Table A24 List of the file, **URPROMPT.DAT .**
This "prompting" file is used during the execution of the GENOPT processors called CHANGE, DECIDE, MAINSETUP, CHOOSEPLOT.
The file, URPROMPT.DAT, is located in the directory:
/home/progs/genopt/execute. URPROMPT.DAT never changes. It does not depend on the generic case.

```
=====================================================================
 10.1  Are you correcting, adding to, or using an existing file?
 10.2
       In this program, yes or no or help answers to prompts for your
       input must be in the form Y or N or H, respectively. (capital
       letter, one character only, please!)

       Usually, your answer will be N. However, if you are rerunning
       BEGIN or DECIDE or MAINSETUP or CHANGE, and you have a good
       partial or complete file NAME.BEG or NAME.DEC or NAME.OPT or
       NAME.CHG, respectively, and you want to complete your inter-
       active session or simply rerun BEGIN or DECIDE or MAINSETUP or
       CHANGE, then answer Y.

       Note that you may only add entries after the last entry in the
       existing file. In order to change the file in other respects,
       you must edit it using the VAX edit mode.

 20.1  Do you want a tutorial session and tutorial output?
 20.2
       If you answer Y, you will see explanations after
       most prompts. The prompts and further explanations of them
       will be reproduced on your output file.

 93.0
       Now you start to provide input data. You will be prompted by
       short questions. If you need help, just type H as an
       answer to the prompt instead of the datum called for. In most
       instances you will then be given more information on the datum
       you must provide. It may be a good idea to run the tutorial
       option if you are a new user of this program.

 300.0 This is the DIPLOT program. It was written by Karen Neier for
       general use and modified by D. Bushnell for special application
       with GENOPT, in which it is used to plot design variables,
       design margins, and the objective for all design iterations.

 310.1 Choose device number (2 - 6) (Type H for HELP)
 310.2
       Current choices for devices are:

          2  means  VT-100-R
```

3 means TEK 4114
4 means TEK 4105
5 means TEK 4107
6 means METAFILE (At Lockheed Dept. 93-30, the laser printer)

If you wish to change this choice, you will have to reprogram SUBROUTINE DINIT accordingly. SUB. DINIT is in the DIPLOT.NEW library.

382.0
For optimized designs the design margins and objective may be sensitive to small changes in the design variables. This ITYPE = 3 analysis branch allows you to obtain plots of design margins and objective v. any design variable that you choose. (To get plots you execute OPTIMIZE followed by CHOOSEPLOT/DIPLOT).

Next, you will be asked to select a design variable, its starting value VARBEG, its ending value VAREND, and the number of steps NSTEPS from the starting value to the ending value.

384.1 Choose a design variable (1, 2, 3, ...), IBVAR
384.2
Choose an integer from the left-hand column.

386.1 Starting value of the design parameter, VARBEG
386.2
Use starting and ending values that are not too far from the value you obtained via optimization.

388.1 Ending value of the design parameter, VAREND
388.2
Use starting and ending values that are not too far from the value you obtained via optimization.

390.1 Do you want to use the default for the number of steps?
390.2
The default value of the number of steps, NSTEPS, is 29
If you do not want the default value, use a value for NSTEPS that is less than 29

392.1 Number of steps from VARBEG to VAREND. NSTEPS
392.2
NSTEPS must be less than or equal to 29 .

400.0
You must provide input data, IBEHAV, for EACH LOAD SET.
Provide IBEHAV for the next load set.

Because of excessive time required for computer runs, you may not want to run all the analyses listed next.

Please indicate, by choosing numbers at the left-hand margin, which of the analyses you do NOT want to run. Choose one at a time.

If you want to run ALL the analyses, just hit zero (0).

405.1 Choose an analysis you DON'T want (1, 2,..), IBEHAV
405.2
Choose an integer from the left-hand column.

410.1 Any more analysis types NOT wanted (Y or N) ?
510.1 Choose a decision variable (1,2,3,...)
510.2
Use an index from the left-hand column of the table above.

514.1 Any design variables to be plotted v. iterations (Y or N)?
514.2
Usually you answer Y. However, you may have plotted all the design parameters you want, and still have more design margins to plot. The plots will show the design variables you next choose versus design iterations from the beginning of the case through the iteration most recently completed.

515.1 Choose a variable to be plotted v. iterations (1,2,3,..)
515.2
Use an index from the left-hand column of the table above.

516.1 Any design margins to be plotted v. iterations (Y or N)?
516.2
Usually you answer Y. However, you may have plotted all the design margins you want, and still have more design variables to plot. The plots will show the design margins you next choose versus design iterations from the beginning of the case through the iteration most recently completed.

517.1 Choose a margin to be plotted v. iterations (1,2,3,..)
517.2
Use an index from the left-hand column of the table above.

520.1 Lower bound of variable no.
530.1 Upper bound of variable no.
540.1 Any more decision variables (Y or N) ?
544.1 Any more design variables to be plotted (Y or N) ?
545.1 Any more margins to be plotted (Y or N) ?
547.1 Give maximum value (positive) to be included in plot frame.

547.2

Margins can vary widely. In order to prevent scaling problems in the plots, it is best to limit the magnitude of the maximum number to be included in the plot frame. 1 - 5 is a good number to use here. You might use a number such as 0.1 or 0.2 if many margins are clustered near zero and you want to see each of them more clearly on the plots.

548.0

Next, choose linked variables.

A linked variable is a variable that is not a decision variable, but is expressed in terms of decision variables, thus:

```
 (linked variable)  =  C1*(decision variable no. j1)**D1
                      +C2*(decision variable no. j2)**D2
                      +C3*(decision variable no. j3)**D3
                      +etc (up to max. of 5 terms)
                      +C0
```

in which C1, C2,..; and C0, and D1, D2... are constants. For example, suppose you have a problem in which the area of a plate is fixed, but either the length or width may be a decision variable. Suppose we arbitrarily choose the length to be the decision variable, then we know that

```
             WIDTH = AREA/LENGTH
```

From the general expression above, C0 = 0.0, C1 = AREA, and D1 = -1. Decision variable no. j1 is LENGTH.

NOTE: YOU MAY USE THE SIMPLE POLYNOMIAL LINKING JUST EXPLAINED OR YOU MAY DEFINE YOUR OWN LINKING EXPRESSION IN SUBROUTINE USRLNK OF THE BEHAVIOR.F FILE.

550.1 Any linked variables (Y or N) ?

550.2

A linked variable is a variable that is not a decision variable, but is expressed in terms of decision variables, thus:

```
 (linked variable)  =  C1*(decision variable no. j1)**D1
                      +C2*(decision variable no. j2)**D2
                      +C3*(decision variable no. j3)**D3
                      +etc (up to max. of 5 terms)
                      +C0
```

in which C1, C2,..; and C0, and D1, D2... are constants.
For example,
suppose you have a problem in which the area of a plate
is fixed, but either the length or width may be a decision
variable. Suppose we arbitrarily choose the length to be
the decision variable, then we know that

```
             WIDTH = AREA/LENGTH
```

From the general expression above, C0 = 0.0, C1 = AREA,
and D1 = -1. Decision variable no. j1 is LENGTH.

NOTE: YOU MAY USE THE SIMPLE POLYNOMIAL LINKING JUST EXPLAINED
      OR YOU MAY DEFINE YOUR OWN LINKING EXPRESSION IN
      SUBROUTINE USRLNK OF THE BEHAVIOR.F FILE.

560.1 Choose a linked variable (1,2,3,...)
560.2
Use an index from the left-hand column of the table above.

565.1 Choose type of linking (1=polynomial; 2=user-defined)
565.2
If you choose user-defined linking you must modify the
USRLNK subroutine in the BEHAVIOR.F file. Then recompile
using the "partial" option of the "GENPROGRAMS" command.

570.1 To which variable is this variable linked?
570.2
Pick an index from the left-hand column of the table above.

580.1 Assign a value to the linking coefficient, C(j)
580.2
A linked variable is a variable that is not a decision
variable, but is expressed in terms of decision variables,
thus:

```
 (linked variable)  =  C1*(decision variable no. j1)**D1
                      +C2*(decision variable no. j2)**D2
                      +C3*(decision variable no. j3)**D3
                      +etc (up to max. of 5 terms)
                      +C0
```

in which C1, C2,..; and C0, and D1, D2... are constants.
For example,
suppose you have a problem in which the area of a plate
is fixed, but either the length or width may be a decision
variable. Suppose we arbitrarily choose the length to be

the decision variable, then we know that

WIDTH = AREA/LENGTH

From the general expression above, C0 = 0.0, C1 = AREA, and D1 = -1. Decision variable no. j1 is LENGTH.

584.1 To what power is the decision variable raised?
584.2
What is the value of D(j)?

587.1 Any other decision variables in the linking expression?
587.2
A general expression for a linked variable has the form:

```
 (linked variable)  =  C1*(decision variable no. j1)**D1
                      +C2*(decision variable no. j2)**D2
                      +C3*(decision variable no. j3)**D3
                      +etc (up to max. of 5 terms)
                      +C0
```

in which C1, C2,..; and C0, and D1, D2... are constants.

588.1 Any constant C0 in the linking expression?
588.2
A general expression for a linked variable has the form:

```
(linked variable)  =  C1*(decision variable no. j1)**D1
                     +C2*(decision variable no. j2)**D2
                     +C3*(decision variable no. j3)**D3
                     +etc (up to max. of 5 terms)
                     +C0
```

in which C1, C2,..; and C0, and D1, D2... are constants.

589.1 Give the value of C0 in the linking expression. C0
589.2
A general expression for a linked variable has the form:

```
(linked variable)  =  C1*(decision variable no. j1)**D1
                     +C2*(decision variable no. j2)**D2
                     +C3*(decision variable no. j3)**D3
                     +etc (up to max. of 5 terms)
                     +C0
```

in which C1, C2,..; and C0, and D1, D2... are constants.

590.1 Any more linked variables (Y or N) ?

595.0

Next, establish inequality relations among variables of the two forms:

```
 1.0 > f(v1,v2,v3,...)    or   1.0 < f(v1,v2,v3,...)
```

in which the expression f(v1,v2,v3,...) has the form:

```
  f(v1,v2,v3,...) = C0 +C1*v1**D1 +C2*v2**D2 +C3*v3**D3 + ...
                       +etc (up to max. of 15 terms).
```

The variables, v1, v2, v3,..., can be any of the variables that are decision variables or potential candidates for decision variables or linked variables.

600.1 Any inequality relations among variables? (type H)

600.2

You may want to impose lower and upper bounds on linked variables, or you may want to force certain expressions involving combinations of variables to be larger than or less than certain values. For example, you may want to force the height of a stiffener segment to be no more than 15 times its total thickness. Or you may want the length of a plate always to be greater than 1.5 times its width.

The inequality relations have either of the two forms:

```
 1.0 > f(v1,v2,v3,...)    or   1.0 < f(v1,v2,v3,...)
```

in which the expression f(v1,v2,v3,...) has the form:

```
  f(v1,v2,v3,...) = C0 +C1*v1**D1 +C2*v2**D2 +C3*v3**D3 + ...
                       +etc (up to max. of 15 terms).
```

The variables, v1, v2, v3,..., can be any of the variables that are decision variables or potential candidates for decision variables or linked variables.

601.1 Want to see an example of how to calculate C0, C1, D1,..?

602.0

```
For example, suppose that you want to impose the condition
that the area of a rectangular plate be greater than 50.
Let v1 = length of plate;  v2 = width of plate. You want
     v1*v2 > 50                                   (1)
The expression (1) must be expressed in the form
       1.0 > C0 + C1*v1**D1 + C2*v2**D2           (2)
If we: (a) divide both sides of (1) by v2 (assume v2 is positive!);
       (b) subtract v1 from both sides of (1); and
       (c) add 1.0 to both sides of (1), we obtain
             1.0 > 1.0 -v1 +50/v2                 (3)
From (3) we easily deduce that in (2): C0 = 1.0; C1 = -1.0;
D1 = 1.0; C2 = 50; and D2 = -1.0.  Eq.(3) represents the
```

```
      first type of expression given above. The actual value of
      the constraint, CONSTR, used later by the optimizer would be
                 CONSTR = 2. - (1.0 -v1 +50/v2).
      This constraint is critical if its value is less than 1.0.

603.1 Identify the type of inequality expression (1 or 2)
603.2
      The inequality relations have either of the two forms:

          Type 1 is:     1.0 > f(v1,v2,v3,...)

          Type 2 is:     1.0 < f(v1,v2,v3,...)

      in which the expression f(v1,v2,v3,...) has the form:

        f(v1,v2,v3,...) = C0 +C1*v1**D1 +C2*v2**D2 +C3*v3**D3 + ...
                             +etc (up to max. of 15 terms).

604.0
      Now start building the expression: C0 +C1*v1**D1 +C2*v2**D2 +...
      You are allowed up to 15 terms in the expression, including C0.

606.1 Give a value to the constant, C0
606.2
      The inequality relations have either of the two forms:

       1.0 > f(v1,v2,v3,...)    or   1.0 < f(v1,v2,v3,...)

      in which the expression f(v1,v2,v3,...) has the form:

        f(v1,v2,v3,...) = C0 +C1*v1**D1 +C2*v2**D2 +C3*v3**D3 + ...
                             +etc (up to max. of 15 terms).

      The variables, v1, v2, v3,..., can be any of the variables
      that are decision variables or potential candidates for
      decision variables or linked variables.

608.1 Choose a variable from the list above (1, 2, 3,...)
608.2
      Use an index from the left-hand column of the list above.

610.1 Choose a value for the coefficient, C1
610.2
      You are building the expression: C0 +C1*v1**D1 +C2*v2**D2 +...

620.1 Choose a value for the power, D1
620.2
      You are building the expression: C0 +C1*v1**D1 +C2*v2**D2 +...
```

630.1 Any more terms in the expression: C0 +C1*v1**D1 +C2*v2**D2 +...
630.2
You are allowed up to 15 terms in the expression, including C0.

635.1 Choose a variable from the list above (1, 2, 3,...)
635.2
Use an index from the left-hand column of the list above.

640.1 Choose a value for the coefficient, Cn
640.2
You are building the expression: C0 +C1*v1**D1 +C2*v2**D2 +...
You are allowed up to 15 terms in the expression, including C0.

645.1 Choose a value for the power, Dn
645.2
You are building the expression: C0 +C1*v1**D1 +C2*v2**D2 +...
You are allowed up to 15 terms in the expression, including C0.

650.1 Are there any more inequality expressions?
650.2
The inequality relations have either of the two forms:

```
 1.0 > f(v1,v2,v3,...)    or   1.0 < f(v1,v2,v3,...)
```

in which the expression f(v1,v2,v3,...) has the form:

```
  f(v1,v2,v3,...) = C0 +C1*v1**D1 +C2*v2**D2 +C3*v3**D3 + ...
                       +etc (up to max. of 15 terms).
```

The variables, v1, v2, v3,..., can be any of the variables that are decision variables or potential candidates for decision variables or linked variables.

680.1 Any escape variables (Y or N) ?
680.2
An escape variable is a variable that when increased drives the design toward the feasible region. For example, in designs which are buckling-critical, local and general instability represent two constraint conditions that bound the feasible region. Increasing the thicknesses of any parts while keeping all other dimensions the same drives the design toward the feasible region (makes buckling less critical). Hence, a thickness should always be chosen as an escape variable. Other variables, such as winding angles, should not be used as escape variables, since their increase might well result in a decrease in the buckling load, hence driving the design toward the infeasible region.

NOTE: YOU MUST INCLUDE THE WORD "THICKNESS", SPELLED CORRECTLY,
IN THE DEFINITIONS OF VARIABLES THAT ARE THICKNESSES!
DOING THIS ALLOWS THE DEFAULT OPTION FOR THE CHOICE OF
ESCAPE VARIABLES.

682.1 Want to have escape variables chosen by default?
682.2

Generally answer Y. This code will then automatically choose as escape variables all of the thicknesses that are decision variables. This is usually the best strategy and use of the default option saves you the trouble of doing it interactively.

NOTE: YOU MUST INCLUDE THE WORD "THICKNESS", SPELLED CORRECTLY,
IN THE DEFINITIONS OF VARIABLES THAT ARE THICKNESSES!
DOING THIS ALLOWS THE DEFAULT OPTION FOR THE CHOICE OF
ESCAPE VARIABLES. THE CHOICE OF ESCAPE VARIABLES IS
MADE BY SEARCHING OVER ALL DECISION VARIABLES AND CHOOSING
ONLY THOSE WITH THE WORD "THICKNESS" IN THEIR DEFINITIONS.

685.1 Choose an escape variable (1, 2, 3, . . .)
685.2

An escape variable is a variable that when increased drives the drives the design toward the feasible region. For example, in designs which are buckling-critical, local and general instability represent two constraint conditions that bound the feasible region. Increasing the thicknesses of any parts while keeping all other dimensions the same drives the design toward the feasible region (makes buckling less critical). Hence, a thickness should always be chosen as an escape variable. Other variables, such as winding angles, should probably not be used as escape variables, since their increase might well result in a decrease in the buckling load, hence driving the design toward the infeasible region.

687.1 Any more escape variables (Y or N) ?
690.1 NLOADS= number of environments (e.g. loads) (usually 1)
690.2

The thing you are designing may be subjected to a number of different environments during its lifetime. The optimum design should be feasible for all of the environments.

700.1 NPRINT= output index (0=GOOD, 1=ok, 2=debug, 3=too much)
700.2

Usually use 0 .

710.1 Choose type of analysis (1=opt., 2=fixed, 3=sensit.) ITYPE
710.2

```
    ITYPE = 1  means an optimization analysis will be performed.
               Make sure that you have chosen decision variables,
               linked variables, and escape variables via DECIDE.

    ITYPE = 2  means analysis of a fixed design will be performed.
               (no design iterations)

    ITYPE = 3 means that margins and objective will be calculated
              with all design variables fixed except one user-selected
              variable. Margins and the objective will be calculated
              for a sequence of designs in which the user-selected
              variable is incremented from a user-selected starting
              value to a user-selected ending value.

720.1 How many design iterations in this run (3 to 25)?
720.2
    Choose a number between 3 and 25, usually 5 to 8.
    If the design margins seem to jump around quite a
    bit, or if the objective cycles from iteration set to
    iteration set, use a high number of iterations (25).

723.1 Take "shortcuts" for perturbed designs (Y or N)?
723.2
    If you answer "Y" IFAST will be set to 1. Otherwise, IFAST = 0

    This prompt allows you to use IFAST in SUBROUTINE STRUCT or in one
    or more of the "behavior" subroutines, BEHXi, i = 1, 2, 3,...
    in order to speed up optimization cycles. It is usually best,
    however, to answer "N", since that choice leads to more accurate
    values for the gradients of the behavioral constraint conditions.

    For example, if you are computing buckling modal imperfection
    shapes: Do you want to recompute them for the PERTURBED designs
    or do you want to use the same buckling modal imperfection shapes
    computed for the UNPERTURBED (current) design for the PERTURBED
    designs also? Recomputing often means higher constraint gradients
    but usually leads to better "global" optimum designs.

725.1 Choose 1 or 2 or 3 or 4 or 5 for IDESIGN
725.2
    IDESIGN controls the quality of the best acceptable design,
    as follows:

    IDESIGN  accept only the best "---" design   minimum allowable
                                                  design margin
     1     "FEASIBLE"                                -0.01
     2     "FEASIBLE or ALMOST FEASIBLE"             -0.05
     3     "FEASIBLE or ALMOST FEASIBLE or
```

```
        MILDLY UNFEASIBLE"                           -0.10
 4     "FEASIBLE or ALMOST FEASIBLE or
        MILDLY UNFEASIBLE or MORE UNFEASIBLE"        -0.15
 5     "FEASIBLE or ALMOST FEASIBLE or
        MILDLY UNFEASIBLE or MORE UNFEASIBLE         -0.20
        or MOSTLY UNFEASIBLE"
```

These choices are permitted because there are many cases for which design iterations "wallow" in a region of design space for which the design is in the range from "ALMOST FEASIBLE" to "MOSTLY UNFEASIBLE". The best "MOSTLY UNFEASIBLE" design may be a lot better (e.g. weigh much less) than the best "ALMOST FEASIBLE" design, and the GENOPT user may be willing to accept a few "MOSTLY UNFEASIBLE" margins, depending upon what particular behavior(s) are "MOSTLY UNFEASIBLE". For example, in the design of a shell structure for which the maximum stress is generated mostly from bending, the GENOPT user may feel that there is considerable residual strength in the shell even if its extreme fibers are stressed well beyond their elastic limit. Hence, if the behavioral constraint is violated because the maximum allowable elastic stress has been exceeded, this GENOPT user may feel that the optimized design will still be safe.

730.0

Next, choose a control for move limits to be used during optimization cycles. By "move limits" we are referring to the size of the boxes that appear in Fig. 2 of the paper, "GENOPT - a program that writes user-friendly optimization code", Int. J. Solids and Structures, Vol. 26, pp 1173- 1210, 1990. You are given five choices: IMOVE = 1 or 2 or 3 or 4 or 5:

IMOVE = 1 means SMOVE = 0.10
IMOVE = 2 means SMOVE = 0.50
IMOVE = 3 means SMOVE = 0.01
IMOVE = 4 means SMOVE = 0.02
IMOVE = 5 means SMOVE = 0.05

Small SMOVE (initial move limit) keeps the boxes small and leads to the requirement for many "OPTIMIZE" commands to obtain an optimum design; the "conservative" approach may be boring, but it may be the most reliable. "Liberal" move limits allow bigger boxes, generally leading to the need for fewer "OPTIMIZEs". However, the decision variables may jump around a lot and have difficulty converging to those corresponding to an optimum design.

THE BEST CHOICE INITIALLY IS TO USE IMOVE = 1

For early optimization cycles you can choose "liberal" move limits, changing to more "conservative" move limits after several "OPTIMIZEs".

In practical problems (such as realistic design problems as opposed to mathematical "toy" problems) it is best to choose "conservative" move limits.

740.1 Choose 1 or 2 or 3 or 4 or 5 for move limits, IMOVE
740.2

IMOVE = 1 means that decision variables will generally change by less than 10 percent of their current values in each optimization cycle (except for occasional "jumps" that may occur on the initial cycle corresponding to each "OPTIMIZE" command). **** Ordinarily you should use this choice. ****

IMOVE = 2 means that decision variables will generally change by less than 50 percent of their current values in each optimization cycle (except for occasional "jumps" that may occur on the initial cycle corresponding to each "OPTIMIZE" command).

IMOVE = 3 means that decision variables will generally change by less than 1.0 percent of their current values in each optimization cycle (except for occasional "jumps" that may occur on the initial cycle corresponding to each "OPTIMIZE" command). You may want to use this choice: 1. if you already have a "global" optimum design from a SUPEROPT run, and 2. you want to explore more in the immediate neighborhood of the "global" optimum that you have already determined from your previous SUPEROPT run.

IMOVE = 4 means that decision variables will generally change by less than 2.0 percent in each optimization cycle. See "IMOVE = 3" for more.

IMOVE = 5 means that decision variables will generally change by less than 5.0 percent in each optimization cycle. See "IMOVE = 3" for more. You may want to use this option if the margins are "jumpy" from optimization cycle to cycle.

742.1 Do you want default (RATIO=10) for initial move limit jump?
742.2

In the first optimization cycle following each "OPTIMIZE" command the upper and lower bounds for each decision variable (x) for that cycle may be expanded ("jumped"). Whether or not this "move limit jump" occurs depends on the RATIO of the absolute values of the upper (xmax) and lower (xmin) bounds that were established by the user in "DECIDE" to the current value of the decision variable:

If abs(xmax/x)/2**k > RATIO the current upper bound is expanded.
If abs(xmin/x)/2**k > RATIO the current lower bound is expanded.

in which k represents the number of times a "jump" has occurred in previous executions of "OPTIMIZE" since the last time "DECIDE" or "CHANGE" were used. The default value of RATIO is 10.

The purposes of the "move limit jump" are: (1) to enable decision variables that are near zero to escape this neighborhood, and (2) to permit exploration of an expanded segment of the domain of the decision variable in the search for an optimum.

If you want to prevent the "jump" set RATIO very large.

743.1 Provide a value for the "move limit jump" ratio, RATIO
743.2

If zero is included in the domain of any decision variable it may be best to use the default value, RATIO = 10.

If any of your decision values has lower and upper bounds that span many orders of magnitude, it may be best to set RATIO to a large number.

If in doubt, use the default value.

745.1 Do you want the default perturbation (dx/x = 0.05)?
745.2

See Fig. 1 and associated discussion on p. 1179 of the paper "GENOPT - a program that writes user-friendly optimization code", Int. J. of Solids and Structures, Vol. 26, pp 1173- 1210, 1990. In order to get gradients of the behavioral constraints the decision variables for the current design are perturbed one at a time and the behavior is calculated for each perturbation. The default perturbation is five per cent of the value of each decision variable, x(i), i = 1, 2, 3... NDV.

Usually you will answer Y. However, if there is difficulty obtaining convergence to an optimum, or if the constraint conditions jump around a lot from design iteration to design iteration, then you might want to try a smaller perturbation, such as 0.01 or 0.005. Do not use a perturbation larger than the default value of 0.05.

747.1 Amount by which decision variables are perturbed, dx/x
747.2
Try 0.01 or 0.005.

748.1 Do you want to have dx/x modified by GENOPT?
748.2
For ordinary structures problems you should probably answer N . If you answer Y GENOPT will modify the size of the perturbation, dx/x, by a factor that depends on the history of the evolution of the design during optimization cycles: the perturbation will be increased by the ratio XAVE(IDV)/X(IDV), in which XAVE(IDV) is the average value of the IDVth decision variable over the last several design cycles and X(IDV) is the current value of that decision variable. If XAVE(IDV)/X(IDV) is less than 1.0, then the perturbation dx/x is not modified.

749.1 Do you want to reset total iterations to zero (Type H)?
749.2
GENOPT accumulates results from all iterations from the start of the case. These results can be plotted via the processors CHOOSEPLOT and DIPLOT. It is possible that you may no longer want to plot results from previous runs; you may want to make a "fresh" start, but with use of the current design state rather than the original design state from the NAME.BEG file. You can do this by answering Y to this question. Then ITRTOT will be set to zero.
Likely occasions to reset ITRTOT to zero are:
1. If you started from a very bad design state;
2. If you used CHANGE and you don't want previous results to show on the plots;
3. If the total number of iterations is approaching the maximum allowable value of 200;
4. If you already have lots of iterations and the plots look too messy.

NOTE: DON'T FORGET TO CHANGE THE ANSWER BACK TO "N" AFTER THE NEXT "OPTIMIZE" RUN. OTHERWISE ITERATIONS FROM MULTIPLE "OPTIMIZEs" WILL NOT ACCUMULATE.

750.0
This program permits you to change certain quantities without starting over from the beginning (without having to use BEGIN).

Parameters that you can change are segregated into three sets:

1. parameters that are "elegible" to be decision variables;
2. parameters that are always considered to be fixed during design iterations: they are not elegible to be decision variables;
3. parameters that describe the environment (loads, temps)
4. parameters that are allowables, such as max. stress.
5. parameters that are factors of safety.

You will next be asked if you want to change any parameters in set no. 1, and if so, which; then you will be asked the same questions relative to parameter sets 2, 3, 4, and 5.

760.1 Do you want to change any values in Parameter Set No. 1?
760.2
Parameter Set No. 1 contains all parameters that are elegible to be decision variables. (Note that they may not actually be decision variables; they are merely elegible to be so.)

770.1 Number of parameter to change (1, 2, 3, . .)
770.2
Choose an index from the left-most column in the above table.

780.1 New value of the parameter
780.2
Remember to change lower and upper bounds via DECIDE if such a change is required to be consistent with the new value of the parameter.

790.1 Want to change any other parameters in this set?
800.1 Do you want to change values of any "fixed" parameters?
800.2
This means changing values of parameters that can never be decision variables, that is parameters that remain constant during optimization and are not among the set of parameters from which decision variables are allowed to be selected.

810.1 Do you want to change any loads?
810.2
What is mean here is any parameters that characterize the environment (loads, temperatures)

820.1 Do you want to change values of allowables?
820.2
Allowables include parameters such as maximum allowable stress, minimum allowable frequency, maximum allowable displacement, etc. We are not referring here to lower and upper bounds of decisiion variables, which can only be changed by rerunning DECIDE.

830.1 Do you want to change any factors of safety?
830.2

The factors of safety are related to behavioral variables, such as stress, buckling load factors, frequency, etc.

850.1 Do you want to get more plots before your next "SUPEROPT"?
850.2

Make sure to get all the plots you want before executing SUPEROPT again. If you answer N , the total number of design iterations will get reset to zero, and the design history will be lost. If your answer Y, the total number of design iterations will not be reset to zero. (However, in that case a subsequent execution of SUPEROPT will not yield any useful information).

Just make sure you do all the CHOOSEPLOT/DIPLOT executions you need to before you answer N . If this is the last set of plots you need from the previous execution of SUPEROPT, then answer N

900.0 DUMMY

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