DOCUMENTATION OF DECISION-AIDING SOFTWARE:

EVAL SYSTEM SPECIFICATION

DECISIONS AND DESIGNS INC.

Linda B. Allardyce
Dorothy M. Amey
Phillip H. Feuerwerger
Roy M. Gulick

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by

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Sponsored by

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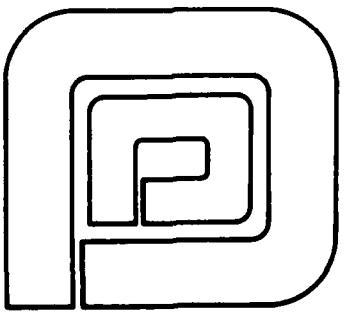

DECISIONS and DESIGNS, INC.
Suite 600, 8400 Westpark Drive
P.O.Box 907
McLean, Virginia 22101
(703) 821-2828

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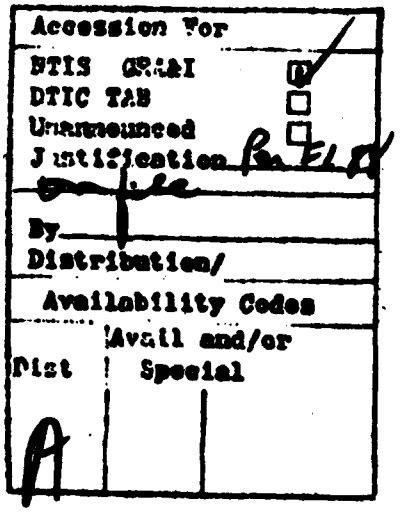


FIGURES

EVAL SYSTEM SPECIFICATION

1.0 INTRODUCTION

1.1 Purpose of the System Specification

The EVAL System Specification is a technical document written for software development personnel. Together with the EVAL Functional Description, it guides the software development effort by identifying the functional requirements and by providing structured logic diagrams that depict the flow, control, and processing of information within the system.

The System Specification is generic and is intended to guide and facilitate the preparation of the language-specific and computer hardware-specific documentation and coding that are necessary to implement and operate EVAL at an installation.

1.2 References

1.2.1 IBM, HIPO--A Design Aid and Documentation Technique. Technical Publication GC20-1851-0. White Plains, New York: IBM, October 1974.-

1.2.2 Allardyce, Linda B.; Amey, Dorothy M.; Feuerwerger, Phillip H.; Gulick, Roy M. Documentation of Decision-Aiding Software: EVAL Functional Description. McLean, Virginia: Decisions and Designs, Incorporated, November 1979.

1.2.3 Allardyce, Linda B.; Amey, Dorothy M.; Feuerwerger, Phillip H.; Gulick, Roy M. Documentation

of Decision-Aiding Software: EVAL Users Manual. McLean, Virginia: Decisions and Designs, Incorporated, November 1979.

1.3 Terms

1.3.1 EVAL - EVAL is an abbreviation for evaluation, reflecting the system's major area of applicability.

1.3.2 HIPO - The specification uses the standard Hierarchy plus Input-Process-Output (HIPO) diagramming technique to depict the structural design and logical flow of the system. A legend explaining the HIPO diagramming symbols is included. Reference 1.2.1 provides a complete description of the HIPO documentation technique.

2.0 DESIGN DETAILS

2.1 Background

Systems development personnel should refer to the EVAL Functional Description, Reference 1.2.2, in conjunction with the documentation contained in this specification. The Functional Description details the evaluation models implemented by EVAL and discusses the specific functions that the software must perform. In addition, systems development personnel may wish to refer to the EVAL User's Manual, Reference 1.2.3.

2.2 General Operating Procedures

EVAL is a menu-driven system. That is, the system is designed to interact with the user by presenting a sequential hierarchy of menus and asking the user to respond by selecting one option from the current menu. If the user does not select one of the menu options, the system displays the previous menu. In this manner, the user moves up and down the hierarchy, as desired. Whenever data entry is required as a result of option selection, the system specifically requests the data and specifies the format.

The system is also designed to be generally forgiving of procedural errors by the user.

2.3 System Logical Flow

EVAL is a hierarchically structured, modular software system. The system structure and logical flow lends itself to presentation in the form of HIPO diagrams, which are contained in this document.

The main purpose of the HIPO diagrams is to provide, in a pictorial manner, the complete set of modular elements necessary to the operation of EVAL, including all input, output, and internal functional processing. This is done by displaying the input items necessary to the process step which uses them, defining the process, and showing the resulting output of the process step.

The HIPO documentation diagrams are designed and drawn in a hierarchical fashion from the main calling routines to the detail-level operation/calculation routines. Extended written descriptions are given below a HIPO diagram whenever it is deemed necessary.

A complete description and explanation of the symbolic notation used in the HIPO diagrams is given in Reference 1.2.1. An abbreviated legend for the symbols used in this specification is given in Figure 2-1. Note that:

a. External subroutines are depicted partly in the Process block and partly out. Internal subroutines are always shown within the Process block.

b. Overview diagrams show general inputs and outputs only, whereas detail/subroutine-level diagrams show specific input/output tables and/or displays.

c. Rectangular boxes inside the Input/Output block areas are generally used to denote single data items. Two or more boxes are grouped to show that several data items are input/output.

d. Rectangular boxes inside the Process block indicate repetitive subprocesses.

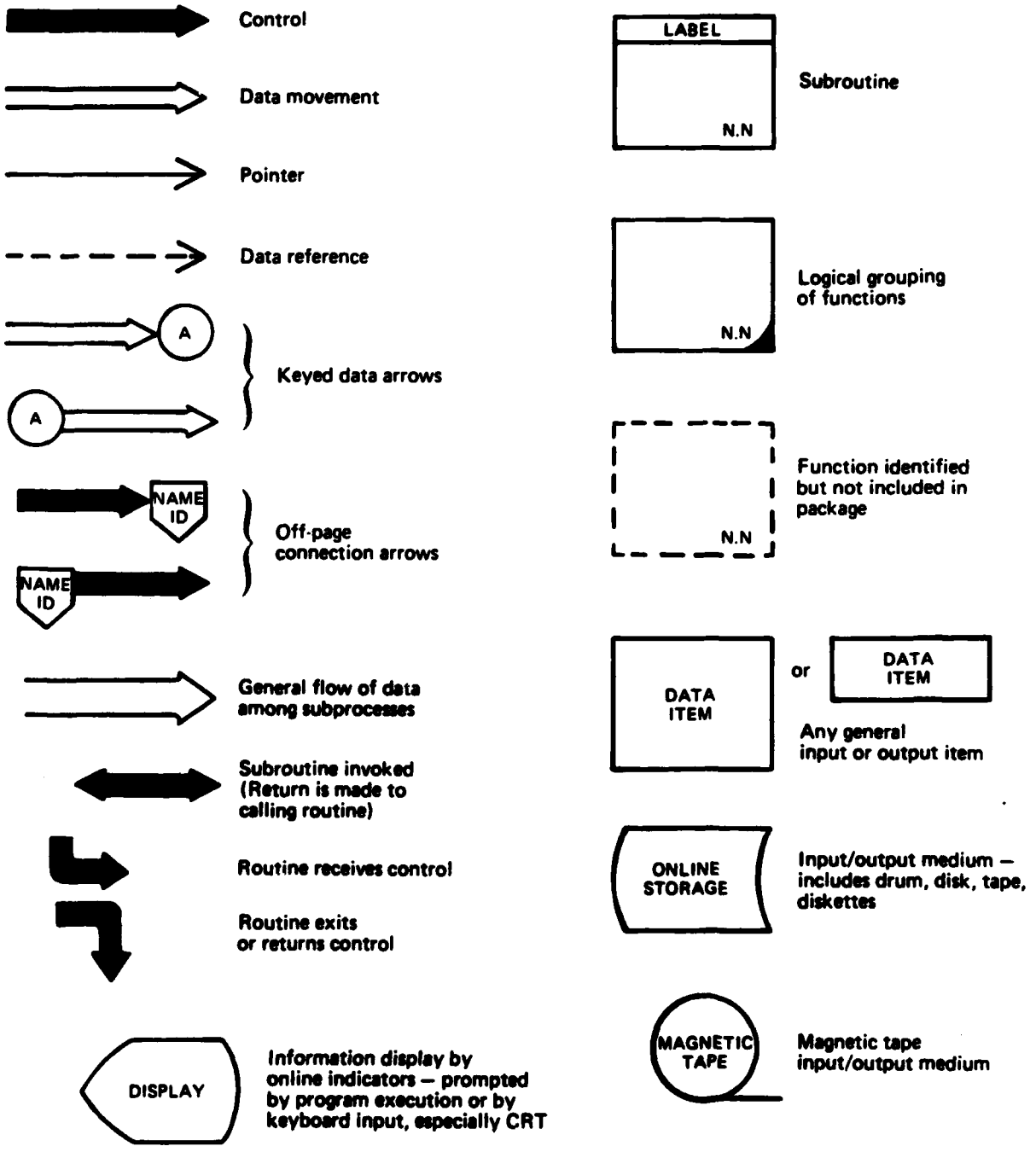


Figure 2-1
LEGEND OF HIPO SYMBOLS

The HIPO diagrams appear in the next section, which completes the system specification.

2.4 HIPO Documentation

The HIPO diagram identification numbers and figure numbers used in this section stand alone; i.e., they start with 1.0, increase hierarchically, and are independent of the numbering scheme used to this point in this document.

The EVAL software consists of two separate subsystems: STRUCTURE and RUN. Figure 2-2 is the system overview chart. The STRUCTURE subsystem is used to create a new evaluation structure or to revise an existing structure. The RUN subsystem is used to specify importance weights and utilities and to display the results of an evaluation model.

Figure 2-3 is a subsystem structure chart for the STRUCTURE subsystem. It represents the overall program logic flow in a visual table of contents. The Visual Table of Contents diagram shows the hierarchical structure, the functional description labels, and the diagram (chart) identifiers of the functions performed by STRUCTURE. Similarly, Figure 2-4 is a visual table of contents diagram for the RUN subsystem.

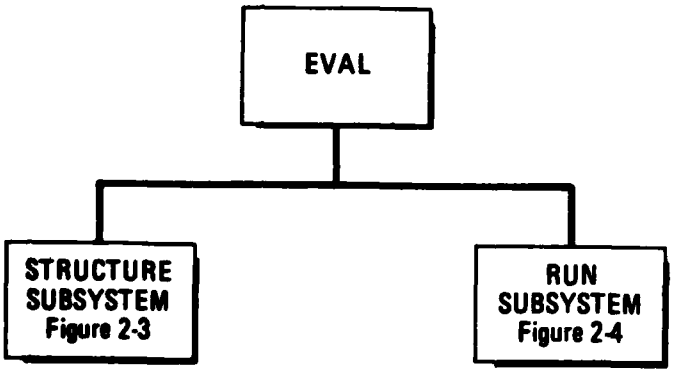


Figure 2-2
EVAL SYSTEM OVERVIEW

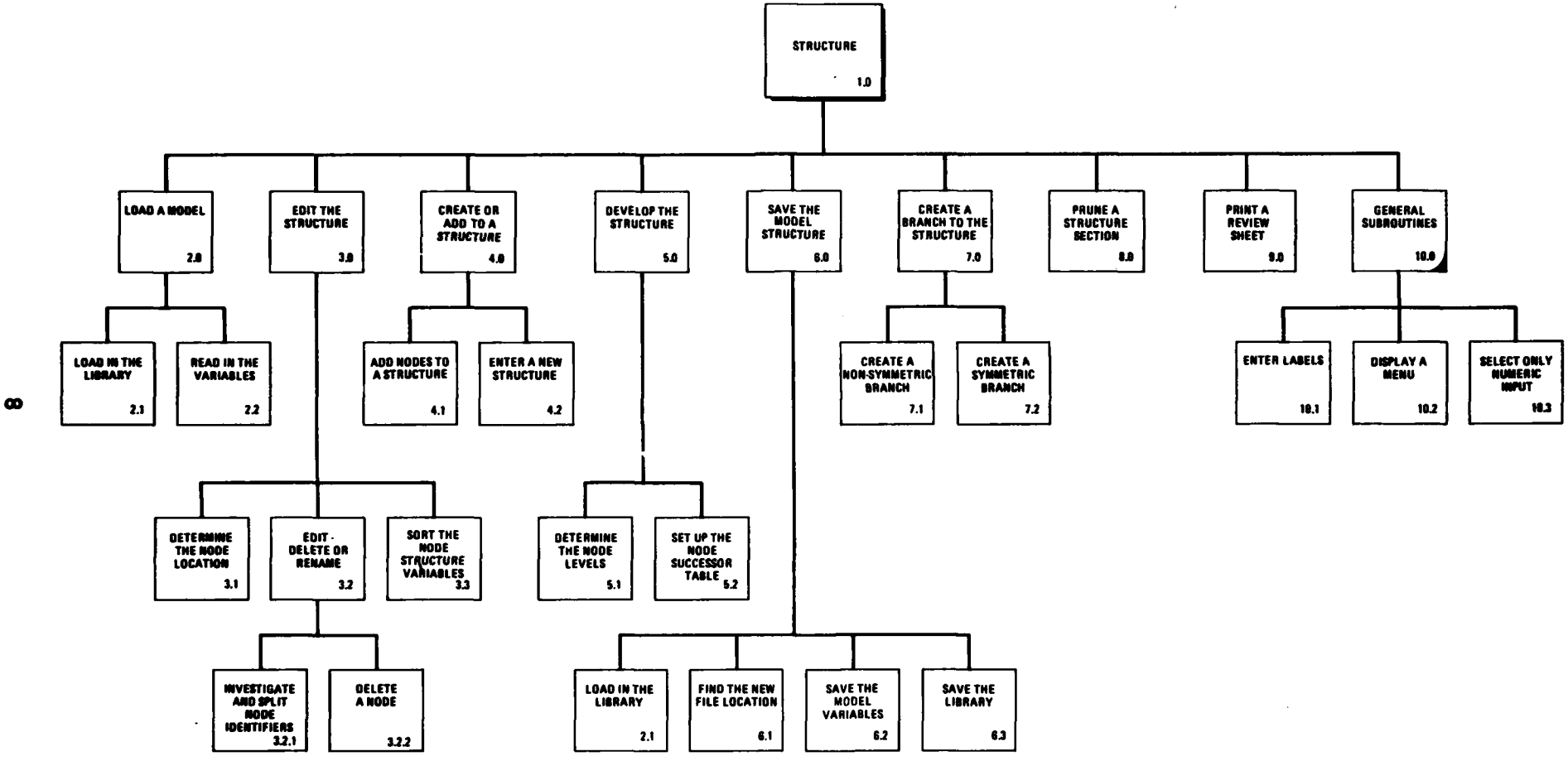


Figure 2-3

STRUCTURE VISUAL TABLE OF CONTENTS

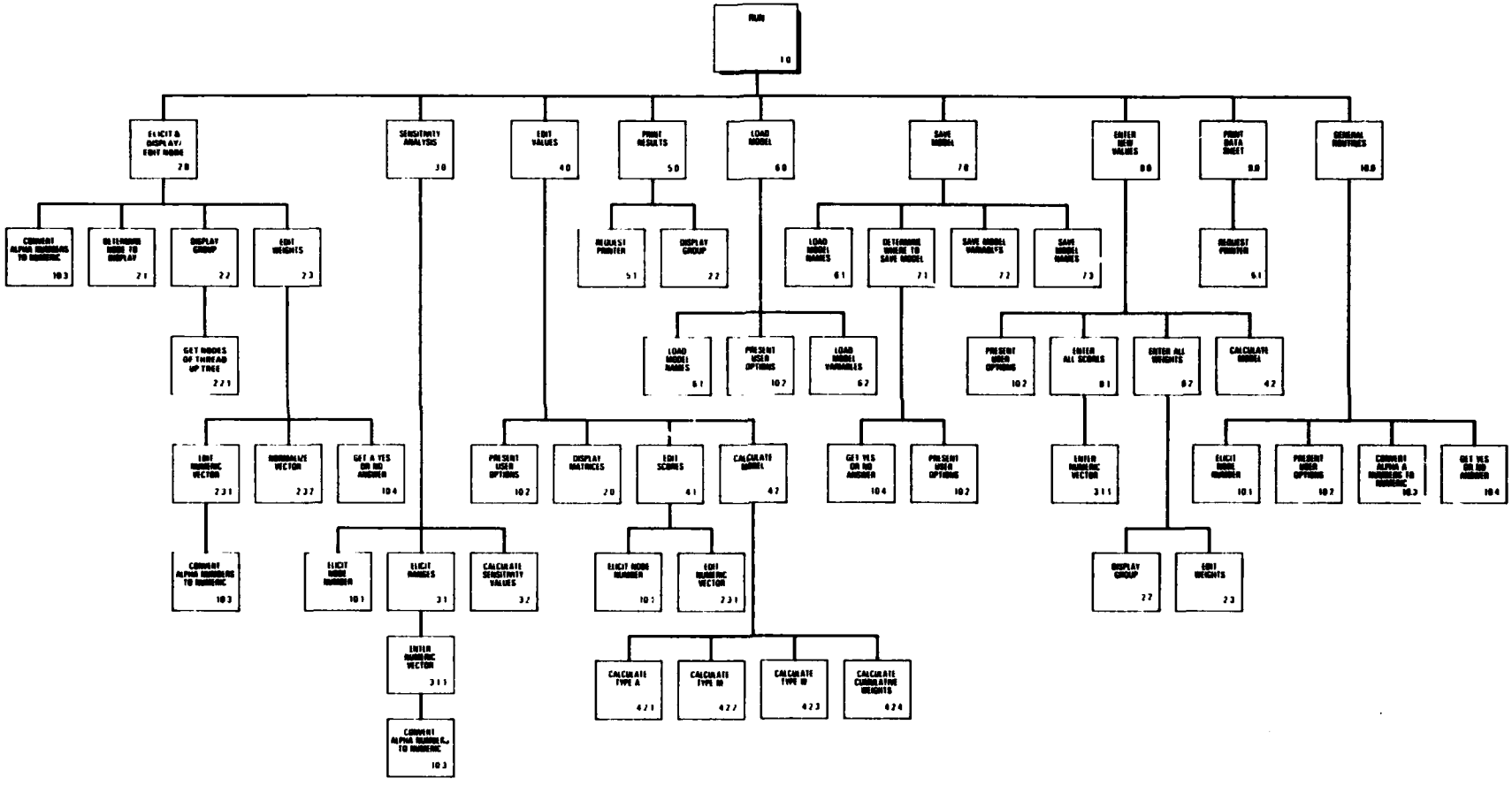
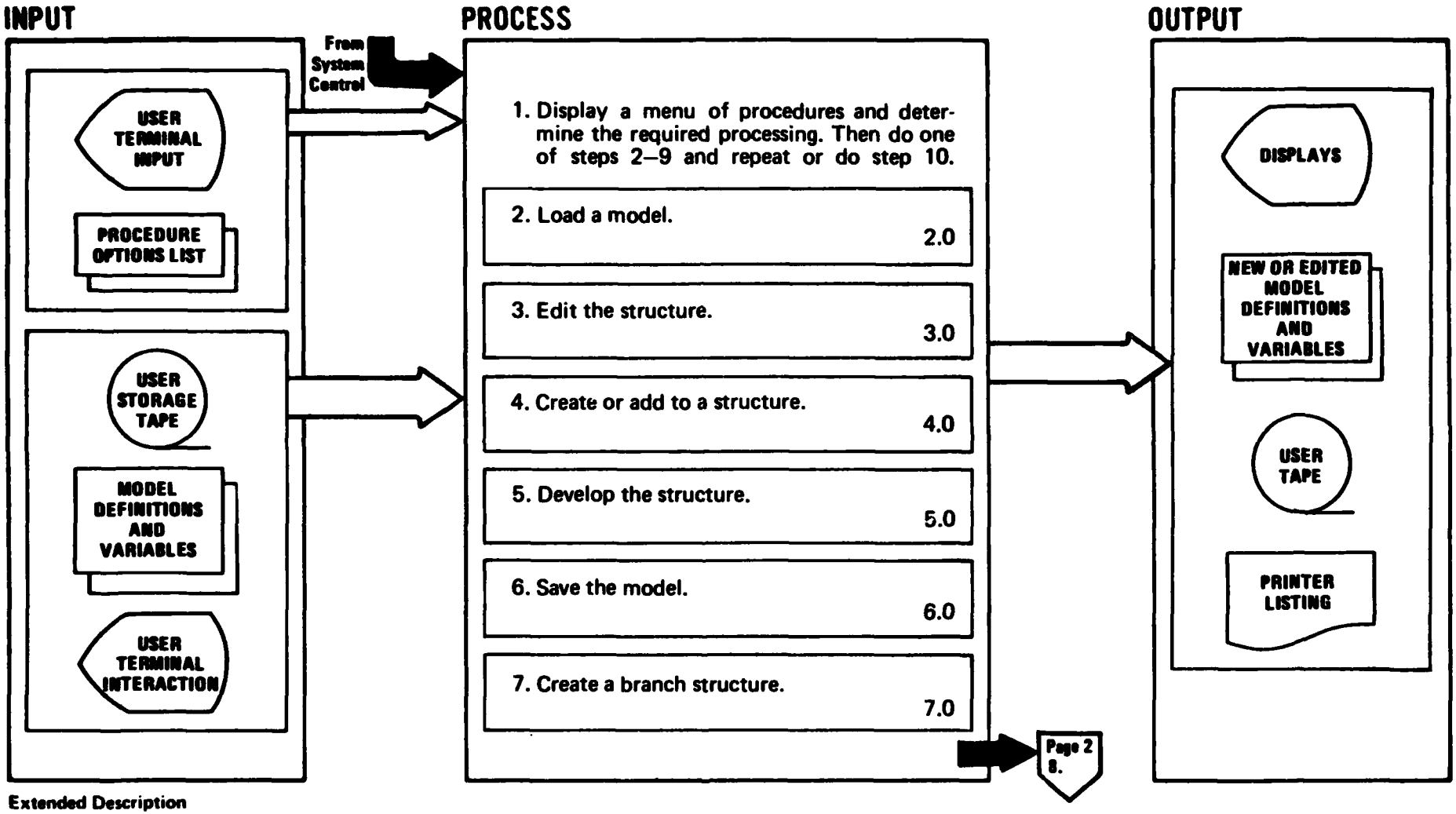


Figure 2-4
RUN VISUAL TABLE OF CONTENTS

System/Program: STRUCTURE Name:

Diagram ID: 1.0 Description: Main Routine Page: 1 of 2



Extended Description

The list of program procedures is displayed so that the user may select the next process to be performed. The list is displayed in menu format which allows the association of position numbers with different options in the list.

1. The user is prompted for a choice of operations. The chosen procedure is invoked via one of steps 2–9. If the user responds with blank or null input, then step 10 is executed.

2. The existence of EVAL/STRUCTURE models on tape (storage) is determined and a selected model is read.

3. The structure (or model) currently defined by the program variables may be changed at this point.

4. A new structure may be entered via user interaction or nodes may be added to an existing structure.

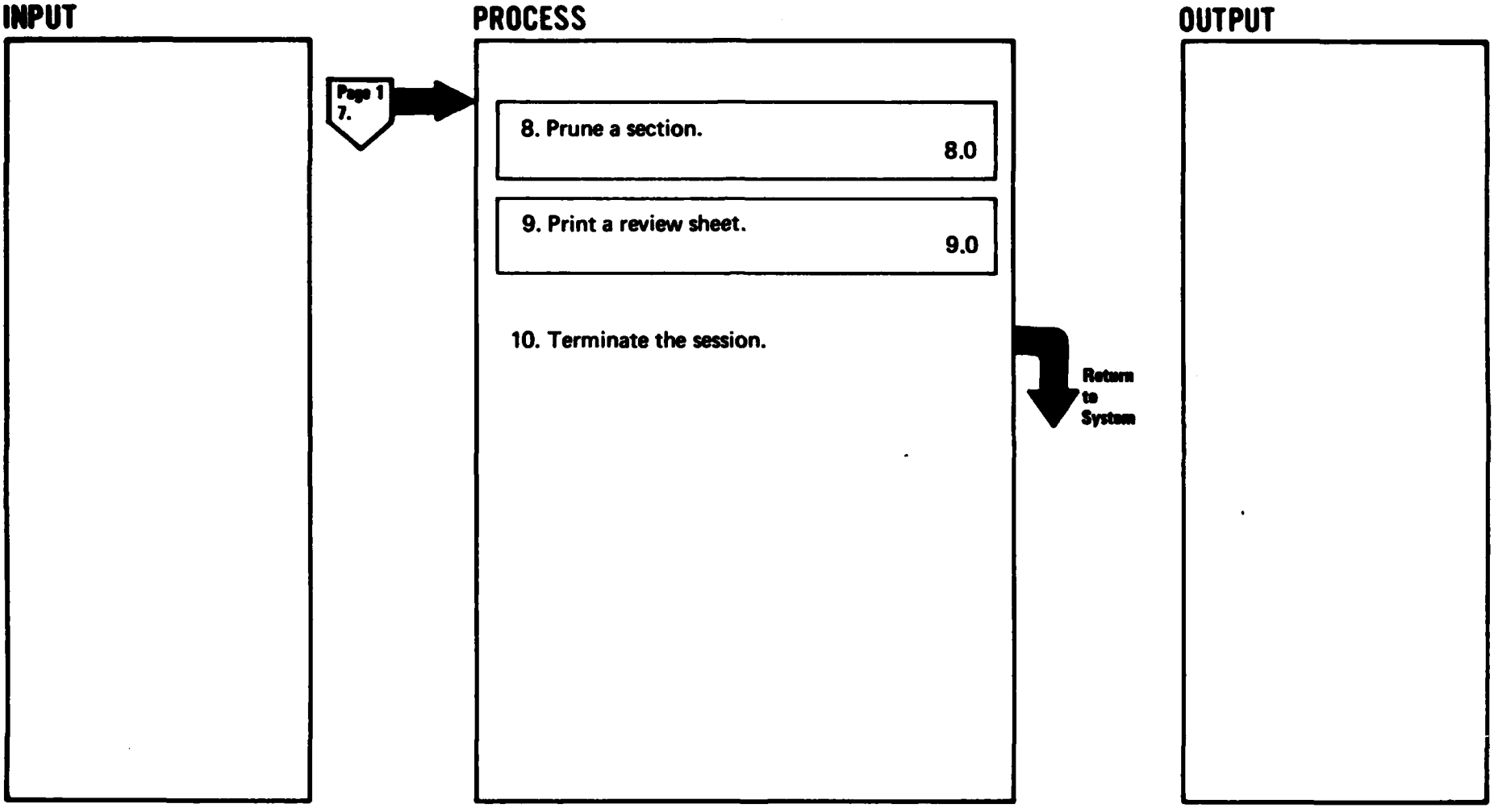
5. This step causes the completion of the model structure by setting up variables which interface with the RUN program. This step should always be performed before step 6.

6. The currently defined model structure may be stored via this step.

7. A branch or subtree may be defined and later added to a structure in procedure 4.

System/Program: STRUCTURE Name:

Diagram ID: 1.0 Description: Main Routine Page: 2 of 2



Extended Description

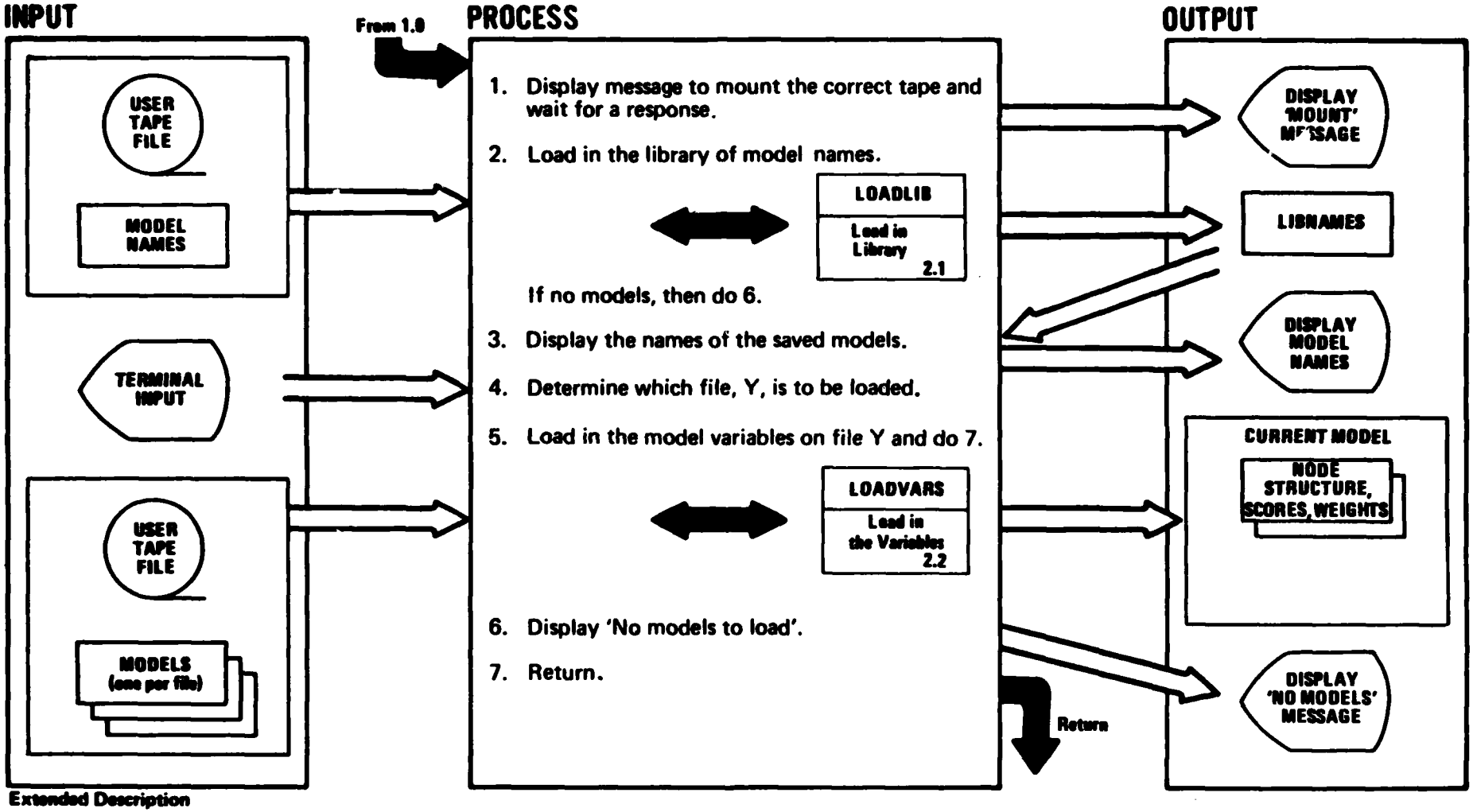
8. Groups of nodes may be deleted from the currently defined structure.

9. A printout of the structure as it is currently defined is obtained.

10. The program ends here: a restart option will cause step 1 to be executed again. When a session is terminated, all branch structures or subtrees defined are deleted.

System/Program: STRUCTURE Name:

Diagram ID: 2.0 Description Load A Model Page: ___ of ___



Extended Description

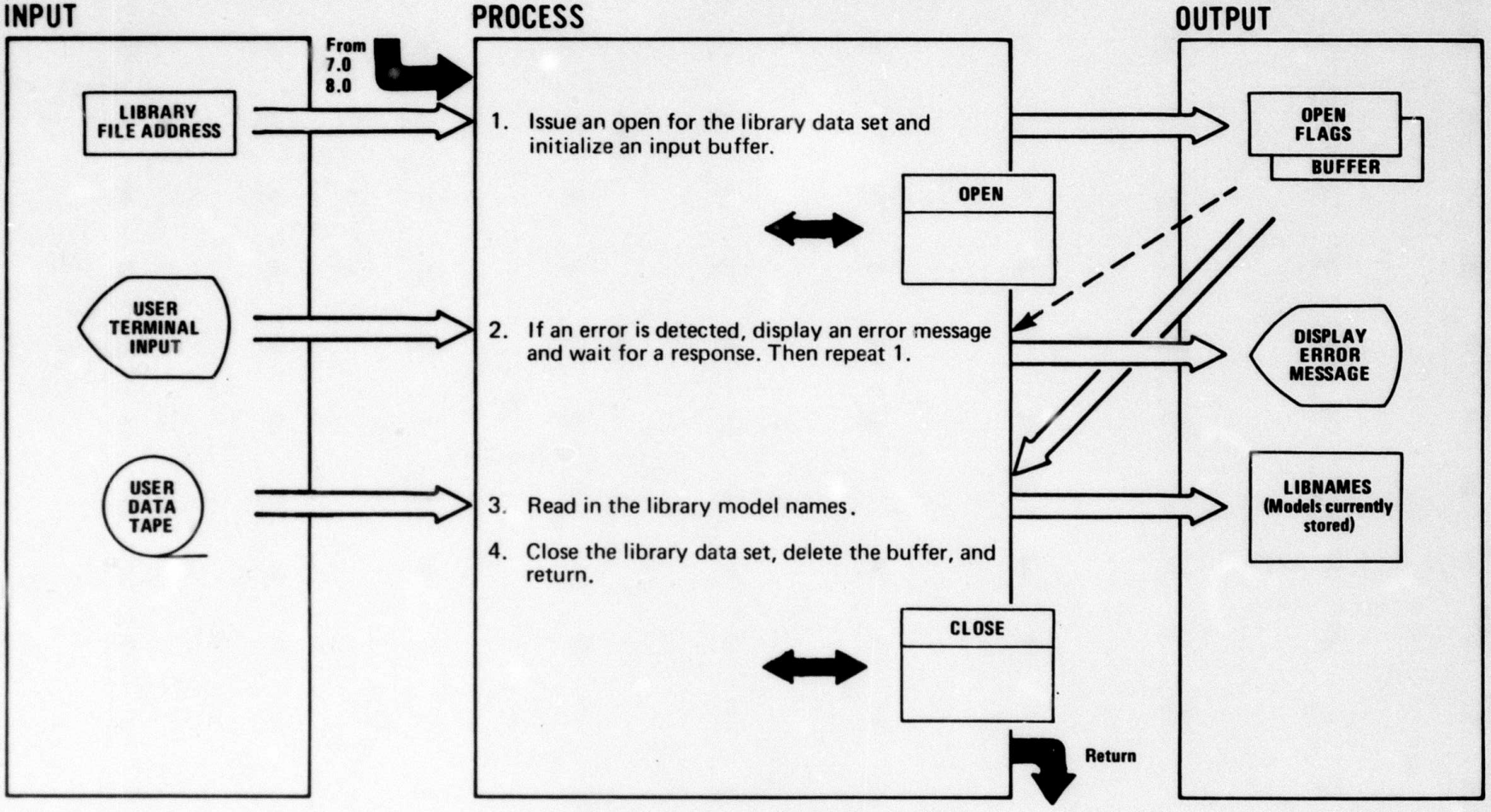
1. The user may have many tape files on which formatted models are stored. In this step, the user is prompted for a response indicating the desired tape is mounted and online.

3. The names of the models existing on the mounted tape are displayed in list or MENU format so that the user may select a model for loading.

4. The user is prompted for a model selection: the response may be the list item number or the model name. The requested model is stored in the same tape file as its position relative to the other model names in the displayed list.

System/Program: STRUCTURE Name: LOADLIB

Diagram ID: 2.1 Description: Load in the Library Page: ___ of ___



Extended Description

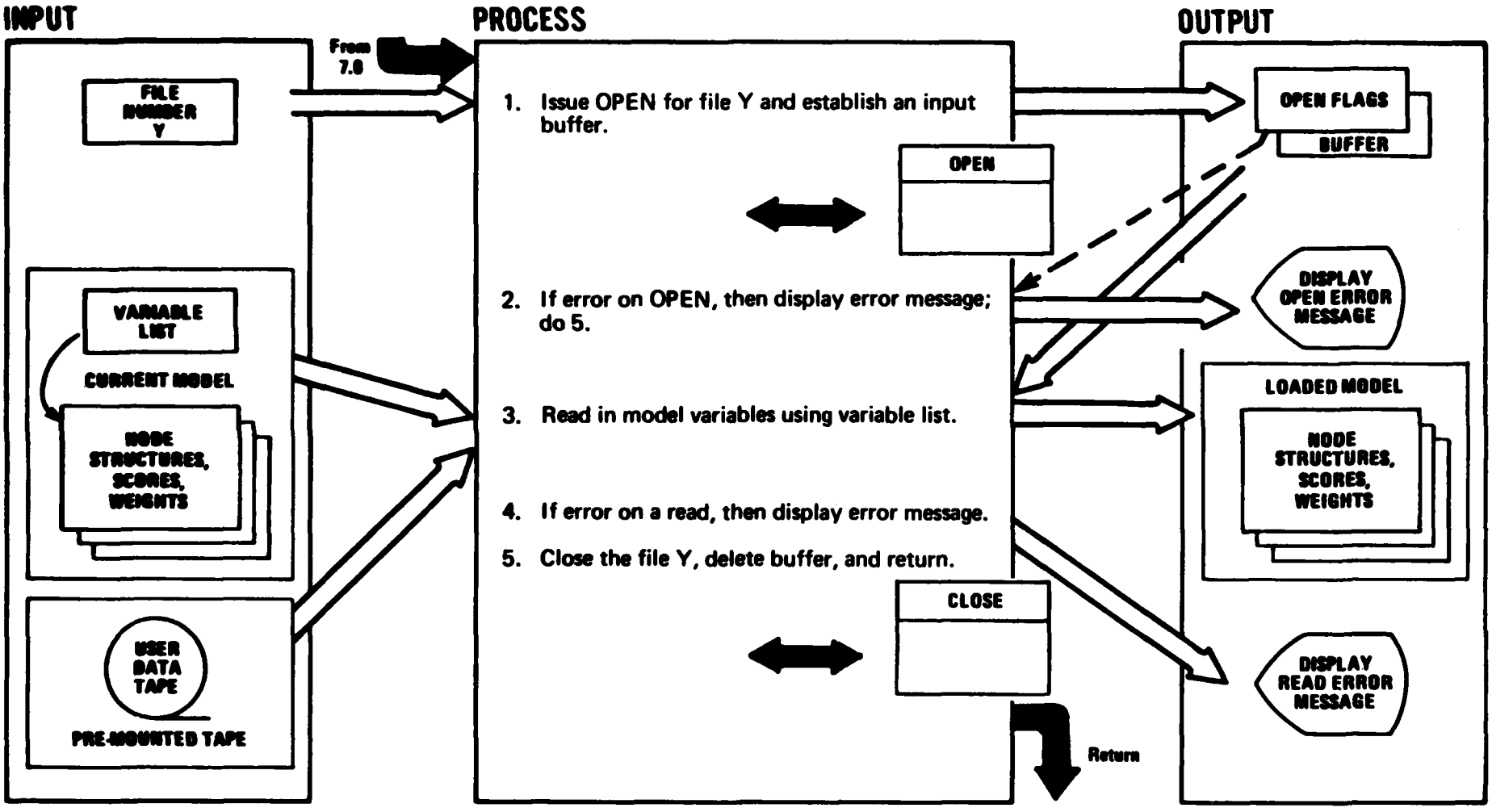
2. The library file of model names is available on each formatted data tape. The file is usually stored and retrieved as a character array and resides on the same device with model data and structure variables. A system OPEN command is needed to ensure that the data file is online and accessible for reading. An input buffer is needed and provides the link between stored information and program addressable information.

3. The library model names are retrieved from storage. The character array used for holding these model names, LIBNAMES, is of a form which facilitates display; thus, the names may all be of equal character length.

4. A system CLOSE command is issued to free the data file for later use.

System/Program: STRUCTURE Name: LOADVARS

Diagram ID: 2.2 Description: Read in the Variables Page: 1 of 3



Extended Description

3. A list of variable Names or identifiers is kept so that load and store routines will always process the variables in the same sequence order.

4. The Model variables retrieved from storage are used in all other program functions (see Diagram 1.0). The variables which must be loaded are the following:

- OUTLINE TABLE
- NODE LABLES
- SCORES
- WEIGHTS
- CUMULATIVE WEIGHTS
- NODE TYPES
- DATA LEVEL MASK
- AGGREGATE NODE INDICES
- SUCCESSOR TABLE
- SYSTEMS LABELS

1. The OUTLINE TABLE contains an element for each node in the model, sorted in increasing numerical sequence order. The value is an encoded representation of the node outline number supplied for a node when the model structure is created.

System/Program: STRUCTURE Name: LOADVARS

Diagram ID: 2.2 Description: Read in the Variables Page: 2 of 3

INPUT

PROCESS

OUTPUT

Extended Description

2. The NODE LABELS contain descriptions (one per node in the same order as the outline table) of nodes that are supplied when the model structure is created.

3. SCORES is a numeric array which contains a set of values for each node of the structure. Each set of values consists of one number per system defined in the model.

4. WEIGHTS is a numeric vector containing the relative-importance values assigned to each node in the model structure. The elements must appear in the same order as the associated outline numbers. When a model structure is created, the vector is null or contains zeros.

5. For each element in the node outline table, there is an associated element in the CUMULATIVE WEIGHTS vector. The vector will contain the percentage of importance with respect to the entire model when all WEIGHTS have been entered.

6. The NODE TYPES are indicators of the type of calculation that is to be used in assessing SCORES and WEIGHTS.

7. The DATA LEVEL MASK indicates which nodes are at the data level (bottom level) versus the nodes that are aggregate or non-bottom-level nodes.

8. The AGGREGATE NODE INDICES contain the sequence number of elements in the model variables which correspond to only the aggregate nodes. An Aggregate node is a node which has one or more subsequent nodes contributing to it.

System/Program: STRUCTURE Name: LOADVARS

Diagram ID: 2.2 Description Read in the Variables Page: 3 of 3

INPUT	PROCESS	OUTPUT

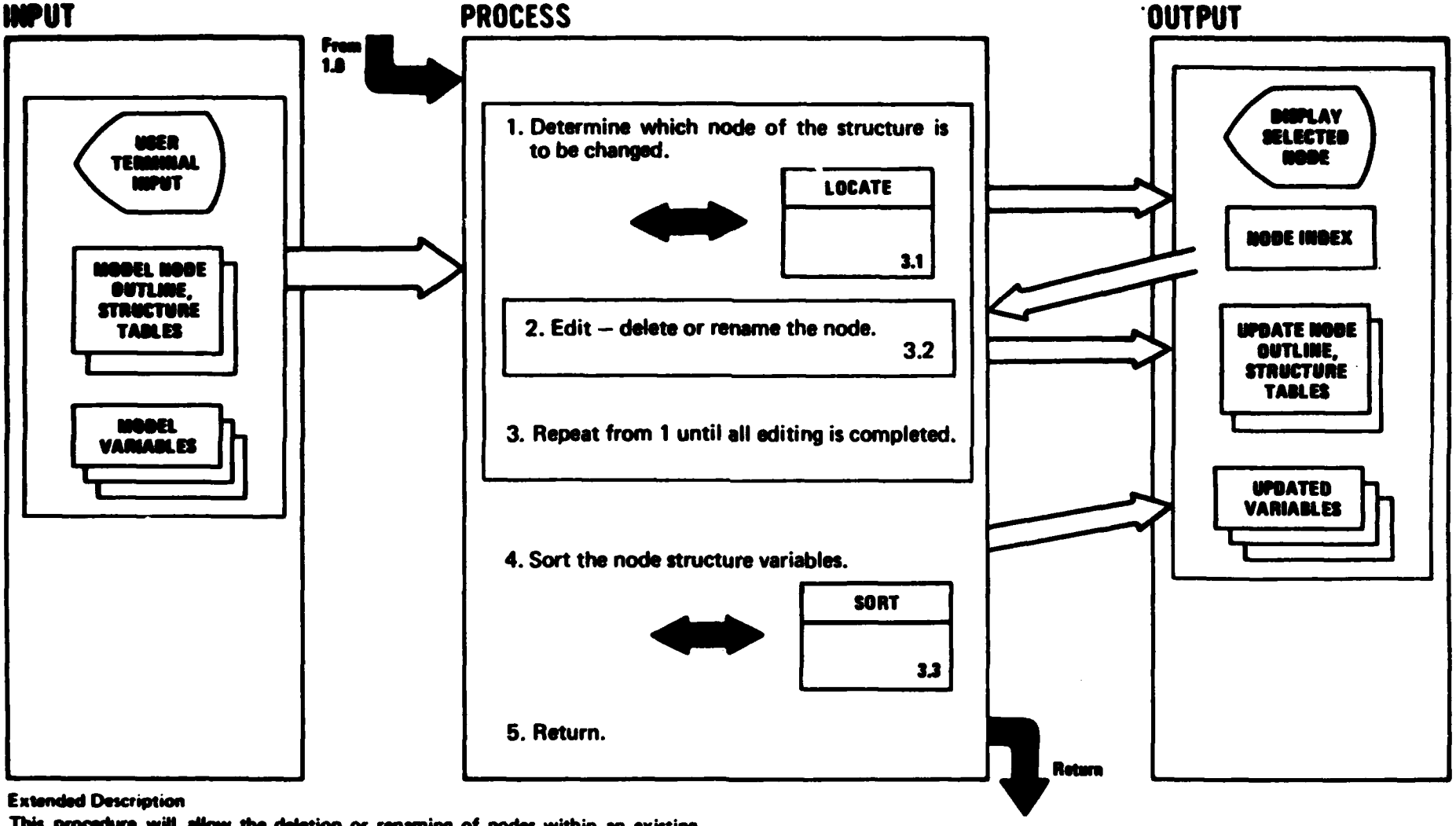
Extended Description

9. The SUCCESSOR TABLE is an array which contains, for each aggregate node, the set of indices of nodes which contribute to a node.

10. The SYSTEMS LABELS contain the user-specified character descriptions of the systems being evaluated.

System Program: STRUCTURE Name:

Diagram ID: 3.0 Description: Edit the Structure Page: ___ of ___



Extended Description

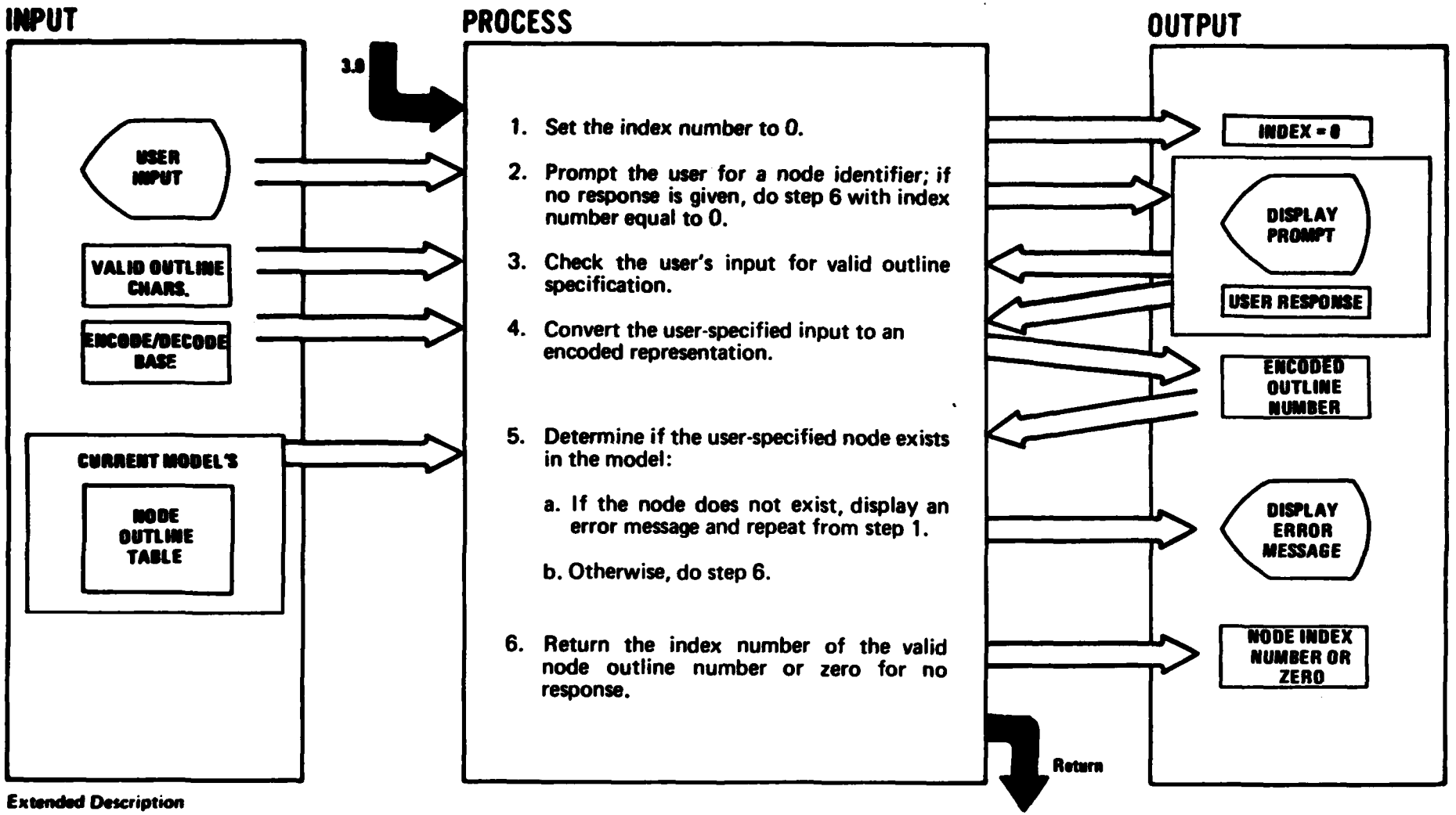
This procedure will allow the deletion or renaming of nodes within an existing structure and operates on a single node at a time. If a group or subtree of nodes is to be deleted, the user should select the "Prune a section" procedure described in diagram 8.0.

1. The user is prompted for a node identifier. This identifier corresponds to the manner in which the node was named when it was placed in the structure. The outline number is a shortened form of the node's identification. An associated index number is determined which is relative to the node outline and structure tables.

4. The node structure variables are reorganized so that associated nodes are always grouped together after the structure has been edited.

System/Program: STRUCTURE Name: LOCATE

Diagram ID: 3.1 Description: Determine the Node Location Page: ___ of ___

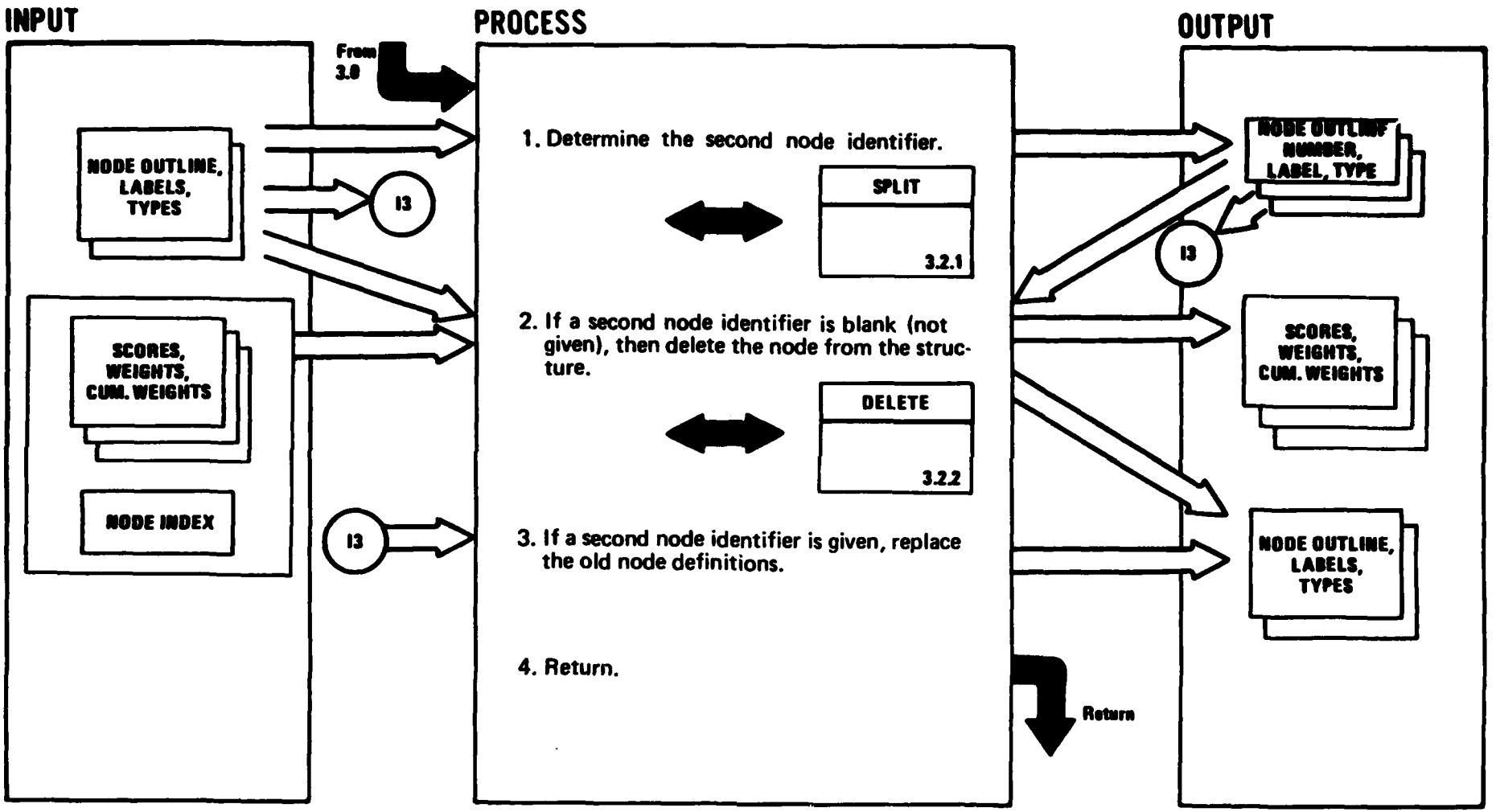


Extended Description

5. The existing outline table is searched for a matching encoded outline number. It is the index into this table of the matching outline number which is returned to the calling routine in step 6.

System Program: STRUCTURE Name:

Diagram ID: 3.2 Description EDIT - Delete or Rename Page: ___ of ___



Extended Description

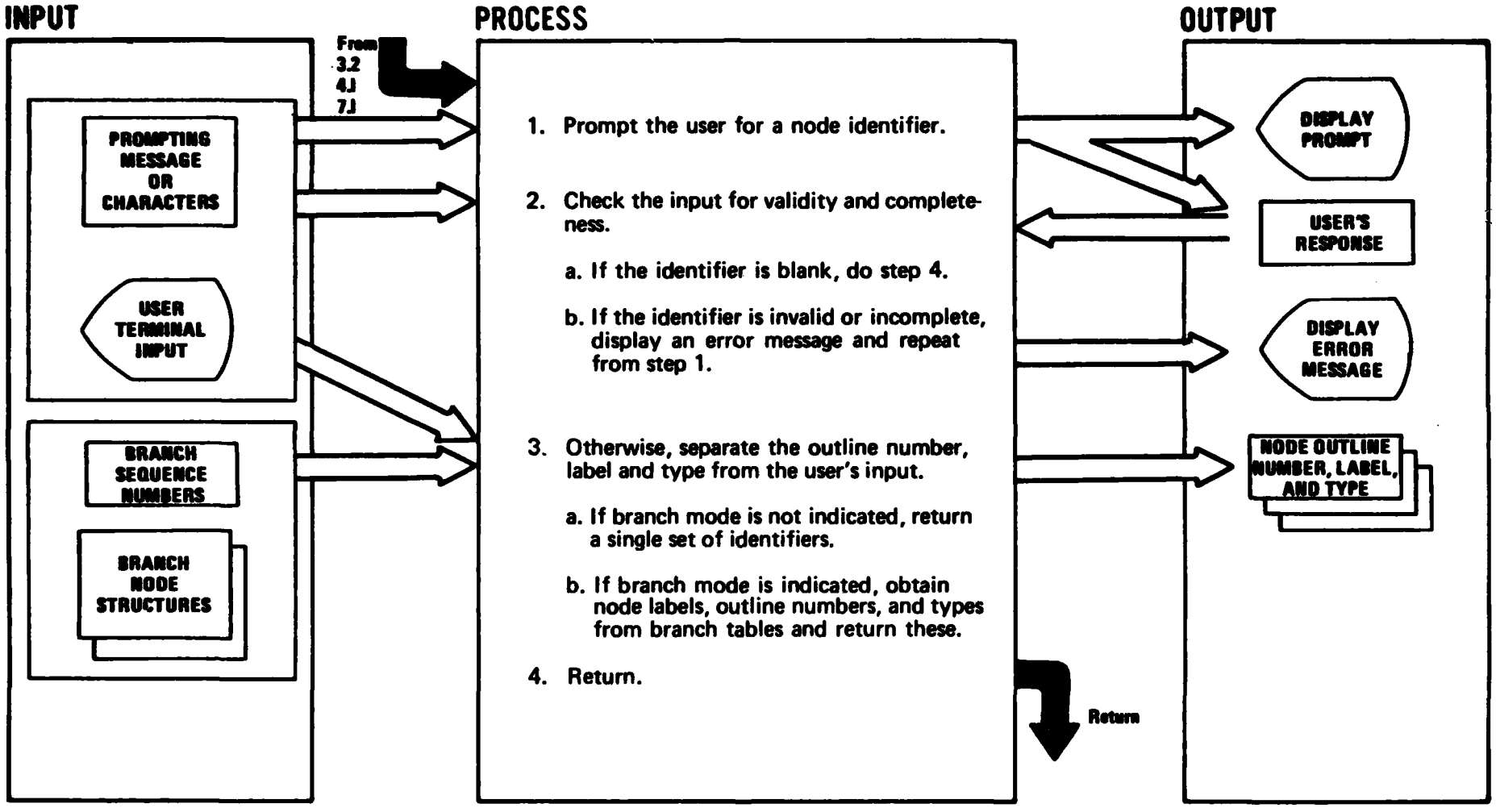
1. The user is prompted for all node identification information – the node outline number, the node label or name and its type. (See diagram 2.2 for a description of these items.)

2. A null entry or blank response from the user indicates that the node is to be deleted from the current structure.

3. Replace the outline number, the node label and type in the appropriate arrays with the new ones.

System Program: STRUCTURE Name: SPLIT

Diagram ID: 3.2.1 Description: Investigate and Split Node Identifiers Page: ____ of ____



Extended Description

1. The user is required to input the identifying information for a particular node in either an existing structure or one that is currently being defined.

2. Proper node identification consists of an outline sequence number which has a hierarchical relationship to other nodes in the structure, a label or descriptive name, and a node "type" indicator. The three variables are usually entered with commas or some other punctuation separating each one from the other.

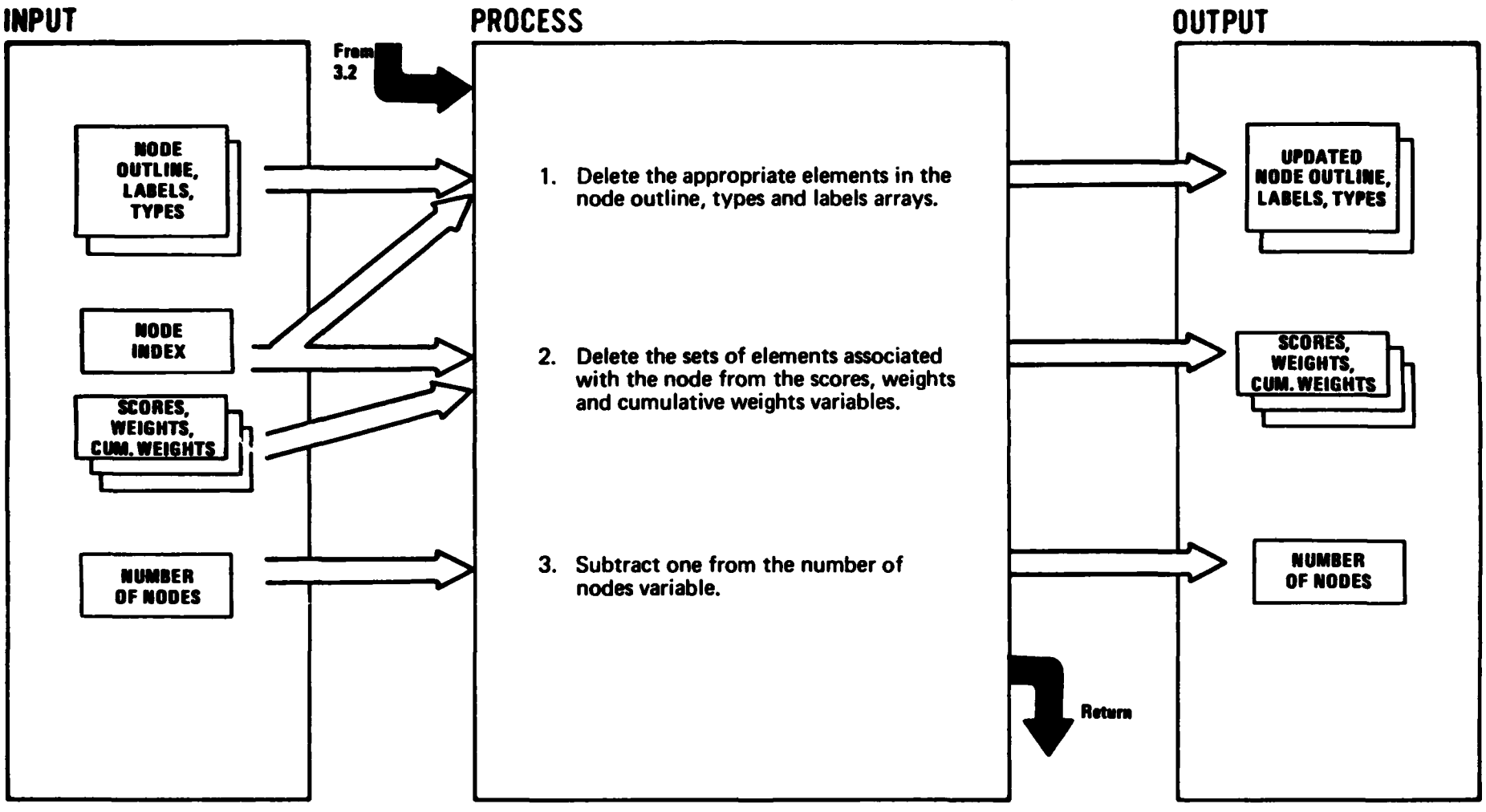
A special character, such as an asterisk (*) or pound sign (#), should be used to designate that a group or subtree is being specified. The special character would be the first in the input line of the user's response.

3. The outline number – numerically encoded to a sufficiently large number, the label, and type are returned as separate variables.

If a branch or subtree is being specified, the appropriate node labels, outline numbers and types are obtained from the branch structure tables. A group of encoded outline numbers, a group of labels and the group types are all returned to the calling routine. The new outline numbers have been encoded again to agree with the node after which the branch or subtree is being placed in hierarchical fashion.

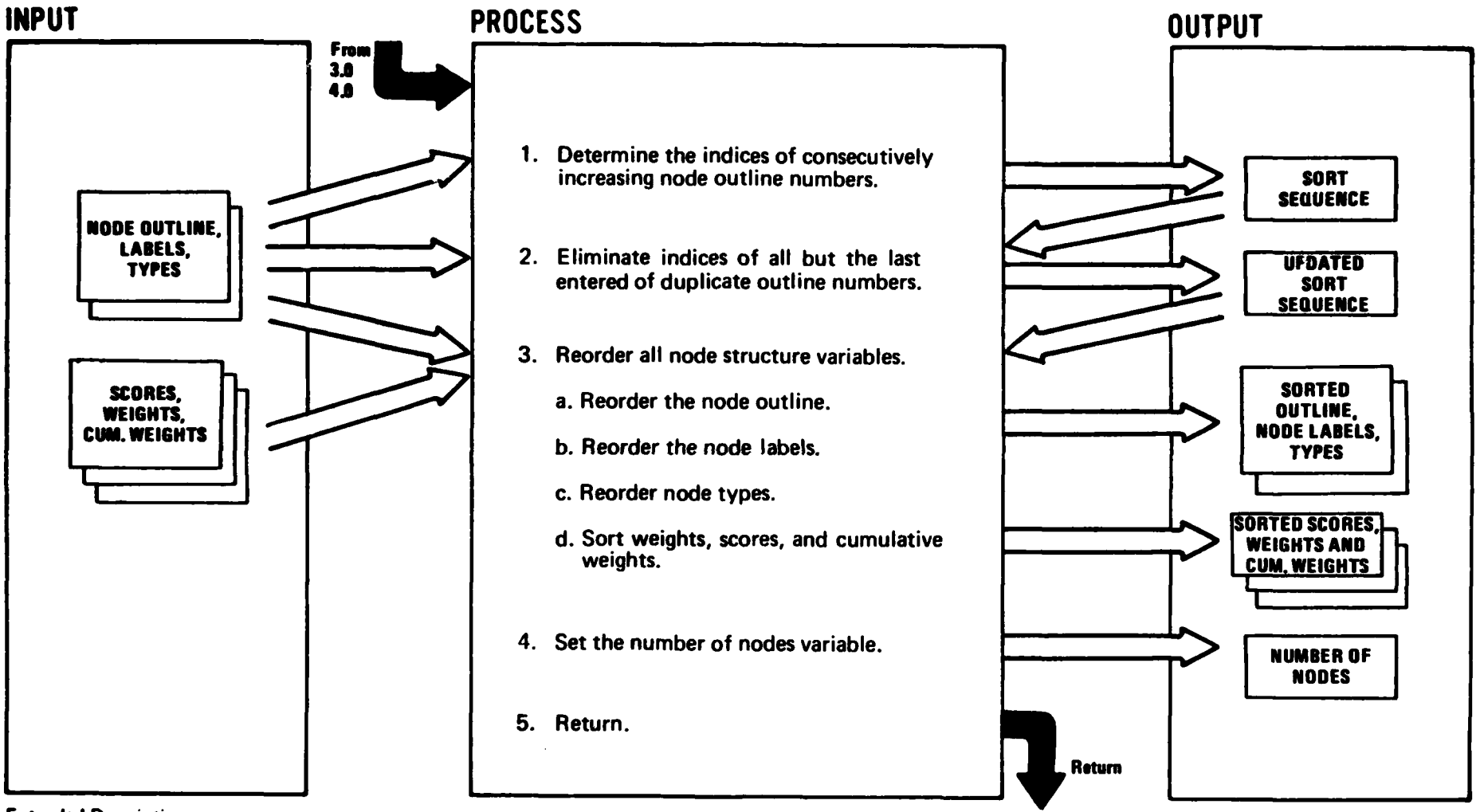
System/Program: STRUCTURE Name:

Diagram ID: 3.2.2 Description: Delete a Node Page: ___ of ___



System Program: STRUCTURE Name: SORT

Diagram ID: 3.3 Description: SORT the Node Structure Variables Page: ___ of ___

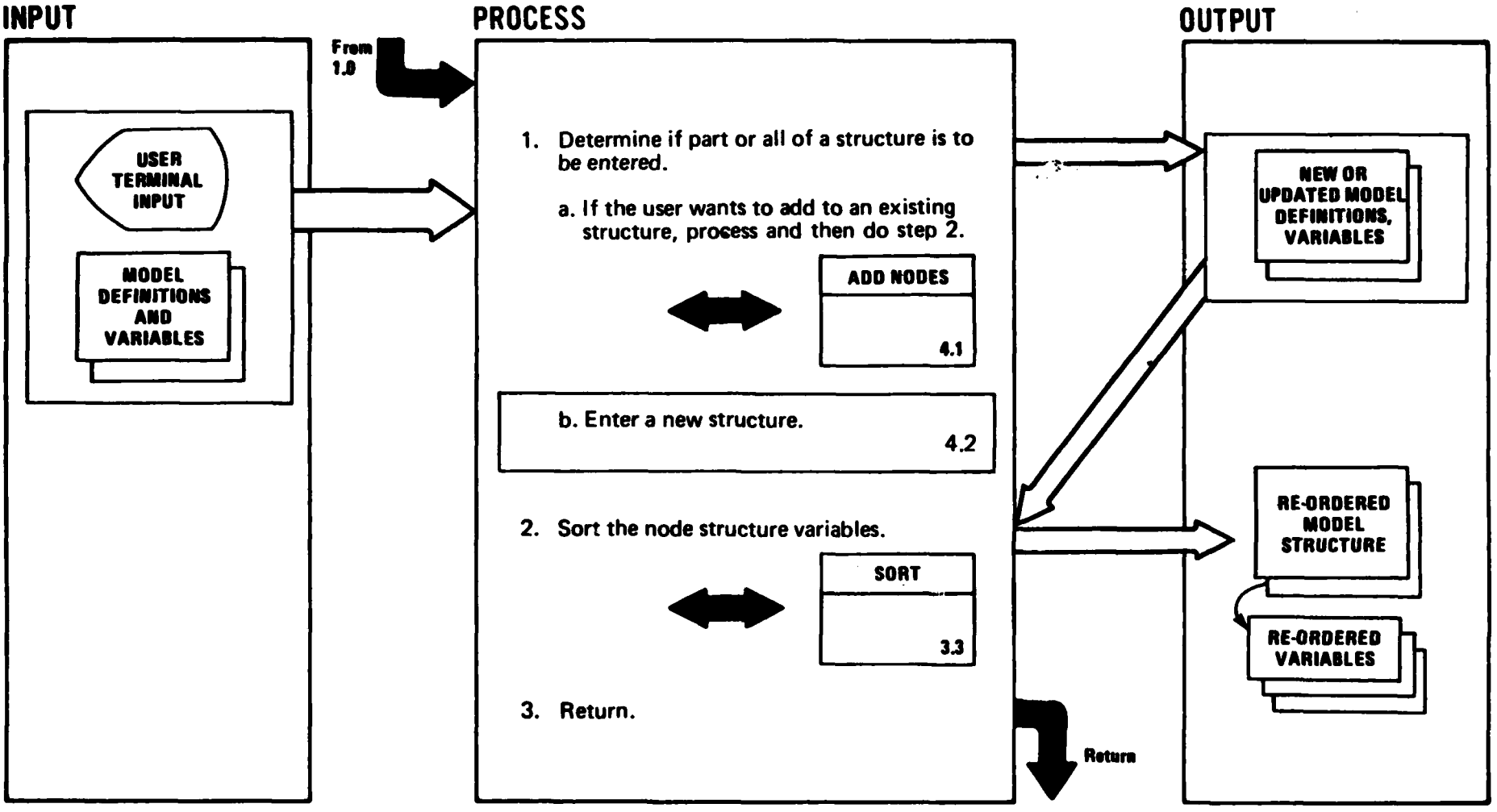


Extended Description

1. The relative indices or locations in the numerically encoded set of outline numbers in increasing value are determined. These indices constitute the sort sequence and will be used to rearrange the structure variables.

System/Program: STRUCTURE Name:

Diagram ID: 4.0 Description: Create or Add to a Structure Page: ___ of ___



Extended Description

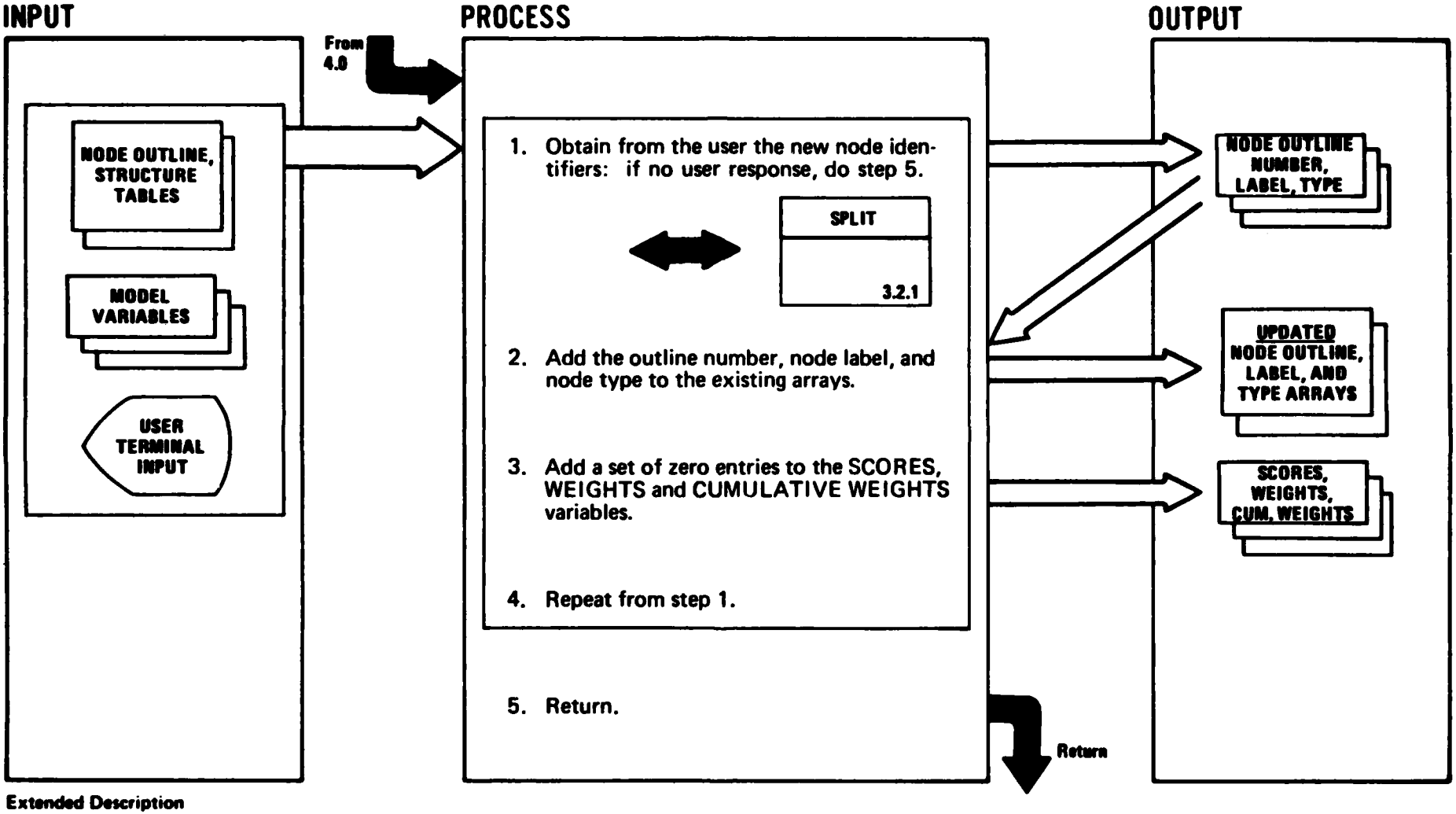
1. Request a "yes" or "no" response directly from the user to determine whether a new structure is to be entered or nodes are to be added to an existing structure.

b. If a new structure is entered, all currently defined variables of the old structure are deleted.

2. An explanation of the sorting function is given in diagram 3.3 of the STRUCTURE System Specifications.

System/Program: STRUCTURE Name: ADDNODES

Diagram ID: 4.1 Description: Add Nodes to a Structure Page: ___ of ___

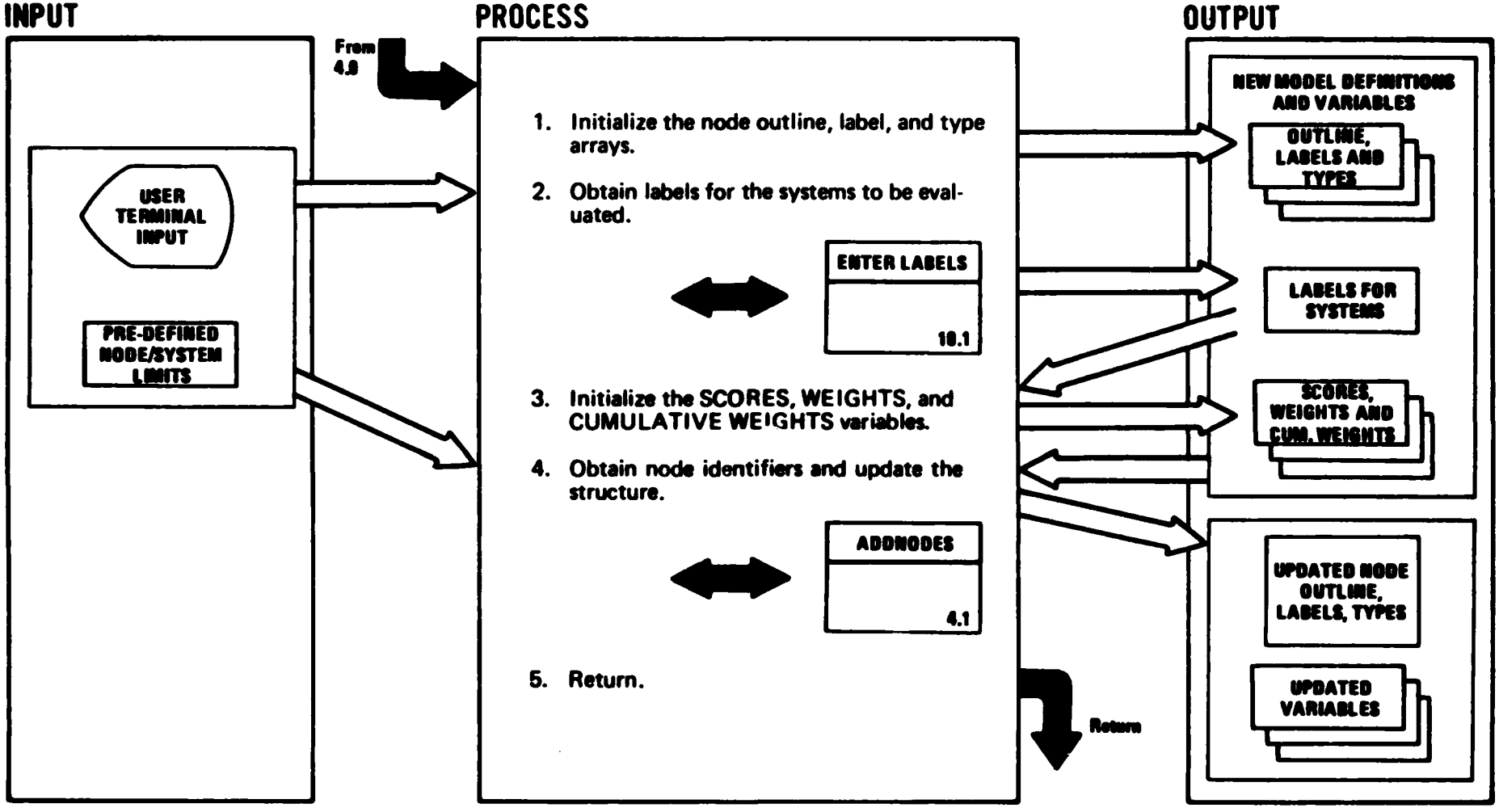


Extended Description

2 - 3. Additions to previously initialized or existing variables are accomplished by extending the arrays such that the corresponding orders of associated labels, scores, types, weights and decoded outline numbers are the same.

System/Program: STRUCTURE Name:

Diagram ID: 4.2 Description: Enter a New Structure Page: ___ of ___



Extended Description

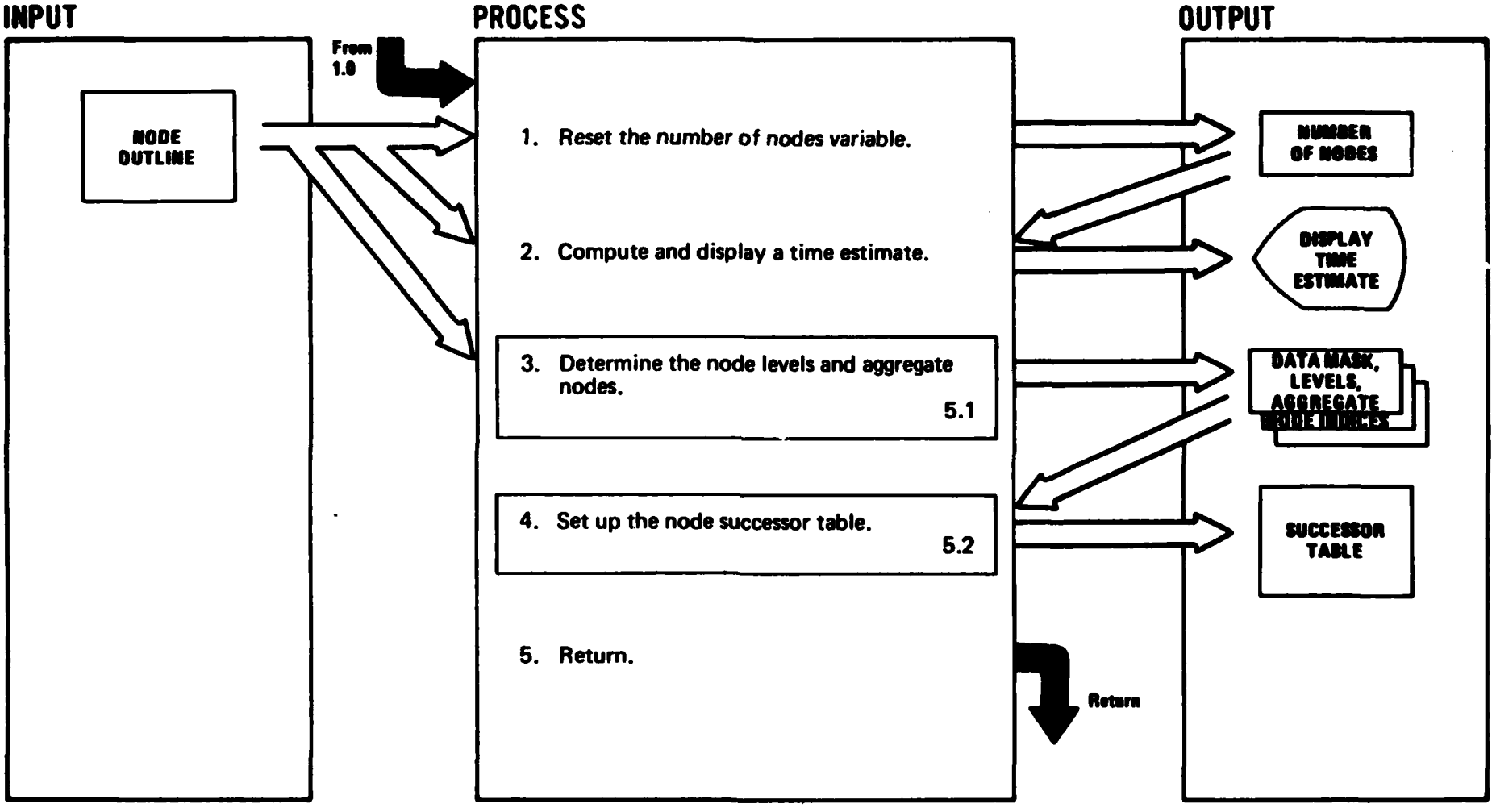
1. Initialization is caused by establishing null or blank vectors for the specified variables.

2. Labels for the systems to be evaluated are obtained from later storage and for the determination of the length of any set of SCORES.

4. The user is prompted for input which will be used to define a hierarchical tree structure described by outline numbers, labels and types of nodes within the structure.

System Program: STRUCTURE Name:

Diagram ID: 5.0 Description: Develop the Structure Page: ___ of ___



Extended Description

1. The number of nodes is equal to the number of entries in the outline array.

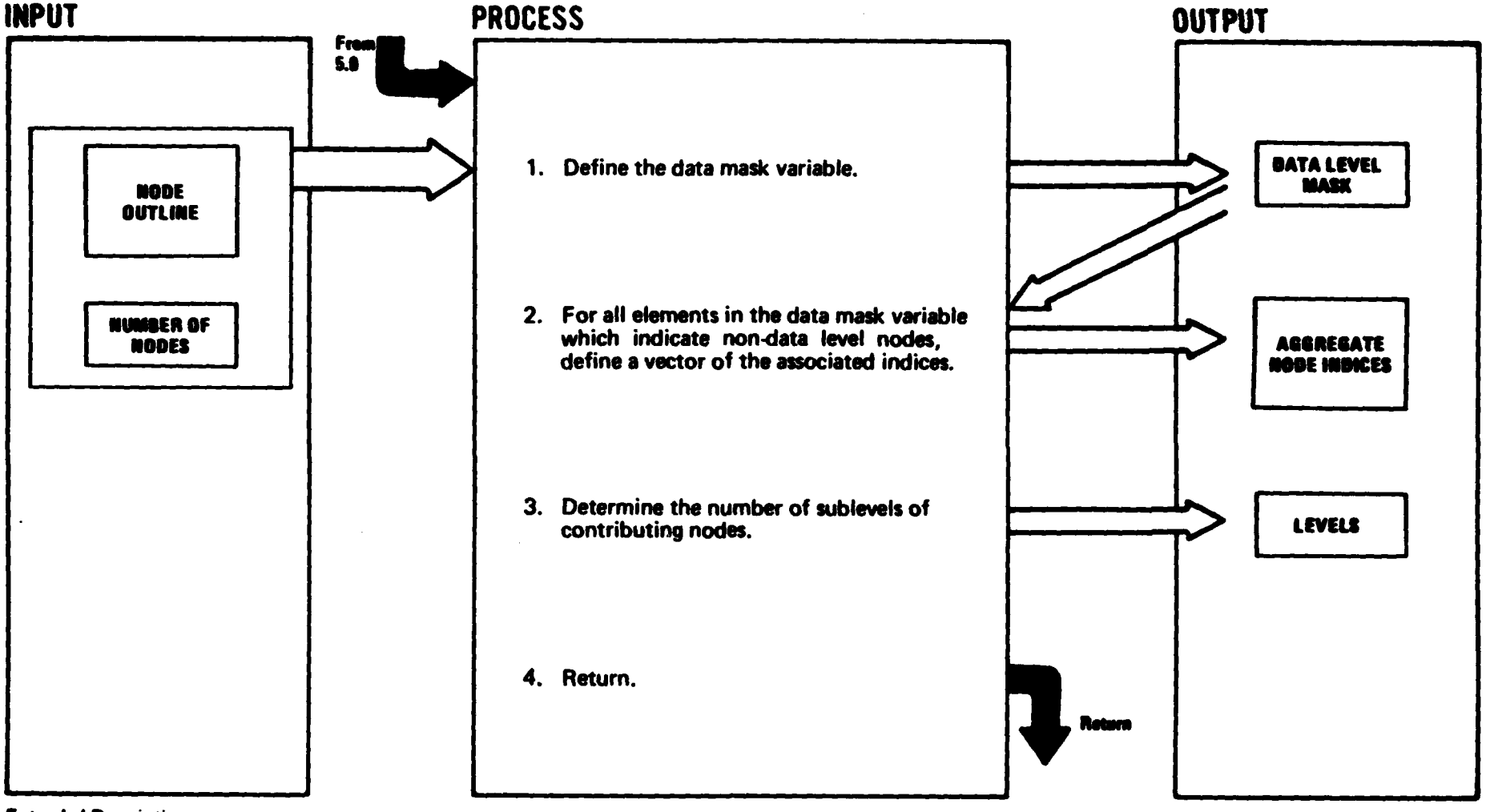
2. A rough estimate of the amount of time required to perform the developing operation may be displayed. The estimate is derived from the number of nodes in the model.

3. The data level mask indicates which nodes in the model are at the data level and which nodes are aggregate nodes. The aggregate node indices are indices into the node outline of nodes which are not at the data level. The LEVELS variable shows how far away a particular node is from the lowest level.

4. The successor table provides a set of contributing node indices for each aggregate node in the same order as aggregate node appearance in the outline.

System Program: STRUCTURE Name:

Diagram ID: 5.1 Description: Determine the Node Levels Page: ___ of ___



Extended Description

1. For each node in the model outline, an element is placed in a vector to indicate that node is a data level node or that it is an aggregate node having other contributing nodes.

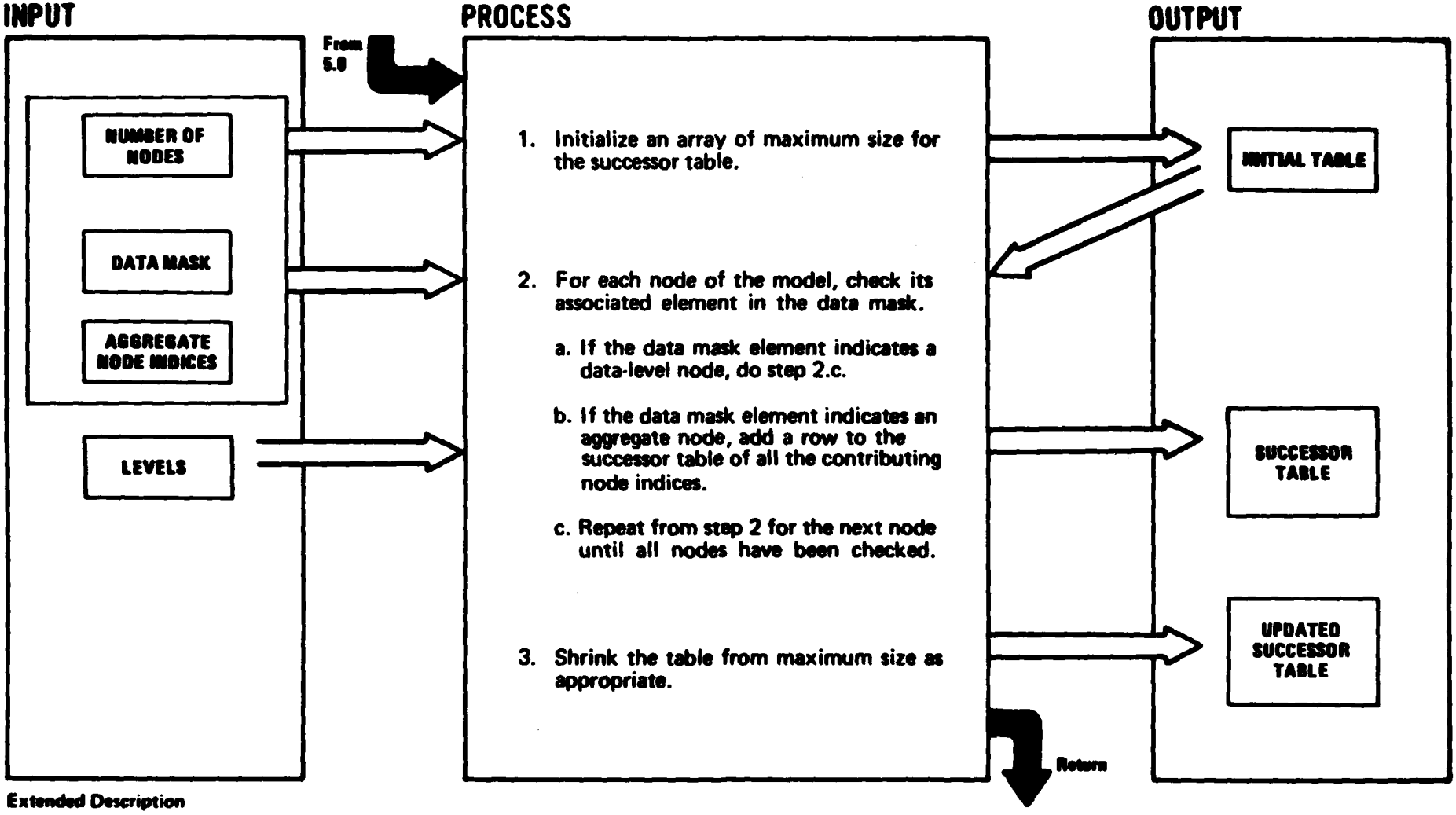
The indicator may be 0 for data level and 1 for the aggregate level or vice versa.

2. The data level mask indicator setting for each node in the outline is used to determine the aggregate node indices – indices into the node outline.

3. The farthest element or data level node from the topmost node is determined. The topmost node is assigned the number of levels between it and the data level farthest away (the depth of the path with the most sub-level tree branches). All other nodes are assigned a value equal to the top-level's minus its distance (number of levels) from the top.

System/Program: STRUCTURE Name:

Diagram ID: 5.2 Description: Set up the Node Successor Table Page: ___ of ___



Extended Description

1. The maximum size table is prescribed by the number of aggregate nodes and the predefined limit to the number of contributing nodes on any single level.

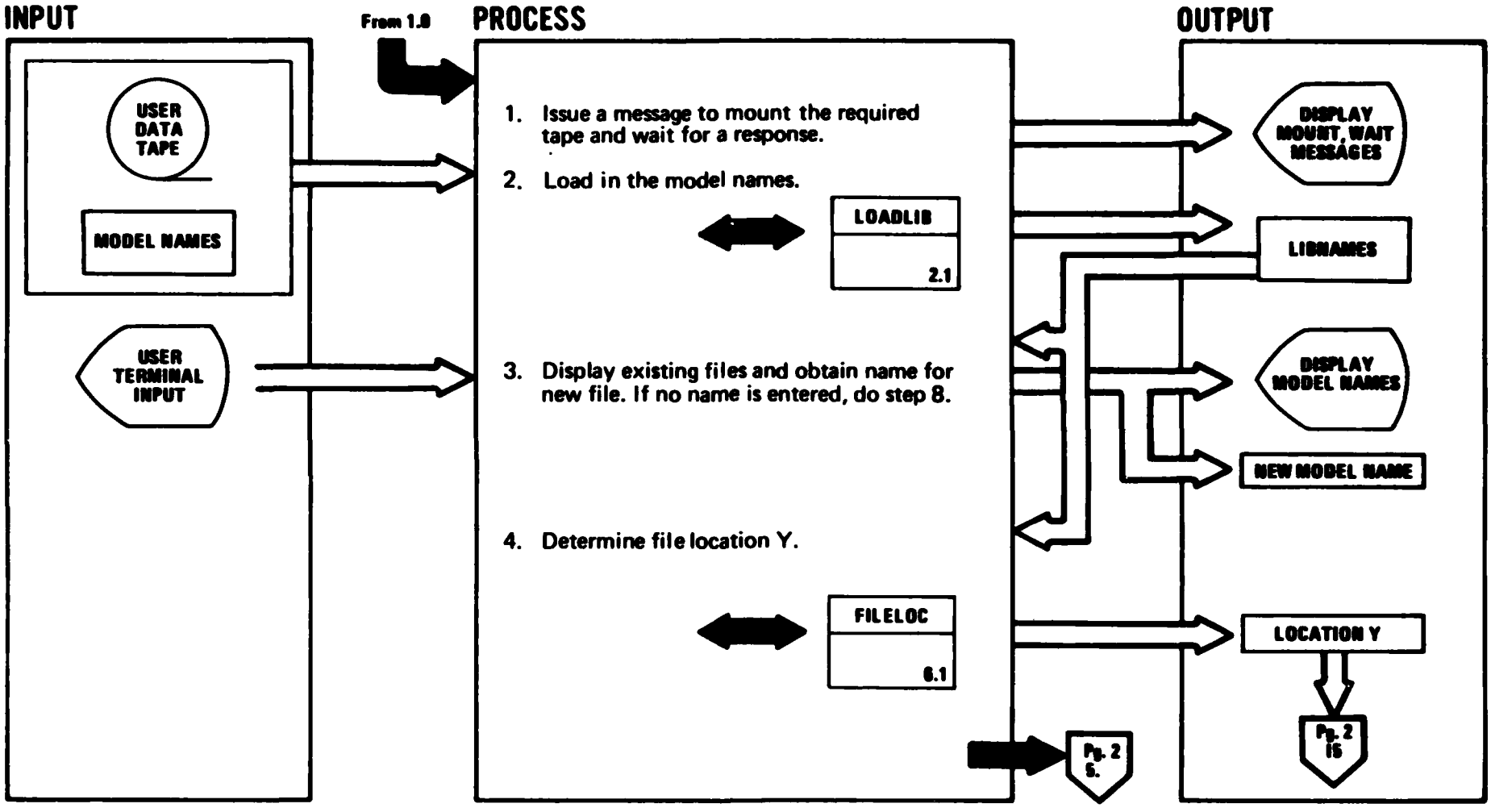
2. This procedure steps through the data mask variable in sequential order: the contributing nodes of the topmost aggregate node will be added to the successor table first.

2.b. If the nodes' associated data mask element indicates an aggregate node, then the contributing nodes are all the nodes which follow in sequential order that have an associated LEVELS number that is less than the selected nodes LEVELS numbers, provided these nodes occur before any node with equal or higher LEVELS number.

3. Since the number of elements in any set of contributing nodes may be less than the predefined limit, the number of columns (or characters) in the table may be diminished.

System/Program: STRUCTURE Name:

Diagram ID: 6.0 Description: Save the Current Model Page: 1 of 2



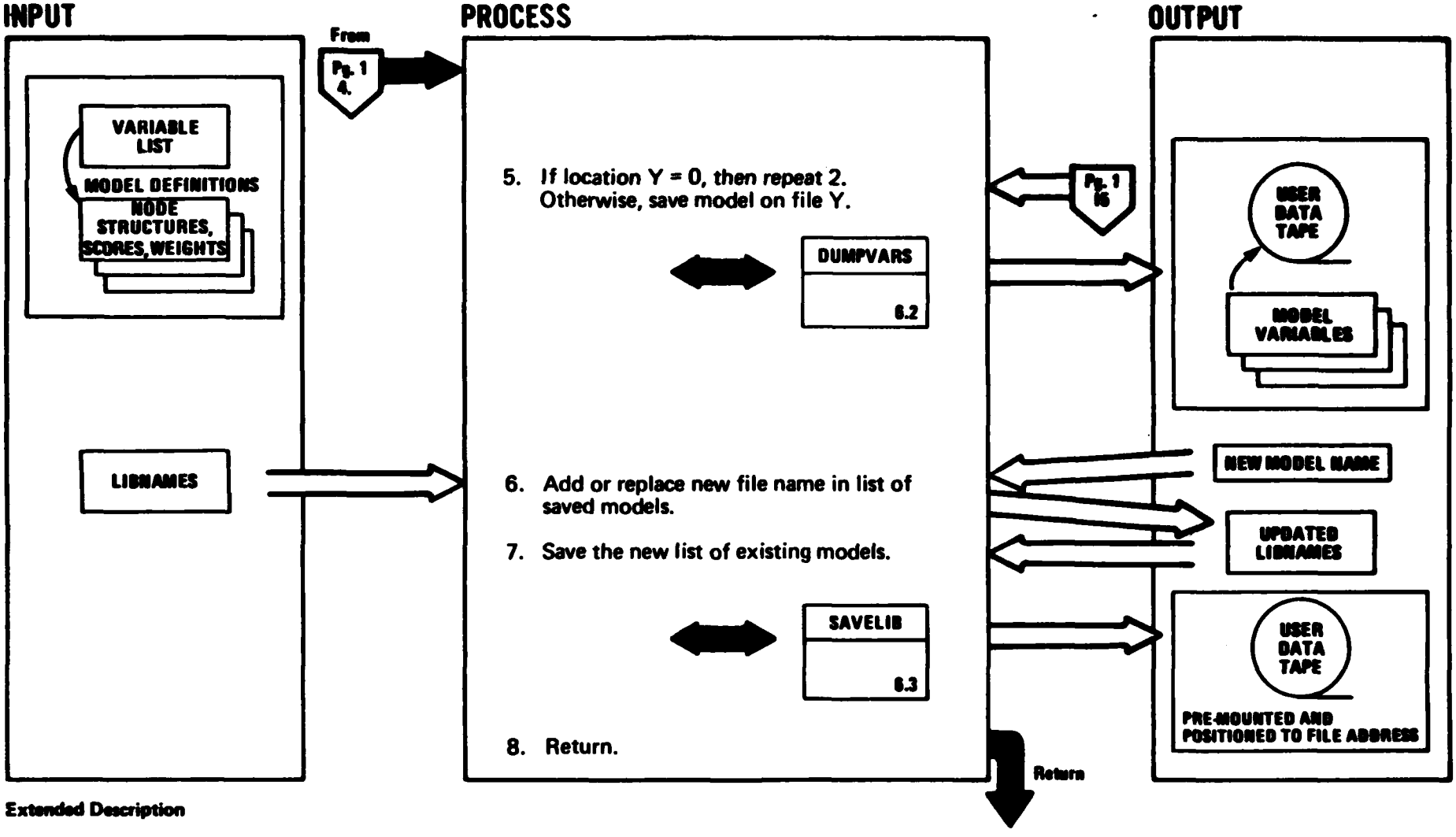
Extended Description

1. The computer program prompts for an indication that the desired storage file/device has been selected and placed online. Any response from the keyboard causes processing to resume.

4. The existing file structure and the amount of available space on the data tape are checked along with the user specification to determine where the model variables are to be stored.

System/Program: STRUCTURE Name:

Diagram ID: 6.0 Description: Save the Current Model Page: 2 of 2

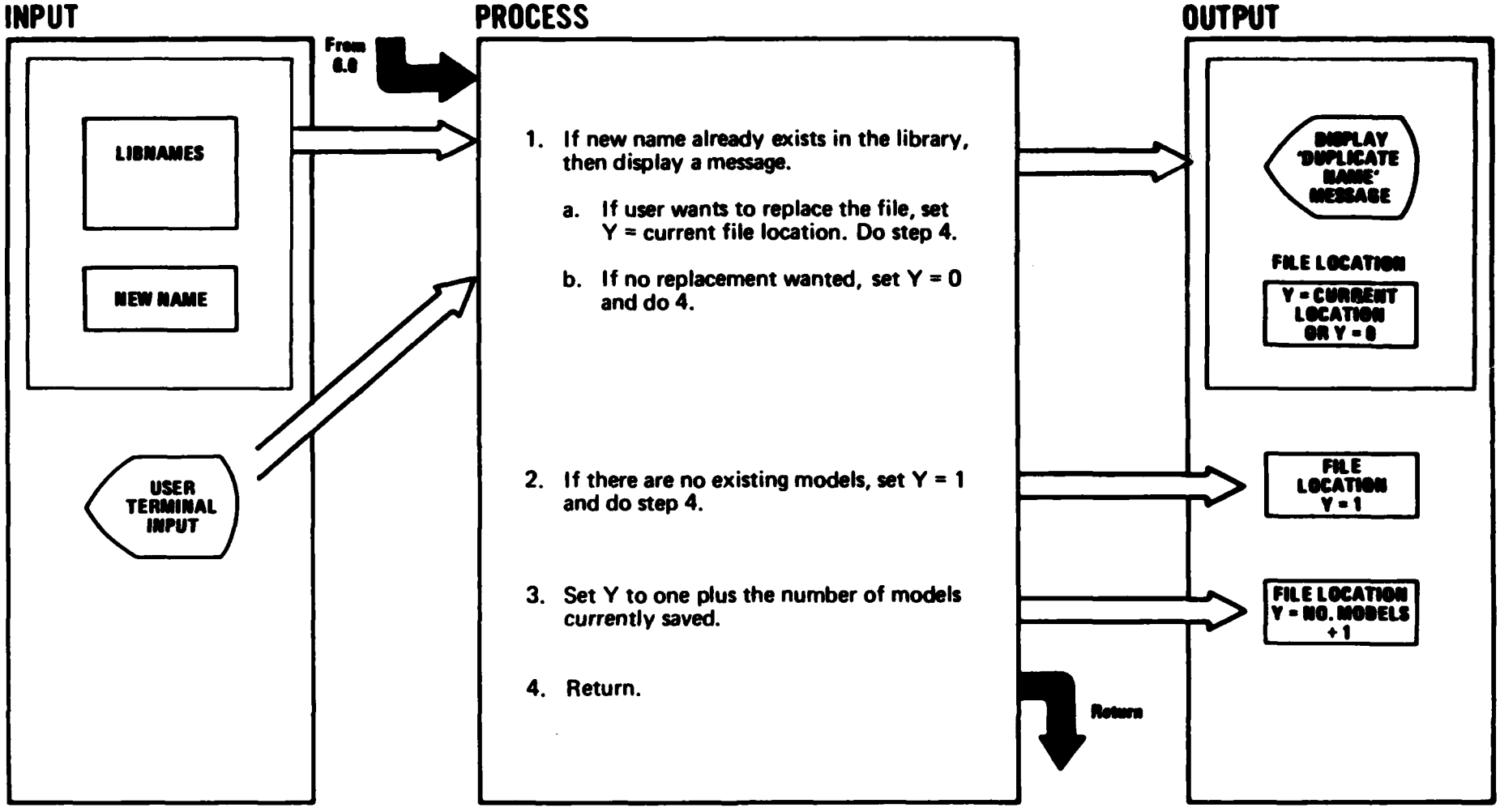


Extended Description

6. The library name list is updated to include the new file. The new model name's position in the LIBNAMES array must be the same relative position to other models stored on the device.

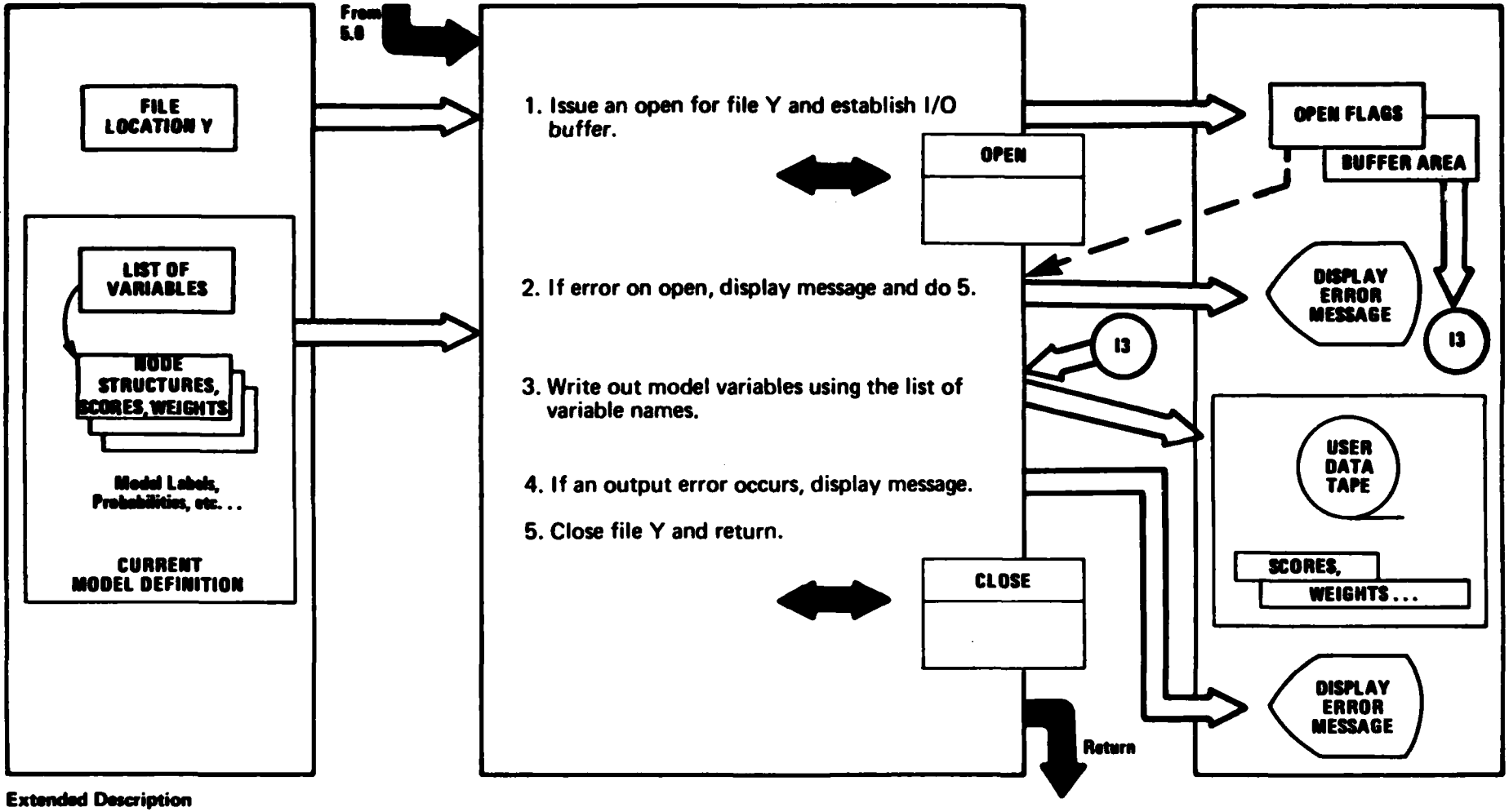
System/Program: STRUCTURE Name: FILELOC

Diagram ID: 6.1 Description: Find File Location Page: ___ of ___



System/Program: STRUCTURE Name: DUMPVARS

Diagram ID: 6.2 Description: Save the Model Variables Page: ____ of ____



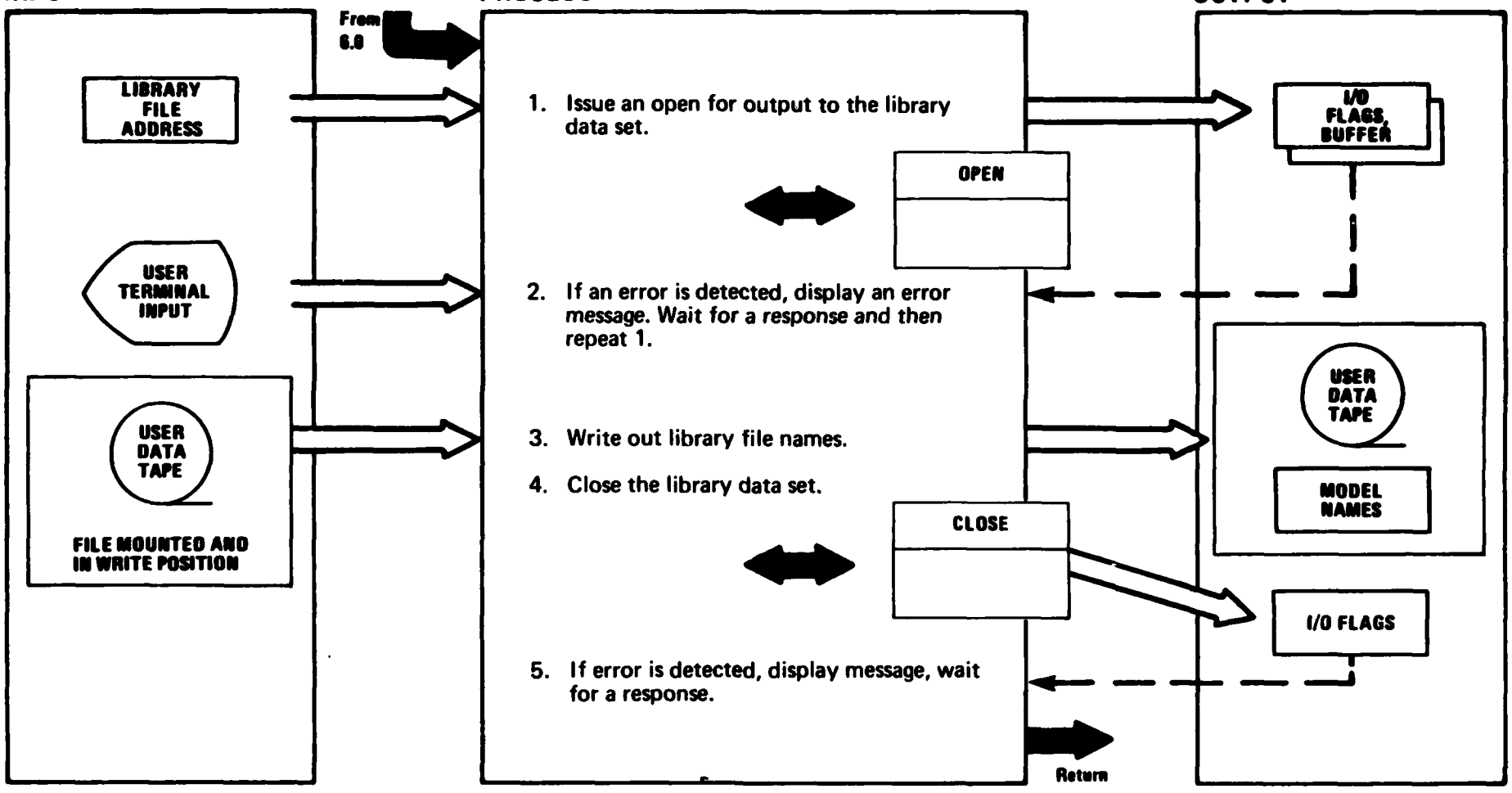
Extended Description

1. The file location Y is used to determine an exact storage position on the selected device.

3. The list of variable names is identical to the list of names used to Load a Model (see diagram 2.2)

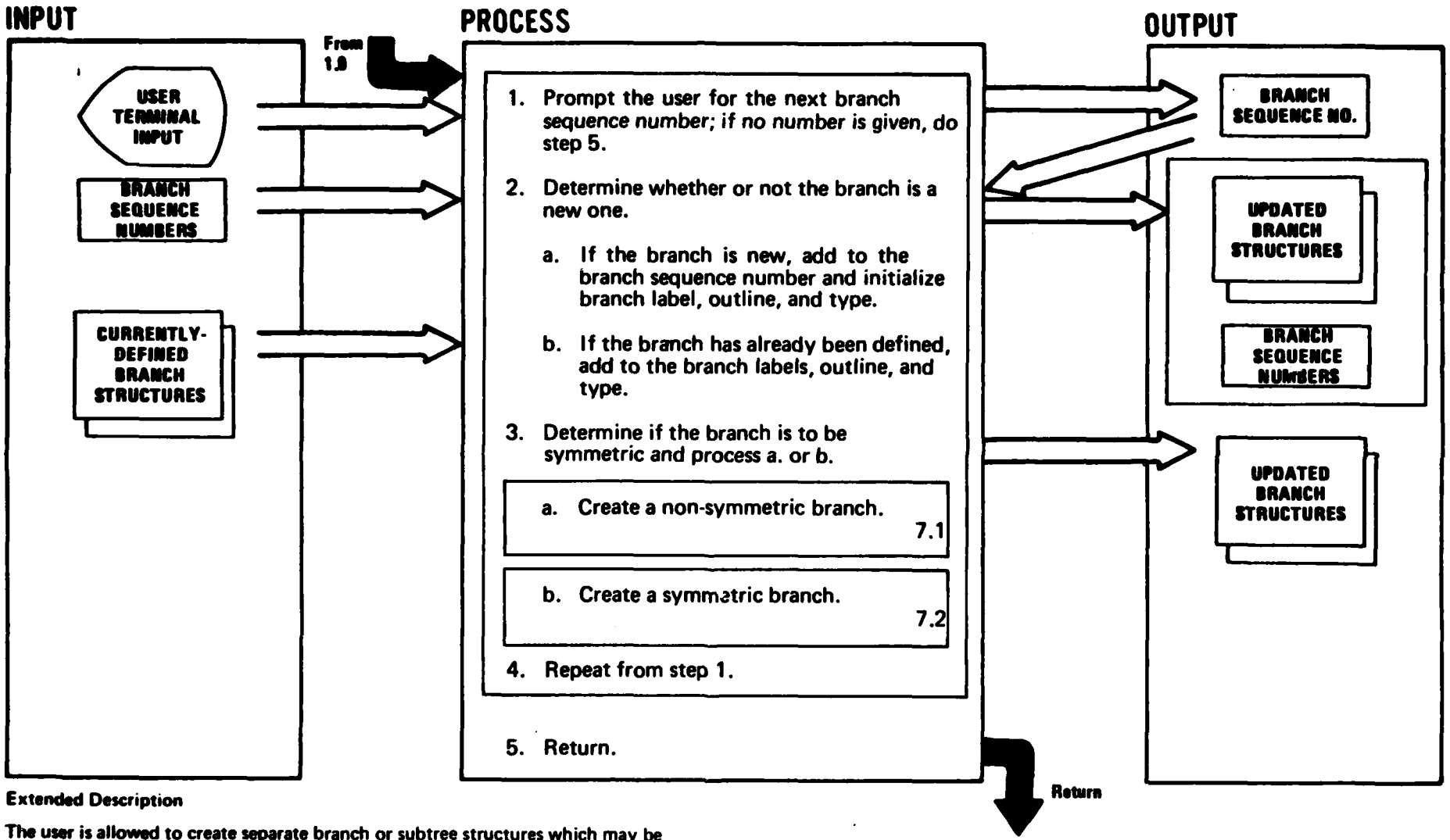
System/Program: STRUCTURE Name: SAVELIB

Diagram ID: 6.3 Description: Save the Library Page: ___ of ___



System/Program: STRUCTURE Name: _____

Diagram ID: 7.0 Description: Create a Branch to the Structure Page: ____ of ____

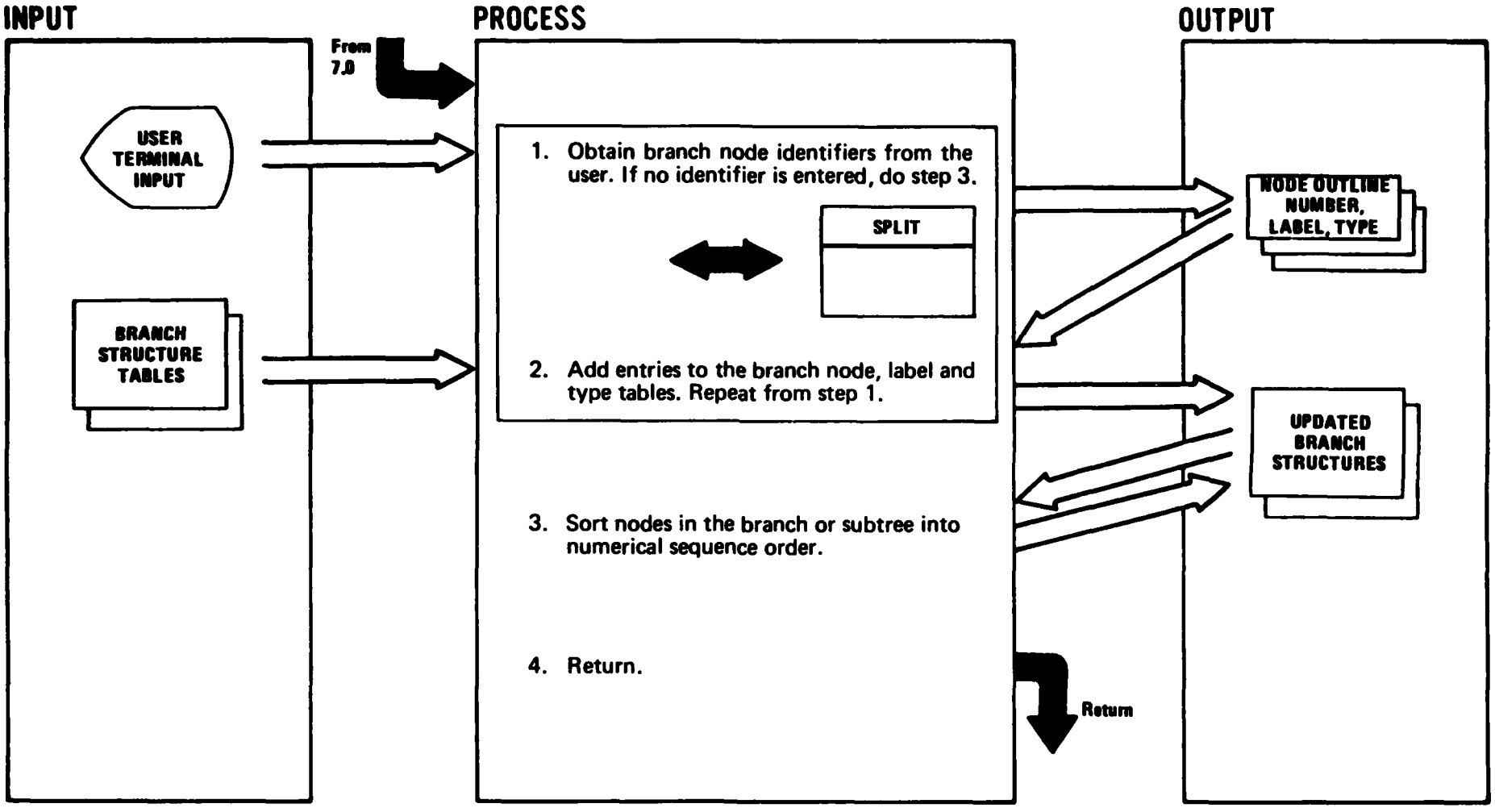


Extended Description

The user is allowed to create separate branch or subtree structures which may be added to the model structure under the "create a structure" process option.

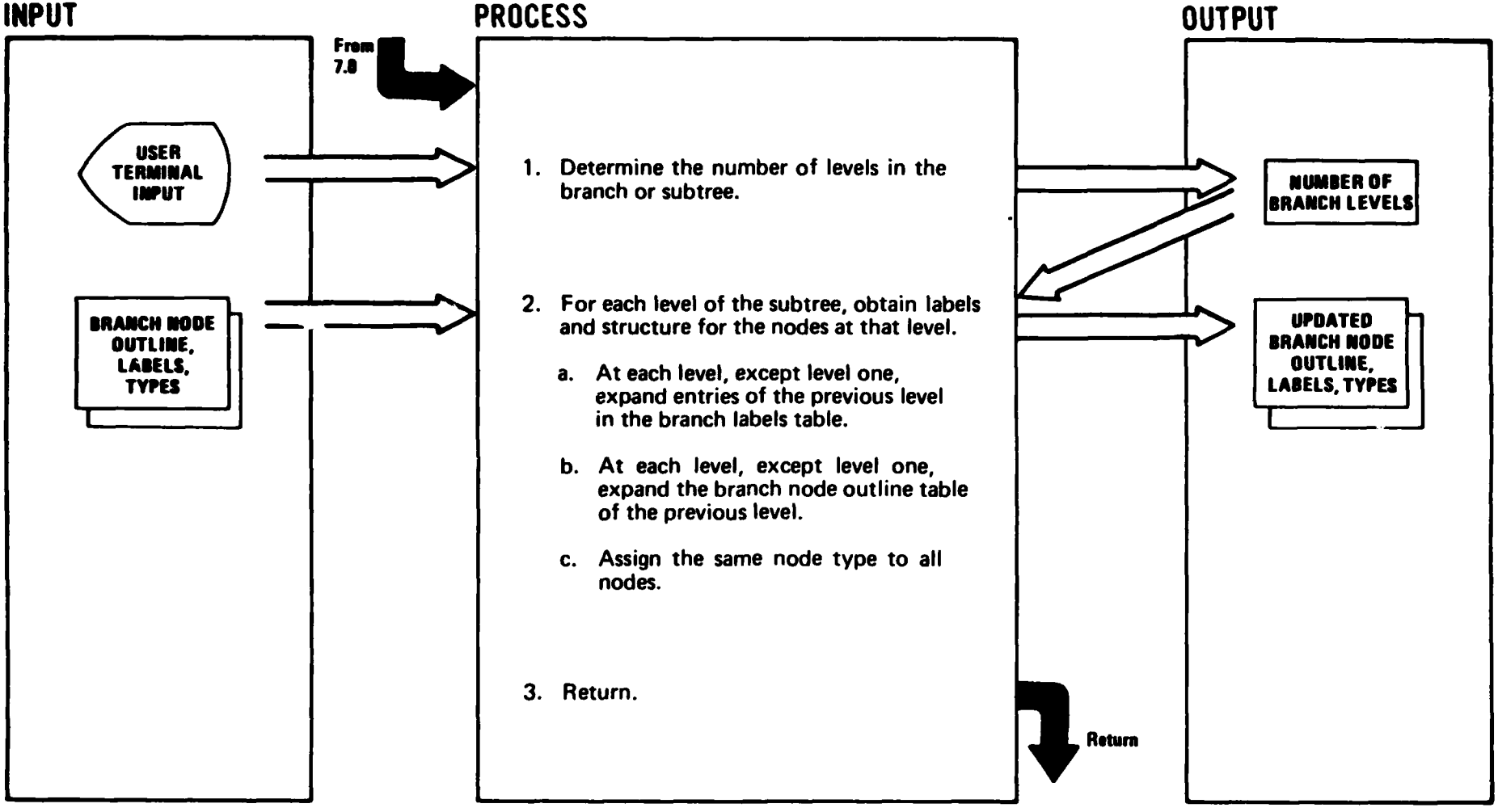
System/Program: STRUCTURE Name:

Diagram ID: 7.1 Description: Create a Non-Symmetric Branch Page: ___ of ___



System/Program: STRUCTURE Name:

Diagram ID: 7.2 Description: Create a Symmetric Branch Page: ___ of ___

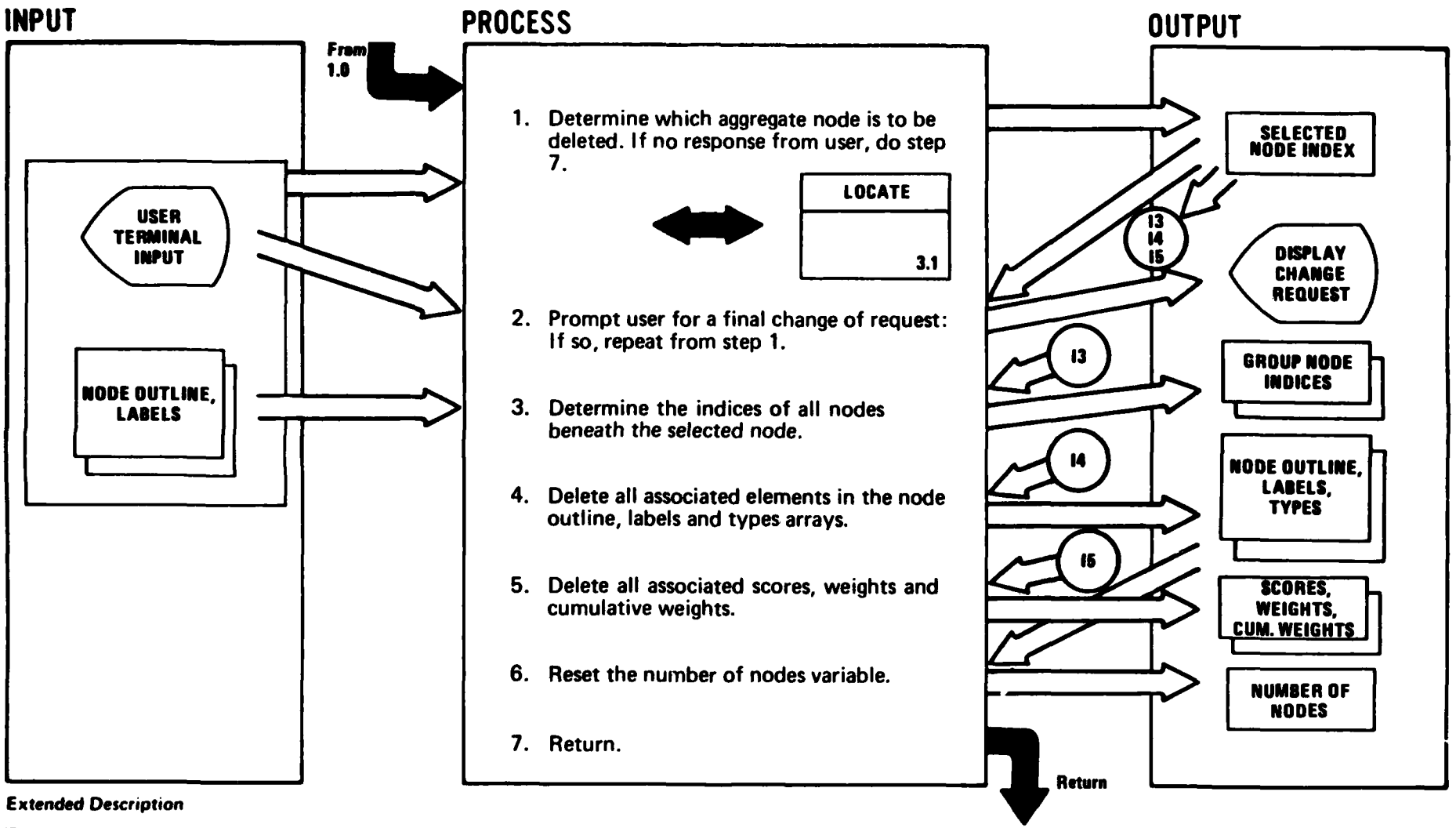


Extended Description

Step 2 processing ensures that for each subsequent level of a multilevel branch structure the outline number, types and labels are all added in the correct numerical sequence to the outline, types and label entries at the previous level. (This is done for every branch node defined at the previous level.)

System/Program: STRUCTURE Name:

Diagram ID: 8.0 Description: Prune a Structure Section Page: ___ of ___

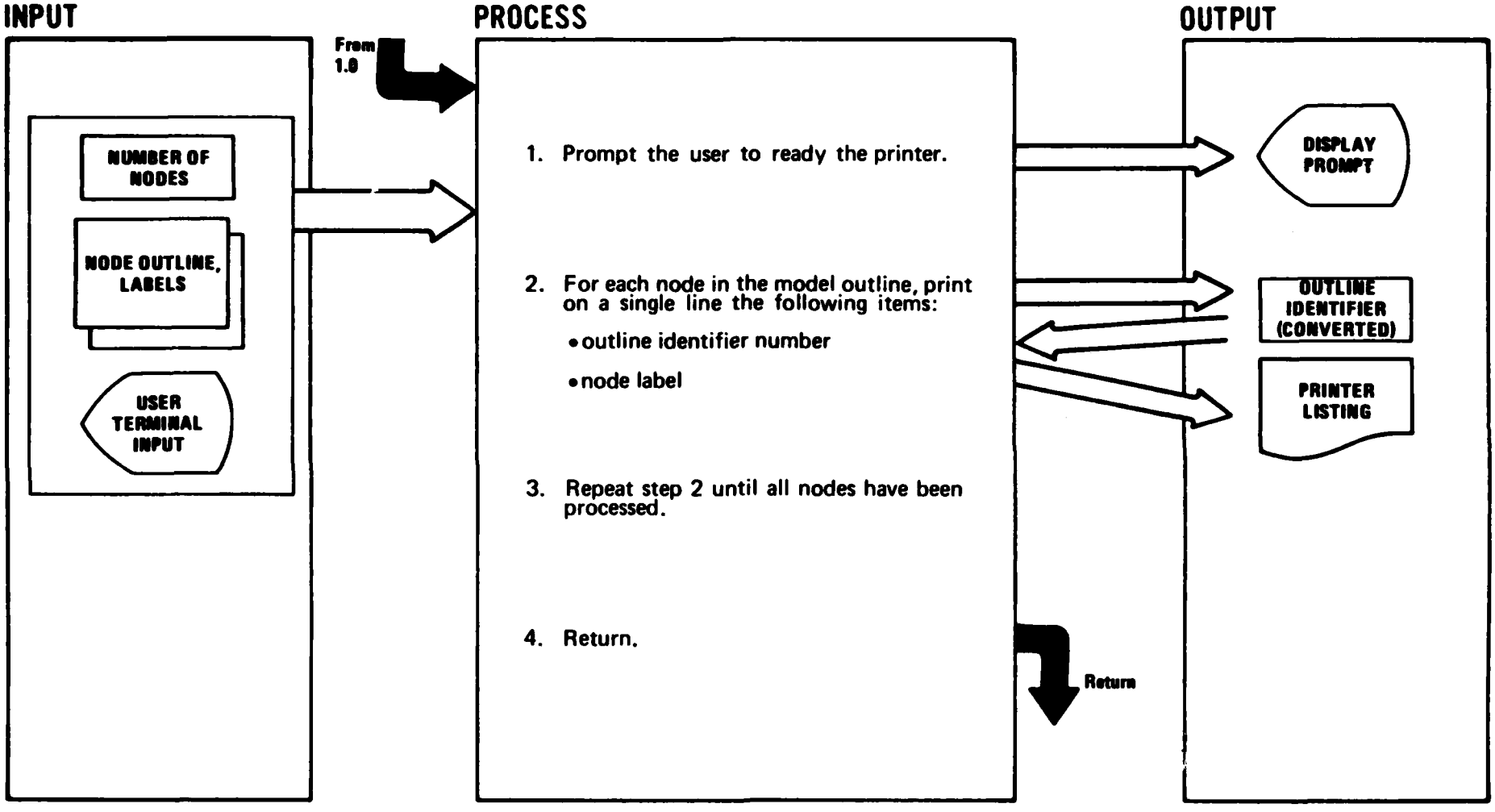


Extended Description

The routine should be executed whenever a group of nodes is to be deleted from an existing node structure. The grouped nodes are all hierarchically placed below a certain aggregate node; hence, a user specification of an aggregate node in step 1 will cause that node and all its subsequent nodes to be deleted.

System/Program: STRUCTURE Name:

Diagram ID: 9.0 Description: Print a Review Sheet Page: ___ of ___

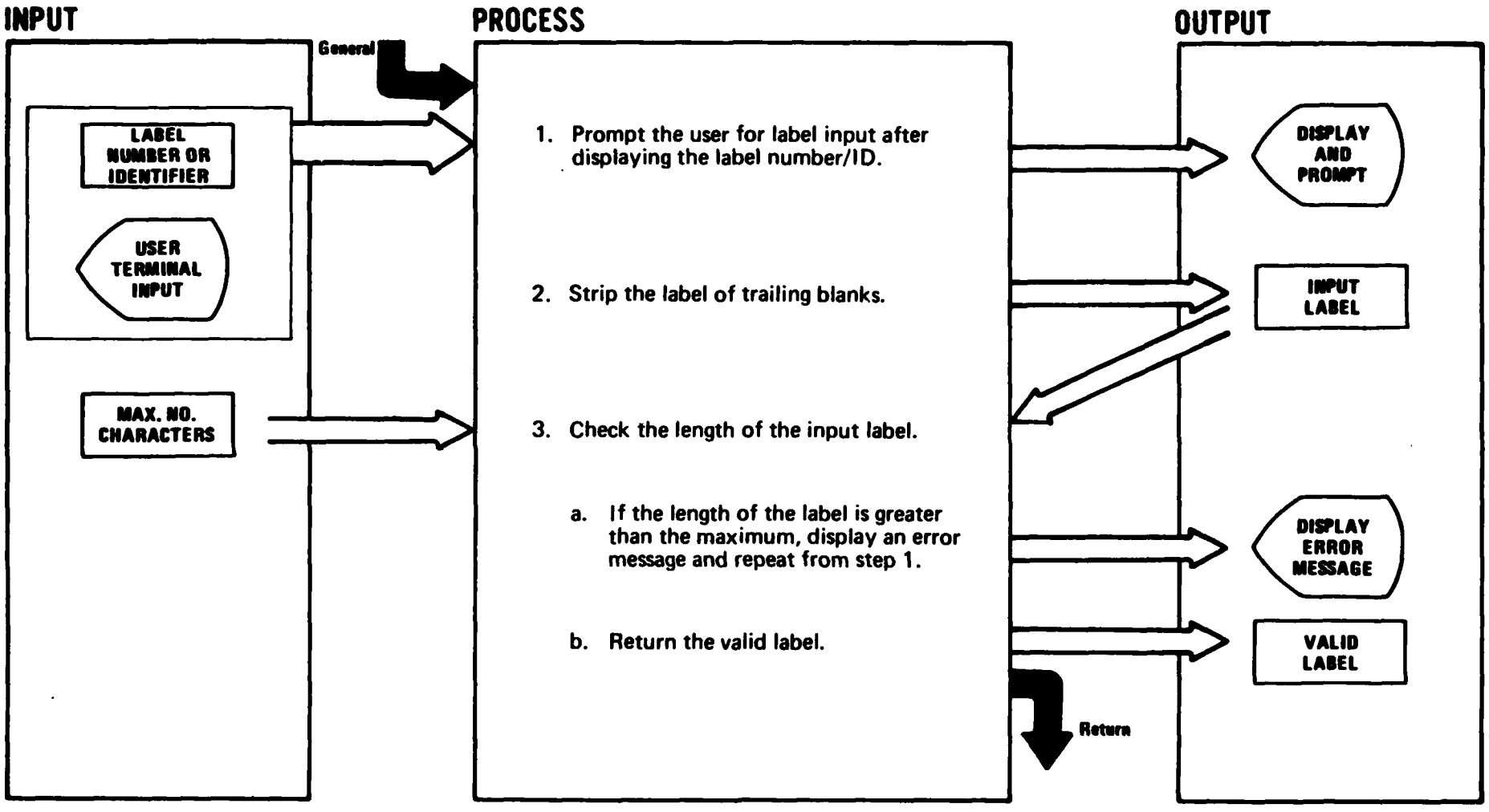


Extended Description

2. The decoded outline identifier number is formatted for output. The output should be equivalent to the user's original input during the creation of the structure.

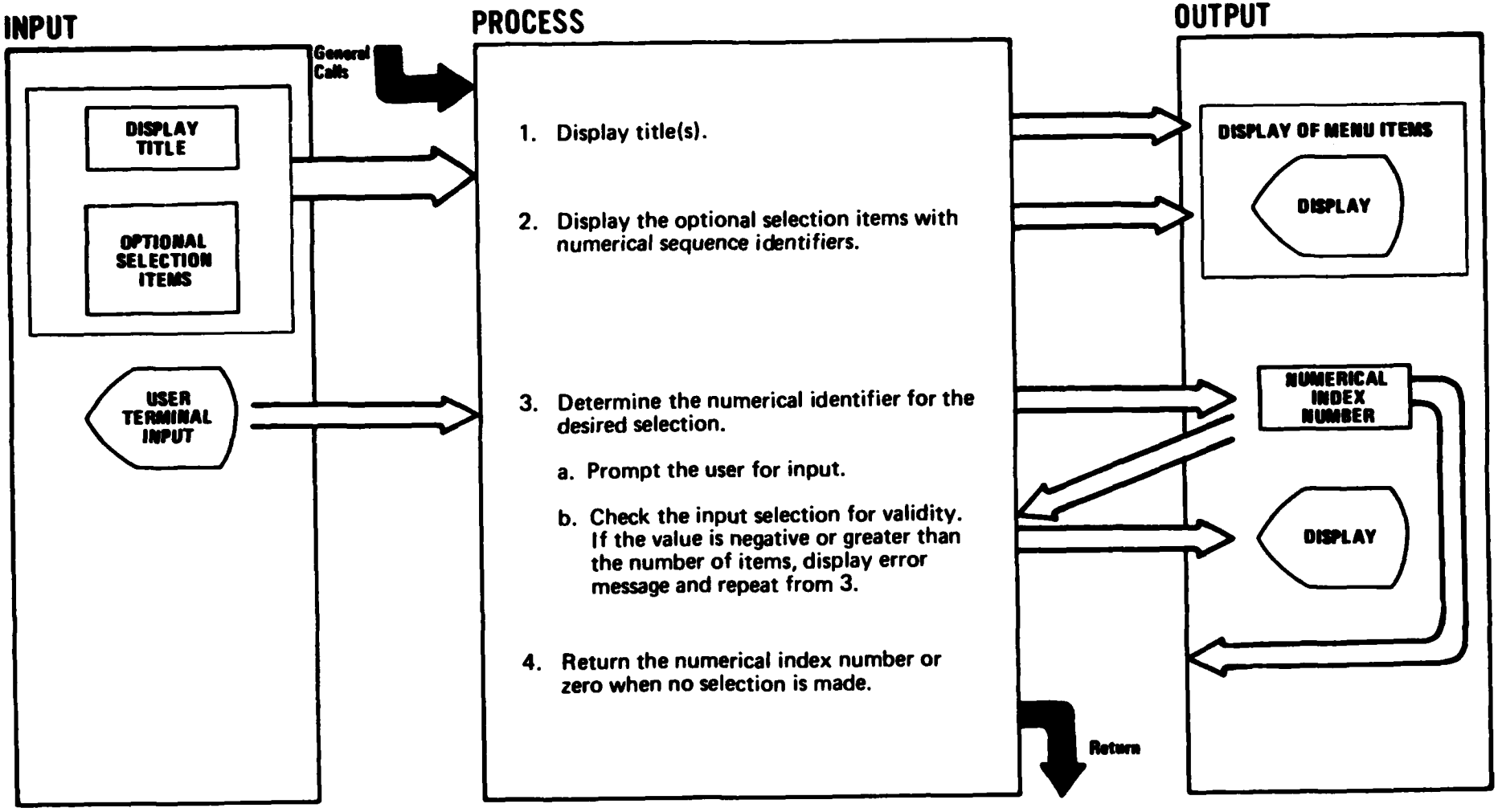
System/Program: STRUCTURE Name: ENTER LABELS

Diagram ID: 10.1 Description: Enter Labels Routine Page: ____ of ____



System/Program: STRUCTURE Name: MENU

Diagram ID: 10.2 Description Display a Menu Page: ____ of ____



Extended Description

1. The title is passed to this routine so that the display will remain in context with the processing function. For example, a title may be 'DISPLAY RESULTS.'

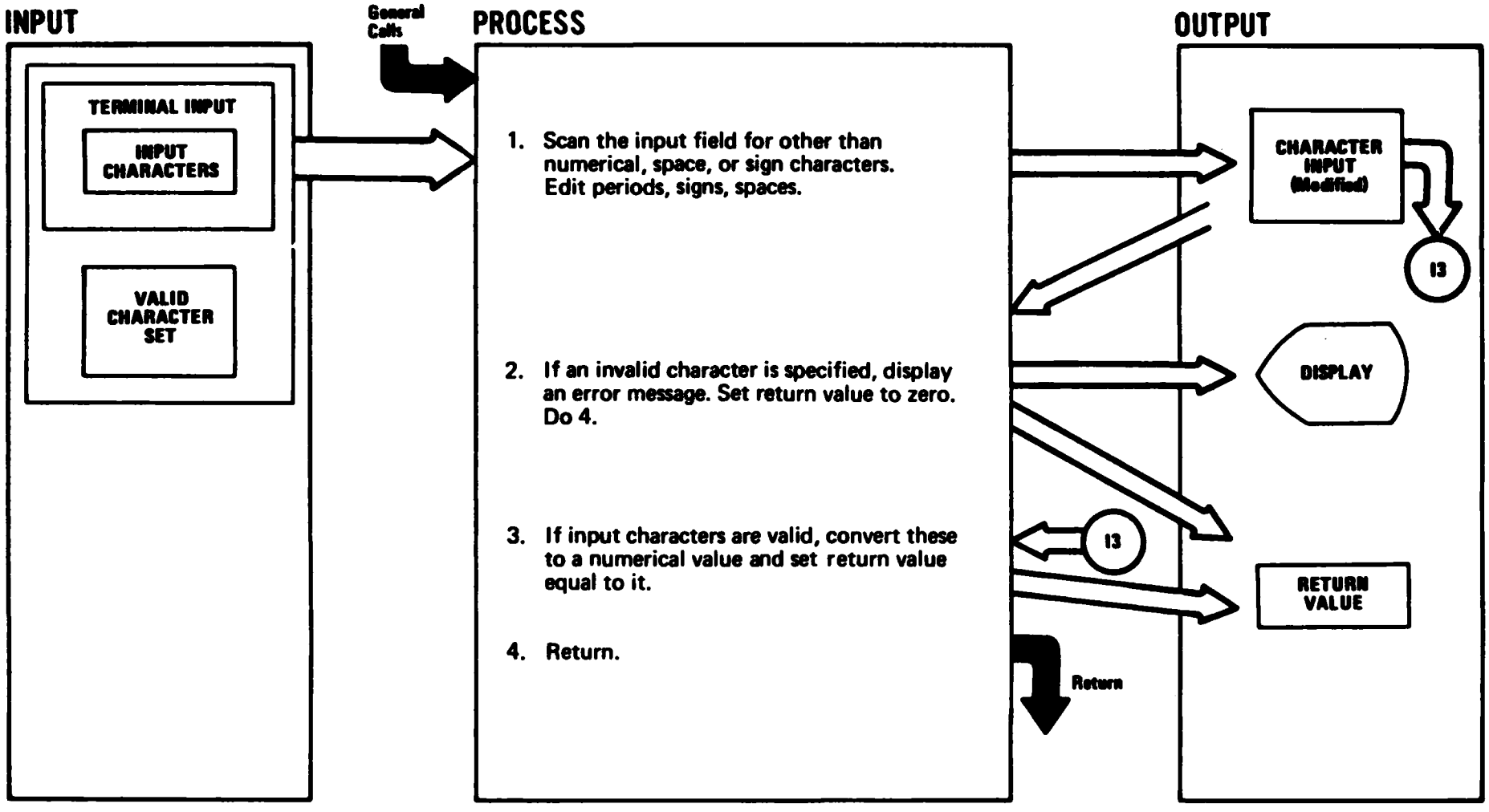
2. The selections that describe what is optimal are passed as input and are displayed in a list or cookbook MENU format along with item sequence numbers.

3. Prompt the user for the item sequence number of the choice selection.

Check the validity of the user input.

System/Program: STRUCTURE Name:

Diagram ID: 10.3 Description Select Only Numeric Input Page: ___ of ___

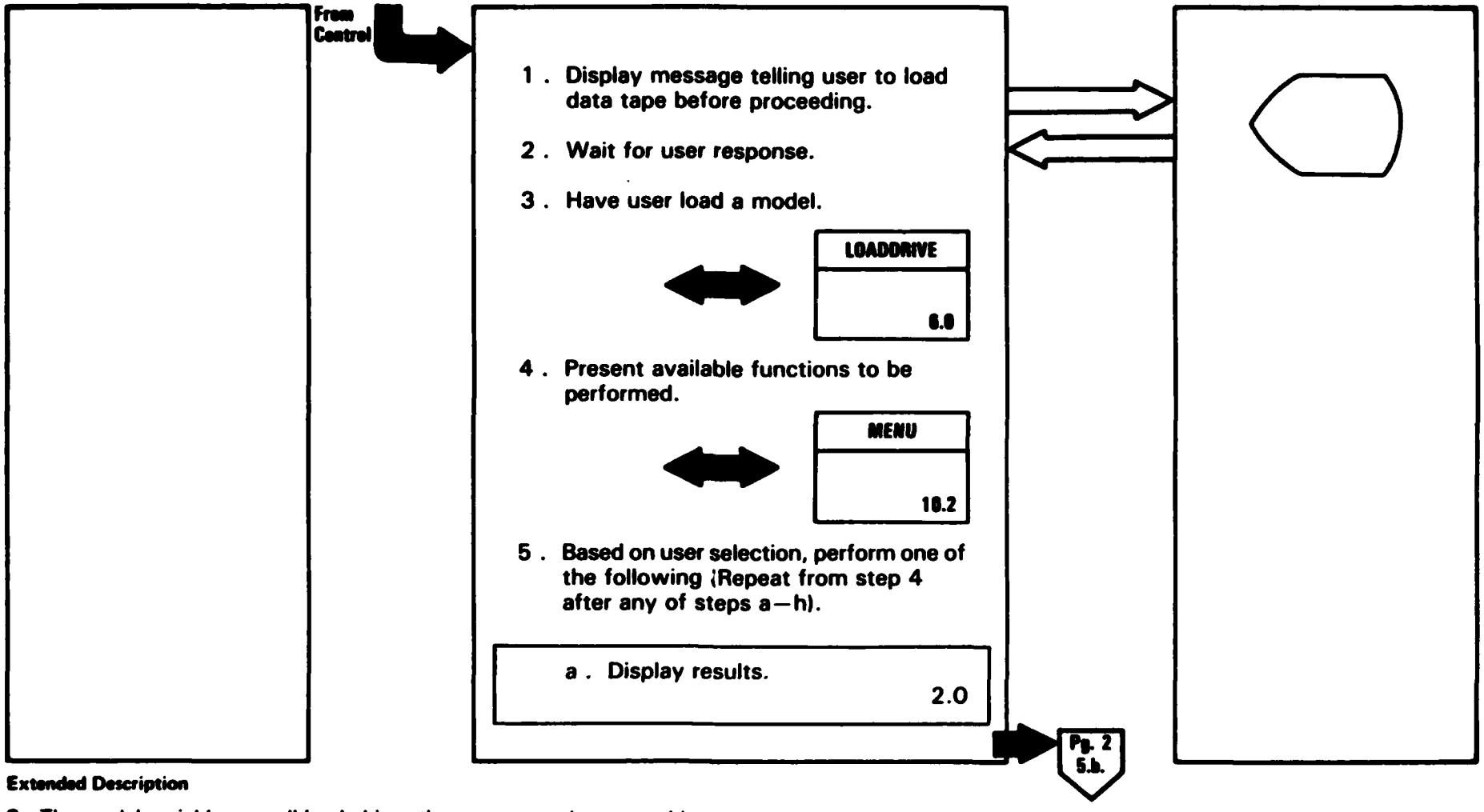


Extended Description

This routine will not be required if system error checking routines interface with the standard keyboard-display input.

System/Program: RUN Name: RUN

Diagram ID: 1.0 Description: Entrance to Eval Program Page: 1 of 2



Extended Description

3. The model variables are all loaded into the current work area at this time, or whenever the user wishes to load a new model. Consequently, this documentation assumes that these variables are "global" and always available for reference, input to procedures, or modification.

System/Program: RUN Name: RUN

Diagram ID: 1.0 Description: Entrance to Eval Program Page: 2 of 2

INPUT

PROCESS

Pg. 1 5.a.

b . Sensitivity analysis. 3.0

c . Edit values. 4.0

d . Print results. 5.0

e . Load model. 6.0

f . Save model. 7.0

g . New values. 8.0

h . Print data sheet. 9.0

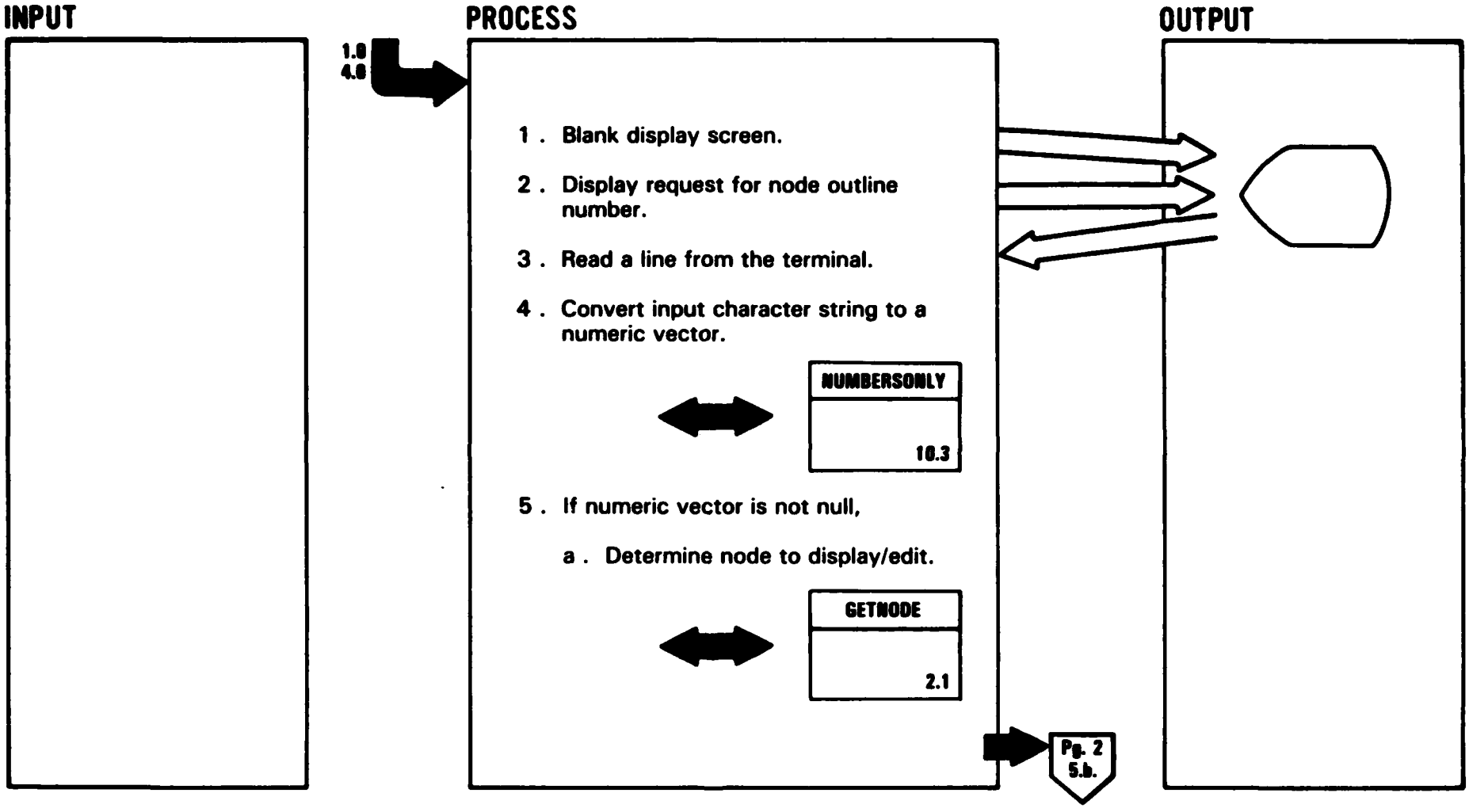
i . Terminate program.

Exit

OUTPUT

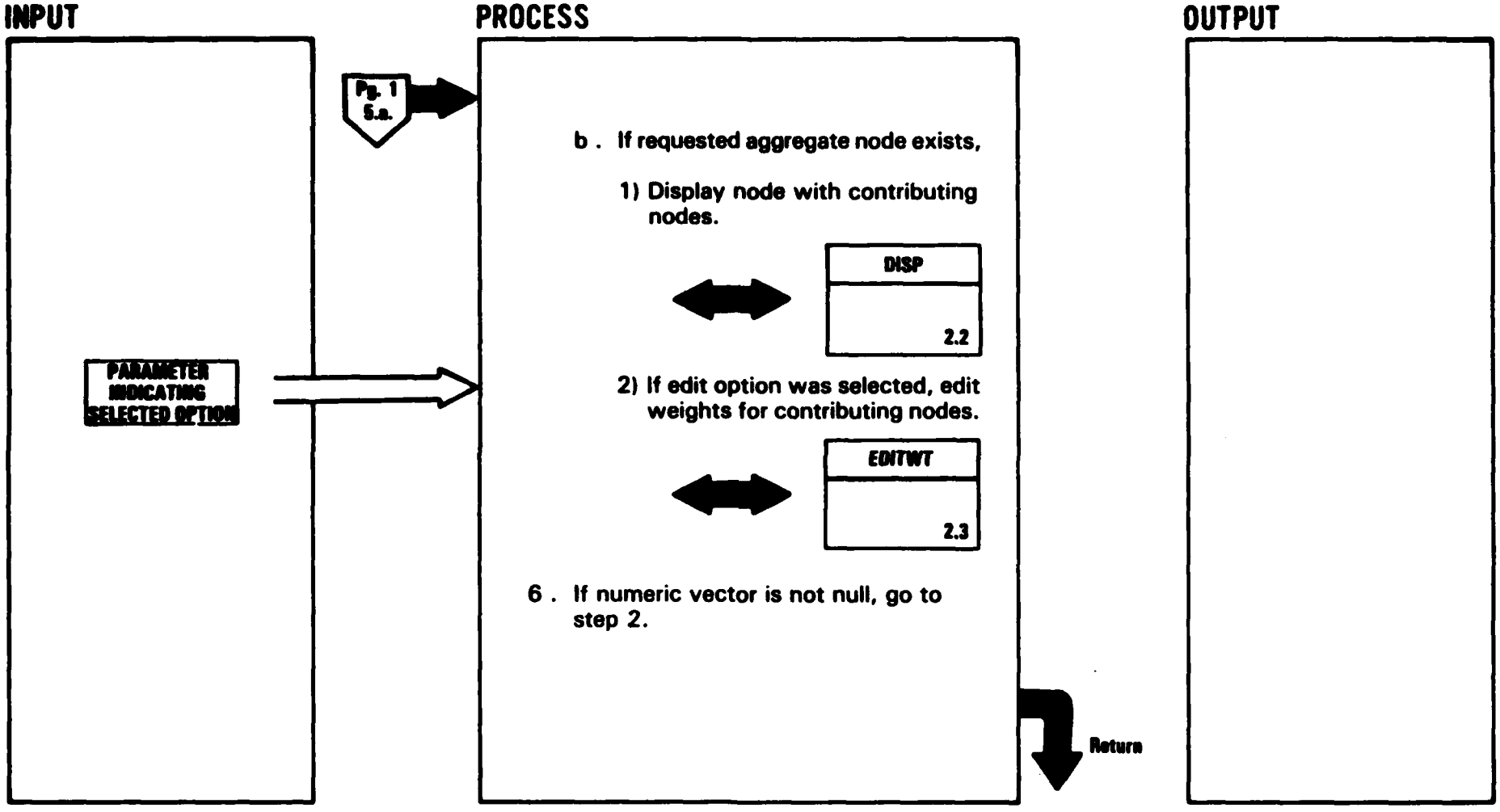
System/Program: RUN Name: SELECT

Diagram ID: 2.0 Description: Elicit & Display/Edit Node Page: 1 of 2



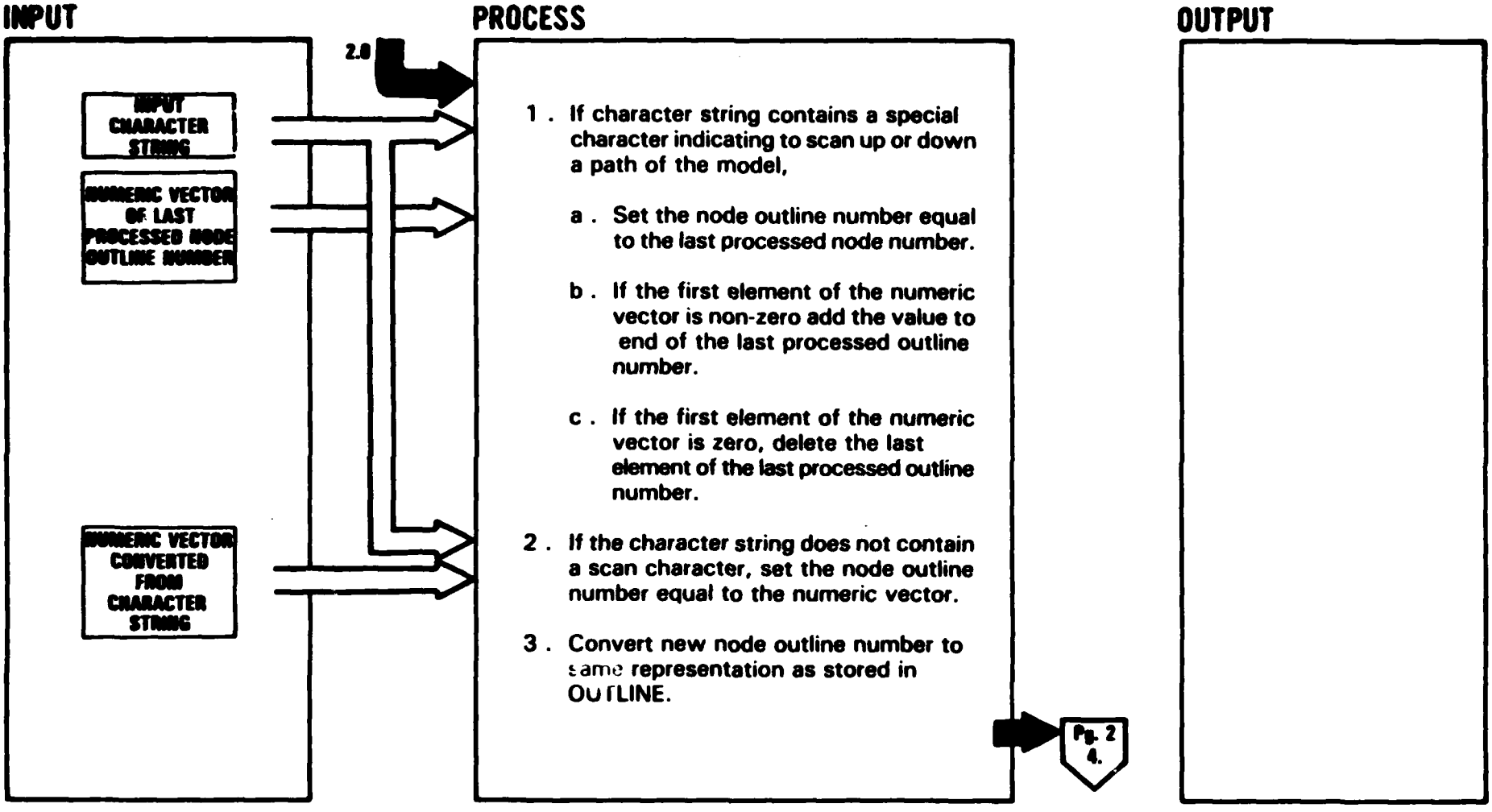
System/Program: RUN Name: SELECT

Diagram ID: 2.0 Description: Elicit & Display/Edit Node Page: 2 of 2



System/Program: RUN Name: GETNODE

Diagram ID: 2.1 Description: Determine Aggregate Node to Display Page: 1 of 2



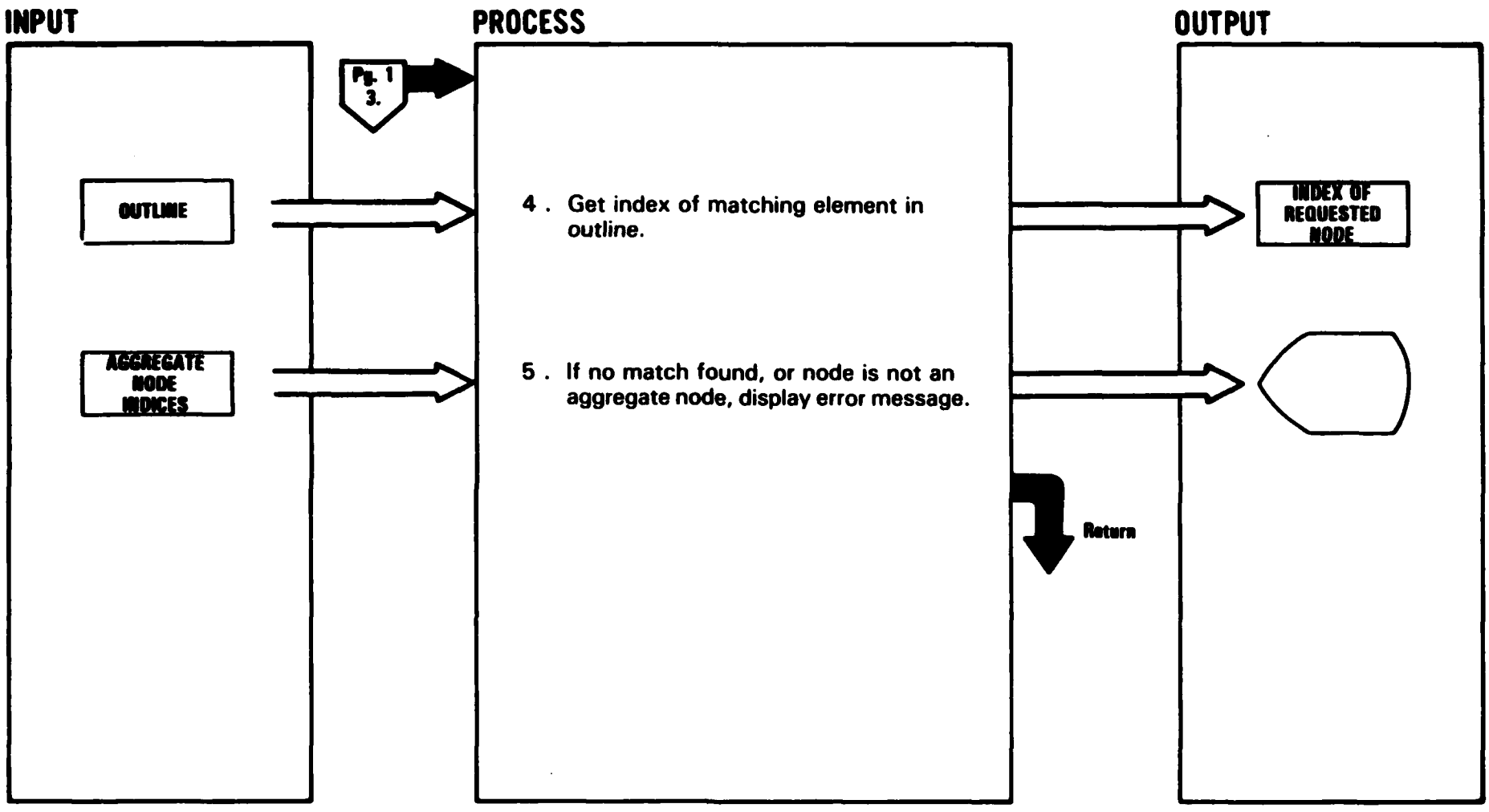
Extended Description

b. This generates a node outline number one level deeper than the previously processed node. For example, if the previously processed number were 3.2.5 and the input '6)' (where the right parenthesis is the scan operator) the new node outline number would be 3.2.5.6.

c. This generates a node outline number one level higher than the previously processed node. For example, if the previously processed number were 3.2.5 and the input '0)' (where the right parenthesis is the scan operator), the new node outline number would be 3.2.

System/Program: RUN Name: GETNODE

Diagram ID: 2.1 Description: Determine Aggregate Node to Display Page: 2 of 2



System/Program: RUN Name: DISP

Diagram ID: 2.2 Description: Display Group Page: 1 of 2

INPUT

PROCESS

OUTPUT

2.0
8.2

1. Get labels of nodes of up to 3 levels up from requested node.

TRACE
2.2.1

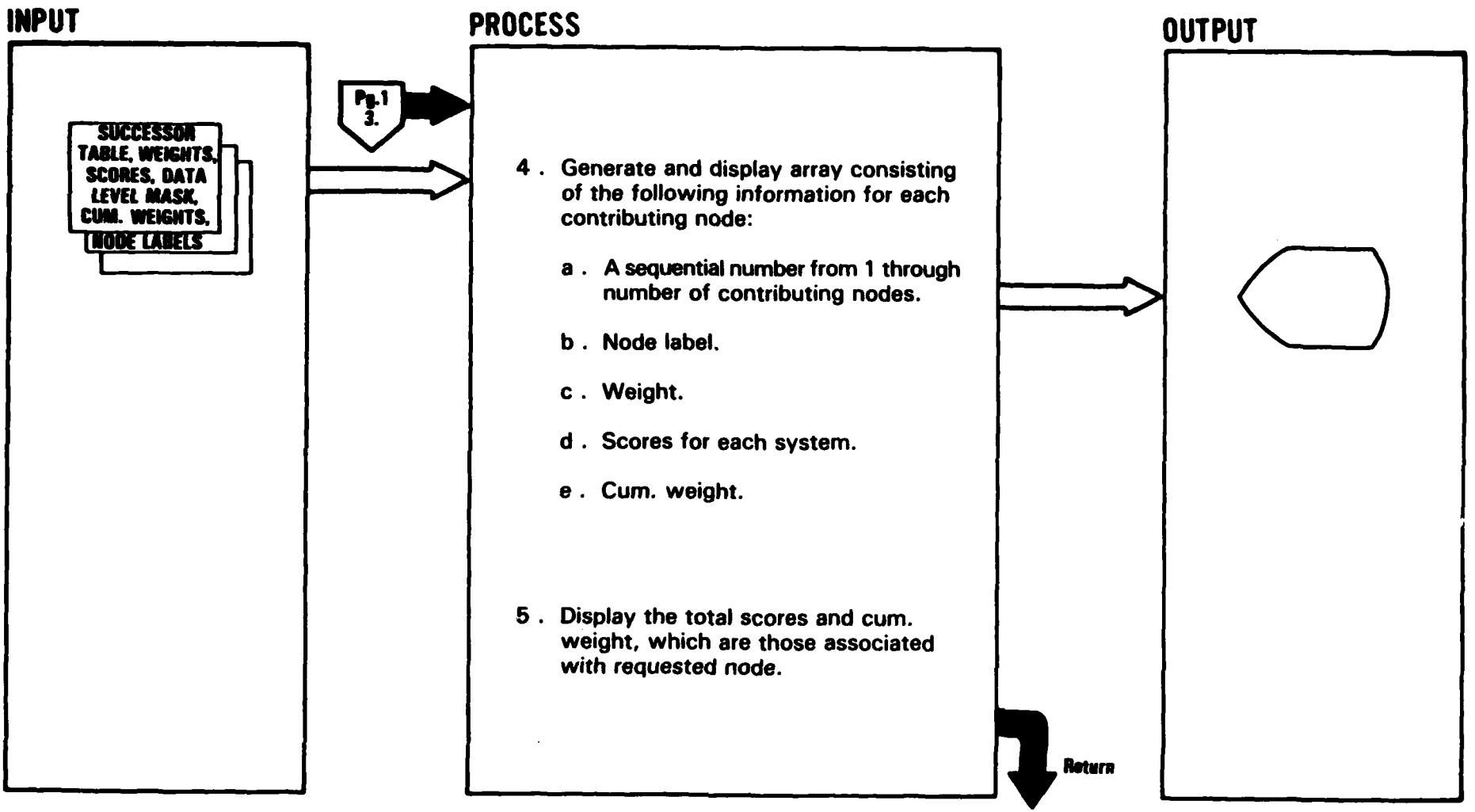
2. Display heading consisting of requested node number and label, up to 3 additional levels of labels and node type of requested node.

3. Display subheading indicating the meaning of the values specified in each column, including the system labels.

Pg. 2
4.

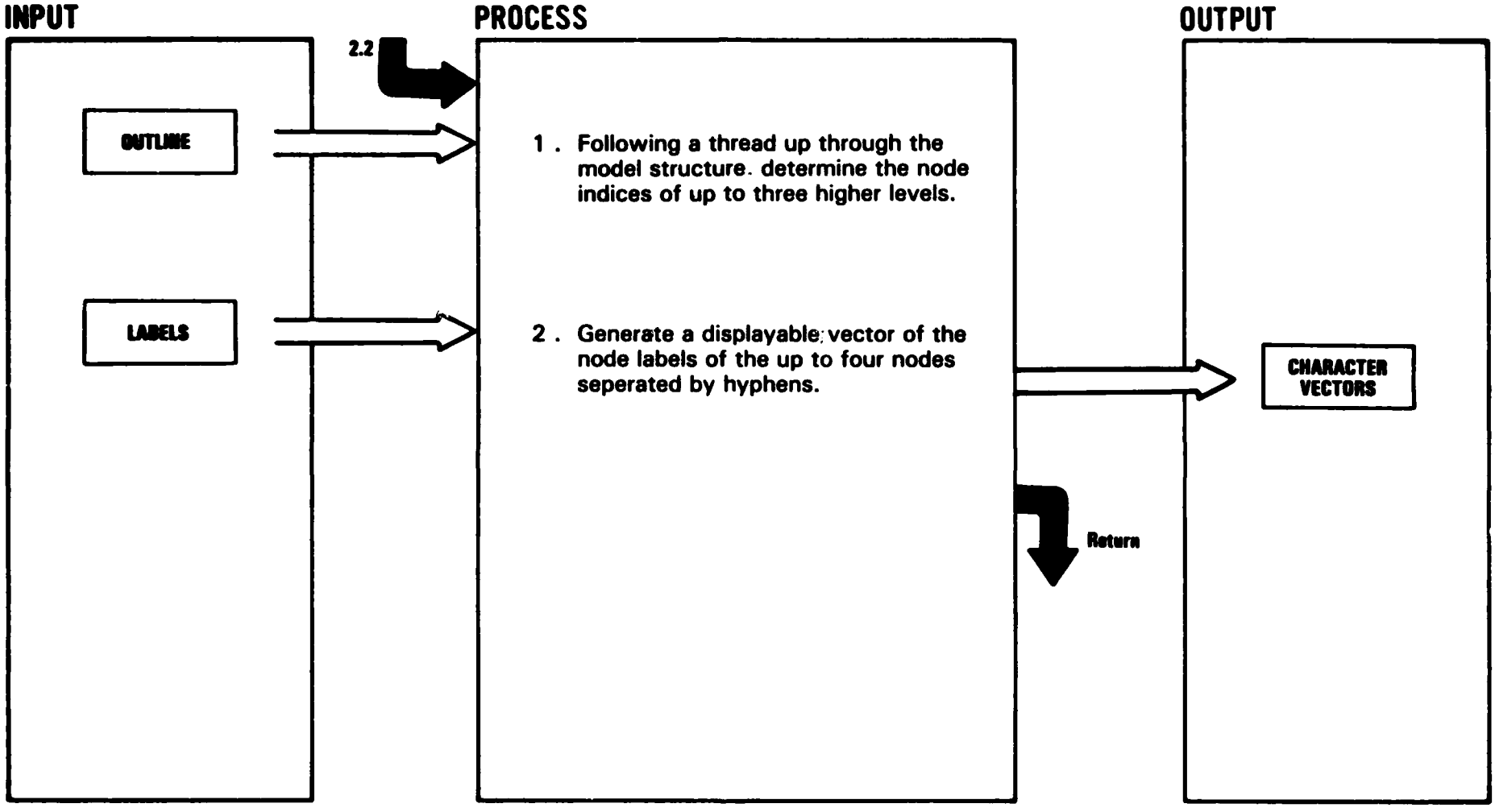
System/Program: RUN Name: DISP

Diagram ID: 2.2 Description: Display Group Page: 2 of 2



System/Program: RUN Name: TRACE

Diagram ID: 2.2.1 Description Get Nodes of Thread Up Tree Page: ___ of ___

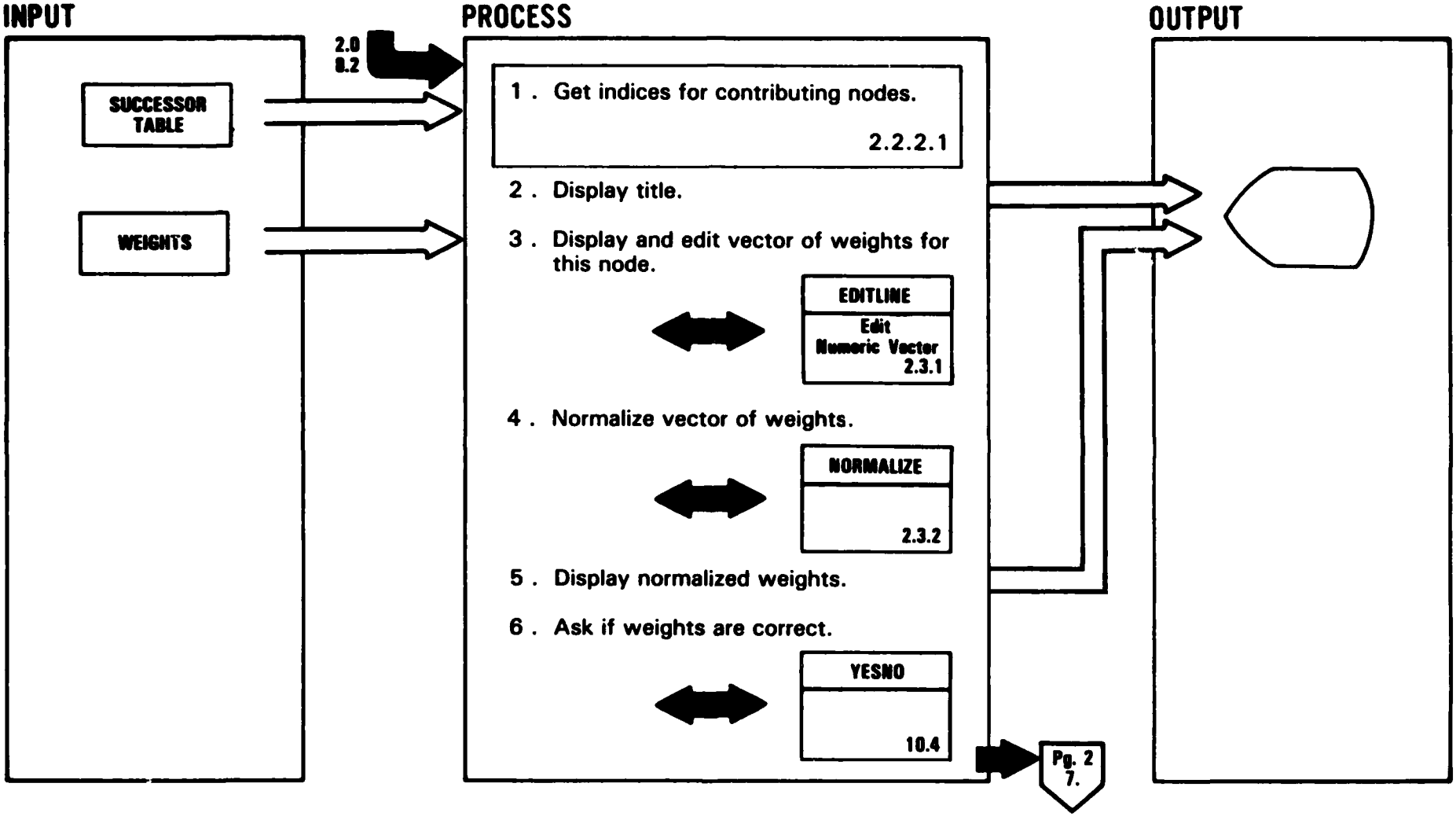


Extended Description

For instance, if the requested node number is 1.4.2.6, the next higher level would be 1.4.2, and the fourth (or highest) calculated level would be 1.4.

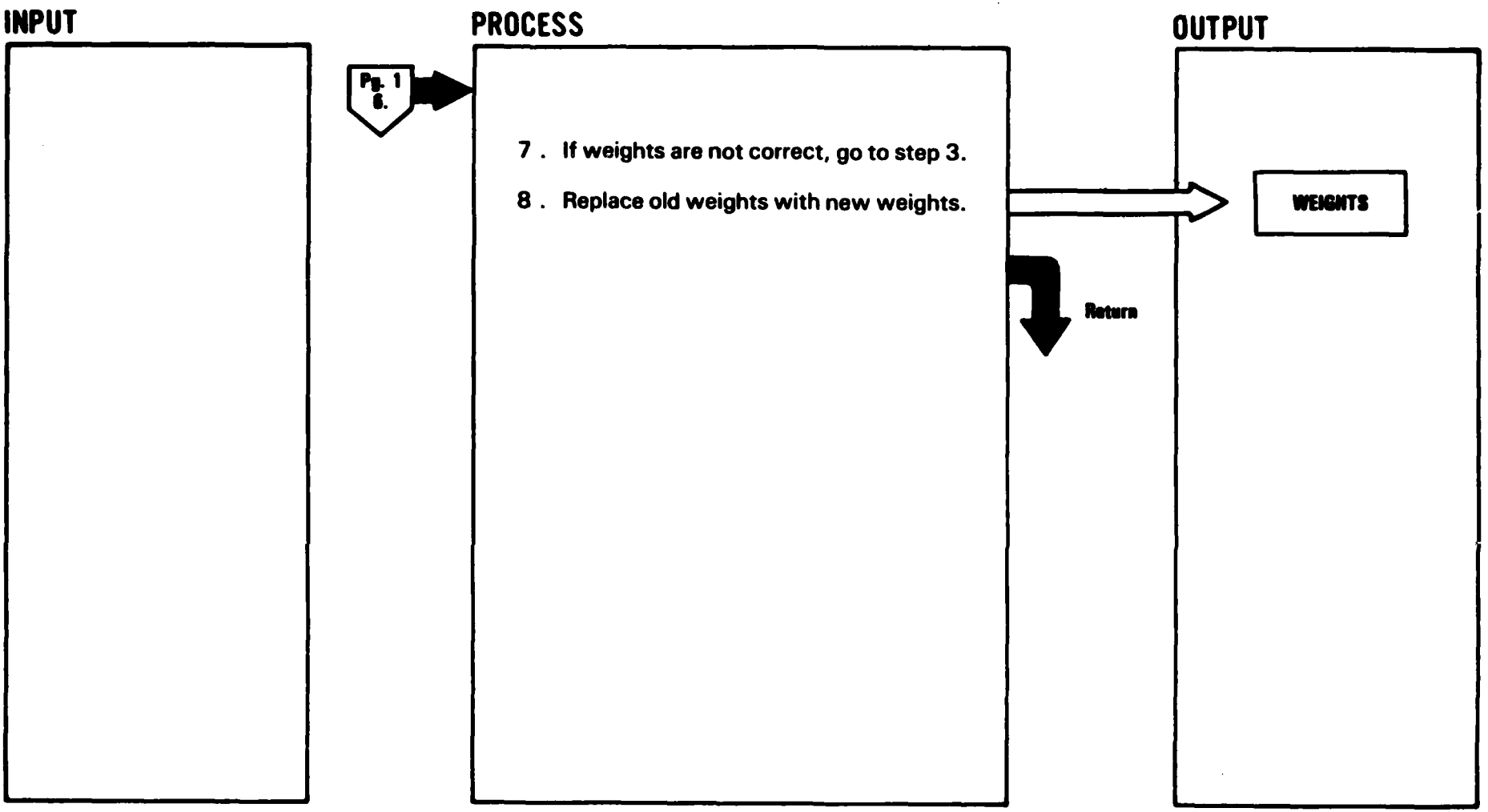
System/Program: RUN Name: EDITWT

Diagram ID: 2.3 Description: Edit Weights Page: 1 of 2



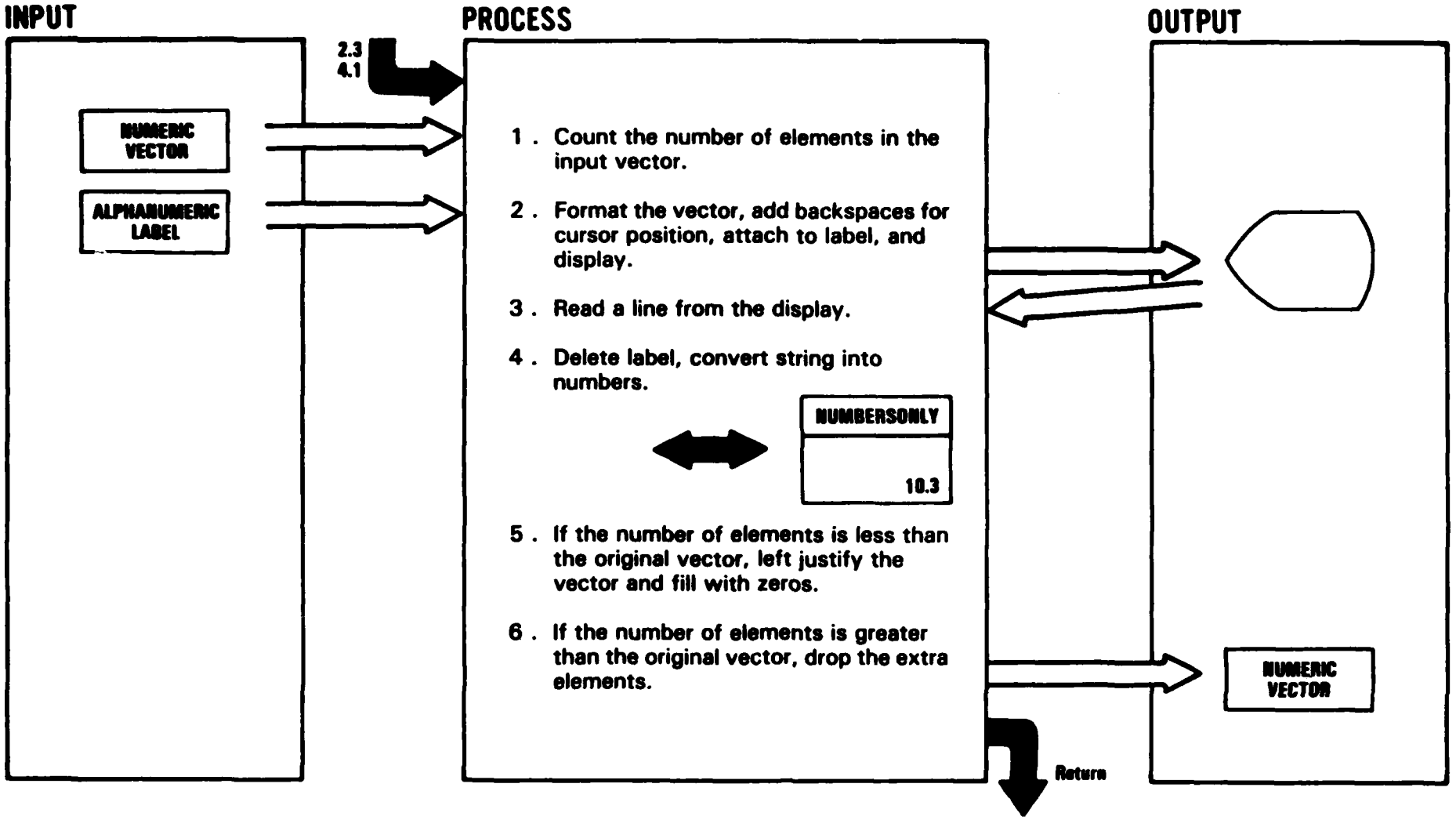
System/Program: RUN Name: EDITWT

Diagram ID: 2.3 Description: Edit Weights Page: 2 of 2



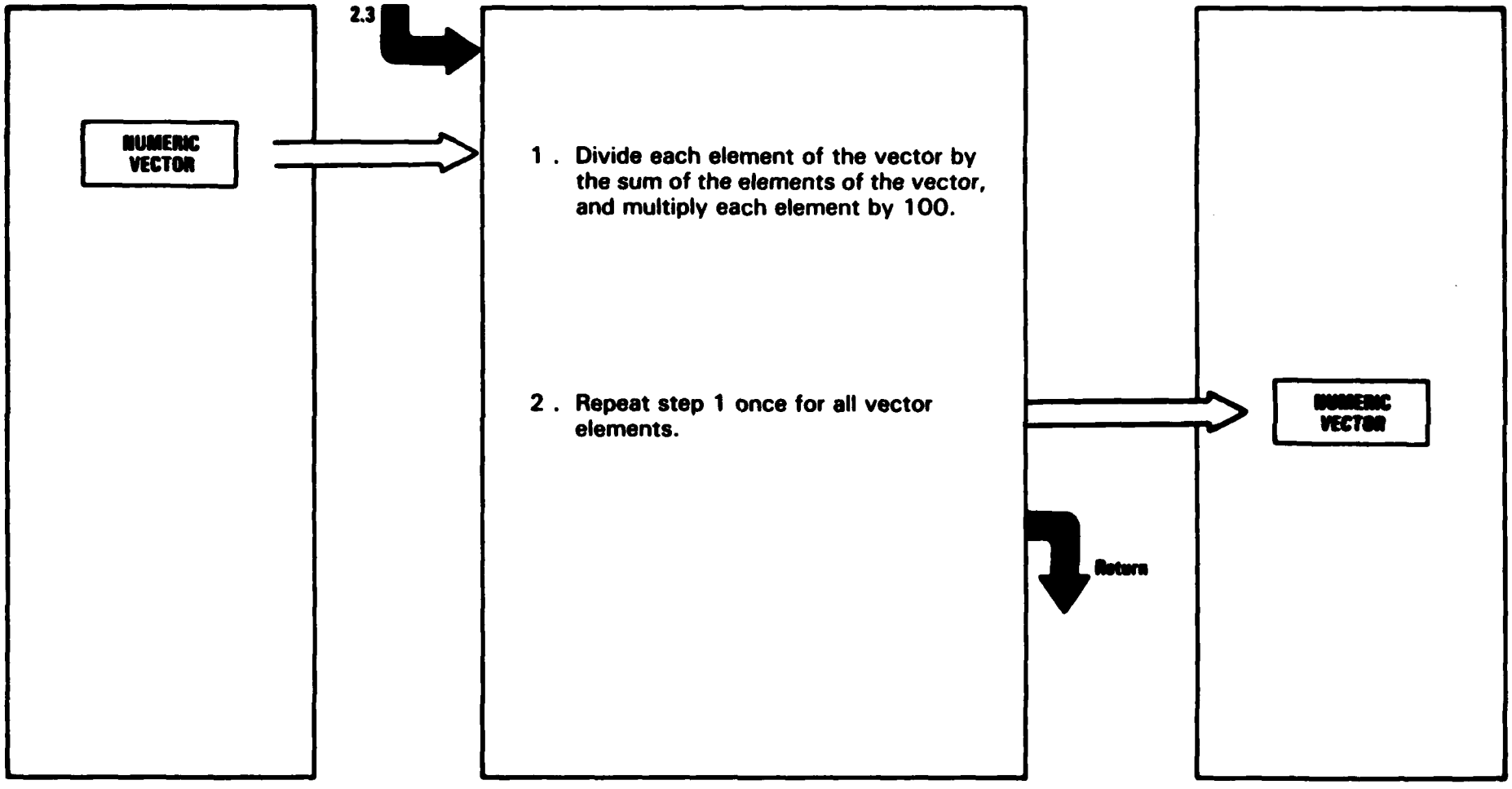
System/Program: RUN Name: EDITLINE

Diagram ID: 2.3.1 Description: Edit a Numeric Vector Page: ___ of ___



System/Program: RUN Name: NORMALIZE

Diagram ID: 2.3.2 Description Normalize a Vector of Numbers Page: ___ of ___



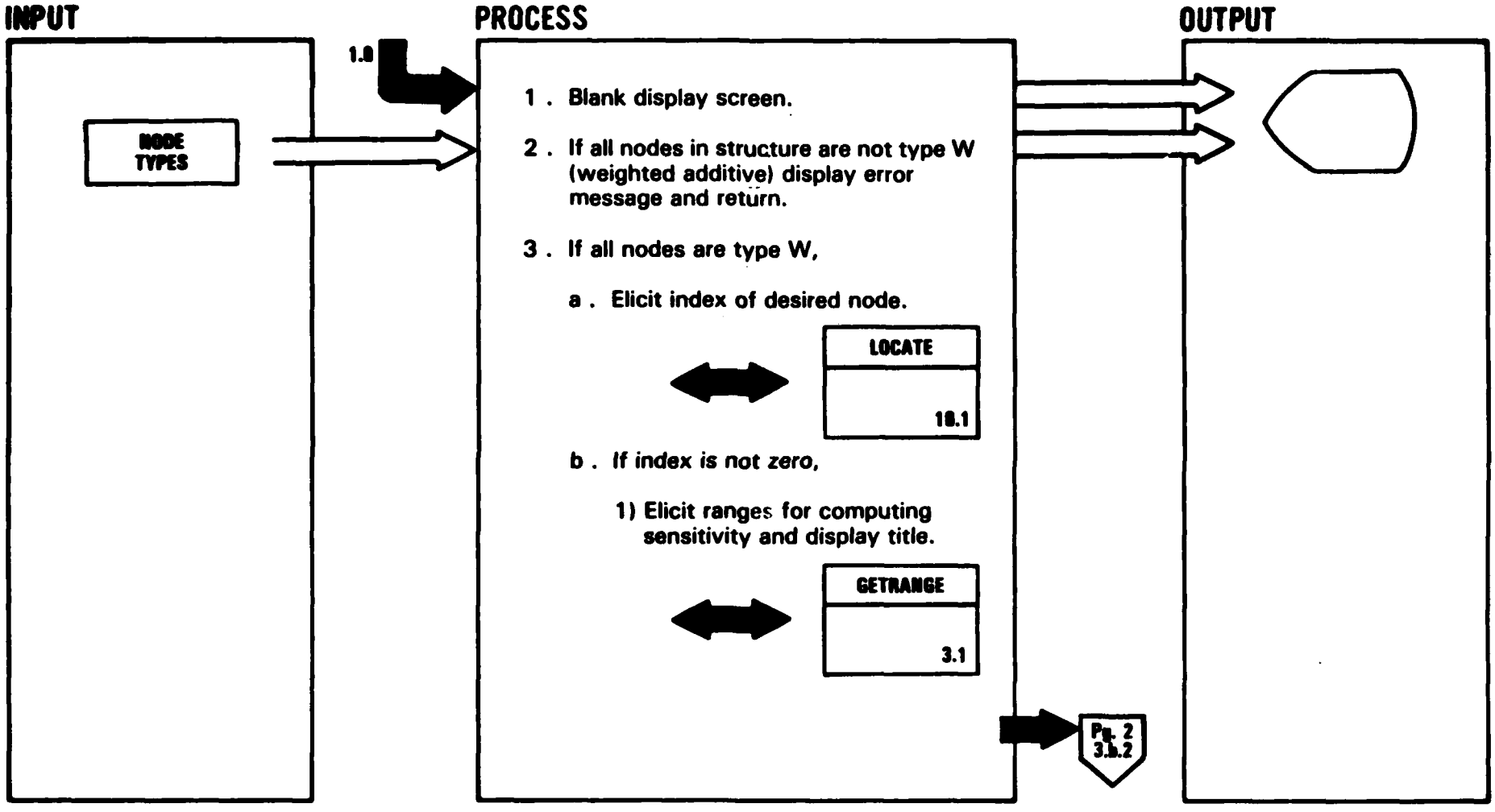
Extended Description

1. Performing this operation converts a group of arbitrary values to a group of values that add up to 100. The values all maintain the same relativity.

2. Performing this operation twice allows the case where the original values are all zero. The final result is a group of equal numbers that add up to 100.

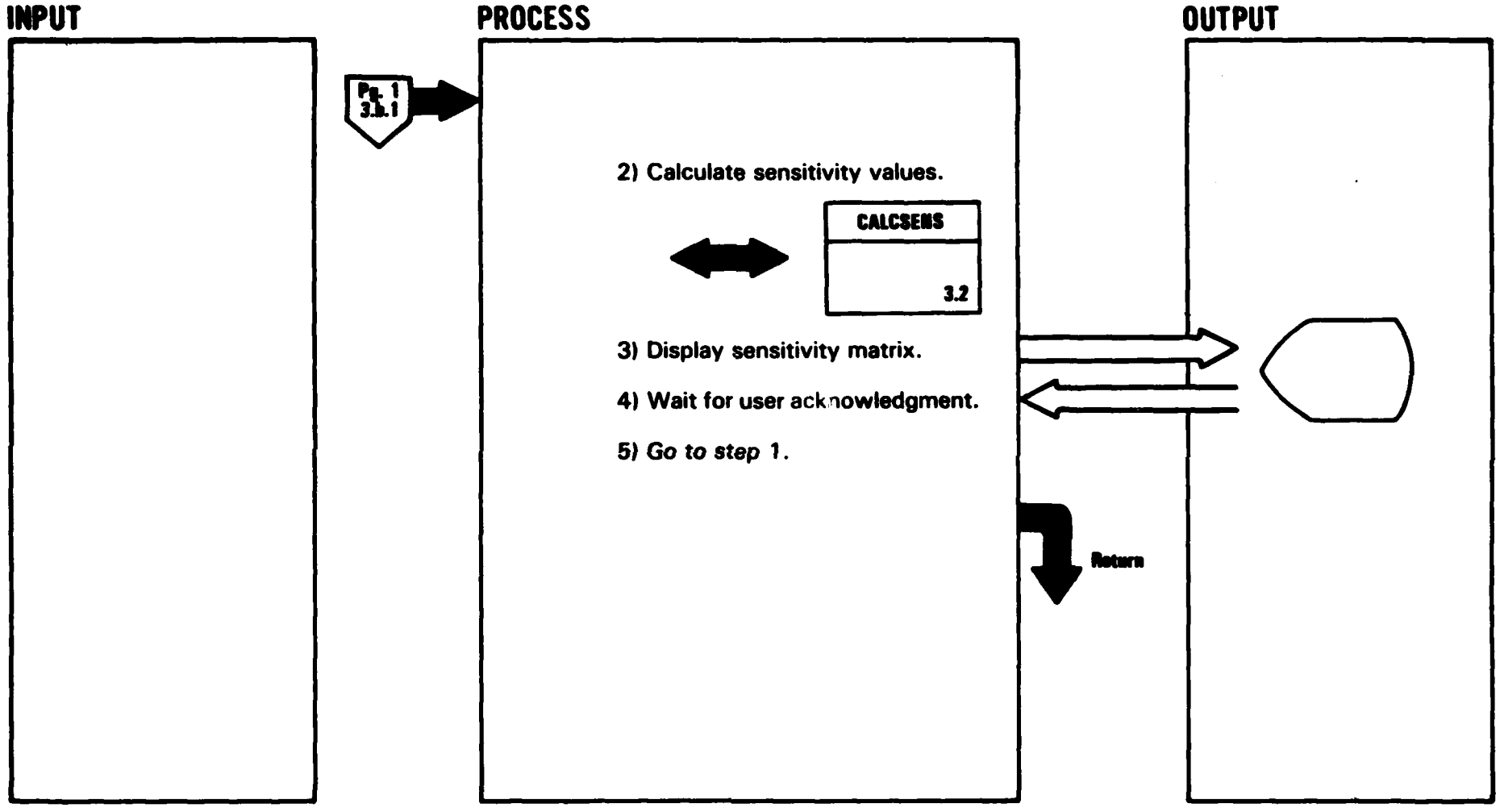
System/Program: RUN Name: SENSITIVITY

Diagram ID: 3.0 Description: Perform Sensitivity Analysis Page: 1 of 2



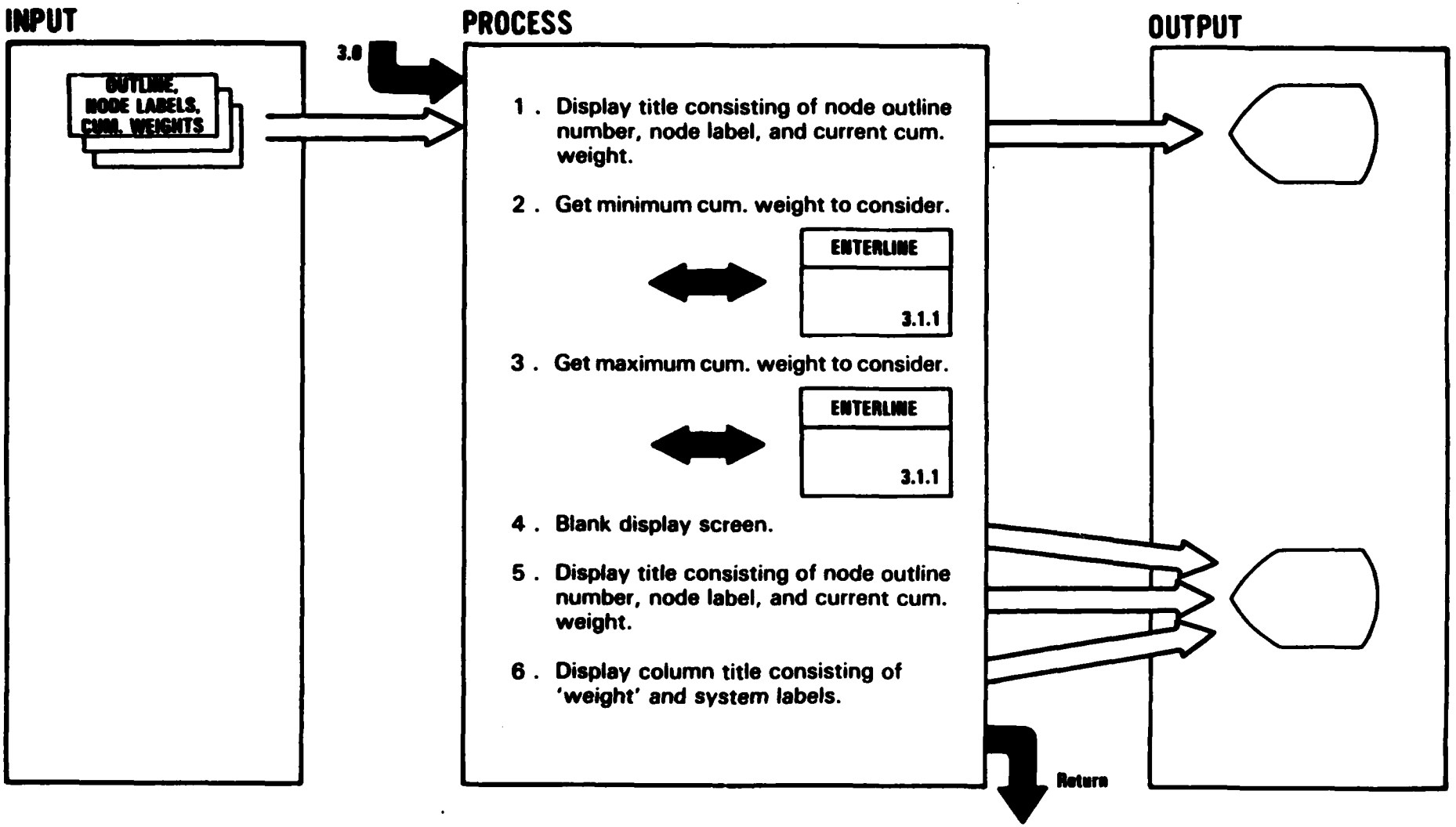
System/Program: RUN Name: SENSITIVITY

Diagram ID: 3.0 Description: Perform Sensitivity Analysis



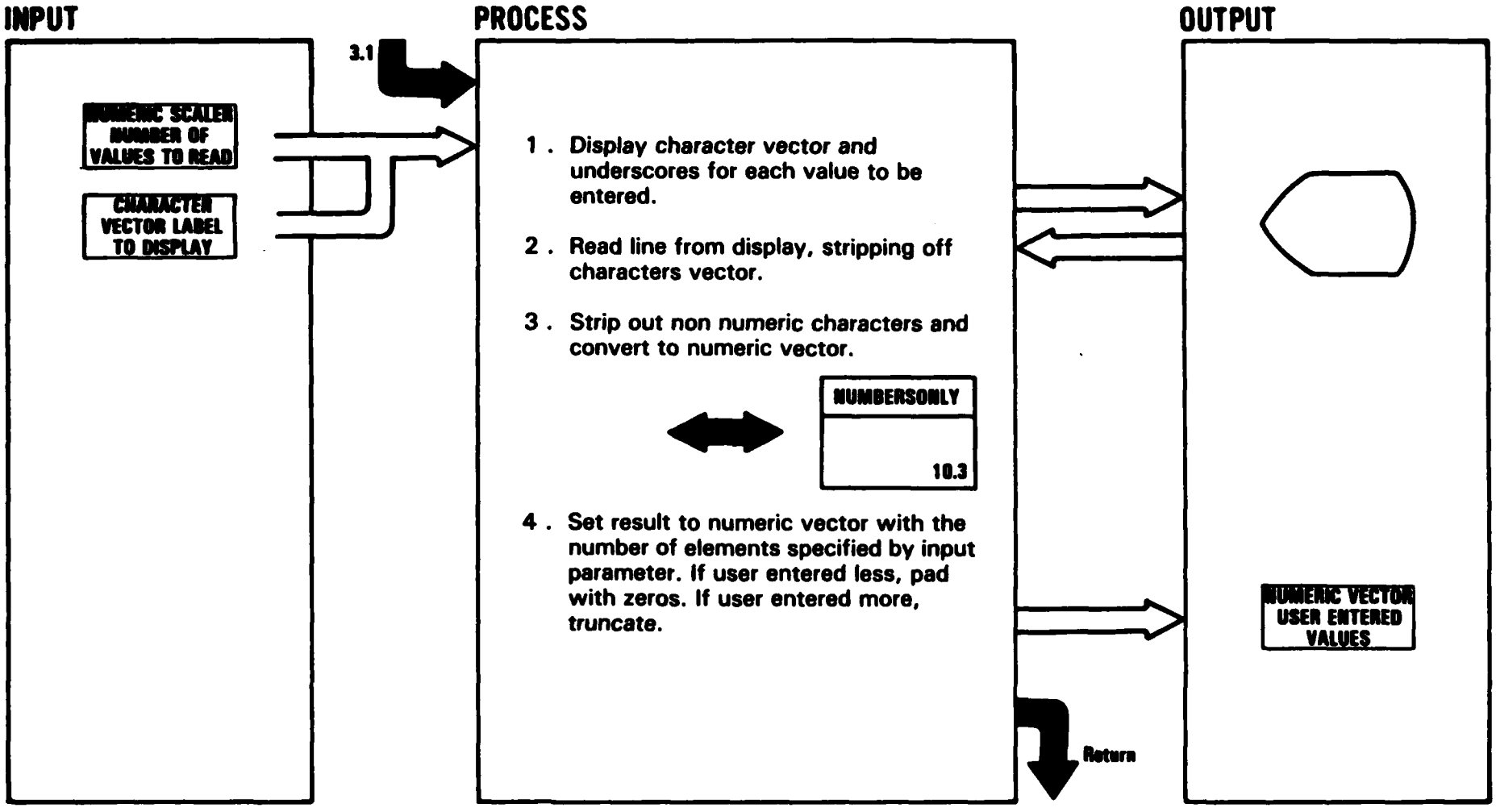
System/Program: RUN Name: GETRANGE

Diagram ID: 3.1 Description: Elicit Ranges for Computing Sensitivity Analysis Page: ____ of ____



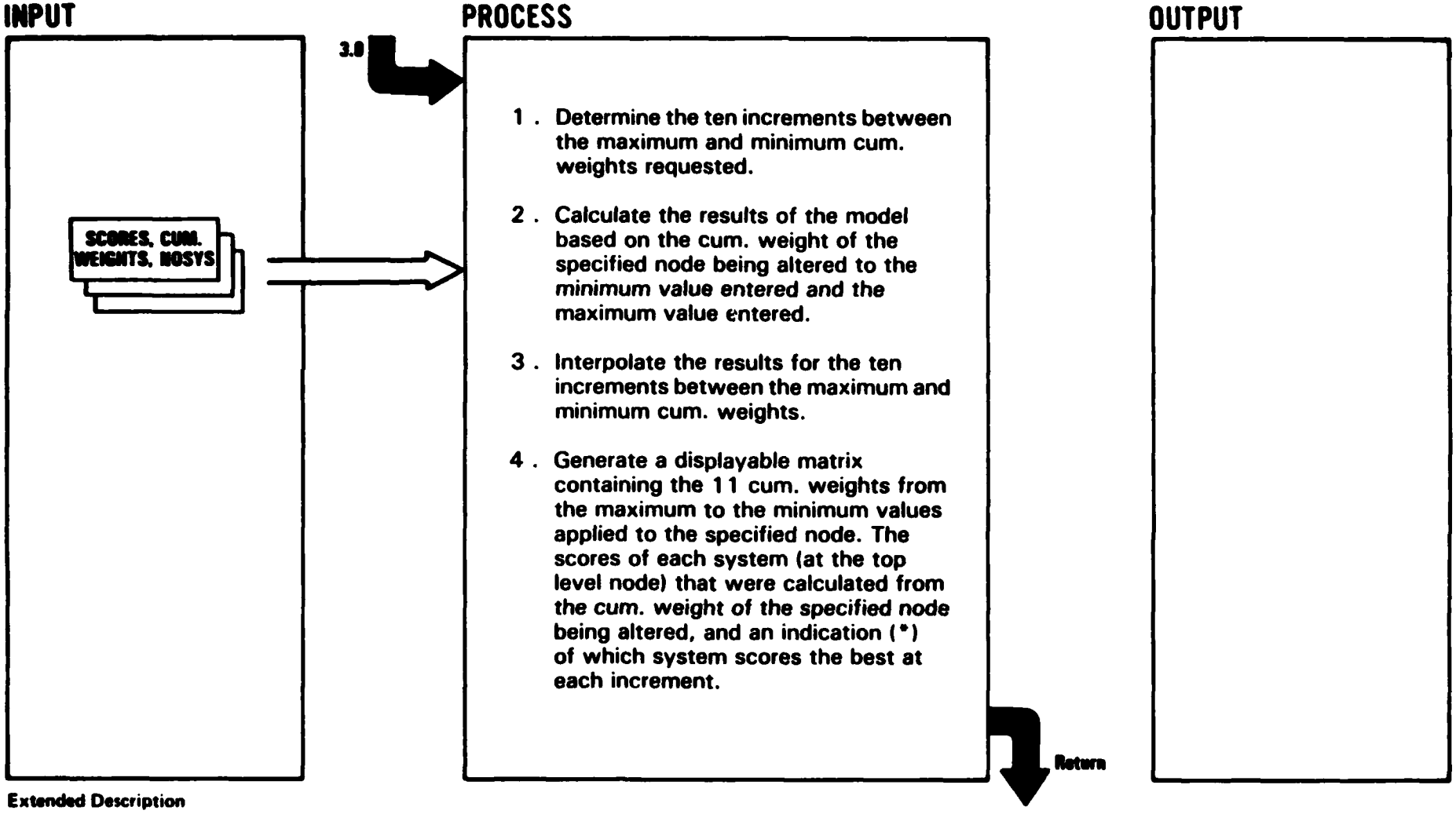
System/Program: RUN Name: ENTERLINE

Diagram ID: 3.1.1 Description: Enter Numeric Vector Page: ___ of ___



System Program: RUN Name: CALCSENS

Diagram ID: 3.2 Description: Calculate Sensitivity Values Page: ____ of ____



Extended Description

2. When the cum. weight of the specified node is altered, the total of the cum. weights of all other nodes automatically goes up or down such that the sum remains the same. The model variable containing the cum. weights does not have to be changed from its original set of values.

System/Program: RUN Name: EDITOR

Diagram ID: 4.0 Description: Edit Values Page: ___ of ___

INPUT

PROCESS

OUTPUT

1.0

1 . Elicit number of desired option from user.

MENU

10.2

2 . If option selected,

a . If edit weights selected,

SELECT

2.0

b . If edit scores selected,

EDITSC

4.1

c . Go to step 1.

3 . If no option selected, calculate model.

ROLLBACK

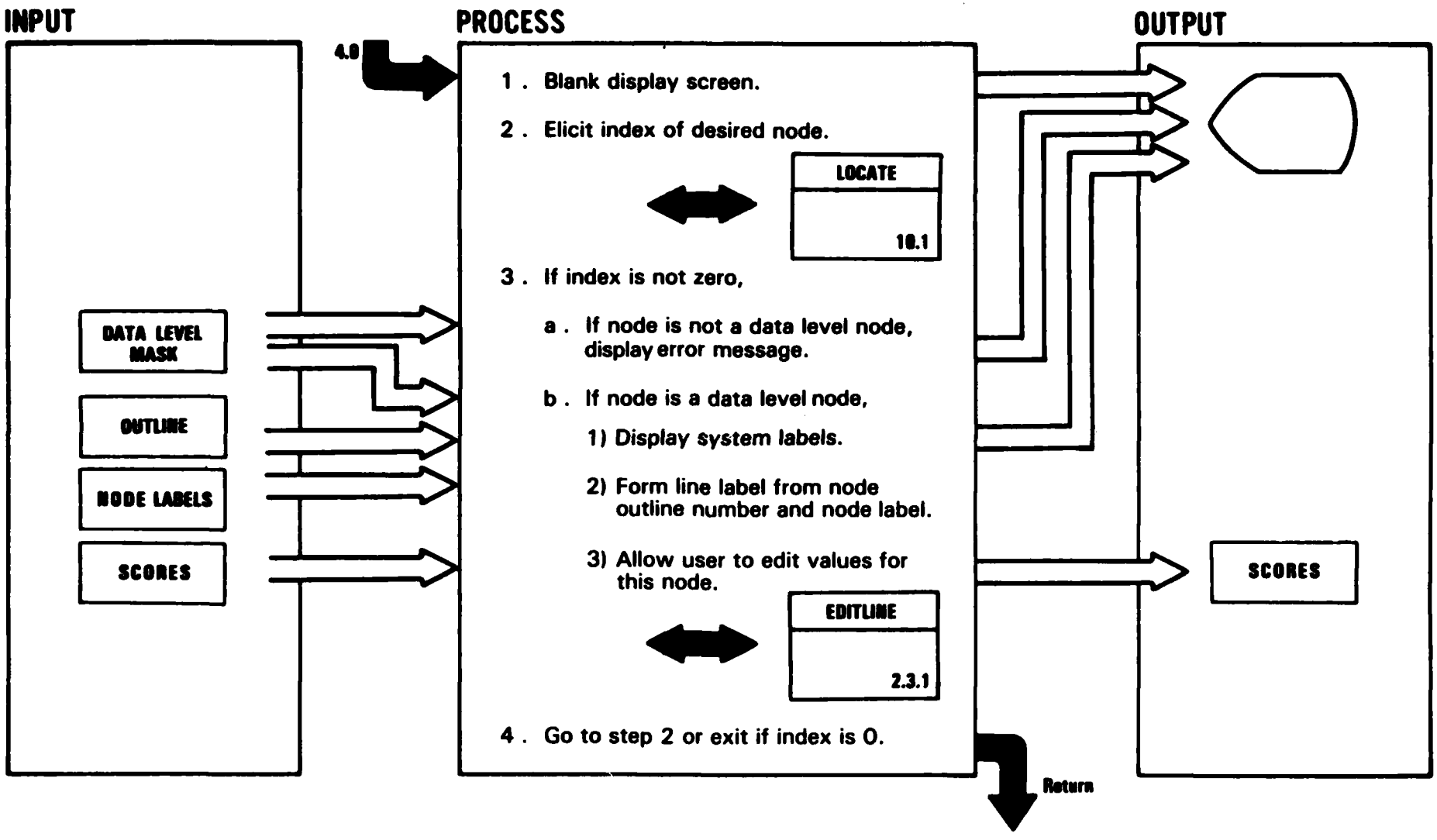
4.2

Return

60

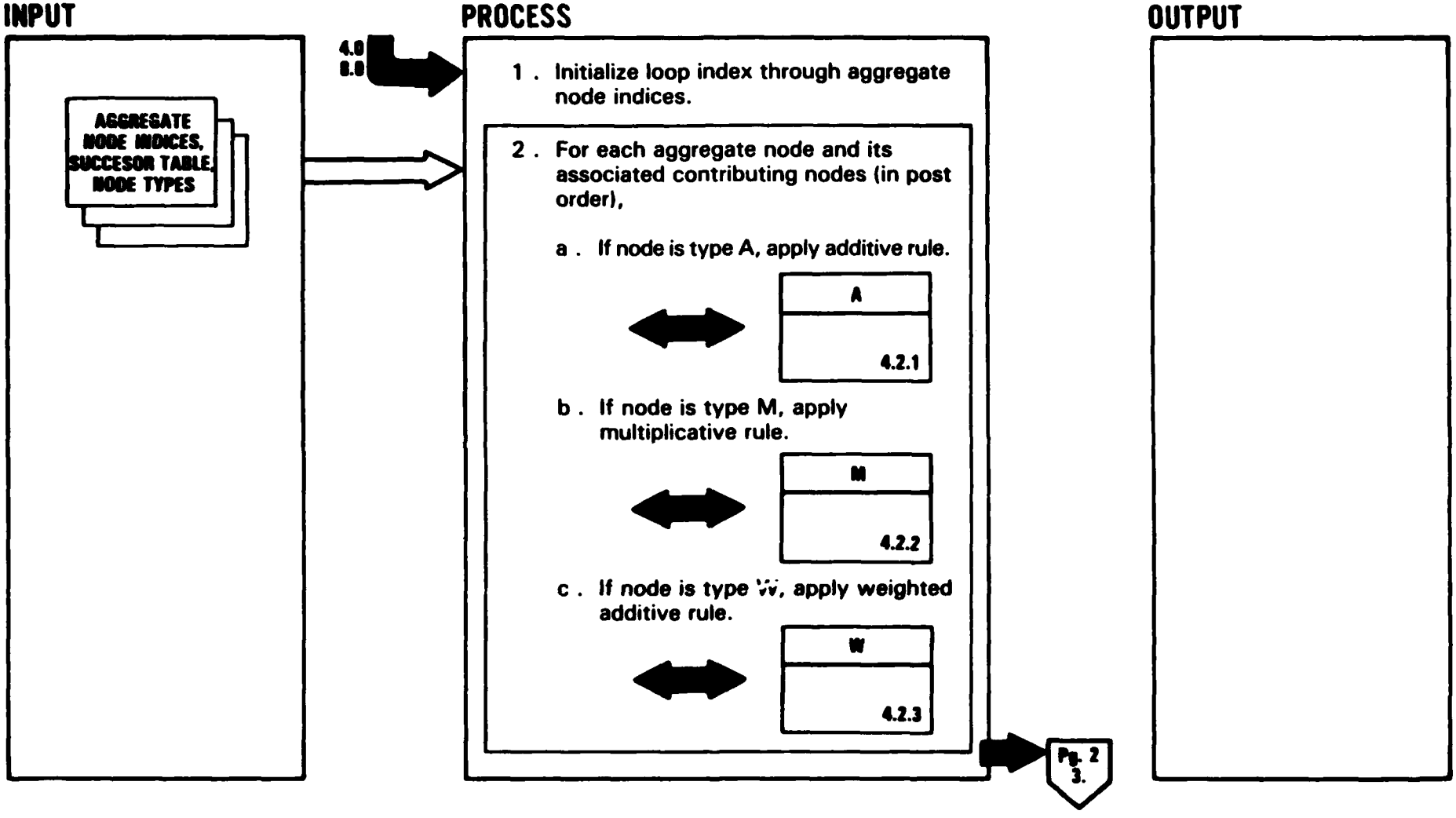
System/Program: RUN Name: EDITSC

Diagram ID: 4.1 Description: Edit Data Level Node Scores Page: ___ of ___



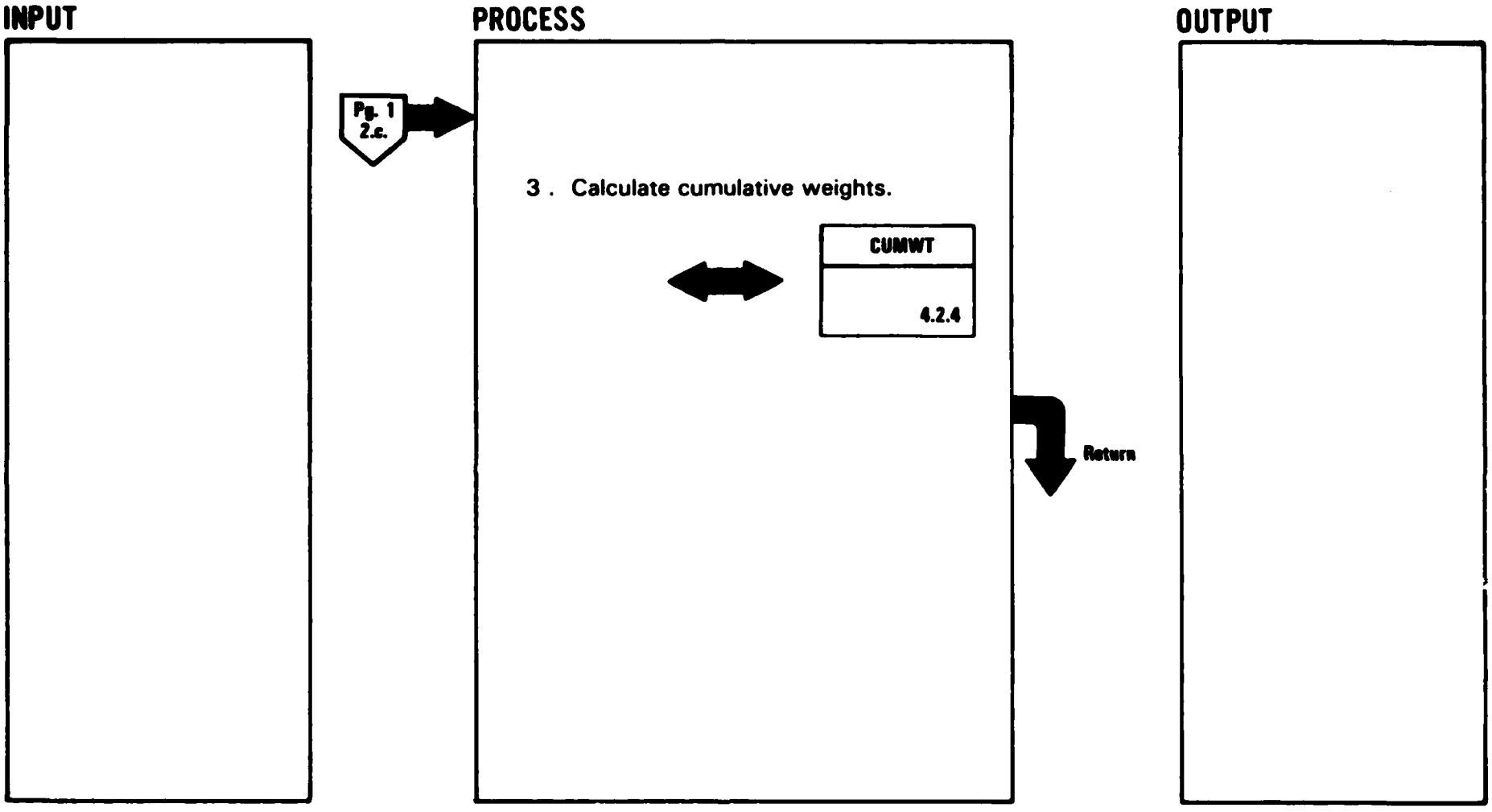
System/Program: RUN Name: ROLLBACK

Diagram ID: 4.2 Description: Calculate Model Page: 1 of 2



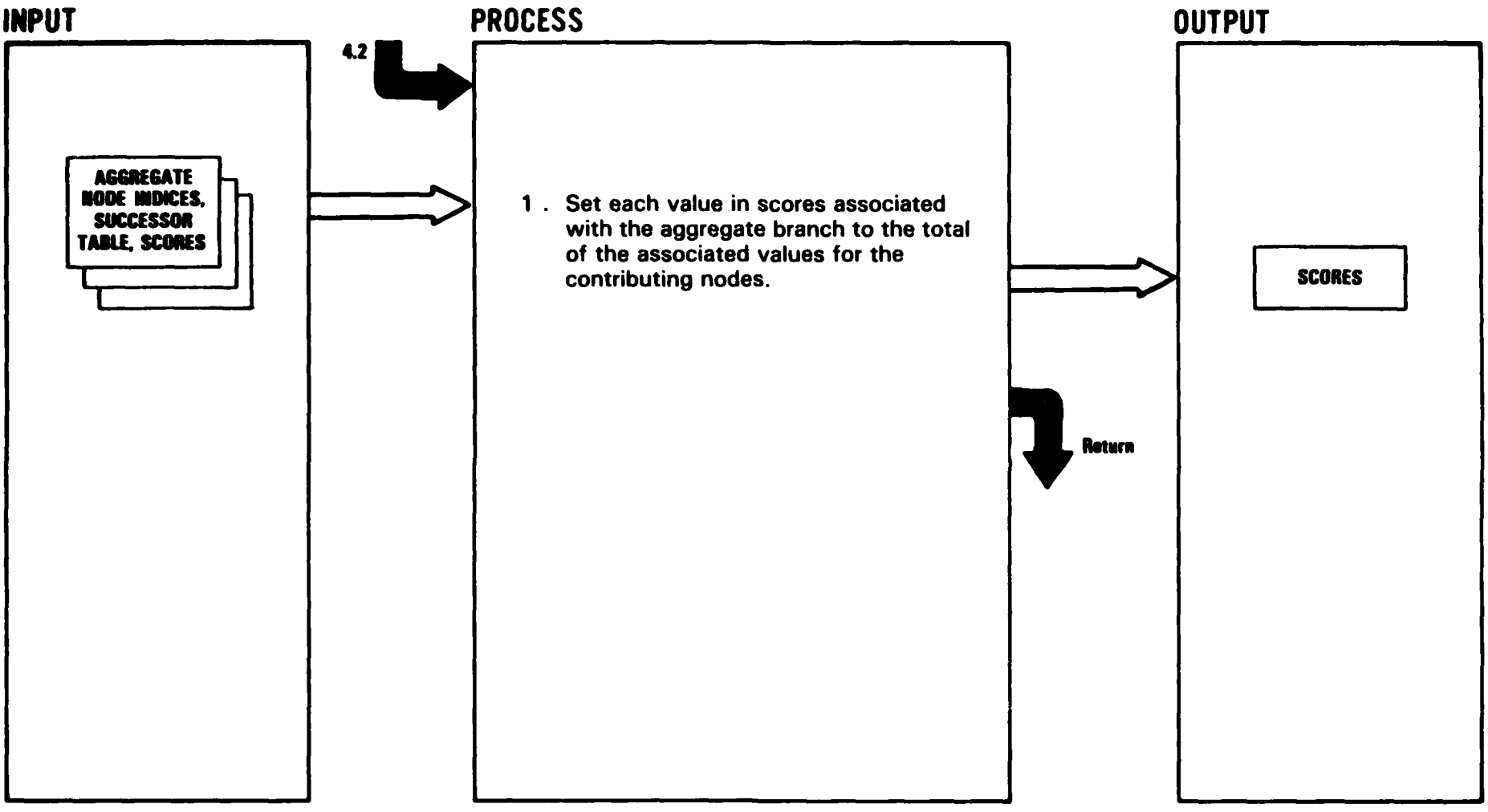
System/Program: RUN Name: ROLLBACK

Diagram ID: 4.2 Description: Calculate Model Page: 2 of 2



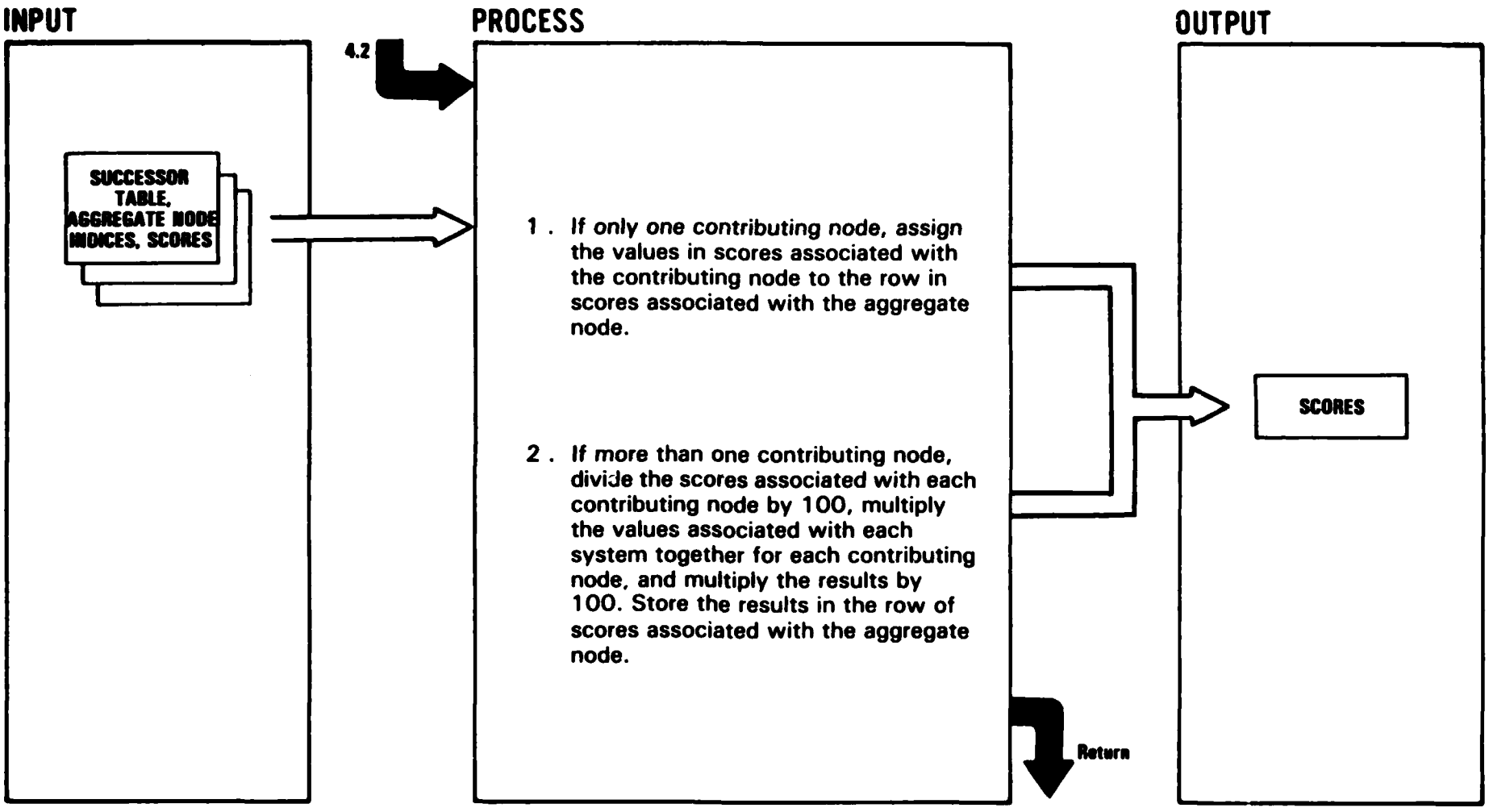
System/Program: RUN Name: A

Diagram ID: 4.2.1 Description Calculate Type A Page: ____ of ____



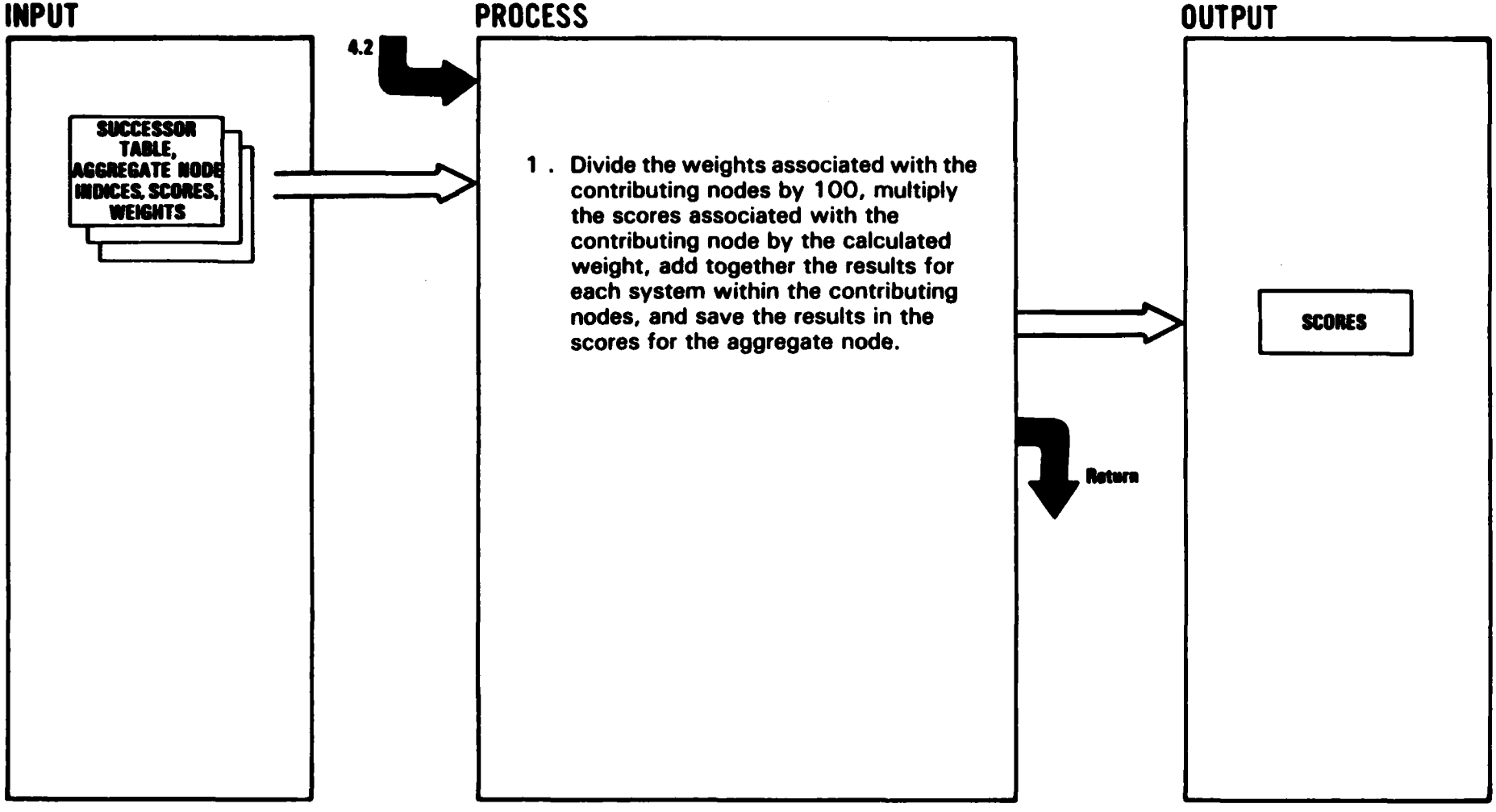
System/Program: RUN Name: M

Diagram ID: 4.2.2 Description: Calculate Type M Page: ____ of ____



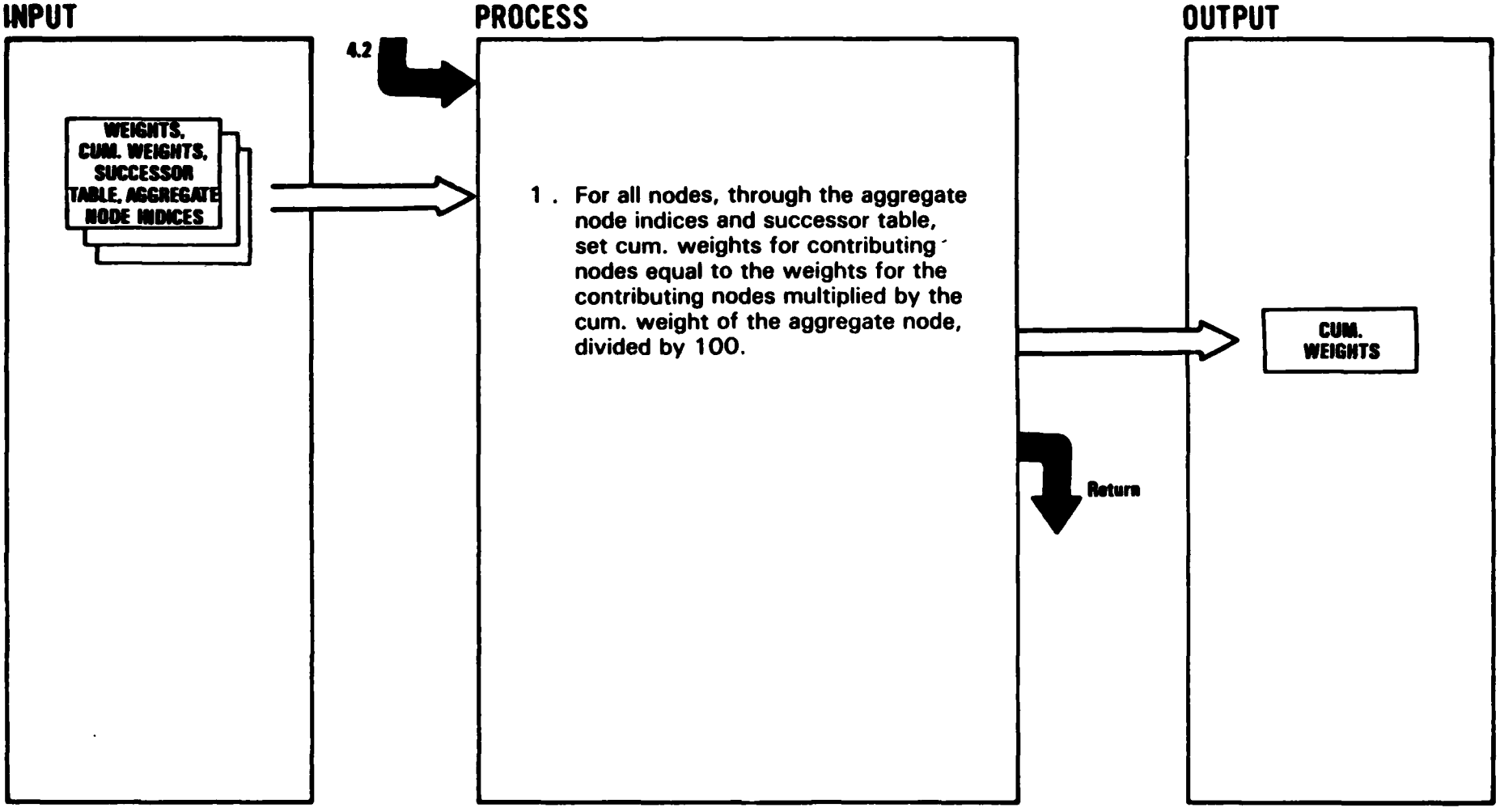
System/Program: RUN Name: W

Diagram ID: 4.2.3 Description: Calculate Type W Page: ____ of ____



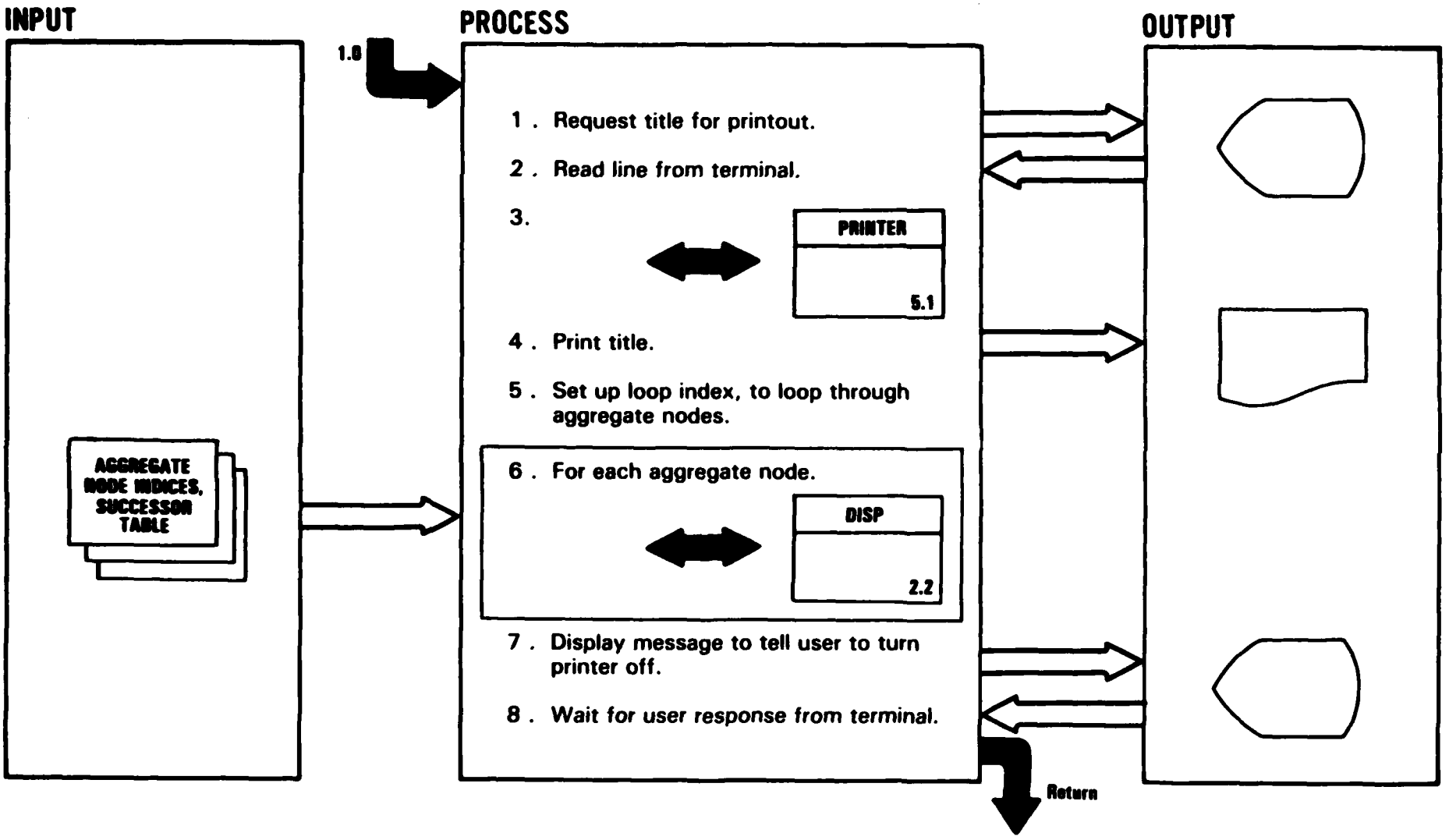
System/Program: RUN Name: CUMWT

Diagram ID: 4.2.4 Description: Calculate Cumulative Weight Page: ____ of ____



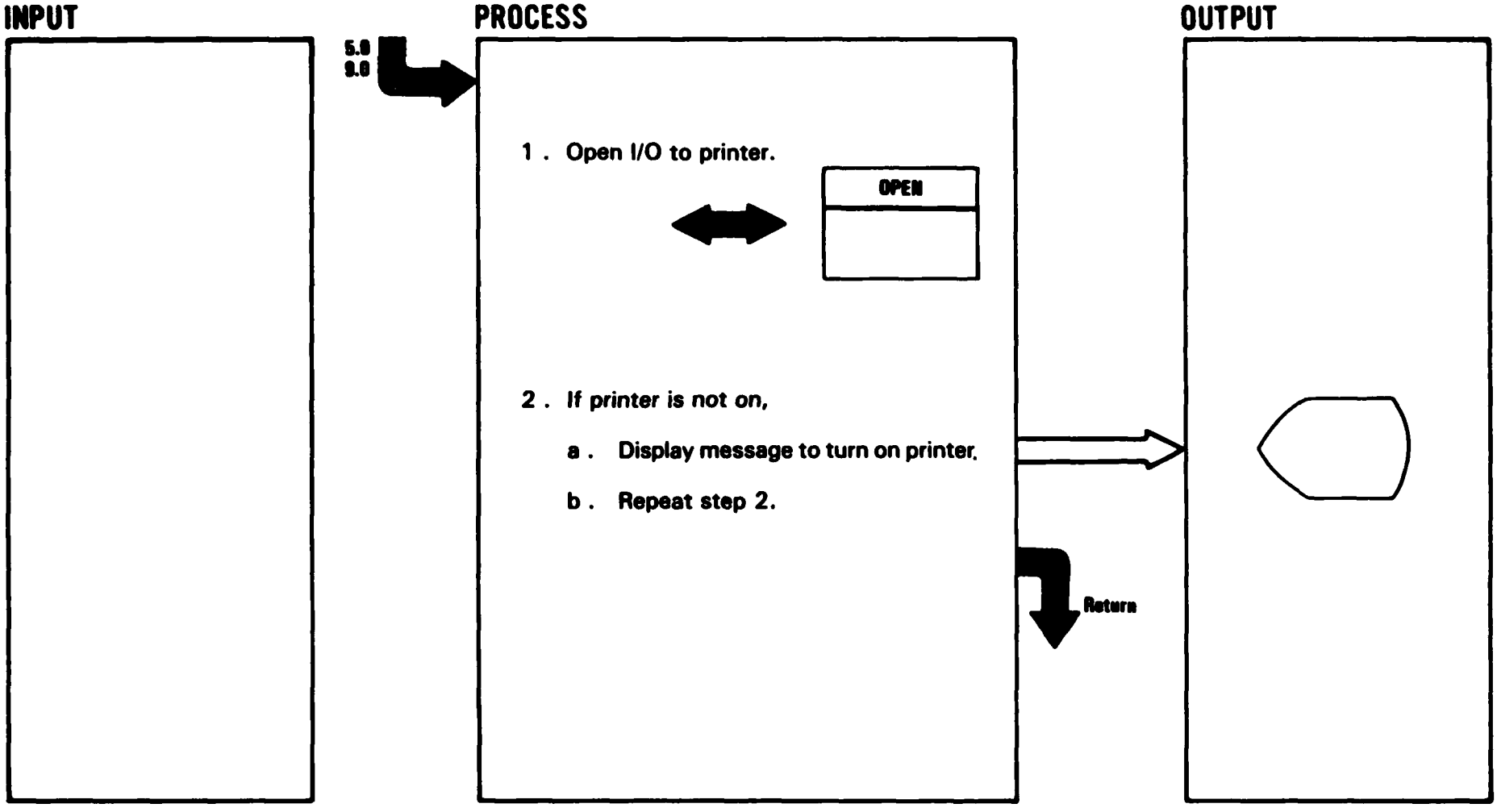
System/Program: RUN Name: SHOWALL

Diagram ID: 5.0 Description: Print Results Page: ___ of ___



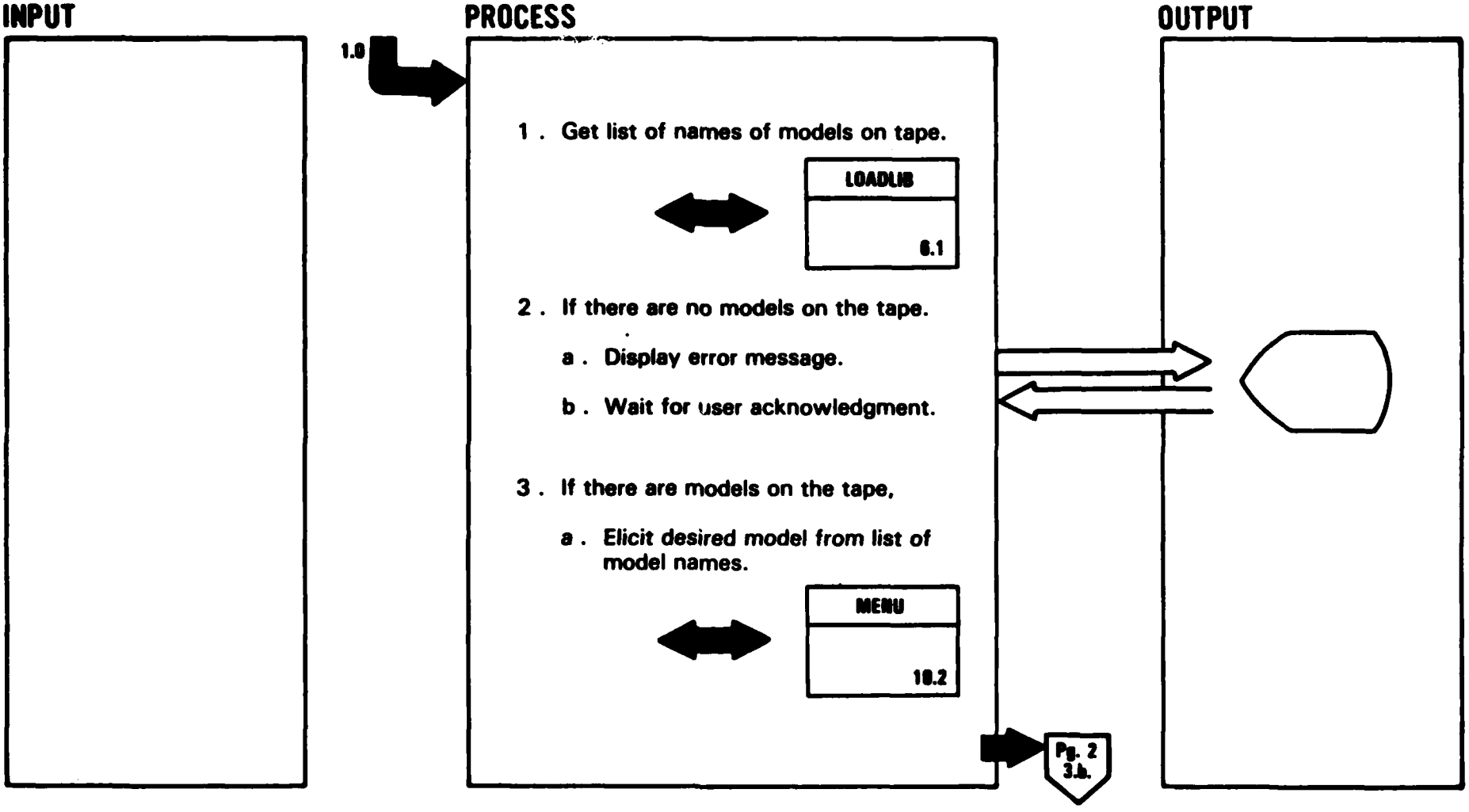
System/Program: RUN Name: PRINTER

Diagram ID: 5.1 Description Page: ___ of ___



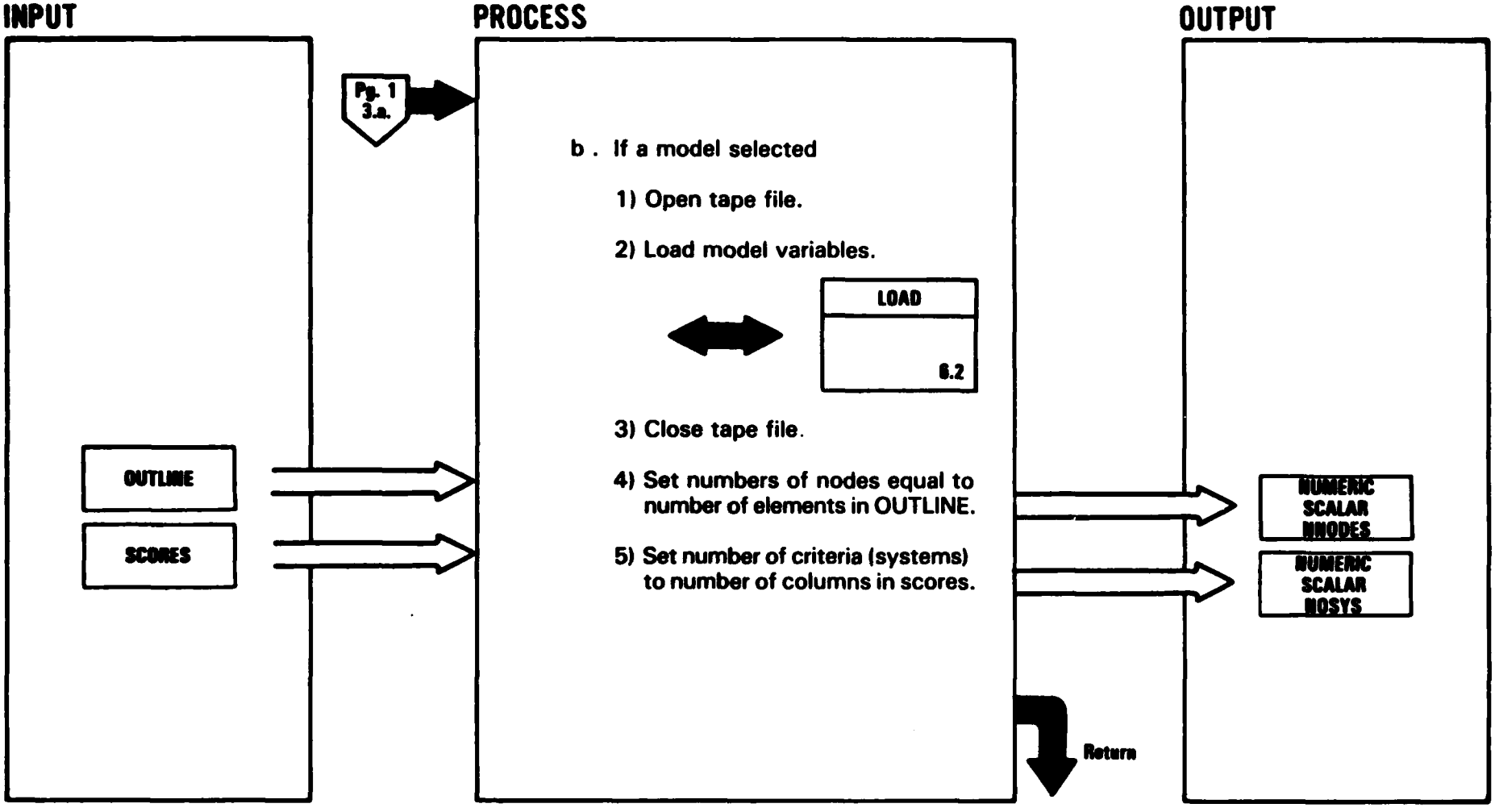
System/Program: RUN Name: LOADDRIVE

Diagram ID: 6.0 Description: Load Model From Tapes Page: 1 of 2



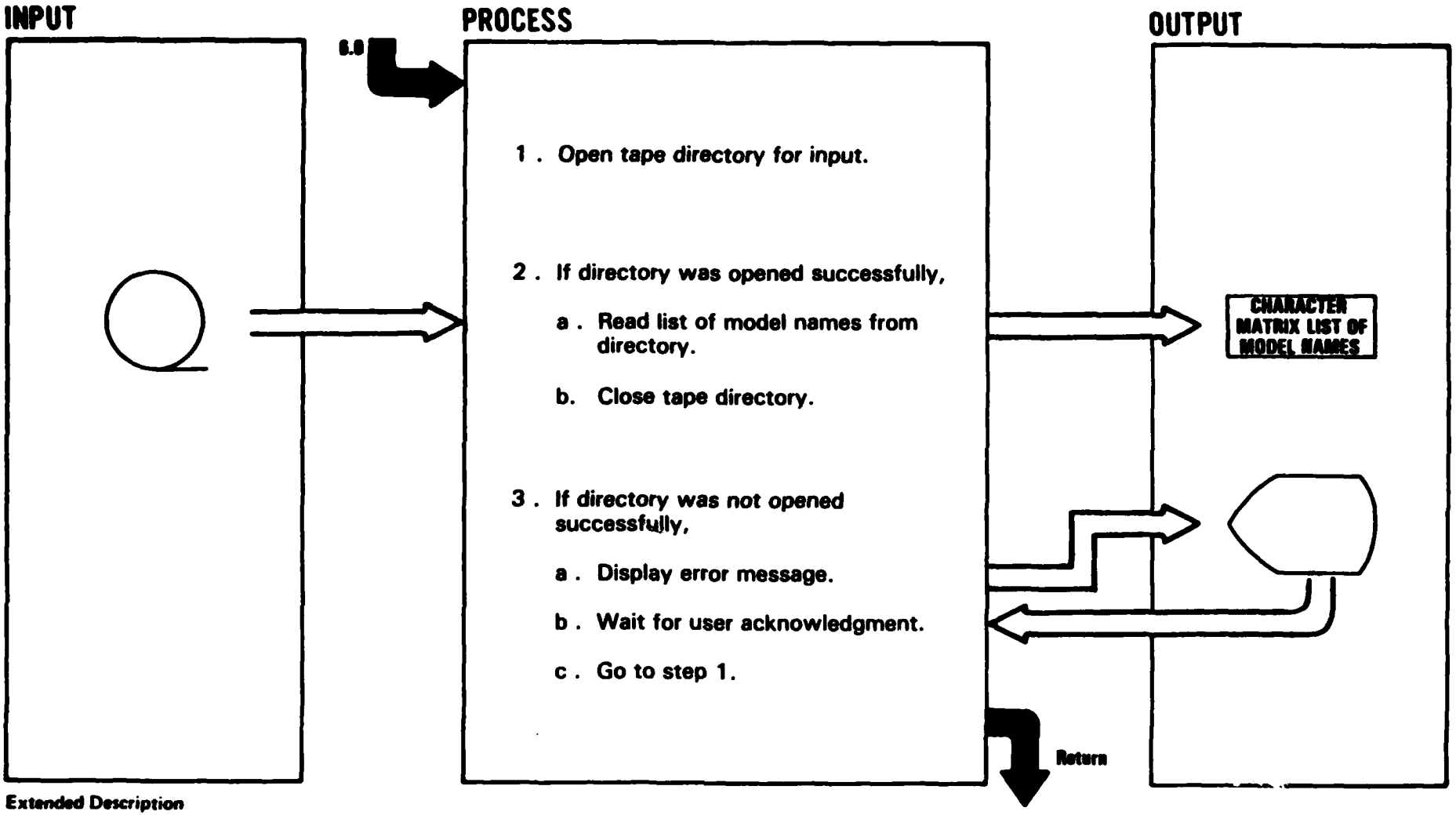
System/Program: RUN Name: LOADDRIVE

Diagram ID: 6.0 Description: Load Model From Tapes Page: 2 of 2



System/Program: RUN Name: LOADLIB

Diagram ID: 6.1 Description Load List of Model Names Page: ___ of ___

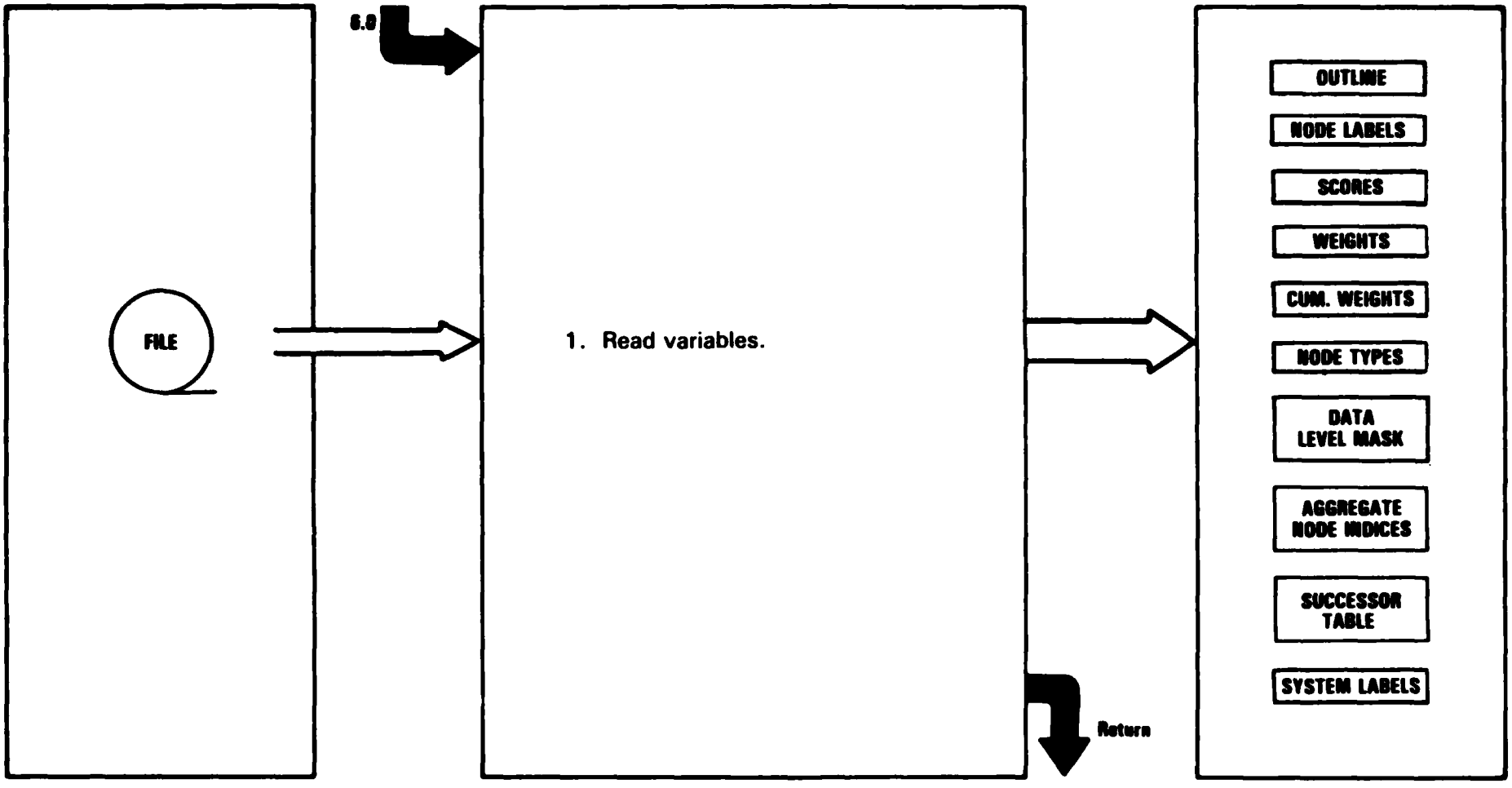


Extended Description

Position of model names within list indicates where models are stored on tape.

System/Program: RUN Name: LOAD

Diagram ID: 6.2 Description: Load Model Variables Page: 1 of 2



Extended Description

1. The OUTLINE TABLE contains an element for each node in the model, sorted in increasing numerical sequence order. The value is an encoded representation of the node outline number supplied for a node when the model structure is created.

2. The NODE LABELS contain descriptions (one per node in the same order as the outline table) of nodes that are supplied when the model structure is created.

3. SCORES is a numeric array which contains a set of values for each node of the structure. Each set of values consists of one number per system defined in the model.

4. WEIGHTS is a numeric vector containing the relative-importance values assigned to each node in the model structure. The elements must appear in the same order as the associated outline numbers. When a model structure is created, the vector is null or contains zeros.

5. For each element in the node outline table, there is an associated element in the CUMULATIVE WEIGHTS vector. The vector will contain the percentage of importance with respect to the entire model when all WEIGHTS have been entered.

6. The NODE TYPES are indicators of the type of calculation that is to be used in assessing SCORES and WEIGHTS.

System/Program: RUN Name: LOAD

Diagram ID: 6.2 Description Load Model Variables Page: 2 of 2

INPUT	PROCESS	OUTPUT

Extended Description

7. The DATA LEVEL MASK indicates which nodes are at the data level (bottom level) versus the nodes that are aggregate or non-bottom-level nodes.

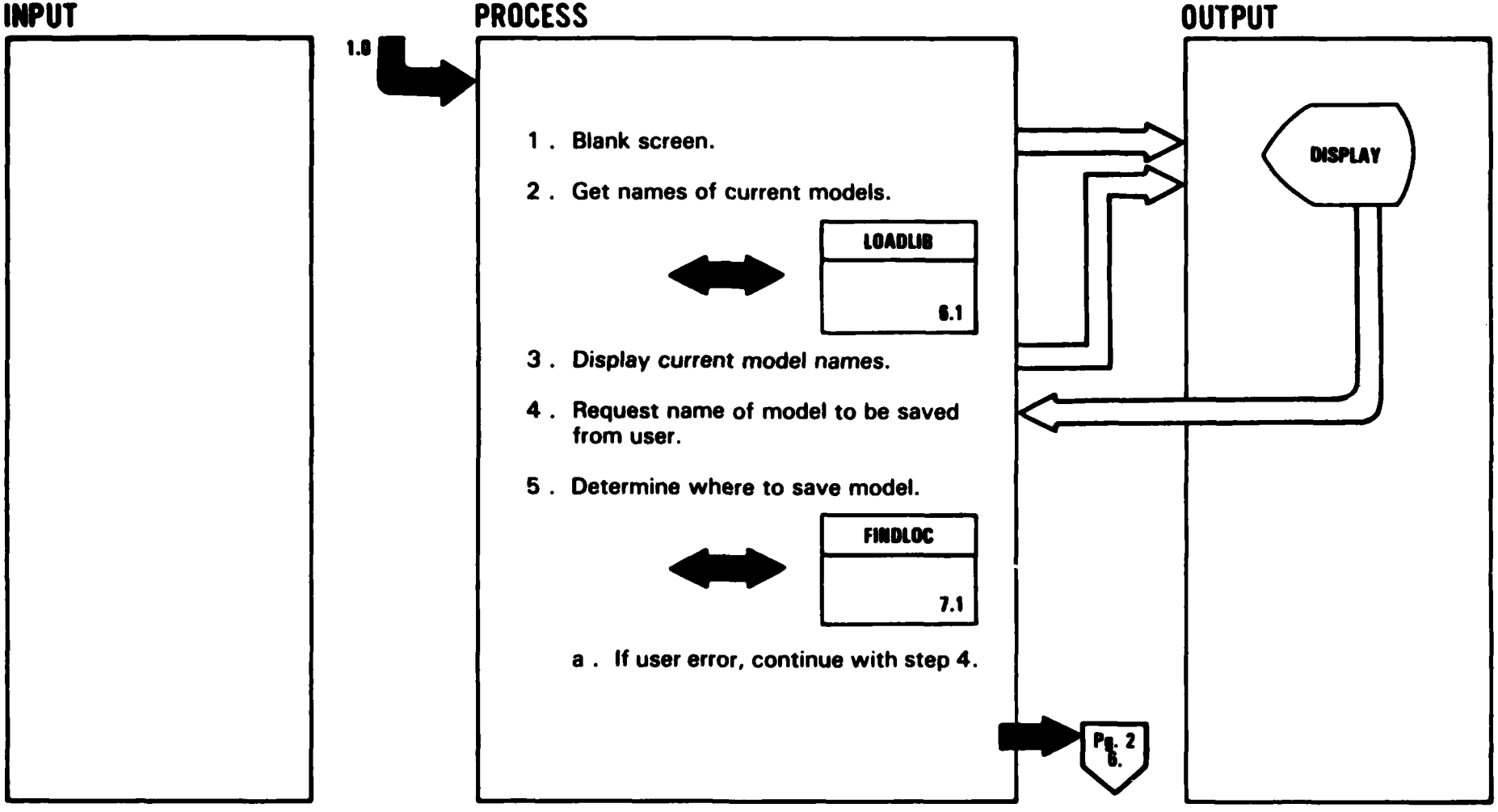
8. The AGGREGATE NODE INDICES contain the sequence number of elements in the model variables which correspond to only the aggregate nodes. An Aggregate node is a node which has one or more subsequent nodes contributing to it.

9. The SUCCESSOR TABLE is an array which contains, for each aggregate node, the set of indices of nodes which contribute to a node.

10. The SYSTEMS LABELS contain the user-specified character descriptions of the systems being evaluated.

System/Program: RUN Name: SAVEDRIVE

Diagram ID: 7.0 Description Page: 1 of 2



System/Program: RUN Name: SAVEDRIVE

Diagram ID: 7.0 Description Page: 2 of 2

INPUT

PROCESS

OUTPUT

6 . If model to be saved,

a . Open tape file.

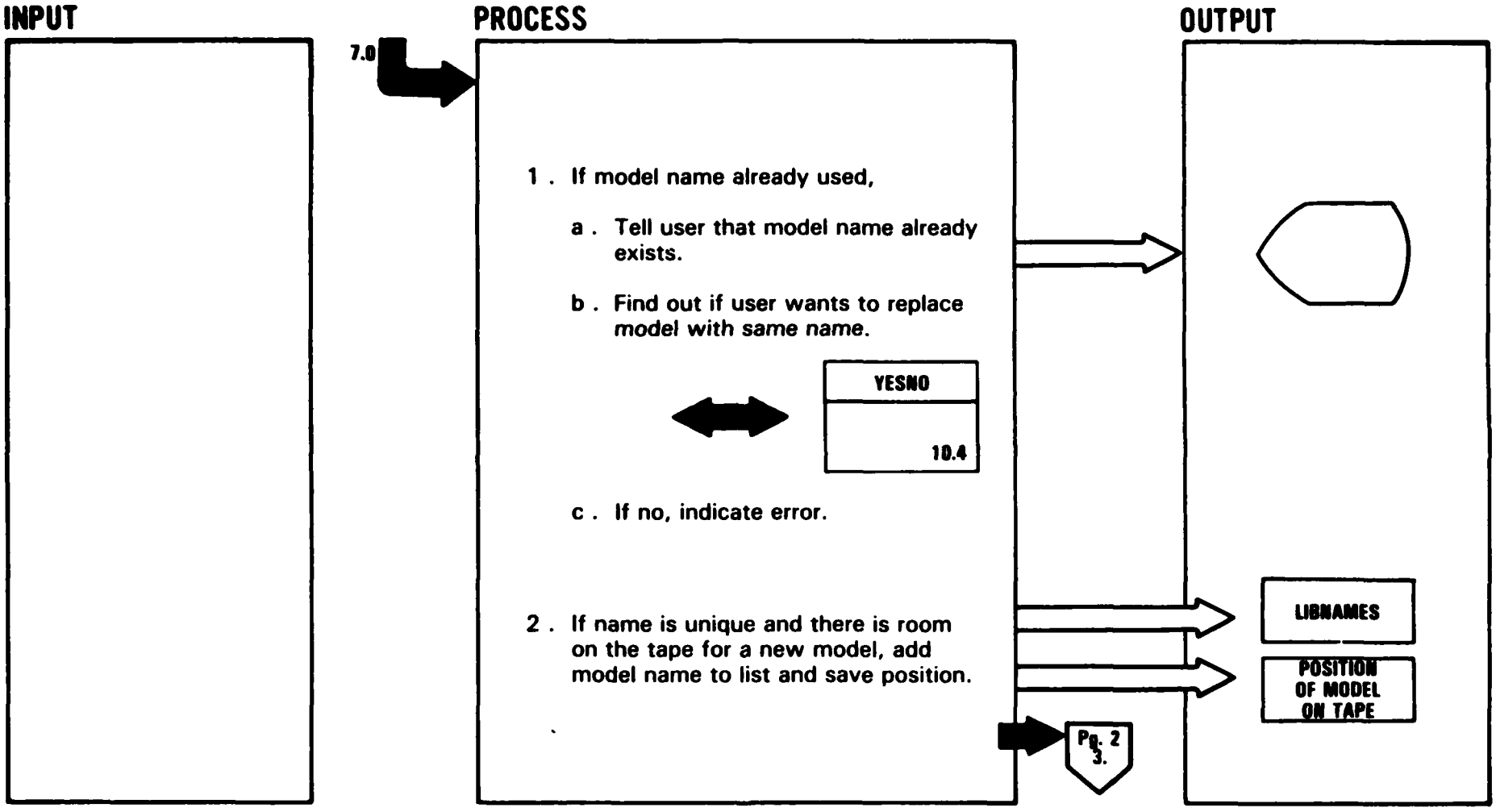
b . Save model variables.

c . Close tape file.

d . Save library.

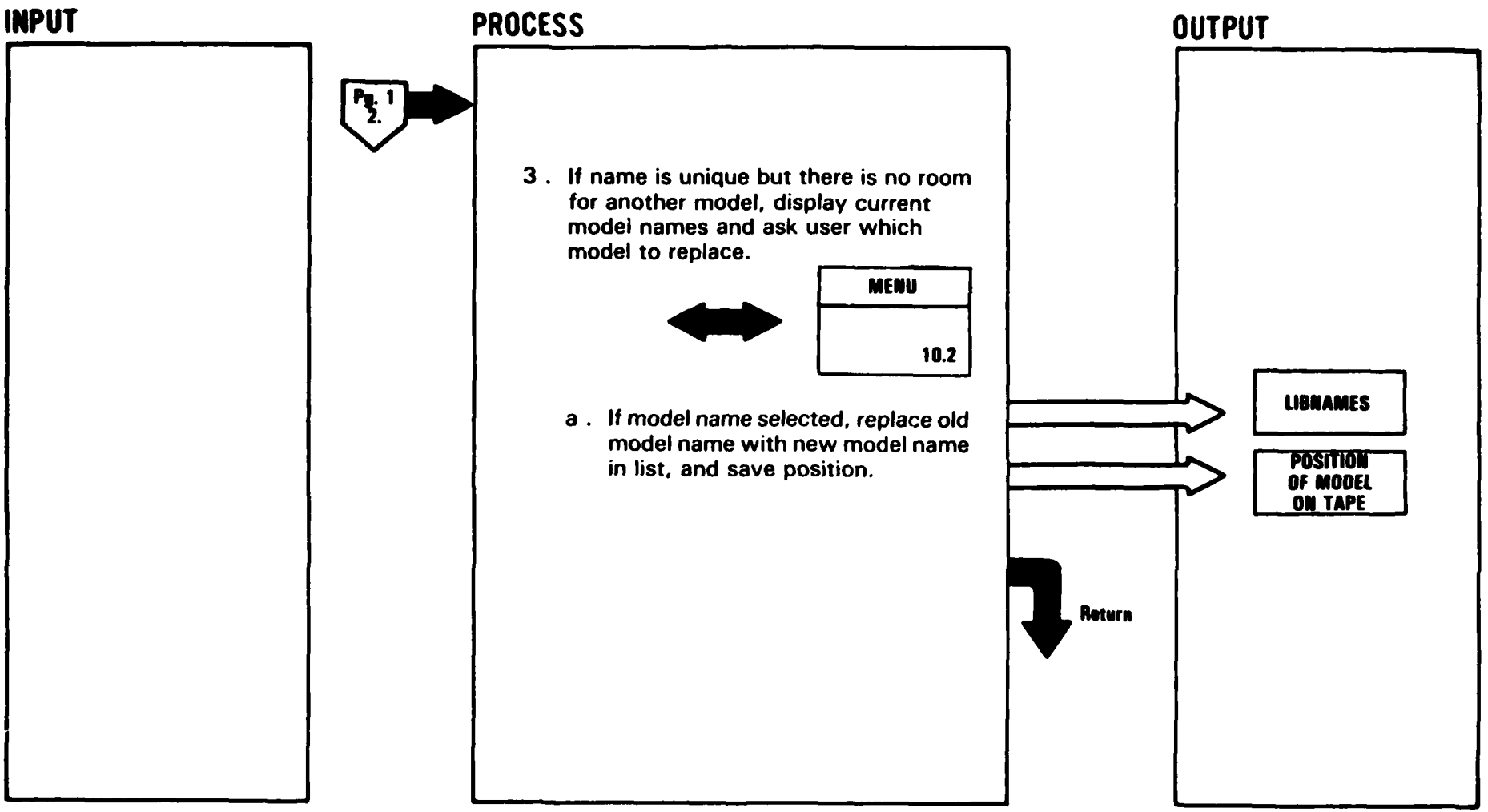
System/Program: RUN Name: FINDLOC

Diagram ID: 7.1 Description: Determine Where to Save Model Page: 1 of 2



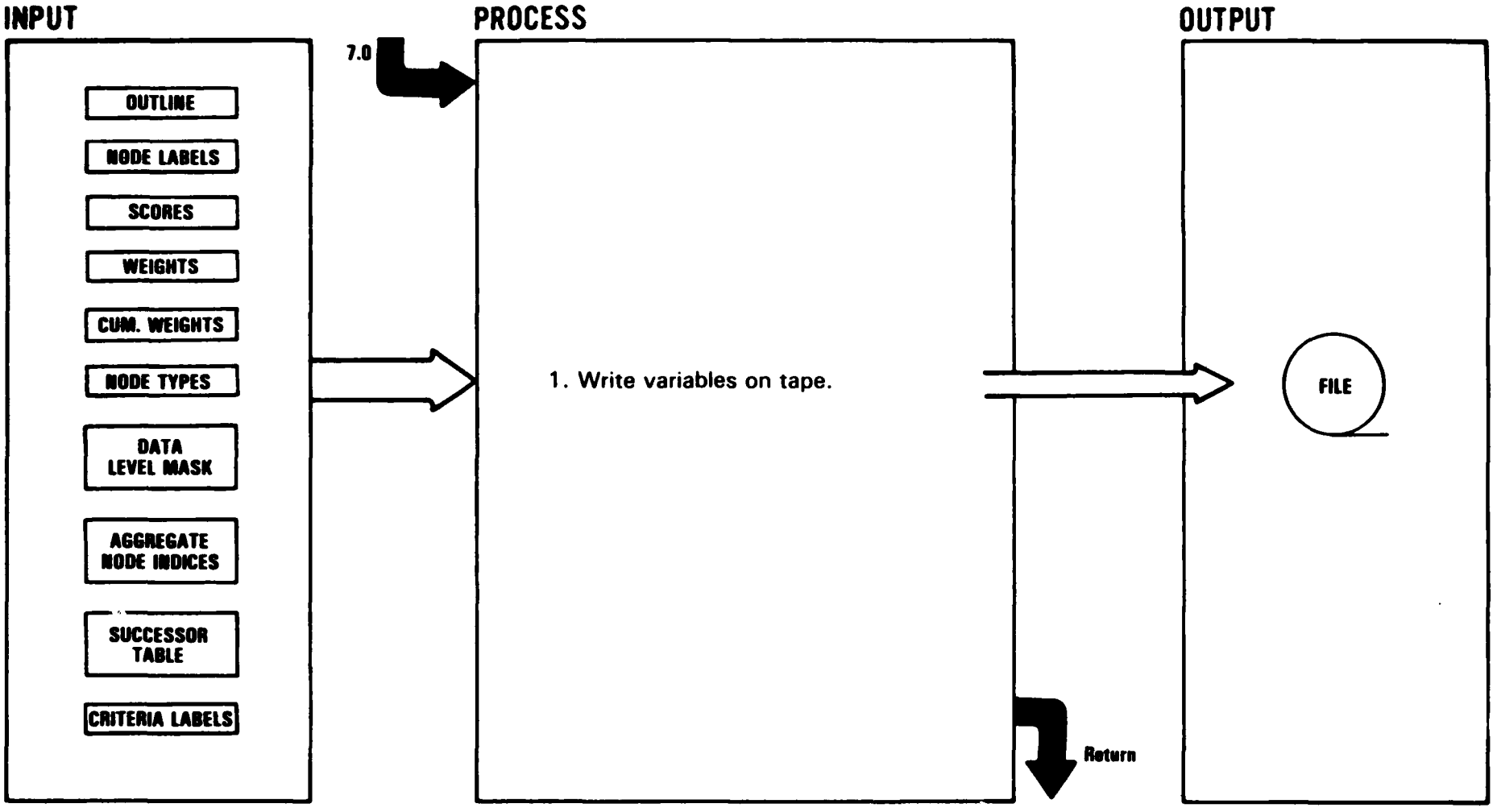
System/Program: RUN Name: FINDLOC

Diagram ID: 7.1 Description: Determine Where to Save Model Page: 2 of 2



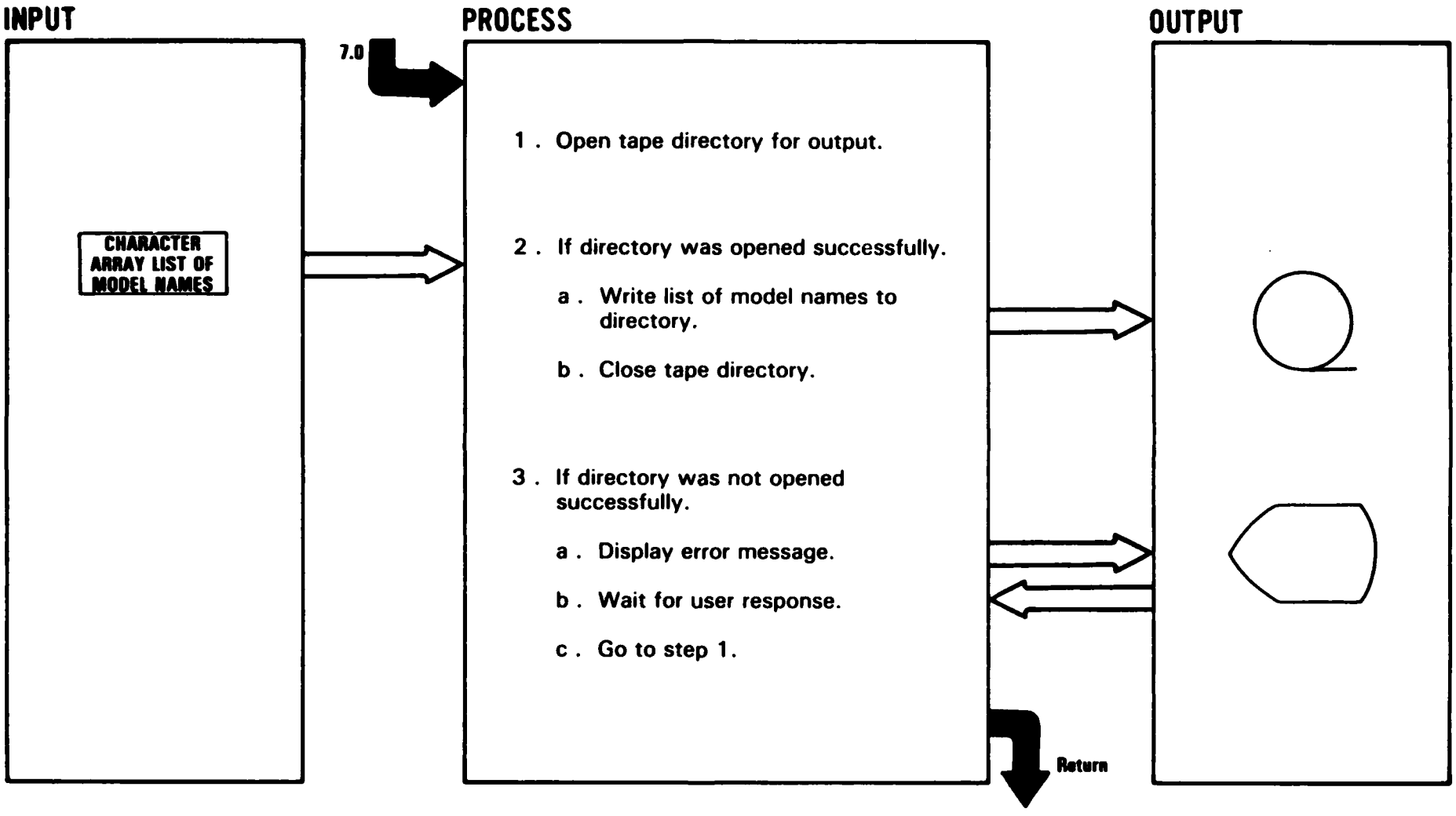
System/Program: RUN Name: SAVE

Diagram ID: 7.2 Description: Save Model Variables on Tape Page: ___ of ___



System/Program: RUN Name: SAVLIB

Diagram ID: 7.3 Description: Save List of Model Names Page: ____ of ____



System/Program: RUN Name: NEWDATA

Diagram ID: 8.0 Description Page: 1 of 2

INPUT

PROCESS

OUTPUT

1.0

1 . Give the user the option to enter scores or enter weights.

MENU

10.2

2 . If enter scores selected.

LOADSCORE

8.1

3 . If enter weights selected.

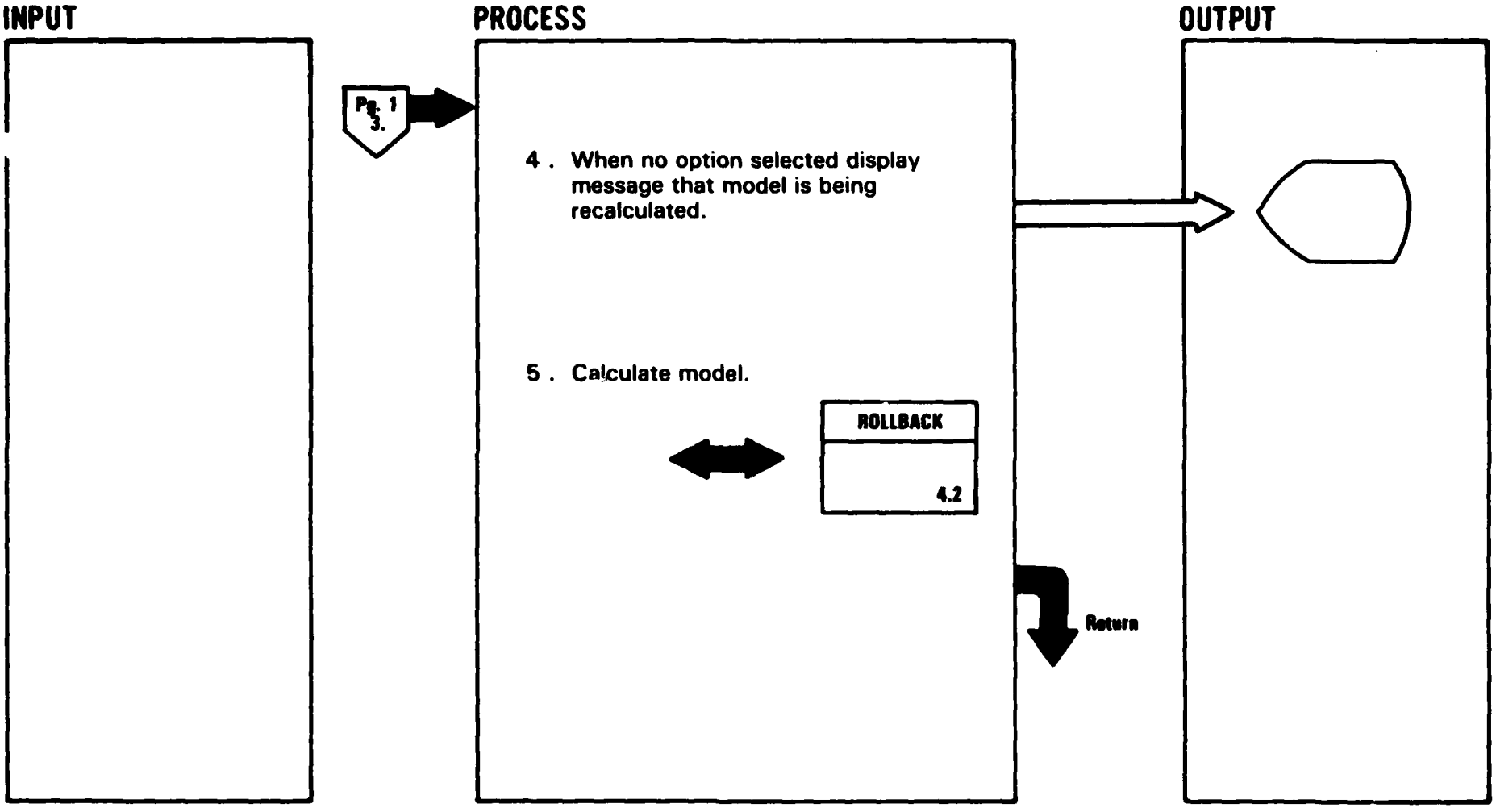
NEWWEIGHT

8.2

Pg. 2 4.

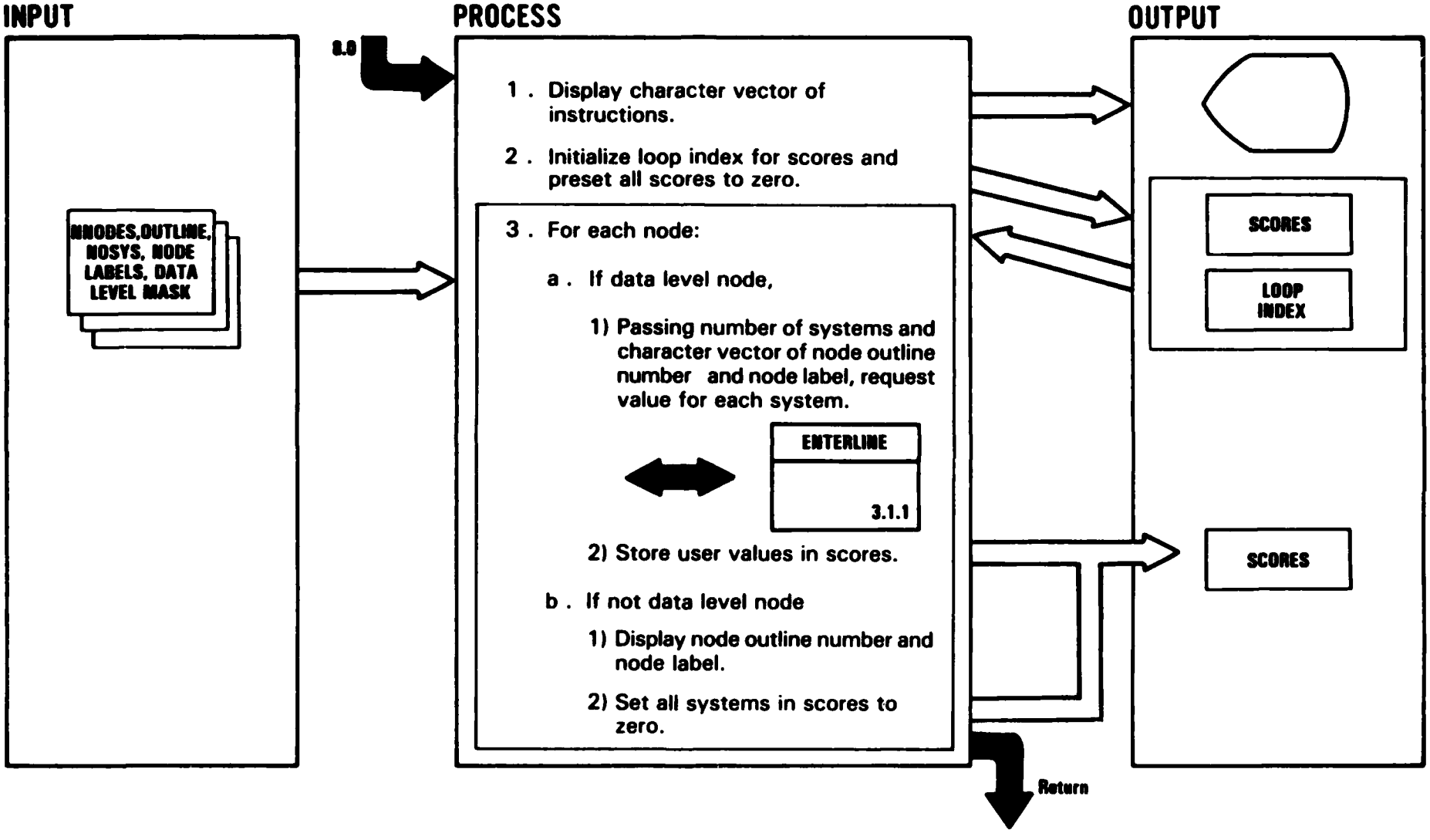
System/Program: RUN Name: NEWDATA

Diagram ID: 8.0 Description Page: 2 of 2



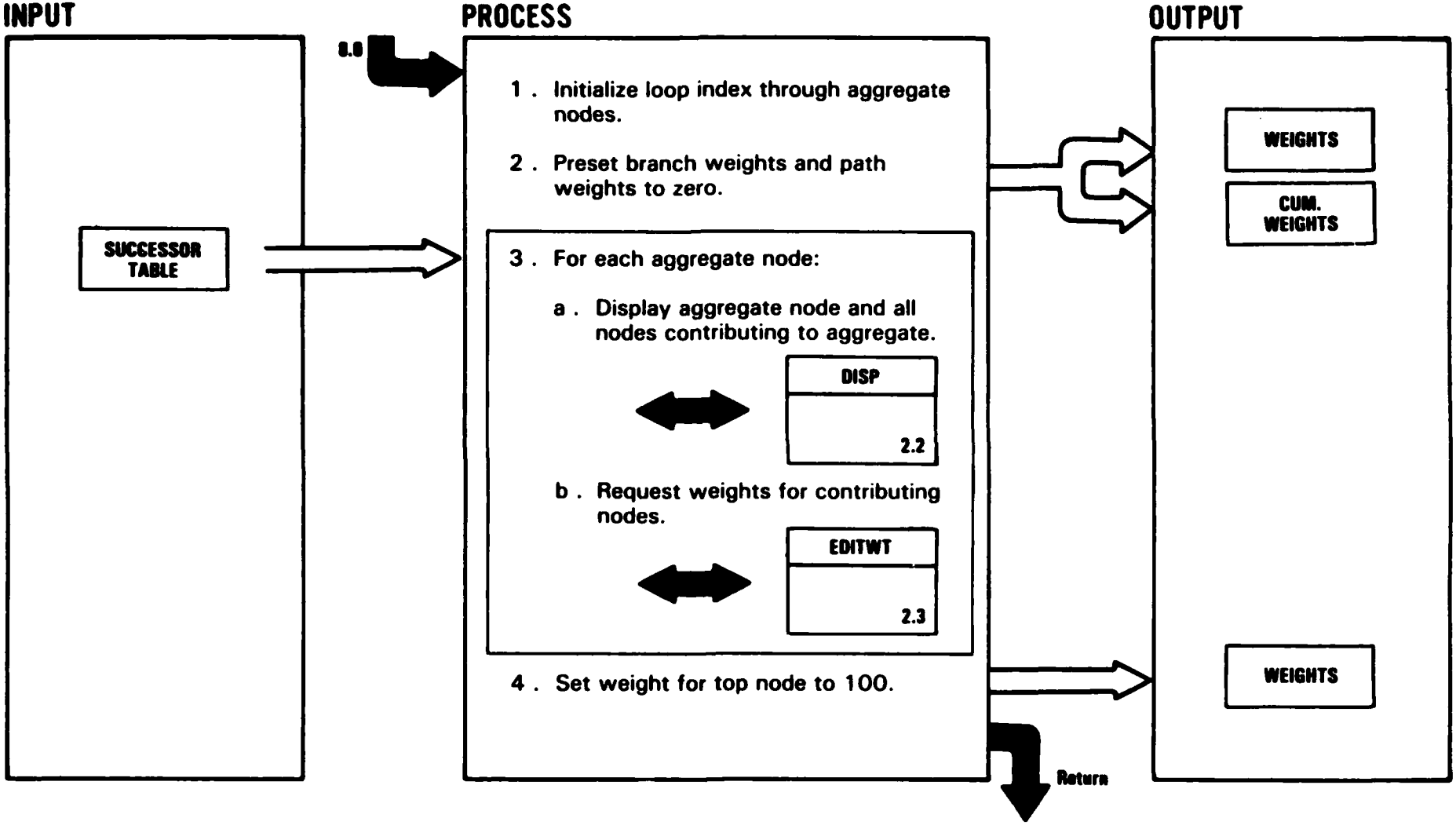
System/Program: RUN Name: LOADSCORE

Diagram ID: 8.1 Description: Enter All Scores Page: ___ of ___



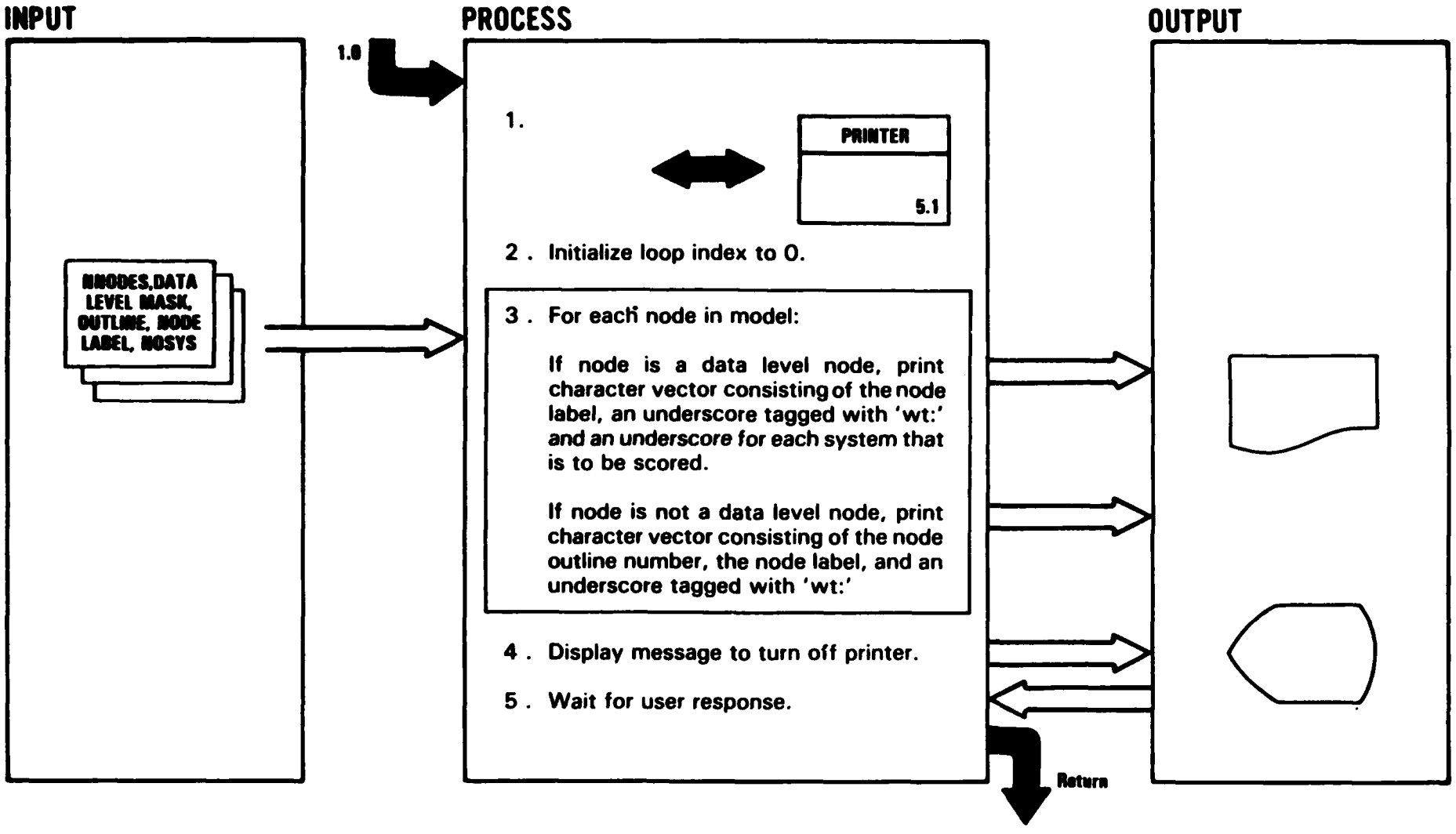
System/Program: RUN Name: NEWWEIGHT

Diagram ID: 8.2 Description: Enter All Weights Page: ____ of ____



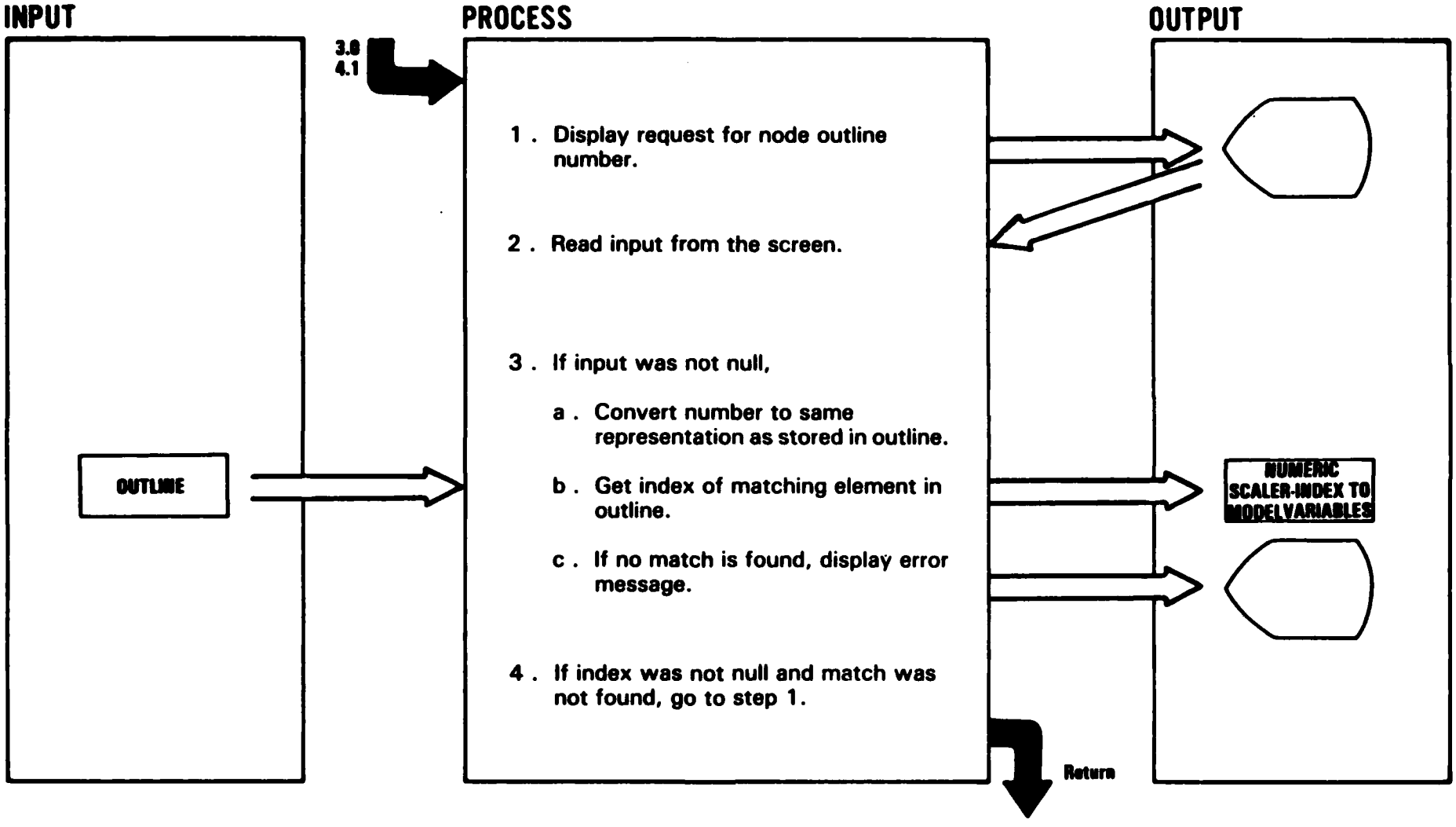
System/Program: RUN Name: DATASHEET

Diagram ID: 9.0 Description: Print Data Sheet Page: ____ of ____



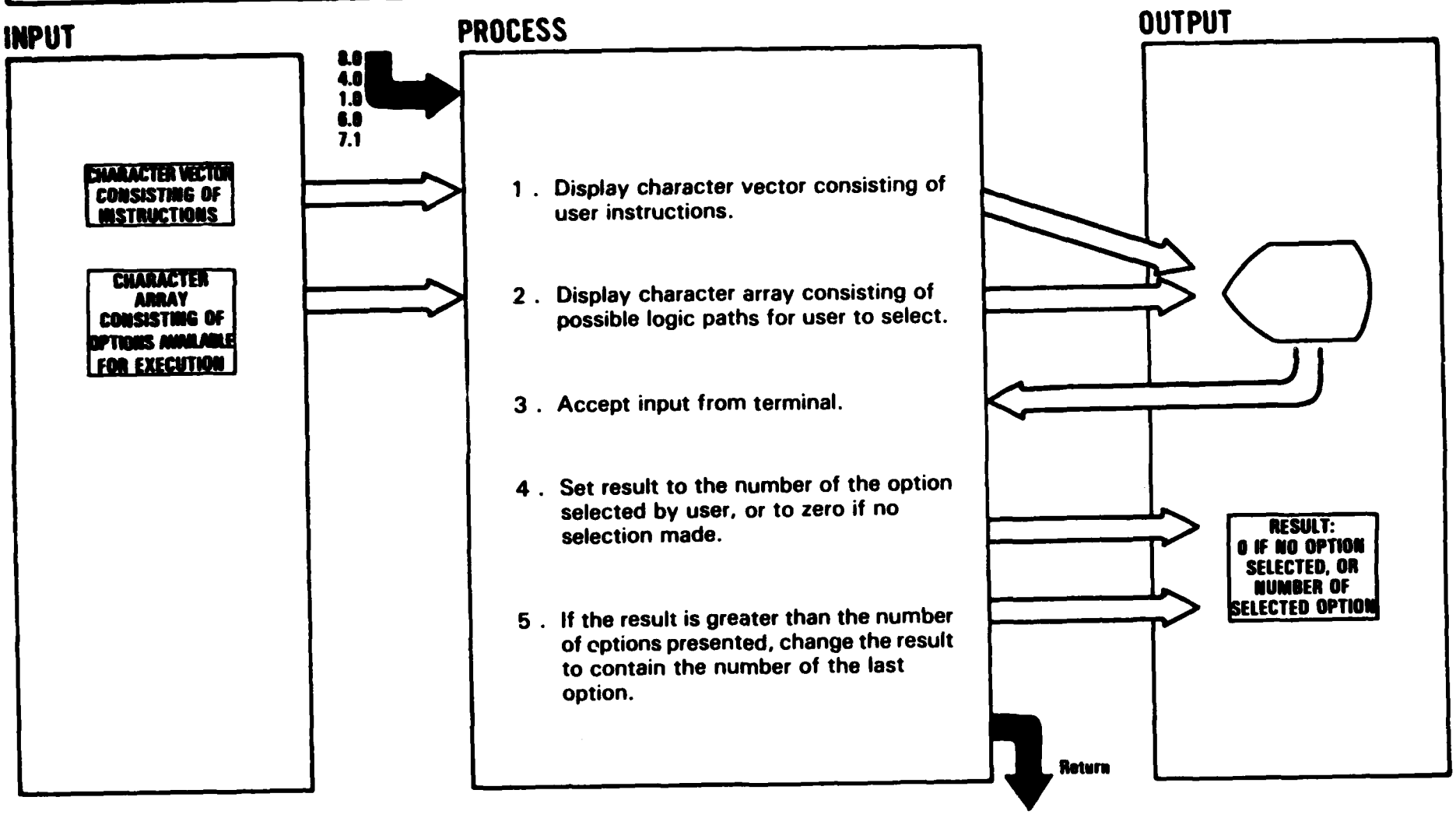
System/Program: RUN Name: LOCATE

Diagram ID: 10.1 Description: Elicit Node Number Page: ___ of ___



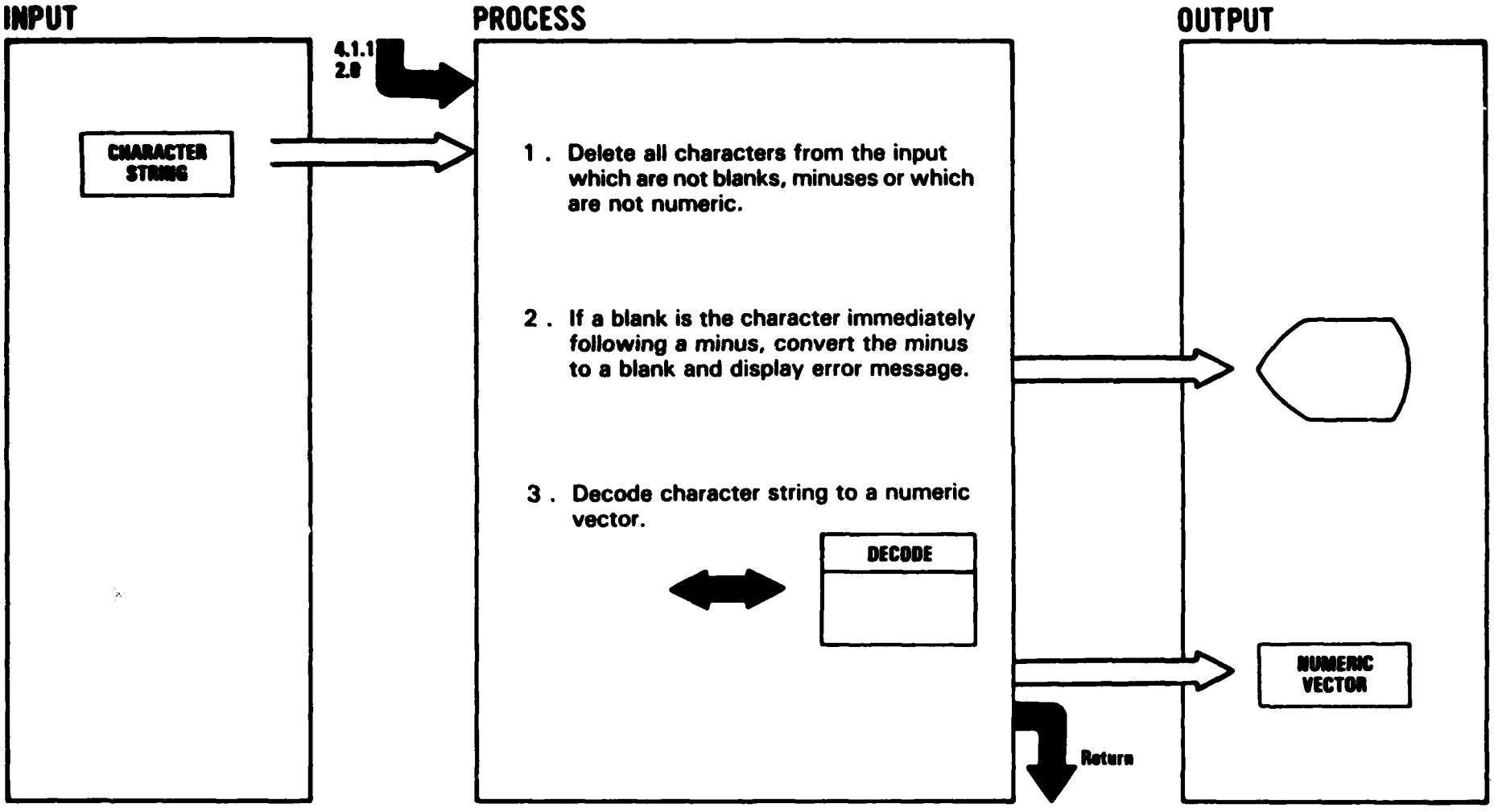
System/Program: RUN Name: MENU

Diagram ID: 10.2 Description: Present User Options Page: ___ of ___



System/Program: RUN Name: NUMBERSONLY

Diagram ID: 10.3 Description: Convert Character Numbers to Numeric Page: ____ of ____



System/Program: RUN Name: YESNO

Diagram ID: 10.4 Description Page: ___ of ___