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TM 1088 002 00

Business Management Game, Part III  
Instructions for the Use and Modification  
of Program UMPIRE

# TECHNICAL MEMORANDUM

(TM Series)

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Business Management Game, Part III:  
Instructions for the Use and Modification  
of Program UMPIRE

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May 20, 1963

SYSTEM

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## PREFACE

This document describes the use, modification and maintenance of program UMPIRE, a program written in JOVIAL for the Philco 2000, to be used in the play of the management game described in TM-1088. The program can be used to replace some of the manual operations involved in umpiring for this game, which is based on the Andlinger- Green game described in the Harvard Business Review for March and April, 1958 by G. R. Andlinger.

While the document describes in some detail those umpiring functions which are unique to the use of the program, it relies heavily on TM-1088 and TM-1088/001/00 for precise descriptions of those functions which are common to players and umpires or to umpires with and without the program. Since the program does not deal with the financial statements, those aspects of umpiring which are concerned with them are not covered.

The author wishes to thank Richard Gilinsky and Patricia Kenney for their constant assistance and advice in the writing and checkout of program UMPIRE.

Sandra Peterson

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BUSINESS MANAGEMENT GAME, PART III:  
INSTRUCTIONS FOR THE USE AND MODIFICATION OF PROGRAM UMPIRE

1. GENERAL

1.1 RESPONSIBILITIES

The responsibilities of the umpires when the automated umpiring function is used are somewhat different from their responsibilities when the umpiring function is entirely manual. The umpires, should, however, acquaint themselves with the responsibilities of the umpires in the manual circumstance.

1.2 FUNCTIONS

The functions of the umpires in the automated umpiring mode of play encompass three of the six functions listed in volume two of this document, with one additional function.

1.2.1 Market

The following functions which deal with the market must be performed manually by the umpires:

- a. Arraying the market initially.
- b. Decreasing the market as a result of sales.
- c. Updating the market for the next quarter.

1.2.2 Sales

The following functions with respect to sales must be performed by the umpires:

- a. Determining product improvement on the basis of R and D investment.
- b. Determining sales probability based on advertising and product improvement.
- c. Determining sales.
- d. Splitting sales if more than one company sells to a customer.

1.2.3 Consulting

The umpires must provide consulting services for the players when they communicate their decision to purchase it by indicating its cost on the Quarterly Report.

#### 1.2.4 Communication with the Computer

The umpires are responsible for communicating player and umpire decisions to the computer for each team. The computer program UMPIRE will then produce correct Quarterly Reports to be returned to the Board of Directors before the next quarter begins.

#### 1.3 ALLOCATION OF FUNCTIONS

The various functions performed by the umpires may be allocated in any convenient way. If the umpires are located at any distance from the computer, however, it is advisable to locate an umpire at the computer to receive inputs by telephone. It is estimated that one umpire will be needed (aside from the umpire at the computer) for four teams or fewer; if from 5 to 7 teams are playing, two umpires will be needed.

#### 1.4 RESTRICTIONS

The computer program UMPIRE imposes restrictions on three areas of the game. The restrictions can be changed easily by slight program modifications. (See Appendix III).

##### 1.4.1 Number of Teams

The program currently provides for a maximum of seven teams playing the game.

##### 1.4.2 Copies of Quarterly Report

The line printer which is used by program UMPIRE to produce copies of the correct Quarterly Report to be returned to the players will handle two types of paper: no carbon, or one carbon (the latter is referred to as "two part" paper). If no carbon is used, three copies of the Quarterly Report for each team will be produced. If carbon is used, six copies will be produced.

##### 1.4.3 Sales

The program currently provides that one team may make sales to no more than 10 customers in any one quarter.

#### 2. STARTING POSITION

Copies of the program UMPIRE are available to provide for two starting positions at the beginning of play. It is possible to modify the program to begin at other points. (See Appendix III).

### 2.1 NEW CORPORATION

The game begins with all corporations just starting in business. To play the game with this beginning position, use UMPIRE deck 1.

### 2.2 NEW MANAGEMENT OF OLD CORPORATION

The game begins with each Board of Directors assuming control of a corporation which has been operating for some length of time. Deck 2 of program UMPIRE is set up to begin at quarter 20, according to the history and starting Quarterly Report shown in Appendix I and Appendix II, respectively, of volume one of this document. The game board at the beginning of play is illustrated in Appendix III of volume one of this document. If this starting position is to be used, the umpires should consult section 2.2 of volume one to insure that the players are given sufficient beginning information.

### 3. MARKET

The activities which the umpires must perform in conjunction with the market are identical to those which must be performed in the case of completely manual umpiring. The description of these activities and the explanation of the methods can be found in section 3 of TM-1088/001/00.

### 4. SALES

The functions of the umpires in the area of sales are identical to those performed in the completely manual method of umpiring. Instructions for these functions can be found in section 5 of TM-1088/001/00.

### 5. CONSULTING

The consulting services which the umpires must provide in this umpiring mode are the same as those performed in the manual umpiring mode, and can be found in section 7 of volume one of this document.

### 6. COMMUNICATION WITH THE COMPUTER

Program UMPIRE is designed to operate on the Philco 2000 computer, located in the SSRL facility in Santa Monica. It assumes responsibility for all of the umpiring functions in the areas of Costs and Computations, as well as the responsibility for determining salesman losses. There are several umpire responsibilities which must be performed in order for the program to perform its duties correctly.

## 6.1 LOADING THE PROGRAM

When the umpires are ready for the program to perform its duties for the first time, they must load the program into the core memory of the computer. The umpire need only present the correct deck of UMPIRE (deck 1 for new corporation, deck 2 for quarter 20) to the computer operator to be loaded. The program will begin operating once it is loaded.

## 6.2 INPUTS

The program will ask certain questions via the typewriter at the computer console. The umpires should provide answers to the questions on the typewriter. All answers will be numbers. A sample of the typewriter messages and responses may be found in Appendix I.

### 6.2.1 General Rules

Each time the program asks a question, it will type out the question and provide a carriage return and shift to upper case. In providing his response, the umpire should do the following.

- a. Type the correct number and hit Carriage Return.
- b. If an error is made, hit the Stop Code button. Begin the response again. If an error is noticed after the Carriage Return, it is impossible to recover. Because of this, care should be used in entering values.

### 6.2.2 Number of Teams

In the first quarter to be played, the first question to be asked by the program is "HOW MANY TEAMS ARE PLAYING." Respond with a one digit number from 1 to 7 and hit Carriage Return. This question will be asked only once.

### 6.2.3 Quarter Number

At the beginning of each quarterly running of the umpiring program, the following two lines will be typed:  
"PLEASE ENTER THE FOLLOWING VALUES"  
"QUARTER NUMBER"

The umpire should respond with the correct quarter number, and a Carriage Return. If play begins with a new corporation, the first quarter number should be 1. If deck 2 is used, the first quarter number should be 20.

#### 6.2.4 Units Scheduled

After the Quarter Number has been entered, the program will begin to ask questions for each of the teams in sequence, from team 1 to the largest team number. All questions will be asked for team 1, then all questions for team 2, etc.

As UMPIRE begins the processing for each team, it will type the following lines:

"FOR TEAM     " (the team number will be filled in)  
"UNITS SCHEDULED"

The umpire should respond with the number entered by the players on the "Units Scheduled" line on page one of the Quarterly Report. If no number has been entered on the Quarterly Report, enter zero. Follow the entry with a Carriage Return.

#### 6.2.5 Factoring

The next questions asked by UMPIRE for the team currently being processed deal with "Current Factoring" specifications as found on the Quarterly Report. The following lines will be typed:

- a. "BLOCK 2 FACTORING" The response must be the "Cash to be Realized" item listed on the "A/R Block 2 @ 90%" line of the Quarterly Report form. It is important to note that the response must be in dollars to be realized, not in number of units factored. Carriage Return will cause the next question to be typed.
- b. "BLOCK 3" The response must be the "Cash to be Realized" item on the "A/R Block 3 @ 90%" line on the Quarterly Report form, followed by a Carriage Return.
- c. "BLOCK 4" The response must be the "Cash to be Realized" item on the "A/R Block 4 @ 80%" line on the Quarterly Report form, followed by a Carriage Return.
- d. "BLOCK 5" The response must be the "Cash to be Realized" item on the "A/R Block 5 @ 80%" line on the Quarterly Report form, followed by a Carriage Return.

In all cases, if no entry has been made on the Quarterly Report form in the position specified, enter zero and hit Carriage Return

#### 6.2.6 Construction

The next line to be typed by UMPIRE is as follows: "CONSTRUCTION." The umpire should respond with the total cost of construction in this quarter for the team being processed. The value can be found on the "Construction" line of the Quarterly Report form. Enter the value and Carriage Return.

#### 6.2.7 Hiring

The next inquiry is made with respect to the hiring decisions made by the team members. The line typed is: "HIRING." The umpires should respond with the total cost of the hiring done by the team. The information can be found on the "Hiring" line under Disbursements on the Quarterly Report form. Enter the value and hit Carriage Return.

#### 6.2.8 R and D

UMPIRE next requests the expenditures of the corporation in this quarter on R and D. The line typed by UMPIRE is: "R AND D." The umpire should respond with the value found on the "R & D" line under Disbursements on the Quarterly Report and a Carriage Return.

#### 6.2.9 Consulting

The information requested by UMPIRE at this point is the total cost of consulting services requested in the current quarter by the team being processed. The umpire has the responsibility of checking the computation of total consulting costs. When the program types "CONSULTING" respond with the total consulting fees found on the "Consulting Fees" line under Disbursements on the Quarterly Report and a Carriage Return.

#### 6.2.10 Advertising

UMPIRE will next type "ADS." The umpire must respond with the total pages of ads found to the left of the "Pages of Ads" line under Disbursements on the Quarterly Report form. It is important to note that pages, and not dollars, is the unit of the response to this query. Follow the response with a Carriage Return.

#### 6.2.11 Sales

In the area of sales the program will, under certain circumstances, make more than one request for information. The following lines are typed by UMPIRE:

- a. "SALES" The umpire should respond with the total sales made by the team in the current quarter. The information can be found on page two of the Quarterly Report, on the "Units Sold" line. Hit Carriage Return.
- b. If the response made to "SALES" was not zero, UMPIRE will type the following message:  
"CUSTOMERS AND UNITS SOLD." The umpire is expected to respond by:
  - 1) Entering the number of the customer to whom a sale was made followed by a Carriage Return.
  - 2) Entering the number of units sold to this customer by the company being processed followed by a Carriage Return.
  - 3) Repeating 1) and 2) until all customers to whom sales were made by the company being processed and the number of units sold to them have been listed.
  - 4) If sales were made to 10 customers by the company, the sequence will automatically end and UMPIRE will go to its next message.
  - 5) If fewer than 10 customers were listed, the umpire must terminate the sequence by entering customer number zero and hitting Carriage Return.
  - 6) UMPIRE will not accept more than 10 customers and units sold for any one team.

#### 6.2.12 Product Improvement

The next line typed by UMPIRE reads:  
"PRODUCT IMPROVEMENT, 1 OR 0 " The umpire should respond by entering 1 and Carriage Return if the team achieved a product improvement in the current quarter, or 0 and Carriage Return if no product improvement was achieved.

### 6.2.13 Production Lines Junked

The next message typed by UMPIRE is:  
" PROD LINES JUNKED." The umpire is expected to respond with the number of production lines junked by the team during the current quarter. This information can be found on page one of the Quarterly Report on the "Production Line Scrapped" line. If no entry was made by the team, enter zero. The umpire must provide a Carriage Return.

## 6.3 OUTPUTS

The program UMPIRE will provide outputs of two kinds.

### 6.3.1 Sales Error

Since UMPIRE keeps records of the number of units each team has in inventory, it can recognize the fact that the sales assigned to a team exceed the inventory of that team. If this occurs, UMPIRE will reduce the total sales to the number of units in inventory, but will not change the listing of the customers and the units sold to them. The umpire must correct this item himself. UMPIRE will warn the umpire located at the console typewriter that this error has occurred by typing the following message before the next team is processed: "SALES HAVE BEEN REDUCED TO THE NUMBER OF UNITS IN INVENTORY."

### 6.3.2 Quarterly Report

Program UMPIRE produces a quarterly report for each team. (See Section 1.4.2). After processing all teams for one quarter, UMPIRE will stop. At this time, the computer operators should be instructed to print the PRINT tape. The output will be the quarterly reports for all the teams playing. A sample of the Quarterly Report printed by UMPIRE will be found in Appendix II.

## 6.4 RESTARTING UMPIRE

In order to restart UMPIRE for the next quarter, the umpire need only instruct the computer operator to "advance" the computer. UMPIRE will continue with the messages "PLEASE ENTER THE FOLLOWING VALUES" and "QUARTER NUMBER." It is important to note that the computer must remain idle until subsequent quarters are to be played. Due to its responsibilities for "remembering," UMPIRE may not be removed from memory between quarters of play.

7. GAME BOARDS

The umpires are responsible for keeping their game boards for the teams updated according to the decisions made by the team members, the umpires' decisions, and the decisions made by UMPIRE. On receiving copies of the completed Quarterly Report from UMPIRE, the umpires should pay particular attention to the salesman losses, and record these events on the game board.

8. EQUIPMENT

The umpires should have the same equipment available to them as described in section 8 of volume one of this document.

9. SEQUENCE

The sequence of activities to be followed by the umpires is as listed in this section. References made are to other sections of this document which describe the particular function in greater detail.

Umpiring ActivitiesReferences

## 9.1 BEFORE PLAY BEGINS

- 9.1.1 Array the market
- 9.1.2 Set up game boards

TM-1088/001/00 Section 3.2

- a. Quarter 1 boards are empty
- b. Quarter 20

TM-1088/001/00, Appendix III

## 9.2 AFTER BOARD MEETING

- 9.2.1 Determine accumulated R & D
- 9.2.2 Determine product improvement (5.1.4)
- 9.2.3 Determine sales probabilities
- 9.2.4 Determine sales
- 9.2.5 Determine split sales
- 9.2.6 Document sales
- 9.2.7 Record team decisions on board

TM-1088/001/00, Section 5.1 1  
 TM-1088/001/00, Section 5.1 2  
 TM-1088/001/00, Section 5.2  
 TM-1088/001/00, Section 5.3  
 TM-1088/001/00, Section 5.4  
 TM-1088/001/00, Section 5.5  
 TM-1088/000/00, Section 15

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- a. Current factoring
- b. Construction
- c. Salesman hire
- d. Units scheduled
- e. Production lines scrapped

9.2.8	Run program UMPIRE	Section 6
9.2.9	Update market for next quarter	TM-1088/001/00, Section 3.4
9.2.10	Complete consulting forms	TM-1088/001/00, Section 7
9.2.11	Receive QRs from UMPIRE	Section 6
9.2.12	Update game board	TM-1088/000/00, Section 15
9.2.13	Give UMPIRE QR, consulting forms and blank QR to players	

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**APPENDIX I**

**UMPIRE MESSAGES**

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UMPIRE  
HOW MANY TEAMS ARE PLAYING  
2

PLEASE ENTER THE FOLLOWING VALUES  
QUARTER NUMBER  
1

FOR TEAM 1  
UNITS SCHEDULED  
0

BLOCK 2 FACTORING  
0

BLOCK 3  
0

BLOCK 4  
0

BLOCK 5  
0

CONSTRUCTION  
180000

HIRING  
50000

R AND D  
5000

CONSULTING  
0

ADS  
0

SALES  
0

PRODUCT IMPROVEMENT, 1 OR 0  
0

PROD LINES JUNKED  
0

FOR TEAM 2  
UNITS SCHEDULED  
0

BLOCK 2 FACTORING  
0

BLOCK 3  
0

BLOCK 4  
0

BLOCK 5  
0

CONSTRUCTION

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Note that this entry is an error, and that the corresponding Quarterly Report in Appendix II shows "0" total salesmen.

150000

HIRING  
3000

R AND D  
5000

CONSULTING  
0

ADS  
0

SALES  
0

PRODUCT IMPROVEMENT, 1 OR 0  
0

PROD LINES JUNKED  
0

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PH1 BGN  
SSRL  
PH1 END  
PH2 BGN

SYBP 01

PH3 BGN

UMPIRE  
HOW MANY TEAMS ARE PLAYING  
2

PLEASE ENTER THE FOLLOWING VALUES  
QUARTER NUMBER  
20

FOR TEAM 1  
UNITS SCHEDULED  
7

BLOCK 2 FACTORING  
18000

BLOCK 3  
27000

BLOCK 4  
16000

BLOCK 5  
24000

CONSTRUCTION  
0

HIRING  
0

R AND D  
5000

CONSULTING  
2000

ADS  
5

SALES  
10

CUSTOMERS AND UNITS SOLD  
2

3

5

4

16

3

0

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PRODUCT IMPROVEMENT, 1 OR 0  
1

PROD LINES JUNKED  
0

FOR TEAM 2  
UNITS SCHEDULED  
10

BLOCK 2 FACTORING  
0

BLOCK 3  
0

BLOCK 4  
80000

BLOCK 5  
0

CONSTRUCTION  
0

HIRING  
10000

R AND D  
0

CONSULTING  
0

ADS  
3

SALES  
9

CUSTOMERS AND UNITS SOLD  
4

2

6

1

7

1

10

1

12

2

21

2

0

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PRODUCT IMPROVEMENT, 1 OR 0  
0

PROD LINES JUNKED  
0

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APPENDIX II

UMPIRE QUARTERLY REPORT

QUARTERLY REPORT						
TEAM NUMBER 1	QUARTER NUMBER 01	R AND D		R AND D		
SALES	CUSTOMER	UNITS SOLD	ACCUMULATED M AND T	PRODUCT IMPROVEMENT NOT ACHIEVED		
40000			5000			
MATURED A/R AT PAID						
0						
TOTAL AVAILABLE CASH						
400000						
CURRENT FACTORING						
AT 90 PERCENT BLOCK 2						
0						
BLOCK 3						
0						
AT 80 PERCENT BLOCK 4						
0						
BLOCK 5						
0						
TOTAL FACTORED A/R						
0						
DISBURSEMENTS						
TOTAL SALES		0				
FIXED COST						
0						
PRODUCTION						
0						
VARIABLE COST						
0						
UNITS IN INVENTORY						
0						
UNITS IN WIP						
0						
CONSTRUCTION COST						
100000						
SALESMAN WIRE						
20000						
PERSONNEL						
2000						
SALESMAN COST						
0						
IN THE FIELD						
0						
FOR QUARTER NUMBER 2						
CONSULTING FEES						
0						
IN TRAINING BLOCK 2						
0						
STARTING CASH ITEMS						
200000						
BLOCK 3						
0						
BEGINNING CASH						
160000						
BLOCK 4						
0						
MATURED A/R AT PAID						
0						
FROM PAST FACTORING						
0						
TOTAL AVAILABLE CASH						
160000						
TOTAL SALFSEM						
5						
PLANT VALUE						
160000						

Q1 A TO Y REPORT		YEAR NUMBER 2	QUARTER NUMBER #1	M AND D
STARTING CASH ITEMS		SALES	UNITS SOLD	M AND D
BEGINNING CASH	40000	CUSTOMER		ACCUMULATED M AND D 5000
MATURED A/R AT PAR	0			PRODUCT IMPROVEMENT NOT ACHIEVED
NEW PAST FACTORING	0			
TOTAL AVAILABLE CASH	400000			
CURRENT FACTORING				
AT 90 PERCENT BLOCK 2	0			
BLOCK 3	0			
AT 80 PERCENT BLOCK 4	0			
BLOCK 5	0			
TOTAL FACTORED A/R	0			
DISBURSEMENTS				
FIXED COST	0	TOTAL SALES	0	
VARIABLE COST	0	PRODUCTION		
SALES SALARIES	0	UNITS IN INVENTORY	0	
UNSTRUCTION COST	150000	UNITS IN WIP	0	
SALESPER WIRE	3000	PERSONNEL		
M AND D REFUSE	3000	SALESMEN LOST		FOR QUARTER NUMBER 2
ADVERTISING EXPENSE	0	IN THE FIELD	0	
CONSULTING FEES	0	IN TRAINING	BLOCK 2 0	STARTING CASH ITEMS
TOTAL DISBURSEMENTS	150000	BLOCK 3	0	BEGINNING CASH 242000
CASH LESS DISBURSEMENTS	242000	BLOCK 4	0	MATURED A/R AT PAR 0
PLANT VALUE	150000	IN HIRING	0	FROM PAST FACTORING 0
		TOTAL SAL-SM-N	0	TOTAL AVAILABLE CASH 242000

## QUARTERLY REPORT

TEAM NUMBER 1      QUARTER NUMBER 20

STARTING CASH ITEMS		SALES		R AND D	
BEGINNING CASH	102000	CUSTOMER	UNITS SOLD	ACCUMULATED M AND L	U
MATURED A/R AT PAR	60000	2	3	PRODUCT IMPROVEMENT	ACHIEVED

TRUP. PAST FACTORING	0	5	4
TOTAL AVAILABLE CASH	162000	16	3

## CURRENT FACTORING

AT 90 PERCENT BLOCK 2	10000
BLOCK 3	27000
AT 90 PERCENT BLOCK 4	10700
BLOCK 5	24000
TOTAL FACTORED A/R	85000

DISBURSEMENTS	TOTAL SALES	10
---------------	-------------	----

FIXED COST	14400	PRODUCTION
------------	-------	------------

VARIABLE COST	19000	UNITS IN INVENTORY	15
---------------	-------	--------------------	----

SALES SALARIES	2000	UNITS IN WIP	7
----------------	------	--------------	---

CONSTRUCTION COST	0	PERSONNEL
-------------------	---	-----------

SALESPER WIRE	0	FOR QUARTER NUMBER 21
---------------	---	-----------------------

M AND D EXPENSE	2000	SALESMEN LOST
-----------------	------	---------------

ADVERTISING EXPENSE	12000	IN THE FIELD	0
---------------------	-------	--------------	---

CONSULTING FEES	4000	IN TRAINING BLOCK 2	0	STARTING CASH ITEMS
-----------------	------	---------------------	---	---------------------

TOTAL DISBURSEMENTS	61200	BLOCK 3	0	BEGINNING CASH	121600
---------------------	-------	---------	---	----------------	--------

CASH LESS DISBURSEMENTS	100800	BLOCK 4	0	MATURED A/R AT PAR	10000
-------------------------	--------	---------	---	--------------------	-------

PLANT VALUE	180000	IN MINING	0	FROM PAST FACTORING	85000
-------------	--------	-----------	---	---------------------	-------

		TOTAL SALESMEN	5	TOTAL AVAILABLE CASH	216600
--	--	----------------	---	----------------------	--------

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QUARTERLY REPORT									
TEAM NUMBER 2		QUARTER NUMBER 20							
STARTING CASH ITEMS	SALES	CUSTOMER	UNITS SOLD	H AND D	ACCUMULATED H AND D	PRODUCT IMPROVEMENT NOT ACHIEVED			
MATERIAL CASH	10000								0
PAID TO A/R AT PAR		4	2						
FROM FAST FACTORING		6	3						
TOTAL AVAILABLE CASH	10000	7	1						
CURRENT FACTORING		10	1						
AT 90 PERCENT BLOCK 2		12	2						
BLOCK 3		21	2						
AT 80 PERCENT BLOCK 4									
BLOCK 5									
TOTAL FACTORED A/R	80000								
DISBURSEMENTS	TOTAL SALES	6							
FIXED COST	10000	PRODUCTION							
VARIABLE COST	10000	UNITS IN INVENTORY 10							
SELLER SALARIES	2000	UNITS IN WIP 10							
CONSTRUCTION COST	0	PERSONNEL							
SALESMAN WIRE	10000	H AND D EXPENSE 0							
H AND D EXPENSE	0	SALESMEN LOST 0							
ADVERTISING EXPENSE	9000	IN THE FFLD 0							
CONSULTING FEES	0	IN TRAINING BLOCK 2 0							
TOTAL DISBURSEMENTS	50000	BLOCK 3 0	BLOCK 4 0	BLOCK 5 0	STARTING CASH 12000	FOR QUARTER NUMBER 21			
CASH LESS DISBURSEMENTS	32000	MATURED A/R AT PAR 30000							
		IN WIP 0							
		FROM PAST FACTORING 80000							
PLANT VALUE	10000	TOTAL SALES 6	TOTAL SALES 6	TOTAL AVAILABLE CASH 23000					

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**APPENDIX III**

**MODIFICATIONS TO PROGRAM UMPIRE**

The program modifications provided in this Appendix will serve to change the following limitations currently imposed by the program:

- 1) The number of teams playing.
- 2) The number of copies of the Quarterly Report produced.
- 3) The starting position of the teams.

The restriction to 10 customers sold per team per quarter is not easily modified, and will therefore not be included herein.

### General

In general, the program modifications described here will require that the JOVIAL deck of the program be modified and re-compiled. The deck exists in two parts, each of which must be compiled separately. The last binary card produced by Part I must be removed and the two binary decks must be put together to produce the binary deck of UMPIRE for loading and operating. The modifications described here will all be done to the second part of the deck.

### Number of Teams

In order to increase the maximum number of teams playing the game, the following changes must be made to the second part of the UMPIRE JOVIAL deck:

- 1) Replace the card reading as follows:  
TABLE QR V 7 S D \$  
with a card reading as follows:  
TABLE QR V n S D \$ where n=maximum number of teams playing.
- 2) Replace the card reading as follows:  
TABLE BOARD V 7 S D \$  
with a card reading as follows:  
TABLE BOARD V n S D \$ where n=maximum number of teams playing.
- 3) Alter preset cards as described below under "Starting Position."

Copies of Quarterly Report

In order to increase or decrease the number of copies of the Quarterly Report produced by program UMPIRE, the following change must be made:

In the Procedure defined by the following card:

PROC I'O'FOUR(INDEX) \$

change the card currently reading as follows:

FOR J=0,1,2 \$

to read as follows:

FOR J=0,1,n \$ where n=the number of copies desired minus one.

This limit applies when no carbon paper is used on the printer. If two-part paper is used, twice as many copies will, of course, be produced.

Starting Position

Modifications to provide that the game begin at other points in time are more extensive than those described above, and require that the game actually be played up to the beginning point, with the board and Quarterly Report being maintained through this playing. It further requires, as does the changing of the number of teams, that the preset data for the items in the tables QR and BOARD be changed.

## 1) Preset Values

The preset values for the items listed below must be changed to reflect the situation at the beginning of the first quarter to be played. Other items need not be changed.

- a. BC 'CSH should reflect the Beginning Cash shown on the Quarterly Report for the first quarter to be played.
- b. AR'PAR should reflect the Matured A/R @ \$10,000 line under Starting Cash on the Quarterly Report for the first quarter to be played.
- c. P'FACTR should reflect the Previous Factored A/R line under Starting Cash on the Quarterly Report for the first quarter to be played.
- d. T'AV'CA should reflect the Total line under Starting Cash on the Quarterly Report for the first quarter to be played.
- e. AR' should reflect the number of units in the second block (Block 2) in the Accounts Receivable column on the game board at the beginning of the first quarter to be played.

- f. AR'3 should reflect the number of units in the third block (Block 3) in the Accounts Receivable column on the game board at the beginning of the first quarter to be played.
- g. AR'4 should reflect the number of units in Block 4 in the Accounts Receivable column on the game board at the beginning of the first quarter to be played.
- h. AR'5 should reflect the number of units in Block 5 of the Accounts Receivable column on the game board at the beginning of the first quarter to be played.
- i) INVTY should reflect the number of units in the Inventory block of the Production column on the game board at the beginning of the first quarter of play.
- j) WIP should reflect the number of units in the Work in Process block of the Production column on the game board at the beginning of the first quarter of play.
- k) OS'1 should reflect the number of units in the first block of the Construction column on the game board at the beginning of the first quarter of play.
- l) CON'2 should reflect the number of units in the second block of the Construction column on the game board at the beginning of the first quarter of play.
- m) CON'3 should reflect the number of units in the third block of the Construction column on the game board at the beginning of the first quarter of play.
- n) FLD'1 should reflect the number of units in the field block (Block 1) of the Salesmen column on the game board at the beginning of the first quarter of play.
- o) TRNG'2 should reflect the number of units in the second block of the Salesmen column on the game board at the beginning of the first quarter of play.
- p) TRNG'3 should reflect the number of units in the third block of the Salesmen column on the game board at the beginning of the first quarter of play.

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- q) TRNG'4 should reflect the number of units in the fourth block of the Salesmen column on the game board at the beginning of the first quarter of play.

2) Preset Cards

The preset cards must conform to the following restrictions:

- a) The cards must be punched only in columns 1 through 72.
- b) The constants for preset must be punched as many times as the maximum number of teams playing.
- c) The constants must be legal JOVIAL arithmetic constants with no fractional bits.

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**APPENDIX IV**

**PROGRAM LISTINGS**

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**PART I**

START ITEM UMPTRF A 7 U S				
ITEM QTRONE B P 1 S				
ITEM TEMP A 48 S S				
ITEM TEAMNO H 10 P 10H(FOR TEAM ) S				
ITEM RESPOND H 8 S				
ITEM BLANK H 10 P 10H( ) S				
ITEM QN3 H 112 P				112H0
		QUARTERLY REPORT		
		) S		
ITEM QR6 H 112 P		TEAM NUMBER	QUARTER NUMBER	112H0
		) S		
ITEM QR10 H 112 P		SALES		112H0
STARTING CASH ITEMS		) S		
H AND D				
ITEM QR12 H 112 P		CUSTOMER	UNITS SOLD	112H0
BEGINNING CASH		) S		
ACCUMULATED H AND D				
ITEM QR14 H 112 P				112H0
MATURED A/R AT PAH				
PRODUCT IMPROVEMENT	ACHIEVED	) S		
ITEM QR16 H 112 P				112H0
FROM PAST FACTORING		) S		
ITEM QR18 H 112 P				112H0
TOTAL AVAILABLE CASH		) S		
ITEM QR20 H 112 P				112H0
		) S		
ITEM QR21 H 112 P				112H0
CURRENT FACTORING		) S		
ITEM QR22 H 112 P				112H0
		) S		
ITEM QR23 H 112 P				112H0
AT 90 PERCENT BLOCK 2		) S		
ITEM QR24 H 112 P				112H0
		) S		
ITEM QR25 H 112 P				112H0
BLOCK 3		) S		
ITEM QR26 H 112 P				112H0
		) S		
ITEM QR27 H 112 P				112H0
AT 80 PERCENT BLOCK 4		) S		
ITEM QR28 H 112 P				112H0
		) S		
ITEM QR29 H 112 P				112H0
BLOCK 5		) S		
ITEM QR30 H 112 P				112H0
		) S		

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ITEM QR31 W 112 P TOTAL FACTORED A/R		112M
ITEM QR32 W 112 P	) \$	112M
ITEM QR34 W 112 P DISBURSEMENTS	) \$	112M
ITEM QR36 W 112 P FIXED COST	) \$	112M
ITEM QR37 W 112 P	) \$	112M
ITEM QR38 W 112 P VARIABLE COST	) \$	112M
ITEM QR39 W 112 P	) \$	112M
ITEM QR40 W 112 P SALES SALARIES	) \$	112M
ITEM QR41 W 112 P	) \$	112M
ITEM QR42 W 112 P CONSTRUCTION COST	) \$	112M
ITEM QR44 W 112 P SALESMAN HIRE	) \$	112M
ITEM QR46 W 112 P M AND D EXPENSE	) \$	112M
ITEM QR47 W 112 P	) \$	112M
FCR QUARTER NUMBER	) \$	112M
ITEM QR48 W 112 P ADVERTISING EXPENSE	) \$	112M
ITEM QR50 W 112 P CONSULTING FEES	) \$	112M
ITEM QR52 W 112 P TOTAL DISBURSEMENTS	) \$	112M
ITEM QR54 W 112 P BEGINNING CASH	) \$	112M
ITEM QR55 W 112 P CASH LESS DISBURSEMENTS	) \$	112M
ITEM QR56 W 112 P	) \$	112M
ITEM QR58 W 112 P PLANT VALUE	) \$	112M
TOTAL AVAILABLE CASH	) \$	112M

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TERMS

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PART II



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```
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM PIFACIR A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END ;;PIFACTR;;
ITEM TJAIVCA A 48 S S
BEGIN 4,0000 4,0000 4,0000 4,0000 4,0000 4,0000 4,0000 4,0000 END
ITEM BL2190P A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM BL3190P A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM BL4190P A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM BL5190P A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM ARIFACT A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM FXJICOST A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM VICOST A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM SALARY A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM CONSTR A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM HIRE A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM RD A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM ADS A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM CONSULT A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM DISBRS A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM CAJLIDB A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM PAGES A 10 U S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM SALES A 10 U S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM MEN A 10 U S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM CUMJRD A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM IMPRV U S
BEGIN 0 0 0 0 0 0 0 0 END ;;FOR IMPRV;;
ITEM FLDJLST A 10 U S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM BL2JLST A 10 U S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM BL3JLST A 10 U S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM BL4JLST A 10 U S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM WIRJLST A 10 U S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
ITEM PLIVAL A 48 S S
BEGIN 0,00 0,00 0,00 0,00 0,00 0,00 0,00 0,00 END
```

```
ENC
TABLE DCARD V 7 S D S
BEGIN
```



```

SICP FIRST S
ENC JUMPIRE))
PRCC ACTREC(INDEX) S JICOMPUTES FACTORED A/R CORRECTS FOR OVER-FACTOR))
ITEM INDEX A 48 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    IF BL2190P(SIS) GR 9000 * AR12(SIS) S
      BL2190P(SIS) = 9000 * AR12(SIS) S
    IF BL3190P(SIS) GR 9000 * AR13(SIS) S
      BL3190P(SIS) = 9000 * AR13(SIS) S
    IF BL4180P(SIS) GR 8000 * AR14(SIS) S
      BL4180P(SIS) = 8000 * AR14(SIS) S
    IF BL5180P(SIS) GR 8000 * AR15(SIS) S
      BL5180P(SIS) = 8000 * AR15(SIS) S
    AR1FACT(SIS) = BL2190P(SIS) + BL3190P(SIS) + BL4180P(SIS)
      + BL5180P(SIS) S
    AR12(SIS) = AR12(SIS) - BL2190P(SIS) / 9000 S
    AR13(SIS) = AR13(SIS) - BL3190P(SIS) / 9000 S
    AR14(SIS) = AR14(SIS) - BL4180P(SIS) / 8000 S
    AR15(SIS) = AR15(SIS) - BL5180P(SIS) / 8000 S
  END
END
PRCC SPEND(INDEX) S
ITEM INDEX A 48 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    FX1COST(SIS) = COST1FIXED(SOB11(SIS)S) S
    V1COST(SIS) = WIP(SIS) * COST1VAR(SOB11(SIS)S) S
    SALARY(SIS) = 1000 * (FLD11(SIS) + TRNG12(SIS) + TRNG13(SIS)
      + TRNG14(SIS)) S
    ADS(SIS) = 3000 * PAGES(SIS) S
    DISBURS(SIS) = FX1COST(SIS) + V1COST(SIS) + SALARY(SIS)
      + CONSTR(SIS) + HIRE(SIS) + RD(SIS) + ADS(SIS)
      + CONSULT(SIS) S
  END
END
PRCC PRCVE(INDEX) S JIUPDATES ACCUMULATED R AND D ))
ITEM INDEX A 48 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    IF IMPRV(SIS) OR RD(SIS) EQ 0 S
      BEGIN
        CUM1RD(SIS) = 0 S
        RETURN S
      END
    END
    CUM1RD(SIS) = CUM1RD(SIS) + RD(SIS) S
  END
END
PRCC QUITTERS(INDEX) S JICONTROLS SALESMAN LOSSES))
ITEM INDEX A 48 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    HIR19(SIS) = HIRE(SIS)/10000 S
    IF FLD11(SIS) NG 0 S
      FIGURE(FLD11(SIS) = FLD11(SIS),FLD1LST(SIS)) S
    END
  END
END

```

```

IF TRNG12(SIS) NO 0 S
  FIGURE(TRNG12(SIS) = TRNG12(SIS),BL21LBT(SIS)) S
IF TRNG13(SIS) NO 0 S
  FIGURE(TRNG13(SIS) = TRNG13(SIS),BL31LBT(SIS)) S
IF TRNG14(SIS) NO 0 S
  FIGURE(TRNG14(SIS) = TRNG14(SIS),BL41LBT(SIS)) S
IF MIR15(SIS) NO 0 S
  FIGURE(MIR15(SIS) = MIR15(SIS),MIR1LBT(SIS)) S
END
ENDC
PRCC FIGURE(NUMBIN = NUMBOUT,LOSSES) S ;;DETERMINES SALESMAN LOSSES;;
ITEM NUMBIN A 40 S S
ITEM NUMBOUT A 40 S S
ITEM LOSSES A 40 S S
ITEM RANDOM A 7 U S
BEGIN
  LOSSES = 0 S
  NUMBOUT = NUMBIN S
  FOR I = NUMBIN = 1, -1, 0 S
    BEGIN
      RNGEN(=RANDOM) S
      IF RANDOM LO 5 S
        BEGIN
          NUMBOUT = NUMBOUT - 1 S
          LOSSES = LOSSES + 1 S
        END
      END
    END
  END
ENDC
PRCC RNGEN(=PRNUMB) S ;;PSEUDO RANDOM NUMBER GENERATOR;;
TABLE GEN R 2 S
BEGIN
  ITEM NGEN A 40 S S
  BEGIN 0(0429434430110479) 0(1272343473274294) END
ENDC
ITEM PRNUMB A 7 U S ;;OUTPUT PARAMETER;;
ITEM TEMPRN A 40 S S
BEGIN
  CGEN. TEMPRN = NGEN(S05) * NGEN(S15) S
  NGEN(S05) = BIT(510,275)(TEMPRN) S
  PRNUMB = BIT(530,75)(NGEN(S05)) S
  IF PRNUMB GR 99.40 S
    807C CGEN S
  END
ENDC
PRCC BYD(NN)S
ITEM BYD M 8S
ITEM NN A 40 8S
ITEM XR A 40 8S
BEGIN ;;CONVERTS BINARY NN TO BCM;;
  DIRECT
  TDLC 0,1 S
  TDM BYD.XR S
  TMA 0/0060000000000000 S
  TAM BYD.BTD S
  TIXZ 0,1 S
  CAMA BYD.NN S
  SRAQ 40 S
  DAQ 0/10 S
  AM 0/00747 S
  SLA 0,1 S
  ANOS BYD.BTD S

```

```

CA          S
JAGQ      (P)+3M      S
TMD       C/HLT,40)C/HLT,(P)-6MS  S
AIXJ      6,1        S
TMD       BTD,XR      S
TDXLC     0,1        S
-----
JCVIAL
ENC J)BTD))
PRCC DTB(MM)S
ITEM DTB A 47 US
ITEM MM H 0S
ITEM PWSTEN A 47 US
BEGIN J)CONVERT BCM MM TO BINARY WTD))
DIRECT
CM        DTB,DTB    SCLEAR DTB.
TMA      D/1042     SGEI 1 INTJ PWSTEN FOR
TAM      DTB.PWSTEN)S1 MULTIPLICATION.
CO       SCLEAR 0.
TMA      DTB,MM     SGEI MM, CYCLE RIGHT 6
SCD      6          SAND PLACE BACK IN MM.
TDM      DTB,MM     S
SRAQ     6          SSHIFT ACTIVE BYTE
TMA      0/00       SINTO 0 SCALED 0S IN 0
JAGQ     (P)+3M     SIF BLANK, SKIP BYTE.
MM       DTB.PWSTEN)SMULT,BY PWSTEN SCALED
AMS      DTB,DTB   S042,PRODUCT 047 IN A.
TMO      D/10-5     SMULT PWSTEN BY 10 AND
MM       DTB.PWSTEN)EXIT ROUTINE WHEN
TMO      D/100      SPWSTEN*100,000,000
JAGQ     (P)+4M     SMEANING LAST BYTE.
SLA      5          SRESCALE PWSTEN TO 042
TAM      DTB.PWSTEN
JMP      (P)-15M   SREPEAT FOR NEXT BYTE.
-----
JCVIAL
ENC J)DT))
PRCC BRG(INDEX) S J)ADVANCES BOARD ITEMS AND SOME OR ITEMS))
ITEM INCEX A 40 S S
BEGIN
  FCR I = INDEX S
  BEGIN
    IF SALES(SIS) OR INVTY(SIS) S
    BEGIN
      SALES(SIS) = INVTY(SIS) S
      LCG(50M(SALES HAVE BEEN REDUCED TO THE NUMBER OF UNITS IN INVEN
TORY)) S
    END
    INVTY(SIS) = INVTY(SIS) - SALES(SIS) S
    CASH)1(SIS) = AR)2(SIS) S
    AR)2(SIS) = AR)3(SIS) S
    AR)3(SIS) = AR)4(SIS) S
    AR)4(SIS) = AR)5(SIS) S
    AR)5(SIS) = SALES(SIS) S
    MEN(SIS) = FLD)1(SIS) + TRNG)2(SIS) + TRNG)3(SIS) + TRNG)4(SIS)
      + MIR)5(SIS) S
    CA)LD)DB(SIS) = T)AV)CA(SIS) - DIB)RB(SIS) S
    INVTY(SIS) = INVTY(SIS) + WIP(SIS) S
    WIP(SIS) = SCMED(SIS) S
    SCMED(SIS) = 0 S
    OS)1(SIS) = OS)1(SIS) + CON)2(SIS) S
    CCN)2(SIS) = CON)3(SIS) S

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```
IFEITH OB;1(SIS) + CON;2(SIS) GO 1 S
CON;3(SIS) = CON;TR(SIS)/300*0 S
CRIF CON;TR(SIS) GO 150000 S
CON;3(SIS) = 1 + (CON;TR(SIS) - 150000)/30000 S
CRIF CON;TR(SIS) GO 0 S
BEGIN
CON;TR(SIS) = 0 S
CON;3(SIS) = 0 S
END
END;ALTERNATIVE;
FLD;1(SIS) = FLD;1(SIS) + TRNG;2(SIS) S
TRNG;2(SIS) = TRNG;3(SIS) S
TRNG;3(SIS) = TRNG;4(SIS) S
TRNG;4(SIS) = MIR;5(SIS) S
MIR;5(SIS) = 0 S
PL;VAL(SIS) = PL;VAL(SIS) + CON;TR(SIS) S
END
ENC
PRCC RESET(INDEX) S ;;RESETS OR FOR NEXT QUARTER;
STEP INDEX A 40 S S
BEGIN
FOR I = INDEX S
BEGIN
CON;CON(SIS) = CA;L;ID(SIS) S
AR;PAR(SIS) = 10000 * CASH;1(SIS) S
P;FACT(SIS) = AR;FACT(SIS) S
T;AV;CA(SIS) = CON;CON(SIS) + AR;PAR(SIS) + P;FACT(SIS) S
BL;2;OP(SIS) = 0 S
BL;3;OP(SIS) = 0 S
BL;4;OP(SIS) = 0 S
BL;5;OP(SIS) = 0 S
AR;FACT(SIS) = 0 S
FX;COST(SIS) = 0 S
V;COST(SIS) = 0 S
SALARY(SIS) = 0 S
CON;TR(SIS) = 0 S
MIR(SIS) = 0 S
RD(SIS) = 0 S
AC(SIS) = 0 S
CONSULT(SIS) = 0 S
DIS;RS(SIS) = 0 S
CA;L;ID(SIS) = 0 S
PAGE(SIS) = 0 S
SALES(SIS) = 0 S
MEN(SIS) = 0 S
I;PRV(SIS) = 0 S
FLD;LST(SIS) = 0 S
BL;LST(SIS) = 0 S
BL;LST(SIS) = 0 S
BL;LST(SIS) = 0 S
MIR;LST(SIS) = 0 S
END
ENC
PRCC I;O;ONE S
BEGIN
LOG(20M(HOW MANY TEAMS ARE PLAYING)) S
FLEXIN S
M;ENT;ION = DTB(RESPOND) S
ENC
PRCC I;O;TWO(INDEX) S
```

```

STEP INDEX A 48 S S
BEGIN
  FOR I = INDEX S
  BEGIN
    IF I EQ 0 S
    BEGIN
      LOG(33M(PLEASE ENTER THE FOLLOWING VALUES)) S
      LOG(14M(QUARTER NUMBER)) S

      FLEXIN S
      BYTE (S92,25)(QR6) = RESPOND S
      TEMP = DTB(RESPOND) + 1 S
      BYTE(S92,25)(QR47) = DTB(TEMP) S
    END
    BYTE(S93)(TEAMJNO) = STD(I + 1) S
    LOG(TEAMJNO) S
    LOG(19M(UNITS SCHEDULED)) S
    FLEXIN S
    SCHED(SIS) = DTB(RESPOND) S
    LOG(17M(BLOCK 2 FACTORING)) S
    FLEXIN S
    BL2J90P(SIS) = DTB(RESPOND) S
    LOG(7M(BLOCK 3)) S
    FLEXIN S
    BL3J90P(SIS) = DTB(RESPOND) S
    LOG(7M(BLOCK 4)) S
    FLEXIN S
    BL4J80P(SIS) = DTB(RESPOND) S
    LOG(7M(BLOCK 5)) S
    FLEXIN S
    BL5J80P(SIS) = DTB(RESPOND) S
    LOG(12M(CONSTRUCTION)) S
    FLEXIN S
    CCNSTR(SIS) = DTB(RESPOND) S
    LOG(6M(MIRING)) S
    FLEXIN S
    HIRE(SIS) = DTB(RESPOND) S
    LOG(7M(R AND D)) S
    FLEXIN S
    RC(SIS) = DTB(RESPOND) S
    LOG(10M(CONSULTING)) S
    FLEXIN S
    CCNSULT(SIS) = DTB(RESPOND) S
    LOG(3M(ADS)) S
    FLEXIN S
    PAGES(SIS) = DTB(RESPOND) S
    LOG(9M(SALES)) S
    FLEXIN S
    SALES(SIS) = DTB(RESPOND) S
    IF SALES(SIS) NG 0 S
    BEGIN
      LOG(24M(CUSTOMERS AND UNITS SOLD)) S
      FOR J = 0,1,9 S
      BEGIN
        FLEXIN S
        CUST(SJS) = DTB(RESPOND) S
        IF CUST(SJS) EQ 0 S
          GOTO SET0 S
        FLEXIN S
        SOLD(SJS) = DTB(RESPOND) S
      END
    END
  END

```

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```
TEST $
SETO, FOR K = J,1,0 $
BEGIN
  CUST($K5) = 0 $
  SOLD($K5) = 0 $
END
GOTO NEXT $
END
NEXT. LCG(27M(PRODUCT IMPROVEMENT, 1 OR 0)) $
FLEXIN $
IMPRV($IS) = DTB(RESPOND) $
LOG(17M(PROD LINES JUNKED)) $
FLEXIN $
TEMP = DTB(RESPOND) $
PLIVAL($IS) = PLIVAL($IS) - 30000 * TEMP $
OS;1($IS) = OS;1($IS) - TEMP $
END
ENC
PRCC I;CITMREE(INDEX) $
STEP INDEX A 40 $ $
BEGIN
  FOR I = INDEX $
  BEGIN
    IF CUST($OS) EQ 0 $
      GOTO $14 $
    BYTE($40,25)(QR14) = BYD(CUST($OS)) $
    BYTE($60,25)(QR14) = BYD(SOLD($OS)) $
    IF CUST($S15) EQ 0 $
      GOTO $16 $
    BYTE($40,25)(QR16) = BYD(CUST($S15)) $
    BYTE($60,25)(QR16) = BYD(SOLD($S15)) $
    IF CUST($S25) EQ 0 $
      GOTO $18 $
    BYTE($40,25)(QR18) = BYD(CUST($S25)) $
    BYTE($60,25)(QR18) = BYD(SOLD($S25)) $
    IF CUST($S35) EQ 0 $
      GOTO $20 $
    BYTE($40,25)(QR20) = BYD(CUST($S35)) $
    BYTE($60,25)(QR20) = BYD(SOLD($S35)) $
    IF CUST($S45) EQ 0 $
      GOTO $22 $
    BYTE($40,25)(QR22) = BYD(CUST($S45)) $
    BYTE($60,25)(QR22) = BYD(SOLD($S45)) $
    IF CUST($S55) EQ 0 $
      GOTO $24 $
    BYTE($40,25)(QR24) = BYD(CUST($S55)) $
    BYTE($60,25)(QR24) = BYD(SOLD($S55)) $
    IF CUST($S65) EQ 0 $
      GOTO $26 $
    BYTE($40,25)(QR26) = BYD(CUST($S65)) $
    BYTE($60,25)(QR26) = BYD(SOLD($S65)) $
    IF CUST($S75) EQ 0 $
      GOTO $28 $
    BYTE($40,25)(QR28) = BYD(CUST($S75)) $
    BYTE($60,25)(QR28) = BYD(SOLD($S75)) $
    IF CUST($S85) EQ 0 $
      GOTO $30 $
    BYTE($40,25)(QR30) = BYD(CUST($S85)) $
    BYTE($60,25)(QR30) = BYD(SOLD($S85)) $
```

```

IF CUST(S98) EQ 0 S
  GOTO 832 S
  BYTE(S40,28)(QR32) = STD(CUST(S98)) S
  BYTE(S40,28)(QR32) = STD(SOLD(S98)) S
NEXT. BYTE(S29,85)(QR12) = STD(OWN)CSH(SIS)) S
      BYTE(S29,85)(QR14) = STD(AR)PAR(SIS)) S
      BYTE(S29,85)(QR16) = STD(P)FACTR(SIS)) S
      BYTE(S29,85)(QR18) = STD(T)AV)CA(SIS)) S
      BYTE(S29,85)(QR23) = STD(ML2)90P(SIS)) S
      BYTE(S29,85)(QR29) = STD(ML3)90P(SIS)) S
      BYTE(S29,85)(QR27) = STD(ML4)80P(SIS)) S
      BYTE(S29,85)(QR29) = STD(ML5)80P(SIS)) S
      BYTE(S29,85)(QR31) = STD(AR)FACT(SIS)) S
      BYTE(S29,85)(QR36) = STD(FX)COS(SIS)) S
      BYTE(S29,85)(QR38) = STD(V)COST(SIS)) S
      BYTE(S29,85)(QR40) = STD(SALARY(SIS)) S
      BYTE(S29,85)(QR42) = STD(CONSTR(SIS)) S
      BYTE(S29,85)(QR44) = STD(WIRE(SIS)) S
      BYTE(S29,85)(QR46) = STD(RD(SIS)) S
      BYTE(S29,85)(QR48) = STD(AD8(SIS)) S
      BYTE(S29,85)(QR50) = STD(CONSULT(SIS)) S
      BYTE(S29,85)(QR52) = STD(DISBRS(SIS)) S
      BYTE(S29,85)(QR59) = STD(CA)LD(SIS)) S
      BYTE(S29,85)(QR56) = STD(PL)VAL(SIS)) S
      BYTE(S102,85)(QR12) = STD(CUM)RD(SIS)) S
      BYTE(S495)(QR6) = STD(I * 1) S
      BYTE(S67,48)(QR34) = STD(SALES(SIS)) S
      BYTE(S67,48)(QR39) = STD(INVTY(SIS)) S
      BYTE(S67,48)(QR41) = STD(WIP(SIS)) S
      BYTE(S67,48)(QR50) = STD(MEN(SIS)) S
      BYTE(S67,48)(QR48) = STD(FLD)LST(SIS)) S
      BYTE(S67,48)(QR50) = STD(ML2)LST(SIS)) S
      BYTE(S67,48)(QR52) = STD(ML3)LST(SIS)) S
      BYTE(S67,48)(QR54) = STD(ML4)LST(SIS)) S
      BYTE(S67,48)(QR56) = STD(WIR)LST(SIS)) S
IF IMPRV(SIS) S
  BEGIN
    BYTE(S98,38)(QR14) = 3M( ) S
    RETURN S
  END
  BYTE(S98,38)(QR14) = 3M(NOT) S
  RETURN S
814. BYTE(S40,148)(QR14) = 14M( ) S
816. BYTE(S40,148)(QR16) = 14M( ) S
818. BYTE(S40,148)(QR18) = 14M( ) S
820. BYTE(S40,148)(QR20) = 14M( ) S
822. BYTE(S40,148)(QR22) = 14M( ) S
824. BYTE(S40,148)(QR24) = 14M( ) S
826. BYTE(S40,148)(QR26) = 14M( ) S
828. BYTE(S40,148)(QR28) = 14M( ) S
830. BYTE(S40,148)(QR30) = 14M( ) S
832. BYTE(S40,148)(QR32) = 14M( ) S
  GOTO NEXT S
END
ENC
PRCC I)C)PQUR(INDEX) S
ITEM INDCR A 48 S S
BEGIN
  FOR I = INDEX S
  BEGIN

```

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```
BYTE($102,85)(QR52) = BTD(BGN)CSM($IS) $
BYTE($102,85)(QR54) = BTD(AR)PAR($IS) $
BYTE($102,85)(QR56) = BTD(P)FACTOR($IS) $
BYTE($102,85)(QR58) = BTD(T)AVJGA($IS) $
OPEN OUTPUT QRPRINT $
FOR J = 0:1:2 $
```

```
BEGIN
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR3 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR6 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR10 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR12 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR14 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR16 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR18 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR20 $
  OUTPUT QRPRINT QR21 $
  OUTPUT QRPRINT QR22 $
  OUTPUT QRPRINT QR23 $
  OUTPUT QRPRINT QR24 $
  OUTPUT QRPRINT QR25 $
  OUTPUT QRPRINT QR26 $
  OUTPUT QRPRINT QR27 $
  OUTPUT QRPRINT QR28 $
  OUTPUT QRPRINT QR29 $
  OUTPUT QRPRINT QR30 $
  OUTPUT QRPRINT QR31 $
  OUTPUT QRPRINT QR32 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR34 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR36 $
  OUTPUT QRPRINT QR37 $
  OUTPUT QRPRINT QR38 $
  OUTPUT QRPRINT QR39 $
  OUTPUT QRPRINT QR40 $
  OUTPUT QRPRINT QR41 $
  OUTPUT QRPRINT QR42 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR44 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR46 $
  OUTPUT QRPRINT QR47 $
  OUTPUT QRPRINT QR48 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR50 $
  OUTPUT QRPRINT BLANK $
  OUTPUT QRPRINT QR52 $
  OUTPUT QRPRINT BLANK $
```

```

OUTPUT QRPRINT QR54 S
OUTPUT QRPRINT QR55 S
OUTPUT QRPRINT QR56 S
OUTPUT QRPRINT BLANK S
OUTPUT QRPRINT QR58 S
POS(QRPRINT) = 0 S

```

```

END
SMUT OUTPUT QRPRINT S

```

```

END
PRCC LOG(FLXIMG)S
STEP FLXIMG M 120S ;;FLEXO IMAGE;;
STEP XR A 48 SS ;;SAVE INDEX REGS 1 AND 2 HERE;;
BEGIN ;;ROUTINE TO PRINT OUT UP TO 120 CHARACTERS ON THE FLEXO SUP-
PRESSING LEADING BLANKS;;

```

```

DIRECT
JMP CRUC,Z S
TXDLC 0,1 S
TXDRC 0,2 S
TDM XR S
L L001 TIXZ 0,1 S
TIXZ 42,2 S
L002 TMA FLXIMG,1 S
SRA 0,2 S
SLA 42 S
TMD 0/60 S
JAED (P)+2M S
JMP L003 S
TMD C/MLT,32762;C/MLTL,L002 S
SIXJ 0,2 S
TMD C/MLT,15;C/MLTR,L001 S
AIXJ 1,1 S
JMP OUT S
L003 TAD S
TDC S
TMD C/MLT,32762;C/MLTR,L004 S
SIXJ 0,2 S
TMD C/MLT,15;C/MLTR,L005 S
AIXJ 1,1 S
L L004 JMP OUT S
TMA FLXIMG,1 S
SRA 0,2 S
SLA 42 S
JMP L003 S
L005 TIXZ 42,2 S
JMP L004 S
OUT TMD XR S
TXDLC 0,1 S
TXRC 0,2 S

```

```

COVIAL
END ;;L00;;
PRCC FLEXINS
STEP XR A 48 S S ;; SAVE INDEX REG 1 HERE;;
STEP TEMP A 48 S S ;;TEMPORARY STORAGE...DIRECTOR OF TCM INSTRUCTION;;
BEGIN ;;ROUTINE TO INPUT UP TO 8 CHARACTERS FROM FLEXO. STOP CODE
ALLOWS RESTART FOR ERRORS, CARRIAGE RETURN ENDS MESSAGE;;

```

```

DIRECT
TXDLC 0,1 S
TDM XR S

```

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AA	CM	UMPIRE,RESPOND	S
	JMP	CRUC,Z	S
L	TIXZ	0,1	S
BB	TMA	0/3272T47	S
	SRAQ	6	S
	CD		S
	TCH	TEMP	S
	JAED	OUT	S
	SRA	6	S
	SLAQ	6	S
	JAED	AA	S
	TDO		S
	TMA	UMPIRE,RESPOND	S
	SLA	6	S
	AOS	UMPIRE,RESPOND	S
	TMD	C/MLT,91C/MLTR,00	S
	AIXJ	1,1	S
OUT	TMD	XR	S
	TDXLC	0,1	S
JOVIAL			
END JIFLEXINJ			
PNCC CRUCS			
BEGIN			
DIRECT			
	TMD	0/32378	
	TDC	S	
	SCD	428	
	TDC	S	
JOVIAL			
END			
TEMP FIRST S			

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QUARTER 20

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```
START ITEM UMPIRE A 7 U S
ITEM QTR ONE H S
ITEM TEMP A 48 S S
ITEM TEAMJAO H 10 S
ITEM RESPOND H 8 S
ITEM BLANK H 10 S
ITEM QR3 H 112 S
ITEM QR6 H 112 S
ITEM QR10 H 112 S
ITEM QR12 H 112 S
ITEM QR14 H 112 S
ITEM QR16 H 112 S
ITEM QR18 H 112 S
ITEM QR20 H 112 S
ITEM QR21 H 112 S
ITEM QR22 H 112 S
ITEM QR23 H 112 S
ITEM QR24 H 112 S
ITEM QR25 H 112 S
ITEM QR26 H 112 S
ITEM QR27 H 112 S
ITEM QR28 H 112 S
ITEM QR29 H 112 S
ITEM QR30 H 112 S
ITEM QR31 H 112 S
ITEM QR32 H 112 S
ITEM QR34 H 112 S
ITEM QR36 H 112 S
ITEM QR37 H 112 S
ITEM QR38 H 112 S
ITEM QR39 H 112 S
ITEM QR40 H 112 S
ITEM QR41 H 112 S
ITEM QR42 H 112 S
ITEM QR44 H 112 S
ITEM QR46 H 112 S
ITEM QR47 H 112 S
ITEM QR48 H 112 S
ITEM QR50 H 112 S
ITEM QR52 H 112 S
ITEM QR54 H 112 S
ITEM QR55 H 112 S
ITEM QR56 H 112 S
ITEM QR58 H 112 S
FILE QRPRT H 32767 H 112 V(TE) V(TPE) V(ENF) V(EOY) V(SET) V(OCC)
V(ESY) PRINT S
TABLE COSTS H A S S INDEX BY OS PLANTS H
BEGIN
ITEM COST/FIXED A 48 S S
BEGIN 0.40 4.6340 14.46340 22.96340 28.86340 31.96340 END
ITEM COST/VAR A 48 S S
BEGIN 0.40 3.6340 2.26340 1.96340 1.06340 0.66340 END
END
TABLE OR V 7 S D S
BEGIN
ITEM HGNICSM A 48 S S
BEGIN 102.8E340 102.8E340 102.8E340 102.8E340 102.8E340 102.8E340
102.8E340 END HGNICSM H
ITEM ARIPAR A 48 S S
BEGIN 90.8E340 80.8E340 80.8E340 80.8E340 80.8E340 80.8E340
```





```

.....
                                T)FOUR(T) $ ;OUTPUT OF OR;
                                END ;PROCESSING;
-----
BTCP FIRST $
ENC ;JUMP;
PHCC ACTREC(INDEX) $ ;COMPUTES FACTORED A/R CORRECTS FOR OVER-FACTOR;
ITEM INDEX A 44 S $
BEGIN
  FOR I = INDEX $
  BEGIN
    IF HL2190P(SIS) GE 9000 * AR12(SIS) $
      RL2190P(SIS) = 9000 * AR12(SIS) $
    IF HL3190P(SIS) GE 9000 * AR13(SIS) $
      RL3190P(SIS) = 9000 * AR13(SIS) $
    IF HL4190P(SIS) GE 8000 * AR14(SIS) $
      RL4190P(SIS) = 8000 * AR14(SIS) $
    IF HL5190P(SIS) GE 8000 * AR15(SIS) $
      RL5190P(SIS) = 8000 * AR15(SIS) $
    ARIFACT(SIS) = HL2190P(SIS) * BL3191P(SIS) + HL4190P(SIS)
      + HL5190P(SIS) $
    AR12(SIS) = AR12(SIS) - HL2190P(SIS) / 9000 $
    AR13(SIS) = AR13(SIS) - HL3190P(SIS) / 9000 $
    AR14(SIS) = AR14(SIS) - HL4190P(SIS) / 8000 $
    AR15(SIS) = AR15(SIS) - HL5190P(SIS) / 8000 $
  END
END
ENC
PHCC SPEND(INDEX) $
ITEM INDEX A 44 S $
BEGIN
  FOR I = INDEX $
  BEGIN
    FXICOST(SIS) = COSTFIXED(SUB1(SIS)) $
    VICUST(SIS) = WIP(SIS) * COSTVAR(SUB1(SIS)) $
    SALARY(SIS) = 1000 * (FLD1(SIS) + TRNG12(SIS) + TRNG13(SIS)
      + TRNG14(SIS)) $
    ADS(SIS) = 300 * PACES(SIS) $
    DISHRS(SIS) = FXICOST(SIS) + VICUST(SIS) + SALARY(SIS)
      + CONSTR(SIS) + HIRE(SIS) + RD(SIS) + ADS(SIS)
      + CONSULT(SIS) $
  END
END
ENC
PHCC PRIVE(INDEX) $ ;UPDATES ACCUMULATED R AND D;
ITEM INDEX A 44 S $
BEGIN
  FOR I = INDEX $
  BEGIN
    IF (MPRV(SIS) OR RD(SIS) EQ 0) $
    BEGIN
      CUMRD(SIS) = 0 $
      RETURN $
    END
    CUMRD(SIS) = CUMRD(SIS) + RD(SIS) $
  END
END
ENC
PHCC QUITTERS(INDEX) $ ;CONTROLS SALESMAN LOSSES;
ITEM INDEX A 44 S $
BEGIN
  FOR I = INDEX $
  BEGIN
    WTR15(SIS) = HIRE(SIS)/10000 $
    IF FLD1(SIS) NE 0 $

```

```

      FIGURE(FLD)1(SIS) = FLD)1(SIS),FLD)1LST(SIS)) S
      IF TRNG)2(SIS) NO 0 S
      FIGURE(TRNG)2(SIS) = TRNG)2(SIS),BL2)1LST(SIS)) S
      IF TRNG)3(SIS) NO 0 S
      FIGURE(TRNG)3(SIS) = TRNG)3(SIS),RL3)1LST(SIS)) S
      IF TRNG)4(SIS) NO 0 S
      FIGURE(TRNG)4(SIS) = TRNG)4(SIS),RL4)1LST(SIS)) S
      IF HIR)5(SIS) NO 0 S
      FIGURE(HIR)5(SIS) = HIR)5(SIS),HIR)1LST(SIS)) S
    END
  END
  PHCC FIGURE(NUMBIN = NUMBOUT,LOSSES) S ;;DETERMINES SALESMAN LOSSES;
  ITEM NUMBIN A 48 S S
  ITEM NUMBOUT A 48 S S
  ITEM LOSSES A 48 S S
  ITEM RANDUM A 7 U 1
  BEGIN
    LOSSES = 0 S
    NUMBOUT = NUMBIN S
    FOR I = NUMBIN - 1, -1, 0 S
      BEGIN
        RAGEN(=RANDUM) S
        IF RANDUM LO 5 S
          BEGIN
            NUMBOUT = NUMBOUT - 1 S
            LOSSES = LOSSES + 1 S
          END
        END
      END
    END
  END
  PHCC RAGEN(=PRNUMR) S ;;PSEUDO RANDOM NUMBER GENERATOR;
  TABLE GEN R 2 S
  BEGIN
    ITEM NGEN A 48 S S
    BEGIN 0(0425434430110475) 0(1272343473274254) END
  END
  ITEM PRNUMR A 7 U S ;;OUTPUT PARAMETER;
  ITEM TEMPRN A 48 S S
  BEGIN
    PRNUMR = NGEN(S08) * NGEN(S15) S
    NGEN(S08) = BIT(S10,275)(TEMPRN) S
    PRNUMR = BIT(S33,75)(NGEN(S08)) S
    IF PRNUMR GR 99.40 S
      GO TO RGEN S
    END
  END
  PHCC BYT(NAS) S
  ITEM BYT N 08
  ITEM NA A 48 S S
  ITEM XR A 48 S S
  BEGIN ;;CONVERTS BINARY NA TO BCH;
    DIRECT
    YX)LC 0,1 S
    YD)  BYT,XR S
    Y1A  0/6060A06000606060 S
    Y1-  BYT,RTD S
    Y1xZ 0,1 S
    CA)A  BYT,NN S
    SH)Q  48 S
    DA)  0/10 S
    A)  0/50T47 S
    SL)A  0,1 S
  END

```

```

      APCS      BTE.ATD      $
      CA        $
-----
      JAGQ      (P)+3H      $
      T44      C/PLT.481C/MLT.(P)-6HS $
      AIXJ      6,1        $
      T40      MTD.XR      $
      TDYLC     0,1        $
-----
UCVIAL
END 119TD11
PRCC DTB(MH)S
ITEM DTB A 47 US
ITEM MH M RS
ITEM PWSTEN A 47 US
REGIA 11CDAVFHY NCM MH TO BINARY DTB11
DIRECT
      CM      DT-.DTH      SCLEAR DTR.
      TMA     U/1842      SSET 1 INTO PWSTEN FOR
      T41     DTB.PWSTEN$1ST MULTIPLICATION.
      C7      $
      T4A     DT+.MH      SCLEAR U.
      SC1     6          $S61 MH CYCLE RIGHT 6
      T44     DT-.MH      SAND PLACE BACK IN MH.
      T44     DT-.MH      $
      SR-3    6          SSHIFT ACTIVE RYTE
      TMA     0/40       SINTO 3 SCALED BY IN 0
      JAGQ    (P)+3H     SIF BLANK, SKIP RYTE.
      M1      DTB.PWSTEN$MULTIPLY PWSTEN SCALED
      A4R     DTB.DTR     $B42*PRODUCT B47 IN A.
      T41     0/10R5     SMULT PWSTEN BY 10 AND
      MH      DTB.PWSTEN$EXIT ROUTINE WHEN
      T41     0/1EA      SPWSTEN=100,000,000
      JAGQ    (P)+4H     SREANING LAST RYTE.
      S61     5          SRESCALE PWSTEN TO M42
      T44     DTB.PWSTEN
      J4P     (P)-15H    SREPEAT FOR NEXT RYTE.
-----
UCVIAL
END 11DTH11
PRCC HRL(INDEX) 3 11ADVANCES BOARD ITEMS AND SOME ON ITEMS11
ITEM INDEX A 41 9 4
REGIA
FOR I = INDEX 5
REGIA
IF SALES(SIS) GR INVTY(SIS) 5
REGIA
SALES(SIS) = INVTY(SIS) 5
LCG1991(SALES HAVE BEEN REDUCED TO THE NUMBER OF UNITS IN INVEN
TORY) 5
END
INVTY(SIS) = INVTY(SIS) - SALES(SIS) 5
CARH1(SIS) = AR12(SIS) 5
AR12(SIS) = AR13(SIS) 5
AR13(SIS) = AR14(SIS) 5
AR14(SIS) = AR15(SIS) 5
AR15(SIS) = SALES(SIS) 5
MEN(SIS) = FLU11(SIS) + TRNQ12(SIS) + TRNQ13(SIS) + TRNQ14(SIS)
+ N1R15(SIS) 5
CAJLD1R(SIS) = T1AV1CA(SIS) - DISRRY(SIS) 5
INVTY(SIS) = INVTY(SIS) + WIP(SIS) 5
WIP(SIS) = SCMED(SIS) 5
SCMED(SIS) = 0 5
OS11(SIS) = OS11(SIS) + CON12(SIS) 5

```

```

-----
CONJ2(SIS) = CONJ3(SIS) $
FEFTM CS11(SIS) + CONJ2(SIS) GU 1 $
-----
CONJ3(SIS) = CONSTR(SIS)/30000 $
CRIF CONSTR(SIS) GC 150000 $
CONJ3(SIS) = 1 + (CONSTR(SIS) - 150000)/30000 $
CRIF CONSTR(SIS) GC 0 $
-----
REGIA
CONSTR(SIS) = 0 $
CONJ3(SIS) = 0 $
-----
END
END]]ALTERNATIVE]]
FLD11(SIS) = FLD11(SIS) + THNG12(SIS) $
THNG12(SIS) = THNG13(SIS) $
THNG13(SIS) = THNG14(SIS) $
THNG14(SIS) = THNG15(SIS) $
MTR15(SIS) = 0 $
PLIVAL(SIS) = PLIVAL(SIS) + CONSTR(SIS) $
-----
END
ENT
PRCC RESET(INDEX) $ ]]RESFIS OR FOR NEXT QUARTER]]
ITEM INDEX A 4H $ $
-----
REGIA
PCH I = INDEX $
REGIA
BGNICSH(SIS) = CASH10(SIS) $
ARIPAR(SIS) = 10000 + CASH11(SIS) $
PIFACTR(SIS) = ANIFACT(SIS) $
YAVVICA(SIS) = BGNICSH(SIS) + ARIPAR(SIS) + PIFACTR(SIS) $
BL21GOP(SIS) = 0 $
BL31GOP(SIS) = 0 $
BL41GOP(SIS) = 0 $
BL51GOP(SIS) = 0 $
ARIFACT(SIS) = 0 $
FXICOST(SIS) = 0 $
VICOST(SIS) = 0 $
SALARY(SIS) = 0 $
CONSTR(SIS) = 0 $
MTRF(SIS) = 0 $
-----
REINTS = 0 $
ADS(SIS) = 0 $
CPNSLLT(SIS) = 0 $
DTSHAS(SIS) = 0 $
CASH10(SIS) = 0 $
PAGE(SIS) = 0 $
BALLS(SIS) = 0 $
MFA(SIS) = 0 $
I-PRV(SIS) = 0 $
FID1LST(SIS) = 0 $
BL21LST(SIS) = 0 $
BL31LST(SIS) = 0 $
BL41LST(SIS) = 0 $
MTR1LST(SIS) = 0 $
-----
END
END
PRCC IACIONE $
REGIA
]CG(2AMHOW MANY YEARS ARE PLAYING)] $
FIEXTM $
MTR1QR = MTR1RESPOND] $
-----
END

```

```

PHCC I(1)T(0)INDEX) $
ITEV INDEX A 4H S $
-----
BEGIN
  FOR I = INDEX $
  BEGIN
    IF I EQ 0 $
    BEGIN
      LCG(13H(PLEASE ENTER THE FOLLOWING VALUES)) $
      LCG(14H(QUARTER NUMBER)) $
      FLEXIN $
      BYTE (172,25)(Q6) = RESPOND $
      TEMP = DT(RESPOND) + 1 $
      BYTE(192,25)(JR47) = RTD(TEMP) $
      END
      BYTE(195)(TEAMING) = RTD(I + 1) $
      LCG(TEAPJND) $
      LCG(15H(UNITS SOLD)) $
      FLEXIN $
      SCHED(15) = DT(RESPOND) $
      LCG(17H(LOCK 2 FACTORING)) $
      FLEXIN $
      RL2190P(15) = DT(RESPOND) $
      LCG(17H(LOCK 3)) $
      FLEXIN $
      RL3190P(15) = DT(RESPOND) $
      LCG(17H(LOCK 4)) $
      FLEXIN $
      BL4190P(15) = DT(RESPOND) $
      LCG(17H(LOCK 5)) $
      FLEXIN $
      RL5190P(15) = DT(RESPOND) $
      LCG(12H(CONSTRUCTION)) $
      FLEXIN $
      CLSTR(15) = DT(RESPOND) $
      LCG(16H(HIRING)) $
      FLEXIN $
      WTR(15) = DT(RESPOND) $
      LCG(17H(AND D)) $
      FLEXIN $
      RD(15) = DT(RESPOND) $
      LCG(10H(CONSULTING)) $
      FLEXIN $
      CONSULT(14) = DT(RESPOND) $
      LCG(13H(A-S)) $
      FLEXIN $
      PAGES(15) = DT(RESPOND) $
      LCG(16H(SALES)) $
      FLEXIN $
      SALES(15) = DT(RESPOND) $
      IF SALES(15) EQ 0 $
      BEGIN
        LCG(24H(CUSTOMERS AND UNITS SOLD)) $
        FOR J = 0,1,2 $
        BEGIN
          FLEXIN $
          CUST(15) = DT(RESPOND) $
          IF CUST(15) EQ 0 $
          GOT1 SET0 $
          FLEXIN $
          SOLD(15) = DT(RESPOND) $

```

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```
TEST *
SETUP FOR K = J, 1, 9 *
REGIN
    CUST(SKS) = 0 *
    SOLD(SKS) = 0 *
END
GOTO NEXT *
END
NEXT. LOG(17H(PROJECT IMPROVEMENT, 1 OR 0)) *
FLXIN *
IMPRV(SIS) = DTR(RESPOND) *
LOG(17H(PROJ LINES JUNKED)) *
FLXIN *
TEMP = DTR(RESPOND) *
PLIVAL(SIS) = PLIVAL(SIS) - 30000 * TEMP *
CS11(SIS) = MS11(SIS) - TEMP *
END
PNC I(1) = REE(INDEX) *
IIE I(1) = A 4 * *
REGIN
FOR I = INDEX *
-EGIN
    IF CUST(10R) EQ 0 *
        GOTO S14 *
    BYTE(S48,25)(QR14) = BYD(CUST(S0S)) *
    BYTE(S40,25)(QR14) = BYD(SOLD(S0S)) *
    IF CUST(11R) EQ 0 *
        GOTO S14 *
    BYTE(S48,25)(QR16) = BYD(CUST(S1S)) *
    BYTE(S40,25)(QR16) = BYD(SOLD(S1S)) *
    IF CUST(12R) EQ 0 *
        GOTO S14 *
    BYTE(S48,25)(QR18) = BYD(CUST(S2S)) *
    BYTE(S40,25)(QR18) = BYD(SOLD(S2S)) *
    IF CUST(13R) EQ 0 *
        GOTO S20 *
    BYTE(S48,25)(QR20) = BYD(CUST(S3S)) *
    BYTE(S40,25)(QR20) = BYD(SOLD(S3S)) *
    IF CUST(14R) EQ 0 *
        GOTO S22 *
    BYTE(S48,25)(QR22) = BYD(CUST(S4S)) *
    BYTE(S40,25)(QR22) = BYD(SOLD(S4S)) *
    IF CUST(15R) EQ 0 *
        GOTO S24 *
    BYTE(S48,25)(QR24) = BYD(CUST(S5S)) *
    BYTE(S40,25)(QR24) = BYD(SOLD(S5S)) *
    IF CUST(16R) EQ 0 *
        GOTO S26 *
    BYTE(S48,25)(QR26) = BYD(CUST(S6S)) *
    BYTE(S40,25)(QR26) = BYD(SOLD(S6S)) *
    IF CUST(17R) EQ 0 *
        GOTO S28 *
    BYTE(S48,25)(QR28) = BYD(CUST(S7S)) *
    BYTE(S40,25)(QR28) = BYD(SOLD(S7S)) *
    IF CUST(18R) EQ 0 *
        GOTO S30 *
    BYTE(S48,25)(QR30) = BYD(CUST(S8S)) *
    BYTE(S40,25)(QR30) = BYD(SOLD(S8S)) *
```

```

IF CLST(99) EQ U *
GOTO S12 *
-----
BYTE($40,25)(QR32) = BTD(CUST($95)) S
BYTE($40,25)(QR32) = BTD(SOLD($95)) S
NEXT, BYTE($29,85)(QR12) = BTD(AGNCSH($IS)) S
      BYTE($29,85)(QR14) = BTD(ARJPAR($IS)) S
      BYTE($29,85)(QR14) = BTD(PJFACTR($IS)) S
      BYTE($29,85)(QR14) = BTD(TJAVICA($IS)) S
      BYTE($29,85)(QR23) = BTD(BL2)80P($IS)) S
      BYTE($29,85)(QR25) = BTD(BL3)90P($IS)) S
      BYTE($29,85)(QR27) = BTD(BL4)80P($IS)) S
      BYTE($29,85)(QR29) = BTD(BL5)80P($IS)) S
      BYTE($29,85)(QR31) = BTD(ARJFACT($IS)) S
      BYTE($29,85)(QR36) = BTD(FX)COST($IS)) S
      BYTE($29,85)(QR38) = BTD(VICOST($IS)) S
      BYTE($29,85)(QR41) = BTD(SALARY($IS)) S
      BYTE($29,85)(QR42) = BTD(CONSTR($IS)) S
      BYTE($29,85)(QR44) = BTD(HIRE($IS)) S
      BYTE($29,85)(QR46) = BTD(RD($IS)) S
      BYTE($29,85)(QR44) = BTD(AUS($IS)) S
      BYTE($29,85)(QR50) = BTD(CONBULT($IS)) S
      BYTE($29,85)(QR52) = BTD(DISBRS($IS)) S
      BYTE($29,85)(QR55) = BTD(CALLIDH($IS)) S
      BYTE($29,85)(QR55) = BTD(PLVAL($IS)) S
      BYTE($137,45)(QR12) = BTD(CUMIRD($IS)) S
      BYTE($49,45)(QR46) = BTD(T * 1) S
      BYTE($67,45)(QR34) = BTD(SALES($IS)) S
      BYTE($67,45)(QR34) = BTD(INVTY($IS)) S
      BYTE($67,45)(QR41) = BTD(WIP($IS)) S
      BYTE($67,45)(QR54) = BTD(PEN($IS)) S
      BYTE($67,45)(QR48) = BTD(PLULST($IS)) S
      BYTE($67,45)(QR50) = BTD(BL2)LSL($IS)) S
      BYTE($67,45)(QR52) = BTD(BL3)LSL($IS)) S
      BYTE($67,45)(QR54) = BTD(BL4)LSL($IS)) S
      BYTE($67,45)(QR54) = BTD(HIRILST($IS)) S
IF IMPRV($IS) S
REGIA
      BYTE($98,35)(QR14) = 3M( ) S
RETURN *
-----
END
BYTE($98,35)(QR14) = 3M(NDT) S
RETURN *
S14. BYTE($40,145)(QR14) = 14M( ) S
S16. BYTE($40,145)(QR16) = 14M( ) S
S18. BYTE($40,145)(QR18) = 14M( ) S
S20. BYTE($40,145)(QR20) = 14M( ) S
S22. BYTE($40,145)(QR22) = 14M( ) S
S24. BYTE($40,145)(QR24) = 14M( ) S
S26. BYTE($40,145)(QR26) = 14M( ) S
S28. BYTE($40,145)(QR28) = 14M( ) S
S30. BYTE($40,145)(QR30) = 14M( ) S
S32. BYTE($40,145)(QR32) = 14M( ) S
GOTO NEXT *
-----
END
END
PACC IJC)FCUR(INDEX) S
ITER INFR A 4# S *
REGIA
FOR I = INDX S
REGIA

```

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```

-----
BYTE($102,85)(QR52) = RTD(RUNJCSH($16)) $
BYTE($102,85)(QR54) = RTD(ARIPAR($15)) $
BYTE($102,85)(QR56) = RTD(PIFACTR($15)) $
BYTE($102,85)(QR58) = RTD(TJAVICA($15)) $
CFEN OUTPUT QRPRINT $
FOR J = 1,2 $
  BEGIN
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR3 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR6 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR10 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR12 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR14 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR16 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR18 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR20 $
    OUTPUT QRPRINT QR21 $
    OUTPUT QRPRINT QR22 $
    OUTPUT QRPRINT QR23 $
    OUTPUT QRPRINT QR24 $
    OUTPUT QRPRINT QR25 $
    OUTPUT QRPRINT QR26 $
    OUTPUT QRPRINT QR27 $
    OUTPUT QRPRINT QR28 $
    OUTPUT QRPRINT QR29 $
    OUTPUT QRPRINT QR30 $
    OUTPUT QRPRINT QR31 $
    OUTPUT QRPRINT QR32 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR34 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR36 $
    OUTPUT QRPRINT QR37 $
    OUTPUT QRPRINT QR38 $
    OUTPUT QRPRINT QR39 $
    OUTPUT QRPRINT QR40 $
    OUTPUT QRPRINT QR41 $
    OUTPUT QRPRINT QR42 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR44 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR46 $
    OUTPUT QRPRINT QR47 $
    OUTPUT QRPRINT QR48 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR55 $
    OUTPUT QRPRINT BLANK $
    OUTPUT QRPRINT QR52 $
    OUTPUT QRPRINT BLANK $
-----
```

```

OUTPUT QRRPRINT QRS4 S
OUTPUT QRRPRINT QRS5 S
OUTPUT QRRPRINT QRS6 S
OUTPUT QRRPRINT BLANK S
OUTPUT QRRPRINT QRS8 S
PCS(CRRPRINT) = 0 S

```

```

END
SMUT OUTPUT QRRPRINT S

```

```

END

```

```

ENC
PHCC LOG(FLEXING)S
ITEM FLEXING M 120 S ;;FLEXO IMAGE;;
ITEM XR A 48 S ;;SAVE INDEX REGS 1 AND 2 HERE;;
BEGIN ;;ROUTINE TO PRINT OUT UP TO 120 CHARACTERS ON THE FLEXO SUP-
PRESSING LEADING BLANKS;;

```

```

DIRECT

```

	J4P	CRWC,Z	S
	TXKLC	0,1	S
	TXKRC	0,2	S
	TJ4	XR	S
L	TIXZ	0,1	S
LG01	TIXZ	42,2	S
LG02	T4A	FLEXING,1	S
	SRA	0,2	S
	SLA	42	S
	T47	0/00	S
	J4ED	(P)*2M	S
	J4P	LG03	S
	T47	C/-LT,32762IC/MLTR,LG02	S
	SIXJ	0,1	S
	T47	C/-LT,15IC/MLTR,LG01	S
	AT4J	1,1	S
	J4P	001	S
LG03	T47		S
	T47	C/-LT,32762IC/MLTR,LG04	S
	SIXJ	0,2	S
	T47	C/-LT,15IC/MLTR,LG05	S
	AT4J	1,1	S
L	J4P	001	S
LG04	T4A	FLEXING,1	S
	SRA	0,2	S
	SLA	42	S
	J4P	LG03	S
LG05	TIXZ	42,2	S
	J4P	LG04	S
011	T47	XR	S
	TXKLC	0,1	S
	TXKRC	0,2	S

```

CVIAL

```

```

ENC ;;LOG;;
PHCC FLEXING
ITEM XR A 48 S ;; SAVE INDEX REG 1 HERE;;
ITEM TEMP A 48 S ;;TEMPORARY STORAGE...DIRECTION OF TCM INSTRUCTIONS;;
BEGIN ;;ROUTINE TO INPUT UP TO 8 CHARACTERS FROM FLEXO. STOP CODE
ALLOWS RESTART FOR ERRORS, CARRIAGE RETURN ENDS MESSAGE;;

```

```

DIRECT

```

	TXKLC	0,1	S
	TJ4	XR	S
AA	01	UMPIRE.RESPOND	S

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(Last Page)

	JHP	CRUC.Z	S
L	TIXZ	0,1	S
BB	T4A	0/3272T47	S
	SRAQ	5	S
	CU		S
	TCH	TEMP	S
	JAED	JUT	S
	SRA	5	S
	SLAQ	6	S
	JAED	AA	S
	TCH		S
	T4A	UMFIRE,RESPOND	S
	SLA	6	S
	AQS	UMFIRE,RESPOND	S
	T4A	C/HLT,93C/HLTR,BB	S
	ATXJ	1,1	S
OUT	T4A	XR	S
	TDXLC	0,1	S
JOVIAL			
END (FLEXIN)			
PRCC CRCS			
BEGIN			
DIRECT			
	T4A	0/3237S	
	TDC	S	
	SCD	42S	
	TDC	S	
JOVIAL			
END			
TERM FIRST S			

UNCLASSIFIED

System Development Corporation,  
Santa Monica, California  
BUSINESS MANAGEMENT GAME, PART III:  
INSTRUCTIONS FOR THE USE AND MODIFI-  
CATION OF PROGRAM UMPIRE. Scientific  
rept., TM-1088/002/00, by S. Peterson.  
20 May 1963, 64p.

Unclassified report

DESCRIPTORS: Management Engineering.

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Describes the use, modification and  
maintenance of program UMPIRE, a pro-  
gram written in JOVIAL for the Philco  
2000, to be used in the play of the  
management game described in TM-1088.

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