
FIGURE 3. **A 1894 Mark X packet.**


FIGURE 4. **A 1895 Mark X Packet.**


**FIGURE 5. An Australian CAC 1985 Packet made for the Government of New Zealand**


**FIGURE 6. A 1896 Mark X packet.**


**FIGURE 7. A 1897 Packet of unspecified mark**


**FIGURE 8. A 1900 Packet of unspecified Mark.**


**FIGURE 9. A 1900 CAC 'repacked' packet of English Eley Brothers Mark III rounds.**

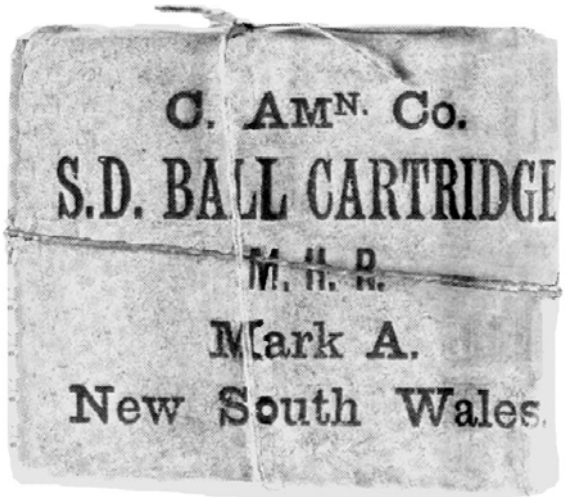


**FIGURE 10. An Undated Mark A packet made for the New South Wales Colony.**


**FIGURE 11. An undated Packet of Mark A made for the Colony of South Australia.**

# Chapter 11: *CAC .303 Mk.VI packets.*

*Images of CAC .303 Paper wrapped packets*

CAC and Ammunition Factory Footscray, produced paper wrapped ‘bundles’ of .303 from initial production in 1900 through to the late 1930’s. This form of packaging was intended to provide a means of filling the ammunition pouches in vogue before and through the WW1 period but superseded by carton and charger loaded packaging by WW2. As can be seen from the following examples, waste was something to be avoided and re-use of out of date packaging was achieved by selective alteration of the ‘obsolete’ information by ‘over-printing’.


FIGURE 1. A string tied packet of CAC 1903 .303 Mark II production


FIGURE 2. CAC 1904 .303 Mk II wrapper converted from a 1903 wrapper.


FIGURE 3. A CAC 1904 .303 Mk VI wrapper converted from a MK II one.


FIGURE 4. A CAC 1906 Mk VI .303 Wrapper


**FIGURE 5. A CAC 1908 .303 MK VI wrapper converted from a 1907 wrapper.**


**FIGURE 6. A CAC 1909 .303 MkVI wrapper.**


**FIGURE 7. A CAC 1912 .303 MK VI wrapper. Note the inclusion of 'cordite' into the symbol**


**FIGURE 8. A CAC 1915 .303 Mk VI paper wrapped packet**


**FIGURE 9. A CAC 1916 .303 MK VI paper wrapped packet**


**FIGURE 10. A CAC 1917 .303 MK VI paper wrapped packet.**


**FIGURE 11. An unusual wrapper in that the date is rubber stamped on to the wrapper rather than being pre printed. The contents are indeed 1-13 MK VI Australian rounds. This form of wrapper may have been used to 'repack' ammunition at some later date.**

# Chapter 12: .303 Mk.VII paper wrapped packets.

*Images of .303 paper wrapped packets.*

From 1918 to 1920, CAC produced paper wrapped 'bundles' of .303 Mk VII as well as the other forms of packaging. In 1921 with Commonwealth Government managing the site the identification of these wrappers began to change. As can be seen in the following graphics, the marking on wrappers changed from CAC to SAAF to MF then 'arrow F'. On full Government ownership the MF identifier was subsequently used.


**FIGURE 1. A CAC 1920 Mk VII .303 Wrapper**


**FIGURE 2. CAC 1920 Mk VII wrapper overstamped 1921 SAAF**


**FIGURE 3. MF .303 Mk VII 1921 paper wrapped packet. Although the wrapper carried the MF identifier the cartridges were headstamped SAAF**


**FIGURE 4. A 1922 Mk.VII packet. Although the wrapper carried the MF identifier the cartridges were headstamped SAAF**


**FIGURE 5. A 1926 packet carrying the 'arrow F' marking.**

# Chapter 13: *CAC .303 Headstamps (1906-1926)*

## *Photographs of .303 Headstamps (1900-1926)*

The following photographs give the actual headstamps of CAC-Ammunition Factory Footscray .303 production rounds from the Mk.II variants , the early Mk. VI undated type and the month dated Mk. VI from 5 06 ( May 1906) and the Mark VII month dated rounds from 2 18 ( Feb. 1918) until December 1926 . Specimens in collections would indicate almost all month - year combinations were made from May 1906 through to December 1926 with the possible exception of the first months of 1921 being the start of the Government Leasing period. The use of 'C' in the early Mark II rounds and Mark VI rounds up to November 1908 denotes 'cordite' propellant. The 'C' was dropped from headstamps in December

1908. The introduction of primer lacquering in August 1918 followed on the UK introduction a year or so earlier.

**FIGURE 1. CAC Cartridge examples of early .303 Mk II and undated Mk VI (lower 2 rows) and month year dated examples from May 1906 to March 1909 ( row 3 from bottom to top).**

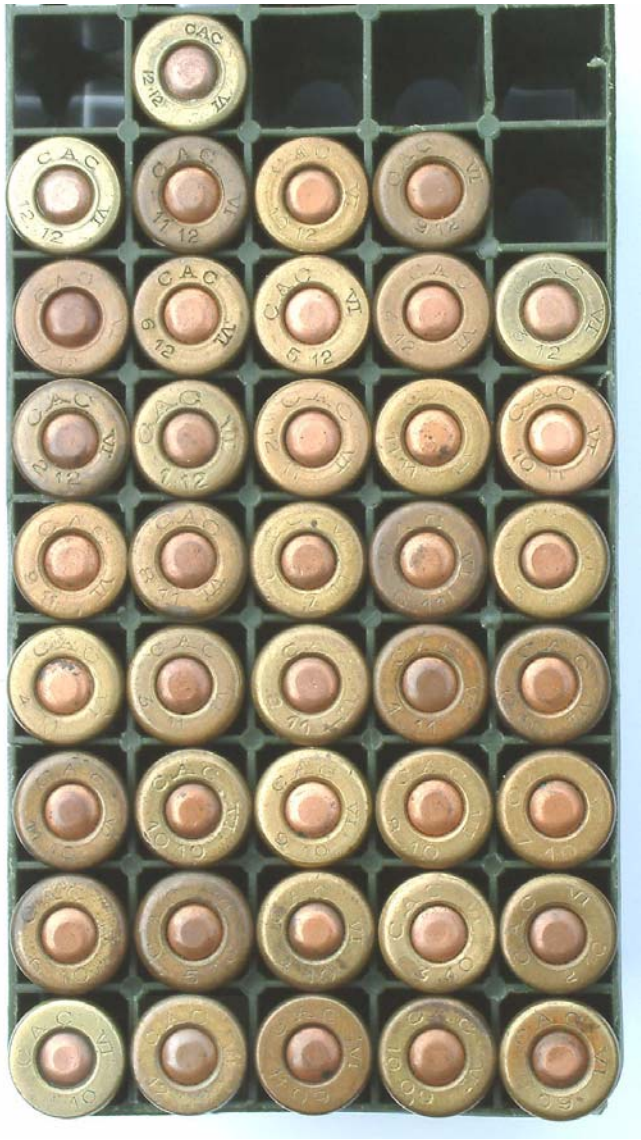

FIGURE 2. CAC .303 Mk VI month-year dated headstamps from Sept. 1909 to December 1912

**FIGURE 3. CAC .303 MkVI month-year dated headstamps Jan. 1913 to December 1915**

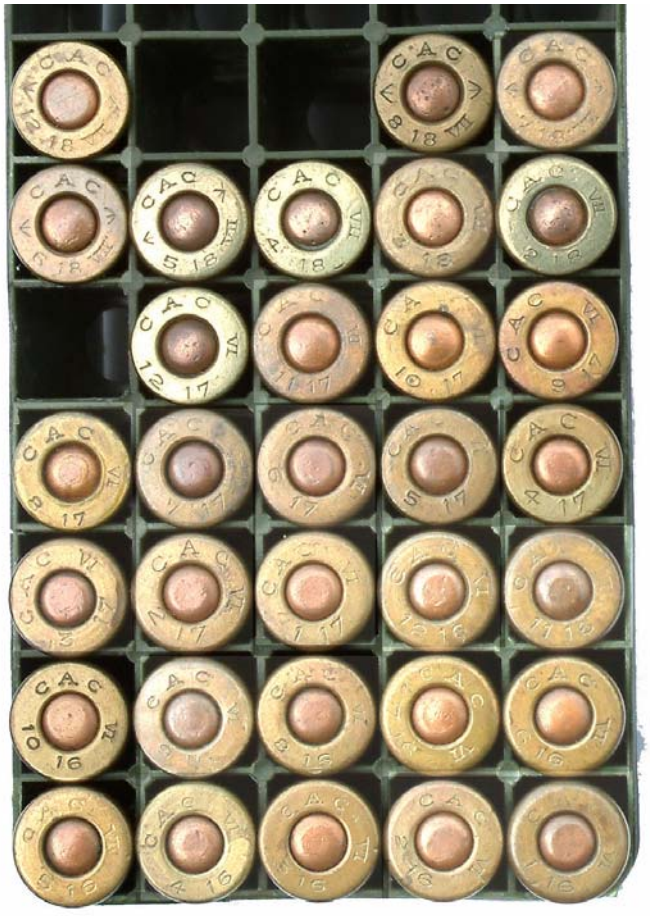

**FIGURE 4. CAC Mk VI and Mk VII month dated headstamps Jan. 1916 to December 1918**

The change from Mark VI to Mark VII on February 1918 and the introduction of the 'crows feet' or arrow-heads into the headstamp in May 1918 is also illustrated in figure 4.

FIGURE 5. CAC - SAAF .303 Mk VII headstamps Jan. 1919 to Dec. 1922.

**FIGURE 6. SAAF - AF - F -MF transitional headstamps Jan. 1923 to December 1926.**

Figures 5 and 6 show the transition from the CAC headstamps which ceased on December 1920. With the Government leasing arrangement taking effect from the first of January 1921 the headstamp was changed to SAAF. On January 1924 the headstamp was changed to AF although for some unknown reason both the SAAF and AF headstamp was used in March 1924. In March 1925 the headstamp was again changed to ‘F’ then in May 1926 to ‘MF’. This format was to remain until 1936 as can be seen in the next chapter.

# Chapter 14: *Footscray .303 Headstamps 1927 -1962*

## *Photographs of .303 'MF' Headstamps (1927-1962)*

As can be seen in previous Chapter, the MF headstamp was introduced in May 1926. It continued on in this format until August 1937 after which month-year dating was abandoned in favour of year dating only. As mentioned elsewhere, the WW2 years saw the introduction of additional plants and new headstamps MG,MH,MJ,MQ and MW. These will be dealt with elsewhere however it should be noted that for a short time in 1940 the MF plant commenced using MF1 to distinguish itself from the No2 plant which had launched production with MF2. These arrangement were cancelled and MF

was restored to the No1 plant and MG to the No2 plant. The No1 plant was closed in 1945 so no further MF headstamps were used until 1949 when the wartime time No2 plant which by this time was the only operating plant, adopted the MF identifier and discarded the MG one. The following figures give examples of .303 cartridge headstamps from 1927 to the last production in 1962. Note that in figure 3 the change from month-year format to year only format is shown at 8-36 i.e. August 1936. Also note that no MF rounds were made in 1946 to 1948 inclusive as production was being carried out at the No2 SAA plant which was still using the ‘MG’ identifier.

**FIGURE 1. MF .303 Headstamps from Jan. 1927 through to December 1930**

FIGURE 2. **MF headstamps for the period January 1931 - December 1934**

**FIGURE 3. MF .303 headstamps for the period January 1935 to 1962**

# Chapter 15: *Air Service Ammunition*

## *CAC starts work on Airservice Ammunition*

Shortly after the Commonwealth had acquired control of CAC via it's leasing arrangement, work commenced on a range of 'new' deliverables required by the Defence Department. One of these requirements was to produce ammunition for aircraft mounted machine guns[1]. By 1926 quantities of Airservice ammunition were submitted for acceptance to the Inspection Group. In a report to the Munitions Supply Board for the year ending June 1926, The Inspection Group reported 'ammunition manufactured at the Small Arms Ammunition Factory was submitted for inspection and proof ... included in this was

1. Reference 3 July 1922-June 1923 Annual Report page 28

a special class of ammunition for the Air Force, manufactured for the first time in Australia.'[2] Packets of Airservice Ammunition made by Footscray in 1926 contain cartridges with normal headstamps. Special headstamping was adopted in 1928 and samples are given later.

WW1 aircraft and those of the 20's and early 30's normally had the guns mounted on the fuselage in front of or near the pilot for ease of aiming and for the clearance of jams or other malfunctions. This almost always resulted in the line of fire passing through the propeller arc and this required linking the permissible firing opportunities to periods when the blade was 'out of the way'. This was achieved through connection of the gun firing mechanism to the propeller shaft but also required use of ammunition of standard and uniform firing characteristics. Delayed ignition, hangfires etc. could result in projectiles striking the propeller with damaging results.

2. Reference 3 1925-1926 Annual Report Page 7,

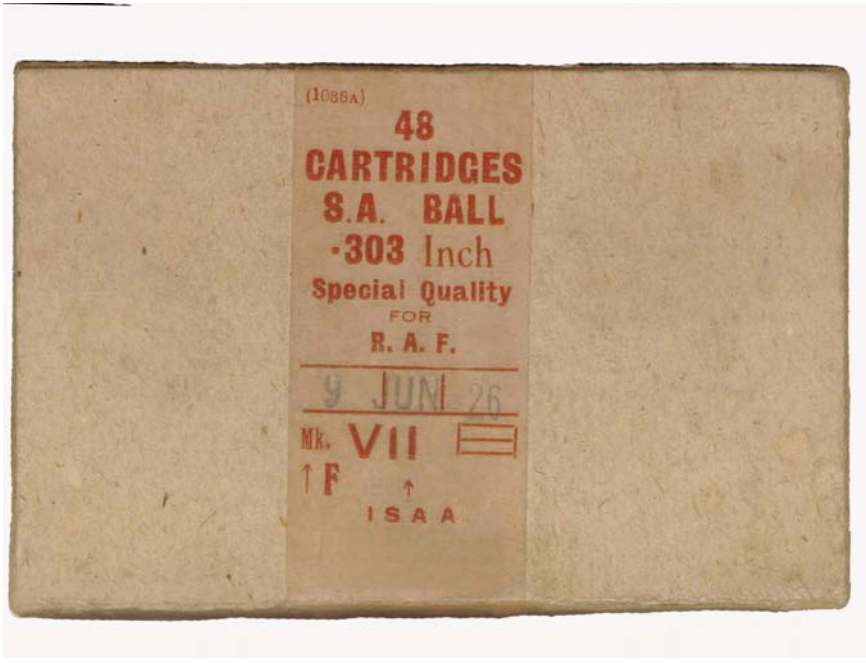


**FIGURE 1. A Packet of June 1926 Footscray made 'Red Label' .303 Ball ammunition illustrating the 'Red Printing" and the 'Special Quality for R.A.F' statement.**

## *Air Service Ammunition Testing.*

The Footscray Factory adopted testing methods as described in the following passage taken from the British Text Book of Small Arms 1929 pages 259-261.

"Although it is not correct to say that the ammunition referred to under this heading is specially designed, all types of ser-

vice ammunition which are used by the Royal Air Force in controlled guns are made in two grades, and in the case of the Air Force or " Red label " ammunition, as this grade is called from its characteristic label, particular attention is paid to immunity, from hangfires, misfires and functioning defects in machine guns.

The term " controlled gun " refers to a machine gun mounted in an aeroplane, and arranged to fire between the blades of the propeller along the axis of the aeroplane only. Should a bullet hit a propeller the result would be most serious, and the gun is controlled. therefore, so that it can only fire when the propeller blades are not passing the muzzle. The controlling mechanism is hydraulic, and actuates the trigger of the gun by mean of impulses or energy waves, generated by a cam connected with the propeller shaft, and transmitted to the gun through a liquid contained in a tube. After the impulse is imparted to the liquid, a certain time elapses before the bullet passes the propeller, during this time the propeller blades rotate to an extent depending on the rate of revolution. At best the time lag cannot be reduced much below twelve-thousandths of a second, and a propeller revolving at 800 revolutions per minute would during this period rotate about 57°,

whilst at 1,600 revolutions per minute the rotation would be about 115° and so on.

The necessity for immunity from functioning defects in a machine gun is fairly obvious, as it will be realised that stoppages during an aerial engagement would be very serious, and owing to the inaccessibility of a machine gun in an aeroplane whilst in flight, any failure such as a separation might put the gun out of action until a landing could be effected .

## *The Test Method*

Red label ammunition is accordingly most carefully inspected, and any which is not of really first-class quality is ruthlessly rejected. During proof the ammunition is required to pass a special test to verify that it is immune from hangfires. This test approximates very closely to the actual conditions obtaining in an aeroplane. A Vickers gun is used, controlled by an actual timing gear, actuated from a shaft driven by an electric motor. On the shaft in place of a propeller is mounted a steel disc on which are arranged two cardboard targets diametrically opposite to each other. The disc is rotated at a constant speed of 1,200 revolutions per minute,

and the posit ion and grouping of the shots is recorded on the targets. The gun is mounted so that the bullets pass at a radial distance of 14 inches from the centre of the disc, and it is required that all shots but one should be within an arc of 4 inches in length, and all shots within an arc of 6 inches. A 6-inch arc at this speed is equivalent to a variation in time lag of about three and a half-thousandths of a second, but in practice all shots but one are usually much closer than this. Special provision is made for one shot to be slightly later than the remainder, because the action of the timing gear is such that the first shot of any series is sometimes 2 or 3 inches behind the others and this abnormality is not the fault of the ammunition.

Actually all ammunition of the types in question manufactured under peace time conditions is up to Red Label standard of quality and there is no real difference in quality between the two grades when the ammunition is new. Owing to the fact however.that immunity from hangfires is largely dependent on caps and that any deterioration in the caps might make such ammunition unsuitable for else in controlled guns, a proof of each batch of Red label ammunition is taken annually and tested for hangfires. whereas this is not the case for ground service ammunition.

Any batch of Red Label ammunition which fails at this annual hang fire test is relegated to ground service.

For purposes of identification the bases of cartridges made for the Royal Air Force for use in controlled guns are stamped with all four figures of the date thus, “ 1918" whereas ammunition for ground service is stamped with the last two figures only thus “ 18." Ammunition containing all four figures of the date will, however, be found among ordinary stocks, as batches made for the Royal Air Force but rejected for that service are from time to time accepted for ordinary stocks, provided their quality is suitable.

Red Label ammunition is packed in 48-round cartons, which are enclosed in a. tin-lined wooden box. Two types of box are in use, one containing 26 cartons and thus holding 1,248 rounds, and the other containing two tin linings. each holding 8 cartons. or a, total of 768 rounds per box. Ammunition for use in controlled guns is labeled with a special red label, characteristic to ammunition up to Red Label standard, and all labels on the box and linings, and the wrappers closing each carton, contain the inscription “ Special for R.A.F.,” all labels except the distinguishing labels being printed in red. “

*Changes to Air Service Ammunition.*

In September 1931, The Secretary of Defence ( Air Board) in Melbourne, was forwarded information on work being done in England to investigate the problems which has arisen with erosion damage to aircraft propellers caused by the glaze-board (a type of dense cardboard) wad over the cordite charge in .303 ammunition. This information detailed the testing of specially prepared batches of ammunition with a range of different over cordite wads including strawboard, cotton cloth and omission of the wad altogether. Strawboard was rated satisfactory from these tests and a batch was submitted to service trials with favorable results . The 'Committee of Small Arms' then recommended that 30,000 rounds be prepared with strawboard wads and fired against service ammunition. The Secretary Department of Defence on forwarded this information to the Secretary Munitions Supply Board. England adopted the strawboard wad for airservice ammunition as a result of the trials and Australia followed shortly thereafter.

## *Disintegrating Link Belts for Airservice Machine Guns.*

In the early 1930's Small Arms Factory was tasked with the manufacture of the Air Service pattern .303 Vickers machine gun in left and right hand feed configuration. The Ordnance Factory Maribyrnong was given the task of producing the links.

**FIGURE 2. An example of Vickers link belt showing Mk III links which were made at OFM.**

FIGURE 3. **A small length of .303 Browning Link Belt.**

WW2 saw the Vickers aircraft mounted guns replaced by Browning designs. The link belts for these guns are a shown above. These links were also made at Ordnance Factory Maribyrnong for supply to SAA factories.

## *Green 'Red Label' Ammunition*


**FIGURE 4. An armour piercing packet dated 25 October 1938 , has no 'red label' despite being designated "Special for RAF" but instead carries the AP colour green. The cartridges are headstamped MF 1938 W1 as per airservice requirements.**

## *Standardisation of all Ammunition to AS requirements.*

In 1940 when all ammunition was standardised to air service requirements, a common over cordite wad and headstamp comprising the 4 digits of the year of manufacture was used.

This was changed again in 1944 when all headstamping reverted to the last two digits of the year of manufacture.


**FIGURE 5. A 1928 Footscray made Airservice ball round.**

In 1940 it was decided that all 303 ammunition should be standardized to air service requirements consequently straw-board wads were then universally used.


**FIGURE 6. Headstamps of Footscray made Air Service .303 ammunition from 1930 -1939. Note variations in layout and format in the 1930 and 1937 specimens**

# Chapter 16: .303 Incendiary Ammunition

## *Interest in Incendiary Manufacture.*

The first documented interest in incendiary ammunition manufacture is found in the Munition Supply Board Annual Report for the year ending June 1923 where in it notes that the Munitions Research Laboratories carried out an investigation into the manufacture of incendiary and armour piercing ammunition for its consideration.[1] By 1922 the English had settled on an incendiary design after numerous types were evaluated during WW1. A Mark IV 'Buckingham' design with a white phosphorus filling and with a distinctive stepped bullet had been adopted circa 1920 and was to remain in service

1. Reference 3 1922-1923 Annual Report page 11.

until the beginning of WW2. The MSB apparently decided against incendiary manufacture possibly due to the rather complex and costly projectile and the limited perceived requirement.

## *A dedicated WW2 incendiary factory*

A requirement for local production of .303 incendiary ammunition for airservice use, was identified early after the outbreak of WW2. At this time the British were still manufacturing the 'obsolescent' Mark 4 white phosphorous incendiary but were experimenting with other improved designs. A mark 5 design had been discarded in the late 30's and work was proceeding on a mark 6 projectile. This variant used an incendiary mixture ignited by the force of impact rather than the 'flammable in air' white phosphorus material. The Mark 6 bullet was closed at the base with a screwed plug which under some situations would separate on firing causing damage to the aircraft firing it. A modified Mark 6 design with a pressed base plug and disk and other minor changes became the Mark 7 design to be ultimately manufactured in Australia. The Mark 7 incendiary projectile arrangement is shown below.

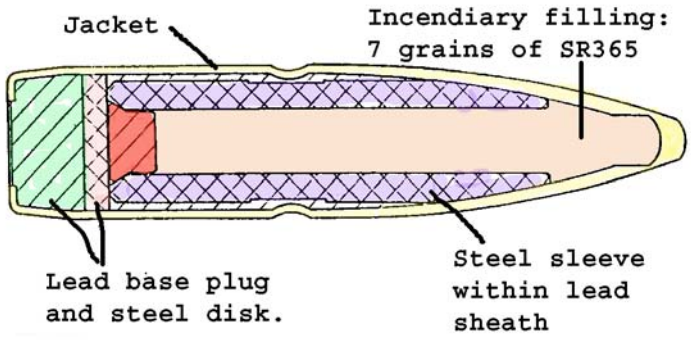


**FIGURE 1. .303 Mark VII Incendiary projectile construction details**

The Munitions Supply Board had schemes prepared for a new incendiary plant to be built alongside the Hendon plant in South Australia. This plant was sometimes referred to as the “Incendiary Annex”.

Two schemes were drawn up on Drawings X31856 dated 9-9-40 and Y31891 dated 10-9-40 which differed mainly in the 'standoff distance' of the incendiary facility from the Hendon plants. In October 1940 the Munition Supply Board, reported that the plant for .303 incendiary cartridges, to have a capacity of 8 million rounds per year, was at the planning stage.

## *Incendiary deliveries*

In the “Australian Munitions programme - December 1940" , .303 incendiary ammunition was shown as having 3 million rounds on order but zero produced as at that date. The plan for 1941 showed production expected to commence in March 1941. A similar Report issued in September 1941 still showed nil produced to date but with production expected to come on line by December 1941 and reaching an annual rate of only 1.5 million by July 42. The report to the Munitions Board in August 41 stated that the Incendiary Buildings were nearing completion with plant soon to be installed.

The relationship of the plant to the Hendon No3 and No4 plants is shown on the Hendon site plan given in Chapter 6. It can be seen that the incendiary facility is adjacent to the No4 plant (MJ) and has only buildings designated to perform 'filling' and loading operations on the incendiary components. The metal components were made at the nearby Hendon case and bullet shops. The Munition Board Reports do not elaborate on the apparent delays to their plans. It would appear however that the delays in delivery resulted in the No1 and No2 SAA plants at Footscray being tasked with

assisting with the incendiary programme by commencing manufacture of the B Mark VII in parallel with Hendon.

**FIGURE 2. An English Mark IV stepped projectile incendiary shown below a blue tipped Hendon Mk VII incendiary round.**

Some 1942 dated Hendon cartridges were headstamped as Mark 4 incendiary i.e. “MJB 1942 BIV “but loaded with Mk7 ball projectiles suggesting perhaps a last minute change away from the aging design of the BMk.IV white phosphorus filled projectile to the latest BMk.VII projectile. Some 1942 ball cases headstamped MJ1942 VII may also be found as incendiary loads. Production of BMkVII incendiary rounds commenced in 1942 and continued until 1945. It is interesting to note that the early BIV cases mentioned above were head-stamped “MJB” as the Factory identifier but this was dropped in favour of “MJ” on the BVII rounds although 48 round

cardboard packets continued to carry a paper label with "MJB" as the factory Identifier.


**FIGURE 3. A 48 round packet of Hendon made incendiary .303 Mk BVII of 12/2/1944. Note use of MJB identifier on packet label.**

## *Test Firing of Incendiary Ammunition*

The overall site plan for Hendon shows the incendiary test firing range along the southern boundary. A similar incendiary test range may be found only on the No1/No2 Factories site layout at Footscray. The design drawing numbers for the Footscray Incendiary "Target" and "Observation Hut" were Y52205 and Y52207 respectively and dated October 1942 .

Acceptance firing of incendiary ammunition consisted of an accuracy test ( 70% to fall within a 5 ft. circle at 500 yards) and an observation of the incendiary effect. The incendiary effect was watched from a special observation 'hut' placed adjacent to the incendiary target and stop butt. ( Building numbers 190 & 191 on Footscray layout Drawing W-89504 and item 80 on the Hendon layout in Chapter 6)

In December 1942 testing at Footscray ran into problems with bullets breaking up on firing. The fault was determined to be problems with irregular depth of seating of the steel sleeve within the jacket, sometimes weakening the jacket to allow it to breakup under the stress of firing. As a result, changes were made in both Australia and England to delete the lead sheath around the steel sleeve and to thicken the steel sleeve and modify it's nose angle.

## *Footscray exits the incendiary programme*

Records viewed at Footscray indicate that unfilled BVII projectiles were being made there from early 1942 at a rate of about 100,000 per week and on forwarded to Explosives Factory Maribyrnong for filling and return for loading into cases. Correspondence dated 1/6/1942 advised that 961,787

Footscray projectiles were shipped to Hendon. Later correspondence dated 3/6/1943 from EFM indicated that 4,492,252 projectiles had been filled to that date and returned to AFF with 281,571 having gone to SAA No1 ( MF) and the balance to SAA No2 ( MG). In September 1943, correspondence from Footscray to Hendon indicated Footscray had ceased production on the incendiary programme and offered Hendon the surplus stock of 675,000 projectiles, 336,000 envelopes and 181,000 cups. The offer was accepted and these were subsequently forwarded to Hendon. Incendiary Production at Hendon ceased in 1945.

## *Incendiary Headstamps*

Examples of typical Footscray and Hendon headstamps are shown below


**FIGURE 4. An early No1 plant (MF) incendiary round. A similar format MG 1942 and MH 1942 incendiary rounds are reported**


**FIGURE 5. An example of MJB 1942 BIV headstamped case usually found as Mk 7 ball loads.**


**FIGURE 6. An example of MJ 1942 BVII incendiary round headstamp. These rounds carried blue tip markings and blue primer lacquer**


**FIGURE 7. Example Headstamps for 1944 and 1945 Hendon incendiary production.**


**FIGURE 8. Examples of the No2 Plant (MG) incendiary headstamps.**

# Chapter 17: *Armour piercing .303 Ammunition*

*MSB considers manufacture of AP ammunition.*

The first documented interest in armour piercing .303 ammunition manufacture is found in the Munition Supply Board Annual Report for the year ending June 1923 where the report notes that the Munitions Research Laboratories carried out an investigation into the manufacture of incendiary and armour piercing ammunition for its consideration.[1]

1. Reference 3 1922-1923 Annual Report page 11

The first deliveries of locally made .303 AP occurred in the 1933-1935 MSB reporting period.[2]

WW2 production of .303 A.P. ammunition was carried out at the SAA No1 plant and at Hendon No 3 plant.

In the December 1940 MSB report on ammunition, the total forecast for .303 AP was only 7,250,000 with the current production running at only 1,000,000 for the whole of 1940. By September 1941 the forecast had lifted to 17 million with actual production running at only 106,000 per month. A side note on the report said " Increased production being arranged'.

Actual final production figures are unknown but data viewed at Footscray indicated the pacing factor at that plant was the production of the hardened steel cores. A Footscray report dated June 1941 indicated that their production was running at 300,000 cores per month with a target of 2 million per month to be reached by March 1942.

As mentioned previously, by July 1942 the Minister of Munitions was looking at cutting back on SAA production generally . In correspondence to the Prime Minister John Curtain

2. Reference 2 1933-1935 Annual Report page 10.

on July 6th 1942 the Minister states " ...a demand from the Eastern Group amounting to 120,000,000 rounds .303 Armour Piercing Ammunition which may not be required now if the example of the Australian Forces is to be followed." Footscray discontinued .303 AP production in early 1943 with Hendon (MH) also ceasing production in that year.


**FIGURE 1. Headstamp markngs of Footscray made .303 AP showing examples 1935-1943**


**FIGURE 2. An example of Hendon 1943 .303AP production headstamp.**

# Chapter 18: *Tracer Ammunition.*

## *Experimental Manufacture*

Australian production of tracer ammunition was initiated by the Munitions Supply Board in the 1922-23 financial year.

The Munitions Research Laboratories reported in the 1922-23 period that it was carrying out the 'experimental manufacture of .303 tracing ammunition and the mixing of tracer composition.'[1] The Inspection Group reported for the same period that it was 'testing tracer mixtures for aircraft ammunition'.[2]

1. Reference 3 1922-1923 Annual Report page 8.
2. Reference 3 1922-1923 Annual Report page 13

In 1923 -24 the Laboratories reported 'further experiments on tracing compositions and methods of mixing'[3] The Inspection Group reported 'test firing of experimental tracer ammunition'[4]. In 1924-25 the Ammunition Factory reported 'further experimental work on tracer ammunition'[5]and the Laboratories made reference to a special report on the 'Manufacture of Tracer Ammunition' prepared for the Munition Supply Board[6]. The Factory reported in the Confidential Annexure to the Annual Report of the MSB for the year ended 1926, that "tracer ammunition has been produced in very small quantities and results are satisfactory as far as can be judged by small scale experiments".

It should be noted that the British had gone through a range of developments of .303 tracer ammunition in WW1 and a design originally known as "Cartridge, Tracer, S.P.G. .303 Cordite Mark VIIG." introduced in 1917 continued into the 1920's. The British continued to mark this tracer round as 'VIIG' until 1928 after which they used the 'G1' identifier. It is

3. Reference 3 1923-1924 Annual Report Page 6.
4. Reference 3 1923-1924 Annual Report Page 9
5. Reference 3 1924-1925 Annual Report Page 10.
6. Reference 3 1924-1925 Annual Report Page 6

not known how the early Australian Tracer rounds were identified but 1931 samples were marked 'MF 1931 G1'.


**FIGURE 1. Examples of Footscray and Hendon Tracer Headstamps showing early 30's examples and the change from GI to GII marks in 1941.**

The Footscray factory continued to make the G1 tracer until 1941 during which a newer design, the GII, was introduced. The GII had been introduced in Britain in 1939.

As at September 1941 , total production of .303 tracer was running at only 150,000 per month, but was planned to lift to 1,000,000 rounds per month by January 1942 and hold at that rate until mid 1943. There was a total forecast requirement of 46 million rounds as at September 1941 a considerable increase on the total forecast of 12 million as at December 1940

Footscray ceased production of .303 tracer in 1943.

Production of the GII type was also carried out at Hendon in 1943 and continued until site closure in 1945.


**FIGURE 2. A Mark GIIZ tracer marked 'MS" loaded at the Explosives and filling factory at Salisbury.**

A 'special' batch of tracer ammunition with nitrocellulose propellant in lieu of cordite was made in South Australia in 1944. This was an unusual batch as it carried the Salisbury Explosives Factory identifier "MS" These rounds were heads-

tamped ‘MS 44 GII Z’. It is understood that some 4 million rounds were produced. The metal components such as projectile envelope and cartridge case were made at Hendon but the filling and loading was carried out at Salisbury. Salisbury had dedicated buildings for .303 tracer activities. Drawing Y55002 dated 20 Jan. 1943, shows details of the '.303 case store and lacquering house (Building 51 in the Pyro section) ', while drawing Y62650 dated 15 November 1943 shows details of plant layout for 'Varnishing and Waterproofing of Cart. S.A., Tracer, .303 G MK II /L' in the Pyro Section. Advice from a former Quality Assurance Officer stationed at Hendon indicated that during acceptance testing of this ammunition, problems arose with premature consumption of the tracing compound with excessive muzzle flash. After retesting and various investigations it was decided that the entire batch be sentenced unserviceable and be destroyed.

The Hendon 1945 output was the last tracer produced within the defence factories until the Footscray factory undertook manufacture of 7.62 tracer in the 1960’s.

## *The F3 Tracer*

The Australian Defence Forces required a long range 7.62 tracer (1000yards plus) that was unfortunately not 'off the shelf'. In an attempt to achieve the requirement, a study was initiated to review the available overseas tracer projectiles and their performance. In 1961-1962 numerous trials were fired with these projectiles loaded into Footscray cases with various propellant charges. The end result of all of these trials lead to the adoption of a long 'blunt ogive' tracer bullet not dissimilar to the British .303 Mk. 8 tracer.

**FIGURE 3. The Footscray made F3 tracer with blunt ogive shown against similar shaped .303 English G8 tracer .**

The Mark 8 .303 tracer was a dark ignition type with trace from 110 yards +/- 40 yards to 1000 yards. The Footscray developed 7.62 tracer was designated as F3 . The 1967 pro-

duction of this round carried a red primer annulus and red bullet tip and the headstamp “MF 67 7.62” . From 1968 the cartridges were headstamped with the F3 designation i.e. “ MF 68 7.62 F3 “. The bullet form chosen engaged into the rifling of a standard barrel on chambering, resulting in the need to increase the lead on the barrels of the weapons intended to use this ammunition to avoid excessive chamber pressure. Unfortunately the 7.62 machine guns furnished with the German Leopard tank program were made for the more conventional bullet profiles and excessive chamber pressure problems were experienced in firing the F3 tracer from these weapons.

The logistics of trying to control the barrel lead on local and overseas supplied barrels and the difficulty in achieving the tracing range required, ultimately lead to the abandonment of the F3 tracer with last production taking place in 1972. Through this period Footscray was assembling mixed ball - tracer link belted ammunition for the M60 machine gun and much imported USA M62 tracer ammunition from Remington Arms Company was used in lieu of the F3 round

# Chapter 19: *Blank Ammunition*

From the beginning of production at the CAC site in Footscray in 1890, blank ammunition has been made for the military. As noted in Chapter 1, the Colony of Victoria alone had at that time a requirement for 300,000 rounds of blank Martini Henry ammunition annually.

## *.303 blank ammunition.*

With the introduction of .303 ammunition in 1900 , blank loadings were supplied. These blanks were made to the then current Mark V pattern which had 20 grains of sliced cordite size 20/SC with a strawboard wad pressed over the charge and

the mouth of the case closed with a ‘rosette’ crimp. Early CAC .303 blanks were loaded into unheadstamped cases or diverted ball cases. Production figures for 1913-1926 blank loadings are given in table 1 of Chapter 4


**FIGURE 1. A 1934 paper wrapped bundle of 10 MkV blank cartridges made at Footscray.**

The first correctly identified .303 blanks were supplied in 1933 and were headstamped MF 33 LV. ( L being the Code for Blank). .303 Blanks continued to be manufactured through to the end of WW2 with the wartime factories at Hendon and

Welshpool also making them from diverted ball cases and from cases specifically marked with the blank code. Footscray also made wood bulleted .303 blanks for use in Bren and Vickers machine guns which did not handle the shorter non-bulleted type satisfactorily. Examples of wood bulleted blanks loaded into ball cases dated 1944 and 1945 are believed to be Mark 7 blanks. Mark 7 blanks had wooden bullets with a hollow core containing oxidized copper dust sealed with a glued on paper disc. The bullet had a weight of 80 grains.The cartridges were loaded with 39 grains of cordite WT size 5/2 chopped into 0.045 inch lengths.

**FIGURE 2. From left to right : Early CAC .303 blanks with short and long mouth crimp in unheadstamped cases, a 1944 Footscray wood bulleted blank, the last of the Mark 5 blanks of 1956 and the Mark 9 type 1957-1960.**


**FIGURE 3. A packet of Footscray made L Mk. 9Z blanks made in 1960.**


**FIGURE 4. Correctly identified L Mark V Blanks made at the WW2 factories Welshpool (MW) and Hendon (MH & MJ) . Many blanks were also made from redirected ball cases**

**FIGURE 5. A Murray Switch case : Primed ball cases were prepared with specially slit necks to be used in the Switch Combination Aust. Mark 1**

While strictly not an item of small arms ammunition, mention should be made of a cartridge based on the .303 cartridge case and commonly called the Murray Switch cartridge. This was used as a triggering cartridge for a mechanism used in trip wires and the like. It consisted of a primed case with a T shaped slit cut into the neck as shown in figure 5. These were supplied by a number of the wartime factories. Cartridges made in 1942 were wrapped in bundles of 10 and the printed wrapper carried the words '10 Cartridges .303 inch Capped Cases for Switch Booby Trap Combination ( Murray ) Mark 1 Aust.' In 1945 the wrappers carried the words '10 Cartridges .303 inch Capped Cases for Switch Combination Aust Mark 1'. This device was used only by Australian troops.

Footscray stopped manufacture of .303 blanks at the end of WW2 but restarted Mark 5 production again in 1956 as a

Mark 5Z with nitrocellulose propellant in place of cordite. In 1957 the production was changed to the similar looking Mark 9Z type. The Mark 9Z blank used 14 grains of Ballistite as the charge but was otherwise identical to the Mark 5Z. Production of the Mark 9Z type continued until 1960

.

**FIGURE 6. This figure shows the headstamps of Footscray made L mark V blanks 1933 - 1956 and L mark 9 types made from 1957 to 1960.**


**FIGURE 7. A WW2 Packet of 50 L Mk V Blanks made at Welshpool W.A. in 1944**

## *7.62 Plastic Blank cartridges*

A German designed full length 'plastic' blank with metal head insert was put into 'licensed' production in 1961 designated L1A1. The cartridge had a brass head insert fitted into a black plastic body. The profile of the blank included the projectile form which had two grooves at right angles across the tip to rupture on firing. The plastic bodies were imported through an agent and the propellant was also imported.

The head insert was changed to aluminium in 1963 and the designation changed to L1A2. In 1964 the head was redesigned in brass with a deep extractor groove and given a Footscray Pattern number of F1. In 1966 the extractor groove was changed again and the pattern designated as F1A1. Part way through 1968 the head material was changed back to aluminium with no change in designation. Production continued in this form until 1982 when the designation was changed to F6. This blank had a poor service record with some weapons damaged due to the variability in the propellant and plastic bodies allowing blockage of the blank firing attachment with plastic fragments and unburned propellant . This in some cases lead to uncontrolled overpressure of the weapon and subsequent damage. The M60 machine guns were commonly damaged in this way.

**FIGURE 8. The evolution of the plastic blanks at Footscray with the 1961 L1A1 at left through to the F6 at right illustrating the changes to base material and form.**

## *Full length Brass 7.62 blank*

The need arose for a full length brass blank and a new cartridge similar to the English L10A2 full length brass blank, was produced in the mid 80's and given the F8 designation.

Production of the F6 blank continued in parallel for some time.

**FIGURE 9. Full length brass blanks : top Footscray F8 , bottom English L10A2**

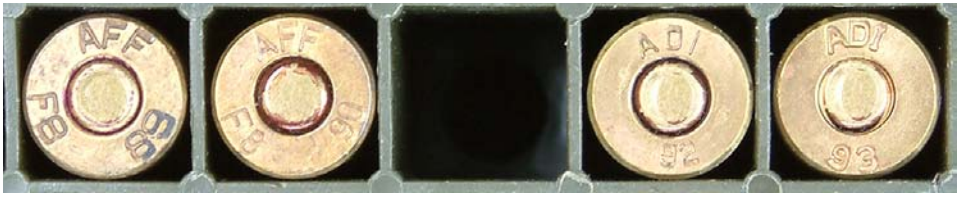


**FIGURE 10. Some typical headstamps of the F8 blank (1989,1990, 1992 and 1993) showing the AFF transition to ADI and the dropping of the F8 identifier from the headstamp in the early 90's.**

# Chapter 20: *.303 Cartridges for propelling grenades and other devices.*

*Photographs of .303 Grenade Launching Cartridges*

The Munitions Supply Board reported in their Annual Report for the period ending June 1926, that “at the present time experimental manufacture of cartridges, S.A. .303 rifle grenades, 30 grains ballistite, is being carried out”. It was also reported at that time that the Inspection Group were conducting experimental firings of rifle grenade cartridges. Figure 1 top specimen shows a 1926 rifle grenade discharging cartridge. The Mark 1 cartridge had its origin in WW1 where it was, from late 1917, used to project grenades from a discharger cup mounted to the muzzle of the SMLE rifle.

Production of the Mark 1 in Australia, ( designated from 1929 onward as H1Z, H being the code for rifle grenade cartridges and Z denoting nitrocellulose propellant) continued through to the end of WW2. The manufacture of the H1Z cartridges was transferred from the No1 to No2 Factory in 1943. Some examples are given in figures 2 and 3. Grenade cartridges were typically packed 14 to a small steel tin which carried a label or labels as shown in Figure 4. .

**FIGURE 1. Rifle Grenade and other discharger cartridges: from top : 1926 rifle grenade Mk 1, 1935 rifle grenade Mk 1, 1941 unknown type , and 1940 Smoke discharger cartridge E1T.**


**FIGURE 2. Some typical H1Z Rifle Grenade Cartridges made by the No1 Factory showing 1937, 1940 and 1941 specimens.**

In 1945 a requirement arose for Rifle Grenade cartridges Mark 4 . These were used to fire the No85 Anti-tank rifle grenade from a spigot attached to the muzzle of the SMLE rifle. Initial quantities of this cartridge were reported to be made with a wadded open mouth case.[1] Problems were experienced with the subsequent batch and after advice from England , the propellant was changed from chopped rod

1. Reference 4 Journal No.82 page 12

cordite WM.017-.019, to tubular cordite MDT 5-2 and the case mouth was rosette crimped. To distinguish this cartridge from the other types of discharger cartridges, it had the top and bottom third of its case stained black, the mouth closed by a rosette crimp and a red sealing applied to the crimp. It is shown in Figure 5 . It is also reported that the last batch of these cartridges carried the marking ‘HIV (Aust) ‘ in place of HIV.

The Central Drawing Office produced packaging stencilling drawings for this ammunition in August 1945. Drawing Y-73291 approved on 1/10/1945 indicated the Mk 4 Cartridge was to be used with rifle grenades M9A1, M19, T5, M17A1 and M22 fired from the No.1 or No.4 rifles only.


**FIGURE 3. No2 Factory (MG) Grenade cartridges H1Z made in the period 1943-1945**

In 1949 a limited production of the H Mark 2 cartridge was undertaken. Although carrying the 'H' code denoting rifle grenade cartridge, this round was in fact used as a line throwing cartridge by the Navy. It is shown in Figure 5.

When the Army introduced a new anti tank rifle grenade, the 'ENERGA' No.94, in the 50's, for use with .303 rifles, the propelling cartridges H Mark 7z were imported from Belgium and not made locally.


**FIGURE 4. Tins of H1Z cartridges: Left a No1 Factory product of April 1940. Centre and right, product from the No2 Factory (MG) made in March and August 1945, but carrying on the top right corner of the label the MY code of the filling factory Explosives Factory Maribyrnong. The right tin also has a visual identification label with the Spades symbol being the visual symbol for H1Z cartridges**


**FIGURE 5. The last of the Australian made .303 grenade cartridges. Top an unheadstamped Mk IV drill from 1945 , the 1945 Mk IV round and the 1949 Mk 2 cartridge.**

# Chapter 21: *7.62mm Cartridges for propelling grenades.*

*Photographs of 7.62mm grenade cartridges.*

The Introduction of the FN Self loading Rifle generated a requirement for a new grenade launching cartridge. Initial specimens appeared in the late 50's using ball cases as shown in Figure 1. The early types were designated as L1A2 but this was changed to F2 in 1967 as shown in Figure 2. The cartridges were packed in sealed metal 'food style' tins as shown in Figure 3. Smaller quantities of cartridges were 'encapsulated' within sealed foil backed paper packs as shown in figure 4.

**FIGURE 1. Grenade launching cartridges : From top un-blackened 1959 specimen using L2A2 ball case, then 1961, 1963,1964 and 1965 correctly identified L1A2 pattern with lower half of case dyed black.**

**FIGURE 2. Grenade cartridges : from top a 1967 L1A2 pattern, a 1967 F2 pattern then 1969 and 1971 F2 specimens and finally an unknown variant using un-blackened 1972 L2A2 ball cases. Note that the first 1967 F2 cartridges had the lower portion of the case blackened but this was changed to upper half blackened in later specimens**


**FIGURE 3. A tin of 15 Cartridges Grenade Rifle L1A2 of July 1963 manufacture. The 'key' attached to the top of tin was used to unwind the soldered seal on the lid to gain access to its contents. Note the similarity to preserved meat tins of the same period.**


**FIGURE 4. A paper/foil packet of 5 cartridges Grenade rifle L1A2 of 1965 manufacture.**

# Chapter 22: *Inert .303 Cartridges.*

## *Dummy and Drill Cartridges.*

Over the years a range of inert cartridges have been made in Australia. These have included ‘dummies’, ‘drill’ and other inert cartridges for specific applications.

The items made were intended for ‘personnel weapons training’, ‘weapons inspection’, or ‘setting machines or evaluation of ammunition related items such as chargers, links or packaging’. The first of the inert rounds was made by CAC, production details of which are given in Chapter 4 table 1. These items were referred to as ‘Dummy’ cartridges[1] one of which is

1. Reference 3 Annual Report 1924 page 12.

shown in figure 1 below. Wooden round nosed (prior to 1918) or wooden pointed bullets ( 1918 and later) were secured to a service cartridge case which had cross holes drilled through it for easy identification purposes. These 'dummies' generally followed the British Dummy, Drill Mark III (round nose bullet) or Mark IV (pointed bullet) patterns.

**FIGURE 1. .303 Drill Rounds : From top : A typical CAC era (1915) wooden bulleted Mark III drill, A 1924 Chromium plated Mk VI drill, A 1924 white metal Mk VI drill , A 1926 whitemetal Mk VI drill. a WW2 expedient drill Mk VIII and a 1940 whitemetal drill Mk VI**

Such examples may be found with headstamped MkVI ball cases or with cases carrying no headstamp, or Mark VII cases for the pointed bullet variant. The item shown above is dated by it's small primer pocket, a characteristic of 1915 production. After leasing of the CAC plant to the Commonwealth, work started on the production of white-metal cartridges for the production of 'dummy' and 'drill' cartridges.[2] Figure 1 shows whitemetal Mark VI fluted drills of 1924 and 1926 production and also a 'chromium plated' brass case fluted drill carrying an 'X' in the headstamp (to denote experimental variant ?) . The distinction between use of the terms dummy and drill seems to have been made in this period where drill is used for fluted specimens and dummy for unfluted items to be used for weapons verification. An example of an early whitemetal dummy is given in figure 2 below. As can be seen in the 1927 specimen, the item carries 'V' in the headstamp denoting Inspector Dummy Mark V pattern. In 1928 the British introduced a letter coding system for .303 ammunition. Drills were assigned the letter 'D' and Inspector rounds the letter 'U'. This can be seen in post 1928 specimens in Figures 1 and 2.

2. Reference 3 Report for period July 1924- June 1926 page14.

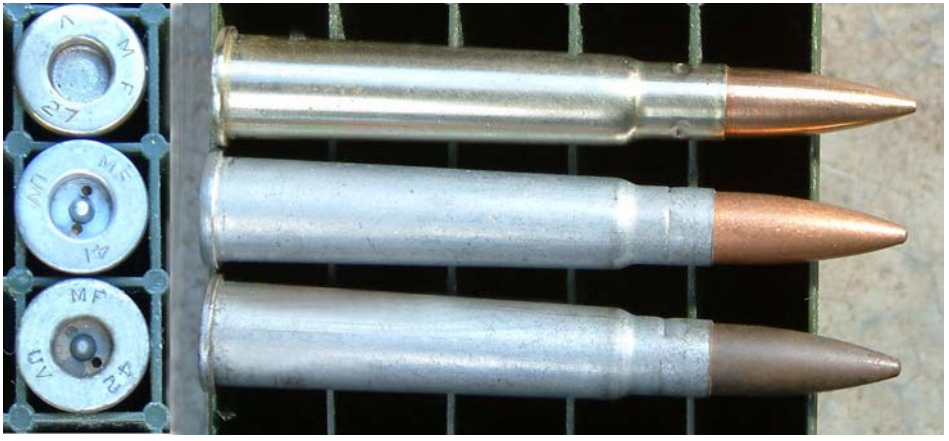

FIGURE 2. **Mark V Inspection Dummy Cartridges : From Top : a 1927 whitemetal case type. a 1941 tinned case UV and a 1942 tinned case UV specimen.**

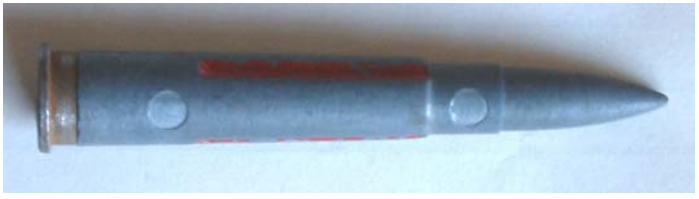

FIGURE 3. **A WW2 expedient drill made from die-cast alloy with steel rim. Designed at the Central Drawing Office Maribyrnong and detailed on Drawing Z-29691 dated May 1940. Officially described as 'Cartridge, S.A., Drill, .303 inch L.P. Mk 1.' (LP = Local Pattern)**

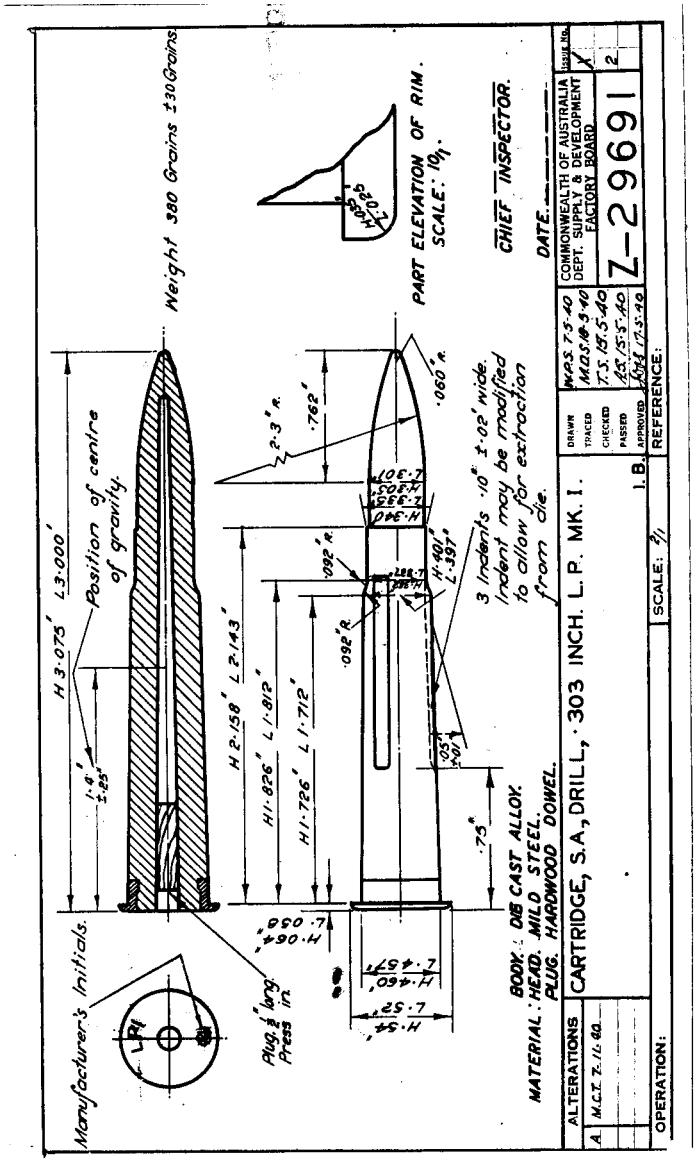


**FIGURE 4. The wartime diecast drill cartridge 'LP Mark 1" made by 'Diecasters Ltd'**


**FIGURE 5. No 2 Factory drills and dummies: From top : Unheadstamped Mk V inspection dummy, two more Mk V Inspector dummies made from surplus ball and Incendiary cases respectively, A Mark VI* fluted drill circa 1944 and a Chromium plated Mk 7 drill circa 1948.**

Whitemetal was used in the manufacture of the Inspector Dummy until WW2 where tin plated cases were used in lieu of whitemetal. Figure 3 shows examples of Inspector rounds made at the No2 Factory in 1943 using surplus cases suitably

tin plated. These may be found with both cupro-nickel and guilding metal projectiles.


**FIGURE 6. Post WW2 specimens : From Top : Improvised inspection dummy, two Mark 7 Chromium plated drills ( Naval Pattern ) and the last .303 drill made at Footscray ; the Mk 10 Chromium plated drill made in 1955.**

Toward the end of WW2, a batch of drills were made at the No2 factory and designated as Mark VI*. A sample is shown in figure 3. Strangely this round bears little resemblance to the British Drill Mark VI* pattern introduced in 1934 and which

had a chromium plated case intended for Naval use. Post WW2 saw the introduction of the Mark 7 drill, examples of which are given in figures 3 and 4. The Mark 7 was a chromium plated variant intended for Naval issue. The last batch of .303 drill rounds made in 1955 used the British pattern of the period which was designated as Mark 10. The differences between the Mark 7 and the Mark 10 were minor. The Footscray Mark 10 specimen is shown in Figure 4.

An unusual variant of the .303 inert cartridge is shown in Figure 5. This is not strictly a cartridge but more of a gauge for the checking of the geometry of Vickers or Browning machine gun disintegrating link belt components. The specimen shown carries the 'MF' identifier on the base and the words ' Links Belt Amm'n Mean Cartg.' on the side. It is made from ground steel.


**FIGURE 7. Links, Belt, Ammunition, Mean Cartridge.**

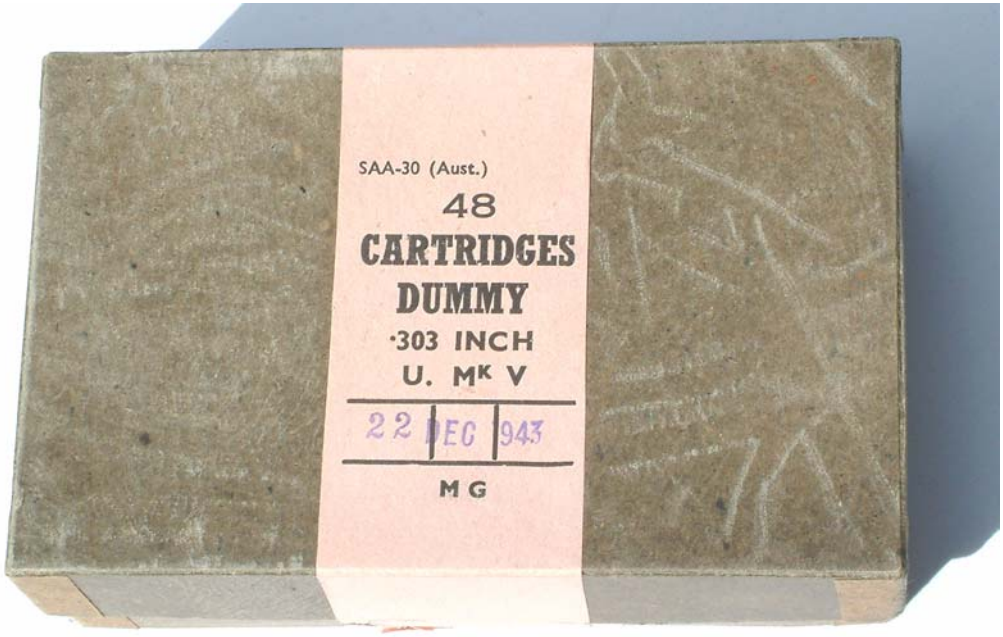


**FIGURE 8. A Packet of tin plated .303 U Mark V 'inspection dummies' made at the No2 factory in December 1943**

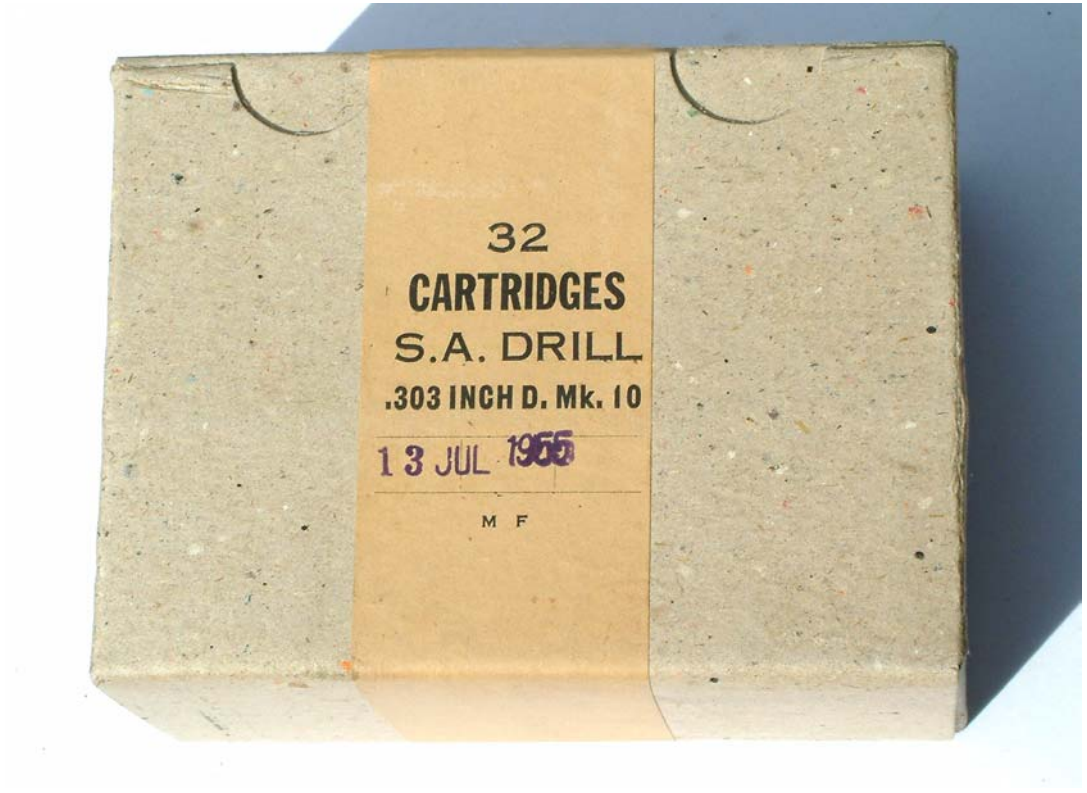


**FIGURE 9. A packet of 32 .303 Drill Mark 10 made at Footscray 13 July 1955.**

# Chapter 23: *Inert 7.62 & 5.56 Cartridges*

*Photographs of 7.62 & 5.56 Inert cartridges*

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**FIGURE 1. Early inert 7.62 cartridges : Top a 1956 tinned dummy made from L2A1 case, Bottom : a 1957 inert round made from a L2A2 case.**


**FIGURE 2. 1959 (top) and 1960 chrome plated dummies made from production ball cases.**

A range of inert 7.62 cartridges were made between 1956 and the termination of 7.62 manufacture by ADI in the late 1990's.


**FIGURE 3. Inert Dummies: Bottom 1961 specimen used by Defence QA and a black bulleted specimen of 1970 (purpose of blackened bullet unknown.)**

Some of the inert rounds were made for 'internal consumption' by Defence Quality personnel rather than for Military Service issue. Some items were made against export orders e.g. from Israel and the USA.

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**FIGURE 4. 7.62 inert rounds : at top two blackened M172 pattern circa 1969, a whitemetal L3A1 inspection dummy of 1973 and at bottom two chromium plated L3A1 dummies from 1979 and 1982 respectively.**

One of the all blackened cartridges shown in figure 4, carries the American M172 designation.

The whitemetal L3A1 inert round shown in Figure 4 was reportedly made for Israel

**FIGURE 5. Typical 7.62 fluted drill rounds From Bottom, 1959, 1961,1961,1964 and 1970 specimens**

Black primer inert rounds were used within the Factory in 'visitor' displays and also used by the Engineering Design Establishment (Army) to evaluate packaging durability and test

alternative materials etc. These rounds sometimes had an inert filling ( reported to be granulated sugar) to simulate the propellant loading. Black primer 5.56 inert rounds were also made up for display purposes. It is believed no formal 5.56 Drill or Inspector rounds have been made at Footscray or Benalla as at the time of writing.


**FIGURE 6. Inert non-bulleted 7.62 : from top a black primer inert F2 grenade launching blank, a F5 Drill Grenade Launching Cartridge and an inert F8 blank**


**FIGURE 7. A black primer inert 5.56 round made by AFF in 1988 for the Australian Industry Defence Exhibition in the early 90's**

**FIGURE 8. Black Primer inert 7.62 rounds : from top 1984 inert F2,1984, 1969 1965 and 1966 inert ball loadings.**

**FIGURE 9. A Blackened Projectile inert round made at Footscray in 1984 - purpose unknown**

# Chapter 24: *Ballistic Standard and Pressure Test (Proof) Cartridges*

Ballistic Standard and High Pressure Test cartridges are seldom seen outside of the Ammunition and Small Arms Factories as they are associated with the manufacture and acceptance of ammunition and of weapons respectively. The Australian ammunition factories manufactured a range of these items as detailed below.

## *Ballistic Standard Ammunition*

The 1928 Textbook of Small Arms describes Ballistic Standard ammunition as follows:- “Standard ammunition is very

carefully made up with specially selected components. Care is taken that the bullets are of uniform weight and diameter, and that the cases are of uniform capacity. The charges are very carefully weighed, and are taken from a batch of propellent which is known to be regular throughout, and which has been stored until its ballistic qualities have settled down and become constant. The loading is carried out with the greatest care, and in fact everything is done to ensure that the cartridges composing any one batch of standard ammunition are as far as possible identical in all respects. The outstanding requirement is uniformity, and the absolute values of the velocity and pressure obtained are of comparatively minor importance, provided that the velocities and pressures throughout the batch are as nearly as possible alike, and that their values are accurately known." Ballistic Standard ammunition provides a means of establishing the effect of equipment and atmospheric conditions on the results obtained of test firing production batches of ammunition . The pressure and velocity values of the Ballistic ammunition are known and a quantity is fired at the time of production testing. The difference in measured values of the Ballistic ammunition 'on the day' to it's known values gives the correction to be applied to the measured values of a production batch submitted for acceptance.  After measuring the production batch velocity

and pressure values, the adjustments established from the Ballistic Standard ammunition are made to the production values. The corrected values must then fall within the acceptance range. Ballistic Standard ammunition can also be used to compare the performance of equipment such as test barrels.

Australian .303 'standard' ammunition carried the unusual 'S' code in the headstamp with the earlier rounds having the 's' enclosed within a circle. As will be seen, Australian 7.62 'standard' cartridges continued with the 's' identifier into the 1970's. In the 1970's the process of specially manufacturing standard ammunition was abandoned in favour of selecting a normal production batch of ammunition of high uniformity to be used as a 'defacto' standard. Specially marked standard ammunition thus disappeared from the scene in the 1970's


**FIGURE 1. Examples of .303 Ballistic Standard rounds showing a June 1944 specimen from the No 2 plant ( top left) , a June 1940 specimen from the No 1 plant ( bottom left) , a 1958 specimen ( top right) and an 'early' October 1925 specimen ( bottom right.)**

Standard .303 ammunition was also made at Hendon during WW2 and rounds similar to the above carrying the Hendon factory codes are in collections. At least one batch of .455 Webley revolver ammunition made at Rocklea ( MQ) was identified as 'standard' and carries the 's' identifier.


**FIGURE 2. A Ballistic Standard .455 Webley Round made at Rocklea.**


**FIGURE 3. A packet of Footscray Ballistic Standard .303 made 28 August 1958.**


**FIGURE 4. Examples of 7.62 Ballistic Standard cartridges from 1962 -1973, Note the 'yellow' primer lacquer which is a requirement of 'standard' ammunition**

## *Proof ammunition*

High Pressure test or 'Proof' ammunition is used to verify the structural integrity of weapons during initial manufacture or after significant modification. Proof rounds develop a higher than standard pressure thus stressing the weapon above what would be normally experienced with service ammunition. Proof .303 ammunition carries the proof type identifier 'Q'. The cases are normally copper washed to give further visual identification. In addition .303 proof rounds have the case 'peened' in around the primer to provide extra support for the higher than normal pressures generated. Australian .303 proof rounds were of Mark III and Mark IV types. The Mark III type featured the service 174 grain Mark VII ball projectile with a charge of 33 grains of cordite size 3 and developing a chamber pressure of 23-25 tons per square inch. The Mark IV type featured a 215 grain round nosed projectile and had a cordite charge developing 25-27 tons per square inch. The Mark IV appeared in England in the late 20's and was reported as being intended for proofing automatic weapons only. It was declared obsolete in the early 40's and the Mark III was then used across all .303 weapons. Figure 6 shows both the Mark IV and Mark III types.

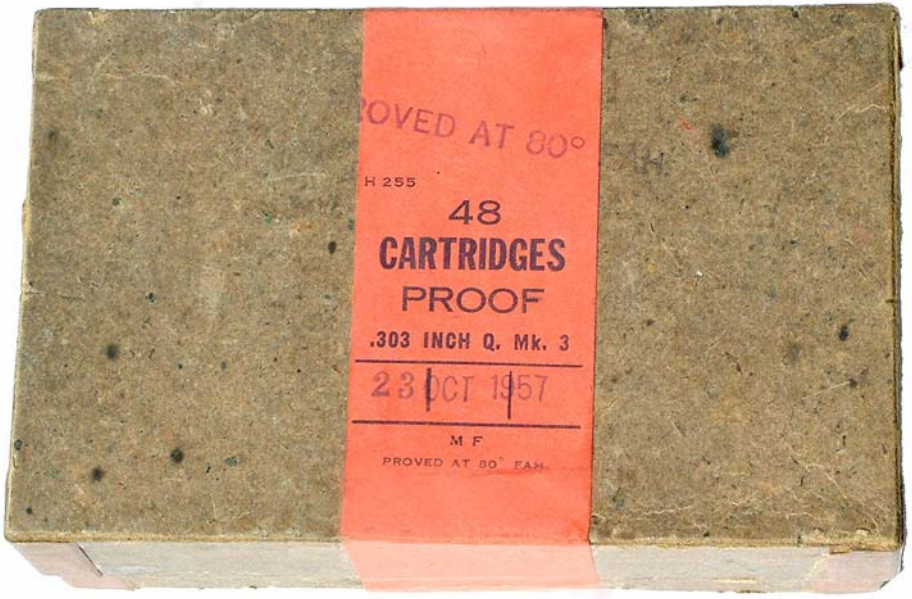


**FIGURE 5. A packet of 48 cartridges .303 Proof Q Mark 3. Note the statement 'proved' at 80 degree F.**

Specimens of 7.62 proof ammunition are shown in Figure 7. It can be seen that the L4A1 pattern was manufactured from the 1950's to the 70's.


**FIGURE 6. Some .303 proof specimens : From top a Mark IV of 1939 manufacture, a mark III from 1940 and Mark 3's from 1956 and 1957.**

**FIGURE 7. Some copper washed 7.62 L4A1 Proof rounds : from top 1959, 1961,1965,1972, 1974 and 1976 specimens**

# Chapter 25: *.380 Revolver, 9mm and .45 Auto Ammunition*

## *.380 Revolver*

In the early years of WW2, the .380 revolver, which had been in service in England for some years, was being introduced into the Australian Defence Forces to replace the .455 Webley. Britain had begun replacing their Webleys with .380 revolvers from 1930. The early British .380 ammunition was designated Mark I and had an unjacketed lead projectile but this was replaced in the mid 30's with the Jacketed mark II projectile.

In the December 1940 Munitions Programme, the quantity of .380 revolver ammunition produced for that year was shown as nil but with a requirement to reach 3.0 million rounds per year by the end of 1941. Production of .380 Mark II ammunition got underway at the Footscray No1 factory in 1941 with projectiles jacketed in cupro-nickel. In 1942 production was transferred to the 'new' Rocklea plant . The Rocklea ammunition had guilding metal projectiles. Production remained at Rocklea until the closure of that plant in October 1943. Quantities produced at Rocklea are given as approximately 9 million annually[1]. Production was returned to the Footscray No2 factory in 1944. No further production of .380 revolver ammunition was carried out after 1944 despite the weapon remaining in service into the 1960's. When reserves of the local ammunition had been consumed, ammunition was imported from the UK. ( usually being of Radway Green and Kynoch manufacture.)

1. Reference 2 Page 17.

**FIGURE 1. Local .380 ammuniton : from the right No1 Factory 1941 production, Rocklea 1942 & 1943 production and No2 Factory 1944 production. At top left is an undated tinned drill D Mark 1* made by the No2 factory and at bottom left an unmarked 'drill' reported as being made at Rocklea.**

**FIGURE 2. Local .380 ammunition; From right a cupronickel jacked specimen from the No1 factory (1941) , a Rocklea specimen (1942,43), a No2 factory specimen (1944) and a tinned , undated fluted drill from the No2 factory (circa 1944).**

The .380 Mark II ammunition had a 178 grain jacket projectile with two cannelures and a loading of 4 grains of cordite size 1/05. As can be seen in Figure 2, the bullet is secured to the

case by coning the case mouth into the top cannelure and rolling the case into the lower cannelure. The ammuniton had to achieve a figure of merit of 3.5 inches at 50 yards and be able to penetrate two 1 inch boards at 10 yards


**FIGURE 3. Typical .380 Mk II packets bearing the Rocklea identifier MQ**

## *9MM ammunition.*

The requirement for 9mm ammunition had not been noted in Munitions Programme Plans as late as mid 1941. The introduction into service of British submachine guns then the local Owen gun firing the 9mm parabellum cartridge generated a need for local production of this ammunition. Production got under way in 1942 at Footscray No1 plant and in 1943 at Hendon No3 plant. Data viewed at the Footscray Factory indicated that by December 1942 production of 9mm at that plant was running at a rate of 8 millions rounds per year. Production continued until 1945 at Footscray. The headstamping at Footscray and Hendon are shown in the following photographs

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**FIGURE 4. Hendon 9mm headstamps for 1943 and 1944 production**


**FIGURE 5. Footscray 9mm WW2 headstamps 1942-1945. Note cupronickel and copper primers on 1945 production with brass primers being used for 1942,43,and 44 production.**

Large stocks on hand of local and overseas WW2 9mm rounds delayed the re-commencement of production until the 60's and continued through the 70's, 80's and 90's until discontinued by ADI. The Headstamp changed from MF to AFF in 1988. A range of drill and dummy rounds were made throughout the life of this programme, some of which are shown below.

**FIGURE 6. 9mm Inspection rounds U Mark I: from right 1960 tin coated solid brass, 1955 all steel.**

**FIGURE 7. 9mm Drill D mark I and F2 types: From right 1943 tinned drill, 1943 ball case with holes and wooden distance piece, 1963 whitemetal case with blackened bullet, 1963 brass case with red primer pocket and typical F2 type with red flutes and primer pocket.(circa 1970-76)**


**FIGURE 8. Typical 9mm packaging of post WW2 production.**

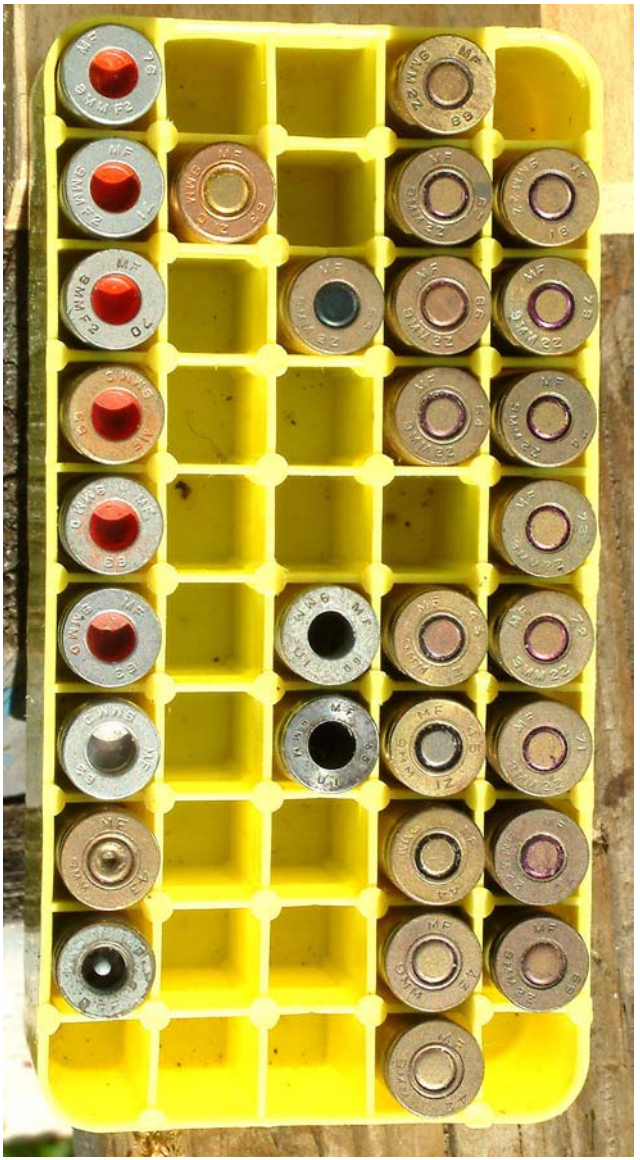

**FIGURE 9. A selection of 9mm headstamps from 1942 -1980 used by the Footscray plant including drill, dummy and proof types. Also show is a black primer 'inert display cartridge'.**

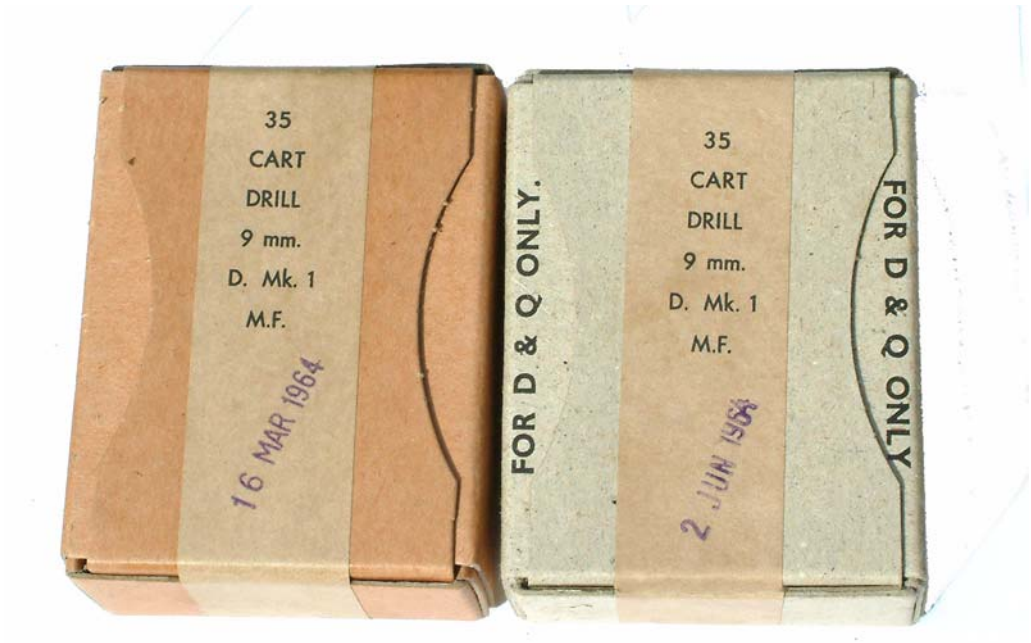


**FIGURE 10. 9mm Drill packets packed in 1964 but carrying 1963 headstamps**

**FIGURE 11. Red tipped 9mm rounds made at the No1 Factory in 1943 and reported as being early proof rounds**

## *.450 ACP ammunition*

Supply of Thompson .45 submachine guns from the USA to the Australian forces during WW2 initiated the manufacture of .45 Auto ammunition at Footscray in 1943.

**FIGURE 12. Footscray made .45 ammunition : Lower 3 examples made at No2 Factory in 1943 and 1944. Upper two made in 1955 and 1956 .**

The WW2 ammunition carried ‘ IZ ‘ in the headstamp ( Z denoting nitrocellulose propellant). The Thompson sub machine guns stayed in service with the RAAF until the 60’s and as a consequence, more ammunition was ordered from

Footscray in the mid 50's. Quantities were produced in 1955 and 56 and carried the mark 'I' ( denoting cordite loading).

**FIGURE 13. .45 Auto cartridges : right a typical WW2 No2 Factory round with case cannelure and a 50's 'MF' round without case cannelure.**


**FIGURE 14. A WW2 packet of .450 ammunition made at the No2 factory on 14 Jun. 1943.**

# Chapter 26: *.455 Webley ,.32 pistol, .22 Rimfire and .310 Cadet ammunition.*

## *.455 Webley*

As noted previously, the Footscray factory commenced manufacture of the .455 Webley Revolver ammunition in the early 1920's. Initial quantities were submitted for testing on the 9th of February 1923.[1] A further four proof firings took place through to March 1923 during which adjustments were made to the propellant charge to achieve satisfactory muzzle velocity ( 600 feet per second) and to bullet retention as mea-

1. Reference 4 Journal No 81 2000 page 11.

sured by the force required to 'pull' the projectile from the case. The first deliveries are reported as being in the 1923-24 Financial year [2] when 625,000 rounds were delivered. This ammunition was packed in small cardboard cartons holding 12 rounds and closed with a paper tape label. Some early examples are shown below. Ammunition was headstamped with "A arrow F II" then " arrow F II " then "MF II".

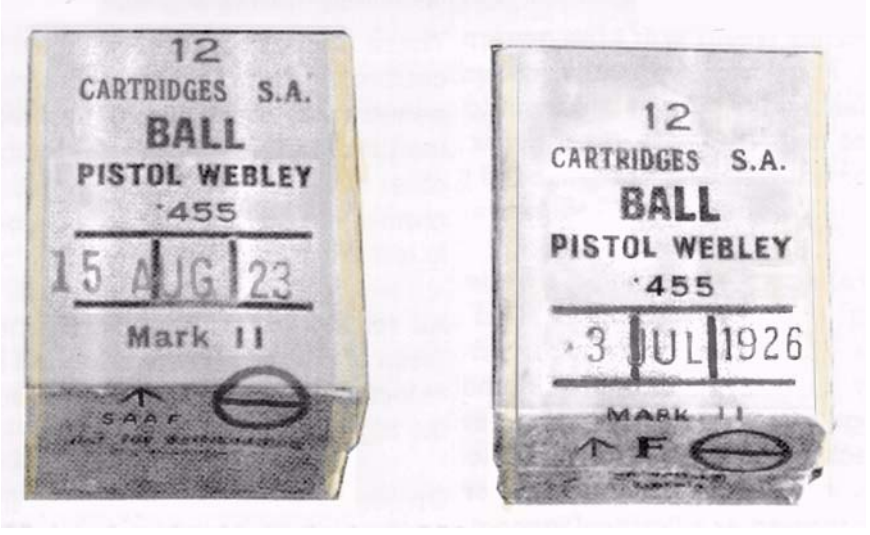


**FIGURE 1. Two early .455 Webley Mark II packets: an August 1923 example carrying the 'arrow SAAF' factory identifier and a July 1926 packet carrying the 'arrow F' identifier: these being Footscray codes of that period.**

2. Reference 3 July 1923-June 1924 Annual Report page13

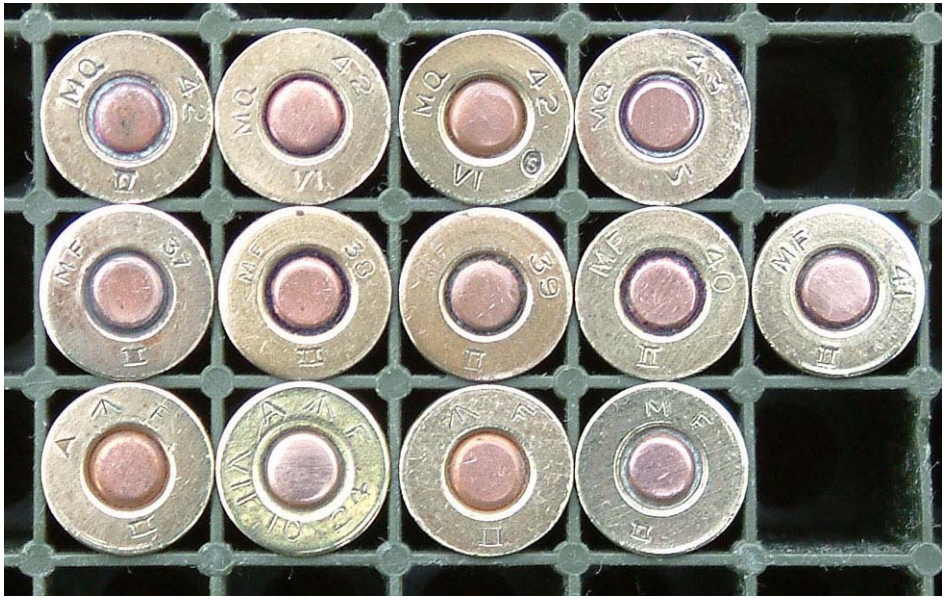


**FIGURE 2. A selection of headstamps from first production at Footscray ( bottom left) thought to last production at Rocklea ( top right). Note the 'ballistic standard marking on the MQ 42 VI round and the use of a 303 headstamp on the second bottom left. ( dated 10-24)**

In 1931 the year of manufacture was added to the headstamp and production was carried out at Footscray in each subsequent year until 1941 when it was transferred to the 'new' Rocklea plant. Rocklea commenced manufacture of the Mark II cartridge in 1942 but this was soon replaced by the jacketed projectile Mk VI round later in 1942 after concerns

that the unjacketed Mk II projectile may be seen as contravening international conventions.

**FIGURE 3. The Mark II unjacketed .455 round made at Footscray and for a short period at Rocklea and the gilding metal jacked mark VI round made at Rocklea.**

**TABLE 1. .455 Production from 1923 to 1939**

| Financial Year | Quantity | Financial Year | Quantity |
|---|---|---|---|
| 1923-24 | 625,000 | 1932-33 | 56,556 |
| 1924-25 | 350,000 | 1934-35 | 80,640 |
| 1926-27 | 400,000 | 1935-36 | 131,840 |
| 1927-28 | 109,208 | 1936-37 | 73,400 |
| 1928-29 | 11,000 | 1937-38 | 166,320 |
| 1930-31 | 11,975 | 1938-39 | 192,960 |
| 1931-32 | 125,848 | | |

In the December 1940 Munitions programme, the current annual production of .455 revolver ammunition was given as 1 million rounds with a plan to achieve a rate of 2 million rounds per annum by end of 1941. Production at Rocklea achieved approximately 2 million rounds per year for 1942 and 1943.

Production of Webley ammunition ceased in October 1943 with the closure of the Rocklea plant. The Webley pistol was at that time being displaced by the ‘new’ .380 service revolver.

After WW2, Civilian Pistol Clubs were given access to surplus .455 pistols and ammunition however these were replaced by modern pistols in due course.

The Mark II ammunition had a 265 grain lead projectile and had a nominal charge of 5.5 grain of cordite 1/05.

The Mark VI ammunition had a 265 grain jacketed projectile and had a nominal charge of 7.5 grains of cordite 1/05. The Mark VI had to be able to penetrate two 1 inch boards 1 inch apart at a range of 10 yards and have an accuracy of a 4 inch figure of merit at 50 yards

## *.320 Auto Pistol and .32 S&W Revolver Ammunition.*

As part of the attempt to supplement the low workloads of the late 1920's and early 30's, the Footscray Factory took on the manufacture of .320 Auto pistol and .32 Smith and Wesson revolver ammunition. These weapons were commonly used by Federal and State Government Departments ,Police, Banks and generally in Industry to secure payroll offices and during the weekly or fortnightly distribution of cash wages and salaries to employees. The local manufacture also achieved the aim of displacing imports.

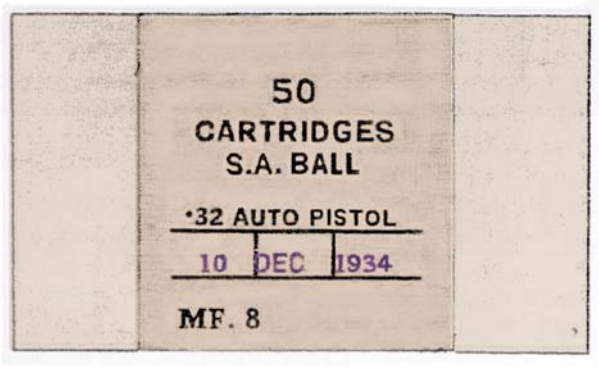


**FIGURE 4.** *Above: A packet of 50 .32 Auto made at Footscray in December 1934. .320 Smith & Wesson rounds were also produced but no surviving packet is known to exist. The significance of the "MF 8" is unknown but may be a lot number identification.*

## *.22 Rimfire Ammunition*

Prior to 1930 all .22 rimfire ammunition used in Australia was imported. In an attempt to supplement workload and eliminate import expenditure, the Footscray factory undertook the manufacture of .22 rimfire ammunition. Information was obtained from the UK in June 1930 and planning for manufacture commenced. The lead projectile was designed by the Munition Supply Drawing Office in 1932. Drawing Z9521 dated 23-8-1932 was issued to define manufacture of the projectile. The Factory commenced production and testing was carried out using military small bore rifles ( based on the Enfield .303 action) . As ammunition reached civilian rifle clubs, problems were experienced by rifle clubs members using other than military small bore rifles. This was subsequently identified as lack of sensitivity of the primer compound. Whilst the ammunition was satisfactory in the military Enfield small bore rifles, the commercial target rifles had less energetic strikers which often caused misfires and hangfires. Problems were solved but production stopped when ICI established local .22 production in 1935. The Government Factories were not encouraged to compete with local industry.


**FIGURE 5. Above A packet of 100 .22 rimfire cartridges produced at Footscray in May 1934.**

## *Jacketed .310 Cadet ammunition*

The .310 cadet rifles used in pre WW1 were progressively withdrawn from Australian Cadet training as Lee-Enfield .303 rifles became available to the Cadets . These rifles had been used with ammunition made at CAC in 1909 -1913. Propellant was still in storage from this pre WW1 program but by 1926-27 the Munition Supply laboratories reported that ”Nitrokol from obsolete .310 small arms ammunition which has been in storage for many years was found to be unstable

and was sentenced unserviceable"[3] In 1929 the Administrator of the Territory of New Guinea requested the issue of .303 rifles to supplement those already on hand. Financial restraints prevented this request from being actioned but the Australian Government offered a free issue of 1000 .310 Cadet rifles.This offer was accepted. Consequently an order for 10,000 rounds of jacketed ammunition was placed on the Ammunition Factory Footscray by the Administrator. A round nose nickel jacketed projectile was made for this order

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**FIGURE 6. Headstamps of Footscray .310 Cadet cartridges.From right an unprimed 1929 cartridge featuring provision for the .455 primer, A 1930's specimen with small copper primer and WW2 No1 and No2 Factory specimens with brass primers.**

The only suitable primers in production at that time were of .240 inch diameter for the .455 revolver, and these were used in this initial order. A further quantity of 20,194 rounds were loaded with pointed nickel jacket projectiles. Further

3. Reference 3 July 1926 -June 1927 Annual Report page 5.

shipments were made through to late 1932 after which New Guinea was able to obtain .303 rifles and withdrew the .310 Cadet rifles and ammunition on hand. Availability of a smaller primer from the .32 pistol and revolver ammunition programme resulted in the smaller primer being incorporated into the .310 cartridge. Limited production continued through until 1939 when production ceased for other priority demands. After the bombing of Darwin in February 1942 , .310 rifles in storage were issued for 'home guard'[4] use.

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**FIGURE 7. A side view of the cases shown in previous figure. Note the Nickel projectile from 1930's production and guilding metal projectiles in the WW2 production items**

4. The VDC or Volunteer Defence Force acted as a type of Home Guard in WW2

This necessitated an order on Footscray for .310 ammunition .

The No1 Factory commenced on the order and ramped up to approximately 2 million rounds per month but in September 1942 production was switched to the No 2 factory. By Christmas 1942 only 4.4 million rounds were required to complete the .310 programme. By mid February only 2 million remained and by May 1943 the manufacturing programme was complete. This WW2 ammunition had a specification of 1170 feet per second plus or minus 50 feet per second measured at 90 feet from the muzzle at 80 degrees Fahrenheit. It was fired from a fixed rest and had to achieve a mean figure of merit of 6inches at 200 yards,


**FIGURE 8. A 20 round .310 packet made at Footscray om 1st September 1942.**

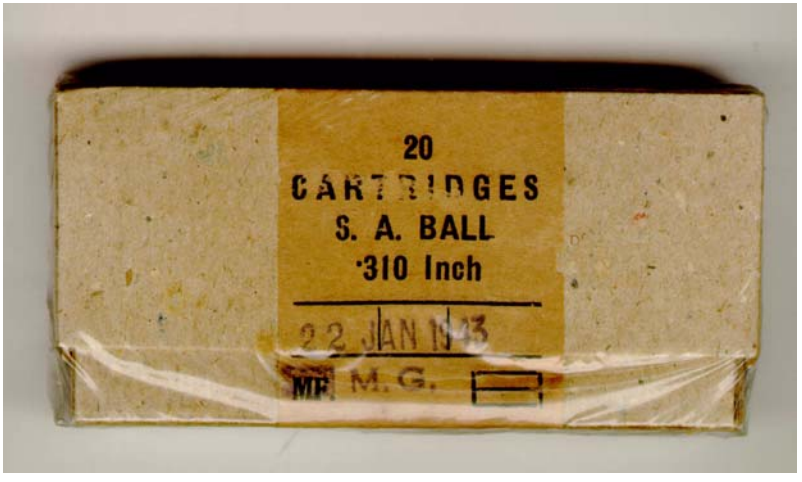


**FIGURE 9. A 20 round packet of .310 made at the No2 Factory on 22 January 1943 using MF packaging overstamped with the MG identifier.**

After WW2, rifles were withdrawn and disposed of. Many were converted to single shot sporting rifles through the 1950's and 60's

**TABLE 2. Manufacture of .310 Jacket ammunition 1929-1939**

| Financial Year | Quantity Made | Financial Year | Quantity Made |
|---|---|---|---|
| 1928-29 | 20,000 | 1934-35 | 31.240 |
| 1929-30 | 40,414 | 1935-36 | 15,000 |
| 1930-31 | 40,500 | 1936-37 | 10,000 |
| 1931-32 | 30,000 | 1937-38 | 9,500 |
| 1932-33 | 13,760 | 1938-39 | 12,500 |
| | | | |

# *Index*

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8 Commonwealth of Australia Departmental Establishment site Plans: Department of Supply 1963 (covering site plans for Albion Explosives Factory, Ashley Street Transport Depot, Magazine area Derrimut, AFF, Munitions Supply Laboratories and EFM, and the Ordnance Factory Maribyrnong including Central Drawing Office and Maribynong Stores.)

9 WW2 “Location of Government Factories” Site Layouts 1945 (covering Ordnance Factory Bendigo, Ordnance Factory Echuca, SAAF Hendon, Gun Ammunition Factories at Finsbury and Rutherford, Ammunition Factory Derwent Park, SAAF Rocklea, SAAF Welshpool, Ammunition Factory Kalgoorlie, Ammunition Factory Hay, Small Arms Factory Bathhurst, Small Arms Factory Orange, Stores and Transport Ashley Street, Munitions Bulk Store Tottenham, Explosives Factory Ballarat, Stores and Transport Stafford, Stores and Transport Penfield. )

10 Technology in Australia 1788 - 1988 an online addition at www.austehc.unimelb.edu.au/tia/ originally published by the Australian Science and Technology Heritage Centre.