

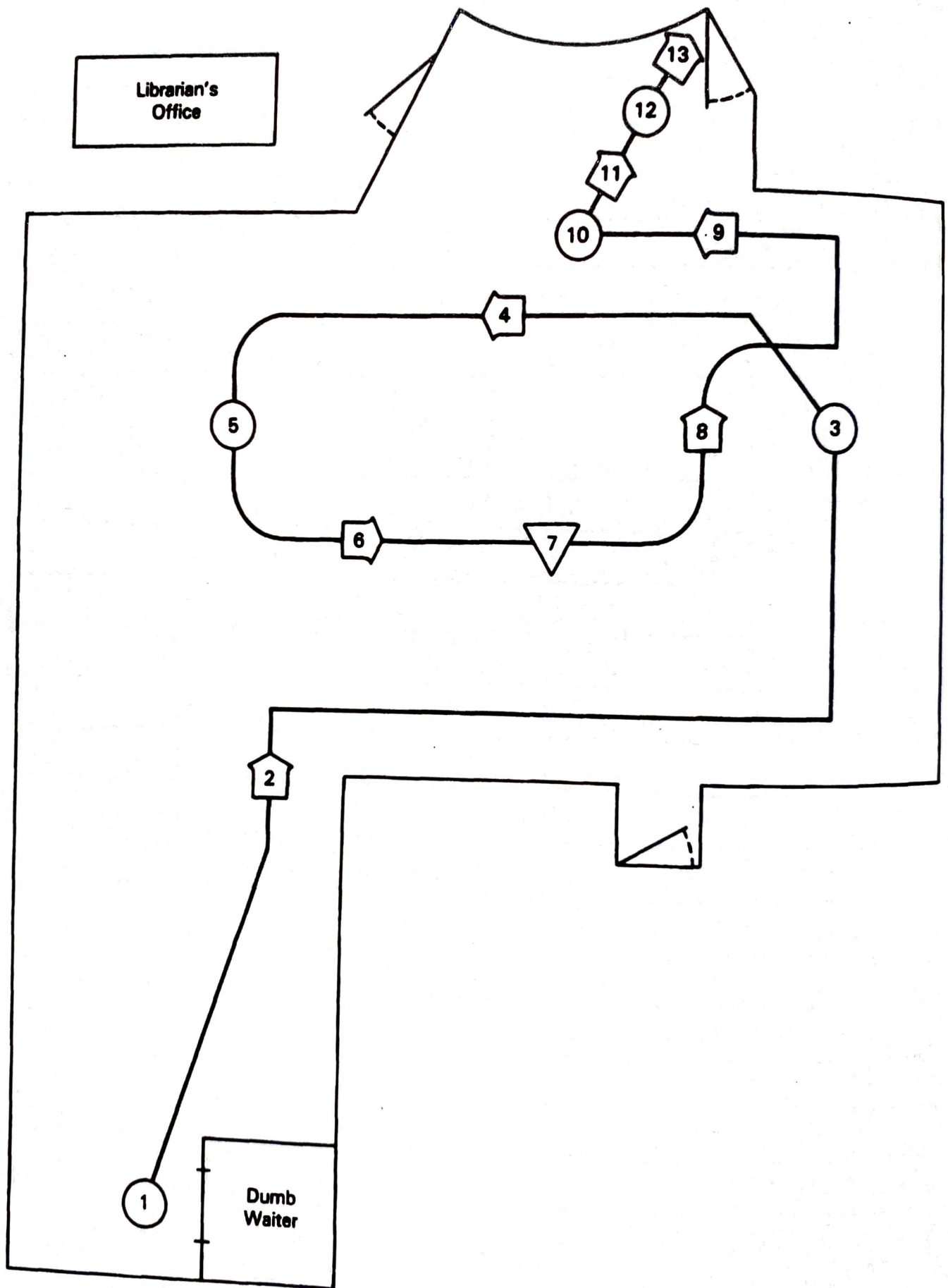


Figure 3-13 Library Flow Diagram—Present Method of Work

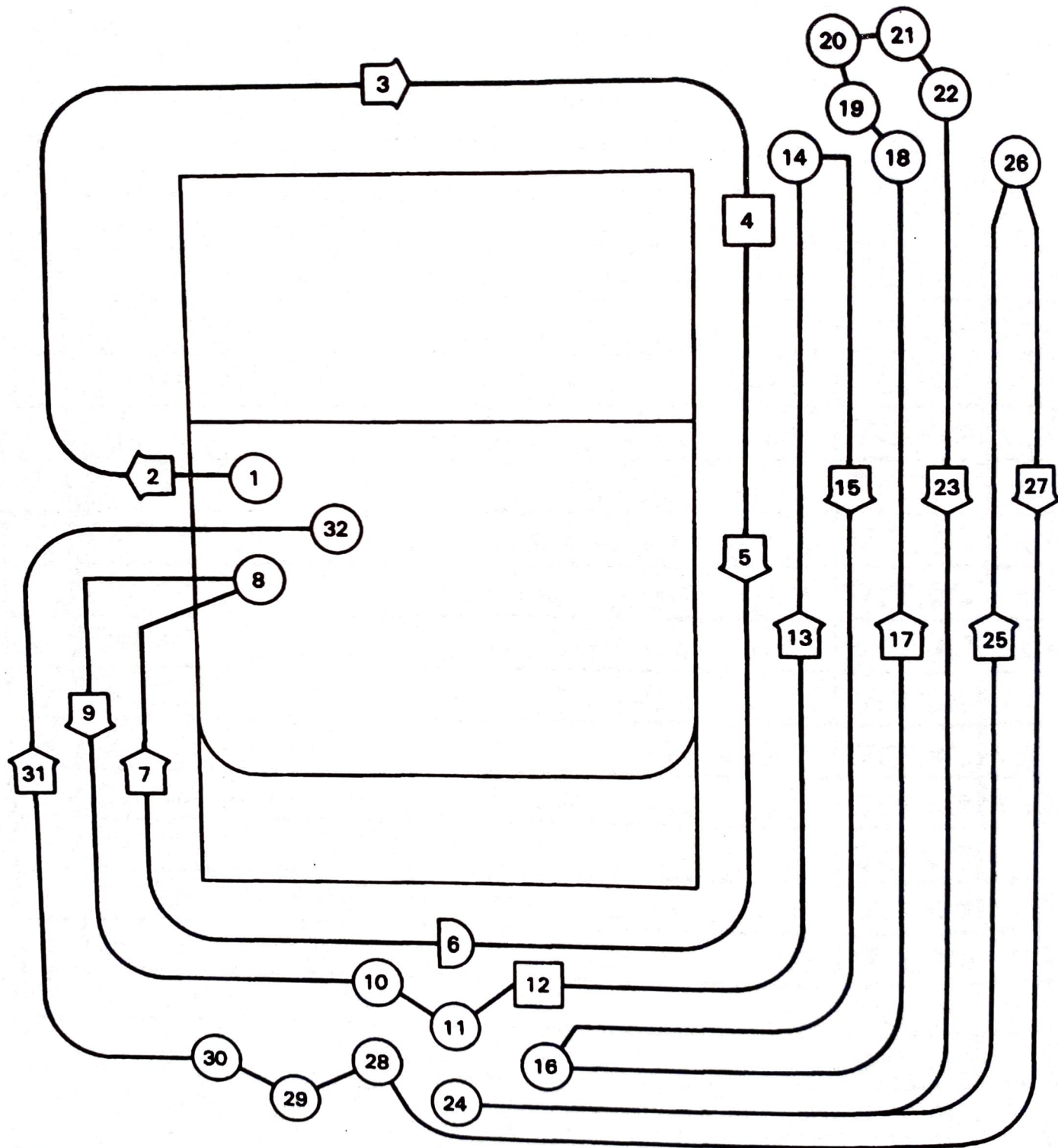


Figure 3-8 Flow Diagram for Tire Change (Numbers refer to the steps used in Figure 7).

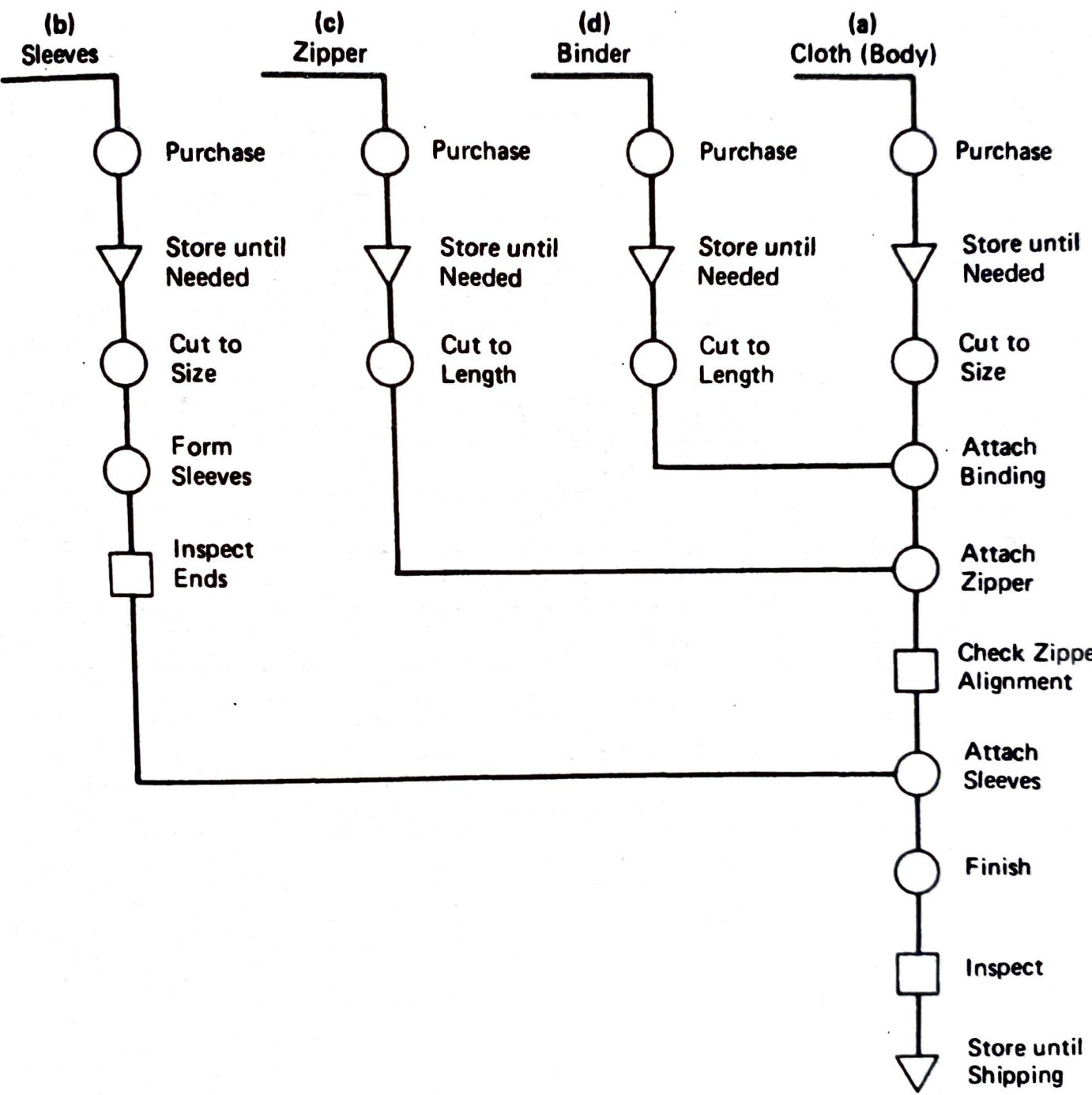


Figure 3-5 Flow Process Chart for Raincoat Liner.

Summary	
Operations	5
Transportations	4
Inspections	4
Delays	3
Storages	0

Step	Symbol	Description of Present Method	Distance
1	T	Go to Advisor's Office From Automobile	400
2	D	Wait for Advisor	
3	O	Be Advised	
4	T	Go to Computer Lab	300
5	D	Wait for Computer	
6	O	Log Onto System	
7	I	Check for Holds	
8	O	Select Courses	
9	I	Check Courses	
10	O	Print Schedule	
11	I	Verify Schedule	
12	T	Go to Business Office	600
13	D	Wait in Line	
14	O	Pay Fees and Receive Receipt	
15	I	Verify Receipt	
16	T	Return to Automobile	600

Figure 3-9 Flow Process Chart. Process Name: Registration.

[illegible]

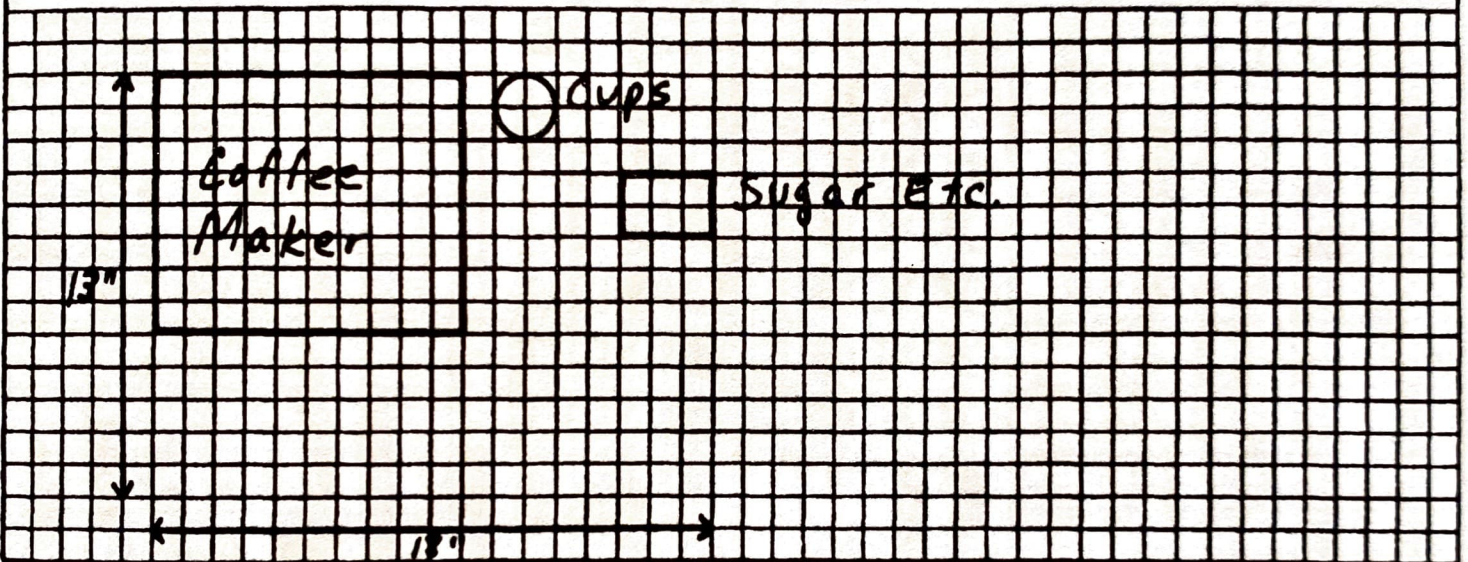
SUMMARY:

SYMBOLS	PRESENT		PROPOSED		DIFFERENCE	
	LH	RH	LH	RH	LH	RH
○ OPERATION	7	14				
➡ TRANSPORTATION	3	11				
□ INSPECTION	0	0				
D DELAYS	16	2				
TOTALS	26	27				

PROCESS: Coffee Pouring
 STUDY No: 6
 OPERATOR: JB
 ANALYST: EB
 DATE 5 1 18 1 82
 METHOD (PRESENT) PROPOSED
 SHEET No. 1 of 2
 REMARKS: _____

SKETCH OF: _____

BY: _____



LEFT HAND <u>Present</u> METHOD		SYMBOL		SYMBOL		RIGHT HAND <u>Present</u> METHOD
Reach for Cups		○ ➡ □ D		○ ➡ □ D		Reach for Top Cup
Grasp Cups		● ➡ □ D		● ➡ □ D		Grasp Cup
Hold Cups		○ ➡ □ D		● ➡ □ D		Remove Top Cup
Set Cup Down-Release		● ➡ □ D		○ ➡ □ D		Bring Cup to Pot
Reach to Cup		○ ➡ □ D		○ ➡ □ D		Hold Cup
Grasp Cup		● ➡ □ D		○ ➡ □ D		Hold Cup
Hold Cup		○ ➡ □ D		● ➡ □ D		Release Cup
Hold Cup		○ ➡ □ D		● ➡ □ D		Reach for Pot and Grasp
Hold Cup		○ ➡ □ D		○ ➡ □ D		Bring Pot to Cup
Hold Cup		○ ➡ □ D		● ➡ □ D		Pour Coffee into Cup
Hold Cup		○ ➡ □ D		○ ➡ □ D		Return Pot to Hot
Hold Cup		○ ➡ □ D		○ ➡ □ D		Plate

Figure 3-16 Left-hand/Right-hand Chart for Pouring Coffee.

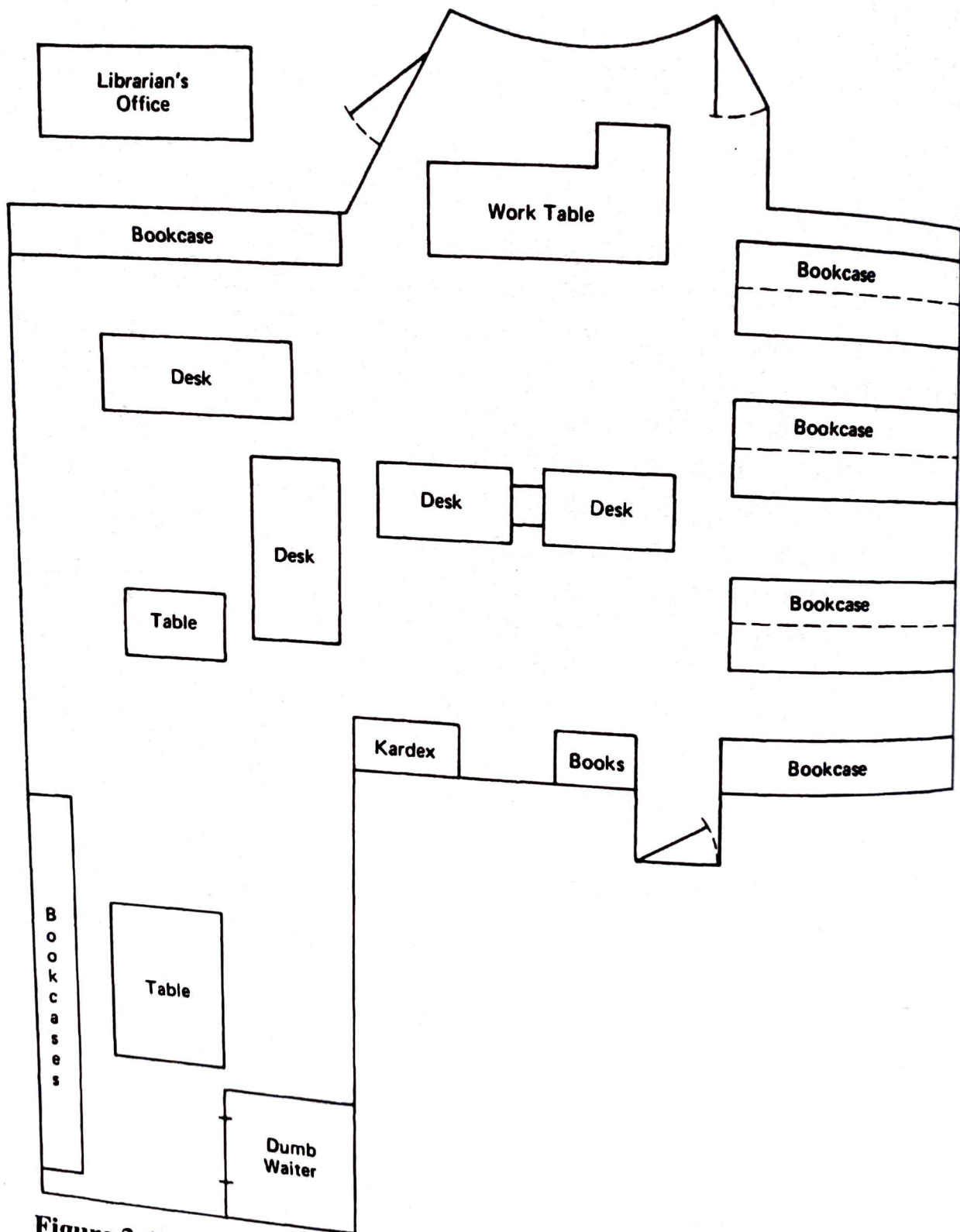


Figure 3-14 Improved Layout for Lib
ods Improvement

MTM Methods Analysis

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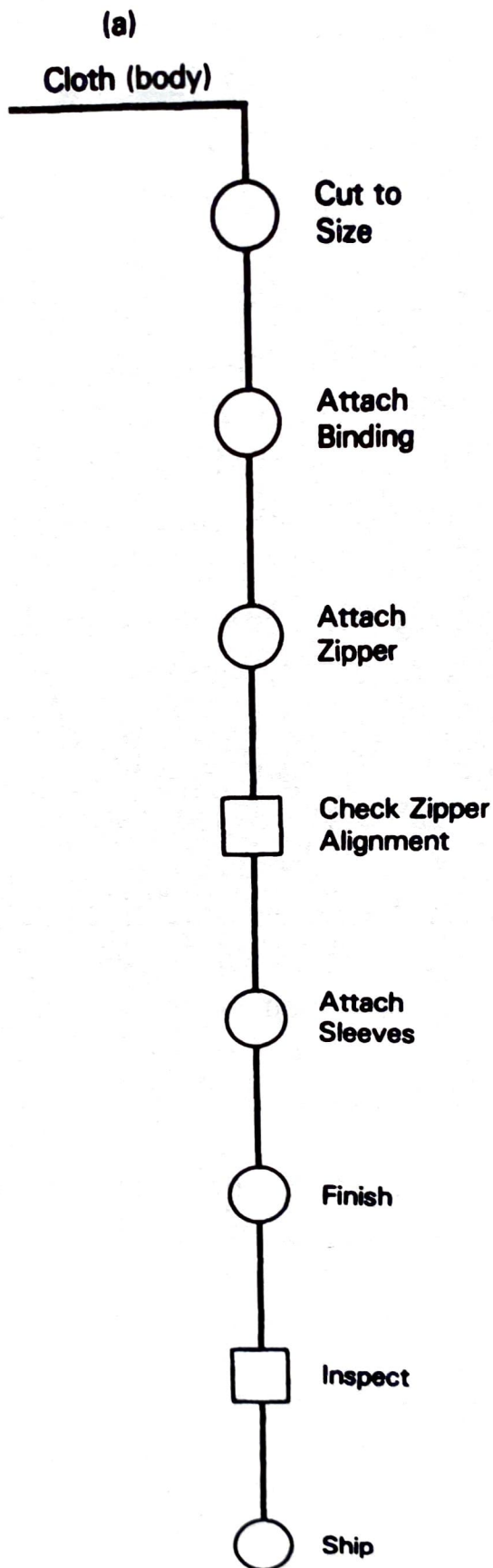


Figure 3-1(a) Operation Process Chart for Raincoat Liner-Body.

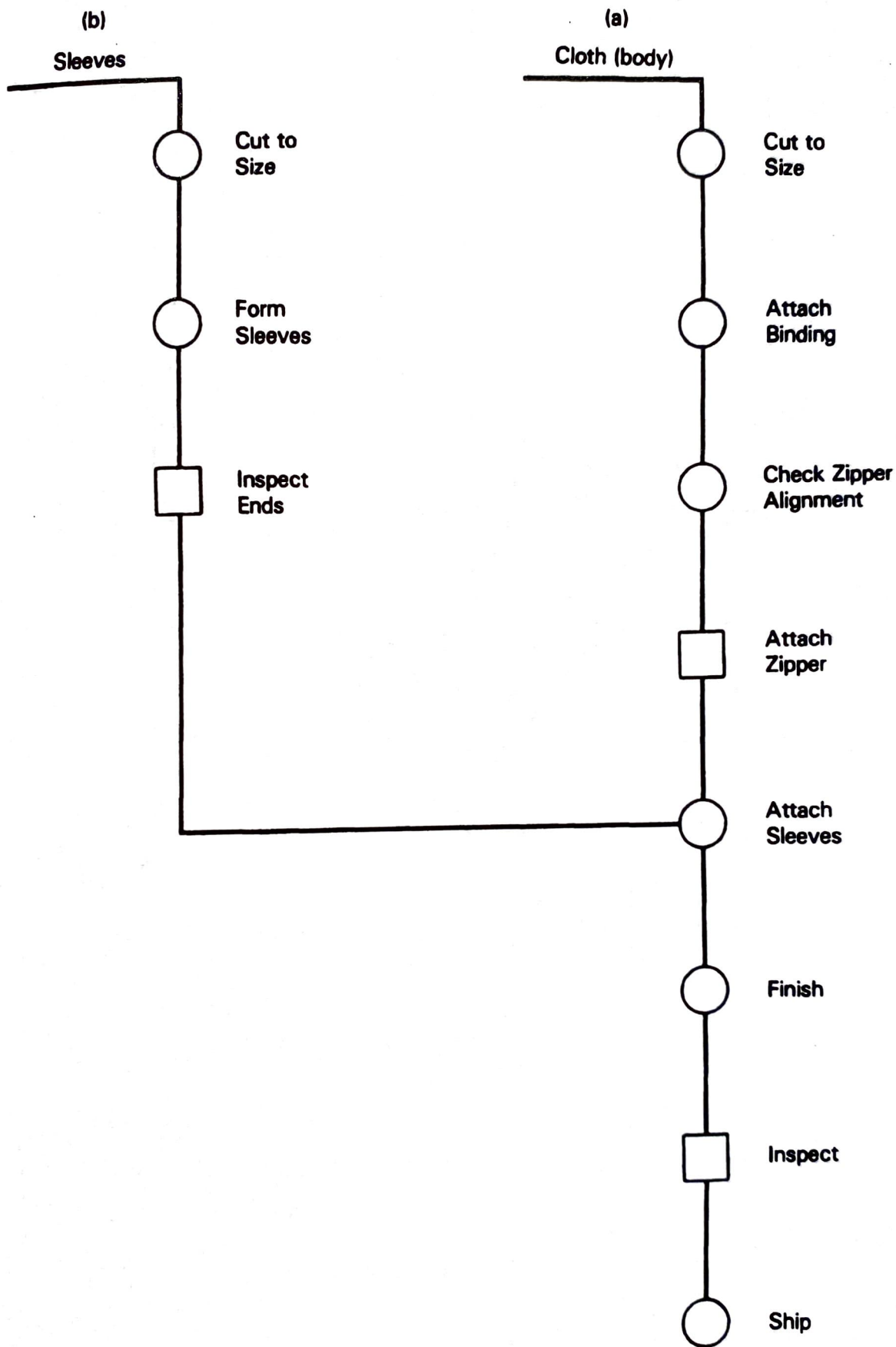


Figure 3-1(b) Operation Process Chart for Raincoat Liner-Sleeves.

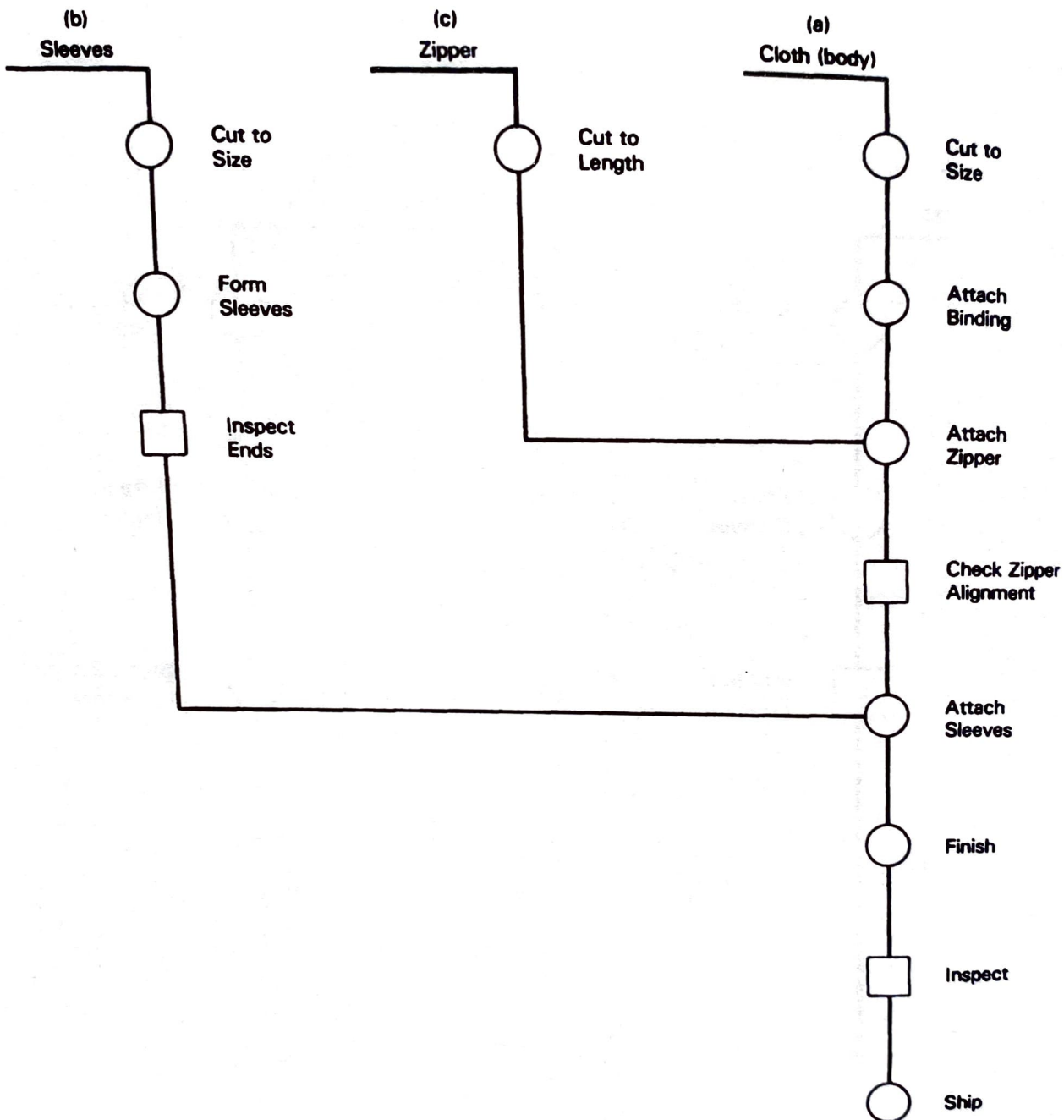


Figure 3-1(c) Operation Process Chart for Raincoat Liner-Zipper.

FLOW PROCESS CHART										1. NUMBER		2. PAGE NO.		3. NO. OF PGS						
4. PROCESS										5. SUMMARY										
6. ☐ MAN OR ☐ MATERIAL										a. ACTIONS		b. PRESENT		c. PROPOSED		d. DIFFERENCE				
												NO.	TIME	NO.	TIME	NO.	TIME			
7. CHART BEGINS					8. CHART ENDS					☐ OPERATIONS										
										☐ TRANSPORTATIONS										
										☐ INSPECTIONS										
9. CHARTED BY					10. DATE					☐ DELAYS										
										☐ STORAGES										
11. ORGANIZATION										DISTANCE TRAVELED (Feet)										
12a. DETAILS OF ☐ PRESENT ☐ PROPOSED METHOD										b. OPERATION TRANSPORT INSPECTION DELAY STORAGE	c. DISTANCE IN FEET	d. QUANTITY	e. TIME	f. ANALYSIS WHY? WHAT? WHERE? WHEN? WHO? HOW?		g. NOTES		h. ANALYSIS ELIMINATE COMBINE SEQUENCE PLACE PERSON IMPROVE		
1.										☐ ☐ ☐ ☐ ☐										
2.										☐ ☐ ☐ ☐ ☐										
3.										☐ ☐ ☐ ☐ ☐										
4.										☐ ☐ ☐ ☐ ☐										
5.										☐ ☐ ☐ ☐ ☐										
6.										☐ ☐ ☐ ☐ ☐										
7.										☐ ☐ ☐ ☐ ☐										
8.										☐ ☐ ☐ ☐ ☐										
9.										☐ ☐ ☐ ☐ ☐										
10.										☐ ☐ ☐ ☐ ☐										
11.										☐ ☐ ☐ ☐ ☐										
12.										☐ ☐ ☐ ☐ ☐										
13.										☐ ☐ ☐ ☐ ☐										
14.										☐ ☐ ☐ ☐ ☐										
15.										☐ ☐ ☐ ☐ ☐										
16.										☐ ☐ ☐ ☐ ☐										
17.										☐ ☐ ☐ ☐ ☐										
18.										☐ ☐ ☐ ☐ ☐										
19.										☐ ☐ ☐ ☐ ☐										
20.										☐ ☐ ☐ ☐ ☐										
21.										☐ ☐ ☐ ☐ ☐										

DETAILS OF ☐ PRESENT ☐ PROPOSED METHOD	OPERATION TRANSPORT INSPECTION DELAY STORAGE	DISTANCE IN FEET	QUANTITY	TIME	ANALYSIS				NOTES	ANALYSIS				
					WHY?					ELIMINATE	COMBINE	CH		
					WHAT?	WHERE?	WHEN?	WHO?	HOW?			SEQUENCE	PLACE	PERSON
22.	☐ ☐ ☐ ☐ ☐													
23.	☐ ☐ ☐ ☐ ☐													
24.	☐ ☐ ☐ ☐ ☐													
25.	☐ ☐ ☐ ☐ ☐													
26.	☐ ☐ ☐ ☐ ☐													
27.	☐ ☐ ☐ ☐ ☐													
28.	☐ ☐ ☐ ☐ ☐													
29.	☐ ☐ ☐ ☐ ☐													
30.	☐ ☐ ☐ ☐ ☐													
31.	☐ ☐ ☐ ☐ ☐													
32.	☐ ☐ ☐ ☐ ☐													
33.	☐ ☐ ☐ ☐ ☐													
34.	☐ ☐ ☐ ☐ ☐													
35.	☐ ☐ ☐ ☐ ☐													
36.	☐ ☐ ☐ ☐ ☐													
37.	☐ ☐ ☐ ☐ ☐													
38.	☐ ☐ ☐ ☐ ☐													
39.	☐ ☐ ☐ ☐ ☐													
40.	☐ ☐ ☐ ☐ ☐													
41.	☐ ☐ ☐ ☐ ☐													
42.	☐ ☐ ☐ ☐ ☐													
43.	☐ ☐ ☐ ☐ ☐													
44.	☐ ☐ ☐ ☐ ☐													
45.	☐ ☐ ☐ ☐ ☐													
46.	☐ ☐ ☐ ☐ ☐													
47.	☐ ☐ ☐ ☐ ☐													
48.	☐ ☐ ☐ ☐ ☐													

THERBLIG ANALYSIS

Frank and Lillian Gilbreth maintained that every motion could be subdivided into a series composed of several of the 17 motions they identified. They called these basic motions *Therbligs*. (Therblig is almost Gilbreth spelled backwards.) The Gilbreths believed that every task was a compilation of the following motions (their original symbol appears after each definition):

REACH: The motion of the empty hand moving from one location to another. Reach begins when the hand (or body member) begins to move without a load and ends when the hand (or body member) touches the object or stops moving. (TE)

MOVE: The motion wherein an object is transported from one location to another. Move begins when the hand starts to move with an object and ends when the hand either arrives at its destination or when movement stops. (TL)

RELEASE: The motion wherein the hand relinquishes control of an object. Release begins when the hand starts to relax its control over the object and ends when the hand loses contact with the object. (RL)

GRASP: The motion wherein the hand gains control of an object. Grasp begins when the hand touches the object and ends after control is secured. (G)

PREPOSITION: The motions wherein the operator prepares an object for future use. Preposition begins when the hand causes the object to begin to be placed into position and ends when

REST: The lack of motion while an operator intentionally stops work due to fatigue. Rest begins when motion ceases and ends when work is resumed. (R)

HOLD: The motion wherein the hand acts as a fixture controlling an object while the other hand operates on the controlled object. Hold starts when the held object ceases movement and stops when the object moves.

To convert the Therbligs to the standard process chart symbols used with the left-hand/right-hand chart, the following conventions are usually used (Mundel, p. 315):

Used with Operation Symbol:	Grasp	Disassemble
	Position	Search
	Preposition	Select
	Use	Release
	Assemble	Inspect
Used with Transportation Symbol:	Reach	Move
Used with Delay Symbol:	Hold	
Used with Storage Symbol:	Avoidable Delay	
	Unavoidable Delay	
	Rest	
	Plan	

As stated earlier, Gilbreth indicated that certain of the Therbligs were necessary for work. They are called effective Therbligs. Effective Therbligs include the following:

Reach	Preposition
Move	Use
Grasp	Assemble
Release	Disassemble

When effective Therbligs are present in the motions performed, productive work is being performed. Ineffective Therbligs are those which describe work that is generally not productive. The analyst should strive to improve the job whenever any ineffective Therbligs

the object is in the correct position for later use. Preposition occurs in a location other than where the object will be used. (PP)

USE: The motion of manipulating a tool for the function for which it was intended. Use begins when the hand starts to manipulate the tool and ends when the hand stops manipulating the tool. (U)

ASSEMBLE: The motion wherein the operator places two or more objects together so that they are more productive in their combined state than in their separate conditions. Assemble begins when the hand causes the objects to begin to go together and ends when the objects are together. (A)

DISASSEMBLE: The motion wherein the operator takes two or more objects apart. Disassemble begins when the hand causes two objects which were together to begin to come apart and ends when the objects are separated. (DA)

SEARCH: The motion wherein the hand tries to find an object. Search begins when the hand starts to hunt and ends when the hand has found the location of the object. (SH)

SELECT: The motion of the hand finding an object within a group of objects. Select begins when the hand touches several objects and ends when the hand has located the object desired. (ST)

POSITION: The hand motion of aligning, orienting, or changing the position of an object. Position begins when the hand starts lining up or orienting the object and ends when the hand has aligned or oriented the object. (P)

INSPECT: The motion of comparing an object to a standard. Inspect begins when the hand begins to feel or the eye begins to view the object and ends when the object has been felt or viewed. (I)

PLAN: The process of determining which activity to perform next. Plan starts when the hand is idle and ends when the course of action is decided upon. (PN)

UNAVOIDABLE DELAY: Delays that are part of the normal work method and beyond the control of the operator. Delay begins when the hand becomes idle and ends when work resumes. (UD)

AVOIDABLE DELAY: Delays that are not part of the normal work method. Avoidable delay starts when normal method is deviated from and concludes when normal method is resumed. (AD)