

THE "FLEET THAT NEVER WAS"

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"The Special Edition Collector's Series" consists of models of ships that were proposed and planned but were never built ("Never-weres"). All have an historical background even if it was just on paper. It's interesting to imagine how these ships would have performed against ships that were built or against each other. These Superior 1:1200 scale models will be made available from time to time on a limited "Special Production Run" basis. A short history follows for most. The names of those in **bold** are models that have been produced and made available.

Ships that never existed elicit a certain fascination for ship lovers. In many cases they were larger than existing ships and were cancelled for artificial reasons (materials, costs, higher priorities, treaties) rather than being technically impossible. Even these large ships prove the triple constraint of firepower, protection and speed. On any given displacement, increasing one requires the decrease of one or both of the others. To paraphrase:

I can make it fast and powerful, but it won't have any armor (battlecruiser)

I can make it fast and well protected, but it won't have much armament (e.g. **SCHARNHORST**)

I can make it powerful and well protected but it will be slow (battleship)

Every ship suffers from these design constraints and even the largest of the never weres had some limitations. These limitations are noted in the text. The largest of the completed battleships also had design issues. **YAMATO** was well armed and armored but had inferior torpedo protection and was slower than desired. **BISMARCK** was fast and relatively well armored but had inadequate firepower and poorly protected turrets. **IOWA** traded suspect torpedo protection and heavy weather handling for excellent fire-power, good protection and speed. If you want it all, the ship must be very large and very expensive. In general, for the price of the very large ship, two adequate ships could be built which have a better chance of winning the engagement. Suggested Seapower values for many of these ships have been created by Bob Weymouth and are tabulated at the end of the document. Some of the more well-known ships (e.g. **MONTANA**, **H**) are already in the Seapower directory. The pictures scattered through the document are also courtesy of Bob Weymouth. The drawings are those of the official US and German design bureaus. At the end of the article are some thoughts on fleet dispositions given some changes in historical decisions. These are the 'What Ifs' that are so fascinating.

	Type	Name	Tons	Dimensions	Armament
A107	BB	Montana	60,500	921x121x36	12-16"/50, 20-5"/54
A120	BB	South Dakota 1921	42,500	684x105x33	12-16", 16-6", 8-5"
A121	BB	South Dakota 1923	42,500	684x105x33	8-18", 16-6", 8-5"
A125	BB	BB65D	60,600	921x121x36	12-16"/50(quad), 12-6"/47
A126	BB	Tillman IV-2	80,000	975x108x33	15-18", 12-6", 8-5"
A127	BB	Georgia (MT II)	60,500	921x121x36	8-18"/50, 12-6"/47 DP
A128	BB	Virginia (MT III)	60,500	921x121x36	9-18"/50, 12-6"/47 DP
A130	BB	BB 1922	44,500	684x108x33	8-18", 18-6", 8-5"
A131	BB	BB 1923	52,000	800x108x33	12-18", 12-6", 8-5"
A132	BB	BB65A	45,000	888x108x38	12-16", 20-5"/38
A133	BB	BB65(I)	45,000	888x108x38	9-18", 20-5"/38
A134	BB	Maximum BB 1934	66,000	975x107x33	8-20", 20-5"/38
A135	BB	BB1917	35,700	644x100x30	10-16", 22-6", 4-3"
A136	BB	BB65C	43,800	888x108x36	12-16", 20-5"
A137	BB	BB1934-2	35,000	745x102x31	8-16", 14-5", 16-1.1"
A138	BB	BB1937 XVI	35,000	740x108x32	12-14", 16-5", 16-1.1"
A141A	BB	BB65-8A	67,000	1050x120x35	12-16", 20-5"
A141B	BB	BB65-8B	75,000	1050x122x36	12-18", 12-6" DP
A142	BB	Iowa Flight Deck	45,000	888x108x36	6-16", 4-5", 122 missiles
A202	CC	Lexington 1921	43,500	874x106x32	8-16", 16-6", 8-5"
A203	CC	Lexington 1916	33,500	874x92x30	10-14".18-5"
A204	BB	Design D, 1918	54,500	874x106x32	12-16", 16-6",
A205	CB	CA2D	38,700	888x104x31	12-12", 16-5"
A206	CB	Scheme #2	15,750	716x72x24	12-8", 12-5"
A207	CB	CAC	20,000	808x77x25	12-8", 12-5"
A208	CB	CA, Scheme 3	17,300	710x74x25	6-12", 12-5"
A209	CC	CC1933	33,500	775x92x32	9-14", 16-5"/38
A313	CA	Scout Cruiser C-1	10,000	620x57x18	7-8", 4-5", 4-3", 6 TT
A510A	CV	CV-A	44,500	900x111x32	9-8", 8-5"
A510B	CV	CV-B	38,500	900x104x32	16-6"
B103	BB	Lion	40,550	793x105x33	9-16", 16-5.25", 84 2pdr
B110	BB	Vanguard	42,300	814x108x34	8-15", 16-5.25", 73 2pdr
B111	BB	Super Lion (16E-38)	48,500	850x108x34	12-16", 16-5.25", 84-2pdr
B112	BB	N3 (1922)	48,500	815x106x32	9-18", 16-6", 6-4.7"
B113	BB	BB1935 15A/B	35,000	770x104x31	9-15", 20-4.5", 32-2pdr
B114	BB	Lion Hybrid	44,750	800x112x30	6-16", 16-5.25", 14 AC
B204	CC	Invincible 1921(G3)	48,400	856x106x36	9-16", 16-6", 6-4.7"
B205	CC	Hood 1944	41,200	860x104x32	8-15", 16-5.25", 56 2pdr
B206	CC	F3	35,000	740x106x32	9-15", 8-6", 32 2pdr
D201	CC	Dutch 1047	28,000	778x98x26	9-11", 12-4.7", 14-40mm
F105	BB	Gascogne	40,270	813x108x32	8-15", 9-6", 16-3.9"
F106	BB	Alsace	45,000	900x108x31	12-15", 12-6", 16-3.9"
F901	BB	Normandie 1916	25,230	578x89x30	12-13.4", 24-5.5"
G103	BB	H 39, 12x15"	56,200	873x121x33	12-15", 12-5.9", 16-4.1"
G104	BB	H 39, 8x16"	56,200	873x121x33	8-16", 12-5.9", 16-4.1"
G105	BB	H44	128,930	1200x169x44	8-20", 12-5.9", 16-4.1"
G203	CC	OPQ	31,152	814x98x29	6-15", 6-5.9", 8-4.1", 12 TT

G207	CB	Kreuzer P	19,679	755x89x28	6-11", 4-5.9", 8-4.1"
G208	CC	KW45	45,000	984x111	8-15", 12-5.9", 8-4.1", 8 TT
G405	CL	Kreuzer M	7,800	600x56x18	8-5.9", 4-4.1", 8-21" TT
J108	BB	Tosa	38,500	768x100x31	10-16", 20-5.5", 8-24" TT
J109	BB	Super Yamato(798)	64,000	863x127x36	6-20", 6-6.1", 20-3.9"
J110	BB	Number 13	47,500	900x101x31	8-18.9", 16-5.5", 8-24" TT
J111	BB	A-140A	68,000	935x132x34	9-18", 12-6.1", 12-5"
J112	BB	A-140/A2	68,000	935x132x34	8-18", 12-6.1", 12-5"
J113	BB	A-140/B2	70,000	935x132x34	8-20", 12-6.1", 12-5"
J114	BB	Fujimoto BB	35,000	762x105x28	9-16", 12-6", 8-4.7" AA
J115	BB	Hiraga BB	35,000	761x105x29	10-16", 16-6", 8-4.7" AA
J201	CC	Amagi	40,000	820x101x31	10-16", 16-5.5", 8-24" TT
J202	CC	B-65 (795)	31,400	808x89x29	9-12", 16-3.9", 8-24" TT
J203	CC	Japanese Vanguard	35,000	848x89x30	8-14", 16-3.9", 8-24" TT
R101	BB	Sovetskii Soyuz	59,150	889x127x33	9-16", 12-6", 8-3.9", 32-37mm
R102	BB	Gibbs & Cox 'D'	45,000	845x113x33	10-16", 20-5", 16-1.1"
R103	BB	Project 24, (XIII)	72,950	925x132x38	9-16", 16-5", 48-45mm
R104	BB	UP 41			
R201	CC	Kronstadt	35,240	813x103x28	9-12", 8-6", 8-3.9", 24-37mm
R202	CC	Stalingrad	38,540	897x105x30	9-12", 12-5.1", 24-45mm

A107 MONTANA 1944

Arguably the most powerful battleships that had a reasonable chance to be built, these ships were the culmination of US design. Even ships of this size were subject to limitations in speed, gunnery or protection. Reverting to the slower speed of the earlier SOUTH DAKOTA and NORTH CAROLINA, MONTANA emphasized firepower and protection. Beam was increased with the understanding that new 140-foot wide locks for the Panama Canal would be built allowing her to transit from the Atlantic to the Pacific. Dozens of potential designs were considered before five ships were authorized in 1940. Two were to be laid down in 1941 but were suspended due to a lack of steel.

The twelve 16"/50s allowed her to fire twice as many shells as the YAMATO over any given time period. They were ballistically equal to the Japanese 18"/45 so they gave nothing away in terms of armor penetration. It was highly desired to carry a secondary armament of 12-6"/47 automatic guns as mounted in the WORCESTER but this gun was not well enough developed. The battle of Crete illustrated the danger of high level bombing and a six inch shell provided a better long range solution to AA fire. The automatic 6"/47 was not well enough developed by 1941 so 20 -5"/54 guns were substituted with 6 twin turrets mounted on the main deck to reduce top weight. Numerous 40mm and 20mm guns would have completed her armament.

Armor protection was extremely complete. The wide beam allowed a 16" external belt sloped at 19° that did not reduce the water plane area below acceptable limits. An 8" internal belt on top of the torpedo bulkhead provided additional protection against underwater hits. A 2" upper deck would fuse any penetrating bombs or shells and the 6.2" main deck would prevent their penetration. Explosions would have been contained outside the armor citadel. The immune zone for these ships was 18,000 to 32,000 yards. The total weight of all protection including STS splinter protection was a staggering 31,650 tons, more than half the displacement.

The broad beam allowed for additional anti-torpedo depth and departed from the other US fast battleships that had large compartments spread across the entire breadth of the hull. The machinery was now arranged in four boiler rooms against the outside bulkheads separated by turbogenerator compartments. Two engine rooms in the middle of the ship, similarly arranged as in the older US turbo-electric battleships, drove the forward screws. Aft the boiler rooms were the two engine rooms driving the rear screws. Protected between the aft boiler and engine rooms was one of the distillation plants plus other auxiliary machinery. Five torpedo bulkheads separated the machinery from the hull.

Stern			Bow		
Port Aft Engine	Boiler	Boiler	Dynamo Turbogenerator	Boiler	Boiler
Electrical Space	Condenser Dynamos	Distiller	Port Inner Engine	Distiller	Starb Inner Engine
Starboard Aft Engine	Boiler	Boiler	Dynamo Turbogenerator	Boiler	Boiler

Despite her increased dimensions over the IOWA, there was insufficient space to install more powerful machinery that would propel her beyond 28 knots. It would have been a challenge to rearrange machinery to provide space for the large magazines had the automatic 6"/47 been available.

War experience led to some redesign in 1942. A 3" upper deck would prevent 500-lb bombs from penetrating while a reduction in the belt could provide enough additional deck armor to prevent larger shells and bombs from penetrating. It seems odd that the ILLINOIS and KENTUCKY were laid down so late in the war when a superior design was available. Instead, the hull and machinery layout was used to build the MIDWAY class carriers that were a better long-term investment.

Displacement 60,500 tons standard, 71,000 full load
 Length 921'
 Width 121' (over the bulges)
 Draft 36'
 Speed 28 knots
 Armament 12-16"/50(4x3)
 20-5"/54 (10x2)
 Armor belt: 16" + 8"
 Deck: 6.2" + 2"
 Turrets: 18" on 4.5" STS

A120/121 SOUTH DAKOTA 1921/1923

These were the last of the US dreadnoughts begun with the NEVADA. Secretary of the Navy Josephus Daniels finally relented on the size of US battleships with this design. These represented a 30% increase in size from the Colorado, a 50% increase in firepower and 2 knots more speed. Final designs were completed in January 1917 (same time frame as the Tillman IV-2!) with 3 to be laid down in the fall of 1917 and the next three in 1918. The declaration of war fatally delayed construction with them being scrapped under the terms of the Washington Treaty.

These ships represented the ultimate in US dreadnoughts and continued the American innovation of thick deck armor, four turrets and endurance for Pacific warfare. World War II experience demonstrated that early hits on fire control (BISMARCK, SCHARNHORST), steering positions (HIEI) or overwhelming numbers of shells (FUSO) were more frequent and important than penetrating hits. Mounting more guns than any of their contemporaries, having better ballistics with the 16"/50, with adequate armor, excellent underwater protection and decent speed, they would have proven formidable opponents even though they weighed 5,000 tons less than the largest of the British and Japanese ships.

Length	684'
Width	106'
Draft	33'
Speed	23 knots
Armament	12-16"/50 (4x3) 16-6"/53 (16x1)
Armor	belt: 13.5" Deck: Main deck 3.5", upper deck 1.25", splinter deck 1.25" Turrets: face 18", roof 8"

Concept sketches in 1919 replaced the triple 16" with twin 18". The major difference in the sketch was mounting 18-6"/53 in six triple turrets located on the main deck abreast the superstructure and funnel and on the lower deck aft abreast the after cage mast. Superior's model includes the twin 18" as an upgrade similar to the COLORADO 16" vs. TENNESSEE 14". The concept ship will be offered as A129 BB 1922.

A125 BB65D

This version of the large battleships that became the MONTANA conserved space and weight by mounting the 16" rifles in quadruple turrets. Originally desired on an IOWA hull, it lacked the volume necessary to support the firepower and protection desired. An IOWA hull did not provide enough displacement to provide protection against her own battery. Moving to the larger MONTANA resolved this problem. This also provided the space and weight necessary to mount the 6"/47 desired as a long range AA battery.

Displacement	60,500 tons standard, 71,000 full load
Length	921'
Width	121' (over the bulges)
Draft	36'
Speed	28 knots
Armament	12-16"/50(3x4) 12-6"/47 (6x2)
Armor	belt: 16" + 8" Deck: 6.2" + 2" Turrets: 18" on 4.5" STS

A126 Tillman IV-2



Concentrated Firepower in the Pacific

Nicknamed after Senator Benjamin Tillman, SC, of the Senate Naval Affairs Committee, these were the most powerful battleships ever designed by the United States. Noting that battleships were increasing in size by 20-30% per year, he introduced a resolution in 1912 for the Navy to report on the maximum size ship that could be built based on harbors and the Panama Canal. Rather than build to this size ship incrementally, what would it cost to build it immediately? Despite this request, US battleships remained roughly the same size through the NEVADA, PENNSYLVANIA, NEW MEXICO, TENNESSEE and COLORADO classes. Secretary of the

Navy Josephus Daniels only relented on the size and expense of battleships with the SOUTH DAKOTA. In 1916 Tillman again repeated his request.

Congress created some initial characteristics of 60,000 tons mounting 10-18" guns. And they gave the Navy one day to come up with a design! Fortunately, the Bureau of Construction and Repair (BuC&R) was able to turn this over to naval constructor McBride who was responsible for the contemporary SOUTH DAKOTA battleships. McBride used "off-the-shelf" plans and figures to extrapolate the scantlings used in the SOUTH DAKOTA and the LEXINGTON power plant.

Displacement	60,000 tons (65,000 tons)
Length	975'
Speed	32(30) knots on 180,000 EHP
Armament	10-18"/50 (5x3) 16-6"/50 (21x1) 4-21" TT
Armor	belt: 10" (18")
Cost	\$39,150,000

An extra 5,000 tons bought more armor but cost 2 knots. The contemporary HOOD and NAGATO were in serious trouble.

BuC&R) created four studies finishing in January 1917. Limitations were the Panama Canal (1000 x 110x 40 feet) and US harbors with a depth of 34 feet. The studies represented a different combination of armor, speed and armament emphasizing one above the others with the fourth one allocating each characteristic equally. Like McBride's design all were built around the LEXINGTON power plant that had known weights and dimensions. Using the SOUTH DAKOTA as the baseline, everyone was appalled that just increasing speed to 30 knots required an increase to 63,500 tons (similar to the abortive MONTANA's 20 years later).

Four sextuplet 16" turrets were considered which provided overwhelming firepower. However, no practical drawings were completed showing how the superimposed guns should be arranged. This impractical arrangement was replaced with five triple 18" turrets arranged as in the TEXAS. The largest of the theoretical designs was the IV-II submitted January 30, 1917. Writing in "Sea Power" in 1917 Commander William Moffett (killed in the Akron crash in 1933) wrote, "*Is it not fair to assume, nay, is it not certain, that if battleship displacement has increased from 10,000 tons in 1896 to 32,000 tons in 1916, that it will continue to do so until the limit has been reached?*" *Why not go to the limit at once? By doing so, we scrap every battleship in the world. Other navies would have to follow our example and build ships like ours or give up the competition. We could stand the cost better than any other nation. It is therefore an advantage to us to make navies cost as much as possible. We have more money than any other nation, and we will have more, comparatively, at the close of the war, when most of them will be bankrupt. In this way we will scrap England's navy, as well as all others. In no other way can we hope to overtake Great Britain.*" Her characteristics were:

	D-IV	D 1	D 2
Displacement	80,000 tons	70,000	
Length	975'	975'	
Width	108'	108'	
Draft	33'	33'	
Speed	25 knots on 180,000 EHP	26.5 kts	
Armament	15-18"/50 (5x3)	24-16"	

	21-6"/50 (21x1)	21-6"
	4-3"/50 AA	4-3" AA
	4-21" TT	4-21" TT
Armor	belt: 16"	
	Deck: 5" main deck, 2.5" upper deck	
	Turrets: 21" face, 12" sides, 8" roof	

These exceptional ships had very complete underwater protection due to her turbo electric drive. This eliminated the steam lines around the middle turret that had proved so troublesome in all US battleships until the NEVADA. The original plans called for 21-6" secondaries but many were mounted in the hull. Hull casements had proven impractical and were being dismantled from existing ships. It was noted that if harbors were dredged, the hull could be made deeper and finer resulting in an increase in speed to 28 knots. It was also estimated that they would cost \$50 million compared to \$30 million for a TENNESSEE. Size and firepower had a steep price although the IOWA of 1940 cost \$100 million.

These would have been handsome ships that would replace the triple funnels with LEXINGTON style funnels and superstructure. There actually is insufficient upper deck space for the 01 level as in the LEXINGTON due to the fifth turret. Backing Q turret against X turret grouped the barbettes together and leaves the engineering ventilators underneath Q turrets barrels. Compare the ventilator and funnel layout to the LEXINGTON and you will find them the same. This also meant that the after cage mast would have to be mounted between the funnels. Sufficient space could be secured for only 12-6" with three being able to bear on any quadrant. Eight 5"/25s complete the AA armament. If the Washington Treaty had not intervened, these would have been very likely candidates to succeed the SOUTH DAKOTA and LEXINGTON. The construction of these ships was very feasible unlike the large German designs of WWII and represents the most powerful, reasonable battleships ever designed. Imagine the impact of having a squadron of these ships mounting 60-18" guns in your war games! Further imagine these ships modernized with twin 5"/38 and 40mm mounts. One further note, while the US Navy preferred firing broadsides, the impact on the hull and superstructure of this many guns would have required salvo fire which may have reduced the rate of fire for the entire ship.

In the early 1920's the Naval War College (NWC) created a sophisticated method of evaluating the worth of individual ships to wargame them. By their calculations, COLORADO, NAGATO and HOOD could each sustain 18 penetrating 14" shells while the D-IV could withstand 36, twice the amount. When gamed, a single COLORADO is overwhelmed by either D1 or D2 and even two COLORADO's are sunk by a single #1 or #2. D2's 24 guns allows her to smother her opponents and actually take less damage than the more heavily protected D1. It is interesting to note that the US WWII ships emphasized fire power and speed rather than the traditional protection although one could hardly call them underprotected. Perhaps they were the beneficiaries of wargames between design concepts prior to WWII.

A127 GEORGIA (MT II)

By December 1938, the Rainbow plan called for the following numbers of ships to support three different strategic scenarios:

	BB	CV	CA	CL
Two Ocean Offense	40	18	41	67
Pacific offensive/Atlantic defensive	32	12	29	55
Pacific defensive/Atlantic Offensive	27	12	26	43

Only the three NEW Mexico's and 'Big Five' were suitable for rebuilding to keep in the fleet. As such, perhaps configured to a MARYLAND standard, they would have been invaluable for supporting island hopping or convoy defense. This would mean at a minimum, 19 new battleships would need to be built. Either additional MONTANAs would need to be built or a successor designed. It has been postulated that MONTANAs successors would have mounted 18" guns. The 18"/48 was last considered in April, 1938 for the preliminary design of the IOWA (see A133 BB65(I)). American designers were reluctant to build ships much larger than the MONTANA due to the cost and consumption of resources needed for other ships. One way to mount 18" guns would be to replace the triple 16" with twin 18". Up-gunning to twin 18" would have been resembled the TENNESSEE/COLORADO situation in 1920. The 3850 lb shell and superior US shell design would have made these battleships irresistible. It would have also meant a 33% reduction in number of shells in a pattern compared to the 12-16"/50s.

It was felt that much longer range AA fire was needed to counteract high level bombing. The automatic twin 6"/47 being designed for MONTANA may have been finished for the follow on class. Volume of fire from the twin 6" was equivalent to the triple 6" using semi-cased ammunition. The advantage was that it was suitable for long-range heavy AA fire. The twin 6"/47 are considerably heavier than the 5"/54 which would have contributed to a displacement problem. Replacing 3-16" barrels with 2-18" barrels would have saved marginal turret weight which would not have compensated for the secondary armament. One incomplete study in March 1940 would have been twin over triple turrets (NEVADA style) giving her 10-18", which would have been considerably superior to the YAMATO. Once again, for this to be effective, the hull would have to be longer and/or wider.

An issue for all the do-it-yourself designers is that none of the above combinations would have allowed enough remaining weight to upgrade the armor to resist the 18" shell. This would be particularly true of the deck armor. Additional displacement for the armor would once again require the ship to be longer or wider. Nevertheless, this version is packed with 4-twin guns and 12-6"/47 DP mounted on the main deck. As an alternative, you can combine the triple 16" from MONTANA with the 6"/47 DP which resembled design 65B of September 1939.

A128 VIRGINIA (MT III)



If Virginia had been British, she would be named 'Irresistible'

Preliminary IOWA (65I) designs included a 27 knot ship with 9-18" guns and sufficient armor for an immune zone of 20k – 29k yards against the 18" shell. The requirement for high speed eliminated the 18" gun as a potential weapon in the IOWA. As the MONTANA design matured, BuOrd stuck with the 16"/50 because of the number that could be carried. However, BB65D with three quadruple 16" turrets were completely interchangeable with triple 18" turrets. This model moves the entire superstructure aft to work in three triple 18" turrets arranged as in IOWA. This would make it easier to free up centerline space for auxiliary machinery thus creating space for the 6" magazines. It is far more likely that this version could be built within the original MONTANA dimensions than the twin 18".

The triple 16" turret weighed 1622 tons while a quad 16" weighed in at 2,064 tons. A triple 18" turret would have been close to the quad 16" in weight. In addition to saving 400 tons in direct turret weight, barbette and supporting structures would have been reduced. This would have saved weight making it possible to use the same dimensions as the MONTANA while improving the secondary guns and armor.

This ship makes an interesting contrast to the super YAMATO. Like the MONTANA vs. YAMATO, VIRGINIA retains a considerable edge in number of shells in the broadside while giving away nothing in armor penetration. Instead of increasing the upper deck by 1" as in the

MONTANA 1942, the main deck could be increased to 7.2 inches in an effort to protect against the 20" shell. In addition, the reduction of the secondary belt could also be used to further strengthen vertical protection.

The exciting news for the do-it-yourself designers is that with these models, you can mix and match hulls and parts to create a variety of MONTANA successors. Another variation is the quadruple 16" which would resemble Design 65D of September 1939 (available as A125). When considering all the issue surrounding compromise in armament, speed and armor, the original MONTANA design stands up well to all these versions and foreign battleships. While impossible to accurately predict what battleship successors may be have been built, all of these configurations were sketch designs considered by the General Board.

A130 and A131, BB1922 and BB1923

Concept sketch designs in August, 1919 postulated the characteristics of the successors to SOUTH DAKOTA 1921. BB1922 could carry 8-18" and 18-6" mounts (6 triple turrets) on a South Dakota hull. Increasing the main armament from 12-14" on the TENNESSEE to 12-16" on the SOUTH DAKOTA cost 10,000 tons. Increasing to 12-18" (4x3) would have required another 10,000 tons on an 800 foot hull. Machinery spaces and funnels configured as the SOUTH DAKOTAs would drive them at 21 knots. To maintain the 23 knots of the SOUTH DAKOTA would have required more efficient boilers such as were planned for the battlecruisers. Additional boilers could not be installed because their space would have further increased hull length and, proportionally, armor and weight.

Replacing 12-16" with 8-18" would have been similar to the situation with the TENNESSEE and COLORADO. However, 8-18" would not have been much of an improvement over the SOUTH DAKOTA, particularly in pattern 'fatness' and would have been less than the British N3 (9-18"). It is more likely that a new design would have contained either 10 or 12 – 18" guns in either a NEVADA or 4x3 configuration. Given the slow pace of US turret development for secondary armament, it is also likely that single 6"/53s would have been retained for the secondary armament. Deck armor would have to be increased to resist an 18" shell, probably to the 5" as designed in the TILLMAN. These battleships would have displaced more than the N3 and trade deck armor (8" in the N3) for an additional triple 18" turret. These studies of incremental improvements in battleship design show just how farsighted Senator Tillman was in asking why not build the biggest ship we could and be done with it.

	BB1922	BB1923
Displacement	44,500 tons	52,000 tons
Length	684'	800'
Width	108'	108'
Draft	33'	33'
Speed	23 knots	23 knots
Armament	8-18"/48 (4x2) 18-6"(6x3) 8-5" (8x1)	12-18"/48 (4x3) 12-6"(12x1) 8-5" (8x1)
Armor	belt: 13.5" Deck: 5"	13.5" 5"

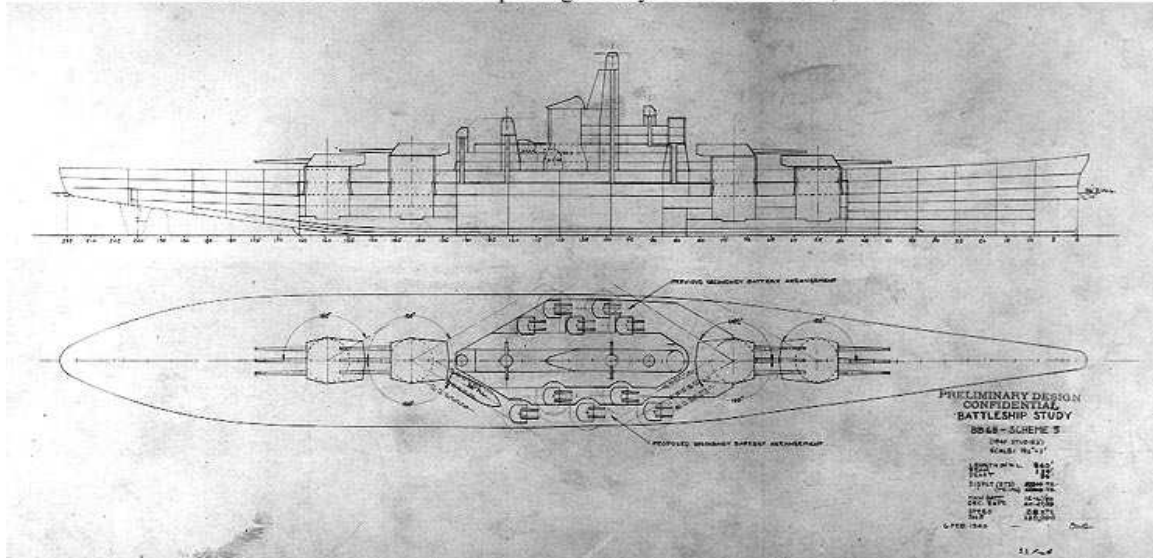
A132 BB65A

The initial 1938 designs for a heavier, slower battleship to follow the IOWAs substituted a SOUTH DAKOTA power plant (130,000 shp) in an IOWA hull which allowed enough space for an additional 16" turret. The first two schemes kept the displacement the same as IOWA with the same inadequate immune zone against the 2700 lb shell. This was fixed in Scheme 3 by increasing the beam 6 feet and fitting heavier armor. This quickly grew to the MONTANA design because once the beam exceeded that of the Panama Canal, there was no reason not to make it completely adequate for torpedo protection.

These were important evolutionary designs for the MONTANA. They also represent an opportunity for wargamers who build campaigns through the 'purchase' of ships based on tonnage. The 1939 schemes are fast, well armed and adequately protected against any gun except the 18"/45 of the YAMATO. You can build almost three of them for two YAMATOs (64,000 tons); 36 guns against 18, 72 rounds per minute against 27. These are winners in the light heavy-weight division.

	BB65A (7/39)	BB65A (9/39)	BB65-Scheme 3 (2/40)
Displacement	45,435 tons	46,668 tons	52,500
Length	888'	888'	888'
Width	108'	108'	114'
Draft	36'	36'	36'
Speed	27 knots	27 knots	27 knots
Armament	12-16"/50 (4x3) 20-5"/38 (10x2)	12-16"/50 (4x3) 20-5"/38 (10x2)	12-16"/50 (4x3) 20-5"/38 (10x2)
Armor	belt: 12.1" Deck: 5"	12.1" 5"	14.2 5.5"
Immune Zone	24k - 28k	24k - 28k	18k-30k yds

Photo # S-511-11 Battleship design study BB65-Scheme 3, 6 Feb. 1940



A133 BB65(I)

Alright, you insist that you MUST have 18" guns on an IOWA hull. You don't care that the 16"/50 is ballistically equal to the Japanese 18"/45. You want the 18"/48, 3850 lb shell and bragging rights to be the baddest thing around. Question, why didn't the MONTANA mount this weapon?

Designed at the same time as BB65A, this IOWA variant is a compelling ship. Thicker armor, heavier main guns and the SOUTH DAKOTA power plant allow you to confidently sail against all enemies. Your only drawback is the slower speed expected by trading heavier guns and armor for engineering space and weight. Go get the YAMATO! You can still build three of these for only two YAMATOs.

But wait, there is more! BB65C had the same hull layout but 3 quadruple 16" turrets. The advantage over BB65A was that she had a shorter armored citadel and less weight at the bow making her more weatherly. This gives us 5 different Superior versions of the IOWA hull. If you were responsible for the building program and could only build one variant, which would you choose?

	BB65(I)	BB65A	CA2D	BB65C	IOWA
Displacement	45,495 tons	45,435 tons	38,700 tons	43,800 t	45,000 t
Length	888'	888'	888'	888'	888'
Width	108'	108'	104'	108'	108'
Draft	35'	36'		36'	38'
Speed	27.5 knots	27 kts	33 kts	27 kts	33 kts
Armament	9-18"/48 (3x3) 20-5"/38 (10x2)	12-16"/50 (4x3) 20-5"/38 (10x2)	12-12"/50 (4x3) 16-5"/38 (8x2)	12-16"/40 (3x4) 20-5"/38 (10x2)	9-16"/50 20-5"/38
Armor	belt: 14.75" Deck/upper:5.1"/1.5"	12.1" 5.1"	13"	14.75" 5.1"/1.5"	12.1" same
Immune Zone	16"/45 12k – 30k yds 16"/50 16k – 32k yds 18"/45 20k – 29k yds				

A134A US Maximum BB 1934A	8x20" (4x2)
A134B US Maximum BB 1934B	12x18" (4x3)
A134C US Maximum BB 1934C	16x16" (4x4)

In 1934 the General Board requested a study for the maximum sized battleship that could transit the Panama Canal. The designers started with the basic Tillman hull keeping the turbo-electric drive. Q turret was suppressed and 12 boilers fitted in its space in a YAMATO configuration of 3 rows of 4 boilers. These powered the generators forward of the boiler room. The generators in turn fed four motor rooms grouped around the after turrets in the same configuration as other US TED battleships. This seemed to be a step backwards in concentrating the boilers and taking risk against a single unlucky hit. The narrow hull precluded a more robust anti-torpedo system such as was designed into the wider MONTANA.

The superstructure was based on that of the remodeled New Mexico with aircraft facilities amidships and a single large funnel aft. The 5"/38 were configured in a cruiser arrangement with midships mounts fore and aft to supply coverage over those arcs. Armor was increased over the TILLMAN with a 6.5" armor deck, a 1.5" upper deck and a 1.5" splinter deck. Speed was 25 knots. The designers noted that if the displacement was increased to 72,000 tons, the hull could be made fuller, nearly triple the horsepower could be installed and the ship could make 30 knots.

It is not clear if the boiler arrangement would have been altered but there is sufficient centerline space between the barbettes to arrange the boilers inside the torpedo bulkhead and provide two funnels. It is clear that the Americans had a significant advantage in their machinery compared to the Japanese and British who required more hull length and volume for comparable speeds with comparable fire power.

The outstanding feature of the design was 8-20" guns (24" was originally requested!). If they were equipped with the oversize shells as represented by the 2700lb 16" or the 3850lb 18", these shells would have weighed over 5,000 pounds! In contrast to this design, the Japanese finished their estimates on a maximum battleship at the same time to ensure that the YAMATO would be individually superior. Their estimates are displayed here also. The Japanese estimates did not take account for the length of the Panama Canal nor the benefits of a parallel hull. They basically traded off 7 knots of speed from their #13 for an additional pair of 18" guns. This US design represents a capability that was only considered as part of the German design studies nearly 10 years later. Please note that the same size turret could mount twin 20"(A), triple 18"(B) or quadruple 16"(C). You can order your Maximum BB with any of these options.

	TILLMAN	US Max BB	Max Fast BB	Japanese Estimates
Displacement	80,000 tons	66,000	72,500	63,000
Length	975'	975'	975'	900'
Width	108'	107'	107'	108'
Draft	33'	33'	36'	34'
Speed	25 knots	25 knots	30 knots	23 knots
Armament	15-18"/50 (5x3) 21-6"/50 (21x1) 4-3"/50 AA 4-21" TT	8-20" (4x2) 20-5"/38 (10x2)	8-20"(4x2) 20-5"/38 (10x2)	10-18"
Armor	belt: 16"	16"	16"	17"
Main/upper	Deck: 5"/1.5"	6.5"/1.5"	6.5"/1.5"	8.8"
Face/roof	Turrets: 21/8"	18"/7"	18"/7"	

A135 BB 1917

The story of BB 1917 is tied to Secretary of the Navy Josephus Daniels just like the South Dakota and the Lexington. This is a study in futility where the US could have had the best individual battleships in the world but were hamstrung by politics. The 16" gun was approved by the General Board on 11/22/1911 but Daniels restricted the study to blueprints only. On 10/22/1912 he authorized a secret prototype which was successfully fired in August 1914. It was superior to both the British and German 15" guns.

Battleship 1915 (becoming the New Mexico class) could mount either 12-14" or 8 of the new 16". In September 1913 (one year before the gun was successfully fired), the board voted for a ship with 10-16". By October 6 sketch designs were available with 3 presented below. One of these alternatives was the PENNSYLVANIA armed with 8-16". All of these were more expensive than the PA so the NEW MEXICO'S were only slightly improved PA. In March 1914 characteristics for BB 1916 were submitted but Daniels ruled in July, 1914 (month prior to the 16" test firing) that the TENNESSE would duplicate the NEW MEXICO. In May, 1915 the fiasco was repeated. Previous arguments had centered on the merits of the 14" vs. 16" when it was not appreciated that battle ranges would increase significantly and at shorter ranges, the more numerous 14: was a better weapon. The increased battle ranges in the North Sea and longer range torpedoes proved the efficacy of Scheme #3 of 1913. It now became the basis of BB 1917. The

Superior model of BB1917 is represented by Scheme 166 which mounted their guns in a TEXAS arrangement. It is unfortunate that NEW MEXICO was not a PENNSYLVANIA with 8-16", disappointing that these were not the basis of the TENNESSEE and a crime they were not built in place of the MARYLANDs.

	Oct 1913 #1	Oct 1913 #3	Oct 1913 # (PA hull)	166
Displacement	39,500 tons	35,500 tons		35,700 tons
Length	695'	650'		644'
Width	99'	96'		100'
Draft	31'	30'		30'
Speed	21 knots	21 knots		20.5
Armament	10-16"/45(5x2)	10-16"/45 (5x2)		10-16"/45 (5x2)
	22-5"/51(22x1)	22-5"/51(22x1)		22-6"/53
				4-3" AA
Armor belt:	16"	13.5"		13.5"
Deck/Splinter:	3.5"	3"		3"/ 1.5"

A209 CC1933

A137 BB1934-2

A138 BB1937 XVI

	BB1934-2	BB1937 XVI	CC1933
Displacement	35,000 tons	35,000 tons	33,500
Length	728'	728'	775'
Width	102'	108'	92'
Draft	31'	32'	32'
Speed	30 knots	27 knots	31.5 knots
Armament	8-16"/45(4x2)	12-14"/45 (3x4)	9-14"/50 (3x3)
	14-5"/38(7x2)	16-5"/38(6x2, 4x1)	16-5"/38 (8x2)
Armor belt:	12.75"	11"	12"
Deck/Splinter:	4.75/1"	5.6"	6"/5" (magazine/machinery)

These three designs marked important milestones in the development of the fast US battleship culminating in the construction of the NORTH CAROLINA. By June of 1933, Preliminary Design delivered two battlecruiser designs (e.g. cruiser killers) to Admiral Pratt. The 12-12" design had inferior armament, inferior armor but better torpedo protection. The 14" version's armor was mounted externally outside the machinery spaces and hung on the third torpedo bulkhead over the magazines. This foreshadowed the SD/IOWA schema. She also suffered from a 'wooded' Q turret and an A turret with limited depression over the bow. This was the same turret, machinery and aircraft arrangement as Scheme G of the proposed BROOKLYN design. In a stern chase, A turret would be firing at long range negating the limitations of the raised forecandle while at short range, all 9 guns would be in action. Nevertheless, it could escort carriers, defeat the pocket battleships and Japanese cruisers and were 5 knots faster than the KONGO. In a displacement limited treaty environment and rapidly improving engineering plants, it was an excellent design, only potentially countered by the HOOD. This model is one of an "American VANGUARD" where enough triple 14" of the NV and PA existed to build four of these battlecruisers. This would have been a distinct improvement to the American battle line to replace 4 NV/PA with these ships. Ten years later ALASKA filled the role envisioned for these ships. We need to note that any 'Vanguard' type rebuilds are only viable in a treaty environment which freezes technology to that of 1920. Massive ships such as YAMATO and MONTANA

eliminate much of the usefulness of rebuilds unless they have specified functionality such as these cruiser killers.

By September 1934, US designers were able to use the new light-weight power plants, welding and tightly constrained hulls to match the HOOD. Scheme 2 used a lengthened SOUTH DAKOTA 1921, a WASP power plant and sufficient protection to provide an immune zone of 21,000 – 29,000 yds against a 16"/50 (a more powerful gun than any mounted by other navies). These studies provided the US with detailed information to resist the British attempt to reduce battleships to 25,000 tons. The Japanese announcement on March 1934 that she was abandoning the treaty also served notice that small capital ships were not viable. This was an excellent design that served as the basis for continuing studies. This author finds this a compelling ship matching BISMARCK in speed and armor and having a superior armament with 16" shells weighing 500 pounds more than BISMARCK's 15" shell.

XVI was the final scheme in the NORTH CAROLINA design. The key design factor for XVI and the NC, was the quadruple 14" turrets that could be replaced by triple 16" guns. This allowed for the escalation of the firepower of this ship without changing the rest of the design. This also allowed the ships to be ordered with 14" guns before the national elections and then converted to 16" after the elections. Once the 16" were placed on the ships, the armor was insufficient to protect her against her own size guns. Underwater protection was also suspect due to weight limitations and the lack of knowledge of the size of the Japanese torpedo warheads. This used the same single fat funnel as the Max BB and had mixed single and twin secondaries. Nevertheless, these were successful ships which could hold their own against all other opponents with the exception of the YAMATO.

The following table estimates the composition of the US battleline had the battlecruisers been built and/or WWII delayed. They have reduced building times because of the use of existing turrets and barbets and the fact that the tower assembly plans built for the NEW MEXICO were available. We assume that we will start by laying down the CCs in 1934 so they are completed after 1/1/1937 thus keeping within the Washington Treaty. Totals available reflect decommissioning and commissioning ships (including rearming WYOMING) and planned Japanese ships; historical reflects Pearl Harbor losses. The 27 BBs by 1946 matches the minimum number needed in a two ocean war. American planners would have been worried between 1936-1939 where the margin would have been reduced by one BB. The Japanese battlecruisers and ALASKAs are not included. Decommissioned ships are in red and rebuilds in green. We have speculated on the MONTANA follow up design with our choice of the 65-8B. This plan exactly matches those detailed on p.7 where the number of US capital ships needed was 27 for an Atlantic

Offensive/Pacific Defensive war plan.

Historical US/Japan Capital ships	Tot B/CC Available	Year							21kt	27kt	31+kts
15/10	15/10	1934	WY	CC7					15		
15/10	15/10	1935	AZ		CC8				15		
15/9	14/9	1936	OK			CC9			14		
15/9	14/9	1937	PA	NC WA			CC10		13		1
15/9	14/9	1938	NV		SD MA				12		2
15/9	15/9	1939				AL IN			12		3
15/10	16/10	1940					IA NJ		12		4
15/10	17/10	1941	CO	MT NH				MO WI	11	2	4
13/12	18/12	1942	MD WV		OH LA ME				10	4	4
19/9	22/13	1943	TN CA			Two- 65-8B			10	6	6
23/5	23/15	1944	MI NM ID				Two- 65-8B		9	6	8
25/4	24/17	1945	TX NY AR WY						8	8	8
	27/17	1946							8	11	8
	29/17	1947							8	11	10
	31/17	1948							8	11	12

. Decommissioned ships are in red and rebuilds in green.

A141A/A1441B**BB65-8**

	BB65-8A	BB65-8B
Displacement	67,000	~75,000
Length	1050'	1050'
Width	120'	122'
Draft	35'	36'
Speed	33 knots	32 knots
Armament	12-16"/50 (4x3) 20-5"/54 (10x2)	12-18"/48 (4x3) 12-6"/47 DP (6x2)
Armor Belt:	15.75" @ 19 degrees	16" @ 19 degrees
Deck:	Main 6.2", upper 1.5"	Main 6.2", upper 1.5"

BB65-8 was designed in January, 1940 along with the other MONTANA variants which resulted in the smaller MONTANA design. This incredibly large ship was designed with the new canal locks in mind. Their extraordinary length was required because of the size of the machinery compartments needed to generate 366,000 shp to achieve 33 knots. This would be essentially TWO (!) MONTANA power plants driving 4 shafts requiring much more hull volume than was available. Instead, this would have been a turbo-electric drive installation that would have had the further advantage of extensive subdivision similar to the earlier TED battleships and battlecruisers. This was considered much too expensive and the smaller MT was finally approved although never laid down.

The BB65 series leading to the MONTANA followed 6 slower BBs and the 4 (later 6) fast IOWAs. Either a MT successor or a MT replacement once foreign designs were better understood could be the BB65-8. Once foreign capabilities such as YAMATO or "H" are discovered, It is imponderable that such an expensive battleship like MONTANA be approved without an apparent increase in firepower. The next class would need to be far superior in capability. A minimum 30 knots was needed and there were many objections that all of the designs only gained one 3x16" turret and some extra deck armor over the IOWA. BB65-8B is the obvious next step in the design of these ships. Ten 65 ton 5"/54 turrets are traded for six 240 ton automatic 6"/47 turrets. Two feet more beam, another foot of draft, reduced main battery shell count yields an incredibly powerful and fast battleship. Two of these would certainly be enough to contain an H44, if they can find a place to dock for provisioning.

A142 IOWA with Flight Deck

Displacement	45,000 tons
Length	888'
Width	108'
Draft	36'
Speed	33 knots
Armament	6-16"/50 (2x3) 4-5"/38 (2x2) 2 Mk41 61 cell VLS totaling 122 missiles 4 CIWS
Armor	belt: 12.1" Deck: 5"

No other capital ships have survived as long or have had as many ideas on how to be used as the IOWAs. Their size, speed and survivability have generated variations to be used as troop transports, missile carriers and hybrids with a flight deck. Six different Phase II plans were created with one having a flight deck and 12 AV-8B Harriers. Challenges to configuring an IOWA in this fashion have been:

- Blast pressure from the 16" guns interferes with missile launchers and life rafts
- The proposed missile farms don't take into account the location of X barrette nor the compartments below the farm. In many cases this placed the farm in the middle of the hangar!
- A Mk 41 61-cell VLS measures 29' x 27' x 25' deep. It weighs 230 tons with missiles and requires pumping facilities of over 1000 gallons/minute for fire suppression. The existing ABL with four missiles weighs 33 tons trading off sufficient topweight of 8 ABLs for one VLS.
- Replacing the twin 5"/38 with 5"/54, 6"/55 or Mk48 8"/55 is difficult without substantial changes and costs to the barbets or magazines
- Limited missile guidance capability considerably reducing AA effectiveness
- Trunking of the funnels would be expensive while offsetting the after funnel would clear the flight deck

Our model attempts to take all of these ideas into account by

1. Providing Aegis for the weapons system, including Mk51 Guidance
2. Providing a missile farm that doesn't interfere with the flight deck or X Barrette. Mimicking the Peripheral Vertical Launch System, their location eliminates the use of hull space, increasing the safety of the ship from the loss of the missile battery and the loss of the ship in the case of a magazine explosion. Located above the main deck amidships, and armored to direct the force of the explosion outward, vital ship systems are protected.
3. Reducing bow trim and displacement by the removal of the armored control tower. This helps offset the removal of X turret
4. Removing four 5"/38 mounts saving a total of 240 tons, the weight of the second VLS
5. Providing a longer flight deck by eliminating the after control positions
6. Providing Landing Craft for a company of Marines
7. Assumed to be equipped with AV8-B Harriers, SH60 and V-22 Osprey. With the 85' wing spread of the Osprey, insufficient flight deck width would exist for a rolling take off, reducing her lift capacity by 7,500 lbs. However, if you want to offset the after stack to starboard, you will create the necessary flight deck width.

8. While not visible on a model but relatively cheap, add to the 60lb STS main deck sufficient thickness of STS to make up the difference between the loss of X turret and the addition of the flight deck. This would provide protection to the ship below the hangar in case of any hangar explosions.

Incorporating extensive flight operations in an IOWA is possible but it does reduce the protected nature of the obsolescent battleship by introducing flammable aviation fuel and an unprotected flight deck and hangar area. On the other hand, you achieve what the Russians were not able to do with their large flight-deck cruisers and heavily armed carriers; create a single ship that can be independent, self-sufficient and irresistible. And no matter what, this is cheaper than any of the Navy's current CG(X) which are expensive, vulnerable, under-armed and ugly.

A202/203/204 LEXINGTON 1921/1916/Fast BB 'D'

These ships had a long conceptual stage, were interrupted by WWI and were finally cancelled by the Washington Treaty. Designed (Design # 169) as scouts able to overwhelm a screen of light ships, they started as battlecruiser equivalents to the NEVADA with 10-14" guns, 7 funnels and capable of 35 knots (A203). High speed required voluminous machinery space and a high freeboard to maintain speed. Turbo electric machinery was introduced in these ships and then adopted for the COLORADO and SOUTH DAKOTA. Heavy machinery, a large hull and powerful guns left little displacement for armor. Half of the 24 boilers were above the armor deck which raised concerns over their protection. The ends were so fine that the original turret arrangements called for triples over twin like the PENSACOLA. The original armor scheme provided protection only against the light cruisers they were expected to encounter in an enemy screen. Design 169 was approved on June 30, 1916, only weeks after the battle of Jutland.

By January 1917 (same month the preliminary designs for the TILLMAN were completed), BuOrd wanted to replace the main armament with at least 6-16"/50s and the 18-5" with 16-6"/53. While the General Board was rejecting this, boiler and machinery design improved so that fewer boilers consumed less space. Now only five funnels were required and new plans were completed in May, 1917. Entry into WWI delayed construction and provided an opportunity to modify the ship once again. By September 1917 the updated plans called for 16" and 6" guns, 8 torpedo tubes and 4 aircraft. Design work was completed by October 1918.

While the design work was being completed, C&R obtained copies of the plans for HOOD and battle damage assessment at Jutland and Dogger Bank. By June 1918, a new concept in US battleships was ready. Design D combined the LEXINGTON machinery in a fuller hull with the SOUTH DAKOTA armament with a 12" belt and 3" upper deck capable of 29 knots. There was no armor deck at the main deck level but a 2" splinter deck at mid-belt completed the deck armor. These ships also had a 10" casemate belt similar to German ships that provided complete protection up to the main deck. If the casemate belt was eliminated, 1.75" of deck armor could be added to the splinter deck or the main deck. This would have also improved the structural strength of a long, narrow ship with heavy turrets at the ends. Unknown at the time, Design D was significantly superior to all the British and Japanese ships. The General Board disapproved because they were worried that these ships would cause a revolution like the DREADNOUGHT and render the entire battle fleet obsolete. What they did not recognize is that the HOOD already did this and the Japanese were sure to follow the British lead. The other major issue was cost. Four SOUTH DAKOTA 1921s or four LEXINGTONs could be built for three Design D's. It is interesting that Bywater's book on "The Great Pacific War" contemplated building battlecruisers mounting 18" guns; simply replace the main turrets of Project D with twin 18" and you have Bywater's battlecruiser.

There was much vacillation in the General Board about what kind of war would be fought and what type of ships would be required. Design D foreshadowed the future change in US philosophy, which was embodied in all the fast BBs of WWII. Unlike the dreadnoughts, firepower and speed were emphasized over protection. Foreshadowing the SOUTH DAKOTA/IOWA evolution, 10,000 tons was required to improve the speed of the SD 1921 by 6 knots. Like Project D, four SOUTH DAKOTA 1942s could be built for three IOWAs. If the Washington treaty had not intervened, either BB1923 or these ships would have been very likely SOUTH DAKOTA 1921 successors because both would have been cheaper than the TILLMAN. The choice would lie between a powerful, slow BB carrying 18" guns or a fast BB with slightly less firepower and armor.

The battlecruisers were slightly redesigned with the knowledge that no armor greater than 9" in thickness was pierced at Jutland and this became the new protection standard. As finally designed, LEXINGTON had a sloping 7" belt that was the equivalent of the 9" 'Jutland Standard'. This paled in comparison with both the Japanese and British fast capital ships. Deck

armor was spread over 4 decks to contribute to hull strength. The upper deck was 2.25" with an armored deck (splinter deck) of 2" at the waterline. The two decks in between had 1.5" of armor over the outer 18 feet. Shells penetrating the side above the armor belt or penetrating the outer edge of the upper deck would be fused and explode with the armored or splinter deck containing the fragments. The angle of descent would have ensured that shells hitting the center of the decks would also penetrate the outer deck on the far side of the ship and also be fused. Given what we now know about spaced armor, this armor schema may not have been as bad as many critics believed.

If her armor was weak, her underwater protection was superb. Post WWI capital ships mainly succumbed to underwater damage from submarine or aerial torpedo. Belts were rarely penetrated and the most serious loss in a gun action was centralized fire control. In this respect, perhaps the combination of high speed and powerful 16" guns would have served them well as it did in the fast BBs of WWII. They were capable of escaping any other capital ship ever built. LEXINGTON and sister SARATOGA were converted to aircraft carriers whose contribution to the US Navy was even more important than the stillborn battlecruisers.

	LEX 1921	LEX 1916	Design D
Displacement	43,500	33,500	54,500
Length	874'	874'	874'
Width	106'	92'	106'
Draft	31'	30'	32'
Speed	33.75 knots	35 knots	29
Armament	8-16"/50 (4x2)	10-14"/50	12-16"/50 (4x3)
	16-6"/53 (16x1)	18-5"	16-6"/53
Armor Belt:	7" sloped at 10 degrees	5"	12"
Deck:	Main 2", upper 1.5"	1.5"	2" main, 2-3" upper
Turrets:	face 11", roof 5"	face 6"	face 16", roof 6"

A313 US Projected Cruiser C-1

US cruisers during and after WWI were subjected to the same design vacillation as the battleships. The major difference was that at least some of the battleships were built. Cruiser design ran the gamut from the small scout through medium sized ships with a small number of large guns to the LEXINGTON 1916 which was designed to overwhelm the cruiser and destroyer screen of an opposing fleet. Smaller ships such as cruisers and destroyers were not pressed forward with the same vigor as the capital ships because it was felt they could be built quickly in any wartime scenario. Only the battlefleet would truly be, 'come as you are'.

The OMAHA represented the first successful cruiser design in over a decade. Fast, maneuverable and relatively powerful, it compared well with any other countries cruisers. Cruisers more powerful than the British HAWKINS with sufficient range for Pacific operations were required. Range required size resulting in sufficient displacement for a wide range of armament and protection. The 6" gun was well liked with the pedestal mounts yielding rapid fire. Its maximum effective range was far less than an 8" gun. The 8" gun was not particularly well liked. It was mounted in the first battleships as the largest available rapid fire gun and the same twin mount was installed in the early cruisers. While the new 8" gun had an effective range over the horizon, it only fired at 3 rounds per minute. The 10" gun was preferred because it fired just as fast and the shell was twice as heavy. It had been mounted in the last large US armored cruisers.

US designs had always emphasized protection against the armament carried. As can be seen from some of the immune zones, this was not possible on these displacements, particularly against the 8" gun. It was proposed that these ships at least be protected against destroyer fire so they could break up attacks while serving as a screen.

As shown in the table, the designs moved through many stages with 8-8" being a common armament. The existence of these designs provided the technical weight the US needed to argue for a 10,000 ton cruiser at the Washington treaty. Original designs asked for a silhouette similar to the battlecruisers to create confusion. The model presented has a single triple turret forward and two twins aft, reminiscent of the TRE KRONER many years later. This was chosen to give a one-gun superiority over the HAWKINS in bow, stern and broadside arcs. The US cruiser was much faster than HAWKINS with a greater radius. Actual development led to the PENSACOLA, which, like the fast BBs of WWII, favored speed and firepower over protection. If you like to build a fleet based on no Washington Treaty, you will need these cruisers to screen your carriers and LEXINGTONs while the OMAHAs screen the battlefleet.

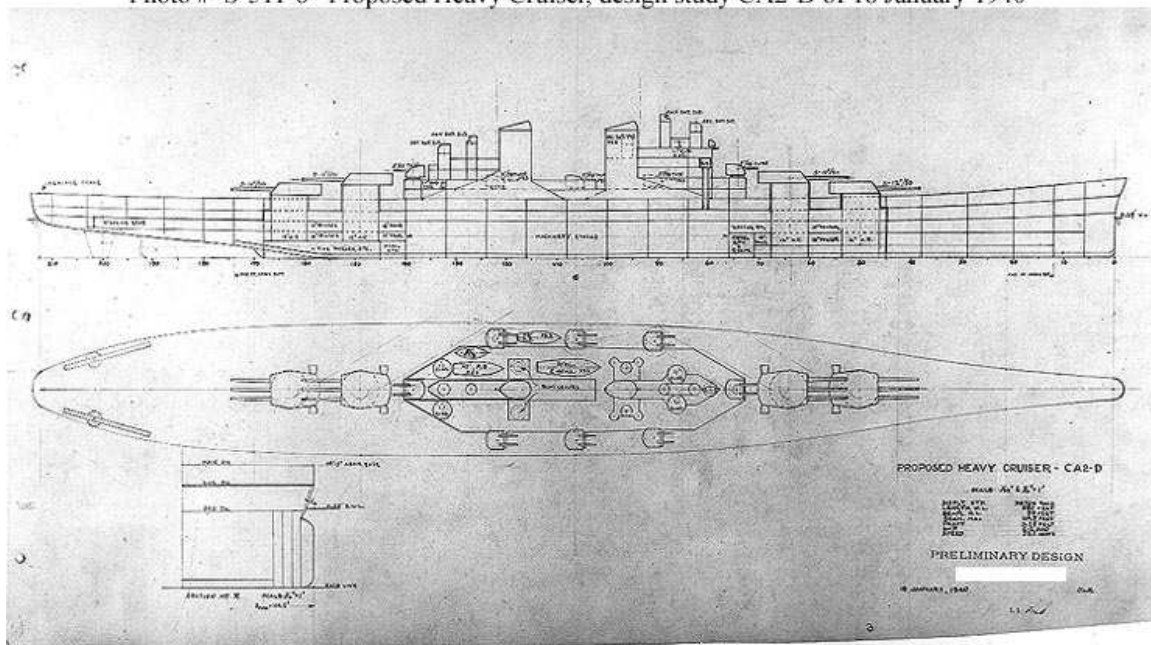
	Oct, 1919	Jan, 1921	March, 1921	April, 1921	PENSACOLA
Displacement	10,000 tons	12,000 tons	11,250 tons	10,000 tons	9,111 tons
Length	620'	635'	625'	600'	585'
Width	57'	57'	57'	57'	65'
Draft	18'	21'	21'	21'	
Speed	36 knots	34.5	34.5	34	33
Armament	7-8"/ 4-5"/51 4-3" AA	6-8" 4-5"/25	6-8" 4-5"/25	8-8" 4-5"/25	10-8" 4-5"/25
Armor belt	6-21" TT 3"	6-21" TT 5"	6-21" TT 4"	6-21" TT 1.5"	6-21" TT 2.5"
deck:		3"	2.5"	1.0"	1"
Imm Zone 6"			11k-21k		
Imm Zone 8"		16k-21k			

A205/206/207 CA2D, 1940 Sketch #2, CAC

The collapse of the Washington treaty allowed US designers free reign to design adequate sized cruisers to meet the fleets' needs. This led to the 'unlimited' designs of the ALASKA, WORCESTER and DES MOINES. There existed the very definite need for a super cruiser to provide an effective counter to the treaty cruisers, particularly as carrier escorts. This required a larger ship with overwhelming firepower, high speed and effective armor. Dozens of designs were studied and all of them had 'Spring Style' design sketches presented to the General Board. All of the Superior ships are built to the design sketches.

Also at this time the US developed their new 12"/50 with a heavy 1140 lb shell. This was an excellent weapon with superior ballistics and penetration than the German 11"/55, the British 15"/42 and 14"/45, and the Japanese 14" and 16" guns. (Imagine the VANGUARD with 12-12"?!)

Photo # S-511-6 Proposed Heavy Cruiser, design study CA2-D of 18 January 1940



At the high end of the spectrum was CA2D of January 1940. This heavy battlecruiser was built on an IOWA hull and power plant with an external armor belt. Fast and well armed, it would have overwhelmed any cruiser and most battleships. Unfortunately, it cost nearly the same as an IOWA (@\$100 million) and required the same building resources. It simply could not be afforded. As originally designed it contained the lower fire controls associated with cruiser design and not the tower fore mast of the ALASKA. The Superior model is built with the tower fore mast which provided long range fire control consistent with the long range 12" gun. CA2D was originally thought to cost \$80 million but the smaller ALASKA cost \$74 million, 15% more than originally projected, thus making the projected CA2D cost about \$90 million.

Similar in size to the DES MOINES was the 1940, Scheme #2 which was considered a 'convertible' cruiser. Preliminary designs of March, 1940 were a flush deck hull with aircraft arrangements aft. Scheme #3 was slightly larger with three twin 12" turrets. Scheme #3 with 6-12" would be an effective 'cruiser killer' with two having an excellent chance against SCHARNHORST. It would also be effective against the feared Japanese 'pocket battleships'.

However, it was not really convertible without rebuilding the ship. Further design studies proved that the displacement would have to be increased to 24,100 tons to effectively house the 12" guns.

Designed on an ALASKA sized hull was the CAC with 12-8" guns. This was a powerful ship with a good immune zone against cruisers but the armament was not overwhelming. The hull was stepped abaft the third turret and aircraft arrangements were amidships. This was a downsized design of a March, 1938 24,100 ton cruiser which had 13' more beam, torpedo bulkheads, aircraft aft and 35 knot speed. These sketches were completed by BuShips in March 1941.

	CA2D	1940#2	CAC	ALASKA	DES MOINES
Date	January, 1940	March, 1940	March, 1941	January, 1941	Nov, 1943
Displacement	38,700 tons	15,750 tons	20,000 tons	27,500 tons	19,930 tons
Length	888'	716'	808'	808'	716'
Width	104'	72'	77'	90'	76'
Draft	'	24'	25'	31'	26'
Speed	33 knots	33.2	33	33	32.5
Armament	12-12"/50"	12-8" (4x3)	12-8" (4x3)	9-12" (3x3)	9-8" (3x3)
	16-5"/38	12-5"/38	12-5"/38	12-5"/38	12-5"/38
	16-1.1"	8-21" TT	8-21" TT	56-40mm	24-3"/50
Armor belt	13"	5.7"	7.6"	9.5"@10°	6"
Deck(upper/main)		1.2/2.5"	1.2"/3"	1.4"/4.25"	1"/3.5"
Imm Zone 8"			15k-24k	12k-30k	
Imm Zone 12"	18k-26k			19k-23k	
Rounds/minute	36	36	36	27	90 !
Weight/minute	41,040	12,060	12,060	30,780	30,150
Cost	\$90 million			\$74 million	\$48 million

The outcome of all these studies was that a very large ship (CA2D) was unaffordable. A 20,000 – 24,000 ton ship with 12-8" or 6-12" would not be as good as adding 3,000 tons and giving her 9-12" (ALASKA), particularly in weight of fire. By building automatic 8" guns, you could fire 2.5 times as many 8" shells with DES MOINES compared to the 20,000 ton cruiser. By comparison, an IOWA could fire 48,600 lb/minute and BALTIMORE 9,045 lb/minute.

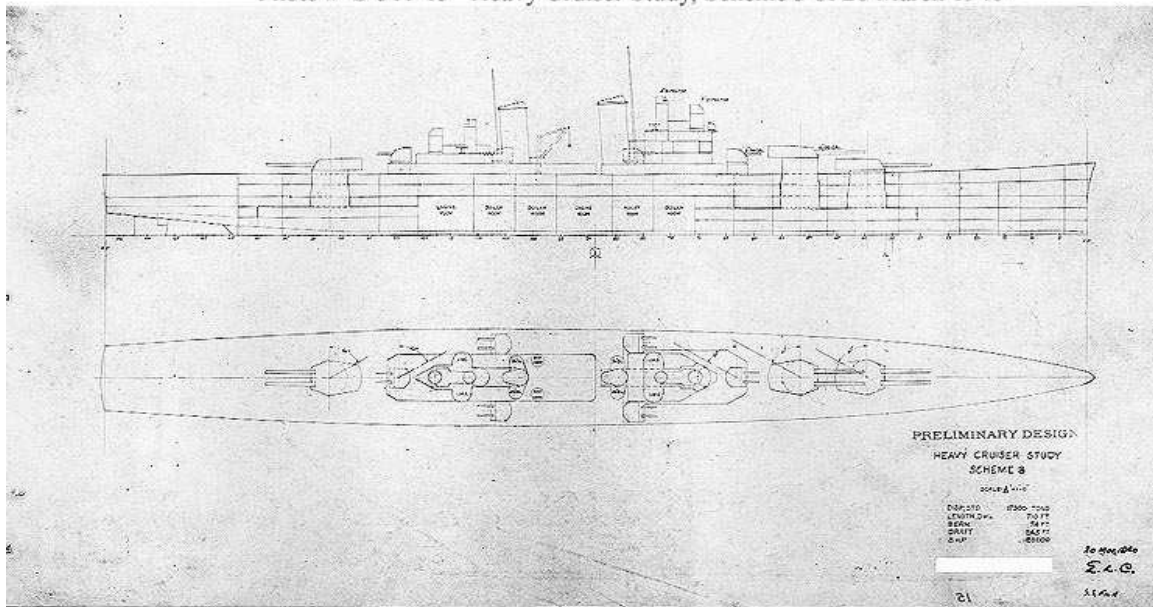
Despite their expense, these studies led to the conclusion that the ALASKA and DES MOINES represented the best value for the tonnage and money. If the war in Europe had not been raging, perhaps the expensive ALASKA or DES MOINES would not have been built. Only the US had the luxury of affording very expensive ships. As a comparison, BROOKLYN cost \$25 million and CLEVELAND cost \$34 million. Each of these models has been built with improved 40mm AA as they might have appeared in the Pacific.

A208 CA, Scheme 3

This fascinating look at cruisers envisioned 'convertibles' where ships like CAC would substitute twin 12" for 8" turrets 1,2 and 4. If other countries started building 'super cruisers', this accommodated the possibility of growth while not starting a spiraling cruiser race. One issue is that the cruisers would trim 2 feet at the bow because of the lack of a fourth turret aft. It was envisioned that two of these would have a reasonable chance against the SCHARNHORST. The choices were between a large, balanced 12" gun ship (CA2 series which became the ALASKA), a balanced CA with 12 8" guns making many hits (CAC), and this compromise which had the 12" guns but only protection against the 8" shell.

	CAIII	CA3	CA MM
Date	March, 1940	June, 1940	
Displacement	20,000 tons	17,300 tons	22,500 tons
Length	735'	710'	735'
Width	78'	74'	78.5
Draft	25'	24.5'	25.8'
Speed	34.4 knots	33.2	35
Armament	6-12"/50" 12-5"/38 16-1.1"	6-12" (3x2) 12-5"/38 16-1.1"	6-12"(3x2) 12-5"/38 24-1.1"

Photo # S-511-15 Heavy Cruiser Study, Scheme 3 of 20 March 1940



A518/A519 August to December, 1940 Armored Carriers

	CV-A	CV-B	MIDWAY
Date			
Displacement	44,500 tons	38,500 tons	45,000
Length	900'	900'	900'
Width	111'	104'	113'
Draft	32'	32'	
SHP	172,000	150,000	212,000
Speed	33 knots	32 knots	33 knots
Armament	9-8"/55 8-5"/38	16-6"/47 (4x2, 8x1)	18-5"/54 84-40mm
Aircraft	112	91	144
Armor			
FD	1"	1"	3.5"
HD	3.5"	3.5"	2"
AD	2"	2"	2"
Belt	7.6"	5"	7.6"

These were two of the competitors for the MIDWAY design. As a group, these were fully armored carriers evolved from the CV-9F of the ESSEX. Designed just after the first four ESSEX were laid down, the focus was on a ship that could protect herself against cruisers as well as aircraft. Several significant factors contributed to each design.

Power plants were only available in three sizes; ESSEX (150,000), MONTANA (172,000) and IOWA (212,000). These ships approached a size where the ESSEX power plant was insufficient to guarantee 30 knots wind over deck if there was any hull fouling. This essentially eliminated the ESSEX plant requiring a much larger engine room. The MIDWAY finally adopted the IOWA plant but with far greater subdivision than even the MONTANA giving her very complete underwater protection.

TB	TB	TB	TB	TB	TB	TB	TB	TB	
ER	PR	BR	BR	BR	BR	BR	BR	Evap	
AMR	Evap	SSTG	ER	PR	SSTG	ER			Bow
ER	PR	BR	BR	BR	BR	BR	BR	AMR	
TB	TB	TB	TB	TB	TB	TB	TB	TB	

AMR – Aux Motor Room BR – Boiler Room Evap – Evaporators ER- Engines
 SSTG Turbo Generators TB – Torpedo Bulkheads

Heavier aircraft required a thicker flight deck; the heavy deck armor led to a wider beam and lower flight deck to the water to preserve stability. Armor was required to protect against bombs and shell fire to prevent the loss of the ship like the GLORIOUS. The lower flight deck would allow spray and even green water to sweep the bow eliminating the preference to use the forward end of the flight deck as an aircraft park. This problem would not be fully resolved until the advent of the angled flight deck. Finally, the experience of the ILLUSTRIOUS a month later in January, 1941 proved the value of armor. The location of the penetrating hit was compared to the ESSEX with the surprising conclusion that the ESSEX would have survived. It was recommended that the hanger deck be divided by 1” STS bulkheads to restrict the spread of damage. Further studies with increased armor lead to the final design of the MIDWAY.

An 8” armament was preferred but it led to a lighter 5” AA armament. This was felt acceptable since the fighters should be her main defense against aircraft. It was not until 2 years later that the battles in the Solomons revealed the inadequacies of the slow-firing 8” cruisers which led to the design of the DES MOINES with automatic 8” guns.

The automatic 6” gun was still in an early stage of development (not operational until 1949!) and CVB could not mount it and transit the Panama Canal unless the single 6” guns in the deck galleries were Single-Purpose. This model is predicated on having DP single and twin 6”/47, hence the larger hull. Not only is this a superior anti-surface weapon due to the rounds-per-minute but in an AA mode, they have 50% greater range than the 5”/38 and a 50% greater lethal radius. The MIDWAY’s 18 -5”/54 gave her both a good anti-surface and AA capability. Finally, CV-A’s hull lead directly to the MIDWAY design.

B102 LION

These ships proved that less is not better. The British deliberately chose to limit displacement to 40,000 tons in a futile attempt to convince other powers to limit the size of their ships. Every other power had already broken this limit on ships building or planned. However, this limit did allow the LIONS to be able to be docked in additional ports compared to larger ships. Despite these faults, they would have been valuable additions to a fleet that lost 5 capital ships during the war with several more permanently crippled.

Successors to the KING GEORGE V, they corrected the issue of an insufficient main armament. The protection and propulsion scheme was nearly identical to the KGV, which proved to be inadequate under war conditions. The armor scheme was good with the armor estimated to be equivalent to American armor 25% thicker. Unfortunately, the planned underwater protection scheme proved disastrous for the PRINCE OF WALES. Despite being designed to withstand a 1000 lb torpedo warhead, the POW's hull was breached by a smaller warhead. Hatches between bulkheads were warped causing massive flooding across the ship and loss of power. The machinery was not as advanced as the Americans or Germans and they carried less than half the fuel of the Americans or Germans. The lack of sheer at the bow meant that these ships would have shipped a lot of water lowering their effective maximum speed in heavy weather.

LION and TEMERAIRE were laid down in 1939 with CONQUEROR and THUNDERER to be laid down later that year. Construction was not significantly advanced because it was not felt they could be finished in time for the war and because of other more pressing construction. Two more were projected under the 1940 estimates. LION was redesigned in 1942 to improve underwater protection, reducing belt armor over the machinery, increasing endurance and improving AA defense. The most important change was to increase the bow height from 28 to 37 feet. Superiors model of LION 1942 can be converted to the earlier design by bending the bow down until there is no sheer and then filing the waterline flat.

Battleships were still considered as part of a balanced fleet late in the war. The final design of the LION was significantly larger than previous ships. The turrets in particular were larger and capable of faster firing.

	Lion 1939	Lion 1942	Lion 1944
Displacement	40,550 tons	42,550 tons	56,500
Length	793'	793'	830'
Width	105'	108'	115'
Draft	30'	30'	35'
Speed	30 knots	28.25 knots	
Armament	9-16"/45 (3x3) 16-5.25"(8x2) 92 2pdr AA (10x8,3x4)	same same 72 2pdr AA (9x8)	same same
Armor	belt: 14.7" Deck: 5.9" Turrets: 14.7" face, 6" roof	14.7" 5.9"	same same same



Lion and Super Lion engaged!

B110 VANGUARD 1946

Last of the British battleships, desired before the war started but not finished until after the war ended, VANGUARD was the largest, best protected ship produced by Britain. Built with 'off-the-shelf' components, she could have been finished much more quickly if needed.

VANGUARD was first proposed in March 1939 using the turrets from the GLORIOUS and COURAGEOUS. Using the machinery, protection and endurance of the KGV, a new battleship could be made very quickly. If this concept ship was successful, sisters could be built around the turrets of the REVENGE class battleships that were due for replacement. Like the LION, VANGUARD had the same propulsion and radius issues and the torpedo bulkhead still had a step in it that reduced its effectiveness. However, watertight and damage control effectiveness was considerably enhanced by eliminating the many watertight hatches in the bulkheads and replacing them with watertight scuttles in the overheads.

Displacement:	42,300 tons
Length	814'
Beam	108''
Draft	34'
Speed	29.5 knots
Armament	8-15" /42 (4x2) 16-5.25" (8x2) dual purpose 73 – 40mm (10x6, 1x2, 11x1)
Armor	Belt: 13.73/ 12.75" (magazines/machinery) tapered to 4" Deck:5.9"/4.9" (magazines/machinery) Turrets 12.75"/10.8"/6.9"/5.9" (face/side/back/roof)

Superior's VANGUARD is also built with 'off-the-shelf' components. This upgraded out-of-production model uses the QE 15" turrets, KGV 5.25" turrets and new sextuple and single 40mm AA. The hull has been upgraded with hatching, rafts and a visible armor belt.

As part of the 'What-If?' scenario of WWII starting five years later than it did, how would VANGUARD be used? A likely scenario would be a battlecruiser squadron based in Gibraltar

where it could help the French against the Italians or sortie into the Atlantic. VANGUARD, a rebuilt HOOD, RENOWN and REPULSE were individually superior to the German surface raiders including the OPQ battlecruisers. As a squadron with air cover, they would have overwhelmed single German battleships and provided a fast squadron to locate the H/Graf Zeppelin battle groups. It would also have been logical for the DUNKERQUE and STRASSBOURG to be part of this battlecruiser squadron while the French battleships engaged the Italian fleet.

B111 Super Lion (16E-38)

This was one of the LION variations investigated in 1938. While it may have been too large and expensive in 1938, it represents a logical next step in 1942. Two LIONS each were programmed for 1938, 1939 and 1940. By this time the trends in German, Japanese, French and Russian ships were becoming known. Britain would have to increase the size of her ships to remain competitive. This would have meant new docks while the beam would have precluded passing through the Panama Canal.

Displacement	48,500 tons
Dimensions	850 x 110 x 33 feet
Speed	26 knots
Armament	12-16"/45 (4x3) 16-5.25"/50 (8x2) 84-2pdr (10x8, 1x4)
Armor	belt: 14.7" Deck: 5.9" Turrets: 14.7" face, 6" roof

These ships matched the size of the cancelled INVINCIBLES of 1921. They had superior armament at the expense of speed and to some extent, protection. Speed could not be improved without increasing the size of the ship to house more powerful machinery.

These ships gave up 12,000 tons to the comparable MONTANA. On 80% of the Montana displacement, they had an inferior main and secondary armament, speed, underwater protection and armor. Despite this, superior numbers of shells would have leveled the playing field against the Germans. However, they also represent the maximum effort an impoverished Britain could afford to maintain her empire. It is also interesting to compare their characteristics against LION as redesigned in 1944 which was a larger ship with less armament. Improved weapons could only be matched by increasing the proportion of the ship devoted to protection.

B112 N3

Approved in November 1921, the N3 was the battleship companion to the INVINCIBLE (G3) laid down the previous month. Less than 50 feet shorter than their battlecruiser cousins, the N3 would have a heavier main battery, heavier armor and be capable of 23 knots so they could operate with the existing battle fleet. Armor arrangement was similar but the machinery arrangement was switched with the boiler rooms aft of the engine rooms. This meant long shaft lengths which could pose the same problems of opening the entire hull if hit by a torpedo as happened with the PRINCE OF WALES.

However, in July 1921 the Five Powers were invited to a disarmament conference that commenced on November 12, 1921, the same month these ships were approved. On February 6,

1922 the Washington Conference confirmed the new treaty restrictions and the G3s were cancelled a week later. The N3s were never ordered or laid down. Design characteristics were:

Displacement	48,500 tons
Dimensions	820 x 106 x 33 feet
Speed	23 knots
Armament	9-18"/45 (3x3) 16-6"/50 (8x2) 6-4.7"/43 AA 40 2pdr (4x10) 2 – 24.5" Torpedo Tubes
Armor	Belt: 15"/13.5" inclined at 18° over the magazines/machinery Deck: 8" over magazines/machinery Turret 18" face, 8" roof

B113 BB1935 15A/B B206 F3

Numerous design studies to replace the G3 (cancelled by the Washington Treaty) had been completed in 1921 as part of the NELSON preliminary design. Design F3 envisioned a 15" armed ship that could be reasonably well protected and achieve 28 knots. Alas, the "mine is bigger than yours" syndrome in battleship guns dictated that the British had to accept 16" guns for the NELSON condemning them to only 23 knots. This was unfortunate because the British lost the opportunity to have a post-Washington Treaty fleet of 14 BBs (5 QE, 5 R, 4 IRON DUKE) screened by a fast wing of 28 knot ships (2 F3, HOOD, 2 RENOWN, TIGER). This would have caused much angst among the Japanese (KONGOs at the time were only 26 knot) and the US (cancelled LEXINGTONs). More importantly, the existence of a fast BB in 1936 could have allowed the British to take the time to produce the 15A/B which would result in a total of 10 (5 15A, 2 F3, HOOD, RENOWN, REPULSE) high speed 15" battleships broadly comparable but more numerable than BISMARCK and LITTORIO.

By the mid 1930s, the British were convinced they had to rearm due to increasing world tensions. Unable to convince anyone that smaller battleships should be built, they studied the differences between 30 and 27 knot ships armed with 14", 15" or 16" guns. It was clear from the studies that on either the 30 or 27 knot hulls, an armament of 15" guns provided the best balance of fire power and left enough weight for good protection. Despite having 15 years to accept the best balanced battleships design, the British still did not get it right; time constraints and the treaty restrictions required a quick decisions leading to the KGVs.

Due to treaty considerations and the run down condition of the armaments factories, the KGV class was fitted with 14" guns. By contrast the Americans waited and were able to escalate to 16" guns but at the expense of NORTH CAROLINA being service ready a year after the KGV. The British position proved correct; they didn't have a year and needed the KGVs even sooner than they became available. It is not clear if torpedo tubes were planned for these ships. They were for the 12" gunned small BBs. Therefore, they have been included but can be removed if you desire. This ship happens to be a personal favorite of this author. A well balanced 30 knot ship **could** be built on 35,000 tons. And you can build 6 of them for 5 BISMARCKs.

	F3	15A	15B	Bismarck	Littorio
Displacement	35,000	35,000	35,000	41,200	40,500
Dimensions	740 x106 x 29	770 x 104 x 31	770 x 104 x 31	820x118x31	780x108x34
Speed	28	30	27	30	30
Armament	9-15"/50 (3x3) 8-6"/50 (4x2) 32 – 2pdr (4x8)	9-15:/45 (3x3) 20-4.5" (10x2) 32- 2pdr (4x8) 10-21" TT 4 aircraft	Same	8-15"/47(4x2) 12-5.9" (6x2) 16-4.1" (8x2) 16-37mm AA 4 aircraft	9-15"/50 (3x3) 12-6" (4x3) 12-3.5" (12x1) 20-37mm AA 3 aircraft
Armor belt	12"	12.5"	14"	12.6"	14.2"
Armor deck*	7"/3.25"mag/mac	5.25"	6"	5.7" (total)	6.7" (total)
Turret	16"	15"	15"	14"	15"
Hull weight	13,500	13,500	13,200	11,506	10,441
Machinery wgt	4,100	2,875	2,375	2,756	2,267
Armor wgt	9,970	11,155	11,955	17,263	13,451
Armament wgt	5,400	6,270	6,270	5,960	6,462
Gen Equipmnt	850	1,200	1,200	1,815	4,583
Fuel	4000	4,000	4,000	8,167	4,161
Margin	180				

* German and Italian deck armor was in multiple layers and in the case of Littorio thinned at the edges. British deck armor was in a single layer but lacked an upper deck layer (American design) that would fuse shells or bombs.

B114 LION Hybrid

If the original LION design proved that less is not better, this concept reduced her battleship qualities even further. By definition, a hybrid attempts to combine the functions of two different types of ship, one usually being an aircraft carrier, at the expense of not being as powerful as a ship with 'pure' functions. The thinking was that for 1/3 of a BB you could get 1/2 of a CV. This ship was proposed in 1941 as a way of providing fighter coverage and very limited strike capability totaling only 14 aircraft. This ship was seen as very inferior to a battleship with an unarmored hanger, unprotected uptakes and potential damage to the flight deck from the gun blast. She sacrificed 1/3 of her firepower, gained virtually no strike capability, and offered a larger target to the enemy. Since she could not be finished until 1945 at the earliest, and the return on investment dubious, the idea was shelved.

	Lion Hybrid
Displacement	44,750 tons
Length	800'
Width	112'
Draft	30'
Speed	28 knots
Armament	6-16"/45 (3x3) 16-5.25"(8x2) 64 2pdr AA (8x8) 12 fighters, 2 torpedo bombers
Armor	belt: 13" Deck: 5.9" Turrets: 14.7" face, 6" roof

B204 INVINCIBLE 1921 (G3)

Financially exhausted by the expenses of WWI, Britain began feeling pressed by her two allies' plans for greatly expanded fleets. The new ships of the United States and Japan would dwarf even the enormous HOOD. Designed during 1920 and laid down in October 1921, all work stopped after 3 weeks on the ways due to the Washington Treaty.

Unlike earlier British capital ships, their dimensions were only limited by the Panama and Suez canals. Designs ranged from 43,750 to 53,100 tons. Eventually the G3 was approved in December 1920 and unofficially assigned the "I" names of the first four British battlecruisers (INVINCIBLE, INFLEXIBLE, INDOMITABLE, INDEFATIGABLE). Design characteristics were:

Displacement	48,400 tons
Dimensions	856 x 106 x 33 feet
Speed	31 knots
Armament	9-16"/45 (3x3) 16-6"/50 (8x2) 6-4.7"/43 AA 40 2pdr (4x10) 2 – 24.5" Torpedo Tubes
Armor	Belt: 14"/12" inclined at 18° over the magazines/machinery Deck: 8"/4" over magazines/machinery Turret 17" face, 8" roof

These ships were the first British dreadnoughts designed without any stern arcs of fire. X turret was located between the bridge and after superstructure with only a 40° blind spot at the stern. This allowed the belt and deck armor over the magazines to be maximized over a minimum distance. The belt was internally sloped which allowed the beam to be maximized. Deck armor, particularly over the magazines, was better than any of her contemporaries.

Compared against the Japanese and American ships, this design was better balanced. Triple turrets saved weight, which was utilized for armor. Secondaries in turrets were an enormous improvement over the casemate mounts. AA was exceptionally complete although the 2pdr mount took 10 years to develop. Speed was only marginally less than the LEXINGTON. This ship introduced the tower superstructure that was used on subsequent new and rebuilt battleships. Although cancelled, the turrets and general design were used as the basis of the NELSON class, the only 16" battleships ever completed in Britain.

If an Achilles heel existed for these ships, it was in the deck armor over the machinery or the shorter length of the belt. Experience with the YAMATO and MUSASHI showed that extensive flooding of unarmored spaces, particularly in the bow, could lead to loss of speed and maneuverability and subsequently the ship. Nevertheless, these were arguably the best ships of their time and would have held their own against any ships built in WWII.

B205 HOOD 1944



HOOD prowling the sea lanes for the new German fleet

WWII interrupted Britain's plans to modernize her battle fleet. For the NELSON and RODNEY, this meant that their careers would be cut short because they could not be spared for extensive modernization. For the HOOD, the results were far more tragic. It was originally thought that inadequately armored magazines and exposed torpedo warheads led to her rapid destruction by the BISMARCK. Recent dives on the wreck suggest that her after magazines were pierced by a diving shell (similar to the PRINCE OF WALES in the same action). The forward magazine could have exploded when the rapid list and potential electrical fires ignited the powder in the trays.

No plans exist of the proposed changes to the HOOD. Proposals developed in 1938 called for the following:

1. Install new main and auxiliary machinery; Weight saved would be used to increase the deck armor.
2. Remove the conning tower and install new bridges
3. Rearrange the protection. The best of the schemes was to delete the upper 5" belt, leave the 12" and 7" belts in place, and increase the deck armor to 5" over the magazines and 4" over the machinery.
4. Replace the secondaries with 16 – 5.25" (8x2)
5. Increase the AA armament to 6 octuple 2pdr
6. Install a cross deck DIIIIH catapult similar to the KGV
7. Remove the torpedo tubes

Several proposed drawings have appeared in Breyer's Battleships and Battlecruisers and in Warship International. None of these is completely satisfactory because they don't take into account machinery and magazine arrangements or the need for secondary fire on fore and aft (four-corner) bearings. Superior's HOOD 1944 is modeled on British practice with their most recently modernized ships, the QUEEN ELIZABETH and RENOWN, and the features of the KGV class. As completed she bears a superficial resemblance to the VANGUARD with twin funnels, modern superstructure and two main turrets fore and aft.

The forward and aft control towers have been replaced by structures that resemble the KGV. Aircraft hangers have been installed next to the after funnel as in KGV and RENOWN. A DIIIIH catapult is located on the main deck between the hangers and after superstructure. The 24 boilers located in four boiler rooms would have been replaced with 8 Admiralty 3-drum boilers. The boiler rooms would have been reduced in size to provide more extensive subdivision. The engine rooms would have also been subdivided as in WARSPITE, RENOWN and QUEEN ELIZABETH to provide better subdivision and reduce vulnerability to single hits. This reclaiming of space was vital for installing the new secondary armament while the new machinery would have improved HOOD's speed to that of when she was first commissioned.

Lying between the forward boiler room and 15" magazines were the 5.5" magazines. Space gained from the boiler room and the 5.5" magazines would have been used as the forward 5.25" magazines. The forward 5.25" guns would have been mounted forward of the first funnel directly over boiler room one to take advantage of this magazine space. The after 5.25" turrets would have been located in the area vacated by the 4" AA. The 4" and 5.5" magazines would have been converted to serve the 5.25".

The length and size of the HOOD would have provided additional opportunities for AA gun emplacement. Four 8x2pdr are mounted in the standard arrangement abreast the funnels. Length aft would have allowed an 8x2pdr to replace the twin 4" AA while retaining the aft 8x2pdr on the bandstand. Two 4x2pdr on the bridge wings would have given good coverage forward as in the HOWE and ANSON. Twin 20mm would have completed the light armament. This would have given HOOD the best AA coverage of any of the British Battleships.

Tired of losing the HOOD to the BISMARCK in your war games? Take BISMARCK on with the rebuilt version as the British planned! See what 5" decks, higher speed; modernized 15" guns and new fire control equipment do for you in the Battle of the Atlantic.

B306 British Planned Heavy Cruiser (Admiral Class)

At the outbreak of the war new large cruisers were desired. Free of treaty restrictions, the British wanted ships that could catch and destroy the large German cruisers. The 9.2" (380lb) gun was initially suggested but this would have created lead-time design problems and supply issues with these being the only ships of this caliber. An immune zone of 14,600 to 24,000 yards against 8" shell was sought. Another significant issue was that 2 VANGUARDs could be built instead of three 9.2" cruisers, a far better investment. Designs were off and on for several years with the following characteristics.

	Sept, 1939	Jan, 1940	Jan, 1941	Mar, 1941	Oct, 1941
Displacement	22,000 tons	15,500 tons	15,000 tons	16,100	16,500
Length	700'	670'	650'	670'	670'
Width	84	77.5'	77'	79'	80'
Speed	33 kts	33 knots	30.5 knots	32	32
Armament	12-9.2" (3x4)	9-8"/50 (3x3)	9-8"/50 (3x3)	9-8"/50 (3x3)	9-8"/50 (3x3)
	12-4.5" (6x2)	12-4" (6x2)	12-4" (6x2)	8-4.5" (4x2) or	16-4" (8x2)
	16 2pdr AA	16 2pdr AA	16-2pd (4x4)	16-2pdr (4x4)	40-2pdr (5x8)
Armor	belt: 7"	6"	4.5"	4.5"	4.5"
	Deck: 4"	3"	4"	4"	4"
	Turrets: 6" face, 3" roof				

The British laid down only 11 new cruisers after the beginning of the war. Construction of destroyers, aircraft carriers and landing craft had a higher priority. This model is the 3x3 design which was to mimic the KGV in appearance to cause misidentification. Design and construction of a 9.2" design meant a five year lead time which meant that the cruiser would probably not be available before the end of the war. Compared to the slightly smaller DES MOINES, the 9.2" design could only fire half the number of shells with no greater penetration capability than the heavy US 8" (335lb). It is more likely that the cruiser would have had 9x8".

The final question in the design was one of secondary armament. The final 8" designs could carry either 8-4.5" or 16-4". The 4.5" was more effective against destroyers but the more numerous 4" was superior against aircraft. Given the heavy losses to aircraft, the 4" would be mounted in the four corner arrangement similar to the British BBs. By the end of January 1942, the question of building large 8" cruisers was shelved forever. An interesting alternative suggested in November, 1941 was to build repeat BELFASTs with 8" armament. Finally, given that the British requested plans for CLEVELAND as potential cruisers, one wonders why they also would not pursue the BALTIMORE, which was a superior design? One reason both US cruisers were able to achieve their combination of armor and armament was the compact, light and powerful machinery which was beyond British capabilities at that time.

D201 Dutch Battlecruisers 1047



Dutch naval power had ebbed considerably since her bitter rivalries with England in the 18th century. Her colonial empire in the Pacific had survived but the light forces stationed there were inadequate to resist the Japanese. Banking on the United States and British battle fleets to tie

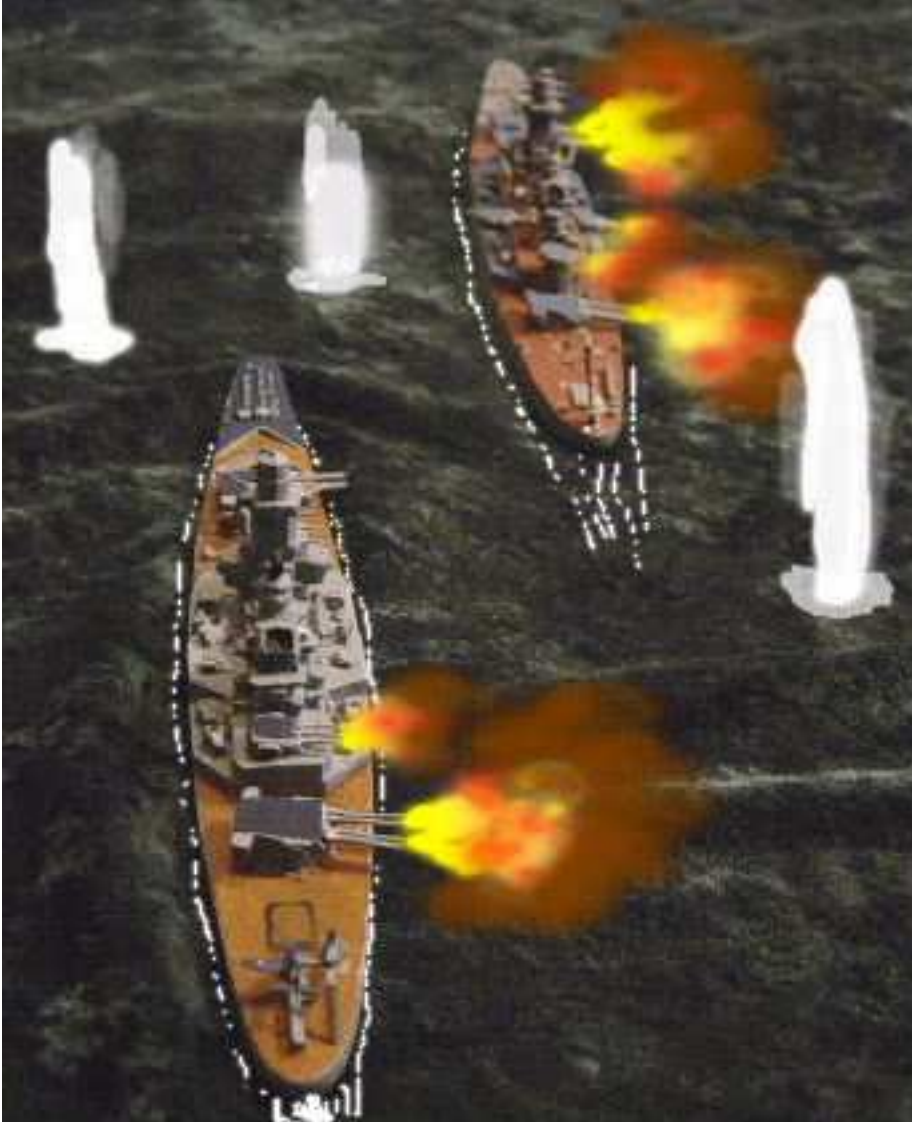
down the Japanese battleships and battlecruisers, it seemed best to design ships that could defeat the numerous Japanese heavy cruisers.

Development of three battlecruisers was begun in February 1939. German assistance was requested in April 1939. Invasion of the Low Countries in May 1940 halted a year of design studies that had produced plans for a battle cruiser with the following characteristics.

Displacement:	28,000 tons
Length	778'
Beam	98'
Draft	26'
Speed	34 knots
Armament	9-11" (3x3) 12-4.7" (6x2) dual purpose 14 – 40mm (7x2) 3 aircraft, one catapult
Armor	Belt: 9.8" inclined at 10" Deck:5.1" (total) Sufficient to provide protection to 8" shells at ranges greater than 10,000 yds

Dimensionally equivalent to the SCHARNHORST, these twin-funneled ships traded armor for speed. The main armament would have been the superb German 11" gun but a low control tower would have limited their effective range. Similar in size to the ALASKA, the 1047 had significantly less firepower, equivalent protection and superior speed. These would have been highly effective against Japanese light forces but lacked the protection to take on even the modernized, elderly KONGO's. Given the history of the Pacific, the torpedo equipped Japanese cruisers would have stood an even chance against these ships in a night action. Assuming the absence of air cover, if the Dutch did manage to catch the Japanese during daylight hours, these ships would be highly effective "cruiser killers". Tired of trying to stem the Japanese tide with the DE RUYTER and JAVA? Try these proposed battlecruisers against the Japanese heavy cruisers!

F105 GASGOGNE



Alsace leads Gascogne in the North Atlantic

In 1926, the French navy began considering a battlecruiser capable of destroying the Washington Treaty Cruisers. By 1930, these designs evolved into the DUNKERQUE class mounting two quadruple 13" turrets forward. Design time was saved by utilizing the existing drawings for the quadruple 13.4" turrets of the NORMANDIE class battleships of WWI. Four Richelieu class battleships followed the DUNKERQUE's with 8-15" guns in quadruple turrets. These excellent ships were technically superior to the LITTORIO and BISMARCK causing the British much anxiety should they be captured by the Axis.

The fourth and last unit of the RICHELIEU was modified to improve firepower aft, reduce vulnerability of the forward turrets and improve the AA arcs. Machinery and superstructure were moved forward and B turret relocated aft. An outstanding feature of this ship was that all nine 6" guns could bear on the broadside offering very heavy resistance to attacks by light cruisers and destroyers. Considered by many to be superior to the BISMARCK, the RICHELIEU class was an outstanding combination of protection, firepower and speed. GASGOGNE was not laid down due to the invasion of France.

F106 French ALSACE

Early in 1940, the French began design studies for a new class of ships. The escalation clause of the Washington treaty was now in effect with the United States planning the 45,000-ton IOWA while the British had laid down the 40,000 ton LION. The French considered three different designs:

40,000 tons, 9-15" (3x3)

42,500 tons, 9-16"(3x3)

45,000 tons, 12-15"(3x4)

These represented ship sizes based on both the British and US plans as well as a compromise ship of 42,500 tons. However, since the French had not built a triple gun turret of such size before, a considerable delay would have ensued. By using the existing quad 15" turret, the ALSACE would have been able to be built more quickly. This was particularly important since existing docks limited them to building no more than two battleships simultaneously. Secondary armament could have included forward and aft mounted 3x6" turret and two wing turrets allowing 9-6" to bear on any destroyers or cruisers. Additional boilers would have been added to a lengthened engine room. This would have resembled the original engineering spaces for the RICHELIEU that could allow for either a single or twin funnels.

The invasion of France eliminated any possibility that the ALSACE, NORMANDIE, FLANDRE or BURGOGNE would ever be completed. These ships would have been more than a match for the BISMARCK or LITTORIO while the 'H' would have been outgunned 12 heavy guns to 8. Compared to the IOWA, these ships saved precious centerline space by using 'macks' integrated with fire control equipment. The French ships had a broader bow giving them better rough weather capability than the IOWA. By contrast, they also had a narrower stern allowing less complete torpedo protection around the aft turrets, propellers and rudders. Given the dimensions of this ship and previous French experience with overweight ships, it is likely they could have displaced about 48,000 tons.

Displacement	45,000 tons
Length	900'
Width	108'
Draft	31'
Speed	30 knots
Armament	12-15" (3x4) 12-6" (4x3) 16-3.9" (8x2) 32 – 37mm AA (8x4)
Armor	Similar to RICHELIEU

F901 French NORMANDIE 1916

Plagued by the lack of large docks, the French navy examined innovative ways to increase the firepower of their battleships yet maintain the same basic hull size. Only 35 feet in length separated the COURBET, BRETAGNE and NORMANDIE classes. The use of a quadruple turret would give the NORMANDIE's a broadside of 12-13.4" compared to 10-13.4" for the BRETAGNE and 10-12" for the COURBET. In addition, arcs of fire were improved with no restricted central or wing turrets. Despite four of the class being launched by 1915, none were completed. However, their machinery saw service in destroyers, the main guns mounted on rail cars and one, the BEARN, became the first French aircraft carrier. Perhaps their most important

legacy was the existence of construction drawings for quadruple turrets that were used in both the DUNKERQUE and RICHELIEU classes.

Displacement	25,230 tons
Length	578'
Width	89'
Draft	30'
Speed	21 knots
Armament	12-13.4"/45 (3x4) 24-5.5"/55 (24x1)
Armor	belt: 11.8" Deck: 4.7" Turrets: 13.4"

G103/104 H Class

Successors to the BISMARCK, this class of six ships formed the backbone of the Z Plan. Formed into two divisions of 3 ships and supported by a carrier and cruisers, these ships were intended for long ocean deployments and convoy destruction. Two H39 were laid down in 1939 but construction was halted after the start of the war.

Beginning in 1940, successive improvements to the design were suggested with the H41 the last practical designs produced. H42, 43 and 44 were successively larger with no possibility of being built because they would not have fit in any of the shallow German harbors. These were theoretical studies only that were never presented to the German naval staff.

These ships were significantly different from the BISMARCK in propulsion with 12 diesel engines providing power to 3 shafts. Each stack held the exhausts and mufflers for 6 of the diesels. Radius of action was to be 16,000 miles or similar to the IOWA. Protection was similar to the BISMARCK and the armament arrangement was identical. The Germans preferred four twin turrets for fire distribution even if three triple turrets provided more firepower, less weight and less hull length. This arrangement consumed excess weight that could have been devoted to better aircraft facilities, secondary armament or protection.

Only 7-16" were completed with 3 becoming railway guns, 3 installed in Norway and one lost in shipment. The 16" shell weighed 1130kg, similar to the US 16" shell. The 16.5" gun was the 16" gun bored out. The H43 and H44 were designed to carry 8-20" (4x2).

Another consumer of weight was the installation of an upper casemate belt to protect against cruiser and destroyer fire. This was unique to all German capital ships and also consumed weight that could be better applied to armament or better-protected vitals. Another unique feature of German capital ships was the bow armor to prevent loss of buoyancy as happened with the LUTZOW at Jutland.

Despite design choices that did not optimize the displacement, these would have been formidable ships with good speed, protection against gunfire and firepower. Underwater protection was excellent as would be expected in any German ship. These models can be converted into any of the H class by mounting the superstructure on the appropriate size hull. The model with 12-15" guns provides the wargamer an alternate gunnery arrangement that would have been possible on this displacement. Superior numbers of shells hitting the target may be more important than fewer penetrating hits.

	H39	H40	H41	H42
Displacement	52,600 tons	62,800	63,000	88,600
Length	873'	942'	901'	1,000'
Width	121'	129'	128'	140'
Draft	33'	33'	36'	39'
Speed	30.4 knots	30.4 knots	28.8 knots	32.2
Armament	8-16"/50 (4x2) 12-5.9"/55 (6x2) 16-4.1"(8x2) 6-21" TT	same	8-16.5"/48 (4x2) same	same
Armor	belt: 11.8" Deck: 4.7 lower slope Turrets: 16" face	same	same	15" 13" total

G207/G203/G208 Kreuzer P/ OPQ Battlecruisers/KW45

These ships proved that everyone designed a stinker once in a while. The Germans lost sight of their strategic focus in the late 1930s choosing to build a small, balanced fleet instead of concentrating on interdicting their enemy's sea lanes. The pocket battleships were designed for long range disruption of trade with very few single ships capable of catching and sinking them. The original design of Kreuzer P was an improvement on this concept.

The design needed to account for high speed to escape cruisers, long range for raiding, protection from 8" guns and a powerful armament. The diesels needed for long range required significant hull length which reduced the maximum speed. The displacement could only be limited if armor, armament and torpedo protection was deliberately reduced. A 6" belt and 4" deck was required to protect against 8" shells which was not possible on this displacement. The lack of a good DP secondary armament consumed more weight. Despite an operational requirement for 12 of these ships, the designers gave up and designed a much larger battlecruiser. Reports from the Naval Technical mission to Germany indicate that a Kreuzer P was laid down at Germania Werft on May 24, 1938. Breyer's book shows the layout of model 1. This model is built to version 3 of the proposed design (Appendix L) which is attached. Note that the date of this design is 1934.

The OPQ rate as the worst capital ships ever designed for the German navy. On a displacement similar to the SCHARNHORST, OPQ had a better main armament, slightly higher speed, significantly greater range, inferior armor and suspect torpedo protection. The center shaft was a steam turbine to allow the OPQ to gain high speed. Speed on diesels alone would reach 25 knots. The boilers were all in a single boiler room making them vulnerable to a single hit. The thin deck armor and thinner turret roofs made OPQ vulnerable to heavy cruiser fire much less STRASSBURG's 13" shells. The fast battleship replaced the battlecruiser concept with an IOWA matching their speed and crushing them with 16" shells while ignoring any hits by the OPQ. Compared to the similar sized B65, OPQ reduced deck armor to gain speed and endurance.

Despite all the things wrong with both these ships, 5 KREUZER P could have been built instead of the HIPPER class cruisers. This would have helped the Germans at the beginning of the war but airpower eliminated the usefulness of surface raiders.

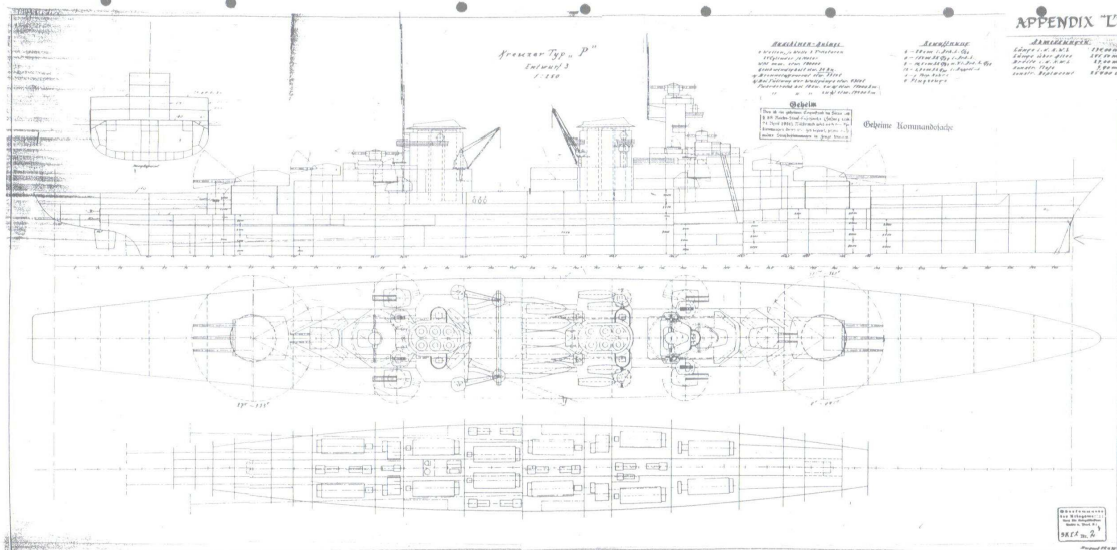
More intriguing were projects KW45 and KW50 designed between June and September 1939. Reports issued by the Director of Naval Intelligence on 8/29/45 contained capture documentation of submarines, cruisers, destroyers, battleships and carriers. Discussed by the

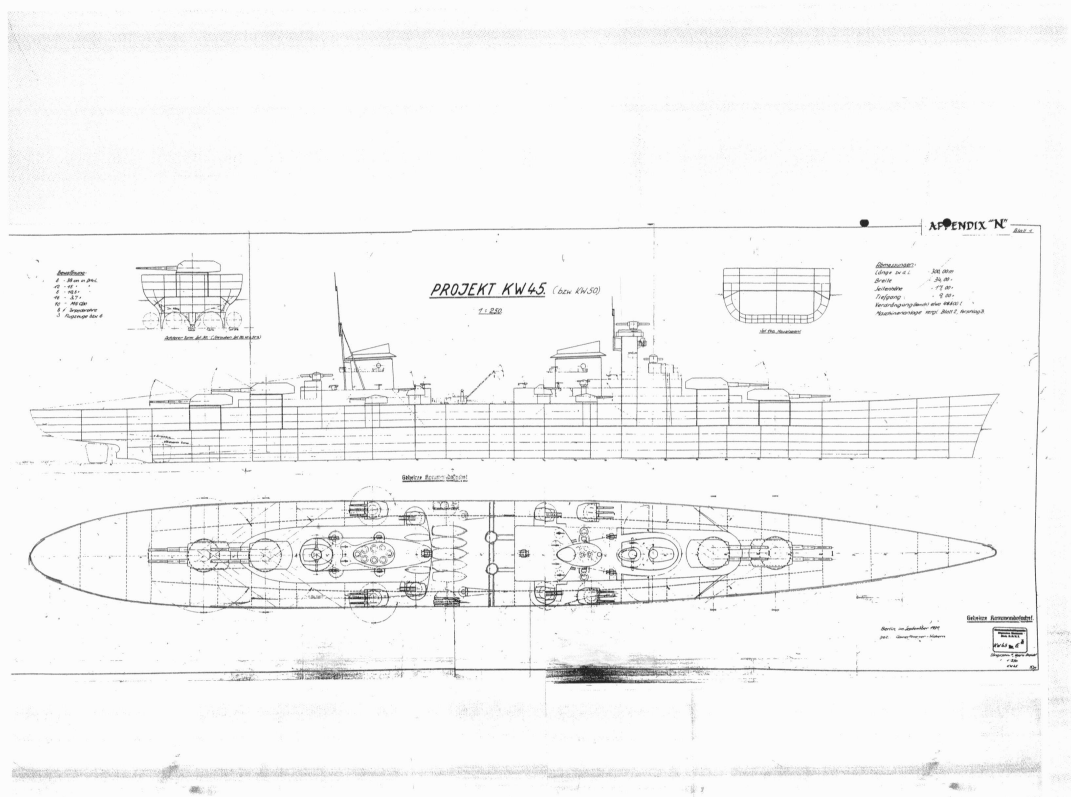
“Neubauausschuss” during the 1939 time period, no other previous or subsequent mention of these ships have been found in the German archives. Immense, fast, under-armed and under-armored battlecruisers had advanced designs completed but were never approved. These would have suffered from the same design defects as the OPQs but remain intriguing ships.

Bearing the same family resemblance to all other German capital ships, these twin funneled ships basically mounted a BISMARCK armament on an H sized hull. The triple 5.9” resembled the LITTORIO layout while the 4.1” AA was completely inadequate. 16-37mm completed the AA armament.

A five shaft power plant consumed enormous hull space and provided 36 knot speed with 300,000 shp. Special tunnels housed the shafts and towing tests revealed at least a 10% increase in efficiency with co-efficients ranging between 0.42 and 0.48. Three different power plant arrangements were being considered. Proposal A had 4 diesel shafts and 1 steam turbine while Proposal C had 2 diesels and 3 steam turbines. All had three rudders in the aft 3 propeller races.

	Kreuzer P	OPQ	KW45	KW50
Displacement	19,679 tons	31,142	45,000	50,000
Length	755'	814'	984'	984'
Width	89'	98'	111'	121'
Draft	28'	29'		
Speed	34 knots	33 knots	36-37 knots	35 knots
Armament	6-11"/55 (2x3) 4-5.9"/55 (2x2) 8-4.1"(4x2) 6-21" TT	6-15"/47(3x2) 6-5.9"/55 (3x2) 8-4.1" (4x2) 12-21" TT	8-15"/47 (4x2) 12-5.9"/55 (4x3) 8-4.1" (4x2) 8-21" TT	same same same same
Armor belt:	4.7"	7.5"	8"	11.8"
Deck:		3.5" (total)		





G405 Kreuzer M

German light cruisers suffered from being designed to a 6,000 ton limit which severely impacted their military qualities. Five years had passed since the NURNBERG had been built to this limit. The new cruiser needed to be capable of long-range commerce raiding, high speed, a respectable armament and light protection. This translated into a requirement for 12 cruisers at three per year. M was laid down on 11/1/38 in Kiel, cancelled on 9/19/39 and scrapped in 1942. Equipped with both diesels and steam turbines, she was designed for 35 knots with a radius of 8,000m at 19 knots. As escorts to the H class battleships, they would have had less than half their combat radius. The main guns were similar to the twin 5.9" turrets on the German battleships and the AA armament was inadequate, being less than half that of other nations cruisers.

Displacement	7,800 tons
Length	600'
Width	56'
Draft	18'
Speed	35.5 knots on 116,500 EHP
Armament	8-5.9" (4x2) 4-4.1" AA (2x2) 8-21" TT
Armor	belt: 2" Deck: 1" Turrets: 3" face

J108 TOSA

These improved NAGATO's were both launched in late 1921 prior to the signing of the Washington treaty. With the NAGATO's and other planned battleships, their high speed would have allowed them to engage the slower American fleet at will. Tests on the TOSA yielded information that was used to construct YAMATO while KAGA was converted into an aircraft carrier after the AMAGI was destroyed on the building slip by the 1923 earthquake in Tokyo.

All ships represent compromises and these were no different. Five turrets used more weight and yielded fewer guns than the SOUTH DAKOTA. Armor was generally thinner but the belt was sloped. Deck armor was comprised of 2.5" armor with 1.5" high tensile steel on top. This equates to an effective thickness of 3.5". Turret armor was inadequate. A central bulkhead split the ship in two and proved disastrous to every Japanese ship with this feature that suffered torpedo damage. Most Japanese ships capsized from those hits because the water could not be dispersed quickly enough across the ship. A narrow beam contributed to speed but not torpedo protection. On the other hand, they had more armor and firepower than the LEXINGTON but were 7 knots slower. It would be fair to say that in any engagement between these likely adversaries, the ship with the higher speed should prudently use it to avoid an engagement.

Displacement	38,500 tons
Length	768'
Width	100'
Draft	31'
Speed	26.5 knots on 91,000 EHP
Armament	10-16"/45 (5x2) 20-5.5"/50 (20x1) 4-3"/50 AA 8-24" TT
Armor	belt: 11" inclined at 15° Deck: 4" Turrets: 14" face

J109 Super YAMATO



The original design for the successors to the YAMATO called for 8 or 9-20" main guns and a speed exceeding 30 knots. Calculations indicated that these ships would have exceeded 90,000 tons, which was too large and expensive to build. Still desiring to keep individual ship superiority, the Japanese revised the plans to produce an upgraded YAMATO. Design A150 was completed in 1941 and hulls 798 and 799 were ordered as part of the 1942 program. Midway brought a halt to these ships before they could be laid down. 798 would have been laid down after SHINANO (Yokosuka) was launched and 799 after 111 (Yamato class, 30% completed) was launched at Kure. 111 was being built on the YAMATO's vacated building slip.

The Japanese had constructed a 48cm gun in 1920 and a 51cm gun was being built at Kure before the program was halted. The barrel would have been 75 feet long, the longest single barreled gun ever built. Shell weight would have been approximately 4290 lbs compared to 3240 for the 18.1" gun and required a staggering 1,056lb powder charge. A significant issue with this ship would have been a 1-minute interval between salvos and only 6 shells in a pattern. The 'fatter' pattern and more numerous guns of the US battleships would have stood an early shot at hitting critical fire control areas eliminating the super YAMATO as an effective fighting unit.

There is some question about whether or not the two 6" turrets would have been mounted. Lengthening the superstructure would have provided additional space for AA guns. The general trend for Japanese battleships was to carry some defense against cruisers and destroyers and the 3.9" gun would have been inadequate for this task. The 3.9" guns, as mounted on the TERUTSUKI, would have provided better AA fire than the standard 5"/40 mounted on other Japanese ships. The 3.9" had twice the rate of fire and a ceiling of 42,000 feet but a relatively short barrel life of 350 rounds. The short citadel would have precluded mounting more than 20 guns in twin mounts.

Despite conjecture of double plated belts, armor could not have been significantly different than YAMATO on the same size hull. Nevertheless, these would have been powerful ships and a single hit from the 4200 lb projectile would have pierced anything built or planned. Replacing the twin 20" turrets with triple 18.1" turrets on this model will also give you the SHINANO and 111 configurations with 3.9" AA.

Displacement	64,000 tons
Length	863'
Width	127'
Draft	36'
Speed	27 knots
Armament	6-20"/45 (3x2) 6-6.1"/60 (2x3) 20-3.9" AA (10x2) numerous 25mm AA
Armor	belt: 16" inclined at 20° Deck: 8" Turrets: 25" face

J110 Number 13

Unnamed, perhaps not designed much beyond the concept stage and never laid down, these four ships represented the final and most powerful ships of the 8-8 plan. Many different configurations and sketches (similar to US Springstyle) were proposed with some carrying up to a dozen 18" guns. The larger ships were not possible at this time due to constraints in building facilities. It is important to note that Japan could build 4 capital ships simultaneously, Britain 8 and the United States 13. As in WW2, it was important for the Japanese to have individual ship superiority because their potential adversaries could easily outbuild them.

These are the examples of what was proposed and it is interesting to compare them with the US Project D. Note that on the same tonnage the Japanese ships purport to carry more guns, thicker armor and more speed. Were they able to suspend the laws of physics?

	Displacement	main guns	spd	armor
E	46,400	12-16" (3x4)	30	12" belt, 4.5" deck
F	48,400	12-16" (2x4,2x2)	30	12" belt, 4.5" deck
H	50,600	14-16" (3x4,1x2)	30	12" belt, 4.5" deck
I	54,000	16-16" (4x4)	30	12" belt, 4.5" deck
K	49,000	8-18" (4x2)	30	12" belt, 4.5" deck
L	56,500	10-18" (5x2)	30	12" belt, 4.5" deck
M	57,200	12-18" (4x3)	30	12" belt, 4.5" deck

Sketches by Jentshura and Beyer (too much beam, both superstructures are too high) are similar showing them with the classical pagoda structure and a single, fat, trunked, raked funnel. It appears that Hiraga's pupil, Shizuo Fukui, made the initial sketches of #13 after WWII. One immediate issue is that the previous two classes with 19 boilers had two funnels; tremendous trunking would be necessary to carry 22 boilers to a single funnel. More detailed sketches of design H show two funnels like AMAGI and KII. The model maker's dilemma is that if the model does not meet what is accepted to be the truth, it is rejected regardless of objective reality. Therefore this model has a single funnel but this model maker believes they would have had two.

Scheduled to be finished by 1927, they had the same strengths and weaknesses as the other 8-8 ships. The main battery was actually the Type 5 (5 Nen Shiki) 48cm (18.9")/45 gun firing a 3410 lb shell propelled by a 750 lb powder charge. The reported muzzle velocity is suspect since it was higher than the YAMATO 18.1" yet fired a heavier shell with a smaller powder charge. This '36cm' gun was tested in November and December, 1920 at the Kamegakubi proving grounds, was damaged but was later used in November 1935 to test the armor scheme of the A140 (YAMATO) designs. Given the armor thicknesses in the sketches noted above, the oft quoted 13" belt/5" deck are suspect. Fast due to their length and narrow beam, well armed and relatively well armored, they would have sparked a reaction from the US that must have included either the TILLMAN, BB1923 or, more probably, Project D which had the armor, armament and speed necessary to successfully engage them.

Displacement 47,500 tons
 Length 900'
 Width 101'
 Draft 31'
 Speed 30 knots on 150,000 SHP
 Armament 8-18.9"/45 (4x2)
 16-5.5"/50 (16x1)
 4-3"/50 AA
 8-24" TT
 Armor belt: 13" inclined at 15°
 Deck: 5"
 Turrets: 14" face

It is interesting to conjecture exactly what the building schedule for all the 8-8 fleet would be considering that only four building slips were available (Compare this with the US which had 13 capital ships on the construction ways simultaneously). *Italicized* are conjectured. It seems impossible that 13-16 would have been able to be completed as early as 1927. The earthquake of 1923 would have destroyed KII on the slip and possibly accumulated equipment for #13..

	Kure	Nagasaki	Kobe	Yokosuka	laid down	launched
	Nagato				11.28.17	11.9.19
				Mutsu	6.1.18	5.31.20
		Tosa			2.16.20	2.11.21
			Kaga		7.19.20	12.11.21
				Amagi	12.6.20	<i>12.22</i>
	Akagi				12.6.20	<i>12.22</i>
			Atago		11.22.21	<i>11.23</i>
		Takao			12.19.21	<i>12.23</i>
				Kii	<i>12.22</i>	<i>12.24</i>
	Owarii				<i>12.22</i>	<i>12.24</i>
			#11		<i>11.23</i>	<i>11.25</i>
		#12			<i>12.23</i>	<i>12.25</i>
				#13	<i>12.24</i>	<i>12.26</i>
	#14				<i>12.24</i>	<i>12.26</i>
		#15			<i>12.25</i>	<i>12.27</i>
			#16		<i>11.25</i>	<i>11.27</i>

J111 A140/A

This was one of the earliest YAMATO designs completed on 4/1/35. It featured mixed diesel/steam propulsion to extend the endurance to 9,200 miles (YAMATO was only 7,200). The main armament was located entirely forward of the superstructure with the entire secondary armament located abaft the superstructure. This main armament arrangement was embraced in 16 of the 24 preliminary designs. Fukuda was responsible for 8 designs in the A, B and C series. All were too large which lead to the J (16"), K (8-18", 9-6"), G (low displacement and speed) and F (YAMATO) series. The 18"/50 was too heavy so all designs featured the 45 caliber rifles. This ship provides the speed necessary to escort your carriers and evade the American and British 35,000 tonners. This model is faithful to the design of the YAMATO herself and not the sketch designs which formed preliminary estimates.

Displacement	68,000 tons
Length	935'
Width	132'
Draft	34'
Speed	30 knots on 200,000 SHP
Armament	9-18"/45 (3x3) 12-6.1"/60 (4x3) 12-5" (6x2)
Armor	immune zone 20,000 to 27,000 meters against 18.1 shells

J112 A140/A2 with 18"

J113 A140/B2 with 20" guns

This YAMATO predecessor (J112) had 8-18" guns equally mounted fore and aft on the same size hull as the A140/A. This configuration had the secondary armament located aft between the main battery and the superstructure. This maximized protection to the armament and resolved issues of trying to fit magazines in the machinery spaces. It too featured mixed diesel/steam propulsion to extend the endurance to 9,200 miles and provided sufficient space for 30 knot machinery. Design A140/J3 substituted triple 16" for the twin 18", reminiscent of the MONTANA. Once again, this model is faithful to the armament layout and the YAMATO's beautiful lines as built.

With J113, the armament and superstructure have a "typical" A-A-O-A-A arrangement. Unless a much larger ship was built, the 20" version must give up engineering space and weight to accommodate the fourth turret. This provides the armament necessary to engage the heavy US battleships with some chance of success. It is interesting to note that the US "Maximum Battleship" design of 1934 mounted 8-20" guns on a 66,000 ton hull capable of transiting the Panama Canal. To increase speed on the US ship from 25 to 30 knots required a fuller hull of 72,500 tons, duplicating a similar problem with which the Japanese had already wrestled. The downside of either US or Japanese ships of this side would be the lack of armor to resist a 20" shell.

	J112	J113
Displacement	68,000 tons	70,000 tons
Length	935'	935'
Width	132'	132'
Draft	34'	34'
Speed	30 knots on 200,000 SHP	27 knots
Armament	8-18"/45 (4x2) 12-6.1"/60 (4x3) 12-5" (6x2)	8-20"/45 12-6.1"/60 (4x3) 12-5" (6x2)
Armor	immune zone 20,000 to 27,000 meters against 18.1 shells	

J114 BB Fujimoto

J115 BB Hiraga

	J114	J115
Displacement	35,000 tons	35,000 tons
Length	762'	761'
Width	105'	105'
Draft	28'	29'
Speed	26 knots	26 knots
Armament	9-16" (3x3) 12-6"/60 (6x2) 8-4.7" (4x2)	10-16" (2x3, 2x2) 16-6"/60 (4x2, 8x1) 8-4.47" (4x2)

These two ships have been described as weird and ugly without much thought placed behind the genesis of their design. Hiraga (NAGATO, TOSA, AMAGI, YUBARI, FURUTAKA) was the foremost Japanese designer with Fujimoto (TAKAO, MOGAMI, AMAGIRI, HATSU HARU) his assistant and later chief designer. Like their American and British counterparts, they needed to design ships to meet the 35,000 ton treaty limit yet try to gain some superiority over their potential opponents. They needed to maintain 26 knots for compatibility with the NAGATO and KONGO. A TOSA-sized hull was chosen which meant that 4,000 tons needed to be pared from the design. In both cases this was accomplished by using fewer turrets and a shorter armored citadel, the same approach as YAMATO. With roughly the same speed and armament as NORTH CAROLINA or KGV, their armor would be limited to perhaps the 11" inclined belt of the TOSA with a 4" deck. They would have also been overweight as were the Japanese cruisers.

Japanese plans of May, 1929 called for four replacement 35,000 ton battleships which would be effective in 1931. The 1930 London Treaty extended the battleship moratorium 5 more years until 1936. Only sketch designs of these ships are available, no "spring style" plans exist that would give us a better idea of their looks. The Superior models are predicated on the Fujimoto and Hiraga layouts with the beauty and symmetry that characterized their cruisers and battleships. Both have the YAMATO style tower with Hiraga having the swept style funnel that characterized the first rebuild of the NAGATO. The Hiraga layout is triples over twins like PENSACOLA and the 14" LEXINGTON, reflecting the fineness of the hull both forward and aft. Both ships have very limited waterline protection meaning the ends are excessively 'soft', particularly against shell fire. The narrow hulls would have also had less torpedo protection than the much wider YAMATO. Both ships would have been improved with the deletion of the 6" guns and the addition of two more twin 5"/40s abreast the superstructure.

These ships represent a very viable alternative for the Japanese navy. Since these ships retain the 35,000 ton limit, it also means that the existing 14" guns remain viable weapons. By keeping the

treaty in force, the Japanese could have built a larger, more diverse battle force. There would have been no YAMATO, IOWA, H or LION classes if the Japanese had not abrogated the treaty. By December, 1941 over 180,000 tons of material had been built into YAMATO, MUSASHI, SHINANO and 111. The same expense could be invested in at least 5 of these ships plus the 'Japanese Vanguard', an improved KONGO using the FUSO and ISE turrets, would have been a viable capital ship. A strong case can be made that by the following years, a battleline would be

1941, December

4 KONGO

2 ISE

2 NAGATO

4 HIRAGA/FUJIMOTO

3 Improved KONGO ('Japanese VANGUARD') (FUSOs decommissioned for turrets)

1943, December

4 additional HIRAGA/FUJIMOTO

1944, December

3 additional Improved KONGO ('Japanese VANGUARD')

ISEs are decommissioned for their turrets for Improved KONGOs

This gives a battleline of 10 26 knot, 16" battleships, 6 30 knot, 14" gunned escorts for the carriers and six 33 knot ships (B65) that are unmatched in speed by the US battleline. The pessimistic US estimates in December 1941 of 4 new battleships completed, four nearing completion and 4 more on order would not have been far off the mark if smaller ships were built. Which is the better choice?

J201 AMAGI

Near classic battlecruiser versions of the TOSA, these ships sacrificed additional armor for increased speed. With the four KII and four #13 class, Japan would have a dozen 30 knot capital ships that could engage or disengage the US fleet at will. The same general armor and armament comments made about TOSA apply to these ships. This model has the "S" shaped forward funnel as mounted on the NAGATO's to keep smoke away from the bridge and range finders. AMAGI and AKAGI were selected to be converted to aircraft carriers but the earthquake of 1923 destroyed AMAGI on the slip.

Displacement	40,000 tons
Length	820'
Width	101'
Draft	31'
Speed	30 knots on 131,000 SHP
Armament	10-16"/45 (5x2) 16-5.5"/50 (16x1) 4-3"/50 AA 8-24" TT
Armor	belt: 10" inclined at 15° Deck: 4" Turrets: 14" face

J202 B-65 (Projects 795-796)

These ships grew out of the 'battlecruiser gap' of the late 1930s paralleling the 'bomber' gap and the 'missile' gaps of the 1950s and 1960s. Justification for these ships was based on the ALASKA class. Interestingly enough, the ALASKAs were being justified based on 'knowledge' that the Japanese were building large cruisers!

Passage of the 'Two Ocean Navy Programs' on June 14, 1940 and July 19, 1940 prodded the Japanese into advanced planning for building 28 new cruisers of various sizes by 1950. The ALASKAs were intended to operate with the carriers and provide protection against any raiding 8" cruisers for which they were well designed. The Japanese plans were to use a special Night Battle Force comprised of four Class A cruiser squadrons (15-8" cruisers), three torpedo cruisers (KITIKAMIs), and 62 destroyers supported by the four KONGOs to launch a devastating torpedo attack against the US battle force. The remaining US ships would be attacked in daylight by Japanese battleships, midget submarines launched from the MIZUHOs and by the cruiser (*junsen*) and fleet (*kaidai*) submarines.

The KONGOs were to be replaced by Super A cruisers with preliminary designs finished in September 1940. Two were to be built under the 'Circle 5' program and four under the 'Circle 6' program of January 1941. The two 'Circle 5s' were to be laid down at Kure following each other in the same building slip with completion in 1945 and 1946. More urgent work occupied the planning staffs as they geared up for war and 'Circle 6' was cancelled along with most of the Super As.

General appearance would have been similar to the YAMATO with an undulating deck, swept funnel, tower foremast and three main turrets. The 12.2" gun fired a 1265 lb shell to a range of 36,000 yards. Four of the superb 3.9" turrets would have been mounted on each side of the main deck forward of the catapult. Eight 24" torpedo tubes in quadruple mounts completed her armament. There was some thought to replacing the triple 12.2" turrets with twin 14" turrets but this would have required additional load balancing for which there was neither staff nor time.

Displacement	31,400/34,447 tons std/full load
Length	808'
Width	89'
Draft	29'
Speed	34 knots
Armament	9-12.2"/50 (3x3) 16-3.9" AA (8x2) numerous 25mm AA 8-24" TT (2x4)
Armor	belt: 7.5" inclined at 20° (9.5" equivalent with an immune zone of 22,000 to 33,000 yards against a 12" shell) Deck: 5" (resist a 2200 lb bomb) Turrets: unknown

J203 Japanese VANGUARD

Some have postulated that a superior Japanese plan would have removed the turrets from the ISE and FUSO class and create 6 fast battleships with 8-14" guns. The combination of heavy shells, the formidable torpedoes and the excellent 3.9" AA guns would have made a superb ship for supporting the carrier forces and striking US forces in the contested islands. This approach was the US vision of a Pacific war, fast gunships with mutually supporting carriers and light forces striking deep and with overwhelming strength.

These ships would still have given the Japanese only 12 battleships at the beginning of the war. As noted above in the B65 text, the Japanese vision was that the cruiser and carrier forces would be used in attrition against the US and the Japanese battleline would prove the coupe-de-grace in the 'decisive battle'. Hence the various building plans calling for individual ship superiority making this approach less likely.

This is a lengthened B65 with an additional turret aft. A significant advantage of the VANGUARD was that the 15" shell is 25% larger than the Japanese 14" and better able to stand against the 16" gunned ships of her potential adversaries.

Displacement	35.000 tons std
Length	848'
Width	89'
Draft	30'
Speed	33 knots
Armament	8-14"/45 (4x2) 16-3.9" AA (8x2) numerous 25mm AA 8-24" TT (2x4)
Armor	belt: 7.5" inclined at 20° (9.5" equivalent with an immune zone of 22,000 to 33,000 yards against a 12" shell) Deck: 5" (resist a 2200 lb bomb) Turrets: unknown

R101 Sovetskii Soyuz

Displacement	59,150 tons std
Length	889'
Width	127'
Draft	33'
Speed	29 knots (220,000 SHP on 3/4 shafts)
Armament	9-16"/50 (3x3) 12-6" (6x2) 8-3.9" AA 32-37mm (12x2) AA 40-25mm (10x4)
Armor	belt: 16.7" inclined at 8° Deck: 8.9" total (1" main, 6" armor, 2" splinter) Turrets 19" CT 16.7"

The penultimate of the Russian battleships, four were authorized on 1/21/1938. Laid down prior to the war, the two building at Molotovsk near Archangel were not well advanced. SOYUZ (Leningrad, hull construction completed) and UKRAINA (Nikolayev, 75% ready for launching) were suspended in 1940 to transfer resources to other industrial construction. Turrets for the Soyuz were completed but only one gun which was fired at the Germans throughout the war. Heavily influenced by Italian technology transfer, the armor was inclined with a 2.5" decapping plate on the outer hull. Underwater protection by the Pugliese system would withstand 3 torpedo hits. Despite the official models showing round funnels, every other Russian destroyer, cruiser and battlecruiser had sleek, swept, elegant funnels which is what is depicted on this model. There is some disagreement about the propulsion plant. Other Russian plants were limited to about 55,000 hp/shaft, if only three shafts were to be installed, insufficient power would be available to make 29 knots; 27 knots would have been more likely. If 70,000 shp were truly available as planned, this would match the output of the US super carriers. The wide hull at the bow that provided good torpedo protection also reduced her speed. Well-balanced designs, only the MONTANA had a clear edge over these ships.

R102 Gibbs & Cox D

Displacement	45,000 tons std
Length	845'
Width	113'
Draft	33'
Speed	31 knots (200,000 SHP on 4 shafts)
Armament	10-16"/50 (2x3, 1x4) 20-5" DP (10x2) 16-1.1" (4x4) AA
Armor	belt: 13" inclined at 15° Deck: 5" Turrets 16" CT 15"

This was the final conventional study done with the request of American assistance. This design was finalized in March 1939 and reflected one of the IOWA configurations. After the invasion of

Poland, the US terminated further assistance and refused any technology transfer. A very solid design, armor and firepower are superior to the IOWA with only the loss of 2 knots of speed.

R103 Project 24, Variant XIII

Displacement	72,950 tons std
Length	925'
Width	132'
Draft	38'
Speed	30 knots (280,000 SHP on 4 shafts)
Armament	9-16"/50 (3x3) 16-5"/58 (8x2) 48-45mm (12x4) AA 48-25mm (12x4)
Armor	belt: 16/17.7" (machinery/magazine). inclined at 20° Deck: 9.6" total (2.4" upper, 6.5" middle, 0.8" splinter) Turrets 20" CT 20"

Preliminary designs for a successor to the Sovetskii Soyuz began in 1939 and was completely interrupted by WWII. Post war designs were framed by the misinformation about the IOWA (19" belt, 35 knots) and the completion of the VANGUARD and JEAN BART. The size of the MONTANA was well known and these ships were intended to be superior to her. The original requirements in 1945 were to complete 10 new 75,000 ton battleships in the next 10 years.

Project 24 was 60% larger than the IOWA and 20% larger than MONTANA. Compared to the MONTANA, these ships were beamier, slightly faster, had superior protection and an improved secondary battery arrangement at the cost of one less main turret. A reduced (6") armor belt was extended forward to the capstans and then reduced to 2" to the bow to provide very complete splinter protection to the waterline. A 6" upper belt similar to BISMARCK protected the upper hull up to the main deck. The 16" guns were the same as the Sovetskii Soyuz and the 5"/58 were the same new model as STALINGRAD.

These ships superstructure resembled the contemporary STALINGRAD's. The bow's exaggerated sheer and flare were adopted to improve seaworthiness. Compared to the STALINGRAD, the machinery was arranged in the 'unit' system similar to US ships with each compartment containing 3 boilers, an engine and two turbo-generators. This 'unit' was further divided longitudinally into three separate compartments to provide extensive anti-torpedo protection. This allowed the machinery to take up less hull length than the narrower STALINGRAD. It would also mean that the massive funnels would be placed closer together than the STALINGRAD. Emergency diesel generators were mounted forward and aft outside the machinery spaces. Taking a cue from the captured German aircraft carrier GRAF ZEPPELIN, two retractable propellers were located by the forward diesel generators to provide emergency propulsion.

The last real battleships designed by any country, these would have been formidable warships outclassing all other ships existing in other navies.

R201 Kronstadt

Displacement	35,240 tons std
Length	813'
Width	103'
Draft	28'
Speed	32 knots (165,000 SHP on 3 shafts)
Armament	9-12"/56 (3x3) or 6-15"/47 (3x2) 8-6"/50 (4x2) 8-3.9" AA
Armor	belt: 9" inclined at 15° Deck: 3.5" Turrets 12"

Two vessels of this class were under construction (Leningrad and Nicholayev), abandoned during the war and then broken up after the war. There were plans to replace the 12" guns with 2x15" guns from Germany. Armor was sufficient against the German 11" but inadequate against anything larger. These would have had 3 propulsion plants instead of the four of the battleships and light cruisers leading to a maximum speed of 32 knots. Their underwater protection was superior to the ALASKA but otherwise these ships were a poor return on investment.

R202 Stalingrad

Displacement	38,540 tons std
Length	897'
Width	105'
Draft	30'
Speed	35 knots (280,000 SHP on 4 shafts)
Armament	9-12"/62 (3x3) 12-5.1" DP (6x2) 24-45mm (6x4) AA 40-25mm (10x4)
Armor	belt: 7" inclined at 15° Deck: 4" Turrets 9.5" CT 8"

There is an excellent article on these ships in Warship 2006 by Stephen McLaughlin. The following information is a summary from that publication.

Successors to the ill-fated KRONSHADTs of WWII, these were pet projects of Stalin. Classic examples of project mis-management (this writer is a PMP), the designs had to be approved by every technical and political bureau in the Soviet Union resulting in their never being completed. Despite Admiral Kuznetsov wanting to construct heavy cruisers with 9" guns, Stalin held out for 12" guns and wanted 35 knots to outpace the IOWAs. It was intended that these ships form part of a mix of coastal naval and air forces to disrupt the American carrier battle groups to prevent them from launching atomic weapons against the USSR. In the words of historian Vitalli Kostrichenko, "These cruisers were capable only of a prolonged and heroic loss....These ships could not have resisted attacks by dozens, or indeed hundreds of aircraft from enemy aircraft carriers, and they would have been sunk."

These ships originally had a superstructure similar to 24-XIII with fewer AA guns but the same 5" layout. After they were substantially designed, Stalin demanded that the speed be increased to outrun an IOWA. The only way to add the necessary boiler space was to redesign the stern superstructure eliminating the rangefinders and secondary armament with their attendant magazines. Machinery was arranged in echelon with alternating boilers and engines extending into the previous aft 5" magazines since the ship lacked the width to place them together as in Project 24. This was a 280,000 shp power plant, the same as Project 24 and similar to the much larger US super carriers. Armor was less than the smaller ALASKA but she had a complete set of torpedo bulkheads against 500 kg warheads. Design started in 1946 with her being laid down in November, 1951. 19% complete (43% planned) at Stalin's death in March 1953, the center section of the hull was launched and used for ordnance trials being finally dismantled in 1962. Two sisters were scrapped on the ways.

Now that you have reviewed these possible additions to your fleets, let's look at some historical possibilities.

1. Washington Treaty signed, Japan still resigns effective 1936. Different ships are built than were historically chosen.

This is the most likely scenario because it involves the fewest political changes.

- The British build the F3 and 15B giving them ten 15" ships capable of at least 28 knots.
- The US builds Admiral Pratt's battlecruisers using the triple turrets from the ARIZONA's and NEVADA's. The battlecruisers are with the carriers on December 7 and the AZ has not exploded, the OK not turned turtle, the NV not beached. The leftover 2x14" turrets are mounted in Oahu as shore defense batteries. With only four BBs in Pearl, perhaps the Japanese concentrate on the fuel farms causing tremendous delay in the US counterattack across the Central Pacific.
- The Germans build 3 Kreuzer P instead of 2 Scharnhorst and 3 more instead of the HIPPERs.
- BISMARCK is the first true battleship built in Germany with 6 more replacing the too large H. Perhaps if the Germans eliminate the upper 6" casemate, enough weight exists to mount 16" guns.

Winners: Britain, Germany, US, all receive more effective ships

Losers Britain, Kreuzer Ps prey on shipping despite the loss of one of them in Norway

- Washington Treaty signed, Japan argues and receive 70% or 5/5/3.5 ratio similar to the cruiser ratio in the London Treaty in 1930

The original US General Board recommendations were to keep many of the new US ships under construction, allow the British to complete the four “Super-Hoods” (G3 – INVINCIBLE) and Japan to complete 7 new ships. Even this was too much for Secretary of State Hughes who bypassed their recommendation and stunned the assembly with his bold plan to scrap virtually everything that the major powers were constructing.

In this scenario, Japan insists on keeping the TOSA’s since they have been launched. The US demands a minimum displacement of 43k tons to keep some of their new ships. The British must build G3s reduced to 43k tons which is an improvement over building the NELSONs reduced to 34k tons. The US decides to keep 4 LEXINGTONs instead of the SOUTH DAKOTAs to have a fast wing capable of defeating the KONGOs or the HOOD. The remaining two LEX’s become carriers. Fleets are as of 1927.

US (17)	British (17)	Japanese (12)	France (6)	Italy (4)
4 Lexington	4 G3 Reduced	2 Tosa	3 Bretagne	2 Doria
4 CO	Hood,	2 Nagato	3 Courbet	2 Cavour
2 TN	2 Renown	2 Ise		
3 NM	5 QE,	2 Fuso		
2 PA	5 R	4 Kongo		
2 NV				

580k	580k	405k	tonnage
168 guns	136 guns	116 guns	

Winners: US, Britain. US has eight 16”-gun ships including the fastest in the world. Without the Lexingtons in the battleline, they still have a clear superiority in the number of guns over the Japanese. The British reduced G3s are no longer a vastly superior vessel since they must combine a reduction in speed and armor or revert to 15” guns. They are an improvement over the NELSON.

Losers: Japan! Despite the Japanese having a higher ratio of ships, the US traded 6 old FL, AR, TX class for 5 new 16” ships far superior in capability. The British have enough fast ships to hunt down and sink the KONGOs if they are used for raiding. Perhaps this is why the Japanese were finally content with the 5/5/3 ratio.

3. Washington Treaty signed, Japanese do not withdraw in 1936.

In this fascinating scenario, BBs continue to be limited to 35ktons. The SOUTH DAKOTAs now become the best BBs of any country. BISMARCK, LITTORIO and RICHELIEU become the largest ships built. The Germans must compromise to get 16" guns on a BISMARCK size hull, perhaps going to triple turrets and eliminate the useless upper casemate armor. Cruiser killers are needed which means that some 35k ton battlecruisers will be built. 14" guns remain viable meaning that some 'Vanguard' type ships might be built as cruiser killers. Some alternate ships in scenario 1 are included. Here is my summary of the fleets as of December, 1941 without taking into account ship losses. Many are building (2/3 = 2 built/3 building). Japanese national will counteracts the US industrial base as the US remains pacifist.

US (26)	British (24)	Japanese (18)	German (14)	French (6)
0/8 SD	5/4 15B	4/4 Fujimoto	2/6 BISMARCK	2/2 Richelieu
2 NC	2 F3	2 NAGATO	6 Kreuzer P	2 DUNKERQUE
3 CO	HOOD	2 ISE		
2 TN	2 RENOWN	2 FUSO		
3 NM	5 QE	4 KONGO		
2 TX	5 R	you can replace 4 ISE/FUSO with 2/4 Improved KONGO		
2 AR				
4 CC1933				

Winners: Everyone! Costs are reduced. More ships can be built. The French, Italian and German ships have a size edge and speed advantage over the British but the British ships are still effective. Superior US technology, particularly machinery, give the US a significant edge with the SD class which now is expanded to 8 ships because the IOWAs are illegal at 45k tons.

4. Washington treaty fails, is revived under President Coolidge and signed in 1926.

With larger ships completed, new standards are now in place. 48k (with two exceptions) becomes the limit to accommodate the G3 and #13. The US is allowed to complete her 4 Design D which were laid down in pairs in 1923 and 1924. Britain is allowed to build four 54k ton ships to replace the IRON DUKES to match the US. AMAGI is destroyed in the 1923 earthquake as is the #13 material. The treaty is still set at 5/5/3 based mostly on tonnage. It is assumed the French and Italians cannot afford new ships. The 4 TILLMANs laid down in 1925 are scrapped. Many of the older dreadnoughts are also scrapped. Fleets are as in 1930 as completed.

US (25)	British (26)	Japanese (16)	France (6)	Italy (4)
4 D	4 new BBs	3 #13	3 Bretagne	2 Doria
6 South Dakota	4 G3	7 Amagi/Kii	3 Courbet	2 Cavour
6 Lexington	4 N3	2 Tosa		
4 CO	Hood, Tiger	2 Nagato		
2 TN	2 Renown	2 Ise (Kongos converted to CVs)		
3 NM	5 QE, 5 R			
1060k	1052k	640k	tonnage	
288 guns	216 guns	154 guns		
Winners:	No one. Fleets are larger but still proportional with more expensive but more capable units. Japanese retain a speed edge while US has gunnery edge.			

5.

Penetration Table at Normal Battle Range of 20,000 yds (m indicates meters instead of yds)

Gun	Country	Ship	AP Shell Weight (lbs)	Belt Penetration at 20,000 yds (m)	Deck Penetration
20"/45	Japan	798	4200		
20"/47	Germany	H44			
18.9"/45	Japan	#13	3410		
18.1"/45	Japan	Yamato	3220	19.4" (m)	
18"/48	US		3850		
18"/45	Britain	N3	2837		
16"/50	US	Iowa	2700	20.0"	
16"/50	Germany	H39	2272	18.8"	
16"/45	US	S.Dakota	2700	17.6"	
16"/45	Britain	Lion	2375	15.3"	
16"/45	Britain	Nelson	2048		
16"/45	Japan	Nagato	2249	10.6" (m)	
16"/45	US	Colorado	2240		
15"/42	Britain	Vanguard	1938	11.7"	
15"/50	Italy	Littorio	1951	20.1"	
15"/50	France	Richelieu	1949	15.5"	
15"/47	Germany	Bismarck	1764	16.5"	
14"/45	Britain	King George V	1590	11.2"	
13"	France	Dunkerque	1235	13.5"	
12"	US	Alaska	1140	12.7"	
11"	Germany	Scharnhorst	728	11.5"	

Statistics gathered from Dulin/Garzke, Raven/Roberts, Lacroix, and Friedman

Seapower Values by Bobby Weymouth.

United States

Tillman IV-II 1917 24 K DV 0.25 Deck:5.0" AA:.5Red
 15-18"/48 SRM:7.5 2950 lbs 1350 rds 47,000 yds TT:4-21"(12)
 12-6"/53 SRM:25 105 lbs 2400 rds 26,500 yds
 8-5"/25AA SRM:60 55 lbs 2880 rds 14,500 yds

Tillman Design 4 24 K DV 0.25 Deck:5.0" AA:.5Red
 24-16"/50 SRM:7.5 2100 lbs 2160 rds 43,500 yds TT:4-21"(12)
 22-6"/53 SRM:25 105 lbs 4400 rds 26,500 yds
 6-3"/50AA SRM: 60 13 lbs 2280 rds 14,500 yds

BB65C Plan 27 k DV: 1 DK:5.1" AA:Blue
 12-16"/50R SRM:10 2700lb 1440 rd 42,500 yds TT: 0
 20-5"/38DP SRM:75 55lb 9000 rd 17,500 yds AC:4 C:2

BB-65D Plan 27 K DV:0.5 DK: 12.0" AA:Blue
 12-16"/50R SRM:10 2700 lb 1440 rd 42,500 yd TT:0
 12-6"/47DPA SRM:100 141 lb 9600 rd 26,000 yd AC:3 C:2

BB65(I) Plan (1938) 27 K DV:1 Deck: 5.1" AA:Blue
 9-18"/48R SRM:10 3850 lb 1080 rd 44,500 yds AC:3 C:2
 20-5"/38DP SRM:75 55 lb 9000 rd 17,500 yds

BB65(A) Plan (1939) 27 K DV:1 Deck:5.1" AA:Blue
 12-16"/50R SRM:10 2700 lb 1440 rd 42,500 yds AC:3 C:2
 20-5"/38DP SRM:75 55 lb 9000 rd 17,500 yds

Georgia Plan 27 K DV:0.5 Deck:12.0" AA:Blue
 8-18"/47R SRM:10 3850 lbs 960 rds 44,500 yds AC:3 C:2
 12-6"/47DP SRM:100 141 lbs 9600 rds 26,000 yds

Virginia Plan 27 K DV:0.5 Deck:12.0" AA: Blue
 9-18"/47R SRM:10 3850 lbs 1080 rds 44,500 yds AC:3 C:2
 12-6"/47 DP SRM:100 141 lbs 9600 rds 26,000 yds

BB 1922 Plan 24 K DV:1 DK: 5.0" AA:.5 Red
 8-18"/48 SRM:7.5 2950 lb 720 rd 47,000 yd TT:4-21" (8)
 18-6"/53 SRM:25 105 lb 3600 rd 26,500 yd AC:3 C:2
 8-5"/25AA SRM:60 55 lb 2880 rd 14,500 yd

BB 1923 Plan 24 K DV:1 DK: 5.0" AA:.5 Red
 12-18"/48 SRM:7.5 2950 lb 1080 rd 47,000 yd TT:4-21"(8)
 12-6"/53 SRM:25 105 lb 2400 rd 26,500 yd AC:3 C:2
 8-5"/25AA SRM:60 55 lb 2880 rd 14,500 yd

Lexington 1916 Values in Seapower Directory
 Lexington 1921 Values In Seapower Directory

Design D	1918	30 K	DV:1	DK: 4.0"	AA:.5 Red
12-16"/50	SRM:7.5	2100 lb	1080 rd	43,500 yd	TT:4-21"(8)
16-6"/53	SRM:25	105 lb	3200 rd	26,500 yd	AC:3 C:2
8-5"/25AA	SRM:60	55 lb	2880 rd	14,500 yd	

CA2D	1940	33 K	DV:6	DK: 5.0"	AA:Blue
12-12"/50R	SRM:15	1140 lb	1800 rd	37,000 yd	TT:0
16-5"/38DP	SRM:75	55 lb	7200 rd	17,500 yd	AC:4 C:2

Scheme 2 Plan	1940	33 K	DV:15	DK:3.0"	AA:Blue
12-8"/55R	SRM:20	335 lb	1920 rd	30,500 yd	TT:8-21"(8)
12-5"/38DP	SRM:75	55 lb	5400 rd	17,500 yd	AC:3 C:2

CAC	1941	33 K	DV:14	DK:3.5"	AA:Blue
12-8"/55R	SRM:20	335 lb	1920 rd	30,500 yd	TT:8-21"(8)
12-5"/38DP	SRM:75	55 lb	5400 rd	17,500 yd	AC:3 C:2

Scout Cruiser

C-1	1921	36 K	DV:20	DK:1.0"	AA:.5Red
7-8"/55	SRM:20	260 lb	1120 rd	28,000 yd	TT:6-21:(6)
4-5"/51	SRM:40	60 lb	960 rd	12,500 yd	AC:1 C:0

BB 1917	Plan	21k	DV:3	DK:7.2"	AA:.25 Red
10-16"/45	SRM:7.5	2100 lb	900 rd	34000 yrds	TT:2-21"(8)
22-6"/53	SRM:25	105 lb	6600 rd	26,500 yds	AC:0 C:0
4-3"/23AA	SRM:60	13 lb	1440 rd	7,500 yds	

MAXIMUM BB

BB 1934	Plan	27k	DV:0.5	DK:6.5	AA:Red
8-20"/50	SRM:7.5	4450lb	960 rd	47,000 yd	TT: 0
20-5"38DP	SRM:75	551b	9000 rd	17,500 yd	AC:4 C:2

BB1934 Counter to the HOOD

BB 1934	Plan	30k	DV:5	DK:5.0	AA:Orange
8-16"/45	SRM:10	2240lb	960 rd	40,500 yd	TT: 0
14-5"38DP	SRM:75	551b	6300 rd	17,500 yd	AC:0 C:0

Scheme XVI

BB 1937	Plan	27k	DV:4	DK:6.0	AA:Orange
12-14"/50	SRM:10	1500lb	1440 rd	36,500 yd	TT: 0
16-5"38DP	SRM:75	551b	7200 rd	17,500 yd	AC:3 C:2

CC 1933

CC 1934	Plan	30k	DV:5	DK:6.0	AA:Orange
9-14"/45	SRM:7.5	1500lb	1080 rd	36,500 yd	TT: 0
16-5"38DP	SRM:75	551b	7200 rd	17,500 yd	AC:4 C:2

Germany

OPQ Values in Seapower Directory
Kreuzer P Values in Seapower Directory

KW45	Plan (1939)	36 K	DV:9	Deck:4.5"	AA:Orange
8-15"/47R	SRM:10	1764lb	960 rd	39,500 yds	AC:4 C:1
12-5.9"/55	SRM:30	100 lb	1800 rd	25,000 yds	TT:8-
21"(24)					
8-4.1"/65AA	SRM:70	35 lb	3200 rd	16,500 yards	

Great Britain

HOOD	Plan 1942	33 K	DV:3	Deck:5.5"	AA:Blue
8-15"/42R	SRM:10	1920 lbs	960 rds	37,000 yds	AC:4 C:1
16-5.25"/50	SRM:40	85 lbs	4320 rds	22,500 yds	

Super LION 16E38		27 K	DV:2	Deck:6.0"	AA:Blue
12-16"/45R	SRM:10	2500 lbs	1440 rds	43,500 yds	AC:4 C:1
16-5.25"/50	SRM:40	85 lbs	4320 rds	22,500 yds	
BB1935A	Plan(1935)	30K	DV:4	Deck:5.25"	AA:Orange
9-15"/45R	SRM:10	2050 lb	1080 rd	40,500 yds	AC:4 C:1
20-4.5"/DP	SRM:75	55 lb	9000 rd	17,500 yds	TT:10-
21"(10)					
BB1935B	Plan (1935)	27 K	DV:3	Deck:6"	AA:Orange
9-15"/45R	SRM:10	2050 lb	1080 rd	40,500 yds	AC:4 C:1
20-4.5"/DP	SRM:75	55 lb	9000 rd	17,500 yds	TT10-
21"(10)					
F3	Plan	30 k	DV:5	DK:7.0"	AA:0.25 Red
9-15"/50	SRM: 7.5	1950 lb	1080 rd	35,000 yd	TT:0
8-6"/50	SRM: 30	100 lb	1920 rd	24,500 yd	AC: 0
Admiral CA	Plan(4)	33 k	DV:14	DK:4.0"	AA:Blue
12-9.2"/45R	SRM:20	380 lb	1920 rd	34,500 yd	TT8-21"(16)
16-4"/45	SRM:75	30 lb	7200 rd	17,500 yd	AC:4 C:1
N-3	Values in Seapower Directory				
G-3	Values in Seapower Directory				

France

Alsace	Plan 1944	33 K	DV:1	Deck:8.0"	AA"Blue
12-15"/45R	SRM:10	1940 lbs	1440 rds	43,500 yds	AC:3 C:1
12-6"/55DP	SRM:25	120 lbs	3000 rds	28,000 yds	
16-3.9"/45	SRM:100	30 lbs	4800 rds	16,000 yds	
St Louis	Plan	33 k	DV:17	DK:3.5"	AA:Orange
9-8"/50	SRM:20	270 lb	1400 rd	30,000 yd	TT6-21"(12)
12-3.9"/50AA	SRM:100	35 lb	5400 rd	20,500 yd	AC:3 C:2

Japan

A-140A	Plan (1934)	30K	DV:0.5	Deck:8.9"	AA:Red
9-18"/45(R)	SRM:7.5	3220 lb	810 rd	46000 yards	AC:6 C:2
12-6.1"/60	SRM:25	125 lb	3600 rd	30,000 yards	
12-5"/40AA	SRM:60	50 lb	4320 rd	16000 yards	
A-140A2	Plan 1935	30 K	DV:0.5	Deck: 8.0	AA:Red
8-18"/45(R)	SRM:7.5	3220 lb	810 rd	46.000 yds	AC:6 C:2
12-6.1"/60	SRM:25	125 lb	3600 rd	30,000 yds	
12-5"/40AA	SRM:60	50 lb	4320 rd	16,000 yds	
A-140B2	Plan 1935	27 K	DV:0.5	Deck:8.9"	AA:Red
8-20"/45(R)	SRM:7.5	4200 lb	810 rd	52,500 yds	AC:6 C:2
12-6,1"/60	SRM:25	125 lb	3600 rds	30,000 yds	
12-5"/40 AA	SRM:60	50 lb	4320 rds	16,000 yds	