

Research Note

Rainbow's Guns - What and When?

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L'histoire officielle du Service Naval du Canada, publiée en 1952, contient des erreurs dans le descriptif de l'armement de HMCS Rainbow, l'un des deux croiseurs d'entraînement achetés à la Grande Bretagne en 1910. Ces erreurs ont entraîné d'autres encore plus graves dans une histoire, non-publiée mais très répandue, du service canadien du Rainbow par le Service Historique Naval en 1961. Afin de corriger ces erreurs il est essentiel de comprendre l'armement monté sur le Rainbow à ses origines avec la Royale britannique en 1892

As we approach the centenary of the establishment of the Royal Canadian Navy (RCN), there is a renewal of interest in the origins of the fleet and its first ships. Anyone interested in researching the characteristics of His Majesty's Canadian Ship (HMCS) *Rainbow*, the first warship purchased for the Naval Service of Canada,¹ can consult a variety of books for a listing of her technical specifications and, with respect to her armament at any rate, get almost as many different answers. While all references agree that *Rainbow* was equipped with two 6-inch guns mounted singly on the fo'c'sle and quarterdeck, they vary considerably in their description of her secondary armament.

¹ This wording is carefully chosen, as *Rainbow* was not "the first warship in the RCN" as so often suggested in much of the literature. The service did not become the "Royal Canadian Navy" until 1911 at which time all ships in the naval branch of the Naval Service of Canada (NSC) would have "joined" it simultaneously. She was not the first ship in the Naval Service of Canada either. That Service actually contained five branches: Naval, Fisheries Protection, Tidal and Current Survey, Hydrographic Survey and Wireless Telegraph. As the Department was quickly organized in this manner upon passage of the *Naval Service Act* of 4 May 1910, the ships of the Fisheries Protection and Survey branches would have joined it prior to any warships arriving. *Rainbow* was not even the first warship commissioned in the Service (though she was the first one commissioned for it). When she was recommissioned 4 August 1910, it was for special service in the Royal Navy; memo Admiralty to Colonial Office, 2 August 1910, Library and Archives Canada (LAC), Record Group (RG) 25, vol 1105, file 735. This ensured that she remained an RN unit for her transit to Canada since the RN was of the opinion that Canadian jurisdiction for naval discipline did not extend beyond Canada's territorial limit. HMCS *Niobe* was similarly commissioned 6 September, and arrived in Halifax 21 October 1910. *Niobe* was acknowledged as being handed over to Canadian authorities on 12 November. However the Admiralty instructions indicated that the date of transfer was to be backdated to the "date of arrival at Dominion waters"; memo Harcourt to Lord Grey, 12 November 1910, LAC RG 25, vol 1105, file 735. Consequently, *Niobe* was technically a Canadian warship before *Rainbow*, which arrived in Esquimalt 7 November.

Some mention a battery of 4-inch and 6-pounder guns with small torpedo tubes, while others refer to 4.7-inch guns and/or 12-pounders². Which was it?

The question itself gives immediate rise to two more. The first, which applies to any warship like *Rainbow* that had a lifespan of almost thirty years, is: to which point in time do the data apply? After all, a ship represents a considerable capital investment, and most navies upgrade or modify a ship's equipment as circumstances change and systems become obsolete. Upgrading systems is usually a cheaper option than replacing the entire ship. This was particularly true at the turn of the last century when improvements in weapons systems that were being introduced into fleets at relatively short intervals could also be back-fit into older ships to preserve their fighting value. However, few of the secondary references consulted for *Rainbow* supply dates for the armament information, leaving the impression that the data quoted apply to the ship as delivered to the Naval Service of Canada in 1910.

The second question is a subjective one: does it really matter? Aside from the academic nicety of getting specific data like this "right", details of the armament of a relatively small warship like *Rainbow* are rather insignificant to any consideration of fleet wide capability. The details are probably only of relevance if they are indicative of policy decisions, have operational implications of historical interest, or if the difference in the details as reported bring the reliability of some sources related to the early history of Canada's navy into question.

In that latter aspect, then, the context in which *Rainbow's* armament specifications are reported may indeed be of interest. This is true for example, of the operational backdrop against which the original official history³ first presents the data. Dr. G.N. Tucker, the author, lists her armament as two 6-inch and four 12-pounder guns and two 14-inch torpedo tubes in a discussion comparing her combat capability to that of the German cruisers *Leipzig* and *Nurnberg*, which she was sent out to hunt in August 1914, observing that *Rainbow* was a much inferior ship. Indeed she was the inferior vessel, but if her armament was as Tucker indicates, the disparity in armament would have been so significant as to make the mission almost absurd.⁴ Was the Admiralty, who

² Ken MacPherson and Ron Barrie, *The Ships of Canada's Naval Forces, 1910-2002* (St Catherines, Ont: Vanwell, 2002), 11, has her armed with 2x6-inch, 6x4-inch, 8x6-pdr, 4x14-inch Torpedo Tubes (TT). MacPherson had a different opinion in *Canada's Fighting Ships* (Toronto: Samuel Stevens, Hakkert, 1975), 99, where he indicates an outfit of 2x6-inch, 6x4.7-inch guns and 2x14-inch TT. Marc Milner in *Canada's Navy: the First Century* (University of Toronto Press, 1999), 20, agrees with MacPherson and Barrie except for a secondary battery of only four 4-inch weapons, while a more recent book, M Whitby, R.H. Gimblett and P. Haydon (eds), *The Admirals* (Toronto: Dundurn, 2006), Plate 1, indicates 2x6-inch, 6x4.7-inch, and 4x12-pounders.

³ G.N. Tucker, *The Naval Service of Canada: Its Official History. Volume 1: Origins and Early Years* (Ottawa: King's Printer, 1952), 266.

⁴ The situation was clear to both Canadian and German commanders. Cdr Walter Hose, captain of *Rainbow*, considered that his main armament was in fact the ships wireless telegraph with which he hoped to at least make a sighting report of *Liepzig* before succumbing in battle. *Rainbow* was 3 knots slower, and worse, still had not received her allocation of warshot ammunition prior to leaving in search of *Liepzig*. The German captain on the other hand, would not have known this, and while he had little worry of losing a gun duel with the Canadian "training ship", he would have been reluctant to risk

had ordered the mission, indeed that obtuse or had Tucker made the situation seem worse than it was? Had the Naval Service of Canada specifically reduced her armament better to suit her intended role as a training ship and fisheries protection vessel and then been caught short in the crisis of 1914? Or has the history been somewhat confused?

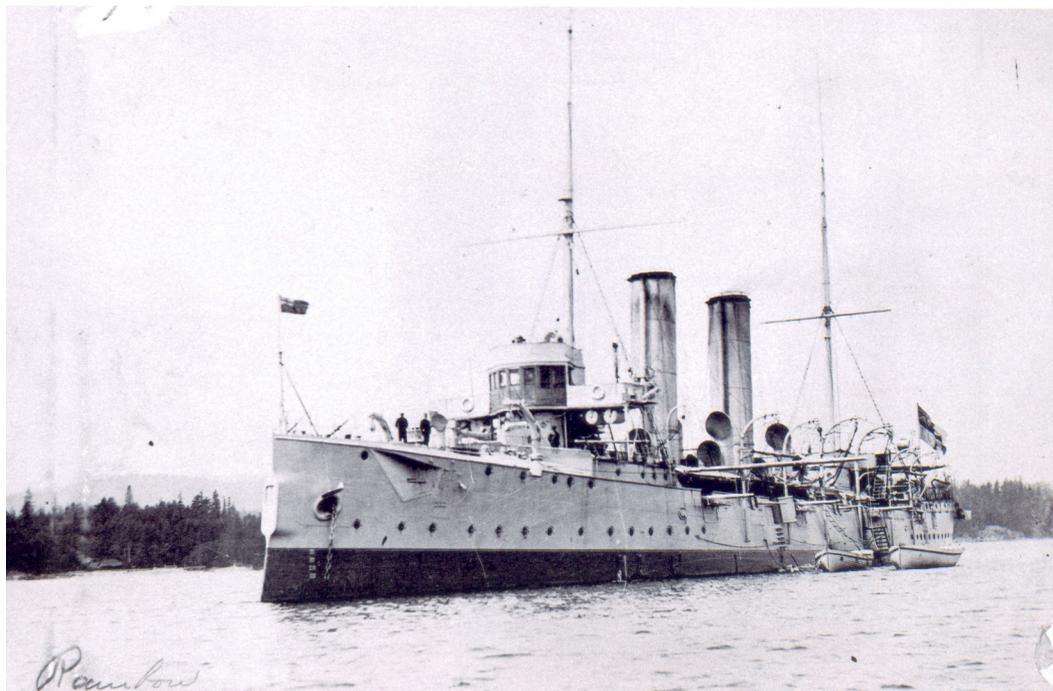


Figure 1 - Rainbow at anchor with her 4.7-inch and 12-pounder battery turned out. Royal BC Museum Archives Photo #A-00246, photographer unknown, date listed as ca 1910 although likely later than this.

The Apollos

Rainbow was one of twenty-one Apollo second-class⁵ protected cruisers built for the Royal Navy from 1889 to 1894 as part of the building programme initiated by the

significant damage given his distance from any repair facility. *Leipzig* had ten modern 105mm (4.1-inch) guns whose range, rate and volume of fire would have overwhelmed any ship with only two old 6-inch weapons.

⁵ The class system of rating cruisers had been introduced in 1888 based largely on the cruiser's size, though it appears to have been imprecisely applied from time to time. First-class cruisers were vessels over 6000 tons, second class 3000-5999 tons, and third-class cruisers were smaller. Precise references are difficult to find that explain this system but see L. Laughton (ed), *The Naval Pocket Book* (London: W. Thacker, 1903), 25. At 3600 tons, *Rainbow* was at the lower limit for a second-class cruiser and, as

Naval Defence Act of 1889.⁶ The Russian war scare of 1884 had revealed that the RN was stretched thin and, while ships of all classes were needed, sufficient cruisers to protect the shipping over Britain's vast empire were a particularly compelling requirement. The scare, exacerbated by a series of "truth about the navy" articles in the press fed by concern over the results of the naval manoeuvres of 1888, led to the two-power fleet size standard proclaimed in the Naval Defence Act and a building programme of seventy ships. Instituted at a time when technology in metallurgy, ordnance and steam propulsion was becoming sufficiently mature and stable to permit more confidence in ship designs, this programme provided for larger numbers of ships in each class than previous ones. The Apollos were originally planned as a class of twenty-nine to meet the demand for a moderate size cruiser in sufficient numbers for the trade protection role.

A follow on to the 2800-ton Medea class design, the Apollos were considered to be a larger and more heavily armed vessel. Their specifications as originally announced in the professional press⁷ were:

Length	300 feet	
Displacement	3400 tons (3600 for those sheathed for overseas duty)	
Speed	20 knots (maximum over measured mile)	
Radius of action	8000 nautical miles at 10 knots	
Armament	2	6-inch (5-ton) bow and stern chasers
	6	4.7-inch quick-firers, broadside
	9	6-pounders and 3-pounders
	4	Torpedo Tubes

The class was immediately criticized as being too lightly armed for its intended role, despite the addition of the new 4.7-inch quick-firing (QF) guns mounted broadside in lieu of the slower breech loading 6-inch weapon used in the broadside batteries of earlier classes of small cruisers. The gunnery layout was considered particularly weak with respect to fore and aft fire where only one 6-inch and one or two of the 6-pounders could be brought to bear. The Apollo programme was stopped after twenty-one ships were built and eight units of the *Astraea* class (which also carried a mixed battery of 6-inch and 4.7-inch guns) were built as a design upgrade.

the criteria for the classification tended to creep upward over time, some references to her in the correspondence concerning her sale to Canada refer to her as a third-class cruiser.

⁶ R. Gardiner (ed), *Conway's All the World's Fighting Ships 1860-1905* (New York: Mayflower, 1979), 76. *Rainbow*, laid down in 1890, was completed in 1892.

⁷ Table taken from *Brassey's Naval Annual, 1888-89* (Portsmouth, UK: J. Griffin, 1889), 545-6. Other contemporary references expand this to note that the light quick firing (QF) guns were eight 6-pounder and one 3-pounder and that the armament included four .45-inch Hotchkiss machine guns (see *The Naval Pocket Book, 1903, op cit*, 65).

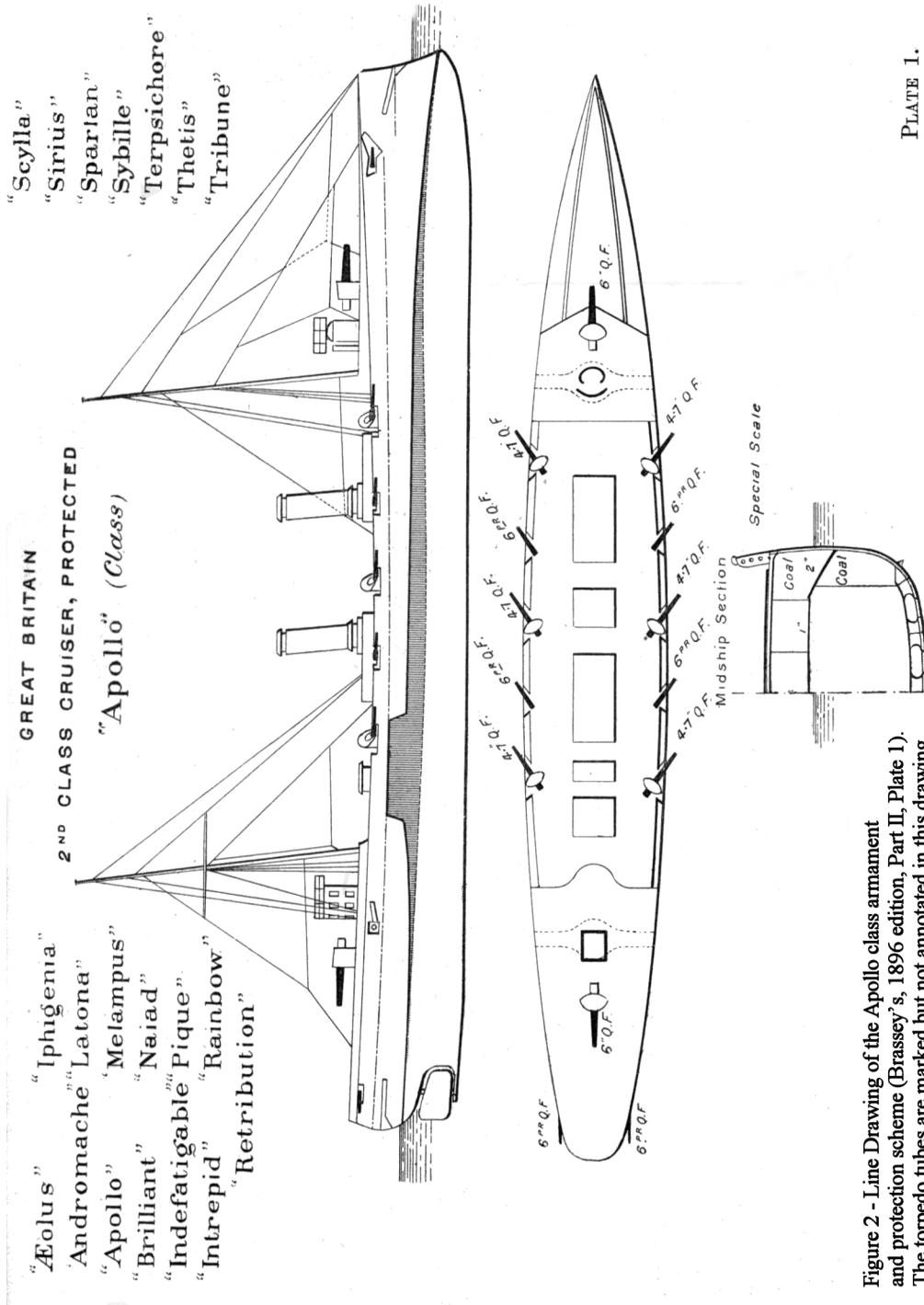


PLATE 1.

Figure 2 - Line Drawing of the Apollo class armament and protection scheme (Brassey's, 1896 edition, Part II, Plate 1). The torpedo tubes are marked but not annotated in this drawing. Courtesy, Archives and Collections Society.

The Armament: The 6-inch Guns

Designed as a larger follow-on to the Medeas, which had been fitted with six 6-inch Breech Loading Rifles (BLRs), the Apollos only mounted two of these weapons, fitted as bow and stern chasers. The original weapon for the Apollos was identified in *Brassey's Naval Annual*⁸ as a 6-inch (5 ton) gun, most likely the 6-inch/26 BL Mark III/IV/VI BLR variant.⁹ As a breech-loading (BL) design, they used a 48-pound silk bag EXE¹⁰ propellant charge to propel a 100-pound shell to about 9000 yards at 15 degrees elevation. The rate of fire (ROF) of this specific weapon is not available in the technical literature, but a contemporary BL 5-inch gun design could only achieve an ROF of about two rounds per minute in a test conducted in 1887.¹¹

However, during the early 1890s, the RN was introducing medium-calibre Quick Firing (QF) guns,¹² and by the end of the Apollo building programme, a 6-inch/40 QF gun was coming into service.¹³ The long, heavy barrel of almost seven tons had a three-motion breech (later a single-action one) that took a brass cartridge case¹⁴ containing thirteen pounds of high-powered cordite propellant in place of the previous bulky, bagged black powder propellant. The brass cartridge was not only safer but permitted quicker loading of the weapon, resulting in a more rapid rate of fire.¹⁵ The new weapon replaced the 6-inch/26 in the last three of the Apollos launched and appears to have been back-fit into most of the remaining ships in the class.¹⁶ Certainly, by the time she was

⁸ *Brassey's Naval Annual 1888-9, op cit*, 546.

⁹ N.J.M. Campbell, "British Naval Guns 1880-1945, No 10," in J. Roberts (ed), *Warship, Volume VII* (Annapolis, Md: Naval Institute Press, 1983), 170-172. The format used indicates a 6-inch bore diameter or calibre and a barrel 26 calibres long (13 feet). These weapons, a relatively early breech loading design, differed little in detail amongst the Mark III, IV and VI versions and were sometimes mixed in the outfits provided to individual ships.

¹⁰ EXperimental E propellant – gunpowder based. It was made using straw charcoal and compressed in a prism form to permit a slow burn throughout the passage of the projectile up the gun barrel. Most powdered natures of gunpowder (including that used as the bursting charge in a shell) burned too quickly to be used as a propellant in a long barrelled gun; Capt H. Garbett, RN, *Naval Gunnery* (London: George Bell, 1897), 220, 224.

¹¹ *Ibid*, 170-1. The trial compared a new 4.7-inch QF which fired 10 rounds in 47 seconds, against a 5-inch BLR which took over 5 minutes to fire 10 rounds.

¹² K. Lautenschläger, "A Majestic Revolution – Part 1," in Roberts, *Warship Vol VII*, 49. The design had been accepted two years earlier.

¹³ Produced in three Marks with slightly different construction details. This was the weapon that comprised the main armament of *HMCS Niobe*, the Diadem class cruiser purchased by the NSC for service on the East Coast. *Niobe's* guns were the Mark II version, an example of which can be seen outside the New Brunswick museum in Saint John and in front of *HMCS Brunswick* in the same city (see Figure 4). These weapons used a Pedestal (P) or Central Pivot (CP) mount.

¹⁴ Admiralty, *Handbook of Ammunition – 1909* (London: HMSO, 1909), 33, Plate VII.

¹⁵ Up to seven rounds per minute; *Brassey's Naval Annual, 1894*, 413. Unfortunately, Brassey's does not provide the ROF for the BLR 6-inch weapons for comparison.

¹⁶ Campbell, "British Naval Guns 1880 – 1945, No 11," in Roberts, *Warship Vol VII*, 240. The Mark I and Mark II 6-inch QF differed in minor details and were generally treated as equivalent weapons. The Mark I was back fit into a number of the Apollos and Campbell suggests that one of these was

recommissioned for Canadian service, *Rainbow* had been re-equipped with the 6-inch/40 Mark II QF gun.



Figure 3 - *Rainbow's* port battery (looking aft). One 12-pounder and three 4.7-inch can be seen. *Royal BC Museum Archives Photo #A-05935 photographer unknown, date listed 1911 although likely later than this*

The 4.7-inch Gun

The substitution of the 4.7-inch QF weapon for the older broadside mounted 6-inch BL in the *Medeas* marked the major departure of the *Apollo* class design. The 4.7-inch/40 QF was produced by Elswick¹⁷ in four marks, and featured the new cordite propellant in brass cartridges. This new weapon's 45-pound shell had nearly the same penetrating power and range as the 100-pound shell of the 6-inch/26 gun but, as a QF design, it was capable of up to twelve rounds per minute.¹⁸ Thus, the effective weight and penetration power per minute achieved with this mixed 6-inch BLR and 4.7-inch QF battery was a considerable improvement over the preceding *Medea* class' uniform battery of slow-firing 6-inch BLR. Even with the later development of the 6-inch gun as a QF type, smaller cruiser designs continued with a mixed battery until the turn of the century. The operating concept in the 1890s was to use a heavy weapon to break through armour and a rapid-fire lighter gun for riddling unprotected portions of the ship and inflicting personnel casualties.¹⁹

Rainbow. However a letter to RAdm Kingsmill reporting the results of a gun survey of *Rainbow* reports the weapon as a 6-inch V.C.P. Mark II (H.M.C.S. *Rainbow*, 1 Feb 1910, LAC, MG 26G, vol 772, 219310-12).

¹⁷ The Elswick Ordnance Corporation (E.O.C.) was Armstrong's factory at Elswick. The weapon was actually a 120cm or 4.724-inch calibre – an unusually metric design for a British gun.

¹⁸ *Brassey's Naval Annual*, 1894, 413.

¹⁹ Lautenschläger, "A Majestic Revolution," 46. Lautenschläger's argument is made for battleships but it would have applied to cruisers engaging cruisers as well.

Smaller Weapons

The development of the torpedo by Robert Whitehead in 1866 and the subsequent introduction of a small, fast torpedo boat to launch it presented a new threat to battleships and cruisers in littoral waters. To defend against torpedo boat attacks, larger ships were provided with a tertiary battery of smaller weapons capable of the high rate of fire considered necessary to obtain a hit on the boat outside torpedo launching range.

For the Apollos this light battery consisted of eight 6-pounder QF guns. Two were mounted on each broadside between the 4.7-inch secondary guns, two to fire through embrasures in the bow, and two to fire through embrasures in the stern; these last four guns were the only weapons besides the 6-inch guns capable of fire directly ahead and astern. The 6-pounder fitted was probably²⁰ a Hotchkiss Mark-I 8cwt design. However, the utility of such a light weapon against torpedo boats was already being questioned by the time the Apollos were launched. Trials conducted in 1889²¹ had determined that an effective engagement against a fast moving torpedo boat would occur at ranges from 1000 yards (the maximum range at which a hit on the boat might be practicable) and 500 yards (at which torpedo launch would occur). During the fifty seconds in which this engagement would last against a 20-knot boat, a 12-pounder would probably achieve a maximum of eight shots and a 6-pounder perhaps twice as many depending how carefully they were aimed. The trials also indicated that a 12-pounder was the smallest shell that would likely disable a torpedo boat with a single hit so smaller weapons, like the 6-pounder, had to rely on mass effect from rapid broadside firing to achieve the volume of hits necessary in the time available to defend against a torpedo boat attack.

The Apollos also carried a single 3-pounder,²² for use in the ship's boat²³ presumably as support to landing party operations. The typical 3-pounder of the day was

²⁰ Based on *Brassey's Naval Annual, 1894*, and http://www.navweaps.com/Weapons/WNBR_6pounder_m1.htm consulted July 2006. The weapon was capable of approximately 20-24 rounds per minute firing with its fixed 57mm six pound shell out to 8700 yards at 45 degrees elevation. That it was a Hotchkiss is based on a comment in the "Return of Misfires Report", 31 December 1910 (HMCS Rainbow: Gunnery Exercises and Practices and Statement of Expenditures, G 23/10, 4th August 1910 to 4th August 1911, LAC, RG 24, vol 4008, NSC 1057-49-11GE, vol 1), indicating an expenditure of 282 6-pdr Hotchkiss rounds fired for saluting. The Hotchkiss was a widely used weapon during this time period and it remained in service through the Second World War.

²¹ D.K. Brown, "Steam Torpedo Boats of the Royal Navy," in J. Jordan (ed), *Warship 2005* (London: Conway Maritime Press, 2005), 92.

²² This weapon was also widespread throughout the British fleet – to the consternation of some commentators who were concerned about confusion over ammunition supply and spotting. See the comments following the 1889 manoeuvres reproduced in O. Parkes, *British Battleships* (London: Seeley Service, 1966), 335. However, the 3-pounder offered considerable flexibility and in larger ships such as battleships and big cruisers, this light weapon was typically sited on the upper decks and the fighting tops of their heavy masts to take advantage of the extra visibility an elevated location afforded *Ibid*, 359.

the Hotchkiss Mark 1 on a low angle mounting, which fired a 47mm 3.3 pound shell out to about 6500 yards. The Apollos were fitted for four machine guns as well – most likely .45-inch Nordenfeldt weapons that fired 180 rounds of Martini-Henry ammunition per minute.²⁴ Finally, there was also a field gun for use by shore parties.

Torpedoes

Rounding out the Apollo's armament was the torpedo outfit. The RN had had some considerable experience with the rapidly evolving torpedo technology by the time the Apollos were designed and had replaced Whitehead's original 16-inch diameter weapon with a 14-inch torpedo armed with a warhead of sixty to seventy pounds of guncotton. The first British version, produced by the Royal Laboratories in 1876 as the Mark I, was followed by a rapid succession of improved designs. By 1883 the Mark VIII was introduced, a variant that would remain in service into the 1900s.²⁵ Propulsion was provided by a three-cylinder single-acting Brotherhood engine powered by thirty pounds of compressed air propelling the weapon to 600 yards at a speed of 24 knots.²⁶ The 14-inch evolved through four more variants,²⁷ but by 1891 it was being superseded by an 18-inch design with a 199-pound warhead and capable of much greater range and speed.

The original Whitehead design solved one of the most significant problems confronting a submerged automobile weapon – that of accurate depth control – using a simple but ingenious combination of hydrostatic pressure and a pendulum to resolve the depth and depth rate inputs to the elevators. However, it was not until the turn of the century that a small clockwork gyroscope (the Obry gyroscope) was introduced to torpedoes to govern lateral movement, thus increasing the practical range of a torpedo beyond 1000 yards.

This latter advance had considerable implications for the method of torpedo discharge in ships. At the time the Apollos were being built, there were four standard launch systems being used: fixed submerged and above water tubes, revolving tubes, and, for large ships' boats, a "dropping gear" system. The submerged tube system was one of

²³ This comment is based on *Rainbow's* own use of the weapon in which she conducted a 10 round 'boat firing' exercise on 15 June 1911; Annual Report of Gunnery Exercises and Practices and Statement of Expenditure of Ammunitions on Board, HMCS *Rainbow*, 4th August 1910 to 4th August 1911, LAC, RG 24, vol 4008, NSC 1057-49-11GE, vol 1. *Rainbow's* weapon was identified later in this report as a Hotchkiss. None of her heavy weapons firing exercise serials included the 3-pounder and no contemporary drawings of an Apollo show a 3-pounder permanently mounted in the ship itself.

²⁴ L.G. Carr Laughton (ed), *The Naval Pocket-Book, 1903* (London: W. Thacker, 1903) 65, 662.

²⁵ *Ibid.*, 666-672.

²⁶ G.E. Armstrong, *Torpedoes & Torpedo-Vessels* (London: George Bell, 1896), 18, 30.

²⁷ The Marks IX, X, XI and Weymouth Mark I which were the only 14-inch torpedoes remaining in RN service by 1912; Admiralty, *Torpedo Drill Book, 1912* (London: HMSO, 1912), 375. *Rainbow* was supplied to the RCN with the Mark IX, the last 14-inch version that was not fitted with a gyroscope. One of these (probably from *Rainbow*) can be seen at the Maritime Museum of British Columbia. That museum also has an excellent model of *Rainbow* in her original armament configuration.

the first developed and it remained a design favourite despite all of its complications to water tight integrity, as it permitted torpedoes to be retained below the armoured deck, away from potential detonation by enemy gunfire. However, for constrained spaces, the RN also employed above water tubes and, in the case of the Apollos, chose a single fixed tube firing forward through the stem and another on the main deck firing astern. Two more were fitted as rotating tubes, located on the upper deck just abaft the main mast with 90 degree arcs of fire on their respective sides.²⁸

The fixed tubes seem a rather curious arrangement, particularly when one considers that putting a tube through the stem of a ship also designed for ramming would compromise its structural rigidity. However, this arrangement would have solved one of the technical difficulties in launching torpedoes not equipped with gyros – that of the torque imparted to a torpedo entering the water launched laterally from the side of a moving ship. Early arrangements for submerged and above water broadside mounted tubes gave rise to deflections of as much as 30 degrees off the initial aim point,²⁹ and while ingenious mechanisms, including protruding guide bars or expendable tubes, were developed to reduce this initial deflection for broadside fired weapons, torpedoes launched from bow or stern aimed tubes would not have been subject to this problem.

The other serious issue with such an arrangement (particularly in the Apollos with their poor fore and aft gun arcs of fire) was the range at which the ship would have to close the enemy (about 500 yards) to use the torpedo – a risky proposition against any enemy still capable of any significant firepower. However, given the British concept of protection for cruisers, one can make some assumptions as to the design intent. A protected deck, as employed in most cruisers of the 1880s, would keep a ship watertight against contemporary cruiser guns but would not keep the shells out of the upper decks. Consequently, in a successful engagement against a ship her own size, an Apollo might render her opponent incapable of returning fire if she was able to riddle her upper decks and mountings sufficiently with shells and splinters from her quick firing guns, but she would not be able to damage its propulsion or compromise underwater integrity to any significant extent with gun fire. However, at the end-stage in the engagement she would have been able to approach a seriously damaged opponent closely enough to launch a torpedo attack in relative safety. The torpedo would hit below the protective deck and, as demonstrated in trials conducted in 1904,³⁰ confound most design techniques for underwater protection as well. In a high-speed mêlée at short range, the stern tube offered a final chance for a second shot against a missed target.³¹

²⁸ The rotating torpedo tubes in the Apollos were likely the Mark V D2, which is described as a ball and socket mounted tube on a cogged racer in the ships side. By 1912 this tube was noted as remaining in “a few old 2nd class cruisers”; *ibid*, 418. Torpedoes launched from this tube were provided their discharge impulse either from compressed air or from the detonation of 4½ ounces of black powder. The drill book makes no comments on through-hull 14-inch tubes, suggesting that there were none operational left in service by this time.

²⁹ Armstrong, *Torpedoes & Torpedo-Vessels*, 15.

³⁰ Parkes, *British Battleships*, 414.

³¹ *Ibid*, 295.

As practical ranges for both torpedoes and guns increased, the utility of stern and bow tubes was being questioned even at the time the Apollos were being designed,³² and they were eliminated or decommissioned in most battleship and cruiser designs after the mid-1890s. Trainable tubes, however, would have retained their utility, particularly when new gyro equipped torpedoes capable of higher speeds and longer ranges (most frequently represented in British service with larger diameter weapons propelled by “hot gas” systems³³) appeared after the turn of the century.

Rainbow in Canadian Service: Acceptance

The Apollos were already obsolete by the time two were offered to Canada as training ships at the 1909 Imperial Defence Conference. By 1908 twelve of them, including *Rainbow*, had been listed as “available for subsidiary purposes – armaments not yet surrendered,”³⁴ some of these were in the process of being, or had already been, converted to minelayers.³⁵ Nevertheless Canada agreed in 1910 to purchase *Rainbow* as a training ship and for fisheries protection duties for £50,000 (in lieu of a second Apollo, the Diadem first-class protected cruiser *Niobe* also was obtained).

Rear-Admiral C.E. Kingsmill, director of the Marine Service in the Department of Marine and Fisheries, had inspected *Rainbow* with a view to her suitability as a training ship. In a message to minister of Marine and Fisheries L.P Brodeur on 9 November 1909, Kingsmill described the armament as “2 6-in QF, 6 4.7-in; 14 machine guns; 4 torpedo tubes.”³⁶ In his message he lumped quick-firing weapons smaller than 4.7-inch together with machine guns (a practice common in some contemporary handbooks). Kingsmill had retained the services of an RN gunner to inspect the condition of the ship’s weapons and recommend any necessary modifications. The gunner, Mr. H.T. Mock, noted that the 6-inch weapons were “quite out of date for the teaching of the modern Seamen (*sic*)” and noted that some discussion had occurred as to the possibility of their being replaced entirely by new weapons (presumably more recent 6-inch QF designs).³⁷ Failing that, he recommended that at least the mountings should be updated

³² *Ibid.*, 335.

³³ For a detailed history of the development of early torpedoes see G. Kirby, “A History of the Torpedo – The Early Days,” in *Navies in Transition*, <http://www.btinternet.com/~philipr/torps.htm>, a reprint of his article in *The Journal of the Royal Navy Scientific Service*, 27:1.

³⁴ A.H. Burgoyne (ed), *The Navy League Annual, 1907-1908* (London: The Navy League, 1907), 218. From one report it can be inferred that *Rainbow* was laid up in Material Reserve at the Motherbank near the Isle of Wight.

³⁵ Indeed in this role, one of the class, *HMS Latona*, succeeded where RAdm Troubridge failed in a controversial decision to avoid combat with the only German warships operating in the Mediterranean at the beginning of the war. Mines she laid in the Bosphorus seriously damaged the former German battle cruiser *Goeben* and sank the light cruiser *Breslau* in 1918.

³⁶ LAC, MG 26G 1A, vol 772, PS 219548.

³⁷ Memo *Rainbow* to Kingsmill, 1 February 1910, LAC, MG 26G 1A, vol 772, PS 219510). Records of the discussion on changing the gun were not found. The 6-inch Mark VII/VIII, a 45-calibre weapon,

from the current Vavasseur type to new central pivot (CP) mountings that would permit the use of telescopic sights. Furthermore, Mock suggested that the 6-pounders be replaced with six 12-pounder weapons and that a field gun be purchased as well.³⁸ Not all of his recommendations could be acted upon – replacement of the 6-inch guns, for example, would have taken too long to effect. In a memo to Whitehall, however, Kingsmill requested that the 6-inch guns be fitted with the new CP mountings together with telescopic sights and a single motion breech mechanism, that the 4.7-inch guns also be fitted with telescopic sights and a single motion breech, but that all of the 6-pounder guns (which had been dismantled) be fitted back into the ship.

Not all of these alterations were provided *gratis*. The Admiralty submitted an invoice for the expenses involved in “Canadianizing” *Rainbow* right down to the £7 16s 3d incurred for supplying electricity to the ship during her refit. The extra work beyond re-commissioning the ship involved an additional £7400 in alterations including new 6-inch P.II UD [upper deck] mountings, supplying a 12-pounder 8 cwt field gun and parts, telescopic sights, a wireless telegraphy house and searchlights.³⁹ Canada also asked that *Rainbow* “may be painted the naval colour” to conform to the paint scheme of the RN.⁴⁰

On 20 August 1910, *Rainbow* left Plymouth for Canada having been commissioned at Portsmouth just over two weeks earlier. After a ceremony-filled but otherwise remarkably smooth passage around South America she arrived in Esquimalt on 7 November (a testimony to the reliability of her old engines) to be subsequently turned over to the Naval Service of Canada. Shortly thereafter, the director of Naval Gunnery (Lieutenant R.M.T. Stephens) of Naval Service Headquarters approved *Rainbow*’s Form G.18: Annual Allowance of Ammunition For Practice.⁴¹ It provided the full statement of the ship’s gun outfit as well as her annual allowance for practice expenditure as of her 4 August 1910 date of commissioning:

was fairly standard in the operational fleet by this time and the new Weymouth class cruisers being considered for the Naval Service of Canada mounted the 50 calibre Mark XI.

³⁸ HMCS *Rainbow* to Kingsmill, 1 February 1910, LAC, MG 26 G 1A, vol 772, PS 219510. The addition of telescopic sights was critical to improving gunnery ranges not so much for the magnification they offered but because they eliminated the necessity for the gun aimer to focus on the back-sight, the fore-sight and the target simultaneously while continuously managing the gun elevation. A mounting that permitted co-axial mounting of a collimated telescope while isolating it from the worst of the gun recoil was essential to making this work. Telescopes effectively increased practical gun ranges from 1000 yards out to about 6000 yards for individually served guns. The field gun proposed was a 12-pdr 8 cwt weapon replacing the 9-pdr muzzle loader originally provided to the Apollos according to Mock. The weapon would have supported landing parties.

³⁹ Admiralty memo to the Office of the High Commissioner for Canada, 19 June 1911, LAC, RG 24, vol 5587, NSS 2-1-1. “Canadianizing” started early in the navy’s history.

⁴⁰ Kingsmill telegram to the Secretary of the High Commissioner for the Dominion, 23 March 1910, LAC, RG 24, vol 5587, NSS 2-1-1. This would suggest that *Rainbow* at the time of purchase was still painted in the former Victorian paint scheme, dropped by the RN in 1902-03. Presumably she had been out of front line service since at least that time.

⁴¹ Forwarded to *Rainbow* in a memo dated 28 November 1910, LAC, RG 24, vol 4008, NSC 1057-49-11GE.

Gun	Number of mounts	Practice Rounds ⁴²	Warshot Rounds
6" QF	2	60	4 common ⁴³
4.7" QF	6	180	12 common
6 pdr	8	240	80 common
3 pdr	1	40	10 common
12 pdr 8 cwt	1	-	8 common & 8 shrapnel
.303" Maxim ⁴⁴	4	-	5000 ball

Thus, with relatively minor upgrades to the breeches and mountings, *Rainbow* arrived in Canada in 1910 with a gun armament largely similar to that with which she was originally commissioned in 1892.

With respect to her torpedo tubes, no specific reference is made in the 1910 acquisition records that remain. However, her torpedo training records make reference only to the port and starboard tubes implying that the bow and stern tubes were no longer operable. This makes sense, as the concept of close-in bow and stern attacks was long outdated and such tubes considered useless. In any case, by 1900, the cold air propelled 14-inch torpedo had been superseded by 18-inch and 21-inch designs with much improved range and speed performance.

In Canadian Service

Rainbow's sojourn in Esquimalt harbour after arrival in Canada did not last long. She spent December on maintenance after her long cruise, dismounting and presumably cleaning and maintaining her 6-inch and 4.7-inch guns and working her boats crews. By 4 January 1911 her guns' crews commenced training at loading drill, the deflection trainer, and at dotter practice.⁴⁵ However, it was not long before the ship fired her first shot "in anger." Aside from duties as a training cruiser, *Rainbow* was also intended for fisheries protection service, and in February 1911 conducted her first such patrol. On 21 February she fired a 6-pounder blank charge to gain the attention of the American schooner *Edrie* caught poaching inside the three-mile limit and taken as prize.

Gunnery drill continued throughout the cruise with deflection and loading drill for the 6-inch and 4.7-inch batteries receiving most attention. Some firing practice was

⁴² Solid cast iron shot; Admiralty, *Handbook of Ammunition, 1909* (London: HMSO, 1909), 74.

⁴³ Essentially a round intended for non-armoured targets, filled with black powder – "P" (or pebbled powder) mixture – and base fuzed. The other option for filled shells in the G18 was for a Lyddite or picric acid formulation, which was the RN standard warshot round for an armour piercing capability; *Handbook of Ammunition*, 69-71. No shells of this type were authorized for *Rainbow* at this time.

⁴⁴ This indicates that *Rainbow's* original Nordenfelt machine guns had been replaced by Maxims in British service. This weapon fired a .303-inch Lee Metford round at 600 rpm; Clowes, *The Naval Pocket Book 1903*, 662.

⁴⁵ Details taken from HMCS *Rainbow* Ship's Log, August 1910 – December 1911, LAC, RG 24, vol 7774.

executed using 1-inch aiming tube ammunition in lieu of full shots.⁴⁶ Deflection training and aiming tube practice for the 6-inch, 4.7-inch and 6-pounder guns increased in frequency throughout the spring in preparation for her first full firing practice. This was conducted in Baynes Sound, 7 June 1911, with her first practice firings using full cordite charges and practice rounds for the 6-inch, 4.7-inch and 6-pounder guns being carried out in preparation for the formal “gun layers’ test” conducted three days later.⁴⁷ The gun layer’s test was an individual prize-firing event intended to test and showcase individual gun’s crews’ proficiency. In 1907 this trial consisted (for a 6-inch gun) of a run at 12 knots against a 10-foot by 8-foot square floating canvas target firing for one minute.⁴⁸ *Rainbow*’s results, an aggregate of fourteen hits from eighteen 6-inch shots (78 per cent) were slightly above the fleet average for 1906⁴⁹ but her 4.7-inch (ten hits out of thirty-three for 30 per cent) were well below the fleet average of 57 per cent for that weapon. Still, as her commanding officer noted, for a first shoot results were good. It was just as well, because this would be the extent of full gunnery practice for *Rainbow*’s first full year in Canadian service.

However, further training on the 6-pounder would not be necessary for, as noted in her log during a passage from Prince Rupert, 9 October 1911, *Rainbow*’s watch was employed dismounting her 6-pounder guns and removing their “stands”. On her return to Esquimalt 16 October, they continued by “hoisting out 6 pdr ammunition and gun mountings” and cleaning up the magazine in preparation for a month in drydock for routine maintenance. After undocking, she was brought alongside the gun wharf and on 23-4 November 1910 the ship’s company was employed bringing aboard and mounting a 12-pounder gun⁵⁰ and shortly thereafter in rigging a fire control platform in the ship. Two months later *Rainbow* received a memo from the director of Naval Gunnery indicating, “the outfit of ammunition allowance for 12 pdr 12 cwt Q.F. guns in ‘Rainbow’ has been fixed at two hundred rounds per gun.”⁵¹ This of course did not constitute her actual training allowance, which was set at 120 rounds of practice and 8 of common shell for four 12-pounders in a revised form G.18 sent later that year.⁵² The new weapon, fitted in

⁴⁶ Effectively a rifle barrel with supports and contacts intended to replicate a gun cartridge fitting snugly in the large calibre weapon’s breech; Admiralty, *Gunnery Drill Book for His Majesty’s Fleet (Book II) – Instructions for Hand Worked Mountings* (London: HMSO, 1913), 186-191.

⁴⁷ The 3-pounder boat’s gun was exercised with “boat firing” being conducted 15 June.

⁴⁸ Nauticus 1907, “Target Practice, Its Lessons and Influence on Artillery Armament,” in Admiralty Intelligence Department, *Papers on Naval Subjects, 1908*, I:844 (April 1908), 4-10. The article, a reprint from the foreign press, notes that the range for the test had been increased from about 1500 yards to account for the use of sighting telescopes in the test. The target itself was bigger than indicated above but “bulls” were only scored for hits within this painted area.

⁴⁹ *Ibid.*, 7. Fleet figures quoted are for more modern 6-inch weapons.

⁵⁰ At least the log uses the singular word “gun” for the entry on this day. Four 12-pounders were provided.

⁵¹ Memo to The Commanding Officer HMCS *Rainbow* from the Director of Naval Gunnery, 15 February 1912, LAC, RG 24, vol 4008, NSC 1057-49-11GE, vol 1.

⁵² *Ibid.* Forwarded in a DNG memo dated 18 September 1912 in response to a 9 September request by *Rainbow*’s new commanding officer, Cdr Walter Hose. The new G.18 now identifies four “12 pdr 12

place of the former 6-pounder broadside mount locations, was a 12-pounder 12 cwt (probably Mark I) weapon firing separate ammunition at about 15 rounds per minute. The 12-pounder had been designed in 1893 for destroyers but also had been installed in larger cruisers as a replacement for the 6-pounder in the anti-torpedo boat role.⁵³



Figure 4 - A 6-inch/40 Mark II from HMCS *Niobe* in front of HMCS *Brunswick*. Another of *Niobe's* guns is in front of the New Brunswick Museum in Fredericton. *Niobe's* guns were used in the Partridge Island battery during the Second World War as part of the harbour defence system for the port of Saint John. (photo courtesy of Cdr D. Harper, 2006.)

No specific reference was noted indicating precisely why the change was made to *Rainbow's* armament, but some reasonable guesses might be made from the information that is available. *Rainbow's* counterpart on the east coast was the much larger first-class protected cruiser, *Niobe*, selected in lieu of a second *Apollo* largely because of her ability to accommodate the greater number of trainees expected on the Atlantic coast.⁵⁴ *Niobe*,

cwt" guns as being fit in *Rainbow* in lieu of her 6-pounders. None of the other weapon allocations were changed.

⁵³ Garbett, *Naval Gunnery*, 176. *Niobe* was likely fitted with the Mk 1 version, which fired a 12.94lb projectile using separate ammunition (that is, the 2 lb propellant charge was loaded separately). A trained crew might fire a round every 4 seconds with some versions of this gun. Campbell, *Naval Weapons of World War II* (London: Conway Maritime Press, 2002), 63-4.

⁵⁴ RAdm C.E. Kingsmill, Report of the Military Branch, 4 May 1911, in *Report of the Department of the Naval Service for the Fiscal Year ending March 31 1911* (Sess. Paper No 38A, 1912) (Ottawa: Kings Printer, 1911), 16.

constructed in 1898, mounted sixteen 6-inch QF guns, and twelve 12-pounder guns in addition to a number of field guns, Maxims and boats' guns. Unfortunately, she did not have a productive early life as a sea-going training ship. On 30 July 1911, during a coastal cruise off Cape Sable, she ran aground in a strong tide at night and suffered such significant damage that she was drydocked in Halifax for repairs, remaining there until 1914. This naturally created a problem for the gunnery training programme in Halifax. One of her 6-inch weapons was landed for firing practice ashore, but no suitable ship was available on the East Coast for heavy weapons firing at sea. In her annual report of gunnery training, *Niobe* noted that "the 'Canada'⁵⁵ has been fitted with 2 12 pdr 12 cwt and 2 3 pdrs supplied from this ship and carried out her gun trial successfully."⁵⁶ However, these training serials were conducted using reduced propellant charges, and when full charges were tried in a later trial the flanges on the gun pedestals became distorted. Subsequent training in *Canada* was conducted with the 12-pounder 8 cwt field gun, which had a much smaller recoil and consequent reduced impact on the little cruiser. It then becomes a reasonable assumption therefore, that some of *Niobe*'s 12-pounder 12 cwt guns might have been shipped to Esquimalt to meet the original request for this weapon for *Rainbow* and to continue training with it in light of *Niobe*'s incapacity. The change of 12-pounder for 6-pounder guns in the fall of 1911 was probably the reason for the confusion in subsequent records of *Rainbow*'s tertiary armament.

Rainbow continued her training into 1912 starting with a Battle Practice⁵⁷ for her 6-inch and 4.7-inch crews conducted 25 January 1912 in Constance Bay. The results were less than stellar (16 per cent and 30 per cent for the 6-inch and 4.7-inch guns respectively compared to RN results that went as high as 72 per cent for a well worked up squadron). This exercise, along with another gun layer's trial run conducted 6 and 8 May, was the end of *Rainbow*'s full gunnery training for the year.

Rainbow also had the opportunity to exercise her torpedo crews. An exercise in "running the torpedoes" was conducted 16 March 1911 with eight shots of her Mark IX 14-inch Whitehead torpedoes off Comox fired from her port and starboard tubes.⁵⁸ Conducted at anchor against a five-knot towed target at ranges that varied from 400 to 800 yards, the practice seems hardly challenging but it was about the limit of capability

⁵⁵ Canadian Government Ship (CGS) *Canada* was a 557-ton fisheries protection cruiser built in 1904 and originally armed with four 3-pounder guns.

⁵⁶ HMCS *Niobe* Light (*sic*) Cruiser Gunnery Exercises and Drills: Report for September 6th 1911 to Sept 6th 1912, LAC, RG 24, vol 4008, NSC 1057-48011GE.

⁵⁷ A second type of competitive firing for the whole ship in which a stylized naval engagement is simulated with an open fire phase followed by a close combat phase. The ship opens fire (in *Rainbow*'s case at 4000 yards), turns and engages more closely with each gun being permitted eight shots. A separate run is conducted for each broadside. *Rainbow* conducted one run each for port and starboard batteries supported by one each of her 6-inch guns. The 12-pounders apparently did not participate.

⁵⁸ Recorded in HMCS *Rainbow*, Light Cruiser: Torpedo Exercises – Annual Report of Torpedo Exercises to August 3rd 1911, LAC, RG 24, vol 4008, NSC 1057-49-TE, vol 1. The conduct of these exercises, using the actual torpedoes with a dummy warhead shipped in place of the HE head and charged with compressed air from the ships compressors is described in Admiralty, *Torpedo Drill Book*, 1912, 425-6. The Mark IX did not have a gyroscope.

for this obsolete weapon. While the performance of the torpedoes was described as “in every way satisfactory” on this occasion, the report for the next exercise, conducted 4 August 1912, noted that “... the torpedoes are very old and showing signs of wear.” The tradition of complaining about obsolete weapons systems was established very early in the Canadian Navy!

With the election of the Borden government in September 1911, the new navy entered what Walter Hose later termed its “heart breaking starvation time” and *Rainbow* engaged in very little activity, aside from short runs to keep her engines operable, after the summer of 1912. However, when reality caught up with the nation with the outbreak of the First World War on 4 August 1914, *Rainbow* had been brought back to some semblance of operational readiness as she had been ordered to prepare to execute the Imperial Government’s monitoring obligations with respect to the Bering Sea sealing patrol. With her tasking quickly changed to patrol duties on declaration of war,⁵⁹ she immediately recommenced gunnery practice, conducting a full battle test on the first day of the war by firing twelve rounds of 6-inch, thirty-one of 4.7-inch and sixteen of 12-pounder ammunition at 4000 to 2000 yards.⁶⁰ This firing was conducted using practice ammunition – the only type she had on board. It would not be until after *Rainbow*’s initial sorties in searches for the German cruiser *Leipzig* ranging as far south as San Francisco that she would finally receive her warshot allocation of Lyddite filled shells.⁶¹

After the situation in the Pacific stabilized and the threat from Germany’s East Asiatic Squadron was eliminated by Sturdee’s battlecruisers at the Falkland Islands in December 1914, *Rainbow* continued her Pacific patrols in support of trade protection and sea control keeping her gun’s crews skills alive with periodic drills. However, by 1917, with the U-boat attack on trade threatening to push England out of the war, those guns and crews were urgently needed in the Atlantic and in May 1917, *Rainbow* was paid off. Her crews were sent to the East Coast to join this struggle, preceded by some of her guns. In a memo to *Rainbow*’s commanding officer, the Esquimalt Dockyard superintendent, Rear-Admiral W.O. Storey, directed that “all 4.7 guns from *Rainbow* are eventually to be sent to Halifax; four guns and mountings with their proportion of spare gear and ammunition, exclusive of Lyddite, are to be prepared immediately for shipment to

⁵⁹ Described in some detail in Tucker, *The Naval Service of Canada (I)*, 261-282, and in Department of National Defence, Directorate of History (DHH), “Brief History of HMCS *Rainbow*”, Naval Historical Section, Ottawa, 24 March 1961.

⁶⁰ Annual Report of Gunnery Exercises – 21st July 1914 to 20th July 1915. The dates of these annual reports always start from commissioning or re-commissioning so that the slippage in this report from the 1912 one (there was no report covering 1913) is indicative of her inactive status. The odd number of rounds fired, given the rules for a Battle Test, tend to suggest a rather hastily worked up crew. The next Test, conducted 18 September 1914 shows a more uniform distribution of ammunition expenditure per gun.

⁶¹ The shells actually did arrive after *Rainbow* returned to Esquimalt after her initial search but they came without fuses. She was sent back out to find the RN sloop *Algerine* still deficient in her warshot ammunition. She successfully made contact a few days later with both the lost sloop and, on return to Esquimalt, the missing fuzes. The incident simply illustrates the lack of preparedness for war in Canada and the rapidity in which naval forces can be expected to transition from a peacetime to a wartime status.

Halifax.”⁶² The urgency was to have the guns fitted as defensive equipment in the threatened merchant fleet.

No further records covering further reductions to *Rainbow*'s remaining two 4.7-inch guns and the 12-pounders have come to light, but it is likely that they too went to counter the U-boat threat on the Atlantic. However the 6-inch guns stayed with the ship. This is evident in some discussions that arose after the war in which *Rainbow* was considered for temporary re-commissioning as a troop ship escort in local waters in response to a requirement to move troops from the mainland to Vancouver Island in 1919. In responding to an inquiry from the Department of the Naval Service concerning preparations for her temporary commissioning, the dockyard superintendent noted that “with regard to stores, there are 100 rounds of ammunition, 6” on board, ...” implying that the guns were available as well.⁶³ This was considered sufficient for the task at hand but *Rainbow*'s services were no longer considered necessary and the re-commissioning did not occur. By 20 January 1920, all ammunition was landed and later that year she was sold to a Seattle firm for disposal.

Historiography

Such was the history of the changing armament of *Rainbow* – a relatively simple one for a warship with a three-decade lifespan. Why then are the accounts of her weapons fit at such a variance? The answer lies partly in the fact that her armament did change from time to time and most accounts have simply not been sufficiently careful in specifying the time frame to which they are referring when they give the ship's statistics. The other part of the answer seems to lie in typographical errors.

The first such error appears in the report submitted by Rear-Admiral Kingsmill to his deputy minister in 1911 on the state of the Military Branch of the Department of the Naval Service in which he provides the “principal details” of *Rainbow* and *Niobe*.⁶⁴ In a parallel table he outlines the basic dimensions, engineering statistics, complement, and lists the armament of the ships. However, while *Rainbow* had a mixed main armament, *Niobe* did not, and in maintaining the parallel structure of the tabular presentation in the report, *Rainbow*'s 4.7-inch battery was left out. The report does include the QF battery of *Niobe* (twelve 12-pounder) and *Rainbow* (eight 6-pounder), their 3-pounder boats' guns, Maxims (only two in *Niobe*) and torpedo tubes (two submerged in *Niobe* and two above water in *Rainbow*). That the omission of the 4.7-inch battery is a typographical oversight is evident given Kingsmill's original report to Brodeur of 1909, referred to earlier, in which the correct information had been supplied.

⁶² Memo from Admiral Superintendent HMC Dockyard Esquimalt to HMCS *Rainbow*, 19 March 1917, LAC, RG 24, vol 11903 AE 8-6-18.

⁶³ Memo from Captain Superintendent Esquimalt to Secretary, Department of Naval Service, 20 September 1919, LAC, RG 24, vol 11,903 AE 8-1-12.

⁶⁴ Memo from Captain Superintendent Esquimalt to Secretary, Department of Naval Service, 20 September 1919, LAC, RG 24, vol 11,903 AE 8-1-12.

It is therefore tempting to assume that when Tucker listed *Rainbow's* armament in the footnote in his official history⁶⁵ he may have copied the error in the 1911 report though he does not provide any reference as to his source of information. However, Tucker does correctly show the exchange of the 6-pounders for 12-pounders by the outbreak of the First World War, which suggests he was using sources other than the 1911 report and makes it unclear why he failed to mention the existence of the 4.7-inch battery. This is likely to have been a typographical error, independent of the one in the 1911 report, for Tucker was perfectly aware that the 4.7-inch battery was still in place, as shown by his account of *Rainbow's* disadvantages as compared to *Leipzig*: “[t]he type of main armament she [*Rainbow*] mounted, consisting of guns of two different calibers [ie, 6-inch and 4.7-inch], was less efficient than that of *Leipzig* because a mixed armament makes spotting more difficult.”⁶⁶

Nevertheless, Tucker's misprint seems to have led to some rather curious musings on the subject by the RCN's Naval Historical Section in 1961 who took it as their authority to conclude that *Rainbow's* original armament had been reduced “by the time she commenced her Canadian service” with the replacement of her 4.7-inch and 6-pounder guns by four 12-pounder guns.⁶⁷ The section also assumed that her original torpedo tubes had all been internal tubes, which had subsequently been sealed off and replaced by “more up-to-date upper deck” tubes. In fact it is more likely that the port and starboard tubes that remained to *Rainbow* in 1910 were the remainder of her original equipment firing thoroughly obsolete torpedoes.⁶⁸

Finally, *Rainbow* was never fitted with 4-inch guns, contrary to the data provided in a number of references, and it is not obvious how such an impression could have been gained. A number of her sister ships were so equipped in lieu of their 6-inch and 4.7-inch guns after they had been converted to minelayers after 1907 – a fate, however, that did not befall *Rainbow*.

The bottom line is that only a modest attempt had been made to ensure that *Rainbow's* armament had been updated to meet her needs as a training cruiser in 1910. Most of her systems were certainly obsolescent by the time that Canada acquired the ship and no significant attempt was made to update them while she was in Canadian service. Finally, her 4.7-inch battery was not removed when she was acquired. That only happened when she was decommissioned in 1917 and, at that, it was these guns that went to continue the war in the Atlantic – a distant war that *Rainbow* was too worn out to join.

⁶⁵ Tucker, *The Naval Service of Canada (I)*, 266.

⁶⁶ *Ibid.*, 280.

⁶⁷ DHH, “Brief History of HMCS *Rainbow*, 4A.

⁶⁸ Indeed had the Naval Service wanted to update her for the purpose of providing torpedo training relevant to the destroyers that Laurier intended to buy for his operational fleet, they would have provided destroyer type tubes capable of firing 18-inch weapons. This would also have provided a degree of commonality with *Niobe*, which was equipped with 18-inch torpedoes for her submerged tubes.