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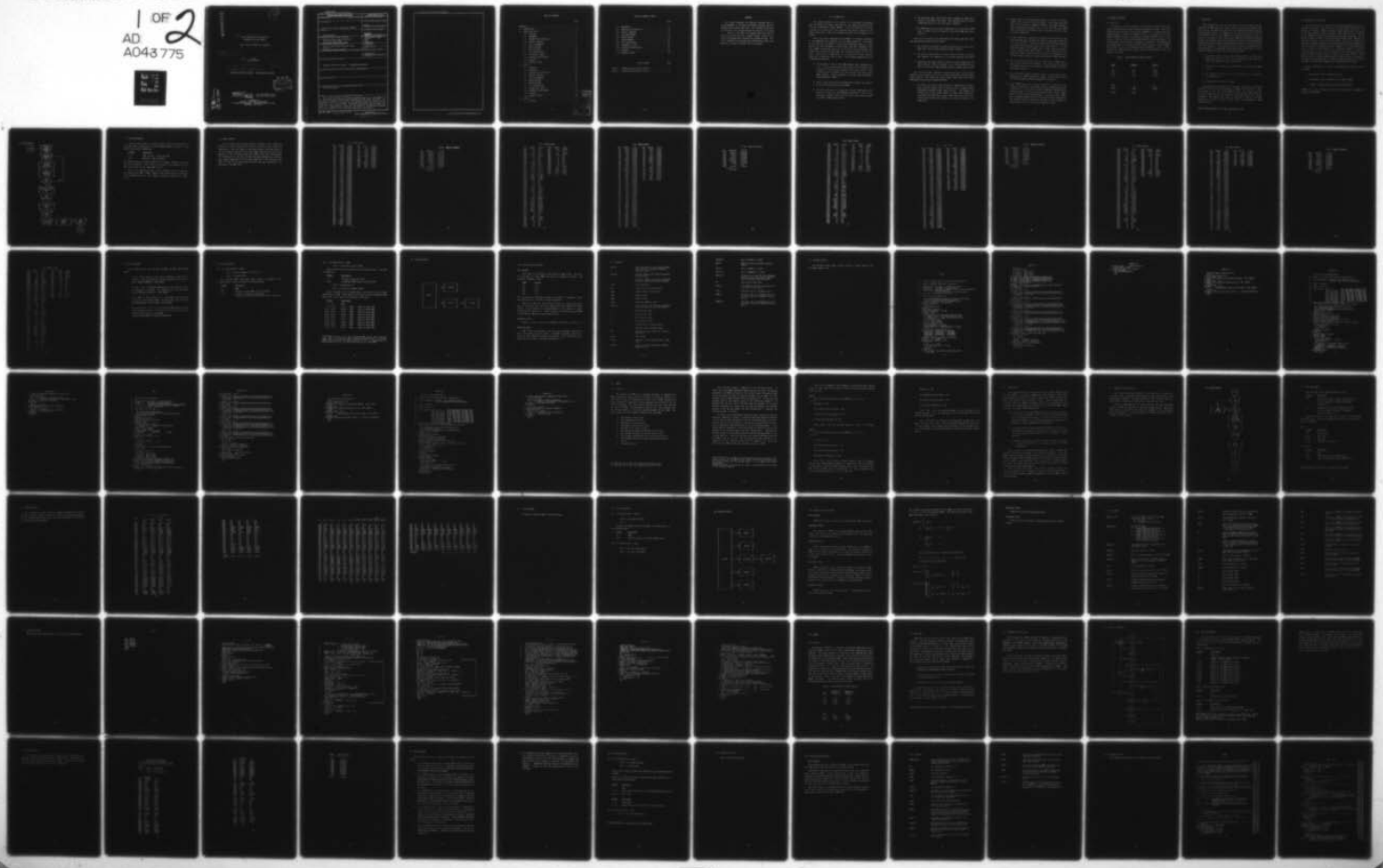

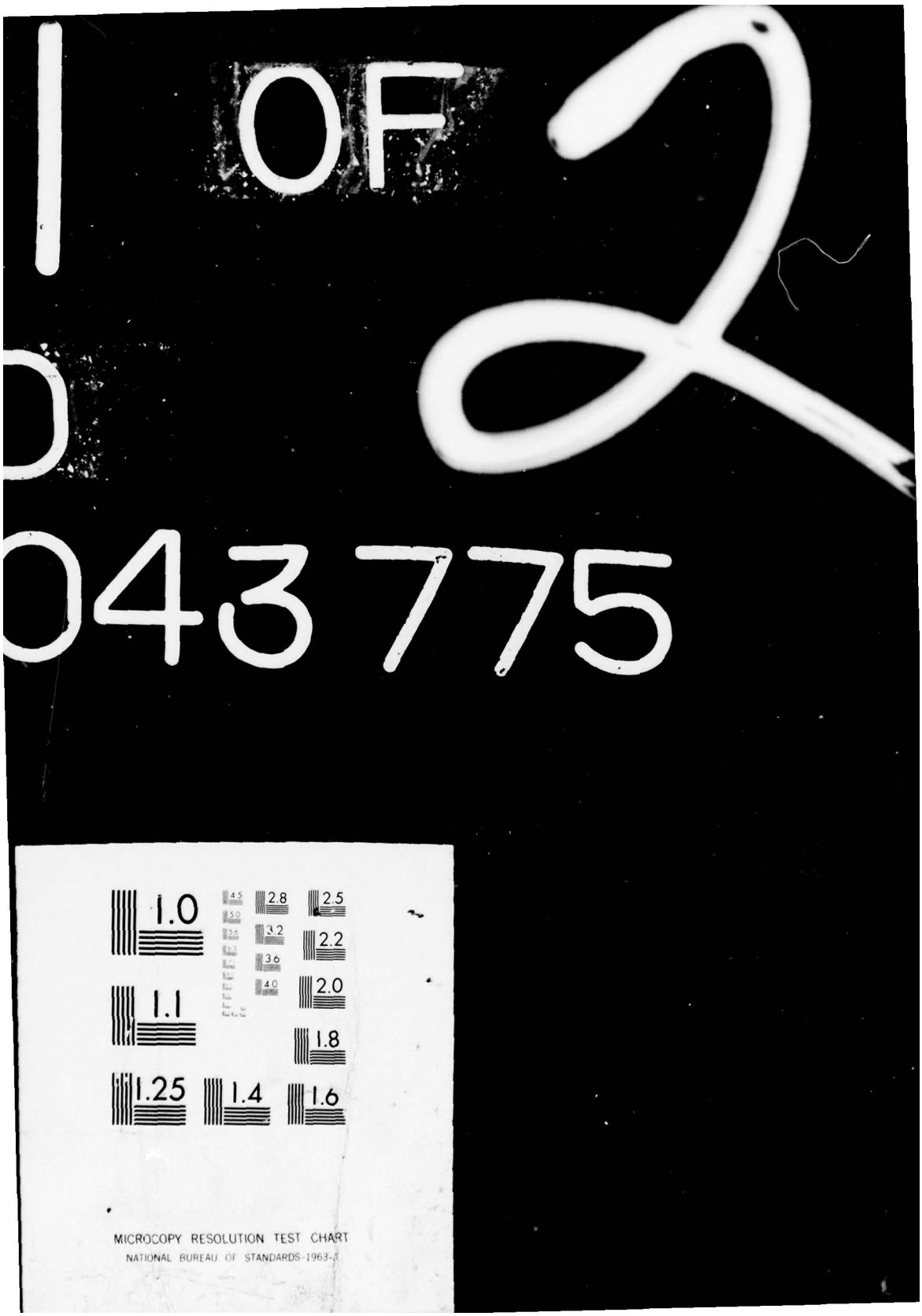
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This report documents the computer programs used for the development of the Depot Maintenance Planning and Programming System repair data base. The introduction presents an overview of the concepts behind the creation of the data base. Section 2 describes the programs which were used to convert raw input data into a usable format. Section 3 explains the program which analyzed the reformatted data. Section 4 documents the program which produced the actual elements of the repair data base after the analyses.

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ABSTRACT

This report documents the computer programs used for the development of the Depot Maintenance Planning and Programming System repair data base. The introduction presents an overview of the concepts behind the creation of the data base. Section 2 describes the programs which were used to convert raw input data into a usable format. Section 3 explains the program which analyzed the reformatted data. Section 4 documents the program which produced the actual elements of the repair data base after the analyses.

1.0 Introduction

The primary purpose of this report is to document the programs used to develop the repair data base for the Depot Maintenance Planning and Programming System (DMPPS). This introduction is written to serve as an overview of the concepts behind the creation of the repair data base so that the following sections do not appear out of context.

One of the major subsystems of the DMPPS is the Repair Subsystem. It is responsible for creating a set of repair matrices. The columns of the matrices correspond to the various functional shops (of shipyards); the rows correspond to single digit ship work breakdown structure (SWBS) categories; and each ij-th matrix entry represents the fraction of work performed under the i-th SWBS category in the j-th shop. Each matrix is applicable to a collection of ships (usually class) for a particular type of work. The following approach was used to develop the matrices.

1) 79 groupings of three digit SWBS elements were developed such that; (1) the shipwork performed within the groupings had a consistently proportional spread to the shops, and (2) each grouping could be mapped into one and only one single digit SWBS category. These groupings are called Depot Maintenance Planning Modules (DMPM's).

2) Sets of shop vectors were developed which specify the fraction of work for each shop within each DMPM.

3) For each collection of ships/type of work combination, the fraction of work for each DMPM was determined. This set of fractions breaking down the total ship repair work by DMPM is termed a "DMPM repair profile."

4) The applicable shop vectors were used to spread the above fractions for each DMPM to the shops. The resultant matrix is called a DMPM-shop matrix for the ship class or category.

5) The DMPM-shop matrices were summarized to the one digit SWBS level, thereby forming the desired single digit SWBS-shop repair matrices.

Some of the rationale for undertaking the above approach rather than developing the matrix directly were:

1) The shipyard and PERA's naturally planned at the three digit SWBS level, thus the data should be easier to obtain

2) By having a data base at a lower level of detail than what was reported, the capability to do further analyses was present

3) Eventually the system might be used for making comparisons between *different* levels of funding - thus a prioritization of the work by three digit SWBS grouping would be needed and utilized.

The following steps represent a general overview of the process leading to the creation of the set of depot maintenance planning module repair profiles that formed the initial repair data base of the Depot Maintenance Planning and Programming System.

1) All active and reserve Naval ships were subdivided into exhaustive, disjoint groups, each of which to have a separate depot maintenance planning module repair profile. The primary subdivision was by ship class, however in some cases (usually for auxiliary and amphibious ships) where there were more minor differences between ship classes, ship type was used for the subdivision.

2) Within some of the groups identified in 1) above, a further subdivision by type of work was made. This subdivision was made in two areas--to separate selected restricted availabilities from regular overhauls (e.g., for CV, CVN, CGN, SSN, SSBN) and to distinguish between regular overhauls and refuelings on nuclear submarines.

3) As many departure reports and shipyard FA-923A reports that could be found were collected for each of the groups identified in 1) and 2) above. The actual manning profile was manually extracted and keypunched from each of the reports. In some cases the profile was by SWBS, and in other cases, the profile was by ships system index (SSI). In those cases where the departure report used the Bureau of Ships consolidated Index or the S-Group Structure, a manual conversion to SWBS was made.

4) For each SWBS/SSI manning profile keypunched, a DMPM single-ship repair profile was created. This function was carried out through the use of the computer programs SUBPRO and SURFPR described in Section 2.

5) All single-ship repair profiles within a ship grouping were combined into a DMPM combined-ship repair (unnormalized) profile by the STATS computer program documented in Section 3.

6) Final DMPM repair profiles were obtained by normalizing the output of STATS with the REPROF computer program documented in Section 4. In the case of nuclear submarines, STATS produced separate output for the non-nuclear repair parts, nuclear repair parts, and the nuclear refueling part. For these ships, REPROF took a weighted average of the distinct parts before normalizing. The weights used were derived on the basis of the averages of these distinct parts in the original departure reports.

2.0 SUBPRO and SURFPR

2.1 Function

The purpose of these programs is to develop a DMPM single-ship repair profile from an input single-ship manning profile. The input manning profile consists of the actual expended or in some cases estimated manning, by three digit SWBS or SSI. If the manning is by SSI, program SUBPRO is used. For manning by SWBS, SURFPR is the correct choice. This is the only difference between the two programs. The input manning may be either in manhours or mandays. The programs do not differentiate. The output profile contains for each of the 79 DMPM's the fraction of the total manning that was expended. Table 1 shows a portion of a DMPM single-ship repair profile corresponding to the input manning, also shown.

TABLE 1 - DMPM SINGLE-SHIP REPAIR PROFILE

DMPM	MANNING	PROFILE
1001	5083	0.0653
1002	5137	0.0660
1003	148	0.0019
.	.	.
.	.	.
.	.	.
9004	0	0.0
9005	490	0.0063
TOTAL	77848	1.0

2.2 Importance

These programs were the sole tools used to develop the entire initial data base of DMPM single-ship repair profiles which were ultimately combined to form the DMPM repair profiles for the Depot Maintenance Planning and Programming System. The DMPM repair profiles consist of the fraction of the work for each of the 79 DMPM's for a given group (usually a class or type) of ship/type of work combination. SWBS/SSI single-ship manning profiles were manually extracted from departure reports containing expended mandays and shipyard FA-923A estimated manhour reports for all recent ships that were available. These manning profiles were put on coding forms and then keypunched. The keypunched profiles were then used as input to either SUBPRO or SURFPR from which four outputs were derived:

1) A printed listing of the input manning profile by three digit SWBS* along with the ratio of the manning for each individual three digit SWBS to the total ship manning.

2) The same as 1) above except summarized to the one digit SWBS level.

3) The same as 1) above except the information is accumulated at the DMPM level.

4) A punched card version of 3) above.

The printed output serves as a permanent record of all raw data available for use in the development of DMPM repair profiles. Once the program is run, the initial SWBS/SSI input is no longer required. If card storage area is not available, these SWBS/SSI profiles can be discarded. The punched card output is utilized as input to the STATS program where further analysis is made toward the development of DMPM repair profiles.

*This is the case even if the input manning was by SSI.

2.3 Prospects for Future Use

The future source of completed ship manday expenditures will be semiannual magnetic tape submissions from the Naval shipyards. The function of creating a DMPM single-ship repair profile will be carried out by other permanent feedback programs. Thus there should be no regular use for SUBPRO and SURFPR on ships overhauled at Naval shipyards. The one possible exception might be Charleston Naval Shipyard where SWBS/SSI are currently not part of the job order number. To avoid the additional conversion problems, completed ships from Charleston are not planned to be used initially for the repair data base. However, if it does become necessary to use data from Charleston (e.g., Charleston overhauls a ship class for which there is very little information in the repair data base), a manual feedback procedure would be required and either SUBPRO or SURFPR would be used to create a DMPM single-ship repair profile. Similarly in the case of private shipyards, if a ship for which the data base is lacking information is overhauled, SUBPRO and/or SURFPR would be utilized.

Several modifications to make the programs more effective can be suggested:

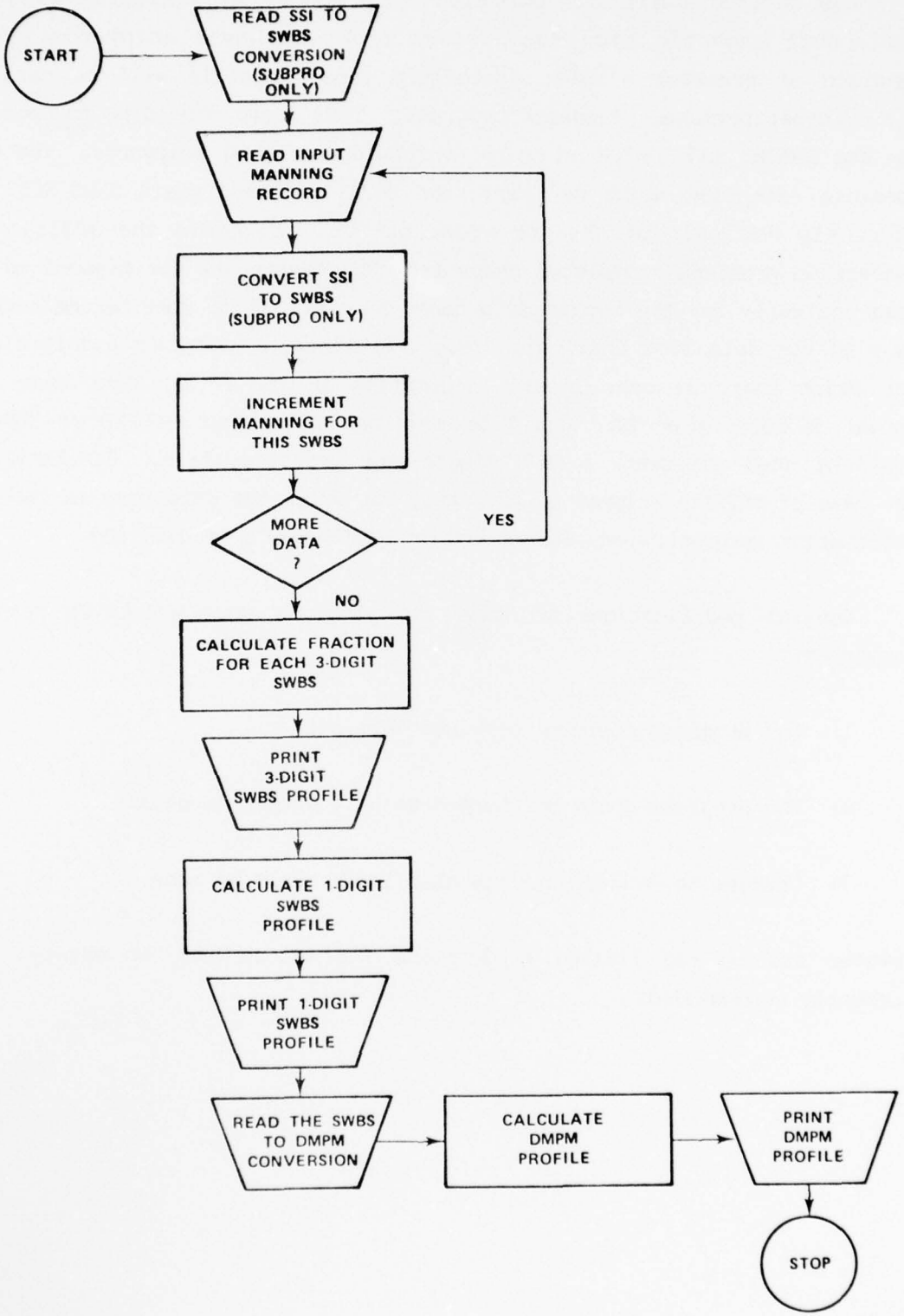
1) The programs could be combined into one.

2) The programs could be changed to only output mandays.

3) Changes to handle multiple ship input could be made.

However due to the limited projections for future use, no changes are currently recommended.

2.4 Overall Flowchart



2.5 User Requirements

Input as many cards as required which constitute the manning of the ship under consideration in the following format for Unit 8. The order of the cards is immaterial.

Columns	Description
1-3	SWBS (or SSI) - right justified
6-13	Manning - right justified

The manning may be in either manhours or mandays. However the cards must be consistent. Also, there is no limit on the number of cards that can be input for any single SWBS (or SSI).

There is the additional input of the conversion of SSI to SWBS and the conversion of SWBS to DMPM. However these inputs should be maintained in a catalogued data set. The format is shown in section 2.8.1, under unit 5.

2.6 Sample Problem

The following twelve pages contain a sample of four outputs of SURFPR for regular overhauls for the CV 59, CV 60, CV 61, and CV 62 respectively. The first page for each ship contains a printed listing of the input manning profile by three digit SWBS along with the ratio of the manning for each individual three digit SWBS to the total ship manning. The second page for each ship contains the same information as the first page, except summarized to the one digit SWBS level. The third and final page for each of the ships again contains the same information, but presented at the DMPM level.

CV 59 - Regular Overhaul

SWBS	MANNING	RATIO	SWBS	MANNING	RATIO
100	7623.	0.0435	622	116.	0.0007
110	309.	0.0018	623	68.	0.0004
111	402.	0.0023	624	391.	0.0022
163	4780.	0.0273	631	13329.	0.0760
167	704.	0.0040	634	672.	0.0038
221	28079.	0.1601	635	29.	0.0002
231	1293.	0.0074	640	5989.	0.0342
241	161.	0.0009	712	4120.	0.0235
243	1698.	0.0097	721	29.	0.0002
245	591.	0.0034	855	60.	0.0003
251	2784.	0.0159	980	909.	0.0052
253	1912.	0.0109	982	3111.	0.0177
254	687.	0.0039	992	8346.	0.0476
255	3753.	0.0214	993	2972.	0.0169
256	866.	0.0049	994	191.	0.0011
259	443.	0.0025	997	1259.	0.0072
261	1565.	0.0089			
262	236.	0.0013			
311	6914.	0.0394			
314	22.	0.0001			
324	1535.	0.0088			
400	34.	0.0002			
422	1908.	0.0109			
426	702.	0.0040			
430	491.	0.0028			
437	545.	0.0031			
441	1883.	0.0107			
451	36.	0.0002			
452	1371.	0.0078			
453	86.	0.0005			
454	962.	0.0055			
455	34.	0.0002			
470	317.	0.0018			
490	889.	0.0051			
511	929.	0.0053			
513	1133.	0.0065			
514	1392.	0.0079			
521	3474.	0.0198			
522	40.	0.0002			
526	612.	0.0035			
528	153.	0.0009			
529	904.	0.0052			
531	1593.	0.0091			
534	3777.	0.0215			
541	180.	0.0010			
542	2157.	0.0123			
551	2502.	0.0143			
553	1107.	0.0063			
561	497.	0.0028			
562	4017.	0.0229			
571	202.	0.0012			
572	1417.	0.0081			
581	65.	0.0004			
583	417.	0.0024			
584	1380.	0.0079			
586	6497.	0.0371			
587	18009.	0.1027			
588	5041.	0.0287			
611	644.	0.0037			

CV 59 - Regular Overhaul

SWBS	MANNING	RATIO
100	13818.	0.0788
200	44068.	0.2513
300	8471.	0.0483
400	9258.	0.0528
500	57495.	0.3279
600	21238.	0.1211
700	4149.	0.0237
800	60.	0.0003
900	16783.	0.0957
	175345.	

CV 59 - Regular Overhaul

DMPM	MANNING	RATIO	DMPM	MANNING	RATIO
1001	8334.	0.0475	6009	5989.	0.0342
1002	0.	0.0	6010	575.	0.0033
1003	0.	0.0	6011	0.	0.0
1004	0.	0.0	7001	29.	0.0002
1005	4780.	0.0273	7002	4120.	0.0235
1006	0.	0.0	7003	0.	0.0
1007	704.	0.0040	7004	0.	0.0
1008	0.	0.0	7005	0.	0.0
1009	0.	0.0	7006	0.	0.0
2001	0.	0.0	7007	0.	0.0
2002	0.	0.0	8001	0.	0.0
2003	28522.	0.1627	8002	0.	0.0
2004	0.	0.0	8003	0.	0.0
2005	1293.	0.0074	8004	60.	0.0003
2006	0.	0.0	8005	0.	0.0
2007	2450.	0.0140	9001	3111.	0.0177
2008	0.	0.0	9002	909.	0.0052
2009	2784.	0.0159	9003	11509.	0.0656
2010	0.	0.0	9004	0.	0.0
2011	1912.	0.0109	9005	1259.	0.0072
2012	5306.	0.0303			
2013	1801.	0.0103			
3001	6914.	0.0394			
3002	1557.	0.0089			
3003	0.	0.0			
3004	0.	0.0			
4001	0.	0.0			
4002	0.	0.0			
4003	2610.	0.0149			
4004	0.	0.0			
4005	2919.	0.0166			
4006	1527.	0.0087			
4007	962.	0.0055			
4008	0.	0.0			
4009	317.	0.0018			
4010	0.	0.0			
4011	923.	0.0053			
5001	929.	0.0053			
5002	1133.	0.0065			
5003	0.	0.0			
5004	1392.	0.0079			
5005	16499.	0.0941			
5006	4017.	0.0229			
5007	497.	0.0028			
5008	3481.	0.0199			
5009	6497.	0.0371			
5010	18009.	0.1027			
5011	5041.	0.0287			
5012	0.	0.0			
5013	0.	0.0			
5014	0.	0.0			
6001	644.	0.0037			
6002	13329.	0.0760			
6003	701.	0.0040			
6004	0.	0.0			
6005	0.	0.0			
6006	0.	0.0			
6007	0.	0.0			
6008	0.	0.0			

CV 60 - Regular Overhaul

SWBS	MANNING	RATIO	SWBS	MANNING	RATIO
100	3149.	0.0118	561	1488.	0.0056
110	7168.	0.0268	562	4847.	0.0181
111	1269.	0.0048	571	2044.	0.0077
140	228.	0.0009	572	97.	0.0004
163	8490.	0.0318	581	736.	0.0028
167	22.	0.0001	583	1057.	0.0040
171	124.	0.0005	584	5820.	0.0218
200	297.	0.0011	586	5590.	0.0209
221	30550.	0.1144	587	29984.	0.1122
231	5780.	0.0216	588	8074.	0.0302
241	29.	0.0001	611	1324.	0.0050
243	6859.	0.0257	622	1714.	0.0064
245	597.	0.0022	623	57.	0.0002
251	5461.	0.0204	624	29.	0.0001
253	1386.	0.0052	631	24363.	0.0912
254	5022.	0.0188	635	1400.	0.0052
255	10482.	0.0392	640	2263.	0.0085
256	116.	0.0004	712	8203.	0.0307
259	102.	0.0004	713	15.	0.0001
261	3785.	0.0142	980	1709.	0.0064
262	1449.	0.0054	982	4244.	0.0159
264	151.	0.0006	992	4463.	0.0167
311	3382.	0.0127	993	5901.	0.0221
312	215.	0.0008	997	1357.	0.0051
314	383.	0.0014			
324	847.	0.0032			
330	247.	0.0009			
422	1209.	0.0045			
426	382.	0.0014			
430	1854.	0.0069			
437	137.	0.0005			
441	2787.	0.0104			
445	859.	0.0032			
451	120.	0.0004			
452	648.	0.0024			
453	584.	0.0022			
454	1465.	0.0055			
455	167.	0.0006			
470	214.	0.0008			
475	163.	0.0006			
490	322.	0.0012			
511	256.	0.0010			
513	3329.	0.0125			
514	5226.	0.0196			
516	3318.	0.0124			
521	3731.	0.0140			
522	26.	0.0001			
524	315.	0.0012			
526	278.	0.0010			
529	3193.	0.0120			
531	2652.	0.0099			
532	1620.	0.0061			
533	92.	0.0003			
534	6428.	0.0241			
541	1639.	0.0061			
542	2243.	0.0084			
543	182.	0.0007			
551	3520.	0.0132			
553	3826.	0.0143			

CV 60 - Regular Overhaul

SWBS	MANNING	RATIO
100	20450.	0.0765
200	72066.	0.2698
300	5074.	0.0190
400	10911.	0.0408
500	101611.	0.3803
600	31150.	0.1166
700	8218.	0.0308
800	0.	0.0
900	17674.	0.0662
	267154.	

CV 60 - Regular Overhaul

DMPM	MANNING	RATIO	DMPM	MANNING	RATIO
1001	11814.	0.0442	6009	2263.	0.0085
1002	0.	0.0	6010	1800.	0.0067
1003	0.	0.0	6011	0.	0.0
1004	0.	0.0	7001	0.	0.0
1005	8490.	0.0318	7002	8218.	0.0308
1006	0.	0.0	7003	0.	0.0
1007	22.	0.0001	7004	0.	0.0
1008	124.	0.0005	7005	0.	0.0
1009	0.	0.0	7006	0.	0.0
2001	297.	0.0011	7007	0.	0.0
2002	0.	0.0	8001	0.	0.0
2003	30652.	0.1147	8002	0.	0.0
2004	0.	0.0	8003	0.	0.0
2005	5780.	0.0216	8004	0.	0.0
2006	0.	0.0	8005	0.	0.0
2007	7485.	0.0280	9001	4244.	0.0159
2008	0.	0.0	9002	1709.	0.0064
2009	5461.	0.0204	9003	10364.	0.0388
2010	0.	0.0	9004	0.	0.0
2011	1386.	0.0052	9005	1357.	0.0051
2012	15620.	0.0585			
2013	5385.	0.0202			
3001	3597.	0.0135			
3002	1477.	0.0055			
3003	0.	0.0			
3004	0.	0.0			
4001	0.	0.0			
4002	0.	0.0			
4003	1591.	0.0060			
4004	0.	0.0			
4005	5637.	0.0211			
4006	1519.	0.0057			
4007	1465.	0.0055			
4008	0.	0.0			
4009	377.	0.0014			
4010	0.	0.0			
4011	322.	0.0012			
5001	256.	0.0010			
5002	3329.	0.0125			
5003	0.	0.0			
5004	8544.	0.0320			
5005	29745.	0.1113			
5006	4847.	0.0181			
5007	1488.	0.0056			
5008	9754.	0.0365			
5009	5590.	0.0209			
5010	29984.	0.1122			
5011	8074.	0.0302			
5012	0.	0.0			
5013	0.	0.0			
5014	0.	0.0			
6001	1324.	0.0050			
6002	24363.	0.0912			
6003	1400.	0.0052			
6004	0.	0.0			
6005	0.	0.0			
6006	0.	0.0			
6007	0.	0.0			
6008	0.	0.0			

CV 61 - Regular Overhaul

SWBS	MANNING	RATIO	SWBS	MANNING	RATIO
100	699.	0.0037	542	3121.	0.0163
110	3801.	0.0199	543	5.	0.0000
111	2749.	0.0144	551	3752.	0.0196
163	563.	0.0029	553	513.	0.0027
167	637.	0.0033	561	865.	0.0045
171	133.	0.0007	562	3228.	0.0169
180	755.	0.0039	571	2088.	0.0109
221	24710.	0.1292	572	673.	0.0035
231	2495.	0.0130	581	190.	0.0010
241	193.	0.0010	583	802.	0.0042
243	1042.	0.0054	584	1330.	0.0070
244	51.	0.0003	586	2205.	0.0115
245	180.	0.0009	587	14156.	0.0740
251	7085.	0.0370	588	4688.	0.0245
253	2029.	0.0106	611	707.	0.0037
254	681.	0.0036	622	718.	0.0038
255	9379.	0.0490	624	52.	0.0003
256	1161.	0.0061	631	10950.	0.0572
259	475.	0.0025	634	353.	0.0018
261	549.	0.0029	635	138.	0.0007
262	327.	0.0017	638	12.	0.0001
264	190.	0.0010	640	4789.	0.0250
311	4889.	0.0256	711	1358.	0.0071
312	20.	0.0001	712	5977.	0.0312
314	1733.	0.0091	980	3156.	0.0165
321	269.	0.0014	982	716.	0.0037
324	1076.	0.0056	991	863.	0.0045
400	59.	0.0003	992	172.	0.0009
422	1124.	0.0059	993	14887.	0.0778
423	244.	0.0013	994	1187.	0.0062
426	654.	0.0034	997	997.	0.0052
430	916.	0.0048			
437	207.	0.0011			
441	1311.	0.0069			
445	75.	0.0004			
446	295.	0.0015			
451	90.	0.0005			
452	361.	0.0019			
453	473.	0.0025			
454	520.	0.0027			
455	67.	0.0004			
460	33.	0.0002			
470	482.	0.0025			
480	458.	0.0024			
490	515.	0.0027			
511	233.	0.0012			
513	1635.	0.0085			
514	11543.	0.0603			
516	654.	0.0034			
521	1484.	0.0078			
524	17.	0.0001			
526	459.	0.0024			
528	88.	0.0005			
529	1788.	0.0093			
531	2461.	0.0129			
533	3654.	0.0191			
534	6072.	0.0317			
536	115.	0.0006			
541	676.	0.0035			

CV 61 - Regular Overhaul

SWBS	MANNING	RATIO
100	9337.	0.0488
200	50547.	0.2643
300	7987.	0.0418
400	7884.	0.0412
500	68495.	0.3581
600	17719.	0.0926
700	7335.	0.0383
800	0.	0.0
900	21978.	0.1149
	191282.	

CV 61 - Regular Overhaul

DMPM	MANNING	RATIO	DMPM	MANNING	RATIO
1001	7249.	0.0379	6009	4789.	0.0250
1002	0.	0.0	6010	770.	0.0040
1003	0.	0.0	6011	0.	0.0
1004	0.	0.0	7001	1358.	0.0071
1005	563.	0.0029	7002	5977.	0.0312
1006	0.	0.0	7003	0.	0.0
1007	637.	0.0033	7004	0.	0.0
1008	133.	0.0007	7005	0.	0.0
1009	755.	0.0039	7006	0.	0.0
2001	0.	0.0	7007	0.	0.0
2002	0.	0.0	8001	0.	0.0
2003	25185.	0.1317	8002	0.	0.0
2004	0.	0.0	8003	0.	0.0
2005	2495.	0.0130	8004	0.	0.0
2006	0.	0.0	8005	0.	0.0
2007	1466.	0.0077	9001	716.	0.0037
2008	0.	0.0	9002	3156.	0.0165
2009	7085.	0.0370	9003	17109.	0.0894
2010	0.	0.0	9004	0.	0.0
2011	2029.	0.0106	9005	997.	0.0052
2012	11221.	0.0587			
2013	1066.	0.0056			
3001	4909.	0.0257			
3002	3078.	0.0161			
3003	0.	0.0			
3004	0.	0.0			
4001	0.	0.0			
4002	0.	0.0			
4003	2022.	0.0106			
4004	0.	0.0			
4005	2804.	0.0147			
4006	991.	0.0052			
4007	520.	0.0027			
4008	33.	0.0002			
4009	482.	0.0025			
4010	458.	0.0024			
4011	574.	0.0030			
5001	233.	0.0012			
5002	1635.	0.0085			
5003	0.	0.0			
5004	12197.	0.0638			
5005	24205.	0.1265			
5006	3228.	0.0169			
5007	865.	0.0045			
5008	5083.	0.0266			
5009	2205.	0.0115			
5010	14156.	0.0740			
5011	4688.	0.0245			
5012	0.	0.0			
5013	0.	0.0			
5014	0.	0.0			
6001	707.	0.0037			
6002	10950.	0.0572			
6003	503.	0.0026			
6004	0.	0.0			
6005	0.	0.0			
6006	0.	0.0			
6007	0.	0.0			
6008	0.	0.0			

CV 62 - Regular Overhaul

SWBS	MANNING	RATIO	SWBS	MANNING	RATIO
100	452.	0.0024	611	6.	0.0000
110	658.	0.0035	622	722.	0.0038
111	846.	0.0044	631	14700.	0.0772
163	6739.	0.0354	640	4173.	0.0219
167	238.	0.0012	711	5.	0.0000
171	102.	0.0005	712	11906.	0.0625
180	162.	0.0009	980	1553.	0.0082
200	101.	0.0005	982	1562.	0.0082
221	25569.	0.1342	992	7393.	0.0388
231	4473.	0.0235	993	6287.	0.0330
241	13.	0.0001	997	943.	0.0050
243	6887.	0.0362			
245	640.	0.0034			
251	4825.	0.0253			
253	2713.	0.0142			
254	1407.	0.0074			
255	5864.	0.0308			
256	1442.	0.0076			
262	1006.	0.0053			
311	5236.	0.0275			
314	342.	0.0018			
324	170.	0.0009			
330	33.	0.0002			
400	49.	0.0003			
422	2367.	0.0124			
423	347.	0.0018			
426	708.	0.0037			
430	2290.	0.0120			
437	28.	0.0001			
441	1867.	0.0098			
445	693.	0.0036			
451	5.	0.0000			
452	1339.	0.0070			
454	797.	0.0042			
455	51.	0.0003			
470	452.	0.0024			
490	573.	0.0030			
513	1771.	0.0093			
514	1409.	0.0074			
516	330.	0.0017			
521	2977.	0.0156			
526	741.	0.0039			
528	3.	0.0000			
531	4045.	0.0212			
533	620.	0.0033			
534	2952.	0.0155			
541	692.	0.0036			
542	3621.	0.0190			
551	1704.	0.0089			
553	1418.	0.0074			
561	359.	0.0019			
562	3836.	0.0201			
571	1756.	0.0092			
581	860.	0.0045			
583	215.	0.0011			
584	1939.	0.0102			
586	7081.	0.0372			
587	16580.	0.0871			
588	4819.	0.0253			

CV 62 - Regular Overhaul

SWBS	MANNING	RATIO
100	9197.	0.0483
200	54940.	0.2885
300	5781.	0.0304
400	11566.	0.0607
500	59728.	0.3136
600	19601.	0.1029
700	11911.	0.0625
800	0.	0.0
900	17738.	0.0931
	190462.	

CV 62 - Regular Overhaul

DMPM	MANNING	RATIO	DMPM	MANNING	RATIO
1001	1956.	0.0103	6009	4173.	0.0219
1002	0.	0.0	6010	722.	0.0038
1003	0.	0.0	6011	0.	0.0
1004	0.	0.0	7001	5.	0.0000
1005	6739.	0.0354	7002	11906.	0.0625
1006	0.	0.0	7003	0.	0.0
1007	238.	0.0012	7004	0.	0.0
1008	102.	0.0005	7005	0.	0.0
1009	162.	0.0009	7006	0.	0.0
2001	101.	0.0005	7007	0.	0.0
2002	0.	0.0	8001	0.	0.0
2003	25569.	0.1342	8002	0.	0.0
2004	0.	0.0	8003	0.	0.0
2005	4473.	0.0235	8004	0.	0.0
2006	0.	0.0	8005	0.	0.0
2007	7540.	0.0396	9001	1562.	0.0082
2008	0.	0.0	9002	1553.	0.0082
2009	4825.	0.0253	9003	13680.	0.0718
2010	0.	0.0	9004	0.	0.0
2011	2713.	0.0142	9005	943.	0.0050
2012	8713.	0.0457			
2013	1006.	0.0053			
3001	5236.	0.0275			
3002	545.	0.0029			
3003	0.	0.0			
3004	0.	0.0			
4001	0.	0.0			
4002	0.	0.0			
4003	3422.	0.0180			
4004	0.	0.0			
4005	4878.	0.0256			
4006	1395.	0.0073			
4007	797.	0.0042			
4008	0.	0.0			
4009	452.	0.0024			
4010	0.	0.0			
4011	622.	0.0033			
5001	0.	0.0			
5002	1771.	0.0093			
5003	0.	0.0			
5004	1739.	0.0091			
5005	18773.	0.0986			
5006	3836.	0.0201			
5007	359.	0.0019			
5008	4770.	0.0250			
5009	7081.	0.0372			
5010	16580.	0.0871			
5011	4819.	0.0253			
5012	0.	0.0			
5013	0.	0.0			
5014	0.	0.0			
6001	6.	0.0000			
6002	14700.	0.0772			
6003	0.	0.0			
6004	0.	0.0			
6005	0.	0.0			
6006	0.	0.0			
6007	0.	0.0			
6008	0.	0.0			

2.7 Error Messages

The following errors are detected, messages printed, and actions taken:

1. If the input manning on any card is negative, that card is ignored. The offending card is printed along with the message: NEGATIVE MANNING - CARD IGNORED

2. If there is no corresponding SWBS value for an input SSI value, the input card is ignored. The offending card is printed along with the message ILLEGAL SSI - CARD IGNORED

3. If no DMPM has been defined for an input SWBS, the input card is ignored. The offending SWBS is printed along with the message NO PLANNING MODULE FOR THIS SWBS - CARD IGNORED

4. The program has a limit of 236 different SWBS values for the input manning profile. If there are more than 236 values, execution terminates with the message
TOO MANY SWBS ELEMENTS - EXECUTION TERMINATING

2.8 File Descriptions

2.8.1 File Descriptions - Output

Unit 6 - See the example in Section 2.6.

Unit 7 - Punched cards

The calculated DMPM single-ship repair profile is punched in the following format. There are exactly 79 records punched.

Columns	Description
1-4	DMPM
5-14	Manning for above DMPM (right justified)
15-24	Fraction of manning in above DMPM (always four decimal places and right justified)

2.8.2 File Descriptions - Input

Unit 5 - Conversion of SSI to SWBS

Input as many records as required in the following format. The order is immaterial.

Columns	Description
1-3	SSI value (right justified)
10-12	Coresponding SWBS value (right justified)

Unit 8 - See Section 2.5

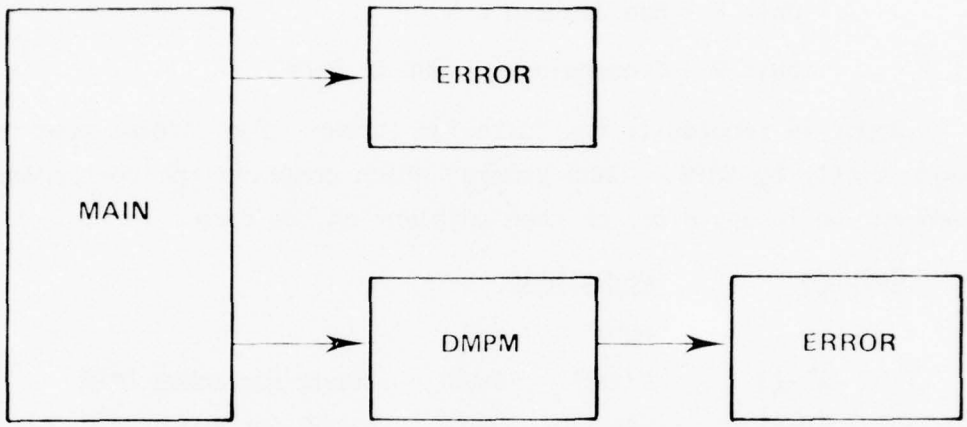
Unit 9 - Conversion of SWBS to DMPM

Input 79 records in the following format. The records must be ordered sequentially by DMPM. SWBS ranges* which comprise the corresponding DMPM need not be in any order or even adjacent on the card.

Columns		Description		
1 - 4		DMPM		
7- 9	11-13	First	SWBS	range for above DMPM
15-17	19-21	Second	SWBS	range for above DMPM
23-25	27-29	Third	SWBS	range for above DMPM
31-33	35-37	Fourth	SWBS	range for above DMPM
39-41	43-45	Fifth	SWBS	range for above DMPM
47-49	51-53	Sixth	SWBS	range for above DMPM
55-57	59-61	Seventh	SWBS	range for above DMPM
63-65	67-69	Eighth	SWBS	range for above DMPM
71-73	75-77	Ninth	SWBS	range for above DMPM

* All ranges consist of two right justified SWBS values (lower limit and higher limit of an interval) with a blank space between them. For example a SWBS range in columns 7-13 might look like 117 156. This would imply all SWBS values from 117 to 156 inclusive belong to the given DMPM.

2.9 Hierarchical Chart



2.10 Subroutine Descriptions

MAIN PROGRAM -

MAIN reads the conversion of SSI values to SWBS values. All SSI's are converted to a single SWBS value with the exception of SSI 860. The following breakdown is used.

SWBS	Percent
210	31.0
830	35.0
992	18.5
996	15.5

This breakdown was developed through the analysis of departure report work descriptions for SSI 860 on several submarines.

MAIN also reads the input manning profile and creates and writes both a three digit and a one digit SWBS manning and single-ship repair profile. Error checking is also performed for error codes 1, 2, and 4 as described in Section 2.7. MAIN concludes by calling subroutine DMPM to calculate the DMPM single-ship repair profile.

SUBROUTINE ERROR -

ERROR is called to print the messages described in Section 2.7.

SUBROUTINE DMPM -

DMPM reads the conversion from ship work breakdown structure to depot maintenance planning module. The DMPM single-ship repair profiles are then computed, printed, and punched. Error checking is performed for error code 3 as described in Section 2.7.

2.11 Glossary

ARRAY(X)	Depot maintenance planning module number corresponding to ship work breakdown structure value X
ARRAY1(X)	Contains number of X^{th} depot maintenance planning module
I	Counter of number of ship work breakdown structure values with non zero manning
ICODE	Error code value
IDEL	Variable used to format printout
IDUM	Flag set when an error occurs
IDUM1	Dummy variable
IDUM2	Dummy variable
INDEX	Particular ARRAY(X) value
IVALUE(X)	Total manning of X^{th} ship work breakdown structure value with non zero manning
I1	Multi-purpose index
I2	Multi-purpose index
I3	Multi-purpose index
I4	Multi-purpose index
J	Variable used to format printout
K	Variable used to format printout
MAN	Manning for single input card - part of the profile
MANDAY	Same as MAN
MODULE	Depot maintenance planning module number value
MODM(X)	Manning for depot maintenance planning module value X

MODPRO(X)	Ratio of MODM(X) to TOTAL
NMODS	Number of depot maintenance planning modules
PROF(X)	Ratio of WBSM(X) to TOTAL
PROFIL(X)	Ratio of WBSMAN(X) to TOTAL
RANGE(18)	Contains up to nine ship work breakdown structure value ranges which compose a depot maintenance planning module
SSI	Ships system index value
SWBS(X)	Corresponding ship work breakdown structure value to SSI value X
TOTAL	Cumulative sum of all MANDAY values
WBSM(X)	Cumulative sum of all MANDAY values for one digit ship work breakdown structure value X
WBSMAN(X)	Cumulative sum of all MANDAY values for three digit ship work breakdown structure value X

2.12 Program Listing

The following eleven pages contain listings of SUBPRO (pages 31-36) and SURFPR (pages 37-41).

```
C
C   PROGRAM TO CONVERT INPUT SSI PROFILE INTO SWBS PROFILE
C
C   REQUIRED PARAMETER CARD INPUT IS ON UNIT 5
C
C   INPUT PROFILE IS ON UNIT 8     FORMAT AS FOLLOWS:
C   COLUMNS 1-3      SSI NUMBER (RIGHT ADJUSTED)
C   COLUMNS 6-13     MANHOURS (OR MANDAYS, MUST BE CONSISTENT HOWEVER)
      REAL  PROF(9)/9*0./,WBSM(9)/9*0./
C                    CORRSPONDING TO THE SSI (RIGHT ADJUSTED)
C   THE ORDER OF THE CARDS IS IMMATERIAL
C
C   OUTPUT WILL BE PUT ON UNIT 6
C
      REAL MANDAY,WBSMAN(1000)/1000*0./,TOTAL/0./,PROFIL(1000)
      INTEGER SSI,SWBS(1000)/1000*0/,IVALUE(500)
C   INITIALIZE CONVERSION ARRAY FROM PARAMETER INPUT
   10 READ (5,20,END=30)   SSI,SWBS(SSI)
   20 FORMAT (I3,6X,I3)
      GO TO 10
C   INITIALIZE ERROR FLAG
   30 IDUM = 0
C   READ INPUT SSI PROFILE
   40 READ (8,50,END=70)   SSI,MAN
   50 FORMAT (I3,2X,I8)
      MANDAY = MAN
C   ERROR CHECK FOR MINUS MANDAY OR ILLEGAL SSI VALUE
      IF (MANDAY.LT.0.)   CALL ERROR(1,IDUM,SSI,MAN)
      IF (SWBS(SSI).EQ.0)   CALL ERROR(2,IDUM,SSI,MAN)
      IF  (IDUM.NE.0)   GO TO 30
C   INCREMENT TOTAL MANDAYS
      TOTAL = TOTAL + MANDAY
C   SSI 860 IS A SPECIAL CASE
      IF (SSI.EQ.860)   GO TO 60
C   INCREMENT MANDAYS FOR EACH SWBS
      WBSMAN(SWBS(SSI)) = WBSMAN(SWBS(SSI)) + MANDAY
      GO TO 40
C   SPLIT SSI 860 TO SWBS 210,830,992
   60 WBSMAN(210) = WBSMAN(210) + .31*MANDAY
      WBSMAN(830) = WBSMAN(830) + .35*MANDAY
      WBSMAN(992) = WBSMAN(992) + .185*MANDAY
      WBSMAN(986) = WBSMAN(986) + .155*MANDAY
      GO TO 40
C   CALCULATE FRACTION OF MANNING IN EACH SWBS
   70 DO 80     I1 = 1,1000
   80 PROFIL(I1) = WBSMAN(I1)/TOTAL
C   PRINT OUTPUT
      I = 0
      DO 85     I1 = 1,1000
      IF (WBSMAN(I1).EQ.0.)   GO TO 85
      I = I + 1
      IVALUE(I) = I1
   85 CONTINUE
      IF (I.GT.236)  CALL ERROR (4,IDUM,IDUM1,IDUM2)
      K = MOD(I,59)
```

```
      IDEL =  1
      IF (K.EQ.0)    IDEL =  0
      J = I/59 + IDEL
      IF (J.EQ.1)    WRITE (6,91)
      IF (J.EQ.2)    WRITE (6,92)
      IF (J.EQ.3)    WRITE (6,93)
      IF (J.EQ.4)    WRITE (6,94)
   91 FORMAT (1H1,1(4HSWBS,3X,7HMANNING,5X,5HRATIO,6X))
   92 FORMAT (1H1,2(4HSWBS,3X,7HMANNING,5X,5HRATIO,6X))
   93 FORMAT (1H1,3(4HSWBS,3X,7HMANNING,5X,5HRATIO,6X))
   94 FORMAT (1H1,4(4HSWBS,3X,7HMANNING,5X,5HRATIO,6X))
      GO TO (95,98,101,104),J
   95 DO 96     I1 = 1,I
   96 WRITE (6,97)  IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
   97 FORMAT (1H ,4(I4,F10.0,F10.4,6X))
      GO TO 110
   98 IF (K.EQ.0)    K = 59
      DO 99     I1 = 1,K
   99 WRITE (6,97)  IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
      IF (K.EQ.59)    GO TO 110
      I2 = K + 1
      DO 100    I1 = I2,59
  100 WRITE (6,97)  IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
      GO TO 110
  101 IF (K.EQ.0)    K = 59
      DO 102    I1 = 1,K
  102 WRITE (6,97)  IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
     B ,IVALUE(I1+ 118),WBSMAN(IVALUE(I1+ 118)),PROFIL(IVALUE(I1+ 118))
      IF (K.EQ.59)    GO TO 110
      I2 = K + 1
      DO 103    I1 = I2,59
  103 WRITE (6,97)  IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
      GO TO 110
  104 IF (K.EQ.0)    K = 59
      DO 105    I1 = 1,K
  105 WRITE (6,97)  IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
     B ,IVALUE(I1+ 118),WBSMAN(IVALUE(I1+ 118)),PROFIL(IVALUE(I1+ 118))
     C ,IVALUE(I1+ 177),WBSMAN(IVALUE(I1+ 177)),PROFIL(IVALUE(I1+ 177))
      IF (K.EQ.59)    GO TO 110
      I2 = K + 1
      DO 106    I1 = I2,59
  106 WRITE (6,97)  IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
     B ,IVALUE(I1+ 118),WBSMAN(IVALUE(I1+ 118)),PROFIL(IVALUE(I1+ 118))
  110 CONTINUE
C    CALCULATE MANNING IN EACH MAJOR SWBS GROUP
      DO 130    I2 = 1,9
      I3 = 100*I2
      I4 = I3 + 99
      DO 130    I1 = I3,I4
      WBSM(I2) = WBSM(I2) + WBSMAN(I1)
  130 PROF(I2) = PROF(I2) + PROFIL(I1)
C    PRINT OUTPUT FOR THE MAJOR GROUPINGS
      WRITE (6,91)
      DO 140    I1 = 100,900,100
      I2 = I1/100
```

SUBPRO cont'd

```
  140 WRITE (6,97)     I1,WBSM(I2),PROF(I2)
      WRITE (6,145)   TOTAL
  145 FORMAT (5X,10(1H-),/,5X,F10.0)
C    PRINT DMPM OUTPUT
      CALL DMPM(WBSMAN,PROFIL)
      STOP
      END
```

SUBPRO cont'd

```
      SUBROUTINE ERROR (ICODE,IDUM,I1,I2)
      IDUM = 1
      GO TO (10,30,50,70),ICODE
   10 WRITE (6,20) I1,I2
   20 FORMAT (1H ,I3,3X,I8,10X,31HNEGATIVE MANNING - CARD IGNORED)
      RETURN
   30 WRITE (6,40)  I1,I2
   40 FORMAT (1H ,I3,3X,I8,10X,26HILLEGAL SSI - CARD IGNORED)
      RETURN
   50 WRITE (6,60)    I1
   60 FORMAT     (1H ,I3,5X,
     A             47HNO PLANNING MODULE FOR THIS SWBS - CARD IGNORED)
      RETURN
   70 WRITE (6,80)
   80 FORMAT (1H ,48HTOO MANY SWBS ELEMENTS  -  EXECUTION TERMINATING)
      STOP
      END
```

```
      SUBROUTINE  DMPM(WBSMAN,PROFIL)
C
C   SUBROUTINE TO CONVERT SWBS PROFILE TO DMPM PROFILE
C
C   CALLING ARGUEMENTS:  WBSMAN(I) TOTAL MANNING FOR SWBS I
C                        PROFIL(I) FRACTION OF WORK WITHIN SWBS I
C
C   OUTPUT IS ON UNIT 6
C
C   INPUT IS ON UNIT 9
C
C   INPUT FORMAT:   COLS 1 - 4          DEPOT MAINTENANCE PLANNING MODULE
C                   COLS 7-9  11-13     FIRST SWBS RANGE FOR ABOVE DMPM
C                   COLS 15-17 19-21    SECOND SWBS RANGE FOR ABOVE DMPM
C                   COLS 23-25 27-29    THIRD  SWBS RANGE FOR ABOVE DMPM
C                   COLS 31-33 35-37    FOURTH SWBS RANGE FOR ABOVE DMPM
C                   COLS 39-41 43-45    FIFTH  SWBS RANGE FOR ABOVE DMPM
C                   COLS 47-49 51-53    SIXTH  SWBS RANGE FOR ABOVE DMPM
C                   COLS 55-57 59-61    SEVENTH SWBS RANGE FOR ABOVE DMPM
C                   COLS 63-65 67-69    EIGHTH  SWBS RANGE FOR ABOVE DMPM
C                   COLS 71-73 75-77    NINTH   SWBS RANGE FOR ABOVE DMPM
C   MODULES MUST BE INPUT IN NUMERICAL ORDER
C   SWBS RANGES NEED NOT BE IN ORDER OR TOGETHER ON THE CARD
C
      REAL WBSMAN(1000),PROFIL(1000),MODM(100)/100*0./
      REAL MODPRO(100)/100*0./
      INTEGER  RANGE(18),ARRAY(1000)/1000*0/,ARRAY1(100)
C   INITIALIZE MODULE COUNTER
      NMODS = 0
C   INCREMENT MODULE COUNTER
   10 NMODS = NMODS + 1
C   READ MODULE DEFINITION INPUT CARD
      READ (9,20,END=50)  MODULE,RANGE
   20 FORMAT (I4,2X,9(I3,1X,I3,1X))
C   ARRAY1(I) CONTAINS THE DMPM NUMBER FOR INDEX I
      ARRAY1(NMODS) = MODULE
C   ARRAY(I) CONTAINS AN INDEX POINTING TO THE DMPM FOR SWBS I
      DO 40     I4 = 1,17,2
      IF (RANGE(I4).EQ.0)   GO TO 40
      I2 = RANGE(I4)
      I3 = RANGE(I4 + 1)
      DO 30     I1 = I2,I3
   30 ARRAY(I1) = NMODS
   40 CONTINUE
      GO TO 10
C   FINALIZE NUMBER OF MODULES
   50 NMODS = NMODS - 1
C   FORM DMPM PROFILE
      DO 60     I1 = 1,1000
      IF (WBSMAN(I1).EQ.0.)     GO TO 60
      INDEX = ARRAY(I1)
      IDUM = 0
      IF (INDEX.EQ.0)  CALL ERROR(3,IDUM,I1,IFILL)
      IF (IDUM.NE.0)   GO TO 60
      MODM(INDEX) = MODM(INDEX) + WBSMAN(I1)
      MODPRO(INDEX) = MODPRO(INDEX) + PROFIL(I1)
   60 CONTINUE
C   PRINT DMPM OUTPUT
      WRITE (6,70)
```

```
   70 FORMAT (1H1,2(4HOMPM,3X,7HMANNING,5X,5HRATIO,6X))
      K = MOD(NMODS,59)
      DO 90     I1 = 1,K
      WRITE(6,80) ARRAY1(I1),MODM(I1),MODPRO(I1)
     A            ,ARRAY1(I1 + 59),MODM(I1 + 59),MODPRO(I1 + 59)
   80 FORMAT (1H ,2(I4,F10.0,F10.4,6X))
   90 CONTINUE
      I2 = K + 1
      DO 100    I1 = I2,59
  100 WRITE(6,80) ARRAY1(I1),MODM(I1),MODPRO(I1)
C    PUNCH OMPM OUTPUT
      DO 120     I1 = 1,NMODS
      WRITE(7,110) ARRAY1(I1),MODM(I1),MODPRO(I1)
  110 FORMAT       (I4,F10.0,F10.4)
  120 CONTINUE
      RETURN
      END
```

```
C
C    PROGRAM TO PRINT SWBS PROFILE
C
C    INPUT PROFILE IS ON UNIT 8     FORMAT AS FOLLOWS:
C    COLUMNS 1-3       SWBS NUMBER (RIGHT ADJUSTED)
C    COLUMNS 6-13      MANHOURS (OR MANDAYS, MUST BE CONSISTENT HOWEVER)
C                      CORRSPONDING TO THE SWBS (RIGHT ADJUSTED)
C    THE ORDER OF THE CARDS IS IMMATERIAL
C
C    OUTPUT WILL BE PUT ON UNIT 6
C
       REAL  PROF(9)/9*0./,WBSM(9)/9*0./
       REAL MANDAY,WBSMAN(1000)/1000*0./,TOTAL/0./,PROFIL(1000)
       INTEGER IVALUE(500),SWBS
C    INITIALIZE ERROR FLAG
    30 IDUM = 0
C    READ INPUT SWBS PROFILE
    40 READ (8,50,END=70)    SWBS,MAN
    50 FORMAT (I3,2X,I8)
       MANDAY = MAN
C    ERROR CHECK FOR MINUS MANDAY
       IF (MANDAY.LT.0.)    CALL ERROR(1,IDUM,SWBS,MAN)
       IF   (IDUM.NE.0)    GO TO 30
C    INCREMENT TOTAL MANDAYS
       TOTAL = TOTAL + MANDAY
C    INCREMENT MANDAYS FOR EACH SWBS
       WBSMAN(SWBS)       = WBSMAN(SWBS)       + MANDAY
       GO TO 40
    70 DO 80     I1 = 1,1000
    80 PROFIL(I1) = WBSMAN(I1)/TOTAL
C    PRINT OUTPUT
       I = 0
       DO 85     I1 = 1,1000
       IF (WBSMAN(I1).EQ.0.)    GO TO 85
       I = I + 1
       IVALUE(I) = I1
    85 CONTINUE
       IF (I.GT.236)  CALL ERROR (4,IDUM,IDUM1,IDUM2)
       K = MOD(I,59)
       IDEL =  1
       IF (K.EQ.0)    IDEL =  0
       J = I/59 + IDEL
       IF (J.EQ.1)    WRITE (6,91)
       IF (J.EQ.2)    WRITE (6,92)
       IF (J.EQ.3)    WRITE (6,93)
       IF (J.EQ.4)    WRITE (6,94)
    91 FORMAT (1H1,1(4HSWBS,3X,7HMANNING,5X,5HRATIO,6X))
    92 FORMAT (1H1,2(4HSWBS,3X,7HMANNING,5X,5HRATIO,6X))
    93 FORMAT (1H1,3(4HSWBS,3X,7HMANNING,5X,5HRATIO,6X))
    94 FORMAT (1H1,4(4HSWBS,3X,7HMANNING,5X,5HRATIO,6X))
       GO TO (95,98,101,104),J
    95 DO 96     I1 = 1,I
    96 WRITE (6,97)  IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
    97 FORMAT (1H ,4(I4,F10.0,F10.4,6X))
       GO TO 110
```

```
   98 IF (K.EQ.0)    K = 59
      DO 99     I1 = 1,K
   99 WRITE (6,97)   IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
      IF (K.EQ.59)    GO TO 110
      I2 = K + 1
      DO 100    I1 = I2,59
  100 WRITE (6,97)   IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
      GO TO 110
  101 IF (K.EQ.0)    K = 59
      DO 102    I1 = 1,K
  102 WRITE (6,97)   IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
     B ,IVALUE(I1+ 118),WBSMAN(IVALUE(I1+ 118)),PROFIL(IVALUE(I1+ 118))
      IF (K.EQ.59)    GO TO 110
      I2 = K + 1
      DO 103    I1 = I2,59
  103 WRITE (6,97)   IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
      GO TO 110
  104 IF (K.EQ.0)    K = 59
      DO 105    I1 = 1,K
  105 WRITE (6,97)   IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
     B ,IVALUE(I1+ 118),WBSMAN(IVALUE(I1+ 118)),PROFIL(IVALUE(I1+ 118))
     C ,IVALUE(I1+ 177),WBSMAN(IVALUE(I1+ 177)),PROFIL(IVALUE(I1+ 177))
      IF (K.EQ.59)    GO TO 110
      I2 = K + 1
      DO 106    I1 = I2,59
  106 WRITE (6,97)   IVALUE(I1),WBSMAN(IVALUE(I1)),PROFIL(IVALUE(I1))
     A ,IVALUE(I1+ 59),WBSMAN(IVALUE(I1+ 59)),PROFIL(IVALUE(I1+ 59))
     B ,IVALUE(I1+ 118),WBSMAN(IVALUE(I1+ 118)),PROFIL(IVALUE(I1+ 118))
  110 CONTINUE
C   CALCULATE MANNING IN EACH MAJOR SWBS GROUP
      DO 130    I2 = 1,9
      I3 = 100*I2
      I4 = I3 + 99
      DO 130    I1 = I3,I4
      WBSM(I2) = WBSM(I2) + WBSMAN(I1)
  130 PROF(I2) = PROF(I2) + PROFIL(I1)
C   PRINT OUTPUT FOR THE MAJOR GROUPINGS
      WRITE (6,91)
      DO 140    I1 = 100,900,100
      I2 = I1/100
  140 WRITE (6,97)     I1,WBSM(I2),PROF(I2)
      WRITE (6,145)   TOTAL
  145 FORMAT (5X,10(1H-),/,5X,F10.0)
C   PRINT DMPM OUTPUT
      CALL DMPM(WBSMAN,PROFIL)
      STOP
      END
```

SURFPR cont'd

```
      SUBROUTINE ERROR (ICODE,IDUM,I1,I2)
      IDUM = 1
      GO TO (10,30,50,70),ICODE
   10 WRITE (6,20) I1,I2
   20 FORMAT (1H ,I3,3X,I8,10X,31HNEGATIVE MANNING - CARD IGNORED)
      RETURN
   30 WRITE (6,40)  I1,I2
   40 FORMAT (1H ,I3,3X,I8,10X,26HILLEGAL SSI - CARD IGNORED)
      RETURN
   50 WRITE (6,60)   I1
   60 FORMAT     (1H ,I3,5X,
     A             47HNO PLANNING MODULE FOR THIS SWBS - CARD IGNORED)
      RETURN
   70 WRITE (6,80)
   80 FORMAT (1H ,48HTOO MANY SWBS ELEMENTS  -  EXECUTION TERMINATING)
      STOP
      END
```

SURFPR cont'd

```
      SUBROUTINE  DMPM(WBSMAN,PROFIL)
C
C    SUBROUTINE TO CONVERT SWBS PROFILE TO DMPM PROFILE
C
C    CALLING ARGUEMENTS:  WBSMAN(I) TOTAL MANNING FOR SWBS I
C                         PROFIL(I) FRACTION OF WORK WITHIN SWBS I
C
C    OUTPUT IS ON UNIT 6
C
C    INPUT IS ON UNIT 9
C
C    INPUT FORMAT:    COLS 1 - 4          DEPOT MAINTENANCE PLANNING MODULE
C                     COLS 7-9  11-13     FIRST SWBS RANGE FOR ABOVE DMPM
C                     COLS 15-17 19-21    SECOND SWBS RANGE FOR ABOVE DMPM
C                     COLS 23-25 27-29    THIRD  SWBS RANGE FOR ABOVE DMPM
C                     COLS 31-33 35-37    FOURTH SWBS RANGE FOR ABOVE DMPM
C                     COLS 39-41 43-45    FIFTH  SWBS RANGE FOR ABOVE DMPM
C                     COLS 47-49 51-53    SIXTH  SWBS RANGE FOR ABOVE DMPM
C                     COLS 55-57 59-61    SEVENTH SWBS RANGE FOR ABOVE DMPM
C                     COLS 63-65 67-69    EIGHTH  SWBS RANGE FOR ABOVE DMPM
C                     COLS 71-73 75-77    NINTH   SWBS RANGE FOR ABOVE DMPM
C    MODULES MUST BE INPUT IN NUMERICAL ORDER
C    SWBS RANGES NEED NOT BE IN ORDER OR TOGETHER ON THE CARD
C
      REAL WBSMAN(1000),PROFIL(1000),MODM(100)/100*0./
      REAL MODPRO(100)/100*0./
      INTEGER  RANGE(18),ARRAY(1000)/1000*0/,ARRAY1(100)
C    INITIALIZE MODULE COUNTER
      NMODS = 0
C    INCREMENT MODULE COUNTER
   10 NMODS = NMODS + 1
C    READ MODULE DEFINITION INPUT CARD
      READ (9,20,END=50)  MODULE,RANGE
   20 FORMAT (I4,2X,9(I3,1X,I3,1X))
C    ARRAY1(I) CONTAINS THE DMPM NUMBER FOR INDEX I
      ARRAY1(NMODS) = MODULE
C    ARRAY(I) CONTAINS AN INDEX POINTING TO THE DMPM FOR SWBS I
      DO 40     I4 = 1,17,2
      IF (RANGE(I4).EQ.0)    GO TO 40
      I2 = RANGE(I4)
      I3 = RANGE(I4 + 1)
      DO 30     I1 = I2,I3
   30 ARRAY(I1) = NMODS
   40 CONTINUE
      GO TO 10
C    FINALIZE NUMBER OF MODULES
   50 NMODS = NMODS - 1
C    FORM DMPM PROFILE
      DO 60     I1 = 1,1000
      IF (WBSMAN(I1).EQ.0.)     GO TO 60
      INDEX = ARRAY(I1)
      IDUM = 0
      IF (INDEX.EQ.0)  CALL ERROR(3,IDUM,I1,IFILL)
      IF (IDUM.NE.0)    GO TO 60
      MODM(INDEX) = MODM(INDEX) + WBSMAN(I1)
      MODPRO(INDEX) = MODPRO(INDEX) + PROFIL(I1)
   60 CONTINUE
C    PRINT DMPM OUTPUT
      WRITE (6,70)
```

SURFPR cont'd

```
   70 FORMAT (1H1,2(4HOMPM,3X,7HMANNING,5X,5HRATIO,6X))
      K = MOD(NMODS,59)
      DO 90     I1 = 1,K
      WRITE(6,80) ARRAY1(I1),MODM(I1),MODPRO(I1)
     A           ,ARRAY1(I1 + 59),MODM(I1 + 59),MODPRO(I1 + 59)
   80 FORMAT (1H ,2(I4,F10.0,F10.4,6X))
   90 CONTINUE
      I2 = K + 1
      DO 100    I1 = I2,59
  100 WRITE(6,80) ARRAY1(I1),MODM(I1),MODPRO(I1)
C     PUNCH OMPM OUTPUT
      DO 120     I1 = 1,NMODS
      WRITE(7,110) ARRAY1(I1),MODM(I1),MODPRO(I1)
  110 FORMAT       (I4,F10.0,F10.4)
  120 CONTINUE
      RETURN
      END
```

3.0 STATS

3.1 Function

The function of STATS is to provide assistance in combining the DMPM single-ship repair profiles produced by SURFPR or SUBPRO for a given ship class (or combination of ships) into a DMPM combined-ship repair profile by producing various averages and statistics for the user to consider. All single-ship profiles which are to be combined are input to STATS. As described in Section 2.1, these profiles consist of the fraction of the total manning expended for each DMPM. The output consists of the following information for each DMPM.

1) The minimum fraction value
2) The maximum fraction value
3) The range of fraction values
4) The median of the fraction values
5) The mean of the fraction values
6) The average* excluding the maximum fraction value
7) The average* excluding the minimum fraction value
8) The average* excluding the most extreme fraction value
9) The average** without the minimum and maximum fraction values
10) A selected average

---

* There must be at least three single-ship profiles input.
** There must be at least four single-ship profiles input.

The selected average is computed in the following manner. If either one or two DMPM single-ship repair profiles are input, the selected average for each DMPM is the mean of its fraction values. For exactly three input single-ship profiles, the selected average, for any DMPM, is either the mean or the average without the most extreme point.* In this case, the program looks at the absolute value of the differences between 1) the maximum minus the mean, and 2) the mean minus the minimum. If the above absolute difference is greater than an input threshold,** the selected average is the average without the most extreme point. Otherwise the selected average is the mean.

For four or more input DMPM single-ship repair profiles the selected average is computed as follows. If the above described absolute difference is less than the input threshold,** then the selected average is the mean. Otherwise the most extreme point is ignored and a second absolute difference is computed as described above, but from the reduced sample. If the second absolute difference is less than another threshold,** the selected average is the average without the most extreme point. Otherwise the selected average is the average without the two most extreme points (of the original data set). Note that the sum of the selected average values over all DMPM's need not be one. The following gives some examples of the computation of the selected average from five numbers (i.e., this would imply that five DMPM single-ship profiles were input to STATS).

---

* Note that for any one DMPM the selected average may be the average of the fraction values for that DMPM and for another the selected average may be the average without the most extreme point; i.e., the DMPM's are treated independently.

**These thresholds were both set at .0500. Little sensitivity to change in this value was noticed.

Let, for all examples, the threshold to exclude the most extreme point be .050, and the threshold to exclude the second most extreme point, be .045.

Case 1

Let the fraction values for a given DMPM be .05, .10, .11, .12, .25

The mean is .126

The maximum minus the mean is .124

The mean minus the minimum is .076

The absolute difference is .048

Since .048 < .050, the selected average is .126, i.e., the mean

Case 2

Let the fraction values for a given DMPM be .01, .10, .11, .12, .35

The mean is .138

The maximum minus the mean is .212

The mean minus the minimum is .128

The absolute difference is .084

Since .084 > .050, the most extreme fraction value is discarded and the above computational procedure is repeated for the four remaining data points, using the second threshold value, .045. In this case, the most extreme fraction value is the maximum, .35. Then, considering only the four remaining values (.01, .10, .11, and .12),

The mean is .085

The maximum minus the mean is .035

The mean minus the minimum is .075

The absolute difference is .040

Since .040 < .045, the selected average is .085, the mean of the reduced data set, i.e., the average of the original data set without the most extreme point.

If the threshold to exclude the second most extreme point had been .038, then since .040 > .038 the selected average would have been .11, the average of the reduced data set without its most extreme point, i.e., the average of the original data set without the two most extreme points.

3.2 Importance

This program served an interface function between SUBPRO (SURFPR) and REPROF. It aided in summarizing the multitude of data output from SUBPRO and SURFPR into sets of unnormalized DMPM combined-ship repair profiles for various groups of ships. These unnormalized profiles are output by STATS on punched cards and are subsequently input to REPROF for normalization and creation of the finalized DMPM repair profiles. The output of STATS consists of:

1) A printed list of input DMPM single-ship repair profiles to 1) serve as a permanent record of those profiles which were to be combined and 2) serve as a convenient reference, when potential changes to the selected average were being considered prior to input to REPROF for normalization.

2) A printed list of those averages mentioned in Section 3.1 which serves as backup for decisions to maintain or change the final selected average before input to REPROF for normalization.

3) A punched card version of the selected average which, with (or without) modifications, is ultimately input to REPROF for normalization.

Modifications to the selected average before input to REPROF were generally carried out according to the following procedure. Only those DMPM's where the range of values was greater than .0500 were even considered for changes to the selected average. The rationale for this was that, when the range is less than .0500, there is very little difference between the mean, the average without the most extreme point, and the average without the two most extreme points.

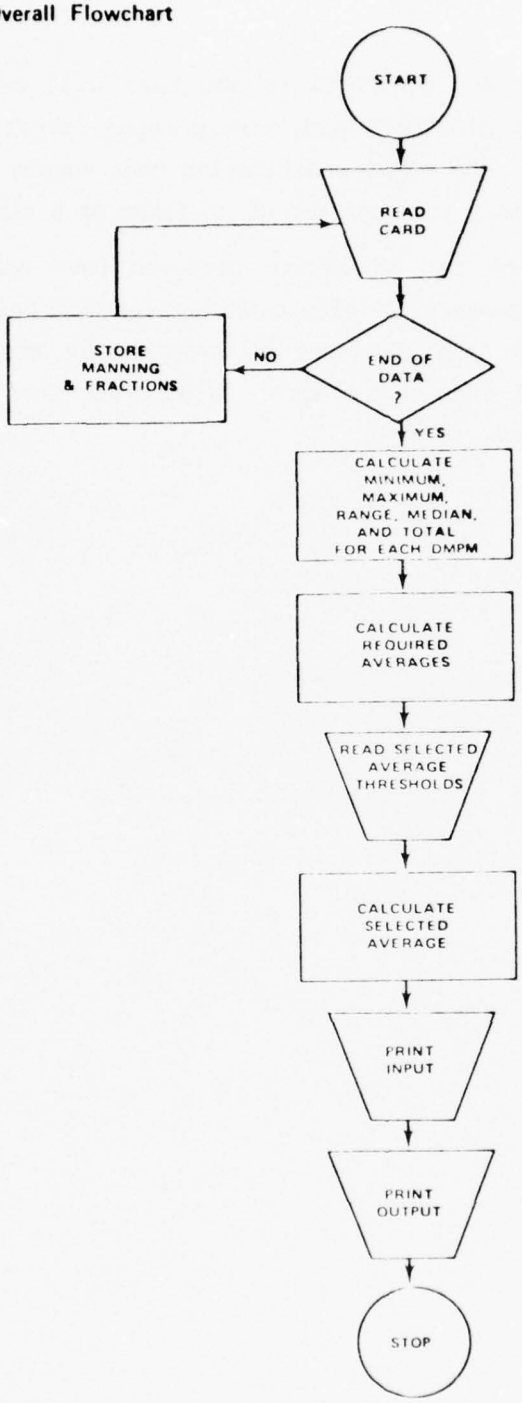
When the range was greater than .0500 a subjective decision was made as to whether or not to change it. The decision simply was whether or not the selected average appeared appropriate given the DMPM fraction values combined.

3.3 Prospects for Future Use

The function provided by STATS is one that will be required in the future, that of combining DMPM single-ship repair profiles for final normalization by REPROF. The major modification that should be made is to enable STATS to combine more than one set of profiles at a time.

Once an established set of repair profiles have been developed, it may no longer be necessary to eliminate extreme points. When additional data is received it can either be averaged in the conventional way or disregarded. If such a procedure is adopted, then the function of STATS could be modified.

3.4 Overall Flowchart



3.5 User Requirements

Input one card in the following format for unit 5

Columns	Description
1-5	Threshold for which the most extreme fraction value is discarded in computing selected average (F5.4)
7-11	Threshold for which the second most extreme fraction value is discarded in computing selected average (F5.4)

Input up to 40 sets of 80 cards, each of which is in the following format for unit 1. These are the DMPM single-ship repair profiles which are to be combined.

Card 1

Columns	Description
1-4	Four asterisks
26-29	Ship type
30-33	Hull number
35-39	Shipyard of availability

Cards 2-80*

Columns	Description
1-4	DMPM
5-14	Total manning for this DMPM (F10.0)
15-20	Fraction of manning for this DMPM (F10.4)

*There must be 79 cards input in ascending order by DMPM.

3.6 Sample Problem

The following four pages contain an example of STATS output corresponding to the inut shown in Section 2.6. Pages 51-52 contain a listing of the input DMPM single-ship repair profiles, and pages 53-54 show the corresponding averages computed.

INPUT PROFILES
(IN PERCENT)

DMPM	CV 59 NORVA	CV 60 NORVA	CV 61 PUGET	CV 62 NORVA
1001	0.0475	0.0442	0.0379	0.0103
1002	0.0	0.0	0.0	0.0
1003	0.0	0.0	0.0	0.0
1004	0.0	0.0	0.0	0.0
1005	0.0273	0.0318	0.0029	0.0354
1006	0.0	0.0	0.0	0.0
1007	0.0040	0.0001	0.0033	0.0012
1008	0.0	0.0005	0.0007	0.0005
1009	0.0	0.0	0.0039	0.0009
2001	0.0	0.0011	0.0	0.0005
2002	0.0	0.0	0.0	0.0
2003	0.1627	0.1147	0.1317	0.1342
2004	0.0	0.0	0.0	0.0
2005	0.0074	0.0216	0.0130	0.0235
2006	0.0	0.0	0.0	0.0
2007	0.0140	0.0280	0.0077	0.0396
2008	0.0	0.0	0.0	0.0
2009	0.0159	0.0204	0.0370	0.0253
2010	0.0	0.0	0.0	0.0
2011	0.0109	0.0052	0.0106	0.0142
2012	0.0303	0.0585	0.0587	0.0457
2013	0.0103	0.0202	0.0056	0.0053
3001	0.0394	0.0135	0.0257	0.0275
3002	0.0089	0.0055	0.0161	0.0029
3003	0.0	0.0	0.0	0.0
3004	0.0	0.0	0.0	0.0
4001	0.0	0.0	0.0	0.0
4002	0.0	0.0	0.0	0.0
4003	0.0149	0.0060	0.0106	0.0180
4004	0.0	0.0	0.0	0.0
4005	0.0166	0.0211	0.0147	0.0256
4006	0.0087	0.0057	0.0052	0.0073
4007	0.0055	0.0055	0.0027	0.0042
4008	0.0	0.0	0.0002	0.0
4009	0.0018	0.0014	0.0025	0.0024
4010	0.0	0.0	0.0024	0.0
4011	0.0053	0.0012	0.0030	0.0033
5001	0.0053	0.0010	0.0012	0.0
5002	0.0065	0.0125	0.0085	0.0093
5003	0.0	0.0	0.0	0.0
5004	0.0079	0.0320	0.0638	0.0091
5005	0.0941	0.1113	0.1265	0.0986
5006	0.0229	0.0181	0.0169	0.0201
5007	0.0028	0.0056	0.0045	0.0019
5008	0.0199	0.0365	0.0266	0.0250
5009	0.0371	0.0209	0.0115	0.0372
5010	0.1027	0.1122	0.0740	0.0871
5011	0.0287	0.0302	0.0245	0.0253
5012	0.0	0.0	0.0	0.0
5013	0.0	0.0	0.0	0.0
5014	0.0	0.0	0.0	0.0
6001	0.0037	0.0050	0.0037	0.0
6002	0.0760	0.0912	0.0572	0.0772
6003	0.0040	0.0052	0.0026	0.0

6004	0.0	0.0	0.0	0.0
6005	0.0	0.0	0.0	0.0
6006	0.0	0.0	0.0	0.0
6007	0.0	0.0	0.0	0.0
6008	0.0	0.0	0.0	0.0
6009	0.0342	0.0085	0.0250	0.0219
6010	0.0033	0.0067	0.0040	0.0038
6011	0.0	0.0	0.0	0.0
7001	0.0002	0.0	0.0071	0.0
7002	0.0235	0.0308	0.0312	0.0625
7003	0.0	0.0	0.0	0.0
7004	0.0	0.0	0.0	0.0
7005	0.0	0.0	0.0	0.0
7006	0.0	0.0	0.0	0.0
7007	0.0	0.0	0.0	0.0
8001	0.0	0.0	0.0	0.0
8002	0.0	0.0	0.0	0.0
8003	0.0	0.0	0.0	0.0
8004	0.0003	0.0	0.0	0.0
8005	0.0	0.0	0.0	0.0
9001	0.0177	0.0159	0.0037	0.0082
9002	0.0052	0.0064	0.0165	0.0082
9003	0.0656	0.0388	0.0894	0.0718
9004	0.0	0.0	0.0	0.0
9005	0.0072	0.0051	0.0052	0.0050
TOTAL MANDAYS	175345.	267154.	191282.	190462.

DMPM	MINIMUM	MAXIMUM	RANGE	MEDIAN	AVERAGE	AVERAGE W/O MIN	AVERAGE W/O MAX	AVERAGE W/O EXT	AVERAGE W/O MIN W/O MAX	SELECTED AVERAGE
1001	0.0103	0.0475	0.0372	0.0410	0.0350	0.0432	0.0308	0.0432	0.0410	0.0432
1002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1005	0.0029	0.0354	0.0325	0.0296	0.0243	0.0315	0.0207	0.0315	0.0295	0.0315
1006	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1007	0.0001	0.0040	0.0039	0.0022	0.0021	0.0028	0.0015	0.0028	0.0022	0.0021
1008	0.0	0.0007	0.0007	0.0005	0.0004	0.0006	0.0003	0.0006	0.0005	0.0004
1009	0.0	0.0039	0.0039	0.0004	0.0012	0.0016	0.0003	0.0003	0.0004	0.0012
2001	0.0	0.0011	0.0011	0.0003	0.0004	0.0005	0.0002	0.0002	0.0003	0.0004
2002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2003	0.1147	0.1627	0.0480	0.1329	0.1358	0.1429	0.1269	0.1269	0.1329	0.1358
2004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2005	0.0074	0.0235	0.0161	0.0173	0.0164	0.0194	0.0140	0.0194	0.0173	0.0164
2006	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2007	0.0077	0.0396	0.0319	0.0210	0.0223	0.0272	0.0166	0.0166	0.0210	0.0223
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2009	0.0159	0.0370	0.0211	0.0228	0.0246	0.0276	0.0205	0.0205	0.0228	0.0246
2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2011	0.0052	0.0142	0.0090	0.0107	0.0102	0.0119	0.0089	0.0119	0.0107	0.0102
2012	0.0303	0.0587	0.0284	0.0521	0.0483	0.0543	0.0448	0.0543	0.0521	0.0543
2013	0.0053	0.0202	0.0149	0.0080	0.0104	0.0120	0.0071	0.0071	0.0080	0.0104
3001	0.0135	0.0394	0.0259	0.0266	0.0265	0.0309	0.0222	0.0309	0.0266	0.0265
3002	0.0029	0.0161	0.0132	0.0072	0.0083	0.0102	0.0058	0.0058	0.0072	0.0083
3003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4003	0.0060	0.0180	0.0120	0.0127	0.0124	0.0145	0.0105	0.0145	0.0127	0.0124
4004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4005	0.0147	0.0256	0.0109	0.0188	0.0195	0.0211	0.0175	0.0175	0.0188	0.0195
4006	0.0052	0.0087	0.0035	0.0065	0.0067	0.0072	0.0061	0.0061	0.0065	0.0067
4007	0.0027	0.0055	0.0028	0.0049	0.0045	0.0051	0.0041	0.0051	0.0048	0.0045
4008	0.0	0.0002	0.0002	0.0	0.0000	0.0001	0.0	0.0	0.0	0.0000
4009	0.0014	0.0025	0.0011	0.0021	0.0020	0.0022	0.0019	0.0022	0.0021	0.0020
4010	0.0	0.0024	0.0024	0.0	0.0006	0.0008	0.0	0.0	0.0	0.0006
4011	0.0012	0.0053	0.0041	0.0031	0.0032	0.0039	0.0025	0.0025	0.0031	0.0032
5001	0.0	0.0053	0.0053	0.0011	0.0019	0.0025	0.0007	0.0007	0.0011	0.0019
5002	0.0065	0.0125	0.0060	0.0089	0.0092	0.0101	0.0081	0.0081	0.0089	0.0092
5003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5004	0.0079	0.0638	0.0559	0.0206	0.0282	0.0350	0.0163	0.0163	0.0205	0.0163
5005	0.0941	0.1265	0.0324	0.1049	0.1076	0.1121	0.1013	0.1013	0.1049	0.1075
5006	0.0169	0.0229	0.0060	0.0191	0.0195	0.0204	0.0184	0.0184	0.0191	0.0195
5007	0.0019	0.0056	0.0037	0.0037	0.0037	0.0043	0.0031	0.0031	0.0036	0.0037
5008	0.0199	0.0365	0.0166	0.0258	0.0270	0.0294	0.0238	0.0238	0.0258	0.0270
5009	0.0115	0.0372	0.0257	0.0290	0.0267	0.0317	0.0232	0.0317	0.0290	0.0267
5010	0.0740	0.1122	0.0382	0.0949	0.0940	0.1007	0.0879	0.1007	0.0949	0.0940
5011	0.0245	0.0302	0.0057	0.0270	0.0272	0.0281	0.0262	0.0262	0.0270	0.0272
5012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6001	0.0	0.0050	0.0050	0.0037	0.0031	0.0041	0.0025	0.0041	0.0037	0.0031
6002	0.0572	0.0912	0.0340	0.0766	0.0754	0.0815	0.0701	0.0815	0.0766	0.0754
6003	0.0	0.0052	0.0052	0.0033	0.0029	0.0039	0.0022	0.0039	0.0033	0.0029

6004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6006	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6009	0.0085	0.0342	0.0257	0.0234	0.0224	0.0270	0.0185	0.0270	0.0234	0.0224
6010	0.0033	0.0067	0.0034	0.0039	0.0044	0.0048	0.0037	0.0037	0.0039	0.0044
6011	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7001	0.0	0.0071	0.0071	0.0001	0.0018	0.0024	0.0001	0.0001	0.0001	0.0018
7002	0.0235	0.0625	0.0390	0.0310	0.0370	0.0415	0.0285	0.0285	0.0310	0.0285
7003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7006	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8004	0.0	0.0003	0.0003	0.0	0.0001	0.0001	0.0	0.0	0.0	0.0001
8005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9001	0.0037	0.0177	0.0140	0.0120	0.0114	0.0139	0.0093	0.0139	0.0120	0.0114
9002	0.0052	0.0165	0.0113	0.0073	0.0091	0.0104	0.0066	0.0066	0.0073	0.0091
9003	0.0388	0.0894	0.0506	0.0687	0.0664	0.0756	0.0587	0.0756	0.0687	0.0664
9004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9005	0.0050	0.0072	0.0022	0.0051	0.0056	0.0058	0.0051	0.0051	0.0051	0.0056
UNNORMALIZED TOTAL					1.0000	1.1167	0.8774	1.0000	0.9911	1.0010

3.7 Error Messages

No attempt is made by STATS to identify errors.

3.8 File Descriptions

3.8.1 File Descriptions - Output

Unit 6 - See sample problem.

Unit 7 -

79 cards are punched, one for each DMPM in ascending order, in the following format:

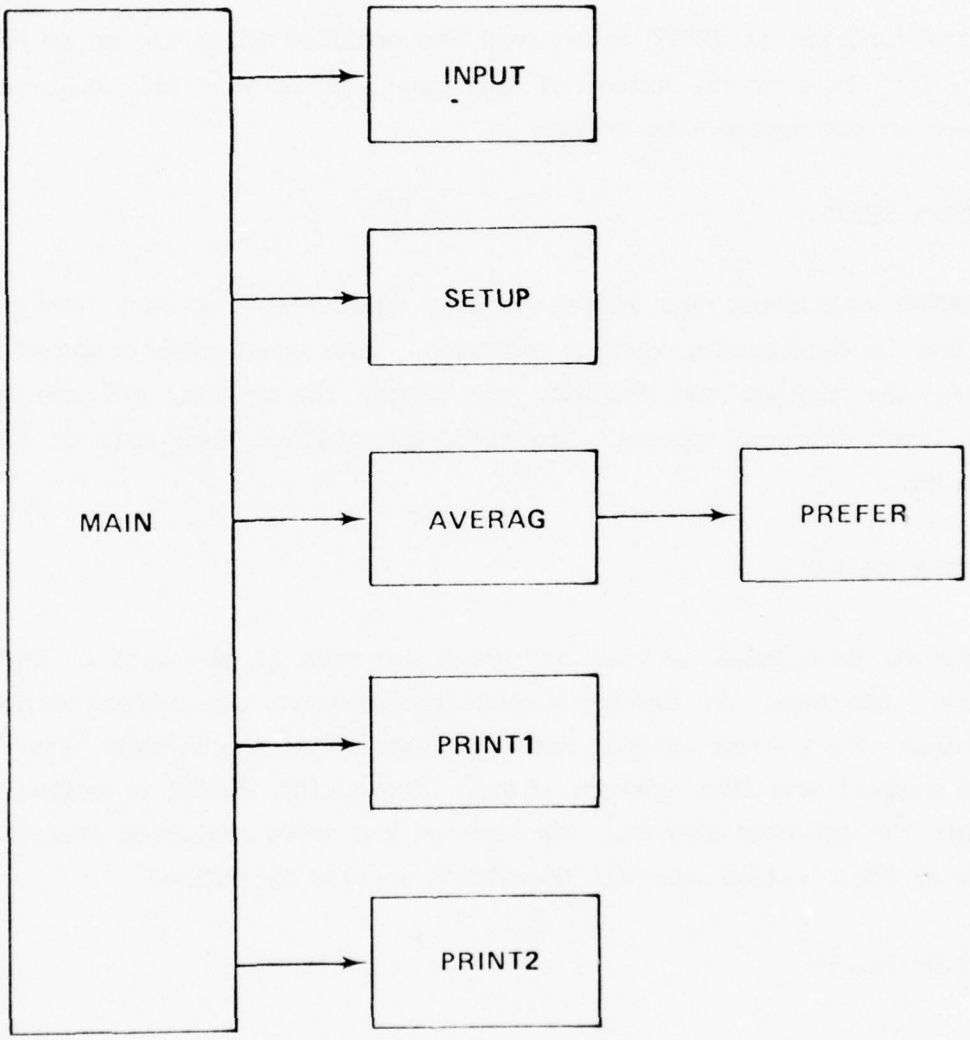
Columns	Description
1-4	DMPM
9-14	Selected average for the above DMPM (F6.4)

3.8.2 File Descriptions - Input

Unit 1 - See user requirements.

Unit 5 - See user requirements.

3.9 Hierarchical Chart



3.10 Subroutine Descriptions

MAIN PROGRAM -

MAIN acts solely as a driver for calling other STATS subroutines.

SUBROUTINE INPUT -

The function of INPUT is to read the profiles which are to be combined. The limit on the number of such profiles is 40. All input data is stored in the appropriate arrays.

SUBROUTINE SETUP -

SETUP calculates and stores various quantities for each DMPM for later use in determining various averages. The quantities computed by DMPM are the minimum and maximum, the range, the median, and the sum of the input fraction values. The total manning for each ship is also determined.

SUBROUTINE AVERAG -

AVERAG calculates several different averages of the data by DMPM. They are: the mean, the average without the maximum, the average without the minimum, the average without both the maximum and the minimum, and the average without the most extreme point. Subroutine PREFER is called to calculate the selected average. For each of the above mentioned averages, the sum of their values over all the DMPM's is also determined.

SUBROUTINE PREFER -

PREFER calculates the selected average. A mathematical description of this average follows:

Let S denote the selected averages for the sample of fraction values X_i, $i = 1, 2, \ldots, N$ for one particular DMPM. This implies there are N input DMPM single-ship repair profiles.

Define $\bar{X} \quad \sum_{i=1}^{N} X_i/N$

$$D_v \quad \left| \left(\max_{i \in v} \{X_i\} - \bar{X} \right) - \left(\bar{X} - \min_{i \in v} \{X_i\} \right) \right.$$

$$E_v \quad \begin{cases} \max_{i \in v} \{X_i\} & D_v \geq 0 \\ \min_{i \in v} \{X_i\} & D_v < 0 \end{cases}$$

Let i_v^* be the value of i at which E_v is determined

A $\{i \mid i = 1, 2, .., N\}$ A1 $\{i \mid i \in A \text{ and } i \neq i_A^*\}$

D1 and D2 are input thresholds.

For $N \leq 2$, $S = \bar{X}$

$$\text{For } N = 3, \; S = \begin{cases} \bar{X} & |D_A| < D1 \\ \left(\sum_{i=1}^{N} X_i - E_A \right)/(N-1) & |D_A| \geq D1 \end{cases}$$

$$\text{For } N \geq 4, \; S = \begin{cases} \bar{X} & |D_A| < D1 \\ \left(\sum_{i=1}^{N} X_i - E_A \right)/(N-1) & |D_A| \geq D1, \; |D_{A1}| \geq D2 \\ \left(\sum_{i=1}^{N} X_i - E_A - E_{A1} \right)/N - 2) & |D_A| \geq D1, \; |D_{A1}| \geq D2 \end{cases}$$

SUBROUTINE PRINT1 -

PRINT1 prints the input manning profiles.

SUBROUTINE PRINT2 -

PRINT2 prints the calculated averages and punches the selected average.

3.11 Glossary

ARRAY(I,J,K)	For the J^{th} DMPM of the I^{th} input DMPM single-ship repair profile: K = 1 manning K = 2 fraction of total manning
ARRAYA(J,K)	For the J^{th} DMPM: K = 1 minimum manning fraction over all input single-ship profiles K = 2 maximum manning fraction over all input single-ship profiles K = 3 range of manning fractions over all input single-ship profiles K = 4 median manning fractions over all input single-ship profiles
ARRAYB(I)	Total manning for I^{th} input DMPM single-ship repair profile
ARRAYC(J)	Numerical value of J^{th} DMPM
ARRAYD(J)	Sum of all manning fractions for the J^{th} DMPM
ARRAYE(L,J)	Manning fractions for J^{th} DMPM sorted from smallest (L = 1) to largest (L = NSHIPS) values
ASTR	Four alphanumeric asterisks
AVG1(J)	Mean of manning fractions for the J^{th} DMPM
AVG2(J)	Average of manning fractions excluding the maximum value for the J^{th} DMPM
AVG3(J)	Average of manning fraction excluding the minimum value for the J^{th} DMPM
AVG4(J)	Average of manning fractions excluding the maximum and minimum values for the J^{th} DMPM

AVG5(J)	Average of manning fractions excluding the most extreme value for the J^{th} DMPM
AVG6(J)	Selected average of manning fractions for the J^{th} DMPM
DELTA	For a set of fraction values of any given DMPM, it is the absolute difference between 1) the maximum value minus the mean and 2) the mean minus the minimum value
D1	Selected average computational threshold which is compared to DELTA calculated from a full set of fraction values for any given DMPM
D2	Selected average computational threshold which is compared to DELTA calculated from a set of fraction values excluding the most extreme point
HULL(I)	Hull number of ship corresponding to the I^{th} DMPM single-ship repair profile
I	Used for calculation of a median
IDMPM	Total number of DMPM's in each input DMPM single-ship repair profile
IEND	Do-loop parameter for sorting
ISTART	Do-loop parameter for sorting
I1	Multi-purpose index
I2	Multi-purpose index
I3	Multi-purpose index
I4	Multi-purpose index
J	Used for calculation of a median
NSHIPS	Total number of input DMPM single-ship repair profiles

SM1	Sum over all DMPM's of the mean of fraction values
SM2	Sum over all DMPM's of the average of fraction values excluding the maximum value
SM3	Sum over all DMPM's of the average of fraction values excluding the minimum value
SM4	Sum over all DMPM's of the average of fraction values excluding the maximum and minimum values
SM5	Sum over all DMPM's of the average of fraction values excluding the most extreme value
SM6	Sum over all DMPM's of the selected average of fraction values
SUBTR	Adjustment made in computing the selected average
TEMP	Temporary storage location
XMAX	Maximum value of all fraction values for any given DMPM
XMAXN	Maximum value of fraction values excluding the most extreme point for any given DMPM
XMIN	Minimum value of all fraction values for any given DMPM
XMINN	Minimum value of fraction values excluding the most extreme point for any given DMPM
YARD(I)	Shipyard for the I^{th} input DMPM single-ship repair profile

3.12 Program Listing

The following seven pages contain a listing of the STATS program.

```
      CALL INPUT
      CALL SETUP
      CALL AVERAG
      CALL PRINT1
      CALL PRINT2
      STOP
      END
```

```
      SUBROUTINE INPUT
C     READ DMPM PROFILE INPUT INTO ARRAY( SHIP , DMPM , 1 = MANNING)
C                                                    , 2 = PERCENT)
C     ARRAYC( DMPM ) CONTAINS THE NUMERICAL IDENTIFICATION OF EACH DMPM
      COMMON/ONE/ YARD(40),SHIP(40),HULL(40)
      COMMON/TWO/ IDMPM,NSHIPS,ARRAY(40,99,2),ARRAYC(99)
      REAL*8 YARD
      REAL ASTR/4H****/
      NSHIPS = 0
   10 BACKSPACE 1
      NSHIPS = NSHIPS + 1
      IDMPM = 0
C     READ HEADER RECORD FOR A SHIP
      READ (1,20)  SHIP(NSHIPS),HULL(NSHIPS),YARD(NSHIPS)
   20 FORMAT (25X,2A4,1X,A5)
C     READ PROFILE DATA
C     ASSUME PLANNING MODULE STRUCTURE IS THE SAME FOR ALL SHIPS
   30 IDMPM = IDMPM + 1
      READ (1,40,END=50) ARRAYC(IDMPM),(ARRAY(NSHIPS,IDMPM,I3),I3=1,2)
   40 FORMAT (A4,F10.0,F10.4)
C     GO TO 10 AT THE END OF A SHIP
      IF (ARRAYC(IDMPM).EQ.ASTR) GO TO 10
C     OTHERWISE CONTINUE READING DATA
      GO TO 30
C     END OF ALL INPUT DATA
C     IDMPM IS NOW THE NUMBER OF PLANNING MODULES
C     NSHIPS IS NOW THE NUMBER OF SHIPS
   50 IDMPM = IDMPM - 1
      RETURN
      END
```

```
      SUBROUTINE SETUP
C     ARRAYA ( OMPM , J ) CONTAINS FOR EACH OMPM:
C                         J = 1 MINIMUM PERCENT OVER ALL SHIPS
C                         J = 2 MAXIMUM PERCENT OVER ALL SHIPS
C                         J = 3 PERCENT RANGE OVER ALL SHIPS
C                         J = 4 MEDIAN FOR ALL SHIPS
C     ARRAYD( OMPM ) IS THE SUM OF PERCENTS OVER ALL SHIPS FOR EACH OMPM
C     ARRAYB( SHIP ) CONTAINS THE TOTAL MANNING FOR  THE SHIP
C     ARRAYE ( SHIP , OMPM ) CONTAINS FOR EACH OMPM  PERCENTS SORTED
C                                          WITHIN SHIP
      COMMON/TWO/ IOMPM,NSHIPS,ARRAY(40,99,2),ARRAYC(99)
      COMMON/THREE/ ARRAYA(99,4),ARRAYD(99),ARRAYB(40),ARRAYE(40,99)
C     SKIP PROCESSING IF ONLY ONE SHIP
      IF (NSHIPS.LE.1)  GO TO 50
C     LOOP ON OMPM TO CALCULATE SOME BASIC DATA FOR EACH     ********************
      DO 40     I2 = 1,IOMPM                                                     *
C     PUT SHIP PERCENT DATA INTO SORTED ARRAY SPACE                            *
      DO 10     I1 = 1,NSHIPS                                                    *
   10 ARRAYE(I1,I2) = ARRAY(I1,I2,2)                                           *
C     SORT THE PERCENT DATA WITHIN SHIP                                        *
      IEND = NSHIPS - 1                                                        *
      DO 20     I3 = 1,IEND                                                    *
      ISTART = I3 + 1                                                          *
      DO 20     I4 = ISTART,NSHIPS                                             *
      IF ( ARRAYE(I3,I2) .LE. ARRAYE(I4,I2) )   GO TO 20                       *
      TEMP = ARRAYE(I4,I2)                                                     *
      ARRAYE(I4,I2) = ARRAYE(I3,I2)                                            *
      ARRAYE(I3,I2) = TEMP                                                     *
   20 CONTINUE                                                                 *
C     SET MINIMUM                                                              *
      ARRAYA(I2,1) = ARRAYE(1,I2)                                              *
C     SET MAXIMUM                                                              *
      ARRAYA(I2,2) = ARRAYE(NSHIPS,I2)                                         *
C     FIND RANGE   OVER ALL SHIPS FOR THIS OMPM                                *
      ARRAYA(I2,3) = ARRAYA(I2,2) - ARRAYA(I2,1)                               *
C     DETERMINE MEDIAN                                                         *
      I = NSHIPS/2                                                             *
      J = 2*I                                                                  *
      ARRAYA(I2,4) = (ARRAYE(NSHIPS/2,I2) + ARRAYE(NSHIPS/2 + 1,I2))/2         *
      IF (J.NE.NSHIPS) ARRAYA(I2,4) = ARRAYE(NSHIPS/2 + 1,I2)                  *
C     FIND SUM OVER ALL SHIPS FOR EACH OMPM FOR AVERAGING                      *
      ARRAYD(I2) = 0.                                                          *
      DO 30     I1 = 1,NSHIPS                                                  *
   30 ARRAYD(I2) = ARRAYD(I2) + ARRAY(I1,I2,2)                                 *
   40 CONTINUE                                                                 *
C     END OF LOOP                                                ********************
   50 CONTINUE
C     CALCULATE TOTAL MANNING FOR EACH SHIP
      DO 60     I1 = 1,NSHIPS
      ARRAYB(I1) = 0.
      DO 60     I2 = 1,IOMPM
   60 ARRAYB(I1)   = ARRAYB(I1) + ARRAY(I1,I2,1)
      RETURN
      END
```

```
      SUBROUTINE AVERAG
C     CALCULATE VARIOUS AVERAGES AND THEIR SUMS FOR EACH DMPM
      COMMON/TWO/ IDMPM,NSHIPS,ARRAY(40,99,2),ARRAYC(99)
      COMMON/THREE/ ARRAYA(99,4),ARRAYD(99),ARRAYB(40),ARRAYE(40,99)
      COMMON/FOUR/ AVG1(99),AVG2(99),AVG3(99),AVG4(99),SM1,SM2,SM3,SM4,
     A             AVG5(99),SM5,AVG6(99),SM6
C     INITIALIZE THE SUMS OF THE AVERAGES
      SM1 = 0.
      SM2 = 0.
      SM3 = 0.
      SM4 = 0.
      SM5 = 0.
      SM6 = 0.
C     NO AVERAGES IF ONLY ONE SHIP
      IF (NSHIPS.EQ.1)  RETURN
C     LOOP ON DMPM TO CALCULATE AVERAGES AND SUMS
      DO 10    I2 = 1,IDMPM
C     COMPUTE STANDARD AVERAGE AND ITS SUM
      AVG1(I2) = ARRAYD(I2)/NSHIPS
      SM1 = SM1 + AVG1(I2)
C     IF TWO SHIPS OR LESS, CANNOT COMPUTE ANY MORE AVERAGES
      IF (NSHIPS.LT.3)  GO TO 10
C     AVERAGE WITHOUT THE HIGHEST AND ITS SUM
      AVG2(I2) = ( ARRAYD(I2) - ARRAYA(I2,2) ) / (NSHIPS - 1)
      SM2 = SM2 + AVG2(I2)
C     AVERAGE WITHOUT THE SMALLEST AND ITS SUM
      AVG3(I2) = ( ARRAYD(I2) - ARRAYA(I2,1) ) / (NSHIPS - 1)
      SM3 = SM3 + AVG3(I2)
C     AVERAGE WITHOUT MOST EXTREME POINT, AND ITS SUM
      AVG5(I2) = AVG2(I2)
      IF (ARRAYA(I2,2) - AVG1(I2).LT.AVG1(I2) - ARRAYA(I2,1))
     A AVG5(I2) = AVG3(I2)
      SM5 = SM5 + AVG5(I2)
C     CALL  SUBROUTINE PREFER TO DETERMINE PREFERRED AVERAGE
      CALL PREFER(I2)
      SM6 = SM6 + AVG6(I2)
C     IF THREE SHIPS OR LESS, CANNOT COMPUTE FINAL AVERAGE
      IF (NSHIPS.LT.4)  GO TO 10
C     AVERAGE WITHOUT THE SMALLEST AND LARGEST AND ITS SUM
      AVG4(I2) = ( ARRAYD(I2) - ARRAYA(I2,1) - ARRAYA(I2,2) )/(NSHIPS-2)
      SM4 = SM4 + AVG4(I2)
   10 CONTINUE
C     END OF LOOP
      RETURN
      END
```

```
      SUBROUTINE PREFER(I2)
C     THIS SUBROUTINE DETERMINES A PREFERRED AVERAGE PROFILE FOR EACH
C     DMPM (I2) FOR WHICH IT IS CALLED.
C     THE ANALYSIS  BELOW ONLY APPLIES FOR THREE OR MORE SHIPS.
C     IF THE ABSOLUTE DIFFERENCE BETWEEN THE MAXIMUM AND THE MEAN
C     WITH THE MINIMUM AND THE MEAN EXCEEDS A THRESHOLD (D1) WE THROW
C     AWAY THE EXTREME POINT, OTHERWISE THE NORMAL AVERAGE IS PREFERRED.
C     IF IN THE REDUCED SAMPLE (MUST BE AT LEAST THREE SHIPS REMAINING)
C     THE ABOVE ABSOLUTE DIFFERENCE EXCEEDS ANOTHER THRESHOLD (D2), WE
C     THROW AWAY THE NEXT EXTREME POINT, OTHERWISE THE NORMAL AVERAGE
C     OF THE REDUCED SAMPLE IS PREFERRED.  D1 AND D2 ARE DEFINED IN
C     THE SUBROUTINE.
      COMMON/TWO/ IDMPM,NSHIPS,ARRAY(40,99,2),ARRAYC(99)
      COMMON/THREE/ ARRAYA(99,4),ARRAYD(99),ARRAYB(40),ARRAYE(40,99)
      COMMON/FOUR/ AVG1(99),AVG2(99),AVG3(99),AVG4(99),SM1,SM2,SM3,SM4,
     A             AVG5(99),SM5,AVG6(99),SM6
C     DEFINE THRESHOLD VALUES
      IF (I2.EQ.1)  READ (5,5)  D1,D2
    5 FORMAT (F5.4,1X,F5.4)
C     DETERMINE INITIAL ABSOLUTE DIFFERENCE
      XMAX = ARRAYE(NSHIPS,I2) - AVG1(I2)
      XMIN = AVG1(I2) - ARRAYE(1,I2)
      DELTA = ABS(XMAX - XMIN)
C     IF ABSOLUTE DIFFERENCE LESS THAN THRESHOLD  GO TO 30
      IF (DELTA.LT.D1    ) GO TO 30
C     IF ONLY THREE SHIPS, CANNOT THROW AWAY 2 POINTS, HENCE, GO TO 40
      IF (NSHIPS.EQ.3)  GO TO 40
C     GO TO 20 IF MAX IS MOST EXTREME POINT IN ORIGINAL SAMPLE
      IF (XMAX.GT.XMIN) GO TO 20
C     CALCULATE ABSOLUTE DIFFERENCE FOR REDUCED SAMPLE
      XMAXN = ARRAYE(NSHIPS,I2) - AVG5(I2)
      XMINN = AVG5(I2) - ARRAYE(2,I2)
      SUBTR = ARRAYE(NSHIPS,I2)
      IF (XMINN.GT.XMAXN)  SUBTR = ARRAYE(2,I2)
   10 DELTA = ABS(XMAXN - XMINN)
C     IF NEW ABSOLUTE DIFFERENCE LESS THAN THRESHOLD  GO TO 40
      IF (DELTA.LT.D2    ) GO TO 40
C     USE AVERAGE EXCLUDING TWO MOST EXTREME POINTS
      AVG6(I2) = (AVG5(I2)*(NSHIPS - 1) - SUBTR)/(NSHIPS - 2)
      IF (AVG6(I2).LT.0.)  AVG6(I2) = 0.
      RETURN
C     CALCULATE ABSOLUTE DIFFERENCE FOR REDUCED SAMPLE
   20 XMAXN = ARRAYE(NSHIPS - 1,I2) - AVG5(I2)
      XMINN = AVG5(I2) - ARRAYE(1,I2)
      SUBTR = ARRAYE(NSHIPS - 1,I2)
      IF (XMINN.GT.XMAXN)  SUBTR = ARRAYE(1,I2)
      GO TO 10
C     USE NORMAL AVERAGE
   30 AVG6(I2) = AVG1(I2)
      RETURN
C     USE AVERAGE EXCLUDING MOST EXTREME POINT
   40 AVG6(I2) = AVG5(I2)
      RETURN
      END
```

```
      SUBROUTINE PRINT1
C     PRINT INPUT PROFILES
      COMMON/ONE/ YARD(40),SHIP(40),HULL(40)
      COMMON/TWO/ IOMPM,NSHIPS,ARRAY(40,99,2),ARRAYC(99)
      COMMON/THREE/ ARRAYA(99,4),ARRAYD(99),ARRAYB(40),ARRAYE(40,99)
      REAL*8 YARD
      I3 = 1
      I4 = MIN0(NSHIPS,10)
    5 WRITE (6,10)
   10 FORMAT (1H1,17X,31HI N P U T       P R O F I L E S ,/,1X,26X,
     A   12H(IN PERCENT))
      WRITE (6,20)  (SHIP(I1),HULL(I1), I1=I3,I4)
   20 FORMAT (1H0,7HOMPM    ,10(1X,A4,1X,A4))
      WRITE (6,30)  (YARD(I1),I1=I3,I4)
   30 FORMAT (1H ,7X        ,10(3X,A5,2X))
      WRITE (6,30)
      DO 50    I2 = 1,IOMPM
      WRITE (6,40) ARRAYC(I2),(ARRAY(I1,I2,2) ,I1=I3,I4)
   40 FORMAT (1H ,A4,3X,10(F9.4,1X))
   50 CONTINUE
      WRITE (6,60) (ARRAYB(I1), I1=I3,I4)
   60 FORMAT (1H0,7H TOTAL ,/,1X,7HMANDAYS,10(F9.0,1X))
      IF (I4.EQ.NSHIPS) RETURN
      I3 = I3 + 10
      I4 = MIN0(NSHIPS,I3 + 9)
      GO TO 5
      END
```

```
      SUBROUTINE PRINT2
C     PRINT VARIOUS AVERAGES COMPUTED
      COMMON/TWO/ IDMPM,NSHIPS,ARRAY(40,99,2),ARRAYC(99)
      COMMON/THREE/ ARRAYA(99,4),ARRAYD(99),ARRAYB(40),ARRAYE(40,99)
      COMMON/FOUR/ AVG1(99),AVG2(99),AVG3(99),AVG4(99),SM1,SM2,SM3,SM4,
     A             AVG5(99),SM5,AVG6(99),SM6
      WRITE (6,10)
   10 FORMAT (1H1,84X,10H   AVERAGE,/,1X,54X,3(10H   AVERAGE),
     A20H   W/O MIN  SELECTED,/,1X,94HDMPM   MINIMUM   MAXIMUM     RANGE
     B    MEDIAN   AVERAGE   W/O MIN   W/O MAX   W/O EXT   W/O MAX,
     C 10H   AVERAGE,///)
      DO 30    I2 = 1,IDMPM
      IF (NSHIPS.EQ.1) WRITE (6,20) ARRAYC(I2),ARRAY(1,I2,2),
     A  ARRAY(1,I2,2),SM4,ARRAY(1,I2,2),ARRAY(1,I2,2),ARRAY(1,I2,2)
      IF (NSHIPS.EQ.1)  AVG6(I2) = ARRAY(1,I2,2)
      IF (NSHIPS.EQ.2)   AVG6(I2) = AVG1(I2)
      IF (NSHIPS.EQ.2) WRITE (6,20) ARRAYC(I2),(ARRAYA(I2,I3),I3=1,4),
     A   AVG1(I2),AVG1(I2)
      IF (NSHIPS.EQ.3) WRITE (6,21) ARRAYC(I2),(ARRAYA(I2,I3),I3=1,4),
     A   AVG1(I2),AVG3(I2),AVG2(I2),AVG5(I2),AVG6(I2)
      IF (NSHIPS.GT.3) WRITE (6,22) ARRAYC(I2),(ARRAYA(I2,I3),I3=1,4),
     A   AVG1(I2),AVG3(I2),AVG2(I2),AVG5(I2),AVG4(I2),AVG6(I2)
   20 FORMAT (1H ,A4,5F10.4,40X,F10.4)
   21 FORMAT (1H ,A4,8F10.4,10X,F10.4)
   22 FORMAT (1H ,A4,10(F10.4))
   30 CONTINUE
      IF (NSHIPS.EQ.2)  WRITE (6,40) SM1,SM1
      IF (NSHIPS.EQ.3)  WRITE (6,41) SM1,SM3,SM2,SM5,SM6
      IF (NSHIPS.GT.3)  WRITE (6,42) SM1,SM3,SM2,SM5,SM4,SM6
   40 FORMAT (1H0,12HUNNORMALIZED,/,1X,12H     TOTAL    ,32X,1F10.4,40X,
     A   F10.4)
   41 FORMAT (1H0,12HUNNORMALIZED,/,1X,12H     TOTAL    ,32X,4F10.4,10X,
     A   F10.4)
   42 FORMAT (1H0,12HUNNORMALIZED,/,1X,12H     TOTAL    ,32X,6F10.4)
C     PUNCH PREFERRED AVERAGE
      DO 60     I2 = 1,IDMPM
      WRITE (7,50)  ARRAYC(I2), AVG6(I2)
   50 FORMAT (A4,4X,F6.4)
   60 CONTINUE
      RETURN
      END
```

4.0 REPROF

4.1 Function

The purpose of REPROF is to develop a (normalized) DMPM repair profile from the weighted sum of up to nine (unnormalized) combined-ship repair profiles. The input consists of from one to nine combined-ship repair profiles, each consisting of 79 cards. Each card gives the fraction of manning for its corresponding DMPM. Since these inputs are derived from the output of the STATS program, the sum of the fractions for any profile is not guaranteed to add to one - hence the requirement to produce a normalized profile (i.e., where all the fractions do add to one). The capability to construct a normalized profile from the weighted average of more than one input profile is accomplished by the input of weights associated with all profiles. Table 2 below illustrates REPROF's accomplishment of its function. There is no limit on the number of normalized profiles REPROF can produce. An unlimited number of sets of weights and corresponding combined-ship repair profiles may be input.

TABLE 2 - DMPM NORMALIZED REPAIR PROFILE

DMPM	UNNORMALIZED PROFILE	NORMALIZED PROFILE
1001	0.0653	0.0523
1002	0.0660	0.0528
1003	0.0019	0.0015
.	.	.
.	.	.
.	.	.
9004	0.0	0.0
9005	0.0063	0.0050
TOTAL	1.2497	1.0000

4.2 Importance

REPROF was the sole source for the final creation of the DMPM repair profiles. The STATS program attempted to develop a combined-ship repair profile by ignoring extreme points. In some cases, decisions were made to override STATS choices. In either case, the combined-ship repair profile developed by STATS, with or without modifications, was generally not normalized. Thus REPROF was necessary to produce the final repair profile. The capability to produce a normalized profile from the weighted average of more than one input was used only for nuclear submarines. The components were non-nuclear repair, nuclear repair, and refueling (if appropriate). The following outputs were derived from REPROF:

1. A printed listing of the finalized repair profile along with those profiles and weights* used to create it.

2. A printed listing of the finalized repair profile summarized to the one digit SWBS level.

3. A punched card version of the finalized repair profile.

The printed output serves as a permanent record of the finalized repair profiles. The punched card output will be used to create the cataloged file of repair profiles for use in matrix creation. Once REPROF was run, its input was not saved since any modifications to a repair profile would in general require STATS to be rerun.

---

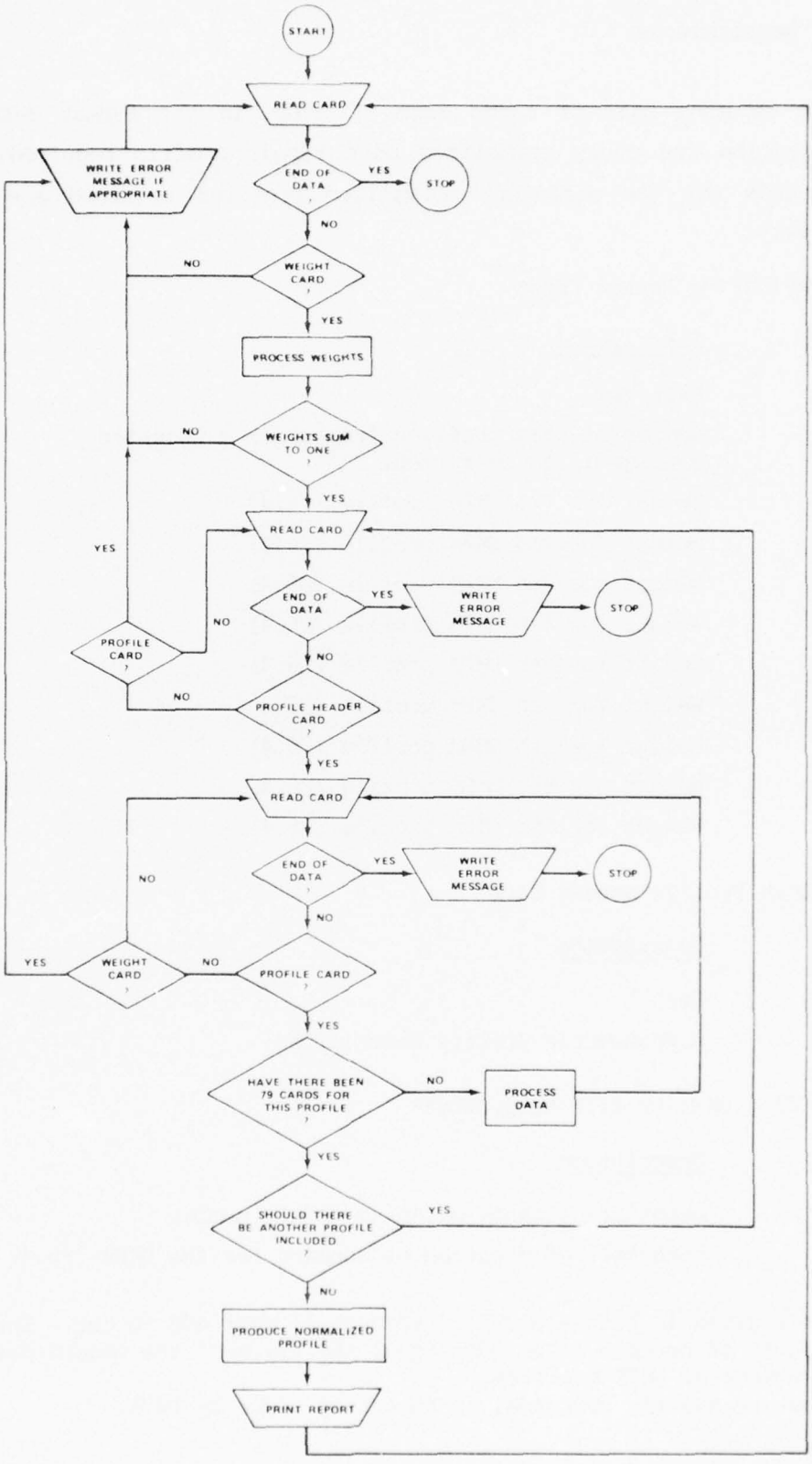
* Only if there was more than one component of the finalized repair profile.

4.3 Prospects for Future Use

The function that REPROF performs is essential if unnormalized profiles will in the future be developed by procedures similar to those employed in the STATS program. Until more sophisticated techniques of updating repair profiles on the basis of shipyard feedback are developed and implemented, REPROF will probably continue to be used as is currently being done.

Since the output of REPROF eventually becomes the actual repair profile for the given ship group (class, type, etc.), an eventual permanent link to the actual cataloged file of repair profiles could be developed. Inputs could be made to REPROF to indicate those ship/hull number combinations for which the normalized profile will apply. The output could be then put directly on the catalogued file in the proper format with the required selection criteria.

4.4 Overall Flowchart



4.5 User Requirements

Input as many sets of cards each of which in the format described in this section for every normalized DMPM repair profile required. The sets of cards for the different normalized profiles required are input consecutively.

Card 1 - Weighting Factor Card*

Columns	Description
1	Asterisk
4	Number of DMPM profiles from which a weighted average is to be formed.
9-14	Weight for 1st DMPM profile (F6.4)
16-21	Weight for 2nd DMPM profile (F6.4)
23-28	Weight for 3rd DMPM profile (F6.4)
30-35	Weight for 4th DMPM profile (F6.4)
37-42	Weight for 5th DMPM profile (F6.4)
44-49	Weight for 6th DMPM profile (F6.4)
51-56	Weight for 7th DMPM profile (F6.4)
58-63	Weight for 8th DMPM profile (F6.4)
65-70	Weight for 9th DMPM profile (F6.4)

Card 2 - DMPM Profile Header Card

Columns	Description
1	Dash
2-50	Alphanumeric profile description

Cards 3 - 81 - DMPM Profile Data Card**

Columns	Description
1-4	Depot maintenance planning module number
9-14	Unnormalized fraction of manning for the DMPM (F6.4)

*The weights given in data elements 3 through 11 must add to one. The number of weights of nonzero value must equal the value of the second data element - number of DMPM profiles.
**There must be exactly 79 cards, in ascending order by DMPM.

Repeat cards 2 through 81 for each DMPM profile that is to be included in the weighted average. For example, if the value of the second data element on the weighting factor card (number of DMPM profiles from which the weighted average is to be found) is N_1, then there must be $1 + 80N_1$ cards input for the first normalized profile required. If there are more normalized profiles required, then input next the second weighting factor card which the corresponding profiles, then the third set, etc., until no more profiles are required.

4.6 Sample Problem

The following three pages contain a sample output from REPROF corresponding to the selected average shown in Section 3.6. Pages 79-80 are a printed listing of the finalized repair profile. Page 81 is the finalized repair profile summarized to the one digit SWBS level.

NORMALIZED REPAIR PROFILES

BY DEPOT MAINTENANCE PLANNING MODULES (DMPM)

PROFILE SET	WEIGHT	DESCRIPTION
1	1.0000	CV 59 CLASS - RO

DMPM	WEIGHTED AVERAGE	SET 1
1001	0.0432	0.0432
1002	0.0	0.0
1003	0.0	0.0
1004	0.0	0.0
1005	0.0315	0.0315
1006	0.0	0.0
1007	0.0021	0.0021
1008	0.0004	0.0004
1009	0.0012	0.0012
2001	0.0004	0.0004
2002	0.0	0.0
2003	0.1357	0.1357
2004	0.0	0.0
2005	0.0164	0.0164
2006	0.0	0.0
2007	0.0223	0.0223
2008	0.0	0.0
2009	0.0246	0.0246
2010	0.0	0.0
2011	0.0102	0.0102
2012	0.0543	0.0543
2013	0.0104	0.0104
3001	0.0265	0.0265
3002	0.0083	0.0083
3003	0.0	0.0
3004	0.0	0.0
4001	0.0	0.0
4002	0.0	0.0
4003	0.0124	0.0124
4004	0.0	0.0
4005	0.0195	0.0195
4006	0.0067	0.0067
4007	0.0045	0.0045
4008	0.0	0.0
4009	0.0020	0.0020
4010	0.0006	0.0006
4011	0.0032	0.0032

DMPM	WEIGHTED AVERAGE	SET 1
5001	0.0019	0.0019
5002	0.0092	0.0092
5003	0.0	0.0
5004	0.0163	0.0163
5005	0.1075	0.1075
5006	0.0195	0.0195
5007	0.0037	0.0037
5008	0.0270	0.0270
5009	0.0267	0.0267
5010	0.0939	0.0939
5011	0.0272	0.0272
5012	0.0	0.0
5013	0.0	0.0
5014	0.0	0.0
6001	0.0031	0.0031
6002	0.0753	0.0753
6003	0.0029	0.0029
6004	0.0	0.0
6005	0.0	0.0
6006	0.0	0.0
6007	0.0	0.0
6008	0.0	0.0
6009	0.0224	0.0224
6010	0.0044	0.0044
6011	0.0	0.0
7001	0.0018	0.0018
7002	0.0285	0.0285
7003	0.0	0.0
7004	0.0	0.0
7005	0.0	0.0
7006	0.0	0.0
7007	0.0	0.0
8001	0.0	0.0
8002	0.0	0.0
8003	0.0	0.0
8004	0.0001	0.0001
8005	0.0	0.0
9001	0.0114	0.0114
9002	0.0091	0.0091
9003	0.0661	0.0664
9004	0.0	0.0
9005	0.0056	0.0056
TOTAL	1.0000	

SWBS	NORM. VALUE
100	0.0784
200	0.2743
300	0.0348
400	0.0489
500	0.3329
600	0.1081
700	0.0303
800	0.0001
900	0.0922
TOTAL	1.0000

4.7 Error Messages

The following errors are detected, messages printed and actions taken:

1. If a weighting factor card is being sought and is not found, a list of cards which are to be ignored is printed along with the following error message: WEIGHTING FACTOR CARD MISSING. THE FOLLOWING CARDS WILL BE IGNORED.

2. If a weighting factor card has weights which do not sum to one, that card is ignored and the following error message is printed: THE WEIGHTING FACTORS SPECIFIED ON THE FOLLOWING HEADER CARD DO NOT SUM TO 1.0. THE PROFILE SETS WHICH FOLLOW THIS HEADER CARD WILL BE IGNORED and a search for the next weighting factor card is initiated.

3. If a combined-ship profile data card is encountered when the I_{th} combined-ship profile header card of the current set is expected, that card is ignored and the following error message is printed: TITLE CARD MISSING FOR PROFILE I OR TOO MANY PROFILE CARDS FOR PREVIOUS SET. THE FOLLOWING CARD(S) WILL BE IGNORED, and a search for the next weighting factor card is initiated.

4. If a weighting factor card is encountered when a combined-ship profile data card is expected, the processing of the weighting factor card on which the program had been operating is terminated and the following error message is printed: WEIGHTING FACTOR CARD UNEXPECTEDLY ENCOUNTERED. CANNOT COMPLETE PROCESSING OF THIS SET OF PROFILES. Processing on the weighting factor card just read is then initiated.

5. If an unexpected end of file is encountered, processing terminates after the following error message is presented. END OF FILE UNEXPECTEDLY ENCOUNTERED. CANNOT COMPLETE PROCESSING OF THIS SET OF PROFILES.

6. If a combined-ship profile header card is encountered when a profile data card from the I^{th} profile is expected, the set of combined-ship profiles currently being processed is skipped and the following error message is printed: TOO FEW DMPM's FOR PROFILE I. REMAINING CARDS FOR THIS SET OF PROFILES WILL BE IGNORED. A search for the next weighting factor card is then initiated.

4.8 File Descriptions

4.8.1 File Descriptions - Output

Unit 6 - See sample problem.

Unit 7 - Punched Cards

Cards in the following formats are produced for each normalized profile created.

Cards 1 to I (where there were I combined-ship repair profiles to be consolidated and normalized)

Columns	Description
1	Dash
2 - 50	Alpha numeric description of included combined-ship profile

Cards I + 1 to I + 80*

Columns	Description
1 - 4	DMPM number
9 - 14	Normalized function of manning for the DMPM (F6.4)

4.8.2 File Descriptions - Input

Unit 5 - See user requirements.

* Cards are punched in ascending order by DMPM number.

4.9 Hierarchical Chart

There is only a main program.

4.10 Subroutine Descriptions

MAIN PROGRAM

MAIN performs the entire function of REPROF. The following text elaborates some specific details that have not yet been stated.

When MAIN is searching for a particular kind of card (e.g., weighting factor, profile header, or profile data card), it does so by looking at column one. An asterisk implies a weighting factor card. A dash implies a combined-ship profile header card. And a non-blank, non-asterisk, non-dash implies a combined-ship profile data card. If ever a blank is encountered in column one, that card is skipped without mention.

When MAIN produces a normalized profile, the final product is guaranteed to sum to one at four decimal place accuracy. This is accomplished by appropriately adjusting the value of DMPM 9003.

4.11 Glossary

ANORM(ISET,I)	The normalized value for the I-th DMPM of the ISET-th combined-ship profile currently being summed and normalized
AST	One alphanumeric asterisk ("*")
BLANK	One alphanumeric blank
CTYPE	Card type indicator
DASH	Five alphanumeric dashes ("-----")
ERROR	Difference between 1.0 and the sum of the weighted average repair profile (see array WTAVG)
HYPHEN	One alphanumeric hyphen ("-")
IDMPM(I)	The number of the I-th DMPM of the combined-ship profile currently being read
ISET	The set number of the combined-ship profiles to be summed and normalized
ISWBS	The (single digit) SWBS categories
JPREV	Variable used to determine carriage control of the printed output
MARKER	Marker which is set to "1" when an error (in the order of the cards input) is encountered-cards following the erroneous card will be ignored until a weighting factor card is found
NSETS	The number of combined-ship profiles to be summed and normalized
SELAVG(I)	Unnormalized value for the I-th DMPM of the combined-ship profile currently being read
SWBS(J)	Fraction of manning for the J-th single digit SWBS for the current final repair profile (normalized)
TITLE(I)	Title (alphanumeric) of the current combined-ship profile

TOTAL	Sum of the unnormalized values for the current combined-ship profile
TOTAL2	Sum of the normalized values for the current DMPM repair profile
TOTAL3	Sum of the values, by SWBS, associated with the current final DMPM repair profile
TOTWT	Sum of the factors to be used to compute the weighted average of the sets of combined-ship profiles input
WEIGHT(I)	Weighting factor for the I-th combined-ship profile
WTAVG(I)	Weighted average of the normalized values for the I-th DMPM, of the combined-ship profiles being summed and normalized - the weighted average value is rounded to four decimal places

4.12 Program Listing

The following four pages contain a complete listing of REPROF.

```
C*****PROGRAM REPROF(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE7)          **** 10
C                                                                          REPR 20
C                                                                          REPR 30
C      REPROF (DMPM REPAIR PROFILES) PREPARES A REPAIR PROFILE, BY DMPM,   REPR 40
C FOR A GROUP OF SHIPS BY TAKING A WEIGHTED AVERAGE OF THE REPAIR          REPR 50
C PROFILES OF UP TO 9 DIFFERENT SHIP CATEGORIES.  THE WEIGHTING FACTORS    REPR 60
C ARE INPUT (VIA CARDS), AS ARE THE DMPM PROFILES OF THE SHIP CATE-        REPR 70
C GORIES TO BE COMBINED.  THESE INPUT PROFILES NEED NOT BE NORMALIZED -    REPR 80
C REPROF NORMALIZES THEM PRIOR TO USING THE VALUES TO COMPUTE THE          REPR 90
C WEIGHTED AVERAGE.                                                        REPR 100
C                                                                          REPR 110
C      IN ADDITION, REPROF SUMS THE APPROPRIATE DMPM VALUES OF THE         REPR 120
C RESULTANT PROFILE TO OBTAIN THE REPAIR VECTOR BY SWBS GROUPING.          REPR 130
C                                                                          REPR 140
C      OUTPUT OF REPROF CONSISTS OF,                                       REPR 150
C                                                                          REPR 160
C ----PRINTOUT OF THE REPAIR PROFILES INPUT FOR EACH SHIP CATEGORY TO      REPR 170
C BE COMBINED TOGETHER (AFTER NORMALIZATION BY REPROF).                    REPR 180
C                                                                          REPR 190
C ----PRINTOUT OF THE CALCULATED REPAIR PROFILE WHICH SYNTHESIZES THE      REPR 200
C REPAIR PROFILES OF THE VARIOUS SHIP CATEGORIES FOR THIS SHIP GROUPING.   REPR 210
C                                                                          REPR 220
C ----PUNCHED DECK OF THE CALCULATED REPAIR PROFILE.                       REPR 230
C                                                                          REPR 240
C ----PRINTOUT OF THE SWBS SUMMARY VECTOR.                                 REPR 250
C                                                                          REPR 260
C      THE UNITS USED BY REPROF ARE SUMMARIZED BELOW.                      REPR 270
C                                                                          REPR 280
C UNIT 5 - INPUT  - CARD INPUTS (WEIGHTING FACTORS, HEADER CARDS,          REPR 290
C                   UNNORMALIZED REPAIR PROFILES FOR VARIOUS SHIP          REPR 300
C                   CATEGORIES, ETC.)                                      REPR 310
C UNIT 6 - OUTPUT - PRINTOUT OF REPAIR PROFILES AND SWBS VECTOR.           REPR 320
C UNIT 7 - OUTPUT - REPAIR PROFILES AS CALCULATED BY REPROF (FOR           REPR 330
C                   PUNCHING).                                             REPR 340
C                                                                          REPR 350
C                                                                          REPR 360
      REAL*8 DASH                                                          **** 370
C                                                                          REPR 380
      DIMENSION IDMPM(100),  SELAVG(100),TITLE(19),ANORM(9,79),SWBS(9),    REPR 390
     .    WTAVG(79),WEIGHT(9)                                              REPR 400
C                                                                          REPR 410
      DATA HYPHEN/1H-/,  AST/1H*/, BLANK/1H /, DASH/5H-----/               REPR 420
C                                                                          REPR 430
C ------------------------------------------------------------------       REPR 440
C                                                                          REPR 450
C                                                                          REPR 460
C EXPECT WEIGHTING FACTOR CARD.  ENCOUNTER OTHER CARD.  ----------         REPR 470
      MARKER=0                                                             REPR 480
C**40 READ(5,50)          CTYPE,TITLE                                      **** 490
   40 READ(5,50,END=90)   CTYPE,TITLE                                      **** 500
   50 FORMAT (A1,19A4)                                                     REPR 510
C*****IF (EOF(5).NE.0.0)  GO TO 90                                         **** 520
      IF (CTYPE.EQ.AST)   GO TO 100                                        REPR 530
      IF (CTYPE.EQ.BLANK)  GO TO 40                                        REPR 540
      IF (MARKER.NE.0)  GO TO 70                                           REPR 550
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C                                                                       REPR 560
      WRITE (6,60)                                                      REPR 570
   60 FORMAT(1H1,9X,45HWEIGHTING FACTOR CARD MISSING.  THE FOLLOWING,   REPR 580
C****.     25H CARD(S) WILL BE IGNORED,/)                               **** 590
     .     25H CARD\S' WILL BE IGNORED,/)                               **** 600
   65 MARKER=1                                                          REPR 610
   70 WRITE (6,80)  CTYPE,TITLE                                         REPR 620
   80 FORMAT (20X,A1,19A4)                                              REPR 630
      GO TO 40                                                          REPR 640
   90 STOP                                                              REPR 650
C                                                                       REPR 660
C WEIGHTING FACTOR CARD FOUND.  READ IT.  ----------------------        REPR 670
  100 MARKER=0                                                          REPR 680
      BACKSPACE 5                                                       REPR 690
      READ (5,110)       NSETS,(WEIGHT(I),I=1,9)                        REPR 700
  110 FORMAT (3X,I1,4X,9(F6.4,1X))                                      REPR 710
C                                                                       REPR 720
C CHECK THAT WEIGHTING FACTORS SUM TO 1.0 ----------------------        REPR 730
      TOTWT=0.0                                                         REPR 740
      DO 120 I=1,NSETS                                                  REPR 750
  120 TOTWT=TOTWT + WEIGHT(I)                                           REPR 760
      IF (TOTWT.EQ.1.0)  GO TO 140                                      REPR 770
      WRITE (6,130)  (WEIGHT(I),I=1,NSETS)                              REPR 780
  130 FORMAT (1H1,10X,38HTHE WEIGHTING FACTORS SPECIFIED ON THE,        REPR 790
     .     40H FOLLOWING HEADER CARD DO NOT SUM TO 1.0,//               REPR 800
C****.     20X,9HWEIGHTS =,9(2X,F6.4) //11X,22HTHE PROFILE SETS WHICH,  **** 810
     .     20X,9HWEIGHTS  ,9(2X,F6.4) //11X,22HTHE PROFILE SETS WHICH,  **** 820
     .     41H FOLLOW THIS HEADER CARD WILL BE IGNORED.)                REPR 830
      MARKER=1                                                          REPR 840
      GO TO 40                                                          REPR 850
C                                                                       REPR 860
C PRINT PROFILE GROUPING HEADING.  ------------------------------       REPR 870
  140 ISET=0                                                            REPR 880
      WRITE (6,150)                                                     REPR 890
  150 FORMAT (1H1,19X, 26HNORMALIZED REPAIR PROFILES/19X,26(1H-)/       REPR 900
     .     10X,44HBY DEPOT MAINTENANCE PLANNING MODULES (DMPM)/         REPR 910
     .     10X,44(1H-)// 10X,7HPROFILE/12X,2HSET      WEIGHT   DESCRIPTIOREPR 920
     .N/   10X,30H-------   ------   -----------/)                     REPR 930
C                                                                       REPR 940
C INITIALIZE WEIGHTED AVERAGE ARRAY.  ------------------------------    REPR 950
      DO 160 I=1,79                                                     REPR 960
  160 WTAVG(I)=0.0                                                      REPR 970
  170 I=1                                                               REPR 980
      ISET=ISET + 1                                                     REPR 990
      TOTAL=0.0                                                         REPR1000
C                                                                       REPR1010
C EXPECT PROFILE TITLE CARD.  ENCOUNTER OTHER CARD.  -------------      REPR1020
C*175 READ (5,50)           CTYPE,TITLE                                 ****1030
  175 READ (5,50,END=200)  CTYPE,TITLE                                  ****1040
C*****IF (EOF(5).NE.0.0)  GO TO 200                                     ****1050
      IF (CTYPE.EQ.HYPHEN)  GO TO 220                                   REPR1060
      IF (CTYPE.EQ.BLANK)  GO TO 175                                    REPR1070
      IF (CTYPE.EQ.AST)  GO TO 175                                      REPR1080
C                                                                       REPR1090
      MARKER=1                                                          REPR1100
      WRITE (6,180)  ISET                                               REPR1110
  180 FORMAT (1H0,9X,30HTITLE CARD MISSING FOR PROFILE, I2,             REPR1120
     .     44H OR TOO MANY PROFILE CARDS FOR PREVIOUS SET./             REPR1130
C****.     10X,38HTHE FOLLOWING CARD(S) WILL BE IGNORED,/)              ****1140
     .     10X,38HTHE FOLLOWING CARD\S' WILL BE IGNORED,/)              ****1150
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AD-A043 775 MANTECH OF NEW JERSEY CORP LIVINGSTON F/G 13/10
DEPOT MAINTENANCE PLANNING AND PROGRAMMING SYSTEM (DMPPS). REPA--ETC(U)
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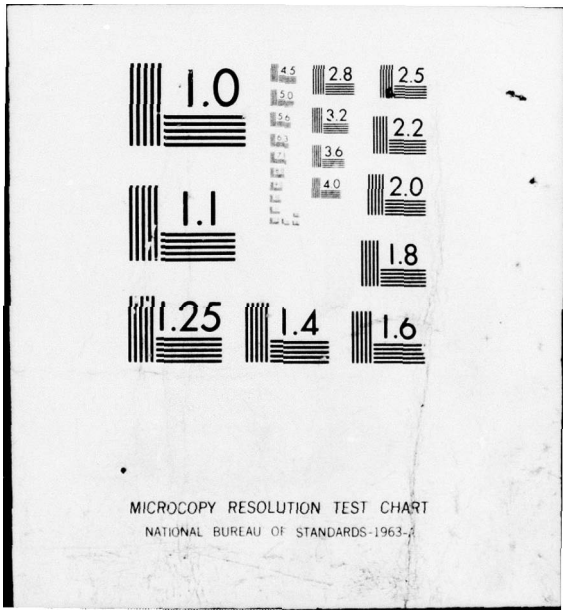
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MICROCOPY RESOLUTION TEST CHART
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      GO TO 65                                                          REPR1160
C                                                                       REPR1170
  195 WRITE (6,190)                                                     REPR1180
  190 FORMAT (1H0,9X,47HWEIGHTING FACTOR CARD UNEXPECTEDLY ENCOUNTERED..REPR1190
     .    53H  CANNOT COMPLETE PROCESSING OF THIS SET OF PROFILES.)     REPR1200
      GO TO 100                                                         REPR1210
C                                                                       REPR1220
  200 WRITE (6,210)                                                     REPR1230
  210 FORMAT (1H0,9X,45HEND OF FILE UNEXPECTEDLY ENCOUNTERED.  CANNOT,  REPR1240
     .    45H COMPLETE PROCESSING OF THIS SET OF PROFILES.)             REPR1250
      STOP                                                              REPR1260
C                                                                       REPR1270
C TITLE CARD FOUND.  PRINT IT.  ---------------------------------       REPR1280
  220 WRITE (6,225)  ISET,WEIGHT(ISET),TITLE                            REPR1290
  225 FORMAT (13X,I1,6X,F6.4,3X,19A4)                                   REPR1300
      WRITE (7,50)  CTYPE,TITLE                                         REPR1310
C                                                                       REPR1320
C EXPECT PROFILE CARD.  ENCOUNTER OTHER CARD.  ------------------       REPR1330
C*230 READ (5,50)           CTYPE,TITLE                                 ****1340
  230 READ (5,50,END=200)  CTYPE,TITLE                                  ****1350
C*****IF (EOF(5).NE.0.0)  GO TO 200                                     ****1360
      IF (CTYPE.EQ.AST)  GO TO 185                                      REPR1370
      IF (CTYPE.EQ.BLANK)  GO TO 230                                    REPR1380
      IF (CTYPE.NE.HYPHEN)  GO TO 250                                   REPR1390
C                                                                       REPR1400
      WRITE (6,240)  ISET                                               REPR1410
C*240 FORMAT (1H0,9X,26HTOO FEW DMPM'S FOR PROFILE, I2,                 ****1420
  240 FORMAT (1H0,9X,26HTOO FEW DMPM@S FOR PROFILE, I2,                 ****1430
     .    60H.  REMAINING CARDS FOR THIS SET OF PROFILES WILL BE IGNOREDREPR1440
     ../)                                                               REPR1450
      GO TO 65                                                          REPR1460
C                                                                       REPR1470
C PROFILE CARD FOUND.  READ IT.  --------------------------------       REPR1480
  250 BACKSPACE 5                                                       REPR1490
      READ (5,260)  IDMPM(I),SELAVG(I)                                  REPR1500
  260 FORMAT(I4,4X,F6.4)                                                REPR1510
      TOTAL=TOTAL+SELAVG(I)                                             REPR1520
      IF (I.EQ.79)  GO TO 270                                           REPR1530
      I=I+1                                                             REPR1540
      GO TO 230                                                         REPR1550
C                                                                       REPR1560
C NORMALIZE VECTOR VALUES.  -------------------------------------       REPR1570
  270 DO 280 I=1,79                                                     REPR1580
      ANORM(ISET,I)=SELAVG(I)/TOTAL                                     REPR1590
  280 WTAVG(I)=WTAVG(I) + WEIGHT(ISET)*ANORM(ISET,I)                    REPR1600
      IF (ISET.LT.NSETS)  GO TO 170                                     REPR1610
C                                                                       REPR1620
C ROUND WEIGHTED AVERAGE TO FOUR DECIMAL POINTS.  ---------------       REPR1630
      TOTAL2=0.0                                                        REPR1640
      DO 290 I=1,79                                                     REPR1650
      WTAVG(I)=FLOAT(IFIX((WTAVG(I) + .00005)*10000.))/10000.           REPR1660
  290 TOTAL2=TOTAL2 + WTAVG(I)                                          REPR1670
C                                                                       REPR1680
C INSURE THAT ROUNDED VALUES ADD TO 1.0.  ------------------------       REPR1690
      ERROR=1.0-TOTAL2                                                  REPR1700
      IF (ERROR.EQ.0.0)  GO TO 300                                      REPR1710
      WTAVG(77)=WTAVG(77) + ERROR                                       REPR1720
      TOTAL2=TOTAL2 + ERROR                                             REPR1730
C                                                                       REPR1740
      DO 295 J=1,9                                                      REPR1750
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  295 SWBS(J)=0.0                                                          REPR1760
C                                                                          REPR1770
C PRINT WEIGHTED AVERAGES AND NORMALIZED VALUES FOR ALL PROFILES. --       REPR1780
  300 WRITE (6,310)  (BLANK,ISET,ISET=1,NSETS)                             REPR1790
  310 FORMAT (1H0/1H0,17X,8HWEIGHTED/ 10X,15HOMPM     AVERAGE,3X,         REPR1800
     .    9(A3,3HSET,I2))                                                  REPR1810
C                                                                          REPR1820
      WRITE (6,320)  (DASH,I=1,NSETS)                                      REPR1830
  320 FORMAT (10X,16H----     --------,2X,9(3X,A5)/)                       REPR1840
C                                                                          REPR1850
      JPREV=1                                                              REPR1860
      DO 370 I=1,79                                                        REPR1870
      IF (I.NE.38)  GO TO 340                                              REPR1880
      JPREV=5                                                              REPR1890
      WRITE (6,330)                                                        REPR1900
  330 FORMAT (1H1)                                                         REPR1910
      WRITE (6,310)  (BLANK,ISET,ISET=1,NSETS)                             REPR1920
      WRITE (6,320)  (DASH,ISET=1,NSETS)                                   REPR1930
  340 J=IFIX(FLOAT(IOMPM(I))/1000.0)                                       REPR1940
      SWBS(J)=SWBS(J) + WTAVG(I)                                           REPR1950
      IF (J.EQ.JPREV)  GO TO 355                                           REPR1960
      JPREV=J                                                              REPR1970
      WRITE (6,350)                                                        REPR1980
  350 FORMAT (1X)                                                          REPR1990
  355 WRITE (6,360)  IOMPM(I),WTAVG(I),(ANORM(ISET,I),ISET=1,NSETS)        REPR2000
  360 FORMAT (10X,I4,4X,F6.4,4X,9(2X,F6.4))                                REPR2010
  370 WRITE (7,260)  IOMPM(I),WTAVG(I)                                     REPR2020
C                                                                          REPR2030
      WRITE (6,375)  TOTAL2                                                REPR2040
  375 FORMAT (1H0,8X,5HTOTAL,4X,F6.4)                                      REPR2050
C                                                                          REPR2060
C PRINT SWBS VECTOR.  ------------------------------------------           REPR2070
C                                                                          REPR2080
      WRITE (6,380)                                                        REPR2090
  380 FORMAT (1H1/     10X,19HSWBS     NORM. VALUE/10X,19H----     --------REPR2100
     .--- /)                                                               REPR2110
      TOTAL3=0.0                                                           REPR2120
      DO 400 J=1,9                                                         REPR2130
      ISWBS=J*100                                                          REPR2140
      TOTAL3=TOTAL3 + SWBS(J)                                              REPR2150
      WRITE (6,390)  ISWBS,SWBS(J)                                         REPR2160
  390 FORMAT (10X,I4,6X,F6.4)                                              REPR2170
  400 CONTINUE                                                             REPR2180
      WRITE (6,410)  TOTAL3                                                REPR2190
  410 FORMAT (1H0,8X,5HTOTAL,6X,F6.4)                                      REPR2200
      GO TO 40                                                             REPR2210
      END                                                                  REPR2220
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