I am indebted to Henry for allowing me to publish his article on World war Two Bombsights on this web site.
This article was also recently published in the RAF Bomber Command Association Newsletter.

Note: I am sadden to advise the Mr. Black has passed away. His articles are left in tribute to his historical research.

When bombs were first dropped from the primitive bombers of WW1 the effect of wind severely affected the accuracy of bombing. The first bombs were small and to be effective, a direct hit became necessary. The only way to nullify the effect of the wind was to bomb up or down the wind direction. For the attacking aircraft the defences could anticipate the direction and thus increasing the danger to the bombers.

Wimperis a graduate engineer working for the Royal Naval Air Service in their research laboratory, devised in 1916 his Course Setting Bombsight (CSBS) that would enable a bomber to attack their target from any direction irrespective of wind direction and speed.

The CSBS was very successful and was eventually fitted to the then giant bombers of the Independent Air Force (IAP) which was being set up to bomb Germany. Due to the bombing of London and other cities by German Gotha aircraft, public opinion had forced retaliation to be undertaken. However, WW1 ended before the I.A.P. could become effective.

The Research Laboratory now operated by the Air Ministry closed in 1932 and from that date all research associated with bombsights was carried out at Farnborough. There was a large range of sights designed and built at Farnborough from dropping bombs, mines and torpedoes to parachutists and for dive bombing. There was even bombsights intended for use in the bombing of bomber formations as they approached British cities.

The CSBS or Wimperis sight as it was known overseas was purchased by many foreign airforces including the Americans who eventually had a stock of 11,000 British designed sights some of whom were purchased direct or built in the USA under licence. The Japanese used a sight developed from the CSBS, which was in service use until the early days of the entering into WW2.

Carl Norden, a graduate engineer who emigrated to the USA and worked for a time with the Sperry Gyroscope Company, was requested to study the Wimperis variant with a view to improving it. After a long period of development, the famous Norden Bombsight of WW2 resulted, although in the process, he came to reject the principles of the Wimperis bombsight..

The Americans quickly appreciated the fact that accuracy could be doubled by stabilising the bombsight so that it in remained in one plane and was not disturbed by aircraft vibration and changes of levelling due to turbulence or by aircraft manoeuvres. Although the British too understood this, it was rather longer before they were able to put it into practice.

There were several variations of the CSBS to allow for bombing at low and high altitudes. At first the speeds of the post-war biplane bombers did not materially increase beyond 100 mph. The Vickers Virginia with a top speed of 108mph remained in front line service until 1937. With the re-armament of the RAF in the mid to late 1930s change was on the way and the biplane bombers slowly gave way to

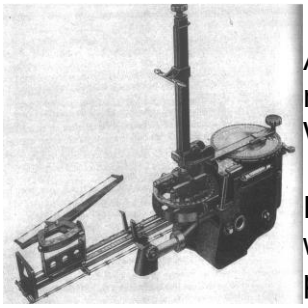
the monoplane. Air speeds greatly increased as well as the requirement for greater bombing heights. The range and weights of the bombs it aimed, also increased.

When the faster monoplane started to supersede the trundling biplane it brought further problems in its wake for the flat turns of the old biplanes were no longer possible with the new monoplanes and accuracy appeared to suffer. A monoplane introduced a degree of bank, which interrupted the apparent smooth flow of the target down the drift wires until the aircraft could return to an even keel. Stabilisation of the bombsight could have corrected this anomaly but it was never applied to the CSBS in service although a system was developed by Farnborough, but not adopted. The rapid rate of change in bomber performance lead in turn to increased development of the CSBS leading to the introduction of Mks Vll in about 1932 and Mk lX in 1939.

The CSBS suited the requirements of the pre-war armament training camps where targets were attacked on a one to one basis and in regime of precision bombing. Under these conditions the CSBS was capable of considerable accuracy; one important problem with the sight remained unrecognised. To achieve the accuracy of which the sight was capable the aircraft had to be flown at a constant speed ‘straight and level’ up to the target. This in wartime, was operationally impractical.

Flying conditions in the armament training camps did not reflect in any way the operational flying conditions to be anticipated in the coming war. Opportunities for night flying were restricted for reasons of cost and little could be done to simulate the effects of anti-aircraft fire. The illuminated cities of Britain and Europe in peacetime gave little practice in navigation for using D.R. plotting over a wartime-darkened Europe.

Two versions each of the MkVll and MklX CSBS were in service use, namely the ‘A’ and the ‘C’. The former was graduated in mph and intended for light bombers with restricted range. while the ‘C’ were graduated in knots and intended for longer range operations and using dead reckoning (D.R.) plotting



Although now operationally superseded by newer systems, the CSBS Mk lXC remained in use in training aircraft in the UK and Commonwealth until the end of WW2.

By the mid thirties it was felt that the use of the CSBS should be simplified and work was started on developing the Automatic Bombsight(ABS) at Farnborough perhaps influenced by the rumoured existence of the American Norden sight.

Some information about its specification had been supplied by an officer stationed at RCAF Trenton, who had been allowed to witness trials in the US. The ABS had a very difficult passage through the development stages with frequent changes in requirements and problems in obtaining serviceable test aircraft. Modern high performance aircraft of the time were not easily available for testing the new sight. Much of the early testing was done on a Boulton Paul Overstrand which only the aged prototype was available. At one time testing had to be delayed until the manufacturers of the Overstrand could sufficiently refurbish the airframe to allow a few more hours of flying time. Eventually Blenheims and Hampdens were made available for test purposes.

The ABS lacked one essential element in its design although the need for it had been the subjects of much discussion since its inception. This was stabilisation which Farnborough knew would double the accuracy of the instrument and rumour had it the Norden incorporated.

The bombsight being tachometric like the Norden, required a long run up to the target flying straight and level. No tactical freedom of manoeuvre was possible adding greatly to the stress on the bomber crew due to the ferocity of defences protecting the target. It was possible to anticipate the position of the bomber for some forty seconds before its bombs could be released thus increasing materially, the danger to the aircraft from defensive fire

A decision was finally made to add stabilisation to the ABS but only when it was in full production with the result production was almost brought to a standstill.

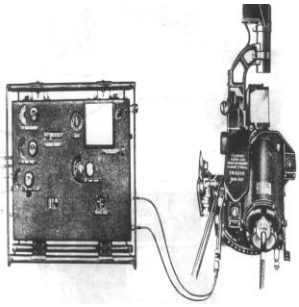
Running in tandem to the ABS was a redesign of the CSBS which used the same principles but bore little resemblance to its predecessor. This was the CSBS MkX. Little testing had been carried out on night operations since it was then thought day light operations would predominate. Five thousand of these sights had been completed by the manufacturers, and were awaiting delivery, when its unsuitability for night operations were recognised and it was abruptly cancelled.

The new four engine bombers were well advanced in production and in view of the problems with the ABS the then successful CSBS MkX was specified for the the new British bombers as well as those ordered from America such as the Liberator and the Baltimore. These aircraft had been 'plumbed up' on the production line with necessary services and mountings to receive the new sight. To provide the quantities required for the new aircraft, companies in Canada and Great Britain ceased production of the Mk lX and were re-equipped to manufacture the new MkX.

At this point it has to be remembered that RAF Bomber Command expected that a major part of its operations would be by day. They were certain in their belief that the combined effect of their machine gun based defence systems would be sufficient to defend their bombers against the opposing fighters; providing the aircraft remained in tight formation. They tragically assumed that Britain alone, had 'radio-location' (radar) defence systems which would warn of the approach of the RAF bombers.

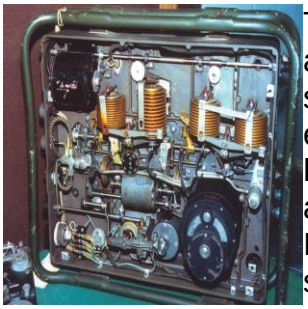
For a year before war was anticipated, operations had been meticulously planned that the German fleet would be attacked at Wilmshaven and so several raids were mounted in the first months of the war. The results were disastrous with German radar giving sufficient notice of the attack. for the defending German fighters. Much of the cream of Bomber Command aircraft were destroyed together with their gallant crews. The Air Staff criticised the leaders of the attack for permitting poor formation flying but it was apparent the bombers had totally inadequate defences for undertaking day light attacks. The solution was to concentrate upon night operations.

With the cancellation of the MkX sight, remaining stocks of the Mk Vll and Mk lX bombsights were raided to be fitted to the new aircraft where the performance envelope was appropriate. In America the Norden bombsight was in short supply for US operated bombers and a new similar Sperry tachometric bombsight was hurriedly developed. Supplies were sought to replace the MkX for the RAF Liberators and other bombers. The few ABS sights available went to the new Manchester bombers and later to Hampdens.



Bomber Harris and his aircrews were not slow in voicing their strong dislike of both the Mk lX and the ABS. and called for their early replacement. Their strong views were registered with the Tizard Committee and a founder member of that committee Prof. Blackett volunteered to design a new sight to meet the needs of Bomber Command. He was given facilities at Farnborough and the services of a small team of engineers. The bombsight that resulted was the Mk XlV regarded then as the wonder sight of the day. It was designed to enable the run up to the target flying straight and level to be restricted to a mere ten seconds and enable

the pilot to carry out evasive manoeuvres on his approach to the target. It could be used to bomb both on the climb and the glide. The bombsight consisted of a computer cabinet mounted to the left of the Air Bomber and a stabilised sighting head with optical graticule. The sight was one of the first practical uses for a mechanical computer and Babbage would have been proud of it.



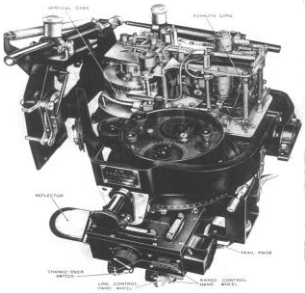
This was the bombsight of choice for Bomber Command until the end of the war and beyond. Shortly after its entry into service, its manufacture was subcontracted to the Sperry Gyroscope Company in America who after re-engineering it to meet American standards, arranged for A.C. Spark Plug , Division of General Motors to manufacture in quantity. Known as the 'T1' version a total of 23,000 were made for use in the RAF and Commonwealth. airforces. In some respects, it was a mechanical improvement on the British manufactured sight but was fully compatible with it in every way.

The principal source of inaccuracy was the need to set on the computer the wind speed and direction which under operational conditions, could be often in error.

A T1A version was produced for use with the faster Mosquito and to allow for the greater operating height. T2 and T4 versions were British manufactured developments based upon the T1 bombsight and used on post-war aircraft and to allow for a connection to Green Satin radar systems. The MkXV and MkXVll versions were intended for Coastal Command but never entered production.

For a time the USAAF considered using the T1 on their medium sized bombers but declared it to have a fault and rejected it. The reason remains unknown it was probably unsuitable for the tactics used and the Norden was predominately used.

The T1 Bombsight Story



The ABS continued its development at Farnborough and emerged in August 1943 as the SABS Mk llA tachometric precision bombsight precision sight. The SABS provided an even more complex mechanical computer being able to calculate its own 'wind' and to automatically release bombs. These were qualities it shared with the Norden and probably the German Lotfe sight.

Starting in 1941 Barnes Wallis had designed a range of very large bombs,namely the 'Tallboy' of 12,000lbs' and 'Grand Slam' of 22,000lbs. These bombs to be effective, had to be dropped within 150 yards of the target from 20,000feet and the SABS MkllA proved to be the ideal sight for this purpose. A direct hit was not required as it was anticipated that the bomb if landed just short of the target would travel forward under the target before detonating. The resulting explosion would destroy the foundations of the target causing a degree of damage that would take many months to repair.

This sight was mainly fitted to the Lancaster's of 617 squadron and used in their precision bombing of tunnels, V1 and V2 ;launch sites. In company with 9 squadron using 'Tall boy' and 'Grand Slam' earthquake bombs the German battleship 'Tirpitz was sunk in 9 minutes of commencement of attack. To achieve such a high level of accuracy required a considerable amount of bombing practice on the bombing range. These attacks were carried out by day or by night.

The accuracy of 617 squadron improved greatly with an average radial error of 170 yards being recorded over the period of June to August 1944 and improved to 125 yards in the period of February 1945 to March 1945. Two other precision bombing squadrons were formed based upon the MkXlV

bombsight and in the period of February to March 1945 their average error was 195 yards. It is not surprising that when the Norden was offered to the RAF later in the war it was rejected.

Less than 1,000 SABS bombsights were manufactured and after the war great difficulty was experienced in finding sufficient sights to equip two Lincoln squadrons for precision bombing against Japan. Compare this with the 23,000 T1 sights manufactured in America.

There was in Bomber Command at the time much discussion on the comparative merits of the two bombsights. The SABS although potentially more accurate lacked the degree of tactical freedom afforded by the MkXlV/T1. As a result the MkXlV/T1 was known to Bomber Command as the 'area' bombsight of the RAF and the SABS as the 'precision sight.'

It was a much more complex sight to use and to maintain than the MkXlV/T1 and required more man-hours in manufacture. For the majority of the squadrons in Bomber Command the MkXlV/T1 was still the preferred sight.

A more controversial aspect was how the American, British and German sights compared. The Norden, the SABS and the German Lotfe 7D or H were all tachometric sights used in the sitting position Norden and Lotfe 7D/H both had direct connections into the automatic pilot systems. so that in the run up to the target the bomb-aimer effectively flew the aircraft without the intervention of the pilot. Work on a SABS Mk lll was cancelled in 1943 which may have had this facility.

The SABS Mk llA uses a simpler system in that was connected to an instrument called the Bombing Direction Indicator(BDI) which was mounted on the pilot's instrument panel. The BDI indicated to the pilot the amount of turn required left or right to bring the sight on to the target..

Using the Norden bombsight, USAAF bombardiers rarely matched the accuracy of those of 617 squadron, or even those of 9 Squadron when using their MkXlV. It could have been the greater proportion of time spent by 617 squadron practicing over the bombing ranges, and a higher standard of Air bomber..

Using tactics devised from pre-war experiments it was standard USAAF practice to fly over hostile territory in large tight formations relying upon the massed machine guns of the formation for defense. Only the bombing leader or his deputy would use their Norden bombsights with the remainder of the formation, dropping their bombs upon sight of the leader's weapons leaving the aircraft..

It was therefore not surprising that only 31% of American bombs would fall within a radius of 1000ft of the target. Further factors were thought to be due to inaccurate settings on their bombsights and higher than specified manufacturing tolerances.

RAF Aircrew veterans will recall the claims of the time that an American Bombardier using the Norden could drop a bomb into a 'pickle barrel from six miles up'. This was a myth but is still attached in some measure today, to the Norden bombsight; although oddly enough, not to the equivalent Sperry sight..

Fortunately the Luftwaffe lacked an effective bomber force to demonstrate the effectiveness of their Lotfe sight. Our German friends may be gratified to know that at one time earlier in the war the German Lotfe 7D sight was found to be so good, the suggestion was made to equip a RAF squadron with sights gathered from crashed aircraft. RAE Farnborough strongly objected to the suggestion and nothing more was heard of the proposal.

In contrast to the Americans many RAF aircrew and the British public remain unaware of the existence of the SABS bombsight. No articles dedicated to the sight appeared to have been published and it is rarely mentioned in books.

All bombsights mentioned in this article can still be found in many aviation museums; but examples of the SABS have not been preserved.

T1 Bombsights

The story begins on the 22nd December 1939 at a wartime conference to discuss bombsight policy. A request was made by Air Chief Marshal Sir Edgar Ludlow-Hewitt, Air Officer Commanding Bomber Command for a new bombsight. He stated that the existing bombsights in service or about to enter service, did not meet the requirements of his Command. He wanted a bombsight that did not require such a long run up to the target and gave his pilots an opportunity to engage in evasive action on the bombing run.

His remark may have been prompted by the fact that four days earlier, Wellingtons of his command took part in a disastrous raid upon shipping off Wilhemshaven in which twelve of the twenty two Bomber Command aircraft were shot down. This defeat was to have major consequences for the conduct of WW2 as a whole. It marked the time when night operations became the major policy of the RAF Bomber Command, the point when radar was first used to detect raiding RAF bombers attacking main land Germany and the birth of the Mk XlV bombsight.

Although later correspondence records the fact that the AOC did make the request during this meeting, the detailed minutes fail to record his request although the volunteering of Prof. Blackett to design a sight to meet his needs was noted. Other documents of the time refer to this request by Sir Edgar Hewitt and so the need for the highest security may have lead for its omission from the minutes.

Through the influence of others present at the meeting he quickly obtained laboratory and engineering facilities at Royal Aircraft Establishment, Farnborough where he could design and initially develop the new bombsight which he based upon the principles of the existing CSBS Mk lX bombsight.

Professor Blackett was an eminent physicist of the time and in his capacity as a scientific advisor to the Air Ministry was present at the meeting. He had volunteered to design a bombsight that would meet the requirements of A O C Bomber Command. Thus was born the Blackett Bombsight. From that day forward, the proposed bombsight had an enthusiastic reception from the RAF and Air Ministry officials before even the first prototype was built.

His new bombsight proved to be the significant improvement that RAF Bomber Command required. The proposal met in full the requirements of the A.O.C Bomber Command.

It was first known as the Blackett sight and later as the MkXlV. It is interesting to note that it was first described as a medium altitude stabilised bombsight to be used within the 5,000 to 10,000 feet range. Later, the maximum altitude for which the sight was designed was 20,000 ft and later still increased to 25,000 ft. The first prototype known as the Mk Xll, consisted of the sighting head only with a second member of the crew feeding data into the sight. This was declared undesirable and resulted in a computer cabinet being designed and built which allowed the sight to be operated by the bomb aimer only. This was designated the MkXlV.

When the concept of the MkXlV had been proved, Prof Blackett left the project team for other important work in Coastal Command. Dr H.J.J. Braddick took his place and was later nominated by Blackett as the co-inventor of the sight.

At an early stage in its trials at the Aeroplane and Armament Establishment, Boscombe Down; it became recognised as the first bombsight whether British, German or American which offered reasonable accuracy in conjunction with a wide degree of tactical freedom. The tachometric bombsights such as the ABS Mk2, the later SABS and the American Norden with their longer run-ups were preferably used at heights above 21,000 ft to reduce the risk from anti aircraft fire.., This height that time was above the maximum service ceilings of the new four engine bombers, the Halifax, Stirlings and Manchesters.

The searchlight and gunnery defences surrounding a vital German target were often sited to take advantage of the short period when the attacking bomber had to fly straight and level to use in order to use its sight to accurately bomb the target. The shorter the run up to the target, the less opportunity it gave the anti aircraft guns and searchlights to aim at the bomber.

The new bombsight was required to be manufactured in quantity to equip the new heavy and medium bombers in production for Bomber Command. It was unique in that it could be built using relatively lower grade labour than either the Norden or the British Automatic bombsights. Both these bombsights required a higher proportion of input from high grade instrument makers in their assembly and led to considerable delays in the production of the Norden. The redesign of the Norden for mass production resulted in the introduction of significant errors which eventually affected the performance of the sight in USAAF service.

The Mk XlV has another little known advantage over its predecessor the ABS Mk ll, in that its bulk was smaller and was less of an impediment to the view through the clear bombing panel by the prone bomb aimer. A clear view through this panel was also important as it was used for map reading. This problem was so serious that consideration was given to providing with each bomber an alternative nose section with the front turret omitted giving space for a larger bombing panel.

With the prototypes of the bombsight operating satisfactorily, the enthusiasm continued for its future use in Bomber Command. This contrasted with the reception of its predecessor, the Automatic Bombsight that was received with little optimism for its eventual success.

At an early stage in its development, steps had to be taken to provide large quantities of the sights to meet the expansion of Bomber Command. The decision was made therefore to sub-contract production of the MkXlV to the USA, which would be additional to the output of British companies and also gain access to a much larger pool of labour.

Sperry Gyroscope Company of USA were approached by the British Purchasing Commission in Washington. This company already had many years experience in manufacturing bombsights which now included the S-1 tachometric bombsight then in production for the USAAF. This bombsight was designed to supplement the production of the Norden, which at that time was in chronic short supply for aircraft of the US Navy and United States Army Air Force and the subject of much controversy between those services.

Mr Vose of Sperry Gyroscopes of America expressed considerable interest in the MkXlV sight. He claimed that his company would be able to redesign the sight for mass production and in so doing, enhance its performance. He stated that at that time his company had development staff immediately available to undertake this work now that their Sperry-0-1 had largely completed development. He

requested a set of drawings to be made available to his company with a sample bombsight being made available as soon as possible.

Before these drawings could be handed over the question of the patents involved had to be considered. Professor Blackett became involved once more with Dr Braddick. Dr Braddick of whom little is now known, had also played a leading part in the development of the SABS MllA and also the cancelled SABS Mklll. This former sight was in final stages of development around about the same time. Although manufactured in small quantities, (less than 1,000) it was used very successfully by 617 Squadron in its precision bombing. It was a further development of the generally unpopular Automatic Bombsight.

Mr Vose of Sperry, in making his case for the manufacture under license of the MkXlV optimistically implied that the USAAF would be interested in acquiring the bombsight for use on some of its types of bombers. Later an old Hudson was indeed equipped with a Mk XlV/T1 but the USAAF rejected it because of the requirement to set manually, a wind speed and direction and for lack of connection to the aircraft through the automatic pilot. These requirements were a feature of the Norden and Sperry bombsights.

The decision was made to subcontract the manufacture the Mk XlV to Sperrys where the American version would be known as the T1 bombsight.

When the initial development work had been completed by Sperrys they in turn subcontracted the work to A.C Spark Plug Company at their Flint plant in Michigan. This company was a division of General Motors.

This decision was probably due to the pressure on their Sperry USA factories in producing a large number of vital products for the American expansion of their own armed services.

Throughout the contract, Sperry production engineers supervised the production at the A.C Spark Plug plant. Some components such as the gyros were supplied ready to install by Sperrys

The section of industrial history which deals with the development and production of equipment for the armed services of any nation is very rarely recorded in any detail; company archives rarely survive for more than a few years and are often not available to the historian. The A.C. Sparkplug Company of Flint, Michigan was no exception to this rule and the author has been very fortunate in being contacted by Mr George A. Krepps in the USA who was an executive at the plant in WW2 throughout the period of the contract. His job was to supervise the quality control functions relative to subcontracted incoming sub-assemblies, final sight assembly and final test. His detailed recollections provide the basis for this article.

The plant provided at that time a number of products to the aircraft manufacturers and government defence departments such as sub- assemblies for the Sperry S-1 Tachometric bombsight. They were also building gun sights for fighter and bomber aircraft that were based upon British designs subcontracted to the Americans. There were also, of course, millions of spark plugs produced for use in both civilian and military internal combustion engines.

The RAF Air Staff in agreeing to these arrangements hoped that the American bombers produced in the USA would arrive in Britain with the MkXlV/T1 already in installed in their bombers.

Work on preparing the bombsight for mass production started in May 1942 with the first T1 being ready for test in November that year.

Initially, Sperry provided three production engineers to work with A.C. Spark Plug engineers in the reworking of the drawings so as to break the bombsight and sighting head mechanisms into sub-assemblies. They suggested improved production methods and provided the criteria to be used. Sperry took steps to ensure that test procedures and equipment met Sperry standards by the training of staff and supervisors.

Changes were made in the overall design of the computer cabinet to reduce the number of manufacturing operations required. The tubular frame which surrounded the computer cabinet was modified to reduce the amount of welding necessary.. All threads used on components were changed to American standard threads. Die castings were extensively used where ever possible in the sub-assemblies. Sintered oilite sleeve bearings replaced ball bearings. The higher standard machine and cutting tools available to the Americans further improved the output.

When it appeared to Sperrys that A.C. Spark Plug had the contracts under control, they arranged with the British Purchasing Commission in Washington to place further orders directly with A.C Spark Plug.

The twelve main sub- assemblies were manufactured by 12-15 sub-contractors of diverse backgrounds such as the manufacturers of pinball machines, cameras, typewriters, and thermostats. A high proportion of female labour was employed, reaching 80%. With so many diverse sub-contractors involved, careful inspection procedures had to be put in place by Sperry. In particular, inspection procedures had to ensure the correct alignment of the sub-assemblies prior to final assembly at the Flint Plant.

At the Flint plant, an assembly line was installed from incoming post inspection stores with a ‘line drop’ at each assembly station for fitting the scheduled assemblies.

The final testing of the completed units was carried out in five vacuum chambers approximately 900 x 1200x 900 mm. In these chambers could be simulated the bombing operation with climb, glide, air speed and cross wind direction. Shaft outputs for the sighting heads were also recorded. The bombsight was tested at 1000 ft levels to 20,000 ft.

The sighting head final test comprised mounting the head on an elevated platform to about 2.4 m above floor level. The input into the sighting head from the computer cabinet was simulated together with specified limits of roll. The performances of both sighting head and computer cabinets were checked to meet the specification. The figures were recorded on charts supplied with each computer cabinet. After final testing the finished computer cabinet or sighting head was mounted in a steel cabinet ready for dispatch.

In August 1943 Sperry published a technical manual describing in considerable detail the T1 bombsight which is now in the possession of the author. The manual recorded the design at that one point in time; when the gyros were air suction driven. In 1944, and from Serial No 18,000, Sperry electrically driven units replaced the air suction gyros. These were used in all succeeding developments of the T1.

The manual states that separate versions were produced were as follows;

1590649 Blenheim and Wellington
1593745 B 24D-Liberator
1593175 B25C & B 25D-Mitchell

In this early manual, apart from a line drawing of a single Lancaster there were no references to the Halifax, Lancaster, Manchester or Stirlings heavy bombers, yet these aircraft were to be the principal bombers of Bomber Command. There is a mystery surrounding this statement, as I am assured by George Krepps that A.C Spark Plug produced in August 1944 one model only of the bombsight. Thus technical centres in USA and UK would have set up the bombsight to suit the flying characteristics of aircraft designated to use it.

A final version of the bombsight was developed to cater for all aircraft that was designated to receive this instrument. A set of loose cams were added to each sight produced which included a dedicated cam for each type of aircraft to using the T1 bombsight. The dedicated cam automatically set into the bombsight the flying characteristics of the aircraft

No attempt was made to pair up a sighting head with a particular computer cabinet. These were to remain completely interchangeable with the corresponding British units as manufactured in Britain. In fact, an RAF bomber aircraft may well have had a T1 computer cabinet, operating quite effectively without loss of accuracy, with a Mk XlV sighting head or vice-versa.

An astonishing total of 23,450 T1 bomb sights were produced at the Michigan plant over the period of November 1942 until June/July 1945. When the factory was fully operational, the output reached about 54 completed bombsights per day, using two shifts of workers eight hours per day in a six day week.. From a pre-war figure of 5,000 employees at A.C. Spark Plug the total size of the operation grew to 20,000.

Further development of the MkXlV sight in Britain appears to have been based on the T1 series of bombsights rather than the British version. Towards the end of the war bomber aircraft were flying higher and so the bombsight design had to be modified to allow for this change. In December 1944 the T1A and B versions were produced. These bombsights had a similar speed range but the effective height range was increased to 25,000 ft.The maximum climb the sight could measure had been increased from 5° to 11° and 12° respectively for yet another version. The T2 and T4 sights were developed and manufactured in Britain after the war for later aircraft and often installed in conjunction with radar devices. With the T2 the effective height range was increased to 600-25,000 ft, a speed range of 150-350 knots and a wind speed of 90 knots. The higher wind speed was to allow for the jet stream at greater heights.

It now seems that MkXlV was the name universally used by RAF and Commonwealth Air Bombers for the bomb sight and most were unaware of the T1 version. However, the version most readily found today in museums and in private collections will be that of the T1 and its derivatives.

During the time the contract was executed it appears there was no record of a visit to the factory by RAF representatives to demonstrate the considerable operational value of the T1 to the Allied War effort. This was an omission that was regrettable. However in August 1943 Mr George Mann visited the UK for a period of about a year liasing on behalf of A.C Spark Plug with RAE Farnborough, Boscombe Down, and the Ministry of Aircraft Production. He also toured unnamed British factories manufacturing MkXlV bombsights.

When the contracts were completed George Krepps continued his association in 1953 with bombsights by working on the Bombing and Navigational Systems for the American B52 bomber.

The author would like to place on record his appreciation of Mr Geoge Krepps in providing extensive information in the manufacture of the T1 version of the bombsight in the USA and to Mr D.W. Allen in granting access to his unpublished autobiography notes on his part in the development of the Mk XlV

bomb sight at RAE Farnborough in 1941

References:

AVIA15-122, AVIA15-123, D.W. Allen, Unpublished Biographical Notes