Map Data File Formats for AE

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1.0 Introduction.

1.1 Usage. This document provides information about the map data files used by the game War in the Pacific: Admiral's Edition (AE). It is intended that this information will be used by the AE modding community in conjunction with the map data editing programs produced by the author. Much of the document's content is carried over from earlier documentation.

1.2 Disclaimer. AE is a product of Matrix Games, who retain all rights associated with their property. This document was not produced by Matrix Games or under their direction. The author is solely responsible for the content herein but no assurance of completeness nor correctness can or will be given. The reader is advised to use this information at their own risk.
Credit. The author wishes to thank the members of the AE modding community who have offered help, advice, testing, and encouragement in the development of the map data editor programs and the accompanying documentation. These efforts don't get done by individuals and I am very aware of that. Thanks guys!

1.3 Feedback. For many purposes what is contained herein should be enough to edit the map data files for new and modified maps. In the course of using this data, if you should uncover errors or new information, by all means please contact me at the Matrix Games forum (PM=dwbradley).
Nomenclature. There are several potential sources of confusion relating to the nomenclature used in this document. The first relates to the unfortunate collision between terms used for the map itself and the map data in the binary files. The map format is a grid of hexagons and the shortened “hex” is often used in lieu of the full word. The map data resides in binary files where individual bytes of data are most easily represented in base 16 format, or hexadecimal, where “hex” may also be used. I have tried to make clear which is meant whenever I thought there might be confusion but I fear that I will have inevitably missed some instances.

2.0 Primary map data file (pwhexe.dat) format

2.1 Introduction. This section contains information about the file format for the primary map data file (pwhexe.dat). The information in this section was originally generated as a joint effort by Dani Mendoza and Dave Bradley, using the starting point of the hints posted by Joe Wilkerson. Comments and help by others along the way have helped refine it. Although the information is as correct and complete as we could make it, you will note by the discussions included that there are still some unresolved anomalies.

2.2 Basic File Structure. The AE map is a Hexagon grid with 232 (x) rows by 205 (y) columns. The basic file structure is a binary file with 47560 records. There is no header. Each record defines data for an individual hexagon and is 56 bytes wide. The starting address of any particular hexagon is ((205*X) +Y)*56.

2.3 Field Data. Each of the 56 bytes associated with a particular X,Y location sets the value for a particular map parameter or is a spare. Table 1 below shows the name of the parameter associated with particular Byte Numbers, which run from 0 to 55 (00 to 37 hexadecimal). In the paragraphs following the table each of the fields is further defined, with the decoding of the hexadecimal values for that byte.

Table 1 Data Fields for pwhexe.dat

Byte Number (Hexadecimal)	Field Description
0 (00)	E Hexside Type
1 (01)	E Road Type
2 (02)	E RR Type
3 (03)	E River Type
4 (04)	E Strait Type
5 (05)	SE Hexside Type
6 (06)	SE Road Type
7 (07)	SE RR Type
8 (08)	SE River Type
9 (09)	SE Strait Type
10 (0A)	SW Hexside Type
11 (0B)	SW Road Type
12 (0C)	SW RR Type
13 (0D)	SW River Type
14 (0E)	SW Strait Type
15 (0F)	W Hexside Type

Byte Number (Hexadecimal)	Field Description
16 (10)	W Road Type
17 (11)	W RR Type
18 (12)	W River Type
19 (13)	W Strait Type
20 (14)	NW Hexside Type
21 (15)	NW Road Type
22 (16)	NW RR Type
23 (17)	NW River Type
24 (18)	NW Strait Type
25 (19)	NE Hexside Type
26 (1A)	NE Road Type
27 (1B)	NE RR Type
28 (1C)	NE River Type
29 (1D)	NE Strait Type
30 (1E)	Hex type
31 (1F)	Terrain Type
32 (20)	Island size
33 (21)	Hex river type
34 (22)	Hex strait type
35 (23)	Sub map number
36 (24)	Weather Zone
37 (25)	Hexagon Control
38 (26)	Computer Control Zone No.
39 (27)	Entry Zone/Port ID
40 (28)	Original hex nation
41 (29)	Malaria Zone
42 (2A)	Amphib Landing
43 (2B)	Hexside Control E
44 (2C)	Hexside Control SE
45 (2D)	Hexside Control SW
46 (2E)	Hexside Control W
47 (2F)	Hexside Control NW
48 (30)	Hexside Control NE
49 (31)	Stacking Limit

Byte Number (Hexadecimal)	Field Description
50 (32)	Spare
51 (33)	Allied Coast Watcher
52 (34)	Japanese Coast Watcher
53 (35)	Spare
54 (36)	Spare
55 (37)	Spare

2.3.1 Hexside Type (Bytes 0,5,10,15,20,25).
00 = Ocean (blue)
01 = Ground A (green)
02 = River (purple)
03 = Ground B (green) (Not used in stock and not tested by me Possibly intended to block armor units from certain terrain types)
04 = Blocked (red) for ground units and TFs
05 = Blocked (red) coral reef for all ships on water hexes
06 = Both (white) –LCUs and TFs (all ships allowed)
07 = Both (white) –LCUS and TFs (shallow draft ships only)
08 = NOT USED?
09= Blocked (red) –Blocked for LCUs but shallow draft ships allowed to transit

2.3.2 Road Type (Bytes 1,6,11,16,21,26).
00 = None
01 = (RR) Trail (The manual says that trails underlie all rail lines where there is no Road ("walking on railway tracks").
02 = Minor Road (developed areas supposed to have them in all directions.
03 = Major Road (urban areas supposed to have them in all directions)
A further note on trails. There have been some clarifications that have surfaced on the AE forum, stating that there is an implicit assumption of trails in hexes where there are no explicit designated road types, that is, where the hexside road type equals 00. So, movement can still occur in these directions but at the slowest rate for that terrain type/unit type/weather/etc. The manual states, "The existence of foot trails is assumed in all hexes on the map that do not have roads defined, and this is accounted for in the off-road movement rates. Therefore there are no actual "trails" defined on the map except for along railway lines......" .I have changed the designation I have assigned to the the code 01 for these fields to (RR) Trail. The stock map is very consistent with this approach, with a few exceptions that may just be oversights. I have however tested the viability of having Railway lines without underlying (RR) Trails and vice-versa. If you wish to use this for modding purposes I think it will work just fine but you should test to see if the movement rates you realize with this are what you intended.

2.3.3 Railway Type (Bytes 2,7,12,17,22,27).
00 = None
01 = Minor Railway
02 = Major Railway

2.3.4 Hexside River Type (Bytes 3,8,13,18,23,28)

00 = None
01 = minor
02 = major
03 = navigable

Note: There is an unresolved anomaly with this parameter. The hexside parameters provide for an individual river type for each of the six sides. How these parameters and the parameters expressed in byte 33-River Type (hexagon) interact is not entirely clear. See River Type (Hexagon) below.

2.3.5 Hexside Straight Type (Bytes 4,9,14,19,24,29)

00 = None
01 = Wide strait (e.g.,Tsushima 103,56)
02 = Narrow strait (e.g.,Shimonoseki 104,57)

Note: There is an unresolved anomaly with this parameter. The hexside parameters provide for an individual strait type for each of the six sides. How these six bytes and the parameters expressed in byte 34-Straight Type (Hexagon) interact is not entirely clear See Strait Type (Hexagon) below.

2.3.6 Hexagon Type (Byte 30)

00 = None
01 = Ocean
02 = Coastal
03 = Land

2.3.7 Terrain Type (Byte 31)

00 = Deep Ocean (OD)
01 = Clear (Clr)
02 = Jungle (Jg)
03 = Mountain (Mtn)
04 = Desert (Des)
05 = Swamp (Swp)
06 = Heavy Urban (Uh)
07 = Forest (Wd)
08 = Rough (Rgh)
09 = Sandy Desert (SDes)
0A = Tundra (Tun)
0B = Ice field (If)
0C = Atoll
0D = Light Urban (Ul)
0E = Tropical Mountain (MT)
0F = Rough Desert (DR)
10 = Rough Forest (WR)
11 = Rough Jungle (JR)
12 = Shallow Ocean (OS)
13 = Pack Ice (Fs)

2.3.8 Island Size (Byte 32)

00 = very large / unlimited (also for non-island hexes)
01 = very small / 6,000 troop capacity
02 = small / 30,000 troop capacity
03 = medium / 60,000 troop capacity
04 = large / unlimited troop capacity

2.3.9 Hexagon River Type (Byte 33)

00 = None
01 = Minor
02 = Major
03 = Navigable

Note: Although I have shown the same code meanings as for the hexside codes it is still not clear to me that this is correct. There are instances where both hexside and hexagon codes are used for the same X,Y location and not always in a manner that I have been able to decipher. Modders using these bytes to define map characteristics should test to verify behavior.

2.3.10 Hexagon Strait Type (Byte 34)

00 = none
01 =Wide (e.g.,Tsushima 103,56)
02 = Narrow (e.g.,Shimonoseki 104,57)

Note: As noted above for the river type coding, this is not clearly correct for all cases seen within the stock file. Modders should test their map data choices carefully before committing to release.

2.3.11 Sub-map Number (Byte 35)

00 = Main map
01-FF = Sub-map

Note: See the discussion of sub-map areas and off-map ports in paragrah x.x.x

2.3.12 Weather Zone (Byte 36)

00 = temperate weather zone
65 = cold weather zone Tibet
66 = cold weather zone North Central China
67 = cold weather zone Siberia
69 = cold weather zone Aleutians
6A = cold weather zone in Canada
97 = cold weather zone South Pole
98 = cold weather zone Falklands
FF = off map

Note: Cold weather zones in the northern hemisphere have specific effects during November through February and cold weather zones in the southern hemisphere are affected from May through August as described in the manual in section 12.0. It is not known if the different zones (e.g., Tibet vs. Siberia) have different effects as this has not been tested by me. No such indication is given in the manual. Strictly speaking these are not zones as this byte allows application of the affect on a hexagon by hexagon basis. Also the description in the manual rather bizarrely lumps together weather, climate, and disease (malaria). This may be partly a result of the base display, which will show cold zone, temperate zone or malaria zone depending on the data setting for the base in this byte, the malaria *zone byte (41) and the date.*

2.3.13 Hexagon Control (Byte 37)

Not Defined

Note: See the discussion in 2.3.19 below

2.3.14 Computer Control Zone No. (Byte 38)

00 = NW
01 = NE
02 = E
03 = SE
04 = S
05 = SW

Note: This appears to be a vestige of the old game, since computer control zones have not been implemented in AE. So the assumption is this serves as a place holder should future versions of the game support this function. It has not been tested by me to see if changing these produces any effect.

2.3.15 Entry Zone/Port ID (Byte 39)

00 =Spare
01-FF = Entry Zone ID or Off-map Port ID

Note: See the discussion of sub-map areas and off-map ports in paragrah x.x.x

2.3.16 Original Hex Nation (Country Code) (Byte 40)

00= None
0A = US West Coast (San Francisco)
0B = US West Coast (Aleutians)
0C = US Pacific Fleet (Midway)
0D = USSAFE (Philippines)
0F = NED KNIL (Borneo)
14 = CAN Cmd
1E = AUS Cmd (Darwin)
1F = AUS Cmd (Papua)
20 = (Manchukuo)
21 = NZ Cmd
22 = Raoul Island (128,177)
28 = U.K.
29 = GB (Falklands)
2A = GB India Cmd (Nagpur), SE Asia (Rangoon)
2B = GB India Cmd (Nepal)
2C = GB SE Asia (Burma)
2D = (hex 28,49)
2E = GB SE Asia (Sinagapore)
2F = (hex 77,61)
30 = GB SE Asia (Sarawak)
31 = GB SE Asia (Borneo)
32 = NZ Cmd (Tonga Isl.)
33 = AUS Cmd (Solomon Isl.)
34 = New Hebrides
35 = Brunei

36 = GB SE Asia (Diego Garcia)
37 = GB India NE Frontier
3C = NED KNIL (Borneo, Sumatra)
46 = CHINA Cmd
47 = (Tibet)
50 = Noumea
51 = FR Free French (Tahiti)
52 = FR Free French (Fiji Area)
53 = Kungchowan (Fr.)
5A = RUS FE Cmd (Vladivostok)
5B = RUS FE Cmd (Mongolia)
5C = (hex 89,7)
6A = IJ Southern Army (Thailand)
6B = IJ Southern Army (Vietnam)
6C = IJ Southern Army (Thailand)
64 = IJ General Def. (Pescadores)
65 = IJ 4th Fleet
66 = IJ 4th Fleet
67 = IJ General Def. (Formosa)
68 = (hex 99,55)
69 = IJ Kwantung Army (Manchukuo)
6A = IJ Southern Army (Thailand)
6B = IJ Southern Army (Vietnam)
6C = IJ Southern Army (Thailand)
Note: As far as is known to this author there is no function currently served by these codes.

2.3.17 Malaria Zone (Byte 41)

00 = Normal
01 = Malarial

2.3.18 Amphibious Landing (Byte 42)

00 = Normal
01 = Prohibited

2.3.19 Hexside Control (Byte 43-48)

Not Defined
Note: It was my thinking that these six bytes and the field (byte 37) that sets hexagon control were intended to provide definition for first turn anomalous situations where Allied and Axis units were in the same hexagon. Hexagon and hexside control in contested hexes is partly a function of previous turns. On the first turn no such previous turn history is available. Limited testing by me has shown no discernible effects from setting this field to non-zero values so it may be that these bits are not currently used by the game code. They are all set to zero in the stock file.

2.3.20 Stacking Limit (Byte 49)

00 = Unlimited
01-FF = the value in this field *5000

Note: At present this field only works with the latest beta releases and is in testing/modification trials. The stacking limit may also be a function of other factors such as terrain, base size, etc.

2.3.21 Allied Coast Watcher (Byte 51)
00 = None
01 = Present

2.3.22 Japanese Coast Watcher (Byte 52)
00 = None
01 = Present

3.0 Entry Zone and Off-map Port data file (pwzone.dat) format

3.1 Introduction. This section contains information about the file format for the entry zone/off-map port data file (pwzone.dat). Please see section x.x.x for a discussion of the interaction of the field data in this file with the other two map data files (pwhexe.dat and pwzlink.dat) Although the information is as correct and complete as we could make it, you will note by the discussions included that there are still some unresolved anomalies.

3.2 File Format. The pwzone.dat file is a binary file. The file is organized as a list of 64-bit records with no separators between records. Each record defines certain parameters for an entry zone or an off-map base/port. The baseline AE release has 20 records maximum but the latest beta is expanded to allow TBD records (tested to 40 so far). The fields in each record are further defined as shown in Table 2.

Table 2. Field definitions for pwzone.dat

Byte #	**0 (00)**	**1 (01)**	**2-26 (02-1A)**	**27 (1B)**	**28-31 (1C-1F)**	**32 47 (20-2F)**	**48-51 (30-33)**	**52-63 (34-3F)**
Field descr.	Entry zone/Port ID	Entry zone or base?	Text description	Always FF	Virtual Location	Entry zone X,Y definitions	Zone/Port X,Y location	Not used

3.2.1 Entry zone/Port ID. Corresponds to byte 27 (hexadecimal) in the pwhexe.dat file. You can see this value (in decimal) in the game when you hit key 4. Some locations have two numbers separated by a slash. The second number is the ID.

3.2.2 Entry zone or base? Is 00 if entry zone and 01 if base.

3.2.3 Text description: 25-character text field that describes the entry zone or base.

3.2.4 Virtual Location: Two 2's complement numbers that describe the virtual X,Y location for ports directly reachable from the main map. See the table in the AE manual in 4.4.2.1 for examples. Byte 1C is the least significant byte for the X value and 1E is the least significant byte for the Y value. Negative values are allowed.

3.2.5 Entry zone X,Y definition: Used only for Entry Zones. Four X,Y locations that define the two ends of the entry zone and two hexes adjacent to the holding box associated with that entry zone. Each X,Y location is four bytes with the first two bytes being the X value, least significant byte first. Note that Entry Zone 1 on the stock map does not quite fit this definition, so there is probably more to this than testing to date has revealed.

3.2.6 Zone/Port X,Y Location. Four bytes, X value first, least significant byte first. If entry zone then this location is at or near the center of the entry zone. If port then this is the X,Y location of the port.

4.0 Entry Zone and Off-map Port Link data file (pwzlink.dat) format

4.1 Introduction. This section contains information about the file format for the entry zone/off-map port link data file (pwzlink.dat). Please see section x.x.x for a discussion of the interaction of the field data in this file with the other two map data files (pwhexe.dat and pwzone.dat) Although the information is as correct and complete as we could make it, you will note by the discussions included that there are still some unresolved anomalies.

4.2 The pwslink.dat file is a binary file. The file is organized as a list of 16-bit records with no separators between records. Each record defines a single link for an entry zone or an off-map port. An entry zone or base may have multiple links. For the stock game much of the information in this file is shown in the table in the AE manual, paragraph 6.2.10.3. The baseline AE release has 100 records maximum but the latest beta is expanded to allow TBD records (tested to 200 so far). The fields in each record are further defined as shown in Table 3.

Table 3. Field definitions for pwzlink.dat

Byte #	**0 (00)**	**1 (01)**	**2-5 (02-05)**	**5-7 (06-07)**	**8-10 (08-0A)**	**11-15 (0B-0F)**
Field descr.	Link start ID	Link end ID	X,Y for holding box	Link Distance	Effectivity Date	Not used/spare

4.2.1 Link start ID: Corresponds to byte 27 (hexadecimal) in the pwhexe.dat file and byte 00 in pwzone.dat You can see this value (in decimal) in the game when you hit key 4. Some locations have two numbers separated by a slash. The second number is the ID.

4.2.1 Link End ID: Corresponds to byte 27 (hexadecimal) in the pwhexe.dat fileand byte 00 in pwzone.dat You can see this value (in decimal) in the game when you hit key 4. Some locations have two numbers separated by a slash. The second number is the ID.

4.2.2 X,Y for holding box: X,Y location expressed in four bytes. X value first, least significant byte first. This is the location where the TF will be shown while it makes its off-map transit from link start to link end. There is a holding box for every entry zone and one (or more) holding boxes for each port.

4.2.3 Link Distance: Two byte number (least significant first) that represents the distance from link start to link end. I think this represents a number of virtual hexes that must be transited. The number of hexes appears to be greater than the straight line real world distance between these points and possibly contains allowances for non-straight line navigation (e.g. around obstacles) and other real world inefficiencies. For links where a virtual X,Y location is defined these two bytes are set to FF FF.

4.2.4 Effectivity Date: A three byte number that represents the first date when this link will work. In the stock game, links through the Med to Aden start on May, 14, 1943. Least significant byte is first.

5.0 Sub-map and Off-map File Coordination

5.1 Introduction. This section will provide some details of the coordination of data between all three map data files for correct operation. It is helpful to have read through the manual section devoted to this subject (4.2.4.4 & 6.2.10). It is also helpful to get used to using the 4 key while in the game since this displays much of the information that concerns sub-map areas and off-map movement.

5.2 Sub-map Areas and the 4 key display. Every hexagon has a sub-map area designation (byte 35 in the pwhexe.dat). This designation can be 00, indicating the main map. It can be 255 (FF), indicating off-map, or it can be a number from 1 to 254 (01-FE), indicating a distinct sub-map area. When you press the 4 key while in game a variety of information is displayed, depending on the combination of parameters applicable to each individual hexagon. For main map land areas, the number displayed is the decimal country code. For off-map areas XX is displayed (in red). For sub-map areas two numbers are displayed, separated by a slash. The first number is the sub-map area (byte 35 in the pwhexe.dat) and the second is the entry zone/port ID number (see below for more information about this). If a hexagon is part of an entry zone then two numbers are displayed, separated by a slash. The first number is 0 (indicating main map) and the next is the entry zone ID number. Note that sub-map area hexagons that are not designated port IDs (including holding boxes) will simply show the sub-map number, a slash, and a 0.

5.3 Using sub-map areas. As far as I have been able to determine you may designate any hexagon (or group of hexagons) as a sub-map area. I have seen information posted that seems to indicate that each sub-map area can be used in the same manner as the main map for movement and combat within the confines of that area. I have tested this almost not at all. I note that the stock map is sparing in its use of sub-map areas and most are well sealed off from the main map by off-map area. Where main-map and sub-map land areas are touching I have verified that strategic movement from one to the other is possible. There are many possible combinations of main map, sub-map, and off map hexagons and there could easily be features and functions (and prohibitions) that I do not know about. It would seem this needs work by some ambitious modders to make our understanding in this area more complete.

5.4 Entry Zones. Entry zones (really, entry/exit zones) provide the basis for sea transit between main map and off-map areas. An entry zone is a strip of hexagons along one of the edges of the main map area (and in the main map area). There are four entry zones in the stock map. I have tested modifying the stock map by adding an entry zone as well as shortening one of the existing zones. Both of these modifications seemed to work OK. An entry zone is defined by applying one of the entry/zone ID numbers to the proper field in pwhexe.dat (byte 39) and by using one of the slots in the pwzone.dat file to complete the definition. Transit links may then be defined in the pwzlink.dat from the entry zone to off-map ports and vice-versa. Note that this only applies to off-map ports for which a virtual X,Y location has been defined.

5.5 Off-map Ports. A functioning off-map port where sea transit to/from main map ports is possible requires several things. The port needs to be defined using an off map area and a Port ID# in the pwhexe.dat file. It needs to be further defined in the pwzone.dat file. Transit links to/from an entry zone need to be defined if the port has a virtual X,Y location. Transit links to/from other off-map ports need to be defined, all transit links being defined in pwzlink.dat. Finally, the location file needs to have a port definition for this port.

5.6 Virtual X,Y Location. The virtual X,Y location is easiest to understand if you simply imagine that the map grid were to be extended from an entry zone. For a particular port you could in theory extend the grid sufficiently to include a port. This obviously leads to X,Y locations outside of the normal grid coordinates. It is also probably obvious that you would like the distance from the entry zone to the port to be minimal. The map is a great feat in fitting a spherical surface to a flat surface but it seems clearly better to have Capetown's virtual X,Y location fitted to entry zone 4 than it would to, oh say, entry zone 3.

5.7 Holding zones. Holding zones play no part in transit calculations. They simply provide a handy parking spot for TFs in transit. For that matter, the placing of off-map ports is arbitrary, since they would work the same even if placed on the other side of the map. The aesthetics are important, however, since the port and holding box placement aid the players understanding of the game situation. That is why some ports have two holding zones. It helps the player see the traffic better.

5.8 Modding using the sub-map areas and off-map ports. There would seem to be considerable room for innovation by changes to these files. I have not tried very many things but of the things I have tried it seems that the game is fairly tolerant. By that I mean that when you do something that won't work the game does not crash but simply ignores whatever you were trying to do or in some cases tells you that is not possible. An example is in putting Axis ports in off-map areas. Yes that is possible but sea transit between these ports and main map ports or other off-map area ports was rejected (I don't remember the exact message). I do not know the limits of what you can do with these parameters and the most likely way for us to find out is for some modders to let their imagination roam. Please share what you learn and I will add it to future revisions of this document and the editors.