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McDonnell Douglas Missile Systems Company

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McDonnell Douglas Missile Systems Company
St. Louis, Missouri 63166

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13. ABSTRACT (Maximum 200 words)

Technology Insertion (TI)/Industrial Process Improvement (IPI) Data Base Documentation Book Volume, for WR-ALC/MANPGC (Directional Gyroscopic Repair) This document contains detailed information about layouts equipment and processes for this RCC.

14. SUBJECT TERMS MAINTENANCE, DATA BASE, TECHNOLOGY INSERTION, PROCESS IMPROVEMENT, AIRCRAFT, MANPPG, GYROSCOPES, EQUIPMENT, AFLC, AF

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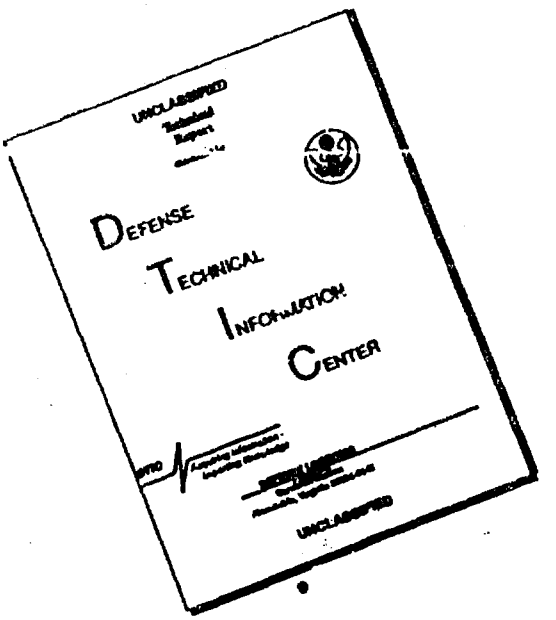

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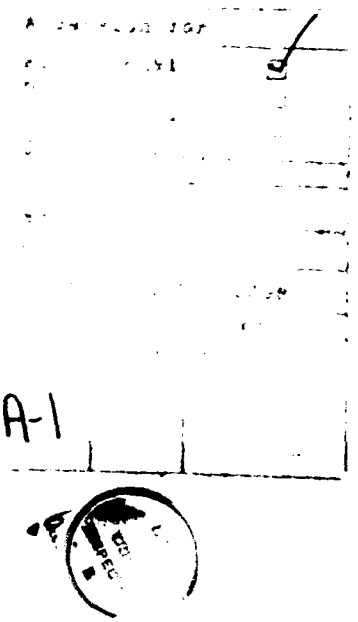
TECHNOLOGY INSERTION-ENGINEERING SERVICES
PROCESS CHARACTERIZATION
TASK ORDER NO. 1
(BLOCK 1)

DATABASE DOCUMENTATION BOOK

WR-ALC

MANPGC



CONTRACT SUMMARY REPORT
14 AUGUST 1989

CONTRACT NO. F33600-88-D-0567
CDRL SEQUENCE NO. B008

MCDONNELL DOUGLAS
McDonnell Douglas Missile Systems Company
St. Louis, Missouri 63166-0516 (314) 232-0232

WR-ALC (MANPGC)

1.0 Identification of RCC

RCC MANPGC has been identified by the statement of work of the contract F33600-88-D-0567 for process characterization.

2.0 General Information

MANPGC is a Resource Control Center under the MANPG section of the Industrial Products Division (MAN) at WR-ALC. MANPGC is located in Building 158. The area is maintained as a 300,000 class clean room though clean room garb is not required. The primary workload is MISTR work. It consists of a variety of directional gyroscope systems and a number of fluid damped rate variety of directional gyroscope systems and a number of fluid damped rate and rate switching gyros. Most product in the area is a 1955 to 1965 design. The workload has been decreasing for some time due primarily to product age.

MANPGC will be discussed in more detail in the following Section 2.1 through 2.8.

2.1 Facility Layout Drawing

The accompanying facility drawing represents MANPGC's portion of Building 158. The RCC is spread into two locations in Building 158 and shares part of its prime area with MANPPC which has moved into the area in the last year. It is not maintained consistent with clean room practices.

2.2 Equipment

MANPGC equipment is mainly individual workbench stations, vacuum and circulating ovens, leak detecting stations, and many manual and semi-programmable test stands. Most of the tooling is standard precision hand tools furnished to the technical operators in complete kit sets. Each separate PCN model does require some special tooling but little is complex enough to require much concern in this study. The circulating and vacuum ovens are minor adaptions of standard units. The leak detection equipment are standard catalog items such as Veeco or Varian, then adapted to specific model gyros or families of gyros. The test sets and stands, except for the contraves rate test stations, are of an age consistent with the product design age. It is doubtful that it can be properly supported much longer.

2.3 Workforce

MANPGC has a stable workforce with little variance. The workforce is comprised of instrument mechanics, three supervisors, a clerk, and a senior supervisor. The following is a breakdown of the mechanics within MANPGC.

Skill Code	Skill Level	Quantity	Experience
WG 3359	G-10	1	25.0 yrs.
WG 3359	G-09	55	20.7 yrs.
WG 3359	G-07	10	7.6 yrs.
WG 7009	G-04	1	12.0 yrs.

It is to be noted that the workforce is shared between the gyro RCCs as workloads vary. A major concern is availability of trained instrument mechanics if increased workload was demanded. The age of the workforce should also be of a concern. Experience is very high but natural attrition is reducing the numbers faster than training is furnishing younger mechanics. Surge conditions would be gated by this constraint.

2.4 Repair Process Technologies

The repair process technologies within MANPGC consist of defining the malfunction causes of gyroscopes, repairing as required, and retesting to verify the completeness of the repair. The gyros are pretested to identify malfunctions, torn down and repaired as required to technical overhaul manuals. Repair is generally accomplished through replacement of worn and/or defective piece parts. The rebuild and acceptance testing is also directed by Technical Orders and test specifications. Some mandatory replacement of high failure items are directed by Technical Orders to extend MTBF. Precision bearing and miniature slip rings/brushes are examples of some 100% replacement parts.

2.5 Workload Volume and Mix

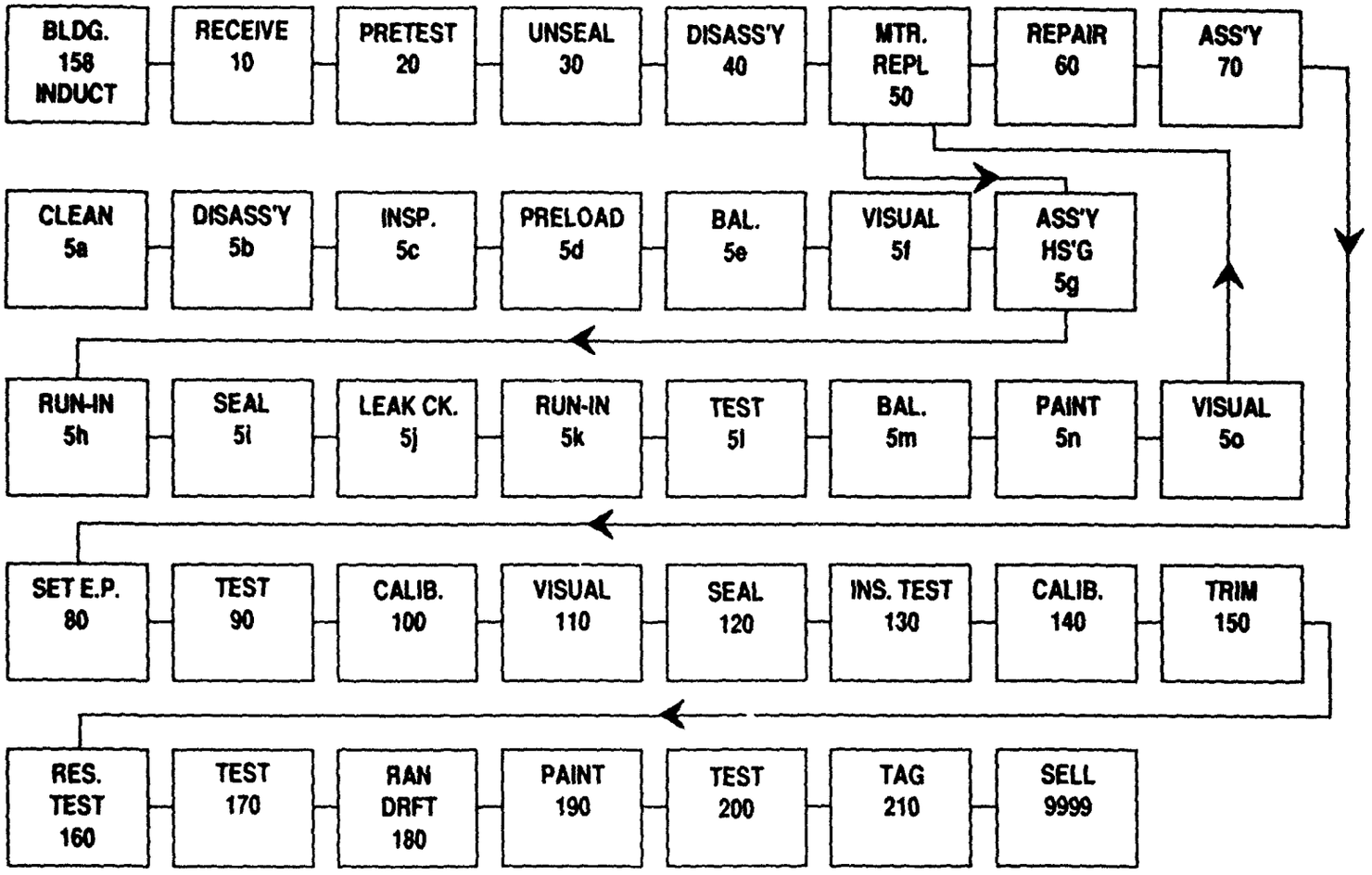
The workload within MANPGC consists of Management of Item Subject To Repair (MISTR) and exchangeables. MISTR represents greater than 98% of the workload. The RCC repairs and tests in excess of 6000 units annually.

2.6 Material Handling

Material handling in MANPGC is mostly accomplished by the repair operator hand carrying the items between stations. The gyroscopes are small, weighing from ounces to a few pounds. Units are repaired by a single mechanic rather than by line flow process. The one exception of this method is rotor repair, which are repaired in groups rather than one at a time. The repair is still accomplished by a mechanic, not a line, but an operation is completed on multi assemblies before moving to the next operation.

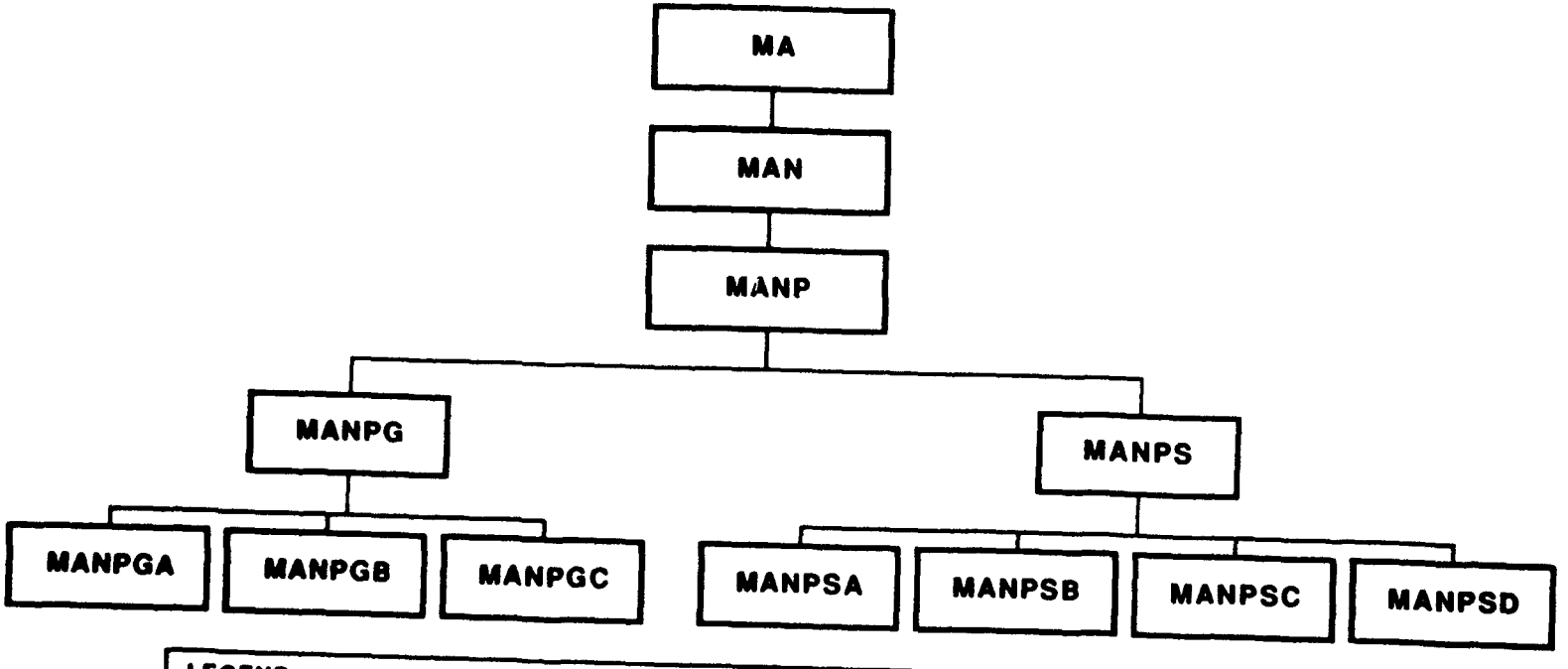
2.7 Storage

Storage is on line in MANPGC. It is accomplished on shelved hand trucks between aisles on the repair floor. The items for repair are received, logged in, and placed on the storage trucks for pretest. After pretest, the items are returned to the truck to wait the availability of a mechanic. The item is repaired and calibrated then returned to the truck or another truck for test and ship.



WR-ALC MANPGC PROCESS FLOW CHART
FIGURE

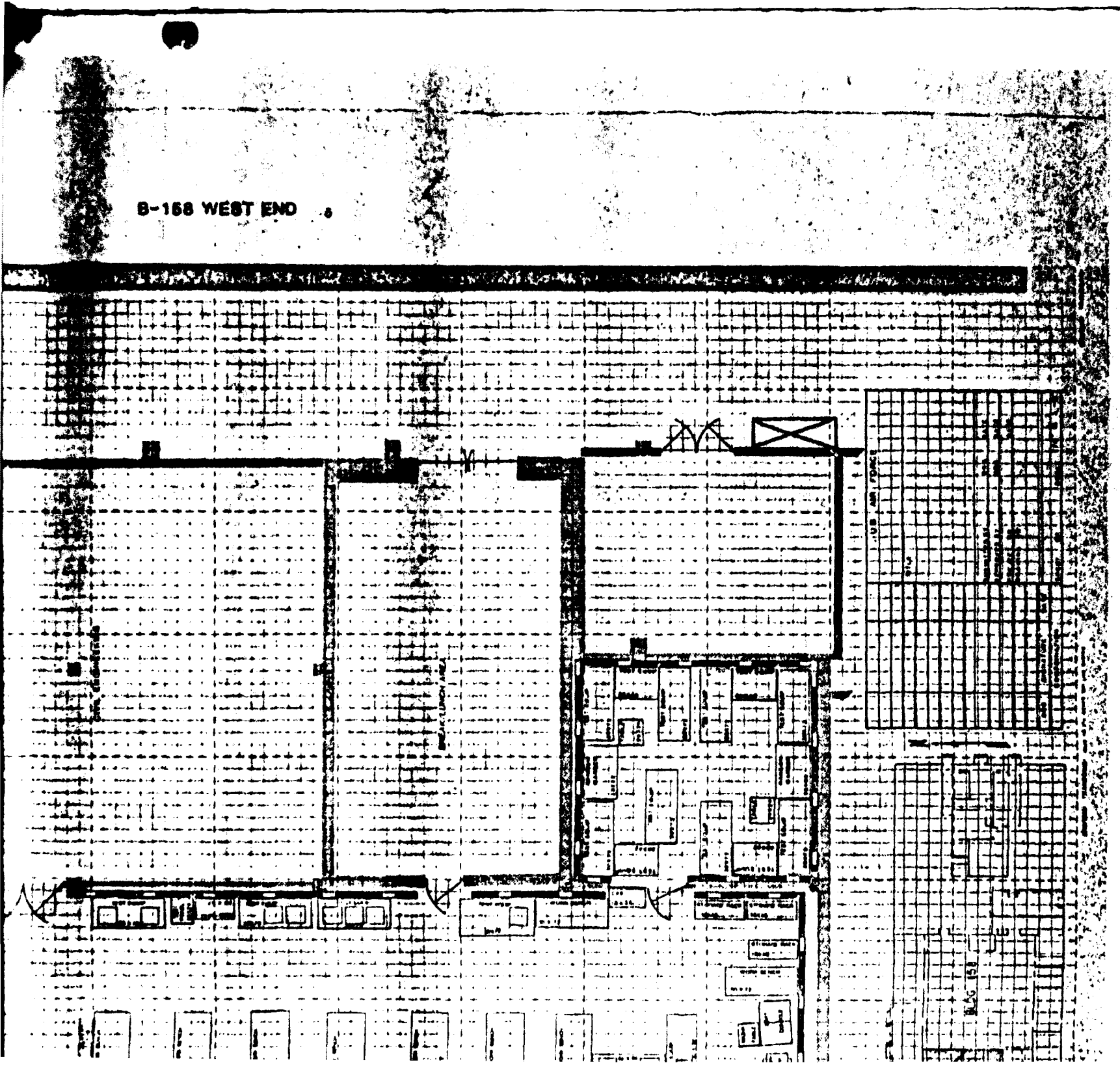
LSC-20236



LSC-20282

WR-ALC RCC PROCESS CHARACTERIZATION COVERAGE

FIGURE 9.0-1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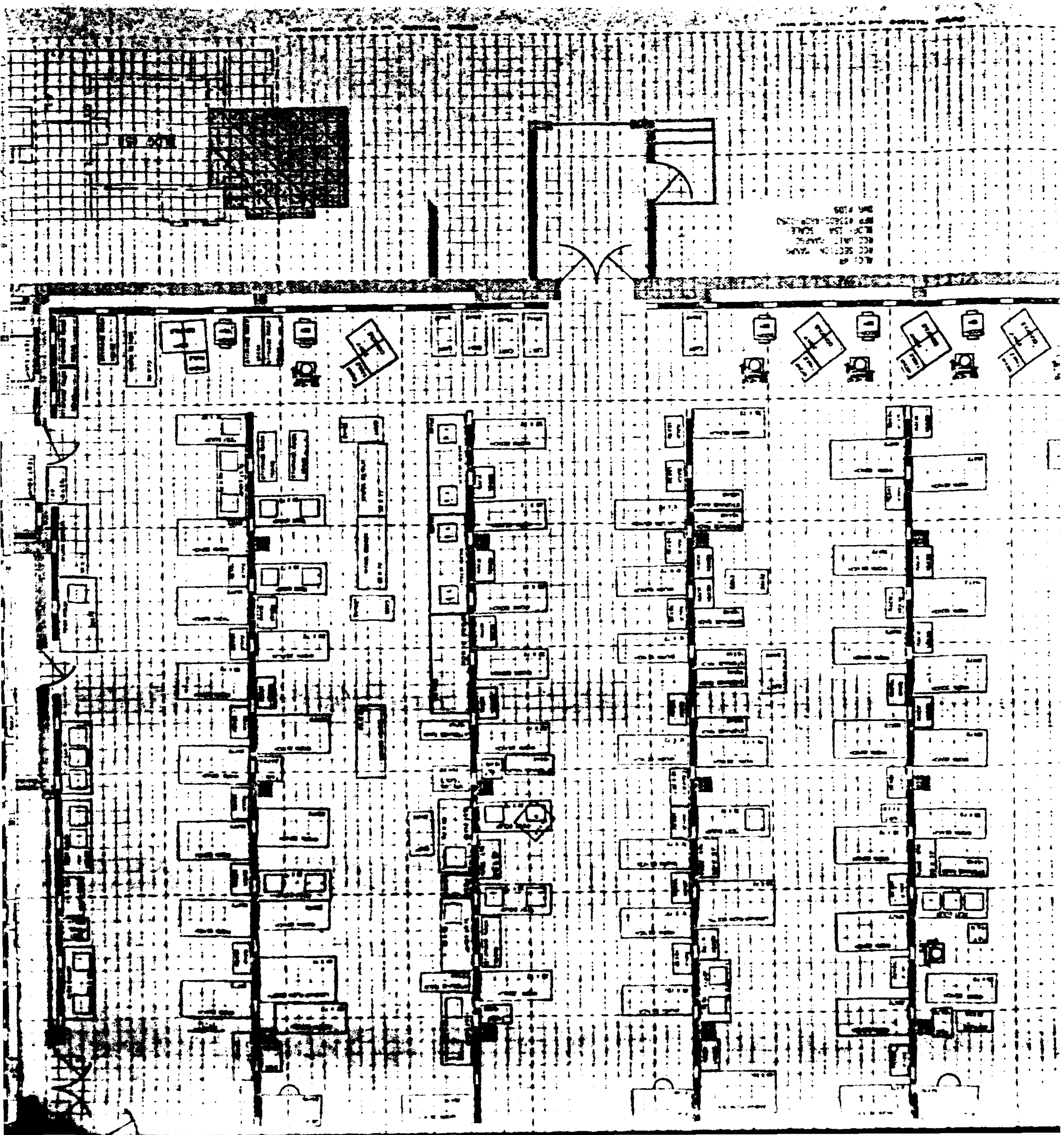
B



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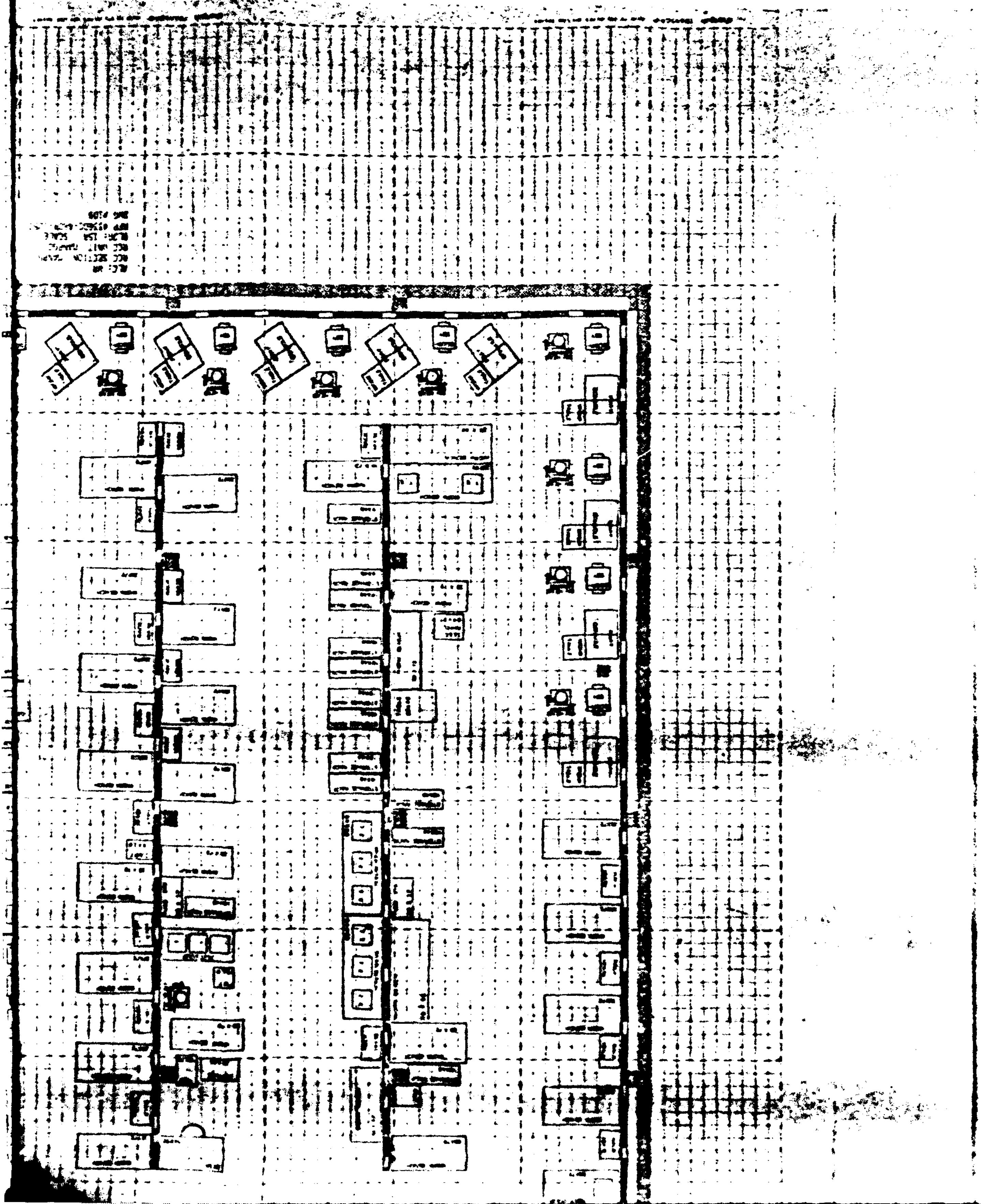

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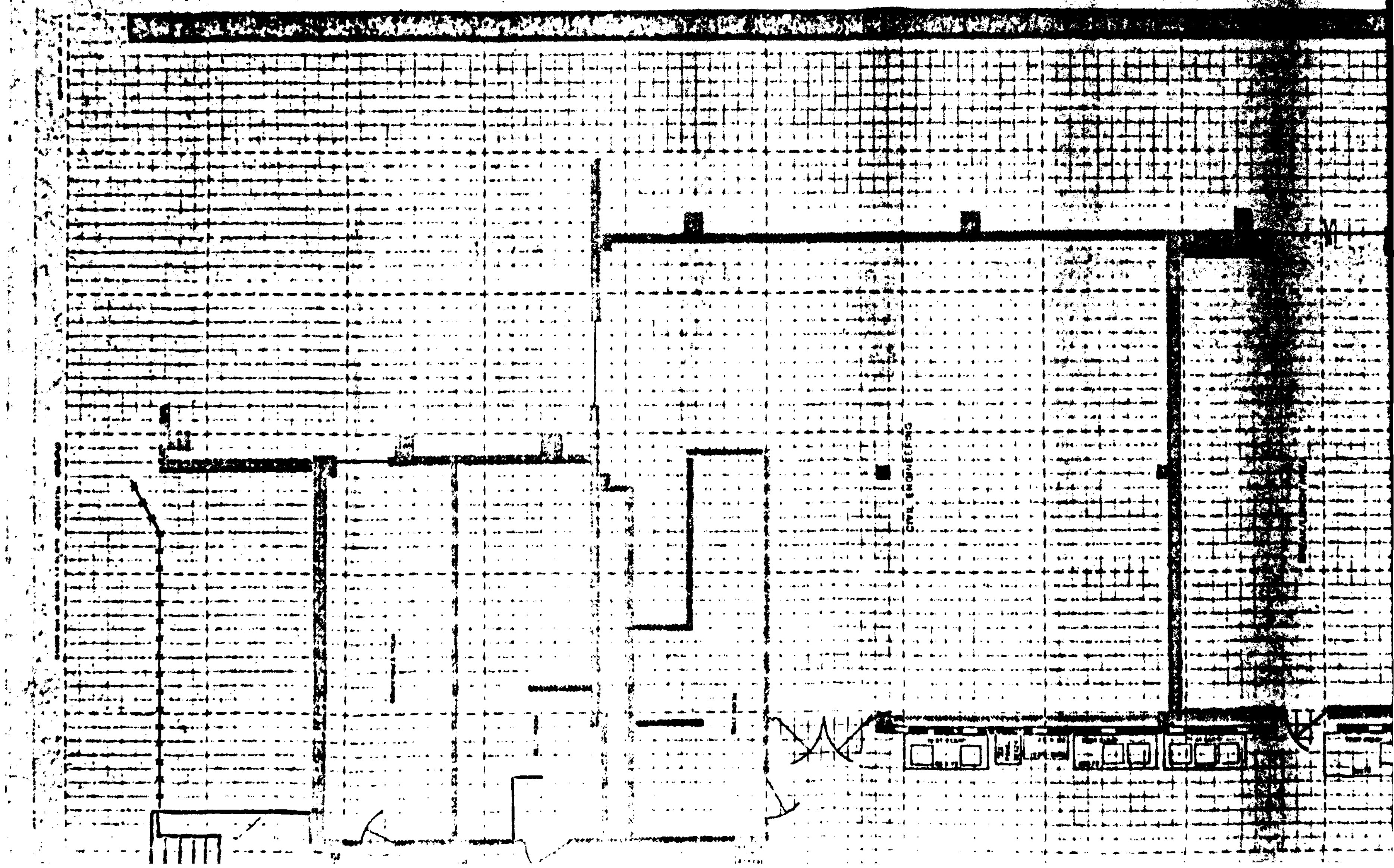
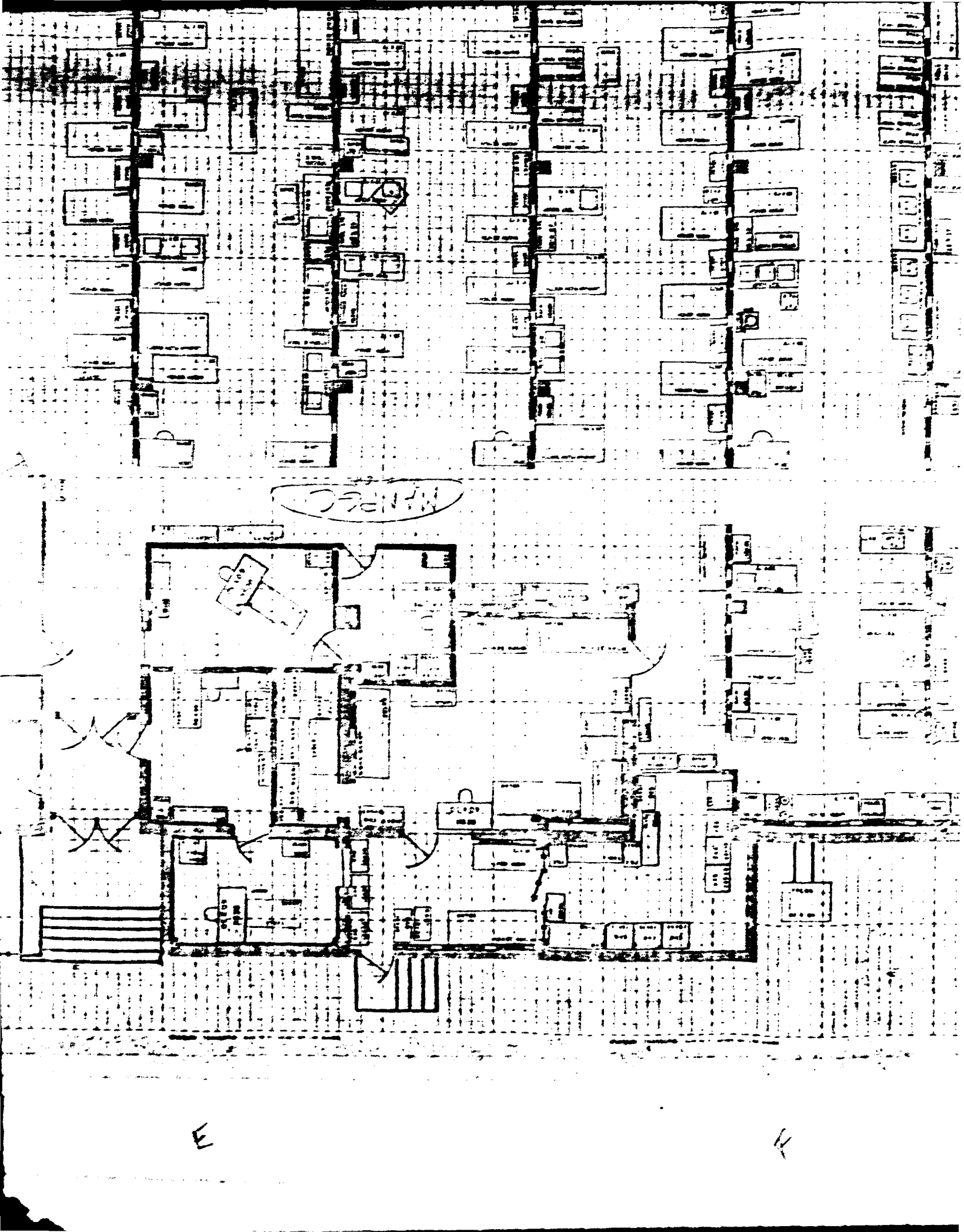
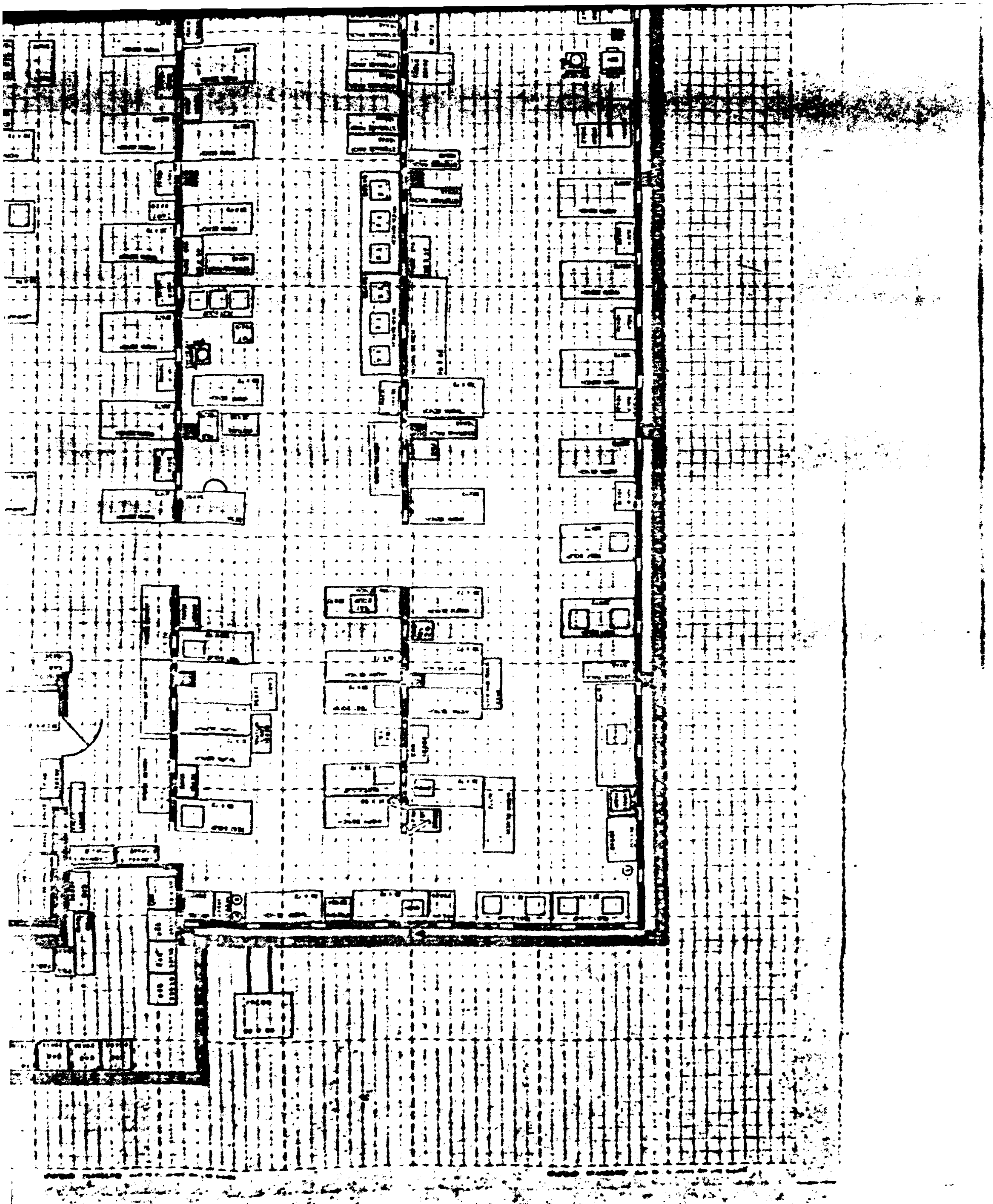



MAIN ST.



4

MANPG WORKLOAD

INDEX.

RSG 4/6/89

METHODOLOGY FOR MANPG WORKLOAD ANALYSIS of 80/20

a. GYRO WORKLOAD HAS BEEN DETERMINED TO BE 98% MSTR GENERATED. THEREFORE ONLY MSTR WORK WAS CONSIDERED

b. ALL LIKE GYRO HOURS WERE GATHERED UNDER A CONTROL GYRO PON TO ESTABLISH FAMILIES of GYROS FOR CHARACTERIZATION

c. TOTAL HOURS FOR EACH FAMILY of GYROS WAS OBTAINED FROM THE 31 OCT 88 ISSUE of THE A-GOI9C-CAA-CA-MCE REPORT, PAGE 2145-THRU 2212

d. THE PON HOURS WERE SEPERATED BY RCC & COMPARED TO THE TOTAL HOURS FOR THE RCC TO VERIFY THE 80% WORKLOAD.

THE METHODOLOGY YIELDED THE RESULTS THAT THE PONS PICKED FOR CHARACTERIZATION REPRESENTED 84.5% OF MANPGA WORKLOAD, 78.5% OF MANPGB & 82.9% of MANPGC. A COMBINED CHARACTERIZATION of 82.3% OF THE MANPG WORKLOAD

C/Ns INCLUDED IN MANPG STUDY

RCC CONTROL C/N		INCLUDED C/Ns
MANPGA		
C/N 74074A		02006A 02007A 74076A 74073A 74075A
C/N 74010A		74002A
C/N 74029A		74034A 74103A
C/N 74126A		
MANPGB		
C/N 20012A	COMP	04791A R0019A R6651A R6700A 30832A 30833A 30834A
C/N 74051A	COMP	01720A 02634A 03614A 03620A 03621A 03641A 03611A 03649A 74017A 74035A 74043A 74044A 74048A 74049A
MANPGC		
C/N 06121A	COMP	01970A 03696A 08023A
C/N 74061A	COMP	02387A 02382A 74065A
C/N 74063A	COMP	74000A 74053A 74058A 74059A 74067A
C/N 74146A	COMP	74282A
C/N 74148A	COMP	
C/N 74149A	COMP	

R.C.V. 10/28

MANPG Workload [Studied vs Forecast]

RCC	C/N Family	Studied Hours	RCC Hours	% of RCC
MANPGA	C/N 74010A C/N 74074A C/N 74103A C/N 74126A			
RCC TOTAL		118,380	140,020	84.5%
MANPGB	C/N 20012A C/N 74051A			
RCC TOTAL		59,449	76,728	78.5%
MANPGC	C/N 06121A C/N 74061A C/N 74063A C/N 74146A C/N 74148A C/N 74149A			
RCC TOTAL		82,723	99,827	82.9%
MANPG TOTAL		260,552	316,575	82.3%

DCS 11/23/88

NG3

FY88

INDUSTRIAL PRODUCTS DIVISION
WORK LOAD HISTORY DPSH
MNPG

WORK CAT	BOY NET AVAIL	FALLOUT	ADJ BOY NET AVAIL	YTD IND	TOTAL WKLD	YTD PROD	EOY NET AVAIL
A/C	0	0	0	0	0	0	0
MISTR	24765	264	24501	266,656	291,157	256,856	34,301
EXCH	1666	111	1555	6,465	8,020	4,043	3,977
MFG	0	0	0	0	0	0	0
OTHER	8	0	8	635	643	639	4
DME	0	0	0	0	0	0	0
TOTAL	26439	375	26064	273,756	299,820	261,538	38,282

MNPG89

FY89

INDUSTRIAL PRODUCTS DIVISION

ANNUAL WORKLOAD VS CAPABILITY DPSH

MNPG

WORK CAT	BOY MOS AVAIL	BOY NET AVAIL	NEG INPUT	TOTAL WKLD	BUDG CAP	EOY NET AVAIL	EOY MOS AVAIL
A/C	0	0	0	0	0	0	0
MISTR	2	34,301	281,292	315,593	210,147	105,446	6
EXCH	16	3,977	3,763	7,740	3,000	4,740	19
MFG	0	0	0	0	0	0	0
OTHER	0	0	0	0	0	0	0
DME	0	0	0	0	0	0	0
TOTAL	2.2	38,282	285,055	323,337	213,147	110,190	6.2

```
**    ALC - WR    RCC - MANPGC    MODEL WORKLOAD FILE    6/30/1989
06121A            8119        0  4 149 149 149 149              16.40      8.50  1A
MULT          681.5    597.1        38    6.1537    0.8808         0      .070    B
06121ASUB1        7167       50  4   0   0   0   0   0.64         .00      3.50  0A
                  .0         .0       0      .0000     .0000         0 S .029     B
74061A            A8119       0  4 343 343 343 343                7.70      7.50  1A
MULT           81.6    119.9        239    3.9937    0.8080         0      .142    B
74061ASUB1        A7167      50  4   0   0   0   0                .00       .70  0A
                  .0         .0       0      .0000     .0000         0 S .013     B
74063A            B8119       0  4 244 244 244 244                9.60      7.60  1A
MULT          997.8   1768.0        192    6.1097    1.2582         0      .102    B
74146A            8133        0  4 255 255 255 255               17.50     11.20  1A
MULT          248.3     96.4        105    5.4419    0.3834         0      .158    B
74146ASUB1        7205       50  4   0   0   0   0                .00      3.00  0A
                456.3    331.5        169    5.9727    0.5209         0 S .042     B
74148A            8271        0  4 175 175 175 175               28.90     25.50  1A
MULT          897.0   1094.9        316    6.1674    1.1510         0      .247    B
74148ASUB1        A7205      50  4   0   0   0   0                .00      6.00  0A
                798.2    486.9        182    6.5126    0.5979         0 S .058     B
74149A            C8119       0  4 169 169 169 169               12.90      9.30  1A
MULT          946.5   1689.9        208    6.0122    1.2537         0      .087    B
74149ASUB1        6339       50  4   0   0   0   0   0.35         .00      5.50  0A
                  .0         .0       0      .0000     .0000         0 S .051     B
```

ITEM CHECK
(For Internal Use, Not a Model Input)

NAME Richardson ALC WR DATE 4-12-89 RCC MANPGC SHEET 1 OF 1

ITEM NUMBER	SPECIFY IF PCN -NON- -SUN-	WCO NO.	WCO DATE	OPERATION PROFILE	OS/AS PROFILE	PARALLEL OPS PROFILE	HISTORICAL DATA	INDUCTION SELL DATE	BLANK WCO	STAMPED OFF WCO REVISIONS	STANDARD HOURS	STANDARD FLOW TIMES	PROCESS FLOW CHARTS
0612A	PCN	N/A	✓	✓	✓	N/R	✓	✓	✓	✓	✓	✓	✓
7406A	PCN	N/A	✓	✓	✓	N/R	✓	✓	✓	✓	✓	✓	✓
7406A	PCN	N/A	✓	✓	N/R	N/R	✓	✓	✓	✓	✓	✓	✓
7414A	PCN	N/A	✓	✓	✓	N/R	✓	✓	✓	✓	✓	✓	✓
7414A	PCN	N/A	✓	✓	✓	N/R	✓	✓	✓	✓	✓	✓	✓
7414A	PCN	N/A	✓	✓	✓	N/R	✓	✓	✓	✓	✓	✓	✓

LSC-20098A

ITEM SUMMARY
(For Internal Use, No. a Model Input)

NAME RVAUBERVeeco ALC WR DATE 4-11-89 RCC MANPGC SHEET 1 OF 1

ITEM NUMBER	WCD	WORKLOAD TYPE	HISTORICAL FLOW TIME	STANDARD HOURS	EXPECTED HOURS
PCN ~~NSN~~ ~~P/N~~ 06121A	N/A	MISTR	[illegible]	16.37	11.6
PCN ~~NSN~~ ~~P/N~~					
PCN NSN ~~P/N~~ 74061A	N/A	MISTR	[illegible]	7.71	8.6
PCN NSN P/N					
PCN ~~NSN~~ ~~P/N~~ 74063A	N/A	MISTR	[illegible]	9.55	9.0
PCN NSN P/N					
PCN NSN P/N 74146A.	N/A	MISTR	[illegible]	17.50	16.7
PCN NSN P/N					
PCN NSN P/N 74148A	N/A	MISTR	[illegible]	28.94	30.0
PCN NSN P/N					
PCN NSN P/N 74149A	N/A	MISTR	[illegible]	12.97	13.5
PCN NSN P/N					

NOTE: HISTORICAL FLOW TIME WILL BE GENERATED BY DATA PROCESSING. IF NO HISTORY IS COLLECTED ON WCD DATA COLLECTION SYSTEM, THIS INFORMATION MUST BE OBTAINED ON-SITE. EXPECTED HOURS WILL BE GENERATED FROM OPS. PROFILES BY DATA PROCESSING.

WORKLOAD PROFILE

NAME Tibbs Richard ALC WR DATE 7/24/81 RCC MAINT&C SHEET 1 OF 1

ITEM NUMBER	AIRCRAFT MODEL	WCD	WORKLOAD TYPE	FLOATING STOCK	ACTUAL PRODUCTION BY QUARTER 1	2	3	4	NO. OF ENVELOP UNITS	MAXIMUM W.I.P.	STANDARD HOURS
PCN NSN P/N 06121A	M-60	8119	M/3TK	NONE	149	149	149	149	1		16.37
PCN NSN P/N 74061A	M-60	A8119	M/3TK		3/3	3/3	3/3	3/3	1		7.71
PCN NSN P/N 74063A	M-60	B8119	M/3TK		244	244	244	244	1		9.56
PCN NSN P/N 74149A	M-60	C8119	M/3TK		169	169	169	169	1		12.96
PCN NSN P/N 74148A	M-60	8271	M/3TK		175	175	175	175	1		28.93
PCN NSN P/N 74146A	M-60	8133	M/3TK		255	255	255	255	1		17.47
PCN NSN P/N 06121A581		7167	M/3TK								
PCN NSN P/N 74061A581		A7167	M/3TK								
PCN NSN P/N 74146A581		7205	M/3TK								
PCN NSN P/N 74148A581		A7205	M/3TK								
PCN NSN P/N 74149A581		6339	M/3TK	NONE							
PCN NSN P/N											
PCN NSN P/N											

LSC 30P01H

DATASET: I7S150ED.ALC.WRMANPGC.WORKLD

DATE: 89/03/29
TIME: 07:22
PAGE: 1

START COL ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8

	PART	WCD	INV-	T	Q1-	Q2-	Q3-	Q4-	
1	06121A	8119		4	149	149	149	149	28.5
1	74061A	A8119		4	343	343	343	343	76.4
1	74063A	B8119		4	244	244	244	244	43.4
1	74149A	C8119		4	169	169	169	169	37.0
1	741148A	8271		4	175	175	175	175	37.9
1	74146A	8133		4	255	255	255	255	18.2
1	74061ASUB1	A7167	0	4					70.5
1	06121ASUB1	7167	0	4					92.5
1	74146ASUB1	7205	0	4					22.9
1	74148ASUB1	A7205	0	4					35.2
1	74149ASUB1	6339	0	4					3.0

AS IS

MANPG WORKLOAD [STUDIED vs FORECAST] 3.0

RCC	C/N FAMILY	STUDIED HOURS	RCC HOURS	% OF RCC
MANPGA	C/N 74010A C/N 74074A C/N 74103A C/N 74126A			
RCC TOTAL		118,380	140,020	84.5%
MANPGB	C/N 20012A C/N 74051A			
RCC TOTAL		59,449	76,728	78.5%
MANPGC	C/N 06121A C/N 74061A C/N 74063A C/N 74146A C/N 74148A C/N 74149A			
RCC TOTAL		82,723	99,827	82.9%
MANPG TOTAL		260,552	316,575	82.3%

2065 11/27/85

C/Ns INCLUDED IN MANPG STUDY

RCC CONTROL C/N		INCLUDED C/Ns 3.0			
MANPGA					
C/N 74074A		02006A	02007A	74076A	74073A
		74075A			
C/N 74010A		74002A			
C/N 74029A		74034A	74103A		
C/N 74126A					
MANPGB					
C/N 20012A	COMP	04791A	R0019A	R6651A	
		R6700A	30832A	30833A	
		30834A			
C/N 74061A	COMP	01720A	02634A	03614A	
		03620A	03621A	03641A	
		03611A	03649A	74017A	
		74035A	74043A	74044A	
		74048A	74049A		
MANPGC					
C/N 06121A	COMP	01970A	03696A	08023A	
C/N 74061A	COMP	02387A	02388A	74065A	
C/N 74063A	COMP	74000A	74053A	74058A	
		74059A	74067A		
C/N 74146A	COMP	74282A			
C/N 74148A	COMP				
C/N 74149A	COMP				

R.V.V. 10/28

SAS

MANPOWER PROFILE

9:24 TUESDAY, MARCH 28, 1989 1

NAME: Edwards Loard ALC: WR DATE: 4-18-89 RCC: MANPGC SHEET 1 OF 1

SK CODE	DESCRIPTN	QTR	QUANTITY AVAILABLE WORK WEEK 1	2	3	WEEK END 1	2	3	HOLIDAY 1	2	3	AVAILABLE HRS (PER SHIFT) WORK WEEK 1	2	3	WEEK END 1	2	3	HOLIDAY 1	2	3	ALTERNATE SKILL CD/LVL	NOTES
IG07		1	10									5.4									IG09 & 10	
IG07		4	10									4.9									IG09 & 10	
IG09		1	54	1								5.4	5.4								IG09 & 10	
IG09		4	54	1								4.9	4.9								IG09 & 10	
IG10		1	1									5.4										
IG10		4	1									4.9										

EQUIPMENT PROFILE

NAME R. VANDERVOORD ALC WE DATE 4-12-89 RCC MAINTEC SHEET 1 OF 5

EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			DOWNTIME					PERCENT USED FOR OTHER RCCs (e.g. TIME NOT AVAILABLE)	ENVELOP UNITS	ALTERNATE EQUIPMENT CODE	SOURCE
					PREVENTIVE MAINT.			UNSCHEDULED BREAKDOWN REPAIR TIME					
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	MTBF	MTTR		MIN / MAX		
5925	OLEG/REITE KT519003	2	2	2	999	1ST	1.0	999	76		1 / 1		MARSHALL PORTER
6849	CONSOLE-- 705024	4	4	4	180	1ST	10.5	180	83		2 / 4		PANEL BOOKCASE Ref 6-4123
0844	PATENT-TO KT519305	2	2	2	999	1ST	1.9	999	77		1 / 1		WILLIAMS WRIGHT T.E. SUPERVISOR
3346	LEARJET LEAR, VER00	6	6	6	90	1ST	16.6	90	89		1 / 1		PN#6-5713 DONALD PORTER T.E. SUPERVISOR
0766	RANDLET- 0492E1253	2	2	2	999	1ST	13.5	999	86		1 / 20		PN#6-9078 VARIOUS QUALITIES
5139	SCHENCBAL MACHINE	6	6	6	999	1ST	10.5	999	83		1 / 1		PERSONNEL OBSERVED
9036	TS-DIRECT KT419805	4	4	4	30	1ST	3.0	30	75		1 / 0		GOVT REPORTS HG00HI098
1022	CONSOLE-- 704908-1	2	2	2	180	1ST	10.5	180	83		1 / 1		RAS-LOG-MAC(M) 7118
0460	CONSOLE-- 705830	2	2	2	180	1ST	13.5	180	86		1 / 2		GOOHI AMCOSP
4126	ELMA-TS- KT426206	2	2	2	270	1ST	5.1	270	78		1 / 1		
9050	INSULTEST KT426598	2	2	2	999	1ST	5.0	999	77		1 / 1		
9103	ERECTLNP KT426215	1	1	1	270	1ST	5.1	270	78		1 / 1		

EQUIPMENT FILE

NAME RAMDEP USED ALC WR DATE 4-17-89 RCC MANPCC SHEET 2 OF 5

EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			DOWNTIME					PERCENT USED FOR OTHER RCCs (e.g. TIME NOT AVAILABLE)	ENVELOP UNITS	ALTERNATE EQUIPMENT CODE	SOURCE
					PREVENTIVE MAINT.			UNSCHEDULED BREAKDOWN REPAIR TIME					
		1st	2nd	3d	FREQ.	SHIFT	DOWN TIME	MTBF	MTTR		MIN / MAX		
8437	BRASOLIS KT4R6R14	2	2	2	120	1ST	5.1	120	78		1/1		
1872	NULL IESI KT4R6R13	2	2	2	Nor	1ST	4.0	999	76		1/1		
9096	PRESUP IS KT4R6R10	2	2	2	999	1ST	4.0	999	76		1/1		
9782	IESIRGYRO KT4R6209	1	1	1	999	1ST	5.1	999	78		1/1		
4396	FLASIARO	1	1	1	Nor	1ST	N/A	300	72		1/4		
9058	IESI PANEL KT4R6R16	2	2	2	90	1ST	3.0	90	75		1/1		
9015	GYRO ISET KT4R6193	4	4	4	90	1ST	4.0	90	76		1/5		
9573	IEMP CHAM TENNEY JR.	4	4	4	Nor	1ST	0	0	0		1/4		
6183	IESI ASSY LT3291	3	3	3	300	1ST	4.9	300	77		1/1		
0787	IESI ASSY 7439238	5	5	5	999	1ST	5.4	999	78		1/1		
5509	RATE IESI M10117	4	4	4	Nor	1ST	4.9	999	77		1/1		
0001	CLRL OVEN	12	12	12	Nor	1ST	5.1	300	50		3/8		

EQUIPMENT PROFILE

NAME R. VALDEZ VOGEL ALC WR DATE 4-12-91 RCC MANRCC SHEET 3 OF 5

EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			DOWNTIME					PERCENT USED FOR OTHER RCCs (e.g. TIME NOT AVAILABLE)	ENVELOP UNITS	ALTERNATE EQUIPMENT CODE	SOURCE
					PREVENTIVE MAINT.			UNSCHEDULED BREAKDOWN REPAIR TIME					
		1st	2nd	3d	FREQ.	SHIFT	DOWN TIME	MTBF	MTTR		MIN / MAX		
0002	VAC OVEN	12	12	12	NCL			300	72		1 / 8		
0003	LAM FLOW WORK STATION	20	20	20	NCL	1ST	5.0	999	77		N/A		
0004	RT BOOTH	1	1	1	NOR			300	120		1 / 1		
0005	LNPLST HE TAYLOR WINFIELD	1	1	1	NOR						1 / 1		
0006	PLNLNBLAL BELL JAR CHAMBER	1	1	1	NCL			300	72		1 / 4		
0007	PUMP LNBACK DIFFUSION	1	1	1	NOR			300	72		1 / 18		
0008	PUMP LNCABN	2	2	2	NOR			300	72		1 / 18		
0009	PUMP LNBACK RATES	3	3	3	NOR			300	72		1 / ~~6~~ 18		
0010	12" BLAL BELL JAR & MANIFOLD	1	1	1	NOR			300	72		1 / 4		
70020	SLAM TSET KT419001	2	2	2	100	1ST	3.0	150	15		1 / 1		
90211	N IAKEPEE KT419807	2	2	2	270	1ST	3.0	720	15		1 / 1		
9411	RATE CSC KT419182	2	2	2	NOR	1ST	5.1	999	18		1 / 1		

EQUIPMENT PROFILE

NAME Chamberlord ALC WR DATE 4-11-89 RCC MANPGC SHEET 4 OF 5

EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			DOWNTIME					PERCENT USED FOR OTHER RCCs (e.g. TIME NOT AVAILABLE)	ENVELOP UNITS	ALTERNATE EQUIPMENT CODE	SOURCE
					PREVENTIVE MAINT.			UNSCHEDULED BREAKDOWN REPAIR TIME					
		1st	2nd	3d	FREQ.	SHIFT	DOWN TIME	MTBF	MTTR		MIN / MAX		
6053	SCROSBY T KT#26636	2	2	2	Nce	1ST	5.1	999	78		1 / 1		
578	LEVLBALCI KH26914	1	1	1	Nce	1ST	5.1	999	78		1 / 1		
9888	TEST ELX T100803	2	2	2	Nce	1ST	5.1	999	78		1 / 1		
0257	THERMIABLE KT#26205-1B	5	5	5	Nce	1ST	5.1	999	78		1 / 1		
2104	MICROBAL EU 2	2	2	2	Nce	1ST	5.0	999	77		1 / 1		
3388	MICROCOI KT#26188	1	1	1	Nce	1ST	5.1	999	78		1 / 1		
8134	RECEIABLE C181	8	8	8	Nce	1ST	5.1	999	78		1 / 1		
2020	RECEIABLE LT3296	2	2	2	Nce	1ST	5.1	999	78		1 / 1		
2026	RIABLESIN LT3377A	1	1	1	Nce	1ST	5.1	999	78		1 / 1		
6936	RECEGYIS 15AC320	4	4	4	180	1ST	5.2	180	78		1 / 1		
3673	TESTIABLE KT#19506	1	1	1	Nce	1ST	5.1	999	78		1 / 1		
6986	DYNAMBAL K1B	1	1	1	90	1ST	9.0	90	81		1 / 1		

EQUIPMENT PROFILE

NAME R Waterhouse ALC WR DATE 1-12-89 RCC MANDOC SHEET 5 OF 5

EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			DOWNTIME					PERCENT USED FOR OTHER RCCs (e.g. TIME NOT AVAILABLE)	ENVELOP UNITS	ALTERNATE EQUIPMENT CODE	SOURCE
					PREVENTIVE MAINT.			UNSCHEDULED BREAKDOWN REPAIR TIME					
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	MTBF	MTTR		MIN / MAX		
7250	TESTSTAND 31TK1461	1	1	1	18	1ST	5.1	180	18		1 / 1		
3200	ECCB2B4IB 2366266	5	5	0	1/2K	1ST	2.3	999	79		1 / 1		
76-18	TESTPANEL 704907-1	13	13	13	180	1ST	5.1	180	78		1 / 1		

NAME Weaver Loco

SAS
ASSEMBLY/DISASSEMBLY PROFILE

9:32 TUESDAY, MARCH 28, 1989 1

DATE 4-18-89

SHEET 1 OF 1

ITEM CODE	WCD	ALC WR WCD DT	DSOP	ASOP	REMOV ITEM CODE	RCC MANPGC WCD	WCD DT	INSTALL SAME	NOTES
PCN 06121A		8119	50	60	PCN 06121ASUB1		7167	N	
PCN 74061A		A8119	50	60	PCN 74061ASUB1		A7167	N	
PCN 74146A		8133	50	60	PCN 74146ASUB1		7205	N	
PCN 74148A		8271	30	40	PCN 74148ASUB1		A7205	N	
PCN 74149A		C8119	40	50	PCN 74149ASUB1		6339	N	

WORK CONTROL DOCUMENT

1. DATE	PAGE
8119	1 OF 2 PAGES

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
01970A/06121A ~~023864~~	1	"O"MNPGC		

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
GG2479AB01	5F10-4-5-53;5F10-4-5-53-1	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-137-6038 ~~6615-01-006-0050~~	NOTE: Use QQ-571 type SN60WRP solder and anticorrosive flux MIL-F-14256. Observe all notes, cautions & warnings throughout TO. MDC data required IAW MAOI 66-22.
13. SERIAL NUMBER	14. NOUN	
	Rate Gyroscope	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	010	Receive and clean gyro. Ascertain data correctness on forms AFLC 959 and AFTO 349.			
	020 0100	Perform functional analysis. If serviceable, stamp condition tag and proceed to Step 160.			B
	020 0200 MNPGB	Perform functional analysis. If serviceable, stamp condition tag and proceed to Step 160.			B
	030	Disassemble only to extent required to repair or replace the faulty parts (TO 5F10-4-5-53, Section III)			
	040	Clean gyro (TO 5F10-4-5-53, Section IV)			
	050	Take rotor and bearing assembly to repair area. See attached Work Control Document.			
	060	Mechanical null and balance adjustments. (TO 5F10-4-5-53, Section VI)			
	070	Temperature cycle (four hours) (TO 5F10-4-5-53, Section VI)			
	080	Complete drift, stop adjustment, and performance checks (TO 5F10-4-5-53, Section VI)			
	090	Clean and cement printed wiring board to gyro. (TO 5F10-4-5-53, Section VI)			

FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANPGC ~~MANPGB~~	c. MAQNG	
		b. MANERG	d. MANSAA	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WORK CONTROL DOCUMENT (CONT'D)			1. DATE 8119	PAGE 2 OF 2 PAGES	
15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	100	Certify that this item does not contain any foreign objects such as tools or unattached components.			B
	110	Clean, inspect and install gyro covers. (T.O. 5F10-4-5-53, Section VI)			
	120	Immerse gyro in freon and observe for bubbles. Fill and leak check (TO 5F10-4-5-53, Section IV)			
	130	Assemble electronic inverter. Assemble gyro and inverter if required. (Temperature cycle required if inverter is removed) (T.O. 5F10-4-5-53, Section VI.)			
	140	Select and install trim resistors and cover assembly. (TO 5F10-4-5-53, Section VI)			
x16	150 0100	Perform functional analysis. Stamp condition tag.			B
16	150 0200 MNPGB	Perform functional analysis. Stamp condition tag			B
	160	Final visual, paint, check for mod TO compliance Complete AFTO Form 349 and install WR-ALC decals IAW MAOI 66-40. Attach condition tag.			

WORK CONTROL DOCUMENT

1. DAT 7167	PAGE 3 OF 4 PAGES

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
01970A/06121A 02386A	1	"O" MNPGC/MNPGB		

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
10063458-102	5F10-4-5-53	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
TRU-2A/2	6615-01-092-7096	
13. SERIAL NUMBER	**14. NOUN**	
	Rotor & Bearing Assy	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	05a 10-40	Remove ball bearing form the rotor and ring assembly (TO 5F10-4-5-53, Section V).			
	05b 10-40	Assemble a new bearing or bearings into the rotor and ring assembly (TO 5F10-4-5-53, Section V).			
	05c 10-40	Place assembly in Balance Machine and dynamic balance (TO 5F10-4-5-53, Section V)			
	05d 10-40	Install spinmotor wound stator (TO 5F10-4-5-53, Section VI)			
	05e 10-40	Install header, primary and secondary coil winding assemblies, and gimbal stop capscrews (TO 5F10-4-5-53, Section VI)			
	05f 10-40	Install gyro electronic assemblies (TO 5F10-4-5-53, Section VI).			
	05g 10-40	Install damper assembly (TO 5F10-4-5-53, Section VI).			
	05h 10-40	Assemble rotor and bearing assembly (TO 5F10-4-5-53, Section VI).			
	05i 10-40	Install gimbal assembly (T05F10-4-5-53, Section VI).			
	05j 10-40	Position rotor, stator and damper (TO 5F10-4-5-53, Section VI).			

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANERC 19 June 87	a. MAQNG 20 June 87	
		b. MANPGC	c. MANSAA 19 JUNE 87	

PREVIOUS EDITION WILL BE USED.

WORK CONTROL DOCUMENT (CONT'D)			1. DATE	PAGE 4 OF 4 PAGES	
14. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	05k 10-50	Set perload and run in motor (36 hours) (TO 5F10-4-5-53, Section VI).			

WORK CONTROL DOCUMENT

1. DATE: 7167 | PAGE 1 OF 4 PAGES

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
01970A/86121A 7386A	1	"0" MNPGC/MNPGB	8196	8256

7. NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
G2479AB01	5F10-4-5-53; 5F10-4-5-53-1 845	X18

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
TRU-2A/2	6615-00-137-6038 6615-01-006-0050	NOTE: Use QQ-571 type SN60WRP solder and anticorrosive flux MIL-F-14256. Observe all notes, cautions, and warnings throughout the TO. MDC data required IAW MAOI 66-22.
13. SERIAL NUMBER	14. NOUN: Rate Gyroscope	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	01 10-10	Receive and clean gyro. Ascertain data correctness on forms AFLC 959 and AFTO 349.	WR PA 7084	15 JUL 1988	
	02 10-20	Pretest If serviceable, proceed to Blocks 15 thru 17. If unserviceable, enter brief malfunction description.	WR PA 7084	15 JUL 1988	
		NO START			
	03 10-30	Disassemble only to extent required to repair or replace the faulty parts. (TO 5F10-4-5-53, Section III).	WR PA 7084	01 SEP 1988	
	04 10-30	Clean gyro (TO 5F10-4-5-53, Section IV).	WR PA 7084	01 SEP 1988	
	05 10-30	Take rotor and bearing assembly to repair area. See attached Work Control Document.	WR PA 7084	02 SEP 1988	
	06 10-60	Mechanical null and balance adjustments. (TO 5F10-4-5-53, Section VI).	WR PA 7084	02 SEP 1988	
	07 10-60	Temperature cycle (four hours) (TO 5F10-4-5-53, Section VI).	WR PA 7084	06 SEP 1988	
	08 10-60	Complete drift, stop adjustment, and performance checks (TO 5F10-4-5-53, Section VI).	WR PA 7084	06 SEP 1988	
	09 10-70	Clean and cement printed wiring board to gyro. (TO 5F10-4-5-5-3, Section VI).	WR PA 7084	07 SEP 1988	

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N.
DISPATCH	FUNCTIONAL CODE	a. MANERG Ward L. Briggs 19 JUN87	a. MAQNG James E. Bryt 22 June 87	
		b. MANPGC MANPGB	MANSAA Don Kittell 19 JUN87	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WR-ALC/MANSAA "OVERPRINT"

WORK CONTROL DOCUMENT (CONT'D)			1. DATE	PAGE 2 OF 4 PAGES	
15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	10	Certify that this item does not contain any foreign objects such as tools or unattached components.	WR PA 7084	07 SEP 1988	B
	11 10-70	Clean, inspect and install gyro covers. (TO 5F10-4-5-53, Section VI).	WR PA 7084	07 SEP 1988	
	12 10-80	Immerse gyro in freon and observe for bubbles. Fill and leak check. (TO 5F10-4-5-53, Section IV).	WR PA 7084	07 SEP 1988	
	13 10-90	Assemble electronic inverter. Assemble gyro and inverter if required. (Temperature cycle required if inverter is removed.) (TO 5F10 4-5-53, Section VI.	WR PA 7084	07 SEP 1988	
	14 10-100	Select and install trim resistors and cover assembly. (TO 5F10-4-5-53, Section VI)	WR PA 7084	07 SEP 1988	
	15 10-110	Final visual, paint, check for mod TO compliance. Complete AFTO Form 349.	WR PA 7084	07 SEP 1988	
	16 10-100	Perform Functional Analysis (Final Test) Stamp Serviceable Tag	WR PA 7084	07 SEP 1988	B
	17 10-110	Attach serviceable tag and install WR-ALC decal IAW MAOI 66-40. Complete AFLC 959	WR PA 7084	07 SEP 1988	

\PROGRAM NAME: 300274 H

\CPIN: 81H-TRU2A/6038-U001-00A

07 SEP 1988

\DATE OF LAST REVISION: 22-NOV-87

\UUT TYPE: RATE GYRO

\UUT NATIONAL STOCK NUMBER: 6615-00-137-6038

\UUT MFR/PART NUMBER: HONEYWELL GG2479AB01

\OPERATOR'S NAME: WILSON

\TEST STATION: RATE STATION # 2

\DATE & TIME OF TEST: 07-SEP-88 10:07:57

#GYRO IN TEST POSITION 1 IS SERIAL NUMBER X18

WR
PA
9335

****

* *

* IMPORTANT NOTE CONCERNING THE STATIC RESISTANCE TESTS *

* ## *

* *

* If a failure of Static Resistance should occur, the operator may retest the UUT Static *

* Resistance manually. *

* If an in-tolerance measurement is obtained in this manner, then the previous failure is *

* to be ignored. *

* *

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/ STATIC RESISTANCE TESTS

PIN A TO CASE J1-A,CASE	1	OHM	.10000E+33	.10000E+07	.10000E+33	PASS	07-SEP-88 10:09:10
PIN B TO CASE J1-B,CASE	1	OHM	.10000E+33	.10000E+07	.10000E+33	PASS	07-SEP-88 10:09:14
PIN C TO CASE J1-C,CASE	1	OHM	.10000E+33	.10000E+07	.10000E+33	PASS	07-SEP-88 10:09:19
PIN D TO CASE J1-D,CASE	1	OHM	.10000E+33	.10000E+07	.10000E+33	PASS	07-SEP-88 10:09:23
/ SPINMOTOR RUNUP TESTS							
STARTING CURRENT	1	Amps	.53500E+00	.50000E-01	.33325E+00	PASS	07-SEP-88 10:09:41
RUNNING CURRENT	1	Amps	.32100E+00	.20000E-01	.28725E+00	PASS	07-SEP-88 10:11:05
DC INPUT VOLTAGE	1	VDC	00028.1000	00027.9000	00027.9523	PASS	07-SEP-88 10:11:46
/ DC NULL TESTS							
DC INPUT VOLTAGE	1	VDC	00028.1000	00027.9000	00028.0114	PASS	07-SEP-88 10:21:42
DC NULL VOLTAGE	1	mVDC	00015.0000	-00015.0000	00003.3570	PASS	07-SEP-88 10:21:46
/ STEADY-STATE RATE TESTS							
DC INPUT VOLTAGE	1	VDC	00028.1000	00027.9000	00028.0100	PASS	07-SEP-88 10:21:51
OUTPUT AT .75 D/S CW RATE	1	VOLTS	.27300E+00	.22800E+00	.24933E+00	PASS	07-SEP-88 10:22:10
OUTPUT AT 1.50 D/S CW RATE	1	VOLTS	.53300E+00	.44800E+00	.49656E+00	PASS	07-SEP-88 10:22:30
OUTPUT AT 3.00 D/S CW RATE	1	VOLTS	00001.0650	.93500E+00	00001.0003	PASS	07-SEP-88 10:22:49
OUTPUT AT 6.00 D/S CW RATE	1	VOLTS	00002.1300	00001.8700	00002.0584	PASS	07-SEP-88 10:23:09
OUTPUT AT .75 D/S CCW RATE	1	VOLTS	-.22800E+00	-.27300E+00	-.23874E+00	PASS	07-SEP-88 10:23:51
OUTPUT AT 1.50 D/S CCW RATE	1	VOLTS	-.46800E+00	-.53300E+00	-.48807E+00	PASS	07-SEP-88 10:24:11
OUTPUT AT 3.00 D/S CCW RATE	1	VOLTS	-.93500E+00	-00001.0650	-.99124E+00	PASS	07-SEP-88 10:24:31
OUTPUT AT 6.00 D/S CCW RATE	1	VOLTS	-00001.8700	-00002.1300	-00002.0583	PASS	07-SEP-88 10:24:50
HYSTERESIS	1	VOLTS	.10000E-01	00000.0000	.44015E-02	PASS	07-SEP-88 10:25:13
ZERO OFFSET	1	VOLTS	.50000E-01	-.50000E-01	.38075E-02	PASS	07-SEP-88 10:25:14
/ VOLTAGE EXTREMES TEST - 21 VOLT EXCITATION							
DC INPUT VOLTAGE	1	VDC	00021.1000	00020.9000	00021.0892	PASS	07-SEP-88 10:25:51
OUTPUT AT .75 D/S CW RATE	1	VOLTS	.28000E+00	.20000E+00	.23371E+00	PASS	07-SEP-88 10:26:10
OUTPUT AT 1.50 D/S CW RATE	1	VOLTS	.56000E+00	.40000E+00	.46389E+00	PASS	07-SEP-88 10:26:29
OUTPUT AT 3.00 D/S CW RATE	1	VOLTS	00001.1200	.80000E+00	.93252E+00	PASS	07-SEP-88 10:26:48
OUTPUT AT 6.00 D/S CW RATE	1	VOLTS	00002.2400	00001.6000	00001.9187	PASS	07-SEP-88 10:27:07
OUTPUT AT .75 D/S CCW RATE	1	VOLTS	-.20000E+00	-.28000E+00	-.22023E+00	PASS	07-SEP-88 10:27:49
OUTPUT AT 1.50 D/S CCW RATE	1	VOLTS	-.40000E+00	-.56000E+00	-.45182E+00	PASS	07-SEP-88 10:28:08
OUTPUT AT 3.00 D/S CCW RATE	1	VOLTS	-.80000E+00	-00001.1200	-.91951E+00	PASS	07-SEP-88 10:28:27
OUTPUT AT 6.00 D/S CCW RATE	1	VOLTS	-00001.6000	-00002.2400	-00001.9119	PASS	07-SEP-88 10:28:46
ZERO OFFSET	1	VOLTS	50000E-01	-.50000E-01	.62813E-02	PASS	07-SEP-88 10:29:09
/ VOLTAGE EXTREMES TEST - 29 VOLT EXCITATION							
DC INPUT VOLTAGE	1	VDC	00029.1000	00028.9000	00028.9181	PASS	07-SEP-88 10:29:49
OUTPUT AT .75 D/S CW RATE	1	VOLTS	.28000E+00	.20000E+00	.25244E+00	PASS	07-SEP-88 10:30:09
OUTPUT AT 1.50 D/S CW RATE	1	VOLTS	.56000E+00	.40000E+00	.50164E+00	PASS	07-SEP-88 10:30:28
OUTPUT AT 3.00 D/S CW RATE	1	VOLTS	00001.1200	.80000E+00	00001.0067	PASS	07-SEP-88 10:30:48
OUTPUT AT 6.00 D/S CW RATE	1	VOLTS	00002.2400	00001.6000	00002.0715	PASS	07-SEP-88 10:31:07

OUTPUT AT 6.00 D/S CCW RATE	1	VOLTS	-00001.6000	-00002.2400	-00002.0663	PASS	07-SEP-88 10:32:49
ZERO OFFSET	1	VOLTS	.50000E-01	-.50000E-01	.60205E-02	PASS	07-SEP-88 10:33:13
/ CROSS AXIS SENSITIVITY TESTS							
DC INPUT VOLTAGE	1	VDC	00028.1000	00027.9000	00028.0133	PASS	07-SEP-88 10:40:37
SPIN AXIS SENSITIVE-CW ROT.	1	mVDC	00015.0000	-00015.0000	00006.4110	PASS	07-SEP-88 10:42:49
SPIN AXIS SENSITIVE-CCW ROT.	1	mVDC	00015.0000	-00015.0000	-00006.7690	PASS	07-SEP-88 10:43:31
\END							

NAME R.Va ERVoorst ALC WR DATE 4-6-8. RCC MANPGC SHEET 1 OF 1

PCN
NSN
DWG 0612A1A WCD N/A WCD DATE 8119

OPERATION NUMBER	RCC	OPERATION DESCRIPTION	MANDATORY OCCURRENCE FACTOR	OPERATION TYPE	MANDATORY FLOW MOVING %	MANDATORY FLOW MOVING HRS.	MANPOWER SKILL CODE/ LEVEL	MANPOWER QTY.	MANPOWER TIME REQUIRED %	MANPOWER TIME REQUIRED HRS.	EQUIPMENT EQUIPMENT CODE	EQUIPMENT QTY.	EQUIPMENT TIME REQUIRED %	EQUIPMENT TIME REQUIRED HRS.	DATA SOURCE COMMENTS
0006 AF	MANPGC	REC	1	TRANSIT											C. DRIVER RANGER MAC MILLER OPER. & A SCHEDULER.
				SETUP											
				PROCESS		1	IG09	1		0.1	STD				
		↑		TRANSIT											
				SETUP											
				PROCESS											
ALL WCD OPERATIONS LISTED IN CA OPER PROFILE				TRANSIT											
				SETUP											
				PROCESS											
		↓		TRANSIT											
				SETUP											
				PROCESS											
9999	MANPGC	SELL	1	TRANSIT											D. HARRELSON Supvsr. MANPGC MAC MILLER OPERATOR & SCHEDULER.
				SETUP											
				PROCESS		.1	IG09	1		0.1	STD				

LSC-20092C

NAME [illegible signature]　　OPERATION PROFILE　　SAS [illegible]　　9:44 TUESDAY, MARCH 28, 1989　1

ALC WR　　DATE

ITEM CD PCN 06121A　　WCD　　WCDDATE 8119　　RCC MANPGC　　SHEET 1 OF 2

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
10	MANPGC	REC	1.00	.	T										
10	MANPGC	REC	.	.	S										
10	MANPGC	REC	.	1.00	P	0.1	IG09	1	.	0.1					
20	MANPGC	NDI	1.00	.	T										
20	MANPGC	NDI	.	.	S										
20	MANPGC	NDI	.	1.00	P	1.0	IG09	1	.	0.8	0787	1	.	0.8	
20	MANPGB	NDI	.	.	P	0.7	IG10	1	.	0.5	0450	1	.	0.5	[illegible]
30	MANPGC	DIS	0.99	.	T										
30	MANPGC	DIS	.	.	S										
30	MANPGC	DIS	.	1.00	P	2.5	IG09	1	.	0.7	0787	1	.	0.5	
40	MANPGC	REP	1.00	.	T										
40	MANPGC	REP	.	.	S										
40	MANPGC	REP	.	~~1.00~~ .85	P	0.8	IG09	1	.	0.8					

NAME [illegible]

OPERATION PROFILE SAS 2/19/89

9:44 TUESDAY, MARCH 28, 1989 2

ITEM CD PCN 06121A ALC WR DATE [illegible] RCC MANPGC

WCD WCDDATE 8119

SHEET 2 OF 4

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
50	MANPGC	REP	1.00		T										
50	MANPGC	REP			S										
50	MANPGC	REP		.85 ~~1.00~~	P	0.2	IG09	1		0.2					85% of wheels Require Repair
60	MANPGC	ASSY	1.00		T										
60	MANPGC	ASSY			S										
60	MANPGC	ASSY		.80 ~~1.00~~	P	2.7	IG09	1		0.8					
70	MANPGC	PROC	1.00		T										
70	MANPGC	PROC			S										
70	MANPGC	PROC		.85 ~~1.00~~	P	5.0	IG09	1		0.1	9573	1		4.0	
80	MANPGC	ASSY	1.00		T										
80	MANPGC	ASSY			S										
80	MANPGC	ASSY		.85 ~~1.00~~	P	~~0.5~~ 6.0	IG09	1		0.3	0787	1		0.1	

OPERATION PROFILE SAS 4/19/89

NAME Pinnacle ALC WR DATE [illegible] RCC MANPGC SHEET 3 OF 4

ITEM CD PCN 08121A WCD WCDDATE 8119

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
90	MANPGC	ASSY	1.00	.	T	.		.	.	.		.	.	.	
90	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
90	MANPGC	ASSY	.	.85 ~~1.00~~	P	4.7	IG09	1	.	0.2		.	.	.	
100	MANPGC	NDI	1.00	.	T	.		.	.	.		.	.	.	
100	MANPGC	NDI	.	.	S	.		.	.	.		.	.	.	
100	MANPGC	NDI	.	.85 ~~1.00~~	P	0.1	IG09	1	.	0.1		.	.	.	
110	MANPGC	ASSY	1.00	.	T	.		.	.	.		.	.	.	
110	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
110	MANPGC	ASSY	.	.85 ~~1.00~~	P	6.0 ~~7.00~~	IG09	1	.	0.3	0001	1	.	2.0	
120	MANPGC	NDI	1.00	.	T	.		.	.	.		.	.	.	
120	MANPGC	NDI	.	.	S	.		.	.	.		.	.	.	
120	MANPGC	NDI	.	.85 ~~1.00~~	P	0.2	IG09	1	.	0.2	0010	1	.	0.1	
130	MANPGC	ASSY	1.00	.	T	.		.	.	.		.	.	.	

NAME [illegible]

OPERATION PROFILE SAS 4/19/89

9:44 TUESDAY, MARCH 28, 1989 4

ITEM CD PCN 08121A ALC WR DATE [illegible] RCC MANPGC

WCD WCDDATE 8119

SHEET 4 OF 4

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
130	MANPGC	ASSY	.	.	S										
130	MANPGC	ASSY	.	.80 ~~1.00~~	P	5.0	IG09	1	.	1.0					
140	MANPGC	ASSY	1.00	.	T										
140	MANPGC	ASSY	.	.	S										
140	MANPGC	ASSY	.	.85 ~~1.00~~	P	0.6	IG09	1	.	0.6	1022	1	.	0.4	
150	MANPGC	NDI	1.00	.	T										
150	MANPGC	NDI	.	.	S										
150	MANPGC	NDI	.	1.00	P	0.6	IG09	1	.	0.4	0450	1	.	0.4	
150	MANPGC	NDI	.	1.00	P	0.6	IG10	1	.	0.4	1022	1	.	0.4	
160	MANPGC	ASSY	0.99	.	T										
160	MANPGC	ASSY	.	.	S										
160	MANPGC	ASSY	.	1.00	P	3.0	IG09	1	.	0.4					

.3 wheels to [illegible] Repair.
100% of wheels Repair Go Thru All op.s

OPERATION PROFILE   SAS 4/19/89   9:44 TUESDAY, MARCH 28, 1989   5

NAME [signature]   ALC WR   DATE [illegible]   RCC MANPGC   SHEET 1 OF 3

ITEM CD PCN 06121ASUB1   WCD   WCDDATE 7167

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
5A	MANPGC	DIS	.	.	T	.		.	.	.		.	.	.	
5A	MANPGC	DIS	.	.	S	.		.	.	.		.	.	.	
5A	MANPGC	DIS	.	1.00	P	0.2	IG09	1	.	0.2		.	.	.	
5B	MANPGC	ASSY	.	.	T	.		.	.	.		.	.	.	
5B	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
5B	MANPGC	ASSY	.	1.00	P	0.2	IG09	1	.	0.2		.	.	.	
5C	MANPGC	ASSY	.	.	T	.		.	.	.		.	.	.	
5C	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
5C	MANPGC	ASSY	.	1.00	P	0.4	IG09	1	.	0.4	5139	1	.	0.4	
5D	MANPGC	ASSY	.	.	T	.		.	.	.		.	.	.	
5D	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
5D	MANPGC	ASSY	.	1.00	P	4.5	IG09	1	.	0.5		.	.	.	
5E	MANPGC	ASSY	.	.	T			.	.			.	.	.	

NAME [signature] OPERATION PROFILE SAS 4/14/89

ALC WR DATE 7167 RCC MANPGC SHEET 2 OF 3

ITEM CD PCN 00121ASUB1 WCD WCDDATE 7167

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
5E	MANPGC	ASSY			S										
5E	MANPGC	ASSY		1.00	P	1.2	IG09	1		0.2					
5F	MANPGC	ASSY			T										
5F	MANPGC	ASSY			S										
5F	MANPGC	ASSY		1.00	P	0.5	IG09	1		0.5					
5G	MANPGC	ASSY			T										
5G	MANPGC	ASSY			S										
5G	MANPGC	ASSY		1.00	P	1.3	IG09	1		0.3					
5H	MANPGC	ASSY			T										
5H	MANPGC	ASSY			S										
5H	MANPGC	ASSY		1.00	P	0.4	IG09	1		0.4					
5I	MANPGC	ASSY			T										

NAME R. VANDERLOOED OPERATION PROFILE SAS 4/17/87 9:44 TUESDAY, MARCH 28, 1989 7

ITEM CD PCN 08121ASUB1 ALC WR DATE [redacted] RCC MANPGC SHEET 3 OF 3

WCD WCDDATE 7167

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
5I	MANPGC	ASSY			S										
5I	MANPGC	ASSY		1.00	P	1.3	IG09	1		0.3					
5J	MANPGC	ASSY			T										
5J	MANPGC	ASSY			S										
5J	MANPGC	ASSY		1.00	P	1.5	IG09	1		0.5	0787	1		0.5	
5K	MANPGC	ASSY			T										
5K	MANPGC	ASSY			S										
5K	MANPGC	ASSY		1.00	P	40.0	IG09	1		0.2	0009	1		36.0	

WORK MEASUREMENT STANDARD DATA COMPUTATION SHEET

Page 1 of 1 Pages

DATE: 22 Nov 82

JOB ASSIGNED TO: CARL MUCHER

COMPUTED BY: CARL MUCHER

INSTRUCTIONS: Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

ORDER	PART NUMBER	STOCK NUMBER	JOB STANDARD	STATION NO.
01970A	GG2479AB01	6615-00-137-6038	N/A	MNPG

NOUN	QUANTITY	STD HRS PER	PIECES	TIME PER PIECE
Transmitter, Rate Gyroscope	N/A	N/A	N/A	N/A

WORK MEASUREMENT REQUIREMENTS:

PRODUCTION SUPERVISOR LABOR STANDARD REVIEW

Observations were made 26 Aug 82 through 3 Sep 82 in accordance with AFLCR 66-4 Work Sampling Techniques. Overall productivity was 91 %.

CATEGORY	BASE HR/OCC	PF&D	STD HR/OCC	OCC FACTOR	STD HR/END ITEM
Receive	.044	1.07	.04708	1.00	.04708
Pretest	.067	1.07	.07169	1.00	.07169
Disass & Clean	7.913	1.07	8.46691	.81	6.85820
Ass & Repair	2.657	1.07	2.84299	.81	2.30282
Motor Run	.211	1.07	.22577	.81	.18287
Calibration	1.961	1.07	2.09827	.81	1.69960
Clean & Cement	.618	1.07	.66126	.81	.53562
PWB & Install Cover					
Leak Check & Fill, Seal &	.059	1.07	.06313	.81	.05114
electronic [illegible]rter	2.195	1.07	2.34865	.81	1.90241
[illegible]ctional -	1.769	1.07	1.89283	1.00	1.89283
[illegible]inal Visual & Condition Tag	.774	1.07	.82818	1.00	.82818

TOTAL 16.37244

This total is manually computed and may vary slightly from E046 output. In accordance with AFLCF 66-4, para 3-10, all standards should be reviewed by affected supervisory personnel for completeness of work content. Production supervisors will be given 10 workdays to express in writing their reasons for nonconcurrence. If, after this time, no reply has been received from the coordinating agency, the standard will be considered coordinated and acceptable.

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER: N/A		WORK CENTER FOREMAN: Dan W. Hanelon	4 Mar 83
IE TECHNICIAN		N/A	

AFLC FORM SEP 60 774 REPLACES AMC FORM 774, SEP 60, WHICH MAY BE USED. AFLC-WPAFB-APR 73 2135

SHOP FLOW DAY COMPUTATION FOR PRODUCTION NO: 01970A

AFLCR 66-4 Shop Flow Day Formula was used to establish this flow day standard as follows: Flow Days = A [(B ÷ C) + D + E] where A = 1.45; B = End Item Labor Standard; C = Direct Labor Hours Per Person Per Day adjusted for indirect categories and labor efficiency; D = Routine Delays; E = Unique Delays. Repair is being accomplished as a responsible shop.

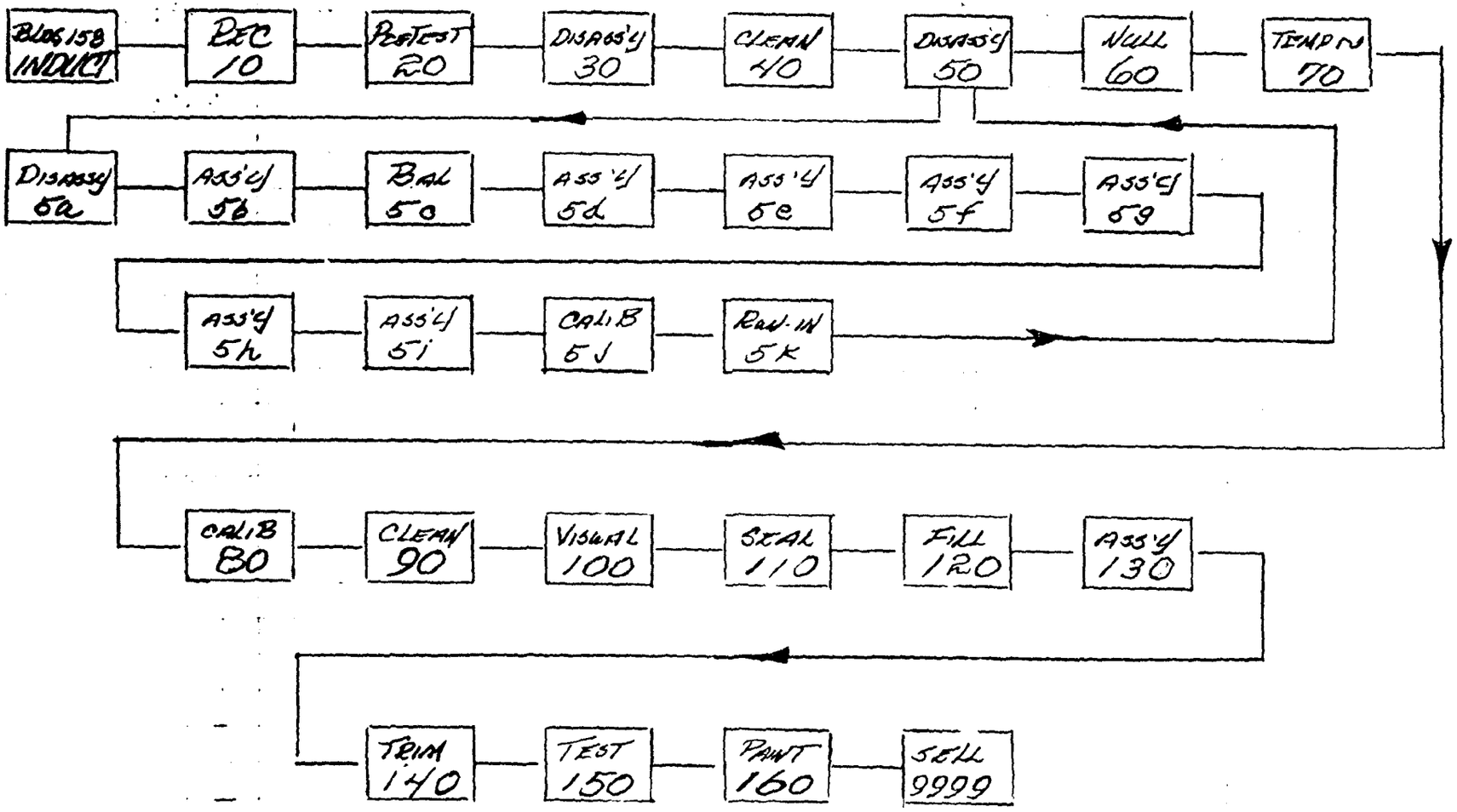
STEP	DESCRIPTION	D
1	B = Labor Standard of 16.37 Hrs C = 7.66 Daily Labor Hrs Value "C" is calculated as follows: MANPG C .24 +.25 + .26 + .29 Indirect Average = .1 Hours MANPG C Labor Efficiency = 97 % C = 8 Hours Minus Indirect Average Times Labor Efficiency	E
2	D = Routine Delays a. Awaiting Maintenance (AWM) = 3.8 days b. One days supply at station awaiting maintenance = 4 days (average 4 stations for each C/N). This is necessary to maintain uninterrupted flow of items. TOTAL	
3	E = Unique Delays a. Machine processing 3.42 Day(s) b. Machine processing delays 3.63 Day(s) c. Routing to support shops _____ Day(s) d. Others (See Reverse Side) _____ Day(s) TOTAL	7
4	Total flow days this shop (1 + 2 + 3)	16
5	Work Shift Adjustment (Item 4 ÷ number of shifts). 16.99 ÷ 1	16
6	Sum of flow days for all shops (Item 5 x 1.45) 16.99 X 1.45 = 24.6355 (Final result to be rounded up to next whole day.)	25

COMPUTED BY: SYLVIA H. BLACK DATE: 2 OCT 84

TO 5F10-4-5-53

		HOURS	PAGE	PARA
3. E = UNIQUE DELAYS				
a. Machine Processing - 27.34 ÷ 8 hrs/day = 3.42				
(1)	To aid in removing cover, gyroscope & capscrews, heat in oven.	2.00	3-1	3-4, 3-6a, 3-6g
(2)	Apply adhesive to stator & place in oven	2.00	6-1	6-4f
(3)	Apply adhesive to brg flange & cure	3.00	6-7	6-13e
(4)	Run in motor 36 hrs ÷ 3	12.00	6-9	6-16f
(5)	Place in temp cycle chamber	4.00	6-10	6-19
(6)	Perform drift test by placing in oven	2.00	6-11	6-21a(5)
(7)	Warm up gyro (10 min)	.17	6-13	6-22b
(8)	Warm up gyro (10 min)	.17	6-13	6-23e
(9)	Cure epoxy in oven for 2 hrs	2.00	6-15	6-28h
b. Machine Processing Delays - 29.00 ÷ 8 hrs/day = 3.63				
(1)	Let cover, assy & capscrew cool	1.00	3-1	3-4, 3-6a, 3-6g
(2)	Cure epoxy	2.00	5-3	5-7e
(3)	Let spinmotor wound stator cool	1.00	6-1	6-4f
(4)	Cure adhesive on header (24 ÷ 3)	8.00	6-1	6-5d
(5)	Cure adhesive on coil winding assy (24 ÷ 3)	8.00	6-1	6-6d
(6)	After drift check cool	4.00	6-11	6-21b(4)
(7)	Dry at room temp	1.00	6-14	6-24d
(8)	Allow silicone rubber to air dry	4.00	6-19	6-40e

PROCESS FLOW CHART PCN 06121A



DDS 4/19/89

SAS

PART OPERATION SUMMARY 9:03 FRIDAY, FEBRUARY 24, 1989 1

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: GG2479AB01 NSN: PCN: 06121A WCD: WCD DATE: 8119

OPERATION: ZPRT
SAMPLE SIZE: 163 MISSING FLOWTIMES: PRIMARY 1 OPERATION TYPE: ASSY MATERIAL TYPE:
END ITEMS: OUTLIERS DELETED: 0

MANPOWER REQUIRED				EQUIPMENT REQUIRED					
		--- TIME ---					--- TIME ---		BATCH
SKILL	QTY	FRACTION	HOURS	CODE	CATEGORY	QTY	FRACTION	HOURS	MIN MAX

HISTORICAL DATA

ACTUAL FREQ	RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0 34	**********
10 14	******
20 13	*****
30 13	*****
40 8	***
50 4	**
60 5	**
70 4	*
80 0	
90 0	
>=100 5	**

DISTRIBUTION	PARAMETERS			D VALUE	D ALPHA
UNIFORM	0.0		119.0	0.409	.
TRIANGULAR	0.0	0.5	119.0	0.198	.
NORMAL	28.2	27.1		0.125	0.01
LOGNORMAL	28.2	27.1		0.060	1.00
EXPONENTIAL	28.7			0.049	1.00

OCCURRANCE FACTOR: . OCCURRANCES: 164

DISTRIBUTION OF CHOICE: EXPONENTIAL

SAS

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: 10063458-102 NSN: PCN: 06121ASUB1 WCD: WCD DATE: 7167

OPERATION: ZPRT PRIMARY OPERATION TYPE: ASSY MATERIAL TYPE:
SAMPLE SIZE: . MISSING FLOWTIMES: . END ITEMS: . OUTLIERS DELETED: .

-------- MANPOWER REQUIRED --------

SKILL	QTY	--- TIME --- FRACTION	HOURS

---------- EQUIPMENT REQUIRED ----------

CODE	CATEGORY	QTY	--- TIME --- FRACTION	HOURS	BATCH MIN	BATCH MAX

HISTORICAL DATA

	ACTUAL FREQ	RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
	0	.
	0	.
	0	.
	0	.
	0	.
	0	.
	0	.
	0	.
	0	.
	0	.
>=	0	.

DISTRIBUTION	PARAMETERS	D VALUE	D ALPHA
UNIFORM	. .	.	.
TRIANGULAR	. . .	.	.
NORMAL	. .	.	.
LOGNORMAL	. .	.	.
EXPONENTIAL	.	.	.

OCCURRANCE FACTOR: . OCCURRANCES: .

DISTRIBUTION OF CHOICE: .

WORK CONTROL DOCUMENT

1. DATE: 8119

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
See Block 12	1	"O"MNPGC		

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
See Block 12	5F10-4-4-3; 5F10-4-4-3-1	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
A2850-1/A2850-5	See Block 12	CIRCLE APPROPRIATE C/N
13. SERIAL NUMBER	14. NOUN	C/N NSN P/N
	TRU-2A/A Rate Gyro	02387A/74061A 6615-00-857-0828 B2888-01
		02382A/74065A 6615-00-869-0825 B2888-02

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	010	Receive (Check data on WCD and AFTO Form 349. Clean gyro external surfaces.)			
	020	Remove gyro from bracket. Strip paint from gyro, if damaged; if not, remove paint from solder tube and filler tube areas only.			
	030	Unsolder and remove filling tube; apply heat, to overlap of solder band and pell or roll it off.			
	040	Pull gyroscope out of cover assembly. Disassemble, assembleclean and inspect.			
	050	Take motor to repair area. See attached work control document.			
	060	Install motor in gimbal; install gimbal assy in frame. Install terminal board and dashpot.			
	070	Calibration: Adjust null, set rates, set bumpers and adjust damping time.			
	080	Certify that this item does not contain any foreign objects such as tools or unattached components.			B
	090	Fill, seal, and leak check gyroscope assy; install mounting strap and mount assy to base.			
	100	Install transmitter assy in fixture and run cross coupling check			

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANPGC MANPGB	c. MAQNG	
		b. MANERG	d. MANSAA	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WORK CONTROL DOCUMENT (CONT'D)			1. DATE 8119	PAGE 2 OF 2 PAGES	
15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	110	Final visual, paint, check for mod TO compliance, complete AFTO Form 349 and apply warning decal.			
	120 0100	Perform functional analysis (final test) Stamp condition tag.			B
	120 0200 MNPGB	Perform functional analysis Stamp condition tag.			B
	130	Attach serviceable tag and install WR-ALC decal IAW MAOI 66-40. Attach condition tag			

WORK CONTROL DOCUMENT

1. DATE: 7167

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
02387A/74061A 2382A/74065A	1	"O" MNPGC		

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
14038-03	5F10-4-4-3	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	NSL	

13. SERIAL NUMBER	14. NOUN
	MOTOR ASSEMBLY

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	"Q"
	05a 10-40	Disassemble, clean, inspect and repair motor assembly IAW 5F10-4-4-3, Section II.			
	05b 10-50	Rebalance motor if rotor or ball bearings have been replaced IAW 5F10-4-4-3, Section II.			
	05c 10-50	Adjust end play IAW 5F10-4-4-3, Section II.			
	05d 10-50	Secure connections IAW 5F10-4-4-3, Section II.			
	05e 10-50	Run motor bearing test (48 hours) IAW 5F10-4-4-3, Section II.			

FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANERC David L Bridges 19 JUN 87	a. MAONG James E. Boyt 22 June 87	
		b. MANPCC Daniel Hamilton 19 JUN 87	b. MANSAA Don Kithull 19 JUN87	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WR-ALC/MANSAA "OVERPRINT"

Dunk

WORK CONTROL DOCUMENT

1. DATE 7167 | PAGE 1 OF 3 PAGES

2. ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
387A/74061A 382A/74065A	1	"0" MNPGC/MNPGB	8053	8215

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
B2888-01 B2888-02	5F10-4-4-3; 5F10-4-4-3-1	65-2757

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
A2850-1 A2850-5	6615-00-857-0828 6615-00-869-0825	NOTE: Use QQ-S-571, type SN 60WRP solder and anticorrosion flux MIL-E-14256. Observe all notes, cautions, and warnings throughout the TO. 82A
13. SERIAL NUMBER	14. NOUN	
	TRU-2A/A Rate Gyro	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	01 10-10	Receive and clean assembly. Ascertain data correctness on Forms AFLC 959 and AFTO 349.	WR PA 6051	25 JUL 1988	
	02 10-20	Remove gyro from bracket. Strip paint from Gyroscope, if damaged; if not, remove paint from solder tube and filler tube areas only. (5F10-4-4-3, Section 1)	WR PA 6051	25 JUL 1988	
	03 10-30	Unsolder and remove filling tube; apply heat to overlap of solder band and peel or roll it off. (5F10-4-4-3, Section II)	WR PA 6051	25 JUL 1988	
	04 10-30	Pull gyroscope out of cover assembly. Disassemble, assemble, clean and inspect. (5F10-4-4-3, Section II)	WR PA 6051	25 JUL 1988	
	05 10-30	Take motor to repair area. See attached Work Control Document. N/A	WR PA 6051	25 JUL 1988	
	06 10-60	Install motor in gimbal; install gimbal assy in frame. Install terminal board and dashpot. (5F10-4-4-3, Section II)	WR PA 6051	25 JUL 1988	
	07 10-70	Calibration: Adjust null, set rates, set bumpers and adjust damping time. (5F10-4-4-3, Section III).	WR PA 6051	26 JUL 1988	
	08	Certify that this item does not contain any foreign objects such as tools or unattached objects.	WR PA 5051	26 JUL 1988 B	
	09 10-80	Fill, seal, and leak check gyroscope assy; install mounting strap and mount assy to base (5F10-4-4-3, Section II).	WR PA 6051	27 JUL 1988	
	10 10-90	Install transmitter assy in fixture and run cross coupling check. (5F10-4-4-3, Section II).	WR PA 6051	27 JUL 1988	

FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANERC Harold S Bridges 14 Jun 87	b. MAQNG James E Bost 22 June 87	
		c. MANPGC/MANPGB William D Hall	d. MANSAA Don Kottell 8 JUNE 87	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WR-ALC/MANSAA "OVERPRINT"

WORK CONTROL DOCUMENT (CONT'D)			1. DATE	PAGE 2 OF 3 PAGES	
15. DISPATCHTATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "B"	20. "C"
	11 10-110	Final visual, paint, check for mod TO compliance, complete AFTO Form 349 and apply warning decal.	WR PA 6051	27 JUL 1988	
	12 10-100	Perform Functional Analysis (Final Test) and stamp serviceable tag.	WR PA 6051	28 JUL 1988	
	13	Attach serviceable tag and install WR-ALC decal IAW MAOI 66-40 complete AFLC Form 959.	WR PA 6051	28 JUL 1988	

\PROGRAM NAME: 300329 A
\CPIN: 81H-TRU2A/0825-U001-00A
\DATE OF LAST REVISION: 22-NOV-87
\UUT TYPE: RATE GYRO
\UUT NATIONAL STOCK NUMBER: 6615-00-869-0825
\UUT MFR/PART NUMBER: R.C.ALLEN A2850-5 / B2883-02
\OPERATOR'S NAME: WILSON
\TEST STATION: RATE STATION # 1
\DATE & TIME OF TEST: 27-JUL-88 12:22:24

JUL 27 1988

WR PA 8335

/ INSULATION TEST

INS. ON PINS J1-A AND CASE	1	uAMPS	00010.0000	00000.0000	.37000E+00	PASS	27-JUL-88 12:23:19
INS. ON PINS J1-B AND CASE	1	uAMPS	00010.0000	00000.0000	.53000E+00	PASS	27-JUL-88 12:23:20

@GYRO IN TEST POSITION 1 IS SERIAL NUMBER 65-2757
@GYRO IN TEST POSITION 2 IS SERIAL NUMBER 68-3721
@GYRO IN TEST POSITION 3 IS SERIAL NUMBER 63-1742

/ SPINMOTOR RUNUP TESTS

STARTING CURRENT	1	Amps	.52600E+00	.50000E-01	.22892E+00	PASS	27-JUL-88 12:28:46
RUNNING CURRENT	1	Amps	.25000E+00	.20000E-01	.20903E+00	PASS	27-JUL-88 12:30:13
DC INPUT VOLTAGE	1	VDC	00028.1000	00027.9000	00027.9217	PASS	27-JUL-88 12:35:04

/ STEADY-STATE RATE TESTS

OUTPUT AT 0.75 D/S CW RATE	1	VOLTS	.28600E+00	.21400E+00	.25896E+00	PASS	27-JUL-88 12:45:14
OUTPUT AT 1.50 D/S CW RATE	1	VOLTS	.55000E+00	.45000E+00	.49492E+00	PASS	27-JUL-88 12:45:42
OUTPUT AT 3.00 D/S CW RATE	1	VOLTS	00001.1000	.90000E+00	00001.0209	PASS	27-JUL-88 12:46:09
OUTPUT AT 6.00 D/S CW RATE	1	VOLTS	00002.1800	00001.8200	00001.9947	PASS	27-JUL-88 12:46:31
OUTPUT AT 0.00 D/S CW RATE	1	VOLTS	.25000E-01	-.25000E-01	.53100E-02	PASS	27-JUL-88 12:47:15
OUTPUT AT 0.75 D/S CCW RATE	1	VOLTS	-.21400E+00	-.28600E+00	-.25294E+00	PASS	27-JUL-88 12:47:43
OUTPUT AT 1.50 D/S CCW RATE	1	VOLTS	-.45000E+00	-.55000E+00	-.49985E+00	PASS	27-JUL-88 12:48:09
OUTPUT AT 3.00 D/S CCW RATE	1	VOLTS	-.90000E+00	-00001.1000	-.99837E+00	PASS	27-JUL-88 12:48:35
OUTPUT AT 6.00 D/S CCW RATE	1	VOLTS	-00001.8200	-00002.1800	-00002.0002	PASS	27-JUL-88 12:49:01
OUTPUT AT 0.00 D/S CCW RATE	1	VOLTS	.25000E-01	-.25000E-01	.71850E-02	PASS	27-JUL-88 12:49:42
HYSTERESIS	1	VOLTS	.25000E-01	-.25000E-01	-.93750E-02	PASS	27-JUL-88 12:49:54
ZERO OFFSET	1	VOLTS	.50000E-01	-.50000E-01	.62475E-02	PASS	27-JUL-88 12:49:55

/ VOLTAGE EXTREMES TEST - 25 VOLT EXCITATION

DC INPUT VOLTAGE	1	VDC	00025.1000	00024.9000	00025.0707	PASS	27-JUL-88 12:50:19
OUTPUT AT 0.75 D/S CW RATE	1	VOLTS	.23000E+00	.20000E+00	.21373E+00	PASS	27-JUL-88 12:50:40
OUTPUT AT 1.50 D/S CW RATE	1	VOLTS	.56000E+00	.41000E+00	.48663E+00	PASS	27-JUL-88 12:51:00
OUTPUT AT 3.00 D/S CW RATE	1	VOLTS	00001.1000	.83000E+00	.99758E+00	PASS	27-JUL-88 12:51:31
OUTPUT AT 6.00 D/S CW RATE	1	VOLTS	00002.2000	00001.6600	00001.9620	PASS	27-JUL-88 12:52:00
OUTPUT AT 0.75 D/S CCW RATE	1	VOLTS	-.20000E+00	-.28000E+00	-.25264E+00	PASS	27-JUL-88 12:52:50
OUTPUT AT 1.50 D/S CCW RATE	1	VOLTS	-.41000E+00	-.56000E+00	-.48144E+00	PASS	27-JUL-88 12:53:15
OUTPUT AT 3.00 D/S CCW RATE	1	VOLTS	-.83000E+00	-00001.1000	-.97241E+00	PASS	27-JUL-88 12:53:42
OUTPUT AT 6.00 D/S CCW RATE	1	VOLTS	-00001.6600	-00002.2000	-00001.9692	PASS	27-JUL-88 12:54:08
ZERO OFFSET	1	VOLTS	.50000E-01	-.50000E-01	.73605E-02	PASS	27-JUL-88 12:54:39

/ VOLTAGE EXTREMES TEST - 29 VOLT EXCITATION

DC INPUT VOLTAGE	1	VDC	00029.1000	00028.9000	00028.9305	PASS	27-JUL-88 12:55:05
OUTPUT AT 0.75 D/S CW RATE	1	VOLTS	.28000E+00	.20000E+00	.24053E+00	PASS	27-JUL-88 12:55:26
OUTPUT AT 1.50 D/S CW RATE	1	VOLTS	.56000E+00	.41000E+00	.49532E+00	PASS	27-JUL-88 12:55:52
OUTPUT AT 3.00 D/S CW RATE	1	VOLTS	00001.1000	.83000E+00	00001.0316	PASS	27-JUL-88 12:56:19
OUTPUT AT 6.00 D/S CW RATE	1	VOLTS	00002.2000	00001.6600	00002.0004	PASS	27-JUL-88 12:56:44
OUTPUT AT 0.75 D/S CCW RATE	1	VOLTS	-.20000E+00	-.28000E+00	-.26380E+00	PASS	27-JUL-88 12:57:33
OUTPUT AT 1.50 D/S CCW RATE	1	VOLTS	-.41000E+00	-.56000E+00	-.49919E+00	PASS	27-JUL-88 12:58:00
OUTPUT AT 3.00 D/S CCW RATE	1	VOLTS	-.83000E+00	-00001.1000	-00001.0032	PASS	27-JUL-88 12:58:26
OUTPUT AT 6.00 D/S CCW RATE	1	VOLTS	-00001.6600	-00002.2000	-00002.0094	PASS	27-JUL-88 12:58:52
ZERO OFFSET	1	VOLTS	.50000E-01	-.50000E-01	.79130E-02	PASS	27-JUL-88 12:59:23
DC INPUT VOLTAGE	1	VDC	00028.1000	00027.9000	00028.0608	PASS	27-JUL-88 12:59:32

/ TRANSIENT RESPONSE TEST

CW 6 DEG-SEC-RATE	1	VOLTS	00002.2000	00001.6600	00001.9922	PASS	27-JUL-88 12:59:54
CW TRANSIENT RESPONSE	1	SEC	00002.5000	00001.5000	00001.8833	PASS	27-JUL-88 12:59:57
CCW 6 DEG/SEC RATE	1	VOLTS	-00001.6600	-00002.2000	-00002.0101	PASS	27-JUL-88 13:00:14
CCW TRANSIENT RESPONSE	1	SEC	00002.5000	00001.5000	00001.9499	PASS	27-JUL-88 13:00:17

/ CROSS AXIS SENSITIVITY TEST

DC INPUT VOLTAGE	1	VDC	00028.1000	00027.9000	00028.0254	PASS	27-JUL-88 13:06:51
SPIN AXIS SENSITIVE-CW ROT.	1	VOLTS	.20000E-01	-.20000E-01	.23146E-02	PASS	27-JUL-88 13:07:36

OPERATION PROFILE

NAME R. VanDerVeer ALC WR DATE 4-6-8 RCC MANPGC SHEET 1 OF 1

PCN NUM- BER 74061A WCD N/A WCD DATE AB119

OPERATION NUMBER	RCC	OPERATION DESCRIPTION	MANDATORY OCCURRENCE FACTOR	OPERATION TYPE	MANDATORY FLOW HOURS %	MANDATORY FLOW HOURS HRS.	MANPOWER SKILL CODE/ LEVEL	MANPOWER QTY.	MANPOWER TIME REQUIRED %	MANPOWER TIME REQUIRED HRS.	EQUIPMENT EQUIPMENT CODE	EQUIPMENT QTY.	EQUIPMENT TIME REQUIRED %	EQUIPMENT TIME REQUIRED HRS.	DATA SOURCE COMMENTS
IN	MANPG	REC	1	TRANSIT											C. DRIVER RANGER MAC MILLER OPER. & A SCHEDULER.
				SETUP											
				PROCESS		1	IG09	1		0.1	STD				
		↑		TRANSIT											
				SETUP											
				PROCESS											
ALL WCD OPERATIONS LISTED IN CM OPER PROFILE				TRANSIT											
				SETUP											
				PROCESS											
		↓		TRANSIT											
				SETUP											
				PROCESS											
9999	MANPG	SELL	1	TRANSIT											D. HARRELSON SUPERV. MANPGC MAC MILLER OPERATOR & SCHEDULER.
				SETUP											
				PROCESS		.1	IG09	1		0.1	STD				

LSC-20092C

NAME [illegible] OPERATION PROFILE SAS 4/19/89 9:44 TUESDAY, MARCH 28, 1989 8

ITEM CD PCN 74061A ALC WR DATE [illegible] RCC MANPGC SHEET 1 OF 4

WCD WCDDATE A8119

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
10	MANPGC	REC	0.99	.	T	.		.	.	.		.	.	.	
10	MANPGC	REC	.	.	S	.		.	.	.		.	.	.	
10	MANPGC	REC	.	1.00	P	0.1	IG09	1	.	0.1		.	.	.	
20	MANPGC	DIS	0.99	.	T	.		.	.	.		.	.	.	
20	MANPGC	DIS	.	.	S	.		.	.	.		.	.	.	
20	MANPGC	DIS	.	1.00	P	1.3	IG09	1	.	0.3		.	.	.	
30	MANPGC	DIS	1.00	.	T	.		.	.	.		.	.	.	
30	MANPGC	DIS	.	.	S	.		.	.	.		.	.	.	
30	MANPGC	DIS	.	1.00	P	0.1	IG09	1	.	0.1		.	.	.	
40	MANPGC	DIS	1.00	.	T	.		.	.	.		.	.	.	
40	MANPGC	DIS	.	.	S	.		.	.	.		.	.	.	
40	MANPGC	DIS	.	1.00	P	0.1	IG09	1	.	0.6	5509	1	.	0.1	
50	MANPGC	DIS	1.00	.	T	.		.	.	.		.	.	.	

NAME [illegible] OPERATION PROFILE SAS 4/19/87 9:44 TUESDAY, MARCH 28, 1989 9

ITEM CD PCN 74061A ALC WR DATE [illegible] RCC MANPGC SHEET 2 OF 4

WCD WCDDATE A8119

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
50	MANPGC	DIS	.	.	S										
50	MANPGC	DIS	.	1.00	P	0.2	IG09	1	.	0.2					
60	MANPGC	ASSY	1.00	.	T										
60	MANPGC	ASSY	.	.	S										
60	MANPGC	ASSY	.	1.00	P	3.5	IG09	1	.	2.0					
70	MANPGC	ASSY	1.00	.	T										
70	MANPGC	ASSY	.	.	S										
70	MANPGC	ASSY	.	1.00	P	0.5	IG09	1	.	1.0	1022	1	.	0.5	
80	MANPGC	ASSY	1.00	.	T										
80	MANPGC	ASSY	.	.	S										
80	MANPGC	ASSY	.	1.00	P	0.2	IG09	1	.	0.2					
90	MANPGC	ASSY	0.98	.	T										

NAME [illegible]

OPERATION PROFILE SAS 4/15/89

9:44 TUESDAY, MARCH 28, 1989 10

ITEM CD PCN 74061A ALC WR DATE [illegible] RCC MANPGC

WCD WCDDATE A8119

SHEET 3 OF 4

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
90	MANPGC	ASSY	.	.	S										
90	MANPGC	ASSY	.	1.00	P	2.6 ~~0.6~~	IG09	1	.	0.6					
100	MANPGC	ASSY	0.99	.	T										
100	MANPGC	ASSY	.	.	S										
100	MANPGC	ASSY	.	1.00	P	0.7	IG09	1	.	0.7	1022	1	.	0.7	
110	MANPGC	ASSY	1.00	.	T										
110	MANPGC	ASSY	.	.	S										
110	MANPGC	ASSY	.	1.00	P	1.2	IG09	1	.	0.7	0004	1	.	0.2	
120	MANPGC	NDI	0.99	.	T										
120	MANPGC	NDI	.	.	S										
120	MANPGC	NDI	.	1.00	P	0.5	IG09	1	.	0.6	0450	1	.	0.5	
120	MANPGB	NDI	.	~~1.00~~	P	0.6	IG10	1	.	0.5	1022	1	.	0.6	
130	MANPGC	ASSY	0.99	.	T										

NAME [redacted] OPERATION PROFILE SAS 4/19/89 9:44 TUESDAY, MARCH 28, 1989 11

ITEM CD PCN 74081A ALC WR DATE [redacted] RCC MANPGC SHEET 1 OF 4

WCD WCDDATE A8119

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
130	MANPGC	ASSY	.	.	S	.	.	.	.	.	.	.	.	.	.
130	MANPGC	ASSY	.	1.00	P	0.2	IG09	1	.	0.2	.	.	.	.	.

NAME [redacted] OPERATION PROFILE SAS 4/5/89 9:44 TUESDAY, MARCH 28, 1989 12

ITEM CD PCN 74061ASUB1 ALC WR DATE [redacted] RCC MANPGC SHEET 1 OF 2

WCD WCDDATE A7167

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
05A	MANPGC	DIS/	1.00	.	T										
05A	MANPGC	DIS/	.	.	S										
05A	MANPGC	DIS/	.	1.00	P	0.2	IG09	1	.	0.2					
05B	MANPGC	ASSY	1.00	.	T										
05B	MANPGC	ASSY	.	.	S										
05B	MANPGC	ASSY	.	1.00	P	0.2	IG09	1	.	0.2	5139	1	.	0.2	
05C	MANPGC	ASSY	1.00	.	T										
05C	MANPGC	ASSY	.	.	S										
05C	MANPGC	ASSY	.	1.00	P	0.1	IG09	1	.	0.1					
05D	MANPGC	ASSY	1.00	.	T										
05D	MANPGC	ASSY	.	.	S										
05D	MANPGC	ASSY	.	1.00	P	0.2	IG09	1	.	0.2					
05E	MANPGC	ASSY	0.50	.	T										

NAME [illegible] OPERATION PROFILE SAS 4/11/89 9:44 TUESDAY, MARCH 28, 1989 13

ALC WR DATE [illegible] RCC MANPGC SHEET 2 OF 2

ITEM CD PCN 74061ASUB1 WCD WCDDATE A7167

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
05E	MANPGC	ASSY			S										
05E	MANPGC	ASSY		1.00	P	50.0	IG09	1		0.2	0009	1		48.0	

WORK MEASUREMENT STANDARD DATA COMPUTATION SHEET

Page 1 of 1 Pages

DATE

INSTRUCTIONS: Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

JOB ASSIGNED TO: Carl Mucher

COMPUTED BY: Carl Mucher

WORK ORDER	PART NUMBER	STOCK NUMBER	JOB STANDARD	STATION NO.
74061A	A2850-1	6615-00-857-0828	N/A	MNPG

NOUN	QUANTITY	STD HRS PER	PIECES	TIME PER PIECE
Rate Gyro TRU-2A/A	N/A	N/A	N/A	N/A

WORK MEASUREMENT REQUIREMENTS:

PRODUCTION SUPERVISOR LABOR STANDARD REVIEW

Observations were made 26 Aug 82 through 3 Sep 82 in accordance with AFLCR 66-4 Work Sampling Techniques. Overall productivity was 89 %.

CATEGORY	BASE HR/OCC	PF&D	STD HR/OCC	OCC FACTOR	STD HR/END ITEM
Receive	.049	1.07	.05243	1.00	.05243
Deseal	.339	1.07	.36273	1.00	.36273
Disass Gyro	1.541	1.07	1.64887	1.00	1.64887
D.C.I.R. Motor Bal/Rebal	.084	1.07	.08988	1.00	.08988
Motor/End play	.084	1.07	.08988	1.00	.08988
Reass Gyro	2.774	1.07	2.96818	1.00	2.96818
Calibrate	1.061	1.07	1.13527	1.00	1.13527
Fill/Seal/Leak Check	.177	1.07	.18939	1.00	.18939
Inst-Trans- &- CC-Check	.168	1.07	.17976	1.00	.17976
Final-Functional	.460	1.07	.4922	1.00	.4922
Fin-Vis-&-Prep	.465	1.07	.49755	1.00	.49755

TOTAL 7.70614 7.71

This total is manually computed and may vary slightly from E046 output. In accordance with AFLCR 66-4, para 3-10, all standards should be reviewed by affected supervisory personnel for completeness of work content. Production supervisors will be given 10 workdays to express in writing their reasons for nonconcurrence. If, after this time, no reply has been received from the coordinating agency, the standard will be considered coordinated and acceptable.

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER N/A		WORK CENTER FOREMAN Dana Hanelan	10 Jan 83
PROCESS TECHNICIAN Carl D. Mucher	10 Jan 83	N/A	

AFLC FORM SEP 66 774 REPLACES AMC FORM 774, SEP 60, WHICH MAY BE USED. AFLC-WPAFB-APR 73 2135

SHOP FLOW DAY COMPUTATION FOR PRODUCTION NO: 74061A

AFLCR 66-4 Shop Flow Day Formula was used to establish this flow day standard as follows: Flow Days = A [(B ÷ C) + D + E] where A = 1.45; B = End Item Labor Standard; C = Direct Labor Hours Per Person Per Day adjusted for indirect categories and labor efficiency; D = Routine Delays; E = Unique Delays. Repair is being accomplished as a responsible shop.

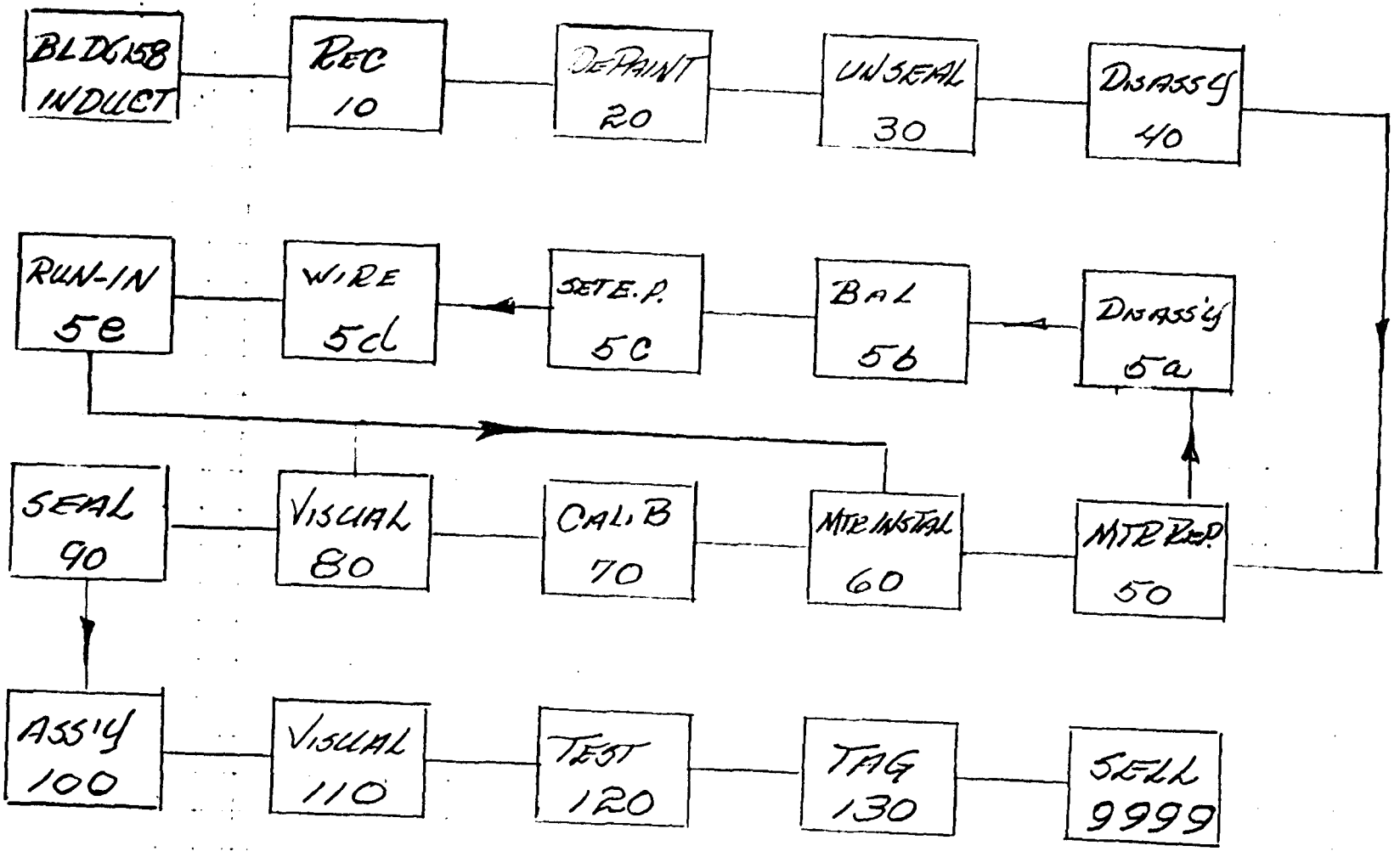
ITEM	DESCRIPTION	DAYS
1	B = Labor Standard of 7.71 Hrs C = 7.66 Daily Labor Hrs Value "C" is calculated as follows: MANPC C .24 +.25 + .26 + .29 Indirect Average = .1 Hours MANPC C Labor Efficiency = 97 % C = 8 Hours Minus Indirect Average Times Labor Efficiency	B 1.0
	D = Routine Delays a. Awaiting Maintenance (AWM) = 3.8 days b. One days supply at station awaiting maintenance = 4 days (average 4 stations for each C/N). This is necessary to maintain uninterrupted flow of items. TOTAL	7
3	E = Unique Delays a. Machine processing 2.00 Day(s) b. Machine processing delays _____ Day(s) c. Routing to support shops _____ Day(s) d. Others (See Reverse Side) _____ Day(s) TOTAL (See reverse side for details)	2.
4	Total flow days this shop (1 + 2 + 3)	10.
5	Work Shift Adjustment (Item 4 ÷ number of shifts). 10.806 ÷ 1	10.
6	Sum of flow days for all shops (Item 5 x 1.45) 10.806 X1.45= 15.6687 (Final result to be rounded up to next whole day.)	16

COMPUTED BY: SYLVIA H. BLACK DATE: 2 OCT 84

	TIME	PAGE	PARA
3. E Unique Delays			
a. Machine Processing			
(1) Run In Motor (48 hrs ÷ 3 = 16)	16.00	2-7	2-24m

16.00 ÷ 8 hrs/day - 2.00 days

PROCESS FLOW CHART PCN 74061A



Rod 4/19

SAS

PART OPERATION SUMMARY 9:03 FRIDAY, FEBRUARY 24, 1989 3

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: B2888-01 NSN PCN: 74061A WCD: WCD DATE: A8119

OPERATION: ZPRT
SAMPLE SIZE: 506 MISSING FLOWTIMES: 2 PRIMARY END ITEMS: OPERATION TYPE: ASSY MATERIAL TYPE:
OUTLIERS DELETED: 0

-------- MANPOWER REQUIRED --------

SKILL	QTY	--- TIME --- FRACTION	HOURS

---------- EQUIPMENT REQUIRED ----------

CODE	CATEGORY	QTY	--- TIME --- FRACTION	HOURS	BATCH MIN	BATCH MAX

HISTORICAL DATA

ACTUAL FREQ		RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0	42	**********
2	22	*********
4	16	******
6	6	**
8	1	*
10	1	
12	2	*
14	1	
16	1	
18	0	
>=20	7	***

DISTRIBUTION	PARAMETERS			D VALUE	D ALPHA
UNIFORM	0.0		127.0	0.809	
TRIANGULAR	0.0	1.0	127.0	0.757	
NORMAL	5.9	13.7		0.333	
LOGNORMAL	5.9	13.7		0.072	
EXPONENTIAL	6.4			0.204	0.01

OCCURRANCE FACTOR: OCCURRANCES: 508

DISTRIBUTION OF CHOICE: HISTORICAL DISCRETE

SAS

ALC WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: B2888-01 NSN: PCN: 74061ASUB1 WCD: WCD DATE: A7167

OPERATION: ZPRT
SAMPLE SIZE: 1 MISSING FLOWTIMES: 1 PRIMARY END ITEMS: OPERATION TYPE: ASSY MATERIAL TYPE:
OUTLIERS DELETED: 0

-------- MANPOWER REQUIRED --------

SKILL	QTY	--- TIME --- FRACTION	HOURS

---------- EQUIPMENT REQUIRED ----------

CODE	CATEGORY	QTY	--- TIME --- FRACTION	HOURS	BATCH MIN	BATCH MAX

HISTORICAL DATA

	ACTUAL FREQ	RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0	100	**********
1	0	
2	0	
3	0	
4	0	
5	0	
6	0	
7	0	
8	0	
9	0	
>=10	0	

DISTRIBUTION	PARAMETERS		D VALUE	D ALPHA
UNIFORM	0.0	0.0	.	.
TRIANGULAR			.	.
NORMAL	0.0		.	.
LOGNORMAL			.	.
EXPONENTIAL	0.2		.	.

OCCURRANCE FACTOR: . OCCURRANCES: 2

DISTRIBUTION OF CHOICE: HISTORICAL DISCRETE

WORK CONTROL DOCUMENT

1. DATE 8119 | PAGE 1 OF 2 PAGES

JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74063A	1	"O"MNPGC		

PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
T3837-02	5F6-4-3-23; 5F6-4-3-23-1	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-768-5019	NOTE: Use QQ-S-571 type SN60WRP solder. Observe all notes, cautions & warnings throughout the TO. MDC data required IAW MAOI 66-22.
13. SERIAL NUMBER	14. NOUN	
	MC-1 Rate Gyro	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	010	Receive (Check data on WCD and AFTO Form 349. Clean gyro external surfaces.)			
	020 0100	Perform functional analysis. If serviceable, stamp condition tag and proceed to Step 090.			B
	020 0200 MNPGB	Perform functional analysis. If serviceable, stamp condition tag and proceed to Step 090.			B
	030	Unseal			
	040	Gyro Repair			
	050	Calibrate gyro			
	060	Final inside visual. Certify that this item does not contain any foreign objects such as tools or unattached components.			B
	070	Fill, seal and leak check			
	~~080~~ 0100	~~Perform functional analysis. Stamp condition~~ tag.			~~B~~
	~~080~~ 0200 MNPGB	~~Perform functionaly analysis. Stamp condition~~ tag.			~~B~~

FINAL DESTINATION		22. COORDINATION/INITIATING OCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANPGC MAQMC		
		b. MANPGB MANERG	c. MANSAA	
		b.	d.	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WORK CONTROL DOCUMENT (CONT'D)			1. DATE 8119	PAGE 2 OF 2 PAGES	
15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	090	Final prep. Final visual. Complete AFLC Form 959, AFTO Form 349. Install WR-ALC decal IAW MAOI 66-40. Attach condition tag.			

Dyal

WORK CONTROL DOCUMENT

1. DATE: 6329 | PAGE 1 OF 1 PAGES

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
14063A	1	"O" MNPGC/MNPGB	8131	JUL 29 1988

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
T3837-32	5F6-4-3-28 5F6-4-3-23-1	64-962

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-768-5019	NOTE: Use QQ-S-571 type SN60WRP solder. Observe all notes, cautions and warnings throughout T.O. MDC. Required IAW MAOI 66-22.
13. SERIAL NUMBER	14. NOUN	
	MC-1 RATE GYRO	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	1 1010	Receive (check data on WCD and AFTO Form 349. Clean gyro external surfaces.) JUN 13 1988	WR PA 6013		
	2 1010	Pretest Motor JUN 13 1988 Essential Repair ____ Overhaul ____	WR PA 6013		
	3 1020	Unseal	WR PA 6245		
	4 1030	Gyro Repair	WR PA 7117 7-26-88		B
	5 1050	Calibrate Gyro	WR PA 7117 7-26-88		B
	6 1050	Final Inside visual. Certify that this item does not contain any foreign objects such as tools or unattached components.	WR PA 7117 7-26-88		B
	7 1060	Fill, Seal and Leak Check	WR PA 7117 7-26-88		
	8 1080	JUL 29 1988 Final Functional Analysis, Condition Tag.	WR PA 6204		B
	9 1090	Final Prep. Final Visual complete AFLC Form 959, AFTO Form 349. Install WR-ALC Decal, Attach Condition tag. JUL 29 1988	WR 5615		

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANPGC David L Briggs 13Jan87	a. MRQNG James E Boyt 13Jan87	
		b. MANPGC ____ MANPGB Thomas D Boyd 13Jan87	b. MANSA J. T. Powell	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WR-ALC/MANSAA "OVERPRINT"

Approved 2853 ABC/L ch 87) (DLM)

\PROGRAM NAME: 300294
\CPIN: 81H-HC1/5019-C001-00A
\DATE OF LAST REVISION: 08-MAY-87
\ TYPE: SWITCHING RATE GYRO HC-1
ATIONAL STOCK NUMBER: 6615-00-768-5019
MFR/PART NUMBER: R.C. ALLEN T3837-02
\OPERATOR'S NAME: FLOYD
\TEST STATION: RATE STATION # 1
\DATE & TIME OF TEST: 29-JUL-88 09:11:12
#GYRO IN TEST MOUNT POSITION 1 IS SERIAL NUMBER 67-7239
#GYRO IN TEST MOUNT POSITION 2 IS SERIAL NUMBER 64-962

JUL 2 9 1988

WR PA 6204

/ SPINMOTOR RUNUP TESTS

NORMALLY CLOSED TURN INDICATOR	2	Ohms	00050.0000	00000.0000	00002.1550	PASS	29-JUL-88 09:13:10
RUNNING CURRENT PHASE-A	2	mAmps	00087.0000	00000.0000	00063.5730	PASS	29-JUL-88 09:18:45

/ SWITCHING AND UNSWITCHING TIME TESTS

SWITCHING TIME 3.0 D/S CW	2	Sec	00004.0000	00000.0000	00001.2833	PASS	29-JUL-88 09:27:05
UNSWITCHING TIME 3.0 D/S CW	2	Sec	00015.0000	00000.0000	00004.0166	PASS	29-JUL-88 09:27:11
SWITCHING TIME 0.75 D/S CW	2	Sec	00008.0000	00000.0000	00003.0999	PASS	29-JUL-88 09:27:45
UNSWITCHING TIME 0.75 D/S CW	2	Sec	00015.0000	00000.0000	00004.0333	PASS	29-JUL-88 09:27:51
SWITCHING TIME 0.333 D/S CW	2	Sec	00020.0000	00000.0000	00006.1499	PASS	29-JUL-88 09:28:29
UNSWITCHING TIME 0.333 D/S CW	2	Sec	00015.0000	00000.0000	00003.2499	PASS	29-JUL-88 09:28:34
SWITCHING TIME 0.25 D/S CW	2	Sec	00030.0000	00000.0000	00010.3333	PASS	29-JUL-88 09:29:16
UNSWITCHING TIME 0.25 D/S CW	2	Sec	00015.0000	00000.0000	00003.2333	PASS	29-JUL-88 09:29:21
SWITCHING TIME 3.0 D/S CCW	2	Sec	00004.0000	00000.0000	00001.3333	PASS	29-JUL-88 09:29:54
UNSWITCHING TIME 3.0 D/S CCW	2	Sec	00015.0000	00000.0000	00004.7666	PASS	29-JUL-88 09:30:00
SWITCHING TIME 0.75 D/S CCW	2	Sec	00008.0000	00000.0000	00003.6833	PASS	29-JUL-88 09:30:36
UNSWITCHING TIME 0.75 D/S CCW	2	Sec	00015.0000	00000.0000	00004.0333	PASS	29-JUL-88 09:30:41
SWITCHING TIME 0.333 D/S CCW	2	Sec	00020.0000	00000.0000	00010.2166	PASS	29-JUL-88 09:31:23
UNSWITCHING TIME 0.333 D/S CCW	2	Sec	00015.0000	00000.0000	00003.2999	PASS	29-JUL-88 09:31:28
ING TIME 0.25 D/S CCW	2	Sec	00030.0000	00000.0000	00015.6833	PASS	29-JUL-88 09:32:15
CHING TIME 0.25 D/S CCW	2	Sec	00015.0000	00000.0000	00003.2666	PASS	29-JUL-88 09:32:19

/ YAW OSCILLATION TESTS

TURN INDICATOR 1 DEG 0.5 HZ	2	Ohms	.10000E+33	00050.0000	.10000E+33	PASS	29-JUL-88 09:39:40
TURN INDICATOR 2 DEG 0.125 HZ	2	Ohms	.10000E+33	00050.0000	.10000E+33	PASS	29-JUL-88 09:41:15

/ STEADY-STATE RATE AND YAW OSCILLATION TESTS

TURN INDICATOR CLOSED CW	2	Ohms	00050.0000	00000.0000	00002.0400	PASS	29-JUL-88 09:47:01
TURN INDICATOR OPEN CW	2	Ohms	.10000E+33	00050.0000	.10000E+33	PASS	29-JUL-88 09:47:23
TURN INDICATOR CLOSED CCW	2	Ohms	00050.0000	00000.0000	00002.0410	PASS	29-JUL-88 09:48:00
TURN INDICATOR OPEN CCW	2	Ohms	.10000E+33	00050.0000	.10000E+33	PASS	29-JUL-88 09:48:21

/ POWER FAIL TESTS

TURN INDICATOR OPEN CW	2	Ohms	.10000E+33	00050.0000	.10000E+33	PASS	29-JUL-88 09:50:47

\END

OPERATION PROFILE

NAME R.Va ERVooRR ALC WR DATE 4-6-81 RCC MANPGC SHEET 1 OF 1

PCN NON-PRT 74063A WCD N/A WCD DATE 88119

OPERATION NUMBER	RCC	OPERATION DESCRIPTION	MANDATORY OCCURRENCE FACTOR	OPERATION TYPE	MANDATORY FLOW HOURS %	MANDATORY FLOW HOURS HRS.	MANPOWER SKILL CODE/ LEVEL	MANPOWER QTY.	MANPOWER TIME REQUIRED %	MANPOWER TIME REQUIRED HRS.	EQUIPMENT EQUIPMENT CODE	EQUIPMENT QTY.	EQUIPMENT TIME REQUIRED %	EQUIPMENT TIME REQUIRED HRS.	DATA SOURCE COMMENTS
0009 M	MANPGC	REC	1	TRANSIT											C. DRIVER RUNNER MAC MILLER OPER. & A SCHEDULER.
				SETUP											
				PROCESS		1	IG09	1		0.1	STD				
		↑		TRANSIT											
				SETUP											
				PROCESS											
ALL WCD OPERATIONS LISTED IN CH OPER PROFILE				TRANSIT											
				SETUP											
				PROCESS											
		↓		TRANSIT											
				SETUP											
				PROCESS											
9999	MANPGC	SELL	1	TRANSIT											D. HARRELSON SUPERV. MANPGC MAC MILLER OPERATOR & SCHEDULER.
				SETUP											
				PROCESS		.1	IG09	1		0.1	STD				

LSC-2(X)92C

NAME R Vanderlaan

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 14

ALC WR DATE 4/04/89

ITEM CD PCN 74063A WCD WCDDATE 88119 RCC MANPGC SHEET 1 OF 3

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
10	MANPGC	REC	0.97	.	T	.		.	.	.		.	.	.	
10	MANPGC	REC	.	.	S	.		.	.	.		.	.	.	
10	MANPGC	REC	.	1.00	P	0.1	IG09	1	.	0.1		.	.	.	
20	MANPGC	NDI	0.97	.	T	.		.	.	.		.	.	.	
20	MANPGC	NDI	.	.	S	.		.	.	.		.	.	.	
20	MANPGC	NDI	.	1.00	P	0.2	IG09	1	.	0.2	6183	1	.	0.2	
											2026	1		0.2	
20	MANPGB	NDI	.	.	P	.	IG10	1	.	0.8	0450	1	.	0.8	
30	MANPCG	PROC	0.99	.	T	.		.	.	.		.	.	.	
30	MANPCG	PROC	.	.	S	.		.	.	.		.	.	.	
30	MANPCG	PROC	.	.88 ~~1.00~~	P	1.5	IG09	1	.	1.5		.	.	.	
40	MANPGC	REP	0.99	.	T	.		.	.	.		.	.	.	
40	MANPGC	REP	.	.	S	.		.	.	.		.	.	.	
40	MANPGC	REP	.	.88 ~~1.00~~	P	2.3	IG09	1	.	2.3		.	.	.	

NAME [illegible]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 15

ALC WR DATE 7/4/89 RCC MANPGC

ITEM CD PCN 74083A WCD WCDDATE B8119

SHEET 2 OF 3

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
45	MANPGC	REP	.	.	T	.		.	.	.		.	.	.	
45	MANPGC	REP	.	.	S	.		.	.	.		.	.	.	
45	MANPGC	REP	.	.75	P	60.0	IG09	1	.	0.8	5139	1	.	0.2	
45	MANPGC	REP	.	.	P	.	[illegible]	[illegible]	.	[illegible]	0009	1	.	48.0	
50	MANPGC	ASSY	0.99	.	T	.		.	.	.		.	.	.	
50	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
50	MANPGC	ASSY	.	.85 [illegible]	P	1.0	IG09	1	.	1.0	6183	1	.	1.0	
60	MANPGC	NDI	0.98	.	T	.		.	.	.		.	.	.	
60	MANPGC	NDI	.	.	S	.		.	.	.		.	.	.	
60	MANPGC	NDI	.	.85 [illegible]	P	0.1	IG09	1	.	0.1		.	.	.	
70	MANPGC	PROC	0.97	.	T	.		.	.	.		.	.	.	
70	MANPGC	PROC	.	.	S	.		.	.	.		.	.	.	

NAME [illegible]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 16

ITEM CD PCN 74063A ALC WR DATE [illegible] RCC MANPGC SHEET 3 OF 3

WCD WCDDATE B8119

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
70	MANPGC	PROC		[illegible]	P		IG09	1		0.8					
80	MANPGC	NDI	0.99		T	3.0									
80	MANPGC	NDI			S										
80	MANPGC	NDI		1.00	P	0.8	IG09	1		0.5	6183	1		0.5	
80	MANPGB	NDI			P	1.0	IG10	1		0.8	0450	1		0.8	
90	MANPGC	ASSY	0.97		T										
90	MANPGC	ASSY			S										
90	MANPGC	ASSY		1.00	P	0.1	IG09	1		0.1					

WORK MEASUREMENT STANDARD DATA COMPUTATION SHEET

Page 1 of 1 Pages | DATE 21 MAR 80

INSTRUCTIONS: Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

JOB ASSIGNED TO: L. HORNE

COMPUTED BY: L. HORNE

WORK ORDER	PART NUMBER	STOCK NUMBER	JOB STANDARD	STATI
74063A		6615-00-768-5019	N/A	MNPL

NOUN	QUANTITY	STD HRS PER	PIECES	TIME PER PIEC
MC-1 GYRO	N/A	N/A	N/A	N/A

WORK MEASUREMENT REQUIREMENTS.

COORDINATION OF LABOR STANDARD WITH PRODUCTION SUPERVISOR

Observations were made 14 JAN 80 through 1 FEB 80 in accordance with AFLCR 66-4 Work Sampling Techniques. Overall productivity 80 %.

CATEGORY	STANDARD HOURS	OCC FACTOR
RECEIVE-PRETEST	.185	1.00
UNSEAL	.447	.88
GYRO-REPAIR	4.124	.88
BUILDUP-TEST	.596	.88
MOTOR-REPAIR	.718	.74
MOTOR-TEST	.319	.74
CALIBRATE	1.359	.88
SEAL	.694	.88
FINAL-FUNCT-TEST	.331	1.0
FINAL-PREP & TAG	.777	1.00

TOTAL 9.55

This total is manually computed and may vary slightly from E046 output.

In accordance with AFLCR 66-4, para 3-10, coordinating agencies are allowed 10 working days from date of this form to express in writing reasons for noncoordination ("insufficient time allowed" is not to be considered). If, after this time, no reply has been received from the coordinating agency, the standard will be considered coordinated and acceptable.

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER: N/A	N/A	WORK CENTER FOREMAN: Curtis R Conley	28 Mar 80
PROCESS TECHNICIAN		N/A	

AFLC FORM 774 REPLACES AMC FORM 774, SEP 69, WHICH MAY BE USED. AFLC-WPAFB-APR 73 213

SHOP FLOW DAY COMPUTATION FOR PRODUCTION NO: 74063A

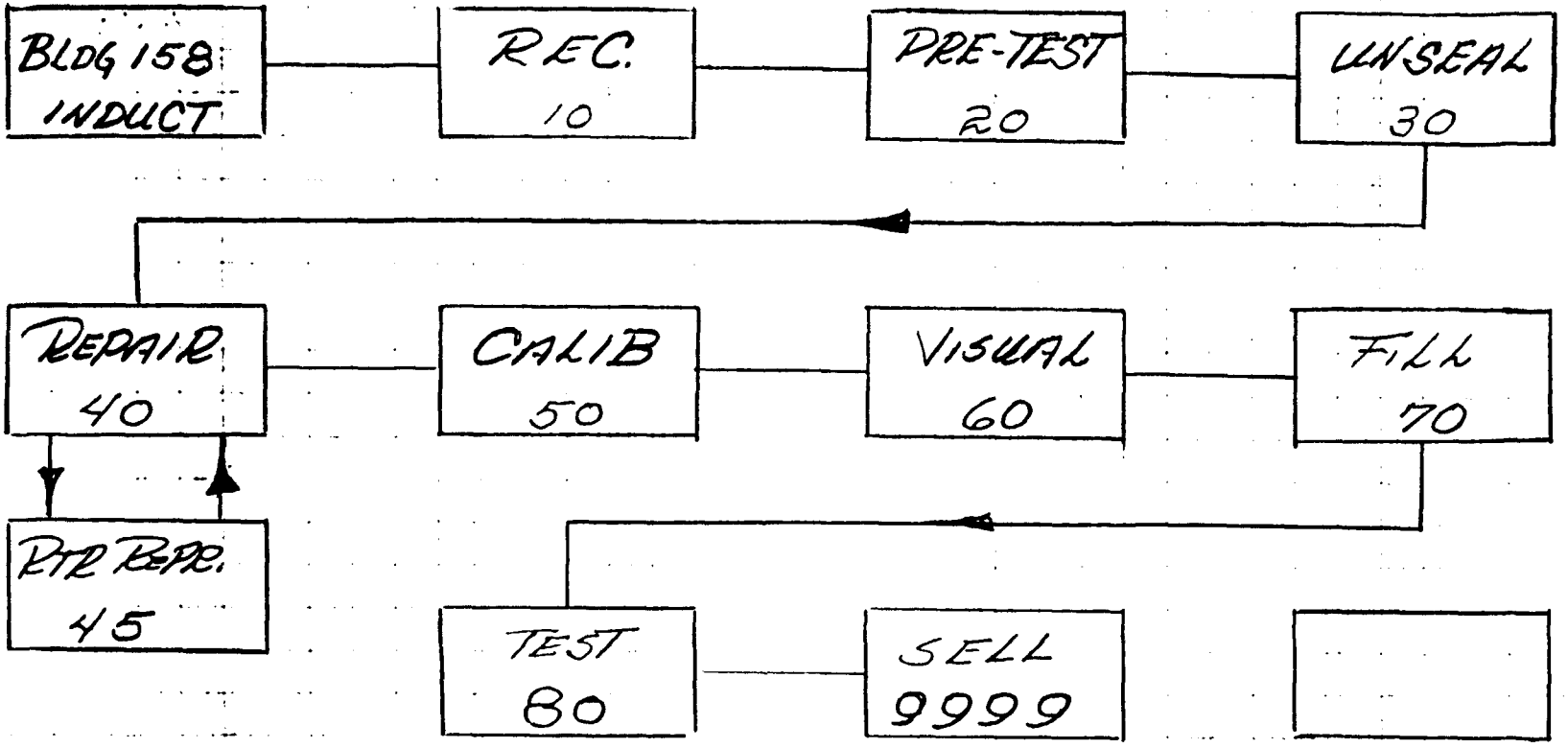
AFLCR 66-4 Shop Flow Day Formula was used to establish this flow day standard as follows: Flow Days = A [(B ÷ C) + D + E] where A = 1.45; B = End Item Labor Standard; C = Direct Labor Hours Per Person Per Day adjusted for indirect categories and labor efficiency; D = Routine Delays; E = Unique Delays. Repair is being accomplished as a responsible shop.

EP	DESCRIPTION	DAYS
	B = Labor Standard of 9.55 Hrs C = 7.66 Daily Labor Hrs	
	Value "C" is calculated as follows:	B ÷ (
	MANPG C .24 + .25 + .26 + .29 Indirect Average = .1 Hours	
	MANPG C Labor Efficiency = 97 %	1.2
	C = 8 Hours Minus Indirect Average Times Labor Efficiency	
	= Routine Delays	
	a. Awaiting Maintenance (AWM) = 3.8 days	
	b. One days supply at station awaiting maintenance = 4 days (average 4 stations for each C/N). This is necessary to maintain uninterrupted flow of items.	
	TOTAL	7.8
	E = Unique Delays	
	a. Machine processing _____ Day(s)	
	b. Machine processing delays _____ Day(s)	
	c. Routing to support shops _____ Day(s)	
	d. Others (See Reverse Side) _____ Day(s)	
	TOTAL	3.32
	Total flow days this shop (1 + 2 + 3)	12.4
	Work Shift Adjustment (Item 4 ÷ number of shifts).	12.4
	Sum of flow days for all shops (Item 5 x 1.45) (Final result to be rounded up to next whole day.)	18

COMPUTED BY: A Bridges/MANEG DATE: 4 OCT 84

3. Run-in motor 48 HRS Page 2-9 Para t.
Run-in Ball Bearings 12 HRS Page 2-9 para ac
Bake gyro 2 HRS Page 2-9 para ad
allow to cool- 1 HR
Bake ADHESIVE 2 HRS page 2-11 para aab
Connect Vacuum Hose BAKE 1 HR page 2-12 para aaj
Cool gyro 1/2 HR.

PROCESS FLOW CHART PCN 74063A



DCD 4/19/89

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: T3837-02 NSN: PCN: 74063A WCD: WCD DATE: B8119

OPERATION: ZPRT PRIMARY OPERATION TYPE: ASSY MATERIAL TYPE:
SAMPLE SIZE: 292 MISSING FLOWTIMES: 0 END ITEMS: . OUTLIERS DELETED: 1

-------- MANPOWER REQUIRED --------				---------- EQUIPMENT REQUIRED ----------					
		--- TIME ---					--- TIME ---		BATCH
SKILL	QTY	FRACTION	HOURS	CODE	CATEGORY	QTY	FRACTION	HOURS	MIN MAX

HISTORICAL DATA

ACTUAL FREQ		RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0	50	**********
20	24	**********
40	10	****
60	2	*
80	1	*
100	4	**
120	2	*
140	1	
160	0	
180	0	
>=00	4	**

DISTRIBUTION	PARAMETERS			D VALUE	D ALPHA
UNIFORM	0.0		460.0	0.724	.
TRIANGULAR	0.0	1.0	460.0	0.620	.
NORMAL	41.2	69.4		0.281	.
LOGNORMAL	41.2	69.4		0.065	0.17
EXPONENTIAL	41.7			0.139	.

OCCURRANCE FACTOR: . OCCURRANCES: 293

DISTRIBUTION OF CHOICE: LOGNORMAL

WORK CONTROL DOCUMENT

1. DATE	PAGE
8133	PAGE 1 OF 2 PAGES

2. ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74146A/74282A	1	"O"MNPGC		

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
17223-1A/423040-2	5N6-2-9-13/13-1/14;5N6-2-4-13/13-1/14	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-581-5792 ~~6615-00-515-6000~~	NOTE: Observe all notes, cautions and warnings throughout T.O. MDS data required IAW MAOI 66-22, Appx 8. Use QQ-571 type SN60WRP solder.
13. SERIAL NUMBER	14. NOUN	
	J-4 Directional Control	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	010	Receive; Ascertain data correctness of WCD and AFTO 349. Clean external surfaces.			
	020 ~~0100~~	Perform functional test (Pretest) If serviceable, proceed to Step 200.			B
	020 ~~0200~~ MNPGB	Perform functional test (Pretest) If serviceable, proceed to Step 200.			B
	030	Unseal			
	040	Disassemble gyro assembly			
	050	Replace motor (As required)			
	060	Clean, inspect and repair gyro			
	070	Reassemble gyro assembly (Use QQ-S-571 SN60WRP solder)			
	080	Inner gimbal end play			B
	090	Pre-seal Test			

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE			23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANPGC Raymond T. Lipke 16 May 88		a. MAQNG James E. Bond 16 May 88	
		b. MANERG David L. Burke 16 MAY 88		c. MANSA Don K. Stroud 16 May 88	

AFTO FORM 060 PREVIOUS EDITION WILL BE USED.

WORK CONTROL DOCUMENT (CONT'D)			1. DATE 8119	PAGE 2 OF 2 PAGES	
15. DISPATCH STATION	16. PGN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	100	Calibrate gyro NOTE: Steps 13-16 may be accomplished just prior to step 13 (Ref Note, para 3-61)			
	110	Visual inspection; certify that this item does not contain any foreign objects such as tools or unattached components.			B
	120	Seal and leak test (Use QQ-S-571 SN 60WRP solder)			
	130	Insulation resistance test			
	140	Azimuth torquer calibration			
	150	Installation of Azimuth torque resistors			
	160	Torquer total circuit resistance test			
	170	Perform functional test			B
	180	RWT DATE RANDOM_____ POSITION_____ TIME_____ RERUN_____			B
	190	Paint			
	200 0100	Perform functional analysis (Final test) Stamp condition tag.			B
	200 0200 MNPGB	Perform functional analysis (Final test) Stamp condition tag.			B
	210	Final prep, final visual, complete AFLC Form 959, check for TO mod compliance. Complete AFTO 349, install WR-ALC decals IAW MAOI 66-40. Attach condition tag.			

WORK CONTROL DOCUMENT

1. DATE 7205					PAGE 1 OF 2 PAGES
2. JOB ORDER NUMBER 74146A & 74282A	3. QUANTITY 1	4. PRODUCTION SECTION/RCC "O" MNPGC	5. DATE SCHED		6. DATE COMP
7. PART NUMBER 5107766-1 AP86A1		8. TECH DATA 5N6-2-4-13 5N6-2-9-13			9. ITEM SERIAL NUMBER
10. MODEL-DESIGN-SERIES	11. STOCK NUMBER 6615-00-832-3196		12. OPTIONAL		
13. SERIAL NUMBER	14. NOUN Gyro Motor (J4)				

15. DISPATCH STATION	16. PON/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	5a	Clean and inspect motor			
	5b	Disassemble motor assembly			
	5c	Clean and inspect parts			
	5d	Clean, lubricate and install bearings and set preload			
	5e	Balance rotor assembly			
	5f	Inside visual. Certify that this item does not contain any foreign objects such as tools or unattached components.			B
	5g	Install rotor into housing and cap			
	5h	Bell jar run-in			
	5i	Seal motor assembly			
	5j	Leak check and evacuate motor assembly			

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANEB [signature] 27-7-87	a. MAONG [signature] 27.7.87	
		b. MANPGC [signature] 27-7-87	c. MANASA [signature] 7-27-87	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED. WR-ALC/MANSAA "OVERPRINT"

WORK CONTROL DOCUMENT (CONT'D)			L. DATE 7205	PAGE 2 OF 2 PAGES	
15. DISPATCH STATION	16. PGM/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	5k	Final run-in			
	5l	Functional test			B
	5m	Static balance motor assembly			
	5n	Paint motor assembly			
	5o	Final visual			

CRomer

WORK CONTROL DOCUMENT

1. DATE 8133 | PAGE 1 OF 2 PAGES

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74146A/7[redacted]	1	"O"MNPGC	8196	8214

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
17223-1A/[redacted]2	5N6-2-9-13/13-1/14[redacted] 84 A	7669

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-581-5792 [redacted]	NOTE: Observe all notes, cautions and warnings throughout T.O. MDS data required IAW MAOI 66-22, Appx 8. Use QQ-571 type SN60WRP solder.
13. SERIAL NUMBER	14. NOUN J-4 Directional Control	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	010	Receive; Ascertain data correctness of WCD and AFTO 349. Clean external surfaces. JUL 25 [redacted]	WR PA 6019		
	020 0100	Perform functional test (Pretest) JUL 25 [redacted] If serviceable, proceed to Step 200.	WR PA 6019		B
	020 0200 MNPGB	Perform functional test (Pretest) JUL 2 [redacted] If serviceable, proceed to Step 200.	WR PA 6019		B
	030	Unseal JUL 25 [redacted]	WR PA 6019		
	040	Disassemble gyro assembly JUL 25 [redacted]	WR PA 6019		
	050	Replace motor (As required) JUL 25 [redacted]	WR PA 6019		
	060	Clean, inspect and repair gyro JUL 25 [redacted]	WR PA 6019		
	070	Reassemble gyro assembly (Use QQ-S-571 SN60WRP solder) JUL 25 [redacted]	WR PA 6019		
	080	Inner gimbal end play JUL 25 [redacted]	WR PA 6019		B
	090	Pre-seal Test JUL 2 1988	WR PA 6019		

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT R/R
DISPATCH	FUNCTIONAL CODE	a. MANPGC Raymond T. Lipke 16 May 88	a. MAQNG James E. Bond 16 May 88	
		b. MANERG Harold Burke 16 May 88	a. MANSKA Don R. Strell 16 May 88	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WORK CONTROL DOCUMENT (CONT'D)			1. DATE 8119	PAGE 2 OF 2 PAGES	
15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	100	Calibrate gyro JUL 27 1988 NOTE: Steps 13-16 may be accomplished just prior to step 13 (Ref Note, para 3-61)	WR M 6472		
	110	Visual inspection; certify that this item does not contain any foreign objects such as tools or unattached components. JUL 27 1988	WR PA 6019		B
	120	Seal and leak test (Use QQ-S-571 SN 60WRP solder) 26 JUL 1988	WR PA 6078		
	130	Insulation resistance test JUL 27 1988	WR PA 6019		
	140	Azimuth torquer calibration JUL 27 1988 228	WR M 6473		
	150	Installation of Azimuth torque resistors JUL 27 1988	WR PA 6019		
	160	Torquer total circuit resistance test JUL 27 1988	WR PA 6019		
	170	Perform functional test JUL 27 1988	WR PA 6019		B
	180	RWT DATE 27 JUL 1988 RANDOM 2 POSITION 13 TIME 0930-1730 RERUN	WR PA 6078		B
	190	Paint JUL 23 1988	WR PA 6021		
	200 0100	Perform functional analysis (Final test) 29 JUL 1988 Stamp condition tag.	WR PA 6031		B
	200 0200 MNPGB	Perform functional analysis (Final test) 29 JUL 1988 Stamp condition tag.	WR PA 6031		B
	210	Final prep, final visual, complete AFLC Form 959, check for TO mod compliance. Complete AFTO 349, install WR-ALC decals IAW MAOI 66-40 Attach condition tag.	AUG 1988 WR M 6473		

\PROGRAM NAME: 300175
\CPIN: 81H-GYR/J4B/DR-U001-00A
\DATE OF LAST REVISION: 19-OCT-87
\UUT TYPE: DIRECTIONAL GYRO J-4
\UUT NATIONAL STOCK NUMBER: 6615-00-581-5792
\UUT MFR/PART NUMBER: BENDIX 17223-1A
\OPERATOR'S NAME: DUNNAM
\TEST STATION: DIRECTIONAL STATION #1
\DATE & TIME OF TEST: 28-JUL-88 22:46:10
\
#GYRO IN TEST MOUNT POSITION 1 IS SERIAL NUMBER 7669
#GYRO IN TEST MOUNT POSITION 2 IS SERIAL NUMBER 807116

29 JUL 1988

****
*
* IMPORTANT NOTE CONCERNING THE STATIC RESISTANCE TESTS
* ##########
*
* If a failure of Static Resistance should occur, the operator may retest the UUT Static
* Resistance manually.
* If an in-tolerance measurement is obtained in this manner, then the previous failure is
* to be ignored.
*
****
\

/ STATIC RESISTANCE TESTS							
AUTOPILOT ROTORS J102-B TO A	1	OHM	00209.0000	00171.0000	00185.1280	PASS	28-JUL-88 22:47:22
AZIMUTH TORQUER J101-U TO V	1	OHM	04203.8000	03250.0000	03582.7800	PASS	28-JUL-88 22:47:31
AZIMUTH TORQUER J101-U TO F	1	OHM	02101.9000	011701.9000	01013.1300	PASS	28-JUL-88 22:47:39
AZIMUTH ROTOR J101-W TO H	1	OHM	00049.5000	00040.5000	00041.2064	PASS	28-JUL-88 22:47:48
BRAKE SOLENOID J101-P TO R	1	OHM	00786.5000	00643.5000	00707.1100	PASS	28-ZUL-88 22:47:56
LATITUDE CORRECTION J101 M-V	1	OHM	32025.0000	28975.0000	30733.0500	PASS	28-JUL-88 22:48:04
/ RUN UP TESTS							
STARTING CURRENT- PHASE B	1	MA	00170.0000	00000.0000	00147.1330	PASS	28-JUL-88 22:49:04
STARTING OSCILLATION TEST	1	--- --	00000.0000	00000.0000	00000.0000	PASS	28-JUL-88 22:49:05
SPINMOTOR SPEED	1	RPM	24300.0000	23500.0000	24000.0000	PASS	28-JUL-88 22:57:34
RUNNING CURRENT- PHASE B	1	MA	00130.0000	00000.0000	00099.8650	PASS	28-JUL-88 23:01:05
/ RUN DOWN TESTS							
RUN DOWN RATE	1	RPM/M	03000.0000	00000.0000	02099.9999	PASS	28-JUL-88 23:06:01
/ HEADING STABILITY TESTS							
BANK RIGHT ERROR ANGLE	1	DEG	00002.0000	00000.0000	.15000E+00	PASS	28-JUL-88 23:08:11
BANK LEFT ERROR ANGLE	1	DEG	00002.0000	00000.0000	.10000E+00	PASS	28-JUL-88 23:10:22
/ GIMBAL FREEDOM TESTS							
BANK RIGHT ERROR ANGLE	1	DEG	00004.0000	00000.0000	.29999E+00	PASS	28-JUL-88 23:12:43
BANK LEFT ERROR ANGLE	1	DEG	00004.0000	00000.0000	.90000E-01	PASS	28-JUL-88 23:15:00
/ SYNCHRO OUTPUT TESTS							
AUTOPILOT OUTPUT-VOLTAGE	1	VOLTS	00018.9500	00017.4500	00018.1000	PASS	28-JUL-88 23:16:22
AZIMUTX OUTPUT VOLTAGE	1	VOLTS	00012.3000	00011.3000	00012.0200	PASS	28-JUL-88 23:17:15
AUTOPILOT PHASING OUTPUT	1	DEG	00048.0000	00042.0000	00045.1400	PASS	28-JUL-88 23:18:03
AZIMUTH PHASING OUTPUT	1	DEG	00048.0000	00042.0000	00045.0600	PASS	28-JUL-88 23:18:51
/ DRIFT TESTS							
DRIFT RATE	1	DEG/HR	00003.0000	-00003.0000	00001.6000	PASS	28-JUL-88 23:35:08
/ LATITUDE CORRECTION TESTS							
CORRECTED DRIFT RATE- 30 NORTH	1	DEG/HR	00004.0000	-00004.0000	.28000E+00	PASS	28-JUL-88 23:51:08
CORRECTED DRIFT RATE- 60 NORTH	1	DEG/HR	00004.0000	-00004.0000	00000.0000	PASS	29-JUL-88 00:06:22
CORRECTED DRIFT RATE- 90 NORTH	1	DEG/HR	00004.0000	-00004.0000	00002.7999	PASS	29-JUL-88 00:21:36
CORRECTED DRIFT RATE- 90 SOUTH	1	DEG/HR	00004.0000	-00004.0000	00001.8800	PASS	29-JUL-88 00:36:49

\END

OPERATION PROFILE

NAME R. VANDERVeer ALC WR DATE 4-6-C. RCC MANPGC SHEET 1 OF 1

PCN ~~NON-PRT~~ 74146A WCD N/A WCD DATE 8133

OPERATION NUMBER	RCC	OPERATION DESCRIPTION	MANDATORY OCCURRENCE FACTOR	OPERATION TYPE	MANDATORY FLOW HOURS %	MANDATORY FLOW HOURS HRS.	MANPOWER SKILL CODE/ LEVEL	MANPOWER QTY.	MANPOWER TIME REQUIRED %	MANPOWER TIME REQUIRED HRS.	EQUIPMENT CODE	EQUIPMENT QTY.	EQUIPMENT TIME REQUIRED %	EQUIPMENT TIME REQUIRED HRS.	DATA SOURCE COMMENTS
IN	MANPG	REC	1	TRANSIT											C. DEUSER RANNER MAC MILLER OPER. & A SCHEDULER.
				SETUP											
				PROCESS		1	IG09	1		0.1	STD				
		↑		TRANSIT											
				SETUP											
				PROCESS											
ALL WCD OPERATIONS LISTED IN CH OPER. PROFILE				TRANSIT											
				SETUP											
				PROCESS											
		↓		TRANSIT											
				SETUP											
				PROCESS											
9999	MANPG	SELL	1	TRANSIT											D. HARRELSON suppvd. MANPGC MAC MILLER OPERATOR & SCHEDULER.
				SETUP											
				PROCESS		.1	IG09	1		0.1	STD				

LSC-20092C

SAS

OPERATION PROFILE

9:44 TUESDAY, MARCH 28, 1989 17

NAME R. Schroeder

ALC WR

DATE ~~3/29~~ 4/1/89

RCC MANPGC

SHEET 1 OF 6

ITEM CD PCN 74146A

WCD

WCDDATE 8133

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
10	MANPGC	REC	0.99	.	T	.		.	.	.		.	.	.	
10	MANPGC.	REC	.	.	S	.		.	.	.		.	.	.	
10	MANPGC	REC	.	1.00	P	0.1	IG09	1	.	0.1			.	.	
20	MANPGC	NDI	0.99	.	T	.		.	.	.		.	.	.	
20	MANPGC	NDI	.	.	S	.		.	.	.		.	.	.	
20	MANPGC	NDI	.	1.00	P	1.5	IG09	1	.	0.5	4126	1	.	0.5	
20	MANPGB	NDI	.	.	P	1.6	IG10	1	.	0.6	8556	1	.	0.6	
30	MANPGC	DIS	0.99	.	T	.		.	.	.		.	.	.	
30	MANPGC	DIS	.	.	S	.		.	.	.		.	.	.	
30	MANPGC	DIS	.	1.00	P	0.1	IG09	1	.	0.1			.	.	
40	MANPGC	DIS	0.99	.	T	.		.	.	.		.	.	.	
40	MANPGC	DIS	.	.	S	.		.	.	.		.	.	.	
40	MANPGC	DIS	.	1.00	P	1.4	IG09	1	.	0.4			.	.	

SAS

OPERATION PROFILE

9:44 TUESDAY, MARCH 28, 1989 18

NAME R. Hammerberg ALC WR DATE 8133 4/19/89

ITEM CD PCN 74146A WCD WCDDATE 8133 RCC MANPGC

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
50	MANPGC	DIS	0.99		T										
50	MANPGC	DIS			S										
50	MANPGC	DIS		1.00	P	1.0	IG09	1		1.0					
60	MANPGC	REP	0.99		T										
60	MANPGC	REP			S										
60	MANPGC	REP		1.00	P	3.0	IG09	1		3.0	9050	1		0.5	
70	MANPGC	ASSY	0.99		T										
70	MANPGC	ASSY			S										
70	MANPGC	ASSY		1.00	P	1.5	IG09	1		1.5	9103	1		0.2	
80	MANPGC	ASSY	0.99		T										
80	MANPGC	ASSY			S										
80	MANPGC	ASSY		1.00	P	0.2	IG09	1		0.2	8437	1		0.1	

NAME L. Underwood

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 19

ITEM CD PCN 74148A ALC WR DATE 8133 4/19/89 RCC MANPGC SHEET 3 OF 6

WCD WCDDATE 8133

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
90	MANPGC	ASSY	0.99		T										
90	MANPGC	ASSY			S										
90	MANPGC	ASSY		1.000	P	2.4	IG09	1		0.4	4126	1		0.4	
100	MANPGC	ASSY	0.98		T										
100	MANPGC	ASSY			S										
100	MANPGC	ASSY		1.000	P	0.5	IG09	1		0.5	9096	1		0.5	
100	MANPGC	ASSY			P						9782	1		0.5	
110	MANPGC	NDI	0.99		T										
110	MANPGC	NDI			S										
110	MANPGC	NDI		1.000	P	0.1	IG09	1		0.1					
120	MANPGC	ASSY	1.00		T										
120	MANPGC	ASSY			S										
120	MANPGC	ASSY		1.000	P	0.7	IG09	1		0.7	4336	1		0.5	

NAME [signature]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 20

ITEM CD PCN 74148A WCD ALC WR WCDDATE 8133 DATE 5/23/89 RCC MANPGC SHEET 4 OF 6

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
130	MANPGC	NDI	1.00		T										
130	MANPGC	NDI			S										
130	MANPGC	NDI		1.00	P	0.1	IG09	1		0.1					
140	MANPGC	ASSY	0.98		T										
140	MANPGC	ASSY			S										
140	MANPGC	ASSY		1.00	P	1.3	IG09	1		0.3	9058	1		0.3	
150	MANPGC	ASSY	1.00		T										
150	MANPGC	ASSY			S										
150	MANPGC	ASSY		1.00	P	1.4	IG09	1		0.4					
160	MANPGC	NDI	0.99		T										
160	MANPGC	NDI			S										
160	MANPGC	NDI		1.00	P	0.1	IG09	1		0.1	9058	1		0.1	

NAME Richard Lacoro OPERATION PROFILE SAS

ALC WR DATE ~~4/19/89~~ 4/19/89 RCC MANPGC

ITEM CD PCN 74146A WCD WCDDATE 8133

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
170	MANPGC	ASSY	0.99		T										
170	MANPGC	ASSY			S										
170	MANPGC	ASSY		1.000	P	2.4	IG09	1		0.4	4126	1		0.4	
180	MANPGC	NDI	0.99		T										
180	MANPGC	NDI			S										
180	MANPGC	NDI		1.00	P	12.0	IG09	1		1.5	0766	1		12.0	
190	MANPGC	PROC	0.99		T										
190	MANPGC	PROC			S										
190	MANPGC	PROC		1.00	P	1.2	IG09	1		0.3	0004	1		0.2	
200	MANPGC	NDI	0.99		T										
200	MANPGC	NDI			S										
200	MANPGC	NDI		1.00	P	2.0	IG09	1		0.5	8556	1		0.5	
200	MANPGB	NDI			P	2.0	IG10	1		0.5	4126	1		0.5	

NAME [signature]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 22

ALC WR DATE ~~4/19/89~~ 4/19/89

ITEM CD PCN 74146A WCD WCDDATE 8133 RCC MANPGC SHEET 6 OF 6

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
210	MANPGC	ASSY	1.00		T										
210	MANPGC	ASSY			S										
210	MANPGC	ASSY		1.00	P	0.4	IG09	1		0.4					

NAME [illegible]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 23

ITEM CD PCN 74146ASUB1 ALC WR DATE 4/19/89 RCC MANPGC

WCD WCDDATE 7205 SHEET 1 OF 4

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
05A	MANPGC	DIS			T										
05A	MANPGC	DIS			S										
05A	MANPGC	DIS		1.00	P	0.1	IG09	1		0.1					
05B	MANPDA	PROC			T										
05B	MANPDA	PROC			S										
05B	MANPDA	PROC		1.00	P										
05C	MANPGC	DIS			T										
05C	MANPGC	DIS			S										
05C	MANPGC	DIS		1.00	P	0.1	IG09	1		0.1					
05D	MANPGC	ASSY			T										
05D	MANPGC	ASSY			S										
05D	MANPGC	ASSY		1.00	P	1.1	IG09	1		0.1					
05E	MANPGC	ASSY			T										

NAME [illegible]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 24

ALC WR DATE 4/19/89 RCC MANPGC

ITEM CD PCN 74146ASUB1 WCD WCDDATE 7205

SHEET 2 OF 4

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
05E	MANPGC	ASSY			S										
05E	MANPGC	ASSY		1.00	P	0.8	IG09	1		0.8	5139	1		0.8	
05F	MANPGC	NDI			T										
05F	MANPGC	NDI			S										
05F	MANPGC	NDI		1.00	P	0.1	IG09	1		0.1					
05G	MANPGC	ASSY			T										
05G	MANPGC	ASSY			S										
05G	MANPGC	ASSY		1.00	P	1.40	IG09	1		0.3					
05H	MANPGC	ASSY			T										
05H	MANPGC	ASSY			S										
05H	MANPGC	ASSY		1.00	P	10.00	IG09	1		0.1	9015	1		0.1	
05I	MANPGC	ASSY			T										

SAS

OPERATION PROFILE

9:44 TUESDAY, MARCH 28, 1989 25

NAME Richard Cooper ALC WR DATE 4/19/89 RCC MANPGC SHEET 3 OF 4

ITEM CD PCN 74146ASUB1 WCD WCDDATE 7205

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
05I	MANPGC	ASSY	.	.	S	.	.	.	.	.	.	.	.	.	
05I	MANPGC	ASSY	.	1.00	P	0.3 ~~1515~~	IG09	1	.	0.3	3346	1	.	0.3	
05J	MANPGC	ASSY	.	.	T	.	.	.	.	.	.	.	.	.	
05J	MANPGC	ASSY	.	.	S	.	.	.	.	.	.	.	.	.	
05J	MANPGC	ASSY	.	1.00	P	17.0	IG09	1	.	0.3	3346	1	.	0.3	
05K	MANPGC	ASSY	.	.	T	.	.	.	.	.	.	.	.	.	
05K	MANPGC	ASSY	.	.	S	.	.	.	.	.	.	.	.	.	
05K	MANPGC	ASSY	.	1.00	P	60.0	IG09	1	.	0.2	0008	1	.	48.0	
05L	MANPGC	NDI	.	.	T	.	.	.	.	.	.	.	.	.	
05L	MANPGC	NDI	.	.	S	.	.	.	.	.	.	.	.	.	
05L	MANPGC	NDI	.	1.00	P	(5.0	IG09	1	.	0.2	9015	1	.	0.1	
05M	MANPGC	ASSY	.	.	T	.	.	.	.	.	.	.	.	.	
05M	MANPGC	ASSY	.	.	S	.	.	.	.	.	.	.	.	.	

SAS

OPERATION PROFILE

9:44 TUESDAY, MARCH 28, 1989 26

NAME Linda Lacey ALC WR DATE 4/19/89 RCC MANPGC SHEET 4 OF 4

ITEM CD PCN 74146ASUB1 WCD WCDDATE 7205

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
05M	MANPGC	ASSY		1.000	P	0.2	IG09	1		0.2					
05N	MANPGC	PROC			T										
05N	MANPGC	PROC			S										
05N	MANPGC	PROC		1.000	P	1.0	IG09	1		0.2	0004	1		0.1	
05O	MANPGC	ASSY			T										
05O	MANPGC	ASSY			S										
05O	MANPGC	ASSY		1.000	P	0.2	IG09	1		0.2					

74282A J-4 DIRECTIONAL GYRO RCC MNPGC D 5N8-2-4-13

OPER SUB	TECH STEP	S T D	S K L	W #R K	P A C	PF FA DC	A/R REV SUPPORT ELEMENT	OCC FACT	STORED	SUPPLEMENTAL	DESCRIPTION	BASE HOURS	PFD TIME	STD HOURS	DLY	PCT	A C
00100	W	E	GA	EA	A		K 85360	1.00	PERCENT ENGR 97.5		OVERHAUL/REPAIR GYRO	17.50		17.50		100	
0010			GA	01		07		1.00			OVERHAUL/J-4 GYRO	16.355	1.145	17.500		100	
	0010	E						1.00	4160 .02		REC-&-PRETEST	.37900		.405			A
	0020	E						1.00	4160 .01		UNSEAL	.15200		.182			A
	0030	E						1.00	4160 .31		GYRO/REPAIR	5.48400		5.867			A
	0035	E						1.00	4160 .04		BUILD/UP-TEST	.78300		.837			A
	0040	E						1.00	4160 .24		MOTOR REPAIR	4.74100		5.072			A
	0045	E						1.00	4160 .04		BUILD/UP MTR TEST	.61200		.654			A
	0050	E						1.00	4160 .06		CALIBRATE	1.03700		1.109			A
	0060	E						1.00	4160 .07		SEAL	1.32200		1.414			A
	0070	E						1.00	4160 .01		RANDOM-WANDER	.25400		.271			A
	0075	N						1.00			FINAL ELEC. TEST	.40000		.428			A
	0080	E						1.00	4160 .04		FINAL-PREP-&-TAG	1.19100		1.274			A
8888			GA	1	00			1.00			STD. CHANGE 0130	.000	.000	.000		0	

0001 LABOR STD CHG DUE TO CHG IN WORK CONTENT
0002 OLD STD 17.30
0003 NEW STD 16.91
0004 NET CHG .39
0005 18 MAR.77 A. S.SPIVEY
0006
0007 TWO YEAR REVIEW. LABOR STD WAS UPDATED USING WORK
0008 SAMPLING TECHNIQUE.
0009 OLD STD 16.91
0010 NEW STD 15.11
0011 NET DEC 1.80
0012 09 MAY 80 J.DEES
0013 TWO YEAR LABOR STD REVIEW ACCOMPLISHED THIS DATE
0014 USING EXISTING STANDARD.OVERHAUL MANUALS UPDATED.
0015 NO CHANGE IN WORK PROCESS OR CONTENT. NO CHANGE IN
0016 LABOR STD RECOMMENDED AT THIS TIME.
0017 OLD STANDARD 15.10
0018 NEW STANDARD 15.10
0019 NET CHANGE 00.00
0020 NOVEMBER 81 D.BRIDGES
0021
0022 REVIEW OF STANDARD INDICATES THAT
0023 DUE TO A WORK CONTENT CHANGE, PRESENT
0024 BACK UP DATA DOES NOT SUPPORT AN ENGINEERED
0025 STANDARD. STANDARD IS DOWNGRADED TO ESTIMATE
0026 UNTIL SUCH TIME AS STUDY CAN BE ACCOMPLISHED
0027 NO TIME CHANGE INVOLVED AT THIS TIME
0028 OCTOBER 83 D. BRIDGES
0029
0030 T.O. DIRECTED 100% OVERHAUL OF GYRO. MOTOR AND
0031 MOTOR AND GIMBAL BEARINGS TO BE REPLACED AT 100%
0032 EST. CHANGE 87.18 HRS.
0033 OLD STD 15.10 HRS
0034 CNG 8.18 HRS
0035 NEW STD 23.28 HRS
0036 D. BRIDGES .15 SEP 85
0037
0038 DUE TO NON-AVAILABILITY OF OUTER RACE BEARINGS
0039 (3110002787381) LABOR STD REDUCED TO ESSENTIAL
0040 REPAIR ONLY. 8.18 HRS REMOVED FROM LABOR STD.
0041 OLD STD 23.28 HRS.
0042 CNG 8.18 HRS
0043 NEW STD 15.10 HRS
0044 D.BRIDGES, 14 JAN 85
0045

SHOP FLOW DAY COMPUTATION FOR PRODUCTION NO: 74146A

AFLCR 66-4 Shop Flow Day Formula was used to establish this flow day standard as follows: Flow Days = A [(B ÷ C) + D + E] where A = 1.45; B = End Item Labor Standard; C = Direct Labor Hours Per Person Per Day adjusted for indirect categories and labor efficiency; D = Routine Delays; E = Unique Delays. Repair is being accomplished as a responsible shop.

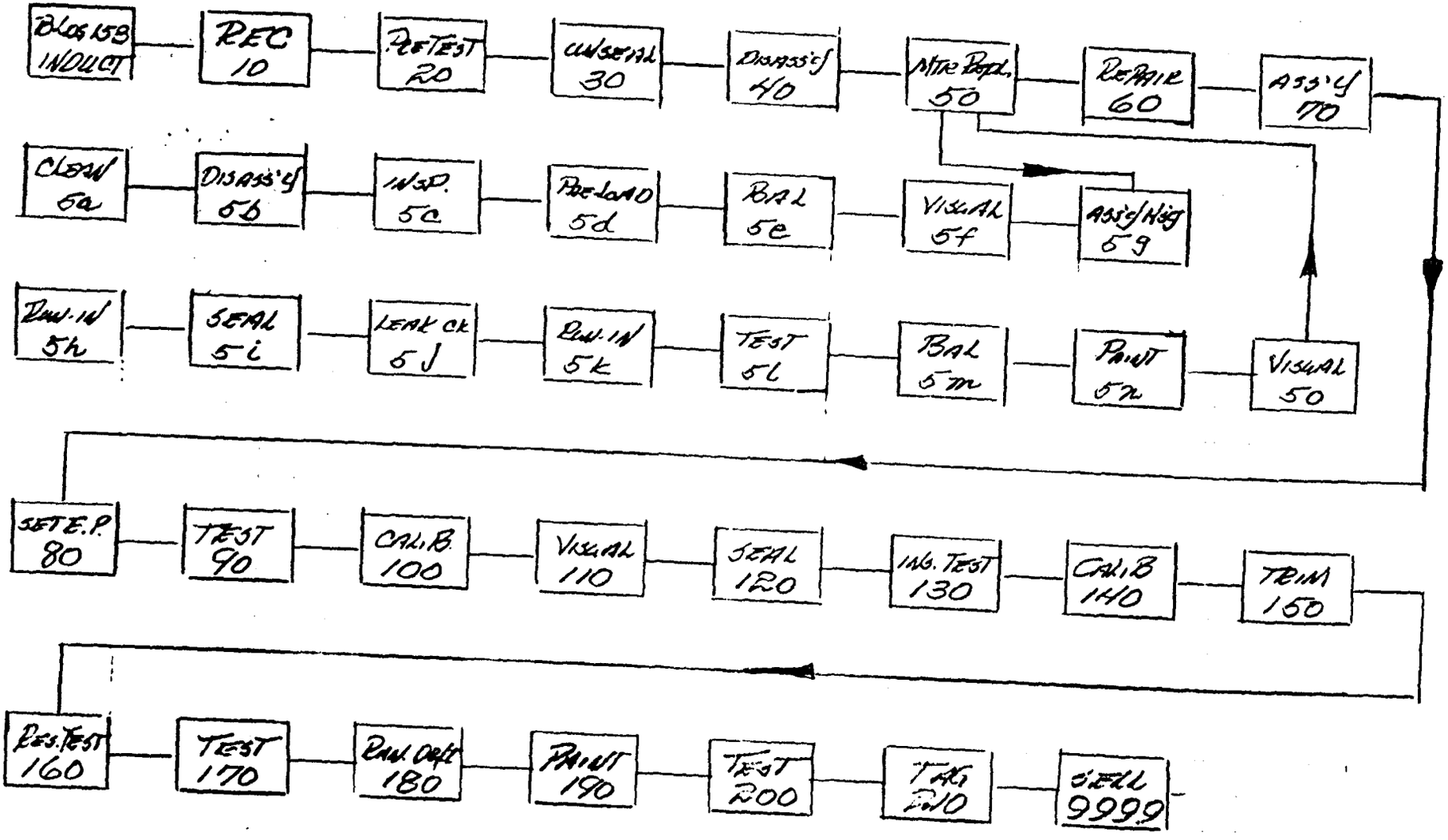
STEP	DESCRIPTION	DAYS
1	B = Labor Standard of 17.47 Hrs C = ~~7.0~~ 6.97 Daily Labor Hrs Value "C" is calculated as follows: MANPG C .24 +.25 + .26 + .29 Indirect Average = 1.04 Hours MANPG C Labor Efficiency = 92 % C = 8 Hours Minus Indirect Average Times Labor Efficiency	B ÷ C 2.5
2	D = Routine Delays a. Awaiting Maintenance (AWM) = 3.8 days b. One days supply at station awaiting maintenance = 4 days (average 4 stations for each C/N). This is necessary to maintain uninterrupted flow of items. TOTAL	7.80
3	E = Unique Delays a. Machine processing 1 Day(s) b. Machine processing delays _____ Day(s) c. Routing to support shops _____ Day(s) d. Others (See ~~Reverse Side~~ Attch Sheet) 16.22 Day(s) TOTAL	17.2
4	Total flow days this shop (1 + 2 + 3)	27.5
5	Work Shift Adjustment (Item 4 ÷ number of shifts).	27.52 ÷
6	Sum of flow days for all shops (Item 5 x 1.45) (Final result to be rounded up to next whole day.)	40.0

COMPUTED BY: D. BRIDGES DATE: 10 DEC 85

OPERATION	T.O. Ref (para)	Time Req'd
Bake after paint	2-18	1.00
Bake (Headers)	2-93k	13.50
Evacuate motor	2-109b	.50
Evacuate motor	2-118h	.25
Heat motor & evac.	2-118i	16.50
Dry motor	2-120c	1.00
Cure paint	2-120e	2.00
Run-in	2-122a	48.00
Route motor	------	24.00
Bake slipring	2-130	9.00
Motor warmup	3-46c	1.00
Cool down	3-99	4.00
Bake after paint	2-168	1.00
Machine processing (RWT)	11-14	8.00
		129.75

129.75 ÷ 8 = 16.22

PROCESS FLOW CHART PCN 74146A



DOD 4/19/89

SAS

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: 172231A NSN: PCN: 74146A WCD: WCD DATE: 8133

OPERATION: ZPRT PRIMARY OPERATION TYPE: ASSY MATERIAL TYPE:
SAMPLE SIZE: 444 MISSING FLOWTIMES: 2 END ITEMS: OUTLIERS DELETED: 0

-------- MANPOWER REQUIRED --------

SKILL	QTY	--- TIME --- FRACTION	HOURS

---------- EQUIPMENT REQUIRED ----------

CODE	CATEGORY	QTY	--- TIME --- FRACTION	HOURS	BATCH MIN	BATCH MAX

HISTORICAL DATA

ACTUAL FREQ		RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0	1	
5	33	**********
10	28	**********
15	13	*****
20	6	**
25	3	*
30	2	*
35	2	*
40	3	*
45	0	
>=50	9	****

DISTRIBUTION	PARAMETERS			D VALUE	D ALPHA
UNIFORM	3.0		159.0	0.673	.
TRIANGULAR	3.0	8.0	159.0	0.577	.
NORMAL	18.8	18.4		0.231	.
LOGNORMAL	18.8	18.4		0.115	.
EXPONENTIAL	19.3			0.247	.

OCCURRANCE FACTOR: . OCCURRANCES: 446

DISTRIBUTION OF CHOICE: HISTORICAL DISCRETE

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: 172231A NSN: PCN: 74146ASUB1 WCD: WCD DATE: 7205

OPERATION: ZPRT PRIMARY OPERATION TYPE: ASSY MATERIAL TYPE:
SAMPLE SIZE: 339 MISSING FLOWTIMES: 1 END ITEMS: OUTLIERS DELETED: 0

MANPOWER REQUIRED				EQUIPMENT REQUIRED					
		--- TIME ---					--- TIME ---		BATCH
SKILL	QTY	FRACTION	HOURS	CODE	CATEGORY	QTY	FRACTION	HOURS	MIN MAX

HISTORICAL DATA

ACTUAL FREQ		RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0	1	*
5	11	****
10	28	**********
15	19	********
20	16	******
25	11	****
30	4	**
35	2	*
40	2	*
45	0	
>=50	5	**

DISTRIBUTION	PARAMETERS			D VALUE	D ALPHA
UNIFORM	3.0		370.0	0.836	.
TRIANGULAR	3.0	13.0	370.0	0.760	.
NORMAL	22.5	30.6		0.280	.
LOGNORMAL	22.5	30.6		0.038	1.00
EXPONENTIAL	23.0			0.245	.

OCCURRANCE FACTOR: . OCCURRANCES: 340

DISTRIBUTION OF CHOICE: LOGNORMAL

WORK CONTROL DOCUMENT

1. DATE	PAGE	OF	PAGES
8271	1		2

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74148A	1	"O"MNPGC		

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
15810-1	5N6-2-3-3 & 4	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-527-9281	
13. SERIAL NUMBER	14. NOUN	
	N-1 Directional Gyro	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	010	Receive (Check data on WCD and AFTO Form 349. Clean gyro external surfaces.)			
	020 0100	Perform functional analysis. Perform resistance & hipot test. If serviceable, proceed to Step 120. Stamp condition tag.			B
	020 0200	Perform functional analysis. Perform resistance & hipot test. If serviceable, proceed to Step 120. Stamp condition tag.			B
	030	Overhaul and repair (clean and inspect)			
	040	Inner Gimbal end play			B
	050	Outer Gimbal end play			B
	060	Final inside visual. Certify that this item does not contain any foreign objects such as as tools or unattached parts.			B
	070	Electrical test			
	080	Seal, leak test, purge and fill			
	090	Install into chasis, perform resistance and hipot check. Paint gyro.			

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANPGC Raymond T. Silph MANPGR William D. Peterson	a. MAONG 29 Sept 88 James E. Bart	
		b. MANERG Maint A Bridges 29 Sep 88	b. MANSAA 29 Sep 88	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WORK CONTROL DOCUMENT (CONT'D)			1. DATE 8271	PAGE 2 OF 2 PAGES	
15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	100	RWT DATE_____ Random_____ Time_____ Position_____			B
	110 0100	Perform functional analysis (final test) Stamp condition tag.			B
	110 0200 MNPGB	Perform functional analysis Stamp condition tag.			B
	120	Final visual. Check compliance with TO modification. Complete AFTO Form 349, decal IAW MAOI 66-40. Attach condition tag.			

WORK CONTROL DOCUMENT

1. DATE	PAGE
7205	PAGE 1 OF 1 PAGES

JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74148A	1	"O" MNPGC		

PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
15119	5N6-2-3-3	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-398-0717	

13. SERIAL NUMBER	14. NOUN
	Gyro Motor (N-1)

15. DISPATCH STATION	16. PON/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	3a	Disassemble, clean and inspect			
	3b	Install bearings and set preload			
	3c	Dynamic balance rotor			
	3d	Install rotor into housing			
	3e	Inside visual. Certify that this item does not contain any foreign objects such as tools or unattached components.			B
	3f	Perform bearing run-in			
	3g	Seal, leak check and evacuate motor assembly.			
	3h	Final motor run-in			
	3i	Paint motor assembly			
	3j	Final visual and functional test			B

FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANERO 27-7-87	a. MANNG 27-7-87	
		b. MANPGC 27-7-87	c. J.T. Powell 7-27-87 MANSAA	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WR-ALC/MANSAA "OVERPRINT"

WORK CONTROL DOCUMENT

1. DATE: 6108 | PAGE 1 OF 2 PAGES

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74148A	1	"O" MNPGC/B	8196	8214

PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
15810-1	5N6-2-3-3 & 4	1667

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-527-9281	

13. SERIAL NUMBER	14. NOUN	
	N-1 Directional Gyro	84 A

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "J"
	01	Receive (Check data on WCD & AFTO 349) Clean Gyro external surfaces. 18 JUL 1988	WR M 01610		
	02	Perform resistance, Hipot Test and Pretest. 18 JUL 1988	WR M 01610		
	03	Overhaul and repair (Clean and Inspect). 18 JUL 1988 NR	WR M 01610		
	04	Inter Gimbal End Play. 18 JUL 1988 NR	WR B PA 7086		
	05	Outer Gimbal End Play 18 JUL 1988 NR	WR B PA 7086		
	06	Final inside visual. Certify that this item does not contain any foreign objects such as tools or unattached parts. NR 18 JUL 1988	WR B PA 7086		
	07	Electrical Test 18 JUL 1988	WR M 01610		
	08	Seal, Leak test, purge and fill 18 JUL 1988 NR	WR M 01610		
	09	Install into chasis, perform resistance and hipot check. Paint Gyro 18 JUL 1988 NR	WR M 01610		
	10	RWT Date 19 July 88 Random L Position 9 Time 2100 - 0500	WR PA 7086		

FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. David S Burgess MANEC 29APR86	a. James E. Bost MAQNG 29 APR 1986	
		b. MNPGC James E. Robertson MNPGC William O. Burton	c. J. I. Powell MANSAA 29APR86	

APPROVED 2853 ABC (MAY 86) (DLM)

AFLC FORM MAR 87 959 PREVIOUS EDITION STILL BE USED. WR-ALC/MANSAA "OVERPRINT"

WORK CONTROL DOCUMENT (CONT'D)			1. DATE 6108	PAGE 2 OF 2 PAGES	
DISPATCH STATION	16. PDM/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19.	20.
	11	JUL 21 1988 Perform Functional Analysis (Final Test) CONDITION TAG	WR PA 6100		
	12	Final Visual. Check compliance with TO modification. Complete AFTO Form 349, Decal IAW WR-ALCO MAOI 66-40 27 JUL 1988	WR PA 7086		

\PROGRAM NAME: 300172
\CPIN: 81M-GYR/N1/DR-U001-00A
\DATE OF LAST REVISION: 19-OCT-87
\ PE: DIRECTIONAL GYRO N1
\ TIONAL STOCK NUMBER: 6615-00-527-9281
\UUT MFR/PART NUMBER: KEARFOTT 15810-1
\OPERATOR'S NAME: DUNHAM
\TEST STATION: DIRECTIONAL STATION #2
\DATE & TIME OF TEST: 21-JUL-88 17:48:15
#GYRO IN TEST MOUNT POSITION 1 IS SERIAL NUMBER 1138
#GYRO IN TEST MOUNT POSITION 2 IS SERIAL NUMBER 1667

****

*

* IMPORTANT NOTE CONCERNING THE STATIC RESISTANCE TESTS

* **********

*

* If a failure of Static Resistance should occur, the operator may retest the UUT Static

* Resistance manually.

* If an in-tolerance measurement is obtained in this manner, then the previous failure is

* to be ignored.

*

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\

/ STATIC RESISTANCE

AZIMUTH SYNCHRO-R1-R2 J201-G,H	2	OHM	00264.0000	00176.0000	00222.5020	PASS	21-JUL-88 17:49:50
AZIMUTH SYNCHRO-S1-S3 J201-J,L	2	OHM	00006.0000	00004.0000	00004.9926	PASS	21-JUL-88 17:49:59
AZIMUTH SYNCHRO-S1-S2 J201-J,K	2	OHM	00006.0000	00004.0000	00005.0286	PASS	21-JUL-88 17:50:09
AZIMUTH SYNCHRO-S2-S3 J201-K,L	2	OHM	00006.0000	00004.0000	00005.0697	PASS	21-JUL-88 17:50:19
L[illegible]NG T.O.-R1-R2 J201-F,A	2	OHM	00087.6000	00058.4000	00068.8730	PASS	21-JUL-88 17:50:28
L[illegible] T.O.-S1-S3 J201-E,D	2	OHM	00151.2000	00100.8000	00125.3500	PASS	21-JUL-88 17:50:37
BR[illegible]OLENOID J201-P,A	2	OHM	01150.0000	00850.0000	00988.2810	PASS	21-JUL-88 17:50:46
SPINMOTOR WINDING B-A J201-B,A	2	OHM	00021.8500	00016.1500	00019.3620	PASS	21-JUL-88 17:50:55
SPINMOTOR WINDING B-C J201-B,C	2	OHM	00021.8500	00016.1500	00019.3334	PASS	21-JUL-88 17:51:06
SPINMOTOR WINDING C-A J201-C,A	2	OHM	00021.8500	00016.1500	00019.4526	PASS	21-JUL-88 17:51:16
LEVELING FXD. FLD. J201-N,A	2	OHM	00314.0000	00230.0000	00267.8550	PASS	21-JUL-88 17:51:26
LEVELING CTL. FLD. J201-N,A	2	OHM	00314.0000	00230.0000	00267.9110	PASS	21-JUL-88 17:51:34

/ BRAKE OPERATION

ZERO VOLTAGE BRAKE RATE	2	D/SEC	00001.0000	00000.0000	.66666E-03	PASS	21-JUL-88 17:52:26

/ SPINMOTOR RUNUP TEST

STARTING CURRENT- PHASE A	2	MA	00500.0000	00050.0000	00393.4190	PASS	21-JUL-88 17:54:27
STARTING CURRENT- PHASE B	2	MA	00500.0000	00050.0000	00395.0330	PASS	21-JUL-88 17:54:28
STARTING CURRENT- PHASE C	2	MA	00500.0000	00050.0000	00392.6170	PASS	21-JUL-88 17:54:29
STARTING OSCILLATION TEST	2		00000.0000	00000.0000	00000.0000	PASS	21-JUL-88 17:54:30
SPINMOTOR SPEED	2	RPM	24300.0000	23320.0000	24000.0000	PASS	21-JUL-88 18:10:25
RUNNING CURRENT- PHASE A	2	MA	00350.0000	00050.0000	00219.5330	PASS	21-JUL-88 18:13:10
RUNNING CURRENT- PHASE B	2	MA	00350.0000	00050.0000	00222.9910	PASS	21-JUL-88 18:13:11
RUNNING CURRENT- PHASE C	2	MA	00350.0000	00050.0000	00221.2610	PASS	21-JUL-88 18:13:12

/ GYRO CARD STABILITY TEST

CARD STABILITY-CLIMB	2	DEG	.25000E+00	00000.0000	.14000E+00	PASS	21-JUL-88 18:29:34
CARD STABILITY-DIVE	2	DEG	.25000E+00	00000.0000	.23000E+00	PASS	21-JUL-88 18:34:58

/ GIMBAL FREEDOM

AZIMUTH ERROR-CLIMB	2	DEG	00002.0000	00000.0000	.30000E-01	PASS	21-JUL-88 18:36:27
LEVELING ERROR-CLIMB	2	DEG	00002.0000	00000.0000	.22500E+00	PASS	21-JUL-88 18:36:28
AZIMUTH ERROR-DIVE	2	DEG	00002.0000	00000.0000	.19000E+00	PASS	21-JUL-88 18:37:59
[illegible]G ERROR-DIVE	2	DEG	00002.0000	00000.0000	00000.0000	PASS	21-JUL-88 18:38:00

LEVELING TORQUER RATE TEST

LEVELING TORQUING TIME-CLIMB	2	MIN	00004.1700	00002.5400	00003.1855	PASS	21-JUL-88 18:53:23
LEVELING TORQUING TIME-DIVE	2	MIN	00004.1700	00002.5400	00003.3941	PASS	21-JUL-88 19:01:06

LEVELING ACCURACY

LEVELING ACCURACY ERROR	2	VOLTS	.12500E+00	00000.0000	.82266E-01	PASS	21-JUL-88 19:10:30

AZIMUTH AND LEVELING SYNCHRO TESTS

AZIMUTH OUTPUT VOLTAGE S1-S2	2	VOLTS	00012.5000	00011.5000	00011.7400	PASS	21-JUL-88 19:15:58
AZIMUTH PHASE ANGLE S1-S2	2	DEG	00172.0000	00168.0000	00169.5000	PASS	21-JUL-88 19:16:07
AZIMUTH OUTPUT VOLTAGE S1-S3	2	VOLTS	00012.5000	00011.5000	00011.7300	PASS	21-JUL-88 19:16:21
AZIMUTH PHASE ANGLE S1-S3	2	DEG	00172.0000	00168.0000	00169.7000	PASS	21-JUL-88 19:16:29
AZIMUTH OUTPUT VOLTAGE S2-S3	2	VOLTS	00012.5000	00011.5000	00011.7200	PASS	21-JUL-88 19:16:43
H PHASE ANGLE S2-S3	2	DEG	00172.0000	00168.0000	00169.6000	PASS	21-JUL-88 19:16:51
LEVELING OUTPUT VOLTAGE-CLIMB	2	VOLTS	00009.4600	00007.7400	00008.5800	PASS	21-JUL-88 19:17:14
LEVELING PHASE ANGLE-CLIMB	2	DEG	00009.0000	00005.0000	00005.9000	PASS	21-JUL-88 19:17:22
LEVELING OUTPUT VOLTAGE-DIVE	2	VOLTS	00009.4600	00007.7400	00008.7000	PASS	21-JUL-88 19:17:34
LEVELING PHASE ANGLE-DIVE	2	DEG	00189.0000	00185.0000	00186.3000	PASS	21-JUL-88 19:17:42
/ MOTOR RUNDOWN TEST							
SPINMOTOR RUNDOWN RATE	2	RPM/M	01200.0000	00000.0000	00719.9999	PASS	21-JUL-88 19:18:55
MOTOR RUNDOWN BALANCE	2	VOLTS	00012.4300	00000.0000	.42000E+00	PASS	21-JUL-88 19:35:50

\END

WORK MEASUREMEN [redacted]
COMPUTATION SHEET

Page 1 of 1 Pages | 25 Feb 85

INSTRUCTIONS: Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

JOB ASSIGNED TO: CARL L. MUCHER

COMPUTED BY: CARL L. MUCHER

WORK ORDER	PART NUMBER	STOCK NUMBER	JOB STANDARD	STATION NO.
74148A	15810-1	6615-00-527-9281	NA	MNPG

NOUN	QUANTITY	STD HRS PER	PIECES	TIME PER PIECE
N-1 Directional Gyro	N/A	N/A	N/A	N/A

WORK MEASUREMENT REQUIREMENTS:
PRODUCTION SUPERVISOR LABOR STANDARD REVIEW

Observations were made 25 Jan 85 through 8 Feb 85 in accordance with AFLCR 66-4 Work Sampling Techniques. Overall productivity was 89%.

CATEGORY	BASE HR/OCC	PF&D	STD HR/OCC	OCC FACTOR	STD HR/END ITEM
Receive	.054	1.07	.058	1.00	.058
Pretest	.231	1.07	.248	1.00	.248
O/H & RPR/Clean & Inspect	8.044	1.07	8.607	1.00	8.607
Motor Repair	7.532	1.07	8.060	1.00	8.060
B/Up Inr Gim/End Play	2.260	1.07	2.419	1.00	2.419
B/Up Otr Gim/End Play	1.478	1.07	1.582	1.00	1.582
Final I/S Visual	.256	1.07	.274	1.00	.274
Funct Test	.713	1.07	.763	1.00	.763
Seal/Fill	2.837	1.07	3.036	1.00	3.036
Instal In Chassis	.490	1.07	.525	1.00	.525
O/H Random	1.429	1.07	1.529	1.00	1.529
Elect Test	1.064	1.07	1.139	1.00	1.139
Final Visual	.657	1.07	.703	1.00	.703

TOTAL 28.943 = 28.94 M/H

This total is manually computed and may vary slightly from E046 output. In accordance with AFLCR 66-4, para 3-10, all standards should be reviewed by affected supervisory personnel for completeness of work content. Production supervisors will be given 10 workdays to express in writing their reasons for nonconcurrence. If, after this time, no reply has been received fromthe coordinating agency, the standard will be considered coordinated and acceptable.

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER: N/A		WORK CENTER FOREMAN: N/A See E046B Print out	
PROCESS TECHNICIAN: Carl L. Mucher	25 Feb 85	N/A	

AFLC FORM SEP 80 774 REPLACES AMC FORM 774, SEP 60, WHICH MAY BE USED. AFLC-WPAFB-APR 73 2135

SHOP FLOW DAY COMPUTATION FOR PRODUCTION NO: 74148A

AFLCR 66-4 Shop Flow Day Formula was used to establish this flow day standard as follows: Flow Days = A [(B ÷ C) + D + E] where A = 1.45; B = End Item Labor Standard; C = Direct Labor Hours Per Person Per Day adjusted for indirect categories and labor efficiency; D = Routine Delays; E = Unique Delays. Repair is being accomplished as a responsible shop.

STEP	DESCRIPTION	DAYS
	B = Labor Standard of 28.93 Hrs C = 7.58 Daily Labor Hrs	B ÷ C
	Value "C" is calculated as follows:	
	MANPG C .24 +.25 + .26 + .29 Indirect Average = .1 Hours	
	MANPG C Labor Efficiency = 96 %	3.82
	C = 8 Hours Minus Indirect Average Times Labor Efficiency	
2	= Routine Delays	
	Awaiting Maintenance (AWM) = 3.8 days	
	b. One days supply at station awaiting maintenance = 4 days (average 4 stations for each C/N). This is necessary to maintain uninterrupted flow of items.	
	TOTAL	7.80
3	E = Unique Delays	
	a. Machine processing 8.12 Day(s)	
	b. Machine processing delays .50 Day(s)	
	c. Routing to support shops _____ Day(s)	
	d. Others (See Reverse Side) _____ Day(s)	
	TOTAL	8.62
	Total flow days this shop (1 + 2 + 3)	20.24
	Work Shift Adjustment (Item 4 ÷ number of shifts). ÷ 2 shift/day	10.12
	of flow days for all shops (Item 5 x 1.45) X 10.12 14.67	
	inal result to be rounded up to next whole day.)	15

COMPUTED BY: CARL MUCHER DATE: 14 Feb 85

UNIQUE DELAYS	TIME	PAGE	PARA
A. Machine Processing			
1. Test Motor 12 Min.	.20 hrs	2-19	2-32b
2. Run-in Motor 48 hrs. 48 hrs ÷ 8 hrs/Day = 6 Days	6 days	2-29	2-47bc
3. Leak Test 15 Minutes = .25 hrs	.25 hrs	2-44	2-58b
4. Random Wander Drift Test Warm/Up Gyro 15 min. 2 ea. Warm/Up Required 15 Min X 2 ea. Warm/Up = 30 min	.50 hrs	3-29	3-64
Drift Test 16 hrs. 16 hrs ÷ 8 hrs/Day = 2 Days	2 days	3-29	3-64
Machine Delay 4 hrs.	4 hrs	3-29	3-64

NAME R. VL 2ERVOORN ALC WR DATE 4-6-6 RCC MANPGC SHEET 1 OF 1

PCN -ISN- PIN= 74148A WCD N/A WCD DATE 8E71

OPERATION NUMBER	RCC	OPERATION DESCRIPTION	MANDATORY OCCURRENCE FACTOR	OPERATION TYPE	MANDATORY FLOW TIMING %	MANDATORY FLOW TIMING HRS.	MANPOWER SKILL CODE/ LEVEL	MANPOWER QTY.	MANPOWER TIME REQUIRED %	MANPOWER TIME REQUIRED HRS.	EQUIPMENT EQUIPMENT CODE	EQUIPMENT QTY.	EQUIPMENT TIME REQUIRED %	EQUIPMENT TIME REQUIRED HRS.	DATA SOURCE COMMENTS
IN	MANPG	REC	1	TRANSIT											C. DRIVER RANIER MAC MILLER OPER. & A SCHEDULER.
				SETUP											
				PROCESS		1	IG09	1		0.1	STD				
		↑		TRANSIT											
				SETUP											
				PROCESS											
ALL WCD OPERATIONS LISTED IN CM OPER FILE				TRANSIT											
				SETUP											
				PROCESS											
		↓		TRANSIT											
				SETUP											
				PROCESS											
9999	MANPG	SELL	1	TRANSIT											D. HARRELSON 6 SPEED MANPG MAC MILLER OPERATOR & SCHEDULER.
				SETUP											
				PROCESS		.1	IG09	1		0.1	STD				

LSC-20092C

NAME Richard Cisco

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 27

ITEM CD PCN 74148A ALC WR DATE 4/19/89 RCC MANPGC SHEET 1 OF 4

WCD WCDDATE 8271

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
10	MANPGC	REC	0.99		T										
10	MANPGC	REC			S										
10	MANPGC	REC		1.000		0.1	IG09	1		0.1					
20	MANPGC	NDI	0.99		T										
20	MANPGC	NDI			S										
20	MANPGC	NDI		1.00	P	0.9	IG09	1		0.6	5925	1		0.6	
20	MANPGB	NDI			P	0.9	IG10	1		0.6	8556	1		0.6	
30	MANPGC	DIS	0.99		T										
30	MANPGC	DIS			S										
30	MANPGC	DIS		1.00	P	18.5	IG09	1		18.5	0844	1		0.3	
40	MANPGC	ASSY	1.00		T										
40	MANPGC	ASSY			S										
40	MANPGC	ASSY		1.00	P	0.2	IG09	1		0.2					

NAME [illegible] CISERO

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 28

ITEM CD PCN 74148A WCD ALC WR WCDDATE 8271 DATE 4/19/89 RCC MANPGC SHEET 2 OF 4

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
50	MANPGC	ASSY	1.00	.	T										
50	MANPGC	ASSY	.	.	S										
50	MANPGC	ASSY	.	1.00	P	0.2	IG09	1	.	0.2					
60	MANPGC	NDI	0.99	.	T										
60	MANPGC	NDI	.	.	S										
60	MANPGC	NDI	.	1.00	P	0.2	IG09	1	.	0.2					
70	MANPGC	ASSY	0.99	.	T										
70	MANPGC	ASSY	.	.	S										
70	MANPGC	ASSY	.	1.00	P	0.6	IG09	1	.	0.6	5925	1	.	0.6	
80	MANPGC	ASSY	0.98	.	T										
80	MANPGC	ASSY	.	.	S										
80	MANPGC	ASSY	.	1.00	P	4.0	IG09	1	.	0.7	0002	1	.	4.0	

NAME [illegible]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 29

ALC WR DATE 4/19/89

ITEM CD PCN 74148A WCD WCDDATE 8271 RCC MANPGC SHEET 3 OF 4

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
80	MANPGC	ASSY	.	.	P	.	.	.	.	.	3346	1	.	0.2	
90	MANPGC	ASSY	0.96	.	T	.	.	.	.	.	.	.	.	.	
90	MANPGC	ASSY	.	.	S	.	.	.	.	.	.	.	.	.	
90	MANPGC	ASSY	.	1.00	P	2.2	IG09	1	.	1.2	.	.	.	.	
100	MANPGC	NDI	0.94	.	T	.	.	.	.	.	.	.	.	.	
100	MANPGC	NDI	.	.	S	.	.	.	.	.	.	.	.	.	
100	MANPGC	NDI	.	1.00	P	16.0	IG09	1	.	1.5	0766	1	.	12.0	
110	MANPGC	NDI	0.88	.	T	.	.	.	.	.	.	.	.	.	
110	MANPGC	NDI	.	[illegible]	S	.	.	.	.	.	.	.	.	.	
110	MANPGC	NDI	.	1.00	P	3.0	IG09	1	.	3.0	5925	1	.	3.0	
110	MANPGB	NDI	.	.	P	3.0	IG10	1	.	3.0	8556	1	.	3.0	
120	MANPGB	ASSY	0.87	.	T	.	.	.	.	.	.	.	.	.	
120	MANPGB	ASSY	.	.	S	.	.	.	.	.	.	.	.	.	

NAME Tim Calocci

SAS

OPERATION PROFILE

9:44 TUESDAY, MARCH 28, 1989 30

ALC WR DATE 4/19/89 RCC MANPGC SHEET 1 OF 1

ITEM CD PCN 74148A WCD WCDDATE 8271

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
120	MANPGB	ASSY		1.00	P	0.4	IG09	1		0.4					

NAME R Vanderbeek OPERATION PROFILE SAS 9:44 TUESDAY, MARCH 28, 1989 31

ALC WR DATE 3/29/89 RCC MANPGC SHEET 1 OF 4

ITEM CD PCN 74148ASUB1 WCD WCDDATE A7205

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
03A	MANPGC	DIS	.	.	T	.		.	.	.		.	.	.	
03A	MANPGC	DIS	.	.	S	.		.	.	.		.	.	.	
03A	MANPGC	DIS	.	1.00	P	0.7	IG09	1	.	0.7		.	.	.	
03A	MANPDA	PROC	.	1.00	P	24.0		.	.	.		.	.	.	
03B	MANPGC	ASSY	.	.	T	.		.	.	.		.	.	.	
03B	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
03B	MANPGC	ASSY	.	1.00	P	0.7	IG09	1	.	0.7		.	.	.	
03C	MANPGC	ASSY	.	.	T	.		.	.	.		.	.	.	
03C	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
03C	MANPGC	ASSY	.	1.00	P	0.8	IG09	1	.	0.8	5139	1	.	0.8	
03D	MANPGC	ASSY	.	.	T	.		.	.	.		.	.	.	
03D	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
03D	MANPGC	ASSY	.	1.00	P	1.3	IG09	1	.	1.3		.	.	.	

NAME [signature]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 32

ALC WR DATE 4/9/87 RCC MANPGC SHEET 2 OF 4

ITEM CD PCN 74148ASUB1 WCD WCDDATE A7205

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
03E	MANPGC	NDI			T										
03E	MANPGC	NDI			S										
03E	MANPGC	NDI		1.00	P	0.1	IG09	1		0.1					
03F	MANPGC	ASSY			T										
03F	MANPGC	ASSY			S										
03F	MANPGC	ASSY		1.00	P	0.4	IG09	1		0.4	9036	1		0.4	
03G	MANPGC	ASSY			T										
03G	MANPGC	ASSY			S										
03G	MANPGC	ASSY		1.00	P	2.8 ~~1.5~~	IG09	1		1.3	0002	1		24.0	
03G	MANPGC	ASSY			P						3346	1		0.2	
03H	MANPGC	ASSY			T										
03H	MANPGC	ASSY			S										

NAME Klondike Lord

SAS

OPERATION PROFILE

9:44 TUESDAY, MARCH 28, 1989 33

ALC WR DATE 5/17/87 RCC MANPGC SHEET 3 OF 4

ITEM CD PCN 74148ASUB1 WCD WCDDATE A7205

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
03H	MANPGC	ASSY	.	1.000	P	50.0	IG09	1	.	0.7	0007	1	.	48.0	
03H	MANPGC	ASSY	.	.	P	.		.	.	.	9036	1	.	0.2	
03I	MANPGC	PROC	.	.	T	.		.	.	.		.	.	.	
03I	MANPGC	PROC	.	.	S	.		.	.	.		.	.	.	
03I	MANPGC	PROC	.	1.000	P	1.0	IG09	1	.	0.5	0004	1	.	0.2	

NAME [signature]

OPERATION PROFILE SAS

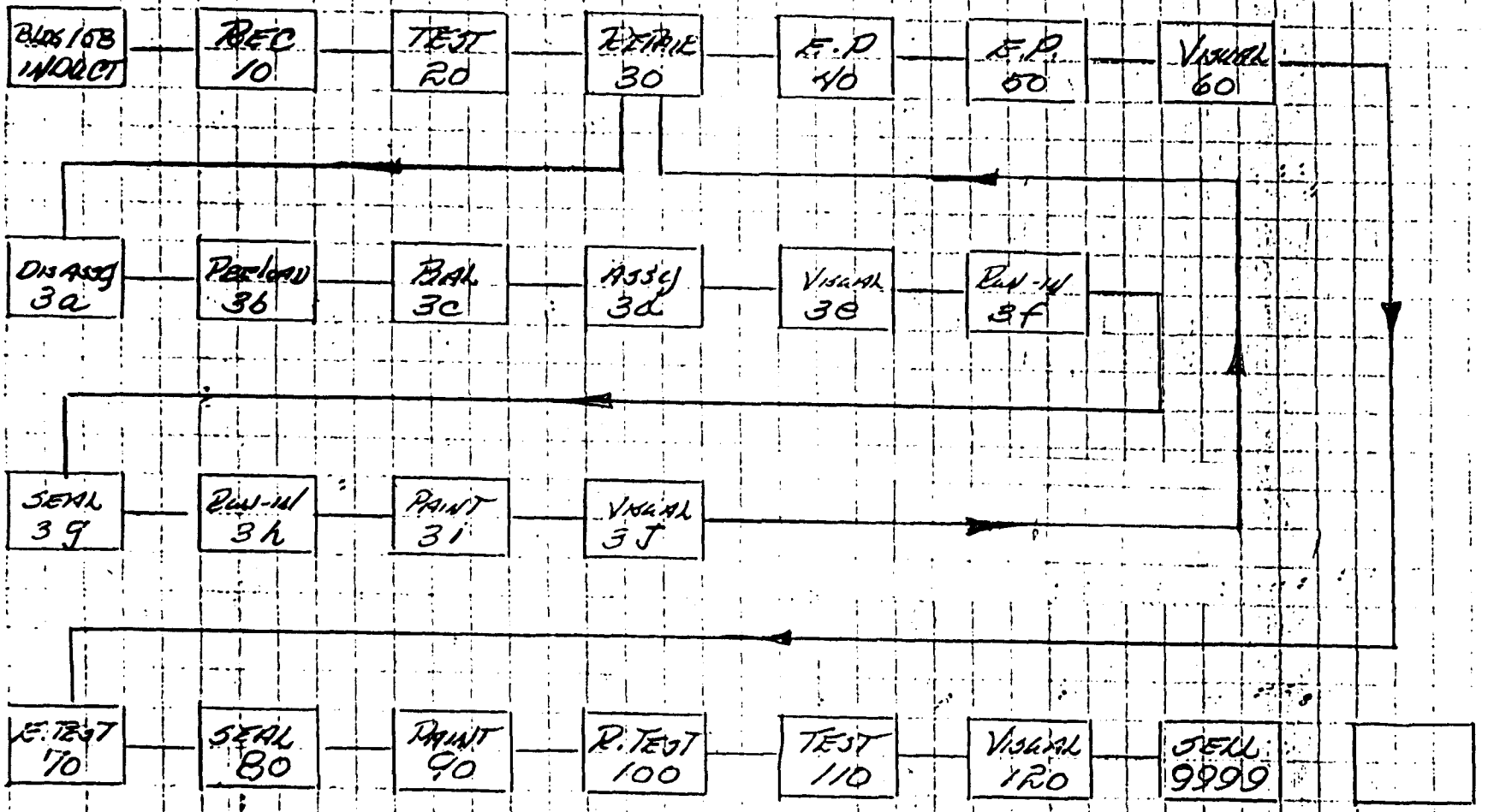
9:44 TUESDAY, MARCH 28, 1989 34

ALC WR DATE 4/19/89

ITEM CD PCN 74148ASUB1 WCD WCDDATE 7205 RCC MANPGC SHEET 1 OF 1

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
03J	MANPGC	NDI	.	.	T	.	.	.	.	.	.	.	.	.	
03J	MANPGC	NDI	.	.	S	.	.	.	.	.	.	.	.	.	
03J	MANPGC	NDI	.	1.00P	.	0.5	IG09	1	.	0.2	9036	1	.	0.2	

PROCESS FLOW CHART PCN 74148A



Rdd 4/19/89

ALC: WARNER ROBBINS RCC: MANPGB GYRO SHOP, UNIT 2

PN: 15810-1 NSN: PCN: 74148A WCD: WCD DATE: 8271

OPERATION: ZPRT PRIMARY OPERATION TYPE: ASSY MATERIAL TYPE:
SAMPLE SIZE: 325 MISSING FLOWTIMES: 0 END ITEMS: OUTLIERS DELETED: 1

-------- MANPOWER REQUIRED --------

SKILL	QTY	--- TIME --- FRACTION	HOURS

---------- EQUIPMENT REQUIRED ----------

CODE	CATEGORY	QTY	--- TIME --- FRACTION	HOURS	BATCH MIN	BATCH MAX

HISTORICAL DATA

ACTUAL FREQ	RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0 56	**********
20 12	*****
40 10	****
60 7	***
80 6	**
100 2	*
120 4	**
140 0	
160 1	
180 0	
>=00 1	

DISTRIBUTION	PARAMETERS		D VALUE	D ALPHA
UNIFORM	0.0	317.0	0.619	
TRIANGULAR	0.0	9.0317.0	0.476	
NORMAL	36.4	45.5	0.207	
LOGNORMAL	36.4	45.5	0.066	0.12
EXPONENTIAL	36.9		0.149	

OCCURRANCE FACTOR: OCCURRANCES: 326

DISTRIBUTION OF CHOICE: LOGNORMAL

SAS

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: 415119 NSN: PCN: 74148ASUB1 WCD: WCD DATE: A7205

OPERATION: ZPRT PRIMARY OPERATION TYPE: PROC MATERIAL TYPE:
SAMPLE SIZE: 194 MISSING FLOWTIMES: 0 END ITEMS: OUTLIERS DELETED: 0

-------- MANPOWER REQUIRED --------

SKILL	QTY	--- TIME --- FRACTION	HOURS

---------- EQUIPMENT REQUIRED ----------

CODE	CATEGORY	QTY	--- TIME --- FRACTION	HOURS	BATCH MIN	BATCH MAX

HISTORICAL DATA

ACTUAL FREQ		RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0	5	**
10	17	*******
20	26	**********
30	23	*********
40	10	****
50	8	***
60	6	**
70	2	*
80	2	*
90	0	
>=100	3	*

DISTRIBUTION	PARAMETERS			D VALUE	D ALPHA
UNIFORM	5.0		122.0	0.435	.
TRIANGULAR	5.0	20.5	122.0	0.283	.
NORMAL	34.7	20.8		0.136	.
LOGNORMAL				1.000	.
EXPONENTIAL	35.2			0.262	.

OCCURRANCE FACTOR: . OCCURRANCES: 194

DISTRIBUTION OF CHOICE: HISTORICAL DISCRETE

WORK CONTROL DOCUMENT

1. DATE	PAGE 1 OF 2 PAGES
8119	

JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74149A	1	"O"MNPGC		

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
15150-1	5N6-3-2-3; 5N6-3-2-4; 5N6-3-2-3-1	

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-570-4966	

13. SERIAL NUMBER	14. NOUN
	Slaving Control (N-1)

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	010	Receive (Check data on WCD and AFTO Form 349. Clean gyro external surfaces.)			
	020 0100	Perform functional analysis. If serviceable proceed to Step 100. Stamp condition tag.			B
	020 0200 MNPGB	Perform functional analysis. If serviceable proceed to Step 100. Stamp condition tag.			B
	030	Unseal			
	040	Gyro repair			B
	050	Build-up test			B
	060	Calibrate			B
	070	Final inside visual. Certify that this item does not contain any foreign objects such as tools or unattached components.			B
	080	Seal, leak test, purge and fill			
	090 0100	Perform functional analysis. Stamp condition tag.			B

FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE			
		a. MANPGC ~~MANPGB~~	c. MAQNG	
		b. MANERG	d. MANSAA	

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WORK CONTROL DOCUMENT (CONT'D)			1. DATE 8119	PAGE 2 OF 2 PAGES	
15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	090 0200 MNPGB	Perform functional analysis. Stamp condition tag.			B
	100	Final prep (final visual, complete AFLC Form 959, check for TO MOD compliance. Complete AFTO 349 & install WR-ALC decal IAW MAOI 66-40. Attach condition tag.			

WORK CONTROL DOCUMENT

1. DATE	PAGE 1 OF 1 PAGES
6339	

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74149A ✓	1	"O" MNPGC		

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
41530W	5N6-3-2-3; 5N6-3-2-4	

10. MODEL - DESIGN - SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-342-3871	

13. SERIAL NUMBER	14. NOUN
	N-1 SLAVE MOTOR

15. DISPATCH STATION	16. PON/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	4a	ROUTE FOR HULL BLASTING (AS REQUIRED)			
	4b	DISASSEMBLE			
	4c	CLEAN AND INSPECT PARTS			
	4d	BUILDUP AND TEST			
	4e	SEAL, FILL, LEAK CHECK			
	4f	FINAL MOTOR BALANCE			
	4g	PERFORM BEARING RUN-IN			
	4h	PAINT			
	4i	FINAL TEST AND FINAL VISUAL			B

21. FINAL DESTINATION		22. COORDINATION INITIATING RCC SIGNATURE DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANENG	a. MAONG 13 Jan 87	
		b. MANPGC	MANSAA 13 Jan 87	

AFLC FORM MAR 81 959 — PREVIOUS EDITION WILL BE USED.

WR-ALC/MANSAA "OVERPRINT"

Inst Kit No AH Lft

WORK CONTROL DOCUMENT

1. DATE: 6339 Bett | PAGE 1 OF 1 PAGES

2. JOB ORDER NUMBER	3. QUANTITY	4. PRODUCTION SECTION/RCC	5. DATE SCHED	6. DATE COMP
74149A	1	"O" MNPGC/MNPGB	0196 SEP 02 1988	

7. PART NUMBER	8. TECH DATA	9. ITEM SERIAL NUMBER
15150-1	5N6-3-2-3; 5N6-3-2-4; 84 A 5N6-3-2-3-1	4669

10. MODEL-DESIGN-SERIES	11. STOCK NUMBER	12. OPTIONAL
	6615-00-570-4966	NOTE: Use QQ-S-571 type SN60WRP solder. Observe all notes, cautions, and warnings throughout T.O. MDC data, required IAW MAOI 66-22.
13. SERIAL NUMBER	14. NOUN	
	SLAVING CONTROL (N-1)	

15. DISPATCH STATION	16. PDN/OP NO.	17. WORK TO BE ACCOMPLISHED	18. MECHANIC	19. "P"	20. "Q"
	1 1010	Receive (Check data on WCD and AFTO Form 349.) Clean External Surfaces. AUG 12 1988	WR PA 6044		
	2 1010	PRETEST Essential Repair _____ Overhaul _____ AUG 12 1988	WR PA 6044		
	3 1020	UNSEAL AUG 16 1988	WR PA 6044		
	4 1030	GYRO REPAIR AUG 16 1988	WR PA 6044		B
	5 1035	BUILD-Up TEST AUG 19 1988	WR PA 6044		B
	6 1045	CALIBRATE AUG 19 1988	WR PA 6044		B
	7 1030	Final Inside Visual. Certify that this item does not contain any foreign objects such as tools or unattached components. AUG 1[illegible]	WR PA 6044		B
	8 1060	SEAL, FILL, LEAK CHECK AUG 1[illegible]	WR PA 6044		
	9 1070	FINAL FUNCTIONAL ANALYSIS. STAMP CONDITION TAG. 22 AUG 1988	WR PA 6335		B
	10 1080	Final Prep. (Final Visual, complete AFLC Form 959, check for T.O. MOD compliance. Complete AFTO 349 and install WR-ALC decal. Remove Tag. SEP 02 1988	WR 5615		

21. FINAL DESTINATION		22. COORDINATION/INITIATING RCC SIGNATURE/DATE		23. DOCUMENT S/N
DISPATCH	FUNCTIONAL CODE	a. MANERC 13 Jan 87	a. MAQNG 13 Jan 87	
		b. MANPGC MANPGB 15 Jan 87	c. MANSAA 13 Jan 87	

Approved 285? AB. (Feb 87) (DLN)

AFLC FORM MAR 81 959 PREVIOUS EDITION WILL BE USED.

WR-ALC/MANSAA "OVER"

\PROGRAM NAME: 300328
\CPIN: 81H-GYR/N1/SCONT-U001-00A
\DATE OF LAST REVISION: 26-MAR-86
\UUT TYPE: SWITCHING RATE GYRO N1
\UUT NATIONAL STOCK NUMBER: 6615-00-570-4966
\UUT MFR/PART NUMBER: KEARFOTT 15150-1
\OPERATOR'S NAME: WILSON
\TEST STATION: RATE STATION # 2
\DATE & TIME OF TEST: 22-AUG-88 12:53:09
GYRO IN TEST MOUNT POSITION 1,
SERIAL NUMBER 4669

22 AUG 1988

WR
PA
6335

/ SPINMOTOR RUNUP							
NORMALLY OPEN TURN INDICATOR	1	Ohms	.10000E+33	00300.0000	.10000E+33	PASS	22-AUG-88 12:54:00
RUNNING CURRENT PHASE-A	1	mA	00150.0000	00000.0000	00093.7270	PASS	22-AUG-88 12:57:28
RUNNING CURRENT PHASE-B	1	mA	00150.0000	00000.0000	00100.3030	PASS	22-AUG-88 12:57:29
RUNNING CURRENT PHASE-C	1	mA	00150.0000	00000.0000	00100.7400	PASS	22-AUG-88 12:57:30
/ SWITCHING AND UNSWITCHING TIME							
SWITCHING TIME 1.5 D/S CW	1	Sec	00045.0000	00001.0000	00005.0833	PASS	22-AUG-88 12:59:59
UNSWITCHING TIME 1.5 D/S CW	1	Sec	00008.0000	00004.0000	00006.2833	PASS	22-AUG-88 13:01:19
SWITCHING TIME 1.5 D/S CCW	1	Sec	00045.0000	00001.0000	00007.1666	PASS	22-AUG-88 13:02:40
UNSWITCHING TIME 1.5 D/S CCW	1	Sec	00008.0000	00004.0000	00004.7166	PASS	22-AUG-88 13:03:59
SWITCHING TIME 0.75 D/S CW	1	Sec	00045.0000	00001.0000	00010.3833	PASS	22-AUG-88 13:05:26
UNSWITCHING TIME 0.75 D/S CW	1	Sec	00006.0000	00002.0000	00004.0833	PASS	22-AUG-88 13:06:44
SWITCHING TIME 0.75 D/S CCW	1	Sec	00045.0000	00001.0000	00014.3499	PASS	22-AUG-88 13:08:13
UNSWITCHING TIME 0.75 D/S CCW	1	Sec	00006.0000	00002.0000	00003.9999	PASS	22-AUG-88 13:09:31
/ YAW OSCILLATION							
TURN INDICATOR 2.5 DEG 0.5 HZ	1	Ohms	.10000E+33	00300.0000	.10000E+33	PASS	22-AUG-88 13:16:16
TURN INDICATOR 4 DEG 0.5 HZ	1	Ohms	.10000E+33	00300.0000	.10000E+33	PASS	22-AUG-88 13:20:39
/ STEADY STATE RATE AND YAW OSCILLATION							
TURN INDICATOR CLOSED CW	1	Ohms	00300.0000	00000.0000	00001.9940	PASS	22-AUG-88 13:27:26
TURN INDICATOR OPEN CW	1	Ohms	.10000E+33	00300.0000	.10000E+33	PASS	22-AUG-88 13:28:14
TURN INDICATOR CLOSED CCW	1	Ohms	00300.0000	00000.0000	00002.0580	PASS	22-AUG-88 13:31:29
TURN INDICATOR OPEN CCW	1	Ohms	.10000E+33	00300.0000	.10000E+33	PASS	22-AUG-88 13:32:19
/ RELAY CURRENT, DROPOUT VOLTAGE, AND PICKUP VOLTAGE							
RELAY CURRENT CW	1	mAmps	00043.0000	00028.0000	00038.8220	PASS	22-AUG-88 13:34:12
RELAY CLOSED 15.0 V CW	1	Ohms	00300.0000	00000.0000	00002.8880	PASS	22-AUG-88 13:34:25
RELAY DROPOUT 0.5 V CW	1	Ohms	.10000E+33	00300.0000	.10000E+33	PASS	22-AUG-88 13:34:39
RELAY PICKUP 21.0 V CW	1	Ohms	00300.0000	00000.0000	00003.0860	PASS	22-AUG-88 13:34:52
RELAY CURRENT CCW	1	mAmps	00043.0000	00028.0000	00038.6340	PASS	22-AUG-88 13:36:34
RELAY CLOSED 15.0 V CCW	1	Ohms	00300.0000	00000.0000	00002.2130	PASS	22-AUG-88 13:36:48
RELAY DROPOUT 0.5 V CCW	1	Ohms	.10000E+33	00300.0000	.10000E+33	PASS	22-AUG-88 13:37:01
RELAY PICKUP 21.0 V CCW	1	Ohms	00300.0000	00000.0000	00001.8450	PASS	22-AUG-88 13:37:14
/ MOTOR RUNDOWN							
SPINMOTOR RUNDOWN RATE	1	Rpm/M	12000.0000	00000.0000	05342.5671	PASS	22-AUG-88 13:39:48

\END

NAME R.L. ZERVOOS ALC WR DATE 4-6-E RCC MANPGC SHEET 1 OF 1

PCN/MSN/PWC 74149A WCD 4/A WCD DATE C8119

OPERATION NUMBER	RCC	OPERATION DESCRIPTION	MANDATORY OCCURRENCE FACTOR	OPERATION TYPE	MANDATORY FLOW ITEMS %	MANDATORY FLOW ITEMS MINS.	MANPOWER SKILL CODE/ LEVEL	MANPOWER QTY.	MANPOWER TIME REQUIRED %	MANPOWER TIME REQUIRED MINS.	EQUIPMENT EQUIPMENT CODE	EQUIPMENT QTY.	EQUIPMENT TIME REQUIRED %	EQUIPMENT TIME REQUIRED MINS.	DATA SOURCE COMMENTS
0000	MANPGC	IN REC	1	TRANSIT											C. DRIVER RANGER MAC M. MILLER OPER. & A SCHEDULER.
				SETUP											
				PROCESS		1	IG09	1		0.1	STD				
		↑		TRANSIT											
				SETUP											
				PROCESS											
ALL WCD OPERATIONS LISTED IN CA OPER PROFILE				TRANSIT											
				SETUP											
				PROCESS											
		↓		TRANSIT											
				SETUP											
				PROCESS											
9999	MANPGC	SELL	1	TRANSIT											D. HARRELSON Supvr. MANPGC MAC. M. MILLER OPERATOR & SCHEDULER.
				SETUP											
				PROCESS		.1	IG09	1		0.1	STD				

LSC-2(X)92C

OPERATION PROFILE SAS

NAME [signature]

ALC WR

DATE 4/19/89

ITEM CD PCN 74149A

WCD

WCDDATE C8119

RCC MANPGC

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
10	MANPGC	REC	1.00	.	T										
10	MANPGC	REC	.	.	S										
10	MANPGC	REC	.	1.00	P	0.1	IG09	1	.	0.1					
20	MANPGC	NDI	0.99	.	T										
20	MANPGC	NDI	.	.	S										
20	MANPGC	NDI	.	1.00	P	0.5	IG09	1	.	0.3	1022	1	.	0.3	
20	MANPGB	NDI	.	.	P	1.0	IG10	1	.	0.8	0450	1	.	0.8	
30	MANPGC	DIS	0.99	.	T										
30	MANPGC	DIS	.	.	S										
30	MANPGC	DIS	.	~~1.00~~ .70	P	0.2	IG09	1	.	0.2	0005	1	.	0.1	
40	MANPGC	DIS	0.99	.	T										
40	MANPGC	DIS	.	.	S										
40	MANPGC	DIS	.	~~1.00~~ .70	P	1.0	IG09	1	.	6.0	9420	1	.	0.2	50% of WHEEL AXLE REPAIR.

SAS

OPERATION PROFILE

NAME [illegible] ALC WR DATE 4/19/89 RCC MANPGC SHEET 2 OF 3

ITEM CD PCN 74149A WCD WCDDATE C8119

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
50	MANPGC	ASSY	0.99	.	T	.		.	.	.		.	.	.	
50	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
50	MANPGC	ASSY	.	.10	P	0.5	IG09	1	.	0.5		.	.	.	
60	MANPGC	ASSY	0.99	.	T	.		.	.	.		.	.	.	
60	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
60	MANPGC	ASSY	.	.70	P	1.5	IG09	1	.	1.5	1022	1	.	1.5	
70	MANPGC	NDI	0.99	.	T	.		.	.	.		.	.	.	
70	MANPGC	NDI	.	.	S	.		.	.	.		.	.	.	
70	MANPGC	NDI	.	.10	P	0.1	IG09	1	.	0.1		.	.	.	
80	MANPGC	ASSY	0.97	.	T	.		.	.	.		.	.	.	
80	MANPGC	ASSY	.	.	S	.		.	.	.		.	.	.	
80	MANPGC	ASSY	.	.20	P	3.0	IG09	1	.	0.5	0002	1	.	1.0	

NAME [illegible]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 37

ITEM CD PCN 74149A WCD ALC WR DATE 3/16/89 RCC MANPGC SHEET 2 OF 3

WCDDATE C8119

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
80	MANPGC	ASSY	.	[illegible]	P	.	.	.	.	.	3346	1	.	0.2	
90	MANPGC	NDI	1.00	.	T	.	.	.	.	.	.	.	.	.	
90	MANPGC	NDI	.	.	S	.	.	.	.	.	.	.	.	.	
90	MANPGC	NDI	.	1.00	P	0.6	IG09	1	.	0.4	1022	1	.	0.4	
90	MANPGB	NDI	.	1.00	P	1.0	IG10	1	.	0.8	0450	1	.	0.8	
100	MANPGC	ASSY	0.97	.	T	.	.	.	.	.	.	.	.	.	
100	MANPGC	ASSY	.	.	S	.	.	.	.	.	.	.	.	.	
100	MANPGC	ASSY	.	1.00	P	0.2	IG09	1	.	0.2		.	.	.	

50%

100% of 11 Weeks Required Go Thru . . Ops

NAME

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 38

ALC WR DATE 3/14/89

ITEM CD PCN 74149ASUB1 WCD WCDDATE 6339 RCC MANPGC SHEET 1 OF 3

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
04A	MANPDA	PROC			T										
04A	MANPDA	PROC			S	5 Eq/c									
04A	MANPDA	PROC		1.00	P										
04B	MANPGC	DIS			T										
04B	MANPGC	DIS			S										
04B	MANPGC	DIS		1.00	P	0.3	IG09	1		0.3					
04C	MANPGC	DIS			T										
04C	MANPGC	DIS			S										
04C	MANPGC	DIS		1.00	P		IG09	1		0.3					
04D	MANPGC	DIS			P										
04D	MANPGC	ASSY			T										
04D	MANPGC	ASSY			S										
04D	MANPGC	ASSY		1.00	P	6.5	IG09	1		3.0	0001	1		2.0	

NAME [signature]

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 39

ALC WR DATE 4/4/89

ITEM CD PCN 74149ASUB1 WCD WCDDATE 6339 RCC MANPGC SHEET 2 OF 3

OPER NUMB	RCC	OPER DESC	HIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
04D	MANPGC	ASSY			P						0008	1		0.2	
04D	MANPGC	ASSY			P						0003	1		3.0	
04D	MANPGC	ASSY			P						9420	1		0.2	
04D	MANPGC	ASSY			P						5139	1		0.2	
04E	MANPGC	ASSY			T										
04E	MANPGC	ASSY			S										
04E	MANPGC	ASSY		1.00	P	13.0	IG09	1		1.2	0002	1		0.8	
04E	MANPGC	ASSY			P						3346	1		0.2	
04F	MANPGC	ASSY			T										
04F	MANPGC	ASSY			S										
04F	MANPGC	ASSY		1.00	P	0.3	IG09	1		0.3					
04G	MANPGC	ASSY			T										

NAME Richard Costa

OPERATION PROFILE SAS

9:44 TUESDAY, MARCH 28, 1989 40

ITEM CD PCN 74149ASUB1 WCD ALC WR WCDDATE 6339 DATE 4/10/87 RCC MANPGC SHEET 3 OF 3

OPER NUMB	RCC	OPER DESC	MIST OCCR	MAND OCCR	OPER TYPE	MAND F HRS	SKILL CD/LVL	QTY	%	HRS	EQUIP CODE	QTY	%	HRS	NOTES
04G	MANPGC	ASSY			S										
04G	MANPGC	ASSY		1.00	P	24.0	IG09	1		0.2	0008	1		24	
04H	MANPGC	PROC			T										
04H	MANPGC	PROC			S										
04H	MANPGC	PROC		1.00	P	1.2	IG09	1		0.2	0004	1		0.2	
04I	MANPGC	NDI			T										
04I	MANPGC	NDI			S										
04I	MANPGC	NDI		1.00	P	0.5	IG09	1		0.2	9420	1		0.2	

WORK MEASUREMENT STANDARD DATA COMPUTATION SHEET

Page 1 of 1 Pages

DATE: 21 MAR 80

JOB ASSIGNED TO: MANEG

COMPUTED BY: L. HORNE

INSTRUCTIONS. Industrial Engineering Division will complete "Work Measurement Requirements" and furnish cut sheets to applicable using activities for each type of computation sheet as required.

WORK ORDER	PART NUMBER	STOCK NUMBER	JOB STANDARD	STATION NO.
74149A	15150-1	6615005704966	N/A	MNPG

NOUN	QUANTITY	STD HRS PER	PIECES	TIME PER PIECE
N-1 SLAVE	N/A	N/A	N/A	N/A

WORK MEASUREMENT REQUIREMENTS.

COORDINATION OF LABOR STANDARD WITH PRODUCTION SUPERVISOR

Observations were made 14 JAN 80 through 01 FEB 80 in accordance with AFLCR 66-4 Work Sampling Techniques. Overall productivity 93 %.

CATEGORY	STANDARD HOURS	OCC FACTOR
RECEIVE/PRETEST	.282	1.00
UNSEAL	.013	.69
GYRO REPAIR	4.764	.69
BUILD UP TEST	.436	.69
MOTOR REPAIR	5.061	.47
MOTOR TEST	.436	.47
CALIBRATE	1.240	.69
SEAL	.171	.69
FINAL FUNCT TEST	.413	1.00
FINAL PREP + TAG	.353	1.00
TOTAL	12.968	

This total is manually computed and may vary slightly from E046 output.

In accordance with AFLCR 66-4, para 3-10, coordinating agencies are allowed 10 working days from date of this form to express in writing reasons for noncoordination ("insufficient time allowed" is not to be considered). If, after this time, no reply has been received from the coordinating agency, the standard will be considered coordinated and acceptable.

APPROVALS	DATE	APPROVALS	DATE
INDUSTRIAL ENGINEER: N/A	N/A	WORK CENTER FOREMAN: Curtis R Conley	28 Mar 80
PROCESS TECHNICIAN: N/A			

SHOP FLOW DAY COMPUTATION FOR PRODUCTION NO: 74149A

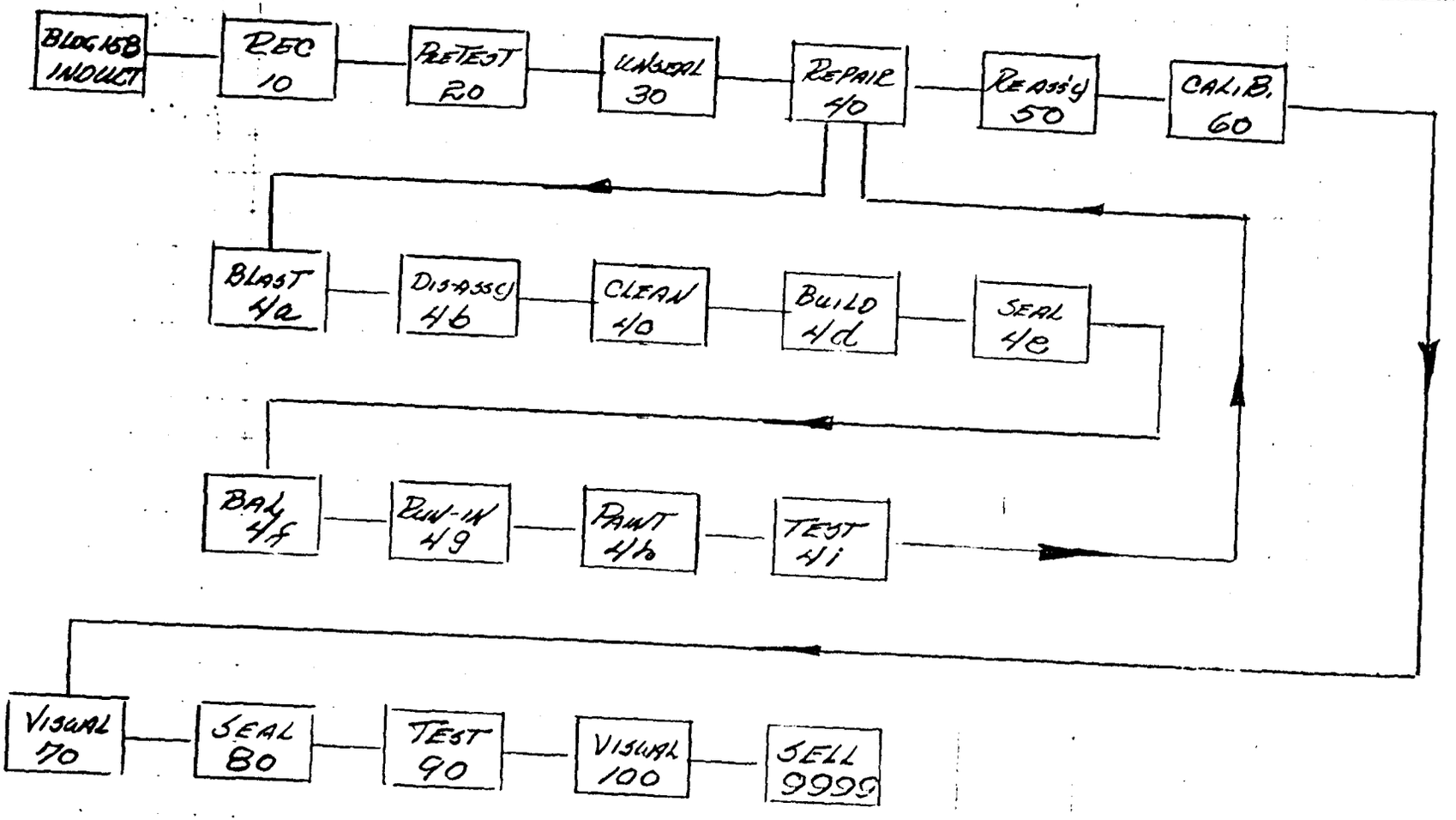
AFLCR 66-4 Shop Flow Day Formula was used to establish this flow day standard as follows: Flow Days = A [(B ÷ C) + D + E] where A = 1.45; B = End Item Labor Standard; C = Direct Labor Hours Per Person Per Day adjusted for indirect categories and labor efficiency; D = Routine Delays; E = Unique Delays. Repair is being accomplished as a responsible shop.

	DESCRIPTION	DAYS
	B = Labor Standard of 12.96 Hrs C = 7.66 Daily Labor Hrs	
	Value "C" is calculated as follows:	B ÷ C
	MANPG C .24 +.25 + .26 + .29 Indirect Average = .1 Hours	
	MANPG C Labor Efficiency = 97 %	1.69
	C = 8 Hours Minus Indirect Average Times Labor Efficiency	
	D = Routine Delays	
	a. Awaiting Maintenance (AWM) = 3.8 days	
	b. One days supply at station awaiting maintenance = 4 days (average 4 stations for each C/N). This is necessary to maintain uninterrupted flow of items.	
	TOTAL	7.8
	E = Unique Delays	
	a. Machine processing _____ Day(s)	
	b. Machine processing delays 2.84 Day(s)	
(c)*	Routing to support shops +3 Day(s)	
	d. Others (See Reverse Side) = 5.84 Day(s)	
	* 1 Day To Shop 1 Day In Process 1 Day Return = 3 days total TOTAL	5.84
	Total flow days this shop (1 + 2 + 3)	15.3
	Work Shift Adjustment (Item 4 ÷ number of shifts).	—
	Sum of flow days for all shops (Item 5 x 1.45) (Final result to be rounded up to next whole day.)	22

COMPUTED BY: D Bridges DATE: 10 OCT 84

MIN	HOUR	DESCRIPTION	PAGE	AREA
	1	SCAR	2-18	[illegible]
	1	BAKE	2-19A	d
	2	BAKE	2-19	2
	12(2)	EVAC	2-20	E
		EVAC	2-20	E
15				
	1.5	BAKE	2-21	[illegible]
	24(2)	[illegible]	2-21	[illegible]
45		BAKE	2-31	F
15		BAKE	2-31	L
75 min	21.5 HRS			
	1.5			
	23.75			

PROCESS FLOW CHART PCN 74149A



RDS 4/18/89

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: 15150-1 NSN: PCN: 74149A WCD: WCD DATE: C8119

OPERATION: ZPRT PRIMARY OPERATION TYPE: ASSY MATERIAL TYPE:
SAMPLE SIZE: 228 MISSING FLOWTIMES: 0 END ITEMS: OUTLIERS DELETED: 0

-------- MANPOWER REQUIRED --------				---------- EQUIPMENT REQUIRED ----------					
		--- TIME ---					--- TIME ---		BATCH
SKILL	QTY	FRACTION	HOURS	CODE	CATEGORY	QTY	FRACTION	HOURS	MIN MAX

HISTORICAL DATA

ACTUAL FREQ		RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0	32	**********
10	23	********
20	21	********
30	7	***
40	2	*
50	2	*
60	2	*
70	2	*
80	0	
90	0	
>=100	8	***

DISTRIBUTION	PARAMETERS			D VALUE	D ALPHA
UNIFORM	0.0		399.0	0.740	.
TRIANGULAR	0.0	1.0	399.0	0.651	.
NORMAL	36.5	68.3		0.328	.
LOGNORMAL	36.5	68.3		0.072	0.19
EXPONENTIAL	37.0			0.208	.

OCCURRANCE FACTOR: . OCCURRANCES: 228

DISTRIBUTION OF CHOICE: LOGNORMAL

SAS

PART OPERATION SUMMARY

ALC: WARNER ROBBINS RCC: MANPGC GYRO SHOP, UNIT 3

PN: 415300 NSN: PCN: 74149ASUB1 WCD: WCD DATE: 6339

OPERATION: ZPRT PRIMARY OPERATION TYPE: NDI MATERIAL TYPE:
SAMPLE SIZE: 66 MISSING FLOWTIMES: 0 END ITEMS: . OUTLIERS DELETED: 0

MANPOWER REQUIRED				EQUIPMENT REQUIRED					
		--- TIME ---					--- TIME ---		BATCH
SKILL	QTY	FRACTION	HOURS	CODE	CATEGORY	QTY	FRACTION	HOURS	MIN MAX

HISTORICAL DATA

ACTUAL FREQ		RELATIVE FREQUENCY 0 10 20 30 40 50 60 70 80 90 100
0	92	**********
1	0	
2	3	*
3	0	
4	0	
5	0	
6	0	
7	2	*
8	0	
9	0	
>=10	3	*

DISTRIBUTION	PARAMETERS			D VALUE	D ALPHA
UNIFORM	0.0		92.0	0.922	.
TRIANGULAR	0.0	0.0	92.0	0.903	.
NORMAL	2.5	13.4		0.483	.
LOGNORMAL	.	.		1.000	.
EXPONENTIAL	3.0			0.639	.

OCCURRANCE FACTOR: . OCCURRANCES: 66

DISTRIBUTION OF CHOICE: HISTORICAL DISCRETE

5.1 PROFILE DATA FILES

The profile data files for RCC MANPGC were previously submitted under memo number NKE-E016-7603, dated July 6, 1989.

5.2 MODEL INPUT FILES

The model input files for RCC MANPGC were previously submitted under memo number NKE-E016-7603, dated July 6, 1989.

MINUTES OF

MODEL VALIDATION MEETING

June 19 thru June 23, 1989

WR-ALC/MDMSC

6-29-89

WR-ALC MODEL VALIDATION MEETING MINUTES

19 June 89:

- Jim Gillis started the meeting by introducing team members:

  - Jim Gillis
  - Gerald Peavy
  - Doug Keene
  - Lott Singletary

  AFLC Representative:

  - Trixie Brown

  MDHSC Representatives:

  - Bob Bashyam
  - Bill Rich
  - Roger VanderVoord
  - Scott Vroman

- Jim pointed out that AFLC instructed them not to sign off the Model Validation Form.

- Reviewed model output for RCC MANPSA. Evaluated throughput, historical flow hours vs. simulated flow hours, expected hours vs. standard hours.

- This evaluation was performed for each item number. During this process list of major assumptions, action items and concerns were noted.

  PCN 01900A: F-15 Speed Brake

  - Historical flow hours 933.5 vs. 466.70 of simulated flow hours.

    Assumption:

    Method of induction may be a problem. History does reflect 500 hours to complete first operation which is inspection.

    Historical backshop hours were greater than simulated hours. We decided to input backshop hours back into the model.

PCN 01900A: F-15 Speed Brake (continued)

- Action items:

  Doug to verify the manpower utilization. Bill to review expected and standard hours.

PCN 05502A: C-141 Aileron

- Simulated throughput 13.2% difference. The difference was due to sporadic induction method.

PCN 51334A: C-141 Leading Edge Horizontal Stabilizer

- Bill to review expected hours.
- Increase backshop hours by 180 hours based on historical report.

PCN 51352A: C-141 Access Door

- Bill to review expected hours.
- Increase backshop hours based on historical report.

PCN 51418A: C-141 Leading Edge Wing

- Bill to verify expected hours.

PCN 51454A: C-141 Petal Door

- Bill to review the subassembly process hours.
- History had one sample of 698 days - adjusted for this odd occurence and made hours from 2288 to 1334.

- This completes the evaluation of model output for RCC MANPSA. At the end of this evaluation, Bob summarized the action items and assumptions. Jim commented that the model

seems to be doing what it is suppose to and asked MDHSC team to complete the action item and re-run the output. Jim also stated that either expected or standard hours can be used in establishing baseline of model based on IE's judgment. AFLC's representative, Trixie Brown, disagreed with Jim's comment. Validation team decided that during evaluation of difference between historical vs. simulation, 10% should be used only as a guideline not as a measurement.

Evaluation of RCC MANPGC:

- Evaluated the model output for the following PCNs: 06121A, 74061A, 74063A, 74146A, 74148A and 74149A.
- Review of throughput, historical vs. simulated flow hours and expected vs. standard hours revealed the following:
  - Expected vs. standard hours were within acceptable range.
  - Throughput was good.
  - Flow hours showed lot of difference between simulation and history. Review of historical report revealed that an unique pattern of process is being followed in Gyro Shop. Gyros after inspection were stored/held for long period of time before the start of repair operation.
  - Discussed about this problem. Doug and Jim wanted to have some methodology to show the unique holding process.

20 June 89:

- Bruce Kirk of MDHSC joined us to facilitate our brainstorming effort.
- Conducted brainstorming effort at Building 169. Morning session for Sheet Metal RCC's MANPSA, MANPSB, MANPSC, and MANPSD and afternoon for Gyro RCC's MANPGA, MANPGB, and MANPGC.

- Due to the nature of process and similarity we decided to have one brainstorming effort for Sheet Metal (4 RCCs) and one for Gyro (3 RCCs).
- Doug arranged both the sessions by bringing in representatives from manufacturing, scheduling, planning and quality.
- Both the sessions went out very good with a lot of participation. Developed fish bone - details of fish bone and brainstorming activities are covered in minutes of model validation/brainstorming.

21 June 89:

- Evaluated the model output for all the RCCs MANPSA, MANPSB, MANPSC, MANPSD, MANPGA, MANPGB, and MANPGC.
- Redlined the backshop hours and added buffer operations as requested by ALC for Gyro RCCs.
- Input all the changes and re-run the model.
- Dick Donnelly and Lou Mavros joined us to support our model validation effort.
- Dick, Lou, Bob and Gerald had an opportunity to meet Mr. Clinton Lewis. Discussed about the validity of model and about future task orders.
- Jim Gillis will be on vacation for the rest of the week.

22 June 89:

- Evaluated the re-run of model ouput after inputting the redlined corrections.

NAME	ITEM CD PCN	OPER NUMB	RCC	
		04G	MANPGC	
		04G	MANPGC	
		04H	MANPGC	
		04H	MANPGC	
		04H	MANPGC	
		04I	MANPGC	
		04I	MANPGC	
		04I	MANPGC	

MANPSA

01900A: F-15 Speed Brake

- Expected vs. standard hours is acceptable.
- Historical vs. simulated flow hours - still have a problem. History shows operation 10 takes about 500 hours to complete. This is due to induction and priority problem. Operation 40 shows 68 hours to complete (waiting for engineer) whereas model shows 1 hour. One hours represents process hour whereas 68 hours includes waiting time also.

05502A: C-141 Aileron

- This a PDM item. No historical data available. Evaluated the output and verified with mechanics and planners to validate the model output.

051334A: C-141 Leading Edge Horizontal Stabilizer

- Standard vs. expected hours is within acceptable range.
- Backshop hours were off. Redlined the output.

51454A: C-141 Petal Door

- Model output does seem to represent as-is condition.

51352A: C-141 Access Door

- Redlined backshop hours to represent historical data.

MANPSD

09193A: F-15 Radome

- Expected vs. standard hours is within acceptable range.

- Simulated flow hours are almost double the historical. Review showed us operation 190 takes about 550 hours to complete.

- Operation 190 is repair operation performed by one mechanic for about 50 hours. Model shows the manpower availability as a problem.

- Doug pointed out that the model exaggerates the problem.

41059A: C-130 Radome Assembly

- Model output does seem to represent the as-is condition.

- Needed to verify the historical data of 500 hours for operation 10.

51420A: C-141 Wing Leading Edge

- Evaluated the output and redlined backshop hours.

40208A: C-130 Radome

- Ouput does seem to represent the as-is condition except the historical hours for Operation 30.

- History shows that it takes over 4000 hours to complete Operation 30.

- Bob to check the historical input data at St. Louis, if availabe and respond to WR-ALC.

03172A: F-15A Canopy

- Evaluated model output. History shows that it takes approximately 1180 hours to complete Operation 10.

- Operation 10 is to inspect and determine what parts are required to perform the repair. It does wait for a long time in getting those required parts.

MANPSB

- This is a manufacturing RCC.
- No historical data for analysis. Reviewed only the throughput.
- Model output was validated based on it's performance on the other 6 RCCs.

MANPG

- Evaluated the re-run of model out for RCCs MANPGA, MANPGB and MANPGC.
- Output for these RCCs were reviewed earlier. Buffer operation were added where necessary to represent historical data.
- Output for PCNs 74010A, 74074A, 74163A, 74126A, 74051A, 20012A, 06121A, 74061A, 74063A, 74146A, 74148A, and 74149A from all the three RCCs were individually evaluated.
- Flow hours, process hours and throughput were within acceptable range. Model does represent the as-is condition.
- Doug and Lott questioned the validity of historical data for PCNs 74074A and 20012A. Wanted to verify with manufacturing personnel.

23 June 89:

- Doug and Lott verified and confirmed the flow hour information.
- Reviewed the re-runs of model output.
- Bob compiled the meeting of minutes and reviewed with team members.

- WR-ALC/AFLC/MDMSC validation team agrees that the model seems to represent the approximation of as-is condition of RCCs MANPSA, MANPSB, MANPSC MANPSD, MANPGA, MANPGB and MANPGC; therefore, the model can be used as a baseline for experimentation.

Doug Keene, WR-ALC/MANEE

Lott Singletary, WR-ALC/MANEE

Jim Gillis, WR-ALC/MAWF

Gerald Peavy, WR-ALC/MAWF

Trixie Brown, AFLC/MAQF

Scott Vroman, MDMSC

W. V. "Bill" Rich

Bill Rich, MDMSC

for B Bashyam

Roger VanderVoord, MDMSC

B Bashyam

Bob Bashyam, MDMSC

6-29-89 / Rev-1
BB/fej

7.0 COMPUTER SIMULATION ANALYSIS OF RCC

The computer simulation analysis for RCC MANPGC was previously submitted under memo number NKE-E016-7603, dated July 6, 1989.

8.0 VALIDATION OF SIMULATION ANALYSIS

The validation of simulation analysis for RCC MANPGC was previously submitted under memo number NKE-E016-7603, dated July 6, 1989.

9.0 BRAINSTORMING

The minutes for RCC MANPGC brainstorming were previously submitted under memo number NKE-E016-7603, dated July 6, 1989.

MINUTES OF

BRAINSTORMING SESSIONS

June 20, 1989

WR-ALC/MDMSC

MINUTES OF BRAINSTORMING SESSION FOR THREE GYRO RCCs
- June 20, 1989 Afternoon Session -

Doug Keene introduced Bruce Kirk to the members of the afternoon session. The following were in attendance:

Bashyam, Bob	MDMSC
Boyt, James	WR-ALC/MAQNG
Driver, Claude	WR-ALC/MANERG
Floyd, Donald	WR-ALC/MANPGB
Harrelson, Dan	WR-ALC/MANPGA
Hulett, Earmon	WR-ALC/MANSAA
Keene, Doug	WR-ALC/MANEE
Kirk, Bruce	MDMSC
Moriarty, Brenda	WR-ALC/MANERA
Pate, William	WR-ALC/MANPGA
Sessions, David	WR-ALC/MANEE
Smith, Oscar	WR-ALC/MANPGB
VanderVoord, Roger	MDMSC

Bruce started the brainstorming session by briefing the process of brainstorming and round robin solution. Following are the suggestions:

1. Space - Building 158.
2. Turn over of skilled people.
   - Grade structure vs. $
   - Not being replaced
3. Projected workload - higher actuals than projected.
4. Primarily funding from Oklahoma City - lack of funding so not hiring.
5. Layout - need more space to improve flow.

6. Equipment maintenance and calibration - availability of parts/manpower.

7. Induction system problem on assest availability.

8. ATE availability (saturates at 2 shifts).

9. Equipment modernization to improve throughput on rate gyros.

10. Parts availability - need local storage.

11. Quality of parts -

    - Bearings (rusty)

    - Poor part packaging

12. Present prioritizing does not warrant overtime.

13. Poor planning - "critical" end items budget. Receive sufficient people and overtime; everything else falls behind!

14. Space and equipment limitations result in 2nd shift for critical items.

15. Mil-specification parts some variability of quality.

16. Environmental restrictions on chemical cleaning.

17. Power

    A. Regulated

    B. Sudden loss (averages 2 times a month)

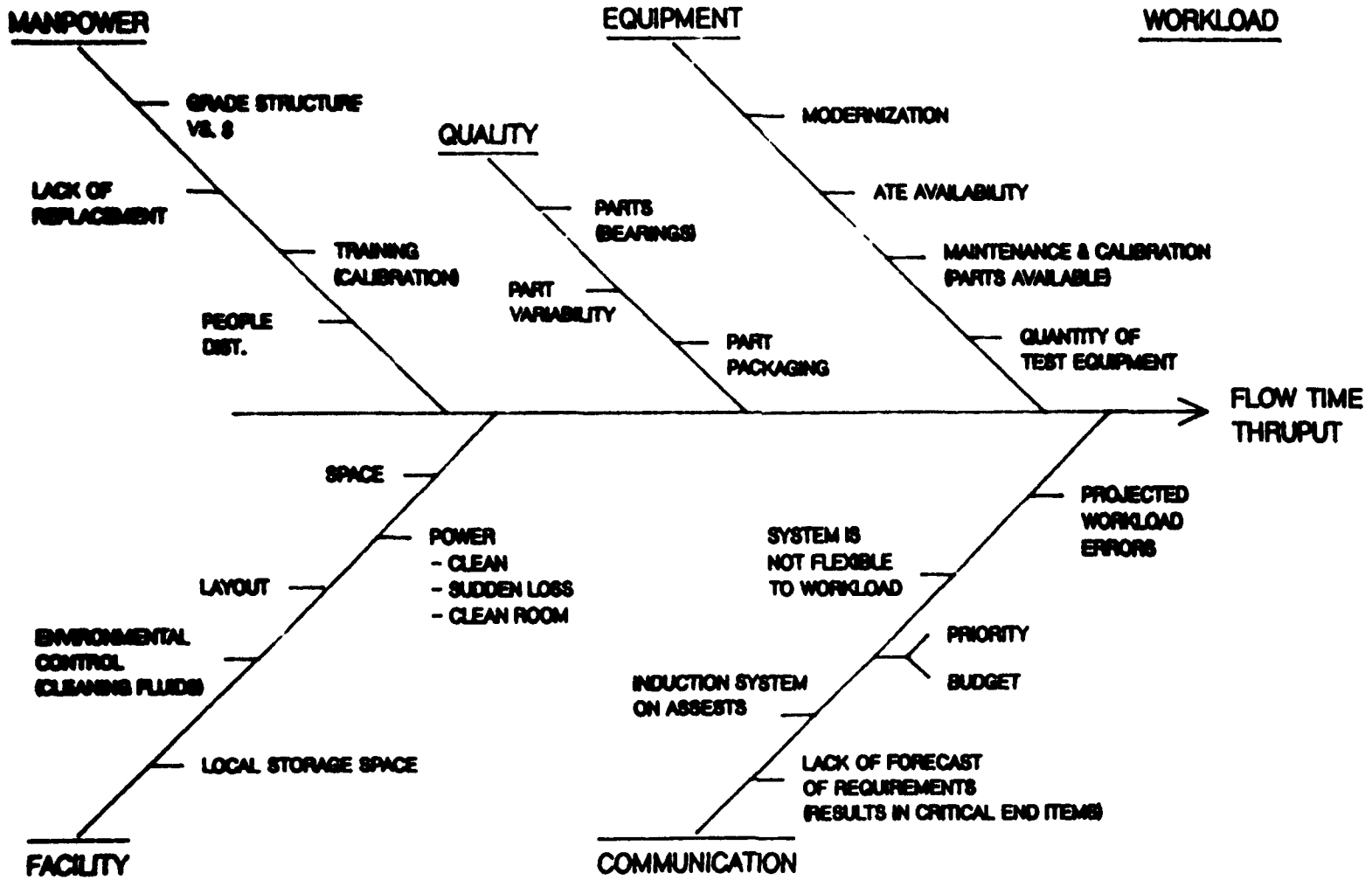
18. Clean room out of tolerance - power loss (air handlers then need to catch up).

DEVELOPED FISHBONE (CAUSE AND EFFECT) DIAGRAM.

NOTE: AS-IS SIMULATION MODEL WAS LOADED AT WR-ALC'S VAX SYSTEM AND THE UDOS PROGRAM RAN SUCCESSFULLY ON 6-23-89.

THESE MINUTES WERE COMPILED BY BASHYAM.

GYRO SHOP
FISHBONE - CAUSE & EFFECT DIAGRAM



RCC: MAN ASC SUMMARY OF RE-EVALUATION

- Reformatted the results of L9 taguchi orthogonal array table.
- Evaluated throughput of each run for average throughput of RCC.
- Analyzed and tabulated results of best and worst PCN for each run including surge.
- This approach gives us a better understanding of the RCC's capability, process, and bottlenecks.

MANPGC CONTROL FACTORS
TABLE 10.3.2-1

BASE			BASE+ (AS-IS)			BASE++		
EQUIP. NO.	EQUIPMENT NAME	EQUIP. QTY.	EQUIP. NO.	EQUIPMENT NAME	EQUIP. QTY.	EQUIP. NO.	EQUIPMENT NAME	EQUIP. QTY.
0002	VACUUM OVEN	6	0002	VACUUM OVEN	12	0002	VACUUM OVEN	12
0787	TEST ASSY	3	0787	TEST ASSY	5	0787	TEST ASSY	5
0844	TEST ASSY	1	0844	TEST ASSY	2	0844	TEST ASSY	2
3346	LEAK DETECTOR	3	3346	LEAK DETECTOR	6	3346	LEAK DETECTOR	6
5509	RATE TEST	2	5509	RATE TEST	4	5509	RATE TEST	4
8437	TESTER	1	8437	TESTER	2	8437	TESTER	2
9015	GYRO TEST	2	9015	GYRO TEST	4	9015	GYRO TEST	4
9036	DIRECT TEST SET	2	9036	DIRECT TEST SET	4	9036	DIRECT TEST SET	4
9058	TEST PANEL	1	9058	TEST PANEL	2	9058	TEST PANEL	2
9420	TEST SET	2	9420	TEST SET	4	9420	TEST SET	4
			IG09	MANPOWER	55	IG09	MANPOWER	60

LSC-20620

C

MANPGS GYRO SHOP TAGUCHI ORTHOGONAL ARRAY

TABLE 10.3.2-2

RUN #	FACTORS & LEVELS						WORKLOAD (THROUGHPUT)		
	MANPOWER			OVERTIME		EQUIPMENT	INDUCTIONS: 6389; 130% OF FY 88		
	1	2	3	SAT	SUN		AVG.	BEST	WORST
1	ALL					BASE	80.3 %	74061A 101.0 %	74148A 4.0 %
2	ALL			YES		BASE +	98.6 %	74148A 100.4 %	74148A 97.5 %
3	ALL			YES	YES	BASE ++	99.2 %	74148A 100.3 %	74148A 97.0 %
4	50%	50%				BASE ++	99.2 %	74148A 100.0 %	74148A 97.5 %
5	50%	50%		YES		BASE	81.2 %	74063A 100.0 %	74148A 5.0 %
6	50%	50%		YES		BASE +	98.9 %	74148A 100.0 %	74148A 97.5 %
7	1/3	1/3	1/3			BASE +	99.0 %	74148A 100.0 %	74148A 97.5 %
8	1/3	1/3	1/3	YES	YES	BASE ++	99.0 %	74148A 100.0 %	74148A 97.6 %
9	1/3	1/3	1/3	YES	YES	BASE	80.2 %	74061A 100.0 %	74148A 6.0 %
SURGE*	50%**	50%**				BASE +	98.0 %	74061A 100.2 %	74063A 97.5 %

NOTES:
- * INDUCTIONS = 4270 (59 % OF FY 88) - 2 QTR
- ** TWO 12 HOUR SHIFTS.

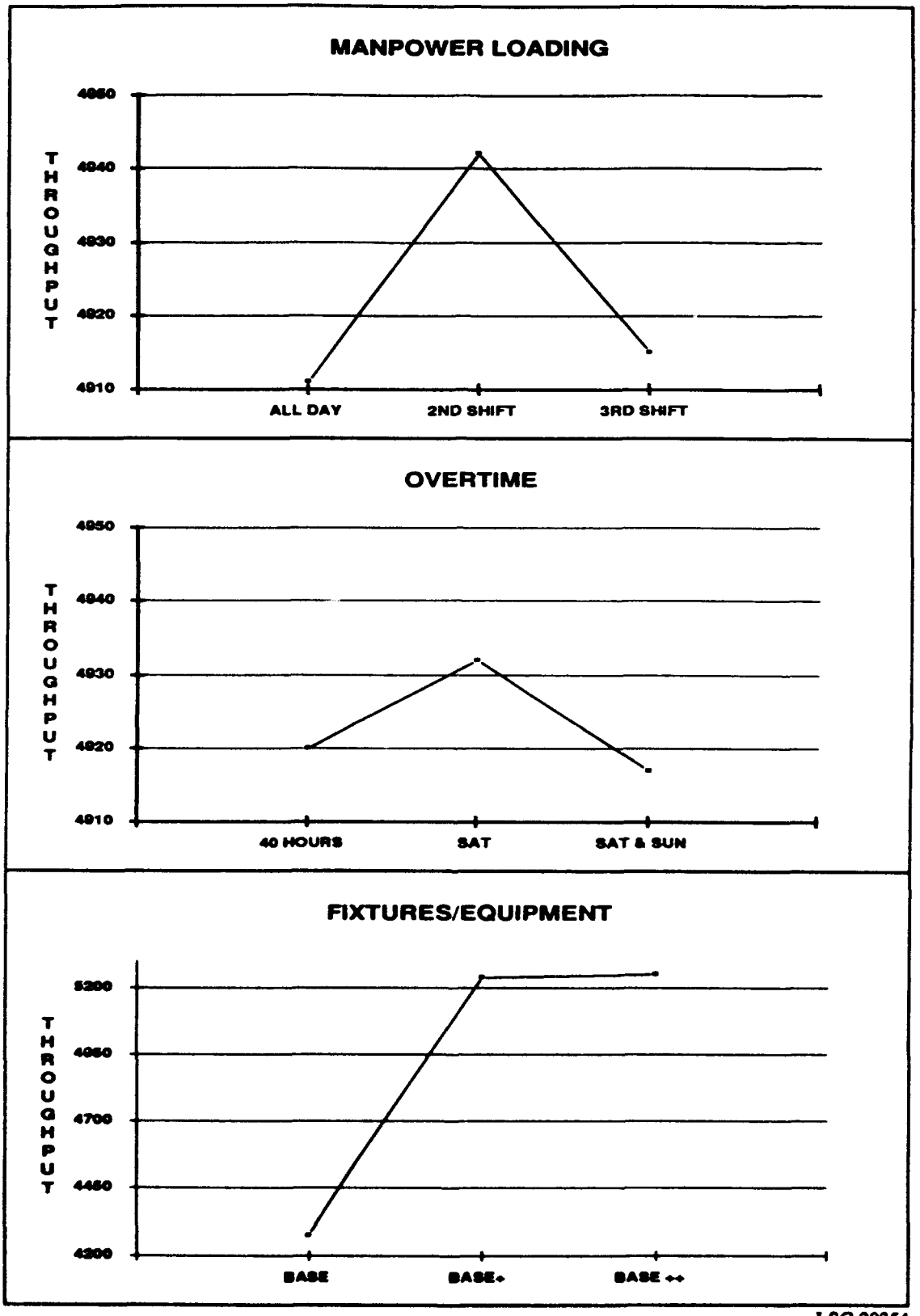
LSC-20621

MANPGC GYRO SHOP TAGUCHI ORTHOGONAL ARRAY

TABLE 10.3.2-1

RUN #	FACTORS & LEVELS						WORKLOAD (THROUGHPUT)			
	MANPOWER			OVERTIME		EQUIPMENT	130% OF FY 88		SURGE	
	1	2	3	SAT	SUN		QTY	%	QTY	%
1	ALL					BASE	4253	80	3408	80
2	ALL			YES		BASE +	5225	98		
3	ALL			YES	YES	BASE ++	5255	98		
4	50%	50%				BASE ++	5256	98		
5	50%	50%		YES		BASE	4325	81		
6	50%	50%		YES		BASE +	5246	98		
7	1/3	1/3	1/3			BASE +	5250	98		
8	1/3	1/3	1/3	YES	YES	BASE ++	5246	98		
9	1/3	1/3	1/3	YES	YES	BASE	4250	80		

LSC-20353



LSC-20354

MANPGC EXPERIMENTATION RESULTS

FIGURE 10.3.2-1

MANPGC - WRALC

QTY: 5340

MANPOWER:

1) $\frac{4253+5225+5255}{3} = 4911 = 92\%$

2) $\frac{5256+4325+5246}{3} = 4942 = 92.5\%$

3) $\frac{5250+5246+4250}{3} = 4915 = 92\%$

OVERTIME:

SAT : $\frac{5225+5246+4325}{3} : 4932 = 92\%$

SAT+SUN : $\frac{5255+5246+4250}{3} : 4917 = 92\%$

40HRS : $\frac{4253+5256+5250}{3} : 4920 = 92\%$

EQUIPMENT:

BASE : $\frac{4253+4325+4250}{3} = 4276$ 80%

BASE+ : $\frac{5225+5246+5250}{3} : 5240$ 98%

BASE++ : $\frac{5255+5256+5246}{3} : 5252$ 98%

MANPGC - WRALC

WORKLOAD QTY 5340 / YR.

BASE: WORKLOAD IS SAME AS IN AS-IS CONDITION AND ALSO THE OTHER RESOURCE FILE - EXCEPT - THE CHANGE IN QTY OF EQUIPMENT.

EQUIPMENT	CHG. QTY TO
6002	6
0787	3
0844	1
3346	3
5509	2
8437	1
9015	2
9036	2
9058	1
9420	2

BASE+: ALL THE RESOURCE FILE ARE SAME AS IN AS-IS CONDITION.

BASE++: ALL THE RESOURCE FILE ARE SAME EXCEPT CHANGE MP-IGOT TO 60 (QTY)

SURGE: INCREASE THE FY88 WORKLOAD BY THE AVG. SURGE FACTOR OF WEAPON SYSTEMS SERVICED AT WR-ALC WHICH IS 15%.
SPREAD MANPOWER BETWEEN (2) 12 HR SHIFT AND 5 DAYS A WEEK SCHEDULE.

MANPEC - WRALC

Summary:

REVIEWED THE RESULTS OF THE OUTPUT ANALYSIS OF THIS EXPERIMENTAL DESIGN FOR RIC MANPEC. EXPERIMENT WAS DESIGNED TO ANALYSE THE SENSITIVITY OF QTY OF EQUIPMENT REQUIRED AND THE IMPACT ON THROUGHPUT BY INCREASING SERVICE for QTY.

SIMULATION OUTPUT RUNS INDICATED THAT THE REQUIRED QTY OF EQUIPMENT HAS VERY LITTLE SENSITIVITY WITH ALL THE AVAILABLE EQUIPMENT AND MANPOWER THE THROUGHPUT FELL FOR

RUN #5 WAS EXECUTED FOR ONLY 2 DAYS DUE TO THE EDU TIME. THE THROUGHPUT WAS CALCULATED AT A REPRESENTATIVE PERCENTAGE IE. 2204/2702 = 81%. SO 81% OF 5340 = 4325.

SURGE REQUIREMENTS WERE EXECUTED FOR 2 DAYS TO SEE THE SENSITIVITY. IT REVEALS THAT 80% OF THROUGHPUT CAN BE ACCOMPLISHED WITH REDUCED RESOURCES.

TECHNOLOGY INSERTION PROGRAM
WR-ALC
MANPG - GYRO SHOP

Bob Bashyam
Roger VanderVoord

Possible Focus Study List

	Description	RCC
1.	RCC WR/MANPGB and AGMC/MANPGB Automatic Test Equipment vs. Product Optimization	
2.	RCC WR/MANPGB and AGMC/MANPGB Increase of Automatic Test Equipment Up Time	
3.	Combine Gyro Rotor Repair to Common Line With Balanced Station Time	
4.	Develop Program to Attack T. E. Obsolescence [Bench Sets]	
5.	Fill Procedure for 74074A to Replace Present Station	
6.	Automate Depaint, Unseal, Reseal Process	
7.	Improve Bearing Procurement/Handling Procedure	
8.	Laser Wheel Balancing (Delay/Monitor AGMC)	
9.	Compare A.T.E. to Manual (Delay for Results From 1)	

TECHNOLOGY INSERTION PROGRAM
WR-ALC
MANPG - GYRO SHOP

Bob Bashyam
Roger VanderVoord

Possible Quick Fix List

	Description	RCC
1.	Improve Bearing Handling	All
2.	Motorize Dividing Heads	All
3.	Fixturize Induction Heater	MANPGB
4.	Remove Clean Room Garb	MANPGA
5.	Improve Random Drift Decisions	MANPGC
6.	Rearrange 74051A Repair Area	MANPGB
7.	Relocate Mass. Spectrometer	MANPGB
8.	Vent Mass. Spectrometer Vacuum Pumps	MANPGA
9.	Re-evaluate Diagnostic Checks	All
10.	Rebonding Disply Tapes	MANPGB
11.	Removal of 06121A Case	MANPGC
12.	Reclaim 74126A Spin Bearing	MANPGA
13.	Improve 74126A Fixture at OP 100	MANPGA
14.	Reduce Test Time 74010A	MANPGA

Following are the Potential Improvements for Quick Fix.

10.31 QUICK FIX OPPORTUNITY TO IMPROVE GIMBAL/SPIN BEARING HANDLING (MANPG)

10.31.1 Description of Current Operations

Bearings being removed from repairable gyroscope product are handled as non-reclaimable material. Little or no care is evident in the removal and/or storage of the bearings prior to attempts to refurbish.

10.31.2 Description of Current Process Problems

Bearings are being damaged during removal by pressing operations, open line storage and piling in uncontrolled containers. Storage is accomplished in open tote boxes or plastic bags with many piled loosely on top of each other continuing the opportunity for damage.

10.31.3 Description of New Process

MDHSC recommends tote tray inserts that locate the I.D. bore of the bearings in a manner to prevent contact of adjacent bearings and control vertical stacking. Further action is required in development of personnel training to instill importance of bearing handling during unit teardown. The use of the tote boxes should be continuious through bearing refurbishment and storage, only being discontinued when bearing is defined as scrap.

10.31.4 Rationale Leading to Change

Both WR-ALC and AGMC are presently engaged in bearing refurnishment with varying degrees of success. If handling damage can be eliminated or reduced, refurbishment yields can be improved. The refurbishment procedures remove contaminants but cannot correct physical damage to the bearings. The lack of proper handling of bearings was observed thru all three gyro RCC's.

Reliability/Maintainability Characteristics: Should improve MTBF by reducing possiblity of returning physically damaged bearings to product.

Human Factors Design Criteria: Re-establish the importance of proper procedure of teardown on unit acceptance yields.

Generally private industries use special bearing pullers during teardown - tote box inserts are used to handle and store bearings expected to be salvaged and returned to product.

10.31.5 Estimated Cost Savings

Actual line observations and interviews with RCC personnel suggest a yield improvement in refurbished bearings in excess of 20%. The improvement will give double fold savings by yielding more product per refurbishment cycle and reducing induction costs of additional new bearings.

Approximately 12,000 units are repaired in MANPG yearly. Assuming each contains an average of four precision ball bearings and half require refurbishment or replacement, 48,000 precision bearings would be available for consideration. Further if half are replaced, 24,000 are committed to refurbishment. The excepted 20% improvement would amount to 4,800 bearings reclaimed over present methods. Using $2.75 as an average cost per ABEC 5 ball bearing, $13,200/year savings is available. No additional labor is added because the refurbishment attempt is completed regardless.

10.31.6 Implementation Cost/Schedule

Some MANPG administrative costs will be incurred due to training of personnel and development of a family of tote box inserts. Schedule and performance will improve as availability of critical bearings improves from the high bearing reclamation yield.

The development of the inserts should require approximately 20 labor hours and would require approximately 200 tote box inserts at less than $5.00 each.

The implementation could be accomplished in three months.

10.32 QUICK FIX OPPORTUNITY TO MOTORIZE DIVIDING HEAD STANDS (MANPG)

10.32.1 Description of Current Operations

The manual test stands for directional and vertical displacement gyros are positioned and/or turned through cranking of hand wheels or hand wheel extenders.

10.32.2 Description of Current Process Problems

The hand cranking is laborous and is avoided by operator using alt. equipment and/or developing methods outside the T.O.

10.32.3 Description of New Process

MDHSC recommends the dividing heads of the manual test stands be motorized in both axis. The motor drives should be frictional to eliminate the need for expensive clutching systems and should allow for final positioning by the operator to eliminate encoders and servo systems. The drives should allow for a smooth constant rate but need not be of great accuracy.

10.32.4 Rationale Leading to Change

Directional gyros were observed waiting the availability of an alternate test set, KT426206, that was motor driven in one axis. Actual interviews of RCC personnel determined this was preferred to hand cranking the manual dividing heads. The hand cranking was very laborous and a smooth rate was difficult to maintain.

Safety Improvements: The hand wheels and extenders are presently in position to allow injury from tripping and/or running into. This hazard should be considered in the design.

Reliability/Maintainability Characteristics: Improvements possible due to closer adherence to T.O.'s.

Human Factors Design Criteria: Less laborous than hand cranking thereby reducing operator fatigue. Improvement in operator concentration.

10.32.5 Estimated Cost Savings

The benefit to be gained in test station capacity and versitility. By removal of the test stand avoidance, adherence to the T.O.'s will improve. Some cost savings are to be realized by reducing operator fatigue but would be difficult to quantify. Throughput should improve by reducing queuing time for the preferred test set.

10.32.6 Implementation Cost/Schedule

A single design would be necessary for all test stands. It would require approximately 75 hours to accomplish. The design could be incorporated into the test stands on a progressive basis to control cost occurrence. It should be incorporated for directional gyros first and then onto the vertical test stands. The actual cost of hardware implementation estimates should be made at completion of design phase. No adverse schedule impact is forseeable.

The design and build time for the modification could be accomplished within three months for the first group with build of one month for the following groups.

10.33 QUICK FIX OPPORTUNITY TO FIXTURIZE THE INDUCTION MACHINE (MANPG)

10.33.1 Description of Current Operations

To hold unit or subassembly in some hand clamping devise, activating the induction heater to heat the assembly until the solder flows. Strike the assembly on a part of the machine to impart enough energy to the assembly to force it apart.

10.33.2 Description of Current Process Problems

The units or subassemblies are being subjected to uncontrolled heat and shock forces producing damage to the units. The operation produces scrap and additional rework.

10.33.3 Description of New Process

MDMSC recommends that a list of all operations of disassembly performed on the induction machine be accomplished. A fixture designed with clamping devises for the list of units/subassemblies that can apply a separating spring force across the solder joint being heated. The spring force will be variable to allow control for the various units/subassemblies. Staging will be incorporated to assure heating of the separable joint with minimal heating of the rest of the assembly.

10.33.4 Rationale Leading to Change

Many observations of the induction machine operations were made. Much of the product from each of the three RCC's passes across it for disassembly operations. Forces great enough to distort parts and heating great enough to produce flaming insulation and cherry red metallic parts were seen in these observations. The suggested fixturization is used successfully in private industry.

Safety Improvements: Reduce or eliminate danger of injury from burns due to falling parts, burning insulation and solder splashes.

Environmental Hazards/Improvements: Elimination of fumes from burning insulation, solder fluxes and other combustible materials.

Reliability/Maintainability Characteristics: MTBF and MTBR should improve by eliminating structural changes in critical parts due to controlled temperature and reduced shock forces.

10.33.5 Estimated Cost Savings

Approximately 4,500 units pass across the induction heater for opening each year. The amount of scrap and/or damage caused by the present method is not recorded or identified. All units are experiencing unnecessary damage.

Large savings will be realized in greatly reducing unit/subassemble clean-ups, rewiring and part replacement costs. Fixtured disassembly should reduce disassembly damage, half clean-up time and eliminate rewiring due to heat damage. Intangible benefits will be gained through reducing structural change of metalic parts due to reduced heating. Tangible savings should also be obtained from increased MTBF though not quantifiable.

10.33.6 Implementation Cost/Schedule

Preparing a product list and accomplishing a fixture design will require approximately 100 hours with fixture build requiring a like amount. Implementation could be accomplished within two months of turn-on. No adverse schedule impact will be seen. The fixturization is add on causing little or no machine time interruption.

10.34 QUICK FIX OPPORTUNITY TO REMOVAL OF CLEAN ROOM GARB (MANPGA)

10.34.1 Description of Current Operations

MANPGA requires full suits, caped hoods and booties be worn and in place prior to entering the lab area. Air locks are also used for entering or exiting the suiting-up area.

10.34.2 Description of Current Process Problems

The requirement is inconsistent with other controls in the area and with like product in other areas. It is not considered necessary for like product by much of private industry today. The garb is doing little if anything to improve product cleanliness.

10.34.3 Description of New Process

Remove the requirements for the full suits, hoods and booties. Replace the air locks and dressing rooms with tack mats at lab entrances. Reprocess critical operations to laminar flow booths. Remove all excess material from the laminar flow booths. Forbid eating and drinking in the labs. Reduce dirty operations such as unsealing, resealing and filing or restrict them to force ventilated booths. Reduce line storage of product and equipment. NOTE: The restrictions on eating and drinking should be extended to MANPGB and MANPGC. The use of coat smocks might be encouraged to continue imortance of cleanliness.

10.34.4 Rationale Leading to Change

Observations of lab conditions, actual interviews with lab personnel, general knowledge of lab requirements through participation in the contamination control working group of the Inertial Guidance Community.

The present laminar flow booths are being badly misused. All are full of parts, tools, personal items. The filter areas are posted with schedules, tech. items, etc. All these items cause air flow restrictions and greatly reduce flow bench effectiveness.

Human Factors Design Criteria: Less restrictive of personnel movement, improved coverage by support functions.

10.34.5 Estimated Cost Savings

Labor savings will be realized from removal of all suit and unsuit up time. This is estimated to be greater than .8 hour per employee per day. Also savings can be realized in eliminated laundry costs of suits, hoods and booties. Additional

cost savings will be realized from elimination of replacement costs. Product improvements will be accomplished by a disciplined cleaning schedule that is not limited to dust count improvement. An intangible savings should be realized through improved product support by removing the reluctance of support personnel to enter the lab areas. Areas presently used for suiting up also become availabe but building construction may limit it's usability.

10.34.6 Implementation Cost/Schedule

Some front end costs may be experienced by MANPG administration to develop laminar flow booth disciplines and cleaning schedules but these should be minimal and no adverse impact is expected on schedule.

The implementation schedule will be dependent on review of T.O. requirements and possible reluctance of change. AGMC and private industry practices and success rates should encourage acceptance.

10.35 QUICK FIX OPPORTUNITY TO IMPROVE RANDOM DRIFT DECISIONS (MANPGC)

10.35.1 Description of Current Operations

After sealing, units are placed on scorsby tables and connected to the test panel. The unit's heading error value is automatically printed out each half hour. One to twenty units are able to be tested at any time. An operator periodically enters the room and observes each unit's drift trend. As unit deviates from specification the readings are calculated for trending. At some point known only to this operator and influenced by time of day trending units are rejected, removed from test and sent to the sealing room along with test data to be opened and adjusted. The unit is resealed, returned to test and the process is restarted. Procedure is repeated until unit passes the eight hour test or is a hard failure.

10.35.2 Description of Current Process Problems

The rejection rate for first and second attempts appears to be 30%. From limited data, 30% appeared to continue into the third and fourth attempt. The decision to readjust does not seem to be bounded either by amount of trending or length of run time. The units are unsealed and adjusted on the second shift only and this may account for the looseness in decision timing. It does not appear to be controlled well enough to assure consistent product.

10.35.3 Description of New Process

Incorportate a decision devise into the panel to plot trending and automatically discontiue test at time of failure. Add a vented solder station and fill manifold to the test area to allow for immediate readjust and return to test. Use the operator who presently observes and plots the trending to increase his productivity.

10.35.4 Rationale Leading to Change

Discussions with the test personnel and review of available test data lead to the opinion that the control does not assure consistent product. It also lead to the conclusion product flow could be improved if adjustments could be made at the test site.

The approach generally taken by private industry in this type of testing is to tightly describe the acceptance values and allow for automatic rejection at the earliest point. This allows for least false testing time and quickest return to productive work. The approach imporves throughput and reduces flow time.

10.35.5 **Estimated Cost Savings**

Elimination of move time and queue times waiting for second shift operator. Development of adjustment expertise from cause and effect relationship. Efficient usage of testers time. Consistent rejection/acceptance decisions.

10.35.6 **Implementation Cost/Schedule**

Costs to be incurred would be the addition of a go/no-go devise on the present panel plus installation costs of a vented solder station and fill manifold. No adverse impact on schedule.

Schedule time to implement the change should require less than three months.

10.36 QUICK FIX OPPORTUNITY TO REARRANGE CN 74051A TEST/ REPAIR AREA (MANPGB)

10.36.1 Description of Current Operations

The repair stations are located on a heavy traffic aisle between the main building corridor and the sealing area. The test panels are located next to the repair stations on a dead end aisle.

10.36.2 Description of Current Process Problems

The repair operators are subjected to many distractions by the heavy traffic pattern through their area. Both their peers from other areas and various support personnel pass the work stations in performance of the daily tasks.

10.36.3 Description of New Process

Exchange the 010 test/calibration panel line with the repair operators line (CN 74051A). The move would remove the repair operators from the traffic pattern and it's accompanying distractions. The distractions would not impact the test/calibration panel line as severely because concentration span time is shorter and unit run times between adjustments is non-productive but necessary.

10.36.4 Rationale Leading to Change

Personnel observations and actual interviews with line supervision and line operators. General knowledge of length of concentration span times for gyro assembly and repair.

Safety Improvements: Do not exist.

Human Factors Design Criteria: Improved concentration times.

10.36.5 Estimated Cost Savings

The repair operators will increase their productivity through less distraction and camaraderie from being outside of the traffic pattern. The test operators should not be adversely effected because their task has inherently more non-productive time.

10.36.6 Implementation Cost/Schedule

Re-layout of the area would require approximately 20 hours and rearrangement approximately 60 hours of labor. It could be accomplished in about two months.

10.37 QUICK FIX OPPORTUNITY TO RELOCATION OF MASS SPECTROMETERS (MANPGB)

10.37.1 Description of Current Operations

Units are solder sealed in the repair area. Hand carried to the mass spectrometer. Leak checked. Hand carried back to the repair area. The two areas are approximately 120 paces apart. The movement is made through other repair areas with the normal distractions that occur.

10.37.2 Description of Current Process Problems

Time is being wasted in non-productive travel. The time wasted is not limited to just the actual walk time but is increased due to socializing, waiting to incorporate the walk with other desired activities. The operator is removed from supervisor's servalance.

10.37.3 Description of New Process

Seal units in the repair area. Leak check in the repair area. Continue work in the repair area.

10.37.4 Rationale Leading to Change

Actual interview with RCC personnel revealed that the mass spectrometers had been placed in this remote area to reduce malfunction of the system due to air contamination in the repair area. If the contamination condition is real, it can be overcome with flushing mass spectrometers with uncontaminated air with proper duct work. This approach is used in general industry where required.

The problem may be exaggerated by increasing sensitivity of the mass spectrometer beyond the rate required to meet the product requirements.

10.37.5 Estimated Cost Savings

MDHSC recommends that the mass spectrometers be relocated in the repair area. Savings to be realized would be 0.1 hour/unit checked. Minimum of 1000 units/year are checked.

10.37.6 Implementation Cost/Schedule

Cost to move the three mass spectrometers would be four hours each or 12 hours. If an air flushing system proves necessary an additional 10 hours of rearrangement cost would be required. The move could be accomplished within one month of turn-on.

10.38 QUICK FIX OPPORTUNITY TO VENTING THE VACUUM PUMPS OF MASS SPECTROMETERS (MANPGA)

10.38.1 Description of Current Operations

Mass spectrometers called out for leak checking of CN 74074A series gyros have been shutdown. The reason given is that the discharge from the rough vacuum pumps increases the dust count in the particulate specification levels. This action forces gyros to be hand carried approximately two hundred feet to a mass spectrometer outside the area.

10.38.2 Description of Current Process Problems

Approximately 0.2 hours of non-productive labor is added to each unit processed. Process flow is further interrupted by the requirement to unsuit and resuit in clean room garb. Some batching is attempted but it is rather hit and miss than planned.

10.38.3 Description of New Process

Leak check CN 74074A units on specified equipment with venting and/or filtering in place.

10.38.4 Rationale Leading to Change

Simple observation recommended that the discharged air could easily be vented or filtered to eliminate the increase in dust count. The mass spectrometers could then be returned to operation.

10.38.5 Estimated Cost Savings

Reduce labor hours on units leak checked by a minimum of 0.2 hour/assembly. Approximately 2000 units of the CN 74074A family are yielded each year. A minimum yearly savings of 2000 X 0.2 hours X $ /hour is available.

10.38.6 Implementation Cost/Schedule

Costs to vent the mass spectrometers would require less than 2 hours each X 2 units. Filtering if required could add $50.00 each. Scheduling would not be impact.

10.39 QUICK FIX OPPORTUNITY TO RE-EVALUATE NEED FOR DIAGNOSTIC CHECKS (MANPG)

10.39.1 Description of Current Operations

Receive unit, perform a complete incoming test (diagnostic check) on C/N 74146A gyroscope, teardown and repair as required, etc. The diagnostic check is performed on final test stand, KT426206, which show a usage rate of 41% at the present.

10.39.2 Description of Current Process Problems

Ninety percent of the units being repaired require complete teardown and rebuild of the gyro wheel. The ninety percent wheel repair figure was established through interview. The standards data sheets, E0468 labor standard operation resource std/method analysis, places the occurence factor at 100%. With this high a percentage of complete teardown, diagnostic testing prior to teardown is of very limited value.

10.39.3 Description of New Process

Receive the units, teardown through the wheel, rebuild complete as per T.O.'s.

10.39.4 Rationale Leading to Change

If 90% to 100% of the units require teardown through the wheel most failures identified other than wheel failures will be removed or changed in character by the teardown process. The failures that are not found will be identified through the normal build up process. Further, the 10% that do not contain identifiable wheel failure, probably contain wheels of limited remaining life.

Reliability/Maintainability Characteristics: The MTBF and MTBR should both be impacted in a positive manner with removal of early failures of the 10% figure for wheels not presently rebuilt.

10.39.5 Estimated Cost Savings

Removal of diagnostic test time, 0.5 hours/unit offset by the addition of 3.7 hours divided by 0.1 = .37 hours/unit for an overall reduction of .13 hours/unit x 1020 units/year or 133 hours/year.

10.39.6 Implementation Cost/Schedule

No cost to implement should be experienced. No affect on schedule. Change could be implemented immediately.

NOTE: The logic applied to this unit should be refined to develop a percentage number where diagnostic test should be dropped and 100% wheel rebuild demanded for all gyro product.

10.40 QUICK FIX OPPORTUNITY TO REBONDING OF 20012A TAPES (MANPGB)

10.40.1 Description of Current Operations

Replace tapes that have become unbonded in service or tear-down with a new tape. Scrap old tape.

10.40.2 Description of Current Process Problems

The tapes that have become unbonded appear to be unnecessary scrap if a new bond could be accomplished.

10.40.3 Description of New Process

Remove parted tapes, clean, thermo-compression bond and reassemble into unit.

10.40.4 Rationale Leading to Change

Actual interviews with repair line supervisor and general knowledge of thermo-compression bonding. The tapes are not damaged other than separating. No jig or figuring should be necessary. The original parting line is evident for restaging.

10.40.5 Estimated Cost Savings

The present tapes experience 30% replacement. The present production rate for the 20012A family is approximately 1300/year or replacement rate of 500/year. Rebonding costs are .05 hours/tapes. The cost of replacement tapes is $104.77/tape. (1299/year X 21% replacement rate.) Gross savings/year of $28.6K. Note: Other like families of indicators should be reviewed for like tape problems.

10.40.6 Implementation Cost/Schedule

The cost of a thermo compression bonder (mico-bonder) is approximately $2,500.00. Plus two hours installation. Schedule is dependent only on delivery of the bonder as it is a line addition. The installation could be accomplished on delivery.

10.41 QUICK FIX OPPORTUNITY TO RECLAIM C/N 74126A SPIN AXIS BEARINGS (MANPGA)

10.41.1 Description of Current Operations

The outer races of the spin axis bearings of the 74126A gyro rotors are pressed out and scrapped along with the ball compliment and shaft.

10.41.2 Description of Current Process Problems

The present operation does not consider re-use of either bearing or bearing races. The races are placed in large boxes which tend to further damage parts.

10.41.3 Description of New Process

Press out outer races place races, shaft and ball compliments as a matched set into some type of protective container. Route container to bearing reclamation area for cleaning and evaluation. Route acceptable sets to wheel build area for re-use.

10.41.4 Rationale Leading to Change

Observation of wheel teardown showed races being removed that appeared to show little or no wear. Some of the bearings still contained lubrication with no discolorization. Bearings and races were examined under high magnification and no wear was evident. The bearings and races are replaced in matched pairs. Examination of the unit does not immediately reveal the reason for matching race to bearing. This must be studied but which ever is required, a process for reusing the bearings could be applied.

Reliability/Maintainability Characteristics: These should be re-evaluated for impact after the process is developed. At this point no impact is identified.

10.41.5 Estimated Cost Savings

Greater than 50% of the repaired 74126A gyroscopes require wheel rebuild. No additional cost should be incurred to control and package bearings for possible reclamation. The actual cost savings to be obtained can only be protected with development of a reclamation process and establishment of the process' success rate.

10.41.6 Implementation Cost/Schedule

A reclamation process and evaluation will require the services of a manufacturing engineer for one month and the support of a gyro technician for one to two weeks. The reclamation process could then be implemented after development of this process with no direct impact on repair schedule.

10.42 QUICK FIX OPPORTUNITY TO REDUCE OPERATOR MOVEMENT THROUGH FIXTURE IMPROVEMENT. (74126A, OPERATION 100) (MANPGA)

10.42.1 Description of Current Operations

Place directional gyroscope into calibration stand. Sit down on very low stool to observe azimuth scale through straight line borescope. Stand to adjust leveling axis, sit on low stool to verify setting. Restand to continue calibration.

10.42.2 Description of Current Process Problems

The standing, sitting, standing, sitting produces both operator fatigue and unsafe conditions. The stool is required to be very low due to eye alignment. The danger to the operator is increased by the stool being castered. Also, necessary to the sighting operation.

10.42.3 Description of New Process

Place directional gyroscope into the calibration stand. Observe azimuth scale through an angled borescope. Establish at standing eye level. Adjust leveling axis. Verify setting. Continue calibration.

10.42.4 Rationale Leading to Change

Observation of the operator performing the directional gyro calibration followed with interviews with the operators and first line supervisor..

Safety Improvements: Removal of injury potential from missing or moving the castored stool while sit-down or standing. Reduction of floor obstruction with the inherent gain in personnel movement freedoms.

Environmental Hazards/Improvements: As described in safety.

Reliability/Maintainability Characteristics: Not affected.

Human Factors Design Criteria: Reduction of operator fatigue from elimination of deep knee bends required to sit and/or stand to the castored stool.

10.42.5 Estimated Cost Savings

Direct dollars savings are not predictable from this change. The savings will be found in reduced operator fatigue. The intangible savings are the reduction of station litter and the removal of a safety hazard of tripping over the stool and/or missing it while attempting to lower one's self to sit down.

10.42.6 **Implementation Cost/Schedule**

The only cost associated with the change is the purchase of an angled borescope to replace the present in-line borescope. Such a devise would not exceed $250.00. Schedule is not impacted. The change could be implemented immediately after receiving the borescope.

10.43 QUICK FIX OPPORTUNITY TO REDUCE TEST TIME/IMPROVE TEST ACCURACY FOR C/N 74010A VERTICAL GYRO, OPERATIONS 20 & 200 (MANPGA)

10.43.1 Description of Current Operations

Both operation 20 and 200 are performed in the same manner. The gyroscope is tested on the automatic test stand, #704424, contraves vertical console. If the unit fails for drift accuracy, the unit is routed to the manual panel, L.T. 3330, gyro test set to be re-run and accepted if drift accuracy meets specification requirements.

10.43.2 Description of Current Process Problems

Present method required retest of approximately 44% of the product. It does not assure improved accuracy of product being returned to the field.

10.43.3 Description of New Process

Route all product to manual panel, L.T. 3330 gyro test set, for operations 20 and 200. Accept or reject by test results obtained. Correct test program for automatic test stand, #704424 contraves vertical test console before testing any product across it.

10.43.4 Rationale Leading to Change

Actual interview with test personnel revealed the double test procedure. Further discussion exposed the reasoning behind the procedure. The computer program in the contraves vertical console improperly calculates Earth rate drift in one or more headings. When the unit under test fails drift rates, it is assumed that the program error is the reason for the failure and therefore the failure is not valid and re-run is justified. This is valid. However Earth rate correction is a fixed rate at a heading and latitude; therefore, an incorrect value is applicable to both passing and failing units. To re-run only failures does not assure shipping acceptable product.

Reliability/Maintainability Characteristics: Present practices sends marginal to failing product to the field. The proposed method assures product returning to field meets specification. This should effect both reliability and maintainability in a positive manner.

10.43.5 Estimated Cost Savings

Immediate gain will be the elimination of re-tests or 1/3 of test time/unit (44% re-test). This is one labor hour/re-test or 1/2 labor hour/unit tested. Present schedule forecasts 1060 units/year. Total savings to be expected 1/2 hour X 1060 units = 530 labor hours minimum.

10.43.6 Implementation Cost/Schedule

No implementation cost is required to accomplish testing as described. Costs will be incurred if the A.T.E. Program is corrected. This cost should be estimated by Contraves and/or base programmers. Timing is also dependent on contraves input.

10.44 QUICK FIX OPPORTUNITY TO OBSOLESCENSE OF OLD BENCH TEST SETS (74146A WHEEL BLD) (MANPG).

10.44.1 Description of Current Operations

The older bench test sets and ruler supply panels for the C/N 74146A, J4 direction gyro wheel ass'y, KT426193 are no longer supportable. They are of 1950 design age and contain switches and meters no longer available. The devices have been repaired in varying manners just to continue operation. Numerous starts are sometimes required to become operational. Taps or kicks are also used. The condition is general over the older units. Discussion with panel and engineering planners confirmed observations that the conditions are increasing due to age of both design and hardware of the support test stands. Most product is of the mid-fifties to early sixties design.

10.44.2 Description of Current Process Problems

Due to age of both design and hardware of the support test stands. Most product is of the mid-fifties to early sixties design. The product that the test equipment services will continue to be repaired and returned to field for many more years but is very questionable if the present support test equipment will remain supportable over such a time frame .

10.44.3 Description of New Process

10.44.4 Rationale Leading to Change

The goal of the study is identify, plan and execute corrective actions prior to lengthy production interruptions due to unsupportable test equipment. Such a plan must be completed to assure wartime/readiness and/or surge acceptable posture.

10.44.5 Estimated Cost Savings

The benefit to be obtained is continued support of the present product line and their aircraft systems.

The goal is at risk of picking the wrong start point. The goal and condition of the test equipment would predict a line shut down without an alternate test approach is possible any time. The other risk is that a satisfactory alternate method is impractical al all because of expense and/or longivity of the product line.

10.44.6 Implementation Cost/Schedule

The study should be scoped to attack one RCC at a time - possibly even one product line - identification of problems will overlap lines and/or RCC's because of like product, age and design approach. I would suggest that MANPGC be the first RCC. If that is still too large, attack directional gyro first - 74146A, 74148A and 74126A with the 74149A slaving control also included. I would further suggest the study at either level will require 2 to 3 months to general approach and cost trending.

10.45 QUICK FIX OPPORTUNITY TO IMPROVE BEARINGS PROCUREMENT AND HANDLING PROCEDURES (MANPG).

10.45.1 Description of Current Operations

The responsible OC-ALC Item Manager specifies the technical description, requests competitive bids from qualified suppliers, selects vendor(s), establishes shipment schedules and procures the required instrument bearings for annual production requirements for all ALCs. All follow up and status of the procurement is also accomplished by OC-ALC Item Manager. AGMC has no authority at all in the procurement process.

10.45.2 Description of Current Process Problems

Instrument bearing quality related problems are a major cost and schedule impact at AGMC and WR-ALC aircraft gyroscope repair activities. This impact manifests itself in corrosion that is frequently evident visually on packaged bearings when initially received at the MAPGB facility. Currently, significant rework/repair costs occur associated with bearing re-inspection, scrap efforts, and nearly 100% repair/cleaning for salvage.

10.45.3 Description of New Process

10.45.4 Rationale Leading to Change

To improve supplier reliability, procurement specifications and material handling procedures to substantially reduce labor costs and increase throughout in AGMC GRU repair operations.

10.45.5 Estimated Cost Savings

An improvement in the quality of instrument bearings available from the ALC material control inventory will eliminate current rework/repair costs associated with re-inspection and nearly 100% cleaning efforts required to produce acceptable bearings. As an example, AGMC currently plans to purchase and implement another Cyl-Sonic cleaning system to meet capacity requirements. This could be eliminated saving a minimum $150,000 implementation expense. Also, the technology could be transferred across the Command avoiding similar rework costs at WR-ALC.

There are no technical risks identified with the insertion of this improvement into the repair processes at both ALCs. Only possible risk might be the administrative difficulty of the AFLC Item Management System to quickly respond to procurement revisions.

- Reduction in ALC bearings repair/salvage/scrap costs.
- Estimated 50% reduction possible in bearings inventory.
- Reduced overheard costs.
- Eliminate the need for an additional Cyl-Sonic cleaning system dedicated to instrument bearings rework. (Cost avoidance of approximately $150,000 capital expense plus floor space allocation costs.)

10.45.6 Implementation Cost/Schedule

A total review of supplier reliability, procurement specifications and material handling procedures is needed at both ALCs to identify opportunities for quality and productivity improvements. MDHSC will meet with vendors and the item manager to resolve concerns. A two to three month period of time is expected to be sufficient to evaluate both ALCs, the bearings supplier(s) and the OC-ALC item manager.

Bob, I don't know what heading to put this under:

Staffing Estimates (preliminary):

It should be understood that the following estimate overview is preliminary in nature. Further cost analysis details will be available upon submittal of the final Contract Summary Report CDRL B008 (approx. 26 January 1989).

DESCRIPTION	DURATION	EFFORT
MDMSC:		
T.O. MGR.	2-3 Months	50%
SR. I.E.	2-3 Months	100%
I.E.	2-3 Months	100%
M & P Engr.	1-2 Months	50%
Tech Writer	1 Month	50%
T.I. Program Administrative Costs		10%
MDMSC Travel Expenses (Actuals)		

AFLC Estimates:

Air Force Administration Costs
Integration/Implementation Costs
OC-ALC Item Manager Implementation Costs

[redacted]

Following are the Potential Improvements for Focus Studies.

Attachment 1

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: MANPGA QF:

NAME: VANDERVOORD FS: GS-5

HEADING: FILL PROCEDURE FOR 74074A TO REPLACE PRESENT STATION

10.1.1 Description of Current Operation:

Filling. The rate gyroscope is to be filled with damping fluid, part number 113B5890G1 or DS510-100CS ± 2%, using purging and filling equipment. 231E4276 Filter through a one-micron filter. Refer to Technical Manual, Operation and Service Instructions, Gyro and Accelerometer Oil Filling Equipment, TO 33D3-9-140-1, for procedures necessary to prepare the purging and filling equipment for filling sensors, and for detailed operation instructions.

a. Uncoil fill tube in bellows end of unit to be filled, being careful not to fracture tube at point where the tube emerges from bellows.

b. Loosen thumbscrew of heater clamp on purging and filling equipment. The heater clamp forms bellows setting for unit to be filled. Insert the sensor, bellows end down, into the heater clamp. Be sure sensor is firmly seated at bottom of clamp because the clamp seat is used to establish final bellows position. Tighten knurled heater clamping screw. Fill tube on the bellows end runs through the hole in seat of the clamp and into oil supply line coupling.

c. Connect knurled vacuum coupling on transparent tubing to oil filler tube at pickoff end of sensor, and tighten coupling.

d. Tighten coupling at bellows end fill tube connection to oil supply line.

e. Energize heater clamp to apply heat to the unit being filled. Operate fill equipment for five hours to evacuate all air, vapor, and other gases from unit. A pressure of 25 microns or less shall be maintained during entire evacuation cycle.

f. Remove heat from the unit be deenergizing heater after five hours of application. Allow unit to cool to room temperature while continuing to evacuate the unit. Allow unit to cool for at least one hour while being evacuated.

g. Pump damping fluid into bellows end of unit at 10 to 15 psig. Maintain vacuum at pickoff end during fill. When fluid can be seen above rate gyro assembly in the fill equipment transparent tube, continue to fill for a least forty-five minutes.

h. Pinch off pickoff end fill tube so that pinched end is no higher than stator pins.

i. Maintain 10 to 15 psig fluid pressure through bellows end fill tube for one hour to ensure that bellows has bottomed against bellows fixture.

j. Pinch off bellows end fill tube about one inch long. Fluied pressure must be at least 8 psig at time of pinch-off.

k. Both fill tube pinch-offs should result in cold-welded joints that are tight enough to prevent leakage of damping fluid. Apply a ball of solder SN-60, to end of each fill tube to completely cover the pinch-off joint.

l. Remove rate gyro assembly from fill equipment.

m. Coil the fill tube at bellows end into bellows. Tube must lie flat against surface of bellows and must not extend into bellows convolutions.

n. Measure depth of bellows int he bellows assembly, using a depth micrometer. Bellows shall be 0.330 to 0.350 inch below outer surface of the bellows assembly. Measure to flat surface of the bellows.

Overall Assessment of Current Operation:

Current Process Problems:

Equipment is a ~~four~~ headed pressure, heat, vacuum system that requires abnormal maintainance time. Seldom are both banks in operation. Present downtime is so great, the work load has been renegotiated to work only a skeleton crew. Personnel has been reassigned to other areas with the RCC.

Shop Organization:

Rationale Leading to Change:

Simplify filling procedures and equipment to reduce time required to perform operation. Greatly improve reliability and availability of station time.

Supporting Data:

Description of New Process:

Mechanically cock the bellows to obtain the .330" to .350" dim. in T.O.

6.44n.
Place unit in bell jar with filters, flap in place.
Pump down to pressure of <25 microns for 5 hours.
Fill filter resv. with DS 570-100CS ± 2%.
Slide flap to allow silicone oil to enter filter - control rate to fill unit in 1 hour minimum (need to develop)
Over fill to some level in funnel to allow for loss with pressure increase.
Vent to one atmosphere.
Remove bell jar.
Seal as before.
Uncock bellows.

Study required to develop.

1. Cocking method.
2. Length of pump down.
3. Rate of fill.
4. Test approach for comparision.

Productivity Improvements:

Quality Improvements:

Resource Utilization:

Flexibility:

Benefits/Trade-offs:

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: WR/MANPGB & AGMC/MANPBG QF:

NAME: VANDERVOORD FS: GS-1

HEADING: RCC WR/MANPGB & AGMC/MANPBG ON AUTOMATIC TEST EQUIPMENT VS. PRODUCT OPTIMATION

Description of Current Operation:

Perform incoming diagnostic test procedure and final acceptance test procedure on the contraves automatic test equipment. Print out unit performance values with product specification limits and accept, reject decisions. Record this same information for storage to the hard disk drives. Store all hard disks. Note: To date no usage of stored data is being planned.

Overall Assessment of Current Operation:

USE AGMC WRITE UP
CHECK WITH BILL BUCHHEIR

Current Process Problems:

Shop Organization:

Rationale Leading to Change:

The data presently stored should be used to develop:

a) Test stand capabilities
b) Test stand accuracies
c) Test stand maintainance schedule
d) Test equipment error budgets
e) Test equipment error biasing
f) Product trending
g) Product repeatabilities
h) Necessities of individual tests
i) Etc.

Supporting Data:

Description of New Process:

Productivity Improvements:

The data can be sorted and compared to give calibration centering data for both test stands and product. This will allow for maximizing product acceptance to the product specification. It will improve product yield in a positive manner. Improved field reliability by assuring middle specification product entering the field. Allow for the development of meanful and timely preventive maintainance schedules. Assure test panel to test panel compatibility is maintained. Product trending can be identified allowing timely corrective actions. Confidence levels can be established that should identify areas that can reduce test times and frequencies. Weak areas of test equipment will be identified, allowing for correction and the inherent decrease in test equipment down time.

Quality Improvements:

Resource Utilization:

Flexibility:

Benefits/Trade-offs:

The data required by the study is available and stored in a usable form at both locations. It is of ample size to satisfy needs for meaningful distribution studies. Navy has developed similar programming through Fletac for A.T.E. capability studies. MDMSC is familiar with the programming through the association with the Harpoon and GMB109B programming.

The unknown required to be established by the study are format of the data stored, number on computer programs required and programming output format for maximizing data usability.

The stability of the study area is stable through 1992 per the forecasted workload report WG324-130.

Cost Savings:

Implementation Cost/Schedule:

The study should develop programs to extract the data from the disk storage, organized the data, sort it for test distribution studies and predict product trending. The study will require the service of the following:

* Site Leader	3 months
* Test Engineer	3 months
* Computer Programmer	?
* Computer Operation Team	?
* Tech Writer	?

* Requires input from compt. people. Time will be required at both sites (WR/AGMC) but AGMC should be used to develop methodology and programming approach.

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: WR-MANPGB & AGMC-MANPBG QF:

NAME: VANDERVOORD FS: GS-2

HEADING: RCC WR-MANPGB & AGMC-MANPBG TO OPTIMIZE UTILIZATION OF GYRO A.T.E. THRU THE REDUCTION OF TEST EQUIPMENT DOWN TIME

Description of Current Operation:

The preferred method of operation at both locations is to route all incoming and final acceptance testing across the contraves automatic test stations. The desire is to reduce labor (input) by performing testing on multiple units and test stations with minimum test personnel and to gain maximum product reliability and integrity through reduction of personnel (biaing)? and test influences. The desire presently cannot be realized because A.T.E. is not usable approximately 50% of the time because of malfunction and/or breakdown or lack of confidence of the test values obtained. Focus study No._____ will address the confidence problem. This focus study will cover test equipment availability.

Overall Assessment of Current Operation:

USE AGMC WRITE UP
BILL BUCHANAN

Current Process Problems:

The low availability of the equipment. The lack of confidence in values obtained causing morale problems and distrust between test and repair areas. Increases in test time because multiple tests cannot be run or validation of failures requires manual testing.

Shop Organization:

Rationale Leading to Change:

The need for the study is the exterme downtime of the A.T.E. and the lack of confidence in the test values obtained. The goal of this study is to reduce the station down enough to realize 90% availability of the A.T.E. for maximum test events of Gyro product. Such improvement will improve measurably the return on investment of vital pram funded equipment and improve confidence level in gyro product returning to service. It will also increase technology consistency between WR-AFLC and AGMC by common solutions to like problems.

Supporting Data:

Description of New Process:

Productivity Improvements:

Quality Improvements:

Resource Utilization:

Both RCC's maintain monthly measurements of auto test equipment availability. AGMC is a formal reporting system referred to as station no. summary all MPBGA, job 4932 A9040A while Warner Robins has an informal report developed by the A.T.E. supervisor for his personal use. Though in different format and completeness both reports show uptime/downtime of test stations.

Flexibility:

Benefits/Trade-offs:

The opportunity to succeed in the stated goals are very possible. The percentage of availability is consistent with availability of like equipment in private industry today. The main risk to not being able to obtain the goal is from lack of detailed knowledge of station design, history of panel failure causes and degree of design margin from panel equipment budgeted error profiles. The A.T.E. presently is the main test equipment for both RCC's and should be capable of testing all present product. Any new inducted systems should be applicable with minor fixturization and fronted computer programming costs.

Cost Savings:

Implementation Cost/Schedule:

(Bill I believe you should write this section with Bashyam's help. You will require services of knowledgable test engineer, system people and visits to contraves if detailed design and equipment specifications are not available. I would suggest 4/5 months study time with possibly some equipment re-specing and complete maintainance schedules and trouble shooting manuals.)

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: WR-MANPG QF:

NAME: VANDERVOORD FS: GS-3

HEADING: WR-MANPG TO COMBINE GYRO ROTOR ASEMBLY REPAIR TO A COMMON LINE FLOW

Description of Current Operation:

Gyro units for repair are disassembled and the rotor assemblies removed and set aside for repair and rebuild. The rotor assembly is replaced by a previously repaired rotor assembly and the rebuild of the gyro unit under repair is completed. The removed rotor assemblies are accumulated into batches of ten to twenty assemblies. They are then repaired as a group by some member of the line tech. personnel in the particular gyro repair line. The rebuild action is informally scheduled by line needs and/or tech. availability. The present method is common for all gyro lines and across the three WR-MANPG RCC's.

Overall Assessment of Current Operation:

OBSERVATION

Current Process Problems:

The present method requires much duplication of equipment. Each product line requires run-in stations, balance machines, leak detectors, filling equipment, ovens, etc. The utilization time of the equipment is generally very light. Rotor assemblies for the gyro assemblies require repair approximately 85% of the time and represent about 2% of the average hours to repair a gyro assembly. The method limits expertise by greatly reducing consecutive repetitive experiences by an operator. It limits common methods for simular assemblies, reduces recognition of common problems. It also increases equipment costs for new technology. The cost of parts inventory is also increased for common parts. The build of rotor assemblies in small quantities and many different technicians and locations encourages deviations from the T.O. methods.

Shop Organization:

Rationale Leading to Change:

The study goals are to substantially reduce labor input for gyro rotor assembly repair, to increase expertise through repetitive operations, reducing attention spans, increasing field reliability through consistent build practices and reduction of reaction time to common problems and/or part deviations. The change will produce improved cross teaming developing rotor repair experts across all gyro product. It will imporve production/process flexibility by familiarizing engineering and planning of alternate build methods. The change will also prepare WR-ALC to except and integrate the new laser rotor balancing procedures being devleoped by AGMC-MAPBG without having to duplicate the expensive laser balancer on each product line.

Supporting Data:

Description of New Process:

Productivity Improvements:

(Bob, this paragraph will require more field information. The model may help in developing "AS IS" costs and a base for "TO BE" inputs. I suggest parts of the study will be necessary to develop savings. Many may prove intangible and/or required by introduction of laser balance. Some others are quipment and space utilization and in house/field reliability improvement.)

Quality Improvements:

Resource Utilization:

Flexibility:

Benefits/Trade-offs:

One identified risk of combining rotor assembly repair will be schedule compliance. The present method allows each line supervisor to control the availability of repaired rotor assemblies for his product line. However, it does not consider best line load and/or optimize quantity. It does not consider repair quality or training procedures/requirements. It is an "Oh, by the way..." scheduling and has lead to uncontrolled build in many areas.

Cost Savings:

Implementation Cost/Schedule:

(Bob, the effort for F.W. will be identifying area to combine repair, gather all present equipment requirement, produce an area layout and process flow. The study should also suggest a scheduling plan to satisfy F/C line requirements. Some production schedule impact may be experienced during change over.

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: _____ QF: _____

NAME: VANDERVOORD FS: GS-4

HEADING: OBSOLESCENSE OF OLD BENCH TEST SETS (74146A WHEEL BLD)

Description of Current Operation:

The older bench test sets and ruler supply panels for the C/N 74146A, J4 direction gyro wheel ass'y, KT426193 are no longer supportable. They are of 1950 design age and contain switches and meters no longer available. The devices have been repaired in varying manners just to continue operation. Numerous starts are sometimes required to become operational. Taps or kicks are also used. The condition is general over the older units. Discussion with panel and engineering planners confirmed observations that the conditions are increasing due to age of both design and hardware of the support test stands. Most product is of the mid-fifties to early sixties design.

Overall Assessment of Current Operation:

Current Process Problems:

Due to age of both design and hardware of the support test stands. Most product is of the mid-fifties to early sixties design. The product that the test equipment services will continue to be repaired and returned to field for many more years but is very questionable if the present support test equipment will remain supportable over such a time frame .

Shop Organization:

Rationale Leading to Change:

The goal of the study is identify, plan and execute corrective actions prior to lengthy production interruptions due to unsupportable test equipment. Such a plan must be completed to assure wartime/readiness and/or surge acceptable posture.

Supporting Data:

Description of New Process:

Productivity Improvements:

The benefits to be obtained (is) are continued support of the present product line and their aircraft systems.

Quality Improvements:

Resource Utilization:

Flexibility:

Benefits/Trade-offs:

The goal is at risk of picking the wrong start point. The goal and condition of the test equipment would predict a line shut down without an alternate test approach is possible any time. The other risk is that a satisfactory alternate method is impractical al all because of expense and/or longivity of the product line.

Cost Savings:

Implementation Cost/Schedule:

The study should be scoped to attack one RCC at a time - possibly even one product line - identification of problems will overlap lines and/or RCC's because of like product, age and design approach. I would suggest that MANPGC be the first RCC. If that is still too large, attack directional gyro first - 74146A, 74148A and 74126A with the 74149A slaving control also included. I would further suggest the study at either level will require 2 to 3 months to general approach and cost trending.

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: MANPGA QF: _____

NAME: VANDERVOORD FS: GS-5

HEADING: FILL PROCEDURE FOR 74074A TO REPLACE PRESENT STATION

Description of Current Operation:

Filling. The rate gyroscope is to be filled with damping fluid, part number 113B5890G1 or DS510-100CS ± 2%, using purging and filling equipment. Filter through aone-micron filter. Refer to Technical Manual, Operation and Service Instructions, Gyro and Accelerometer Oil Filling Equipment, TO 33D3-9-140-1, for procedures necessary to prepare the purging and filling equipment for filling sensors, and for detailed operation instructions.

a. Uncoil fill tube in bellows end of unit to be filled, being careful not to fracture tube at poin where the tube emerges from bellows.

b. Loosen thumbscrew of heater clamp on purging and filling equipment. The heater clamp forms bellows setting for unit to be filled. Insert the sensor, bellows end down, into the heater clamp. Be sure sensor is firmly seated at bottom of clamp because the clamp seat is used to establish final bellows position. Tighten knurled heater clamping screw. Fill tube on the bellows end runs through the hole in seat of the clamp and into oil supply line coupling.

c. Connect knurled vacuum coupling on transparent tubing to oil filler tube at pickoff end of sensor, and tighten coupling.

d. Tighten coupling at bellows end fill tube connection to oil supply line.

e. Energize heater clamp to apply heat to the unit being filled. Operate fill equipment for five hours to evacuate all air, vapor, and other gases from unit. A pressure of 25 microns or less shall be maintained during entire evacuation cycle.

f. Remove heat from the unit be deenergizing heater after five hours of application. Allow unit to cool to room temperature while continuing to evacuate the unit. Allow unit to cool for at least one hour while being evacuated.

g. Pump damping fluid into bellows end of unit at 10 to 15 psig. Maintain vacuum at pickoff end during fill. When fluid can be seen above rate gyro assembly in the fill equipment transparent tube, continue to fill for a least forty-five minutes.

h. Pinch off pickoff end fill tube so that pinched end is no higher than stator pins.

i. Maintain 10 to 15 psig fluid pressure through bellows end fill tube for one hour to ensure that bellows has bottomed against bellows fixture.

j. Pinch off bellows end fill tube about one inch long. Fluied pressure must be at least 8 psig at time of pinch-off.

k. Both fill tube pinch-offs should result in cold-welded joints that are tight enough to prevent leakage of damping fluid. Apply a ball of solder SN-60, to end of each fill tube to completely cover the pinch-off joint.

l. Remove rate gyro assembly from fill equipment.

m. Coil the fill tube at bellows end into bellows. Tube must lie flat against surface of bellows and must not extend into bellows convolutions.

n. Measure depth of bellows int he bellows assembly, using a depth micrometer. Bellows shall be 0.330 to 0.350 inch below outer surface of the bellows assembly. Measure to flat surface of the bellows.

Overall Assessment of Current Operation:

Current Process Problems:

Equipment is a four headed pressure, heat, vacuum system that requires abnormal maintainance time. Seldom are both banks in operation. Present downtime is so great, the work load has been renegotiated to work only a skeleton crew. Personnel has been reassigned to other areas with the RCC.

Shop Organization:

Rationale Leading to Change:

Simplify filling procedures and equipment to reduce time required to perform operation. Greatly improve reliability and availability of station time.

Supporting Data:

Description of New Process:

Mechanically cock the bellows to obtain the .330" to .350" dim. in T.O.

6.44n.
Place unit in bell jar with filters, flap in place.
Pump down to pressure of <25 microns for 5 hours.
Fill filter resv. with DS 570-100CS ± 2%.
Slide flap to allow silicone oil to enter filter - control rate to fill unit in 1 hour minimum (need to develop)
Over fill to some level in funnel to allow for loss with pressure increase.
Vent to one atmosphere.
Remove bell jar.
Seal as before.
Uncock bellows.

Study required to develop.

1. Cocking method.
2. Length of pump down.
3. Rate of fill.
4. Test approach for comparision.

Productivity Improvements:

Quality Improvements:

Resource Utilization:

Flexibility:

Benefits/Trade-offs:

Cost Savings:

Implementation Cost/Schedule:

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: _____ QF: _____

NAME: VANDERVOORD FS: GS-6

HEADING: AUTOMATE DEPAINT, UNSEAL RESEAL PROCESS

Description of Current Operation:

Gyro units are currently manually unsealed, depainted, resealed and (leak) checked in a semi-enclosed room adjacent to normal displacement gyro repair and test activities.

Overall Assessment of Current Operation:

AGMC WRITEUP

Current Process Problems:

Environmental, safety, and equipment conditions are substandard as compared to most AGMC facilities. Without an enclosed ventilation system there is a risk of periodic foreign object contamination when processing equipment malfunctions.

Shop Organization:

Rationale Leading to Change:

To substantially reduce labor costs and increase throughput in AGMC GRU repair operations through implementation of modernized equipment, batch processing methods.

Supporting Data:

Description of New Process:

Productivity Improvements:

Eliminate technicians exposure to irritating fumes and high temperature heavy-duty soldering irons with the implemetnation of semi-automatic processing deseal/reseal equipment and improved facilities.

Quality Improvements:

Resource Utilization:

Flexibility:

Benefits/Trade-offs:

There are technical risks identified with the insertion of this improvement into the repair processes at AGMC. Consider the risks of not being able to successfully automate, obtain adequate seals, etc. Also, some inventory stockpiling may be required in the immediate sealing area prior to production interruption during facility rearrangements.

Cost Savings:

Reduced overhead costs.

Implementation Cost/Schedule:

A thorough review of state-of-the-art commercial aerospace Gyro manufacturers will address the cost effective modernization improvements possible at AGMC sealing, leak checking and finishing operations. A two to three month period of time is expected to be sufficient to evaluate private industry and AGMC. Expand to include others doing automated depaint, unseal, etc.

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

Bob, what heading should this go under?:

Staffing Estimates (preliminary):

It should be understood that the following estimate overview is preliminary in nature. Further cost analysis details will be available upon submittal of the final Contract Summary Report CDRL B008 (approx. 26 January 1989).

	DESCRIPTION	DURATION	EFFORT
MDMSC:	T.O. MGR	2-3 Months	50%
	SR. I.E.	2-3 Months	100%
	I.E.	2-3 Months	100%
	M & P Engr.	1-2 Months	50%
	Tech Writer	1 Month	50%
	T.I. Program Administrative Costs		10%
	MDMSC Travel Expenses (Actuals)		

AFLC Estimates:
Air Force Administration Costs
Integration/Implementation Costs

FS GS-6

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: _____ QF: _____

NAME: VANDERVOORD FS: GS-7

HEADING: IMPROVE BEARINGS PROCUREMENT AND HANDLING PROCEDURES

Description of Current Operation:

The responsible OC-ALC Item Manager specifies the technical description, requests competitive bids from qualified suppliers, selects vendor(s), establishes shipment schedules and procures the required instrument bearings for annual production requirements for all ALCs. All follow up and status of the procurement is also accomplished by OC-ALC Item Manager. AGMC has no authority at all in the procurement process.

Overall Assessment of Current Operation:

Current Process Problems:

Instrument bearing quality related problems are a major cost and schedule impact at AGMC and WR-ALC aircraft gyroscope repair activities. This impact manifests itself in corrosion that is frequently evident visually on packaged bearings when initially received at the MAPGB facility. Currently, significant rework/repair costs occur associated with bearing re-inspection, scrap efforts, and nearly 100% repair/cleaning for salvage.

Shop Organization:

Rationale Leading to Change:

To improve supplier reliability, procurement specifications and material handling procedures to substntially reduce labor costs and increase throughout in AGMC GRU repair operations.

Supporting Data:

Description of New Process:

Productivity Improvements:

An improvement in the quality of instrument bearings available from the ALC material control inventory will eliminate current rework/repair costs associated with re-inspection and nearly 100% cleaning efforts required to produce acceptable bearings. As an example, AGMC currently plans to purchase and implement another Cyl-Sonic cleaning system to meet capacity requirements. This could be eliminated saving a minimum $150,000 implementation expense. Also, the technology could be transferred across the Command avoiding similar rework costs at WR-ALC.

Quality Improvements:

Resource Utilization:

Flexibility:

Benefits/Trade-offs:

There are no technical risks identified with the insertion of this improvement into the repair processes at both ALCs. Only possible risk might be the administrative difficulty of the AFLC Item Management System to quickly respond to procurement revisions.

Cost Savings:

align

- Reduction in ALC bearings repair/salvage/scrap costs.
- Estimated 50% reduction possible in bearings inventory.
- Reduced overheard costs.
- Eliminate the need for an additional Cyl-Sonic cleaning system dedicated to instrument bearings rework. (Cost avoidance of approximately $150,000 capital expense plus floor space allocation costs.)

Implementation Cost/Schedule:

A total review of supplier reliability, procurement specifications and material handling procedures is needed at both ALCs to identify opportunities for quality and productivity improvements. MDMSC will meet with vendors and the item manager to resolve concerns. A two to three month period of time is expected to be sufficient to evaluate both ALCs, the bearings supplier(s) and the OC-ALC item manager.

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

Bob, I don't know what heading to put this under:

Staffing Estimates (preliminary):

It should be understood that the following estimate overview is preliminary in nature. Further cost analysis details will be available upon submittal of the final Contract Summary Report CDRL B008 (approx. 26 January 1989).

DESCRIPTION	DURATION	EFFORT
MDMSC:		
T.O. MGR.	2-3 Months	50%
SR. I.E.	2-3 Months	100%
I.E.	2-3 Months	100%
M & P Engr.	1-2 Months	50%
Tech Writer	1 Month	50%
T.I. Program Administrative Costs		10%
MDMSC Travel Expenses (Actuals)		

AFLC Estimates:

Air Force Administration Costs
Integration/Implementation Costs
OC-ALC Item Manager Implementation Costs

FS: GS-7

~~GS-7~~

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: MANPBG QF:

NAME: VANDERVOORD FS: GS-8

HEADING: LASER WHEEL BALANCING (DELAY/MONITOR AGMC)

Description of Current Operation:

A new pram funded dynamic balancing laser system for gyro rotors is scheduled to be installed in the AGMC Gyro Reference Unit Wheel Repair Facility during the first quarter of CY 1989. WR-ALC is not as yet ready to specify or define a specific system.

Overall Assessment of Current Operation: DROP

Current Process Problems:

A significant material and labor cost is incurred by the frequent rework scrap generated by improper manual drilling of the rotor wheel during the difficult precision balancing process.

Shop Organization:

Rationale Leading to Change:

Once the AGMC Laser Balancing System is operational and an attractive return on investment (ROI) can be verified utilizing Taguchi investigation methods, MDMSC will act as coordinator to accelerate the implementation of a similar Rotor Dynamic Balancing Laser System at WR-ALC to provide technology consistency across AFLC.

Supporting Data:

Description of New Process:

Productivity Improvements:

Accelerate the implementation of AGMC's Laser Balancer and verify attained cost savings and ROI. MDMDSC can perform as technology transfer manager to insert this same process improvement at WR-ALC in the shortest possible amount of time.

Quality Improvements:

Resource Utilization:

Flexibility:

Benefits/Trade-offs:

Once AGMC's Laser Balancing System is operational and accepted by all users there are no technical risks identified with the insertion of this improvement into the repair processes at WR-ALC.

Cost Savings:

Implementation Cost/Schedule:

A relatively quick study is needed at both ALC's to identify opportunities for quality and productivity improvements. A one to two month period of time is expected to be sufficient to evaluate both ALC's involved.

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

Bob, what heading?

Staffing Estimates (preliminary):

It should be understood that the following estimate overview is preliminary in nature. Further cost analysis details will be available upon submittal of the final Contract Summary Report CDRL B008 (approx. 26 January 1989).

	DESCRIPTION	DURATION	EFFORT
MDMSC:	T.O. MGR	1-2 Months	50%
	SR. I.E.	1-2 Months	100%
	I.E.	1-2 Months	100%
	M & P Engr	1 Month	50%
	Tech Writer	1 Month	50%
	T.I. Preogram Administrative Costs		10%
	MDMSC Travel Expenses (Actuals)		

AFLC Estimates:

Air Force Administration Costs
Integration/Implementation Costs
WR-ALC Floorspace Allocation Costs

FS: GS-8

TECHNOLOGY INSERTION PROGRAM

ALC: WR-ALC RCC: QF:

NAME: VANDERVOORD FS: GS-9

HEADING: COMPARE A.T.E. TO MANUAL (DELAY FOR RESULTS FROM 1)

Description of Current Operation:

Diagnostic tests and/or final acceptance tests are often performed on both A.T.E. and manual test sets. The duplication of tests is because of lack of confidence in one or both pieces of equipment. The problem is evident at both AGMC-MANPBG and WR-ALC, MANPG. The difference between the bases is AGMC places more faith in the manual stations and accepts product in dispute from manual station values while WR-ALC, MANPG in general uses the A.T.E. as the final acceptance measure.

Overall Assessment of Current Operation:

Current Process Problems:

The basic problem is evident from opposite approaches taken by the separate bases. The acceptability of values from either set of equipment is by opinion or rationale of the acceptor and not from an engineering researched position. Opportunity to compromise product is very great in either method. Both locations perform redundant testing, increasing labor input unnecessarily.

Shop Organization:

Rationale Leading to Change:

Determine quantified statistics through Taguchi* analysis of compatibility and/or differences between the GRU A.T.E. and manual test stations to allow full utilization of the RCC equipment resources. Use distributions and values obtained through Focus Study 6 A.T.E. vs. Product for A.T. E. characteristics.

* - I do not believe that "Taguchi" will do anything toward this end! This should be results of aseies of test data comparisions. A Taguchi array may rate number of comparisions necessary and impact weight of some conditions.

Supporting Data:

Description of New Process:

Productivity Improvements:

In addition to the obvious elimination of duplicate testing, reliability of the product and the increase in field time should result in further cost savings. Both will be obtained by shipping more product meet specification allowing maximum field time before failure. There are alos pisitive intangible benefits to be gained in employee morale and product confidence.

Quality Improvements:

Resource Utilization:

(Obvious savings from duplicate test - occurrence factor will vary with product line - data is in model also should have occurence factor from WCD history.)

Flexibility:

Benefits/Trade-offs:

One risk that must be considered is that an indepth study will result in neither test methods meet the product specification. Another consideration is that product randomeness is too great to produce meaningful tests.

Cost Savings:

Implementation Cost/Schedule:

A total review is needed at both ALC's to identify opportunities for quality and productivity improvements. A two to three month period of time is expected to be sufficient to evaluate both ALC's involved.

Impact:

Safety Improvements:

Environmental Hazards/Improvements:

Reliability/Maintainability Characteristics:

Human Factors Design Criteria:

Bob, what heading?

Staffing Estimates (preliminary):

It should be understood that the following estimate overview is preliminary in nature. Further cost analysis details will be available upon submittal of the final Contract Summary Report CDRL B006 (approx. 26 January 1989).

	DESCRIPTION	DURATION	EFFORT
MDMSC:			
	T.O. MGR	2-3 Months	50%
	SR. I.E.	2-3 Months	100%
	I.E.	2-3 Months	100%
	M & P Engr	1-2 Months	50%
	Tech Writer	1 Month	50%
	T.I. Program Adiminstrative Costs		10%
	MDMSC Travel Expenses (Actuals)		

AFLC Estimates:

Air Force Administration Costs
Integration/Implementation Costs

FS: GS-9

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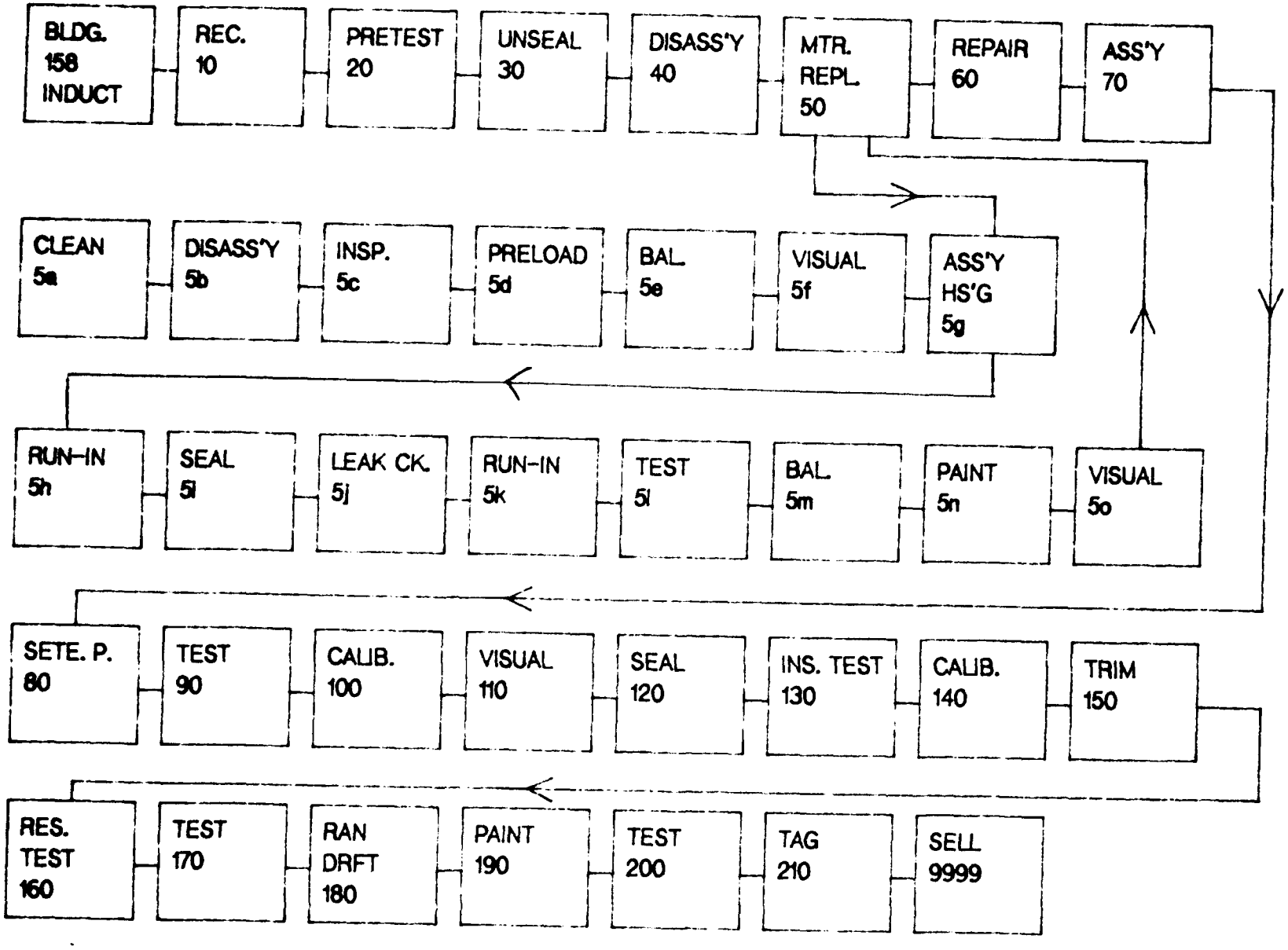

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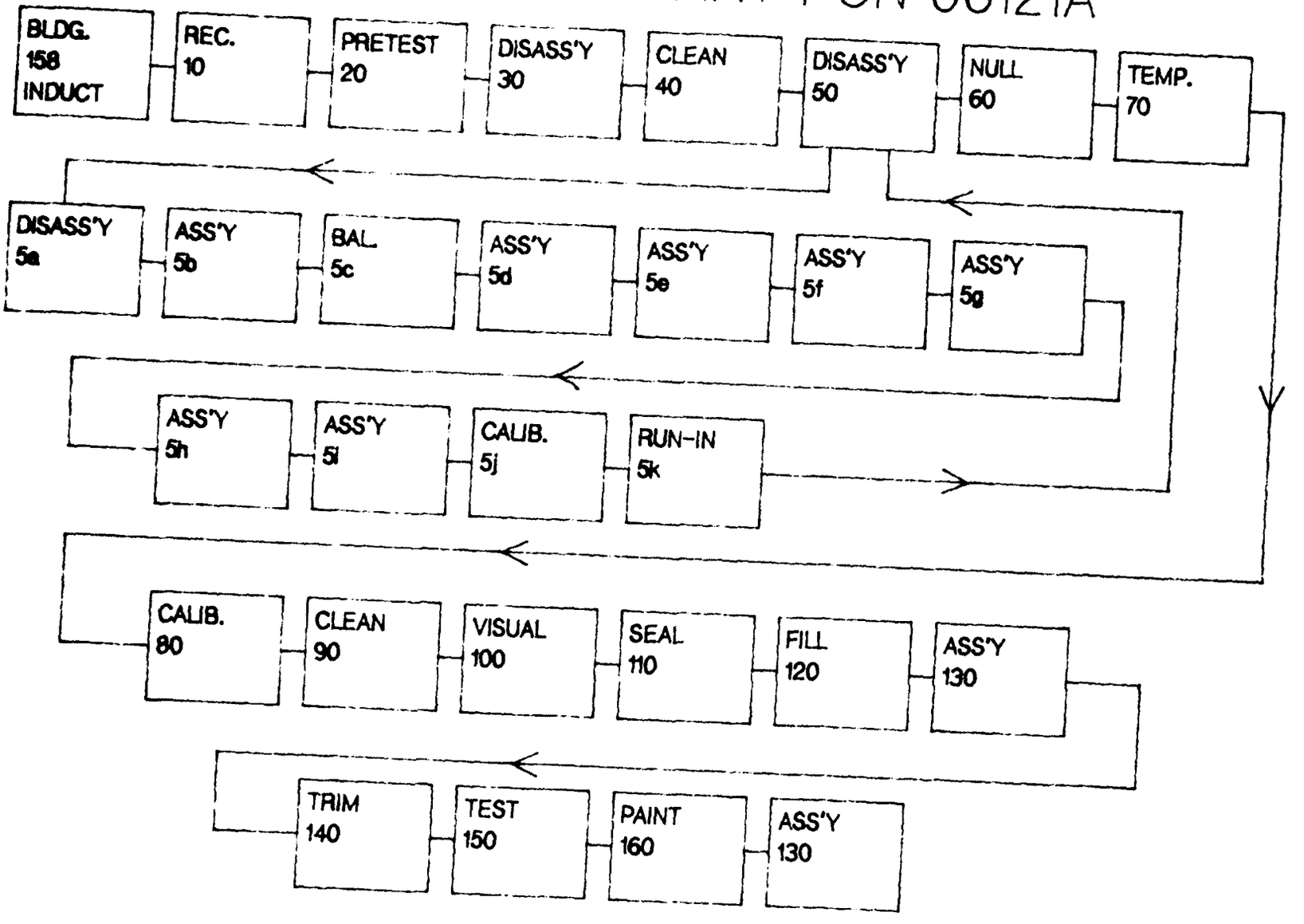

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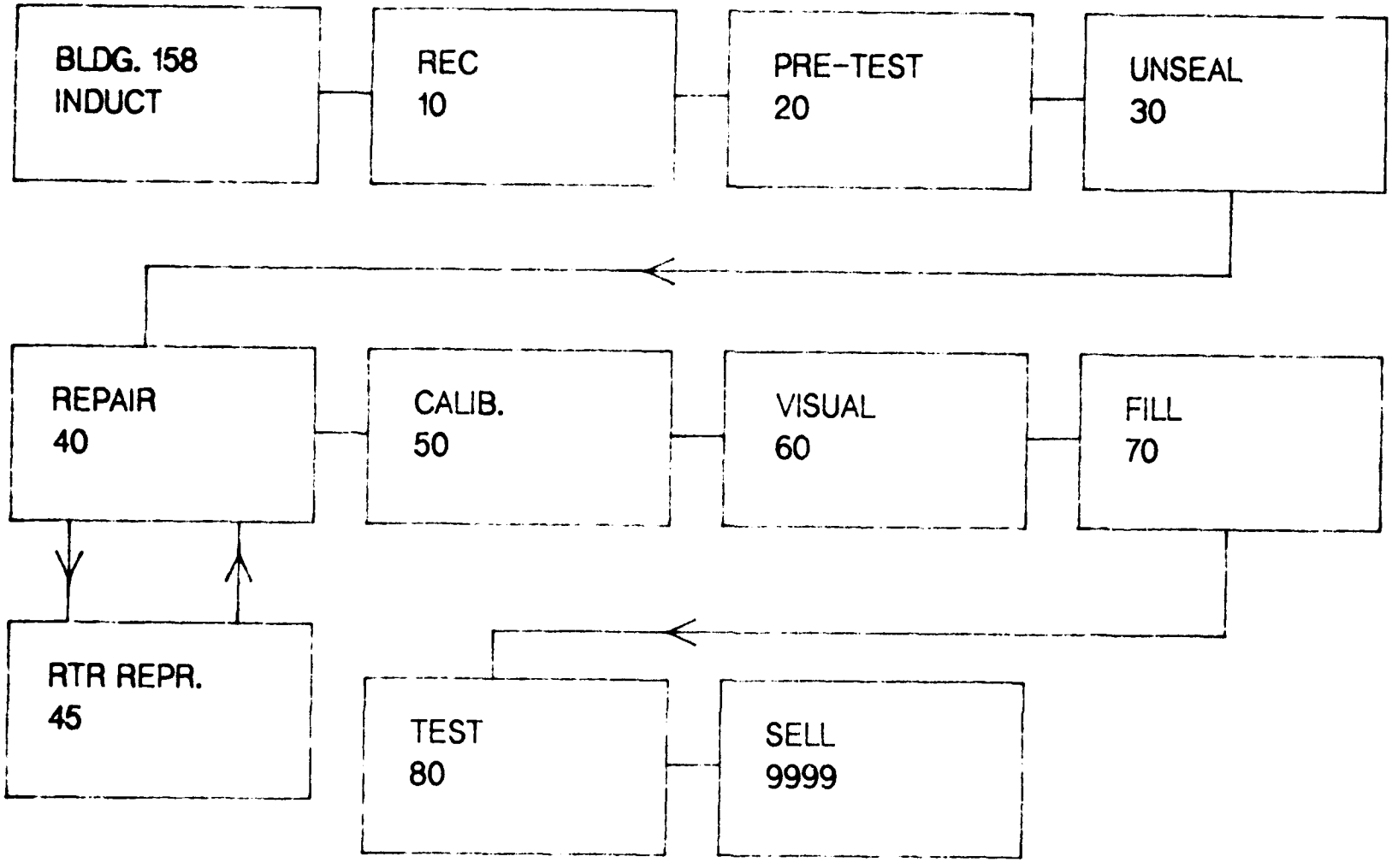

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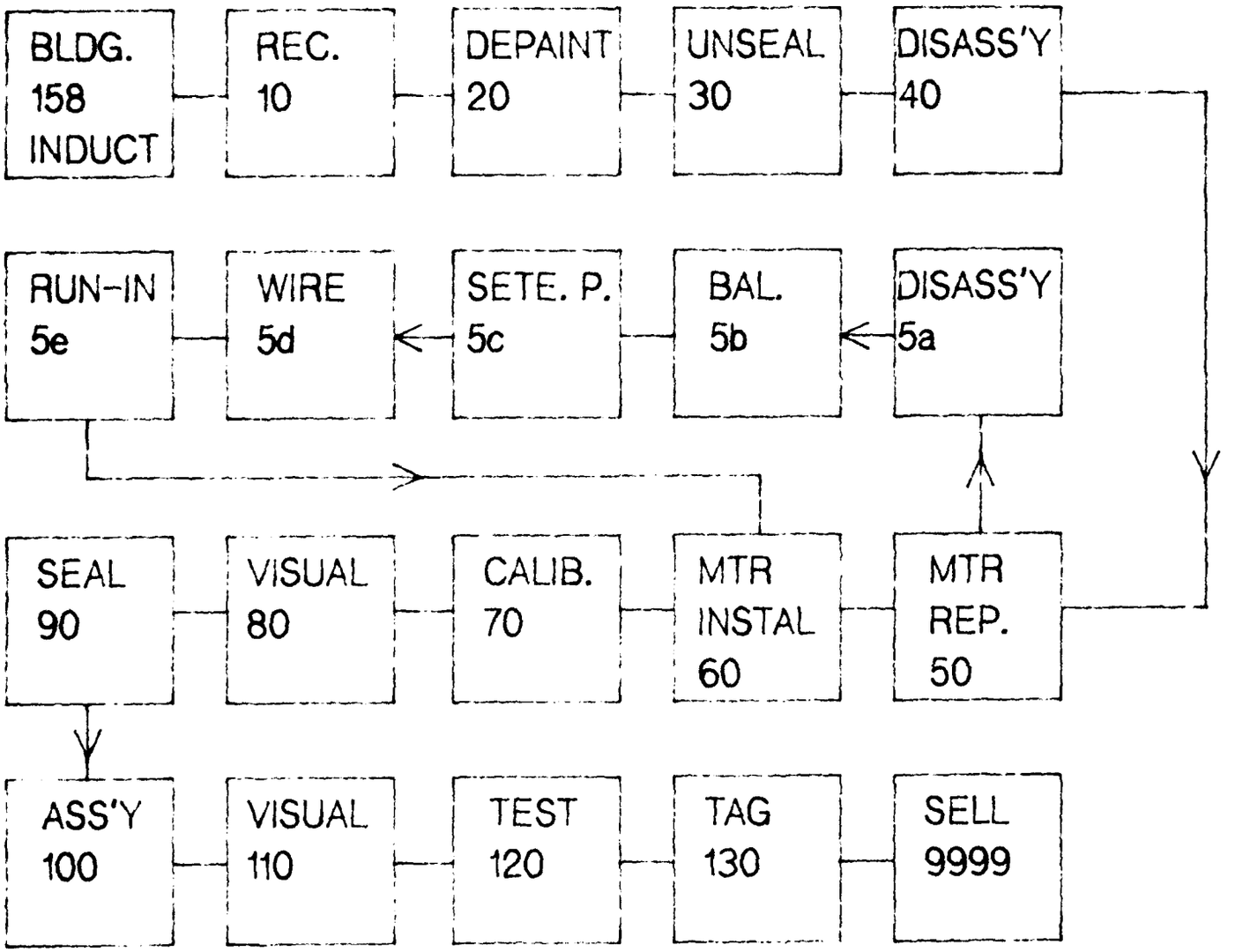

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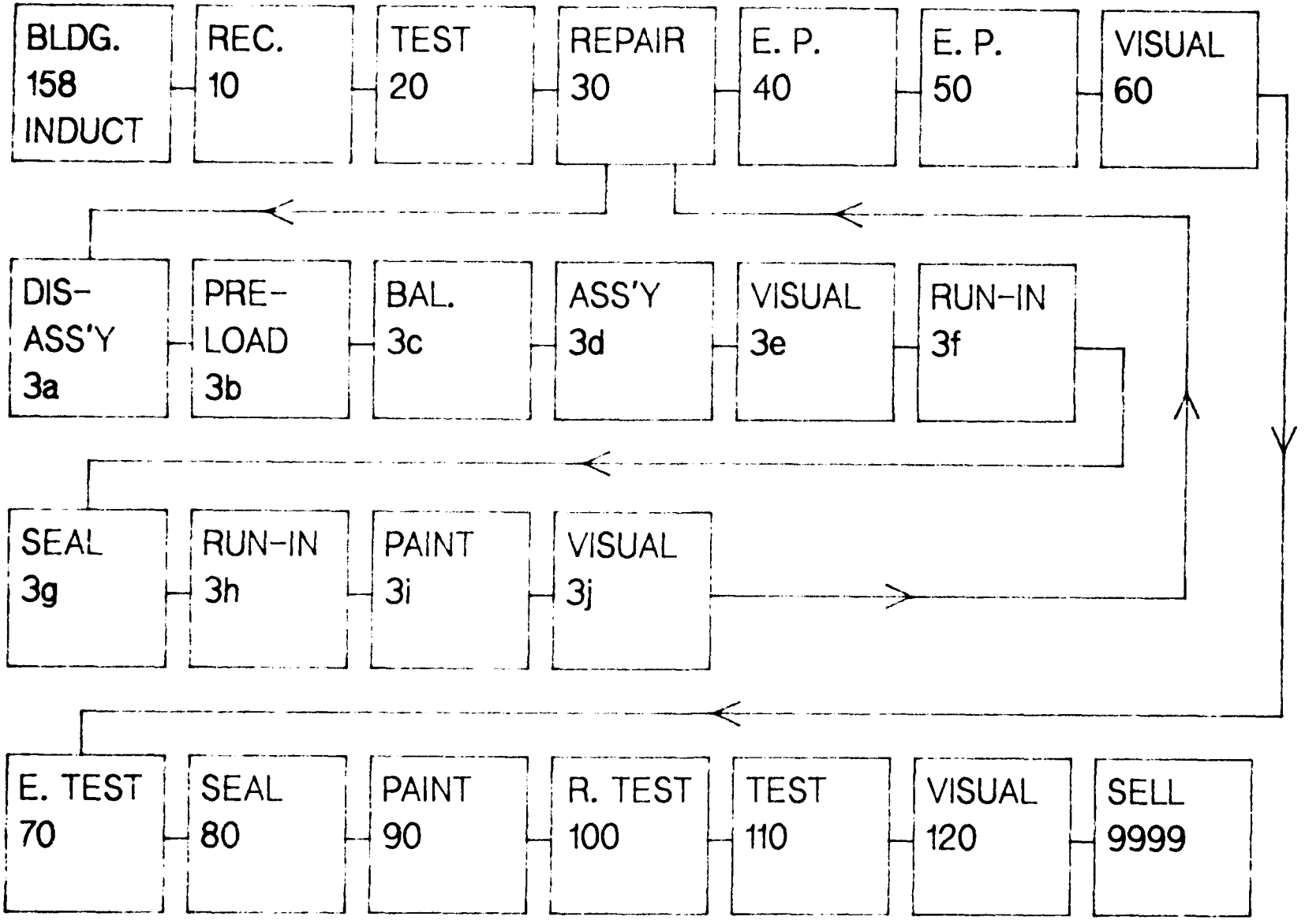

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