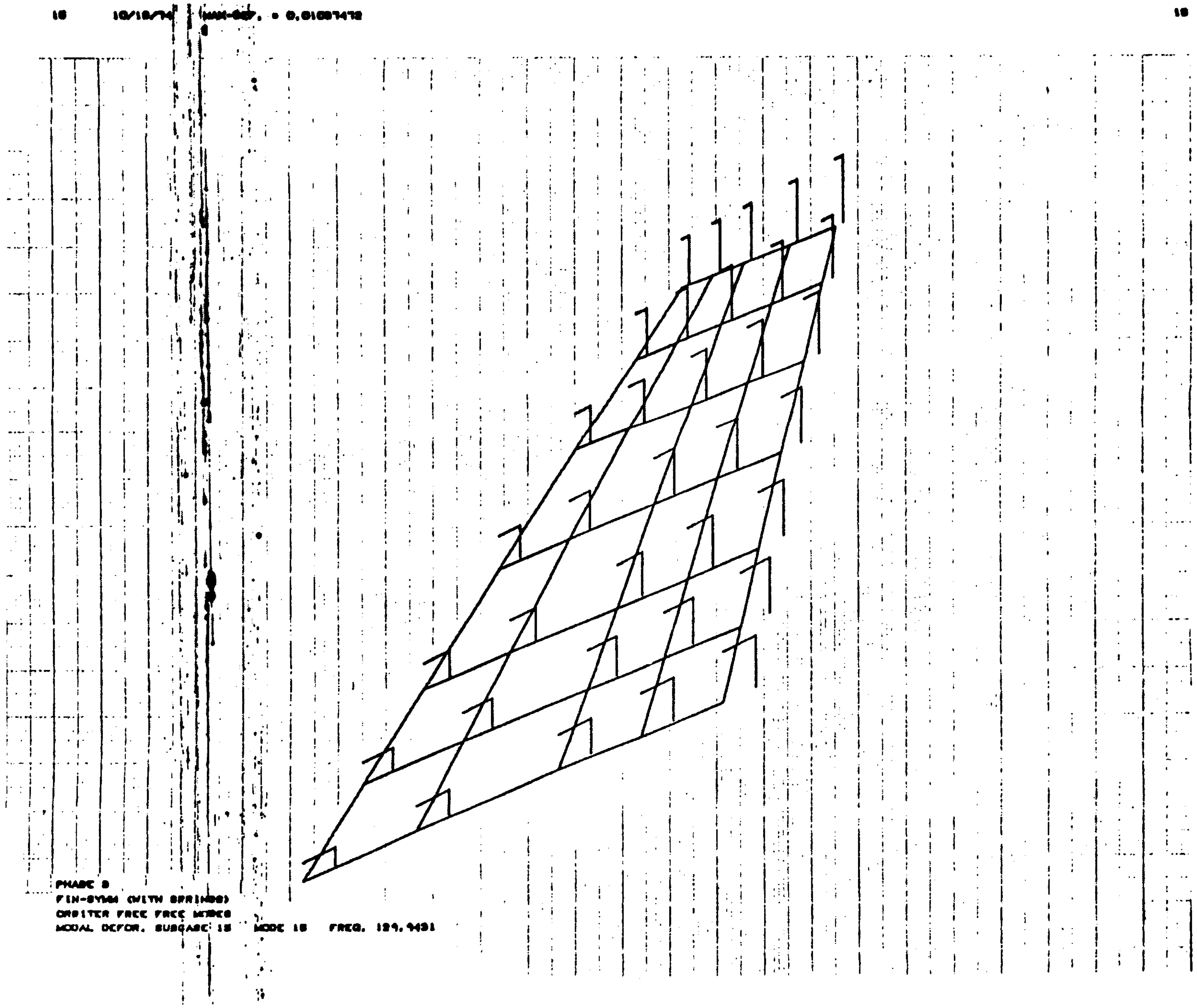

10 10/18/74 MAX-DEF. = 0.08988197
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 78.71848


11 10/10/74 MAX-DEF. = 0.00920082
11
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 11 MODE 11 FREQ. 88.11100

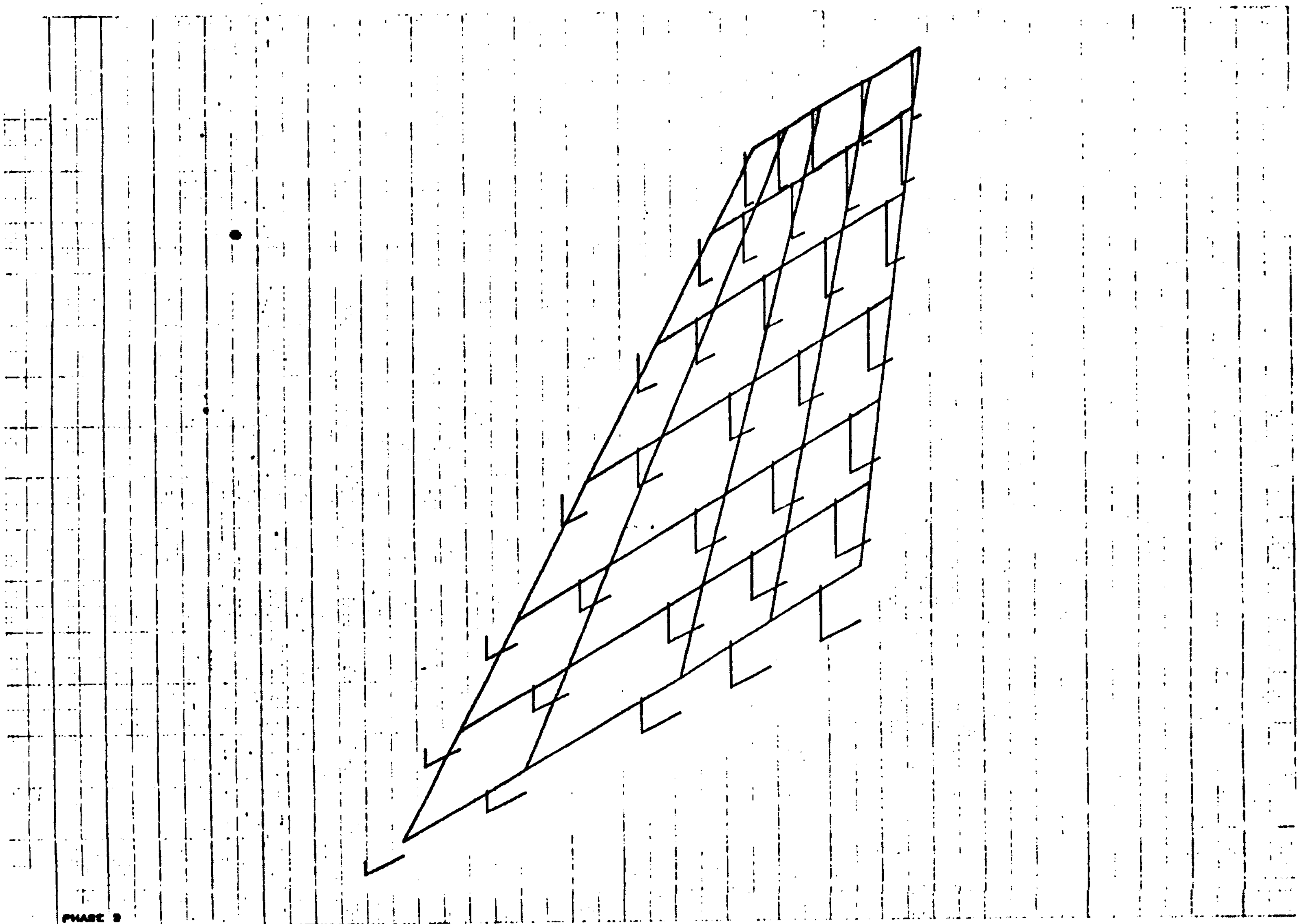

12. 10/18/74 MAX-DEF. = 0.00298984
12
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 12 MODE 12 FREQ. 104.7841


19
10/18/74
MAX-DEF. = 0.13277300
19
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 13
MODE 13
FREQ. 115.6278


14 10/18/74 MAX-DEF. = 0.72170086
14
PHASE B
FIN-BYAM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 14 MODE 14 FREQ. 122.2084


18 10/18/74 MAX-DEF. = 0.01087472
18
PHASE B
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 129.9431

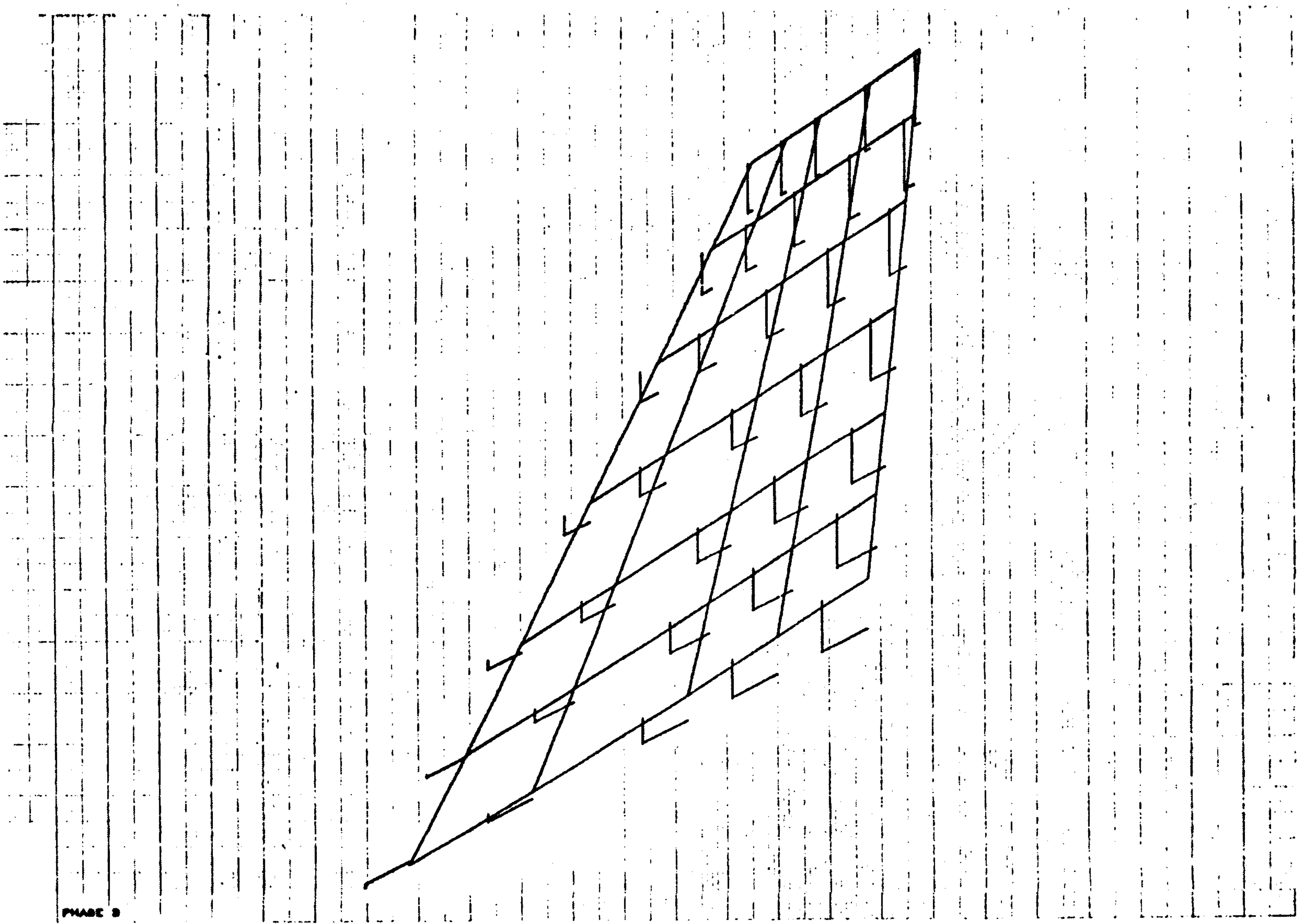
16 10/18/74 MAX-DEF. = 0.01811049 16



PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 16 MODE 16 FREQ. 130.2039

17 10/18/74 MAX-DEF. = 0.30000000

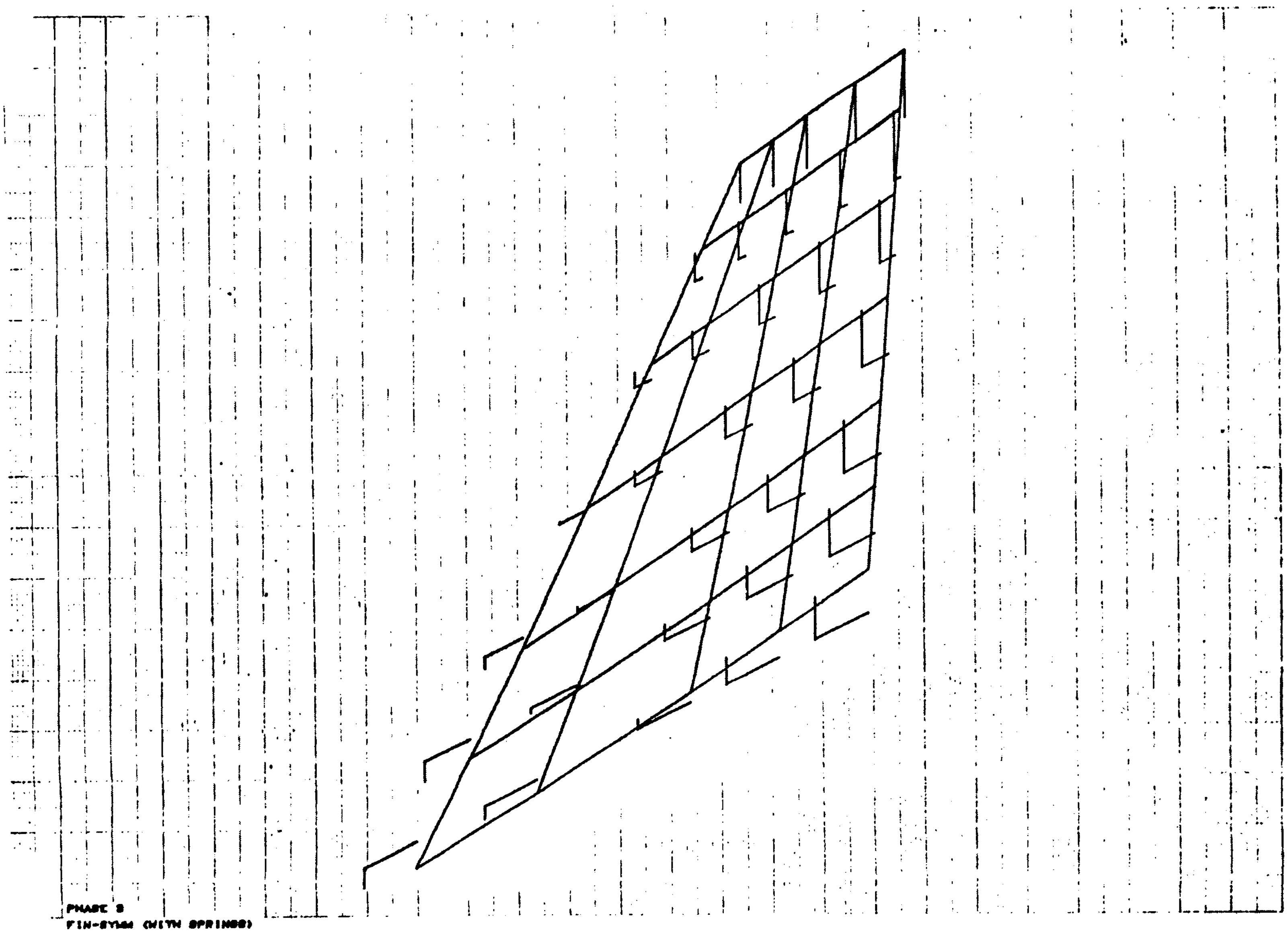
19



PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 17 MODE 17 FREQ. 142.1300

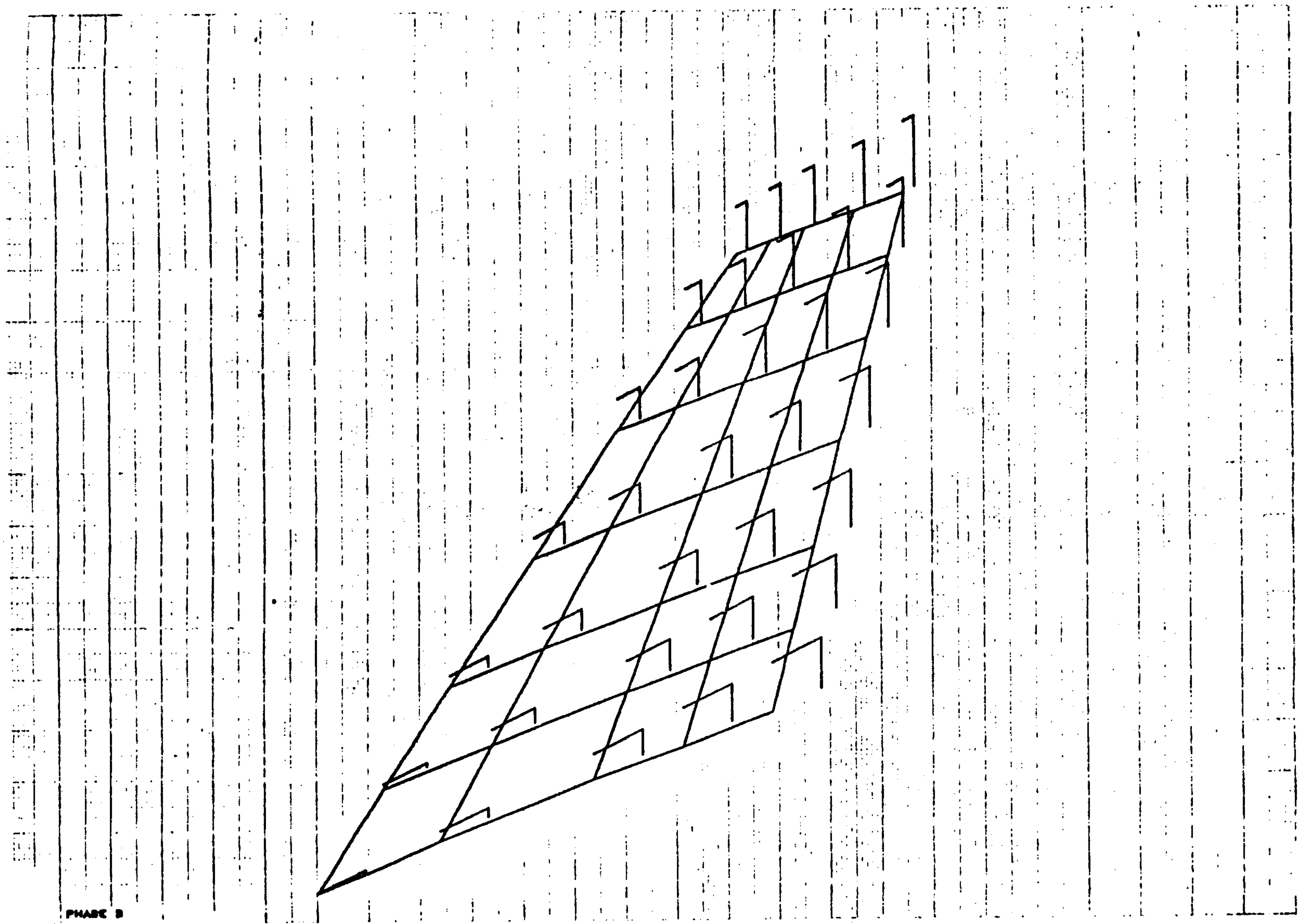
18 10/10/74 MAX-DEF. = 0.01392431

19



PHASE B
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 159.0369

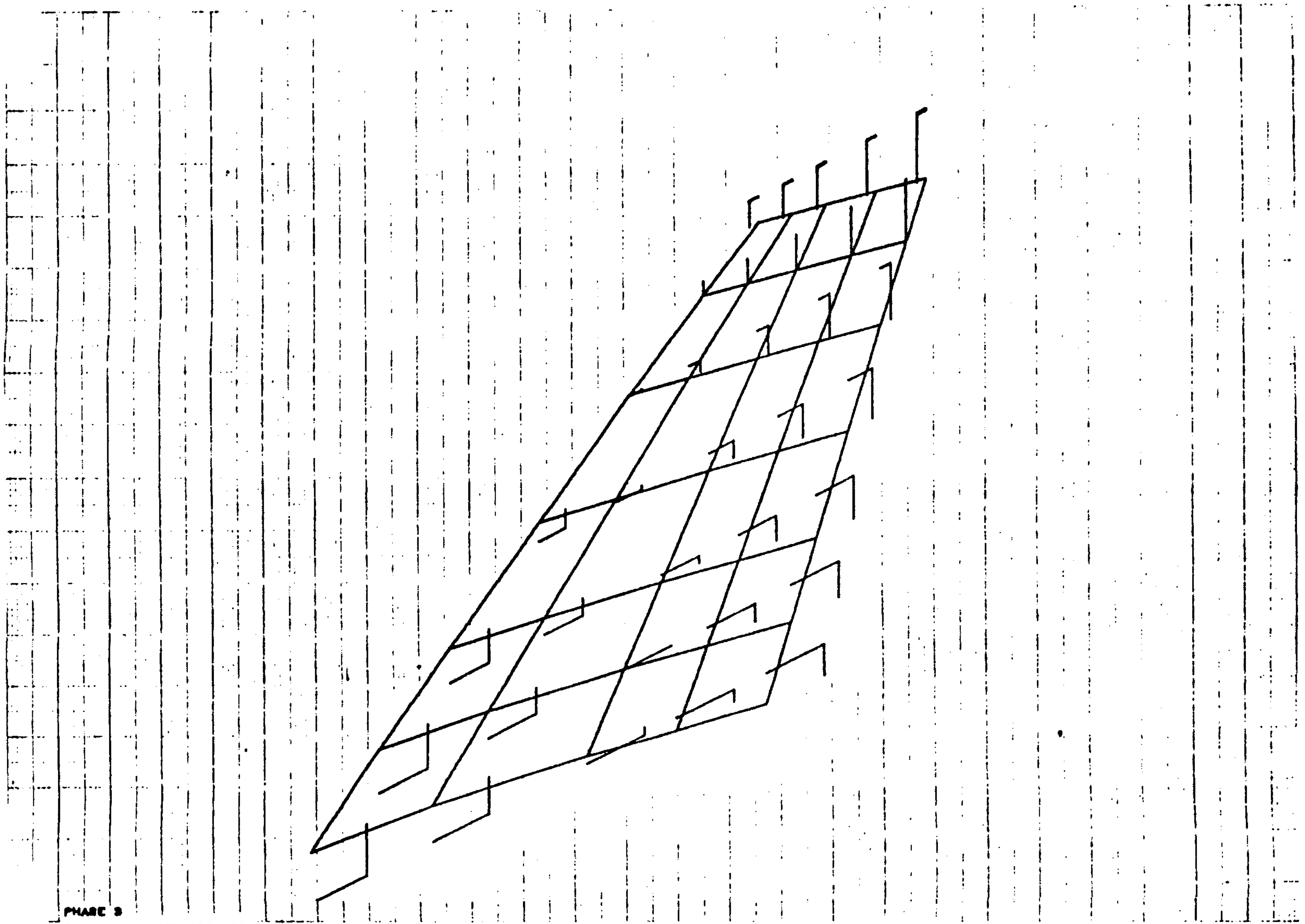
19 10/18/74 MAX-DEF. = 0.01199008 19



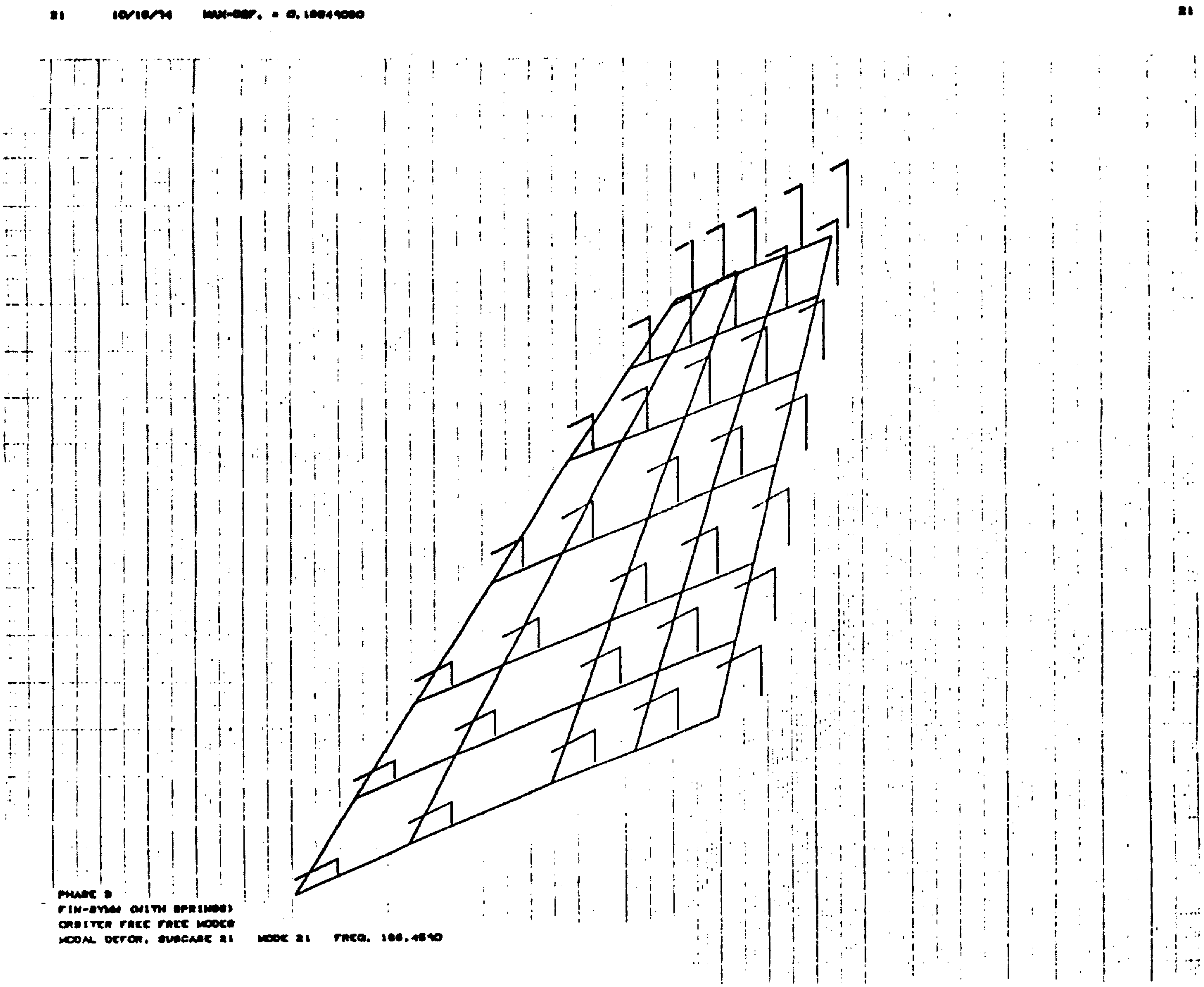
PHASE B
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 19 MODE 19 FREQ. 160.3032

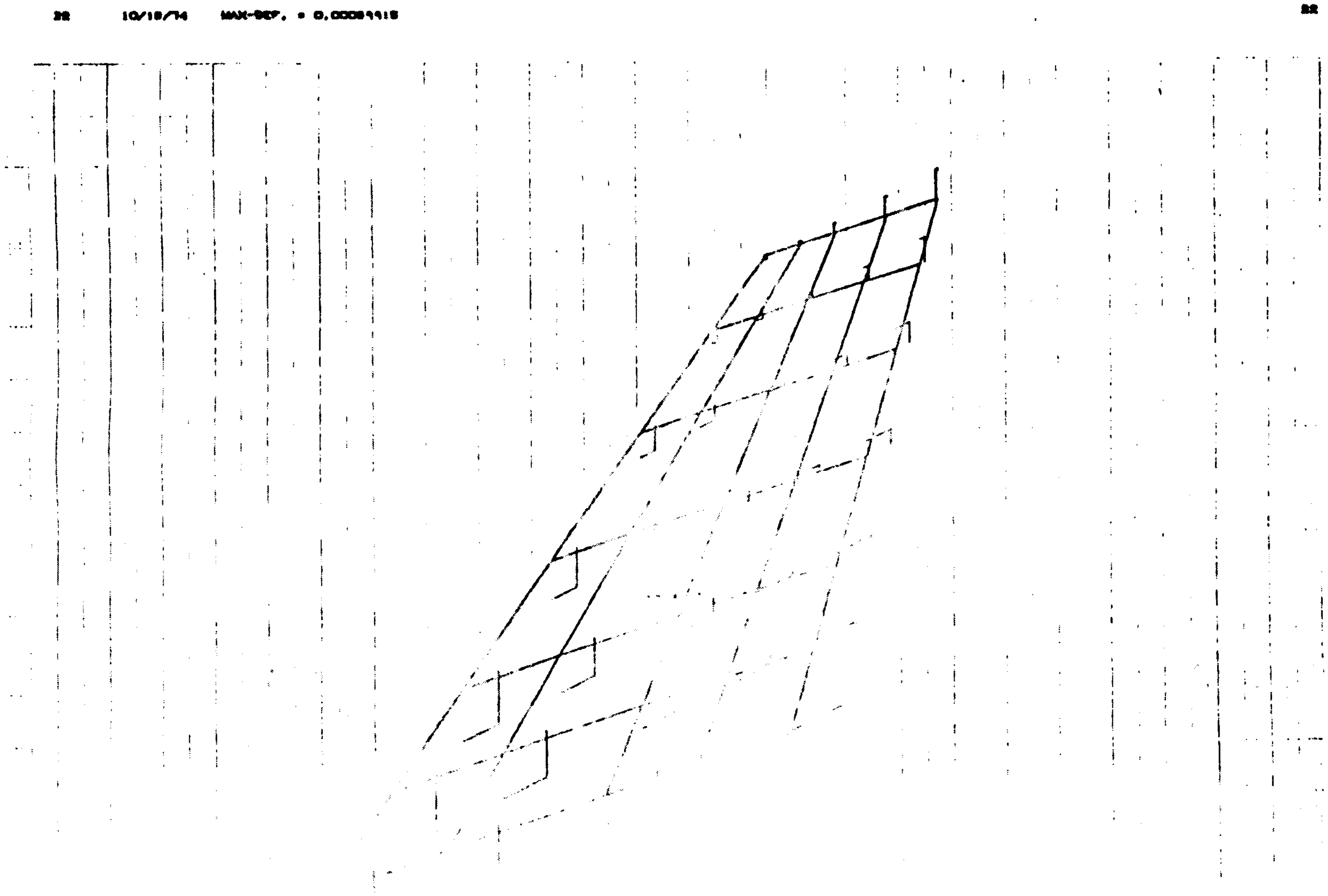
20 10/18/74 MAX-DEF. = 0.24826736

20



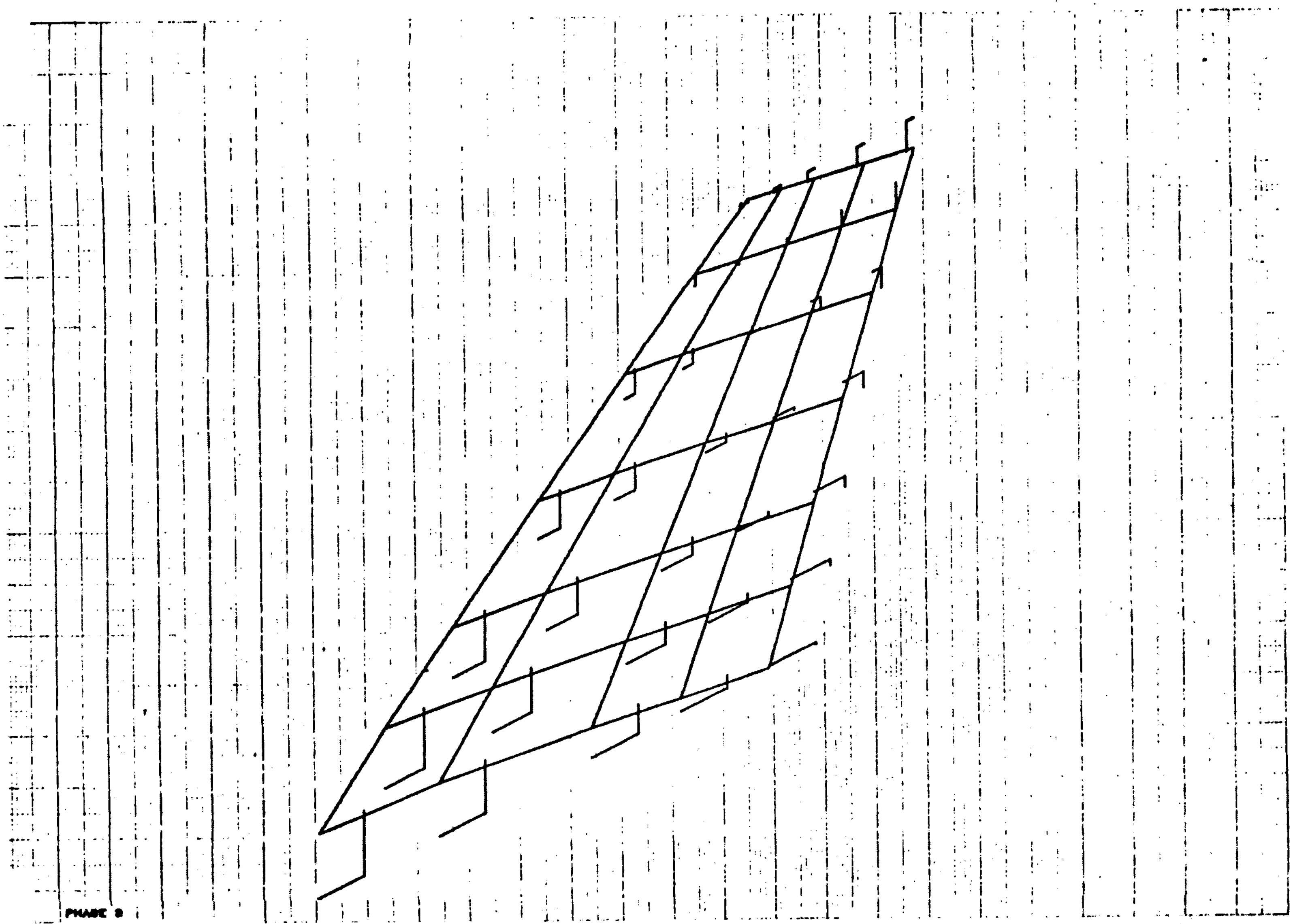
PHASE 3
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 20 MODE 20 FREQ. 171.7384


21 10/18/94 MAX-DEF. = 0.10649080
21
PHASE B
FIN-SYMM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 21 MODE 21 FREQ. 166.4590


10/18/74
MAX-DEF. = 0.00099918

23 10/18/74 MAX-DEF. = 0.0086610R

23

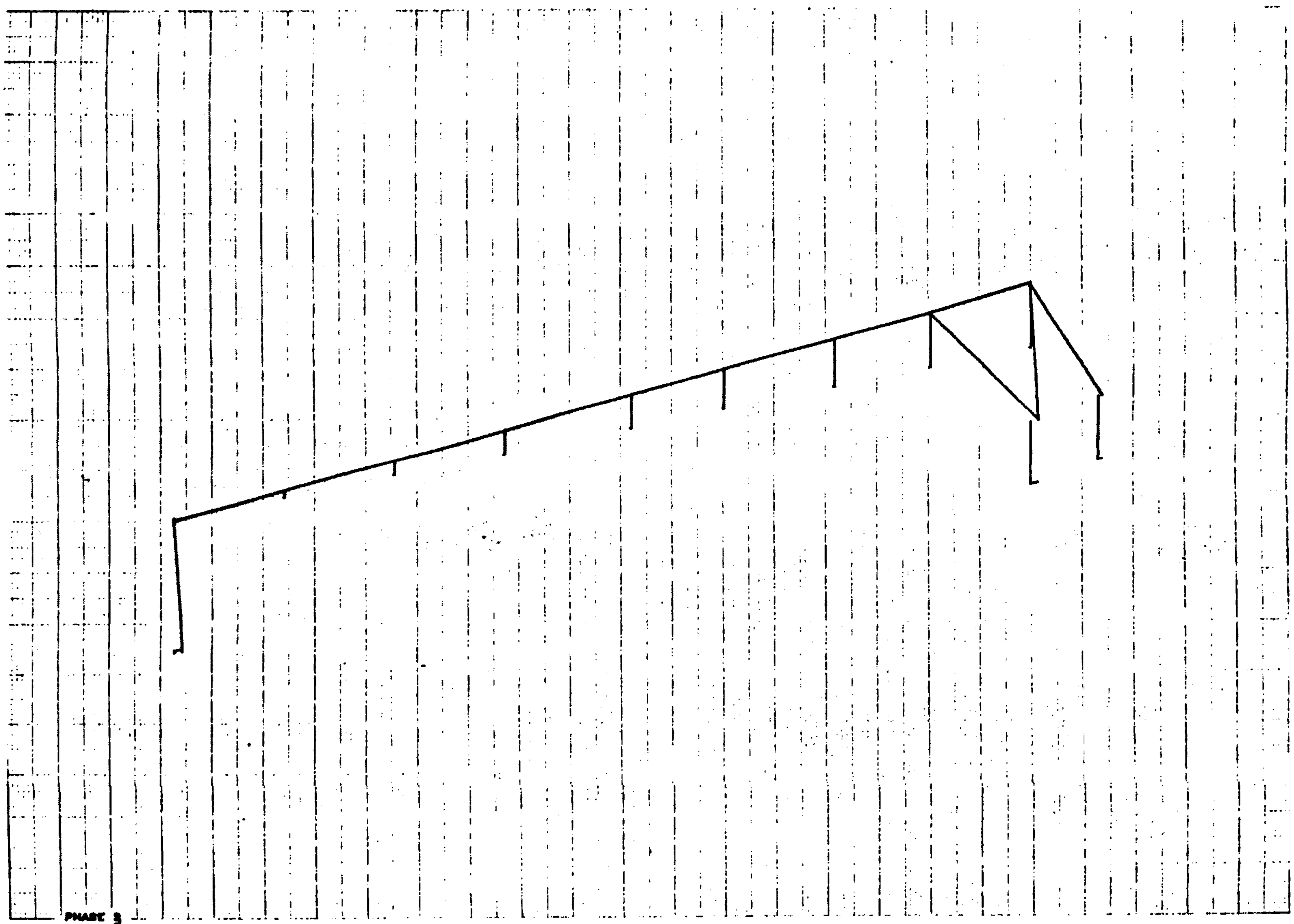


PHASE B
FIN-SYM (WITH SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 23 MODE 23 FREQ. 224.0894

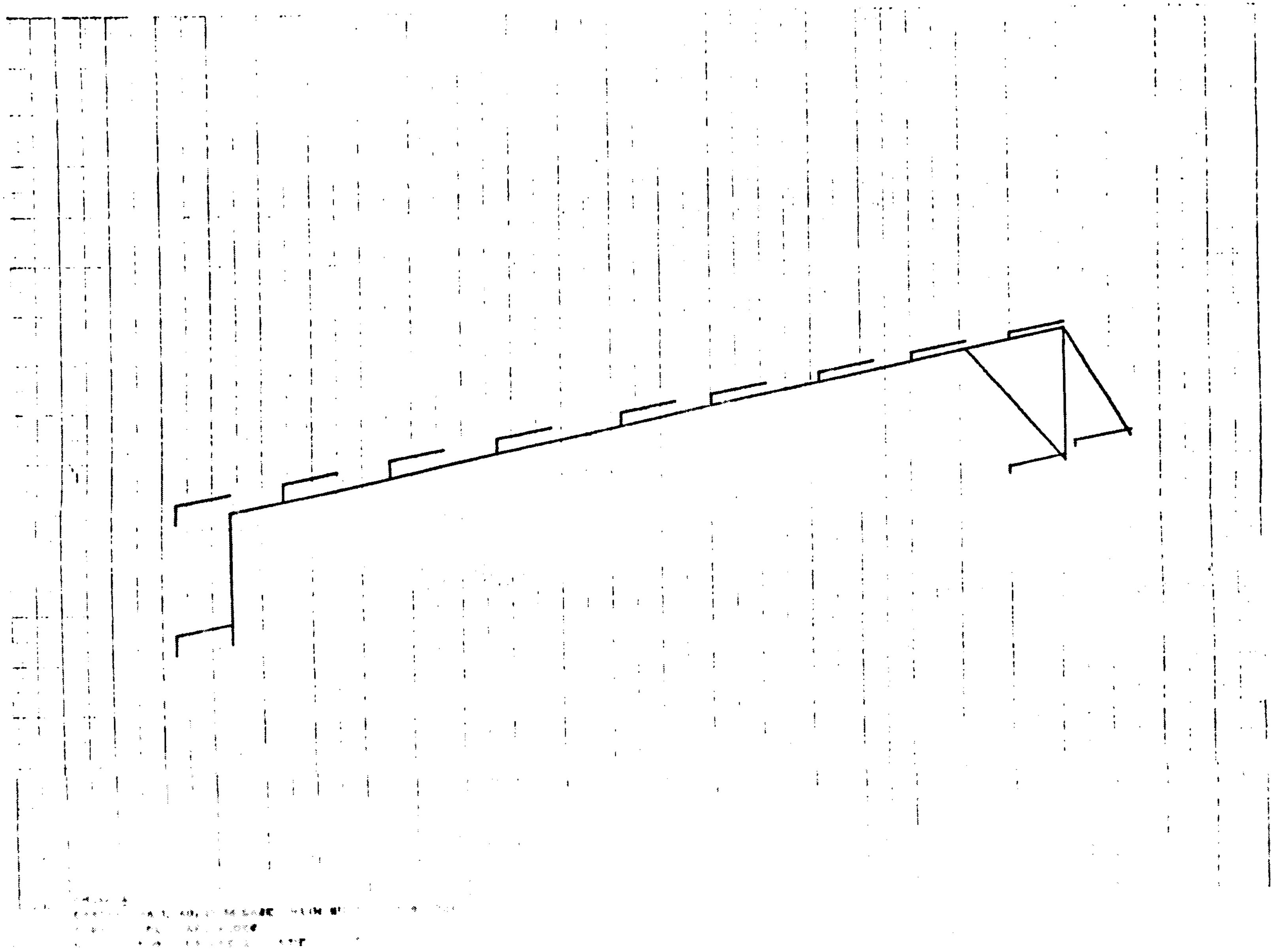
Appendix B18
INPUT & PLOTS/PHASE 3 ANALYSIS: MODEL II PAYLOAD SYMMETRIC FREE-FREE ORBITER MODES

```
PHASE -3                                                      OCTOBER  18, 1974   NASTRAN  2/ 1/73    PAGE      6
ORBITER PAYLOAD.SYMM CASE %WITH SUPPORT SPRINGSH

                                     C A S E    C O N T R O L    D E C K    E C H O
 CARD
 COUNT
   1        TITLE # PHASE -3
   2        SUBTITLE # ORBITER PAYLOAD.SYMM CASE %WITH SUPPORT SPRINGSH
   3        VECTOR  # ALL
   4        SUBCASE  1
   5        LABEL      # ORBITER FREE FREE MODES
   6        MODES     # 23
   7        OUTPUT%PLOTH
   8        SET 1   # ALL
   9        PLOTTER CALCOMP 765,105
  10        AXES     MY,X,Z
  11        VIEW    #   0.0,20.0,0.0
  12        MAXIMUM DEFLECTION 5.0
  13        FIND  SCALE ,ORIGIN 2,SET 1
  14        PLOT MODAL DEFORMATION 1 THRU 23,SET 1,ORIGIN 2,SHAPE,VECTOR XYZ
  15        BEGIN BULK


            PARAM     IFVABLE2    CASESP2


            ENDDATA
```

1 10/18/74 MAX-DEF. = 0.70114676



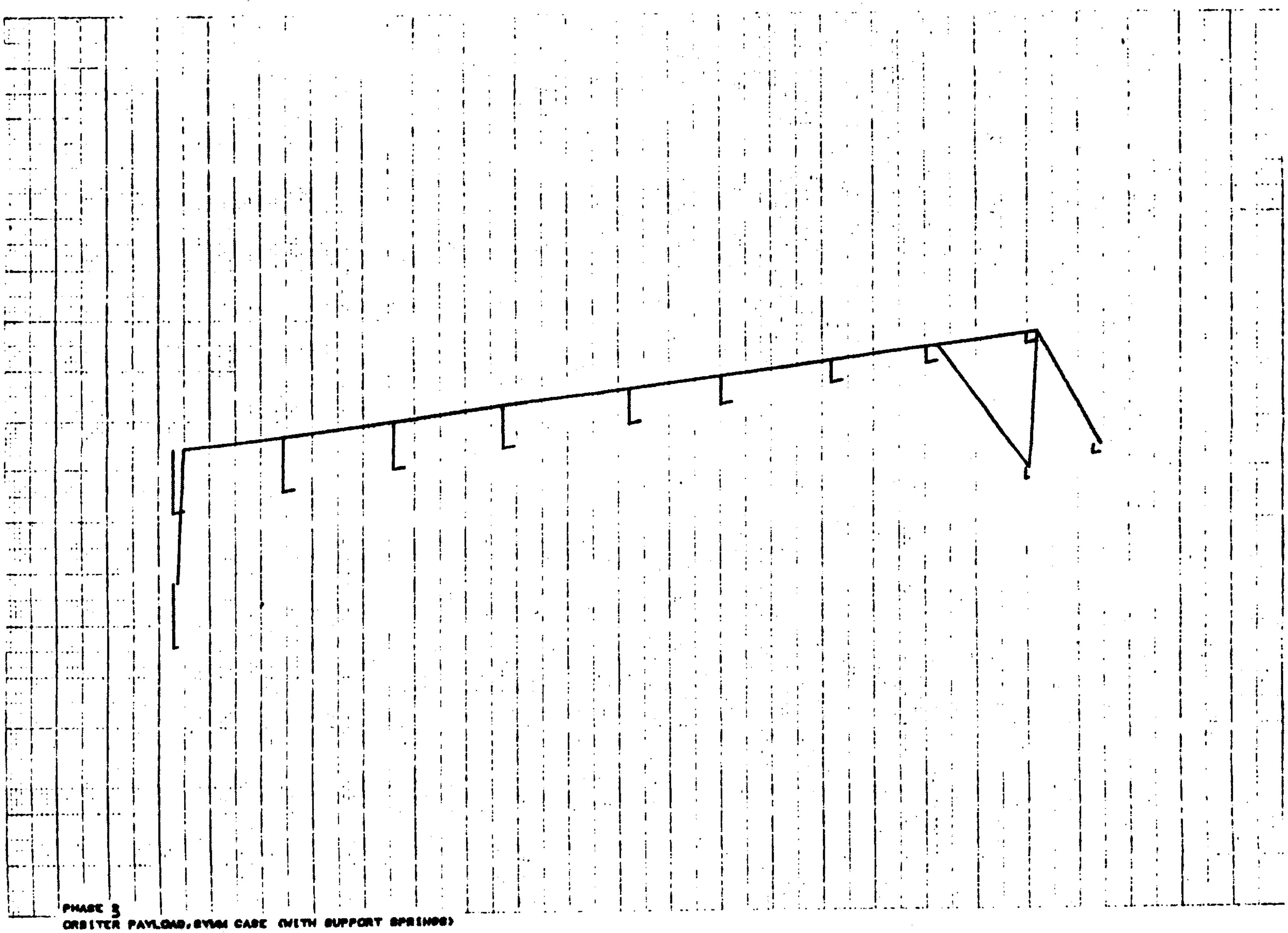
PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 1 MODE 1 FREQ. 0.



2 10/18/74 MAX-DEF. = 0.4810E+00

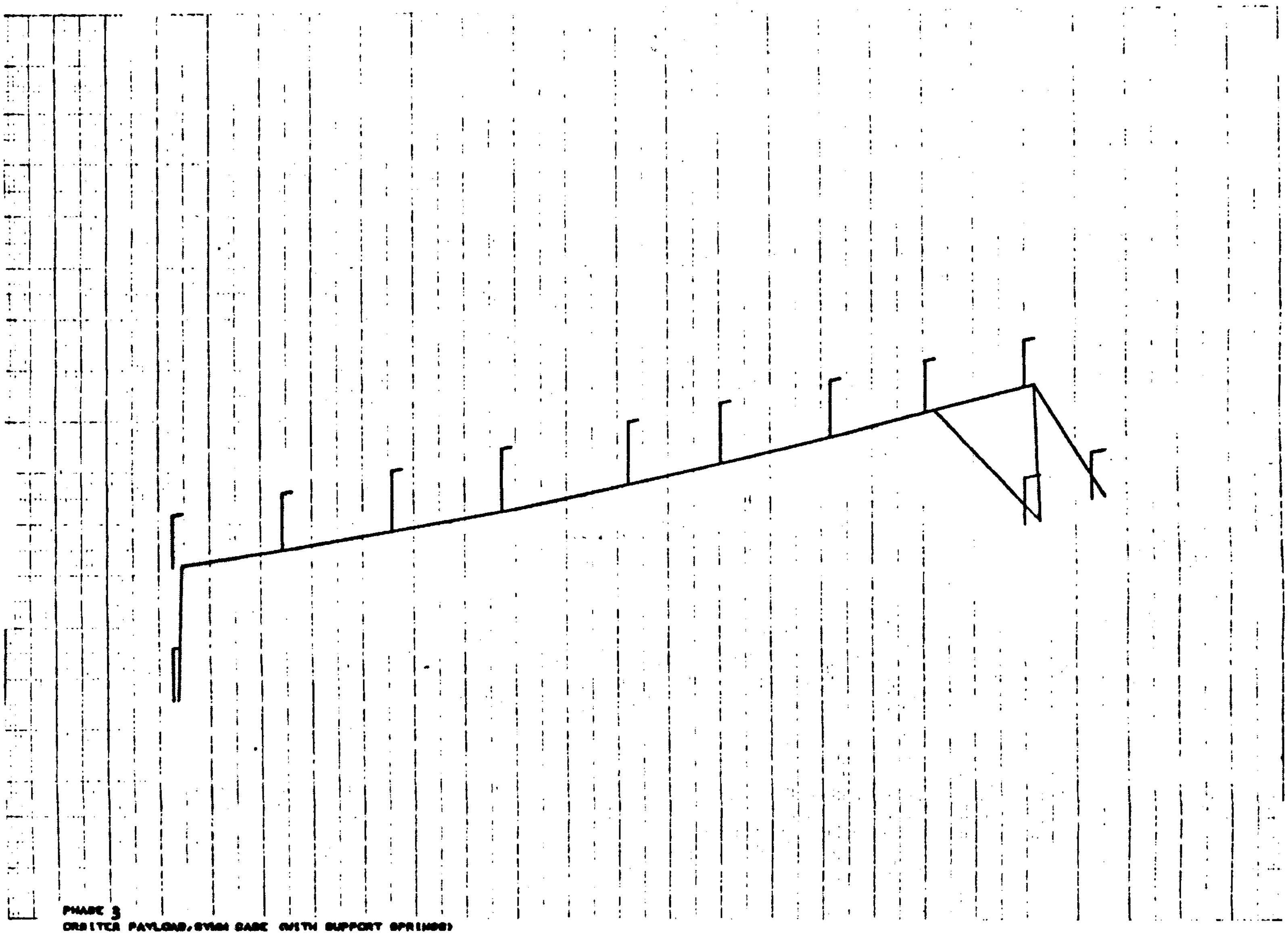
3 10/10/74 MAX-DEF. = 0.00170040

3



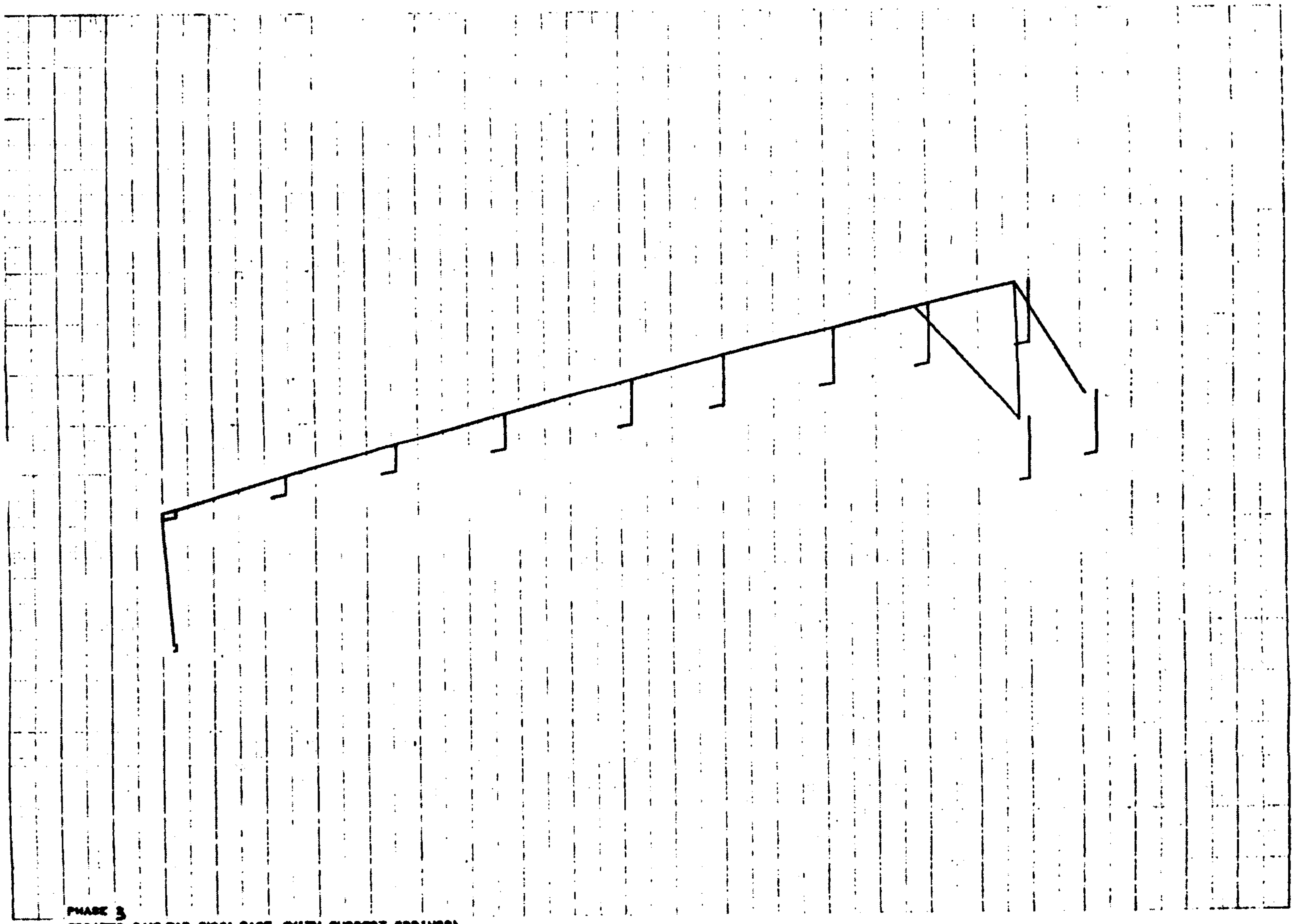
PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 3 MODE 3 FREQ. 0.

4 10/18/74 MAX-DEF. = 0.30788400



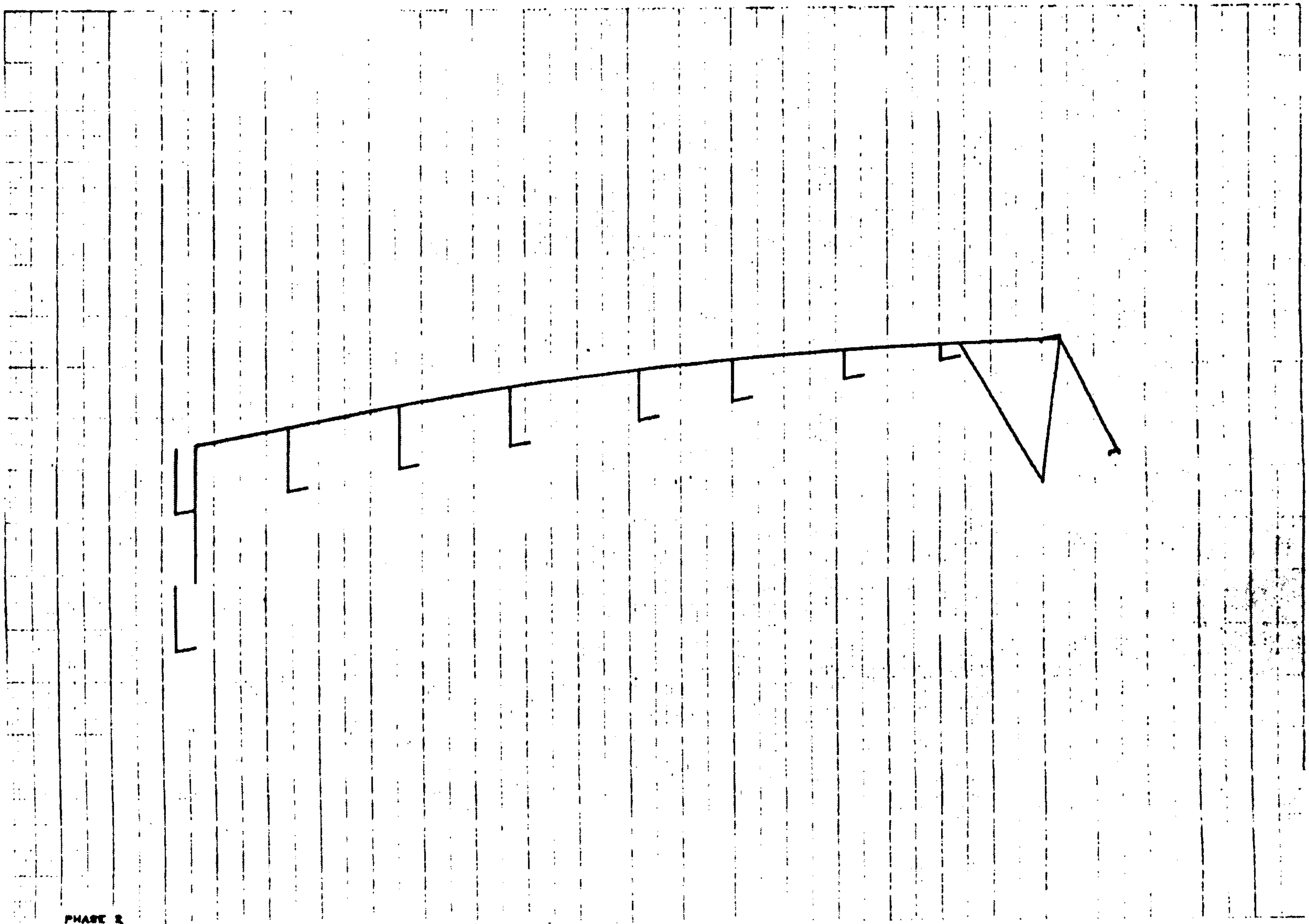
PHASE 3
ORBITER PAYLOAD,SYSM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 4 MODE 4 FREQ. 44.11371

8 10/18/74 MAX-DEF. = 0.00104172



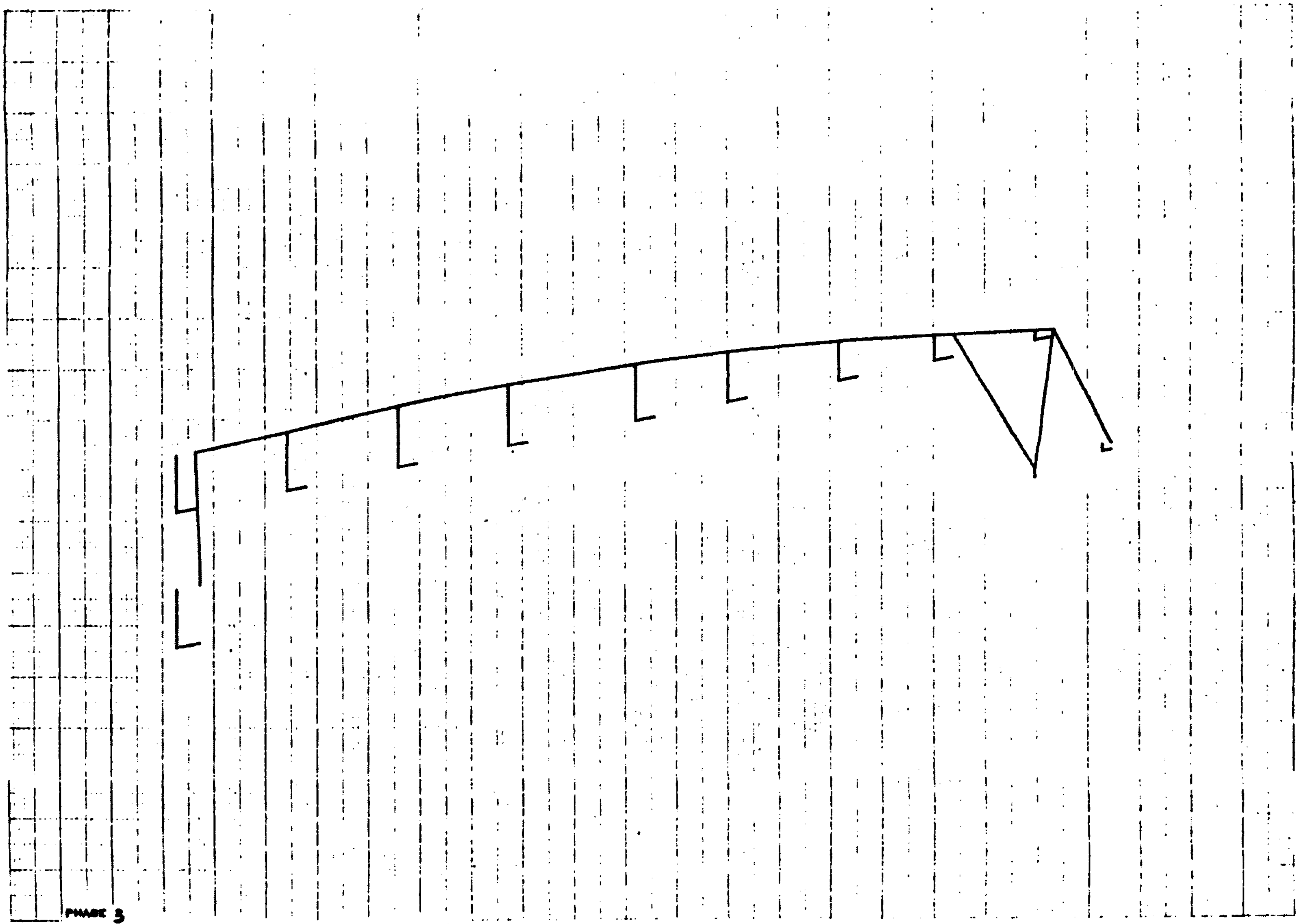
PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR, SUBCASE 8 MODE 8 FREQ. 45.33590

10/18/74 MAX-DEF. = 0.08418940



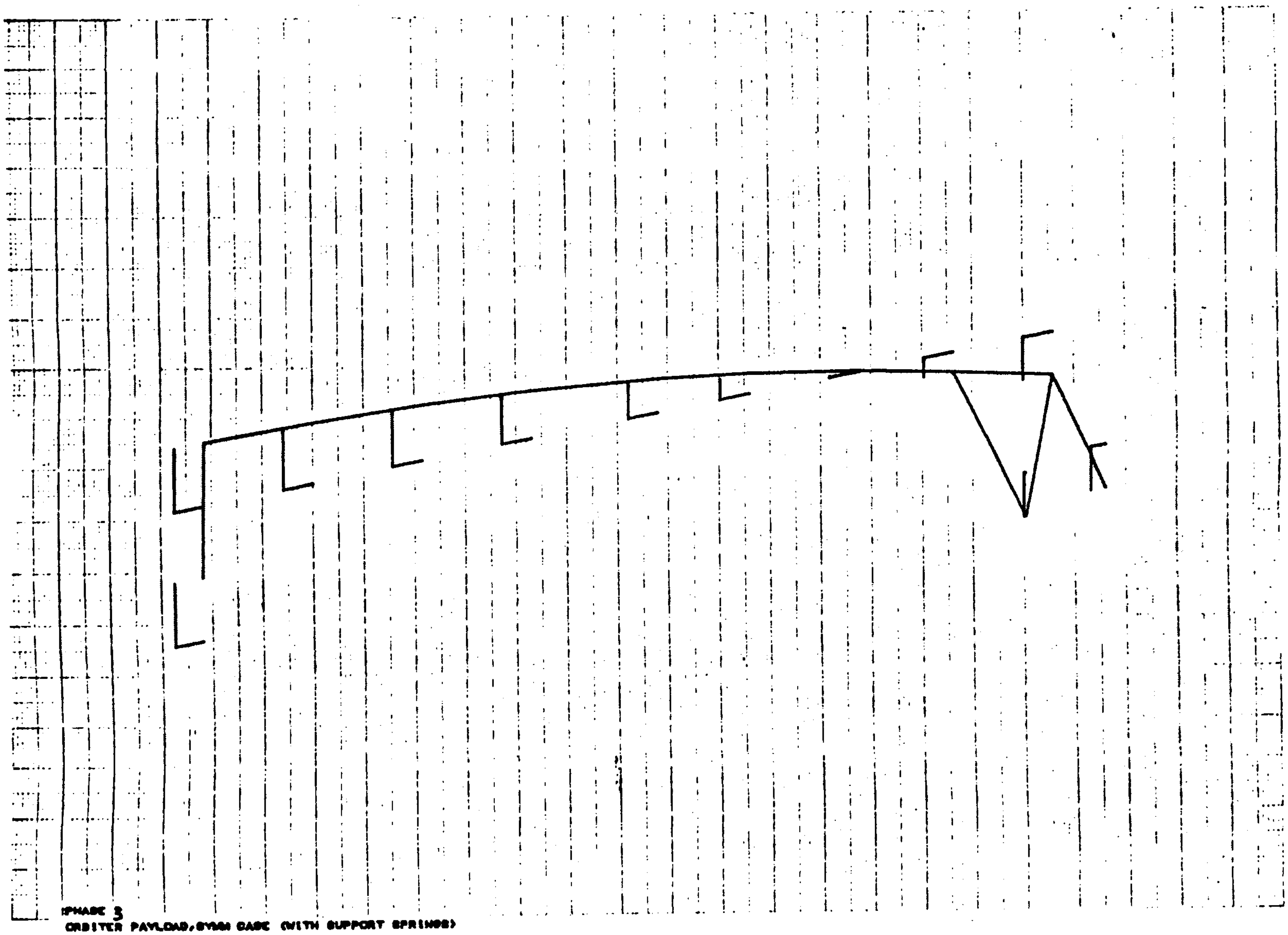
PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 51.20822

1 10/18/74 MAX-DEF. = 0.40879424



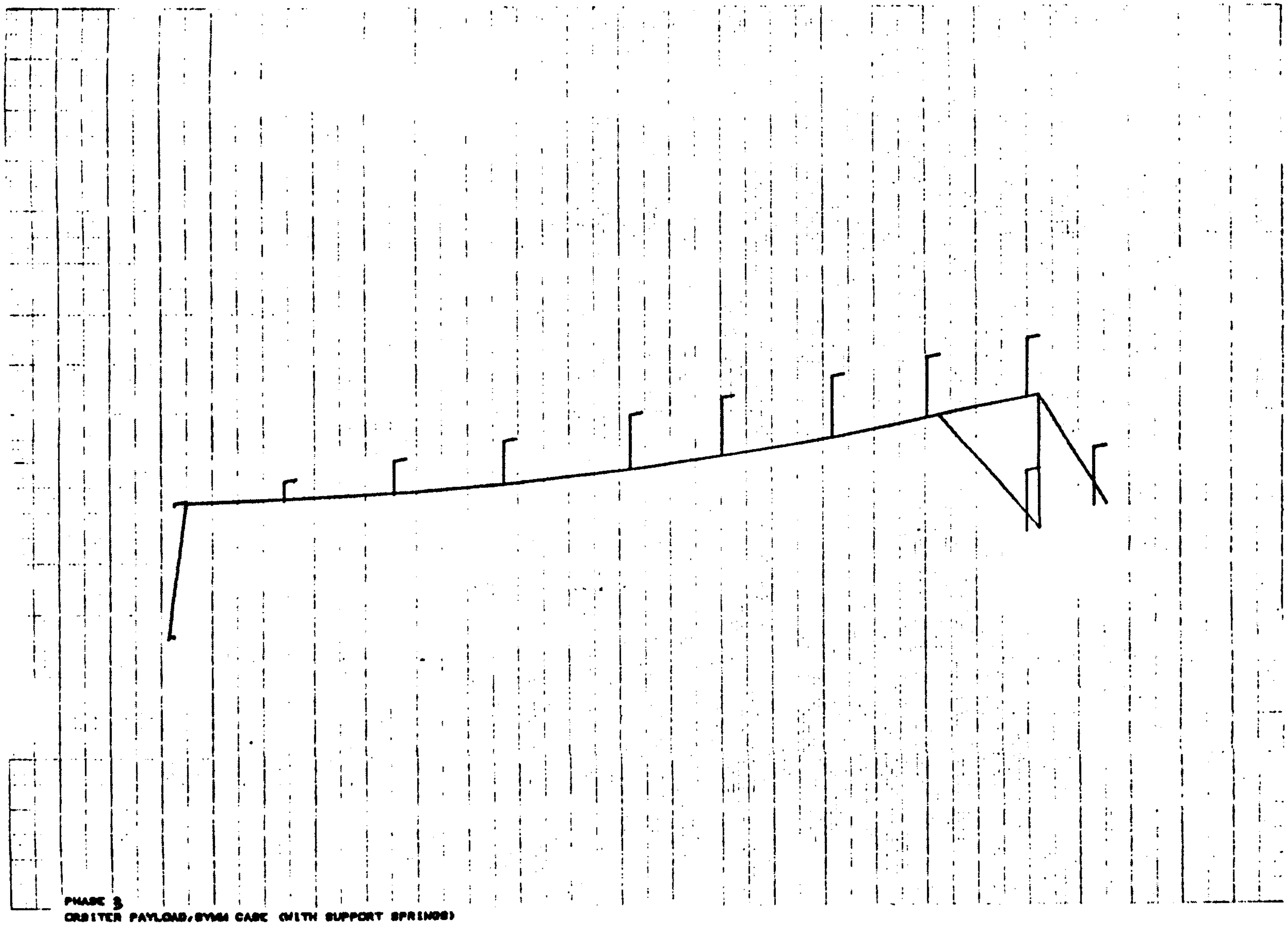
PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 7 MODE 7 FREQ. 54.42372

8 10/18/74 MAX-DEF. = 0.[illegible]

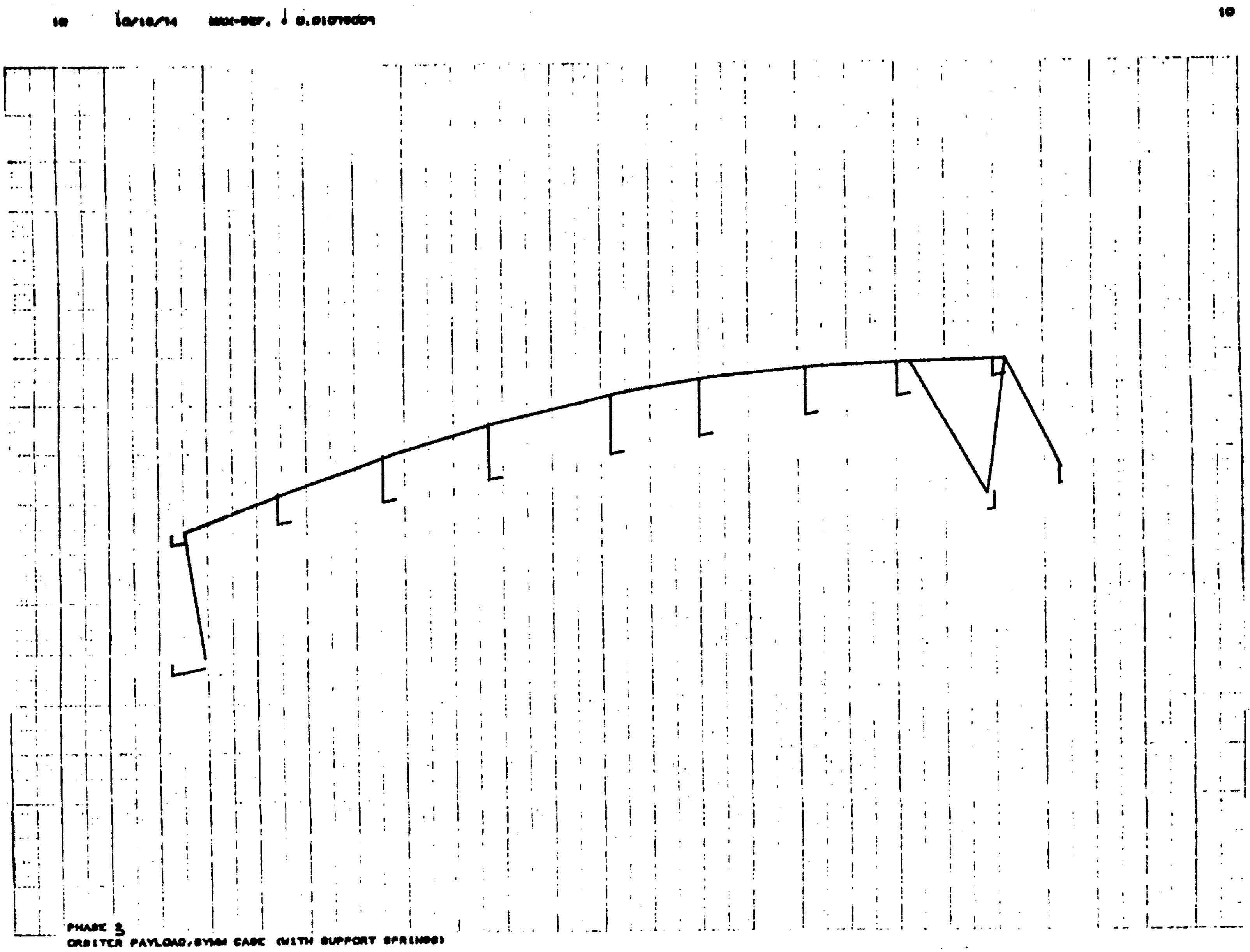


PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 8 MODE 8 FREQ. 82.71584

10/18/74 MAX-DEF. = 0.00246117

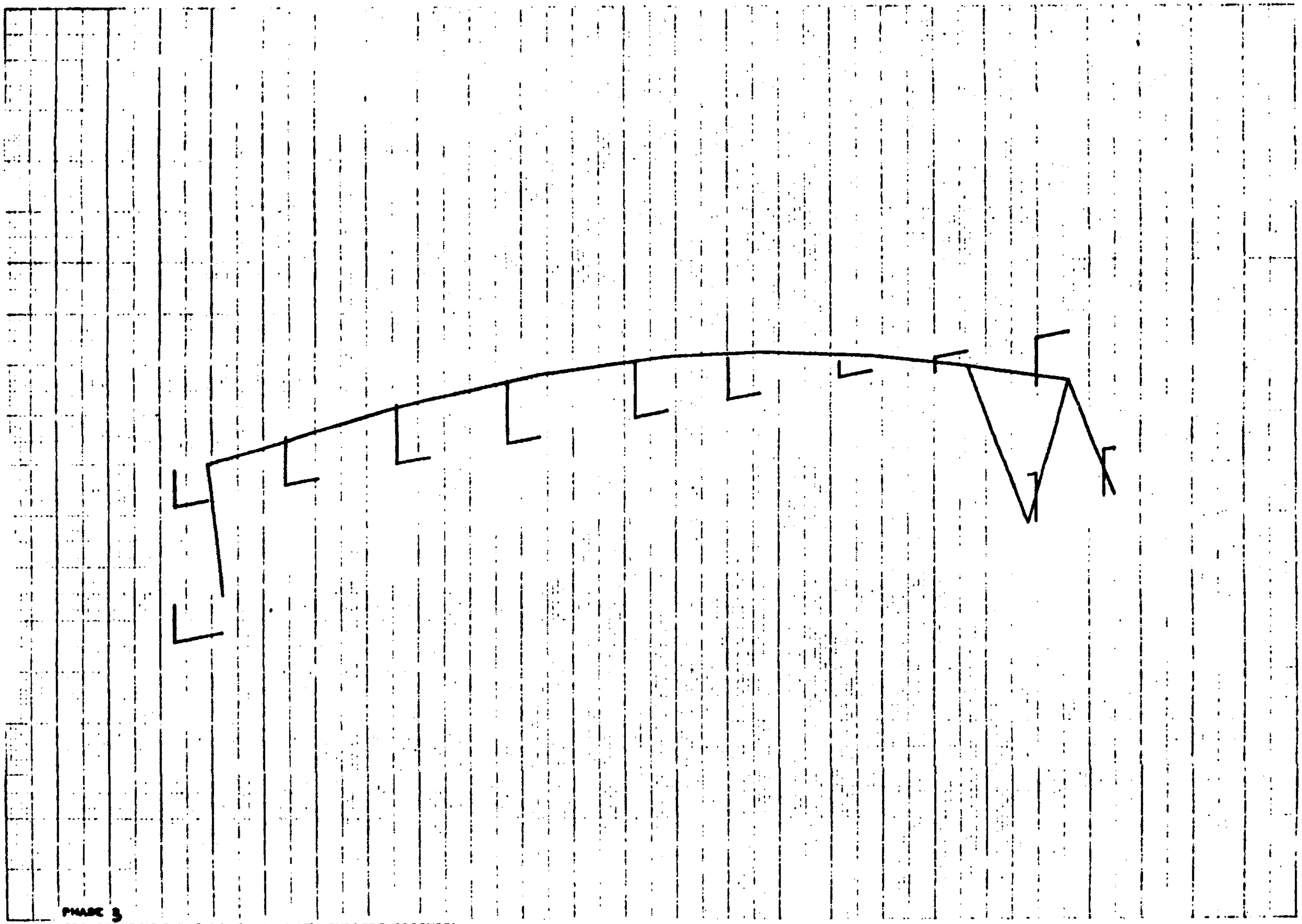


PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 9 MODE 9 FREQ. 66.66681

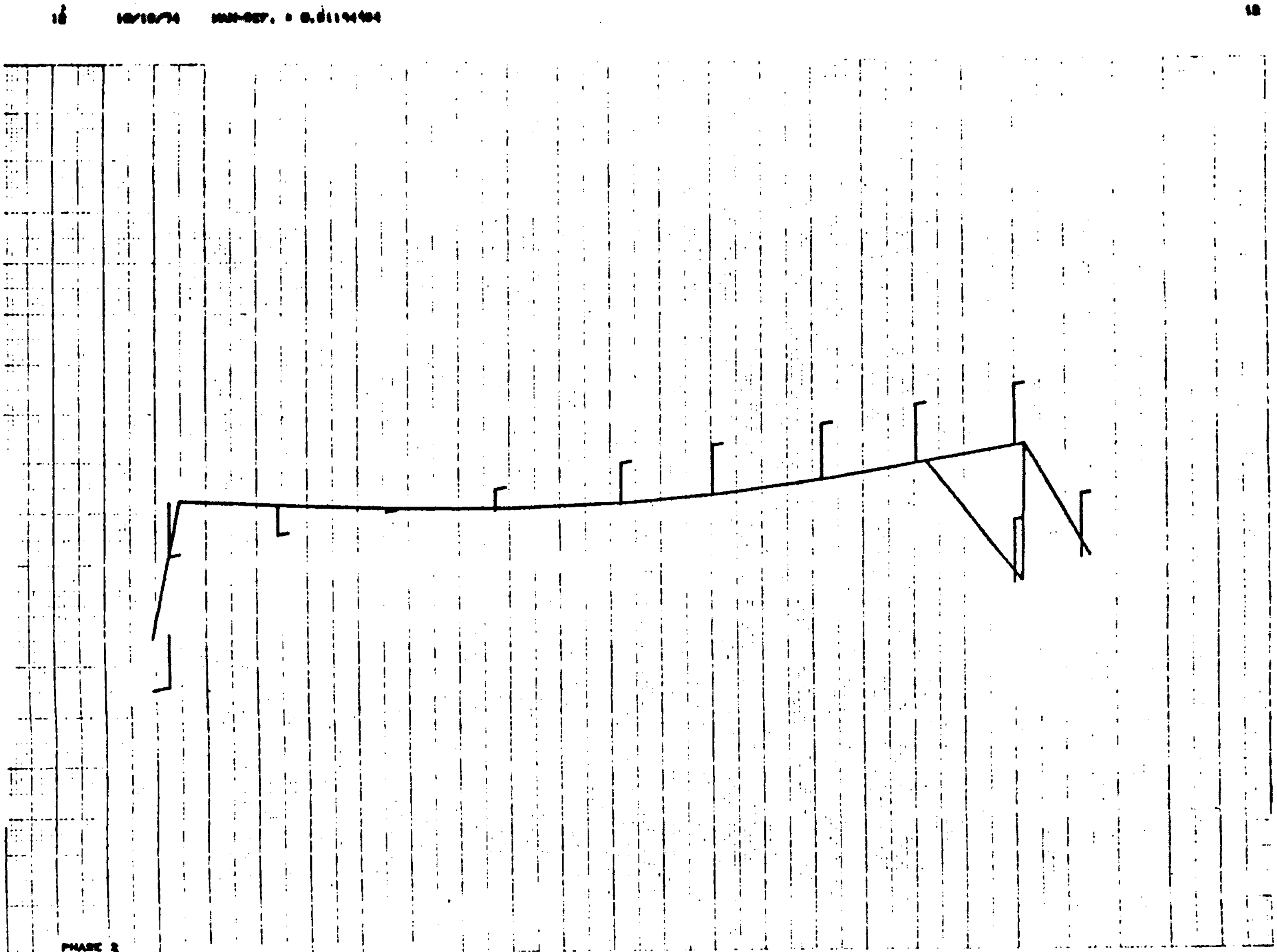


PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 10 MODE 10 FREQ. 78.71840

11 10/18/74 MAX-DEF. = 0.14012887 11

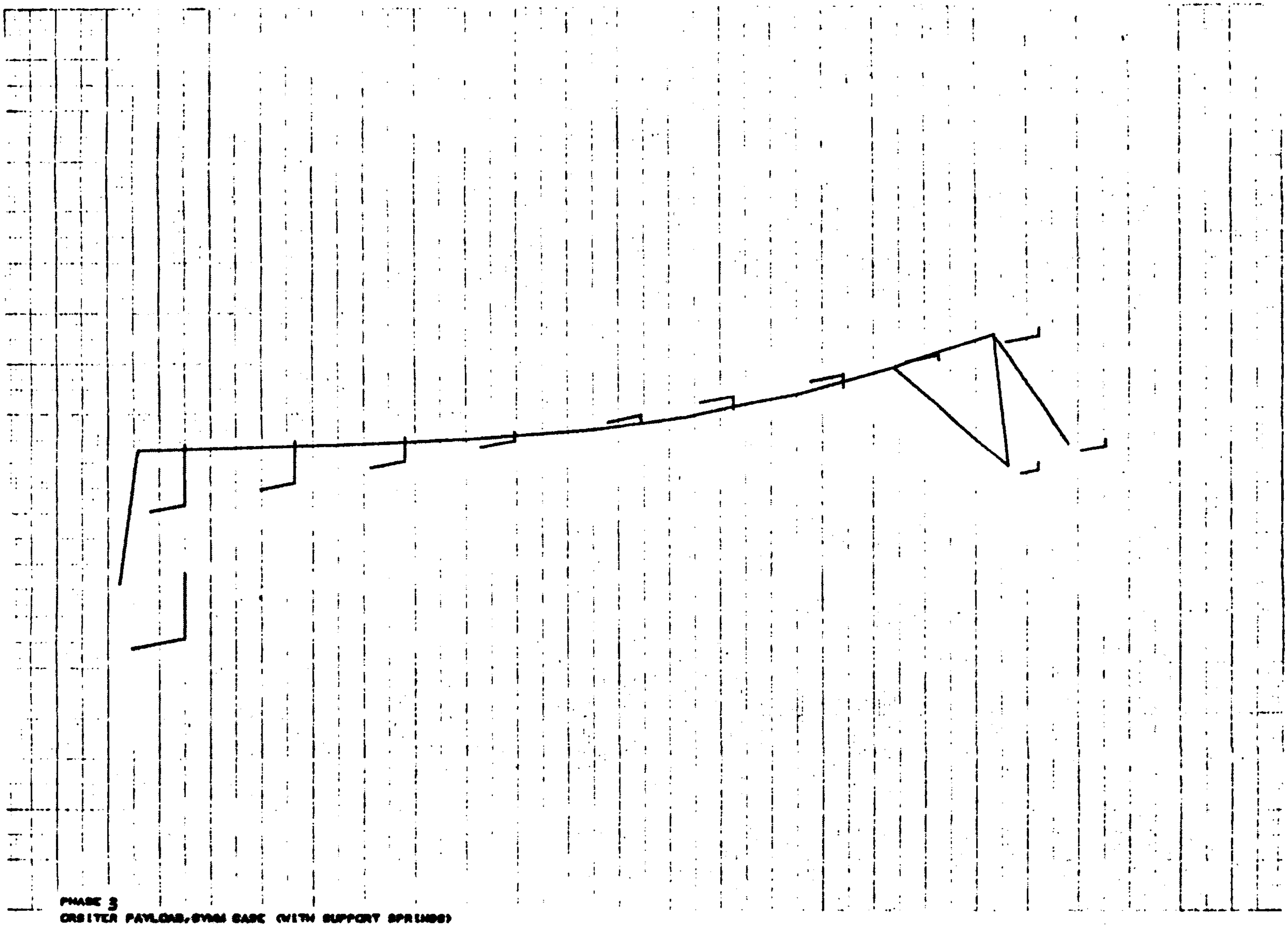


PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR., SUBCASE 11 MODE 11 FREQ. 83.11108



PHASE 3
ORBITER PAYLOAD, SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 12 MODE 12 FREQ. 104.7841

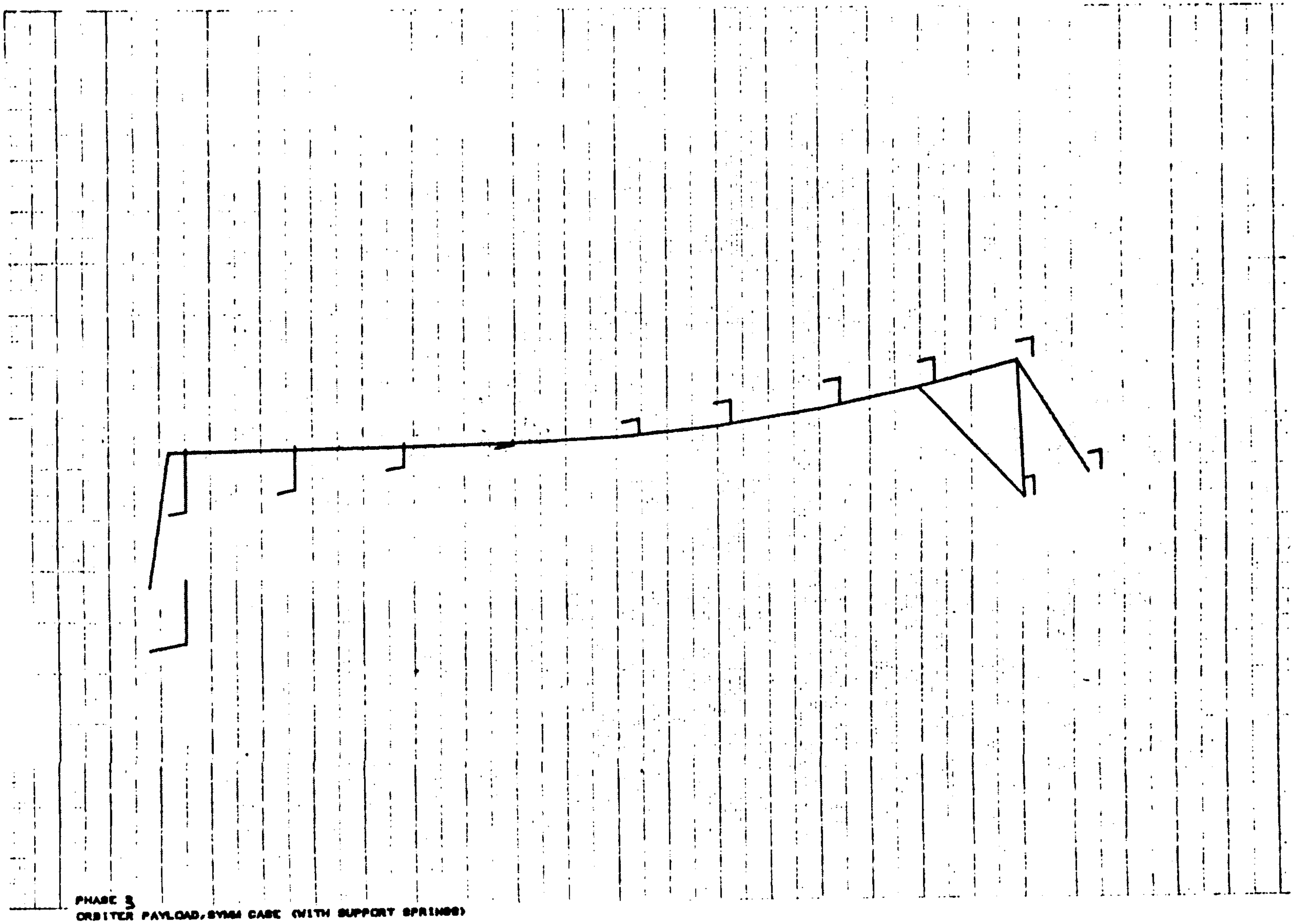
19 10/18/74 MAX-DEF. = 1.09784100 19



PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 13 MODE 13 FREQ. 118.0278

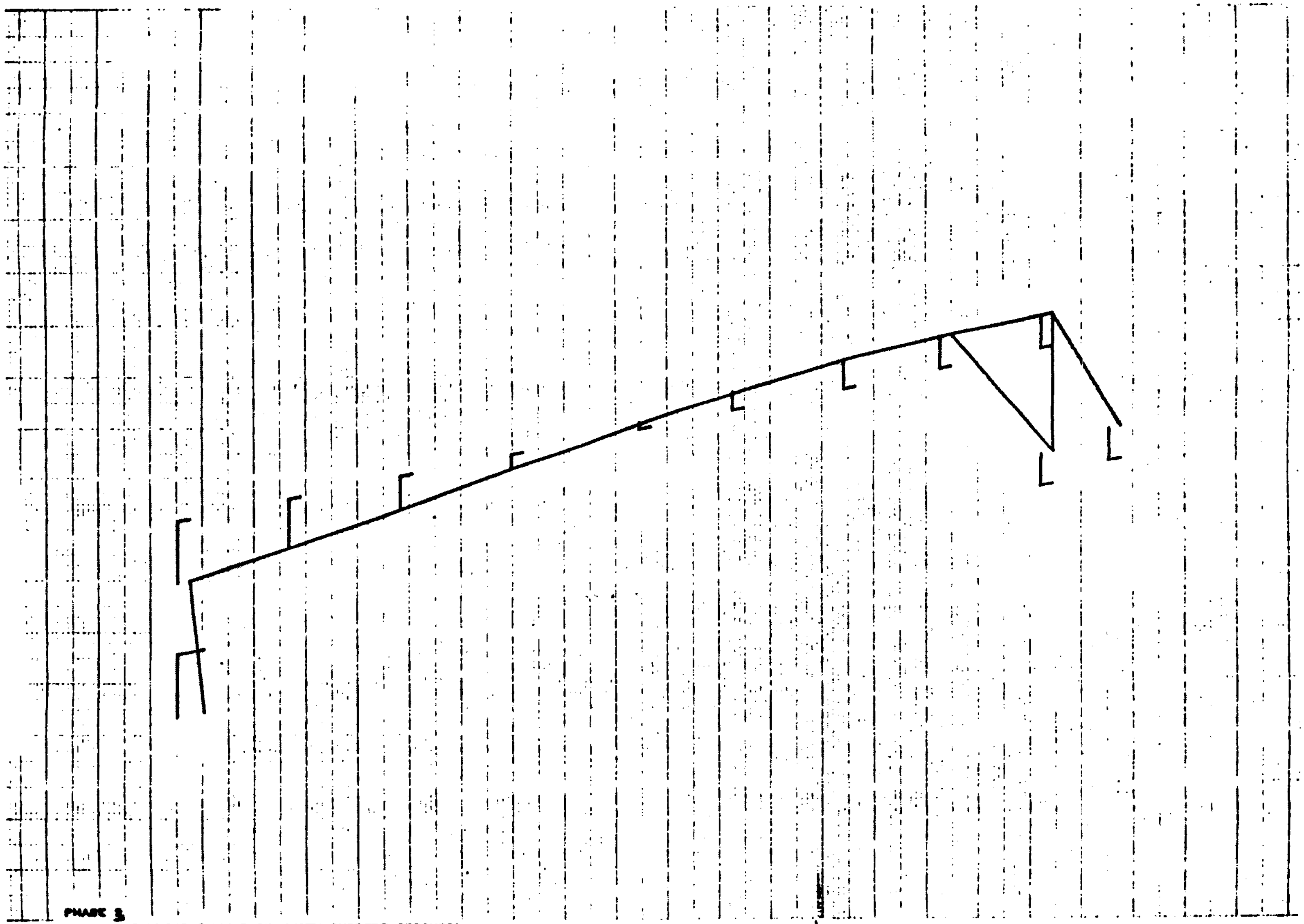
14 10/18/74 MAX-DEF. = 0.32437692

14



PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 14 MODE 14 FREQ. 122.2084

15 10/16/74 MAX-DEF. = 0.00000402



PHASE 3
ORBITER PAYLOAD,SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 15 MODE 15 FREQ. 129.9431

16 10/18/74 MAX-DEF. = 0.04788879

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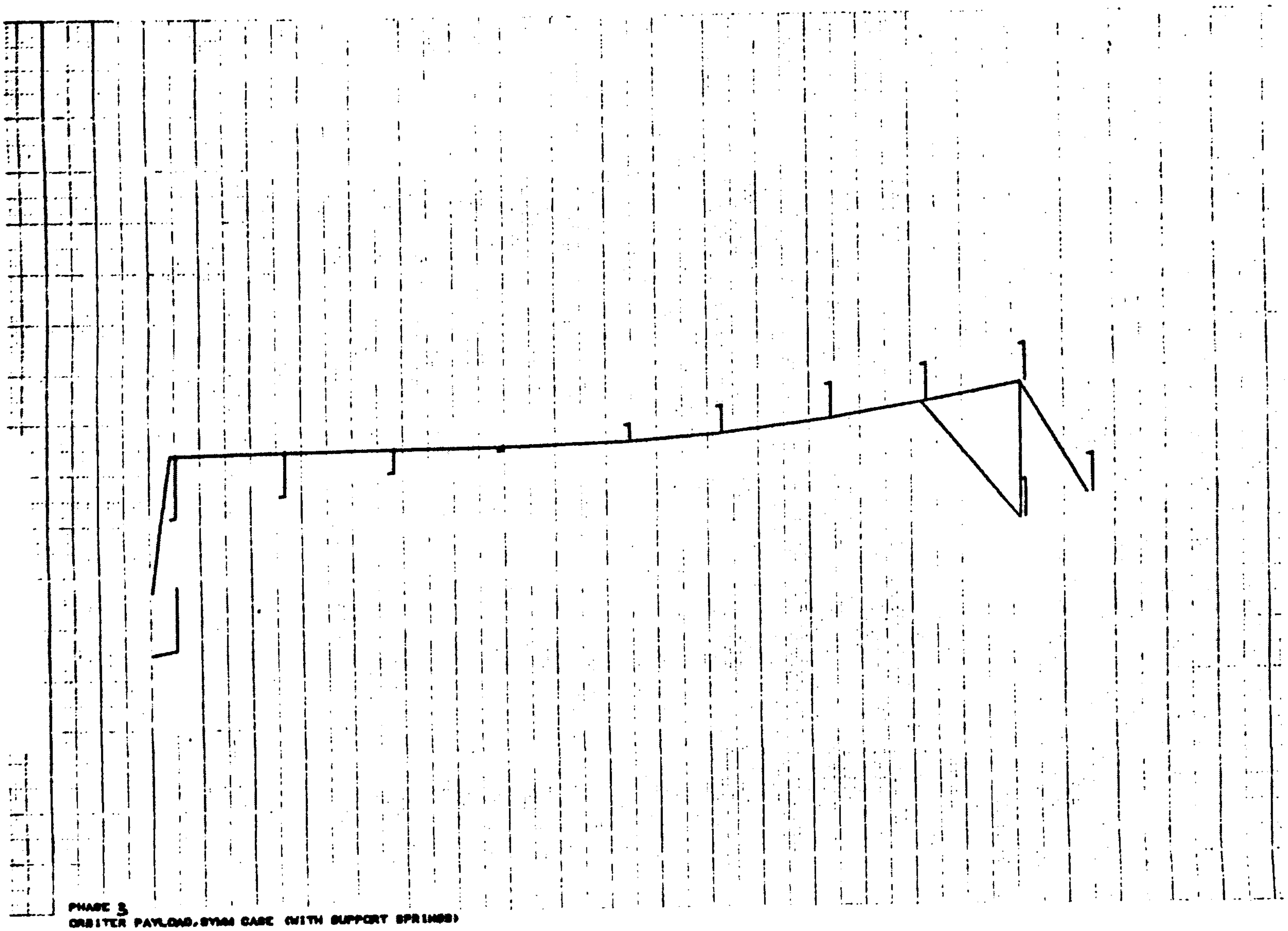
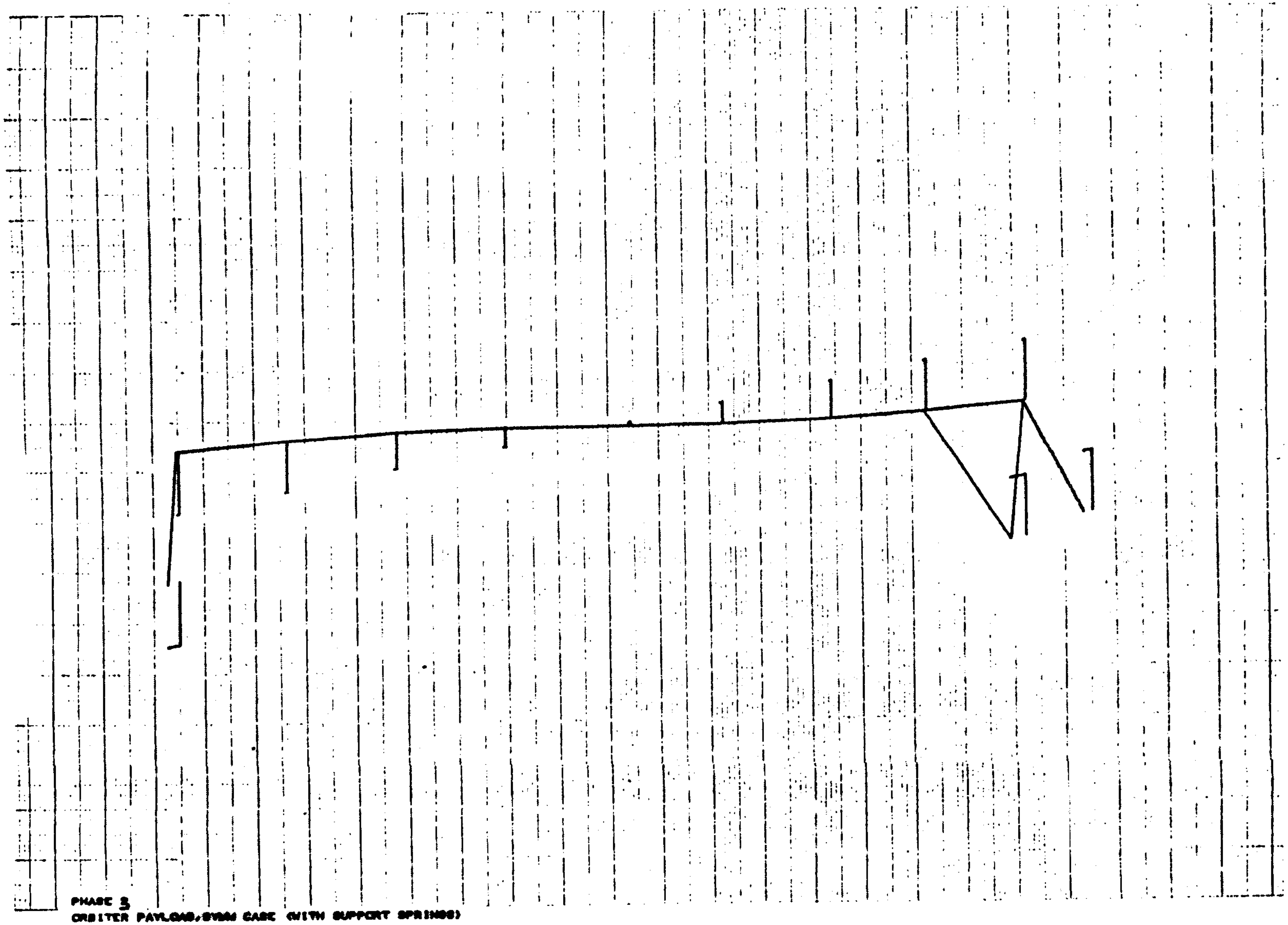


PHASE 3
ORBITER PAYLOAD,SYAM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 16 MODE 16 FREQ. 120.2833

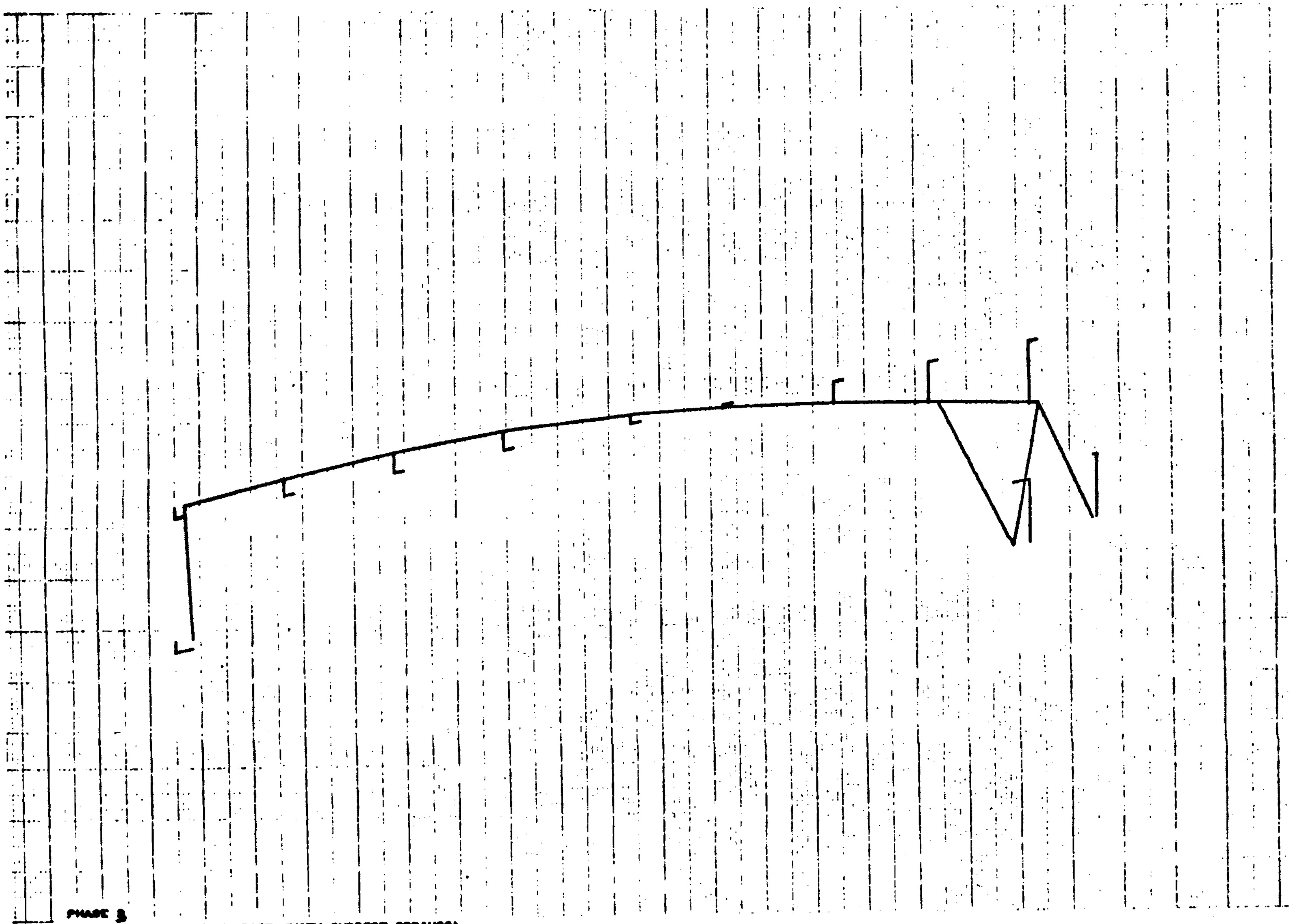
17 10/10/74 - MAX-DEF. = 0.10086480

17



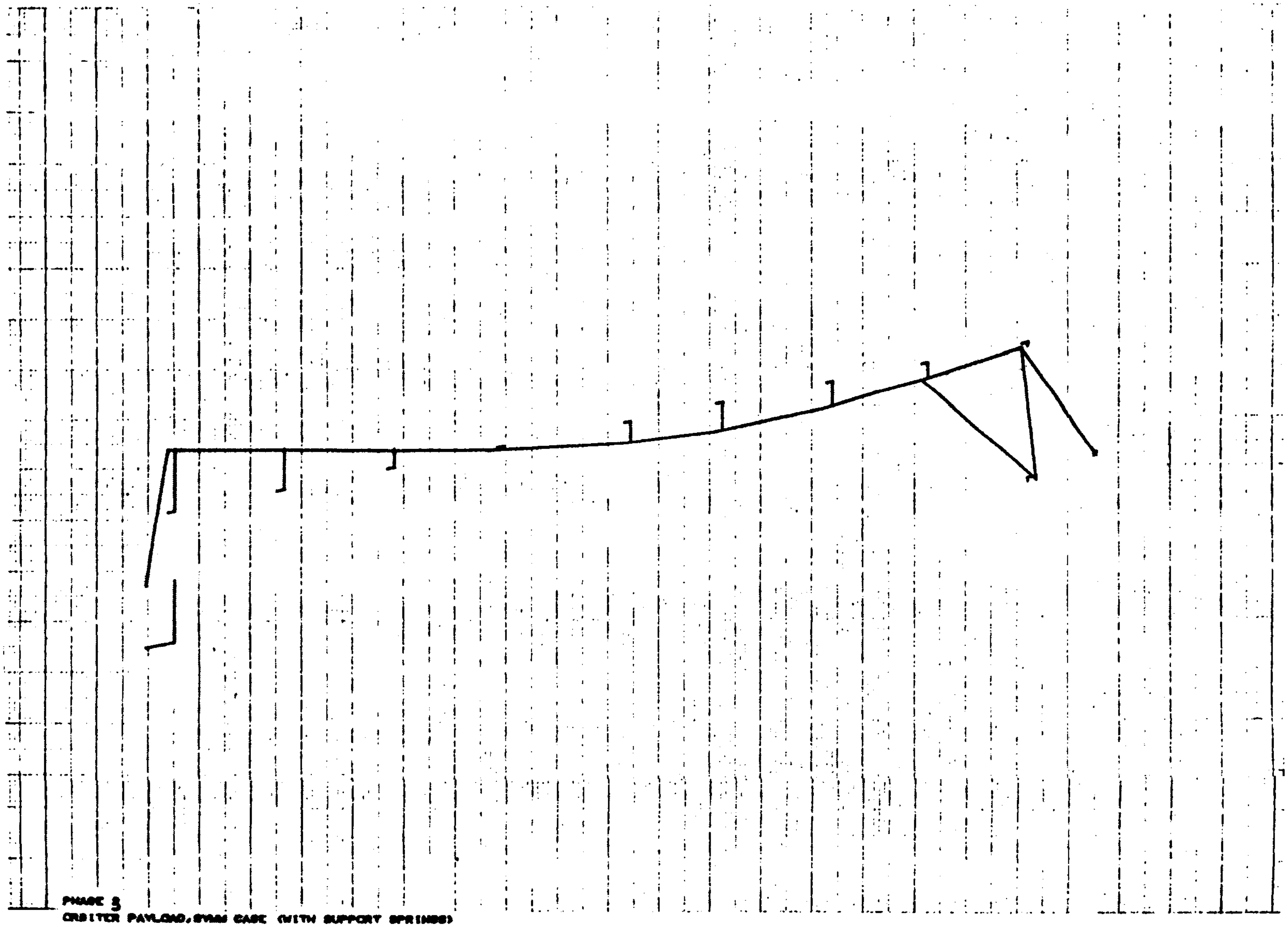
PHASE 3
ORBITER PAYLOAD/SYSM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 17 MODE 17 FREQ. 142.1300

18 10/18/74 MAX-DEF. = 0.01861248

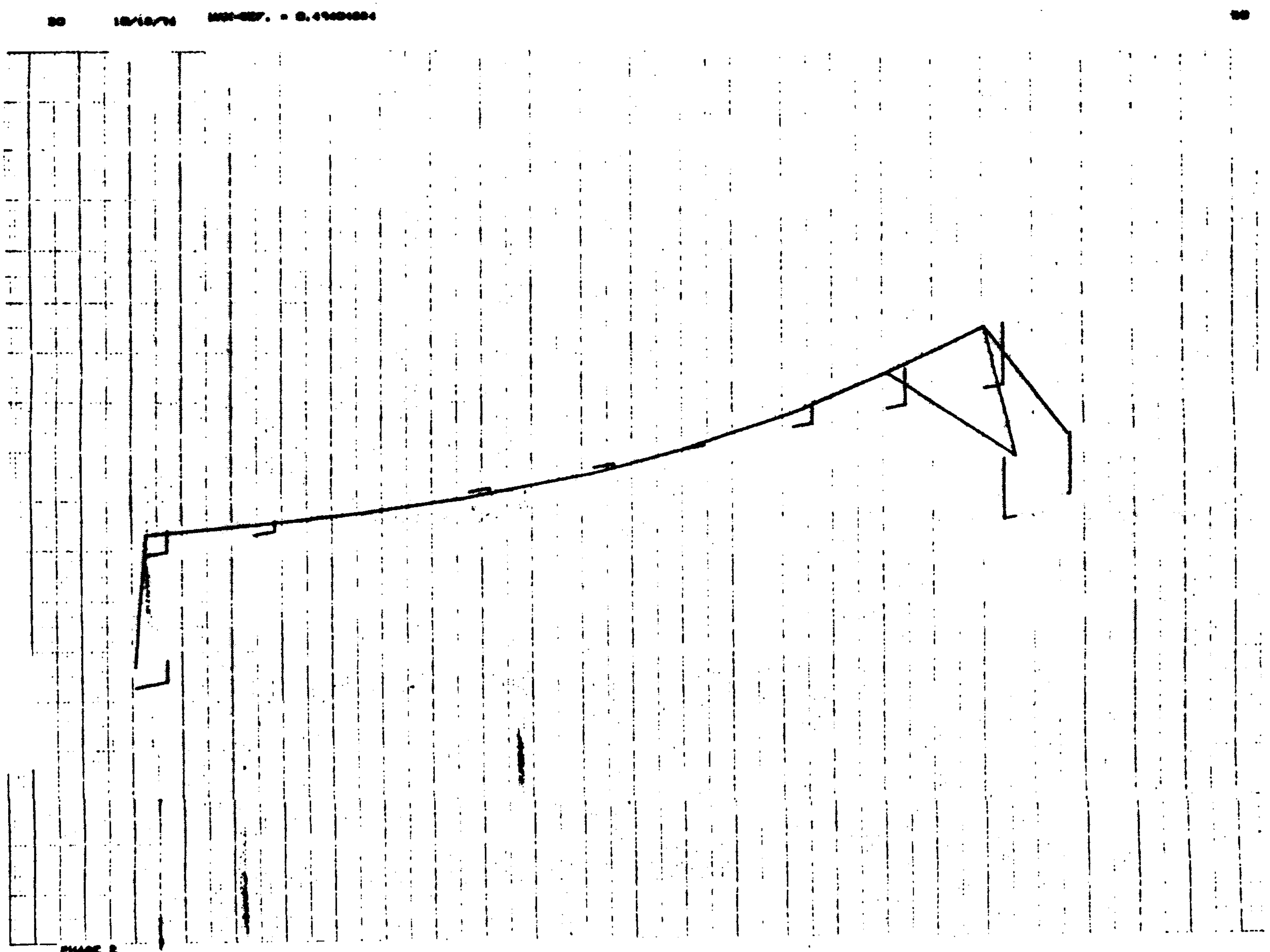


PHASE 3
ORBITER PAYLOAD, SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 18 MODE 18 FREQ. 159.8369

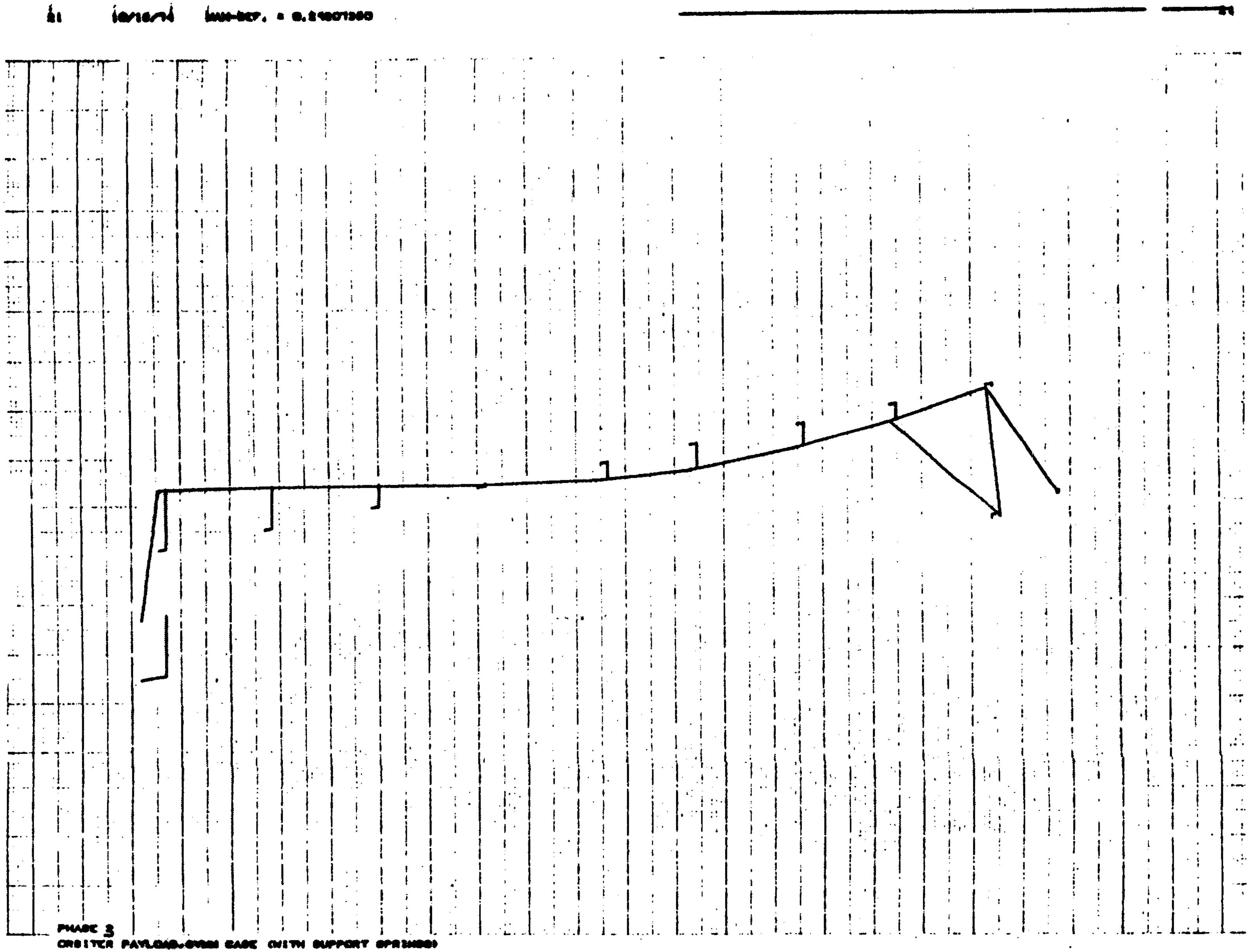
19 10/18/74 MAX-DEF. = 0.01420000 19



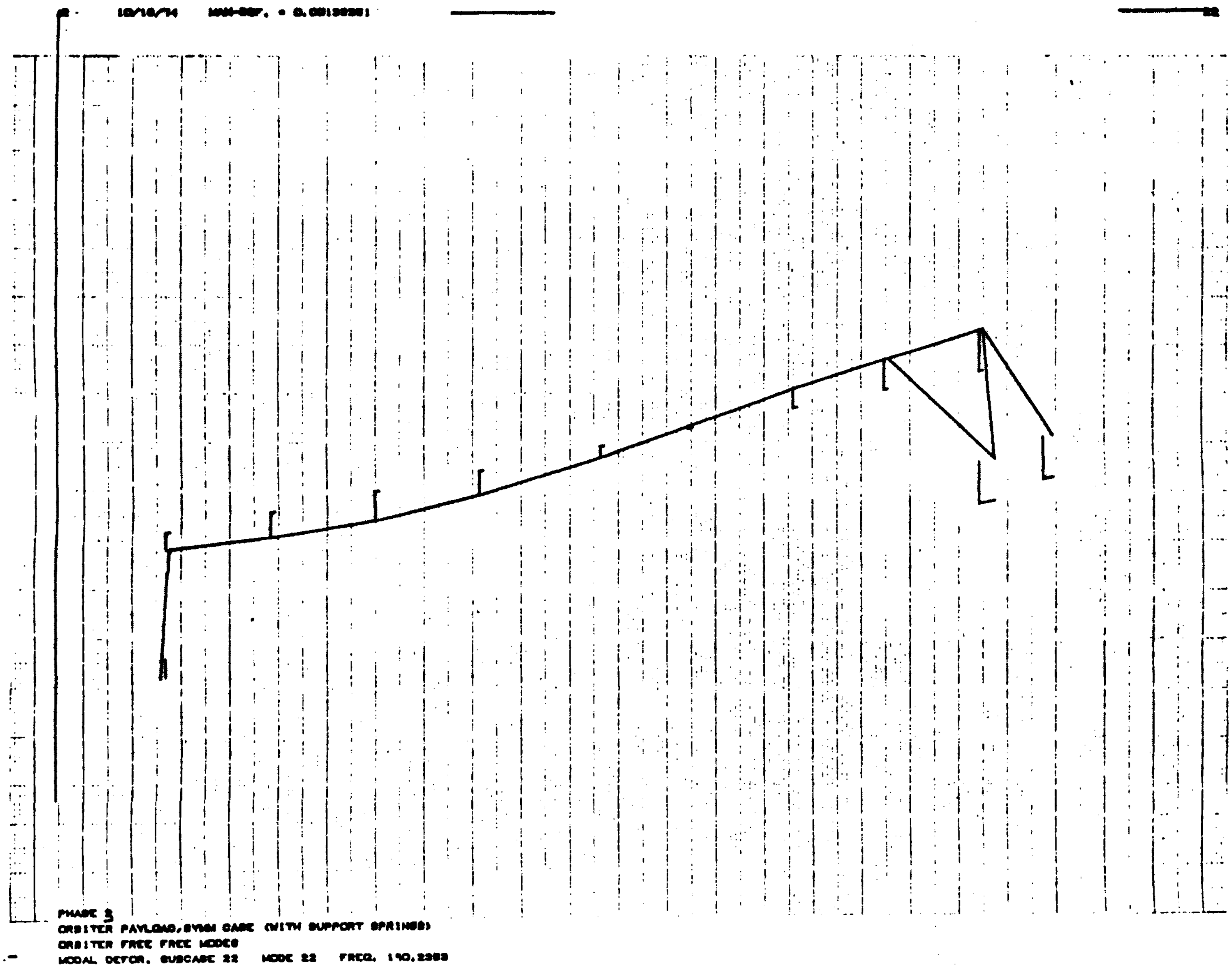
PHASE 3
ORBITER PAYLOAD,SYAW CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 19 MODE 19 FREQ. 166.3092



PHASE 5
ORBITER PAYLOAD,SYM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 20 MODE 20 FREQ. 171.7384



PHASE 3
ORBITER PAYLOAD-BOOM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 21 MODE 21 FREQ. 106.4890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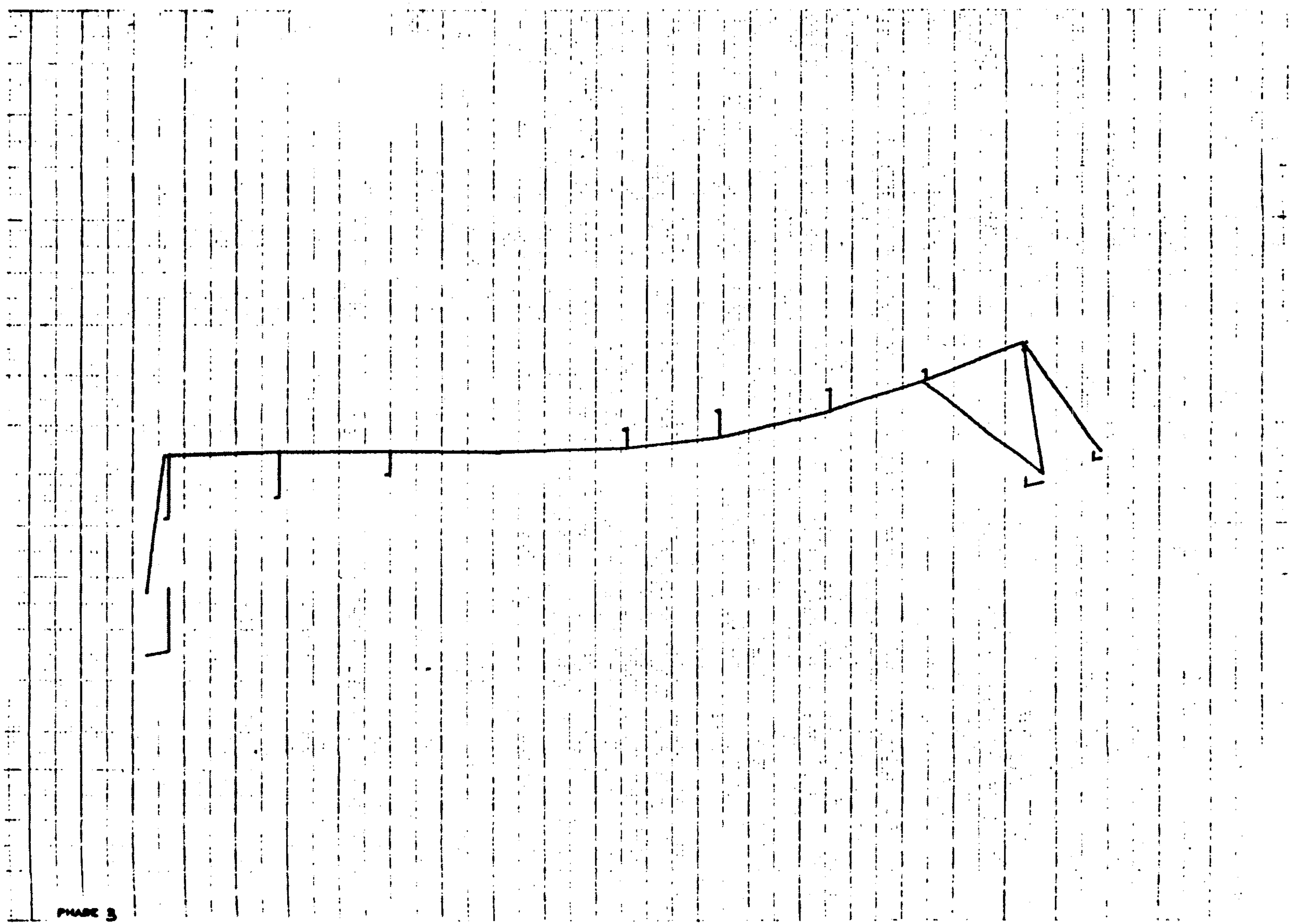
PHASE 3
ORBITER PAYLOAD, SYMM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 22 MODE 22 FREQ. 190.2383

23 10/18/74 MAX-DEF. = 0,00002880 23



PHASE 3
ORBITER PAYLOAD,SYSM CASE (WITH SUPPORT SPRINGS)
ORBITER FREE FREE MODES
MODAL DEFOR. SUBCASE 23 MODE 23 FREQ. 224.0294