211 21 ENGINE MAINTENANCE SHOP (NON-NARF) (SF)

This section provides the method for determining the space requirement for the Power Plants Division (Engine Maintenance Shop) of an Intermediate Maintenance Activity (IMA). The Navy and Marine Corps Chain-of-Command through OPNAVINST 4790.2 assigned aircraft maintenance tasks and responsibilities to air activities which in turn establish individual work centers to perform these tasks. With regard to engine maintenance, individual work centers are established for each type of engine assigned, i.e., a work center would be established for the J-79 engine. Work centers may also be established for specialized maintenance tasks assigned to the activity, such as propeller maintenance, rotor dynamics maintenance, etc. Under the criteria outlined below, Engine Maintenance Shop space is allocated by work center to support maintenance tasks for assigned engines, equipment, or components authorized for repair at the activity by higher authority. The Engine Shop work centers, which are authorized for individual activities, can be obtained from the Individual Component Repair List (ICRL).

Table 211 21A lists the space required for all work centers involved in engine maintenance for the various types and numbers of aircraft within the Navy's inventory. (Certain aircraft types, such as the C-118 and S-2, are not listed because they have negligible impact on the sizing of an Engine Maintenance Shop.) First and second degree maintenance, as well as the following data items, were considered in calculating the listed space:

1. Size of engine
2. Number of engines per aircraft
3. Number, type and size of required maintenance stands
4. Work benches
5. Work center administrative and storage area
6. Fire lane/aisle space
7. Mean flight hours between failure (MFHBF) of engines requiring removal to an IMA
8. Averaged turn around time (TAT) of engine in IMA
9. Flight hours between inspections (FHBI)
10. Elapsed inspection time (EIT)
11. Quick engine change assembly (QECA) build up time (EBT)
12. Aircraft monthly utilization

To use Table 211-2lA, enter the total number of each aircraft type (EA-6, KA-6 and A-6 are considered one type, A-6s) into the appropriate column and read the area. Then total the areas read from the columns for each

aircraft model assigned engine maintenance.

Engine Maintenance Shop High Bay space, in addition to that shown in Table 211-21A, may be required for engine related components as indicated below if specialized work centers have been authorized for any of the following: (Only one work center of each type required, for example, only one APU work center at 1800 SF is required even if C-130, F-18 and S-3 aircraft are assigned.)

1. Auxiliary Fuel Stores associated with the A-4, A-6, A-7, F-4, F-14, F-18 - add 3375 S.F.

2. Auxiliary Power Unit (APU) associated with the C-2, C-130, F-18, H-46, H-53, H-60, P-3, S-3, AV-8 - add 1800 S.F.

3. Propellers associated with the C-2, C-130, E-2, P-3, T-34, OV-10 add 2925 S.F.

4. Rotor Dynamics associated with any helo - add 3375 S.F.

The space derived from Table 211-21A, in addition to any authorized above for specialized work centers, constitutes the high bay area of the Engine Maintenance Shop.

To determine the remaining space requirements for an Engine Maintenance Shop (i.e., administrative and other support functions such as cleaning, welding, supply support and storage) normally housed in the shop wings and mezzanine areas use the percentage factors in Table 211-21B applied to the areas established from Table 211-21A. Do not apply the percentage factors to the areas for specialized work centers shown above. See Examples 1 and 2 following these criteria.

TABLE 211-21A
Space Allowance for Engine Maintenance Shop
(High Bay Engine)

A-4 J52		A-6 J52		A-7 TF41		F-4 J79		F-14 TF30		F-18 F404	
No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA
1-9	925	1-8	1475	1-10	1975	1-8	1075	1-8	1975	1-8	1475
10-19	1475	9-16	2575	11-21	3575	9-16	3575	9-17	3575	9-17	2575
20-28	2025	17-24	3675	22-32	5175	17-24	5175	18-26	5175	18-25	3675
29-38	2575	25-32	4775	33-42	6775	25-32	6775	27-35	6775	26-34	4775
39-47	3125	33-40	5875	63-53	8375	33-40	8375	36-46	8375	35-43	5875
48-57	3675	41-48	6975	54-63	9975	41-49	9975	45-53	9975	44-51	6975
58-66	4225	49-56	8075	64-74	11575	50-57	11575	54-62	11575	52-60	8075
67-76	4775	57-64	9175	75-85	13175	58-65	13175	63-71	13175	61-69	9175
77-85	5325	65-72	10275	86-95	14775	66-73	16775	72-79	14775	70-77	10275
86-95	5875	73-80	11375	96-106	16375	74-81	16375	80-88	16375	78-86	11375
96-104	6425	81-88	12475	107-116	17975	82-89	17975	89-97	17975	87-94	12475
105-114	6975	89-96	13575	117-127	19575	90-98	19575	98-106	19575	93-103	13575
115-123	7525	97-104	14675	128-135	21175	99-106	21175	107-115	21175	104-112	14675
124-133	8075	105-112	15775	136-148	22775	107-114	22775	116-124	21775	113-121	15775
134-142	8625	113-120	16875	149-150	23575	115-122	24375	125-133	24375	122-129	16875
143-150	9175	121-128	17975			123-130	25975	134-142	25975	130-138	17975
		129-136	19075			131-138	27575	143-150	27575	139-147	19075
		137-145	20175			139-150	29175			148-150	19625
		146-150	20725								

H-1 T400		H-2 T58		H-3 T58		H-46 T58		H-53 T64		H-60 T700	
No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA
1-16	775	1-6	1175	1-8	1175	1-21	775	1-6	925	1-9	775
17-33	1175	7-12	1975	9-16	1975	22-42	1175	7-12	1475	10-18	1175
34-49	1575	13-19	2775	17-24	2775	43-64	1575	13-18	2025	19-28	1575
50-66	1975	20-25	3575	25-32	3575	65-85	1975	19-24	2575	29-37	1975
67-83	2375	26-32	4375	33-41	4375	86-107	2375	25-30	3125	38-47	2375
86-99	2775	33-38	5175	42-49	5175	108-128	2775	31-36	3675	48-56	2775
100-116	3175	39-45	5975	50-57	5975	129-150	3175	37-42	4225	57-65	3175
117-133	3575	46-51	6775	58-65	6775			43-48	6775	66-75	3575
134-150	3975	52-57	7575	66-74	7575			49-54	5325	76-84	3975
		58-64	8375	75-82	8375			55-60	5875	85-94	4375
		65-70	9175	83-90	9175			61-66	6425	95-103	4775
		71-77	9975	91-98	9975			67-72	6975	104-113	5175
		78-87	10775	99-106	10775			73-78	7525	114-122	5575
		84-90	11575	107-115	11575			79-85	8075	123-131	5975
		91-96	12375	116-123	12375			86-91	8625	132-141	6375
		97-102	13175	124-131	1317s			92-103	9725	142-150	6775
		103-115	14775	132-139	13975			104-115	10825		
		116-128	16375	169-148	14775			116-127	11925		
		129-141	17975	149-150	15175			128-139	13025		
		142-150	19175					140-150	14125		

TABLE 211-21A (continued)

C-2 T56		C-130 T56		P-3 T56		s-3 TF34		AV-8 F402		OV-10 T76	
No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA
1-19	1175	1-10	1975	1-8	1175	1-6	925	1-11	2775	1-8	775
20-39	1975	11-20	3575	9-16	1975	7-13	1475	12-22	5175	9-16	1175
40-58	2775	21-30	5175	17-24	2275	14-19	2025	23-33	7575	17-24	1575
59-76	3575	31-41	6775	25-32	3575	20-26	2575	34-45	9975	25-32	1975
79-97	4375	42-51	8375	33-40	4375	27-32	3125	46-56	12375	33-60	2375
98-117	5175	52-61	9975	41-48	5175	33-39	3675	57-67	14775	41-49	2775
118-136	5975	62-71	11575	49-57	5975	40-45	4225	68-78	17175	50-57	3175
137-150	6775	72-82	13175	58-65	6775	46-52	4775	79-80	19575	58-65	3575
		83-92	14775	66-73	7575	53-59	5325	91-101	21975	66-73	3975
		93-102	16375	74-81	8375	60-65	5875	102-112	24375	74-81	4375
		103-112	17975	82-89	9175	66-72	6425	113-123	26775	82-90	4775
		113-123	19575	90-97	9975	73-78	6975	124-135	29175	91-98	5175
		124-133	21175	98-106	10775	79-85	7525	136-146	31575	99-106	5575
		134-143	22775	107-114	11575	86-31	8075	147-150	33975	107-114	5975
		146-150	26375	115-122	12375	92-98	8625			115-122	6375
				123-130	13175	99-105	9175			123-130	6775
				131-138	13975	106-111	9725			131-139	7175
				139-146	14775	112-124	10825			140-147	7575
				147-150	15575	125-137	11925			148-150	7975
						138-140	13025				

E-2 T56	
No A/C	AREA
1-39	1175
40-78	1975
79-116	2775
117-150	3575

TA-4 J52		TH-1 T53		T2C J85		T-34C PT-6		T-39D J60		T-44A PT-6	
No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA	No A/C	AREA
1-7	925	1-26	775	1-7	1175	1-6	775	1-6	1475	1-8	1175
8-15	1475	27-53	1175	8-16	1975	7-13	1175	7-13	2575	9-16	1975
16-23	2025	54-80	1575	15-22	2775	14-20	1575	14-20	3675	17-24	2775
24-30	2575	81-107	1975	23-29	3575	21-27	1975	21-27	4775	25-33	3575
31-38	3125	108-134	2375	30-37	4375	28-33	2375	28-34	5875	34-41	4375
39-46	3675	135-150	2775	38-46	5175	36-40	2775	35-41	6975	42-49	5175
47-54	4225			45-52	5975	41-47	3175	42-48	8075	50-57	5975
55-61	4775			53-59	6775	48-54	3575	49-55	9175	58-66	6775
62-69	5325			60-67	7575	55-60	3975	56-62	10275	67-74	7575
70-77	587 5			68-74	8375	61-67	4375	62-68	11375	75-83	8375
78-84	6425			75-82	9175	68-74	4775	69-75	12475	84-91	9175
85-92	6975			83-89	9975	75-81	5175	76-82	13575	92-99	9975
93-100	7525			90-97	10775	82-88	5575	83-89	14675	100-108	10775
101-108	8075			98-104	11575	89-94	5975	90-96	15775	109-116	11575
109-115	8625			105-111	12375	95-101	6375	97-103	16875	117-124	12375
116-123	9175			112-119	13175	102-108	6775	104-110	17959	125-132	13175
126-131	9725			120-126	13975	109-115	7175	111-117	19075	133-141	13975
132-138	10275			127-134	16775	116-121	7575	118-124	20175	142-150	14775
139-146	10825			135-141	15575	122-135	8375	125-137	22375		
147-150	11375			142-150	16375	136-150	9175	138-150	16575		

TF-57 T-63	
No A/C	AREA
1-15	575
16-30	775
31-65	945
46-60	1175
61-75	1375
76-90	1575
91-105	1775
106-120	1975
121-135	2175
136-150	2375

TABLE 211-21B
Space Allowance for Engine Maintenance Shop
(Administration Areas)

up to	15,000 SF	50%	32,501	35,000	42%
15,001	17,500	49%	35,001	37,500	41%
17,501	20,000	48%	37,501	40,000	40%
20,001	22,500	47%	40,001	42,500	39%
22,501	25,000	46%	42,501	45,000	38%
25,001	27,500	45%	45,001	47,000	37%
27,501	30,000	44%	47,501	50,000	36%
30,001	32,500	43%	50,001	and up	35%

EXAMPLE NO. 1: Air station base loading is 47 A6E, 14 KA6D, 29 EA6B, 11 UH-1N, 9 P3A, 4 C-118D, 2 EA6A.

A/C No. & Type	High Bay-Engine (Table 211-2lA)	Rotor Dynamics	APU	PROPS	Aux. Fuel Stores	Total High Bay
92 A6	13575	-	-	-	3375	16950
11 H1	-	-	-	-	-	Note 1
9 P3	1975	-	1800	2925	-	6700
4 C-118	-	-	-	-	-	Note 1
	15550					23650

Shop Administration (Table 211-21B) 15550 x .49 = 7595 S.F.
Total Engine Maintenance Shop 23650 + 7595 = 31245 S.F.

EXAMPLE NO. 2: Air station has 2 C-117, 16 CH-46, 5 OV-10A, 5 AH-1J, 10 UH-1N, 1 CH-53, 8 C-130, 22 A4M, 13 AV-8A.

A/C No. & Type	High Bay-Engine (Table 211-21A)	Rotor Dynamics	APU	PROPS	Aux. Fuel Stores	Total High Bay
2 C-117	-	-	-	-	-	Note 1
16 H-46	775	3375	1800	-	-	5950
5 OV-10	775	-	-	-	-	775
15 H-1	775	Note 2	-	-	-	775
1 H-53	-	-	-	-	-	Note 1
8 C-130	1975	-	Note 2	2925	-	4900
22 A4	2025	-	-	-	3375	5400

A/C No. & Type	High Bay-Engine (Table 211-21A)	Rotor Dynamics	APU	PROPS	Aux. Fuel Stores	Total High Bay
13 AV-8	5175	-	Note 2	-	-	5175
	11500					22975

Administration 11500 x .50 = 5750
Total Engine Maintenance Shop 22975 + 5750 = 28725 S.F.

Note 1 - Activity does not have second and third degree maintenance responsibility for the engine or components per ICRL.

Note 2 - Only one component work center of each type required.