# MSC/NASTRAN STATUS REPORT (MARCH 1979)

- PERSONNEL CHANGES
- MOST RECENT NEW CAPABILITIES
- CURRENT PROJECTS
- LONGER RANGE PROJECTS
- MSC/VAX/NASTRAN SCHEDULE
- MSC/VAX/NASTRAN PERFORMANCE

# PERSONNEL CHANGES AT MSC

## SINCE THE LAST MSC/NASTRAN USER'S CONFERENCE

- INCREASE IN STAFF FROM 24 TO 37

- NEW POSITIONS:

  C. W. McCormick: Executive Vice President

  J. F. Gloudeman: Vice President, Marketing

  D. N. Herting: Chief Engineer

- SOUTHWEST REGIONAL OFFICE:

  R. H. Dyer

- AFFILIATION OF SCHAEFFER ANALYSIS, INC.

## THE MOST RECENT NEW CAPABILITIES

RELEASE DATES: SEPTEMBER 1978 - JANUARY 1979

- COMPONENT MODE SYNTHESIS (DYNAMIC SUPERELEMENTS)
- NEW GRID POINT SEQUENCING ALGORITHM
- CURVED PIPE ELEMENT (BEND)
- VIRTUAL FLUID MASS
- DEMONSTRATION PROBLEM MANUAL

# CURRENT PROJECTS

## (SCHEDULED FOR NEXT RELEASE)

- VAX 11/780 VERSION OF MSC/NASTRAN
- HIGHER ORDER ELEMENTS:
  - QUAD8
  - TRIA6
- CYCLIC SYMMETRY IMPROVEMENTS
- NONLINEAR RØD AND GAP ELEMENTS
- NONLINEAR MATERIAL PROPERTIES IN HEAT TRANSFER
- COMPRESSIBLE FLUID MASS
- MORE EFFICIENT METHOD OF STATIC CONDENSATION
- MORE EFFICIENT UNSYMMETRIC DECOMPOSITION
- MSGVIEW
- AEROELASTICITY MANUAL (THE AEROELASTIC SUPPLEMENT)
- MSC/NASTRAN PRIMER (AUTHORED BY HARRY SCHAEFFER)

## LONGER RANGE PROJECTS

- MATERIAL NONLINEARITY IN BEAM, SHELL, AND SOLID ELEMENTS
- IMPROVED GRAPHICAL OUTPUT
- IMPROVED INPUT FOR LAYERED COMPOSITES
- HANDBOOK FOR LINEAR STATIC ANALYSIS
- NEW THEORETICAL MANUAL
- SUPERELEMENT MANUAL

# MSC/VAX/NASTRAN SCHEDULE

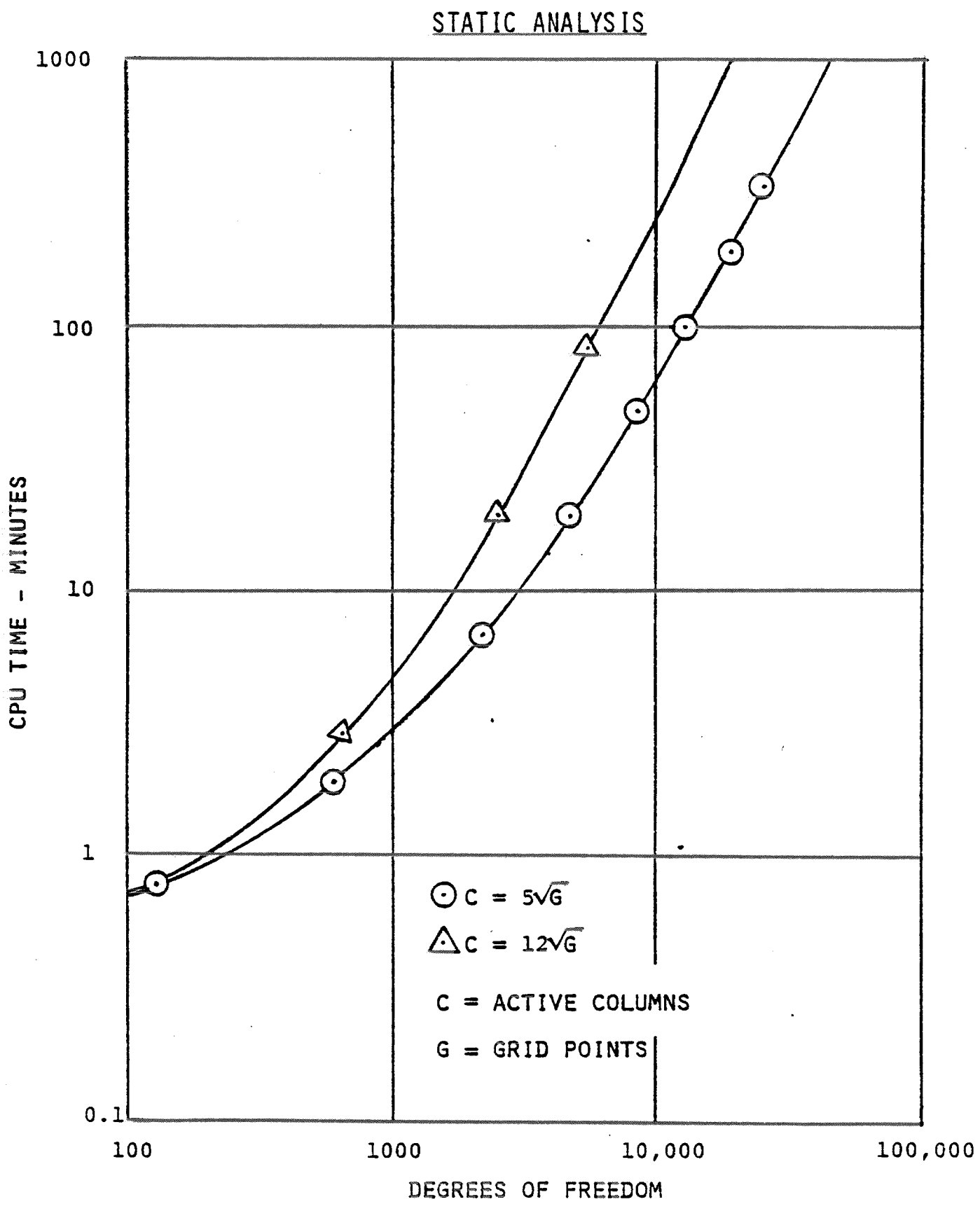
INITIAL CODE COMPLETE: 15 JANUARY

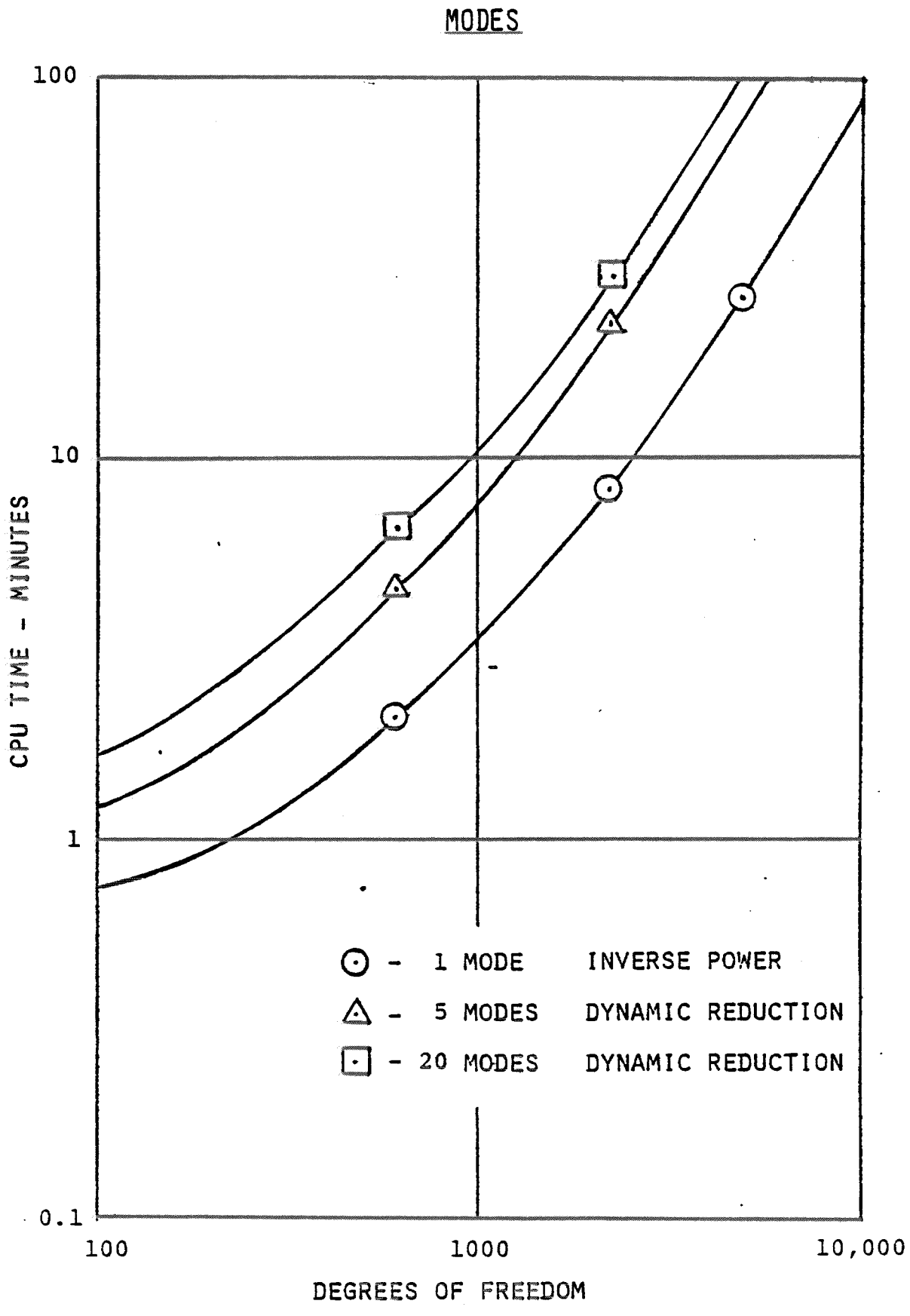
- DEBUGGING COMPLETE: 1 MARCH

- PERFORMANCE EVALUATE COMPLETE: 15 MARCH

- QA TESTING COMPLETE AND AVAILABLE FOR TESTING AT BETA TEST SITES: 1 MAY

- AVAILABLE FOR DELIVERY: 1 JULY


STATIC ANALYSIS
1000
100
10
1
0.1
CPU TIME - MINUTES
C = 5√G
C = 12√G
C = ACTIVE COLUMNS
G = GRID POINTS
100
1000
10,000
100,000
DEGREES OF FREEDOM


MODES
100
10
1
0.1
CPU TIME - MINUTES
100
1000
10,000
DEGREES OF FREEDOM
- 1 MODE INVERSE POWER
- 5 MODES DYNAMIC REDUCTION
- 20 MODES DYNAMIC REDUCTION

## TIME TO GENERATE THE STIFFNESS MATRIX

## ON THE VAX 11/780 COMPUTER

| ELEMENT TYPE | $T_i$, SEC./ELEMENT |
|---|---|
| One-Dimensional Elements | |
| RØD, TUBE | .07 |
| BAR | .14 |
| BEAM | .17 |
| Triangular Elements | |
| TRIM6 | .77 |
| TRIA3 | .16 |
| Quadrilateral Elements | |
| QUAD4 | .35 |
| SHEAR Panel | .24 |
| Solid Elements | |
| PENTA (6 nodes) | .47 |
| PENTA (15 nodes) | 2.10 |
| HEXA (8 nodes) | .68 |
| HEXA (20 nodes) | 4.90 |
| HEX20 | 7.00 |
| Axisymmetric Solids | |
| TRIARG | .42 |
| TRIAX6 | .79 |
| TRAPRG | .72 |

CPU TIME FOR REAL DOUBLE PRECISION OPERATIONS

ON THE VAX 11/780 COMPUTER

| TIMING PARAMETERS, $10^{-6}$ SECONDS | | | |
|---|---|---|---|
| $M_\ell$ | $P_s$ | P | $P_i$ |
| 12. | 10. | 18. | 80. |

$M_\ell$ = Arithmetic time for multiply/add loop.

$P_s$ = Pack or unpack one term in a string of nonzero matrix terms

P = Pack or unpack one element in a column of a matrix

$P_i$ = Pack or unpack one nonzero term in a column of a matrix

CPU TIME FOR COMPLEX DOUBLE PRECISION OPERATIONS

ON THE VAX 11/780 COMPUTER

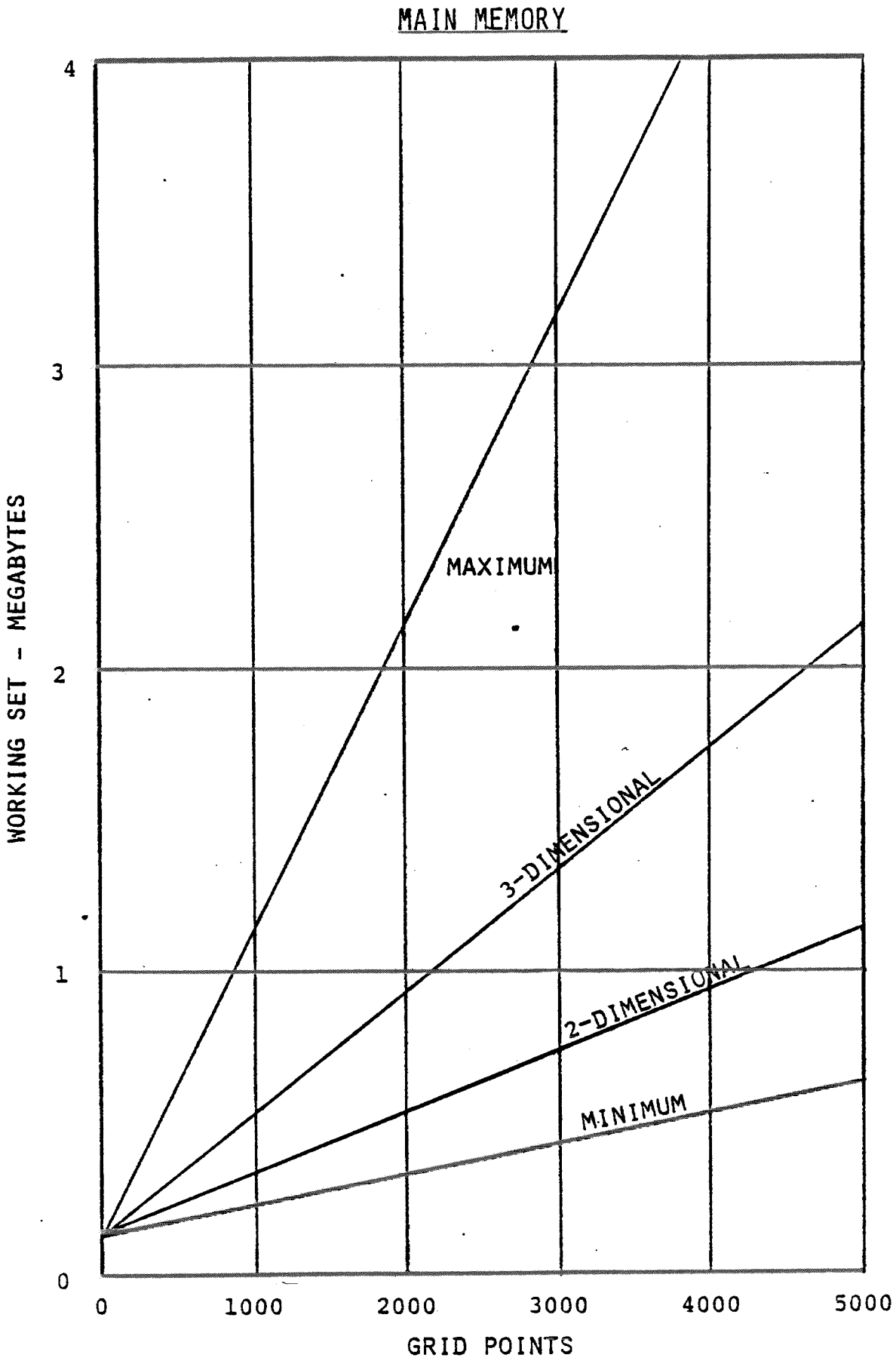
| TIMING PARAMETERS, $10^{-6}$ SECONDS | | | |
|---|---|---|---|
| $M_\ell$ | $P_S$ | P | $P_i$ |
| 45. | 12. | 25. | 85. |

$M_\ell$ = Arithmetic time for multiply/add loop.

$P_S$ = Pack or unpack one term in a string of nonzero matrix terms

P = Pack or unpack one element in a column of a matrix

$P_i$ = Pack or unpack one nonzero term in a column of a matrix


MAIN MEMORY
WORKING SET - MEGABYTES
4
3
2
1
0
MAXIMUM
3-DIMENSIONAL
2-DIMENSIONAL
MINIMUM
0
1000
2000
3000
4000
5000
GRID POINTS