

[54] **COMPUTER SYSTEM AND METHOD FOR DECISION TREE ANALYSIS**

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[21] Appl. No.: **955,823**

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**Related U.S. Application Data**

[63] Continuation of Ser. No. 537,305, Dec. 30, 1974, abandoned, which is a continuation of Ser. No. 397,555, Sep. 14, 1973, abandoned, which is a continuation of Ser. No. 174,100, Aug. 23, 1971, abandoned.

[51] Int. Cl.<sup>2</sup> ..... **G06F 15/20**

[52] U.S. Cl. .... **364/412; 364/300; 364/401**

[57] **ABSTRACT**

A tool to aid decision-makers in making non-programmed decisions in an uncertain environment. A small computer having graphic display capabilities is

combined with a program which provides the means for operating the computer directly by the decision-maker. Problems are stated in decision-tree format with the decision-maker providing probabilities for chance events, terminal values and points on his preference curve. The computer makes choices at decision nodes on the basis of maximization of expected value or utility and displays both the expectation of the project and the decision path. Automated sensitivity analysis is provided to determine those probabilities lying on the decision path which are most sensitive in changing either that path or the expectation. In addition, the effects of varying the probability of any selected branch may be determined. Instructions appear on the display and the user's response is by selecting a program alternate with the light pen or typing a numeral. All results are given on the display.

**52 Claims, 14 Sheets Drawing,  
171 Pages Specification**

The file of this unexamined application may be inspected and copies thereof may be purchased (849 O.G. 1221, Apr. 9, 1968).



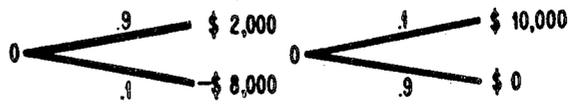


FIG. 4

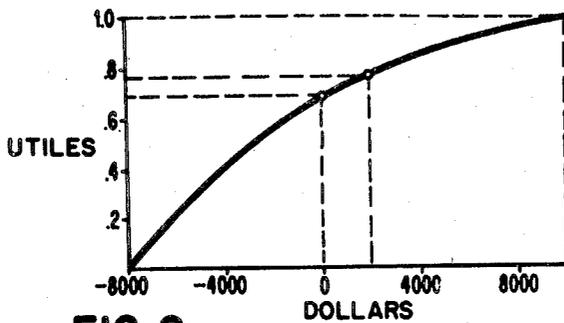


FIG. 2

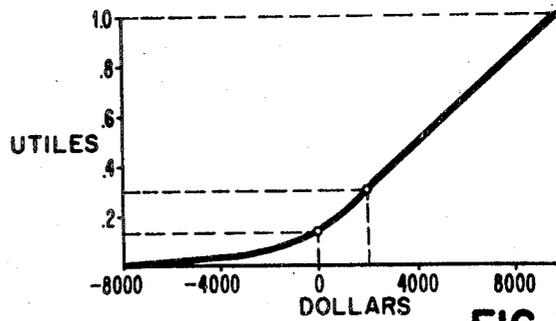


FIG. 3

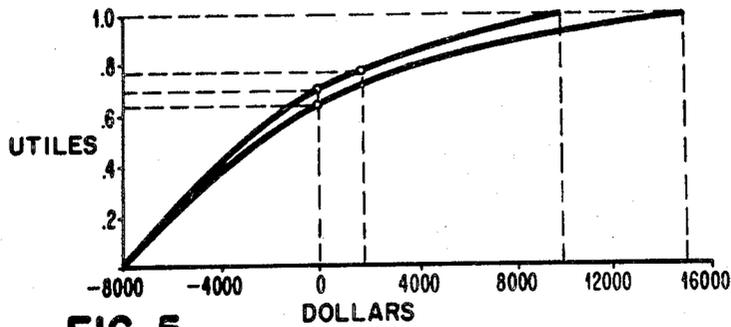


FIG. 5

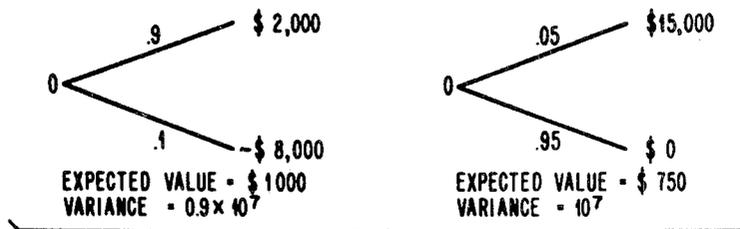


FIG. 4

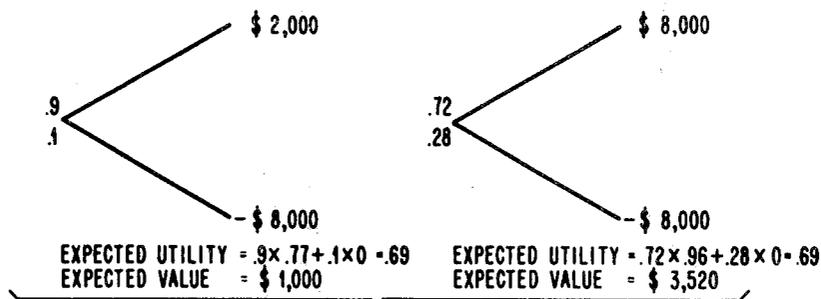


FIG. 6

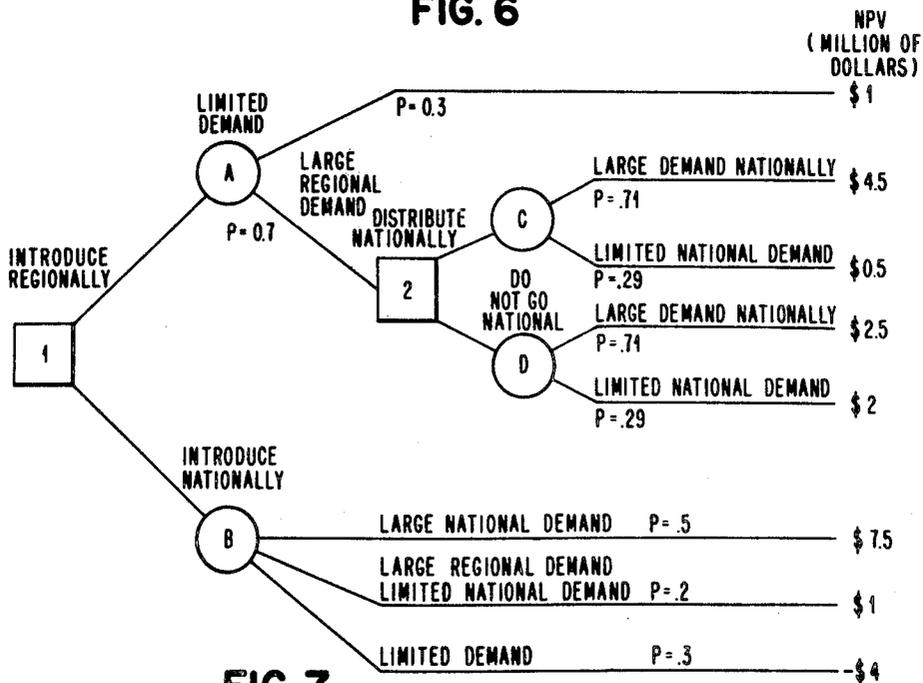
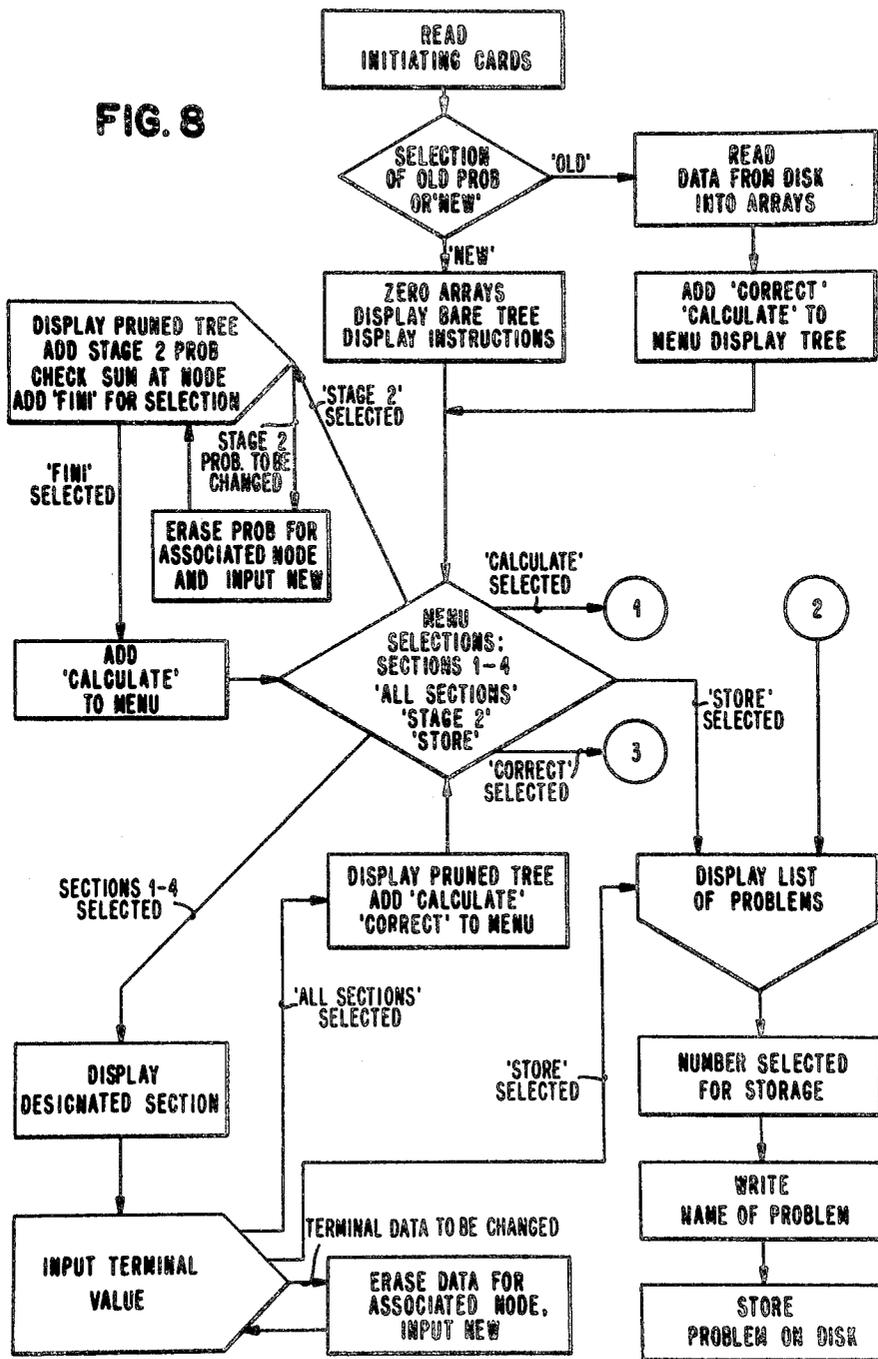


FIG. 7

FIG. 8



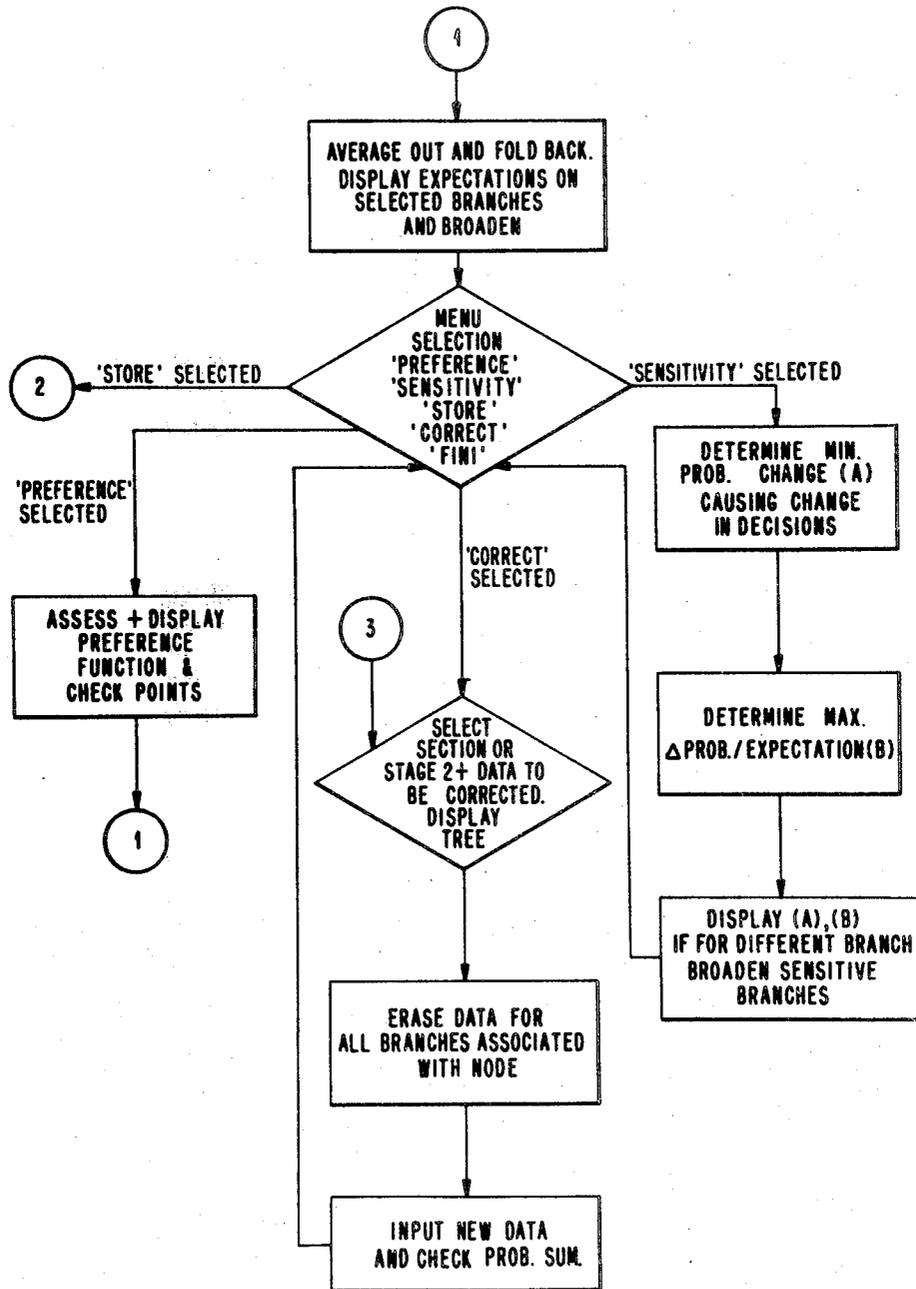
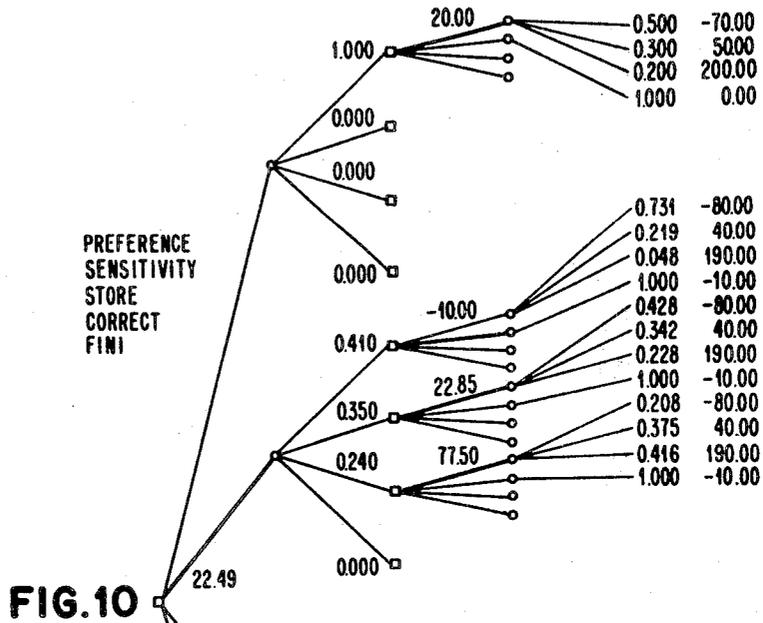


FIG. 9



PREFERENCE  
SENSITIVITY  
STORE  
CORRECT  
FINI

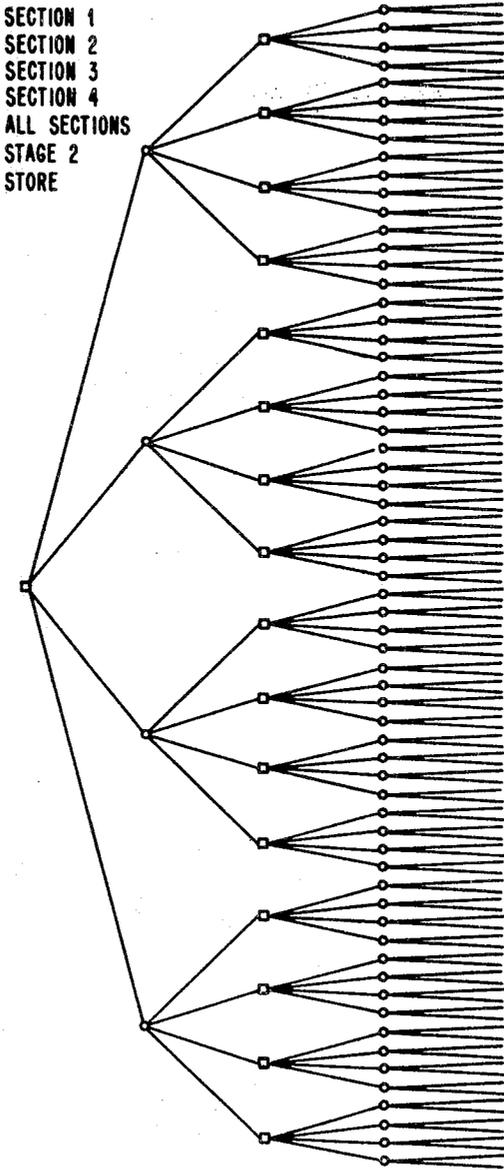
FIG. 10

- 1.. RAIFFA DOLLARS
- 2.. PROB ASSGN ERRORS

FIG. 11

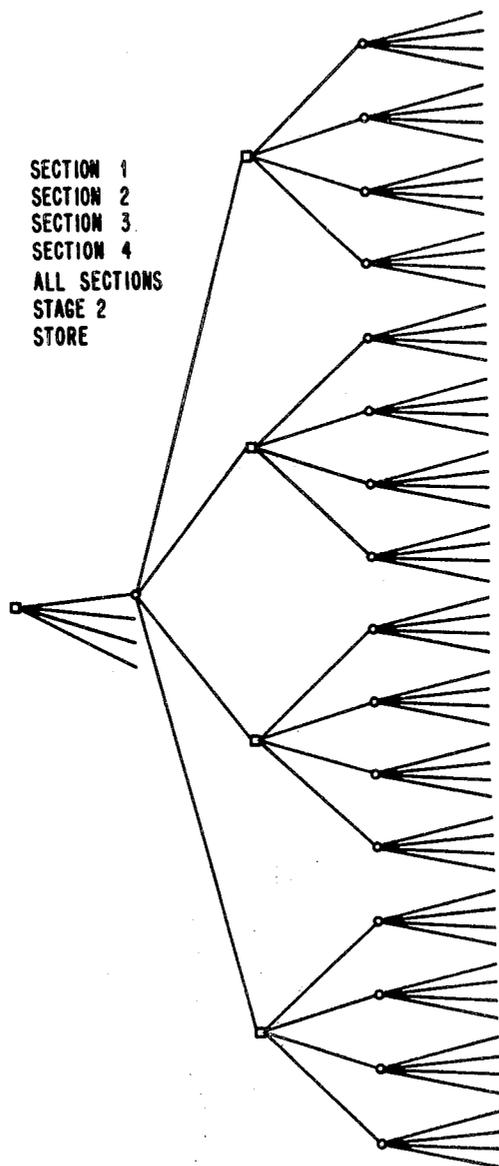
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  
11.  
12.  
13.  
14.  
15.  
16.  
.. NEW  
SELECT DESIRED PROBLEM OR 'NEW'  
WITH LIGHT PEN  
WAITING FOR YOUR SELECTION

I HAVE COMPUTED THE VALUE OF YOUR PROPOSITION  
THE MOST VALUABLE CHOICES ARE PRINTED AND SELECTED  
BRANCHES ARE HEAVY  
SELECT PREFERENCE TO DO A UTILITY ANALYSIS  
SENSITIVITY FOR SENSITIVITY ANALYSIS, FINI WHEN  
FINISHED, PLEASE SELECT



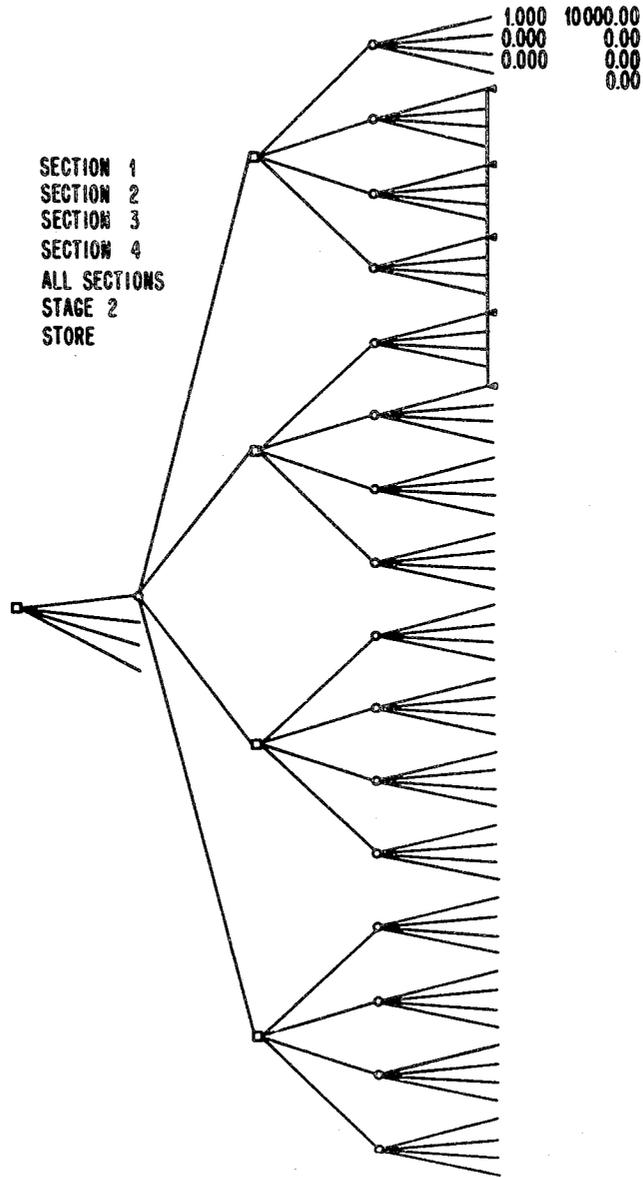
THIS IS YOUR INITIAL DECISION TREE  
THERE ARE FOUR EQUAL SECTIONS OF THE TREE FROM TOP TO BOTTOM  
USE LIGHT PEN TO SELECT A SECTION TO BE MAGNIFIED  
WAITING FOR YOU TO MAKE A SELECTION

FIG. 12



TYPE TERMINAL VALUE FOR BRANCH 1 IF VALUE WOULD EXCEED 3 DIGITS  
USE K AFTER DIGITS FOR TIMES 1,000,M FOR TIMES 1,000,000  
THEN PUSH ALTN CODING AND END AT THE SAME TIME

**FIG. 13**



PUSH F/K 8 AND F/K 31 TO SKIP ANOTHER NODE  
JUST F/K 31 TO CONTINUE

FIG. 14

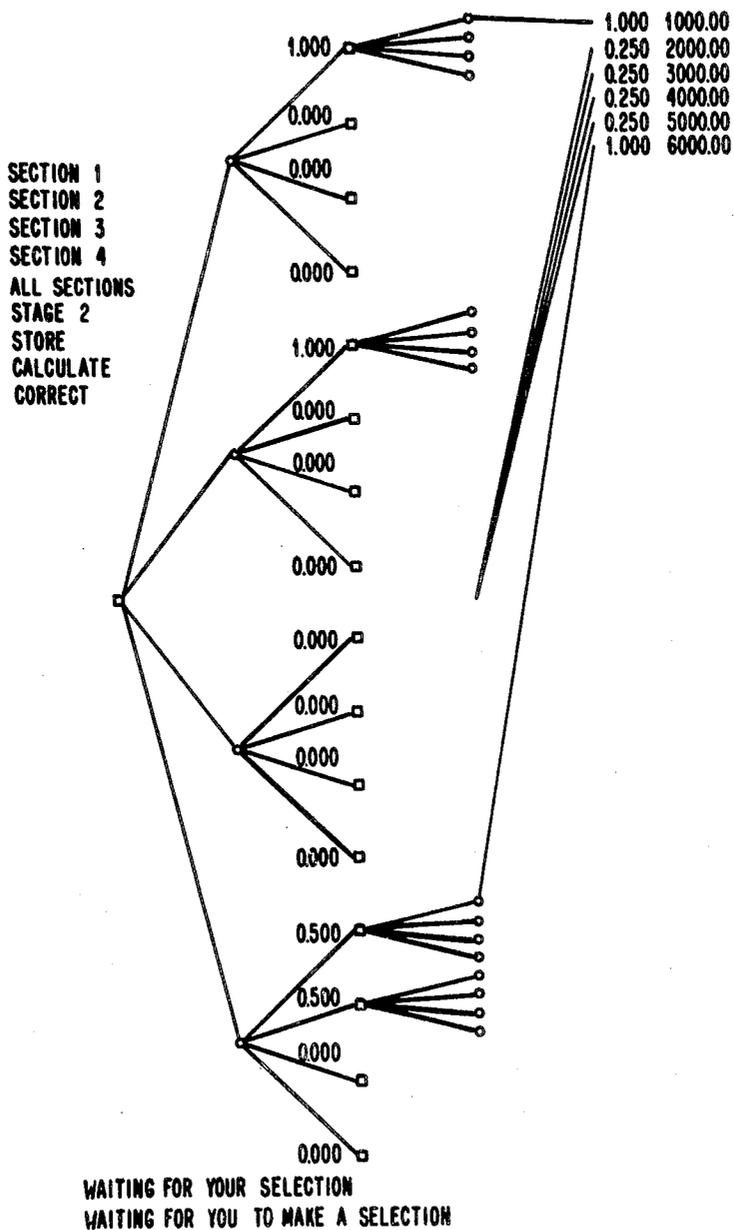


FIG. 15

FIG. 16

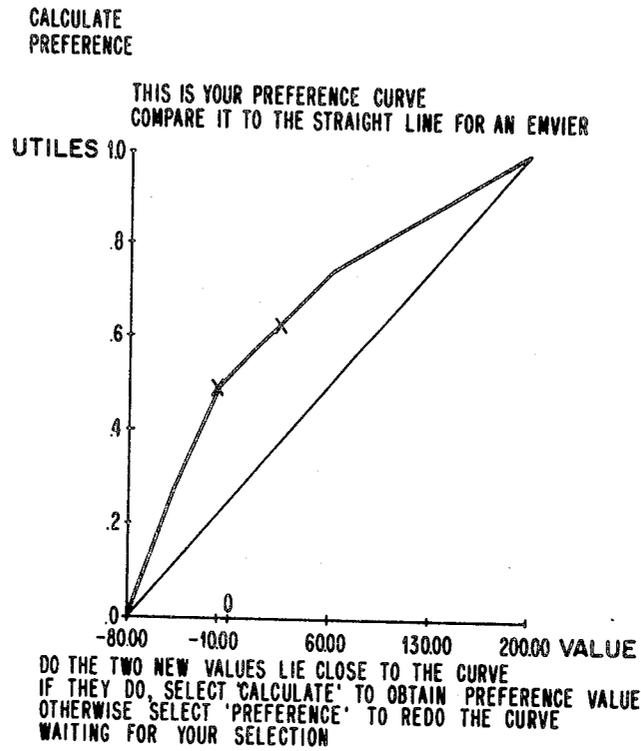
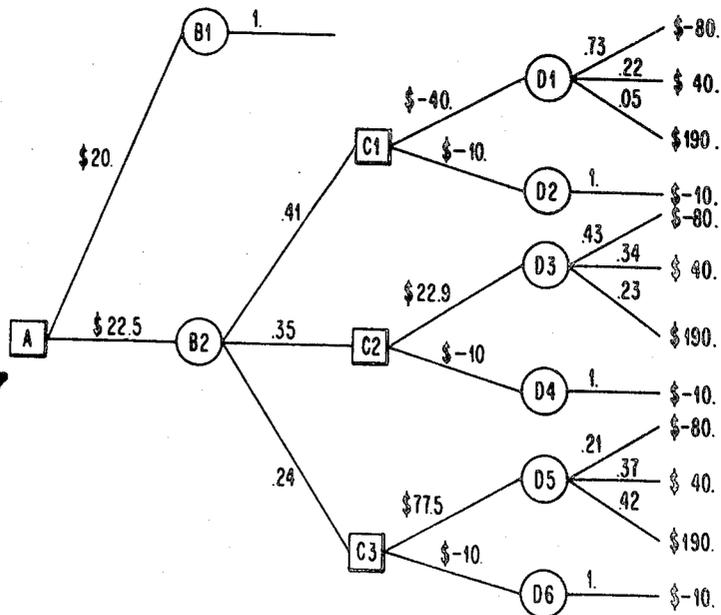
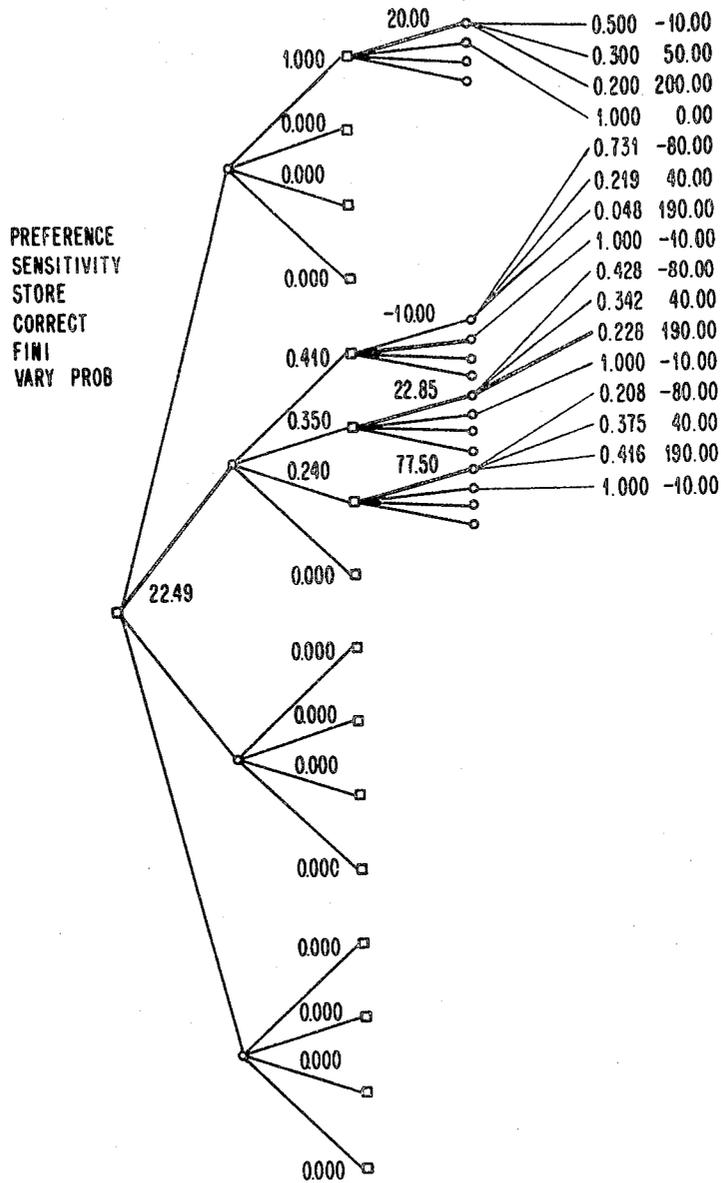


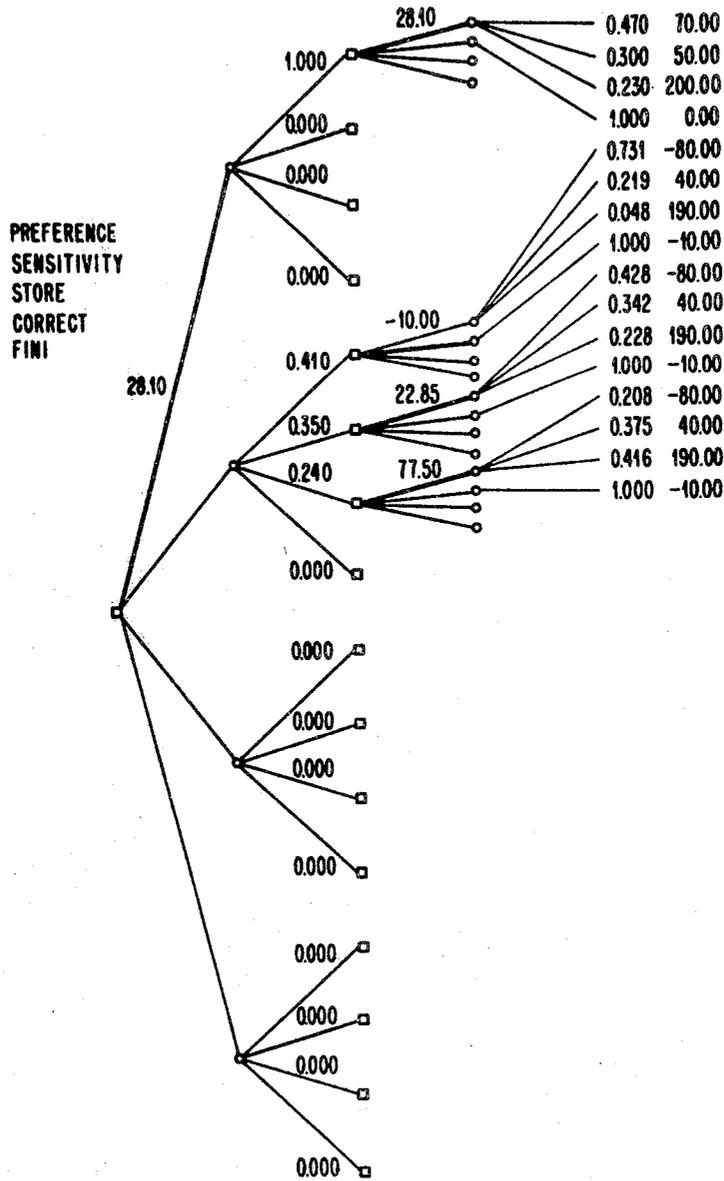
FIG. 17





IF THE PROB OF BRANCH 83 DECREASES BY 0.026 FROM 0.228  
 YOUR FIRST DECISION CHANGES TO BRANCH A 1. YOUR VALUE IS 20.00  
 THE SAME PROB IS ALSO MOST SENSITIVE IN CHANGING VALUE

FIG. 18



I HAVE COMPUTED THE VALUE OF YOUR PROPOSITION  
THE MOST VALUABLE CHOICES ARE PRINTED AND SELECTED BRANCHES ARE HEAVY  
SELECT PREFERENCE TO DO A UTILITY ANALYSIS  
SENSITIVITY FOR SENSITIVITY ANALYSIS, FINI WHEN FINISHED, PLEASE SELECT

FIG. 19



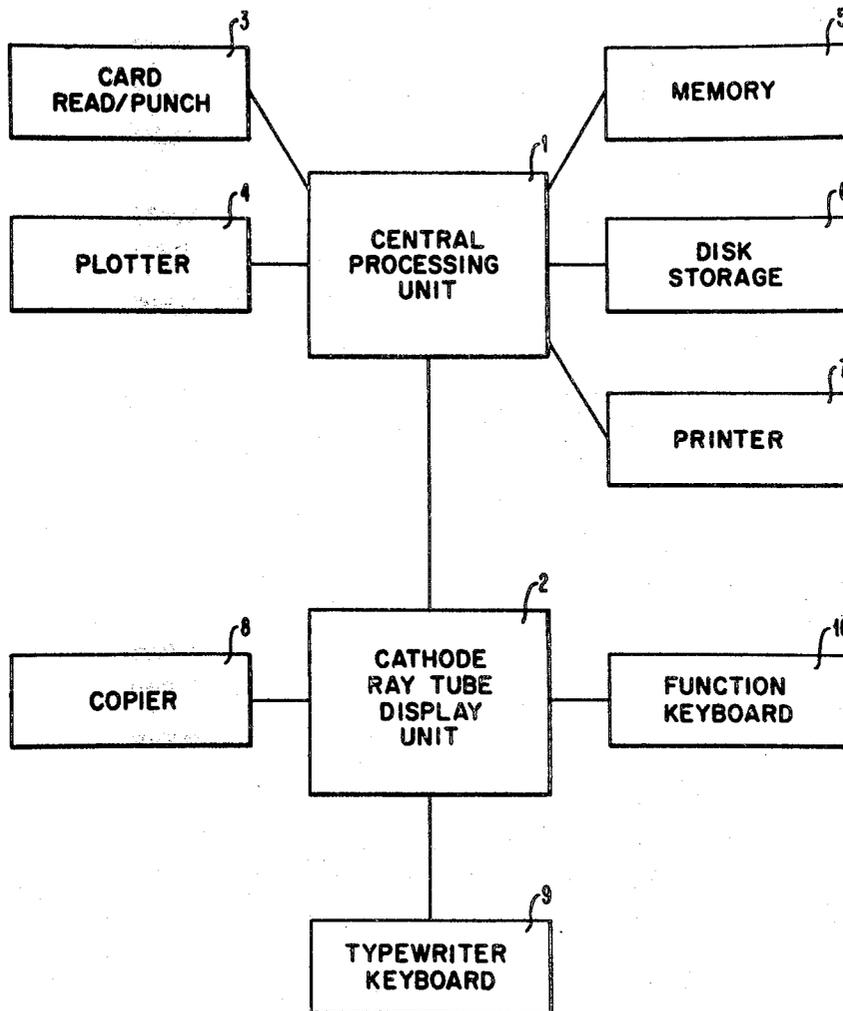


FIG. 21