



211 45 AVIONICS SHOP (NON-NARF) (SF)

An avionics shop at the intermediate maintenance level is required at Navy and Marine Corps air installations for the testing, maintenance, and repair

of avionics systems. See the basic Category 211 Supplement which provides additional planning guidance for Marine Corps activities. The avionics shops have some common spaces which vary proportionally with the overall shop size. These spaces include administrative, mechanical equipment, electrical, vari-drive, instrument calibration, material control, ready-for-issue, rotatable pool, production control, classified storage, module test and repair, cleanroom, shielded, and crypto spaces. The shops also contain spaces which are not proportional to overall size and are peculiar to a given type of aircraft. Table 211-45A identifies the six basic shops (A, B, C, D, E, and F) for the major types of aircraft and shows the impact of the nonproportional/aircraft peculiar spaces on those shops:

TABLE 211-45A
Aircraft Peculiar Avionics Shop Spaces

Space	Type A (VF)	Type B (VA)	Type C (VW)	Type D (VP/VS)	Type E (VT/VU/ VC/H/VR)	Type F (VMGR/ HM/VMO)
Communications navigation and identification (CNI)	Major	Major	Average	Minor	varies	varies
Radar	None	None	Average	Average	varies	varies
Semiautomatic checkout (SACE)	None	Major	Major	None	varies	varies
Fire control/radar	Major	Major	None	None	varies	varies
Electronic-counter measures (ECM)	Major	Major	None	None	varies	varies
Antisubmarine warfare (ASW)	None	None	None	Average	varies	varies
Magnetic anomaly detection (MAD)	None	None	None	Average	None	None

NOTE: See Table 211-45B for definition of aircraft squadron designations

NAVFAC P-272 contains definitive drawings for large and small type A, B, C, and D shops. Because of the nonstandard mixes of the squadrons covered by the Type E shop, no definitive design is available. Each such shop must be planned to take into account the specific avionics configurations

of the assigned aircraft. NAVFAC P-272 also contains a Type F shop configured for an HM group and a Type A and B shop configured for a VMF/VMA group. The selection of the definitive drawing to be used in planning an avionics shop for a particular activity is generally a local decision. For example:

1. An activity with a majority of VF/VA aircraft may choose the definitive drawing for either the VA or VF avionics shop or may, if conditions warrant, select a combination of both definitives.
2. On the other hand, an activity with a majority of helo type aircraft, but having some VS aircraft, may choose a VS definitive drawing as being more adaptable to its avionics functions.

To determine the gross square-footage requirements for a given air installation, the number of assigned aircraft of each type is multiplied by the corresponding Intermediate Maintenance and Operations (I.M.O.) factors for aviation electricians mate (AE), aviation fire control technician (AQ, AQB, and AQF), aviation electronics technician (AT, ATN, ATR), master chief avionics technician (AVCM), and aviation antisubmarine warfare technician (AX). Information pertaining to the I.M.O. factors will be provided by NAVFAC Headquarters upon request. The sum of the products for each aircraft type within a particular group, as defined in Table 211-45B becomes the sizing factor for that group. The gross square foot area for each group is then read directly from the applicable column of Table 211-45B. In those instances where the total assigned loading of the installation is comprised entirely of aircraft of only one group, the area thus established is the maximum allowable for the avionics shop for that installation. Such a loading, however, would be the exception, as most assigned loadings include aircraft from any or all of the groups represented. To establish the maximum requirement for such a mixed assigned loading, the gross square foot area for each group is determined as described above. The gross area for the total mixed aircraft loading is then computed as follows:

EQUATION (1):

$$A = \sqrt{a^2 + b^2 + c^2 + d^2}$$

A = gross area
a = square foot area of 1st aircraft group from col. (1) Table 211-45B
b = 2nd col. (2)
c = 3rd col. (3)
d = 4th col. (4)

The area established by this method includes:

- (a) Common spaces which vary proportionately with overall shop space.
- (b) Aircraft peculiar spaces which are not proportional to overall shop space.

NOTE: Naval activities programmed to receive Versatile Avionics Systems Test (VAST) installations will require permanent space in addition to the above for each station programmed. As these stations are to be "tailored" for each individual activity and as the number of stations per activity will vary, the space requirements will be determined at the time the

equipment is assigned. For Basic Facilities Requirements (BFR) planning purposes, 1,000 square feet per station should be used.

Example 1

There are 118 assigned aircraft of the type and number indicated in Column (1) below. Column (2) contains the I.M.O. factors, and Column (3) is the product of Columns (1) and (2).

Step 1:

Use the following format to determine the "sizing factor." Assigned aircraft must be grouped to correspond to aircraft type groups identified in Columns (1) thru (4) of Table 211-45B. Sum the "sizing factors" to determine the total "sizing factor" for each particular group. In this case there is only one aircraft grouping as the assigned aircraft loadings all fall within the VF/VA/-VMA/VMF grouping of Table 211-45B.

Column 1 No. & Type A/C (n)	Column 2 IMO Factors	Column 3 Sizing Factor (n x IMO)
3 VA x	.56 =	1.68
96 VA x	2.94 =	282.24
19 VA x	1.25 =	23.75
<u>118 A/C</u>		<u>307.67</u>

Step 2:

Establish the space allowance for the avionics shop requirement for each particular group identified in Step 1. Only one group is in this example. Enter the "sizing factor" column of Table 211-45B with the total sizing factor computed for VA aircraft in Step 1 and read the avionics space allowance from Column (1) of the Table.

Sizing factor of 307.67 for VA.
From Column (1) of Table 211-45B, read 48,300 square feet.

Step 3:

Since there are no other aircraft-type groups represented in the base loading, the gross space allowance for the avionics shop is 48,300 square feet. See example 2 for application of criteria to an installation with multiple aircraft-type groups assigned.

Example 2

There are 105 assigned aircraft of the type and number indicated in Column (1) below. Column (2) contains the I.M.O. factors, and Column (3) is the product of Columns (1) and (2).

Step 1:

Use the following format to determine the "sizing factor". Assigned aircraft must be grouped to correspond to aircraft-type groups identified in

TABLE 211-45B
Space Allowance for Avionics Shop
(Gross Area)

Sizing	Column	Column	Column	Column
	1	2	3	4
	VF/VA	VP/VS/VW	VT/W/VC	VMGR/HM/VMO
	VMF/VMA		VR/H	
Group	Group	Group	Group	
(Sq Ft)	(Sq Ft)	(Sq Ft)	(Sq Ft)	
0-10	3,500	11,400	2,000	2,600
11-20	8,000	16,000	3,800	5,200
21-30	12,000	19,300	5,100	7,600
31-40	15,400	22,450	6,400	9,800
41-50	18,000	25,000	7,500	12,000
51-60	20,900	26,700	8,300	14,100
61-70	23,100	28,000	8,800	15,600
71-80	25,200	28,800	9,200	19,300
81-90	27,200	29,400	9,400	20,300
91-100	29,700	29,900		
101-110	30,750	30,300		
111-120	32,190	30,600		
121-130	33,600	30,900		
131-140	34,800	31,000		
141-150	36,100	31,100		
151-180	38,900			
181-210	41,400			
211-240	43,600			
241-270	45,300			
271-300	46,900			
301-330	48,300			
331-360	49,500			
361-390	50,600			
391-420	51,500			
421-450	52,400			
451-500	53,500			
501-550	54,600			
551-600	55,600			
601-650	56,500			

NOTE:

Squadron Designation

VF	-	Fixed wing fighter
VA	-	Fixed wing attack
VMF	-	Fixed wing fighter - USMC
VMS	-	Fixed wing attack - USMC
VP	-	Fixed wing patrol
VS	-	Fixed wing antisubmarine
VW	-	Fixed wing early warning
VT	-	Fixed wing training
VU	-	Fixed wing utility
VC	-	Fixed wing composite
VR	-	Fixed wing transport
H	-	Helicopter
HM	-	Helicopter - USMC
VMO	-	Fixed wing observation - USMC
VMGR	-	Fixed wing refueler/transport
		- USMC

Columns (1) thru (4) of Table 211-45B. Sum the "sizing factors" to determine the total "sizing factor" for each aircraft grouping.

For Column (1) of Table 211-45B, VF/VA/VMF/VMA Group

Column 1 No. & Type A/C (n)	Column 2 IMO Factors	Column 3 Sizing Factor (n x IMO)
2 VA x	.56 =	1.12
1 VA x	1.32 =	1.32
<u>2 VA x</u>	1.01 =	<u>2.02</u>
5 A/C		4.46

For Column (2) of Table 211-45B, VP/VS/VW Group

8 VS x	1.00 =	8.00
<u>7 VW x</u>	1.00 =	<u>7.00</u>
15		15.00

For Column (3) of Table 211-45B, VT/VU/VC/VR/H Group

Column 1 No. & Type A/C (n)	Column 2 IMO Factors	Column 3 Sizing Factor (n x IMO)
3 VU x	.48 =	1.44
19H x	1.00 =	19.00
4H x	1.05 =	4.20
34H x	1.31 =	44.54
3H x	.93 =	2.79
2 VT x	.05 =	.10
8H x	.57 =	4.56
6H x	.62 =	3.72
<u>6H x</u>	.50 =	<u>3.00</u>
85 A/C		83.35

Step 2:

Establish the space allowance for the avionics shop requirement for each particular aircraft group identified in Step 1. In the "sizing factor" column of Table 211-45B, locate the total "sizing factor" computed in Step 1 for each aircraft grouping and determine the shop allowance for that aircraft grouping.

Sizing factor of 4.46 for VA/VF

From col. (1) of Table 211-45B, read - - - - - 3,500 sq ft

Sizing factor of 15.00 for VS/VW

From col. (2) of Table 211-45B, read - - - - - 16,000 sq ft

Sizing factor of 83.35 for VT/VU/H

From col. (3) of Table 211-45B, read - - - - - 9,400 sq ft

Step 3:

Determining the gross space allowance for the avionics shop using Equation (1) which is stated in Category Code 211 45.

$$A = \sqrt{a^2 + b^2 + c^2 + d^2}$$

$$A = \sqrt{(3,500)^2 + (16,000)^2 + (9,400)^2 + (0)^2}$$

$$A = \text{Gross Area} = 18,884 \text{ sq ft}$$

A = 18,884 sq ft, gross space allowance for avionics shop

For design criteria for avionics shops, see NAVFAC DM-28.1. Exterior pavement is provided for vehicle access and vehicle parking. See Category Code 852 10, Parking Area.