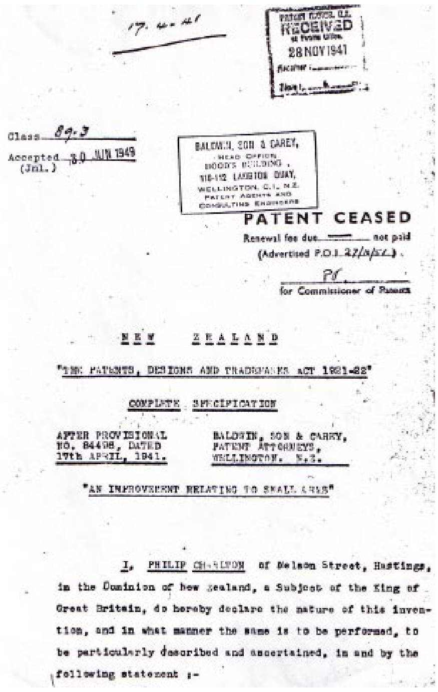
NZAR ID A9 CHARLTON SELF LOADING RIFLE

By **John Osborne** MG DTT PhD FSG Copyright retained by author July 1979 reviewed Oct 2010

Philip Charlton (1901 -1978), an Englishman, born Grimsby, Lincolnshire, served an apprenticeship with a firm in Leicester, became a qualified Automotive and General Engineer before coming to New Zealand in 1923 as 2nd Engineer on board the 240-ton ship "Futurist"
Eventually Philip Charlton set himself up in Hastings New Zealand in his own business Automotive Motor Body Engineering.
Having a very receptive mind and described by fellow engineers as very clever, especially to improving existing mechanical devices.
From an early age it was clear Philip had a passion for firearms. Whilst still at school in England and on his 14th birthday his uncle had given him a .22lr calibre BSA rifle. Before very long and after much practice Philip became quite a marksman.
Philip Charlton's love of firearms drew him into contact with Maurice Field, joint owner of Waipuka Station, then a 1,800 acre hill country farm a few miles south east of Hastings borough and by the late 1930s a friendship had developed between Philip and Maurice both being gun fanciers and having small collections of antique and vintage firearms.
Before the 2nd World War Philip would frequently visit Maurice at Waipuka Station and they would partake of some general gun talk, ammunition reloading and target practice, using a variety of firearms they both owned.
They developed a 200 yard shooting range directed into the Waipuka hills; this later was to become the testing ground for the prototype Charlton Automatic Rifle (the name Charlton gave to his rifle). During the early stages of World War II both Philip and Maurice continued in their professions and occasionally enjoyed some shooting practice. It was general knowledge the New Zealand Military had a desperate need for self-loading quick firing firearms. With the very real threat of a Japanese invasion the New Zealand Home Guard had only a few modern firearms to resist such an attack.
One of the firearms owned by Philip was a Winchester .401" calibre self-loading rifle, and during one of his visits to Waipuka Station he suggested to Maurice he might attempt to convert the .401" Winchester to fully automatic. After much deliberation Maurice convinced Philip that although his idea had merit, ammunition would present a problem and suggested to Philip that a more satisfactory move might be to convert a standard military issue .303" calibre bolt action rifle to automatic self-loading, a task easier said than done.
Philip Charlton took up the challenge and over the following few months in early 1941, using his engineering expertise and knowledge of firearms to advantage, had developed a crude, but effective, automatic fire gas operated conversion of the semi obsolete Long Magazine Lee Enfield Rifle from the Boer War era many of which were being held in NZ Military stores.
The first prototype Philip referred to as the "Stick and String" model, for obvious reasons, and it left much to be desired. It had three major faults – firstly the original 10 shot box magazine not only being too small in capacity, but when loaded with more than two or three live cartridges lacked the required spring pressure to raise the cartridges fast enough for the speed of the action. The second problem was it would malfunction when it was on automatic fire, and thirdly the original simple trigger assembly was unreliable on single shot function.
The first problem was partially overcome by slightly modifying the rifle receiver body and fitting a modified 30 round .303" calibre Bren Light Machine Gun magazine, but the spring pressure could still only lift five or six cartridges fast enough for automatic fire. Note the Bren gun magazine was designed to operate as a spring assisted top loading gravity feed magazine and its application in the Charlton bottom loading relied totally on the magazine spring pressure to lift the cartridges.
The malfunction problem was not so easily overcome, as the cyclic rate of the gun on automatic fire was approximately 800 rounds per minute and it was virtually impossible to observe the fault while the gun was in operation. Philip, in discussing the problem with as many people as possible, eventually co-opted Guy Milne, a Radio Technician in Hastings, who very cleverly developed a stroboscope which was mounted alongside the gun and calibrated to its cyclic rate.

Philip Charlton c1940s



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BALDWIN, SON & CAREY,
HEAD OFFICE
WOOD'S BUILDING,
110-112 LAMBTON QUAY,
WELLINGTON, C.1., N.Z.
PATENT AGENTS AND
CONSULTING ENGINEERS

PATENT CEASED
Renewal fee due ______ not paid
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NEW ZEALAND

"THE PATENTS, DESIGNS AND TRADEMARKS ACT 1921-22"

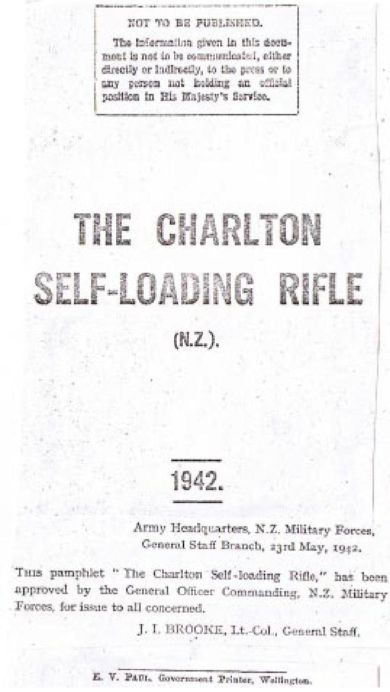
COMPLETE SPECIFICATION

AFTER PROVISIONAL NO. 84498, DATED 17th APRIL, 1941.

BALDWIN, SON & CAREY, PATENT ATTORNEYS, WELLINGTON. N.Z.

"AN IMPROVEMENT RELATING TO SMALL ARMS"

I, PHILIP CHARLTON of Nelson Street, Hastings, in the Dominion of New Zealand, a Subject of the King of Great Britain, do hereby declare the nature of this invention, and in what manner the same is to be performed, to be particularly described and ascertained, in and by the following statement :-



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THE CHARLTON SELF-LOADING RIFLE

(N.Z.).

1942.

Army Headquarters, N.Z. Military Forces,
General Staff Branch, 23rd May, 1942.

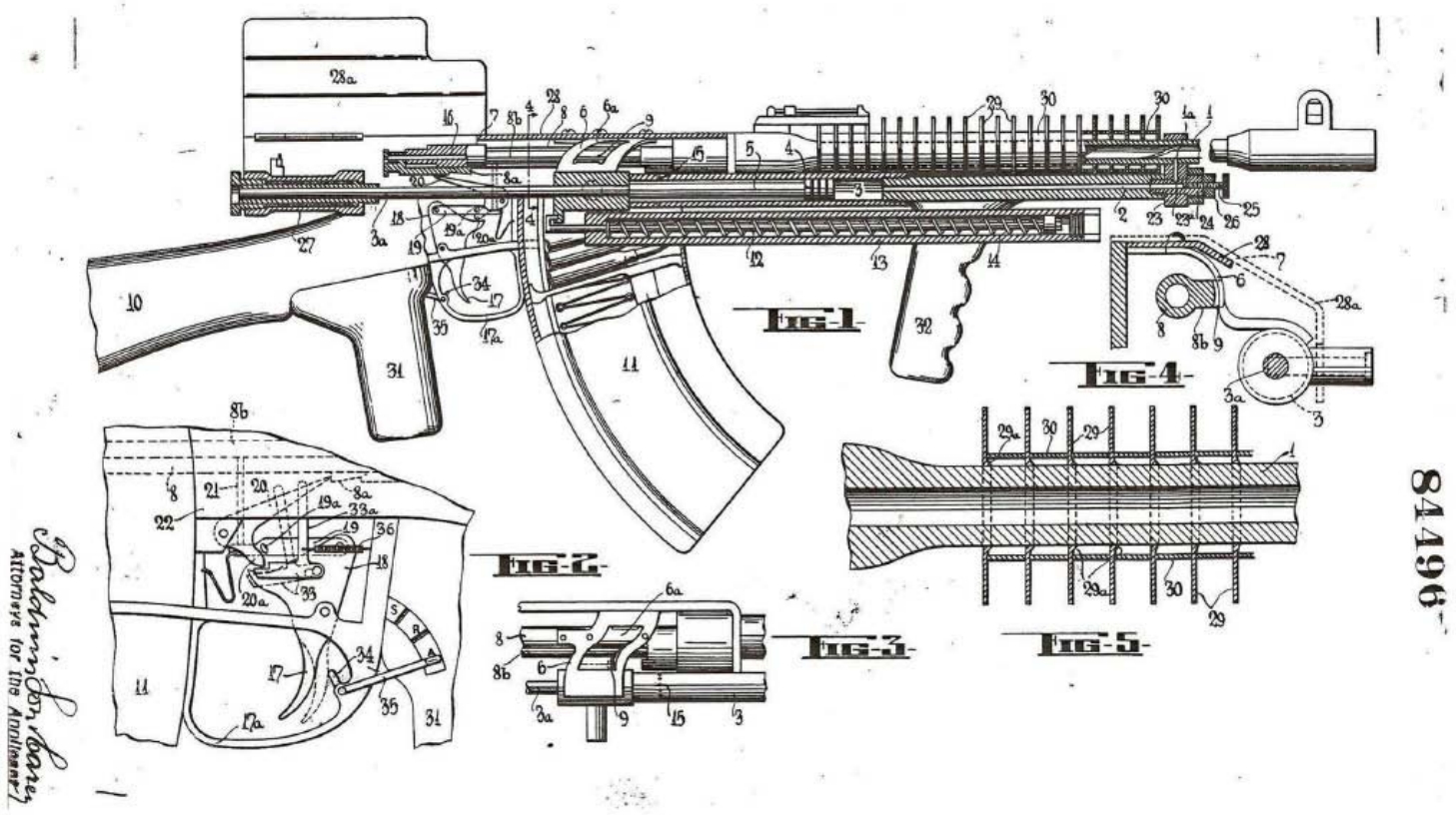
This pamphlet "The Charlton Self-loading Rifle," has been approved by the General Officer Commanding, N.Z. Military Forces, for issue to all concerned.

J. I. BROOKE, Lt.-Col., General Staff.

E. V. PAUL, Government Printer, Wellington.

This clearly showed whilst the gun was operating, the fault to be that, the spent cartridge cases were not being ejected properly and remaining in the way of the bolt as it moved forward to pickup, chamber and fire another cartridge. Charlton developed an extended, hardened ejector pin which he called "a power ejector" to replace the existing original ejector pin fitted through the left-hand side of the body, at the same time had to modify the bolt to accommodate the new protruding "power ejector". Having completed the modifications, further tests were conducted using the stroboscope and the rifle was clearly observed to be functioning correctly. At this stage the third problem of selective fire - single shot fire being unreliable was shelved with the action working perfectly either on safe or automatic fire. Charlton knew the time was right to approach the New Zealand Government, this he did with the aid of Maurice Field and the Hastings Labour MP Ted Cullen.

In June 1841off they went to Trentham Military Camp and put on a most successful demonstration to the Army and Government, Maurice Field handling and operating the gun whilst Philip Charlton using his tactful salesman's ability convinced the Army and Government his gun was a viable proposition. Charlton's suggestion was enthusiastically received and he was commissioned to carry out further tests and development with his "Stick and String" model, the Government making available 10,000 rounds of standard .303" service ammunition for the purpose. During his first visit to Wellington Philip Charlton had entered Parliament Buildings carrying his rifle, determined to get maximum benefit from his visit. However he was very quickly hustled out of Parliament by the Prime Minister and other MP's. The first demonstration had been successful, now it was up to Charlton to satisfy the Army and Government his gun would hold together, as it had been suggested by Captain Tommy Chapman in charge of the Trentham Armoury that he had reservations about the gun withstanding prolonged operation. 10,000 rounds and in November 1941, five months later, the "Stick and String" model was again taken to Trentham for demonstration, again being capably handled by Maurice Field, whilst Philip Charlton made himself available to answer questions. This second demonstration was even more convincing and successful than the first and quickly led to a contract being drawn up for the conversion of 1,500 semi-obsolete (a mixture of) MKII Magazine Lee Metford MLM and MKI and MKI* Magazine Lee Enfield MLE rifles, originally manufactured between 1894 and 1903 and being held in reserve for use by the Home Guard. Philip Charlton had provisionally patented his improvements in April 1941 and obtained full patent rights on the 28 November 1941.



Note: At no time were these Charlton Self Loading Rifles considered for active service, they were no match for the Bren Light Machine Gun recently approved to replace the Lewis Machine Gun. The Charlton Automatic Rifle as Charlton himself called the gun was to be held in reserve at strategic places around New Zealand and only brought into service should the Japanese invasion eventuate.

Charlton had negotiated with the New Zealand Government to pay him a salary, car mileage and traveling and accommodation expenses, plus a royalty per converted rifle for 1500 rifles, delivery to be completed within 6 months (an impossible proposition).

Once approved the whole project came under the overall control of the Munitions Department headed by a Senior New Zealand Air Force Officer, Squadron Leader Mr Carter. Mr Carter had as his coordinator for the Charlton project a very competent New Zealand Railway's Department Engineer, Gordon Connor who was at the time in charge of the NZR draughting office.

The Munitions Department had the right during wartime to requisition any workshop facilities, plant and material throughout New Zealand. Gordon Connor had an excellent knowledge of plant and material available and was authorized by government to supply all necessary plant and material and to pay all wages and other expenses to the contractors. Much of the local Hastings coordinating was given to Philip Charlton who made arrangements with a good friend Syd Morrison, owner of Morrison Motor Mowers Ltd to do the machine work, altering existing parts and the manufacture of some new parts. Syd Morrison had previously provided the machining facilities to Charlton enabling him to produce his prototype rifle.

In the early stages of conversion drawings had not been considered, neither Charlton nor Morrison where familiar with drawings. Parts were to be manufactured or altered to samples supplied and an arrangement between Charlton and Morrison was that some of the parts were to be completely finished and many others supplied in a semi-finished state. Morrison was only concerned with carrying out work that required a straight forward machining operation, leaving the finishing work and final assembly to Charlton.

It quickly became obvious to Gordon Connor that Charlton and Morrison should receive additional help if the contract was to be met in anything like the time stated and Connor introduced Precision Engineering Ltd a Wellington firm who specialized in press work, managed by Mr Bob Burn. Mr Burn undertook to improve the design of the barrel cooling fins, previously Charlton's design used washers and spacers pressed over the slow taper of the barrel but these proved unsatisfactory - they came loose when the barrel heated up. Burn's improvement used only flared washers pressed directly on to the barrel. It proved to be a sound improvement so Burns received the contract for the manufacture of the fins and the trigger mechanism side plates.

The Hastings Boys High School machine workshop produced a few (30) gas cylinders and piston rods. Although the finished components were excellent, supply was very slow and limited so the contract was taken over by Morrison Motor Mowers Ltd. N W Thomas & Co Ltd, Wellington obtained the contract for manufacturing the coil return springs.

Charlton now had to consider preparing his own rented building in Hastings. Times had been very lean for the motor industry; petrol was rationed, causing severe cuts in the use of private motor vehicles. Charlton's own motor body business had suffered and he was left with his premises and a young employee, Horace Timms, who had continued doing odd jobs whilst Charlton was involved with his rifle.

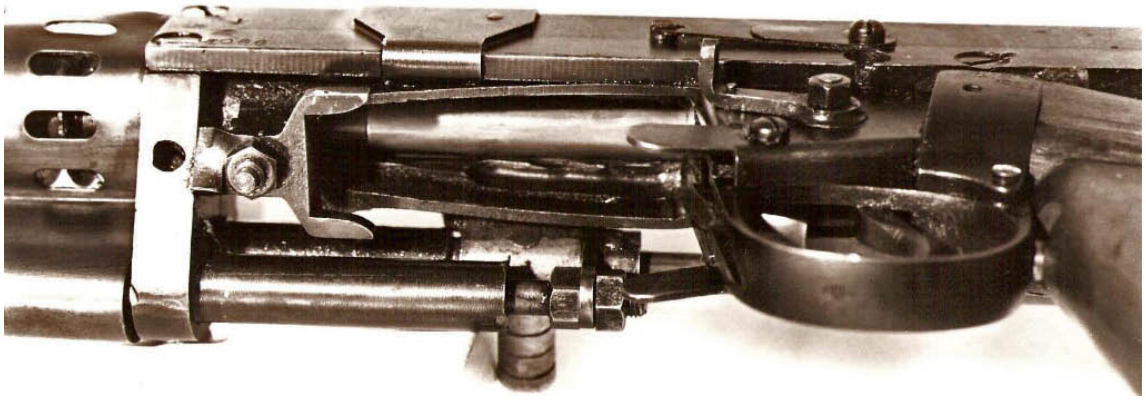
A good friend and colleague, Stan Doherty, a Hastings motor & general engineer was also feeling the pinch of the wartime measures, having little work to keep him going. Charlton enticed Stan Doherty to join him in setting up the rifle assembly factory and on 2nd January 1942, Charlton, Doherty and Timms commenced work in Charlton's completely empty workshop to set up the necessary facilities to finish and assemble the incoming parts.
An oil fired liquid hardening furness - process (pearlaton) and gas fired bluing tanks were set up. A local Hastings firm H H Campbell and Sons manufactured several double sided benches. The hardening furnace was built of second hand fire bricks from the local gasworks and an annealing oven was made up for the prior treatment of parts.

Left side of the completed Charlton Self Loading Rifle with its 30 round modified Bren Gun Magazine and adjustable bipod rest.

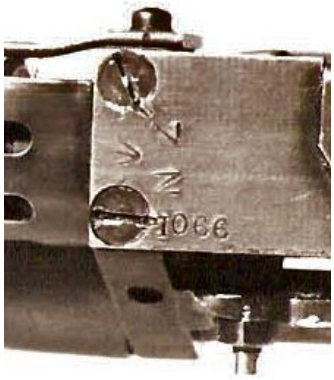
Left side of the completed Charlton Self Loading Rifle, Magazine removed. The receiver side plate is marked Broad Arrow NZ 1066.
To test fire the completed rifles a 25yard tunnel safety range was constructed. It consisted of a bricked in firing box, through a tunnel of reinforced concrete pipes about 3ft diameter which finished up in the back yard in a large square box of railway sleepers. The outside rear wall was lined with heavy steel RSJ's. The whole box (bullet trap) was filled with shingle, and covered by a substantial top also of railway sleepers.

Right side of the completed Charlton Self Loading Rifle with its 30 round modified Bren Gun Magazine and bipod.
Weight of rifle 16.5 pounds with filled magazine, Rate of fire - 30 aimed shots per minute - automatic approximately 700 rounds per minute. Firing positions from the bipod, the waist and the shoulder.

Right side of the completed Charlton Self Loading Rifle, Magazine removed.



Underside side of the completed Charlton Self Loading Rifle, Magazine removed.



NZ acceptance marks - Broad Arrow / NZ /1066

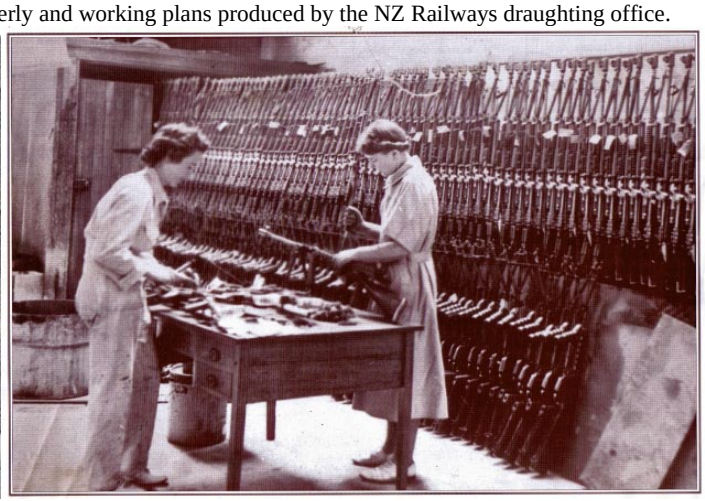
The New Zealand Army's held Magazine Lee Metford MKII and Magazine Lee Enfield MKI and MKI* began to arrive at Charlton's factory in January 1942. It was then necessary to begin to employ further staff to completely strip the donor rifles, clean the parts, gauge the barrels, .306" being set down by the army as being the maximum bore diameter acceptable and barrels were rejected if a .306" gauge passed through the entire barrel easily. Only Enfield rifled barrels were used and about half were brand new.

The three types of .303" donor rifles from the Boer War period. Top MLM MKII: Centre MLE MKI: Lower MLE MKI*

The Government had established a "Man Power" Department and it was in control of all labour in New Zealand and would direct people according to their skills, wherever the Government needed them. Most of the male staff at the Charlton Factory were obtained from the Man Power Department, the total staff over the production period comprised about 28 men and 12 women.

In the early stages of the factory being set up early one morning Philip Charlton entered the factory waving a telegram requesting that he go to Australia the next morning. The Australian Government had decided to convert 10,000 semi obsolete MLE rifles to Charlton's patent. Stan Doherty knew very little about the Charlton rifle and suggested to Charlton that they had better have a session on the rifle before he went to Australia however Charlton assured Doherty he would be back in a week to ten days at the outside. As it turned out Charlton was in Australia for four months leaving Doherty to complete the factory set up and implement all the production modifications needed.

The Man Power Department not only directed men but also women up to a certain age, without children or other important responsibilities. This caused consternation among many young women, some having held responsible positions in offices and had never been required in their lives to undertake manual tasks.
A good friend of Stan Doherty was Stan Marshall, a first World War Veteran and described as a very clever general engineer and was now back in uniform at the army camp in Napier. Stan Doherty applied to the Man Power Department and Marshall was transferred to the Charlton Factory. Another intelligent and well heeled young fellow – Dinnie Donovan, who had spent some time at University and had gained a considerable knowledge of Chemistry, was co-opted and placed in charge of the bluing tank. He later volunteered for active service in the Air Force and was replaced by one of the Man Power girls who had an interest "yen" for chemistry.
Gordon Connor the munitions coordinator rightly insisted that making parts to samples instead of drawings was hopeless and instructed that Charlton's last prototype (stick and string model) was dismantled and all parts were drawn properly and working plans produced by the NZ Railways draughting office.

Left; Mrs Noeline Liggett assembling a Charlton Self loading Rifle. Right Betty Cunningham (left) & Mrs Kitty Hill assembling the Charlton Self Loading Rifles

It soon became obvious to Doherty and Marshall that the prototype rifle was impossible to put into production in its original form and whilst stripping, cleaning and other preparations were going on in the workshop they developed and built one rifle in a manner they considered a production possibility. This took some time but was vital if they were to succeed at all. On completing this first rifle Doherty and Marshal test fired the rifle at Maurice Fields Waipuka Station. Several minor problems were encountered but were quickly overcome.
Modifications to the stock work and supply of the new hand grips were contracted out to Christie & Rae, furniture manufactures, Hastings. Syd Morrison had originally undertaken to manufacture the scroll cam but found later he was not able to meet the requirements.
Gordon Connor realized how complex the scroll cam was and approached "Ginger" – Len Southwood of Southwood Engineering, Wellington.
Ginger was an ingenious engineer and designed a punch and die set to stamp out "hot" the scroll cam from .25" flat steel plate. The carrier sleeve was then arc welded on to the side and finally hot forged to obtain the correct contours.
The challenge of machining inside the cam face was left to Gordon Connor to sort out and he contracted Levin Machine Tools Ltd, in Wellington but unfortunately the face was not machined correctly and when delivered to Hastings it would have required a considerable amount of individual hand fitting which was time consuming and required skilled labour which was impossible to find so Doherty and Marshall set to work and contrived a way of using a mill to machine the inside contours to suit the offset centers of the scroll cam, then it was hardened. Many other hand fitting operations were eliminated by Doherty and Marshall by improvising and using the milling machine and other machines and several special jigs were made to simplify assembly. The majority of the original parts modification machining work was carried out by Syd Morrison and staff in his King Street, Hastings workshop. All other alterations, hardening, finishing, bluing, assembly, test firing and final approval and acceptance marking were carried out at the Charlton Factory in Nelson Street, Hastings.
A major setback came in the production of the magazine. Originally Charlton had adapted a 30shot Bren Gun magazine fitted with a more powerful spring to replace the original 10 shot magazine, Charlton thought the 30 shot magazine could have been produced in New Zealand, however Gordon Connor decided it would be better contracted to an Australian firm as they were already set up for such production and could manufacture the 1500 or so ordered in a few weeks.
Before any rifles were accepted by the Army they had to be individually inspected and test fired by the Army's chief armourer, Captain Tommy Chapman. Particular attention was paid to gauging the barrel bores, cartridge head spacing, trigger pull and mechanism and test fire. Any rifles not meeting the army's requirements were rejected. However the minor problems were soon corrected and they passed inspection.
Approximately 1400 Charlton Self loading rifles had been delivered to the army with the original 10 shot magazines before the Australian made 30 shot magazines arrived 20 months later, even then they could not be used as they would not fit into the Carlton rifle body and required each magazine to be re-machined in a mill before they could be used. The final 100 rifles were delivered with the new 30 shot magazines. The other 1400 magazines after modification were delivered about 3 weeks after the last rifle was dispatched.
On acceptance by the chief armourer each rifle was stamped with the broad arrow and NZ (denoting NZ Government Ownership) and the Charlton Rifle Number which was recorded. The rifles were then greased and fitted into wooden cases manufactured by H H Campbell & Sons, Hastings. The rifles were then delivered to three places;- Narrow Neck in Auckland, Ngaruawahia near Hamilton, and Burnham near Christchurch in proportion depending on the estimated magnitude of the Japanese invasion risk.
After the war was over the Charlton rifles were sent to and stored in the Palmerston North Show Ground Buildings which was later destroyed by fire, along with most of the Charlton Self Loading Rifles.
By the time the contract was complete practically all hand work had been eliminated and production was quick and efficient – a far cry from the first few that were produced. It took approximately 2 years to complete the 1500 rifle contract.
The first production rifle was never delivered to the army and became known as "Old Faithful". During the entire period of manufacture of the Charlton Self Loading Rifle several VIPs visited the Charlton factory; they included the Governor General, Prime Minister and other cabinet ministers, as well as senior military personnel. Inevitably each requested that they be permitted to inspect and test fire a rifle.
To avoid minor problems "Old Faithful" was generally selected for the test fire. By the time the contract was finished "Old Faithful" was said to have been worn out and was unfortunately dismantled and destroyed as it was not one of the 1500 accepted and approved rifles.
The Australian Government intended to produce 10,000 Charlton Self Loading Rifles similar to those being produced in New Zealand to Charlton's Patent and to pay Charlton a small royalty for each completed rifle. It is understood no Charlton SLRs were ever completed in Australia and in the latter stages of the war the Australian Government offered to sell the semi finished parts to NZ and provided the New Zealand Government with a list of parts, detailing the quantities in store, full details as to manufacturing process and a list of operations still to be completed before assembly could take place. The New Zealand contract had long since been completed and the offer was declined.

Because of the demand by collectors particularly in the USA several replica Charlton SLRs have been manufactured in NZ and overseas to the original plans. According to Charlton, Doherty and Field no SMLEs were ever government approved or officially converted to the Charlton design either in New Zealand or Australia. There were a lot of unfinished parts in Australia which were disposed of after the end of WWII which may have been used in the manufacture of the replica Charlton's.

Acknowledgements and Special Thanks to:-
Philip Charlton, Maurice Field, Stan Doherty. Major General Ron Hassett, Chief of the General Staff, NZDF.
Staff of the Queen Elizabeth II Army Memorial Museum, New Zealand Defence Force;
New Zealand Railways Department, Plans for the Charlton Self Loading Rifle
New Zealand National Achieves, Osborne Arms Museum.
New Zealand Patents Office, Patent Specification No 84496, 28 November 1941.
New Zealand Government Contract Specifications for the Charlton Self Loading Rifle, December 1941.
Pamphlet "The Charlton Self-Loading Rifle" issued by Army Headquarters, NZ Military Forces, General Staff Branch 23 May 1942.
Report by the Munitions Controller (Ministry of Supply) on the Charlton Automatic Rifle Manufacture 13 August 1942