

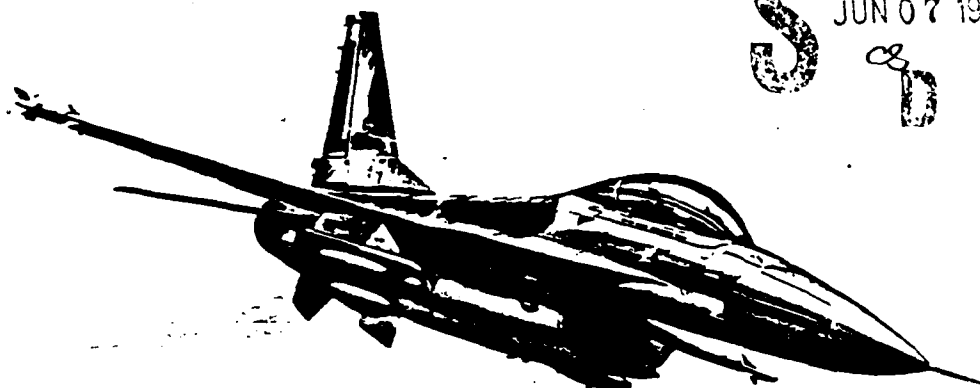
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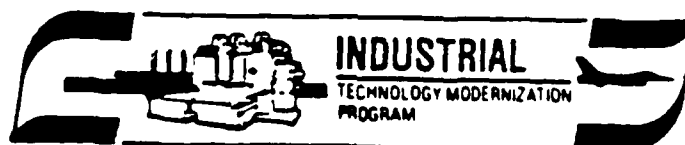
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PHASE 3 PROPOSAL CATEGORY 1 PROJECT COUNTERMEASURES ASSEMBLY IMPROVEMENTS

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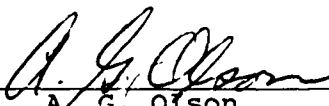
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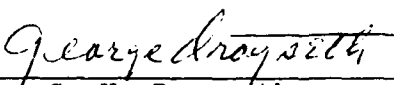
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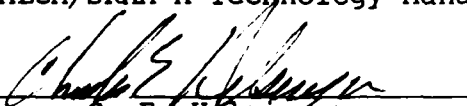
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A-1

Tracor Aerospace
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PHASE III PROPOSAL
CATEGORY 1 PROJECT
COUNTERMEASURES ASSEMBLY IMPROVEMENTS

TRACOR PROPOSAL 905-0163

SUBMITTED TO:
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May 24, 1985



A-1

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TECH MOD COUNTERMEASURES ASSEMBLY IMPROVEMENTS

1.0 INTRODUCTION

The objective of this project has been to design, develop, and implement a plan of improving all aspects of the Countermeasures Assembly procedure. This project included the stockroom, staging area, and the assembly area. The initial data and ideas were outlined about three years ago and have been further defined and developed in this project.

1.1 Countermeasures Area Description

The Countermeasures Assembly area produces four basic products with each basic product having variations. The four basic products are the Programmer Assembly, Dispenser Assembly, Electromagnetic Interference (EMI) Filter, and the Dispenser Control Panel Assembly (Cockpit Control).

Initial analysis of the assembly area and its related areas identified six areas of improvement. These areas of improvement include:

- 1) Stockroom location
- 2) Method of pulling kit parts in the stockroom
- 3) Staging room methods and location
- 4) Workstation concept and setup
- 5) Material handling equipment
- 6) On-line testing

Once the areas of improvement were identified, further investigation and development was pursued. The results of this investigation and development effort are presented in the following pages.

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1.2 AS IS Assessment

Stockroom

The Countermeasures stockroom is located in Building 2. A layout showing the stockroom in Building 2 and the assembly area in Building 8 is presented in Figure 1-1. All parts and materials from Receiving Inspection are identified and stored in the stockroom. The material is stored in bin-shelves by part number sequence.

Stockroom personnel use Quota Pull Requests (Figure 1-2) to kit all parts. A preprinted tag (Figure 1-3) is issued with the Quota Pull Request for each part listed. The stockroom person reads the Quota Pull Request and writes down the required parts on scrap paper. The person searches for the proper shelf(shelves), pulls as many part bins as can be carried, and returns to the desk. The person then performs the following operations:

- 1) Opens the parts package from the bin.
- 2) Counts the required number of parts.
- 3) Reseals the parts package from the bin.
- 4) Puts the required number of parts in a plastic bag.
- 5) Seals the plastic bag.
- 6) Puts a preprinted label on the plastic bag.
- 7) Sets the bag of parts in a box.
- 8) Marks the part off the Quota Pull Sheet.
- 9) Repeats steps 1-8 for each part pulled.

The stockroom person then returns the part bins to the shelves and repeats the process until the Quota Pull Request is completed. When the kit is completed, it is set in a storage

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area to be picked up by a Production Coordinator. A Flow Process Chart is presented in Figure 1-4.

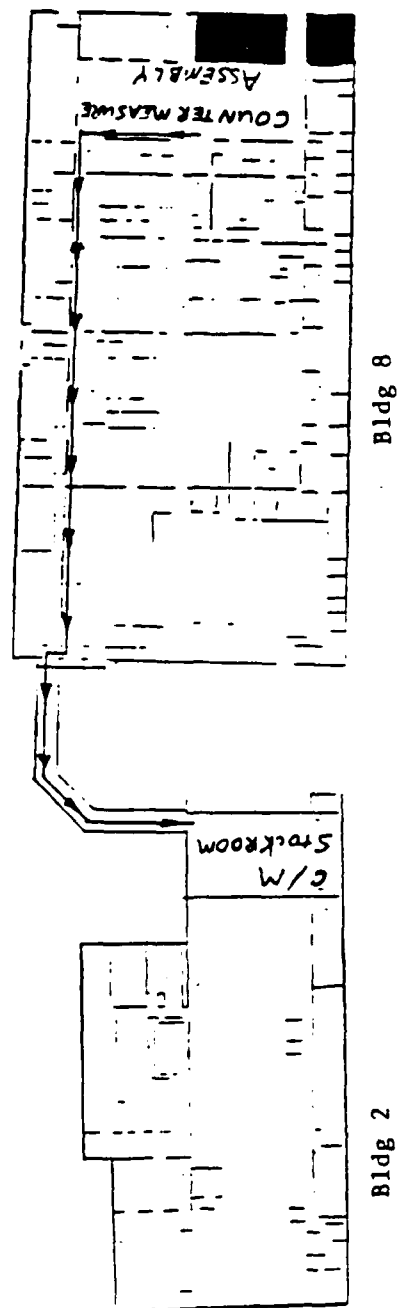


Figure 1-1. STOCKROOM/COUNTERMEASURES ASSEMBLY AREA LAYOUT

AEROSPACE GROUP MATERIAL REQUISITION / TRANSFER ORDER
 ISSUED BY: DATE: 03/22/85
 REQUESTED BY: 807 DATE: 03/15/85
 POSTED BY: DATE: RECEIVED BY: DATE: APPROVED BY: DATE:
 REMARKS: UNIT S/N ASSY: 040: /JAI271
 QUOTA PULL FOR P/N 141587-0005 QTY TO BUILD 50 FROM ACCOUNT NO TO ACCOUNT NO
 REVISION: YCO #: 11-9999 206-000 75 48 046-004 75 50

TRANSACTION INFORMATION											
SEQ	PART NUMBER	OP	U/M	DESCRIPTION	PO/PWO	QC	QTY REQ'D	QTY AVAIL	QTY ISSUED	UNIT PRICE	TOTAL PRICE
73	24750-0333		EA	RES CMPSN 33K			450.000	450.000			
74	24750-0334		EA	RES CMPSN 33U			450.000	450.000			
75	24750-0335		EA	RES CMPSN 3.3			150.000	150.000			
101	24750-0470		EA	RES CMPSN 47			50.000	50.000			
74	24750-0473		EA	RES CMPSN 47K			300.000	300.000			
50	24750-0511		EA	RES CMPSN 11U			300.000	300.000			
91	24750-0641		EA	RES CMPSN 640			300.000	300.000			
77	2479 -0470		EA	RES CMPSN 47			300.000	300.000			
75	24750-0002		EA	INDUCTOR DEF 5			50.000	50.000			
22	24750-0008		EA	CAP CER .0027			150.000	150.000			
23	24750-0009		EA	CAP CER .0010			150.000	150.000			

Figure 1-2. QUOTA PULL REQUEST EXAMPLE

PW0/NO JAI271	PW0/NO JAI271	PW0/NO JAI271	PW0/NO JAI271
P/N 24750-0473	P/N 24750-0681	P/N 24750-0511	P/N 24750-0332
QTY 300.0	QTY 300.0	QTY 300.0	QTY 900.0
ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005
TRACE DOC	TRACE DOC	TRACE DOC	TRACE DOC
SEQ 74	SEQ 81	SEQ 56	SEQ 75
MR10/NO H16140	MR10/NO H16140	MR10/NO H16140	MR10/NO H16139
ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005
TRACE DOC	TRACE DOC	TRACE DOC	TRACE DOC
PW0/NO JAI271	PW0/NO JAI271	PW0/NO JAI271	PW0/NO JAI271
P/N 24750-0334	P/N 24750-0470	P/N 24750-0335	P/N 24750-0271
QTY 450.0	QTY 50.0	QTY 150.0	QTY 150.0
ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005
TRACE DOC	TRACE DOC	TRACE DOC	TRACE DOC
SEQ 65	SEQ 101	SEQ 72	SEQ 80
MR10/NO H16140	MR10/NO H16140	MR10/NO H16140	MR10/NO H16139
ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005
TRACE DOC	TRACE DOC	TRACE DOC	TRACE DOC
PW0/NO JAI271	PW0/NO JAI271	PW0/NO JAI271	PW0/NO JAI271
P/N 24750-0303	P/N 24750-0272	P/N 24750-0152	P/N 24750-0152
QTY 150.0	QTY 150.0	QTY 300.0	QTY 300.0
ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005
TRACE DOC	TRACE DOC	TRACE DOC	TRACE DOC
SEQ 61	SEQ 83	SEQ 64	SEQ 64
MR10/NO H16139	MR10/NO H16139	MR10/NO H16139	MR10/NO H16139
ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005
TRACE DOC	TRACE DOC	TRACE DOC	TRACE DOC
PW0/NO JAI271	PW0/NO JAI271	PW0/NO JAI271	PW0/NO JAI271
P/N 24750-0222	P/N 24750-0181	P/N 24750-0152	P/N 24750-0152
QTY 300.0	QTY 150.0	QTY 300.0	QTY 300.0
ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005
TRACE DOC	TRACE DOC	TRACE DOC	TRACE DOC
SEQ 94	SEQ 62	SEQ 64	SEQ 64
MR10/NO H16139	MR10/NO H16139	MR10/NO H16139	MR10/NO H16139
ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005	ASY 004/141587-0005
TRACE DOC	TRACE DOC	TRACE DOC	TRACE DOC

Figure 1-3. PREPRINTED TAG LIST



QUESTION
EACH
DETAIL

FLOW PROCESS CHART

NO _____
PAGE 1 OF 4

	SUMMARY					
	PRESENT		PROPOSED		DIFFERENCE	
	NO	TIME	NO	TIME	NO	TIME
○ OPERATIONS	69					
○ TRANSPORTATIONS	32					
□ INSPECTIONS						
○ DELAYS	3					
▽ STORAGES						
DISTANCE TRAVELED		FT		FT		FT

JOB Kitting Parts in Stockroom (6 parts)

☒ MAN OR ☐ MATERIAL John Condon

CHART BEGINS _____

CHART ENDS _____

CHARTED BY GD DATE 2/8/85

DETAILS OF (PRESENT/PROPOSED) METHOD		OPERATION	TRANSPORTATION	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	QUANTITY	TIME MIN	ACTION						NOTES
										START	END	CHANGE	REWORK	PLACED	REMOVED	
1	Receive Quota Pull Sheet	●	→	□	▽				2							
2	Write down parts on scrap paper	●	→	□	▽				1	X						
3	Walk to Shelf	○	→	□	▽				3							3 min divided by 20 steps = 0.15 min/step
4	Pull part bin	●	→	□	▽											6 part average
5	Walk to shelf	○	→	□	▽											
6	Pull part bin	●	→	□	▽											
7	Stack part bin in hands	●	→	□	▽					X						
8	Walk to shelf	○	→	□	▽											
9	Pull part bin	●	→	□	▽											
10	Stack part bins in hands	●	→	□	▽					X						
11	Walk to shelf	○	→	□	▽											
12	Pull part bin	●	→	□	▽											
13	Stack part bins in hands	●	→	□	▽					X						
14	Walk to shelf	○	→	□	▽											
15	Pull part bin	●	→	□	▽											
16	Stack part bins in hands	●	→	□	▽					X						
17	Walk to shelf	○	→	□	▽											
18	Pull part bin	●	→	□	▽											
19	Stack part bins in hands	●	→	□	▽					X						
20	Walk back to desk	○	→	□	▽											
21	Set bins down on desk in order	●	→	□	▽											
22	Sit down at desk	○	→	□	▽					X						
23	Pick up part out of 1st bin	○	→	□	▽				1.8							1.8 min divided by 11 steps = 0.16 min/step
24	Open package	●	→	□	▽											part

Figure 1-4. KITTING PARTS IN STOCKROOM

FLOW PROCESS CHART

NO. _____
PAGE 2 OF 4

DETAILS OF (PRESENT) METHOD	POSSIBILITIES														NOTES
	OPERATION	TRANSPORT	INVENTORY	STORAGE	WASTE	REWORK	TIME	ELIMINATE	MODIFY	IMPROVE	REPLACE	DELETE	ADD	REWORK	
Count required number of parts	●→□D▽														
Reseal package in bin	●→□D▽														
Put package back in bin	○→□D▽														
Put part in plastic bag	●→□D▽													X	
Seal plastic bag with stapler	●→□D▽							X							
Mark paperwork	●→□D▽														
Peel preprinted tag from sheet	●→□D▽														
Put preprinted tag on plastic bag	●→□D▽													X	
Put plastic bag into kit box	○→□D▽							X							
Pick up part out of 2nd bin	○→□D▽						1.8								
Open package	●→□D▽														
Count required number of parts	●→□D▽														
Reseal package	●→□D▽														
Put package back in bin	○→□D▽														
Put part in plastic bag	●→□D▽													X	
Seal plastic bag with stapler	●→□D▽							X							
Mark paperwork	●→□D▽														
Peel preprinted tag from sheet	●→□D▽														
Put preprinted tag on plastic bag	●→□D▽													X	
Put plastic bag into kit box	○→□D▽							X							
Pick up part out of 3rd bin	○→□D▽						1.8								
Open package	●→□D▽														
Count required number of parts	●→□D▽														
Reseal package	●→□D▽														
Put package back in bin	○→□D▽														
Put part in plastic bag	●→□D▽													X	
Seal plastic bag with stapler	●→□D▽							X							
Mark paperwork	●→□D▽														
Peel preprinted tag from sheet	●→□D▽														

Figure 1-4. KITTING PARTS IN STOCKROOM

FLOW PROCESS CHART

NO. _____
PAGE 3 OF 4

DETAILS OF (PRESENT) METHOD	POSSIBILITIES													NOTES
	OPERATION	TRANSPORT	STORAGE	DELIVER	RECEIVE	DISPOSE	WASTE	REWORK	REPAIR	REPLACE	REUSE	RECYCLE	REPAIR	
Put preprinted tag on plastic bag	●	◇	□	D	▽								X	
Put plastic bag into kit box	○	◇	□	D	▽				X					
Pick up part out of 4th bin	○	◇	□	D	▽			1.8						
Open package	●	◇	□	D	▽									
Count required number of parts	●	◇	□	D	▽									
Reseal package	●	◇	□	D	▽									
Put package back in bin	○	◇	□	D	▽									
Put part in plastic bag	●	◇	□	D	▽								X	
Seal plastic bag with stapler	●	◇	□	D	▽				X					
Mark paperwork	●	◇	□	D	▽									
Peel preprinted tag from sheet	●	◇	□	D	▽									
Put preprinted tag on plastic bag	●	◇	□	D	▽								X	
Put plastic bag into kit box	○	◇	□	D	▽				X					
Pick up part out of 5th bin	○	◇	□	D	▽			1.8						
Open package	●	◇	□	D	▽									
Count required number of parts	●	◇	□	D	▽									
Reseal package	●	◇	□	D	▽									
Put package back in bin	○	◇	□	D	▽									
Put part in plastic bag	●	◇	□	D	▽								X	
Seal plastic bag with stapler	●	◇	□	D	▽				X					
Mark paperwork	●	◇	□	D	▽									
Peel preprinted tag from sheet	●	◇	□	D	▽									
Put preprinted tag on plastic bag	●	◇	□	D	▽								X	
Put plastic bag into kit box	○	◇	□	D	▽				X					
Pick up part out of 6th bin	○	◇	□	D	▽			1.8						
Open package	●	◇	□	D	▽									
Count required number of parts	●	◇	□	D	▽									
Reseal package	●	◇	□	D	▽									
Put package back in bin	○	◇	□	D	▽									

Figure 1-4. KITTING PARTS IN STOCKROOM

NO. _____
PAGE 4 OF 4

Figure 1-4. KITTING PARTS IN STOCKROOM

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Production Coordinator - Stockroom to Staging Area

The Production Coordinator makes four trips daily or as required to pick up kits in the Building 2 stockroom. The coordinator delivers the kits by portable cart to the kit staging room in Building 8 (see Figure 1-1). The round trip is approximately 1200 feet and averages 12 minutes per trip.

Staging Room Procedures

One of two clerks uses the Quota Pull Request to verify the accuracy of the kitted parts. All parts, except weighed hardware, are physically counted to insure accuracy. This requires the kit parts to be emptied from the box, verified, and repacked into the box. The parts are then stored on shelves and logged into a kit log. A Shortage Sheet is sent to the planners. The planners track the parts on the Shortage Sheet and have them delivered to the staging area where they are mated with the respective kit. A Flow Process Chart is presented in Figure 1-5.

Production Coordinator - Staging Room to Workstation

After the planners have reconciled shortages, a PWO is sent to the Production Coordinator. The coordinator, upon receipt of the PWO, logs the kit out of the staging room and delivers it to the assembly area. A Flow Process Chart is presented in Figure 1-6.

Assembly Area

The working supervisor uses the PWO Instruction Sheets to stage kitted parts, materials, and tools at the workstations. This requires sorting through the kitted parts,

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emptying the parts into storage containers, and identifying which part belongs at each workstation. Each storage container must be properly identified with the item number and part number by use of a tag which is attached to the container. The workstation location varies depending upon production requirements. A Flow Process Chart is presented in Figure 1-7.

Assembly personnel use the Parts List attached to the PWO Instruction Sheets to verify the parts and quantities. The assembly operator proceeds with the assembly operations using the PWO Instruction Sheets as a guide.

Assembly work that must be inspected is recorded in an inspection log by a group leader. This log contains the date, PWO number, part number, quantity, operation number, and location, which are used by inspectors to locate the assemblies.

The group leader informs the Production Coordinator of assemblies that are ready for test or burn-in. The coordinator transports the assemblies on a portable cart and places them on incoming shelves located in test and burn-in. The coordinator also retrieves tested and burned-in assemblies from the shelves and transports them to the proper assembly workstation.

Rework from inspection, test, or burn-in is returned to the assembly area where it is repaired and reprocessed through inspection and test operations.

Completed subassemblies are taken by the Production Coordinator to the staging room where they are stored until kitted for final assembly.

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Completed final assemblies (LRU's) are delivered by the Production Coordinator to a staging area to wait for Government Inspection (DCASMA) or Customer Inspection (CSI). After the inspection approval, the Production Coordinator delivers the LRU's to the Shipping Department.

Tools & Testing Equipment

The Countermeasure assemblies require typical electronic assembly equipment, tools, and methods. The PWO Instruction Sheets specify the assembly method, sequence of assembly, and tools required. The following are typical tools and equipment used during the process: soldering equipment; hot air blowers; screwdrivers; pliers; harness boards; arbor presses; allen, socket, and open-end wrenches; riveting tools; and continuity testers.

Manufacturing Test Procedures, Acceptance Test Procedures, and Burn-in Test Procedures are used by the Test and Burn-in Departments in the performance of their specific tasks. These procedures are used in conjunction with special test equipment, Thermotron units, and holding fixtures to perform the functions descibed in the procedures.

ANALYSIS	QUESTION EACH DETAIL
WHAT	
WHERE	
WHEN	
HOW	
WHY	

FLOW PROCESS CHART

NO _____
PAGE 1 OF 1

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO	TIME	NO	TIME	NO	TIME
○ OPERATIONS	6					
◁ TRANSPORTATIONS	5					
□ INSPECTIONS	3					
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELED		FT.		FT.		FT.

JOB Staging Parts/Verifying Quantities

☒ MAN OR ☐ MATERIAL _____
CHART BEGINS _____
CHART ENDS _____
CHARTED BY GD DATE 2/8/85

DETAILS OF (PRESENT PROPOSED) METHOD	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	QUANTITY	TIME	ACTION						NOTES
									ELIMINATE	COMBINE	REUSE	CHANGE PLACE	PERFORM	IMPROVE	
1 Get kit box of parts	○	→	□	D	▽			1/16 K.V.	X						
2 Remove paperwork from kit box	○	→	□	D	▽			1/16 K.V.	X						
3 Remove parts from kit box	○	→	□	D	▽			1/16 K.V.	X						
4 Organize parts on table	●	→	□	D	▽			1/16 K.V.	X						
5 Verify sequence number	○	→	■	D	▽			1/16 K.V.	X						
6 Verify P.O. number	○	→	■	D	▽			1/16 K.V.	X						
7 Verify quantity	○	→	■	D	▽			1/16 K.V.	X						All parts other than hrd. is recounted by hand
8 Mark paperwork	●	→	□	D	▽			1/16 K.V.	X						
9 Put part back in kit box	○	→	□	D	▽			1/16 K.V.	X						
10 Organize paperwork	●	→	□	D	▽			1/16 K.V.	X						
1 Put shortage sheet in planner box	○	→	□	D	▽			1/16 K.V.							
2 File computer card (location card)	●	→	□	D	▽			1/16 K.V.							
3 Log kit into staging area	●	→	□	D	▽										
4 Store kit on shelf	●	→	□	D	▽			1/16 K.V.	X						
5	○	→	□	D	▽										
6	○	→	□	D	▽										
7	○	→	□	D	▽										
8	○	→	□	D	▽										
9	○	→	□	D	▽										
10	○	→	□	D	▽										
	○	→	□	D	▽										
2	○	→	□	D	▽										
3	○	→	□	D	▽										
4	○	→	□	D	▽										

Figure 1-5. STAGING PARTS/VERIFYING QUANTITIES

ANALYSIS	QUESTION
DATE	EACH
TIME	DETAIL
BY	
NO.	

FLOW PROCESS CHART

NO. _____
PAGE 1 OF 1

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO	TIME	NO	TIME	NO	TIME
○ OPERATIONS	5					
◐ TRANSPORTATIONS	4					
□ INSPECTIONS						
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELED		FT.		FT.		FT.

JOB Production Coordinator

☒ MAN OR ☐ MATERIAL

CHART BEGINS _____

CHART ENDS _____

CHARTED BY GD DATE 2/8/85

DETAILS OF (PRESENT/PROPOSED) METHOD

	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	QUANTITY	TIME Min	ACTION				
									ELIMINATE	COMBINE	REWORK	PLACE	IMPROVE
1	Receive PWO	●→	□	D	▽			2					
2	Walk to staging area	○→	□	D	▽								
3	Log out kit	●→	□	D	▽								
4	Walk to shelf	○→	□	D	▽								
5	Pull kit	●→	□	D	▽								
6	Carry kit to work area	○→	□	D	▽								
7	Set kit in work area	●→	□	D	▽								
8	Walk to desk	○→	□	D	▽								
9	Log kit movement in status log	●→	□	D	▽								
10		○→	□	D	▽								
11		○→	□	D	▽								
12		○→	□	D	▽								
13		○→	□	D	▽								
14		○→	□	D	▽								
15		○→	□	D	▽								
16		○→	□	D	▽								
17		○→	□	D	▽								
18		○→	□	D	▽								
19		○→	□	D	▽								
20		○→	□	D	▽								
21		○→	□	D	▽								
22		○→	□	D	▽								
23		○→	□	D	▽								
24		○→	□	D	▽								

NOTES

Figure 1-6. PRODUCTION COORDINATOR

ANALYSIS				
DATE	TIME	BY	REVIEW	APPROVAL

QUESTION
EACH
DETAIL

FLOW PROCESS CHART

NO _____
PAGE 1 OF 1

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO	TIME	NO	TIME	NO	TIME
○ OPERATIONS	4					
◁ TRANSPORTATIONS	1					
□ INSPECTIONS	1					
D DELAYS						
▽ STORAGES						
DISTANCE TRAVELED		FT.		FT.		FT.

JOB Sorting Parts for Workstation

☒ MAN OR ☐ MATERIAL Working Supervisor

CHART BEGINS _____

CHART ENDS _____

CHARTED BY GD DATE 2/11/85

DETAILS OF (PRESENT PROPOSED) METHOD

	OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	QUANTITY	TIME	ACTION					NOTES
									ELIMINATE	COMBINE	CHANGE	RELOC	PLACE	
1	Empty box onto table	●	→	□	D	▽		.42						
2	Sort per workstation	●	→	□	D	▽		.50						
3	Open package	●	→	□	D	▽		.37						
4	Verify part	○	→	■	D	▽		.40						
5	Put part back in bag	●	→	□	D	▽		.22						
6	Put in workstation storage container	○	→	□	D	▽		.37						
7		○	→	□	D	▽								
8		○	→	□	D	▽								
9		○	→	□	D	▽								
10		○	→	□	D	▽								
11		○	→	□	D	▽								
12		○	→	□	D	▽								
13		○	→	□	D	▽								
14		○	→	□	D	▽								
15		○	→	□	D	▽								
16		○	→	□	D	▽								
17		○	→	□	D	▽								
18		○	→	□	D	▽								
19		○	→	□	D	▽								
20		○	→	□	D	▽								
21		○	→	□	D	▽								
22		○	→	□	D	▽								
23		○	→	□	D	▽								
24		○	→	□	D	▽								

Figure 1-7. SORTING PARTS FOR WORKSTATION

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2.0 PROJECT DESCRIPTION

The basic improvement areas are listed below. A more detailed list describing the improvement procedures and the benefits of each change also follows this list of improvement areas.

1) Relocate the Countermeasures stockroom in Building 8 adjacent to the assembly area.

2) Eliminate extra steps in the stockroom by using modified preprinted labels and carts with storage containers.

3) Eliminate the audit count in the staging room and bring the staging room under the control of the Production Coordinator.

4) Eliminate labeling part containers by the working supervisor.

5) Reduce assembly time and rework time while increasing efficiency by using a Cablesan Continuity Monitor/Tester.

2.1 Proposed Improvements

Departmental Layout

A departmental layout analysis was made to determine the most efficient location for the departments concerned with production. The analysis was based on the four basic products and the flow through departments during assembly. Figure 2-8 shows the resulting Departmental Process Layout. A high correlation exists between assembly, quality control, stockroom, and test. The assembly and quality control areas are so interrelated, they are shown in one area intermixed. The stockroom and test areas are also required to be adjacent to the

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assembly area due to the high correlation of material flow through the departments.

Assembly Layout

A layout of the assembly area was prepared. Figure 2-9 shows the basic layout. Note the designated cart storage areas located next to the aisles of the assembly area. These storage areas will leave the required aisle space required by safety.

Staging Room

The staging room will be located in Building 8 adjacent to the stockroom and the assembly area. The staging room will be used for storage of parts which have been pulled from stock but are waiting to go to the assembly area. The audit counting and logging procedure currently used will be eliminated. The staging room will be controlled by the Production Coordinator. A drawing of the basic layout is presented in Figure 2-10.

Stockroom Location

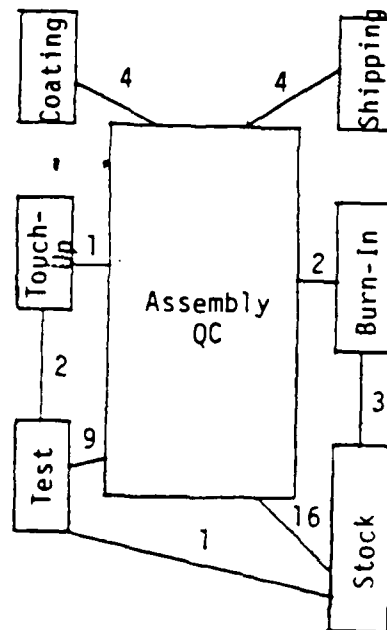
The stockroom will be located in Building 8 adjacent to the assembly area. This will reduce the time and distance used to transport kits from stock to the staging area. See Figure 2-11 for a layout of Building 8.

Stockroom Layout

The stockroom will be located in Building 8 adjacent to the assembly area. All parts will be located in bins

		From						
		Assembly	QC	Test	Touch-Up	Coating	Burn-In	Stock
To	Assembly		17	5		3	2	16
	QC	41		3	4		1	
	Test	4	7					
	Touch-Up	1	1	2				
	Coating	1	2					
	Burn-in							3
	Stock		18	1				
	Shipping		4					

IDEAL DEPARTMENTAL LAYOUT
BASED ON MATERIAL FLOW
THROUGH OPERATIONS



	To	From	Total
Assy	47	47	94
QC	49	49	98
Test	11	11	22
Touch-Up	4	4	8
Coating	3	3	6
Burn-In	3	3	6
Stock	19	19	38
Shipping	4	0	4
Total	140	136	276

To	FROM		
Assy	QC	17	> 58
QC	Assy	41	
Assy	Test	5	> 9
Test	Assy	4	
Assy	Touch-Up	0	> 1
Touch-Up	Assy	1	
Assy	Coating	3	> 4
Coating	Assy	1	
Assy	Burn-in	2	> 2
Burn-In	Assy	0	
Assy	Stock	16	> 16
Stock	Assy	0	

To	From		
Test	Touch-Up	0	> 2
Touch-Up	Test	2	
Test	Stock	0	> 1
Stock	Test	1	
Burn-In	Stock	3	> 3
Stock	Burn-In	0	
Shipping	Assy	4	> 4
QC	Stock	0	
Stock	QC	18	> 18
QC	Test	3	
Test	QC	7	> 10

Figure 2-8. DEPARTMENTAL PROCESS LAYOUT

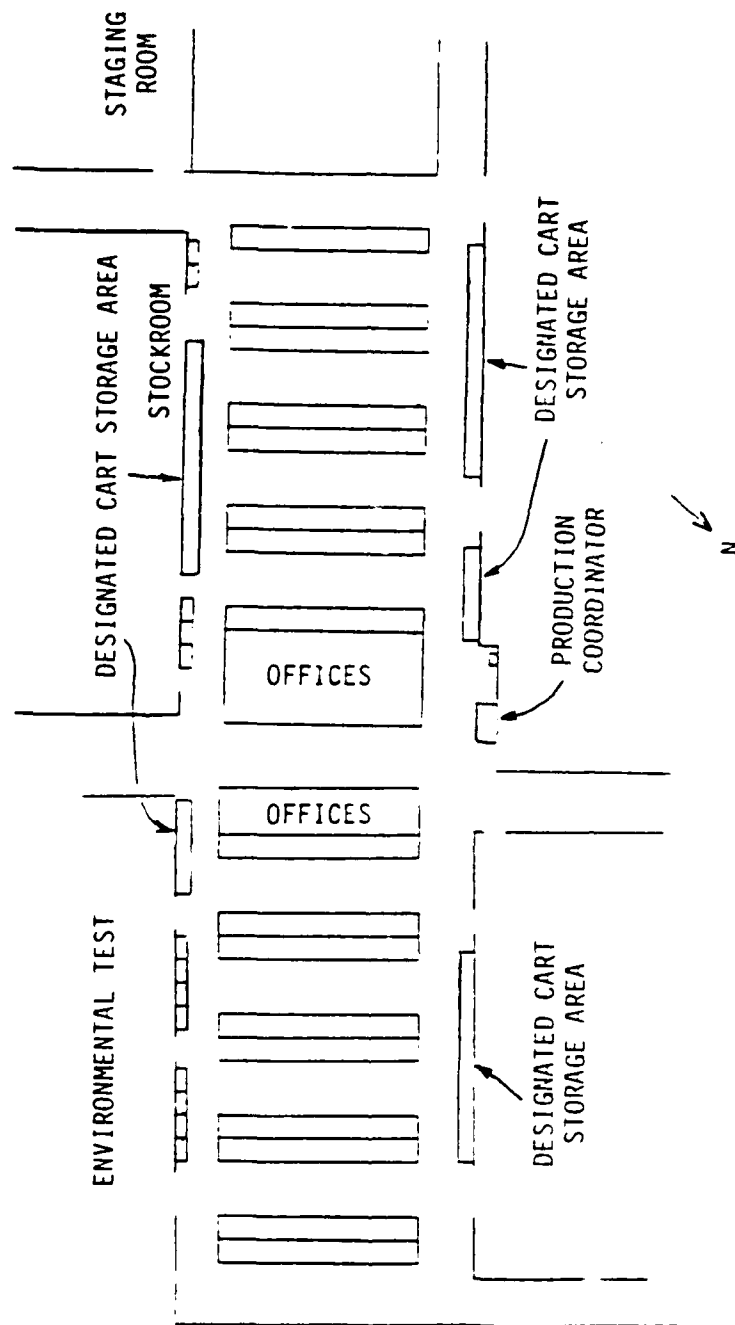
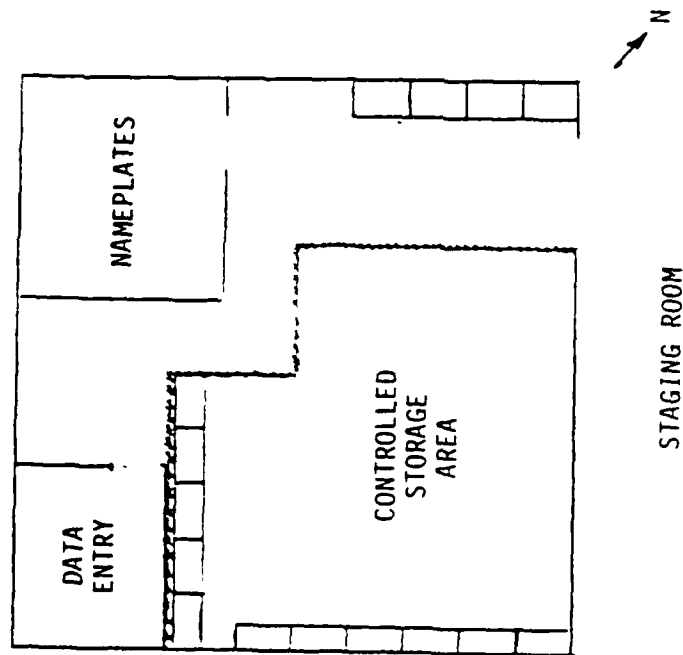
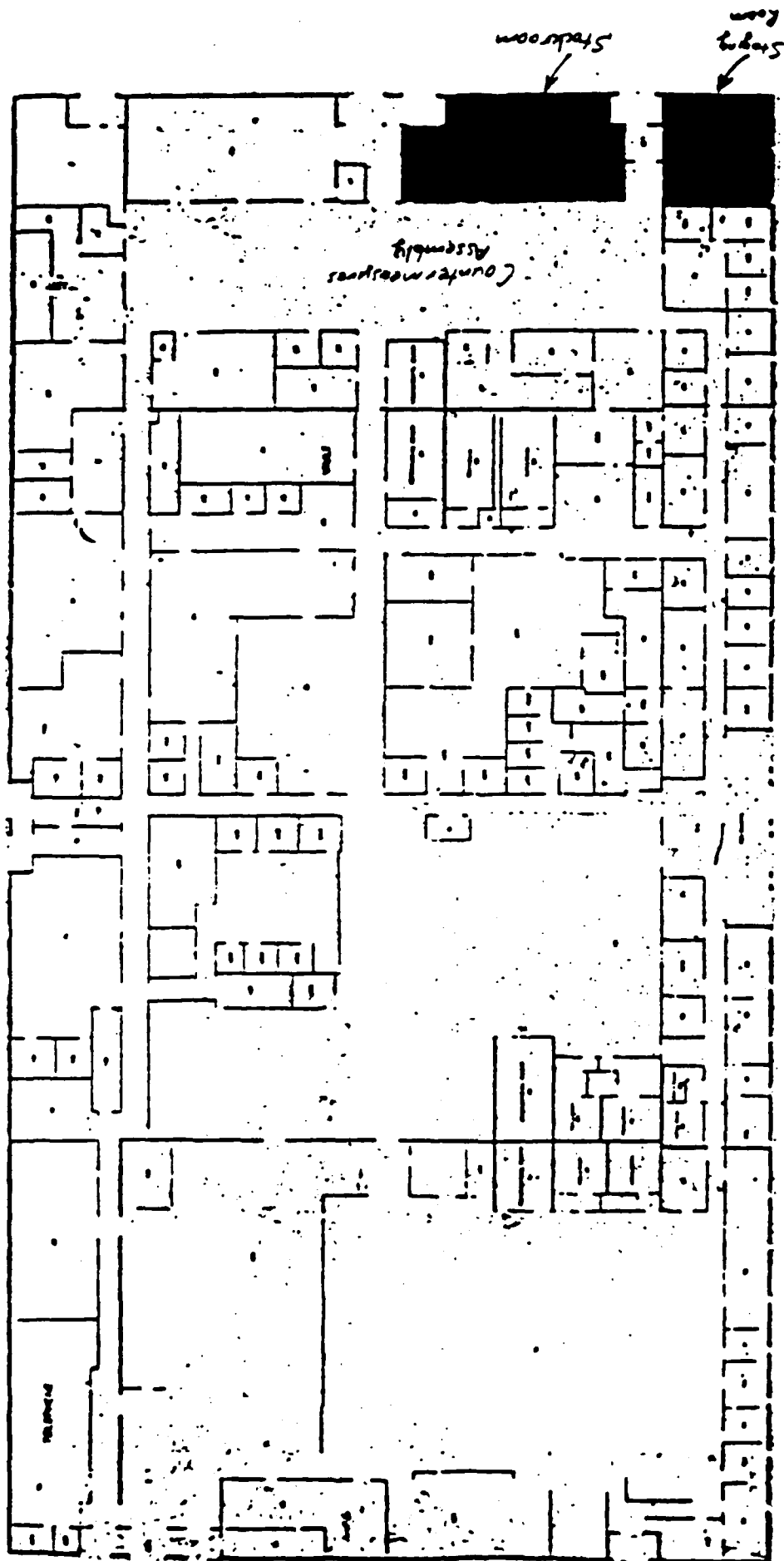


Figure 2-9. NEW ASSEMBLY LAYOUT



STAGING ROOM

Figure 2-10. NEW STAGING ROOM LAYOUT



BUILDING 8
LOCATION PLAN FOR PROJECT

DARK AREA INDICATES CONSTRUCTION PROJECT AREA

Figure 2-11. NEW STOCKROOM/STAGING LOCATION

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on the shelves in numerical sequence excluding bulk material. A layout is presented in Figure 2-12.

Preprinted Labels

Preprinted labels will be issued with the Quota Pull Request. The preprinted labels will be modified to include the workstation number and the location in which it should be set at the workstation. The modified labels will reduce the time used to set up a workstation. A modified preprinted label is presented in Figure 2-13.

Carts

Forty stockroom carts will be located in a designated cart storage area located next to the aisles of the assembly area. Each cart will have a place to hang storage containers and a work area in which to count parts. It will hold the Quota Pull Request and office equipment (pens, ruler, scissors, etc.). These carts will be pushed to the stockroom shelves, have the parts counted out on them, and then be pushed to the staging area. See Figure 2-14 for a picture of cart.

Fifteen additional carts will be used for large stock items which will not fit into the storage containers. These carts will be used to move material from stock to staging to assembly. See Figure 2-15 for cart description.

Ten carts for in process storage and moving parts to and from special areas (test, burn-in) will be provided in the assembly area. The carts will be located near each workstation. These carts will reduce time spent loading and unloading subassemblies by the Production Coordinator. See Figure 2-14 for a picture of cart.

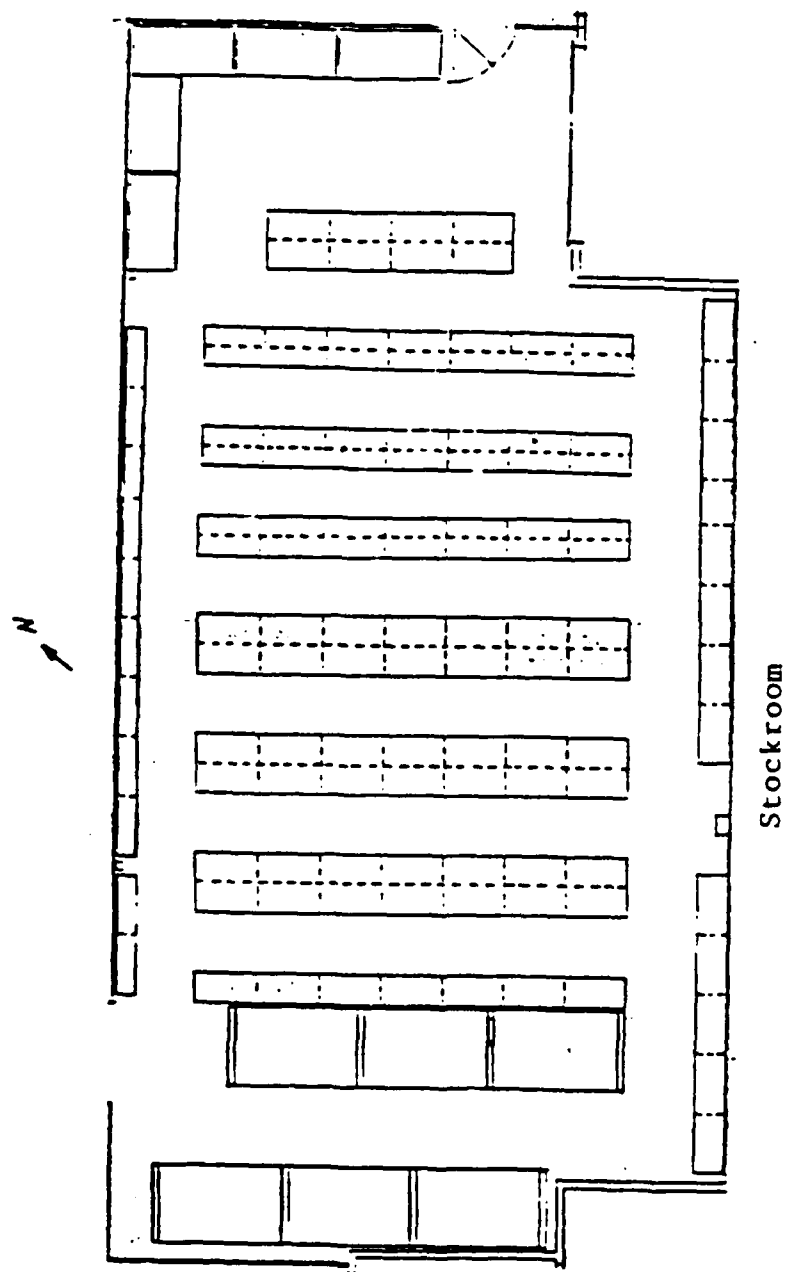


Figure 2-12. NEW STOCKROOM LAYOUT

PW0/NO JAI271 P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 1-1 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 2-1 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 3-1 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC
PW0/NO JAI271 P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 1-2 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 2-2 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 3-2 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC
PW0/NO JAI271 P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 1-3 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 2-3 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 3-3 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC
PW0/NO JAI271 P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 1-4 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 2-4 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 3-4 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC
PW0/NO JAI271 P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 1-5 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 2-5 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC	WS 3-5 SEQ P/N 24750-0413 QTY 300.0 ASY 004/141587-0005 TRACE DOC

Figure 2-13. MODIFIED PREPRINTED LABEL



STOCKROOM CART



IN-PROCESS CART

Figure 2-14. EXAMPLE - STOCKROOM CARTS

HODGE TRUCKS

All Welded ■ Shipped Completely Assembled ■ Ready to Use

Low Deck Shop 800 lb. Capacity

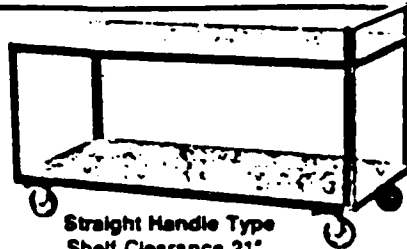
- Shelves made of #13 gauge steel with lips down
- Handle offset on LD Series to allow room for fingers when loaded with packages
- Supplied with 5" rubber tired casters - 2 rigid and 2 swivel
- Finished in gray

For welded casters, add suffix -W

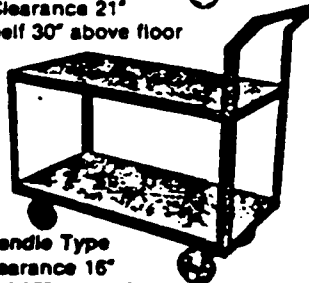
Example: LD-836-W

For shelves with lips up, add suffix -L

Example SH-830-L



Straight Handle Type
Shelf Clearance 21"
Top Shelf 30" above floor



Offset Handle Type
Shelf Clearance 16"
Top Shelf 25" above floor

Depth	Width	Offset Handle Type	Straight Handle Type	Shop. Wt.
18"	30"	LD-830	SH-830	90
18"	33"	LD-833	SH-833	92
18"	36"	LD-831	SH-831	94
18"	48"	LD-832	SH-832	100
22"	36"	LD-836	SH-836	97
24"	30"	LD-834	SH-834	98
24"	36"	LD-835	SH-835	100
24"	42"	LD-837	SH-837	102
24"	48"	LD-838	SH-838	109
24"	64"	LD-839	SH-839	113
24"	60"	LD-840	SH-840	120
30"	42"	LD-841	SH-841	120
30"	48"	LD-842	SH-842	126
30"	60"	LD-843	SH-843	140
30"	72"	LD-844	SH-844	158
36"	60"	LD-845	SH-845	158
36"	72"	LD-846	SH-846	170

Portable Tables

Figure 2-15. CART DESCRIPTION

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Stockroom Procedure

Upon receipt of a Quota Pull Request and the preprinted labels, the stockroom personnel will get a cart and enough storage bins to fill the order. The person will proceed to the first part number and location listed on the Quota Pull Request. Upon reaching the location, the person pulls the part bin from the shelf and counts out the proper number of parts on the cart. The person puts the part bin back onto the shelf. The person then gets a storage container from the cart, puts the counted parts into the storage container, and finds a preprinted label which corresponds to the part and puts it onto the storage container. The storage container with parts is put onto the cart. The person marks off the part on the Quota Pull Request and moves to the next part and location. When the person finishes all of the parts on the Quota Pull Request, the person pushes the cart with parts to the staging area and notifies the Production Coordinator. The person sends the Shortage Sheet to the planners and returns to the stockroom. This procedure eliminates writing the parts down, trips to the shelves and back to the desk to get parts, sealing the parts in a plastic bag, and trips to shelves to return the part bins. A Flow Process Chart is presented in Figure 2-16.

Setup Sheets

Setup Sheets will be prepared by the Manufacturing Engineers based on the Manufacturing Packages for each assembly. The Setup Sheets will standardize the workstations with operations, parts, and tools. Copies of all Setup Sheets will be included with the Instruction Sheets. The Setup Sheets will reduce time setting up the assembly workstation by providing part locations and a list of required tools.

ANALYSIS				
DATE	TIME	BY	NO.	REV.

QUESTION
EACH
DETAIL

FLOW PROCESS CHART

NO. _____
PAGE 1 OF 4

SUMMARY						
	PRESENT		PROPOSED		DIFFERENCE	
	NO	TIME	NO	TIME	NO	TIME
☐ OPERATIONS	57					
☐ TRANSPORTATIONS	28					
☐ INSPECTIONS						
☐ DELAYS						
☐ STORAGES						
DISTANCE TRAVELED		FT.		FT.		FT.

JOB Kitting Parts in Stockroom (6 Parts)

☒ MAN OR ☐ MATERIAL _____
CHART BEGINS _____
CHART ENDS _____
CHARTED BY GD DATE 2/8/85

DETAILS OF (PRESENT PROPOSED) METHOD		OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	QUANTITY	TIME	ACTION						NOTES
										ELIMINATE	COMBINE	CHANGE	REUSE	PLACE	IMPROVE	
1	Receive Quota Pull Sheet	●	→	□	□	▽										
2	Get cart from cart storage area	○	→	□	□	▽										
3	Put required number of bins on cart	●	→	□	□	▽										
4	Walk to shelf pushing cart w/ bins	○	→	□	□	▽										
5	Pull 1st part bin from shelf	●	→	□	□	▽										
6	Set bin on cart	○	→	□	□	▽										
7	Pick up part package	○	→	□	□	▽										
8	Open package	●	→	□	□	▽										
9	Count required number of parts	●	→	□	□	▽										
10	Reseal package	●	→	□	□	▽										
11	Put package back in bin from shelf	○	→	□	□	▽										
12	Put counted parts in bin from cart	●	→	□	□	▽										
13	Mark paperwork	●	→	□	□	▽										
14	Peel preprinted tag from sheet	●	→	□	□	▽										
15	Put preprinted tag on bin from cart	●	→	□	□	▽										
16	Put shelf bin back on shelf	●	→	□	□	▽										
17	Walk to shelf pushing cart	○	→	□	□	▽										
18	Pull 2nd part from shelf	●	→	□	□	▽										
19	Set bin on cart	○	→	□	□	▽										
20	Pick up part package	○	→	□	□	▽										
21	Open package	●	→	□	□	▽										
22	Count required number of parts	●	→	□	□	▽										
23	Reseal package	●	→	□	□	▽										
24	Put package back in bin from shelf	○	→	□	□	▽										

Figure 2-16. KITTING PARTS IN STOCKROOM

FLOW PROCESS CHART

NO. _____
PAGE 2 OF 4

FLOW PROCESS CHART												PAGE 4 OF 4	
DETAILS OF (PRESENT) METHOD	POSSIBILITIES												NOTES
	OPERATION	TRANSPORT	INSPECTION	STORAGE	DISPATCH	QUANTITY	TIME	ELIMINATE	COMBINE	CHANGE	REVERSE		
Put counted parts in bin from cart	●	◊	□	D	▽								
Mark paperwork	●	◊	□	D	▽								
Peel preprinted tag from sheet	●	◊	□	D	▽								
Put preprinted tag on bin from cart	●	◊	□	D	▽								
Return shelf bin back to shelf	●	◊	□	D	▽								
Walk to shelf pushing cart	○	◊	□	D	▽								
Pull 3rd part from shelf	●	◊	□	D	▽								
Set bin on cart	○	◊	□	D	▽								
Pickup part package	○	◊	□	D	▽								
Open package	●	◊	□	D	▽								
Count required number of parts	●	◊	□	D	▽								
Reseal package	●	◊	□	D	▽								
Put package back in bin from shelf	○	◊	□	D	▽								
Put counted parts in bin from cart	●	◊	□	D	▽								
Mark paperwork	●	◊	□	D	▽								
Peel preprinted tag from sheet	●	◊	□	D	▽								
Put preprinted tag on cart bin	●	◊	□	D	▽								
Return shelf bin to shelf	●	◊	□	D	▽								
Walk to shelf pushing cart	○	◊	□	D	▽								
Pull 4th part from shelf	●	◊	□	D	▽								
Set bin on cart	○	◊	□	D	▽								
Pickup part package	○	◊	□	D	▽								
Open package	●	◊	□	D	▽								
Count required number of parts	●	◊	□	D	▽								
Reseal package	●	◊	□	D	▽								
Put package back in bin from shelf	○	◊	□	D	▽								
Put counted parts in bin from cart	●	◊	□	D	▽								
Mark paperwork	●	◊	□	D	▽								
Peel preprinted tag from sheet	●	◊	□	D	▽								

Figure 2-16. KITTING PARTS IN STOCKROOM

FLOW PROCESS CHART

NO. 3 OF 4
PAGE 3 OF 4

DETAILS OF (PRESENT) METHOD	POSSIBILITIES											NOTES
	OPERATION	TRANSPORT	INSPECTION	STORAGE	REWORK	WASTE	TIME	ELIMINATE	COMBINE	REVERSE	REWORK	
Put <u>preprinted</u> tag on cart bin	●	○	□	◇	▽							
Return shelf bin to shelf	●	○	□	◇	▽							
Walk to shelf pusing cart	○	●	□	◇	▽							
Pull 5th part from shelf	●	○	□	◇	▽							
Set bin on cart	○	●	□	◇	▽							
Pickup part package	○	●	□	◇	▽							
Open package	●	○	□	◇	▽							
Count required number of parts	●	○	□	◇	▽							
Reseal package	●	○	□	◇	▽							
Put package back in bin from shelf	○	●	□	◇	▽							
Put counted parts in bin from cart	●	○	□	◇	▽							
Mark paperwork	●	○	□	◇	▽							
Peel preprinted tag from sheet	●	○	□	◇	▽							
Put preprinted tag on cart bin	●	○	□	◇	▽							
Return shelf bin to shelf	●	○	□	◇	▽							
Walk to shelf pushing cart	○	●	□	◇	▽							
Pull 6th part from shelf	●	○	□	◇	▽							
Set bin on cart	○	●	□	◇	▽							
Pickup part package	○	●	□	◇	▽							
Open package	●	○	□	◇	▽							
Count required number of parts	●	○	□	◇	▽							
Reseal package	●	○	□	◇	▽							
Put package back in bin from shelf	○	●	□	◇	▽							
Put counted parts in bin from cart	●	○	□	◇	▽							
Mark paperwork	●	○	□	◇	▽							
Peel preprinted tag from sheet	●	○	□	◇	▽							
Put preprinted tag on cart bin	●	○	□	◇	▽							
Return shelf bin to shelf	●	○	□	◇	▽							
Walk to planner desk pushing cart	○	●	□	◇	▽							

Figure 2-16. KITTING PARTS IN STOCKROOM

NO. _____
PAGE 4 OF 4

Figure 2-16. KITTING PARTS IN STOCKROOM

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Workstation Description

A workstation will not be a permanent location but will be a standardization of the operations, required parts, and tools required in an area. The workstation location for an assembly will be designated by the assembly supervisor based on production requirements at the time of assembly. The work tables used for workstations will have racks permanently mounted to hang the part bins. Storage carts for finished assemblies will also be located next to a workstation. A standardized workstation will reduce setup time and reduce assembly time because the assembly operator will know the location of each part.

Production Coordinator

Upon receipt of a Production Work Order the Production Coordinator will retrieve the cart(s) with the kit and take the kit to the assembly area. After the working supervisor has audited the kit and placed the parts at the proper workstation, the Production Coordinator will return the cart to stock. A Flow Process Chart is presented in Figure 2-17.

The Production Coordinator will also move in-process subassemblies to the staging room or to a special area as required using the storage carts.

Working Supervisor

The Working Supervisor will get a Setup Sheet and the Quota Pull Request. The supervisor will verify the parts and quantities and set the parts at the proper workstation per the Setup Sheet and the preprinted label. The supervisor will also

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set the required tools at the workstation. A Flow Process Chart is presented in Figure 2-18.

Testing Equipment

Cablescon Continuity Monitor/Tester units will be installed in the assembly areas. These units will reduce assembly and rework time while increasing assembly efficiency. A description of the Continuity Monitor/Tester is presented in Figure 2-19.

2.2 Project Management Plan

The Project Investigator for this project is George Dickinson, Industrial Engineer. The Project Investigator reports directly to the Industrial Tech Mod Program Manager, who is Russ Petrie. Responsibilities of the Project Investigator include project management, cost, schedule, and technical conformance.

The departments contributing direct support to the project include Manufacturing, Engineering, Material Control, and Quality Engineering. Considerable overhead support was contributed by Facilities Engineering. The organization for this project is depicted in Figure 2-20. The required job type and man-hours for this project appear in Chapter 3. The Project Master Schedule for this project is shown in Figure 2-21.

ANALYSIS				
WHAT	WHERE	WHEN	WHO	HOW

QUESTION
EACH
DETAIL

FLOW PROCESS CHART

NO. _____
PAGE 1 OF 1

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO	TIME	NO	TIME	NO	TIME
☐ OPERATIONS						
☐ TRANSPORTATIONS						
☐ INSPECTIONS						
☐ DELAYS						
☐ STORAGES						
DISTANCE TRAVELED		FT.		FT.		FT.

JOB Production Coordinator

☒ MAN OR ☐ MATERIAL

CHART BEGINS _____

CHART ENDS _____

CHARTED BY GD DATE 2/8/85

DETAILS OF (PRESENT PROPOSED) METHOD		OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	QUANTITY	TIME	ACTION					NOTES
										ELIMINATE	COMBINE	CHANGE	REPLACE	IMPROVE	
1	Receive PWO	●	→	□	D	▽									
2	Get cart with parts	●	→	□	D	▽									
3	Transport kit to work area	○	→	□	D	▽									
4	Return cart to storage area	○	→	□	D	▽									
5	after supervisor has verified parts	○	→	□	D	▽									
6		○	→	□	D	▽									
7		○	→	□	D	▽									
8		○	→	□	D	▽									
9		○	→	□	D	▽									
10		○	→	□	D	▽									
11		○	→	□	D	▽									
12		○	→	□	D	▽									
13		○	→	□	D	▽									
14		○	→	□	D	▽									
15		○	→	□	D	▽									
16		○	→	□	D	▽									
17		○	→	□	D	▽									
18		○	→	□	D	▽									
19		○	→	□	D	▽									
20		○	→	□	D	▽									
21		○	→	□	D	▽									
22		○	→	□	D	▽									
23		○	→	□	D	▽									
24		○	→	□	D	▽									

ANALYSIS				
WHAT	WHERE	WHEN	WHO	HOW

QUESTION
EACH
DETAIL

FLOW PROCESS CHART

NO. _____
PAGE 1 OF 1

SUMMARY

	PRESENT		PROPOSED		DIFFERENCE	
	NO	TIME	NO	TIME	NO	TIME
☐ OPERATIONS						
☐ TRANSPORTATIONS						
☐ INSPECTIONS						
☐ DELAYS						
☐ STORAGES						
DISTANCE TRAVELED		FT.		FT.		FT.

JOB Working Supervisor

☐ MAN OR ☐ MATERIAL

CHART BEGINS _____

CHART ENDS _____

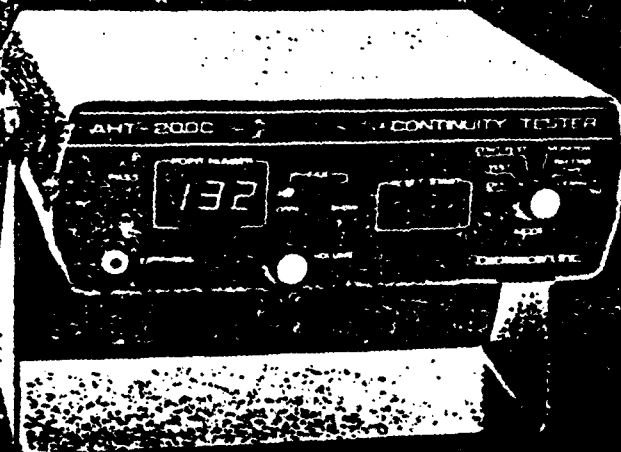
CHARTED BY GD DATE 2/8/85

DETAILS OF (PRESENT PROPOSED) METHOD		OPERATION	TRANSPORT	INSPECTION	DELAY	STORAGE	DISTANCE IN FEET	QUANTITY	TIME	ACTION						NOTES
										ELIMINATE	COMBINE	CHANGE	SEQUENCE	PLACE	PERSON	
1	Get Setup Sheet & Quota Pull	☐	☒	☐	☐	☐										
2	Verify parts and quantities	☐	☒	☐	☐	☐										
3	Set parts at proper workstation	☒	☒	☐	☐	☐										
4	Set required tools at workstation	☒	☒	☐	☐	☐										
5	Notify Production Coordinator	☒	☒	☐	☐	☐										
6	that cart is ready to go to storage	☐	☒	☐	☐	☐										
7		☐	☒	☐	☐	☐										
8		☐	☒	☐	☐	☐										
9		☐	☒	☐	☐	☐										
10		☐	☒	☐	☐	☐										
11		☐	☒	☐	☐	☐										
12		☐	☒	☐	☐	☐										
13		☐	☒	☐	☐	☐										
14		☐	☒	☐	☐	☐										
15		☐	☒	☐	☐	☐										
16		☐	☒	☐	☐	☐										
17		☐	☒	☐	☐	☐										
18		☐	☒	☐	☐	☐										
19		☐	☒	☐	☐	☐										
20		☐	☒	☐	☐	☐										
21		☐	☒	☐	☐	☐										
22		☐	☒	☐	☐	☐										
23		☐	☒	☐	☐	☐										
24		☐	☒	☐	☐	☐										

Figure 2-18. WORKING SUPERVISOR

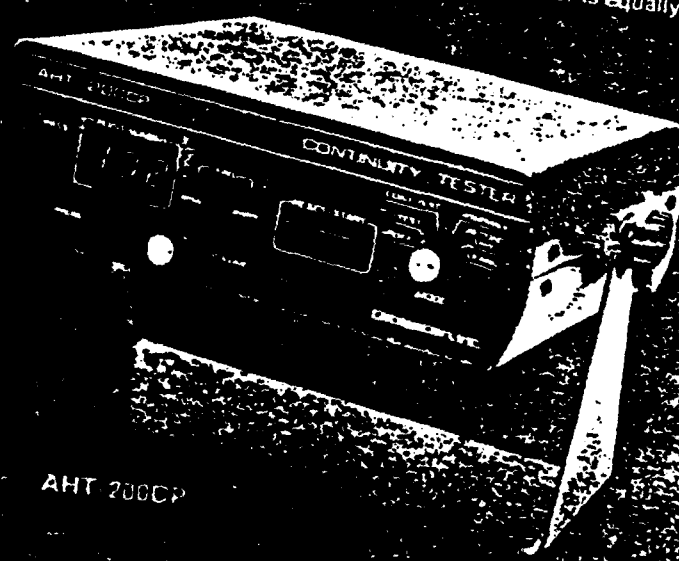
Cablescaan

AHT-200C AHT-200CP Self-Programming Continuity Monitor/Tester



AHT-200C

The AHT Continuity Monitor/Tester, incorporating space-age microprocessor technology, represents a new era in cable and harness assembly efficiency. Dramatic savings in assembly and testing costs are provided by eliminating the need for preprogramming or wiring of programmed interfaces. With the AHT you can monitor and test assemblies within minutes after you fabricate a correct cable or even a simulation, plus changeover from one cable program to another is equally fast!



AHT-200CP

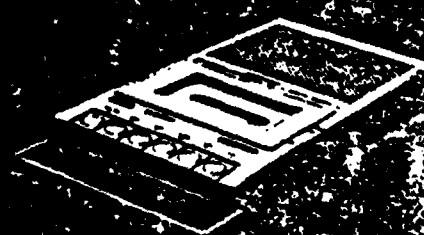
The AHT incorporates sophisticated circuitry enabling it to "memorize" point-to-point and multiple circuit connections of an existing cable or harness in seconds. This memory is then retained in the unit as you monitor and test any number of additional assemblies.

The AHT-200CP has the same features except the Assembly mode replaces the Monitor mode. In this mode a probe located on the front panel is used to locate wires and provide "From" - "To" point data.

Special Features

- Key Switch** prevents accidental alteration of AHT's memory by unauthorized personnel.
- Self-Test** capability verifies the proper operation of the AHT before use, tests more than 90% of the unit's electronics within a flip of the mode switch.
- Memory Error** is indicated if the data input from a tape is unreadable.
- Jack** allows use of the earphone instead of the built-in speaker for assembly monitoring; volume control adjusts sound level for both.
- Battery Pack** incorporated internally with automatic charger to maintain assisting memory up to 30 days without external power in case of accidental power disconnects.

Stored Memory - Cablescaan AHT models have the unique built-in capability to feed their memories to the cassettes of ordinary tape recorders. The programs can then be stored while the AHT is used to monitor or test differently wired harnesses. Later, the AHT can relearn from a stored memory by playing the tape back into it. This changeover from monitoring or testing one assembly to another can be accomplished in minutes. A single AHT can perform a multitude of functions on different harnesses within a single workday... all performed by less costly non-technical personnel. These same features allow quick and economical engineering changes.



Cassette Tape Recorder

Figure 2-19. CABLESCAN CONTINUITY MONITOR/TESTER

AHT-200C AHT-200CP

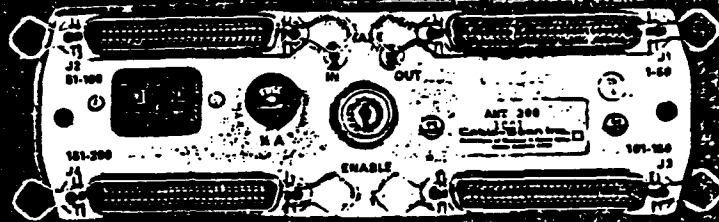
Learn • To input memory, connect a properly wired assembly or simulation to the unit, set the mode switch to Learn and press the start button. In less than a second, the pass light will come on, indicating that the AHT is programmed and ready to monitor or test.

Test • Interconnect a completed harness to the AHT and set the mode switch to test. The unit immediately checks point-by-point and multiple connections against its memory and signals with the Pass light if the wiring is correct. A missing or poorly connected wire will be indicated by the Open light and the flashing of two point numbers. An incorrect connection is indicated by the Short light and display of the two point numbers which are connected. Additional errors will be detected by pressing Start or correcting an open condition.

Continuous Test • Intermittent shorts or open connections, due to vibration, temperature extremes, etc., are readily detected by selecting the Continuous Test mode while subjecting the assembly to the suspected condition. The AHT will repeatedly test all connections until an error is detected, then it will display the type of problem and the point numbers.

Monitor • The AHT-200C will assist in wiring of assemblies by using the Monitor mode. Any attempt to miswire while assembling the harness is signalled by both an audio and visual display indicating a short. The two point numbers of the miswire will be displayed.

Assembly • The Assembly mode of the AHT-200CP has replaced the Monitor mode of the AHT-200C. A probe, located on the front panel, is used to locate wires and provide "From" - "To" point data. When a wire end is probed the display will indicate the point number along with the termination point number. An audio tone will sound when the wire is terminated properly and the display will be cleared. If the displayed wire is not to be terminated the wire may be cancelled by either depressing the Start switch or by probing the termination point. If the probed point has already been terminated the tone will sound to verify termination. After the assembly has been completed the Test mode is used to verify that all terminations have been completed and that no shorts have been created.



Back of unit

SPECIFICATIONS

Capacity	AHT-200 - 200 Points
Operating Speed	Test, Self Test, Monitor, Learn (from known good) less than 1s. Record Tape, Learn (from tape) less than 40s.
Sensitivity	Short Circuit: Less than 1K indicates short. Open circuit: More than 10K indicates open. Test Voltage: Less than 5VDC. Test Current: Less than 2mA.
Interwire Capacitance	1000 pF maximum
Display	4 1/2 inch (11mm) LED numeric display. LED indicators for Pass, Open, Short.
Audio	Tone sounds when a short is created while in Monitor mode or on valid continuity in Assembly mode.
Program Memory	Unit has internal battery pack and automatic charger to provide program memory up to 30 days without external power.
Tape In	Impedance: 5KΩ Nominal Level: 2V P-P minimum
Tape Out	Impedance: 33Ω Nominal Level: 30mV P-P Nominal
Recorder Speed	Variation up to +5% from record to playback is acceptable.
Power	104-126 VRMS or 206-252 VRMS internally selectable. 50-60 Hz
Operating Temperature	32°F to 104°F (0°C to 40°C)
Storage Temperature	-40°F to 165°F (-40°C to 74°C)
Maximum Dimensions	10.7 x 3.6 x 8.3 inches (27.18 x 9.14 x 21.14 cm) Dimensions do not include handle.
Weight	200 points: 6.39 lbs (2.90 kg)

Ordering Information

Model Number	Description	Part Number
AHT-200C	200 Point Self-Programming Continuity Monitor/Tester	5210695-01
AHT-200CP	200 Point Self-Programming Continuity Tester/Assembly Aid	5210816-01

Accessories

Cassette Tape Recorder	5210660
Probe	5210465

NOTE: Operating characteristics are designed to be compatible with any good quality consumer tape recorder. Specification change privileges reserved.

Cablescon, Inc.

Subsidiary of Eubanks Engineering Co.
1451 E. Emerson Avenue, Orange, California 92665
714/998-1861 Telex: 692345



The Mello Company, Inc.

P.O. BOX 29301 • Dallas, Texas 75229
214/241-9196

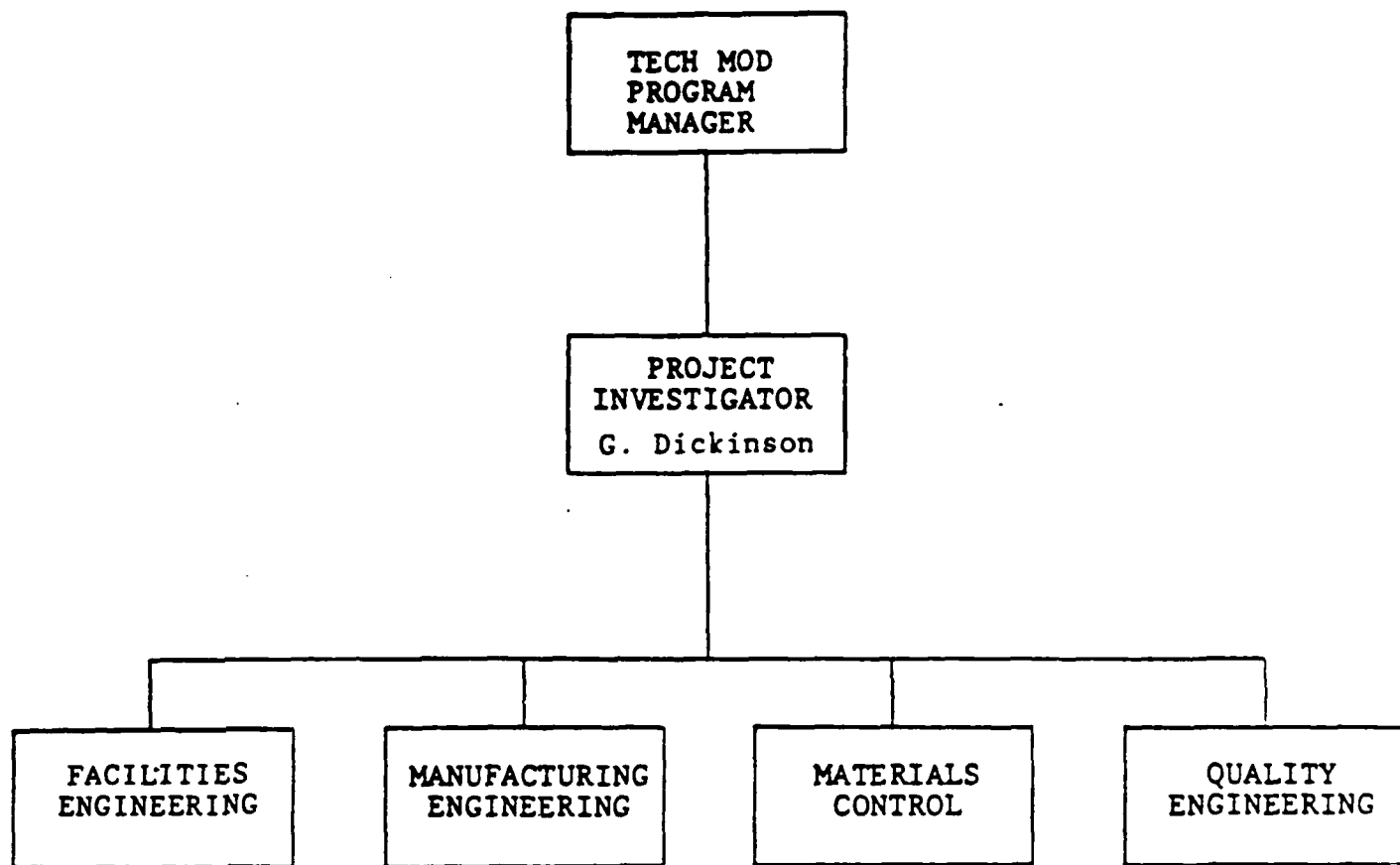


Figure 2-20.
PROJECT ORGANIZATION STRUCTURE
COUNTERMEASURES ASSEMBLY

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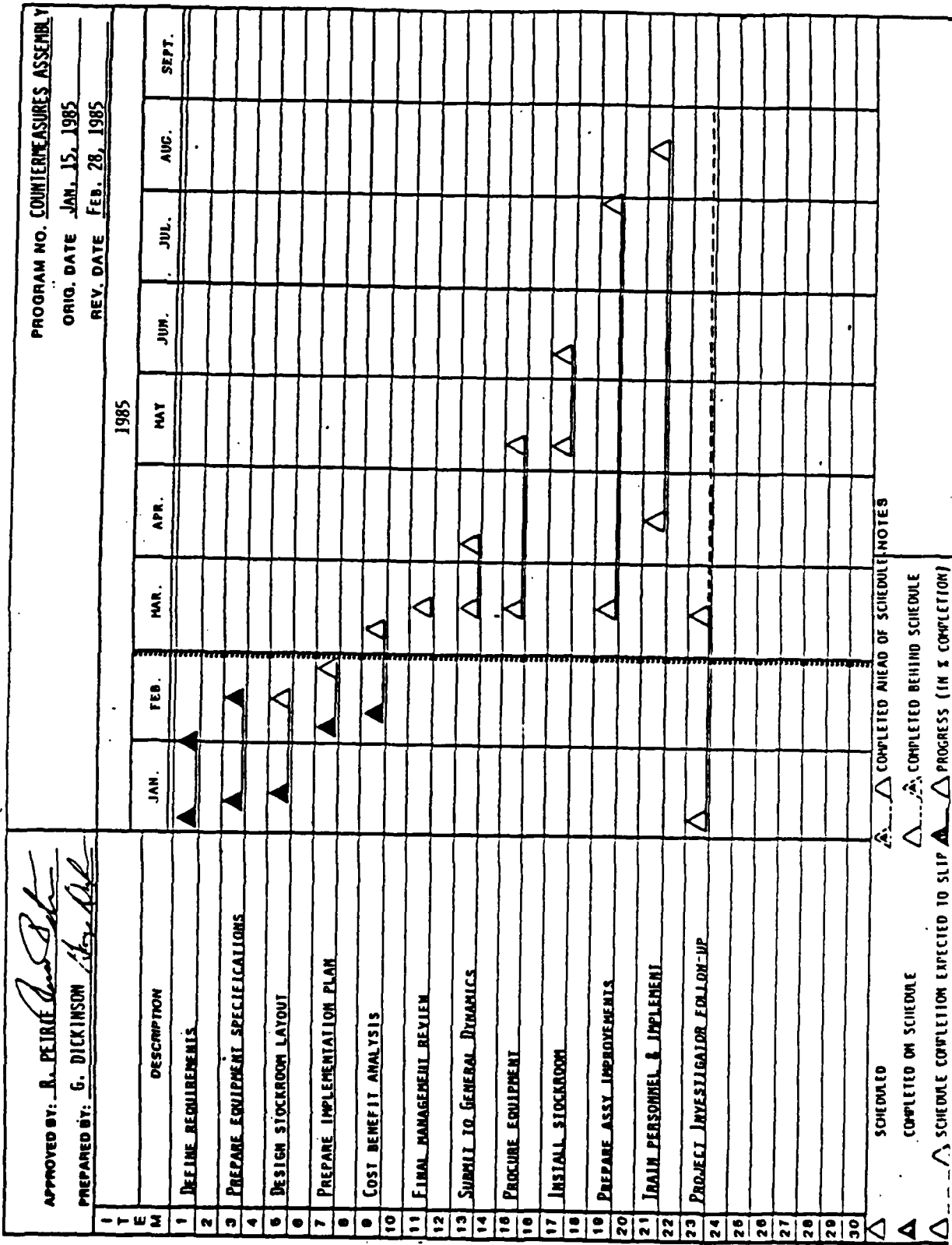


Figure 2-21. PROJECT MASTER SCHEDULE

3.0 IMPACT OF PROJECT SAVINGS ON FUTURE PROPOSALS

Beginning 1 June 85 all proposals leaving Tracor will have to include a slight price reduction as a result of the Tech Mod project for the Countermeasures Assembly Improvements. These improvements will be put in place during the summer, and the shop will start using the Cablesan Continuity Monitor/Tester (CCM/T) on 1 Sep 85. However, the parts coming through the improved shop will not show up in LRU's to be shipped until Feb 1986. This is due to the normal scheduling of parts through the sequence of Fab-Finish-PCB-Assembly-Test-Ship.

For the purpose of proposals, Tracor intends to eliminate any possibility of submitting old labor estimates on parts to be produced using the CCM/T. This section explains the procedures to be used in properly pricing proposals that contain Countermeasures Shop parts.

During the first 5 months of operation, using the CCM/T, the 13 part numbers that currently go through the Countermeasures Assembly will be processed through the shop once. This is based on the average length of time between PWO runs on a variety of part numbers from past records. It will take a second 5-month period (Feb - Jun 86) for 2 lots of all part numbers to get through the shop, another 5 months for 3 lots, etc. It is assumed that it will take five 5-month periods, or 25 months (1 Sep 85 - 30 Sep 87), before the 13 part numbers will have been through the Countermeasures Assembly 5 times, for 5 "new" actuals.

Normally, Tracor bases its proposals on the average labor and materials cost on the last 5 runs of each part number that goes into an LRU. Tracor will continue to roll-up manufacturing bids based on the last 5 actuals, but will make an

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adjustment at the LRU level to take into account the savings being realized for Countermeasures LRU's. The adjustment will depend upon when the data on the last 5 runs is gathered.

The following explains how the adjustment will be made during the September 1985 - September 1987 time frame:

1 June 85 - 31 Aug 85

During this period all 5 manufacturing lots are "old" touch labor actuals, recorded in the "unimproved" Countermeasures LRU's. For a proposal being prepared during this period with contractual delivery in February 1986 or later, each LRU will have to be adjusted downward by an amount equal to the proposed Countermeasures Shop savings. The savings have been identified by LRU and are being provided to our Proposals people concurrently with the submittal of this proposal.

1 Sep 85 - 31 Jan 86

The proposals prepared during this period will be based on 4 "old" lots and 1 "new" lot. We cannot deduct the full savings from manufacturing estimates on each LRU because the figures already reflect some improvement based on the 1 new lot. Therefore, 80% of the full LRU savings will be deducted from the manufacturing estimates during this time period.

1 Feb 86 - 30 Jun 86

Since the manufacturing actuals will now show 3 "old" lots and 2 "new" lots, 60% of the LRU savings will be deducted from manufacturing estimates for each LRU during this period.

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1 Jul 86 - 30 Nov 87

The manufacturing actuals during this period will now contain 2 "old" lots and 3 "new" lots. Forty percent of the LRU savings will be deducted from each LRU during this period.

1 Dec 87 - 30 Apr 87

Actuals now contain just 1 "old" lot and 4 "new" lots. Deduct 20% of full LRU savings during this period.

1 May 87 and after

After 1 May 1987 all 5 manufacturing lots are assumed to be "new" actuals, recorded in the "improved" Countermeasures Assembly LRU's. Since the data fully reflects the full savings, there is no longer any adjustment required at the LRU level.

As accounting date is generated on actual hours per part following implementation of the improvements, savings data will be compared to expectations. Depending on whether savings are higher or lower than expected, there may have to be some revisions made to the systematic procedures and percentage adjustments outlined above.

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VOLUME I

ATTACHMENTS

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COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

Attachment A - Project Economic Summary

Implementation Date:		<u>1 Sept 1985</u>
Man-Hour Savings	Instant F16	<u>253.8</u>
	Future F16	<u>1607.9</u>
	Instant Other DoD	<u>598.8</u>
	Future Other DoD	<u>3303.9</u>
	TOTAL	<u><u>5764.4</u></u>
Labor and Material Savings (Loaded \$'s thru fees)	Instant F16	\$ <u>7,585</u>
	Future F16	\$ <u>51,414</u>
	Instant Other DoD	\$ <u>17,595</u>
	Future Other DoD	\$ <u>107,821</u>
	TOTAL	\$ <u><u>184,415</u></u>
Internal Rate of Return:		<u>21.7%</u>
Payback in Years:		<u>2.5</u>
Subcontractors Capital Funds:		\$ <u>38,220</u>
Subcontractors Related Funds:		\$ <u>15,830</u>
DoD Funds:		\$ <u> </u>

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COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

Attachment B - Project Cash Flow Summary

See IRR model results in Volume II 2.0

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

Attachment C - Expenditure Summary

<u>Capital Labor</u>	<u>1985</u>
Install Stockroom	
Contract Labor (Exp. Code 25)	
300 hours x \$10 per hour (est.)	\$ 3,000
Prepare Setup Sheets (PWO's)	
Manufacturing Engineer, Bid Code M2, Exp. Code 05	
250 hours x \$14.90 ① x 2.60 ②	9,685
Modify Computer Printouts	
Operation Services (Exp. Code 01)	
300 hours x \$10 per hour (est.)	3,000
Train Personnel	
Manufacturing Engineer, M2, 05.	
250 hours x \$14.90 x 2.60	<u>9,685</u>
	<u>\$25,370</u>

① Hourly bid rate per latest revised bid package
(thru 4-5-85)

② 1 + overhead rate from latest revised bid package
(thru 4-5-85)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

Attachment C - Expenditure Summary (cont.)

<u>Capital Equipment</u>		<u>1985</u>
2 Cablesan Monitor Testers	\$1895.00 ea.	\$ 3,790
8 Mating Connectors	30.00 ea.	240
1 Tape Recorder for programming Continuity Monitor Testers	161.00 ea.	161
40 Portable Stockroom Carts	125.00 ea.	5,000
10 Portable In-Process Carts	229.00 ea.	2,290
15 Low Deck Carts w/o Racks	110.00 ea.	1,650
1000 Storage Containers (small)	.65 ea.	650
200 Storage Containers (large)	1.43 ea.	286
80 3-Tier Table Storage Racks	16.00 ea.	1,280
Staging Room Caging		894
		<u>\$16,241</u>
Tax 5 1/8%		832
		<u>\$17,073</u>
Material Handling 12%		2,049
Total		<u>\$19,122</u>

Capital Other

Construct Stockroom & Staging Area
FIR 85-003

\$ 3,283

TOTAL CAPITAL (Recovered)

\$47,775

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COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

ATTACHMENT C - Expenditure Summary (cont.)

<u>Non-Recovered Expensed Costs</u>	<u>1985</u>
Project Investigator	
Mfg. Engineer, M2, 05	
300 hours x \$14.90 x 1.32	\$ 5,900
Move stock, label shelves, enter locations	
Stockroom Personnel, M7, 05	
500 hours x \$5.87 x 1.32	3,874
Removal & rework of old structures in new Stockroom area	
FIR 85-003	<u>8,033</u>
Total Non-Recovered Expensed Costs	<u><u>\$17,807</u></u>
<u>Recovered Expensed Costs (Budgeted)</u>	
Design & Layout of Stockroom & Staging Room	
Facility Engineer, 01	
150 hours x \$10.00 (est.) x 1.32	<u>\$ 1,980</u>
Total Recovered Expense Costs	<u><u>\$ 1,980</u></u>

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COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

Attachment D - Project Assumptions

No specific assumptions were made during the course of this project investigation.

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COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

Attachment E - Visual Summary of Current
and Proposed Processes

See Sections 1 and 2, Volume I.

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COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

Attachment F - IRR Computations

See IRR Model, Volume II, page 3.

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT 6 - MANUFACTURING SCHEDULES

	INSTANT			FOLLOW-ON			
	F16	USAF		F16	USAF		COMM'L
		1985	1986		1986	1987-91	
130386-0001	12	72	12			170	114
*133490-0001		43					
*133490-0002		136					44
133686-0001		245		96	213		44
133800-0001		117	6	96	213	35	76
133882-0001		36					22
133882-0002		36					22
133896-0001	72	133	8				22
*134001-0001	117	179					44
134016-0001		43					44
134025-0001					26	77	
*134025-0002	72	78					44
*134036-0001		72					
*135820-0003			2				44
*135820-0004			2			61	35
135850-0110							
135878-0001	82	327		96	213	45	45
*135890-0002	107	409		192	426		
*135890-0003		23				90	90
135912-0001	534	49		96	213	90	90
						170	70

* Cablesan savings related part number

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT 6 - MANUFACTURING SCHEDULES

	INSTANT			FOLLOW-ON			
	F16	USAF		F16	USAF		COMM'L
		1985	1986		1986	1987-91	
136550-0001			3				
136570-0001			1				
*136580-0001			1				
139651-0002			131				
140487-0001			300				
141020-0001			144				
141030-0001			36				
142927-0001	176			96	213	45	45
142942-0001						448	240
142949-0001						112	60
142952-0001							
143119-0001							
143120-0001							45
143121-0001							45
148250-0001							45
155200-0001							34
157600-0001	1						11
143112-0001							
143115-0001							
135602-0004			1				

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT 6 - MANUFACTURING SCHEDULES

	INSTANT			FOLLOW-ON		
	F16	USAF	COMM'L	F16	USAF	COMM'L
	1985	1986	1985	1986	1986	1987-91
135602-0400			3			
135603-0300			4			
135604-0500			3			
135947-0001				96	45	45
136530-0001					26	51
*136540-0001					26	24
136560-0001					67	
145303-0001					26	
145304-0001					67	
145550-0001					26	
145560-0001						24
145570-0001						24
148075-0001						7
148125-0001						7
148331-0001						7
148451-0001						45
154097-0001						45
145180-0002						90
145576-0001						45
						7
						48
						7

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TECH MOD COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT H - SAVINGS CALCULATIONS

RELOCATE STOCKROOM

(eliminate costs - observation by IE to assess savings)

4 trips/day x 12 min/trip x 246 days/yr x hr/60 min =

196.8 hr/yr

8 trips from test/day x 12 min/trip x 246 day/yr x hr/60 min =

393.6 hr/yr

TOTAL = 196.8 + 393.6 = 590.4 hrs/yr

MODIFY STOCKROOM PROCEDURES (reduce costs)

Data from timing of 6 parts pulled 2/8/85

5000 parts/month pulled

5000 parts/month x 30% (# of parts pulled using cart) =

1500 parts/month

PULLING PARTS (See Kitting Parts in Stockroom - Figure 1-4)

0.15 min/step-6 parts x 7 steps x 1500 parts/month x hr/60 min

x 12 month/yr = 52.5 hr/yr

PACKAGING PARTS (see Fig. 1-4)

0.16 min/step-part x 2 steps x 1500 parts/month x hr/60 min

x 12 month/yr = 96 hrs/yr

RETURNING PARTS TO SHELF (see Fig. 1-4)

0.12 min/step-6 parts x 9 steps x 1500 parts/yr x 12 months/yr

x hr/60 min = 54 hrs/yr

TOTAL = 52.5 + 96 + 54 = 202.5 hrs/yr (overhead function)

ELIMINATE STAGING AREA (see Staging Parts/Verifying

Quantities - Figure 1-5)

0.12 + .16 + .42 + .5 + .16 + .12 = 1.48 min/kit

0.4 + .4 + .4 + .16 + .16 = 1.52 min/part

1.48 min/kit x 5 kit/day x 246 day/yr x hr/60 min = 30 hrs/yr

1.52 min/part x 5000 part/month x 12 month/yr x hr/60 min =

1520 hr/yr

TOTAL = 30 hr/yr + 1520 hr/yr = 1550 hrs/yr (overhead function)

PRODUCTION COORDINATOR-STAGING TO ASSEMBLY

(eliminate costs - Fig. 1-6)

1 min/kit x 5 kit/day x 246 day/yr x hr/60 min = 20.5 hr/yr

(S7)

Tracor Aerospace

TECH MOD COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT B - SAVINGS CALCULATIONS

SORTING PARTS AT WORKSTATION (reduce costs - see Fig. 1-7)
 5 kit/day average taken from staging room logout sheet over
 6-month period. Timed the sorting operation to get times.
 $0.42 \text{ min/kit} \times 5 \text{ kit/day} \times 246 \text{ day/yr} = 8.6 \text{ hrs/yr}$
 $1.38 \text{ min/part} \times 1500 \text{ parts/month} \times 12 \text{ month/yr} \times \text{hr/60 min} =$
 414 hrs/yr
 TOTAL = $8.6 \text{ hrs/yr} + 414 \text{ hrs/yr} = 422.6 \text{ hrs/yr}$ (M7)

CONTINUITY MONITOR/TESTER

Savings based on standard times formula for manually sorting
 wires in a bundle ($W \times W \times .005 = \text{times in minutes}$) and the
 time required to label each wire (0.153 min/wire). The time
 to sort and install the wires to the proper connector location
 using the Continuity Monitor/Tester (0.2 min/wire) was sub-
 tracted from the manual time to compute the total savings.

(See below.)

Example: 33 wires

$33 \times 33 \times 0.005 = 5.445 \text{ min/assy}$

$33 \times 0.153 = 5.049 \text{ min/assy}$

$5.445 + 5.049 = 10.494 \text{ min/assy}$ (manually)

$33 \times 0.2 = 6.6 \text{ min/assy}$ (Continuity Tester)

SAVINGS = $10.494 - 6.6 = 3.894 \text{ min/assy}$

LRU'S	SUBASSY'S	# OF WIRES	SAVINGS	BID CODE
135890-0002		30, 23	4.65 min/assy	(M7)
135890-0003		33	3.89 min/assy	(M7)
134001-0001	(134007-1)	34, 15	4.60 min/assy	(M7)
134025-000X	(134030-1)	16, 32	5.65 min/assy	(M7)
	(134030-2)	16, 32	5.65 min/assy	(M7)
	(134030-3)	16, 32	5.65 min/assy	(M7)
134036-0001		50	10.15 min/assy	(M7)
136540-0001		30, 31, 30	9.52 min/assy	(M7)
135820-0003	(135845-1)	44	7.61 min/assy	(M7)
135820-0004	(135845-1)	44	7.61 min/assy	(M7)
136580-0001	(136581-1)	40, 20	7.18 min/assy	(M7)
133490-0001		15	0.42 min/assy	(M7)
133490-0002		15	0.42 min/assy	(M7)

CABLESCAN (uses **. marked part / from Attachment E)

- 87.3
'85 - 84.1
'86 - 3.2

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT H - SAVINGS CALCULATIONS

CABLESCAN (uses *** marked part # from Attachment G)

Part Number	Minutes Saved	F16			USAF			COM'L		
		'85 Units	'86 Tot.Sav.	'87 Units	'85 Units	'86 Tot.Sav.	'87 Units	'85 Units	'86 Tot.Sav.	'87 Units
PROPOSED										
133490-0001	.42									
2	.42									
134001-0001	4.6									44 18.48
134025-0001	5.65									44 202.4
134036-0001	10.15									44 248.2
135820-0003	7.61									44 446.60
4	7.61							61 464.21		35 266.35
135890-0002	4.65							61 464.21		35 266.35
3	3.89									
136540-0001	9.52									
136580-0001	7.18									
TOTAL Minutes		-0-	892.8		-0-	784.3	1469.0	-0-	928.42	1448.4
Hours			14.9	33.0		13.1	24.8		15.5	24.1

- 125.4
'86 = 43.5
'87 = 81.9

Tracor Aerospace

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT H - SAVINGS CALCULATIONS

		INSTANT SAVINGS		PROPOSED SAVINGS		
		1985	1986	1986	1987	1988-91
<u>F16</u>	Stockroom relocation	135.9 hrs		135.9 hrs	135.9 hrs	Same hours as '87 with rates *1.05 for PSI
① 23%	S7	x \$ 9.92		x \$10.42	x \$10.94	
		<u>\$1348</u>		<u>\$1415</u>	<u>\$1486</u>	
	Sort parts at workstation	97.3		97.3	97.3	
	M7	x \$ 5.92		x \$ 6.22	x \$ 6.53	
		<u>\$ 576</u>		<u>\$ 605</u>	<u>\$ 635</u>	
	Cablescon	15.8		14.9	33.0	
	M7	x \$ 5.92		x \$ 6.22	x \$ 6.53	
		<u>\$ 94</u>		<u>\$ 93</u>	<u>\$ 215</u>	
	Staging method change	4.8		4.8	4.8	
	S7	x \$ 9.92		x \$10.42	x \$10.94	
		<u>\$ 48</u>		<u>\$ 50</u>	<u>\$ 52</u>	
	TOTAL	<u>\$2066</u>		<u>\$2163</u>	<u>\$2388</u>	
 <u>USAF</u>	Stockroom relocation	301.4 hrs		301.4 hrs	301.4 hrs	
① 51%	S7	x \$ 9.92		x \$10.42	x \$10.94	
		<u>\$2990</u>		<u>\$3139</u>	<u>\$3296</u>	
	Sort parts at workstation	215.7		215.7	215.7	
	M7	x \$ 5.92		x \$ 6.22	x \$ 6.53	
		<u>\$1277</u>		<u>\$1341</u>	<u>\$1408</u>	
	Cablescon	67.8	3.2	13.1	24.8	
	M7	x \$ 5.92	x \$ 6.22	x \$ 6.22	x \$ 6.53	
		<u>\$ 401</u>	<u>\$ 20</u>	<u>\$ 81</u>	<u>\$ 162</u>	
	Staging method change	10.7		10.7	10.7	
	S7	x \$ 9.92		x \$10.42	x \$10.94	
		<u>\$ 106</u>		<u>\$ 111</u>	<u>\$ 117</u>	
	TOTAL	<u>\$4774</u>	<u>\$ 20</u>	<u>\$4672</u>	<u>\$4983</u>	

Tracor Aerospace

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT H - SAVINGS CALCULATIONS

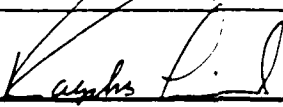
COMM'L		153.7 hrs	153.7 hrs	153.7 hrs
① 26%	S7	x \$ 9.92	x \$10.42	x \$10.94
		<u>\$1525</u>	<u>\$1601</u>	<u>\$1681</u>
	Sort parts at workstation	110.0	110.0	110.0
	M7	x \$ 5.92	x \$ 6.22	x \$ 6.53
		<u>\$ 651</u>	<u>\$ 684</u>	<u>\$ 718</u>
	Cablescon	.5	15.5	24.1
	M7	x \$ 5.92	x \$ 6.22	x \$ 6.53
		<u>\$ 3</u>	<u>\$ 96</u>	<u>\$ 157</u>
	Staging method change	5.5	5.5	5.5
	S7	x \$ 9.92	x \$10.42	x \$10.94
		<u>\$ 55</u>	<u>\$ 57</u>	<u>\$ 60</u>
	TOTAL	<u><u>\$2234</u></u>	<u><u>\$2438</u></u>	<u><u>\$2616</u></u>

- ① %'s based on total Countermeasures Assembly LRU's in 1985; Category (ex F16)/Total.
See Attachment G. % used on all but Cablescon savings.

Cablescon savings uses asterisked parts shown on Attachment G and hours saved calculations on prior page.

Tracor Aerospace

VOLUME II

CONTRACT PRICING PROPOSAL COVER SHEET		1. SOLICITATION/CONTRACT/MODIFICATION NO. P.O. #1005205 F		FORM APPROVED OMB NO. 3090-0116			
NOTE: This form is used in contract actions if submission of cost or pricing data is required. (See FAR 15.804-6(b))							
2. NAME AND ADDRESS OF OFFEROR (Include ZIP Code) Tracor Aerospace Austin, Inc. 6500 Tracor Lane Austin, Texas 78725		3A. NAME AND TITLE OF OFFEROR'S POINT OF CONTACT Ralph G. Leigh, Special Ass't to Div. V.P., Contracts		3B. TELEPHONE NO. 512-929-2192			
		4. TYPE OF CONTRACT ACTION (Check)					
		☒ A. NEW CONTRACT ☒ B. CHANGE ORDER ☐ C. PRICE REVISION/REDETERMINATION		☐ D. LETTER CONTRACT ☐ E. UNPRICED ORDER ☐ F. OTHER (Specify)			
5. TYPE OF CONTRACT (Check) ☒ FFP ☐ CPFF ☐ CPIF ☐ CPAF ☐ FPI ☐ OTHER (Specify)		6. PROPOSED COST (A+B=C) <table style="width: 100%;"> <tr> <td>A. COST \$ N/A</td> <td>B. PROFIT/FEE \$ N/A</td> <td>C. TOTAL \$ N/A</td> </tr> </table>			A. COST \$ N/A	B. PROFIT/FEE \$ N/A	C. TOTAL \$ N/A
A. COST \$ N/A	B. PROFIT/FEE \$ N/A	C. TOTAL \$ N/A					
7. PLACE(S) AND PERIOD(S) OF PERFORMANCE Austin, Texas							
8. List and reference the identification, quantity and total price proposed for each contract line item. A line item cost breakdown supporting this recap is required unless otherwise specified by the Contracting Officer. (Continue on reverse, and then on plain paper, if necessary. Use same headings.)							
A. LINE ITEM NO.	B. IDENTIFICATION	C. QUANTITY	D. TOTAL PRICE	E. REF			
03	Phase 3/Category 1 Countermeasures Assembly Improvements Project						
	Gross Savings		184,415	Vol. II			
	DoD Share of Savings		159,235	Vol. II			
	Subcontractor Productivity Savings Reward (w/ Option 3 Payments)		39,269	Vol. II			
9. PROVIDE NAME, ADDRESS, AND TELEPHONE NUMBER FOR THE FOLLOWING (If available)							
A. CONTRACT ADMINISTRATION OFFICE DCAS Resident Office Attn: Lloyd Billiter 6500 Tracor Lane Austin, Texas 78725		B. AUDIT OFFICE DCAA Regional Office J. R. Walters, Chief 6500 Tracor Lane Austin, Texas 78725					
10. WILL YOU REQUIRE THE USE OF ANY GOVERNMENT PROPERTY IN THE PERFORMANCE OF THIS WORK? (If "Yes," identify) ☐ YES ☒ NO		11A. DO YOU REQUIRE GOVERNMENT CONTRACT FINANCING TO PERFORM THIS PROPOSED CONTRACT? (If "Yes," complete Item 11B) ☐ YES ☒ NO		11B. TYPE OF FINANCING (If one) ☐ ADVANCE PAYMENTS ☐ PROGRESS PAYMENTS ☐ GUARANTEED LOANS			
12. HAVE YOU BEEN AWARDED ANY CONTRACTS OR SUBCONTRACTS FOR THE SAME OR SIMILAR ITEMS WITHIN THE PAST 3 YEARS? (If "Yes," identify item(s), customer(s) and contract number(s)) ☒ YES ☐ NO Block Fabrication Improvements Machine Shop Improvements		13. IS THIS PROPOSAL CONSISTENT WITH YOUR ESTABLISHED ESTIMATING AND ACCOUNTING PRACTICES AND PROCEDURES AND FAR PART 31 COST PRINCIPLES? (If "No," explain) ☒ YES ☐ NO					
14. COST ACCOUNTING STANDARDS BOARD (CASB) DATA (Public Law 91-379 as amended and FAR PART 30)							
A. WILL THIS CONTRACT ACTION BE SUBJECT TO CASB REGULATIONS? (If "No," explain in proposal) ☒ YES ☐ NO		B. HAVE YOU SUBMITTED A CASB DISCLOSURE STATEMENT (CASB DS-1 or 2)? (If "Yes," specify in proposal the office to which submitted and if determined to be adequate) ☒ YES ☐ NO See Block A					
C. HAVE YOU BEEN NOTIFIED THAT YOU ARE OR MAY BE IN NON-COMPLIANCE WITH YOUR DISCLOSURE STATEMENT OR COST ACCOUNTING STANDARDS? (If "Yes," explain in proposal) ☒ YES ☐ NO		D. IS ANY ASPECT OF THIS PROPOSAL INCONSISTENT WITH YOUR DISCLOSED PRACTICES OR APPLICABLE COST ACCOUNTING STANDARDS? (If "Yes," explain in proposal) ☐ YES ☒ NO					
This proposal is submitted in response to the RFP contract, modification, etc. in Item 1 and reflects our best estimates and/or actual costs as of this date							
15. NAME AND TITLE (Type) Ralph G. Leigh, Special Assistant to Division Vice President, Contracts		16. NAME OF FIRM Tracor Aerospace Austin, Inc.					
17. SIGNATURE 			18. DATE OF SUBMISSION 24 May 1985				

INDUSTRIAL MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL TMIRRS USING CMASST7)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

	1985	1986	1987	1988
INVESTMENTS				
BUDGETED & RECOVERED CAPITAL				
COST OF CAPITALIZED LABOR	\$ 25,370	\$ 0	\$ 0	\$ 0
COST OF CAPITALIZED EQUIPMENT	\$ 16,241	\$ 0	\$ 0	\$ 0
COST OF CAPITALIZED OTHER	\$ 3,123	\$ 0	\$ 0	\$ 0
WITH SALES TAX & MTL OVERHEAD				
TOTAL CAPITAL (AFTER % DOD BUSINESS)	\$ 38,220	\$ 0	\$ 0	\$ 0
BUDGETED & RECOVERED EXPENSED AFTER APPLYING PER CENT DOD BUSINESS				
TOTAL RECOVERED EXPENSED COST	\$ 1,584	\$ 0	\$ 0	\$ 0
UNRECOVERED EXPENSE				
TOTAL NON RECOVERED EXPENSED COST	\$ 14,246	\$ 0	\$ 0	\$ 0
TOTAL EXPENSED COST	\$ 15,830	\$ 0	\$ 0	\$ 0
TOTAL INVESTMENT	\$ 54,050	\$ 0	\$ 0	\$ 0
TOTAL SAVINGS	\$ 25,112	\$ 23,202	\$ 24,631	\$ 25,862
DOD SHARE	\$ 0	\$ 23,134	\$ 24,631	\$ 25,862
OPTION3 PAYMENTS	\$ 7,045	\$ 7,045	\$ 0	\$ 0
SUBCONT SHARE OF SAVINGS (WITH OPTION 3 PAYMENTS)	\$ 32,157	\$ 7,113	\$ 0	\$ 0
COM RECOVERY	\$ 44	\$ 1,842	\$ 1,371	\$ 686
SUBCONTRACTOR BEFORE TAX IRR	.00%	.00%	7.70%	14.12%

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INDUSTRIAL MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL THIRRS USING CHASSY7)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

	1989	1990	1991	TOTAL
INVESTMENTS				
BUDGETED & RECOVERED CAPITAL				
COST OF CAPITALIZED LABOR	\$ 0	\$ 0	\$ 0	\$ 25,370
COST OF CAPITALIZED EQUIPMENT	\$ 0	\$ 0	\$ 0	\$ 16,241
COST OF CAPITALIZED OTHER	\$ 0	\$ 0	\$ 0	\$ 3,123
WITH SALES TAX & MTL OVERHEAD				
TOTAL CAPITAL (AFTER & DOD BUSINESS)	\$ 0	\$ 0	\$ 0	\$ 38,220
BUDGETED & RECOVERED EXPENSED AFTER APPLYING PER CENT DOD BUSINESS				
TOTAL RECOVERED EXPENSED COST	\$ 0	\$ 0	\$ 0	\$ 1,584
UNRECOVERED EXPENSE				
TOTAL NON RECOVERED EXPENSED COST	\$ 0	\$ 0	\$ 0	\$ 14,246
TOTAL EXPENSED COST	\$ 0	\$ 0	\$ 0	\$ 15,830
TOTAL INVESTMENT	\$ 0	\$ 0	\$ 0	\$ 54,050
TOTAL SAVINGS				
DOD SHARE	\$ 27,156	\$ 28,513	\$ 29,939	\$ 184,415
OPTION3 PAYMENTS	\$ 27,156	\$ 28,513	\$ 29,939	\$ 159,235
SUBCONT SHARE OF SAVINGS	\$ 0	\$ 0	\$ 0	\$ 14,090
(WITH OPTION 3 PAYMENTS)	\$ 0	\$ 0	\$ 0	\$ 39,269
COM RECOVERY				
SUBCONTRACTOR BEFORE TAX IRR	\$ (31)	\$ (696)	\$ (1,395)	\$ 1,849
	\$ 17.97%	\$ 20.30%	\$ 21.70%	\$ 21.70%

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INDUSTRIAL TECHNOLOGY MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL THIRRS USING CHASSY7)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

	1985	1986	1987	1988
DOD SHARE TOTAL BUSINESS	80.00 %	80.00 %	80.00 %	80.00 %
DOD SHARE OF SAVINGS	100.00 %	100.00 %	100.00 %	100.00 %
INSTANT F16 (COST)	\$ 6,204	\$ 0	\$ 0	\$ 0
FOLLOWON F16 (COST)	\$ 0	\$ 5,982	\$ 6,570	\$ 6,899
INSTANT OTHER DOD (COST)	\$ 14,337	\$ 55	\$ 0	\$ 0
FOLLOWON OTHER DOD (COST)	\$ 0	\$ 12,921	\$ 13,710	\$ 14,395
INSTANT F16 (SELL)	\$ 7,585	\$ 0	\$ 0	\$ 0
FOLLOWON F16 (SELL)	\$ 0	\$ 7,321	\$ 7,980	\$ 8,379
INSTANT OTHER DOD (SELL)	\$ 17,527	\$ 68	\$ 0	\$ 0
FOLLOWON OTHER DOD (SELL)	\$ 0	\$ 15,813	\$ 16,651	\$ 17,484
RECOVERED INDIRECT	\$ 1,584	\$ 0	\$ 0	\$ 0
RECOVERED DEPR (CAS 409)	\$ 4,914	\$ 4,914	\$ 4,914	\$ 4,914
UNRECOVERED INDIRECT	\$ 14,246	\$ 0	\$ 0	\$ 0

INDUSTRIAL TECHNOLOGY MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL IMIRRS USING CHASSY7)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

	1989	1990	1991	TOTAL
DOD SHAPE TOTAL BUSINESS	80.00 %	80.00 %	80.00 %	
DOD SHARE OF SAVINGS	100.00 %	100.00 %	100.00 %	
INSTANT F16 (COST)	\$ 0	\$ 0	\$ 0	\$ 6,204
FOLLOWON F16 (COST)	\$ 7,243	\$ 7,606	\$ 7,986	\$ 42,286
INSTANT OTHER DOD (COST)	\$ 0	\$ 0	\$ 0	\$ 14,392
FOLLOWON OTHER DOD (COST)	\$ 15,115	\$ 15,871	\$ 16,664	\$ 88,675
INSTANT F16 (SELL)	\$ 0	\$ 0	\$ 0	\$ 7,585
FOLLOWON F16 (SELL)	\$ 8,798	\$ 9,238	\$ 9,699	\$ 51,414
INSTANT OTHER DOD (SELL)	\$ 0	\$ 0	\$ 0	\$ 17,595
FOLLOWON OTHER DOD (SELL)	\$ 18,358	\$ 19,276	\$ 20,240	\$ 107,821
RECOVERED INDIRECT	\$ 0	\$ 0	\$ 0	\$ 1,584
RECOVERED DEPR (CAS 409)	\$ 4,914	\$ 4,914	\$ 4,914	\$ 34,398
UNRECOVERED INDIRECT	\$ 0	\$ 0	\$ 0	\$ 14,246

ELEMENT IFASHJ.CHASSY7 05/23/85 13:10
 MICRO EPR CT6COUNTERMEASURES ASSEMBLY IMPROVEMENTS
 MICRO 6YEARS&1985,1986,1987,1988,1989,1990,1991,TOTAL
 MICRO 6COLUMNS&76
 MICRO 6COLUMNS-1666
 SALES TAX RATE = .05125
 COST OF CAPITALIZED LABOR = 25370,0
 COST OF CAPITALIZED EQUIPMENT = 16241,0
 COST OF CAPITALIZED OTHER = 3123,0
 NON RECOVERED CAPITALIZED COSTS = 0
 RECOVERED EXPENSED COSTS = 1980,0
 NONRECOVERED EXPENSED COSTS = 17807,0
 F SIX INSTANT DIRECT DOLLAR SAVINGS = 2066,0
 F SIX FOLLOW ON DIRECT DOLLAR SAVINGS = 0,2163,2388,PREVIOUS * 1.05 FOR 4,0
 OTHER DOD INSTANT DIRECT DOLLAR SAVINGS = 4774,20,0
 OTHER DOD FOLLOW ON DIRECT DOLLAR SAVINGS = 0,4672,4983,PREVIOUS * 1.05 FOR 4,0
 GOVT INSTANT DIRECT DOLLAR SAVINGS = 6840,20,0
 COMMERCIAL DIRECT DOLLAR SAVINGS = 2234,2438,2616,PREVIOUS * 1.05 FOR 4,0
 GOVT FOLLOW ON DIRECT DOLLAR SAVINGS = 0,6835,7371,PREVIOUS * 1.05 FOR 4,0
 DIRECT VARIABLE LABOR DOLLARS SAVED = 1
 DIRECT FIXED LABOR DOLLARS SAVED = 0
 AVERAGE DIRECT LABOR RATE = 1
 MFG RATE = 1.58,1.38
 ENG RATE = 0
 MH RATE = .12
 MFG COM RATE = .19577,.18162,.16015
 ENG COM RATE = 0
 MH COM RATE = 0
 GA RATE = .164,.162,.156
 GA COM RATE = .00851,.00952,.00734
 FEE RATE = .15
 EQUIPMENT LIFE = 5
 INSTANT DOD FACTOR = 0
 DOD FACTOR = 1
 COM FACTOR = .12125
 INCOME TAX RATE = .46
 ITC RATE = .1
 DISCOUNT RATE = .12
 PER CENT DOD BUSINESS = .8
 YEAR = 1985,PREVIOUS + 1
 EQUIP LIFE SL = 7
 MATERIAL COST SAVED = 0
 OPTIONS PAYMENTS = 7045,7045,0
 END OF DATAFILE

Tracor Aerospace

Tracor Inc
6500 Tracor Lane
Austin Texas 78721
Telephone 512 926 2800

January 10, 1986

RGL-86-01-10

General Dynamics
Fort Worth Division
P. O. Box 748
Fort Worth, Texas 76101

Attention: Harvey Patton, MZ #1400/Dept. 082
ITM Program Administrator

SUBJECT: Revision "C" Pages to Countermeasures Assembly
Improvements Project Proposal and Tracor's Responses
To Questions Raised During December 9-11, 1985
Fact Finding on Coordinate Measuring Machine
and Finishing Shop Project

Gentlemen:

Enclosed are our responses to the questions you raised during
Fact Finding. The responses have been segregated by major topic,
information provided during Fact Finding, responses provided
herein, and other data to follow.

Responses Concerning General Program

Provided during Fact Finding:

- o 4th. Quarter, 1985 Bid Package dated October 31, 1985.

Provided herein:

- GP-1 Amendment to 4th. Quarter Bid Package dated
December 17, 1985.

- GP-2 Procedure for going from Tracor model to Form 1411.

Data to follow:

- o Memorandum of Negotiations on 4th. Quarter Bid Package.

Volume I-Attachments A, G, and H.

Volume II-All Pages.

CAI-2 Summary of Reasons for Changes to Proposal.

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Responses concerning Coordinate Measuring Machine

Provided during Fact Finding:

- o Direct #'s sheet (prepared by Project Investigator) representing project savings.

Provided herein:

CMM-1 Cost sheet showing overall program investment.

Responses concerning Finishing Shop Proposal (Revision A)

Provided during Fact Finding:

- o Tracor IFPS IRR Model TMIRR5 Results Reports for datafiles FINSHPl1 and FINSHPl2, reports dated December 10, 1985.
- o GD DCF Model report using FINSHPl1 data of December 10.
- o November 1985 Act/Bud for Construction In Progress (CIP) 905 and 905-01.
- o Cost of Projects (COP) September 30 and November 30, 1985 for CIP 905.
- o Labor estimates dated October 22, and December 5, 1985 from Pat Casey.
- o Monthly labor run for CIP 905 dated November 23, 1985.
- o Tracor Manufacturing Control System (TMCS) printouts for equipment (supports p.109 data); also some invoices, PR's, and PO's.
- o OHYTDC dated September 30, 1985 and Overhead Charges Reports for 1984 to support p.110 data.
- o FIR 85-092 with allocation sheets.
- o Example of Production Work Order (PWO) for PN 134008-0001, Breech Plate. (4pp.)
- o MTS calculations ("before" and "after") for Chem-Film, Anodize, Passivation, and Painting. (28pp.)
- o MTS Standards for various work elements. (1p)

Provided herein:

- FS-1 Updated FIR 85-092 allocation schedule for Finishing Shop Project.
- FS-2 Updated OHYTDC (November 1985) to support Finishing Shop expensed charges.
- FS-3 Disposition of Equipment being replaced in Finishing Shop.
- FS-4 Paint consumption during 24 months period. (1p.) Back-up for p.98 of proposal.
- FS-5 Calculation of percent savings in the 12 main routing patterns (12pp.). Back-up for savings percentages on p.89 of proposal.
- FS-6 Copy of instructions used to enter proposed build quantities into computer. (2pp.) Referred to on p.95 of proposal.

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Page 3

- FS-7 Approximate annual chem-film production based on chem-film work in various routing patterns. (1p.) Referred to on p.16 of proposal.
- FS-8 Printout of savings per deliverable LRU. (229pp.)
- FS-9 Printout of man-hour savings, Finishing Shop, by customer category (F-16, USAF, DoD, Com'l), by year (1986-1993), including Instant and Follow-On.

Data to follow will be submitted under Revision "B" to the proposal:

- o Updates to I.R.R. model.

If you desire additional information, please let us know.

Sincerely,



Ralph G. Leigh
Manager, General Contracts
Administration

/bc

Tracor Aerospace
Aerospace Austin

Revision C

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

Phase III Proposal

Attachment A - Project Economic Summary

Implementation Date:		<u>Jan 86</u>
Man-Hour Savings	Instant F-16	<u>169.0</u>
	Future F-16	<u>1,006.6</u>
	Instant Other DoD	<u>1,946.9</u>
	Future Other DoD	<u>5,068.9</u>
	TOTAL	<u>8,191.4</u>
Labor and Material	Instant F-16	<u>\$ 5,337</u>
Savings (Loaded \$'s	Future F-16	<u>\$ 39,056</u>
thru fees)	Instant Other DoD	<u>\$ 55,843</u>
	Future Other DoD	<u>\$ 144,071</u>
	TOTAL	<u>\$ 244,307</u>
Internal Rate of Return		
(Before tax in 4th year)		<u>20.0%</u>
Subcontractors Capital Funds:		<u>\$ 27,181</u>
Subcontractors Related Funds:		<u>\$ 11,698</u>
DoD Funds:		<u>\$</u>

Tracor Aerospace
Aerospace Austin

Summary of Δ 's to CM Assy Proposal 905-1063B

- o Cablesan savings - Due to rate changes, implementation date, and Instant vs F-0 allocation.
- o Other savings - Due to rate changes, implementation date, Instant vs F-0 allocation, and changes in the F-16, other Govt, and Commercial Savings allocations.

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT ATTACHMENT G - MANUFACTURING SCHEDULES

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130326-0001	0	0	0	0	0	0	0	0	0	0	0	112	0	0	0
130334-0001	0	0	0	0	0	0	0	0	0	0	1	59	0	0	0
131433-0001	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
131437-0002	0	0	0	0	0	0	0	0	0	0	10	6	0	0	0
132276-0001	0	0	0	0	0	0	0	0	0	0	0	327	0	0	0
132278-0001	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
132279-0001	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0
132490-0001	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0
133490-0002	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0
133686-0001	0	0	0	0	0	0	0	0	0	0	14	164	0	0	0
133686-0002	0	0	0	0	0	0	0	0	0	0	14	4	0	0	0
133797-0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133798-0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133803-0001	0	124	195	37	0	0	0	23	44	0	0	152	0	0	0
133803-0002	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0
133823-0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133834-0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
133882-0001	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0
133882-0002	0	0	0	0	0	0	0	0	0	0	0	22	0	0	0
133936-0001	0	0	0	0	0	0	0	0	0	0	0	166	0	0	0
134001-0001	0	0	0	0	0	0	0	296	0	0	17	64	0	0	0
134001-0002	0	0	0	0	0	0	0	1262	1268	630	0	0	0	0	0
134004-0002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134010-0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134011-0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134016-0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
134025-0001	0	0	0	0	0	0	0	0	0	0	0	54	0	0	0
134025-0002	0	0	0	0	0	0	0	792	721	65	0	0	0	0	0
134036-0001	0	0	0	0	0	0	0	0	0	0	0	44	0	0	0
135602-0004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135602-0400	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135603-0200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135604-0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135604-0500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
135605-0001	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

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F16:851	F16:861	F16:871	F16:881	F16:891	F16:901	F16:911	F16:921	F16:931	F16:941	F16:951	F16:961	F16:971	F16:981	F16:991	F17:001	F17:011	F17:021	F17:031	F17:041	F17:051	F17:061	F17:071	F17:081	F17:091	F17:101	F17:111	F17:121	F17:131	F17:141	F17:151	F17:161	F17:171	F17:181	F17:191	F17:201	F17:211	F17:221	F17:231	F17:241	F17:251	F17:261	F17:271	F17:281	F17:291	F17:301	F17:311	F17:321	F17:331	F17:341	F17:351	F17:361	F17:371	F17:381	F17:391	F17:401	F17:411	F17:421	F17:431	F17:441	F17:451	F17:461	F17:471	F17:481	F17:491	F17:501	F17:511	F17:521	F17:531	F17:541	F17:551	F17:561	F17:571	F17:581	F17:591	F17:601	F17:611	F17:621	F17:631	F17:641	F17:651	F17:661	F17:671	F17:681	F17:691	F17:701	F17:711	F17:721	F17:731	F17:741	F17:751	F17:761	F17:771	F17:781	F17:791	F17:801	F17:811	F17:821	F17:831	F17:841	F17:851	F17:861	F17:871	F17:881	F17:891	F17:901	F17:911	F17:921	F17:931	F17:941	F17:951	F17:961	F17:971	F17:981	F17:991	F18:001	F18:011	F18:021	F18:031	F18:041	F18:051	F18:061	F18:071	F18:081	F18:091	F18:101	F18:111	F18:121	F18:131	F18:141	F18:151	F18:161	F18:171	F18:181	F18:191	F18:201	F18:211	F18:221	F18:231	F18:241	F18:251	F18:261	F18:271	F18:281	F18:291	F18:301	F18:311	F18:321	F18:331	F18:341	F18:351	F18:361	F18:371	F18:381	F18:391	F18:401	F18:411	F18:421	F18:431	F18:441	F18:451	F18:461	F18:471	F18:481	F18:491	F18:501	F18:511	F18:521	F18:531	F18:541	F18:551	F18:561	F18:571	F18:581	F18:591	F18:601	F18:611	F18:621	F18:631	F18:641	F18:651	F18:661	F18:671	F18:681	F18:691	F18:701	F18:711	F18:721	F18:731	F18:741	F18:751	F18:761	F18:771	F18:781	F18:791	F18:801	F18:811	F18:821	F18:831	F18:841	F18:851	F18:861	F18:871	F18:881	F18:891	F18:901	F18:911	F18:921	F18:931	F18:941	F18:951	F18:961	F18:971	F18:981	F18:991	F19:001	F19:011	F19:021	F19:031	F19:041	F19:051	F19:061	F19:071	F19:081	F19:091	F19:101	F19:111	F19:121	F19:131	F19:141	F19:151	F19:161	F19:171	F19:181	F19:191	F19:201	F19:211	F19:221	F19:231	F19:241	F19:251	F19:261	F19:271	F19:281	F19:291	F19:301	F19:311	F19:321	F19:331	F19:341	F19:351	F19:361	F19:371	F19:381	F19:391	F19:401	F19:411	F19:421	F19:431	F19:441	F19:451	F19:461	F19:471	F19:481	F19:491	F19:501	F19:511	F19:521	F19:531	F19:541	F19:551	F19:561	F19:571	F19:581	F19:591	F19:601	F19:611	F19:621	F19:631	F19:641	F19:651	F19:661	F19:671	F19:681	F19:691	F19:701	F19:711	F19:721	F19:731	F19:741	F19:751	F19:761	F19:771	F19:781	F19:791	F19:801	F19:811	F19:821	F19:831	F19:841	F19:851	F19:861	F19:871	F19:881	F19:891	F19:901	F19:911	F19:921	F19:931	F19:941	F19:951	F19:961	F19:971	F19:981	F19:991	F20:001	F20:011	F20:021	F20:031	F20:041	F20:051	F20:061	F20:071	F20:081	F20:091	F20:101	F20:111	F20:121	F20:131	F20:141	F20:151	F20:161	F20:171	F20:181	F20:191	F20:201	F20:211	F20:221	F20:231	F20:241	F20:251	F20:261	F20:271	F20:281	F20:291	F20:301	F20:311	F20:321	F20:331	F20:341	F20:351	F20:361	F20:371	F20:381	F20:391	F20:401	F20:411	F20:421	F20:431	F20:441	F20:451	F20:461	F20:471	F20:481	F20:491	F20:501	F20:511	F20:521	F20:531	F20:541	F20:551	F20:561	F20:571	F20:581	F20:591	F20:601	F20:611	F20:621	F20:631	F20:641	F20:651	F20:661	F20:671	F20:681	F20:691	F20:701	F20:711	F20:721	F20:731	F20:741	F20:751	F20:761	F20:771	F20:781	F20:791	F20:801	F20:811	F20:821	F20:831	F20:841	F20:851	F20:861	F20:871	F20:881	F20:891	F20:901	F20:911	F20:921	F20:931	F20:941	F20:951	F20:961	F20:971	F20:981	F20:991	F21:001	F21:011	F21:021	F21:031	F21:041	F21:051	F21:061	F21:071	F21:081	F21:091	F21:101	F21:111	F21:121	F21:131	F21:141	F21:151	F21:161	F21:171	F21:181	F21:191	F21:201	F21:211	F21:221	F21:231	F21:241	F21:251	F21:261	F21:271	F21:281	F21:291	F21:301	F21:311	F21:321	F21:331	F21:341	F21:351	F21:361	F21:371	F21:381	F21:391	F21:401	F21:411	F21:421	F21:431	F21:441	F21:451	F21:461	F21:471	F21:481	F21:491	F21:501	F21:511	F21:521	F21:531	F21:541	F21:551	F21:561	F21:571	F21:581	F21:591	F21:601	F21:611	F21:621	F21:631	F21:641	F21:651	F21:661	F21:671	F21:681	F21:691	F21:701	F21:711	F21:721	F21:731	F21:741	F21:751	F21:761	F21:771	F21:781	F21:791	F21:801	F21:811	F21:821	F21:831	F21:841	F21:851	F21:861	F21:871	F21:881	F21:891	F21:901	F21:911	F21:921	F21:931	F21:941	F21:951	F21:961	F21:971	F21:981	F21:991	F22:001	F22:011	F22:021	F22:031	F22:041	F22:051	F22:061	F22:071	F22:081	F22:091	F22:101	F22:111	F22:121	F22:131	F22:141	F22:151	F22:161	F22:171	F22:181	F22:191	F22:201	F22:211	F22:221	F22:231	F22:241	F22:251	F22:261	F22:271	F22:281	F22:291	F22:301	F22:311	F22:321	F22:331	F22:341	F22:351	F22:361	F22:371	F22:381	F22:391	F22:401	F22:411	F22:421	F22:431	F22:441	F22:451	F22:461	F22:471	F22:481	F22:491	F22:501	F22:511	F22:521	F22:531	F22:541	F22:551	F22:561	F22:571	F22:581	F22:591	F22:601	F22:611	F22:621	F22:631	F22:641	F22:651	F22:661	F22:671	F22:681	F22:691	F22:701	F22:711	F22:721	F22:731	F22:741	F22:751	F22:761	F22:771	F22:781	F22:791	F22:801	F22:811	F22:821	F22:831	F22:841	F22:851	F22:861	F22:871	F22:881	F22:891	F22:901	F22:911	F22:921	F22:931	F22:941	F22:951	F22:961	F22:971	F22:981	F22:991	F23:001	F23:011	F23:021	F23:031	F23:041	F23:051	F23:061	F23:071	F23:081	F23:091	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Revision C

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**COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT
ATTACHMENT G - MANUFACTURING SCHEDULES (CONT.)**

Revision C

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COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT
ATTACHMENT G - MANUFACTURING SCHEDULES (CONT.)

Revision C

[illegible]

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT
ATTACHMENT G - MANUFACTURING SCHEDULES (CONT.)

Revision C

[illegible]

ATTACHMENT G

COUNTERMEASURES ASSEMBLY ALLOCATION #'s OF BUILD SCHEDULE

	1985	1986	1987	1988	1989	1990
<u>Instant</u>						
F-16	30	227	1574	37		
	1%	1.5%	14%	.5%		
Other DoD	2284	10917	3179	2142	695	
	86%	69.5%	27%	25%	10%	
Commercial	348	3757	538			
	13%	24%	5%			
<u>Follow-On</u>						
F-16		223	1317	1317 ^①	1317 ^①	1317 ^①
		1.5%	11%	15%	19%	21%
Other DoD		360	3710	3710 ^①	3710 ^①	3710 ^①
		2%	32%	43.5%	52%	58%
Commercial		232	1332	1332 ^①	1332 ^①	1332 ^①
		1.5%	11%	16%	19%	21%

① Assumes on going level of effort

NOTES: o 1985 is 1/3 (7/85-12/85) of total '85 Build.

o Instant #'s from Pat Casey's 10/4/85 computer run and isolates LRU's for CM.

o Follow-On #'s from Mike Andrews' worksheets dated 9-26-85.

Tracor Aerospace
Aerospace Austin

Revision C

FLEX SCHEDULE
12-23-85

		1986	1987	1988-92	Test Time Per Part in Hours
<u>Quantities</u>					
141203-0001	Instant	653	128	0	.08
	F-0	190	894	1022	
141206-0001	Instant	653	128	0	.07
	F-0	190	894	1022	
141209-0001	Instant	653	128	0	.14
	F-0	190	894	1022	
141210-0001	Instant	653	128	0	.08
		190	894	1022	
<u>Test Time in</u>					
<u>Hours Per Year:</u>					
	Instant	241.6	47.4	0	
	F-0	70.3	330.8	378.1	

NOTE: All F-15, No foreign.

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT

ATTACHMENT B - SAVINGS CALCULATIONS^①

Revision C

INSTANT
SAVINGS

FOLLOW-ON
SAVINGS

	1985	1986	1987	1988	1989	1986	1987	1988	1989	1990	1991	1992
F-16												
Stockroom relocation	2.0 hrs	6.9 hrs	82.7 hrs	3.0 hrs		6.9 hrs	65.0 hrs	88.7 hrs	112.3 hrs	124.1 hrs	124.1 hrs	83.1 hrs
S7	x \$ 10.31	x \$ 10.77	x \$ 11.42	x \$ 12.10		x \$ 10.77	x \$ 11.42	x \$ 12.10	x \$ 12.83	x \$ 13.60	x \$ 14.41	x \$ 15.27
	\$ 21	\$ 96	\$ 944	\$ 36		\$ 96	\$ 742	\$ 1,073	\$ 1,440	\$ 1,688	\$ 1,789	\$ 1,289
Sort parts at workstation	1.4	46.3	59.2	2.1		46.3	46.5	63.5	180.4	88.8	88.8	59.5
M7	x \$ 6.13	x \$ 6.40	x \$ 6.79	x \$ 7.20		x \$ 6.40	x \$ 6.79	x \$ 7.20	x \$ 7.63	x \$ 8.08	x \$ 8.57	x \$ 9.08
	\$ 9	\$ 40	\$ 402	\$ 15		\$ 40	\$ 316	\$ 457	\$ 613	\$ 718	\$ 761	\$ 540
Staging method change	.1	.3	2.9	.1		.3	2.3	3.2	4.0	4.4	4.4	3.0
S7	x \$ 10.31	x \$ 10.77	x \$ 11.42	x \$ 12.10		x \$ 10.77	x \$ 11.42	x \$ 12.10	x \$ 12.83	x \$ 13.60	x \$ 14.41	x \$ 15.27
	\$ 1	\$ 3	\$ 33	\$ 1		\$ 3	\$ 26	\$ 39	\$ 51	\$ 60	\$ 63	\$ 46
TOTAL	\$ 31	\$ 139	\$ 1,379	\$ 52		\$ 139	\$ 1,084	\$ 1,569	\$ 2,104	\$ 2,466	\$ 2,613	\$ 1,855
Other DoD												
Stockroom relocation	163.4 hrs	410.7 hrs	159.6 hrs	147.8 hrs	59.1 hrs	11.8 hrs	189.1 hrs	257.1 hrs	307.3 hrs	342.8 hrs	342.8 hrs	229.7 hrs
S7	x \$ 10.31	x \$ 10.77	x \$ 11.42	x \$ 12.10	x \$ 12.83	x \$ 10.77	x \$ 11.42	x \$ 12.10	x \$ 12.83	x \$ 13.60	x \$ 14.41	x \$ 15.27
	\$ 1,747	\$ 4,423	\$ 1,823	\$ 1,788	\$ 758	\$ 127	\$ 2,160	\$ 3,110	\$ 3,943	\$ 4,662	\$ 4,942	\$ 3,508
Sort parts at workstation	121.3	294.0	114.2	105.8	42.3	8.5	135.4	184.0	220.0	245.3	245.3	164.4
M7	x \$ 6.13	x \$ 6.40	x \$ 6.79	x \$ 7.20	x \$ 7.63	x \$ 6.40	x \$ 6.79	x \$ 7.20	x \$ 7.63	x \$ 8.08	x \$ 8.57	x \$ 9.08
	\$ 744	\$ 1,882	\$ 775	\$ 762	\$ 323	\$ 54	\$ 919	\$ 1,325	\$ 1,679	\$ 1,982	\$ 2,101	\$ 1,493
Cablescon		241.6	47.4			70.3	330.8	378.1	378.1	378.1	378.1	378.1
H9-M7		x \$ 3.84	x \$ 4.08			x \$ 3.84	x \$ 4.08	x \$ 4.32	x \$ 4.58	x \$ 4.86	x \$ 5.15	x \$ 5.46
		\$ 928	\$ 193			\$ 270	\$ 1,350	\$ 1,633	\$ 1,732	\$ 1,838	\$ 1,947	\$ 2,064
Staging method change	6.0	14.6	5.7	5.3	2.1	.4	6.7	9.1	10.9	12.2	12.2	8.2
S7	x \$ 10.31	x \$ 10.77	x \$ 11.42	x \$ 12.10	x \$ 12.83	x \$ 10.77	x \$ 11.42	x \$ 12.10	x \$ 12.83	x \$ 13.60	x \$ 14.41	x \$ 15.27
	\$ 62	\$ 157	\$ 65	\$ 64	\$ 27	\$ 4	\$ 77	\$ 110	\$ 140	\$ 166	\$ 176	\$ 125
TOTAL	\$ 2,553	\$ 7,390	\$ 2,856	\$ 2,614	\$ 1,108	\$ 455	\$ 4,506	\$ 6,178	\$ 7,494	\$ 8,648	\$ 9,166	\$ 7,190
TOTAL CONT	\$ 2,584	\$ 7,529	\$ 4,235	\$ 2,666	\$ 1,108	\$ 594	\$ 5,590	\$ 7,747	\$ 9,598	\$ 11,114	\$ 11,779	\$ 9,045

COUNTERMEASURES ASSEMBLY IMPROVEMENTS PROJECT
ATTACHMENT H - SAVINGS CALCULATIONS^① (CONT.)

Revision C

	INSTANT SAVINGS					FOLLOW-ON SAVINGS				
	1985	1986	1987	1988	1989	1986	1987	1988	1989	1990
Commercial										
Stockroom relocation	25.6 hrs	141.8 hrs	29.6 hrs			8.9 hrs	65.0 hrs	94.6 hrs	112.3 hrs	124.1 hrs
S7	x \$ 10.31	x \$ 10.77	x \$ 11.42			x \$ 10.77	x \$ 11.42	x \$ 12.10	x \$ 12.83	x \$ 13.60
	\$ 264	\$ 1,527	\$ 338			\$ 96	\$ 742	\$ 1,145	\$ 1,441	\$ 1,688
Sort parts at workstation	18.3	101.5	21.2			6.3	46.5	67.7	80.4	88.8
M7	x \$ 6.13	x \$ 6.40	x \$ 6.79			x \$ 6.40	x \$ 6.79	x \$ 7.20	x \$ 7.63	x \$ 8.08
	\$ 112	\$ 650	\$ 144			\$ 40	\$ 316	\$ 487	\$ 613	\$ 718
Staging method change	.9	5.0	1.1			.3	2.3	3.4	4.0	4.4
S7	x \$ 10.31	x \$ 10.77	x \$ 11.42			x \$ 10.77	x \$ 11.42	x \$ 12.10	x \$ 12.83	x \$ 13.60
	\$ 9	\$ 54	\$ 13			\$ 3	\$ 26	\$ 41	\$ 51	\$ 60
TOTAL	\$ 385	\$ 2,231	\$ 495			\$ 139	\$ 1,084	\$ 1,673	\$ 2,105	\$ 2,466
										\$ 2,613
										\$ 1,855

① Allocations based on total Countermeasures Assembly LRU's in 1985 thru 1989. (see Attach. "G")
 U's used on all but Cablescan Savings.

NOTE: Hourly rates from 10/31/85 Bid Package, but P.S.I. is from 12/11/85 package submission to DCAS/DCA. Also, Overhead rates use latter submission.

Tracor Aerospace
Aerospace Austin

Procedure for Going From Tracor Model to
Form 1411 Column 8.D.

- o Find the "total" column in the Tracor Model (the 1st results report)
- o Find 4 variables:
 - ① Total Savings
 - ② DoD Share
 - ③ Option 3 payments
 - ④ Subcont Share of Savings
(with option 3 payments)
- o ① goes to 1st line of column 8.D.
- o ② goes to 2nd line of column 8.D.
- o ④ goes to 3rd line of column 8.D.
- o $(④ - ③) + ② = ①$

INDUSTRIAL MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL TMIRRS USING CMAS9)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

	1985	1986	1987	1988
	-----	-----	-----	-----
INVESTMENTS				
BUDGETED & RECOVERED CAPITAL				
COST OF CAPITALIZED LABOR	\$ 13,859	\$ 0	\$ 0	\$ 0
COST OF CAPITALIZED EQUIPMENT (NO TAX, OH)	\$ 14,826	\$ 0	\$ 0	\$ 0
COST OF CAPITALIZED OTHER (NO TAX)	\$ 2,605	\$ 0	\$ 0	\$ 0
TOTAL CAPITAL (AFTER & DOD BUSINESS AND WITH SALES TAX AND MTL OH)	\$ 27,181	\$ 0	\$ 0	\$ 0
BUDGETED & RECOVERED EXPENSED COSTS				
TOTAL RECOVERED EXPENSED COST (AFTER & DOD BUSINESS)	\$ 0	\$ 0	\$ 0	\$ 0
UNRECOVERED EXPENSE COSTS				
TOTAL NOV RECOVERED EXPENSED COST	\$ 11,698	\$ 0	\$ 0	\$ 0
TOTAL EXPENSED COST	\$ 11,698	\$ 0	\$ 0	\$ 0
TOTAL INVESTMENT	\$ 38,879	\$ 0	\$ 0	\$ 0
TOTAL SAVINGS (NO COMM'L)	\$ 8,868	\$ 27,827	\$ 32,650	\$ 34,338
DOD SHARE	\$ 0	\$ 2,035	\$ 18,577	\$ 25,546
OPTION3 PAYMENTS	\$ 0	\$ 0	\$ 0	\$ 0
SUBCONT SHARE OF SAVINGS (WITH OPTION 3 PAYMENTS)	\$ 8,868	\$ 25,792	\$ 14,074	\$ 8,791
DEPRECIATION (TAX)	\$ 3,873	\$ 5,681	\$ 5,423	\$ 5,423
COM RECOVERY	\$ 697	\$ 467	\$ 226	\$ (237)
SUB INCOME TAXES	\$ (12,763)	\$ 9,466	\$ 4,083	\$ 1,441
ITC	\$ 2,718	\$ 0	\$ 0	\$ 0
DEPRECIATION	\$ 3,405	\$ 3,495	\$ 3,495	\$ 3,495
SUBCONT NET CASH FLOW AFTER TAX	\$ 6,842	\$ 20,288	\$ 13,711	\$ 10,609
DISCOUNTED CASH FLOW AFTER TAX	\$ (121,071)	\$ (4,898)	\$ 4,861	\$ 11,603
SUBCONTRACTOR BEFORE TAX IRR	.0%	7.16%	29.09%	37.01%

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INDUSTRIAL MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL IMIRRS USING CHASSY9)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

	1989	1990	1991	1992
INVESTMENTS				
BUDGETED & RECOVERED CAPITAL				
COST OF CAPITALIZED LABOR	\$ 0	\$ 0	\$ 0	\$ 0
COST OF CAPITALIZED EQUIPMENT (NO TAX, OH)	\$ 0	\$ 0	\$ 0	\$ 0
COST OF CAPITALIZED OTHER (NO TAX)	\$ 0	\$ 0	\$ 0	\$ 0
TOTAL CAPITAL (AFTER & DOD BUSINESS AND WITH SALES TAX AND MTL OH)	\$ 0	\$ 0	\$ 0	\$ 0
BUDGETED & RECOVERED EXPENSED COSTS				
TOTAL RECOVERED EXPENSED COST (AFTER & DOD BUSINESS)	\$ 0	\$ 0	\$ 0	\$ 0
UNRECOVERED EXPENSE COSTS				
TOTAL NON RECOVERED EXPENSED COST	\$ 0	\$ 0	\$ 0	\$ 0
TOTAL EXPENSED COST				
TOTAL INVESTMENT	\$ 0	\$ 0	\$ 0	\$ 0
TOTAL SAVINGS (NO COMM'L)	\$ 35,374	\$ 36,649	\$ 38,842	\$ 29,827
DOD SHARE	\$ 31,650	\$ 36,649	\$ 38,842	\$ 29,827
OPTION 3 PAYMENTS	\$ 0	\$ 0	\$ 0	\$ 0
SUBCONTRACT SHARE OF SAVINGS	\$ 3,654	\$ 0	\$ 0	\$ 0
(WITH OPTION 3 PAYMENTS)				
DEPRECIATION (TAX)	\$ 5,423	\$ 0	\$ 0	\$ 0
COM RECOVERY	\$ (776)	\$ (1,183)	\$ (1,665)	\$ (1,330)
SUB INCOME TAXES	\$ (1,139)	\$ (544)	\$ (766)	\$ (612)
IIC	\$ 0	\$ 0	\$ 0	\$ 0
DEPRECIATION	\$ 3,495	\$ 3,495	\$ 3,495	\$ 0
SUBCONTRACT NET CASH FLOW AFTER TAX	\$ 7,591	\$ 2,856	\$ 2,595	\$ (718)
DISCOUNTED CASH FLOW AFTER TAX	\$ 15,905	\$ 17,352	\$ 18,526	\$ 18,235
SUBCONTRACTOR BEFORE TAX IRR	\$ 39.5%	\$ 40.1%	\$ 40.5%	\$ 40.3%

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INDUSTRIAL MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL TMIRRS USING CHASSY9)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

TOTAL

INVESTMENTS

BUDGETED & RECOVERED CAPITAL	
COST OF CAPITALIZED LABOR	\$ 13,859
COST OF CAPITALIZED EQUIPMENT (NO TAX, OH)	\$ 14,826
COST OF CAPITALIZED OTHER (NO TAX)	\$ 2,605
TOTAL CAPITAL (AFTER & DOD BUSINESS AND WITH SALES TAX AND MTL OH)	\$ 27,181
BUDGETED & RECOVERED EXPENSED COSTS	
TOTAL RECOVERED EXPENSED COST (AFTER & DOD BUSINESS)	\$ 0
UNRECOVERED EXPENSE COSTS	
TOTAL NON RECOVERED EXPENSED COST	\$ 11,698
TOTAL EXPENSED COST	\$ 11,698
TOTAL INVESTMENT	\$ 38,879
TOTAL SAVINGS (NO COMM'L)	\$ 244,306
DOD SHARE	\$ 183,127
OPTION3 PAYMENTS	\$ 0
SUBCONT SHARE OF SAVINGS (WITH OPTION 3 PAYMENTS)	\$ 61,179
DEPRECIATION (TAX)	\$ 25,822
COM RECOVERY	\$ (3,731)
SUB INCOME TAXES	\$ 9,167
ITC	\$ 2,718
DEPRECIATION	
SUBCONT NET CASH FLOW AFTER TAX	\$ 63,743
DISCOUNTED CASH FLOW AFTER TAX	\$ 18,235
SUBCONTRACTOR BEFORE TAX TRP	40.36%

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01/05/86

13:00

INDUSTRIAL TECHNOLOGY MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL TMR5 USING CMAS9)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

	1985	1986	1987	1988
DOD SHARE TOTAL BUSINESS	80.00 %	80.00 %	80.00 %	80.00 %
DOD SHARE OF SAVINGS	100.00 %	100.00 %	100.00 %	100.00 %
INSTANT F16 (COST)	\$ 88	\$ 393	\$ 3,807	\$ 142
FOLLOWON F16 (COST)	\$ 0	\$ 393	\$ 2,993	\$ 4,297
INSTANT OTHER DOD (COST)	\$ 7,221	\$ 20,906	\$ 7,886	\$ 7,159
FOLLOWON OTHER DOD (COST)	\$ 0	\$ 1,287	\$ 12,441	\$ 16,921
INSTANT F16 (SELL)	\$ 106	\$ 476	\$ 4,583	\$ 171
FOLLOWON F16 (SELL)	\$ 0	\$ 476	\$ 3,602	\$ 5,174
INSTANT OTHER DOD (SELL)	\$ 8,762	\$ 25,316	\$ 9,491	\$ 8,620
FOLLOWON OTHER DOD (SELL)	\$ 0	\$ 1,559	\$ 14,974	\$ 20,373
RECOVERED INDIRECT	\$ 0	\$ 0	\$ 0	\$ 0
RECOVERED DEPR (CAS 409)	\$ 3,495	\$ 3,495	\$ 3,495	\$ 3,495
UNRECOVERED INDIRECT	\$ 11,698	\$ 0	\$ 0	\$ 0
DEPRECIATION (TAX)	\$ 3,873	\$ 5,681	\$ 5,423	\$ 5,423

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INDUSTRIAL TECHNOLOGY MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL THIRRS USING CHASSY9)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

	1989	1990	1991	1992
DOD SHARE TOTAL BUSINESS	80.00 %	80.00 %	80.00 %	80.00 %
DOD SHARE OF SAVINGS	100.00 %	100.00 %	100.00 %	100.00 %
INSTANT F16 (COST)	\$ 0	\$ 0	\$ 0	\$ 0
FOLLOWON F16 (COST)	\$ 5,763	\$ 6,754	\$ 7,157	\$ 5,081
INSTANT OTHER DOD (COST)	\$ 3,035	\$ 0	\$ 0	\$ 0
FOLLOWON OTHER DOD (COST)	\$ 20,525	\$ 23,686	\$ 25,104	\$ 19,692
INSTANT F16 (SELL)	\$ 0	\$ 0	\$ 0	\$ 0
FOLLOWON F16 (SELL)	\$ 6,938	\$ 8,132	\$ 8,617	\$ 6,117
INSTANT OTHER DOD (SELL)	\$ 3,654	\$ 0	\$ 0	\$ 0
FOLLOWON OTHER DOD (SELL)	\$ 24,712	\$ 28,518	\$ 30,226	\$ 23,710
RECOVERED INDIRECT	\$ 0	\$ 0	\$ 0	\$ 0
RECOVERED DEPR (CAS 409)	\$ 3,495	\$ 3,495	\$ 3,495	\$ 0
UNRECOVERED INDIRECT	\$ 0	\$ 0	\$ 0	\$ 0
DEPRECIATION (TAX)	\$ 5,423	\$ 0	\$ 0	\$ 0

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INDUSTRIAL TECHNOLOGY MODERNIZATION PROGRAM
INTERNAL RATE OF RETURN MODEL RESULTS
(MODEL TMR5 USING CMAS9)

COUNTERMEASURES ASSEMBLY IMPROVEMENTS

TOTAL

DOO SHARE TOTAL BUSINESS	
DOD SHARE OF SAVINGS	
INSTANT F16 (COST)	\$ 4,431
FOLLOWON F16 (COST)	\$ 32,437
INSTANT OTHER DOD (COST)	\$ 46,207
FOLLOWON OTHER DOD (COST)	\$ 119,657
INSTANT F16 (SELL)	\$ 5,337
FOLLOWON F16 (SELL)	\$ 39,056
INSTANT OTHER DOD (SELL)	\$ 55,843
FOLLOWON OTHER DOD (SELL)	\$ 144,071
RECOVERED INDIRECT	\$ 0
RECOVERED DEPR (CAS 409)	\$ 24,463
UNRECOVERED INDIRECT	\$ 11,698
DEPRECIATION (TAX)	\$ 25,822

ELEMENT IFPSMJ.CHASSY9 01/06/86 12:58
 MICRO PROJECTCOUNTERMEASURES ASSEMBLY IMPROVEMENTSC
 MICRO 1YEARSC1985,1986,1987,1988,1989,1990,1991,1992,TOTAL
 MICRO 2COLUMNSC8C
 MICRO 2COLUMNS-167E
 SALES TAX RATE = .05125
 COST OF CAPITALIZED LABOR = 13859,0
 COST OF CAPITALIZED EQUIPMENT = 14826,0
 COST OF CAPITALIZED OTHER = 2605,0
 NON RECOVERED CAPITALIZED COSTS = 0
 RECOVERED EXPENSED COSTS = 0
 NONRECOVERED EXPENSED COSTS = 14623,0
 F SIX INSTANT DIRECT DOLLAR SAVINGS = 31,139,1379,52,0
 F SIX FOLLOW ON DIRECT DOLLAR SAVINGS = 0,139,1084,1569,2104,2466,2613,1855
 OTHER DOD INSTANT DIRECT DOLLAR SAVINGS = 2553,7390,2856,2614,1108,0
 OTHER DOD FOLLOW ON DIRECT DOLLAR SAVINGS = 0,455,4506,6178,7494,
 6648,9165,7190
 GOVT INSTANT DIRECT DOLLAR SAVINGS = 2584,7529,4235,2666,1108,0
 COMMERCIAL DIRECT DOLLAR SAVINGS = 385,2370,1579,1673,2105,2466,2613,1855
 GOVT FOLLOW ON DIRECT DOLLAR SAVINGS = 0,594,5590,7747,
 9598,11114,11779,9045
 DIRECT VARIABLE LABOR DOLLARS SAVED = 1
 DIRECT FIXED LABOR DOLLARS SAVED = 0
 AVERAGE DIRECT LABOR RATE = 1
 MFG RATE = 1.450,1.420,1.37,1.355
 ENG RATE = 0
 MH RATE = .105
 MFG COM RATE = .16178,.15182,.13292
 ENG COM RATE = 0
 MH COM RATE = 0
 GA RATE = .1545,.1690,.1650,.1630
 GA COM RATE = .00713,.00849,.00636
 FEE RATE = .15
 EQUIPMENT LIFE = 5
 INSTANT DOD FACTOR = 0
 DOD FACTOR = 1
 COM FACTOR = .10375
 INCOME TAX RATE = .46
 ITC RATE = .1
 DISCOUNT RATE = .12
 PER CENT DOD BUSINESS = .8
 YEAR = 1985,PREVIOUS + 1

EQUIP LIFE SL = 7
MATERIAL COST SAVED = 0
OPTION3 PAYMENTS = 0
MH = .115,0
END OF DATAFILE

THIS MODEL WAS CREATED TO ANALYZE CAPITAL INVESTMENTS REGARDING
THE INDUSTRIAL TECHNOLOGY MODERNIZATION PROGRAM (TECH MOD).

YEAR	1985	1986	1987	1988	1989	1990
DATA ELEMENTS SECTION						
SALES TAX RATE	.0513	.0513	.0513	.0513	.0513	.0513
COST OF CAPITALIZED LABO	13859	0	0	0	0	0
COST OF CAPITALIZED EQUI	14826	0	0	0	0	0
COST OF CAPITALIZED OTHE	2605	0	0	0	0	0
SALES TAX M	759.8	0	0	0	0	0
SALES TAX C	133.5	0	0	0	0	0
MATERIAL HANDLING C	1792	0	0	0	0	0
NON RECOVERED CAPITALIZE	0	0	0	0	0	0
RECOVERED EXPENSED COSTS	0	0	0	0	0	0
NONRECOVERED EXPENSED CO	14623	0	0	0	0	0
MATERIAL COST SAVED	0	0	0	0	0	0
F SIX INSTANT DIRECT DOL	31	139	1379	52	0	0
F SIX FOLLOW ON DIRECT D	0	139	1084	1569	2104	2466
OTHER DOD INSTANT DIRECT	2553	7390	2856	2614	1138	0
OTHER DOD FOLLOW ON DIRE	0	455	4576	6178	7494	8648
GOVT INSTANT DIRECT DOLL	2584	7529	4235	2666	1138	0
COMMERCIAL DIRECT DOLLAR	385	2370	1579	1673	2105	2466
GOVT FOLLOW ON DIRECT DO	0	594	5590	7747	9598	11114
DIRECT VARIABLE LABOR DO	1	1	1	1	1	1
DIRECT FIXED LABOR DOLLA	0	0	0	0	0	0
AVERAGE DIRECT LABOR RAT	1	1	1	1	1	1
WFG RATE	1.450	1.420	1.370	1.355	1.355	1.355
ENG RATE	0	0	0	0	0	0
WH RATE	.1050	.1050	.1050	.1050	.1050	.1050
WH	.1150	0	0	0	0	0

MH COM RATE	0	0	0	0	0	0	0	0	0
GA RATE	.1545	.1690	.1650	.1630	.1630	.1630	.1630	.1630	.1630
GA COM RATE	.0071	.0085	.0064	.0064	.0064	.0064	.0064	.0064	.0064
EQUIP LIFE SL	7	7	7	7	7	7	7	7	7
FEE RATE	.1500	.1500	.1500	.1500	.1500	.1500	.1500	.1500	.1500
EQUIPMENT LIFE	5	5	5	5	5	5	5	5	5
INSTANT DOD FACTOR	0	0	0	0	0	0	0	0	0
DOD FACTOR	1	1	1	1	1	1	1	1	1
OPTION3 PAYMENTS	0	0	0	0	0	0	0	0	0
COM FACTOR	.1038	.1038	.1038	.1038	.1038	.1038	.1038	.1038	.1038
INCOME TAX RATE	.4600	.4600	.4600	.4600	.4600	.4600	.4600	.4600	.4600
ITC RATE	.1000	.1000	.1000	.1000	.1000	.1000	.1000	.1000	.1000
DISCOUNT RATE	.1200	.1200	.1200	.1200	.1200	.1200	.1200	.1200	.1200
PER CENT DOD BUSINESS	.8000	.8000	.8000	.8000	.8000	.8000	.8000	.8000	.8000

*****INVESTMENT*****

TOTAL BUDGETED CAPITAL	27181	0	0	0	0	0	0	0	0
TOTAL NONRECOVERED CAPIT	0	0	0	0	0	0	0	0	0
TOTAL RECOVERED EXPENSED	0	0	0	0	0	0	0	0	0
TOTAL NON RECOVERED EXPE	11698	0	0	0	0	0	0	0	0
RECOVERED DEPRECIATION	3495	3495	3495	3495	3495	3495	3495	3495	3495
TOTAL RECOVERED INVESTME	3495	3495	3495	3495	3495	3495	3495	3495	3495
TOTAL NON RECOVERED INVE	35384	-3495	-3495	-3495	-3495	-3495	-3495	-3495	-3495
TOTAL CAPITAL	27181	0	0	0	0	0	0	0	0
TOTAL EXPENSED COST	11698	0	0	0	0	0	0	0	0
TOTAL INVESTMENT	38879	0	0	0	0	0	0	0	0

*****SAVINGS*****

RATIO CALCULATIONS

TOTAL VARIABLE LABOR DIR	2969	10493	11474	12086	12811	13580
COMMERCIAL RATIO	.1297	.2259	.1384	.1384	.1643	.1916
GOVT INSTANT RATIO	.8703	.7175	.3714	.2206	.0865	0
GOVT FOLLOW ON RATIO	0	.0566	.4972	.6410	.7492	.8184
F SIX INSTANT RATIO	.0120	.0185	.3256	.0195	0	0
F SIX FOLLOW ON RATIO	0	.2340	.1939	.2025	.2192	.2219
OTHER DOD INSTANT RATIO	.6880	.9815	.6744	.9805	1	0
OTHER DOD FOLLOW ON RATIO	0	.7660	.8061	.7975	.7808	.7781

LABOR COST SAVINGS

TOTAL DIRECT LABOR DOLLA	2969	10493	11474	12086	12811	13580
TOTAL DIRECT SAVED	2969	10493	11474	12086	12811	13580
LOADED AVERAGE DIRECT LA	2.829	2.829	2.761	2.739	2.739	2.739
LOADED DIRECT LABOR SAVE	8930	31493	33175	34889	36982	39202
COM ON MFG DIRECT LABOR	480.3	1593	1516	1606	1703	1805

CUMULATIVE DEPR
TOTAL SL DEPRECIATION
DEFERRED DEPRECIATION
CAPITAL COM BASE
NBV CAPITAL

3495 3495 3495 3495 3495
378.6 1928 1928 1928 1928
11843 2186 2186 2186 2186
0 21939 18444 14949 11455
0 0 0 0 0

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***** SCHEDULE 3

PROD SAVINGS REWARD

INSTANT F SIX 106.4 476.2 4593 171.5 0 0
FOLLOW ON F SIX 0 0 0 0 0 0
INSTANT OTHER DOD 8762 25316 9491 8620 3654 0
FOLLOW ON OTHER DOD 0 0 0 0 0 0
DOD TO SELL TOTAL 8968 25792 14074 8791 3654 0
DOD SHARE 0 0 0 0 0 0
DOD SHARE INSTANT F SIX 0 0 0 0 0 0
F SIX DOD SHARE 0 476.2 3672 5174 6938 8132
DOD SHARE INSTANT OTHER 0 0 0 0 0 0
OTHER DOD SHARE 0 1559 14974 20373 24712 28518
DOD TO SELL TOTAL 0 2035 13577 25546 31650 36649
TOTAL SAVINGS TO SELL 106.4 476.2 4593 171.5 0 0
INSTANT F 0 476.2 3672 5174 6938 8132
FOLLOW ON F 0 25316 9491 8620 3654 0
INSTANT OTHER 0 1559 14974 20373 24712 28518
OTHER FOLLOW ON 0 27827 32650 34338 35304 36649
TOTAL SAVINGS 8868 16793 10216 7114 4086 -638.6

DOD SHARE
SUBCONTRACTOR SHARE
-OST PROFIT ON SAVINGS
SUB SHARE

0 2035 18577 25546 31650 36649
8868 25792 14074 8791 3654 0
0 354.4 3142 4328 5363 6210
8868 25438 10931 4463 -1709 -6210

SUBC TOTAL SAVINGS
INCOME TAXES

10190 33911 19321 14308 10595 8132

ITC
SUB INCOME TAXES
-P VERSION TAXES
DEFERRED TAXES

2718 0 0 0 0 0
-2763 9466 4093 1441 -1139 -544.0
-2763 9303 2638 -550.2 -3605 -3400
174.1 1006 886.8 886.8 886.8 -1608

SUBCONTRACTOR INCOME AFT

3348 16793 10216 7114 4086 -638.6

SUBCONTRACTOR NET INCOME AFTER TAX

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
*****CASH FLOW*****										
CASH INFLOW PRE TAX	1361	29754	17794	12050	6442	2312				
CASH INFLOW AFTER TAX	6842	20288	13711	10609	7581	2856				
-P INFLOW AFTER TAX	19018	20635	12675	9395	6278	-922.1				
CUMULATIVE CASH INFLOW	1361	31115	48910	60959	67401	69713				
CUMULATIVE CASH INFLOW	6842	27130	40841	51450	59030	61886				
CUMULATIVE LP INFLOW AF	18018	38653	51328	60722	67000	66078				
DISCOUNTED CASH FLOW										
NPV PRE TAX	-25965	-2245	10420	18078	21733	22905				
NPV AFTER TAX	-21071	-4898	4861	11603	15905	17352				
-P NPV AFTER TAX	-11093	5357	14379	20349	23911	23444				
SUBCONTRACTOR BEFORE TAX	0	7.161	29.09	37.01	39.58	40.19				
SUBCONTRACTOR AFTER TAX	0	0	21.15	30.09	33.94	34.90				
-P AFTER TAX IRR	0	26.37	42.52	48.83	51.26	51.04				
YEAR	1985	1986	1987	1988	1989	1990				
*****TOTALING*****										

THIS MODEL WAS CREATED TO ANALYZE CAPITAL INVESTMENTS REGARDING
 THE INDUSTRIAL TECHNOLOGY MODERNIZATION PROGRAM (TECH MOD).

YFART

1991 1992

DATA ELEMENTS SECTION

SALES TAX RATE	.0513	.0513
COST OF CAPITALIZED LABO	0	0
COST OF CAPITALIZED EQUI	0	0
COST OF CAPITALIZED OTHE	0	0
SALES TAX M	0	0
SALES TAX C	0	0
MATERIAL HANDLING C	0	0
VON RECOVERED CAPITALIZE	0	0
RECOVERED EXPENSED COSTS	0	0
VONRECOVERED EXPENSED CO	0	0
MATERIAL COST SAVED	0	0
- SIX INSTANT DIRECT DOL	0	0
- SIX FOLLOW ON DIRECT D	0	0
OTHER DOD INSTANT DIRECT	2613	1855
	0	0
	13859	14826
	2605	759.8
	133.5	1792
	14623	1601
	11830	16521

GOVT INSTANT LABOR DOLL	U	18124
COMMERCIAL DIRECT DOLLAR	2613	1855
GOVT FOLLOW ON DIRECT DO	11779	9045
DIRECT VARIABLE LABOR DO	1	1
DIRECT FIXED LABOR DOLLA	0	0
AVERAGE DIRECT LABOR RAT	1	1
MFG RATE	1.355	1.355
ENG RATE	0	0
MH RATE	.1050	.1050
MH	0	0
MFG COM RATE	.1329	.1329
ENG COM RATE	0	0
MH COM RATE	0	0
SA RATE	.1630	.1630
SA COM RATE	.0064	.0064
EQUIP LIFE SL	7	7
SEE RATE	.1500	.1500
EQUIPMENT LIFE	5	5
INSTANT DOD FACTOR	0	0
DOD FACTOR	1	1
OPTIONS PAYMENTS	0	0
COM FACTOR	.1238	.1038
INCOME TAX RATE	.4600	.4600
ITC RATE	.1000	.1000
DISCOUNT RATE	.1200	.1200
PER CENT DOD BUSINESS	.8000	.8000

*****INVESTMENT*****

TOTAL BUDGETED CAPITAL	0	0	27181
TOTAL NONRECOVERED CAPIT	0	0	0
TOTAL RECOVERED EXPENSED	0	0	0
TOTAL NON RECOVERED EXPE	0	0	11690
RECOVERED DEPRECIATION	3495	0	24463
TOTAL RECOVERED INVESTME	3495	0	24463
TOTAL NON RECOVERED INVE	-3495	0	14416
TOTAL CAPITAL	0	0	27181
TOTAL EXPENSED COST	0	0	11698
TOTAL INVESTMENT	0	0	38879

*****SAVINGS*****

RATIO CALCULATIONS

TOTAL VARIABLE LABOR DIR	14392	10900
COMMERCIAL RATIO	.1816	.1702
GOVT INSTANT RATIO	0	0
GOVT FOLLOW ON RATIO	.8184	.8298
SIX INSTANT RATIO	0	0
SIX FOLLOW ON RATIO	.2219	.2051

LABOR COST SAVINGS

TOTAL DIRECT LABOR DOLLA	14392	10900	88635
TOTAL DIRECT SAVED	14392	10900	88635
LOADED AVERAGE DIRECT LA	2.739	2.739	
LOADED DIRECT LABOR SAVE	41546	31466	257684
COM ON MFG DIRECT LABOR	1913	1449	

MATERIAL COST SAVINGS

LOADED MATERIAL COST SAV	0	0	0
MAT SAVED	0	0	0
COM ON MATL COST SAVED	0	0	0

COST OF MONEY

SA COM FOR LABOR	215.6	163.3	1394
SA COM FOR MATERIAL	0	0	0
TOTAL COST OF MONEY SAVE	2129	1612	13460
COM ON CAPITAL	463.3	282.0	9729
COM RECOVERY	-1665	-1330	-3731

SAVINGS BY CUSTOMER

TOTAL DIRECT SAVINGS	14392	10900	88635
TOTAL COST SAVINGS	39418	29854	244224
TOTAL OVERHEAD SAVED	25026	18954	155589
TOTAL SAVINGS TO SELL	47459	35944	294318
TOTAL FEE	8041	6090	50093
COMMERCIAL LOADED SAVING	7157	5081	41492
COMMERCIAL SAVINGS TO SE	8617	6117	50011
COMMERCIAL GROSS FEE	1460	1036	8519
JOVT INSTANT LOADED SAVI	0	0	50638
JOVT INSTANT SAVINGS TO	0	0	61179
JOVT INSTANT GROSS FEE	0	0	10542
JOVT FOLLOW ON LOADED SA	32261	24773	152094
JOVT FOLLOW ON SAVINGS T	38842	29827	183127
JOVT FOLLOW ON GROSS FEE	6581	5054	31033
= SIX INSTANT LOADED SAV	0	0	4431
= SIX INSTANT SAVINGS TO	0	0	5337
= SIX INSTANT GROSS FEE	0	0	905.9
= SIX FOLLOW ON LOADED S	7157	5081	32437
= SIX FOLLOW ON SAVINGS	8617	6117	39056
= SIX FOLLOW ON GROSS FE	1460	1036	6619
OTHER DOD INSTANT LOADED	0	0	46207
OTHER DOD INSTANT SAVING	0	0	55843
OTHER DOD INSTANT GROSS	0	0	9636
OTHER DOD FOLLOW ON LOAD	25104	19692	119657

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DEPRECIATION

NET DEPRECIABLE COST	0	0	
ACC DEPRECIATION	0	0	
BOOK VALUE	0	0	
CUMULATIVE DEPRECIATION	25822	25822	25822
ACCEL DEPRECIATION	0	0	
DEPRECIATION	3495	0	
BOOK VAL	2718	2718	
CUM DEPRECIATION	24463	24463	
DEPR			
BOOK VALUE			
CUMULATIVE DEPR			
TOTAL SL DEPRECIATION	3495		24463
DEFERRED DEPRECIATION	-3495		1359
CAPITAL COM BASE	4465	2718	
BBV CAPITAL	0	0	

***** SCHEDULE B

PROD SAVINGS REWARD

INSTANT F SIX	0	0	5337
FOLLOW ON F SIX	0	0	0
INSTANT OTHER DOD	0	0	55843
FOLLOW ON OTHER DOD	0	0	0
PSR TO SELL TOTAL	0	0	61179
DOD SHARE			
DOD SHARE INSTANT F SIX	0	0	0
F SIX DOD SHARE	8617	6117	39056
DOD SHARE INSTANT OTHER	0	0	0
OTHER DOD SHARE	30226	23710	144071
DOD TO SELL TOTAL	38842	29827	183127
TOTAL SAVINGS TO SELL			
INSTANT F	0	0	5337
FOLLOW ON F	8617	6117	39056
INSTANT OTHER	0	0	55843
OTHER FOLLOW ON	30226	23710	144071
TOTAL SAVINGS	38842	29827	244306

DOD SHARE	38842	29827	183127
SUBCONTRACTOR SHARE	0	0	61179
-OST PROFIT ON SAVINGS	6581	5054	31033
SUB SHARE	-6581	-5054	30147

ITC 0 2718
 SUB INCOME TAXES -766.0 -611.8 9167
 LP VERSION TAXES -3793 -2937 -5178
 DEFERRED TAXES -1608 0 625.2
 SUBCONTRACTOR INCOME AFT -899.2 -718.2 39301

SUBCONTRACTOR NET INCOME AFTER TAX
 SUBC NET INCOME AFTER TA -899.2 -718.2 13479
 LP A T SAVINGS -2788 -2117 37973

*****CASH FLOW*****

CASH INFLOW PRE TAX 1829 -1330 70213
 CASH INFLOW AFTER TAX 2595 -718.2 63763
 LP INFLOW AFTER TAX -900.7 -2117 63060
 CUMULATIVE CASH INFLOW 71543 70213
 CUMULATIVE CASH INFLOW 64482 63763
 CUMULATIVE LP INFLOW AF 65177 63060

DISCOUNTED CASH FLOW

NPV PRE TAX 23732 23195 23195
 NPV AFTER TAX 18526 18235 18235
 LP NPV AFTER TAX 23037 22182 22182
 SUBCONTRACTOR BEFORE TAX 40.53 40.36 40.36
 SUBCONTRACTOR AFTER TAX 35.52 35.39 35.39
 LP AFTER TAX IRR 50.89 50.66 50.66
 YEAR 1991 1992

*****TOTALING*****

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THE FIRST YEAR IN WHICH INPUTS WILL BE MADE IS***	1985 ***
CAPITAL EQUIPMENT COSTS?-->	27181 <---
DOD SHARE TOTAL BUSINESS?-->	1.00 <---
DOD SHARE OF SAVINGS ***	1.00 ***
MANUFACTURING HOURLY RATE	ENGINEERING HOURLY RATE
1985 0.00 <---	1985 0.00 <---
1986 0.00 <---	1986 0.00 <---
1987 0.00 <---	1987 0.00 <---
1988 0.00 <---	1988 0.00 <---
1989 0.00 <---	1989 0.00 <---
1990 0.00 <---	1990 0.00 <---
1991 0.00 <---	1991 0.00 <---
1992 0.00 <---	1992 0.00 <---
1993 0.00 <---	1993 0.00 <---
1994 0.00 <---	1994 0.00 <---
LATEST RATES	
MIL-->	0.000
MFG-->	0.000
ENG-->	0.000
C&A-->	0.000
OTH-->	0.000
PROFIT-->	0.000
COM-->	0.000

ENTER DOD SHARE-->> 1.00 <<-- 81274
 DOD DISCOUNT FACTOR> 0.12 <<-- 0.498
 VENDOR DISC FACTOR>> 0.35 <<-- 3108

VENDOR		DOD	
YEAR	CAPITAL	YEAR	SAVINGS
1985	-21946	1985	-3495
1986	18680	1986	-1460
1987	12104	1987	15081
1988	9001	1988	22052
1989	5974	1989	28155
1990	1248	1990	33155
1991	988	1991	35348
1992	-718	1992	29827
1993	0	1993	0
1994	0	1994	0
TOTAL	25332	TOTAL	158663

 SCHEDULE A1 FORECASTED INSTANT F-16 SAVINGS
 -ALT W-

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
1. MATERIALS	0	0	0	0	0	0	0	0	0	0	0
2. MANUFACTURING HOURS											
3. *HOURLY RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4. SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0
5. ENGINEERING HOURS											
6. *HOURLY RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
7. SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0
8. OTHER (SPECIFY)											
9. TOTAL DIRECT	0	0	0	0	0	0	0	0	0	0	0
10. MATERIALS	0	0	0	0	0	0	0	0	0	0	0
11. MANUFACTURING	0	0	0	0	0	0	0	0	0	0	0
12. ENGINEERING	0	0	0	0	0	0	0	0	0	0	0
13. OTHER (SPECIFY)	0	0	0	0	0	0	0	0	0	0	0
14. GEN & ADMN	0	0	0	0	0	0	0	0	0	0	0
15. TOTAL INDIRECT	0	0	0	0	0	0	0	0	0	0	0
16. SAVINGS THRU G&A	88	393	3807	142	0	0	0	0	0	0	4430

SCHEME A2
-ALT X-

FORECASTED F/O F-16 SAVINGS

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
1. MATERIALS	0										0
2. MANUFACTURING HOURS											
3. *HOURLY RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4. SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0
5. ENGINEERING HOURS											
6. *HOURLY RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
7. SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0
8. OTHER (SPECIFY)											
9. TOTAL DIRECT	0	0	0	0	0	0	0	0	0	0	0
10. MATERIALS											
11. MANUFACTURING	0	0	0	0	0	0	0	0	0	0	0
12. ENGINEERING	0	0	0	0	0	0	0	0	0	0	0
13. OTHER (SPECIFY)	0	0	0	0	0	0	0	0	0	0	0
14. GEN & ADMN	0	0	0	0	0	0	0	0	0	0	0
15. TOTAL INDIRECT	0	0	0	0	0	0	0	0	0	0	0
16. SAVINGS THRU G&A	0	393	2993	4297	5763	6754	7157	5081	0	0	32438

CHEDULE A3 FORECASTED INSTANT OTHER DOD SAVINGS

-ALT Y-

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
1. MATERIALS	0										0
2. MANUFACTURING HOURS											
3. *HOURLY RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
4. SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0
5. ENGINEERING HOURS											
6. *HOURLY RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
7. SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0
8. OTHER (SPECIFY)											
9. TOTAL DIRECT	0	0	0	0	0	0	0	0	0	0	0
10. MATERIALS	0	0	0	0	0	0	0	0	0	0	0
11. MANUFACTURING	0	0	0	0	0	0	0	0	0	0	0
12. ENGINEERING	0	0	0	0	0	0	0	0	0	0	0
13. OTHER (SPECIFY)	0	0	0	0	0	0	0	0	0	0	0
14. GEN & ADMN	0	0	0	0	0	0	0	0	0	0	0
15. TOTAL INDIRECT	0	0	0	0	0	0	0	0	0	0	0
16. SAVINGS THRU G&A	7221	20906	7886	7159	3035	0	0	0	0	0	46207

SOME AW

CONCLUSIONS

SCHEDULE A
-ALT A-

BY ELEMENT SAVINGS SUMMARY TO COST

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
1. MATERIALS	0	0	0	0	0	0	0	0	0	0	0
2. MANUFACTURING HOURS											
3. *HOURLY RATE	0	0	0	0	0	0	0	0	0	0	0
4. TOTAL MFG LABOR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
5. ENGINEERING HOURS											
6. *HOURLY RATE	0	0	0	0	0	0	0	0	0	0	0
7. TOTAL ENG LABOR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
8. OTHER (SPECIFY)											
9. TOTAL DIRECT	0	0	0	0	0	0	0	0	0	0	0
10. MATERIALS	0	0	0	0	0	0	0	0	0	0	0
11. MANUFACTURING	0	0	0	0	0	0	0	0	0	0	0
12. ENGINEERING	0	0	0	0	0	0	0	0	0	0	0
13. OTHER (SPECIFY)	0	0	0	0	0	0	0	0	0	0	0
14. GEN & ADMN	0	0	0	0	0	0	0	0	0	0	0
15. TOTAL INDIRECT	0	0	0	0	0	0	0	0	0	0	0
16. SAVINGS THRU C&A	0	0	0	0	0	0	0	0	0	0	0

**ALT B-
SCIENCE**

**ALTB-
SOCIETY**

PROD SAVINGS REMARK		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
1.	INSTANT F-16	106	476	4583	171	0	0	0	0	0	0	5336
2.	F/O F-16	0	476	3602	5174	6938	8132	8617	6117	0	0	39056
3.	INSTANT OTHER DOD	8762	25316	9491	8620	3654	0	0	0	0	0	55843
4.	F/O OTHER DOD	0	1559	14974	20373	24712	28518	30226	23710	0	0	144072
5.	SUBTOTAL	8868	27827	32650	34338	35304	36650	38843	29827	0	0	244307
DOD SHARE												
6.	INSTANT F-16	106	476	4583	171	0	0	0	0	0	0	5336
7.	F/O F-16	0	476	3602	5174	6938	8132	8617	6117	0	0	39056
8.	INSTANT OTHER DOD	8762	25316	9491	8620	3654	0	0	0	0	0	55843
9.	F/O OTHER DOD	0	1559	14974	20373	24712	28518	30226	23710	0	0	144072
10.	SUBTOTAL	8868	27827	32650	34338	35304	36650	38843	29827	0	0	244307
TOTAL SAVINGS												
11.	INSTANT F-16	106	476	4583	171	0	0	0	0	0	0	5336
12.	F/O F-16	0	476	3602	5174	6938	8132	8617	6117	0	0	39056
13.	INSTANT OTHER DOD	8762	25316	9491	8620	3654	0	0	0	0	0	55843
14.	F/O OTHER DOD	0	1559	14974	20373	24712	28518	30226	23710	0	0	144072
15.	TOTAL	8868	27827	32650	34338	35304	36650	38843	29827	0	0	244307

RECOVERED FORECASTED EXPENSES/INVESTMENT

UNIT 1

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
1. MATERIALS											0
2. MANUFACTURING HOURS											0
3. *HOURLY RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
4. SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0
5. ENGINEERING HOURS											0
6. *HOURLY RATE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
7. SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0
8. OTHER (SPECIFY)											0
9. TOTAL DIRECT	0	0	0	0	0	0	0	0	0	0	0
10. MATERIALS	0	0	0	0	0	0	0	0	0	0	0
11. MANUFACTURING	0	0	0	0	0	0	0	0	0	0	0
12. ENGINEERING	0	0	0	0	0	0	0	0	0	0	0
13. OTHER (SPECIFY)	0	0	0	0	0	0	0	0	0	0	0
14. GEN & ADMN	0	0	0	0	0	0	0	0	0	0	0
15. TOTAL INDIRECT	0	0	0	0	0	0	0	0	0	0	0
16. DEPRECIATION (CAS409)	3495	3495	3495	3495	3495	3495	3495				24465
17. TOTAL RECOVERED	3495	3495	3495	3495	3495	3495	3495	0	0	0	24465

SCHEME D
-ALT D-

SCHEDULE E
 -ALT E-
 FORECASTED SUBCONTRACTOR NET INCOME

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
1. GROSS SAVINGS	8868	27827	32650	34338	35304	36650	38843	29827	0	0	244307
2. LESS EXPENSES AT SELL	3495	3495	3495	3495	3495	3495	3495	0	0	0	24465
3. SAVINGS AVAILABLE	5373	24332	29155	30843	31809	33155	35348	29827	0	0	219842
4. LESS: DOD SHARE	-3495	-1460	15081	22052	28155	33155	35348	29827	0	0	158663
5. PROD SAVINGS RMD	8868	25792	14074	8791	3654	0	0	0	0	0	61179
6. LESS: EXPENSES	11698	0	0	0	0	0	0	0	0	0	11698
7. ADD: PROF/COM ON SCH C	0	0	0	0	0	0	0	0	0	0	0
8. OTHER (SPECIFY +/-)	697	467	226	-237	-706	-1183	-1665	-1330	0	0	-3731
9. CONTRACTOR TAXABLE INCOME	-2133	26259	14300	8554	2948	-1183	-1665	-1330	0	0	45750
10. LESS: CORP TAX?	-981	12079	6578	3935	1356	-544	-766	-612	0	0	21045
11. ADD: INVEST TAX CREDIT	2718										2718
CAPITAL COSTS?											
DOD BUSINESS?											
12. SUBCONTRACTOR NET INCOME	1566	14180	7722	4619	1592	-639	-899	-718	0	0	27423
13. DEPRECIATION (TAX)	3873	5681	5423	5423	5423	0					25823
14. DEFERRED TAXES	174	1006	887	887	887	-1608	-1608	0	0	0	625
*****											*****

L
 0
 0

SCHEDULE F SCHEDULE OF FORECASTED AFTER TAX CASH FLOW

-ALT F-

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	TOTAL
1. ADD: NET INCOME	1566	14180	7722	4619	1592	-639	-899	-718	0	0	27423
2. DEPRECIATION (CAS 409)	3495	3495	3495	3495	3495	3495	3495	0	0	0	24465
3. DEFERRED TAXES	174	1006	887	887	887	-1608	-1608	0	0	0	625
4. NEW OF DISPOSABLE F/A											0
5. OTHER (SPECIFY)											0
6. LESS: CAPITAL INVESTMENT	27181										27181
7. OTHER (SPECIFY)											0
8. AFTER TAX CASH FLOW	-21946	18680	12104	9001	5974	1248	988	-718	0	0	25332
9. CUMULATIVE ATC FLOW	-21946	-3265	8838	17840	23813	25062	26050	25332	25332	25332	25332

10. WITH A DISCOUNT FACTOR ==> 0.1200 <=NPV IS** 13812 **

11. SUBCONTRACTOR IRR 0.4977

GUESS? 0.50
