

SHIP PRODUCTION COMMITTEE
FACILITIES AND ENVIRONMENTAL EFFECTS
SURFACE PREPARATION AND COATINGS
DESIGN/PRODUCTION INTEGRATION
HUMAN RESOURCE INNOVATION
MARINE INDUSTRY STANDARDS
WELDING
INDUSTRIAL ENGINEERING
EDUCATION AND TRAINING

October 1980
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THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Proceedings of the REAPS Technical Symposium

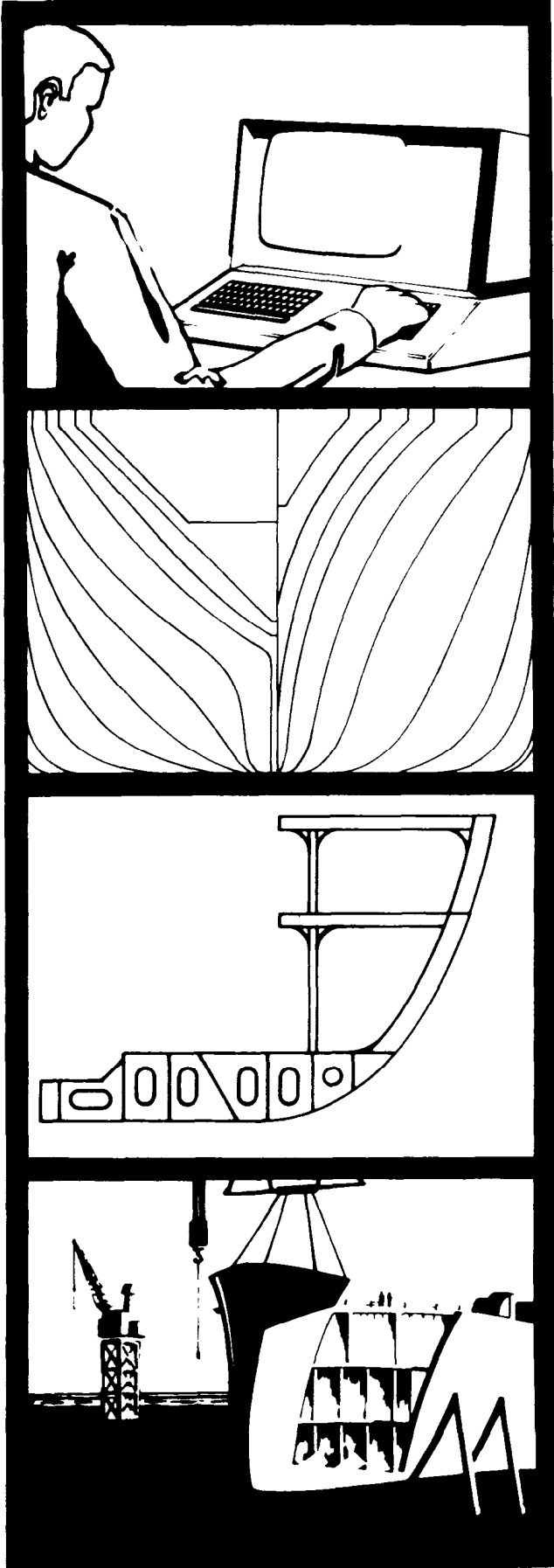
Paper No. 26: An Overview of the Manual and the Computerized "MOST" Work Measurement Systems

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

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R ESEARCH
E AND
E NGINEERING
A FOR
A UTOMATION
P AND
P RODUCTIVITY
S IN
SHIPBUILDING

**Proceedings of the
REAPS Technical Symposium
October 14-16, 1980
Philadelphia, Pennsylvania**

**AN OVERVIEW OF THE MANUAL AND THE COMPUTER "MOST" WORK
MEASUREMENT SYSTEMS**

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Sales Coordinator
H. B. Maynard and Company Inc
Pittsburgh, Pennsylvania**

Mr. Yates has the responsibility for the administration of all company sales information and reports. He aids the sales staff with computer systems configuration and proposal preparation. He also provides presentations and demonstrations of H. B. Maynard and Company services to potential clients as well as interested professional organizations.

Mr. Yates holds a degree in administration from the University of Pittsburgh, and 'is a graduate of Carnegie-Mellon University.

MOST[®] COMPUTER SYSTEMS

**A NEW AUTOMATED
SYSTEM FOR THE ESTABLISHMENT AND
MAINTENANCE OF ENGINEERED LABOR TIME STANDARDS**

H. B. MAYNARD and COMPANY, INC.

INTERNATIONAL MANAGEMENT CONSULTANTS



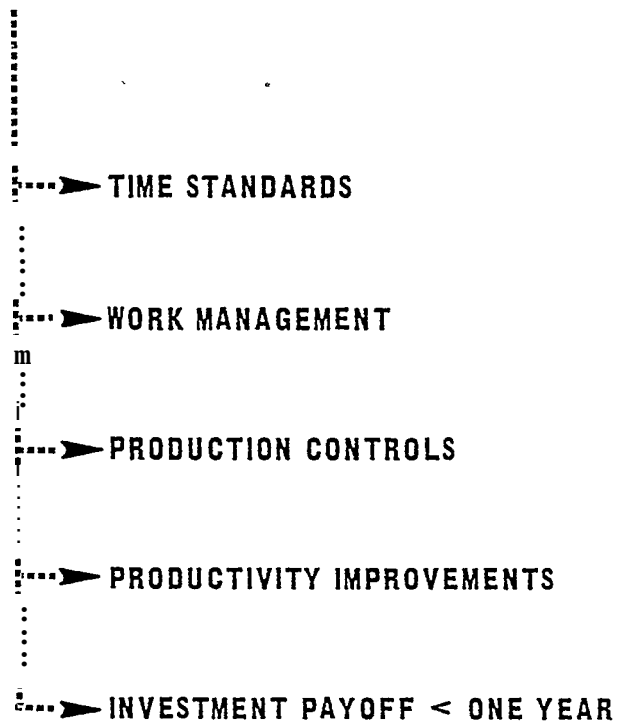
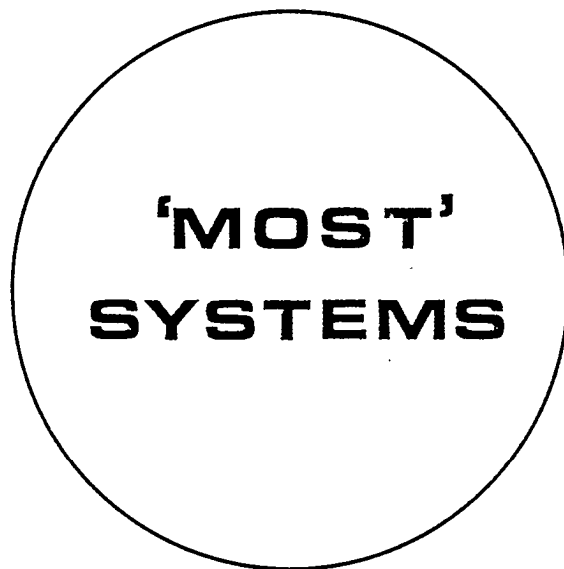


WHY DO WE NEED LABOR TIME STANDARDS?

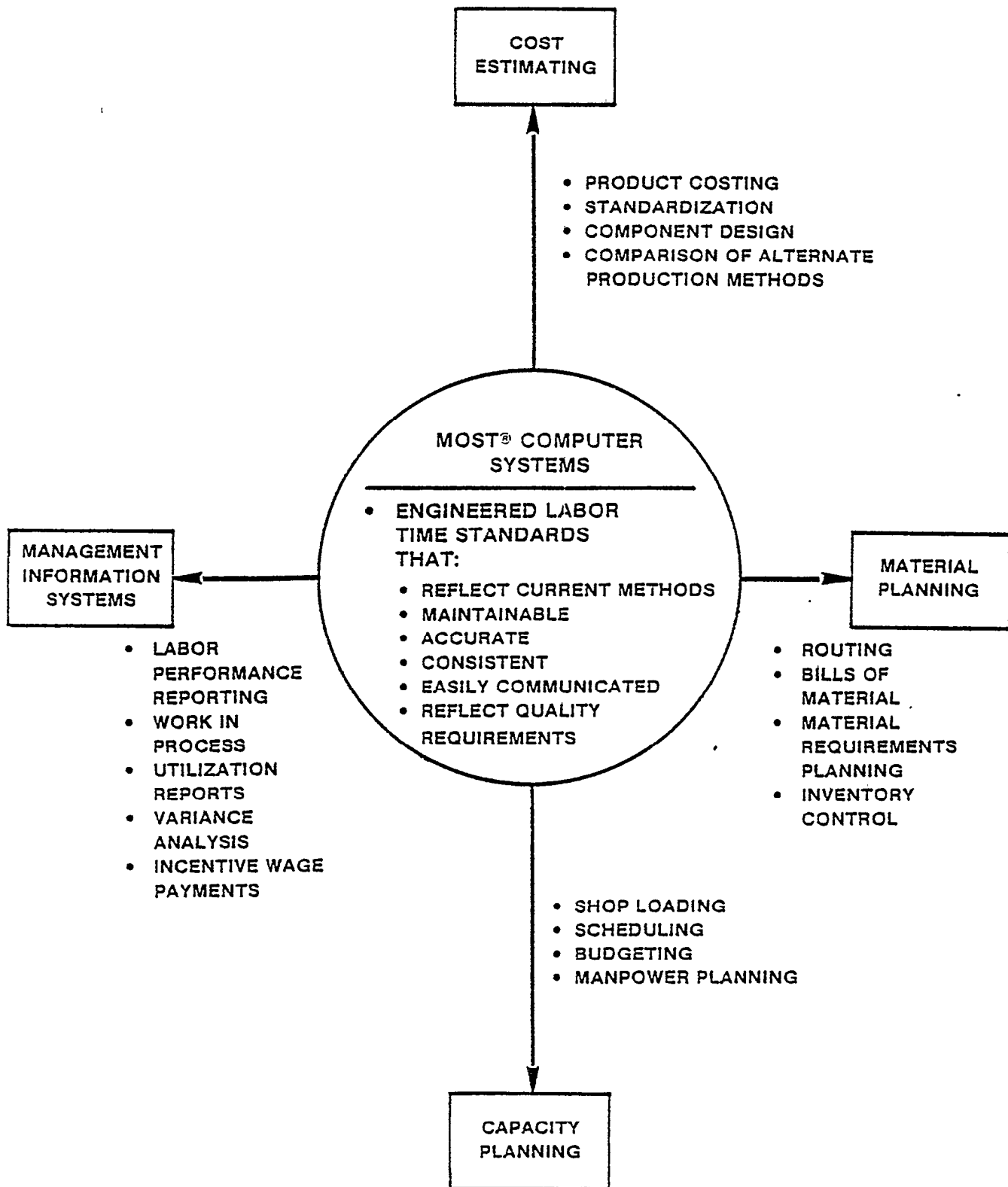
- **SATISFY A BASIC HUMAN CHARACTERISTIC (THE NEED TO KNOW WHAT IS EXPECTED FROM A PERSON)**
- **PLAN AND SCHEDULE LABOR REGARDING TIME AND MANPOWER**
- **CONTROL OUTPUT AND PRODUCTIVITY**
- **CALCULATE PRODUCT AND LABOR COSTS**
- **PAY BY RESULTS**

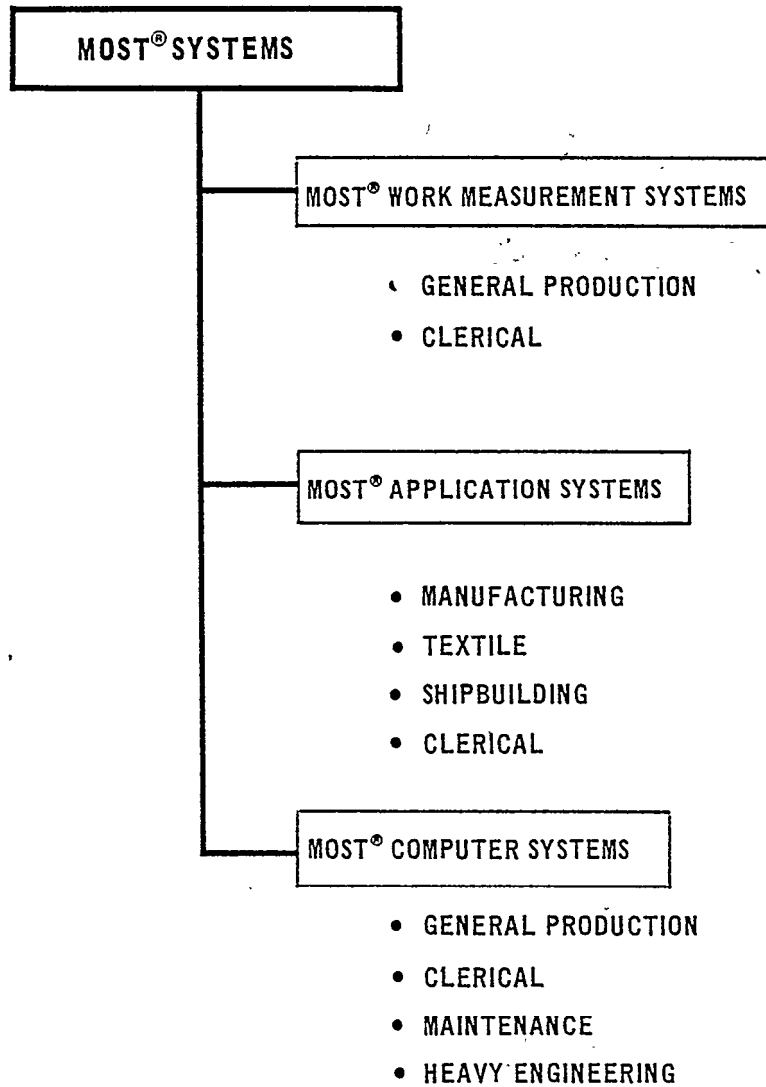
WHAT IS REQUIRED TO CALCULATE AN ENGINEERED TIME STANDARD?

- 1** DOCUMENTATION OF WORK CONDITIONS
- 2** WORK MEASUREMENT TECHNIQUE (MOST)
- 3** SUB-OPERATION DATA DEVELOPMENT
PRINCIPLES AND RULES
- 4** FILING SYSTEM FOR SUB-OPERATION DATA
- 5** CALCULATION FORMATS FOR FINAL TIME
STANDARDS

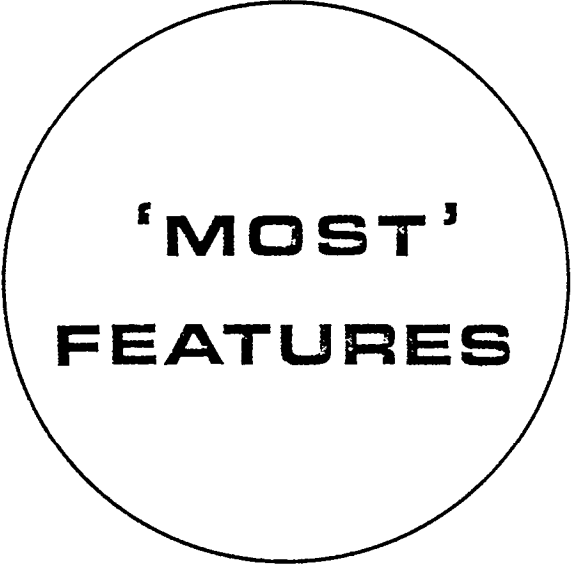


MOST® COMPUTER SYSTEMS





MOST SYSTEMS FAMILY



'MOST' FEATURES

- UNIVERSAL APPROACH
- FAST TO APPLY
- ADEQUATE ACCURACY
- EASY TO UNDERSTAND AND LEARN
- MINIMUM OF PAPERWORK
- MULTILEVEL SYSTEM
- CONSISTENT RESULTS
- ENCOURAGE METHODS DEVELOPMENT
- OPEN TO SUPPLEMENTS
- ECONOMIC INSTALLATION

MOST[®] COMPUTER SYSTEMS

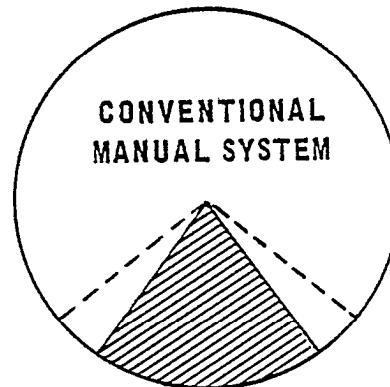
WILL -

- **SIMPLIFY AND ACCELERATE THE DEVELOPMENT AND MAINTENANCE OF TIME STANDARDS**
- **IMPROVE THE PRODUCTIVITY OF THE INDUSTRIAL ENGINEER**
- **MAKE THE INDUSTRIAL ENGINEER'S JOB MORE CHALLENGING AND STIMULATING**
- **GENERATE UNIFORM INFORMATION AND DATA FOR FASTER AND MORE CONSISTENT PRODUCTION PLANNING AND CONTROL**
- **INCREASE THE SAVINGS/COST RATIO FOR THE INDUSTRIAL ENGINEERING FUNCTION AND THE PROFITABILITY FOR THE COMPANY**

**REDUCED MANPOWER
REQUIREMENTS FOR:**

DEVELOPMENT

20%

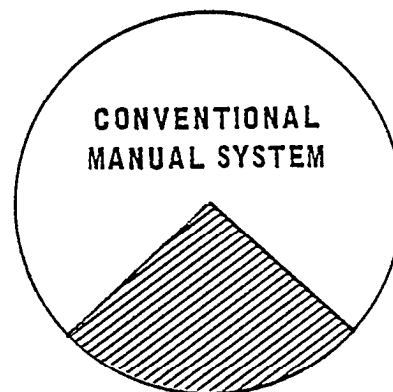


**INCREASE
IN OUTPUT**

> 5 TIMES

APPLICATION

25%



> 4 TIMES

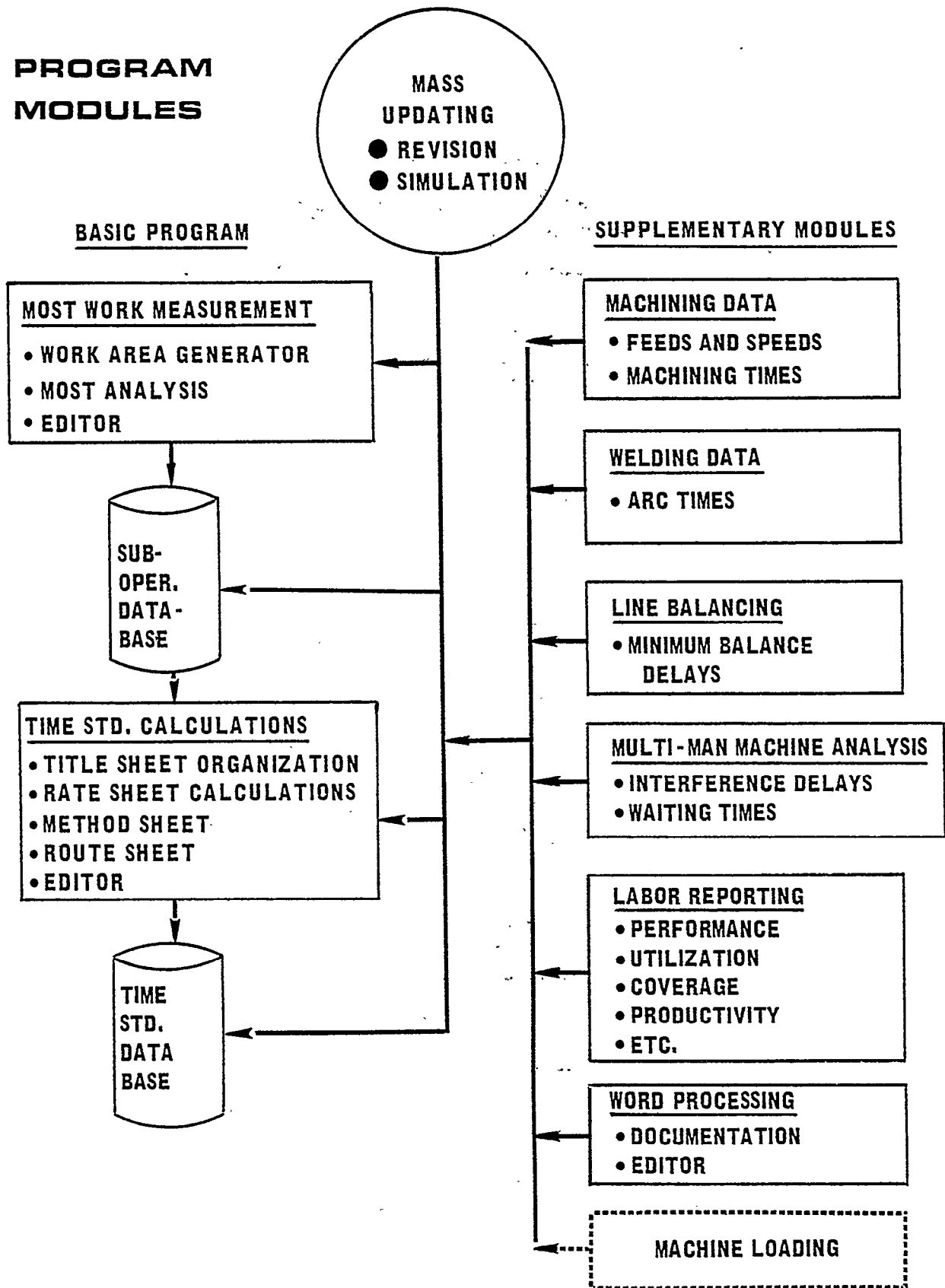
MAINTENANCE

10%

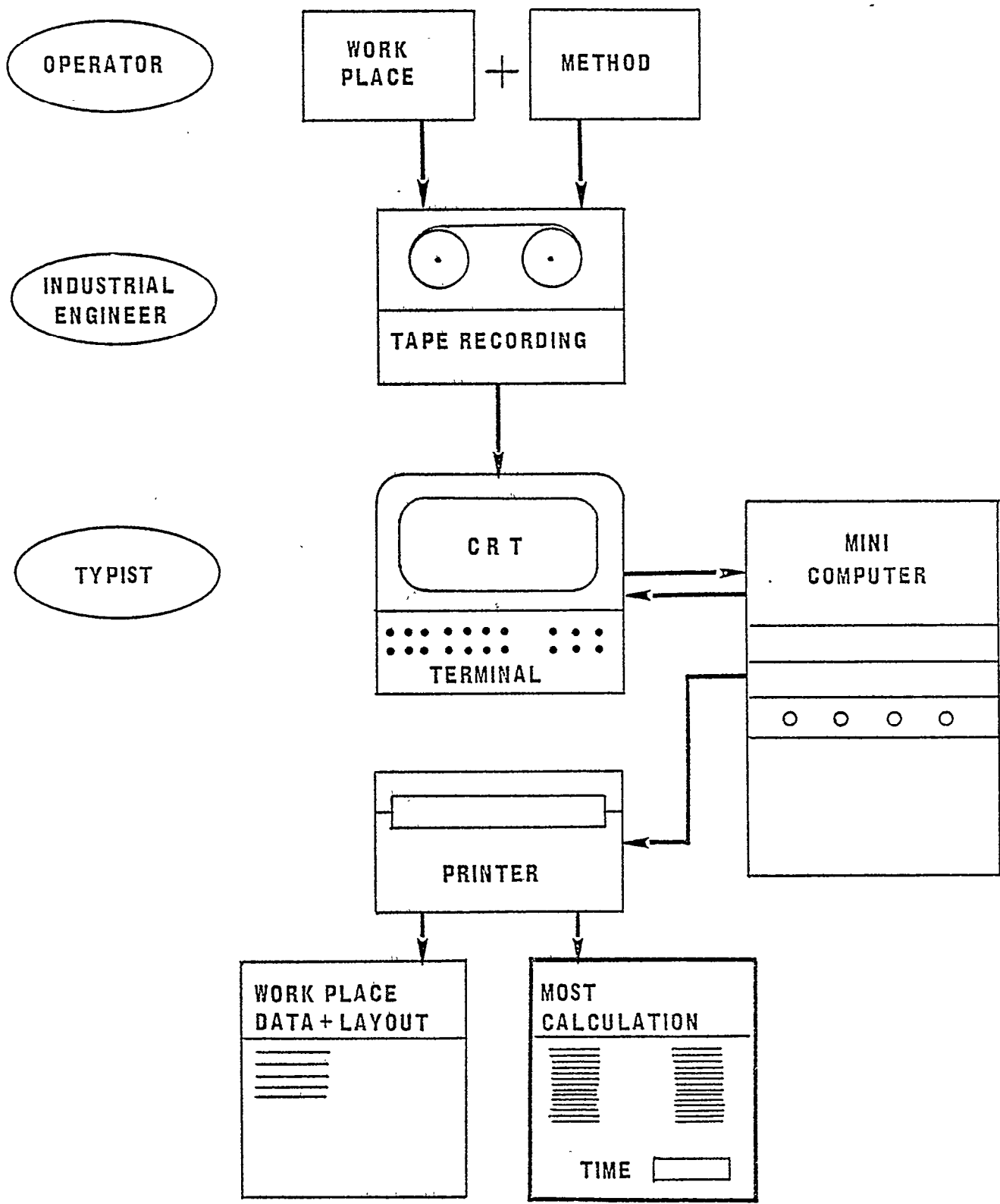


> 10 TIMES

PROGRAM MODULES

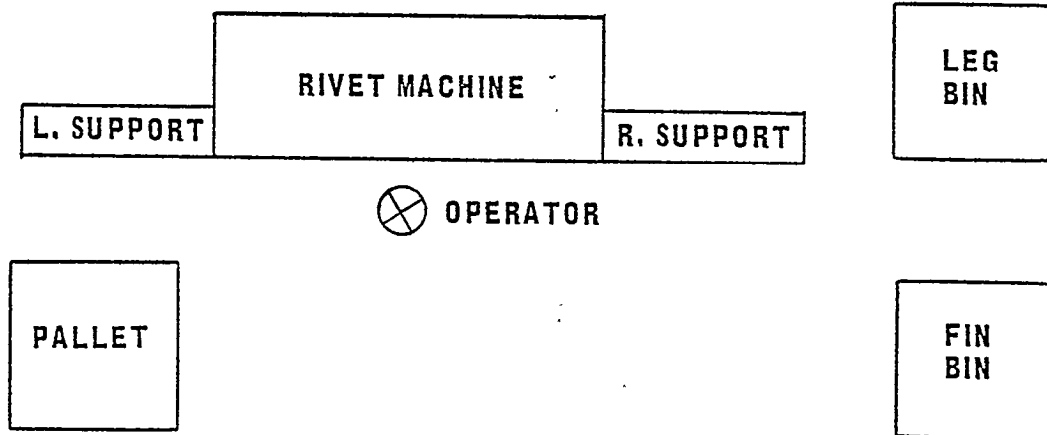


BASIC DATA ENTRY



ANALYSIS EXAMPLE

WORKPLACE: RIVET MACHINE



WORK STATIONS:

RIVET MACHINE	12/6, 6/3
LEFT SUPPORT	8/6, 4/1
RIGHT SUPPORT	16/6, 4/1
PALLET/BEND	8/2, 4/4
LEG BIN	22/6, 4/4
FIN BIN	22/2, 4/4

OPERATOR 15/6

EQUIPMENT:

RIVET MACHINE - PT =.5 SEC.

TOOLS:

NONE

ACTION DISTANCES:

FIN BIN - PALLET	3 STEPS
FIN BIN - R. SUPPORT	2
FIN BIN - L. SUPPORT	2
FIN BIN - RIVET MACH,	2
FIN BIN - LEG BIN	2
PALLET - R. SUPPORT	2
PALLET - L. SUPPORT	2
PALLET - RIVET MACH.	2
PALLET - LEG BIN	2

PARTS/OBJECTS:

PALLET - ANGLES

RIVET MACHINE - RIVET PINS

LEG BIN - LEGS

FASTEN WITH RIVETER

107/1005/2

RIVET 2 LEGS TO CENTER SUPPORT

1	PLACE 1ST LEG TO RIVETPINS AND LEFTSUPPORT		
	A3 B0 G1 A1 B0 F3 A0	1.0	80
2	PLACE ANGLE FROM PALLET TO RIVETPINS F 2		
	A3 B6 G1 A3 B0 F3 A0	2.0	320
3	PUSH FOOTPEDAL FOR RIVETING LEG		
	A1 B0 G1 M1 X1 I0 A0	1.0	40
4	HOLDMOVE ANGLE FROM RIVETMACHINE TO RIGHTSUPPORT		
	A0 B0 G0 A1 B0 F1 A0	1.0	20
5	PLACE 2ND LEG AND ANGLE TO RIVETPINS		
	A1 B0 G1 A1 B0 F3 A0	1.0	60
6	PUSH FOOTPEDAL FOR RIVETING LEG		
	A1 B0 G1 M1 X1 I0 A0	1.0	40
7	HOLDMOVE LEG ASSEMBLY TO FINBIN		
	A0 B0 G0 A3 B0 F1 A0	1.0	40

TOTAL TMU

600

MANUAL HANDLING		
ACTIVITY	SEQUENCE MODEL	SUB-ACTIVITIES
GENERAL MOVE	ABGABPA	A - ACTION DISTANCE B - BODY MOTION G - GAIN CONTROL P - PLACE
CONTROLLED MOVE	ABGMXIA	M - MOVE CONTROLLED X - PROCESS TIME I - ALIGN
TOOL USE	ABGABP ABPA	F - FASTEN L - LOOSEN M - MEASURE R - RECORD S - SURFACE TREAT T - THINK

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MOST[®] COMPUTER SYSTEMS

FILING PROGRAM CATEGORIES FOR

SUB-OPERATION DATA UNITS

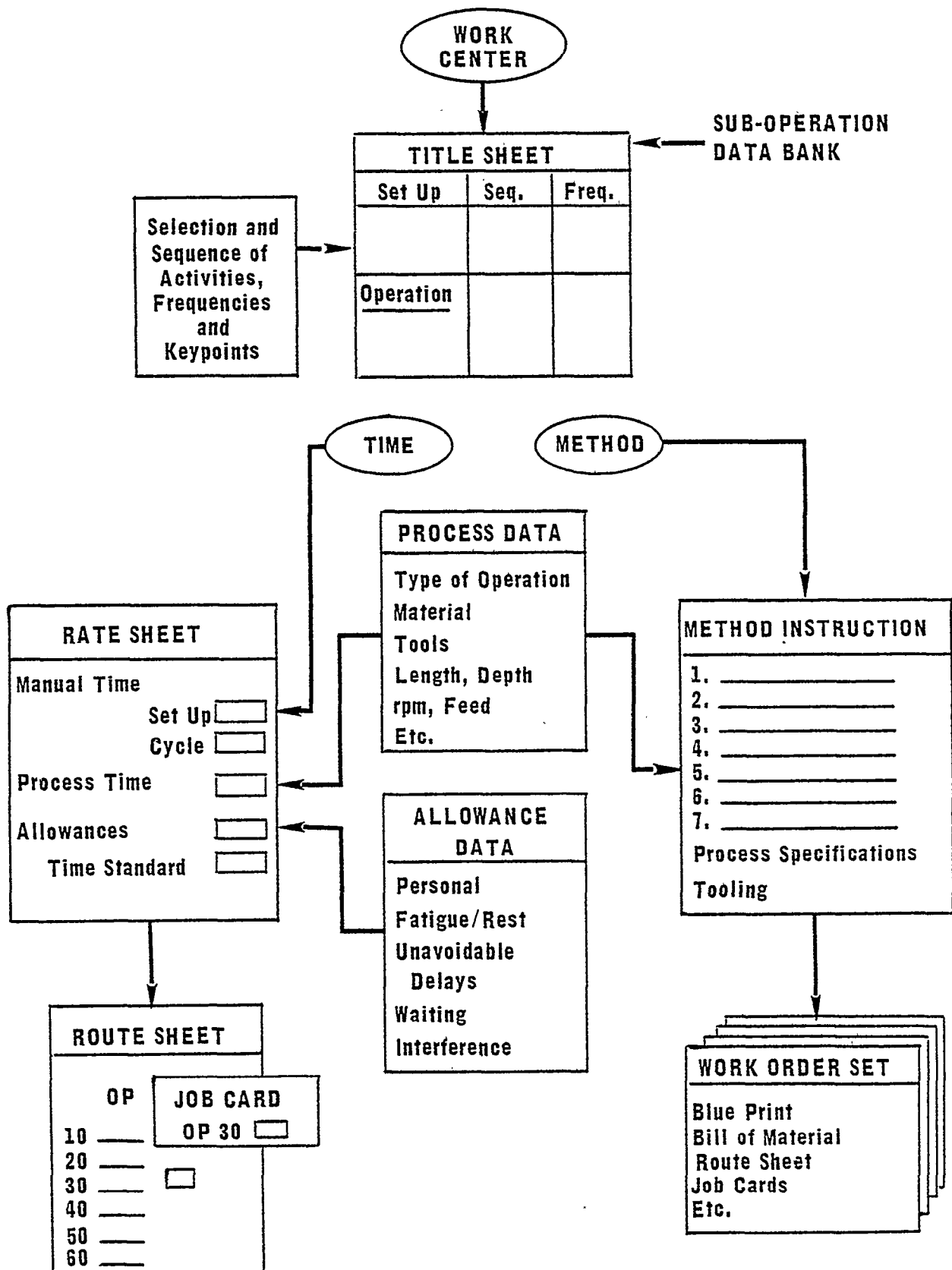
		<u>EXAMPLE</u>
M A J O R C A T E G O R I E S	● ACTIVITY(IES)	EXCHANGE
	● OBJECT(S) / COMPONENT(S) in/on/for	WORKPIECE in
	● EQUIPMENT / PRODUCT with	3-JAW CHUCK with
	● TOOL(S) from/to/at	T-WRENCH at
	● LOCATION	ENGINE LATHE #341
.....		
S U P P L E M E N T A R Y D A T A	● PER unit	PER part
	● OCCURRENCE FREQUENCY GROUP	OFG 2
	● DATE	11/7/77
	● SPECIAL USER CATEGORY(IES)	(APPLICATOR, PLANT, ETC.)
	● CONDITIONS	(RESTRICTIONS, SPECIAL APPLICATIONS, ETC.)

MOST" COMPUTER SYSTEMS

FILING CATEGORIES FOR TIME STANDARDS

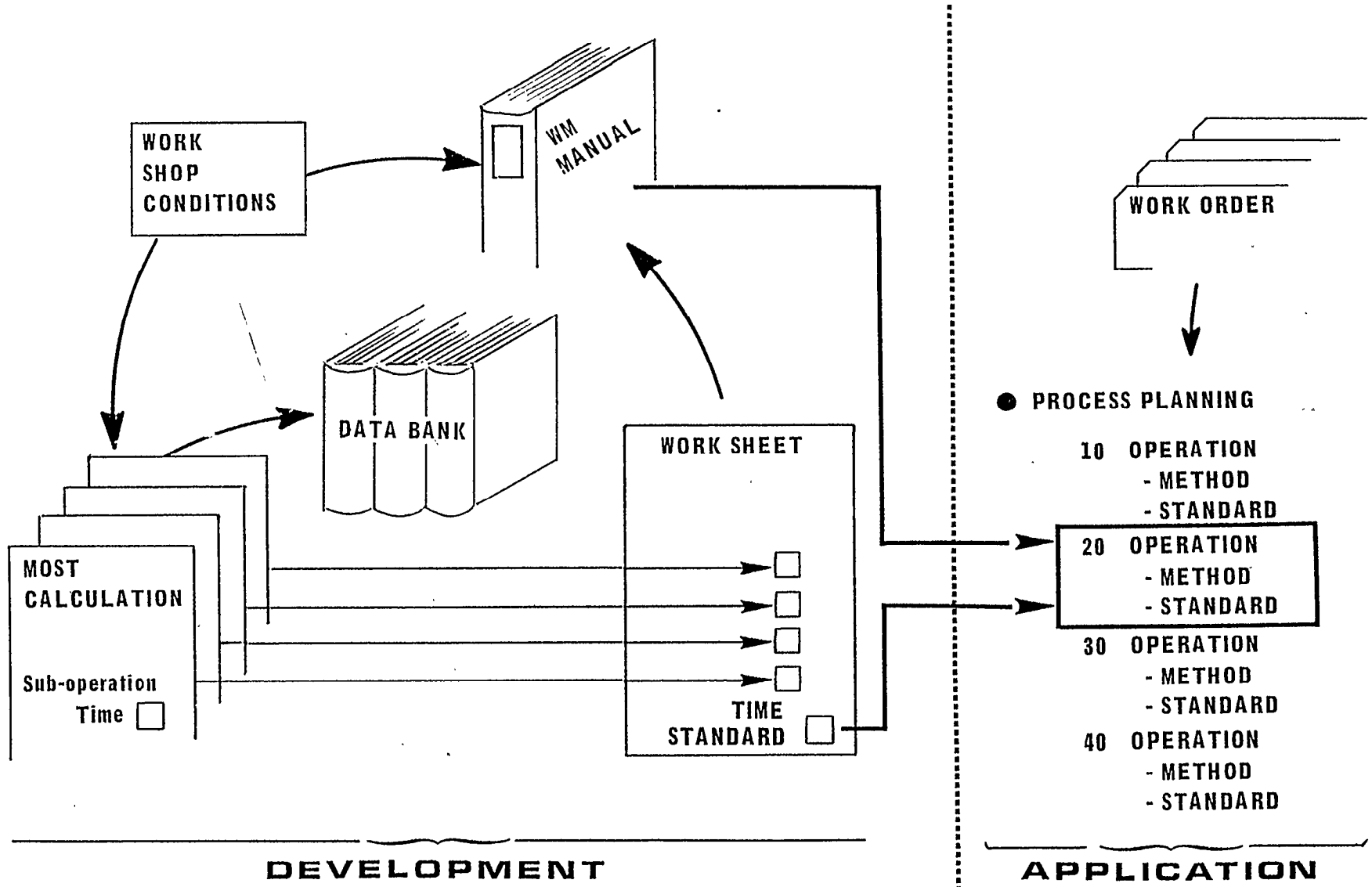
- PRODUCT/SUBASSEMBLY/PART NUMBER
- PRODUCT/SUBASSEMBLY/PART NAME
- COMPONENT CLASSIFICATION NUMBER
- PLANT NUMBER
- DEPARTMENT NUMBER
- COST CENTER NUMBER
- WORK CENTER NUMBER
- BILL OF MATERIAL NUMBER
- ROUTE SHEET NUMBER
- OPERATION NUMBER
- OPERATION NAME

PROCEDURE FOR ESTABLISHING METHODS AND TIME STANDARDS



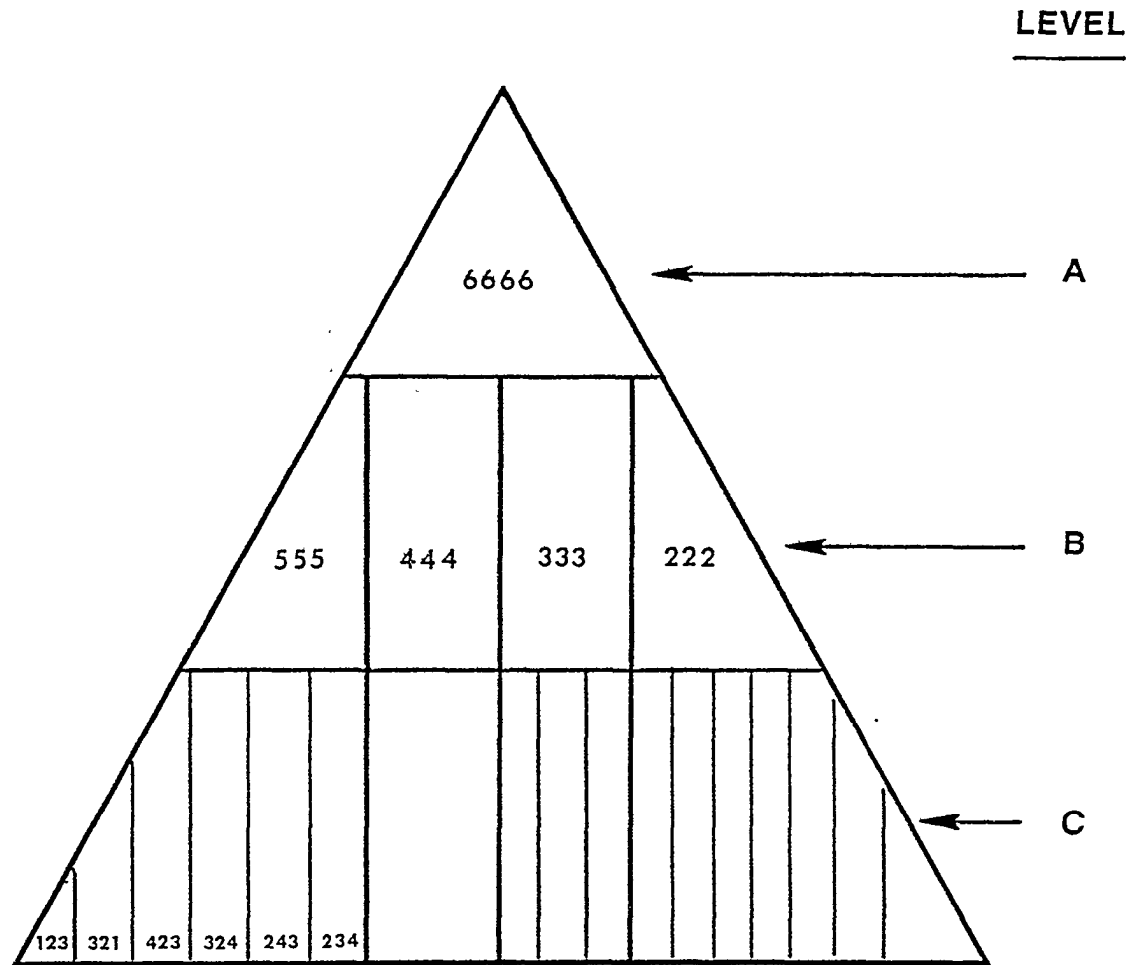
PROCEDURE FOR DEVELOPMENT & APPLICATION OF STANDARDS

585



SHIPBUILDING

MOST@ APPLICATION LEVELS



A - INDIVIDUAL STANDARDS COMBINED FOR WORK PACKAGE
APPLICATION - APPEAR ON THE STANDARDS CALCULATION
SHEET

B - FINAL COMBINED MOST ANALYSES

C - INDIVIDUAL OR COMBINED MOST ANALYSES

**COMPUTER MOST
APPLICATION SHEET
FITTING**

TITLE SHEET LOCATOR NUMBER 4321

MAJOR CATEGORY	NO.	DESCRIPTION	PER	LOCATER NO.
RINGS	1	INSTALL REINFORCEMENT RING	RING	6666
	2	MAKE-UP REINFORCEMENT RING	RING	7777
	3	_____	_____	_____
PLATES	4	MAKE-UP FACE PLATE TO WEB OR SECTION PART	FOOT	9999
	5	_____	_____	_____
	6	_____	_____	_____
	7	_____	_____	_____
	8	_____	_____	_____
_____	_____	_____	_____	_____

LEVEL

0	A		LN	6666	COMB SUB-OPERATION	FR
				555	MAKE-UP RING	1
				444	GRIND	1
				333	INSTALL RING	1
0	B	COMB SUB- OPERATIONS	}	222	GRIND	4
0	E		LN	555	MAKE-UP RING	FR
				123	MOVE	1
				321	MEASURE	2
				423	FIT	4
0	C	COMB SUB- OPERATIONS	}	324	TACK	4
				243	INSPECT	2
				L 234	ASIDE	1

WHY SHOULD YOU USE MOST[®] COMPUTER SYSTEMS?

(1) BECAUSE MOST[®] COMPUTER SYSTEMS CAN:

- **PROVIDE YOU WITH ACCURATE AND CONSISTENT WELL-DOCUMENTED TIME STANDARDS AND METHODS DESCRIPTIONS**
- **PROVIDE YOU WITH REALISTIC TIME STANDARDS FOR COSTING, SCHEDULING, MANPOWER PLANNING, PERFORMANCE CONTROL, WAGE INCENTIVES, ETC., E.G., THE BASIS FOR YOUR "MANUFACTURING INFORMATION SYSTEM"**
- **PROVIDE YOU WITH EASY-TO-READ METHOD INSTRUCTIONS FOR YOUR OPERATORS, ROUTE OR PROCESS SHEETS AS WELL AS WORKPLACE LAYOUTS AND DATA**
- **PROVIDE YOU WITH AN EXTREMELY COST EFFECTIVE SET OF LABOR TIME STANDARDS WITH SAVINGS OF:**
 - 25% - DEVELOPMENT**
 - 75% - APPLICATION**
 - 90% - MAINTENANCE****COMPARED TO A MANUAL APPLICATION**
- **PROVIDE THE BASIS FOR A COMPREHENSIVE INCENTIVE CORRECTION PROGRAM WITHIN REASONABLE TIME AND COST**
- **PROVIDE YOUR UNION AND/OR WORKER REPRESENTATIVES WITH FULL KNOWLEDGE AND PROPER APPLICATION EXPERIENCE TO ENHANCE THEIR UNDERSTANDING AND INVOLVEMENT IN THE IMPLEMENTATION**
- **PROVIDE THE OPPORTUNITY FOR EITHER A COMPUTERIZED OR A MANUAL APPLICATION ALIKE**
- **PROVIDE A UNIFORM APPLICATION IN MULTI-PLANT ORGANIZATIONS AS A RESULT OF YOUR 'CENTRAL COORDINATION AND INSTANT INTERCHANGEABILITY OF COMPUTER STORED DATA**

WHY SHOULD YOU USE MOST[®] COMPUTER SYSTEMS ?

(2) BECAUSE YOU CAN:

- **PRE-SET COMPLETE ENGINEERED TIME STANDARDS INCLUDING MANUAL, PROCESS AND ALLOWANCE TIMES AND KEEP THESE STANDARDS UP-TO-DATE WITH A MINIMUM OF EFFORT**
- **DOCUMENT ALL YOUR WORKSHOP CONDITIONS AND DATA FOR RAPID AND NEAT PRINTING AND UPDATING TO BE USED FOR INSTRUCTIONS AND REFERENCING AS WELL AS THE BASIS FOR FURTHER COMPANY-WIDE DEVELOPMENTS**
- **ADAPT PROGRAM OUTPUT FORMATS TO YOUR PRESENT ESTABLISHED PROCEDURES AND ROUTINES**
- **SIMULATE POSSIBLE PRODUCTIVITY IMPROVEMENT OPPORTUNITIES IN YOUR MANUFACTURING AREAS, A KEY TASK FOR YOUR INDUSTRIAL ENGINEERS**
- **INCREASE YOUR INDUSTRIAL ENGINEERS' OUTPUT AND PRODUCTIVITY AS WELL AS IMPROVE THE QUALITY OF THEIR WORK**
- **ATTRACT NEW AND QUALIFIED INDUSTRIAL ENGINEERING 'CAPACITY AS WELL AS KEEP YOUR COMPETENT INDUSTRIAL ENGINEERING PERSONNEL**
- **INCORPORATE MODERN COMPUTER TECHNOLOGY IN YOUR INDUSTRIAL ENGINEERING DEPARTMENT WITHOUT REQUIRING SOPHISTICATED COMPUTER SKILLS FROM THE USERS**
- **INSTALL A DEDICATED MINI-COMPUTER IN YOUR INDUSTRIAL ENGINEERING DEPARTMENT FOR DIRECT ON-LINE ACCESS AND INTERFACE THE OUTPUT OF COMPLETE TIME STANDARDS WITH EXISTING SOFTWARE PROGRAMS ON YOUR MAIN FRAME COMPUTER**
- **UTILIZE A VARIETY OF ADDITIONAL PROGRAM FEATURES THAT WILL ADVANCE YOUR INDUSTRIAL ENGINEERING AND IMPROVE YOUR OVERALL PRODUCTION PLANNING AND CONTROL**

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